

SPECIFICATION



SAMWHA CAPACITOR CO.,LTD
PT SAMCON

JL. RAYA SUBANG CIKUMPAY
CAMPAKA-PURWAKARTA
JAWA BARAT – INDONESIA

SPECIFICATION

ITEM : DISC CERAMIC CAPACITOR
(Class II : High Voltage)

PT. SAMCON		
Written	Checked	Approved
		
Irman Sudirman	Apang Djafar S.	Kim Jae Min
TME		

2025.10.16



SAMWHA CAPACITOR Co., Ltd
(Manufacturer : PT. SAMCON)
Jln Raya Subang Cikumpay – campaka
Purwakarta – West Java Indonesia

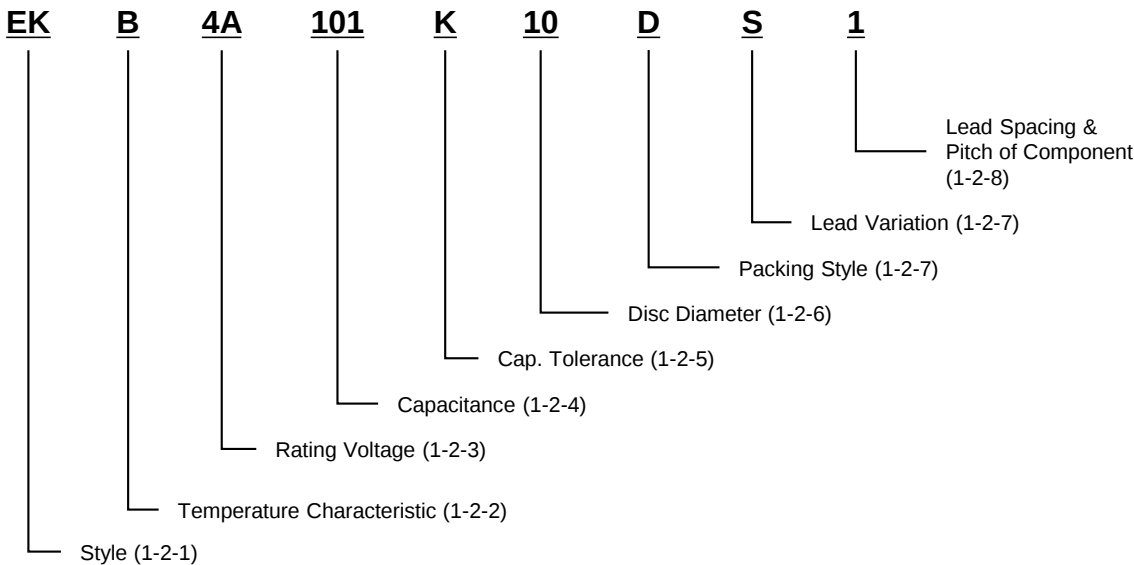
Record of Revision					SW-D02-01B	
					2/12	
P/N		SAMWHA SPEC	P/N		SAMWHA SPEC	
- - - - - - - - - - - - - - - - -		EKB4A101K10DS1	- - - - - - - - - - - - - - - - -		EKE4A102M11DS1	
		EKB4A151K10DS1			EKE4A472M22DS1	
		EKB4A221K10DS1			EKE4C102M11DS2	
		EKB4A331K12DS1			EKE4C472M23DS2	
		EKB4A471K14DS1				
		EKB4A681K14DS1			EKR4A101K09DS1	
		EKB4A102K16DS1			EKR4A102K17DS1	
		EKB4A202K18DS1			EKR4C101K10DS2	
		EKB4A222K18DS1			EKR4C102M20DS2	
		EKB4C101K10DS2				
		EKB4C151K10DS2				
		EKB4C221K11DS2				
		EKB4C331K12DS2				
		EKB4C471K14DS2				
		EKB4C681K15DS2				
		EKB4C102K18DS2				
		EKB4C222K24DS2				
		No			Reason	Contents



1. Scope.

This specification relates temperature compensating, high dielectric constant disc type fixed ceramic capacitor, intended for use in equipment for telecommunication and in electronic devices.

