Panasonic

Radial lead type

Discontinued

Series: FA Type : A

■ Features
- Endurance :105°C 2000 to 5000h
- Smaller than Series HFQ
- Low impedance (20 to 40 less volume than Series HFQ)

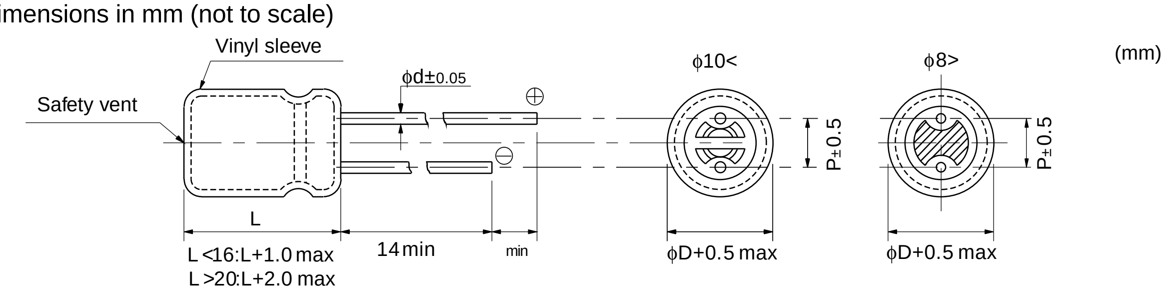
■Specification

<table>
<tr><td>Operating Temp. Range</td><td>-55 to + 105°C</td></tr>
<tr><td>Rated W.V. range</td><td>6.3 to 63 V .DC</td></tr>
<tr><td>Nominal cap. range</td><td>68 to 15000 µ F</td></tr>
<tr><td>Capacitance tol.</td><td>±20 % (120Hz/+20°C)</td></tr>
<tr><td>DC leakage current</td><td>I < 0.01 CV (µ A) after 2 minutes application of rated working voltage at +20°C.</td></tr>
<tr><td>tan δ</td><td><table><tr><td>W.V.</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td></tr><tr><td>tan δ</td><td>0.22</td><td>0.19</td><td>0.16</td><td>0.14</td><td>0.12</td><td>0.10</td><td>0.08</td></tr></table> (max.) (120Hz /+20°C)
Add 0.02 per 1000µF for products of 1000µF or more.</td></tr>
<tr><td>Characteristics at Low Temperature</td><td>Impedance at -10°C, 100KHz <200 % of initial specified value at 20°C,100kHz.
(Impedance ratio at 100kHz)</td></tr>
<tr><td>Endurance</td><td>After following life test with DC voltage and +105 ±2°C ripple current value applied (The sum of DC and ripple peak voltage shall not exceed the rated working voltage),the capacitors shall meet the limits specified below.
Duration: 2000 hours (ϕ8), 3000 hours (ϕ10), 5000 hours (ϕ12.5 to ϕ18) Post test requirements at 20°C.<table><tr><td>Capacitance change</td><td><±20% of initial measured value</td></tr><tr><td>tan δ</td><td>< 200% of initial specified value</td></tr><tr><td>DC leakage current</td><td>< initial specified value</td></tr></table></td></tr>
<tr><td>Shelf life</td><td>After storage for 1000 hours at +105± 2°C with no voltage applied and then being stabilized at +20°C,capacitor shall meet the limits specified in “Enduramce”.</td></tr>
</table>

■Explanation of Part Numbers

E	E	U	F	A							
Product code			Series code		R.W.V. code		N.Capacitance code			Option	

■ Dimensions in mm (not to scale)



Body Dia. ϕD	8	10	12.5		16	18
Body Length L			< 25	> 30		
Lead Dia. ϕd	0.6	0.6	0.6	0.8	0.8	0.8
Lead space P	3.5	5	5	5	7.5	7.5

■ Frequency correction factor for ripple current

W (V.DC)	Cap.(µF)	Frequency(Hz)				
		60	120	1k	10k	100k
6.3 to 63	6.8 to 330	0.55	0.65	0.85	0.90	1.0
	390 to 1000	0.70	0.75	0.90	0.95	1.0
	1200 to 2200	0.75	0.80	0.90	0.95	1.0
	2700 to 15000	0.80	0.85	0.95	1.00	1.0

Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.
Whenever a doubt about safety arises from this product, please inform us immediately for technical consulation without fail.

