Safety Recognized Ceramic Capacitors

muRata Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.C80E-6

CONTENTS

● Part Numbering

Safety Standard Recognized Ceramic Capacitors

(Part Number) DE | 2 | E3 | KH | 102 | M | N3 | A | ❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾

❶Product ID

Product ID	
DE	High Voltage (250V - 6.3kV) / Safety Standard Recognized Ceramic Capacitors

❷Series Category

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

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

❸Temperature Characteristics

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

❹Rated Voltage/Safety Standard Recognized Type

Code	Rated Voltage
E2	AC250V
KH	X1, Y2; AC250V, (Safety Standard Recognized Type KH)
KY	X1, Y2; AC250V, (Safety Standard Recognized Type KY)
KX	X1, Y1; AC250V, (Safety Standard Recognized Type KX)

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 which follow the two numbers.
If there is a decimal point, it is expressed by the capital letter "**R**". In this case, all figures are significant digits.

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		
A5		10	ø0.6+0.1,−0.05	
B2	Vertical Crimp Short	5	ø0.6±0.05	—
B3		7.5		
B5		10	ø0.6+0.1, −0.05	
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
N5		10	ø0.6+0.1, −0.05	25.4
N7		7.5	ø0.6±0.05	30
P3	Straight Taping	7.5	ø0.6±0.05	15

❽Packaging

Code	Packaging
A	Ammo Pack
B	Bulk

❾Individual Specification

In case part number cannot be identified without "Individual Specification", it is added at the end of part number.

Code	Individual Specification	Application
A01	Small Size	Type KX
M01	Simplicity Marking, Dielectric Strength : AC2000V	Type KY
M02	Simplicity Marking, Dielectric Strength : AC2600V	

Safety Recognized Ceramic Capacitors

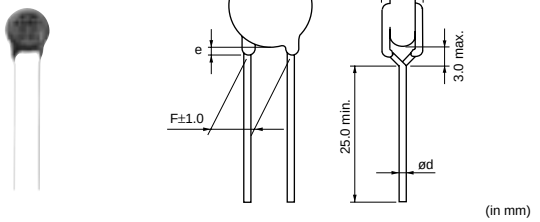
Type KY (Basic insulation)-IEC60384-14 Class X1, Y2-

■ Features

1. We design capacitors in much more compact size than type KH, having reduced the diameter by 25% max.
2. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.)
3. Dielectric strength:
   AC2000V (In case of lead spacing F=5mm)
   AC2600V (In case of lead spacing F=7.5mm)
4. Class X1/Y2 capacitors which are recognized by UL/CSA/BSI/SEMKO/SEV/VDE/FIMKO/NEMKO/ DEMKO/NSW.
5. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standards).
6. We eliminated lead (Pb) from plating lead wires and inner-solder.
7. Cost-saving automatic insertion available.

■ Applications

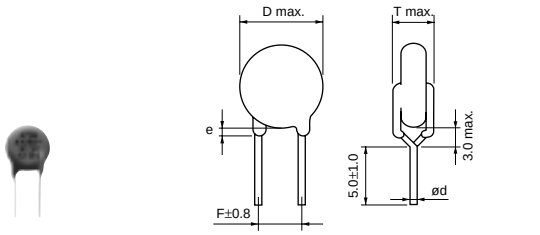
1. Ideal for use as X/Y capacitors for AC line filter and primary-secondary coupling on switching power supplies and AC adapters.
2. Ideal for use on D-A isolation and noise absorption for DAA modems without transformers.



[Bulk]
Vertical Crimp Long (A2, A3)

(in mm)

Lead Code	Coating Extension e	ød
A2, A3	Up to the end of crimp	0.6±0.05



[Bulk]
Vertical Crimp Short (B2, B3)

(in mm)

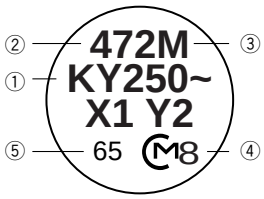
Lead Code	Coating Extension e	ød
B2, B3	Up to the end of crimp	0.6±0.05

■ Standard Recognition

	Standard No.	Recognized No.	Rated Voltage
UL	UL 1414	E37921	AC250V(r.m.s.)
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227935	
SEMKO	EN132400	9542043 01	
SEV		00.1494	
VDE		91890, 91892, 91894, 91896	
FIMKO		189014	
NEMKO		P96100479	
DEMKO		305182	
NSW (SAA)	IEC60384-14 (2nd Edition)	6824/2	

The recognition number might change by the revision of the application standard and the change within the range of acquisition.

■ Marking

Example	Item
	① Type Designation KY
	② Nominal Capacitance (Under 100pF : Actual value, 100pF and over : Marked with 3 figures)
	③ Capacitance Tolerance
	④ Company Name Code
	⑤ Manufactured Date Code
	Class Code X1Y2
	Rated Voltage Mark 250~

Lead Spacing F=7.5mm

Part Number	AC Rated Voltage (Vac)	Temp. Char.	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping (1)
DE21XKY100J□□□M02	250	SL	10 ±5%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE21XKY150J□□□M02	250	SL	15 ±5%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE21XKY220J□□□M02	250	SL	22 ±5%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE21XKY330J□□□M02	250	SL	33 ±5%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE21XKY470J□□□M02	250	SL	47 ±5%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE21XKY680J□□□M02	250	SL	68 ±5%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY101K□□□M02	250	B	100 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY151K□□□M02	250	B	150 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY221K□□□M02	250	B	220 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY331K□□□M02	250	B	330 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY471K□□□M02	250	B	470 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY681K□□□M02	250	B	680 ±10%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY102M□□□M02	250	E	1000 ±20%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY152M□□□M02	250	E	1500 ±20%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY222M□□□M02	250	E	2200 ±20%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY332M□□□M02	250	E	3300 ±20%	9 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY472M□□□M02	250	E	4700 ±20%	10 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2F3KY103M□□□M02	250	F	10000 ±20%	14 max.	7.5	5.0 max.	A3B	B3B	N3A

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.
Individual specification code "M02" expresses "simplicity marking and guarantee of dielectric strength between lead wires: AC2600V".
Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name (KY) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

Lead Spacing F=5mm

Part Number	AC Rated Voltage (Vac)	Temp. Char.	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping (1)
DE21XKY100J□□□M01	250	SL	10 ±5%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE21XKY150J□□□M01	250	SL	15 ±5%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE21XKY220J□□□M01	250	SL	22 ±5%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE21XKY330J□□□M01	250	SL	33 ±5%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE21XKY470J□□□M01	250	SL	47 ±5%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE21XKY680J□□□M01	250	SL	68 ±5%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY101K□□□M01	250	B	100 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY151K□□□M01	250	B	150 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY221K□□□M01	250	B	220 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY331K□□□M01	250	B	330 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY471K□□□M01	250	B	470 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY681K□□□M01	250	B	680 ±10%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2E3KY102M□□□M01	250	E	1000 ±20%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2E3KY152M□□□M01	250	E	1500 ±20%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2E3KY222M□□□M01	250	E	2200 ±20%	8 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2E3KY332M□□□M01	250	E	3300 ±20%	9 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2E3KY472M□□□M01	250	E	4700 ±20%	10 max.	5.0	5.0 max.	A2B	B2B	N2A

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.
Individual specification code "M01" expresses "simplicity marking and guarantee of dielectric strength between lead wires: AC2000V".
Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name (KY) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

Safety Recognized Ceramic Capacitors

Type KH (Basic insulation)-IEC60384-14 Class X1, Y2-

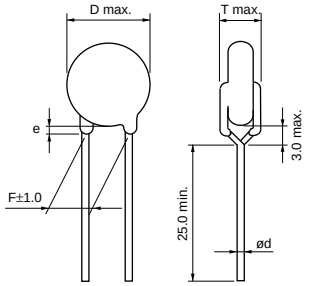
■ Features

1. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.)
2. Dielectric strength: AC2600V
3. Class X1/Y2 capacitors which are recognized by UL/CSA/BSI/SEMKO/SEV/VDE/FIMKO/NEMKO/DEMKO/NSW.
4. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standards).
5. We eliminated lead (Pb) from plating lead wires and inner-solder.
6. Cost-saving automatic insertion available.

