

# アキシアルリード形セラミックコンデンサ

## AXIAL LEADED CERAMIC CAPACITORS

OPERATING TEMP. -25~+85°C



フロー/WAVE

### 特長 FEATURES

- 汎用型セラミックコンデンサで、単層形と積層形合わせて1pF~10 $\mu$ Fと広い容量範囲で部品の標準化が可能
- ラジアルに比べ自挿コストが安く、部品高さを低減、実装密度アップ、在庫スペースも減少
- 実装ピッチ5mmから26mmまでジャンパー線機能と兼用可能

- This widely used ceramic capacitor includes both monolithic and multi-layer types to provide a wide capacitance range of 1pF through 10 $\mu$ F in one standard size and shape.
- Automatic insertion related costs are lower than with radial type capacitors.
- Mounting pitch can be between 5mm to 26mm which could be used as a jumper.

### 用途 APPLICATIONS

- Class1品は回路の温度特性補正及び周波数特性の安定化。B、F特はバイパスコンデンサに最適

- The class 1 temperature compensating (NPO) products can be used in circuits to stabilize frequency and temperature characteristics.
- The B, and F dielectrics are optimum for bypass capacitors.

### 形名表記法 ORDERING CODE

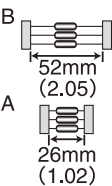
|                                                                       |                                                                                                                                                                                   |                                                                                                                                  |                                                                                          |                                           |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-------------------------------------------|
| <b>1</b><br><b>定格電圧 [VDC]</b><br>L 10<br>E 16<br>T 25<br>G 35<br>U 50 | <b>3</b><br><b>形状寸法 (L×φd) [mm]</b><br>075 4.2×3.2 (積層形)<br>050 3.5×1.9 (単層形)<br>3.2×2.2 (積層形)<br>025 2.3×2.0 (積層形)<br>015 3.0×2.5 (積層形)                                          | <b>5</b><br><b>公称静電容量 [pF]</b><br>例 ※R=小数点<br>010 1<br>1R2 1.2<br>103 10000                                                      | <b>6</b><br><b>容量許容差</b><br>D- ±0.5pF<br>J- ±5%<br>K- ±10%<br>M- ±20%<br>Z- ±80%<br>±20% | <b>8</b><br><b>梱包</b><br>B つづら折り<br>C 袋づめ |
| <b>2</b><br><b>形式</b><br>P アキシアルリードコンデンサ                              | <b>4</b><br><b>温度特性</b><br>CK 0±250 (ppm/°C)<br>CH 0±60 (ppm/°C)<br>RH -220±60 (ppm/°C)<br>UJ -750±120 (ppm/°C)<br>SL +350~-1000 (ppm/°C)<br>△B ±10%<br>△F ±30%<br>±85%<br>△=スペース | <b>7</b><br><b>リード形状 [mm]</b><br>A- 26mmテープ幅テーピング<br>B- 52mmテープ幅テーピング<br>KF 5.0mmピッチフォーミング<br>KE 7.5mmピッチフォーミング<br>NA 単品ストレートリード | <b>9</b><br><b>当社管理記号</b><br>△△ 単層標準品<br>△Z 積層標準品<br>△J 積層品 (低電圧タイプ)<br>△=スペース           |                                           |

U P 0 5 0 C H 1 0 0 J - A - B ○ ○

1 2 3 4 5 6 7 8 9

|                                                                                |                                                                                                                                                                                                                    |                                                                                                                                                                                                      |                                                                                                                                                                                         |                                                  |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| <b>1</b><br><b>Rated voltage [VDC]</b><br>L 10<br>E 16<br>T 25<br>G 35<br>U 50 | <b>3</b><br><b>Outside Dimensions (L×φd) [mm]</b><br>075 4.2×3.2 (multilayer type)<br>050 3.5×1.9 (monolithic type)<br>3.2×2.2 (multilayer type)<br>025 2.3×2.0 (multilayer type)<br>015 3.0×2.5 (multilayer type) | <b>5</b><br><b>Nominal Capacitance [pF]</b><br>example<br>010 1<br>1R2 1.2<br>103 10000<br>※R=decimal point                                                                                          | <b>6</b><br><b>Capacitance Tolerances</b><br>D- ±0.5pF<br>J- ±5%<br>K- ±10%<br>M- ±20%<br>Z- ±80%<br>±20%                                                                               | <b>8</b><br><b>Packaging</b><br>B Ammo<br>C Bulk |
| <b>2</b><br><b>Type</b><br>P Axial leaded capacitors                           | <b>4</b><br><b>Temperature characteristics</b><br>CK 0±250 (ppm/°C)<br>CH 0±60 (ppm/°C)<br>RH -220±60 (ppm/°C)<br>UJ -750±120 (ppm/°C)<br>SL +350~-1000 (ppm/°C)<br>△B ±10%<br>△F ±30%<br>±85%<br>△=Blank space    | <b>7</b><br><b>Lead Configuration</b><br>A- 26mm lead space, ammo pack<br>B- 52mm lead space, ammo pack<br>KF 5.0mm pitch formed lead bulk<br>KE 7.5mm pitch formed lead bulk<br>NA Axial lead, bulk | <b>9</b><br><b>Internal code</b><br>△△ Monolithic type<br>Standard products<br>△Z Multilayer type<br>Standard products<br>△J Multilayer type<br>(Low voltage products)<br>△=Blank space |                                                  |

# 外形寸法 EXTERNAL DIMENSIONS

| TYPE                        | Dimensions           |                      |                            | テーピング品 Taped product                                                              |                                                                                     | 単品 Bulk Product                                                                     |  |
|-----------------------------|----------------------|----------------------|----------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
|                             | L                    | φD                   | φd                         | ストレート Straight                                                                    | ストレート Straight                                                                      | フォーミング Formed                                                                       |  |
| 単層形050<br>(Monolithic Type) | 3.5max<br>(0.138max) | 1.9max<br>(0.075max) | 0.45±0.05<br>(0.018±0.002) |  |  |  |  |
| 積層形075<br>(Multilayer Type) | 4.2max<br>(0.165max) | 3.2max<br>(0.126max) | 0.55±0.05<br>(0.022±0.002) |                                                                                   |                                                                                     |  |  |
| 積層形050<br>(Multilayer Type) | 3.2max<br>(0.126max) | 2.2max<br>(0.087max) | 0.45±0.05<br>(0.018±0.002) |                                                                                   |                                                                                     |  |  |
| 積層形025<br>(Multilayer Type) | 2.3max<br>(0.09max)  | 2.0max<br>(0.079max) |                            |                                                                                   |                                                                                     |                                                                                     |  |
| 積層形015<br>(Multilayer Type) | 3.0max<br>(0.118max) | 2.5max<br>(0.098max) |                            |                                                                                   |                                                                                     |                                                                                     |  |

Unit : mm (inch)

## 概略バリエーション AVAILABLE CAPACITANCE RANGE

Class 1 (Temperature compensating)

| WV         |                | 50V (UP) |     |     |     |  |
|------------|----------------|----------|-----|-----|-----|--|
| Temp.char. |                | CH       | RH  | UJ  | SL  |  |
| Type cap.  |                | 025      | 050 | 050 | 050 |  |
| [pF]       | [pF : 3digits] |          |     |     |     |  |
| 1          | 010            |          |     |     |     |  |
| 1.2        | 1R2            |          |     |     |     |  |
| 1.5        | 1R5            |          |     |     |     |  |
| 1.8        | 1R8            |          |     |     |     |  |
| 2.2        | 2R2            |          |     |     |     |  |
| 2.7        | 2R7            |          |     |     |     |  |
| 3.3        | 3R3            |          |     |     |     |  |
| 3.9        | 3R9            |          |     |     |     |  |
| 4.7        | 4R7            |          |     |     |     |  |
| 5.6        | 5R6            |          |     |     |     |  |
| 6.8        | 6R8            |          |     |     |     |  |
| 8.2        | 8R2            |          |     |     |     |  |
| 10         | 100            |          |     |     |     |  |
| 11         | 110            |          |     |     |     |  |
| 12         | 120            |          |     |     |     |  |
| 13         | 130            |          |     |     |     |  |
| 15         | 150            |          |     |     |     |  |
| 16         | 160            |          |     |     |     |  |
| 18         | 180            |          |     |     |     |  |
| 20         | 200            |          |     |     |     |  |
| 22         | 220            |          |     |     |     |  |
| 24         | 240            |          |     |     |     |  |
| 27         | 270            |          |     |     |     |  |
| 30         | 300            |          |     |     |     |  |
| 33         | 330            |          |     |     |     |  |
| 36         | 360            |          |     |     |     |  |
| 39         | 390            |          |     |     |     |  |
| 43         | 430            |          |     |     |     |  |
| 47         | 470            |          |     |     |     |  |
| 51         | 510            |          |     |     |     |  |
| 56         | 560            |          |     |     |     |  |
| 62         | 620            |          |     |     |     |  |
| 68         | 680            |          |     |     |     |  |
| 100        | 101            |          |     |     |     |  |
| 150        | 151            |          |     |     |     |  |
| 220        | 221            |          |     |     |     |  |
| 330        | 331            |          |     |     |     |  |
| 470        | 471            |          |     |     |     |  |
| 680        | 681            |          |     |     |     |  |
| 1000       | 102            |          |     |     |     |  |

Class 2 (High dielectric constant)

| WV         |                | 50V (UP) |     |     |     |     |     |     |     | 35V (GP) |     | 25V (TP) |     |     |     | 16V (EP) |     |     |     | 10V(LP) |
|------------|----------------|----------|-----|-----|-----|-----|-----|-----|-----|----------|-----|----------|-----|-----|-----|----------|-----|-----|-----|---------|
| Temp.char. |                | B        |     |     | F   |     |     |     |     | B        | F   | B        | F   | B   | F   | B        | F   | F   |     |         |
| Type cap.  |                | 025      | 050 | 075 | 015 | 025 | 050 | 075 | 075 | 015      | 075 | 025      | 050 | 015 | 025 | 050      | 015 | 050 | 050 |         |
| [pF]       | [pF : 3digits] |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 75         | 750            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 82         | 820            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 91         | 910            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 100        | 101            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 120        | 121            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 150        | 151            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 180        | 181            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 220        | 221            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 270        | 271            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 330        | 331            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 390        | 391            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 470        | 471            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 560        | 561            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 680        | 681            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 820        | 821            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 1000       | 102            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 1200       | 122            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 1500       | 152            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 1800       | 182            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 2200       | 222            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 2700       | 272            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 3300       | 332            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 3900       | 392            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 4700       | 472            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 5600       | 562            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 6800       | 682            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 8200       | 822            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 10000      | 103            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 15000      | 153            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 22000      | 223            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 33000      | 333            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 47000      | 473            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 68000      | 683            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 100000     | 104            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 220000     | 224            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 470000     | 474            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 1000000    | 105            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 2200000    | 225            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 4700000    | 475            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |
| 10000000   | 106            |          |     |     |     |     |     |     |     |          |     |          |     |     |     |          |     |     |     |         |

※単層タイプの製品につきましては、生産終了予定ですので詳細につきましては最寄の弊社営業窓口までお問い合わせ下さい。

※Since the production of monolithic layer products is scheduled to be discontinued, please contact your nearest sales office if you require any detailed information.

| 温度特性<br>Temperature char. | 静電容量変化率<br>Capacitance change | 容量許容差<br>Capacitance Tolerance                | Q又はtanδ<br>Q or tan δ                    | 種類<br>Class |
|---------------------------|-------------------------------|-----------------------------------------------|------------------------------------------|-------------|
| CH                        | 0± 60ppm/°C                   | D (±0.5pF)<br>M (±20%)<br>K (±10%)<br>J (±5%) | アイテム一覧参照<br>eng・Refer to the Part number | 1           |
| RH                        | -220± 60ppm/°C                |                                               |                                          |             |
| UJ                        | -750±120ppm/°C                |                                               |                                          |             |
| SL                        | +350~- 1000ppm/°C             |                                               |                                          |             |
| △B                        | ±10%                          | K (±10%)                                      | アイテム一覧参照<br>eng・Refer to the Part number | 2           |
| △F                        | ± $\frac{30}{100}$ %          | Z (± $\frac{30}{100}$ %)                      |                                          |             |

※20℃における静電容量を基準。

※Capacitance characteristics measured at 20℃

セクションガイド  
Selection Guide

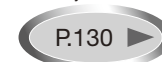
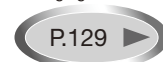
アイテム一覧  
Part Numbers

特性図  
Electrical Characteristics

梱包  
Packaging

信頼性  
Reliability Data

使用上の注意  
Precautions



etc

TAIYO YUDEN 2008

[単層タイプ Monolithic type]