Discontinued

■Case size / Impedance / Ripple current

W.V.(V.DC) / (φD×L)	6.3 (0J)				10 (1A)			
	Capacitance (μF)	Impedance(100kHz) (Ω) -10°C	Impedance(100kHz) (Ω) +20°C	Ripple current (100kHz) (+105°C) (mA)	Capacitance (μF)	Impedance(100kHz) (Ω) -10°C	Impedance(100kHz) (Ω) +20°C	Ripple current (100kHz) (+105°C) (mA)
8 × 11.5	560	0.234	0.117	555	390	0.234	0.117	555
8 × 15	820L❇	0.170	0.085	730	680L	0.170	0.085	730
8 × 20	1200	0.130	0.065	995	1000	0.130	0.065	995
10 × 12.5	820	0.180	0.090	755	680	0.180	0.090	755
10 × 16	1000	0.136	0.068	950	820	0.136	0.068	950
10 × 20	1500	0.104	0.052	1220	1200	0.104	0.052	1220
10 × 25	1800	0.090	0.045	1440	1500	0.090	0.045	1440
10 × 30	2700L❇	0.070	0.035	1815	2200	0.070	0.035	1815
12.5 × 15	1500S❇	0.120	0.060	1205	1200S❇	0.120	0.060	1205
12.5 × 20	2700	0.076	0.038	1655	1800	0.076	0.038	1655
12.5 × 25	3900	0.068	0.034	1945	2700	0.068	0.034	1945
12.5 × 30	4700L❇	0.050	0.025	2310	3300L	0.050	0.025	2310
12.5 × 35	5600L❇	0.044	0.022	2510	3900	0.044	0.022	2510
12.5 × 40	6800L❇	0.036	0.018	2655	4700L	0.036	0.018	2655
16 × 20	4700	0.050	0.025	2205	3300	0.050	0.025	2205
16 × 25	5600	0.044	0.022	2555	4700	0.044	0.022	2555
16 × 31.5	6800	0.036	0.018	3010	5600	0.036	0.018	3010
16 × 35.5	8200	0.032	0.016	3150	6800	0.032	0.016	3150
16 × 40	10000L❇	0.030	0.015	3360	8200L❇	0.030	0.015	3360
18 × 20	5600S❇	0.044	0.022	2490	4700S❇	0.044	0.022	2490
18 × 25	6800S❇	0.038	0.019	2740	5600S❇	0.038	0.019	2740
18 × 31.5	10000	0.032	0.016	3635	8200	0.032	0.016	3635
18 × 35.5	12000	0.030	0.015	3680	10000	0.030	0.015	3680
18 × 40	15000	0.028	0.014	3735	12000	0.028	0.014	3735

W.V.(V.DC) / (φD×L)	16 (1C)				25 (1E)			
	Capacitance (μF)	Impedance(100kHz) (Ω) -10°C	Impedance(100kHz) (Ω) +20°C	Ripple current (100kHz) (+105°C) (mA)	Capacitance (μF)	Impedance(100kHz) (Ω) -10°C	Impedance(100kHz) (Ω) +20°C	Ripple current (100kHz) (+105°C) (mA)
8 × 11.5	270	0.234	0.117	555	180	0.234	0.117	555
8 × 15	470L❇	0.170	0.085	730	330L❇	0.170	0.085	730
8 × 20	680	0.130	0.065	995	470	0.130	0.065	995
10 × 12.5	470	0.180	0.090	755	330	0.180	0.090	755
10 × 16	560	0.136	0.068	950	390	0.136	0.068	950
10 × 20	820	0.104	0.052	1220	560	0.104	0.052	1220
10 × 25	1000	0.090	0.045	1440	680	0.090	0.045	1440
10 × 30	1500	0.070	0.035	1815	1000L❇	0.070	0.035	1815
12.5 × 15	820S	0.120	0.060	1205	560S❇	0.120	0.060	1205
12.5 × 20	1200	0.076	0.038	1655	1000	0.076	0.038	1655
12.5 × 25	1800	0.068	0.034	1945	1200	0.068	0.034	1945
12.5 × 30	2200L❇	0.050	0.025	2310	1500L	0.050	0.025	2310
12.5 × 35	2700	0.044	0.022	2510	1800	0.044	0.022	2510
12.5 × 40	3300L❇	0.036	0.018	2655	2200L❇	0.036	0.018	2655
16 × 20	2200	0.050	0.025	2205	1500	0.050	0.025	2205
16 × 25	3300	0.044	0.022	2555	2200	0.044	0.022	2555
16 × 31.5	3900	0.036	0.018	3010	2700	0.036	0.018	3010
16 × 35.5	4700	0.032	0.016	3150	3300	0.032	0.016	3150
16 × 40	5600L❇	0.030	0.015	3360	3900L❇	0.030	0.015	3360
18 × 20	3300S❇	0.044	0.022	2490	2200S❇	0.044	0.022	2490
18 × 25	3900S❇	0.038	0.019	2740	2700S❇	0.038	0.019	2740
18 × 31.5	5600	0.032	0.016	3635	3900	0.032	0.016	3635
18 × 35.5	6800	0.030	0.015	3680	4700	0.030	0.015	3680
18 × 40	8200	0.028	0.014	3735	5600	0.028	0.014	3735

