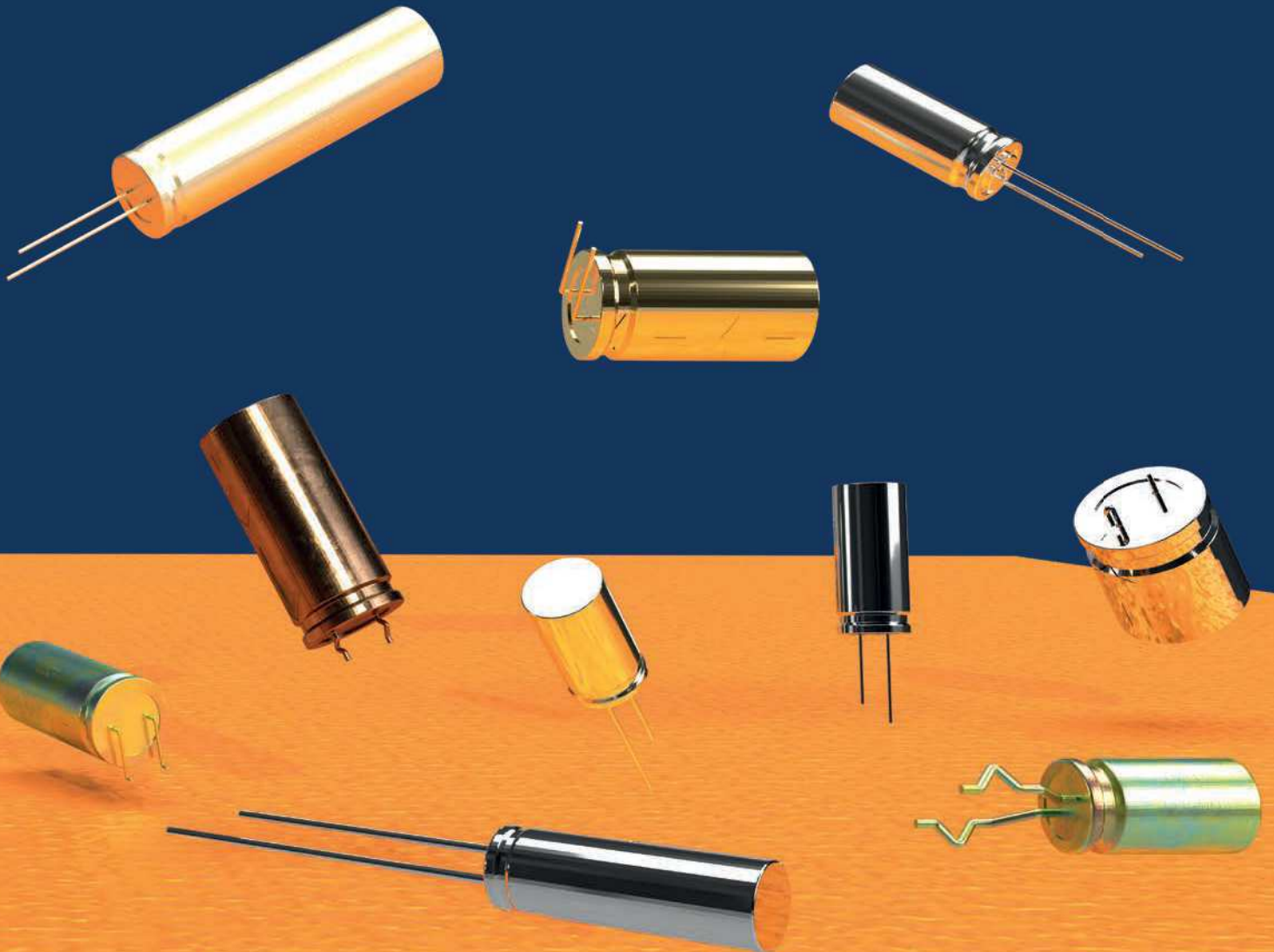


CAPXON

ELECTROLYTIC CAPACITORS

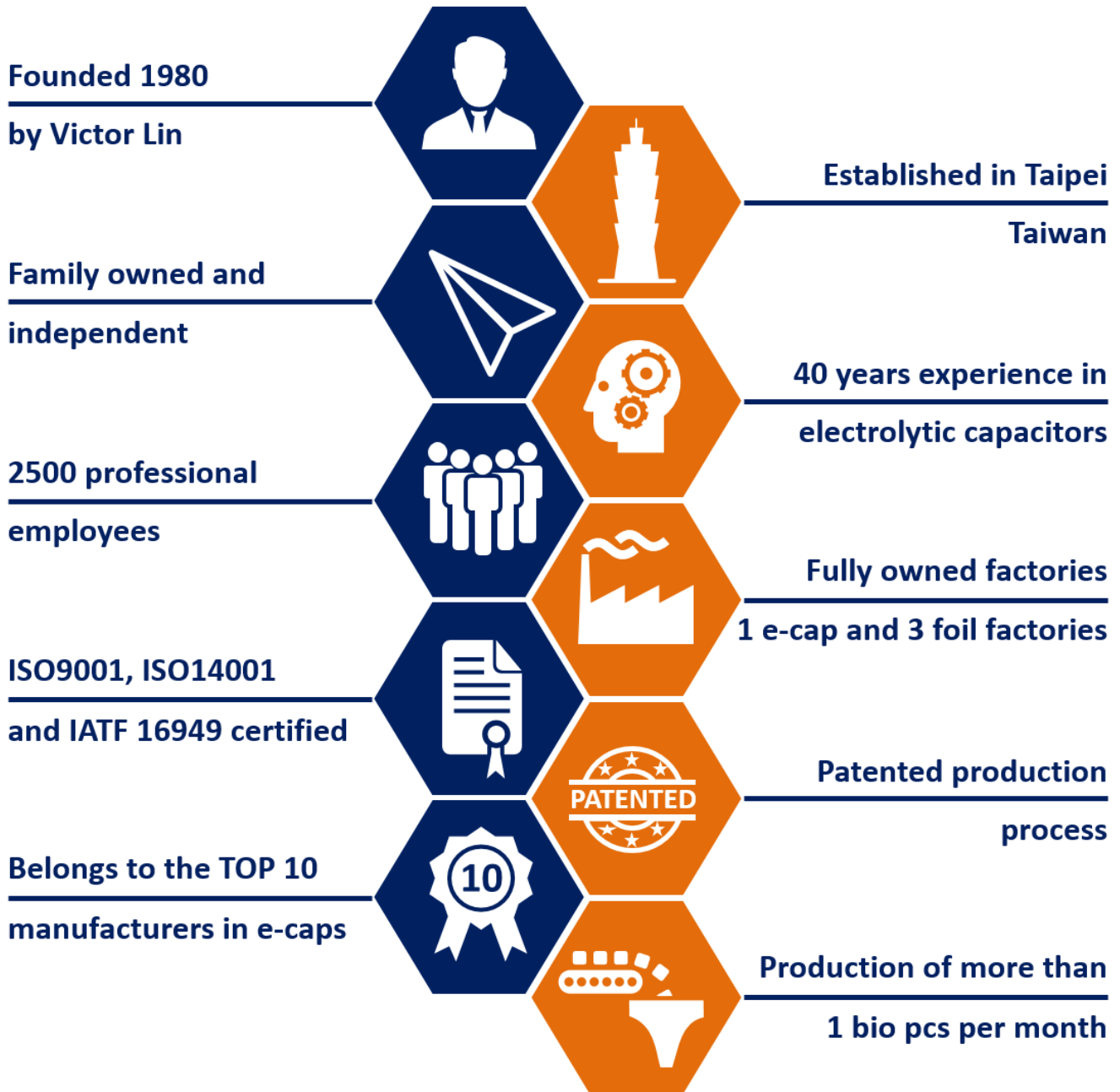
RADIAL TYPE CAPACITORS
(Liquid Electrolyte)



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10 FACTS ABOUT CAPXON



A WORLD OF ELECTROLYTIC CAPACITORS

CapXon's know-how in Electrolytic Capacitors covers technologies with aluminium foil. These are Aluminum Electrolytics, Solid Conductive Polymers and the combination known as Hybrid Conductive Polymers:

Aluminum Electrolytic	Description	Features
	<p>Rated Voltage • V_R</p> <p>Cathode Material</p> <p>Self-healing of Dielectric</p> <p>Package</p> <p>Stability</p> <p>Lifetime</p> <p>Reliability</p>	<p>4 VDC to 650 VDC</p> <p>Liquid Electrolyte</p> <p>Yes</p> <p>Widest range in all sizes</p> <p>Reduced performance at low temperature</p> <p>Limited life at high temperature</p> <p>Automotive AEC-Q200 qualified</p>
Solid Conductive Polymer	Description	Features
	<p>Rated Voltage • V_R</p> <p>Cathode Material</p> <p>Self-Healing of Dielectric</p> <p>ESR</p> <p>Stability</p> <p>Lifetime</p> <p>Reliability</p>	<p>2.5 VDC to 100 VDC</p> <p>Solid Conductive Polymer</p> <p>No</p> <p>Ultra-low ESR at high frequency</p> <p>Stable for low and high temperature</p> <p>Very stable and long life - no dry out</p> <p>Only internal standard qualification</p>
Hybrid Conductive Polymer	Description	Features
	<p>Rated Voltage • V_R</p> <p>Cathode Material</p> <p>Self-Healing of Dielectric</p> <p>ESR</p> <p>Stability</p> <p>Leakage Current • I_{LEAK}</p> <p>Reliability</p>	<p>16 VDC to 400 VDC</p> <p>Solid Conductive Polymer & Liquid Electrolyte</p> <p>Yes</p> <p>Very low ESR at high frequency</p> <p>Even more stable than liquid type</p> <p>Lower leakage current than Solid Conductive Polymer Type</p> <p>Automotive AEC-Q200 qualified</p>

COMPARISON OF ELECTROLYTIC CAPACITOR TECHNOLOGIES

Characteristics	Aluminum Electrolytic Capacitor	Solid Conductive Polymer Capacitor	Hybrid Conductive Polymer Capacitor
ESR at High Frequency	● (120 ~ 1 000 mΩ)	++ (7 ~ 15 mΩ)	+ (20 ~ 30 mΩ)
Leakage Current · I _{LEAK}	++ (0.01·C _R ·V _R)	● (0.2·C _R ·V _R)	++ (0.01·C _R ·V _R)
Ripple Current · I _R	● (~ 600 mA)	++ (2 000 ~ 7 000 mA)	+ (2 000 ~ 3 000 mA)
Rated Voltage · V _R	++ (~ 700 V)	● (~ 100 V)	+ (~ 400 V)
Operating Temperature Characteristics	+ (-40 ~ + 125 °C)	+ (-55 ~ + 125 °C)	++ (-55 ~ + 150 °C)
Low Temperature Characteristics	● (-40 ~ + 125 °C)	++ (-55 ~ + 125 °C)	+ (-55 ~ + 150 °C)
Lifetime	● (105 °C / 3 000h)	++ (105 °C / 5 000h)	++ (105 °C / 10 000h)
Failure Mode	+ Open	● Short	+ Open

++ ... best performance

+ ... well performance

● ... basic performance

CERTIFICATION ACCORDING TO INTERNATIONAL STANDARDS

Quality, the environment, safety, and conservation of resources are the focus of our daily added value.

To meet the high requirements in the electronics industry, CapXon, as a global company, is certified according to the highest international standards. In this way, we ensure that all procedures and processes in our company are always structured and continuously optimized based on the valid and defined requirements.

CapXon is certified according to the following standards:



ISO 9001



ISO 14001



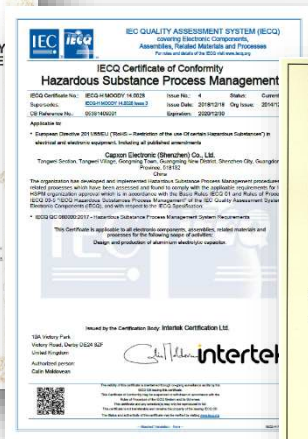
IATF 16949



ISO 50001



OHSAS 18001



OC 080000



China RoHS



ISO/IEC 17025

SMART PRODUCTION

Since 1980 CapXon focuses on research, development and manufacturing of Aluminum Electrolytic Capacitors and is a leading brand with its own capacitor production in Shenzhen and its own foil production in Yichang, Qinghai and Baotou. 40 years of experience give us a deep understanding of foil material, high performance electrolytes, advance lead wire technology, conductive polymer and electrochemical systems.

Precision equipment ensures the quality of key components



Capacitor production for all core technologies as Aluminium Electrolytic, Solid Conductive and Hybrid Conductive Polymer capacitors with R&D and Quality headquarters in Shenzhen

Development of our own production process and machinery with the highest grade of automated production equipment and software



ADVANCED TECHNOLOGY

Only with the best production equipment and well-trained staff is it possible to maintain and expand the market position. Every year CapXon invests very large sums in machine, software and the education for our more than 2500 employees. To recognize deviation immediately during the production process, CapXon uses various precise inspection equipment.

All productions are qualified with strict specifications and every operation is monitored and measured at the machine



The products and the production meet the requirements of all industries even Medical or Automotive

Automated and full controlled manufacturing process



NEW RESEARCH

Highly roughened and formed anode foils are the heart of every Aluminum Electrolytic Capacitor. CapXon has been conducting intensive research and development for decades to bring low-voltage and high-voltage films into new spheres and at the same time to optimize processability and durability. The electrolytes and conductive polymers used on the cathode side are subject to a continuous improvement process, taking commercial and technical aspects into account.

Electrolyte and polymer development to achieve maximum product reliability and a long life



High grade etching foil, high grade forming foil through consistent further development to the limit of what is technically feasible

Well-equipped ISO/IEC 17025: 2005 accredited laboratories for research, analysis and testing



COMPONENT RELIABILITY DATA

In this section, the main parameters for predictive reliability and availability calculations are explained and in which way CapXon can provide you with such data.

FAILURE RATE λ

The failure rate λ describes the frequency which components possibly fail. The failure rate describes how many defects can be expected, if you run the application in operation for a certain time.

The failure rate can be calculated as following:

$$(1) \quad \lambda = \frac{n}{N \cdot t}$$

n ... Number of defect components

N ... Number of tested components

t ... Amount of operating hours

FAILURE CRITERIA

Capacitors will show certain wear-out phenomenon's by aging and so as times goes by the capacitors can possibly change their electrical performance.

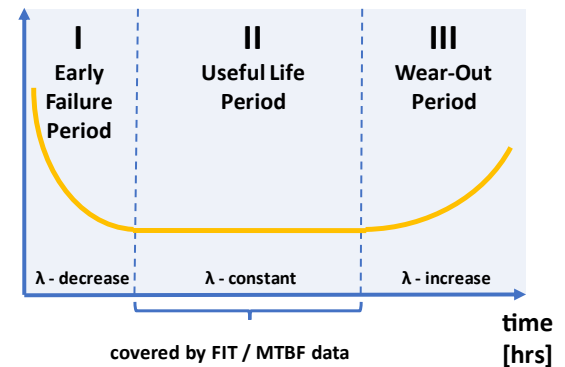
As soon as the component is no longer fulfilling their electrical spec, stated features or with customer agreed parameters, the status of capacitor is seen as in failure mode or defect. This does not necessarily mean that the application will fail. An essential influence are the design and dimensioning by customer, which lead to major impact on possible failure modes and fail criteria for the application itself.

All given data by CapXon is just concerning the failure mode cases of the single component and is not representing the complexity of complete applications, assembled systems nor full electronic PCB boards.

BATHTUB CURVE

It's a widely used model within the reliability engineering to describe the expected failure rates over the whole application lifetime / product life cycle.

λ - Failure Rate



Bathtub curve

The Bathtub Curve states the failure rate behaviour within the three different product life cycle stages. These are the Early Failure Period, the Useful Life Period and the Wear Out Period.

With production control, monitoring and quality assurance, it is possible to reduce the early failures to a best possible minimum.

Failures within the Useful Life Period, which are described as FIT or MTBF value, are defined as events of coincidence and are not representing any systematic or epidemic failures.

FIT – FAILURES IN TIME

FIT - Failures In Time is the common way to describe the expected failure rate for electronics.

The FIT values describe certain failure rate within the useful life period and provides the basis for calculations, assumptions and extrapolation of reliability and availability to gather the understanding for expected failures / defects. These calculated figures are used to decide whether the component is a proper choice for the desired use case. Additionally, it need to be clarified whether redundancies are necessary and which redundancies are needed to fulfil the desired mission profile of an application.

The unit FIT defines the expected amount of failures per application hour.

$$(2) \quad 1 \text{ FIT} = \frac{10^{-9}}{h} = \frac{10^{-9} \text{ failures}}{\text{per operating hour}}$$

So as higher the stated FIT value is, as higher the statistical chance of defect is.

Please find the following example of a failure rate test determined by a useful life test:

- Number of failures $n = 2$
- Number of tested components $N = 10\ 000$
- Operating hours $t = 20\ 000\ h$

$$(3) \quad \lambda = \frac{n}{N \cdot t} = \frac{2}{10\ 000 \cdot 20\ 000\ h} = 10\ FIT$$

$$(4) \quad 10\ FIT = \frac{10^{-8}}{h} = \frac{0.001\%}{1\ 000\ h}$$

MTBF - MEANTIME BETWEEN FAILURES

It's the predicted elapsed time between inherent failures of an electronic system during normal operation. The MTBF can be calculated as arithmetic mean / average time between failures of a system.

Assuming a constant failure rate, the MTBF can be easily calculated by reciprocal value of the Failure Rate λ :

$$(5) \quad MTBF = \frac{1}{\lambda}$$

MTBF is just a different way to describe the failure rate and can be easily converted to FIT and vice versa:

$$(6) \quad MTBF = \frac{10^9\ h}{FIT} = \frac{114\ 000\ years}{FIT}$$

$$(7) \quad FIT = \frac{10^9\ h}{MTBF} = \frac{114\ 000\ years}{MTBF}$$

The **MTBF** values are just covering the useful life period (flat middle section) of the bathtub curve. Because of this, a FIT or MTBF value can't be extrapolated to estimate the service lifetime for a component. FIT or MTBF values doesn't cover the higher failure rates of the wear-out period, where the expected failure rate would be higher due to occurring wear-out phenomenon's.

LIFETIME TESTS

Due to the fact that all electrolytic capacitors show aging behaviour and a possible drift of electrical parameters over usage time, lifetime tests are performed by manufacturers to describe the related reliability and performance of a certain capacitor. Different product series as well as the single product itself can provide very different lifetime performance. So, these test results are given to select the proper product in relation to the applied stress profile of application to gain the desired application performance within the whole product life cycle.

There are various names (e.g. Endurance, Load Life, Useful Life, Operational Life, Life Expectancy, Shelf Life, ...) and different lifetime tests that are existing within the industry. Please kindly check the specific test specification and given data for the capacitor before design-in.

Sadly, there is no standardized naming and test criteria existing, given by any international accepted standard committee for all the lifetime tests, which are applied to electrolytic capacitors. Customers need to compare competitor products carefully with each other to see if test specifications are similar or different.

Please see particular datasheets for the specific test results and criteria of an individual product of CapXon.

Again, please note that the criteria of failure are given by the test specification limits of the dedicated lifetime test and as soon as a component is not fulfilling these given limits, it is rated as a failure. So, failure does not necessarily mean defect or breakdown of application. It is just describing that the drift of electrical performance is bigger than the checked limits of the particular test. It doesn't matter whether the measured C value is lower as the allowed test limit or the component is in a failure mode of open circuit, both cases are treated the same as a failure. Design and dimensioning of application will arrange how much drift of electrical parameters can be accepted for the individual capacitor. For example, when the rate of capacitance change is becoming critical within the application is defined by customer design. The lifetime tests are in place to provide a common and industry-wide comparable performance index of the capacitors.

As manufacturer, we can state and check how fast a drift of capacitance and further parameters will happen. Dimensioning within application design will set how long an error-free operation is possible. A proper dimensioning can enlarge the acceptable drift and so the lifetime performance. But be aware, if it is not done properly or component is overstressed, it also can shorten the expected lifetime performance. Please be aware to check dimensioning and drift estimation to assure your product performance for the desired lifetime. For support with lifetime estimations and dimensioning, we are pleased to support you and feel free to get in touch with our technical support.

In the following section CapXon's lifetime tests, which are performed with our products, are described in detail.

ENDURANCE

The Endurance test of the product checks the performance of its electrical parameters, such as capacitance change, leakage current and dissipation factor on their behaviour over time at a predetermined test setup of electrical stress and ambient condition.

Depending on the product series, the Endurance test is performed according to one of the settings below:

Setting 1 - applying Endurance test:

- max. Temperature
- V_R - Rated Voltage

Setting 2 - applying Endurance test:

- max. Temperature
- V_R - Rated Voltage
- I_R - Rated Ripple

Setting 1 is in accordance to the IEC 60364-4 / JIS 51001-4 test criteria and Setting 2 is enlarging the electrical stress setup with additional appliance of I_R , to get a more representative result in comparison to possible real-life application stress.

The Endurance test is performed within product qualification at the stage of internal product validation and is repeated periodically for product requalification.

USEFUL LIFE

To get more representative understanding of lifetime performance for typical capacitor use, the useful life test represents such criteria.

The applied electrical stress is like the Endurance test - Setting 2. The test specification limits are wider as the endurance test specification, but as described the applied electrical stress stays similar. So, a larger acceptable drift of electrical parameters results in a larger expected lifetime. This represents the operational frame which is set by customer at dimensioning the capacitor specification for their application and the possible borders of an error-free operation.

Also, we state a FIT value related to the useful life test. These failure rate describes the deviation / possibility of occurrence of failures within the useful life period when the settings of useful life test are applied. This is related to the middle section of the bathtub curve the so-called useful life period (see above page 12 - Bathtub Curve of Product Reliability).

In the datasheet you will find the following phrase:

Failure Rate (during useful Life): 1%/1 000h with a confidence level of 60%. As a result, this is like a 10 000 FIT:

$$\lambda = \frac{1\%}{h} = 10\,000 \text{ FIT} = 10\,000 \text{ failures} * 10^{-9h}$$

Example:

If you have 8 000 components running in applications for 5 000 hours with the test conditions applied like the useful life test, you can estimate the number of components that show a higher drift as given by the useful life test spec borders as follows:

- Number of components $N = 8\,000$
- Operating hours $t = 5\,000 \text{ h}$

$$\lambda = \frac{n}{N * t}$$

$$n = \lambda * N * t = \frac{1\%}{1\,000h} * 8\,000 * 5\,000h = 400$$

This means that when there are 8 000 pcs in operation for 5 000 hours at the maximum possible operating conditions (max. temp., V_R & I_R similar to useful life test criteria) an amount of 400 products (with a confidence level of 60%) can be expected to show a higher drift as given in the test spec.

SHELF LIFE

The shelf life test simulates the aging of the capacitor, if it is just stressed with ambient temperature without any electrical load. The shelf life is not defining the possible storage time of the capacitor but just to describe the aging situation before mounting / PCB assembly.

The Shelf Life test criteria shall be satisfied, if the capacitor was restored to 20°C and following a conditioning by voltage treatment in accordance with 4.1 of JIS 5101-4 was applied, before measuring the capacitor.

LIFETIME TEST EXAMPLES

Example 1 - Useful Life, Endurance (Setting 1) and Shelf life tests of SMD types – HV Series:

Lifetime Test		
Endurance 105°C (V _a applied)	Test	2000 hours
	ΔC/C	≤ ±30% of initial measured value
	tanδ	≤ 300% of initial specified value
	I _{leak}	≤ the initial specified value
Shelf Life 105°C (None)	Test	1000 hours
	ΔC/C	≤ ±30% of initial measured value
	tanδ	≤ 300% of initial specified value
	I _{leak}	≤ the initial specified value
Resistance to Soldering Heat	The capacitors shall be kept on a hot plate maintained at 250°C for 30 seconds. After removing from the hot plate and restored at room temperature, they meet the characteristic requirements listed below	
	ΔC/C	Within ±10% of initial value
	tanδ	Less than specified value
	I _{leak}	Less than specified value

Example 2 - of Useful Life, Endurance (Setting 2) and Shelf life tests of Radial types – GF Series

Lifetime Test			
Endurance 105°C (V _a & I _a applied)	Test	2000 hours	ø D 5 ~ 6.3 mm
		3000 hours	ø D 8 mm
		5000 hours	ø D ≥ 10 mm
	ΔC/C	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
Shelf Life 105°C (None)	Test	1000 hours	
		ΔC/C ≤ ±20% of initial measured value	
		tanδ ≤ 200% of initial specified value	
		I _{leak} ≤ the initial specified value	

Example 3 - of Useful Life, Endurance (Setting 2) and Shelf life tests of Snap In types – HU Series:

Lifetime Test		V _a ≤ 100V		V _a > 100V	
		Test		Test	
Useful Life 105°C (V _a & I _a applied)	Test	5000 hours		8000 hours	
	ΔC/C	≤ ±30% of initial measured value		≤ ±20% of initial measured value	
	tanδ	≤ 300% of initial specified value		≤ 200% of initial specified value	
	I _{leak}	≤ the initial specified value		≤ the initial specified value	
Endurance 105°C (V _a applied)	Test	3000 hours			
	ΔC/C	≤ ±15% of initial measured value		≤ ±10% of initial measured value	
	tanδ	≤ 130% of initial specified value		≤ 130% of initial specified value	
	I _{leak}	≤ the initial specified value		≤ the initial specified value	
Shelf Life 105°C (None)	Test	1000 hours			
	ΔC/C	≤ ±15% of initial measured value		≤ ±10% of initial measured value	
	tanδ	≤ 130% of initial specified value		≤ 130% of initial specified value	
	I _{leak}	≤ the initial specified value		≤ the initial specified value	

Example 4 - Useful Life, Endurance (Setting 2) and Shelf life tests of Screw types – RK Series:

Lifetime Test		
Useful Life 105°C (V _a & I _a applied)	Test	4000 hours
	ΔC/C	≤ ±45% of initial measured value
	tanδ	≤ 300% of initial specified value
	I _{leak}	≤ the initial specified value
Endurance 105°C (V _a applied)	Test	2000 hours
	ΔC/C	≤ ±15% of initial measured value
	tanδ	≤ 130% of initial specified value
	I _{leak}	≤ the initial specified value
Shelf Life 105°C (None)	Test	1000 hours
	ΔC/C	≤ ±15% of initial measured value
	tanδ	≤ 130% of initial specified value
	I _{leak}	≤ the initial specified value

TELCORDIA SR-332

This industry-wide accepted standard provides data and tools for reliability predictions of components, devices or full hardware units of electronic equipment. Telcordia (for-

merly Bellcore). With the given figures and data, it is possible to assure system availability and to gather the desired system reliability.

FIT & MTBF DATA OF CAPXON PRODUCTS

CapXon provides FIT & MTBF values based on Telcordia SR332 standard for all components. From our perspective, it provides more reliable prediction because it is more specific and detailed than MIL-217 or Siemens SN 29500.

Please find the FIT values for CapXon components and application-based reliability prediction calculations on the following page.

The table of SMD / RADIAL / Snap-In is covering all Electrolytic Technologies – Liquid, Solid and Hybrid Electrolytic Capacitors in SMD & Radial.

The table of Screw capacitors is just concerning Liquid Aluminum Electrolytic Capacitors.

Mounting Type	SMD / Radial / Snap-In					
	100%		75%		50%	
Electrical Stress						
Operating Temp. [°C]	λ [FIT]	σ [FIT]	λ [FIT]	σ [FIT]	λ [FIT]	σ [FIT]
≤ 30	1,19	0,28	0,65	0,15	0,36	0,08
35	1,52	0,35	0,84	0,19	0,46	0,11
40	1,94	0,45	1,06	0,25	0,58	0,14
45	2,45	0,57	1,34	0,31	0,74	0,17
50	3,07	0,71	1,68	0,39	0,92	0,22
55	3,82	0,89	2,10	0,49	1,15	0,27
60	4,72	1,10	2,59	0,60	1,42	0,33
65	5,80	1,35	3,19	0,74	1,75	0,41
70	7,09	1,65	3,89	0,91	2,14	0,50
75	8,61	2,01	4,73	1,10	2,59	0,60
80	10,40	2,42	5,71	1,33	3,13	0,73
85	12,50	2,91	6,86	1,60	3,76	0,88
90	14,94	3,48	8,20	1,91	4,50	1,05
95	17,78	4,14	9,76	2,27	5,35	1,25
100	21,05	4,90	11,55	2,69	6,34	1,48
105	24,82	5,78	13,62	3,17	7,47	1,74
110	29,13	6,78	15,99	3,72	8,77	2,04
115	34,05	7,93	18,69	4,35	10,26	2,39
120	39,65	9,23	21,76	5,07	11,94	2,78
125	45,99	10,71	25,24	5,88	13,85	3,23
130	53,15	12,38	29,17	6,79	16,01	3,73
135	61,20	14,25	33,59	7,82	18,43	4,29
140	70,24	16,36	38,55	8,98	21,15	4,93
145	80,34	18,71	44,09	10,27	24,20	5,64
150	91,60	21,33	50,27	11,71	27,59	6,43

Table 1: FIT values for SMD, Radial, Snap-In

Remark: Above values are only valid within the max. specified temperature range of the particular component. All given FIT data is meant for lifetime predictions only and is not representing any warranty.

For particular products (e.g. screw capacitors) within the datasheet, further FIT or MTBF data is added and in such a case, this substitutes the general information stated above.

Mounting Type	Screw terminal					
	100%		75%		50%	
Electrical Stress						
Operating Temp. [°C]	λ [FIT]	σ [FIT]	λ [FIT]	σ [FIT]	λ [FIT]	σ [FIT]
≤ 30	34,20	24,43	18,77	13,40	10,30	7,36
35	43,85	31,32	24,06	17,19	13,21	9,43
40	55,78	39,84	30,61	21,87	16,80	12,00
45	70,42	50,30	38,65	27,61	21,21	15,15
50	88,27	63,05	48,44	34,60	26,59	18,99
55	109,88	78,48	60,30	43,07	33,09	23,64
60	135,88	97,06	74,57	53,27	40,93	29,23
65	166,99	119,28	91,65	65,46	50,30	35,93
70	203,99	145,71	111,95	79,97	61,44	43,89
75	247,76	176,97	135,97	97,12	74,62	53,30
80	299,26	213,76	164,24	117,31	90,14	64,38
85	359,57	256,84	197,34	140,96	108,30	77,36
90	429,86	307,04	235,91	168,51	129,47	92,48
95	511,39	365,28	280,66	200,47	154,03	110,02
100	605,57	432,55	332,34	237,39	182,39	130,28
105	713,89	509,92	391,79	279,85	215,02	153,59

Table 2: FIT values for Screw types

λ - Mean Component Failure Rate

σ - Standard Deviation of Component Failure Rate

CALCULATION OF FIT VALUE FOR APPLICATION CASE

By using the given Telcordia SR-332 figures and by the assumption that the failure rate follows a gamma distribution, the FIT value can be calculated with given mean λ and standard deviation σ (see section tables in section 8.8) and desired UCL - Upper Confidence Level as follows:

$$\text{shape } \kappa = \left(\frac{\lambda}{\sigma} \right)^2$$

$$\text{scale } \theta = \frac{\sigma^2}{\lambda}$$

The desired FIT value for the application case is the P% quantile of the gamma distribution and it can be calculated by the inverse cumulative gamma distribution with the shape κ and scale θ parameters as follows:

$$\lambda_{P\%UCL} = G^{-1}(P/100; \kappa; \theta)$$

If the shape κ parameter is >100 the FIT can also be calculated by using the P% quantile of the normal distribution, by inverse cumulative distribution of normal distribution with mean λ and standard deviation σ :

$$\lambda_{P\%UCL} = N^{-1}(P/100; \lambda; \sigma)$$

Customer need to define which UCL is desired for the reliability prediction for their application case (typical values for UCL are e.g. 60%,90%, 95%, 99%).

CALCULATION EXAMPLE

Example 1:

GF Series – Radial type
Aluminum Electrolytic Capacitor

@ 70°C and 75% electrical stress
Upper Confidence Level (UCL) = 90%

Values according to table 1 at page 16:

$\lambda = 3.89$ FIT / $\sigma = 0.91$ FIT

$$\text{shape } \kappa = \left(\frac{3.89}{0.91} \right)^2 = 18.27$$

$$\text{scale } \theta = \frac{0.91^2}{3.89} = 0.21$$

$$\lambda_{90\%UCL} = G^{-1}(90/100; 18.27; 0.21) = 5.02 \text{ FIT}$$

In Microsoft Excel you can solve this with the following formula:

International / American Excel Version:
=GAMMAINV(0.9,18.27,0.21)

European Excel Version:
=GAMMAINV(0,9;18,27;0,21)

Example 2:

RG Series - Screw type
Aluminum Electrolytic Capacitor

@ 60°C and 75% electrical stress
Upper Confidence Level (UCL) = 90%

Values according to table 2 at page 16:

$\lambda = 74.57$ FIT / $\sigma = 53,27$ FIT

$$\text{shape } \kappa = \left(\frac{74.57}{53.27} \right)^2 = 2.01$$

$$\text{scale } \theta = \frac{0.91^2}{3.89} = 38.05 \text{ FIT}$$

$$\lambda_{90\%UCL} = G^{-1}(90/100; 2.01; 38.05) = 148.57 \text{ FIT}$$

In Microsoft Excel you can solve this with the following formula:

International / American Excel Version:
=GAMMAINV(0.9,2,01,38,05)

European Excel Version:
=GAMMAINV(0,9;2,01;38,05)

QUALITY MANAGEMENT SYSTEM

We are committed and living the principle of **QUALITY FIRST - to offer highly satisfying products and service to the customer**. This global aim is shared by the CapXon quality and environmental management system and part of our business philosophy:

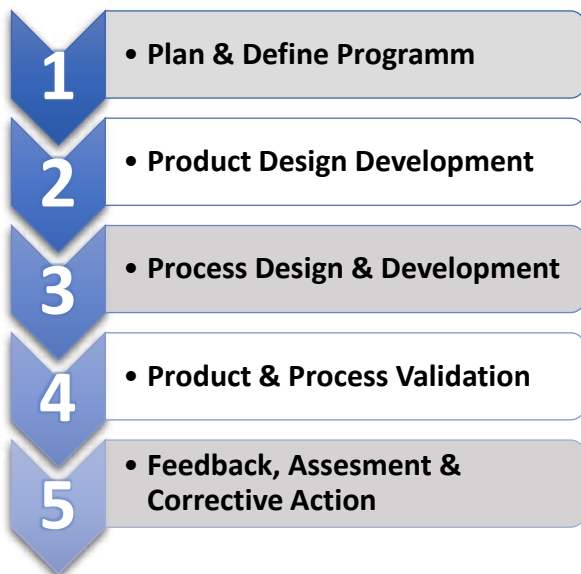
QUALITY MANAGEMENT SYSTEM CERTIFICATION

In accordance with our quality commitment, CapXon quality management is certified by **ISO 9001** and **IATF 16949**. The certification covers our production plants as well as our sales organization. This standard is applied throughout the company and is used to implement, monitor and to proceed the CapXon quality policy in all process steps.

PRODUCT AND PROCESS QUALITY

Our product and process development follows the sequence and phases of **APQP – Advance Product Quality Planning**:

5 Phases of APQP



Quality tools such quality tools, including **5S, PDCA, FMEA, (DFMEA & PFMEA), MSA, APQP, PPAP, SPC** and others, are in place to minimize risks, provide constant monitoring and ensure continuous improvements in conjunction with regular internal audits and QM reviews.

QUALITY ASSURANCE

For our sample checks, we refer to **AQL - Acceptable Quality Level** figures, which are based on a random sampling

plan in accordance with **MIL-STD-1916**. Referring to instructions of this standard, a delivered lot will be accepted with a probability of 90%, if the percentage of non-conformance does not exceed the stated AQL figure. As a general internal target, the percentage of non-conformance in deliveries from CapXon is significantly below the AQL figure. The acceptance value we apply to non-conform components is $c=0$.

INCOMING GOODS INSPECTION BY CUSTOMER

We recommend applying planned random sampling checks in accordance with MIL-STD-1916, is compliant with MIL STD 105 D and IEC 60410, for incoming goods inspection. The test methods, which shall be applied, are laid down in the relevant standards.

ENVIRONMENTAL MANAGEMENT

Environmental Policy

CapXon defines internally the following environmental protection principles:

- comply with the given law & regulations
- observe and act to reduce pollution
- produce cleanly
- reduce the consumption and save resources
- cut down usage of toxic substances
- make continuous improvements
- protect the environment

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATION

CapXon environmental management system is certified in accordance with ISO 14001 and is applied throughout the whole company as well as CapXon's environmental policy is implemented.

ENVIRONMENTAL HAZARDOUS SUBSTANCES FREE MANAGEMENT SYSTEM

To show our commitment to protect the environment and people, CapXon drives a sustainable effort to produce environment-friendly products.

IECQ QC 080000 HSPM - Hazardous Substance Process Management, which is based on the quality management system of ISO 9001.

The CapXon QC080000 based HSF management system is company-wide applied for implementing the CapXon environmental Hazardous Substances management and that CapXon products effectively in the management of hazardous substances.

ENERGY MANAGEMENT SYSTEM

CapXon establishes comprehensive energy use management in accordance with the requirements of ISO 50001 Energy Management System in order to meet the social responsibility of low carbon environmental protection and efficiency

CERTIFICATION IN ACCORDANCE TO ISO 14001, ISO 50001, QC 080000

The CapXon Group operates an environmental management system that conforms to the requirements of **ISO 14001** and is mandatory for all plants. The CapXon Group operates an Energy management system that conforms to the requirements of **ISO 50001** and is mandatory for all plants. The CapXon Group operates an environmental **Hazardous Substances Free management system** that conforms to the requirements of QC 080000 and is mandatory for all plants. The company certificate is posted on the CapXon internet: (www.capxongroup.com).

RoHS COMPLIANCE

The abbreviation **RoHS** is usually called **Restriction of Hazardous Substances**, the full term is the short term for the **Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment** and is referring to the EU directive 2011/65/EU. The RoHS 2 – 2011/65/Eu substituted the former RoHS 1- 2002/95/EC.

The aim of RoHS is to banish Hazardous Substances of electronic waste, which can harm the environment and others. Based on this regulation, we as component manufacturer, need to design, observe and control that such hazardous materials are fully avoided and reduced to the max. Moreover, it's possible to replace them by adequate non concerned materials within the given limitations .

For all by RoHS scoped materials (excluding exempt products) the maximum permitted concentrations are:

all concerned materials (except Cd)

- 0,1% / 1000ppm

Cadmium -Cd:

- 0,01% or 100ppm

These limitations for the restricted materials focus on each homogeneous material within the product. So, the limitations are concerning each individual / single substance or part, which can be separated mechanically (e.g. aluminum can, rubber sealant) and are not apply to the weight of the whole component itself.

Last update of RoHS was Directive (EU) 2015/863, which was published on 2015-03-31 and implemented by 2019-07-22. According to this directive, the following ten substances are restricted:

- **Pb** - Lead
- **Hg**- Mercury
- **Cd** - Cadmium
- **Cr⁺⁶** - Hexavalent chromium
- **PBB** - Polybrominated biphenyls
- **PBDE** - Polybrominated diphenyl ether
- **DEHP** - Bis (2-ethylhexyl) phthalate
- **BBP** - Butyl benzyl phthalate
- **DBP** - Dibutyl phthalate
- **DIBP** - Diisobutyl phthalate

By the update DEHP, BBP, DBP and DIBP were added to the list of hazardous substances.

Since 2011 RoHS compliance is mandatory to be able to get CE approval.

C-RoHS / CHINA RoHS COMPLIANCE

The common speech so called China RoHS means the conformance to **SJ/T 11363-2006** for electrical components and assemblies and is fully called **Administrative Measure on the Control of Pollution Caused by Electronic Information Products**.

In China RoHS, the following substances are banned because they are considered as environmentally hazardous:

- **Pb** - Lead
- **Hg**- Mercury
- **Cd** - Cadmium
- **Cr⁺⁶** - Hexavalent chromium
- **PBB** - Polybrominated biphenyls
- **PBDE** - Polybrominated diphenyl ether

Since December 2012, CapXon has provided China RoHS certification for our products and certifications.

SONY GP CERTIFICATION

Since Nov 2011, CapXon has been certified as Green Partner by SONY and we are running an environmental management system that continuously meet the requirements of the SONY Green Partner Program and we are working in

accordance with the Sony environmental quality assurance. The Certificate is listed by **SONY GP Certificate No.: FC012746**

REACH CERTIFICATION

REACH is the abbreviation for Registration, Evaluation, Authorization of Chemicals and by Regulation (EC) No 1907 /2006 it is

So each manufacturer or importer, who is shipping goods to the European Union, need to declare and be compliant according to REACH, if within the shipped goods a substance, which is listed out SVHC-List (Substances of Very High Concern) is included and overall a total mass of bigger a ton per year is imported.

CapXon is working in accordance with REACH requirements and certification is available for our products.

ROHS & REACH MARKING

Within our datasheets, we mark the RoHS and REACH compliance with our "RoHS & REACH compliant"- marking, please see marking below for reference:



HALOGEN FREE (HF)

The Halogen Free requirements are based on customer and environmental regulations on management and control requirements of halogens, such as the **European Directive 2002/95/EC, IEC 61249-2-21, Montreal Protocol on Substances that Deplete the Ozone Layer and Controls the Stockholm joint pledge about durable organic pollutant.**

Concerned by the halogen-free initiative are elements like:

- **Fluorine**
- **Chlorine**
- **Bromine**
- **Iodine**
- **Astatine**

In case of fire, these elements can release toxic fumes, which could harm humans and can also cause corrosion of metals.

CapXon is using halogen-free materials for all our electrolytic capacitors. Since 31st of Oct 2009 all products meet the halogen-free requirements.

BANNED AND ENVIRONMENTAL HAZARDOUS SUBSTANCES IN COMPONENTS

As a manufacturer of passive components, we develop our products focussing on sustainability. In order to guarantee a standardized procedure within CapXon, a mandatory avoidance list of Environmental Hazardous Substances with special interest is part of our environmental management system. The planning and development instructions include regulations and guidelines that aim to identify environmental aspects and to optimize products as well as processes with respect to material usage and environmental compliance to design them with sparing use of resources and to substitute hazardous substances as far as possible.

The environmental officer provides support in the assessment of the environmental impacts of our development projects and as part of our environmental management these aspects are checked and recorded in internal design reviews.

AEC-Q200 & AUTOMOTIVE REQUIREMENTS

To serve the high standards of automotive applications, CapXon provides AEC-Q200 versions for many of their product series.

If AEC-Q200 version is available, the product series or single component is marked with the following marking on the datasheet:



Marking of components with references in reliability testing to AEC-Q200

The AEC-Q200 versions are different in case of reliability testing, production monitoring and available material declaration. For details, please see the table below:

	Standard Version	AEC-Q200 Version
Reliability Testing		
Tests according to internal specification	✓	✓
Tests according to AEC-Q200 applied test range related to product	✗	✓
Production Monitoring		
Production & documentation in accordance with ISO 9001	✓	✓
Production & documentation in accordance with IATF 16949	✗	✓
Compliance and Declarations		
RoHS & REACH compliance	✓	✓
IMDS entry available (on request)	✗	✓
PPAP (on request)	✗	✓

Table 9: Differences between standard and AEC-Q200 components

AEC-Q200

The AEC-Q200 was issued as a global reliability test standard by the AEC - Automotive Electronics Council. The overall aim of this standard is to define the minimum stress test driven qualification requirements and references of test conditions for qualification of passive components.

AEC-Q200 qualified components are highly qualified products for critical surroundings and can withstand the harsh and challenging usage conditions of an automotive environment.

For Aluminum Electrolytic Capacitors, concerning all technologies of Liquid Aluminum Electrolytic, Solid and hybrid types, the AEC-Q200 claims a test plan of 27 different reliability tests (e.g.: Temperature Cycling, Vibration, Biased Humidity, Surge Voltage, ...) with a sample size of about 77 pcs. and a maximum test duration of particular test of about 1000 hours.

By AEC-Q200 at least the temperature range of -40°C to 105°C need to be tested and applicable for Aluminum Electrolytic Capacitors, if not, differently specified by datasheet.

In case of AEC-Q200 version, reliability testing is performed for the dedicated components in addition to CapXon's internal qualification setup as well as additional agreed requirements between CapXon and their customers.

PPAP

PPAP – Production Part Approval Process is a documentation to assure quality of supplier and their production process within the automotive supply chain.

The PPAP covers and ensure the following aspects:

- Manufacturability and meeting all given quality requirements
- Design records and specification requirements
- Manufacturing process can consistently meet all component requirements

For our AEC-Q200 components, we provide PPAP Level 3 on request, which is providing product samples as well as the complete supporting data.

IMDS

The IMDS – International Material Database System contains information about the used materials within the build-up of the component.

With IMDS, it is possible to monitor and control hazardous substances and prohibited substances down to the single component. IMDS is mainly used to fulfil various reporting requirements of automotive manufacturers.

For all our AEC-Q200 components and in case of an automotive use case, we provide IMDS entries on request. For further information, visit our website <http://www.capxongroup.com/en/> or contact CapXon directly.

LIFETIME ESTIMATION • LIFETIME COMPENDIUM

The accurate estimation of the lifetime of components is one of the elementary considerations of any electronic assembly. If electrolytic capacitors are not properly designed for the application environment and load, they will inevitably lead to a disproportionate change in their electrical performance or, in the worst case, failure of the capacitor. CapXon's lifetime compendium helps users to calculate and estimate the expected lifetime of **Aluminum Electrolytic Capacitors**.

The lifetime compendium is available to download from our website http://www.capxongroup.com/files/Lifetime%20Compendium_EN.pdf



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Technical Background

LIFETIME COMPENDIUM

structure of the component. To explain and calculate the additional heating, the relationship of the thermal resistance, or the ability of electronic components to dissipate heat.

Like all electronic components, electrolytic capacitors are not ideal components, but have issues that give off in the form of heat under load. For all electronic components, the cooler the component, the longer the expected lifetime.

For e-caps the ohmic losses are grouped under the term "ESR" for Equivalent Series Resistance. These include the ohmic losses resulting from the terminals of the capacitor, the contact connections of the terminals, the contact resistance of the electrode contacting and the dielectric losses, also referred to as a dissipation factor tan δ.

$$P_i = I_{RMS}^2 \cdot ESR$$

WITH
 P_i Internal power losses [W]
 I_{RMS} Ripple current flowing in the capacitor [A-RMS]
 ESR Equivalent series resistance [Ω]

(3) $P_T = \frac{P_i}{R_{th}} = \Delta T_A \cdot \beta \cdot A$

WITH
 P_T Thermal power [W]
 ΔT_A Core temperature rise (°C) by internal heating due to the application current
 R_{th} Thermal resistance of the electrolytic capacitor [K/W]
 β Radiation coefficient [W/(cm²·K)]
 A Surface of the capacitor [cm²]

(4) $\Delta T_A = \frac{P_i}{\beta \cdot A}$

DETERMINATION OF THE CORE TEMPERATURE INCREASE ΔT_A

To calculate the lifetime, the determination of ΔT_A - core temperature rise due to the application current in the capacitor - is necessary.

This can be done in different ways

a.) Temperature measurement of core temperature T_c

By this very precise method, a thermocouple (usually a K sensor) is inserted into the capacitor, which is possible only during the production of the e-cap, and determines the core temperature T_c over this. The ambient temperature T_a is measured secondarily.

Calculation base

LIFETIME COMPENDIUM

For all CapXon high-performance series ≤ 200V, see table 3

$$(8) I_{\Delta T} = I_{RMS} \cdot K_{Temp} \cdot K_{Voltage} = I_{RMS} \cdot 2 \cdot \frac{V_{Cap} - V_{N}}{V_{N}}$$

WITH
 I_{ΔT} Ripple current influence ΔT_A Core temperature rise (°C) by internal heating due to the application current
 ΔT_A Core temperature increase (°C) by internal heating due to the application current
 I_{RMS} RMS ripple current [A-RMS]
 K_{Temp} Temperature rise factor
 K_{Voltage} Voltage rise factor

Upper ripple temperature T _u	85°C	105°C	115°C	≥ 120°C
Temperature rise ΔT _A	30°C	5°C	5°C	5°C

Table 3: Maximum permissible core temperature rise due to the permissible rated alternating current

HIGH VOLTAGE E-CAPS (≥ 160V) WITH LIQUID ELECTROLYTES

Under the low voltage electrolytic capacitors are described in the previous chapter, in e-cap series with ≥ 160V another factor influencing the life-time is added: the operating voltage is applied to the electrolytic capacitor. It is known that the nominal voltage of the capacitor V_N the thermal stress on its dielectric decreases, which in turn leads to an extension of the service life. For all cases V_u between 80% to 100% of V_N, take for calculations V_u < V_N.

K _{Temp}	K _{Voltage}	Type	Product	CapXon series
1	1	Radial	1K, 1L, 2D, 2DVA, PHE, HE (D, BA), SE (D, 30AV), KL, KM (D, 50AV), KS, KV, LV, TE (D, 50AV), TH (D, 30AV)	
1	1	Snap-in	1H, 1L (D, 50AV), 1P (D, 50AV), 1T, 1U (D, 100V), 1D (D, 100V), 1P (D, 100V), 1T (D, 100V), 1U (D, 100V), 1V (D, 100V), 1W (D, 100V), 1X (D, 100V)	
1	1	Surface terminal	8G, 1H, 1L, 1M, 1P, 1U, 1X	

Table 2: Influence of the application current and the application voltage on CapXon high-voltage series

K _{Temp}	K _{Voltage}	Type	Product	CapXon series
1	1.5	Radial	1H, 1L, 1S, 1A, 1L, 1H, 1K	

Table 2: Influence of the application current and application voltage on CapXon high voltage series for use in lightning application

Application example

LIFETIME COMPENDIUM

CALCULATION EXAMPLE - OUTPUT FILTER CAP - IN A SWITCH MODE POWER SUPPLY

Fig. 1: Principal diagram for switching mode power supply with active PFC and galvanically isolated output

Output voltage: 27V
 Rated filter: 83 μF ± 5% 200V
 Operating cycles: 200,000 during the operating period of 10 years

Operation under different conditions according to the following table:

Operation in Mode 1	Operation in Mode 2	Stand / Standby
Duty cycle T _{on} ≤ 30%	Duty cycle T _{on} ≤ 30%	Duty cycle T _{on} ≤ 30%
Ambient temperature T _a 20°C	Ambient temperature T _a 20°C	Ambient temperature T _a 40°C

Frequency f [kHz]	I [A-RMS]	Frequency f [kHz]	I [A-RMS]	Frequency f [kHz]	I [A-RMS]
10kHz	1.5A	30kHz	1.2A	100kHz	0.7A
30kHz	1.2A	100kHz	0.7A	100kHz	0.7A
100kHz	0.7A	100kHz	0.7A	100kHz	0.7A

Table 16: Requirement profile for the calculation example - switched-mode power supply

Selected Type: **GF561M035G250ETA**

Rated capacitance C _r	Rated voltage V _N	Rated current I _N	Dimension φ x L	Endurance
500 μF	35V	3.0A at 100kHz/105°C	10mm x 25mm	50,000 h at 105°C

Table 17: Main parameter GF561M035G250ETA

Graphical estimation

LIFETIME COMPENDIUM

The first step is to calculate the equivalent ripple current I_{ΔT} and I_{ΔT} as well as the resulting RMS value I_{RMS}:

$$I_{\Delta T} = I_{RMS} \cdot K_{Temp} \cdot K_{Voltage}$$

$$I_{RMS} = \sqrt{I_{ESR}^2 + I_{ESR}^2 + \dots + I_{ESR}^2}$$

The necessary ripple current correction factors are shown in table 3. Extract data sheet 001 series

Frequency [kHz]	50 [kHz]	100	300	1k	≥ 1k
Ripple current correction factor K _f	0.8	1.0	1.2	1.5	1.4

Table 20: Ripple current correction factor for the CapXon series

Equip. 120Hz current 1: $I_{RMS1} = \frac{I_{\Delta T}}{K_{f1}} = 20A$
 Equip. 120Hz current 2: $I_{RMS2} = \frac{I_{\Delta T}}{K_{f2}} = 11.4A$

RMS value: $I_{RMS} = \sqrt{I_{RMS1}^2 + I_{RMS2}^2} = 23.4A$

In the second step, the ripple current ratio I_{ΔT}/I_N can be calculated with

Ripple current ratio: $\frac{I_{\Delta T}}{I_N} = \frac{23.4A}{3.0A} = 7.8$

Fig. 1: Nomogram for the CapXon series with intersection point for the application example

The ripple current ratio and the ambient temperature of 60°C show the intersection of the graph in the nomogram. The useful life is between the 50,000 and 100,000 curve, exactly at 60,000 and meets the minimum requirement of > 40,000.

TECHNICAL NOTES • TECHNICAL COMPENDIUM

Due to their compact design, **Aluminum Electrolytic Capacitors** are the most common high-capacitance storage and filter elements in electronics. Like all electronic components, they do not have an “ideal” electrical behavior, they have losses. Their properties are very dependent on temperature and frequency. Detailed knowledge of these components is an absolute must for all electronics developers, especially for power supplies and converters.

The CapXon Technical Compendium describes the basics, electrical parameters, production steps, provides suggestions for the selection of suitable capacitors and design rules for reliable and long-lasting operation.

The technical compendium is available to download from our website http://www.capxongroup.com/files/Technical%20Compendium_EN.pdf



Basics

1. BASICS

Aluminum Electrolytic Capacitors are by far the most important and common high-capacitance storage or filter capacitors in electronic devices.

The enormous importance of electrolytic capacitors is related to their properties:

- Extremely high CV (capacitance per volume) values on the smallest volume
- High dielectric strength of even the thinnest layers (2 to a 10⁷ V/cm)
- Relatively high dielectric constant ϵ (up to 10⁴)
- Etching ability of aluminum, which allows a surface enlargement of up to 200 times and thus a dramatic space reduction
- Very wide range of design and dimensions

1.1. BASIC STRUCTURE OF A CAPACITOR

When voltage is applied between both conducting electrode plates, a certain amount of charge Q will be stored in the dielectric surface by a proportional relative voltage. The proportional constant is designating the ability of the capacitor to store energy in electric field.

The capacitance can be calculated using the amount of charge and the applied voltage

$$C = \frac{Q}{U}$$

1.2. CONSTRUCTION OF ALUMINUM ELECTROLYTIC CAPACITORS

All Aluminum Electrolytic Capacitors are based on the knowledge that an oxide layer, which is electrochemically produced on aluminum, allows current to pass in one direction and blocks the current in the other direction, like the principle of a semiconductor diode. Even very thin layers enable very high dielectric strength. The oxide layer thus forms the dielectric of the capacitor.

The oxide layer has a porous structure, even before it is processed in order to achieve an optimal electrical connection of this rough surface, a conductive liquid, the electrolyte, is used. The liquid penetrates the pores and wets the coarse layer. The electrolyte is in turn contacted electrically via a second aluminum foil (current supply foil).

WITH

- C Capacitance [F]
- Q Charge [C]
- U Applied Voltage [V]

$$C = \epsilon_0 \cdot \epsilon_r \cdot \frac{A}{d}$$

WITH

- ϵ_0 Absolutely Permittivity (8.85 · 10⁻¹² F/m)
- ϵ_r Relative Permittivity [F/m] – depending on used dielectric material
- A Surface of capacitor electrode [m²]
- d Distance between the capacitor plates [m]

Production steps

2. PRODUCTION STEPS

To achieve the highest level of reliability for all our products, CapXon only uses 99.99% pure aluminum in its electrolytic capacitors. Foreign atoms on the surface in connection with the electrolyte would lead to corrosion.

Raw material Aluminum foil

Foil etching

The surface of the aluminum foil is enlarged by 50 to 200 times by etching. At CapXon, this is done in its own factory using appropriate continuous baths. The etching process, especially of high-quality high-voltage foil, requires enormous know-how and decades of experience. The electrolyte this foil (20 – 200µm) have to be mechanically stable enough to survive the further manufacturing steps like multiple etching, weaving, drying, chemical rinsing without damage. Only a high understanding of the complex processing of etched aluminum foils are the guarantee for an aluminum electrolytic capacitor of the highest quality!

Foiling

The oxide layer required as a dielectric is produced electrochemically on the anode foil after the roughing process (etching) by immersing the foil in a bath with boric acid or similar chemical and applying voltage during the process. The process is called forming. Over time, the layer thickness increases, while the current decreases and the roughness of the oxide layer increases. At first very strongly then increasingly a maximum value. Depending on the bath composition, rated voltages of 650V or higher can be achieved.

Assembling

The processing of the foils, the so-called etching process, the forming and the subsequent manufacture of the electrolytic capacitor with cutting, winding, contacting, impregnating, assembling, aging and final tests take place entirely in our own production facilities under the strictest environmental and cleanliness standards.

Aluminum electrolytic capacitor

Electrical parameters

4.3. STABILITY OF ELECTRICAL PARAMETERS

If we compare the solid polymer or hybrid polymer technology with other capacitors designs, the advantages become clear.

The capacitance of ceramic capacitors reduces for high capacitance types with the applied voltage, the advantage becomes clear.

Ceramic materials like X7R, X7E, Y4T or Z5U are ferroelectric materials and classified as class 2 ceramics. As higher the applied voltage is lower the permittivity, i.e. lower the capacitance value. The capacitance measured as applied at higher voltage may drop to 50% of the value measured with the standardized measurement voltage of 0.5 or 1.0V, what that means for the circuit in filters or memory applications need not be further elaborated here. This is the reason for harmonic distortions in audio applications.

4.4. EXTREMELY LONG LIFE

In order to achieve a high capacity in the smallest space at the same time acceptable costs remained so far only the way to use aluminum capacitors with liquid electrolyte.

Apart from the temperature and frequency-related disadvantages, the lifetime of these capacitors must always be considered.

The use of a liquid electrolyte results in changes in electrical properties over time.

As a result, an aluminum electrolytic capacitor slowly but constantly loses electrolyte during the time – the component is driving out. The lower the temperature of the capacitor, the slower the desiccation process, hence a longer life.

Capacitor selection

6.2. HIGH FREQUENCY OUTPUT SMOOTHING

In the output stage on the secondary side, a rectification and smoothing circuit converts the AC voltage supplied by the full-bridge MOSFET into the desired DC voltage. For example, 2.2VDC. The smoothing circuit can consist of capacitors or the combination of capacitor and inductor. See figure 56. The output current smooth ripples in the rectified voltage and also ensure the stability during transient increase in the load current.

6.3. BUFFERING

The block diagram in figure 38 shows a microcontroller (µC) that is supplied by a linear voltage regulator, whose output voltage is 5V. In the application we assume a steadily under load operation with minimal power consumption and an operating mode of the µC. As standby current (I_{standby}) and an operating current between 50mA and 500mA are necessary for the µC. The threshold value between standby and operating current is therefore 50mA, which leads to a sudden current requirement of the µC up to rise times of 1000ns on the linear regulator.

Design rules

7.1. ARRANGEMENT

Never arrange electrolytic capacitors near hot components such as heat sinks, transformers, power semiconductors etc. to avoid thermal heating of the liquid electrolyte.

7.3. CLEARANCE / OVERPRESSURE VENT

During operation, current flows through the capacitor and the ohmic losses, converted to ESR, create conduction in the form of heat.

The hydrogen released inside the electrolytic capacitor increases the internal pressure. If the internal pressure is too high, the overpressure vent opens and the gas escapes in a controlled manner.

In order not to impair the functioning of the vent, a minimum distance to other components must be maintained above.

No conducting tracks, wires or other circuit parts may be arranged above the valve.

7.2. CONDUCTOR TRACKS

Make conductor tracks sufficiently thick. Especially at high I_{PK} currents the track can be very hot. If the proximity effect is significant, large widths at 25µm doesn't help! Provide 100µm, 200µm thickness or more.

Power	Track thickness
Very low	35µm
> 25W	100µm
> 100W	200µm

Table 31: Recommended track thickness for high-vol. RMS current

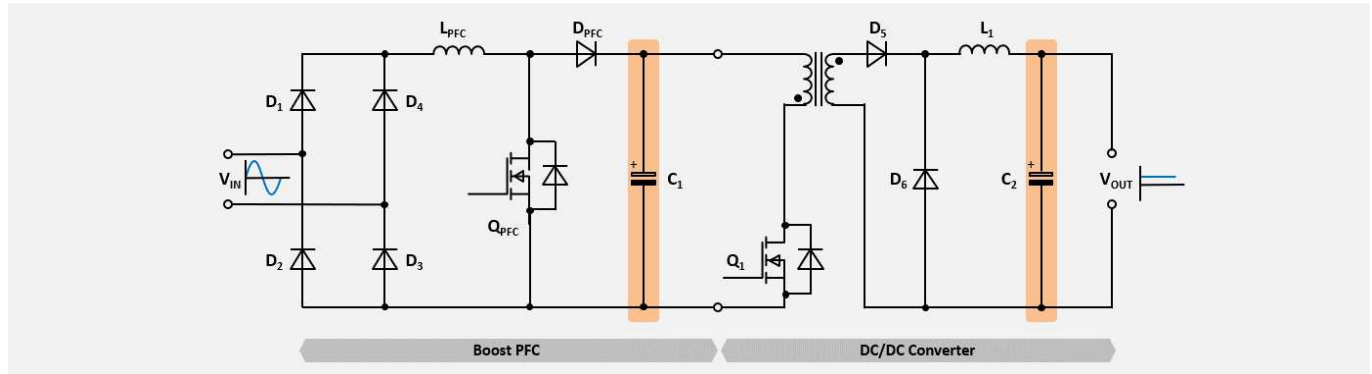
Power	Track thickness
Very low	35µm
> 25W	100µm
> 100W	200µm

Table 32: Recommended minimum clearance distance between topology capacitor and device case

Case diameter Ø	Clearance distance Cl
10mm to 16mm	Min. 2mm
16mm to 25mm	Min. 3mm
> 25mm	Min. 4mm

SWITCH MODE POWER SUPPLY (SMPS)

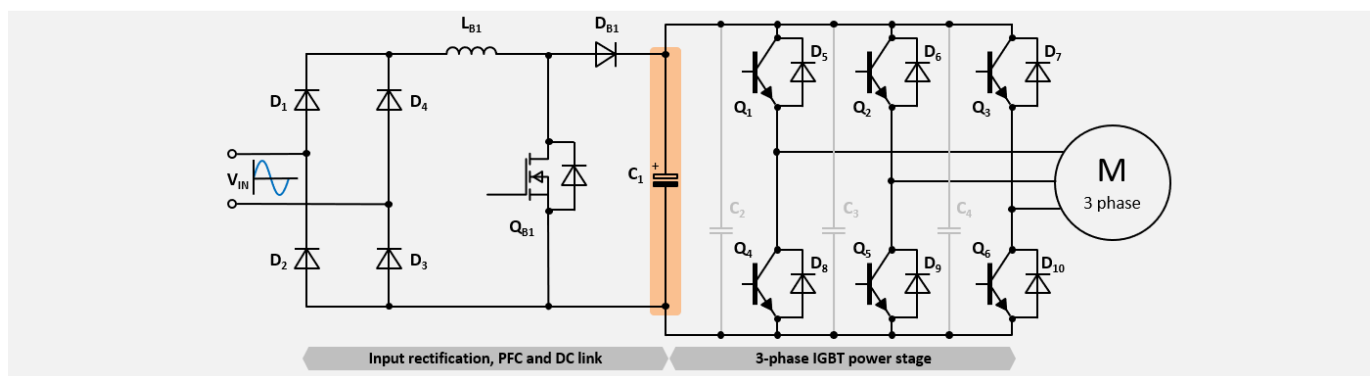
Example of a Switch Mode Power Supply with boost Power Factor Correction (PFC) and downstream DC/DC converter in Fly-back topology with recommended products.



Designation	Circuit	Purpose	Specification	Series	Part Number
C ₁	Boost PFC	Inductor ripple current filtering	100µF; 400V; 105°C; Radial; 2000h D18xL31.5mm; 0.53A@120Hz	KM	KM101M400K315A
C ₁	Boost PFC	Inductor ripple current filtering	470µF; 450V; 105°C; Snap-In ; 5000h D35xL45mm; 1.94A@120Hz	HP	HP471M450P450A
C ₂	DC/DC Converter	Output filtering	470µF; 25V; 105°C; SMD; 2000h D10xL10.5mm; 0.65A@100kHz	DV	DV471M025G105A
C ₂	DC/DC Converter	Output filtering	1000µF; 25V; 105°C; Radial; 10000h D13xL20mm; 1.91A@100kHz	FH	FH102M025I200A
C ₂	DC/DC Converter	Output filtering	82µF; 25V; 105°C; Radial; 2000h D8xL11.5mm; 4.1A@100kHz	PS	PS820M025F115A

INDUSTRIAL MOTOR DRIVE

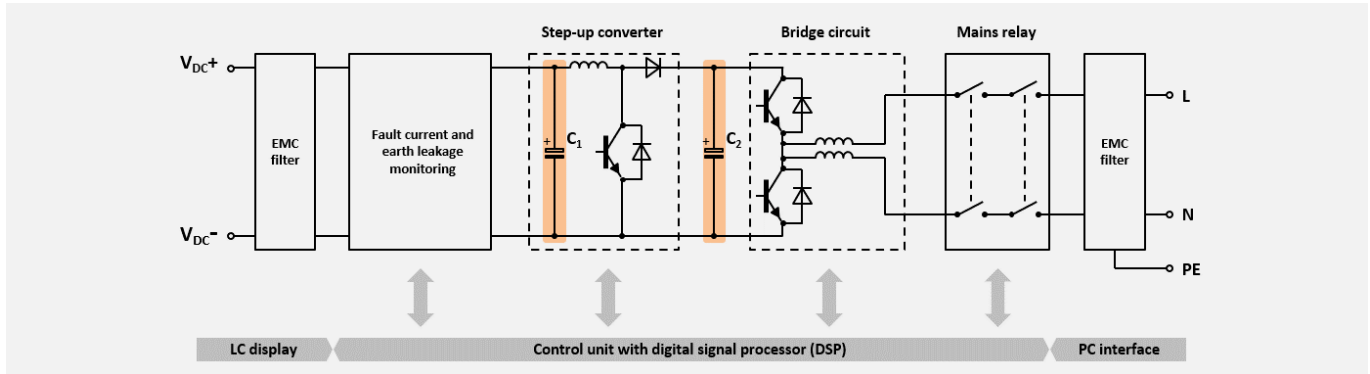
Example of a typical industrial motor drive for pumps, fans or compressors. The power circuit consist input rectifier, Power Factor Correction (PFC), DC link bank and 3-phase IGBT power stage. CapXon offers the full range of DC link solutions in electrolyte technology



Designation	Circuit	Purpose	Specification	Series	Part Number
C ₁	DC link bank	Energy storage and supply	560µF; 450V; 85°C; Snap-In; 7000h D30xL50mm; 3.17A@120Hz	UC	UC561M450O500A
C ₁	DC link bank	Energy storage and supply	470µF; 500V; 85°C; Snap-In; 10000h D35xL55mm; 2.99A@120Hz	UD	UD471M500P550A
C ₁	DC link bank	Energy storage and supply	680µF; 450V; 105°C; Snap-In; 8000h D35xL60mm; 2.94A@120Hz	UK	UK681M450P600A
C ₁	DC link bank	Energy storage and supply	680µF; 450V; 105°C; Snap-In; 10000h D35xL55mm; 3A@120Hz	UL	UL821M450Q550A

PHOTO VOLTAIC INVERTER

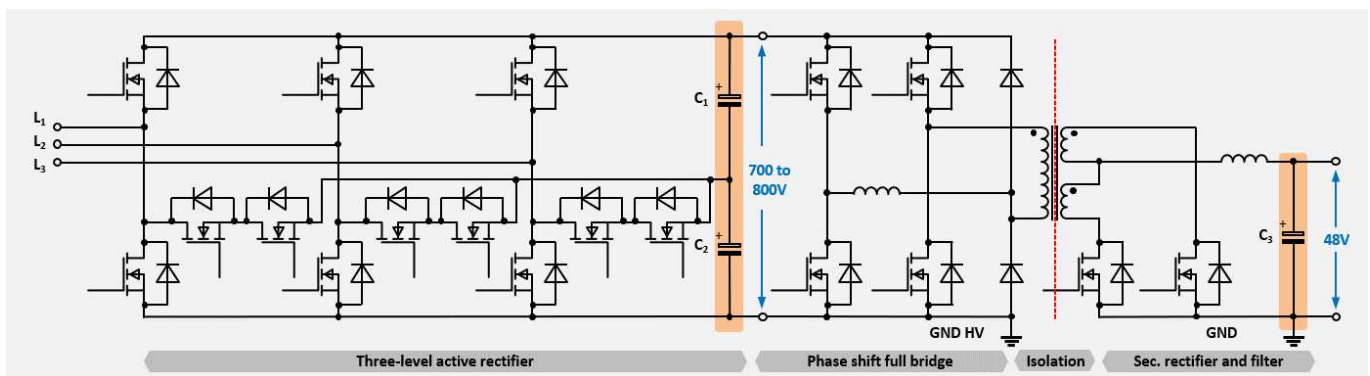
Block diagram of the power circuit of a photo voltaic inverter with EMC filter, monitoring circuit, step-up converter, bridge circuit, and mains relay with recommended products.



Designation	Circuit	Purpose	Specification	Series	Part Number
C ₁ , C ₂	Step-up + DC link	Energy storage and supply	680µF; 500V; 105°C; Snap-In; 5000h D40xL60mm; 3A@120Hz	UJ	UJ681M500Q600A
C ₁ , C ₂	Step-up + DC link	Energy storage and supply	5600µF; 450V; 105°C; Screw; 20000h D63.5xL165mm; 21.7@120Hz	RX	RX562M450SA65A
C ₁ , C ₂	Step-up + DC link	Energy storage and supply	470µF; 450V; 105°C; Snap-In; 10000h D30xL50mm; 1.97A@120Hz	UL	UL471M450O500A
C ₁ , C ₂	Step-up + DC link	Energy storage and supply	1000µF; 450V; 105°C; Screw; 8000h D51xL80mm; 4.6A@120Hz	RH	RH102M350R800A

3-PHASE HIGH VOLTAGE BATTERY CHARGER

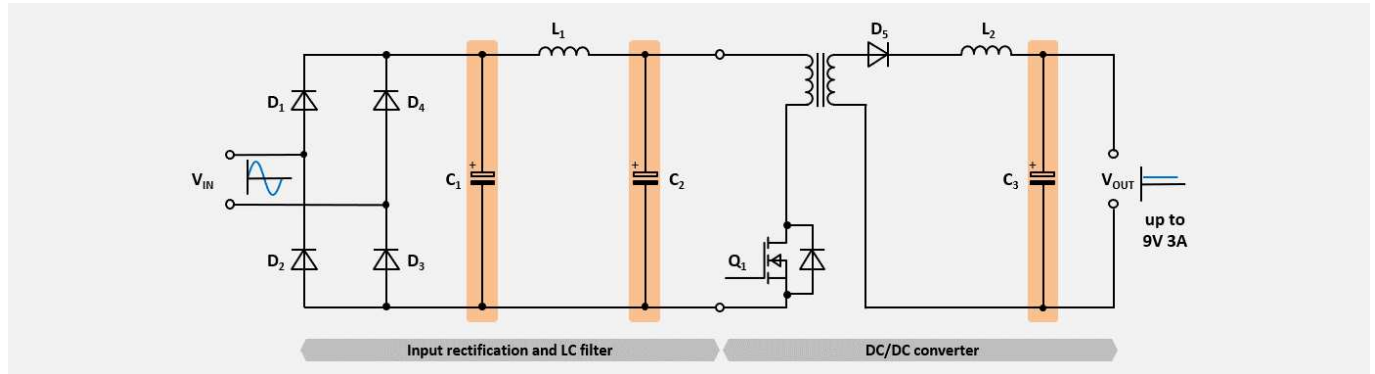
Principal circuit of a 3-phase high voltage battery charger for bidirectional applications such as electric vehicle charging (e-cars, fork-lift trucks, transport vehicles with recommend products for the active rectifier and output filter.



Designation	Circuit	Purpose	Specification	Series	Part Number
C ₁ , C ₂	Three-level active rectifier	Energy storage and supply	2200µF; 450V; 85°C; Snap-In; 7000h D45xL90mm; 8.5A@120Hz	UC	UC222M450V900A
C ₁ , C ₂	Three-level active rectifier	Energy storage and supply	1000µF; 500V; 105°C; Snap-In; 5000h D40xL80mm; 4.68A@120Hz	UJ	UJ102M500Q800A
C ₃	Output filter	Output buffering and ensure stability	56µF; 63V; 105°C; Radial; 10000h D10xL12.5mm; 2.4A@100kHz	AS	AS560M063G125PTA
C ₃	Output filter	Output buffering and ensure stability	150µF; 63V; 105°C; Radial; 2000h D10xL18mm; 3A@100kHz	PH	PH151M063G125PTA

27W PORTABLE POWER USB-C ADAPTER

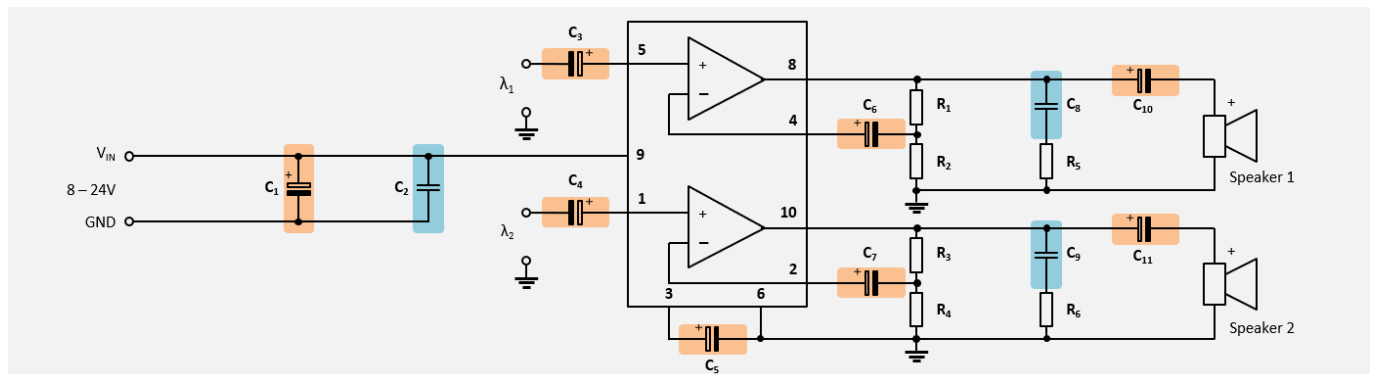
Example of a portable power adapter for USB-C laptops, smartphones and tablets with recommend products for the LC filter and to ensure stability (smoothing) during transient increase in the load voltage.



Designation	Circuit	Purpose	Specification	Series	Part Number
C ₁ , C ₂	LC filter	Input filtering	22μF; 400V; 105°C; Radial; 2000h D10xL25mm; 0.125A@120Hz	KM	KM220M400G250A
C ₁ , C ₂	LC filter	Input filtering	15μF; 400V; 105°C; Radial; 5000h D10xL20mm; 0.24A@120Hz	KF	KF150M400G200A
C ₃	DC/DC converter	Output filtering	470μF; 16V; 105°C; Radial; 2000h D5.5xL11mm; 2.69A@100kHz	PX	PX471M016C090P
C ₃	DC/DC converter	Output filtering	330μF; 12V; 105°C; Radial; 2000h D5xL9mm; 2.69A@100kHz	PX	PX331M012C090P

AUDIO SPEAKER

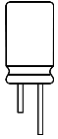
Example of an active audio speaker with treble and bass and the recommend products for the NF filter as well as the acoustic coupling.



