Safety Recognized/ High Voltage Ceramic Capacitors



muRata

Innovator in Electronics

Murata Manufacturing Co., Ltd.

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Part Numbering

Safety Standard Recognized Ceramic Capacitors

DE 2 E3 KH 102 M N3 A (Part Number)

●Product ID

Product ID	
DE	Safety Standard Recognized / High Voltage Ceramic Capacitors

2 Series Category

Code	Outline	Contents
1	Safety Standard	IEC60384-14 Class X1, Y1
2	Recognized	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 (1) Product ID and 2 Series 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 **4** Safety Standard Recognized Type column.

3Temperature Characteristics

Code	Temperature Characteristics	Cap.Change or Temp. Coeff.	Temperature Range
В3	В	±10%	
E3	E	+20%,-55%	–25 to +85℃
F3	F	+30%,-80%	
1X	SL	+350 to −1000ppm/°C	+20 to +85℃

Pated 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)
кх	X1, Y1; AC250V, (Safety Standard Recognized Type KX)

6 Capacitance

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.

6Capacitance Tolerance

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

Dead Style

	Lead	Dimensions (mm)		
Code	Style	Lead Spacing	Lead Diameter	Pitch of Components
A2		5		
А3	Vertical	7.5	ø0.6±0.05	
A4	Crimp Long	10		_
A5		10	ø0.6+0.1,-0.05	
B2		5		
В3	Vertical Crimp	7.5	ø0.6±0.05	
B4	Short	10		
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		5		12.7
N3	Vertical	7.5	ø0.6±0.05	15
N4	Crimp	10		25.4
N5	Taping	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

8 Packaging

Code	Packaging
Α	Ammo Pack Taping Type
В	Bulk Type

Individual Specification Code

In case part number cannot be identified without "Individual Specification", it is added at the end of part number. Expreseed by three-digit alphanumerics.



High Voltage Ceramic Capacitors

DE B B3 3A 102 K N2 A (Part Number)

Product ID

Product ID	
DE	Safety Standard Recognized / High Voltage Ceramic Capacitors

2 Series Category

Code	Outline	Contents	
Α	High Voltage	Class 1 (Char. SL) DC1-3.15kV Rated	
В		Class 2 DC1-3.15kV Rated	
С		Class 1, 2 DC6.3kV Rated	
н		High Temperature Guaranteed, Low-dissipation Factor (Char. R, C)	
s		High Temperature Guaranteed, Low-dissipation Factor (Char. D)	

First three digits (Product ID and 2 Series Category) express "Series

3Temperature Characteristics

	Tomporatura	Cap. Change	Tomporatura
Code	Temperature Characteristics	'	Temperature Range
В3	В	±10%	
E3	E	+20%,-55%	–25 to +85℃
F3	F	+30%,-80%	
C3	0	±20%	-25 to +85℃
	С	+15%,-30%	+85 to +125℃
R3	R	±15%	-25 to +85℃
	K	+15%,-30%	+85 to +125℃
D3	D	+20%,-30%	-25 to +125℃
1X	SL	+350 to −1000ppm/°C	+20 to +85℃

4Rated Voltage

Code	Rated Voltage
2E	DC250V
2H	DC500V
3A	DC1kV
3D	DC2kV
3F	DC3.15kV
3J	DC6.3kV

6 Capacitance

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.

6Capacitance Tolerance

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

Lead Style

	Lead		Dimensions(mm)	
Code	Style	Lead Spacing	Lead Diameter	Pitch of Components
A2	Vertical	5		
А3	Crimp	7.5	ø0.6±0.05	_
A4	Long	10		
B2/J2	Vertical	5		
B3/J3	Crimp	7.5	ø0.6±0.05	_
B4	Short	10		
C1		5	ø0.5±0.05	
C3	Straight	7.5	ø0.6±0.05	_
C4	Long	10	Ø0.0±0.05	
CD		7.5	ø0.5±0.05	
D1	61 11	5	ø0.5±0.05	
D3	Straight Short	7.5	ø0.6±0.05	_
DD	011011	7.5	ø0.5±0.05	
N2	Vertical	5		12.7
N3	Crimp	7.5	ø0.6±0.05	15
N7	Taping	7.5		30
P2	Straight	5	ø0.6±0.05	12.7
P3	Taping	7.5	00.0±0.00	15

8 Packaging

Code	Packaging				
Α	Ammo Pack Taping Type				
В	Bulk Type				

Individual Specification Code

In case part number cannot be identified without "Individual Specification", it is added at the end of part number. Expressed by three-digit alphanumerics.



Safety Recognized/High Voltage Ceramic Capacitors



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

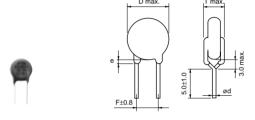
■ Features

- 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 standard).
- 6. Cost-saving automatic insertion available.
- Available product for RoHS Restriction (EU Directive 2002/95/EC).

Applications

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



(in mm)

[Bulk]	Lead Code	Coating Extension e	ød
ertical Crimp Short (B2, B3)	B2, B3	Up to the end of crimp	0.6±0.05

■ Standard Recognition

	Standard No.	Recognized No.	Rated Voltage
UL	UL1414	E37921	
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227935	
SEMKO		507224	
SEV		05.0742	
VDE	EN132400	91890, 91892, 91894, 91896	AC250V(r.m.s.)
FIMKO		189014 A1	
NEMKO		P96100479	
DEMKO		305182-02	
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

Ve

Example	Item
	① Type Designation KY
2 472M 3 1 KY250~	② Nominal Capacitance (Under 100pF : Actual value, 100pF and over : Marked with 3 figures) ③ Capacitance Tolerance
X1 Y2	4 Company Name Code ©8
5 <u>← 65 (M8</u> ≠ 4)	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	В	100 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY151K□□□M02	250	В	150 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY221K□□□M02	250	В	220 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY331K□□□M02	250	В	330 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY471K□□□M02	250	В	470 ±10%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2B3KY681K□□□M02	250	В	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	Е	1500 ±20%	7 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY222M□□□M02	250	Е	2200 ±20%	8 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY332M□□□M02	250	Е	3300 ±20%	9 max.	7.5	5.0 max.	A3B	B3B	N3A
DE2E3KY472M□□□M02	250	Е	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	В	100 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY151K□□□M01	250	В	150 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY221K□□□M01	250	В	220 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY331K□□□M01	250	В	330 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY471K□□□M01	250	В	470 ±10%	7 max.	5.0	5.0 max.	A2B	B2B	N2A
DE2B3KY681K□□□M01	250	В	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	Е	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.



(in mm)

0.6+0.05

Safety Recognized/High Voltage Ceramic Capacitors

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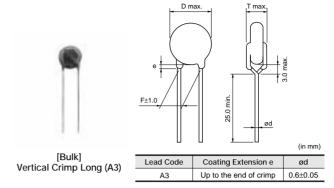
Type KH (Basic Insulation) -IEC60384-14 Class X1, Y2-

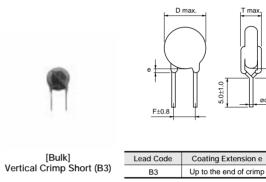
■ Features

- 1. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.).
- 2. Dielectric strength: AC2600V
- 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 standard).
- 5. Cost-saving automatic insertion available.
- Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

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





■ Standard Recognition

	Standard No.	Rated Voltage	
UL	UL1414	E37921	
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227636	
SEMKO		0236131/01-02	
SEV		02.1106	AC250V
VDE	EN132400	40002796	(r.m.s.)
FIMKO	EN 132400	18986	
NEMKO		P02102025	
DEMKO		139471-01/A1	
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

Example	Item	
	1 Type Designation	KH
	② Nominal Capacitance (Marked with 3 figures)	
	3 Capacitance Tolerance	
(2)	4 Company Name Code	€8
1) KH472M 3 X1Y2 BS415	⑤ Manufactured Date Code	
	UL Approval Mark	<i>91</i>
	CSA Approval Mark	@
(\$) (F) (M8-)4	BSI Approval Mark	BS415
MJ502 N 65 $+$ 5	SEMKO Approval Mark	(\$)
250~ ①	SEV Approval Mark	∰ MJ502
250	VDE Approval Mark	<u> </u>
	FIMKO Approval Mark	FI
	NEMKO Approval Mark	N
	DEMKO Approval Mark	D
	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	В	100 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH151K□□□	250	В	150 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH221K□□□	250	В	220 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH331K□□□	250	В	330 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH471K□□□	250	В	470 ±10%	8 max.	7.5	7.0 max.	A3B	B3B	N3A
DE2B3KH681K□□□	250	В	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/High Voltage Ceramic Capacitors



Type KX Small Size (Reinforced Insulation) -IEC60384-14 Class X1, Y1-

■ Features

- We design capacitors in much more compact size than current Type KX, having reduced the diameter by 20% max.
- 2. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.).
- 3. Dielectric strength: AC4000V
- Class X1/Y1 capacitors which are recognized by UL/CSA/BSI/SEMKO/SEV/VDE/FIMKO/NEMKO/DEMKO/ IMQ.
- Possible to use with a component in appliance requiring reinforced insulation and double insulation based on UL1492, IEC60065 and IEC60950.
- Coated with flame-retardant epoxy resin (conforming to UL94V-0 standard).
- 7. Cost-saving automatic insertion available.
- 8. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

- 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.
- *: Small sized Type KX differs from current Type KX in electrical characteristics, such as the voltage dependency, of capacitance temperature dependecy, and Dielectric strength.

Therefore, before replacing current Type KX, please make a performance check by equipment. Please refer below too.

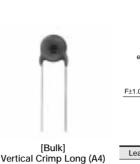
[Notice (Rating)

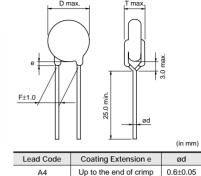
item 2. "Performance check by equipment".]

■ Standard Recognition

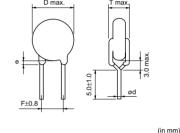
	Standard No.	Recognized No.	Rated Voltage
UL	UL1414	E37921	
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227859	
SEMKO		310283	
SEV		02.1105	AC250V (r.m.s.)
VDE		40002831	(1.111.3.)
FIMKO	EN132400	18987	
NEMKO		P02102026	
DEMKO		139471-01/A1	
IMQ		V4069	

- 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.









[Bulk] Vertical Crimp Short (B4)

 Lead Code
 Coating Extension e
 ød

 B4
 Up to the end of crimp
 0.6±0.05

■ Marking

Example	Item				
	① Type Designation KX				
2 472M 3	② Nominal Capacitance (Marked with 3 figures)				
⊕ + KX250~ \	③ Capacitance Tolerance				
X1 Y1	④ Company Name Code ੴ8				
$5 - 65 \text{ (M8} \neq 4$	⑤ Manufactured Date Code				
	Class Code X1Y1				
	Rated Voltage Mark 250~				



3

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)
DE1B3KX101K□□□L01	250	В	100 ±10%	8 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1B3KX151K□□□L01	250	В	150 ±10%	8 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1B3KX221K□□□L01	250	В	220 ±10%	8 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1B3KX331K□□□L01	250	В	330 ±10%	8 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1B3KX471K□□□L01	250	В	470 ±10%	8 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1B3KX681K□□□L01	250	В	680 ±10%	9 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1E3KX102M□□□L01	250	E	1000 ±20%	7 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1E3KX152M□□□L01	250	Е	1500 ±20%	8 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1E3KX222M□□□L01	250	E	2200 ±20%	9 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1E3KX332M□□□L01	250	E	3300 ±20%	10 max.	10.0	7.0 max.	A4B	B4B	N4A
DE1E3KX472M□□□L01	250	Е	4700 ±20%	12 max.	10.0	7.0 max.	A4B	B4B	N4A

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.

Safety Recognized/High Voltage Ceramic Capacitors



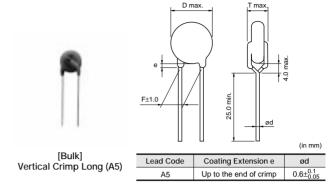
Type KX (Reinforced Insulation) -IEC60384-14 Class X1, Y1-

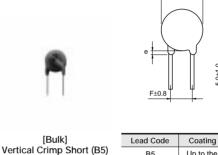
■ Features

- 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/
- 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 standard).
- 6. Cost-saving automatic insertion available.
- 7. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

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





(in mm) Coating Extension e 0.6+0 **B**5 Up to the end of crimp

■ Standard Recognition

	Standard No.	Recognized No.	Rated Voltage
UL	UL1414		
CSA	E384-14	LR44559	
BSI	EN60065 (8.8, 14.2) EN132400	227859	AC250V
SEMKO		310283	
SEV		02.1105	
VDE	40002831		(r.m.s.)
FIMKO	EN132400	18987	
NEMKO		P02102026	
DEMKO		139471-01/A1	
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

Evemple	Item	
Example		
	1) Type Designation	KX
	② Nominal Capacitance (Under 100pF : Actual value, 100pF and over	: Marked with 3 figures)
	③ Capacitance Tolerance	
1 KX222M 3 X1Y1 6E BS415 6E	4 Company Name Code	€8
	⑤ Manufactured Date Code	
	UL Approval Mark	<i>9</i> 7
	CSA Approval Mark	®
	BSI Approval Mark	BS415
MJ502 C T C	SEMKO Approval Mark	<u>S</u>
	SEV Approval Mark	\$ MJ502
250~ (D) 65 / (S)	VDE Approval Mark	<u> </u>
	IMQ Approval Mark	(4)
	FIMKO Approval Mark	FI
	NEMKO Approval Mark	N
	DEMKO Approval Mark	(D)
	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	В	100 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX151K□□□	250	В	150 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX221K□□□	250	В	220 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX331K□□□	250	В	330 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX471K□□□	250	В	470 ±10%	9 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1B3KX681K□□□	250	В	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	Е	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	Е	3900 ±20%	13 max.	10.0	8.0 max.	A5B	B5B	N5A
DE1E3KX472M□□□A01	250	Е	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.