Class 1

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| 定 格<br>電 圧<br>RatedVoltage<br>(DC) | 形 名<br>Ordering code |      | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公 称<br>静電容量<br>Capacitance<br>〔pF〕 | 容 量<br>許 容 差<br>Capacitance<br>tolerance | Q or tan δ                                                                                                                       | 絶縁抵抗<br>Insulation<br>resistance |       |
|------------------------------------|----------------------|------|---------------------------------------------------|----------------------------------------|------------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------|
| 50V                                | UP050△010M-○         |      | RoHS                                              | CH<br>RH<br>SL                         | 1.0                                | ±20%                                     | Q≥400+20C<br>(C:公称静電容量<br>capacitance〔pF〕)<br>ただしRHは<br>16pF以上は<br>Q≥500<br>but Q≥500<br>at 16pF or over<br>of characteristic RH | 10000MΩmin                       |       |
|                                    | UP050△1R2M-○         |      | RoHS                                              |                                        | 1.2                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△1R5M-○         |      | RoHS                                              |                                        | 1.5                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△1R8M-○         |      | RoHS                                              |                                        | 1.8                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△2R2K-○         |      | RoHS                                              | CH<br>RH<br>UJ<br>SL                   | 2.2                                | ±10%                                     |                                                                                                                                  |                                  |       |
|                                    | UP050△2R7K-○         |      | RoHS                                              |                                        | 2.7                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△3R3K-○         |      | RoHS                                              |                                        | 3.3                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△3R9K-○         |      | RoHS                                              |                                        | 3.9                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△4R7K-○         |      | RoHS                                              |                                        | 4.7                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△5R6K-○         |      | RoHS                                              |                                        | 5.6                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△6R8K-○         |      | RoHS                                              |                                        | 6.8                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△8R2K-○         |      | RoHS                                              |                                        | 8.2                                |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△100J-○         |      | RoHS                                              |                                        | 10                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△110J-○         |      | RoHS                                              |                                        | 11                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△120J-○         |      | RoHS                                              |                                        | 12                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△130J-○         |      | RoHS                                              |                                        | 13                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△150J-○         |      | RoHS                                              |                                        | 15                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△160J-○         |      | RoHS                                              |                                        | 16                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△180J-○         |      | RoHS                                              |                                        | 18                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△200J-○         |      | RoHS                                              | CH、UJ、SL                               | 20                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△220J-○         |      | RoHS                                              | UJ<br>SL                               | 22                                 | ±5%                                      |                                                                                                                                  |                                  |       |
|                                    | UP050△240J-○         |      | RoHS                                              |                                        | 24                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△270J-○         |      | RoHS                                              |                                        | 27                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050△300J-○         |      | RoHS                                              |                                        | 30                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050SL330J-○        |      | RoHS                                              | SL                                     | 33                                 |                                          |                                                                                                                                  |                                  | Q≥500 |
|                                    | UP050SL360J-○        |      | RoHS                                              |                                        | 36                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050SL390J-○        |      | RoHS                                              |                                        | 39                                 |                                          |                                                                                                                                  |                                  |       |
|                                    | UP050SL430J-○        |      | RoHS                                              |                                        | 43                                 |                                          |                                                                                                                                  |                                  |       |
| UP050SL470J-○                      |                      | RoHS | 47                                                |                                        |                                    |                                          |                                                                                                                                  |                                  |       |
| UP050SL510J-○                      |                      | RoHS | 51                                                |                                        |                                    |                                          |                                                                                                                                  |                                  |       |
| UP050SL560J-○                      |                      | RoHS | 56                                                |                                        |                                    |                                          |                                                                                                                                  |                                  |       |
| UP050SL620J-○                      |                      | RoHS | 62                                                |                                        |                                    |                                          |                                                                                                                                  |                                  |       |
| UP050SL680J-○                      |                      | RoHS | 68                                                |                                        |                                    |                                          |                                                                                                                                  |                                  |       |

形名の△には温度特性、○にはリード形状分類記号が入ります。

△Please specify the temperature characteristics code and ○ lead configuration code.

[積層025タイプ Multilayer 025 Type]

Class 1

| 定 格<br>電 圧<br>RatedVoltage<br>(DC) | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公 称<br>静電容量<br>Capacitance<br>[pF] | 容 量<br>許 容 差<br>Capacitance<br>tolerance | Q or tan δ | 絶縁抵抗<br>Insulation<br>resistance |
|------------------------------------|----------------------|--|---------------------------------------------------|----------------------------------------|------------------------------------|------------------------------------------|------------|----------------------------------|
| 50V                                | UP025△010D-○ Z       |  | RoHS                                              | CH<br>SL                               | 1.0                                | ±0.5pF                                   | Q≧400+20C  | 10000MΩmin                       |
|                                    | UP025△1R2D-○ Z       |  | RoHS                                              |                                        | 1.2                                |                                          |            |                                  |
|                                    | UP025△1R5D-○ Z       |  | RoHS                                              |                                        | 1.5                                |                                          |            |                                  |
|                                    | UP025△1R8D-○ Z       |  | RoHS                                              |                                        | 1.8                                |                                          |            |                                  |
|                                    | UP025△2R2D-○ Z       |  | RoHS                                              |                                        | 2.2                                |                                          |            |                                  |
|                                    | UP025△2R7D-○ Z       |  | RoHS                                              |                                        | 2.7                                |                                          |            |                                  |
|                                    | UP025△3R3D-○ Z       |  | RoHS                                              |                                        | 3.3                                |                                          |            |                                  |
|                                    | UP025△3R9D-○ Z       |  | RoHS                                              |                                        | 3.9                                |                                          |            |                                  |
|                                    | UP025△4R7D-○ Z       |  | RoHS                                              |                                        | 4.7                                |                                          |            |                                  |
|                                    | UP025△5R6K-○ Z       |  | RoHS                                              |                                        | 5.6                                | ±10%                                     |            |                                  |
|                                    | UP025△6R8K-○ Z       |  | RoHS                                              |                                        | 6.8                                |                                          |            |                                  |
|                                    | UP025△8R2K-○ Z       |  | RoHS                                              |                                        | 8.2                                |                                          |            |                                  |
|                                    | UP025△100J-○ Z       |  | RoHS                                              |                                        | 10                                 | ±5%                                      |            |                                  |
|                                    | UP025△120J-○ Z       |  | RoHS                                              |                                        | 12                                 |                                          |            |                                  |
|                                    | UP025△150J-○ Z       |  | RoHS                                              |                                        | 15                                 |                                          |            |                                  |
|                                    | UP025△180J-○ Z       |  | RoHS                                              |                                        | 18                                 |                                          |            |                                  |
|                                    | UP025△220J-○ Z       |  | RoHS                                              |                                        | 22                                 |                                          |            |                                  |
|                                    | UP025△270J-○ Z       |  | RoHS                                              |                                        | 27                                 |                                          |            |                                  |
|                                    | UP025△330J-○ Z       |  | RoHS                                              |                                        | 33                                 |                                          |            |                                  |
|                                    | UP025△390J-○ Z       |  | RoHS                                              |                                        | 39                                 |                                          |            |                                  |
|                                    | UP025△470J-○ Z       |  | RoHS                                              |                                        | 47                                 |                                          |            |                                  |
|                                    | UP025△560J-○ Z       |  | RoHS                                              |                                        | 56                                 |                                          |            |                                  |
|                                    | UP025△680J-○ Z       |  | RoHS                                              |                                        | 68                                 |                                          |            |                                  |
|                                    | UP025△820J-○ Z       |  | RoHS                                              |                                        | 82                                 |                                          |            |                                  |
|                                    | UP025CH101J-○ Z      |  | RoHS                                              | CH                                     | 100                                | Q≧1000                                   |            |                                  |
|                                    | UP025CH151J-○ Z      |  | RoHS                                              |                                        | 150                                |                                          |            |                                  |
|                                    | UP025CH221J-○ Z      |  | RoHS                                              |                                        | 220                                |                                          |            |                                  |
|                                    | UP025CH331J-○ Z      |  | RoHS                                              |                                        | 330                                |                                          |            |                                  |
|                                    | UP025CH471J-○ Z      |  | RoHS                                              |                                        | 470                                |                                          |            |                                  |
|                                    | UP025CH681J-○ Z      |  | RoHS                                              |                                        | 680                                |                                          |            |                                  |
|                                    | UP025CH102J-○ Z      |  | RoHS                                              |                                        | 1000                               |                                          |            |                                  |

形名の△には温度特性、○にはリード形状分類記号が入ります。

△Please specify the temperature characteristics code and ○ lead configuration code.

# アイテム一覧 PART NUMBERS

[積層015タイプ Multilayer 015type]  
Class 2

| 定格電圧<br>Rated Voltage<br>(DC) | 形名<br>Ordering Code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公称<br>静電容量<br>Capacitance<br>[pF] | 容量<br>許容差<br>Capacitance<br>tolerance | Q or tan $\delta$         | 絶縁抵抗<br>Insulation<br>resistance |
|-------------------------------|---------------------|--|---------------------------------------------------|----------------------------------------|-----------------------------------|---------------------------------------|---------------------------|----------------------------------|
| 25V                           | TP015 B103K-○ Z     |  | RoHS                                              | B                                      | 10000                             | ±10%                                  | $\tan \delta \leq 3.5\%$  | 5000M $\Omega$ min               |
| 16V                           | EP015 B104K-○ Z     |  | RoHS                                              |                                        | 100000                            |                                       | $\tan \delta \leq 5.0\%$  | 1000M $\Omega$ min               |
| 50V                           | UP015 F103Z-○ Z     |  | RoHS                                              | F                                      | 10000                             | +80<br>-20 %                          | $\tan \delta \leq 7.5\%$  | 1000M $\Omega$ min               |
| 16V                           | EP015 F104Z-○ Z     |  | RoHS                                              |                                        | 100000                            |                                       | $\tan \delta \leq 10.0\%$ |                                  |

形名の△には温度特性、○にはリード形状分類記号が入ります。

△Please specify the temperature characteristics code and ○ lead configuration code.

[積層025タイプ Multilayer 025 Type]  
Class 2

| 定格電圧<br>Rated Voltage<br>(DC) | 形名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公称<br>静電容量<br>Capacitance<br>[pF] | 容量<br>許容差<br>Capacitance<br>tolerance | Q or tan $\delta$        | 絶縁抵抗<br>Insulation<br>resistance |
|-------------------------------|---------------------|--|---------------------------------------------------|----------------------------------------|-----------------------------------|---------------------------------------|--------------------------|----------------------------------|
| 50V                           | UP025 B101K-○ Z     |  | RoHS                                              | B                                      | 100                               | ±10%                                  | $\tan \delta \leq 3.5\%$ | 5000M $\Omega$ min               |
|                               | UP025 B121K-○ Z     |  | RoHS                                              |                                        | 120                               |                                       |                          |                                  |
|                               | UP025 B151K-○ Z     |  | RoHS                                              |                                        | 150                               |                                       |                          |                                  |
|                               | UP025 B181K-○ Z     |  | RoHS                                              |                                        | 180                               |                                       |                          |                                  |
|                               | UP025 B221K-○ Z     |  | RoHS                                              |                                        | 220                               |                                       |                          |                                  |
|                               | UP025 B271K-○ Z     |  | RoHS                                              |                                        | 270                               |                                       |                          |                                  |
|                               | UP025 B331K-○ Z     |  | RoHS                                              |                                        | 330                               |                                       |                          |                                  |
|                               | UP025 B391K-○ Z     |  | RoHS                                              |                                        | 390                               |                                       |                          |                                  |
|                               | UP025 B471K-○ Z     |  | RoHS                                              |                                        | 470                               |                                       |                          |                                  |
|                               | UP025 B561K-○ Z     |  | RoHS                                              |                                        | 560                               |                                       |                          |                                  |
|                               | UP025 B681K-○ Z     |  | RoHS                                              |                                        | 680                               |                                       |                          |                                  |
|                               | UP025 B821K-○ Z     |  | RoHS                                              |                                        | 820                               |                                       |                          |                                  |
|                               | UP025 B102K-○ Z     |  | RoHS                                              |                                        | 1000                              |                                       |                          |                                  |
|                               | UP025 B122K-○ Z     |  | RoHS                                              |                                        | 1200                              |                                       |                          |                                  |
|                               | UP025 B152K-○ Z     |  | RoHS                                              |                                        | 1500                              |                                       |                          |                                  |
|                               | UP025 B222K-○ Z     |  | RoHS                                              |                                        | 2200                              |                                       |                          |                                  |
|                               | UP025 B332K-○ Z     |  | RoHS                                              |                                        | 3300                              |                                       |                          |                                  |
|                               | UP025 B472K-○ Z     |  | RoHS                                              |                                        | 4700                              |                                       |                          |                                  |
|                               | UP025 B682K-○ Z     |  | RoHS                                              |                                        | 6800                              |                                       |                          |                                  |
|                               | UP025 B103K-○ Z     |  | RoHS                                              |                                        | 10000                             |                                       |                          |                                  |
|                               | UP025 B153K-○ Z     |  | RoHS                                              |                                        | 15000                             |                                       |                          |                                  |
|                               | UP025 B223K-○ Z     |  | RoHS                                              |                                        | 22000                             |                                       |                          |                                  |
|                               | UP025 B333K-○ Z     |  | RoHS                                              |                                        | 33000                             |                                       |                          |                                  |
|                               | UP025 B473K-○ Z     |  | RoHS                                              |                                        | 47000                             |                                       | $\tan \delta \leq 5.0\%$ | 1000M $\Omega$ min               |
|                               | UP025 B683K-○ Z     |  | RoHS                                              |                                        | 68000                             |                                       |                          |                                  |
|                               | UP025 B104K-○ Z     |  | RoHS                                              |                                        | 100000                            |                                       |                          |                                  |
| 50V                           | UP025 F103Z-○ Z     |  | RoHS                                              | F                                      | 10000                             | +80<br>-20 %                          | $\tan \delta \leq 7.5\%$ | 1000M $\Omega$ min               |
|                               | UP025 F223Z-○ Z     |  | RoHS                                              |                                        | 22000                             |                                       |                          |                                  |
|                               | UP025 F473Z-○ Z     |  | RoHS                                              |                                        | 47000                             |                                       |                          |                                  |
|                               | UP025 F104Z-○ Z     |  | RoHS                                              |                                        | 100000                            |                                       |                          |                                  |
| 16V                           | EP025 B122M-○ J     |  | RoHS                                              | B                                      | 1200                              | ±20%                                  | $\tan \delta \leq 3.5\%$ | 5000M $\Omega$ min               |
|                               | EP025 B152M-○ J     |  | RoHS                                              |                                        | 1500                              |                                       |                          |                                  |
|                               | EP025 B182M-○ J     |  | RoHS                                              |                                        | 1800                              |                                       |                          |                                  |
|                               | EP025 B222M-○ J     |  | RoHS                                              |                                        | 2200                              |                                       |                          |                                  |
|                               | EP025 B272M-○ J     |  | RoHS                                              |                                        | 2700                              |                                       |                          |                                  |
|                               | EP025 B332M-○ J     |  | RoHS                                              |                                        | 3300                              |                                       |                          |                                  |
|                               | EP025 B392M-○ J     |  | RoHS                                              |                                        | 3900                              |                                       |                          |                                  |
|                               | EP025 B472M-○ J     |  | RoHS                                              |                                        | 4700                              |                                       |                          |                                  |
|                               | EP025 B562M-○ J     |  | RoHS                                              |                                        | 5600                              |                                       |                          |                                  |
|                               | EP025 B682M-○ J     |  | RoHS                                              |                                        | 6800                              |                                       |                          |                                  |
|                               | EP025 B822M-○ J     |  | RoHS                                              |                                        | 8200                              |                                       |                          |                                  |
|                               | EP025 B103M-○ J     |  | RoHS                                              |                                        | 10000                             |                                       |                          |                                  |
|                               | EP025 B123M-○ J     |  | RoHS                                              |                                        | 12000                             |                                       |                          |                                  |
|                               | EP025 B153M-○ J     |  | RoHS                                              |                                        | 15000                             |                                       |                          |                                  |
|                               | EP025 B183M-○ J     |  | RoHS                                              |                                        | 18000                             |                                       |                          |                                  |
|                               | EP025 B223M-○ J     |  | RoHS                                              |                                        | 22000                             |                                       |                          |                                  |
| 25V                           | TP025 F103Z-○ J     |  | RoHS                                              | F                                      | 10000                             | +80<br>-20 %                          | $\tan \delta \leq 7.5\%$ | 1000M $\Omega$ min               |
|                               | TP025 F223Z-○ J     |  | RoHS                                              |                                        | 22000                             |                                       |                          |                                  |
|                               | TP025 F473Z-○ J     |  | RoHS                                              |                                        | 47000                             |                                       |                          |                                  |

形名の△には温度特性、○にはリード形状分類記号が入ります。

△Please specify the temperature characteristics code and ○ lead configuration code.

