Specification
No. G110510A0339Z2 — 1 to 16

Electrolytic Capacitors
Specifications

Customer Part No. :

Customer Specification No. :

Nippon Chemi-Con Part No. : KYA SERIES

Nippon Chemi-Con Corporation

Chemi-Con Miyagi Corporation

Design Group Manager

K. Kunishima

Kazuyoshi Kunishima

Receipt Stamp

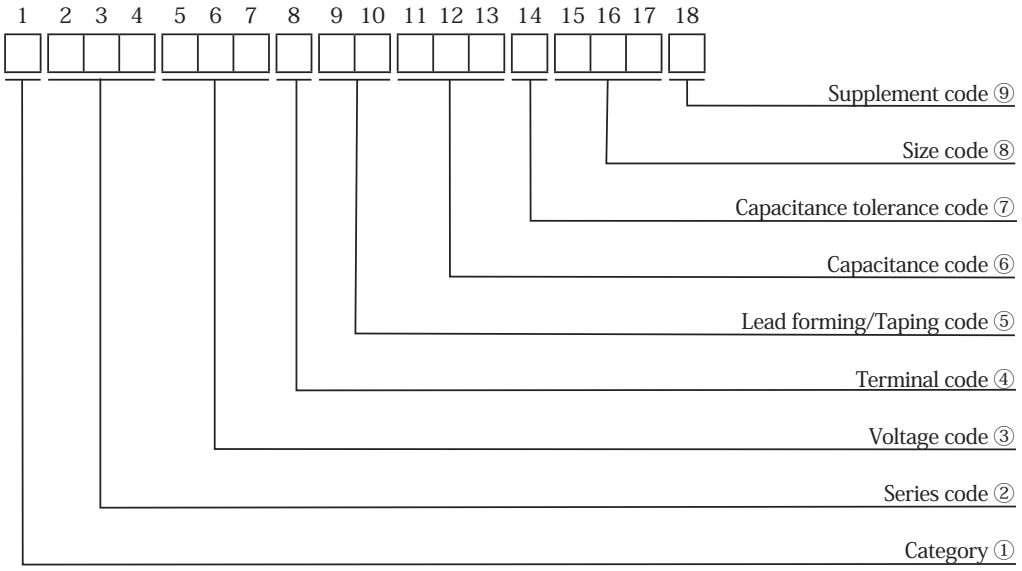
Change history of specifications

Specifications No.	Revision date	Pages/section revised	Changes made	Reasons for changes
G110510A0339Z1	Nov.14.2011	—	First issue	—
G110510A0339Z2	Feb.09.2012	—	Change from an individual product specification to KYA series product specification.	—
		—	No. G110510A0330Z1 was included to a unified specification.	—

1 Scope

This specification defines the requirements for aluminum electrolytic capacitors KYA series.

2 Part Numbering System



① Category

Category	Code
	1st
Polar	E

② Series code

Series name	Series code		
	2nd	3rd	4th
KYA	K	Y	A

③ Voltage code

Voltage [V]	Voltage code		
	5th	6th	7th
6.3	6	R	3
10	1	0	0
16	1	6	0
25	2	5	0
35	3	5	0
50	5	0	0
63	6	3	0
100	1	0	1

④ Terminal code

Terminal configuration	Terminal code
	8th
Radial lead	E

⑤ Lead forming/Taping code

Type	Shape/contents	Lead forming/Taping code	
		9th	10th
Lead forming (Radial lead/Bulk)	Straight	L	L
Taping (Radial lead)	Straight	T	D
	Sloping clinch	T	D
	Straight (Skip a hole : Applicable to only ϕ 12.5)	T	E
	Straight (Styrofoam-less : Applicable to only ϕ 16)	T	S
	Clinch(F=5.0mm)	T	C

⑥ Capacitance code

Capacitance[μ F]	Capacitance code			Capacitance[μ F]	Capacitance code		
	11th	12th	13th		11th	12th	13th
1.0	1	R	0	330	3	3	1
2.2	2	R	2	390	3	9	1
3.3	3	R	3	470	4	7	1
4.7	4	R	7	560	5	6	1
6.8	6	R	8	680	6	8	1
10	1	0	0	820	8	2	1
15	1	5	0	1000	1	0	2
22	2	2	0	1200	1	2	2
27	2	7	0	1500	1	5	2
33	3	3	0	1800	1	8	2
39	3	9	0	2200	2	2	2
47	4	7	0	2700	2	7	2
56	5	6	0	3300	3	3	2
68	6	8	0	3900	3	9	2
82	8	2	0	4700	4	7	2
100	1	0	1	5600	5	6	2
120	1	2	1	6800	6	8	2
150	1	5	1	8200	8	2	2
180	1	8	1	10000	1	0	3
220	2	2	1	12000	1	2	3
270	2	7	1	15000	1	5	3

⑦ Capacitance tolerance code

Capacitance tolerance [%]	Capacitance tolerance code
	14th
± 20	M

⑧ Size code

φ D	Size code
	15th
5	E
6.3	F
8	H
10	J
12.5	K
16	L

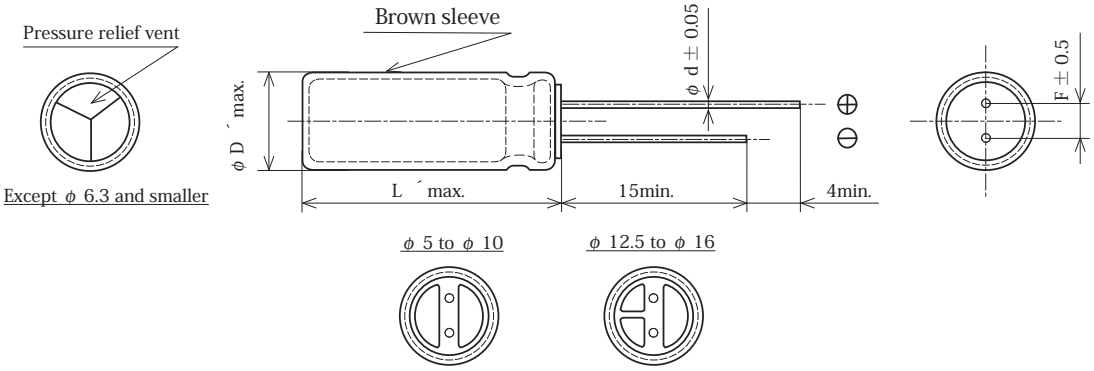
L	Size code	
	16th	17th
11	1	1
11.5	B	5
12.5	C	5
15	1	5
16	1	6
20	2	0
25	2	5
31.5	N	3
35.5	P	1

⑨ Supplement code

Sleeve material	Terminal plating material	Supplement code
		18th
PET	Sn-Bi	D
PET	Sn	S

3 Appearance and dimensions

Long lead
Lead forming code : L L

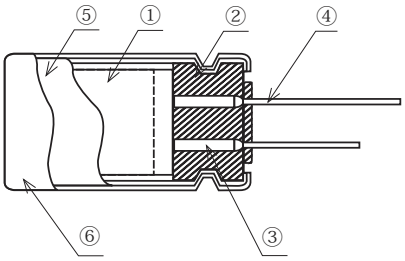


Dimension [mm]

φ D	5	6.3	8	10	12.5	16
L	11 to 35.5					
φ d	0.5		0.6			0.8
F	2.0	2.5	3.5	5.0		7.5
L´	L + 1.5 ※1					
φ D´	φ D + 0.5 ※1					

※1 φ D , L : Nominal case size

4 Construction



No.	Compositions		Materials
①	Element	Anode foil	Aluminum
		Cathode foil	Aluminum
		Separator	Paper
		Fixing tape	Polypropylene(PP)
②	Seal		Rubber
③	Aluminum tab		Aluminum
④	Lead wire		Tinned copper clad steel Bismuth-containig tinned copper clad steel
⑤	Case		Aluminum
⑥	Sleeve		Polyester

※ No ozone depleting substance has been used.
RoHS Directive(2002/95/EC)
Substances banned in the RoHS directive are not used in these products.

