

Safety Recognized/ High Voltage Ceramic Capacitors



Cat.No.C85E-2

muRata *Innovator
in Electronics*
Murata
Manufacturing Co., Ltd.

for EU RoHS Compliant

- All the products in this catalog comply with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (<http://www.murata.com/info/rohs.html>).

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● Part Numbering

Safety Standard Recognized Ceramic Capacitors

(Part Number)

| | | | | | | | | |
|----|---|----|----|-----|---|----|---|---|
| DE | 2 | E3 | KH | 102 | M | N3 | A | |
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ |

① Product ID

| Product ID | |
|------------|--|
| DE | Safety Standard Recognized / High Voltage Ceramic Capacitors |

② Series Category

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

In case of Electrical Appliance and Material Safety Law of Japan, first three digits (①Product ID and ②Series 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 ④Safety Standard Recognized Type column.

③ Temperature Characteristics

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

④ Rated Voltage/Safety Standard Recognized Type

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

⑤ 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.

⑥ Capacitance Tolerance

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

⑦ Lead Style

| Code | Lead Style | Dimensions (mm) | | | |
|-----------|-----------------------|-----------------|---------------|---------------------|------|
| | | Lead Spacing | Lead Diameter | Pitch of Components | |
| A2 | Vertical Crimp Long | 5 | ø0.6±0.05 | - | |
| A3 | | 7.5 | | | |
| A4 | | 10 | | | |
| A5 | | 10 | | | |
| B2 | Vertical Crimp Short | 5 | ø0.6±0.05 | - | |
| B3 | | 7.5 | | | |
| B4 | | 10 | | | |
| B5 | | 10 | | | |
| C3 | Straight Long | 7.5 | ø0.6±0.05 | - | |
| D3 | Straight Short | 7.5 | ø0.6±0.05 | - | |
| N2 | Vertical Crimp Taping | 5 | ø0.6±0.05 | 12.7 | |
| N3 | | 7.5 | | 15 | |
| N4 | | 10 | | 25.4 | |
| N5 | | 10 | | ø0.6+0.1, -0.05 | 25.4 |
| N7 | | 7.5 | | ø0.6±0.05 | 30 |
| P3 | Straight Taping | 7.5 | ø0.6±0.05 | 15 | |

⑧ Packaging

| Code | Packaging |
|----------|-----------------------|
| A | Ammo Pack Taping Type |
| B | Bulk Type |

⑨ 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.

High Voltage Ceramic Capacitors (250V-6.3kV)

(Part Number)

| | | | | | | | | |
|----|---|----|----|-----|---|----|---|---|
| DE | B | B3 | 3A | 102 | K | N2 | A | |
| ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ | ⑧ | ⑨ |

① Product ID

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

② Series Category

| Code | Outline | Contents |
|------|--------------|---|
| A | High Voltage | Class 1 (Char. SL) DC1-3.15kV Rated |
| B | | Class 2 DC1-3.15kV Rated |
| C | | Class 1, 2 DC6.3kV Rated |
| H | | High Temperature Guaranteed, Low-dissipation Factor (Char. R, C) |
| S | | High Temperature Guaranteed, Low-dissipation Factor (Char. D) |
| F | | LCD Backlight Inverter Circuit |

First three digits (① Product ID and ② Series Category) express "Series Name".

③ Temperature Characteristics

| Code | Temperature Characteristics | Cap. Change or Temp. Coeff. | Temperature Range |
|------|-----------------------------|-----------------------------|-------------------|
| B3 | B | ±10% | -25 to +85°C |
| E3 | E | +20%, -55% | |
| F3 | F | +30%, -80% | |
| C3 | C | ±20% | -25 to +85°C |
| | | +15%, -30% | +85 to +125°C |
| R3 | R | ±15% | -25 to +85°C |
| | | +15%, -30% | +85 to +125°C |
| D3 | D | +20%, -30% | -25 to +125°C |
| 1X | SL | +350 to -1000ppm/°C | +20 to +85°C |
| 2C | CH | 0±60ppm/°C | +20 to +85°C |

④ Rated Voltage

| Code | Rated Voltage |
|------|---------------|
| 2E | DC250V |
| 2H | DC500V |
| 3A | DC1kV |
| 3D | DC2kV |
| 3F | DC3.15kV |
| 3J | DC6.3kV |
| LH | 6.3kVp-p |

⑤ 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.

⑥ Capacitance Tolerance

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

⑦ Lead Style

| Code | Lead Style | Dimensions (mm) | | |
|-------|-----------------------|-----------------|---------------|---------------------|
| | | Lead Spacing | Lead Diameter | Pitch of Components |
| A2 | Vertical Crimp Long | 5 | ø0.6±0.05 | - |
| A3 | | 7.5 | | |
| A4 | | 10 | | |
| B2/J2 | Vertical Crimp Short | 5 | ø0.6±0.05 | - |
| B3/J3 | | 7.5 | | |
| B4 | | 10 | | |
| C1 | Straight Long | 5 | ø0.5±0.05 | - |
| C3 | | 7.5 | ø0.6±0.05 | |
| C4 | | 10 | ø0.5±0.05 | |
| D1 | Straight Short | 5 | ø0.5±0.05 | - |
| D3 | | 7.5 | ø0.6±0.05 | |
| DD | | 7.5 | ø0.5±0.05 | |
| N2 | Vertical Crimp Taping | 5 | ø0.6±0.05 | 12.7 |
| N3 | | 7.5 | | 15 |
| N7 | | 7.5 | | 30 |
| P2 | Straight Taping | 5 | ø0.6±0.05 | 12.7 |
| P3 | | 7.5 | | 15 |

⑧ Packaging

| Code | Packaging |
|------|-----------------------|
| A | Ammo Pack Taping Type |
| B | Bulk Type |

⑨ 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



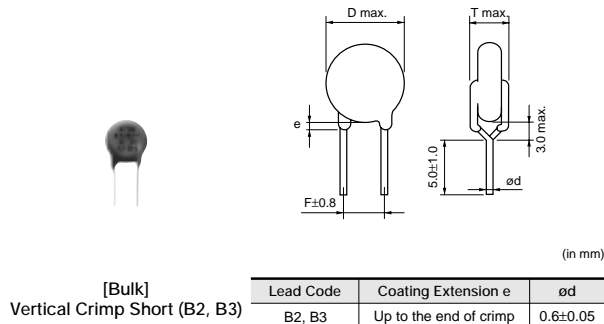
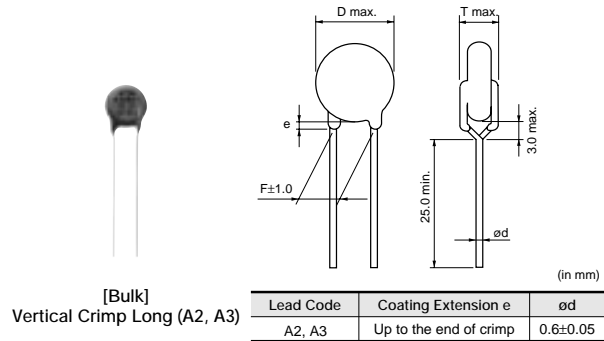
Type KY (Basic Insulation) -IEC60384-14 Class X1, Y2-

■ 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/VDE/BSI/SEMKO/DEMKO/FIMKO/NEMKO/ESTI/NSW.
5. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standard).
6. Cost-saving automatic insertion available.

■ Applications

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



■ Standard Recognition

| | Standard No. | Recognized No. | Rated Voltage |
|-------|---|----------------|----------------|
| UL | UL1414 | E37921 | AC250V(r.m.s.) |
| CSA | E384-14 | 1283280 | |
| VDE | IEC 60384-14 EN 60384-14 | 40006273 | |
| BSI | IEC 60065 (8.8, 14.2) EN 60065 (8.8, 14.2) | 227935 | |
| | IEC 60384-14 EN 60384-14 | | |
| | IEC 60384-14 EN 60384-14 | | |
| SEMKO | IEC 60384-14 EN 60384-14 | 806804 | |
| DEMKO | | 314115-03 | |
| FIMKO | EN 60384-14 | FI 24197 A1 | |
| NEMKO | | P08209361 | |
| ESTI | IEC 60384-14 | 08.0251 | |
| NSW | IEC 60384-14 | 6824 | |
| | AS3250 | | |

- 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 Chinese Safety Standard or South Korean Safety Standard is necessary.

■ Marking

| Example | Item |
|---------|--|
| | ① Type Designation KY |
| | ② Nominal Capacitance (Under 100pF: Actual value, 100pF and over: Marked with 3 figures) |
| | ③ Capacitance Tolerance |
| | ④ Company Name Code Ⓢ : Made in Taiwan Ⓢ15 : Made in Thailand |
| | ⑤ Manufactured Date Code |
| | Class Code X1Y2 |
| | Rated Voltage Mark 250~ |

Lead Spacing F=7.5mm

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

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.

Individual specification code "M02" expresses "simplicity marking and guarantee of dielectric strength between lead wires: AC2600V".

Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name (KY) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

Lead Spacing F=5mm

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

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.

Individual specification code "M01" expresses "simplicity marking and guarantee of dielectric strength between lead wires: AC2000V".

Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name (KY) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

Safety Recognized/High Voltage Ceramic Capacitors



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

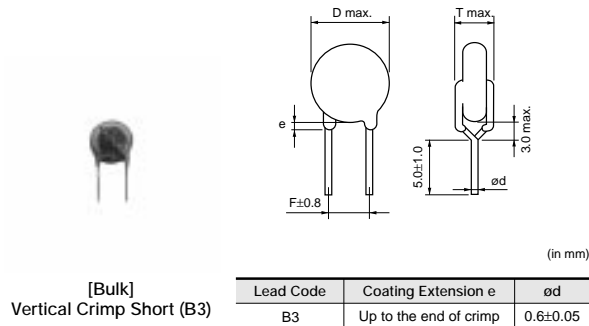
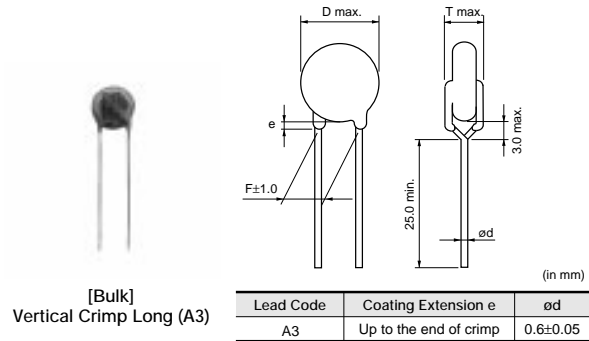
2

■ Features

1. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.).
2. Dielectric strength: AC2600V
3. Class X1/Y2 capacitors which are recognized by UL/CSA/VDE/BSI/SEMKO/DEMKO/FIMKO/NEMKO/ESTI/NSW.
4. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standard).
5. Cost-saving automatic insertion available.

■ 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. | Recognized No. | Rated Voltage |
|-------|--|----------------|----------------|
| UL | UL1414 | E37921 | AC250V(r.m.s.) |
| CSA | E384-14 | 1343805 | |
| VDE | IEC 60384-14 EN 60384-14 | 40002796 | |
| BSI | IEC 60065 (8.8, 14.2) EN 60065 (8.8, 14.2) IEC 60384-14 EN 60384-14 | 227636 | |
| SEMKO | IEC 60384-14 EN 60384-14 | 803916 | |
| DEMKO | | 314578-01 | |
| FIMKO | EN 60384-14 | FI 24195 | |
| NEMKO | | P08209182 | |
| ESTI | IEC 60384-14 EN 60384-14 | 07.0623 | |
| NSW | IEC 60384-14 AS3250 | 6529 | |

- 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 Chinese Safety Standard or South Korean Safety Standard is necessary.

■ Marking

| Example | Item |
|-------------------------|--|
| | ① Type Designation KH |
| | ② Nominal Capacitance (Marked with 3 figures) |
| | ③ Capacitance Tolerance |
| | ④ Company Name Code ☉: Made in Taiwan ☉15: Made in Thailand |
| | ⑤ Manufactured Date Code |
| | UL Approval Mark |
| | CSA Approval Mark |
| | VDE Approval Mark |
| | BSI Approval Mark BSI |
| | SEMKO Approval Mark |
| | DEMKO Approval Mark |
| FIMKO Approval Mark | |
| NEMKO Approval Mark | |
| ESTI Approval Mark | |
| Class Code X1Y2 | |
| Rated Voltage Mark 250~ | |

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

Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.

Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name (KH) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

2

Safety Recognized/High Voltage Ceramic Capacitors



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

3

■ Features

1. 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
4. Class X1/Y1 capacitors which are recognized by UL/CSA/VDE/BSI/SEMKO/DEMKO/FIMKO/NEMKO/ESTI/IMQ.
5. Possible to use with a component in appliance requiring reinforced insulation and double insulation based on UL1492, IEC60065 and IEC60950.
6. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standard).
7. Cost-saving automatic insertion available.

■ Applications

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

*: Small sized Type KX differs from current Type KX in electrical characteristics, such as the voltage dependency, of capacitance temperature dependency, and Dielectric strength.
 Therefore, before replacing current Type KX, please make a performance check by equipment.
 Please refer below too.

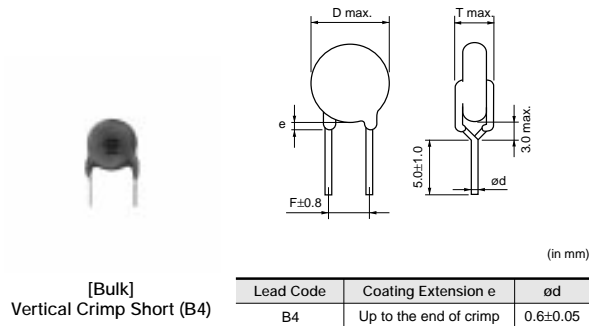
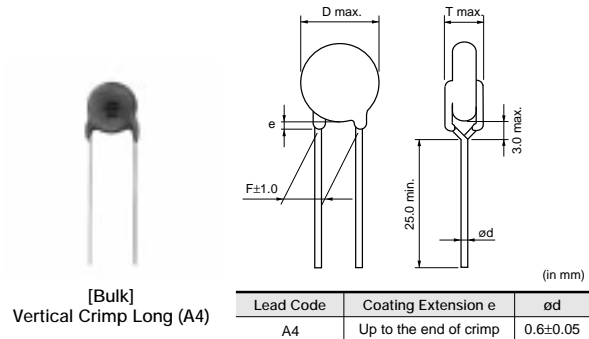
[Notice(Rating)

item 2. "Performance Check by Equipment".]

■ Standard Recognition

| | Standard No. | Recognized No. | Rated Voltage |
|-------|---|----------------|----------------|
| UL | UL1414 | E37921 | AC250V(r.m.s.) |
| CSA | E384-14 | 1343810 | |
| VDE | IEC 60384-14 EN 60384-14 | 40002831 | |
| BSI | IEC 60065 (8.8, 14.2) EN 60065 (8.8, 14.2) | 227859 | |
| | IEC 60384-14 EN 60384-14 | | |
| | IEC 60384-14 EN 60384-14 | | |
| SEMKO | IEC 60384-14 EN 60384-14 | 803908 | |
| DEMKO | EN 60384-14 | 314577-01 | |
| FIMKO | EN 60384-14 | FI 24191 | |
| NEMKO | IEC 60384-14 | P08209173 | |
| ESTI | EN 60384-14 | 07.0622 | |
| IMQ | EN 60384-14 | 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 Chinese Safety Standard or South Korean Safety Standard is necessary.



■ Marking

| Example | Item |
|---------|--|
| | ① Type Designation KX |
| | ② Nominal Capacitance (Marked with 3 figures) |
| | ③ Capacitance Tolerance |
| | ④ Company Name Code ☉: Made in Taiwan ☉15: Made in Thailand |
| | ⑤ Manufactured Date Code |
| | 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) |
|-------------------|------------------------|-------------|------------------|------------------|---------------------|-----------------------|------------------------|-------------------------|-------------------------|
| DE1B3KX101K□□□L01 | 250 | B | 100 ±10% | 8 max. | 10.0 | 7.0 max. | A4B | B4B | N4A |
| DE1B3KX151K□□□L01 | 250 | B | 150 ±10% | 8 max. | 10.0 | 7.0 max. | A4B | B4B | N4A |
| DE1B3KX221K□□□L01 | 250 | B | 220 ±10% | 8 max. | 10.0 | 7.0 max. | A4B | B4B | N4A |
| DE1B3KX331K□□□L01 | 250 | B | 330 ±10% | 8 max. | 10.0 | 7.0 max. | A4B | B4B | N4A |
| DE1B3KX471K□□□L01 | 250 | B | 470 ±10% | 8 max. | 10.0 | 7.0 max. | A4B | B4B | N4A |
| DE1B3KX681K□□□L01 | 250 | B | 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 | E | 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 | E | 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-

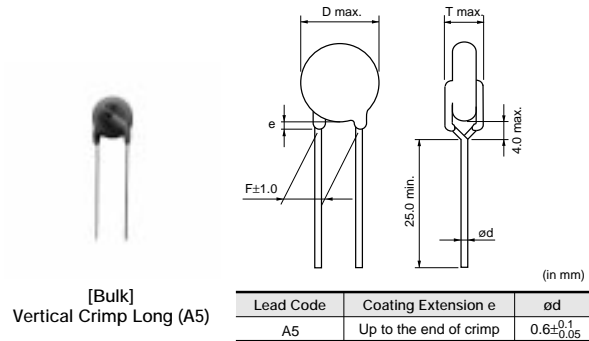
4

■ Features

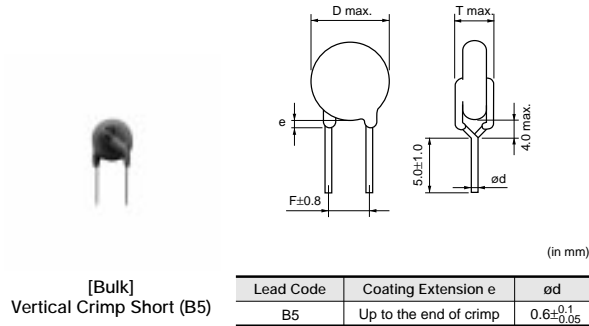
1. Operating temperature range guaranteed up to 125 degrees (UL: 85 deg.).
2. Dielectric strength: AC4000V
3. Class X1/Y1 capacitors which are recognized by UL/CSA/VDE/BSI/SEMKO/DEMKO/FIMKO/NEMKO/ESTI/IMQ.
4. Possible to use with a component in appliance requiring reinforced insulation and double insulation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

■ Applications

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



[Bulk]
Vertical Crimp Long (A5)



[Bulk]
Vertical Crimp Short (B5)

■ Standard Recognition

| | Standard No. | Recognized No. | Rated Voltage |
|-------|---|----------------|----------------|
| UL | UL1414 | E37921 | AC250V(r.m.s.) |
| CSA | E384-14 | 1343810 | |
| VDE | IEC 60384-14 EN 60384-14 | 40002831 | |
| BSI | IEC 60065 (8.8, 14.2) EN 60065 (8.8, 14.2) | 227859 | |
| | IEC 60384-14 EN 60384-14 | | |
| | IEC 60384-14 EN 60384-14 | | |
| SEMKO | IEC 60384-14 EN 60384-14 | 803908 | |
| DEMKO | EN 60384-14 | 314577-01 | |
| FIMKO | EN 60384-14 | FI 24191 | |
| NEMKO | IEC 60384-14 | P08209173 | |
| ESTI | EN 60384-14 | 07.0622 | |
| IMQ | EN 60384-14 | 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 Chinese Safety Standard or South Korean Safety Standard is necessary.

