

# High Voltage Ceramic Capacitors DC10-40kV

## HIGH VOLTAGE CERAMIC CAPACITORS



*Innovator  
in Electronics*

**Murata  
Manufacturing Co., Ltd.**

**Cat.No.C41E-2**

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## ● Part Numbering

### High Voltage Ceramic Capacitors (over 10kV)

(Global Part Number) 

|    |   |    |    |     |   |    |   |
|----|---|----|----|-----|---|----|---|
| DH | R | B3 | 4A | 101 | M | 2B | B |
| ①  | ② | ③  | ④  | ⑤   | ⑥ | ⑦  | ⑧ |

#### ① Product ID

| Product ID |                                             |
|------------|---------------------------------------------|
| DH         | High Voltage Ceramic Capacitors (over 10kV) |

#### ② Series Category

| Code | Contents    |
|------|-------------|
| R    | Radial Type |
| S    | Mold Type   |

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

#### ③ Temperature Characteristics

| Code | Temp. Char. | Cap. Change or Temp. Coeff. | Temp. Range  |
|------|-------------|-----------------------------|--------------|
| B3   | B           | ±10%                        | −25 to +85°C |
| F4   | Z5V         | +22%, −82%                  | +10 to +85°C |
| 4E   | ZM          | −4700±1000ppm/°C            | +20 to +85°C |
|      | N4700       |                             |              |

#### ④ Rated Voltage

| Code | Rated Voltage |
|------|---------------|
| 4A   | DC10kV        |
| 4B   | DC12kV        |
| 4C   | DC15kV        |
| 4D   | DC20kV        |
| 4F   | DC30kV        |
| 4G   | DC40kV        |

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

#### ⑥ Capacitance Tolerance

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

#### ⑦ Lead Type (DHR Series)

| Code | Lead Type     | Lead Spacing | Lead Diameter |
|------|---------------|--------------|---------------|
| 2B   | Straight Long | 9.5mm        | ø0.65mm       |
| 2F   |               | 12.7mm       | ø0.8mm        |

#### ⑦ Body Diameter and Terminal Type (DHS Series)

| Code | Body Diameter | Terminal Type                                         |
|------|---------------|-------------------------------------------------------|
| C2   | 20mm          | ISO M4, P0.7<br>Tapped Holes<br>(Metric Screw Thread) |
| D2   | 24mm          |                                                       |
| H2   | 30mm          |                                                       |
| L2   | 38mm          |                                                       |
| N2   | 43mm          |                                                       |
| R2   | 52mm          |                                                       |
| T2   | 60mm          | No.8-32, NC-2B<br>Tapped Holes<br>(Inch Screw Thread) |
| CX   | 20mm          |                                                       |
| DX   | 24mm          |                                                       |
| HX   | 30mm          |                                                       |
| LX   | 38mm          |                                                       |
| NX   | 43mm          |                                                       |
| RX   | 52mm          |                                                       |
| TX   | 60mm          |                                                       |

#### ⑧ Packaging

| Code | Packaging |
|------|-----------|
| B    | Bulk      |

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## ■ Features

- ## ■ Applications

- 
- Technical drawing of a 100 ohm 1/4W resistor. The drawing includes a photograph of the component and three views: top, side, and detail.
- Top View:**
- Overall diameter:  $D \text{ max.}$
  - Terminal diameter:  $D+1.0 \text{ max.}$
  - Terminal length:  $4.0 \text{ max.}$
  - Terminal thickness:  $35.0 \text{ min.}$
- Side View:**
- Terminal thickness:  $T \text{ max.}$
  - Terminal diameter:  $\phi d \pm 0.05$
- Detail View:**
- Detail of the terminal tip with a radius:  $R \leq 0.2$
- (in mm)

### ■ Marking

| Marking                       |                               | Temp. Char.                                                                                                                                                                            | ZM                     | B                      |
|-------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------|
| Nominal body dia.             |                               |                                                                                                                                                                                        |                        |                        |
| ø8mm                          |                               |                                                                                                                                                                                        | 101<br>10K             | 101<br>10K             |
| ø9mm and 10mm                 |                               |                                                                                                                                                                                        | 221K<br>10K•           | 221M<br>10K            |
| ø11mm to 14mm                 |                               |                                                                                                                                                                                        | ZM<br>471K<br>10K      | B<br>471M<br>10K       |
| ø15mm to 18mm                 |                               |                                                                                                                                                                                        | 102KZ<br>Ⓜ 10K<br>0050 | 102MB<br>Ⓜ 10K<br>0050 |
| Temperature Characteristics   | Nominal body dia. ø8mm        |                                                                                                                                                                                        | Omitted                | Omitted                |
|                               | Nominal body dia. ø9 and 10mm |                                                                                                                                                                                        | Marked with • (dot)    |                        |
|                               | Nominal body dia. ø11 to 14mm |                                                                                                                                                                                        | Marked with code.      | Marked with code.      |
|                               | Nominal body dia. ø15mm min.  |                                                                                                                                                                                        | Marked with Z.         |                        |
| Nominal Capacitance           |                               | Under 100pF : Actual value, 100pF and over : Marked with 3 figures.                                                                                                                    |                        |                        |
| Capacitance Tolerance         |                               | Marked with code, omitted for nominal body diameter ø8mm and under.                                                                                                                    |                        |                        |
| Rated Voltage                 |                               | Marked with code.                                                                                                                                                                      |                        |                        |
| Manufacturer's Identification |                               | Marked with Ⓜ, omitted for nominal body diameter ø14mm and under.                                                                                                                      |                        |                        |
| Manufactured Date             |                               | Abbreviation, omitted for nominal body diameter ø14mm and under.<br>(Ex.) 0 0 5 0      ① : Last numeral in year      ③ : Fix No.<br>① ② ③                      ② : Number in the month |                        |                        |