5 Rating and characteristics

No.	Item	Specification
1	Category temperature range	− 40 to + 105℃
2	Rated voltage range	6.3 to 100V$_{DC}$
3	Surge voltage	Table-1
4	Rated capacitance range	See the standard rating table
5	Capacitance tolerance	− 20 to + 20%
6	Dissipation factor(tan δ)	See the standard rating table
7	Leakage current	See the standard rating table
8	Rated ripple current	See the standard rating table
9	Impedance	See the standard rating table

Table-1 Surge voltage

Rated voltage [V$_{DC}$]	6.3	10	16	25	35	50	63	100
Surge voltage [V$_{DC}$]	7.2	11.5	18.4	28.8	40.3	57.5	72.5	115

Rated ripple current multipliers

Frequency multipliers

Frequency [Hz] / Capacitance [μ F]	120	1k	10k	100k
1.0 to 180	0.40	0.75	0.90	1.00
220 to 560	0.50	0.85	0.94	1.00
680 to 1800	0.60	0.87	0.95	1.00
2200 to 3900	0.75	0.90	0.95	1.00
4700 to 15000	0.85	0.95	0.98	1.00

When a frequency is different from the specified condition shown in the table of standard ratings, do not exceed the value obtained by multiplying the permissible maximum ripple current by the multiplier above.

6 Marking

The following items shall be marked on each capacitor. (White marking)

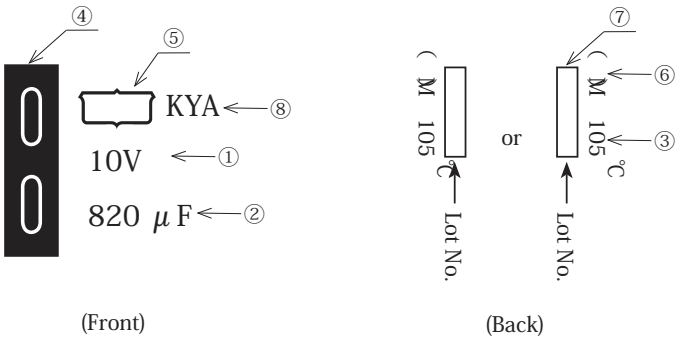
① Rated voltage
② Rated capacitance
③ Upper category temperature
④ Negative polarity marking
⑤ Manufacturer's identification mark
⑥ Capacitance tolerance code
⑦ Lot No.
⑧ Series name

Finish method

1.Lot No. is marked on either of the sieeve or the top of the alnminum case.

2.The negative polarity marking (stripe) is maked to disinguish the negative lead.

(Example)



(Front) (Back)

7 Performance

Unless otherwise specified, the capacitors shall be measured at a temperature at + 15 to + 35℃ , a humidity of 45 to 75% RH and a atmospheric pressure of 86 to 106kPa. However, if any doubt arises on the judgment, the measurement conditions shall be + 20 ± 2℃ , 60 to 70% RH and 86 to 106kPa.

7.1 Leakage current (L.C.)

〔Conditions〕 Rated voltage shall be applied to capacitors in series with a resistor of 1000 ± 10 Ω .Then leakage current shall be measured at the end of a specified period after the capacitors reached the rated voltage across the terminals.

〔Criteria〕 Shall not exceed the values specified in the table of Standard Ratings.

7.2 Capacitance（Cap.）

〔Conditions〕 Measuring frequency : 120Hz ± 20%
Measuring voltage : 0.5Vrms max. + 1.5 to 2.0V_{DC}
Measuring circuit : Series equivalent circuit()
〔Criteria〕 Shall be within the specified capacitance tolerance.

7.3 Dissipation factor（tan δ）

〔Conditions〕 Measuring frequency : 120Hz ± 20%
Measuring voltage : 0.5Vrms max. + 1.5 to 2.0V_{DC}
Measuring circuit : Series equivalent circuit()
〔Criteria〕 Shall not exceed the values specified in the table of Standard Ratings.

7.4 Impedance

〔Conditions〕 Measuring frequency : 100kHz ± 10%
Measuring voltage : 0.5V rms max.
〔Criteria〕 Shall not exceed the values specified in the table of Standard Ratings.

7.5 Terminal strength

(1) Pull strength

〔Conditions〕 The capacitor body shall be held. A force shall be gradually applied to the lead wire in the direction of the axis of the lead wire up to the specified pull force, and retained for 10 ± 1 seconds.

Nominal lead diameter [mm]	Pull force [N]
Over 0.3 to 0.5 inc1.	5
Over 0.5 to 0.8 inc1.	10

〔Criteria〕 The lead wire shall neither loosen nor break away.

(2) Lead bending strength

〔Conditions〕 The capacitor shall be held so that the normal axis of the lead wire can be in a vertical position. A weight equivalent to the specified load shall be hung on the end of the lead wire. The capacitor body shall be inclined through 90° and returned to its normal position within 2 to 3 seconds. The consecutive bend shall then be in the opposite direction in the same manner.

Nominal lead diameter [mm]	Bending load [N]
Over 0.3 to 0.5 inc1.	2.5
Over 0.5 to 0.8 inc1.	5

〔Criteria〕 The lead wire shall neither loosen nor break away.

7.6 Soldering heat

〔Conditions〕 Type of solder : Sn-3Ag-0.5Cu
Flux : Ethanol solution(25 wt.% rosin)
Solder temperature/immersion time : + 260 ± 5℃ for l0 ± 1 seconds or + 380 ± 10℃ for 3 ± 0.5 seconds.
Depth of immersion : Up to 1.5 to 2.0mm from the root of the lead wire covered with a thermal shield plate
Speed of immersion : 25 ± 2.5mm/sec.
〔Criteria〕 Appearance : No significant damage.
Leakage current : Shall not exceed the initial specified value.
Capacitance change : Shall be within ± 10% of the initial measured value.
Tan δ : Shall not exceed the initial specified value.

7.7 Solderability

〔Conditions〕 Type of solder : Sn-3Ag-0.5Cu
Flux : Ethanol solution (25 wt.% rosin)
Solder temperature : + 245 ± 3℃
Depth of immersion : Up to 1.5 to 2.0mm
Immersion time : 2 to 3sec.
〔Criteria〕 Solder shall cover at least 3/4 of the lead surface immersed.

7.8 Vibration

〔Conditions〕 Vibration frequency range : 10 to 55Hz
Amplitude or Acceleration : 0.75 mm (Half amplitude)or 98m/s^2(Whichever is less severe)
Sweep rate : 10 to 55 to 10Hz in about 1 minute
Direction and period of motion : 2 hours in each of 3 mutually perpendicular directions (total of 6 hours)

Note : Capacitors shall be mounted on the pc board with their lead wires anchored at 4mm max. of their bodies, except for the capacitors with the case size ϕ 16 x30L, whose lead wire shall be anchored at 1mm max. of their bodies The body of the capacitor with 12.5mm or larger in diameter or 25mm or longer in length, in addition, shall be anchored to the pc board with a fixture.

〔Criteria〕 Appearance : No significant damage, legible marking, and no electrolyte leakage.
Capacitance change : Shall be within ± 5% of the initial measured value.

7.9 Damp heat

〔Conditions〕 Test temperature : + 40 ± 2℃
Relative humidity : 90 to 95% RH
Test time : 240 ± 8 hours

〔Criteria〕 Appearance : No significant damage, legible marking, and no electrolyte leakage.
Leakage current : Shall not exceed the initial specified value.
Capacitance change : Shall be within ± 20% of the initial measured value.
Tan δ : Shall not exceed 120% of the initial specified value.

7.10 Endurance

〔Conditions〕 After the capacitors are put to a DC voltage with the rated ripple current within the rated voltage for the specified test of time at + 105 ± 2℃ , the following specifications shall be satisfied when the capacitors are restored to + 20℃ . The sum of a DC voltage and a peak AC voltage must not exceed their full rated voltage.

Specified test time (6.3V_{DC} to 10V_{DC}) : 4,000 $^{+72}_{0}$ hours (ϕ 5, ϕ 6.3)
: 6,000 $^{+72}_{0}$ hours (ϕ 8 , ϕ 10)
: 8,000 $^{+72}_{0}$ hours (ϕ 12.5 or more)
(16V_{DC} to 100V_{DC}) : 5,000 $^{+72}_{0}$ hours (ϕ 5, ϕ 6.3)
: 7,000 $^{+72}_{0}$ hours (ϕ 8 , ϕ 10)
: 10,000 $^{+72}_{0}$ hours (ϕ 12.5 or more)

〔Criteria〕 Appearance : No significant damage, legible marking, and no electrolyte leakage.
Leakage current : Shall not exceed the initial specified value.
Capacitance change : Shall be within ± 25% of the initial measured value.
Tan δ : Shall not exceed 200% of the initial specified value.

