# Notice for TAIYO YUDEN products

Please read this notice before using the TAIYO YUDEN products.

## PREMINDERS

Product information in this catalog is as of October 2014. All of the contents specified herein are subject to change without notice due to technical improvements, etc. Therefore, please check for the latest information carefully before practical application or usage of the Products.

Please note that TAIYO YUDEN CO., LTD. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

- Please contact TAIYO YUDEN CO., LTD. for further details of product specifications as the individual specification is available.
- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,( automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact TAIYO YUDEN CO., LTD. for more detail in advance.

Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

In addition, even electronic components or functional modules that are used for the general electronic equipment, if the equipment or the electric circuit require high safety or reliability function or performances, a sufficient reliability evaluation check for safety shall be performed before commercial shipment and moreover, due consideration to install a protective circuit is strongly recommended at customer's design stage.

- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN's official sales channel").
  - It is only applicable to the products purchased from any of TAIYO YUDEN's official sales channel.
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- Caution for export

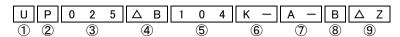
Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

## **AXIAL LEADED CERAMIC CAPACITORS**



WAVE

### ■PARTS NUMBER



①Rated voltage

Code	Rated voltage[VDC]
L	10
E	16
Т	25
G	35
U	50

②Series name

Code	Series name
Р	Axial leaded capacitor

3Dimensions (L ×  $\phi$  D)

ODINICIOSIONS (E)	Spillerisions (Ex 4B)					
Code	Dimensions $(L \times \phi D)$ [mm]					
025	2.3 × 2.0 (Multilayer type)					
050	3.2 × 2.2 (Multilayer type)					
075	4.2 × 3.2 (Multilayer type)					

**4**Temperature characteristics

Code	Temperature Characteristics
CH	0±60(ppm/°C)
SL	+350~-1000(ppm/°C)
ΔΒ	±10%
B5	±15%
ΔF	+30/-85%

Nominal capacitance

Code (example)	Nominal capacitance[pF]			
010	1			
1R2	1.2			
103	10000			

※R=Decimal point

#### **6**Capacitance tolerances

Code	Capacitance tolerances			
D-	±0.5pF			
J—	±5%			
к-	±10%			
M-	±20%			
Z-	+80/-20%			

△=Blank space

①Lead Configurations

Code Lead Configurations				
A-	26mm lead space, ammo pack			
B-	52mm lead space, ammo pack			
KF	5.0mm pitch formed lead bulk			
KE	7.5mm pitch formed lead bulk			
NA	Axial lead, bulk			

8 Packaging

Code	Packaging			
В	Ammo			
С	Bulk			

(9)Internal code

Jinternal code					
Code	Internal Code				
$\Delta\Delta$	Multilana tona (Chandand)				
ΔZ	Multilayer type(Standard)				
ΔJ	Multilayer type (Low voltage type)				

### ■STANDARD EXTERNAL DIMENSIONS / MINIMUM QUANTITY

Туре	L	φD	φ d	Minimum quantity [pcs]			
					Taping		
				NA	KF	KE	A-/B-
Multilayer type 025	2.3max (0.09max)	2.0max (0.079max)	0.45±0.05 (0.018±0.002)	1000	4000	_	5000
Multilayer type 050	3.2max (0.126max)	2.2max (0.087max)	0.45±0.05 (0.018±0.002)	1000	3000	_	3000
Multilayer type 075	4.2max (0.165max)	3.2max (0.126max)	$0.55 \pm 0.05$ (0.022 \pm 0.002)	1000	-	3000	2000

Unit:mm(inch)

	Bulk	Taping			
Straight	For	med	Straight		
NA NA	Fitch: 5.0 (0.197)	Pitch: 7.5 (0.295)	A- 26(1.024)	B- 52(2.047)	
				Unit:mm(inch)	

<sup>▶</sup> This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) .

Parts number	Rated voltage[V]	EHS	Nominal capacitance[pF]	Capacitance tolerance	Q	Insulation resistance [MΩ] (min.)
UP025△010D-[] Z	50	RoHS	1.0	±0.5pF	Q≧400+20C	10,000
UP025△1R2D-[] Z	50	RoHS	1.2	±0.5pF	Q≧400+20C	10,000
UP025△1R5D-[] Z	50	RoHS	1.5	±0.5pF	Q≧400+20C	10,000
UP025△1R8D-[] Z	50	RoHS	1.8	±0.5pF	Q≧400+20C	10,000
UP025△2R2D-[] Z	50	RoHS	2.2	±0.5pF	Q≧400+20C	10,000
UP025△2R7D-[] Z	50	RoHS	2.7	±0.5pF	Q≧400+20C	10,000
UP025△3R3D-[] Z	50	RoHS	3.3	±0.5pF	Q≧400+20C	10,000
UP025△3R9D-[] Z	50	RoHS	3.9	±0.5pF	Q≧400+20C	10,000
UP025△4R7D-[] Z	50	RoHS	4.7	±0.5pF	Q≧400+20C	10,000
UP025△5R6K-[] Z	50	RoHS	5.6	±10%	Q≧400+20C	10,000
UP025△6R8K-[] Z	50	RoHS	6.8	±10%	Q≧400+20C	10,000
UP025△8R2K-[] Z	50	RoHS	8.2	±10%	Q≧400+20C	10,000
UP025△100J-[] Z	50	RoHS	10	±5%	Q≧400+20C	10,000
UP025△120J-[] Z	50	RoHS	12	±5%	Q≧400+20C	10,000
UP025△150J-[] Z	50	RoHS	15	±5%	Q≧400+20C	10,000
UP025△180J-[] Z	50	RoHS	18	±5%	Q≧400+20C	10,000
UP025△220J-[] Z	50	RoHS	22	±5%	Q≧400+20C	10,000
UP025△270J-[] Z	50	RoHS	27	±5%	Q≧400+20C	10,000
UP025△330J-[] Z	50	RoHS	33	±5%	Q≧1000	10,000
UP025△390J-[] Z	50	RoHS	39	±5%	Q≧1000	10,000
UP025△470J-[] Z	50	RoHS	47	±5%	Q≧1000	10,000
UP025△560J-[] Z	50	RoHS	56	±5%	Q≧1000	10,000
UP025△680J-[] Z	50	RoHS	68	±5%	Q≧1000	10,000
UP025△820J-[] Z	50	RoHS	82	±5%	Q≧1000	10,000
UP025CH101J-[] Z	50	RoHS	100	±5%	Q≧1000	10,000
UP025CH151J-[] Z	50	RoHS	150	±5%	Q≧1000	10,000
UP025CH221J-∏ Z	50	RoHS	220	±5%	Q≧1000	10,000
UP025CH331J-□ Z	50	RoHS	330	±5%	Q≧1000	10,000
UP025CH471J-∏ Z	50	RoHS	470	±5%	Q≧1000	10,000
UP025CH681J-□ Z	50	RoHS	680	±5%	Q≧1000	10,000
UP025CH102J-[] Z	50	R <sub>0</sub> HS	1 000	±5%	Q≧1000	10.000