## ZM Characteristics

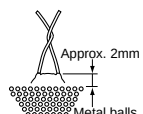
| Part Number    | Rated Voltage (kV) | Capacitance (pF) | Body Dia. D (mm) | Lead Spacing F (mm) | Body Thickness T (mm) | Lead Dia. ød (mm) |
|----------------|--------------------|------------------|------------------|---------------------|-----------------------|-------------------|
| DHR4E4A101K2BB | DC10               | 100 +10, -10%    | 8.0              | 9.5                 | 7.0                   | 0.65              |
| DHR4E4A151K2BB | DC10               | 150 +10, -10%    | 8.0              | 9.5                 | 7.0                   | 0.65              |
| DHR4E4A221K2BB | DC10               | 220 +10, -10%    | 9.0              | 9.5                 | 7.0                   | 0.65              |
| DHR4E4A331K2BB | DC10               | 330 +10, -10%    | 10.0             | 9.5                 | 7.0                   | 0.65              |
| DHR4E4A471K2BB | DC10               | 470 +10, -10%    | 12.0             | 9.5                 | 7.0                   | 0.65              |
| DHR4E4A681K2BB | DC10               | 680 +10, -10%    | 13.0             | 9.5                 | 7.0                   | 0.65              |
| DHR4E4A102K2BB | DC10               | 1000 +10, -10%   | 15.0             | 9.5                 | 7.0                   | 0.65              |
| DHR4E4B101K2BB | DC12               | 100 +10, -10%    | 8.0              | 9.5                 | 7.3                   | 0.65              |
| DHR4E4B151K2BB | DC12               | 150 +10, -10%    | 9.0              | 9.5                 | 7.3                   | 0.65              |
| DHR4E4B221K2BB | DC12               | 220 +10, -10%    | 9.0              | 9.5                 | 7.3                   | 0.65              |
| DHR4E4B331K2BB | DC12               | 330 +10, -10%    | 11.0             | 9.5                 | 7.3                   | 0.65              |
| DHR4E4B471K2BB | DC12               | 470 +10, -10%    | 12.0             | 9.5                 | 7.3                   | 0.65              |
| DHR4E4B681K2BB | DC12               | 680 +10, -10%    | 14.0             | 9.5                 | 7.3                   | 0.65              |
| DHR4E4B102K2BB | DC12               | 1000 +10, -10%   | 16.0             | 9.5                 | 7.3                   | 0.65              |
| DHR4E4C101K2BB | DC15               | 100 +10, -10%    | 8.0              | 9.5                 | 8.2                   | 0.65              |
| DHR4E4C151K2BB | DC15               | 150 +10, -10%    | 9.0              | 9.5                 | 8.2                   | 0.65              |
| DHR4E4C221K2BB | DC15               | 220 +10, -10%    | 10.0             | 9.5                 | 8.2                   | 0.65              |
| DHR4E4C331K2BB | DC15               | 330 +10, -10%    | 12.0             | 9.5                 | 8.2                   | 0.65              |
| DHR4E4C471K2BB | DC15               | 470 +10, -10%    | 13.0             | 9.5                 | 8.2                   | 0.65              |
| DHR4E4C681K2BB | DC15               | 680 +10, -10%    | 15.0             | 9.5                 | 8.2                   | 0.65              |
| DHR4E4C102K2FB | DC15               | 1000 +10, -10%   | 18.0             | 12.7                | 8.2                   | 0.8               |

## B Characteristics

| Part Number    | Rated Voltage (kV) | Capacitance (pF) | Body Dia. D (mm) | Lead Spacing F (mm) | Body Thickness T (mm) | Lead Dia. ød (mm) |
|----------------|--------------------|------------------|------------------|---------------------|-----------------------|-------------------|
| DHRB34A101M2BB | DC10               | 100 +20, -20%    | 8.0              | 9.5                 | 7.0                   | 0.65              |
| DHRB34A151M2BB | DC10               | 150 +20, -20%    | 8.0              | 9.5                 | 7.0                   | 0.65              |
| DHRB34A221M2BB | DC10               | 220 +20, -20%    | 9.0              | 9.5                 | 7.0                   | 0.65              |
| DHRB34A331M2BB | DC10               | 330 +20, -20%    | 10.0             | 9.5                 | 7.0                   | 0.65              |
| DHRB34A471M2BB | DC10               | 470 +20, -20%    | 12.0             | 9.5                 | 7.0                   | 0.65              |
| DHRB34A681M2BB | DC10               | 680 +20, -20%    | 13.0             | 9.5                 | 7.0                   | 0.65              |
| DHRB34A102M2BB | DC10               | 1000 +20, -20%   | 15.0             | 9.5                 | 7.0                   | 0.65              |
| DHRB34B101M2BB | DC12               | 100 +20, -20%    | 8.0              | 9.5                 | 7.7                   | 0.65              |
| DHRB34B151M2BB | DC12               | 150 +20, -20%    | 9.0              | 9.5                 | 7.5                   | 0.65              |
| DHRB34B221M2BB | DC12               | 220 +20, -20%    | 9.0              | 9.5                 | 7.5                   | 0.65              |
| DHRB34B331M2BB | DC12               | 330 +20, -20%    | 11.0             | 9.5                 | 7.5                   | 0.65              |
| DHRB34B471M2BB | DC12               | 470 +20, -20%    | 12.0             | 9.5                 | 7.5                   | 0.65              |
| DHRB34B681M2BB | DC12               | 680 +20, -20%    | 14.0             | 9.5                 | 7.5                   | 0.65              |
| DHRB34B102M2BB | DC12               | 1000 +20, -20%   | 16.0             | 9.5                 | 7.5                   | 0.65              |
| DHRB34C101M2BB | DC15               | 100 +20, -20%    | 8.0              | 9.5                 | 8.5                   | 0.65              |
| DHRB34C151M2BB | DC15               | 150 +20, -20%    | 9.0              | 9.5                 | 8.2                   | 0.65              |
| DHRB34C221M2BB | DC15               | 220 +20, -20%    | 10.0             | 9.5                 | 8.2                   | 0.65              |
| DHRB34C331M2BB | DC15               | 330 +20, -20%    | 12.0             | 9.5                 | 8.2                   | 0.65              |
| DHRB34C471M2BB | DC15               | 470 +20, -20%    | 13.0             | 9.5                 | 8.2                   | 0.65              |
| DHRB34C681M2BB | DC15               | 680 +20, -20%    | 15.0             | 9.5                 | 8.2                   | 0.65              |
| DHRB34C102M2FB | DC15               | 1000 +20, -20%   | 18.0             | 12.7                | 8.2                   | 0.8               |

