Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

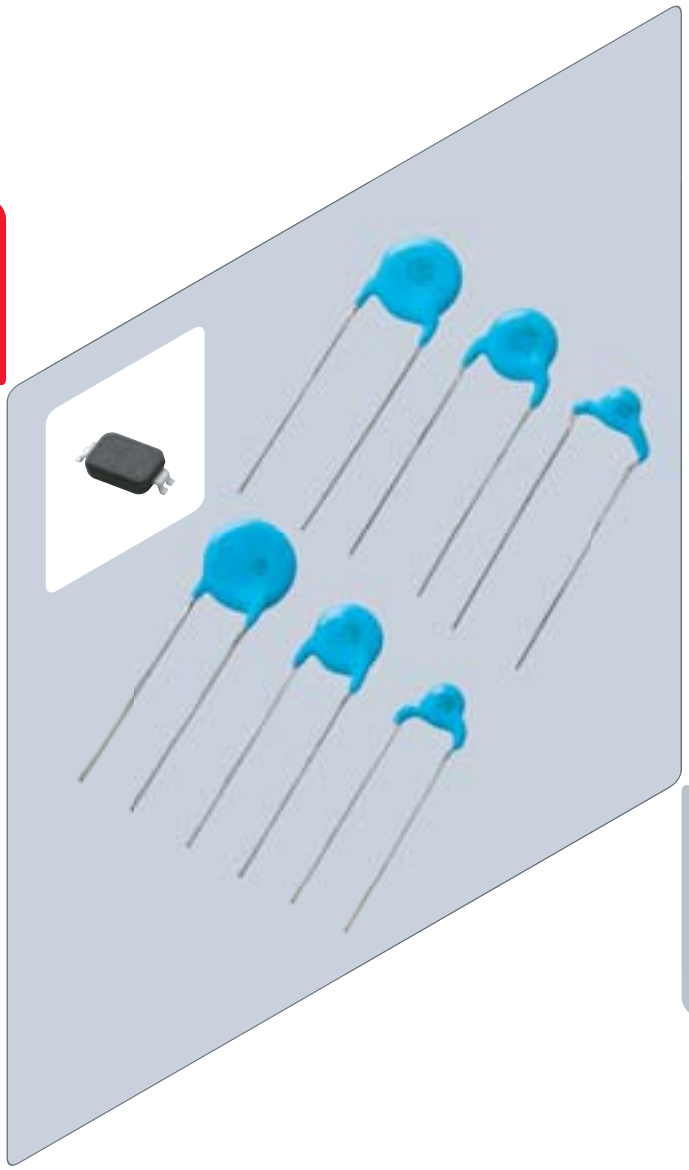
Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

C85E.pdf
Mar. 27,2018

muRata
INNOVATOR IN ELECTRONICS

Lead Type Disc Ceramic Capacitors (Safety Standard Certified, DC2k to DC6.3kV)
Resin Molding SMD Type Ceramic Capacitors (Safety Standard Certified)



Contents

Product specifications are as of February 2018.

Please check the MURATA website (**https://www.murata.com/**)
if you cannot find a part number in this catalog.

EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment."
- For more details, please refer to our web page, "Murata's Approach for EU RoHS" (https://www.murata.com/en-eu/support/compliance/rohs).

● Part Numbering

Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose

(Part Number)

DK	1	E3	EA	102	M	86	R	AH01
❶	❷	❸	❹	❺	❻	❼	❽	❾

❶Product ID ❷Series Category

Product ID	Code	Outline	Contents
DK	1	Safety Standard Certified	IEC60384-14 ClassX1, Y1

❸Temperature Characteristics

Code	Temperature Characteristics	Cap. Change or Temp. Coeff.	Temperature Range
B3	B	±10%	-25 to +85°C
E3	E	+20%, -55%	
1X	SL	+350 to -1000ppm/°C	+20 to +85°C

❹Rated Voltage/Safety Standard Certified Type

Code	Rated Voltage
EA	X1: AC440V (r.m.s.), Y1: AC250V (r.m.s.) or X1: AC440V (r.m.s.), Y1: AC300V (r.m.s.) (Safety Standard Certified Type EA)

❺Capacitance

Expressed by three figures. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two numbers.

❻Capacitance Tolerance

Code	Capacitance Tolerance
K	±10%
M	±20%

❼Case Size

Code	Dimensions
86	8.0 x 6.0mm

❽Packaging

Code	Packaging
R	ø330mm Embossed Taping

❾Individual Specification Code

Expressed by four figures.

Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose

(Part Number)

DE	2	E3	KY	102	M	N3	A		F
❶	❷	❸	❹	❺	❻	❼	❽	❾	❿

❶Product ID ❷Series Category

Product ID	Code	Outline	Contents
DE	1	Safety Standard Certified	IEC60384-14 Class X1, Y1
	2		IEC60384-14 Class X1, Y2
	J	AC250V (r.m.s.)	-Products based on the Electrical Appliance and Material Safety Law of Japan-

For Electrical Appliance and Material Safety Law of Japan, the first three digits (❶Product ID and ❷Series Category) express "Series Name."
For Safety Certified Capacitors, the first three digits express product code. The fourth figure expresses certified type shown in ❹Safety Standard Certified Type column.

❸Temperature Characteristics

Code	Temperature Characteristics	Cap. Change or Temp. Coeff.	Temperature Range
B3	B	±10%	-25 to +85°C
E3	E	+20%, -55%	
F3	F	+30%, -80%	
1X	SL	+350 to -1000ppm/°C	+20 to +85°C

❹Rated Voltage/Safety Standard Certified Type

Code	Rated Voltage
RA	X1: AC440V (r.m.s.), Y1: AC250V (r.m.s.) or X1: AC440V (r.m.s.), Y1: AC300V (r.m.s.) or X1: AC500V (r.m.s.), Y1: AC500V (r.m.s.) (Safety Standard Certified Type RA)
KX	X1: AC440V (r.m.s.), Y1: AC250V (r.m.s.) or X1: AC440V (r.m.s.), Y1: AC300V (r.m.s.) (Safety Standard Certified Type KX)
SA	X1: AC300V (r.m.s.), Y2: AC250V (r.m.s.) or X1: AC300V (r.m.s.), Y2: AC300V (r.m.s.) or X1: AC440V (r.m.s.), Y2: AC400V (r.m.s.) (Safety Standard Certified Type SA)
KY	X1: AC250V (r.m.s.), Y2: AC250V (r.m.s.) or X1: AC250V (r.m.s.), Y2: AC300V (r.m.s.) (Safety Standard Certified Type KY)
E2	AC250V (r.m.s.)

❺Capacitance

Expressed by three figures. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two numbers.

❻Capacitance Tolerance

Code	Capacitance Tolerance
J	±5%
K	±10%
M	±20%
Z	+80%, -20%

❼Lead Style

Code	Lead Style	Dimensions (mm)		
		Lead Spacing	Lead Diameter	Pitch of Components
A2	Vertical Crimp Long	5	ø0.6±0.05	—
A3		7.5		
A4		10		
B2/J2	Vertical Crimp Short	5	ø0.6±0.05	—
B3/J3		7.5		
B4/J4		10		
C3	Straight Long	7.5	ø0.6±0.05	—
D3	Straight Short	7.5	ø0.6±0.05	—
N2	Vertical Crimp Taping	5	ø0.6±0.05	12.7
N3		7.5		15
N4		10		25.4
P3	Straight Taping	7.5	ø0.6±0.05	15

❽Packaging

Code	Packaging
A	Ammo Pack Taping
B	Bulk

❾Individual Specification Code

For part number that cannot be identified without "Individual Specification," it is added at the end of part number, expressed by three-digit alphanumerics.

