# アキシャルリード形セラミックコンデンサ AXIAL LEADED CERAMIC CAPACITORS

**OPERATING TEMP** -25~+85°C



フロー/WAVE

#### 特長 FEATURES

・汎用型セラミックコンデンサで、単層形と積層形合わせて1pF~1µFと広 い容量範囲で部品の標準化が可能

- ・ラジアルに比べ自挿コストが安く、部品高さ低減、実装密度アップ、在庫 スペースも減少
- · This widely used ceramic capacitor includes both monolithic and multilayer types to provide a wide capacitance range of 1pF through 1uF in one standard size and shape.
- · Automatic insertion related costs are lower than with radial type capacitors

#### 用途 APPLICATIONS

形名表記法 ORDERING CODE

- ・Class1品は回路の温度特性補正及び周波数特性の安定化。B、X、Y、F特 はバイパスコンデンサに最適
- The class 1 temperature compensating (NPO) products can be used in circuits to stabilize frequency and temperature characteristics. • The B, X, Y and F dielectrics are optimum for bypass capacitors.

#### 5 8 4 6 0 定格電圧 [VDC] 温度特性 公称静電容量 [pF] 容量許容差 [%] Е 16 СН 0± 60(ppm /°C) 例 ※R= 小数点 J-± 5 25 RH -220± 60(ppm /°C) 010 K-±10 Т 1 M-U 50 UJ -750±120(ppm /℃) 1R2 1.2 ±20 \_ N-SL +350~-1000(ppm /°C) 103 10000 ±30 2 Z ± 20 (Y5P) ±10% (単層形) (X5R) ±15% (積層形) ∆B 形式 (Y5V)<sup>+30</sup><sub>-85</sub>% ∆F アキシャルリードコンデンサ Р ΔX (Y5R)±15% リード形状 (mm) ΔY (Y5S) ±22% 3 △= スペース Α-| 26.0 テープ幅テーピング 形状寸法 (LX ød)[mm] 52.0 テープ幅テーピング B-3.5×1.9(単層形) KE 7.5 ピッチフォーミング (単層タイプ) 050 3.2×2.2(積層形) 5.0 ピッチフォーミング KF 025 2.5×1.9(積層形) 単品ストレートリー NA ĸ

9	
当社管	理記号
$\bigtriangleup$	単層標準品
∆Z	積層標準品
	△= スペース

# P 0 5 0 S L 0 1 0 M

	_		
1	-1		

Rated voltage(VDC)							
E	16						
Т	25						
U	50						
2							

Туре

Р Axial leaded capacitors

## 3

Outside Dimensions(L $\times \phi$ d)(mm) 3.5×1.9(monolithic type) 050 3.2×2.2(multilayer type) 025 2.5×1.9(multilayer type)

Temperature							
characteristics(ppm/°C)							
CH	CH 0± 60						
RH	$-220\pm 60$						
UJ -750±120 SL +350~-1000							
						∆B	(Y5P) ±10% (monolithic type) (X5R) ±15% (multilayer type)
△F (Y5V) <sup>+30</sup> / <sub>85</sub> %							
△X (Y5R)±15%							
△Y (Y5S)±22%							
∠=Blank space							

4

5

Nominal Capacitance(pF)							
example							
010	1						
1R2	1.2						
103	10000						
WP-decimal point							

6	
Capaci	tance Tolerances(%)
J—	± 5
К—	±10
М-	±20
N-	±30
Z-	± 20

NA Axial lead, bulk

	± 20	
7		9
Lead (	Configuration	Int
A-	26mm lead space, ammo pack	,
В—	52mm lead space, ammo pack	2
KE	7.5mm pitch formed lead	,
	bulk(monolithic type)	2
KF	5.0mm pitch formed lead	
	bulk	

8

Packaging

в

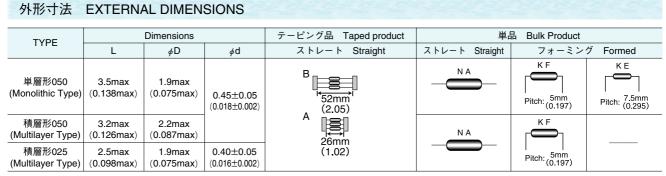
С

nterna	l code
	Monolithic type
	Standard products
∧7	Multilayer type
	Standard products
	∠=Blank space

Ammo

Bulk

## TAIYO YUDEN



#### Unit : mm(inch)

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

Class 1 (Temperature compensating)								
WV		50V(UP)						
Temp.char.		(	СН	RH	UJ	SL		
Type cap.		050	025	050	050	050		
[pF]	[pF:3digits]	030	025	030	030	050		
1	010							
1.2	1R2							
1.5	1R5							
1.8	1R8							
2.2	2R2							
2.7	2R7							
3.3	3R3							
3.9	3R9							
4.7	4R7							
5.6	5R6							
6.8	6R8							
8.2	8R2							
10 11	100							
12	110 120							
	130							
13 15	150							
16	160							
18	180							
20	200							
20	200							
24	240							
24	240							
27 30	300							
33	330		_					
36	360							
39	390							
43	430							
47	470							
51	510							
56	560							
62	620							
68	680							
100	101							
150	151							
220	221							
330	331							
470	471							
680	681							
1000	102							

P.130

単層タイプ (Monolithic type) Class 2, 3 (High dielectric constant)   積層タイプ (Multilayer type)									
W	50V(UP)				25V (TP)	16V	(EP)		
Temp.char.		В				F	F	Х	Y
Type cap.									
[pF]	[pF:3digits]	050	02	025	050	025	050	050	050
75	750								
82	820								
91	910								
100	101								
120	121								
150	151								
180	181								
220	221								
270	271								
330	331								
390 470	391 471								
470 560	561								
680	681								
820	821								
1000	102								
1200	122								
1500	152								
1800	182								
2200	222								
2700	272								
3300	332								
3900	392								
4700	472								
5600	562								
6800	682								
8200	822								
10000	103								
22000	223								
33000	333								
47000	473								
68000	683								
100000	104								
220000	224								
470000 1000000	474								
1000000	105								

温周	复特性	静電容量変化	静電容量変化率     容量許容差		Q又はtan <i>s</i>	種類
Temperature char.		Capacitance c	hange Capa	citance Tolerance	Q or tan <i></i> s	Class
СН		0± 60pp	om/°C 1.8pF(an 2.2~8.2p		単層タイプ(Monolithic Type) Q≧400+20C 積層タイプ(Multilayer Type) Q≧400+20C, 33pF(and over) Q≧1000	
	RH	$-220\pm$ 60pp	om/°C 10pF(or		Q≥400+20 · C, 16pF(and over) Q≥500	
	UJ	-750±120pp	om/°C		Q≧400+20 · C	
	ŞL	+350~-1000	opm/°C		Q≥400+20 · C, 33pF(and over) Q≥500	
	Y5P	±10%			単層タイプ(Monolithic Type) tanδ≦1.5%, 470pF(and over)tanδ≦2.5%	2, 3
∆B	X5R	±15%		K (±10%)	積層タイプ(Multilayer Type) 1200pF~39000pF :tanδ≦3.5% 47000pF~100000pF :tanδ≦5.0%	2
Χ(	Ý5R)	±15%	M(±20%	)、N(±30%)	tanδ≦2.5%	3
Υ(	Y5S)	<u>±22%</u> M(±20%)、N(±30%) tanδ≦2.5%			3	
					単層タイプ(Monolithic Type) tan <i>δ</i> ≦7.5%	3
∆F	Y5V	土 號 %		$Z(\pm^{80}_{20}\%)$	積層(Multilayer Type) 10000pF~100000pF :tan∂≦7.5% 220000pF~470000pF :tan∂≦10.0% 1000000pF :tan∂≦15.0%	2
	注1:温 注2:20	度特性の( )はEIA規格 ℃における静電容量を表			ristics in ( ) are EIA Standard. ristics measured at 20℃	
ェレクションフ selection Guid		アイテム一覧 Part Numbers	特性図 Electrical Characteristic	梱包 s Packaging	信頼性     使用上⊄ Reliability Data     Precauti	

P.8

P.136

P.138

P.135

P.148

## [単層タイプ Monolithic type] -

定格 電圧 RatedVoltage (DC)	形 名 Ordering code	温度特性 Temperature characteristic:	Capacitance	容量 許容差 Capacitance tolerance	Q or tan <i></i>	絶縁抵抗 Insulation resistance
	UP050 $\triangle$ 010M- $\bigcirc$	СН	1.0	-		
	UP050 $\triangle$ 1R2M- $\bigcirc$		1.2	±20%		
	UP050 $\triangle$ 1R5M– $\bigcirc$		1.5	±20%		
	UP050 △ 1R8M- 〇		1.8		_	
	UP050 △ 2R2K- 〇		2.2			
	UP050 △ 2R7K- 〇		2.7	_		
	UP050 △ 3R3K- 〇		3.3	_		
	UP050 $\triangle$ 3R9K– $\bigcirc$		3.9	±10%	Q≧400+20C	
	UP050 $\triangle$ 4R7K– $\bigcirc$		4.7		(C:公称静電容量	
	UP050 $\triangle$ 5R6K– $\bigcirc$	СН	5.6	-	capacitance[pF]) ただしRHは 16pF以上は Q≧500 but Q≧500 at 16pF or over of characteristic RH	
-	UP050 $\triangle$ 6R8K– $\bigcirc$	RH	6.8			
	UP050 △ 8R2K- 〇		8.2			
	UP050 △ 100 J – 〇	0J SL	10			
	UP050△110J-〇	SL	11			10000MΩmin
	UP050 △ 120 J – ()		12			
	UP050 △ 130 J – 〇		13			
50V	UP050 △ 150 J – 〇		15			
	UP050 △ 160 J – 〇		16			
	UP050 △ 180 J – 〇		18			
	UP050 △ 200 J – ()	CH、UJ、SL	. 20			
	UP050 △ 220 J – 〇		22			
	UP050 △ 240 J – 〇	UJ	24	-		
	UP050 △ 270 J – 〇	SL	27	± 5%		
	UP050 △ 300 J – 〇		30	-		
	UP050SL330J-()		33	1		
	UP050SL360J-()		36	-		
	UP050SL390J-()		39	1		
	UP050SL430J-()		43	1		
	UP050SL470J-〇	SL	47	1	Q≧500	
	UP050SL510J-〇		51	1		
	UP050SL560J-0		56	1		
	UP050SL620J-〇		62	1		
	UP050SL680J-0		68	1		

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

 $\bigtriangleup {\sf P}{\sf lease}$  specify the temperature characteristics code and  $\bigcirc$  lead configuration code.