## Specifications and Test Methods

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| No.                                      | Item                                  |                                          | Specifications                                                                                                                                                          |             | Testing Method                                                                                                                                                                                                                                                                                                                                                                                                             |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|------------------------------------------|---------------------------------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------------|--------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|------------|---|---|---|---|---|----|---|---|--------|--------|--------|---|--------|---------|--------|--------|--------|
| 1                                        | Operating Temperature Range           |                                          | -25 to +100°C                                                                                                                                                           |             | —                                                                                                                                                                                                                                                                                                                                                                                                                          |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 2                                        | Capacitance                           |                                          | Within the specified tolerance.                                                                                                                                         |             | The capacitance should be measured at 20°C with 1±0.2kHz and AC 5V(r.m.s.) max.                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 3                                        | Dissipation Factor (D.F.)             |                                          | <table><tr><td>ZM</td><td>1.0% max.</td></tr><tr><td>B</td><td>2.5% max.</td></tr></table>                                                                              | ZM          | 1.0% max.                                                                                                                                                                                                                                                                                                                                                                                                                  | B         | 2.5% max.        | Same condition as capacitance. |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| ZM                                       | 1.0% max.                             |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| B                                        | 2.5% max.                             |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 4                                        | Insulation Resistance (I.R.)          | Between Lead Wires                       | 10000MΩ min.                                                                                                                                                            |             | The insulation resistance should be measured with DC1000V within 60±5 sec. of charging.                                                                                                                                                                                                                                                                                                                                    |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 5                                        | Dielectric Strength                   | Between Lead Wires                       | No failure.                                                                                                                                                             |             | The capacitor should not be damaged when DC voltage of 150% of the rated voltage is applied between the lead wires for 60±5 sec. in insulating liquid or gas. (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, shortcircuited, is kept approximately 2mm off the metal balls as shown in the figure at right, and DC voltage of 3kV is applied for 10 sec. between capacitor lead wires and metal balls. (Charge/Discharge current≤50mA) <div></div> |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 6                                        | Temperature Characteristics           |                                          | <table><tr><td>Temp. Char.</td><td>Temp. Coefficient or Max. Cap. Change</td></tr><tr><td>ZM</td><td>-4700±1000ppm/°C</td></tr><tr><td>B</td><td>±10%</td></tr></table> | Temp. Char. | Temp. Coefficient or Max. Cap. Change                                                                                                                                                                                                                                                                                                                                                                                      | ZM        | -4700±1000ppm/°C | B                              | ±10% | The capacitance measurement should be made at each step specified in table. Capacitance change from the value of step 3 should not exceed the limit specified. <table><tr><td>Step Char.</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>ZM</td><td>—</td><td>—</td><td>20±2°C</td><td>85±2°C</td><td>20±2°C</td></tr><tr><td>B</td><td>20±2°C</td><td>-25±3°C</td><td>20±2°C</td><td>85±2°C</td><td>20±2°C</td></tr></table> |  |  | Step Char. | 1 | 2 | 3 | 4 | 5 | ZM | — | — | 20±2°C | 85±2°C | 20±2°C | B | 20±2°C | -25±3°C | 20±2°C | 85±2°C | 20±2°C |
| Temp. Char.                              | Temp. Coefficient or Max. Cap. Change |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| ZM                                       | -4700±1000ppm/°C                      |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| B                                        | ±10%                                  |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| Step Char.                               | 1                                     | 2                                        | 3                                                                                                                                                                       | 4           | 5                                                                                                                                                                                                                                                                                                                                                                                                                          |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| ZM                                       | —                                     | —                                        | 20±2°C                                                                                                                                                                  | 85±2°C      | 20±2°C                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| B                                        | 20±2°C                                | -25±3°C                                  | 20±2°C                                                                                                                                                                  | 85±2°C      | 20±2°C                                                                                                                                                                                                                                                                                                                                                                                                                     |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 7                                        | Soldering Effect                      | Appearance                               | No marked defect.                                                                                                                                                       |             | The lead wires 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 24±2 hrs. at *room condition.                                                                                                                                                                                                             |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | Capacitance Change                       | Within ±10%                                                                                                                                                             |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | Dielectric Strength (Between Lead Wires) | No failure.                                                                                                                                                             |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 8                                        | Humidity (Under Steady State)         | Appearance                               | No marked defect.                                                                                                                                                       |             | Set the capacitor for 240±8 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.                                                                                                                                                                                                                                                                  |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | Capacitance Change                       | Within ±10%                                                                                                                                                             |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | D.F.                                     | <table><tr><td>ZM</td><td>1.5% max.</td></tr><tr><td>B</td><td>4.0% max.</td></tr></table>                                                                              | ZM          |                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.5% max. | B                | 4.0% max.                      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | ZM                                       | 1.5% max.                                                                                                                                                               |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | B                                        | 4.0% max.                                                                                                                                                               |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| I.R.                                     | 5000MΩ min.                           |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| Dielectric Strength (Between Lead Wires) | No failure.                           |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| 9                                        | Life                                  | Appearance                               | No marked defect.                                                                                                                                                       |             | Apply a DC voltage of 125% of the rated voltage for 1000 <sup>+48</sup> <sub>0</sub> hrs. in silicon oil at 85±2°C. Post-treatment: Capacitor should be stored for 24±2 hrs. at *room condition. (Charge/Discharge current≤50mA)                                                                                                                                                                                           |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | Capacitance Change                       | Within ±10%                                                                                                                                                             |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | D.F.                                     | <table><tr><td>ZM</td><td>1.5% max.</td></tr><tr><td>B</td><td>4.0% max.</td></tr></table>                                                                              | ZM          |                                                                                                                                                                                                                                                                                                                                                                                                                            | 1.5% max. | B                | 4.0% max.                      |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | ZM                                       | 1.5% max.                                                                                                                                                               |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
|                                          |                                       | B                                        | 4.0% max.                                                                                                                                                               |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| I.R.                                     | 5000MΩ min.                           |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |
| Dielectric Strength (Between Lead Wires) | No failure                            |                                          |                                                                                                                                                                         |             |                                                                                                                                                                                                                                                                                                                                                                                                                            |           |                  |                                |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |  |            |   |   |   |   |   |    |   |   |        |        |        |   |        |         |        |        |        |

(Note) Tests for Dielectric Strength (between lead wires), Charge Discharge Test, Humidity, Temperature Cycle and Life should be performed with specimens having molded resin (MR1023C : made by Murata) extending over 3mm on all the surface.

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

Continued on the following page. 

## Specifications and Test Methods

Continued from the preceding page.