Designation	Circuit	Purpose	Specification	Series	Part Number
C ₁ , C ₃ , C ₄ , C ₅ C ₆ , C ₇ , C ₁₀ , C ₁₁	Audio speaker	NF filter	470μF; 35V; 85°C; Radial; 2000h D10xL16mm; 0.63A@120Hz	RW	RW471M035G160A
C ₂ , C ₈ , C ₉	Audio speaker	Acoustic coupling	47μF; 35V; 85°C; Radial; 2000h D10xL12.5mm; 0.15A@120Hz	NR	NR470M035G125ETA

TECHNICAL TERMS

Item	Description	SI units
V_R	Rated voltage	V
V_S	Surge voltage	V
V_{Ripple_AC}	Ripple voltage	V
$V_{Reverse}$	Reverse voltage	V
V_A	Application voltage, operating voltage	A
I_R	Rated ripple current, rated alternating current	A
I_A	Application current, operating current	A
I_{A_Max}	Maximum application current, maximum operating current	A
I_{Leak}	Leakage current	A
T_{0_Max}	Upper category temperature	°C
T_{0_Min}	Lower category temperature	°C
T_A	Application temperature, operating temperature	°C
T_S	Capacitor surface temperature	°C
ΔT_0	Core temperature increase by internal heating due to rated ripple current	°C
ΔT_A	Core temperature increase by internal heating due to application ripple current	°C
C_R	Rated capacitance	F
ΔC	Capacitance tolerance	%
C/C_R	Capacitance drift	-
$\tan \delta$	Dissipation factor	-
Z	Impedance	Ω
ESR	Equivalent series resistance	Ω
ESL	Equivalent series inductance	H
X_C	Capacitive reactance	Ω
X_L	Inductive reactance	Ω
f	Frequency	Hz
ω	Angular frequency	Hz
λ	FIT = failure in time	-
K_f	Multiplier for ripple current vs. frequency	-
K_T	Multiplier for ripple current vs. temperature	-
K_0	Dielectric constant derating coefficient at high temperature	-
L_0	Specified lifetime at max. capacitor temperature, rated voltage (and rated ripple current)	h
L_A	Expected lifetime at application conditions	h



OVERVIEW - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Features

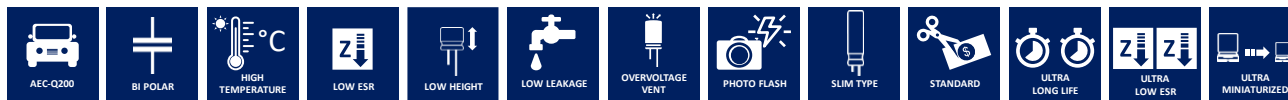


Series	Page	AEC-Q200	Bi-Polar	High Temperature	Low ESR	Low Height	Low Leakage	Overvoltage Vent	Photo Flash	Slim Type	Standard	Ultra Long Life	Ultra Low ESR	Ultra Miniaturized	Temperature Range (°C)	Voltage Range (V)	Capacitance Range (µF)	Endurance (hours)	
RF	28								•						-20 +55	330 350	100 450	5000 times	
SS	30					•								•	-40 +85	4 50	1 330	1000	
SM	34					•								•	-40 +85	4 63	1 470	1000	
SR	39					•									-40 +85	6.3 50	1 220	1000	
SW	42					•									-40 +85	4 50	1 470	1000	
SH	45					•								•	-40 +85	4 63	1 470	2000	
RW	50										•				-40 +85	6.3 100	1 33000	2000	
NR	55		•												-40 +85	6.3 100	1 1000	2000	
GS	59														-40	+85	6.3 100	1 33000	2000
															-25		160 450	1 560	
NP	71		•												-40	+85	6.3 100	1 3300	2000
															-25		160 250	1 47	
ST	76					•								•	-40 +105	4 50	1 220	1000	
SK	80					•								•	-40 +105	4 63	1 470	1000	
SZ	85				•									•	-55 +105	6.3 35	6.8 330	1000	
KZ	89				•										-40 +105	6.3 50	1 6800	1000 to 2000	
KS	96							•							-25 +105	200 400	4.7 400	2000	
KY	100								•						-25 +105	250 450	12 150	2000	
KM	104										•				-40	+105	6.3 100	1 22000	2000
															-25		160 500	1 560	
NK	120		•												-40	+105	6.3 100	1 3300	2000
															-25		160 250	1 47	
SJ	125					•								•	-40 +105	6.3 63	1 220	2000	
LL	129						•								-40 +105	6.3 63	1 2200	2000	
LZ	133												•		-40 +105	6.3 25	220 3300	2000	
SY	137				•	•									-55 +105	6.3 50	1 330	2000	



OVERVIEW - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Features



Series	Page	AEC-Q200	Bi-Polar	High Temperature	Low ESR	Low Height	Low Leakage	Overvoltage Vent	Photo Flash	Slim Type	Standard	Ultra Long Life	Ultra Low ESR	Ultra Miniaturized	Temperature Range (°C)		Voltage Range (V)		Capacitance Range (µF)		Endurance (hours)
															-40	+105	6.3	100	1	15000	
KF	141				•										-40	+105	6.3	100	1	15000	2000 to 5000
															-25	+105	160	450	1	330	
GF	154				•										-40	+105	6.3	100	4.7	6800	2000 to 5000
KC	162								•				•		-25	+105	400	450	82	220	3000
SG	165	•				•							•		-40	+105	6.3	50	1	470	4000
FH	169												•		-40	+105	6.3	100	6.8	18000	4000 to 10000
LY	178								•						-25	+105	250	450	12	150	5000
KL	182	•										•			-40	+105	160	400	3.3	330	5000
															-25	+105	450	500	2.2	180	
GH	189	•			•										-55	+105	6.3	100	1	12000	5000 to 10000
KH	205											•			-40	+105	10	400	6.8	3300	5000 to 10000
															-25	+105	450		6.8	100	
FK	212	•										•			-40	+105	160	450	1	330	6000 to 8000
															-25	+105	500		4.7	120	
ZH	220												•		-40	+105	6.3	100	8.2	8200	6000 to 10000
FL	227	•										•			-40	+105	160	450	1	680	8000 to 12000
															-25	+105	500		10	68	
HY	237								•						-25	+105	250	450	12	120	10000
GT	241	•										•			-40	+105	10	100	1	330	10000
LE	244											•			-40	+105	160	450	1	68	12000 to 20000
TH	248	•	•												-40	+125	10	400	1	8200	1000 to 3000
															-25	+125	450		1	47	
TE	259	•		•											-40	+130	10	400	2.2	4700	1000 to 3000
TU	267	•		•								•	•		-40	+135	25	100	160	12000	2000 to 3000

TU: New Product Series

RF SERIES ■ PULSE & PHOTO-FLASH TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Small dimensions and low leakage current
- Optimized material combination to achieve low ESR and low dissipation factor
- Especially for impulse applications as photo flash generators, intense pulse light hair removers, laser power supplies and warning beacons



SPECIFICATIONS

Items		Performance Characteristics
Operating Temperature Range		-20 ~ +55°C
Rated Voltage Range	V _R	330 ~ 350V DC
Capacitance Range	C _R	100 ~ 450μF
Cap. Tolerance	ΔC	-10 ~ +20% (120Hz ■ 25°C)
Leakage Current (20°C ■ V _R applied)	I _{LEAK}	≤ 1·C _R (μA) ■ After 5 minutes [I _{LEAK} (μA) ; C _R (μF)]
Dissipation Factor % (20°C ■ 120Hz)	tanδ	8% max.

Lifetime Test		
Charge and Discharge 5 ~ 35°C (V _R applied)	Test	5 000 times
	Cycles	30 sec
	R _D	0.7 ~ 1Ω
	ΔC/C _R	≤ ±10% of initial measured value
	tanδ	≤ 150% of initial specified value
	I _{Leak}	≤ 150% of initial specified value
Shelf Life 55°C (V _R = 0)	Test	1 000 hours
	ΔC/C _R	≤ ±10% of initial measured value
	tanδ	≤ 150% of initial specified value
	I _{Leak}	≤ 150% of initial specified value
Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4		

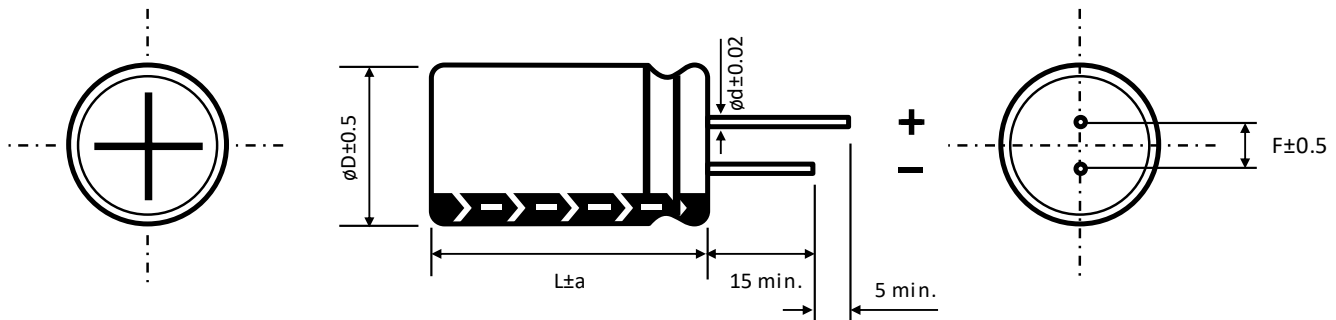
Pulse and flash-light capacitors are specially adapted to the application.



The data listed in the upper table and the following page are therefore **only a guide** for possible designs of the capacitance, voltage, dimensions, pulse frequency.

Please contact our CapXon product specialists for further details.

DIMENSIONS ▪ All dimensions in mm



ø D	8	10	12	13	14	16	18	20
F	3.5	5	5	5	5	7.5	7.5	7.5
ø d	0.6	0.6	0.8	0.8	0.8	0.8	0.8	0.8
a	1.5							

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

SS SERIES ▪ 5MM HEIGHT, STANDARD 85°C TYPE

KEY FEATURES

- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 85°C ▪ 1000 hours
- Optimized for high density insertion
- Low height ▪ 5mm
- Miniaturized for space critical applications



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +85°C							
Rated Voltage Range	V_R	4 ~ 50V DC							
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$							
Capacitance Range	C_R	1 ~ 330 μ F							
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)							
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 1 minute [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]							
Dissipation Factor % (20°C ▪ 120Hz)	$\tan \delta$	V_R (V DC)	4	6.3	10	16	25	35	50
		$\tan \delta$ (%)	35	24	20	16	14	12	10
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	4	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	7	4	3	2	2	2	2
		Z-40°C/Z+20°C	15	8	8	4	4	3	3

Lifetime Test			
Endurance 85°C (V_R applied)	Test	1000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 50 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
I_{Leak}	\leq the initial specified value		
Shelf Life 85°C ($V_R = 0$)	Test	1000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 50 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	1k	$\geq 10k$
1 ~ 68	0.8	1	1.3	1.5
100 ~ 330	0.8	1	1.15	1.2

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
4	10	4	5	11	SS100M004B050A
	15	4	5	17	SS150M004B050A
	22	4	5	21	SS220M004B050A
	33	4	5	28	SS330M004B050A
	47	4	5	33	SS470M004B050A
	68	5	5	43	SS680M004C050A
	68	6.3	5	48	SS680M004E050A
	100	5	5	52	SS101M004C050A
	220	6.3	5	78	SS221M004E050A
	330	8	5	142	SS331M004F050A
6.3	10	4	5	14	SS100M6R3B050A
	15	4	5	17	SS150M6R3B050A
	22	4	5	24	SS220M6R3B050A
	33	4	5	33	SS330M6R3B050A
	33	5	5	37	SS330M6R3C050A
	47	5	5	39	SS470M6R3C050A
	68	6.3	5	53	SS680M6R3E050A
	100	6.3	5	65	SS101M6R3E050A
	220	6.3	5	90	SS221M6R3E050A
	220	8	5	115	SS221M6R3F050A
330	8	5	145	SS331M6R3F050A	
10	6.8	4	5	11	SS6R8M010B050A
	10	4	5	17	SS100M010B050A
	15	4	5	21	SS150M010B050A
	22	4	5	30	SS220M010B050A
	22	5	5	33	SS220M010C050A
	33	5	5	39	SS330M010C050A
	47	5	5	42	SS470M010C050A
	47	6.3	5	46	SS470M010E050A
	68	6.3	5	56	SS680M010E050A
	100	6.3	5	76	SS101M010E050A
220	8	5	138	SS221M010F050A	
16	4.7	4	5	11	SS4R7M016B050A
	6.8	4	5	13	SS6R8M016B050A
	10	4	5	20	SS100M016B050A
	15	5	5	26	SS150M016C050A
	22	4	5	33	SS220M016B050A
	22	5	5	35	SS220M016C050A
	33	5	5	42	SS330M016C050A
	33	6.3	5	46	SS330M016E050A
	47	6.3	5	58	SS470M016E050A
	68	6.3	5	65	SS680M016E050A
100	6.3	5	86	SS101M016E050A	
100	8	5	92	SS101M016F050A	

See "PACKAGING INFORMATION" to taped or formed products.

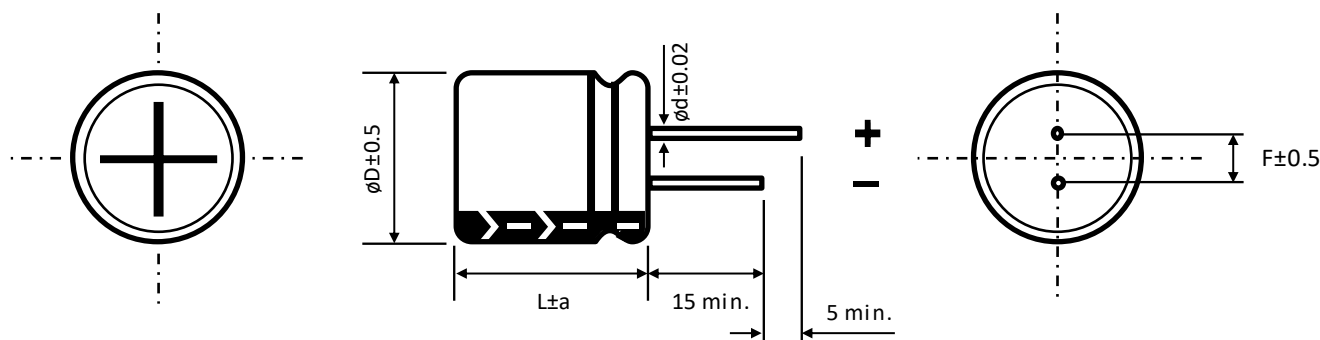
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
25	3.3	4	5	10	SS3R3M025B050A
	4.7	4	5	15	SS4R7M025B050A
	6.8	4	5	17	SS6R8M025B050A
	10	4	5	27	SS100M025B050A
	10	5	5	28	SS100M025C050A
	15	5	5	30	SS150M025C050A
	15	6.3	5	33	SS150M025E050A
	22	6.3	5	44	SS220M025E050A
	33	6.3	5	52	SS330M025E050A
	47	6.3	5	62	SS470M025E050A
	68	8	5	90	SS680M025F050A
100	8	5	108	SS101M025F050A	
35	2.2	4	5	8.4	SS2R2M035B050A
	3.3	4	5	11	SS3R3M035B050A
	4.7	4	5	18	SS4R7M035B050A
	6.8	5	5	20	SS6R8M035C050A
	10	5	5	29	SS100M035C050A
	15	6.3	5	33	SS150M035E050A
	22	6.3	5	46	SS220M035E050A
	33	8	5	63	SS330M035F050A
47	8	5	83	SS470M035F050A	
50	1	4	5	6.2	SS010M050B050A
	1.5	4	5	7	SS1R5M050B050A
	2.2	4	5	9	SS2R2M050B050A
	3.3	4	5	14	SS3R3M050B050A
	4.7	5	5	20	SS4R7M050C050A
	6.8	6.3	5	25	SS6R8M050E050A
	10	6.3	5	30	SS100M050E050A
	15	6.3	5	37	SS150M050E050A
	22	6.3	5	48	SS220M050E050A
	22	8	5	52	SS220M050F050A
33	8	5	70	SS330M050F050A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.45	0.45
a	1	1	1	1

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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For further information, please visit our website www.capxongroup.com or contact CapXon directly.

SM SERIES ■ 7MM HEIGHT, STANDARD 85°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 85°C ■ 1000 hours
- Optimized for high density insertion
- Low height ■ 7mm
- Miniaturized for space critical applications



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +85°C								
Rated Voltage Range	V_R	4 ~ 63V DC								
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$								
Capacitance Range	C_R	1 ~ 470 μ F								
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)								
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 1 minute [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C - 120Hz)	$\tan\delta$	V_R (V DC)	4	6.3	10	16	25	35	50	63
		$\tan\delta$ (%)	25	22	20	16	14	12	10	9
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	4	6.3	10	16	25	35	50	63
		Z-25°C/Z+20°C	7	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	15	8	6	4	4	3	3	3

Lifetime Test			
Endurance 85°C (V_R applied)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 63 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan\delta$	$\leq 200\%$ of initial specified value	
I_{Leak}	\leq the initial specified value		
Shelf Life 85°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 63 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan\delta$	$\leq 200\%$ of initial specified value	
I_{Leak}	\leq the initial specified value		
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 470$	0.8	1	1.16	1.25	1.35	1.38

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
4	33	4	7	33	SM330M004B070A
	47	4	7	35	SM470M004B070A
	68	4	7	42	SM680M004B070A
	100	4	7	55	SM101M004B070A
	100	5	7	61	SM101M004C070A
	150	5	7	72	SM151M004C070A
	220	6.3	7	110	SM221M004E070A
	330	6.3	7	120	SM331M004E070A
	330	8	7	165	SM331M004F070A
	470	8	7	235	SM471M004F070A
6.3	15	4	7	28	SM150M6R3B070A
	22	4	7	35	SM220M6R3B070A
	33	4	7	40	SM330M6R3B070A
	33	5	7	42	SM330M6R3C070A
	47	4	7	46	SM470M6R3B070A
	47	5	7	48	SM470M6R3C070A
	68	5	7	50	SM680M6R3C070A
	100	5	7	75	SM101M6R3C070A
	100	6.3	7	80	SM101M6R3E070A
	150	6.3	7	82	SM151M6R3E070A
	150	8	7	85	SM151M6R3F070A
	220	6.3	7	120	SM221M6R3E070A
	220	8	7	133	SM221M6R3F070A
	330	8	7	160	SM331M6R3F070A
10	15	4	7	32	SM150M010B070A
	22	4	7	36	SM220M010B070A
	22	5	7	38	SM220M010C070A
	33	4	7	43	SM330M010B070A
	33	5	7	45	SM330M010C070A
	47	4	7	50	SM470M010B070A
	47	5	7	58	SM470M010C070A
	68	5	7	60	SM680M010C070A
	100	5	7	82	SM101M010C070A
	100	6.3	7	90	SM101M010E070A
	150	6.3	7	95	SM151M010E070A
	220	6.3	7	136	SM221M010E070A
	220	8	7	140	SM221M010F070A
	330	8	7	182	SM331M010F070A
16	4.7	4	7	15	SM4R7M016B070A
	6.8	4	7	20	SM6R8M016B070A
	10	4	7	28	SM100M016B070A
	15	4	7	35	SM150M016B070A
	22	4	7	40	SM220M016B070A
	22	5	7	42	SM220M016C070A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	∅ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
16	33	4	7	45	SM330M016B070A
	33	5	7	55	SM330M016C070A
	47	5	7	65	SM470M016C070A
	47	6.3	7	68	SM470M016E070A
	68	6.3	7	70	SM680M016E070A
	100	6.3	7	98	SM101M016E070A
	100	8	7	105	SM101M016F070A
	150	8	7	111	SM151M016F070A
25	220	8	7	152	SM221M016F070A
	4.7	4	7	20	SM4R7M025B070A
	6.8	4	7	22	SM6R8M025B070A
	10	4	7	30	SM100M025B070A
	15	5	7	37	SM150M025C070A
	22	4	7	46	SM220M025B070A
	22	5	7	50	SM220M025C070A
	33	5	7	52	SM330M025C070A
	33	6.3	7	58	SM330M025E070A
	47	6.3	7	71	SM470M025E070A
35	68	6.3	7	79	SM680M025E070A
	100	8	7	113	SM101M025F070A
	3.3	4	7	18	SM3R3M035B070A
	4.7	4	7	22	SM4R7M035B070A
	6.8	5	7	25	SM6R8M035C070A
	10	4	7	31	SM100M035B070A
	10	5	7	33	SM100M035C070A
	15	5	7	37	SM150M035C070A
	22	5	7	47	SM220M035C070A
	22	6.3	7	55	SM220M035E070A
	33	6.3	7	65	SM330M035E070A
	33	8	7	68	SM330M035F070A
50	47	8	7	85	SM470M035F070A
	68	8	7	88	SM680M035F070A
	100	8	7	119	SM101M035F070A
	1	4	7	10	SM010M050B070A
	1.5	4	7	13	SM1R5M050B070A
	2.2	4	7	17	SM2R2M050B070A
	3.3	4	7	23	SM3R3M050B070A
	4.7	4	7	24	SM4R7M050B070A

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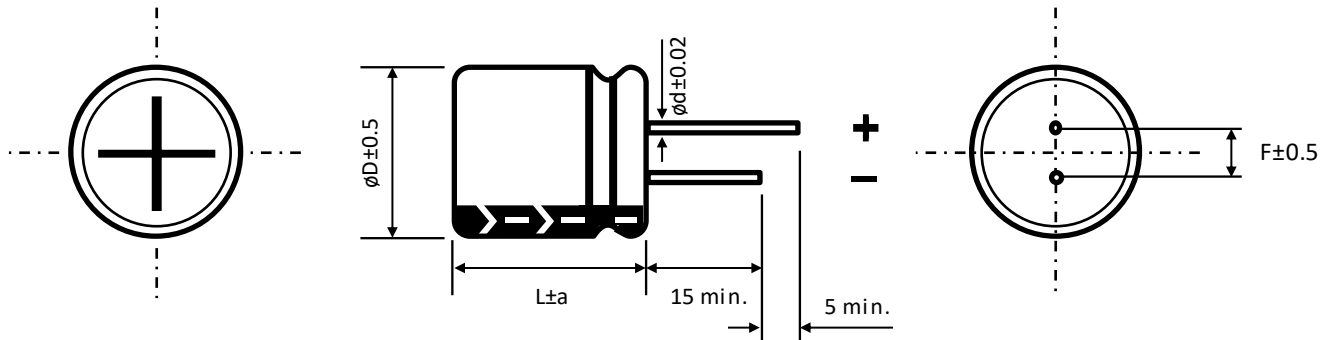
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
50	4.7	5	7	26	SM4R7M050C070A
	6.8	5	7	28	SM6R8M050C070A
	10	5	7	35	SM100M050C070A
	10	6.3	7	38	SM100M050E070A
	15	6.3	7	42	SM150M050E070A
	22	6.3	7	59	SM220M050E070A
	22	8	7	63	SM220M050F070A
	33	8	7	75	SM330M050F070A
63	47	8	7	88	SM470M050F070A
	1	4	7	12	SM010M063B070A
	1.5	4	7	14	SM1R5M063B070A
	2.2	4	7	18	SM2R2M063B070A
	3.3	5	7	25	SM3R3M063C070A
	4.7	5	7	30	SM4R7M063C070A
	4.7	6.3	7	33	SM4R7M063E070A
	6.8	6.3	7	31	SM6R8M063E070A
	10	6.3	7	48	SM100M063E070A
	15	8	7	45	SM150M063F070A
22	8	7	65	SM220M063F070A	

See "PACKAGING INFORMATION" to taped or formed products.



DIMENSIONS - All dimensions in mm



ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.5	0.5
a	1	1	1	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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SR SERIES ■ 7MM HEIGHT, AUDIO 85°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 85°C ■ 1000 hours
- Optimized for high density insertion
- Low height ■ 7mm
- Especially for audio applications



SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +85°C						
Rated Voltage Range	V_R	6.3 ~ 50V DC						
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$						
Capacitance Range	C_R	1 ~ 220 μ F						
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]						
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	6.3	10	16	25	35	50
		$\tan \delta$ (%)	24	20	16	14	12	10
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	4	3	3

Lifetime Test			
Endurance 85°C (V_R applied)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 85°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4		

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	300	1k	$\geq 10k$
1 ~ 220	0.7	1	1.17	1.36	1.5

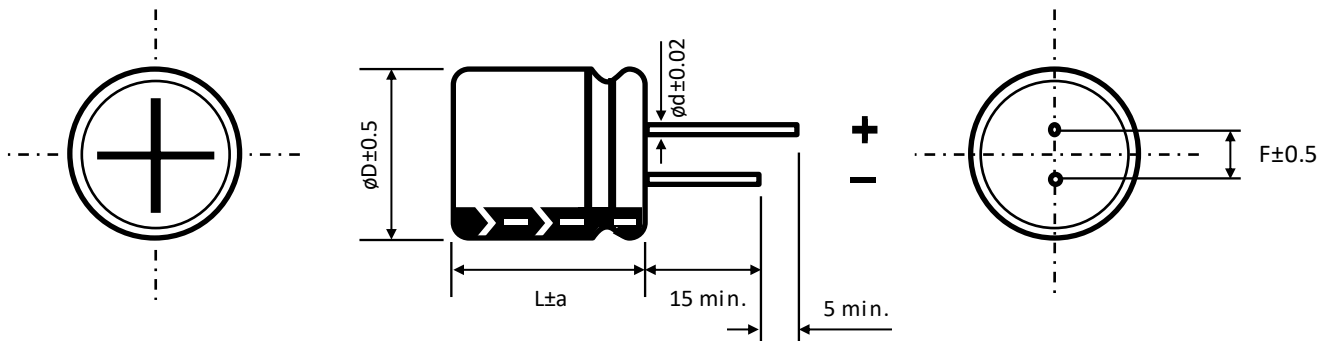
STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
6.3	22	4	7	34	SR220M6R3B070A
	33	4	7	40	SR330M6R3B070A
	47	4	7	47	SR470M6R3B070A
	100	5	7	76	SR101M6R3C070A
	220	6.3	7	124	SR221M6R3E070A
10	22	4	7	35	SR220M010B070A
	33	4	7	45	SR330M010B070A
	47	5	7	59	SR470M010C070A
	100	6.3	7	88	SR101M010E070A
16	10	4	7	28	SR100M016B070A
	22	4	7	39	SR220M016B070A
	33	5	7	55	SR330M016C070A
	47	5	7	65	SR470M016C070A
	100	6.3	7	98	SR101M016E070A
25	10	4	7	29	SR100M025B070A
	22	5	7	49	SR220M025C070A
	33	5	7	55	SR330M025C070A
	47	6.3	7	71	SR470M025E070A
35	4.7	4	7	23	SR4R7M035B070A
	10	4	7	31	SR100M035B070A
	22	5	7	49	SR220M035C070A
	33	6.3	7	65	SR330M035E070A
50	1	4	7	10	SR010M050B070A
	2.2	4	7	18	SR2R2M050B070A
	3.3	4	7	23	SR3R3M050B070A
	4.7	4	7	26	SR4R7M050B070A
	10	5	7	35	SR100M050C070A
	22	6.3	7	58	SR220M050E070A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ϕD	4	5	6.3
F	1.5	2	2.5
ϕd	0.45	0.45	0.5
a	1	1	1

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SW SERIES ■ 5MM HEIGHT, AUDIO 85°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 85°C ■ 1000 hours
- Optimized for high density insertion
- Low height ■ 5mm
- Especially for audio applications



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +85°C							
Rated Voltage Range	V_R	4 ~ 50V DC							
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$							
Capacitance Range	C_R	1 ~ 470μF							
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)							
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or $3\mu A$, whichever is greater ■ After 2 minutes [I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]							
Dissipation Factor % (20°C ■ 120Hz)	$\tan\delta$	V_R (V DC)	4	6.3	10	16	25	35	50
		$\tan\delta$ (%)	35	24	20	16	14	12	10
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	4	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	7	4	3	2	2	2	2
		Z-40°C/Z+20°C	15	8	6	4	4	3	3

Lifetime Test									
Endurance 85°C (V_R applied)	Test	1000 hours							
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value							
	$\tan\delta$	$\leq 200\%$ of initial specified value							
	I_{Leak}	\leq the initial specified value							
Shelf Life 85°C ($V_R = 0$)	Test	1000 hours							
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value							
	$\tan\delta$	$\leq 200\%$ of initial specified value							
	I_{Leak}	\leq the initial specified value							
			Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4						

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	300	1k	≥ 10k
1 ~ 470	0.7	1	1.17	1.36	1.5

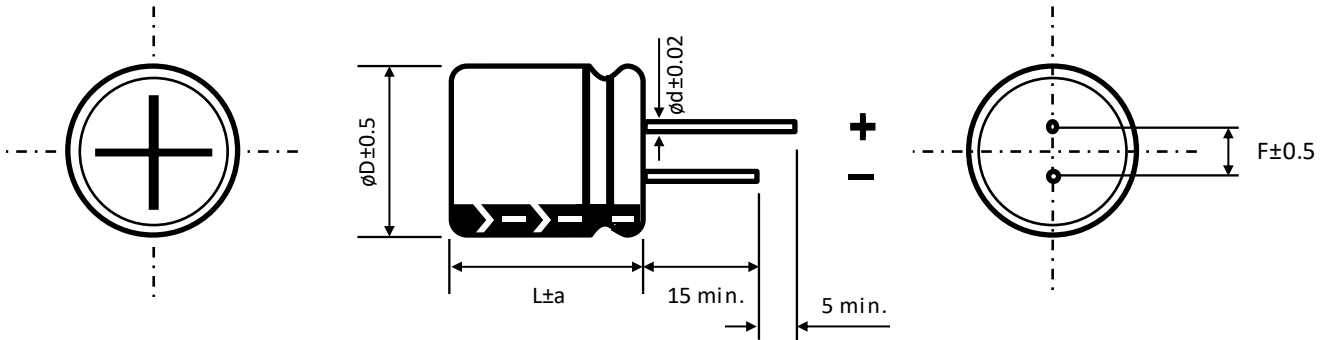
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
4	33	4	5	30	SW330M004B050A
	47	4	5	33	SW470M004B050A
	100	5	5	54	SW101M004C050A
	220	6.3	5	87	SW221M004E050A
	330	8	5	143	SW331M004F050A
	470	8	5	185	SW471M004F050A
6.3	22	4	5	26	SW220M6R3B050A
	33	5	5	37	SW330M6R3C050A
	47	5	5	42	SW470M6R3C050A
	100	6.3	5	67	SW101M6R3E050A
	220	8	5	112	SW221M6R3F050A
	330	8	5	170	SW331M6R3F050A
10	22	5	5	33	SW220M010C050A
	33	5	5	40	SW330M010C050A
	47	6.3	5	49	SW470M010E050A
	100	8	5	80	SW101M010F050A
	220	8	5	136	SW221M010F050A
16	10	4	5	21	SW100M016B050A
	22	5	5	36	SW220M016C050A
	33	6.3	5	47	SW330M016E050A
	47	6.3	5	58	SW470M016E050A
	100	8	5	92	SW101M016F050A
25	4.7	4	5	15	SW4R7M025B050A
	10	5	5	27	SW100M025C050A
	22	6.3	5	43	SW220M025E050A
	33	6.3	5	52	SW330M025E050A
	47	8	5	70	SW470M025F050A
	100	8	5	109	SW101M025F050A
35	3.3	4	5	13	SW3R3M035B050A
	4.7	4	5	18	SW4R7M035B050A
	10	5	5	29	SW100M035C050A
	22	6.3	5	46	SW220M035E050A
	33	8	5	62	SW330M035F050A
	47	8	5	81	SW470M035F050A
50	1	4	5	7.3	SW010M050B050A
	2.2	4	5	11	SW2R2M050B050A
	3.3	4	5	15	SW3R3M050B050A
	4.7	5	5	20	SW4R7M050C050A
	10	6.3	5	31	SW100M050E050A
	22	8	5	52	SW220M050F050A
	33	8	5	70	SW330M050F050A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ø D	4	5	6.3	8
F	1.5	2	2.5	3.5
ø d	0.45	0.45	0.45	0.45
a	1	1	1	1

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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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For further information, please visit our website www.capxongroup.com or contact CapXon directly.

SH SERIES ■ 7MM, LONG LIFE 85°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 85°C ■ 2000 hours
- Optimized for high density insertion
- Low height ■ 7mm
- Miniaturized for space critical applications



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +85°C								
Rated Voltage Range	V_R	4 ~ 63V DC								
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$								
Capacitance Range	C_R	1 ~ 470 μ F								
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)								
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 1 minute [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C - 120Hz)	$\tan \delta$	V_R (V DC)	4	6.3	10	16	25	35	50	63
		$\tan \delta$ (%)	25	22	20	16	14	12	10	9
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	4	6.3	10	16	25	35	50	63
		Z-25°C/Z+20°C	7	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	15	8	6	4	4	3	3	3

Lifetime Test			
Endurance 85°C (V_R applied)	Test	2000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 63 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 85°C ($V_R = 0$)	Test	1000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 63 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 470$	0.8	1	1.16	1.25	1.35	1.38

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
4	22	4	7	23	SH220M004B070A
	33	4	7	26	SH330M004B070A
	47	4	7	35	SH470M004B070A
	68	5	7	55	SH680M004C070A
	100	5	7	58	SH101M004C070A
	220	6.3	7	65	SH221M004E070A
	330	6.3	7	90	SH331M004E070A
	470	8	7	120	SH471M004F070A
6.3	22	4	7	31	SH220M6R3B070A
	33	4	7	32	SH330M6R3B070A
	33	5	7	35	SH330M6R3C070A
	47	4	7	40	SH470M6R3B070A
	47	5	7	47	SH470M6R3C070A
	68	5	7	55	SH680M6R3C070A
	100	5	7	65	SH101M6R3C070A
	100	6.3	7	75	SH101M6R3E070A
	220	6.3	7	70	SH221M6R3E070A
	220	8	7	90	SH221M6R3F070A
	330	8	7	120	SH331M6R3F070A
10	15	4	7	28	SH150M010B070A
	22	4	7	35	SH220M010B070A
	33	4	7	40	SH330M010B070A
	33	5	7	45	SH330M010C070A
	47	4	7	47	SH470M010B070A
	47	5	7	51	SH470M010C070A
	68	5	7	60	SH680M010C070A
	68	6.3	7	68	SH680M010E070A
	100	5	7	80	SH101M010C070A
	100	6.3	7	90	SH101M010E070A
	220	6.3	7	105	SH221M010E070A
	220	8	7	125	SH221M010F070A
16	6.8	4	7	20	SH6R8M016B070A
	10	4	7	30	SH100M016B070A
	15	4	7	32	SH150M016B070A
	22	4	7	37	SH220M016B070A
	22	5	7	42	SH220M016C070A
	33	4	7	45	SH330M016B070A
	33	5	7	50	SH330M016C070A
	47	5	7	61	SH470M016C070A
	47	6.3	7	67	SH470M016E070A
	68	6.3	7	72	SH680M016E070A
	100	6.3	7	95	SH101M016E070A
	100	8	7	105	SH101M016F070A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
25	4.7	4	7	17	SH4R7M025B070A
	6.8	4	7	21	SH6R8M025B070A
	10	4	7	30	SH100M025B070A
	10	5	7	33	SH100M025C070A
	15	5	7	38	SH150M025C070A
	22	5	7	45	SH220M025C070A
	22	6.3	7	48	SH220M025E070A
	33	5	7	52	SH330M025C070A
	33	6.3	7	60	SH330M025E070A
	47	6.3	7	68	SH470M025E070A
	47	8	7	72	SH470M025F070A
	68	6.3	7	75	SH680M025E070A
100	8	7	115	SH101M025F070A	
35	4.7	4	7	22	SH4R7M035B070A
	6.8	4	7	24	SH6R8M035B070A
	6.8	5	7	28	SH6R8M035C070A
	10	4	7	30	SH100M035B070A
	10	5	7	35	SH100M035C070A
	15	5	7	38	SH150M035C070A
	15	6.3	7	45	SH150M035E070A
	22	5	7	50	SH220M035C070A
	22	6.3	7	58	SH220M035E070A
	33	6.3	7	54	SH330M035E070A
	33	8	7	68	SH330M035F070A
	47	8	7	80	SH470M035F070A
68	8	7	85	SH680M035F070A	
50	1	4	7	10	SH010M050B070A
	1.5	4	7	13	SH1R5M050B070A
	2.2	4	7	19	SH2R2M050B070A
	3.3	4	7	24	SH3R3M050B070A
	4.7	4	7	27	SH4R7M050B070A
	4.7	5	7	29	SH4R7M050C070A
	6.8	5	7	32	SH6R8M050C070A
	6.8	6.3	7	33	SH6R8M050E070A
	10	5	7	35	SH100M050C070A
	10	6.3	7	38	SH100M050E070A
	15	6.3	7	52	SH150M050E070A
	22	6.3	7	60	SH220M050E070A
22	8	7	63	SH220M050F070A	
33	8	7	78	SH330M050F070A	

See "PACKAGING INFORMATION" to taped or formed products.

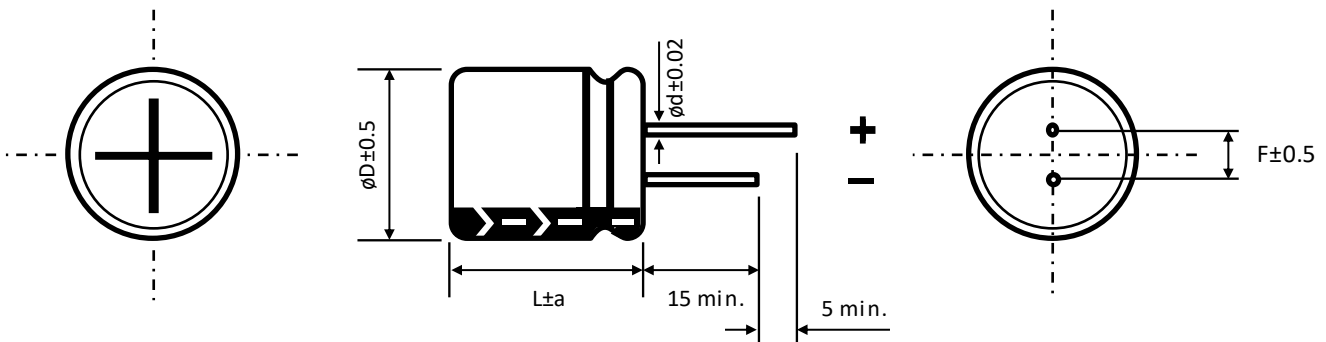
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
63	1	4	7	12	SH010M063B070A
	1.5	4	7	14	SH1R5M063B070A
	2.2	4	7	19	SH2R2M063B070A
	3.3	5	7	25	SH3R3M063C070A
	4.7	5	7	29	SH4R7M063C070A
	4.7	6.3	7	33	SH4R7M063E070A
	6.8	6.3	7	35	SH6R8M063E070A
	10	6.3	7	40	SH100M063E070A
	15	8	7	55	SH150M063F070A
22	8	7	65	SH220M063F070A	

See "PACKAGING INFORMATION" to taped or formed products



DIMENSIONS - All dimensions in mm



ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.5	0.5
a	1	1	1	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
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RW SERIES ■ STANDARD, AUDIO 85°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 85°C ■ 2000 hours
- Optimized for cost effective applications
- High capacitance range
- Especially for audio applications



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +85°C								
Rated Voltage Range	V_R	6.3 ~ 100V DC								
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$								
Capacitance Range	C_R	1 ~ 33000 μ F								
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)								
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 1 minute [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	6.3	10	16	25	35	50	63	100
		$\tan \delta$ (%)	28	24	20	16	14	12	10	8
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value								
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	5	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	12	10	8	5	4	3	3	3
		For capacitance > 1000 μ F								
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value							
Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value									

Lifetime Test			
Endurance 85°C (V_R applied)	Test	2000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 85°C ($V_R = 0$)	Test	1000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4		

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	300	1k	10k
$C_R \leq 47$	0.75	1	1.35	1.57	1.2
$100 < C_R \leq 470$	0.8	1	1.23	1.34	1.5
$1000 < C_R \leq 33000$	0.85	1	1.1	1.13	1.15

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
6.3	330	6.3	11	282	RW331M6R3E110A
	470	6.3	11	330	RW471M6R3E110A
	1000	8	11.5	560	RW102M6R3F115A
	2200	10	20	1015	RW222M6R3G200A
	3300	10	20	1245	RW332M6R3G200A
	4700	13	20	1435	RW472M6R3I200A
	6800	13	25	1600	RW682M6R3I250A
	10000	16	25	2000	RW103M6R3J250A
	15000	16	35.5	2620	RW153M6R3J355A
	22000	18	40	3220	RW223M6R3K400A
33000	22	50	3900	RW333M6R3M500A	
10	100	5	11	162	RW101M010C110A
	220	6.3	11	247	RW221M010E110A
	330	6.3	11	300	RW331M010E110A
	470	6.3	11	355	RW471M010E110A
	1000	10	12.5	600	RW102M010G125A
	2200	10	20	1075	RW222M010G200A
	3300	13	20	1410	RW332M010I200A
	4700	13	25	1800	RW472M010I250A
	6800	16	25	2200	RW682M010J250A
	10000	16	35.5	2450	RW103M010J355A
	15000	18	35.5	2900	RW153M010K355A
	22000	22	40	3700	RW223M010M400A
33000	22	50	4300	RW333M010M500A	
16	100	5	11	155	RW101M016C110A
	220	6.3	11	265	RW221M016E110A
	330	8	11.5	365	RW331M016F115A
	470	8	11.5	445	RW471M016F115A
	1000	10	16	780	RW102M016G160A
	2200	13	20	1300	RW222M016I200A
	3300	13	25	1700	RW332M016I250A
	4700	16	25	2100	RW472M016J250A
	6800	16	35.5	2520	RW682M016J355A
	10000	18	35.5	2670	RW103M016K355A
	15000	22	40	3400	RW153M016M400A
	22000	22	50	4200	RW223M016M500A
	33000	22	50	4200	RW223M016M500A
25	47	5	11	117	RW470M025C110A
	100	6.3	11	187	RW101M025E110A
	220	8	11.5	325	RW221M025F115A
	330	10	12.5	415	RW331M025G125A
	470	10	12.5	535	RW471M025G125A
	1000	10	20	950	RW102M025G200A
	2200	13	25	1550	RW222M025I250A
	3300	16	25	1675	RW332M025J250A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
25	4700	16	31.5	2380	RW472M025J315A
	6800	18	35.5	2650	RW682M025K355A
	10000	22	40	3000	RW103M025M400A
	15000	22	50	3800	RW153M025M500A
35	33	5	11	107	RW330M035C110A
	47	5	11	125	RW470M035C110A
	100	6.3	11	205	RW101M035E110A
	220	10	12.5	370	RW221M035G125A
	330	10	12.5	475	RW331M035G125A
	470	10	16	630	RW471M035G160A
	1000	13	20	1120	RW102M035I200A
	2200	16	25	1650	RW222M035J250A
	3300	16	35.5	2270	RW332M035J355A
	4700	18	35.5	2540	RW472M035K355A
	6800	22	40	3000	RW682M035M400A
50	1	5	11	12	RW010M050C110A
	2.2	5	11	24	RW2R2M050C110A
	3.3	5	11	35	RW3R3M050C110A
	4.7	5	11	41	RW4R7M050C110A
	10	5	11	65	RW100M050C110A
	22	5	11	97	RW220M050C110A
	33	5	11	120	RW330M050C110A
	47	6.3	11	150	RW470M050E110A
	100	8	11.5	255	RW101M050F115A
	220	10	12.5	417	RW221M050G125A
	330	10	16	580	RW331M050G160A
	470	13	20	770	RW471M050I200A
	1000	13	25	1320	RW102M050I250A
	2200	16	35.5	2090	RW222M050J355A
	3300	18	35.5	2430	RW332M050K355A
	4700	22	40	2900	RW472M050M400A
6800	22	50	3500	RW682M050M500A	
63	1	5	11	15	RW010M063C110A
	2.2	5	11	28	RW2R2M063C110A
	3.3	5	11	35	RW3R3M063C110A
	4.7	5	11	45	RW4R7M063C110A

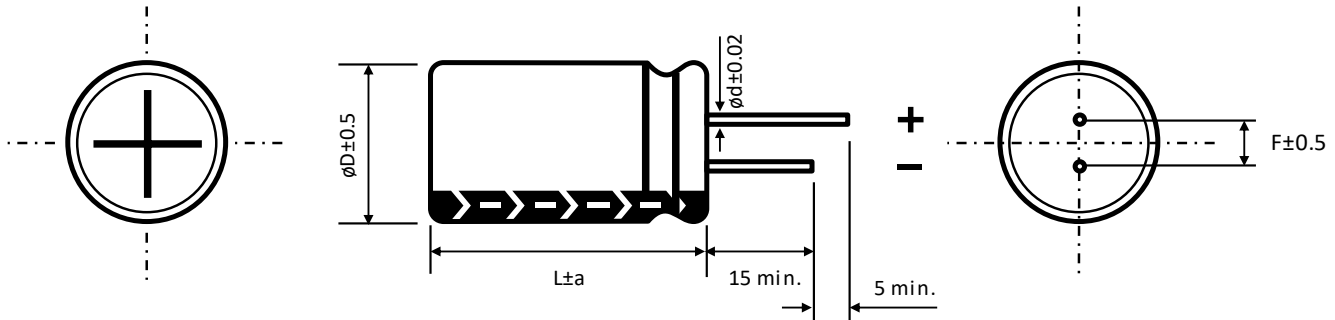
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
63	10	5	11	70	RW100M063C110A
	22	5	11	107	RW220M063C110A
	33	6.3	11	137	RW330M063E110A
	47	6.3	11	172	RW470M063E110A
	100	10	12.5	300	RW101M063G125A
	220	10	16	485	RW221M063G160A
	330	10	20	670	RW331M063G200A
	470	13	20	880	RW471M063I200A
	1000	16	25	1350	RW102M063J250A
	2200	18	35.5	2220	RW222M063K355A
	3300	22	40	2700	RW332M063M400A
4700	22	50	3400	RW472M063M500A	
100	1	5	11	21	RW010M100C110A
	2.2	5	11	31	RW2R2M100C110A
	3.3	5	11	40	RW3R3M100C110A
	4.7	5	11	46	RW4R7M100C110A
	10	6.3	11	75	RW100M100E110A
	22	6.3	11	125	RW220M100E110A
	33	8	11.5	165	RW330M100F115A
	47	10	12.5	220	RW470M100G125A
	100	10	20	370	RW101M100G200A
	220	13	25	615	RW221M100I250A
	330	13	25	755	RW331M100I250A
	470	16	25	1000	RW471M100J250A
	1000	18	40	1500	RW102M100K400A
	2200	22	50	2400	RW222M100M500A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	5	6.3	8	10	13	16	18	22
F	2	2.5	3.5	5	5	7.5	7.5	10
ϕd	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				
a	$\phi D < 16$		$\phi D = 16$		$\phi D = 18$		$\phi D > 18$	
	1.5		L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5	2	
			1.5	2	1.5	2		

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General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

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NR SERIES ▪ STANDARD, BI-POLAR, AUDIO 85°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 85°C ▪ 2000 hours
- Bi-Polar, Non-polarized type
- Excellent frequency characteristics
- Especially for audio applications



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +85°C								
Rated Voltage Range	V_R	6.3 ~ 100V DC								
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$								
Capacitance Range	C_R	1 ~ 1000 μ F								
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)								
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.03 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 1 minute [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C ▪ 120Hz)	tan δ	V_R (V DC)	6.3	10	16	25	35	50	63	100
		tan δ (%)	24	20	16	16	14	12	10	10
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value								
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	4	3	3	3	3
		For capacitance > 1000 μ F								
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value							
Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value									
Lifetime Test										
Endurance 85°C (V_R applied)	Test	2000 hours								
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
	tan δ	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
Shelf Life 85°C ($V_R = 0$)	Test	1000 hours								
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
	tan δ	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4									

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
6.3	33	5	11	62	NR330M6R3C110A
	47	6.3	11	76	NR470M6R3E110A
	100	8	11.5	154	NR101M6R3F115A
	220	10	12.5	245	NR221M6R3G125A
	330	10	16	330	NR331M6R3G160A
	470	10	20	360	NR471M6R3G200A
	1000	13	25	910	NR102M6R3I250A
10	22	5	11	60	NR220M010C110A
	33	6.3	11	70	NR330M010E110A
	47	6.3	11	95	NR470M010E110A
	100	10	12.5	188	NR101M010G125A
	220	10	16	294	NR221M010G160A
	330	10	20	360	NR331M010G200A
	470	13	20	538	NR471M010I200A
16	1000	16	25	940	NR102M010J250A
	10	5	11	43	NR100M016C110A
	22	6.3	11	71	NR220M016E110A
	33	6.3	11	90	NR330M016E110A
	47	8	11.5	122	NR470M016F115A
	100	10	12.5	208	NR101M016G125A
	220	10	20	360	NR221M016G200A
	330	13	20	480	NR331M016I200A
25	470	13	25	638	NR471M016I250A
	1000	16	31.5	1090	NR102M016J315A
	4.7	5	11	26	NR4R7M025C110A
	10	5	11	44	NR100M025C110A
	22	6.3	11	71	NR220M025E110A
	33	8	11.5	110	NR330M025F115A
	47	10	12.5	150	NR470M025G125A
	100	10	16	250	NR101M025G160A
	220	13	25	478	NR221M025I250A
35	330	13	25	615	NR331M025I250A
	470	16	25	720	NR471M025J250A
	4.7	5	11	34	NR4R7M035C110A
	10	6.3	11	48	NR100M035E110A
	22	8	11.5	96	NR220M035F115A
	33	10	12.5	135	NR330M035G125A
	47	10	12.5	154	NR470M035G125A
	100	10	20	275	NR101M035G200A
35	220	13	25	560	NR221M035I250A
	330	16	25	670	NR331M035J250A

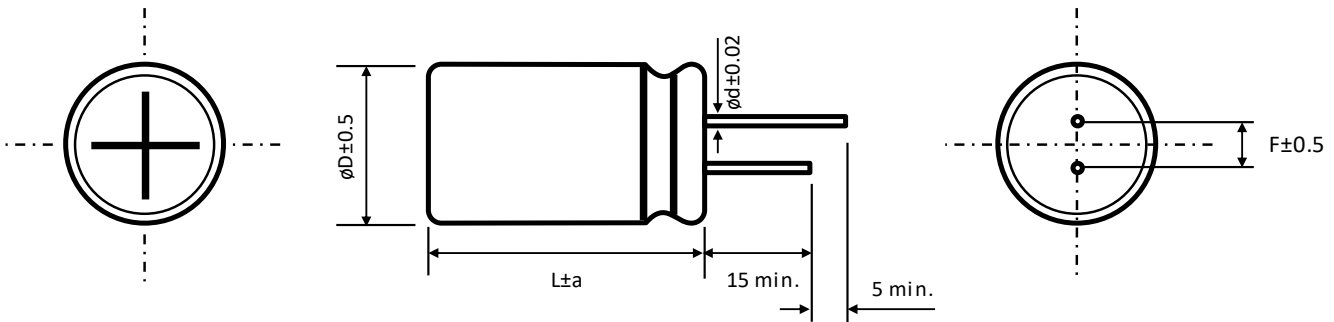
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
50	1	5	11	18	NR010M050C110A
	1.8	5	11	22	NR1R8M050C110A
	2.2	5	11	27	NR2R2M050C110A
	3.3	5	11	29	NR3R3M050C110A
	4.7	6.3	11	42	NR4R7M050E110A
	10	8	11.5	65	NR100M050F115A
	22	10	12.5	118	NR220M050G125A
	33	10	16	155	NR330M050G160A
	47	10	20	200	NR470M050G200A
	100	13	25	370	NR101M050I250A
	220	16	25	645	NR221M050J250A
330	16	31.5	760	NR331M050J315A	
63	1	6.3	11	22	NR010M063E110A
	1.8	6.3	11	26	NR1R8M063E110A
	2.2	6.3	11	33	NR2R2M063E110A
	3.3	8	11.5	36	NR3R3M063F115A
	4.7	8	11.5	44	NR4R7M063F115A
	10	8	11.5	73	NR100M063F115A
	22	10	12.5	125	NR220M063G125A
	33	10	16	170	NR330M063G160A
	47	10	20	215	NR470M063G200A
	100	13	25	384	NR101M063I250A
100	1	6.3	11	25	NR010M100E110A
	1.8	6.3	11	32	NR1R8M100E110A
	2.2	6.3	11	39	NR2R2M100E110A
	3.3	8	11.5	49	NR3R3M100F115A
	4.7	10	12.5	60	NR4R7M100G125A
	10	10	16	98	NR100M100G160A
	22	10	20	165	NR220M100G200A
	33	13	20	275	NR330M100I200A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	5	6.3	8	10	13	16
F	2	2.5	3.5	5	5	7.5
ϕd	0.5			0.6		0.8
a	1.5			1.5		1.5

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

GS SERIES ▪ STANDARD 85°C TYPE

KEY FEATURES

- **ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type**
- Endurance: 85°C ▪ 2 000 hours
- Optimized for cost effective applications
- High capacitance range
- Wide voltage range, up to 450V



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +85°C				-25 ~ +85°C				
Rated Voltage Range	V_R	6.3 ~ 100V DC				160 ~ 450V DC				
Surge Voltage	V_S	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$				$(V_R > 315V): V_S = 1.10 \cdot V_R$				
Capacitance Range	C_R	1 ~ 33000 μ F				1 ~ 560 μ F				
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)								
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 1 minute				$\leq 0.03 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 1 minute				
		[I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C ▪ 120Hz)	$\tan\delta$	V_R (V DC)	6.3	10	16	25	35	50	63	100
		$\tan\delta$ (%)	22	19	16	14	12	10	9	8
		V_R (V DC)	160	200	250	350	400	450		
		$\tan\delta$ (%)	12	12	12	15	15	17		
For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value										
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3	3	3
		V_R (V DC)	160	200	250	350	400	450		
		Z-25°C/Z+20°C	2	2	3	5	15	15		
		For capacitance > 1000 μ F								
Lifetime Test										
Endurance 85°C (V_R & I_R applied)	Test	2 000 hours								
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
	$\tan\delta$	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
Shelf Life 85°C ($V_R = 0$)	Test	1 000 hours								
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
	$\tan\delta$	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4										

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
6.3	33	5	11	72	GS330M6R3C110A
	47	5	11	88	GS470M6R3C110A
	68	5	11	110	GS680M6R3C110A
	100	5	11	143	GS101M6R3C110A
	120	5	11	165	GS121M6R3C110A
	150	5	11	198	GS151M6R3C110A
	180	5	11	220	GS181M6R3C110A
	220	5	11	242	GS221M6R3C110A
	220	6.3	11	264	GS221M6R3E110A
	330	6.3	11	330	GS331M6R3E110A
	470	6.3	11	385	GS471M6R3E110A
	470	8	11.5	418	GS471M6R3F115A
	560	8	11.5	473	GS561M6R3F115A
	680	8	11.5	539	GS681M6R3F115A
	820	8	11.5	605	GS821M6R3F115A
	1000	8	11.5	649	GS102M6R3F115A
	1000	10	12.5	715	GS102M6R3G125A
	1200	10	12.5	814	GS122M6R3G125A
	1500	10	16	935	GS152M6R3G160A
	1800	10	16	1035	GS182M6R3G160A
	2200	10	20	1135	GS222M6R3G200A
	2700	10	20	1353	GS272M6R3G200A
	3300	10	20	1430	GS332M6R3G200A
	3300	13	20	1485	GS332M6R3I200A
	3900	13	20	1529	GS392M6R3I200A
	4700	13	20	1672	GS472M6R3I200A
	4700	13	25	1870	GS472M6R3I250A
	5600	13	25	2002	GS562M6R3I250A
	6800	16	25	2310	GS682M6R3J250A
	8200	16	25	2332	GS822M6R3J250A
	10000	16	31.5	2530	GS103M6R3J315A
	12000	16	35.5	2783	GS123M6R3J355A
	15000	16	35.5	2948	GS153M6R3J355A
15000	18	35.5	3168	GS153M6R3K355A	
18000	18	35.5	3300	GS183M6R3K355A	
22000	18	40	3575	GS223M6R3K400A	
33000	22	40	4290	GS333M6R3M400A	
10	22	5	11	66	GS220M010C110A
	33	5	11	88	GS330M010C110A
	47	5	11	105	GS470M010C110A
	68	5	11	132	GS680M010C110A
	100	5	11	198	GS101M010C110A
	120	5	11	209	GS121M010C110A
	150	5	11	231	GS151M010C110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
10	180	6.3	11	253	GS181M010E110A
	220	6.3	11	294	GS221M010E110A
	330	6.3	11	363	GS331M010E110A
	470	6.3	11	418	GS471M010E110A
	470	8	11.5	440	GS471M010F115A
	560	8	11.5	506	GS561M010F115A
	680	8	11.5	572	GS681M010F115A
	820	10	12.5	671	GS821M010G125A
	1000	8	16	725	GS102M010F160A
	1000	8	20	803	GS102M010F200A
	1000	10	12.5	726	GS102M010G125A
	1200	10	16	902	GS122M010G160A
	1500	10	16	1001	GS152M010G160A
	1800	10	20	1089	GS182M010G200A
	2200	10	20	1210	GS222M010G200A
	2200	13	20	1330	GS222M010I200A
	2700	13	20	1419	GS272M010I200A
	3300	13	20	1540	GS332M010I200A
	3900	13	20	1760	GS392M010I200A
	4700	13	25	1980	GS472M010I250A
	5600	16	25	2189	GS562M010J250A
	6800	16	25	2475	GS682M010J250A
	8200	16	31.5	2541	GS822M010J315A
	10000	16	35.5	2640	GS103M010J355A
	10000	18	35.5	2915	GS103M010K355A
	12000	18	35.5	3025	GS123M010K355A
15000	18	35.5	3310	GS153M010K355A	
18000	18	40	3410	GS183M010K400A	
22000	22	40	4092	GS223M010M400A	
33000	22	50	4620	GS333M010M500A	
16	10	5	11	44	GS100M016C110A
	22	5	11	83	GS220M016C110A
	33	5	11	84	GS330M016C110A
	47	5	11	132	GS470M016C110A
	68	5	11	149	GS680M016C110A
	100	5	11	176	GS101M016C110A
	100	6.3	11	204	GS101M016E110A
	120	6.3	11	231	GS121M016E110A
	150	6.3	11	253	GS151M016E110A
	180	6.3	11	275	GS181M016E110A
	220	6.3	11	308	GS221M016E110A
	220	8	11.5	352	GS221M016F115A
	330	8	11.5	407	GS331M016F115A
	470	8	11.5	517	GS471M016F115A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
16	560	10	12.5	572	GS561M016G125A
	680	8	16	640	GS681M016F160A
	680	10	12.5	682	GS681M016G125A
	820	10	16	803	GS821M016G160A
	1000	10	16	869	GS102M016G160A
	1200	10	16	979	GS122M016G160A
	1500	10	20	1100	GS152M016G200A
	1800	13	20	1298	GS182M016I200A
	2200	13	20	1485	GS222M016I200A
	2700	13	20	1716	GS272M016I200A
	3300	13	20	1750	GS332M016I200A
	3300	13	25	1870	GS332M016I250A
	3900	16	25	2002	GS392M016J250A
	4700	16	25	2310	GS472M016J250A
	5600	16	31.5	2453	GS562M016J315A
	6800	16	31.5	2805	GS682M016J315A
	8200	16	35.5	2893	GS822M016J355A
	10000	18	35.5	2970	GS103M016K355A
	10000	18	40	3190	GS103M016K400A
	12000	18	35.5	3058	GS123M016K355A
12000	18	40	3212	GS123M016K400A	
15000	22	40	3905	GS153M016M400A	
25	4.7	5	11	34	GS4R7M025C110A
	10	5	11	50	GS100M025C110A
	22	5	11	94	GS220M025C110A
	33	5	11	105	GS330M025C110A
	47	5	11	132	GS470M025C110A
	68	6.3	11	176	GS680M025E110A
	100	6.3	11	209	GS101M025E110A
	120	6.3	11	253	GS121M025E110A
	150	6.3	11	275	GS151M025E110A
	180	6.3	11	280	GS181M025E110A
	180	8	11.5	319	GS181M025F115A
	220	6.3	11	310	GS221M025E110A
	220	8	11.5	363	GS221M025F115A
	330	8	11.5	451	GS331M025F115A
	330	10	12.5	484	GS331M025G125A
	470	8	11.5	561	GS471M025F115A
	470	10	12.5	594	GS471M025G125A
	560	10	16	693	GS561M025G160A
	680	10	16	792	GS681M025G160A
	680	10	20	825	GS681M025G200A
820	10	20	891	GS821M025G200A	
1000	10	20	1050	GS102M025G200A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
25	1200	13	20	1155	GS122M025I200A
	1500	13	20	1353	GS152M025I200A
	1800	13	20	1496	GS182M025I200A
	2200	13	25	1705	GS222M025I250A
	2700	16	25	1804	GS272M025J250A
	3300	16	25	1870	GS332M025J250A
	3300	16	31.5	2145	GS332M025J315A
	3900	16	31.5	2343	GS392M025J315A
	4700	16	31.5	2640	GS472M025J315A
	5600	18	31.5	2816	GS562M025K315A
	6800	18	35.5	2970	GS682M025K355A
	8200	18	35.5	2981	GS822M025K355A
10000	22	40	3960	GS103M025M400A	
35	4.7	5	11	44	GS4R7M035C110A
	10	5	11	66	GS100M035C110A
	22	5	11	108	GS220M035C110A
	33	5	11	121	GS330M035C110A
	47	5	11	143	GS470M035C110A
	47	6.3	11	154	GS470M035E110A
	68	6.3	11	198	GS680M035E110A
	100	6.3	11	231	GS101M035E110A
	100	8	11.5	253	GS101M035F115A
	120	8	11.5	275	GS121M035F115A
	150	8	11.5	308	GS151M035F115A
	180	8	11.5	352	GS181M035F115A
	220	8	11.5	385	GS221M035F115A
	220	10	12.5	407	GS221M035G125A
	330	10	12.5	528	GS331M035G125A
	330	10	16	539	GS331M035G160A
	470	10	16	693	GS471M035G160A
	470	10	20	748	GS471M035G200A
	560	10	20	847	GS561M035G200A
	680	10	20	891	GS681M035G200A
	820	13	20	1045	GS821M035I200A
	1000	13	20	1265	GS102M035I200A
	1200	13	20	1375	GS122M035I200A
	1500	13	25	1570	GS152M035I250A
	1800	16	25	1749	GS182M035J250A
	2200	16	25	1870	GS222M035J250A
	2200	16	31.5	1980	GS222M035J315A
	2700	16	31.5	2178	GS272M035J315A
	3300	16	31.5	2365	GS332M035J315A
	3300	16	35.5	2552	GS332M035J355A
3900	18	31.5	2640	GS392M035K315A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
35	4700	18	35.5	2860	GS472M035K355A
	5600	18	40	2915	GS562M035K400A
	6800	22	40	3630	GS682M035M400A
50	1	5	11	17	GS010M050C110A
	2.2	5	11	28	GS2R2M050C110A
	3.3	5	11	39	GS3R3M050C110A
	4.7	5	11	46	GS4R7M050C110A
	10	5	11	72	GS100M050C110A
	22	5	11	110	GS220M050C110A
	33	5	11	132	GS330M050C110A
	33	6.3	11	138	GS330M050E110A
	47	6.3	11	165	GS470M050E110A
	68	8	11.5	220	GS680M050F115A
	100	8	11.5	286	GS101M050F115A
	120	8	11.5	319	GS121M050F115A
	150	10	12.5	363	GS151M050G125A
	180	10	12.5	418	GS181M050G125A
	220	10	12.5	468	GS221M050G125A
	220	10	16	484	GS221M050G160A
	330	10	16	649	GS331M050G160A
	330	10	20	671	GS331M050G200A
	470	10	20	828	GS471M050G200A
	470	13	20	858	GS471M050I200A
	560	13	20	902	GS561M050I200A
	680	13	20	1056	GS681M050I200A
	820	13	25	1287	GS821M050I250A
	1000	13	25	1485	GS102M050I250A
	1000	16	25	1540	GS102M050J250A
	1200	16	25	1617	GS122M050J250A
	1500	16	31.5	1848	GS152M050J315A
	1800	16	31.5	2112	GS182M050J315A
	2200	16	35.5	2310	GS222M050J355A
	2700	18	31.5	2420	GS272M050K315A
3300	18	35.5	2750	GS332M050K355A	
3900	18	40	2871	GS392M050K400A	
4700	22	40	3355	GS472M050M400A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
63	1	5	11	17	GS010M063C110A
	2.2	5	11	31	GS2R2M063C110A
	3.3	5	11	39	GS3R3M063C110A
	4.7	5	11	50	GS4R7M063C110A
	10	5	11	77	GS100M063C110A
	22	6.3	11	127	GS220M063E110A
	33	6.3	11	149	GS330M063E110A
	33	8	11.5	160	GS330M063F115A
	47	6.3	11	198	GS470M063E110A
	47	8	11.5	209	GS470M063F115A
	68	8	11.5	253	GS680M063F115A
	100	10	12.5	330	GS101M063G125A
	120	10	16	396	GS121M063G160A
	150	10	16	462	GS151M063G160A
	180	10	16	528	GS181M063G160A
	220	10	16	550	GS221M063G160A
	220	10	20	583	GS221M063G200A
	330	10	20	759	GS331M063G200A
	330	13	20	781	GS331M063I200A
	470	13	20	968	GS471M063I200A
	470	13	25	1023	GS471M063I250A
	560	13	25	1056	GS561M063I250A
	560	16	25	1089	GS561M063J250A
	680	16	25	1265	GS681M063J250A
	820	16	25	1430	GS821M063J250A
	1000	16	25	1540	GS102M063J250A
	1000	16	31.5	1705	GS102M063J315A
1200	16	31.5	1837	GS122M063J315A	
1500	16	35.5	2090	GS152M063J355A	
1800	16	35.5	2255	GS182M063J355A	
2200	18	35.5	2475	GS222M063K355A	
2200	18	40	2750	GS222M063K400A	
2700	22	40	2860	GS272M063M400A	
3300	22	40	3080	GS332M063M400A	
100	1	5	11	27	GS010M100C110A
	2.2	5	11	40	GS2R2M100C110A
	3.3	5	11	48	GS3R3M100C110A
	4.7	5	11	58	GS4R7M100C110A
	10	5	11	85	GS100M100C110A
	10	6.3	11	92	GS100M100E110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
100	22	6.3	11	157	GS220M100E110A
	22	8	11.5	164	GS220M100F115A
	33	8	11.5	206	GS330M100F115A
	33	10	12.5	218	GS330M100G125A
	47	10	12.5	278	GS470M100G125A
	47	10	16	303	GS470M100G160A
	68	10	16	387	GS680M100G160A
	100	10	20	472	GS101M100G200A
	120	10	20	532	GS121M100G200A
	150	13	20	629	GS151M100I200A
	180	13	20	667	GS181M100I200A
	220	13	25	740	GS221M100I250A
	220	16	25	872	GS221M100J250A
	330	13	25	920	GS331M100I250A
	330	16	25	1040	GS331M100J250A
	470	16	25	1210	GS471M100J250A
	470	16	31.5	1330	GS471M100J315A
	560	16	35.5	1465	GS561M100J355A
	680	16	35.5	1634	GS681M100J355A
	820	18	35.5	1815	GS821M100K355A
1000	18	40	1940	GS102M100K400A	
160	1	5	11	17	GS010M160C110A
	2.2	6.3	11	30	GS2R2M160E110A
	3.3	6.3	11	36	GS3R3M160E110A
	4.7	6.3	11	40	GS4R7M160E110A
	4.7	8	11.5	48	GS4R7M160F115A
	10	8	11.5	80	GS100M160F115A
	22	10	12.5	135	GS220M160G125A
	33	10	16	180	GS330M160G160A
	47	10	20	230	GS470M160G200A
	68	13	20	360	GS680M160I200A
	100	13	25	430	GS101M160I250A
	120	16	25	530	GS121M160J250A
	150	16	25	560	GS151M160J250A
	180	16	31.5	650	GS181M160J315A
	220	16	31.5	850	GS221M160J315A
	220	16	35.5	890	GS221M160J355A
	330	18	31.5	890	GS331M160K315A
	330	18	35.5	920	GS331M160K355A
	470	18	35.5	1180	GS471M160K355A
	470	18	40	1250	GS471M160K400A
560	18	45	1320	GS561M160K450A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
200	1	6.3	11	17	GS010M200E110A
	2.2	6.3	11	30	GS2R2M200E110A
	3.3	6.3	11	36	GS3R3M200E110A
	4.7	8	11.5	51	GS4R7M200F115A
	10	10	12.5	83	GS100M200G125A
	10	10	16	88	GS100M200G160A
	22	10	20	135	GS220M200G200A
	33	13	20	205	GS330M200I200A
	47	13	20	250	GS470M200I200A
	47	13	25	280	GS470M200I250A
	68	13	25	370	GS680M200I250A
	100	16	25	460	GS101M200J250A
	120	16	25	550	GS121M200J250A
	150	16	31.5	580	GS151M200J315A
	180	16	31.5	660	GS181M200J315A
	220	18	31.5	750	GS221M200K315A
	220	18	35.5	800	GS221M200K355A
	330	18	35.5	940	GS331M200K355A
330	18	40	1000	GS331M200K400A	
470	18	40	1330	GS471M200K400A	
250	1	6.3	11	17	GS010M250E110A
	2.2	6.3	11	20	GS2R2M250E110A
	2.2	8	11.5	33	GS2R2M250F115A
	3.3	8	11.5	38	GS3R3M250F115A
	3.3	10	12.5	43	GS3R3M250G125A
	4.7	8	11.5	48	GS4R7M250F115A
	4.7	10	12.5	51	GS4R7M250G125A
	10	10	12.5	90	GS100M250G125A
	22	10	20	135	GS220M250G200A
	22	13	20	165	GS220M250I200A
	33	13	20	210	GS330M250I200A
	33	13	25	220	GS330M250I250A
	47	13	20	240	GS470M250I200A
	47	13	25	260	GS470M250I250A
	68	13	25	340	GS680M250I250A
	68	16	25	390	GS680M250J250A
	100	16	25	410	GS101M250J250A
	100	16	31.5	450	GS101M250J315A
120	16	31.5	560	GS121M250J315A	
150	18	31.5	600	GS151M250K315A	
180	18	31.5	680	GS181M250K315A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
350	1	6.3	11	22	GS010M350E110A
	2.2	8	11.5	30	GS2R2M350F115A
	2.2	10	12.5	32	GS2R2M350G125A
	3.3	8	11.5	46	GS3R3M350F115A
	3.3	10	12.5	51	GS3R3M350G125A
	4.7	8	11.5	55	GS4R7M350F115A
	4.7	10	12.5	63	GS4R7M350G125A
	4.7	10	16	66	GS4R7M350G160A
	10	10	16	115	GS100M350G160A
	10	10	20	125	GS100M350G200A
	22	13	20	180	GS220M350I200A
	33	13	20	225	GS330M350I200A
	33	13	25	250	GS330M350I250A
	47	16	25	290	GS470M350J250A
	68	16	31.5	400	GS680M350J315A
	100	18	31.5	430	GS101M350K315A
120	18	35.5	550	GS121M350K355A	
150	18	40	570	GS151M350K400A	
400	1	6.3	11	20	GS010M400E110A
	1	8	11.5	22	GS010M400F115A
	2.2	8	11.5	32	GS2R2M400F115A
	2.2	10	12.5	35	GS2R2M400G125A
	3.3	8	11.5	45	GS3R3M400F115A
	3.3	10	12.5	53	GS3R3M400G125A
	4.7	8	11.5	55	GS4R7M400F115A
	4.7	10	12.5	66	GS4R7M400G125A
	4.7	10	16	70	GS4R7M400G160A
	10	10	16	100	GS100M400G160A
	10	10	20	115	GS100M400G200A
	10	13	20	120	GS100M400I200A
	22	13	20	190	GS220M400I200A
	22	13	25	200	GS220M400I250A
	33	13	25	230	GS330M400I250A
	33	16	25	250	GS330M400J250A
	47	16	25	270	GS470M400J250A
	47	16	31.5	290	GS470M400J315A
	68	16	35.5	410	GS680M400J355A
	68	18	25	380	GS680M400K250A
68	18	31.5	420	GS680M400K315A	
100	18	31.5	440	GS101M400K315A	
100	18	35.5	450	GS101M400K355A	
120	18	40	520	GS121M400K400A	

See "PACKAGING INFORMATION" to taped or formed products.

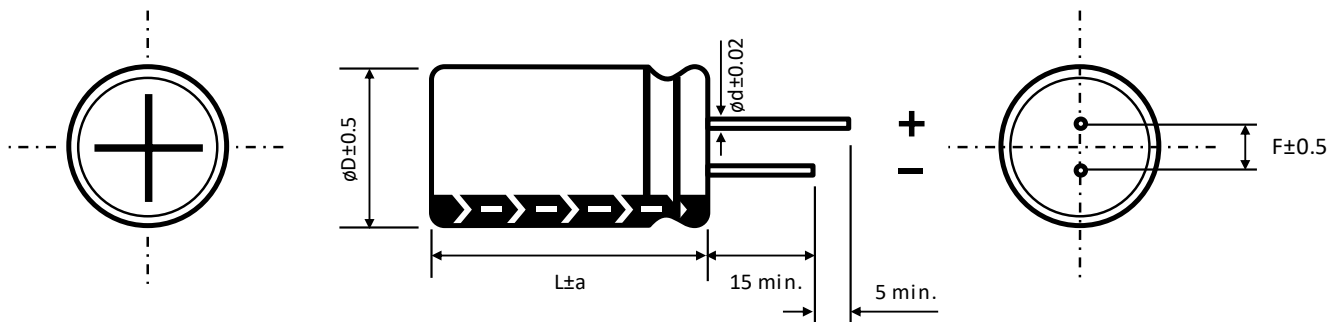
STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r = Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
450	1	8	11.5	22	GS010M450F115A
	2.2	8	11.5	32	GS2R2M450F115A
	2.2	10	12.5	35	GS2R2M450G125A
	3.3	8	11.5	35	GS3R3M450F115A
	3.3	10	12.5	37	GS3R3M450G125A
	3.3	10	16	40	GS3R3M450G160A
	4.7	10	12.5	50	GS4R7M450G125A
	4.7	10	16	56	GS4R7M450G160A
	10	10	20	90	GS100M450G200A
	10	13	20	105	GS100M450I200A
	10	13	25	110	GS100M450I250A
	22	13	20	140	GS220M450I200A
	22	13	25	150	GS220M450I250A
	22	16	25	165	GS220M450J250A
	33	16	25	190	GS330M450J250A
	33	16	31.5	210	GS330M450J315A
	47	16	31.5	260	GS470M450J315A
	47	16	35.5	280	GS470M450J355A
	68	18	31.5	370	GS680M450K315A
	68	18	35.5	390	GS680M450K355A
100	18	40	420	GS101M450K400A	
120	18	45	510	GS121M450K450A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



∅ D	5	6.3	8	10	13	16	18	22
F	2	2.5	3.5	5	5	7.5	7.5	10
∅ d	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				
a	∅ D < 16		∅ D = 16		∅ D = 18		∅ D > 18	
	1.5		L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5	2	
			1.5	2	1.5	2		

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38
$1000 \leq C_R$	0.8	1	1.11	1.17	1.25	1.28

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

NP SERIES ▪ BI-POLAR 85°C TYPE

KEY FEATURES



BI-POLAR

- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 85°C ▪ 2 000 hours
- Bi-Polar, Non-polarized type
- Excellent frequency characteristics
- Minimal capacitance deviation



SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +85°C			-25 ~ +85°C			
Rated Voltage Range	V_R	6.3 ~ 100V DC			160 ~ 250V DC			
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$						
Capacitance Range	C_R	1 ~ 3300 μ F			1 ~ 47 μ F			
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)						
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.03 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]						
Dissipation Factor % (20°C ▪ 120Hz)	tan δ	V_R (V DC)	6.3	10	16	25	35	50
		tan δ (%)	25	25	20	15	15	13
		V_R (V DC)	63	100	160	200	250	
		tan δ (%)	10	10	15	15	20	
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value						
		For capacitance > 1000 μ F						
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3
		V_R (V DC)	63	100	160	200	250	
		Z-25°C/Z+20°C	2	2	2	2	3	
		Z-40°C/Z+20°C	3	3	-	-	-	
For capacitance > 1000 μ F								
Lifetime Test								
Endurance 85°C (V_R applied)	Test	2 000 hours						
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value						
	tan δ	$\leq 150\%$ of initial specified value						
	I_{Leak}	\leq the initial specified value						
Shelf Life 85°C ($V_R = 0$)	Test	1 000 hours						
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value						
	tan δ	$\leq 150\%$ of initial specified value						
	I_{Leak}	\leq the initial specified value						
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4								

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
6.3	100	6.3	11	120	NP101M6R3E110A
	220	6.3	11	175	NP221M6R3E110A
	330	8	11.5	250	NP331M6R3F115A
	470	10	12.5	330	NP471M6R3G125A
	1000	10	20	650	NP102M6R3G200A
	2200	13	20	850	NP222M6R3I200A
	3300	16	25	970	NP332M6R3J250A
10	22	5	11	55	NP220M010C110A
	33	5	11	66	NP330M010C110A
	47	5	11	82	NP470M010C110A
	100	6.3	11	125	NP101M010E110A
	220	8	11.5	205	NP221M010F115A
	330	10	12.5	270	NP331M010G125A
	330	10	16	300	NP331M010G160A
	470	10	16	388	NP471M010G160A
	1000	13	20	700	NP102M010I200A
	2200	16	25	1000	NP222M010J250A
3300	18	35.5	1300	NP332M010K355A	
16	22	5	11	57	NP220M016C110A
	33	5	11	75	NP330M016C110A
	47	6.3	11	97	NP470M016E110A
	100	8	11.5	162	NP101M016F115A
	220	10	12.5	270	NP221M016G125A
	330	10	16	350	NP331M016G160A
	470	10	20	455	NP471M016G200A
	1000	13	20	730	NP102M016I200A
	1000	13	25	800	NP102M016I250A
	2200	16	31.5	1100	NP222M016J315A
25	10	5	11	34	NP100M025C110A
	22	6.3	11	65	NP220M025E110A
	33	6.3	11	86	NP330M025E110A
	47	6.3	11	100	NP470M025E110A
	100	8	11.5	175	NP101M025F115A
	220	10	12.5	295	NP221M025G125A
	220	10	16	310	NP221M025G160A
	330	10	20	440	NP331M025G200A
	470	13	20	530	NP471M025I200A
35	10	5	11	43	NP100M035C110A
	22	6.3	11	75	NP220M035E110A
	33	8	11.5	105	NP330M035F115A
	47	8	11.5	120	NP470M035F115A
	100	10	12.5	210	NP101M035G125A
	100	10	16	230	NP101M035G160A
	220	10	20	400	NP221M035G200A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +85°C • 120Hz (mA rms)	CapXon Part Number
35	330	13	20	495	NP331M035I200A
	470	13	25	655	NP471M035I250A
50	1	5	11	17	NP010M050C110A
	2.2	5	11	25	NP2R2M050C110A
	3.3	5	11	27	NP3R3M050C110A
	4.7	5	11	34	NP4R7M050C110A
	10	6.3	11	52	NP100M050E110A
	22	8	11.5	92	NP220M050F115A
	33	8	11.5	109	NP330M050F115A
	47	10	12.5	150	NP470M050G125A
	100	10	20	265	NP101M050G200A
	220	13	20	475	NP221M050I200A
	330	13	25	560	NP331M050I250A
63	1	5	11	18	NP010M063C110A
	2.2	5	11	26	NP2R2M063C110A
	3.3	6.3	11	28	NP3R3M063E110A
	4.7	6.3	11	34	NP4R7M063E110A
	10	6.3	11	57	NP100M063E110A
	22	8	11.5	97	NP220M063F115A
	33	10	12.5	140	NP330M063G125A
	47	10	16	180	NP470M063G160A
	100	13	20	320	NP101M063I200A
	220	13	25	510	NP221M063I250A
	100	1	5	11	21
2.2		5	11	34	NP2R2M100C110A
3.3		6.3	11	39	NP3R3M100E110A
4.7		8	11.5	47	NP4R7M100F115A
10		8	11.5	71	NP100M100F115A
22		10	16	140	NP220M100G160A
33		10	16	190	NP330M100G160A
33		10	20	220	NP330M100G200A
47		10	20	195	NP470M100G200A
47		13	20	240	NP470M100I200A
100		16	25	425	NP101M100J250A
220		16	25	520	NP221M100J250A
220		16	31.5	550	NP221M100J315A
160	1	6.3	11	25	NP010M160E110A
	2.2	8	11.5	38	NP2R2M160F115A
	3.3	8	11.5	43	NP3R3M160F115A
	4.7	10	12.5	52	NP4R7M160G125A

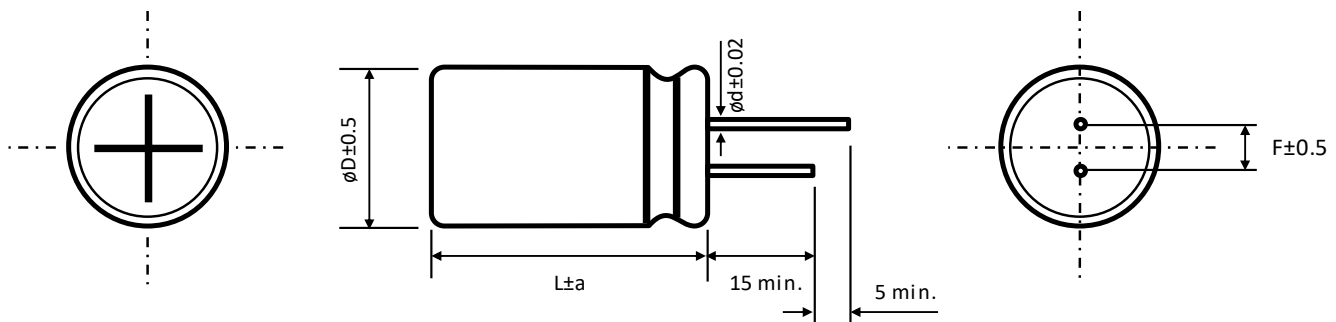
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +85°C - 120Hz (mA rms)	CapXon Part Number
160	10	10	16	89	NP100M160G160A
	22	13	20	155	NP220M160I200A
	33	13	20	230	NP330M160I200A
	47	13	25	250	NP470M160I250A
200	1	8	11.5	28	NP010M200F115A
	2.2	8	11.5	42	NP2R2M200F115A
	3.3	10	12.5	46	NP3R3M200G125A
	4.7	10	16	56	NP4R7M200G160A
	10	10	20	95	NP100M200G200A
	22	13	20	180	NP220M200I200A
	33	13	25	250	NP330M200I250A
250	1	8	11.5	32	NP010M250F115A
	2.2	10	12.5	48	NP2R2M250G125A
	3.3	10	16	57	NP3R3M250G160A
	4.7	10	20	88	NP4R7M250G200A
	10	10	20	130	NP100M250G200A
	22	13	25	224	NP220M250I250A
	33	16	25	305	NP330M250J250A
	33	16	25	305	NP330M250J250A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm


ϕD	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ϕd	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				



a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5		L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5
		1.5	2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38
$1000 \leq C_R$	0.8	1	1.11	1.17	1.25	1.28

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

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ST SERIES ■ 5MM HEIGHT, STANDARD 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 1 000 hours
- Optimized for high density insertion
- Low height ■ 5mm
- Miniaturized for space critical applications



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C							
Rated Voltage Range	V_R	4 ~ 50V DC							
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$							
Capacitance Range	C_R	1 ~ 220 μ F							
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)							
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]							
Dissipation Factor % (20°C - 120Hz)	$\tan \delta$	V_R (V DC)	4	6.3	10	16	25	35	50
		$\tan \delta$ (%)	35	24	20	16	14	12	10
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	4	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	6	3	3	2	2	2	2
		Z-40°C/Z+20°C	12	8	5	4	3	3	3

Lifetime Test			
Endurance 105°C (V_R applied)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 50 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 50 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4		

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	1k	$\geq 10k$
1 ~ 68	0.8	1	1.3	1.5
100 ~ 220	0.8	1	1.15	1.2

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
4	10	4	5	10	ST100M004B050A
	15	4	5	13	ST150M004B050A
	22	4	5	22	ST220M004B050A
	33	5	5	30	ST330M004C050A
	47	5	5	36	ST470M004C050A
	68	6.3	5	52	ST680M004E050A
	100	6.3	5	60	ST101M004E050A
	220	6.3	5	80	ST221M004E050A
6.3	10	4	5	12	ST100M6R3B050A
	15	4	5	15	ST150M6R3B050A
	22	4	5	22	ST220M6R3B050A
	33	5	5	30	ST330M6R3C050A
	47	5	5	36	ST470M6R3C050A
	68	6.3	5	52	ST680M6R3E050A
	100	6.3	5	60	ST101M6R3E050A
	220	6.3	5	80	ST221M6R3E050A
10	6.8	4	5	11	ST6R8M010B050A
	10	4	5	15	ST100M010B050A
	15	4	5	18	ST150M010B050A
	22	5	5	27	ST220M010C050A
	33	5	5	35	ST330M010C050A
	47	6.3	5	48	ST470M010E050A
	68	6.3	5	53	ST680M010E050A
	100	8	5	65	ST101M010F050A
16	4.7	4	5	9	ST4R7M016B050A
	6.8	4	5	13	ST6R8M016B050A
	10	4	5	18	ST100M016B050A
	15	5	5	23	ST150M016C050A
	22	5	5	30	ST220M016C050A
	33	6.3	5	45	ST330M016E050A
	47	6.3	5	50	ST470M016E050A
	68	8	5	55	ST680M016F050A
25	3.3	4	5	8.5	ST3R3M025B050A
	4.7	4	5	13	ST4R7M025B050A
	6.8	4	5	15	ST6R8M025B050A
	10	5	5	23	ST100M025C050A
	15	6.3	5	32	ST150M025E050A
	22	6.3	5	39	ST220M025E050A
	33	6.3	5	48	ST330M025E050A
	47	6.3	5	50	ST470M025E050A
	47	8	5	55	ST470M025F050A

See "PACKAGING INFORMATION" to taped or formed products.