Multilayer 025 type Class 2

PD025 BISINF-   2	Parts number	Rated voltage[V]	EHS	Nominal capacitance[pF]	Capacitance tolerance	$ an\delta$	Insulation resistance [MΩ] (min.)
UP025 BISINC   Z	UP025 B101K-[] Z	50	RoHS	100	±10%	$\tan\delta \leq 3.5\%$	5,000
UPD25 B21K-∏ Z   50   RoHS   180   ±10%   tan 0 ≤3.5%   5.000	UP025 B121K-[] Z	50	RoHS	120	±10%	$\tan\delta \leq 3.5\%$	5,000
UPD25 B221K-   2   50	UP025 B151K-[] Z	50	RoHS	150	±10%	$\tan\delta \le 3.5\%$	5,000
UPD25 B271K-∏   2   50	UP025 B181K-[] Z	50	RoHS	180	±10%	$\tan\delta \le 3.5\%$	5,000
UPD25 B331K-   Z   50	UP025 B221K-[] Z	50	RoHS	220	±10%	$\tan\delta \leq 3.5\%$	5,000
UPD25 B391K-□ Z   50   RoHS   330   ±10%   tan δ ≤3.5%   5.000     UPD25 B561K-□ Z   50   RoHS   470   ±10%   tan δ ≤3.5%   5.000     UPD25 B561K-□ Z   50   RoHS   680   ±10%   tan δ ≤3.5%   5.000     UPD25 B561K-□ Z   50   RoHS   680   ±10%   tan δ ≤3.5%   5.000     UPD25 B25K-□ Z   50   RoHS   680   ±10%   tan δ ≤3.5%   5.000     UPD25 B25K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B25K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B12K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B12K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B12K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B12K-□ Z   50   RoHS   1.500   ±10%   tan δ ≤3.5%   5.000     UPD25 B12K-□ Z   50   RoHS   1.500   ±10%   tan δ ≤3.5%   5.000     UPD25 B25K-□ Z   50   RoHS   3.300   ±10%   tan δ ≤3.5%   5.000     UPD25 B25K-□ Z   50   RoHS   4.700   ±10%   tan δ ≤3.5%   5.000     UPD25 B25K-□ Z   50   RoHS   4.700   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B22K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%   5.000     UPD25 B105K-□ Z   50   ROHS   10.000   ±10%   tan δ ≤3.5%	UP025 B271K-[] Z	50	RoHS	270	±10%	$\tan\delta \leq 3.5\%$	5,000
UP025 B851K-   Z   50	UP025 B331K-[] Z	50	RoHS	330	±10%	$\tan\delta \leq 3.5\%$	5,000
UP025 B861K-□ Z   50   RoHS   560   ±10%   tan δ ≤3.5%   5.000     UP025 B881K-□ Z   50   RoHS   680   ±10%   tan δ ≤3.5%   5.000     UP025 B821K-□ Z   50   RoHS   820   ±10%   tan δ ≤3.5%   5.000     UP025 B102K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UP025 B102K-□ Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UP025 B12K-□ Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UP025 B12K-□ Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UP025 B12K-□ Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UP025 B12K-□ Z   50   RoHS   1.500   ±10%   tan δ ≤3.5%   5.000     UP025 B12K-□ Z   50   RoHS   1.500   ±10%   tan δ ≤3.5%   5.000     UP025 B12K-□ Z   50   RoHS   3.300   ±10%   tan δ ≤3.5%   5.000     UP025 B13K-□ Z   50   RoHS   3.300   ±10%   tan δ ≤3.5%   5.000     UP025 B13K-□ Z   50   RoHS   3.300   ±10%   tan δ ≤3.5%   5.000     UP025 B103K-□ Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UP025 B103K-□ Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UP025 B103K-□ Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UP025 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UP025 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UP025 B103K-□ Z   50   RoHS   10.000   ±10%   tan δ ≤3.5%   5.000     UP025 B13K-□ Z   50   RoHS   22.000   ±10%   tan δ ≤3.5%   5.000     UP025 B13K-□ Z   50   RoHS   20.000   ±10%   tan δ ≤3.5%   5.000     UP025 B13K-□ Z   50   RoHS   20.000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   RoHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   RoHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   ROHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   ROHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   ROHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   ROHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   ROHS   10.0000   ±10%   tan δ ≤3.5%   5.000     UP025 B104K-□ Z   50   ROHS   10.0000	UP025 B391K-[] Z	50	RoHS	390	±10%	tan δ ≦3.5%	5,000
UPO25 B831K-   Z   50   RoHS   680   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   820   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   1.000   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   1.200   ±10%   tan δ ≤3.5%   5.000     UPO25 B2ZK-   Z   50   RoHS   2.200   ±10%   tan δ ≤3.5%   5.000     UPO25 B32XK-   Z   50   RoHS   3.300   ±10%   tan δ ≤3.5%   5.000     UPO25 B47ZK-   Z   50   RoHS   4.700   ±10%   tan δ ≤3.5%   5.000     UPO25 B47ZK-   Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   6.800   ±10%   tan δ ≤3.5%   5.000     UPO25 B10ZK-   Z   50   RoHS   15.000   ±10%   tan δ ≤3.5%   5.000     UPO25 B2ZK-   Z   50   RoHS   15.000   ±10%   tan δ ≤3.5%   5.000     UPO25 B2ZK-   Z   50   RoHS   33.000   ±10%   tan δ ≤3.5%   5.000     UPO25 B2ZK-   Z   50   ROHS   33.000   ±10%   tan δ ≤3.5%   5.000     UPO25 B2ZK-   Z   50   ROHS   33.000   ±10%   tan δ ≤3.5%   5.000     UPO25 B2ZK-   Z   50   ROHS   47.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZK-   Z   50   ROHS   40.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZK-   Z   50   ROHS   40.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZK-   Z   50   ROHS   40.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZK-   Z   50   ROHS   40.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZK-   Z   50   ROHS   40.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZK-   Z   50   ROHS   40.000   ±10%   tan δ ≤5.0%   1.000     UPO25 B2ZX-   Z   50   ROHS   40.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000   ±0.000	UP025 B471K-∏ Z	50	RoHS	470	±10%	tan δ ≦3.5%	5,000
UP025 BB21K-□ Z   50	UP025 B561K-□ Z	50	RoHS	560	±10%	tan δ ≦3.5%	5,000
UP025 B102K-□ Z   50	UP025 B681K-□ Z	50	RoHS	680	±10%	tan δ ≦3.5%	5,000
UPO25 B122K-□ Z   50	UP025 B821K-[] Z	50	RoHS	820	±10%	$\tan\delta \leq 3.5\%$	5,000
UPD25 B152K-□ Z   50	UP025 B102K-□ Z	50	RoHS	1 000	±10%	$\tan\delta \leq 3.5\%$	5,000
UPD25 B322K-□ Z   50	UP025 B122K-[] Z	50	RoHS	1 200	±10%	$\tan\delta \leq 3.5\%$	5,000
UPU25 B322K-□ Z   50	UP025 B152K-□ Z	50	RoHS	1 500	±10%	$\tan\delta \leq 3.5\%$	5,000
UP025 B472K-   Z   50	UP025 B222K-□ Z	50	RoHS	2 200	±10%		5,000
UP025 B682K-□ Z         50         RoHS         6 800         ±10%         tan δ ≤3.5%         5,000           UP025 B103K-□ Z         50         RoHS         10 000         ±10%         tan δ ≤3.5%         5,000           UP025 B153K-□ Z         50         RoHS         15 000         ±10%         tan δ ≤3.5%         5,000           UP025 B23K-□ Z         50         RoHS         22 000         ±10%         tan δ ≤3.5%         5,000           UP025 B33K-□ Z         50         RoHS         33 000         ±10%         tan δ ≤3.5%         5,000           UP025 B33K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤5.5%         5,000           UP025 B63K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤5.0%         1,000           UP025 B63K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           UP025 B210K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤5.0%         20           EP025 B10K-□ Z         16         RoHS         1000 000         ±10% <td>UP025 B332K-□ Z</td> <td>50</td> <td>RoHS</td> <td>3 300</td> <td>±10%</td> <td><math>\tan\delta \leq 3.5\%</math></td> <td>5,000</td>	UP025 B332K-□ Z	50	RoHS	3 300	±10%	$\tan\delta \leq 3.5\%$	5,000
UP025 B103K-□ Z         50         RoHS         10 000         ±10%         tan δ ≤ 3.5%         5,000           UP025 B153K-□ Z         50         RoHS         15 000         ±10%         tan δ ≤ 3.5%         5,000           UP025 B23K-□ Z         50         RoHS         22 000         ±10%         tan δ ≤ 3.5%         5,000           UP025 B333K-□ Z         50         RoHS         33 000         ±10%         tan δ ≤ 3.5%         5,000           UP025 B833K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B838K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B838K-□ Z         50         RoHS         40 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤ 5.0%         1,000           EP025 B224K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤ 5.0%         5.00           EP025 B105K-□ Z         16         RoHS         1 000 000         ±10%         tan δ ≤ 12.5%         100           UP025 F103Z-□ Z         16         RoHS         1 000 000	UP025 B472K-□ Z	50	RoHS	4 700	±10%	$\tan\delta \leq 3.5\%$	5,000
UP025 B153K-□ Z         50         RoHS         15 000         ±10%         tan δ ≤3.5%         5,000           UP025 B22K-□ Z         50         RoHS         22 000         ±10%         tan δ ≤3.5%         5,000           UP025 B333K-□ Z         50         RoHS         33 000         ±10%         tan δ ≤3.5%         5,000           UP025 B473K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤5.0%         1,000           UP025 B683K-□ Z         50         RoHS         68 000         ±10%         tan δ ≤5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           EP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           EP025 B474K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤5.0%         500           EP025 B105K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤5.0%         200           EP025 B105K-□ Z         16         RoHS         1000 000         ±10%         tan δ ≤12.5%         100           UP025 F103Z-□ Z         16         RoHS         1000 000	UP025 B682K-□ Z	50	RoHS	6 800	±10%	$\tan\delta \leq 3.5\%$	5,000
UP025 B223K-□ Z         50         RoHS         22 000         ±10%         tan δ ≤3.5%         5,000           UP025 B333K-□ Z         50         RoHS         33 000         ±10%         tan δ ≤3.5%         5,000           UP025 B478K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤5.0%         1,000           UP025 B683K-□ Z         50         RoHS         68 000         ±10%         tan δ ≤5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           UP025 B224K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤5.0%         500           EP025 B224K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤5.0%         500           EP025 B2474K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤5.0%         500           EP025 B105K-□ Z         16         RoHS         1000         ±10%         tan δ ≤12.5%         100           UP025 F103Z-□ Z         16         RoHS         1000 000         ±10%         tan δ ≤12.5%         100           UP025 F103Z-□ Z         50         RoHS         1000 000         ±80	UP025 B103K-□ Z	50	RoHS	10 000	±10%	$\tan \delta \leq 3.5\%$	5,000
UP025 B333K-□ Z         50         RoHS         33 000         ±10%         tan δ ≤ 5.0%         5.000           UP025 B473K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B683K-□ Z         50         RoHS         68 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤ 5.0%         1,000           EP025 B104K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤ 5.0%         500           EP025 B105K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤ 5.0%         500           EP025 B105K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤ 5.0%         200           EP025 B105K-□ Z         16         RoHS         1 000 000         ±10%         tan δ ≤ 7.5%         100           UP025 F103Z-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤ 7.5%         100           UP025 F103Z-□ Z         50         RoHS         1 000 000         ±80/-20%         tan δ ≤ 7.5%         1,000           UP025 F123Z-□ Z         50         RoHS         10 000 </td <td>UP025 B153K-□ Z</td> <td>50</td> <td>RoHS</td> <td>15 000</td> <td>±10%</td> <td><math>\tan \delta \leq 3.5\%</math></td> <td>5,000</td>	UP025 B153K-□ Z	50	RoHS	15 000	±10%	$\tan \delta \leq 3.5\%$	5,000
UP025 B333K-□ Z         50         RoHS         33 000         ±10%         tan δ ≤ 3.5%         5.000           UP025 B473K-□ Z         50         RoHS         47 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B683K-□ Z         50         RoHS         68 000         ±10%         tan δ ≤ 5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤ 5.0%         1,000           EP025 B224K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤ 5.0%         500           EP025 B105K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤ 5.0%         500           EP025 B105K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤ 5.0%         200           EP025 B105K-□ Z         16         RoHS         1 000 000         ±10%         tan δ ≤ 7.5%         100           UP025 F103Z-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤ 7.5%         100           UP025 F103Z-□ Z         50         RoHS         1 000 000         ±80/-20%         tan δ ≤ 7.5%         1,000           UP025 F123Z-□ Z         50         RoHS         47 000 </td <td>UP025 B223K-∏ Z</td> <td>50</td> <td>RoHS</td> <td>22 000</td> <td>±10%</td> <td><math>\tan \delta \leq 3.5\%</math></td> <td>5.000</td>	UP025 B223K-∏ Z	50	RoHS	22 000	±10%	$\tan \delta \leq 3.5\%$	5.000
UP025 B683K-□ Z         50         RoHS         68 000         ±10%         tan δ ≤5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           EP025 B224K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤5.0%         500           EP025 B474K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤5.0%         200           EP025 B105K-□ Z         16         RoHS         1 000 000         ±10%         tan δ ≤7.5%         100           UP025 B105K-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤1.5%         100           UP025 F103Z-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤7.5%         100           UP025 F103Z-□ Z         50         RoHS         10 000         ±80/-20%         tan δ ≤7.5%         1,000           UP025 F103Z-□ Z         50         RoHS         20 000         ±80/-20%         tan δ ≤7.5%         1,000           UP025 F473Z-□ Z         50         RoHS         47 000         ±80/-20%         tan δ ≤7.5%         1,000           UP025 F104Z-□ Z         50         RoHS         470 000	UP025 B333K-∏ Z	50	RoHS	33 000	±10%		5.000
UP025 B683K-□ Z         50         RoHS         68 000         ±10%         tan δ ≤5.0%         1,000           UP025 B104K-□ Z         50         RoHS         100 000         ±10%         tan δ ≤5.0%         1,000           EP025 B224K-□ Z         16         RoHS         220 000         ±10%         tan δ ≤5.0%         500           EP025 B474K-□ Z         16         RoHS         470 000         ±10%         tan δ ≤5.0%         200           EP025 B105K-□ Z         16         RoHS         1 000 000         ±10%         tan δ ≤7.5%         100           UP025 B105K-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤1.5%         100           UP025 F103Z-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤7.5%         100           UP025 F103Z-□ Z         50         RoHS         10 000         ±80/-20%         tan δ ≤7.5%         1,000           UP025 F103Z-□ Z         50         RoHS         20 000         ±80/-20%         tan δ ≤7.5%         1,000           UP025 F473Z-□ Z         50         RoHS         47 000         ±80/-20%         tan δ ≤7.5%         1,000           UP025 F104Z-□ Z         50         RoHS         470 000	UP025 B473K-∏ Z	50	RoHS	47 000	±10%	$\tan \delta \leq 5.0\%$	1,000
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		50		68 000			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	UP025 B104K-∏ Z	50	RoHS	100 000	±10%	$\tan \delta \leq 5.0\%$	1,000
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		16	RoHS				500
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	EP025 B474K-□ Z	16	RoHS	470 000	±10%		200
UP025B5105K-□ Z         50         RoHS         1 000 000         ±10%         tan δ ≤12.5%         100           UP025 F103Z-□ Z         50         RoHS         10 000         +80/-20%         tan δ ≤7.5%         1,000           UP025 F23Z-□ Z         50         RoHS         22 000         +80/-20%         tan δ ≤7.5%         1,000           UP025 F23Z-□ Z         50         RoHS         47 000         +80/-20%         tan δ ≤7.5%         1,000           UP025 F104Z-□ Z         50         RoHS         100 000         +80/-20%         tan δ ≤7.5%         1,000           EP025 F224Z-□ Z         16         RoHS         220 000         +80/-20%         tan δ ≤10.0%         500           EP025 F224Z-□ Z         16         RoHS         220 000         +80/-20%         tan δ ≤10.0%         500           EP025 F24Z-□ Z         16         RoHS         220 000         +80/-20%         tan δ ≤10.0%         500           EP025 F105Z-□ Z         16         RoHS         1 000 000         +80/-20%         tan δ ≤17.5%         250           EP025 B122M-□ J         16         RoHS         1 200         ±20%         tan δ ≤17.5%         250           EP025 B152M-□ J         16         RoHS		16	RoHS	1 000 000			100
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	UP025B5105K-∏ Z	50	RoHS	1 000 000	±10%		100
UP025 F473Z-□ Z         50         RoHS         47 000 $+80/-20\%$ $\tan \delta \le 7.5\%$ 1,000           UP025 F104Z-□ Z         50         RoHS         100 000 $+80/-20\%$ $\tan \delta \le 7.5\%$ 1,000           EP025 F224Z-□ Z         16         RoHS         220 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F2474Z-□ Z         16         RoHS         470 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F105Z-□ Z         16         RoHS         1 000 000 $+80/-20\%$ $\tan \delta \le 17.5\%$ 250           EP025 B122M-□ J         16         RoHS         1 200 $\pm 20\%$ $\tan \delta \le 17.5\%$ 5,000           EP025 B152M-□ J         16         RoHS         1 500 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B152M-□ J         16         RoHS         1 800 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B222M-□ J         16         RoHS         2 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B322M-□ J         16         RoHS         2 700 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B332M-□ J         16	UP025 F103Z-□ Z	50	RoHS	10 000	+80/-20%	$\tan \delta \leq 7.5\%$	1,000
UP025 F104Z-□ Z         50         RoHS         100 000 $+80/-20\%$ $\tan \delta \le 7.5\%$ 1,000           EP025 F224Z-□ Z         16         RoHS         220 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F474Z-□ Z         16         RoHS         470 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F105Z-□ Z         16         RoHS         1 000 000 $+80/-20\%$ $\tan \delta \le 17.5\%$ 250           EP025 B122M-□ J         16         RoHS         1 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B152M-□ J         16         RoHS         1 500 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B182M-□ J         16         RoHS         1 800 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B222M-□ J         16         RoHS         2 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B272M-□ J         16         RoHS         2 700 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B332M-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B392M-□ J         16 <t< td=""><td>UP025 F223Z-□ Z</td><td>50</td><td>RoHS</td><td>22 000</td><td>+80/-20%</td><td><math>\tan \delta \leq 7.5\%</math></td><td>1,000</td></t<>	UP025 F223Z-□ Z	50	RoHS	22 000	+80/-20%	$\tan \delta \leq 7.5\%$	1,000
UP025 F104Z-□ Z         50         RoHS         100 000 $+80/-20\%$ $\tan \delta \le 7.5\%$ 1,000           EP025 F224Z-□ Z         16         RoHS         220 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F474Z-□ Z         16         RoHS         470 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F105Z-□ Z         16         RoHS         1 000 000 $+80/-20\%$ $\tan \delta \le 17.5\%$ 250           EP025 B122M-□ J         16         RoHS         1 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B152M-□ J         16         RoHS         1 500 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B182M-□ J         16         RoHS         1 800 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B222M-□ J         16         RoHS         2 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B272M-□ J         16         RoHS         2 700 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B332M-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B392M-□ J         16 <t< td=""><td>UP025 F473Z-∏ Z</td><td>50</td><td>RoHS</td><td>47 000</td><td>+80/-20%</td><td><math>\tan \delta \le 7.5\%</math></td><td>1,000</td></t<>	UP025 F473Z-∏ Z	50	RoHS	47 000	+80/-20%	$\tan \delta \le 7.5\%$	1,000
EP025 F224Z-□ Z         16         RoHS         220 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F474Z-□ Z         16         RoHS         470 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F105Z-□ Z         16         RoHS         1 000 000 $+80/-20\%$ $\tan \delta \le 17.5\%$ 250           EP025 B12ZM-□ J         16         RoHS         1 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B15ZM-□ J         16         RoHS         1 500 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B18ZM-□ J         16         RoHS         1 800 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B22ZM-□ J         16         RoHS         2 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B27ZM-□ J         16         RoHS         2 700 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B33ZM-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B39ZM-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B39ZM-□ J         16         RoH		50		100 000			1,000
EP025 F474Z-□ Z         16         RoHS         470 000 $+80/-20\%$ $\tan \delta \le 10.0\%$ 500           EP025 F105Z-□ Z         16         RoHS         1 000 000 $+80/-20\%$ $\tan \delta \le 17.5\%$ 250           EP025 B122M-□ J         16         RoHS         1 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B152M-□ J         16         RoHS         1 500 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B182M-□ J         16         RoHS         1 800 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B222M-□ J         16         RoHS         2 200 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B272M-□ J         16         RoHS         2 700 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B332M-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B392M-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B392M-□ J         16         RoHS         3 300 $\pm 20\%$ $\tan \delta \le 3.5\%$ 5,000           EP025 B392M-□ J         16         RoHS <td>EP025 F224Z-∏ Z</td> <td>16</td> <td>RoHS</td> <td>220 000</td> <td>+80/-20%</td> <td></td> <td>500</td>	EP025 F224Z-∏ Z	16	RoHS	220 000	+80/-20%		500
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		16		470 000			500
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		16	RoHS	1 000 000	+80/-20%		250
		16		1 200			
	EP025 B152M-∏ J	16	RoHS	1 500	±20%		5.000
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$							,
EP025 B332M−□ J         16         RoHS         3 300         ±20%         tan δ ≤3.5%         5,000           EP025 B392M−□ J         16         RoHS         3 900         ±20%         tan δ ≤3.5%         5,000							,
EP025 B392M-□ J 16 RoHS 3 900 ±20% $\tan \delta \le 3.5\%$ 5,000							,
							,
	EP025 B472M-[] J	16	RoHS	4 700	±20%	$\tan \delta \leq 3.5\%$	5.000
EP025 B562M−□ J 16 RoHS 5 600 ±20% tan δ ≤ 3.5% 5,000							, , , , , , , , , , , , , , , , , , ,
EP025 B682M-□ J 16 RoHS 6 800 ±20% tan δ ≤ 3.5% 5,000							
EP025 B822M-□ J 16 RoHS 8 200 ±20% tan δ ≤ 3.5% 5,000							·

<sup>•</sup> Please specify the lead configuration code.

<sup>• ● ☐</sup> Temperature characteristics has CH and SL.

<sup>▶</sup> This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) .