| No.                                      | Item                   |                    | Specifications                                                                                                                                                                                                                                                                                                                                                                                        |    | Testing Method                                                                                                                                                                                                                                    |   |           |  |  |                                                                                        |
|------------------------------------------|------------------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|-----------|--|--|----------------------------------------------------------------------------------------|
| 10                                       | Charge Discharge Test  | Appearance         | No marked defect.                                                                                                                                                                                                                                                                                                                                                                                     |    | Charge discharge test should be measured in the following test circuit and cycle.                                                                                                                                                                 |   |           |  |  |                                                                                        |
|                                          |                        | Capacitance Change | Within $\pm 10\%$                                                                                                                                                                                                                                                                                                                                                                                     |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
|                                          |                        | D.F.               | <table><tr><td>ZM</td><td>1.5% max.</td></tr><tr><td>B</td><td>4.0% max.</td></tr></table>                                                                                                                                                                                                                                                                                                            | ZM | 1.5% max.                                                                                                                                                                                                                                         | B | 4.0% max. |  |  | Applied voltage : Rated voltage<br>Cycle time : 20000 cycle                            |
|                                          |                        | ZM                 | 1.5% max.                                                                                                                                                                                                                                                                                                                                                                                             |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
|                                          |                        | B                  | 4.0% max.                                                                                                                                                                                                                                                                                                                                                                                             |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
| I.R.                                     | 5000M $\Omega$ min.    |                    | <p>Post-treatment : Capacitor should be stored for 4 hrs. at *room condition.</p> <div><div>&lt;Circuit&gt;</div><div>&lt;Cycle&gt;</div><div>Cx : specimen<br/>R1 : circuit protective resistor (300k<math>\Omega</math>)<br/>C0 : supplied energy for Cx. C0<math>\approx</math>10Cx<br/>R2 : current limiting resistor (E/10<math>\Omega</math>)<br/>E : direct-current voltage source</div></div> |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
| Dielectric Strength (Between Lead Wires) | No failure.            |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
| 11                                       | Temperature Cycle      | Appearance         | No marked defect.                                                                                                                                                                                                                                                                                                                                                                                     |    | Temperature cycle should be measured in the following test.<br>Cycle time : 5 cycle<br>Post-treatment : Capacitor should be stored for 4 hrs. at *room condition.                                                                                 |   |           |  |  |                                                                                        |
|                                          |                        | Capacitance Change | Within $\pm 10\%$                                                                                                                                                                                                                                                                                                                                                                                     |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
|                                          |                        | D.F.               | <table><tr><td>ZM</td><td>1.5% max.</td></tr><tr><td>B</td><td>4.0% max.</td></tr></table>                                                                                                                                                                                                                                                                                                            | ZM | 1.5% max.                                                                                                                                                                                                                                         | B | 4.0% max. |  |  | <div><div>-30°C</div><div>30</div><div>30</div><div>+100°C</div><div>(min)</div></div> |
|                                          |                        | ZM                 | 1.5% max.                                                                                                                                                                                                                                                                                                                                                                                             |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
|                                          |                        | B                  | 4.0% max.                                                                                                                                                                                                                                                                                                                                                                                             |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
| I.R.                                     | 5000M $\Omega$ min.    |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
| Dielectric Strength (Between Lead Wires) | No failure.            |                    |                                                                                                                                                                                                                                                                                                                                                                                                       |    |                                                                                                                                                                                                                                                   |   |           |  |  |                                                                                        |
| 12                                       | Strength of Lead       | Pull               | Lead wire should not be cut off.<br>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 $\pm$ 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.                    |   |           |  |  |                                                                                        |
| 13                                       | Solderability of Leads |                    | Lead wire should be soldered with uniform coating on the axial direction over $\frac{3}{4}$ of the circumferential direction.                                                                                                                                                                                                                                                                         |    | The lead wire of a capacitor should be dipped into a 25% methanol solution of rosin and then into molten solder of 235 $\pm$ 5°C for 2 $\pm$ 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. |   |           |  |  |                                                                                        |

(Note) Tests for Dielectric Strength (between lead wires), Charge Discharge Test, Humidity, Temperature Cycle and Life should be performed with specimens having molded resin (MR1023C : made by Murata) extending over 3mm on all the surface.

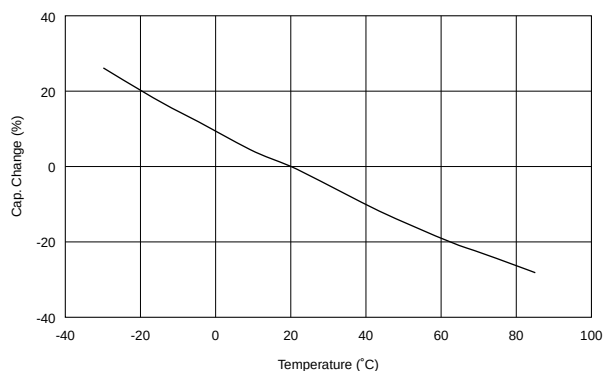
\* "room condition" Temperature: 15 to 35°C, Relative humidity: 45 to 75%, Atmospheric pressure: 86 to 106kPa

## Typical Characteristics Data/Packaging

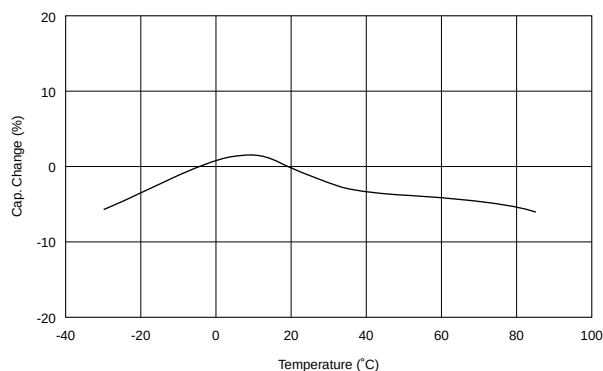
1

### ■ Cap.-Temp. Char.

ZM Characteristics

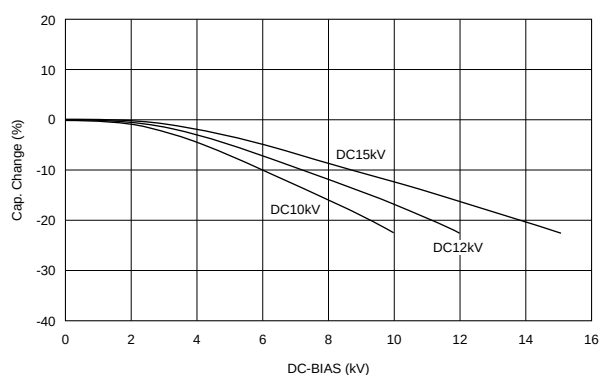


B Characteristics

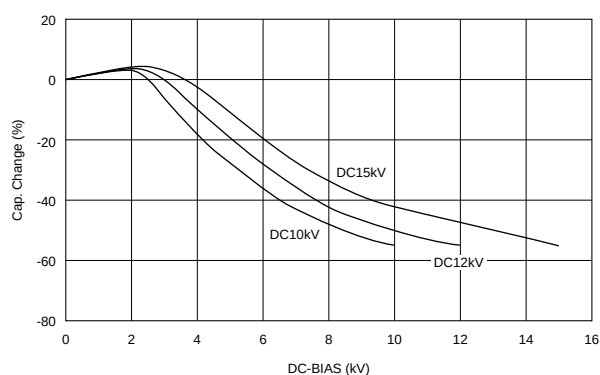


### ■ Cap.-DC Bias Char.

ZM Characteristics



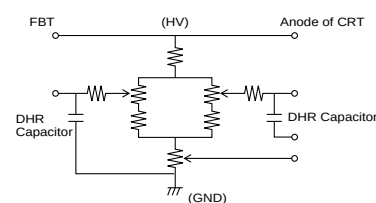
B Characteristics



### ■ Packaging Styles



### ■ Example



|                                       |            |
|---------------------------------------|------------|
| Minimum Quantity (Order in Sets Only) | 200 (pcs.) |
| Minimum Order Quantity                | 200 (pcs.) |

- "Minimum Quantity" means the number 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.)



## DHR Series ⚠Caution/Notice

### ■ ⚠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  $V_{o-p}$  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

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 applied voltage load should be such that the capacitor's self-generated heat is within 10°C at an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of  $\phi 0.1\text{mm}$  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.)

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 (Storage and Operation 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.

The capacitor is designed to be used in insulating media, such as epoxy resin, silicone oil, etc.

There must be 3mm or more of insulating media for each direction of the capacitor.

Before cleaning, bonding, or molding this product,

verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment. Store the capacitors where the temperature and relative humidity do not exceed -10 to 40 degrees centigrade and 15 to 85%. Use capacitors within 6 months.