★ : Option

#### TAIYO YUDEN

lass 2							
定格	形名		温度特性	公称	容量		絶縁抵抗
電圧			Temperature	静電容量	許容差	Q or tan <i></i>	Insulation
RatedVoltage	Ordering code		characteristics	Capacitance	Capacitance		resistance
(DC)				(pF)	tolerance		
-	UP025CH220J- () Z		-	22			
*	UP025CH240J-OZ		-	24		Q≧400+20C	
_	UP025CH270J-OZ		-	27		<u>q_1001200</u>	
*	UP025CH300J- 🔿 Z		-	30			
	UP025CH330J- 🔿 Z		-	33			
*	UP025CH360J- 🔿 Z			36			
	UP025CH390J- 🔿 Z		-	39			
*	UP025CH430J- 🔿 Z		-	43			
	UP025CH470J- 🔿 Z		_	47			
*	UP025CH510J-OZ		-	51			
	UP025CH560J-OZ		-	56			
*	UP025CH620J-O Z			62			
	UP025CH680J-0 Z			68			
*	UP025CH750J- 🔿 Z			75			
*	UP025CH820J- 🔿 Z			82			
*	UP025CH910J-0 Z			91			10000MΩmin
	UP025CH101J- 〇 Z			100			
*	UP025CH111J-O Z			110			
*	UP025CH121J- 🔿 Z			120		Q≧1000	
*	UP025CH131J- 🔿 Z		СН	130			
50V	UP025CH151J- 🔿 Z			150	± 5%		
*	UP025CH161J-〇 Z	- O Z		160			
*	UP025CH181J- 〇 Z			180			
*	UP025CH201J- 〇 Z			200	-		
	UP025CH221J- ○ Z ★ UP025CH241J- ○ Z			220			
*			240				
*	UP025CH271J- O Z			270	-		
*	UP025CH301J- 〇 Z			300			
	UP025CH331J- 🔿 Z			330			
*	UP025CH361J- 〇 Z		-	360			
*	UP025CH391J- 〇 Z		-	390			
*	UP025CH431J- 〇 Z		-	430	-		
	UP025CH471J- 〇 Z		-	470			
*	UP025CH511J- 〇 Z		-	510			
*	UP025CH561J- 〇 Z		-	560			
*	UP025CH621J- 〇 Z		-	620			
	UP025CH681J- 〇 Z		-	680			
*	UP025CH751J- O Z		-	750			
*	UP025CH821J- O Z		-	820			
*	UP025CH911J- O Z		-	910			
	UP025CH102J- O Z		-	1000			
*	UP025 B122K- O Z			1200			
	UP025 B152K-O Z			1500			
*	UP025 B182K-O Z			1800			
	UP025 B222K- O Z			2200			
*	UP025 B272K- O Z		-	2700			
	UP025 B332K- O Z		-	3300			
<sup>50V</sup> ★	UP025 B392K- O Z		B	3900	±10%	tan <i></i> δ≦3.5%	5000MΩmin
	UP025 B472K- O Z			4700			
*	UP025 B562K- O Z			5600			
	UP025 B682K- O Z			6800			
	UP025 B822K- O Z			8200			
^	UP025 B103K- O Z			10000			
	UP025 F103Z- O Z			10000			
F	UP025 F1032- O Z UP025 F223Z- O Z			22000			
50V	UP025 F2232- O Z UP025 F473Z- O Z		F	47000	±20%	tan <i></i> s≦7.5%	1000MΩmin
F							
	UP025 F104Z-🔿 Z			100000			

アイテム一覧 PART NUMBERS

## [積層タイプ Multilayer type] -

C	ass	1

Class 1						
定格	TV A	印度性地	公 称	容量		絶縁抵抗
電圧	形名	温度特性	静電容量	許 容 差	Q or tan <i></i>	
RatedVoltage		Temperature	Capacitance	Capacitance	G of tanto	Insulation
(DC)	Ordering code	characteristics	(pF)	tolerance		resistance
	UP050CH220J-O Z		22			
*	UP050CH240J-0 Z		24		Q≧400+20C	
	UP050CH270J-0 Z		27		Q≧400⊤20C	
*	UP050CH300J-0 Z		30			
	UP050CH330J-O Z		33			
*	UP050CH360J-O Z		36			
	UP050CH390J-0 Z		39			
*	UP050CH430J-0 Z		43			
	UP050CH470J-OZ		47			
*	UP050CH510J-O Z		51			
	UP050CH560J-0 Z		56			
*	UP050CH620J-0 Z		62			
	UP050CH680J-0 Z		68			
*	UP050CH750J-OZ		75			
*	UP050CH820J-0 Z		82			
*	UP050CH910J-O Z		91			
	UP050CH101J-O Z		100	_		
*	UP050CH111J-OZ		110			
*	UP050CH121J-OZ		120			
*	UP050CH131J-0 Z		130			
50V	UP050CH151J-OZ	СН	150	± 5%	Q≧1000	10000MΩmin
*	UP050CH161J-OZ		160			
*	UP050CH181J-0 Z		180			
*	UP050CH201J-OZ		200			
	UP050CH221J-O Z	-	220			
*	UP050CH241J-OZ		240			
*	UP050CH271J-OZ		270			
*	UP050CH301J-O Z		300			
			330			
*			360			
*			390			
*			430			
			470			
*			510			
*			560			
*			620			
			680			
*	UP050CH751J-OZ		750			
*		ł	820			
*	UP050CH911J-OZ		910			
	UP050CH102J-0 Z		1000			

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

 $\bigtriangleup {\sf P}{\sf lease}$  specify the temperature characteristics code and  $\bigcirc$  lead configuration code.

 $\bigstar$  : Option

[単層タイプ	Monolithic type]	_
Class 2.3		

Class 2, 3							
定格電圧	形名		温度特性 Temperature	公称	容量許容差	Q or tan <i></i>	絶縁抵抗 Insulation
RatedVoltage (DC)	Ordering code		characteristics	Capacitance (pF)	Capacitance tolerance		resistance
	UP050 B750K- 🔿			75			
-	UP050 B820K- 🔿			82			
-	UP050 B910K- 🔿			91			
	UP050 B101K- 🔿			100			
	UP050 B121K- 🔿			120			
	UP050 B151K- ()			150		tan <i></i> δ≦1.5%	
-	UP050 B181K- ()			180			10000MΩmin
50V	UP050 B221K- ()		в	220	±10%		
500	UP050 B271K- ()		в	270	±10%		
-	UP050 B331K- 🔿		1	330			
-	UP050 B391K- 🔿	050 B391K- ()		390			
-	UP050 B471K- ()		-	470	-	_	
-	UP050 B561K- ()			560			
-	UP050 B681K- 🔿			680			
-	UP050 B821K- 🔿			820			
-	UP050 B102K- ()			1000			
	EP050 X122□-○			1200			
	EP050 X152□-○			1500			
	EP050 X182□-○			1800			
	EP050 X222□-○			2200		tan <i></i> s≦2.5%	
-	EP050 X272□-○		y I	2700			
101	EP050 X332□-○		Х	3300	±20%		1000MΩmin
16V	EP050 X392□-○			3900	±30%		
-	EP050 X472□-○			4700			
-	EP050 X562□-○			5600			
	EP050 X682□-○			6800			
	EP050 Y822 - O		V	8200			
	EP050 Y103□-0		Y	10000			
051/	TP050 F103Z- ()		_	10000	1 80 c/		
25V	TP050 F223Z- ()		F	22000	$\pm^{80}_{20}\%$	tan <i></i> s≦7.5%	

形名の□には容量許容差、○にはリード形状分類記号が入ります。

 $\Box \mbox{Please}$  specify the capacitance tolerance code and  $\bigcirc$  lead configuration code.

## [積層タイプ Multilayer type] -

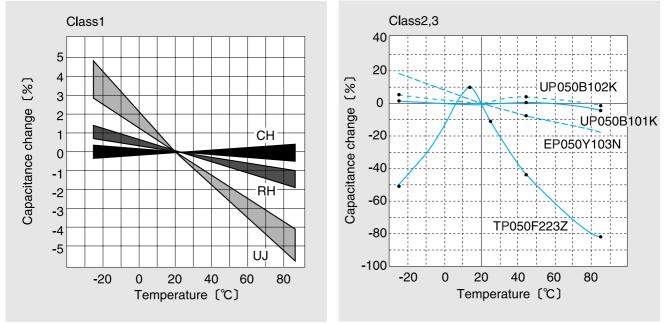
Class	2
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Class 2							
定格 電圧 RatedVoltage (DC)	形 名 Ordering code		温度特性 Temperature characteristics	公称 静電容量 Capacitance 〔pF〕	容量 許容差 Capacitance tolerance	Q or tan <i></i>	絶縁抵抗 Insulation resistance
*	UP050 B122K-O Z			1200			
	UP050 B152K-O Z			1500			
*	UP050 B182K-O Z			1800			
	UP050 B222K-O Z			2200			
*	UP050 B272K-O Z			2700			
	UP050 B332K-O Z			3300			
*	UP050 B392K-O Z			3900			
	UP050 B472K-O Z			4700			
*	UP050 B562K-O Z			5600			
	UP050 B682K-O Z		]	6800		tan <i>δ≦</i> 3.5%	5000MΩmin
*	UP050 B822K-O Z			8200			
50V	UP050 B103K-O Z		B	10000	±10%		
*	UP050 B123K-O Z			12000			
	UP050 B153K-O Z			15000			
*	UP050 B183K-O Z			18000			
	UP050 B223K-O Z			22000			
*	UP050 B273K-O Z		1	27000			
	UP050 B333K-O Z			33000			
*	UP050 B393K-O Z			39000			
	UP050 B473K-O Z			47000			
*	UP050 B563K-O Z			56000			
	UP050 B683K-O Z			68000		tan <i>δ≦</i> 5.0%	1000MΩmin
*	UP050 B823K-O Z			82000			
	UP050 B104K-O Z			100000			
	UP050 F103Z-O Z			10000			
	UP050 F223Z-0 Z			22000		tan <i>δ</i> ≦7.5%	1000MΩmin
	UP050 F473Z-O Z			47000		ld∏∂≧7.5%	1000101321010
50V	UP050 F104Z-0 Z		F	100000	+80 %		
	UP050 F224Z-0 Z		1	220000		ton \$<10.0%	500MΩmin
	UP050 F474Z-0 Z		1	470000		tan <i></i> δ≦10.0%	SUOIVISZMIN
	UP050 F105Z-0 Z			1000000		tan <i></i> s≦15%	250MΩmin

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

 $\bigtriangleup Please$  specify the temperature characteristics code and  $\bigcirc$  lead configuration code.