■ Marking

| Example | Item |
|---------------------|---|
| | ① Type Designation KX |
| | ② Nominal Capacitance (Under 100pF: Actual value, 100pF and over: Marked with 3 figures) |
| | ③ Capacitance Tolerance |
| | ④ Company Name Code Ⓢ: Made in Taiwan Ⓢ15: Made in Thailand |
| | ⑤ Manufactured Date Code |
| | UL Approval Mark |
| | CSA Approval Mark |
| | VDE Approval Mark |
| | BSI Approval Mark |
| | SEMKO Approval Mark |
| | DEMKO Approval Mark |
| | FIMKO Approval Mark |
| NEMKO Approval Mark | |
| ESTI Approval Mark | |
| IMQ Approval Mark | |
| Class Code | X1Y1 |
| Rated Voltage Mark | 250~ |

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

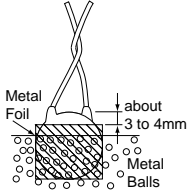
Three blank columns are filled with the lead and packaging codes. Please refer to the 3 columns on the right for the appropriate code.

Murata part numbers might be changed depending on lead code or any other changes. Therefore, please specify only the type name (KX) and capacitance of products in the parts list when it is required for applying safety standard of electric equipment.

Type KY/KH/KX Specifications and Test Methods

■ Apply to Type KY/KH/KX

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

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------|--|--|---|--------------------|-----------------|-------------|---|---|-----------------|-----------------------------|---|-------------------------|----|---------------------|---|------|------------------|---|------|---|-------|---|------|---|------|---|------|
| 1 | Appearance and Dimensions | No marked defect on appearance form and dimensions are within specified range. | The capacitor should be visually inspected for evidence of defect. Dimensions should be measured with slide calipers. | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Marking | To be easily legible | The capacitor should be visually inspected. | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Capacitance | Within specified tolerance | The capacitance, 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. | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Dissipation Factor (D.F.) Q | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 30%;">Char.</th> <th style="width: 70%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>B, E</td> <td>D.F. ≤2.5%</td> </tr> <tr> <td>F</td> <td>D.F. ≤5.0%</td> </tr> <tr> <td>SL</td> <td>Q ≥ 400+20C^{*1} (C<30pF) Q ≥ 1000 (C ≥ 30pF)</td> </tr> </tbody> </table> | | Char. | Specifications | B, E | D.F. ≤2.5% | F | D.F. ≤5.0% | SL | Q ≥ 400+20C ^{*1} (C<30pF) Q ≥ 1000 (C ≥ 30pF) | | | | | | | | | | | | | | | | |
| Char. | Specifications | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B, E | D.F. ≤2.5% | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | D.F. ≤5.0% | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL | Q ≥ 400+20C ^{*1} (C<30pF) Q ≥ 1000 (C ≥ 30pF) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Insulation Resistance (I.R.) | 10000MΩ min. | The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging. The voltage should be applied to the capacitor through a resistor of 1MΩ. | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Dielectric Strength | 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> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 20%;">Type</th> <th style="width: 80%;">Test Voltage</th> </tr> </thead> <tbody> <tr> <td rowspan="2">KY</td> <td>In case of lead spacing F=5mm AC2000V(r.m.s.)</td> </tr> <tr> <td>In case of lead spacing F=7.5mm AC2600V(r.m.s.)</td> </tr> <tr> <td>KH</td> <td>AC2600V(r.m.s.)</td> </tr> <tr> <td>KX</td> <td>AC4000V(r.m.s.)</td> </tr> </tbody> </table> | Type | Test Voltage | KY | 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.) | | | | | | | | | | | | | | | |
| | | Type | Test Voltage | | | | | | | | | | | | | | | | | | | | | | | | |
| KY | 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.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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. <Table 2> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 20%;">Type</th> <th style="width: 80%;">Test Voltage</th> </tr> </thead> <tbody> <tr> <td>KY</td> <td>AC2600V(r.m.s.)</td> </tr> <tr> <td>KH</td> <td>AC2600V(r.m.s.)</td> </tr> <tr> <td>KX</td> <td>AC4000V(r.m.s.)</td> </tr> </tbody> </table>  | Type | Test Voltage | KY | AC2600V(r.m.s.) | KH | AC2600V(r.m.s.) | KX | AC4000V(r.m.s.) | | | | | | | | | | | | | | | | | | |
| Type | Test Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KY | AC2600V(r.m.s.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KH | AC2600V(r.m.s.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| KX | AC4000V(r.m.s.) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Temperature Characteristics | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 30%;">Char.</th> <th style="width: 70%;">Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>B</td> <td>Within ±10%</td> </tr> <tr> <td>E</td> <td>Within $\pm\frac{20}{55}\%$</td> </tr> <tr> <td>F</td> <td>Within $\pm\frac{30}{88}\%$</td> </tr> </tbody> </table> (Temp. range: -25 to +85°C) <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 30%;">Char.</th> <th style="width: 70%;">Temperature Coefficient</th> </tr> </thead> <tbody> <tr> <td>SL</td> <td>+350 to -1000ppm/°C</td> </tr> </tbody> </table> (Temp. range: +20 to +85°C) | Char. | Capacitance Change | B | Within ±10% | E | Within $\pm\frac{20}{55}\%$ | F | Within $\pm\frac{30}{88}\%$ | Char. | Temperature Coefficient | SL | +350 to -1000ppm/°C | The capacitance measurement should be made at each step specified in Table 3. <Table 3> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 20%;">Step</th> <th style="width: 80%;">Temperature (°C)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20±2</td> </tr> <tr> <td>2</td> <td>-25±2</td> </tr> <tr> <td>3</td> <td>20±2</td> </tr> <tr> <td>4</td> <td>85±2</td> </tr> <tr> <td>5</td> <td>20±2</td> </tr> </tbody> </table> | Step | Temperature (°C) | 1 | 20±2 | 2 | -25±2 | 3 | 20±2 | 4 | 85±2 | 5 | 20±2 |
| Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | Within ±10% | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | Within $\pm\frac{20}{55}\%$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | Within $\pm\frac{30}{88}\%$ | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Char. | Temperature Coefficient | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL | +350 to -1000ppm/°C | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 20±2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | -25±2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 20±2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | 85±2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 20±2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 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 | | | | | | | | | | | | | | | | | | | | | | | | |

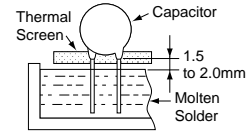
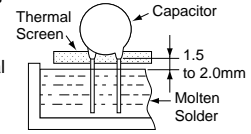
*1 "C" expresses nominal capacitance value (pF).

Continued on the following page.

Type KY/KH/KX Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | |
|---------------------|---|---------------------|---|-------|--------------------|------|-------------------|------|--|----|--|
| 9 | Soldering Effect (Non-Preheat) | Appearance | No marked defect | | | | | | | | |
| | | Capacitance Change | Within $\pm 10\%$ | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | |
| | | Dielectric Strength | Per Item 6 | | | | | | | | |
| 10 | Soldering Effect (On-Preheat) | Appearance | No marked defect | | | | | | | | |
| | | Capacitance Change | Within $\pm 10\%$ | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | |
| | | Dielectric Strength | Per Item 6 | | | | | | | | |
| 11 | Vibration Resistance | Appearance | No marked defect | | | | | | | | |
| | | Capacitance | Within the specified tolerance | | | | | | | | |
| | | D.F. Q | <table border="1" style="width: 100%;"> <thead> <tr> <th>Char.</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>B, E</td> <td>D.F. $\leq 2.5\%$</td> </tr> <tr> <td>F</td> <td>D.F. $\leq 5.0\%$</td> </tr> <tr> <td>SL</td> <td> $Q \geq 400 + 20C^{*1}$ (C < 30pF) $Q \geq 1000$ (C ≥ 30pF) </td> </tr> </tbody> </table> | Char. | Specifications | B, E | D.F. $\leq 2.5\%$ | F | D.F. $\leq 5.0\%$ | SL | $Q \geq 400 + 20C^{*1}$ (C < 30pF) $Q \geq 1000$ (C ≥ 30 pF) |
| Char. | Specifications | | | | | | | | | | |
| B, E | D.F. $\leq 2.5\%$ | | | | | | | | | | |
| F | D.F. $\leq 5.0\%$ | | | | | | | | | | |
| SL | $Q \geq 400 + 20C^{*1}$ (C < 30pF) $Q \geq 1000$ (C ≥ 30 pF) | | | | | | | | | | |
| 12 | Humidity (Under Steady State) | Appearance | No marked defect | | | | | | | | |
| | | Capacitance Change | <table border="1" style="width: 100%;"> <thead> <tr> <th>Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>B</td> <td>Within $\pm 10\%$</td> </tr> <tr> <td>E, F</td> <td>Within $\pm 15\%$</td> </tr> <tr> <td>SL</td> <td>Within $\pm 5\%$</td> </tr> </tbody> </table> | Char. | Capacitance Change | B | Within $\pm 10\%$ | E, F | Within $\pm 15\%$ | SL | Within $\pm 5\%$ |
| | | Char. | Capacitance Change | | | | | | | | |
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| SL | $Q \geq 275 + 5/2C^{*1}$ (C < 30pF) $Q \geq 350$ (C ≥ 30 pF) | | | | | | | | | | |
| I.R. | 3000M Ω min. | | | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | | | |
| 13 | Humidity Loading | Appearance | No marked defect | | | | | | | | |
| | | Capacitance Change | <table border="1" style="width: 100%;"> <thead> <tr> <th>Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>B</td> <td>Within $\pm 10\%$</td> </tr> <tr> <td>E, F</td> <td>Within $\pm 15\%$</td> </tr> <tr> <td>SL</td> <td>Within $\pm 5\%$</td> </tr> </tbody> </table> | Char. | Capacitance Change | B | Within $\pm 10\%$ | E, F | Within $\pm 15\%$ | SL | Within $\pm 5\%$ |
| | | Char. | Capacitance Change | | | | | | | | |
| | | B | Within $\pm 10\%$ | | | | | | | | |
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| D.F. Q | <table border="1" style="width: 100%;"> <thead> <tr> <th>Char.</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>B, E</td> <td>D.F. $\leq 5.0\%$</td> </tr> <tr> <td>F</td> <td>D.F. $\leq 7.5\%$</td> </tr> <tr> <td>SL</td> <td> $Q \geq 275 + 5/2C^{*1}$ (C < 30pF) $Q \geq 350$ (C ≥ 30pF) </td> </tr> </tbody> </table> | Char. | Specifications | B, E | D.F. $\leq 5.0\%$ | F | D.F. $\leq 7.5\%$ | SL | $Q \geq 275 + 5/2C^{*1}$ (C < 30pF) $Q \geq 350$ (C ≥ 30 pF) | | |
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| I.R. | 3000M Ω min. | | | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | | | |



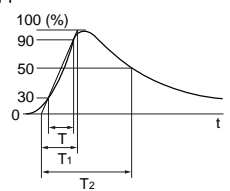
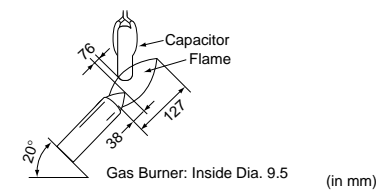
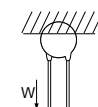
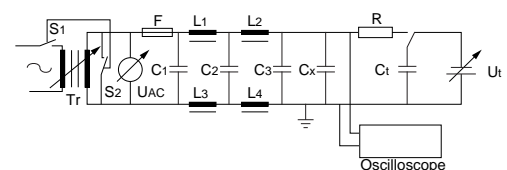
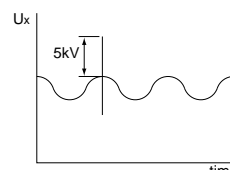
*1 "C" expresses nominal capacitance value (pF).

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

Continued on the following page.

Type KY/KH/KX Specifications and Test Methods

Continued from the preceding page.

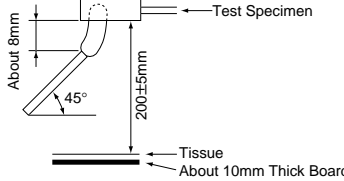
| No. | Item | Specifications | Test Method | | | | | | | | | | | | |
|---|-----------------------------------|---|---|-------------------------------|-----------------------------------|---|------|-------------------------------|---|------------------------------|---|---------------------|--------------------|--|-------------------------------|
| 14 | Life | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Appearance</td> <td>No marked defect</td> </tr> <tr> <td>Capacitance Change</td> <td>Within $\pm 20\%$</td> </tr> <tr> <td>I.R.</td> <td>3000MΩ min.</td> </tr> </table> | Appearance | No marked defect | Capacitance Change | Within $\pm 20\%$ | I.R. | 3000M Ω min. | <p>Impulse Voltage</p> <p>Each individual capacitor should be subjected to a 5kV (Type KX: 8kV) impulses for three times. After the capacitors are applied to life test.</p>  <p style="text-align: right;">Front time (T_1) = $1.2\mu s = 1.67T$ Time to half-value (T_2) = $50\mu s$</p> <p>Apply a voltage of Table 4 for 1000 hrs. at $125 \pm 2/0^\circ C$, and relative humidity of 50% max.</p> <p style="text-align: center;"><Table 4></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Applied Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">AC425V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec.</td> </tr> </tbody> </table> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*2.</p> | Applied Voltage | AC425V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec. | | | | |
| | Appearance | No marked defect | | | | | | | | | | | | | |
| Capacitance Change | Within $\pm 20\%$ | | | | | | | | | | | | | | |
| I.R. | 3000M Ω min. | | | | | | | | | | | | | | |
| Applied Voltage | | | | | | | | | | | | | | | |
| AC425V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec. | | | | | | | | | | | | | | | |
| 15 | Flame Test | <p>The capacitor flame discontinues as follows.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Cycle</th> <th style="width: 70%;">Time (sec.)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1 to 4</td> <td style="text-align: center;">30 max.</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">60 max.</td> </tr> </tbody> </table> | Cycle | Time (sec.) | 1 to 4 | 30 max. | 5 | 60 max. | <p>The capacitor should be subjected to applied flame for 15 sec. and then removed for 15 sec. until 5 cycles are completed.</p>  <p style="text-align: right;">Gas Burner: Inside Dia. 9.5 (in mm)</p> | | | | | | |
| Cycle | Time (sec.) | | | | | | | | | | | | | | |
| 1 to 4 | 30 max. | | | | | | | | | | | | | | |
| 5 | 60 max. | | | | | | | | | | | | | | |
| 16 | Robustness of Terminations | <p>Lead wire should not be cut off. Capacitor should not be broken.</p> | <p>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.</p>  | | | | | | | | | | | | |
| | Bending | | <p>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.</p> | | | | | | | | | | | | |
| 17 | Active Flammability | <p>The cheese-cloth should not be on fire.</p> | <p>The capacitor should be individually wrapped in at least one but not more than two complete layers of cheesecloth. The capacitor should be subjected to 20 discharges. The interval between successive discharges should be 5 sec. The UAC should be maintained for 2 min. after the last discharge.</p>  <p> <table style="width: 100%;"> <tr> <td>$C_{1,2}$: $1\mu F \pm 10\%$</td> <td>C_3 : $0.033\mu F \pm 5\%$ 10kV</td> </tr> <tr> <td>L1 to 4 : $1.5mH \pm 20\%$ 16A Rod core choke</td> <td></td> </tr> <tr> <td>C_t : $3\mu F \pm 5\%$ 10kV</td> <td>R : $100\Omega \pm 2\%$</td> </tr> <tr> <td>C_x : Capacitor under test</td> <td>UAC : $UR \pm 5\%$</td> </tr> <tr> <td>F : Fuse, Rated 10A</td> <td>UR : Rated Voltage</td> </tr> <tr> <td></td> <td>Ut : Voltage applied to C_t</td> </tr> </table> </p>  | $C_{1,2}$: $1\mu F \pm 10\%$ | C_3 : $0.033\mu F \pm 5\%$ 10kV | L1 to 4 : $1.5mH \pm 20\%$ 16A Rod core choke | | C_t : $3\mu F \pm 5\%$ 10kV | R : $100\Omega \pm 2\%$ | C_x : Capacitor under test | UAC : $UR \pm 5\%$ | F : Fuse, Rated 10A | UR : Rated Voltage | | Ut : Voltage applied to C_t |
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*2 "room condition" Temperature: 15 to $35^\circ C$, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

Type KY/KH/KX Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|---|---|--|------------------|--------------------|--|------------|--------------------|---|-------------|------|-------------|----|-------------|-----------|---|-------|----------------|------|------------|---|------------|----|---|------|-------------|---------------------|------------|--|------|------------------|------------|---|----------|----|---|------------|---|---|----------|----|---|------------|---|------|------------------|------------|-----------------|---|---------|----|-------------|---|-----|----|------------|
| 18 | Passive Flammability | The burning time should not exceed 30 sec. The tissue paper should not ignite. | <p>The capacitor under test should be held in the flame in the position which best promotes burning. Each specimen should only be exposed once to the flame. Time of exposure to flame: 30 sec.</p> <p style="margin-left: 20px;">Length of flame: 12±1mm Gas burner : Length 35mm min. : Inside Dia. 0.5±0.1mm : Outside Dia. 0.9mm max. Gas : Butane gas Purity 95% min.</p>  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | Temperature and Immersion Cycle | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Appearance</td> <td>No marked defect</td> </tr> <tr> <td rowspan="3">Capacitance Change</td> <td style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Char.</th> <th>Capacitance Change</th> </tr> <tr> <td>B</td> <td>Within ±10%</td> </tr> <tr> <td>E, F</td> <td>Within ±20%</td> </tr> <tr> <td>SL</td> <td>Within ± 5%</td> </tr> </table> </td> </tr> <tr> <td rowspan="4">D.F. Q</td> <td style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Char.</th> <th>Specifications</th> </tr> <tr> <td>B, E</td> <td>D.F. ≤5.0%</td> </tr> <tr> <td>F</td> <td>D.F. ≤7.5%</td> </tr> <tr> <td>SL</td> <td>Q ≥ 275 + 5/2C*¹ (C < 30pF) Q ≥ 350 (C ≥ 30pF)</td> </tr> </table> </td> </tr> <tr> <td>I.R.</td> <td>3000MΩ min.</td> </tr> <tr> <td>Dielectric Strength</td> <td>Per Item 6</td> </tr> </table> | Appearance | No marked defect | Capacitance Change | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Char.</th> <th>Capacitance Change</th> </tr> <tr> <td>B</td> <td>Within ±10%</td> </tr> <tr> <td>E, F</td> <td>Within ±20%</td> </tr> <tr> <td>SL</td> <td>Within ± 5%</td> </tr> </table> | Char. | Capacitance Change | B | Within ±10% | E, F | Within ±20% | SL | Within ± 5% | D.F. Q | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Char.</th> <th>Specifications</th> </tr> <tr> <td>B, E</td> <td>D.F. ≤5.0%</td> </tr> <tr> <td>F</td> <td>D.F. ≤7.5%</td> </tr> <tr> <td>SL</td> <td>Q ≥ 275 + 5/2C*¹ (C < 30pF) Q ≥ 350 (C ≥ 30pF)</td> </tr> </table> | Char. | Specifications | B, E | D.F. ≤5.0% | F | D.F. ≤7.5% | SL | Q ≥ 275 + 5/2C* ¹ (C < 30pF) Q ≥ 350 (C ≥ 30pF) | I.R. | 3000MΩ min. | Dielectric Strength | Per Item 6 | <p>The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.</p> <p style="text-align: center;"><Temperature Cycle></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Step</th> <th style="width: 40%;">Temperature (°C)</th> <th style="width: 50%;">Time (min)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-25+0/-3</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">125+3/-0</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">3</td> </tr> </tbody> </table> <p style="text-align: right;">Cycle time: 5 cycle</p> <p style="text-align: center;"><Immersion Cycle></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Step</th> <th style="width: 30%;">Temperature (°C)</th> <th style="width: 15%;">Time (min)</th> <th style="width: 45%;">Immersion Water</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">65+5/-0</td> <td style="text-align: center;">15</td> <td style="text-align: center;">Clean water</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">0±3</td> <td style="text-align: center;">15</td> <td style="text-align: center;">Salt water</td> </tr> </tbody> </table> <p style="text-align: right;">Cycle time: 2 cycle</p> <p>Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*² for 24±2 hrs.</p> <p>Post-treatment: Capacitor should be stored for 24±2 hrs. at room condition*².</p> | Step | Temperature (°C) | Time (min) | 1 | -25+0/-3 | 30 | 2 | Room temp. | 3 | 3 | 125+3/-0 | 30 | 4 | Room temp. | 3 | Step | Temperature (°C) | Time (min) | Immersion Water | 1 | 65+5/-0 | 15 | Clean water | 2 | 0±3 | 15 | Salt water |
| Appearance | No marked defect | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Char.</th> <th>Capacitance Change</th> </tr> <tr> <td>B</td> <td>Within ±10%</td> </tr> <tr> <td>E, F</td> <td>Within ±20%</td> </tr> <tr> <td>SL</td> <td>Within ± 5%</td> </tr> </table> | Char. | Capacitance Change | B | | Within ±10% | E, F | Within ±20% | SL | Within ± 5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | B | Within ±10% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E, F | Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL | Within ± 5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. Q | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Char.</th> <th>Specifications</th> </tr> <tr> <td>B, E</td> <td>D.F. ≤5.0%</td> </tr> <tr> <td>F</td> <td>D.F. ≤7.5%</td> </tr> <tr> <td>SL</td> <td>Q ≥ 275 + 5/2C*¹ (C < 30pF) Q ≥ 350 (C ≥ 30pF)</td> </tr> </table> | Char. | Specifications | B, E | D.F. ≤5.0% | F | D.F. ≤7.5% | SL | Q ≥ 275 + 5/2C* ¹ (C < 30pF) Q ≥ 350 (C ≥ 30pF) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Char. | Specifications | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | B, E | D.F. ≤5.0% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | F | D.F. ≤7.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| SL | Q ≥ 275 + 5/2C* ¹ (C < 30pF) Q ≥ 350 (C ≥ 30pF) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 3000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | -25+0/-3 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Room temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 125+3/-0 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Room temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | Immersion Water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 65+5/-0 | 15 | Clean water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0±3 | 15 | Salt water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