■ Applications

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

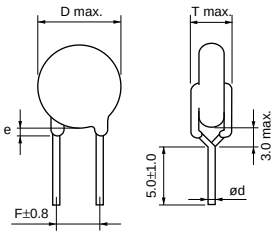
[Bulk]
Vertical Crimp Long (A3)



(in mm)

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

[Bulk]
Vertical Crimp Short (B3)



(in mm)

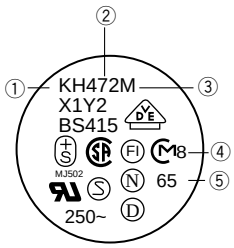
Lead Code	Coating Extension e	ød
B3	Up to the end of crimp	0.6±0.05

■ Standard Recognition

	Standard No.	Recognized No.	Rated Voltage
UL	UL1414	E37921	AC250V (r.m.s.)
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227636	
SEMKO	EN132400	0236131/01-02	
SEV		02.1106	
VDE		40002796	
FIMKO		18986	
NEMKO		P02102025	
DEMKO		133474-01/A	
NSW (SAA)	IEC60384-14 (2nd Edition)	6529/5	

- The recognition number might change by the revision of the application standard and the change within the range of acquisition.
- Please contact us when the recognition of CQC (Chinese Safety Standard) or KTL (South Korean Safety Standard) is necessary.

■ Marking



Item	
① Type Designation	KH
② Nominal Capacitance (Marked with 3 figures)	
③ Capacitance Tolerance	
④ Company Name Code	©8
⑤ Manufactured Date Code	
UL Approval Mark	
CSA Approval Mark	
BSI Approval Mark	BS415
SEMKO Approval Mark	Ⓢ
SEV Approval Mark	MJ502
VDE Approval Mark	
FIMKO Approval Mark	Ⓕ
NEMKO Approval Mark	Ⓝ
DEMKO Approval Mark	Ⓓ
Class Code	X1Y2
Rated Voltage Mark	250~

Part Number	AC Rated Voltage (Vac)	Temp. Char.	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping (1)
DE2B3KH101K□□□	250	B	100 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH151K□□□	250	B	150 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH221K□□□	250	B	220 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH331K□□□	250	B	330 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH471K□□□	250	B	470 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH681K□□□	250	B	680 ±10%	9 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2E3KH102M□□□	250	E	1000 ±20%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2E3KH152M□□□	250	E	1500 ±20%	9 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2E3KH222M□□□	250	E	2200 ±20%	10 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2E3KH332M□□□	250	E	3300 ±20%	12 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2E3KH472M□□□	250	E	4700 ±20%	13 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2F3KH103M□□□	250	F	10000 ±20%	16 max.	7.5	7.0 max.	A3B	B3B	N7A

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

Safety Recognized Ceramic Capacitors

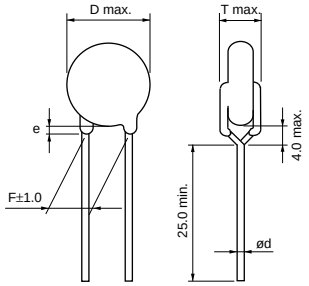
Type KX (Reinforced insulation)-IEC60384-14 Class X1, Y1-

■ Features

1. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.)
2. Dielectric strength: AC4000V
3. Class X1/Y1 capacitors which are recognized by UL/CSA/BSI/SEMKO/SEV/VDE/FIMKO/NEMKO/DEMKO/IMQ.
4. Possible to use with a component in appliance requiring reinforced insulation and double insulation based on UL1492, IEC60065 and IEC60950.
5. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standards).
6. We eliminated lead (Pb) from plating lead wires and inner-solder.
7. Cost-saving automatic insertion available.

■ Applications

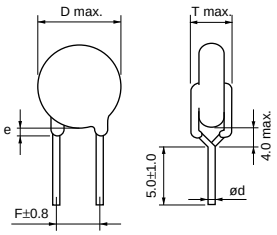
Ideal for use as X/Y capacitor for AC line filter and primary-secondary coupling on switching power supplies and AC adapters.



[Bulk]
Vertical Crimp Long (A5)

(in mm)

Lead Code	Coating Extension e	ød
A5	Up to the end of crimp	$0.6^{0.1}_{0.05}$



[Bulk]
Vertical Crimp Short (B5)

(in mm)

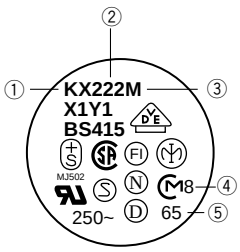
Lead Code	Coating Extension e	ød
B5	Up to the end of crimp	$0.6^{0.1}_{0.05}$

■ Standard Recognition

	Standard No.	Recognized No.	Rated Voltage
UL	UL1414	E37921	AC250V (r.m.s.)
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227859	
SEMKO	EN132400	310283	
SEV		02.1105	
VDE		40002831	
FIMKO		18987	
NEMKO		P02102026	
DEMKO		133474-02	
IMQ		V4069	

- The recognition number might change by the revision of the application standard and the change within the range of acquisition.
- Please contact us when the recognition of CQC (Chinese Safety Standard) or KTL (South Korean Safety Standard) is necessary.

■ Marking



Example	Item	
	① Type Designation	KX
	② Nominal Capacitance (Under 100pF : Actual value, 100pF and over : Marked with 3 figures)	
	③ Capacitance Tolerance	
	④ Company Name Code	M8
	⑤ Manufactured Date Code	
	UL Approval Mark	
	CSA Approval Mark	
	BSI Approval Mark	BS415
	SEMKO Approval Mark	
	SEV Approval Mark	
	VDE Approval Mark	
	IMQ Approval Mark	
	FIMKO Approval Mark	
	NEMKO Approval Mark	
	DEMKO Approval Mark	
	Class Code	X1Y1
	Rated Voltage Mark	250~