Discontinued

■Case size / Impedance / Ripple current

W.V.(V.DC) (φD×L)	35 (1V) Capacitance (μF)	35 (1V) Impedance(100kHz)(Ω) -10°C	35 (1V) Impedance(100kHz)(Ω) +20°C	35 (1V) Ripple current (100kHz) (+105°C) (mA)	50 (1H) Capacitance (μF)	50 (1H) Impedance(100kHz)(Ω) -10°C	50 (1H) Impedance(100kHz)(Ω) +20°C	50 (1H) Ripple current (100kHz) (+105°C) (mA)
8 × 11.5	150	0.234	0.117	555	82	0.468	0.234	485
8 × 15	220L❇	0.170	0.085	730	120L❇	0.310	0.155	635
8 × 20	330	0.130	0.065	995	180	0.240	0.120	860
10 × 12.5	220	0.180	0.090	755	120	0.324	0.162	615
10 × 16	270	0.136	0.068	950	150	0.238	0.119	740
10 × 20	390	0.104	0.052	1220	220	0.180	0.090	1030
10 × 25	470	0.090	0.045	1440	270	0.164	0.082	1200
10 × 30	680L❇	0.070	0.035	1815	470	0.120	0.060	1610
12.5 × 15	390S❇	0.120	0.060	1205	220S❇	0.200	0.100	1150
12.5 × 20	680	0.076	0.038	1655	390	0.116	0.058	1480
12.5 × 25	1000	0.068	0.034	1945	560	0.100	0.050	1832
12.5 × 30	1200L❇	0.050	0.025	2310	680L❇	0.080	0.040	2215
12.5 × 35	1500L❇	0.044	0.022	2510	820L❇	0.068	0.034	2285
12.5 × 40	1800L❇	0.036	0.018	2655	1000L❇	0.060	0.030	2590
16 × 20	1200	0.050	0.025	2205	680	0.096	0.048	1835
16 × 25	1500	0.044	0.022	2555	1000	0.068	0.034	2235
16 × 31.5	1800	0.036	0.018	3010	1200	0.056	0.028	2700
16 × 35.5	2200	0.032	0.016	3150	1500L❇	0.050	0.025	2790
16 × 40	2700L❇	0.030	0.015	3360	1800L❇	0.046	0.023	2845
18 × 20	1500S❇	0.044	0.022	2490	820	0.080	0.040	2420
18 × 25	1800S❇	0.038	0.019	2740	1200S❇	0.058	0.029	2610
18 × 31.5	2700	0.032	0.016	3635	1500	0.050	0.025	3000
18 × 35.5	3300	0.030	0.015	3680	1800	0.046	0.023	3100
18 × 40	3900	0.028	0.014	3735	2200	0.040	0.020	3250

W.V.(V.DC) (φD×L)	63 (1J) Capacitance (μF)	63 (1J) Impedance(100kHz)(Ω) -10°C	63 (1J) Impedance(100kHz)(Ω) +20°C	63 (1J) Ripple current (100kHz) (+105°C) (mA)
8 × 11.5	68	0.684	0.342	405
8 × 15	100L	0.460	0.230	535
8 × 20	150	0.356	0.178	690
10 × 12.5	100	0.512	0.256	535
10 × 16	120	0.388	0.194	600
10 × 20	180	0.294	0.147	885
10 × 25	220	0.260	0.130	1050
10 × 30	330L	0.180	0.090	1300
12.5 × 15	180S	0.300	0.150	1020
12.5 × 20	330	0.170	0.085	1285
12.5 × 25	390	0.140	0.070	1720
12.5 × 30	470L	0.110	0.055	2090
12.5 × 35	680L	0.094	0.047	2265
12.5 × 40	820L	0.084	0.042	2560
16 × 20	470	0.118	0.059	1765
16 × 25	680	0.100	0.050	2160
16 × 31.5	820	0.086	0.043	2670
16 × 35.5	1000	0.072	0.036	2770
16 × 40	1200L	0.060	0.030	2825
18 × 20	680S	0.110	0.055	2290
18 × 25	820S	0.086	0.043	2585
18 × 31.5	1200	0.064	0.032	2950
18 × 35.5	1500	0.060	0.030	3095
18 × 40	1800	0.050	0.025	3205

⚠ Application Guidelines

1. Circuit Design

Ensure that operational and mounting conditions follw the specified conditions detailed in the catalog and specification sheets.

1.1 Operating Temperature and Frequency

Electrolytic capacitor electrical parameters are normally specified at 20°C temperature and 120Hz frequency. These parameters vary with changes in temperature and frequency. Circuit designers should take these changes into consideration.

