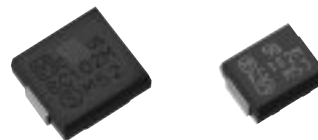


### Ceramic Capacitors (Safety Regulations) For Surface Mounting Types BC and FC



#### ■ Features

- Resin molded SMD type for reflow soldering
- High reliability
- Safety requirement approved by UL, SEMKO, NEMKO, FIMKO, DEMKO and KTL (for Type FC)

#### ■ Recommended Application

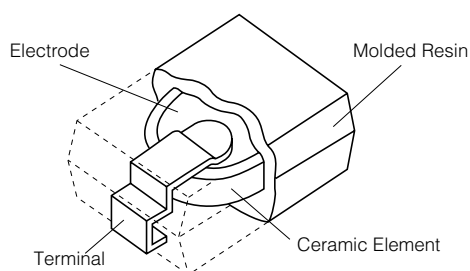
- Interference suppressors circuit and Isolation circuit of IT equipment such as MODEM.
- Interference suppressors circuit of small power supply machinery such as DC-DC converters and power modules.

#### ■ Explanation of Part Numbers

|              |        |                 |            |      |         |                     |             |                |          |             |             |        |
|--------------|--------|-----------------|------------|------|---------|---------------------|-------------|----------------|----------|-------------|-------------|--------|
| 1            | 2      | 3               | 4          | 5    | 6       | 7                   | 8           | 9              | 10       | 11          | 12          |        |
| E            | C      | K               | T          | B    | C       | 1                   | 0           | 2              | M        | E           |             |        |
| Product Code |        | Packaging Style |            | Type |         | Nominal Capacitance |             | Cap. Tolerance |          | Temp. Char. |             | Suffix |
| Code         | Class  | Code            | Style      | Code | Type    | (Ex.)               | Capacitance | Code           | Tol.     | Code        | Temp. Char. |        |
| ECC          | Class1 | T               | Taped type | BC   | Type BC | 050                 | 5 pF        | C              | ±0.25 pF | G           | SL/GP       |        |
| ECK          | Class2 |                 |            | FC   | Type FC | 100                 | 10 pF       | D              | ±0.5 pF  | B           | B/Y5P       |        |
|              |        |                 |            |      |         | 470                 | 47 pF       | F              | ±1 pF    | E           | E/Y5U       |        |
|              |        |                 |            |      |         | 101                 | 100 pF      | J              | ±5 %     | F           | F/Y5V       |        |
|              |        |                 |            |      |         | 221                 | 220 pF      | K              | ±10 %    |             |             |        |
|              |        |                 |            |      |         | 102                 | 1000 pF     | M              | ±20 %    |             |             |        |

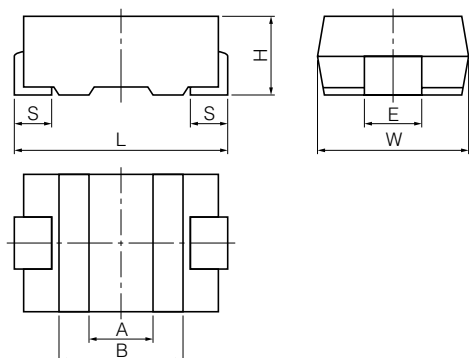
#### ■ Construction

- Type BC, FC



### ■ Dimensions in mm (not to scale)

#### ● Type BC, FC



| Symbol       | L       | W       | H        | S         | E       | A     | B     |
|--------------|---------|---------|----------|-----------|---------|-------|-------|
| Dim. Type BC | 7.1±0.5 | 6.3±0.3 | 2.5±0.3  | 1.45±0.30 | 2.5±0.2 | (2.0) | (3.7) |
| Type FC      | 5.7±0.5 | 4.5±0.3 | 2.3 max. | 0.85±0.30 | 2.5±0.2 | (1.7) | (3.1) |