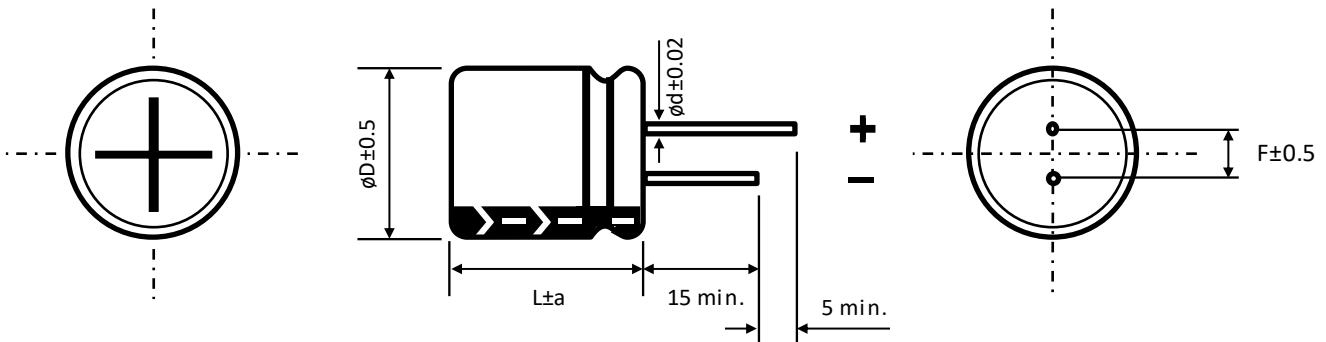
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
35	2.2	4	5	7.5	ST2R2M035B050A
	3.3	4	5	11	ST3R3M035B050A
	4.7	4	5	15	ST4R7M035B050A
	6.8	5	5	19	ST6R8M035C050A
	10	5	5	25	ST100M035C050A
	15	6.3	5	32	ST150M035E050A
	22	6.3	5	48	ST220M035E050A
	33	8	5	50	ST330M035F050A
50	1	4	5	6.2	ST010M050B050A
	1.5	4	5	7	ST1R5M050B050A
	2.2	4	5	11	ST2R2M050B050A
	3.3	4	5	14	ST3R3M050B050A
	4.7	5	5	19	ST4R7M050C050A
	6.8	5	5	22	ST6R8M050C050A
	6.8	6.3	5	25	ST6R8M050E050A
	10	6.3	5	30	ST100M050E050A
	15	8	5	35	ST150M050F050A
	22	8	5	50	ST220M050F050A

See "PACKAGING INFORMATION" to taped or formed products.



DIMENSIONS - All dimensions in mm



ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.45	0.45
a	1	1	1	1

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SK SERIES ■ 7MM HEIGHT, STANDARD 105°C TYPE

KEY FEATURES

- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 1 000 hours
- Optimized for high density insertion
- Low height ■ 7mm
- Miniaturized for space critical applications



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +105°C								
Rated Voltage Range	V_R	4 ~ 63V DC								
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$								
Capacitance Range	C_R	1 ~ 470 μ F								
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)								
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C - 120Hz)	$\tan \delta$	V_R (V DC)	4	6.3	10	16	25	35	50	63
		$\tan \delta$ (%)	25	22	20	16	14	12	10	9
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	4	6.3	10	16	25	35	50	63
		Z-25°C/Z+20°C	7	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	15	8	6	4	4	3	3	3

Lifetime Test			
Endurance 105°C (V_R applied)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 63 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
I_{Leak}	\leq the initial specified value		
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	6.3 ~ 63 V
		$\leq \pm 30\%$ of initial measured value	4V
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 470$	0.8	1	1.16	1.25	1.35	1.38

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
4	22	4	7	23	SK220M004B070A
	33	4	7	26	SK330M004B070A
	47	4	7	35	SK470M004B070A
	68	5	7	55	SK680M004C070A
	100	5	7	58	SK101M004C070A
	220	6.3	7	65	SK221M004E070A
	330	6.3	7	90	SK331M004E070A
	470	8	7	120	SK471M004F070A
6.3	22	4	7	31	SK220M6R3B070A
	33	4	7	32	SK330M6R3B070A
	33	5	7	35	SK330M6R3C070A
	47	4	7	40	SK470M6R3B070A
	47	5	7	47	SK470M6R3C070A
	68	5	7	55	SK680M6R3C070A
	100	5	7	65	SK101M6R3C070A
	100	6.3	7	75	SK101M6R3E070A
	220	6.3	7	90	SK221M6R3E070A
	220	8	7	120	SK221M6R3F070A
	330	8	7	120	SK331M6R3F070A
10	15	4	7	28	SK150M010B070A
	22	4	7	35	SK220M010B070A
	33	4	7	40	SK330M010B070A
	33	5	7	45	SK330M010C070A
	47	4	7	47	SK470M010B070A
	47	5	7	51	SK470M010C070A
	68	5	7	60	SK680M010C070A
	68	6.3	7	68	SK680M010E070A
	100	5	7	80	SK101M010C070A
	100	6.3	7	90	SK101M010E070A
	220	6.3	7	105	SK221M010E070A
	220	8	7	150	SK221M010F070A
16	6.8	4	7	20	SK6R8M016B070A
	10	4	7	30	SK100M016B070A
	15	4	7	32	SK150M016B070A
	22	4	7	37	SK220M016B070A
	22	5	7	42	SK220M016C070A
	33	4	7	45	SK330M016B070A
	33	5	7	50	SK330M016C070A
	47	5	7	61	SK470M016C070A
	47	6.3	7	67	SK470M016E070A
	68	6.3	7	72	SK680M016E070A
	100	6.3	7	95	SK101M016E070A
	100	8	7	105	SK101M016F070A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
25	4.7	4	7	17	SK4R7M025B070A
	6.8	4	7	21	SK6R8M025B070A
	10	4	7	30	SK100M025B070A
	10	5	7	33	SK100M025C070A
	15	5	7	38	SK150M025C070A
	22	5	7	45	SK220M025C070A
	22	6.3	7	48	SK220M025E070A
	33	5	7	52	SK330M025C070A
	33	6.3	7	60	SK330M025E070A
	47	6.3	7	68	SK470M025E070A
	47	8	7	72	SK470M025F070A
	68	6.3	7	75	SK680M025E070A
100	8	7	115	SK101M025F070A	
35	4.7	4	7	22	SK4R7M035B070A
	6.8	4	7	24	SK6R8M035B070A
	6.8	5	7	28	SK6R8M035C070A
	10	4	7	30	SK100M035B070A
	10	5	7	35	SK100M035C070A
	15	5	7	38	SK150M035C070A
	15	6.3	7	45	SK150M035E070A
	22	5	7	50	SK220M035C070A
	22	6.3	7	58	SK220M035E070A
	33	6.3	7	54	SK330M035E070A
	33	8	7	68	SK330M035F070A
	47	8	7	80	SK470M035F070A
68	8	7	85	SK680M035F070A	
50	1	4	7	10	SK010M050B070A
	1.5	4	7	13	SK1R5M050B070A
	2.2	4	7	19	SK2R2M050B070A
	3.3	4	7	24	SK3R3M050B070A
	4.7	4	7	27	SK4R7M050B070A
	4.7	5	7	29	SK4R7M050C070A
	6.8	5	7	32	SK6R8M050C070A
	6.8	6.3	7	33	SK6R8M050E070A
	10	5	7	35	SK100M050C070A
	10	6.3	7	38	SK100M050E070A
	15	6.3	7	52	SK150M050E070A
	22	6.3	7	60	SK220M050E070A
22	8	7	63	SK220M050F070A	
33	8	7	78	SK330M050F070A	

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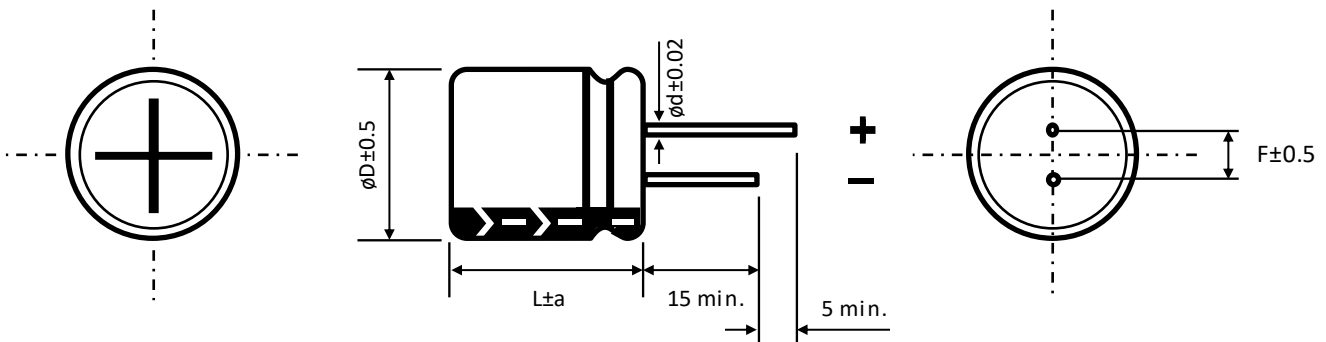
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
63	1	4	7	12	SK010M063B070A
	1.5	4	7	14	SK1R5M063B070A
	2.2	4	7	19	SK2R2M063B070A
	3.3	5	7	25	SK3R3M063C070A
	4.7	5	7	29	SK4R7M063C070A
	4.7	6.3	7	33	SK4R7M063E070A
	6.8	6.3	7	35	SK6R8M063E070A
	10	6.3	7	40	SK100M063E070A
	15	8	7	55	SK150M063F070A
22	8	7	65	SK220M063F070A	

See "PACKAGING INFORMATION" to taped or formed products.



DIMENSIONS - All dimensions in mm



ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.5	0.5
a	1	1	1	1

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SZ SERIES ▪ 7/9MM HEIGHT, LOW IMPEDANCE, 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 1 000 hours
- Miniaturized for space critical applications
- Low height ▪ 7 and 9mm
- Low impedance type



SPECIFICATIONS

Items		Performance Characteristics					
Operating Temperature Range		-55 ~ +105°C					
Rated Voltage Range	V_R	6.3 ~ 35V DC					
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$					
Capacitance Range	C_R	6.8 ~ 470 μ F					
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)					
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]					
Dissipation Factor % (20°C ▪ 120Hz)	$\tan \delta$	V_R (V DC)	6.3	10	16	25	35
		$\tan \delta$ (%)	18	16	14	12	12
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35
		Z-25°C/Z+20°C	2	2	2	2	2
		Z-40°C/Z+20°C	3	3	2	2	2
		Z-55°C/Z+20°C	3	3	3	3	3

Lifetime Test			
Endurance 105°C (V_R applied)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4		

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.47	0.59	0.76	0.85	0.91	1
$10 < C_R \leq 100$	0.52	0.65	0.8	0.89	0.97	1
$100 \leq C_R$	0.58	0.72	0.84	0.9	0.98	1

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	33	5	7	1700	110	SZ330M6R3C070A
	47	5	7	1700	110	SZ470M6R3C070A
	68	6.3	7	800	160	SZ680M6R3E070A
	100	6.3	7	800	160	SZ101M6R3E070A
	120	6.3	7	700	165	SZ121M6R3E070A
	150	6.3	7	600	178	SZ151M6R3E070A
	180	8	7	580	190	SZ181M6R3F070A
	220	8	7	500	200	SZ221M6R3F070A
	330	8	7	350	350	SZ331M6R3F070A
	470	8	9	300	400	SZ471M6R3F090A
10	22	4	7	3300	70	SZ220M010B070A
	33	5	7	1700	110	SZ330M010C070A
	47	5	7	800	160	SZ470M010C070A
	68	6.3	7	800	160	SZ680M010E070A
	100	6.3	7	500	200	SZ101M010E070A
	120	6.3	7	480	205	SZ121M010E070A
	150	8	7	450	230	SZ151M010F070A
	180	8	7	450	250	SZ181M010F070A
	220	8	7	350	280	SZ221M010F070A
	330	8	9	300	320	SZ331M010F090A
470	10	9	220	430	SZ471M010G090A	
16	22	5	7	1700	115	SZ220M016C070A
	33	6.3	7	800	160	SZ330M016E070A
	47	6.3	7	800	160	SZ470M016E070A
	68	8	7	500	200	SZ680M016F070A
	100	8	7	450	200	SZ101M016F070A
	120	8	7	350	350	SZ121M016F070A
	150	8	7	320	370	SZ151M016F070A
	180	8	7	300	400	SZ181M016F070A
	220	8	7	260	430	SZ221M016F070A
	330	8	9	220	500	SZ331M016F090A
25	10	4	7	3000	70	SZ100M025B070A
	22	5	7	1700	110	SZ220M025C070A
	33	6.3	7	800	160	SZ330M025E070A
	47	8	7	500	200	SZ470M025F070A
	68	8	7	500	200	SZ680M025F070A
	100	8	7	350	250	SZ101M025F070A
	150	8	7	400	340	SZ151M025F070A
	180	8	9	250	450	SZ181M025F090A
	220	8	9	220	600	SZ221M025F090A
	330	10	9	150	750	SZ331M025G090A

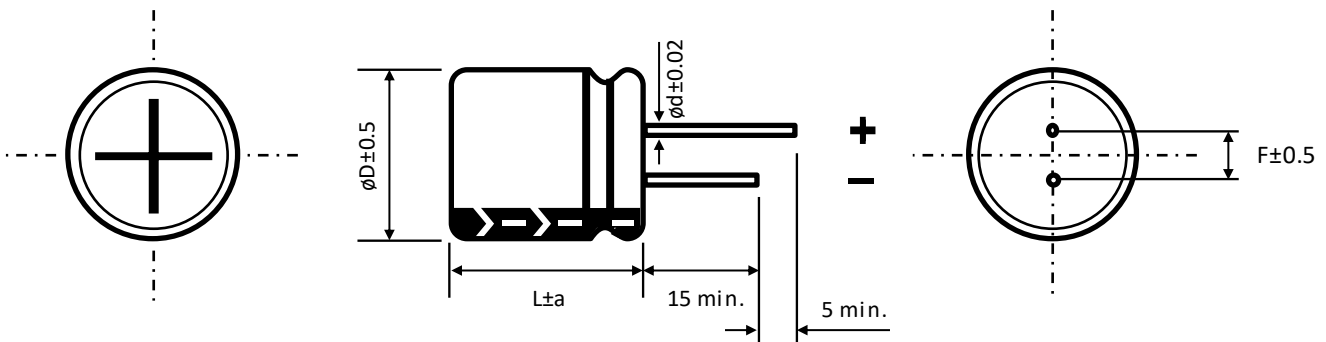
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
35	6.8	4	7	3300	70	SZ6R8M035B070A
	10	5	7	1700	110	SZ100M035C070A
	22	6.3	7	800	160	SZ220M035E070A
	33	8	7	500	200	SZ330M035F070A
	47	8	7	450	245	SZ470M035F070A
	68	8	7	420	280	SZ680M035F070A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm


ϕD	5	6.3	8	10
F	2	2.5	3.5	5
ϕd	0.45	0.5	0.5	0.6
a	1	1	L = 7	L = 9
			1	1.5

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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General Precautions and Guidelines Page 293	Packaging Information Liquid Radial Page 272



DISCLAIMER

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CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

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KZ SERIES ■ LOW IMPEDANCE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 1 000 hours up to 2 000 hours
- Low impedance and high ripple current
- Wide capacitance range
- Small dimensions



SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +105°C						
Rated Voltage Range	V_R	6.3 ~ 50V DC						
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$						
Capacitance Range	C_R	1 ~ 6800 μ F						
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]						
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	6.3	10	16	25	35	50
		$\tan \delta$ (%)	18	16	14	12	10	9
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value						
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	3	3	3	3
		Z-40°C/Z+20°C	8	6	4	3	3	3
		For capacitance > 1000 μ F						
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value					
Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value							
Lifetime Test								
Endurance 105°C (V_R & I_R applied)	Test	2 000 hours					$\geq \phi$ D 8 mm	
		1 000 hours					ϕ D 5 ~ 6.3 mm	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value						
	$\tan \delta$	$\leq 200\%$ of initial specified value						
	I_{Leak}	\leq the initial specified value						
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours						
		$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value					
	$\tan \delta$	$\leq 200\%$ of initial specified value						
	I_{Leak}	\leq the initial specified value						
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4							

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	22	5	11	3000	80	KZ220M6R3C110A
	33	5	11	2000	90	KZ330M6R3C110A
	47	5	11	1500	140	KZ470M6R3C110A
	56	5	11	1500	150	KZ560M6R3C110A
	68	5	11	1100	160	KZ680M6R3C110A
	100	5	11	1000	170	KZ101M6R3C110A
	120	5	11	900	173	KZ121M6R3C110A
	150	5	11	850	178	KZ151M6R3C110A
	180	6.3	11	720	215	KZ181M6R3E110A
	220	6.3	11	620	295	KZ221M6R3E110A
	270	6.3	11	500	320	KZ271M6R3E110A
	330	6.3	11	450	380	KZ331M6R3E110A
	470	8	11.5	220	460	KZ471M6R3F115A
	560	8	11.5	220	490	KZ561M6R3F115A
	680	8	11.5	190	520	KZ681M6R3F115A
	820	8	11.5	190	605	KZ821M6R3F115A
	1000	8	11.5	180	680	KZ102M6R3F115A
	1200	10	12.5	150	750	KZ122M6R3G125A
	1500	10	12.5	140	820	KZ152M6R3G125A
	1800	10	16	120	920	KZ182M6R3G160A
	2200	10	20	100	1150	KZ222M6R3G200A
	2700	10	20	75	1500	KZ272M6R3G200A
3300	10	20	60	1620	KZ332M6R3G200A	
3900	13	25	58	1820	KZ392M6R3I250A	
4700	13	25	40	1920	KZ472M6R3I250A	
5600	13	30	38	2210	KZ562M6R3I300A	
6800	16	25	32	2380	KZ682M6R3J250A	
10	22	5	11	2500	90	KZ220M010C110A
	33	5	11	2000	105	KZ330M010C110A
	47	5	11	1300	155	KZ470M010C110A
	56	5	11	1200	165	KZ560M010C110A
	68	5	11	1000	175	KZ680M010C110A
	100	5	11	750	215	KZ101M010C110A
	120	6.3	11	730	240	KZ121M010E110A
	150	6.3	11	600	225	KZ151M010E110A
	180	6.3	11	580	280	KZ181M010E110A
	220	6.3	11	430	300	KZ221M010E110A
	270	8	11.5	280	405	KZ271M010F115A
	330	8	11.5	250	465	KZ331M010F115A
	470	8	11.5	220	500	KZ471M010F115A
	560	8	11.5	170	620	KZ561M010F115A
	680	8	11.5	120	750	KZ681M010F115A
	820	10	12.5	100	805	KZ821M010G125A
	1000	10	12.5	80	1050	KZ102M010G125A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
10	1200	10	16	65	1150	KZ122M010G160A
	1500	10	16	62	1210	KZ152M010G160A
	1800	10	20	60	1280	KZ182M010G200A
	2200	10	20	50	1520	KZ222M010G200A
	2700	13	20	48	1580	KZ272M010I200A
	3300	13	20	43	1700	KZ332M010I200A
	3900	13	25	40	1860	KZ392M010I250A
	4700	13	25	38	1950	KZ472M010I250A
	5600	16	25	33	2290	KZ562M010J250A
	6800	16	25	28	2480	KZ682M010J250A
16	10	5	11	4000	80	KZ100M016C110A
	22	5	11	2000	110	KZ220M016C110A
	33	5	11	1800	114	KZ330M016C110A
	47	5	11	1000	160	KZ470M016C110A
	56	5	11	800	180	KZ560M016C110A
	68	5	11	650	200	KZ680M016C110A
	100	5	11	550	255	KZ101M016C110A
	120	6.3	11	450	270	KZ121M016E110A
	150	6.3	11	400	292	KZ151M016E110A
	180	6.3	11	320	380	KZ181M016E110A
	220	6.3	11	250	430	KZ221M016E110A
	270	8	11.5	200	480	KZ271M016F115A
	330	8	11.5	150	595	KZ331M016F115A
	470	8	11.5	150	650	KZ471M016F115A
	560	8	11.5	120	730	KZ561M016F115A
	680	10	12.5	90	890	KZ681M016G125A
	820	10	12.5	85	980	KZ821M016G125A
	1000	10	16	70	1180	KZ102M016G160A
	1200	10	20	60	1320	KZ122M016G200A
	1500	10	20	56	1450	KZ152M016G200A
	1800	10	20	53	1510	KZ182M016G200A
	2200	13	20	40	1820	KZ222M016I200A
	2700	13	20	35	2050	KZ272M016I200A
	3300	13	25	33	2300	KZ332M016I250A
	3900	16	25	33	2550	KZ392M016J250A
	4700	16	25	32	2580	KZ472M016J250A
	5600	16	31.5	30	2650	KZ562M016J315A
	6800	16	31.5	24	2900	KZ682M016J315A
25	4.7	5	11	3500	72	KZ4R7M025C110A
	5.6	5	11	3500	75	KZ5R6M025C110A
	6.8	5	11	2800	83	KZ6R8M025C110A
	10	5	11	2500	87	KZ100M025C110A
	22	5	11	1800	118	KZ220M025C110A
	33	5	11	1400	155	KZ330M025C110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
25	47	5	11	900	183	KZ470M025C110A
	56	5	11	830	207	KZ560M025C110A
	68	5	11	690	210	KZ680M025C110A
	100	6.3	11	340	378	KZ101M025E110A
	120	6.3	11	330	380	KZ121M025E110A
	150	8	11.5	325	390	KZ151M025F115A
	180	8	11.5	250	430	KZ181M025F115A
	220	8	11.5	150	550	KZ221M025F115A
	270	8	11.5	150	520	KZ271M025F115A
	330	8	11.5	130	710	KZ331M025F115A
	470	8	11.5	78	980	KZ471M025F115A
	470	8	16	70	1050	KZ471M025F160A
	560	10	16	65	1080	KZ561M025G160A
	680	10	16	65	1100	KZ681M025G160A
	820	10	20	50	1350	KZ821M025G200A
	1000	10	20	45	1580	KZ102M025G200A
	1200	13	20	40	1720	KZ122M025I200A
	1500	13	20	40	1780	KZ152M025I200A
	1800	13	20	35	1980	KZ182M025I200A
	2200	13	25	33	2000	KZ222M025I250A
2700	13	25	32	2250	KZ272M025I250A	
3300	16	25	27	2580	KZ332M025J250A	
4700	16	31.5	25	2850	KZ472M025J315A	
5600	16	35.5	25	3000	KZ562M025J355A	
6800	18	35.5	25	3550	KZ682M025K355A	
35	4.7	5	11	3500	87	KZ4R7M035C110A
	5.6	5	11	3000	95	KZ5R6M035C110A
	6.8	5	11	2700	98	KZ6R8M035C110A
	10	5	11	2200	107	KZ100M035C110A
	22	5	11	1500	150	KZ220M035C110A
	33	5	11	1200	180	KZ330M035C110A
	47	5	11	750	257	KZ470M035C110A
	56	6.3	11	600	283	KZ560M035E110A
	68	6.3	11	550	290	KZ680M035E110A
	100	6.3	11	260	430	KZ101M035E110A
	120	8	11.5	200	470	KZ121M035F115A
	150	8	11.5	200	510	KZ151M035F115A
	180	8	11.5	180	570	KZ181M035F115A
	220	8	11.5	130	620	KZ221M035F115A
	270	10	12.5	120	850	KZ271M035G125A
	330	8	16	80	1050	KZ331M035F160A
	470	10	16	65	1100	KZ471M035G160A
	560	13	20	60	1300	KZ561M035I200A
680	13	20	56	1570	KZ681M035I200A	

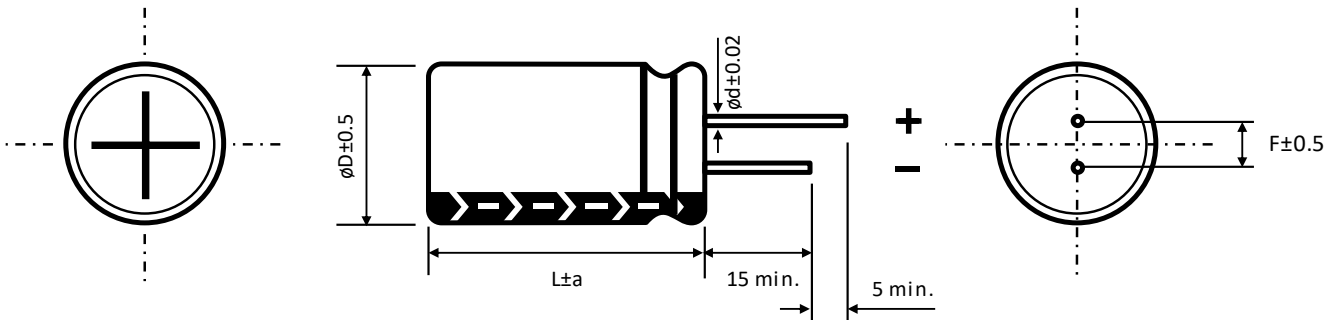
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STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
35	820	13	20	48	1700	KZ821M035I200A
	1000	13	20	42	1820	KZ102M035I200A
	1200	13	25	38	2130	KZ122M035I250A
	1500	13	25	38	2150	KZ152M035I250A
	1800	13	25	35	2450	KZ182M035I250A
	2200	16	25	34	2650	KZ222M035J250A
	2700	16	31.5	30	2690	KZ272M035J315A
	3300	16	35.5	27	2750	KZ332M035J355A
	4700	18	35.5	25	2940	KZ472M035K355A
5600	18	35.5	24	3050	KZ562M035K355A	
50	1	5	11	3800	42	KZ010M050C110A
	2.2	5	11	2800	55	KZ2R2M050C110A
	3.3	5	11	2000	62	KZ3R3M050C110A
	4.7	5	11	2000	90	KZ4R7M050C110A
	5.6	5	11	1800	108	KZ5R6M050C110A
	6.8	5	11	1800	112	KZ6R8M050C110A
	10	5	11	1750	120	KZ100M050C110A
	22	5	11	1500	150	KZ220M050C110A
	33	6.3	11	780	233	KZ330M050E110A
	47	6.3	11	650	270	KZ470M050E110A
	56	6.3	11	600	290	KZ560M050E110A
	68	6.3	11	500	310	KZ680M050E110A
	100	8	11.5	170	480	KZ101M050F115A
	120	10	12.5	164	500	KZ121M050G125A
	150	10	12.5	160	560	KZ151M050G125A
	180	10	12.5	140	580	KZ181M050G125A
	220	10	16	90	640	KZ221M050G160A
	270	10	16	80	905	KZ271M050G160A
	330	10	16	70	1050	KZ331M050G160A
	470	13	20	50	1450	KZ471M050I200A
	560	13	20	50	1510	KZ561M050I200A
	680	13	20	50	1750	KZ681M050I200A
	820	13	25	40	1980	KZ821M050I250A
	1000	13	25	40	2000	KZ102M050I250A
	1200	16	25	38	2200	KZ122M050J250A
	1500	16	25	38	2300	KZ152M050J250A
	1800	16	31.5	36	2610	KZ182M050J315A
2200	16	31.5	33	2900	KZ222M050J315A	
2700	18	35.5	28	3000	KZ272M050K355A	
3300	18	35.5	26	3050	KZ332M050K355A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ø D	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ø d	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				

a	ø D < 16	ø D = 16		ø D = 18	
	1.5	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5
1.5			2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (µF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.47	0.59	0.76	0.85	0.97	1
$10 < C_R \leq 100$	0.52	0.65	0.8	0.89	0.97	1
$100 < C_R \leq 1000$	0.58	0.72	0.84	0.9	0.98	1
$1000 \leq C_R$	0.63	0.78	0.87	0.91	0.98	1

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KS SERIES ■ OVERVOLTAGE VENT 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 2 000 hours
- High ripple current
- Defined vent operation in overvoltage situation
- High voltage version



SPECIFICATIONS

Items		Performance Characteristics		
Operating Temperature Range		-25 ~ +105°C		
Rated Voltage Range	V_R	200 ~ 400V DC		
Surge Voltage	V_S	Defined vent operation in overvoltage situation; $V_S = 1.50 \cdot V_R$		
Capacitance Range	C_R	4.7 ~ 470 μ F		
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)		
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A ■ After 1 minute [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]		
Dissipation Factor % (20°C ■ 120Hz)	tan δ	V_R (V DC)	200	400
		tan δ (%)	15	15
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	200	400
		Z-25°C/Z+20°C	3	6

Lifetime Test				
Endurance 105°C (V_R & I_R applied)	Test	2 000 hours		
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value		
	tan δ	$\leq 200\%$ of initial specified value		
	I_{Leak}	\leq the initial specified value		
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours		
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value		
	tan δ	$\leq 200\%$ of initial specified value		
	I_{Leak}	\leq the initial specified value		
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4				

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

V_R (V)	C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	$\geq 10k$
200	22 ~ 470	0.85	1	1.1	1.25	1.5
	4.7 ~ 68	0.85	1	1.05	1.2	1.4
400	82 ~ 150	0.85	1	1.03	1.15	1.35

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
200	22	10	20	120	KS220M200G200A
	33	10	25	160	KS330M200G250A
	33	13	20	160	KS330M200I200A
	47	10	30	195	KS470M200G300A
	47	13	20	195	KS470M200I200A
	56	13	25	210	KS560M200I250A
	68	13	25	270	KS680M200I250A
	68	16	20	270	KS680M200J200A
	82	13	30	310	KS820M200I300A
	82	16	20	320	KS820M200J200A
	82	16	25	360	KS820M200J250A
	100	16	25	400	KS101M200J250A
	100	18	20	400	KS101M200K200A
	120	16	25	460	KS121M200J250A
	120	16	31.5	500	KS121M200J315A
	120	18	25	500	KS121M200K250A
	150	16	31.5	560	KS151M200J315A
	150	16	35.5	590	KS151M200J355A
	150	18	25	560	KS151M200K250A
	180	16	35.5	600	KS181M200J355A
	180	18	31.5	650	KS181M200K315A
	220	18	31.5	700	KS221M200K315A
	220	18	35.5	740	KS221M200K355A
330	18	35.5	780	KS331M200K355A	
330	18	40	840	KS331M200K400A	
390	18	40	860	KS391M200K400A	
390	18	45	920	KS391M200K450A	
470	18	45	1120	KS471M200K450A	
400	4.7	10	12.5	60	KS4R7M400G125A
	10	10	16	100	KS100M400G160A
	10	10	20	125	KS100M400G200A
	22	13	20	135	KS220M400I200A
	22	13	25	150	KS220M400I250A
	22	16	20	150	KS220M400J200A
	33	13	25	180	KS330M400I250A
	33	16	20	210	KS330M400J200A
	47	16	31.5	300	KS470M400J315A
	47	16	35.5	320	KS470M400J355A
	47	18	25	300	KS470M400K250A
	47	18	31.5	320	KS470M400K315A
	56	16	31.5	360	KS560M400J315A
	56	18	25	350	KS560M400K250A
	56	18	31.5	370	KS560M400K315A
68	16	31.5	365	KS680M400J315A	

See "PACKAGING INFORMATION" to taped or formed products.

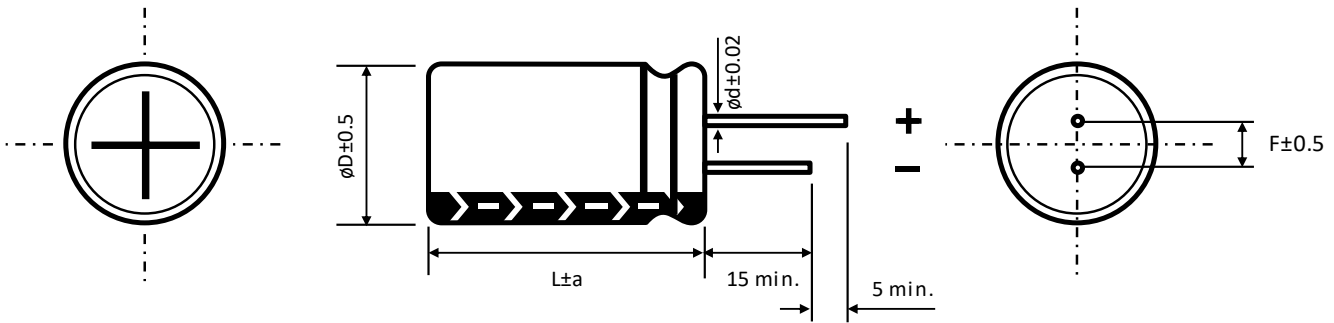
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
400	68	16	35.5	380	KS680M400J355A
	68	18	31.5	375	KS680M400K315A
	82	16	35.5	410	KS820M400J355A
	82	18	31.5	410	KS820M400K315A
	82	18	35.5	450	KS820M400K355A
	100	16	35.5	470	KS101M400J355A
	100	18	31.5	470	KS101M400K315A
	100	18	35.5	490	KS101M400K355A
	120	18	31.5	520	KS121M400K315A
	120	18	35.5	540	KS121M400K355A
	120	18	40	560	KS121M400K400A
	150	18	35.5	770	KS151M400K355A
150	18	40	790	KS151M400K400A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm



ϕD	10	13	16	18
F	5	5	7.5	7.5
ϕd	0.6		0.8	

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	L = 25 to 35.5	L < 25 and L \geq 40	L = 25 to 31.5	L < 25 and L \geq 35.5
		1.5	2	1.5	2

DEFINED OVERVOLTAGE VENT OPERATION

Ordinary Aluminum Electrolytic Capacitors with rated voltages of $V_R > 315V$ have a surge voltage of $V_S = 1.10 \cdot V_R$. Surge voltage is the maximum voltage which may applied to the capacitor for a short time. In maximum 5 times with a duration of one minute each per hour, according JIS C 5101-4.



It applies to $V_R = 200V$ then $V_S = 220V$ and to $V_R = 400V$ then $V_S = 440V$.

The leakage current of the capacitor increases exponentially when the rated voltage is exceeded and increases the pressure inside the component. In the worst case, the capacitor explodes.

Due to its internal structure, the KS series can cope with surge voltages with 1.5 times the rated voltage and definitely opens its safety vent. An explosion of the component is impossible.

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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General Precautions and Guidelines	Packaging Information Liquid Radial
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KY SERIES ■ SLIM SIZE 105°C TYPE

KEY FEATURES



- **ALUMINUM ELECTROLYTIC CAPACITOR** ■ THT type
- Endurance: 105°C ■ 2 000 hours
- Slim design for height limited applications
- High reliability
- High voltage version



SPECIFICATIONS

Items		Performance Characteristics					
Operating Temperature Range		-25 ~ +105°C					
Rated Voltage Range	V_R	250 ~ 450V DC					
Surge Voltage	V_S	(V _R ≤ 315V): $V_S = 1.15 \cdot V_R$		(V _R > 315V): $V_S = 1.10 \cdot V_R$			
Capacitance Range	C_R	12 ~ 150μF					
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)					
Leakage Current (20°C ■ V _R applied)	I_{LEAK}	$\leq 3 \cdot \sqrt{C_R \cdot V_R}$ ■ After 5 minutes [I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]					
Dissipation Factor % (20°C - 120Hz)	tanδ	V _R (V DC)	250	350	400	420	450
		tanδ (%)	15	15	15	20	20
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	250	350	400	420	450
		Z-25°C/Z+20°C	3	8	8	8	8
Lifetime Test							
Endurance 105°C (V _R & I _R applied)	Test	2 000 hours					
	$\Delta C/C_R$	≤ ±20% of initial measured value					
	tanδ	≤ 200% of initial specified value					
	I _{Leak}	≤ the initial specified value					
Shelf Life 105°C (V _R = 0)	Test	1 000 hours					
	$\Delta C/C_R$	≤ ±20% of initial measured value					
	tanδ	≤ 200% of initial specified value					
	I _{Leak}	≤ the initial specified value					
		Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4					

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

V _R (V) / Frequency (Hz)	50/60	100/120	400	1k	100k
250 ~ 350	0.8	1	1.2	1.3	1.4
400 ~ 450	0.8	1	1.25	1.4	1.5

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
250	22	8	30	200	KY220M250F300A
	27	8	30	220	KY270M250F300A
	33	8	30	240	KY330M250F300A
	39	8	35	270	KY390M250F350A
	47	8	40	330	KY470M250F400A
	56	10	35	380	KY560M250G350A
	68	10	35	435	KY680M250G350A
	82	10	40	500	KY820M250G400A
	100	10	45	585	KY101M250G450A
	120	13	35	620	KY121M250I350A
150	13	40	670	KY151M250I400A	
350	15	8	30	145	KY150M350F300A
	22	8	35	185	KY220M350F350A
	27	8	40	220	KY270M350F400A
	33	8	40	250	KY330M350F400A
	39	10	35	300	KY390M350G350A
	47	10	40	380	KY470M350G400A
	56	10	45	430	KY560M350G450A
	68	13	35	480	KY680M350I350A
	82	13	40	550	KY820M350I400A
	100	13	45	600	KY101M350I450A
400	15	8	30	170	KY150M400F300A
	22	8	35	220	KY220M400F350A
	27	8	40	255	KY270M400F400A
	27	10	30	255	KY270M400G300A
	33	8	45	280	KY330M400F450A
	33	10	30	280	KY330M400G300A
	39	8	50	330	KY390M400F500A
	39	10	35	330	KY390M400G350A
	47	10	40	430	KY470M400G400A
	47	13	30	430	KY470M400I300A
	56	10	50	480	KY560M400G500A
	56	13	30	450	KY560M400I300A
	68	10	55	550	KY680M400G550A
	68	13	35	520	KY680M400I350A
	68	13	40	550	KY680M400I400A
	82	13	40	580	KY820M400I400A
	100	13	45	620	KY101M400I450A
	100	13	50	650	KY101M400I500A
120	13	55	750	KY121M400I550A	
420	15	8	30	150	KY150M420F300A
	22	8	35	195	KY220M420F350A
	27	8	40	230	KY270M420F400A
	33	8	50	300	KY330M420F500A
	33	10	35	290	KY330M420G350A

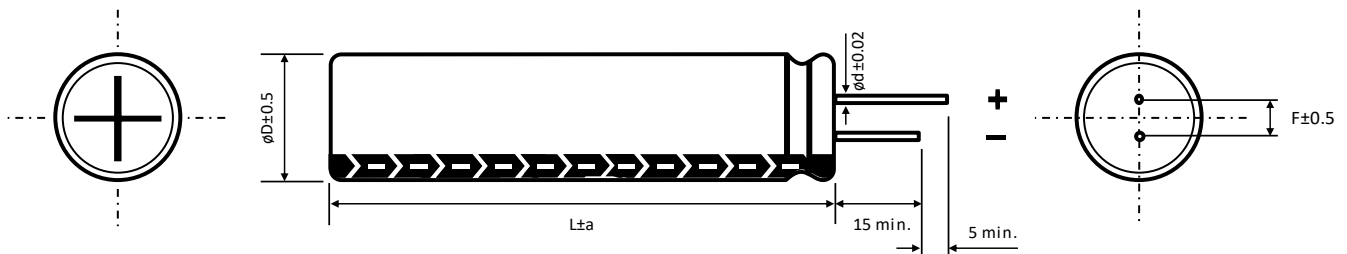
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
420	39	10	40	315	KY390M420G400A
	39	13	30	315	KY390M420I300A
	47	10	40	360	KY470M420G400A
	47	13	30	360	KY470M420I300A
	56	10	50	440	KY560M420G500A
	56	13	30	400	KY560M420I300A
	68	13	35	470	KY680M420I350A
	82	13	40	550	KY820M420I400A
	100	13	50	620	KY101M420I500A
450	12	8	30	135	KY120M450F300A
	15	8	35	150	KY150M450F350A
	22	8	40	195	KY220M450F400A
	22	10	30	195	KY220M450G300A
	27	8	45	230	KY270M450F450A
	27	10	30	220	KY270M450G300A
	33	10	35	255	KY330M450G350A
	33	10	40	280	KY330M450G400A
	39	10	40	300	KY390M450G400A
	39	10	45	315	KY390M450G450A
	39	10	50	330	KY390M450G500A
	47	10	50	390	KY470M450G500A
	56	13	35	420	KY560M450I350A
	56	13	40	450	KY560M450I400A
	68	13	40	520	KY680M450I400A
	68	13	45	550	KY680M450I450A
	82	13	45	570	KY820M450I450A



See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	8	10	13
F	3.5	5	5
ϕd	0.5	0.6	0.6
a	1.5	2	2

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KM SERIES ▪ STANDARD 105°C TYPE

KEY FEATURES

- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 2 000 hours
- Optimized for cost effective applications
- High capacitance range
- Wide voltage range, up to 500V



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +105°C				-25 ~ +105°C				
Rated Voltage Range	V_R	6.3 ~ 100V DC				160 ~ 500V DC				
Surge Voltage	V_S	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$				$(V_R > 315V): V_S = 1.10 \cdot V_R$				
Capacitance Range	C_R	1 ~ 22000 μ F				1 ~ 560 μ F				
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)								
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 1 minute				$\leq 0.03 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 1 minute				
		[I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]								
Dissipation Factor % (20°C ▪ 120Hz)	$\tan\delta$	V_R (V DC)	6.3	10	16	25	35	50	63	100
		$\tan\delta$ (%)	22	17	16	14	12	10	9	8
		V_R (V DC)	160	200	250	350	400	420	450	500
		$\tan\delta$ (%)	12	12	12	15	15	17	17	22
For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value										
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3	3	3
		V_R (V DC)	160	200	250	350	400	420	450	500
		Z-25°C/Z+20°C	2	2	3	5	6	6	6	6
		For capacitance > 1000 μ F								
Z-25°C/Z+20°C		Add 0.5 for every multiple 1000 μ F of rated capacitance value								
Z-40°C/Z+20°C		Add 1 for every multiple 1000 μ F of rated capacitance value								
Lifetime Test										
Endurance 105°C (V_R & I_R applied)	Test	2 000 hours								
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
	$\tan\delta$	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours								
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
	$\tan\delta$	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4										

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
6.3	33	5	11	54	KM330M6R3C110A
	47	5	11	65	KM470M6R3C110A
	68	5	11	75	KM680M6R3C110A
	100	5	11	96	KM101M6R3C110A
	120	5	11	110	KM121M6R3C110A
	150	5	11	120	KM151M6R3C110A
	150	6.3	11	130	KM151M6R3E110A
	180	6.3	11	140	KM181M6R3E110A
	220	6.3	11	160	KM221M6R3E110A
	330	6.3	11	195	KM331M6R3E110A
	470	6.3	11	220	KM471M6R3E110A
	470	8	11.5	270	KM471M6R3F115A
	560	8	11.5	310	KM561M6R3F115A
	680	8	11.5	360	KM681M6R3F115A
	820	8	11.5	390	KM821M6R3F115A
	1000	10	12.5	430	KM102M6R3G125A
	1200	10	12.5	550	KM122M6R3G125A
	1500	10	16	625	KM152M6R3G160A
	1800	10	16	710	KM182M6R3G160A
	2200	10	16	750	KM222M6R3G160A
	2200	10	20	775	KM222M6R3G200A
	2700	10	20	850	KM272M6R3G200A
	3300	13	20	960	KM332M6R3I200A
	3900	13	20	1000	KM392M6R3I200A
4700	13	20	1150	KM472M6R3I200A	
5600	13	25	1300	KM562M6R3I250A	
6800	13	25	1480	KM682M6R3I250A	
8200	16	25	1520	KM822M6R3J250A	
10000	16	25	1680	KM103M6R3J250A	
12000	16	31.5	1750	KM123M6R3J315A	
15000	16	35.5	2075	KM153M6R3J355A	
18000	18	31.5	2150	KM183M6R3K315A	
22000	18	40	2300	KM223M6R3K400A	
10	22	5	11	45	KM220M010C110A
	33	5	11	60	KM330M010C110A
	47	5	11	70	KM470M010C110A
	68	5	11	80	KM680M010C110A
	100	5	11	105	KM101M010C110A
	120	5	11	110	KM121M010C110A
	120	6.3	11	120	KM121M010E110A
	150	5	11	120	KM151M010C110A
	150	6.3	11	145	KM151M010E110A
	180	6.3	11	160	KM181M010E110A
	220	6.3	11	175	KM221M010E110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
10	330	6.3	11	205	KM331M010E110A
	330	8	11.5	255	KM331M010F115A
	470	6.3	11	235	KM471M010E110A
	470	8	11.5	290	KM471M010F115A
	560	8	11.5	330	KM561M010F115A
	560	10	12.5	340	KM561M010G125A
	680	8	11.5	365	KM681M010F115A
	680	8	16	410	KM681M010F160A
	820	10	12.5	480	KM821M010G125A
	1000	10	12.5	520	KM102M010G125A
	1200	10	16	630	KM122M010G160A
	1500	8	20	715	KM152M010F200A
	1500	10	16	770	KM152M010G160A
	1800	10	20	820	KM182M010G200A
	2200	10	20	860	KM222M010G200A
	2700	10	25	880	KM272M010G250A
	2700	13	20	920	KM272M010I200A
	3300	13	20	1100	KM332M010I200A
	3900	13	20	1280	KM392M010I200A
	4700	13	25	1350	KM472M010I250A
5600	16	25	1490	KM562M010J250A	
6800	16	25	1670	KM682M010J250A	
8200	16	31.5	1840	KM822M010J315A	
10000	16	35.5	1900	KM103M010J355A	
12000	16	35.5	2050	KM123M010J355A	
15000	18	35.5	2180	KM153M010K355A	
18000	18	35.5	2205	KM183M010K355A	
16	10	5	11	35	KM100M016C110A
	22	5	11	54	KM220M016C110A
	33	5	11	64	KM330M016C110A
	47	5	11	100	KM470M016C110A
	68	5	11	105	KM680M016C110A
	100	5	11	115	KM101M016C110A
	100	6.3	11	130	KM101M016E110A
	120	6.3	11	155	KM121M016E110A
	150	6.3	11	170	KM151M016E110A
	180	6.3	11	190	KM181M016E110A
	220	6.3	11	215	KM221M016E110A
	330	6.3	11	225	KM331M016E110A
	330	8	11.5	265	KM331M016F115A
	470	8	11.5	370	KM471M016F115A
	470	8	16	400	KM471M016F160A
	560	10	12.5	410	KM561M016G125A
	680	8	16	470	KM681M016F160A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
16	680	10	12.5	480	KM681M016G125A
	820	10	16	550	KM821M016G160A
	1000	10	12.5	540	KM102M016G125A
	1000	10	16	600	KM102M016G160A
	1200	10	20	700	KM122M016G200A
	1500	10	20	820	KM152M016G200A
	1800	13	20	920	KM182M016I200A
	2200	13	20	1000	KM222M016I200A
	2700	13	20	1080	KM272M016I200A
	3300	13	25	1200	KM332M016I250A
	3900	16	25	1490	KM392M016J250A
	4700	16	25	1600	KM472M016J250A
	5600	16	31.5	1720	KM562M016J315A
	6800	16	31.5	1900	KM682M016J315A
	8200	16	35.5	2020	KM822M016J355A
	10000	18	35.5	2060	KM103M016K355A
12000	18	35.5	2150	KM123M016K355A	
25	4.7	5	11	26	KM4R7M025C110A
	6.8	5	11	32	KM6R8M025C110A
	10	5	11	38	KM100M025C110A
	22	5	11	58	KM220M025C110A
	33	5	11	69	KM330M025C110A
	47	5	11	105	KM470M025C110A
	68	6.3	11	120	KM680M025E110A
	100	6.3	11	145	KM101M025E110A
	120	6.3	11	175	KM121M025E110A
	150	6.3	11	180	KM151M025E110A
	150	8	11.5	200	KM151M025F115A
	180	8	11.5	210	KM181M025F115A
	220	8	11.5	235	KM221M025F115A
	330	8	11.5	310	KM331M025F115A
	330	10	12.5	335	KM331M025G125A
	470	8	11.5	410	KM471M025F115A
	470	10	12.5	440	KM471M025G125A
	560	10	16	460	KM561M025G160A
	680	10	16	520	KM681M025G160A
	820	10	20	640	KM821M025G200A
	1000	10	20	710	KM102M025G200A
	1200	13	20	810	KM122M025I200A
	1500	13	20	900	KM152M025I200A
	1800	13	25	1050	KM182M025I250A
	2200	13	25	1200	KM222M025I250A
	2700	16	25	1320	KM272M025J250A
	3300	16	25	1460	KM332M025J250A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
25	3900	16	31.5	1670	KM392M025J315A
	4700	16	35.5	1780	KM472M025J355A
	5600	16	35.5	1890	KM562M025J355A
	6800	18	35.5	2050	KM682M025K355A
	8200	18	35.5	2090	KM822M025K355A
35	4.7	5	11	28	KM4R7M035C110A
	6.8	5	11	36	KM6R8M035C110A
	10	5	11	46	KM100M035C110A
	22	5	11	61	KM220M035C110A
	33	5	11	75	KM330M035C110A
	47	5	11	110	KM470M035C110A
	68	6.3	11	140	KM680M035E110A
	100	6.3	11	160	KM101M035E110A
	100	8	11.5	175	KM101M035F115A
	120	8	11.5	185	KM121M035F115A
	150	8	11.5	215	KM151M035F115A
	180	8	11.5	225	KM181M035F115A
	180	10	12.5	265	KM181M035G125A
	220	8	11.5	255	KM221M035F115A
	220	10	12.5	300	KM221M035G125A
	330	10	12.5	400	KM331M035G125A
	470	10	16	520	KM471M035G160A
	560	10	20	540	KM561M035G200A
	680	10	20	560	KM681M035G200A
	680	13	20	650	KM681M035I200A
	820	13	20	760	KM821M035I200A
	1000	13	20	830	KM102M035I200A
	1200	13	20	900	KM122M035I200A
	1200	13	25	930	KM122M035I250A
	1500	13	25	960	KM152M035I250A
	1800	16	25	1150	KM182M035J250A
	2200	16	25	1290	KM222M035J250A
	2200	16	31.5	1350	KM222M035J315A
	2700	16	31.5	1480	KM272M035J315A
	3300	16	35.5	1650	KM332M035J355A
3900	18	31.5	1820	KM392M035K315A	
4700	18	35.5	1900	KM472M035K355A	
5600	18	35.5	2000	KM562M035K355A	
50	1	5	11	13	KM010M050C110A
	2.2	5	11	20	KM2R2M050C110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
50	3.3	5	11	26	KM3R3M050C110A
	4.7	5	11	32	KM4R7M050C110A
	6.8	5	11	40	KM6R8M050C110A
	10	5	11	48	KM100M050C110A
	22	5	11	60	KM220M050C110A
	22	6.3	11	70	KM220M050E110A
	33	5	11	75	KM330M050C110A
	33	6.3	11	90	KM330M050E110A
	47	6.3	11	115	KM470M050E110A
	68	6.3	11	130	KM680M050E110A
	68	8	11.5	155	KM680M050F115A
	100	8	11.5	200	KM101M050F115A
	120	8	16	220	KM121M050F160A
	120	10	12.5	225	KM121M050G125A
	150	10	12.5	245	KM151M050G125A
	180	10	12.5	260	KM181M050G125A
	180	10	16	280	KM181M050G160A
	220	10	12.5	345	KM221M050G125A
	220	10	16	360	KM221M050G160A
	330	10	16	450	KM331M050G160A
	330	10	20	470	KM331M050G200A
	470	10	20	600	KM471M050G200A
	470	13	20	650	KM471M050I200A
	560	13	20	660	KM561M050I200A
	680	13	20	700	KM681M050I200A
	680	13	25	770	KM681M050I250A
	820	13	25	850	KM821M050I250A
	1000	13	25	890	KM102M050I250A
	1000	16	25	1000	KM102M050J250A
	1200	16	25	1150	KM122M050J250A
1500	16	31.5	1300	KM152M050J315A	
1800	16	35.5	1480	KM182M050J355A	
2200	16	35.5	1530	KM222M050J355A	
2700	18	35.5	1590	KM272M050K355A	
3300	18	35.5	1750	KM332M050K355A	
63	1	5	11	13	KM010M063C110A
	2.2	5	11	20	KM2R2M063C110A
	3.3	5	11	28	KM3R3M063C110A
	4.7	5	11	32	KM4R7M063C110A
	6.8	5	11	40	KM6R8M063C110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
63	10	5	11	42	KM100M063C110A
	10	6.3	11	48	KM100M063E110A
	22	6.3	11	82	KM220M063E110A
	33	6.3	11	100	KM330M063E110A
	47	6.3	11	125	KM470M063E110A
	47	8	11.5	140	KM470M063F115A
	68	8	11.5	155	KM680M063F115A
	68	10	12.5	185	KM680M063G125A
	100	10	12.5	230	KM101M063G125A
	120	10	16	255	KM121M063G160A
	150	10	16	270	KM151M063G160A
	180	10	16	310	KM181M063G160A
	220	10	16	375	KM221M063G160A
	220	10	20	400	KM221M063G200A
	330	13	20	580	KM331M063I200A
	470	13	20	690	KM471M063I200A
	560	13	25	770	KM561M063I250A
	680	16	25	880	KM681M063J250A
	820	16	25	920	KM821M063J250A
1000	16	31.5	1185	KM102M063J315A	
1200	16	35.5	1200	KM122M063J355A	
1500	18	31.5	1350	KM152M063K315A	
100	1	5	11	15	KM010M100C110A
	2.2	5	11	21	KM2R2M100C110A
	3.3	5	11	30	KM3R3M100C110A
	4.7	5	11	35	KM4R7M100C110A
	6.8	6.3	11	47	KM6R8M100E110A
	10	6.3	11	56	KM100M100E110A
	10	8	11.5	60	KM100M100F115A
	22	6.3	11	75	KM220M100E110A
	22	8	11.5	90	KM220M100F115A
	33	8	11.5	140	KM330M100F115A
	33	10	12.5	155	KM330M100G125A
	47	8	16	165	KM470M100F160A
	47	10	12.5	170	KM470M100G125A
	68	10	16	240	KM680M100G160A
	100	10	20	280	KM101M100G200A
	120	10	20	295	KM121M100G200A
	150	13	20	340	KM151M100I200A
150	13	25	360	KM151M100I250A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _r - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
100	180	13	20	410	KM181M100I200A
	180	13	25	480	KM181M100I250A
	220	13	25	520	KM221M100I250A
	330	16	25	690	KM331M100J250A
	470	16	25	820	KM471M100J250A
	470	16	31.5	860	KM471M100J315A
	560	16	35.5	900	KM561M100J355A
	680	16	35.5	920	KM681M100J355A
	680	18	31.5	950	KM681M100K315A
	820	18	35.5	1020	KM821M100K355A
1000	18	40	1200	KM102M100K400A	
160	1	5	11	17	KM010M160C110A
	1	6.3	11	19	KM010M160E110A
	2.2	6.3	11	25	KM2R2M160E110A
	3.3	6.3	11	32	KM3R3M160E110A
	4.7	6.3	11	38	KM4R7M160E110A
	4.7	8	11.5	42	KM4R7M160F115A
	6.8	8	11.5	56	KM6R8M160F115A
	10	8	11.5	63	KM100M160F115A
	10	10	12.5	75	KM100M160G125A
	22	10	12.5	95	KM220M160G125A
	22	10	16	105	KM220M160G160A
	22	10	20	120	KM220M160G200A
	33	10	16	155	KM330M160G160A
	33	10	20	170	KM330M160G200A
	47	10	20	180	KM470M160G200A
	47	13	20	210	KM470M160I200A
	68	13	20	260	KM680M160I200A
	68	13	25	280	KM680M160I250A
	100	13	25	310	KM101M160I250A
	100	16	25	330	KM101M160J250A
	120	13	25	320	KM121M160I250A
	120	16	25	350	KM121M160J250A
	150	16	25	470	KM151M160J250A
	180	16	25	550	KM181M160J250A
	220	16	31.5	560	KM221M160J315A
	220	16	35.5	580	KM221M160J355A
	330	18	31.5	660	KM331M160K315A
	330	18	35.5	700	KM331M160K355A
	470	18	35.5	810	KM471M160K355A
	470	18	40	860	KM471M160K400A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
200	1	6.3	11	17	KM010M200E110A
	2.2	6.3	11	25	KM2R2M200E110A
	3.3	6.3	11	33	KM3R3M200E110A
	3.3	8	11.5	35	KM3R3M200F115A
	4.7	6.3	11	42	KM4R7M200E110A
	4.7	8	11.5	50	KM4R7M200F115A
	6.8	8	11.5	60	KM6R8M200F115A
	6.8	10	12.5	63	KM6R8M200G125A
	10	8	11.5	78	KM100M200F115A
	10	10	12.5	85	KM100M200G125A
	22	10	16	125	KM220M200G160A
	22	10	20	130	KM220M200G200A
	33	10	16	160	KM330M200G160A
	33	10	20	180	KM330M200G200A
	33	13	20	190	KM330M200I200A
	47	13	20	220	KM470M200I200A
	68	13	20	270	KM680M200I200A
	68	13	25	300	KM680M200I250A
	100	13	25	320	KM101M200I250A
	100	16	25	345	KM101M200J250A
	120	16	25	360	KM121M200J250A
	120	16	31.5	390	KM121M200J315A
	150	16	25	440	KM151M200J250A
	150	16	31.5	480	KM151M200J315A
	180	16	31.5	550	KM181M200J315A
	180	16	35.5	560	KM181M200J355A
	220	16	35.5	670	KM221M200J355A
220	18	31.5	690	KM221M200K315A	
330	18	35.5	750	KM331M200K355A	
330	18	40	810	KM331M200K400A	
470	18	40	840	KM471M200K400A	
470	22	40	925	KM471M200M400A	
560	18	50	940	KM561M200K500A	
250	1	6.3	11	16	KM010M250E110A
	2.2	6.3	11	20	KM2R2M250E110A
	2.2	8	11.5	25	KM2R2M250F115A
	3.3	8	11.5	33	KM3R3M250F115A
	4.7	8	11.5	46	KM4R7M250F115A
	4.7	10	12.5	50	KM4R7M250G125A
	6.8	8	11.5	60	KM6R8M250F115A
	6.8	10	12.5	70	KM6R8M250G125A
	10	8	11.5	68	KM100M250F115A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	∅ D (mm)	L (mm)	I_r - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
250	10	10	12.5	80	KM100M250G125A
	22	10	16	110	KM220M250G160A
	22	10	20	125	KM220M250G200A
	22	13	20	150	KM220M250I200A
	33	13	20	190	KM330M250I200A
	47	13	20	230	KM470M250I200A
	47	13	25	240	KM470M250I250A
	56	13	20	255	KM560M250I200A
	56	13	25	280	KM560M250I250A
	68	13	25	310	KM680M250I250A
	68	16	25	355	KM680M250J250A
	82	16	25	370	KM820M250J250A
	100	16	25	375	KM101M250J250A
	100	16	31.5	395	KM101M250J315A
	120	16	31.5	420	KM121M250J315A
	120	16	35.5	430	KM121M250J355A
	150	16	35.5	460	KM151M250J355A
	150	18	31.5	460	KM151M250K315A
	180	18	31.5	465	KM181M250K315A
	180	18	35.5	470	KM181M250K355A
220	18	35.5	650	KM221M250K355A	
220	18	40	700	KM221M250K400A	
330	18	45	720	KM331M250K450A	
330	22	40	780	KM331M250M400A	
350	1	6.3	11	16	KM010M350E110A
	2.2	8	11.5	31	KM2R2M350F115A
	3.3	8	11.5	34	KM3R3M350F115A
	3.3	10	12.5	38	KM3R3M350G125A
	4.7	8	11.5	47	KM4R7M350F115A
	4.7	10	12.5	52	KM4R7M350G125A
	6.8	10	12.5	79	KM6R8M350G125A
	10	10	16	87	KM100M350G160A
	10	10	20	92	KM100M350G200A
	22	13	20	160	KM220M350I200A
	22	13	25	170	KM220M350I250A
	33	13	20	180	KM330M350I200A
	33	13	25	200	KM330M350I250A
	47	16	25	245	KM470M350J250A
	47	16	31.5	260	KM470M350J315A
	56	16	25	330	KM560M350J250A
	68	16	31.5	370	KM680M350J315A
	82	16	35.5	385	KM820M350J355A
	100	18	31.5	390	KM101M350K315A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
350	120	16	40	400	KM121M350J400A
	120	18	35.5	400	KM121M350K355A
	150	18	40	420	KM151M350K400A
	180	18	40	430	KM181M350K400A
	220	22	40	500	KM221M350M400A
400	1	6.3	11	17	KM010M400E110A
	2.2	6.3	15	34	KM2R2M400E150A
	2.2	8	11.5	35	KM2R2M400F115A
	2.2	10	12.5	40	KM2R2M400G125A
	3.3	6.3	15	35	KM3R3M400E150A
	3.3	8	11.5	36	KM3R3M400F115A
	3.3	8	16	40	KM3R3M400F160A
	3.3	10	12.5	41	KM3R3M400G125A
	4.7	8	11.5	48	KM4R7M400F115A
	4.7	8	16	54	KM4R7M400F160A
	4.7	10	12.5	55	KM4R7M400G125A
	4.7	10	16	65	KM4R7M400G160A
	6.8	8	14	75	KM6R8M400F140A
	6.8	8	15	77	KM6R8M400F150A
	6.8	8	16	80	KM6R8M400F160A
	6.8	10	12.5	82	KM6R8M400G125A
	6.8	10	16	90	KM6R8M400G160A
	10	10	14	104	KM100M400G140A
	10	10	15	107	KM100M400G150A
	10	10	16	110	KM100M400G160A
	10	10	20	125	KM100M400G200A
	22	10	25	162	KM220M400G250A
	22	13	20	170	KM220M400I200A
	22	13	25	190	KM220M400I250A
	33	13	20	235	KM330M400I200A
	33	13	25	260	KM330M400I250A
	33	16	25	290	KM330M400J250A
	47	16	25	300	KM470M400J250A
	47	16	31.5	360	KM470M400J315A
	47	18	25	320	KM470M400K250A
	56	16	25	360	KM560M400J250A
	56	16	31.5	400	KM560M400J315A
	68	16	25	410	KM680M400J250A
68	16	31.5	450	KM680M400J315A	
68	16	35.5	480	KM680M400J355A	
68	18	25	440	KM680M400K250A	
68	18	31.5	500	KM680M400K315A	
82	16	31.5	480	KM820M400J315A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
400	82	18	25	470	KM820M400K250A
	82	18	31.5	520	KM820M400K315A
	100	16	35.5	520	KM101M400J355A
	100	18	31.5	530	KM101M400K315A
	100	18	35.5	550	KM101M400K355A
	120	18	31.5	550	KM121M400K315A
	120	18	35.5	580	KM121M400K355A
	150	18	35.5	610	KM151M400K355A
	150	18	40	650	KM151M400K400A
	150	22	30	640	KM151M400M300A
180	18	45	700	KM181M400K450A	
420	1	8	11.5	20	KM010M420F115A
	2.2	8	11.5	35	KM2R2M420F115A
	3.3	10	12.5	42	KM3R3M420G125A
	4.7	10	12.5	58	KM4R7M420G125A
	4.7	10	16	61	KM4R7M420G160A
	6.8	10	16	84	KM6R8M420G160A
	10	10	20	112	KM100M420G200A
	22	13	25	185	KM220M420I250A
	33	16	25	230	KM330M420J250A
	47	16	25	280	KM470M420J250A
	47	16	31.5	310	KM470M420J315A
	56	16	35.5	390	KM560M420J355A
	68	18	31.5	470	KM680M420K315A
	82	18	31.5	475	KM820M420K315A
	82	18	35.5	500	KM820M420K355A
	100	16	35.5	525	KM101M420J355A
	100	18	31.5	535	KM101M420K315A
	100	18	35.5	555	KM101M420K355A
	120	18	31.5	560	KM121M420K315A
	120	18	35.5	590	KM121M420K355A
	120	18	40	630	KM121M420K400A
	150	18	35.5	615	KM151M420K355A
150	18	40	660	KM151M420K400A	
180	18	45	680	KM181M420K450A	
180	20	40	685	KM181M420L400A	
450	1	8	11.5	20	KM010M450F115A
	2.2	8	11.5	30	KM2R2M450F115A
	2.2	10	12.5	35	KM2R2M450G125A
	3.3	8	11.5	32	KM3R3M450F115A
	3.3	10	12.5	38	KM3R3M450G125A
	3.3	10	16	42	KM3R3M450G160A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
450	4.7	8	16	44	KM4R7M450F160A
	4.7	10	16	50	KM4R7M450G160A
	4.7	10	12.5	45	KM4R7M450G125A
	6.8	10	12.5	58	KM6R8M450G125A
	6.8	10	16	65	KM6R8M450G160A
	6.8	10	20	72	KM6R8M450G200A
	10	10	16	80	KM100M450G160A
	10	10	20	92	KM100M450G200A
	10	13	20	98	KM100M450I200A
	22	13	20	165	KM220M450I200A
	22	13	25	180	KM220M450I250A
	22	16	25	200	KM220M450J250A
	33	13	25	185	KM330M450I250A
	33	16	25	210	KM330M450J250A
	33	16	31.5	230	KM330M450J315A
	47	16	25	305	KM470M450J250A
	47	16	31.5	340	KM470M450J315A
	47	16	35.5	380	KM470M450J355A
	47	18	25	350	KM470M450K250A
	47	18	31.5	360	KM470M450K315A
	56	16	31.5	370	KM560M450J315A
	56	16	35.5	400	KM560M450J355A
	56	18	25	370	KM560M450K250A
	68	16	31.5	425	KM680M450J315A
	68	16	35.5	450	KM680M450J355A
	68	18	25	410	KM680M450K250A
	68	18	31.5	460	KM680M450K315A
	68	18	35.5	470	KM680M450K355A
	82	18	31.5	465	KM820M450K315A
	82	18	35.5	480	KM820M450K355A
	100	18	31.5	500	KM101M450K315A
	100	18	35.5	525	KM101M450K355A
100	18	40	560	KM101M450K400A	
120	18	40	580	KM121M450K400A	
120	20	35	580	KM121M450L350A	
120	22	40	650	KM121M450M400A	
150	18	45	690	KM151M450K450A	
150	20	40	695	KM151M450L400A	
150	22	35	695	KM151M450M350A	
150	22	40	720	KM151M450M400A	

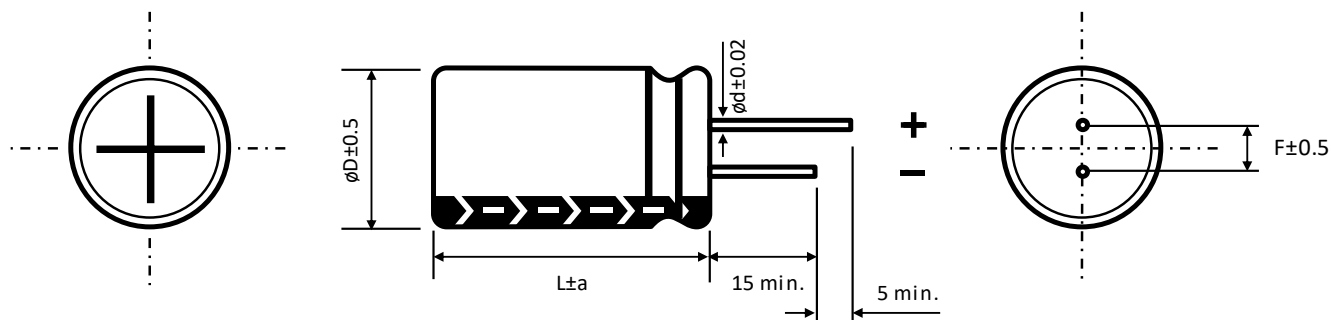
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
500	1	8	11.5	20	KM010M500F115A
	1	8	16	23	KM010M500F160A
	1	10	12.5	24	KM010M500G125A
	2.2	8	16	32	KM2R2M500F160A
	2.2	10	12.5	33	KM2R2M500G125A
	2.2	10	16	36	KM2R2M500G160A
	3.3	10	12.5	38	KM3R3M500G125A
	3.3	10	16	42	KM3R3M500G160A
	3.3	10	20	49	KM3R3M500G200A
	4.7	10	16	50	KM4R7M500G160A
	4.7	10	20	58	KM4R7M500G200A
	6.8	10	16	63	KM6R8M500G160A
	6.8	10	20	70	KM6R8M500G200A
	6.8	13	20	80	KM6R8M500I200A
	10	10	20	90	KM100M500G200A
	10	13	20	98	KM100M500I200A
	10	13	25	115	KM100M500I250A
	22	13	25	160	KM220M500I250A
	22	16	25	180	KM220M500J250A
	33	16	31.5	230	KM330M500J315A
	33	18	25	220	KM330M500K250A
	47	16	35.5	360	KM470M500J355A
	47	18	25	330	KM470M500K250A
	47	18	31.5	360	KM470M500K315A
	56	16	35.5	390	KM560M500J355A
	56	16	40	420	KM560M500J400A
	56	18	31.5	400	KM560M500K315A
	68	16	45	480	KM680M500J450A
	68	18	35.5	460	KM680M500K355A
	68	18	40	490	KM680M500K400A
82	16	45	490	KM820M500J450A	
82	18	35.5	470	KM820M500K355A	
82	18	40	500	KM820M500K400A	
100	18	40	550	KM101M500K400A	
100	18	45	570	KM101M500K450A	
100	20	40	580	KM101M500L400A	
120	20	45	600	KM121M500L450A	
150	22	45	750	KM151M500M450A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	5	6.3	8	10	13	16	18	22
F	2	2.5	3.5	5	5	7.5	7.5	10
ϕd	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$		$\phi D > 18$
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5	2
	1.5	2	1.5	2		

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38
$1000 \leq C_R$	0.8	1	1.11	1.17	1.25	1.28

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General Precautions and Guidelines	Packaging Information Liquid Radial
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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

NK SERIES ▪ BI-POLAR 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 2 000 hours
- Bi-Polar, Non-polarized type
- Excellent frequency characteristics
- Minimal capacitance deviation



SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +105°C			-25 ~ +105°C			
Rated Voltage Range	V_R	6.3 ~ 100V DC			160 ~ 250V DC			
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$						
Capacitance Range	C_R	1 ~ 3300µF			1 ~ 47µF			
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)						
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.03 \cdot C_R \cdot V_R$ or $3\mu A$, whichever is greater ▪ After 1 minute [I_{LEAK} (µA) ; C_R (µF) ; V_R (V)]						
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V_R (V DC)	6.3	10	16	25	35	50
		tanδ (%)	25	25	20	15	15	13
		V_R (V DC)	63	100	160	200	250	
		tanδ (%)	10	10	15	15	20	
		For $C_R > 1000\mu F$, add 2% per every multiple 1000µF of rated capacitance value						
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3
		V_R (V DC)	63	100	160	200	250	
		Z-25°C/Z+20°C	2	2	2	2	3	
		Z-40°C/Z+20°C	3	3	-	-	-	
		For capacitance > 1000µF						
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000µF of rated capacitance value					
Z-40°C/Z+20°C	Add 1 for every multiple 1000µF of rated capacitance value							
Lifetime Test								
Endurance 105°C (V_R applied)	Test	2 000 hours						
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value						
	tanδ	$\leq 150\%$ of initial specified value						
	I_{Leak}	\leq the initial specified value						
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours						
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value						
	tanδ	$\leq 150\%$ of initial specified value						
	I_{Leak}	\leq the initial specified value						
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4						

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
6.3	100	5	11	99	NK101M6R3C110A
	220	8	11.5	149	NK221M6R3F115A
	330	8	11.5	190	NK331M6R3F115A
	470	10	12.5	280	NK471M6R3G125A
	1000	10	16	352	NK102M6R3G160A
	2200	13	20	645	NK222M6R3I200A
	3300	16	25	950	NK332M6R3J250A
10	33	5	11	59	NK330M010C110A
	47	5	11	79	NK470M010C110A
	100	6.3	11	99	NK101M010E110A
	220	8	11.5	157	NK221M010F115A
	330	10	12.5	235	NK331M010G125A
	470	10	12.5	290	NK471M010G125A
	1000	10	20	430	NK102M010G200A
	2200	16	25	830	NK222M010J250A
3300	16	31.5	1150	NK332M010J315A	
16	22	5	11	53	NK220M016C110A
	33	5	11	62	NK330M016C110A
	47	6.3	11	90	NK470M016E110A
	100	6.3	11	99	NK101M016E110A
	100	8	11.5	123	NK101M016F115A
	220	8	11.5	200	NK221M016F115A
	220	10	12.5	234	NK221M016G125A
	330	10	12.5	255	NK331M016G125A
	470	10	16	360	NK471M016G160A
	1000	13	20	511	NK102M016I200A
2200	16	31.5	950	NK222M016J315A	
25	10	5	11	34	NK100M025C110A
	22	6.3	11	55	NK220M025E110A
	33	6.3	11	72	NK330M025E110A
	47	6.3	11	96	NK470M025E110A
	100	8	11.5	152	NK101M025F115A
	220	10	12.5	245	NK221M025G125A
	330	10	16	310	NK331M025G160A
	470	13	20	420	NK471M025I200A
35	10	5	11	38	NK100M035C110A
	22	6.3	11	65	NK220M035E110A
	33	8	11.5	75	NK330M035F115A
	47	8	11.5	107	NK470M035F115A
	100	10	12.5	198	NK101M035G125A
	220	10	20	320	NK221M035G200A
	330	13	20	370	NK331M035I200A
	470	13	25	495	NK471M035I250A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
50	1	5	11	12	NK010M050C110A
	2.2	5	11	17	NK2R2M050C110A
	3.3	5	11	23	NK3R3M050C110A
	4.7	5	11	30	NK4R7M050C110A
	10	6.3	11	50	NK100M050E110A
	22	8	11.5	85	NK220M050F115A
	33	8	11.5	89	NK330M050F115A
	47	10	12.5	123	NK470M050G125A
	100	10	16	198	NK101M050G160A
	100	10	20	220	NK101M050G200A
	220	13	20	340	NK221M050I200A
	220	13	25	375	NK221M050I250A
330	16	25	500	NK331M050J250A	
63	1	5	11	14	NK010M063C110A
	2.2	5	11	20	NK2R2M063C110A
	3.3	6.3	11	25	NK3R3M063E110A
	4.7	6.3	11	30	NK4R7M063E110A
	10	6.3	11	52	NK100M063E110A
	22	8	11.5	88	NK220M063F115A
	22	10	12.5	92	NK220M063G125A
	33	10	12.5	115	NK330M063G125A
	47	10	16	150	NK470M063G160A
	100	13	20	295	NK101M063I200A
	220	13	25	420	NK221M063I250A
	100	1	5	11	15
2.2		5	11	20	NK2R2M100C110A
2.2		6.3	11	22	NK2R2M100E110A
3.3		6.3	11	28	NK3R3M100E110A
4.7		6.3	11	32	NK4R7M100E110A
4.7		8	11.5	36	NK4R7M100F115A
10		8	11.5	52	NK100M100F115A
10		10	12.5	55	NK100M100G125A
22		10	16	120	NK220M100G160A
33		10	20	175	NK330M100G200A
47		13	20	187	NK470M100I200A
100		16	25	399	NK101M100J250A
160	1	6.3	11	18	NK010M160E110A
	2.2	8	11.5	28	NK2R2M160F115A
	3.3	8	11.5	37	NK3R3M160F115A
	4.7	10	12.5	45	NK4R7M160G125A

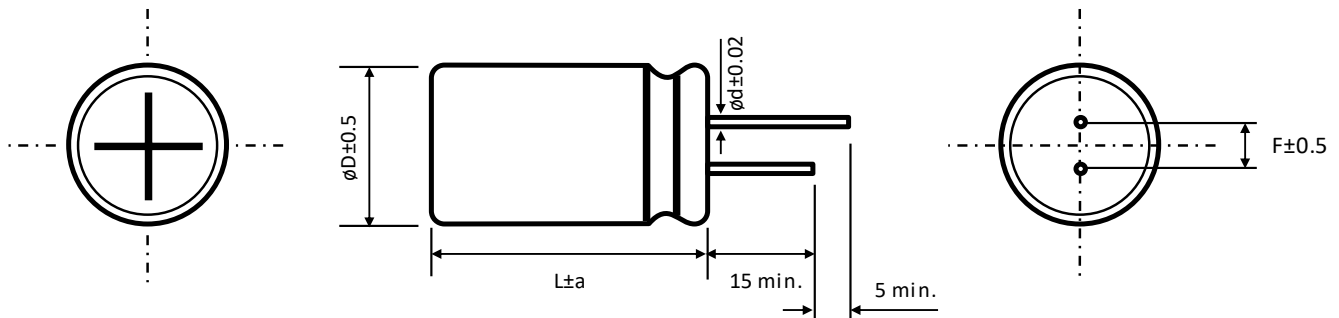
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
160	10	10	16	79	NK100M160G160A
	22	13	20	140	NK220M160I200A
	33	13	20	200	NK330M160I200A
	47	13	25	215	NK470M160I250A
200	1	8	11.5	21	NK010M200F115A
	2.2	8	11.5	32	NK2R2M200F115A
	3.3	10	12.5	40	NK3R3M200G125A
	4.7	10	16	52	NK4R7M200G160A
	10	10	20	86	NK100M200G200A
	22	13	20	160	NK220M200I200A
	33	13	25	213	NK330M200I250A
250	1	8	11.5	25	NK010M250F115A
	2.2	10	12.5	39	NK2R2M250G125A
	3.3	10	16	43	NK3R3M250G160A
	4.7	10	20	65	NK4R7M250G200A
	10	10	20	109	NK100M250G200A
	22	13	25	189	NK220M250I250A
	33	16	25	250	NK330M250J250A

Part number shows bulk version with straight leads. See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm


ϕD	5	6.3	8	10	13	16
F	2	2.5	3.5	5	5	7.5
ϕd	0.5			0.6		0.8
a	1.5			1.5		1.5

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38
$1000 \leq C_R$	0.8	1	1.11	1.17	1.25	1.28

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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For further information, please visit our website www.capxongroup.com or contact CapXon directly.