Parts number	Rated voltage[V]	EHS	Nominal capacitance[pF]	Capacitance tolerance	$ an\delta$	Insulation resistance $[M\Omega]$ (min.)
EP025 B103M-□ J	16	R₀HS	10 000	±20%	$\tan \delta \leq 3.5\%$	5,000
EP025 B123M-□ J	16	R₀HS	12 000	±20%	$\tan \delta \leq 3.5\%$	5,000
EP025 B153M-[] J	16	RoHS	15 000	±20%	$\tan\delta \leq 3.5\%$	5,000
EP025 B183M-□ J	16	RoHS	18 000	±20%	tan δ ≦3.5%	5,000
EP025 B223M-□ J	16	RoHS	22 000	±20%	tan δ ≦3.5%	5,000
TP025 F103Z-[] J	25	RoHS	10 000	+80/-20%	$\tan\delta \le 7.5\%$	1,000
TP025 F223Z-[] J	25	RoHS	22 000	+80/-20%	$\tan \delta \leq 7.5\%$	1,000
TP025 F473Z-[] J	25	RoHS	47 000	+80/-20%	$\tan\delta \le 7.5\%$	1,000

<sup>•</sup> Please specify the lead configuration code.

Multilayer 050 type Class 1

Parts number		Rated voltage[V]	EHS	Nominal capacitance[pF]	Capacitance tolerance	Q	Insulation resistance [MΩ] (min.)
UP050CH220J-[] Z		50	RoHS	22	±5%	Q≧400+20C	10,000
UP050CH240J-[] Z	*	50	RoHS	24	±5%	Q≧400+20C	10,000
UP050CH270J-[] Z		50	RoHS	27	±5%	Q≧400+20C	10,000
UP050CH300J-[] Z	*	50	RoHS	30	±5%	Q≧1000	10,000
UP050CH330J-[] Z		50	RoHS	33	±5%	Q≧1000	10,000
UP050CH360J-[] Z	*	50	RoHS	36	±5%	Q≧1000	10,000
UP050CH390J-[] Z		50	RoHS	39	±5%	Q≧1000	10,000
UP050CH430J-[] Z	*	50	RoHS	43	±5%	Q≧1000	10,000
UP050CH470J-[] Z		50	RoHS	47	±5%	Q≧1000	10,000
UP050CH510J-[] Z	*	50	RoHS	51	±5%	Q≧1000	10,000
UP050CH560J-□ Z		50	R₀HS	56	±5%	Q≧1000	10,000
UP050CH620J-∏ Z	*	50	RoHS	62	±5%	Q≧1000	10,000
UP050CH680J-[] Z		50	RoHS	68	±5%	Q≧1000	10,000
UP050CH750J-[] Z	*	50	RoHS	75	±5%	Q≧1000	10,000
UP050CH820J-[] Z	*	50	RoHS	82	±5%	Q≧1000	10,000
UP050CH910J-[] Z	*	50	RoHS	91	±5%	Q≧1000	10,000
UP050CH101J-[] Z		50	RoHS	100	±5%	Q≧1000	10,000
UP050CH111J-[] Z	*	50	RoHS	110	±5%	Q≧1000	10,000
UP050CH121J-[] Z	*	50	RoHS	120	±5%	Q≧1000	10,000
UP050CH131J-[] Z	*	50	RoHS	130	±5%	Q≧1000	10,000
UP050CH151J-[] Z		50	RoHS	150	±5%	Q≧1000	10,000
UP050CH161J-[] Z	*	50	RoHS	160	±5%	Q≧1000	10,000
UP050CH181J-[] Z	*	50	RoHS	180	±5%	Q≧1000	10,000
UP050CH201J-[] Z	*	50	RoHS	200	±5%	Q≧1000	10,000
UP050CH221J-[] Z		50	RoHS	220	±5%	Q≧1000	10,000
UP050CH241J-[] Z	*	50	RoHS	240	±5%	Q≧1000	10,000
UP050CH271J-[] Z	*	50	RoHS	270	±5%	Q≧1000	10,000
UP050CH301J-[] Z	*	50	RoHS	300	±5%	Q≧1000	10,000
UP050CH331J-[] Z		50	RoHS	330	±5%	Q≧1000	10,000
UP050CH361J-[] Z	*	50	RoHS	360	±5%	Q≧1000	10,000
UP050CH391J-[] Z	*	50	RoHS	390	±5%	Q≧1000	10,000
UP050CH431J-[] Z	*	50	RoHS	430	±5%	Q≧1000	10,000
UP050CH471J-[] Z		50	RoHS	470	±5%	Q≧1000	10,000
UP050CH511J-[] Z	*	50	RoHS	510	±5%	Q≧1000	10,000
UP050CH561J-[] Z	*	50	RoHS	560	±5%	Q≧1000	10,000
UP050CH621J-[] Z	*	50	RoHS	620	±5%	Q≧1000	10,000
UP050CH681J-[] Z		50	R₀HS	680	±5%	Q≧1000	10,000
UP050CH751J-[] Z	*	50	R₀HS	750	±5%	Q≧1000	10,000
UP050CH821J-[] Z	*	50	R₀HS	820	±5%	Q≧1000	10,000
UP050CH911J-[] Z	*	50	R₀HS	910	±5%	Q≧1000	10,000
UP050CH102J-[] Z		50	RoHS	1 000	±5%	Q≧1000	10,000

<sup>•</sup> Please specify the lead configuration code.

★: Option

<sup>▶</sup> This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) .

Parts number	Rated voltage[V]	EHS	Nominal capacitance[pF]	Capacitance tolerance	$ an\delta$	Insulation resistance [MΩ] (min.)
UP050 B122K-[] Z	₹ 50	RoHS	1 200	±10%	tan δ ≦3.5%	5,000
UP050 B152K-[] Z	50	RoHS	1 500	±10%	$tan \delta \leq 3.5\%$	5,000
UP050 B182K-[] Z	₹ 50	RoHS	1 800	±10%	$tan \delta \leq 3.5\%$	5,000
UP050 B222K-[] Z	50	RoHS	2 200	±10%	$tan \delta \leq 3.5\%$	5,000
UP050 B272K-[] Z	₹ 50	RoHS	2 700	±10%	tan δ ≦3.5%	5,000
JP050 B332K-[] Z	50	RoHS	3 300	±10%	$tan \delta \leq 3.5\%$	5,000
JP050 B392K-[] Z	₹ 50	RoHS	3 900	±10%	$tan \delta \leq 3.5\%$	5,000
JP050 B472K-[] Z	50	RoHS	4 700	±10%	$\tan\delta \leq 3.5\%$	5,000
JP050 B562K-[] Z	₹ 50	RoHS	5 600	±10%	$tan \delta \leq 3.5\%$	5,000
JP050 B682K-∏ Z	50	RoHS	6 800	±10%	$\tan\delta \leq 3.5\%$	5,000
JP050 B822K-[] Z	<b>t</b> 50	RoHS	8 200	±10%	$ an\delta \leqq 3.5\%$	5,000
JP050 B103K-[] Z	50	RoHS	10 000	±10%	$ an\delta \leqq 3.5\%$	5,000
UP050 B123K-[] Z	₹ 50	RoHS	12 000	±10%	$\tan\delta \leq 3.5\%$	5,000
UP050 B153K-∏ Z	50	RoHS	15 000	±10%	$tan \delta \leq 3.5\%$	5,000
UP050 B183K-[] Z	₹ 50	RoHS	18 000	±10%	$\tan\delta \leq 3.5\%$	5,000
JP050 B223K-[] Z	50	R <sub>0</sub> HS	2 2000	±10%	tan δ ≦3.5%	5,000
JP050 B273K-[] Z	₹ 50	R <sub>0</sub> HS	27 000	±10%	$\tan\delta \leq 3.5\%$	5,000
JP050 B333K-[] Z	50	R <sub>0</sub> HS	33 000	±10%	$\tan\delta \leq 3.5\%$	5,000
UP050 B393K-[] Z	₹ 50	R <sub>0</sub> HS	39 000	±10%	$\tan\delta \leq 3.5\%$	5,000
UP050 B473K-[] Z	50	R <sub>0</sub> HS	47 000	±10%	$\tan\delta \le 5.0\%$	1,000
UP050 B563K-[] Z	₹ 50	R <sub>0</sub> HS	56 000	±10%	$\tan\delta \le 5.0\%$	1,000
JP050 B683K-[] Z	50	RoHS	68 000	±10%	$ an\delta \leqq 5.0\%$	1,000
UP050 B823K-[] Z	<b>★</b> 50	RoHS	82 000	±10%	$ an\delta \leqq 5.0\%$	1,000
UP050 B104K-[] Z	50	RoHS	100 000	±10%	$ an\delta \leqq 5.0\%$	1,000
UP050 B224K-[] Z	50	RoHS	220 000	±10%	tan δ ≦5.0%	500
JP050 B474K-[] Z	50	RoHS	470 000	±10%	tan δ ≦5.0%	200
GP050 B105K-[] Z	35	RoHS	1 000 000	±10%	tan δ ≦5.0%	100
EP050 B225K-∏ Z	16	RoHS	2 200 000	±10%	$tan \delta \leq 7.5\%$	50
P050 B475K-∏ Z	16	RoHS	4 700 000	±10%	$\tan\delta \leq 12.5\%$	20
EP050 B106K-∏ Z	16	RoHS	10 000 000	±10%	$\tan\delta \leq 12.5\%$	20
JP050 F103Z-[] Z	50	RoHS	10 000	+80/-20%	tan δ ≦7.5%	1,000
JP050 F223Z-[] Z	50	RoHS	22 000	+80/-20%	tan δ ≦7.5%	1,000
JP050 F473Z-[] Z	50	RoHS	47 000	+80/-20%	tan δ ≦7.5%	1,000
JP050 F104Z-[] Z	50	RoHS	100 000	+80/-20%	tan δ ≦7.5%	1,000
JP050 F224Z-[] Z	50	RoHS	220 000	+80/-20%	tan δ ≦10.0%	500
UP050 F474Z-[] Z	50	RoHS	470 000	+80/-20%	$ an\delta \leqq 10.0\%$	500
UP050 F105Z-[] Z	50	RoHS	1 000 000	+80/-20%	tan δ ≦15.0%	250
EP050 F225Z-[] Z	16	RoHS	2 200 000	+80/-20%	tan δ ≦15.0%	125
_P050 F475Z-[] Z	10	RoHS	4 700 000	+80/-20%	tan δ ≦17.5%	50
_P050 F106Z-[] Z	10	RoHS	10 000 000	+80/-20%	tan δ ≦17.5%	25

<sup>• ☐</sup> Please specify the lead configuration code.

Multilayer 075 type Class 2

Widicilayer 070 type Olass 2						
Parts number	Rated voltage[V]	EHS	Nominal capacitance[pF]	Capacitance tolerance	$ an\delta$	Insulation resistance [ΜΩ] (min.)
UP075 B105K-[]	50	RoHS	1 000 000	±10%	$\tan\delta \le 5.0\%$	100
GP075 B225K-[]	35	RoHS	2 200 000	±10%	$\tan \delta \leq 7.5\%$	50
GP075 B475K-[]	35	RoHS	4 700 000	±10%	$\tan \delta \leq 7.5\%$	20
TP075 B106K-□	25	RoHS	10 000 000	±10%	$\tan\delta \leq 12.5\%$	20
UP075B5225K-[]	50	RoHS	2 200 000	±10%	$\tan\delta \leq 12.5\%$	40
UP075B5475K-[]	50	RoHS	4 700 000	±10%	$\tan\delta \leq 12.5\%$	10
GP075B5106K-[]	35	RoHS	10 000 000	±10%	$\tan\delta \leq 12.5\%$	10
GP075 F106Z-□	35	RoHS	10 000 000	+80/-20%	tan δ ≦17.5%	25

<sup>•</sup> Please specify the lead configuration code.

<sup>★ :</sup> Option

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## **Axial Leaded Ceramic Capacitors**

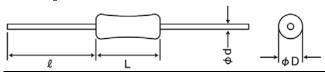
## ■PACKAGING

### **1**Minimum Quantity

Туре	Lead configuration code	Minimum Quantity [pcs]		
туре	Lead Corniguration Code	Bulk	Taping	
	A-(1.024 inch wide)		2000 (075)	
AA 109	B-(2.047 inches wide)	ı	3000 (050) 5000 (025)	
Multilayer type (075, 050, 025)	NA	1000		
(075, 050, 025)	KE(075)	3000		
	KF(050)	3000	_	
	KF(025)	4000		

## ②Dimensions of Bulk Products

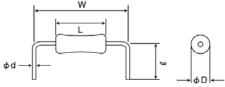
### NA configuration



Turns	Dimensions (mm)							
Туре	φD	L	φd	Q				
Multilayer type	2.0max.	2.3max.	$0.45 \pm 0.05$	20.0min.				
025	(0.079max.)	(0.09max.)	$(0.018 \pm 0.002)$	(0.787min.)				
Multilayer type	2.2max.	3.2max.	0.45±0.05	20.0min.				
050	(0.087max.)	(0.126max.)	$(0.018\pm0.002)$	(0.787min.)				
Multilayer type	3.2max.	4.2max.	0.55±0.05	20.0min.				
075	(0.126max.)	(0.165max.)	$(0.022\pm0.002)$	(0.787min.)				