7.11 Surge voltage test

〔Conditions〕 Test temperature : + 15 to + 35℃
Series protective resistor : 1000 ± 10 Ω
Test voltage : Surge voltage shown in Table-1
Applying of voltage : 30 ± 5 seconds every 6 ± 0.5minutes.
Test cycle : 1000cycle.

〔Criteria〕 Appearance : No significant damage and no electrolyte leakage.
Leakage current : Shall not exceed the initial specified value.
Capacitance change : Shall be within ± 20% of the initial measured value.
Tan δ : Shall not exceed 200% of the initial specified value.

7.12 Pressure relief vent

〔Conditions〕 Apply a reverse voltage with the DC current of 1 amp.(DC reverse voltage test)

〔Criteria〕 When the pressure relief vent operated, the capacitor shall not flame although emission of gas or a part of the inside element is allowable.
If the vent does not operate with the voltage applied for 30 minutes, the test is considered to be passed.

7.13 High Temperature Storage

〔Conditions〕 The following specifications shall be satisfied when the capacitors are restored to + 20℃ after exposing them for 500 $^{+24}_{0}$ hours at + 105 ± 2℃ without an applied voltage. Before the measurements, the capacitor shall be preconditioned by applying voltage according to Item 4.1 of JIS C 5101-4.

〔Criteria〕 Appearance : No significant damage, legible marking, and no electrolyte leakage.
Leakage current : Shall not exceed the initial specified value.
Capacitance change : Shall be within ± 25% of the initial measured value.
Tan δ : Shall not exceed 200% of the initial specified value.

7.14 High and Low Temperature characteristics

〔Conditions〕

Step	Temperature [℃]
1	＋ 20 ± 2
2	－ 10 ± 3, － 25 ± 3, － 40 ± 3
3	＋ 105 ± 2

Step 1：Measure capacitance , tan δ and impedance
Step 2：Measure impedance
Step 3：Measure capacitance, tan δ and a leakage current.

〔Criteria〕 Step 2：Impedance ratio shall not exceed the values shown in Table attached.

[120Hz]

Rated voltage [V_{DC}]	6.3	10	16	25	35	50	63	100
Z － 25℃ /Z ＋ 20℃	4	3	2	2	2	2	2	2
Z － 40℃ /Z ＋ 20℃	8	6	4	3	3	3	3	3

Step 3：Leakage current : Shall not increase 8 times more than the initial specified value.
Capacitance change : Shall be within ± 25% of the initial measured value.
Tan δ : Shall not exceed the initial specified value.

8 Others

8.1 Export Trade Control Ordinance (When our product our is exported from Japan)

(1) Export Trade Control Ordinance (Section 1 through 15 of Appendix Table 1)

Export regulation of the capacitors for pulse use (750V or higher) and the capacitors for high voltage (5,000V or higher) is carried out sccording to (item 41-4) in Section 2 of Appendix Table 1 (Section 49 in Chapter 1 of METI's Ordinance) and (item 7) in Section 7 of Appendix Table 1 (Section 6 in Chapter 6 of METI's Ordinance). However, the aluminum electrolytic capacitors, which are described in this specification, don't fulfill the regulated level. Therefore, the aluminum electrolytic capacitors are not applicable to Export Trade Control Ordinance.

(2) Export Trade Control Ordinance (Section 16 of Appendix Table 1)

The aluminum electrolytic capacitors, which are described in this specification, applicable to goods under Export Regulations (Category 85 of Appendix Table in Customs Tariff Law) based on Section 16 of Appendix Table 1 in Export Trade Control Ordinance.
If the exporter got information that their exporting goods are used to any development of massive weapon, the exporter must apply for exporting permission to Ministry of Economy, Trade and Industry (METI), and get METI's approval.
Regardless of the above, if the exporter is notified by METI that his/her exporting goods are potentially used to any development of extensive destructive weapons, the exporter must seek permission from METI to export, and get METI's approval. When Nippon Chemi-Con receives such notice from METI, we will inform your company of that.

8.2 Cleaning PC board

(1) Alcohol system

Higher alcohol system / Isopropyl alcohol cleaning agents

Recommended cleaning agents:

Pine Alpha ST-100S (Arakawa Chemical)
Clean Through 750H, 750K, 750L, and 710M (Kao)
Technocare FRW-14,15,16,17 (Momentive performance materials)

Cleaning conditions:

Using these cleaning agents, capacitors are capable of withstanding immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60℃ . Find optimum conditions for washing, rinsing, and drying. Be sure not to rub off the marking of the capacitors by coming in contact with any other components or the PC board. Note that shower cleaning adversely affects the markings on the sleeve.
It is necessary to maintain a flux content in the cleaning liquid in of 2 Wt.% or less, and to control for alkaline components not to remain in the final cleaning process.

8.3 Manufacturing plant

CHEMI-CON MIYAGI CORPORATION (JAPAN)
CHEMI-CON IWATE CORPORATION (JAPAN)
P.T. INDONESIA CHEMI-CON (INDONESIA)
TAIWAN CHEMI-CON (TAIWAN)
SAMYOUNG ELECTRONICS CO., LTD. (KOREA)
QINGDAO SAMYOUNG ELECTRONICS CO., LTD. (CHINA)
CHEMI-CON (WUXI) CO., LTD. (CHINA)

8.4 For aluminum electrolytic capacitors, please refer to PRECAUTIONS AND GUIDELINES.

9 Reference standard

KYA series is applicable to general-purpose grade capacitors of JIS C 5101-4-1-1998.
The othes test conditions shall comply with JIS C 5101-4-1998 and JIS C 5101-1998.

10 Taping

10.1 Scope

This specification is applied to radial lead type aluminum electrolytic capacitors which are taped according to JIS C 0805-1989.