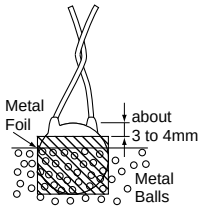
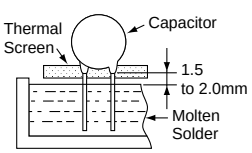
Part Number	AC Rated Voltage (Vac)	Temp. Char.	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping (1)
DE11XKX100J□□□	250	SL	10 ±5%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE11XKX150J□□□	250	SL	15 ±5%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE11XKX220J□□□	250	SL	22 ±5%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE11XKX330J□□□	250	SL	33 ±5%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE11XKX470J□□□	250	SL	47 ±5%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE11XKX680J□□□	250	SL	68 ±5%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX101K□□□	250	B	100 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX151K□□□	250	B	150 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX221K□□□	250	B	220 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX331K□□□	250	B	330 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX471K□□□	250	B	470 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX681K□□□	250	B	680 ±10%	10 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX102M□□□A01	250	E	1000 ±20%	8 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX152M□□□A01	250	E	1500 ±20%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX222M□□□A01	250	E	2200 ±20%	10 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX332M□□□A01	250	E	3300 ±20%	12 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX392M□□□A01	250	E	3900 ±20%	13 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX472M□□□A01	250	E	4700 ±20%	15 max.	10.0	8.0 max.	A5B	B5B	N5A

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

Type KY/KH/KX Specifications and Test Methods

■ Apply to Type KY/KH/KX

Operating Temperature Range : -25 to +125°C (-25 to +85°C in case of the standard of UL)

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Testing Method</th></tr>
<tr><td>1</td><td colspan="2">Appearance and Dimensions</td><td>No marked defect on appearance form 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 and Q should be measured at 20˚C with 1±0.1kHz (char. SL : 1±0.1MHz) and AC5V (r.m.s.) max.</td></tr>
<tr><td>4</td><td colspan="2">Dissipation Factor (D.F.)
Q</td><td><table><tr><th>Char.</th><th>Specifications</th></tr><tr><td>B, E</td><td>D.F.≦2.5%</td></tr><tr><td>F</td><td>D.F.≦5.0%</td></tr><tr><td>SL</td><td>Q≧400+20C*1(C<30pF)
Q≧1000 (C≧30pF)</td></tr></table></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±5 sec. 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 test voltages of Table 1 are applied between the lead wires for 60 sec.
<Table.1><table><tr><th>Type</th><th>Test Voltage</th></tr><tr><td>KY</td><td>In case of lead spacing F=5mm AC2000V (r.m.s.)
In case of lead spacing F=7.5mm AC2600V (r.m.s.)</td></tr><tr><td>KH</td><td>AC2600V (r.m.s.)</td></tr><tr><td>KX</td><td>AC4000V (r.m.s.)</td></tr></table></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 figure at right, a metal foil should be closely wrapped around the body of the capacitor to the distance of about 3 to 4mm from each terminal.
Then, the capacitor should be inserted into a container filled with metal balls of about 1mm diameter. Finally, AC voltage of Table 2 is applied for 60 sec. between the capacitor lead wires and metal balls.
 
<Table.2><table><tr><th>Type</th><th>Test Voltage</th></tr><tr><td>KY</td><td>AC2600V (r.m.s.)</td></tr><tr><td>KH</td><td>AC2600V (r.m.s.)</td></tr><tr><td>KX</td><td>AC4000V (r.m.s.)</td></tr></table></td></tr>
<tr><td>7</td><td colspan="2">Temperature Characteristics</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 $^{+20}_{-55}$%</td></tr><tr><td>F</td><td>Within $^{+30}_{-80}$%</td></tr></table>Temperature characteristic guarantee is -25 to +85°C
<table><tr><th>Char.</th><th>Temperature Coefficient</th></tr><tr><td>SL</td><td>+350 to -1000ppm/°C</td></tr></table>Temperature characteristic guarantee is +20 to +85°C</td><td>The capacitance measurement should be made at each step specified in Table 3.
<Table.3><table><tr><th>Step</th><th>Temperature (ºC)</th></tr><tr><td>1</td><td>20±2</td></tr><tr><td>2</td><td>-25±2</td></tr><tr><td>3</td><td>20±2</td></tr><tr><td>4</td><td>85±2</td></tr><tr><td>5</td><td>20±2</td></tr></table></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 of 235±5°C for 2±0.5 sec.
The depth of immersion is up to about 1.5 to 2.0mm from the root of lead wires.</td></tr>
<tr><td rowspan="4">9</td><td rowspan="4">Soldering Effect</td><td>Appearance</td><td>No marked defect</td><td rowspan="4">As shown in 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±0.5 sec. (10±1 sec. for 260±5°C).
 
Pre-treatment:
Capacitor should be stored at 85±2°C for 1 hr., then placed at *2room condition for 24±2 hrs. before initial measurements.
Post-treatment:
Capacitor should be stored for 1 to 2 hrs. at *2room 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>

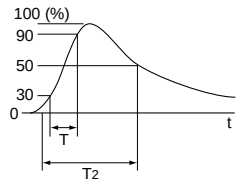
∗1 "C" expresses nominal capacitance value (pF).

∗2 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

Type KY/KH/KX Specifications and Test Methods

Continued from the preceding page.

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Testing Method</th></tr>
<tr><td rowspan="3">10</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 10Hz to 55Hz and back to 10Hz.
Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions.</td></tr>
<tr><td>Capacitance</td><td>Within the specified tolerance</td></tr>
<tr><td>D.F.
Q</td><td><table><tr><th>Char.</th><th>Specifications</th></tr><tr><td>B, E</td><td>D.F.≦2.5%</td></tr><tr><td>F</td><td>D.F.≦5.0%</td></tr><tr><td>SL</td><td>Q≧400+20C*1(C＜30pF)
Q≧1000 (C≧30pF)</td></tr></table></td></tr>
<tr><td rowspan="5">11</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±12 hrs. at 40±2°C in 90 to 95% relative humidity.
Post-treatment:
Capacitor should be stored for 1 to 2 hrs. at *2room 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, F</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ± 5%</td></tr></table></td></tr>
<tr><td>D.F.
Q</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>F</td><td>D.F.≦7.5%</td></tr><tr><td>SL</td><td>Q≧275+5/2C*1(C＜30pF)
Q≧350 (C≧30pF)</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">12</td><td rowspan="5">Humidity Loading</td><td>Appearance</td><td>No marked defect</td><td rowspan="5">Apply the rated voltage for 500±12 hrs. at 40±2°C in 90 to 95% relative humidity.
Post-treatment:
Capacitor should be stored for 1 to 2 hrs. at *2room 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, F</td><td>Within ±15%</td></tr><tr><td>SL</td><td>Within ± 5%</td></tr></table></td></tr>
<tr><td>D.F.
Q</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>F</td><td>D.F.≦7.5%</td></tr><tr><td>SL</td><td>Q≧275+5/2C*1(C＜30pF)
Q≧350 (C≧30pF)</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">Life</td><td>Appearance</td><td>No marked defect</td><td rowspan="5">Impulse Voltage
Each individual capacitor should be subjected to a 5kV (Type KX: 8kV) impulses for three times. After the capacitors are applied to life test.
 