[積層タイプ Multilayer type]

Class 1

| 定 格<br>電 圧<br>Rated Voltage<br>(DC) | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公 称<br>静電容量<br>Capacitance<br>〔pF〕 | 容 量<br>許 容 差<br>Capacitance<br>tolerance | Q or tan δ | 絶縁抵抗<br>Insulation<br>resistance |
|-------------------------------------|----------------------|--|---------------------------------------------------|----------------------------------------|------------------------------------|------------------------------------------|------------|----------------------------------|
| 50V                                 | ★ UP050CH220J-○ Z    |  | RoHS                                              | CH                                     | 22                                 | ± 5%                                     | Q≥400+20C  | 10000MΩ min                      |
|                                     | ★ UP050CH240J-○ Z    |  | RoHS                                              |                                        | 24                                 |                                          |            |                                  |
|                                     | ★ UP050CH270J-○ Z    |  | RoHS                                              |                                        | 27                                 |                                          |            |                                  |
|                                     | ★ UP050CH300J-○ Z    |  | RoHS                                              |                                        | 30                                 |                                          |            |                                  |
|                                     | ★ UP050CH330J-○ Z    |  | RoHS                                              |                                        | 33                                 |                                          |            |                                  |
|                                     | ★ UP050CH360J-○ Z    |  | RoHS                                              |                                        | 36                                 |                                          |            |                                  |
|                                     | ★ UP050CH390J-○ Z    |  | RoHS                                              |                                        | 39                                 |                                          |            |                                  |
|                                     | ★ UP050CH430J-○ Z    |  | RoHS                                              |                                        | 43                                 |                                          |            |                                  |
|                                     | ★ UP050CH470J-○ Z    |  | RoHS                                              |                                        | 47                                 |                                          |            |                                  |
|                                     | ★ UP050CH510J-○ Z    |  | RoHS                                              |                                        | 51                                 |                                          |            |                                  |
|                                     | ★ UP050CH560J-○ Z    |  | RoHS                                              |                                        | 56                                 |                                          |            |                                  |
|                                     | ★ UP050CH620J-○ Z    |  | RoHS                                              |                                        | 62                                 |                                          |            |                                  |
|                                     | ★ UP050CH680J-○ Z    |  | RoHS                                              |                                        | 68                                 |                                          |            |                                  |
|                                     | ★ UP050CH750J-○ Z    |  | RoHS                                              |                                        | 75                                 |                                          |            |                                  |
|                                     | ★ UP050CH820J-○ Z    |  | RoHS                                              |                                        | 82                                 |                                          |            |                                  |
|                                     | ★ UP050CH910J-○ Z    |  | RoHS                                              |                                        | 91                                 |                                          |            |                                  |
|                                     | ★ UP050CH101J-○ Z    |  | RoHS                                              |                                        | 100                                |                                          |            |                                  |
|                                     | ★ UP050CH111J-○ Z    |  | RoHS                                              |                                        | 110                                |                                          |            |                                  |
|                                     | ★ UP050CH121J-○ Z    |  | RoHS                                              |                                        | 120                                |                                          |            |                                  |
|                                     | ★ UP050CH131J-○ Z    |  | RoHS                                              |                                        | 130                                |                                          |            |                                  |
|                                     | ★ UP050CH151J-○ Z    |  | RoHS                                              |                                        | 150                                |                                          |            |                                  |
|                                     | ★ UP050CH161J-○ Z    |  | RoHS                                              |                                        | 160                                |                                          |            |                                  |
|                                     | ★ UP050CH181J-○ Z    |  | RoHS                                              |                                        | 180                                |                                          |            |                                  |
|                                     | ★ UP050CH201J-○ Z    |  | RoHS                                              |                                        | 200                                |                                          |            |                                  |
|                                     | ★ UP050CH221J-○ Z    |  | RoHS                                              |                                        | 220                                |                                          |            |                                  |
|                                     | ★ UP050CH241J-○ Z    |  | RoHS                                              |                                        | 240                                |                                          |            |                                  |
|                                     | ★ UP050CH271J-○ Z    |  | RoHS                                              |                                        | 270                                |                                          |            |                                  |
|                                     | ★ UP050CH301J-○ Z    |  | RoHS                                              |                                        | 300                                |                                          |            |                                  |
|                                     | ★ UP050CH331J-○ Z    |  | RoHS                                              |                                        | 330                                |                                          |            |                                  |
|                                     | ★ UP050CH361J-○ Z    |  | RoHS                                              |                                        | 360                                |                                          |            |                                  |
|                                     | ★ UP050CH391J-○ Z    |  | RoHS                                              |                                        | 390                                |                                          |            |                                  |
|                                     | ★ UP050CH431J-○ Z    |  | RoHS                                              |                                        | 430                                |                                          |            |                                  |
|                                     | ★ UP050CH471J-○ Z    |  | RoHS                                              |                                        | 470                                |                                          |            |                                  |
|                                     | ★ UP050CH511J-○ Z    |  | RoHS                                              |                                        | 510                                |                                          |            |                                  |
|                                     | ★ UP050CH561J-○ Z    |  | RoHS                                              |                                        | 560                                |                                          |            |                                  |
|                                     | ★ UP050CH621J-○ Z    |  | RoHS                                              |                                        | 620                                |                                          |            |                                  |
|                                     | ★ UP050CH681J-○ Z    |  | RoHS                                              |                                        | 680                                |                                          |            |                                  |
|                                     | ★ UP050CH751J-○ Z    |  | RoHS                                              |                                        | 750                                |                                          |            |                                  |
|                                     | ★ UP050CH821J-○ Z    |  | RoHS                                              |                                        | 820                                |                                          |            |                                  |
|                                     | ★ UP050CH911J-○ Z    |  | RoHS                                              |                                        | 910                                |                                          |            |                                  |
|                                     | ★ UP050CH102J-○ Z    |  | RoHS                                              |                                        | 1000                               |                                          |            |                                  |

形名の△には温度特性、○にはリード形状分類記号が入ります。 ★：オプション対応

△Please specify the temperature characteristics code and ○ lead configuration code.

★：Option

[単層タイプ Monolithic type]

Class 2

※単層タイプの製品につきましては、生産終息予定ですので詳細につきましては最寄の弊社営業窓口までお問い合わせ下さい。

※Since the production of monolithic layer products is scheduled to be discontinued, please contact your nearest sales office if you require any detailed information.

| 定 格<br>電 圧<br>Rated Voltage<br>(DC) | 形 名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公 称<br>静電容量<br>Capacitance<br>[pF] | 容 量<br>許 容 差<br>Capacitance<br>tolerance | Q or $\tan \delta$       | 絶縁抵抗<br>Insulation<br>resistance |
|-------------------------------------|----------------------|--|---------------------------------------------------|----------------------------------------|------------------------------------|------------------------------------------|--------------------------|----------------------------------|
| 50V                                 | UP050 B750K-○        |  | RoHS                                              | B                                      | 75                                 | ±10%                                     | $\tan \delta \leq 1.5\%$ | 10000M $\Omega$ min              |
|                                     | UP050 B820K-○        |  | RoHS                                              |                                        | 82                                 |                                          |                          |                                  |
|                                     | UP050 B910K-○        |  | RoHS                                              |                                        | 91                                 |                                          |                          |                                  |
|                                     | UP050 B101K-○        |  | RoHS                                              |                                        | 100                                |                                          |                          |                                  |
|                                     | UP050 B121K-○        |  | RoHS                                              |                                        | 120                                |                                          |                          |                                  |
|                                     | UP050 B151K-○        |  | RoHS                                              |                                        | 150                                |                                          |                          |                                  |
|                                     | UP050 B181K-○        |  | RoHS                                              |                                        | 180                                |                                          |                          |                                  |
|                                     | UP050 B221K-○        |  | RoHS                                              |                                        | 220                                |                                          |                          |                                  |
|                                     | UP050 B271K-○        |  | RoHS                                              |                                        | 270                                |                                          |                          |                                  |
|                                     | UP050 B331K-○        |  | RoHS                                              |                                        | 330                                |                                          |                          |                                  |
|                                     | UP050 B391K-○        |  | RoHS                                              |                                        | 390                                |                                          |                          |                                  |
|                                     | UP050 B471K-○        |  | RoHS                                              |                                        | 470                                |                                          |                          |                                  |
|                                     | UP050 B561K-○        |  | RoHS                                              |                                        | 560                                |                                          | $\tan \delta \leq 2.5\%$ | 1000M $\Omega$ min               |
|                                     | UP050 B681K-○        |  | RoHS                                              |                                        | 680                                |                                          |                          |                                  |
|                                     | UP050 B821K-○        |  | RoHS                                              |                                        | 820                                |                                          |                          |                                  |
|                                     | UP050 B102K-○        |  | RoHS                                              |                                        | 1000                               |                                          |                          |                                  |
| 25V                                 | TP050 F103Z-○        |  | RoHS                                              | F                                      | 10000                              | ± $\frac{80}{20}\%$                      | $\tan \delta \leq 7.5\%$ | 1000M $\Omega$ min               |
|                                     | TP050 F223Z-○        |  | RoHS                                              |                                        | 22000                              |                                          |                          |                                  |

形名の□には容量許容差、○にはリード形状分類記号が入ります。

□Please specify the capacitance tolerance code and ○ lead configuration code.



[積層タイプ Multilayer type]