(1) Effects of operating temperature on electrical parameters
  a) At higher temperatures, leakage current and capacitance increase while equivalent series resistance(ESR) decreases.
  b) At lower temperatures, leakage current and capacitance decrease while equivalent series resistance(ESR) increases.

(2) Effects of frequency on electrical parameters
  a) At higher frequencies, capacitance and impedance decrease while tan δ increases.
  b) At lower frequencies, ripple current generated heat will rise due to an increase in equivalent series resistance (ESR).

1.2 Operating Temperature and Life Expectancy

(1) Expected life is affected by operating temperature. Generally, each 10°C reduction in temperature will double the expected life. Use capacitors at the lowest possible temperature below the maximum guaranteed temperature.

(2) If operating conditions exceed the maximum guaranteed limit, rapid electrical parameter deterioration will occur, and irreversible damage will result.
Check for maximum capacitor operating temperatures including ambient temperature, internal capacitor temperature rise caused by ripple current, and the effects of radiated heat from power transistors, IC?s or resistors.
Avoid placing components which could conduct heat to the capacitor from the back side of the circuit board.

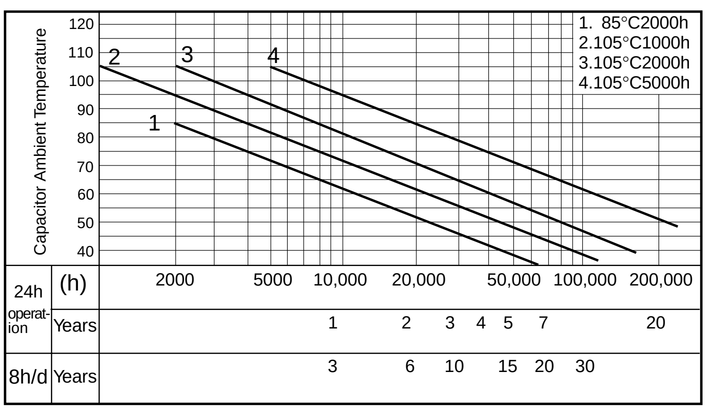
(3) The formula for calculating expected life at lower operating temperatures is as fllows;

$$L_2 = L_1 \times 2^{\frac{T_1 - T_2}{10}}$$ where,

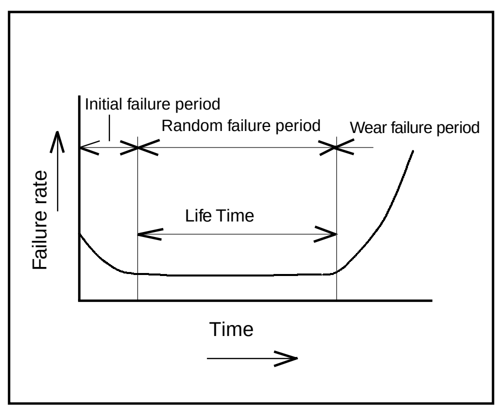
L_1: Guaranteed life (h) at temperature, T_1° C
L_2: Expected life (h) at temperature,T_2°C
T_1: Maximum operating temperature (°C)
T_2: Actual operating temperature, ambient temperature + temperature rise due to ripple currentheating(°C)

A quick eference capacitor guide for estimating exected life is included for your reference.