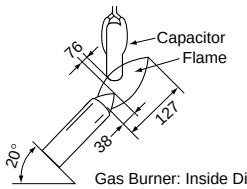
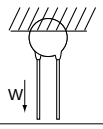
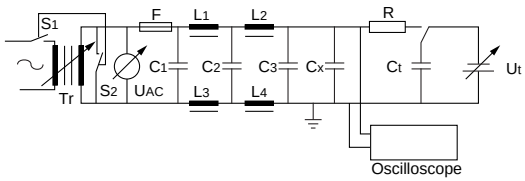
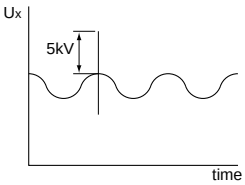
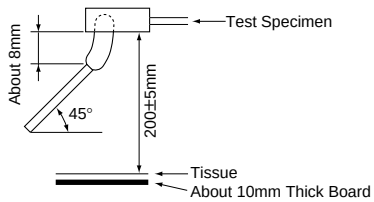
T1=1.2μs=1.67T
T2=50μs
Apply a voltage of Table 4 for 1000 hrs. at 125+2/-0°C, and relative humidity of 50% max.
<table><tr><th>Applied Voltage</th></tr><tr><td>AC425V (r.m.s.), except that once each hour the voltage is increased to AC1000V (r.m.s.) for 0.1 sec.</td></tr></table>
Post-treatment:
Capacitor should be stored for 1 to 2 hrs. at *2room condition.</td></tr>
<tr><td>Capacitance Change</td><td>Within ±20%</td></tr>
<tr><td>I.R.</td><td>3000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
</table>

*1 "C" expresses nominal capacitance value (pF).
*2 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

Type KY/KH/KX Specifications and Test Methods

Continued from the preceding page.

No.	Item		Specifications	Testing Method
14	Flame Test		The capacitor flame discontinues as follows. Cycle: 1 to 4 — Time (sec.): 30 max. Cycle: 5 — Time (sec.): 60 max.	The capacitor should be subjected to applied flame for 15 sec. and then removed for 15 sec. until 5 cycles are completed.  Gas Burner: Inside Dia. 9.5 (in mm)
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±1 sec. 
		Bending		Each lead wire should be subjected to 5N weight and then a 90° bend, at the point of egress, in one direction, return to original position, and then apply a 90° bend in the opposite direction at the rate of one bend in 2 to 3 sec.
16	Active Flammability		The cheese-cloth should not be on fire.	The capacitor should be individually wrapped in at least one but not more than two complete layers of cheese-cloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The U_{AC} should be maintained for 2 min. 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 
17	Passive Flammability		The burning time should not exceed 30 sec. The tissue paper should not ignite.	The capacitor under test should be held in the flame in the position which best promotes burning. Each specimen should only be exposed once to the flame. Time of exposure to flame: 30 sec. 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. 

Continued on the following page.

Type KY/KH/KX Specifications and Test Methods

Continued from the preceding page.

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Testing Method</th></tr>
<tr><td rowspan="4">18</td><td rowspan="4">Temperature and Immersion Cycle</td><td>Appearance</td><td>No marked defect</td><td rowspan="4">The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.

<Temperature Cycle>
<table><tr><th>Step</th><th>Temperature (ºC)</th><th>Time (min.)</th></tr><tr><td>1</td><td>-25+0/-3</td><td>30</td></tr><tr><td>2</td><td>Room temp.</td><td>3</td></tr><tr><td>3</td><td>125+3/-0</td><td>30</td></tr><tr><td>4</td><td>Room temp.</td><td>3</td></tr></table>Cycle time : 5 cycle

<Immersion Cycle>
<table><tr><th>Step</th><th>Temperature (ºC)</th><th>Time (min.)</th><th>Immersion Water</th></tr><tr><td>1</td><td>65+5/-0</td><td>15</td><td>Clean water</td></tr><tr><td>2</td><td>0±3</td><td>15</td><td>Salt water</td></tr></table>Cycle time : 2 cycle

Pre-treatment:
Capacitor should be stored at 85±2°C for 1 hr., then placed at *2room condition for 24±2 hrs.
Post-treatment:
Capacitor should be stored for 24±2 hrs. at *2room 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, F</td><td>Within ±20%</td></tr><tr><td>SL</td><td>Within ± 5%</td></tr></table></td></tr>
<tr><td>D.F.
Q</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>F</td><td>D.F.≦7.5%</td></tr><tr><td>SL</td><td>Q≧275+5/2C*1(C<30pF)
Q≧350 (C≧30pF)</td></tr></table></td></tr>
<tr><td>I.R.</td><td>3000MΩ min.</td></tr>
<tr><td></td><td>Dielectric Strength</td><td>Per Item 6</td><td></td></tr>
</table>

*1 "C" expresses nominal capacitance value (pF).
*2 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Type KY/KH/KX are recognized by UL1414 6th edition and CSA E384-14.
"Discharge Test" that was compulsory in previous safety standards(*) is not specified in new safety standards. (* UL1414 5th edition and CSA C22.2 No.1)
Therefore the description of "Discharge Test" is deleted in this catalog.

Safety Recognized Ceramic Capacitors

DEJ Series -Based on the Electrical Appliance and Material Safety Law of Japan-

■ Features

1. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standards).
2. We eliminated lead (Pb) from plating lead wires and inner-solder.
3. Cost-saving automatic insertion available.
4. This type is based on the electrical appliance and material safety law of Japan and JIS-C-5150 (general rules of AC mains supply capacitors of electronic equipment).

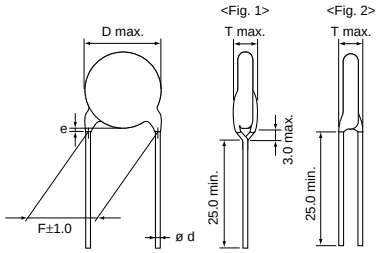
■ Applications

Ideal for use on AC line filter and primary-secondary coupling for switching power supplies and AC adapters.

■ Marking

Temp. Char.		E, F
Nominal Body Diameter	ø7-8mm	102Z 250~ 65
	ø9-11mm	332Z 250~ Ⓜ65
Nominal Capacitance		Marked with 3 figures
Capacitance Tolerance		Marked with code
Rated Voltage		Marked with code
Manufacturer's Identification		Marked with Ⓜ (omitted for nominal body diameter ø8mm and under)
Manufactured Date Code		Abbreviation

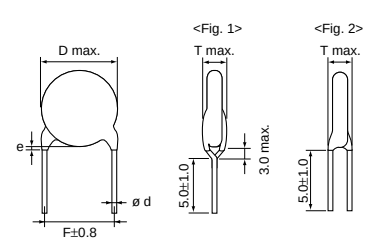
[Bulk]
Vertical Crimp Long (A3)
Straight Long (C3)



(in mm)

Lead Code	Coating Extension e	ø d	Style
A3	Up to the end of crimp	0.6±0.05	Fig. 1
C3	3.0 max.	0.6±0.05	Fig. 2

[Bulk]
Vertical Crimp Short (B3)
Straight Short (D3)



(in mm)

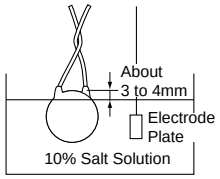
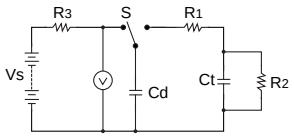
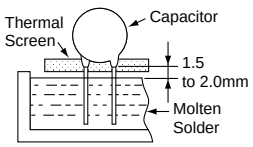
Lead Code	Coating Extension e	ø d	Style
B3	Up to the end of crimp	0.6±0.05	Fig. 1
D3	3.0 max.	0.6±0.05	Fig. 2

Part Number	AC Rated Voltage (Vac)	Temp. Char.	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)	Lead Package Long Bulk	Lead Package Short Bulk	Lead Package Taping (1)	Lead Package Taping (2)
DEJE3E2102Z□□□	250	E	1000 +80/-20%	7 max.	7.5	4.0 max.	C3B	D3B	N2A	P3A
DEJE3E2222Z□□□	250	E	2200 +80/-20%	8 max.	7.5	4.0 max.	A3B	B3B	N2A	N3A
DEJE3E2332Z□□□	250	E	3300 +80/-20%	9 max.	7.5	4.0 max.	A3B	B3B	N2A	N3A
DEJE3E2472Z□□□	250	E	4700 +80/-20%	11 max.	7.5	4.0 max.	A3B	B3B	N2A	N3A
DEJF3E2472Z□□□	250	F	4700 +80/-20%	8 max.	7.5	4.0 max.	A3B	B3B	N2A	N3A
DEJF3E2103Z□□□	250	F	10000 +80/-20%	11 max.	7.5	4.0 max.	A3B	B3B	N2A	N3A

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.
Taping (1): Lead spacing F=5.0mm, Taping(2): Lead spacing F=7.5mm.

