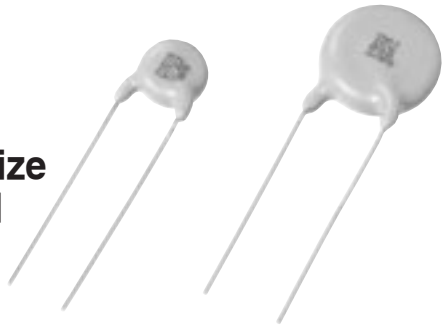
# Ceramic Disc Capacitors (Safety Regulations)

## Type NS-A IEC60384-14 Sub-class Y1/X1
## Type TS IEC60384-14 Sub-class Y2/X1
## Type VS IEC60384-14 Sub-class Y2/X1 Smaller size
## Type BE 250 VAC Electrical Appliance and Material Safety Law compliance (Former Electrical Appliance and Material Control Law)



### ■ Features

- Related by IEC60384-14 2nd Ed. and approved by European Safety Regulations (Types NS-A, TS and VS)
- Reinforced Body Insulation /0.4mm min. approved by BSI, VDE (Type NS-A)
- Flame-retardant insulating coating applied
- Easy mounting through kinked Lead and Radial Taping

### ■ Recommended Applications

- Interference suppressor for AC Primary Line of electronic equipments.

### ■ Explanation of Part Numbers

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | C | K | N | T | S | 1 | 0 | 2 | M | E | | (Examples) |

| Product Code | |
|---|---|
| Code | Class |
| ECC | Class 1 |
| ECK | Class 2 |

| Lead Style | |
|---|---|
| Code | Style |
| A | Kinked Lead Bulk |
| N | Kinked Lead Taped |

| Type Name | |
|---|---|
| Code | Type |
| NA | Type NS-A |
| TS | Type TS |
| VS | Type VS |
| BE | Type BE |

| Nominal Capacitance | |
|---|---|
| Ex. | Cap. |
| 101 | 100 pF |
| 102 | 1000 pF |
| 222 | 2200 pF |
| 472 | 4700 pF |
| 103 | 10000 pF |

| Cap. Tolerance | |
|---|---|
| Code | Cap. Tol. |
| J | ±5 % |
| K | ±10 % |
| M | ±20 % |
| Z | +80, –20 % |

| Temp. Char | |
|---|---|
| Code | Char. |
| G | SL/GP |
| B | B/Y5P |
| E | E/Y5U |
| F | F/Y5V |

Suffix

### ■ Specifications

| Characteristics | Type NS-A | Type TS | Type VS | Type BE |
|---|---|---|---|---|
| Related Standaeds | IEC 60384-14(Y1/,X1) BSI, VDE, SEV, SEMKO FIMKO, NEMKO, DEMKO UL,CSA, KTL | IEC 60384-14(Y2/,X1) BSI, VDE, SEV, SEMKO FIMKO, NEMKO, DEMKO UL,CSA, KTL | IEC 60384-14(Y2/, X1) VDE, SEMKO, FIMKO NEMKO, DEMKO UL, KTL | Electrical Appliance and Material Safety Law compliance (Former Electrical Appliance and Material Control Law) |
| Operating Temperature Range | –25 to 125 ˚C | | | –25 to 105 ˚C |
| Rated Voltage | 250 VAC/440 VAC | | | 250 VAC |
| Dielectric Withstanding Voltage | 4000 VAC for 1 minute | 2600 VAC for 1 minute | 1500 VAC for 1 minute | |
| Capacitance | Within the tolerance, when measured at 1 kHz ± 20 %, 1 Vrms, and 20 ˚C | | | |
| Dissipation Factor (tan$\delta$) | tan $\delta$ ≦ 0.025, when measured at 1 kHz ± 20 %,1 Vrms, and 20 ˚C | | | tan $\delta$ ≦ 0.025 for Char.E<br>tan $\delta$ ≦ 0.05 for Char.F<br>at 1 kHz ±20 %, 1 Vrms, and 20 ˚C |
| Insulation Resistance | 10000 MΩ min at 500 VDC 1 minute electrification. | | | |
| Temperature Characteristics | | | | |

| Char. | max. Cap. Change | Temperature Range |
|---|---|---|
| SL/GP | +350 to -1000 ppm/˚C | 20 to 85 ˚C |
| B | ±10 % | –25 to 85 ˚C |
| E | +20,–55 % | –25 to 85 ˚C |
| F | +30, –80 % | –25 to 85 ˚C |