 $\bigstar$  : Option



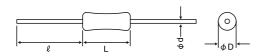
・静電容量-温度特性 Capacitance -vs- Temperature Characteristics

#### ①最小受注単位数 Minimum Quantity

形式 Type	リード形状記号 Lead configuration	最小受注単位数(PCS) Minimum Quantity		
туре	code	袋づめ Bulk	テーピング Taping	
積層形	A-(26mm幅) 1.024 inch wide		3000, 4000(025type)	
項眉加 Multilayer type	B-(52mm幅)2.047 inches wide		3000, 4000(025type)	
(050, 025)	NA	1000		
(050, 025)	KF	3000	_	
	A-(26mma)1.024 inch wide		4000	
単層形	B(52mm幅)2.047 inches wide		4000	
平信//2 Monolithic type	NA	1000		
wononitriic type	KF	3000		
	KE	3000		

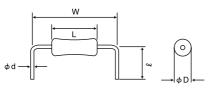
#### ②製品単品形状 Dimensions of Bulk Products

・NA形状 NA configuration



形式	寸 法 Dimensions(mm)						
Туре	φD	L	φd	l			
積層形 025	1.9max	2.5max	0.40±0.05	20.0min			
Multilayer type	(0.075)	(0.098)	(0.016±0.002)	(0.787)			
積層形 050	2.2max	3.2max	0.45±0.05	20.0min			
Multilayer type	(0.087)	(0.126)	(0.018±0.002)	(0.787)			
単層形	1.9max	3.5max	0.45±0.05	20.0min			
Monolithic type	(0.075)	(0.138)	(0.018±0.002)	(0.787)			
Unit : mm(inch)							

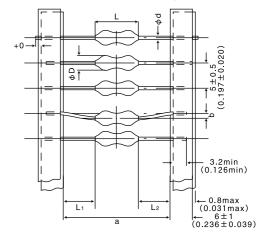
・KF/KE形状 KF/KE configuration



形式	リード形状記号	寸 法 Dimensions(mm)					
Туре	Lead configuration code	¢D	L	w	¢d	l	
積層形 025	KF	1.9max	2.5max	5.0±0.5	0.40±0.05	6.5±0.5	
Multilayer type		(0.075max)	(0.098max)	(0.197±0.020)	(0.016±0.002)	(0.256±0.020)	
積層形 050	KF	2.2max	3.2max	5.0±0.5	0.45±0.05	6.5±0.5	
Multilayer type		(0.087max)	(0.126max)	(0.197±0.020)	(0.018±0.002)	(0.256±0.020)	
単層形	KF	1.9max	3.5max	5.0±0.5	0.45±0.05	6.5±0.5	
Monolithic type		(0.075max)	(0.138max)	(0.197±0.020)	(0.018±0.002)	(0.256±0.020)	
単層形	KE	1.9max	3.5max	7.5±0.5	$0.45 \pm 0.05$	6.5±0.5	
Monolithic type		(0.075max)	(0.138max)	(0.295±0.020)	(0.018±0.002)	(0.256±0.020)	
					Unit :	mm(inch)	

#### ③テーピング寸法 Taping Dimensions

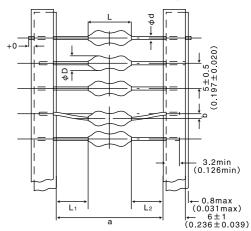
A-(a:26mm幅)形状(a:1.024 inch wide)configuration



形式		寸 法 Dimensions						
Туре	φD	L	а	b	$  L_1 - L_2  $	ød	insertion pitch	
積層形 025	1.9max	2.5max				0.40±0.05		
Multilayer type	(0.075max)	(0.098max)				(0.016±0.002)		
積層形 050	2.2max	3.2max	26 <sup>+0.5</sup>	0.8以下	0.5max		5.0	
Multilayer type	(0.087max)	(0.126max)	$(1.024^{+0.020}_{-0})$	(0.031 or less)	(0.020max.)	0.45±0.05	(0.197)	
単層形	1.9max	3.5max				(0.018±0.002)		
Monolithic type	(0.075max)	(0.138max)						

Unit mm(inch)





形式		寸 法 Dimensions						
Туре	φD	L	а	b	$ L_1 - L_2 $	ød	insertion pitch	
積層形 025	1.9max	2.5max				0.40±0.05		
Multilayer type	(0.075max)	(0.098max)				(0.016±0.002)		
積層形 050	2.2max	3.2max	52 <sup>+2</sup>	1.2以下	1.0max		5.0	
Multilayer type	(0.087max)	(0.126max)	$(2.047^{+0.079}_{-0.039})$	(0.047 or less)	(0.039max.)	0.45±0.05	(0.197)	
単層形	1.9max	3.5max				(0.018±0.002)		
Monolithic type	(0.075max)	(0.138max)						

Unit: mm(inch)

## TAIYO YUDEN

				Specified Value				
Item		Temperature Com	pensating(Class 1)	High Permit	tivity(Class 2)	Semiconductor(Class 3)	Test Methods and Remarks	
		Monolithic type	Multilayer Type	Monolithic type	Multilayer Type	Monolithic type		
1.Operating Ten Range	nperature	-25 to +85℃	—55∼+85℃	–25~+85℃	B:−25~+85℃ (X5R:−55~+85℃) F:−25~+85℃ (Y5V:−30~+85℃)	−25~+85℃		
2.Storage Tem Range	perature	-25 to +85℃						
3.Rated Voltage	)	50VDC		50VDC	16VDC,25VDC,50VDC	16VDC,25VDC,50VDC		
4. Withstanding Voltage	Between terminals	No abnormality					Applied voltage: Rated Voltage×3 (Class 1) (Class 2: Monolithic type) Rated Voltage×1.5 (Class 3: B) 18V (Class 3: X,Y) Rated Voltage×2 (Class 2: Multilayer type) (Class 3: F Rated Voltage×2.5 (Class 2: Multilayer type 50VDC) Duration: 1 to 5 sec. Charge/discharge current: 50mA max. (Class 1,2) 10mA max. (Class 3)	
	Between	No abnormality					Metal globule method	
	terminals and body						Applied voltage: Rated Voltage×2.5 Duration: 1 to 5 sec. Charge/Discharge current : 50mA max.	
5.Insulation Res	sistance	10,000 MΩ min.		10,000 MΩ min.	Rated voltage: 16 VDC           F: 250 MΩ min.           Rated voltage: 25 VDC           B: 1,000 MΩ min.           Rated voltage: 50 VDC           B(X5R):           1200pF-3000pF : 500M0min.           4700pF-10000pF : 1000Momin.           F(YSV):           10000pF-470000pF : 500M0min.           100000pF : 250M0min.	1,000 MΩ min.	Applied voltage: Rated voltage Duration : 60±5 sec.	
6.Capacitance		1.8 pF or under : ±20% 2.2 pF to 8.2 pF: ±10% 10 pF or over : ±5%	±5%	Rated voltage: 50 VDC B: 75 pF to 560 pF : ±10%	$\begin{array}{l} \mbox{Rated voltage: 16 VDC} F: 1,000,000 \ pF: \frac{80}{20} \% \\ \mbox{Rated voltage: 25 VDC} \\ \mbox{B: 100,000 \ pF: \pm 10\%} \\ \mbox{Rated voltage: 50 VDC} \\ \mbox{B(X5R): \pm 10\%} \\ \mbox{F(Y5V): } \frac{+80}{-20} \% \end{array}$	X: 1,200 pF to 6,800 pF: ±20%, ±30%	Measuring frequency 1MHz±20% (Class 1: Monolithic type) 1kHz±20% (Class 2: Monolithic type) (Class 3) 1MHz±10% (Class 1: Multilayer type C≤1000pF) 1kHz±10% (Class 1: Multilayer type C>1000pF) 1kHz±10% (Class 2: Multilayer type) Measuring voltage:1.0±0.5Vrms (Class 1,2) (Class 3: B,X,Y) 0.1Vrms max. (Class 3: F) Measuring temperature: 20°C (Monolithic type) Bias application: None	
7.Q or Tangent Loss Angle	of	30 pF or under : Q≥400+20C 33 pF or over : Q≥500 16 pF to 18 pF of RH: Q≥500 C= Nominal capacitance [pF]	30 pF or under : Q≥400+20C 30 pF or over : Q≥1000	B: 75 pF to 390 pF: 1.5% max. 470 pF to 560 pF: 2.5% max	Rated voltage: 16 VDC           F: 15.0% max.           Rated voltage: 25 VDC           B: 5.0% max.           Rated voltage: 50 VDC           B(X5R):           1200F-30000F           1200F-400000F           10000F-400000F           10000F-400000F           10000F-10.0000F           100000F           15.0% max           100000F           15.0% max	Rated voltage: 16 VDC           X: 2.5% max.           Y: 2.5% max.           Rated voltage: 25 VDC           F: 7.5% max.           Rated voltage: 50 VDC           B: 2.5% max.		
8.Capacitance Change due to Temperature or Rate of Capaci- tance Change	(When voltage is not applied)	CH: 0±60 RH: -220±60 UJ: -750±120 SL: +350 to -1,000 [ppm/C]	CH:0±60 [ppm/C]	B: ±10%	$\begin{array}{l} \mbox{Rated voltage: 16 VDC} \\ \mbox{F:} ^{+30}_{-85} \% \\ \mbox{Rated voltage: 25 VDC} \\ \mbox{B:} \pm 10\% \\ \mbox{Rated voltage: 50 VDC} \\ \mbox{B:} \pm 10\% \\ \mbox{(X5R:} \pm 15\%) \\ \mbox{F:} ^{+30}_{-85} \% \\ \mbox{(Y5V:} ^{+22}_{-82} \%) \end{array}$	Rated voltage: 16 VDC X: $\pm 15\%$ Y: $\pm 22\%$ Rated voltage: 25 VDC F: $\frac{+30}{85}$ % Rated voltage: 50 VDC B: $\pm 10\%$	$\begin{array}{l} \mbox{Measurement of capacitance at 20°C and 85°C, -25°C shall be made to calculate temperature characteristic by the following equation. (Class 1) \begin{array}{l} (C_{ss}-C_{so}) \\ C_{so}\times\Delta T \end{array} \times 10^{\circ} (ppm/C) \\ \hline (C_{-2s}-C_{so}) \\ C_{co}\times\Delta T \end{array} \times 10^{\circ} (ppm/C) \\ \hline (C_{-2s}-C_{so}) \\ C_{-2s}\times\Delta T \end{array} \times 10^{\circ} (ppm/C) \\ \hline (C_{-2s}-C_{so}) \\ Change of maximum capacitance deviation in step 1 to 5 (Class 2,3) \\ \hline Temperature at step 1: 20°C \\ Temperature at step 2: -25°C \\ Temperature at step 3: 20°C (Reference temperature Reference temperature for X5R and Y5V shall be +25°C \\ \hline \end{tabular}$	