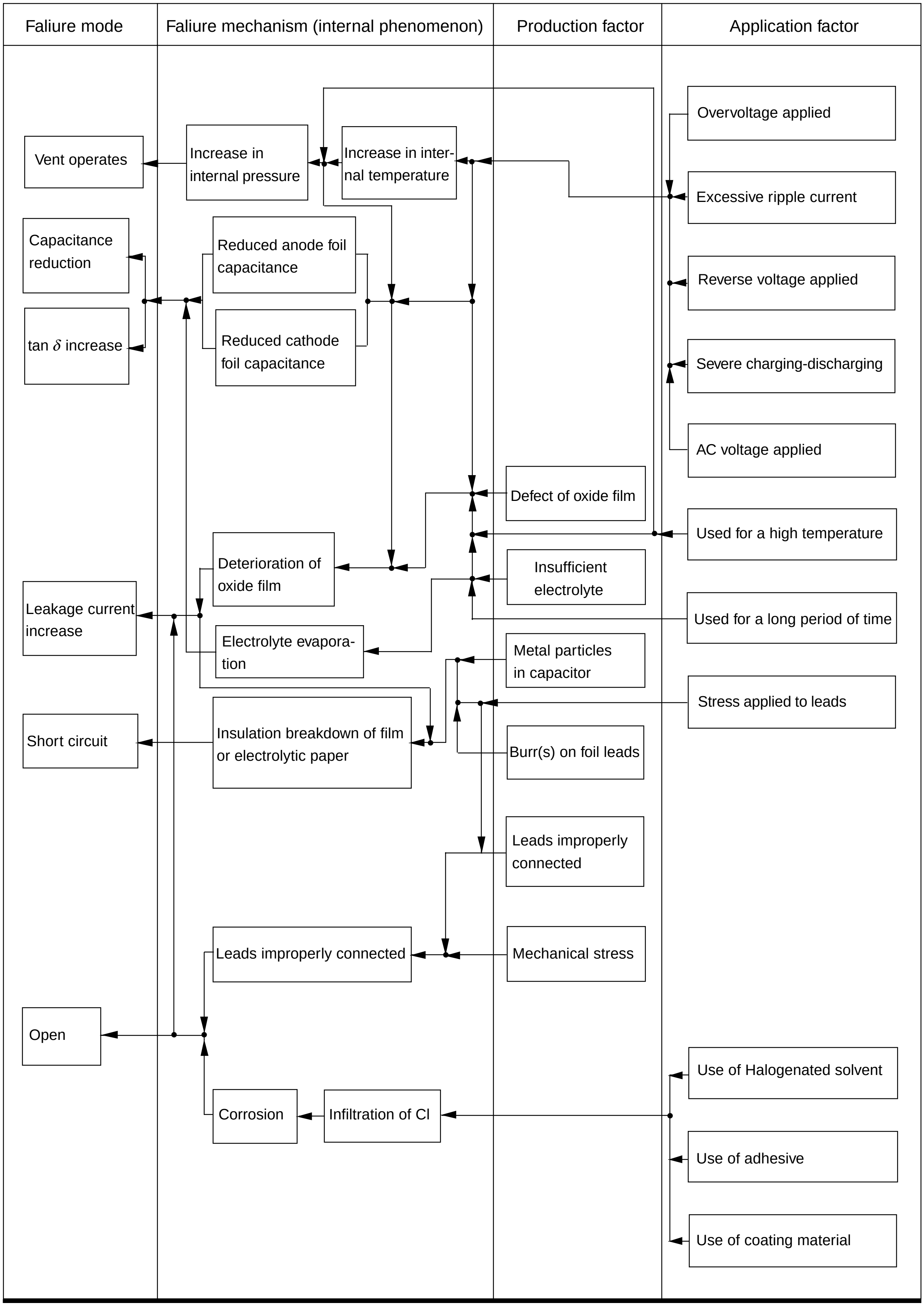
■ Expected Life Estimate Quick Reference Guide



■ Failure rate curve



■ Typical failure modes and their factors



Design, Specifications are subject to change without notice. Ask factory for technical specifications before purchase and/or use.
Whenever a doubt about safety arises from this product, please inform us immediately for technical consulation without fail.

1.3 Common Application Conditions to Avoid

The following misapplication load conditions will cause rapid deterioration to capacitor electrical parameters. In addition, rapid heating and gas generation within the capacitor can occur causing the pressure relief vent to operate and resultant leakage of electrolyte. Under extreme conditions, explosion and fire could result. Leakinq electrolyte is combustible and electrically conductive.

(1) Reverse Voltaqe

DC capacitors have polarity. Verify correct polarity before insertion. For circuits with changing or uncertain polarity,use DC bipolar capacitors. DC bipolar capacitors are not suitable for use in AC circuits.

(2) Charqe/Discharqe Applications

Standard capacitors are not suitable for use in repeating charge/discharge applications. For charqe/discharqe applications consult us and advise actual conditions.

(3) Overvoltage

Do not apply voltaqes exceeding the maximum specified rated voltages. Voltage up to the surge voltage rating are acceptable for short periods of time. Ensure that the sum of the DC voltage and the superimposed AC ripple voltage does not exceed the rated voltage.

(4) Ripple Current

Do not apply ripple currents exceeding the maximum specified value. For high ripple current applications, use a capacitor designed for high ripple currents or contact us with your requirements.

Ensure that allowable ripple currents superimposed on low DC bias voltages do not cause reverse voltage conditions.

1.4 Using Two or More Capacitors in Series or Parallel

(1) Capacitors Connected in Parallel

The circuit resistance can closely approximate the series resistance of the capacitor causing an imbalance of ripple current loads within the capacitors. Careful design of wiring methods can minimize the possibility of excessive ripple currents applied to a capacitor.

(2) Capacitors Connected in Series

Normal DC leakage current differences among capacitors can cause voltage imbalances. The use of voltage divider shunt resistors with consideration to leakage currents, can prevent capacitor voltage imbalances.

1.5 Capacitor Mounting Considerations

(1) Double - Sided Circuit Boards

Avoid wiring Pattern runs which pass between the mounted capacitor and the circuit board. When dipping into a solder bath, excess solder may collect under the capacitor by capillary action and shortcircuit the anode and cathode terminals.