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

Safety Recognized/High Voltage Ceramic Capacitors



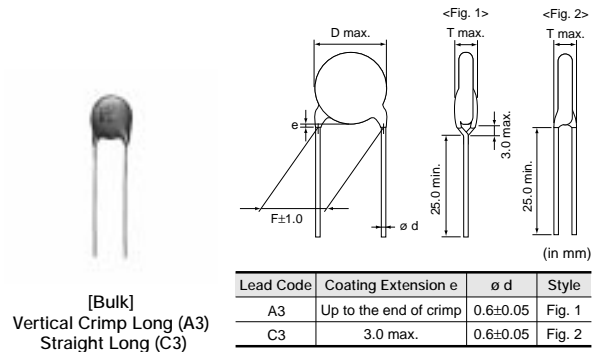
DEJ Series -Based on the Electrical Appliance and Material Safety Law of Japan-

■ Features

1. Coated with flame-retardant epoxy resin (conforming to UL94V-0 standard).
2. Cost-saving automatic insertion available.
3. This type is based on the electrical appliance and material safety law of Japan (separated table 4).

■ Applications

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

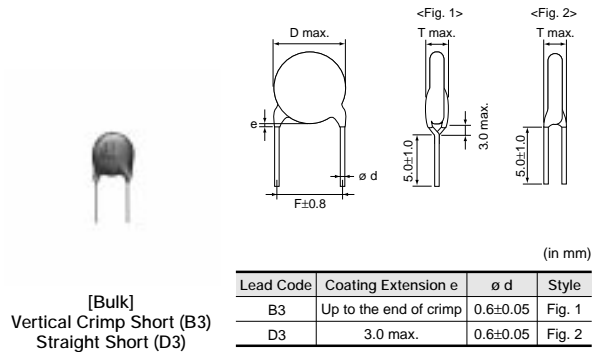


[Bulk]
Vertical Crimp Long (A3)
Straight Long (C3)

5

■ Marking

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



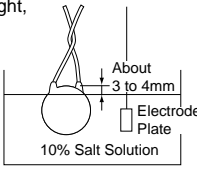
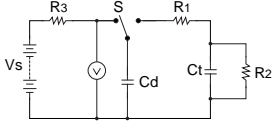
[Bulk]
Vertical Crimp Short (B3)
Straight Short (D3)

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

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

DEJ Series Specifications and Test Methods

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

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | |
|-------|------------------------------|---|---|--------------------|---------|--------------|--------|--------------|--|------|------------------|---|------|---|-------|---|------|---|------|---|------|
| 1 | Appearance and Dimensions | No marked defect on appearance form and dimensions are within specified range. | The capacitor should be visually inspected for evidence of defect. Dimensions should be measured with slide calipers. | | | | | | | | | | | | | | | | | | |
| 2 | Marking | To be easily legible | The capacitor should be visually inspected. | | | | | | | | | | | | | | | | | | |
| 3 | Capacitance | Within specified tolerance | The capacitance should be measured at 20°C with 1±0.1kHz and AC5V(r.m.s.) max. | | | | | | | | | | | | | | | | | | |
| 4 | Dissipation Factor (D.F.) | <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 15%;">Char.</th> <th style="width: 85%;">Specifications</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>D.F. ≤2.5%</td> </tr> <tr> <td>F</td> <td>D.F. ≤5.0%</td> </tr> </tbody> </table> | 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. | | | | | | | | | | | | |
| Char. | Specifications | | | | | | | | | | | | | | | | | | | | |
| E | D.F. ≤2.5% | | | | | | | | | | | | | | | | | | | | |
| F | D.F. ≤5.0% | | | | | | | | | | | | | | | | | | | | |
| 5 | Insulation Resistance (I.R.) | 10000MΩ min. | The insulation resistance should be measured with DC500±50V within 60±5 sec. of charging. | | | | | | | | | | | | | | | | | | |
| 6 | Dielectric Strength | Between Lead Wires | No failure | | | | | | | | | | | | | | | | | | |
| | Dielectric Strength | Body Insulation | No failure | | | | | | | | | | | | | | | | | | |
| | | The capacitor should not be damaged when AC1500V(r.m.s.) are applied between the lead wires for 60 sec. 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. <div style="text-align: right; margin-top: 10px;">  </div> | | | | | | | | | | | | | | | | | | | |
| 7 | Temperature Characteristics | <table border="1" style="width: 100%; border-collapse: collapse; margin-bottom: 5px;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 15%;">Char.</th> <th style="width: 85%;">Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Within ±2.5%</td> </tr> <tr> <td>F</td> <td>Within ±3.0%</td> </tr> </tbody> </table> | Char. | Capacitance Change | E | Within ±2.5% | F | Within ±3.0% | The capacitance measurement should be made at each step specified in Table 1. <div style="text-align: center;"> <Table 1> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #f2f2f2;"> <th style="width: 15%;">Step</th> <th style="width: 85%;">Temperature (°C)</th> </tr> </thead> <tbody> <tr><td>1</td><td>20±2</td></tr> <tr><td>2</td><td>-25±2</td></tr> <tr><td>3</td><td>20±2</td></tr> <tr><td>4</td><td>85±2</td></tr> <tr><td>5</td><td>20±2</td></tr> </tbody> </table> </div> | Step | Temperature (°C) | 1 | 20±2 | 2 | -25±2 | 3 | 20±2 | 4 | 85±2 | 5 | 20±2 |
| Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | |
| E | Within ±2.5% | | | | | | | | | | | | | | | | | | | | |
| F | Within ±3.0% | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | | | | | | | | | | | | | | | | | | | | |
| 1 | 20±2 | | | | | | | | | | | | | | | | | | | | |
| 2 | -25±2 | | | | | | | | | | | | | | | | | | | | |
| 3 | 20±2 | | | | | | | | | | | | | | | | | | | | |
| 4 | 85±2 | | | | | | | | | | | | | | | | | | | | |
| 5 | 20±2 | | | | | | | | | | | | | | | | | | | | |
| 8 | Discharge Test | Appearance | No marked defect | | | | | | | | | | | | | | | | | | |
| | Discharge Test | I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | |
| | | Dielectric Strength | Per Item 6 | | | | | | | | | | | | | | | | | | |
| | | As in Figure 1, discharge is made 50 times at 5 sec. intervals from the capacitor (Cd) charged at DC voltage of specified. <div style="text-align: center; margin-top: 10px;">  </div> <div style="text-align: center; margin-top: 5px;"> Fig.1 Ct: Capacitor under test R2: 100MΩ S: High-voltage switch R3: Surge resistance R1: 1000Ω </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tbody> <tr> <td style="width: 30%;">Cd</td> <td>0.001μF</td> </tr> <tr> <td>Vs</td> <td>DC10kV</td> </tr> </tbody> </table> | | Cd | 0.001μF | Vs | DC10kV | | | | | | | | | | | | | | |
| Cd | 0.001μF | | | | | | | | | | | | | | | | | | | | |
| Vs | DC10kV | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | |

5


Continued on the following page.

DEJ Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | |
|---------------------|---|---|--|-------|--------------------|---|-------------------|---|-------------------|
| 10 | Appearance | No marked defect | As shown in figure, the lead wires should be immersed in solder of $350\pm 10^{\circ}\text{C}$ up to 1.5 to 2.0mm from the root of terminal for 3.5 ± 0.5 sec. Pre-treatment: Capacitor should be stored at $85\pm 2^{\circ}\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. | | | | | | |
| | I.R. | 1000M Ω min. | | | | | | | |
| | Dielectric Strength | Per Item 6 | | | | | | | |
| 11 | Appearance | No marked defect | First the capacitor should be stored at $120+0/-5^{\circ}\text{C}$ for $60+0/-5$ sec. Then, as in figure, the lead wires should be immersed in solder of $260+0/-5^{\circ}\text{C}$ 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 $85\pm 2^{\circ}\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. | | | | | | |
| | I.R. | 1000M Ω min. | | | | | | | |
| | Dielectric Strength | Per Item 6 | | | | | | | |
| 12 | Appearance | No marked defect | The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions. | | | | | | |
| | Capacitance | Within the specified tolerance | | | | | | | |
| | D.F. | <table border="1"> <thead> <tr> <th>Char.</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>D.F. $\leq 2.5\%$</td> </tr> <tr> <td>F</td> <td>D.F. $\leq 5.0\%$</td> </tr> </tbody> </table> | | Char. | Specifications | E | D.F. $\leq 2.5\%$ | F | D.F. $\leq 5.0\%$ |
| Char. | Specifications | | | | | | | | |
| E | D.F. $\leq 2.5\%$ | | | | | | | | |
| F | D.F. $\leq 5.0\%$ | | | | | | | | |
| 13 | Solvent Resistance | Appearance: No marked defect | The capacitor should be immersed into a isopropyl alcohol for 30 ± 5 sec. | | | | | | |
| 14 | Appearance | No marked defect | Set the capacitor for 500 ± 12 hrs. at $40\pm 2^{\circ}\text{C}$ in 90 to 95% relative humidity. Pre-treatment: Capacitor should be stored at $85\pm 2^{\circ}\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | | | | | | |
| | Capacitance Change | <table border="1"> <thead> <tr> <th>Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Within $\pm 20\%$</td> </tr> <tr> <td>F</td> <td>Within $\pm 30\%$</td> </tr> </tbody> </table> | | Char. | Capacitance Change | E | Within $\pm 20\%$ | F | Within $\pm 30\%$ |
| | Char. | Capacitance Change | | | | | | | |
| | E | Within $\pm 20\%$ | | | | | | | |
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| Char. | Specifications | | | | | | | | |
| E | D.F. $\leq 5.0\%$ | | | | | | | | |
| F | D.F. $\leq 7.5\%$ | | | | | | | | |
| I.R. | 1000M Ω min. | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | |
| 15 | Appearance | No marked defect | The capacitor should be subjected to $40\pm 2^{\circ}\text{C}$, relative humidity of 90 to 98% for 8 hrs., and then removed in room temperature for 16 hrs. until 5 cycles. Pre-treatment: Capacitor should be stored at $85\pm 2^{\circ}\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | | | | | | |
| | Capacitance Change | <table border="1"> <thead> <tr> <th>Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Within $\pm 20\%$</td> </tr> <tr> <td>F</td> <td>Within $\pm 30\%$</td> </tr> </tbody> </table> | | Char. | Capacitance Change | E | Within $\pm 20\%$ | F | Within $\pm 30\%$ |
| | Char. | Capacitance Change | | | | | | | |
| | E | Within $\pm 20\%$ | | | | | | | |
| | F | Within $\pm 30\%$ | | | | | | | |
| D.F. | <table border="1"> <thead> <tr> <th>Char.</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>D.F. $\leq 5.0\%$</td> </tr> <tr> <td>F</td> <td>D.F. $\leq 7.5\%$</td> </tr> </tbody> </table> | Char. | Specifications | E | D.F. $\leq 5.0\%$ | F | D.F. $\leq 7.5\%$ | | |
| Char. | Specifications | | | | | | | | |
| E | D.F. $\leq 5.0\%$ | | | | | | | | |
| F | D.F. $\leq 7.5\%$ | | | | | | | | |
| I.R. | 1000M Ω min. | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | |

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

Continued on the following page. 

DEJ Series Specifications and Test Methods

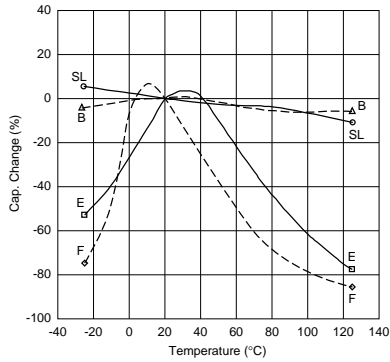
Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|---|---|--|---------------------|--------------------|-----------|---|------------------|-------------|---|----------|----|---|------------|---|---|---------|----|---|------------|---|-------------------|--|--|--|------|------------------|------------|-----------------|---|---------|----|-------------|---|-----|----|------------|
| 16 | Humidity Loading | Appearance | No marked defect | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Capacitance Change | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Within ±20%</td> </tr> <tr> <td>F</td> <td>Within ±30%</td> </tr> </tbody> </table> | Char. | Capacitance Change | E | Within ±20% | F | Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | E | Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | F | Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Char.</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>D.F. ≤5.0%</td> </tr> <tr> <td>F</td> <td>D.F. ≤7.5%</td> </tr> </tbody> </table> | Char. | Specifications | E | D.F. ≤5.0% | F | D.F. ≤7.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Char. | Specifications | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | D.F. ≤5.0% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | D.F. ≤7.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Apply the rated voltage for 500±12 hrs. at 40±2°C in 90 to 95% relative humidity. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Life | Appearance | No marked defect | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Capacitance Change | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Within ±20%</td> </tr> <tr> <td>F</td> <td>Within ±30%</td> </tr> </tbody> </table> | Char. | Capacitance Change | E | Within ±20% | F | Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | E | Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Apply a voltage of Table 2 for 1500 hrs. at 85±2°C, relative humidity 50% max. <div style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 50%;">Applied Voltage</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;"><Table 2></td> <td style="text-align: center;">AC500V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec.</td> </tr> </tbody> </table> </div> Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. | | Applied Voltage | <Table 2> | AC500V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Applied Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <Table 2> | AC500V(r.m.s.), except that once each hour the voltage is increased to AC1000V(r.m.s.) for 0.1 sec. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | Flame Test | The capacitor flame discontinued as follows. | The capacitor should be subjected to applied flame for 15 sec. and then removed for 15 sec. until 3 cycles are completed. <div style="text-align: right;"> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Cycle</th> <th>Time (sec.)</th> </tr> </thead> <tbody> <tr> <td>1 to 2</td> <td>15 max.</td> </tr> <tr> <td>3</td> <td>60 max.</td> </tr> </tbody> </table> | | Cycle | Time (sec.) | 1 to 2 | 15 max. | 3 | 60 max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cycle | Time (sec.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 2 | 15 max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 60 max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | Robustness of Terminations | Tensile | Lead wire should not be cut off. Capacitor should not be broken. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 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. <div style="text-align: right;"> </div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | Temperature and Immersion Cycle | Appearance | No marked defect | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Capacitance Change | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Char.</th> <th>Capacitance Change</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>Within ±20%</td> </tr> <tr> <td>F</td> <td>Within ±30%</td> </tr> </tbody> </table> | Char. | Capacitance Change | E | Within ±20% | F | Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | Char. | Capacitance Change | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | E | Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | F | Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Char.</th> <th>Specifications</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>D.F. ≤5.0%</td> </tr> <tr> <td>F</td> <td>D.F. ≤7.5%</td> </tr> </tbody> </table> | Char. | Specifications | E | D.F. ≤5.0% | F | D.F. ≤7.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Char. | Specifications | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | D.F. ≤5.0% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | D.F. ≤7.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength | Per Item 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. <div style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;"><Temperature Cycle></th> </tr> <tr> <th style="width: 15%;">Step</th> <th style="width: 45%;">Temperature (°C)</th> <th style="width: 40%;">Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25+0/-3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>85+3/-0</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>3</td> </tr> </tbody> </table> Cycle time: 5 cycle </div> <div style="text-align: center;"> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;"><Immersion Cycle></th> </tr> <tr> <th style="width: 10%;">Step</th> <th style="width: 30%;">Temperature (°C)</th> <th style="width: 15%;">Time (min)</th> <th style="width: 45%;">Immersion Water</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>65+5/-0</td> <td>15</td> <td>Clean water</td> </tr> <tr> <td>2</td> <td>0±3</td> <td>15</td> <td>Salt water</td> </tr> </tbody> </table> Cycle time: 2 cycle </div> Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. | <Temperature Cycle> | | | Step | Temperature (°C) | Time (min) | 1 | -25+0/-3 | 30 | 2 | Room temp. | 3 | 3 | 85+3/-0 | 30 | 4 | Room temp. | 3 | <Immersion Cycle> | | | | Step | Temperature (°C) | Time (min) | Immersion Water | 1 | 65+5/-0 | 15 | Clean water | 2 | 0±3 | 15 | Salt water |
| <Temperature Cycle> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | -25+0/-3 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Room temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 85+3/-0 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Room temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <Immersion Cycle> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | Immersion Water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 65+5/-0 | 15 | Clean water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0±3 | 15 | Salt water | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

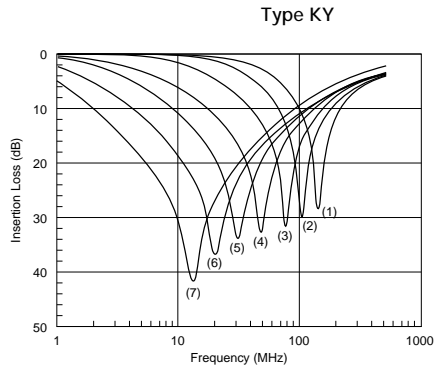
*1 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Safety Recognized Ceramic Capacitors Characteristics Data (Typical Example)

■ Capacitance - Temperature Characteristics

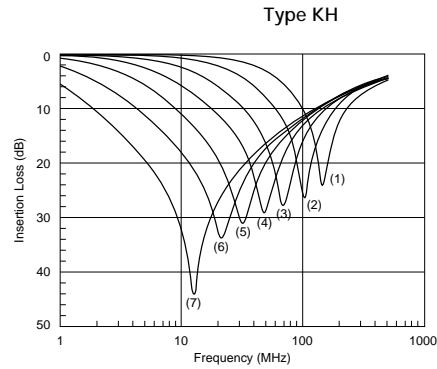


■ Insertion Loss - Frequency Characteristics



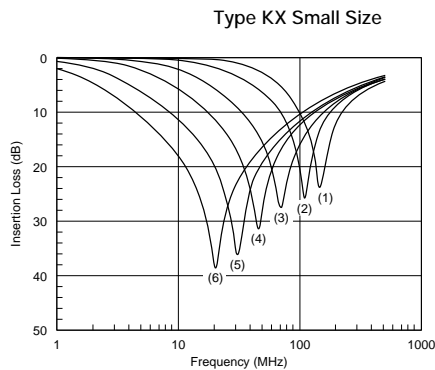
Type KY
 Signal power: 1mW
 AC240V(r.m.s.) / 60Hz is applied on the capacitor.