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

4 CAPACITORS

#### AXIAL LEADED CERAMIC CAPACITORS

		Specified Value			_				
Item Temp		Temperature Con	npensating(Class 1)	High Permit	tivity(Class 2)	Semiconductor(Class 3)	Test Methods and Remarks		
	1	Monolithic type	Multilayer Type	Monolithic type	Multilayer Type	Monolithic type			
9.Terminal Strength	Tensile	No abnormality such	as cut lead, or loosene	955.			Apply the stated te rection to draw ter Nominal wire diame [mm]	rminal. ter Tensile force [N]	Duration [s]
10.Resistance Vibration	Torsional 9 to	No abnormalities, su Appearance: No significant abnormality Capacitance change: 1.8 pF or under : Within ±20% 2.2 pF to 8.2 pF:	Appearance: No significant abnormality Capacitance change: Within ±5% Q: 30 pF or under :	Appearance: No significant abnormality Capacitance change: Within ±10% tan 8: 75 pF to 390 pF: 1.5% max.	Rated voltage: 16VDC Appearance: No significant abnormality Capacitance change: Withint <sup>20</sup> tan 2: 15.0% max. Insulation resistance: 250 MQmin Withstanding voltage: No abnormality Rated voltage: 25 VDC,	Capacitance change	0.45 Suspend a mass at through angle of 90 This operation is o second bend in the Number of bends Nominal wire diameter [mm] 0.45 According to JIS 0 Vibration type: A Directions: 2 hrs e Total: 6 hrs Frequency range: Amplitude: 1.5 mm	3° and return it to done over a per e opposite direct : 2 times Bending force [N] 2.45 C 5102 clause 8 each in X,Y and 10 to 55 to 10H	initial position. iod of 5 sec. Then ion shall be made. Mass weight [kg] 0.25 2 2 2 2 2 directions
		2.2 pF to 8.2 pF: Within $\pm 10\%$ 10 pF or over : Within $\pm 5\%$ Q : 30 pF or under : Q $\geq$ 400+20C 33 pF or over : Q $\geq$ 500 16 pF to 18 pF of RH: Q $\geq$ 500 C= Nominal capacitance [pF] Insulation resistance: 10,000 M $\Omega$ min. Withstanding voltage: No abnormality	Q≥400+20C 30 pF or over : Q≥1000 Insulation resistance: 10,000 MΩ min. Withstanding voltage: No abnormality	470 pF to 560 pF: 2.5% max. Insulation resistance: 10,000 MΩ min. Withstanding voltage:	Appearance: No significant abnormality Capacitance change: Within ±10% tan 8: 5.0% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No abnormality Rated voltage: 50 VDC Appearance: No significant abnormality B(XSR) Capacitance change: Within±10 % tan 8: 1200pF-30000pF : 3.5%max. 47000pF-100000pF : 100MΩmin. 47000pF-100000pF : 100MΩmin. 47000pF-100000pF : 100MΩmin. 100000pF-470000pF : 10.5%max. 100000pF-470000pF : 10.5%max. 100000pF-100000pF : 50MGmin. 20000pF-470000pF : 100MΩmin.	min. Withstanding voltage: No abnormality Rated voltage: 25 VDC Appearance: No significant abnormality Capacitance change: Within <sup>+80</sup> / <sub>-20</sub> % tan δ: 7.5% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No abnormality Rated voltage: 50 VDC Appearance: No significant abnormality Capacitance change: Within	Amplitude: 1.5 mn Mounting method:		the PC board
11.Free Fall		Appearance: No significant abnormality Capacitance change: 1.8 pF or under : Within $\pm 20\%$ 2.2 pF to 8.2 pF: Within $\pm 10\%$ 10 pF or over : Within $\pm 5\%$ Q: 30 pF or under : Q $\geq$ 400+20C 33 pF or over : Q $\geq$ 500 16 pF to 18 pF of RH: Q $\geq$ 500 C= Nominal capacitance [pF] Insulation resistance: 10,000 MQ min. Withstanding voltage: No abnormality	Appearance: No significant abnormality Capacitance change: Within ±5% Q: 30 pF or under : Q≥400+20C 30 pF or over : Q≥1000 Insulation resistance: 10,000 MΩ min. Withstanding voltage: No abnormality	significant abnormality Capacitance change: Within $\pm 10\%$ tan $\delta$ : 75 pF to 390 pF: 1.5% max. 470 pF to 560 pF: 2.5% max. Insulation resistance: 10,000 M $\Omega$ min.		Capacitance change: Within ±20%, Within ±30% tan 8: 2.5% max. Insulation resistance: 1000 MΩ min. Withstanding voltage: No abnormality Rated voltage: 25 VDC Appearance: No significant abnormality Capacitance change: Within <sup>±80</sup> / <sub>-20</sub> % tan 8: 7.5% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No	Drop Test: Free fa Impact material: F Height: 1 m Total number of du	loor	

4 CAPACITORS

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

#### TAIYO YUDEN

#### AXIAL LEADED CERAMIC CAPACITORS

	Specified Value						
ltem	Temperature Com	pensating(Class 1)	High Permit	ivity(Class 2)	Semiconductor (Class 3)	Test Methods and Remarks	
	Monolithic type	Multilayer Type	Monolithic type	Multilayer Type	Monolithic type		
12.Body Strength	No abnormality such	as damage				Applied force: 19.6N Duration: 5 sec. Speed: Shall attain to specified force in 2 sec.	
13.Solderability	At least 75% of lead	surface is covered with r	new solder.			Solder temperature: 230±5°C Duration: 2±0.5 sec. (This test may be applicable after 6 months storage.)	
14.Soldering	Appearance: No significant abnormality Capacitance change: 1.0 pF to 4.7pF : Within $\pm 0.25$ pF 5.6 pF or over : Within $\pm 5\%$ Q: 30 pF or under : Q $\geq$ 400+20C 33 pF or over : Q $\geq$ 500 16 pF to 18 pF of RH: Q $\geq$ 500 C = Nominal capacitance [pF] Insulation resistance: 10,000 M $\Omega$ min. Withstanding voltage: No abnormality	Appearance: No significant abnormality Capacitance change: Within $\pm 2.5\%$ Q : 30  pF or under : $Q \geq 400+20C$ 30  pF or over : $Q \geq 1000$ Insulation resistance: $10,000 \text{ M}\Omega$ min. Withstanding voltage: No abnormality	Rated voltage: 50 VDC Appearance: No significant abnormality Capacitance change: Within $\pm 10\%$ tan $\delta$ : 75 pF to 390 pF: 1.5% max. 470 pF to 560 pF: 2.5% max. Insulation resistance: 10,000 M $\Omega$ min. Withstanding voltage: No abnormality	Rated voltage: 16 VDC           Appearance: No significant abnormality           Capacitance change: Within:20%           tan 3: 15.0% max.           Insulation resistance: 250 MΩ min.           Withstanding voltage: No abnormality           Rated voltage: 25 VDC,           Appearance. No significant abnormality           Rated voltage: 25 VDC,           Appearance. No significant abnormality           Capacitance change: Within:10%           tan 3: 5.0% max.           Insulation resistance: 1,000 MΩ min.           Withstanding voltage: No abnormality           Rated voltage: S0 VDC           Appearance. No significant abnormality           PACAPPC           PACAPPC           Appearance. No significant abnormality           PLOOPF-100000pF: S0/VBCA           47000pF-100000pF: S0/WGam.           1200pF-39000pF : S0/S/max.           1200pF-20000pF : S0/WGam.           1200pF-100000pF: S0/WGam.           1200pF-200000pF : S0/WGam.           1200pF-20000pF : S0/WGam.           1200pF-200000pF : S0/WGam.           1200pF-200000pF : S0/WGam.           12000pF-200000pF : S0/WGam.           12000pF-200000pF : S0/WGam.           12000pF-200000pF : S0/WGam.           120000pF-100000pF : S0/Wmax. </td <td>ahormality Capacitance change: Within ±10% tan 3: 2.5% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No abnormality Capacitance change: Within ±30% tan 3: 7.5% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No abnormality Rated voltage: 50 VDC Appearance: No significant abnormality Capacitance change: Within ±10% tan 3: 7.5% max. Insulation resistance: 1,000 MΩ min.</td> <td><ul> <li>(Class 1, Class 2: Monolithic type, Class 3)</li> <li>Solder temperature: 350±10°C</li> <li>Duration: 3 <sup>+0.5</sup>/<sub>-1.0</sub> sec. or</li> <li>Solder temperature: 260±5°C</li> <li>Duration: 10±1 sec.</li> <li>Immersed conditions: Inserted into the PC board (with t=1.6mm, hole=1.0mm diameter)</li> <li>Recovery: 4 to 24 hrs of recovery under the standard condition after the test.</li> <li>(Class 2: Multilayer type)</li> <li>Solder temperature: 270±5°C</li> <li>Duration: 5±0.5 sec.</li> <li>Immersed conditions: Inserted into the PC board (with t=1.6mm, hole=1.0mm diameter)</li> <li>Preconditioning: 1 hr of preconditioning at 150<sup>+0</sup>/<sub>-10</sub>°C followed by 48±4 hrs of recovery under the standard condition.</li> <li>Recovery: 48±4 hrs of recovery under the standard condition after the test.</li> </ul></td>	ahormality Capacitance change: Within ±10% tan 3: 2.5% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No abnormality Capacitance change: Within ±30% tan 3: 7.5% max. Insulation resistance: 1,000 MΩ min. Withstanding voltage: No abnormality Rated voltage: 50 VDC Appearance: No significant abnormality Capacitance change: Within ±10% tan 3: 7.5% max. Insulation resistance: 1,000 MΩ min.	<ul> <li>(Class 1, Class 2: Monolithic type, Class 3)</li> <li>Solder temperature: 350±10°C</li> <li>Duration: 3 <sup>+0.5</sup>/<sub>-1.0</sub> sec. or</li> <li>Solder temperature: 260±5°C</li> <li>Duration: 10±1 sec.</li> <li>Immersed conditions: Inserted into the PC board (with t=1.6mm, hole=1.0mm diameter)</li> <li>Recovery: 4 to 24 hrs of recovery under the standard condition after the test.</li> <li>(Class 2: Multilayer type)</li> <li>Solder temperature: 270±5°C</li> <li>Duration: 5±0.5 sec.</li> <li>Immersed conditions: Inserted into the PC board (with t=1.6mm, hole=1.0mm diameter)</li> <li>Preconditioning: 1 hr of preconditioning at 150<sup>+0</sup>/<sub>-10</sub>°C followed by 48±4 hrs of recovery under the standard condition.</li> <li>Recovery: 48±4 hrs of recovery under the standard condition after the test.</li> </ul>	
15.Resistance to Solvent	No abnormality in ap	pearance and legible r	narking.	Withstanding voltage: No abnormality	abnormality	According to JIS C 5102 clause 8.7.4. Type of test: Method 1 Solvent temperature: 20 to 25°C Duration: 30±5 sec. Solvent Type: A in Table 23, Isopropyl alcohol	
16.Thermal Shock	Appearance: No significant abnormality Capacitance change: 1.0 pF to 10 pF : Within $\pm 0.5 pF$ 11 pF or over : Within $\pm 5\%$ Q : Under 10 pF : Q $\geq$ 200+10C 10 pF to 30 pF: Q $\geq$ 275+2.5C 33 pF or over: Q $\geq$ 250 16 pF to 18 pF of RH: Q $\geq$ 250 C= Nominal capacitance [pF] Insulation resistance: 1,000 M $\Omega$ min. Withstanding voltage: No abnormality	Appearance: No significant abnormality Capacitance change: Within $\pm 5\%$ Q : 30 pF or under : Q $\ge 275+2.5C$ 30 pF or over : Q $\ge 350$ Insulation resistance: 1,000 M $\Omega$ min. Withstanding voltage: No abnormality	Rated voltage: 50 VDC Appearance: No significant abnormality Capacitance change: Within $\pm 10\%$ tan $\delta$ : 75 pF to 390 pF: 2.5% max. 470 pF to 560 pF: 4% max. Insulation resistance: 1,000 M $\Omega$ min. Withstanding voltage: No abnormality	Rated voltage: 16 VDC Appearance: No significant denomality Capacitance change: Within ±30% tan 3: 17.5% max. Insulation resistance: 50 MD min Withstanding voltage: No atnormality Rated voltage: 25 VDC, Appearance: No significant danomality Rated voltage: 25 VDC, Appearance: 50 VDC Appearance: No significant danomality Rated voltage: 50 VDC Appearance: No significant danomality B(XSR) Capacitance change: 1200pF-30000pF : 100MGmin. 47000pF-100000pF : 15.0%max. 47000pF-100000pF : 15.0%max. 47000pF-100000pF : 15.0%max. 47000pF-100000pF : 15.0%max. 47000pF-100000pF : 15.0%max. 10000pF-100000pF : 15.0%max. 10000pF-100000pF : 15.0%max. 10000pF-100000pF : 15.0%max. 10000pF-100000pF : 15.0%max. 10000pF-100000pF : 15.0%max. 10000pF-100000pF : 5.00MQmin. 22000pF-470000pF : 5.00MQmin. 22000pF-470000pF : 5.00MQmin. 22000pF-470000pF : 5.00MQmin. 22000pF-470000pF : 5.00MQmin. 220000pF-470000pF : 5.00MQmin. 20000pF : 5.00MQmin.	representation for a graduated to a normality           Capacitance change: Within ±10% tan δ: 4% max.           Insulation resistance: 500 MΩ min.           With standing voltage:           No abnormality           Rated voltage: 25 VDC           Appearance: No significant abnormality	Conditions for 1 cycle Step Temperature ['C] Duration [min] 1 Room temperature Within 3 2 $-25 \frac{+0}{-3}$ $30\pm3$ 3 Room temperature Within 3 4 $+85 \frac{+3}{-3}$ $30\pm3$ 5 Room temperature Within 3 Number of cycles: 5 Preconditioning: 1 hr of preconditioning at $150 \frac{+0}{-10}$ °C followed by $48\pm4$ hrs of recovery under the standard condition	