10.2 Taping configurations

Figure1
TCtype
ϕ 5 to ϕ 8

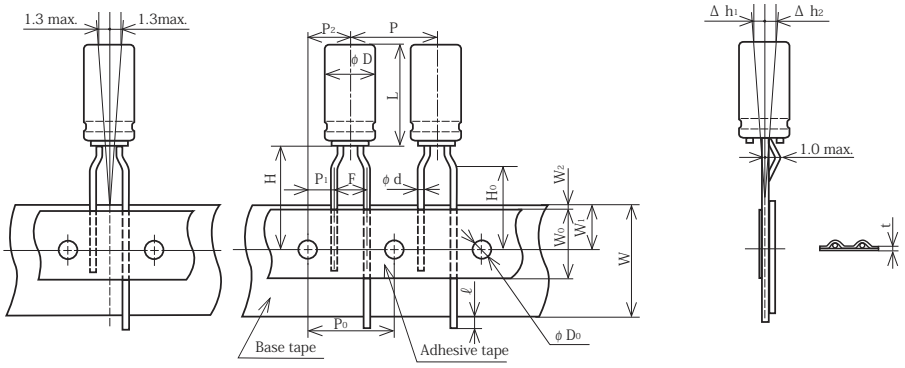


Figure2
TDtype
ϕ 5

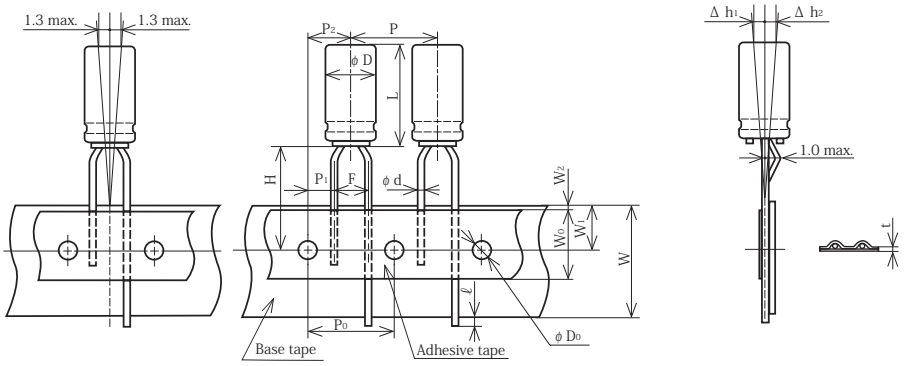


Figure3
TDtype
ϕ 6.3, ϕ 8, ϕ 10
TDtype
ϕ 12.5

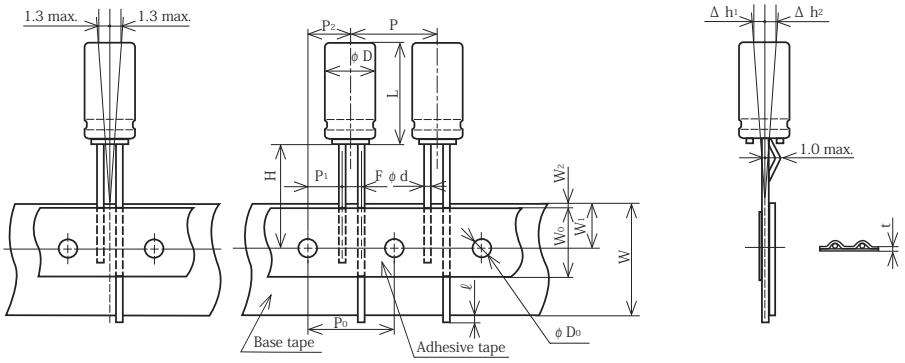
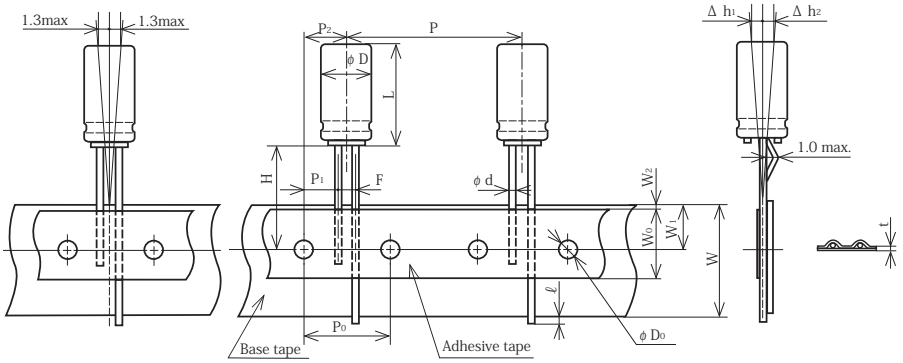


Figure4
TE type
ϕ 12.5
TD type, TS type
ϕ 16



10.3 Taping dimensions

[mm]

Symbol	Tolerance	Nominal value						Remarks
ϕ D	−	5		6.3		8		
L	−	11		11		11.5 to 20		
ϕ d	± 0.05	0.5		0.5		0.6		
P	± 1.0	12.7		12.7		12.7		
P_0	± 0.2	12.7		12.7		12.7		※ 1
P_1	± 0.7	5.1	3.85	5.1	3.85	4.6	3.85	※ 2
P_2	± 1.0	6.35		6.35		6.35		
F	− 0.2/ + 0.8	2.5	5.0	2.5	5.0	3.5	5.0	※ 2
W	± 0.5	18.0		18.0		18.0		
W_0	min.	10.0		10.0		10.0		※ 3
W_1	± 0.5	9.0		9.0		9.0		
W_2	max.	1.5		1.5		1.5		※ 3
H	± 0.75	18.5		18.5		20.0		
H_0	± 0.5	−	16.0	−	16.0	−	16.0	※ 4
ϕ D_0	± 0.2	4.0		4.0		4.0		
ℓ	max.	1.0		1.0		1.0		
t	± 0.2	0.7		0.7		0.7		
Δh_1, Δh_2	Max.	2.0		2.0		2.0		※ 5
Figure		2	1	3	1	3	1	

[mm]

Symbol	Tolerance	Nominal value				Remarks
ϕ D	−	10	12.5		16	
L	−	12.5 to 25	20 to 25		25	
ϕ d	± 0.05	0.6	0.6		0.8	
P	± 1.0	12.7	15	25.4	30	
P_0	± 0.3	12.7	15	12.7	15	※ 1
P_1	± 0.7	3.85	5.0	3.85	3.75	※ 2
P_2	± 1.3	6.35	7.5	6.35	7.5	
F	− 0.2/ + 0.8	5.0	5.0		7.5	※ 2
W	± 0.5	18.0	18.0		18.0	
W_0	min.	12.5	12.5		12.5	※ 3
W_1	± 0.5	9.0	9.0		9.0	
W_2	max.	1.5	1.5		1.5	※ 3
H	− 0/ + 2.0	18.0	18.0		18.0	
ϕ D_0	± 0.2	4.0	4.0		4.0	
ℓ	max.	1.0	1.0		1.0	
t	± 0.2	0.7	0.7		0.7	
Δh_1, Δh_2	max.	2.0	2.0		2.0	※ 5
Figure		3	3	4	4	

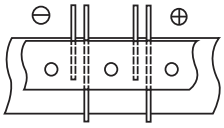
※ 1 Cumulative pitch error shall not exceed ± 1.0mm per 20 pitches.
※ 2 Measurement shall be made at the top of the tape and the center of the lead.
※ 3 Adhesive tape shall not extend beyond the edge of the base tape.
※ 4 Measurement shall be made from the bottom of the lead clinch.
※ 5 Measurement shall be made at the top to the capacitor.

10.4 Taping method and polarity

(1) Taping method

Capacitors shall be taped on the base tape with the adhesive tape so that their lead wires can be perpendicular to the longitudinal direction of the base tape, and their polarities shall be arranged in one orientation.

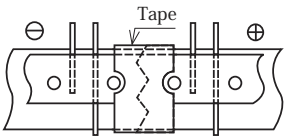
※ The polarity orientation does not apply to non-polarized capacitors.



(2) Splicing of base tape

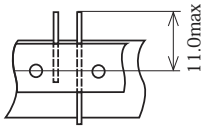
Splicing shall be made with a tape by means of a prescribed tool as shown below. The spliced base tapes shall be aligned within a error of 1.0mm. The splicing joint shall not have capacitors.

※ The polarity orientation does not apply to non-polarized capacitors.



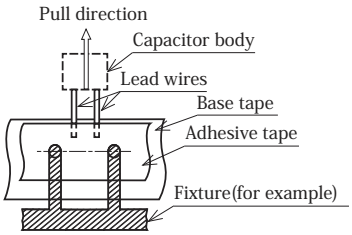
(3) Missing of capacitor

Consecutive missing capacitors shall not exceed 3 pcs after taped. Although quantity of discontinuous missing capacitors is not specified, the total quantity per a box shall be satisfied. When a capacitor is removed from the tape after taped, its lead wires shall be cut off or the capacitor shall be pulled out. Cutting the lead wires shall be made as follows.



(4) Pull strength of taped capacitor

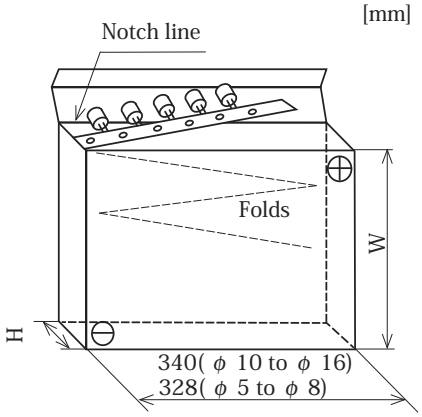
The capacitors which were fixed in between the base tape and adhesive tape shall have adhesion of at least 5N when the capacitor was pulled out in the axis direction of the capacitor as follows.



11 Packaging

11.1 Packaging for taping

[mm]



Case size（ϕ D × L）		W	H	Quantity packed
[mm]				[pcs]
ϕ 5	length 11	232	51	2000
ϕ 6.3	length 11	284	51	2000
ϕ 8	length 11.5 to 15	232	51	1000
	length 20	235	60	1000
ϕ 10	length 16 max.	308	56	800
	length 20	308	62	800
	length 25	308	67	800
ϕ 12.5	length 20 to 25	308	67	500
ϕ 16	length 25	350	67	250

Note ; The box dimensions may change slightly.

For ϕ 10 and ϕ 12.5 with P=15, the capacitors located on folds shall be removed.
（The polarity orientation does not apply to non-polarized capacitors.）

The following items shall be marked on the box.