1-1. Type Designation



1-2. Specification

1-2-1. Style

EK : High dielectric constant fixed ceramic capacitor
(class II) - Epoxy coated ceramic capacitor

1-2-2. Temperature coefficient and Temperature characteristics

1-2-2-1. CK,EK (class II)

EIA Code	SAMWHA Symbol	Temp. Range	Change Rate
Y5P	B	- 25℃ ~ + 85℃	+ 10% ~ - 10%
Y5U	E	- 25℃ ~ + 85℃	+ 22% ~ - 56%
Y5V	F	- 25℃ ~ + 85℃	+ 22% ~ - 82%
Y5R	R	- 25℃ ~ + 85℃	+ 15% ~ - 15%

1-2-3. Rating Voltage

4A : 10kV, 4B : 12kV, 4C : 15kV, 4D : 20kV

1-2-4. Capacitance

The nominal capacitance value in μF is expressed by three digit number.

The first two digits represent significant figures and the last digit is the number of zero to follow.

Ex. 100 μF – 101

Note : Pre-treatment : max operating temp $\pm 2^\circ\text{C}$ heating and maintain 1hr, and release 24 ± 2 hr at room condition, using LCR meter.

1-2-5. Cap. Tolerance

Symbol	K	M
Cap. Tol	$\pm 10\%$	$\pm 20\%$

1-2-6. Disc Diameter

Unit : mm

Code	8	9	10	11	12	13	14	15	16	17	18	19	20	22	23
Dia. ($\varnothing$ mm)	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	22.5	23.5

1-2-7. Packing Style and Lead Variation (see page 9/12~11/12)

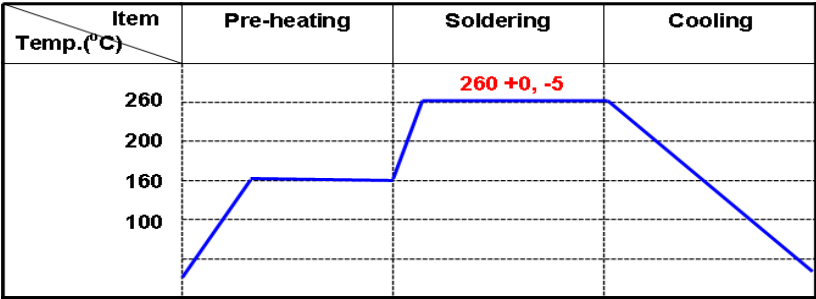
Packing Style		Lead Variation	
B	Bulk	S	Straight Long Type
		W	Kink Short Type
		N	Straight Short Type
D	Double Bulk	S	Straight Type Long

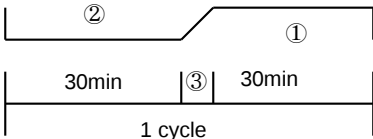
1-2-8. Lead Spacing and Pitch of Component [mm] (see page 9/12~11/12)