SJ SERIES ▪ 7MM HEIGHT 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 2 000 hours
- Miniaturized for space critical applications
- Low height ▪ 7mm
- Low voltage version



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C							
Rated Voltage Range	V_R	6.3 ~ 63V DC							
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$							
Capacitance Range	C_R	1 ~ 220 μ F							
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ▪ 20°C)							
Leakage Current (20°C ▪ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ▪ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]							
Dissipation Factor % (20°C ▪ 120Hz)	$\tan\delta$	V_R (V DC)	6.3	10	16	25	35	50	63
		$\tan\delta$ (%)	22	20	16	14	12	10	9
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63
		Z-25°C/Z+20°C	4	3	2	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	4	3	3	3

Lifetime Test			
Endurance 105°C (V_R applied)	Test	2 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan\delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan\delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 220$	0.8	1	1.23	1.36	1.48	1.53

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
6.3	22	4	7	28	SJ220M6R3B070A
	33	4	7	32	SJ330M6R3B070A
	33	5	7	35	SJ330M6R3C070A
	47	5	7	47	SJ470M6R3C070A
	68	5	7	50	SJ680M6R3C070A
	100	6.3	7	75	SJ101M6R3E070A
	220	8	7	92	SJ221M6R3F070A
10	15	4	7	26	SJ150M010B070A
	22	4	7	32	SJ220M010B070A
	33	5	7	48	SJ330M010C070A
	47	5	7	51	SJ470M010C070A
	68	6.3	7	68	SJ680M010E070A
	100	6.3	7	80	SJ101M010E070A
	100	8	7	95	SJ101M010F070A
16	220	8	7	130	SJ221M010F070A
	6.8	4	7	19	SJ6R8M016B070A
	10	4	7	28	SJ100M016B070A
	15	4	7	30	SJ150M016B070A
	22	4	7	35	SJ220M016B070A
	22	5	7	42	SJ220M016C070A
	33	5	7	50	SJ330M016C070A
	47	6.3	7	67	SJ470M016E070A
	68	6.3	7	70	SJ680M016E070A
68	8	7	78	SJ680M016F070A	
100	8	7	110	SJ101M016F070A	
25	4.7	4	7	17	SJ4R7M025B070A
	6.8	4	7	19	SJ6R8M025B070A
	10	4	7	28	SJ100M025B070A
	10	5	7	33	SJ100M025C070A
	15	5	7	35	SJ150M025C070A
	22	5	7	43	SJ220M025C070A
	22	6.3	7	45	SJ220M025E070A
	33	6.3	7	62	SJ330M025E070A
	47	8	7	75	SJ470M025F070A
	68	8	7	80	SJ680M025F070A
100	8	7	115	SJ101M025F070A	
35	4.7	4	7	22	SJ4R7M035B070A
	6.8	4	7	24	SJ6R8M035B070A
	6.8	5	7	28	SJ6R8M035C070A
	10	5	7	35	SJ100M035C070A
	15	5	7	38	SJ150M035C070A
	15	6.3	7	45	SJ150M035E070A
	22	6.3	7	60	SJ220M035E070A
	33	6.3	7	50	SJ330M035E070A

See "PACKAGING INFORMATION" to taped or formed products.

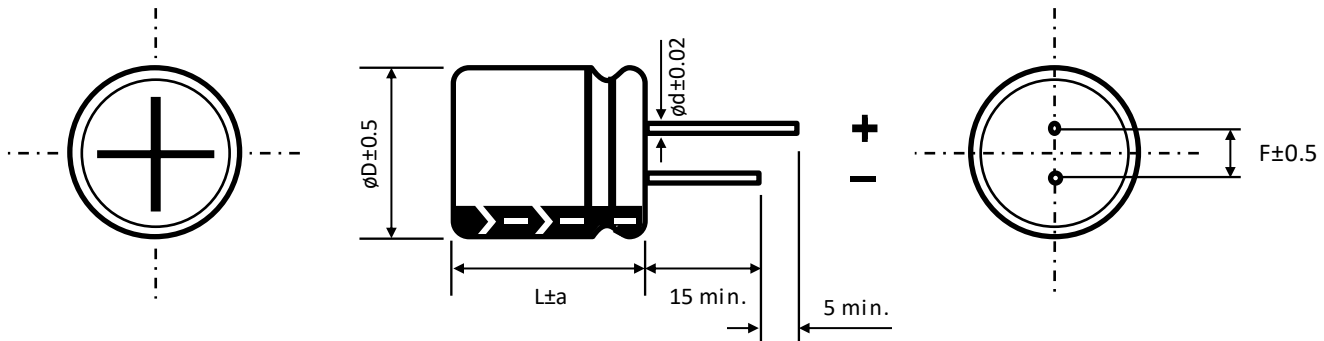
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
35	33	8	7	68	SJ330M035F070A
	47	8	7	80	SJ470M035F070A
	68	8	7	85	SJ680M035F070A
50	1	4	7	10	SJ010M050B070A
	1.5	4	7	13	SJ1R5M050B070A
	2.2	4	7	20	SJ2R2M050B070A
	3.3	4	7	26	SJ3R3M050B070A
	4.7	4	7	27	SJ4R7M050B070A
	4.7	5	7	29	SJ4R7M050C070A
	6.8	5	7	32	SJ6R8M050C070A
	6.8	6.3	7	33	SJ6R8M050E070A
	10	6.3	7	38	SJ100M050E070A
	15	6.3	7	52	SJ150M050E070A
	22	8	7	63	SJ220M050F070A
	33	8	7	78	SJ330M050F070A
63	1	4	7	12	SJ010M063B070A
	1.5	4	7	14	SJ1R5M063B070A
	2.2	4	7	20	SJ2R2M063B070A
	3.3	5	7	28	SJ3R3M063C070A
	4.7	5	7	29	SJ4R7M063C070A
	4.7	6.3	7	33	SJ4R7M063E070A
	6.8	6.3	7	35	SJ6R8M063E070A
	10	6.3	7	40	SJ100M063E070A
	15	8	7	55	SJ150M063F070A
	22	8	7	65	SJ220M063F070A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.5	0.5
a	1	1	1	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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General Precautions and Guidelines	Packaging Information Liquid Radial
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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

LL SERIES ▀ LOW LEAKAGE CURRENT 105°C TYPE

KEY FEATURES LOW LEAKAGE

- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C • 2000 hours
- Low leakage current, $I_{LEAK} \leq 0.002 \cdot C_R \cdot V_R$ or 0.4 (μA)
- Extremely stable leakage current characteristic
- Capacitance tolerance ± 10% on request



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C							
Rated Voltage Range	V_R	6.3 ~ 63V DC							
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$							
Capacitance Range	C_R	1 ~ 2200μF							
Cap. Tolerance	ΔC	±20% (120Hz • 20°C)							
Leakage Current (20°C • V_R applied)	I_{LEAK}	$\leq 0.002 \cdot C_R \cdot V_R$ or 0.4μA, whichever is greater • After 3 minutes [I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]							
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	V_R (V DC)	6.3	10	16	25	35	50	63
		$\tan\delta$ (%)	20	17	13	10	9	8	8
		For $C_R > 1000\mu F$, add 2% per every multiple 1000μF of rated capacitance value							
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63
		Z-25°C/Z+20°C	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	4	3	3	2	2	2	2
		For capacitance > 1000μF							
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value						
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value								
Lifetime Test									
Endurance 105°C (V_R & I_R applied)	Test	2000 hours							
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value							
	$\tan\delta$	$\leq 150\%$ of initial specified value							
	I_{Leak}	\leq the initial specified value							
Shelf Life 105°C ($V_R = 0$)	Test	1000 hours							
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value							
	$\tan\delta$	$\leq 150\%$ of initial specified value							
	I_{Leak}	\leq the initial specified value							
	Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4								

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 2200$	0.8	1	1.16	1.25	1.35	1.38

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
6.3	22	5	11	36	LL220M6R3C110A
	33	5	11	44	LL330M6R3C110A
	47	5	11	53	LL470M6R3C110A
	100	5	11	74	LL101M6R3C110A
	220	6.3	11	131	LL221M6R3E110A
	330	6.3	11	161	LL331M6R3E110A
	470	8	11.5	242	LL471M6R3F115A
	1000	10	12.5	390	LL102M6R3G125A
10	2200	13	20	665	LL222M6R3I200A
	22	5	11	50	LL220M010C110A
	33	5	11	66	LL330M010C110A
	47	5	11	75	LL470M010C110A
	100	5	11	104	LL101M010C110A
	220	8	11.5	193	LL221M010F115A
	330	8	11.5	256	LL331M010F115A
	470	8	11.5	319	LL471M010F115A
16	1000	10	16	605	LL102M010G160A
	2200	13	20	860	LL222M010I200A
	10	5	11	39	LL100M016C110A
	22	5	11	62	LL220M016C110A
	33	5	11	68	LL330M016C110A
	47	5	11	105	LL470M016C110A
	100	6.3	11	138	LL101M016E110A
	220	8	11.5	220	LL221M016F115A
25	330	8	11.5	268	LL331M016F115A
	470	10	12.5	407	LL471M016G125A
	1000	10	20	704	LL102M016G200A
	2200	13	25	890	LL222M016I250A
	4.7	5	11	32	LL4R7M025C110A
	10	5	11	43	LL100M025C110A
	22	5	11	65	LL220M025C110A
	33	5	11	76	LL330M025C110A
35	47	6.3	11	116	LL470M025E110A
	100	8	11.5	149	LL101M025F115A
	220	10	12.5	246	LL221M025G125A
	330	10	12.5	352	LL331M025G125A
	470	10	16	484	LL471M025G160A
	1000	13	20	847	LL102M025I200A
	4.7	5	11	33	LL4R7M035C110A
	10	5	11	48	LL100M035C110A
35	22	6.3	11	71	LL220M035E110A
	33	6.3	11	83	LL330M035E110A
	47	6.3	11	125	LL470M035E110A
	100	8	11.5	187	LL101M035F115A

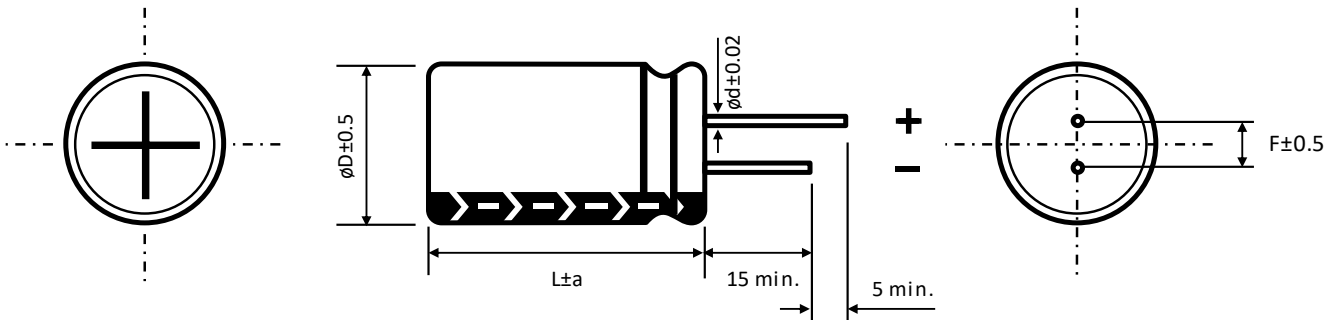
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
35	220	10	12.5	330	LL221M035G125A
	330	10	16	440	LL331M035G160A
	470	13	20	590	LL471M035I200A
	1000	13	25	1012	LL102M035I250A
50	1	5	11	17	LL010M050C110A
	2.2	5	11	24	LL2R2M050C110A
	3.3	5	11	29	LL3R3M050C110A
	4.7	5	11	36	LL4R7M050C110A
	10	5	11	52	LL100M050C110A
	22	6.3	11	77	LL220M050E110A
	33	6.3	11	99	LL330M050E110A
	47	8	11.5	138	LL470M050F115A
	100	10	12.5	217	LL101M050G125A
	220	10	20	380	LL221M050G200A
	330	13	20	506	LL331M050I200A
	470	13	25	705	LL471M050I250A
63	1	5	11	17	LL010M063C110A
	2.2	5	11	24	LL2R2M063C110A
	3.3	5	11	32	LL3R3M063C110A
	4.7	5	11	39	LL4R7M063C110A
	10	6.3	11	58	LL100M063E110A
	22	6.3	11	94	LL220M063E110A
	33	8	11.5	110	LL330M063F115A
	47	8	11.5	152	LL470M063F115A
	100	10	16	260	LL101M063G160A
	220	13	20	440	LL221M063I200A
	330	13	25	594	LL331M063I250A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	5	6.3	8	10	13
F	2	2.5	3.5	5	5
ϕd	0.5			0.6	
a	1.5			1.5	

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

LZ SERIES ■ ULTRA LOW IMPEDANCE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 2 000 hours
- Ultra low impedance
- Highest ripple current in small size
- Ideal for output filter applications



SPECIFICATIONS

Items		Performance Characteristics				
Operating Temperature Range		-40 ~ +105°C				
Rated Voltage Range	V_R	6.3 ~ 25V DC				
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$				
Capacitance Range	C_R	220 ~ 3300 μ F				
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)				
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]				
Dissipation Factor % (20°C ■ 120Hz)	tan δ	V_R (V DC)	6.3	10	16	25
		tan δ (%)	14	12	10	9
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value				
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25
		Z-25°C/Z+20°C	4	3	2	2
		Z-40°C/Z+20°C	6	4	3	3
		For capacitance > 1000 μ F				
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value			
Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value					
Lifetime Test						
Endurance 105°C (V_R & I_R applied)	Test	2 000 hours				
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value				
	tan δ	$\leq 200\%$ of initial specified value				
	I_{Leak}	\leq the initial specified value				
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours				
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value				
	tan δ	$\leq 200\%$ of initial specified value				
	I_{Leak}	\leq the initial specified value				
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4				

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	100/120	1k	10k	100k
220 ~ 330	0.4	0.75	0.93	1
390 ~ 1000	0.5	0.85	0.95	1
1200 ~ 3300	0.55	0.9	0.98	1

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	560	8	11,5	38	1080	LZ561M6R3F115ETD
	680	8	11,5	38	1080	LZ681M6R3F115ETD
	820	8	11,5	38	1080	LZ821M6R3F115ETD
	1000	8	16	36	1100	LZ102M6R3F160ETD
	1000	10	12,5	27	1500	LZ102M6R3G125ETA
	1200	8	16	29	1450	LZ122M6R3F160ETD
	1500	8	20	20	1850	LZ152M6R3F200ETD
	1500	10	12,5	27	1500	LZ152M6R3G125ETA
	1800	10	16	18	1910	LZ182M6R3G160ETA
	2200	8	20	20	1850	LZ222M6R3F200ETD
	2200	10	16	18	1910	LZ222M6R3G160ETA
	2700	10	20	13	2540	LZ272M6R3G200ETA
3300	10	30	12	2800	LZ332M6R3G300ETA	
10	470	8	11,5	38	1080	LZ471M010F115ETD
	560	8	11,5	38	1080	LZ561M010F115ETD
	680	8	11,5	38	1080	LZ681M010F115ETD
	680	10	12,5	27	1500	LZ681M010G125ETA
	820	10	12,5	29	1450	LZ821M010G125ETA
	1000	8	16	29	1450	LZ102M010F160ETD
	1000	10	12,5	27	1500	LZ102M010G125ETA
	1200	8	20	20	1850	LZ122M010F200ETD
	1500	8	20	20	1850	LZ152M010F200ETD
	1500	10	16	18	1910	LZ152M010G160ETA
	1800	10	20	16	2540	LZ182M010G200ETA
	2200	10	20	15	2540	LZ222M010G200ETA
2200	10	25	14	2800	LZ222M010G250ETA	
16	330	8	11,5	38	1080	LZ331M016F115ETD
	470	8	11,5	38	1080	LZ471M016F115ETD
	470	10	12,5	27	1500	LZ471M016G125ETA
	560	8	16	29	1450	LZ561M016F160ETD
	680	8	16	29	1450	LZ681M016F160ETD
	680	10	12,5	27	1500	LZ681M016G125ETA
	820	8	20	20	1850	LZ821M016F200ETD
	1000	8	20	20	1850	LZ102M016F200ETD
	1000	10	16	18	1910	LZ102M016G160ETA
	1200	10	20	17	2540	LZ122M016G200ETA
	1500	10	20	15	2540	LZ152M016G200ETA
	1800	10	25	13	2800	LZ182M016G250ETA

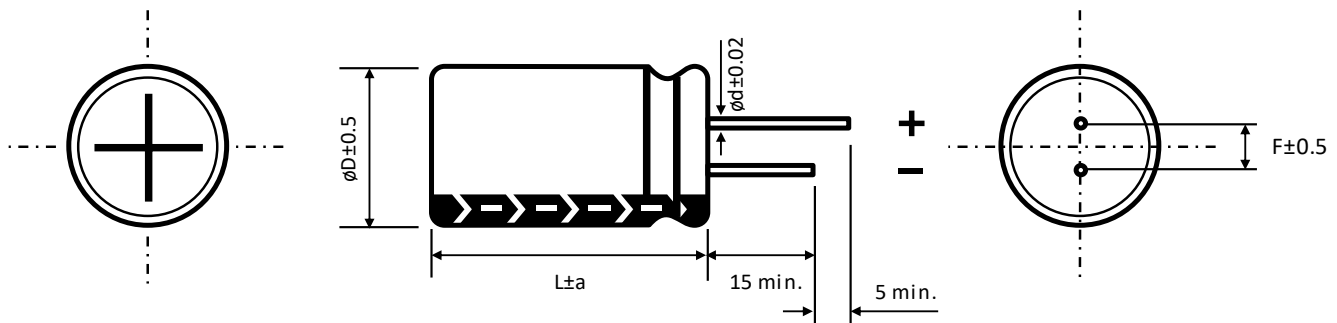
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STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
25	220	8	11,5	32	1080	LZ221M025F115ETD
	270	8	11,5	31	1150	LZ271M025F115ETD
	330	8	11,5	29	1450	LZ331M025F115ETD
	330	10	12,5	27	1650	LZ331M025G125ETA
	470	8	20	20	1720	LZ471M025F200ETD
	470	10	12,5	25	1700	LZ471M025G125ETA
	470	10	16	22	1830	LZ471M025G160ETA
	560	10	16	21	1850	LZ561M025G160ETA
	680	8	20	18	1820	LZ681M025F200ETD
	680	10	16	20	1920	LZ681M025G160ETA
	680	10	20	18	2060	LZ681M025G200ETA
	1000	10	20	16	2180	LZ102M025G200ETA

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm


∅ D	8		10
F	3.5		5
∅ d	L < 20	L ≥ 20	0.6
	0.5	0.6	
a	1.5		1.5

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

SY SERIES ■ 7MM HEIGHT, LOW IMPEDANCE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 2 000 hours
- Miniaturized for space critical applications
- Low height ■ 7mm
- Low impedance and high ripple current



SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-55 ~ +105°C						
Rated Voltage Range	V_R	6.3 ~ 50V DC						
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$						
Capacitance Range	C_R	1 ~ 330 μ F						
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)						
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]						
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	6.3	10	16	25	35	50
		$\tan \delta$ (%)	18	16	14	12	12	10
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	2	2	2	2	2	2
		Z-55°C/Z+20°C	3	3	3	3	3	3

Lifetime Test			
Endurance 105°C (V_R applied)	Test	2 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μ F) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k - 100k
$1 \leq C_R \leq 10$	0.47	0.59	0.76	0.85	0.97	1
$10 < C_R \leq 100$	0.52	0.65	0.8	0.89	0.97	1
$100 < C_R \leq 330$	0.58	0.72	0.84	0.9	0.98	1

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	33	5	7	1950	90	SY330M6R3C070A
	47	6.3	7	1870	99	SY470M6R3E070A
	68	6.3	7	1000	125	SY680M6R3E070A
	100	6.3	7	820	144	SY101M6R3E070A
	120	6.3	7	770	148	SY121M6R3E070A
	150	6.3	7	660	160	SY151M6R3E070A
	180	8	7	640	171	SY181M6R3F070A
	220	8	7	550	180	SY221M6R3F070A
	330	8	7	390	315	SY331M6R3F070A
10	22	4	7	3630	63	SY220M010B070A
	33	5	7	1900	95	SY330M010C070A
	47	5	7	1300	120	SY470M010C070A
	68	6.3	7	880	144	SY680M010E070A
	100	6.3	7	550	180	SY101M010E070A
	120	6.3	7	520	185	SY121M010E070A
	150	8	7	500	207	SY151M010F070A
	180	8	7	490	225	SY181M010F070A
	220	8	7	400	252	SY221M010F070A
16	10	4	7	3500	60	SY100M016B070A
	15	4	7	3000	75	SY150M016B070A
	22	5	7	2000	90	SY220M016C070A
	33	6.3	7	1400	120	SY330M016E070A
	47	6.3	7	900	140	SY470M016E070A
	68	8	7	650	160	SY680M016F070A
	100	8	7	490	180	SY101M016F070A
	120	8	7	930	315	SY121M016F070A
	150	8	7	950	333	SY151M016F070A
25	180	8	7	330	360	SY181M016F070A
	220	8	7	290	387	SY221M016F070A
	10	4	7	3500	60	SY100M025B070A
	22	5	7	1870	99	SY220M025C070A
	33	6.3	7	880	144	SY330M025E070A
	47	8	7	700	160	SY470M025F070A
	68	8	7	550	180	SY680M025F070A
	100	8	7	390	225	SY101M025F070A
	150	8	7	350	306	SY151M025F070A
35	6.8	4	7	3630	63	SY6R8M035B070A
	10	5	7	3200	99	SY100M035C070A
	22	6.3	7	900	140	SY220M035E070A
	33	8	7	550	180	SY330M035F070A
	47	8	7	500	220	SY470M035F070A

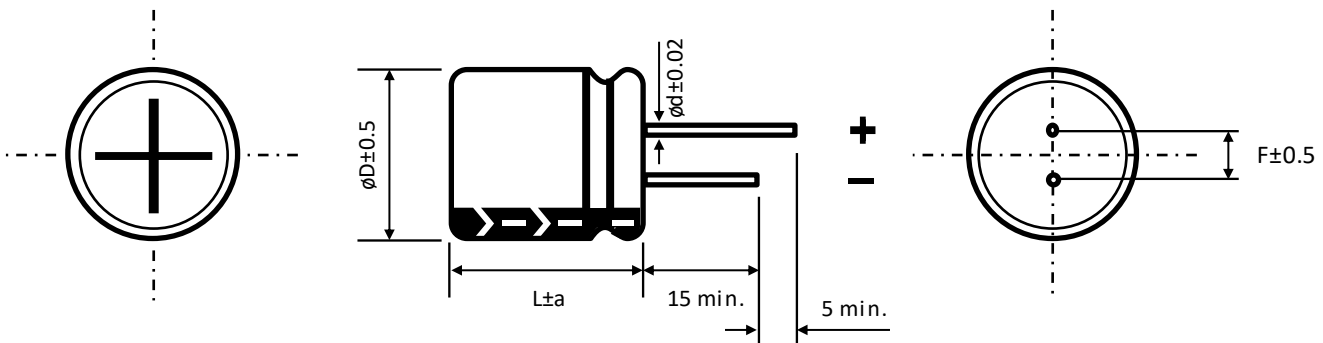
See "PACKAGING INFORMATION" to taped or formed products

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
50	1	4	7	3500	60	SY010M050B070A
	2.2	4	7	3500	60	SY2R2M050B070A
	3.3	4	7	3500	60	SY3R3M050B070A
	4.7	4	7	3500	60	SY4R7M050B070A
	6.8	5	7	2200	80	SY6R8M050C070A
	10	6.3	7	920	135	SY100M050E070A

See "PACKAGING INFORMATION" to taped or formed products

DIMENSIONS - All dimensions in mm


ϕD	4	5	6.3	8
F	1.5	2	2.5	3.5
ϕd	0.45	0.45	0.5	0.5
a	1	1	1	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our "General Precautions and Guidelines" as well as our "Packaging Information". Please refer to the following links in the table.

General Precautions and Guidelines Page 293	Packaging Information Liquid Radial Page 272



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For further information, please visit our website www.capxongroup.com or contact CapXon directly.

KF SERIES ■ LOW IMPEDANCE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 2 000 hours up to 5 000 hours
- Low impedance and high ripple current
- High reliability
- Wide voltage range



SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +105°C					-25 ~ +105°C				
Rated Voltage Range	V_R	6.3 ~ 100V DC					160 ~ 450V DC				
Surge Voltage	V_S	(V _R ≤ 315V): V _S = 1.15·V _R					(V _R > 315V): V _S = 1.10·V _R				
Capacitance Range	C_R	1 ~ 15000μF					1 ~ 330μF				
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)									
Leakage Current (20°C ■ V _R applied)	I_{LEAK}	≤ 0.01·C _R ·V _R or 3μA ■ After 2 minutes					≤ 0.03·C _R ·V _R or 3μA ■ After 2 minutes				
		[I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]									
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V _R (V DC)	6.3	10	16	25	35	50	63	80	100
		tanδ (%)	18	16	14	12	10	9	8	8	8
		V _R (V DC)	160	200	250	350	400	420	450		
		tanδ (%)	12	12	12	15	15	17	17		
		For C _R > 1000μF, add 2% per every multiple 1000μF of rated capacitance value									
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	6.3	10	16	25	35	50	63	80	100
		Z-25°C/Z+20°C	4	3	3	3	3	3	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3	3	3	3
		V _R (V DC)	160	200	250	350	400	450			
		Z-25°C/Z+20°C	2	2	3	5	5	6			
		Z-25°C/Z+20°C	For C _R ≥ 1000μF		Add 0.5 for every multiple 1000μF of C _R value						
Z-40°C/Z+20°C	For C _R ≥ 1000μF		Add 1 for every multiple 1000μF of C _R value								
Lifetime Test											
Endurance 105°C (V _R & I _R applied)	Test	2 000 hours	∅ D 5 ~ 6.3 mm ■ ≤ 100V								
		3 000 hours	∅ D 8 mm ■ ≤ 100V								
		5 000 hours	∅ D ≥ 10 mm ■ ≤ 100V								
		2 000 hours	All ∅ D ■ ≥ 160V								
	$\Delta C/C_R$	≤ ±20% of initial measured value									
tanδ	≤ 200% of initial specified value										
I _{Leak}	≤ the initial specified value										
Shelf Life 105°C (V _R = 0)	Test	1 000 hours									
		$\Delta C/C_R$	≤ ±20% of initial measured value								
		tanδ	≤ 200% of initial specified value								
	I _{Leak}	≤ the initial specified value									
		Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4									

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	100	5	11	1000	170	KF101M6R3C110A
	120	5	11	920	175	KF121M6R3C110A
	150	5	11	900	185	KF151M6R3C110A
	150	6.3	11	810	220	KF151M6R3E110A
	180	6.3	11	760	240	KF181M6R3E110A
	220	6.3	11	650	310	KF221M6R3E110A
	270	6.3	11	540	340	KF271M6R3E110A
	330	8	11.5	420	390	KF331M6R3F115A
	470	8	11.5	250	450	KF471M6R3F115A
	560	8	11.5	230	490	KF561M6R3F115A
	680	8	11.5	210	550	KF681M6R3F115A
	820	8	16	200	620	KF821M6R3F160A
	1000	8	16	180	750	KF102M6R3F160A
	1000	10	12.5	170	770	KF102M6R3G125A
	1200	10	16	160	860	KF122M6R3G160A
	1500	10	16	140	1100	KF152M6R3G160A
	1800	10	20	110	1250	KF182M6R3G200A
	2200	10	20	90	1380	KF222M6R3G200A
	2200	10	25	95	1470	KF222M6R3G250A
	2700	10	25	75	1490	KF272M6R3G250A
	2700	13	20	75	1550	KF272M6R3I200A
	3300	13	20	36	1650	KF332M6R3I200A
	4700	13	30	36	2100	KF472M6R3I300A
	4700	13	25	40	1900	KF472M6R3I250A
	5600	13	30	34	2160	KF562M6R3I300A
	6800	16	25	32	2350	KF682M6R3J250A
8200	16	31.5	27	2550	KF822M6R3J315A	
10000	16	35.5	24	2700	KF103M6R3J355A	
15000	18	35.5	23	2950	KF153M6R3K355A	
10	22	5	11	2700	98	KF220M010C110A
	33	5	11	2600	100	KF330M010C110A
	47	5	11	1340	150	KF470M010C110A
	56	5	11	1230	160	KF560M010C110A
	68	5	11	1050	170	KF680M010C110A
	100	5	11	800	210	KF101M010C110A
	120	6.3	11	750	250	KF121M010E110A
	150	6.3	11	610	290	KF151M010E110A
	180	6.3	11	460	320	KF181M010E110A
	220	6.3	11	350	340	KF221M010E110A
	270	8	11.5	300	400	KF271M010F115A
	330	8	11.5	270	460	KF331M010F115A
	470	8	11.5	250	580	KF471M010F115A
	560	8	11.5	170	550	KF561M010F115A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
10	560	10	12.5	160	635	KF561M010G125A
	680	10	12.5	110	765	KF681M010G125A
	820	10	16	100	890	KF821M010G160A
	1000	10	16	76	1040	KF102M010G160A
	1200	10	16	67	1200	KF122M010G160A
	1500	10	20	62	1400	KF152M010G200A
	1800	10	25	58	1550	KF182M010G250A
	2200	10	25	52	1650	KF222M010G250A
	2200	13	20	41	1750	KF222M010I200A
	2700	13	20	35	1900	KF272M010I200A
	3300	13	25	31	2000	KF332M010I250A
	4700	16	25	30	2100	KF472M010J250A
	5600	16	25	28	2290	KF562M010J250A
	6800	16	31.5	26	2650	KF682M010J315A
	8200	16	35.5	26	2770	KF822M010J355A
10000	18	35.5	24	2850	KF103M010K355A	
16	10	5	11	4700	74	KF100M016C110A
	22	5	11	2600	100	KF220M016C110A
	33	5	11	2000	114	KF330M016C110A
	47	5	11	1100	155	KF470M016C110A
	56	5	11	820	180	KF560M016C110A
	68	5	11	690	195	KF680M016C110A
	100	6.3	11	500	265	KF101M016E110A
	120	6.3	11	470	270	KF121M016E110A
	150	6.3	11	410	290	KF151M016E110A
	180	6.3	11	380	315	KF181M016E110A
	180	8	11.5	340	370	KF181M016F115A
	220	8	11.5	250	480	KF221M016F115A
	270	8	11.5	210	520	KF271M016F115A
	330	8	11.5	156	590	KF331M016F115A
	470	10	12.5	124	750	KF471M016G125A
	560	10	12.5	105	785	KF561M016G125A
	680	10	16	92	1100	KF681M016G160A
	820	10	16	78	1180	KF821M016G160A
	1000	10	20	65	1350	KF102M016G200A
	1200	10	25	61	1500	KF122M016G250A
	1500	10	30	56	1600	KF152M016G300A
	1500	13	20	60	1380	KF152M016I200A
	1800	10	25	50	1730	KF182M016G250A
	1800	13	20	47	1800	KF182M016I200A
	2200	13	25	38	2000	KF222M016I250A
2200	13	20	40	1880	KF222M016I200A	
2700	13	25	33	2450	KF272M016I250A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
16	3300	13	30	30	2640	KF332M016I300A
	3300	16	25	30	2790	KF332M016J250A
	4700	16	31.5	26	2880	KF472M016J315A
	5600	16	35.5	25	2990	KF562M016J355A
	6800	18	35.5	24	3200	KF682M016K355A
	8200	18	35.5	24	3320	KF822M016K355A
	10000	18	40	24	3550	KF103M016K400A
25	4.7	5	11	3950	68	KF4R7M025C110A
	5.6	5	11	3250	75	KF5R6M025C110A
	6.8	5	11	2980	80	KF6R8M025C110A
	10	5	11	2560	85	KF100M025C110A
	22	5	11	1950	125	KF220M025C110A
	33	5	11	1420	155	KF330M025C110A
	47	5	11	1100	190	KF470M025C110A
	47	6.3	11	1000	220	KF470M025E110A
	56	6.3	11	790	250	KF560M025E110A
	68	6.3	11	650	280	KF680M025E110A
	100	6.3	11	350	370	KF101M025E110A
	120	6.3	11	330	380	KF121M025E110A
	150	8	11.5	310	410	KF151M025F115A
	180	8	11.5	250	455	KF181M025F115A
	220	8	11.5	150	550	KF221M025F115A
	270	10	12.5	125	720	KF271M025G125A
	330	10	12.5	114	820	KF331M025G125A
	470	10	16	76	1200	KF471M025G160A
	560	10	16	72	1250	KF561M025G160A
	680	10	20	65	1320	KF681M025G200A
	820	10	20	52	1400	KF821M025G200A
	820	10	25	52	1530	KF821M025G250A
	1000	13	20	45	1650	KF102M025I200A
	1200	13	25	41	1980	KF122M025I250A
	1500	13	25	38	2210	KF152M025I250A
	1800	16	25	36	2510	KF182M025J250A
	2200	16	25	35	2650	KF222M025J250A
	2700	16	25	31	2820	KF272M025J250A
3300	16	31.5	26	3240	KF332M025J315A	
4700	16	35.5	24	3650	KF472M025J355A	
5600	18	35.5	24	3720	KF562M025K355A	
6800	18	40	24	3850	KF682M025K400A	
35	4.7	5	11	3650	85	KF4R7M035C110A
	5.6	5	11	3090	92	KF5R6M035C110A
	6.8	5	11	2820	97	KF6R8M035C110A
	10	5	11	2370	105	KF100M035C110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
35	22	5	11	1500	150	KF220M035C110A
	33	5	11	1210	180	KF330M035C110A
	47	6.3	11	800	280	KF470M035E110A
	56	6.3	11	640	310	KF560M035E110A
	68	8	11.5	520	350	KF680M035F115A
	100	8	11.5	250	450	KF101M035F115A
	120	8	11.5	220	510	KF121M035F115A
	150	8	11.5	191	540	KF151M035F115A
	180	10	12.5	172	650	KF181M035G125A
	220	10	12.5	114	750	KF221M035G125A
	270	10	16	95	910	KF271M035G160A
	330	10	16	79	1050	KF331M035G160A
	470	10	20	65	1200	KF471M035G200A
	560	10	25	61	1500	KF561M035G250A
	680	13	20	56	1570	KF681M035I200A
	820	13	20	48	1700	KF821M035I200A
	1000	13	25	42	1900	KF102M035I250A
	1200	13	30	39	2130	KF122M035I300A
	1500	16	25	36	2270	KF152M035J250A
	1800	16	31.5	35	2700	KF182M035J315A
2200	16	31.5	34	2780	KF222M035J315A	
2700	16	35.5	29	2850	KF272M035J355A	
3300	18	35.5	26	3100	KF332M035K355A	
4700	18	40	24	3500	KF472M035K400A	
50	1	5	11	4000	40	KF010M050C110A
	2.2	5	11	2800	55	KF2R2M050C110A
	3.3	5	11	2200	60	KF3R3M050C110A
	4.7	5	11	2000	90	KF4R7M050C110A
	5.6	5	11	1930	105	KF5R6M050C110A
	6.8	5	11	1890	110	KF6R8M050C110A
	10	5	11	1820	120	KF100M050C110A
	22	6.3	11	1250	150	KF220M050E110A
	33	6.3	11	800	250	KF330M050E110A
	47	6.3	11	650	290	KF470M050E110A
	56	8	11.5	490	310	KF560M050F115A
	68	8	11.5	330	375	KF680M050F115A
	100	10	12.5	170	480	KF101M050G125A
	120	10	12.5	156	530	KF121M050G125A
	150	10	12.5	132	590	KF151M050G125A
	180	10	16	114	860	KF181M050G160A
220	10	16	96	930	KF221M050G160A	
270	10	20	78	1060	KF271M050G200A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
50	330	10	25	65	1150	KF331M050G250A
	470	13	20	55	1590	KF471M050I200A
	560	13	20	50	1740	KF561M050I200A
	680	13	25	44	1930	KF681M050I250A
	820	13	30	39	2100	KF821M050I300A
	1000	16	25	36	2300	KF102M050J250A
	1200	16	31.5	36	2650	KF122M050J315A
	1500	16	35.5	34	2750	KF152M050J355A
	1800	16	35.5	34	2850	KF182M050J355A
	2200	18	35.5	32	3040	KF222M050K355A
	2700	18	40	27	3070	KF272M050K400A
3300	18	40	25	3100	KF332M050K400A	
63	1	5	11	4000	33	KF010M063C110A
	2.2	5	11	2800	45	KF2R2M063C110A
	3.3	5	11	2200	58	KF3R3M063C110A
	4.7	5	11	2000	65	KF4R7M063C110A
	5.6	5	11	1900	95	KF5R6M063C110A
	6.8	5	11	1820	100	KF6R8M063C110A
	10	5	11	1750	110	KF100M063C110A
	22	6.3	11	800	180	KF220M063E110A
	33	8	11.5	610	270	KF330M063F115A
	47	8	11.5	560	300	KF470M063F115A
	56	8	11.5	380	330	KF560M063F115A
	68	10	12.5	210	480	KF680M063G125A
	100	10	16	140	610	KF101M063G160A
	120	10	16	130	620	KF121M063G160A
	150	10	16	110	700	KF151M063G160A
	180	10	20	100	800	KF181M063G200A
	220	10	20	80	920	KF221M063G200A
	270	13	20	65	1150	KF271M063I200A
	330	13	20	55	1250	KF331M063I200A
	470	13	25	53	1620	KF471M063I250A
	560	13	25	49	1680	KF561M063I250A
	680	13	30	43	1950	KF681M063I300A
	820	16	25	38	2150	KF821M063J250A
1000	16	31.5	34	2350	KF102M063J315A	
1200	16	35.5	32	2550	KF122M063J355A	
1500	18	35.5	31	2710	KF152M063K355A	
1800	18	40	27	3000	KF182M063K400A	
80	1	5	11	4300	24	KF010M080C110A
	2.2	5	11	3200	36	KF2R2M080C110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
80	3.3	5	11	2700	47	KF3R3M080C110A
	4.7	5	11	2500	63	KF4R7M080C110A
	5.6	5	11	2300	85	KF5R6M080C110A
	6.8	5	11	1850	92	KF6R8M080C110A
	10	5	11	1700	105	KF100M080C110A
	22	6.3	11	830	175	KF220M080E110A
	33	8	11.5	610	280	KF330M080F115A
	47	8	11.5	550	310	KF470M080F115A
	56	8	11.5	410	360	KF560M080F115A
	68	8	16	280	400	KF680M080F160A
	100	8	20	220	500	KF101M080F200A
	120	10	16	180	580	KF121M080G160A
	150	10	20	150	680	KF151M080G200A
	180	10	20	112	800	KF181M080G200A
	220	13	20	90	900	KF221M080I200A
	270	13	20	95	1080	KF271M080I200A
	330	13	25	85	1210	KF331M080I250A
	470	16	25	70	1500	KF471M080J250A
	560	16	25	62	1640	KF561M080J250A
	680	18	25	59	1680	KF681M080K250A
820	18	31.5	56	1780	KF821M080K315A	
1000	18	31.5	45	1850	KF102M080K315A	
1200	18	35.5	42	1960	KF122M080K355A	
1500	18	40	36	2160	KF152M080K400A	
100	1	5	11	4400	30	KF010M100C110A
	2.2	5	11	3300	42	KF2R2M100C110A
	3.3	5	11	2800	55	KF3R3M100C110A
	4.7	5	11	2600	72	KF4R7M100C110A
	5.6	5	11	2330	100	KF5R6M100C110A
	6.8	6.3	11	1950	115	KF6R8M100E110A
	10	6.3	11	1770	130	KF100M100E110A
	22	8	11.5	850	220	KF220M100F115A
	33	10	12.5	690	320	KF330M100G125A
	47	10	12.5	580	370	KF470M100G125A
	56	10	12.5	430	400	KF560M100G125A
	56	10	16	420	440	KF560M100G160A
	68	10	16	350	470	KF680M100G160A
	100	10	25	300	560	KF101M100G250A
	120	10	25	220	660	KF121M100G250A
	150	13	20	174	780	KF151M100I200A
	180	13	20	142	820	KF181M100I200A
220	13	25	130	950	KF221M100I250A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
100	270	13	30	110	1120	KF271M100I300A
	330	16	25	100	1440	KF331M100J250A
	470	16	31.5	90	1650	KF471M100J315A
	560	16	35.5	85	1720	KF561M100J355A
	680	18	35.5	80	1790	KF681M100K355A
	820	18	35.5	71	1840	KF821M100K355A
	1000	18	40	66	1930	KF102M100K400A
160	1	6.3	11	12000	45	KF010M160E110A
	2.2	6.3	11	9900	55	KF2R2M160E110A
	3.3	8	11.5	4310	70	KF3R3M160F115A
	4.7	8	11.5	4160	80	KF4R7M160F115A
	5.6	10	12.5	3610	91	KF5R6M160G125A
	6.8	10	16	3120	100	KF6R8M160G160A
	10	10	12.5	3000	126	KF100M160G125A
	10	10	16	2690	140	KF100M160G160A
	22	10	16	1300	205	KF220M160G160A
	33	10	20	1100	260	KF330M160G200A
	47	10	20	1650	276	KF470M160G200A
	47	13	20	910	320	KF470M160I200A
	56	13	20	670	340	KF560M160I200A
	56	13	25	660	370	KF560M160I250A
	68	13	25	560	450	KF680M160I250A
	100	16	25	470	540	KF101M160J250A
	120	16	25	350	560	KF121M160J250A
	150	16	31.5	260	710	KF151M160J315A
	180	16	35.5	220	760	KF181M160J355A
	220	16	35.5	190	820	KF221M160J355A
270	18	35.5	180	990	KF271M160K355A	
330	18	40	160	1180	KF331M160K400A	
200	1	6.3	11	7760	45	KF010M200E110A
	2.2	6.3	11	5180	55	KF2R2M200E110A
	3.3	8	11.5	4250	71	KF3R3M200F115A
	4.7	8	11.5	5000	78	KF4R7M200F115A
	4.7	10	12.5	4120	85	KF4R7M200G125A
	5.6	8	11.5	4500	90	KF5R6M200F115A
	5.6	10	12.5	3550	95	KF5R6M200G125A
	6.8	8	16	3250	115	KF6R8M200F160A
	6.8	10	16	2710	140	KF6R8M200G160A
	10	8	11.5	3750	115	KF100M200F115A
	10	10	16	2020	150	KF100M200G160A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
200	22	10	16	1800	186	KF220M200G160A
	22	10	20	1400	205	KF220M200G200A
	33	10	20	1000	280	KF330M200G200A
	33	13	20	800	330	KF330M200I200A
	47	10	20	720	311	KF470M200G200A
	47	13	20	650	360	KF470M200I200A
	47	13	25	620	400	KF470M200I250A
	56	13	20	450	430	KF560M200I200A
	68	13	25	420	480	KF680M200I250A
	68	16	25	350	540	KF680M200J250A
	100	16	25	300	780	KF101M200J250A
	100	16	31.5	280	820	KF101M200J315A
	120	16	25	280	740	KF121M200J250A
	120	16	31.5	260	830	KF121M200J315A
	150	16	31.5	250	840	KF151M200J315A
	150	16	35.5	230	860	KF151M200J355A
	180	18	31.5	200	920	KF181M200K315A
	220	18	35.5	190	1050	KF221M200K355A
220	18	40	160	1090	KF221M200K400A	
250	1	6.3	11	6540	50	KF010M250E110A
	2.2	8	11.5	4120	72	KF2R2M250F115A
	3.3	8	11.5	3850	75	KF3R3M250F115A
	4.7	8	11.5	3500	85	KF4R7M250F115A
	4.7	10	12.5	2950	100	KF4R7M250G125A
	5.6	8	11.5	2930	95	KF5R6M250F115A
	5.6	10	12.5	2900	105	KF5R6M250G125A
	6.8	8	16	2800	124	KF6R8M250F160A
	6.8	10	12.5	2800	126	KF6R8M250G125A
	6.8	10	16	1860	140	KF6R8M250G160A
	10	8	16	1800	141	KF100M250F160A
	10	10	12.5	1750	144	KF100M250G125A
	10	10	16	1600	160	KF100M250G160A
	22	10	16	1400	190	KF220M250G160A
	22	10	20	1300	210	KF220M250G200A
	33	10	20	1400	224	KF330M250G200A
	33	10	25	1250	248	KF330M250G250A
	33	13	20	900	310	KF330M250I200A
	47	13	20	600	375	KF470M250I200A
	47	13	25	450	405	KF470M250I250A
	56	13	25	420	420	KF560M250I250A
68	16	25	380	490	KF680M250J250A	
100	16	31.5	270	675	KF101M250J315A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
250	120	16	31.5	260	692	KF121M250J315A
	120	16	35.5	250	730	KF121M250J355A
	150	16	35.5	240	750	KF151M250J355A
	150	18	31.5	230	750	KF151M250K315A
	180	18	35.5	210	830	KF181M250K355A
	220	18	31.5	200	850	KF221M250K315A
	220	18	40	190	910	KF221M250K400A
350	1	6.3	11	7900	50	KF010M350E110A
	1	8	11.5	6350	58	KF010M350F115A
	2.2	8	11.5	5300	75	KF2R2M350F115A
	2.2	10	12.5	4020	86	KF2R2M350G125A
	3.3	10	12.5	3800	90	KF3R3M350G125A
	3.3	10	16	3520	100	KF3R3M350G160A
	4.7	10	16	3130	118	KF4R7M350G160A
	4.7	10	20	2770	130	KF4R7M350G200A
	5.6	10	16	2760	120	KF5R6M350G160A
	5.6	10	20	2580	132	KF5R6M350G200A
	6.8	10	16	2430	148	KF6R8M350G160A
	6.8	10	25	1650	180	KF6R8M350G250A
	10	10	16	1640	165	KF100M350G160A
	10	10	25	1350	200	KF100M350G250A
	22	13	20	1220	220	KF220M350I200A
	33	13	20	1020	263	KF330M350I200A
	33	13	25	860	290	KF330M350I250A
	47	16	25	760	389	KF470M350J250A
	47	16	31.5	620	430	KF470M350J315A
	56	16	35.5	600	460	KF560M350J355A
	68	16	31.5	570	475	KF680M350J315A
	100	16	35.5	560	481	KF101M350J355A
100	18	31.5	560	487	KF101M350K315A	
100	18	35.5	550	513	KF101M350K355A	
120	18	35.5	540	525	KF121M350K355A	
120	18	40	520	560	KF121M350K400A	
150	18	40	500	590	KF151M350K400A	
400	1	8	11.5	16500	36	KF010M400F115A
	2.2	8	11.5	13000	65	KF2R2M400F115A
	2.2	10	12.5	13000	76	KF2R2M400G125A
	3.3	8	9	14000	78	KF3R3M400F090A
	3.3	8	11.5	12000	86	KF3R3M400F115A
	4.7	8	11.5	11000	89	KF4R7M400F115A
	4.7	10	12.5	10000	105	KF4R7M400G125A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
400	5.6	8	16	8000	105	KF5R6M400F160A
	5.6	10	12.5	9000	120	KF5R6M400G125A
	6.8	10	12.5	7700	144	KF6R8M400G125A
	6.8	10	16	7500	160	KF6R8M400G160A
	10	10	14	5000	201	KF100M400G140A
	10	10	16	3800	213	KF100M400G160A
	10	10	20	3600	235	KF100M400G200A
	15	10	20	3000	240	KF150M400G200A
	22	13	16	2800	268	KF220M400I160A
	22	13	20	2650	295	KF220M400I200A
	33	13	20	1800	399	KF330M400I200A
	33	13	25	1600	440	KF330M400I250A
	33	16	20	1900	459	KF330M400J200A
	47	16	20	1600	539	KF470M400J200A
	47	16	25	1400	580	KF470M400J250A
	56	16	25	1030	587	KF560M400J250A
	56	16	31.5	850	650	KF560M400J315A
	68	16	31.5	800	800	KF680M400J315A
	68	18	25	760	774	KF680M400K250A
	100	18	31.5	700	854	KF101M400K315A
100	18	35.5	680	900	KF101M400K355A	
120	18	35.5	580	930	KF121M400K355A	
420	1	8	11.5	17000	38	KF010M420F115A
	2.2	10	12.5	12100	58	KF2R2M420G125A
	3.3	10	12.5	11000	87	KF3R3M420G125A
	4.7	10	16	8500	102	KF4R7M420G160A
	5.6	10	16	6800	109	KF5R6M420G160A
	6.8	10	16	6000	160	KF6R8M420G160A
	10	10	20	3700	180	KF100M420G200A
	22	13	25	2700	330	KF220M420I250A
	33	16	25	1800	480	KF330M420J250A
	47	16	31.5	1100	620	KF470M420J315A
	56	16	35.5	900	670	KF560M420J355A
	68	18	31.5	800	750	KF680M420K315A
100	18	35.5	700	820	KF101M420K355A	
450	1	8	11.5	17350	45	KF010M450F115A
	2.2	10	16	10250	65	KF2R2M450G160A
	3.3	10	16	10000	89	KF3R3M450G160A
	4.7	10	20	5000	105	KF4R7M450G200A
	5.6	10	20	4750	110	KF5R6M450G200A
	6.8	10	20	4050	135	KF6R8M450G200A

See "PACKAGING INFORMATION" to taped or formed products.

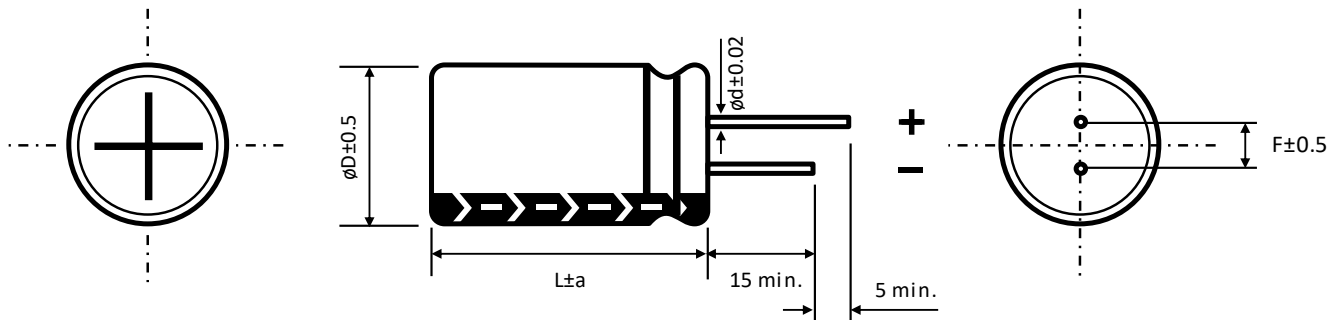
STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
450	10	10	20	7000	163	KF100M450G200A
	10	10	25	3750	180	KF100M450G250A
	10	13	20	6800	189	KF100M450I200A
	22	13	25	2800	320	KF220M450I250A
	33	16	25	2200	460	KF330M450J250A
	33	18	20	2700	458	KF330M450K200A
	47	16	35.5	1050	650	KF470M450J355A
	47	18	25	1650	596	KF470M450K250A
	56	18	31.5	950	730	KF560M450K315A
	68	18	31.5	800	721	KF680M450K315A
	68	18	35.5	750	760	KF680M450K355A
	100	18	35.5	1100	825	KF101M450K355A
	100	18	40	740	880	KF101M450K400A
120	18	40	1000	980	KF121M450K400A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm



∅ D	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
∅ d	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				



a	∅ D < 16		∅ D = 16		∅ D = 18	
	1.5		L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5
			1.5	2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C _R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	100k
C _R ≤ 10	0.47	0.59	0.76	0.85	0.97	1
10 < C _R ≤ 100	0.52	0.62	0.8	0.89	0.97	1
100 < C _R ≤ 1000	0.58	0.72	0.84	0.9	0.98	1
1000 ≤ C _R	0.63	0.78	0.87	0.91	0.98	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

	
<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
<p>Page 293</p>	<p>Page 272</p>

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

GF SERIES ■ LOW IMPEDANCE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C ■ 2 000 hours up to 5 000 hours
- Low impedance and high ripple current
- Wide capacitance range
- Optimized low temperature type



SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +105°C									
Rated Voltage Range	V_R	6.3 ~ 100V DC									
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$									
Capacitance Range	C_R	4.7 ~ 6800 μ F									
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)									
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]									
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	6.3	10	16	25	35	50	63	100	
		$\tan \delta$ (%)	16	14	12	10	9	8	8	8	
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value									
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	100	
		Z-25°C/Z+20°C	4	3	3	3	3	3	2	2	
		Z-40°C/Z+20°C	8	6	4	3	3	3	3	3	
		For capacitance > 1000 μ F									
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value								
Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value										
Lifetime Test											
Endurance 105°C (V_R & I_R applied)	Test	2 000 hours						ϕ D 5 ~ 6.3 mm			
		3 000 hours						ϕ D 8 mm			
		5 000 hours						ϕ D \geq 10 mm			
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value									
	$\tan \delta$	$\leq 200\%$ of initial specified value									
I_{Leak}	\leq the initial specified value										
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours									
		$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value								
		$\tan \delta$	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value									
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4									

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	100	5	11	400	200	GF101M6R3C110A
	120	5	11	380	210	GF121M6R3C110A
	150	5	11	350	225	GF151M6R3C110A
	180	6.3	11	320	300	GF181M6R3E110A
	220	6.3	11	250	360	GF221M6R3E110A
	270	6.3	11	240	377	GF271M6R3E110A
	330	6.3	11	200	395	GF331M6R3E110A
	390	8	11.5	140	576	GF391M6R3F115A
	470	8	11.5	95	600	GF471M6R3F115A
	560	8	16	87	720	GF561M6R3F160A
	680	8	16	80	800	GF681M6R3F160A
	680	10	16	84	814	GF681M6R3G160A
	820	8	20	70	970	GF821M6R3F200A
	1000	10	12.5	55	1000	GF102M6R3G125A
	1200	8	20	48	1150	GF122M6R3F200A
	1200	10	16	50	1180	GF122M6R3G160A
	1500	10	20	45	1400	GF152M6R3G200A
	1500	10	25	43	1560	GF152M6R3G250A
	1800	10	20	41	1500	GF182M6R3G200A
	2200	10	25	37	1720	GF222M6R3G250A
	2200	13	20	39	1890	GF222M6R3I200A
	2700	13	20	34	2080	GF272M6R3I200A
	3300	13	20	26	2290	GF332M6R3I200A
	3900	10	30	24	2450	GF392M6R3G300A
	3900	13	25	22	2670	GF392M6R3I250A
	4700	13	30	21	3200	GF472M6R3I300A
5600	13	35	20	3270	GF562M6R3I350A	
6800	16	31.5	18	3490	GF682M6R3J315A	
10	68	5	11	700	190	GF680M010C110A
	82	5	11	500	210	GF820M010C110A
	100	5	11	310	242	GF101M010C110A
	120	5	11	280	261	GF121M010C110A
	150	6.3	11	260	300	GF151M010E110A
	180	6.3	11	220	350	GF181M010E110A
	220	6.3	11	180	390	GF221M010E110A
	270	6.3	15	160	460	GF271M010E150A
	330	8	11.5	110	540	GF331M010F115A
	390	8	11.5	95	620	GF391M010F115A
	470	8	11.5	75	750	GF471M010F115A
	560	8	16	72	870	GF561M010F160A
	680	8	20	68	1010	GF681M010F200A
	820	8	20	65	1030	GF821M010F200A
	1000	8	20	50	1220	GF102M010F200A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (mΩ)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
10	1000	10	16	42	1400	GF102M010G160A
	1200	10	20	35	1560	GF122M010G200A
	1500	10	20	32	1670	GF152M010G200A
	1800	10	25	28	2000	GF182M010G250A
	2200	13	20	25	2370	GF222M010I200A
	2700	13	20	23	2400	GF272M010I200A
	3300	13	25	21	2720	GF332M010I250A
	3900	13	30	20	3000	GF392M010I300A
	4700	13	35	19	3450	GF472M010I350A
	5600	16	31.5	18	3460	GF562M010J315A
6800	16	31.5	16	3630	GF682M010J315A	
16	47	5	11	400	200	GF470M016C110A
	56	5	11	380	220	GF560M016C110A
	68	5	11	350	230	GF680M016C110A
	82	5	11	310	260	GF820M016C110A
	100	6.3	11	250	360	GF101M016E110A
	120	6.3	11	230	365	GF121M016E110A
	150	6.3	11	210	385	GF151M016E110A
	180	8	11.5	190	520	GF181M016F115A
	220	8	11.5	140	575	GF221M016F115A
	270	8	11.5	120	600	GF271M016F115A
	330	8	11.5	80	740	GF331M016F115A
	390	8	16	75	790	GF391M016F160A
	470	8	16	62	990	GF471M016F160A
	470	10	12.5	58	1000	GF471M016G125A
	560	8	20	57	1070	GF561M016F200A
	680	8	20	55	1120	GF681M016F200A
	680	10	16	52	1280	GF681M016G160A
	820	10	20	48	1400	GF821M016G200A
	1000	10	20	35	1840	GF102M016G200A
	1200	10	25	32	1920	GF122M016G250A
	1500	10	25	30	2050	GF152M016G250A
	1500	13	20	29	2200	GF152M016I200A
	1800	13	20	26	2380	GF182M016I200A
	2200	13	25	22	2750	GF222M016I250A
2700	13	25	22	3000	GF272M016I250A	
3300	13	35	18	3490	GF332M016I350A	
3900	16	25	18	3520	GF392M016J250A	
4700	16	31.5	17	3770	GF472M016J315A	
25	39	5	11	420	210	GF390M025C110A
	47	5	11	350	240	GF470M025C110A
	56	5	11	310	256	GF560M025C110A
	68	6.3	11	280	300	GF680M025E110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z - Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
25	82	6.3	11	240	350	GF820M025E110A
	100	6.3	11	150	410	GF101M025E110A
	120	6.3	15	130	490	GF121M025E150A
	150	8	11.5	110	540	GF151M025F115A
	180	8	11.5	98	620	GF181M025F115A
	220	8	11.5	75	750	GF221M025F115A
	270	8	16	63	850	GF271M025F160A
	330	8	16	56	990	GF331M025F160A
	330	10	12.5	54	1010	GF331M025G125A
	390	10	12.5	51	1050	GF391M025G125A
	470	8	20	45	1260	GF471M025F200A
	470	10	16	42	1415	GF471M025G160A
	560	10	20	40	1450	GF561M025G200A
	680	10	20	35	1570	GF681M025G200A
	820	10	25	32	1910	GF821M025G250A
	1000	13	20	25	2340	GF102M025I200A
	1200	13	20	25	2390	GF122M025I200A
	1500	13	25	23	2710	GF152M025I250A
	1800	13	30	21	3150	GF182M025I300A
	2200	13	35	18	3420	GF222M025I350A
2700	16	31.5	18	3480	GF272M025J315A	
3300	16	31.5	18	3600	GF332M025J315A	
35	33	5	11	320	230	GF330M035C110A
	39	6.3	11	310	277	GF390M035E110A
	47	6.3	11	200	340	GF470M035E110A
	56	6.3	11	200	375	GF560M035E110A
	68	6.3	11	190	400	GF680M035E110A
	82	8	11.5	170	480	GF820M035F115A
	100	8	11.5	150	560	GF101M035F115A
	120	8	11.5	130	585	GF121M035F115A
	150	8	11.5	110	680	GF151M035F115A
	180	8	16	98	810	GF181M035F160A
	220	8	16	56	1000	GF221M035F160A
	220	10	12.5	52	1060	GF221M035G125A
	270	10	16	50	1190	GF271M035G160A
	330	8	20	41	1210	GF331M035F200A
	330	10	16	38	1400	GF331M035G160A
	390	10	20	35	1550	GF391M035G200A
	470	10	20	34	1850	GF471M035G200A
	560	10	25	31	2040	GF561M035G250A
	680	13	20	29	2260	GF681M035I200A
	820	13	25	21	2630	GF821M035I250A
1000	13	25	19	2780	GF102M035I250A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z - Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
35	1200	13	30	19	2950	GF122M035I300A
	1200	16	25	18	3150	GF122M035J250A
	1500	13	35	18	3350	GF152M035I350A
	1500	16	31.5	17	3600	GF152M035J315A
	1800	16	31.5	16	3670	GF182M035J315A
	2200	16	31.5	15	3750	GF222M035J315A
	2700	18	31.5	14	3850	GF272M035K315A
50	22	5	11	350	220	GF220M050C110A
	27	6.3	11	340	265	GF270M050E110A
	33	6.3	11	320	280	GF330M050E110A
	39	6.3	11	280	300	GF390M050E110A
	47	8	11.5	200	360	GF470M050F115A
	56	8	11.5	190	385	GF560M050F115A
	68	8	11.5	170	400	GF680M050F115A
	82	8	11.5	120	550	GF820M050F115A
	100	8	11.5	75	730	GF101M050F115A
	120	8	16	73	770	GF121M050F160A
	120	10	12.5	72	790	GF121M050G125A
	150	10	12.5	68	870	GF151M050G125A
	180	8	20	55	1060	GF181M050F200A
	180	10	16	55	1090	GF181M050G160A
	220	10	16	45	1385	GF221M050G160A
	270	10	20	43	1500	GF271M050G200A
	330	10	25	32	1850	GF331M050G250A
	390	13	20	31	1910	GF391M050I200A
	470	13	20	30	2000	GF471M050I200A
	560	13	20	28	2150	GF561M050I200A
680	13	25	26	2490	GF681M050I250A	
820	13	30	25	2770	GF821M050I300A	
820	16	25	24	2960	GF821M050J250A	
1000	16	25	20	3000	GF102M050J250A	
63	10	5	11	950	135	GF100M063C110A
	15	6.3	11	850	168	GF150M063E110A
	18	6.3	11	820	170	GF180M063E110A
	22	6.3	11	750	250	GF220M063E110A
	27	6.3	11	550	260	GF270M063E110A
	33	6.3	11	380	270	GF330M063E110A
	39	8	11.5	350	320	GF390M063F115A
	47	8	11.5	220	400	GF470M063F115A
	56	8	11.5	220	420	GF560M063F115A
	68	10	12.5	200	500	GF680M063G125A
	82	8	16	170	540	GF820M063F160A
	82	10	12.5	160	570	GF820M063G125A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (mΩ)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
63	100	10	12.5	140	720	GF101M063G125A
	120	8	20	140	790	GF121M063F200A
	120	10	16	130	835	GF121M063G160A
	150	10	16	110	900	GF151M063G160A
	180	10	20	95	1200	GF181M063G200A
	220	10	25	75	1315	GF221M063G250A
	270	13	20	71	1400	GF271M063I200A
	330	10	30	47	1750	GF331M063G300A
	330	13	25	45	1870	GF331M063I250A
	390	13	25	44	1920	GF391M063I250A
	470	13	30	41	2225	GF471M063I300A
	470	16	20	43	1970	GF471M063J200A
	560	16	25	39	2350	GF561M063J250A
	680	16	31.5	35	2600	GF681M063J315A
	820	16	31.5	31	2650	GF821M063J315A
	1000	16	35.5	26	2780	GF102M063J355A
1000	18	31.5	28	3230	GF102M063K315A	
100	4.7	5	11	1600	105	GF4R7M100C110A
	5.6	5	11	1490	116	GF5R6M100C110A
	6.8	5	11	1450	120	GF6R8M100C110A
	10	6.3	11	700	170	GF100M100E110A
	15	8	11.5	610	255	GF150M100F115A
	18	8	11.5	560	270	GF180M100F115A
	22	8	11.5	480	320	GF220M100F115A
	27	8	11.5	390	340	GF270M100F115A
	33	8	16	310	400	GF330M100F160A
	39	8	16	290	425	GF390M100F160A
	39	10	12.5	270	440	GF390M100G125A
	47	10	12.5	250	450	GF470M100G125A
	56	10	16	210	540	GF560M100G160A
	68	10	20	180	630	GF680M100G200A
	82	10	20	150	720	GF820M100G200A
	100	10	25	120	890	GF101M100G250A
	120	10	25	120	900	GF121M100G250A
	120	13	20	110	980	GF121M100I200A
	150	13	20	95	1100	GF151M100I200A
	180	13	25	78	1250	GF181M100I250A
	220	13	30	65	1420	GF221M100I300A
	220	16	20	75	1270	GF221M100J200A
	270	13	35	57	1630	GF271M100I350A
	270	16	25	58	1570	GF271M100J250A
330	13	40	45	1650	GF331M100I400A	
390	16	31.5	43	1850	GF391M100J315A	
470	16	35.5	32	1900	GF471M100J355A	

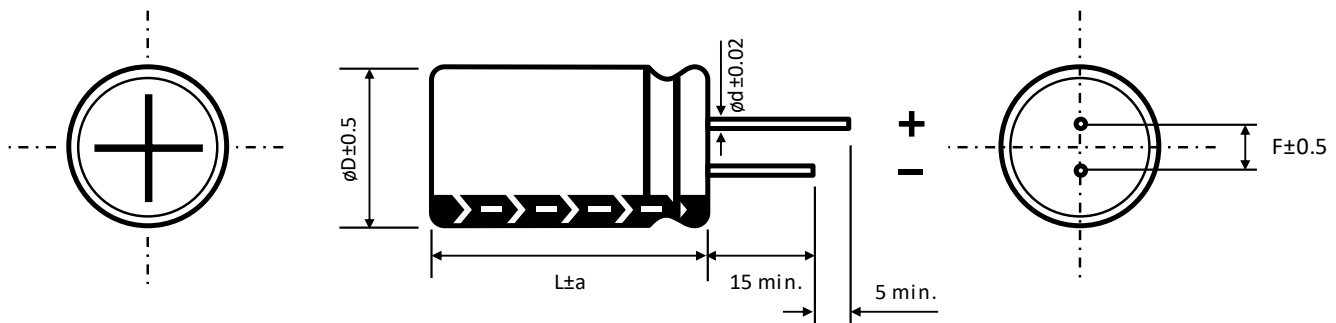
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
100	470	18	31.5	38	1700	GF471M100K315A
	560	16	40	32	2170	GF561M100J400A
	560	18	31.5	31	2100	GF561M100K315A
	680	18	35.5	29	2400	GF681M100K355A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm


ϕD	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ϕd	0.5		L < 20	L \geq 20	0.6		0.8	
			0.5	0.6				



a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	L = 25 to 35.5	L < 25 and L \geq 40	L = 25 to 31.5	L < 25 and L \geq 35.5
		1.5	2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k ~ 100k
$C_R \leq 10$	0.47	0.59	0.76	0.85	0.97	1
$10 < C_R \leq 100$	0.52	0.62	0.8	0.89	0.97	1
$100 < C_R \leq 1000$	0.58	0.72	0.84	0.9	0.98	1
$1000 \leq C_R$	0.63	0.78	0.87	0.91	0.98	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

	
<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
<p>Page 293</p>	<p>Page 272</p>

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

KC SERIES ■ ULTRA MINIATURIZED, SLIM SIZE 105°C TYPE

KEY FEATURES


- **ALUMINUM ELECTROLYTIC CAPACITOR** ■ THT type
- Endurance: 105°C ■ 3 000 hours
- Miniaturized for space critical applications
- Ideal in applications where snap-in capacitors are too big
- High voltage version


SPECIFICATIONS

Items		Performance Characteristics		
Operating Temperature Range		-25 ~ +105°C		
Rated Voltage Range	V_R	400 ~ 450V DC		
Surge Voltage	V_S	$V_S = 1.10 \cdot V_R$		
Capacitance Range	C_R	82 ~ 220μF		
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)		
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 3 \cdot \sqrt{C_R \cdot V_R}$ ■ After 5 minutes [I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]		
Dissipation Factor % (20°C - 120Hz)	tanδ	V_R (V DC)	400	450
		tanδ (%)	20	20
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	400	450
		Z-25°C/Z+20°C	8	8
Lifetime Test				
Endurance 105°C (V_R & I_R applied)	Test	3 000 hours		
	$\Delta C/C_R$	≤ ±20% of initial measured value		
	tanδ	≤ 200% of initial specified value		
	I_{Leak}	≤ the initial specified value		
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours		
	$\Delta C/C_R$	≤ ±20% of initial measured value		
	tanδ	≤ 200% of initial specified value		
	I_{Leak}	≤ the initial specified value		
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4				

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k ~ 100k
82 < C_R ≤ 220	0.8	1	1.3	1.45	1.5	1.65

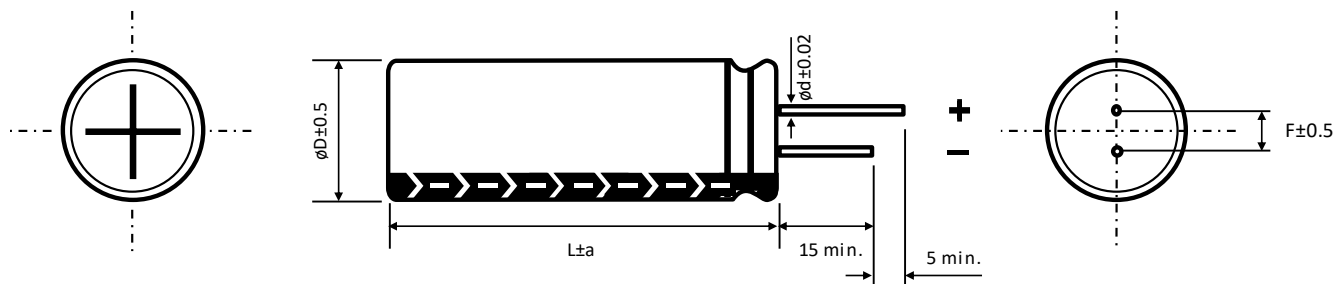
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
400	82	16	25	600	KC820M400J250A
	100	16	31.5	710	KC101M400J315A
	120	16	35.5	800	KC121M400J355A
	150	16	40	920	KC151M400J400A
	150	18	31.5	890	KC151M400K315A
	180	16	50	1080	KC181M400J500A
	180	18	40	1060	KC181M400K400A
	220	18	45	1200	KC221M400K450A
420	100	16	31.5	690	KC101M420J315A
	120	16	35.5	780	KC121M420J355A
	120	18	31.5	800	KC121M420K315A
	150	16	45	940	KC151M420J450A
	150	18	35.5	920	KC151M420K355A
	180	16	50	1050	KC181M420J500A
	180	18	40	1040	KC181M420K400A
	220	18	50	1220	KC221M420K500A
450	82	16	31.5	640	KC820M450J315A
	100	16	35.5	730	KC101M450J355A
	120	16	40	820	KC121M450J400A
	120	18	31.5	800	KC121M450K315A
	150	16	50	980	KC151M450J500A
	150	18	40	970	KC151M450K400A
	180	18	45	1090	KC181M450K450A
	220	18	50	1220	KC221M450K500A

See "PACKAGING INFORMATION" to taped or formed products.