### ■ Specifications

| Characteristics                 | Temp. Char. SL/GP                                                                                     | Temp. Char. B/Y5P, E/Y5U, F/Y5V                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |
|---------------------------------|-------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------------------|-------------|-------|-------|--------------|-------|------------|-------|------------|
| Operating Temperature Range     | -25 to 100 °C (-25 to 85 °C for UL approved)                                                          |                                                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |
| Rated Voltage                   | 250 VAC                                                                                               |                                                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |
| Dielectric Withstanding Voltage | 1500 VAC for 1 minute                                                                                 |                                                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |
| Capacitance                     | Within the specified tolerance, when measured at 1 MHz±20 %, 1 to 5 Vrms. and 20 °C                   | Within the specified tolerance, when measured at 1 kHz±20 %, 1 to 5 Vrms. and 20 °C                                                                                                                                                                    |       |                  |             |       |       |              |       |            |       |            |
| Q or Dissipation Factor (tan δ) | 30 pF or under Q ≥ 200+10 C (C:Cap.pF)<br>over 30 pF Q ≥ 500<br>at 1 MHz±20 %, 1 to 5 Vrms. and 20 °C | tan δ ≤ 0.025<br>at 1 kHz±20 %, 1 to 5 Vrms. and 20 °C                                                                                                                                                                                                 |       |                  |             |       |       |              |       |            |       |            |
| Insulation Resistance           | 10000 M Ω min. at 500 VDC and 1 minute electrification                                                |                                                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |
| Temperature Characteristics     | Temperature Coefficient: +350 to -1000 ppm/°C over the temperature range 20 to 85 °C                  | <table> <tr> <th>Char.</th><th>Max. Cap. Change</th><th>Temp. Range</th></tr> <tr> <td>B/Y5P</td><td>±10 %</td><td rowspan="3">-25 to 85 °C</td></tr> <tr> <td>E/Y5U</td><td>+20, -55 %</td></tr> <tr> <td>F/Y5V</td><td>+30, -80 %</td></tr> </table> | Char. | Max. Cap. Change | Temp. Range | B/Y5P | ±10 % | -25 to 85 °C | E/Y5U | +20, -55 % | F/Y5V | +30, -80 % |
| Char.                           | Max. Cap. Change                                                                                      | Temp. Range                                                                                                                                                                                                                                            |       |                  |             |       |       |              |       |            |       |            |
| B/Y5P                           | ±10 %                                                                                                 | -25 to 85 °C                                                                                                                                                                                                                                           |       |                  |             |       |       |              |       |            |       |            |
| E/Y5U                           | +20, -55 %                                                                                            |                                                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |
| F/Y5V                           | +30, -80 %                                                                                            |                                                                                                                                                                                                                                                        |       |                  |             |       |       |              |       |            |       |            |

### ■ Related Standards and Certificate Number

| Certification Body | Related Standard                                      | Certificate Number |                          | Sub-Class | Rated Voltage | Dielectric Withstanding Voltage | Operating Temperature Range |
|--------------------|-------------------------------------------------------|--------------------|--------------------------|-----------|---------------|---------------------------------|-----------------------------|
|                    |                                                       | Type BC            | Type FC                  |           |               |                                 |                             |
| UL (USA)           | UL1414*                                               | E62674             | —                        | —         | 250 VAC       | 1500 VAC                        | -25 to 85 °C                |
|                    | UL1414 6th Ed.                                        | —                  | E62674                   | Y2        |               | 2000 VAC                        |                             |
|                    | CSA C22.2 No.1*                                       | E62674             | —                        | —         |               | 1500 VAC                        |                             |
| SEMKO (Sweden)     | EN132 400:1994 Sub-class Y2<br>(IEC 60384-14 2nd.Ed.) | 0026049/01         | 0101074/01<br>0126276/01 | Y2        | 250 VAC       | 1500 VAC                        | -25 to 100 °C               |
| FIMKO (Finland)    |                                                       | —                  | FI 16588<br>FI 17348     |           |               |                                 |                             |
| DEMKO (Denmark)    |                                                       | —                  | 310914-01<br>310698-01   |           |               |                                 |                             |
| NEMKO (Norway)     |                                                       | —                  | P01101830<br>P01100665   |           |               |                                 |                             |
| KTL (Korea)        | K60384-14 (IEC60384-14 2nd Ed.)                       | —                  | SU03013-3001             |           |               |                                 |                             |

Note : \* is for Line-by-pass capacitors. Certification Number sometimes changes with the change of the approval contents and so on.  
KTL mark is indicated on the label.