1）Part Numbering System
2）Lot No.
3）Manufacturer's name
4）Quantity

Standard Ratings

WV [Vdc]	Cap [μ F]	Case size φ D × L[mm]	tan δ Max.	LC [μ A] Max.	Impedance [Ω Max./100kHz]		Rated ripple current [mArms/105℃]	Part No.
				2minutes	20℃	-10℃	100kHz	
6.3	100	5 × 11	0.22	6.3	0.90	3.6	150	EKYA6R3E □□ 101ME11D
6.3	180	5 × 11	0.22	11.3	0.40	1.6	250	EKYA6R3E □□ 181ME11D
6.3	220	5 × 11	0.22	13.8	0.40	1.6	250	EKYA6R3E □□ 221ME11D
6.3	330	6.3 × 11	0.22	20.7	0.22	0.87	400	EKYA6R3E □□ 331MF11D
6.3	470	6.3 × 11	0.22	29.6	0.22	0.87	400	EKYA6R3E □□ 471MF11D
6.3	820	8 × 11.5	0.22	51.6	0.13	0.52	640	EKYA6R3E □□ 821MHB5D
6.3	1200	10 × 12.5	0.22	75.6	0.080	0.32	865	EKYA6R3E □□ 122MJC5S
6.3	1200	8 × 15	0.22	75.6	0.087	0.35	840	EKYA6R3E □□ 122MH15D
6.3	1500	8 × 20	0.22	94.5	0.069	0.27	1050	EKYA6R3E □□ 152MH20D
6.3	1800	10 × 16	0.22	113	0.060	0.24	1300	EKYA6R3E □□ 182MJ16S
6.3	2700	10 × 20	0.24	170	0.046	0.18	1400	EKYA6R3E □□ 272MJ20S
6.3	3300	10 × 25	0.26	207	0.042	0.17	1650	EKYA6R3E □□ 332MJ25S
6.3	3900	12.5 × 20	0.26	245	0.035	0.12	1900	EKYA6R3E □□ 392MK20S
6.3	4700	12.5 × 25	0.28	296	0.027	0.089	2230	EKYA6R3E □□ 472MK25S
6.3	5600	12.5 × 25	0.30	352	0.027	0.089	2230	EKYA6R3E □□ 562MK25S
6.3	10000	16 × 25	0.40	630	0.021	0.060	2930	EKYA6R3E □□ 103ML25S
6.3	12000	16 × 31.5	0.44	756	0.017	0.050	3450	EKYA6R3E □□ 123MLN3S
6.3	15000	16 × 35.5	0.50	945	0.015	0.044	3610	EKYA6R3E □□ 153MLP1S
10	100	5 × 11	0.19	10.0	0.90	3.6	150	EKYA100E □□ 101ME11D
10	120	5 × 11	0.19	12.0	0.40	1.6	250	EKYA100E □□ 121ME11D
10	330	6.3 × 11	0.19	33.0	0.22	0.87	400	EKYA100E □□ 331MF11D
10	560	8 × 11.5	0.19	56.0	0.13	0.52	640	EKYA100E □□ 561MHB5D
10	820	8 × 15	0.19	82.0	0.087	0.35	840	EKYA100E □□ 821MH15D
10	820	10 × 12.5	0.19	82.0	0.080	0.32	865	EKYA100E □□ 821MJC5S
10	1000	10 × 12.5	0.19	100	0.080	0.32	865	EKYA100E □□ 102MJC5S
10	1200	8 × 20	0.19	120	0.069	0.27	1050	EKYA100E □□ 122MH20D
10	1200	10 × 16	0.19	120	0.060	0.24	1300	EKYA100E □□ 122MJ16S
10	1800	10 × 20	0.19	180	0.046	0.18	1400	EKYA100E □□ 182MJ20S
10	2200	10 × 25	0.21	220	0.042	0.17	1650	EKYA100E □□ 222MJ25S
10	3300	12.5 × 20	0.23	330	0.035	0.12	1900	EKYA100E □□ 332MK20S
10	3900	12.5 × 25	0.23	390	0.027	0.089	2230	EKYA100E □□ 392MK25S
10	6800	16 × 25	0.29	680	0.021	0.060	2930	EKYA100E □□ 682ML25S
10	10000	16 × 31.5	0.37	1000	0.017	0.050	3450	EKYA100E □□ 103MLN3S
10	12000	16 × 35.5	0.41	1200	0.015	0.044	3610	EKYA100E □□ 123MLP1S
16	47	5 × 11	0.16	7.5	0.40	1.6	250	EKYA160E □□ 470ME11D
16	100	5 × 11	0.16	16.0	0.40	1.6	250	EKYA160E □□ 101ME11D
16	220	6.3 × 11	0.16	35.2	0.22	0.87	400	EKYA160E □□ 221MF11D
16	270	6.3 × 11	0.16	43.2	0.22	0.87	400	EKYA160E □□ 271MF11D
16	470	8 × 11.5	0.16	75.2	0.13	0.52	640	EKYA160E □□ 471MHB5D
16	680	8 × 15	0.16	108	0.087	0.35	840	EKYA160E □□ 681MH15D
16	680	10 × 12.5	0.16	108	0.080	0.32	865	EKYA160E □□ 681MJC5S
16	820	8 × 20	0.16	131	0.069	0.27	1050	EKYA160E □□ 821MH20D
16	1000	10 × 16	0.16	160	0.060	0.24	1300	EKYA160E □□ 102MJ16S
16	1500	10 × 20	0.16	240	0.046	0.18	1400	EKYA160E □□ 152MJ20S
16	1800	10 × 25	0.16	288	0.042	0.17	1650	EKYA160E □□ 182MJ25S
16	2200	12.5 × 20	0.18	352	0.035	0.12	1900	EKYA160E □□ 222MK20S
16	3300	12.5 × 25	0.20	528	0.027	0.089	2230	EKYA160E □□ 332MK25S
16	4700	16 × 25	0.22	752	0.021	0.060	2930	EKYA160E □□ 472ML25S
16	5600	16 × 25	0.24	896	0.021	0.060	2930	EKYA160E □□ 562ML25S
16	6800	16 × 31.5	0.26	1080	0.017	0.050	3450	EKYA160E □□ 682MLN3S
16	8200	16 × 31.5	0.28	1310	0.017	0.050	3450	EKYA160E □□ 822MLN3S
16	10000	16 × 35.5	0.34	1600	0.015	0.044	3610	EKYA160E □□ 103MLP1S
25	33	5 × 11	0.14	8.2	0.40	1.6	250	EKYA250E □□ 330ME11D
25	47	5 × 11	0.14	11.7	0.40	1.6	250	EKYA250E □□ 470ME11D
25	68	5 × 11	0.14	17.0	0.40	1.6	250	EKYA250E □□ 680ME11D
25	150	6.3 × 11	0.14	37.5	0.22	0.87	400	EKYA250E □□ 151MF11D
25	330	8 × 11.5	0.14	82.5	0.13	0.52	640	EKYA250E □□ 331MHB5D
25	390	8 × 15	0.14	97.5	0.087	0.35	840	EKYA250E □□ 391MH15D
25	470	10 × 12.5	0.14	117	0.080	0.32	865	EKYA250E □□ 471MJC5S
25	560	8 × 20	0.14	140	0.069	0.27	1050	EKYA250E □□ 561MH20D