### ■ Precautions for Handling

See Page 93 to 95

### ■ Packaging Information

See Page 96 to 97

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

## ■ Related Standards and Certificate Numbers

● Type NS-A

| Certificated Body | Related Standard | Certificate Number | Sub-class | Rated Voltage | Dielectric Withstanding Voltage | Operating Temperature Range |
|---|---|---|---|---|---|---|
| BSI (UK) | EN 132 400:1994 Sub-class Y2 (IEC 60384-14 2nd Ed.) | 226319 | Y1, X1 | Y1:250 VAC X1:440 VAC | Y1:4000 VAC X1:1892 VDC | –25 to 125°C |
| VDE (Germany) | | 087472 | | | | |
| SEV (Switzerland) | | 00.0587 | | | | |
| SEMKO (Sweden) | | 9918234/01-02 | | | | |
| FIMKO (Finland) | | F1 13556 | | | | |
| NEMKO (Norway) | | P99101676 | | | | |
| DEMKO (Denmark) | | DK99-02495 | | | | |
| CQC (China) | GB/T14472 (IEC 60384-14 2nd Ed.) | CQC03001008315 | | | | |
| KTL (Korea) | K60384-14 (IEC 60384-14 2nd Ed.) | SU03012-3002 | | | | |
| UL (USA) | UL1414 | E62674 | – | 250 VAC | 1500 VAC | –25 to 85°C |
| CSA (Canada) | CSA C22.2 No.1 | LR58064 | | | | |

Note:Certification Number sometimes changes with the change of the approval contents and so on. CQC and KTL marks are indicated on the label.

● Type TS

| Certificated Body | Related Standard | Certificate Number | | Sub-class | Rated Voltage | Dielectric Withstanding Voltage | Operating Temperature Range |
|---|---|---|---|---|---|---|---|
| | | Plant Code H | Plant Code M | | | | |
| BSI (UK) | EN132 400:1994 Sub-class Y2 (IEC 60384-14 2nd Ed.) | 228035 | | Y2, X1 | Y2:250 VAC X1:440 VAC | Y2:1500 VAC X1:1892 VDC | –25 to 125°C |
| VDE (Germany) | | 1220129 | 118911 | | | | |
| SEV (Switzerland) | | 00.0588 | | | | | |
| SEMKO (Sweden) | | 9618031/01(Y2) 9909191/01(X1) | 9909196/01-02 | | | | |
| FIMKO (Finland) | | FI13324A1 | | | | | |
| NEMKO (Norway) | | P96102354(Y2) P99101084(X1) | P99101190 | | | | |
| DEMKO (Denmark) | | 305880(Y2) DK99-01676(X1) | DK99-01749 | | | | |
| KTL (Korea) | K60384-14(IEC 60384-14 2nd Ed.) | SU03012-3001 | SU03013-3002 | | | | |
| UL (USA) | UL 1414 | E62674 | | – | 250 VAC | 1500 VAC | –25 to 85 °C |
| CSA (Canada) | CSA C22.2 No.1 | LR58064 | LR31605 | | | | |

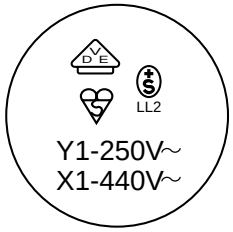
Note:Certification Number sometimes changes with the change of the approval contents and so on. KTL marks are indicated on the label.

● Type VS

| Certificated Body | Related Standard | Certificate Number | Sub-class | Rated Voltage | Dielectric Withstanding Voltage | Operating Temperature Range |
|---|---|---|---|---|---|---|
| VDE (Germany) | EN 132 400:1994 Sub-class Y2 (IEC 60384-14 2nd Ed.) | 123139 | Y2, X1 | Y2:250 VAC X1:440 VAC | Y2:1500 VAC X1:1892 VDC | –25 to 125°C |
| SEMKO (Sweden) | | 0042075/01-02 | | | | |
| FIMKO (Finland) | | FI16196 | | | | |
| NEMKO (Norway) | | P00102412 | | | | |
| DEMKO (Denmark) | | 310308-01 | | | | |
| KTL (Korea) | K60384-14 (IEC 60384-14 2nd Ed.) | SU03013-3003 | | | | |
| UL (USA) | UL1414* CSA C22.2 No.1* | E62674 | – | 250 VAC | 1500 VAC | –25 to 85°C |

Note:* is for Line-by-pass capacitors. Certification Number sometimes changes with the change of the approval contents and so on. KTL marks is indicated on the label. Certification contents are subject to differ in capacitance values.