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

#### AXIAL LEADED CERAMIC CAPACITORS

	Temp	erature	Specified Value	tivity(Class 2)	Semiconductor	
Item		ling(Class 1)	High Permiti	tivity(Class 2)	(Class 3)	Test Methods and Remarks
	Monolithic type	Multilayer Type	Monolithic type	Multilayer Type	Monolithic type	
Damp Heat	Appearance: No	Appearance: No	Rated voltage: 50 VDC	Rated voltage: 16 VDC Appearance: No significant	Rated voltage: 16 VDC Appearance: No significant	Temperature: 40±2°C Humidity: 90 to 95 % RH
(steady state)	significant abnormality Capacitance change:	significant abnormality Capacitance change:	Appearance: No significant abnormality	abnormality	abnormality	Duration: $500 \frac{+24}{-0}$ hrs
	1.0 pF to 10 pF :	Within ±5%	Capacitance change:	Capacitance change: Within ±30%	Capacitance change: Within $\pm 10\%$	Preconditioning: 1 hr of preconditioning at $150^{+0}_{-11}$
	Within ±0.5pF	Q :	Within ±10%	tan 8: 17.5% max.	tan δ: 4% max.	followed by 48±4 hrs of recover
	11 pF or over :	30 pF or under :	tan ∂: 75 pF to 390	Insulation resistance: 50 MΩ min.	Insulation resistance: 500 MQ min. Withstanding voltage: No	under the standard condition.
	Within $\pm$ 5%	Q≧275+2.5C	pF: 2.5% max.	abnormality	abnormality	(Class 2: Multilayer type)
	Q: Under 10 pF :	30 pF or over :	470 pF to 560 pF:	Rated voltage: 25 VDC,	Rated voltage: 25 VDC	Recovery: 1 hr of recovery under the standard cor
	Q≧200+10C	Q≧350	4% max.	Rated voltage: 50 VDC	Appearance: No significant	tion after the removal from test chamb
	10 pF to 30 pF:	Insulation resistance:	Insulation resistance:	Appearance: No significant		(Monolithic type)
	Q≧275+2.5C	1,000 MΩ min.	1,000 MΩ min.	abnormality B(X5R)	Capacitance change: Within ±30% tan 8: 12.5% max.	24±2 hrs of recovery under the stand
	33 pF or over : Q≧250	Withstanding voltage: No abnormality	Withstanding voltage: No abnormality	Capacitance change:	Insulation resistance: 500 MQ min.	condition after the removal from test cha ber. (Class 1: Multilayer type)
	16 pF to 18 pF of	No abnormanty	No abhormailty	1200pF~39000pF : Within 12.5%	Withstanding voltage: No	48±4 hrs of recovery under the standa
	RH: Q≧250			47000pF~100000pF : Within 15.0%		condition after the removal from test cha
	C= Nominal			tan <i>8</i> : 1200pF~39000pF : 5.0%max.	Rated voltage: 50 VDC	ber. (Class 2: Multilayer type)
	capacitance [pF]			47000pF~100000pF : 7.5%max.	Appearance: No significant abnormality	
	Insulation resistance:			Insulation resistance:	Capacitance change: Within ±10%	
	1,000 MΩ min.			1200pF~39000pF : 1000MΩmin.	tan δ: 4% max.	
	Withstanding voltage:			47000pF~100000pF: 500MΩmin.	Insulation resistance: 500 MΩ min.	
	No abnormality			F(Y5V) Capacitance change:	Withstanding voltage: No ab- normality	
				10000pF~1000000pF: Within30.0%	normality	
				tan∂∶		
				10000pF~100000pF: 12.5%max.		
				220000pF~470000pF: 15.0%max. 1000000pF : 17.5%max.		
				Insulation resistance:		
				10000pF~100000pF: 500MΩmin.		
				220000pF~470000pF: 250MΩmin.		
				1000000pF : 50MΩmin. Withstanding voltage: No abnor-		
				mality		
Loading under	Appearance: No	Appearance: No	Rated voltage: 50 VDC	Rated voltage: 16 VDC	Rated voltage: 16 VDC	Temperature: 40±2°C
Damp Heat	significant abnormality	significant abnormality	Appearance: No		Appearance: No significant	Humidity: 90 to 95 % RH
	Capacitance change:	Capacitance change:	significant abnormality	abnormality Capacitance change: Within ±30%	abnormality Capacitance change: Within ±10%	Duration: $500_{-0}^{+24}$ hrs
	1.0 pF to 10 pF :	Within ±7.5% Q :	Capacitance change: Within ±10%	tan δ: 17.5% max.	tan 8: 5% max.	Applied voltage: Rated voltage
	Within ±0.75pF 11 pF or over :	30 pF or under :	tan $\delta$ : 75 pF to 390 pF:	Insulation resistance: 25 $\mbox{M}\Omega$ min.		Preconditioning: Voltage treatment (Class 2: Mu layer type)
	Within ±7.5%	Q≧100+10/3 · C	2.5% max.	Withstanding voltage: No ab-		Recovery: 1 hr of recovery under the standard cor
	Q: 30 pF or under:	30 pF or over :	470 pF to 560 pF:	normality Rated voltage: 25 VDC,	Withstanding voltage: No ab- normality	tion after the removal from test chamb
	Q≧100+ <sup>10</sup> / <sub>3</sub> C	Q≧200	5% max.	Rated voltage: 50 VDC	Rated voltage: 25 VDC	(Class 1, Class 2: Monolithic type)
	33 pF or over :	Insulation resistance:	Insulation resistance:	-	Appearance: No significant ab-	24±2 hrs of recovery under the standa
	Q≧125	500 MΩ min.	500 MΩ min.	normality	normality	condition after the removal from test cha
	16 pF to 18 pF of	Withstanding voltage:	Withstanding voltage:	B(X5R)	Capacitance change: Within ±30% tan ∂: 12.5% max.	ber. (Class 1: Multilayer type)
	RH: Q≧125	No abnormality	No abnormality	Capacitance change: 1200pF~39000pF : Within 12.5%	Insulation resistance: 250 MΩ min.	48±4 hrs of recovery under the standa
	C= Nominal			47000pF~100000pF : Within 15.0%	Withstanding voltage: No ab-	condition after the removal from test chamb (Class 2: Multilayer type)
	capacitance [pF] Insulation resistance:			tans :	normality	(Class 2: Multilayer type) 30 min. of conditioning at 150±3°C
	500 MΩ min.			1200pF~39000pF : 5.0%max.	Rated voltage: 50 VDC	followed by 1 hr of recovery under the
	Withstanding voltage:			47000pF~100000pF : 7.5%max. Insulation resistance:	Appearance: No significant ab- normality	standard conditon after the removal fro
	No abnormality			1200pF~39000pF : 500MΩmin.	Capacitance change: Within ±10%	test chamber. (Class 3)
				47000pF~100000pF: 250MΩmin.	tan δ: 5% max.	
				F(Y5V)	Insulation resistance: 250 MΩ min.	
				Capacitance change: 10000pF~100000pF: Within30.0%	Withstanding voltage: No ab- normality	
				tana:	normany	
				10000pF~100000pF: 12.5%max.		
				220000pF~470000pF: 15.0%max.		
				1000000pF : 17.5%max.		
				Insulation resistance: 10000pF~100000pF : 250MΩmin.		
				220000pF~470000pF : 125MΩmin.		
				1000000pF : 25MΩmin.		