Unit:mm(inch)

## KF/KE configuration



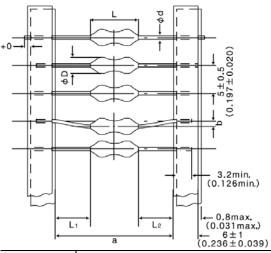
Type	Lead configuration	Dimensions (mm)						
Туре	code	$\phi$ D	Ш	W	$\phi$ d	Q		
Multilayer type	KF	2.0max.	2.3max.	5.0±0.5	$0.45 \pm 0.05$	6.5±0.5		
025		(0.079max.)	(0.09max.)	(0.197±0.020)	(0.018 \pm 0.002)	(0.256±0.020)		
Multilayer type	KF	2.2max.	3.2max.	5.0±0.5	0.45±0.05	6.5±0.5		
050		(0.087max.)	(0.126max.)	(0.197±0.020)	(0.018±0.002)	(0.256±0.020)		
Multilayer type	KE	3.2max.	4.2max.	7.5±0.5	0.55±0.05	6.5±0.5		
075		(0.126max.)	(0.165max.)	(0.295±0.020)	(0.022±0.002)	(0.256±0.020)		

Unit:mm(inch)

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## **3**Taping Dimensions

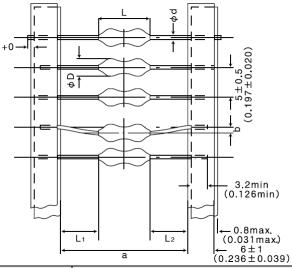
## A—(a:1.024 inch wide)configuration



Turne		Dimensions (mm)					
Туре	$\phi$ D	L	а	b	L1-L2	φd	pitch
Multilayer type	2.0max.	2.3max.				0.45±0.05	
025	(0.079max.)	(0.09max)				$(0.018 \pm 0.002)$	5.0
Multilayer type	2.2max.	3.2max.	26+0.5/-0	0.8max.	0.5max.	0.45±0.05	(0.197)
050	(0.087max.)	(0.126max.)	(1.024+0.020/-0)	(0.031max.)	(0.020max.)	$(0.018 \pm 0.002)$	
Multilayer type	3.2max.	4.2max.				0.55±0.05	7.5
075	(0.126max.)	(0.165max.)				$(0.022\pm0.002)$	(0.295)

Unit:mm(inch)

### ■B-(a:2.047 inches wide) configuration



Turne			Dimensions (	Minimum insertion			
Туре	$\phi$ D	L	а	b	L1-L2	$\phi$ d	pitch
Multilayer type	2.0max.	2.3max.				0.45±0.05	
025	(0.079max.)	(0.09max.)				$(0.018 \pm 0.002)$	5.0
Multilayer type	2.2max.	3.2max.	52+2/-1	1.2max.	1.0max.	0.45±0.05	(0.197)
050	(0.087max.)	(0.126max.)	(2.047 + 0.079 / -0.039)	(0.047 max.)	(0.039max.)	$(0.018 \pm 0.002)$	
Multilayer type	3.2max.	4.2max.				0.55±0.05	7.5
075	(0.126max.)	(0.165max.)				$(0.022\pm0.002)$	(0.295)

XRadial taping is available for 075 type (Optional)

Unit:mm(inch)

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## **Axial Leaded Ceramic Capacitors**

## ■RELIABILITY DATA

1. Operating Tempe	eratura Panga					
1. Operating Tellipe						
	Class1 (Temperature Compensating)	Multilayer type				
Specified Value	01 0(11:1 0:1 1:)	Multilayer type (Characteristics:B, B5)	-25 to +85°C			
	Class2 (High Dielectric)	Multilayer type (Characteristics:F)				
	-		•			
2. Storage Tempera	ature Range					
	Class1 (Temperature Compensating)	Multilayer type				
Specified Value		Multilayer type (Characteristics: B. B5)	−25 to +85°C			
	Class2(High Dielectric)		<del></del>			
		Multilayer type (Characteristics:F)				
	<u> </u>					
3. Rate Voltage						
	Class1 (Temperature Compensating)	Multilayer type	50VDC			
Specified Value	Class2(High Dielectric)	Multilayer type (Characteristics: B, B5)	16VDC, 25VDC, 35VDC, 50VDC			
	Class (mg. Dielessie)	Multilayer type (Characteristics: F)	10VDC, 16VDC, 25VDC, 35VDC, 5	50VDC		
	l .					
4. Withstanding Vol	tage					
Between terminals						
Specified Value	No abnorminality					
	Applied voltage	: Rate Voltage × 3 (Class 1)				
Test Methods and Remarks	Duration	: Rate Voltage × 2.5 (Class 2) : 1 to 5 sec.				
Remarks	Charge/discharge current	: 50mA max.(Class 1,2)				
Between terminals	and body					
Specified Value	No abnorminality					
Test Methods and	Metal globule method	Applied voltage	: Rate Voltage × 2.5			
Remarks			: 1 to 5 sec.			
		Charge/Discharge current	: 50mA max.			
5. Insulation Resis	tance					
O. Misdiación resis	Class1 (Temperature					
	Compensating)	Multilayer type	10000M Ω min.			
			Rate voltage : 16VDC			
			1200pF~22000pF(Item△J)	: 5000M Ω min		
			220000 <sub>p</sub> F	: 500MΩ min		
			470000pF	: 200M Ω min		
			1000000pF	: 100MΩ min		
			2200000pF	: 50M Ω min		
			4700000pF	: 20M Ω min		
			1000000pF	: 20M Ω min		
			Rate voltage : 25VDC			
Specified Value			1000000pF	: 20M Ω min		
· ·	Class2(High Dielectric)	Multilayer type	Rate voltage : 35VDC	100110		
	S.2502 (Fight Diolocally)	(Characteristics: B, B5)	1000000pF	: 100MΩ min		
			2200000pF	: 50M Ω min		
			4700000pF	: 20M Ω min		
			10000000pF Rate voltage : 50VDC	: 10M Ω min		
			100pF~39000pF	: 5000M Ω min		
			47000pF~100000pF	: 1000M Ω min		
			220000pF	: 500M Ω min		
			47000pF	: 200M Ω min		
			1000000pF	: 100M Ω min		
		ĺ	0000000 5			

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: 40M  $\Omega$  min

2200000pF

			4700000pF	: 10MΩ min
			Rate voltage : 10VDC	
			4700000pF	: 50M Ω min
			1000000pF	: 25M Ω min
			Rate voltage : 16VDC	
			220000pF	: 500MΩ min
			470000pF	: 500MΩ min
			1000000pF	: 250MΩ min
		Multilayer type	2200000pF	: 125MΩ min
		(Characteristics:F)	Rate voltage : 25VDC	
			10000pF~47000pF(Item△J)	: 1000M Ω min
			Rate voltage : 35VDC	
			1000000pF	: 25M Ω min
			Rate voltage : 50VDC	
			10000pF∼100000pF	: 1000M Ω min
			220000pF~470000pF	: 500M Ω min
			1000000pF	: 250M Ω min
est Methods and	Applied voltage : Rate vol	tage		
Remarks	Duration : 60±5 se	ec.		
6. Capacitance				
			+0.5nE	

6. Capacitance				
	Class1 (Temperature Compensating)	Multilayer type		±0.5pF ±5% ±10%
Specified Value	Class2 (High Dielectric)	Multilayer type (Characteristics	:B, B5)	±10%, ±20%(ItemΔJ)
	Glassz (Flight Dielectric)	Multilayer type (Characteristics	:F)	+80/-20%
	Measuring frequency	: 1MHz±10%	(Class1 : C	:≦1000pF)
		: 1kHz±10%	(Class1 : C	>1000pF)
	: 1	: 1kHz±10%	(Class2 : C	s≦10 μ F)
Test Methods and		: 120Hz±10%	(Class2 : C	$>$ 10 $\mu$ F)
Remarks		: 1.0±0.5Vrms	(Class1 : C	:≦1000pF)
Memarks		: 1.0±0.2Vrms	(Class1 : C	>1000pF)
	: 1	: 1.0±0.2Vrms	(Class2 : C	s≦10 μ F)
		: 0.5±0.1Vrms	(Class2 : C	$>$ 10 $\mu$ F)
	Bias application	: None		

7. Q or Tangent o	f Loss Angle(tan $\delta$ )			
	Class1 (Temperature Compensating)	Multilayer type	30pF or under : Q≧400+20C 33pF or over : Q≧1000 C:Nominal Capacitance[pF]	
Specified Value	Class2(High Dielectric)	Multilayer type (Characteristics: B, B5)	Rate voltage : 16VDC  1200pF~22000pF(Item△J)  220000pF~470000pF  1000000pF~2200000pF  4700000pF~10000000pF  Rate voltage : 25VDC  1000000pF  2200000pF~4700000pF  2200000pF~4700000pF  Rate voltage : 50VDC  100pF~39000pF  47000pF~1000000pF  (100000pF~155  2200000pF~85  2200000pF~4700000pF	: 3.5% max : 5.0% max : 7.5% max : 12.5% max  : 12.5% max  : 5.0% max : 7.5% max : 12.5% max : 12.5% max : 12.5% max
		Multilayer type (Characteristics:F)	Rate voltage : 10VDC  470000pF~10000000pF  Rate voltage : 16VDC  220000pF  470000pF  1000000pF  2200000pF  Rate voltage : 25VDC  10000pF~47000pF(Item△J)  Rate voltage : 35VDC	: 17.5% max  : 10.0% max : 10.0% max : 17.5% max : 15.0% max

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			1000	00000pF	: 17.5% max	
			Rate	voltage : 50VDC		
			1000	00pF∼100000pF	: 7.5% max	
			2200	000pF∼470000pF	: 10.0% max	
			1000	0000pF	: 15.0% max	
	Measuring frequency	: 1MHz±10%	(Class1 : C≦100	00pF)		
		: 1kHz±10%	(Class1: C>100	00pF)		
		: 1kHz±10%	(Class2 : C≦10)	<i>μ</i> F)		
Test Methods and		: 120Hz±10%	(Class2 : C>10)	<i>u</i> F)		
Remarks	Measuring voltage	$: 1.0 \pm 0.5 \text{Vrms}$	(Class1 : C≦100	00pF)		
Remarks		: 1.0±0.2Vrms	(Class1 : C>100	00pF)		
		$: 1.0 \pm 0.2 \text{Vrms}$	(Class2 : C≦10)	<i>u</i> F)		
		$: 0.5 \pm 0.1 \text{Vrms}$	(Class2 : C>10)	<i>μ</i> F)		
	Bias application	: None				

## 8. Capacitance: Change due to Temperature or Rate of Capacitance Change

1 A /I	1.					ı
When	voltage	ıs	not	ann	lied	

	Class1 (Temperature Compensating)	Multilayer type	CH: 0±60 SL: -350~+1000 [ppm/°C]
Specified Value	Class2(High Dielectric)	Multilayer type (Characteristics: B, B5)	±10%(B5: ±15%)
		Multilayer type (Characteristics:F)	+30/-85 %

Measurement of capacitance at  $20^{\circ}$ C and  $85^{\circ}$ C,  $-25^{\circ}$ C shall be made to calculate temperature characteristic by the following equation. (Class 1)

 $\frac{(C_{85}-C_{20})}{C_{20}\times\Delta T}$  × 10<sup>6</sup>(ppm/°C)

Change of maximum capacitance deviation in step 1 to 5 (Class2)

# Test Methods and Remarks

	Step	Temperature (°C)	
	1	20	
	2	-25	
ĺ	3	20(Reference temperature)	
ĺ	4	85	
ĺ	5	20	

XIn the B5 characteristics is, the Temperatures of step 1,3, and 5 are 25°C.

### 9. Terminal Strength

т			:1	٦
	er	ıs	ш	ıe

	Class1 (Temperature Compensating)	Multilayer type		
Specified Value	Class2 (High Dielectric)	Multilayer type (Characteristics:B, B5)	No abr	
	Glassz (High Dielectric)	Multilayer type (Characteristics:F)		
	A 1 11 1 1 1 1 C	1 1 1 1 1 1 1 1 1 1		

No abnomalities, such as cuts or looseness of terminals.

# Test Methods and Remarks

Apply the stated tensile force progressively in the direction to draw terminal.

| Nominal wire diameter[mm] | Tensile force[N] | Duration[s] |
| 0.45 • 0.55 | 19.6 | 5

### Torsional

	Class1 (Temperature Compensating)	Multilayer type
Specified Value		Multilayer type (Characteristics:B, B5)
	Class2(High Dielectric)	Multilayer type (Characteristics:F)

No abnomalities, such as cuts or looseness of terminals.

## Test Methods and

Remarks

initial position.

This operation is done over a period of 5 sec. Then second bend in the opposite direction shall be made.

Suspend a weight of specified mass at the end of the terminals and incline the body through the angle of 90 degrees and return it to the

Number of bends : 2 times

 Nominal wire diameter[mm]
 Bending force[N]
 Mass weight[kg]

 0.45 • 0.55
 2.45
 0.25

### 10. Resistance to Vibration

Specified Value	Class1 (Temperature	Multilayer type	Appearance: No significant abnomality
Specified value	Compensating)	Multilayer type	Withstanding Voltage: No abnomality

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		Capacitance :	
		4.7pF or under	: Within ±0.5pF
		5.6pF~8.2pF	: Within ± 10%
		1	
		10pF or over	: Within±5%
		Q:	. 0 > 400 - 000
		30pF or under	: Q≧400+20C
		33pF or over	: Q≧1000
		Insulation resistance	: 10000M Ω min
		C : Nominal Capacitance [pF]	
		Appearance : No significant abnor	mality
		Withstanding Voltage : No abnoma	ality
		Rate Voltage : 16VDC	
		Capacitance	
		1200pF~22000pF(Item△J)	: Within ±20%
		220000pF~10000000pF	: Within ±10%
		$\tan \delta$ :	. Within ± 10%
		1200pF~22000pF(Item△J)	: 3.5% max
		22000pF~47000pF	: 5.0% max
		1000000pF~2200000pF	: 7.5% max
		4700000pF~10000000pF	: 12.5% max
		Insulation Resistance :	5000:: O
		1200pF~22000pF(Item△J)	: 5000M Ω min
		220000 <sub>p</sub> F	: 500M $\Omega$ min
		470000pF	: $200M\Omega$ min
		1000000pF	: $100M\Omega$ min
		2200000pF	: $50M\Omega$ min
		4700000pF~10000000pF	: 20M Ω min
		Rate Voltage : 25VDC	
		Capacitance : Within ±10%	
		$\tan \delta$ :	
		1000000pF	: 12.5% max
			. IZ.J/0 IIIXX
		Insulation Resistance :	0014 0 :
	M 100	1000000pF	: 20M Ω min
	Multilayer type	Rate Voltage : 35VDC	
	(Characteristics:B, B5)	Capacitance : Within ±10%	
		$tan \delta$ :	
		1000000pF	: 5.0% max
		2200000pF~4700000pF	: 7.5% max
		10000000pF	: 12.5% max
Class2(High Dielectric)		Insulation Resistance :	
		1000000pF	: 100MΩ min
			: 100M Ω min
		2200000pF	
		4700000pF	: 20M Ω min
		1000000pF	: 10M Ω min
		Rate Voltage : 50VDC	
		Capacitance : Within ±10%	
		$tan \delta$ :	
		100pF∼39000pF	: 3.5% max
		47000pF~1000000pF	: 5.0% max
		(1000000pF/B5	: 12.5% max)
		2200000pF~4700000pF	: 12.5% max
		Insulation Resistance :	
		100pF∼39000pF	: 5000M $\Omega$ min
		47000pF~100000pF	: 1000M Ω min
		220000pF	: 1000MΩ min
		47000pF	: 200M Ω min
		• • • • • • • • • • • • • • • • • • •	
		1000000pF	: 100MΩ min
		2200000pF	: 40M Ω min
		4700000pF	: 10M Ω min
		Appearance : No significant abnor	-
		Withstanding Voltage : No abnoma	ality
		Rate Voltage : 10VDC	
		Capacitance	: Within +80/-20%
	Multilayer type	$\tan \delta$ :	
	(Characteristics: F)	470000pF~1000000pF	: 17.5% max
	(Onal acteristics. F)	· · · · · · · · · · · · · · · · · · ·	. 17.3/0 Max
		Insulation Resistance :	50MO :
		4700000pF	: $50M\Omega$ min
			05140
		10000000pF Rate Voltage: 16VDC	: 25M Ω min

<sup>►</sup> This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/).