- (1) DE2B3KY101KA2BM01
- (2) DE2B3KY221KA2BM01
- (3) DE2B3KY471KA2BM01
- (4) DE2E3KY102MA2BM01
- (5) DE2E3KY222MA2BM01
- (6) DE2E3KY472MA2BM01
- (7) DE2F3KY103MA3BM02



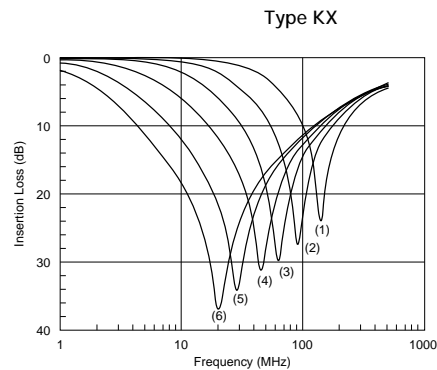
Type KH
 Signal power: 1mW
 AC240V(r.m.s.) / 60Hz is applied on the capacitor.

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



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

- (1) DE1B3KX101KA4BL01
- (2) DE1B3KX221KA4BL01
- (3) DE1B3KX471KA4BL01
- (4) DE1E3KX102MA4BL01
- (5) DE1E3KX222MA4BL01
- (6) DE1E3KX472MA4BL01

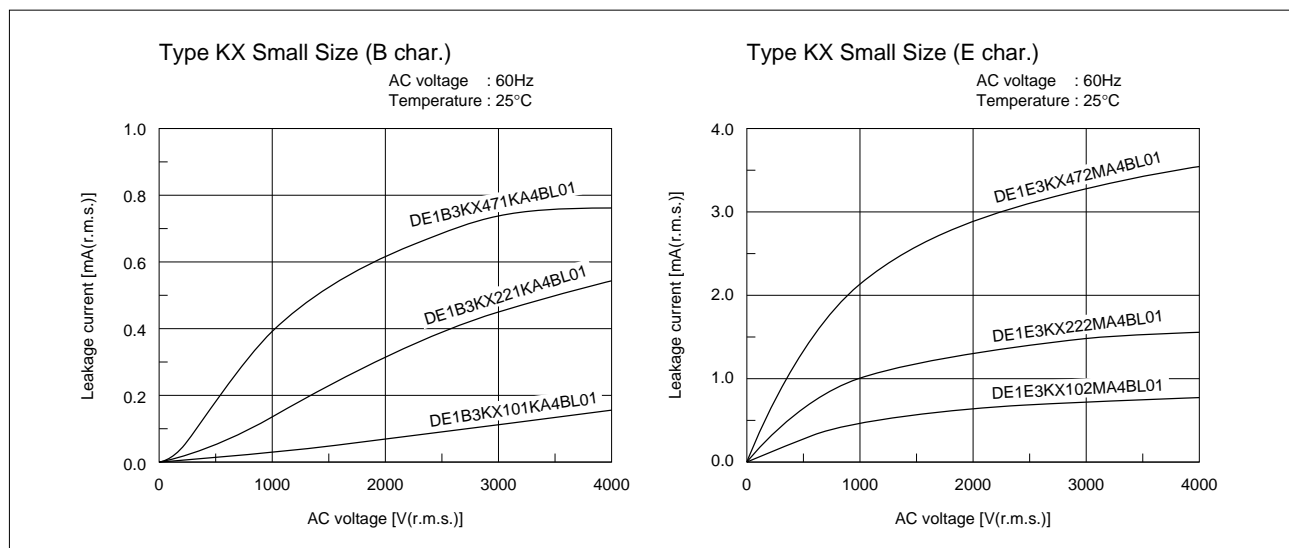
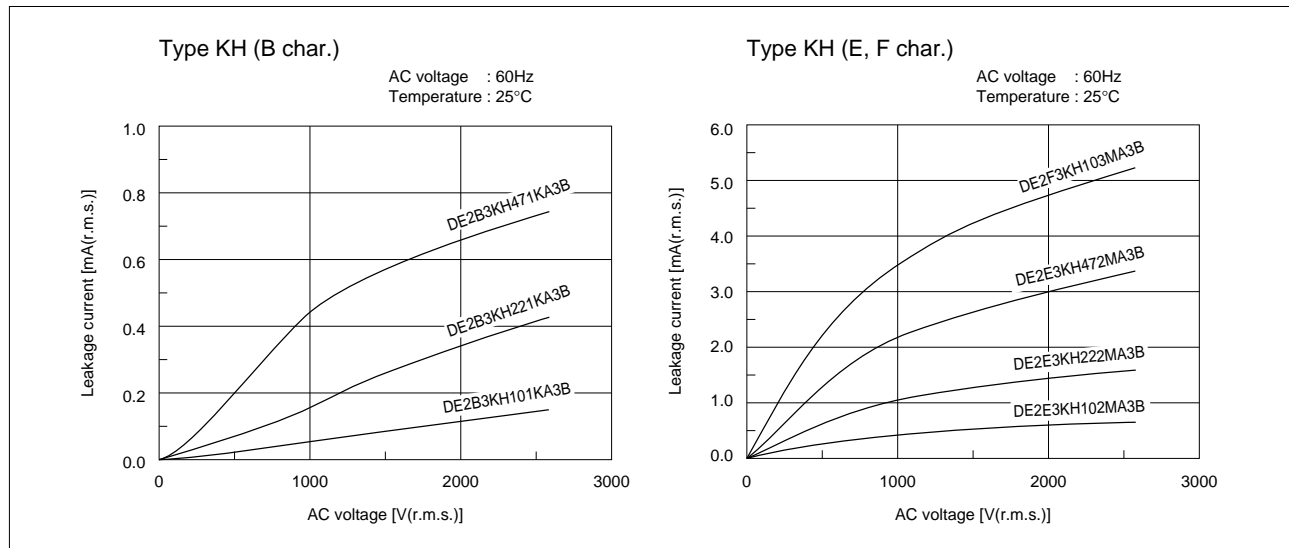
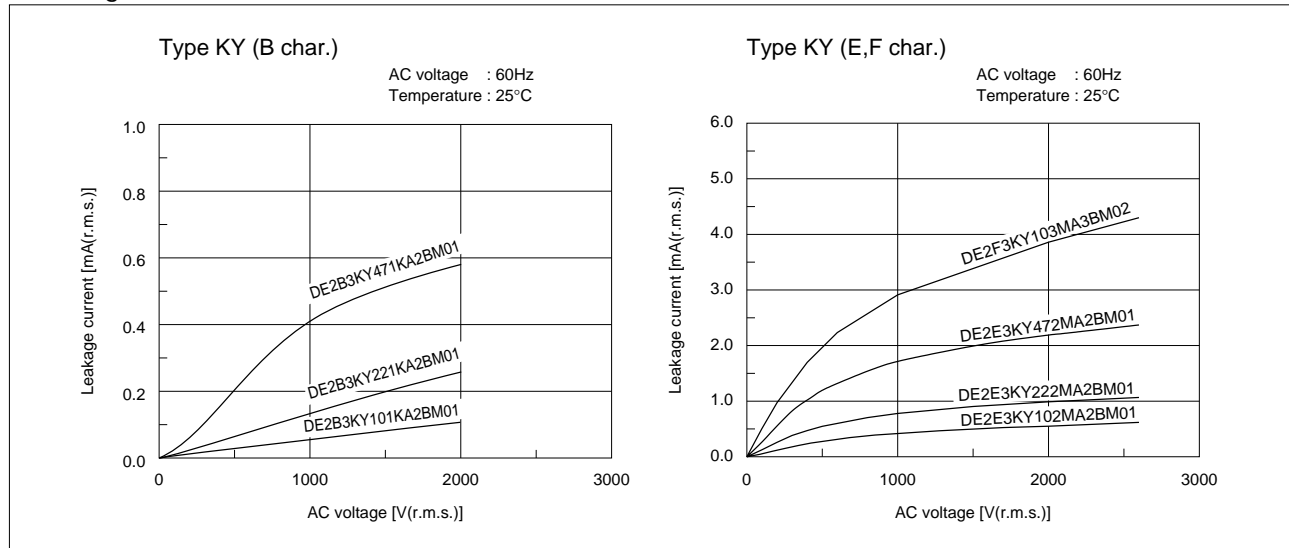


Type KX
 Signal power: 1mW
 AC240V(r.m.s.) / 60Hz is applied on the capacitor.

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

Safety Recognized Ceramic Capacitors Characteristics Data (Typical Example)

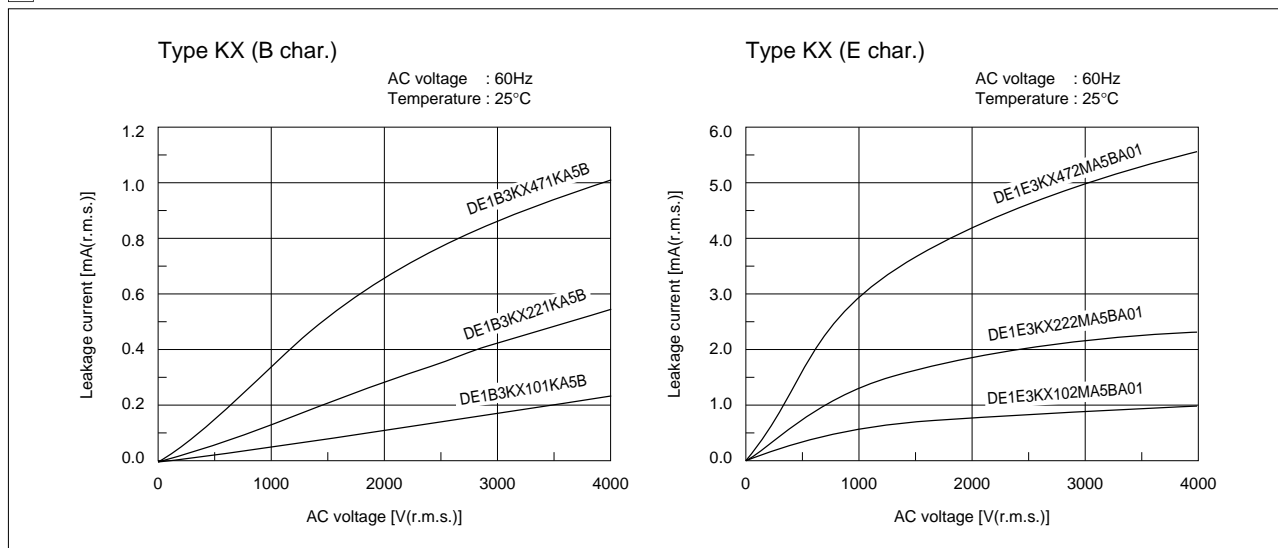
Leakage Current Characteristics



Continued on the following page.

Safety Recognized Ceramic Capacitors Characteristics Data (Typical Example)

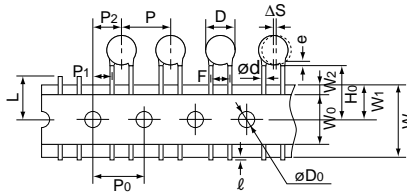
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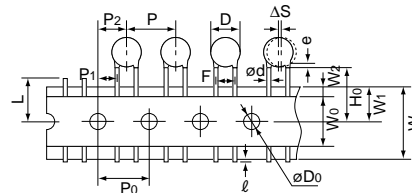
Safety Recognized Ceramic Capacitors Packaging

Taping Specifications

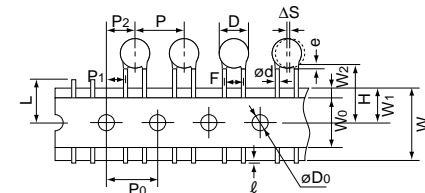
- 12.7mm pitch / lead spacing 5mm taping
Vertical crimp type
(Lead Code: N2)



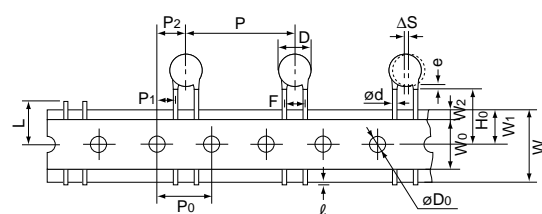
- 15mm pitch / lead spacing 7.5mm taping
Vertical crimp type
(Lead Code: N3)



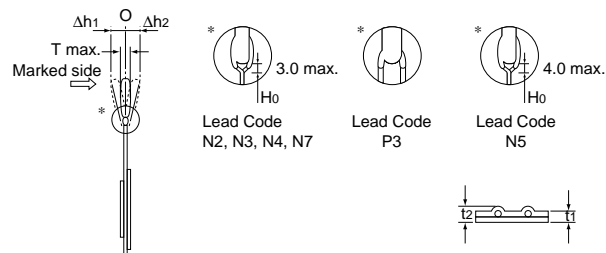
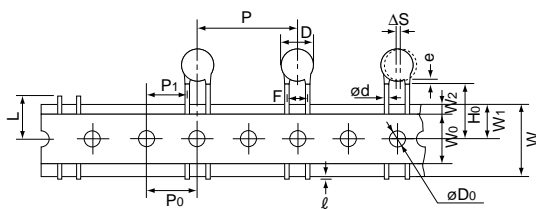
- 15mm pitch / lead spacing 7.5mm taping
Straight type
(Lead Code: P3)



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



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



| Item | Code | N2 | N3 | P3 | N7 | N4 | N5 |
|---|-----------------|--|----------|--------------------------------------|------------------------------------|----------|--------------------------------------|
| Pitch of component | P | 12.7 | 15.0 | 15.0 | 30.0 | 25.4 | |
| Pitch of sprocket hole | P ₀ | 12.7±0.3 | 15.0±0.3 | 15.0±0.3 | 15.0±0.3 | 12.7±0.3 | |
| Lead spacing | F | 5.0 ^{+0.8} _{-0.2} | 7.5±1.0 | 7.5±1.0 | 7.5±1.0 | 10.0±1.0 | |
| Length from hole center to component center | P ₂ | 6.35±1.3 | 7.5±1.5 | 7.5±1.5 | 7.5±1.5 | — | |
| Length from hole center to lead | P ₁ | 3.85±0.7 | 3.75±1.0 | 3.75±1.0 | 3.75±1.0 | 7.7±1.5 | |
| Body diameter | D | See the individual product specifications. | | | | | |
| Deviation along tape, left or right | ΔS | 0±1.0 | 0±2.0 | | | | |
| Carrier tape width | W | 18.0±0.5 | | | | | |
| Position of sprocket hole | W ₁ | 9.0±0.5 | | | | | |
| Lead distance between reference and bottom planes | H ₀ | 18.0 ^{+2.0} ₋₀ | — | | 18.0 ^{+2.0} ₋₀ | | |
| | H | — | | 20.0 ^{+1.5} _{-1.0} | | — | |
| Protrusion length | ℓ | +0.5 to -1.0 | | | | | |
| Diameter of sprocket hole | øD ₀ | 4.0±0.1 | | | | | |
| Lead diameter | ød | 0.6±0.05 | | | | | 0.6 ^{+0.1} _{-0.05} |
| Total tape thickness | t ₁ | 0.6±0.3 | | | | | |
| Total thickness, tape and lead wire | t ₂ | 1.5 max. | | | | | |
| Body thickness | T | See the individual product specifications. | | | | | |
| Portion to cut in case of defect | L | 11.0 ⁺⁰ _{-1.0} | | | | | |
| Hold down tape width | W ₀ | 11.5 min. | | | | | |
| Hold down tape position | W ₂ | 1.5±1.5 | | | | | |
| Coating extension on lead | e | Up to the end of crimp | | 3.0 max. | Up to the end of crimp | | |
| Deviation across tape, front | Δh ₁ | 1.0 max. | | 2.0 max. | | | |
| Deviation across tape, rear | Δh ₂ | 2.0 max. | | | | | |

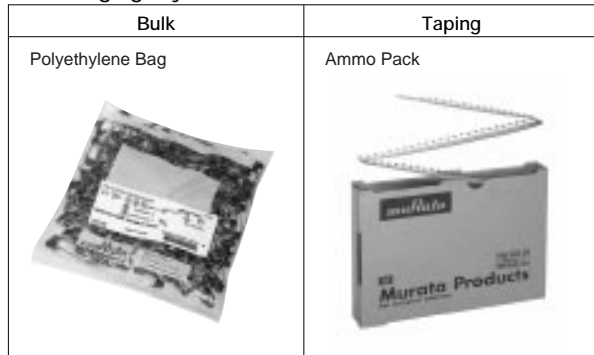
(in mm)

Continued on the following page.

Safety Recognized Ceramic Capacitors Packaging

Continued from the preceding page.

■ Packaging Styles



■ Minimum Quantity (Order in Sets Only)

[Bulk] 1,000 pcs.

[Taping] (pcs.)

| Lead Code | Type KY | Type KH | Type KX | DEJ Series |
|---------------|---------|---------|---------|------------|
| N2 | 1,000 | – | – | 1,500 |
| N3, P3 | 900 | 900 | – | 1,000 |
| N7 | – | 400 | – | – |
| 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.)

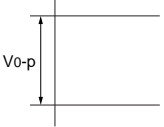
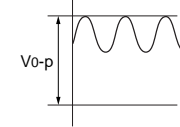
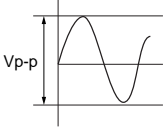
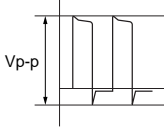
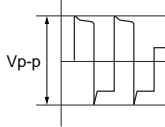
Safety Recognized Ceramic Capacitors ⚠Caution

■ ⚠Caution (Rating)

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the V_{p-p} value of the applied voltage or the V_{0-p} which contains DC bias within the rated voltage range.

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

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

2. Operating Temperature and Self-generated Heat

(Apply to B/E/F Char.)


Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in a high-frequency current, pulse current or similar current, it may have self-generated heat due to dielectric loss. Applied voltage load should be such that self-generated heat is within 20°C under the condition where the capacitor is subjected to an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of $\phi 0.1\text{mm}$ 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. 

Safety Recognized Ceramic Capacitors ⚠Caution

☒ Continued from the preceding page.

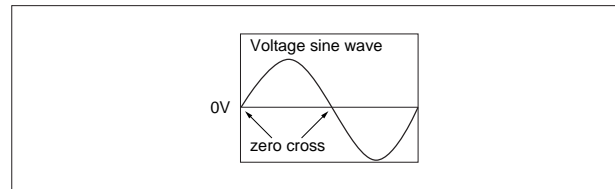
(2) Voltage Applied Method

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

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

Safety Recognized Ceramic Capacitors ⚠Caution

■ ⚠Caution (Storage and Operating Condition)

Operating and Storage Environment

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

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

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

■ ⚠Caution (Soldering and Mounting)

1. Vibration and Impact

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

2. Soldering

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

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

Temperature of iron-tip: 400 degrees C. max.

Soldering iron wattage: 50W max.

Soldering time: 3.5 sec. max.