Class 2

| 定格電圧<br>Rated Voltage<br>(DC) | 形名<br>Ordering code |  | EHS<br>(Environmental<br>Hazardous<br>Substances) | 温度特性<br>Temperature<br>characteristics | 公称<br>静電容量<br>Capacitance<br>[pF] | 容量<br>許容差<br>Capacitance<br>tolerance | Q or tan $\delta$        | 絶縁抵抗<br>Insulation<br>resistance |
|-------------------------------|---------------------|--|---------------------------------------------------|----------------------------------------|-----------------------------------|---------------------------------------|--------------------------|----------------------------------|
| 50V                           | ★ UP050 B122K-○ Z   |  | RoHS                                              | B                                      | 1200                              | ±10%                                  | tan $\delta \leq 3.5\%$  | 5000M $\Omega$ min               |
|                               | UP050 B152K-○ Z     |  | RoHS                                              |                                        | 1500                              |                                       |                          |                                  |
|                               | ★ UP050 B182K-○ Z   |  | RoHS                                              |                                        | 1800                              |                                       |                          |                                  |
|                               | UP050 B222K-○ Z     |  | RoHS                                              |                                        | 2200                              |                                       |                          |                                  |
|                               | ★ UP050 B272K-○ Z   |  | RoHS                                              |                                        | 2700                              |                                       |                          |                                  |
|                               | UP050 B332K-○ Z     |  | RoHS                                              |                                        | 3300                              |                                       |                          |                                  |
|                               | ★ UP050 B392K-○ Z   |  | RoHS                                              |                                        | 3900                              |                                       |                          |                                  |
|                               | UP050 B472K-○ Z     |  | RoHS                                              |                                        | 4700                              |                                       |                          |                                  |
|                               | ★ UP050 B562K-○ Z   |  | RoHS                                              |                                        | 5600                              |                                       |                          |                                  |
|                               | UP050 B682K-○ Z     |  | RoHS                                              |                                        | 6800                              |                                       |                          |                                  |
|                               | ★ UP050 B822K-○ Z   |  | RoHS                                              |                                        | 8200                              |                                       |                          |                                  |
|                               | UP050 B103K-○ Z     |  | RoHS                                              |                                        | 10000                             |                                       |                          |                                  |
|                               | ★ UP050 B123K-○ Z   |  | RoHS                                              |                                        | 12000                             |                                       |                          |                                  |
|                               | UP050 B153K-○ Z     |  | RoHS                                              |                                        | 15000                             |                                       |                          |                                  |
|                               | ★ UP050 B183K-○ Z   |  | RoHS                                              |                                        | 18000                             |                                       |                          |                                  |
|                               | UP050 B223K-○ Z     |  | RoHS                                              |                                        | 22000                             |                                       |                          |                                  |
|                               | ★ UP050 B273K-○ Z   |  | RoHS                                              |                                        | 27000                             |                                       |                          |                                  |
|                               | UP050 B333K-○ Z     |  | RoHS                                              |                                        | 33000                             |                                       |                          |                                  |
|                               | ★ UP050 B393K-○ Z   |  | RoHS                                              |                                        | 39000                             |                                       |                          |                                  |
|                               | UP050 B473K-○ Z     |  | RoHS                                              |                                        | 47000                             |                                       |                          |                                  |
|                               | ★ UP050 B563K-○ Z   |  | RoHS                                              |                                        | 56000                             |                                       | tan $\delta \leq 5.0\%$  | 1000M $\Omega$ min               |
|                               | UP050 B683K-○ Z     |  | RoHS                                              |                                        | 68000                             |                                       |                          |                                  |
|                               | ★ UP050 B823K-○ Z   |  | RoHS                                              |                                        | 82000                             |                                       |                          |                                  |
|                               | UP050 B104K-○ Z     |  | RoHS                                              |                                        | 100000                            |                                       |                          |                                  |
|                               | UP050 B224K-○ Z     |  | RoHS                                              |                                        | 220000                            |                                       |                          |                                  |
|                               | UP050 B474K-○ Z     |  | RoHS                                              |                                        | 470000                            |                                       |                          |                                  |
| 16V                           | EP050 B105K-○ Z     |  | RoHS                                              | F                                      | 1000000                           | +80%<br>-20%                          | tan $\delta \leq 7.5\%$  | 50M $\Omega$ min                 |
|                               | EP050 B225K-○ Z     |  | RoHS                                              |                                        | 2200000                           |                                       |                          |                                  |
|                               | EP050 B475K-○ Z     |  | RoHS                                              |                                        | 4700000                           |                                       |                          |                                  |
|                               | EP050 B106K-○ Z     |  | RoHS                                              |                                        | 10000000                          |                                       | tan $\delta \leq 12.5\%$ | 20M $\Omega$ min                 |
| 50V                           | UP050 F103Z-○ Z     |  | RoHS                                              |                                        | 10000                             |                                       | tan $\delta \leq 7.5\%$  | 1000M $\Omega$ min               |
|                               | UP050 F223Z-○ Z     |  | RoHS                                              |                                        | 22000                             |                                       |                          |                                  |
|                               | UP050 F473Z-○ Z     |  | RoHS                                              |                                        | 47000                             |                                       | tan $\delta \leq 10.0\%$ | 500M $\Omega$ min                |
|                               | UP050 F104Z-○ Z     |  | RoHS                                              |                                        | 100000                            |                                       |                          |                                  |
|                               | UP050 F224Z-○ Z     |  | RoHS                                              |                                        | 220000                            |                                       | tan $\delta \leq 15\%$   | 250M $\Omega$ min                |
|                               | UP050 F474Z-○ Z     |  | RoHS                                              |                                        | 470000                            |                                       |                          |                                  |
| 16V                           | EP050 F105Z-○ Z     |  | RoHS                                              |                                        | 1000000                           |                                       | tan $\delta \leq 17.5\%$ | 125M $\Omega$ min                |
|                               | EP050 F225Z-○ Z     |  | RoHS                                              |                                        | 2200000                           |                                       |                          |                                  |
| 10V                           | LP050 F475Z-○ Z     |  | RoHS                                              |                                        | 4700000                           |                                       | tan $\delta \leq 17.5\%$ | 50M $\Omega$ min                 |
|                               | LP050 F106Z-○ Z     |  | RoHS                                              |                                        | 10000000                          |                                       |                          |                                  |
| 50V                           | UP075 B105K-○       |  | RoHS                                              | B                                      | 1000000                           | ±10%                                  | tan $\delta \leq 5.0\%$  | 100M $\Omega$ min                |
| 35V                           | GP075 B225K-○       |  | RoHS                                              |                                        | 2200000                           |                                       | tan $\delta \leq 7.5\%$  | 50M $\Omega$ min                 |
|                               | GP075 B475K-○       |  | RoHS                                              |                                        | 4700000                           |                                       |                          |                                  |
| 25V                           | TP075 B106K-○       |  | RoHS                                              | F                                      | 10000000                          | +80%<br>-20%                          | tan $\delta \leq 12.5\%$ | 20M $\Omega$ min                 |
| 35V                           | GP075 F106Z-○       |  | RoHS                                              |                                        | 10000000                          |                                       | tan $\delta \leq 17.5\%$ | 25M $\Omega$ min                 |

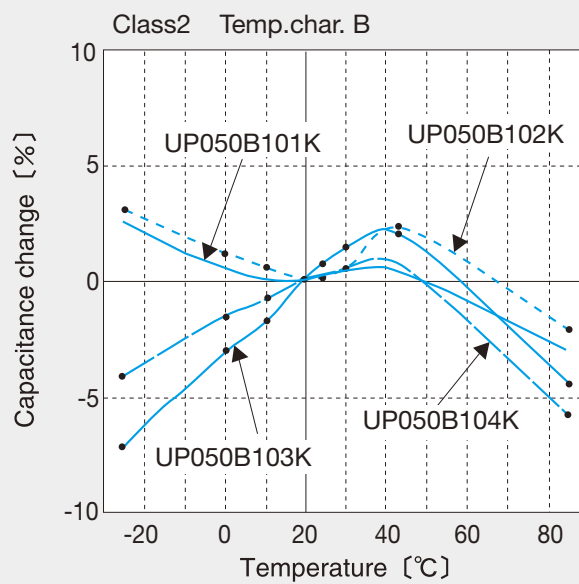
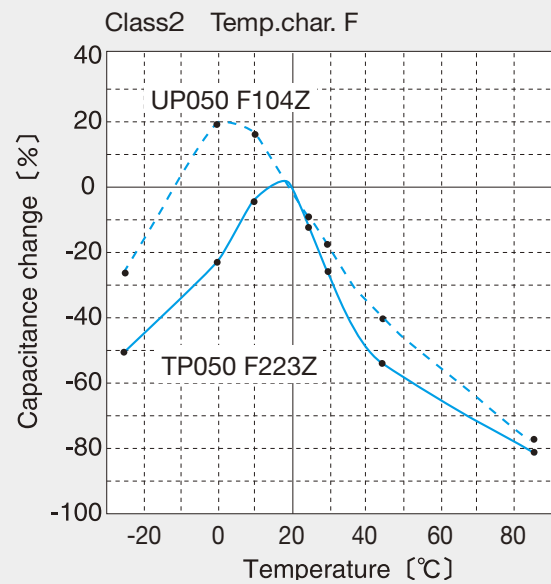
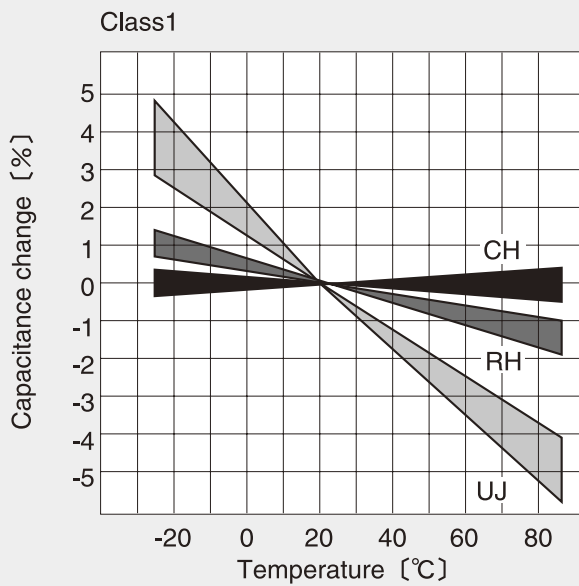
形名の△には温度特性、○にはリード形状分類記号が入ります。 ★：オプション対応

△Please specify the temperature characteristics code and ○ lead configuration code.

★：Option



・静電容量－温度特性 Capacitance -vs- Temperature Characteristics

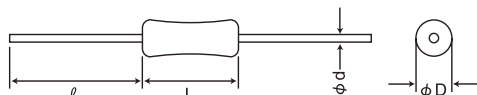


①最小受注単位数 Minimum Quantity

| 形式<br>Type                                     | リード形状記号<br>Lead configuration<br>code | 最小受注単位数(PCS)<br>Minimum Quantity |                                                        |
|------------------------------------------------|---------------------------------------|----------------------------------|--------------------------------------------------------|
|                                                |                                       | 袋づめ<br>Bulk                      | テーピング<br>Taping                                        |
| 積層形<br>Multilayer type<br>(075, 050, 025, 015) | A-(26mm幅) 1.024 inch wide             | —                                | 2000 (075type)<br>3000 (050type)<br>5000 (015,025type) |
|                                                | B-(52mm幅) 2.047 inches wide           | —                                | 2000 (075type)<br>3000 (050type)<br>5000 (015,025type) |
|                                                | NA                                    | 1000                             | —                                                      |
|                                                | KE (075type)<br>KF (015,025,050type)  | 3000,<br>4000<br>(015,025 type)  | —                                                      |
|                                                |                                       |                                  |                                                        |
| 単層形<br>Monolithic type<br>(050)                | A-(26mm幅) 1.024 inch wide             | —                                | 4000                                                   |
|                                                | B-(52mm幅) 2.047 inches wide           | —                                | 4000                                                   |
|                                                | NA                                    | 1000                             | —                                                      |
|                                                | KF                                    | 3000                             | —                                                      |

②製品単品形状 Dimensions of Bulk Products

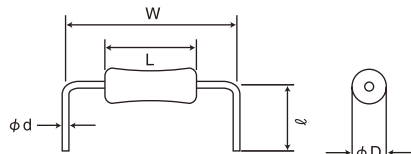
・NA形状 NA configuration



| 形式<br>Type                 | 寸法 Dimensions (mm) |                   |                            |                    |
|----------------------------|--------------------|-------------------|----------------------------|--------------------|
|                            | φD                 | L                 | φd                         | ℓ                  |
| 積層形 015<br>Multilayer type | 2.5max<br>(0.098)  | 3.0max<br>(0.118) | 0.45±0.05<br>(0.018±0.002) | 20.0min<br>(0.787) |
| 積層形 025<br>Multilayer type | 2.0max<br>(0.079)  | 2.3max<br>(0.09)  | 0.45±0.05<br>(0.018±0.002) | 20.0min<br>(0.787) |
| 積層形 050<br>Multilayer type | 2.2max<br>(0.087)  | 3.2max<br>(0.126) | 0.45±0.05<br>(0.018±0.002) | 20.0min<br>(0.787) |
| 積層形 075<br>Multilayer type | 3.2max<br>(0.126)  | 4.2max<br>(0.165) | 0.55±0.05<br>(0.022±0.002) | 20.0min<br>(0.787) |
| 単層形050<br>Monolithic type  | 1.9max<br>(0.075)  | 3.5max<br>(0.138) | 0.45±0.05<br>(0.018±0.002) | 20.0min<br>(0.787) |

Unit : mm (inch)

・KF/KE形状 KF/KE configuration

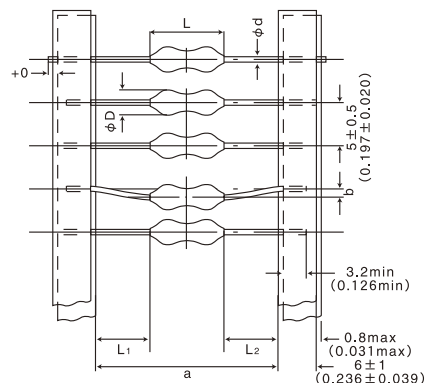


| 形式<br>Type                 | リード形状記号<br>Lead<br>configuration<br>code | 寸法 Dimensions (mm)   |                      |                          |                            |                          |
|----------------------------|------------------------------------------|----------------------|----------------------|--------------------------|----------------------------|--------------------------|
|                            |                                          | φD                   | L                    | W                        | φd                         | ℓ                        |
| 積層形 015<br>Multilayer type | KF                                       | 2.5max<br>(0.098max) | 3.0max<br>(0.118max) | 5.0±0.5<br>(0.197±0.020) | 0.45±0.05<br>(0.018±0.002) | 6.5±0.5<br>(0.256±0.020) |
| 積層形 025<br>Multilayer type | KF                                       | 2.0max<br>(0.079max) | 2.3max<br>(0.09max)  | 5.0±0.5<br>(0.197±0.020) | 0.45±0.05<br>(0.018±0.002) | 6.5±0.5<br>(0.256±0.020) |
| 積層形 050<br>Multilayer type | KF                                       | 2.2max<br>(0.087max) | 3.2max<br>(0.126max) | 5.0±0.5<br>(0.197±0.020) | 0.45±0.05<br>(0.018±0.002) | 6.5±0.5<br>(0.256±0.020) |
| 積層形 075<br>Multilayer type | KE                                       | 3.2max<br>(0.126max) | 4.2max<br>(0.165max) | 7.5±0.5<br>(0.295±0.020) | 0.55±0.05<br>(0.022±0.002) | 6.5±0.5<br>(0.256±0.020) |
| 単層形050<br>Monolithic type  | KF                                       | 1.9max<br>(0.075max) | 3.5max<br>(0.138max) | 5.0±0.5<br>(0.197±0.020) | 0.45±0.05<br>(0.018±0.002) | 6.5±0.5<br>(0.256±0.020) |

Unit : mm (inch)