			Capacitance	: Within $+80/-20\%$
			tan δ :	
			220000pF	: 10.0% max
			470000pF	: 10.0% max
			1000000pF	: 17.5% max
			2200000pF	: 15.0% max
			Insulation Resistance :	
			220000pF	: 500MΩ min
			470000pF	: 500MΩ min
			1000000pF	: 250MΩ min
			2200000pF	: 125MΩ min
			Rate Voltage : 25VDC	
			Capacitance	: Within $+80/-20\%$
			$tan \delta$ :	
			10000pF∼47000pF(Item△J)	: 7.5% max
			Insulation Resistance :	
			10000pF∼47000pF(Item△J)	: 1000M Ω min
			Rate Voltage : 35VDC	
			Capacitance	: Within $+80/-20\%$
			$tan \delta$ :	
			10000000pF	: 17.5% max
			Insulation Resistance	
			10000000pF	: <b>25M</b> Ω min
			Rate Voltage : 50VDC	
			Capacitance	: Within +80/-20%
			$\tan\delta$ :	
			10000pF∼100000pF	: 7.5% max
			220000pF~470000pF	: 10.0% max
			1000000pF	: 15.0% max
			Insulation Resistance :	
			10000pF~100000pF	: 1000M $\Omega$ min
			220000pF~470000pF	: 500M $\Omega$ min
			1000000pF	: 250M $\Omega$ min
	According to JIS C 5	102 clause 8.2		
	Vibration type	: A		
	Directions	: 2 hrs each in X, Y and Z directions		
est Methods and	Total	: 6 hrs		
emarks	Frequency range	: 10 to 55 to 10Hz(1min)		
	Amplitude	: 1.5mm		

11. Free Fall				
			Appearance: No significant abnon Withstanding Voltage: No abnoma	
	Class1 (Temperature Compensating)	Multilayer type	Capacitance 4.7pF or under 5.6pF~8.2pF 10pF or over Q: 30pF or under 33pF or over Insulation resistance C: Nominal Capacitance [pF]	: Within $\pm 0.5 pF$ : Within $\pm 10\%$ : Within $\pm 5\%$ : $Q \ge 400 + 20C$ : $Q \ge 1000$ : $10000M \Omega$ min
Specified Value	Class2(High Dielectric)	Multilayer type (Characteristics:B, B5)	Appearance: No significant abnorm Withstanding Voltage: No abnorma Rate Voltage: 16VDC Capacitance: 1200pF~22000pF(Item△J) 220000pF~10000000pF tan &: 1200pF~22000pF(Item△J) 220000pF~470000pF 1000000pF~220000pF 4700000pF~10000000pF Insulation resistance: 1200pF~22000pF(Item△J) 220000pF 470000pF 1700000pF 1700000pF	-

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	2200000 <sub>p</sub> F	: 50M Ω min
	4700000pF~10000000pF	: 20M Ω min
	Rate Voltage: 25VDC	
	Capacitance: Within ±10%	
	$tan \delta$ : $10000000pF$	:12.5% max
	Insulation resistance:	: 12.5% max
	10000000pF	: 20M Ω min
	Rate Voltage: 35VDC	: ZOWI SZ HIIFI
	Capacitance: Within ±10%	
	tan $\delta$ :	
	1000000pF	: 5.0% max
	2200000pF~4700000pF	: 7.5% max
	1000000pF	: 12.5% max
	Insulation resistance:	
	1000000pF	: 100M Ω min
	2200000pF	: 50M Ω min
	4700000pF	: 20M Ω min
	1000000pF	:10MΩ min
	Rate Voltage: 50VDC	
	Capacitance: Within ±10%	
	$\tan \delta$ :	
	100pF∼39000pF	: 3.5% max
	47000pF~1000000pF	: 5.0% max
	(1000000pF/B5	:12.5% max)
	2200000pF~4700000pF	:12.5% max
	Insulation resistance:	
	100pF∼39000pF	:5000MΩ min
	47000pF~100000pF	:1000MΩ min
	220000pF	: 500M Ω min
	470000pF	: 200M Ω min
	1000000pF	:100M Ω min
	2200000pF	: 40M Ω min
	4700000pF	: 10M Ω min
	Appearance: No significant abnoma	ality
	Withstanding Voltage: No abnomali	ity
	Rate Voltage: 10VDC	
	Capacitance	:Within +80/-20%
	Capacitance tan δ:	:Within +80/-20%
		:Within +80/-20% :17.5% max
	tan δ : 4700000pF∼10000000pF  Insulation resistance:	:17.5% max
	tan ô: 4700000pF∼10000000pF Insulation resistance: 4700000pF	:17.5% max :50MΩ min
	tan δ: 4700000pF∼10000000pF Insulation resistance: 4700000pF 10000000pF	:17.5% max
	tan $\delta$ : 470000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage:16VDC	:17.5% max :50MΩ min :25MΩ min
	tan δ: 470000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage:16VDC Capacitance	:17.5% max :50MΩ min
	$\tan \delta$ :  470000pF~10000000pF  Insulation resistance:  4700000pF  10000000pF  Rate Voltage:16VDC  Capacitance $\tan \delta$ :	:17.5% max $:50M\Omega  \text{min} \\ :25M\Omega  \text{min}$ $:Within+80/-20\%$
	$\tan \delta$ :  470000pF~10000000pF  Insulation resistance:  470000pF  10000000pF  Rate Voltage: 16VDC  Capacitance $\tan \delta$ :  220000pF	:17.5% max :50M $\Omega$ min :25M $\Omega$ min : Within+80/-20% :10.0% max
	tan $\delta$ :  470000pF $\sim$ 10000000pF  Insulation resistance:  470000pF  10000000pF  Rate Voltage: 16VDC  Capacitance  tan $\delta$ :  220000pF  470000pF	:17.5% max  :50MΩ min :25MΩ min  : Within+80/-20%  :10.0% max :10.0% max
	tan $\delta$ :  470000pF~10000000pF  Insulation resistance:  4700000pF  10000000pF  Rate Voltage: 16VDC  Capacitance  tan $\delta$ :  220000pF  470000pF  1000000pF	:17.5% max  :50MΩ min :25MΩ min  : Within+80/-20%  :10.0% max :10.0% max :17.5% max
	tan $\delta$ :  470000pF~10000000pF  Insulation resistance:  4700000pF  10000000pF  Rate Voltage: 16VDC  Capacitance  tan $\delta$ :  220000pF  470000pF  1000000pF  2200000pF	:17.5% max  :50MΩ min :25MΩ min  : Within+80/-20%  :10.0% max :10.0% max
Multilayer type	tan $\delta$ :  470000pF~10000000pF  Insulation resistance:  4700000pF  10000000pF  Rate Voltage: 16VDC  Capacitance  tan $\delta$ :  220000pF  470000pF  1000000pF  2200000pF  Insulation resistance:	:17.5% max  :50MΩ min :25MΩ min  : Within+80/-20%  :10.0% max :10.0% max :17.5% max :15.0% max
Multilayer type (Characteristics:F)	tan $\delta$ :  470000pF~10000000pF  Insulation resistance:  470000pF  1000000pF  Rate Voltage: 16VDC  Capacitance  tan $\delta$ :  220000pF  470000pF  1000000pF  2200000pF  Insulation resistance:  220000pF	:17.5% max  :50M Ω min :25M Ω min  : Within+80/-20%  :10.0% max :10.0% max :17.5% max :15.0% max
	tan $\delta$ :  470000pF~10000000pF  Insulation resistance:  470000pF 1000000pF Rate Voltage: 16VDC  Capacitance tan $\delta$ : 220000pF 470000pF 1000000pF 220000pF Insulation resistance: 220000pF 47000pF	:17.5% max $:50M\Omega  \text{min}$ :25M\Omega  \text{min} $: \text{Within} + 80/ - 20\%$ :10.0% max $:10.0\% \text{ max}$ :17.5% max $:15.0\% \text{ max}$ :500M\Omega  \text{min} $:500M\Omega  \text{min}$
	tan δ:  470000pF~1000000pF  Insulation resistance:  470000pF 1000000pF 1000000pF Rate Voltage:16VDC  Capacitance tan δ: 220000pF 470000pF 1000000pF 220000pF Insulation resistance: 220000pF 470000pF 1000000pF	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within+ $80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $500M\Omega$ min : $250M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF 1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF 470000pF 1000000pF 220000pF Insulation resistance: 220000pF 470000pF 100000pF 220000pF 100000pF 220000pF 470000pF 220000pF	:17.5% max $:50M\Omega  \text{min}$ :25M\Omega  \text{min} $: \text{Within} + 80/ - 20\%$ :10.0% max $:10.0\% \text{ max}$ :17.5% max $:15.0\% \text{ max}$ :500M\Omega  \text{min} $:500M\Omega  \text{min}$
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF 1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF 470000pF 1000000pF 220000pF Insulation resistance: 220000pF 470000pF 100000pF 220000pF A70000pF Rate Voltage:25VDC	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF 1000000pF 1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF 470000pF 1000000pF 220000pF Insulation resistance: 220000pF 470000pF 470000pF 220000pF 470000pF 1000000pF 220000pF 470000pF 220000pF 220000pF A70000pF 2200000pF 2200000pF Capacitance	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within+ $80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $500M\Omega$ min : $250M\Omega$ min
	tan $\delta$ :  470000pF~10000000pF  Insulation resistance:  4700000pF  10000000pF  Rate Voltage:16VDC  Capacitance  tan $\delta$ :  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  220000pF  470000pF  220000pF  470000pF  220000pF  470000pF  2200000pF  2200000pF  Are Voltage:25VDC  Capacitance  tan $\delta$ :	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within+ $80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  4700000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  220000pF  470000pF  1000000pF  220000pF  470000pF  220000pF  Around P  220000pF  1000000pF  2200000pF  1000000pF  2200000pF  Around P  2200000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF(Item△J)	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  220000pF  470000pF  1000000pF  220000pF  470000pF  1000000pF  2200000pF  1000000pF  2100000pF  2200000pF  Insulation resistance:  210000pF  2200000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF(Item△J)  Insulation resistance:	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within+ $80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  220000pF  470000pF  1000000pF  2200000pF  1000000pF  2200000pF  1000000pF  1000000pF  1000000pF  1000000pF  1000000pF  1000000pF  1000000pF  1000000pF  100000pF  100000pF  100000pF  10000pF 47000pF (Item△J)  Insulation resistance:  10000pF~47000pF (Item△J)	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within+ $80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  4700000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  220000pF  470000pF  1000000pF  2200000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF(Item△J)  Insulation resistance:  10000pF~47000pF(Item△J)  Rate Voltage:35VDC	:17.5% max  :50M $\Omega$ min :25M $\Omega$ min  : Within+80/-20%  :10.0% max :10.0% max :15.0% max :15.0% max  :500M $\Omega$ min :500M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :125M $\Omega$ min :125M $\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  4700000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  1000000pF  220000pF  470000pF  1000000pF  2200000pF  1000000pF  2100000pF  2200000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF(Item△J)  Insulation resistance:  10000pF~47000pF(Item△J)  Rate Voltage:35VDC  Capacitance	: $17.5\%$ max : $50M\Omega$ min : $25M\Omega$ min : Within+ $80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  220000pF  Insulation resistance:  220000pF  470000pF  1000000pF  220000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF(ItemΔJ)  Insulation resistance:  10000pF~47000pF(ItemΔJ)  Rate Voltage:35VDC  Capacitance  tan δ:	: $17.5\%$ max  : $50M\Omega$ min : $25M\Omega$ min  : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max  : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min : $125M\Omega$ min : Within $+80/-20\%$ : $7.5\%$ max  : $1000M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  1000000pF  2200000pF  Insulation resistance:  220000pF  470000pF  470000pF  1000000pF  2200000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF(ItemΔJ)  Insulation resistance:  1000pF~47000pF(ItemΔJ)  Rate Voltage:35VDC  Capacitance  tan δ:  10000pF~47000pF(ItemΔJ)  Rate Voltage:35VDC  Capacitance  tan δ:  10000pF~47000pF	:17.5% max  :50M $\Omega$ min :25M $\Omega$ min  : Within+80/-20%  :10.0% max :10.0% max :15.0% max :15.0% max  :500M $\Omega$ min :500M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :125M $\Omega$ min :125M $\Omega$ min
	tan $\delta$ : $470000pF \sim 10000000pF$ Insulation resistance: $4700000pF$ $10000000pF$ Rate Voltage: $16VDC$ Capacitance  tan $\delta$ : $220000pF$ $470000pF$ $1000000pF$ $100000pF$ Insulation resistance: $220000pF$ $470000pF$ $470000pF$ $1000000pF$ $2200000pF$ Rate Voltage: $25VDC$ Capacitance  tan $\delta$ : $10000pF \sim 47000pF (Item \Delta J)$ Insulation resistance: $10000pF \sim 47000pF (Item \Delta J)$ Rate Voltage: $35VDC$ Capacitance  tan $\delta$ : $10000pF \sim 47000pF (Item \Delta J)$ Rate Voltage: $35VDC$ Capacitance  tan $\delta$ : $10000000pF$ Insulation resistance:	: $17.5\%$ max  : $50M\Omega$ min : $25M\Omega$ min  : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max  : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min : $125M\Omega$ min : Within $+80/-20\%$ : $17.5\%$ max
	tan $\delta$ : $470000pF \sim 10000000pF$ Insulation resistance: $4700000pF$ $1000000pF$ Rate Voltage: $16VDC$ Capacitance  tan $\delta$ : $220000pF$ $470000pF$ $1000000pF$ $2200000pF$ Insulation resistance: $220000pF$ $470000pF$ $470000pF$ $1000000pF$ $2200000pF$ Rate Voltage: $25VDC$ Capacitance  tan $\delta$ : $10000pF \sim 47000pF (Item \Delta J)$ Insulation resistance: $10000pF \sim 47000pF (Item \Delta J)$ Rate Voltage: $35VDC$ Capacitance  tan $\delta$ : $10000pF \sim 47000pF$ Insulation resistance: $10000pF \sim 47000pF$ Insulation resistance: $10000000pF$ Insulation resistance: $100000000pF$ Insulation resistance: $100000000pF$	: $17.5\%$ max  : $50M\Omega$ min : $25M\Omega$ min  : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max  : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min : $125M\Omega$ min : Within $+80/-20\%$ : $7.5\%$ max  : $1000M\Omega$ min
	tan δ:  470000pF~10000000pF  Insulation resistance:  470000pF  1000000pF  Rate Voltage:16VDC  Capacitance  tan δ:  220000pF  470000pF  100000pF  220000pF  Insulation resistance:  220000pF  470000pF  100000pF  220000pF  Rate Voltage:25VDC  Capacitance  tan δ:  10000pF~47000pF (Item△J)  Insulation resistance:  10000pF~47000pF (Item△J)  Rate Voltage:35VDC  Capacitance  tan δ:  10000pF~47000pF Item△J)  Rate Voltage:35VDC  Capacitance  tan δ:  100000pF  Insulation resistance:  10000pF  Rate Voltage:50VDC	: $17.5\%$ max  : $50M\Omega$ min : $25M\Omega$ min  : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max  : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min : Within $+80/-20\%$ : $7.5\%$ max  : $1000M\Omega$ min
	tan $\delta$ : $470000pF \sim 10000000pF$ Insulation resistance: $4700000pF$ $1000000pF$ Rate Voltage: $16VDC$ Capacitance  tan $\delta$ : $220000pF$ $470000pF$ $1000000pF$ $2200000pF$ Insulation resistance: $220000pF$ $470000pF$ $470000pF$ $1000000pF$ $2200000pF$ Rate Voltage: $25VDC$ Capacitance  tan $\delta$ : $10000pF \sim 47000pF (Item \Delta J)$ Insulation resistance: $10000pF \sim 47000pF (Item \Delta J)$ Rate Voltage: $35VDC$ Capacitance  tan $\delta$ : $10000pF \sim 47000pF$ Insulation resistance: $10000pF \sim 47000pF$ Insulation resistance: $10000000pF$ Insulation resistance: $100000000pF$ Insulation resistance: $100000000pF$	: $17.5\%$ max  : $50M\Omega$ min : $25M\Omega$ min  : Within $+80/-20\%$ : $10.0\%$ max : $10.0\%$ max : $17.5\%$ max : $15.0\%$ max  : $500M\Omega$ min : $250M\Omega$ min : $250M\Omega$ min : $125M\Omega$ min : $125M\Omega$ min : Within $+80/-20\%$ : $17.5\%$ max