□□ : Enter the appropriate lead forming or taping code

Standard Ratings

WV [Vdc]	Cap [μ F]	Case size φ D × L[mm]	tan δ Max.	LC [μ A] Max.	Impedance [Ω Max./100kHz]		Rated ripple current [mArms/105℃]	Part No.
				2minutes	20℃	-10℃	100kHz	
25	680	10 × 16	0.14	170	0.060	0.24	1300	EKYA250E □□ 681MJ16S
25	1000	10 × 20	0.14	250	0.046	0.18	1400	EKYA250E □□ 102MJ20S
25	1200	10 × 25	0.14	300	0.042	0.17	1650	EKYA250E □□ 122MJ25S
25	1500	12.5 × 20	0.14	375	0.035	0.12	1900	EKYA250E □□ 152MK20S
25	2200	12.5 × 25	0.16	550	0.027	0.089	2230	EKYA250E □□ 222MK25S
25	3300	16 × 25	0.18	825	0.021	0.060	2930	EKYA250E □□ 332ML25S
25	3900	16 × 25	0.18	975	0.021	0.060	2930	EKYA250E □□ 392ML25S
25	4700	16 × 31.5	0.20	1170	0.017	0.050	3450	EKYA250E □□ 472MLN3S
25	5600	16 × 35.5	0.22	1400	0.015	0.044	3610	EKYA250E □□ 562MLP1S
35	33	5 × 11	0.12	11.5	0.40	1.6	250	EKYA350E □□ 330ME11D
35	47	5 × 11	0.12	16.4	0.40	1.6	250	EKYA350E □□ 470ME11D
35	100	6.3 × 11	0.12	35.0	0.22	0.87	400	EKYA350E □□ 101MF11D
35	220	8 × 11.5	0.12	77.0	0.13	0.52	640	EKYA350E □□ 221MHB5D
35	270	8 × 15	0.12	94.5	0.087	0.35	840	EKYA350E □□ 271MH15D
35	330	10 × 12.5	0.12	115	0.080	0.32	865	EKYA350E □□ 331MJC5S
35	390	8 × 20	0.12	136	0.069	0.27	1050	EKYA350E □□ 391MH20D
35	470	10 × 16	0.12	164	0.060	0.24	1300	EKYA350E □□ 471MJ16S
35	680	10 × 20	0.12	238	0.046	0.18	1400	EKYA350E □□ 681MJ20S
35	820	10 × 25	0.12	287	0.042	0.17	1650	EKYA350E □□ 821MJ25S
35	1000	12.5 × 20	0.12	350	0.035	0.12	1900	EKYA350E □□ 102MK20S
35	1500	12.5 × 25	0.12	525	0.027	0.089	2230	EKYA350E □□ 152MK25S
35	2200	16 × 25	0.14	770	0.021	0.060	2930	EKYA350E □□ 222ML25S
35	2700	16 × 25	0.14	945	0.021	0.060	2930	EKYA350E □□ 272ML25S
35	3300	16 × 31.5	0.16	1150	0.017	0.050	3450	EKYA350E □□ 332MLN3S
35	3900	16 × 35.5	0.16	1360	0.015	0.044	3610	EKYA350E □□ 392MLP1S
50	1.0	5 × 11	0.10	3.0	4.0	16.0	30	EKYA500E □□ 1R0ME11D
50	2.2	5 × 11	0.10	3.0	2.5	10.0	43	EKYA500E □□ 2R2ME11D
50	3.3	5 × 11	0.10	3.0	2.2	8.8	53	EKYA500E □□ 3R3ME11D
50	4.7	5 × 11	0.10	3.0	1.9	7.6	88	EKYA500E □□ 4R7ME11D
50	10	5 × 11	0.10	5.0	1.5	6.0	100	EKYA500E □□ 100ME11D
50	22	5 × 11	0.10	11.0	0.70	2.8	180	EKYA500E □□ 220ME11D
50	27	5 × 11	0.10	13.5	0.70	2.8	250	EKYA500E □□ 270ME11D
50	47	6.3 × 11	0.10	23.5	0.30	1.2	295	EKYA500E □□ 470MF11D
50	56	6.3 × 11	0.10	28.0	0.30	1.2	295	EKYA500E □□ 560MF11D
50	100	8 × 11.5	0.10	50.0	0.17	0.68	555	EKYA500E □□ 101MHB5D
50	150	8 × 15	0.10	75.0	0.12	0.48	730	EKYA500E □□ 151MH15D
50	180	10 × 12.5	0.10	90.0	0.12	0.48	760	EKYA500E □□ 181MJC5S
50	180	8 × 20	0.10	90.0	0.091	0.36	910	EKYA500E □□ 181MH20D
50	220	10 × 16	0.10	110	0.084	0.34	1050	EKYA500E □□ 221MJ16S
50	330	10 × 20	0.10	165	0.06	0.24	1220	EKYA500E □□ 331MJ20S
50	470	10 × 25	0.10	235	0.055	0.22	1440	EKYA500E □□ 471MJ25S
50	470	12.5 × 20	0.10	235	0.045	0.15	1660	EKYA500E □□ 471MK20S
50	560	12.5 × 20	0.10	280	0.045	0.15	1660	EKYA500E □□ 561MK20S
50	820	12.5 × 25	0.10	410	0.034	0.11	1950	EKYA500E □□ 821MK25S
50	1000	16 × 25	0.10	500	0.025	0.075	2555	EKYA500E □□ 102ML25S
50	1200	16 × 25	0.10	600	0.025	0.075	2555	EKYA500E □□ 122ML25S
50	1800	16 × 31.5	0.10	900	0.022	0.066	3010	EKYA500E □□ 182MLN3S
50	2200	16 × 35.5	0.12	1100	0.019	0.057	3150	EKYA500E □□ 222MLP1S
63	10	5 × 11	0.09	6.3	0.88	3.5	173	EKYA630E □□ 100ME11D
63	15	5 × 11	0.09	9.4	0.88	3.5	173	EKYA630E □□ 150ME11D
63	33	6.3 × 11	0.09	20.7	0.35	1.4	278	EKYA630E □□ 330MF11D
63	56	8 × 11.5	0.09	35.2	0.22	0.88	500	EKYA630E □□ 560MHB5D
63	82	8 × 15	0.09	51.6	0.16	0.64	665	EKYA630E □□ 820MH15D
63	100	10 × 12.5	0.09	63.0	0.11	0.44	725	EKYA630E □□ 101MJC5S
63	120	8 × 20	0.09	75.6	0.12	0.48	820	EKYA630E □□ 121MH20D
63	120	10 × 16	0.09	75.6	0.076	0.31	950	EKYA630E □□ 121MJ16S
63	220	10 × 20	0.09	138	0.056	0.23	1200	EKYA630E □□ 221MJ20S
63	330	10 × 25	0.09	207	0.046	0.19	1350	EKYA630E □□ 331MJ25S
63	330	12.5 × 20	0.09	207	0.041	0.13	1570	EKYA630E □□ 331MK20S
63	390	12.5 × 20	0.09	245	0.041	0.13	1570	EKYA630E □□ 391MK20S
63	470	12.5 × 25	0.09	296	0.031	0.093	1990	EKYA630E □□ 471MK25S

□□ : Enter the appropriate lead forming or taping code

Standard Ratings

WV [Vdc]	Cap [μ F]	Case size φ D × L[mm]	tan δ Max.	LC [μ A] Max.	Impedance [Ω Max./100kHz]		Rated ripple current [mArms/105℃]	Part No.
				2minutes	20℃	-10℃	100kHz	
63	560	12.5 × 25	0.09	352	0.031	0.093	1990	EKYA630E □□ 561MK25S
63	1000	16 × 25	0.09	630	0.025	0.075	2730	EKYA630E □□ 102ML25S
63	1200	16 × 31.5	0.09	756	0.021	0.063	2850	EKYA630E □□ 122MLN3S
63	1500	16 × 35.5	0.09	945	0.019	0.057	2900	EKYA630E □□ 152MLP1S
100	1.0	5 × 11	0.08	3.0	4.5	15.0	20	EKYA101E □□ 1R0ME11D
100	2.2	5 × 11	0.08	3.0	3.0	13.0	30	EKYA101E □□ 2R2ME11D
100	3.3	5 × 11	0.08	3.3	2.7	11.0	40	EKYA101E □□ 3R3ME11D
100	4.7	5 × 11	0.08	4.7	2.5	10.0	65	EKYA101E □□ 4R7ME11D
100	6.8	5 × 11	0.08	6.8	1.4	5.6	125	EKYA101E □□ 6R8ME11D
100	10	6.3 × 11	0.08	10.0	0.57	2.3	205	EKYA101E □□ 100MF11D
100	15	6.3 × 11	0.08	15.0	0.57	2.3	205	EKYA101E □□ 150MF11D
100	27	8 × 11.5	0.08	27.0	0.36	1.4	355	EKYA101E □□ 270MHB5D
100	39	8 × 15	0.08	39.0	0.25	1.0	450	EKYA101E □□ 390MH15D
100	47	10 × 12.5	0.08	47.0	0.17	0.66	480	EKYA101E □□ 470MJC5S
100	56	8 × 20	0.08	56.0	0.19	0.76	565	EKYA101E □□ 560MH20D
100	68	10 × 16	0.08	68.0	0.11	0.47	600	EKYA101E □□ 680MJ16S
100	100	10 × 20	0.08	100	0.084	0.34	800	EKYA101E □□ 101MJ20S
100	150	10 × 25	0.08	150	0.069	0.28	900	EKYA101E □□ 151MJ25S
100	180	12.5 × 20	0.08	180	0.062	0.18	1100	EKYA101E □□ 181MK20S
100	220	12.5 × 25	0.08	220	0.047	0.14	1250	EKYA101E □□ 221MK25S
100	330	16 × 25	0.08	330	0.038	0.12	1700	EKYA101E □□ 331ML25S
100	470	16 × 31.5	0.08	470	0.032	0.095	1850	EKYA101E □□ 471MLN3S
100	560	16 × 35.5	0.08	560	0.029	0.086	2000	EKYA101E □□ 561MLP1S

□□ : Enter the appropriate lead forming or taping code

PRECAUTIONS AND GUIDELINES(Aluminum Electrolytic Capacitors)

Designing Device Circuits

【1】 Select the capacitors to suit installation and operating conditions, and use the capacitors to meet the performance limits prescribed in this catalog or the product specifications.