③テーピング寸法 Taping Dimensions

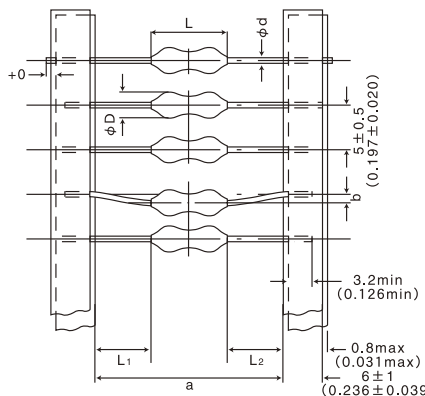
A-(a : 26mm幅)形状 (a : 1.024 inch wide) configuration



| 形式<br>Type                 | 寸法 Dimensions        |                      |                                                                              |                          |                                |                            | 最小挿入<br>ピッチ<br>Minimum<br>insertion<br>pitch |
|----------------------------|----------------------|----------------------|------------------------------------------------------------------------------|--------------------------|--------------------------------|----------------------------|----------------------------------------------|
|                            | φD                   | L                    | a                                                                            | b                        | L <sub>1</sub> -L <sub>2</sub> | φd                         |                                              |
| 積層形 015<br>Multilayer type | 2.5max<br>(0.098max) | 3.0max<br>(0.118max) | 26 <sup>+0.5</sup> <sub>-0</sub><br>(1.024 <sup>+0.020</sup> <sub>-0</sub> ) | 0.8以下<br>(0.031 or less) | 0.5max<br>(0.020max)           | 0.45±0.05<br>(0.018±0.002) | 5.0<br>(0.197)                               |
| 積層形 025<br>Multilayer type | 2.0max<br>(0.079max) | 2.3max<br>(0.09max)  |                                                                              |                          |                                | 0.45±0.05<br>(0.018±0.002) |                                              |
| 積層形 050<br>Multilayer type | 2.2max<br>(0.087max) | 3.2max<br>(0.126max) |                                                                              |                          |                                | 0.45±0.05<br>(0.018±0.002) |                                              |
| 積層形 075<br>Multilayer type | 3.2max<br>(0.126max) | 4.2max<br>(0.165max) |                                                                              |                          |                                | 0.55±0.05<br>(0.022±0.002) | 7.5<br>(0.295)                               |
| 単層形050<br>Monolithic type  | 1.9max<br>(0.075max) | 3.5max<br>(0.138max) |                                                                              |                          |                                | 0.45±0.05<br>(0.018±0.002) | 5.0<br>(0.197)                               |

Unit : mm (inch)

B-(a : 52mm幅)形状 (a : 2.047 inches wide) configuration



| 形式<br>Type                 | 寸法 Dimensions        |                      |                                                                                |                          |                                |                            | 最小挿入<br>ピッチ<br>Minimum<br>insertion<br>pitch |
|----------------------------|----------------------|----------------------|--------------------------------------------------------------------------------|--------------------------|--------------------------------|----------------------------|----------------------------------------------|
|                            | φD                   | L                    | a                                                                              | b                        | L <sub>1</sub> -L <sub>2</sub> | φd                         |                                              |
| 積層形 015<br>Multilayer type | 2.5max<br>(0.098max) | 3.0max<br>(0.118max) | 52 <sup>+2</sup> <sub>-1</sub><br>(2.047 <sup>+0.075</sup> <sub>-0.039</sub> ) | 1.2以下<br>(0.047 or less) | 1.0max<br>(0.039max)           | 0.45±0.05<br>(0.018±0.002) | 5.0<br>(0.197)                               |
| 積層形 025<br>Multilayer type | 2.0max<br>(0.079max) | 2.3max<br>(0.09max)  |                                                                                |                          |                                | 0.45±0.05<br>(0.018±0.002) |                                              |
| 積層形 050<br>Multilayer type | 2.2max<br>(0.087max) | 3.2max<br>(0.126max) |                                                                                |                          |                                | 0.45±0.05<br>(0.018±0.002) |                                              |
| 積層形 075<br>Multilayer type | 3.2max<br>(0.126max) | 4.2max<br>(0.165max) |                                                                                |                          |                                | 0.55±0.05<br>(0.022±0.002) | 7.5<br>(0.295)                               |
| 単層形050<br>Monolithic type  | 1.9max<br>(0.075max) | 3.5max<br>(0.138max) |                                                                                |                          |                                | 0.45±0.05<br>(0.018±0.002) | 5.0<br>(0.197)                               |

Unit : mm (inch)

※075Typeはラジアルテーピングもオプション対応可能。

## AXIAL LEADED CERAMIC CAPACITORS

| Item                                                                        |                            | Specified Value                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                      | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                             |                            | Temperature Compensating (Class1)                                                       | High Permittivity (Class2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                             |                            | Multilayer type                                                                         | Multilayer type (Characteristics:B)                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Multilayer type (Characteristics:F)                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 1. Operating Temperature Range                                              |                            | -25~+85℃                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2. Storage Temperature Range                                                |                            | -25~+85℃                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 3. Rated Voltage                                                            |                            | 50VDC                                                                                   | 16VDC、25VDC、35VDC、50VDC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 10VDC、16VDC、25VDC、35VDC、50VDC                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 4. Withstanding Voltage                                                     | Between terminals          | No abnormality                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                      | Applied voltage: Rated Voltage×3 (Class 1)<br>Rated Voltage×2.5 (Class 2)<br>Duration: 1 to 5 sec.<br>Charge/discharge current: 50mA max. (Class 1,2)                                                                                                                                                                                                                                                                                                               |
|                                                                             | Between terminals and body | No abnormality                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                      | Metal globule method<br>Applied voltage: Rated Voltage×2.5<br>Duration: 1 to 5 sec.<br>Charge/Discharge current : 50mA max.                                                                                                                                                                                                                                                                                                                                         |
| 5. Insulation Resistance                                                    |                            | 10000MΩmin.                                                                             | Rated Ivoltage:16VDC<br>B:<br>100000pF :1000MΩmin<br>1000000pF :100MΩ min<br>2200000pF :50MΩ min<br>4700000pF~10000000pF :20MΩ min<br>1200pF~22000pF (Item:ΔJ):5000MΩmin<br><br>Rated Ivoltage:25VDC<br>B:<br>10000pF :5000MΩmin<br>10000000pF :20MΩ min<br><br>Rated Ivoltage:35VDC<br>B:<br>2200000pF :50MΩ min<br>4700000pF :20MΩ min<br><br>Rated Ivoltage:50VDC<br>B:<br>100pF~39000pF :5000MΩ min<br>47000pF~100000pF :1000MΩ min<br>220000pF :500MΩ min<br>470000pF :200MΩ min<br>1000000pF :100MΩ min | Rated Ivoltage:10VDC<br>F:<br>4700000pF :50MΩ min<br>10000000pF :25MΩ min<br><br>Rated Ivoltage:16VDC<br>F:<br>100000pF :1000MΩmin<br>2200000pF :125MΩ min<br><br>Rated voltage:25VDC<br>F:<br>10000pF~47000pF (ItemΔJ) :1000MΩmin<br><br>Rated voltage:35VDC<br>F:<br>10000000pF :25MΩ min<br><br>Rated voltage:50VDC<br>F:<br>10000pF~100000pF :1000MΩ min<br>220000pF~470000pF :500MΩ min<br>1000000pF :250MΩ min | Applied voltage: Rated voltage<br>Duration : 60±5 sec.                                                                                                                                                                                                                                                                                                                                                                                                              |
| 6. Capacitance :                                                            |                            | ±0.5pF<br>± 5%<br>± 10%                                                                 | Rated Ivoltage:16VDC<br>B: ±10%,±20% (ItemΔJ)<br><br>Rated Ivoltage:25VDC<br>B: ±10%<br><br>Rated Ivoltage:35VDC<br>B: ±10%<br><br>Rated Ivoltage:50VDC<br>B: ±10%                                                                                                                                                                                                                                                                                                                                            | Rated Ivoltage:10VDC<br>F: +80%<br>-20%<br><br>Rated Ivoltage:16VDC<br>F: +80%<br>-20%<br><br>Rated Ivoltage:25VDC<br>F: +80%<br>-20%<br><br>Rated Ivoltage:35VDC<br>F: +80%<br>-20%<br><br>Rated Ivoltage:50VDC<br>F: +80%<br>-20%                                                                                                                                                                                  | Measuring frequency<br>1MHz±10% (Class 1: C≤1000pF)<br>1kHz±10% (Class 1: C>1000pF)<br>1kHz±10% (Class 2)<br>Measuring voltage<br>1.0±0.5Vrms (Class 1: C≤1000pF)<br>1.0±0.2Vrms (Class 1: C>1000pF)<br>1.0±0.2Vrms (Class 2)<br>Measuring temperature: 20℃<br>Bias application: None                                                                                                                                                                               |
| 7. Q or Tangent of Loss Angle                                               |                            | 30pF or under :<br>Q≥400+20C<br>33pF or over :<br>Q≥1000<br>C:Nominal Capacitance :[pF] | Rated Ivoltage:16VDC<br>B:<br>1200pF~22000pF (ItemΔJ) :3.5%max<br>100000pF :5.0%max<br>1000000pF :5.0% max<br>2200000pF~4700000pF :7.5% max<br>10000000pF :12.5% max<br><br>Rated Ivoltage:25VDC<br>B:<br>10000pF :3.5%max<br>10000000pF :12.5% max<br><br>Rated Ivoltage:35VDC<br>B:<br>2200000pF~4700000pF :7.5% max<br><br>Rated Ivoltage:50VDC<br>B:<br>100pF~39000pF :3.5% max<br>47000pF~100000pF :5.0% max                                                                                             | Rated Ivoltage:10VDC<br>F:<br>4700000pF~10000000pF :17.5% max<br><br>Rated Ivoltage:16VDC<br>F:<br>100000pF :10.0% max<br>2200000pF :15.0% max<br><br>Rated Ivoltage:25VDC<br>F:<br>10000pF~47000pF (ItemΔJ) :7.5% max<br><br>Rated Ivoltage:35VDC<br>F:<br>10000000pF :17.5% max<br><br>Rated Ivoltage:50VDC<br>F:<br>10000pF~100000pF :7.5% max<br>220000pF~470000pF :10.0% max<br>1000000pF :15.0% max            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 8. Capacitance :<br>Change due to Temperature or Rate of Capacitance Change |                            | (When voltage is not applied)<br>CH : 0±60<br>SL : -350~+1000 [ppm/℃]                   | Rated Ivoltage:16VDC<br>B: ±10%<br><br>Rated Ivoltage:25VDC<br>B: ±10%<br><br>Rated Ivoltage:35VDC<br>B: ±10%<br><br>Rated Ivoltage:50VDC<br>B: ±10%                                                                                                                                                                                                                                                                                                                                                          | Rated Ivoltage:10VDC<br>F: +30%<br>-85%<br><br>Rated Ivoltage:16VDC<br>F: +30%<br>-85%<br><br>Rated Ivoltage:25VDC<br>F: +30%<br>-85%<br><br>Rated Ivoltage:35VDC<br>F: +30%<br>-85%<br><br>Rated Ivoltage:50VDC<br>F: +30%<br>-85%                                                                                                                                                                                  | Measurement of capacitance at 20℃ and 85℃, -25℃ shall be made to calculate temperature characteristic by the following equation. (Class 1)<br>$\frac{(C_{85}-C_{20})}{C_{20} \times \Delta T} \times 10^6$ (ppm/℃)<br><br>Change of maximum capacitance deviation in step 1 to 5 (Class 2)<br>Temperature at step 1: 20℃ Temperature at step 4: 85℃<br>Temperature at step 2: -25℃ Temperature at step 5: 20℃<br>Temperature at step 3: 20℃ (Reference temperature) |

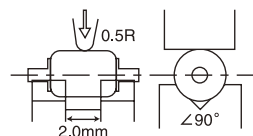
Withstanding voltage is also referred to as "voltage proof" under IEC specifications.