Bulk Type	
Code	Lead Spacing (mm)
1	10.0
2	12.5
3	15.0

2. Requirements and method of test and environmental substance

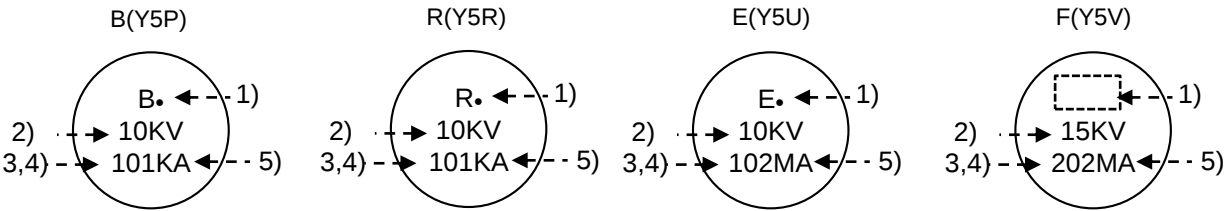
NO	ITEM		Rated value	Testing method / application																						
			Class II																							
1.	Operating Temperature Range		-25℃ ~ +85℃																							
2.	Capacitance		Within the specified range	- Temperature : 20℃ - Frequency : 1 ± 0.1 KHz - Measured voltage : 1 ± 0.1Vrms																						
3.	Dissipation Factor (tan δ)		B : 2.5% Max E,F : 3.5% Max R : 0.2 Max																							
4.	Insulation resistance	Between terminals	More than 10000MΩ	- Applied Voltage : Charge at 500 VDC - Charge Time : 60 ± 5 sec																						
5.	Withstand Voltage	Between terminals	No remarkable abnormality is recognized	- 4A, 4C : Applied voltage 150% of rating voltage between the lead wire with insulate in silicon oil. - 4D : Applied voltage 130% of rating voltage between the lead wire with insulate in silicon oil. - Charge Time : 1 ~ 5 sec																						
6.	Capacitance Temperature Characteristics		<table><tr><th>Temp. Char. Code</th><th>Cap. Change Rate</th></tr><tr><td>B(Y5P)</td><td>±10%</td></tr><tr><td>E(Y5U)</td><td>-56 ~ +22%</td></tr><tr><td>F(Y5V)</td><td>-82 ~ +22%</td></tr><tr><td>R(Y5R)</td><td>±15%</td></tr></table>	Temp. Char. Code	Cap. Change Rate	B(Y5P)	±10%	E(Y5U)	-56 ~ +22%	F(Y5V)	-82 ~ +22%	R(Y5R)	±15%	The capacitor measurement shall be made at each step specified in table. Capacitance change from the value of the step 3 shall not exceed the limit specified. <table><tr><th>Step Char.</th><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th></tr><tr><td>B, E, F, R</td><td>+20</td><td>-25</td><td>+20</td><td>+85</td><td>+20</td></tr></table>	Step Char.	1	2	3	4	5	B, E, F, R	+20	-25	+20	+85	+20
Temp. Char. Code	Cap. Change Rate																									
B(Y5P)	±10%																									
E(Y5U)	-56 ~ +22%																									
F(Y5V)	-82 ~ +22%																									
R(Y5R)	±15%																									
Step Char.	1	2	3	4	5																					
B, E, F, R	+20	-25	+20	+85	+20																					
7.	Solder Heat Resistance	External view	No remarkable abnormality is recognized	- Soldering temperature: 260 -0,+5℃ - Immersion : 5 sec																						
		Rate change for capacitance	B:Within ± 5% E:Within ± 15% F:Within ± 20% R:Within ± 10%																							
8.	Solder ability		The lead wire is soldered more than 3/4 of it in the circumferential direction and to the immersed part continuously in the axial direction	- Soldering temp : 230 ± 5℃ or 260 ± 5℃ - Immersion time : 2 ± 0.5 sec																						

No	ITEM		Rated value	Testing method/application (EIA-STD, RS-198-C)
			Class II	
9.	Soldering Profile	Flow Soldering	Item Temp.(°C) 260 200 160 100 Pre-heating Soldering Cooling  60sec. min 5sec. max 60sec. min When soldering this product to a Pcb / Pwb, do not exceed the solder heat resistance specification of capacitor. Subjecting this product to excessive heating could melt the internal junction solder and may result in thermal shocks that can crack the ceramic element.	
		Iron Soldering	When soldering capacitor with a soldering capacitor iron, it should be performed in following conditions. Temperature of iron-tip : 400°C max. Soldering iron wattage : 50W max. Soldering time : 3.5 sec. max. Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used	
10.	Humidity Resistance Test	External view	No remarkable abnormality is recognized	- Temperature : 40 ± 2°C - Humidity : 90 ~ 95% RH - Testing time : 240 +24,-0 hours
		Rate change for capacitance	B: Within ± 10% E: Within ± 20% F: Within ± 30% R: Within ± 10%	
		Dissipation Factor (tan δ)	B : 5%Max E, F : 7.5%Max R : 0.4% Max	
		Insulation resistance	More than 5000MΩ	