❿Halogen-free Compatible Product

Lead Type Disc Ceramic Capacitors (2kV-6.3kV)

(Part Number) DE | B | B3 | 3D | 102 | K | N2 | A | ❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾

❶Product ID ❷Series Category

Product ID	Code	Outline	Contents
DE	A	High Voltage	Class 1 (Char. SL) DC2k-3.15kV Rated
	B		Class 2 DC2k-3.15kV Rated
	C		Class 1, 2 DC6.3kV Rated
	F		LCD Backlight Inverter Circuit 6.3kVp-p
	H		High Temperature Guaranteed, Low-dissipation Factor (Char. R) DC2k-3.15kV Rated

The first three digits (❶Product ID and ❷Series Category) express "Series Name."

❸Temperature Characteristics

Code	Temperature Characteristics	Cap. Change or Temp. Coeff.	Temperature Range
B3	B	±10%	–25 to +85°C
E3	E	+20%, –55%	
F3	F	+30%, –80%	
R3	R	±15%	–25 to +85°C
		+15%, –30%	+85 to +125°C
D3	D	+20%, –30%	–25 to +125°C
1X	SL	+350 to –1000ppm/°C	+20 to +85°C
2C	CH	0±60ppm/°C	+20 to +85°C

❹Rated Voltage

Code	Rated Voltage
3D	DC2kV
3F	DC3.15kV
3J	DC6.3kV
LH	6.3kVp-p

❺Capacitance

Expressed by three figures. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two numbers.

❻Capacitance Tolerance

Code	Capacitance Tolerance
C	±0.25pF
D	±0.5pF
J	±5%
K	±10%
Z	+80%, –20%

❼Lead Style

Code	Lead Style	Dimensions (mm)		
		Lead Spacing	Lead Diameter	Pitch of Components
A2	Vertical Crimp Long	5	ø0.6±0.05	–
A3		7.5		
A4		10		
B2	Vertical Crimp Short	5	ø0.6±0.05	–
B3/J3		7.5		
B4		10		
C1	Straight Long	5	ø0.5±0.05	–
C3		7.5	ø0.6±0.05	
C4		10		
CD		7.5	ø0.5±0.05	
D1	Straight Short	5	ø0.5±0.05	–
D3		7.5	ø0.6±0.05	
DD		7.5	ø0.5±0.05	
N2	Vertical Crimp Taping	5	ø0.6±0.05	12.7
N3		7.5		15
N7		7.5		30
P2	Straight Taping	5	ø0.6±0.05	12.7
P3		7.5		15

❽Packaging

Code	Packaging
A	Ammo Pack Taping
B	Bulk

❾Individual Specification Code

For part number that cannot be identified without "Individual Specification," it is added at the end of part number, expressed by three-digit alphanumerics.

Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive

(Part Number)

DE	6	E3	KJ	102	M	N3	A	
❶	❷	❸	❹	❺	❻	❼	❽	❾

❶Product ID ❷Series Category

Product ID	Code	Outline	Contents
DE	6	Safety Standard Certified	IEC60384-14 Class X1, Y2

The first three digits express product code. The fourth figure expresses certified type shown in ❹Safety Standard Certified Type column.

❸Temperature Characteristics

Code	Temperature Characteristics	Cap. Change or Temp. Coeff.	Temperature Range
B3	B	±10%	-25 to +85°C
E3	E	+20%, -55%	

❹Rated Voltage/Safety Standard Certified Type

Code	Rated Voltage
KJ	X1: AC440V (r.m.s.), Y2: AC300V (r.m.s.) (Safety Standard Certified Type KJ)

❺Capacitance

Expressed by three figures. The unit is pico-farad (pF). The first and second figures are significant digits, and the third figure expresses the number of zeros that follow the two numbers.

❻Capacitance Tolerance

Code	Capacitance Tolerance
K	±10%
M	±20%

❼Lead Style

Code	Lead Style	Dimensions (mm)		
		Lead Spacing	Lead Diameter	Pitch of Components
A3	Vertical Crimp Long	7.5	ø0.6±0.05	—
B3	Vertical Crimp Short			—
N3	Vertical Crimp Taping			15

❽Packaging

Code	Packaging
A	Ammo Pack Taping
B	Bulk

❾Individual Specification Code

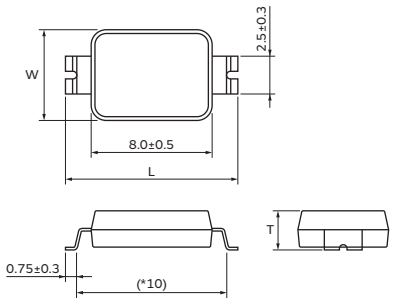
For part number that cannot be identified without "Individual Specification," it is added at the end of part number, expressed by three-digit alphanumerics.

Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose

Type EA (Reinforced Insulation) -Class X1, Y1 SMD Type- (Recommend)

Features

1. Small size and low height SMD
2. Operating temperature range guaranteed up to 125°C.
3. Dielectric strength: AC4000V
4. Class X1/Y1 capacitors certified by ENEC (SEMKO)/UL/ CQC/KTC
5. Can be use with a component in appliances requiring reinforced insulation and double insulation based on UL1492, IEC60065 and IEC60950.
6. Coated with flame-retardant halogen-free* epoxy resin (conforming to UL94V-0 standard).
   * Cl=900ppm max., Br=900ppm max. and Cl+Br=1500ppm max.
7. Rated voltage: X1: AC440V(r.m.s.), Y1: AC250V(r.m.s.) or X1: AC440V(r.m.s.), Y1: AC300V(r.m.s.)



(in mm)

L: 11.4±0.5, W: 6.0±0.5, T: 2.5 max.
The value marked with * is a reference.

Applications

Ideal for use as Y capacitors and primary-secondary coupling on the reduction in the size and thickness of power supply equipment.

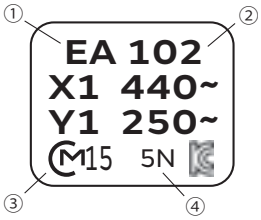
Do not use these products in any automotive power train or safety equipment including battery chargers for electric vehicles and plug-in hybrids. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as power train and safety equipment.

Standard Certification Rated Voltage (250Vac)

	Standard No.	Certified No.	Rated Voltage
ENEC (SEMKO)	EN 60384-14	SE/16008-1	250Vac(r.m.s.)
UL	UL 60384-14	E37921	
CQC	IEC 60384-14	CQC16001142384	
KTC	KC 60384-14	HU03008-16007	

▪ The certification number might change due to revision of the application standard and changes in the range of acquisition.

Marking Rated Voltage (250Vac)

Example	Item
	① Type Designation EA
	② Nominal Capacitance (Under 100pF: Actual value, 100pF and over: 3 digit system)
	③ Company Name Code Ⓜ15: Made in Thailand
	④ Manufactured Date Code
	KTC Approval Mark
	Class Code X1Y1
	Rated Voltage Mark 440~, 250~

Continued on the following page.↗

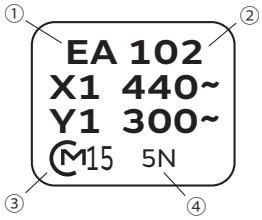
Continued from the preceding page.↘

Standard Certification Rated Voltage (300Vac)

	Standard No.	Certified No.	Rated Voltage
ENEC (SEMKO)	EN 60384-14	SE/16008-1	300Vac(r.m.s.)
UL	UL 60384-14	E37921	
CQC	IEC 60384-14	CQC16001142384	

• The certification number might change due to revision of the application standard and changes in the range of acquisition.