3. Bonding, 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 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 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



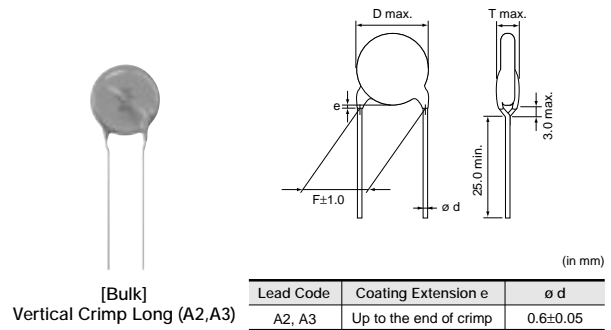
DES Series (125 deg. C Guaranteed/Low-dissipation Factor/DC500V-1kV)

■ Features

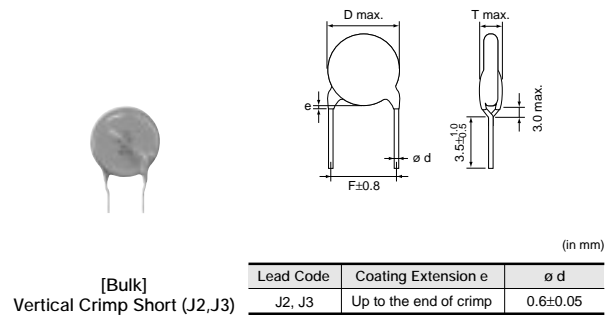
1. Low dissipation factor series which can be used for power supplies with an increased switching frequency.
2. The allowable power in the 100 to 300kHz band is improved to approximately one-and-a-half times that of DEH series while remaining the same size.
3. Operating temperature range is guaranteed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

■ Applications

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



[Bulk]
Vertical Crimp Long (A2,A3)



[Bulk]
Vertical Crimp Short (J2,J3)

■ Marking

| Nominal Body Diameter | Rated Voltage | |
|-------------------------------|--|-------|
| | DC500V | DC1KV |
| ø6mm | | |
| ø7-9mm | | |
| ø10-17mm | | |
| 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 | |

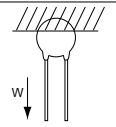
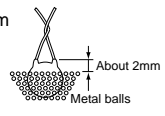
D Characteristics

| Part Number | DC Rated Voltage (V) | 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 | Specifications | Test 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. | | | | | | | | | | | | |
| 4 | Dielectric Strength | 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) | | | | | | | | | | | | |
| | | 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. | | | | | | | | | | | | |
| 8 | Temperature Characteristics | Within +20/-30% (Temp. range: -25 to +125°C) | The capacitance measurement should be made at each step specified in Table. | | | | | | | | | | | | |
| | | Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at room condition* for 24±2 hrs. before measurements. | | | | | | | | | | | | | |
| | | <table border="1" style="margin: auto;"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>20±2</td> <td>-25±3</td> <td>20±2</td> <td>125±2</td> <td>20±2</td> </tr> </tbody> </table> | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 20±2 | -25±3 | 20±2 | 125±2 | 20±2 | |
| 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 | | 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. | | | | | | | | | | | |
| 10 | Vibration Resistance | Appearance | No marked defect | | | | | | | | | | | | |
| | | Capacitance | Within specified tolerance | | | | | | | | | | | | |
| | | D.F. | 0.3% max. | | | | | | | | | | | | |
| 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 an 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 | | | | | | | | | | | | |
| 12 | Soldering Effect (Non-Preheat) | Appearance | 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. 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*. | | | | | | | | | | | | |
| | | Capacitance Change | | Within ±10% | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | | Per item 4. | | | | | | | | | | | |



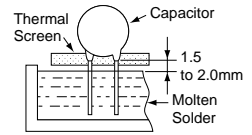
* "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

Continued on the following page.

DES Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | |
|--|--|--------------------|--|------------------|------------------|------------|---|-------|----|---|------------|---|---|-------|----|---|------------|---|
| 13 | Soldering Effect (On-Preheat) | Appearance | 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 in 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*. | | | | | | | | | | | | | | | |
| | Capacitance Change | Within ±10% | | | | | | | | | | | | | | | | |
| | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | |
| 14 | Temperature Cycle | Appearance | The capacitor should be subjected to 5 temperature cycles. <Temperature Cycle> <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25±3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>125±3</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>3</td> </tr> </tbody> </table> Cycle time: 5 cycle 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*. | Step | Temperature (°C) | Time (min) | 1 | -25±3 | 30 | 2 | Room Temp. | 3 | 3 | 125±3 | 30 | 4 | Room Temp. | 3 |
| | | Step | | Temperature (°C) | Time (min) | | | | | | | | | | | | | |
| | | 1 | | -25±3 | 30 | | | | | | | | | | | | | |
| | | 2 | | Room Temp. | 3 | | | | | | | | | | | | | |
| | | 3 | | 125±3 | 30 | | | | | | | | | | | | | |
| 4 | Room Temp. | 3 | | | | | | | | | | | | | | | | |
| Capacitance Change | Within ±10% | | | | | | | | | | | | | | | | | |
| D.F. | 0.4% max. | | | | | | | | | | | | | | | | | |
| I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | |
| Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | |
| 15 | Humidity (Under Steady State) | Appearance | 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 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 1 to 2 hrs. at room condition*. | | | | | | | | | | | | | | | |
| | | Capacitance Change | | Within ±10% | | | | | | | | | | | | | | |
| | | D.F. | | 0.4% max. | | | | | | | | | | | | | | |
| | | I.R. | | 1000MΩ min. | | | | | | | | | | | | | | |
| 16 | Humidity Loading | Appearance | Apply the rated voltage for 500+24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. (Charge/Discharge current≤50mA) 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 1 to 2 hrs. at room condition*. | | | | | | | | | | | | | | | |
| | | Capacitance Change | | Within ±10% | | | | | | | | | | | | | | |
| | | D.F. | | 0.6% max. | | | | | | | | | | | | | | |
| | | I.R. | | 1000MΩ min. | | | | | | | | | | | | | | |
| 17 | Life | Appearance | Apply a DC voltage of 200% of the rated voltage (DC500V) or 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) 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 at 125±3°C for 1 hr., then placed at room condition* for 24±2 hrs. | | | | | | | | | | | | | | | |
| | | Capacitance Change | | Within ±10% | | | | | | | | | | | | | | |
| | | D.F. | | 0.4% max. | | | | | | | | | | | | | | |
| | | I.R. | | 2000MΩ min. | | | | | | | | | | | | | | |



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

Safety Recognized/High Voltage Ceramic Capacitors



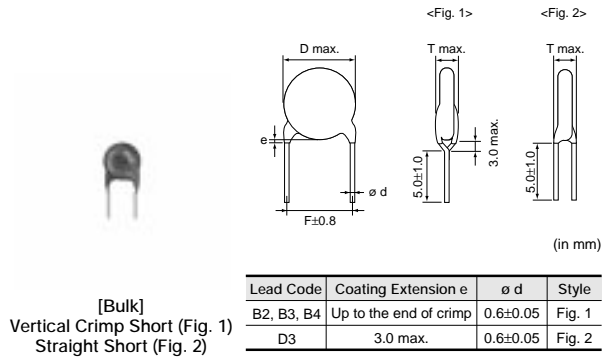
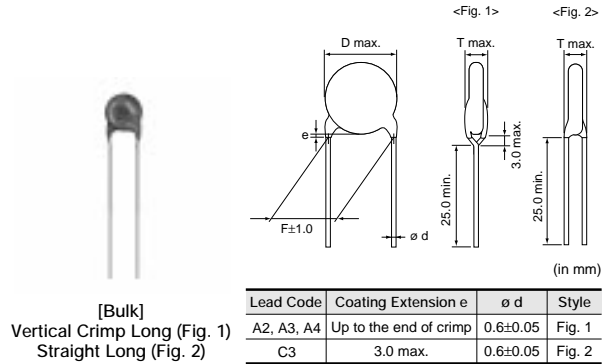
DEH Series (125 deg. C Guaranteed/Low-dissipation Factor/DC250V-3.15kV)

■ Features

1. Reduced heat dissipation permitted due to small dielectric loss of the ceramic material.
2. Operating temperature range is guaranteed up to 125 degrees C.
3. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
4. Taping available for automatic insertion.

■ Applications

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



■ Marking

| Nominal Body Diameter | Rated Voltage | DC250V | DC500V | DC1-3.15kV |
|----------------------------------|---------------|---|---------------------|----------------------------|
| | Temp. Char. | R | C | 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 Temperature Guaranteed Code | | HR | | |
| Temperature Characteristics | | Marked with code (omitted for nominal body diameter ø6mm) | | |
| Nominal Capacitance | | Marked with 3 figures | | |
| Capacitance Tolerance | | Marked with code (omitted for nominal body diameter ø6mm) | | |
| Rated Voltage | DC250V | Marked with code (Marked with horizontal line over nominal capacitance for nominal body diameter ø6mm) | | |
| | DC500V | Omitted | | |
| | DC1-3.15kV | 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 | | |

DC250V, R Characteristics

| Part Number | DC Rated Voltage (V) | 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 (V) | 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 (V) | 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 |

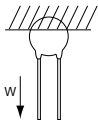
Continued on the following page. 

Continued from the preceding page.


| Part Number | DC Rated Voltage (V) | 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.

DEH Series Specifications and Test Methods

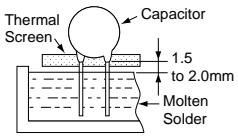
| No. | Item | | Specifications | Test Method | | | | | | | | | | | |
|---|------------------------------|--------------------|---|--|-------------|---|--------------|---------------|------------|-------------|-----------------|------|-------------|---|--|
| 1 | Operating Temperature Range | | -25 to +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. | | | | | | | | | | | |
| 4 | Dielectric Strength | 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) | | | | | | | | | | | |
| | | 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. | The insulation resistance should be measured with DC500±50V (Char. R [DC 250V]: DC100±15V) 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. 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 | | <table border="1"> <thead> <tr> <th rowspan="2">T. C.</th> <th colspan="2">Temp. Char.</th> </tr> <tr> <th>-25 to +85°C</th> <th>+85 to +125°C</th> </tr> </thead> <tbody> <tr> <td>R</td> <td>Within ±15%</td> <td rowspan="2">Within +15/-30%</td> </tr> <tr> <td>C</td> <td>Within ±20%</td> </tr> </tbody> </table> | T. C. | Temp. Char. | | -25 to +85°C | +85 to +125°C | R | Within ±15% | Within +15/-30% | C | Within ±20% | The capacitance measurement should be made at each step specified in Table. | |
| | | | T. C. | | Temp. Char. | | | | | | | | | | |
| -25 to +85°C | +85 to +125°C | | | | | | | | | | | | | | |
| R | Within ±15% | Within +15/-30% | | | | | | | | | | | | | |
| C | Within ±20% | | | | | | | | | | | | | | |
| Pre-treatment: Capacitor should be stored at 125±3°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before measurements. <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>20±2</td> <td>-25±3</td> <td>20±2</td> <td>125±2</td> <td>20±2</td> </tr> </tbody> </table> | | | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 20±2 | -25±3 | 20±2 | 125±2 | 20±2 | |
| 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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec.  | | | | | | | | | | | |
| | | Bending | | 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. | | | | | | | | | | | |
| 10 | Vibration Resistance | Appearance | No marked defect | The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions. | | | | | | | | | | | |
| | | Capacitance | Within specified tolerance | | | | | | | | | | | | |
| | | D.F. | Char. R [DC250V]: 0.4% max. Char. R [DC1 to 3.15kV]: 0.2% max. Char. C: 0.3% max. | | | | | | | | | | | | |
| 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 | | | | | | | | | | | |

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

Continued on the following page. 

DEH Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | |
|--|-----------------------------------|--|---------------------|------|----------------------------------|------------|---|-------------|----|---|------------|---|---|-------------|----|---|------------|---|
| 12 | Soldering Effect (Non-Preheat) | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 10\%$ | | | | | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | |
| <p>The lead wire should be immersed into the melted solder of $350 \pm 10^\circ\text{C}$ up to about 1.5 to 2mm from the main body for 3.5 ± 0.5 sec. Pre-treatment: Capacitor should be stored at $125 \pm 3^\circ\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24 ± 2 hrs. at room condition*1. Measurement order: Dielectric strength -> Pre-treatment -> Capacitance -> Soldering effect test -> Post-treatment -> Capacitance · Dielectric strength (Char. R [DC250V])</p> | | | | | | | | | | | | | | | | | | |
| 13 | Soldering Effect (On-Preheat) | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 10\%$ | | | | | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | |
| <p>First the capacitor should be stored at $120 + 0 / - 5^\circ\text{C}$ for $60 + 0 / - 5$ sec. Then, as in figure, the lead wires should be immersed in solder of $260 + 0 / - 5^\circ\text{C}$ 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 $125 \pm 3^\circ\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24 ± 2 hrs. at room condition*1. Measurement order: Dielectric strength -> Pre-treatment -> Capacitance -> Soldering effect test -> Post-treatment -> Capacitance · Dielectric strength (Char. R [DC250V])</p> <div style="text-align: right;">  </div> | | | | | | | | | | | | | | | | | | |
| 14 | Temperature Cycle | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 10\%$ | | | | | | | | | | | | | | | |
| | | D.F. | 0.4% max. | | | | | | | | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | |
| <p>The capacitor should be subjected to 5 temperature cycles. <Temperature Cycle></p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th>Step</th> <th>Temperature ($^\circ\text{C}$)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">-25 ± 3</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room Temp.</td> <td style="text-align: center;">3</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">125 ± 3</td> <td style="text-align: center;">30</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room Temp.</td> <td style="text-align: center;">3</td> </tr> </tbody> </table> <p style="text-align: right;">Cycle time: 5 cycle</p> <p>Pre-treatment: Capacitor should be stored at $125 \pm 3^\circ\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 24 ± 2 hrs. at room condition*1. 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])</p> | | | | Step | Temperature ($^\circ\text{C}$) | Time (min) | 1 | -25 ± 3 | 30 | 2 | Room Temp. | 3 | 3 | 125 ± 3 | 30 | 4 | Room Temp. | 3 |
| Step | Temperature ($^\circ\text{C}$) | Time (min) | | | | | | | | | | | | | | | | |
| 1 | -25 ± 3 | 30 | | | | | | | | | | | | | | | | |
| 2 | Room Temp. | 3 | | | | | | | | | | | | | | | | |
| 3 | 125 ± 3 | 30 | | | | | | | | | | | | | | | | |
| 4 | Room Temp. | 3 | | | | | | | | | | | | | | | | |
| 15 | Humidity (Under Steady State) | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 10\%$ | | | | | | | | | | | | | | | |
| | | D.F. | 0.4% max. | | | | | | | | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | | | | | | | | |
| <p>Set the capacitor for $500 + 24 / - 0$ hrs. at $40 \pm 2^\circ\text{C}$ in 90 to 95% relative humidity. Pre-treatment: Capacitor should be stored at $125 \pm 3^\circ\text{C}$ for 1 hr., then placed at room condition*1 for 24 ± 2 hrs. before initial measurements. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. Measurement order: I.R. -> Pre-treatment -> Capacitance · D.F. -> Humidity test -> Post-treatment -> Capacitance · D.F. · I.R. (Char. R [DC250V])</p> | | | | | | | | | | | | | | | | | | |

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

Continued on the following page.

DEH Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method |
|-----|------------------|--------------------|---|
| 16 | Humidity Loading | Appearance | No marked defect |
| | | Capacitance Change | Within $\pm 10\%$ |
| | | D.F. | 0.6% max. |
| | | I.R. | 1000M Ω min. |
| 17 | Life | Appearance | No marked defect |
| | | Capacitance Change | Within $\pm 10\%$ |
| | | D.F. | 0.4% max. |
| | | I.R. | Char. R [DC1 to 3.15kV], Char. C : 2000M Ω min. Char. R [DC250V]: 1000M Ω min. |

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

*2 The measurement of I.R. will be held in 1 to 2 hrs. after Humidity loading test.

*3 The measurement of I.R. will be held in 12 to 24 hrs. after Life test.

Safety Recognized/High Voltage Ceramic Capacitors



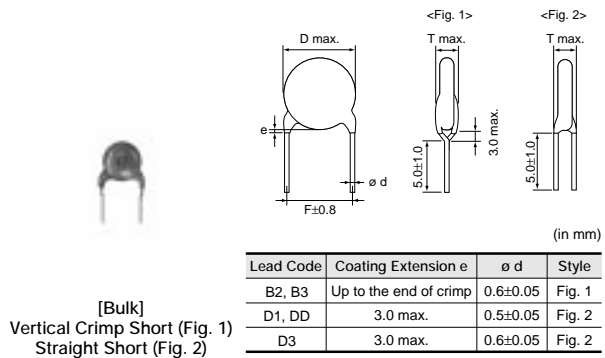
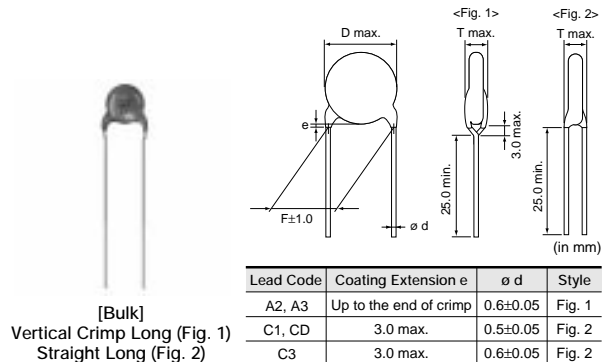
DEA Series (125 deg. C Guaranteed/Class 1/DC1k-3.15kV)

■ Features

1. Temperature compensating type ceramics realize low heat dissipation than DEH/DES series.
2. Operating temperature range is guaranteed up to 125 degrees C.
3. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
4. Taping available for automatic insertion.

■ Applications

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



■ Marking

| Nominal Body Diameter | Temp. Char. | SL |
|-------------------------------|---|---------------------|
| 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 M (omitted for nominal body diameter ø9mm and under) | |
| Manufactured Date Code | Abbreviation (omitted for nominal body diameter ø5mm and under) | |

SL Characteristics

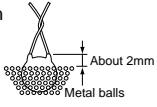
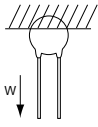
| Part Number | DC Rated Voltage (V) | Capacitance (pF) | Body Dia. D (mm) | Lead Spacing F (mm) | Body Thickness T (mm) | Lead Package Long Bulk | Lead Package Short Bulk | Lead Package Taping |
|----------------|----------------------|------------------|------------------|---------------------|-----------------------|------------------------|-------------------------|---------------------|
| 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 | B2B | N2A |
| DEA1X3A471J□□□ | 1000 | 470 ±5% | 11 | 5.0 | 4.0 | A2B | B2B | N2A |
| DEA1X3A561J□□□ | 1000 | 560 ±5% | 12 | 7.5 | 4.0 | A3B | B3B | N3A |
| DEA1X3D100J□□□ | 2000 | 10 ±5% | 4.5 | 5.0 | 5.0 | C1B | D1B | P2A |
| DEA1X3D120J□□□ | 2000 | 12 ±5% | 4.5 | 5.0 | 5.0 | C1B | D1B | P2A |
| 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 | P3A |
| DEA1X3F390J□□□ | 3150 | 39 ±5% | 6 | 7.5 | 6.0 | C3B | D3B | P3A |
| DEA1X3F470J□□□ | 3150 | 47 ±5% | 7 | 7.5 | 6.0 | C3B | D3B | P3A |
| DEA1X3F560J□□□ | 3150 | 56 ±5% | 7 | 7.5 | 6.0 | C3B | D3B | P3A |

Continued from the preceding page.

| Part Number | DC Rated Voltage (V) | 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. | Item | Specifications | Test 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. | | | | | | | | | | |
| 4 | Dielectric Strength | 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) | | | | | | | | | | |
| | | 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±0.2MHz and AC5V(r.m.s.) max. | | | | | | | | | | |
| 7 | Q | 400+20C ⁺² min. (30pF under) 1000 min. (30pF min.) | The Q should be measured at 20°C with 1±0.2MHz and AC5V(r.m.s.) max. | | | | | | | | | | |
| 8 | Temperature Characteristics | +350 to -1000ppm/°C (Temp. range: +20 to +85°C) | The capacitance measurement should be made at each step specified in Table. | | | | | | | | | | |
| | | <table border="1"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>20±2</td> <td>-25±3</td> <td>20±2</td> <td>85±2</td> <td>20±2</td> </tr> </tbody> </table> | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±2 |
| Step | 1 | 2 | 3 | 4 | 5 | | | | | | | | |
| Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec.  | | | | | | | | | | |
| | | Bending | 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. | | | | | | | | | | |
| 10 | Vibration Resistance | Appearance | No marked defect | | | | | | | | | | |
| | | Capacitance | Within specified tolerance | | | | | | | | | | |
| | | Q | 400+20C ⁺² min. (30pF under) 1000 min. (30pF min.) | | | | | | | | | | |
| 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 an 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 | | | | | | | | | | |
| 12 | Soldering Effect (Non-Preheat) | Appearance | No marked defect | | | | | | | | | | |
| | | Capacitance Change | Within ±2.5% | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | |
| | | The lead wire should be immersed into the melted solder of 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.) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | | | | | | | | | | | |

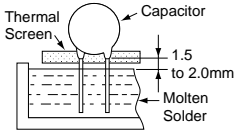
*1 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

*2 "C" expresses nominal capacitance value (pF).