No	ITEM		Rated value		Testing method/application (EIA-STD, RS-198-C)																
			Class II																		
11.	High Temperature Load	External view	No remarkable abnormality is recognized		– Temperature : 85 ± 2°C – Testing Time : 1000 +48,-0 hours – Applied voltage : 4A, 4C : rated voltage × 125% 4D : rated voltage × 110% – The discharge current shall be 50mA or less																
		Rate change for capacitance	B: Within ± 10% E: Within ± 20% F: Within ± 30% R: Within ± 10%																		
		Dissipation Factor (tan δ)	B : 5%Max E, F : 7.5%Max R : 0.4% Max																		
		Insulation resistance	More than 5000MΩ																		
12.	Temperature Cycling Test		Appearance		No. visible damage	Temperature cycle should be measured in the following test. Cycle time : 5 cycle Pre-treatment : Capacitor should be stored at max operating temp^①. for 1hr., placing at room condition for 24±2hrs. Post treatment : Capacitor should be stored for 24±2hrs at room. ※^②:min. operating temperature ③:2 to 5minutes  Table II : Temperature Cycle <table><thead><tr><th>Step</th><th>Temperature (°C)</th><th>Time (min)</th></tr></thead><tbody><tr><td>1</td><td>X ; +0/-3</td><td>30</td></tr><tr><td>2</td><td>Room temp.</td><td>3</td></tr><tr><td>3</td><td>Y; +3/-0</td><td>30</td></tr><tr><td>4</td><td>Room temp.</td><td>3</td></tr></tbody></table> Note : X = minimum operating temp Y = maximum operating temp Based on temp characteristics	Step	Temperature (°C)	Time (min)	1	X ; +0/-3	30	2	Room temp.	3	3	Y; +3/-0	30	4	Room temp.	3
			Step	Temperature (°C)	Time (min)																
			1	X ; +0/-3	30																
			2	Room temp.	3																
			3	Y; +3/-0	30																
			4	Room temp.	3																
			Cap. Change	B	Within ± 10%																
				E	Within ± 20%																
				F	Within ± 20%																
				R	Within ± 10%																
			Tan δ	B	5% max																
				E	5% max																
				F	7.5% max																
R	0.4% max																				
I . R		5000MΩ min																			
13.	Preservation (keeping)		When Solderability is considered, capacitors are recommended to be used in 12 months		1). Temperature : 30°C ± 10°C 2). Relative Humidity : 55% ± 25																
14.	The Regulation of Environmental Pollution Materials.		* Never use materials mentioned below based on International RoHS Standard. * Pb, Hg, Cr ⁺⁶ , PBB, PBDE, Cd, Phthalate (DEHP, DBP, BBP & DIBP).																		

3. Marking

High Voltage Dielectric Capacitor



Code No.	Marking Item	Char.
1	Temperature Characteristics	B•, R•, E•, F•
2	Rated Voltage (kV)	10, 15, 20
3	Nominal capacitance	Based on SPEC
4	Tolerance of Capacitance	K / M
5	Last Letter	Month of Manufacture

*. Month of Manufacture :

- | | |
|-----------------|------------------|
| A, M : January | G, S : July |
| B, N : February | H, T : August |
| C, O : March | I, U : September |
| D, P : April | J, V : October |
| E, Q : May | K, W : November |
| F, R : June | L, X : December |

From A to L are Even year, From M to X are odd year

5. Dimension & Packing Style

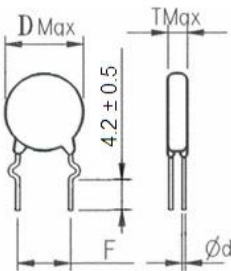
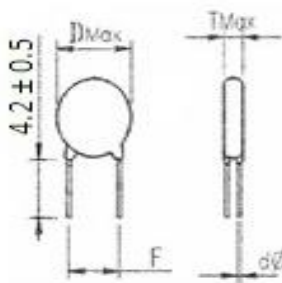
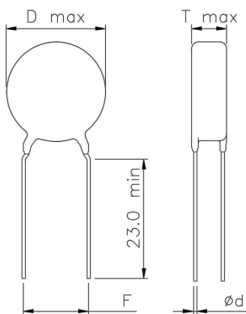
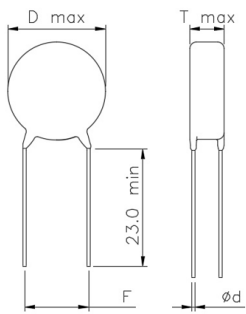
5-1). 10 kV