Marking Rated Voltage (300Vac)

Example	Item
	① Type Designation EA
	② Nominal Capacitance (Under 100pF: Actual value, 100pF and over: 3 digit system)
	③ Company Name Code Ⓜ15: Made in Thailand
	④ Manufactured Date Code
	Class Code X1Y1
	Rated Voltage Mark 440~, 300~

Rated Voltage 250Vac

Part Number	AC Rated Voltage	Temp. Char.	Capacitance	Dimension L	Dimension W	Body Thickness T
DK11XEA100K86RAH01	250Vac(r.m.s.)	SL	10pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK11XEA220K86RAH01	250Vac(r.m.s.)	SL	22pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK11XEA470K86RAH01	250Vac(r.m.s.)	SL	47pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA101K86RAH01	250Vac(r.m.s.)	B	100pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA221K86RAH01	250Vac(r.m.s.)	B	220pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA331K86RAH01	250Vac(r.m.s.)	B	330pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA471K86RAH01	250Vac(r.m.s.)	B	470pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA681K86RAH01	250Vac(r.m.s.)	B	680pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1E3EA102M86RAH01	250Vac(r.m.s.)	E	1000pF±20%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1E3EA152M86RAH01	250Vac(r.m.s.)	E	1500pF±20%	11.4±0.5mm	6.0±0.5mm	2.5mm max.

Murata part numbers might be changed. Therefore, please specify only the type name (EA) and capacitance of products in the part list when it is required for applying safety standard of electric equipments.

Rated Voltage 300Vac

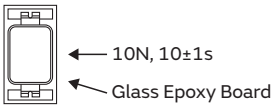
Part Number	AC Rated Voltage	Temp. Char.	Capacitance	Dimension L	Dimension W	Body Thickness T
DK11XEA100K86RBH01	300Vac(r.m.s.)	SL	10pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK11XEA220K86RBH01	300Vac(r.m.s.)	SL	22pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK11XEA470K86RBH01	300Vac(r.m.s.)	SL	47pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA101K86RBH01	300Vac(r.m.s.)	B	100pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA221K86RBH01	300Vac(r.m.s.)	B	220pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA331K86RBH01	300Vac(r.m.s.)	B	330pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA471K86RBH01	300Vac(r.m.s.)	B	470pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1B3EA681K86RBH01	300Vac(r.m.s.)	B	680pF±10%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1E3EA102M86RBH01	300Vac(r.m.s.)	E	1000pF±20%	11.4±0.5mm	6.0±0.5mm	2.5mm max.
DK1E3EA152M86RBH01	300Vac(r.m.s.)	E	1500pF±20%	11.4±0.5mm	6.0±0.5mm	2.5mm max.

Murata part numbers might be changed. Therefore, please specify only the type name (EA) and capacitance of products in the part list when it is required for applying safety standard of electric equipments.

Continued on the following page.↗

Type EA Specifications and Test Methods

Operating Temperature Range: -40 to +125°C

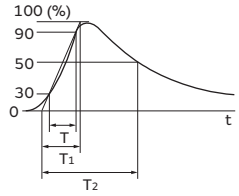
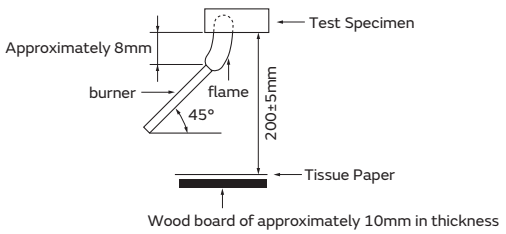
No.	Item		Specifications	Test Method
1	Appearance		No defects or abnormalities	Visual Inspection.
2	Dimensions		Within specified dimension	Using calipers and micrometers.
3	Dielectric Strength		No defects or abnormalities	The capacitor shall not be damage when AC4000V(r.m.s.) is applied between the terminations for 60s.
4	Insulation Resistance (I.R.)		6000MΩ or more	The insulation resistance shall be measured with DC500±50V within 60±5s of charging. The voltage should be applied to the capacitor through a resistor of 1MΩ.
5	Capacitance		Within the specified tolerance	Capacitance/D.F. shall be measured at 20°C with the frequency of 1±0.2kHz and a voltage of AC1±0.2V(r.m.s.).
6	Dissipation Factor (D.F.)		0.025 max.	
7	Capacitance Temperature Characteristics		Temp. Coefficient SL: +350 to -1000 ppm/°C (Temp. Range: +20 to +85°C) Cap. Change B: within ±10% E: within ±20/-55% (Temp. Range: -25 to +85°C)	The capacitance measurement shall be made at each step in table. ▪Pretreatment for B, E char. Perform the heat treatment at 150+0/-10°C for 60±5min and then let sit for 24±2h at room condition*. Step: 1 / 2 / 3 / 4 / 5 Temp. (°C): 20±2 / -25±2 / 20±2 / 85±2 / 20±2
8	Vibration Resistance	Appearance	No marked defect	Solder the capacitor to the Test Jig a (glass epoxy board) shown in "Complement of test method". The capacitor shall be subjected to a simple harmonic motion having a total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55Hz. The frequency range, from 10 to 55Hz and return to 10Hz, shall be traversed in approximately 1min. This motion shall be applied for a period of 2h in each of 3 mutually perpendicular directions (total of 6h).
		Capacitance	Within the specified tolerance	
		D.F.	Pass the item No.6	
9	Solderability of Termination		75% of the terminations are to be soldered.	Immerse the capacitor in the solution of ethanol (JIS K 8101) and rosin (JIS K 5902) (25% rosin in weight proportion). Immerse in solder solution for 2±0.5s. Temp. of solder: 245±5°C
10	Soldering Effect (Reflow)	Appearance	No marked defects	Preheat the capacitor at 150 to 180°C for 90±30s. Reflow temp.: 230°C min. (max. temp.: 260°C) Reflow time: 30±10s. Reflow number of times: 4 times Let sit at room condition* for 24±2h, then measure. ▪The next reflow porcess should be done after the temperature of the sample has dropped to room temperature. ▪Pretreatment for B, E char. Capacitor should be stored at 150+0/-10°C for 1h, and apply the AC4000V(r.m.s.) 60s then placed at room condition* for 24±2h before initial measurements.
		Capacitance	Within ±10%	
		I.R.	1000MΩ or more	
		Dielectric Strength	Pass the item No.3	
11	Adhesive strength of Termination		No removal of the terminations or other defects should occur.	Solder the capacitor to the Test Jig a (glass epoxy board) shown in "Complement of test method". Then apply 10N force in the direction of the arrow. 
12	Temperature Cycle	Appearance	No marked defect	Fix the capacitor to the supporting Test Jig A (glass epoxy board) shown in "Complement of test method". Perform the 5 cycles according to the 4 heat treatments listed the following table. Step / Temp. (°C) / Time (min.) 1 / -40±3 / 30±3 2 / Room Temp. / 2 to 3 3 / 125±3 / 30±3 4 / Room Temp. / 2 to 3 Let sit for 24±2h, at room condition*, then measure. ▪Pretreatment for B, E char. Capacitor should be stored at 150+0/-10°C for 1h, and apply the AC4000V(r.m.s.) 60s then placed at room condition* for 24±2h berore initial measurements.
		Capacitance Change	Within ±15%	
		D.F.	SL: 0.025 max. B, E: 0.05 max.	
		I.R.	3000MΩ or more	
		Dielectric Strength	Pass the item No.3	