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

#### TAIYO YUDEN

4 CAPACITORS

#### AXIAL LEADED CERAMIC CAPACITORS

Item         Temperature (Class 3)         Test Methods and Remarks           19. High Temperature Loading Test         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Monolithic type         Monolithic type         Test Methods and Remarks           19. High Temperature Loading Test         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Temperature: 65 ±3 C (Class 3)           19. High Temperature Sprifter anonomality         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Appearance: No sprifter anonomality         Temperature: 65 ±3 C (Class 3)           10. De F to 30 pF : Class 2: Multi- titation resistance: 10. De F to 30 pF : Class 2: Multi- titation resistance: 10. De F to 30 pF : Class 2: Multi- sprifter anonomality         De F or ver : Class 2: Multi- titation resistance: 10.00 M0 min. Withstanding voltage: No abnormality         De F or ver : Class 2: Multi- titation resistance: 10.00 M0 min. Withstanding voltage: No abnormality         No abnormality         Distance there with the standard condition after the removal from test charm- ber. (Class 2: Multi- titation resistance: 10.00 M0 min. Withstanding voltage: No abnormality         No abnormality         No abnormality         Distance there with the standard condition after the removal from test charm- ber. (Class 2: Multi- with the standard condition after the removal from test charm- ber. (Class 3)			Specified Value				
19. High Temperature Loading Test       Appearance: No significant abnormality Capacitance change: 10.0F to 10 pF : Within ± 3%       Appearance: No significant abnormality Capacitance change: 10.0F to 10 pF : Within ± 3%       Appearance: No significant abnormality Capacitance change: 10.0F to 10 pF : Within ± 3%       Appearance: No significant abnormality Capacitance change: Within ± 3%       Rated voltage: 50 VDC Appearance: No significant maly Capacitance change: Within ± 3%       Rated voltage: 50 VDC Appearance: No significant abnormality Capacitance change: Within ± 3%       Rated voltage: 50 VDC Capacitance change: Within ± 3%       Rated voltage: 50 VDC Rated voltag	Item			High Permittiv	vity(Class 2)		Test Methods and Remarks
Loading Test       significant abnormality Capacitance change: Capacitance change: Capacitance change: Within ±0.0 pF i 0 p		Monolithic type	Multilayer Type	Monolithic type	Multilayer Type	Monolithic type	
Capacitance change: 1.0 pF to 10 pF:Capacitance change: chatamaily chatanomalitycomality chaptice voltage: X102 trains: X now. trains: X	19. High Temperature	Appearance: No	Appearance: No	Ũ	ů	Rated voltage: 16 VDC	Temperature: 85 <sup>+3</sup> / <sub>-0</sub> °C
Objective of top F: I (0) Ft to 10 pF: Within ±0.30F Within ±0.30FCapacitance of ange Within ±0.30 Within ±0.30FCapacitance of ange Within ±0.30 math top F or over:Capacitance of ange Within ±0.30 within ±10% top F or over:Capacitance of ange Within ±0.30 math top E or 0.25% Has 2.5% max.Capacitance of ange Within ±0.30 math Within ±0.30 Within ±0.30 Within ±0.30 Within ±0.30 Mithin ±0.30 Math Outper E or 0.25% Has 1.000 MD min.Capacitance of ange Within ±0.30 Mithin ±0.30 Within ±0.30 Within ±0.30 Within ±0.30 Math Mithin ±0.30 Math <br< td=""><td>Loading Test</td><td>significant abnormality</td><td>significant abnormality</td><td>Appearance: No signifi-</td><td></td><td></td><td>Duration: <math>1000^{+48}_{-0}</math> hrs</td></br<>	Loading Test	significant abnormality	significant abnormality	Appearance: No signifi-			Duration: $1000^{+48}_{-0}$ hrs
Holp in OrdprinWritin 1:3%Organization of subscriptionIn 2:175 (max instanting voltage for a construction of the subscription of the subscr		Capacitance change:	Capacitance change:	cant abnormality			Applied voltage: Rated voltage×2 (Class 1)
With 3:0.3prG :With 1:0.3prRated voltage X:15 (Class 3: X, Y)11 pF or over :30 pF or under :1a 3: 75 pF to 39 bp fWith 1:0.3prMiddo rediator: 50 UnderMiddo rediator: 50 UnderWith 1:3%Class 2: X pF25% max470 pF to 500 pF: 4% maxMiddo rediator: 50 UnderMiddo rediator: 50 UnderMiddo rediator: 50 UnderC: Under 10 pF :30 pF or over :470 pF to 500 pF: 4% max470 pF to 500 pF: 4% maxMiddo rediator: 50 UnderMiddo rediator: 50 UnderC: 275 A: 25.01.000 MD min.1.000 MD min.Middo rediator: 50 UnderAppearance. No significant abAppearance. No significant ab33 pF or over :Withstanding voltage:No abnormalityNo abnormalityNo abnormalityMiddo rediator: 50 UnderInsulation resistance:1.000 MD min.No abnormalityNo abnormalityNo abnormalityNo abnormalityMiddo rediator: 50 min.No abnormalityMiddo rediator: 50 min.1.000 MD min.Yith and Yith and Y		1.0 pF to 10 pF :	Within ± 3%	Capacitance change:			(Class 2)
11 pF or over :30 pF or under :at a : 7 b f to 30 pFWithistanding voltage: NatureWithistanding voltage: NatureWithistandin		Within $\pm 0.3 pF$	Q :	Within ±10%			Rated voltage×1.5 (Class 3: B, F)
With ± 3% C: Under 10 pF :Cb 2275+2.5C 30 pF or over :25% max. 470 pF to 560 pF :%, wax all y 470 pF to 560 pF :%, wax hall of using resistancemaily maily Rate volge 25 V0C Appearance. No significant abor- nomallyPreconditioning: Voltage treatment (Class 2: Multi- layer type)10 pF to 30 pF :Insulation resistance: 1,000 M0 min.Insulation resistance: 1,000 M0 min.No Mo min.Rate voltage: 5V0C Appearance. No significant abor- momilyRecovery: 1 hr of recovery under the standard tion after the removal from test chamber. (Class 1: All tilayer type)23 pF or over :Withstanding voltage: No abnormalityNo abnormalityB055R)Ins. 10% max. 12067-90000F: 100 max. 12067-9000F: 100 max. 12067-9000F: 100 max. 12067-9000F: 100 max. 1000 from min.Rete voltage: 500 Cm mailyRete voltage: 500 Cm mailyRete voltage: 500 Cm maily2250C = Nominal capacitance (pF) Insulation resistance: 1,000 M0 min.No abnormalityB055R)Rete voltage: 500 Cm mailyRete voltage: 500 Cm maily <t< td=""><td></td><td>11 pF or over :</td><td>30 pF or under :</td><td>tan δ: 75 pF to 390 pF:</td><td></td><td></td><td>Rated voltage×1.125 (Class 3: X, Y)</td></t<>		11 pF or over :	30 pF or under :	tan δ: 75 pF to 390 pF:			Rated voltage×1.125 (Class 3: X, Y)
Q: Under 10 pF:       30 pF or over :       470 pF 10 580 pF: 4% max       Rade volage: 5V0C       Rade volage: 2S V0C       Apparance No significant as       Recovery: 1 h or fecovery under the standard condi- tion after the removal from test chamber.         Q:2276+25C       1,000 MQ min.       Withstanding voltage:       No abnormality       BX5R)       tas: 10% max.       24±2hrs of recovery under the standard         Q:2250       No abnormality       No abnormality       BX5R)       tas: 10% max.       24±2hrs of recovery under the standard         Q:2250       No abnormality       Rade volage: 50 V0C       max!       Rade volage: 50 V0C       Rade volage: 50 V0C       Rade volage: 50 V0C       Class 11. Class 2: Monolithic type)         Q:2250       No abnormality       Rade volage: 50 V0C       max!       Rade volage: 50 V0C		Within $\pm$ 3%	Q≧275+2.5C	2.5% max.		0 0	Preconditioning: Voltage treatment (Class 2: Multi-
Q≥200+10CQ≥350Insulation resistance: 1.00 M0 min. Q≥275+2.5CInsulation resistance: 1.00 M0 min. Withstanding voltage: mailAppearance hosginitization: monily Capacine energy. With 12% to ath 1: 0% monily Capacine energy. With 12% to 18.0 F or voer:Recovery: 1 hr of recovery under the standard condi- tion after the removal from test chamber. Capacine energy. With 12% to 24.250Recovery: 1 hr of recovery under the standard Condition after the removal from test cham- ber. (Class 1: Muttilayer type)10.250No abnormalityRisk Capacine energy. With 12% to 24.250Station resistance: Handarding voltage. No abnor mailyStation resistance: Handarding voltage. No abnor Handarding voltage. No abnor Handardin		Q: Under 10 pF :	30 pF or over :	470 pF to 560 pF: 4% max.			layer type)
10 pF to 30 pF :Insulation resistance:1.000 MΩ min.Appearance No significant above mailynormalitycomailytion after the removal from test chamber.32 pF or over :Withstanding voltage:No abnormalityBXDSP)insulation estance:1.000 MΩ min.24±2hrs of recovery under the standard condition after the removal from test chamber.Q=250No abnormalityNo abnormalityBXDSP, -10000;F: With 15% analyInsulation estance:1.000 MΩ min.24±2hrs of recovery under the standard condition after the removal from test chamber.Q=250C= Norninal1.000 MΩ min.Appearance: No significant above art00xF-10000;F: With 15% tan JRadiv voltage: 50 VDC capacitance fullyAppearance: No significant above art00xF-10000;F: With 15% tan JRadiv voltage: 50 VDC capacitance darge: mailyAppearance: No significant above art00xF-10000;F: With 15% tan JAppearance: No significant above art00xF-10000;F: With 15% tan J1.000 MΩ min.First art00xF-10000;F: With 15% tan JRadiv voltage: VMin 15% tan JRadiv voltage: With 15% tan JRadiv voltage: With 15% tan JAppearance: No significant above tan abive1.000 MΩ min.First art00xF-10000;F: With 15% tan abiveRadiv voltage: With 15% tan JRadiv voltage: With 15% tan JRadiv voltage: With 15% tan JRadiv voltage: With 15% tan JRadiv voltage: With 15% tan J1.000 MΩ min.First art00xF-10000;F: With 15% tan JFirst wort above tan JRadiv voltage: With 15% tan JRadiv voltage: With 15% tan JFirst wort above tan J <td< td=""><td></td><td>Q≧200+10C</td><td>Q≧350</td><td>Insulation resistance:</td><td><b>u</b> .</td><td>°</td><td>Recovery: 1 hr of recovery under the standard condi-</td></td<>		Q≧200+10C	Q≧350	Insulation resistance:	<b>u</b> .	°	Recovery: 1 hr of recovery under the standard condi-
33 pF or over :       Withstanding voltage:       No abnormality       B(XFR)       in : 10% max.       24±2hrs of recovery under the standard         Qa250       No abnormality       Capaciton o tango:       1200F-30000F, Winit 125       Withstanding voltage: No abnormality       24±2hrs of recovery under the standard         Qa250       Capacitance (pF)       Hale voltage: 50 VC       Appearance: No significant abnormality       24±2hrs of recovery under the standard         Qa250       Ca Nominal       Capacitance (pF)       Hale voltage: 50 VC       Appearance: No significant abnormality       Capacitance (pF)         Insulation resistance:       1,000 MQ min.       1200F-30000F: 100/0mm       Insulation resistance:       No abnormality       Appearance: No significant abnormality       As for Class2: Multilayer type)         No abnormality       1200F-30000F: 100/0mm       Insulation resistance:       Insulation resistance:       No abnormality       As for Class2: Multilayer type         No abnormality       No abnormality       F(YSY)       Withstanding voltage: No abnormality       As for Class2: Multilayer type       As for Class2: Multilayer type         No abnormality       F(YSY)       Rade voltage: No abnormality       B 47000F-100000F       B 47000F       B 470000F       Condition if at 150±20       Condition if at 150±20       Condition if at 150±20       Condition if at 150±20       Condi		10 pF to 30 pF :	Insulation resistance:	1,000 MΩ min.	Appearance: No significant abnor-		
Q=250       No abnormality       Capatiance drange:       Insulation resistance:		Q≧275+2.5C	1,000 MΩ min.	Withstanding voltage:	mality	Capacitance change: Within ±30%	(Class 1, Class 2: Monolithic type)
Lancob       No dottom langer       100 dottom langer       1200F-38000F: Within 125%       Withstanding voltage: No abnormality       ber. (Class 1:Multilayer type)         C = Nominal       200F-38000F: S0/Mmx       Rate voltage: S0 VDC       Appearance: No significant abnormality       ber. (Class 2: Multilayer type)         Insulation resistance:       1000F-38000F: S0/Mmx       No abnormality       Capachance drange:       normality       S44 for G Class 2: Multilayer type)         No abnormality       1000F-38000F: S0/Mmx       1200F-38000F: S0/Mmx       Insulation resistance:       1000F-100000F-10000F         No abnormality       1200F-38000F: S0/Mmx       Insulation resistance:       10000F-100000F       B:47000P-100000PF         No abnormality       10000F-100000F: Vitrin30VF       10000F-100000F       B:47000P-100000PF       B:47000P-100000PF         1ans :       10000F-100000F: Vitrin30VF       110000F-100000F       B:47000P-100000PF       B:47000P-100000PF         1ans :       10000F-10000F       10000F       110000F       110000F       110000F       110000F         1ans :       10000F-100000F       110000F       1100000F       110000F       110000F <td></td> <td>33 pF or over :</td> <td>Withstanding voltage:</td> <td>No abnormality</td> <td>B(X5R)</td> <td>tan δ: 10% max.</td> <td>24±2hrs of recovery under the standard</td>		33 pF or over :	Withstanding voltage:	No abnormality	B(X5R)	tan δ: 10% max.	24±2hrs of recovery under the standard