BS Type

DS Type

BN Type

BW Type

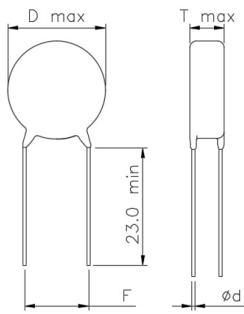


TCC	Cap.	TOL.	D	T	F	WIRE SIZE ORDERING	Size code
	(pF)	(%)	Dmax (mm)	Tmax (mm)	mm	mm	
B(Y5P) -25~85°C ±10%	100	±10%	10.5	8.5	10±2.0	0.80±0.05	10
	150	±10%	10.5	8.5	10±2.0	0.80±0.05	10
	220	±10%	10.5	8.5	10±2.0	0.80±0.05	10
	270	±10%	11.5	8.5	10±2.0	0.80±0.05	11
	330	±10%	12.5	8.5	10±2.0	0.80±0.05	12
	470	±10%	14.5	8.5	10±2.0	0.80±0.05	14
	560	±10%	14.5	8.5	10±2.0	0.80±0.05	14
	680	±10%	14.5	8.5	10±2.0	0.80±0.05	14
	1000	±10%	16.5	8.5	10±2.0	0.80±0.05	16
	2000	±10%	18.5	8.5	10±2.0	0.80±0.05	18
	2200	±10%	18.5	8.5	10±2.0	0.80±0.05	18
E(Y5U) -25~85°C +22~-56%	1000	±20%	11.5	9.0	10±2.0	0.80±0.05	11
	2000	±20%	14.5	9.0	10±2.0	0.80±0.05	14
	2200	±20%	15.5	9.0	10±2.0	0.80±0.05	15
	3300	±20%	20.5	9.0	10±2.0	0.80±0.05	20
	4700	±20%	22.5	9.0	10±2.0	0.80±0.05	22
F(Y5V) -25~85°C +22~-82%	1000	±20%	10.5	9.0	10±2.0	0.80±0.05	10
	2000	±20%	12.5	9.0	10±2.0	0.80±0.05	12
	2200	±20%	13.5	9.0	10±2.0	0.80±0.05	13
	3300	±20%	15.5	9.0	10±2.0	0.80±0.05	15
	4700	±20%	18.5	9.0	10±2.0	0.80±0.05	18
	1000	+80~-20%	10.5	9.0	10±2.0	0.80±0.05	10
	2000	+80~-20%	12.5	9.0	10±2.0	0.80±0.05	12
	2200	+80~-20%	13.5	9.0	10±2.0	0.80±0.05	13
	3300	+80~-20%	15.5	9.0	10±2.0	0.80±0.05	15
	4700	+80~-20%	18.5	9.0	10±2.0	0.80±0.05	18
R(Y5R) -25~85°C ±15%	100	±10%	9.5	8.5	10±2.0	0.80±0.05	9
	150	±10%	9.5	8.5	10±2.0	0.80±0.05	9
	220	±10%	10.5	8.5	10±2.0	0.80±0.05	10
	330	±10%	12.5	8.5	10±2.0	0.80±0.05	12
	470	±10%	14.5	8.5	10±2.0	0.80±0.05	14
	680	±10%	14.5	8.5	10±2.0	0.80±0.05	14
	1000	±10%	17.5	8.5	10±2.0	0.80±0.05	17