### ■ Ratings and Characteristics

| Type Name | Part Number | Capacitance (pF) | Cap. Tolerance | Temp. Char | Dimensions in mm |
|-----------|-------------|------------------|----------------|------------|------------------|
| Type BC   | ECCTBC100DG | 10               | ±0.5 pF        | SL/GP      | 7.1L×6.3W×2.5H   |
|           | ECCTBC150JG | 15               | ±5 %           | SL/GP      |                  |
|           | ECCTBC220JG | 22               | ±5 %           | SL/GP      |                  |
|           | ECCTBC330JG | 33               | ±5 %           | SL/GP      |                  |
|           | ECCTBC470JG | 47               | ±5 %           | SL/GP      |                  |
|           | ECCTBC680JG | 68               | ±5 %           | SL/GP      |                  |
|           | ECKTBC101KB | 100              | ±10 %          | B/Y5P      |                  |
|           | ECKTBC151KB | 150              | ±10 %          | B/Y5P      |                  |
|           | ECKTBC221KB | 220              | ±10 %          | B/Y5P      |                  |
|           | ECKTBC331KB | 330              | ±10 %          | B/Y5P      |                  |
|           | ECKTBC471KB | 470              | ±10 %          | B/Y5P      |                  |
|           | ECKTBC681KB | 680              | ±10 %          | B/Y5P      |                  |
|           | ECKTBC102ME | 1000             | ±20 %          | E/Y5U      |                  |
|           | ECKTBC152ME | 1500             | ±20 %          | E/Y5U      |                  |
|           | ECKTBC222ME | 2200             | ±20 %          | E/Y5U      |                  |
| Type FC   | ECCTFC100DG | 10               | ±0.5 pF        | SL/GP      | 5.7L×4.5W×2.3H   |
|           | ECCTFC150JG | 15               | ±5 %           | SL/GP      |                  |
|           | ECCTFC220JG | 22               | ±5 %           | SL/GP      |                  |
|           | ECCTFC330JG | 33               | ±5 %           | SL/GP      |                  |
|           | ECKTFC470KB | 47               | ±10 %          | B/Y5P      |                  |
|           | ECKTFC680KB | 68               | ±10 %          | B/Y5P      |                  |
|           | ECKTFC101KB | 100              | ±10 %          | B/Y5P      |                  |
|           | ECKTFC151KB | 150              | ±10 %          | B/Y5P      |                  |
|           | ECKTFC221KB | 220              | ±10 %          | B/Y5P      |                  |
|           | ECKTFC331KB | 330              | ±10 %          | B/Y5P      |                  |
|           | ECKTFC471KB | 470              | ±10 %          | B/Y5P      |                  |
|           | ECKTFC102ME | 1000             | ±20 %          | E/Y5U      |                  |
|           | ECKTFC152MF | 1500             | ±20 %          | F/Y5V      |                  |
|           | ECKTFC222MF | 2200             | ±20 %          | F/Y5V      |                  |

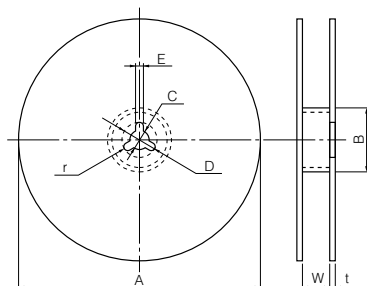
Notes \* Other capacitance values are available by special order.