## ■ Marking Examples (Ex. Type NS-A, 4700 pF)

| Marking Items | | Examples* (Marking of the face and the reverse) |
|---|---|---|
| Manufacturer's Identification | Ⓜ |   |
| Type Designation | NS-A | |
| sub-class and Rated Voltage | Y1-250V ~ X1-440V~ | |
| Capacitance | 472 | |
| Recognized Marking (Logo or Monogram) BSI | | |
| VDE | | |
| SEV | LL2 | |
| SEMKO | Ⓢ | |
| FIMKO | Ⓕ | |
| NEMKO | Ⓝ | |
| DEMKO | Ⓓ | |
| UL | | |
| CSA | | |
| Plant Code | H | |
| Date Code (Ex. Sep. 2001) | 19 | |

Note: * The actual marking is sometimes different from the above example with the change of the safety approval contents and so on.

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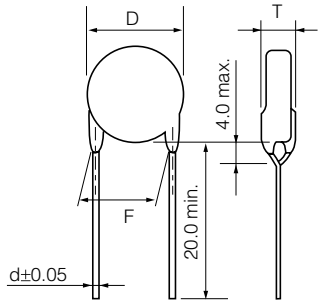
Should a safety concern arise regarding this product, please be sure to contact us immediately.

## ■ Dimensions in mm (not to scale)

Standard lead style are kinked Lead and Kinked Lead Taping as below.

### ● Kinked Lead Type

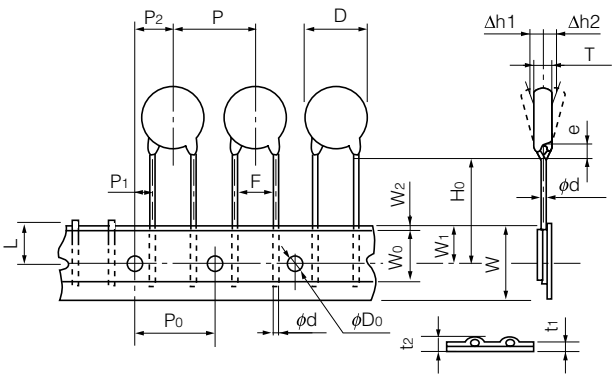



Note:Tolerance of Lead Space

| Dim. F(Nominal) | Tolerance of Dim. F |
|---|---|
| 5.0 | ±1.0 |
| 7.5 | ±1.5 |
| 10.0 | ±1.5 ($^{+1.5}_{-1.0}$ for Type NS–A) |

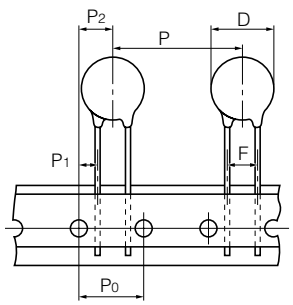
### ● Kinked Lead Taping

**Type N0, N1**

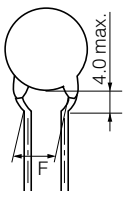



| Symbol \ Taping Type | N0 | N1 | N2 |
|---|---|---|---|
| P | 12.7±1.0 | 15.0±2.0 | 30.0±2.0 |
| $P_0$ | 12.7±0.3 | 15.0±0.3 | |
| F | 5.0±0.8 | 7.5±1.0 | |
| $P_1$ | 3.85±0.70 | 3.75±0.80 | |
| $P_2$ | 6.35±1.30 | 7.5±1.5 | |
| D | To comply with each individual specification | | |
| W | $18.0^{+1.0}_{-0.5}$ | | |
| $W_0$ | 10.0 min. | | |
| $W_1$ | 9.0±0.5 | | |
| $W_2$ | 3.0 max. | | |
| $H_0$ | $18.0^{+2.0}_{0}$ | | |
| e | 4.0 max. | | |
| $\phi D_0$ | 4.0±0.2 | | |
| $\phi$d | 0.60±0.05 | 0.65±0.05 | |
| $t_1$ | 0.6±0.3 | | |
| $t_2$ | 1.5 max. | | |
| T | To comply with each individual specification | | |
| $\Delta h_1$, $\Delta h_2$ | 2.0 max. | | |
| L | 11.0 max. | | |

**Type N2** *




Under kinked lead style are applied to only 3300 pF and over have a lead space (F) 7.5 mm of Type TS




* Same dimensions as Type N0, N1 except for special dimensions.