DIMENSIONS • All dimensions in mm



ϕD	16	18
F	7.5	7.5
ϕd	0.8	0.8
a	2	2

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
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DISCLAIMER

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

SG SERIES ■ 7/9 MM HEIGHT, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 4 000 hours
- Miniaturized for space critical applications
- Low height ■ 7mm and 9mm
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics						
Operating Temperature Range		-40 ~ +105°C						
Rated Voltage Range	V_R	6.3 ~ 50V DC						
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$						
Capacitance Range	C_R	1 ~ 470μF						
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)						
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	≤ 0.01 · $C_R \cdot V_R$ or 3μA, whichever is greater After 2 minutes						
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V_R (V DC)	6.3	10	16	25	35	50
		tanδ (%)	24	20	17	15	13	12
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50
		Z-25°C/Z+20°C	4	3	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3

Lifetime Test			
Endurance 105°C (V_R applied)	Test	4 000 hours	
	$\Delta C/C_R$	≤ ±30% of initial measured value	
	tanδ	≤ 300% of initial specified value	
	I_{Leak}	≤ the initial specified value	
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	≤ ±30% of initial measured value	
	tanδ	≤ 300% of initial specified value	
	I_{Leak}	≤ the initial specified value	
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4	

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	1k	50k ~ 100k
$1 < C_R \leq 470$	0.65	1	1.35	1.5

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
6.3	22	4	7	35	SG220M6R3B070A <input type="checkbox"/>
	33	5	7	43	SG330M6R3C070A <input type="checkbox"/>
	47	5	7	50	SG470M6R3C070A <input type="checkbox"/>
	100	6.3	7	76	SG101M6R3E070A <input type="checkbox"/>
	220	8	7	131	SG221M6R3F070A <input type="checkbox"/>
	330	8	9	145	SG331M6R3F090A <input type="checkbox"/>
	470	8	9	145	SG471M6R3F090A <input type="checkbox"/>
10	22	5	7	42	SG220M010C070A <input type="checkbox"/>
	33	5	7	50	SG330M010C070A <input type="checkbox"/>
	47	6.3	7	60	SG470M010E070A <input type="checkbox"/>
	100	8	7	96	SG101M010F070A <input type="checkbox"/>
	220	8	9	145	SG221M010F090A <input type="checkbox"/>
	330	8	9	145	SG331M010F090A <input type="checkbox"/>
	470	8	9	145	SG471M010F090A <input type="checkbox"/>
	470	10	9	165	SG471M010G090A <input type="checkbox"/>
16	10	4	7	29	SG100M016B070A <input type="checkbox"/>
	10	5	7	29	SG100M016C070A <input type="checkbox"/>
	22	5	7	46	SG220M016C070A <input type="checkbox"/>
	33	6.3	7	58	SG330M016E070A <input type="checkbox"/>
	47	6.3	7	70	SG470M016E070A <input type="checkbox"/>
	100	6.3	7	95	SG101M016E070A <input type="checkbox"/>
	100	8	7	110	SG101M016F070A <input type="checkbox"/>
	220	8	9	145	SG221M016F090A <input type="checkbox"/>
	330	8	9	145	SG331M016F090A <input type="checkbox"/>
	330	10	9	165	SG331M016G090A <input type="checkbox"/>
	470	10	9	165	SG471M016G090A <input type="checkbox"/>
25	10	5	7	36	SG100M025C070A <input type="checkbox"/>
	22	6.3	7	52	SG220M025E070A <input type="checkbox"/>
	33	6.3	7	65	SG330M025E070A <input type="checkbox"/>
	47	6.3	7	70	SG470M025E070A <input type="checkbox"/>
	47	8	7	80	SG470M025F070A <input type="checkbox"/>
	100	8	7	100	SG101M025F070A <input type="checkbox"/>
	100	8	9	145	SG101M025F090A <input type="checkbox"/>
	150	8	9	145	SG151M025F090A <input type="checkbox"/>
	220	10	9	165	SG221M025G090A <input type="checkbox"/>
35	10	4	7	26	SG100M035B070A <input type="checkbox"/>
	22	6.3	7	60	SG220M035E070A <input type="checkbox"/>
	33	8	7	75	SG330M035F070A <input type="checkbox"/>
	47	8	9	89	SG470M035F090A <input type="checkbox"/>
	100	10	9	165	SG101M035G090A <input type="checkbox"/>

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

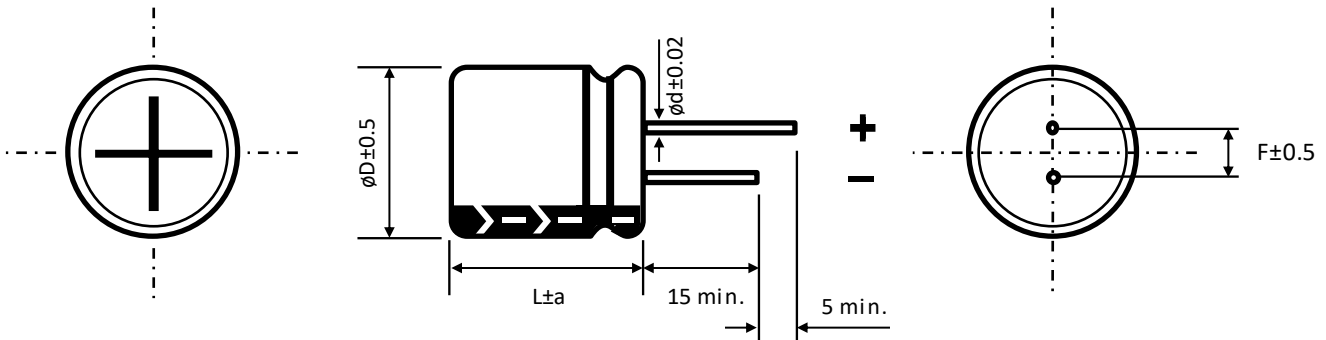
V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
50	1	4	7	12	SG010M050B070A □
	2.2	4	7	21	SG2R2M050B070A □
	3.3	4	7	26	SG3R3M050B070A □
	4.7	5	7	31	SG4R7M050C070A □
	10	6.3	7	46	SG100M050E070A □
	22	8	7	67	SG220M050F070A □
	33	8	9	89	SG330M050F090A □
	47	8	9	89	SG470M050F090A □
	100	10	9	165	SG101M050G090A □

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.



DIMENSIONS - All dimensions in mm



ϕD	4	5	6.3	8	10
F	1.5	2	2.5	3.5	5
ϕd	0.45	0.45	0.5	0.5	0.6
a	1	1	1	L = 7	L = 9
				1	1.5

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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FH SERIES ■ HIGH RIPPLE CURRENT 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C ■ 4 000 hours up to 10 000 hours
- Low impedance and high ripple current
- Wide capacitance range, up to 18000μF
- Low voltage version



SPECIFICATIONS

Items		Performance Characteristics								
Operating Temperature Range		-40 ~ +105°C								
Rated Voltage Range	V_R	6.3 ~ 100V DC								
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$								
Capacitance Range	C_R	6.8 ~ 18000μF								
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)								
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3μA, whichever is greater ■ After 2 minutes [I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]								
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V_R (V DC)	6.3	10	16	25	35	50	63	100
		tanδ (%)	22	19	16	14	12	10	9	8
		For $C_R > 1000\mu F$, add 2% per every multiple 1000μF of rated capacitance value								
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	4	3	2	2	2	2	2	2
		Z-40°C/Z+20°C	8	6	4	3	3	3	3	3
		For capacitance > 1000μF								
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value							
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value									
Lifetime Test										
Endurance 105°C (V_R & I_R applied)	Test	4 000 hours	$\phi D \leq 6.3$ mm ■ 6.3 ~ 10V							
		5 000 hours	$\phi D \leq 6.3$ mm ■ 16 ~ 100V							
		6 000 hours	$\phi D = 8$ & 10 mm ■ 6.3 ~ 10V							
		7 000 hours	$\phi D = 8$ & 10 mm ■ 16 ~ 100V							
		8 000 hours	$\phi D \geq 13$ mm ■ 6.3 ~ 10V							
		10 000 hours	$\phi D \geq 13$ mm ■ 16 ~ 100V							
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value								
tanδ	$\leq 200\%$ of initial specified value									
I_{Leak}	\leq the initial specified value									
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours								
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value								
	tanδ	$\leq 200\%$ of initial specified value								
	I_{Leak}	\leq the initial specified value								
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4								

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	150	5	11	550	220	FH151M6R3C110A
	220	6.3	11	260	300	FH221M6R3E110A
	330	6.3	11	210	350	FH331M6R3E110A
	470	8	11.5	140	440	FH471M6R3F115A
	680	8	11.5	130	650	FH681M6R3F115A
	820	10	12.5	90	870	FH821M6R3G125A
	1000	8	16	80	850	FH102M6R3F160A
	1200	8	20	75	1060	FH122M6R3F200A
	1200	10	16	64	1220	FH122M6R3G160A
	1500	10	20	50	1410	FH152M6R3G200A
	1800	13	16	49	1460	FH182M6R3I160A
	2200	10	25	46	1660	FH222M6R3G250A
	2700	16	16	42	1950	FH272M6R3J160A
	3300	13	20	38	1910	FH332M6R3I200A
	3900	13	25	29	2240	FH392M6R3I250A
	3900	18	16	40	2220	FH392M6R3K160A
	4700	13	30	27	2660	FH472M6R3I300A
	5600	13	35	24	2890	FH562M6R3I350A
	5600	16	20	27	2540	FH562M6R3J200A
	6800	13	40	17	3360	FH682M6R3I400A
	6800	16	25	21	2940	FH682M6R3J250A
	6800	18	20	26	2870	FH682M6R3K200A
	8200	16	31.5	17	3460	FH822M6R3J315A
	10000	16	35.5	15	3620	FH103M6R3J355A
	10000	18	25	19	3150	FH103M6R3K250A
	12000	16	40	13	4090	FH123M6R3J400A
12000	18	31.5	15	4180	FH123M6R3K315A	
15000	18	35.5	14	4230	FH153M6R3K355A	
18000	18	40	12	4290	FH183M6R3K400A	
10	100	5	11	580	220	FH101M010C110A
	220	6.3	11	230	350	FH221M010E110A
	330	6.3	11	220	450	FH331M010E110A
	470	8	11.5	130	650	FH471M010F115A
	680	8	16	96	850	FH681M010F160A
	680	10	12.5	85	870	FH681M010G125A
	820	10	16	75	950	FH821M010G160A
	1000	8	20	72	1060	FH102M010F200A
	1000	10	16	64	1220	FH102M010G160A
	1200	10	20	45	1410	FH122M010G200A
	1500	10	25	43	1560	FH152M010G250A
	1500	13	16	49	1460	FH152M010I160A
	2200	10	30	30	1920	FH222M010G300A
	2200	13	20	35	1910	FH222M010I200A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
10	2200	16	16	42	1950	FH222M010J160A
	2700	18	16	43	2220	FH272M010K160A
	3300	13	25	29	2240	FH332M010I250A
	3900	13	30	25	2660	FH392M010I300A
	3900	16	20	27	2540	FH392M010J200A
	4700	13	35	20	2890	FH472M010I350A
	5600	13	40	17	3360	FH562M010I400A
	5600	16	25	21	2940	FH562M010J250A
	5600	18	20	26	2870	FH562M010K200A
	6800	16	31.5	17	3460	FH682M010J315A
	6800	18	25	19	3150	FH682M010K250A
	8200	16	35.5	15	3620	FH822M010J355A
	8200	18	31.5	15	4180	FH822M010K315A
	10000	16	40	13	4090	FH103M010J400A
	10000	18	35.5	14	4230	FH103M010K355A
12000	18	40	12	4290	FH123M010K400A	
16	56	5	11	560	220	FH560M016C110A
	100	6.3	11	220	300	FH101M016E110A
	120	6.3	11	215	350	FH121M016E110A
	220	8	11.5	180	500	FH221M016F115A
	330	8	11.5	140	650	FH331M016F115A
	470	8	11.5	100	740	FH471M016F115A
	470	8	16	95	850	FH471M016F160A
	470	10	12.5	85	870	FH471M016G125A
	680	8	20	80	1060	FH681M016F200A
	680	10	16	60	1220	FH681M016G160A
	820	10	20	52	1300	FH821M016G200A
	1000	10	20	46	1410	FH102M016G200A
	1000	13	16	50	1460	FH102M016I160A
	1200	10	25	44	1660	FH122M016G250A
	1500	10	25	36	1770	FH152M016G250A
	1500	10	30	31	1920	FH152M016G300A
	1500	13	20	37	1910	FH152M016I200A
	1500	16	16	42	1950	FH152M016J160A
	1800	10	25	36	1800	FH182M016G250A
	1800	13	25	30	2080	FH182M016I250A
	2200	13	25	26	2240	FH222M016I250A
	2200	18	16	43	2220	FH222M016K160A
	2700	13	30	23	2660	FH272M016I300A
	2700	16	20	27	2540	FH272M016J200A
	3300	13	35	22	2890	FH332M016I350A
	3900	13	40	17	3360	FH392M016I400A
	3900	16	25	21	2940	FH392M016J250A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
16	3900	18	20	26	2870	FH392M016K200A
	4700	16	31.5	17	3460	FH472M016J315A
	4700	18	25	20	3150	FH472M016K250A
	5600	16	35.5	15	3620	FH562M016J355A
	5600	18	31.5	15	4180	FH562M016K315A
	6800	16	40	13	4090	FH682M016J400A
	8200	18	35.5	14	4230	FH822M016K355A
	10000	18	40	12	4290	FH103M016K400A
25	47	5	11	560	220	FH470M025C110A
	56	5	11	560	260	FH560M025C110A
	100	6.3	11	250	350	FH101M025E110A
	220	8	11.5	150	650	FH221M025F115A
	330	8	16	92	850	FH331M025F160A
	330	10	12.5	82	870	FH331M025G125A
	470	8	20	74	1060	FH471M025F200A
	470	10	12.5	74	1100	FH471M025G125A
	470	10	16	68	1220	FH471M025G160A
	680	10	20	50	1410	FH681M025G200A
	680	13	16	49	1460	FH681M025I160A
	820	10	25	41	1660	FH821M025G250A
	1000	10	30	32	1920	FH102M025G300A
	1000	13	20	36	1910	FH102M025I200A
	1000	16	16	42	1950	FH102M025J160A
	1200	18	16	43	2220	FH122M025K160A
	1500	13	25	28	2240	FH152M025I250A
	1800	13	30	24	2660	FH182M025I300A
	1800	16	20	27	2540	FH182M025J200A
	2200	13	30	25	2695	FH222M025I300A
	2200	13	35	23	2890	FH222M025I350A
	2200	18	20	26	2870	FH222M025K200A
	2700	13	40	17	3360	FH272M025I400A
	2700	16	25	22	2940	FH272M025J250A
	3300	16	31.5	17	3460	FH332M025J315A
	3300	18	25	19	3150	FH332M025K250A
	3900	16	35.5	15	3620	FH392M025J355A
	3900	18	31.5	15	4180	FH392M025K315A
	4700	16	40	13	4090	FH472M025J400A
	4700	18	35.5	14	4230	FH472M025K355A
	5600	18	40	12	4290	FH562M025K400A
	35	33	5	11	550	230
47		5	11	450	300	FH470M035C110A
56		6.3	11	210	360	FH560M035E110A
100		6.3	11	180	480	FH101M035E110A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
35	150	8	11.5	140	680	FH151M035F115A
	220	8	11.5	95	870	FH221M035F115A
	220	8	16	90	1000	FH221M035F160A
	220	10	12.5	80	1060	FH221M035G125A
	270	8	20	70	1180	FH271M035F200A
	330	10	16	62	1380	FH331M035G160A
	470	10	20	48	1800	FH471M035G200A
	470	13	16	49	1560	FH471M035I160A
	560	10	25	42	1900	FH561M035G250A
	680	10	30	35	2000	FH681M035G300A
	680	13	20	34	2100	FH681M035I200A
	680	16	16	42	2050	FH681M035J160A
	1000	13	20	38	2180	FH102M035I200A
	1000	13	25	28	2400	FH102M035I250A
	1000	18	16	43	2220	FH102M035K160A
	1200	13	30	24	2800	FH122M035I300A
	1200	16	20	28	2800	FH122M035J200A
	1500	13	35	22	3000	FH152M035I350A
	1800	13	40	17	3360	FH182M035I400A
	1800	16	25	20	2940	FH182M035J250A
	1800	18	20	26	2870	FH182M035K200A
	2200	16	31.5	17	3460	FH222M035J315A
	2200	18	20	25	2930	FH222M035K200A
	2200	18	25	19	3150	FH222M035K250A
	2700	16	35.5	18	3620	FH272M035J355A
	2700	18	31.5	16	4180	FH272M035K315A
	3300	16	40	13	4090	FH332M035J400A
	3300	18	35.5	14	4230	FH332M035K355A
3900	18	40	12	4300	FH392M035K400A	
50	22	5	11	650	220	FH220M050C110A
	47	6.3	11	370	270	FH470M050E110A
	56	6.3	11	290	300	FH560M050E110A
	100	8	11.5	160	680	FH101M050F115A
	120	8	16	120	760	FH121M050F160A
	150	10	12.5	120	800	FH151M050G125A
	180	8	20	90	1000	FH181M050F200A
	220	10	16	82	1300	FH221M050G160A
	270	10	20	60	1350	FH271M050G200A
	270	13	16	61	1270	FH271M050I160A
	330	10	25	57	1600	FH331M050G250A
	470	10	30	48	1800	FH471M050G300A
470	13	20	45	1740	FH471M050I200A	
470	16	16	55	1710	FH471M050J160A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
50	560	13	25	42	1960	FH561M050I250A
	560	18	16	54	1940	FH561M050K160A
	680	13	30	30	2320	FH681M050I300A
	820	13	35	25	2520	FH821M050I350A
	820	16	20	34	2220	FH821M050J200A
	1000	13	35	24	2650	FH102M050I350A
	1000	13	40	21	2930	FH102M050I400A
	1000	16	25	25	2565	FH102M050J250A
	1000	18	20	36	2500	FH102M050K200A
	1200	16	31.5	30	3020	FH122M050J315A
	1200	18	25	26	2750	FH122M050K250A
	1500	16	35.5	19	3160	FH152M050J355A
	1800	16	40	16	3720	FH182M050J400A
	1800	18	31.5	21	3645	FH182M050K315A
	2200	18	35.5	17	3690	FH222M050K355A
	2700	18	40	14	3810	FH272M050K400A
3300	18	40	14	3810	FH332M050K400A	
63	15	5	11	1800	65	FH150M063C110A
	33	6.3	11	1200	260	FH330M063E110A
	47	8	11.5	660	360	FH470M063F115A
	56	8	11.5	600	380	FH560M063F115A
	82	8	16	440	460	FH820M063F160A
	82	10	12.5	430	500	FH820M063G125A
	100	10	12.5	340	640	FH101M063G125A
	120	8	20	320	700	FH121M063F200A
	120	10	16	300	760	FH121M063G160A
	180	10	20	190	880	FH181M063G200A
	180	13	16	180	800	FH181M063I160A
	220	10	20	188	995	FH221M063G200A
	220	10	25	185	1100	FH221M063G250A
	270	10	30	120	1200	FH271M063G300A
	270	13	20	160	1200	FH271M063I200A
	270	16	16	110	1200	FH271M063J160A
	330	13	25	120	1600	FH331M063I250A
	390	18	16	96	1610	FH391M063K160A
	470	13	30	100	1800	FH471M063I300A
	470	16	20	77	1500	FH471M063J200A
	560	13	35	70	2000	FH561M063I350A
	560	16	25	73	2000	FH561M063J250A
	680	13	40	70	2200	FH681M063I400A
	680	18	20	72	1600	FH681M063K200A
820	16	31.5	54	2400	FH821M063J315A	
820	18	25	52	1800	FH821M063K250A	

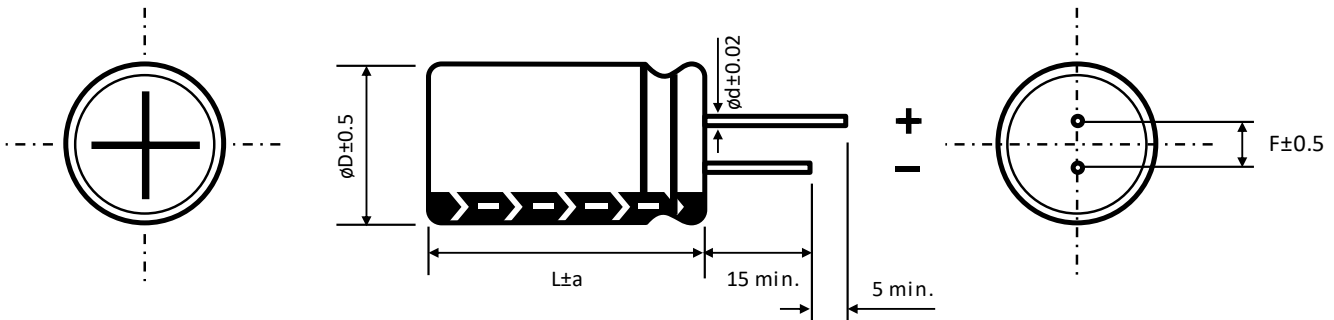
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
63	1000	16	35.5	48	2500	FH102M063J355A
	1000	18	25	52	2290	FH102M063K250A
	1000	18	31.5	47	2800	FH102M063K315A
	1200	16	40	40	2920	FH122M063J400A
	1200	18	31.5	45	2850	FH122M063K315A
	1200	18	35.5	39	3000	FH122M063K355A
	1500	18	40	36	3200	FH152M063K400A
100	6.8	5	11	1800	65	FH6R8M100C110A
	15	6.3	11	1000	130	FH150M100E110A
	27	8	11.5	610	300	FH270M100F115A
	39	8	16	360	340	FH390M100F160A
	47	10	12.5	420	400	FH470M100G125A
	56	8	20	260	410	FH560M100F200A
	68	10	16	300	460	FH680M100G160A
	82	10	20	210	600	FH820M100G200A
	82	13	16	180	540	FH820M100I160A
	100	10	25	200	800	FH101M100G250A
	120	10	30	120	830	FH121M100G300A
	120	13	20	160	900	FH121M100I200A
	150	13	20	110	1000	FH151M100I200A
	150	16	16	110	1000	FH151M100J160A
	180	13	25	96	1010	FH181M100I250A
	180	18	16	96	1180	FH181M100K160A
	220	13	30	80	1210	FH221M100I300A
	220	16	20	77	1140	FH221M100J200A
	270	13	35	70	1450	FH271M100I350A
	270	16	25	73	1480	FH271M100J250A
	330	13	40	71	1600	FH331M100I400A
	330	18	20	72	1400	FH331M100K200A
	390	16	31.5	55	1700	FH391M100J315A
	390	18	25	54	1740	FH391M100K250A
	470	16	35.5	47	1910	FH471M100J355A
	470	18	31.5	47	1730	FH471M100K315A
	560	16	40	36	2140	FH561M100J400A
	680	18	35.5	42	2000	FH681M100K355A
	820	18	40	40	2480	FH821M100K400A
	1000	18	40	38	2580	FH102M100K400A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ø D	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ø d	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				

a	ø D < 16	ø D = 16		ø D = 18		
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40		L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2		1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	100k
$C_R \leq 10$	0.47	0.59	0.76	0.85	0.97	1
$10 < C_R \leq 100$	0.52	0.62	0.8	0.89	0.97	1
$100 < C_R \leq 1000$	0.58	0.72	0.84	0.9	0.98	1
$1000 \leq C_R$	0.63	0.78	0.87	0.91	0.98	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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General Precautions and Guidelines	Packaging Information Liquid Radial
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DISCLAIMER

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Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

LY SERIES ■ LONG LIFE, SLIM SIZE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C ■ 5 000 hours
- Slim design for height limited applications
- High reliability
- High voltage version



SPECIFICATIONS

Items		Performance Characteristics					
Operating Temperature Range		-25 ~ +105°C					
Rated Voltage Range	V _R	250 ~ 450V DC					
Surge Voltage	V _S	(V _R ≤ 315V): V _S = 1.15·V _R		(V _R > 315V): V _S = 1.10·V _R			
Capacitance Range	C _R	12 ~ 150μF					
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)					
Leakage Current (20°C ■ V _R applied)	I _{LEAK}	≤ 3 · √C _R · V _R ■ After 5 minutes [I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]					
Dissipation Factor % (20°C - 120Hz)	tanδ	V _R (V DC)	250	350	400	420	450
		tanδ (%)	15	15	15	20	20
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	250	350	400	420	450
		Z-25°C/Z+20°C	3	8	8	8	8
Lifetime Test							
Endurance 105°C (V _R & I _R applied)	Test	5 000 hours					
	ΔC/C _R	≤ ±20% of initial measured value					
	tanδ	≤ 200% of initial specified value					
	I _{Leak}	≤ the initial specified value					
Shelf Life 105°C (V _R = 0)	Test	1 000 hours					
	ΔC/C _R	≤ ±20% of initial measured value					
	tanδ	≤ 200% of initial specified value					
	I _{Leak}	≤ the initial specified value					
		Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4					

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

V _R (V) / Frequency (Hz)	50/60	100/120	400	1k	100k
250 ~ 350	0.8	1	1.2	1.3	1.4
400 ~ 450	0.8	1	1.25	1.4	1.5

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
250	22	8	30	130	LY220M250F300A
	27	8	30	150	LY270M250F300A
	33	8	35	170	LY330M250F350A
	39	8	40	200	LY390M250F400A
	47	8	45	220	LY470M250F450A
	56	10	35	260	LY560M250G350A
	56	10	40	300	LY560M250G400A
	68	10	40	350	LY680M250G400A
	82	10	45	480	LY820M250G450A
	100	10	50	550	LY101M250G500A
	120	13	40	570	LY121M250I400A
150	13	45	620	LY151M250I450A	
350	15	8	30	110	LY150M350F300A
	22	8	35	150	LY220M350F350A
	27	8	40	165	LY270M350F400A
	33	8	45	195	LY330M350F450A
	39	10	40	280	LY390M350G400A
	47	10	45	330	LY470M350G450A
	56	10	50	380	LY560M350G500A
	68	13	35	425	LY680M350I350A
	68	13	40	450	LY680M350I400A
	82	13	40	500	LY820M350I400A
	100	13	50	520	LY101M350I500A
400	15	8	30	120	LY150M400F300A
	22	8	35	160	LY220M400F350A
	27	8	40	195	LY270M400F400A
	27	10	30	195	LY270M400G300A
	33	8	45	250	LY330M400F450A
	33	10	30	250	LY330M400G300A
	39	8	50	280	LY390M400F500A
	39	10	40	300	LY390M400G400A
	47	10	45	350	LY470M400G450A
	47	13	30	330	LY470M400I300A
	56	10	50	400	LY560M400G500A
	56	13	30	380	LY560M400I300A
	56	13	35	420	LY560M400I350A
	68	13	35	440	LY680M400I350A
	68	13	40	460	LY680M400I400A
	82	13	45	520	LY820M400I450A
	100	13	50	580	LY101M400I500A
	120	13	60	680	LY121M400I600A
420	15	8	30	100	LY150M420F300A
	22	8	40	180	LY220M420F400A
	27	8	45	200	LY270M420F450A

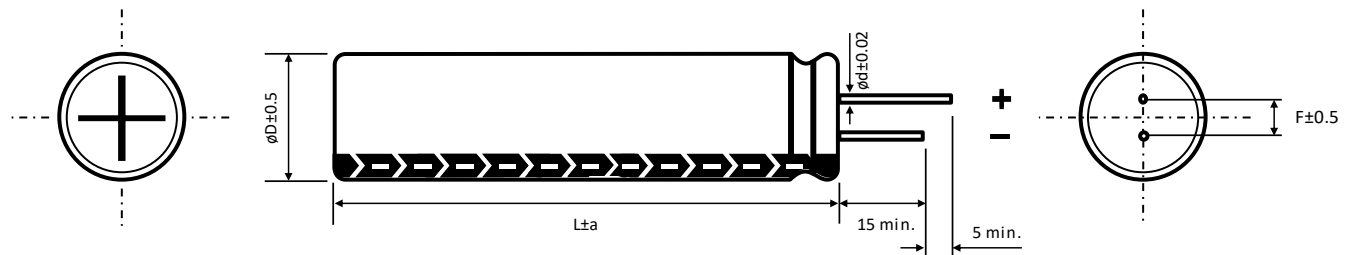
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
420	33	10	35	230	LY330M420G350A
	39	10	45	275	LY390M420G450A
	39	13	30	275	LY390M420I300A
	47	10	45	330	LY470M420G450A
	47	13	35	360	LY470M420I350A
	56	10	55	420	LY560M420G550A
	56	13	35	410	LY560M420I350A
	68	13	40	450	LY680M420I400A
	82	13	45	500	LY820M420I450A
	100	13	50	600	LY101M420I500A
450	12	8	30	110	LY120M450F300A
	15	8	35	120	LY150M450F350A
	22	8	45	160	LY220M450F450A
	22	10	30	150	LY220M450G300A
	27	8	50	190	LY270M450F500A
	27	10	35	180	LY270M450G350A
	33	10	40	220	LY330M450G400A
	33	10	45	235	LY330M450G450A
	33	10	50	250	LY330M450G500A
	39	10	45	260	LY390M450G450A
	39	10	50	290	LY390M450G500A
	39	13	35	290	LY390M450I350A
	47	10	55	350	LY470M450G550A
	47	13	35	350	LY470M450I350A
	56	13	35	400	LY560M450I350A
	56	13	40	425	LY560M450I400A
	68	13	45	470	LY680M450I450A
	68	13	50	500	LY680M450I500A
	82	13	50	530	LY820M450I500A



See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS - All dimensions in mm


ϕ D	8	10	13
F	3.5	5	5
ϕ d	0.5	0.6	0.6
a	1.5	2	2

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
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For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

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KL SERIES ▪ HIGH VOLTAGE, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 5 000 hours
- High voltage version up to 500V
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C				-25 ~ +105°C			
Rated Voltage Range	V _R	160 ~ 400V DC				450V ~ 500V DC			
Surge Voltage	V _S	(V _R ≤ 315V): V _S = 1.15·V _R				(V _R > 315V): V _S = 1.10·V _R			
Capacitance Range	C _R	3.3 ~ 330μF				2.2 ~ 180μF			
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)							
Leakage Current (20°C ▪ V _R applied)	I _{LEAK}	C _R ·V _R ≤ 1000				≤ 0.1·C _R ·V _R + 40μA (After 1 minute)			
		C _R ·V _R > 1000				≤ 0.04·C _R ·V _R + 100μA (After 1 minute)			
		[I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]							
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V _R (V DC)	160	200	250	350	400	450	500
		tanδ (%)	12	12	12	15	15	17	20
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	160	200	250	350	400	450	500
		Z-25°C/Z+20°C	3	3	3	6	6	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	-	-

Lifetime Test			
Endurance 105°C (V _R & I _R applied)	Test	5 000 hours	
	ΔC/C _R	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
	I _{Leak}	≤ the initial specified value	
Shelf Life 105°C (V _R = 0)	Test	1 000 hours	
	ΔC/C _R	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
	I _{Leak}	≤ the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4			

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R - Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
160	3.3	10	12.5	52	KL3R3M160G125A ☐
	4.7	10	12.5	60	KL4R7M160G125A ☐
	10	10	12.5	104	KL100M160G125A ☐
	10	10	16	115	KL100M160G160A ☐
	15	10	16	150	KL150M160G160A ☐
	22	10	16	190	KL220M160G160A ☐
	22	10	20	210	KL220M160G200A ☐
	33	10	16	235	KL330M160G160A ☐
	33	10	20	258	KL330M160G200A ☐
	33	13	20	300	KL330M160I200A ☐
	47	10	20	270	KL470M160G200A ☐
	47	13	20	310	KL470M160I200A ☐
	68	13	20	430	KL680M160I200A ☐
	68	13	25	470	KL680M160I250A ☐
	100	13	25	540	KL101M160I250A ☐
	100	16	20	540	KL101M160J200A ☐
	100	16	25	590	KL101M160J250A ☐
	120	16	20	560	KL121M160J200A ☐
	150	16	25	650	KL151M160J250A ☐
	180	16	31.5	750	KL181M160J315A ☐
	220	16	31.5	820	KL221M160J315A ☐
	220	18	25	710	KL221M160K250A ☐
270	18	31.5	880	KL271M160K315A ☐	
330	18	31.5	930	KL331M160K315A ☐	
330	18	40	1000	KL331M160K400A ☐	
200	3.3	10	12.5	52	KL3R3M200G125A ☐
	4.7	10	12.5	60	KL4R7M200G125A ☐
	6.8	10	12.5	70	KL6R8M200G125A ☐
	10	10	12.5	104	KL100M200G125A ☐
	10	10	16	115	KL100M200G160A ☐
	10	10	20	125	KL100M200G200A ☐
	15	10	16	150	KL150M200G160A ☐
	22	10	16	210	KL220M200G160A ☐
	22	10	20	230	KL220M200G200A ☐
	33	10	20	290	KL330M200G200A ☐
	33	13	20	350	KL330M200I200A ☐
	47	13	20	380	KL470M200I200A ☐
	68	13	25	530	KL680M200I250A ☐
	68	16	20	530	KL680M200J200A ☐
	100	16	20	570	KL101M200J200A ☐
	100	16	25	610	KL101M200J250A ☐
120	16	25	700	KL121M200J250A ☐	
150	16	25	700	KL151M200J250A ☐	

☐: Enter **blank** for Standard version

☐: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
200	150	16	31.5	750	KL151M200J315A □
	180	18	31.5	830	KL181M200K315A □
	220	18	31.5	970	KL221M200K315A □
	270	18	40	1100	KL271M200K400A □
	330	18	45	1250	KL331M200K450A □
250	4.7	10	12.5	60	KL4R7M250G125A □
	6.8	10	12.5	75	KL6R8M250G125A □
	10	10	16	160	KL100M250G160A □
	10	10	20	170	KL100M250G200A □
	15	10	16	180	KL150M250G160A □
	22	10	20	250	KL220M250G200A □
	22	13	20	290	KL220M250I200A □
	33	13	20	360	KL330M250I200A □
	33	13	25	380	KL330M250I250A □
	47	13	25	430	KL470M250I250A □
	68	16	20	530	KL680M250J200A □
	68	16	25	550	KL680M250J250A □
	68	18	20	550	KL680M250K200A □
	100	16	25	630	KL101M250J250A □
	100	16	31.5	700	KL101M250J315A □
	100	18	25	680	KL101M250K250A □
	100	18	31.5	750	KL101M250K315A □
	120	18	31.5	790	KL121M250K315A □
	150	18	31.5	840	KL151M250K315A □
	150	18	35.5	880	KL151M250K355A □
	180	18	40	980	KL181M250K400A □
	220	18	35.5	960	KL221M250K355A □
	220	18	40	1020	KL221M250K400A □
350	4.7	10	12.5	65	KL4R7M350G125A □
	6.8	10	16	100	KL6R8M350G160A □
	10	10	20	170	KL100M350G200A □
	10	13	20	180	KL100M350I200A □
	15	13	20	200	KL150M350I200A □
	22	13	20	290	KL220M350I200A □
	33	13	25	320	KL330M350I250A □
	33	16	20	320	KL330M350J200A □
	47	16	25	430	KL470M350J250A □
	47	16	31.5	440	KL470M350J315A □
	68	16	35.5	550	KL680M350J355A □
	100	18	31.5	750	KL101M350K315A □
	100	18	35.5	780	KL101M350K355A □
400	3.3	10	12.5	55	KL3R3M400G125A □
	4.7	10	16	100	KL4R7M400G160A □

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
400	6.8	10	16	120	KL6R8M400G160A □
	6.8	10	20	125	KL6R8M400G200A □
	10	10	16	156	KL100M400G160A □
	10	10	20	170	KL100M400G200A □
	10	13	20	200	KL100M400I200A □
	15	10	16	156	KL150M400G160A □
	15	13	20	200	KL150M400I200A □
	22	13	25	320	KL220M400I250A □
	22	16	20	320	KL220M400J200A □
	33	16	20	400	KL330M400J200A □
	33	16	25	430	KL330M400J250A □
	47	16	20	420	KL470M400J200A □
	47	16	25	450	KL470M400J250A □
	47	16	31.5	530	KL470M400J315A □
	68	16	25	480	KL680M400J250A □
	68	16	31.5	530	KL680M400J315A □
	82	16	31.5	580	KL820M400J315A □
	100	16	31.5	710	KL101M400J315A □
	100	18	35.5	750	KL101M400K355A □
	120	16	35.5	800	KL121M400J355A □
	120	18	31.5	800	KL121M400K315A □
	150	16	40	920	KL151M400J400A □
150	18	31.5	890	KL151M400K315A □	
180	18	40	1060	KL181M400K400A □	
220	18	45	1200	KL221M400K450A □	
450	2.2	10	12.5	45	KL2R2M450G125A □
	3.3	10	16	65	KL3R3M450G160A □
	4.7	10	12.5	95	KL4R7M450G125A □
	4.7	10	16	105	KL4R7M450G160A □
	6.8	10	16	125	KL6R8M450G160A □
	6.8	10	20	140	KL6R8M450G200A □
	10	10	20	170	KL100M450G200A □
	10	13	20	190	KL100M450I200A □
	10	13	25	220	KL100M450I250A □
	15	16	20	270	KL150M450J200A □
	22	13	20	280	KL220M450I200A □
	22	16	20	320	KL220M450J200A □
	22	16	25	360	KL220M450J250A □
	33	16	25	440	KL330M450J250A □
	33	18	25	460	KL330M450K250A □
	47	16	31.5	480	KL470M450J315A □
47	18	25	450	KL470M450K250A □	
56	16	31.5	530	KL560M450J315A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

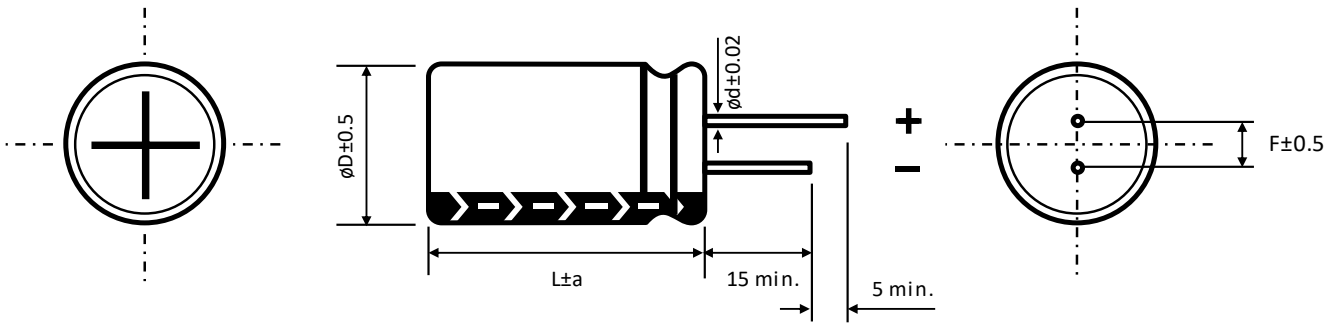
Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
450	68	16	35.5	600	KL680M450J355A □
	68	18	25	580	KL680M450K250A □
	68	18	31.5	620	KL680M450K315A □
	82	16	35.5	680	KL820M450J355A □
	100	16	35.5	750	KL101M450J355A □
	120	18	35.5	840	KL121M450K355A □
	150	18	40	970	KL151M450K400A □
	180	18	45	1090	KL181M450K450A □
500	4.7	13	20	82	KL4R7M500I200A □
	6.8	13	20	96	KL6R8M500I200A □
	10	13	25	130	KL100M500I250A □
	22	16	25	210	KL220M500J250A □
	33	16	31.5	280	KL330M500J315A □
	47	16	35.5	360	KL470M500J355A □
	47	18	31.5	360	KL470M500K315A □
	56	16	40	420	KL560M500J400A □
	56	18	31.5	400	KL560M500K315A □
	68	16	45	480	KL680M500J450A □
	68	18	35.5	460	KL680M500K355A □
	68	18	40	490	KL680M500K400A □
	82	18	40	540	KL820M500K400A □
	100	18	45	630	KL101M500K450A □
	100	20	40	660	KL101M500L400A □
120	22	45	800	KL121M500M450A □	

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See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	10	13	16	18	22
F	5	5	7.5	7.5	10
ϕd	0.6		0.8		

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$		$\phi D > 18$
	1.5	L = 25 to 35.5	L < 25 and L \geq 40	L = 25 to 31.5	L < 25 and L \geq 35.5	2
		1.5	2	1.5	2	

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	100/120	1k	10k	$\geq 50k$
$3.3 < C_R \leq 330$	1	1.5	1.7	1.9

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

GH SERIES ▀ LOW IMPEDANCE, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 105°C • 3 000 hours up to 10 000 hours
- Low impedance and high ripple current
- Wide capacitance range
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics										
Operating Temperature Range		-55 ~ +105°C										
Rated Voltage Range	V_R	6.3 ~ 100V DC										
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$										
Capacitance Range	C_R	1 ~ 12000 μ F										
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz • 20°C)										
Leakage Current (20°C • V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater • After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]										
Dissipation Factor % (20°C • 120Hz)	$\tan\delta$	V_R (V DC)	6.3	10	16	25	35	50	63	80	100	
		$\tan\delta$ (%)	22	19	16	14	12	10	9	9	10	
		For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value										
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	80	100	
		Z-25°C/Z+20°C	4	3	2	2	1.5	1.5	1.5	1.5	1.5	
		Z-40°C/Z+20°C	6	4	3	3	2	2	2	2	2	
		Z-55°C/Z+20°C	8	6	5	5	4	4	4	4	4	
		For capacitance > 1000 μ F										
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value									
		Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value									
Z-55°C/Z+20°C	Add 1.5 for every multiple 1000 μ F of rated capacitance value											
Lifetime Test												
Endurance 105°C (V_R & I_R applied)	Test	5 000 hours					ϕ D 5 ~ 6.3 mm					
		7 000 hours					ϕ D 8 ~ 12 mm					
		10 000 hours					ϕ D \geq 13 mm					
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value										
	$\tan\delta$	$\leq 200\%$ of initial specified value										
I_{Leak}	\leq the initial specified value											
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours										
		$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value									
		$\tan\delta$	$\leq 200\%$ of initial specified value									
		I_{Leak}	\leq the initial specified value									
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4										

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	82	5	11	1630	198	GH820M6R3C110A □
	100	5	11	1450	210	GH101M6R3C110A □
	120	5	11	1280	222	GH121M6R3C110A □
	150	6.3	11	1160	240	GH151M6R3E110A □
	180	6.3	11	1040	282	GH181M6R3E110A □
	220	6.3	11	890	378	GH221M6R3E110A □
	270	6.3	11	770	396	GH271M6R3E110A □
	330	6.3	11	770	396	GH331M6R3E110A □
	330	6.3	15	680	426	GH331M6R3E150A □
	330	8	11.5	680	444	GH331M6R3F115A □
	390	6.3	15	580	462	GH391M6R3E150A □
	390	8	11.5	520	480	GH391M6R3F115A □
	470	6.3	15	410	504	GH471M6R3E150A □
	470	8	11.5	380	534	GH471M6R3F115A □
	470	10	12.5	380	564	GH471M6R3G125A □
	560	8	11.5	360	570	GH561M6R3F115A □
	560	8	16	360	600	GH561M6R3F160A □
	560	10	12.5	360	612	GH561M6R3G125A □
	680	8	11.5	330	582	GH681M6R3F115A □
	680	8	16	330	618	GH681M6R3F160A □
	680	10	12.5	330	642	GH681M6R3G125A □
	820	8	11.5	250	666	GH821M6R3F115A □
	820	10	12.5	250	720	GH821M6R3G125A □
	1000	8	16	220	690	GH102M6R3F160A □
	1000	8	20	220	756	GH102M6R3F200A □
	1000	10	12.5	220	708	GH102M6R3G125A □
	1200	8	20	180	840	GH122M6R3F200A □
	1200	10	16	180	888	GH122M6R3G160A □
	1500	8	20	150	1056	GH152M6R3F200A □
	1500	10	16	120	1128	GH152M6R3G160A □
	1500	10	20	120	1176	GH152M6R3G200A □
	1800	8	25	110	1230	GH182M6R3F250A □
	1800	10	20	110	1308	GH182M6R3G200A □
	2200	10	20	100	1350	GH222M6R3G200A □
	2200	10	25	100	1362	GH222M6R3G250A □
	2700	10	25	90	1488	GH272M6R3G250A □
	2700	10	30	90	1560	GH272M6R3G300A □
	2700	13	20	90	1512	GH272M6R3I200A □
	3300	10	30	85	1620	GH332M6R3G300A □
	3300	13	20	85	1584	GH332M6R3I200A □
3900	13	25	80	1860	GH392M6R3I250A □	
4700	13	25	75	1938	GH472M6R3I250A □	
4700	13	30	70	1992	GH472M6R3I300A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
6.3	5600	13	30	68	1992	GH562M6R3I300A □
	5600	16	25	68	2196	GH562M6R3J250A □
	6800	13	30	63	2520	GH682M6R3I300A □
	6800	16	25	63	2718	GH682M6R3J250A □
10	22	5	11	3080	66	GH220M010C110A □
	27	5	11	2670	72	GH270M010C110A □
	33	5	11	2330	72	GH330M010C110A □
	39	5	11	2020	120	GH390M010C110A □
	47	5	11	1710	132	GH470M010C110A □
	56	5	11	1470	144	GH560M010C110A □
	68	5	11	1300	162	GH680M010C110A □
	82	5	11	1150	192	GH820M010C110A □
	100	5	11	1020	222	GH101M010C110A □
	100	6.3	11	1020	240	GH101M010E110A □
	120	5	11	1020	246	GH121M010C110A □
	120	6.3	11	1020	258	GH121M010E110A □
	150	6.3	11	950	282	GH151M010E110A □
	180	6.3	11	680	318	GH181M010E110A □
	220	6.3	11	600	366	GH221M010E110A □
	220	6.3	15	580	390	GH221M010E150A □
	270	6.3	15	560	414	GH271M010E150A □
	270	8	11.5	530	420	GH271M010F115A □
	330	6.3	11	500	402	GH331M010E110A □
	330	6.3	15	470	462	GH331M010E150A □
	330	8	11.5	450	492	GH331M010F115A □
	390	6.3	15	420	456	GH391M010E150A □
	390	8	11.5	420	516	GH391M010F115A □
	470	6.3	15	370	480	GH471M010E150A □
	470	8	11.5	300	552	GH471M010F115A □
	560	8	11.5	280	588	GH561M010F115A □
	560	8	16	250	636	GH561M010F160A □
	560	10	12.5	250	636	GH561M010G125A □
	680	8	16	210	660	GH681M010F160A □
	680	8	20	200	684	GH681M010F200A □
	680	10	12.5	200	684	GH681M010G125A □
	820	8	16	200	732	GH821M010F160A □
	820	8	20	180	828	GH821M010F200A □
	820	10	12.5	160	876	GH821M010G125A □
	820	10	16	160	936	GH821M010G160A □
	1000	8	16	160	1020	GH102M010F160A □
1000	8	20	140	1122	GH102M010F200A □	
1000	10	12.5	140	1032	GH102M010G125A □	
1000	10	16	130	1140	GH102M010G160A □	

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
10	1200	8	20	130	1248	GH122M010F200A
	1200	10	16	130	1272	GH122M010G160A
	1200	10	20	120	1368	GH122M010G200A
	1500	10	20	106	1536	GH152M010G200A
	1500	13	16	110	1619	GH152M010I160A
	1800	10	25	102	1650	GH182M010G250A
	1800	13	20	98	1704	GH182M010I200A
	2200	10	25	95	1776	GH222M010G250A
	2200	10	30	93	1860	GH222M010G300A
	2200	13	20	93	1872	GH222M010I200A
	2200	16	16	93	1926	GH222M010J160A
	2700	10	30	84	2076	GH272M010G300A
	2700	13	20	84	2028	GH272M010I200A
	2700	13	25	84	2124	GH272M010I250A
	2700	18	16	84	2240	GH272M010K160A
	3300	10	30	70	2232	GH332M010G300A
	3300	13	25	70	2268	GH332M010I250A
	3300	16	25	70	2316	GH332M010J250A
	3900	13	25	65	2304	GH392M010I250A
	3900	13	30	65	2376	GH392M010I300A
	3900	16	20	70	2362	GH392M010J200A
	3900	16	25	65	2544	GH392M010J250A
	4700	13	30	65	2484	GH472M010I300A
	4700	13	35	60	2568	GH472M010I350A
	4700	16	25	57	2634	GH472M010J250A
	5600	13	35	54	2640	GH562M010I350A
	5600	16	25	54	2472	GH562M010J250A
	5600	16	31.5	50	2736	GH562M010J315A
	5600	18	20	57	2459	GH562M010K200A
	6800	16	31.5	46	2964	GH682M010J315A
	6800	18	25	52	2865	GH682M010K250A
	8200	16	35.5	43	3350	GH822M010J355A
8200	18	31.5	44	3392	GH822M010K315A	
10000	16	40	40	3850	GH103M010J400A	
10000	18	35.5	41	3850	GH103M010K355A	
12000	18	40	37	4150	GH123M010K400A	
16	10	5	11	3900	36	GH100M016C110A
	15	5	11	3320	72	GH150M016C110A
	22	5	11	2640	72	GH220M016C110A
	27	5	11	2370	132	GH270M016C110A
	33	5	11	2000	144	GH330M016C110A
	39	5	11	1610	168	GH390M016C110A
47	5	11	1350	186	GH470M016C110A	

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
16	56	5	11	1240	210	GH560M016C110A □
	68	5	11	1180	228	GH680M016C110A □
	82	6.3	11	1030	264	GH820M016E110A □
	100	5	11	1100	228	GH101M016C110A □
	100	6.3	11	860	264	GH101M016E110A □
	120	6.3	11	660	312	GH121M016E110A □
	150	6.3	11	580	336	GH151M016E110A □
	150	6.3	15	580	396	GH151M016E150A □
	180	6.3	15	560	420	GH181M016E150A □
	180	8	11.5	540	426	GH181M016F115A □
	220	6.3	15	520	504	GH221M016E150A □
	220	8	11.5	460	540	GH221M016F115A □
	270	6.3	15	420	540	GH271M016E150A □
	270	8	11.5	380	582	GH271M016F115A □
	330	6.3	15	340	588	GH331M016E150A □
	330	8	11.5	370	588	GH331M016F115A □
	330	8	16	350	618	GH331M016F160A □
	390	8	11.5	330	612	GH391M016F115A □
	390	8	16	330	654	GH391M016F160A □
	390	10	12.5	330	648	GH391M016G125A □
	470	8	16	290	846	GH471M016F160A □
	470	8	20	280	900	GH471M016F200A □
	470	10	12.5	280	882	GH471M016G125A □
	560	8	16	260	864	GH561M016F160A □
	560	8	20	240	936	GH561M016F200A □
	560	10	12.5	240	882	GH561M016G125A □
	560	10	16	200	960	GH561M016G160A □
	680	8	20	200	960	GH681M016F200A □
	680	10	16	180	1044	GH681M016G160A □
	820	8	20	170	1104	GH821M016F200A □
	820	10	16	150	1254	GH821M016G160A □
	820	10	20	150	1320	GH821M016G200A □
	1000	10	16	140	1404	GH102M016G160A □
	1000	10	20	120	1476	GH102M016G200A □
	1200	10	20	130	1500	GH122M016G200A □
	1200	10	25	110	1578	GH122M016G250A □
	1500	10	25	96	1620	GH152M016G250A □
	1500	13	20	95	1728	GH152M016I200A □
	1500	16	16	95	1778	GH152M016J160A □
	1800	10	30	97	1776	GH182M016G300A □
1800	13	20	94	1854	GH182M016I200A □	
1800	13	25	90	1956	GH182M016I250A □	
2200	13	20	90	2082	GH222M016I200A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
16	2200	13	25	85	2340	GH222M016I250A <input type="checkbox"/>
	2200	18	16	90	2300	GH222M016K160A <input type="checkbox"/>
	2700	13	25	76	2436	GH272M016I250A <input type="checkbox"/>
	2700	13	30	72	2496	GH272M016I300A <input type="checkbox"/>
	2700	16	20	74	2362	GH272M016J200A <input type="checkbox"/>
	2700	16	25	72	2544	GH272M016J250A <input type="checkbox"/>
	3300	13	30	68	2562	GH332M016I300A <input type="checkbox"/>
	3300	13	35	66	2628	GH332M016I350A <input type="checkbox"/>
	3300	16	25	64	2700	GH332M016J250A <input type="checkbox"/>
	3900	13	35	50	2664	GH392M016I350A <input type="checkbox"/>
	3900	16	25	60	2736	GH392M016J250A <input type="checkbox"/>
	3900	16	31.5	58	2856	GH392M016J315A <input type="checkbox"/>
	3900	18	20	60	2721	GH392M016K200A <input type="checkbox"/>
	4700	16	31.5	50	2886	GH472M016J315A <input type="checkbox"/>
	4700	18	25	55	2844	GH472M016K250A <input type="checkbox"/>
	5600	16	35.5	46	2968	GH562M016J355A <input type="checkbox"/>
	5600	18	31.5	48	3084	GH562M016K315A <input type="checkbox"/>
	5600	18	35.5	45	3168	GH562M016K355A <input type="checkbox"/>
	6800	16	40	40	3252	GH682M016J400A <input type="checkbox"/>
	6800	18	35.5	40	3252	GH682M016K355A <input type="checkbox"/>
8200	18	35.5	38	3750	GH822M016K355A <input type="checkbox"/>	
10000	18	40	36	4150	GH103M016K400A <input type="checkbox"/>	
25	10	5	11	3010	66	GH100M025C110A <input type="checkbox"/>
	15	5	11	2640	120	GH150M025C110A <input type="checkbox"/>
	22	5	11	2300	144	GH220M025C110A <input type="checkbox"/>
	27	5	11	2030	156	GH270M025C110A <input type="checkbox"/>
	33	5	11	1720	174	GH330M025C110A <input type="checkbox"/>
	39	5	11	1500	174	GH390M025C110A <input type="checkbox"/>
	47	5	11	1370	222	GH470M025C110A <input type="checkbox"/>
	47	6.3	11	1280	240	GH470M025E110A <input type="checkbox"/>
	56	5	11	1250	264	GH560M025C110A <input type="checkbox"/>
	68	6.3	11	970	300	GH680M025E110A <input type="checkbox"/>
	82	6.3	11	790	312	GH820M025E110A <input type="checkbox"/>
	100	6.3	11	680	360	GH101M025E110A <input type="checkbox"/>
	100	8	11.5	540	516	GH101M025F115A <input type="checkbox"/>
	120	6.3	11	580	402	GH121M025E110A <input type="checkbox"/>
	120	6.3	15	560	462	GH121M025E150A <input type="checkbox"/>
	150	6.3	15	540	510	GH151M025E150A <input type="checkbox"/>
	150	8	11.5	520	528	GH151M025F115A <input type="checkbox"/>
	180	6.3	15	510	546	GH181M025E150A <input type="checkbox"/>
	180	8	11.5	460	552	GH181M025F115A <input type="checkbox"/>
	220	8	11.5	420	618	GH221M025F115A <input type="checkbox"/>
220	8	16	400	642	GH221M025F160A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
25	270	8	11.5	340	750	GH271M025F115A
	270	8	16	320	756	GH271M025F160A
	270	10	12.5	320	816	GH271M025G125A
	330	8	16	250	960	GH331M025F160A
	330	10	12.5	240	924	GH331M025G125A
	470	8	20	230	1056	GH471M025F200A
	470	10	12.5	210	1020	GH471M025G125A
	470	10	16	210	1080	GH471M025G160A
	560	8	20	170	1224	GH561M025F200A
	560	10	16	150	1260	GH561M025G160A
	680	10	20	110	1470	GH681M025G200A
	680	13	16	100	1550	GH681M025I160A
	820	10	20	110	1668	GH821M025G200A
	820	10	25	100	1704	GH821M025G250A
	1000	10	25	93	1812	GH102M025G250A
	1000	13	20	90	1872	GH102M025I200A
	1000	16	16	88	1926	GH102M025J160A
	1200	13	20	82	2028	GH122M025I200A
	1200	18	16	80	2240	GH122M025K160A
	1500	13	20	67	2124	GH152M025I200A
	1500	13	25	65	2190	GH152M025I250A
	1800	13	30	58	2310	GH182M025I300A
	1800	16	20	56	2172	GH182M025J200A
	1800	16	25	58	2340	GH182M025J250A
	2200	13	30	52	2592	GH222M025I300A
	2200	16	25	50	2712	GH222M025J250A
	2200	18	20	52	2697	GH222M025K200A
	2700	13	35	50	2850	GH272M025I350A
	2700	16	25	48	2673	GH272M025J250A
	2700	16	31.5	46	2958	GH272M025J315A
	3300	16	31.5	38	3204	GH332M025J315A
	3300	16	35.5	36	3288	GH332M025J355A
	3300	18	25	41	3156	GH332M025K250A
3900	16	35.5	36	3500	GH392M025J355A	
3900	18	31.5	36	3544	GH392M025K315A	
4700	16	40	34	3800	GH472M025J400A	
4700	18	35.5	34	3800	GH472M025K355A	
5600	18	40	30	4100	GH562M025K400A	
35	10	5	11	2650	84	GH100M035C110A
	15	5	11	2290	144	GH150M035C110A
	22	5	11	1900	162	GH220M035C110A
	27	5	11	1580	174	GH270M035C110A
	27	6.3	11	1420	198	GH270M035E110A

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: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (m Ω)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
35	33	5	11	1250	222	GH330M035C110A <input type="checkbox"/>
	33	6.3	11	1250	240	GH330M035E110A <input type="checkbox"/>
	39	6.3	11	1100	252	GH390M035E110A <input type="checkbox"/>
	47	5	11	96	232	GH470M035C110A <input type="checkbox"/>
	47	6.3	11	920	264	GH470M035E110A <input type="checkbox"/>
	56	6.3	11	750	282	GH560M035E110A <input type="checkbox"/>
	56	6.3	15	680	306	GH560M035E150A <input type="checkbox"/>
	68	6.3	11	620	312	GH680M035E110A <input type="checkbox"/>
	68	6.3	15	550	348	GH680M035E150A <input type="checkbox"/>
	82	6.3	15	510	354	GH820M035E150A <input type="checkbox"/>
	82	8	11.5	470	384	GH820M035F115A <input type="checkbox"/>
	100	6.3	11	490	329	GH101M035E110A <input type="checkbox"/>
	100	6.3	15	470	378	GH101M035E150A <input type="checkbox"/>
	100	8	11.5	450	414	GH101M035F115A <input type="checkbox"/>
	120	8	11.5	420	546	GH121M035F115A <input type="checkbox"/>
	120	8	16	380	612	GH121M035F160A <input type="checkbox"/>
	150	8	11.5	380	618	GH151M035F115A <input type="checkbox"/>
	150	8	16	350	714	GH151M035F160A <input type="checkbox"/>
	150	10	12.5	350	720	GH151M035G125A <input type="checkbox"/>
	180	8	16	320	792	GH181M035F160A <input type="checkbox"/>
	180	10	12.5	320	804	GH181M035G125A <input type="checkbox"/>
	220	8	16	260	864	GH221M035F160A <input type="checkbox"/>
	220	8	20	240	936	GH221M035F200A <input type="checkbox"/>
	220	10	12.5	240	888	GH221M035G125A <input type="checkbox"/>
	270	8	20	220	1056	GH271M035F200A <input type="checkbox"/>
	270	10	12.5	240	984	GH271M035G125A <input type="checkbox"/>
	270	10	16	210	1068	GH271M035G160A <input type="checkbox"/>
	330	8	20	160	1140	GH331M035F200A <input type="checkbox"/>
	330	10	16	150	1176	GH331M035G160A <input type="checkbox"/>
	470	10	20	110	1302	GH471M035G200A <input type="checkbox"/>
	470	10	25	100	1398	GH471M035G250A <input type="checkbox"/>
	470	13	16	110	1272	GH471M035I160A <input type="checkbox"/>
	470	13	20	100	1398	GH471M035I200A <input type="checkbox"/>
	560	10	25	96	1572	GH561M035G250A <input type="checkbox"/>
	560	13	20	96	1584	GH561M035I200A <input type="checkbox"/>
	680	10	25	84	1680	GH681M035G250A <input type="checkbox"/>
	680	13	20	82	1692	GH681M035I200A <input type="checkbox"/>
	680	16	16	80	1740	GH681M035J160A <input type="checkbox"/>
	820	13	20	68	1818	GH821M035I200A <input type="checkbox"/>
	820	13	25	62	1944	GH821M035I250A <input type="checkbox"/>
1000	10	30	60	2136	GH102M035G300A <input type="checkbox"/>	
1000	13	25	60	2184	GH102M035I250A <input type="checkbox"/>	
1000	13	30	58	2280	GH102M035I300A <input type="checkbox"/>	

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: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
35	1000	18	16	56	2189	GH102M035K160A <input type="checkbox"/>
	1200	13	25	52	2292	GH122M035I250A <input type="checkbox"/>
	1200	16	20	52	2384	GH122M035J200A <input type="checkbox"/>
	1200	16	25	50	2568	GH122M035J250A <input type="checkbox"/>
	1500	13	35	48	2820	GH152M035I350A <input type="checkbox"/>
	1500	16	31.5	48	2928	GH152M035J315A <input type="checkbox"/>
	1800	13	35	45	2976	GH182M035I350A <input type="checkbox"/>
	1800	16	25	48	2722	GH182M035J250A <input type="checkbox"/>
	1800	16	31.5	45	3012	GH182M035J315A <input type="checkbox"/>
	1800	18	20	48	2707	GH182M035K200A <input type="checkbox"/>
	2200	16	31.5	36	3228	GH222M035J315A <input type="checkbox"/>
	2200	18	25	36	3132	GH222M035K250A <input type="checkbox"/>
	2700	16	35.5	32	3294	GH272M035J355A <input type="checkbox"/>
	2700	18	31.5	32	3336	GH272M035K315A <input type="checkbox"/>
	3300	16	40	29	3800	GH332M035J400A <input type="checkbox"/>
	3300	18	35.5	29	3800	GH332M035K355A <input type="checkbox"/>
3900	18	40	26	4100	GH392M035K400A <input type="checkbox"/>	
50	1	5	11	4310	24	GH010M050C110A <input type="checkbox"/>
	2.2	5	11	3600	36	GH2R2M050C110A <input type="checkbox"/>
	3.3	5	11	3500	48	GH3R3M050C110A <input type="checkbox"/>
	4.7	5	11	3300	66	GH4R7M050C110A <input type="checkbox"/>
	5.6	5	11	3200	96	GH5R6M050C110A <input type="checkbox"/>
	6.8	5	11	3000	96	GH6R8M050C110A <input type="checkbox"/>
	8.2	5	11	2800	108	GH8R2M050C110A <input type="checkbox"/>
	10	5	11	2600	120	GH100M050C110A <input type="checkbox"/>
	15	5	11	1870	150	GH150M050C110A <input type="checkbox"/>
	22	5	11	1600	162	GH220M050C110A <input type="checkbox"/>
	22	6.3	11	1270	168	GH220M050E110A <input type="checkbox"/>
	27	6.3	11	1020	192	GH270M050E110A <input type="checkbox"/>
	33	6.3	11	870	282	GH330M050E110A <input type="checkbox"/>
	33	6.3	15	850	296	GH330M050E150A <input type="checkbox"/>
	39	6.3	11	720	306	GH390M050E110A <input type="checkbox"/>
	39	6.3	15	700	330	GH390M050E150A <input type="checkbox"/>
	47	6.3	11	580	303	GH470M050E110A <input type="checkbox"/>
	47	6.3	15	550	348	GH470M050E150A <input type="checkbox"/>
	47	8	11.5	550	366	GH470M050F115A <input type="checkbox"/>
	56	6.3	11	490	323	GH560M050E110A <input type="checkbox"/>
	56	8	11.5	470	378	GH560M050F115A <input type="checkbox"/>
	68	8	11.5	470	420	GH680M050F115A <input type="checkbox"/>
82	6.3	15	460	462	GH820M050E150A <input type="checkbox"/>	
82	8	11.5	460	492	GH820M050F115A <input type="checkbox"/>	
82	8	16	450	528	GH820M050F160A <input type="checkbox"/>	

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: Enter X for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
50	100	8	11.5	450	540	GH101M050F115A <input type="checkbox"/>
	100	8	16	250	576	GH101M050F160A <input type="checkbox"/>
	120	8	16	250	630	GH121M050F160A <input type="checkbox"/>
	150	8	16	240	696	GH151M050F160A <input type="checkbox"/>
	150	8	20	240	756	GH151M050F200A <input type="checkbox"/>
	150	10	12.5	250	702	GH151M050G125A <input type="checkbox"/>
	150	10	16	240	780	GH151M050G160A <input type="checkbox"/>
	180	8	20	240	864	GH181M050F200A <input type="checkbox"/>
	180	10	16	240	912	GH181M050G160A <input type="checkbox"/>
	220	10	16	240	1056	GH221M050G160A <input type="checkbox"/>
	220	10	20	200	1122	GH221M050G200A <input type="checkbox"/>
	270	10	20	100	1212	GH271M050G200A <input type="checkbox"/>
	270	10	25	100	1284	GH271M050G250A <input type="checkbox"/>
	270	13	16	100	1278	GH271M050I160A <input type="checkbox"/>
	330	10	25	95	1404	GH331M050G250A <input type="checkbox"/>
	330	13	20	82	1500	GH331M050I200A <input type="checkbox"/>
	470	10	30	78	1749	GH471M050G300A <input type="checkbox"/>
	470	13	20	78	1776	GH471M050I200A <input type="checkbox"/>
	470	13	25	78	1860	GH471M050I250A <input type="checkbox"/>
	470	16	16	78	1827	GH471M050J160A <input type="checkbox"/>
	560	13	20	75	2094	GH561M050I200A <input type="checkbox"/>
	560	13	25	70	2172	GH561M050I250A <input type="checkbox"/>
	560	18	16	73	2313	GH561M050K160A <input type="checkbox"/>
	680	13	25	57	2304	GH681M050I250A <input type="checkbox"/>
	680	16	25	57	2376	GH681M050J250A <input type="checkbox"/>
	820	13	30	52	2412	GH821M050I300A <input type="checkbox"/>
	820	16	20	54	2084	GH821M050J200A <input type="checkbox"/>
	820	16	31.5	52	2484	GH821M050J315A <input type="checkbox"/>
	1000	13	40	48	2750	GH102M050I400A <input type="checkbox"/>
	1000	16	25	50	2676	GH102M050J250A <input type="checkbox"/>
	1000	16	31.5	48	2736	GH102M050J315A <input type="checkbox"/>
	1000	18	20	50	2661	GH102M050K200A <input type="checkbox"/>
	1200	16	31.5	45	2952	GH122M050J315A <input type="checkbox"/>
	1200	16	35.5	42	3048	GH122M050J355A <input type="checkbox"/>
1200	18	25	47	2854	GH122M050K250A <input type="checkbox"/>	
1500	16	35.5	38	3216	GH152M050J355A <input type="checkbox"/>	
1800	16	40	35	3550	GH182M050J400A <input type="checkbox"/>	
1800	18	31.5	35	3367	GH182M050K315A <input type="checkbox"/>	
2200	18	35.5	32	3550	GH222M050K355A <input type="checkbox"/>	
2700	18	40	30	3790	GH272M050K400A <input type="checkbox"/>	
3300	18	40	28	3810	GH332M050K400A <input type="checkbox"/>	
63	10	5	11	3015	116	GH100M063C110A <input type="checkbox"/>
	15	5	11	2370	130	GH150M063C110A <input type="checkbox"/>

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
63	22	5	11	1770	151	GH220M063C110A □
	22	6.3	11	1391	194	GH220M063E110A □
	27	6.3	11	1290	201	GH270M063E110A □
	33	6.3	11	1013	227	GH330M063E110A □
	39	6.3	11	890	242	GH390M063E110A □
	47	6.3	11	755	263	GH470M063E110A □
	47	8	11.5	730	313	GH470M063F115A □
	56	8	11.5	700	319	GH560M063F115A □
	68	8	11.5	500	378	GH680M063F115A □
	68	8	16	420	476	GH680M063F160A □
	82	8	11.5	470	390	GH820M063F115A □
	82	8	16	420	476	GH820M063F160A □
	82	10	12.5	430	480	GH820M063G125A □
	100	8	16	360	514	GH101M063F160A □
	100	10	12.5	375	514	GH101M063G125A □
	120	8	16	365	511	GH121M063F160A □
	120	8	20	320	603	GH121M063F200A □
	120	10	12.5	357	527	GH121M063G125A □
	120	10	16	300	639	GH121M063G160A □
	150	8	20	320	603	GH151M063F200A □
	150	10	16	276	666	GH151M063G160A □
	180	8	25	260	741	GH181M063F250A □
	180	10	16	280	662	GH181M063G160A □
	180	10	20	260	757	GH181M063G200A □
	220	8	25	230	788	GH221M063F250A □
	220	10	16	230	730	GH221M063G160A □
	220	10	20	200	891	GH221M063G200A □
	220	13	16	200	910	GH221M063I160A □
	270	10	20	164	986	GH271M063G200A □
	270	13	20	130	1241	GH271M063I200A □
	330	10	25	126	1242	GH331M063G250A □
	330	13	16	150	1086	GH331M063I160A □
	330	13	20	130	1281	GH331M063I200A □
	330	13	25	100	1611	GH331M063I250A □
	390	13	25	93	1618	GH391M063I250A □
	470	13	20	93	1516	GH471M063I200A □
	470	13	25	90	1698	GH471M063I250A □
	470	13	30	88	1863	GH471M063I300A □
	470	16	20	82	1856	GH471M063J200A □
	560	13	25	87	1727	GH561M063I250A □
560	13	30	81	1942	GH561M063I300A □	
560	16	20	82	1857	GH561M063J200A □	
680	13	30	71	2081	GH681M063I300A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
63	680	13	35	68	2273	GH681M063I350A <input type="checkbox"/>
	680	16	20	84	1834	GH681M063J200A <input type="checkbox"/>
	820	13	40	66	2453	GH821M063I400A <input type="checkbox"/>
	820	16	25	66	2229	GH821M063J250A <input type="checkbox"/>
	820	18	20	73	2108	GH821M063K200A <input type="checkbox"/>
	1000	13	45	63	2652	GH102M063I450A <input type="checkbox"/>
	1000	16	31.5	56	2689	GH102M063J315A <input type="checkbox"/>
	1000	18	25	71	2307	GH102M063K250A <input type="checkbox"/>
	1200	16	31.5	54	2726	GH122M063J315A <input type="checkbox"/>
	1200	18	25	62	2470	GH122M063K250A <input type="checkbox"/>
	1500	18	31.5	51	2996	GH152M063K315A <input type="checkbox"/>
	1500	18	35.5	48	3256	GH152M063K355A <input type="checkbox"/>
	1800	16	40	36	3759	GH182M063J400A <input type="checkbox"/>
	1800	18	35.5	42	3480	GH182M063K355A <input type="checkbox"/>
	2200	18	40	35	3937	GH222M063K400A <input type="checkbox"/>
80	10	5	11	4070	99	GH100M080C110A <input type="checkbox"/>
	15	5	11	3200	112	GH150M080C110A <input type="checkbox"/>
	22	6.3	11	1878	167	GH220M080E110A <input type="checkbox"/>
	27	6.3	11	1742	173	GH270M080E110A <input type="checkbox"/>
	33	6.3	11	1367	195	GH330M080E110A <input type="checkbox"/>
	39	8	11.5	1202	244	GH390M080F115A <input type="checkbox"/>
	47	8	11.5	1019	265	GH470M080F115A <input type="checkbox"/>
	56	8	11.5	945	275	GH560M080F115A <input type="checkbox"/>
	56	8	16	900	325	GH560M080F160A <input type="checkbox"/>
	68	8	16	660	380	GH680M080F160A <input type="checkbox"/>
	68	10	12.5	660	388	GH680M080G125A <input type="checkbox"/>
	82	8	16	630	389	GH820M080F160A <input type="checkbox"/>
	82	10	12.5	660	389	GH820M080G125A <input type="checkbox"/>
	100	8	20	450	509	GH101M080F200A <input type="checkbox"/>
	100	10	16	450	521	GH101M080G160A <input type="checkbox"/>
	100	13	16	440	634	GH101M080I160A <input type="checkbox"/>
	120	10	16	430	533	GH121M080G160A <input type="checkbox"/>
	150	10	20	345	657	GH151M080G200A <input type="checkbox"/>
	150	13	16	400	664	GH151M080I160A <input type="checkbox"/>
	180	10	20	330	677	GH181M080G200A <input type="checkbox"/>
	180	10	25	320	755	GH181M080G250A <input type="checkbox"/>
	180	13	16	340	721	GH181M080I160A <input type="checkbox"/>
	220	10	25	310	766	GH221M080G250A <input type="checkbox"/>
	220	13	20	310	830	GH221M080I200A <input type="checkbox"/>
	270	13	20	270	889	GH271M080I200A <input type="checkbox"/>
270	13	25	250	1018	GH271M080I250A <input type="checkbox"/>	
330	13	20	190	1060	GH331M080I200A <input type="checkbox"/>	
330	16	20	180	1253	GH331M080J200A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
80	390	13	30	150	1427	GH391M080I300A <input type="checkbox"/>
	470	13	30	130	1533	GH471M080I300A <input type="checkbox"/>
	470	13	35	120	1711	GH471M080I350A <input type="checkbox"/>
	470	16	25	160	1431	GH471M080J250A <input type="checkbox"/>
	470	18	20	150	1470	GH471M080K200A <input type="checkbox"/>
	560	13	40	140	1684	GH561M080I400A <input type="checkbox"/>
	560	16	25	150	1478	GH561M080J250A <input type="checkbox"/>
	560	18	20	150	1470	GH561M080K200A <input type="checkbox"/>
	680	16	31.5	130	1757	GH681M080J315A <input type="checkbox"/>
	680	18	25	150	1581	GH681M080K250A <input type="checkbox"/>
	820	16	35.5	120	1929	GH821M080J355A <input type="checkbox"/>
	820	18	25	130	1699	GH821M080K250A <input type="checkbox"/>
	1000	16	35.5	120	1929	GH102M080J355A <input type="checkbox"/>
	1000	16	40	110	2150	GH102M080J400A <input type="checkbox"/>
	1000	18	31.5	110	2040	GH102M080K315A <input type="checkbox"/>
	1200	16	40	90	2377	GH122M080J400A <input type="checkbox"/>
	1200	18	35.5	95	2314	GH122M080K355A <input type="checkbox"/>
	1500	16	40	84	2461	GH152M080J400A <input type="checkbox"/>
	1500	18	40	83	2641	GH152M080K400A <input type="checkbox"/>
	1800	18	40	82	2657	GH182M080K400A <input type="checkbox"/>
100	4.7	5	11	5750	54	GH4R7M100C110A <input type="checkbox"/>
	5.6	5	11	5000	90	GH5R6M100C110A <input type="checkbox"/>
	6.8	5	11	4360	96	GH6R8M100C110A <input type="checkbox"/>
	8.2	5	11	3675	105	GH8R2M100C110A <input type="checkbox"/>
	10	6.3	11	2625	141	GH100M100E110A <input type="checkbox"/>
	10	8	11.5	2200	180	GH100M100F115A <input type="checkbox"/>
	15	6.3	11	2313	150	GH150M100E110A <input type="checkbox"/>
	22	6.3	11	1850	168	GH220M100E110A <input type="checkbox"/>
	22	8	11.5	1375	228	GH220M100F115A <input type="checkbox"/>
	27	8	11.5	1310	233	GH270M100F115A <input type="checkbox"/>
	33	8	11.5	1238	240	GH330M100F115A <input type="checkbox"/>
	39	8	16	1200	281	GH390M100F160A <input type="checkbox"/>
	47	8	16	850	335	GH470M100F160A <input type="checkbox"/>
	47	10	12.5	810	350	GH470M100G125A <input type="checkbox"/>
	47	10	16	780	357	GH470M100G160A <input type="checkbox"/>
	56	8	16	760	354	GH560M100F160A <input type="checkbox"/>
	56	8	20	680	414	GH560M100F200A <input type="checkbox"/>
	56	10	12.5	750	364	GH560M100G125A <input type="checkbox"/>
	68	8	20	650	423	GH680M100F200A <input type="checkbox"/>
	68	10	16	680	424	GH680M100G160A <input type="checkbox"/>
82	8	20	520	473	GH820M100F200A <input type="checkbox"/>	
82	10	16	520	485	GH820M100G160A <input type="checkbox"/>	
100	8	30	420	635	GH101M100F300A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

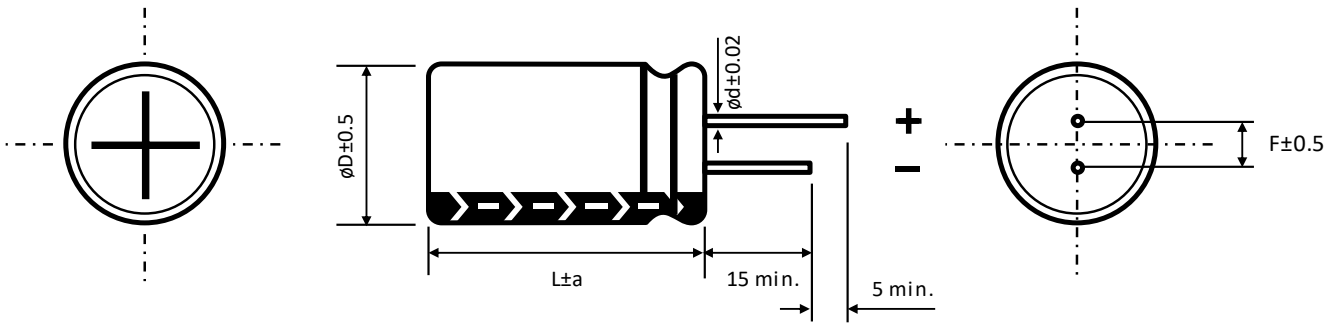
Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
100	100	10	16	450	521	GH101M100G160A □
	100	10	20	420	595	GH101M100G200A □
	100	13	16	430	641	GH101M100I160A □
	100	13	20	380	749	GH101M100I200A □
	120	8	35	360	738	GH121M100F350A □
	120	10	20	400	610	GH121M100G200A □
	120	10	25	370	701	GH121M100G250A □
	120	13	16	400	664	GH121M100I160A □
	150	10	25	330	743	GH151M100G250A □
	150	10	30	310	833	GH151M100G300A □
	150	13	20	330	804	GH151M100I200A □
	180	13	20	290	858	GH181M100I200A □
	180	13	25	280	962	GH181M100I250A □
	220	13	20	270	889	GH221M100I200A □
	220	13	25	250	108	GH221M100I250A □
	220	16	16	270	915	GH221M100J160A □
	220	16	20	250	1063	GH221M100J200A □
	270	10	40	230	1106	GH271M100G400A □
	270	13	30	200	1235	GH271M100I300A □
	270	16	25	200	1280	GH271M100J250A □
	330	13	30	160	1381	GH331M100I300A □
	330	13	35	140	1584	GH331M100I350A □
	330	16	25	140	1530	GH331M100J250A □
	390	13	40	130	1748	GH391M100I400A □
	390	18	25	150	1581	GH391M100K250A □
	470	16	25	150	1478	GH471M100J250A □
	470	16	31.5	110	1910	GH471M100J315A □
	470	18	25	140	1637	GH471M100K250A □
	560	16	35.5	130	1853	GH561M100J355A □
	560	18	31.5	130	1877	GH561M100K315A □
	680	16	35.5	120	1929	GH681M100J355A □
	680	18	35.5	110	2150	GH681M100K355A □
	820	18	35.5	105	2201	GH821M100K355A □
820	18	40	100	2406	GH821M100K400A □	
1000	18	40	95	2468	GH102M100K400A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ϕd	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				



a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$		
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40		L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2		1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	100/120	400	1k	10k	100k
$C_R \leq 10$	0.4	0.52	0.6	0.92	1
$10 < C_R \leq 100$	0.67	0.8	0.83	0.94	1
$100 < C_R \leq 1000$	0.75	0.84	0.88	0.95	1
$1000 \leq C_R$	0.82	0.87	0.92	0.95	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

	
<p>General Precautions and Guidelines</p>	<p>Packaging Information Liquid Radial</p>
<p>Page 293</p>	<p>Page 272</p>

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

KH SERIES ▪ HIGH VOLTAGE, LONG LIFE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ▪ THT type
- Endurance: 105°C ▪ 5 000 hours up to 10 000 hours
- High ripple current
- High reliability
- Wide voltage range



SPECIFICATIONS

Items		Performance Characteristics												
Operating Temperature Range		-40 ~ +105°C						-25 ~ +105°C						
Rated Voltage Range	V _R	10 ~ 400V DC						450V DC						
Surge Voltage	V _S	(V _R ≤ 315V): V _S = 1.15·V _R						(V _R > 315V): V _S = 1.10·V _R						
Capacitance Range	C _R	6.8 ~ 3300μF						6.8 ~ 100μF						
Cap. Tolerance	ΔC	±20% (120Hz ▪ 20°C)												
Leakage Current (20°C ▪ V _R applied)	I _{LEAK}	10 ~ 100V						≤ 0.01·C _R ·V _R or 3μA (After 2 min.)						
		160 ~ 450V						≤ 0.04·C _R ·V _R + 100μA (After 1 min.)						
		[I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]												
Dissipation Factor % (20°C ▪ 120Hz)	tanδ	V _R (V DC)	10	16	25	35	50	160	200	250	350	400	450	
		tanδ (%)	19	16	14	12	10	15	15	15	20	20	20	
		For C _R > 1000μF, add 2% per every multiple 1000μF of rated capacitance value												
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	10	16	25	35	50	160	200	250	350	400	450	
		Z-25°C/Z+20°C	4	3	2	2	2	3	3	3	6	6	6	
		Z-40°C/Z+20°C	6	4	3	3	3	6	6	6	6	6	-	
		For capacitance > 1000μF												
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value											
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value													
Lifetime Test														
Endurance 105°C (V _R & I _R applied)	Test	5 000 hours						∅ D < 8 mm						
		8 000 hours						∅ D = 8 mm						
		10 000 hours						∅ D ≥ 10 mm						
	ΔC/C _R	≤ ±20% of initial measured value												
	tanδ	≤ 200% of initial specified value												
I _{Leak}	≤ the initial specified value													
Shelf Life 105°C (V _R = 0)	Test	1 000 hours												
		ΔC/C _R	≤ ±20% of initial measured value											
		tanδ	≤ 200% of initial specified value											
	I _{Leak}	≤ the initial specified value												
		Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4												

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
10	47	5	11	100	KH470M010C110A
	68	5	11	130	KH680M010C110A
	100	6.3	11	190	KH101M010E110A
	150	6.3	11	220	KH151M010E110A
	220	6.3	11	270	KH221M010E110A
	330	6.3	11	334	KH331M010E110A
	330	8	11.5	390	KH331M010F115A
	470	8	11.5	458	KH471M010F115A
	470	10	12.5	540	KH471M010G125A
	1000	8	20	877	KH102M010F200A
	1000	10	12.5	810	KH102M010G125A
	1000	10	16	900	KH102M010G160A
	2200	13	16	1401	KH222M010I160A
	2200	13	20	1540	KH222M010I200A
	3300	13	20	1533	KH332M010I200A
3300	16	25	1900	KH332M010J250A	
16	33	5	11	115	KH330M016C110A
	47	5	11	145	KH470M016C110A
	68	6.3	11	200	KH680M016E110A
	100	6.3	11	209	KH101M016E110A
	100	8	11.5	245	KH101M016F115A
	150	6.3	11	256	KH151M016E110A
	150	8	11.5	300	KH151M016F115A
	220	6.3	11	359	KH221M016E110A
	220	8	11.5	420	KH221M016F115A
	220	10	12.5	495	KH221M016G125A
	330	8	11.5	433	KH331M016F115A
	330	8	16	500	KH331M016F160A
	470	8	11.5	557	KH471M016F115A
	470	10	12.5	657	KH471M016G125A
	470	10	16	730	KH471M016G160A
	1000	10	20	1012	KH102M016G200A
	1000	13	20	1173	KH102M016I200A
	2200	13	20	1689	KH222M016I200A
2200	13	25	1862	KH222M016I250A	
2200	16	25	2093	KH222M016J250A	
25	22	5	11	100	KH220M025C110A
	33	5	11	130	KH330M025C110A
	47	6.3	11	160	KH470M025E110A
	68	6.3	11	196	KH680M025E110A
	68	8	11.5	230	KH680M025F115A
	100	6.3	11	280	KH101M025E110A
	100	8	11.5	327	KH101M025F115A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
25	150	8	11.5	390	KH151M025F115A
	150	10	12.5	460	KH151M025G125A
	220	8	11.5	443	KH221M025F115A
	220	10	16	580	KH221M025G160A
	330	8	16	644	KH331M025F160A
	330	10	12.5	657	KH331M025G125A
	330	10	16	729	KH331M025G160A
	330	10	20	805	KH331M025G200A
	470	10	16	861	KH471M025G160A
	470	10	20	950	KH471M025G200A
	1000	13	20	1407	KH102M025I200A
	1000	13	25	1552	KH102M025I250A
	2200	16	25	2169	KH222M025J250A
	2200	16	31.5	2400	KH222M025J315A
35	10	5	11	65	KH100M035C110A
	22	5	11	125	KH220M035C110A
	33	5	11	160	KH330M035C110A
	33	6.3	11	178	KH330M035E110A
	47	5	11	180	KH470M035C110A
	47	6.3	11	205	KH470M035E110A
	47	8	11.5	240	KH470M035F115A
	68	6.3	11	231	KH680M035E110A
	68	8	11.5	270	KH680M035F115A
	100	8	11.5	330	KH101M035F115A
	100	10	12.5	390	KH101M035G125A
	150	8	11.5	482	KH151M035F115A
	150	8	16	557	KH151M035F160A
	150	10	16	632	KH151M035G160A
	220	8	16	610	KH221M035F160A
	220	10	16	689	KH221M035G160A
	220	10	20	760	KH221M035G200A
	330	10	16	809	KH331M035G160A
	330	10	20	892	KH331M035G200A
	330	13	20	1035	KH331M035I200A
	470	10	16	780	KH471M035G160A
	470	10	20	860	KH471M035G200A
	470	13	20	997	KH471M035I200A
	470	13	25	1100	KH471M035I250A
	820	10	25	1300	KH821M035G250A
	1000	13	20	1409	KH102M035I200A
	1000	13	25	1553	KH102M035I250A
	1000	16	25	1746	KH102M035J250A
	1000	16	31.5	1932	KH102M035J315A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
50	6.8	5	11	75	KH6R8M050C110A
	10	5	11	97	KH100M050C110A
	22	6.3	11	130	KH220M050E110A
	33	6.3	11	210	KH330M050E110A
	33	8	11.5	241	KH330M050F115A
	47	6.3	11	245	KH470M050E110A
	47	8	11.5	287	KH470M050F115A
	47	10	12.5	300	KH470M050G125A
	68	8	11.5	302	KH680M050F115A
	68	10	12.5	356	KH680M050G125A
	100	8	11.5	382	KH101M050F115A
	100	10	16	500	KH101M050G160A
	150	10	12.5	609	KH151M050G125A
	150	10	16	677	KH151M050G160A
	150	10	20	747	KH151M050G200A
	220	10	16	764	KH221M050G160A
	220	10	20	842	KH221M050G200A
	220	13	20	977	KH221M050I200A
	330	13	20	1043	KH331M050I200A
	330	13	25	1150	KH331M050I250A
	470	13	20	1252	KH471M050I200A
	470	16	20	1440	KH471M050J200A
	470	16	25	1552	KH471M050J250A
1000	16	25	1771	KH102M050J250A	
1000	16	31.5	1959	KH102M050J315A	
1000	18	31.5	2093	KH102M050K315A	
160	10	10	16	330	KH100M160G160A
	22	10	20	510	KH220M160G200A
	33	10	20	660	KH330M160G200A
	33	13	20	760	KH330M160I200A
	47	10	20	760	KH470M160G200A
	47	13	20	870	KH470M160I200A
	68	13	20	1190	KH680M160I200A
	68	13	25	1350	KH680M160I250A
	82	13	20	1280	KH820M160I200A
	100	13	25	1430	KH101M160I250A
	100	16	20	1430	KH101M160J200A
	100	18	20	1530	KH101M160K200A
	150	16	20	1900	KH151M160J200A
	150	18	25	2180	KH151M160K250A
	220	16	25	2380	KH221M160J250A
	220	18	25	2540	KH221M160K250A
330	18	31.5	3140	KH331M160K315A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
200	10	10	16	330	KH100M200G160A
	10	10	20	360	KH100M200G200A
	22	10	20	510	KH220M200G200A
	33	10	20	660	KH330M200G200A
	33	13	20	760	KH330M200I200A
	47	13	20	990	KH470M200I200A
	68	13	20	1310	KH680M200I200A
	82	16	20	1390	KH820M200J200A
	100	16	20	1430	KH101M200J200A
	100	18	20	1530	KH101M200K200A
	150	16	25	1900	KH151M200J250A
	150	18	25	2030	KH151M200K250A
	220	18	25	2370	KH221M200K250A
	220	18	31.5	2620	KH221M200K315A
	330	18	35.5	3230	KH331M200K355A
250	10	10	20	360	KH100M250G200A
	22	10	20	510	KH220M250G200A
	22	13	20	590	KH220M250I200A
	33	13	20	810	KH330M250I200A
	33	13	25	890	KH330M250I250A
	47	13	20	990	KH470M250I200A
	47	16	20	1130	KH470M250J200A
	68	16	20	1310	KH680M250J200A
	68	18	20	1400	KH680M250K200A
	82	16	20	1390	KH820M250J200A
	100	16	25	1540	KH101M250J250A
	100	18	25	1640	KH101M250K250A
	150	18	25	1950	KH151M250K250A
	150	18	31.5	2150	KH151M250K315A
	220	18	31.5	3140	KH221M250K315A
350	6.8	10	16	290	KH6R8M350G160A
	6.8	10	20	310	KH6R8M350G200A
	10	10	20	360	KH100M350G200A
	10	13	20	410	KH100M350I200A
	22	13	20	660	KH220M350I200A
	22	13	25	720	KH220M350I250A
	33	16	20	910	KH330M350J200A
	47	16	20	1090	KH470M350J200A
	47	18	20	1160	KH470M350K200A
	68	16	25	1410	KH680M350J250A
	68	18	20	1380	KH680M350K200A
	68	18	25	1480	KH680M350K250A
	82	18	25	1540	KH820M350K250A

See "PACKAGING INFORMATION" to taped or formed products.