DEJ Series Specifications and Test Methods

■Apply to DEJ Series (Products which are based on the electrical appliance and material safety law of Japan)
Operating Temperature Range : -25 to +85°C

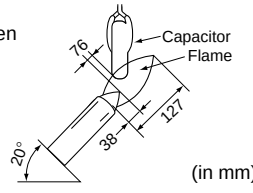
No.	Item		Specifications	Testing Method
1	Appearance and Dimensions		No marked defect on appearance form and dimensions are within specified range.	The capacitor should be visually inspected for evidence of defect. Dimensions should be measured with slide calipers.
2	Marking		To be easily legible	The capacitor should be visually inspected.
3	Capacitance		Within specified tolerance	The capacitance should be measured at 20˚C with 1±0.1kHz and AC5V (r.m.s.) max.
4	Dissipation Factor (D.F.)		Char. / Specifications E / D.F.≦2.5% F / D.F.≦5.0%	The dissipation factor should be measured at 20˚C with 1±0.1kHz and AC5V (r.m.s.) max.
5	Insulation Resistance (I.R.)		10000MΩ min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.
6	Dielectric Strength	Between Lead Wires	No failure	The capacitor should not be damaged when AC1500V (r.m.s.) are applied between the lead wires for 60 sec. (Charge / discharge current≦50mA)
		Body Insulation	No failure	First, the terminals of the capacitor should be connected together. Then, as shown in figure at right, the capacitor should be immersed into 10% salt solution up to a position of about 3 to 4mm apart from the terminals. Finally, AC1500V (r.m.s.) is applied for 60 sec. between the capacitor lead wires and electrode plate. (Charge / discharge current≦50mA) 
7	Temperature Characteristics		Char. / Capacitance Change E / Within $^{+20}_{-55}$% F / Within $^{+30}_{-80}$%	The capacitance measurement should be made at each step specified in Table 1. <Table.1> Step / Temperature (ºC) 1 / 20±2 2 / -25±2 3 / 20±2 4 / 85±2 5 / 20±2
8	Discharge Test	Appearance	No marked defect	As in Figure 1, discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified.  Fig.1 Ct : Capacitor under test R2 : 100MΩ S : High-voltage switch R3 : Surge resistance R1 : 1000Ω Cd / 0.001μF Vs / DC10kV
		I.R.	1000MΩ min.	
		Dielectric Strength	Per Item 6	
9	Solderability of Leads		Lead wire should be soldered with uniform coating on the axial direction over 3/4 of the circumferential direction.	The lead wire of a capacitor should be dipped into molten solder of 235±5˚C for 2±0.5 sec. The depth of immersion is up to about 1.5 to 2.0mm from the root of lead wires.
10	Soldering Effect	Appearance	No marked defect	As shown in figure, the lead wires should be immersed in solder of 350±10˚C up to 1.5 to 2.0mm from the root of terminal for 3.5±0.5 sec.  Pre-treatment: Capacitor should be stored at 85±2˚C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition.
		I.R.	1000MΩ min.	
		Dielectric Strength	Per Item 6	

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

Continued on the following page.

DEJ Series Specifications and Test Methods

Continued from the preceding page.

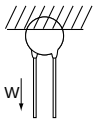
No.	Item		Specifications	Testing Method
11	Vibration Resistance	Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions.
		Capacitance	Within the specified tolerance	
		D.F.	Char. / Specifications E: D.F.≦2.5% F: D.F.≦5.0%	
12	Solvent Resistance	Appearance	No marked defect	The capacitor should be immersed into a isopropyl alcohol for 30±5 sec.
13	Humidity (Under Steady State)	Appearance	No marked defect	Set the capacitor for 500±12 hrs. at 40±2˚C in 90 to 95% relative humidity. Pre-treatment: Capacitor should be stored at 85±2˚C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		Capacitance Change	Char. / Capacitance Change E: Within ±20% F: Within ±30%	
		D.F.	Char. / Specifications E: D.F.≦5.0% F: D.F.≦7.5%	
		I.R.	1000MΩ min.	
		Dielectric Strength	Per Item 6	
14	Humidity Insulation	Appearance	No marked defect	The capacitor should be subjected to 40±2˚C, relative humidity of 90 to 98% for 8 hrs., and then removed in room temperature for 16 hrs. until 5 cycles. Pre-treatment: Capacitor should be stored at 85±2˚C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		Capacitance Change	Char. / Capacitance Change E: Within ±20% F: Within ±30%	
		D.F.	Char. / Specifications E: D.F.≦5.0% F: D.F.≦7.5%	
		I.R.	1000MΩ min.	
		Dielectric Strength	Per Item 6	
15	Humidity Loading	Appearance	No marked defect	Apply the rated voltage for 500±12 hrs. at 40±2˚C in 90 to 95% relative humidity. Pre-treatment: Capacitor should be stored at 85±2˚C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		Capacitance Change	Char. / Capacitance Change E: Within ±20% F: Within ±30%	
		D.F.	Char. / Specifications E: D.F.≦5.0% F: D.F.≦7.5%	
		I.R.	1000MΩ min.	
		Dielectric Strength	Per Item 6	
16	Life	Appearance	No marked defect	Apply a voltage of Table 2 for 1500 hrs. at 85±2˚C, relative humidity 50% max. <Table.2> Applied Voltage: AC500V (r.m.s.), except that once each hour the voltage is increased to AC1000V (r.m.s.) for 0.1 sec. Pre-treatment: Capacitor should be stored at 85±2˚C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition.
		Capacitance Change	Char. / Capacitance Change E: Within ±20% F: Within ±30%	
		I.R.	1000MΩ min.	
		Dielectric Strength	Per Item 6	
17	Flame Test		The capacitor flame discontinued as follows. Cycle / Time (sec.) 1 to 2: 15 max. 3: 60 max.	The capacitor should be subjected to applied flame for 15 sec. and then removed for 15 sec. until 3 cycles are completed.  Gas Burner: Inside Dia. 9.5 (in mm)

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

Continued on the following page.

DEJ Series Specifications and Test Methods

Continued from the preceding page.