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

### ■ ⚠Caution (Soldering and Mounting)

#### 1. Vibration and impact

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

#### 2. Soldering

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

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

### ■ ⚠Caution (Handling)

#### Vibration and impact

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

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

### ■ Notice (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. Class 1 capacitors

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. Class 2 and 3 capacitors

Class 2 and 3 capacitors with temperature characteristics B, E and F 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.

# High Voltage Ceramic Capacitors DC10-40kV

**muRata**

## Mold Type DHS N4700 Series (DC10-40kV)

2

Murata's high voltage ceramic capacitors, DHS N4700 series, are designed to meet the stringent requirements of high voltage applications.

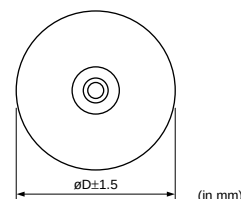
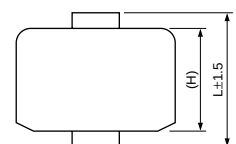
These capacitors are especially appropriate for applications which require a low dissipation factor and a small voltage coefficient.

### ■ Features

1. Epoxy resin encapsulated
2. Small size
3. Low dissipation factor and low heating value
4. Linear temperature characteristic
5. Low DC, AC-voltage coefficient

### ■ Applications

- Gas laser
- DC HV power supplies
- Lightning arresters, voltage distribution systems
- Electron microscopes, synchroscopes
- Electrostatic coating machines



| DC Rated Voltage (kV) | Depth of tapped holes (mm) |
|-----------------------|----------------------------|
| 10, 15                | 4                          |
| 20, 30                | 6                          |
| 40                    | 8                          |

| Part Number    | Capacitance (pF) | Capacitance Tolerance (%) | DC Rated Voltage (kV) | Dimensions (mm) |    |    | Terminal Type (Screw Thread Type)  |
|----------------|------------------|---------------------------|-----------------------|-----------------|----|----|------------------------------------|
|                |                  |                           |                       | D               | L  | H  |                                    |
| DHS4E4A561KC2B | 560              | ±10                       | 10                    | 20              | 16 | 12 | ISO M4, P0.7 (Metric Screw Thread) |
| DHS4E4A122KH2B | 1200             |                           |                       | 30              |    |    |                                    |
| DHS4E4A282KL2B | 2800             |                           |                       | 38              |    |    |                                    |
| DHS4E4A502KR2B | 5000             |                           |                       | 52              |    |    |                                    |
| DHS4E4A802KT2B | 8000             |                           |                       | 60              |    |    |                                    |
| DHS4E4A561MCXB | 560              | ±20                       |                       | 20              | 18 | 14 | No.8-32, NC-2B (Inch Screw Thread) |
| DHS4E4A122MHXB | 1200             |                           |                       | 30              |    |    |                                    |
| DHS4E4A282MLXB | 2800             |                           |                       | 38              |    |    |                                    |
| DHS4E4A502MRXB | 5000             |                           |                       | 52              |    |    |                                    |
| DHS4E4A802MTXB | 8000             |                           |                       | 60              |    |    |                                    |
| DHS4E4C371KC2B | 370              | ±10                       | 15                    | 20              | 18 | 14 | ISO M4, P0.7 (Metric Screw Thread) |
| DHS4E4C112KH2B | 1100             |                           |                       | 30              |    |    |                                    |
| DHS4E4C192KL2B | 1900             |                           |                       | 38              |    |    |                                    |
| DHS4E4C342KR2B | 3400             |                           |                       | 52              |    |    |                                    |
| DHS4E4C532KT2B | 5300             |                           |                       | 60              |    |    |                                    |
| DHS4E4C371MCXB | 370              | ±20                       |                       | 20              | 18 | 14 | No.8-32, NC-2B (Inch Screw Thread) |
| DHS4E4C112MHXB | 1100             |                           |                       | 30              |    |    |                                    |
| DHS4E4C192MLXB | 1900             |                           |                       | 38              |    |    |                                    |
| DHS4E4C342MRXB | 3400             |                           |                       | 52              |    |    |                                    |
| DHS4E4C532MTXB | 5300             |                           |                       | 60              |    |    |                                    |

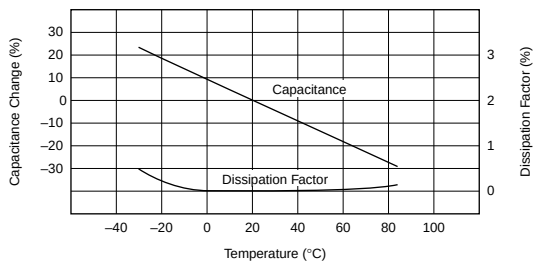
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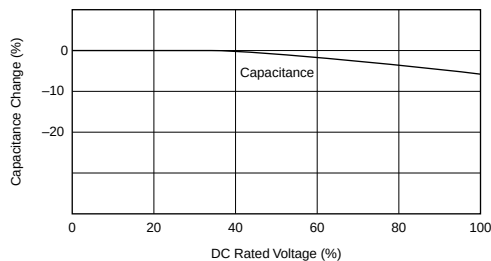
| Part Number    | Capacitance<br>(pF) | Capacitance<br>Tolerance (%) | DC Rated<br>Voltage (kV) | Dimensions (mm) |    |    | Terminal Type<br>(Screw Thread Type)  |                                       |
|----------------|---------------------|------------------------------|--------------------------|-----------------|----|----|---------------------------------------|---------------------------------------|
|                |                     |                              |                          | D               | L  | H  |                                       |                                       |
| DHS4E4D281KC2B | 280                 | ±10                          | 20                       | 20              | 24 | 20 | ISO M4, P0.7<br>(Metric Screw Thread) |                                       |
| DHS4E4D881KH2B | 880                 |                              |                          | 30              |    |    |                                       |                                       |
| DHS4E4D142KL2B | 1400                |                              |                          | 38              |    |    |                                       |                                       |
| DHS4E4D252KR2B | 2500                |                              |                          | 52              |    |    |                                       |                                       |
| DHS4E4D402KT2B | 4000                |                              |                          | 60              |    |    |                                       |                                       |
| DHS4E4D281MCXB | 280                 | ±20                          |                          |                 | 20 |    |                                       | No.8-32, NC-2B<br>(Inch Screw Thread) |
| DHS4E4D881MHXB | 880                 |                              |                          | 30              |    |    |                                       |                                       |
| DHS4E4D142MLXB | 1400                |                              |                          | 38              |    |    |                                       |                                       |
| DHS4E4D252MRXB | 2500                |                              |                          | 52              |    |    |                                       |                                       |
| DHS4E4D402MTXB | 4000                |                              |                          | 60              |    |    |                                       |                                       |
| DHS4E4F191KC2B | 190                 | ±10                          | 30                       | 20              | 28 | 24 | ISO M4, P0.7<br>(Metric Screw Thread) |                                       |
| DHS4E4F591KH2B | 590                 |                              |                          | 30              |    |    |                                       |                                       |
| DHS4E4F941KL2B | 940                 |                              |                          | 38              |    |    |                                       |                                       |
| DHS4E4F172KR2B | 1700                |                              |                          | 52              |    |    |                                       |                                       |
| DHS4E4F272KT2B | 2700                |                              |                          | 60              |    |    |                                       |                                       |
| DHS4E4F191MCXB | 190                 | ±20                          |                          |                 | 20 |    |                                       | No.8-32, NC-2B<br>(Inch Screw Thread) |
| DHS4E4F591MHXB | 590                 |                              |                          | 30              |    |    |                                       |                                       |
| DHS4E4F941MLXB | 940                 |                              |                          | 38              |    |    |                                       |                                       |
| DHS4E4F172MRXB | 1700                |                              |                          | 52              |    |    |                                       |                                       |
| DHS4E4F272MTXB | 2700                |                              |                          | 60              |    |    |                                       |                                       |
| DHS4E4G141KC2B | 140                 | ±10                          | 40                       | 20              | 36 | 32 | ISO M4, P0.7<br>(Metric Screw Thread) |                                       |
| DHS4E4G441KH2B | 440                 |                              |                          | 30              |    |    |                                       |                                       |
| DHS4E4G701KL2B | 700                 |                              |                          | 38              |    |    |                                       |                                       |
| DHS4E4G132KR2B | 1300                |                              |                          | 52              |    |    |                                       |                                       |
| DHS4E4G202KT2B | 2000                |                              |                          | 60              |    |    |                                       |                                       |
| DHS4E4G141MCXB | 140                 | ±20                          |                          |                 | 20 |    |                                       | No.8-32, NC-2B<br>(Inch Screw Thread) |
| DHS4E4G441MHXB | 440                 |                              |                          | 30              |    |    |                                       |                                       |
| DHS4E4G701MLXB | 700                 |                              |                          | 38              |    |    |                                       |                                       |
| DHS4E4G132MRXB | 1300                |                              |                          | 52              |    |    |                                       |                                       |
| DHS4E4G202MTXB | 2000                |                              |                          | 60              |    |    |                                       |                                       |