### ■ Packaging Methods (Taping)

#### ● Minimum Quantity/Packing Unit

| Type    | Packaging style         | Part Number |               | Minimum Packing Quantity | Packing Quantity in Carton | Carton Dimensions in mm (LxWxH) |
|---------|-------------------------|-------------|---------------|--------------------------|----------------------------|---------------------------------|
| Type BC | Embossed Carrier Taping | EC□TBC□□□□□ | 10 to 2200 pF | 2000 pcs./reel           | 6000 pcs.                  | 350×350×62                      |
| Type FC | Embossed Carrier Taping | EC□TFC□□□□□ | 10 to 2200 pF | 3000 pcs./reel           | 9000 pcs.                  | 350×350×62                      |

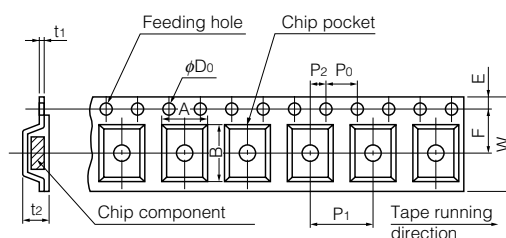
#### ● Reel



Unit:(mm)

| Symbol    | A     | B       | C        | D        | E       | W        | t       | r    |
|-----------|-------|---------|----------|----------|---------|----------|---------|------|
| Dim. (mm) | 330±5 | 60 min. | 13.0±0.5 | 21.0±1.0 | 2.0±0.5 | 13.5±1.5 | 2.0±0.5 | R1.0 |

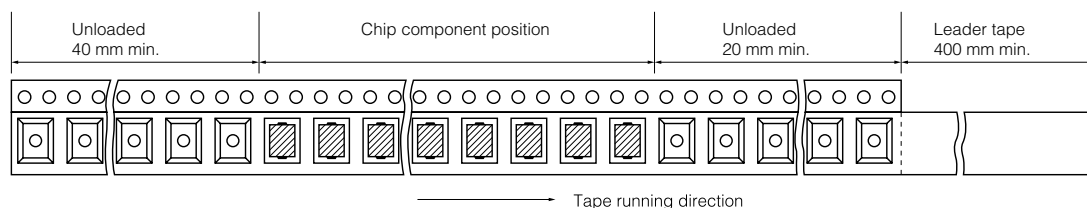
#### ● Embossed carrier taping



Unit:(mm)

| Symbol       |         | A           | B           | W            | F           | E             | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | φD <sub>0</sub>   | t <sub>1</sub> | t <sub>2</sub> |
|--------------|---------|-------------|-------------|--------------|-------------|---------------|----------------|----------------|----------------|-------------------|----------------|----------------|
| Dim.<br>(mm) | Type BC | 6.5<br>±0.2 | 7.5<br>±0.2 | 12.0<br>±0.3 | 5.5<br>±0.1 | 1.75<br>±0.10 | 8.0<br>±0.1    | 2.00<br>±0.05  | 4.0<br>±0.1    | 1.5<br>+0.1<br>-0 | 0.3<br>±0.1    | 3.2<br>±0.3    |
|              | Type FC | 4.8<br>±0.2 | 6.0<br>±0.2 |              | 4.8<br>±0.1 | 1.75<br>±0.10 | 8.0<br>±0.1    | 2.00<br>±0.05  | 4.0<br>±0.1    | 1.5<br>+0.1<br>-0 | 0.3<br>±0.1    | 2.8<br>±0.3    |