<table>
<tr><th>No.</th><th colspan="2">Item</th><th>Specifications</th><th>Testing Method</th></tr>
<tr><td rowspan="2">18</td><td rowspan="2">Robustness of Terminations</td><td>Tensile</td><td rowspan="2">Lead wire should not be cut off. Capacitor should not be broken.</td><td>As shown in figure at right, fix the body of capacitor, apply a tensile weight gradually to each lead wire in the radial direction of capacitor up to 10N and keep it for 10±1 sec.
 
</td></tr>
<tr><td>Bending</td><td>Each lead wire should be subjected to 5N weight and then a 90° bend, at the point of egress, in one direction, return to original position, and then apply a 90° bend in the opposite direction at the rate of one bend in 2 to 3 sec.</td></tr>
<tr><td rowspan="5">19</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>
<table><tr><th>Step</th><th>Temperature (ºC)</th><th>Time (min.)</th></tr><tr><td>1</td><td>-25+0/-3</td><td>30</td></tr><tr><td>2</td><td>Room temp.</td><td>3</td></tr><tr><td>3</td><td>85+3/-0</td><td>30</td></tr><tr><td>4</td><td>Room temp.</td><td>3</td></tr></table>Cycle time : 5 cycle

<Immersion Cycle>
<table><tr><th>Step</th><th>Temperature (ºC)</th><th>Time (min.)</th><th>Immersion Water</th></tr><tr><td>1</td><td>65+5/-0</td><td>15</td><td>Clean water</td></tr><tr><td>2</td><td>0±3</td><td>15</td><td>Salt water</td></tr></table>Cycle time : 2 cycle

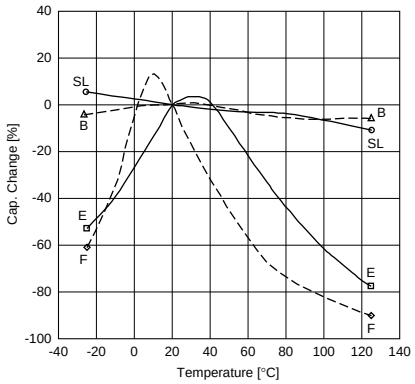
Pre-treatment:
Capacitor should be stored at 85±2˚C for 1 hr., then placed at *1room condition for 24±2 hrs.
Post-treatment:
Capacitor should be stored for 4 to 24 hrs. at *1room condition.</td></tr>
<tr><td>Capacitance Change</td><td><table><tr><th>Char.</th><th>Capacitance Change</th></tr><tr><td>E</td><td>Within ±20%</td></tr><tr><td>F</td><td>Within ±30%</td></tr></table></td></tr>
<tr><td>D.F.</td><td><table><tr><th>Char.</th><th>Specifications</th></tr><tr><td>E</td><td>D.F.≦5.0%</td></tr><tr><td>F</td><td>D.F.≦7.5%</td></tr></table></td></tr>
<tr><td>I.R.</td><td>1000MΩ min.</td></tr>
<tr><td>Dielectric Strength</td><td>Per Item 6</td></tr>
</table>

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

4

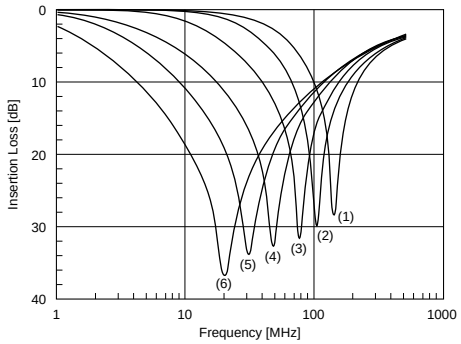
Characteristics Data (Typical Example)

■ Capacitance-Temperature Characteristics



■ Insertion Loss-Frequency Characteristics

Type KY

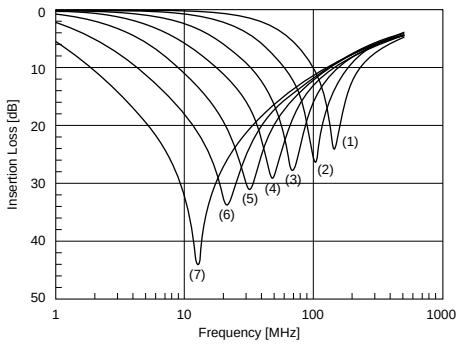


Type KY

Signal power : 1mW
AC240V(r.m.s.) / 60Hz is applied on the capacitor.

(1) DE2B3KY101KA2BM01
(2) DE2B3KY221KA2BM01
(3) DE2B3KY471KA2BM01
(4) DE2E3KY102MA2BM01
(5) DE2E3KY222MA2BM01
(6) DE2E3KY472MA2BM01

Type KH

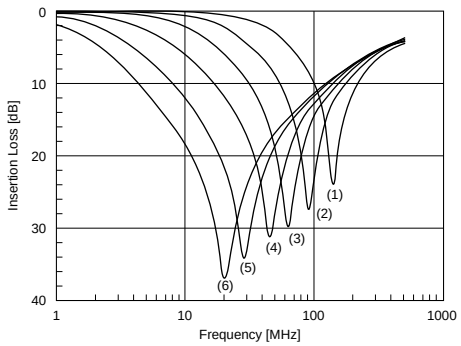


Type KH

Signal power : 1mW
AC240V(r.m.s.) / 60Hz is applied on the capacitor.

(1) DE2B3KH101KA3B
(2) DE2B3KH221KA3B
(3) DE2B3KH471KA3B
(4) DE2E3KH102MA3B
(5) DE2E3KH222MA3B
(6) DE2E3KH472MA3B
(7) DE2F3KH103MA3B

Type KX



Type KX

Signal power : 1mW
AC240V(r.m.s.) / 60Hz is applied on the capacitor.

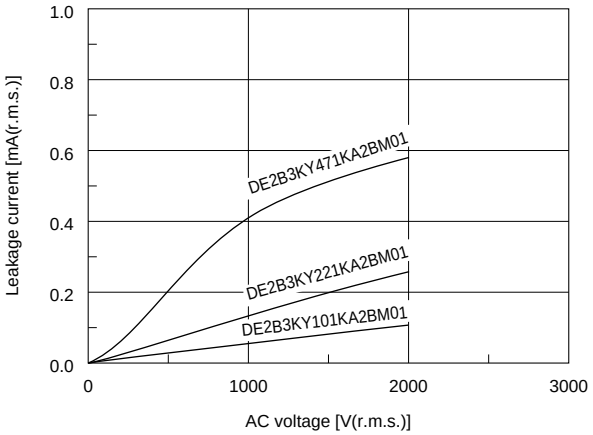
(1) DE1B3KX101KA5B
(2) DE1B3KX221KA5B
(3) DE1B3KX471KA5B
(4) DE1E3KX102MA5BA01
(5) DE1E3KX222MA5BA01
(6) DE1E3KX472MA5BA01

Characteristics Data (Typical Example)

■ Leakage Current Characteristics

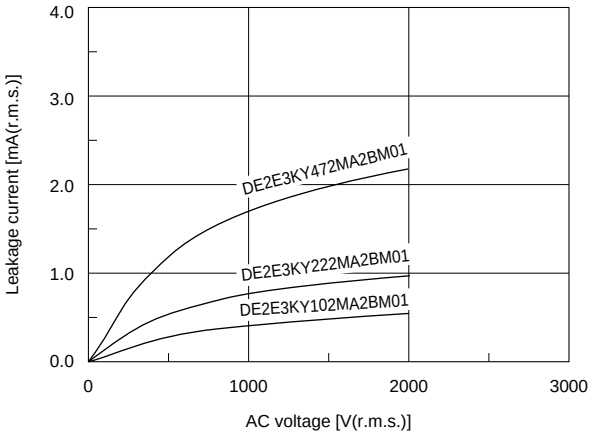
Type KY (B char.)