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## ■ Rating and Characteristics

### ● Type NS-A (IEC60384-14 Sub-class Y1, X1) Rating and Characteristics

| Cap. in pF | Cap. Tol. (%) | Temp. Char. | Dimensions in mm | | Kinked Lead Type (Bulk) | | |
|---|---|---|---|---|---|---|---|
| | | | D max. | T max. | Part Number | Dim. in mm | |
| | | | | | | F | d |
| 100 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA101□B | 10.0 | 0.65 |
| 150 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA151□B | 10.0 | 0.65 |
| 220 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA221□B | 10.0 | 0.65 |
| 330 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA331□B | 10.0 | 0.65 |
| 470 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA471□B | 10.0 | 0.65 |
| 680 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA681□B | 10.0 | 0.65 |
| 1000 | ±10 or ±20 | B | 11.0 | 8.0 | ECKANA102□B | 10.0 | 0.65 |
| 1000 | ±20 | E | 10.0 | 8.0 | ECKANA102ME | 10.0 | 0.65 |
| 1500 | ±20 | E | 11.0 | 8.0 | ECKANA152ME | 10.0 | 0.65 |
| 2200 | ±20 | E | 11.0 | 8.0 | ECKANA222ME | 10.0 | 0.65 |
| 3300 | ±20 | E | 13.0 | 8.0 | ECKANA332ME | 10.0 | 0.65 |
| 4700 | ±20 | E | 16.0 | 8.0 | ECKANA472ME | 10.0 | 0.65 |

Remark
·Type NS-A is approved by BSI and VDE for Reinforced Body Insulation (0.4 mm min.)

CB certification No.

| BSI (UK) | GB386W |
|---|---|

Certification No.

| VDE (Germay) | 087469 |
|---|---|
| | 087472 |

·Redial Taped version is available. (Lead space is available only in 10 mm)

·□:Capacitance Tolerance Code K:(±10 %) or M(±20 %)

### ● Type TS (IEC60384-14 Sub-class Y2, X1) Rating and Characteristics

| Cap. in pF | Cap. Tol. (%) | Temp. Char. | Dimensions in mm | | Kinked Lead Type (Bulk) | | | Kimked Lead Taped Type | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | D max. (Tol.) | T max. | Part Number | Dim. in mm | | Part Number | Taped Type | Dim. in mm | |
| | | | | | | F | d | | | F | d |
| 100 | ±10 or ±20 | B/Y5P | 8.0(7.0±1.0) | 7.0 | ECKATS101□B | 7.5 | 0.65 | ECKNTS101□B | N1 | 7.5 | 0.65 |
| 150 | ±10 or ±20 | B/Y5P | 8.0(7.0±1.0) | 7.0 | ECKATS151□B | 7.5 | 0.65 | ECKNTS151□B | N1 | 7.5 | 0.65 |
| 220 | ±10 or ±20 | B/Y5P | 8.0(7.0±1.0) | 7.0 | ECKATS221□B | 7.5 | 0.65 | ECKNTS221□B | N1 | 7.5 | 0.65 |
| 330 | ±10 or ±20 | B/Y5P | 8.0(7.0±1.0) | 7.0 | ECKATS331□B | 7.5 | 0.65 | ECKNTS331□B | N1 | 7.5 | 0.65 |
| 470 | ±10 or ±20 | B/Y5P | 8.0(7.0±1.0) | 7.0 | ECKATS471□B | 7.5 | 0.65 | ECKNTS471□B | N1 | 7.5 | 0.65 |
| 680 | ±10 or ±20 | B/Y5P | 9.0(8.0±1.0) | 7.0 | ECKATS681□B | 7.5 | 0.65 | ECKNTS681□B | N1 | 7.5 | 0.65 |
| 1000 | ±10 or ±20 | B/Y5P | 10.5(9.5±1.0) | 7.0 | ECKATS102□B | 7.5 | 0.65 | ECKNTS102□B | N1 | 7.5 | 0.65 |
| 1000 | ±20 | E/Y5U | 8.0(7.0±1.0) | 7.0 | ECKATS102ME | 7.5 | 0.65 | ECKNTS102ME | N1 | 7.5 | 0.65 |
| 1500 | ±20 | E/Y5U | 9.0(8.0±1.0) | 7.0 | ECKATS152ME | 7.5 | 0.65 | ECKNTS152ME | N1 | 7.5 | 0.65 |
| 2200 | ±20 | E/Y5U | 9.5(9.0±1.0) | 7.0 | ECKATS222ME | 7.5 | 0.65 | ECKNTS222ME | N1 | 7.5 | 0.65 |
| 3300 | ±20 | E/Y5U | 12.5(11.5±1.0) | 7.0 | ECKATS332ME | 7.5 | 0.65 | ECKNTS332ME | N1 | 7.5 | 0.65 |
| 4700 | ±20 | E/Y5U | 15.0(14.0±1.0) | 7.0 | ECKATS472ME | 10.0 | 0.65 | ECKNTS472ME | N2 | 7.5 | 0.65 |
| 4700 | ±20 | F/Y5V | 12.5(11.5±1.0) | 7.0 | ECKATS472MF | 7.5 | 0.65 | ECKNTS472MF | N1 | 7.5 | 0.65 |
| 10000 | ±20 | F/Y5V | 17.0(16.0±1.5) | 7.0 | ECKATS103MF | 10.0 | 0.65 | ECKNTS103MF | N2 | 7.5 | 0.65 |