## Typical Characteristics Data / Specifications and Test Methods

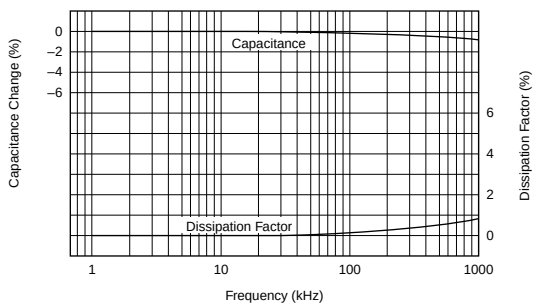
### ■ Temperature Characteristic



### ■ Typical Voltage Coefficient



### ■ Frequency Characteristic



| No | Item                          |                    | Specifications                                                             | Testing Method                                                                                                                                                                                    |   |              |      |      |      |  |  |
|----|-------------------------------|--------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|--------------|------|------|------|--|--|
| 1  | Operating Temperature Range   |                    | -20 to +85°C                                                               |                                                                                                                                                                                                   |   |              |      |      |      |  |  |
| 2  | Capacitance                   |                    | Within the specified tolerance.                                            | The capacitance should be measured at 20°C with 1±0.1kHz and AC 1 to 5V(r.m.s.).                                                                                                                  |   |              |      |      |      |  |  |
| 3  | Temperature Characteristics   |                    | Temperature coefficient<br>-4700±1000ppm/°C<br>(Temp. range: +20 to +85°C) | The capacitance measurement should be made at each step specified in table.<br>Capacitance change from the value of step 3 should not exceed the limit specified.                                 |   |              |      |      |      |  |  |
|    |                               |                    |                                                                            | Step                                                                                                                                                                                              | 1 | 2            | 3    | 4    | 5    |  |  |
|    |                               |                    |                                                                            | Temp. (°C)                                                                                                                                                                                        | — | —            | 20±2 | 85±2 | 20±2 |  |  |
| 4  | Dissipation Factor (D.F.)     |                    | 0.3% max.                                                                  | The dissipation factor should be measured at 20°C with 1±0.1kHz and AC 1 to 5V(r.m.s.).                                                                                                           |   |              |      |      |      |  |  |
| 5  | Dielectric Strength           | Between Terminal   | No failure.                                                                | The capacitor should not be damaged when DC voltage of 150% of the rated voltage is applied between the terminals for 60±5 sec. in insulating liquid or gas.<br>(Charge/Discharge current ≤ 50mA) |   |              |      |      |      |  |  |
| 6  | Insulation Resistance (I.R.)  |                    | 10000MΩ min.                                                               | The insulation resistance should be measured with DC1000V within 60±5 sec. of charging.                                                                                                           |   |              |      |      |      |  |  |
| 7  | Strength of Terminal          | Torque Strength    | Capacitor should not be broken.                                            | When mounting the capacitor on equipment, be sure to mount them within the torque strength values shown in the table below.                                                                       |   |              |      |      |      |  |  |
|    |                               |                    |                                                                            | Terminal Type                                                                                                                                                                                     |   | torque (N·m) |      |      |      |  |  |
|    |                               |                    |                                                                            | ISO M4, No.8-32                                                                                                                                                                                   |   | 1.5          |      |      |      |  |  |
| 8  | Life                          | Appearance         | No marked defect.                                                          | Apply a DC voltage of 125% of the rated voltage for 100+24/-0 hrs. in silicon oil at 85±2°C.                                                                                                      |   |              |      |      |      |  |  |
|    |                               | Capacitance Change | Within ±5%                                                                 |                                                                                                                                                                                                   |   |              |      |      |      |  |  |
|    |                               | D.F.               | 1.0% max.                                                                  | Post-treatment: Capacitor should be stored for 24 hrs. at *room condition. (Charge/Discharge current ≤ 50mA)                                                                                      |   |              |      |      |      |  |  |
|    |                               | I.R.               | 1000MΩ min.                                                                |                                                                                                                                                                                                   |   |              |      |      |      |  |  |
| 9  | Humidity (Under Steady State) | Appearance         | No marked defect.                                                          | Set the capacitor for 100+24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. Post-treatment: Capacitor should be stored for 24 hrs. at *room condition.                                         |   |              |      |      |      |  |  |
|    |                               | Capacitance Change | Within ±5%                                                                 |                                                                                                                                                                                                   |   |              |      |      |      |  |  |
|    |                               | D.F.               | 1.0% max.                                                                  |                                                                                                                                                                                                   |   |              |      |      |      |  |  |
|    |                               | I.R.               | 1000MΩ min.                                                                |                                                                                                                                                                                                   |   |              |      |      |      |  |  |