【2】 Polarity

Aluminum Electrolytic Capacitors are polarized. Apply neither reverse voltage nor AC voltage to polarized capacitors. Using reversed polarity causes a short circuit or venting. Before use, refer to the catalog, product specifications or capacitor body to identify the polarity marking. (The shape of rubber seal does not represent the directional rule for polarity.) Use a bi-polar type of non-solid aluminum electrolytic capacitor for a circuit where the polarity is occasionally reversed. However, note that even a bi-polar aluminum electrolytic capacitor must not be used for AC voltage applications.

【3】 Operating voltage

Do not apply a DC voltage which exceeds the full rated voltage. The peak voltage of a superimposed AC voltage (ripple voltage) on the DC voltage must not exceed the full rated voltage. A surge voltage value, which exceeds the full rated voltage, is prescribed in the catalogs, but it is a restricted condition, for especially short periods of time.

【4】 Ripple current

Do not apply overcurrent which exceeds the full rated ripple current. The superimposition of a large ripple current increases the rate of heating within the capacitor. When excessive ripple current is imposed the internal temperature increases which may occur failure mode as follows.

・Shorten lifetime
・Open vent
・Short circuit

The rated ripple current has been specified at a certain ripple frequency. The rated ripple current at several frequencies must be calculated by multiplying the rated ripple current at the original frequency using the frequency multipliers for each product series. For more details, refer to the paragraph on Aluminum Electrolytic Capacitor Life.

【5】 Category temperature

Do not apply over temperature which exceeds the maximum category temperature.
The use of a capacitor outside the maximum rated category temperature will considerably shorten the life or cause the capacitor to vent. The relation between the lifetime of aluminum electrolytic capacitors and ambient temperature follows Arrhenius' rule that the lifetime is approximately halved with each 10℃ rise in ambient temperature.

【6】 Life expectancy

Select the capacitors to meet the service life of a device.

【7】 Charge and discharge

Do not use capacitors in circuits where heavy charge and discharge cycles are frequently repeated. Frequent and sharp heavy discharging cycles will result in decreasing capacitance and damage to the capacitors due to generated heat. Specified capacitors can be designed to meet the requirements of charging-discharging cycles, frequency, operating temperature, etc.

【8】 Failure mode of capacitors

Non-solid aluminum electrolytic capacitors, in general, have a lifetime which ends in an open circuit, but depending on conditions of usage or products type, failure mode of capacitors will be venting. Please contact a representative of Nippon Chemi-Con.

【9】 Insulating

Electrically isolate the following parts of a capacitor from the negative terminal, the positive terminal and the circuit traces.

・The outer can case of a non-solid aluminum capacitor.
・The dummy terminal of a non-solid aluminum capacitor, which is designed for mounting stability.

【10】 The outer sleeve

The outer sleeve of a capacitor is not assured as an insulator (Except for screw type).

【11】 Condition

Do not use/expose capacitors to the following conditions.

a) Oil, water, salty water storage in damp locations.
b) Direct sunlight
c) Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium.
d) Ozone, ultraviolet rays or radiation
e) Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or the product specification.

【12】 Mounting

a) The paper separators and the electrolytic-conductive electrolytes in a non-solid aluminum electrolytic capacitor are flammable. Leaking electrolyte on a printed circuit board can gradually erode the copper traces, possibly causing smoke or burning by short-circuiting the copper traces. Verify the following points when designing a PC board.
・Provide the appropriate hole spacing on the PC board to match the terminal spacing of the capacitor.

・Make the following open space over the vent so that the vent can operate correctly.

Case diameter	Clearance
ϕ 6.3 to ϕ 16mm	2mm minimum
ϕ 18 to ϕ 35mm	3mm minimum
ϕ 40mm and up	5mm minimum

・Do not place any wires or copper traces over the vent of the capacitor.
・Installing a capacitor with the vent facing the PC board needs an appropriate ventilation hole in PC board.
・Do not pass any copper traces beneath the seal side of a capacitor. The trace must pass 1 or 2mm to the side of the capacitor.
・Avoid placing any heat-generating objects adjacent to a capacitor or even on the reverse side of the PC board.
・Do not pass any via holes underneath a capacitor on double sided PC board.
・In designing double-sided PC boards, do not locate any copper trace under the seal side of a capacitor.

b) Do not mount the terminal side of a screw mount capacitor downwards. If a screw terminal capacitor is mounted on its side, make sure the positive terminal and vent are higher than the negative terminal. Do not tighten the screws of the terminals and the mounting clamps over the specified torque prescribed in the catalog or the production specification.

c) For a surface mount capacitor, design the copper pads of the PC board in accordance with the catalog or the product specifications.

【13】Others

a) Using capacitor for applications which always consider safety. Consult with our factory before use in applications which can affect human life.(space equipment, aerial equipment, nuclear equipment, medical equipment, vehicle control equipment, etc) Please note that the product, which is designed only for specific usage cannot be used in other usages.(ex. Photo flash type, etc.)

b) The electrical characteristics of capacitors vary in respect to temperature, frequency and service life. Design the device circuits by taking these changes into account.

c) Capacitors mounted in parallel need the current to flow equally through the individual capacitors.

d) Capacitors mounted in series require resistors in parallel with the individual capacitors to balance the voltage.

Installing Capacitors

【1】Installing

a) Used capacitors are not reusable, except in the case that the capacitors are detached from a device for periodic inspection to measure their electrical characteristics.

b) If the capacitors have self charged, discharge in the capacitors through a resistor of approximately 1k Ω before use.

c) If capacitors are stored at a temperature of 35℃ or more and more than 75% RH, the leakage current may increase. In this case, they can be reformed by applying the rated voltage through a resistor of approximately 1k Ω .

d) Verify the rated capacitance and voltages of the capacitors when installing.

e) Verify the polarity of the capacitors.

f) Do not use the capacitors if they have been dropped on the floor.

g) Do not deform the cases of capacitors.

h) Verify that the lead spacing of the capacitor fits the hole spacing in the PC board before installing the capacitors.Some standard pre-formed leads are available.

i) For radial or snap-in terminals, insert the terminals into PC board and press the capacitor downward until the bottom of the capacitor body reaches PC board surface.

j) Do not apply any mechanical force in excess of the limits prescribed in the catalogs or the product specifications of the capacitors. Also, note the capacitors may be damaged by mechanical shocks caused by the vacuum/insertion head, component checker or centering operation of an automatic mounting or insertion machine.

【2】Soldering and Solderability

a) When soldering with a soldering iron
・Soldering conditions (temperature and time) should be within the limits prescribed in the catalogs or the product specifications.
・If the terminal spacing of a capacitor does not fit the terminal hole spacing of the PC board, reform the terminals in a manner to minimize a mechanical stress into the body of the capacitor.
・Remove the capacitors from the PC board, after the solder is completely melted, reworking by using a soldering iron minimizes the mechanical stress to the capacitors.
・Do not touch the capacitor body with the hot tip of the soldering iron.

b) Flow soldering
・Do not dip the body of a capacitor into the solder bath only dip the terminals in. The soldering must be done on the reverse side of PC board.
・Soldering conditions (preheat, solder temperature and dipping time) should be within the limits prescribed in the catalogs or the product specifications.
・Do not apply flux to any part of capacitors other than their terminals.
・Make sure the capacitors do not come into contact with any other components while soldering.

c) Reflow soldering
- Soldering conditions (preheat, solder temperature and soldering time) should be within the limits prescribed in the catalogs or the product specifications.
- When setting the temperature infrared heaters, consider that the infrared absorption causes material to be discolored and change in appearance.
- Do not solder capacitors more than two times using reflow. If you need to do three times, be sure to consult with us.
- Make sure capacitors do not come into contact with copper traces.
- Vapor phase soldering (VPS) is not used.

d) Do not re-use surface mount capacitors which have already been soldered. In addition, when installing a new capacitor onto the assembly board to rework, remove old residual flux from the surface of the PC board, and then use a soldering iron within the prescribed conditions.

e) Confirm before running into soldering that the capacitors are SMD for reflow soldering.