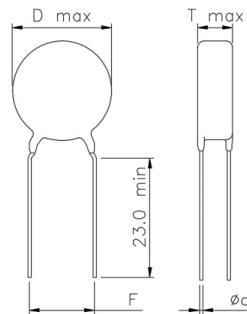
5. Dimension & Packing Style

5-2). 15 kV

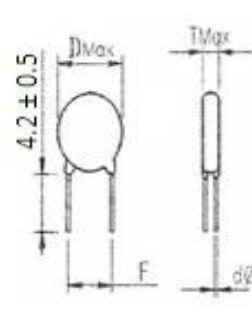
BS Type



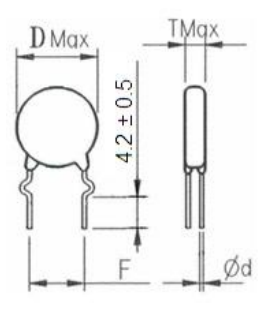
DS Type



BN Type



BW Type

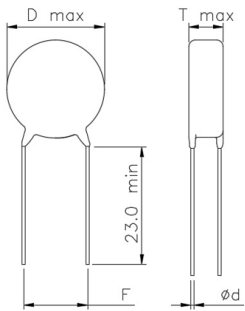


TCC	Cap.	TOL.	D	T	F	WIRE SIZE ORDERING	Size code
	(pF)	(%)	Dmax (mm)	Tmax (mm)	mm	mm	
B(Y5P) -25~85°C ±10%	100	±10%	10.5	10.0	12.5±2.0	0.80±0.05	10
	150	±10%	10.5	10.0	12.5±2.0	0.80±0.05	10
	220	±10%	11.5	10.0	12.5±2.0	0.80±0.05	11
	330	±10%	12.5	10.0	12.5±2.0	0.80±0.05	12
	470	±10%	14.5	10.0	12.5±2.0	0.80±0.05	14
	680	±10%	15.5	10.0	12.5±2.0	0.80±0.05	15
	1000	±10%	18.5	10.0	12.5±2.0	0.80±0.05	18
	2200	±10%	24.5	10.0	12.5±2.0	0.80±0.05	24
E(Y5U) -25~85°C +22~-56%	1000	±20%	11.5	10.0	12.5±2.0	0.80±0.05	11
	2000	±20%	15.5	10.0	12.5±2.0	0.80±0.05	15
	2200	±20%	16.5	10.0	12.5±2.0	0.80±0.05	16
	2400	±20%	17.5	10.0	12.5±2.0	0.80±0.05	17
	3300	±20%	20.5	10.0	12.5±2.0	0.80±0.05	20
F(Y5V) -25~85°C +22~-82%	4700	±20%	23.5	10.0	12.5±2.0	0.80±0.05	23
	1000	±20%	11.5	10.0	12.5±2.0	0.80±0.05	11
	2000	±20%	14.5	10.0	12.5±2.0	0.80±0.05	14
	2200	±20%	16.5	10.0	12.5±2.0	0.80±0.05	16
	3300	±20%	17.5	10.0	12.5±2.0	0.80±0.05	17
	4700	±20%	20.5	10.0	12.5±2.0	0.80±0.05	20
	1000	+80~-20%	11.5	10.0	12.5±2.0	0.80±0.05	11
	2000	+80~-20%	14.5	10.0	12.5±2.0	0.80±0.05	14
	2200	+80~-20%	16.5	10.0	12.5±2.0	0.80±0.05	16
	3300	+80~-20%	17.5	10.0	12.5±2.0	0.80±0.05	17
R(Y5R) -25~85°C ±15%	4700	+80~-20%	20.5	10.0	12.5±2.0	0.80±0.05	20
	100	±10%	10.5	9.0	12.5±2.0	0.80±0.05	10
	150	±10%	10.5	9.0	12.5±2.0	0.80±0.05	10
	220	±10%	11.5	9.0	12.5±2.0	0.80±0.05	11
	330	±10%	14.5	9.0	12.5±2.0	0.80±0.05	14
	470	±10%	14.5	9.0	12.5±2.0	0.80±0.05	14
	680	±10%	17.5	9.0	12.5±2.0	0.80±0.05	17
	1000	±20%	20.5	9.0	12.5±2.0	0.80±0.05	20

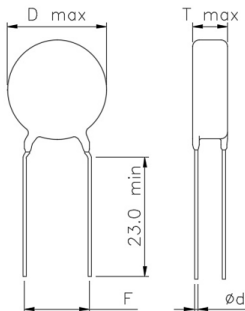
5. Dimension & Packing Style

5-3). 20 kV

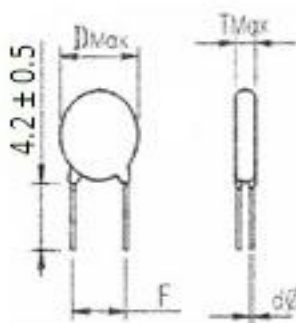
BS Type



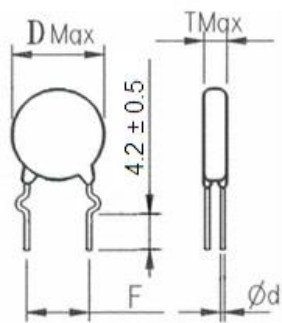
DS Type



BN Type



BW Type



TCC	Cap.	TOL.	D	T	F	WIRE SIZE ORDERING	Size Code
	(pF)	(%)	Dmax (mm)	Tmax (mm)	mm	mm	
E(Y5U) -25~85°C +22~-56%	2200	±20%	19.5	10.0	15±2.0	0.80±0.05	19

PACKING SPECIFICATION

1) BULK

TYPE		PACKING QUANTITY [pcs]				
DIVISION	L/W DIVISION [mm]	DIAMETER [Φ]	INNER BOX		OUT BOX	
			VINIL PAPERBAG	IBB 140	OBB 150	OBB 300
10 ~ 20 KV	Short	All	200 +2, -0	2,000	4,000	-
	Long	10	200 +2, -0	2,000	4,000	-
		11 ~ 15	100 +2, -0	1,000	2,000	-
		16 ~ 23	50 +2, -0	800	1,600	-