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			tanδ: 10000pF∼100000pF 220000pF∼470000pF 1000000pF	: 7.5% max : 10.0% max : 15.0% max
			Insulation resistance: 10000pF~100000pF 220000pF~470000pF 1000000pF	: $1000 \text{M}\Omega$ min : $500 \text{M}\Omega$ min : $250 \text{M}\Omega$ min
	Drop Test	: Free fall	<u>'</u>	
Test Methods and	Impact material	: Floor		
Remarks	Height	: 1 m		
	Total number of drops	: 5 times		

	Total number of drops : 5	times	
12. Body Strength			
	Class1 (Temperature Compensating)	Multilayer type	
Specified Value	Olean 2 (High Dielentoir)	Multilayer type (Characteristics: B, B5)	No abnomality such as damage.
	Class2 (High Dielectric)	Multilayer type (Characteristics:F)	
Test Methods and Remarks	Applied force : 19.6N Duration : 5 sec. Speed : Shall atta	nin to specified force in 2 sec.	

13. Solderability			
	Class1 (Temperature Compensating)	Multilayer type	
Specified Value		Multilayer type (Characteristics: B, B5)	At least 75% of lead surface is covered with new solder.
	Class2(High Dielectric)	Multilayer type (Characteristics:F)	
Test Methods and	Solder temperature : 23	0±5°C	
Remarks	Duration : 2±	=0.5 sec.(This test may be applica	ble after 6 months storage.)

			Appearance: No significant abnom Withstanding Voltage: No abnoma	_
Specified Value	Class1 (Temperature Compensating)	Multilayer type	Capacitance change: 8.2pF or under 10pF or over Q: 30pF or under 33pF or over Insulation resistance C: Nominal Capacitance [pF]	:Within ±0.25pF :Within ±2.5% :Q≧400+20C :Q≧1000 :10000MΩ min
	Class2(High Dielectric)	Multilayer type (Characteristics: B, B5)	Appearance: No significant abnorm Withstanding Voltage: No abnormal Rate Voltage: 16VDC Capacitance change: 1200pF~22000pF (ItemΔJ) 220000pF~10000000pF tanδ: 1200pF~22000pF (ItemΔJ) 220000pF~470000pF 1000000pF~220000pF 470000pF~10000000pF Insulation resistance: 1200pF~22000pF	

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	470000pF	: 200M Ω min
	1000000pF	:100M Ω min
	2200000pF	: 50M Ω min
	4700000pF~10000000pF	: 20M Ω min
	Rate Voltage: 25VDC	
	Capacitance change:	140.00
	1000000pF	:Within ±10.0%
	tan δ:	10.5%
	1000000pF	:12.5% max
	Insulation resistance: 10000000pF	: 20M Ω min
	Rate Voltage: 35VDC	: ZOM SZ HIIN
	Capacitance change:	
	1000000pF~1000000pF	:Within ±10.0%
	$\tan \delta$ :	
	1000000pF	: 5.0% max
	2200000pF~4700000pF	: 7.5% max
	1000000pF	: 12.5% max
	Insulation resistance:	
	1000000pF	: $100M\Omega$ min
	2200000pF	: 50M Ω min
	4700000pF	: 20M Ω min
	1000000pF	:10MΩ min
	Rate Voltage:50VDC	
	Capacitance change:	
	100pF∼39000pF	:Within ±7.5%
	47000pF~1000000pF	:Within ±10.0%
	tan δ:	0.5%
	100pF~39000pF	: 3.5% max : 5.0% max
	47000pF~1000000pF (1000000pF/B5	: 12.5% max
	2200000pF~4700000pF	: 12.5% max
	Insulation resistance:	. 12.0% 110
	100pF~39000pF	:5000MΩ min
	47000pF~100000pF	:1000M Ω min
	220000pF	: 500M Ω min
	220000pF 470000pF	:500M Ω min :200M Ω min
	•	
	470000pF	: 200M $\Omega$ min : 100M $\Omega$ min : 40M $\Omega$ min
	470000 <sub>p</sub> F 1000000 <sub>p</sub> F	: $200M\Omega$ min : $100M\Omega$ min
	470000pF 1000000pF 2200000pF	: $200M\Omega$ min : $100M\Omega$ min : $40M\Omega$ min : $10M\Omega$ min
	470000pF 1000000pF 2200000pF 4700000pF	: $200M\Omega$ min : $100M\Omega$ min : $40M\Omega$ min : $10M\Omega$ min
	470000pF 1000000pF 2200000pF 4700000pF Appearance: No significant abnomality	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min
	47000pF 100000pF 2200000pF 470000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality	: $200M\Omega$ min : $100M\Omega$ min : $40M\Omega$ min : $10M\Omega$ min
	47000pF 100000pF 2200000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ:	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :Within $\pm 20\%$
	470000pF 1000000pF 2200000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF∼10000000pF	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min
	470000pF 1000000pF 2200000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF ~ 10000000pF Insulation resistance:	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within ±20%
	470000pF 1000000pF 2200000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF∼10000000pF Insulation resistance: 4700000pF	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within $\pm 20\%$ :17.5% max
	470000pF 1000000pF 2200000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF ~ 10000000pF Insulation resistance: 4700000pF 10000000pF	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within ±20%
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF ~ 10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within $\pm 20\%$ :17.5% max :50M $\Omega$ min :25M $\Omega$ min
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within $\pm 20\%$ :17.5% max
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ:	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ :Within \pm 20\% :17.5\% max :50M Ω min \\ :25M Ω min \\ :Within \pm 20\%$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within $\pm 20\%$ :17.5% max :50M $\Omega$ min :25M $\Omega$ min :Within $\pm 20\%$ :10.0% max
Multilayer type	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ :Within \pm 20\% :17.5\% max :50M Ω min \\ :25M Ω min \\ :Within \pm 20\% :10.0\% max \\ :17.5\% max$
Multilayer type (Characteristics:F)	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 2200000pF	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within $\pm 20\%$ :17.5% max :50M $\Omega$ min :25M $\Omega$ min :Within $\pm 20\%$ :10.0% max
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 1000000pF 1000000pF 1000000pF 1000000pF 1000000pF 1000000pF	$:200M Ω min$ $:100M Ω min$ $:40M Ω min$ $:10M Ω min$ $:10M Ω min$ $:Within \pm 20\%$ $:17.5\% max$ $:50M Ω min$ $:25M Ω min$ $:Within \pm 20\%$ $:10.0\% max$ $:17.5\% max$ $:15.0\% max$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ :Within \pm 20\% :17.5\% max :50M Ω min \\ :25M Ω min \\ :Within \pm 20\% :10.0\% max \\ :17.5\% max$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 1000000pF 1000000pF 1000000pF 1000000pF 1000000pF 1000000pF	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ :Within \pm 20\% :17.5\% max :50M Ω min \\ :25M Ω min \\ :Within \pm 20\% :10.0\% max \\ :17.5\% max \\ :15.0\% max \\ :500M Ω min \\ :20\%$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 1000000pF 1000000pF 1000000pF 2200000pF~470000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ : Within \pm 20\% :17.5\% max :50M Ω min \\ :25M Ω min \\ :Within \pm 20\% :10.0\% max \\ :17.5\% max \\ :15.0\% max \\ :500M Ω min \\ :250M Ω min \\ :$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 1000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Insulation resistance: 220000pF~470000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Rate Voltage: 25VDC	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within ±20% :17.5% max :50M $\Omega$ min :25M $\Omega$ min :Within ±20% :10.0% max :17.5% max :15.0% max :500M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :125M $\Omega$ min
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 10000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 1000000pF 1000000pF 1000000pF 2200000pF~470000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ : Within \pm 20\% :17.5\% max :50M Ω min \\ :25M Ω min \\ :Within \pm 20\% :10.0\% max \\ :17.5\% max \\ :15.0\% max \\ :500M Ω min \\ :250M Ω min \\ :$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 1000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Atomatical change Insulation resistance: 220000pF~470000pF Insulation resistance: 220000pF~470000pF Atomatical change Rate Voltage: 25VDC Capacitance change	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within ±20% :17.5% max :50M $\Omega$ min :25M $\Omega$ min :Within ±20% :10.0% max :17.5% max :15.0% max :500M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :125M $\Omega$ min
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance:No significant abnomality Withstanding Voltage:No abnomality Withstanding Voltage:No abnomality Rate Voltage:10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 1000000pF Rate Voltage:16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Rate Voltage:25VDC Capacitance change tan δ:	$:200M  \Omega  \text{ min}$ $:100M  \Omega  \text{ min}$ $:40M  \Omega  \text{ min}$ $:10M  \Omega  \text{ min}$ $:10M  \Omega  \text{ min}$ $:Within  \pm 20\%$ $:17.5\%  \text{max}$ $:50M  \Omega  \text{ min}$ $:25M  \Omega  \text{ min}$ $:Within  \pm 20\%$ $:10.0\%  \text{max}$ $:17.5\%  \text{max}$ $:15.0\%  \text{max}$ $:500M  \Omega  \text{ min}$ $:250M  \Omega  \text{ min}$ $:250M  \Omega  \text{ min}$ $:125M  \Omega  \text{ min}$ $:Within  \pm 20\%$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance: No significant abnomality Withstanding Voltage: No abnomality Withstanding Voltage: No abnomality Rate Voltage: 10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 1000000pF Rate Voltage: 16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Rate Voltage: 25VDC Capacitance change tan δ: 10000pF~47000pF (ItemΔJ)	$:200M  \Omega  \text{ min}$ $:100M  \Omega  \text{ min}$ $:40M  \Omega  \text{ min}$ $:10M  \Omega  \text{ min}$ $:10M  \Omega  \text{ min}$ $:Within  \pm 20\%$ $:17.5\%  \text{max}$ $:50M  \Omega  \text{ min}$ $:25M  \Omega  \text{ min}$ $:Within  \pm 20\%$ $:10.0\%  \text{max}$ $:17.5\%  \text{max}$ $:15.0\%  \text{max}$ $:500M  \Omega  \text{ min}$ $:250M  \Omega  \text{ min}$ $:250M  \Omega  \text{ min}$ $:125M  \Omega  \text{ min}$ $:Within  \pm 20\%$
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance:No significant abnomality Withstanding Voltage:No abnomality Withstanding Voltage:No abnomality Rate Voltage:10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 1000000pF Rate Voltage:16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF Insulation resistance: 220000pF~470000pF Insulation resistance: 220000pF~470000pF Capacitance change tan δ: 100000pF 2200000pF Rate Voltage:25VDC Capacitance change tan δ: 10000pF~47000pF (ItemΔJ) Insulation resistance:	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within ±20% :17.5% max :50M $\Omega$ min :25M $\Omega$ min :Within ±20% :10.0% max :17.5% max :500M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :125M $\Omega$ min :Within ±20%
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance:No significant abnomality Withstanding Voltage:No abnomality Withstanding Voltage:No abnomality Rate Voltage:10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 200000pF Rate Voltage:16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 2200000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Rate Voltage:25VDC Capacitance change tan δ: 10000pF~47000pF(ItemΔJ) Insulation resistance: 10000pF~47000pF(ItemΔJ) Rate Voltage:35VDC Capacitance change	:200M $\Omega$ min :100M $\Omega$ min :40M $\Omega$ min :10M $\Omega$ min :10M $\Omega$ min :Within ±20% :17.5% max :50M $\Omega$ min :25M $\Omega$ min :Within ±20% :10.0% max :17.5% max :500M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :250M $\Omega$ min :125M $\Omega$ min :Within ±20%
	470000pF 1000000pF 2200000pF 4700000pF 4700000pF Appearance:No significant abnomality Withstanding Voltage:No abnomality Withstanding Voltage:No abnomality Rate Voltage:10VDC Capacitance change tan δ: 4700000pF~10000000pF Insulation resistance: 4700000pF 200000pF Rate Voltage:16VDC Capacitance change tan δ: 220000pF~470000pF 1000000pF 2200000pF Insulation resistance: 220000pF~470000pF 1000000pF 2200000pF Rate Voltage:25VDC Capacitance change tan δ: 10000pF~47000pF(ItemΔJ) Insulation resistance: 10000pF~47000pF(ItemΔJ) Rate Voltage:35VDC	$:200M Ω min \\ :100M Ω min \\ :40M Ω min \\ :10M Ω min \\ :10M Ω min \\ : Within \pm 20\% :17.5\% max \\ :50M Ω min \\ :25M Ω min \\ :Within \pm 20\% :10.0\% max \\ :17.5\% max \\ :15.0\% max \\ :500M Ω min \\ :250M Ω min \\ :250M Ω min \\ :250M Ω min \\ :125M Ω min \\ :1000M Ω min \\ :Within \pm 20\% :7.5\% max \\ :1000M Ω min \\ :000M Ω min \\ :0000M Ω min \\ :00000M Ω min \\ :0000M Ω min \\ :00000M Ω min \\ :0000M Ω$

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			Insulation resistance:	
			1000000pF	: <b>25M</b> Ω min
			Rate Voltage: 50VDC	
			Capacitance change:	
			10000pF~1000000pF	: Within 20.0%
			$tan \delta$ :	
			10000pF~100000pF	:7.5% max
			220000pF~470000pF	:10.0% max
			1000000pF	:15.0% max
			Insulation resistance:	
			10000pF~100000pF	: 1000M Ω min
			220000pF~470000pF	: $500M\Omega$ min
			1000000pF	: 250M Ω min
	Solder temperature	: 270±5°C		
	Duration	$:5\pm0.5$ sec.		
	Immersed conditions	•	vith t=1.6mm, hole=1.0mm diameter)	
Test Methods and Remarks	Preconditioning	: 1 hr of preconditioning at 15 condition.	$0 + 0/-10^{\circ}$ C followed by $48 \pm 4$ hrs	of recovery under the standard
	Recovery	: Recovery for the following pe	eriod under the standard condition afte	er the test.
		24±2 hrs(Class 1)		
		48±4 hrs(Class 2)		
15. Resistance to S	Solvent			
	Class1 (Temperature Compensating)	Multilayer type		