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa

Continued on the following page.↗

Type EA Specifications and Test Methods

Continued from the preceding page.↘

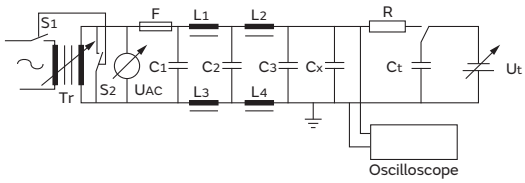
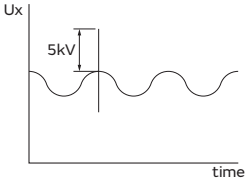
No.	Item		Specifications	Test Method
13	Humidity (Steady state)	Appearance	No marked defect	Sit the capacitor at 40±2°C and relative humidity 90 to 95% for 500+24/-0h. Remove and let sit for 24±2h at room condition*, then measure. ▪Pretreatment for B, E char. Capacitor should be stored at 150+0/-10°C for 1h, and apply the AC4000V(r.m.s.) 60s then placed at room condition* for 24±2h berore initial measurements.
		Capacitance Change	Within ±20%	
		D.F.	SL: 0.025 max. B, E: 0.05 max.	
		I.R.	3000MΩ or more	
		Dielectric Strength	Pass the item No.3	
14	Humidity Loading	Appearance	No marked defect	Apply the rated voltage at 40±2°C and relative humidity 90 to 95% for 500+24/-0h. Remove and let sit for 24±2h at room condition*, then measure. ▪Pretreatment for B, E char. Capacitor should be stored at 150+0/-10°C for 1h, and apply the AC4000V(r.m.s.) 60s then placed at room condition* for 24±2h berore initial measurements.
		Capacitance Change	Within ±20%	
		D.F.	SL: 0.025 max. B, E: 0.05 max.	
		I.R.	3000MΩ or more	
		Dielectric Strength	Pass the item No.3	
15	Life	Appearance	No marked defect	Impulse Voltage test is performed. Each individual capacitor shall be subjected to a 8kV impulse (the voltage value means zero to peak) for 3 times. Then the capacitors are applied to life test.  Front time (T_1) =1.2μs=1.67T Time to half-value (T_2) =50μs Apply voltage as Table for 1000h at 125+2/-0°C, relative humidity 50% max. Applied Voltage: AC550V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1s. Remove and let sit for 24±2h at room condition*, then measure. ▪Pretreatment for B, E char. Capacitor should be stored at 150+0/-10°C for 1h, and apply the AC4000V(r.m.s.) 60s then placed at room condition* for 24±2h berore initial measurements.
		Capacitance Change	Within ±20%	
		I.R.	3000MΩ or more	
		Dielectric Strength	Pass the item No.3	
16	Passive Flammability		The burning time should not exceeded the time 30s. The tissue paper should not ignite.	The capacitor under test shall be held in the flame in the position which best promotes burning. Each specimen shall only be exposed once to the flame. Time of exposure to flame: 30s. Length of flame : 12±1mm Gas burner : Length 35mm min. Inside Dia. 0.5±0.1mm Outside Dia. 0.9mm max. Gas : Butane gas Purity 95% min. 

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa

Continued on the following page.↗

Type EA Specifications and Test Methods

Continued from the preceding page.↘

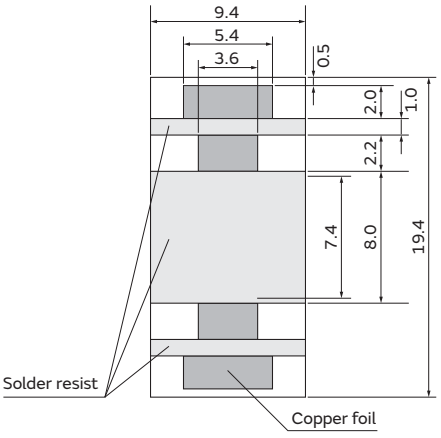
No.	Item	Specifications	Test Method
17	**Active Flammability**	The cheesecloth should not be on fire.	The capacitor shall be individually wrapped in at least one but more than two complete layers of cheesecloth. The capacitor shall be subjected to 20 discharges. The interval between successive discharges should be 5s. The U_{AC} shall be maintained for 2min after the last discharge.  $C_{1,2}$: 1μF±10% C_3 : 0.033μF±5% 10kV $L_{1\ to\ 4}$: 1.5mH±20% 16A Rod core choke C_t : 3μF±5% 10kv R : 100Ω±2% C_x : Capacitor specimens U_{AC} : U_R±5% F : Fuse, rated 16A U_R : Rated Voltage U_t : Voltage impressed on the tank capacitor Ct 

Complement of Test Method

Test Jig

The test jig should be Jig A as described in “Specifications and Test Methods”.
The specimen should be soldered by the conditions as described below.
Soldering Method: Reflow soldering
Solder: Sn-3.0Ag-0.5Cu

Test Jig A



(in mm)

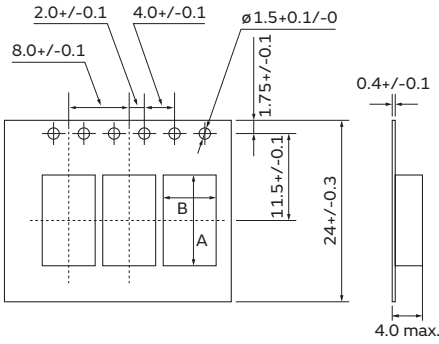
Test Jig

- Material: Glass Epoxy Board
- Thickness: 1.6mm
- Thickness of copper foil: 0.035mm

Type EA Packing

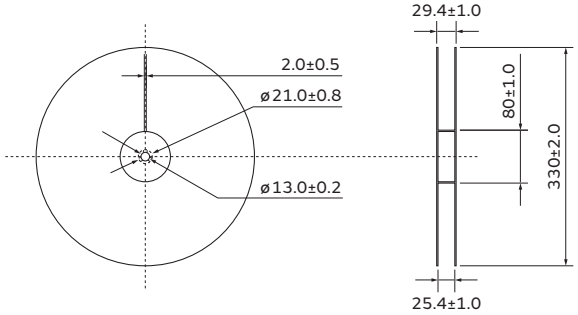
Packing

1. Dimension of Tape



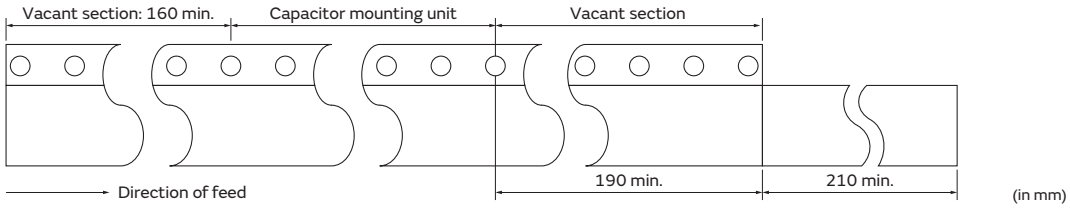
A×B=12.0×7.0 (typ.) (in mm)

2. Dimension of Reel



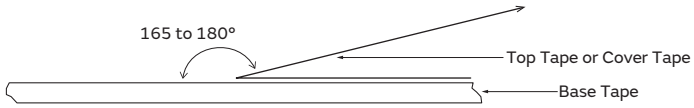
(in mm)

(1) Part of the leader and part of the empty tape shall be attached to the end of the tape as follows.



(in mm)

(2) The top tape or cover tape and base tape are not attached at the end of the tape for a minimum of 2 pitches.
(3) Missing capacitors number within 0.1% of the number per reel or 1pc, whichever is greater, and not continuous.
(4) The top tape or cover tape and bottom tape shall not protrude beyond the edges of the tape and shall not cover sprocket holes.
(5) Cumulative tolerance of sprocket holes, 10 pitches: ±0.3mm.
(6) Peeling off force: 0.1 to 0.6N in the direction shown on the follows.