(2) Circuit Board Hole Positioning

The vinyl sleeve of the capacitor can be damaged if solder passes through a lead hole for subsequently processed parts. Special care when locating hole positions in proximity to capacitors is recommended.

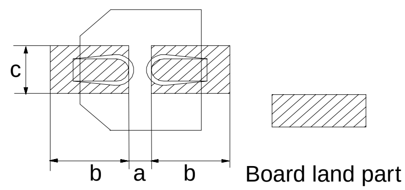
(3) Circuit Board Hole Spacing

The circuit board holes spacing should match the capacitor lead wire spacing within the specified tolerances. Incorrect spacing can cause excessive lead wire stress during the insertion process. This may result in premature capacitor failure due to short or open circuit, increased leakage current, or electrolyte leakage.

(4)Land/Pad Pattern

The circuit board land/pad pattern size for chip capacitors is specified in the following table.

[Table of Board Land Size vs. Capacitor Size]



(mm)

Size	a	b	c
A(ϕ3)	0.6	2.2	1.5
B(ϕ4)	1.0	2.5.	1.6
C(ϕ5)	1.5	2.8	1.6
D(ϕ6.3)	1.8	3.2	1.6
E(ϕ8 x 6.2L)	2.2	4.0	1.6
F(ϕ8 x 10.2L)	3.1	4.0	2.0
G(ϕ10 x 10.2L)	4.6	4.1	2.0

Among others, when the size a is wide , back fillet can not be made, decreasing fitting strength.

❇ Decide considering mounting condition, solderability and fitting strength, etc. based on the design standards of your company.

(5) Clearance for Case Mounted Pressure Relief Vents

Capacitors with case mounted pressure relief vents require sufficient clearance to allow for proper vent operation. The minimum clearances are dependent on capacitor diameters as follows.

ϕ6.3 to ϕ16 mm : 2 mm minimum,
ϕ18 to ϕ35 mm : 3 mm minimum.
ϕ40 mm or greater: 5 mm minimum

(6) Clearance for Seal Mounted Pressure Relief Vents

A hole in the circuit board directly under the seal vent location is required to allow proper release of pressure.

(7) Wiring Near the Pressure Relief Vent

Avoid locating high voltage or high current wiring or circuit board paths above the pressure relief vent. Flammable, high temperature gas exceeding 100°C may be released which could dissolve the wire insulation and ignite.

(8) Circuit Board Patterns Under the Capacitor

Avoid circuit board runs under the capacitor as electrolyte leakage could cause an electrical short.

(9) Screw Terminal Capacitor Mounting

- Do not orient the capacitor with the screw terminal side of the capacitor facing downwards.
- Tighten the terminal and mounting bracket screws within the torque range specified in the specification.

1.6 Electrical Isolation of the Capacitor

Completely isolate the capacitor as follows.

- Between the cathode and the case (except for axially leaded B types) and between the anode terminal and other circuit paths.
- Between the extra mounting terminals (on T types) and the anode terminal, cathode terminal, and other circuit paths.

1.7 Capacitor Sleeve

The vinyl sleeve or laminate coating is intended for marking and identification purposes and is not meant to electrically insulate the capacitor.
The sleeving may split or crack if immersed into solvents such as toluene or xylene, and then exposed to high temperatures.

> Always consider safety when designing equipment and circuits. Plan for worst case failure modes such as short circuits and open circuits which could occur during use.
> (1) Provide protection circuits and protection devices to allow safe failure modes.
> (2) Design redundant or secondary circuits where possible to assure continued operation in case of main circuit failure.

2. Capacitor Handling Techniques

2.1 Considerations Before Using

(1) Capacitors have a finite life. Do not reuse or recycle capacitors from used equipment.
(2) Transient recovery voltage may be generated in the capacitor due to dielectric absorption. If required, this voltage can be discharged with a resistor with a value of about 1 kΩ.
(3) Capacitors stored for long periods of time may exhibit an increase in leakage current. This can be corrected by gradually applying rated voltage in series with a resistor of approximately 1 kΩ.
(4) If capacitors are dropped, they can be damaged mechanically or electrically. Avoid using dropped capacitors.
(5) Dented or crushed capacitors should not be used. The seal integrity can be compromised and loss of electrolyte/shortened life can result.

2.2 Capacitor Insertion

(1) Verify the correct capacitance and rated voltage of the capacitor.
(2) Verify the correct polarity of the capacitor before inserting.
(3) Verify the correct hole spacing before insertion (land pattern size on chip type) to avoid stress on the terminals.
(4) Ensure that the auto insertion equipment lead clinching operation does not stress the capacitor leads where they enter the seal of the capacitor. For chip type capacitors, excessive mounting pressure can cause high leakage current, short circuit, or disconnection.