Note: □-- Capacitance Tolerance Code K (±10 %) or M(±20 %)

### ● Type VS (IEC60384-14 Sub-class Y2, X1 Smaller type) Rating and Characteristics

| Cap. in pF | Capacitance Tolerance (%) | Temp. Char. | Dimensions in mm | | Kinked Lead Type (Bulk) | | | Kinked Lead Taped Type | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | D max. | T max. | Part Number | Dim. in mm | | Part Number | Taped Type | Dim. in mm | |
| | | | | | | F | d | | | F | d |
| 10 | ±0.5pF or ±1pF | SL/GP | 8.0 | 6.0 | ECCAVS100□G* | 5.0 | 0.60 | ECCNVS100□G* | N0 | 5.0 | 0.60 |
| 15 | ±5 or ±10 | SL/GP | 8.0 | 6.0 | ECCAVS150□G* | 5.0 | 0.60 | ECCNVS150□G* | N0 | 5.0 | 0.60 |
| 22 | ±5 or ±10 | SL/GP | 8.0 | 6.0 | ECCAVS220□G* | 5.0 | 0.60 | ECCNVS220□G* | N0 | 5.0 | 0.60 |
| 33 | ±5 or ±10 | SL/GP | 8.0 | 6.0 | ECCAVS330□G | 5.0 | 0.60 | ECCNVS330□G | N0 | 5.0 | 0.60 |
| 47 | ±5 or ±10 | SL/GP | 8.0 | 6.0 | ECCAVS470□G | 5.0 | 0.60 | ECCNVS470□G | N0 | 5.0 | 0.60 |
| 68 | ±5 or ±10 | SL/GP | 8.0 | 6.0 | ECCAVS680□G | 5.0 | 0.60 | ECCNVS680□G | N0 | 5.0 | 0.60 |
| 100 | ±10 or ±20 | B/Y5P | 8.0 | 6.0 | ECKAVS101□B | 5.0 | 0.60 | ECKNVS101□B | N0 | 5.0 | 0.60 |
| 150 | ±10 or ±20 | B/Y5P | 8.0 | 6.0 | ECKAVS151□B | 5.0 | 0.60 | ECKNVS151□B | N0 | 5.0 | 0.60 |
| 220 | ±10 or ±20 | B/Y5P | 8.0 | 6.0 | ECKAVS221□B | 5.0 | 0.60 | ECKNVS221□B | N0 | 5.0 | 0.60 |
| 330 | ±10 or ±20 | B/Y5P | 8.0 | 6.0 | ECKAVS331□B | 5.0 | 0.60 | ECKNVS331□B | N0 | 5.0 | 0.60 |
| 470 | ±10 or ±20 | B/Y5P | 8.0 | 6.0 | ECKAVS471□B | 5.0 | 0.60 | ECKNVS471□B | N0 | 5.0 | 0.60 |
| 680 | ±10 or ±20 | B/Y5P | 8.0 | 6.0 | ECKAVS681□B | 5.0 | 0.60 | ECKNVS681□B | N0 | 5.0 | 0.60 |
| 1000 | ±20 | E/Y5U | 8.0 | 6.0 | ECKAVS102ME | 5.0 | 0.60 | ECKNVS102ME | N0 | 5.0 | 0.60 |
| 1500 | ±20 | E/Y5U | 8.0 | 6.0 | ECKAVS152ME | 5.0 | 0.60 | ECKNVS152ME | N0 | 5.0 | 0.60 |
| 2200 | ±20 | E/Y5U | 9.0 | 6.0 | ECKAVS222ME | 5.0 | 0.60 | ECKNVS222ME | N0 | 5.0 | 0.60 |
| 3300 | ±20 | E/Y5U | 10.0 | 6.0 | ECKAVS332ME | 5.0 | 0.60 | ECKNVS332ME | N0 | 5.0 | 0.60 |
| 4700 | ±20 | E/Y5U | 11.0 | 6.0 | ECKAVS472ME | 5.0 | 0.60 | ECKNVS472ME | N0 | 5.0 | 0.60 |
| 4700 | ±20 | F/Y5V | 10.0 | 6.0 | ECKAVS472MF | 5.0 | 0.60 | ECKNVS472MF | N0 | 5.0 | 0.60 |
| 10000 | ±20 | F/Y5V | 14.0 | 6.0 | ECKAVS103MF | 7.5 | 0.65 | ECKNVS103MF | N1 | 7.5 | 0.65 |