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

# High Voltage Ceramic Capacitors DC10-40kV

**muRata**

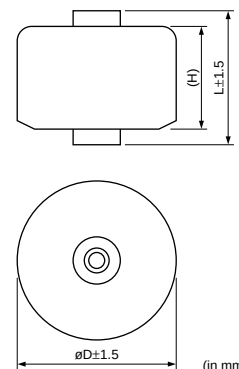
## Mold Type DHS Z5V Series (DC20-40kV)

### ■ Features

1. Epoxy resin encapsulated
2. Small size
3. Highly reliable internal construction
4. Wide selection of values
5. Up to DC 40kV working voltage

### ■ Applications

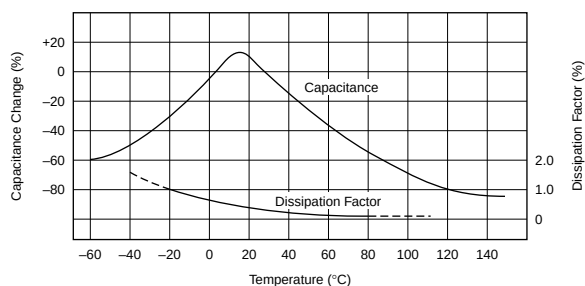
- Electrostatic coating machines
- Electron microscopes, synchroscopes
- CRT power supplies
- Lightning arrester voltage distribution systems
- DC HV power supplies



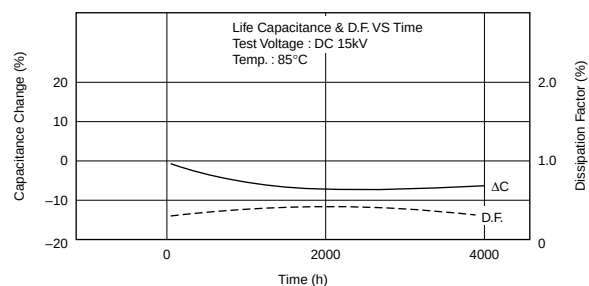
| Part Number    | Capacitance (pF) | Capacitance Tolerance (%) | DC Rated Voltage (kV) | Dimensions (mm) |    |    | Terminal Type (Screw Thread Type)  |
|----------------|------------------|---------------------------|-----------------------|-----------------|----|----|------------------------------------|
|                |                  |                           |                       | D               | L  | H  |                                    |
| DHSF44D601ZD2B | 600              | +80, -20                  | 20                    | 24              | 26 | 24 | ISO M4, P0.7 (Metric Screw Thread) |
| DHSF44D102ZH2B | 1000             |                           |                       | 30              |    |    |                                    |
| DHSF44D242ZN2B | 2400             |                           |                       | 43              |    |    |                                    |
| DHSF44D332ZR2B | 3300             |                           |                       | 52              |    |    |                                    |
| DHSF44D482ZT2B | 4800             |                           |                       | 60              |    |    |                                    |
| DHSF44D601ZDXB | 600              |                           |                       | 24              |    |    | No.8-32, NC-2B (Inch Screw Thread) |
| DHSF44D102ZHXB | 1000             |                           |                       | 30              |    |    |                                    |
| DHSF44D242ZNXB | 2400             |                           |                       | 43              |    |    |                                    |
| DHSF44D332ZRXB | 3300             |                           |                       | 52              |    |    |                                    |
| DHSF44D482ZTXB | 4800             |                           |                       | 60              |    |    |                                    |
| DHSF44F461ZD2B | 460              |                           | 30                    | 24              | 34 | 32 | ISO M4, P0.7 (Metric Screw Thread) |
| DHSF44F781ZH2B | 780              |                           |                       | 30              |    |    |                                    |
| DHSF44F182ZN2B | 1800             |                           |                       | 43              |    |    |                                    |
| DHSF44F252ZR2B | 2500             |                           |                       | 52              |    |    |                                    |
| DHSF44F362ZT2B | 3600             |                           |                       | 60              |    |    |                                    |
| DHSF44F461ZDXB | 460              |                           |                       | 24              |    |    | No.8-32, NC-2B (Inch Screw Thread) |
| DHSF44F781ZHXB | 780              |                           |                       | 30              |    |    |                                    |
| DHSF44F182ZNXB | 1800             |                           |                       | 43              |    |    |                                    |
| DHSF44F252ZRXB | 2500             |                           |                       | 52              |    |    |                                    |
| DHSF44F362ZTXB | 3600             |                           |                       | 60              |    |    |                                    |
| DHSF44G341ZD2B | 340              |                           | 40                    | 24              | 41 | 39 | ISO M4, P0.7 (Metric Screw Thread) |
| DHSF44G571ZH2B | 570              |                           |                       | 30              |    |    |                                    |
| DHSF44G132ZN2B | 1300             |                           |                       | 43              |    |    |                                    |
| DHSF44G192ZR2B | 1900             |                           |                       | 52              |    |    |                                    |
| DHSF44G272ZT2B | 2700             |                           |                       | 60              |    |    |                                    |
| DHSF44G341ZDXB | 340              |                           |                       | 24              |    |    | No.8-32, NC-2B (Inch Screw Thread) |
| DHSF44G571ZHXB | 570              |                           |                       | 30              |    |    |                                    |
| DHSF44G132ZNXB | 1300             |                           |                       | 43              |    |    |                                    |
| DHSF44G192ZRXB | 1900             |                           |                       | 52              |    |    |                                    |
| DHSF44G272ZTXB | 2700             |                           |                       | 60              |    |    |                                    |

## Typical Characteristics Data

### ■ Dissipation Factor and Capacitance-Temperature

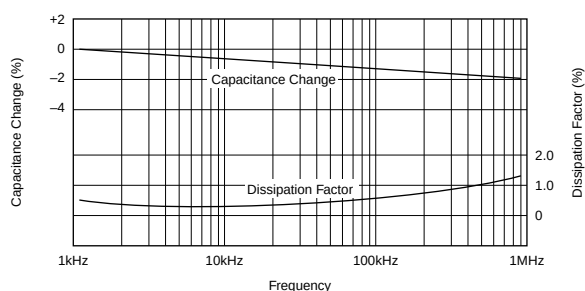


### ■ Life

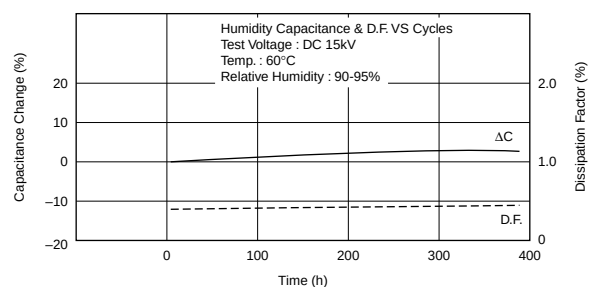


3

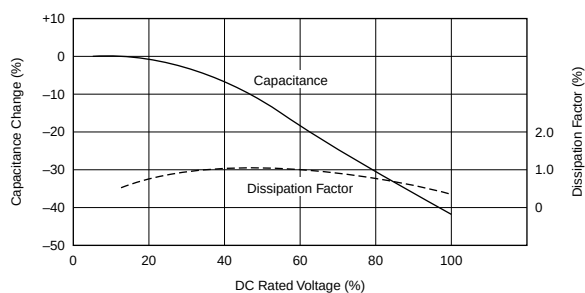
### ■ Dissipation Factor and Capacitance-Frequency