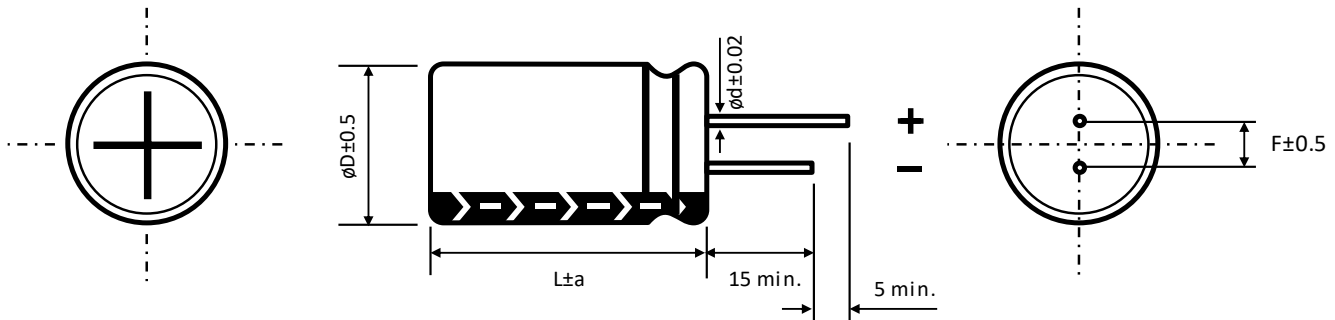
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
350	100	18	25	1580	KH101M350K250A
	120	18	31.5	1870	KH121M350K315A
	150	18	35.5	2170	KH151M350K355A
400	6.8	10	12.5	260	KH6R8M400G125A
	6.8	10	16	290	KH6R8M400G160A
	6.8	10	20	310	KH6R8M400G200A
	10	10	16	330	KH100M400G160A
	10	10	20	360	KH100M400G200A
	10	13	20	410	KH100M400I200A
	15	13	20	560	KH150M400I200A
	22	13	20	770	KH220M400I200A
	22	16	20	880	KH220M400J200A
	22	16	25	950	KH220M400J250A
	33	16	20	910	KH330M400J200A
	33	18	20	970	KH330M400K200A
	47	16	25	1190	KH470M400J250A
	47	18	20	1190	KH470M400K200A
	47	18	25	1270	KH470M400K250A
	68	18	25	1480	KH680M400K250A
	68	18	31.5	1630	KH680M400K315A
	82	18	25	1530	KH820M400K250A
	100	18	31.5	1730	KH101M400K315A
	120	18	35.5	1950	KH121M400K355A
150	18	40	2220	KH151M400K400A	
450	6.8	10	20	290	KH6R8M450G200A
	6.8	13	20	330	KH6R8M450I200A
	10	13	20	460	KH100M450I200A
	10	13	25	500	KH100M450I250A
	15	13	20	550	KH150M450I200A
	15	13	25	610	KH150M450I250A
	22	13	25	710	KH220M450I250A
	22	16	20	760	KH220M450J200A
	22	16	25	790	KH220M450J250A
	33	16	25	990	KH330M450J250A
	33	18	20	990	KH330M450K200A
	33	18	25	1060	KH330M450K250A
	47	18	25	1210	KH470M450K250A
	47	18	31.5	1330	KH470M450K315A
	68	18	31.5	1580	KH680M450K315A
	82	18	35.5	1790	KH820M450K355A
100	18	40	1810	KH101M450K400A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ϕD	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ϕd	0.5		L < 20	L \geq 20	0.6		0.8	
			0.5	0.6				



a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	1.5	L = 25 to 35.5	L < 25 and L \geq 40	L = 25 to 31.5
1.5			2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	100/120	1k	10k	100k
6.8 ~ 3300	0.5	0.8	0.85	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

	
General Precautions and Guidelines Page 293	Packaging Information Liquid Radial Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

FK SERIES ■ HIGH VOLTAGE, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 6000 hours up to 8000 hours
- High voltage up to 500V
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C				-25 ~ +105°C			
Rated Voltage Range	V _R	160 ~ 450V DC				500V DC			
Surge Voltage	V _S	(V _R ≤ 315V): V _S = 1.15·V _R				(V _R > 315V): V _S = 1.10·V _R			
Capacitance Range	C _R	1 ~ 330μF				4.7 ~ 120μF			
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)							
Leakage Current (20°C - V _R applied)	I _{LEAK}	C _R ·V _R ≤ 1000				≤ 0.1·C _R ·V _R + 40μA (After 1 minute)			
		C _R ·V _R > 1000				≤ 0.04·C _R ·V _R + 100μA (After 1 minute)			
		[I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]							
Dissipation Factor % (20°C - 120Hz)	tanδ	V _R (V DC)	160	200	250	350	400	450	500
		tanδ (%)	15	15	15	20	20	20	24
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	160	200	250	350	400	450	500
		Z-25°C/Z+20°C	3	3	3	5	5	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	-	-

Lifetime Test			
Endurance 105°C (V _R & I _R applied)	Test	6 000 hours	∅ D 6.3 ~ 8 mm
		6 000 hours	∅ D 10 x L 9 mm
		8 000 hours	∅ D 10 x L 12.5 mm
		8 000 hours	∅ D > 10 mm
	ΔC/C _R	≤ ±20% of initial measured value	
	tanδ	≤ 200% of initial specified value	
I _{Leak}	≤ the initial specified value		
Shelf Life 105°C (V _R = 0)	Test	1 000 hours	
		ΔC/C _R	≤ ±20% of initial measured value
	tanδ	≤ 200% of initial specified value	
	I _{Leak}	≤ the initial specified value	
	Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4		

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
160	1	6.3	11	20.4	51	FK010M160E110A <input type="checkbox"/>
	1	6.3	9	18.4	46	FK010M160E090A <input type="checkbox"/>
	1.5	6.3	11	22.4	56	FK1R5M160E110A <input type="checkbox"/>
	1.5	6.3	9	20.4	51	FK1R5M160E090A <input type="checkbox"/>
	2.2	6.3	11	28.4	71	FK2R2M160E110A <input type="checkbox"/>
	2.2	6.3	9	26	65	FK2R2M160E090A <input type="checkbox"/>
	3.3	6.3	11	32.4	81	FK3R3M160E110A <input type="checkbox"/>
	3.3	6.3	9	29.2	73	FK3R3M160E090A <input type="checkbox"/>
	4.7	6.3	11	36.4	91	FK4R7M160E110A <input type="checkbox"/>
	4.7	6.3	9	34.4	86	FK4R7M160E090A <input type="checkbox"/>
	5.6	6.3	11	38.4	96	FK5R6M160E110A <input type="checkbox"/>
	5.6	6.3	9	36.4	91	FK5R6M160E090A <input type="checkbox"/>
	5.6	8	11.5	44	110	FK5R6M160F115A <input type="checkbox"/>
	6.8	6.3	11	44	110	FK6R8M160E110A <input type="checkbox"/>
	6.8	8	11.5	52	130	FK6R8M160F115A <input type="checkbox"/>
	6.8	8	9	44	110	FK6R8M160F090A <input type="checkbox"/>
	8.2	8	11.5	60	150	FK8R2M160F115A <input type="checkbox"/>
	8.2	8	9	56	140	FK8R2M160F090A <input type="checkbox"/>
	10	8	11.5	96	240	FK100M160F115A <input type="checkbox"/>
	10	8	16	110	275	FK100M160F160A <input type="checkbox"/>
	10	8	9	88	220	FK100M160F090A <input type="checkbox"/>
	10	10	12.5	120	300	FK100M160G125A <input type="checkbox"/>
	15	8	16	110	275	FK150M160F160A <input type="checkbox"/>
	15	10	9	100	250	FK150M160G090A <input type="checkbox"/>
	22	8	20	180	450	FK220M160F200A <input type="checkbox"/>
	22	10	12.5	160	400	FK220M160G125A <input type="checkbox"/>
	22	10	16	180	450	FK220M160G160A <input type="checkbox"/>
	33	10	16	230	575	FK330M160G160A <input type="checkbox"/>
	33	10	20	250	625	FK330M160G200A <input type="checkbox"/>
	47	10	16	300	750	FK470M160G160A <input type="checkbox"/>
	47	10	20	300	750	FK470M160G200A <input type="checkbox"/>
	68	13	20	470	1175	FK680M160I200A <input type="checkbox"/>
	82	13	20	520	1300	FK820M160I200A <input type="checkbox"/>
100	13	25	620	1395	FK101M160I250A <input type="checkbox"/>	
100	16	20	630	1418	FK101M160J200A <input type="checkbox"/>	
150	16	25	840	1890	FK151M160J250A <input type="checkbox"/>	
220	18	25	1090	2453	FK221M160K250A <input type="checkbox"/>	
270	16	31.5	1260	2835	FK271M160J315A <input type="checkbox"/>	
330	18	31.5	1400	3150	FK331M160K315A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
200	1	6.3	11	22.8	57	FK010M200E110A <input type="checkbox"/>
	1	6.3	9	21.2	53	FK010M200E090A <input type="checkbox"/>
	1.5	6.3	11	24.4	61	FK1R5M200E110A <input type="checkbox"/>
	1.5	6.3	9	22.8	57	FK1R5M200E090A <input type="checkbox"/>
	2.2	6.3	11	30	75	FK2R2M200E110A <input type="checkbox"/>
	2.2	6.3	9	27.6	69	FK2R2M200E090A <input type="checkbox"/>
	3.3	6.3	11	38.8	97	FK3R3M200E110A <input type="checkbox"/>
	3.3	6.3	9	34.8	87	FK3R3M200E090A <input type="checkbox"/>
	4.7	6.3	11	52	130	FK4R7M200E110A <input type="checkbox"/>
	4.7	8	9	52	130	FK4R7M200F090A <input type="checkbox"/>
	5.6	6.3	11	56	140	FK5R6M200E110A <input type="checkbox"/>
	5.6	8	11.5	64	160	FK5R6M200F115A <input type="checkbox"/>
	5.6	8	9	56	140	FK5R6M200F090A <input type="checkbox"/>
	6.8	8	11.5	76	190	FK6R8M200F115A <input type="checkbox"/>
	6.8	8	9	64	160	FK6R8M200F090A <input type="checkbox"/>
	8.2	8	11.5	84	210	FK8R2M200F115A <input type="checkbox"/>
	10	8	11.5	110	275	FK100M200F115A <input type="checkbox"/>
	10	8	16	120	300	FK100M200F160A <input type="checkbox"/>
	10	10	12.5	130	325	FK100M200G125A <input type="checkbox"/>
	10	10	9	110	275	FK100M200G090A <input type="checkbox"/>
	22	8	20	220	550	FK220M200F200A <input type="checkbox"/>
	22	10	16	220	550	FK220M200G160A <input type="checkbox"/>
	22	10	20	250	625	FK220M200G200A <input type="checkbox"/>
	33	10	16	260	650	FK330M200G160A <input type="checkbox"/>
33	10	20	280	700	FK330M200G200A <input type="checkbox"/>	
47	13	16	360	900	FK470M200I160A <input type="checkbox"/>	
47	13	20	390	975	FK470M200I200A <input type="checkbox"/>	
68	13	20	470	1175	FK680M200I200A <input type="checkbox"/>	
68	13	25	520	1300	FK680M200I250A <input type="checkbox"/>	
100	13	25	630	1418	FK101M200I250A <input type="checkbox"/>	
100	16	25	680	1530	FK101M200J250A <input type="checkbox"/>	
150	18	25	900	2025	FK151M200K250A <input type="checkbox"/>	
220	16	31.5	1090	2453	FK221M200J315A <input type="checkbox"/>	
250	1	6.3	11	23.6	59	FK010M250E110A <input type="checkbox"/>
	1	6.3	9	21.2	53	FK010M250E090A <input type="checkbox"/>
	1.5	6.3	11	24.4	61	FK1R5M250E110A <input type="checkbox"/>
	1.5	6.3	9	22.8	57	FK1R5M250E090A <input type="checkbox"/>
	2.2	6.3	11	30.4	76	FK2R2M250E110A <input type="checkbox"/>
	2.2	6.3	9	27.6	69	FK2R2M250E090A <input type="checkbox"/>
	2.2	8	11.5	38	95	FK2R2M250F115A <input type="checkbox"/>
	3.3	6.3	11	40	100	FK3R3M250E110A <input type="checkbox"/>
	3.3	6.3	9	34.8	87	FK3R3M250E090A <input type="checkbox"/>

: Enter blank for Standard version

: Enter X for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
250	3.3	8	11.5	56	140	FK3R3M250F115A □
	4.7	8	11.5	64	160	FK4R7M250F115A □
	4.7	8	16	72	180	FK4R7M250F160A □
	4.7	8	9	52	130	FK4R7M250F090A □
	4.7	10	12.5	76	190	FK4R7M250G125A □
	5.6	8	11.5	72	180	FK5R6M250F115A □
	5.6	8	9	64	160	FK5R6M250F090A □
	6.8	8	11.5	80	200	FK6R8M250F115A □
	6.8	8	16	92	230	FK6R8M250F160A □
	6.8	10	12.5	100	250	FK6R8M250G125A □
	8.2	8	16	88	220	FK8R2M250F160A □
	8.2	10	9	80	200	FK8R2M250G090A □
	10	8	16	120	300	FK100M250F160A □
	10	10	12.5	120	300	FK100M250G125A □
	15	10	16	130	325	FK150M250G160A □
	22	10	16	180	450	FK220M250G160A □
	22	10	20	200	500	FK220M250G200A □
	33	10	20	270	675	FK330M250G200A □
	33	13	16	270	675	FK330M250I160A □
	33	13	20	320	800	FK330M250I200A □
	47	13	20	400	1000	FK470M250I200A □
	47	13	25	430	1075	FK470M250I250A □
	56	13	25	500	1250	FK560M250I250A □
68	16	25	560	1400	FK680M250J250A □	
100	16	25	680	1530	FK101M250J250A □	
150	16	31.5	900	2025	FK151M250J315A □	
220	18	31.5	1130	2543	FK221M250K315A □	
350	1	6.3	11	26.4	66	FK010M350E110A □
	1	6.3	9	21.2	53	FK010M350E090A □
	1	8	11.5	30.8	77	FK010M350F115A □
	1.5	6.3	11	30	75	FK1R5M350E110A □
	1.5	6.3	9	26.4	66	FK1R5M350E090A □
	2.2	6.3	11	38	95	FK2R2M350E110A □
	2.2	8	11.5	48	120	FK2R2M350F115A □
	2.2	8	9	35.2	88	FK2R2M350F090A □
	3.3	8	11.5	56	140	FK3R3M350F115A □
	3.3	8	9	48	120	FK3R3M350F090A □
	3.3	10	12.5	64	160	FK3R3M350G125A □
	4.7	8	16	72	180	FK4R7M350F160A □
	4.7	10	12.5	76	190	FK4R7M350G125A □
	4.7	10	9	64	160	FK4R7M350G090A □
	5.6	8	16	84	210	FK5R6M350F160A □

□: Enter blank for Standard version

□: Enter X for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
350	5.6	10	12.5	88	220	FK5R6M350G125A <input type="checkbox"/>
	6.8	8	20	110	275	FK6R8M350F200A <input type="checkbox"/>
	6.8	10	16	110	275	FK6R8M350G160A <input type="checkbox"/>
	8.2	8	20	130	325	FK8R2M350F200A <input type="checkbox"/>
	10	8	20	130	325	FK100M350F200A <input type="checkbox"/>
	10	10	16	130	325	FK100M350G160A <input type="checkbox"/>
	15	10	20	150	375	FK150M350G200A <input type="checkbox"/>
	22	13	20	260	650	FK220M350I200A <input type="checkbox"/>
	33	13	25	380	950	FK330M350I250A <input type="checkbox"/>
	47	16	20	430	1075	FK470M350J200A <input type="checkbox"/>
	47	16	25	460	1150	FK470M350J250A <input type="checkbox"/>
	68	18	20	560	1400	FK680M350K200A <input type="checkbox"/>
	68	18	25	600	1500	FK680M350K250A <input type="checkbox"/>
	82	18	25	610	1525	FK820M350K250A <input type="checkbox"/>
	100	16	31.5	720	1620	FK101M350J315A <input type="checkbox"/>
150	18	35.5	960	2160	FK151M350K355A <input type="checkbox"/>	
400	1	6.3	11	30.4	76	FK010M400E110A <input type="checkbox"/>
	1	6.3	9	25.2	63	FK010M400E090A <input type="checkbox"/>
	1.5	6.3	9	30.4	76	FK1R5M400E090A <input type="checkbox"/>
	1.5	8	11.5	36.4	91	FK1R5M400F115A <input type="checkbox"/>
	2.2	6.3	11	44	110	FK2R2M400E110A <input type="checkbox"/>
	2.2	8	11.5	48	120	FK2R2M400F115A <input type="checkbox"/>
	2.2	8	9	40	100	FK2R2M400F090A <input type="checkbox"/>
	3.3	8	11.5	60	150	FK3R3M400F115A <input type="checkbox"/>
	3.3	8	9	52	130	FK3R3M400F090A <input type="checkbox"/>
	4.7	8	11.5	80	200	FK4R7M400F115A <input type="checkbox"/>
	4.7	8	16	88	220	FK4R7M400F160A <input type="checkbox"/>
	4.7	10	12.5	92	230	FK4R7M400G125A <input type="checkbox"/>
	4.7	10	9	72	180	FK4R7M400G090A <input type="checkbox"/>
	5.6	8	16	88	220	FK5R6M400F160A <input type="checkbox"/>
	5.6	10	12.5	100	250	FK5R6M400G125A <input type="checkbox"/>
	6.8	8	16	110	275	FK6R8M400F160A <input type="checkbox"/>
	6.8	10	12.5	110	275	FK6R8M400G125A <input type="checkbox"/>
	8.2	8	16	110	275	FK8R2M400F160A <input type="checkbox"/>
	8.2	10	12.5	120	300	FK8R2M400G125A <input type="checkbox"/>
	8.2	10	16	130	325	FK8R2M400G160A <input type="checkbox"/>
	10	8	20	140	350	FK100M400F200A <input type="checkbox"/>
	10	10	16	140	350	FK100M400G160A <input type="checkbox"/>
	10	10	20	160	400	FK100M400G200A <input type="checkbox"/>
15	10	20	190	475	FK150M400G200A <input type="checkbox"/>	
15	13	16	200	500	FK150M400I160A <input type="checkbox"/>	
22	13	20	260	650	FK220M400I200A <input type="checkbox"/>	

: Enter blank for Standard version

: Enter X for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
400	33	13	25	360	900	FK330M400I250A ☐
	33	16	20	360	900	FK330M400J200A ☐
	47	16	25	470	1175	FK470M400J250A ☐
	56	18	25	560	1400	FK560M400K250A ☐
	68	18	25	590	1475	FK680M400K250A ☐
	82	16	31.5	630	1575	FK820M400J315A ☐
	100	18	31.5	770	1733	FK101M400K315A ☐
	120	18	31.5	830	1868	FK121M400K315A ☐
450	150	18	35.5	930	2093	FK151M400K355A ☐
	1	6.3	11	30.4	76	FK010M450E110A ☐
	1	6.3	9	25.2	63	FK010M450E090A ☐
	1.5	8	11.5	36.4	91	FK1R5M450F115A ☐
	2.2	8	11.5	48	120	FK2R2M450F115A ☐
	2.2	8	16	56	140	FK2R2M450F160A ☐
	2.2	8	9	40	100	FK2R2M450F090A ☐
	2.2	10	12.5	60	150	FK2R2M450G125A ☐
	3.3	8	11.5	64	160	FK3R3M450F115A ☐
	3.3	10	12.5	80	200	FK3R3M450G125A ☐
	3.3	10	9	68	170	FK3R3M450G090A ☐
	4.7	8	16	100	250	FK4R7M450F160A ☐
	4.7	10	12.5	100	250	FK4R7M450G125A ☐
	4.7	10	16	110	275	FK4R7M450G160A ☐
	5.6	10	16	110	275	FK5R6M450G160A ☐
	6.8	8	20	120	300	FK6R8M450F200A ☐
	6.8	10	16	130	325	FK6R8M450G160A ☐
	6.8	10	20	140	350	FK6R8M450G200A ☐
	8.2	10	20	140	350	FK8R2M450G200A ☐
	10	10	20	160	400	FK100M450G200A ☐
	15	13	20	220	550	FK150M450I200A ☐
	22	13	25	290	725	FK220M450I250A ☐
	22	16	20	290	725	FK220M450J200A ☐
	33	13	25	360	900	FK330M450I250A ☐
	33	16	25	390	975	FK330M450J250A ☐
	47	16	25	470	1175	FK470M450J250A ☐
	47	18	25	500	1250	FK470M450K250A ☐
	68	16	31.5	630	1575	FK680M450J315A ☐
	68	18	25	590	1475	FK680M450K250A ☐
	82	18	31.5	680	1700	FK820M450K315A ☐
100	18	35.5	800	1800	FK101M450K355A ☐	

☐: Enter **blank** for Standard version

☐: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

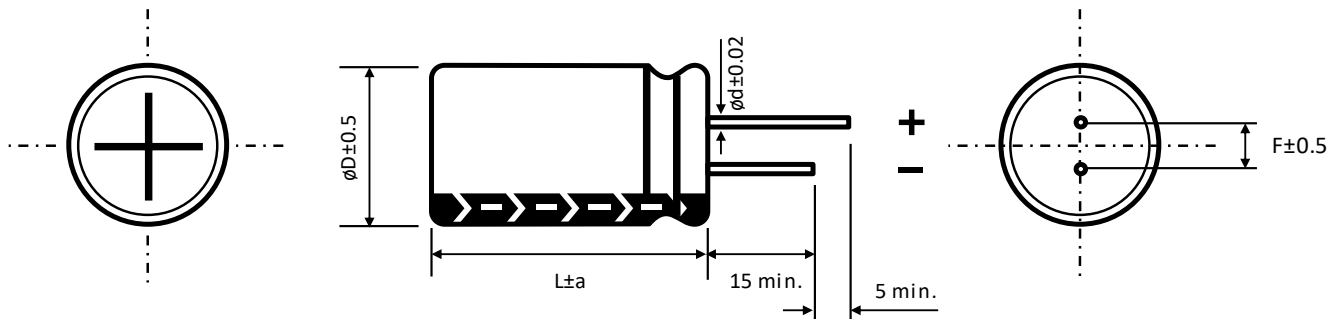
V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +105°C • 120Hz (mA rms)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
500	4.7	10	20	88	220	FK4R7M500G200A □
	5.6	10	20	92	230	FK5R6M500G200A □
	6.8	10	20	130	325	FK6R8M500G200A □
	8.2	10	20	130	325	FK8R2M500G200A □
	10	13	20	140	350	FK100M500I200A □
	15	13	25	180	450	FK150M500I250A □
	22	16	25	230	575	FK220M500J250A □
	33	18	25	390	975	FK330M500K250A □
	47	16	31.5	500	1250	FK470M500J315A □
	56	18	31.5	570	1425	FK560M500K315A □
	68	18	35.5	630	1575	FK680M500K355A □
	82	18	40	680	1700	FK820M500K400A □
	100	18	45	800	1800	FK101M500K450A □
120	22	45	840	1890	FK121M500M450A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS • All dimensions in mm



ϕD	6.3	8	10	13	16	18	22
F	2.5	3.5	5	5	7.5	7.5	10
ϕd	0.5	L < 20	L ≥ 20	0.6		0.8	
		0.5	0.6				

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$		$\phi D > 18$
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5	2
		1.5	2	1.5	2	

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 82	1	1.75	2.25	2.5
≥ 100	1	1.67	2.05	2.25

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

ZH SERIES ■ LOW IMPEDANCE, MINIATURIZED 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 6000 hours up to 10000 hours
- Low impedance and high ripple current
- Wide capacitance range
- Low voltage version



SPECIFICATIONS

Items		Performance Characteristics										
Operating Temperature Range		-40 ~ +105°C										
Rated Voltage Range	V_R	6.3 ~ 100V DC										
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$										
Capacitance Range	C_R	8.2 ~ 8200μF										
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)										
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3μA, whichever is greater ■ After 2 minutes [I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]										
Dissipation Factor % (20°C ■ 120Hz)	tanδ	V_R (V DC)	6.3	10	16	25	35	50	63	80	100	
		tanδ (%)	22	19	16	14	12	10	9	8	8	
		For $C_R > 1000\mu F$, add 2% per every multiple 1000μF of rated capacitance value										
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	6.3	10	16	25	35	50	63	80	100	
		Z-25°C/Z+20°C	2	2	2	2	2	2	2	2	2	
		Z-40°C/Z+20°C	3	3	3	3	3	3	3	3	3	
		For capacitance > 1000μF										
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value									
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value											
Lifetime Test												
Endurance 105°C (V_R & I_R applied)	Test	6 000 hours					$\phi D \leq 6.3$ mm					
		8 000 hours					$\phi D = 8$ mm					
		10 000 hours					$\phi D \geq 10$ mm					
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value										
	tanδ	$\leq 200\%$ of initial specified value										
I_{Leak}	\leq the initial specified value											
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours										
		$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value									
		tanδ	$\leq 200\%$ of initial specified value									
	I_{Leak}	\leq the initial specified value										
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4										

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
6.3	220	5	11	230	355	ZH221M6R3C110A
	470	6.3	11	100	550	ZH471M6R3E110A
	820	8	11.5	60	955	ZH821M6R3F115A
	1200	8	16	50	1260	ZH122M6R3F160A
	1200	10	12.5	44	1340	ZH122M6R3G125A
	1500	8	20	34	1510	ZH152M6R3F200A
	1800	10	16	33	1770	ZH182M6R3G160A
	2200	10	20	25	1970	ZH222M6R3G200A
	2700	10	25	23	2260	ZH272M6R3G250A
	3900	13	20	22	2490	ZH392M6R3I200A
	4700	13	25	20	2910	ZH472M6R3I250A
	5600	13	30	18	3460	ZH562M6R3I300A
	6800	13	35	17	3580	ZH682M6R3I350A
	6800	16	20	20	3260	ZH682M6R3J200A
8200	16	25	18	3640	ZH822M6R3J250A	
10	150	5	11	230	355	ZH151M010C110A
	330	6.3	11	100	550	ZH331M010E110A
	680	8	11.5	60	955	ZH681M010F115A
	1000	8	16	50	1260	ZH102M010F160A
	1000	10	12.5	49	1340	ZH102M010G125A
	1500	8	20	34	1510	ZH152M010F200A
	1500	10	16	33	1770	ZH152M010G160A
	1800	10	20	25	1970	ZH182M010G200A
	2200	10	25	23	2260	ZH222M010G250A
	2700	13	20	22	2440	ZH272M010I200A
	3300	13	20	21	2490	ZH332M010I200A
	3900	13	25	20	2910	ZH392M010I250A
	4700	13	30	18	3460	ZH472M010I300A
	4700	16	20	20	3260	ZH472M010J200A
5600	13	35	17	3580	ZH562M010I350A	
6800	16	25	18	3640	ZH682M010J250A	
16	100	5	11	230	355	ZH101M016C110A
	220	6.3	11	100	550	ZH221M016E110A
	470	8	11.5	60	955	ZH471M016F115A
	680	8	16	50	1260	ZH681M016F160A
	680	10	12.5	44	1340	ZH681M016G125A
	1000	8	20	34	1510	ZH102M016F200A
	1000	10	16	33	1770	ZH102M016G160A
	1500	10	20	25	1970	ZH152M016G200A
	1800	10	25	23	2260	ZH182M016G250A
	2200	13	20	22	2490	ZH222M016I200A
	2700	13	25	20	2910	ZH272M016I250A
	3300	13	30	18	3460	ZH332M016I300A
	3300	16	20	23	3260	ZH332M016J200A

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
16	3900	13	35	17	3580	ZH392M016I350A
	4700	16	25	18	3640	ZH472M016J250A
25	68	5	11	240	355	ZH680M025C110A
	150	6.3	11	100	550	ZH151M025E110A
	330	8	11.5	60	955	ZH331M025F115A
	390	8	16	50	1260	ZH391M025F160A
	470	10	12.5	44	1340	ZH471M025G125A
	560	8	20	34	1510	ZH561M025F200A
	680	10	16	33	1770	ZH681M025G160A
	820	10	20	25	1970	ZH821M025G200A
	1000	10	20	24	2045	ZH102M025G200A
	1000	10	25	23	2260	ZH102M025G250A
	1500	13	20	22	2490	ZH152M025I200A
	1800	13	25	20	2910	ZH182M025I250A
	2200	13	30	18	3460	ZH222M025I300A
	2200	16	20	20	3260	ZH222M025J200A
	2700	13	35	17	3580	ZH272M025I350A
3300	16	25	18	3640	ZH332M025J250A	
35	47	5	11	500	355	ZH470M035C110A
	100	6.3	11	110	550	ZH101M035E110A
	220	8	11.5	62	955	ZH221M035F115A
	270	8	16	60	1260	ZH271M035F160A
	330	10	12.5	43	1340	ZH331M035G125A
	390	8	20	32	1510	ZH391M035F200A
	470	10	16	33	1770	ZH471M035G160A
	560	10	20	30	1970	ZH561M035G200A
	680	10	25	28	2260	ZH681M035G250A
	820	10	25	27	2360	ZH821M035G250A
	1000	10	30	25	2580	ZH102M035G300A
	1000	13	20	22	2490	ZH102M035I200A
	1200	13	25	18	2910	ZH122M035I250A
	1500	13	30	18	3460	ZH152M035I300A
	1500	16	20	23	3260	ZH152M035J200A
1800	13	35	17	3580	ZH182M035I350A	
2200	16	25	18	3640	ZH222M035J250A	
50	27	5	11	400	248	ZH270M050C110A
	56	6.3	11	150	395	ZH560M050E110A
	100	8	11.5	110	755	ZH101M050F115A
	120	8	16	65	960	ZH121M050F160A
	150	10	12.5	67	989	ZH151M050G125A
	180	8	20	51	1200	ZH181M050F200A
	220	10	16	46	1380	ZH221M050G160A
	270	10	20	33	1590	ZH271M050G200A
330	10	20	33	1600	ZH331M050G200A	

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	Z - Max. Impedance +20°C - 100kHz (mΩ)	I _R - Max. Ripple Current +105°C - 100kHz (mA rms)	CapXon Part Number
50	330	10	25	32	1880	ZH331M050G250A
	470	13	20	32	2060	ZH471M050I200A
	560	13	25	28	2420	ZH561M050I250A
	680	13	30	26	2870	ZH681M050I300A
	820	13	35	24	2970	ZH821M050I350A
	820	16	20	28	2740	ZH821M050J200A
	1000	16	25	26	3020	ZH102M050J250A
63	18	5	11	980	183	ZH180M063C110A
	47	6.3	11	600	288	ZH470M063E110A
	82	8	11.5	300	535	ZH820M063F115A
	100	8	16	200	698	ZH101M063F160A
	120	10	12.5	165	735	ZH121M063G125A
	150	8	20	140	871	ZH151M063F200A
	180	10	16	130	1008	ZH181M063G160A
	220	10	20	120	1110	ZH221M063G200A
	270	10	20	86	1210	ZH271M063G200A
	270	13	16	90	1210	ZH271M063I160A
	270	13	20	88	1330	ZH271M063I200A
	330	10	25	76	1420	ZH331M063G250A
	330	13	25	73	1610	ZH331M063I250A
	390	13	20	66	1580	ZH391M063I200A
	470	13	25	48	2000	ZH471M063I250A
	470	13	30	46	2170	ZH471M063I300A
	470	16	20	47	2090	ZH471M063J200A
	560	13	30	40	2420	ZH561M063I300A
	560	16	20	48	2110	ZH561M063J200A
	680	13	35	38	2630	ZH681M063I350A
	820	13	40	32	2950	ZH821M063I400A
	820	16	25	37	2740	ZH821M063J250A
	820	18	20	43	2510	ZH821M063K200A
	1200	16	31.5	29	3000	ZH122M063J315A
	1200	18	25	36	2810	ZH122M063K250A
	1500	16	35.5	26	3050	ZH152M063J355A
	1500	18	31.5	30	3310	ZH152M063K315A
1800	16	40	24	3580	ZH182M063J400A	
1800	18	35.5	25	3580	ZH182M063K355A	
2200	18	40	23	3680	ZH222M063K400A	
80	12	5	11	1540	173	ZH120M080C110A
	33	6.3	11	630	277	ZH330M080E110A
	56	8	11.5	400	472	ZH560M080F115A
	68	8	16	280	595	ZH680M080F160A
	82	10	12.5	250	634	ZH820M080G125A
	100	8	20	210	745	ZH101M080F200A

See "PACKAGING INFORMATION" to taped or formed products.

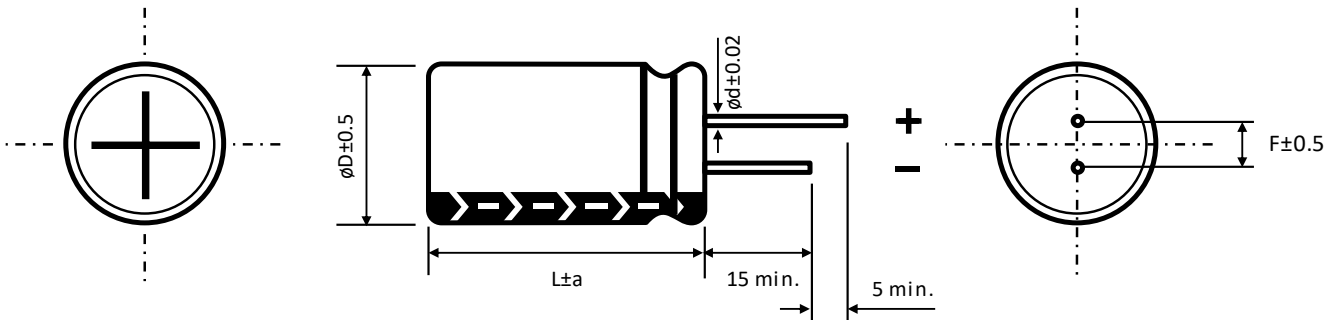
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C • 100kHz (m Ω)	I_R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
80	120	10	16	187	790	ZH121M080G160A
	180	10	20	130	1050	ZH181M080G200A
	180	13	16	140	985	ZH181M080I160A
	220	10	25	120	1180	ZH221M080G250A
	270	13	20	94	1440	ZH271M080I200A
	330	13	25	66	1630	ZH331M080I250A
	390	13	30	56	1960	ZH391M080I300A
	390	16	20	64	1760	ZH391M080J200A
	470	13	35	47	2150	ZH471M080I350A
	560	13	40	45	2350	ZH561M080I400A
	560	16	25	49	2220	ZH561M080J250A
	560	18	20	59	1960	ZH561M080K200A
	680	16	31.5	38	2410	ZH681M080J315A
	820	16	35.5	32	2610	ZH821M080J355A
	820	18	25	42	2280	ZH821M080K250A
	1000	16	40	33	2870	ZH102M080J400A
	1000	18	31.5	36	2480	ZH102M080K315A
	1200	18	35.5	33	2870	ZH122M080K355A
1500	18	40	32	3520	ZH152M080K400A	
100	8.2	5	11	1540	173	ZH8R2M100C110A
	18	6.3	11	627	277	ZH180M100E110A
	33	8	11.5	420	472	ZH330M100F115A
	47	8	16	400	595	ZH470M100F160A
	56	10	12.5	350	634	ZH560M100G125A
	68	8	20	300	745	ZH680M100F200A
	82	10	16	220	790	ZH820M100G160A
	100	10	20	150	1050	ZH101M100G200A
	100	13	16	160	985	ZH101M100I160A
	120	10	25	140	1180	ZH121M100G250A
	150	13	20	94	1440	ZH151M100I200A
	220	13	25	66	1660	ZH221M100I250A
	270	13	30	56	1960	ZH271M100I300A
	270	16	20	64	1760	ZH271M100J200A
	330	13	35	47	2150	ZH331M100I350A
	390	13	40	40	2350	ZH391M100I400A
	390	16	25	49	2220	ZH391M100J250A
	390	18	20	59	1960	ZH391M100K200A
	470	16	31.5	36	2410	ZH471M100J315A
	470	18	25	42	2280	ZH471M100K250A
	560	16	35.5	32	2610	ZH561M100J355A
	560	18	31.5	34	2480	ZH561M100K315A
	680	16	40	30	2870	ZH681M100J400A
	680	18	35.5	30	2870	ZH681M100K355A
820	18	40	29	3520	ZH821M100K400A	

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm



ϕD	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ϕd	0.5		L < 20	L \geq 20	0.6		0.8	
			0.5	0.6				



a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	1.5	L = 25 to 35.5	L < 25 and L \geq 40	L = 25 to 31.5
1.5			2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	100/120	1k	10k	50k - 100k
8.2 ~ 33	0.42	0.7	0.9	1
47 ~ 270	0.5	0.73	0.92	1
330 ~ 680	0.55	0.77	0.94	1
820 ~ 1800	0.6	0.8	0.96	1
2200 ~ 8200	0.7	0.85	0.98	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

	
General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272



DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

FL SERIES ■ LONG LIFE, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 8000 hours up to 12000 hours
- High voltage up to 500V
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +105°C					-25 ~ +105°C				
Rated Voltage Range	V_R	160 ~ 450V DC					500V DC				
Surge Voltage	V_S	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$					$(V_R > 315V): V_S = 1.10 \cdot V_R$				
Capacitance Range	C_R	1 ~ 680 μ F					10 ~ 68 μ F				
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)									
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$C_R \cdot V_R \leq 1000$					$\leq 0.1 \cdot C_R \cdot V_R + 40\mu A$ (After 1 minute)				
		$C_R \cdot V_R > 1000$					$\leq 0.04 \cdot C_R \cdot V_R + 100\mu A$ (After 1 minute)				
		[I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]									
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	160	200	220	250	350	400	420	450	500
		$\tan \delta$ (%)	15	15	15	15	20	20	20	20	24
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	160	200	220	250	350	400	420	450	500
		Z-25°C/Z+20°C	3	3	3	3	5	5	6	6	6
		Z-40°C/Z+20°C	6	6	6	6	6	6	-	-	-

Lifetime Test			
Endurance 105°C (V_R & I_R applied)	Test	8 000 hours	$\phi D = 6.3 \sim 8$ mm
		10 000 hours	$\phi D = 10$ mm
		12 000 hours	$\phi D \geq 13$ mm ■ $\leq 450V$
		10 000 hours	$\phi D \geq 13$ mm ■ 500V
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value	
	$\tan \delta$	$\leq 200\%$ of initial specified value	
I_{Leak}	\leq the initial specified value		
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
		$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value
		$\tan \delta$	$\leq 200\%$ of initial specified value
		I_{Leak}	\leq the initial specified value
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
160	1	6.3	11	18.4	46	FL010M160E110A <input type="checkbox"/>
	1.5	6.3	11	20.4	51	FL1R5M160E110A <input type="checkbox"/>
	2.2	6.3	11	24.8	62	FL2R2M160E110A <input type="checkbox"/>
	3.3	6.3	11	37.2	93	FL3R3M160E110A <input type="checkbox"/>
	4.7	8	11.5	38	95	FL4R7M160F115A <input type="checkbox"/>
	5.6	8	11.5	40	100	FL5R6M160F115A <input type="checkbox"/>
	6.8	8	11.5	50	125	FL6R8M160F115A <input type="checkbox"/>
	6.8	8	16	59.2	148	FL6R8M160F160A <input type="checkbox"/>
	10	8	11.5	72	180	FL100M160F115A <input type="checkbox"/>
	15	8	16	100	250	FL150M160F160A <input type="checkbox"/>
	15	10	12.5	100	250	FL150M160G125A <input type="checkbox"/>
	22	10	16	140	350	FL220M160G160A <input type="checkbox"/>
	22	10	20	150	375	FL220M160G200A <input type="checkbox"/>
	33	10	16	190	475	FL330M160G160A <input type="checkbox"/>
	33	10	20	210	525	FL330M160G200A <input type="checkbox"/>
	39	10	16	240	600	FL390M160G160A <input type="checkbox"/>
	47	10	20	300	750	FL470M160G200A <input type="checkbox"/>
	56	10	20	310	775	FL560M160G200A <input type="checkbox"/>
	68	13	20	480	1200	FL680M160I200A <input type="checkbox"/>
	68	13	25	520	1300	FL680M160I250A <input type="checkbox"/>
	82	10	25	440	1100	FL820M160G250A <input type="checkbox"/>
	82	13	20	510	1275	FL820M160I200A <input type="checkbox"/>
	100	13	20	590	1328	FL101M160I200A <input type="checkbox"/>
	100	13	25	630	1418	FL101M160I250A <input type="checkbox"/>
	100	16	20	630	1418	FL101M160J200A <input type="checkbox"/>
	150	13	25	730	1643	FL151M160I250A <input type="checkbox"/>
	150	16	20	770	1733	FL151M160J200A <input type="checkbox"/>
	150	16	25	820	1845	FL151M160J250A <input type="checkbox"/>
	180	16	20	870	1958	FL181M160J200A <input type="checkbox"/>
	220	16	25	1020	2295	FL221M160J250A <input type="checkbox"/>
	220	18	20	1000	2250	FL221M160K200A <input type="checkbox"/>
	220	18	25	1040	2340	FL221M160K250A <input type="checkbox"/>
	330	16	31.5	1350	3038	FL331M160J315A <input type="checkbox"/>
330	18	31.5	1380	3105	FL331M160K315A <input type="checkbox"/>	
390	16	35.5	1510	3398	FL391M160J355A <input type="checkbox"/>	
470	16	40	1710	3848	FL471M160J400A <input type="checkbox"/>	
470	18	35.5	1720	3870	FL471M160K355A <input type="checkbox"/>	
560	18	40	1910	4298	FL561M160K400A <input type="checkbox"/>	
680	18	45	2130	4793	FL681M160K450A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
200	1	6.3	11	26	65	FL010M200E110A <input type="checkbox"/>
	1.5	6.3	11	28	70	FL1R5M200E110A <input type="checkbox"/>
	2.2	6.3	11	34	85	FL2R2M200E110A <input type="checkbox"/>
	3.3	6.3	11	46	115	FL3R3M200E110A <input type="checkbox"/>
	4.7	8	11.5	64	160	FL4R7M200F115A <input type="checkbox"/>
	5.6	8	11.5	66.4	166	FL5R6M200F115A <input type="checkbox"/>
	6.8	8	11.5	70	175	FL6R8M200F115A <input type="checkbox"/>
	6.8	10	12.5	76	190	FL6R8M200G125A <input type="checkbox"/>
	10	8	16	92	230	FL100M200F160A <input type="checkbox"/>
	10	10	16	100	250	FL100M200G160A <input type="checkbox"/>
	12	10	12.5	100	250	FL120M200G125A <input type="checkbox"/>
	15	8	20	140	350	FL150M200F200A <input type="checkbox"/>
	22	10	16	180	450	FL220M200G160A <input type="checkbox"/>
	22	10	20	200	500	FL220M200G200A <input type="checkbox"/>
	27	10	16	200	500	FL270M200G160A <input type="checkbox"/>
	33	10	20	260	650	FL330M200G200A <input type="checkbox"/>
	33	13	20	300	750	FL330M200I200A <input type="checkbox"/>
	47	10	20	310	775	FL470M200G200A <input type="checkbox"/>
	47	13	20	400	1000	FL470M200I200A <input type="checkbox"/>
	56	10	25	380	950	FL560M200G250A <input type="checkbox"/>
	68	13	20	470	1175	FL680M200I200A <input type="checkbox"/>
	68	13	25	520	1300	FL680M200I250A <input type="checkbox"/>
	68	16	20	520	1300	FL680M200J200A <input type="checkbox"/>
	82	16	20	560	1400	FL820M200J200A <input type="checkbox"/>
	100	13	25	640	1440	FL101M200I250A <input type="checkbox"/>
	100	16	20	670	1508	FL101M200J200A <input type="checkbox"/>
	100	16	25	690	1553	FL101M200J250A <input type="checkbox"/>
	100	18	20	710	1598	FL101M200K200A <input type="checkbox"/>
	120	16	20	720	1620	FL121M200J200A <input type="checkbox"/>
	150	16	20	790	1778	FL151M200J200A <input type="checkbox"/>
	150	16	25	840	1890	FL151M200J250A <input type="checkbox"/>
	150	18	25	890	2003	FL151M200K250A <input type="checkbox"/>
	180	16	25	910	2048	FL181M200J250A <input type="checkbox"/>
	180	18	20	910	2048	FL181M200K200A <input type="checkbox"/>
	220	18	25	1050	2363	FL221M200K250A <input type="checkbox"/>
	220	18	31.5	1160	2610	FL221M200K315A <input type="checkbox"/>
	270	16	35.5	1250	2813	FL271M200J355A <input type="checkbox"/>
	330	16	40	1430	3218	FL331M200J400A <input type="checkbox"/>
	330	18	31.5	1400	3150	FL331M200K315A <input type="checkbox"/>
	330	18	35.5	1440	3240	FL331M200K355A <input type="checkbox"/>
390	18	35.5	1520	3420	FL391M200K355A <input type="checkbox"/>	
470	18	40	1750	3938	FL471M200K400A <input type="checkbox"/>	
470	18	45	1820	4095	FL471M200K450A <input type="checkbox"/>	

: Enter **blank** for Standard version

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
220	27	10	16	200	500	FL270M220G160A
	39	10	20	270	675	FL390M220G200A
	68	13	20	480	1200	FL680M220I200A
	150	16	25	850	1913	FL151M220J250A
	220	16	31.5	1110	2498	FL221M220J315A
	270	18	31.5	1260	2835	FL271M220K315A
	330	16	45	1450	3263	FL331M220J450A
	390	18	45	1620	3645	FL391M220K450A
250	470	18	50	1840	4140	FL471M220K500A
	1	6.3	11	26	65	FL010M250E110A
	1.5	6.3	11	28	70	FL1R5M250E110A
	2.2	6.3	11	34	85	FL2R2M250E110A
	3.3	6.3	11	46	115	FL3R3M250E110A
	3.3	8	11.5	60	150	FL3R3M250F115A
	4.7	8	11.5	68	170	FL4R7M250F115A
	5.6	8	11.5	76	190	FL5R6M250F115A
	6.8	8	16	96	240	FL6R8M250F160A
	6.8	10	12.5	96	240	FL6R8M250G125A
	8.2	8	20	120	300	FL8R2M250F200A
	10	8	16	120	300	FL100M250F160A
	10	10	16	130	325	FL100M250G160A
	15	8	20	150	375	FL150M250F200A
	22	10	16	200	500	FL220M250G160A
	22	10	20	220	550	FL220M250G200A
	22	13	20	250	625	FL220M250I200A
	33	10	20	270	675	FL330M250G200A
	33	13	16	270	675	FL330M250I160A
	33	13	20	320	800	FL330M250I200A
	47	13	20	400	1000	FL470M250I200A
	47	13	25	410	1025	FL470M250I250A
	47	16	20	450	1125	FL470M250J200A
	56	13	20	430	1075	FL560M250I200A
	68	13	25	500	1250	FL680M250I250A
	68	16	20	530	1325	FL680M250J200A
	68	16	25	570	1425	FL680M250J250A
	68	18	20	570	1425	FL680M250K200A
	82	13	25	570	1425	FL820M250I250A
	82	16	20	580	1450	FL820M250J200A
	100	16	25	760	1710	FL101M250J250A
	100	16	31.5	800	1800	FL101M250J315A
100	18	20	720	1620	FL101M250K200A	
100	18	25	780	1755	FL101M250K250A	

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
250	120	16	25	780	1755	FL121M250J250A ☐
	120	18	20	780	1755	FL121M250K200A ☐
	150	18	25	890	2003	FL151M250K250A ☐
	150	18	31.5	980	2205	FL151M250K315A ☐
	180	16	31.5	1020	2295	FL181M250J315A ☐
	180	18	25	980	2205	FL181M250K250A ☐
	220	16	35.5	1130	2543	FL221M250J355A ☐
	220	18	31.5	1130	2543	FL221M250K315A ☐
	270	16	40	1290	2903	FL271M250J400A ☐
	270	18	35.5	1310	2948	FL271M250K355A ☐
330	18	40	1460	3285	FL331M250K400A ☐	
350	1	8	11.5	30	75	FL010M350F115A ☐
	1.5	8	11.5	32	80	FL1R5M350F115A ☐
	2.2	10	12.5	44	110	FL2R2M350G125A ☐
	3.3	10	12.5	60	150	FL3R3M350G125A ☐
	4.7	10	16	80	200	FL4R7M350G160A ☐
	6.8	10	16	100	250	FL6R8M350G160A ☐
	10	10	20	130	325	FL100M350G200A ☐
	15	10	20	160	400	FL150M350G200A ☐
	18	10	20	180	450	FL180M350G200A ☐
	22	10	20	200	500	FL220M350G200A ☐
	22	13	20	260	650	FL220M350I200A ☐
	27	10	25	260	650	FL270M350G250A ☐
	33	13	20	330	825	FL330M350I200A ☐
	33	13	25	360	900	FL330M350I250A ☐
	33	16	20	380	950	FL330M350J200A ☐
	47	13	25	430	1075	FL470M350I250A ☐
	47	16	20	440	1100	FL470M350J200A ☐
	47	18	20	470	1175	FL470M350K200A ☐
	56	16	20	480	1200	FL560M350J200A ☐
	68	16	25	570	1425	FL680M350J250A ☐
	68	16	31.5	620	1550	FL680M350J315A ☐
	68	18	20	570	1425	FL680M350K200A ☐
	68	18	25	620	1550	FL680M350K250A ☐
	82	16	25	620	1550	FL820M350J250A ☐
	82	18	25	640	1600	FL820M350K250A ☐
	100	16	31.5	800	1800	FL101M350J315A ☐
	100	18	25	780	1755	FL101M350K250A ☐
	120	16	35.5	860	1935	FL121M350J355A ☐
	120	18	31.5	870	1958	FL121M350K315A ☐
	150	16	40	1020	2295	FL151M350J400A ☐
150	18	35.5	1020	2295	FL151M350K355A ☐	
180	18	40	1080	2430	FL181M350K400A ☐	

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STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
400	1	8	9	26	65	FL010M400F090A □
	1	8	11.5	30	75	FL010M400F115A □
	1.5	8	9	30.4	76	FL1R5M400F090A □
	1.5	8	11.5	36.4	91	FL1R5M400F115A □
	1.5	8	16	40.4	101	FL1R5M400F160A □
	2.2	8	11.5	40	100	FL2R2M400F115A □
	2.2	8	16	56	140	FL2R2M400F160A □
	3.3	8	11.5	52	130	FL3R3M400F115A □
	3.3	8	16	60	150	FL3R3M400F160A □
	3.3	8	20	61.2	153	FL3R3M400F200A □
	3.3	10	12.5	60.4	151	FL3R3M400G125A □
	3.3	10	16	72.8	182	FL3R3M400G160A □
	3.9	8	16	66	165	FL3R9M400F160A □
	4.7	8	11.5	72	180	FL4R7M400F115A □
	4.7	8	20	92	230	FL4R7M400F200A □
	4.7	10	16	96	240	FL4R7M400G160A □
	5.6	8	20	100	250	FL5R6M400F200A □
	5.6	10	16	100	250	FL5R6M400G160A □
	5.6	10	20	110	275	FL5R6M400G200A □
	6.8	8	20	120	300	FL6R8M400F200A □
	6.8	10	16	120	300	FL6R8M400G160A □
	8.2	10	16	120	300	FL8R2M400G160A □
	8.2	10	20	130	325	FL8R2M400G200A □
	10	10	16	130	325	FL100M400G160A □
	10	10	20	140	350	FL100M400G200A □
	15	10	20	180	450	FL150M400G200A □
	15	13	20	200	500	FL150M400I200A □
	22	13	20	280	700	FL220M400I200A □
	22	13	25	310	775	FL220M400I250A □
	22	16	20	320	800	FL220M400J200A □
	27	13	20	300	750	FL270M400I200A □
	33	13	25	330	825	FL330M400I250A □
	33	16	20	340	850	FL330M400J200A □
	39	13	25	390	975	FL390M400I250A □
	47	16	25	480	1200	FL470M400J250A □
	47	16	31.5	530	1325	FL470M400J315A □
	47	18	20	470	1175	FL470M400K200A □
	47	18	25	510	1275	FL470M400K250A □
	56	16	25	500	1250	FL560M400J250A □
	56	18	20	500	1250	FL560M400K200A □
68	16	25	580	1450	FL680M400J250A □	
68	18	25	630	1575	FL680M400K250A □	
68	18	31.5	700	1750	FL680M400K315A □	

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□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
400	82	16	31.5	660	1650	FL820M400J315A ☐
	82	18	25	650	1625	FL820M400K250A ☐
	82	18	31.5	710	1775	FL820M400K315A ☐
	100	16	35.5	760	1710	FL101M400J355A ☐
	100	18	31.5	770	1733	FL101M400K315A ☐
	120	16	40	870	1958	FL121M400J400A ☐
	120	18	35.5	870	1958	FL121M400K355A ☐
	150	18	40	1020	2295	FL151M400K400A ☐
420	6.8	10	16	120	300	FL6R8M420G160A ☐
	12	10	20	150	375	FL120M420G200A ☐
	15	10	25	190	475	FL150M420G250A ☐
	22	13	20	290	725	FL220M420I200A ☐
	27	13	25	340	850	FL270M420I250A ☐
	33	16	20	390	975	FL330M420J200A ☐
	47	16	25	500	1250	FL470M420J250A ☐
	47	18	20	500	1250	FL470M420K200A ☐
	68	16	31.5	650	1625	FL680M420J315A ☐
	68	18	25	620	1550	FL680M420K250A ☐
	82	16	35.5	730	1825	FL820M420J355A ☐
	82	18	31.5	730	1825	FL820M420K315A ☐
	100	16	40	830	1868	FL101M420J400A ☐
	100	18	35.5	840	1890	FL101M420K355A ☐
	120	18	40	930	2093	FL121M420K400A ☐
	120	18	45	950	2138	FL121M420K450A ☐
	150	18	50	1060	2385	FL151M420K500A ☐
	450	1	8	9	26	65
1		8	11.5	33.2	83	FL010M450F115A ☐
1.5		8	11.5	36.8	92	FL1R5M450F115A ☐
1.5		10	9	37.2	93	FL1R5M450G090A ☐
1.8		8	11.5	38.8	97	FL1R8M450F115A ☐
1.8		10	9	39.2	98	FL1R8M450G090A ☐
2.2		8	16	56.4	141	FL2R2M450F160A ☐
3.3		8	16	61.2	153	FL3R3M450F160A ☐
4.7		10	16	92	230	FL4R7M450G160A ☐
5.6		10	16	100	250	FL5R6M450G160A ☐
6.8		10	16	130	325	FL6R8M450G160A ☐
6.8		10	20	140	350	FL6R8M450G200A ☐
8.2		10	20	140	350	FL8R2M450G200A ☐
10		10	20	140	350	FL100M450G200A ☐
10		10	25	160	400	FL100M450G250A ☐
10	13	16	150	375	FL100M450I160A ☐	

☐: Enter blank for Standard version

☐: Enter X for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

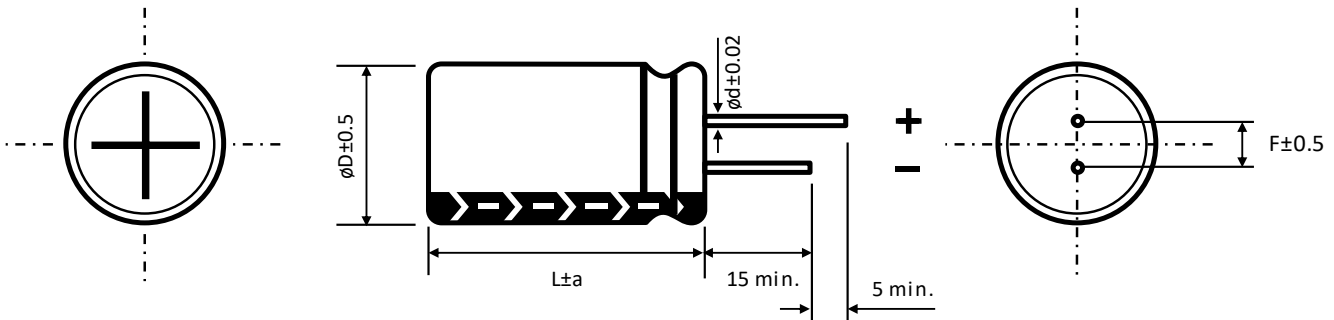
Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 120Hz (mA rms)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
450	15	10	25	190	475	FL150M450G250A □
	15	13	20	200	500	FL150M450I200A □
	18	13	20	260	650	FL180M450I200A □
	22	13	25	290	725	FL220M450I250A □
	22	16	20	300	750	FL220M450J200A □
	22	18	20	320	800	FL220M450K200A □
	27	13	25	340	850	FL270M450I250A □
	33	16	20	390	975	FL330M450J200A □
	33	16	25	420	1050	FL330M450J250A □
	33	16	31.5	460	1150	FL330M450J315A □
	33	18	20	420	1050	FL330M450K200A □
	33	18	25	450	1125	FL330M450K250A □
	39	18	20	440	1100	FL390M450K200A □
	47	16	25	500	1250	FL470M450J250A □
	47	16	31.5	560	1400	FL470M450J315A □
	47	18	25	540	1350	FL470M450K250A □
	47	18	31.5	590	1475	FL470M450K315A □
	56	16	31.5	590	1475	FL560M450J315A □
	56	18	25	560	1400	FL560M450K250A □
	56	18	31.5	630	1575	FL560M450K315A □
	68	16	35.5	660	1650	FL680M450J355A □
	68	18	31.5	660	1650	FL680M450K315A □
	82	16	40	750	1875	FL820M450J400A □
	82	18	31.5	720	1800	FL820M450K315A □
	82	18	35.5	750	1875	FL820M450K355A □
	100	18	35.5	840	1890	FL101M450K355A □
	100	18	40	900	2025	FL101M450K400A □
	120	18	45	950	2138	FL121M450K450A □
150	18	50	1070	2408	FL151M450K500A □	
500	10	13	20	130	325	FL100M500I200A □
	12	13	20	140	350	FL120M500I200A □
	15	13	25	180	450	FL150M500I250A □
	15	16	20	180	450	FL150M500J200A □
	22	16	25	230	575	FL220M500J250A □
	22	18	20	220	550	FL220M500K200A □
	33	16	31.5	290	725	FL330M500J315A □
	33	18	25	280	700	FL330M500K250A □
	47	18	31.5	360	900	FL470M500K315A □
	56	18	35.5	390	975	FL560M500K355A □
	68	18	40	420	1050	FL680M500K400A □

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ø D	6.3	8		10	13	16	18
F	2.5	3.5		5	5	7.5	7.5
ø d	0.5	L < 20	L ≥ 20	0.6		0.8	
		0.5	0.6				

a	ø D < 16		ø D = 16		ø D = 18		
	1.5	L = 25 to 35.5		L < 25 and L ≥ 40		L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5		2		1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

CAP (µF) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 82	1	1.75	2.25	2.5
≥ 100	1	1.67	2.05	2.25

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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HY SERIES ■ LONG LIFE, SLIM SIZE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 10000 hours
- Slim design for height limited applications
- High reliability
- High voltage version



SPECIFICATIONS

Items		Performance Characteristics					
Operating Temperature Range		-25 ~ +105°C					
Rated Voltage Range	V_R	250 ~ 450V DC					
Surge Voltage	V_S	(V _R ≤ 315V): $V_S = 1.15 \cdot V_R$		(V _R > 315V): $V_S = 1.10 \cdot V_R$			
Capacitance Range	C_R	12 ~ 120μF					
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)					
Leakage Current (20°C ■ V _R applied)	I_{LEAK}	$\leq 3 \cdot \sqrt{C_R \cdot V_R}$ ■ After 5 minutes [I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]					
Dissipation Factor % (20°C - 120Hz)	tanδ	V _R (V DC)	250	350	400	420	450
		tanδ (%)	20	20	20	25	25
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	250	350	400	420	450
		Z-25°C/Z+20°C	3	8	8	8	8
Lifetime Test							
Endurance 105°C (V _R & I _R applied)	Test	10 000 hours					
	$\Delta C/C_R$	≤ ±20% of initial measured value					
	tanδ	≤ 200% of initial specified value					
	I _{Leak}	≤ the initial specified value					
Shelf Life 105°C (V _R = 0)	Test	1 000 hours					
	$\Delta C/C_R$	≤ ±20% of initial measured value					
	tanδ	≤ 200% of initial specified value					
	I _{Leak}	≤ the initial specified value					
		Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4					

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

V _R (V) / Frequency (Hz)	50/60	100/120	400	1k	100k
250 ~ 350	0.8	1	1.2	1.3	1.4
400 ~ 450	0.8	1	1.25	1.4	1.5

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C - 120Hz (mA rms)	CapXon Part Number
250	22	8	35	140	HY220M250F350A
	27	8	40	165	HY270M250F400A
	27	10	30	165	HY270M250G300A
	33	10	30	180	HY330M250G300A
	39	10	35	210	HY390M250G350A
	47	10	40	280	HY470M250G400A
	47	13	30	260	HY470M250I300A
	56	10	45	330	HY560M250G450A
	56	13	35	330	HY560M250I350A
	68	10	50	380	HY680M250G500A
	68	13	35	370	HY680M250I350A
	82	10	60	490	HY820M250G600A
	82	13	40	465	HY820M250I400A
	100	13	45	500	HY101M250I450A
120	13	50	580	HY121M250I500A	
350	12	8	30	100	HY120M350F300A
	15	8	35	130	HY150M350F350A
	22	8	40	165	HY220M350F400A
	27	10	30	185	HY270M350G300A
	33	10	35	200	HY330M350G350A
	39	10	40	285	HY390M350G400A
	39	13	30	285	HY390M350I300A
	47	13	35	360	HY460M350I350A
	47	10	45	340	HY470M350G450A
	47	13	30	330	HY470M350I300A
	56	10	50	380	HY560M350G500A
	68	10	60	450	HY680M350G600A
	68	13	40	430	HY680M350I400A
	82	13	45	520	HY820M350I450A
100	13	50	580	HY101M350I500A	
400	12	8	30	130	HY120M400F300A
	15	8	35	180	HY150M400F350A
	22	8	45	230	HY220M400F450A
	27	10	30	240	HY270M400G300A
	33	10	35	290	HY330M400G350A
	39	10	40	400	HY390M400G400A
	39	13	30	400	HY390M400I300A
	47	10	45	450	HY470M400G450A
	47	13	30	440	HY470M400I300A
	56	10	50	520	HY560M400G500A
	56	13	35	500	HY560M400I350A
	68	13	40	580	HY680M400I400A
	82	13	45	650	HY820M400I450A
	100	13	50	680	HY101M400I500A

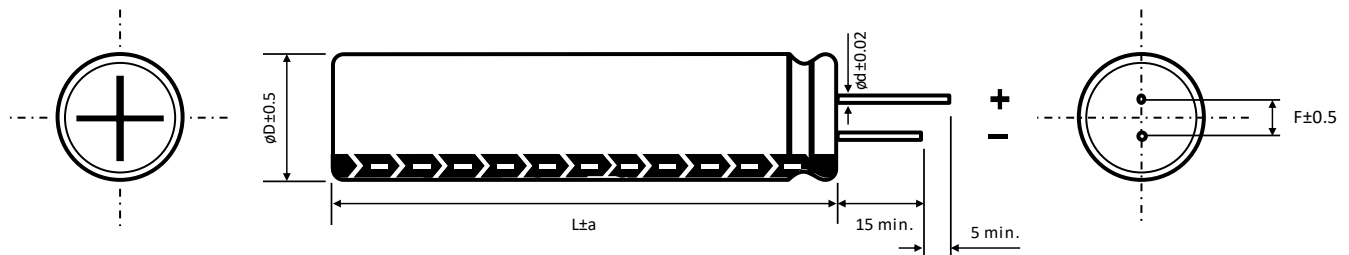
See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R - Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
420	12	8	30	140	HY120M420F300A
	15	8	35	170	HY150M420F350A
	22	8	50	250	HY220M420F500A
	27	10	35	270	HY270M420G350A
	33	10	40	370	HY330M420G400A
	39	10	45	410	HY390M420G450A
	39	13	30	390	HY390M420I300A
	47	10	50	420	HY470M420G500A
	47	13	35	450	HY470M420I350A
	56	10	60	530	HY560M420G600A
	56	13	40	520	HY560M420I400A
	68	13	45	580	HY680M420I450A
450	12	8	30	150	HY120M450F300A
	15	8	40	190	HY150M450F400A
	22	10	30	220	HY220M450G300A
	27	10	40	280	HY270M450G400A
	33	10	40	360	HY330M450G400A
	33	13	30	370	HY330M450I300A
	39	10	50	410	HY390M450G500A
	39	13	35	420	HY390M450I350A
	47	10	50	420	HY470M450G500A
	47	13	40	480	HY470M450I400A
	56	13	45	530	HY560M450I450A
	68	13	50	620	HY680M450I500A
82	13	55	680	HY820M450I550A	



See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	8	10	13
F	3.5	5	5
ϕd	0.5	0.6	0.6
a	1.5	2	2

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

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GT SERIES ■ MINIATURIZED, AUTOMOTIVE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 10000 hours
- Miniaturized for space critical applications
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +105°C							
Rated Voltage Range	V_R	10 ~ 100V DC							
Surge Voltage	V_S	$V_S = 1.15 \cdot V_R$							
Capacitance Range	C_R	1 ~ 330 μ F							
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)							
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$\leq 0.01 \cdot C_R \cdot V_R$ or 3 μ A, whichever is greater ■ After 2 minutes [I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]							
Dissipation Factor % (20°C ■ 120Hz)	tan δ	V_R (V DC)	10	16	25	35	50	63	100
		tan δ (%)	45	35	30	22	19	17	15
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	10	16	25	35	50	63	100
		Z-25°C/Z+20°C	10	8	6	6	5	5	5
		Z-40°C/Z+20°C	14	10	8	8	8	8	6

Lifetime Test			
Endurance 105°C (V_R & I_R applied)	Test	10 000 hours	
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value	
	tan δ	$\leq 300\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours	
	$\Delta C/C_R$	$\leq \pm 25\%$ of initial measured value	
	tan δ	$\leq 300\%$ of initial specified value	
	I_{Leak}	\leq the initial specified value	
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4			

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +105°C • 100kHz (mA rms)	CapXon Part Number
10	100	5	11	140	GT101M010C110A □
	220	6.3	11	220	GT221M010E110A □
	330	8	11.5	340	GT331M010F115A □
16	47	5	11	140	GT470M016C110A □
	100	6.3	11	220	GT101M016E110A □
	220	8	11.5	340	GT221M016F115A □
25	33	5	11	140	GT330M025C110A □
	47	5	11	140	GT470M025C110A □
	100	6.3	11	220	GT101M025E110A □
35	33	5	11	90	GT330M035C110A □
	47	6.3	11	220	GT470M035E110A □
	100	8	11.5	340	GT101M035F115A □
50	1	5	11	26	GT010M050C110A □
	2.2	5	11	36	GT2R2M050C110A □
	3.3	5	11	75	GT3R3M050C110A □
	4.7	5	11	85	GT4R7M050C110A □
	10	5	11	95	GT100M050C110A □
	22	5	11	140	GT220M050C110A □
	33	6.3	11	200	GT330M050E110A □
	47	6.3	11	200	GT470M050E110A □
100	8	11.5	280	GT101M050F115A □	
63	10	5	11	85	GT100M063C110A □
	22	6.3	11	180	GT220M063E110A □
	33	6.3	11	180	GT330M063E110A □
	47	8	11.5	250	GT470M063F115A □
100	1	5	11	40	GT010M100C110A □
	2.2	5	11	50	GT2R2M100C110A □
	3.3	5	11	60	GT3R3M100C110A □
	4.7	5	11	70	GT4R7M100C110A □
	10	6.3	11	150	GT100M100E110A □
	22	8	11.5	230	GT220M100F115A □

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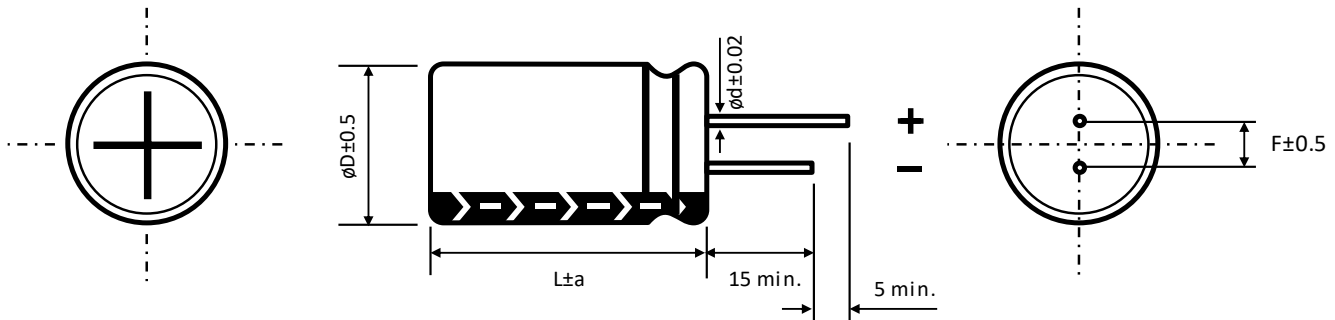
 □: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C _R (μF) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 10	0.42	0.6	0.8	1
22 ~ 33	0.55	0.75	0.9	1
47 ~ 330	0.7	0.85	0.95	1

DIMENSIONS ▪ All dimensions in mm



ø D	5	6.3	8
F	2	2.5	3.5
ø d	0.5	0.5	0.5
a	1.5	1.5	1.5

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LE SERIES ■ ULTRA LONG LIFE 105°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR ■ THT type
- Endurance: 105°C ■ 12 000 hours up to 20 000 hours
- High voltage up to 450V
- High reliability
- Ideal for applications with very long-life expectancies



SPECIFICATIONS

Items		Performance Characteristics					
Operating Temperature Range		-40 ~ +105°C					
Rated Voltage Range	V_R	160 ~ 450V DC					
Surge Voltage	V_S	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$			$(V_R > 315V): V_S = 1.10 \cdot V_R$		
Capacitance Range	C_R	1 ~ 68 μ F					
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)					
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	$C_R \cdot V_R \leq 1000$			$\leq 0.1 \cdot C_R \cdot V_R + 40\mu A$ (After 1 minute)		
		$C_R \cdot V_R > 1000$			$\leq 0.04 \cdot C_R \cdot V_R + 100\mu A$ (After 1 minute)		
		[I_{LEAK} (μA) ; C_R (μF) ; V_R (V)]					
Dissipation Factor % (20°C ■ 120Hz)	tan δ	V_R (V DC)	160	200	250	400	450
		tan δ (%)	24	24	24	24	24
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	160	200	250	400	450
		Z-25°C/Z+20°C	3	3	6	6	8
		Z-40°C/Z+20°C	8	8	10	10	12
Lifetime Test							
Endurance 105°C (V_R & I_R applied)	Test	12 000 hours	ϕ D 6.3 x L 11 mm				
		12 000 hours	ϕ D 8 x L 9 mm				
		12 000 hours	ϕ D 10 x L 9 mm				
		15 000 hours	ϕ D 8 x L 11.5 mm				
		15 000 hours	ϕ D 10 x L 12.5 mm				
		20 000 hours	ϕ D \geq 10 x L 16 mm				
		$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value				
		tan δ	$\leq 300\%$ of initial specified value				
		I_{Leak}	\leq the initial specified value				
Shelf Life 105°C ($V_R = 0$)	Test	1 000 hours					
		$\Delta C/C_R$	$\leq \pm 30\%$ of initial measured value				
		tan δ	$\leq 300\%$ of initial specified value				
		I_{Leak}	\leq the initial specified value				
		Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4					

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
160	5.6	6.3	11	53	LE5R6M160E110A
	10	8	9	71	LE100M160F090A
	15	8	11.5	93	LE150M160F115A
	15	10	9	96	LE150M160G090A
	22	10	12.5	122	LE220M160G125A
	33	10	16	159	LE330M160G160A
200	2.2	6.3	11	37	LE2R2M200E110A
	3.3	6.3	11	43	LE3R3M200E110A
	4.7	6.3	11	50	LE4R7M200E110A
	5.6	8	9	57	LE5R6M200F090A
	6.8	8	9	63	LE6R8M200F090A
	8.2	8	9	67	LE8R2M200F090A
	10	8	11.5	81	LE100M200F115A
	12	10	9	89	LE120M200G090A
	18	10	12.5	114	LE180M200G125A
	27	10	16	150	LE270M200G160A
250	1.8	6.3	11	34	LE1R8M250E110A
	2.2	6.3	11	37	LE2R2M250E110A
	3.3	6.3	11	43	LE3R3M250E110A
	4.7	8	9	54	LE4R7M250F090A
	5.6	8	11.5	63	LE5R6M250F115A
	6.8	8	11.5	69	LE6R8M250F115A
	8.2	10	9	77	LE8R2M250G090A
	10	10	12.5	91	LE100M250G125A
	12	10	12.5	98	LE120M250G125A
	18	10	16	128	LE180M250G160A
400	1	6.3	11	25	LE010M400E110A
	1.2	8	9	29	LE1R2M400F090A
	1.5	8	9	31	LE1R5M400F090A
	1.8	8	9	34	LE1R8M400F090A
	2.2	8	9	37	LE2R2M400F090A
	2.2	8	11.5	41	LE2R2M400F115A
	2.7	8	11.5	44	LE2R7M400F115A
	3.3	8	11.5	48	LE3R3M400F115A
	3.3	10	9	49	LE3R3M400G090A
	3.9	10	12.5	58	LE3R9M400G125A
	4.7	10	12.5	62	LE4R7M400G125A
	6.8	10	16	86	LE6R8M400G160A

See "PACKAGING INFORMATION" to taped or formed products.