Note 1: Dimensions "F"(Lead Space) of 7.5mm is available instead of 5.0 mm only by special order.
2: □-- Capacitance Tolerance Code D (±0.5 pF) or F (±1 pF) or J (±5 %) or K(±10 %) or M(±20 %)
3: * -- except for VDE and KTL.

Design and specifications are each subject to change without notice. Ask factory for the current technical specifications before purchase and/or use.
Should a safety concern arise regarding this product, please be sure to contact us immediately.

● Type BE (250 VAC For Electrical Appliance and Material Safety Law compliance (Former Electrical Appliance and Material Control Law))

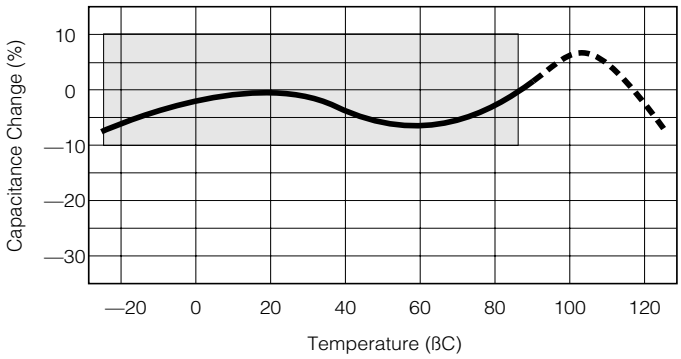
| Cap. in pF | Cap. Tol. (%) | Temp. Char. | Dimensions in mm | | Kinked Lead Type (Bulk) | | | Kimked Lead Taped Type | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | D max. | T max. | Part Number | Dim. in mm | | Part Number | Taped Type | Dim. in mm | |
| | | | | | | F | d | | | F | d |
| 1000 | +80, –20 | E/Y5U | 7.0 | 5.0 | ECKABE102ZE | 7.5 | 0.65 | ECKNBE102ZE | N1 | 7.5 | 0.65 |
| 2200 | +80, –20 | E/Y5U | 8.0 | 5.0 | ECKABE222ZE | 7.5 | 0.65 | ECKNBE222ZE | N1 | 7.5 | 0.65 |
| 3300 | +80, –20 | E/Y5U | 9.0 | 5.0 | ECKABE332ZE | 7.5 | 0.65 | ECKNBE332ZE | N1 | 7.5 | 0.65 |
| 4700 | +80, –20 | E/Y5U | 11.0 | 5.0 | ECKABE472ZE | 7.5 | 0.65 | ECKNBE472ZE | N1 | 7.5 | 0.65 |
| 4700 | +80, –20 | F/Y5V | 8.0 | 5.0 | ECKABE472ZF | 7.5 | 0.65 | ECKNBE472ZF | N1 | 7.5 | 0.65 |
| 10000 | +80, –20 | F/Y5V | 11.0 | 5.0 | ECKABE103ZF | 7.5 | 0.65 | ECKNBE103ZF | N1 | 7.5 | 0.65 |