#### ● Leader Part and Taped End

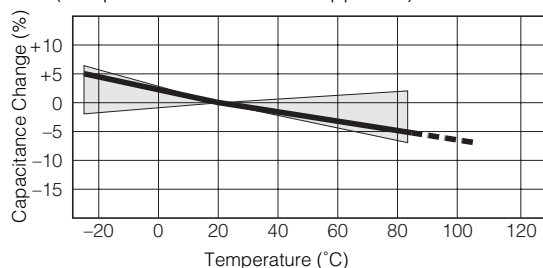


### ■ Typical Characteristics

#### ● Temperature Characteristics

##### Char. SL/GP

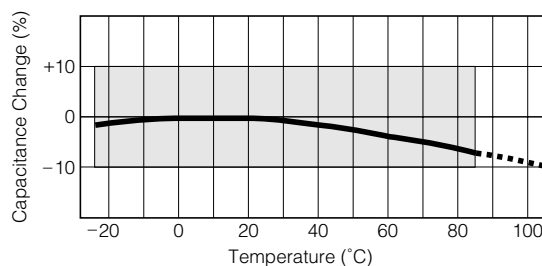
(Temp.Coeff.:+350 to -1000 ppm/°C)



##### Char. B/Y5P

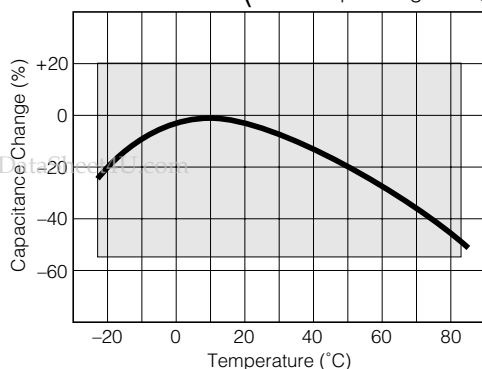
Temp.Range:-25 to 85 °C

Max.Cap.Change:±10 %



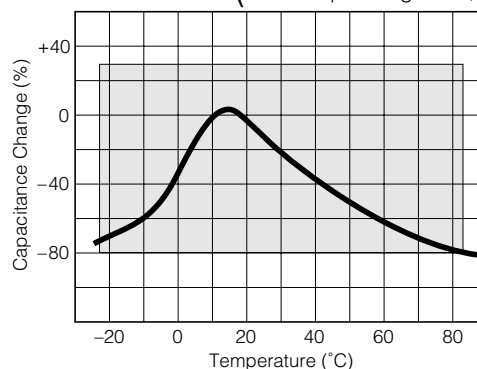
##### Char. E/Y5U

(Temp.Range:-25 to 85 °C  
max.Cap.Change:+20, -55 %)



##### Char. F/Y5V

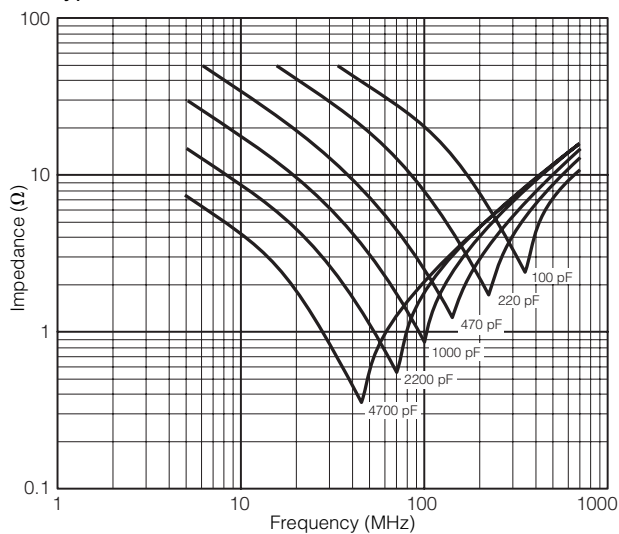
(Temp.Range:-25 to 85 °C  
max.Cap.Change:+30, -80 %)