In bit for the formal descent the format descent descent the format descent the format descent the format descent the format descent descent the format descent descent the format descent descent the formal descent descondition deservers descent descent descen		Q≧250	No abnormality		Capacitance change:	Insulation resistance: 500MQ min.	condition after the removal from test cham-
C2250       48±4 hrs of recovery under the standard         C = Nominal       120pF-39000pF : 5.0%max       Appearance: No significant ab- 47000pF-100000pF : 7.5%max       condition after the removal from test cham- ber. (Class 2: Multilayer type)         Insulation resistance:       120pF-39000pF : 100M0min       tan 3: 4% max.       B:47000pF~100000pF         Withstanding voltage:       47000pF-100000pF : 500M0min       tan 3: 4% max.       B:47000pF~100000pF         No abnormality       F(Y5V)       Withstanding voltage: No abnor       11hr of conditioning at 150 $^{+0}$ 0°.         10000pF-100000pF : 100%max       an 3:       insulation resistance:       30 min. of conditioning at 150 $^{+0}$ 0°.         10000pF-100000pF : 125/max       10000pF-100000pF : 125/max.       30 min. of conditioning at 150 $^{+0}$ 0°.         10000pF-100000pF : 125/max.       20000pF - 125/max.       30 min. of conditioning at 150 $^{+0}$ 0°.         20000pF - 100000pF : 100M0min.       10000pF : 125/max.       30 min. of conditioning at 150 $^{+0}$ 0°.         10000pF : 125/max.       20000pF - 100000pF : 125/max.       30 min. of conditioning at 150 $^{+0}$ 0°.         10000pF : 125/max.       20000pF - 10000pF : 500M0min.       by 1 hr of recovery under the standard         10000pF : 125/max.       20000pF - 10000pF : 50M0min.       by 1 hr of recovery under the standard         10000pF : 125/max.       20000pF - 10000pF : 50M0min. <td></td> <td>16 pF to 18 pF of RH:</td> <td></td> <td></td> <td></td> <td>Withstanding voltage: No abnor-</td> <td>ber. (Class1:Multilayer type)</td>		16 pF to 18 pF of RH:				Withstanding voltage: No abnor-	ber. (Class1:Multilayer type)
C= Nominal       1200F~39000F       :5.0%max       Appearance: No significant ab- normality       condition after the removal from test cham- ber. (Class 2: Multilayer type)         1,000 MQ min.       1200F~30000F: :100M0min.       ta 2: 4% max.       B:470000F~100000FF         Withstanding voltage:       47000F~100000F; 500M0min.       ta 2: 4% max.       B:470000F~1000000FF         No abnormality       F(YSV)       mality       Withstanding voltage: No abnor- mality       Thr of condition after the removal from test cham- ber. (Class 2: Multilayer type)         10000F-100000F       :1000F-100000F       :0000F       :0000F       :0000F       :0000F         10000F-100000F       :0000F       :0000F       :0000F       :0000F       :0000F       :0000F         100000F-100000F       :0000F       :0000F       :0000F       :0000F       :0000F       :0000F       :0000F         100000F-100000F       :0000F       :00000F       :0000F       :0000F		Q≧250					
capacitance [pF]47000pF-10000pF: 7.5%max Insulation resistance:ormality Capacitance change: Within ±10% tan 2: 4% max.ber. (Class 2: Multilayer type)1,000 MΩ min.1200F-30000pF: 100000min.tan 2: 4% max.B:47000pF~100000pFWithstanding voltage:47000pF-100000pF: 500MΩmin.F:220000pF~100000pFNo abnormalityF(Y5V)Withstanding voltage: No abnor- 10000pF-100000pF-100000pF: 10.5%max1hr of conditioning at 150 ±1₀°Cmailyfollowed by 48±4 Hr of recovery under the standard condition after the removal from test chamber.30 min. of conditioning at 150±3°C followed by 1 hr of recovery under the standard condition resistance:1000pF-10000pF: 105%max L0000pF: 105%max17.5%max L0000pF: 105%max30 min. of conditioning at 150±3°C followed by 1 hr of recovery under the standard condition after the removal from test cham- ber. (Class 3)20000pF: 10000pF: 10000pF: 10000pF: 10000pF: 10000pF: 10000pF100000pF: 10000pF: 10000pF10000pF: 10000pF: 10000pF: 10000pF: 10000pF: 10000pF: 10000pFby 1 hr of recovery under the standard condition after the removal from test cham- ber. (Class 3)		C= Nominal				-	condition after the removal from test cham-
Insulation resistance:       1.000 MΩ min.       Capacitance charge: Within ±10%       As for Class2:Multilayer type         1.000 MΩ min.       1200F-30000pF :1000k0min.       tan 8: 4% max.       B:47000pF~-100000pF         Withstanding voltage:       47000pF-100000pF: 500M0min.       F:220000pF~-100000pF         No abnormality       FY5V)       Withstanding voltage: No abnormality       1hr of conditioning at 150 ±9° C         Capacitance charge:       mail       mailty       followed by 48±4 Hr of recovery under the standard condition after the removal from test chamber.         10000pF-10000pF:       10000pF-10000pF: 10.0%max.       30 min. of conditioning at 150±3°C followed by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF       175 Mmax.       30 min. of ccondition after the removal from test chamber.         100000pF-100000pF       175 Mmax.       30 min. of ccondition after the removal from test chamber.         100000pF-100000pF       10000pF-100000pF       175 Mmax.       by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF       100000pF       10000pF       20000pF-47000pF       10000pF         100000pF       10000pF       10000pF       10000pF       10000pF         100000pF       10000pF       10000pF       10000pF       10000pF         1000		capacitance [pF]					
1,000 MΩ min.       1200fr-39000pf ::100M0min.       tan 8:4% max.       B:470000pF ~100000pF         Withstanding voltage:       47000pF -100000pf ::00M0min.       F:220000pF ~1000000pF         No abnormality       F(Y5V)       Withstanding voltage: No abnor       1hr of conditioning at 150 ±0°/±0° C         Capacitance dnage:       mailton       mailton       1hr of conditioning at 150 ±0°/±0° C         10000pf-10000pf:       Withstanding voltage: No abnor       1hr of conditioning at 150 ±0°/±0° C         10000pf-10000pf:       1000pf-10000pf:       1hr of conditioning at 150 ±3°C followed         10000pf-10000pf:       1175/max.       30 min. of conditioning at 150±3°C followed         100000pf-10000pf:       1175/max.       30 min. of conditioning at 150±3°C followed         100000pf-10000pf:       1175/max.       30 min. of conditioning at 150±3°C followed         100000pf-10000pf:       1175/max.       30 min. of conditioning at 150±3°C followed         100000pf-10000pf:       1175/max.       30 min. of conditioning at 150±3°C followed         100000pf:       1175/max.       30 min. of condition after the removal from test chamber.         100000pf:       10000pf:       10000pf:       10000pf:         100000pf:       10000pf:       10000pf:       10000pf:         100000pf:       10000pf:       10000pf:		Insulation resistance:					
Withstanding voltage:       47000F-100000pF: 500M0min.       F:220000pF~100000pF         No abnormality       FY(5V)       Withstanding voltage: No abnormality       1hr of conditioning at 150 ±9°0 °C         Capacitance change:       maily       followed by 48±4 Hr of recovery under the standard condition after the removal from test chamber.         10000pF-100000pF:       10000pF-100000pF: 10.0%max.       30 min. of conditioning at 150±3°C followed by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF:       17.5%max.       30 min. of conditioning at 150±3°C followed by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF:       17.5%max.       by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF:       100000pF-100000pF:       500M0min.       by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF:       500M0min.       20000pF-470000pF:       by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF       100000pF       500M0min.       ber. (Class 3)		1,000 MΩ min.					
No abnormality       FYGV)       Withstanding voltage: No abnormality       1hr of conditioning at 150 ±0° C         Capacitance change:       maily       followed by 48±4 Hr of recovery under the standard condition after the removal from test chamber.         10000pF-100000pF: Within30.0%       tans :       30 min. of conditioning at 150±3°C followed         100000pF-100000pF: 10.0%max.       30 min. of conditioning at 150±3°C followed       by 1 hr of recovery under the standard         100000pF-100000pF: 10.5%max.       100000pF-100000pF: 10.5%max.       30 min. of conditioning at 150±3°C followed         100000pF-100000pF: 10.5%max.       100000pF-100000pF: 50000min.       by 1 hr of recovery under the standard         100000pF-100000pF: 50000min.       20000pF-400000pF: 50000min.       ber. (Class 3)         20000pF-470000pF: 50000min.       Withstanding voltage: No abnor		Withstanding voltage:					
Capacitance change:       maily       followed by 48±4 Hr of recovery under the standard condition after the removal from test chamber.         10000pF-100000pF:       10000pF-10.0%max.       30 min. of conditioning at 150±3°C followed to y48±4 Hr of recovery under the standard condition after the removal from test chamber.         20000pF-470000pF:       100000pF:       1075 kmax.       30 min. of conditioning at 150±3°C followed to y1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF:       1075 kmax.       by 1 hr of recovery under the standard condition after the removal from test chamber.         100000pF-100000pF:       50000min.       ber. (Class 3)         220000pF-470000pF:       220000pF-470000pF:         100000pF :       50000min.       ber. (Class 3)		No abnormality			F(Y5V)		
10000pF-100000pF: Within30.0%     standard condition after the removal from test chamber.       10000pF-100000pF: 10.0%max.     30 min. of conditioning at 150±3°C followed       100000pF-100000pF: 125%max.     30 min. of ecovery under the standard       100000pF-100000pF: 175%max.     by 1 hr of recovery under the standard       100000pF-100000pF: 500M0min.     ber. (Class 3)       220000pF-470000pF: 550M0min.     ber. (Class 3)					Capacitance change:		
tan 3 :       test chamber.         10000pF-10000pF: 10.0%max.       30 min. of conditioning at 150±3°C followed         20000pF-470000pF: 125%max.       by 1 hr of recovery under the standard         100000pF       :17.55%max.         100000pF       :17.55%max.         100000pF       :17.55%max.         100000pF       :0000pF-10000pF: 5000/Qmin.         100000pF       :0000pF-20000pF: 5000/Qmin.         100000pF       :5000/Qmin.         100000pF       :5000/Qmin.         100000pF       :5000/Qmin.         Withstanding voltage: No abnor-       Withstanding voltage: No abnor-					10000pF~1000000pF: Within30.0%		
10000pF-10000pF: 100%max.     30 min. of conditioning at 150±3°C followed       22000pF-47000pF: 125%max.     by 1 hr of recovery under the standard       100000pF     :175%max.     condition after the removal from test cham-       100000pF     :0000pF-47000pF: 50000min.     ber. (Class 3)       22000pF-47000pF     :50MΩmin.     ber.       100000pF     :50MΩmin.     ber.					tan∂∶		
22000pF-470000pF ::17.5%max. by 1 hr of recovery under the standard 100000pF ::17.5%max. by 1 hr of recovery under the standard Insulation resistance: condition after the removal from test cham- 10000pF-470000pF :50MQmin. 220000pF-470000pF :50MQmin. 100000pF ::50MQmin. Withstanding voltage: No abnor-							
Insulation resistance:     condition after the removal from test cham- lnsulation resistance:       10000pF-10000pF-500M0min.     ber. (Class 3)       22000pF-47000pF : 50M0min.     100000pF is 50M0min.       Withstanding voltage: No abnor-     Withstanding voltage: No abnor-							
Instalative         ber. (Class 3)           10000pF-10000pF: 50MQmin.         22000pF-470000pF: 55MQmin.           100000pF : 55MQmin.         100000pF : 55MQmin.           Withstanding voltage: No abnor-         Withstanding voltage: No abnor-							
220000pF470000pF: 250MΩmin. 1000000pF : 50MΩmin. Withstanding voltage: No abnor-							
1000000pF : 50M 0min. Withstanding voltage: No abnor-							(Class 3)
Withstanding voltage: No abnor-							