Continued on the following page. 

DEA Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | |
|------|----------------------------------|--|---|------|----------------------------------|------------|---|-------------|----|---|------------|---|---|-------------|----|---|------------|---|
| 13 | Soldering Effect (On-Preheat) | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 2.5\%$ | | | | | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | |
| | | | <p>First the capacitor should be stored at $120 \pm 0 / -5^\circ\text{C}$ for $60 \pm 0 / -5$ sec.</p> <p>Then, as in figure, the lead wires should be immersed in solder of $260 \pm 0 / -5^\circ\text{C}$ up to 1.5 to 2.0mm from the root of terminal for $7.5 \pm 0 / -1$ sec.</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1.</p> <div style="text-align: right;">  </div> | | | | | | | | | | | | | | | |
| 14 | Temperature Cycle | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 5\%$ | | | | | | | | | | | | | | | |
| | | Q | $275 \pm 5 / 2\text{C}^{*2}$ min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | |
| | | | <p>The capacitor should be subjected to 5 temperature cycles.</p> <p><Temperature Cycle></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Step</th> <th>Temperature ($^\circ\text{C}$)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25 ± 3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>125 ± 3</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>3</td> </tr> </tbody> </table> <p style="text-align: center;">Cycle time: 5 cycle</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1.</p> | Step | Temperature ($^\circ\text{C}$) | Time (min) | 1 | -25 ± 3 | 30 | 2 | Room Temp. | 3 | 3 | 125 ± 3 | 30 | 4 | Room Temp. | 3 |
| Step | Temperature ($^\circ\text{C}$) | Time (min) | | | | | | | | | | | | | | | | |
| 1 | -25 ± 3 | 30 | | | | | | | | | | | | | | | | |
| 2 | Room Temp. | 3 | | | | | | | | | | | | | | | | |
| 3 | 125 ± 3 | 30 | | | | | | | | | | | | | | | | |
| 4 | Room Temp. | 3 | | | | | | | | | | | | | | | | |
| 15 | Humidity (Under Steady State) | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 5\%$ | | | | | | | | | | | | | | | |
| | | Q | $275 \pm 5 / 2\text{C}^{*2}$ min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | | | | | | | | |
| | | | <p>Set the capacitor for $500 \pm 24 / -0$ hrs. at $40 \pm 2^\circ\text{C}$ in 90 to 95% relative humidity.</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1.</p> | | | | | | | | | | | | | | | |
| 16 | Humidity Loading | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 5\%$ | | | | | | | | | | | | | | | |
| | | Q | $275 \pm 5 / 2\text{C}^{*2}$ min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | |
| | | I.R. | 1000M Ω min. | | | | | | | | | | | | | | | |
| | | | <p>Apply the rated voltage for $500 \pm 24 / -0$ hrs. at $40 \pm 2^\circ\text{C}$ in 90 to 95% relative humidity. (Charge/Discharge current $\leq 50\text{mA}$)</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1.</p> | | | | | | | | | | | | | | | |
| 17 | Life | Appearance | No marked defect | | | | | | | | | | | | | | | |
| | | Capacitance Change | Within $\pm 3\%$ | | | | | | | | | | | | | | | |
| | | Q | $275 \pm 5 / 2\text{C}^{*2}$ min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | |
| | | I.R. | 2000M Ω min. | | | | | | | | | | | | | | | |
| | | | <p>Apply a DC voltage of 150% of the rated voltage for $1000 \pm 48 / -0$ hrs. at $125 \pm 2^\circ\text{C}$ with a relative humidity of 50% max. (Charge/Discharge current $\leq 50\text{mA}$)</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1.</p> | | | | | | | | | | | | | | | |

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

*2 "C" expresses nominal capacitance value (pF).

Safety Recognized/High Voltage Ceramic Capacitors



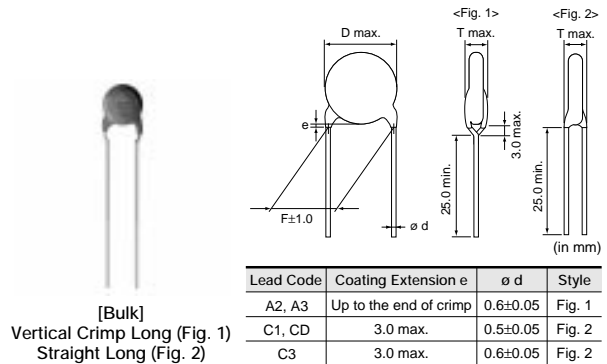
DEB Series (Class 2/DC1k-3.15kV)

■ Features

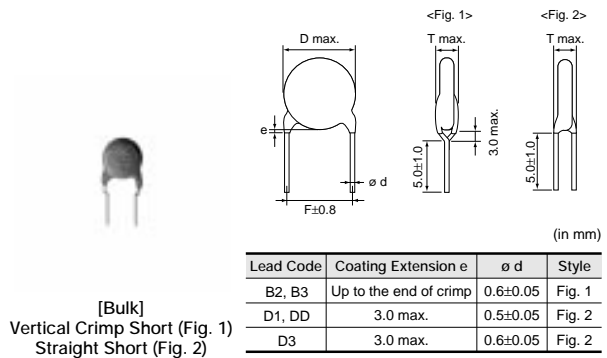
1. Small size and high capacitance
2. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
3. Taping available for automatic insertion.

■ Applications

Ideal for use on decoupling circuits for power supplies.



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



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

9

■ Marking

| Nominal Body Diameter | Temp. Char. | B | E | F |
|-------------------------------|-------------|---|--------------------------|---------------------|
| | ø4.5-5mm | | 221 3KV | 102 1KV |
| 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 and E (omitted for nominal body diameter 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 nominal body diameter ø5mm and under) | | |

B Characteristics

| Part Number | DC Rated Voltage (V) | 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 (V) | 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 |

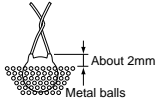
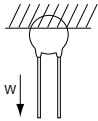
Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

F Characteristics

| Part Number | DC Rated Voltage (V) | 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

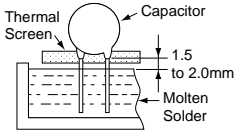
| No. | Item | Specifications | Test Method | | | | | | | | | |
|------------|--------------------------------|---|--|------|------|---|---|---|---|------------|------|-------|
| 1 | Operating Temperature Range | -25 to +85°C | | | | | | | | | | |
| 2 | Appearance and Dimensions | No marked defect on 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. | | | | | | | | | |
| 4 | Dielectric Strength | 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) | | | | | | | | | |
| | 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. | | | | | | | | | |
| 8 | Temperature Characteristics | 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. | | | | | | | | | |
| | | Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition* for 24±2 hrs. before measurements. <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="font-size: small;">Step</th> <th style="font-size: small;">1</th> <th style="font-size: small;">2</th> <th style="font-size: small;">3</th> <th style="font-size: small;">4</th> <th style="font-size: small;">5</th> </tr> </thead> <tbody> <tr> <td style="font-size: x-small;">Temp. (°C)</td> <td style="font-size: x-small;">20±2</td> <td style="font-size: x-small;">-25±3</td> <td style="font-size: x-small;">20±2</td> <td style="font-size: x-small;">85±2</td> <td style="font-size: x-small;">20±2</td> </tr> </tbody> </table> | | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 20±2 | -25±3 |
| Step | 1 | 2 | 3 | 4 | 5 | | | | | | | |
| Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±2 | 20±2 | | | | | | | |
| 9 | Strength of Lead | 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 (5N for lead diameter 0.5mm), and keep it for 10±1 sec.  | | | | | | | | | |
| | | | 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. | | | | | | | | | |
| 10 | Vibration Resistance | Appearance | The capacitor should be firmly soldered to the supporting lead wire and vibrated at a frequency range of 10 to 55Hz, 1.5mm in total amplitude, with about a 1 minute rate of vibration change from 10Hz to 55Hz and back to 10Hz. Apply for a total of 6 hrs., 2 hrs. each in 3 mutually perpendicular directions. | | | | | | | | | |
| | | Capacitance | | | | | | | | | | |
| | | D.F. | | | | | | | | | | |
| 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 an 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 | | | | | | | | | |
| 12 | Soldering Effect (Non-Preheat) | Appearance | The lead wire should be immersed into the melted solder of 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., 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*. | | | | | | | | | |
| | | Capacitance Change | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | | | | | | | | | | |

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

Continued on the following page.

DEB Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|---|------------|------------------|------------|---|-------|----|---|------------|---|---|------|----|---|------------|---|------|------------------|------------|-----------------|---|---------|----|-------------|---|-----|----|------------|
| 13 | Appearance | No marked defect | <p>First the capacitor should be stored at 120±0/-5°C for 60±0/-5 sec.</p> <p>Then, as in figure, the lead wires should be immersed in solder of 260±0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5±0/-1 sec.</p> <p>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.</p> <p>Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*.</p>  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. B: Within ±5% Char. E: Within ±15% Char. F: Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Appearance | No marked defect | <p>The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.</p> <p><Temperature Cycle></p> <table border="1" data-bbox="1031 640 1372 745"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25±3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>85±3</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>3</td> </tr> </tbody> </table> <p style="text-align: center;">Cycle time: 5 cycle</p> <p><Immersion Cycle></p> <table border="1" data-bbox="950 798 1404 871"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> <th>Immersion Water</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>65±5/-0</td> <td>15</td> <td>Clean water</td> </tr> <tr> <td>2</td> <td>0±3</td> <td>15</td> <td>Salt water</td> </tr> </tbody> </table> <p style="text-align: center;">Cycle time : 2 cycle</p> <p>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.</p> <p>Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*.</p> | Step | Temperature (°C) | Time (min) | 1 | -25±3 | 30 | 2 | Room Temp. | 3 | 3 | 85±3 | 30 | 4 | Room Temp. | 3 | Step | Temperature (°C) | Time (min) | Immersion Water | 1 | 65±5/-0 | 15 | Clean water | 2 | 0±3 | 15 | Salt water |
| | Step | Temperature (°C) | | Time (min) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | -25±3 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | Room Temp. | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 85±3 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Room Temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | Immersion Water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 65±5/-0 | 15 | Clean water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0±3 | 15 | Salt water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. | Char. B, E: 4.0% max. Char. F: 7.5% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 2000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | Appearance | No marked defect | <p>Set the capacitor for 500±24/-0 hrs. at 40±2°C in 90 to 95% relative humidity.</p> <p>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.</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D.F. | Char. B, E: 5.0% max. Char. F: 7.5% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Appearance | No marked defect | <p>Apply the rated voltage for 500±24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. (Charge/Discharge current ≤50mA)</p> <p>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.</p> <p>Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition* for 24±2 hrs.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D.F. | Char. B, E: 5.0% max. Char. F: 7.5% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 500MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Appearance | No marked defect | <p>Apply a DC voltage of 150% of the rated voltage for 1000±48/-0 hrs. at 85±2°C with a relative humidity of 50% max. (Charge/Discharge current ≤50mA)</p> <p>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.</p> <p>Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition* for 24±2 hrs.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. B: Within ±10% Char. E: Within ±20% Char. F: Within ±30% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D.F. | Char. B, E: 4.0% max. Char. F: 7.5% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 2000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

Safety Recognized/High Voltage Ceramic Capacitors



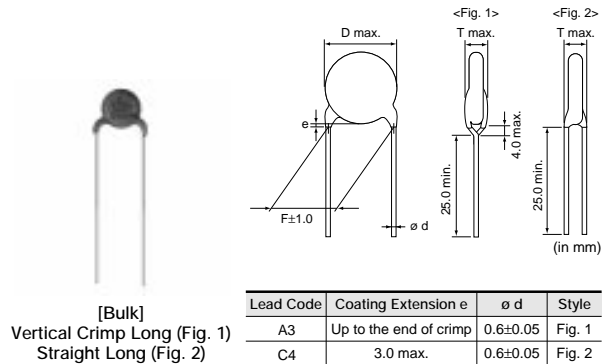
DEC Series (Class 1, 2/DC6.3kV)

■ Features

Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).

■ 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.).



■ Marking

| Temp. Char. | SL | B | E |
|-------------------------------|---|--------------------------|---------------------|
| Nominal Body Diameter | | | |
| 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 DC6.3kV, marked with 6KV) | | |
| Manufacturer's Identification | Marked with M (omitted for nominal body diameter ø9mm and under) | | |
| Manufactured Date Code | Abbreviation (omitted for nominal body diameter ø7mm) | | |

10

SL Characteristics

| Part Number | DC Rated Voltage (V) | Capacitance (pF) | Body Dia. D (mm) | Lead Spacing F (mm) | Body Thickness T (mm) |
|-------------------|----------------------|------------------|------------------|---------------------|-----------------------|
| DEC1X3J100JA3BMS1 | 6300 | 10 ±5% | 7 | 7.5 | 7.0 |
| DEC1X3J100JC4BMS1 | 6300 | 10 ±5% | 7 | 10.0 | 7.0 |
| DEC1X3J120JA3B | 6300 | 12 ±5% | 8 | 7.5 | 7.0 |
| DEC1X3J120JC4B | 6300 | 12 ±5% | 8 | 10.0 | 7.0 |
| DEC1X3J150JA3B | 6300 | 15 ±5% | 8 | 7.5 | 7.0 |
| DEC1X3J150JC4B | 6300 | 15 ±5% | 8 | 10.0 | 7.0 |
| DEC1X3J180JA3B | 6300 | 18 ±5% | 9 | 7.5 | 7.0 |
| DEC1X3J180JC4B | 6300 | 18 ±5% | 9 | 10.0 | 7.0 |
| DEC1X3J220JA3B | 6300 | 22 ±5% | 9 | 7.5 | 7.0 |
| DEC1X3J220JC4B | 6300 | 22 ±5% | 9 | 10.0 | 7.0 |
| DEC1X3J270JA3B | 6300 | 27 ±5% | 9 | 7.5 | 7.0 |
| DEC1X3J270JC4B | 6300 | 27 ±5% | 9 | 10.0 | 7.0 |
| DEC1X3J330JA3B | 6300 | 33 ±5% | 9 | 7.5 | 7.0 |
| DEC1X3J330JC4B | 6300 | 33 ±5% | 9 | 10.0 | 7.0 |
| DEC1X3J390JA3B | 6300 | 39 ±5% | 9 | 7.5 | 7.0 |
| DEC1X3J390JC4B | 6300 | 39 ±5% | 9 | 10.0 | 7.0 |

Continued on the following page.



Continued from the preceding page.

| Part Number | DC Rated Voltage (V) | Capacitance (pF) | Body Dia. D (mm) | Lead Spacing F (mm) | Body Thickness T (mm) |
|----------------|----------------------|------------------|------------------|---------------------|-----------------------|
| DEC1X3J470JA3B | 6300 | 47 ±5% | 9 | 7.5 | 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

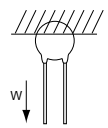
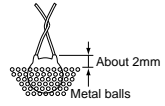
| Part Number | DC Rated Voltage (V) | Capacitance (pF) | Body Dia. D (mm) | Lead Spacing F (mm) | Body Thickness T (mm) |
|----------------|----------------------|------------------|------------------|---------------------|-----------------------|
| DECB33J101KC4B | 6300 | 100 ±10% | 9 | 10.0 | 7.0 |
| 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 (V) | 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. | Item | Specifications | Test Method | | | | | | | | | | | | |
|------------|--------------------------------|---|---|------|------|---|---|---|------------|------|-------|------|------|------|--|
| 1 | Operating Temperature Range | -25 to +85°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. | | | | | | | | | | | | |
| 4 | Dielectric Strength | 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) | | | | | | | | | | | | |
| | | 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. | | | | | | | | | | | | | |
| 8 | Temperature Characteristics | Char. SL: +350 to -1000ppm/°C (Temp. range: +20 to +85°C) Char. B: Within ±10% Char. E: Within +20/-55% | The capacitance measurement should be made at each step specified in Table. | | | | | | | | | | | | |
| | | Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before measurements. (Char. B, E) | | | | | | | | | | | | | |
| | | <table border="1" style="margin: auto;"> <thead> <tr> <th>Step</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>Temp. (°C)</td> <td>20±2</td> <td>-25±3</td> <td>20±2</td> <td>85±2</td> <td>20±2</td> </tr> </tbody> </table> | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±2 | 20±2 | |
| Step | 1 | 2 | 3 | 4 | 5 | | | | | | | | | | |
| Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±2 | 20±2 | | | | | | | | | | |
| 9 | Strength of Lead | Pull | Lead wire should not be cut off. Capacitor should not be broken. | | | | | | | | | | | | |
| | | 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. | | | | | | | | | | | | |
| 10 | Vibration Resistance | Appearance | No marked defect | | | | | | | | | | | | |
| | | Capacitance | Within specified tolerance | | | | | | | | | | | | |
| | | Q | Char. SL: 400+20C*2min. (30pF under) 1000 min. (30pF min.) | | | | | | | | | | | | |
| | | D.F. | Char. B, E: 2.5% max. | | | | | | | | | | | | |
| 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 an 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 | | | | | | | | | | | | |
| 12 | Soldering Effect (Non-Preheat) | Appearance | No marked defect | | | | | | | | | | | | |
| | | Capacitance Change | Char. SL: Within ±2.5% Char. B: Within ±5% Char. E: Within ±15% | | | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | |
| | | | 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. Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. (Char. B, E) Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. (Char. SL) Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. (Char. B, E) | | | | | | | | | | | | |



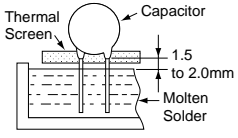
*1 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

*2 "C" expresses nominal capacitance value (pF).

Continued on the following page.