AC voltage : 60Hz
Temperature : 25°C



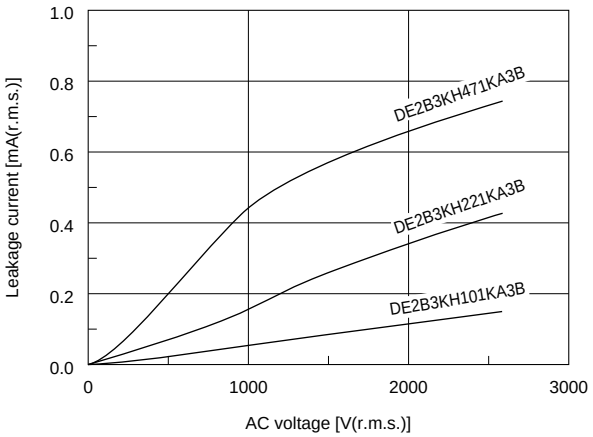
Type KY (E char.)

AC voltage : 60Hz
Temperature : 25°C



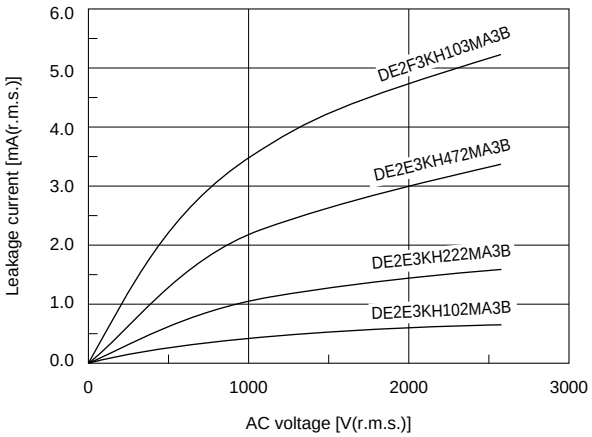
Type KH (B char.)

AC voltage : 60Hz
Temperature : 25°C



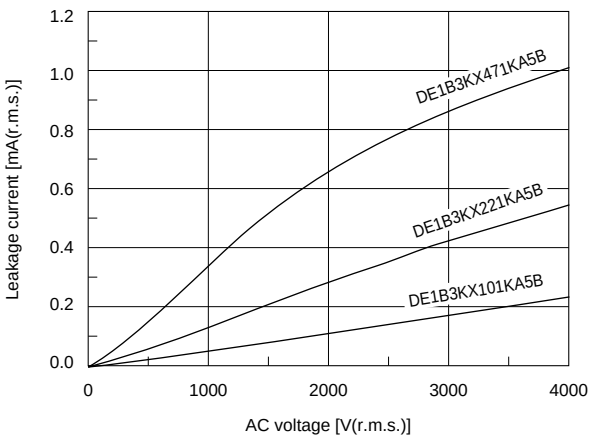
Type KH (E, F char.)

AC voltage : 60Hz
Temperature : 25°C



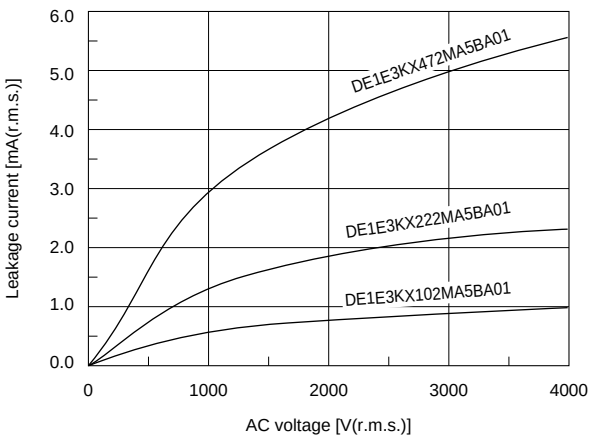
Type KX (B char.)

AC voltage : 60Hz
Temperature : 25°C



Type KX (E char.)

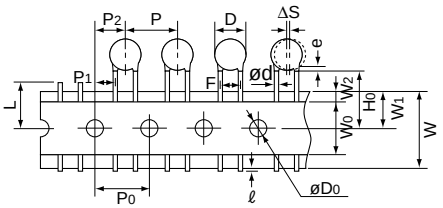
AC voltage : 60Hz
Temperature : 25°C



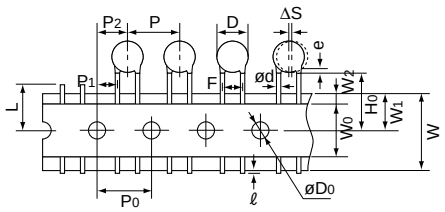
Packaging

■ Taping Specifications

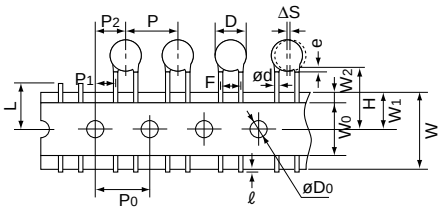
● 12.7mm pitch / lead spacing 5mm taping
Vertical crimp type
(Lead Code : N2)



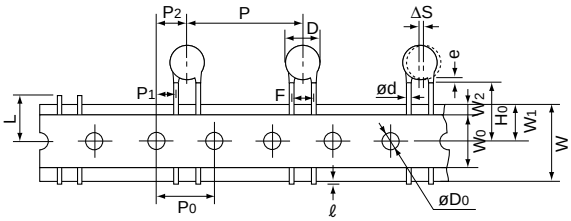
● 15mm pitch / lead spacing 7.5mm taping
Vertical crimp type
(Lead Code : N3)



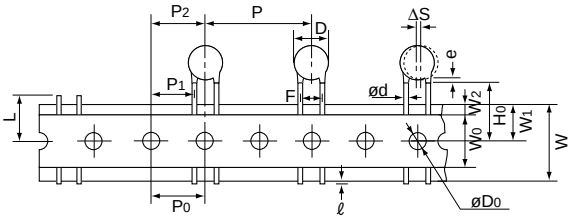
● 15mm pitch / lead spacing 7.5mm taping
Straight type
(Lead Code : P3)

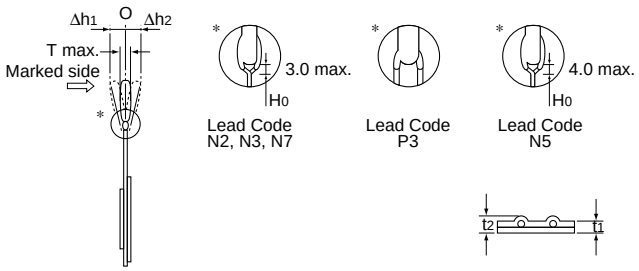


● 30mm pitch / lead spacing 7.5mm taping
Vertical crimp type
(Lead Code : N7)



● 25.4mm pitch / lead spacing 10.0mm taping
Vertical crimp type
(Lead Code : N5)