2.3 Manual Soldering

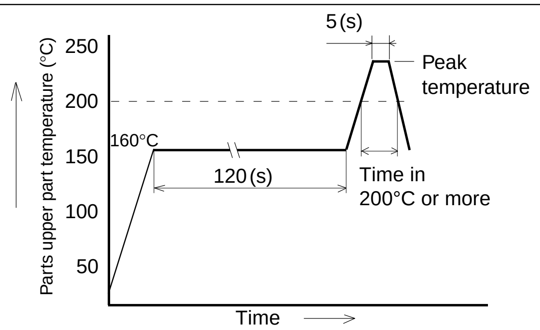
(1) Observe temperature and time soldering specifications or do not exceed temperatures of 350°C for 3 seconds or less.
(2) If lead wires must be formed to meet terminal board hole spacing, avoid stress on the leadwire where it enters the capacitor seal.
(3) If a soldered capacitor must be removed and reinserted, avoid excessive stress to the capacitor leads.
(4) Aviod touching the tip of the soldering iron to the capacitor, to prevent melting of the vinyl sleeve.

2.4 Flow Soldering

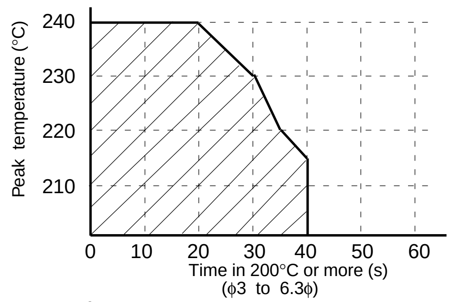
(1) Don not immerse the capacitor body into the solder bath as excessive internal pressure could result.
(2) Observe proper soldering conditions (temperature, time, etc.). Do not exceed the specified limits.
(3) Do not allow other parts or components to touch the capacitor during soldering.

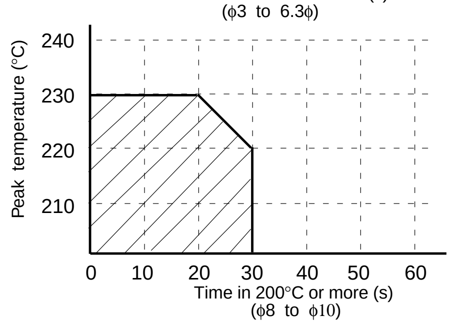
2.5 Reflow Soldering for Chip Capacitors

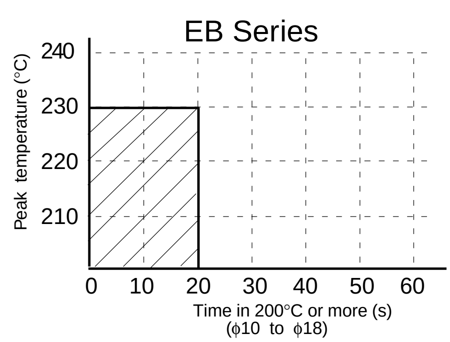
(1) For reflow, use a thermal conduction system such as infrared radiation (IR) or hot blast. Vapor heat transfer systems (VPS) are not recommended.
(2) Observe proper soldering conditions (temperature, time, etc.). Do not exceed the specified limits.
(3) Reflow should be performed one time. Consult us for additional reflow restrictions.



Chip capacitor reflow guaranteed condition







2.6 Other Soldering Considerations

Rapid temperature rises during the preheat operation and resin bonding operation can cause cracking of the capacitor vinyl sleeve. For heat curing, do not exceed 150°C for a maximum time of 2 minutes.

2.7 Capacitor Handling after Soldering

(1) Avoid movement of the capacitor after soldering to prevent excessive stress on the leadwires where they enter the seal.
(2) Do not use the capacitor as a handle when moving the circuit board assembly.
(3) Avoid striking the capacitor after assembly to prevent failure due to excessive shock.

2.8 Circuit Board Cleaning

(1) Circuit boards can be immersed or ultrasonically cleaned using suitable cleaning solvents for up to 5 minutes and up to 60°C maximum temperatures. The boards should be thoroughly rinsed and dried.
Recommended cleaning solvents include Pine Alpha ST-100S, Sunelec B-12, DK Beclear CW-5790, Aqua Cleaner 210SEP, Cold Cleaner P3-375, Telpen Cleaner EC-7R, Clean-thru 750H, Clean-thru 750L, Clean thru 710M, Techno Cleaner 219, Techno Care FRW-17, Techno Care FRW-1, Techno Care FRV-1, IPA (isopropyl alcohol)

✻ The use of ozone depleting cleaning agents are not recommended in the interest of protecting the environment.