DEC Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|---|------------|------------------|------------|---|-------|----|---|------------|---|---|------|----|---|------------|---|------|------------------|------------|-----------------|---|---------|----|-------------|---|-----|----|------------|
| 13 | Appearance | No marked defect | <p>First the capacitor should be stored at 120±0/-5°C for 60±0/-5 sec.</p> <p>Then, as in figure, the lead wires should be immersed in solder of 260±0/-5°C up to 1.5 to 2.0mm from the root of terminal for 7.5±0/-1 sec.</p> <p>Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. (Char. B, E)</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. (Char. SL)</p> <p>Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. (Char. B, E)</p>  | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. SL: Within ±2.5% Char. B: Within ±5% Char. E: Within ±15% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Appearance | No marked defect | <p>The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles.</p> <p><Temperature Cycle></p> <table border="1" data-bbox="1031 703 1372 819"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25±3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>85±3</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>3</td> </tr> </tbody> </table> <p style="text-align: right;">Cycle time: 5 cycle</p> <p><Immersion Cycle></p> <table border="1" data-bbox="941 861 1412 934"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> <th>Immersion Water</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>65±5/-0</td> <td>15</td> <td>Clean water</td> </tr> <tr> <td>2</td> <td>0±3</td> <td>15</td> <td>Salt water</td> </tr> </tbody> </table> <p style="text-align: right;">Cycle time: 2 cycle</p> <p>Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. (Char. B, E)</p> <p>Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1.</p> | Step | Temperature (°C) | Time (min) | 1 | -25±3 | 30 | 2 | Room Temp. | 3 | 3 | 85±3 | 30 | 4 | Room Temp. | 3 | Step | Temperature (°C) | Time (min) | Immersion Water | 1 | 65±5/-0 | 15 | Clean water | 2 | 0±3 | 15 | Salt water |
| | Step | Temperature (°C) | | Time (min) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | -25±3 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | Room Temp. | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 85±3 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Room Temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | Immersion Water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 65±5/-0 | 15 | Clean water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0±3 | 15 | Salt water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | Char. SL: Within ±3% Char. B: Within ±10% Char. E: Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | Char. SL: 275+5/2C*min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D.F. | Char. B, E: 4.0% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 2000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | Appearance | No marked defect | <p>Set the capacitor for 500±24/-0 hrs. at 40±2°C in 90 to 95% relative humidity.</p> <p>Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. (Char. B, E)</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1.</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. SL: Within ±5% Char. B: Within ±10% Char. E: Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Q | Char. SL: 275+5/2C*min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D.F. | Char. B, E: 5.0% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Appearance | No marked defect | <p>Apply the rated voltage for 500±24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. (Charge/Discharge current≤50mA.)</p> <p>Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. (Char. B, E)</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. (Char. SL)</p> <p>Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. (Char. B, E)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. SL: Within ±7.5% Char. B: Within ±10% Char. E: Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Q | Char. SL: 100+10/3C*min. (30pF under) 200 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D.F. | Char. B, E: 5.0% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 500MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | Appearance | No marked defect | <p>Apply a DC voltage of 150% of the rated voltage for 1000±48/-0 hrs. at 85±2°C with a relative humidity of 50% max. (Charge/Discharge current≤50mA.)</p> <p>Pre-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. before initial measurements. (Char. B, E)</p> <p>Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. (Char. SL)</p> <p>Post-treatment: Capacitor should be stored at 85±2°C for 1 hr., then placed at room condition*1 for 24±2 hrs. (Char. B, E)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Char. SL: Within ±3% Char. B: Within ±10% Char. E: Within ±20% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Q | Char. SL: 275+5/2C*min. (30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | D.F. | Char. B, E: 4.0% max. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 2000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

*2 "C" expresses nominal capacitance value (pF).

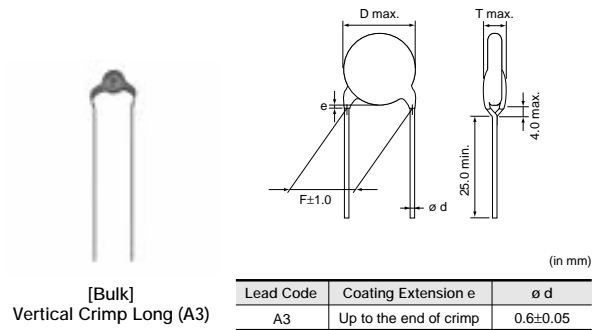
Safety Recognized/High Voltage Ceramic Capacitors



DEF Series (Only for LCD Backlight Inverter Circuit/6.3kVp-p)

■ Features

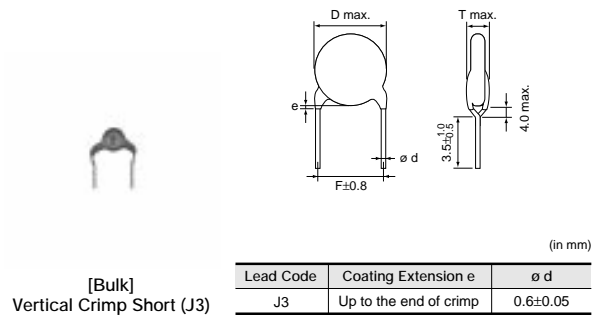
1. We design capacitors in much more compact size than DEC series, having reduced the diameter by 20% max.
2. Low self-heating at high frequency and high voltage due to low dielectric loss of the ceramic material.
3. Operating temperature range is guaranteed up to 105 degrees C.
4. Coated with flame-retardant epoxy resin (equivalent to UL94V-0 standard).
5. Taping available for automatic insertion.



[Bulk]
Vertical Crimp Long (A3)

■ Applications

Ideal for use in LCD backlight inverter.



[Bulk]
Vertical Crimp Short (J3)

■ Marking

| Nominal Body Diameter | Temp. Char. | CH | SL |
|-----------------------------|------------------------------------|----|----|
| | ø7-9mm | | |
| Temperature Characteristics | Upper horizontal line | | - |
| Nominal Capacitance | Actual value | | |
| Capacitance Tolerance | Marked with code | | |
| Rated Voltage | Marked with code (Marked with 6K-) | | |
| Manufactured Date Code | Abbreviation | | |

11

SL Characteristics

| Part Number | Rated Voltage (Vp-p) | 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 |
|----------------|----------------------|------------------|------------------|---------------------|-----------------------|------------------------|-------------------------|---------------------|
| DEF1XLH100J□□□ | 6300 | 10 ±5% | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH120J□□□ | 6300 | 12 ±5% | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH150J□□□ | 6300 | 15 ±5% | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH180J□□□ | 6300 | 18 ±5% | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH220J□□□ | 6300 | 22 ±5% | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH270J□□□ | 6300 | 27 ±5% | 8 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH330J□□□ | 6300 | 33 ±5% | 9 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH390J□□□ | 6300 | 39 ±5% | 9 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF1XLH470J□□□ | 6300 | 47 ±5% | 9 | 7.5 | 6.0 | A3B | J3B | N3A |

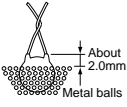
Three blank columns are filled with the lead and packaging codes. Please refer to the three columns on the right for the appropriate code.

CH Characteristics

| Part Number | Rated Voltage (Vp-p) | 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 |
|----------------|----------------------|------------------|------------------|---------------------|-----------------------|------------------------|-------------------------|---------------------|
| DEF2CLH020C□□□ | 6300 | 2 ±0.25pF | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH030C□□□ | 6300 | 3 ±0.25pF | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH040C□□□ | 6300 | 4 ±0.25pF | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH050D□□□ | 6300 | 5 ±0.5pF | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH060D□□□ | 6300 | 6 ±0.5pF | 7 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH070D□□□ | 6300 | 7 ±0.5pF | 8 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH080D□□□ | 6300 | 8 ±0.5pF | 8 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH090D□□□ | 6300 | 9 ±0.5pF | 8 | 7.5 | 6.0 | A3B | J3B | N3A |
| DEF2CLH100J□□□ | 6300 | 10 ±5% | 8 | 7.5 | 6.0 | A3B | J3B | 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.

DEF Series Specifications and Test Methods

| No. | Item | Specifications | Test Method | | | | | | | | | | |
|------------|--------------------------------|--|--|------|------|---|---|---|------------|------|-------|------|------|
| 1 | Operating Temperature Range | -25 to +105°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. | | | | | | | | | | |
| 4 | Dielectric Strength | Between Lead Wires | No failure The capacitor should not be damaged when DC12.6kV is applied between the lead wires for 1 to 5 sec. (Charge/Discharge current ≤ 50mA) | | | | | | | | | | |
| | | 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 2.0mm 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±0.2MHz and AC5V(r.m.s.) max. | | | | | | | | | | |
| 7 | Q | 400+20C ^{0.2} min. (30pF under) 1000 min. (30pF min.) | The Q should be measured at 20°C with 1±0.2MHz and AC5V(r.m.s.) max. | | | | | | | | | | |
| 8 | Temperature Characteristics | Char. CH: 0±60ppm/°C Char. SL: +350 to -1000ppm/°C (Temp. range: +20 to +85°C) | The capacitance measurement should be made at each step specified in Table. | | | | | | | | | | |
| | | <table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 2px;">Step</th> <th style="padding: 2px;">1</th> <th style="padding: 2px;">2</th> <th style="padding: 2px;">3</th> <th style="padding: 2px;">4</th> <th style="padding: 2px;">5</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">Temp. (°C)</td> <td style="padding: 2px;">20±2</td> <td style="padding: 2px;">-25±3</td> <td style="padding: 2px;">20±2</td> <td style="padding: 2px;">85±2</td> <td style="padding: 2px;">20±2</td> </tr> </tbody> </table> | Step | 1 | 2 | 3 | 4 | 5 | Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±2 |
| Step | 1 | 2 | 3 | 4 | 5 | | | | | | | | |
| Temp. (°C) | 20±2 | -25±3 | 20±2 | 85±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 | 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. | | | | | | | | | | |
| 10 | Vibration Resistance | Appearance | No marked defect | | | | | | | | | | |
| | | Capacitance | Within specified tolerance | | | | | | | | | | |
| | | Q | 400+20C ^{0.2} min. (30pF under) 1000 min. (30pF min.) | | | | | | | | | | |
| 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 an 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 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 | | | | | | | | | | |
| 12 | Soldering Effect (Non-Preheat) | Appearance | No marked defect | | | | | | | | | | |
| | | Capacitance Change | Within ±2.5% | | | | | | | | | | |
| | | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | |
| | | The lead wire should be immersed into the melted solder of 350±10°C up to about 1.5 to 2.0mm from the main body for 3.5±0.5 sec. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | | | | | | | | | | | |

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

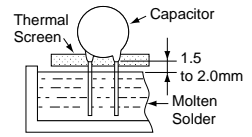
*2 "C" expresses nominal capacitance value (pF).

Continued on the following page. 

DEF Series Specifications and Test Methods

Continued from the preceding page.

| No. | Item | Specifications | Test Method | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---|---|--|------------------|------------------|------------|-----|----------|----|----------|------------|---|---|-------|----|---|------------|---|------|------------------|------------|-----------------|---|---------|----|-------------|---|-----|----|------------|
| 13 | 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 in 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 room condition*1. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Within ±2.5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | Appearance | No marked defect | The capacitor should be subjected to 5 temperature cycles, then consecutively to 2 immersion cycles. <Temperature Cycle> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25±3</td> <td>30</td> </tr> <tr> <td>2</td> <td>Room Temp.</td> <td>3</td> </tr> <tr> <td>3</td> <td>105±3</td> <td>30</td> </tr> <tr> <td>4</td> <td>Room Temp.</td> <td>3</td> </tr> </tbody> </table> Cycle time: 5 cycle <Immersion Cycle> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>Time (min)</th> <th>Immersion Water</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>65+5/-0</td> <td>15</td> <td>Clean water</td> </tr> <tr> <td>2</td> <td>0±3</td> <td>15</td> <td>Salt water</td> </tr> </tbody> </table> Cycle time: 2 cycle Post-treatment: Capacitor should be stored for 4 to 24 hrs. at room condition*1. | Step | Temperature (°C) | Time (min) | 1 | -25±3 | 30 | 2 | Room Temp. | 3 | 3 | 105±3 | 30 | 4 | Room Temp. | 3 | Step | Temperature (°C) | Time (min) | Immersion Water | 1 | 65+5/-0 | 15 | Clean water | 2 | 0±3 | 15 | Salt water |
| | Step | Temperature (°C) | | Time (min) | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 1 | -25±3 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 2 | Room Temp. | | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | 105±3 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Room Temp. | 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step | Temperature (°C) | Time (min) | Immersion Water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 65+5/-0 | 15 | Clean water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | 0±3 | 15 | Salt water | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | Within ±3% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | 200+10C*2min. (10pF under) 275+5/2C*2min. (10pF min. and 30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 2000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dielectric Strength (Between Lead Wires) | Per item 4. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | Appearance | No marked defect | Set the capacitor for 500 +24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Capacitance Change | Within ±5% | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Q | 200+10C*2min. (10pF under) 275+5/2C*2min. (10pF min. and 30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | I.R. | 1000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | Appearance | No marked defect | Apply 6.3kVp-p at the frequency in Table for 1000+48/-0 hrs. at 105±2°C with a relative humidity of 50% max. (Charge/Discharge current≤50mA.) <Frequency> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Capacitance (pF)</th> <th>Frequency (kHz)</th> </tr> </thead> <tbody> <tr> <td>to 10</td> <td>100</td> </tr> <tr> <td>12 to 22</td> <td>45</td> </tr> <tr> <td>27 to 47</td> <td>33</td> </tr> </tbody> </table> Post-treatment: Capacitor should be stored for 1 to 2 hrs. at room condition*1. | Capacitance (pF) | Frequency (kHz) | to 10 | 100 | 12 to 22 | 45 | 27 to 47 | 33 | | | | | | | | | | | | | | | | | | | |
| | Capacitance (pF) | Frequency (kHz) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | to 10 | 100 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 12 to 22 | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 27 to 47 | 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Capacitance Change | Within ±3% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Q | 200+10C*2min. (10pF under) 275+5/2C*2min. (10pF min. and 30pF under) 350 min. (30pF min.) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| I.R. | 2000MΩ min. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

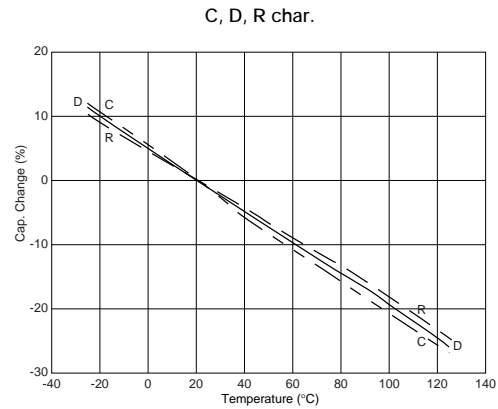
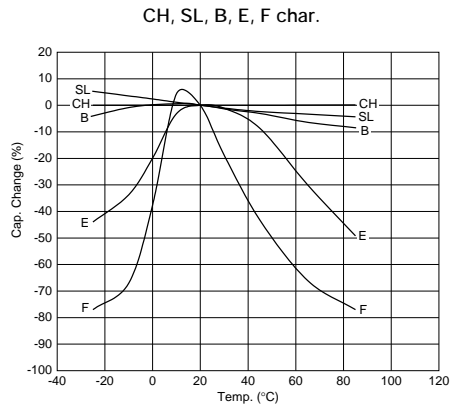


*1 "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

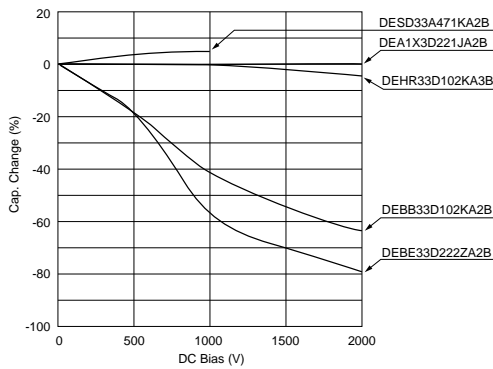
*2 "C" expresses nominal capacitance value (pF).

High Voltage Ceramic Capacitors Characteristics Data (Typical Example)

■ Capacitance - Temperature Characteristics



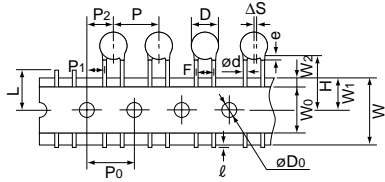
■ Capacitance - DC Bias Characteristics



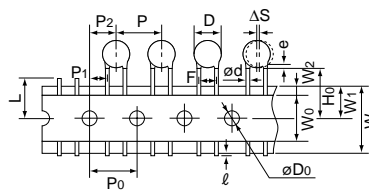
High Voltage Ceramic Capacitors Packaging

Taping Specifications

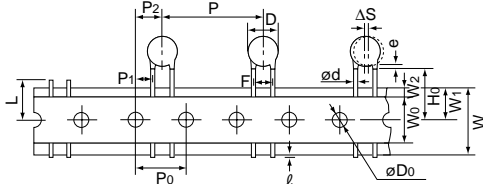
- 15.0mm pitch / lead spacing 7.5mm taping
Straight type
(Lead Code: P3)



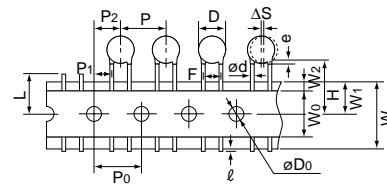
- 15.0mm pitch / lead spacing 7.5mm taping
Vertical crimp type
(Lead Code: N3)



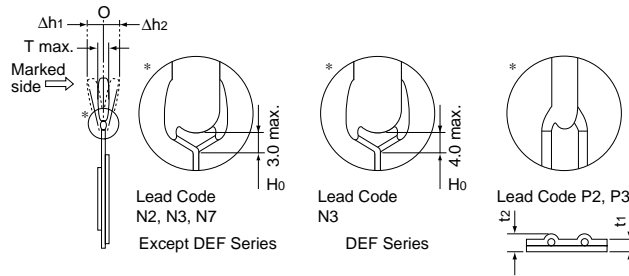
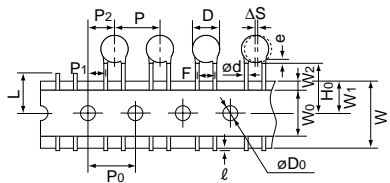
- 30.0mm pitch / lead spacing 7.5mm taping
Vertical crimp type
(Lead Code: N7)



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



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




| Item | Code | P3 | N3 | N7 | P2 | N2 |
|---|-----------------|--|------------------------------------|-------------------------------------|--------------------------------------|------------------------------------|
| Pitch of component | P | 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 ^{+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 | P ₁ | 3.75±1.0 | | 3.85±0.7 | | |
| Body diameter | D | See the individual product specifications. | | | | |
| 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 | W ₁ | 9.0±0.5 | | | | |
| Lead distance between reference and bottom planes | H | 20.0 ^{+1.5} _{-1.0} | — | | 20.0 ^{+1.5} _{-1.0} | — |
| | H ₀ | — | 18.0 ^{+2.0} ₋₀ | | — | 18.0 ^{+2.0} ₋₀ |
| Protusion length | ℓ | +0.5 to -1.0 | | | | |
| Diameter of sprocket hole | φD ₀ | 4.0±0.1 | | | | |
| Lead diameter | φd | 0.6±0.05 | | | | |
| Total tape thickness | t ₁ | 0.6±0.3 | | | | |
| Total thickness, tape and lead wire | t ₂ | 1.5 max. | | | | |
| Body thickness | T | See the individual product specifications. | | | | |
| Portion to cut in case of defect | L | 11.0 ⁺⁰ _{-1.0} | | | | |
| Hold down tape width | W ₀ | 11.5 min. | | | | |
| Hold down tape position | W ₂ | 1.5±1.5 | | | | |
| Coating extension on lead | e | 3.0 max. (Vertical crimp type: Up to the end of crimp) | | | | |
| Deviation across tape, front | Δh ₁ | 2.0 max. | | | 1.0 max. | |
| Deviation across tape, rear | Δh ₂ | | | | | |



(in : mm)

Continued on the following page.

High Voltage Ceramic Capacitors Packaging

 Continued from the preceding page.

■ Packaging Styles

| Bulk | Taping |
|---|--|
| Polyethylene Bag  | Ammo Pack  |

■ Minimum Quantity (Order in Sets Only)

[Bulk] 1,000 pcs.

[Taping]

1,500 pcs. (Lead Code: P2, N2)

1,000 pcs. (Lead Code: P3, N3*)

500 pcs. (Lead Code: N7)

* 900 pcs. for 2kV, 3.15kV and DEF Series

■ 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, 3.15kV and DEF Series

"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.)

High Voltage Ceramic Capacitors ⚠Caution

■ ⚠Caution (Rating)

<DES/DEH/DEA/DEB/DEC Series>

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the V_{p-p} value of the applied voltage or the V_{0-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 high-frequency and high-voltage circuit, be sure to read the instructions in item 4.