Note: Dimensions “F” (Lead space) of 5.0 mm is available instead of 7.5 mm by special order

## ■ Typical Temperature Characteristics (Type TS, and Type NS-A)

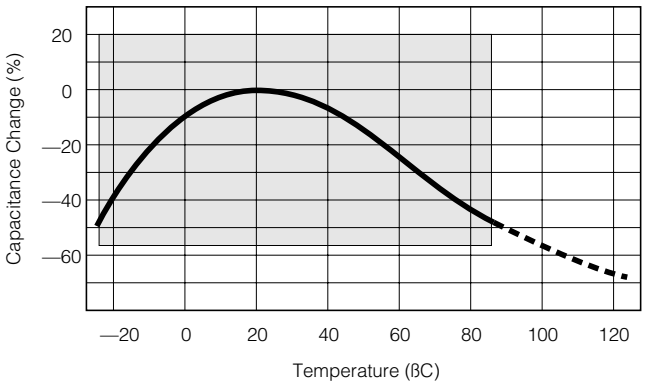
Char. B/Y5P)

( Temp. Range : –25 to 85˚ max.Cap.Change : +10% )



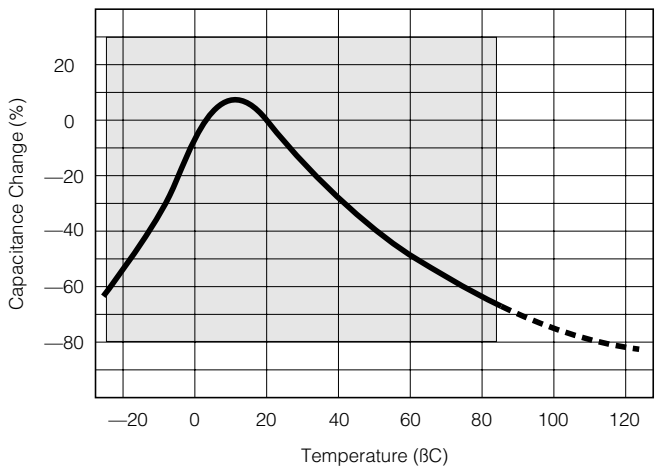

Char. E/Y5U)

( Temp. Range : –25 to 85˚ max.Cap.Change : +20, –55% )




Char. F/Y5V)

( Temp. Range : –25 to 85˚ max.Cap.Change : +30, –80% )

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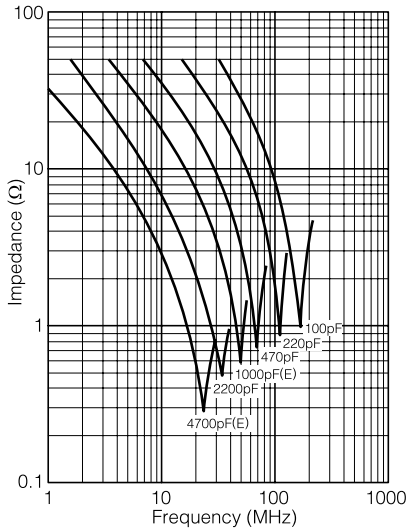
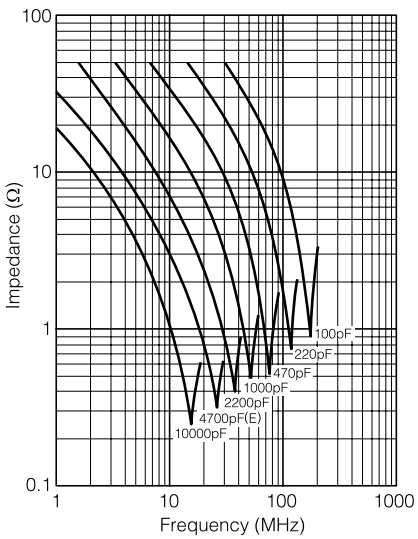
## ■ Impedance vs. Frequency Characteristics