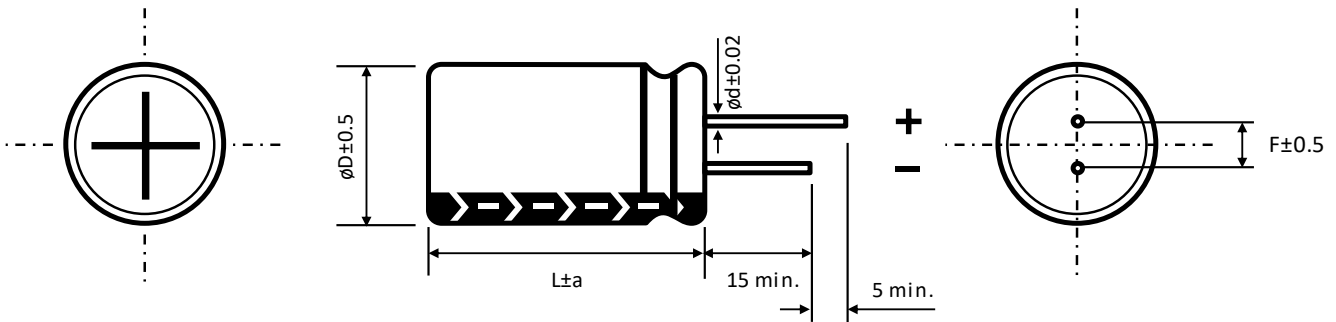
STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +105°C • 120Hz (mA rms)	CapXon Part Number
450	4.7	10	16	55	LE4R7M450G160A
	4.7	10	20	67	LE4R7M450G200A
	6.8	10	20	85	LE6R8M450G200A
	8.2	10	20	85	LE8R2M450G200A
	10	13	20	136	LE100M450I200A
	15	13	25	181	LE150M450I250A
	22	13	25	241	LE220M450I250A
	22	16	20	293	LE220M450J200A
	33	16	25	321	LE330M450J250A
	33	18	20	313	LE330M450K200A
	47	18	25	481	LE470M450K250A
	68	18	31.5	521	LE680M450K315A

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS • All dimensions in mm



ϕD	6.3	8	10	13	16	18
F	2.5	3.5	5	5	7.5	7.5
ϕd	0.5	L < 20	L \geq 20	0.6		0.8
		0.5	0.6			

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	L = 25 to 35.5	L < 25 and L \geq 40	L = 25 to 31.5	L < 25 and L \geq 35.5
		1.5	2	1.5	2

MULTIPLIER for RIPPLE CURRENT vs. FREQUENCY
160 ~ 400V

C_R (μ F) / Frequency (Hz)	100/120	1k	10k	100k
1 ~ 5.6	1	1.6	1.8	2
6.8 ~ 18	1	1.5	1.7	1.9
22 ~ 33	1	1.4	1.6	1.8

 \geq 450V

C_R (μ F) / Frequency (Hz)	100/120	1k	10k	100k
4.7 ~ 15	0.3	0.6	0.9	1
22 ~ 68	0.4	0.7	0.9	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

TH SERIES ■ HIGH TEMP., AUTOMOTIVE 125°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 125°C ■ 1 000 hours up to 3 000 hours
- Especially for applications with high ambient temperatures
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics									
Operating Temperature Range		-40 ~ +125°C				-25 ~ +125°C					
Rated Voltage Range	V_R	10 ~ 400V DC				450V DC					
Surge Voltage	V_S	$(V_R \leq 315V): V_S = 1.15 \cdot V_R$				$(V_R > 315V): V_S = 1.10 \cdot V_R$					
Capacitance Range	C_R	1 ~ 8200 μ F				1 ~ 47 μ F					
Cap. Tolerance	ΔC	$\pm 20\%$ (120Hz ■ 20°C)									
Leakage Current (20°C ■ V_R applied)	I_{LEAK}	10 ~ 100V				$\leq 0.01C_R \cdot V_R$ or 3 μ A (After 2 minutes)					
		160 ~ 450V	$C_R \cdot V_R \leq 1000$		$\leq 0.1C_R \cdot V_R + 40\mu$ A (After 1 minute)						
			$C_R \cdot V_R > 1000$		$\leq 0.04C_R \cdot V_R + 100\mu$ A (After 1 minute)						
[I_{LEAK} (μ A) ; C_R (μ F) ; V_R (V)]											
Dissipation Factor % (20°C ■ 120Hz)	$\tan \delta$	V_R (V DC)	10	16	25	35	50	63	80		
		$\tan \delta$ (%)	18	15	13	12	10	8	8		
		V_R (V DC)	100	160	200	250	350	400	450		
		$\tan \delta$ (%)	7	12	12	12	15	15	20		
For $C_R > 1000\mu$ F, add 2% per every multiple 1000 μ F of rated capacitance value											
Low Temperature Characteristics at 120Hz	Z ratio max.	V_R (V DC)	10	16 ~ 100	160 ~ 250	350 ~ 400	450				
		Z-25°C/Z+20°C	3	2	3	6	6				
		Z-40°C/Z+20°C	4	4	6	12	-				
		For capacitance > 1000 μ F									
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000 μ F of rated capacitance value								
Z-40°C/Z+20°C	Add 1 for every multiple 1000 μ F of rated capacitance value										
Lifetime Test											
Endurance 125°C (V_R & I_R applied)	Test	1 000 hours				ϕ D < 8 mm					
		2 000 hours				ϕ D = 8 ~ 10 mm					
		3 000 hours				ϕ D \geq 13 mm					
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value									
	$\tan \delta$	$\leq 300\%$ of initial specified value									
I_{Leak}	\leq the initial specified value										
Shelf Life 125°C ($V_R = 0$)	Test	1 000 hours									
	$\Delta C/C_R$	$\leq \pm 20\%$ of initial measured value									
	$\tan \delta$	$\leq 300\%$ of initial specified value									
	I_{Leak}	\leq the initial specified value									
Before measurement: Restore capacitor to 20°C, apply V_R for 30 min according JIS-C-5101-4											

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
10	47	5	11	92	TH470M010C110A <input type="checkbox"/>
	56	5	11	100	TH560M010C110A <input type="checkbox"/>
	100	5	11	130	TH101M010C110A <input type="checkbox"/>
	100	6.3	11	145	TH101M010E110A <input type="checkbox"/>
	120	6.3	11	160	TH121M010E110A <input type="checkbox"/>
	330	8	11.5	350	TH331M010F115A <input type="checkbox"/>
	330	10	12.5	410	TH331M010G125A <input type="checkbox"/>
	470	8	11.5	430	TH471M010F115A <input type="checkbox"/>
	470	8	16	500	TH471M010F160A <input type="checkbox"/>
	470	10	12.5	505	TH471M010G125A <input type="checkbox"/>
	470	10	16	525	TH471M010G160A <input type="checkbox"/>
	560	10	12.5	530	TH561M010G125A <input type="checkbox"/>
	680	8	20	640	TH681M010F200A <input type="checkbox"/>
	680	10	16	660	TH681M010G160A <input type="checkbox"/>
	1000	10	16	870	TH102M010G160A <input type="checkbox"/>
	1000	10	20	960	TH102M010G200A <input type="checkbox"/>
	1200	10	20	1000	TH122M010G200A <input type="checkbox"/>
1500	10	20	1120	TH152M010G200A <input type="checkbox"/>	
16	22	5	11	66	TH220M016C110A <input type="checkbox"/>
	33	6.3	11	91	TH330M016E110A <input type="checkbox"/>
	47	5	11	97	TH470M016C110A <input type="checkbox"/>
	47	6.3	11	110	TH470M016E110A <input type="checkbox"/>
	100	6.3	11	175	TH101M016E110A <input type="checkbox"/>
	100	8	11.5	206	TH101M016F115A <input type="checkbox"/>
	220	8	11.5	340	TH221M016F115A <input type="checkbox"/>
	220	10	12.5	400	TH221M016G125A <input type="checkbox"/>
	330	8	11.5	400	TH331M016F115A <input type="checkbox"/>
	330	8	16	460	TH331M016F160A <input type="checkbox"/>
	330	10	12.5	470	TH331M016G125A <input type="checkbox"/>
	330	10	16	525	TH331M016G160A <input type="checkbox"/>
	470	8	11.5	500	TH471M016F115A <input type="checkbox"/>
	470	8	20	640	TH471M016F200A <input type="checkbox"/>
	470	10	12.5	590	TH471M016G125A <input type="checkbox"/>
	470	10	16	650	TH471M016G160A <input type="checkbox"/>
	470	10	20	720	TH471M016G200A <input type="checkbox"/>
	680	10	20	760	TH681M016G200A <input type="checkbox"/>
	820	10	16	740	TH821M016G160A <input type="checkbox"/>
	820	10	25	900	TH821M016G250A <input type="checkbox"/>
	1000	10	20	860	TH102M016G200A <input type="checkbox"/>
	1000	10	25	950	TH102M016G250A <input type="checkbox"/>
1000	13	20	1000	TH102M016I200A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
25	22	6.3	11	70	TH220M025E110A □
	33	5	11	88	TH330M025C110A □
	33	6.3	11	100	TH330M025E110A □
	47	5	11	97	TH470M025C110A □
	47	6.3	11	110	TH470M025E110A □
	47	8	11.5	130	TH470M025F115A □
	56	6.3	11	120	TH560M025E110A □
	100	8	11.5	210	TH101M025F115A □
	100	10	12.5	250	TH101M025G125A □
	120	8	11.5	220	TH121M025F115A □
	150	8	11.5	260	TH151M025F115A □
	180	8	11.5	290	TH181M025F115A □
	220	8	11.5	360	TH221M025F115A □
	220	8	16	415	TH221M025F160A □
	220	10	12.5	420	TH221M025G125A □
	220	10	16	470	TH221M025G160A □
	270	8	20	470	TH271M025F200A □
	270	10	12.5	435	TH271M025G125A □
	330	8	16	510	TH331M025F160A □
	330	10	12.5	520	TH331M025G125A □
	330	10	16	570	TH331M025G160A □
	330	10	20	631	TH331M025G200A □
	390	10	16	650	TH391M025G160A □
	470	8	20	620	TH471M025F200A □
	470	10	16	640	TH471M025G160A □
	470	10	20	700	TH471M025G200A □
	470	10	25	770	TH471M025G250A □
	470	13	20	810	TH471M025I200A □
	560	10	20	680	TH561M025G200A □
	560	10	25	750	TH561M025G250A □
	680	10	20	740	TH681M025G200A □
	1000	13	20	880	TH102M025I200A □
	1000	13	25	970	TH102M025I250A □
	1000	16	25	1100	TH102M025J250A □
	1200	10	20	1010	TH122M025G200A □
	1500	10	25	1220	TH152M025G250A □
	1800	13	20	1350	TH182M025I200A □
	2700	13	25	1710	TH272M025I250A □
	3300	13	30	2070	TH332M025I300A □
	5600	18	25	2730	TH562M025K250A □
6800	16	35.5	3300	TH682M025J355A □	
8200	16	40	3750	TH822M025J400A □	

 □: Enter **blank** for Standard version

 □: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
35	22	5	11	72	TH220M035C110A <input type="checkbox"/>
	22	6.3	11	82	TH220M035E110A <input type="checkbox"/>
	33	8	11.5	108	TH330M035F115A <input type="checkbox"/>
	47	6.3	11	110	TH470M035E110A <input type="checkbox"/>
	47	8	11.5	130	TH470M035F115A <input type="checkbox"/>
	47	10	12.5	158	TH470M035G125A <input type="checkbox"/>
	56	6.3	11	130	TH560M035E110A <input type="checkbox"/>
	100	8	11.5	200	TH101M035F115A <input type="checkbox"/>
	100	10	12.5	230	TH101M035G125A <input type="checkbox"/>
	100	10	16	262	TH101M035G160A <input type="checkbox"/>
	120	8	11.5	300	TH121M035F115A <input type="checkbox"/>
	120	8	16	350	TH121M035F160A <input type="checkbox"/>
	150	10	12.5	360	TH151M035G125A <input type="checkbox"/>
	180	8	20	410	TH181M035F200A <input type="checkbox"/>
	180	10	12.5	380	TH181M035G125A <input type="checkbox"/>
	220	10	12.5	440	TH221M035G125A <input type="checkbox"/>
	220	10	16	490	TH221M035G160A <input type="checkbox"/>
	220	10	20	540	TH221M035G200A <input type="checkbox"/>
	270	10	16	500	TH271M035G160A <input type="checkbox"/>
	270	10	20	550	TH271M035G200A <input type="checkbox"/>
	330	10	16	560	TH331M035G160A <input type="checkbox"/>
	330	10	25	680	TH331M035G250A <input type="checkbox"/>
	330	13	20	718	TH331M035I200A <input type="checkbox"/>
	390	10	20	590	TH391M035G200A <input type="checkbox"/>
	470	10	20	700	TH471M035G200A <input type="checkbox"/>
	470	13	20	810	TH471M035I200A <input type="checkbox"/>
	470	13	25	900	TH471M035I250A <input type="checkbox"/>
	560	10	20	580	TH561M035G200A <input type="checkbox"/>
	560	13	16	610	TH561M035I160A <input type="checkbox"/>
	680	10	20	800	TH681M035G200A <input type="checkbox"/>
	820	10	25	980	TH821M035G250A <input type="checkbox"/>
	1000	13	25	1140	TH102M035I250A <input type="checkbox"/>
	1000	16	25	1280	TH102M035J250A <input type="checkbox"/>
	1200	10	30	1290	TH122M035G300A <input type="checkbox"/>
	1500	13	25	1368	TH152M035I250A <input type="checkbox"/>
2200	13	30	1660	TH222M035I300A <input type="checkbox"/>	
2700	13	40	2350	TH272M035I400A <input type="checkbox"/>	
3300	16	31.5	2480	TH332M035J315A <input type="checkbox"/>	
3300	18	25	2400	TH332M035K250A <input type="checkbox"/>	
4700	16	40	3000	TH472M035J400A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
50	2.2	8	11.5	25	TH2R2M050F115A □
	3.3	8	11.5	30	TH3R3M050F115A □
	4.7	5	11	32	TH4R7M050C110A □
	4.7	8	11.5	42.5	TH4R7M050F115A □
	10	5	11	42	TH100M050C110A □
	10	6.3	11	48	TH100M050E110A □
	10	8	11.5	56	TH100M050F115A □
	22	5	11	66	TH220M050C110A □
	22	6.3	11	75	TH220M050E110A □
	22	8	11.5	86	TH220M050F115A □
	33	8	11.5	118	TH330M050F115A □
	47	6.3	11	120	TH470M050E110A □
	47	8	11.5	140	TH470M050F115A □
	47	10	12.5	164	TH470M050G125A □
	56	8	11.5	150	TH560M050F115A □
	68	8	11.5	160	TH680M050F115A □
	82	8	11.5	170	TH820M050F115A □
	100	10	12.5	230	TH101M050G125A □
	100	10	16	250	TH101M050G160A □
	100	10	20	277	TH101M050G200A □
	120	10	16	290	TH121M050G160A □
	180	10	20	400	TH181M050G200A □
	220	10	20	510	TH221M050G200A □
	220	10	25	560	TH221M050G250A □
	220	13	20	587	TH221M050I200A □
	270	10	20	610	TH271M050G200A □
	330	10	20	700	TH331M050G200A □
	330	13	20	810	TH331M050I200A □
	330	13	25	900	TH331M050I250A □
	470	13	25	900	TH471M050I250A □
	470	16	25	1000	TH471M050J250A □
	560	10	30	950	TH561M050G300A □
	680	13	25	1050	TH681M050I250A □
1000	13	30	1390	TH102M050I300A □	
1200	13	35	1510	TH122M050I350A □	
1200	18	20	1450	TH122M050K200A □	
1500	13	40	1960	TH152M050I400A □	
1800	18	25	1960	TH182M050K250A □	
2200	18	31.5	2500	TH222M050K315A □	
2700	18	35.5	2750	TH272M050K355A □	
3300	18	40	2950	TH332M050K400A □	

 □: Enter **blank** for Standard version

 □: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	I_R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
63	4.7	6.3	11	38	TH4R7M063E110A
	10	8	11.5	58	TH100M063F115A
	22	8	11.5	93	TH220M063F115A
	33	8	11.5	115	TH330M063F115A
	33	10	12.5	132	TH330M063G125A
	47	10	12.5	155	TH470M063G125A
	47	10	16	172	TH470M063G160A
	100	10	16	260	TH101M063G160A
	180	10	20	400	TH181M063G200A
	220	10	25	520	TH221M063G250A
	220	13	25	595	TH221M063I250A
	330	13	25	880	TH331M063I250A
	330	16	25	1000	TH331M063J250A
	390	13	20	800	TH391M063I200A
	680	13	30	1290	TH681M063I300A
	820	13	35	1420	TH821M063I350A
	820	18	20	1360	TH821M063K200A
	1200	18	25	1620	TH122M063K250A
	1500	18	31.5	1980	TH152M063K315A
	1800	16	40	2260	TH182M063J400A
2200	18	40	2680	TH222M063K400A	
80	22	8	11.5	120	TH220M080F115A
	33	10	12.5	170	TH330M080G125A
	47	10	12.5	200	TH470M080G125A
	100	10	20	370	TH101M080G200A
	330	13	25	870	TH331M080I250A
	390	16	20	900	TH391M080J200A
	470	16	25	1010	TH471M080J250A
	560	13	35	1100	TH561M080I350A
	560	16	25	1060	TH561M080J250A
	560	18	20	1050	TH561M080K200A
680	16	31.5	1300	TH681M080J315A	
100	1	6.3	11	24	TH010M100E110A
	2.2	6.3	11	31	TH2R2M100E110A
	3.3	6.3	11	36	TH3R3M100E110A
	4.7	6.3	11	38	TH4R7M100E110A
	4.7	8	11.5	48	TH4R7M100F115A
	10	8	11.5	60	TH100M100F115A
	10	10	12.5	70	TH100M100G125A
	22	8	11.5	76	TH220M100F115A
	22	10	12.5	90	TH220M100G125A
	22	10	16	100	TH220M100G160A

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
100	33	10	12.5	130	TH330M100G125A <input type="checkbox"/>
	33	10	16	140	TH330M100G160A <input type="checkbox"/>
	33	10	20	158	TH330M100G200A <input type="checkbox"/>
	47	10	16	150	TH470M100G160A <input type="checkbox"/>
	47	10	25	175	TH470M100G250A <input type="checkbox"/>
	47	13	20	185	TH470M100I200A <input type="checkbox"/>
	100	13	25	320	TH101M100I250A <input type="checkbox"/>
	100	16	25	350	TH101M100J250A <input type="checkbox"/>
	330	13	35	890	TH331M100I350A <input type="checkbox"/>
	330	16	25	860	TH331M100J250A <input type="checkbox"/>
	330	18	20	850	TH331M100K200A <input type="checkbox"/>
	390	13	40	1050	TH391M100I400A <input type="checkbox"/>
	390	16	31.5	1050	TH391M100J315A <input type="checkbox"/>
	560	18	31.5	1290	TH561M100K315A <input type="checkbox"/>
	680	18	35.5	1480	TH681M100K355A <input type="checkbox"/>
820	18	40	1850	TH821M100K400A <input type="checkbox"/>	
160	1	6.3	11	23	TH010M160E110A <input type="checkbox"/>
	2.2	6.3	11	35	TH2R2M160E110A <input type="checkbox"/>
	3.3	6.3	11	37	TH3R3M160E110A <input type="checkbox"/>
	3.3	8	11.5	41	TH3R3M160F115A <input type="checkbox"/>
	4.7	8	11.5	52	TH4R7M160F115A <input type="checkbox"/>
	6.8	10	12.5	70	TH6R8M160G125A <input type="checkbox"/>
	10	8	11.5	70	TH100M160F115A <input type="checkbox"/>
	10	10	12.5	82	TH100M160G125A <input type="checkbox"/>
	22	10	16	115	TH220M160G160A <input type="checkbox"/>
	22	10	20	128	TH220M160G200A <input type="checkbox"/>
	33	13	20	200	TH330M160I200A <input type="checkbox"/>
	47	13	20	240	TH470M160I200A <input type="checkbox"/>
	47	13	25	260	TH470M160I250A <input type="checkbox"/>
	82	10	30	340	TH820M160G300A <input type="checkbox"/>
	100	10	35	380	TH101M160G350A <input type="checkbox"/>
	100	13	25	390	TH101M160I250A <input type="checkbox"/>
	100	16	25	430	TH101M160J250A <input type="checkbox"/>
	120	10	40	450	TH121M160G400A <input type="checkbox"/>
	150	13	30	500	TH151M160I300A <input type="checkbox"/>
	180	13	35	600	TH181M160I350A <input type="checkbox"/>
180	18	20	550	TH181M160K200A <input type="checkbox"/>	
220	16	31.5	690	TH221M160J315A <input type="checkbox"/>	
330	18	35.5	900	TH331M160K355A <input type="checkbox"/>	
200	1	6.3	11	23	TH010M200E110A <input type="checkbox"/>
	2.2	6.3	11	35	TH2R2M200E110A <input type="checkbox"/>
	3.3	8	11.5	48	TH3R3M200F115A <input type="checkbox"/>
	4.7	8	11.5	50	TH4R7M200F115A <input type="checkbox"/>

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number
200	4.7	10	12.5	60	TH4R7M200G125A <input type="checkbox"/>
	6.8	10	12.5	70	TH6R8M200G125A <input type="checkbox"/>
	10	10	12.5	80	TH100M200G125A <input type="checkbox"/>
	22	10	20	140	TH220M200G200A <input type="checkbox"/>
	22	10	25	150	TH220M200G250A <input type="checkbox"/>
	22	13	20	160	TH220M200I200A <input type="checkbox"/>
	33	13	20	200	TH330M200I200A <input type="checkbox"/>
	33	13	25	220	TH330M200I250A <input type="checkbox"/>
	47	13	20	245	TH470M200I200A <input type="checkbox"/>
	47	13	25	270	TH470M200I250A <input type="checkbox"/>
	47	16	25	300	TH470M200J250A <input type="checkbox"/>
	56	13	20	260	TH560M200I200A <input type="checkbox"/>
	82	13	25	360	TH820M200I250A <input type="checkbox"/>
	100	13	30	430	TH101M200I300A <input type="checkbox"/>
	100	16	20	400	TH101M200J200A <input type="checkbox"/>
	100	16	25	440	TH101M200J250A <input type="checkbox"/>
	100	16	31.5	490	TH101M200J315A <input type="checkbox"/>
	150	13	40	600	TH151M200I400A <input type="checkbox"/>
	150	16	25	530	TH151M200J250A <input type="checkbox"/>
	180	18	25	650	TH181M200K250A <input type="checkbox"/>
220	18	31.5	850	TH221M200K315A <input type="checkbox"/>	
330	18	35.5	1100	TH331M200K355A <input type="checkbox"/>	
250	1	6.3	11	23	TH010M250E110A <input type="checkbox"/>
	2.2	6.3	11	35	TH2R2M250E110A <input type="checkbox"/>
	2.2	8	11.5	40	TH2R2M250F115A <input type="checkbox"/>
	3.3	8	11.5	50	TH3R3M250F115A <input type="checkbox"/>
	3.3	10	12.5	53	TH3R3M250G125A <input type="checkbox"/>
	4.7	10	12.5	60	TH4R7M250G125A <input type="checkbox"/>
	4.7	10	16	68	TH4R7M250G160A <input type="checkbox"/>
	6.8	10	16	75	TH6R8M250G160A <input type="checkbox"/>
	10	10	16	83	TH100M250G160A <input type="checkbox"/>
	22	13	20	160	TH220M250I200A <input type="checkbox"/>
	22	13	25	170	TH220M250I250A <input type="checkbox"/>
	33	13	25	220	TH330M250I250A <input type="checkbox"/>
	33	16	25	240	TH330M250J250A <input type="checkbox"/>
	39	10	30	230	TH390M250G300A <input type="checkbox"/>
	47	10	35	280	TH470M250G350A <input type="checkbox"/>
	47	16	25	300	TH470M250J250A <input type="checkbox"/>
	47	16	31.5	330	TH470M250J315A <input type="checkbox"/>
	56	10	40	300	TH560M250G400A <input type="checkbox"/>
	68	13	30	330	TH680M250I300A <input type="checkbox"/>
	82	13	35	380	TH820M250I350A <input type="checkbox"/>
82	18	20	350	TH820M250K200A <input type="checkbox"/>	

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

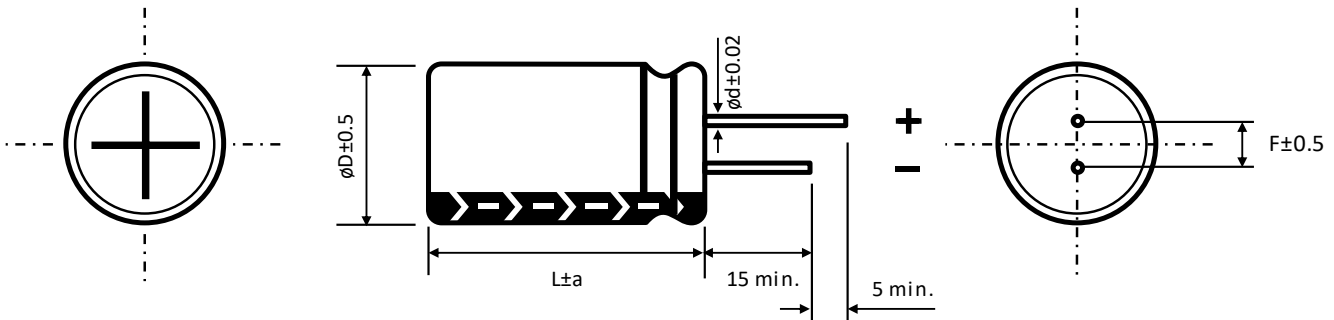
Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +125°C • 120Hz (mA rms)	CapXon Part Number	
250	100	13	40	490	TH101M250I400A □	
	120	18	25	460	TH121M250K250A □	
	220	18	35.5	850	TH221M250K355A □	
350	1	8	11.5	26	TH010M350F115A □	
	2.2	8	11.5	40	TH2R2M350F115A □	
	2.2	10	12.5	47	TH2R2M350G125A □	
	3.3	10	12.5	55	TH3R3M350G125A □	
	3.3	10	16	60	TH3R3M350G160A □	
	4.7	10	16	68	TH4R7M350G160A □	
	4.7	10	20	75	TH4R7M350G200A □	
	5.6	10	20	78	TH5R6M350G200A □	
	6.8	13	20	85	TH6R8M350I200A □	
	10	10	25	105	TH100M350G250A □	
	10	13	20	110	TH100M350I200A □	
	22	13	25	180	TH220M350I250A □	
	22	16	25	200	TH220M350J250A □	
	27	10	30	180	TH270M350G300A □	
	33	10	35	220	TH330M350G350A □	
	33	16	25	230	TH330M350J250A □	
	33	16	31.5	260	TH330M350J315A □	
	47	13	30	280	TH470M350I300A □	
	47	16	31.5	320	TH470M350J315A □	
	47	16	35.5	340	TH470M350J355A □	
	56	13	35	330	TH560M350I350A □	
	56	16	25	320	TH560M350J250A □	
	56	18	20	310	TH560M350K200A □	
	68	13	40	390	TH680M350I400A □	
	400	1	10	12.5	30	TH010M400G125A □
		2.2	10	16	50	TH2R2M400G160A □
		3.3	10	16	60	TH3R3M400G160A □
4.7		10	16	70	TH4R7M400G160A □	
4.7		10	20	80	TH4R7M400G200A □	
5.6		10	20	85	TH5R6M400G200A □	
6.8		13	20	90	TH6R8M400I200A □	
10		13	20	110	TH100M400I200A □	
22		13	25	180	TH220M400I250A □	
27		13	25	190	TH270M400I250A □	
33		16	20	220	TH330M400J200A □	
33		16	25	240	TH330M400J250A □	
47		16	25	290	TH470M400J250A □	
47		16	31.5	320	TH470M400J315A □	

□: Enter **blank** for Standard version

□: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	5	6.3	8		10	13	16	18
F	2	2.5	3.5		5	5	7.5	7.5
ϕd	0.5		L < 20	L ≥ 20	0.6		0.8	
			0.5	0.6				

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	50/60	100/120	400	1k	10k	50k ~ 100k
$C_R \leq 10$	0.8	1	1.3	1.45	1.65	1.7
$10 < C_R \leq 100$	0.8	1	1.23	1.36	1.48	1.53
$100 < C_R \leq 1000$	0.8	1	1.16	1.25	1.35	1.38
$1000 \leq C_R$	0.8	1	1.11	1.17	1.25	1.28

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272



DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

TE SERIES ■ HIGH TEMP., AUTOMOTIVE 130°C TYPE

KEY FEATURES



- ALUMINUM ELECTROLYTIC CAPACITOR • THT type
- Endurance: 130°C ■ 1 000 hours up to 3 000 hours
- Especially for applications with high ambient temperatures
- High reliability
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +130°C			-25 ~ +130°C				
Rated Voltage Range	V _R	10 ~ 400V DC			450V DC				
Surge Voltage	V _S	(V _R ≤ 315V): V _S = 1.15·V _R			(V _R > 315V): V _S = 1.10·V _R				
Capacitance Range	C _R	2.2 ~ 4700μF			1 ~ 100μF				
Cap. Tolerance	ΔC	±20% (120Hz ■ 20°C)							
Leakage Current (20°C • V _R applied)	I _{LEAK}	10 ~ 100V			≤ 0.01C _R ·V _R or 3μA (After 2 minutes)				
		160 ~ 450V	C _R ·V _R ≤ 1000		≤ 0.1C _R ·V _R + 40μA (After 1 minute)				
			C _R ·V _R > 1000		≤ 0.04C _R ·V _R + 100μA (After 1 minute)				
Dissipation Factor % (20°C • 120Hz)	tanδ	V _R (V DC)	10	16	25	35	50	63	
		tanδ (%)	20	16	14	12	10	9	
		V _R (V DC)	100	160	200	250	350	400	450
		tanδ (%)	8	15	15	15	20	20	25
		For C _R > 1000μF, add 2% per every multiple 1000μF of rated capacitance value							
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	10	16 ~ 100	160 ~ 250	350 ~ 400	450		
		Z-25°C/Z+20°C	3	2	3	5	6		
		Z-40°C/Z+20°C	4	4	6	-	-		
		For capacitance > 1000μF							
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value						
		Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value						
Lifetime Test									
Endurance 130°C (V _R & I _R applied)	Test	1 000 hours			ø D 6.3 mm				
		2 000 hours			ø D 8 mm				
		3 000 hours			ø D ≥ 10 mm ■ 10 ~ 100V				
		2 000 hours			ø D ≥ 10 mm ■ 160 ~ 450V				
	ΔC/C _R	≤ ±30% of initial measured value							
tanδ	≤ 300% of initial specified value								
I _{Leak}	≤ the initial specified value								
Shelf Life 130°C (V _R = 0)	Test	1 000 hours							
		ΔC/C _R	≤ ±30% of initial measured value						
		tanδ	≤ 300% of initial specified value						
		I _{Leak}	≤ the initial specified value						
	Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4								

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R • Max. Ripple Current +130°C • 100kHz (mA rms)	CapXon Part Number
10	220	8	11.5	360	TE221M010F115A <input type="checkbox"/>
	330	8	11.5	475	TE331M010F115A <input type="checkbox"/>
	330	10	12.5	500	TE331M010G125A <input type="checkbox"/>
	470	10	12.5	670	TE471M010G125A <input type="checkbox"/>
	470	10	16	720	TE471M010G160A <input type="checkbox"/>
	1000	10	20	1175	TE102M010G200A <input type="checkbox"/>
	1500	13	20	1495	TE152M010I200A <input type="checkbox"/>
	2200	13	25	1690	TE222M010I250A <input type="checkbox"/>
	3300	16	25	2275	TE332M010J250A <input type="checkbox"/>
	4700	16	31.5	2765	TE472M010J315A <input type="checkbox"/>
16	220	8	11.5	360	TE221M016F115A <input type="checkbox"/>
	220	10	12.5	375	TE221M016G125A <input type="checkbox"/>
	330	8	11.5	395	TE331M016F115A <input type="checkbox"/>
	330	10	16	515	TE331M016G160A <input type="checkbox"/>
	470	10	12.5	655	TE471M016G125A <input type="checkbox"/>
	470	10	20	800	TE471M016G200A <input type="checkbox"/>
	1000	10	20	1175	TE102M016G200A <input type="checkbox"/>
	1000	13	20	1240	TE102M016I200A <input type="checkbox"/>
	1500	13	20	1515	TE152M016I200A <input type="checkbox"/>
	1500	13	25	1665	TE152M016I250A <input type="checkbox"/>
	2200	13	25	1690	TE222M016I250A <input type="checkbox"/>
	2200	16	25	1875	TE222M016J250A <input type="checkbox"/>
	3300	16	31.5	2690	TE332M016J315A <input type="checkbox"/>
	4700	16	35.5	2940	TE472M016J355A <input type="checkbox"/>
	25	220	8	11.5	360
220		10	16	475	TE221M025G160A <input type="checkbox"/>
330		10	12.5	630	TE331M025G125A <input type="checkbox"/>
330		10	20	775	TE331M025G200A <input type="checkbox"/>
470		10	16	755	TE471M025G160A <input type="checkbox"/>
470		13	20	960	TE471M025I200A <input type="checkbox"/>
1000		13	20	1240	TE102M025I200A <input type="checkbox"/>
1000		16	25	1465	TE102M025J250A <input type="checkbox"/>
1500		16	25	1865	TE152M025J250A <input type="checkbox"/>
1500		16	31.5	2065	TE152M025J315A <input type="checkbox"/>
2200		16	31.5	2380	TE222M025J315A <input type="checkbox"/>
2200		16	35.5	2515	TE222M025J355A <input type="checkbox"/>
3300		16	35.5	2695	TE332M025J355A <input type="checkbox"/>
3300		18	35.5	2875	TE332M025K355A <input type="checkbox"/>

: Enter **blank** for Standard version

: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R • Max. Ripple Current +130°C • 100kHz (mA rms)	CapXon Part Number
35	100	8	11.5	460	TE101M035F115A <input type="checkbox"/>
	100	10	16	600	TE101M035G160A <input type="checkbox"/>
	220	10	12.5	610	TE221M035G125A <input type="checkbox"/>
	220	10	20	745	TE221M035G200A <input type="checkbox"/>
	330	10	16	790	TE331M035G160A <input type="checkbox"/>
	330	13	20	1000	TE331M035I200A <input type="checkbox"/>
	470	10	20	920	TE471M035G200A <input type="checkbox"/>
	470	13	25	1175	TE471M035I250A <input type="checkbox"/>
	1000	13	25	1235	TE102M035I250A <input type="checkbox"/>
	1000	16	31.5	1535	TE102M035J315A <input type="checkbox"/>
	1500	16	31.5	2340	TE152M035J315A <input type="checkbox"/>
	1500	16	35.5	2465	TE152M035J355A <input type="checkbox"/>
	2200	16	35.5	2695	TE222M035J355A <input type="checkbox"/>
	2200	18	35.5	2875	TE222M035K355A <input type="checkbox"/>
50	10	6.3	11	140	TE100M050E110A <input type="checkbox"/>
	22	6.3	11	200	TE220M050E110A <input type="checkbox"/>
	22	8	11.5	240	TE220M050F115A <input type="checkbox"/>
	33	8	11.5	285	TE330M050F115A <input type="checkbox"/>
	47	8	11.5	275	TE470M050F115A <input type="checkbox"/>
	47	10	12.5	315	TE470M050G125A <input type="checkbox"/>
	100	10	12.5	465	TE101M050G125A <input type="checkbox"/>
	100	10	16	515	TE101M050G160A <input type="checkbox"/>
	220	10	20	865	TE221M050G200A <input type="checkbox"/>
	220	13	20	1000	TE221M050I200A <input type="checkbox"/>
	330	13	20	1065	TE331M050I200A <input type="checkbox"/>
	330	13	25	1175	TE331M050I250A <input type="checkbox"/>
	470	16	20	1240	TE471M050J200A <input type="checkbox"/>
	470	16	25	1335	TE471M050J250A <input type="checkbox"/>
1000	16	31.5	2465	TE102M050J315A <input type="checkbox"/>	
2200	18	40	3065	TE222M050K400A <input type="checkbox"/>	
63	33	8	11.5	255	TE330M063F115A <input type="checkbox"/>
	47	10	12.5	285	TE470M063G125A <input type="checkbox"/>
	100	10	16	415	TE101M063G160A <input type="checkbox"/>
	220	13	20	845	TE221M063I200A <input type="checkbox"/>
	330	13	25	1145	TE331M063I250A <input type="checkbox"/>
	470	16	25	1455	TE471M063J250A <input type="checkbox"/>
	1000	16	31.5	1865	TE102M063J315A <input type="checkbox"/>
	1500	18	40	2735	TE152M063K400A <input type="checkbox"/>

: Enter **blank** for Standard version

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	∅ D (mm)	L (mm)	I _R = Max. Ripple Current +130°C = 100kHz (mA rms)	CapXon Part Number
100	4.7	8	11.5	115	TE4R7M100F115A ☐
	10	8	11.5	130	TE100M100F115A ☐
	22	8	11.5	190	TE220M100F115A ☐
	33	10	12.5	275	TE330M100G125A ☐
	47	10	16	285	TE470M100G160A ☐
	100	13	20	545	TE101M100I200A ☐
	220	16	25	1000	TE221M100J250A ☐
	330	16	31.5	1345	TE331M100J315A ☐
	470	18	31.5	1600	TE471M100K315A ☐
160	3.3	6.3	11	65	TE3R3M160E110A ☐
	4.7	6.3	11	70	TE4R7M160E110A ☐
	4.7	8	11.5	85	TE4R7M160F115A ☐
	5.6	8	11.5	100	TE5R6M160F115A ☐
	6.8	8	11.5	110	TE6R8M160F115A ☐
	6.8	8	16	130	TE6R8M160F160A ☐
	10	8	16	145	TE100M160F160A ☐
	15	8	16	190	TE150M160F160A ☐
	22	10	16	310	TE220M160G160A ☐
	33	10	20	360	TE330M160G200A ☐
	47	13	20	460	TE470M160I200A ☐
	68	13	25	585	TE680M160I250A ☐
	100	16	25	820	TE101M160J250A ☐
	150	16	31.5	940	TE151M160J315A ☐
	200	3.3	6.3	11	70
4.7		6.3	11	75	TE4R7M200E110A ☐
4.7		8	11.5	85	TE4R7M200F115A ☐
5.6		8	11.5	100	TE5R6M200F115A ☐
5.6		8	16	120	TE5R6M200F160A ☐
6.8		8	11.5	115	TE6R8M200F115A ☐
6.8		8	16	135	TE6R8M200F160A ☐
10		8	16	160	TE100M200F160A ☐
10		8	20	180	TE100M200F200A ☐
15		8	16	190	TE150M200F160A ☐
15		8	20	210	TE150M200F200A ☐
22		8	20	310	TE220M200F200A ☐
22		10	16	310	TE220M200G160A ☐
22		10	20	320	TE220M200G200A ☐
33		10	20	360	TE330M200G200A ☐
33		13	20	410	TE330M200I200A ☐
47		13	20	460	TE470M200I200A ☐
47		13	25	515	TE470M200I250A ☐
68		16	20	585	TE680M200J200A ☐
68	16	25	630	TE680M200J250A ☐	

☐: Enter **blank** for Standard version

☒: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R = Max. Ripple Current +130°C = 100kHz (mA rms)	CapXon Part Number
200	100	13	30	675	TE101M200I300A ☐
	100	16	25	820	TE101M200J250A ☐
	150	13	40	880	TE151M200I400A ☐
	150	16	35.5	945	TE151M200J355A ☐
250	3.3	6.3	11	75	TE3R3M250E110A ☐
	4.7	8	11.5	110	TE4R7M250F115A ☐
	5.6	8	11.5	110	TE5R6M250F115A ☐
	6.8	8	16	135	TE6R8M250F160A ☐
	8.2	8	16	165	TE8R2M250F160A ☐
	10	8	16	180	TE100M250F160A ☐
	15	8	20	220	TE150M250F200A ☐
	22	10	16	300	TE220M250G160A ☐
	33	13	20	450	TE330M250I200A ☐
	47	13	20	475	TE470M250I200A ☐
	68	13	30	640	TE680M250I300A ☐
	68	16	25	640	TE680M250J250A ☐
	100	13	35	710	TE101M250I350A ☐
	100	16	31.5	835	TE101M250J315A ☐
	150	13	50	980	TE151M250I500A ☐
	150	16	35.5	1025	TE151M250J355A ☐
350	2.2	6.3	11	60	TE2R2M350E110A ☐
	3.3	8	11.5	85	TE3R3M350F115A ☐
	4.7	8	11.5	110	TE4R7M350F115A ☐
	5.6	8	16	125	TE5R6M350F160A ☐
	6.8	8	20	150	TE6R8M350F200A ☐
	8.2	8	20	170	TE8R2M350F200A ☐
	10	10	20	195	TE100M350G200A ☐
	15	10	20	250	TE150M350G200A ☐
	22	13	20	310	TE220M350I200A ☐
	33	16	20	450	TE330M350J200A ☐
	47	16	20	540	TE470M350J200A ☐
	68	18	25	645	TE680M350K250A ☐
100	18	31.5	850	TE101M350K315A ☐	
400	2.2	6.3	11	75	TE2R2M400E110A ☐
	2.2	8	11.5	85	TE2R2M400F115A ☐
	2.2	8	16	95	TE2R2M400F160A ☐
	2.7	8	16	100	TE2R7M400F160A ☐
	3.3	8	11.5	95	TE3R3M400F115A ☐
	3.3	8	16	115	TE3R3M400F160A ☐
	3.3	8	20	125	TE3R3M400F200A ☐
	4.7	8	11.5	110	TE4R7M400F115A ☐
	4.7	8	20	125	TE4R7M400F200A ☐
	4.7	10	16	125	TE4R7M400G160A ☐

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

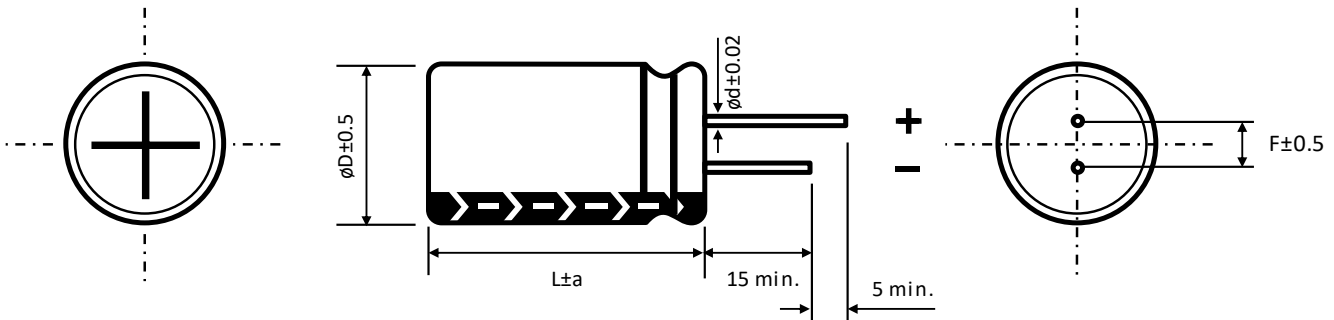
Part number shows bulk version with straight leads

V _R (V)	C _R (μF)	ø D (mm)	L (mm)	I _R - Max. Ripple Current +130°C - 100kHz (mA rms)	CapXon Part Number
400	5.6	8	20	135	TE5R6M400F200A <input type="checkbox"/>
	5.6	10	16	135	TE5R6M400G160A <input type="checkbox"/>
	5.6	10	20	150	TE5R6M400G200A <input type="checkbox"/>
	6.8	8	20	150	TE6R8M400F200A <input type="checkbox"/>
	6.8	10	16	150	TE6R8M400G160A <input type="checkbox"/>
	6.8	10	20	165	TE6R8M400G200A <input type="checkbox"/>
	8.2	10	16	170	TE8R2M400G160A <input type="checkbox"/>
	8.2	10	20	190	TE8R2M400G200A <input type="checkbox"/>
	10	10	16	190	TE100M400G160A <input type="checkbox"/>
	10	10	20	200	TE100M400G200A <input type="checkbox"/>
	10	10	25	215	TE100M400G250A <input type="checkbox"/>
	15	13	20	260	TE150M400I200A <input type="checkbox"/>
	22	13	25	345	TE220M400I250A <input type="checkbox"/>
	33	16	25	460	TE330M400J250A <input type="checkbox"/>
	47	13	40	520	TE470M400I400A <input type="checkbox"/>
	47	16	31.5	610	TE470M400J315A <input type="checkbox"/>
	47	18	25	579	TE470M400K250A <input type="checkbox"/>
	68	13	55	745	TE680M400I550A <input type="checkbox"/>
68	18	31.5	660	TE680M400K315A <input type="checkbox"/>	
100	18	40	880	TE101M400K400A <input type="checkbox"/>	
450	1	8	11.5	65	TE010M450F115A <input type="checkbox"/>
	2.2	8	16	95	TE2R2M450F160A <input type="checkbox"/>
	3.3	8	16	100	TE3R3M450F160A <input type="checkbox"/>
	4.7	8	20	125	TE4R7M450F200A <input type="checkbox"/>
	5.6	10	16	135	TE5R6M450G160A <input type="checkbox"/>
	6.8	10	20	165	TE6R8M450G200A <input type="checkbox"/>
	8.2	10	20	190	TE8R2M450G200A <input type="checkbox"/>
	10	10	25	215	TE100M450G250A <input type="checkbox"/>
	10	13	20	215	TE100M450I200A <input type="checkbox"/>
	15	13	20	260	TE150M450I200A <input type="checkbox"/>
	22	10	40	350	TE220M450G400A <input type="checkbox"/>
	22	16	20	345	TE220M450J200A <input type="checkbox"/>
	22	16	25	385	TE220M450J250A <input type="checkbox"/>
	33	10	50	450	TE330M450G500A <input type="checkbox"/>
	33	16	25	485	TE330M450J250A <input type="checkbox"/>
	33	16	31.5	545	TE330M450J315A <input type="checkbox"/>
	47	13	45	565	TE470M450I450A <input type="checkbox"/>
	47	16	35.5	600	TE470M450J355A <input type="checkbox"/>
68	18	31.5	660	TE680M450K315A <input type="checkbox"/>	
100	18	40	880	TE101M450K400A <input type="checkbox"/>	

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See "PACKAGING INFORMATION" to taped or formed products.

DIMENSIONS ▪ All dimensions in mm


ϕD	6.3	8	10	13	16	18
F	2.5	3.5	5	5	7.5	7.5
ϕd	0.5	L < 20	L ≥ 20	0.6		0.8
		0.5	0.6			

a	$\phi D < 16$	$\phi D = 16$		$\phi D = 18$	
	1.5	L = 25 to 35.5	L < 25 and L ≥ 40	L = 25 to 31.5	L < 25 and L ≥ 35.5
		1.5	2	1.5	2

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY
10 ~ 100V

C_R (μF) / Frequency (Hz)	50/60	100/120	1k	10k	50k ~ 100k
$C_R < 10$	0.35	0.42	0.6	0.8	1
10 ~ 33	0.45	0.55	0.75	0.9	1
47 ~ 330	0.6	0.7	0.85	0.95	1
470 ~ 1500	0.65	0.75	0.9	0.98	1
$1500 \leq C_R$	0.75	0.8	0.95	1	1

160 ~ 450V

C_R (μF) / Frequency (Hz)	100/120	400	1k	10k	50k ~ 100k
$C_R < 33$	0.4	0.6	0.75	0.9	1
$C_R \geq 33$	0.45	0.65	0.8	0.95	1

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines Page 293	Packaging Information Liquid Radial Page 272



DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.

TU SERIES ■ HIGH TEMP., HIGH RIPPLE, AUTOMOTIVE 135°C TYPE

KEY FEATURES



AEC-Q200



HIGH RIPPLE



HIGH TEMPERATURE

- **ALUMINUM ELECTROLYTIC CAPACITOR • THT type**
- Endurance: 135°C • 2 000 hours up to 3 000 hours
- Especially for applications with high ambient temperatures
- 150°C short-term load for 100 hours guaranteed
- AEC-Q200 version available



SPECIFICATIONS

Items		Performance Characteristics							
Operating Temperature Range		-40 ~ +135°C							
Rated Voltage Range	V _R	25 ~ 100V DC							
Surge Voltage	V _S	V _S = 1.15·V _R							
Capacitance Range	C _R	390 ~ 12000μF							
Cap. Tolerance	ΔC	±20% (120Hz • 20°C)							
Leakage Current (20°C • V _R applied)	I _{LEAK}	≤ 0.03·C _R ·V _R or 4μA, whichever is greater • After 2 minutes [I _{LEAK} (μA) ; C _R (μF) ; V _R (V)]							
Dissipation Factor % (20°C • 120Hz)	tanδ	V _R (V DC)	25	35	50	63	80	100	
		tanδ (%)	14	12	10	10	8	8	
For C _R ≥ 1000μF, add 2% per every multiple 1000μF of rated capacitance value									
Low Temperature Characteristics at 120Hz	Z ratio max.	V _R (V DC)	25	35	50	63	80	100	
		Z-25°C/Z+20°C	3	2	2	2	2	2	
		Z-40°C/Z+20°C	4	4	4	4	4	4	
		For capacitance > 1000μF							
		Z-25°C/Z+20°C	Add 0.5 for every multiple 1000μF of rated capacitance value						
Z-40°C/Z+20°C	Add 1 for every multiple 1000μF of rated capacitance value								
Lifetime Test									
Endurance 135°C & 125°C (V _R & I _R applied)	Test	135°C	3000 hours	25 ~ 50V DC					
			2000 hours	63 ~ 100V DC					
		125°C	3000 hours	25 ~ 100V DC					
	ΔC/C _R	≤ ±30% of initial measured value							
	tanδ	≤ 300% of initial specified value							
I _{Leak}	≤ initial specified value								
High Temperature Endurance 135°C & 125°C (V _R & I _R applied)	Test	135°C	2500 hours	25 ~ 50V DC					
			1500 hours	63 ~ 100V DC					
		125°C	2500 hours	25 ~ 100V DC					
	ΔC/C _R	≤ ±30% of initial measured value							
	tanδ	≤ 300% of initial specified value							
I _{Leak}	≤ initial specified value								
Shelf Life 135°C (V _R = 0)	Test	1000 hours							
	ΔC/C _R	≤ ±30% of initial measured value							
	tanδ	≤ 300% of initial specified value							
	I _{Leak}	≤ initial specified value							
Before measurement: Restore capacitor to 20°C, apply V _R for 30 min according JIS-C-5101-4									

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μ F)	ϕ D (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (Ω)	I_R • Max. Ripple Current +125°C • 100kHz (mA rms)	I_R • Max. Ripple Current +135°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
25	2000	12.5	20	0.042	2760	1690	TU202M025Z200A <input type="checkbox"/>
	3000	12.5	25	0.034	3480	2010	TU302M025Z250A <input type="checkbox"/>
	3300	16	20	0.035	3040	1860	TU332M025J200A <input type="checkbox"/>
	3600	12.5	30	0.028	4490	2900	TU362M025Z300A <input type="checkbox"/>
	4300	18	20	0.034	3250	1870	TU432M025K200A <input type="checkbox"/>
	4700	12.5	35	0.026	5140	3190	TU472M025Z350A <input type="checkbox"/>
	4700	16	25	0.028	4260	2870	TU472M025J250A <input type="checkbox"/>
	5100	12.5	40	0.025	5810	3470	TU512M025Z400A <input type="checkbox"/>
	5600	16	30	0.024	5480	3400	TU562M025J300A <input type="checkbox"/>
	6200	18	25	0.027	4500	2900	TU622M025K250A <input type="checkbox"/>
	7500	16	35	0.020	6070	3630	TU752M025J350A <input type="checkbox"/>
	7500	18	30	0.022	5600	3470	TU752M025K300A <input type="checkbox"/>
	9100	16	40	0.019	6810	3930	TU912M025J400A <input type="checkbox"/>
	10000	18	35	0.019	6280	3750	TU103M025K350A <input type="checkbox"/>
12000	18	40	0.018	7070	4080	TU123M025K400A <input type="checkbox"/>	
35	1300	12.5	20	0.042	2760	1690	TU132M035Z200A <input type="checkbox"/>
	1800	12.5	25	0.033	3480	2010	TU182M035Z250A <input type="checkbox"/>
	2000	16	20	0.035	3040	1860	TU202M035J200A <input type="checkbox"/>
	2200	12.5	30	0.028	4490	2900	TU222M035Z300A <input type="checkbox"/>
	2400	18	20	0.034	3250	1870	TU242M035K200A <input type="checkbox"/>
	2700	12.5	35	0.030	5140	3190	TU272M035Z350A <input type="checkbox"/>
	3000	16	25	0.028	4260	2870	TU302M035J250A <input type="checkbox"/>
	3300	12.5	40	0.024	5810	3470	TU332M035Z400A <input type="checkbox"/>
	3600	16	30	0.023	5480	3400	TU362M035J300A <input type="checkbox"/>
	3900	18	25	0.027	4500	2900	TU392M035K250A <input type="checkbox"/>
	4300	16	35	0.020	6070	3630	TU432M035J350A <input type="checkbox"/>
	4700	18	30	0.022	5600	3470	TU472M035K300A <input type="checkbox"/>
	5600	16	40	0.021	6810	3930	TU562M035J400A <input type="checkbox"/>
	6200	18	35	0.021	6280	3750	TU622M035K350A <input type="checkbox"/>
7500	18	40	0.020	7070	4080	TU752M035K400A <input type="checkbox"/>	
50	620	12.5	20	0.073	2400	1470	TU621M050Z200A <input type="checkbox"/>
	820	12.5	25	0.058	3350	2260	TU821M050Z250A <input type="checkbox"/>
	1000	16	20	0.050	2960	1870	TU102M050J200A <input type="checkbox"/>
	1100	12.5	30	0.048	4220	2520	TU112M050Z300A <input type="checkbox"/>
	1300	12.5	35	0.042	4810	2780	TU132M050Z350A <input type="checkbox"/>
	1300	16	25	0.042	4040	2500	TU132M050J250A <input type="checkbox"/>
	1300	18	20	0.049	3130	2110	TU132M050K200A <input type="checkbox"/>
	1600	12.5	40	0.041	5240	3020	TU162M050Z400A <input type="checkbox"/>
1600	16	30	0.038	5130	2960	TU162M050J300A <input type="checkbox"/>	

: Enter **blank** for Standard version

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See "PACKAGING INFORMATION" to taped or formed products.

STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z - Max. Impedance +20°C • 100kHz (Ω)	I_R - Max. Ripple Current +125°C • 100kHz (mA rms)	I_R - Max. Ripple Current +135°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
50	1800	18	25	0.038	4230	2530	TU182M050K250A <input type="checkbox"/>
	2200	16	35	0.029	5480	3160	TU222M050J350A <input type="checkbox"/>
	2400	18	30	0.028	5240	3020	TU242M050K300A <input type="checkbox"/>
	2700	16	40	0.025	5930	3420	TU272M050J400A <input type="checkbox"/>
	3000	18	35	0.024	5870	3390	TU302M050K350A <input type="checkbox"/>
	3600	18	40	0.023	6420	3700	TU362M050K400A <input type="checkbox"/>
63	390	12.5	20	0.074	1640	1420	TU391M063Z200A <input type="checkbox"/>
	560	12.5	25	0.054	2520	2050	TU561M063Z250A <input type="checkbox"/>
	680	16	20	0.053	2140	1910	TU681M063J200A <input type="checkbox"/>
	750	12.5	30	0.053	3110	2630	TU751M063Z300A <input type="checkbox"/>
	910	12.5	35	0.038	3760	2970	TU911M063Z350A <input type="checkbox"/>
	910	18	20	0.048	2350	2100	TU911M063K200A <input type="checkbox"/>
	1000	16	25	0.038	2940	2680	TU102M063J250A <input type="checkbox"/>
	1100	12.5	40	0.031	4610	3260	TU112M063Z400A <input type="checkbox"/>
	1200	16	30	0.034	3860	3050	TU122M063J300A <input type="checkbox"/>
	1300	18	25	0.035	3080	2810	TU132M063K250A <input type="checkbox"/>
	1600	16	35	0.027	4590	3420	TU162M063J350A <input type="checkbox"/>
	1600	18	30	0.028	4080	3220	TU162M063K300A <input type="checkbox"/>
	1800	16	40	0.025	5190	3670	TU182M063J400A <input type="checkbox"/>
	2200	18	35	0.023	5220	3690	TU222M063K350A <input type="checkbox"/>
2400	18	40	0.021	5660	3820	TU242M063K400A <input type="checkbox"/>	
80	270	12.5	20	0.074	1610	1400	TU271M080Z200A <input type="checkbox"/>
	390	12.5	25	0.052	2520	2050	TU391M080Z250A <input type="checkbox"/>
	470	16	20	0.053	2140	1910	TU471M080J200A <input type="checkbox"/>
	510	12.5	30	0.042	3110	2630	TU511M080Z300A <input type="checkbox"/>
	620	12.5	35	0.038	3745	2960	TU621M080Z350A <input type="checkbox"/>
	620	18	20	0.044	2350	2100	TU621M080K200A <input type="checkbox"/>
	680	16	25	0.046	2900	2650	TU681M080J250A <input type="checkbox"/>
	750	12.5	40	0.035	4610	3260	TU751M080Z400A <input type="checkbox"/>
	750	16	30	0.038	3860	3050	TU751M080J300A <input type="checkbox"/>
	820	18	25	0.033	3080	2810	TU821M080K250A <input type="checkbox"/>
	1000	16	35	0.032	4570	3410	TU102M080J350A <input type="checkbox"/>
	1100	18	30	0.034	4080	3220	TU112M080K300A <input type="checkbox"/>
	1300	16	40	0.033	5190	3670	TU132M080J400A <input type="checkbox"/>
	1300	18	35	0.028	5190	3670	TU132M080K350A <input type="checkbox"/>
1600	18	40	0.026	5640	3810	TU162M080K400A <input type="checkbox"/>	

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STANDARD RATINGS

Part number shows bulk version with straight leads

V_R (V)	C_R (μF)	ϕD (mm)	L (mm)	Z • Max. Impedance +20°C • 100kHz (Ω)	I_R • Max. Ripple Current +125°C • 100kHz (mA rms)	I_R • Max. Ripple Current +135°C • 100kHz (mA rms)	CapXon Part Number Automotive Type
100	160	12.5	20	0.090	1580	1410	TU161M100Z200A <input type="checkbox"/>
	220	12.5	25	0.068	2120	1950	TU221M100Z250A <input type="checkbox"/>
	270	16	20	0.067	2050	1670	TU271M100J200A <input type="checkbox"/>
	300	12.5	30	0.052	2950	2330	TU301M100Z300A <input type="checkbox"/>
	360	12.5	35	0.045	3530	2630	TU361M100Z350A <input type="checkbox"/>
	360	18	20	0.061	2270	1860	TU361M100K200A <input type="checkbox"/>
	390	16	25	0.048	2790	2340	TU391M100J250A <input type="checkbox"/>
	430	12.5	40	0.038	4140	2920	TU431M100Z400A <input type="checkbox"/>
	470	16	30	0.041	3440	2720	TU471M100J300A <input type="checkbox"/>
	510	18	25	0.045	2920	2470	TU511M100K250A <input type="checkbox"/>
	560	16	35	0.036	4150	2930	TU561M100J350A <input type="checkbox"/>
	620	18	30	0.037	3920	2920	TU621M100K300A <input type="checkbox"/>
	750	16	40	0.029	5020	3380	TU751M100J400A <input type="checkbox"/>
	820	18	35	0.030	4710	3330	TU821M100K350A <input type="checkbox"/>
910	18	40	0.028	5260	3550	TU911M100K400A <input type="checkbox"/>	

: Enter **blank** for Standard version

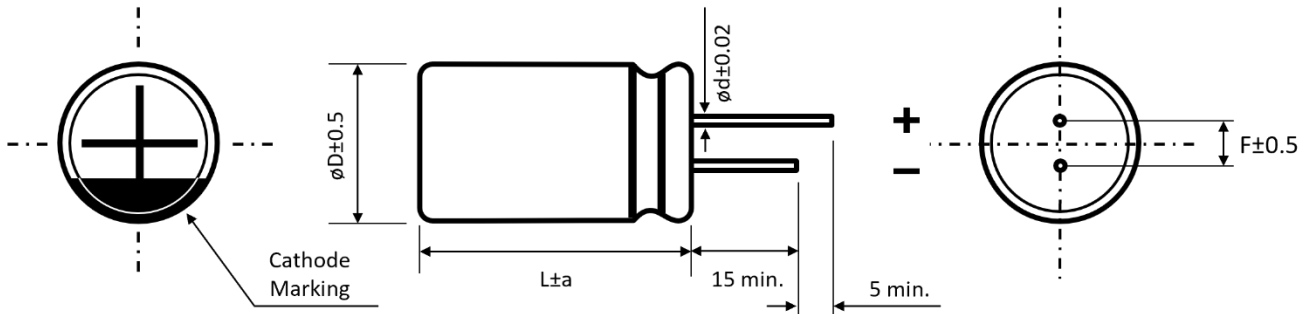
: Enter **X** for AEC-Q200 version

See "PACKAGING INFORMATION" to taped or formed products.

MULTIPLIER K_f for RIPPLE CURRENT vs. FREQUENCY

C_R (μF) / Frequency (Hz)	100/120	1k	10k	50k ~ 100k
$C_R \leq 160$	0.4	0.75	0.90	1
$160 < C_R \leq 680$	0.5	0.85	0.94	1
$680 < C_R \leq 2000$	0.6	0.87	0.95	1
$2200 < C_R \leq 4300$	0.75	0.9	0.95	1
$4300 < C_R$	0.85	0.95	0.98	1

DIMENSIONS ▪ All dimensions in mm



ϕD	12.5	16		18	
F	5.0	7.5		7.5	
ϕd	0.6	0.8			
a	1.5	L = 25 to 35	L < 25 and L ≥ 40	L = 25 to 30	L < 25 and L ≥ 35
		1.5	2	1.5	2

PRECAUTIONS, GUIDELINES AND PACKAGING INFORMATION

Unless otherwise agreed in individual specifications, all products are subject to our “General Precautions and Guidelines” as well as our “Packaging Information”. Please refer to the following links in the table.

General Precautions and Guidelines	Packaging Information Liquid Radial
Page 293	Page 272

DISCLAIMER

All product related data (e.g. specification, statements and general information) are subject to change without any notice. It is necessary that the customer observes all product related technical / application information and handling instructions.

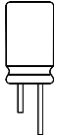
CapXon products are designed and manufactured according to severe quality and safety standards. Under no circumstance, CapXon warrants that any CapXon product is suitable for the purposes intended for your application, even CapXon knows the application. It is customer's duty and obligation to check and make sure that CapXon products are suitable for the purposes intended and select the correct and proper CapXon product. Customers are requested to perform a sufficient validation and reliability evaluation to assure needed safety level and reliability performance by suitable designs and to apply proper safeguards (e.g. redundancies, protective circuits).

Particular operating conditions (ambient temperature, ripple current, voltage, thermal resistance, etc.) as well as storage, production or assembly may affect the performance and the lifetime of the capacitor. Please consult CapXon for lifetime estimation, failure mode considerations or worst-case scenarios according to the product technology, product tolerances / deviations or change of the characteristics of the capacitor due to shipment, storage, handling, production and usage.

For aerospace or military application, life-saving, life-sustaining, safety critical applications or any application where failure may cause severe personal injury or death, please consult us before design-in the capacitor in your application.

Except for the written expressed warranties, CapXon does not impliedly, by assumption or whatever else, warrant, undertake, promise any other warranty or guaranty for any CapXon product.

For further information, please visit our website www.capxongroup.com or contact CapXon directly.



PRODUCT CODE - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

THT type example:

GH series ▪ 330µF ▪ 80V ▪ ±20% ▪ Ø 13mm ▪ H 20mm ▪ P 5mm ▪ Tape Ammo ▪ AEC-Q200

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
G	H	3	3	1	M	0	8	0	I	2	0	0	E	T	A	X	-	-	-	
Series		Capacitance			Capacitance tolerance	Voltage			Case Ø (mm)	Height (mm)			Type code	Taping / lead treatment *		Special requirement				
Code		µF	Code		%	Code		Volt	Code		ØD	Code		H	Code		Type	Code		Special
OR1		0.1	H		±5	004		4	B		4	050		5	A		Without lead treatment	X		AEC-Q200
R47		0.47	K		±10	6R3		6.3	C		5	070		7	E		With lead treatment	See datasheet for reference		
010		1	S		±15	010		10	E		6.3	090		9						
4R7		4.7	N		±30	016		16	G		10	115		11.5						
100		10	D		±40	025		25	H		12	125		12.5						
220		22	I		+5 to +20	035		35	Z		12.5	130		13						
101		100	B		0 to -20	050		50	I		13	140		14						
561		560	G		0 to +10	063		63	100		100	150		15						
102		1000	Z		0 to +20	100		100	K		16	160		16						
472		4700	Y		0 to +30	160		160	L		20	200		20						
103		10000	X		0 to +40	200		200	A		22	250		25						
333		33000	A		0 to +50	220		220	J		250	300		30						
			J		-5 to +20	250		250	C		350	315		31.5						
			C		-5 to +30	350		350	E		400	350		35						
			E		-8 to +5	400		400	V		420	355		35.5						
			V		-10 to +20	420		420	Q		450	400		40						
			Q		-10 to +30	450		450	T		500	450		45						
			T		-10 to +50	500		500	W			500		50						
			W		-20 to +10				P			550		55						
			P		-15 to +20				L			600		60						
			L		-25 to +20				U											
			U		-30 to 0				F											
			F		-35 to 0				O											
			O		-50 to 0															

* See chapter taping or lead treatment for further information
Please consult CapXon for further assistance

MARKING - RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Aluminum Electrolytic Capacitor - Radial type		Standard type	AEC-Q200 type	
	CapXon:	Manufacturer trademark		
	330µF:	Nominal capacitance		
	80V:	Rated voltage (V) ▪ Standard type		
		(-) polarity (Cathode indicate)		
	GH:	Series		
105°C:	Maximum operating temperature			
P1944:	Production datacode year/week (ex. 2019/CW44)			
X:	AEC-Q200 type			
VENT:	Safety vent			
				Front side
				Back side

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Possible tape versions in AMMO packaging with lead space F and taping ordering code.
All dimensions in mm.

D	Diameter	4	5	6.3	8	10	12.5	13	14.5	16	18	20	22	25	Code
F	Lead space Straight leads	1.5	2	2.5	3.5	5	5	5	7.5	7.5	7.5	10	10	10	
F	Ammo Tape	2	2	-	-	-	-	-	-	-	-	-	-	-	TB
	Ammo Tape	2.5	2.5	2.5	-	-	-	-	-	-	-	-	-	-	TC
	Ammo Tape	-	-	-	3.5	-	-	-	-	-	-	-	-	-	TD
	Ammo Tape	5	5	5	5	5	5	5	-	-	-	-	-	-	TA
	Ammo Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	TE
	Ammo Tape	-	-	-	-	-	-	5	-	-	-	-	-	-	PA
	Ammo Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	PE

Possible tape versions in REEL packaging with lead space F and taping ordering code.
All dimensions in mm.