15. Resistance to S	Solvent			
	Class1 (Temperature Compensating)	Multilayer type		
Specified Value	Class2 (High Dielectric)	Multilayer type (Characteristics:B, B5)	No significant abnormality in appearance and legible marking.	
	Glassz (High Dielectric)	Multilayer type (Characteristics:F)		
	According to JIS C 5102 clause	e 8.7.4.		
Test Methods and	Type of test :	Method 1		
Remarks	Solvent temperature :	: 20 to 25°C		
Remarks	Duration :	30±5 sec.		
	Solvent Type :	A in Table 23, Isopropyl alcohol		

			Appearance: No significant abnor Withstanding Voltage: No abnoma	•
	Class1 (Temperature Compensating)	Multilayer type	Capacitance change: 8.2pF or under 10pF or over Q: 8.2pF or under 10pF~30pF 33pF or over Insulation resistance C: Nominal Capacitance [pF]	:Within $\pm 0.5 pF$ :Within $\pm 5.0\%$ :Q $\ge 200+10C$ :Q $\ge 275+2.5C$ :Q $\ge 350$ :1000M $\Omega$ min
Specified Value	Class2 (High Dielectric)	Multilayer type (Characteristics:B, B5)	Appearance: No significant abnorm Withstanding Voltage: No abnorma Rate voltage: 16VDC Capacitance change: 1200pF~22000pF(ItemΔJ) 220000pF~10000000pF tan δ: 1200pF~22000pF(ItemΔJ) 220000pF~470000pF 1000000pF~2200000pF 4700000pF~10000000pF Insulation resistance: 1200pF~22000pF(ItemΔJ) 220000pF 470000pF 470000pF 1000000pF 1000000pF 2200000pF 4700000pF 2200000pF 4700000pF 2200000pF 4700000pF 2200000pF 4700000pF 2200000pF 4700000pF 2200000pF 47000000pF 2200000pF 47000000pF	

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	tanδ: 10000000pF	: 15.0% max
	Insulation resistance:	
	10000000pF	:5MΩ min
	Rate voltage: 35VDC	
	Capacitance change: 1000000pF	: Within ±15.0%
	2200000pF~4700000pF	:Within ±15.0%
	10000000pF	: Within ±15.0%
	$\tan \delta$ :	7.5%
	1000000pF	: 7.5% max
	2200000pF~4700000pF 10000000pF	: 10.0% max : 22.5% max
	Insulation resistance:	. ££.0/# 111QA
	1000000pF	: 50M Ω min
	2200000pF	: 25M Ω min
	4700000pF~1000000pF	:5MΩ min
	Rate voltage: 50VDC	
	Capacitance change: 100pF~39000pF	: Within ± 12.5%
	47000pF~4700000pF	: Within ± 15.0%
	(1000000pF/B5	:Within ±22.5%)
	$tan \delta$ :	
	100pF∼39000pF	: 5.0% max
	47000pF~1000000pF	: 7.5% max
	(1000000pF/B5	:Within ±17.5%)
	2200000pF~47000000pF Insulation resistance:	: 22.5% max
	100pF~39000pF	:1000MΩ min
	47000pF~100000pF	: 500M Ω min
	220000pF	: 250M $\Omega$ min
	470000 <sub>p</sub> F	:100M Ω min
	100000pF	:50MΩ min
	2200000pF 4700000pF	: $20M\Omega$ min : $5M\Omega$ min
	Appearance: No significant abnoma	
	Withstanding Voltage: No abnomali	•
	Rate voltage: 10VDC	-
	Capacitance change	: Within ±30.0%
	$tan \delta$ :	
	4700000pF~10000000pF	:20.0% max
	Insulation resistance:	.10MO :
	4700000pF 10000000pF	: $10M\Omega$ min : $5M\Omega$ min
	Rate voltage: 16VDC	. UIVI 3E IIIIII
	Capacitance change	: Within ±30.0%
	$\tan \delta$ :	
	220000pF~470000pF	:15.0% max
	1000000pF	: 22.5% max
	2200000pF	:17.5% max
1	Insulation resistance: 220000pF	:100MΩ min
Multilaver type	·	
Multilayer type (Characteristics: F)	470000pF	: 5UM SZ min
Multilayer type (Characteristics:F)	470000 <sub>p</sub> F 1000000 <sub>p</sub> F	: $50M\Omega$ min : $25M\Omega$ min
	·	
	1000000pF	: 25MΩ min : 25MΩ min
	1000000pF 2200000pF Rate voltage:25VDC Capacitance change	: $25M\Omega$ min : $25M\Omega$ min : Within $\pm 30\%$
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ	: 25M Ω min : 25M Ω min : Within ±30%
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF(ItemΔJ)	: $25M\Omega$ min : $25M\Omega$ min : Within $\pm 30\%$
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF (ItemΔJ) Insulation resistance:	: 25M Ω min : 25M Ω min : Within ±30% : : 12.5% max
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF(ItemΔJ) Insulation resistance: 10000pF~47000pF(ItemΔJ)	: 25M Ω min : 25M Ω min : Within ±30%
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF (ItemΔJ) Insulation resistance:	: 25M Ω min : 25M Ω min : Within ±30% : : 12.5% max
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF (ItemΔJ) Insulation resistance: 10000pF~47000pF (ItemΔJ) Rate voltage: 35VDC	: $25M\Omega$ min : $25M\Omega$ min : Within $\pm 30\%$ : : : $12.5\%$ max : $500M\Omega$ min
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF(ItemΔJ) Insulation resistance: 10000pF~47000pF(ItemΔJ) Rate voltage: 35VDC Capacitance change tan δ: 10000000pF	: $25M\Omega$ min : $25M\Omega$ min : Within $\pm 30\%$ : : : $12.5\%$ max : $500M\Omega$ min
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change $\tan \delta$ 10000pF $\sim$ 47000pF(Item $\triangle$ J) Insulation resistance: 10000pF $\sim$ 47000pF(Item $\triangle$ J) Rate voltage: 35VDC Capacitance change $\tan \delta$ : 10000000pF	: $25M\Omega$ min : $25M\Omega$ min : Within $\pm 30\%$ : : 12.5% max : $500M\Omega$ min : Within $\pm 30.0\%$ : 20.0% max
	1000000pF 2200000pF Rate voltage: 25VDC Capacitance change tan δ 10000pF~47000pF(ItemΔJ) Insulation resistance: 10000pF~47000pF(ItemΔJ) Rate voltage: 35VDC Capacitance change tan δ: 10000000pF	: 25M Ω min : 25M Ω min : Within ±30% : 12.5% max : 500M Ω min : Within ±30.0%

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		T			
				10000pF~1000000pF	:Within $\pm 30.0\%$
				$tan \delta$ :	
				10000pF∼100000pF	:12.5% max
				220000pF~470000pF	:15.0% max
				1000000pF	:17.5% max
				Insulation resistance:	
				10000pF~100000pF	: $500M\Omega$ min
				220000pF~470000pF	: $250M\Omega$ min
				1000000pF	: 50M Ω min
	Conditions for	or 1 cycle			
	Step	Temperature[°C]	Duration[min.]		
	1	Room temperature	Within 3		
	2	-25+0/-3	30±3		
	3	Room temperature	Within 3		
Took Mothedo and	4	+85+3/-0	30±3	<del></del>	
Test Methods and	-				

Remarks

Room temperature Within 3

Number of cycles : 5

Preconditioning Recovery

: 1 hr of preconditioning at 150  $\pm 0/-10^{\circ}$ C followed by 48±4 hrs of recovery under the standard condition. : Recovery for the following period under the standard condition after the removal from test chamber.

24±2 hrs( Class 1)

48±4 hrs( Class 2)

			Appearance: No significant abnomality	
	0. 4/7		Withstanding Voltage: No abnoma Capacitance change: 8.2pF or under 10pF or over	:Within ±0.5pF :Within ±5.0%
	Class1 (Temperature Compensating)	Multilayer type	Q: 8.2pF or under 10pF~30pF 33pF or over Insulation resistance C: Nominal Capacitance [pF]	: Q ≥ 200 + 10C : Q ≥ 275 + 2.5C : Q ≥ 350 : 1000M Ω min
Specified Value	Class2 (High Dielectric)	Multilayer type (Characteristics: B, B5)	Appearance: No significant abnorm Withstanding Voltage: No abnorma Rate voltage: 16VDC Capacitance change: 1200pF~22000pF(ItemΔJ) 220000pF~10000000pF tanδ: 1200pF~22000pF(ItemΔJ) 220000pF~470000pF 1000000pF~220000pF 470000pF~10000000pF Insulation resistance: 1200pF~22000pF(ItemΔJ) 220000pF 470000pF 1000000pF 470000pF 1000000pF 2200000pF 470000pF 1000000pF Rate voltage: 25VDC Capacitance change: 1000000pF Insulation resistance: 1000000pF Tanδ: 1000000pF Insulation resistance: 1000000pF Insulation resistance: 1000000pF Tanδ: 1000000pF 220000pF~4700000pF 1000000pF 1000000pF 2200000pF~4700000pF Tanδ: 1000000pF 1000000pF 2200000pF~4700000pF	•

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			To and attention to the control of	
			Insulation resistance: 1000000pF	: 50M Ω min
			2200000pF	: 25M Ω min
			470000pF~1000000pF	:5MΩ min
			Rate voltage: 50VDC	
			Capacitance change:	
			100pF∼39000pF	: Within ± 12.5%
			47000pF~4700000pF	:Within ±15.0%
			(1000000pF/B5	:Within ±22.5%)
			$\tan\delta$ :	
			100pF∼39000pF	:5.0% max
			47000pF~1000000pF	:7.5% max
			(1000000/B5	:17.5% max)
			2200000pF~4700000pF	: 22.5% max
			Insulation resistance:	
			100pF∼39000pF	:1000MΩ min
			47000pF~100000pF	: 500M Ω min
			220000pF	: 250M Ω min
			470000pF 1000000pF	: $100M\Omega$ min : $50M\Omega$ min
			2200000pF	: 20M Ω min
			4700000pF	: 5M Ω min
			Appearance: No significant abnomal	
			Withstanding Voltage: No abnomality	-
			Rate voltage: 10VDC	,
			Capacitance change	: Within ±30.0%
			tan δ:	. HIGHI = 00.0/0
			4700000pF~10000000pF	: 20.0% max
			Insulation resistance:	. 20.0% Max
			470000pF	: 10M Ω min
			10000000pF	:5MΩ min
			Rate voltage: 16VDC	
			Capacitance change	: Within ±30.0%
			$\tan \delta$ :	
			220000pF~470000pF	:15.0% max
			1000000pF	: 22.5% max
			2200000pF	:17.5% max
			Insulation resistance:	
			220000pF	:100M Ω min
			470000 <sub>p</sub> F	: 50M Ω min
			1000000pF	: 25M Ω min
			2200000pF	: 25M Ω min
		Multilayer type	Rate voltage: 25VDC	
		(Characteristics:F)	Capacitance change	: Within ±30%
			$tan \delta$ :	
			10000pF~47000pF(Item△J)	: 12.5% max
			Insulation resistance:	500140
			10000pF~47000pF(Item△J)	: 500M Ω min
			Rate voltage: 35VDC	.\Mithin → 20.00/
			Capacitance change	:Within ±30.0%
			tan δ:	· 20.0% ms··
			1000000pF Insulation resistance:	: 20.0% max
			10000000pF	: 5M Ω min
			Rate voltage: 50VDC	. OIVI 3E THIIT
			Capacitance change:	
			10000pF~100000pF	:Within ±30.0%
			$\tan \delta$ :	
			10000pF~100000pF	: 12.5% max
			220000pF~470000pF	:15.0% max
			1000000pF	: 17.5% max
			Insulation resistance:	
			10000pF~100000pF	: 500M Ω min
			220000pF~470000pF	: 250M $\Omega$ min
			1000000pF	: 50M Ω min
	Temperature : 40±2°C			
Test Methods and	Humidity : 90 to 95			
Remarks		24/-0 hrs		
	Preconditioning : 1 hr of pr	reconditioning at $150+0/-10$ °C	followed by 48±4 hrs of recovery un	der the standard condition.

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Recovery	: 24±2 hrs of recovery under the standard condition after the removal from test chamber. (Class 1)
	:1 hr of preconditioning at 150+10/-0 °C followed by 48±4 hrs of recovery under the standard condition after
	the removal from chamber.(Class 2)

18. Loading under	Damp Heat				
			Appearance: No significant abnoma	-	
			Withstanding Voltage: No abnomality		
			Capacitance change:		
			8.2pF or under	:Within ±0.75pF	
	Class1 (Temperature	Multilayer type	10pF or over	:Within ±7.5%	
	Compensating)	Marchayor cypo	Q:		
			30pF or under	:Q≧100+10/3*C	
			33pF or over	:Q≧200	
			Insulation resistance	:500M Ω min	
			C : Nominal Capacitance [pF]		
			Appearance: No significant abnomality		
			Withstanding Voltage: No abnomali	ty	
			Rate voltage: 16VDC		
			Capacitance change:		
			1200pF~22000pF(Item△J)	: Within ±12.5%	
			220000pF~470000pF	: Within $\pm 15.0\%$	
			1000000pF~1000000pF	:Within ±22.5%	
			$ an\delta$ :		
			1200pF~22000pF(Item△J)	: 5.0% max	
			220000pF~470000pF	: 7.5% max	
			1000000pF~2200000pF	:10.0% max	
			4700000pF~10000000pF	: 22.5% max	
			Insulation resistance:	_	
			1200pF~22000pF(Item△J)	:500MΩ min	
			220000pF	: 50M Ω min	
			470000pF	: 25M Ω min	
			1000000pF	:12.5M Ω min	
			2200000pF	: 5.0M Ω min	
			4700000pF~10000000pF	: 2.5M Ω min	
			Rate voltage: 25VDC		
Specified Value			Capacitance change:	W:-1: 1 00 F8/	
Specified value			1000000pF	: Within ±22.5%	
			$\tan \delta$ :	. 00 F0/	
			1000000pF	: 22.5% max	
			Insulation resistance: 10000000pF	: 2.5M Ω min	
	Class2(High Dielectric)	Multilayer type	Rate voltage: 35VDC	. 2.5101 32 111111	
	Olassiz (Trigit Dicicculic)	(Characteristics: B, B5)	Capacitance change:		
			1000000pF	: Within $\pm 15.0\%$	
			2200000pF	: Within ± 15.0%	
			470000pF~1000000pF	: Within ±22.5%	
			$\tan \delta$ :		
			1000000pF	:10.0% max	
			2200000pF~4700000pF	:10.0% max	
			10000000pF	: 22.5% max	
			Insulation resistance:		
			1000000pF	: 12.5M Ω min	
			2200000pF	: 5.0M Ω min	
			4700000pF~10000000pF	: 2.5M Ω min	
			Rate voltage: 50VDC		
			Capacitance change:		
			100pF∼39000pF	: Within $\pm 12.5\%$	
			47000pF~1000000pF	:Within ±15.0%	
			(1000000pF/B5	:Within ±22.5%)	
			2200000pF~4700000pF	: Within ±22.5%	
			$ an\delta$ :		
			100pF∼39000pF	:5.0% max	
			47000pF~1000000pF	: 7.5% max	
			(1000000 <sub>p</sub> F/B5	:17.5% max)	
			2200000pF~4700000pF	: 22.5% max	
			Insulation resistance:		
				_	
			100pF~39000pF 47000pF~100000pF	: $500M\Omega$ min : $250M\Omega$ min	