### ■ Humidity



### ■ Typical Voltage Coefficient



## Specifications and Test Methods

| No              | Item                          |                    | Specifications                                                 | Testing Method                                                                                                                                                                                                                                                        |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|-----------------|-------------------------------|--------------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|------|------|---------------|--------------|--|--|--|--|-----------------|-----|--|--|--|--|
| 1               | Operating Temperature Range   |                    | -20 to +85°C                                                   |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 2               | Capacitance                   |                    | Within the specified tolerance.                                | The capacitance should be measured at 25°C with 1±0.1kHz and AC 1 to 5V (r.m.s.).                                                                                                                                                                                     |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 3               | Temperature Characteristics   |                    | Capacitance change<br>+22%/-82%<br>(Temp. range: +10 to +85°C) | The capacitance measurement should be made at each step specified in table.<br>Capacitance change from the value of step 3 should not exceed the limit specified.                                                                                                     |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               |                    |                                                                | Step                                                                                                                                                                                                                                                                  | 1    | 2     | 3    | 4    | 5    |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               |                    |                                                                | Temp. (°C)                                                                                                                                                                                                                                                            | 25±2 | -20±3 | 25±2 | 85±2 | 25±2 |               |              |  |  |  |  |                 |     |  |  |  |  |
| 4               | Dissipation Factor (D.F.)     |                    | 1.5% max.                                                      | The dissipation factor should be measured at 25°C with 1±0.1kHz and AC 1 to 5V (r.m.s.).                                                                                                                                                                              |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 5               | Dielectric Strength           | Between Terminal   | No failure.                                                    | The capacitor should not be damaged when DC voltage of 150% of the rated voltage is applied between the terminals for 60±5 sec. in insulating liquid or gas.<br>(Charge/Discharge current ≤ 50mA)                                                                     |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 6               | Insulation Resistance (I.R.)  |                    | 10000MΩ min.                                                   | The insulation resistance should be measured with DC1000V within 60±5 sec. of charging.                                                                                                                                                                               |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 7               | Strength of Terminal          | Torque Strength    | Capacitor should not be broken.                                | When mounting the capacitors on equipment, be sure to mount them within the torque strength values shown in the table below. <table><tr><td>Terminal Type</td><td colspan="5">torque (N·m)</td></tr><tr><td>ISO M4, No.8-32</td><td colspan="5">1.5</td></tr></table> |      |       |      |      |      | Terminal Type | torque (N·m) |  |  |  |  | ISO M4, No.8-32 | 1.5 |  |  |  |  |
| Terminal Type   | torque (N·m)                  |                    |                                                                |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| ISO M4, No.8-32 | 1.5                           |                    |                                                                |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 8               | Life                          | Appearance         | No marked defect.                                              | Apply a DC voltage of 125% of the rated voltage for 100+24/-0 hrs. in silicon oil at 85±2°C.<br>Post-treatment: Capacitor should be stored for 24 hrs. at *room condition. (Charge/Discharge current ≤ 50mA)                                                          |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               | Capacitance Change | Within ±20%                                                    |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               | D.F.               | 5.0% max.                                                      |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               | I.R.               | 1000MΩ min.                                                    |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
| 9               | Humidity (Under Steady State) | Appearance         | No marked defect.                                              | Set the capacitor for 100+24/-0 hrs. at 40±2°C in 90 to 95% relative humidity. Post-treatment: Capacitor should be stored for 24 hrs. at *room condition.                                                                                                             |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               | Capacitance Change | Within ±20%                                                    |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               | D.F.               | 5.0% max.                                                      |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |
|                 |                               | I.R.               | 1000MΩ min.                                                    |                                                                                                                                                                                                                                                                       |      |       |      |      |      |               |              |  |  |  |  |                 |     |  |  |  |  |

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

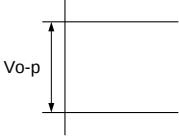
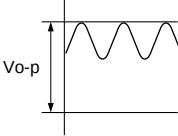
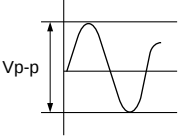
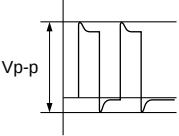
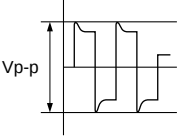


## DHS Series ⚠Caution and Notice

### ■ ⚠Caution

#### 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  $V_{o-p}$  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

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 applied voltage load should be such that the capacitor's self-generated heat is within 10°C at an atmosphere temperature of 25°C.

When measuring, use a thermocouple of small thermal capacity-K of  $\varnothing 0.1\text{mm}$  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.)

#### 3. Installation

Installation torque should not exceed the torque strength values in "Specifications and Test Methods".

Do not use a screw with a thread depth greater than specified.

Avoid installation in which any bending torque is applied to the capacitor terminal.

Do not rework or resolder the terminal.

#### 4. 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  $40^\circ\text{C}$  and 15 to 85%. Use capacitors within 6 months.

#### 5. Vibration and impact

Do not expose a capacitor 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.

## DHS Series ⚠Caution and Notice

### ■ Notice

#### Capacitance change of capacitor

##### ● Class 1 capacitors

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.

##### ● Class 2 and 3 capacitors

Class 2 and 3 capacitors with temperature characteristics

B, E and F 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.

## ISO9000 Certifications

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

| Plant                                | Certified Date | Organization                   | Registration No. | Applied standard |
|--------------------------------------|----------------|--------------------------------|------------------|------------------|
| Izumo Murata Manufacturing Co., Ltd. | Feb. 1. '00    | Underwriters Laboratories Inc. | A5587            | ISO9001          |
| Murata Electronics (Thailand), Ltd.  | Apr. 8. '02    | Underwriters Laboratories Inc. | A6279            | ISO9001          |

**⚠Note:**

1. Export Control  
    <For customers outside Japan>  
    Murata products should not be used or sold for use in the development, production, stockpiling or utilization of any conventional weapons or mass-destructive weapons (nuclear weapons, chemical or biological weapons, or missiles), or any other weapons.  
    <For customers in Japan>  
    For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.
2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage to a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
  - ① Aircraft equipment                      ② Aerospace equipment
  - ③ Undersea equipment                  ④ Power plant equipment
  - ⑤ Medical equipment                    ⑥ Transportation equipment (vehicles, trains, ships, etc.)
  - ⑦ Traffic signal equipment            ⑧ Disaster prevention / crime prevention equipment
  - ⑨ Data-processing equipment        ⑩ Application of similar complexity and/or reliability requirements to the applications listed in the above
3. Product specifications in this catalog are as of April 2003. 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.