【3】 Handling after soldering

Do not apply any mechanical stress to the capacitor after soldering onto the PC board.

a) Do not lean or twist the body of the capacitor after soldering the capacitors onto the PC board.

b) Do not use the capacitors for lifting or carrying the assembly board.

c) Do not hit or poke the capacitor after soldering to PC board. When stacking the assembly board, be careful that other components do not touch the aluminum electrolytic capacitors.

d) Do not drop the assembly board.

【4】 Cleaning PC boards

a) Do not wash capacitors by using the following cleaning agents.
- Halogenated solvents; cause capacitors to fail due to corrosion.
- Alkali system solvents; corrode (dissolve) an aluminum case.
- Petroleum and terpene system solvents; cause the rubber seal material to deteriorate.
- Xylene; causes the rubber seal material to deteriorate.
- Acetone; erases the marking.

Solvent resistant capacitors are only suitable for washing using the cleaning conditions prescribed in the catalogs or the product specifications. In particular, ultrasonic cleaning will accelerate damaging capacitors.

b) Verify the following points when washing capacitors.
- Monitor conductivity, pH, specific gravity, and the water content of cleaning agents. Contamination adversely affects these characteristics.
- Be sure not to expose the capacitors under solvent rich conditions or keep capacitors inside a closed container. In addition, please dry the solvent sufficiently on the PC board and the capacitor with an air knife (temperature should be less than the maximum rated category temperature of the capacitor) over 10 minutes. Aluminum electrolytic capacitors can be characteristically and catastrophically damaged by halogen ions, particularly by chlorine ions, though the degree of the damage mainly depends upon the characteristics of the electrolyte and rubber seal material. When halogen ions come into contact with the capacitors, the foil corrodes when voltages applied. This corrosion causes ; extremely high leakage current, which causes in line with, venting, and an open circuit. Global environmental warnings (Greenhouse effects and other environmental destruction by depletion of the ozone layer), new types of cleaning agents have been developed and commercialized as substitutes for CFC-113,1,1,2-trichloroethlene and 1,1,1-trichloroethylene. The following are recommended as cleaning conditions for some of new cleaning agents.

-Higher alcohol system cleaning agents

Recommended cleaning agents:
Pine Alpha ST-100S (Arakawa Chemical)
Clean Through 750H, 750K, 750L, and 710M (Kao)
Technocare FRW-14,15,16,17 (Momentive performance materials)
Cleaning conditions:
Using these cleaning agents capacitors are capable of withstanding immersion or ultrasonic cleaning for 10 minutes at a maximum liquid temperature of 60℃ . Find optimum condition for washing, rinsing, and drying. Be sure not to rub the marking off the capacitor by contacting any other components or the PC board. Note that shower cleaning adversely affects the markings on the sleeve.

-Non-Halogenated Solvent Cleaning

AK225AES (Asahi Glass)
Cleaning conditions:
Solvent resistant capacitors are capable of withstanding any one of immersion, ultrasonic or vapor cleaning for 5 minutes; exception is 2 minutes max. for KRE, and KRE-BP series capacitors and 3 minutes for SRM series capacitors.However, from a view of the global environmental problems, these types of solvent will be banned in near future. We would recommended not using them as much as possible.

Isopropyl alcohol cleaning agents

IPA (Isopropyl Alcohol) is one of the most acceptable cleaning agents; it is necessary to maintain a flux content in the cleaning liquid at a maximum limit of 2 Wt.% .

【5】 Precautions for using adhesives and coating materials

a) Do not use any adhesive and coating materials containing halogenated solvent.

b) Verify the following before using adhesive and coating material.
- Remove flux and dust leftover between the rubber seal and the PC board before applying adhesive or coating materials to the capacitor.
- Dry and remove any residual cleaning agents before applying adhesive and coating materials to the capacitors. Do not cover over the whole surface of the rubber seal with the adhesive or coating materials.
- For permissible heat conditions for curing adhesives or coating materials, follow the instructions in the catalogs or the product specifications of the capacitors.
- Covering over the whole surface of the capacitor rubber seal with resin may result in a hazardous condition because the inside pressure cannot release completely. Also, a large amount of halogen ions in resins will cause the capacitors to fail because the halogen ions penetrate into the rubber seal and the inside of the capacitor.

c) Some coating materials, it cannot be implemented to the capacitor.
Please note that loose luster and whitening on the surface of the outer sleeve might be caused according to the kind of solvents used for mounting adhesives and coating agents.

【6】 Fumigation

In many cases when exporting or importing electronic devices, such as capacitors, wooden packaging is used. In order to control insects, many times, it becomes necessary to fumigate the shipments. Precautions during “Fumigation” using halogenated chemical such as Methyl Bromide must be taken. Halogen gas can penetrate packaging materials used, such as, cardboard boxes and vinyl bags. Penetration of the halogenide gas can cause corrosion of Electrolytic capacitors.

The Operation of Devices

a) Do not touch terminals of capacitor directly with bare hands.

b) Do not short-circuit the terminal of a capacitor by letting it come into contact with any conductive object. Also, do not spill electric-conductive liquid such as acid or alkaline solution over the capacitor.

c) Do not use capacitors in circumstance where they would be subject to exposure to the following materials exist or expose.
- Oil, water, salty water or damp location.
- Direct sunlight.
- Toxic gases such as hydrogen sulfide, sulfurous acid, nitrous acid, chlorine or its compounds, and ammonium.
- Ozone, ultraviolet rays or radiation.
- Severe vibration or mechanical shock conditions beyond the limits prescribed in the catalogs or product specification.

Maintenance Inspection

a) Make periodic inspections of capacitors that have been used in industrial applications. Before inspection, turn off the power supply and carefully discharge the electricity in the capacitors. Verify the polarity when measuring the capacitors with a volt-ohm meter. Also, do not apply any mechanical stress to the terminals of the capacitors.

b) The following items should be checked during the periodic inspections.
- Significant damage in appearance : venting and electrolyte leakage.
- Electrical characteristics: leakage current, capacitance, tan δ and other characteristics prescribed in the catalogs or product specifications.

We recommend replacing the capacitors if the parts are out of specification.

In Case of Venting

a) If a non-solid aluminum electrolytic capacitor expels gas when venting, it will discharge odors or smoke, or burn in the case of a short-circuit failure. Immediately turn off or unplug the main power supply of the device.

b) When venting, a non-solid aluminum electrolytic capacitor blows out gas with a temperature of over 100℃ . (A solid aluminum electrolytic capacitor discharges decomposition gas or burning gas while the outer resin case is burning.) The gas which comes out from the pressure vent of a capacitor, it is not smoke by flammable. This is the vaporized electrolyte. Never expose the face close to a venting capacitor. If your eyes should inadvertently become exposed to the spouting gas or you inhale it, immediately flush the open eyes with large amounts of water and gargle with water respectively. If electrolyte is on the skin, wash the electrolyte away from the skin with soap and plenty of water. Do not lick the electrolyte of non-solid aluminum electrolytic capacitors.

Storage

We recommend the following conditions for storage.

a) Do not store capacitors at a high temperature or in high humidity. Store the capacitors indoors at a temperature of 5 to 35℃ and a humidity of less than 75% RH.

b) Keep capacitors in the original package.

c) Store the capacitors in places free from water, oil or salt water.

d) Store the capacitors in places free from toxic gasses (hydrogen sulfide, sulfurous acid, chlorine, ammonium, etc.)

e) Store the capacitors in places free from acidic and alkaline solvents.

f) Store the capacitors in places free from ozone, ultraviolet rays or radiation.

g) Store the capacitor in place free vibrations and mechanical shocks.

h) It is not applied to a regulation of JEDEC J-STD-020(Rev.C).

Disposal

Please consult with a local industrial waste disposal specialist when disposing of aluminum electrolytic capacitors.

Precautions and guidelines

For more details of precautions and guidelines for aluminum electrolytic capacitors, please refer to Engineering Bulletin No. 634A.

Regarding compliance for EU REACH Regulation

According to the content of REACH handbook (Guidance on requirements for substances in articles which is published on May 2008), our electronic components are "articles without any intended release". Therefore they are not applicable for "Registration" for EU REACH Regulation Article 7 (1).

Reference: Electrolytic Condenser Investigation Society

"Study of REACH Regulation in EU about Electrolytic Capacitor" (publicized on 13 March 2008)