## AXIAL LEADED CERAMIC CAPACITORS

| Item                          |                                                           | Specified Value                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Test Methods and Remarks                                                                                                                                                                                                                            |                               |                      |                 |      |      |   |
|-------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------|-----------------|------|------|---|
|                               |                                                           | Temperature Compensating (Class1)                                                                                                                                                                                                                                                                                                                    | High Permittivity (Class2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                     |                               |                      |                 |      |      |   |
|                               |                                                           | Multilayer type                                                                                                                                                                                                                                                                                                                                      | Multilayer type (Characteristics:B)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Multilayer type (Characteristics:F)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                     |                               |                      |                 |      |      |   |
| 9. Terminal Strength          | Tensile                                                   | No abnormalities, such as cuts or looseness of terminals.                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Apply the stated tensile force progressively in the direction to draw terminal. <table><tr><td>Nominal wire diameter<br/>[mm]</td><td>Tensile force<br/>[N]</td><td>Duration<br/>[s]</td></tr><tr><td>0.45</td><td>19.6</td><td>5</td></tr></table> | Nominal wire diameter<br>[mm] | Tensile force<br>[N] | Duration<br>[s] | 0.45 | 19.6 | 5 |
|                               | Nominal wire diameter<br>[mm]                             | Tensile force<br>[N]                                                                                                                                                                                                                                                                                                                                 | Duration<br>[s]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                     |                               |                      |                 |      |      |   |
| 0.45                          | 19.6                                                      | 5                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                     |                               |                      |                 |      |      |   |
| Torsional                     | No abnormalities, such as cuts or looseness of terminals. |                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Suspend a mass at the end the terminal, incline the body through angle of 90° and return it to initial position.<br>This operation is done over a period of 5 sec. Then second bend in the opposite direction shall be made.<br>Number of bends : 2 times <table><tr><td>Nominal wire diameter<br/>[mm]</td><td>Bending force<br/>[N]</td><td>Mass weight<br/>[kg]</td></tr><tr><td>0.45</td><td>2.45</td><td>0.25</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Nominal wire diameter<br>[mm]                                                                                                                                                                                                                       | Bending force<br>[N]          | Mass weight<br>[kg]  | 0.45            | 2.45 | 0.25 |   |
| Nominal wire diameter<br>[mm] | Bending force<br>[N]                                      | Mass weight<br>[kg]                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                     |                               |                      |                 |      |      |   |
| 0.45                          | 2.45                                                      | 0.25                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                     |                               |                      |                 |      |      |   |
| 10. Resistance to Vaibration  |                                                           | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality<br>Capacitance :<br>Within ±5%<br>4.7pF or under :Within ±0.5pF<br>5.6pF~8.2pF :Within ±10%<br>10pF or over :Within ±5%<br>Q:<br>30pF or under :<br>Q≥400+20C<br>33pF or over :<br>Q≥1000<br>Insulation resistance :<br>10000MΩ min.<br>C:Nominal Capacitance :[pF] | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality<br>Rated Voltage:16VDC<br>B<br>Capacitance : Within ±10%<br>1200pF~22000pF (Item.ΔJ) :Within ±20%<br>100000pF~1000000pF :Within ±10%<br>tanδ:<br>1200pF~22000pF (Item.ΔJ) :3.5% max<br>100000pF :5.0% max<br>1000000pF :5.0% max<br>2200000pF~4700000pF :7.5% max<br>1000000pF :12.5% max<br>Insulation Resistance:<br>1200pF~22000pF (Item.ΔJ) :5000MΩmin<br>100000pF :1000MΩmin<br>1000000pF :100MΩmin<br>2200000pF :50MΩmin<br>4700000pF~10000000pF :20MΩmin<br>Rated Voltage:25VDC<br>B<br>Capacitance : Within ±10%<br>tanδ:<br>10000pF :3.5% max<br>1000000pF :12.5% max<br>Insulation Resistance:<br>10000pF :5000MΩmin<br>1000000pF :20MΩmin<br>Rated Voltage:35VDC<br>B<br>Capacitance : Within ±10%<br>tanδ:<br>2200000pF~4700000pF :7.5% max<br>2200000pF :50MΩmin<br>4700000pF :20MΩmin<br>Rated Voltage:50VDC<br>B<br>Capacitance : Within ±10%<br>tanδ:<br>100pF~39000pF :3.5% max<br>47000pF~1000000pF :5.0% max<br>Insulation Resistance:<br>100pF~39000pF :5000MΩ min<br>47000pF~100000pF :1000MΩ min<br>220000pF :50MΩ min<br>470000pF :20MΩ min<br>1000000pF :100MΩ min | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality<br>Rated Voltage:10VDC<br>F<br>Capacitance : Within +80 -20 %<br>tanδ:<br>4700000pF~10000000pF : 17.5% max<br>Insulation Resistance:<br>4700000pF :50MΩ min<br>10000000pF :25MΩ min<br>Rated Voltage:16VDC<br>F<br>Capacitance : Within +80 -20 %<br>tanδ:<br>100000pF :10.0% max<br>2200000pF :15.0% max<br>Insulation Resistance:<br>100000pF :1000MΩmin<br>2200000pF :125MΩmin<br>Rated Voltage:25VDC<br>F<br>Capacitance : Within +80 -20 %<br>tanδ:<br>10000pF~47000pF (Item.ΔJ) :7.5% max<br>Insulation Resistance:<br>10000pF~47000pF (Item.ΔJ) :1000MΩmin<br>Rated Voltage:35VDC<br>F<br>Capacitance : Within +80 -20 %<br>tanδ:<br>1000000pF :17.5% max<br>Insulation Resistance:<br>1000000pF :25MΩmin<br>Rated Voltage:50VDC<br>F<br>Capacitance : Within +80 -20 %<br>tanδ:<br>10000pF~100000pF :7.5% max<br>220000pF~470000pF :10.0% max<br>1000000pF :15.0% max<br>Insulation Resistance:<br>10000pF~100000pF :1000MΩmin<br>220000pF~470000pF :500MΩmin<br>1000000pF :250MΩmin | According to JIS C 5102 clause 8.2<br>Vibration type: A<br>Directions: 2 hrs each in X, Y and Z directions<br>Total: 6 hrs<br>Frequency range: 10 to 55 to 10Hz (1min)<br>Amplitude: 1.5 mm<br>Mounting method: Soldering onto the PC board         |                               |                      |                 |      |      |   |

Withstanding voltage is also referred to as "voltage proof" under IEC specifications.

## AXIAL LEADED CERAMIC CAPACITORS

| Item              | Specified Value                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Test Methods and Remarks                                                                                                                                                                                     |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                   | Temperature Compensating(Class1)                                                                                                                                                                                                                                                                                                               | High Permittivity (Class2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                              |
|                   | Multilayer type                                                                                                                                                                                                                                                                                                                                | Multilayer type (Characteristics:B)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Multilayer type (Characteristics:F)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                              |
| 11. Free Fall     | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality<br>Capacitance :<br>4.7pF or under :Within ±0.5pF<br>5.6pF~8.2pF :Within ±10%<br>10pF or over :Within ±5%<br><br>Q:<br>30pF or under :<br>Q≥400+20C<br>33pF or over :<br>Q≥1000<br>Insulation resistance :<br>10000MΩ min.<br><br>C:Nominal Capacitance :[pF] | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality<br>Rated Voltage:16VDC<br>B<br>Capacitance :<br>1200pF~22000pF (Item△J) :Within±20%<br>100000pF~1000000pF :Within±10%<br>tanδ :<br>1200pF~22000pF (Item△J) :3.5% max<br>100000pF :5.0% max<br>1000000pF :5.0% max<br>2200000pF~4700000pF :7.5% max<br>10000000pF :12.5% max<br>Insulation Resistance:<br>1200pF~22000pF (Item△J) :5000MΩ min<br>100000pF :1000MΩ min<br>1000000pF :100MΩ min<br>2200000pF :50MΩ min<br>4700000pF~10000000pF :20MΩ min<br><br>Rated Voltage:25VDC<br>B<br>Capacitance : Within ±10%<br>tanδ :<br>10000pF :3.5% max<br>1000000pF :12.5% max<br>Insulation Resistance:<br>10000pF :5000MΩ min<br>1000000pF :20MΩ min<br><br>Rated Voltage:35VDC<br>B<br>Capacitance : Within ±10%<br>tanδ :<br>2200000pF~4700000pF :7.5% max<br>Insulation Resistance:<br>2200000pF :50MΩ min<br>4700000pF :20MΩ min<br><br>Rated Voltage:50VDC<br>B<br>Capacitance : Within ±10%<br>tanδ :<br>100pF~39000pF :3.5% max<br>47000pF~1000000pF :5.0% max<br>Insulation Resistance:<br>100pF~39000pF :5000MΩ min<br>47000pF~100000pF :1000MΩ min<br>220000pF :500MΩ min<br>470000pF :200MΩ min<br>1000000pF :100MΩ min | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality<br>Rated Voltage:10VDC<br>F<br>Capacitance : Within <sup>+80</sup> <sub>-20</sub> %<br>tanδ :<br>4700000pF~10000000pF : 17.5% max<br>Insulation Resistance:<br>4700000pF :50MΩ min<br>10000000pF :25MΩ min<br><br>Rated Voltage:16VDC<br>F<br>Capacitance : Within <sup>+80</sup> <sub>-20</sub> %<br>tanδ :<br>100000pF :10.0% max<br>2200000pF :15.0% max<br>Insulation Resistance:<br>100000pF :1000MΩ min<br>2200000pF :125MΩ min<br><br>Rated Voltage:25VDC<br>F<br>Capacitance : Within <sup>+80</sup> <sub>-20</sub> %<br>tanδ :<br>10000pF~47000pF (Item△J) :7.5% max<br>Insulation Resistance:<br>10000pF~47000pF (Item△J) :1000MΩ min<br><br>Rated Voltage:35VDC<br>F<br>Capacitance : Within <sup>+80</sup> <sub>-20</sub> %<br>tanδ :<br>10000000pF :17.5% max<br>Insulation Resistance:<br>10000000pF :25MΩ min<br><br>Rated Voltage:50VDC<br>F<br>Capacitance : Within <sup>+80</sup> <sub>-20</sub> %<br>tanδ :<br>10000pF~100000pF :7.5% max<br>220000pF~470000pF :10.0% max<br>1000000pF :15.0% max<br>Insulation Resistance:<br>10000pF~100000pF :1000MΩ min<br>220000pF~470000pF :500MΩ min<br>1000000pF :250MΩ min | Drop Test: Free fall<br>Impact material: Floor<br>Height: 1 m<br>Total number of drops: 5 times                                                                                                              |
| 12. Body Strength | No abnormality such as damage.                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Applied force: 19.6N<br>Duration: 5 sec.<br>Speed: Shall attain to specified force in 2 sec.<br><br><br>1.5mm (025type) |
| 13. Solderability | At least 75% of lead surface is covered with new solder.                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Solder temperature: 230±5℃<br>Duration: 2±0.5 sec. (This test may be applicable after 6 months storage.)                                                                                                     |

Withstanding voltage is also referred to as "voltage proof" under IEC specifications.

## AXIAL LEADED CERAMIC CAPACITORS

| Item                      | Specified Value                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                           | Temperature Compensating (Class1)                                                                                                                                                                                                                        | High Permittivity (Class2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                           | Multilayer type                                                                                                                                                                                                                                          | Multilayer type (Characteristics:B)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Multilayer type (Characteristics:F)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 14. Soldering             | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                         | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Solder temperature: 270±5℃<br><br>Duration: 5±0.5 sec.<br><br>Immersed conditions: Inserted into the PC board<br>(with t=1.6mm, hole=1.0mm diameter)<br><br>Preconditioning: 1 hr of preconditioning at 150 $\pm_{10}^{\circ}$ ℃<br>followed by 48±4 hrs of recovery<br>under the standard condition.<br><br>Recovery: Recovery for the following period under the<br>standard condition after the test.<br>24±2 hrs (Class 1)<br>48±4 hrs (Class 2) |
|                           | Capacitance change :<br>8.2pF or under :Within ±0.25pF<br>10pF or over :Within ±2.5%<br>Q:<br>30pF or under:<br>Q≥400+20C<br>33pF or over:<br>Q≥1000<br>Insulation resistance:<br>10000MΩ min.<br><br>C:Nominal Capacitance :[pF]                        | Rated Voltage:16VDC<br>B<br>Capacitance change :<br>1200pF~22000pF (Item△J)<br>100000pF : Within ±7.5%<br>1000000pF~10000000pF : Within ±10.0%<br>tanδ:<br>1200pF~22000pF (Item△J) : 3.5% max<br>100000pF : 5.0% max<br>1000000pF : 5.0% max<br>2200000pF~4700000pF : 7.5% max<br>10000000pF : 12.5% max<br>Insulation Resistance:<br>1200pF~22000pF (Item△J) : 5000MΩ min<br>100000pF : 1000MΩ min<br>1000000pF : 100MΩ min<br>2200000pF : 50MΩ min<br>4700000pF~10000000pF : 20MΩ min<br><br>Rated Voltage:25VDC<br>B<br>Capacitance change :<br>10000pF : Within ±7.5%<br>10000000pF : Within ±10.0%<br>tanδ:<br>10000pF : 3.5% max<br>10000000pF : 12.5% max<br>Insulation Resistance:<br>10000pF : 5000MΩ min<br>10000000pF : 20MΩ min<br><br>Rated Voltage:35VDC<br>B<br>Capacitance change :<br>tanδ:<br>2200000pF~4700000pF : 7.5% max<br>Insulation Resistance:<br>2200000pF : 50MΩ min<br>4700000pF : 20MΩ min<br><br>Rated Voltage:50VDC<br>B<br>Capacitance change :<br>100pF~39000pF : Within ±7.5%<br>47000pF~1000000pF : Within ±10.0%<br>tanδ:<br>100pF~39000pF : 3.5% max<br>47000pF~1000000pF : 5.0% max<br>Insulation Resistance:<br>100pF~39000pF : 5000MΩ min<br>47000pF~100000pF : 1000MΩ min<br>220000pF : 500MΩ min<br>470000pF : 200MΩ min<br>1000000pF : 100MΩ min               | Rated Voltage:10VDC<br>F<br>Capacitance change : Within ±20.0%<br>tanδ:<br>4700000pF~10000000pF : 17.5% max<br>Insulation Resistance:<br>1000000pF : 50MΩ min<br>10000000pF : 25MΩ min<br><br>Rated Voltage:16VDC<br>F<br>Capacitance change : Within ±20.0%<br>tanδ:<br>100000pF : 10.0% max<br>2200000pF : 15.0% max<br>Insulation Resistance:<br>100000pF : 1000MΩ min<br>2200000pF : 125MΩ min<br><br>Rated Voltage:25VDC<br>F<br>Capacitance change : Within ±20.0%<br>tanδ:<br>10000pF~47000pF (Item△J) : 7.5% max<br>Insulation Resistance:<br>10000pF~47000pF (Item△J) : 1000MΩ min<br><br>Rated Voltage:35VDC<br>F<br>Capacitance change : Within ±20.0%<br>tanδ:<br>10000000pF : 17.5% max<br>Insulation Resistance:<br>10000000pF : 25MΩ min<br><br>Rated Voltage:50VDC<br>F<br>Capacitance change :<br>10000pF~1000000pF : Within ±20.0%<br>tanδ:<br>10000pF~100000pF : 7.5% max<br>2200000pF~4700000pF : 10.0% max<br>10000000pF : 15.0% max<br>Insulation Resistance:<br>10000pF~100000pF : 1000MΩ min<br>220000pF~470000pF : 500MΩ min<br>1000000pF : 250MΩ min |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 15. Resistance to Solvent | No significant abnormality in appearance and legible marking.                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | According to JIS C 5102 clause 8.7.4.<br>Type of test: Method 1<br>Solvent temperature: 20 to 25℃<br>Duration: 30±5 sec.<br>Solvent Type: A in Table 23, Isopropyl alcohol                                                                                                                                                                                                                                                                           |
| 16. Thermal Shock         | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                         | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Conditions for 1 cycle                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                           | Capacitance change :<br>8.2pF or under :Within ±0.5pF<br>10pF or over :Within ±5.0%<br>Q:<br>8.2pF or under<br>Q≥200+10C<br>10pF~30pF<br>Q≥275+2.5C<br>33pF or over:<br>Q≥350<br>Insulation resistance:<br>1000MΩ min.<br><br>C:Nominal Capacitance [pF] | Rated Voltage:16VDC<br>B<br>Capacitance change :<br>1200pF~22000pF (Item△J) : Within ±12.5%<br>100000pF : Within ±15.0%<br>1000000pF~10000000pF : Within ±15.0%<br>tanδ:<br>1200pF~22000pF (Item△J) : 5.0% max<br>100000pF : 7.5% max<br>1000000pF : 7.5% max<br>2200000pF~4700000pF : 10.0% max<br>10000000pF : 15.0% max<br>Insulation Resistance:<br>1200pF~22000pF (Item△J) : 1000MΩ min<br>100000pF : 500MΩ min<br>1000000pF : 50MΩ min<br>2200000pF : 25MΩ min<br>4700000pF~10000000pF : 5MΩ min<br><br>Rated Voltage:25VDC<br>B<br>Capacitance change :<br>10000pF : Within ±12.5%<br>10000000pF : Within ±15.0%<br>tanδ:<br>10000pF : 5.0% max<br>10000000pF : 15.0% max<br>Insulation Resistance:<br>10000pF : 1000MΩ min<br>10000000pF : 5MΩ min<br><br>Rated Voltage:35VDC<br>B<br>Capacitance change :<br>tanδ:<br>2200000pF~4700000pF : 10.0% max<br>Insulation Resistance:<br>2200000pF : 25MΩ min<br>4700000pF : 5MΩ min<br><br>Rated Voltage:50VDC<br>B<br>Capacitance change :<br>100pF~39000pF : Within ±12.5%<br>47000pF~1000000pF : Within ±15.0%<br>tanδ:<br>100pF~39000pF : 5.0% max<br>47000pF~1000000pF : 7.5% max<br>Insulation Resistance:<br>100pF~39000pF : 1000MΩ min<br>47000pF~100000pF : 500MΩ min<br>220000pF : 250MΩ min<br>470000pF : 100MΩ min<br>1000000pF : 50MΩ min | Rated Voltage:10VDC<br>F<br>Capacitance change : Within ±30.0%<br>tanδ:<br>4700000pF~10000000pF : 20.0% max<br>Insulation Resistance:<br>4700000pF : 10MΩ min<br>10000000pF : 5MΩ min<br><br>Rated Voltage:16VDC<br>F<br>Capacitance change : Within ±30.0%<br>tanδ:<br>100000pF : 15.0% max<br>2200000pF : 17.5% max<br>Insulation Resistance:<br>100000pF : 500MΩ min<br>2200000pF : 25MΩ min<br><br>Rated Voltage:25VDC<br>F<br>Capacitance change : Within ±30.0%<br>tanδ:<br>10000pF~47000pF (Item△J) : 12.5% max<br>Insulation Resistance:<br>10000pF~47000pF (Item△J) : 500MΩ min<br><br>Rated Voltage:35VDC<br>F<br>Capacitance change : Within ±30.0%<br>tanδ:<br>10000000pF : 20.0% max<br>Insulation Resistance:<br>10000000pF : 5MΩ min<br><br>Rated Voltage:50VDC<br>F<br>Capacitance change :<br>10000pF~1000000pF : Within ±30%<br>tanδ:<br>10000pF~100000pF : 12.5% max<br>2200000pF~4700000pF : 15.0% max<br>10000000pF : 17.5% max<br>Insulation Resistance:<br>10000pF~100000pF : 500MΩ min<br>220000pF~470000pF : 250MΩ min<br>1000000pF : 50MΩ min        | Number of cycles: 5<br><br>Preconditioning: 1 hr of preconditioning at 150 $\pm_{10}^{\circ}$ ℃<br>followed by 48±4 hrs of recovery<br>under the standard condition.<br><br>Recovery: Recovery for the following period under the<br>standard condition after the removal from<br>test chamber.<br>24±2 hrs (Class 1)<br>48±4 hrs (Class 2)                                                                                                          |