2) PACKING BOX DIMENSIONS

PACKING STYLE		CATEGORY	L × W × H [mm]
BULK	IBB (Inner Box Bulk)	IBB 140	250 × 235 × 130
	OBB (Out Box Bulk)	OBB 150 (IBB 140 × 2)	485 × 265 × 145

3) STACKING BOX (Maximum)

PACKING STYLE	INBOX	OUTBOX
BULK	6	6

▣ MATERIAL LIST

NO	Material Name	Substance	Hazardous Substance Existences						Remarks
			Pb	Hg	Cr	Cr ⁺⁶	PBB	PBDE	
1	Dielectric Powder	BaTiO ₃	X	X	X	X	X	X	Exception for R-Series (Based on RoHS data)
2	Ag Paste	Ag	X	X	X	X	X	X	
3	Solder	Sn,Ag,Cu	X	X	X	X	X	X	
4	Epoxy resin	Epoxy	X	X	X	X	X	X	
5	Lead wire	Cu, Sn, Fe	X	X	X	X	X	X	Plating thickness : Min 3 μm. (material : tin)

Label Type

Bulk Style

BULK TYPE		
PLASTIC	INBOX	OUTBOX
		

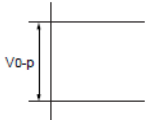
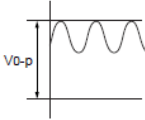
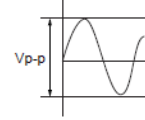
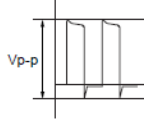
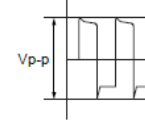
■ **Caution and Notice**

⚠ **Caution (Rating)**

1. Operating Voltage

When DC-rated capacitors are to be used in AC or ripple current circuits, be sure to maintain the V_{p-p} value of the applied voltage or the V_{0-p} which contains DC bias within the rated voltage range.

When the voltage is applied to the circuit, starting or stopping may generate irregular voltage for a transit period because of resonance or switching. Be sure to use a capacitor with a rated voltage range that includes these irregular voltages.

Voltage	DC Voltage	DC+AC Voltage	AC Voltage	Pulse Voltage (1)	Pulse Voltage (2)
Positional Measurement					

2. Operating Temperature and Self-generated Heat

Keep the surface temperature of a capacitor below the upper limit of its rated operating temperature range. Be sure to take into account the heat generated by the capacitor itself. When the capacitor is used in high-frequency current, pulse current or similar current, it may self-generate heat due to dielectric loss. The applied voltage load should be such that the capacitor's self-generated heat is within 10°C at an atmosphere temperature of 25°C. When measuring, use a thermocouple of small thermal capacity-K of Ø0.1mm in conditions where the capacitor is not affected by radiant heat from other components or surrounding ambient fluctuations. Excessive heat may lead to deterioration of the capacitor characteristics and reliability. (never attempt to perform measurement with the cooling fan running. Otherwise, accurate measurement cannot be ensured.)

Failure to follow the above cautions may result, worst case, in a short circuit and cause fuming or partial dispersion when the product is used.

⚠ **Caution (Storage and Operation Condition)**

Operating and storage environment.

The insulating coating of capacitors does not form a perfect seal; therefore, do not use or store capacitors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture.

The capacitor is designed to be used in insulating media, such as epoxy resin, silicone oil, etc. there must be 3mm or more of insulating media for each direction of the capacitor.

Before cleaning, bonding or molding this product, verify that these processes do not affect product quality by testing the performance of a cleaned, bonded or molded product in the intended equipment.

Store the capacitors where the temperature and relative humidity do not exceed 20 to 40 degrees centigrade and 30 to 80%. Use the capacitors within 12 months.

⚠ **Caution (Soldering and Mounting)**

1. Vibration and impact

Do not expose a capacitor or its leads to excessive shock or vibration during use.

► **Notice (Capacitance change of capacitors)**

For some of the capacitors, capacitance value may change considerably in the temperature range, or by applied DC voltage. and capacitor has aging characteristics (capacitance decreases by keeping as it is)