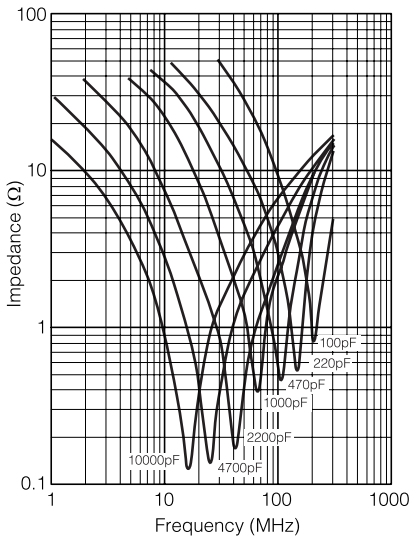
Type NS-A




Type TS



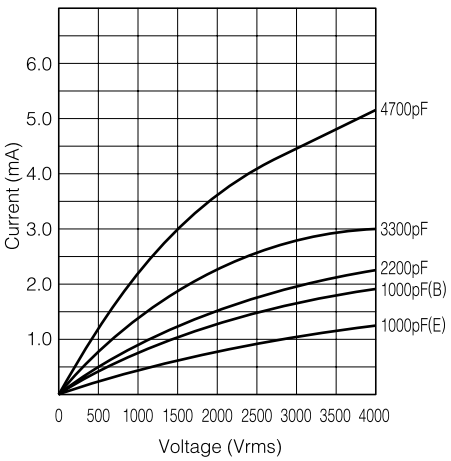

Type VS



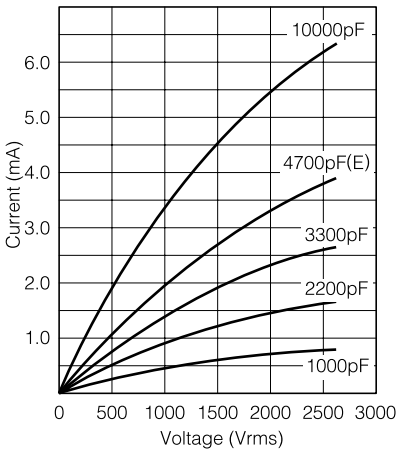

## ■ Current vs. Voltage (Leakage Current Characteristics)

Conditions Temperature: 20 ˚C, Applied Voltage: Sine Wave 60 Hz

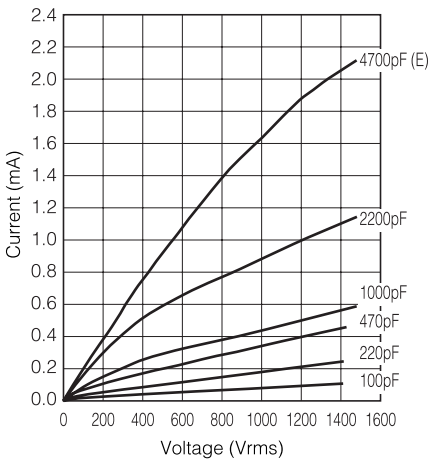
Type NS-A

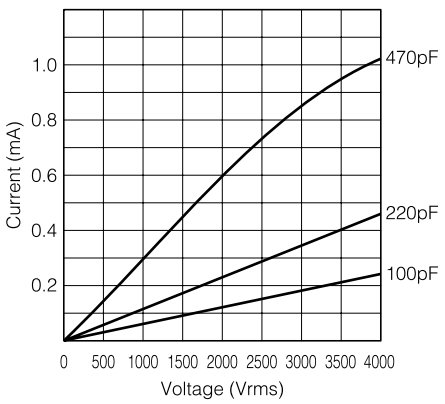


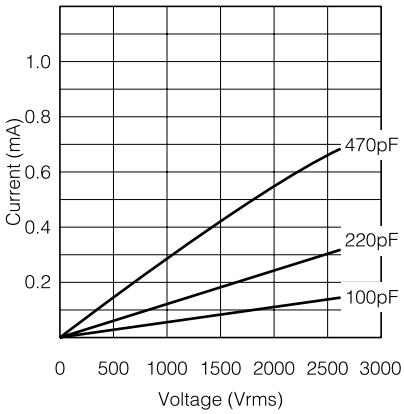

Type TS

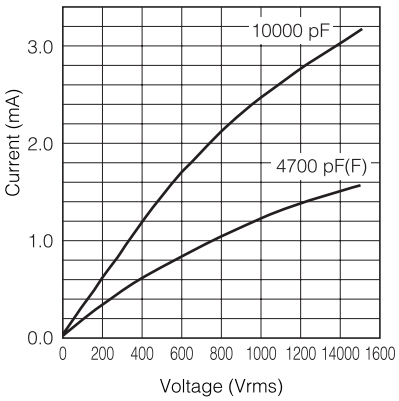



Type VS

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