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			220000pF	:125MΩ min	
			470000pF	: 25M Ω min	
			100000pF	: 12.5M Ω min	
			2200000pF	: 10M Ω min	
			4700000pF	: 2.5M Ω min	
			Appearance: No significant abnoma		
			=	=	
			Withstanding Voltage: No abnomali	ity	
			Rate voltage: 10VDC		
			Capacitance change	:Within ±30.0%	
			$ an\delta$ :		
			4700000pF~10000000pF	: 20.0% max	
			Insulation resistance:		
			4700000pF	:5MΩ min	
			1000000pF	: 2.5M Ω min	
			Rate voltage: 16VDC		
			Capacitance change	: Within ±30.0%	
			$\tan \delta$ :		
			220000pF~470000pF	: 15.0% max	
			1000000pF	: 22.5% max	
			2200000pF	: 17.5% max	
			Insulation resistance:	. 17.5/0 1110	
				. EOM ()	
			220000pF	:50MΩ min	
			470000pF	: 25M Ω min	
			1000000pF	: 12.5M Ω min	
			2200000pF	: 12.5M Ω min	
		Multilayer type	Rate voltage: 25VDC		
		(Characteristics: F)	Capacitance change	: Within $\pm 30.0\%$	
		(Gridianteriones).	$ an\delta$ :		
			10000pF∼47000pF(Item△J)	:12.5% max	
			Insulation resistance: 10000pF~47000pF(Item△J)	: 250M Ω min	
			Rate voltage:35VDC		
			Capacitance change	: Within ±30.0%	
			tan δ:	: Within ±30.0%	
				00.0%	
			1000000pF	: 20.0% max	
			Insulation resistance:	0.514.0	
			10000000pF	: 2.5M Ω min	
			Rate voltage: 50VDC		
			Capacitance change	:	
			10000pF~1000000pF	:Within $\pm 30.0\%$	
			$ an\delta$ :		
			10000pF∼100000pF	:12.5% max	
			220000pF~470000pF	:15.0% max	
			1000000pF	:17.5% max	
			Insulation resistance:		
			10000pF∼100000pF	: 250M Ω min	
			220000pF~470000pF	:125MΩ min	
			1000000pF	: 25M Ω min	
-	Temperature : 40±2°C	1	· · · · · · · · · · · · · · · · · · ·		
	Humidity : 90 to 95	% RH			
	Duration : 500 +24				
	Applied voltage : Rate volt				
est Methods and		_	C followed by 48±4 hrs of recovery	under the standard condition	
emarks					
	Recovery : 24±2 hrs of recovery under the standard condition after the removal from test cham-ber. (Class 1)				
		followed by 48±4 hrs of recovery ur	nder the standard condition off-		
		oval from chamber. (Class 2)	Tollowed by 40 14 files of recovery un	ider the Standard Condition alle	
	une rem	oval from chamber. (Glass 2)			
). High Temperatu	re Lading Test	1			
			Appearance: No significant abnoma	ality	
			Withstanding Voltage: No abnomali	ity	
			Capacitance change:		
			8.2pF or under	:Within ±0.3pF	
	Class1 (Temperature		10pF or over	:Within ±3.0%	
pecified Value		Multilayer type	<del>- '                                  </del>		

Specified Value			Appearance: No significant abr Withstanding Voltage: No abno	•
	Class1 (Temperature	Multilayer type	Capacitance change: 8.2pF or under 10pF or over	:Within ±0.3pF :Within ±3.0%
	Compensating)		Q: 8.2pF or under 10pF~30pF 33pF or over Insulation resistance	: Q≧200+10C : Q≧275+2.5C : Q≧350 :1000MΩ min

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		C : Nominal Capacitance [pF]  Appearance: No significant abnor	nality
		Withstanding Voltage: No abnoma	
		Rate voltage: 16VDC	<u> </u>
		Capacitance change:	
		1200pF~22000pF(Item△J)	:Within ±12.5%
		220000pF~470000pF	:Within ±15.0%
		1000000pF~1000000pF	:Within $\pm 22.5\%$
		$\tan \delta$ :	
		1200pF~22000pF(Item△J)	: 5.0% max
		220000pF~470000pF	: 7.5% max
		1000000pF~2200000pF	: 10.0% max
		4700000pF~1000000pF	: 22.5% max
		Insulation resistance:	
		1200pF∼22000pF(Item△J)	:1000MΩ min
		220000pF	:125MΩ min
		470000pF	: $50M\Omega$ min
		1000000pF	: 25M $\Omega$ min
		2200000pF	: 12.5M $\Omega$ min
		4700000pF~10000000pF	: 5.0MΩ min
		Rate voltage: 25VDC	
		Capacitance change:	
		10000000pF	:Within ±22.5%
		tan δ:	
		10000000pF	: 22.5% max
		Insulation resistance:	
		10000000pF	:5MΩ min
		Rate voltage: 35VDC	
		Capacitance change:	
	Multilayer type	1000000 <sub>p</sub> F	: Within $\pm 15.0\%$
	(Characteristics: B, B5)	2200000 <sub>p</sub> F	: Within $\pm 15.0\%$
		4700000pF~10000000pF	:Within ±22.5%
		$ an\delta$ :	
		1000000 <sub>p</sub> F	:10.0% max
Class2(High Dielectric)		2200000pF~4700000pF	:10.0% max
Glassz (filgri Dielectric)		10000000pF	: 22.5% max
		Insulation resistance:	
		1000000 <sub>p</sub> F	: 25M $\Omega$ min
		2200000 <sub>p</sub> F	: 25M $\Omega$ min
		4700000pF~10000000pF	:5MΩ min
		Rate voltage:50VDC	
		Capacitance change:	
		100pF∼39000pF	: Within $\pm 12.5\%$
		47000pF~1000000pF	:Within ±15.0%
		(1000000pF/B5	: Within ±22.5%)
		2200000pF~4700000pF	: Within ±22.5%
		tan δ:	F.62"
		100pF~39000pF	: 5.0% max
		47000pF~1000000pF	: 7.5% max
		(1000000/B5	: 17.5% max)
		2200000pF~4700000pF	: 22.5% max
		Insulation resistance:	· 1000M ()!
		100pF~39000pF	:1000MΩ min
		47000pF~100000pF	: $500M \Omega$ min : $250M \Omega$ min
		220000pF	:250M Ω min :100M Ω min
		470000pF 1000000pF	: 100M Ω min : 50M Ω min
		2200000pF	: 50M Ω min
		-	: 20M Ω min : 5M Ω min
		4700000pF	
		Appearance: No significant abnor	
		Withstanding Voltage: No abnoma	lity
		Rate voltage: 10VDC	
		Capacitance change	:Within ±30.0%
	Multilayer type	$\tan\delta$ :	
	(Characteristics:F)	4700000pF~10000000pF	: 20.0% max
		Insulation resistance:	
		4700000pF	: $10M\Omega$ min
		10000000pF	:5MΩ min
		Rate voltage: 16VDC	

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Capacitance change	: Within $\pm 30.0\%$
$\tan\delta$ :	
220000pF~470000pF	:15.0% max
1000000pF	: 22.5% max
2200000pF	:17.5% max
Insulation resistance:	
220000pF	: 100M Ω min
470000pF	:50MΩ min
1000000pF	: 25M Ω min
2200000pF	: 25M Ω min
Rate voltage: 25VDC	
Capacitance change	: Within ±30%
$tan \delta$ :	
10000pF∼47000pF(Item△J)	:10.0% max
Insulation resistance:	
10000pF∼47000pF(Item△J)	: 500M Ω min
Rate voltage: 35VDC	
Capacitance change	: Within ±30.0%
$tan \delta$ :	
1000000pF	: 20.0% max
Insulation resistance:	
1000000pF	: 5M Ω min
Rate voltage: 50VDC	
Capacitance change:	W: 1 . 00 00/
	: Within 30.0%
	10.0%
· · · · · · · · · · · · · · · · · · ·	: 10.0% max
_ · · · · · · · · · · · · · · · · · · ·	:12.5% max
· · · · · · · · · · · · · · · · · · ·	:17.5% max
	500MO :
	:500M Ω min
	: 250M Ω min
TUUUUUUpF	: 50M Ω min
	tan $\delta$ :  220000pF~470000pF  1000000pF  2200000pF  Insulation resistance:  220000pF  470000pF  1000000pF  2200000pF  Rate voltage:25VDC  Capacitance change  tan $\delta$ :  10000pF~47000pF(Item $\Delta$ J)  Insulation resistance:  10000pF~47000pF(Item $\Delta$ J)  Rate voltage:35VDC  Capacitance change  tan $\delta$ :  100000pF~1000pF  Insulation resistance:  10000000pF  Insulation resistance:  10000000pF  Insulation resistance:

Class 2: B,B5 1000000pF(025Type)

: B,B5 220000pF~10000000pF(050Type, 075Type)

: 1 hr of preconditioning at 150  $\,\pm$ 10-0  $\,^{\circ}$ C followed by 48 $\pm$ 4 hrs of recovery under the standard condition. Preconditioning :  $24\pm2\text{hrs}$  of recovery under the standard condition after the removal from test chamber. Recovery

(Class1)

: 1 hr of preconditioning at  $150 \pm 10 - 0$  °C followed by  $48 \pm 4$  hrs of recovery under the standard condition after the

removal from chamber. (Class 2)

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

5 to  $35^{\circ}\text{C}\,$  of temperature, 45 to 85% relative humidity, and 86 to 106kPa of air pressure.

When there are questions concerning measurement results:

Test Methods and

Remarks

In order to provide correlation data, the test shall be conducted under condition of 20±2°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.

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## Precautions on the use of Axial Leaded Ceramic Capacitors

#### **■PRECAUTIONS**

#### 1. Circuit Design

- ◆ Verification of operating environment, electrical rating and performance
  - 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.
- ◆Verification of Rated voltage ( DC rated voltage)
- 1. The operating voltage for capacitors must always be lower than their rated values.

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.

#### Precautions

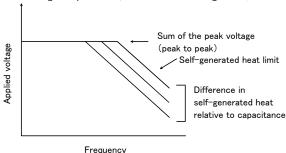
- ◆Self-generated heat (Verification of Temperature)
  - 1. If the capacitors specified only for DC use are used in AC or pulse circuits, the AC or a pulse current can generate heat inside the capacitor so the self-generated temperature rise should be limited to within 20°C. The surface temperature measured 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.
- ◆Operating Environment precautions
  - 1. Capacitors should not be used in the following environments:
  - (1) Environmental conditions to avoid
    - a. exposure to water or salt water.
    - b. exposure to moisture or condensation.
    - c. exposure to corrosive gases (such as hydrogen sulfide, sulfurous acid, chlorine, and ammonia)
- 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.

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.

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.

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.)

## Technical considerations



### 2. PCB Design

## Precautions

#### ◆Design of the capacitor mount

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.

### 3. Considerations for automatic insertion

### Precautions

- ◆Adjustment Automatic Insertion machines ( leaded components)
  - 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.

# Technical considerations

- 1. When installing products, care should be taken not to apply distortion stress as it may deform the products.
- 2. Our company recommends the method to place the lead with fewer loads that join the product.

### 4. Soldering

This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/).

### ◆Selection of Flux 1. When soldering capacitors are on the board, flux should be applied thinly and evenly. 2. Flux used should be with less than or equal to 0.1 wt% (equivalent to Chlorine) of halogenated content. Flux having a strong acidity content should not be applied. 3. When using water-soluble flux, special care should be taken to properly clean the boards. ◆Wave Soldering 1. Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions. Precautions 2. Do not immerse the entire capacitor in the flux during the soldering operation. Only solder the lead wires on the bottom of the board. Recommended conditions for using a soldering iron: 1. Put the soldering iron on the land-pattern. Soldering iron's temperature - below 350°C Duration - 3 seconds or less Numbers of times - 1 times The soldering iron should not directly touch the capacitor. Selection of Flux 1. 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. 2. 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. 3. 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. Technical ◆Wave Soldering considerations 1. 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.

◆Recommended conditions for using a soldering iron:

the reliability of the products.

voltage.

5. Cleaning	
Precautions	◆Board cleaning  1. When cleaning the mounted PC boards, make sure that cleaning conditions are consistent with prescribed usage conditions.
Technical considerations	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.  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.

2. 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

1. If products are used beyond the range of the recommended conditions, heat stress may deform the products, and consequently degrade

6. Post-cleaning	-process
Precautions	<ul> <li>♠Application of resin molding, etc. to the PCB and components.</li> <li>1. Please contact your local Taiyo Yuden sales office before performing resin coating or molding on mounted capacitors. Please contact your local Taiyo Yuden sales office in case of sealing the capacitor with resin or molding it on mounted capacitors. Please verify that the sealing or molding does not affect on the actual application in quality.</li> </ul>
Technical considerations	<ul> <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 withstanding 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, cause 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> </ul>

7. Handling	
Precautions	<ul> <li>♦ Mechanical considerations</li> <li>1. Be careful not to subject the capacitors to excessive mechanical shocks. Withstanding voltage failure may result.</li> <li>2. If ceramic capacitors are dropped onto the floor or a hard surface they should not be used.</li> </ul>
Technical	1. Because the capacitor is made of ceramic, mechanical shocks applied to the board may damage or crack the capacitors.
considerations	2. Ceramic capacitors which are dropped onto the floor or a hard surface may develop defects and have a higher risk of failure over time.

### 8. Storage conditions

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	♦Storage
	1. 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: Ambien temperature Below 40 °C Humidity Below 70% RH.
Precautions	Products should be used within 6 months after delivery. After the above period, the solderability should be checked before using the capacitors.
	2. Capacitors should not be kept in an environment filled with decomposition gases such as sulfurous hydrogen, sulfurous acid, chlorine, ammonia, etc.
	3. Capacitors should not be kept in a location where they may be exposed to moisture, condensation or direct sunlight.
Technical considerations	1. 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.