■ Apply to Type KY/KH/KX

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

No.	o. Item		Specifications	Testing Method			
				The capacitor should be visually inspected for evidence of			
1	Appearance ar	nd Dimensions	No marked defect on appearance form and dimensions are within specified range.	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				
4	Dissipation Factor (D.F.) Q		Char. Specifications B, E D.F.≤2.5% F D.F.≤5.0% SL Q≥400+20C*¹(C<30pF)	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.			
5	Insulation Resi	stance (I.R.)	10000MΩ min.	The insulation resistance should be measured with DC500 \pm 50V within 60 \pm 5 sec. of charging. The voltage should be applied to the capacitor through a resistor of 1M Ω .			
		Between Lead Wires	No failure	The capacitor should not be damaged when test voltages of Table 1 are applied between the lead wires for 60 sec. <table 1=""> Type Test Voltage In case of lead spacing F=5mm AC2000V(r.m.s.) In case of lead spacing F=7.5mm AC2600V(r.m.s.) KH AC2600V(r.m.s.) KX AC4000V(r.m.s.)</table>			
6	Dielectric Strength	Body Insulation	No failure	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. 			
				KY AC2600V(r.m.s.) KH AC2600V(r.m.s.) KX AC4000V(r.m.s.)			
7	7 Temperature Characteristics		Char. Capacitance Change B Within ±10% E Within ±26% F Within ±36% (Temp. range: -25 to +85°C) Char. Temperature Coefficient SL +350 to -1000ppm/°C (Temp. range: +20 to +85°C)	The capacitance measurement should be made at each step specified in Table 3.			
8	Solderability of	f 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 for 2±0.5 sec. 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 H63 Eutectic Solder 235±5°C			

^{*1 &}quot;C" expresses nominal capacitance value (pF).

Continued on the following page.





7	Continued from the preceding page.						
No.	. Item		Specifications	Testing Method			
		Appearance Capacitance Change	No marked defect Within ±10%	As shown in figure, the lead wires should be immersed in solder of 350±10°C or 260±5°C up to 1.5 Thermal Screen 1.5			
	Soldering	I.R.	1000MΩ min.	to 2.0mm from the root of terminal			
9	Effect (Non-Preheat)	Dielectric Strength	Per Item 6	260±5°C). Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at °room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at °room condition.			
		Appearance	No marked defect	First the capacitor should be			
		Capacitance Change	Within ±10%	stored at 120+0/-5°C for 60+0/-5 sec. Then, as in figure, the lead wires The property of the figure in the lead wires to 2.0mm			
	Caldavian	I.R.	1000MΩ min.	should be immersed solder of Molten			
10	Soldering Effect (On-Preheat)	Effect	Dielectric Strength	Per Item 6	260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at "room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at "room condition.		
		Appearance	No marked defect				
		Capacitance	Within the specified tolerance	The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in			
11	Vibration Resistance	D.F. Q	Char. Specifications B, E D.F.≤2.5% F D.F.≤5.0% SL Q≥400+20C*¹(C<30pF)	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.			
		Appearance	No marked defect				
		Capacitance Change	Char. Capacitance Change B Within ±10% E, F Within ±15% SL Within ± 5%				
12	Humidity (Under Steady State)	D.F. Q	Char. Specifications B, E D.F.≤5.0% F D.F.≤7.5% SL Q≥275+5/2C*¹(C<30pF)	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.			
		I.R.	3000MΩ min.				
		Dielectric Strength	Per Item 6				
		Appearance	No marked defect				
		Capacitance Change	Char. Capacitance Change B Within ±10% E, F Within ±15% SL Within ± 5%				
13	Humidity Loading	D.F. Q	Char. Specifications B, E D.F.≦5.0% F D.F.≦7.5% SL Q≥275+5/2C*¹(C<30pF)	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.			
		I.R.	3000M $Ω$ min.				
		Dielectric Strength	Per Item 6				

^{*1 &}quot;C" expresses nominal capacitance value (pF).

Continued on the following page.





 $^{^{\}star 2}$ "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued from the preceding page Specifications No Item **Testing Method** Appearance No marked defect Impulse Voltage Each individual capacitor should be subjected to a 5kV (Type Capacitance Within ±20% KX: 8kV) impulses for three times. After the capacitors are Change applied to life test. I.R. $3000M\Omega$ min. 100 (%) Front time $(T_1) = 1.2 \mu s = 1.67T$ 90 Time to half-value (T2) =50µs 50 30 T. Life 14 Apply a voltage of Table 4 for 1000 hrs. at 125+2/-0°C, and Dielectric relative humidity of 50% max. Per Item 6 Strength <Table 4> Applied Voltage AC425V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *2 room condition. The capacitor should be subjected to applied flame for 15 sec. and then removed for 15 sec. until 5 cycles are completed. The capacitor flame discontinues as follows. Capacitor Flame Flame Test Cycle Time (sec.) 15 30 max 1 to 4 5 60 max Gas Burner: Inside Dia. 9.5 (in mm) As shown in the figure at right, fix the body of the capacitor and apply a tensile weight Tensile gradually to each lead wire in the radial direction of the capacitor up to 10N and keep Robustness Lead wire should not be cut off. Capacitor should it for 10±1 sec. 16 of not be broken. Terminations Each lead wire should be subjected to 5N weight and then a 90° bend, at the point of egress, in one direction, return to Bending original position, and then apply a 90° bend in the opposite direction at the rate of one bend in 2 to 3 sec. 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 UAC should be maintained for 2 min. after the last discharge. Oscilloscope Active Flammability The cheese-cloth should not be on fire. : 0.033µF±5% 10kV C1,2 : 1µF±10% Сз L1 to 4: 1.5mH±20% 16A Rod core choke Ct 3µF±5% 10kV : 100Ω±2% Сх : Capacitor under test UAC : UR±5% : Rated Voltage : Fuse, Rated 10A UR Ut : Voltage applied to Ct Ux

^{*2 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



time

Continued from the preceding page

	Continued from the preceding page.									
No.	It€	em		Specifications			Testing I	Method		
18				me should not exceed 30 sec. per should not ignite.	po on	The capacitor under test should be position which best promotes bur only be exposed once to the flam 30 sec. Length of flame: Gas burner: Gas : I			be held in the flame in the rning. Each specimen should ne. Time of exposure to flame:	
		Appearance	No marked de		The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.					
		Capacitance Change	Char. B E, F SL	Capacitance Change Within ±10% Within ±20% Within ± 5%		Step 1	<temperature -25+0="" -3<="" td=""><td>ure Cycle> e (°C)</td><td>Time (min)</td></temperature>	ure Cycle> e (°C)	Time (min)	
						2	Room ten 125+3/-0		3 30	
			Char.	Specifications		<u>3</u>	Room tem		3	
19	Temperature and Immersion	D.F. Q	B, E D.F.≤5.0% F D.F.≤7.5% SL Q≥275+5/2C*'(C<30pF) Q≥350 (C≥30pF)			·	<immersio< td=""><td></td><td>Cycle time: 5 cycle</td></immersio<>		Cycle time: 5 cycle	
	Cycle	I.R.	3000M $Ω$ min.			Step	Temperature (°C)	(min)	Water	
						1	65+5/-0	15	Clean water	
						2	0±3	15	Salt water	
		Dielectric Strength Per Ite		Per Item 6		²room co ost-treatm	should be stored at 8 ndition for 24±2 hrs.		Cycle time: 2 cycle 1 hr., then placed at at *2room condition.	

^{*1 &}quot;C" expresses nominal capacitance value (pF).

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.

 $^{^{\}star 2}$ "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

• This PDF 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 because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

Safety Recognized/High Voltage Ceramic Capacitors



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

■ Features

- Coated with flame-retardant epoxy resin (conforming to UL94V-0 standard).
- 2. Cost-saving automatic insertion available.
- 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).
- 4. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

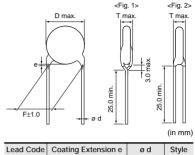
Ideal for use on AC line filter and primary-secondary coupling for switching power supplies and AC adapters.

■ Marking

	Temp. Char.	E, F
Nominal Body Diameter	ø7-8mm	102Z 250~ 65
Nomina Body Di	Ø9-11mm	332Z 250~ @165
Non	ninal Capacitance	Marked with 3 figures
Capa	acitance Tolerance	Marked with code
	Rated Voltage	Marked with code
	Manufacturer's dentification	Marked with № (omitted for nominal body diameter ø8mm and under)
Manu	factured Date Code	Abbreviation



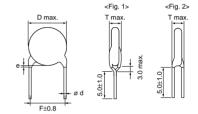
[Bulk] Vertical Crimp Long (A3) Straight Long (C3)



Lead Code	Coating Extension e	ø d	Style
А3	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)



Lead Code	Coating Extension e	ø d	Style
В3	Up to the end of crimp	0.6±0.05	Fig. 1
D3	3.0 max.	0.6±0.05	Fig. 2

(in mm)

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
DEJE3E222Z□□□	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.

Note • This PDF catalog is downloaded from the website of Murata Manufacturing co., ltd. Therefore, it's specifications 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. • This PDF 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.

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.		em	Specifications	Testing Method		
1	Appearance ar	nd 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 Fac (D.F.)	ctor	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 Resi	stance (I.R.)	10000MΩ min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.		
		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.		
6	Dielectric Strength Body		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.		
7	7 Temperature Characteristics		Char. Capacitance Change E Within *38% F Within *38%	The capacitance measurement should be made at each step specified in Table 1. Capacitance Capacitance		
		Appearance	No marked defect	As in Figure 1, discharge is made 50 times at 5 sec. intervals		
		I.R.	1000MΩ min.	from the capacitor (Cd) charged at DC voltage of specified.		
8	Discharge Test	Dielectric Strength Per Item 6		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		
9	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 for 2±0.5 sec. 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 H63 Eutectic Solder 235±5°C		

Continued on the following page.





DEJ Series Specifications and Test Methods

Continued from the preceding page.

No.	Ite	em	Specifications	Testing Method		
		Appearance	No marked defect	As shown in figure, the lead wires Thermal Capacitor		
10	Soldering Effect	I.R.	1000MΩ min.	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		
	(Non-Preheat)	Dielectric Strength	Per Item 6	85±2°C for 1 hr., then placed at "room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at "room condition.		
		Appearance	No marked defect	First the capacitor should be Thermal Capacitor		
		I.R.	1000M Ω min.	stored at 120+0/-5°C for 60+0/-5 sec.		
11	Soldering Effect (On-Preheat)	Dielectric Strength	Per Item 6	Then, as in figure, the lead wires should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at "room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at "room condition.		
		Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead		
		Capacitance	Within the specified tolerance	wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in		
12	Vibration Resistance		Char. Specifications	total amplitude, with about a 1 minute rate of vibration change		
			E D.F.≦2.5%	from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular		
			F D.F.≦5.0%	directions.		
13	Solvent Resistance	Appearance	No marked defect	The capacitor should be immersed into a isopropyl alcohol for 30±5 sec.		
		Appearance	No marked defect			
			Char. Capacitance Change			
		Capacitance Change	E Within ±20%	Set the capacitor for 500±12 hrs. at 40±2°C in 90 to 95%		
	Llumidity	Change	F Within ±30%	relative humidity.		
	Humidity (Under			Pre-treatment:		
14	Steady	D.F.	Char. Specifications E D.F.≦5.0%	Capacitor should be stored at 85±2°C for 1 hr., then placed at *Troom condition for 24±2 hrs. before initial measurements.		
	State)		F D.F.≦7.5%	Post-treatment:		
		I.R.	1000MΩ min.	Capacitor should be stored for 1 to 2 hrs. at *1room condition.		
		Dielectric				
		Strength	Per Item 6			
		Appearance	No marked defect			
			Char. Capacitance Change			
		Capacitance	E Within ±20%	The capacitor should be subjected to 40±2°C, relative humidity		
		Change	F Within ±30%	of 90 to 98% for 8 hrs., and then removed in room temperature		
1-	Humidity			for 16 hrs. until 5 cycles. Pre-treatment:		
15	Insulation	DF	Char. Specifications F D F ≤5.0%	Capacitor should be stored at 85±2°C for 1 hr., then placed at		
		D.F. <u>E D.F.≤5.0%</u> F D.F.≤7.5%		*¹room condition for 24±2 hrs. before initial measurements. Post-treatment:		
		LD	4000MO min	Capacitor should be stored for 1 to 2 hrs. at *1room condition.		
		I.R.	1000MΩ min.			
		Dielectric Strength	Per Item 6			

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

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DEJ Series Specifications and Test Methods

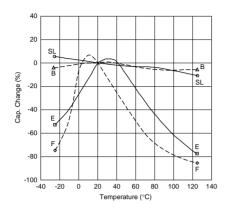
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	Continued from the preceding page.	