(2) Avoid using the following solvent groups unless specifically allowed for in the specification;

- Halogenated cleaning solvents: except for solvent resistant capacitor types, halogenated solvents can permeate the seal and cause internal capacitor corrosion and failure. For solvent resistant capacitors, carefully follow the temperature and time requirements of the specificaion. 1-1-1 trichloroe thane should never be used on any aluminium electrolytic capacitor.
- Alkali solvents: could attack and dissolve the aluminum case.
- Petroleum based solvents: deterioration of the rubber seal could result.
- Xylene: deterioration of the rubber seal could result.
- Acetone: removal of the ink markings on the vinyl sleeve could result.

✻ Temperature measuring method: Measure temperature in assuming quantitative production, by sticking the thermo-couple to the capacitor upper part with epoxy adhesives.

(3) A thorough drying after cleaning is required to remove residual cleaning solvents which may be trapped between the capacitor and the circuit board. Avoid drying temperatures which exceed the maximum rated temperature of the capacitor.
(4) Monitor the contamination levels of the cleaning solvents during use by electrical conductivity, pH, specific gravity, or water content. Chlorine levels can rise with contamination and adversely affect the performance of the capacitor.

✻ Please consult us for additonal information about acceptable cleaning solvents or cleaning methods.

Type	Series	Cleaning permitted
Surface mount type	V(Except EB Series)	○
Lead type	Bi-polar SU	○
	M	○(~ 100V)
	KA	○
	Bi-polar KA	○
	FB	○
	FC	○
	GA	○
	NHG	○(~ 100V)
	EB	○(~ 100V)
	TA	○
Snap-in type	TS UP	○(~ 100V)
	TS HA	○(~ 100V)

2.9 Mounting Adhesives and Coating Agents

When using mounting adhesives or coating agents to control humidity, avoid using materials containing halogenated solvents. Also, avoid the use of chloroprene based polymers.

✻ After applying adhesives or coatings, dry thoroughly to prevent residual solvents from being trapped between the capacitor and the circuit board.

3. Precautions for using capacitors

3.1 Environmental Conditions

Capacitors should not be used in the following environments.

(1) Temperature exposure above the maximum rated or below the minimum rated temperature of the capacitor.
(2) Direct contact with water, salt water, or oil.
(3) High humidity conditions where water could condense on the capacitor.
(4) Exposure to toxic gases such as hydrogen sulfide, sulfuric acid, nitric acid, chlorine, or ammonia.
(5) Exposure to ozone, radiation, or ultraviolet rays.
(6) Vibration and shock conditions exceeding specified requirements.

3.2 Electrical Precautions

(1) Avoid touching the terminals of the capacitor as possible electric shock could result. The exposed aluminium case is not insulated and could also cause electric shock if touched.
(2) Avoid short circuiting the area between the capacitor terminals with conductive materials including liquids such as acids or alkaline solutions.

4. Emergency Procedures

(1) If the pressure relief vent of the capacitor operates, immediately turn off the equipment and disconnect from the power source. This will minimize additional damage caused by the vaporizing electrolyte.
(2) Avoid contact with the escaping electrolyte gas which can exceed 100°C temperatures.
If electrolyte or gas enters the eye, immediately flush the eye with large amounts of water.
If electrolyte or gas is ingested by mouth, gargle with water. If electrolyte contacts the skin, wash with soap and water.

5. Long Term Storage

Leakage current of a capacitor increases with long storage times. The aluminium oxide film deteriorates as a function of temperature and time. If used without reconditioning, an abnormally high current will be required to restore the oxide film. This current surge could cause the circuit or the capacitor to fail. Capacitor should be reconditioned by applying rated voltage in series with a 1000 Ω, current limiting resistor for a time period of 30 minutes.

5.1 Environmental Conditions (Storage)

Capacitors should not be stored in the following environments.

(1) Temperature exposure above 35°C or below 15 °C.
(2) Direct contact with water, salt water, or oil.
(3) High humidity conditions where water could condense on the capacitor.
(4) Exposure to toxic gases such as hydrogen sulfide,sulfuric acid, nitric acid, chlorine, or ammonia.
(5) Exposure to ozone, radiation, or ultraviolet rays.
(6) Vibration and shock conditions exceeding specified requirements.

6. Capacitor Disposal

When disposing of capacitors, use one of the following methods.

- Incinerate after crushing the capacitor or puncturing the can wall (to prevent explosion due to internal pressure rise). Capacitors should be incinerated at high temperatures to prevent the release of toxic gases such as chlorine from the polyvinyl chloride sleeve, etc.
- Dispose of as solid waste.
- Local laws may have specific disposal requirements which must be followed.

The application guidelines above are taken from:

Technical Report EIAJ RCR-2367 issued by the Japan Electronic Industry Association, Inc. -
Guideline of notabilia for aluminium electrolytic capacitors with non-solid electrolytic for use in electronic equipment.

Refer to this Technical Report for additional details.