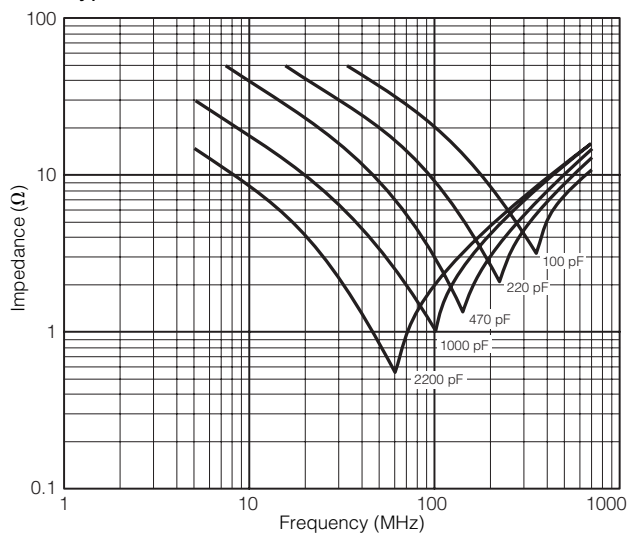
### Typical Characteristics

#### Impedance vs. Frequency Characteristics

Type BC

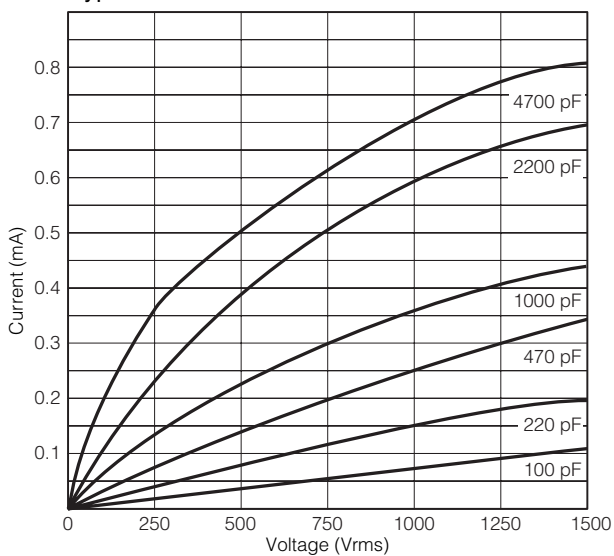


Type FC

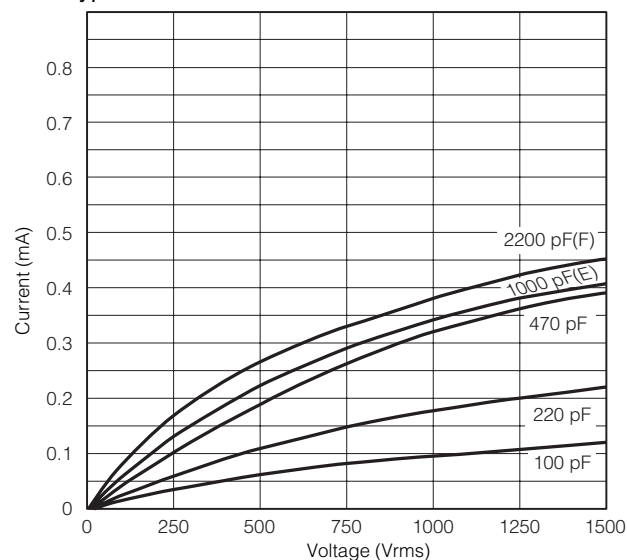


#### Current vs. Voltage (Leakage Current Characteristics)

Type BC

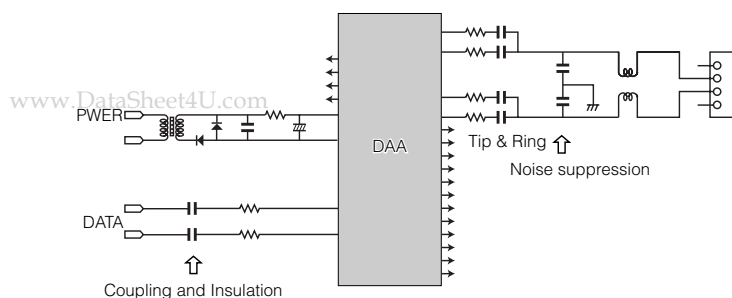


Type FC



### Application Examples

#### MODEM



#### Primary circuit of Switching Power Supply