Minimum Quantity (Order in Sets Only)

[Taping] (pcs./Ammo Pack)

	Packing Qty
Type EA	2,500

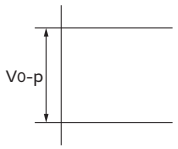
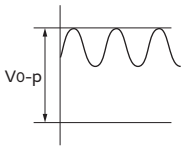
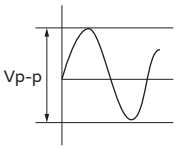
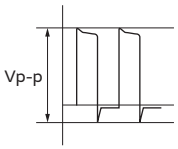
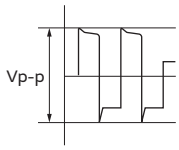
Type EA ⚠Caution

⚠Caution (Rating)

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the Vp-p value of the applied voltage or the Vo-p that contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement					

2. Operating Temperature and Self-generated Heat (Apply to B/E/F Char.)

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may have self-generated heat due to dielectric loss. Applied voltage load should be such that self-generated heat is within 20°C under the condition where the capacitor is subjected to an atmospheric temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of ø0.1mm under conditions where the capacitor is not affected by radiant heat from other components or wind from surroundings. Excessive heat may lead to deterioration of the capacitor's characteristics and reliability. (Never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

3. Test Condition for Withstanding Voltage

(1) Test Equipment

Test equipment for AC withstanding voltage should be used with the performance of the wave similar to 50/60Hz sine wave.

If the distorted sine wave or overload exceeding the specified voltage value is applied, a defect may be caused.

Continued on the following page.↗

Type EA ⚠Caution

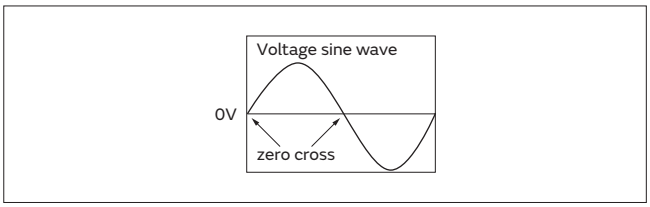
Continued from the preceding page.↘

(2) Voltage Applied Method

When the withstanding voltage is applied, the capacitor's lead or terminal should be firmly connected to the output of the withstanding voltage test equipment, and then the voltage should be raised from near zero to the test voltage.

If the test voltage without the raise from near zero voltage would be applied directly to capacitor, test voltage should be applied with the zero cross.* At the end of the test time, the test voltage should be reduced to near zero, and then capacitor's lead or terminal should be taken off the output of the withstanding voltage test equipment.

If the test voltage without the raise from near zero voltage would be applied directly to capacitor, the surge voltage may rise, and therefore, a defect may be caused.



*ZERO CROSS is the point where voltage sine wave passes 0V. See the figure at right.

4. Fail-Safe

When the capacitor is broken, failure may result in a short circuit. Be sure to provide an appropriate fail-safe function like a fuse on your product if failure could result in an electric shock, fire or fuming.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

Type EA ⚠Caution

⚠Caution (Storage and Operating Condition)

Operating and Storage Environment

The insulation coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture. Before cleaning, bonding, or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment.

This one is MSL 3 product. So, in order to avoid the absorption of moisture, capacitors are packed in moisture-proof envelope.

Store the capacitors in the following conditions at all times, and use within 6 months after delivered.

Temperature: 10 to 30°C.
Humidity: 60% max.

Solder the enclosed capacitors within 168 hours after opening the moisture-proof package.

After opening, store the capacitors in moisture-proof package with a desiccant and HIC card and keep the described condition.

In case the storage period has been exceeded 6 months or the indicator color of a enclosed HIC card has changed when the package has been opened, perform baking (60°C x 168h) before soldering.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

⚠Caution (Soldering and Mounting)

1. VIBRATION AND IMPACT

Do not expose a capacitor or its leads to excessive shock or vibration during use.

2. SOLDERING

(1) Reflow Soldering

When soldering capacitor, it should be performed in following conditions.

Soldering temperature: 230 to 260°C
Soldering time: 10 to 30s.
Preheating temperature: 170°C max.

(2) Flow Soldering

When soldering capacitor, it should be performed in following conditions.

Soldering temperature: 260°C max.
Soldering time: 5s max.
Preheating temperature: 120°C max.
Preheating time: 60s max.

(3) Soldering Iron

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance specification of the capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.

When soldering capacitor with a soldering iron, it should be performed in following conditions.

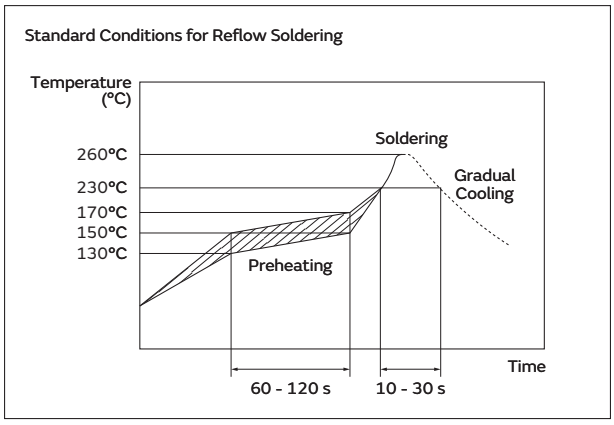
Temperature of iron-tip: 400°C max.
Soldering iron wattage: 50W max.
Soldering time: 3.5s max.

3. BONDING, RESIN MOLDING AND COATING

Before bonding, molding or coating this product, verify that these processes do not affect the quality of capacitor by testing the performance of the bonded, molded or coated product in the intended equipment.

In case of the amount of applications, dryness / hardening conditions of adhesives and molding resins containing organic solvents (ethyl acetate, methyl ethyl ketone, toluene, etc.) are unsuitable, the outer coating resin of a capacitor is damaged by the organic solvents and it may result, worst case, in a short circuit.

The variation in thickness of adhesive, molding resin or coating may cause a outer coating resin cracking and/or ceramic element cracking of a capacitor in a temperature cycling.



FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

Type EA ⚠Caution/Notice

⚠Caution (Handling)

VIBRATION AND IMPACT

Do not expose a capacitor or its leads to excessive shock or vibration during use.

FAILURE TO FOLLOW THE ABOVE CAUTIONS MAY RESULT, WORST CASE, IN A SHORT CIRCUIT AND CAUSE FUMING OR PARTIAL DISPERSION WHEN THE PRODUCT IS USED.

Notice (Soldering and Mounting)

CLEANING (ULTRASONIC CLEANING)

To perform ultrasonic cleaning, observe the following conditions.
Rinse bath capacity: Output of 20 watts per liter or less.
Rinsing time: 5min maximum.
Do not vibrate the PCB/PWB directly.
Excessive ultrasonic cleaning may lead to fatigue destruction of the terminals.

Notice (Rating)

1. CAPACITANCE CHANGE OF CAPACITORS

(1) Class 1 capacitors

Capacitance might change a little depending on a surrounding temperature or an applied voltage.
Please contact us if you use for the strict time constant circuit.

(2) Class 2 capacitors

Class 2 capacitors like temperature characteristic B, E and F have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor leaves for a long time.
Moreover, capacitance might change greatly depending on a surrounding temperature or an applied voltage.
So, it is not likely to be able to use for the time constant circuit.
Please contact us if you need a detail information.

2. PERFORMANCE CHECK BY EQUIPMENT

Before using a capacitor, check that there is no problem in the equipment's performance and the specifications.
Generally speaking, Class 2 ceramic capacitors have voltage dependence characteristics and temperature dependence characteristics in capacitance.
So, the capacitance value may change depending on the operating condition in a equipment.
Therefore, be sure to confirm the apparatus performance of receiving influence in a capacitance value change of a capacitor, such as leakage current and noise suppression characteristic.
Moreover, check the surge-proof ability of a capacitor in the equipment, if needed, because the surge voltage may exceed specific value by the inductance of the circuit.

Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose

Type SA: AC400V (Basic Insulation) -Class X1, Y2- (Recommend)

Features

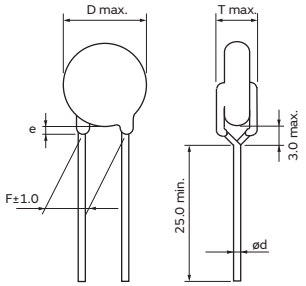
1. Impulse voltage guaranteed 8kV0-p.
2. Operating temperature range guaranteed up to 125°C.
3. Dielectric strength: AC2600V
4. Class X1/Y2 capacitors certified by ENEC(VDE)/UL/CQC.
5. Coated with flame-retardant halogen-free* epoxy resin (conforming to UL94V-0 standard).
   * Cl=900ppm max., Br=900ppm max. and Cl+Br=1500ppm max.
6. Taping available for automatic insertion.
7. Rated Voltage: X1: AC440V(r.m.s.), Y2: AC400V(r.m.s.)

Applications

Ideal for use as X/Y capacitors for AC line filters and primary-secondary coupling on switching power supplies and AC adapters.

Do not use these products in any automotive power train or safety equipment including battery chargers for electric vehicles and plug-in hybrids. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as power train and safety equipment.

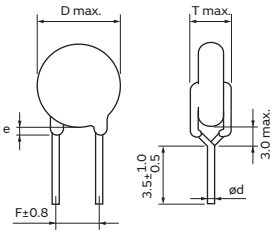
[Bulk]
Vertical Crimp Long (A3)



(in mm)

Lead Code	Coating Extension e	ød
A3	Up to the end of crimp	0.6±0.05

[Bulk]
Vertical Crimp Short (J3)



(in mm)

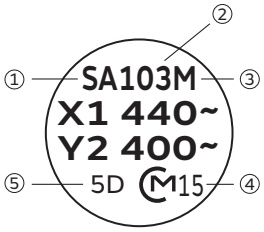
Lead Code	Coating Extension e	ød
J3	Up to the end of crimp	0.6±0.05

Standard Certification

	Standard No.	Certified No.	Rated Voltage
ENEC (VDE)	EN 60384-14	40042990	400Vac(r.m.s.)
UL	UL 60384-14	E37921	
CQC	IEC 60384-14	CQC15001137840	

• The certification number might change due to revision of the application standard and changes in the range of acquisition.

Marking

Example	Item
	① Type Designation SA
	② Nominal Capacitance (Under 100pF: Actual value, 100pF and over: 3 digit system)
	③ Capacitance Tolerance
	④ Company Name Code Ⓜ15: Made in Thailand
	⑤ Manufactured Date Code
	Class Code X1Y2
	Rated Voltage Mark 440~, 400~

Rated Voltage 400Vac

Part Number	AC Rated Voltage	Temp. Char.	Capacitance	Body Dia. D	Lead Spacing F (mm)	Body Thickness T	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DE21XSA100K□□□Y02F	400Vac(r.m.s.)	SL	10pF±10%	7.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE21XSA150K□□□Y02F	400Vac(r.m.s.)	SL	15pF±10%	6.0mm max.	7.5	6.0mm max.	A3B	J3B	N3A
DE21XSA220K□□□Y02F	400Vac(r.m.s.)	SL	22pF±10%	6.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE21XSA330K□□□Y02F	400Vac(r.m.s.)	SL	33pF±10%	7.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE21XSA470K□□□Y02F	400Vac(r.m.s.)	SL	47pF±10%	7.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE21XSA680K□□□Y02F	400Vac(r.m.s.)	SL	68pF±10%	9.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2B3SA101K□□□Y02F	400Vac(r.m.s.)	B	100pF±10%	6.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2B3SA151K□□□Y02F	400Vac(r.m.s.)	B	150pF±10%	6.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2B3SA221K□□□Y02F	400Vac(r.m.s.)	B	220pF±10%	6.0mm max.	7.5	6.0mm max.	A3B	J3B	N3A
DE2B3SA331K□□□Y02F	400Vac(r.m.s.)	B	330pF±10%	6.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2B3SA471K□□□Y02F	400Vac(r.m.s.)	B	470pF±10%	7.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2B3SA681K□□□Y02F	400Vac(r.m.s.)	B	680pF±10%	8.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2E3SA102M□□□Y02F	400Vac(r.m.s.)	E	1000pF±20%	7.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2E3SA152M□□□Y02F	400Vac(r.m.s.)	E	1500pF±20%	8.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2E3SA222M□□□Y02F	400Vac(r.m.s.)	E	2200pF±20%	9.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2E3SA332M□□□Y02F	400Vac(r.m.s.)	E	3300pF±20%	12.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2E3SA472M□□□Y02F	400Vac(r.m.s.)	E	4700pF±20%	13.0mm max.	7.5	5.0mm max.	A3B	J3B	N3A
DE2E3SA103M□□□Y02F	400Vac(r.m.s.)	E	10000pF±20%	17.0mm max.	7.5	6.0mm max.	A3B	J3B	N7A

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate codes.
Individual specification code "Y02F" express "simplicity marking and guarantee of dielectric strength between lead wires: AC2600V."
Murata part numbers might be changed depending on lead code or any other chagnes. Therefore, please specify only the type name (SA) and capacitance of products in the part list when it is required for applying safety standard of electric equipments.

Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose

Type RA: AC500V (Reinforced Insulation) -Class X1, Y1- (Recommend)

Features

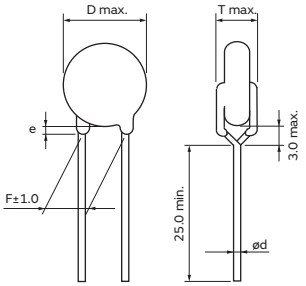
1. Impulse voltage guaranteed 12kV0-p.
2. Operating temperature range guaranteed up to 125°C.
3. Dielectric strength: AC4000V
4. Class X1/Y1 capacitors certified by ENEC(VDE)/UL/CQC.
5. Can be use with a component in appliances requiring reinforced insulation and double insulation based on UL1492, IEC60065 and IEC60950.
6. Coated with flame-retardant halogen-free* epoxy resin (conforming to UL94V-0 standard).
   * Cl=900ppm max., Br=900ppm max. and Cl+Br=1500ppm max.
7. Taping available for automatic insertion.
8. Rated Voltage: X1: AC500V(r.m.s.), Y1: AC500V(r.m.s.)

Applications

Ideal for use as X/Y capacitors for AC line filters and primary-secondary coupling on switching power supplies and AC adapters.

Do not use these products in any automotive power train or safety equipment including battery chargers for electric vehicles and plug-in hybrids. Only Murata products clearly stipulated as "for Automotive use" on its catalog can be used for automobile applications such as power train and safety equipment.

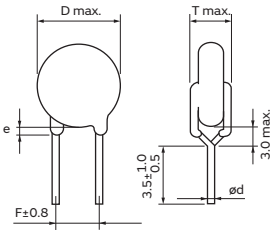
[Bulk]
Vertical Crimp Long (A4)



(in mm)

Lead Code	Coating Extension e	ød
A4	Up to the end of crimp	0.6±0.05

[Bulk]
Vertical Crimp Short (J4)



(in mm)

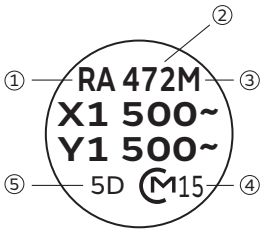
Lead Code	Coating Extension e	ød
J4	Up to the end of crimp	0.6±0.05

Standard Certification

	Standard No.	Certified No.	Rated Voltage
ENEC (VDE)	EN 60384-14	40043033	500Vac(r.m.s.)
UL	UL 60384-14	E37921	
CQC	IEC 60384-14	CQC16001138225	

• The certification number might change due to revision of the application standard and changes in the range of acquisition.