When DC-rated capacitors are to be used in input circuits from commercial power source (AC filter), be sure to use Safety Recognized Capacitors because various regulations on withstand voltage or impulse withstand established for each equipment should be taken into considerations.

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

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 high-frequency 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 in an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of $\phi 0.1$ mm 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.

Continued on the following page.

High Voltage Ceramic Capacitors ⚠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 low-dissipation capacitors, the allowable electric power of these capacitors is generally much higher than that of B characteristic capacitors. However, in case the self-heating 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 its 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.

We are offering free software, The Capacitor 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.

* Subject series are below.

- DEA/DEC (SL char.) /DEH/DES/DEF Series

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.

<Table 1> Allowable Conditions at High-frequency

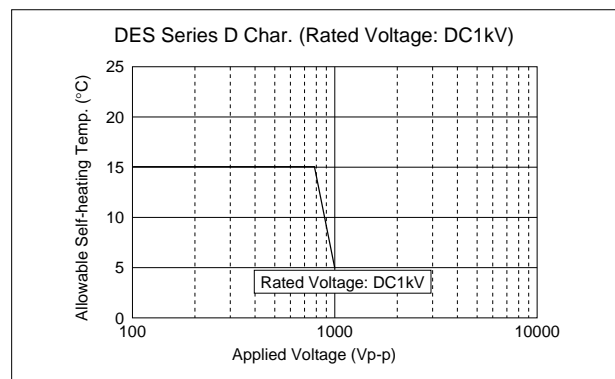
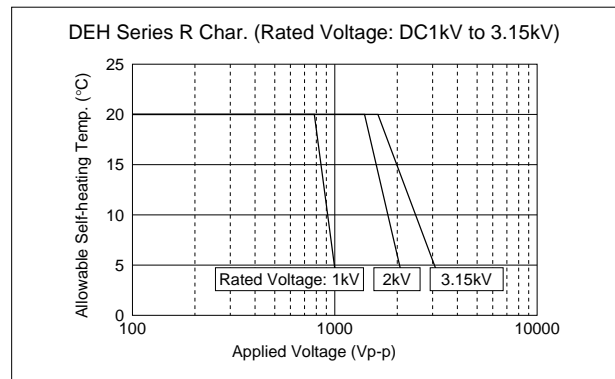
| Series | Temp. Char. | DC Rated Voltage | Allowable Conditions at High-frequency *3 | | Capacitor's Ambient Temp. *2 |
|----------|-------------|------------------|---|--|------------------------------|
| | | | Applied Voltage (Max.) | Self-heating Temp. (25°C Ambient Temp.) *1 | |
| DEH | R | 250V | 250Vp-p | 10°C Max. | -25 to +85°C |
| | C | 500V | 500Vp-p | 20°C Max. | |
| | R | 1kV | 800Vp-p | 20°C Max. | |
| | | | 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 | 5°C Max. | |
| | | 2kV | 2000Vp-p | | |
| | | 3.15kV | 3150Vp-p | | |
| DEC | SL | 6.3kV | 6300Vp-p | 5°C Max. | |
| DES | D | 500V | 500Vp-p | 15°C Max. | |
| | | 1kV | 800Vp-p | | |
| | | | 1000Vp-p | 5°C Max. | |

*1 Fig. 1 shows the relationship between the applied voltage and the allowable self-heating temperature regarding 1 to 3.15kV rated voltage of the DEH series R characteristic and 1kV rated voltage of the DES series D characteristic.

*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 characteristics for a sine wave voltage.

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

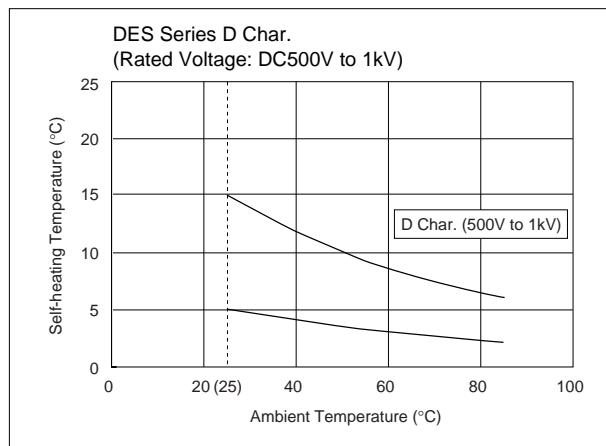
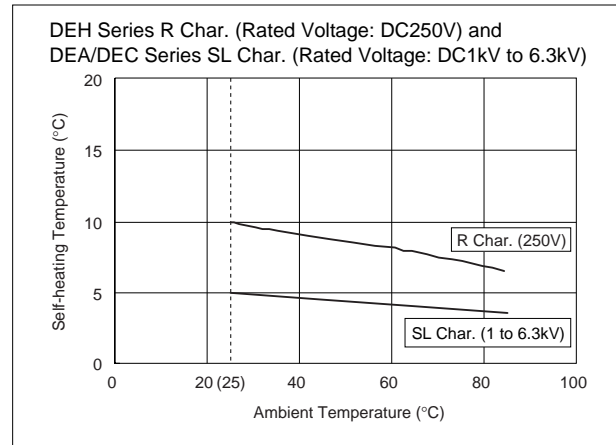
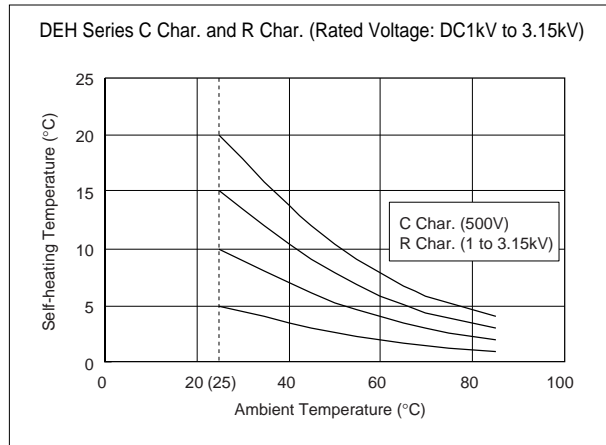


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High Voltage Ceramic Capacitors ⚠ Caution

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



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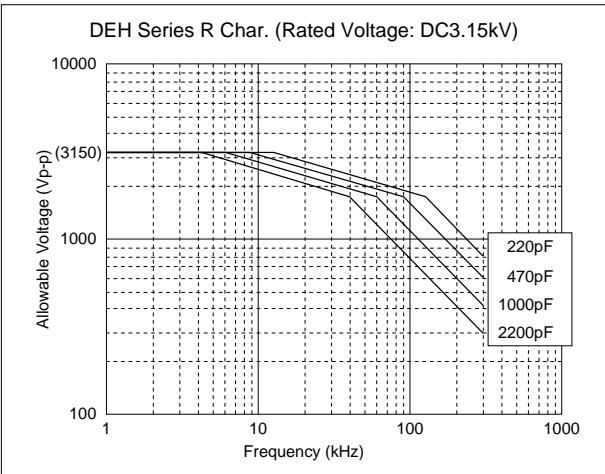
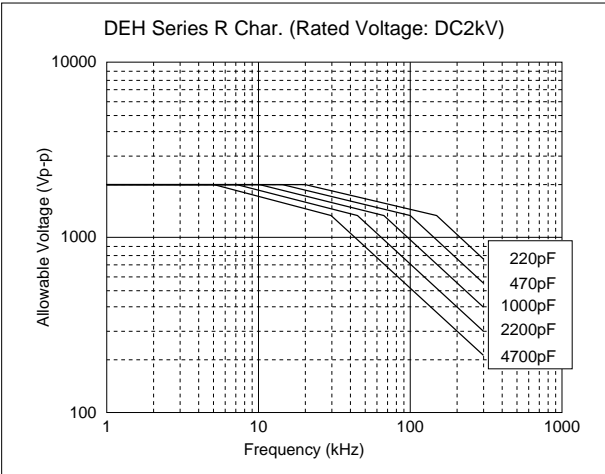
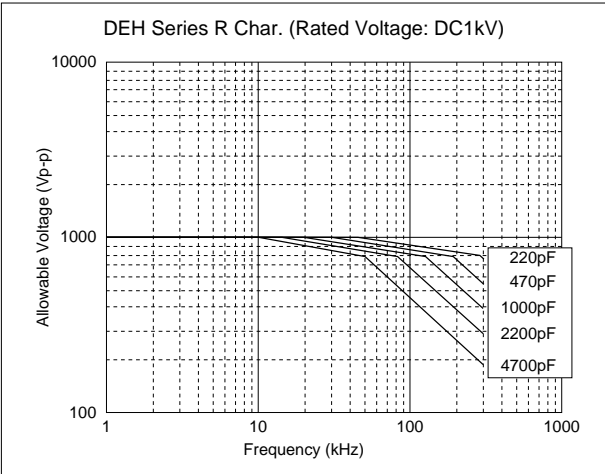
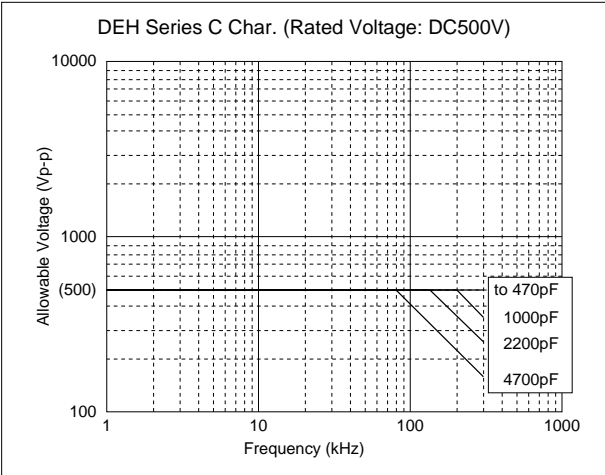
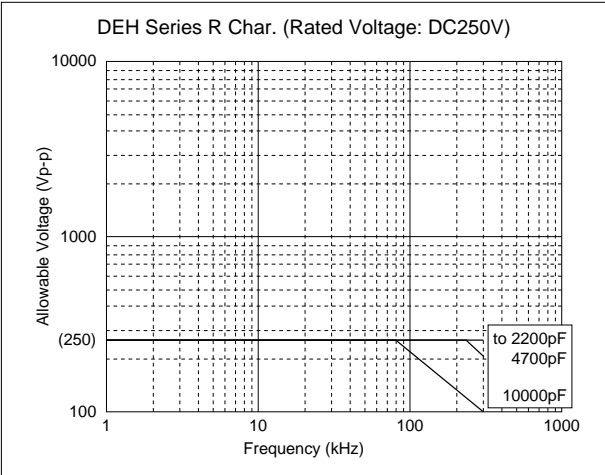
High Voltage Ceramic Capacitors ⚠Caution

☐ Continued from the preceding page.

<Fig. 3> 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 (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 self-heating temperature is not higher than the value specified in Table 1.



Continued on the following page. ☐

High Voltage Ceramic Capacitors ⚠ Caution

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

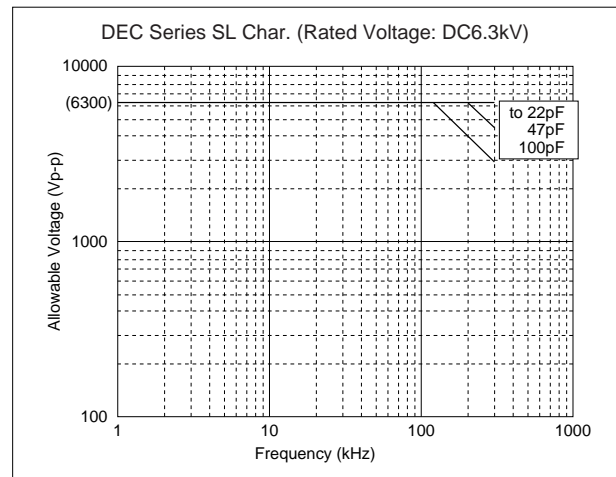
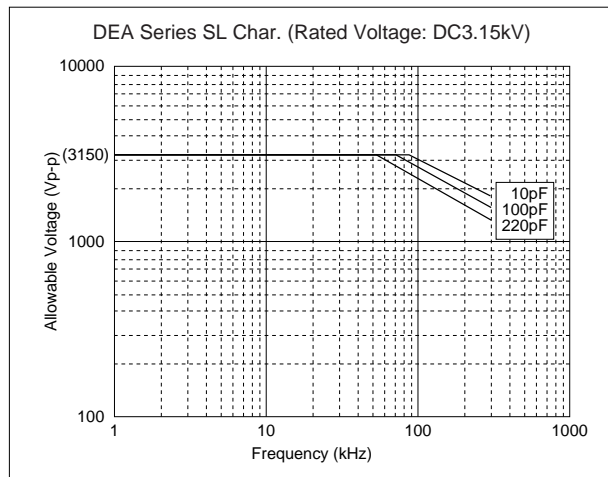
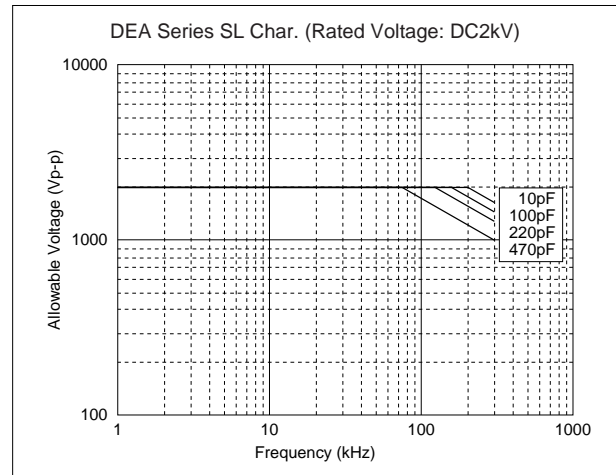
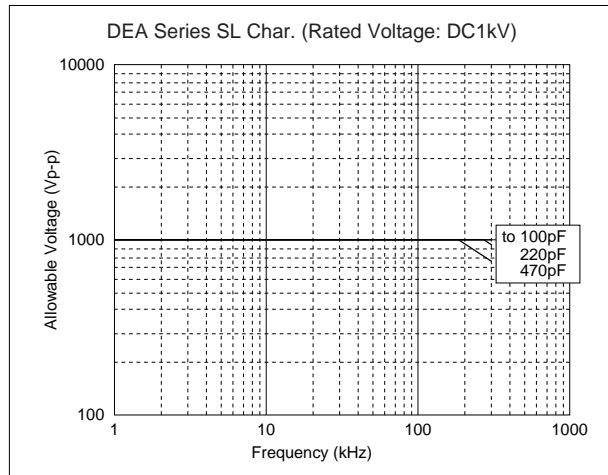
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Roughly calculated for reference, the allowable voltage for a rectangular wave or pulse wave corresponds

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 self-heating temperature is not higher than the value specified in Table 1.



Continued on the following page. ☒

High Voltage Ceramic Capacitors ⚠ Caution

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

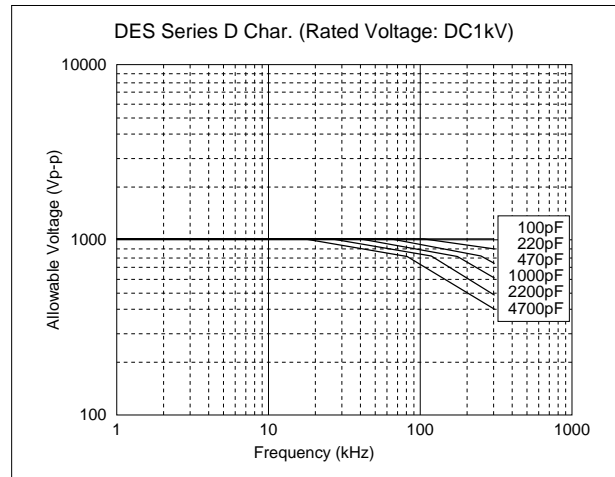
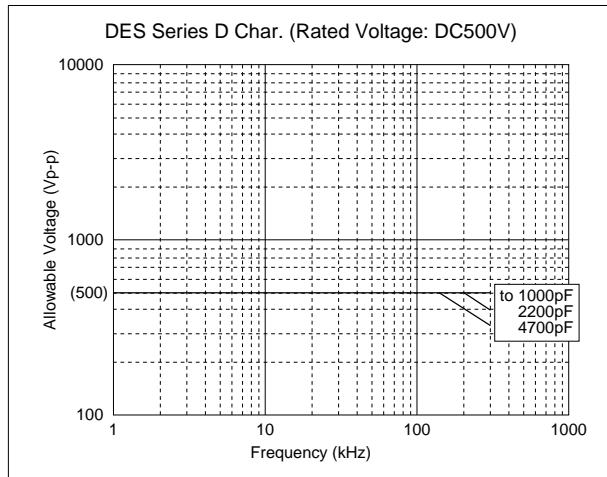
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Roughly calculated for reference, the allowable voltage for a rectangular wave or pulse wave corresponds

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 self-heating temperature is not higher than the value specified in Table 1.



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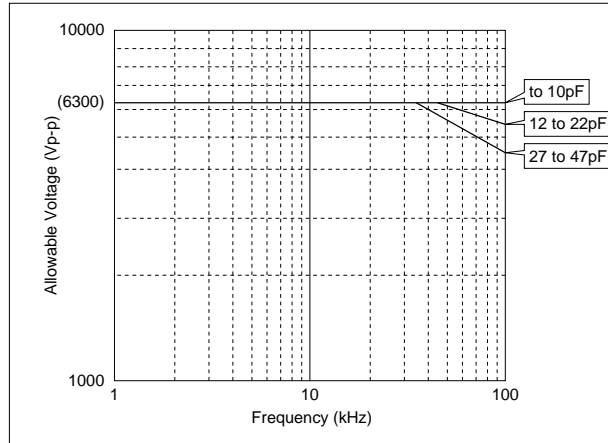
High Voltage Ceramic Capacitors ⚠ Caution

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<DEF Series>

1. Operating Voltage

The frequency of the applied sine wave voltage should be less than 100kHz. The applied voltage should be less than the value shown in figure below. In case of non-sine wave which includes a harmonic frequency, please contact our sales representatives or product engineers.



The temperature of the surface of capacitor:
below the upper limit of its rated operating temperature range (including self-heating.)

The capacitor can be applied maximum 6.3kVp-p at 100kHz when lamp turn on.

| Voltage | AC Voltage |
|------------------------|------------|
| Positional Measurement | |

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 high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. 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. 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 could result in an electric shock, fire or fume.

High Voltage Ceramic Capacitors ⚠Caution

■ ⚠Caution (Storage and Operating Condition)

Operating and Storage Environment

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

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

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

■ ⚠Caution (Soldering and Mounting)

1. Vibration and Impact

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

2. Soldering

When soldering this product to a PCB/PWB, do not exceed the solder heat resistance 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.

3. Bonding, Resin Molding and Coating

Before bonding, molding or coating this product, verify that these processes do not affect the quality of capacitor by testing the performance

of the bonded, molded or coated product in the intended equipment.

In case 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 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.

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

1. DEA/DEC/DEF Series (Temp. Char. CH, 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.

2. 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.

3. 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 |

△Note:

1. Export Control

<For customers outside Japan>

No muRata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

<For customers in Japan>

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

- | | |
|-----------------------------|--|
| ① Aircraft equipment | ② Aerospace equipment |
| ③ Undersea equipment | ④ Power plant equipment |
| ⑤ Medical equipment | ⑥ Transportation equipment (vehicles, trains, ships, etc.) |
| ⑦ Traffic signal equipment | ⑧ Disaster prevention / crime prevention equipment |
| ⑨ Data-processing equipment | ⑩ Application of similar complexity and/or reliability requirements to the applications listed above |

3. Product specifications in this catalog are as of September 2008. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4. Please read rating and △ CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

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