Item	Code	N2	N3	P3	N7	N5
Pitch of component	P	12.7	15.0	15.0	30.0	25.4
Pitch of sprocket hole	P_0	12.7±0.3	15.0±0.3	15.0±0.3	15.0±0.3	12.7±0.3
Lead spacing	F	$5.0^{+0.8}_{-0.2}$	7.5±1.0	7.5±1.0	7.5±1.0	10.0±1.0
Length from hole center to component center	P_2	6.35±1.3	7.5±1.5	7.5±1.5	7.5±1.5	—
Length from hole center to lead	P_1	3.85±0.7	3.75±1.0	3.75±1.0	3.75±1.0	7.7±1.5
Body diameter	D	See the individual product specifications				
Deviation along tape, left or right	ΔS	0±1.0	0±2.0			
Carrier tape width	W	18.0±0.5				
Position of sprocket hold	W_1	9.0±0.5				
Lead distance between reference and bottom planes	H_0	$18.0^{+2.0}_{-0}$		—	$18.0^{+2.0}_{-0}$	
	H	—		$20.0^{+1.5}_{-1.0}$	—	
Protrusion length	ℓ	+0.5 to -1.0				
Diameter of sprocket hole	$øD_0$	4.0±0.1				
Lead diameter	ød	0.6±0.05				$0.6^{+0.1}_{-0.05}$
Total tape thickness	t_1	0.6±0.3				
Total thickness, tape and lead wire	t_2	1.5 max.				
Body thickness	T	See the individual product specifications				
Portion to cut in case of defect	L	$11.0^{+0}_{-1.0}$				
Hold down tape width	W_0	11.5 min.				
Hold down tape position	W_2	1.5±1.5				
Coating extension on lead	e	Up to the end of crimp		3.0 max.	Up to the end of crimp	
Deviation across tape, front	$Δh_1$	1.0 max.	2.0 max.			
Deviation across tape, rear	$Δh_2$					

(in mm)

Continued on the following page.

Packaging

Continued from the preceding page.

■ Packaging Styles

Bulk	Taping
Polyethylene Bag 	Ammo Pack 

■ Minimum Quantity (Order in Sets Only)

[Bulk] 1,000 pcs.

[Taping] (pcs.)

Lead Code	Type KY	Type KH	Type KX	DEJ Series
N2	1,000	–	–	1,500
N3, P3	900	900	–	1,000
N7	–	400	–	–
N5	–	–	500	–

■ Minimum Order Quantity

[Bulk] 3,000 pcs.

[Taping] (pcs.)

Lead Code	Type KY	Type KH	Type KX	DEJ Series
N2	3,000	–	–	3,000
N3, P3	2,700	2,700	–	3,000
N7	–	2,000	–	–
N5	–	–	2,000	–

“Minimum Quantity” means the numbers of units of each delivery or order.
The quantity should be an integral multiple of the “minimum quantity”.
(In case of bulk packaging, minimum quantities differ from packing quantities in a bulk bag.)

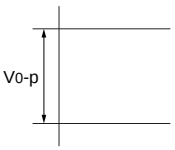
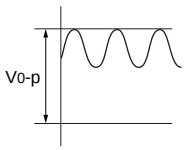
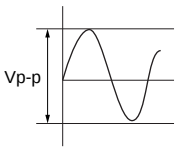
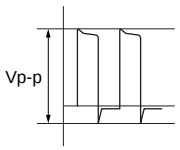
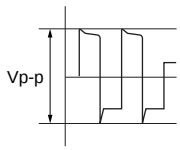
⚠Caution

■ ⚠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 which 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 at an atmosphere 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.

⚠Caution

Continued from the preceding page.

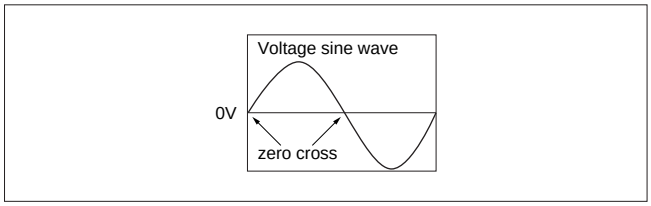
(2) Voltage Applied Method

When the withstanding voltage is applied, 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 arise, and therefore, a defect may be caused.

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



4. Fail-Safe

When capacitor would be 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 would 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.

⚠Caution

■ ⚠Caution (Storage and Operating Condition)

Operating and storage environment

The insulating 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. Store the capacitors where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade and 15 to 85%.
Use capacitors within 6 months.

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
   When soldering this product to a PCB/PWB, do not exceed the solder heat resistance Specifications 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 the following conditions.
   Temperature of iron-tip: 400 degrees C. max.
   Soldering iron wattage: 50W max.
   Soldering time: 3.5 sec. max.
3. Bonding and resin molding
   Before bonding or molding this product, verify that these processes do not affect the quality of capacitor by testing the performance of a bonded or molded 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 or molding resin 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.

■ ⚠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 / ISO9000 Certifications

■ 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: 5 min. maximum.

Do not vibrate the PCB/PWB directly.

Excessive ultrasonic cleaning may lead to fatigue destruction of the lead wires.

■ Notice (Rating)

1. Capacitance change of capacitors

(1) In case of SL char.

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

(2) In case of B/E/F char.

Capacitors have an aging characteristic, whereby the capacitor continually decreases its capacitance slightly if the capacitor is left on for a long time. Moreover, capacitance might change greatly depending on the surrounding temperature or an applied voltage. So, it is not likely to be suitable for use in a constant time circuit. Please contact us if you need detailed 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 (B/E/F char.) ceramic capacitors have voltage dependence characteristics and temperature dependence characteristics in capacitance. So, the capacitance value may change depending on the operating condition in the equipment. Therefore, be sure to confirm the apparatus performance of receiving influence in the 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.

■ ISO9000 Certifications

Manufacturing plants which produce the products in this catalog have obtained the ISO9000 quality system certificate.

Plant	Certified Date	Organization	Registration No.	Applied Standard
Izumo Murata Manufacturing Co., Ltd.	Jul. 25. '97	Underwriters Laboratories Inc.	A5587	ISO9001
Murata Electronics (Thailand), Ltd.	Mar. 17. '98	Underwriters Laboratories Inc.	A6279	ISO9001
Taiwan Murata Electronics Co., Ltd.	Nov. 26. '93	BUREAU OF STANDARDS, METROLOGY AND INSPECTION	5E8Y001	ISO9001

⚠Note:

1. Export Control
   〈For customers outside Japan〉
   Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.
   〈For customers in Japan〉
   For products which are controlled items subject to the “Foreign Exchange and Foreign Trade Law” of Japan, the export license specified by the law is required for export.
2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage to a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
   ① Aircraft equipment ② Aerospace equipment
   ③ Undersea equipment ④ Power plant equipment
   ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above
3. Product specifications in this catalog are as of January 2005. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
4. Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.
5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.
6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.
7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

Murata Manufacturing Co., Ltd.

http://www.murata.com/

Head Office
1-10-1, Higashi Kotari, Nagaokakyo-shi, Kyoto 617-8555, Japan
Phone: 81-75-951-9111

International Division
3-29-12, Shibuya, Shibuya-ku, Tokyo 150-0002, Japan
Phone: 81-3-5469-6123 Fax: 81-3-5469-6155 E-mail: intl@murata.co.jp