Marking

Example	Item
	① Type Designation RA
	② Nominal Capacitance (Under 100pF: Actual value, 100pF and over: 3 digit system)
	③ Capacitance Tolerance
	④ Company Name Code ©M15: Made in Thailand
	⑤ Manufactured Date Code
	Class Code X1Y1
	Rated Voltage Mark 500~

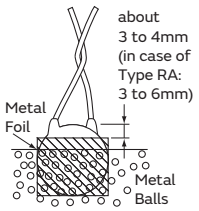
Rated Voltage 500Vac

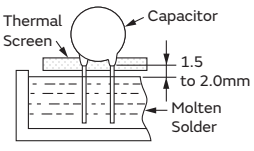
Part Number	AC Rated Voltage	Temp. Char.	Capacitance	Body Dia. D	Lead Spacing F (mm)	Body Thickness T	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping
DE11XRA100K□□□Q01F	500Vac(r.m.s.)	SL	10pF±10%	8.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE11XRA150K□□□Q01F	500Vac(r.m.s.)	SL	15pF±10%	6.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE11XRA220K□□□Q01F	500Vac(r.m.s.)	SL	22pF±10%	6.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE11XRA330K□□□Q01F	500Vac(r.m.s.)	SL	33pF±10%	7.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE11XRA470K□□□Q01F	500Vac(r.m.s.)	SL	47pF±10%	8.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE11XRA680K□□□Q01F	500Vac(r.m.s.)	SL	68pF±10%	9.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE1B3RA101K□□□Q01F	500Vac(r.m.s.)	B	100pF±10%	6.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE1B3RA151K□□□Q01F	500Vac(r.m.s.)	B	150pF±10%	8.0mm max.	10.0	5.0mm max.	A4B	J4B	N4A
DE1B3RA221K□□□Q01F	500Vac(r.m.s.)	B	220pF±10%	6.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1B3RA331K□□□Q01F	500Vac(r.m.s.)	B	330pF±10%	7.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1B3RA471K□□□Q01F	500Vac(r.m.s.)	B	470pF±10%	8.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1B3RA681K□□□Q01F	500Vac(r.m.s.)	B	680pF±10%	9.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1E3RA102M□□□Q01F	500Vac(r.m.s.)	E	1000pF±20%	8.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1E3RA152M□□□Q01F	500Vac(r.m.s.)	E	1500pF±20%	9.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1E3RA222M□□□Q01F	500Vac(r.m.s.)	E	2200pF±20%	11.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1E3RA332M□□□Q01F	500Vac(r.m.s.)	E	3300pF±20%	13.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A
DE1E3RA472M□□□Q01F	500Vac(r.m.s.)	E	4700pF±20%	14.0mm max.	10.0	6.0mm max.	A4B	J4B	N4A

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate codes.
Murata part numbers might be changed depending on lead code or any other chagnes. Therefore, please specify only the type name (RA) and capacitance of products in the part list when it is required for applying safety standard of electric equipments.

Type SA: AC400V / RA: AC500V Specifications and Test Methods

Operating Temperature Range: -40 to +125°C

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td>1</td><td colspan="2">Appearance and Dimensions</td><td>No visible defect, and dimensions are within specified range.</td><td>The capacitor should be visually inspected for evidence of defect.
Dimensions should be measured with slide calipers.</td></tr>
<tr><td>2</td><td colspan="2">Marking</td><td>To be easily legible</td><td>The capacitor should be visually inspected.</td></tr>
<tr><td>3</td><td colspan="2">Capacitance</td><td>Within specified tolerance</td><td rowspan="2">The capacitance, dissipation factor should be measured at 20˚C with 1±0.1kHz and AC1±0.2V max.</td></tr>
<tr><td>4</td><td colspan="2">Dissipation Factor (D.F.)</td><td>2.5% max.</td></tr>
<tr><td>5</td><td colspan="2">Insulation Resistance (I.R.)</td><td>10000MΩ min.</td><td>The insulation resistance should be measured with DC500±50V within 60±5s of charging.
The voltage should be applied to the capacitor through a resistor of 1MΩ.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Dielectric Strength</td><td>Between Lead Wires</td><td>No failure</td><td>The capacitor should not be damaged when the test voltages from Table 1 are applied between the lead wires for 60s.
<Table 1>
Type: SA — Test Voltage: AC2600V(r.m.s.)
Type: RA — Test Voltage: AC4000V(r.m.s.)</td></tr>
<tr><td>Body Insulation</td><td>No failure</td><td>First, the terminals of the capacitor should be connected together. Then, as shown in the figure at right, a metal foil should be closely wrapped around the body of the capacitor to the distance of about 3 to 4mm (in case of Type RA: 3 to 6mm) from each terminal. Then, the capacitor should be inserted into a container filled with metal balls of about 1mm diameter. Finally, AC voltage from Table 2 is applied for 60s between the capacitor lead wires and metal balls.
 

<Table 2>
Type: SA — Test Voltage: AC2600V(r.m.s.)
Type: RA — Test Voltage: AC4000V(r.m.s.)</td></tr>
<tr><td>7</td><td colspan="2">Temperature Characteristics</td><td>Char. B: Capacitance Change Within ±10%
Char. E: Capacitance Change Within $^{+20}_{-55}$%
(Temp. range: -25 to +85°C)
Char. SL: Temperature Coefficient +350 to -1000ppm/°C
(Temp. range: +20 to +85°C)</td><td>The capacitance measurement should be made at each step specified in Table 3.
<Table 3>
Step 1: 20±2
Step 2: -25±2
Step 3: 20±2
Step 4: 85±2
Step 5: 20±2</td></tr>
<tr><td>8</td><td colspan="2">Solderability of Leads</td><td>Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.</td><td>The lead wire of a capacitor should be dipped into molten solder for 2±0.5s.
The depth of immersion is up to about 1.5 to 2.0mm from the root of lead wires.
Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C</td></tr>
<tr><td rowspan="4">9</td><td rowspan="4">Soldering Effect (Non-Preheat)</td><td>Appearance</td><td>No marked defect</td><td rowspan="4">As shown in the figure, the lead wires should be immersed in solder of 350±10°C or 260±5°C up to 1.5 to 2.0mm from the root of terminal for 3.5±0.5s. (10±1s for 260±5°C)
 

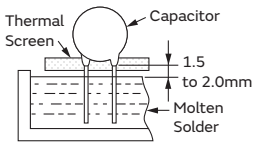
Pre-treatment:
Capacitor should be stored at 125±2°C for 1h, and apply the AC2000V(r.m.s.) 60s (in case of Type RA, apply the AC4000V(r.m.s.) 60s) then placed at room condition* for 24±2h before initial measurements. (Do not apply to SL char.)
Post-treatment:
Capacitor should be stored for 1 to 2h at room condition*.</td></tr>
<tr><td>Capacitance Change</td><td>Within ±10%</td></tr>
<tr><td>I.R.</td><td>1000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
</table>

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa

Continued on the following page.↗

Type SA: AC400V / RA: AC500V Specifications and Test Methods

Continued from the preceding page.↘

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td rowspan="4">10</td><td rowspan="4">Soldering Effect (On-Preheat)</td><td>Appearance</td><td>No marked defect</td><td rowspan="4">First the capacitor should be stored at 120+0/-5°C for 60+0/-5s.
Then, as in the figure, the lead wires should be immersed in solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1s.
 