	Appearance		Specifications		Testing		
		No marked de	fect				
	Capacitance Char. E F		E Within ±20%		Apply the rated voltage for 500±12 hrs. at 40±2°C in 90 to relative humidity.		
Humidity Loading	D.F.	Char. E F	Specifications D.F.≤5.0% D.F.≤7.5%	Pre-treatm Capacito *1room co Post-treatr	ent: r should be stored at ondition for 24±2 hrs. nent:	before initia	al measurements.
	I.R.	1000MΩ min.		Oupdono	1 Should be stored for	1 10 2 1113.	at 100111 condition.
	Dielectric Strength	Per Item 6					
	Appearance	No marked de	fect			500 hrs. at	85±2°C, relative
	Capacitance Change	Char. E F	Capacitance Change Within ±20% Within ±30%	AC500	<tab Applied V(r.m.s.), except that</tab 	Voltage once each	
Life	I.R.	1000MΩ min.		is incre	ased to AC1000V(r.m	n.s.) for 0.1	sec.
	Dielectric Strength	Per Item 6		Capacito *¹room co Post-treatr	r should be stored at podition for 24±2 hrs. nent:	before initia	al measurements.
	,	The capacitor	flame discontinued as follows.	to applied	flame for 15 sec. and	then	Capacitor
F. F.		Cycle	Time (sec.)		•	es	Fidille
Flame Test							13
				G	Gas Burner: Inside Dia. 9.5	Ö	(in mm
Robustness of	Tensile	Lead wire should not be cut off. Capacitor should		capacitor, each lead	apply a tensile weight wire in the radial direct	gradually to	\ /
Terminations	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.			
	Appearance	No marked de	fect		•		perature cycles,
		Char	Capacitance Change	then conse	•	•	
	Capacitance Change	E	Within ±20%		· ·		
	3	F	Within ±30%	Step 1			Time (min)
		Char	Specifications	2	Room ter	np.	3
	D.F.	E	D.F.≦5.0%	3 4			30
		F	D.F.≦7.5%		1.00 101	1	Cycle time: 5 cycle
Temperature and	I.R.	1000M Ω min.			<immersion< td=""><td>on Cycle></td><td></td></immersion<>	on Cycle>	
Immersion Cycle				Step	Temperature (°C)	Time (min)	Immersion Water
				1	65+5/-0	15	Clean water
	Dielectric			2	0±3	15	Salt water
	Strength	Per Item 6		<u> </u>	I	I.	Cycle time: 2 cycle
				Capacito *¹room co Post-treatr	r should be stored at andition for 24±2 hrs. ment:		1 hr., then placed at
	Loading Life Flame Test Robustness of Terminations Temperature and Immersion Cycle	Loading D.F. I.R. Dielectric Strength Appearance Capacitance Change I.R. Dielectric Strength Flame Test Tensile Robustness of Terminations Bending Appearance Capacitance Change D.F. Temperature and Immersion Cycle Dielectric Strength Dielectric Strength Dielectric Strength	Loading D.F. E.F. I.R. 1000MΩ min. Dielectric Strength Appearance Char. E.F. F. I.R. Appearance No marked de Capacitance Change F. I.R. Dielectric Strength Per Item 6 The capacitor Cycle 1 to 2 3 Tensile Appearance No marked de Capacitance Change F. Cycle 1 to 2 3 Appearance No marked de Capacitance Change F. Char. E.F. F. Char. E. F. Char. E. Char. E. F. Char. E. Char. E. Char. E. F. Char. E.	D.F. Specifications Canal Canal Canal Canal Canal	Humidity Loading D.F. Each Char. Specifications E D.F. ±5.50% F D.F. ±5.50% Post-treat Capacito Capacito	Humidity Loading D.F. Char Specifications E D.F. 35.0% F D.F. 35.0% F D.F. 35.5% Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment: Capacitor should be stored at "room condition for 24.2 hrs. Post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radial discondition at the rate of one bend for the post-teatment in the radi	Fundating Loading D.F. Char. Specifications E. D.F.\$5.0% D.F.\$7.5%

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

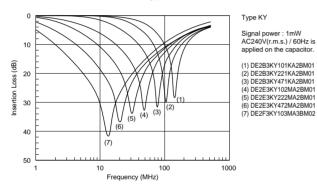
Safety Recognized Ceramic Capacitors Characteristics Data (Typical Example)

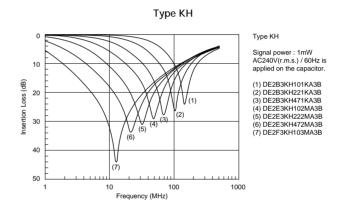
■ Capacitance-Temperature Characteristics

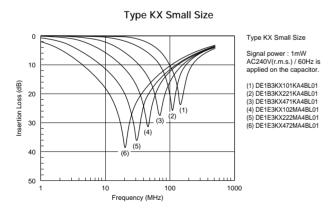


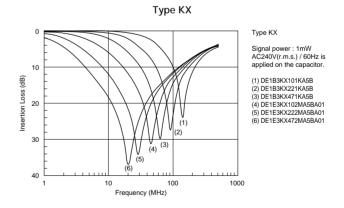
■ Insertion Loss-Frequency Characteristics

Type KY





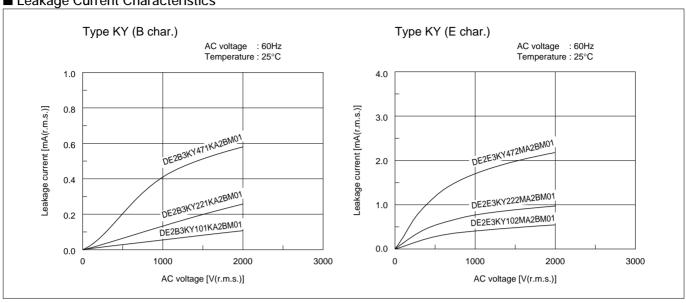


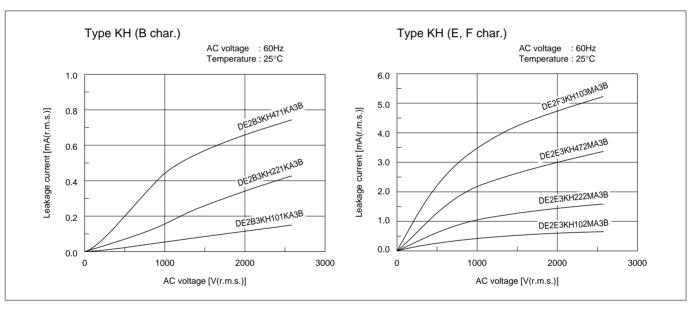


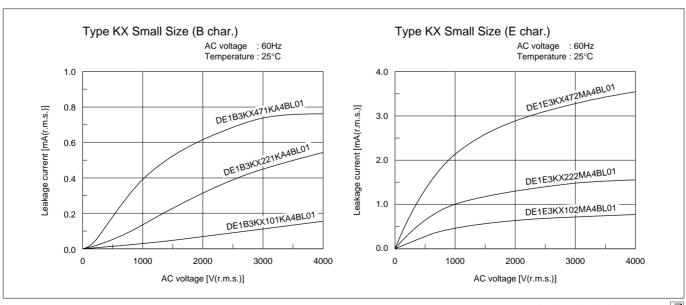
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Safety Recognized Ceramic Capacitors Characteristics Data (Typical Example)

■ Leakage Current Characteristics





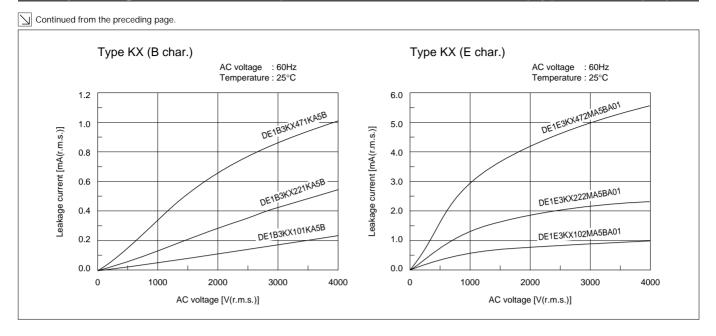


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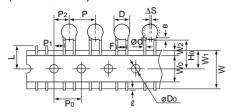
Safety Recognized Ceramic Capacitors Characteristics Data (Typical Example)



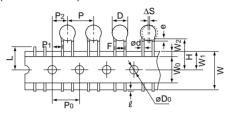
Safety Recognized Ceramic Capacitors Packaging

■ Taping Specifications

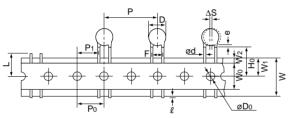
• 12.7mm pitch / lead spacing 5mm taping Vertical crimp type (Lead Code: N2)



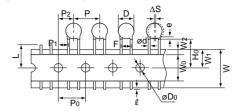
• 15mm pitch / lead spacing 7.5mm taping Straight type (Lead Code : P3)



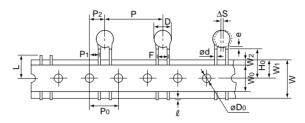
• 25.4mm pitch / lead spacing 10.0mm taping Vertical crimp type (Lead Code: N4, N5)

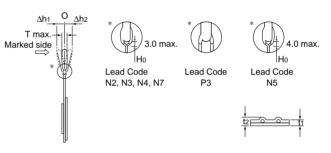


• 15mm pitch / lead spacing 7.5mm taping Vertical crimp type (Lead Code: N3)



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





Item	Code	N2	N3	P3	N7	N4	N5
Pitch of component		12.7	12.7 15.0 15.0 30.0		25	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	P1	3.85±0.7	3.75±1.0	3.75±1.0	3.75±1.0	7.7±	1.5
Body diameter	D		See th	e individual p	roduct specific	cations	
Deviation along tape, left or right	ΔS	0±1.0			0±2.0		
Carrier tape width	W			18.0	±0.5		
Position of sprocket hole	W1			9.0	±0.5		
Lead distance between reference	Ho	18.0	+2.0 -0	_	18.0 ^{+2.0}		
and bottom planes	Н	_	_	20.0+1.5	_		
Protrusion length	ℓ			+0.5 t	o -1.0		
Diameter of sprocket hole	øD0			4.0	±0.1		
Lead diameter	ød			0.6±0.05			0.6+0.1
Total tape thickness	t1			0.6	±0.3		
Total thickness, tape and lead wire	t2			1.5 ı	max.		
Body thickness	Т		See th	e individual p	roduct specific	cations	
Portion to cut in case of defect	L			11.0	+0 –1.0		
Hold down tape width	Wo	11.5 min.					
Hold down tape position	W2	1.5±1.5					
Coating extension on lead	е	Up to the end of crimp 3.0 max. Up to the end of crimp			rimp		
Deviation across tape, front	Δh1	1.0 max.			2.0 max.		
Deviation across tape, rear	Δh2	1.0 IIIaX.			2.0 mdX.		

(in mm)

Safety Recognized Ceramic Capacitors Packaging

Continued from the preceding page.

Packaging Styles



■ Minimum Quantity (Order in Sets Only) [Bulk] 1,000 pcs.

[Taping] (pcs.) DEJ Series Lead Code Type KY Туре КН Type KX N2 1,000 1,500 N3, P3 900 900 1,000 N7 400 N4, 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	_	_
N4, 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.)



Safety Recognized Ceramic Capacitors **(1)** Caution

■ ①Caution (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	Vo-p	V0-p	Vp-p	Vp-p	Vp-p

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 highfrequency 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.





sales representatives or product engineers before ordering.

• This PDF 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.

Safety Recognized Ceramic Capacitors (1) 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.

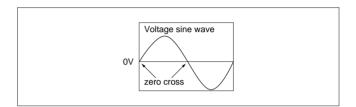
If the test voltage without the raise from near zero voltage would be applied directly to capacitor, test voltage should be applied with the *zero cross. At the end of the test time, the test voltage should be reduced to near zero, and then capacitor's lead or terminal should be taken off the output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



sales representatives or product engineers before ordering. • This PDF 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.

Safety Recognized Ceramic Capacitors **(1)** Caution

■ ① 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 after delivered.

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.

■ ①Caution (Soldering and Mounting)

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.

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.

■ **(**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.



Safety Recognized Ceramic Capacitors Notice

■ 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.



Safety Recognized/High Voltage Ceramic Capacitors



DES Series (125 deg. C Guaranteed/Low-dissipation Factor/DC500V-1kV)

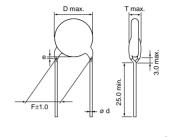
■ Features

- 1. Low dissipation factor series which can be used for power supplies with an increased switching frequency.
- 2. The allowable power in the 100 to 300kHz band is improved to approximately one-and-a-half times that of DEH series while remaining the same size.
- 3. Operating temperature range is guaranteed up to 125 degree C.
- 4. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
- 5. Taping available for automatic insertion.
- 6. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

Ideal for use on high frequency pulse circuits such as snubber circuits for switching power supplies.



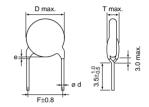


(in mm)

[Bulk]	Le
Vertical Crimp Long (A2,A3)	

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





[Bulk] Vertical Crimp Short (J2,J3)

Lead Code	Coating Extension e	ø d
J2, J3	Up to the end of crimp	0.6±0.05

■ Marking

Rated Voltage Nominal Body Diameter	DC500V	DC1kV			
ø6mm	SD 101 66	S D 101 1KV 66			
ø7-9mm	S D 102K 66	S D 471K 1KV 66			
ø10-17mm	S D 222K (M 66	S D 152K 1KV 17466			
Series Code	Abbreviation (S)				
Temperature Characteristic	Marked with code				
Nominal Capacitance	Marked with 3 figures				
Capacitance Tolerance	Marked with code (omitted for nominal body diameter ø6mm)				
Rated Voltage	Marked with code (omitted for DC500V)				
Manufacturer's Identification	Marked with (M) (omitted for nominal body diameter ø9mm and under)				
Manufactured Date Code	Abbreviation				

D Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DESD32H101K□□□	500	100 ±10%	6	5.0	4.0	A2B	J2B	N2A
DESD32H151K□□□	500	150 ±10%	6	5.0	4.0	A2B	J2B	N2A
DESD32H221K□□□	500	220 ±10%	6	5.0	4.0	A2B	J2B	N2A
DESD32H331K□□□	500	330 ±10%	6	5.0	4.0	A2B	J2B	N2A
DESD32H471K□□□	500	470 ±10%	6	5.0	4.0	A2B	J2B	N2A
DESD32H681K□□□	500	680 ±10%	6	5.0	4.0	A2B	J2B	N2A
DESD32H102K□□□	500	1000 ±10%	8	5.0	4.0	A2B	J2B	N2A
DESD32H152K□□□	500	1500 ±10%	9	5.0	4.0	A2B	J2B	N2A
DESD32H222K□□□	500	2200 ±10%	10	5.0	4.0	A2B	J2B	N2A
DESD32H332K□□□	500	3300 ±10%	12	7.5	4.0	A3B	J3B	N3A
DESD32H472K□□□	500	4700 ±10%	14	7.5	4.0	A3B	J3B	N7A
DESD33A101K□□□	1000	100 ±10%	6	5.0	4.5	A2B	J2B	N2A
DESD33A151K□□□	1000	150 ±10%	6	5.0	4.5	A2B	J2B	N2A
DESD33A221K□□□	1000	220 ±10%	6	5.0	4.5	A2B	J2B	N2A
DESD33A331K□□□	1000	330 ±10%	6	5.0	4.5	A2B	J2B	N2A
DESD33A471K□□□	1000	470 ±10%	7	5.0	4.5	A2B	J2B	N2A
DESD33A681K□□□	1000	680 ±10%	8	5.0	4.5	A2B	J2B	N2A
DESD33A102K□□□	1000	1000 ±10%	9	5.0	4.5	A2B	J2B	N2A
DESD33A152K□□□	1000	1500 ±10%	10	5.0	4.5	A2B	J2B	N2A
DESD33A222K□□□	1000	2200 ±10%	12	7.5	4.5	A3B	J3B	N3A
DESD33A332K□□□	1000	3300 ±10%	14	7.5	4.5	A3B	J3B	N7A
DESD33A472K□□□	1000	4700 ±10%	17	7.5	4.5	A3B	J3B	N7A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

DES Series Specifications and Test Methods

No.	Item Operating Temperature Range		Specifications	Testing Method		
1			-25 to +125°C	•		
2	Appearance and [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.		
3	Marking		To be easily legible	The capacitor should be visually inspected.		
		Between Lead Wires	No failure	The capacitor should not be damaged when DC voltage of 200% of the rated voltage (DC1kV) or DC voltage of 250% of the rated voltage (DC500V) is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current ≤ 50mA)		
4	Dielectric Strength	Body Insulation	No failure	The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short circuited, is kept about 2mm off the metal balls as shown in the figure at right, and AC1250V(r.m.s.) <50/60Hz> is applied for 1 to 5 sec. between capacitor lead wires and metal balls. (Charge/Discharge current ≤ 50mA)		
5	Insulation Resistance (I.R.)	Between Lead Wires	10000MΩ min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.		
6	Capacitance		Within specified tolerance	The capacitance should be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max.		
7	Dissipation Factor	(D.F.)	0.3% max.	The dissipation factor should be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max.		
	3 Temperature Characteristics		Within +20/-30% (Temp. range : -25 to +125°C)	The capacitance measurement should be made at each step specified in Table.		
8			Pre-treatment : Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before measurements. Step 1 2 3 4 5 Temp. (°C) 20±2 -25±3 20±2 125±2 20±2			
9	Strength of Lead	Pull	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	Capacitor cricate not 50 proton.	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 3 sec.		
		Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead		
10	Vibration Resistance	Capacitance	Within specified tolerance	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		
	Resistance	D.F.	0.3% max.	from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions.		
11	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 a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 sec. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires. Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C H63 Eutectic Solder 235±5°C		
		Appearance	No marked defect	The lead wire should be immersed into the melted solder of		
10	Soldering Effect	Capacitance Change	Within ±10%	350±10°C up to about 1.5 to 2mm from the main body for 3.5±0.5 sec. Pre-treatment:		
12	(Non-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24±2 hrs. at *room condition.		