Note on standard condition: "standard condition" referred to herein is defined as follows: 5 to  $35^\circ$ C of temperature, 45 to  $85^\circ$  relative humidity, and 86 to 106kPa of air pressure.

When there are questions concerning measurement results:

In order to provide correlation data, the test shall be conducted under condition of  $20\pm2^{\circ}$  c of temperature, 60 to 70% relative humidity, and 86 to 106kPa of air pressure. Unless otherwise specified, all the tests are conducted under the "standard condition."

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

## Precautions on the use of Axiel Leaded Ceramic Capacitors

Stages	Precautions	Technical considerations				
1. Circuit Design	<ul> <li>Verification of operating environment, electrical rating and performance</li> <li>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.</li> <li>Verification of Rated voltage (DC rated voltage)</li> <li>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.</li> <li>2. Even if the applied voltage is lower than the rated value, the reliability of capacitors might be reduced if either a high frequency AC voltage or a pulse voltage having rapid rise time is present in the circuit.</li> <li>Self-generated heat (Verification of Temperature)</li> <li>1. If the capacitor 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 limit capacitor surface temperature including self -generated heat should not exceed the maximum operating temperature of +85°C.</li> </ul>	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. Hease contact Taiyo Yuden with any questions regarding emitted heat levels in your particular application. It is recommend 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 allow frequencies, and by self-generated heat at high frequencies. (Refer to the following curve.) <b>Output Output O</b>				
	<ul> <li>Operating Environment precautions</li> <li>Capacitors should not be used in the following environments:</li> <li>(1)Environmental conditions to avoid</li> <li>a. exposure to water or salt water.</li> <li>b. exposure to moisture or condensation.</li> <li>c. exposure to corrosive gases (such as hydrogen sulfide, sulfurous acid, chlorine, and ammonia)</li> </ul>					
2. PCB Design	<ol> <li>When capacitors are mounted onto a PC board, hole dimen- sions on the board should match the lead pitch of the compo- nent, 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.</li> </ol>					
3. Considerations for automatic insertion	<ul> <li>Adjustment Automatic Insertion machines (leaded components)</li> <li>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.</li> </ul>					

## Precautions on the use of Axiel Leaded Ceramic Capacitors

Stages	Precautions	Technical considerations				
4. Soldering	<ul> <li>Selection of Flux</li> <li>When soldering capacitors on the board, flux should be applied thinly and evenly.</li> <li>Flux used should be with less than or equal to 0.1 wt% (equivalent to Chroline) of halogenated content. Flux having a strong acidity content should not be applied.</li> <li>When using water-soluble flux, special care should be taken to properly clean the boards.</li> <li>Wave Soldering</li> <li>Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions.</li> <li>Do not immerse the entire capacitor in the flux during the sol-</li> </ul>	<ol> <li>Flux is used to increase solderability in wave soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.</li> <li>With too much halogenated substance (Chlorine, etc.) content is used to activate the flux, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the capacitors.</li> <li>Since the residue of water-soluble flux is easily dissolved by water content in the air, the residue on the surface of capacitors in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux.</li> <li>If capacitors are used beyond the range of the recommended conditions, heat stresses may cause cracks inside the capacitors, and consequently degrade the reliability of the capacitors.</li> <li>When the capacitors are dipped in solder, some soldered parts of the capacitor may</li> </ol>				
	dering operation. Only solder the lead wires on the bottom of the board.	melt due to solder heat and cause short-circuits or cracking of the ceramic material. Deterioration of the resin coating may lower insulation resistance and cause a reduction of withstand voltage.				
5. Cleaning	<ul> <li>Board cleaning</li> <li>When cleaning the mounted PC boards, make sure that cleaning conditions are consistent with prescribed usage conditions.</li> </ul>	<ol> <li>The resin material used for the outer coating of capacitors is occasionally a wax sub- stance 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.</li> <li>When using water-soluble flux please clean the PCB with purified water sufficiently and dry thoroughly at the end of the process. Insufficient washing or drying could lower the reliability of the capacitors.</li> </ol>				
6. Post-cleaning-process	<ul> <li>Application of resin molding, etc. to the PCB and components.</li> <li>Please contact your local Taiyo Yuden sales office before performing resin coating or molding on mounted capacitors.</li> <li>Please verify on the actual application that the coating process will not adversely affect the component quality.</li> </ul>	<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 withstand voltage by cracking the ceramic or separating the coated resin from the ceramics.</li> <li>1-2. With some types of mold resins, the resin's decomposition gas or reaction gas may remain inside the resin during the hardening period or while left under normal conditions, causing a deterioration of the capacitor's performance.</li> <li>1-3. Some mold resins may have poor moisture proofing properties. Please verify the contents of the resins before they are applied.</li> <li>1-4. Please contact Taiyo Yuden before using if the hardening process temperature of the mold resins is higher than the operating temperature of the capacitors.</li> </ul>				
7. Handling	<ul> <li>Mechanical considerations</li> <li>Be careful not to subject the capacitors to excessive mechanical shocks. Withstanding voltage failure may result.</li> <li>If ceramic capacitors are dropped onto the floor or a hard surface they should not be used.</li> </ul>	<ol> <li>Because the capacitor is made of ceramic, mechanical shocks applied to the board may damage or crack the capacitors.</li> <li>Ceramic capacitors which are dropped onto the floor or a hard surface may develop defects and have a higher risk of failure over time.</li> </ol>				
8. Storage conditions	<ul> <li>Storage</li> <li>To maintain the solderability of terminal electrodes and to keep the packaging material in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible. Recommended conditions: Ambient temperature Below 40 °C Humidity Below 70% RH. Products should be used within 6 months after delivery. After the above period, the solderability should be checked before using the capacitors.</li> <li>Capacitors should not be kept in an environment filled with decomposition gases such as (sulfurous hydrogen, sulfurous acid, chlorine, ammonia, etc.)</li> <li>Capacitors should not be kept in a location where they may be exposed to moisture, condensation or direct sunlight.</li> </ul>	<ol> <li>Under high temperature/high humidity conditions, the decrease in solderability due to the oxidation of terminal electrodes and deterioration of taping and packaging character- istics may be accelerated.</li> </ol>				