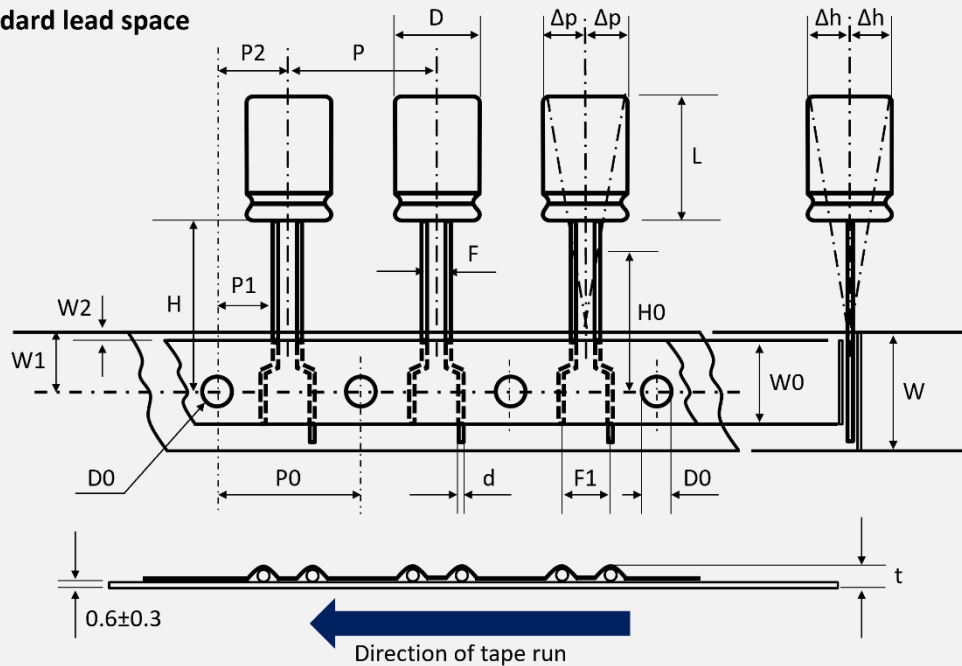
D	Diameter	4	5	6.3	8	10	12.5	13	14.5	16	18	20	22	25	Code
F	Lead space Straight leads	1.5	2	2.5	3.5	5	5	5	7.5	7.5	7.5	10	10	10	
F	Reel Tape	2	2	-	-	-	-	-	-	-	-	-	-	-	RB
	Reel Tape	2.5	2.5	2.5	-	-	-	-	-	-	-	-	-	-	RC
	Reel Tape	-	-	-	3.5	-	-	-	-	-	-	-	-	-	RD
	Reel Tape	5	5	5	5	5	5	5	-	-	-	-	-	-	RA
	Reel Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	RE
	Reel Tape	-	-	-	-	-	-	5	-	-	-	-	-	-	QA
	Reel Tape	-	-	-	-	-	-	-	7.5	7.5	7.5	-	-	-	QE

Details to the exact tape dimensions can be found in the following drawings on the next pages:

- T1 taping** ▪ ØD 5mm ▪ standard lead space
- T2 taping** ▪ ØD 4 and 5mm ▪ wide lead space
- T3 taping** ▪ ØD 6.3 to 13mm ▪ standard lead space
- T4 taping** ▪ ØD 4 to 8mm ▪ lead space F = 5mm
- T5 taping** ▪ ØD ≥ 12.5mm ▪ wide component space
- T6 taping** ▪ ØD ≥ 14.5mm ▪ standard component space

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

T1 taping • ØD 5mm • standard lead space



Example

F	H	3 3 0	M	0 3 5	C	1 1 0	E	T B	-	-	-	-
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement				

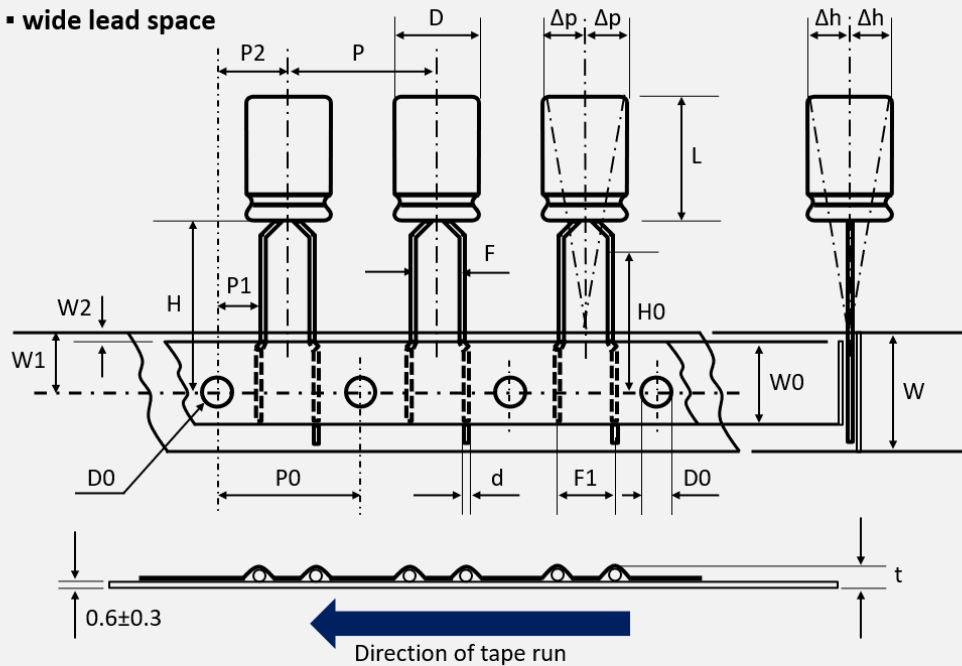
All dimensions in mm

	D	L	d	P	P0	P1	P2	F	F1	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
Tol	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	+0.4 -0.2	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	
Item	5	5-7 (+1) 9 (±2) 11-15 (±1.5)	0.45 0.5 0.5	12.7	12.7	5.35	6.35	2	5	18	11	9	2	18.5	4	1	1	1.5	TB

Table and example show the ammo package version. Coding RB instead of TB means the reel package version. In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

T2 taping • ØD 4 and 5mm • wide lead space



Example

S	W	1 0 1	M	0 0 4	C	0 5 0	E	T C	- - - -
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

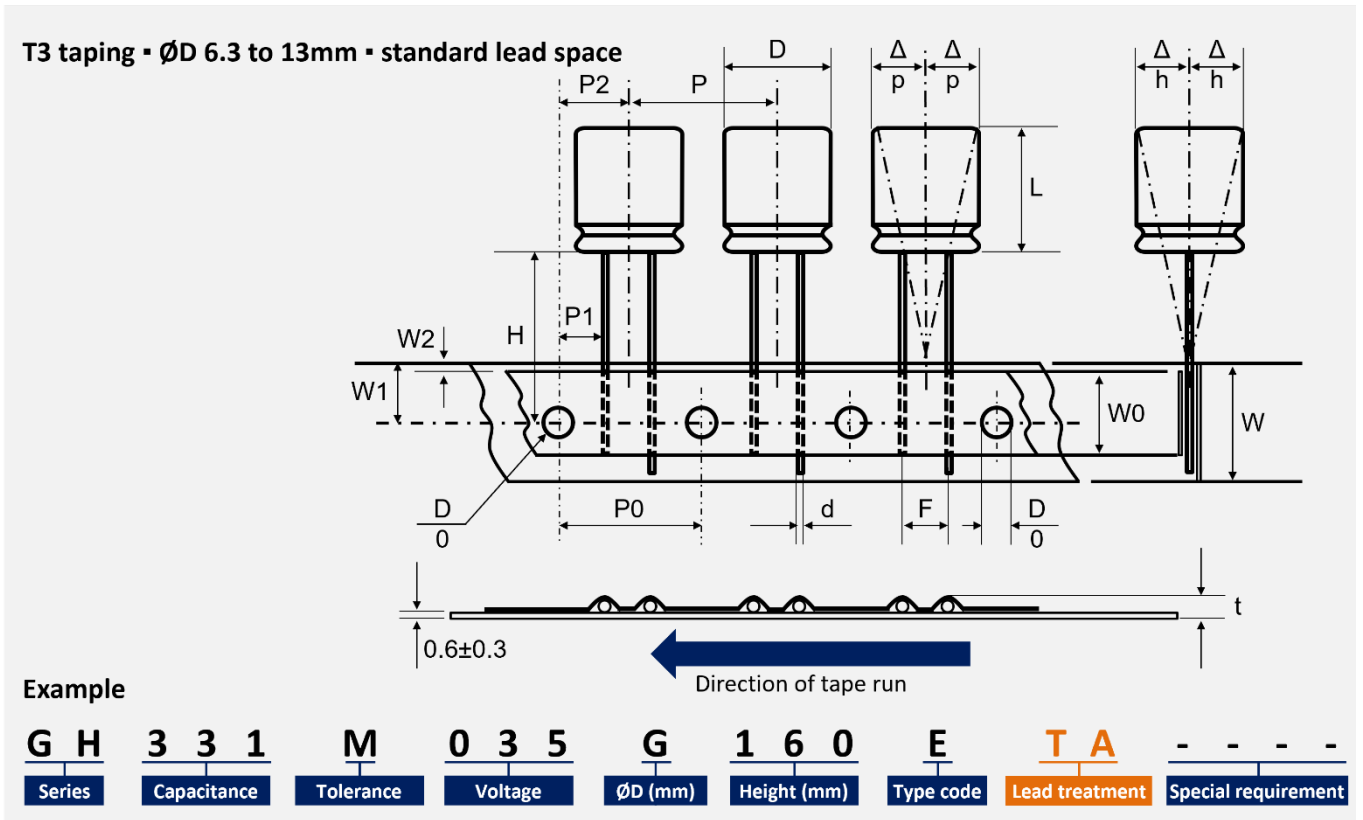
All dimensions in mm

	D	L	d	P	P0	P1	P2	F	F1	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
Tol	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	+0.4 -0.2	±0.5	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	Code
Item	4	5-7 (+1)	0.45	12.7	12.7	5.35 5.1	6.35	2 2.5	5	18	11	9	2	18.5	4	1	1	1.5	TB TC
		5	5-7 (+1) 9 (±2) 11-15 (±1.5)	0.45 0.5 0.5	12.7	12.7	5.1	6.35	2.5	5	18	11	9	2	18.5	4	1	1	1.5

Table and example show the ammo package version. Coding RB or RC instead of TB or TC means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS



All dimensions in mm

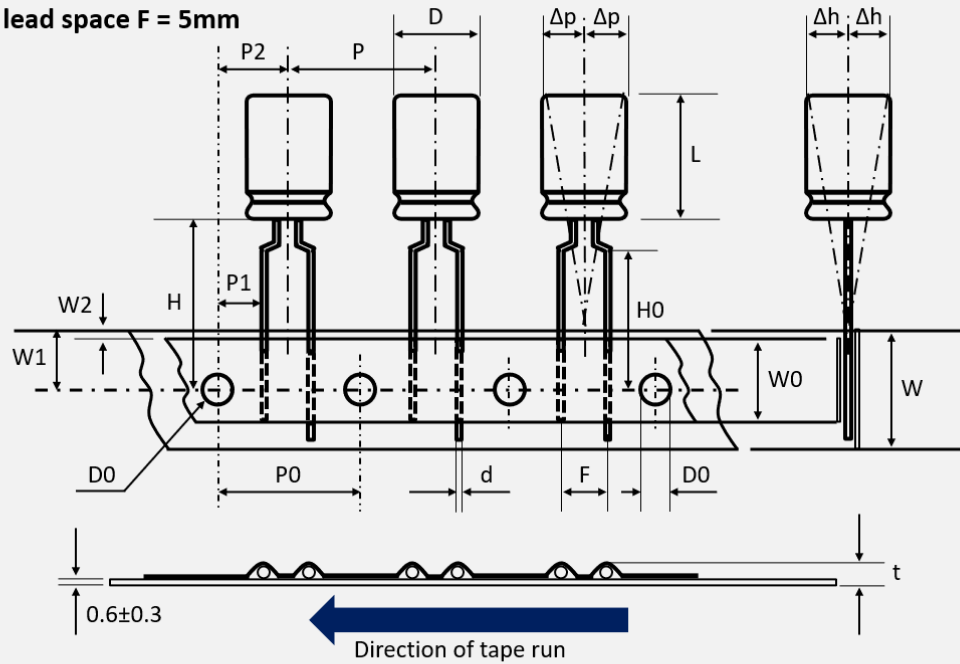
	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
Tol	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	+0.4 -0.2	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.2	Max	Max	Max	
Item	6.3	5 (+1)	0.45	12.7	12.7	5.1	6.35	2.5	18	11	9	2	18.5	4	1	1	1.5	TC
		7 (+1)	0.5															
		9 (±2)	0.5															
		11-25 (±1.5)	0.5															
	8	5 (+1)	0.45	12.7	12.7	4.6	6.35	3.5	18	11	9	2	18.5	4	1	1	1.5	TD
		7 (+1)	0.5															
		9 (±2)	0.5															
		11.5-16 (±1.5)	0.5															
	10	7-9 (±2)	0.6	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	4	1	1	1.5	TA
		12.3-35 (±1.5)	0.6															
(12.5)	13-16 (+2)	0.6	15	15	5	7.5	5	18	15	9	2	18.5	4	2	2	1.5	TA	
13	20-35 (±1.5)	0.6																

Table and example show the ammo package version. Coding RA, RC or RD instead of TA, TC or TD means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

T4 taping • ØD 4 to 8mm • lead space F = 5mm



Example

G	H	4 7 0	M	0 6 3	F	1 1 5	E	T A	- - - -
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

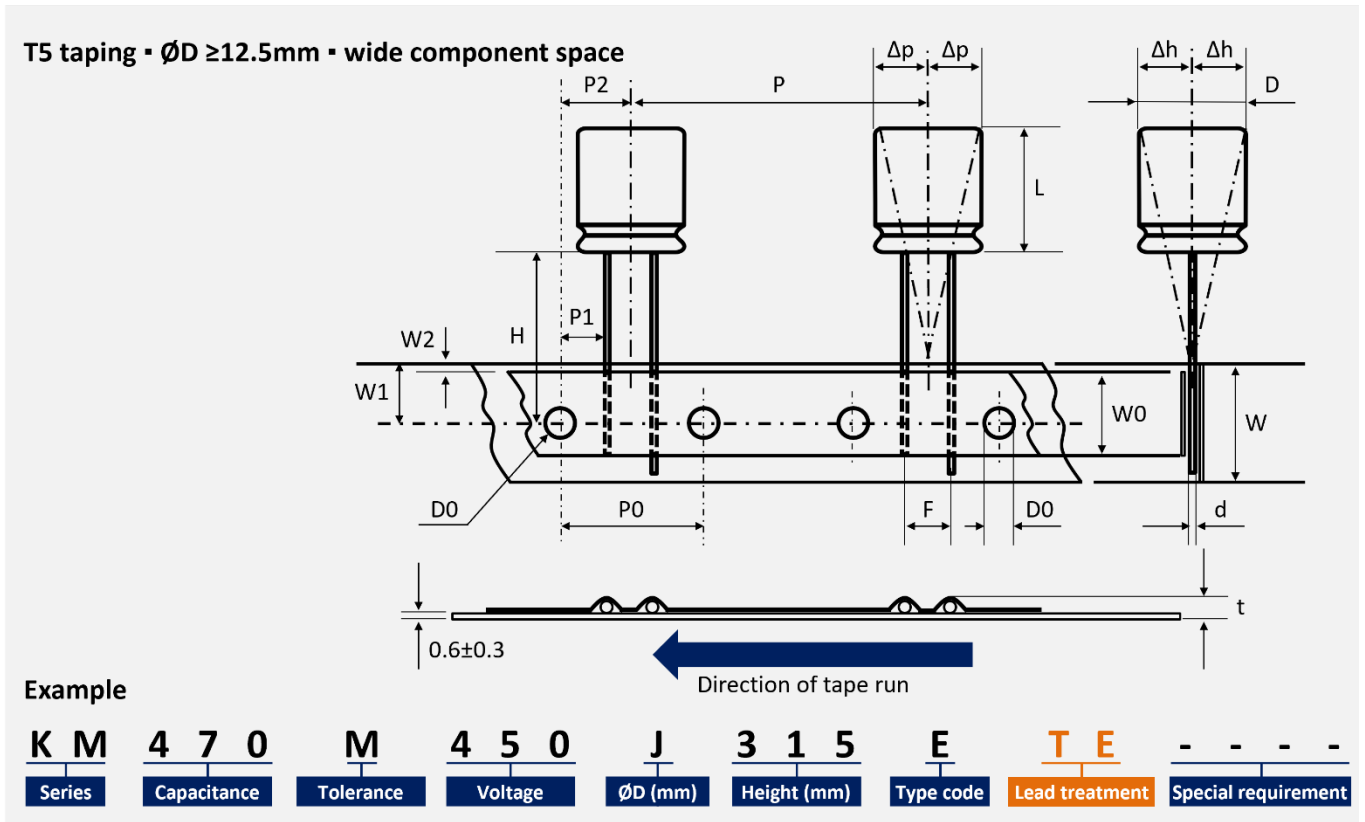
All dimensions in mm

	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	H0	D0	Δh	Δp	t	Code
Tol	±0.5	-	±0.02	±1.0	±0.2	±0.7	±1.3	+0.4 -0.2	±0.5	±0.5	±0.5	Max	+0.75 -0.5	±0.5	±0.2	Max	Max	Max	Code
Item	4	5-7 (+1)	0.45	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	16	4	1	1	1.5	TA
		5-7 (+1)	0.45																
	5	9 (±2)	0.5	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	16	4	1	1	1.5	
		11-15 (±1.5)	0.5																
	6.3	5 (+1)	0.45	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	16	4	1	1	1.5	
		7 (+1)	0.5																
		9 (±2)	0.5																
		11-25 (±1.5)	0.5																
	8	5 (+1)	0.45	12.7	12.7	3.85	6.35	5	18	11	9	2	18.5	16	4	1	1	1	
		7 (+1)	0.5																
		9 (±2)	0.5																
		11.5-16 (±1.5)	0.5																
20-30 (±1.5)		0.6																	

Table and example show the ammo package version. Coding RA instead of TA means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS



All dimensions in mm

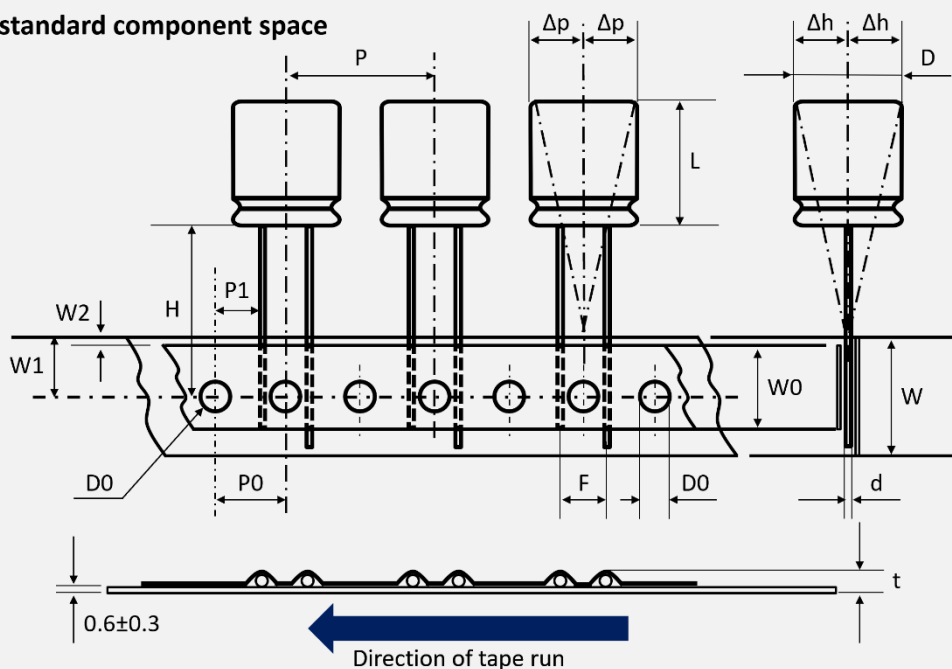
	D	L	d	P	P0	P1	P2	F	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
Tol	± 0.5	-	± 0.02	± 1.0	± 0.2	± 0.7	± 1.3	+0.4 -0.2	± 0.5	± 0.5	± 0.5	Max	+0.75 -0.5	± 0.2	Max	Max	Max	Code
Item	13 (12.5)	13-16 (+2) 20-35 (± 1.5)	0.6	25.4	12.7	3.85	6.35	5	18	15	9	2	18.5	4	2	2	1.5	PA
	14.5	18-35 (± 2)	0.8	30	15	3.75	7.5	7.5	18	15	9	2	18.5	4	2	2	1.5	TE
	16	16-21 (± 2) 25-35.5 (± 1.5)	0.8	30	15	3.75	7.5	7.5	18	15	9	2	18.5	4	2	2	1.5	
		18	16-21 (± 2) 25-31.5 (± 1.5) 35.5 (± 2)	0.8	30	15	3.75	7.5	7.5	18	15	9	2	18.5	4	2	2	

Table and example show the ammo package version. Coding RE or QA instead of TE or PA means the reel package version.

In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

T6 taping - $\varnothing D \geq 14.5\text{mm}$ - standard component space



Example

F	L	4 7 0	M	4 5 0	J	3 1 5	E	P E	- - - -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement	

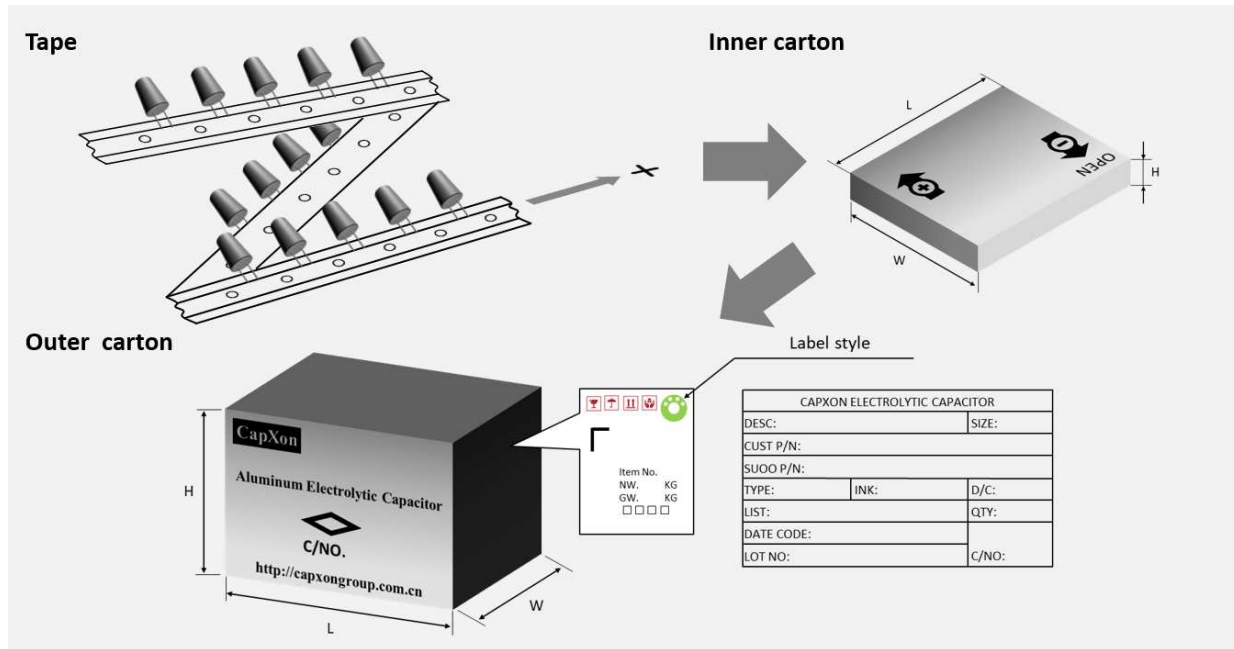
All dimensions in mm

	D	L	d	P	P0	P1	F	W	W0	W1	W2	H	D0	Δh	Δp	t	Code
Tol	± 0.5	-	± 0.02	± 1.0	± 0.2	± 0.7	+0.4 -0.2	± 0.5	± 0.5	± 0.5	Max	+0.75 -0.5	± 0.2	Max	Max	Max	Code
Item	14.5	18-35 (± 2)	0.8	25.4	12.7	8.95	7.5	18	15	9	2	18.5	4	2	2	1.5	PE
	16	16-21 (± 2)	0.8	25.4	12.7	8.95	7.5	18	15	9	2	18.5	4	2	2	1.5	
		25-35.5 (± 1.5)															
	18	16-21 (± 2)	0.8	25.4	12.7	8.95	7.5	18	15	9	2	18.5	4	2	2	1.5	
25-31.5 (± 1.5) 35.5 (± 2)																	

Table and example show the ammo package version. Coding QE instead of PE means the reel package version.

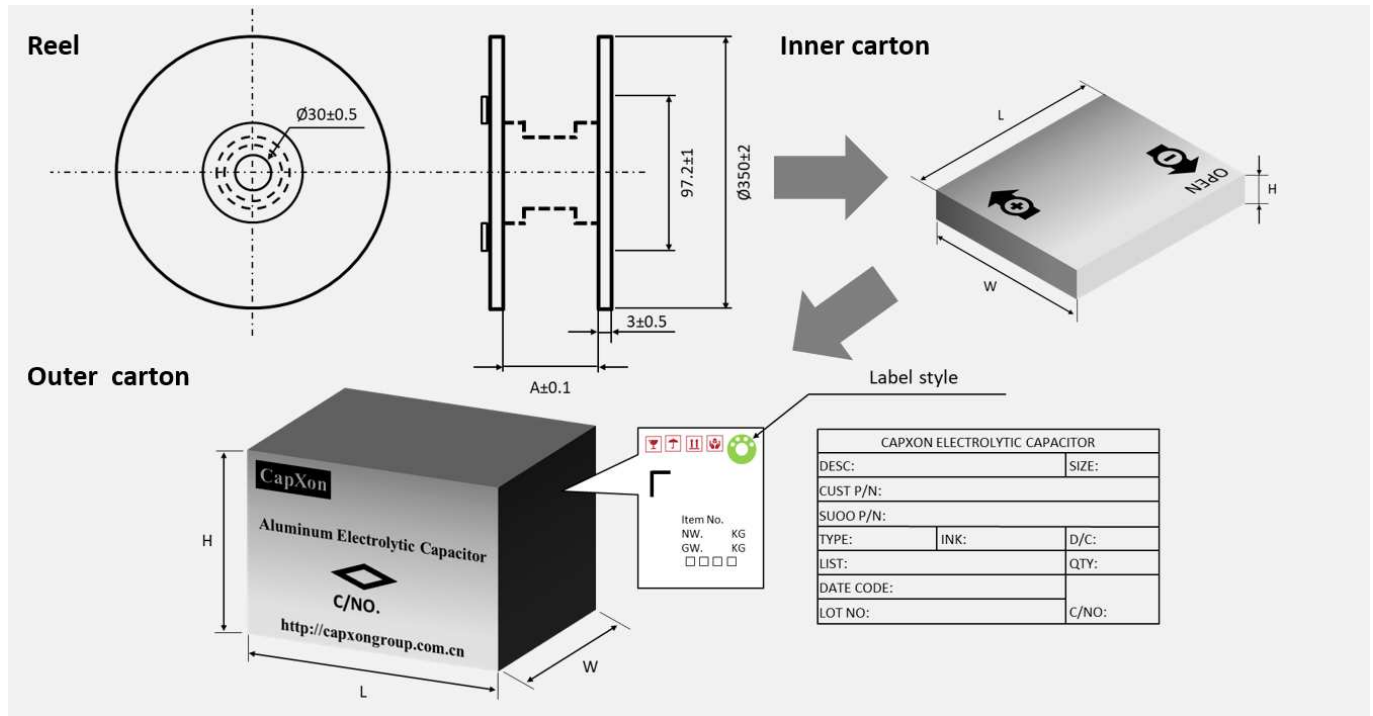
In the case of polarized capacitors, the negative lead (cathode) is in the front, i.e. in the direction of tape run.

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS • AMMO PACK



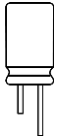
∅ D (mm)	Length L (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	All	2500	331 x 227 x 51	25000	474 x 343 x 285	China	85322200
5	All	2000	331 x 227 x 51	20000	474 x 343 x 285	China	85322200
6.3	5 to 15	1500	331 x 227 x 51	15000	474 x 343 x 285	China	85322200
	17 to 20	1300	327 x 191 x 57	13000	403 x 343 x 312	China	85322200
8	5 to 20	800	327 x 191 x 57	8000	403 x 343 x 312	China	85322200
	25 to 30	800	332 x 216 x 64	6400	474 x 343 x 285	China	85322200
10	7 to 15	600	331 x 227 x 51	6000	474 x 343 x 285	China	85322200
	16 to 20	500	327 x 191 x 57	5000	403 x 343 x 312	China	85322200
	21 to 25	500	332 x 190 x 60	2500	351 x 208 x 334	China	85322200
	26 to 30	500	332 x 216 x 64	4000	474 x 343 x 285	China	85322200
12.5 (P0=15)	35	500	310 x 260 x 71	2500	330 x 278 x 380	China	85322200
	13 to 25	300	327 x 191 x 57	3000	403 x 343 x 312	China	85322200
	26 to 30	300	332 x 216 x 64	2400	474 x 343 x 285	China	85322200
12.5 (P0=12.7)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	13 to 25	300	327 x 191 x 57	3000	403 x 343 x 312	China	85322200
	26 to 30	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
13 (P0=15)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	13 to 25	300	327 x 191 x 57	3000	403 x 343 x 312	China	85322200
	26 to 30	300	332 x 216 x 64	2400	474 x 343 x 285	China	85322200
13 (P0=12.7)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	13 to 25	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	26 to 30	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
16 (P0=15)	35	400	318 x 254 x 70	2000	330 x 278 x 380	China	85322200
	16 to 20	200	327 x 191 x 57	2000	403 x 343 x 312	China	85322200
	21 to 25	250	318 x 254 x 67	2000	528 x 331 x 281	China	85322200
16 (P0=12.7)	> 25	250	310 x 260 x 71	1250	330 x 278 x 380	China	85322200
	16 to 20	200	327 x 191 x 57	2000	403 x 343 x 312	China	85322200
	21 to 25	200	332 x 216 x 64	1600	474 x 343 x 285	China	85322200
18	> 25	250	310 x 260 x 71	1250	330 x 278 x 380	China	85322200
	16 to 25	200	310 x 260 x 61	1000	330 x 278 x 333	China	85322200
	> 25	200	310 x 260 x 71	1000	330 x 278 x 380	China	85322200

TAPING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS • REEL PACK



Ø D (mm)	Length L (mm)	A (mm)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
4	All	45	1800	350 x 350 x 105	10800	375 x 375 x 343	China	85322200
5	All	45	1300	350 x 350 x 105	7800	375 x 375 x 343	China	85322200
6.3	All	45	1000	350 x 350 x 105	6000	375 x 375 x 343	China	85322200
8	5 to 17	45	800	350 x 350 x 105	4800	375 x 375 x 343	China	85322200
	18 to 28	55	800	349 x 349 x 121	4800	375 x 375 x 385	China	85322200
10	7 to 17	45	600	350 x 350 x 105	3600	375 x 375 x 343	China	85322200
	18 to 28	55	600	349 x 349 x 121	3600	375 x 375 x 385	China	85322200
12.5	13 to 17	45	400	350 x 350 x 105	1800	375 x 375 x 343	China	85322200
	18 to 28	55	400	349 x 349 x 121	1800	375 x 375 x 385	China	85322200
13	13 to 17	45	300	350 x 350 x 105	1800	375 x 375 x 343	China	85322200
	18 to 28	55	300	349 x 349 x 121	1800	375 x 375 x 385	China	85322200
16	13 to 17	45	200	350 x 350 x 105	1200	375 x 375 x 343	China	85322200
	18 to 28	55	200	349 x 349 x 121	1200	375 x 375 x 385	China	85322200

PACKAGING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS STRAIGHT LEADS • BULK PACK

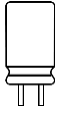


∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
3	5	1000/bag	20000	293 x 181 x 223	60000	562 x 318 x 238	China	85322200
4	5 to 7	1000/bag	15000	293 x 181 x 223	45000	562 x 318 x 238	China	85322200
5	5 to 9	1000/bag	15000	293 x 181 x 223	45000	562 x 318 x 238	China	85322200
	11 to 12	1000/bag	10000	293 x 181 x 223	30000	562 x 318 x 238	China	85322200
6.3	5 to 9	1000/bag	10000	293 x 181 x 223	30000	562 x 318 x 238	China	85322200
	11 to 20	1000/bag	8000	293 x 181 x 223	24000	562 x 318 x 238	China	85322200
8	5 to 9	500/bag	6000	293 x 181 x 223	18000	562 x 318 x 238	China	85322200
	11 to 14	500/bag	5000	293 x 181 x 223	15000	562 x 318 x 238	China	85322200
	15 to 16	500/bag	4000	293 x 181 x 223	12000	562 x 318 x 238	China	85322200
	20	500/bag	3000	293 x 181 x 223	9000	562 x 318 x 238	China	85322200
	25 to 30	400/bag	2400	293 x 181 x 223	7200	562 x 318 x 238	China	85322200
	30 to 34	40/line	840	334 x 217 x 68	6720	448 x 354 x 295	China	85322200
	35 to 41	40/line	840	334 x 217 x 79.5	5040	448 x 354 x 260	China	85322200
	42 to 51	40/line	840	334 x 217 x 92	5040	448 x 354 x 295	China	85322200
10	52 to 60	40/line	840	334 x 217 x 92	5040	448 x 354 x 295	China	85322200
	≤ 13	500/bag	4000	293 x 181 x 223	12000	562 x 318 x 238	China	85322200
	14 to 17	500/bag	3000	293 x 181 x 223	9000	562 x 318 x 238	China	85322200
	20	500/bag	2500	293 x 181 x 223	7500	562 x 318 x 238	China	85322200
	24 to 25	400/bag	2000	293 x 181 x 223	6000	562 x 318 x 238	China	85322200
	30 to 34	32/line	544	334 x 217 x 68	4352	448 x 354 x 295	China	85322200
	35	32/line	544	334 x 217 x 79.5	3264	448 x 354 x 260	China	85322200
	40 to 51	32/line	544	334 x 217 x 92	3264	448 x 354 x 295	China	85322200
12.5	55 to 60	32/line	544	334 x 217 x 92	3264	448 x 354 x 295	China	85322200
	≤ 21	300/bag	1500	293 x 181 x 223	4500	562 x 318 x 238	China	85322200
	25	200/bag	1200	293 x 181 x 223	3600	562 x 318 x 238	China	85322200
	30	200/bag	1000	293 x 181 x 223	3000	562 x 318 x 238	China	85322200
	35	25/line	350	334 x 217 x 79.5	2100	448 x 354 x 260	China	85322200
13	40 to 50	26/line	364	334 x 217 x 92	2184	448 x 354 x 295	China	85322200
	≤ 21	300/bag	1500	293 x 181 x 223	4500	562 x 318 x 238	China	85322200
	25 to 31.5	25/line	350	334 x 217 x 68	2800	448 x 354 x 295	China	85322200
	35.5 to 41	25/line	350	334 x 217 x 79.5	2100	448 x 354 x 260	China	85322200
	42 to 51	25/line	350	334 x 217 x 92	2100	448 x 354 x 295	China	85322200
14.5	55 to 60	25/line	350	334 x 217 x 92	2100	448 x 354 x 295	China	85322200
	31.5 to 32	20/line	220	304 x 196 x 68	1760	415 x 320 x 295	China	85322200
	37	20/line	220	304 x 196 x 92	1320	415 x 320 x 295	China	85322200
16	15 to 21	18/line	180	304 x 196 x 55	1800	415 x 320 x 295	China	85322200
	25 to 31.5	18/line	180	304 x 196 x 68	1440	415 x 320 x 295	China	85322200
	35.5 to 41	18/line	180	305 x 197 x 79.5	1080	415 x 320 x 260	China	85322200
	45 to 50	18/line	180	304 x 196 x 92	1080	415 x 320 x 295	China	85322200
18	15 to 21	32 in all/2 lines	160	304 x 196 x 55	1600	415 x 320 x 295	China	85322200
	25 to 31.5	32 in all/2 lines	160	304 x 196 x 68	1280	415 x 320 x 295	China	85322200
	35.5 to 41	32 in all/2 lines	160	305 x 197 x 79.5	960	415 x 320 x 260	China	85322200
	45 to 51	32 in all/2 lines	160	304 x 196 x 92	960	415 x 320 x 295	China	85322200
20	21 to 31.5	32 in all/2 lines	160	334 x 217 x 68	1280	448 x 354 x 295	China	85322200
	35 to 36	32 in all/2 lines	160	334 x 217 x 79.5	960	448 x 354 x 248	China	85322200
	42 to 51	32 in all/2 lines	160	334 x 217 x 92	960	448 x 354 x 295	China	85322200
	40 to 51	32 in all/2 lines	160	334 x 217 x 92	960	448 x 354 x 295	China	85322200

**PACKAGING ▪ RADIAL ALUMINUM ELECTROLYTIC CAPACITORS
STRAIGHT LEADS ▪ BULK PACK**


∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Inner box size L x W x H (mm)	Outer box quantity (pcs)	Outer box size L x W x H (mm)	Country of origin	Tariff number
22	21 to 26	25 in all/2 lines	100	304 x 196 x 68	800	415 x 320 x 295	China	85322200
	30 to 41	25 in all/2 lines	100	305 x 197 x 79.5	600	415 x 320 x 260	China	85322200
	45 to 70	25 in all/2 lines	100	304 x 196 x 92	600	415 x 320 x 295	China	85322200
25	21 to 26	25 in all/2 lines	100	334 x 217 x 68	800	448 x 354 x 295	China	85322200
	30 to 41	25 in all/2 lines	100	334 x 217 x 79.5	600	448 x 354 x 260	China	85322200
	≥ 45	25 in all/2 lines	100	334 x 217 x 92	600	448 x 354 x 295	China	85322200
	21 to 26	25 in all/2 lines	100	304 x 196 x 68	800	415 x 320 x 295	China	85322200

PACKAGING • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS CUTTED LEADS • BULK PACK



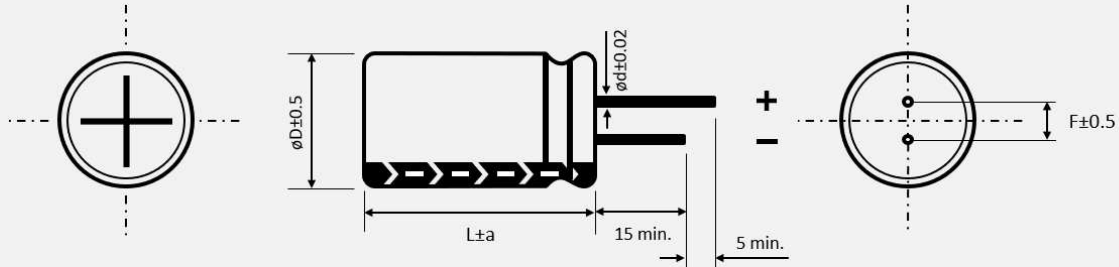
∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Cutting height (mm)	Outer box quantity (pcs)	Outer carton quantity (pcs)	Country of origin	Tariff number
3	All L	2500/bag	10000	N/A	6	60000	China	85322200
4	5 to 7	2000/bag	8000	N/A	5	40000	China	85322200
5	5 to 9	2000/bag	8000	N/A	5	40000	China	85322200
	11 to 12	1000/bag	6000	C < 7	5	30000	China	85322200
	11 to 12	1000/bag	4000	C ≥ 7	5	20000	China	85322200
6.3	5 to 7	1000/bag	6000	N/A	5	30000	China	85322200
	9 to 12	1000/bag	4000	N/A	5	20000	China	85322200
	15 to 20	1000/bag	4000	N/A	6	24000	China	85322200
8	≤ 9	500/bag	4000	N/A	6	24000	China	85322200
	11 to 13	500/bag	3000	C < 7	6	18000	China	85322200
	14	500/bag	2500	C < 7	6	15000	China	85322200
	15 to 16	500/bag	2000	C < 7	6	12000	China	85322200
	20	500/bag	1000	C < 7	12	12000	China	85322200
	30 to 35.5	500/bag	1000	C < 7	8	8000	China	85322200
	36 to 41	40/line	840	C < 7	10	8400	China	85322200
	42 to 51	40/line	840	C < 7	6	5040	China	85322200
10	52 to 60	40/line	840	C < 7	6	5040	China	85322200
	7 to 10	500/bag	1000	C < 7	12	12000	China	85322200
	12 to 17	500/bag	1000	C < 7	10	10000	China	85322200
	20	500/bag	1000	C < 7	8	8000	China	85322200
	24 to 25	500/bag	1000	C < 7	6	6000	China	85322200
	30 to 35.5	32/line	540	C < 7	12	6480	China	85322200
	36 to 41	32/line	540	C < 7	10	5400	China	85322200
	42 to 51	32/line	540	C < 7	8	4320	China	85322200
13	52 to 60	32/line	540	C < 7	6	3240	China	85322200
	31	25/line	350	C < 7	6	2100	China	85322200
	35 to 41	25/line	350	C < 7	5	1750	China	85322200
	42 to 51	25/line	350	C < 7	4	1400	China	85322200
	52 to 60	25/line	350	C < 7	4	1400	China	85322200
16	35 to 40	25/line	350	C ≥ 12	4	1400	China	85322200
	16 to 21	18/line	180	N/A	6	1080	China	85322200
	25 to 31.5	18/line	180	C < 7	6	1080	China	85322200
	25 to 31.5	18/line	180	C ≥ 7	5	900	China	85322200
	35.5 to 41	18/line	180	C < 7	5	900	China	85322200
18	35.5 to 41	18/line	180	C ≥ 7	4	720	China	85322200
	15 to 21	32 in all/2 lines	160	N/A	6	960	China	85322200
	25 to 31.5	32 in all/2 lines	160	C < 7	6	960	China	85322200
	25 to 31.5	32 in all/2 lines	160	C ≥ 7	5	800	China	85322200
	35.5 to 41	32 in all/2 lines	160	C < 7	5	800	China	85322200
	35.5 to 41	32 in all/2 lines	160	C ≥ 7	4	640	China	85322200
20	≥ 45	32 in all/2 lines	160	N/A	4	640	China	85322200
	25 to 40	30 in all/2 lines	120	C < 7	6	720	China	85322200
	25 to 40	30 in all/2 lines	150	C ≥ 7	4	600	China	85322200
	≥ 41	30 in all/2 lines	150	C < 7	4	600	China	85322200
20	≥ 41	30 in all/2 lines	120	C ≥ 7	4	480	China	85322200

**PACKAGING ▪ RADIAL ALUMINUM ELECTROLYTIC CAPACITORS
CUTTED LEADS ▪ BULK PACK**


∅ D (mm)	Length L (mm)	Inner bag / Inner row (pcs)	Inner box quantity (pcs)	Cutting height (mm)	Outer box quantity (pcs)	Outer carton quantity (pcs)	Country of origin	Tariff number
22	21 to 31	25 in all/2 lines	100	C < 7	6	600	China	85322200
	21 to 31	25 in all/2 lines	100	C ≥ 7	5	500	China	85322200
	36 to 41	25 in all/2 lines	100	C < 7	5	500	China	85322200
	36 to 41	25 in all/2 lines	100	C ≥ 7	6	600	China	85322200
	46 to 51	25 in all/2 lines	100	C < 7	4	400	China	85322200
	46 to 51	25 in all/2 lines	100	C ≥ 7	3	300	China	85322200
	≥ 56	25 in all/2 lines	100	C < 7	3	300	China	85322200
25	21 to 26	25 in all/2 lines	100	N/A	6	600	China	85322200
	30 to 37	25 in all/2 lines	100	N/A	5	500	China	85322200
	40 to 51	25 in all/2 lines	100	N/A	4	400	China	85322200
	≥ 52	25 in all/2 lines	100	N/A	3	300	China	85322200

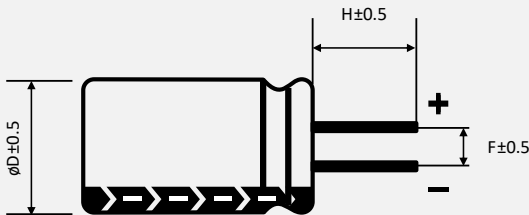
AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • standard version • standard lead spacing (all dimension in mm)



ø D (mm)	4	5	6.3	8			10	13	16		18		22	25		
F (mm)	1.5	2	2.5	3.5			5	7.5	7.5		10	12.5				
L (mm)	All	≤ 7	> 7	≤ 5	> 5	≤ 5	7	9 to < 20	≥ 20	All	25 to 35.5	< 25 & ≥ 40	25 to 31.5	< 25 & ≥ 35	All	All
ø d (mm)	0.45	0.45	0.5	0.45	0.5	0.45	0.5	0.6	0.6	0.6	0.8	0.8	0.8	1		
a (mm)	1	1	1	1	1	1	1.5	1.5	1.5	1.5	2	1.5	2	2		

Radial type • CA version • cutted leads • standard lead spacing



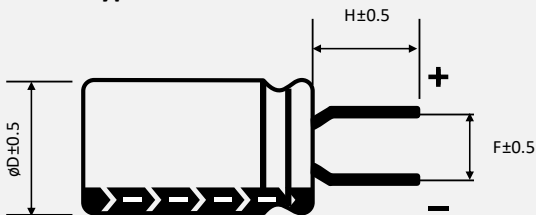
Length „H“ customized. See product code table customized lead length for further reference.

ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5

Example

F	H	2	2	1	M	6	R	3	E	1	1	0	E	C	A	-	-	-
Series	Capacitance	Tolerance	Voltage	øD (mm)	Height (mm)	Type code	Lead treatment	Special requirement										

Radial type • CE version • cutted leads • wide lead spacing ≤ 2.5mm



Length „H“ customized. See product code table customized lead length for further reference.

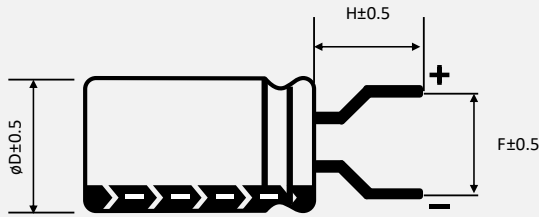
ø D (mm)	4	4
F (mm)	2	2.5

Example

S	A	2	R	2	M	0	5	0	B	0	5	0	E	C	E	-	-	-
Series	Capacitance	Tolerance	Voltage	øD (mm)	Height (mm)	Type code	Lead treatment	Special requirement										

AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **CF** version • cutted leads • wide lead spacing $\geq 2.5\text{mm}$



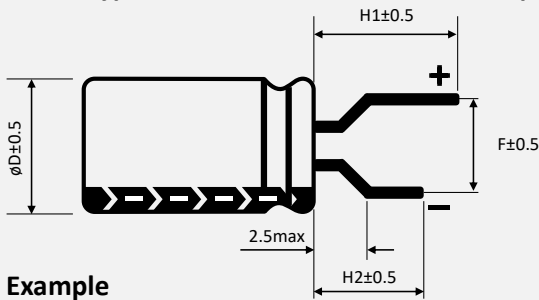
Example

Length „H“ customized. See product code table customized lead length for further reference.

$\varnothing D$ (mm)	4	4	4	5	5	6.3	6.3	8	10	13
F (mm)	2.5	3.5	5	3.5	5	3.5	5	5	7.5	7.5

G	H	1 2 1	M	0 1 6	E	1 1 0	E	C F	-	-	-	-
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement			

Radial type • **FA / FE** version • wide lead spacing $\geq 5\text{mm}$ • long anode



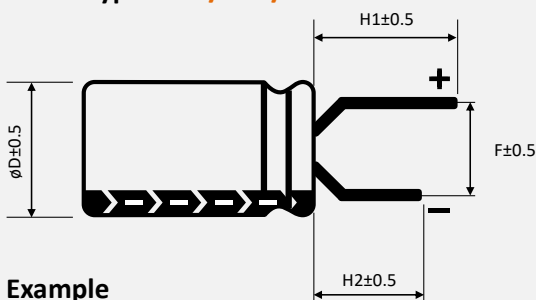
Length „H1“ and „H2“ customized. Consult CapXon to specify the details.

$\varnothing D$ (mm)	4	5	6.3	8	10	13
F (mm)	5	5	5	5	7.5	7.5
Code	FA	FA	FA	FA	FE	FE

Example

S	M	2 2 1	M	0 1 0	E	0 7 0	E	F A	-	-	-	-
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement			

Radial type • **FB / FC / FD** version • wide lead spacing $\leq 3.5\text{mm}$ • long anode



Length „H1“ and „H2“ customized. Consult CapXon to specify the details.

$\varnothing D$ (mm)	4	5	6.3
F (mm)	2	2.5	3.5
Code	FB	FC	FD

Example

S	G	R 3 3	M	0 5 0	B	0 7 0	E	F B	-	-	-	-
Series		Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement			

AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **KA** version • kinked anode and cathode • standard lead spacing

Ø D (mm)	5	6.3	8	10	13	16	18	22
F (mm)	2	2.5	3.5	5	5	7.5	7.5	10
H ₁ (mm)	4	4	4	4.5	4.5	4.5	4.5	4.5
H ₂ (mm)	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
E (mm)	1.12	1.12	1.32	1.32	1.32	1.32	1.32	1.82

Example

T	E	2 2 2	M	0 2 5	J	3 5 5	E	K A	- - - -
Series		Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **KE** version • kinked anode and cathode • wide lead spacing ≤ 2.5mm

Ø D (mm)	4	5
F (mm)	2	2.5
H ₁ (mm)	1.8	1.8
H ₂ (mm)	4	4
E (mm)	1.12	1.12

Example

G W	1 5 1	M	6 R 3	C	0 9 0	E	K E	- - - -
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **KF** version • kinked anode and cathode • wide lead spacing 5mm

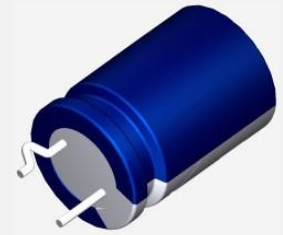
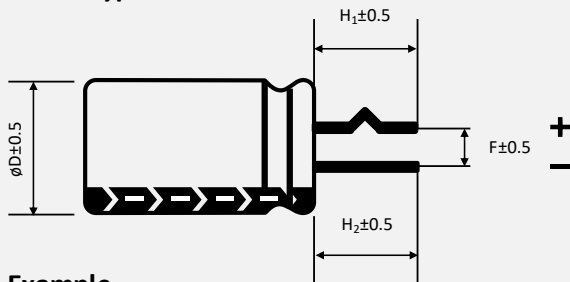
Ø D (mm)	5	6.3	8
F (mm)	5	5	5
H ₁ (mm)	4	4	4
E (mm)	1.12	1.12	1.32

Example

T H	2 2 1	M	0 2 5	F	1 1 5	E	K F	- - - -
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement

AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • CK version • kinked anode

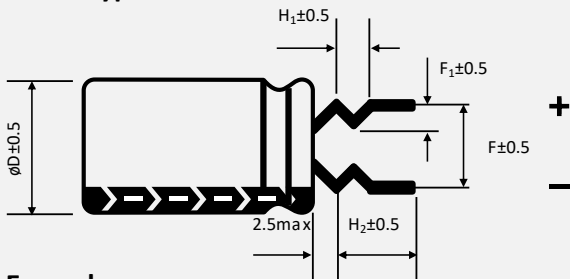


$\varnothing D$ (mm)	4	5	6.3	8	10	13	16	18
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5
H_1 (mm)	4	4	4	4	4.5	4.5	4.5	4.5
H_2 (mm)	4	4	4	4	4.5	4.5	4.5	4.5

Example

G S	4 7 1	M	0 2 5	F	1 1 5	E	C K	- - - -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • EF version • double kinked anode and cathode • lead spacing 5mm

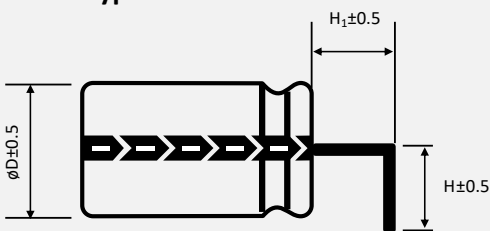


$\varnothing D$ (mm)	4	5	6.3	8
F (mm)	5	5	5	5
H_1 (mm)	1.8	1.8	1.8	1.8
H_2 (mm)	4	4	4	4
F_1 (mm)	1.2	1.2	1.2	1.2

Example

K W	1 0 0	M	0 6 3	C	0 9 0	E	E F	- - - -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • CR version • L-bended leads • cathode right



Length „H“ customized. See product code table customized lead length for further reference.

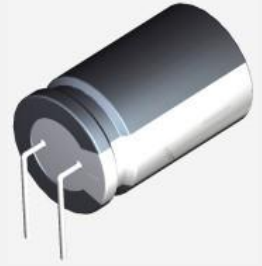
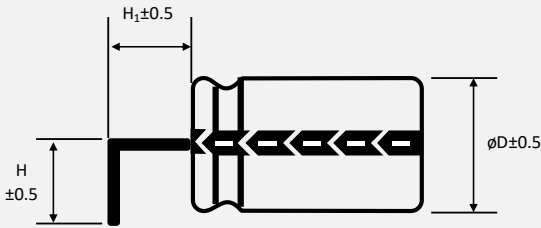
$\varnothing D$ (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5
H_1 (mm)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Example

F K	1 0 1	M	4 5 0	K	3 5 5	E	C R	- - - -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type - **CL** version - L - bended leads - cathode left



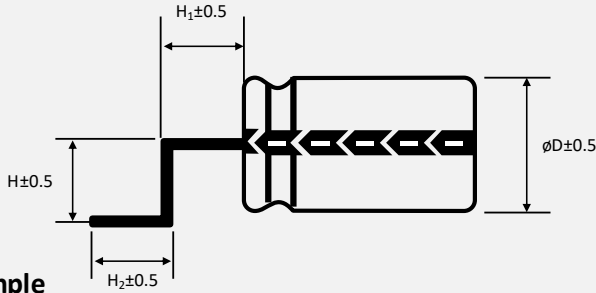
Ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5
H ₁ (mm)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Example

Length „H“ customized. See product code table customized lead length for further reference.

K S	2 2 0	M	4 0 0	I	2 0 0	E	C L	-	-	-	-
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement			

Radial type - **CS** version - SMD - bended leads - cathode left



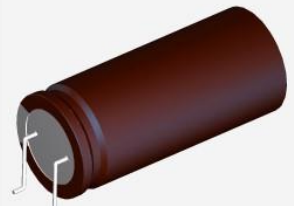
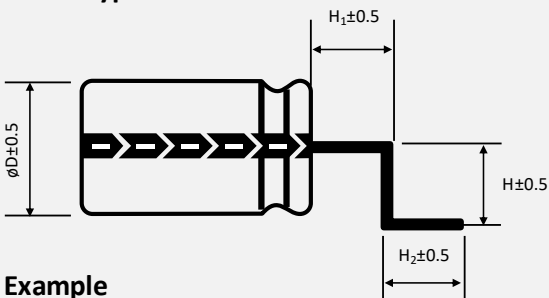
Length „H“, „H₁“ and H₂“ customized. Ask CapXon for further assistance

Ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5

Example

F K	3 R 3	M	4 5 0	G	0 9 0	E	C S	-	-	-	-
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement			

Radial type - **CZ** version - SMD - bended leads - cathode right



Length „H“, „H₁“ and H₂“ customized. Ask CapXon for further assistance

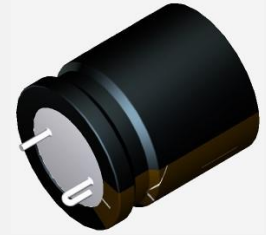
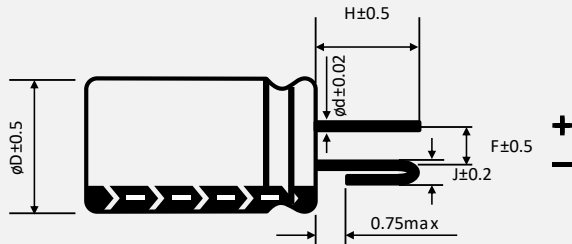
Ø D (mm)	4	5	6.3	8	10	13	16	18	22	25
F (mm)	1.5	2	2.5	3.5	5	5	7.5	7.5	10	12.5

Example

R W	4 7 2	M	0 6 3	M	5 0 0	E	C Z	-	-	-	-
Series	Capacitance	Tolerance	Voltage	ØD (mm)	Height (mm)	Type code	Lead treatment	Special requirement			

AVAILABLE LEAD TREATMENTS • RADIAL ALUMINUM ELECTROLYTIC CAPACITORS

Radial type • **J I** version • polarity protected footprint • cathode bended



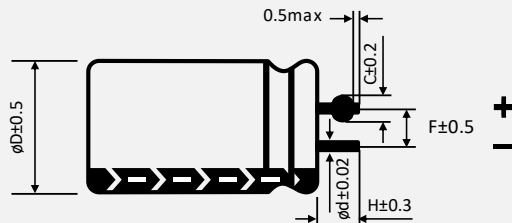
$\varnothing D$ (mm)	10	12.5	13	16	18	22
F (mm)	5	5	5	7.5	7.5	10
J (mm)	1.5	1.5	1.5	1.9	1.9	1.9
$\varnothing d$ (mm)	0.6	0.6	0.6	0.8	0.8	0.8

Example

Length „H“ customized. See product code table **customized lead length** for further reference.

F L	4 7 0	M	4 0 0	K	2 0 0	E	J I	- - - -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

Radial type • **CD** version • polarity protected footprint • anode pressed

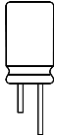


$\varnothing D$ (mm)	10	12.5	13	16	18	22
F (mm)	5	5	5	7.5	7.5	10
C (mm)	1.1	1.1	1.1	1.4	1.4	1.4
$\varnothing d$ (mm)	0.6	0.6	0.6	0.8	0.8	0.8

Example

Length „H“ customized. See product code table **customized lead length** for further reference.

G L	2 2 1	M	0 5 0	G	1 6 0	E	C D	- - - -
Series	Capacitance	Tolerance	Voltage	$\varnothing D$ (mm)	Height (mm)	Type code	Lead treatment	Special requirement

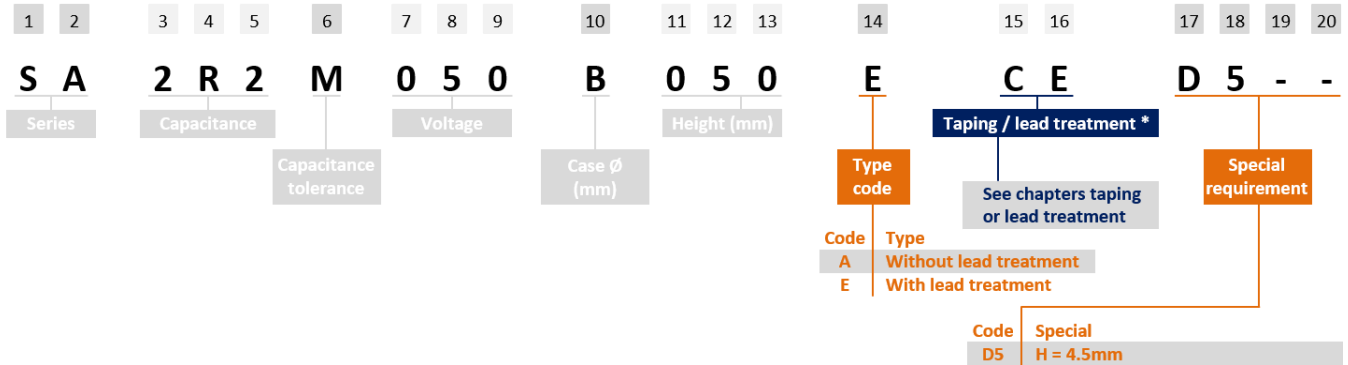


PRODUCT CODE TABLE • CUSTOMIZED LEAD LENGTH

THT type example:

SA series ▪ 2.2µF ▪ 50V ▪ ±20% ▪ Ø 4mm ▪ L 5mm ▪ CE version, wide lead spacing ▪ P 2.5mm ▪ H 4.5mm

▪ Non-Automotive



Product code 17 th digit	H (mm)
A	1
B	2
C	3
D	4
E	5
F	6
G	7
H	8
I	9
J	10
K	11
L	12
M	13
N	14
O	15
P	16
Q	17
R	18
S	19
T	20
U	21
V	22
W	23
X	24
Y	25
Z	26

Product code 18 th digit	H (mm)
0	0.0
1	0.1
2	0.2
3	0.3
4	0.4
5	0.5
6	0.6
7	0.7
8	0.8
9	0.9

Example H (mm)	Product code Non-Automotive
4.5	D5
6.0	F0
10.7	J7
16.5	P5

Example H (mm)	Product code Automotive
4.5	XD5
6.0	XF0
10.7	XX7
16.5	XP5

The 17th digit is according basic ordering of the Latin alphabet and shows the measure "H" in front of the decimal separator. The 18th digit follows the numbering from 0 to 9 and shows the measure "H" after the decimal separator.

Remark for Automotive version: In the case of an AEC-Q200 qualified component, the measure "H" in front of the decimal separator moves to the 18th digit and the measure "H" after the decimal separator to the 19th digit.

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1. GENERAL PRECAUTIONS & GUIDELINES

In the following Precautions and Guidelines, CapXon provides instructions and requirements to assure a proper handling and desired performance of capacitors. Firstly, all general information is given, which applies to all technologies. The following chapters provides additional instructions specifically about technology and mounting style, which completes the full set of instructions.

1.1. GENERAL - ALL TYPES -

1.1.1. POLARITY

All conventional Electrolytic Capacitors have a polarity due to the internal construction. This polarity is marked on the component by printing on the top of component or on the sleeve of Aluminum Electrolytic Capacitors, including Radial, Snap-In and Screw types.

Any reverse voltage can cause short circuit breakdown of capacitor or leakage of electrolyte. Electrolytic Capacitors isn't designed for AC-voltage supply and only meant for DC-voltage applications.

For an application where polarity in circuit can be reversed or unknown, specific bi-polar aluminium electrolytic capacitors shall be used. We offer such components within our product range.

1.1.2. OVERVOLTAGE

Overvoltage can damage the capacitor and can cause a drastic increase in leakage current, which possibly shortens the lifetime of the capacitor. In a worst case, short circuit failure mode can happen. As a result, do not apply any continuous or temporary overvoltage.

The applied operating voltage, which is applied to the capacitor, should not exceed the rated voltage of the capacitor.

1.1.3. OPERATING TEMPERATURE

Only operate the capacitor within the limits of allowed temperature range, which is specified by datasheet. Be aware that the sum of thermal stress by ambient condition plus electrical stress is the main driving factor for aging. As the thermal stress level gets higher, the expected capacitor lifetime would be lower.

A drop in applied temperature, ambient condition or cooling within application can enlarge the expected lifetime of

the capacitor. For details, please see further documentation of lifetime estimation.

1.1.4. RIPPLE CURRENT

The applied ripple current shall not exceed the stated max. ripple current I_R on the datasheet at the specific frequency.

When capacitors are overstressed by ripple, it can generate massive heat inside the capacitor, which can result in deterioration, vent operation or capacitor breakage.

1.1.5. CHARGE AND DISCHARGING

Frequent and quick charge / discharge generates heat inside the capacitor and can cause possible increase of leakage current, reduction of the expected lifetime, decrease of capacitance, vent operation or breakage.

For such applications please see design rules or consult our technical support for assistance.

1.1.6. SOLDERING CONDITIONS

For recommended reflow solder profile, please see additional information at Section 2. Soldering Instructions.

Soldering by vapor phase for SMD types or any hand soldering are not recommended. No permission is released by CapXon side either. In case of such a usage, customer need to validate solder result and applied component stress within their own manufacturing process.

1.1.7. MSL – MOISTURE SENSITIVE LEVEL (ONLY FOR SMD TYPES)

Our standard SMD components are rated according to JEDEC J-STD020 with MSL1. Construction of this part does not include hygroscopic critical materials and are not prone to delamination or popcorn effects. Only SMD MLPC types of the Solid Conductive Polymer components have MSL3. Moreover, only this type requires additional actions or specific handling in factory floor by customer such as handling or storing the goods after opening the package in accordance to JEDEC J-STD020.

1.1.8. RESISTANCE TO CHEMICALS AND SOLVENTS FOR WASHING, GLUING, FILLING AND COATING

Due to the wide variety of suppliers and different chemical formulas of washing, gluing, filling and coating materials, the individually used material and appliance process need to be validated by customer itself. It is not possible to provide any global material usage approval from our side.

CapXon can provide additional information, including combination of chemicals which could be critical to the component behavior and can support measurements of component performance after appliance of washing, gluing, filling or coating materials. For specific support, please kindly contact our technical support for further advices.

1.1.9. CLEANING AND WASHING

Do not wash the assembled capacitors with the following cleaning agents:

- **Xylene**
 - can cause deterioration of the rubber seal material
- **Halogenated solvents**
 - can cause corrosion and electrical failure modes
- **Petroleum based solvents**
 - can cause degeneration of the rubber seal material
- **Alkali based solvents**
 - can cause corrosion and dissolving of aluminum can
- **Acetone**
 - component marking possibly dissolve

After finishing cleaning and washing, the below points need to be verified by customer:

Dry all solvents properly from PCB as well as capacitor surface sufficiently and apply air blower or air knife, with temperatures within the temperature range of the product specification, if needed.

Monitor pH value, conductivity, specific gravity and water content of cleaning solvents to be sure of possible contaminations and pollution. Contaminations can negatively affect the performance of the capacitor.

1.1.10. GLUING, FILLING OR COATING

It is not allowed to use any gluing (adhesives), filling or coating materials, which contains halogenated solvents. Halogen ions are critical, because they can diffuse or creep in the capacitor through rubber sealing and can possibly damage the internal capacitor element /structure result in serious failure modes for the capacitor.

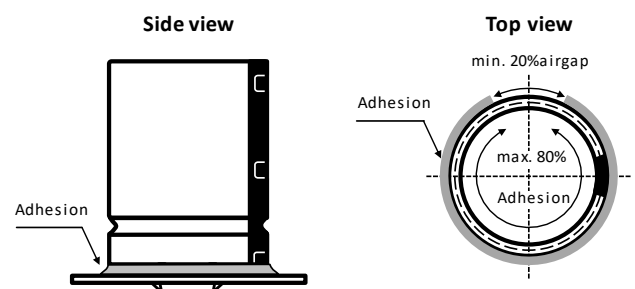
Additionally, please pay attention to the following points:

- Make sure that the surface of capacitor and the area between component bottom / rubber sealant is dry and clean before appliance of gluing, filling or coating material. It is important to avoid any contamination with chemical residues (e.g. flux residues, cleaning).
- Please follow and meet the stated gluing, coating, filling, heating and curing instructions from manufacturer or supplier of such materials. Be aware of possi-

ble shrinkage of such materials. Verify that the hardening was properly done and that no solvents / agents do remain.

- There should be no excessive heat nor mechanical pressure /stress at any stages from the production on customer side. Be aware of the possible material shrinkage of used material. High material shrinkage which leads to damage on capacitor is not CapXon's responsibility.
- The used materials of gluing, coating or filling can possibly react with the marking of component and this can change optical appearance such as the appearance and legibility.
- If the rubber seal surface is fully covered by gluing, filling or coating material, it is no longer possible to have a natural diffusion of gas between the inside of the capacitor and the ambient. So, to avoid such situation, it's strongly recommended to block maximum 80% of the sealed section on the bottom side of the capacitor.

Please find the example below of how gluing could be applied on Radial and Snap-In types.



Gluing reference example of a Snap-In capacitor

1.1.11. OPERATION AND ENVIRONMENT

As long as the application is powered, in operation and cap is not discharged, the user is never permitted to touch the electric terminals of the capacitor directly or to bridge the terminals by hand or any other conductive liquid or solid material. Otherwise, a short circuit of terminals can happen and a hard discharge can damage capacitor / application as well as it can harm the operator.

Within operation, please avoid the following environmental conditions to assure proper capacitor operation:

- high vibration, shocks or mechanical stress. For tested and allowed conditions, please see available references or contact us for details
- avoid direct sunlight, ozone and any kind of radiation or ultraviolet rays
- corrosive or toxic gases (e.g. ammonium, chlorine)

and compounds, bromine and compounds, hydrogen sulfide, sulfuric acid)

- ambient with high amount of damp condensation, water or types of oil

1.1.12. MECHANICAL STRESS

Best possible, avoid mechanical stress for the capacitor and do not apply any excessive mechanical stress to the lead wire pins or terminal.

After mounting, do not lift nor carry the PCB assembly by just grabbing the capacitor to pick up the board.

1.1.13. STORAGE

In case of long-term storage without applying voltage to the capacitor, leakage current tends to increase.

By applying the rated voltage before usage, the dielectric layer of aluminium oxide and leakage current can be stabilized.

If the capacitor is for more than 12 months, it is recommended to apply the DC rated voltage V_R for 30 minutes through 1k Ω protective series resistor.

The storage conditions for storage on customer side should be monitored and controlled to a temperature of 5°C up to 35°C and less than 75% rel. humidity.

1.1.14. DISPOSAL

Please follow your local governmental and organizational restrictions for disposal and if needed, contact your local responsible for correct handling.

In case of incineration, punch holes in the aluminum can in advanced to avoid explosion of capacitor and then burn with at least 800°C, otherwise it can result toxic gas.

1.2. ALUMINUM ELECTROLYTIC & HYBRID CONDUCTIVE POLYMER CAPACITORS - ALL MOUNTING STYLES -

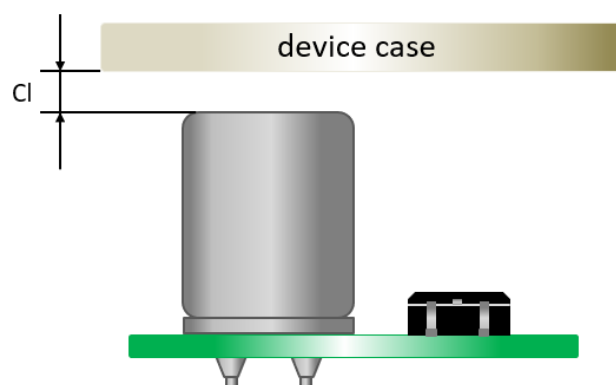
1.2.1. VENT & VENT OPERATION AT EMERGENCY

As a safety feature, most our regular electrolytic capacitors have a so-called vent, which is a pre-determined breaking point. In case of overstressed component, it can lead to internal gassing and due to this an internal overpressure will

result in vent operation. So, the vent will open to release such pressure and gas can become visible. If user detects vent operation or gassing out of the capacitor when operating, disconnect the application immediately from power supply to turn it off directly. If it can't be turned off, the capacitor or the conductive liquid / gas of electrolyte can result in short-circuits, which can dramatically damage the application.

Please notice to avoid being near with body or face above or in direction of capacitors vent when powered. When the running application is overstressed, gas leakage by vent is possible. By this gas with temperatures higher than 100°C can occur and can hurt human body and face. In such an event, if contact with skin, wash it immediately with plenty of water and soap. If contact with eyes, rinse immediately (e.g. eye shower) with plenty of water. If gas is inhaled, gargle right away with plenty of water. For all three cases, please consult a doctor for medical advices.

For proper operation of vent, consider space between the vent and covering surfaces (e.g. housing) as stated at the table below, it is strongly recommended for your mechanical construction / build-up of your product:



Minimum distance to be observed for the safe operation of the capacitor

Case diameter ϕ	Clearance distance Cl
6.3mm to 16mm	Min. 2mm
18mm to 35mm	Min. 3mm
≥ 40 mm	Min. 5mm

Recommended minimum clearance distance between topline capacitor and device case

If such a space is not provided, the vent will not operate completely or even cannot open in case of overpressure.

Case sizes which are smaller than 6.3mm in diameter have no vent on top, for these no space need to be considered.

1.2.2. SLEEVE MATERIAL (NOT FOR SMD)

The standard sleeve material for the majority of our Radial, Snap-In and Screw mounting capacitors is PET and for some series PVC is used as sleeve material. When sleeve is exposed to xylene, toluene or similar and afterwards exposed to high heat, the sleeve may be cracked or damaged.

The sleeve is not used as insulating material or layer and does not insulate capacitor to surroundings. For needed insulation, further actions need to be considered by customer and please follow our recommended design rules.

Sleeves are applied for all Aluminum Electrolytic Capacitors with Radial, Snap-In or Screw mounting and if desired for further customized solutions.

1.3. ALUMINUM ELECTROLYTIC - RADIAL TYPE -

1.3.1. PIN CUTTING & BENDING

Please take absolute care when cutting or bending pins, that the pin is fixed mechanically in direction of rubber sealant. It is necessary that the mechanical force while cutting and bending, which results in pulling or pressing force on pin, does not stress the inner construction of capacitor element or to damage the rubber sealant. Excessive pulling or pressing force on the pin with missing fixation can result in damage of internal pin to capacitor element connection and also the sealing can be weakened. So, please take care to assure appropriate cutting and bending. Do not pre-damage the capacitors and shorten their lifetime performance by incorrect handling.

1.3.2. SOLDERING

For recommended wave solder profile, please see additional solder instruction at section 2.5.

Improper soldering conditions may shrink or break the sleeve. Additionally, excessive heat can damage the internal capacitor element as terminals and lead wires conduct heat into the capacitor.

1.4. ALUMINUM ELECTROLYTIC CAPACITORS - SCREW TYPE -

1.4.1. MAINTENANCE

A regular inspection is recommended when screw capacitors are used at industrial applications. Before inspection, make sure to turn off the power, discharge screw capacitors carefully and do not apply mechanical force or pressure to the terminal to avoid damage. Inspection items are as stated below:

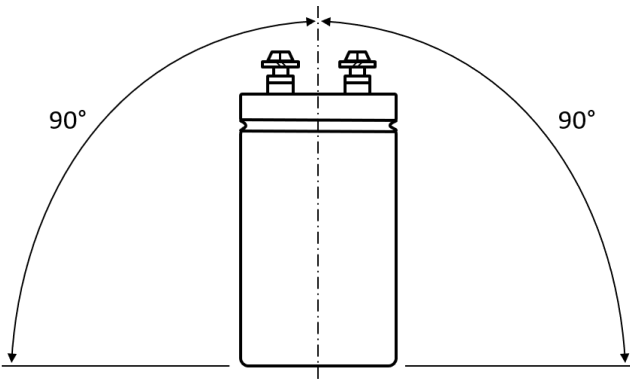
- Check on outer damage, deformation and electrolyte leakage
- Check electrical performance: leakage current, capacitance, DF value and other product specifications. If there is any abnormality detected, make sure a capacitor replacement will be done and handled properly

1.4.2. MOUNTING & INSTALLATION

Make sure capacitors rated capacitance, rated voltage and polarity is according to spec before installation. Please confirm that capacitors and circuit board terminal pitch is consistent to each other before installation. It may cause stress to internal capacitor element through the terminal. If the pitch is different, mounting was done nevertheless and strong mechanical stress was applied. In such case, this can cause short-circuit and other failure modes. Machine automated force and lead torque strength must be controlled properly when mounting happens with automated machine.

1.4.3. MOUNTING DIRECTION OF SCREW TYPE CAPACITORS

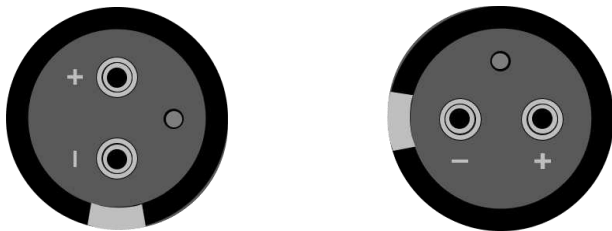
To avoid screw capacitor breakage / explosion, it is not allowed to be mounted with the safety vent downwards to ground, because vent can't function properly when mounted with vent to bottom side and existing gas pressure cannot release properly. Recommended mounting method is shown as figure below, to avoid any safety vent downwards installation. So, capacitor should be mounted with screw terminals up as shown below:



Recommended mounting direction

1.4.4. HORIZONTAL MOUNTING

For horizontal mounting following mounting is strongly recommended. Anode terminal in upper position with safety vent in horizontal position as figure below on left side or safety vent in upper position with anode and cathode terminal in horizontal as figure below on right side.



Recommended mounting position, also in accordance to EIAJ RCR-2367C

It may not damage capacitors directly, but an electrolyte leakage may happen, if installed by other mounting method in horizontal direction.

1.5. SOLID CONDUCTIVE POLYMER CAPACITORS

1.5.1. APPLICATION RESTRICTIONS

The leakage current of Solid Conductive Polymer Capacitors may vary which depends on thermal stress.

Please don't use Solid Conductive Polymer Capacitors in the following types of applications / circuits:

- High-impedance circuits - which are meant to sustain voltages
- Coupling circuits

- Time constant circuits - in addition to the leakage current fluctuation, capacitance may also fluctuate, which depends on operational temperature and humidity. The fluctuation of the capacitance may cause problems, if it is used as a time constant capacitor, which is extremely sensitive to the fluctuation of the capacitance. So, do not use it as a time constant capacitor.
- Other circuits - which are significantly affected by leakage current. If you want to use 2 or more capacitors in a series connection, please contact us before usage.

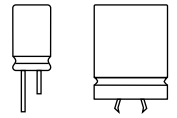
1.5.2. SUDDEN CHARGE AND DISCHARGE

Do not use the capacitor in circuits when capacitor is repetitively charged and discharged rapidly. If repetitively and rapid charging and discharging stresses the capacitor, it can result in reduction of capacitance or may cause further damage due to internal heating. The usage of a protective circuit is recommended to ensure reliability, when rush currents exceeds 10 times of capacitors allowed max. ripple current I_R , but never more than max. 10A. When measuring the leakage current, a protective resistor (1 k Ω) must be inserted to the circuit during the charge and discharge.

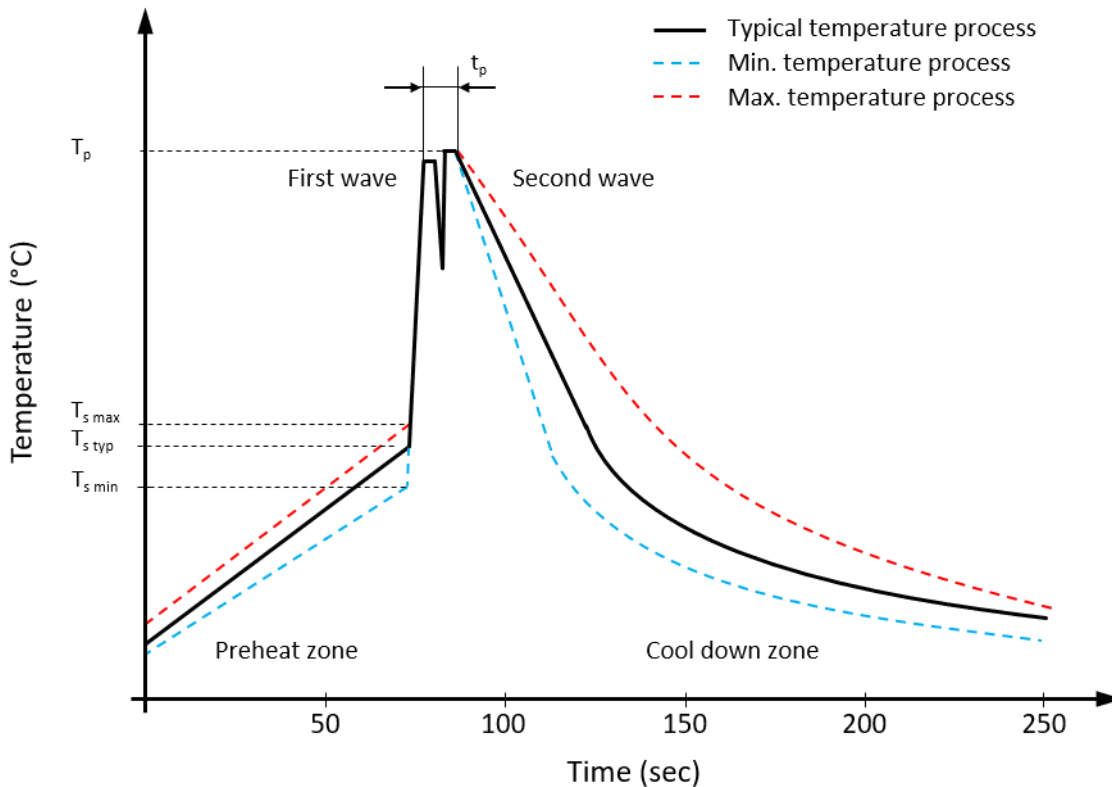
2. SOLDERING INSTRUCTIONS

In the following sections CapXon’s leadfree solder profiles are stated in detail.

2.1. WAVE SOLDERING • ALL RADIAL & SNAP-IN CAPACITORS



Recommended wave soldering conditions



Classification wave soldering profile • Refer to EN 61760-1: 2006

Profile Features		Value • Pb-free Assembly	Value • Sn-Pb Assembly
Preheat temperature min.	$T_{s \text{ min}}$	100 °C	100 °C
Preheat temperature typical	$T_{s \text{ typ}}$	120 °C	120 °C
Preheat temperature max.	$T_{s \text{ max}}$	130 °C	130 °C
Preheat time t_s from $T_{s \text{ min}}$ to $T_{s \text{ max}}$	t_s	70 seconds	70 seconds
Peak temperature	T_p	245 °C ~ 260 °C	235 °C ~ 260 °C
Time of actual peak temperature	t_p	Max. 10 seconds Max. 5 second each wave	Max. 10 seconds Max. 5 second each wave
Ramp-down rate min.		~ 2 °C/second	~ 2 °C/second
Ramp-down rate typical		~ 3.5 °C/second	~ 3.5 °C/second
Ramp-down rate max.		~ 5 °C/second	~ 5 °C/second
Time 25°C to 25°C		4 minutes	4 minutes

CAPXON

IATF 16949

AEC-Q200

ISO 9001

ISO 14001

QC 080000



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Taiwan

CapXon Technology Limited Taiwan Branch
5F, No. 157, Datong Road, Sec. 2, XiZhi Dist.,
New Taipei City, 22183, Taiwan R. O. C.
+886-2-8692-6611
sales@capxon-taiwan.com

China

CapXon Electronic (Shen-Zhen) Co., Ltd.
Fengbin Industrial Park A102, Tangwei Community,
Fenghuang street, Guangming District, (No. 4132 Songbai Rd.)
Shenzhen 518106, China
+86-755-2717-7888
sales@capxon.com.cn

South Korea

CapXon Korea Office
RM309, Metrokhan, 239 Pyeongchon-daero, Dongan-gu,
Anyang-si, Gyeonggi-do, Korea, 14047
sales@capxon-korea.com

Southeast Asia

CapXon Singapore Office
51 Goldhill Plaza #07-10/11
Singapore 308900
+65-3-1572870
sales@capxon-asia.com

United States of America

CapXon US Office
New York +1-607-846 4546
sales@capxon-usa.com

Europe

CapXon Europe Office
Schwalbenweg 11
72793 Pfullingen, Germany
+49-7121-1452700
sales@capxon-europe.com