Withstanding voltage is also referred to as "voltage proof" under IEC specifications.

Thermal Shock is also referred to as "rapid change of temperature" under IEC specifications.



## AXIAL LEADED CERAMIC CAPACITORS

| Item                            | Specified Value                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | Temperature Compensating (Class1)                                                                                                                                                                                                                          | High Permittivity (Class2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                                 | Multilayer type                                                                                                                                                                                                                                            | Multilayer type (Characteristics:B)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Multilayer type (Characteristics:F)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 17. Damp Heat<br>(steady state) | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                           | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | emperature: 40±2°C<br><br>Humidity: 90 to 95 % RH<br><br>Duration: 500 <sup>+24</sup> <sub>-0</sub> hrs<br><br>Preconditioning: 1 hr of preconditioning at 150 <sup>+10</sup> <sub>-10</sub> °C<br>followed by 48±4 hrs of recovery under the standard condition.<br><br>Recovery: 24±2 hrs of recovery under the standard condition after the removal from test chamber. (Class 1)<br><br>: 1 hr of preconditioning at 150 <sup>+10</sup> <sub>-0</sub> °C followed by 48±4 hrs of recovery under the standard condition after the removal from chamber. (Class 2)                                       |
|                                 | Capacitance change :<br>8.2pF or under :Within ±0.5pF<br>10pF or over :Within ±5.0%<br>Q:<br>:8.2pF or under<br>:10pF~30pF<br>33pF or over:<br>Q≥200+10C<br>Q≥275+2.5C<br>Q≥350<br>Insulation resistance:<br>1000MΩ min.<br><br>C:Nominal Capacitance [pF] | Rated Voltage:16VDC<br>B<br>Capacitance change :<br>1200pF~2200pF (ItemΔJ) : Within ±12.5%<br>100000pF : Within ±15.0%<br>1000000pF~10000000pF : Within ±15.0%<br>tanδ:<br>1200pF~22000pF (ItemΔJ) : 5.0% max<br>100000pF : 7.5% max<br>1000000pF : 7.5% max<br>2200000pF~4700000pF : 10.0% max<br>10000000pF : 15.0% max<br>Insulation Resistance:<br>1200pF~22000pF (ItemΔJ) : 1000MΩ min<br>100000pF : 500MΩ min<br>1000000pF : 50MΩ min<br>2200000pF : 25MΩ min<br>4700000pF~10000000pF : 5MΩ min<br><br>Rated Voltage:25VDC<br>B<br>Capacitance change:<br>10000pF : Within ±12.5%<br>10000000pF : Within ±15.0%<br>tanδ:<br>10000pF : 5.0% max<br>10000000pF : 15.0% max<br>Insulation Resistance:<br>10000pF : 1000MΩ min<br>10000000pF : 5MΩ min<br><br>Rated Voltage:35VDC<br>B<br>Capacitance change : Within ±15.0%<br>tanδ:<br>2200000pF~4700000pF : 10.0% max<br>Insulation Resistance:<br>2200000pF : 25MΩ min<br>4700000pF : 5MΩ min<br><br>Rated Voltage:50VDC<br>B<br>Capacitance change :<br>100pF~39000pF : Within ±12.5%<br>47000pF~1000000pF : Within ±15.0%<br>tanδ:<br>100pF~39000pF : 5.0% max<br>47000pF~1000000pF : 7.5% max<br>Insulation Resistance:<br>100pF~39000pF : 1000MΩ min<br>47000pF~1000000pF : 500MΩ min<br>2200000pF : 250MΩ min<br>4700000pF : 100MΩ min<br>10000000pF : 50MΩ min                                                                                        | Rated Voltage:10VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>4700000pF~10000000pF : 20.0% max<br>Insulation Resistance:<br>4700000pF : 10MΩ min<br>10000000pF : 5MΩ min<br><br>Rated Voltage:16VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>100000pF : 15.0% max<br>2200000pF : 17.5% max<br>Insulation Resistance:<br>100000pF : 500MΩ min<br>2200000pF : 25MΩ min<br><br>Rated Voltage:25VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>10000pF~47000pF (ItemΔJ) : 12.5% max<br>Insulation Resistance:<br>10000pF~47000pF (ItemΔJ) : 500MΩ min<br><br>Rated Voltage:35VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>10000000pF : 20.0% max<br>Insulation Resistance:<br>10000000pF : 5MΩ min<br><br>Rated Voltage:50VDC<br>F<br>Capacitance change :<br>10000pF~1000000pF : Within ±30%<br>tanδ:<br>10000pF~100000pF : 12.5% max<br>220000pF~470000pF : 15.0% max<br>1000000pF : 17.5% max<br>Insulation Resistance:<br>10000pF~100000pF : 500MΩ min<br>220000pF~470000pF : 250MΩ min<br>1000000pF : 50MΩ min     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 18. Loading under Damp<br>Heat  | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                           | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Temperature: 40±2°C<br><br>Humidity: 90 to 95 % RH<br><br>Duration: 500 <sup>+24</sup> <sub>-0</sub> hrs<br><br>Applied voltage: Rated voltage<br><br>Preconditioning: 1 hr of preconditioning at 150 <sup>+10</sup> <sub>-0</sub> °C<br>followed by 48±4 hrs of recovery under the standard condition.<br><br>Recovery: 24±2 hrs of recovery under the standard condition after the removal from test chamber. (Class 1)<br><br>: 1 hr of preconditioning at 150 <sup>+10</sup> <sub>-0</sub> °C followed by 48±4 hrs of recovery under the standard condition after the removal from chamber. (Class 2) |
|                                 | Capacitance change :<br>8.2pF or under :Within ±0.75pF<br>10pF or over :Within ±7.5%<br>Q:<br>30pF or under:<br>33pF or over:<br>Q≥100+10/3°C<br>Q≥200<br>Insulation resistance:<br>500MΩ min.<br><br>C:Nominal Capacitance [pF]                           | Rated Voltage:16VDC<br>B<br>Capacitance change :<br>1200pF~2200pF (ItemΔJ) : Within ±12.5%<br>100000pF : Within ±15.0%<br>1000000pF~2200000pF : Within ±15.0%<br>4700000pF~10000000pF : Within ±22.5%<br>tanδ:<br>1200pF~22000pF (ItemΔJ) : 5.0% max<br>100000pF : 7.5% max<br>1000000pF : 7.5% max<br>2200000pF~4700000pF : 10.0% max<br>10000000pF : 22.5% max<br>Insulation Resistance:<br>1200pF~22000pF (ItemΔJ) : 500MΩ min<br>100000pF : 250MΩ min<br>1000000pF : 12.5MΩ min<br>2200000pF : 5MΩ min<br>4700000pF~10000000pF : 2.5MΩ min<br><br>Rated Voltage:25VDC<br>B<br>Capacitance change :<br>10000pF : Within ±12.5%<br>10000000pF : Within ±22.5%<br>tanδ:<br>10000pF : 5.0% max<br>10000000pF : 22.5% max<br>Insulation Resistance:<br>10000pF : 500MΩ min<br>10000000pF : 2.5MΩ min<br><br>Rated Voltage:35VDC<br>B<br>Capacitance change :<br>2200000pF : Within ±15.0%<br>4700000pF : Within ±22.5%<br>tanδ:<br>2200000pF~4700000pF : 10.0% max<br>Insulation Resistance:<br>2200000pF : 5MΩ min<br>4700000pF : 2.5MΩ min<br><br>Rated Voltage:50VDC<br>B<br>Capacitance change :<br>100pF~39000pF : Within ±12.5%<br>47000pF~1000000pF : Within ±15.0%<br>tanδ:<br>100pF~39000pF : 5.0% max<br>47000pF~1000000pF : 7.5% max<br>Insulation Resistance:<br>100pF~39000pF : 500MΩ min<br>47000pF~1000000pF : 250MΩ min<br>220000pF : 125MΩ min<br>4700000pF : 25MΩ min<br>10000000pF : 12.5MΩ min | Rated Voltage:10VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>4700000pF~10000000pF : 20.0% max<br>Insulation Resistance:<br>4700000pF : 5MΩ min<br>10000000pF : 2.5MΩ min<br><br>Rated Voltage:16VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>10000pF : 15.0% max<br>2200000pF : 17.5% max<br>Insulation Resistance:<br>10000pF : 250MΩ min<br>2200000pF : 12.5MΩ min<br><br>Rated Voltage:25VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>10000pF~47000pF (ItemΔJ) : 12.5% max<br>Insulation Resistance:<br>10000pF~47000pF (ItemΔJ) : 250MΩ min<br><br>Rated Voltage:35VDC<br>F<br>Capacitance change: Within ±30.0%<br>tanδ:<br>10000000pF : 20.0% max<br>Insulation Resistance:<br>10000000pF : 25MΩ min<br><br>Rated Voltage:50VDC<br>F<br>Capacitance change :<br>10000pF~1000000pF : Within ±30.0%<br>tanδ:<br>10000pF~100000pF : 12.5% max<br>220000pF~470000pF : 15.0% max<br>1000000pF : 17.5% max<br>Insulation Resistance:<br>10000pF~100000pF : 250MΩ min<br>220000pF~470000pF : 125MΩ min<br>1000000pF : 25MΩ min |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

Withstanding voltage is also referred to as "voltage proof" under IEC specifications.