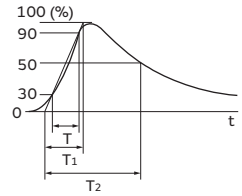
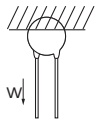
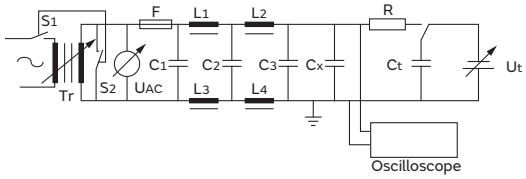
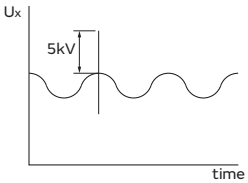
Pre-treatment:
Capacitor should be stored at 125±2°C for 1h, and apply the AC2000V(r.m.s.) 60s (in case of Type RA, apply the AC4000V(r.m.s.) 60s) then placed at room condition* for 24±2h before initial measurements. (Do not apply to SL char.)
Post-treatment:
Capacitor should be stored for 1 to 2h at room condition*.</td></tr>
<tr><td>Capacitance Change</td><td>Within ±10%</td></tr>
<tr><td>I.R.</td><td>1000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
<tr><td rowspan="3">11</td><td rowspan="3">Vibration Resistance</td><td>Appearance</td><td>No marked defect</td><td rowspan="3">The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1-minute rate of vibration change from 10 to 55Hz and back to 10Hz.
Apply for a total of 6h, 2h each in 3 mutually perpendicular directions.</td></tr>
<tr><td>Capacitance</td><td>Within the specified tolerance</td></tr>
<tr><td>D.F.</td><td>2.5% max.</td></tr>
<tr><td rowspan="5">12</td><td rowspan="5">Humidity (Under Steady State)</td><td>Appearance</td><td>No marked defect</td><td rowspan="5">Set the capacitor for 500±12h at 40±2°C in 90 to 95% relative humidity.
Pre-treatment:
Capacitor should be stored at 125±2°C for 1h, and apply the AC2000V(r.m.s.) 60s (in case of Type RA, apply the AC4000V(r.m.s.) 60s) then placed at room condition* for 24±2h berore initial measurements. (Do not apply to SL char.)
Post-treatment:
Capacitor should be stored for 1 to 2h at room condition*.</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>B</td><td>Within ±10%</td></tr><tr><td>E</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ± 5%</td></tr></table></td></tr>
<tr><td>D.F.</td><td><table><tr><th>Char.</th><th>Specifications</th></tr><tr><td>B, E</td><td>D.F.≦5.0%</td></tr><tr><td>SL</td><td>D.F.≦2.5%</td></tr></table></td></tr>
<tr><td>I.R.</td><td>3000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
<tr><td rowspan="5">13</td><td rowspan="5">Humidity Loading</td><td>Appearance</td><td>No marked defect</td><td rowspan="5">Apply the AC440V (r.m.s.) (in case of Type RA: AC500V (r.m.s.)) for 500±12h at 40±2°C in 90 to 95% relative humidity.
Pre-treatment:
Capacitor should be stored at 125±2°C for 1h, and apply the AC2000V(r.m.s.) 60s (in case of Type RA, apply the AC4000V(r.m.s.) 60s) then placed at room condition* for 24±2h berore initial measurements. (Do not apply to SL char.)
Post-treatment:
Capacitor should be stored for 1 to 2h at room condition*.</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>B</td><td>Within ±10%</td></tr><tr><td>E</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ± 5%</td></tr></table></td></tr>
<tr><td>D.F.</td><td><table><tr><th>Char.</th><th>Specifications</th></tr><tr><td>B, E</td><td>D.F.≦5.0%</td></tr><tr><td>SL</td><td>D.F.≦2.5%</td></tr></table></td></tr>
<tr><td>I.R.</td><td>3000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
</table>

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa

Continued on the following page.↗

Type SA: AC400V / RA: AC500V Specifications and Test Methods

Continued from the preceding page.↘

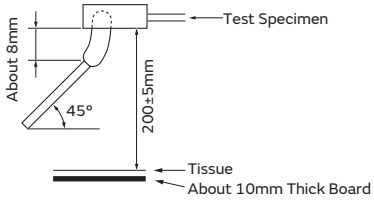
No.	Item		Specifications	Test Method
14	Life	Appearance	No marked defect	Impulse Voltage Each individual capacitor should be subjected to a 8kV (Type RA: 12kV) impulses for three times. Then the capacitors are applied to life test.  Front time (T_1) =1.2μs=1.67T Time to half-value (T_2) =50μs Apply a voltage from Table 4 for 1000h at 125+2/-0°C, and relative humidity of 50% max. <Table 4> **In Case of Type SA rated voltage: AC400V** The capacitors are subjected to a AC680V(r.m.s.), alternating voltage of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1s. **In Case of Type RA rated voltage: AC500V** The capacitors are subjected to a AC850V(r.m.s.), alternating voltage of mains frequency, except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1s. Pre-treatment: Capacitor should be stored at 125±2°C for 1h, and apply the AC2000V(r.m.s.) 60s (in case of Type RA, apply the AC4000V(r.m.s.) 60s) then placed at room condition* for 24±2h before initial measurements. (Do not apply to SL char.) Post-treatment: Capacitor should be stored for 1 to 2h at room condition*.
		Capacitance Change	Within ±20%	
		I.R.	3000MΩ min.	
		Dielectric Strength	Per Item 6	
15	Robustness of Terminations	Tensile	Lead wire should not be cut off. Capacitor should not be broken.	As shown in the figure at right, fix the body of the capacitor and apply a tensile weight gradually to each lead wire in the radial direction of the capacitor up to 10N and keep it for 10±1s. 
		Bending		Each lead wire should be subjected to 5N of weight and bent 90° at the point of egress, in one direction, then returned to its original position and bent 90° in the opposite direction at the rate of one bend in 2 to 3s.
16	Active Flammability		The cheesecloth should not be on fire.	The capacitor should be individually wrapped in at least one but not more than two complete layers of cheesecloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5s. The U_{AC} should be maintained for 2min after the last discharge.  $C_{1,2}$: 1μF±10% C_3 : 0.033μF±5% 10kV $L_{1\ to\ 4}$: 1.5mH±20% 16A Rod core choke C_t : 3μF±5% 10kV R : 100Ω±2% C_x : Capacitor under test U_{AC} : U_R±5% F : Fuse, Rated 10A U_R : Rated Voltage U_t : Voltage applied to C_t 

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa

Continued on the following page.↗

Type SA: AC400V / RA: AC500V Specifications and Test Methods

Continued from the preceding page.↘

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Test Method</th></tr>
<tr><td>17</td><td colspan="2">Passive Flammability</td><td>The burning time should not exceed 30s.
The tissue paper should not ignite.</td><td>The capacitor under test should be held in the flame in the position that best promotes burning. Each specimen should only be exposed once to the flame. Time of exposure to flame: 30s.
Length of flame : 12±1mm
Gas burner : Length 35mm min.
Inside Dia. 0.5±0.1mm
Outside Dia. 0.9mm max.
Gas : Butane gas Purity 95% min.
 
</td></tr>
<tr><td rowspan="5">18</td><td rowspan="5">Temperature and Immersion Cycle</td><td>Appearance</td><td>No marked defect</td><td rowspan="5">The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.
<Temperature Cycle>
Step | Temperature (ºC) | Time (min.)
1 | -40+0/-3 | 30
2 | Room temp. | 3
3 | 125+3/-0 | 30
4 | Room temp. | 3
Cycle time: 500 cycles
<Immersion Cycle>
Step | Temperature (ºC) | Time (min.) | Immersion Water
1 | 65+5/-0 | 15 | Clean water
2 | 0±3 | 15 | Salt water
Cycle time: 2 cycles
Pre-treatment:
Capacitor should be stored at 125±2ºC for 1h, and apply the AC2000V(r.m.s.) 60s (in case of Type RA, apply the AC4000V(r.m.s.) 60s) then placed at room condition* for 24±2h. (Do not apply to SL char.)
Post-treatment:
Capacitor should be stored for 24±2h at room condition*.</td></tr>
<tr><td>Capacitance Change</td><td>Char. | Capacitance Change
B | Within ±10%
E | Within ±20%
SL | Within ± 5%</td></tr>
<tr><td>D.F.</td><td>Char. | Specifications
B, E | D.F.≦5.0%
SL | D.F.≦2.5%</td></tr>
<tr><td>I.R.</td><td>3000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
</table>

* "Room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmosphere pressure: 86 to 106kPa