^{* &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.





DES Series Specifications and Test Methods

Continued from the preceding page

No.		Item	Specifications	Testing Method
		Appearance	No marked defect	First the capacitor should be stored at 120+0/-5°C for Thermal Capacitor
		Capacitance Change	Within ±10%	60+0/-5 sec. Then, as in figure, the lead wires 1.5 1.5 1.5 1.5
13	Soldering Effect (On-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24±2 hrs. at *room condition.
		Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles.
		Capacitance Change	Within ±10%	<pre><temperature cycle=""></temperature></pre>
		D.F.	0.4% max.	1 -25±3 30 2 Room Temp. 3
14	Temperature Cycle	I.R.	1000MΩ min.	3 125±3 30 4 Room Temp. 3
		Dielectric Strength (Between Lead Wires)	Per item 4.	Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24±2 hrs. at *room condition.
		Appearance	No marked defect	Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95%
15	Humidity (Under	Capacitance Change	Within ±10%	relative humidity. Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed
	Steady State)	D.F.	0.4% max.	at *room condition for 24±2 hrs. before initial measurements.
		I.R.	1000M Ω min.	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *room condition.
		Appearance	No marked defect	Apply the rated voltage for 500 +24/-0 hrs. at 40±2°C in 90 to
16	Humidity	Capacitance Change	Within ±10%	95% relative humidity. (Charge/Discharge current≦50mA) Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed
	Loading	D.F.	0.6% max.	at *room condition for 24±2 hrs. before initial measurements.
		I.R.	1000M Ω min.	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *room condition.
		Appearance	No marked defect	Apply a DC voltage of 200% of the rated voltage (DC500V) or
		Capacitance Change	Within ±10%	DC voltage of 150% of the rated voltage (DC1kV) for 1000 +48/-0 hrs. at 125±2°C with a relative humidity of 50% max. (Charge/Discharge current ≤ 50mA)
17	Life	D.F.	0.4% max.	Pre-treatment:
		I.R.	2000 Μ Ω min.	Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs.

^{* &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Safety Recognized/High Voltage Ceramic Capacitors



DEH Series (125 deg. C Guaranteed/Low-dissipation Factor/DC250V-3.15kV)

■ Features

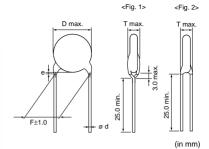
- Reduced heat dissipation permitted due to small dielectric loss of the ceramic material.
- 2. Operating temperature range is guaranteed up to 125 degree C.
- 3. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
- 4. Taping available for automatic insertion.
- 5. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

Ideal for use on high frequency pulse circuits such as a horizontal resonance circuit for CTV and snubber circuits for switching power supplies.





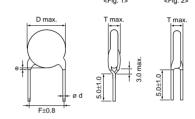


 Lead Code
 Coating Extension e
 ø d
 Style

 A2, A3, A4
 Up to the end of crimp
 0.6±0.05
 Fig. 1

 C3
 3.0 max.
 0.6±0.05
 Fig. 2





(in mm)

[Bulk] Vertical Crimp Short (Fig. 1) Straight Short (Fig. 2)

Lead Code	Coating Extension e	ø d	Style
B2, B3, B4	Up to the end of crimp	0.6±0.05	Fig. 1
D3	3.0 max.	0.6±0.05	Fig. 2

■ Marking

■ Marking							
	Rated Voltage	DC250V	DC500V	DC1-3.15kV			
Nominal Body Diameter	Temp. Char.	R	С	R			
	ø6mm	HR 102 66	HR 471 66				
	ø7-9mm	HR R 332K 250V 66	HR C 152K 66	HR R 102K 1KV 66			
	ø10-21mm	HR R 103K 250V (M66	HR C 472K (M66	HR R 272K 3KV (M66			
High Tempe	erature Guaranteed Code	HR					
Temper	ature Characteristics	Marked with code (omitted for nominal body diameter ø6mm)					
Non	ninal Capacitance	Marked with 3 figures					
Сара	acitance Tolerance	Marked with code (omitted for nominal body diameter ø6mm)					
	DC250V	Marked with code (Marked with horizontal line over nominal capacitance for nominal body diameter ø6mm)					
Rated Voltage	DC500V	Omitted					
	DC1-3.15kV	Marked with code (In case of DC3.15kV, marked with 3KV)					
Manufa	cturer's Identification	Marked with ((omitted for nominal body diameter ø9mm and under)					
Manu	factured Date Code	Abbreviation					

DC250V, R Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEHR32E221K□□□	250	220 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E331K□□□	250	330 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E471K□□□	250	470 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E681K□□□	250	680 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E102K□□□	250	1000 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHR32E152K□□□	250	1500 ±10%	7	5.0	4.0	A2B	B2B	N2A
DEHR32E222K□□□	250	2200 ±10%	8	5.0	4.0	A2B	B2B	N2A
DEHR32E332K□□□	250	3300 ±10%	9	5.0	4.0	A2B	B2B	N2A
DEHR32E472K□□□	250	4700 ±10%	10	5.0	4.0	A2B	B2B	N2A
DEHR32E682K□□□	250	6800 ±10%	12	5.0	4.0	A2B	B2B	N2A
DEHR32E103K□□□	250	10000 ±10%	12	5.0	4.0	A2B	B2B	N2A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

DC500V, C Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEHC32H331K□□□	500	330 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHC32H471K□□□	500	470 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEHC32H681K□□□	500	680 ±10%	7	5.0	4.0	A2B	B2B	N2A
DEHC32H102K□□□	500	1000 ±10%	8	5.0	4.0	A2B	B2B	N2A
DEHC32H152K□□□	500	1500 ±10%	9	5.0	4.0	A2B	B2B	N2A
DEHC32H222K□□□	500	2200 ±10%	10	5.0	4.0	A2B	B2B	N2A
DEHC32H332K□□□	500	3300 ±10%	12	5.0	4.0	A2B	B2B	N2A
DEHC32H472K□□□	500	4700 ±10%	14	10.0	4.0	A4B	B4B	-

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

DC1-3.15kV, R Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEHR33A221K□□□	1000	220 ±10%	7	5.0	4.5	A2B	B2B	N2A
DEHR33A331K□□□	1000	330 ±10%	7	5.0	4.5	A2B	B2B	N2A
DEHR33A471K□□□	1000	470 ±10%	7	5.0	4.5	A2B	B2B	N2A
DEHR33A681K□□□	1000	680 ±10%	8	5.0	4.5	A2B	B2B	N2A
DEHR33A102K□□□	1000	1000 ±10%	9	5.0	4.5	A2B	B2B	N2A
DEHR33A152K□□□	1000	1500 ±10%	11	5.0	4.5	A2B	B2B	N2A
DEHR33A222K□□□	1000	2200 ±10%	13	7.5	4.5	A3B	B3B	N3A
DEHR33A332K□□□	1000	3300 ±10%	15	7.5	4.5	A3B	B3B	N7A
DEHR33A472K□□□	1000	4700 ±10%	17	7.5	4.5	A3B	B3B	N7A
DEHR33D221K□□□	2000	220 ±10%	7	7.5	5.0	C3B	D3B	P3A
DEHR33D271K□□□	2000	270 ±10%	7	7.5	5.0	C3B	D3B	P3A
DEHR33D331K□□□	2000	330 ±10%	8	7.5	5.0	A3B	B3B	N3A
DEHR33D391K□□□	2000	390 ±10%	8	7.5	5.0	A3B	B3B	N3A
DEHR33D471K□□□	2000	470 ±10%	9	7.5	5.0	A3B	B3B	N3A
DEHR33D561K□□□	2000	560 ±10%	9	7.5	5.0	A3B	B3B	N3A
DEHR33D681K□□□	2000	680 ±10%	10	7.5	5.0	A3B	B3B	N3A
DEHR33D821K□□□	2000	820 ±10%	11	7.5	5.0	A3B	B3B	N3A
DEHR33D102K□□□	2000	1000 ±10%	12	7.5	5.0	A3B	B3B	N3A
DEHR33D122K□□□	2000	1200 ±10%	12	7.5	5.0	A3B	B3B	N3A
DEHR33D152K□□□	2000	1500 ±10%	12	7.5	5.0	A3B	B3B	N3A
DEHR33D182K□□□	2000	1800 ±10%	14	7.5	5.0	A3B	B3B	N7A



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Part Number	DC Rated Voltage (Vdc)	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
DEHR33D222K□□□	2000	2200 ±10%	15	7.5	5.0	A3B	B3B	N7A
DEHR33D272K□□□	2000	2700 ±10%	17	7.5	5.0	A3B	B3B	N7A
DEHR33D332K□□□	2000	3300 ±10%	19	10.0	5.0	A4B	B4B	-
DEHR33D392K□□□	2000	3900 ±10%	20	10.0	5.0	A4B	B4B	-
DEHR33D472K□□□	2000	4700 ±10%	21	10.0	5.0	A4B	B4B	-
DEHR33F151K□□□	3150	150 ±10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F181K□□□	3150	180 ±10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F221K□□□	3150	220 ±10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F271K□□□	3150	270 ±10%	7	7.5	6.0	C3B	D3B	P3A
DEHR33F331K□□□	3150	330 ±10%	8	7.5	6.0	A3B	B3B	N3A
DEHR33F391K□□□	3150	390 ±10%	9	7.5	6.0	A3B	B3B	N3A
DEHR33F471K□□□	3150	470 ±10%	10	7.5	6.0	A3B	B3B	N3A
DEHR33F561K□□□	3150	560 ±10%	10	7.5	6.0	A3B	B3B	N3A
DEHR33F681K□□□	3150	680 ±10%	11	7.5	6.0	A3B	B3B	N3A
DEHR33F821K□□□	3150	820 ±10%	12	7.5	6.0	A3B	B3B	N3A
DEHR33F102K□□□	3150	1000 ±10%	13	7.5	6.0	A3B	B3B	N3A
DEHR33F122K□□□	3150	1200 ±10%	14	7.5	6.0	A3B	B3B	N7A
DEHR33F152K□□□	3150	1500 ±10%	15	7.5	6.0	A3B	B3B	N7A
DEHR33F182K□□□	3150	1800 ±10%	16	7.5	6.0	A3B	B3B	N7A
DEHR33F222K□□□	3150	2200 ±10%	17	7.5	6.0	A3B	B3B	N7A
DEHR33F272K□□□	3150	2700 ±10%	19	10.0	6.0	A4B	B4B	-

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

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DEH Series Specifications and Test Methods

No.			Specifications	Testing Method		
1			-25 to +125°C			
2	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.		
3	Marking		To be easily legible	The capacitor should be visually inspected.		
		Between Lead Wires	No failure	The capacitor should not be damaged when DC voltage of 200% of the rated voltage (DC1 to 3.15kV) or DC voltage of 250% of the rated voltage (DC250V, DC500V) is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current ≤ 50mA)		
4	Dielectric Strength	Body Insulation	No failure	The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short circuited, is kept about 2mm off the metal balls as shown in the figure at right, and AC1250V(r.m.s.) <50/60Hz> is applied for 1 to 5 sec. between capacitor lead wires and metal balls. (Charge/Discharge current ≤ 50mA)		
5	Insulation Resistance (I.R.) Between Lead Wires Char. R [DC1 to 3.15kV], Char. C : 10000MΩ min. Char. R [DC250V] : 1000MΩ min.		: 10000MΩ min.	The insulation resistance should be measured with DC500±50V (Char. R [DC 250V]: DC100±15V) within 60±5 sec. of charging.		
6	Capacitance Dissipation Factor (D.F.)		Capacitance Within specified tolerance The capacitance should be measured and AC5V(r.m.s.) max.			
7			Char. R [DC250V] : 0.4% max. Char. R [DC1 to 3.15kV] : 0.2% max. Char. C : 0.3% max.	The dissipation factor should be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max.		
8	Temperature Characteristics		T. C25 to +85°C +85 to +125°C R Within ±15% Within ±15/-30% 8 Temperature Characteristics Pre-treatment : Capacitor should be stored a		C -25 to +85°C +85 to +125°C R Within ±15% Within ±20% Within +15/-30%	· •
			Step 1 Temp. (°C) 20±2	2 3 4 5 -25±3 20±2 125±2 20±2		
9	Strength of Lead	Pull	Lead wire should not be cut off.	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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec.		
		Bending Capacitor should not		Each lead wire should be subjected to 5N (2.5N for lead diameter 0.5mm) 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 3 sec.		
		Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead		
	Vibration	Capacitance	Within specified tolerance	wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in		
10	Resistance	D.F.	Char. R [DC250V] : 0.4% max. Char. R [DC1 to 3.15kV] : 0.2% max. Char. C : 0.3% max.	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.		
11	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 a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 sec. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires. Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C H63 Eutectic Solder 235±5°C		

^{* &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





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DEH Series Specifications and Test Methods

Continued from the preceding page

No.		Item	Specifications	Testing Method
		Appearance Capacitance Change	No marked defect Within ±10%	The lead wire should be immersed into the melted solder of 350±10°C up to about 1.5 to 2mm from the main body for 3.5±0.5 sec.
12	Soldering Effect (Non-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24±2 hrs. at *room condition. Measurement order: Dielectric strength -> Pre-treatment -> Capacitance -> Soldering effect test -> Post-treatment -> Capacitance • Dielectric strength (Char. R [DC250V])
		Appearance	No marked defect	First the capacitor should be
		Capacitance Change	Within ±10%	stored at 120+0/-5°C for 60+0/-5 sec. Then, as in figure, the lead wires Capacitor Capacitor Screen 1.5
13	Soldering Effect (On-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24±2 hrs. at *room condition. Measurement order: Dielectric strength -> Pre-treatment -> Capacitance -> Soldering effect test -> Post-treatment -> Capacitance · Dielectric strength (Char. R [DC250V])
		Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles.
		Capacitance Change	Within ±10%	<temperature cycle=""> Step Temperature (°C) Time (min) 1 -25±3 30</temperature>
		D.F.	0.4% max.	2 Room Temp. 3
		I.R.	1000MΩ min.	3 125±3 30 4 Room Temp. 3
14	Temperature Cycle	Dielectric Strength (Between Lead Wires)	Per item 4.	Cycle time: 5 cycle Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *¹room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24±2 hrs. at *¹room condition. Measurement order: I.R. • Dielectric strength -> Pre-treatment -> Capacitance • D.F> Temperature cycle test -> Post-treatment -> Capacitance • D.F. • I.R. • Dielectric strength (Char. R [DC250V])
		Appearance	No marked defect	Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95%
		Capacitance Change	Within ±10%	relative humidity. Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed
	Humidity (Under	D.F.	0.4% max.	at *1room condition for 24±2 hrs. before initial measurements.
15	Humidity (Under Steady State)	I.R.	1000MΩ min.	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *¹room condition. Measurement order: I.R> Pre-treatment -> Capacitance • D.F> Humidity test -> Post-treatment -> Capacitance • D.F. • I.R. (Char. R [DC250V])

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





DEH Series Specifications and Test Methods

 $\begin{tabular}{|c|c|c|c|}\hline \end{tabular}$ Continued from the preceding page.

No.		Item	Specifications	Testing Method		
IVO.		item	Specifications	Testing Method		
		Appearance	No marked defect	Apply the rated voltage for 500 +24/-0 hrs. at 40±2°C in 90 to		
		Capacitance Change	Within ±10%	95% relative humidity. (Charge/Discharge current≦50mA) Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at		
		D.F.	0.6% max.	*1room condition for 24±2 hrs. before initial measurements.		
16	Humidity Loading	I.R.	1000M Ω min.	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *¹room condition. (Char. R [DC1 to 3.15kV], Char. C) Post-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *¹room condition for 24±2 hrs. (Char. R [DC250V]) Measurement order: I.R> Pre-treatment -> Capacitance • D.F> Humidity loading test -> *² I.R> Post-treatment -> Capacitance • D.F. (Char. R [DC250V])		
		Appearance	No marked defect	Apply a DC voltage of 200% of the rated voltage (DC250V,		
		Capacitance Change	Within ±10%	DC500V) or DC voltage of 150% of the rated voltage (DC1 to 3.15kV) for 1000 +48/-0 hrs. at 125±2°C with a relative humidity of 50% max.		
		D.F.	0.4% max.	(Charge/Discharge current≦50mA)		
17	Life	I.R.	Char. R [DC1 to 3.15kV], Char. C : 2000MΩ min. Char. R [DC250V] : 1000MΩ min.	Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *¹room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at *¹room condition for 24±2 hrs. Measurement order: I.R> Pre-treatment -> Capacitance • D.F> Life test -> *³I.R> Post-treatment -> Capacitance • D.F. (Char. R [DC250V])		

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

 $^{^{\}star 2}$ The measurement of I.R. will be held in 1 to 2 hrs. after Humidity loading test.

 $^{^{\}ast 3}$ The measurement of I.R. will be held in 12 to 24 hrs. after Life test.

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Safety Recognized/High Voltage Ceramic Capacitors



DEA Series (125 deg. C Guaranteed/Class 1/DC1k-3.15kV)

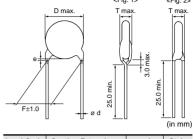
■ Features

- Temperature compensating type ceramics realize low heat dissipation than DEH/DES series.
- 2. Operating temperature range is guaranteed up to 125 degree C.
- 3. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
- 4. Taping available for automatic insertion.
- 5. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

- Ideal for use as the ballast in back lighting inverters for liquid crystal display.
- Ideal for use on high frequency pulse circuits such as a horizontal resonance circuit for CTV and snubber circuits for switching power supplies.





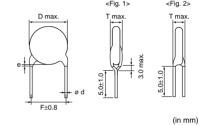
 Lead Code
 Coating Extension e
 ø d
 Style

 [Bulk]
 A2, A3
 Up to the end of crimp
 0.6±0.05
 Fig. 1

 Vertical Crimp Long (Fig. 1)
 C1, CD
 3.0 max.
 0.5±0.05
 Fig. 2

 Straight Long (Fig. 2)
 C3
 3.0 max.
 0.6±0.05
 Fig. 2





[Bulk] Vertical Crimp Short (Fig. 1) Straight Short (Fig. 2)

Lead Code	Coating Extension e	ø d	Style
B2, B3	Up to the end of crimp	0.6±0.05	Fig. 1
D1, DD	3.0 max.	0.5±0.05	Fig. 2
D3	3.0 max.	0.6±0.05	Fig. 2

■ Marking

■ Marking	
Temp. Char.	SL
Nominal Body Diameter	<u>-</u>
ø4.5-5mm	68 1KV
ø6mm	39 3KV 66
ø7-9mm	181J 2KV 66
ø10-16mm	391J 3KV (M 66
Nominal Capacitance	Under 100pF : Actual value, 100pF and over : Marked with 3 figures
Capacitance Tolerance	Marked with code (omitted for nominal body diameter ø6mm and under)
Rated Voltage	Marked with code (In case of DC3.15kV, marked with 3KV)
Manufacturer's Identification	Marked with ((omitted for nominal body diameter ø9mm and under)
Manufactured Date Code	Abbreviation (omitted for nominal body diameter ø5mm and under)

SL Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEA1X3A100J□□□	1000	10 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A120J□□□	1000	12 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A150J□□□	1000	15 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A180J□□□	1000	18 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A220J□□□	1000	22 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A270J□□□	1000	27 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A330J□□□	1000	33 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A390J□□□	1000	39 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A470J□□□	1000	47 ±5%	4.5	5.0	4.0	C1B	D1B	P2A
DEA1X3A560J□□□	1000	56 ±5%	5	5.0	4.0	C1B	D1B	P2A
DEA1X3A680J□□□	1000	68 ±5%	5	5.0	4.0	C1B	D1B	P2A
DEA1X3A820J□□□	1000	82 ±5%	6	5.0	4.0	A2B	B2B	N2A
DEA1X3A101J□□□	1000	100 ±5%	6	5.0	4.0	A2B	B2B	N2A
DEA1X3A121J□□□	1000	120 ±5%	6	5.0	4.0	A2B	B2B	N2A
DEA1X3A151J	1000	150 ±5%	7	5.0	4.0	A2B	B2B	N2A
DEA1X3A181J	1000	180 ±5%	7	5.0	4.0	A2B	B2B	N2A
DEA1X3A221J	1000	220 ±5%	8	5.0	4.0	A2B	B2B	N2A
DEA1X3A271J	1000	270 ±5%	9	5.0	4.0	A2B	B2B	N2A
DEA1X3A331J	1000	330 ±5%	10	5.0	4.0	A2B	B2B	N2A
DEA1X3A391J	1000	390 ±5%	10	5.0	4.0	A2B A2B	B2B B2B	N2A N2A
DEA1X3A471J	1000	470 ±5%	11	5.0	4.0	A2B	B2B	N2A N2A
DEA1X3A4713	1000	560 ±5%	12	7.5	4.0	A3B	B3B	N3A
DEA1X3D100J	2000	10 ±5%	4.5	5.0	5.0	C1B	D1B	P2A
DEA1X3D100J	2000	10 ±5% 12 ±5%				C1B	D1B	P2A P2A
			4.5	5.0	5.0			
DEA1X3D150J	2000	15 ±5%	4.5	5.0	5.0	C1B	D1B	P2A
DEA1X3D180J	2000	18 ±5%	4.5	5.0	5.0	C1B	D1B	P2A
DEA1X3D220J	2000	22 ±5%	4.5	5.0	5.0	C1B	D1B	P2A
DEA1X3D270J□□□	2000	27 ±5%	4.5	5.0	5.0	C1B	D1B	P2A
DEA1X3D330J□□□	2000	33 ±5%	4.5	5.0	5.0	C1B	D1B	P2A
DEA1X3D390J□□□	2000	39 ±5%	5	5.0	5.0	C1B	D1B	P2A
DEA1X3D470J□□□	2000	47 ±5%	6	5.0	5.0	A2B	B2B	N2A
DEA1X3D560J□□□	2000	56 ±5%	6	5.0	5.0	A2B	B2B	N2A
DEA1X3D680J□□□	2000	68 ±5%	6	5.0	5.0	A2B	B2B	N2A
DEA1X3D820J□□□	2000	82 ±5%	7	5.0	5.0	A2B	B2B	N2A
DEA1X3D101J□□□	2000	100 ±5%	7	5.0	5.0	A2B	B2B	N2A
DEA1X3D121J□□□	2000	120 ±5%	8	5.0	5.0	A2B	B2B	N2A
DEA1X3D151J□□□	2000	150 ±5%	8	5.0	5.0	A2B	B2B	N2A
DEA1X3D181J□□□	2000	180 ±5%	9	5.0	5.0	A2B	B2B	N2A
DEA1X3D221J□□□	2000	220 ±5%	10	5.0	5.0	A2B	B2B	N2A
DEA1X3D271J□□□	2000	270 ±5%	11	5.0	5.0	A2B	B2B	N2A
DEA1X3D331J□□□	2000	330 ±5%	12	7.5	5.0	A3B	B3B	N3A
DEA1X3D391J□□□	2000	390 ±5%	13	7.5	5.0	A3B	B3B	N3A
DEA1X3D471J□□□	2000	470 ±5%	14	7.5	5.0	A3B	B3B	N7A
DEA1X3D561J□□□	2000	560 ±5%	15	7.5	5.0	A3B	B3B	N7A
DEA1X3F100J□□□	3150	10 ±5%	5	7.5	6.0	CDB	DDB	P3A
DEA1X3F120J□□□	3150	12 ±5%	5	7.5	6.0	CDB	DDB	P3A
DEA1X3F150J	3150	15 ±5%	5	7.5	6.0	CDB	DDB	P3A
DEA1X3F180J	3150	18 ±5%	5	7.5	6.0	CDB	DDB	P3A
DEA1X3F220J	3150	22 ±5%	5	7.5	6.0	CDB	DDB	P3A
DEA1X3F270J	3150	27 ±5%	6	7.5	6.0	C3B	D3B	P3A
DEA1X3F330J	3150	33 ±5%	6	7.5	6.0	C3B	D3B D3B	P3A
DEA1X3F390J	3150	39 ±5%	6	7.5	6.0	C3B	D3B	P3A
1 = A 1 x 4 = A / D	3150	47 ±5%	7	7.5	6.0	C3B	D3B	P3A

muRata

Continued from the preceding page.

Part Number	DC Rated Voltage (Vdc)	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
DEA1X3F680J□□□	3150	68 ±5%	8	7.5	6.0	A3B	B3B	N3A
DEA1X3F820J□□□	3150	82 ±5%	8	7.5	6.0	A3B	B3B	N3A
DEA1X3F101J□□□	3150	100 ±5%	9	7.5	6.0	A3B	B3B	N3A
DEA1X3F121J□□□	3150	120 ±5%	10	7.5	6.0	A3B	B3B	N3A
DEA1X3F151J□□□	3150	150 ±5%	11	7.5	6.0	A3B	B3B	N3A
DEA1X3F181J□□□	3150	180 ±5%	11	7.5	6.0	A3B	B3B	N3A
DEA1X3F221J□□□	3150	220 ±5%	12	7.5	6.0	A3B	B3B	N3A
DEA1X3F271J□□□	3150	270 ±5%	14	7.5	6.0	A3B	B3B	N7A
DEA1X3F331J□□□	3150	330 ±5%	15	7.5	6.0	A3B	B3B	N7A
DEA1X3F391J□□□	3150	390 ±5%	16	7.5	6.0	A3B	B3B	N7A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

DEA Series Specifications and Test Methods

No.	ĺ	tem	Specifications	Testing Method		
1	Operating Temperature Range		-25 to +125°C			
2	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.		
3	Marking		To be easily legible	The capacitor should be visually inspected.		
		Between Lead Wires	No failure	The capacitor should not be damaged when DC voltage of 200% of the rated voltage is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current≦50mA)		
4	Dielectric Strength	Body Insulation	No failure	The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short circuited, is kept about 2mm off the metal balls as shown in the figure at right, and AC1250V(r.m.s.) <50/60Hz> is applied for 1 to 5 sec. between capacitor lead wires and metal balls. (Charge/Discharge current≦50mA)		
5	Insulation Resistance (I.R.)	Between Lead Wires	10000M Ω min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.		
6	Capacitance		Within specified tolerance	The capacitance should be measured at 20°C with 1±0.2MHz and AC5V(r.m.s.) max.		
7	Q		400+20C*2min. (30pF under) 1000 min. (30pF min.)	The Q should be measured at 20°C with 1±0.2MHz and AC5V(r.m.s.) max.		
	Temperature Characteristics		+350 to -1000ppm/°C (Temp. range: +20 to +85°C)	The capacitance measurement should be made at each step specified in Table.		
8			Step 1 Temp. (°C) 20±2	2 3 4 5 -25±3 20±2 85±2 20±2		
9	Strength of Lead	Pull	Lead wire should not be cut off.	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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec.		
		Bending	- Capacitor should not be broken.	Each lead wire should be subjected to 5N (2.5N for lead diameter 0.5mm) 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 3 sec.		
		Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead		
10	Vibration	Capacitance	Within specified tolerance	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		
	Resistance	Q	400+20C*²min. (30pF under) 1000 min. (30pF min.)	from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions.		
11	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 a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 sec. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires. Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C H63 Eutectic Solder 235±5°C		
		Appearance	No marked defect	The lead wire should be immersed into the melted solder of		
12	Soldering Effect	Capacitance Change	Within ±2.5%	350±10°C (Body of ø5mm and under: 270±5°C) up to about 1.5 to 2mm from the main body for 3.5±0.5 sec.		
12	(Non-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	(Body of ø5mm and under: 5±0.5 sec.) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.		

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa



 $^{^{\}star 2}$ "C" expresses nominal capacitance value (pF)

DEA Series Specifications and Test Methods

Continued from the preceding page

No.		Item	Specifications	Testing Method
13		Appearance	No marked defect	First the capacitor should be
		Capacitance Change	Within ±2.5%	stored at 120+0/-5°C for Thermal Screen 60+0/-5 sec. Then, as in figure, the lead wires 1.5 1.5 1.5 1.5 1.5
	Soldering Effect (On-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles.
		Capacitance Change	Within ±5%	<temperature cycle=""> Step Temperature (°C) Time (min)</temperature>
14	Temperature Cycle	Q	275+5/2C*2min. (30pF under) 350 min. (30pF min.)	1 -25±3 30 2 Room Temp. 3 3 125±3 30
	0,0.0	I.R.	1000MΩ min.	4 Room Temp. 3
		Dielectric Strength (Between Lead Wires)	Per item 4.	Cycle time: 5 cycle Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		Appearance	No marked defect	
15	Humidity (Under	Capacitance Change	Within ±5%	Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95% relative humidity.
15	Steady State)	Q	275+5/2C*2min. (30pF under) 350 min. (30pF min.)	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		I.R.	1000MΩ min.	
		Appearance	No marked defect	
16	Humidity	Capacitance Change	Within ±5%	Apply the rated voltage for 500 +24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. (Charge/Discharge current≦50mA)
10	Loading	Q	275+5/2C*2min. (30pF under) 350 min. (30pF min.)	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition.
		I.R.	1000MΩ min.	
		Appearance	No marked defect	
17	Lifo	Capacitance Change	Within ±3%	Apply a DC voltage of 150% of the rated voltage for 1000 +48/-0 hrs. at 125±2°C with a relative humidity of 50% max. (Charge/Discharge current≦50mA)
17	Life	Q	275+5/2C*2min. (30pF under) 350 min. (30pF min.)	Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *¹room condition.
		I.R.	2000MΩ min.	

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

^{*2 &}quot;C" expresses nominal capacitance value (pF)

Safety Recognized/High Voltage Ceramic Capacitors



DEB Series (Class 2/DC1k-3.15kV)

■ Features

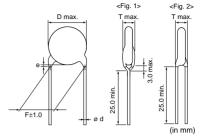
- 1. Small size and high capacitance
- 2. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
- 3. Taping available for automatic insertion.
- 4. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

Ideal for use on decoupling circuits for power supplies.



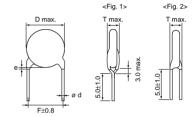




Lead Code Coating Extension e 0.6±0.05 Fig. 1 A2, A3 Up to the end of crimp C1, CD 3.0 max 0.5±0.05 Fig. 2 3.0 max 0.6±0.05 Fig. 2 C3



[Bulk] Vertical Crimp Short (Fig. 1) Straight Short (Fig. 2)



(in mm)

Lead Code	Coating Extension e	ø d	Style
B2, B3	Up to the end of crimp	0.6±0.05	Fig. 1
D1, DD	3.0 max.	0.5±0.05	Fig. 2
D3	3.0 max.	0.6±0.05	Fig. 2

■ Marking

Temp. Char. Nominal Body Diameter	В	E	F		
ø4.5-5mm	221 3KV	102 1KV	102 2KV		
ø6mm	331 3KV 66	102 2KV 66	222 1KV 66		
ø7-9mm	102K 3KV 66	102Z 3KV 66	472Z 2KV 66		
ø10-16mm	B 332K 3KV (M 66	E 472Z 3KV (M 66	103Z 2KV (M 66		
Temperature Characteristics	Marked with code for char. B a	nd E (omitted for nominal body di	ameter ø9mm and under)		
Nominal Capacitance	Marked with 3 figures				
Capacitance Tolerance	Marked with code (omitted for nominal body diameter ø6mm and under)				
Rated Voltage	Marked with code (In case of DC3.15kV, marked with 3KV)				
Manufacturer's Identification	Marked with (M (omitted for nominal body diameter ø9mm and under)				
Manufactured Date Code	Abbreviation (omitted for nomin	nal body diameter ø5mm and und	ler)		

B Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEBB33A101K□□□	1000	100 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A151K□□□	1000	150 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A221K□□□	1000	220 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A331K□□□	1000	330 ±10%	4.5	5.0	4.0	C1B	D1B	P2A
DEBB33A471K□□□	1000	470 ±10%	5	5.0	4.0	C1B	D1B	P2A
DEBB33A681K□□□	1000	680 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEBB33A102K□□□	1000	1000 ±10%	6	5.0	4.0	A2B	B2B	N2A
DEBB33A152K□□□	1000	1500 ±10%	8	5.0	4.0	A2B	B2B	N2A
DEBB33A222K□□□	1000	2200 ±10%	9	5.0	4.0	A2B	B2B	N2A
DEBB33A332K□□□	1000	3300 ±10%	10	5.0	4.0	A2B	B2B	N2A
DEBB33A472K□□□	1000	4700 ±10%	12	7.5	4.0	A3B	B3B	N3A
DEBB33A682K□□□	1000	6800 ±10%	15	7.5	4.0	A3B	B3B	N7A
DEBB33D101K□□□	2000	100 ±10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D151K□□□	2000	150 ±10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D221K□□□	2000	220 ±10%	4.5	5.0	5.0	C1B	D1B	P2A
DEBB33D331K□□□	2000	330 ±10%	5	5.0	5.0	C1B	D1B	P2A
DEBB33D471K□□□	2000	470 ±10%	6	5.0	5.0	A2B	B2B	N2A
DEBB33D681K□□□	2000	680 ±10%	7	5.0	5.0	A2B	B2B	N2A
DEBB33D102K□□□	2000	1000 ±10%	8	5.0	5.0	A2B	B2B	N2A
DEBB33D152K□□□	2000	1500 ±10%	9	5.0	5.0	A2B	B2B	N2A
DEBB33D222K□□□	2000	2200 ±10%	10	5.0	5.0	A2B	B2B	N2A
DEBB33D332K□□□	2000	3300 ±10%	12	7.5	5.0	A3B	B3B	N3A
DEBB33D472K□□□	2000	4700 ±10%	15	7.5	5.0	A3B	B3B	N7A
DEBB33F101K□□□	3150	100 ±10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F151K□□□	3150	150 ±10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F221K□□□	3150	220 ±10%	5	7.5	6.0	CDB	DDB	P3A
DEBB33F331K□□□	3150	330 ±10%	6	7.5	6.0	C3B	D3B	P3A
DEBB33F471K□□□	3150	470 ±10%	7	7.5	6.0	C3B	D3B	P3A
DEBB33F681K□□□	3150	680 ±10%	8	7.5	6.0	A3B	B3B	N3A
DEBB33F102K□□□	3150	1000 ±10%	9	7.5	6.0	A3B	B3B	N3A
DEBB33F152K□□□	3150	1500 ±10%	11	7.5	6.0	A3B	B3B	N3A
DEBB33F222K□□□	3150	2200 ±10%	13	7.5	6.0	A3B	B3B	N3A
DEBB33F332K□□□	3150	3300 ±10%	15	7.5	6.0	A3B	B3B	N7A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

E Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEBE33A102Z□□□	1000	1000 +80/-20%	5	5.0	4.0	C1B	D1B	P2A
DEBE33A222Z□□□	1000	2200 +80/-20%	7	5.0	4.0	A2B	B2B	N2A
DEBE33A472Z□□□	1000	4700 +80/-20%	9	5.0	4.0	A2B	B2B	N2A
DEBE33A103Z□□□	1000	10000 +80/-20%	13	7.5	4.0	A3B	B3B	N3A
DEBE33D102Z□□□	2000	1000 +80/-20%	6	5.0	5.0	A2B	B2B	N2A
DEBE33D222Z□□□	2000	2200 +80/-20%	8	5.0	5.0	A2B	B2B	N2A
DEBE33D472Z□□□	2000	4700 +80/-20%	11	5.0	5.0	A2B	B2B	N2A
DEBE33D103Z□□□	2000	10000 +80/-20%	16	7.5	5.0	A3B	B3B	N7A
DEBE33F102Z□□□	3150	1000 +80/-20%	7	7.5	6.0	C3B	D3B	P3A
DEBE33F222Z□□□	3150	2200 +80/-20%	10	7.5	6.0	A3B	B3B	N3A
DEBE33F472Z□□□	3150	4700 +80/-20%	13	7.5	6.0	A3B	B3B	N3A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

F Characteristics

Part Number	DC Rated Voltage (Vdc)	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
DEBF33A222Z□□□	1000	2200 +80/-20%	6	5.0	4.0	A2B	B2B	N2A
DEBF33A472Z□□□	1000	4700 +80/-20%	7	5.0	4.0	A2B	B2B	N2A
DEBF33A103Z□□□	1000	10000 +80/-20%	10	5.0	4.0	A2B	B2B	N2A
DEBF33D102Z□□□	2000	1000 +80/-20%	5	5.0	5.0	C1B	D1B	P2A
DEBF33D222Z□□□	2000	2200 +80/-20%	7	5.0	5.0	A2B	B2B	N2A
DEBF33D472Z□□□	2000	4700 +80/-20%	9	5.0	5.0	A2B	B2B	N2A
DEBF33D103Z□□□	2000	10000 +80/-20%	12	7.5	5.0	A3B	B3B	N3A

Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

DEB Series Specifications and Test Methods

No.	J	Item	Specifications	Testing Method		
1	Operating Temper	rature Range	-25 to +85°C			
2	Appearance and E	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.		
3	Marking		To be easily legible	The capacitor should be visually inspected.		
		Between Lead Wires	No failure	The capacitor should not be damaged when DC voltage of 200% of the rated voltage is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current≦50mA)		
4	Dielectric Strength	Body Insulation	No failure	The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short circuited, is kept about 2mm off the metal balls as shown in the figure at right, and DC voltage of 1.3kV is applied for 1 to 5 sec. between capacitor lead wires and metal balls. (Charge/Discharge current≦50mA)		
5	Insulation Resistance (I.R.)	Between Lead Wires	10000MΩ min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.		
6	Capacitance		Within specified tolerance	The capacitance should be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max.		
7	Dissipation Factor (D.F.)		Char. B, E: 2.5% max. Char. F: 5.0% max.	The dissipation factor should be measured at 20°C with 1±0.2kHz and AC5V(r.m.s.) max.		
			Char. B: Within ±10% Char. E: Within +20/-55% Char. F: Within +30/-80%	The capacitance measurement should be made at each step specified in Table.		
8	Temperature Characteristics		Pre-treatment : Capacitor should be stored *room condition for 24±2 h Step 1	·		
			Temp. (°C) 20±2	-25±3 20±2 85±2 20±2		
9	Chroneth of Local	Pull Lead wire should not be cut off.		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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec.		
		Bending Capacitor should not be broken.	 Capacitor should not be broken. 	Each lead wire should be subjected to 5N (2.5N for lead diameter 0.5mm) 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 3 sec.		
		Appearance	No marked defect	The capacitor should be firmly soldered to the supporting lead		
10	Vibration	Capacitance	Within specified tolerance	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		
10	Resistance	D.F.	Char. B, E: 2.5% max. Char. F: 5.0% max.	from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions.		
11	1 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 a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 sec. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires. Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C H63 Eutectic Solder 235±5°C		
		Appearance	No marked defect	The lead wire should be immersed into the melted solder of		
12	Soldering Effect	Capacitance Change	Char. B: Within ± 5% Char. E: Within ± 15% Char. F: Within ± 20%	350±10°C (Body of ø5mm and under: 270±5°C) up to about 1.5 to 2mm from the main body for 3.5±0.5 sec. (Body of ø5mm and under: 5±0.5 sec.) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr.,		
12	(Non-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *room condition.		

^{* &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa





DEB Series Specifications and Test Methods

Continued from the preceding page.

No.		Item Specifications		Testing Method			
		Appearance Capacitance Change	No marked defect Char. B: Within ± 5% Char. E: Within ± 15% Char. F: Within ± 20%	First the capacitor should be stored at 120+0/-5°C for 60+0/-5 sec. Then, as in figure, the lead wires should be immersed solder of			
13	Soldering Effect (On-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *room condition.			
		Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles,			
		Capacitance Change	Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30%	then consecutively to 2 immersion cycles. <temperature cycle=""> Step Temperature (°C) Time (min)</temperature>			
		D.F.	Char. B, E: 4.0% max. Char. F: 7.5% max.	1 -25±3 30 2 Room Temp. 3 3 85±3 30			
	Temperature	I.R.	2000MΩ min.				
	Cycle	Dielectric Strength (Between Lead Wires) Per item 4.		Step Temperature (°C) Time (min) Immersion water 1 65 +5/-0 15 Clean water 2 0 ±3 15 Salt water Cycle time: 2 cycle Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *room condition.			
		Appearance	No marked defect	Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95%			
15	Humidity (Under Steady State)	Capacitance Change	Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30%	relative humidity. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs.			
	Steady State)	D.F.	Char. B, E: 5.0% max. Char. F: 7.5% max.	before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *room condition.			
		I.R.	1000MΩ min.	room condition.			
		Appearance	No marked defect	Apply the rated voltage for 500 +24/-0 hrs. at 40±2°C in 90 to			
16	Humidity Loading	Capacitance Change	Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30%	95% relative humidity. (Charge/Discharge current≦50mA) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *room condition for 24±2 hrs.			
	Loading	D.F.	Char. B, E: 5.0% max. Char. F: 7.5% max.	before initial measurements. Post-treatment: Capacitor should be stored at 85±2°C for 1 hr			
		I.R.	500MΩ min.	then placed at *room condition for 24±2 hrs.			
		Appearance	No marked defect	Apply a DC voltage of 150% of the rated voltage for			
17	Life	Capacitance Change	Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30%	1000 +48/-0 hrs. at 85±2°C with a relative humidity of 50% max. (Charge/Discharge current≦50mA) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr.			
		D.F.	Char. B, E: 4.0% max. Char. F: 7.5% max.	then placed at *room condition for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored at 85±2°C for 1 hr			
		I.R.	2000MΩ min.	then placed at *room condition for 24±2 hrs.			

^{* &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Safety Recognized/High Voltage Ceramic Capacitors



DEC Series (Class 1, 2/DC6.3kV)

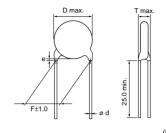
■ Features

- 1. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
- 2. Available product for RoHS Restriction (EU Directive 2002/95/EC).

■ Applications

- 1. Ideal for use as the ballast in back lighting inverters for liquid crystal displays (SL Char.).
- 2. Ideal for use on high voltage circuits such as Cockcroft circuits (B Char.).





(in mm)

Lead Code	Coating Extension e	ød
C4	3.0 max.	0.6±0.05

■ Marking

Temp. Char. Nominal Body Diameter	SL	В	E			
ø7mm	(5D 6KV					
ø8-9mm	47J 6KV 66	331K 6KV 66				
ø10-15mm	151J 6KV (M 66	B 102K 6KV (M 66	222Z 6KV (M 66			
Temperature Characteristics	Marked with code for char. B (omitted for nominal body diameter	ø9mm and under)			
Nominal Capacitance	Under 100pF: Actual value, 100pF and over: Marked with 3 figures					
Capacitance Tolerance	Marked with code					
Rated Voltage	Marked with code (In case of D	C6.3kV, marked with 6KV)				
Manufacturer's Identification	Marked with (omitted for no	minal body diameter ø9mm and u	nder)			
Manufactured Date Code	Abbreviation (omitted for noming	nal body diameter ø7mm)				

SL Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)
DEC1X3J050DC4BMS1	6300	5 ±0.5pF	7	10.0	7.0
DEC1X3J100JC4BMS1	6300	10 ±5%	7	10.0	7.0
DEC1X3J120JC4B	6300	12 ±5%	8	10.0	7.0
DEC1X3J150JC4B	6300	15 ±5%	8	10.0	7.0
DEC1X3J180JC4B	6300	18 ±5%	9	10.0	7.0
DEC1X3J220JC4B	6300	22 ±5%	9	10.0	7.0
DEC1X3J270JC4B	6300	27 ±5%	9	10.0	7.0
DEC1X3J330JC4B	6300	33 ±5%	9	10.0	7.0
DEC1X3J390JC4B	6300	39 ±5%	9	10.0	7.0
DEC1X3J470JC4B	6300	47 ±5%	9	10.0	7.0
DEC1X3J560JC4B	6300	56 ±5%	10	10.0	7.0
DEC1X3J680JC4B	6300	68 ±5%	12	10.0	7.0
DEC1X3J820JC4B	6300	82 ±5%	12	10.0	7.0
DEC1X3J101JC4B	6300	100 ±5%	13	10.0	7.0
DEC1X3J121JC4B	6300	120 ±5%	14	10.0	7.0
DEC1X3J151JC4B	6300	150 ±5%	15	10.0	7.0

B Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)
DECB33J101KC4B	6300	100 ±10%	9	10.0	7.0
DECB33J151KC4B	6300	150 ±10%	9	10.0	7.0
DECB33J221KC4B	6300	220 ±10%	9	10.0	7.0
DECB33J331KC4B	6300	330 ±10%	9	10.0	7.0
DECB33J471KC4B	6300	470 ±10%	10	10.0	7.0
DECB33J681KC4B	6300	680 ±10%	11	10.0	7.0
DECB33J102KC4B	6300	1000 ±10%	13	10.0	7.0

E Characteristics

Part Number	DC Rated Voltage (Vdc)	Capacitance (pF)	Body Dia. D (mm)	Lead Spacing F (mm)	Body Thickness T (mm)
DECE33J102ZC4B	6300	1000 +80/-20%	11	10.0	7.0
DECE33J222ZC4B	6300	2200 +80/-20%	15	10.0	7.0

DEC Series Specifications and Test Methods

No.		tem	Specifications	Testing Method
1	Operating Temper	ature Range	-25 to +85°C	
2	Appearance and E	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.
3	Marking		To be easily legible	The capacitor should be visually inspected.
		Between Lead Wires	No failure	The capacitor should not be damaged when DC voltage of 200% of the rated voltage is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current≦50mA)
4	Dielectric Strength	Body Insulation	No failure	The capacitor is placed in the container with metal balls of diameter 1mm so that each lead wire, short circuited, is kept about 2mm off the metal balls as shown in the figure at right, and DC voltage of 1.3kV is applied for 1 to 5 sec. between capacitor lead wires and metal balls. (Charge/Discharge current≦50mA)
5	Insulation Resistance (I.R.)	Between Lead Wires	10000MΩ min.	The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging.
6	Capacitance		Within specified tolerance	The capacitance should be measured at 20°C with 1±0.2kHz (Char. SL: 1±0.2MHz) and AC5V(r.m.s.) max.
7	Q		Char. SL: 400+20C*2min. (30pF under) 1000 min. (30pF min.)	The dissipation factor and Q should be measured at 20°C with 1±0.2kHz (Char. SL: 1±0.2MHz) and AC5V(r.m.s.) max.
	Dissipation Factor (D.F.)		Char. B, E: 2.5% max.	TEO.ZNI IZ (Char. St. TEO.ZIVII IZ) and ACSV(I.III.S.) IIIax.
0	T	(Temp. range: +20 to +85°C) specified in Table Char. B: Within ±10% Char. E: Within +20/-55%		The capacitance measurement should be made at each step specified in Table.
8	Temperature Characteristics		Pre-treatment : Capacitor should be stored *¹room condition for 24±2 to Step 1 Temp. (°C) 20±2	l at 85±2°C for 1 hr., then placed at hrs. before measurements. (Char. B, E) 2
9	Strength of Lead	Pull	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 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 3 sec.
		Appearance	No marked defect	The conneiter should be firmly coldered to the supporting lead
	Vibration	Capacitance	Within specified tolerance	The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in
10	Resistance	Q	Char. SL: 400+20C*2min. (30pF under) 1000 min. (30pF min.)	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.,
		D.F.	Char. B, E: 2.5% max.	2 hrs. each in 3 mutually perpendicular directions.
11			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 a ethanol solution of 25wt% rosin and then into molten solder for 2±0.5 sec. In both cases the depth of dipping is up to about 1.5 to 2mm from the root of lead wires. Temp. of solder: Lead Free Solder (Sn-3Ag-0.5Cu) 245±5°C H63 Eutectic Solder 235±5°C
		Appearance	No marked defect	The lead wire should be immersed into the melted solder of
	Soldering Effect	Capacitance Change	Char. SL: Within ±2.5% Char. B: Within ±5% Char. E: Within ±15%	350±10°C up to about 1.5 to 2mm from the main body 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.
12	(Non-Preheat)	Dielectric Strength (Between Lead Wires)	Per item 4.	before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *'room condition. (Char. SL) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *'room condition. (Char. B, E)

^{*1 &}quot;room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.





10

^{*2 &}quot;C" expresses nominal capacitance value (pF)

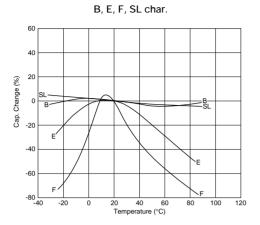
DEC Series Specifications and Test Methods

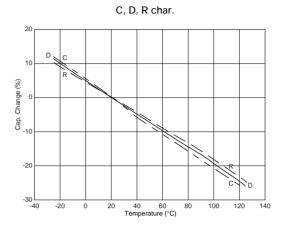
No.		Item	Specifications	Testing Method		
		Appearance	No marked defect	First the capacitor should be		
		· ·		stored at 120+0/-5°C for 60+0/-5 sec. Then, as in figure, the lead wires should be immersed solder of 260+0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5+0/-1 sec. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition. (Char. SL) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition. (Char. B, E)		
13	Soldering Effect (On-Preheat)					
		Appearance	No marked defect	The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.		
		Capacitance Change	Char. SL: Within ±3% Char. B: Within ±10% Char. E: Within ±20%	<temperature cycle=""></temperature>		
		Q	Char. SL: 275+5/2C*2min. (30pF under) 350 min. (30pF min.)	Step Temperature (°C) Time (min) 1 -25±3 30 2 Room Temp. 3		
		D.F.	Char. B, E: 4.0% max.	3 85±3 30 4 Room Temp. 3		
	Temperature	I.R.	2000MΩ min.	Cycle time: 5 cycle		
14	Cycle	Dielectric Strength (Between Lead Wires)	Per item 4.	Step Temperature (°C) Time (min) Immersion water 1 65 +5/-0 15 Clean water 2 0 ±3 15 Salt water 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. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at *1room condition.		
		Appearance	No marked defect			
	Humidity (Under	Capacitance Change	Char. SL: Within ±5% Char. B: Within ±10% Char. E: Within ±20%	Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95' relative humidity. Pre-treatment: Capacitor should be stored at 85±2°C for 1		
15	Steady State)	Q	Char. SL: 275+5/2C*2min. (30pF under) 350 min. (30pF min.)	then placed at *1room condition for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at		
		D.F.	Char. B, E: 5.0% max.	*1room condition.		
		I.R.	1000MΩ min.			
		Appearance	No marked defect	Apply the rated voltage for 500 +24/-0 hrs. at 40±2°C in 90 to		
		Capacitance Change	Char. SL: Within ±7.5% Char. B: Within ±10% Char. E: Within ±20%	95% relative humidity. (Charge/Discharge current≦50mA.) Pre-treatment: Capacitor should be stored at 85±2°C for 1 h then placed at *¹room condition for 24±2 hrs		
16	Humidity Loading	Q	Char. SL: 100+10/3C*²min. (30pF under) 200 min. (30pF min.)	before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at *1room condition. (Char. SL) Post-treatment: Capacitor should be stored at 85±2°C for 1 hr.		
		D.F.	Char. B, E: 5.0% max.	then placed at *1room condition for 24±2 hrs.		
		I.R.	500MΩ min.	(Char. B, E)		
		Appearance	No marked defect	Apply a DC voltage of 150% of the rated voltage for		
		Capacitance Change	Char. SL: Within ±3% Char. B: Within ±10% Char. E: Within ±20%	1000 +48/-0 hrs. at 85±2°C with a relative humidity of 50% max. (Charge/Discharge current≦50mA.) Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr. then placed at *¹room condition for 24±2 hrs.		
17	Life	Q	Char. SL: 275+5/2C*2min. (30pF under) 350 min. (30pF min.)	before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at		
		D.F.	Char. B, E: 4.0% max.	*¹room condition. (Char. SL) Post-treatment: Capacitor should be stored at 85±2°C for 1 hr.		
		I.R.	2000MΩ min.	then placed at *1room condition for 24±2 hrs.		

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

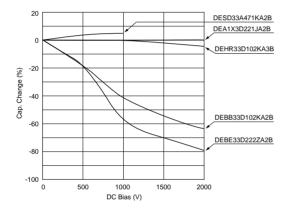
High Voltage Ceramic Capacitors Characteristics Data (Typical Example)

■ Capacitance-Temperature Characteristics





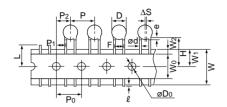
■ Capacitance-DC Bias Characteristics



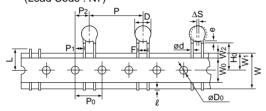
High Voltage Ceramic Capacitors Packaging

■ Taping Specifications

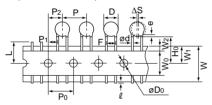
• 15.0mm pitch / lead spacing 7.5mm taping Straight type (Lead Code: P3)



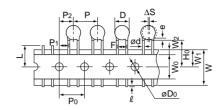
• 30.0mm pitch / lead spacing 7.5mm taping Vertical crimp type (Lead Code: N7)



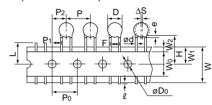
• 12.7mm pitch / lead spacing 5.0mm taping Vertical crimp type (Lead Code: N2)

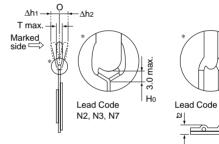


• 15.0mm pitch / lead spacing 7.5mm taping Vertical crimp type (Lead Code: N3)



• 12.7mm pitch / lead spacing 5.0mm taping Straight type (Lead Code: P2)





Item	Code	P3	N3	N7	P2	N2	
Pitch of component	Р	15.0 30.0			12.7		
Pitch of sprocket hole	P ₀		15.0±0.3		12.7	±0.3	
Lead spacing	F		7.5±1.0		5.0	5.0 ^{+0.8} _{-0.2}	
Length from hole center to component center	P ₂		7.5±1.5		6.35	±1.3	
Length from hole center to lead	P1		3.75±1.0		3.85	±0.7	
Body diameter	D		See the ind	ividual product s	pecifications		
Deviation along tape, left or right	ΔS		0±2.0		0±	1.0	
Carrier tape width	W			18.0±0.5			
Position of sprocket hole	W1			9.0±0.5			
Lead distance between reference	Н	$20.0^{+1.5}_{-1.0}$	_	_	20.0 +1.5	_	
and bottom planes	Ho		18.0) + 2.0 -0	_	18.0 ^{+2.0}	
Protrusion length	ℓ	+0.5 to -1.0					
Diameter of sprocket hole	φDo	Do 4.0±0.1					
Lead diameter	φd			0.6±0.05			
Total tape thickness	t1			0.6±0.3			
Total thickness, tape and lead wire	t2			1.5 max.			
Body thickness	Т		See the indi	ividual product sp	pecifications		
Portion to cut in case of defect	L			11.0 +0			
Hold down tape width	Wo			11.5 min.			
Hold down tape position	W2			1.5±1.5			
Coating extension on lead	е	3.0) max. (Vertical	crimp type : Up t	to the end of crim	np)	
Deviation across tape, front	Δh1		2.0 may		4.0	***	
Deviation across tape, rear	Δh2	2.0 max. 1.0 max		ııax.			

(in: mm)

High Voltage Ceramic Capacitors Packaging

Continued from the preceding page.

■ Packaging Styles



■ Minimum Quantity (Order in Sets Only)

[Bulk] 1,000 pcs.

[Taping]

1,500 pcs. (Lead Code: P2, N2) 1,000 pcs. (Lead Code: P3, N3*) 500 pcs. (Lead Code: N7) * 900 pcs. for 2kV and 3.15kV

■ Minimum Order Quantity

[Bulk] 3,000 pcs.

[Taping]

3,000 pcs. (Lead Code: P2, N2) 3,000 pcs. (Lead Code: P3, N3*) 2,000 pcs. (Lead Code: N7) * 2,700 pcs. for 2kV and 3.15kV

"Minimum Quantity" means the numbers of units of each delivery or order. The quantity should be an integral multiple of the "minimum quantity". (Please note that the actual delivery quantity in a package may change sometimes.)



■ ①Caution (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.

When using the low-dissipation DEA (SL Char.) /DEC (SL Char.) /DEH (C, R Char.) /DES (D Char.) series in a highfrequency and high-voltage circuit, be sure to read the instructions in item 4.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement	Vo-p	Vo-p	Vp-p	Vp-p	Vp-p

2. Operating Temperature and Self-generated Heat 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 highfrequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. The frequency of the applied sine wave voltage should be less than 300kHz. The applied voltage load (*) should be such that the capacitor's self-generated heat is within 20°C at an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of Ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations.

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.)

*Before using the low-dissipation DEA/DEC (SL Char.) /DEH/DES series, be sure to read the instructions in item 4.

3. Fail-Safe

When 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 would follow an electric shock, fire or fume.



sales representatives or product engineers before ordering. • This PDF 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.

High Voltage Ceramic Capacitors (1) Caution

Continued from the preceding page

4. Load Reduction and Self-generated Heat During Application of High-frequency and High-voltage Due to the low self-heating characteristics of lowdissipation capacitors, the allowable electric power of these capacitors is generally much higher than that of B characteristic capacitors. However, in case the selfheating temperature is 20°C under a high-frequency voltage whose peak-to-peak value equals the capacitor's rated voltage, the capacitor's power consumption may exceed it's allowable electric power.

Therefore, when using the DEA/DEC (SL Char.) /DEH /DES series in a high-frequency and high-voltage circuit with a frequency of 1kHz or higher, make sure that the Vp-p values including the DC bias, do not exceed the applied voltage value specified in Table 1. Also make sure that the self-heating temperature (the difference between the capacitor's surface temperature and the capacitor's ambient temperature) at an ambient temperature of 25°C does not exceed the value specified in Table 1

As shown in Fig. 2, the self-heating temperature depends on the ambient temperature. Therefore, if you are not able to set the ambient temperature to approximately 25°C, please contact our sales representatives or product engineers.

Table 15 Allowable Conditions at High-frequency

< rable 1> Allowable Conditions at High-frequency						
Series	Temp. Char.	DC Rated Voltage	Allowab at High	Capacitor's		
			Applied Voltage (Max.)	Self-heating Temp. (25°C Ambient Temp.) *1	Ambient Temp. *2	
DEH	R	250V	250Vp-p	10°C Max.		
	С	500V	500Vp-p	20°C Max.		
	R	1kV	800Vp-p	20°C Max.	-25 to +85°C	
			1000Vp-p	5°C Max.		
		2kV	1400Vp-p	20°C Max.		
			2000Vp-p	5°C Max.		
		3.15kV	1600Vp-p	20°C Max.		
			3150Vp-p	5°C Max.		
DEA	SL	1kV	1000Vp-p			
		2kV	2000Vp-p	5°C Max.		
		3.15kV	3150Vp-p			
DEC	SL	6.3kV	6300Vp-p	5°C Max.		
DES	D	500V	500Vp-p	15°C Max.		
		1kV	800Vp-p	15 C IVIAX.		
			1000Vp-p	5°C Max.		

^{*1} Fig. 1 shows the relationship between the applied voltage and the allowable selfheating temperature regarding 1 to 3.15kV rated voltage of the DEH series R characteristic and 1kV rated voltage of the DES series D characteristic

We are offering free software the "capacitor selection tool: Murata Medium Voltage Capacitors Selection Tool by Voltage Form (*)" which will assist you in selecting a suitable capacitor.

The software can be downloaded from Murata's Internet Web site.

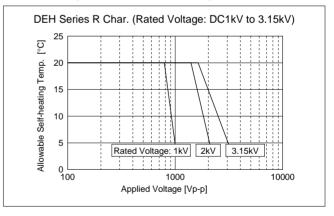
(http://www.murata.com/designlib/mmcsv_e.html) By inputting capacitance values and applied voltage waveform of the specific capacitor series, this software will calculate the capacitor's power consumption and list suitable capacitors.

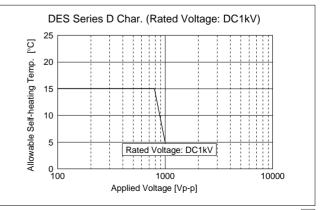
When the result of this software is different from the measurement result of the self-heating temperature on your side, please contact our sales representatives or product engineers.

- * As of May. 2005, subject series are below.
 - · DEA/DEH/DES Series: Selection currently available.

Failure to follow the above cautions (items 1 to 4) may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.

<Fig. 1> Relationship Between Applied Voltage and Self-heating Temperature (Allowable Self-heating Temp. at 25°C Ambient Temp.)







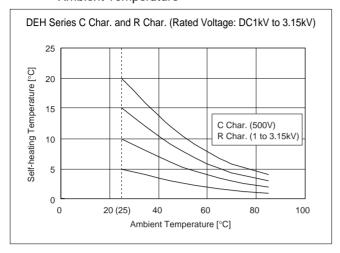


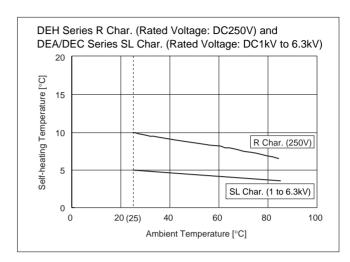
^{*2} When the ambient temperature is 85 to 125°C, the applied voltage needs to be further reduced. If the DEA/DEH/DES series needs to be used at an ambient temperature of 85 to 125°C, please contact our sales representatives or product engineers

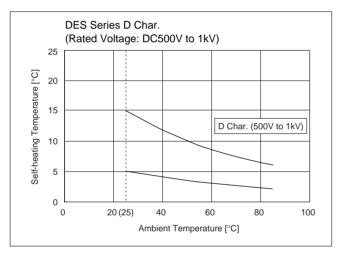
^{*3} Fig. 3 shows reference data on the allowable voltage-frequency characteristic for a sine wave voltage

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<Fig. 2> Dependence of Self-heating Temperature on **Ambient Temperature**









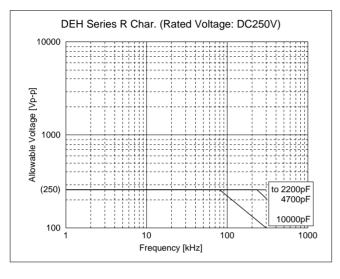
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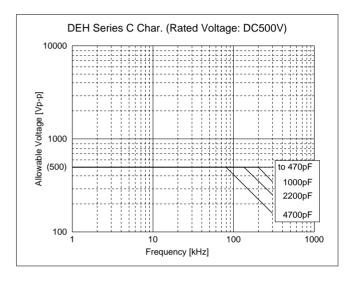
Because of the influence of harmonics, when the applied voltage is a rectangular wave or pulse wave voltage (instead of a sine wave voltage), the heat generated by the capacitor

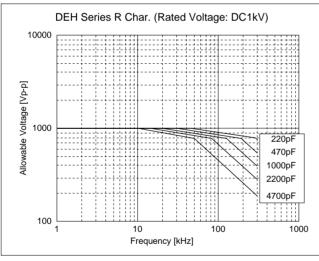
is higher than the value obtained by application of the sine wave with the same fundamental frequency.

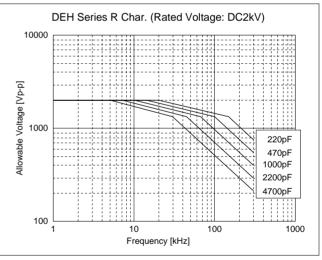
Roughly calculated for reference, the allowable voltage for a rectangular wave or pulse wave corresponds approximately

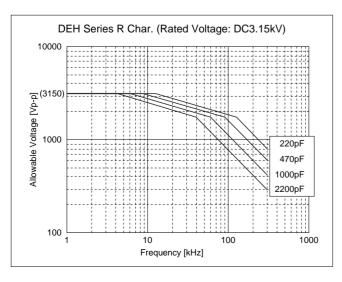
< Fig. 3> Allowable Voltage (Sine Wave Voltage) - Frequency Characteristics (At Ambient Temperature of 85°C or less) to the allowable voltage for a sine wave whose fundamental frequency is twice as large as that of the rectangular wave or pulse wave. This allowable voltage, however, varies depending on the voltage and current waveforms. Therefore, you are requested to make sure that the selfheating temperature is not higher than the value specified in Table 1.











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<Fig. 3 (continue)> Allowable Voltage (Sine Wave Voltage) -**Frequency Characteristics** (At Ambient Temperature of 85°C or less)

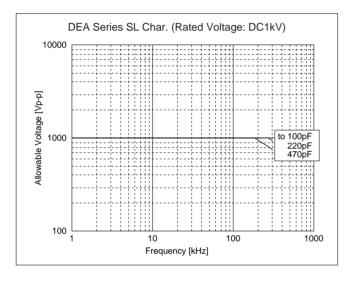
Because of the influence of harmonics, when the applied voltage is a rectangular wave or pulse wave voltage (instead of a sine wave voltage), the heat generated by the capacitor is higher than the value obtained by application of the sine wave with the same fundamental frequency.

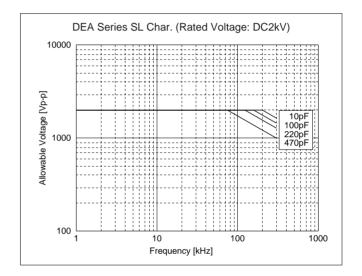
Roughly calculated for reference, the allowable voltage for a rectangular wave or pulse wave corresponds

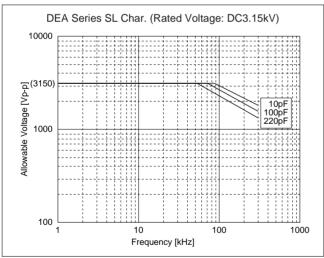
approximately to the allowable voltage for a sine wave whose fundamental frequency is twice as large as that of the rectangular wave or pulse wave.

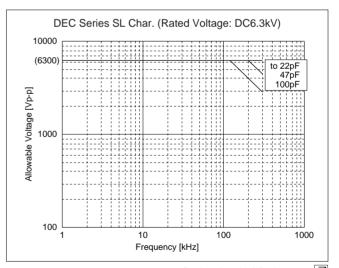
This allowable voltage, however, varies depending on the voltage and current waveforms.

Therefore, you are requested to make sure that the selfheating temperature is not higher than the value specified in Table 1.









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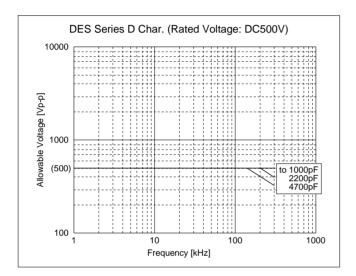
High Voltage Ceramic Capacitors (1) Caution

Continued from the preceding page

<Fig. 3 (continue)> Allowable Voltage (Sine Wave Voltage) -Frequency Characteristics (At Ambient Temperature of 85°C or less)

Because of the influence of harmonics, when the applied voltage is a rectangular wave or pulse wave voltage (instead of a sine wave voltage), the heat generated by the capacitor is higher than the value obtained by application of the sine wave with the same fundamental frequency.

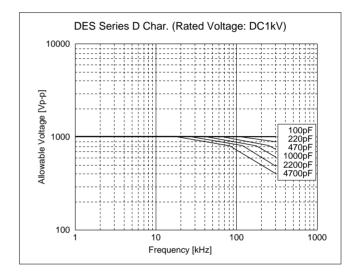
Roughly calculated for reference, the allowable voltage for a rectangular wave or pulse wave corresponds



approximately to the allowable voltage for a sine wave whose fundamental frequency is twice as large as that of the rectangular wave or pulse wave.

This allowable voltage, however, varies depending on the voltage and current waveforms.

Therefore, you are requested to make sure that the selfheating temperature is not higher than the value specified in Table 1.



■ ①Caution (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 after delivered.

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.

■ ①Caution (Soldering and Mounting)

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 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 degrees C. max. Soldering iron wattage: 50W max. Soldering time: 3.5 sec. max.

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.

■ **(**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.



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High Voltage Ceramic Capacitors Notice

■ 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)

Capacitance change of capacitor

- DEA/DEC series (Temp. Char. SL)
 Capacitance might change a little depending on the surrounding temperature or an applied voltage.
 Please contact us if you intend to use this product in a strict time constant circuit.
- DEB/DEC series (Temp. Char. B, E, F)
 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 time constant circuit.

 Please contact us if you need detailed information.
- DEH/DES series
 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 time constant circuit. Please contact us if you need detailed information.



Safety Recognized Ceramic Capacitors/High Voltage Ceramic Capacitors ISO9000 Certifications

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

Plant	Applied Standard	
Izumo Murata Manufacturing Co., Ltd.	ISO9001	
Murata Electronics (Thailand), Ltd.	ISO9001	
Taiwan Murata Electronics Co., Ltd.	ISO9001	



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♠ Note:

1. Export Control

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 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 3 Undersea equipment
- 2 Aerospace 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
- Data-processing equipment
- (ii) Application of similar complexity and/or reliability requirements to the applications listed in the above
- 3. Product specifications in this catalog are as of March 2006. 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
- 4. Please read rating and ACAUTION (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.



http://www.murata.com/