## AXIAL LEADED CERAMIC CAPACITORS

| Item                             | Specified Value                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Test Methods and Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                  | Temterature Compensating (Class1)                                                                                                                                                                                | High Permittivity (Class2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  | Multilayer type                                                                                                                                                                                                  | Multilayer type (Characteristics:B)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Multilayer type (Characteristics:F)                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 19. High Temperature Lading Test | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                 | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Appearance : No significant abnormality<br>Withstanding Voltage : No abnormality                                                                                                                                                                                                                                                                                                                                                                           | Temperature: $85 \pm \begin{smallmatrix} 3 \\ 0 \end{smallmatrix}^{\circ}\text{C}$<br>Duration: $1000 \pm \begin{smallmatrix} 48 \\ 0 \end{smallmatrix}$ hrs<br>Applied voltage: Rated voltage $\times 2$ (Class 1)<br>(Class 2)<br>Rated voltage $\times 1.5$<br>(Class 2: B 220000pF $\sim$ 10000000pF)<br>Preconditioning: 1 hr of preconditioning at $150 \begin{smallmatrix} +10 \\ -10 \end{smallmatrix}^{\circ}\text{C}$<br>followed by 48 $\pm 4$ hrs of recovery<br>under the standard condition.<br>Recovery: 24 $\pm 2$ hrs of recovery under the standard<br>condition after the removal from test cham-<br>ber. (Class1)<br>: 1 hr of preconditioning at $150 \begin{smallmatrix} +10 \\ -0 \end{smallmatrix}^{\circ}\text{C}$ fol-<br>lowed by 48 $\pm 4$ hrs of recovery under the<br>standard condition after the removal from<br>chamber. (Class 2) |
|                                  | Capacitance change :<br>8.2pF or under :Within $\pm 0.3$ pF<br>10pF or over :Within $\pm 3.0\%$<br>Q:<br>:8.2pF or under<br>:10pF 30pF<br>33pF or over:<br>Q $\geq 200+10C$<br>Q $\geq 275+2.5C$<br>Q $\geq 350$ | Rated Voltage:16VDC<br>B<br>Capacitance change :<br>1200pF $\sim$ 22000pF (Item $\Delta$ J) : Within $\pm 12.5\%$<br>100000pF : Within $\pm 15.0\%$<br>1000000pF $\sim$ 2200000pF : Within $\pm 15.0\%$<br>4700000pF $\sim$ 10000000pF : Within $\pm 22.5\%$<br>tan $\delta$ :<br>1200pF $\sim$ 22000pF (Item $\Delta$ J) : 5.0% max<br>100000pF : 7.5% max<br>1000000pF : 7.5% max<br>2200000pF $\sim$ 4700000pF : 10.0% max<br>10000000pF : 22.5% max<br>Insulation Resistance:<br>1200pF $\sim$ 22000pF (Item $\Delta$ J) : 1000M $\Omega$ min<br>100000pF : 500M $\Omega$ min<br>1000000pF : 50M $\Omega$ min<br>2200000pF : 25M $\Omega$ min<br>4700000pF $\sim$ 10000000pF : 5M $\Omega$ min | Rated Voltage:10VDC<br>F<br>Capacitance change : Within $\pm 30.0\%$<br>tan $\delta$ :<br>4700000pF $\sim$ 10000000pF :20.0% max<br>Insulation Resistance:<br>4700000pF :10M $\Omega$ min<br>10000000pF :5M $\Omega$ min                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  | Insulation resistance:<br>1000M $\Omega$ min.                                                                                                                                                                    | Insulation Resistance:<br>1200pF $\sim$ 22000pF (Item $\Delta$ J) : 1000M $\Omega$ min<br>100000pF : 500M $\Omega$ min<br>1000000pF : 50M $\Omega$ min<br>2200000pF : 25M $\Omega$ min<br>4700000pF $\sim$ 10000000pF : 5M $\Omega$ min                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Insulation Resistance:<br>1000000pF :17.5% max<br>100000pF :500M $\Omega$ min<br>2200000pF :25M $\Omega$ min                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  | C:Nominal Capacitance [pF]                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rated Voltage:25VDC<br>F<br>Capacitance change : Within $\pm 30.0\%$<br>tan $\delta$ :<br>10000pF $\sim$ 47000pF (Item $\Delta$ J) : 10.0% max<br>Insulation Resistance:<br>10000pF $\sim$ 47000pF (Item $\Delta$ J) : 500M $\Omega$ min                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rated Voltage:35VDC<br>F<br>Capacitance change : Within $\pm 30.0\%$<br>tan $\delta$ :<br>10000000pF :20.0% max<br>Insulation Resistance:<br>10000000pF :5M $\Omega$ min                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rated Voltage:50VDC<br>F<br>Capacitance change :<br>10000pF $\sim$ 1000000pF :Within $\pm 30.0\%$<br>tan $\delta$ :<br>10000pF $\sim$ 100000pF :10.0% max<br>220000pF $\sim$ 470000pF :12.5% max<br>1000000pF :17.5% max<br>Insulation Resistance:<br>10000pF $\sim$ 100000pF :500M $\Omega$ min<br>220000pF $\sim$ 470000pF :250M $\Omega$ min<br>1000000pF :50M $\Omega$ min                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rated Voltage:35VDC<br>B<br>Capacitance change :<br>2200000pF :Within $\pm 15.0\%$<br>4700000pF :Within $\pm 22.5\%$<br>tan $\delta$ :<br>2200000pF $\sim$ 4700000pF :10.0% max<br>Insulation Resistance:<br>2200000pF :25M $\Omega$ min<br>4700000pF :5M $\Omega$ min                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Rated Voltage:50VDC<br>B<br>Capacitance change :<br>100pF $\sim$ 39000pF :Within $\pm 12.5\%$<br>47000pF $\sim$ 1000000pF :Within $\pm 15.0\%$<br>tan $\delta$ :<br>100pF $\sim$ 39000pF :5.0% max<br>47000pF $\sim$ 1000000pF :7.5% max<br>Insulation Resistance:<br>100pF $\sim$ 39000pF :1000M $\Omega$ min<br>47000pF $\sim$ 1000000pF :500M $\Omega$ min<br>220000pF :250M $\Omega$ min<br>470000pF :100M $\Omega$ min<br>1000000pF :50M $\Omega$ min |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                  |                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

Note on standard condition: "standard condition" referred to herein is defined as follows:

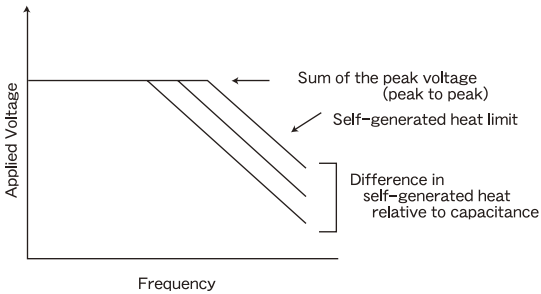
5 to 35°C of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.

When there are questions concerning measurement results:

In order to provide correlation data, the test shall be conducted under condition of  $20 \pm 2^{\circ}\text{C}$  of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."

Withstanding voltage is also referred to as "voltage proof" under IEC specifications.

## Precautions on the use of Axial Leaded Ceramic Capacitors

| Stages                                    | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Circuit Design                         | <p>◆ Verification of operating environment, electrical rating and performance</p> <p>1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications. As such, any capacitors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.</p> <p>◆ Verification of Rated voltage (DC rated voltage)</p> <p>1. The operating voltage for capacitors must always be lower than their rated values.</p> <p>If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages should be lower than the rated value of the capacitor chosen. For a circuit where both an AC and a pulse voltage may be present, the sum of their peak voltages should also be lower than the capacitor's rated voltage.</p> <p>2. Even if the applied voltage is lower than the rated value, the reliability of capacitors might be reduced if either a high frequency AC voltage or a pulse voltage having rapid rise time is present in the circuit.</p> <p>◆ Self-generated heat (Verification of Temperature)</p> <p>1. If the capacitors specified only for DC use are used in AC or pulse circuits, the AC or a pulse current can generate heat inside the capacitor so the self-generated temperature rise should be limited to within 20°C. The surface temperature measured should include this self-temperature rise. Therefore, it is required to limit capacitor surface temperature including self-generated heat should not exceed the maximum operating temperature of +85°C.</p> <p>◆ Operating Environment precautions</p> <p>1. Capacitors should not be used in the following environments:</p> <p>(1) Environmental conditions to avoid</p> <p>a. exposure to water or salt water.</p> <p>b. exposure to moisture or condensation.</p> <p>c. exposure to corrosive gases (such as hydrogen sulfide, sulfurous acid, chlorine, and ammonia)</p> | <p>1-1. When an AC or a pulse voltage is applied to capacitors specified for DC use, even if the voltage is less than the rated voltage, the AC current or pulse current running through the capacitor will cause the capacitor to self-generate heat because of the loss characteristics.</p> <p>The amount of heat generated depends on the dielectric materials used, capacitance, applied voltage, frequency, voltage waveform, etc. The surface temperature changes due to emitted heat which differs by capacitor shape or mounting method.</p> <p>Please contact Taiyo Yuden with any questions regarding emitted heat levels in your particular application. It is recommended the temperature rise be measured in the actual circuit to be used.</p> <p>1-2. For capacitors, the voltage and frequency relationship is generally determined by peak voltage at low frequencies, and by self-generated heat at high frequencies. (Refer to the following curve.)</p>  |
| 2. PCB Design                             | <p>1. When capacitors are mounted onto a PC board, hole dimensions on the board should match the lead pitch of the component, if not it will cause breakage of the terminals or cracking of terminal roots covered with resin as excess stress travels through the terminal legs. As a result, humidity resistance performance would be lost and may lead to a reduction in insulation resistance and cause a withstand voltage failure.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3. Considerations for automatic insertion | <p>◆ Adjustment Automatic Insertion machines (leaded components)</p> <p>1. When inserting capacitors in a PC board by auto-insertion machines the impact load imposed on the capacitors should be minimized to prevent the leads from chucking or clinching.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <p>1. When installing products, care should be taken not to apply distortion stress as it may deform the products.</p> <p>2. Our company recommends the method to place the lead with fewer loads that join the product.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## Precautions on the use of Axiel Leaded Ceramic Capacitors

| Stages                   | Precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Technical considerations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4. Soldering             | <p>◆ Selection of Flux</p> <ol style="list-style-type: none"> <li>When soldering capacitors on the board, flux should be applied thinly and evenly.</li> <li>Flux used should be with less than or equal to 0.1 wt% (equivalent to Choline) of halogenated content. Flux having a strong acidity content should not be applied.</li> <li>When using water-soluble flux, special care should be taken to properly clean the boards.</li> </ol> <p>◆ Wave Soldering</p> <ol style="list-style-type: none"> <li>Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions.</li> <li>Do not immerse the entire capacitor in the flux during the soldering operation. Only solder the lead wires on the bottom of the board.</li> </ol> <p>◆ Recommended conditions for using a soldering iron:</p> <p>Put the soldering iron on the land-pattern.<br/>Soldering iron's temperature - below 350°C<br/>Duration - 3 seconds or less<br/>Numbers of times - 1 times<br/>The soldering iron should not directly touch the capacitor.</p> | <ol style="list-style-type: none"> <li>Flux is used to increase solderability in wave soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.</li> <li>With too much halogenated substance (Chlorine, etc.) content is used to activate the flux, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the capacitors.</li> <li>Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of capacitors in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.</li> </ol> <ol style="list-style-type: none"> <li>If capacitors are used beyond the range of the recommended conditions, heat stresses may cause cracks inside the capacitors, and consequently degrade the reliability of the capacitors.</li> <li>When the capacitors are dipped in solder, some soldered parts of the capacitor may melt due to solder heat and cause short-circuits or cracking of the ceramic material. Deterioration of the resin coating may lower insulation resistance and cause a reduction of withstand voltage.</li> </ol> <ol style="list-style-type: none"> <li>If products are used beyond the range of the recommended conditions, heat stress may deform the products, and consequently degrade the reliability of the products.</li> </ol> |
| 5. Cleaning              | <p>◆ Board cleaning</p> <ol style="list-style-type: none"> <li>When cleaning the mounted PC boards, make sure that cleaning conditions are consistent with prescribed usage conditions.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <ol style="list-style-type: none"> <li>The resin material used for the outer coating of capacitors is occasionally a wax substance for moisture resistance which can easily be dissolved by some solutions. So before cleaning, special care should be taken to test the component's vulnerability to the solutions used.<br/>When using water-soluble flux please clean the PCB with purified water sufficiently and dry thoroughly at the end of the process. Insufficient washing or drying could lower the reliability of the capacitors.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 6. Post-cleaning-process | <p>◆ Application of resin molding, etc. to the PCB and components.</p> <ol style="list-style-type: none"> <li>Please contact your local Taiyo Yuden sales office before performing resin coating or molding on mounted capacitors. Please verify on the actual application that the coating process will not adversely affect the component quality.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ol style="list-style-type: none"> <li>1-1. The thermal expansion and coefficient of contraction of the molded resin are not necessarily matched with those of the capacitor. The capacitors may be exposed to stresses due to thermal expansion and contraction during and after hardening. This may lower the specified characteristics and insulation resistance or cause reduced withstand voltage by cracking the ceramic or separating the coated resin from the ceramics.</li> <li>1-2. With some types of mold resins, the resin's decomposition gas or reaction gas may remain inside the resin during the hardening period or while left under normal conditions, causing a deterioration of the capacitor's performance.</li> <li>1-3. Some mold resins may have poor moisture proofing properties. Please verify the contents of the resins before they are applied.</li> <li>1-4. Please contact Taiyo Yuden before using if the hardening process temperature of the mold resins is higher than the operating temperature of the capacitors.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 7. Handling              | <p>◆ Mechanical considerations</p> <ol style="list-style-type: none"> <li>Be careful not to subject the capacitors to excessive mechanical shocks. Withstanding voltage failure may result.</li> <li>If ceramic capacitors are dropped onto the floor or a hard surface they should not be used.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <ol style="list-style-type: none"> <li>Because the capacitor is made of ceramic, mechanical shocks applied to the board may damage or crack the capacitors.</li> <li>Ceramic capacitors which are dropped onto the floor or a hard surface may develop defects and have a higher risk of failure over time.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 8. Storage conditions    | <p>◆ Storage</p> <ol style="list-style-type: none"> <li>To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible. Recommended conditions: Ambient temperature Below 40 °C Humidity Below 70% RH. Products should be used within 6 months after delivery. After the above period, the solderability should be checked before using the capacitors.</li> <li>Capacitors should not be kept in an environment filled with decomposition gases such as (sulfurous hydrogen, sulfurous acid, chlorine, ammonia, etc.)</li> <li>Capacitors should not be kept in a location where they may be exposed to moisture, condensation or direct sunlight.</li> </ol>                                                                                                                                                                                                                                           | <ol style="list-style-type: none"> <li>Under high temperature/high humidity conditions, the decrease in solderability due to the oxidation of terminal electrodes and deterioration of taping and packaging characteristics may be accelerated.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |