

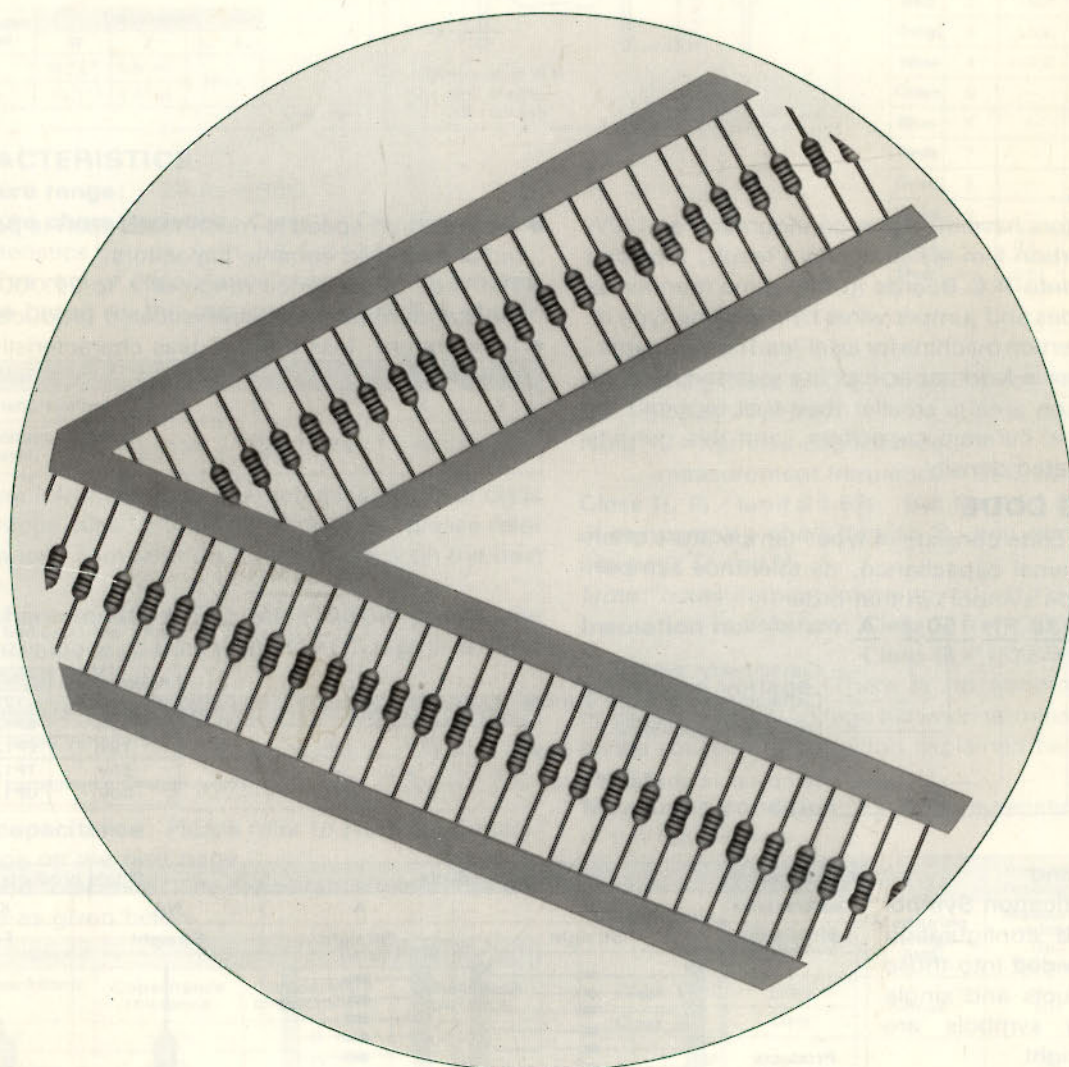


TAIYO YUDEN
PRODUCTS

TUBULAR CERAMIC CAPACITORS

AXIAL LEAD FOR AUTOMATIC INSERTION

- Ordinary Configuration
- Miniaturized Configuration
- Super-Miniaturized Configuration



TAIYO YUDEN CO., LTD.



125 AND 250 TYPE ORDINARY CONFIGURATION

These axial-lead tubular-type ceramic capacitors have been developed for automatic insertion and are available in two ordinary-configuration types: 125 and 250. They provide the same performance quality as the previous radial-lead tubular-type ceramic capacitors. Productivity can be raised since they can be employed in a completely automatic production line. Their range of capacitance is 1 to 33,000pF.

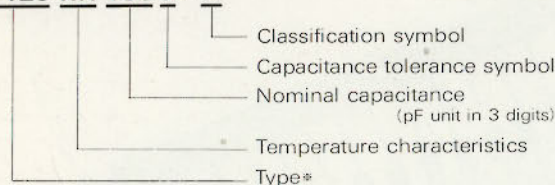
FEATURES

- These capacitors have the same configuration as 1/8W and 1/4W carbon film resistors. As a result, they can be mounted onto P.C. Boards in the same manner as resistors, diodes and jumper wires by the same type of automatic insertion machine for axial-lead components.
- When these axial-lead capacitors are inserted vertically, the insertion area is smaller than that required for radial-lead disc ceramic capacitors, and this permits greater integrated density.
- The insertion speed is much faster than is possible for radial-lead disc ceramic capacitors.
- The wide capacitance range of 1 to 22,000pF allows the standardization of sophisticated products.
- Temperature, loss and DC bias characteristics are excellent.

ORDERING CODE

The ordering code consists of type, temperature characteristics, nominal capacitance, its tolerance symbol, and classification symbol, in that order.

(Example) **UP125 RH 150 J - A**



* Types are classified by the rated voltage as listed below.

Rated voltage (DC)	Type	
	125	250
12V	BP125	—
16V	EP125	—
25V	TP125	TP250
50V	UP125	UP250

Configuration and Classification Symbol

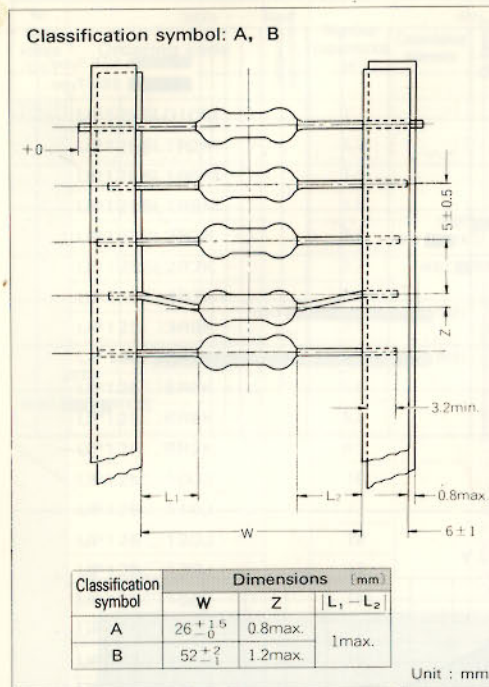
The classified configuration symbols are divided into those for taped products and single products. The symbols are shown on the right.

Note: 250-type for taping are available with 52mm taping space only.

Classification	Taped products		Single products	
	B	A	NA	KH KB
Lead configuration	Straight	Straight	Straight	Formed
Products configuration				
	Taping space: 52mm	Taping space: 26mm		

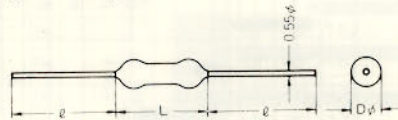
OUTER DIMENSIONS

Taping Dimensions



Dimensions of Single Products

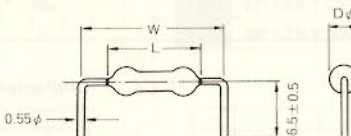
Classification symbol: NA
(Straight lead)
Applies to all types.



Type	Dimensions (mm)		
	L (max)	D (max)	L (min)
UP125 TP125 EP125 BP125	7.1	2.8	20
UP250 TP250	9.1	3.0	20

Classification symbol: KH, KB

(Formed lead)
KH applies to UP125, TP125 and EP125.
KB applies to all types.



Dimension of W is:
KH: 10 ± 0.5
KB: 12.5 ± 0.5

Unit: mm

MARKING

Rated voltages are indicated by the color code shown below: Characteristics, nominal capacitances, and its tolerances are as indicated in the color-code table shown below.

Rated voltage (DC)	Body color
50 V	Yellowish green
12V 16V 25V	Pink

Color Code Marking

Color	Nominal capacitance (pF)		Tolerance	Characteristic or Temperature coefficient	
	First figure	Second figure		T.C.	Characteristic
Black	0	1	$\pm 20\%$	C	—
Brown	1	10	—	—	Y
Red	2	100	—	—	D
Orange	3	1000	—	—	—
Yellow	4	10000	—	R	—
Green	5	—	—	—	—
Blue	6	—	—	—	—
Purple	7	—	—	U	—
Grey	8	—	$\pm 30\%$	—	X
White	9	—	—	—	SL
Gold	—	0.1	$\pm 5\%$	—	V
Silver	—	0.01	$\pm 10\%$	—	B

CHARACTERISTICS

Temperature range: -25 to $+85^{\circ}\text{C}$

Temperature characteristics: Class I/CH, RH, UJ and SL characteristics comply with JIS-C-6423(Class I).

Class II/The rate of capacitance change in the temperature range based on the capacitance at 20°C is shown below.

Class	II		III		
Characteristic symbol	B	D	V	X	Y
Rate of capacitance change (within)	$\pm 10\%$	$+20\%$ -30%	$\pm 7.5\%$	$\pm 15\%$	$\pm 22\%$

For further information on characteristics B, D of class II and characteristics V, X and Y of class III, please refer to Capacitance - Temperature Characteristics on the next page.

DC bias characteristics: The table below shows the rates of capacitance change when the DC bias is applied up to the rated voltage.

Temperature characteristics	V, X	X	Y
Rated voltage (DC)	50V	25V	12V 16V
Rate of capacitance change (within)	$+5\%$ -20%	$+5\%$ -12.5%	$+5\%$ -20%

Nominal capacitance: Please refer to Nominal Capacitance Range on the next page.

Capacitance tolerance: The capacitance tolerances are in principle as given below.

Class I		Class II, III	
Nominal capacitance (pF)	Capacitance tolerance	Temperature characteristic	Capacitance tolerance
1 to 1.8	$\pm 20\%$	B	$\pm 10\%$
2.2 to 8.2	$\pm 10\%$	D	$\pm 20\%$
10 to 180	$\pm 5\%$	V	$\pm 10\%$
—	—	X	$\pm 20, \pm 30\%$
—	—	Y	$\pm 30\%$

Q or $\tan \delta$: Class I/ $Q \geq 400 + 20 \cdot C$ for 1 to 27pF.

$Q \geq 1,000$ at 30pFmin.

Note: C=nominal capacitance(pF)

measurement frequency= $1 \pm 0.1\text{MHz}$

Class II, III/ $\tan \delta \leq 1.5\%$ But $\tan \delta \leq 2.5\%$ for 1,000pF of temperature characteristic B, and temperature characteristic D and Y.

Note: measurement frequency= $1 \pm 0.1\text{kHz}$

Insulation resistance: Class I, II/ $10,000\text{M}\Omega \text{ min.}$

Class III/ $1,000\text{M}\Omega \text{ min.}$

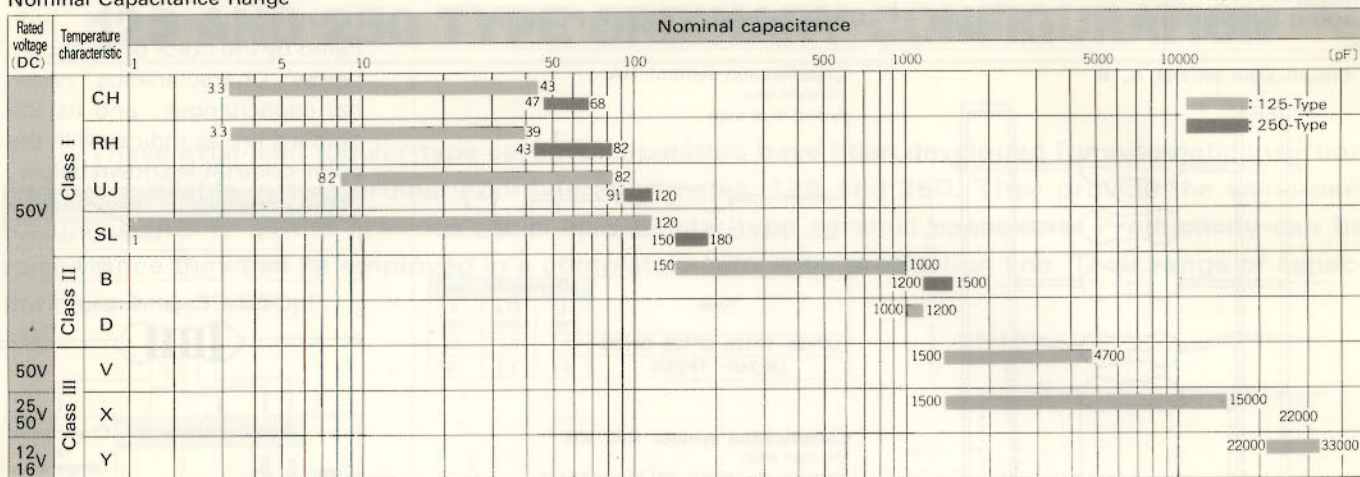
Withstand voltage: There is no abnormality after the application of test voltage between terminals. Please refer to the measuring condition explained below for voltage values.

Measuring condition: Each characteristic at 20°C is given in the table below.

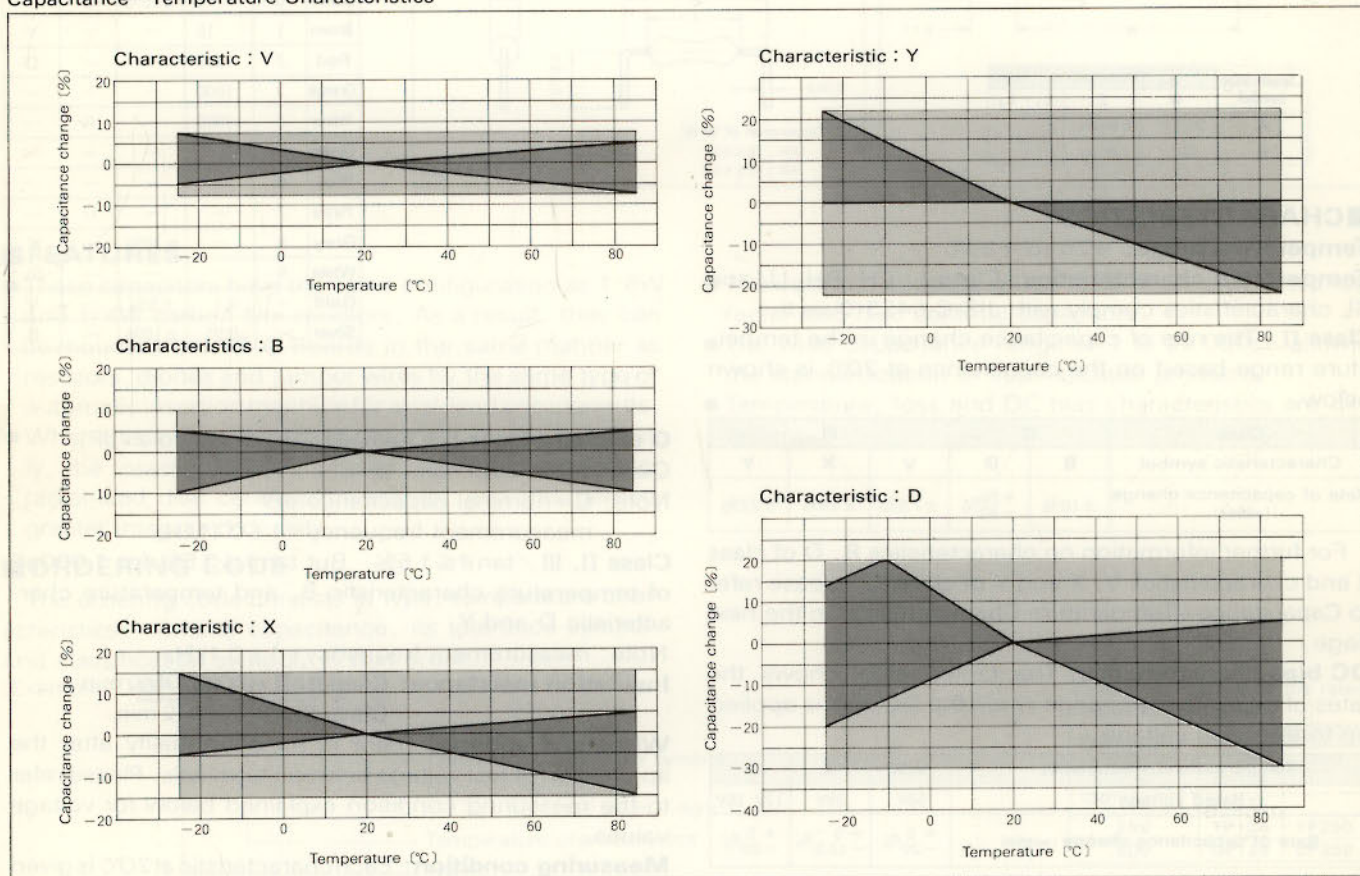
Classification	Capacitance		Insulation resistance	Withstand voltage
	Measuring frequency	Measuring voltage (RMS)	Measuring voltage (DC) 60 sec.	Test voltage (DC) 1 to 5 sec.
Class I	1MHz	5Vmax.	50V	150V
Class II	1kHz			
Class III	V	1 $\pm$ 0.5V	50V	Rated voltage $\times 1.5$
	X		Rated voltage value	
	Y		Rated voltage value	Rated voltage $\times 1.25$



Nominal Capacitance Range



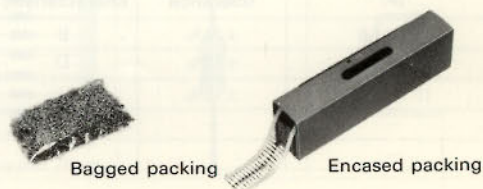
Capacitance—Temperature Characteristics



PACKING

Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

Kind of packing	Config-uration	Classification symbol	Standard quantity
Encased packing	125	A	2000 4000
		B	2000 5000
Encased packing	250	A	2000 3000
		B	2000 4000
Bagged packing	125	NA	1000
	250	KH, KB	2000



■TABLE OF ORDERING CODES AND CHARACTERISTICS

125-Type

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking								
							First	Second	Power	Tolerance	Characteristic				
50V	UP125SL010M—○	SL	1	± 20 %	Q ≥ 400 + 20 · C (C : Nominal capacitance)	100000MΩ min.	Q ≧ 1000		Bk.						
	UP125SL1R2M—○		1.2						Re.						
	UP125SL1R5M—○		1.5					Br.	Gn.						
	UP125SL1R8M—○		1.8						Gr.						
	UP125SL2R2K—○		2.2						Re.	Re.					
	UP125SL2R7K—○	2.7						Pu.							
	UP125□3R3K—○	CH RH SL	3.3	± 10 %											
	UP125□3R9K—○		3.9						Or.	Wh.					
	UP125□4R7K—○		4.7						Ye	Pu.					
	UP125□5R6K—○		5.6						Gn.	Bl.					
	UP125□6R8K—○		6.8						Bl.	Gr.					
	UP125□8R2K—○	8.2						Gr.	Re.						
	UP125□100J—○	CH RH UJ SL	10	± 5 %								Bk.			
	UP125□110J—○		11									Br.	Or.		
	UP125□120J—○		12									Re.			
	UP125□130J—○		13									Gn.	Bl.		
	UP125□150J—○		15									Gr.			
	UP125□160J—○		16									Bk.			
	UP125□180J—○		18									Re.			
	UP125□200J—○		20									Ye.			
	UP125□220J—○		22									Bk.			
	UP125□240J—○		24									Re.			
	UP125□270J—○		27									Pu.			
	UP125□300J—○		30									Bk.			
	UP125□330J—○		33									Or.			
	UP125□360J—○		36									Bl.			
	UP125□390J—○		39									Wh.			
	UP125□430J—○	★	43								Ye.	Or.			
	UP125□470J—○	UJ SL	47									Pu.			
	UP125□510J—○		51								Gn.	Br.			
	UP125□560J—○		56								Bl.	Bl.			
	UP125□620J—○		62								Re.	Gr.			
	UP125□680J—○		68								Pu.	Gn.			
	UP125□750J—○		75								Gr.	Re.			
	UP125□820J—○		82								Wh.	Br.			
	UP125SL910J—○	SL	91									Bk.			
	UP125SL101J—○		100								Br.	Re.			
	UP125SL121J—○		120								Gn.				
	UP125 B 151K—○	B	150	± 10 %				tan δ ≤ 1.5 %	* 1			Re.			
	UP125 B 181K—○		180									Gr.			
UP125 B 221K—○	220				Re.	Re.									
UP125 B 271K—○	270				Pu.										
UP125 B 331K—○	330				Or.	Or.									
UP125 B 391K—○	390				Wh.										
UP125 B 471K—○	470				Ye.	Pu.									
UP125 B 561K—○	560				Gn.	Bl.									
UP125 B 681K—○	680				Bl.	Gr.									
UP125 B 821K—○	820				Gr.	Re.									
UP125 B 102K—○		1000						Bk.							
UP125 D 102M—○	D	1000	± 20 %					Br.	Bk.	Red					
UP125 D 122M—○		1200						Re.			Black	Red			

★CH, UJ, SL *1 tan $\delta \leq 2.5\%$

125-Type

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking				
							First	Second	Power	Tolerance	Characteristic
50V	UP125□152△—○	V X	1500	±10% for characteristic Y ±20% ±30% for characteristic X	tan δ ≤ 1.5%	1000MΩ min.	Br.	Gn.	Red	k = Silver M = Black N = Grey V = Gold X = Grey	
	UP125□182△—○						Gr.				
	UP125□222△—○						Re.				
	UP125□272△—○						Pu.				
	UP125□332△—○						Or.				
	UP125□392△—○						Wh.				
	UP125□472△—○						Ye. Pu.				
25V	TP125X562△—○	X	5600	±20% ±30%			Gn.	Bl.	Orange	M = Bk. N = Gr. Grey	
	TP125X682△—○						Bl. Gr.				
	TP125X822△—○						Gr. Re.				
	TP125X103△—○						Br. Bk.				
	TP125X153△—○						Gn.				
16V	EP125Y223N—○	Y	22000	±30%	※1		Re. Re.	Orange	Gr.	Br	
12V	BP125Y333N—○		33000	Or. Or.							

250-Type

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking					
							First	Second	Power	Tolerance	Characteristic	
50V	UP250RH430J—○	RH	43	± 5 %	Q ≥ 1000	10000MΩ min.	Ye.	Or.	Black	Gold	Ye.	
	UP250□470J—○	CH	47					Pu.			Ye.	
	UP250□510J—○		51					Br			Ye.	
	UP250□560J—○		56					Bl.			RH = Ye.	
	UP250□620J—○		62				Re.	CH = Bl.				
	UP250□680J—○	68	Gr.				Gr.					
	UP250RH750J—○	RH	75				Pu.	Gn.				
	UP250RH820J—○	82	Gr.				Re.					
	UP250UJ910J—○	91	Wh.				Br.					
	UP250UJ101J—○	100	Bk.				Brown	Purple				
	UP250UJ121J—○	120	Re.									
	UP250SL151J—○	150	Gn.								Wh.	
	UP250SL181J—○	180	Gr.									
	UP250 B 122K—○	B	1200				Re.	Red			Silver	Silver
	UP250 B 152K—○	1500	± 10%				Gn.	Silver			Silver	
25V	TP250 X 223N—○	X	22000	± 30%	☆	Re.	Re.	Or.	Gr.	G		

*2 tan $\delta \leq 1.5\%$ *1 Insulation resistance = 1,000M Ω min.

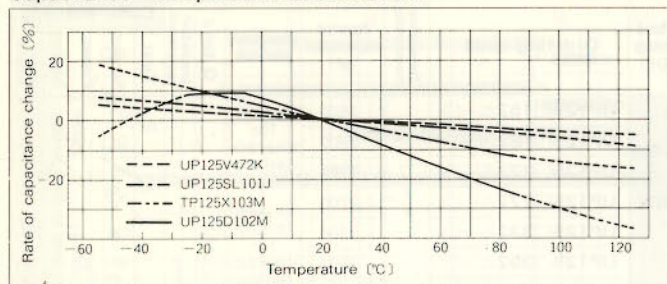
Note 1: In the ordering code, □, △ and ○ are for the characteristic symbol, capacitance tolerance symbol and classification symbol respectively.

Note 2: Bold-faced nominal capacitances are standard.

Note 3: Ye., Bl., Re., Bk., Gn., Gr., Pu., Or., Wh., Br., are the abbreviations of Yellow, Blue, Red, Black, Green, Grey, Purple, Orange, White, Brown respectively.

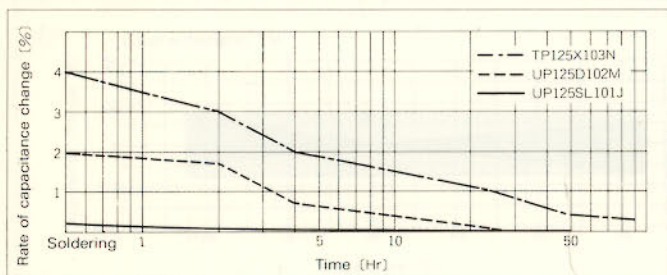
VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



Capacitance Change after Solder Heat Resistance

The figure opposite shows the test data for capacitance change after soldering. The initial value is the capacitance immediately after the automatic insertion of a sample onto a P.C.Board with a 10mm pitch. The time indicates the hours that have elapsed following the automatic insertion.



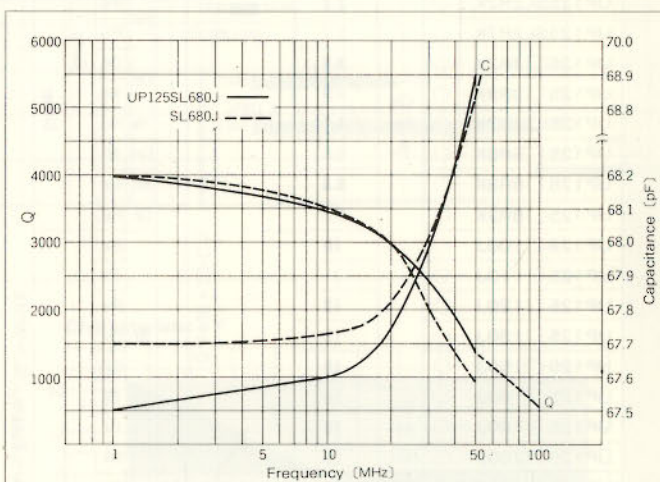
Body Strength Test

(No. of samples=50)

Sample name	Breakdown strength [kg wt.]						
	9	10	11	12	13	14	15
UP125SL 220J							
UP125RH390J							
UP125SL 680J							
UP125SL 101J							
UP125 B 681K							
UP125 B 821K							
UP125 D 102M							
TP125 X 103N							

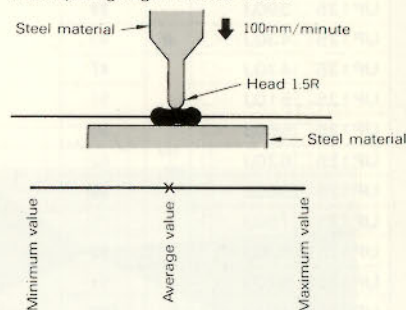
Capacitance - Frequency Characteristics

Single products with lead wires cut at a length of 5mm on one side were measured in the Frequency range of 1MHz to 50MHz. Three products connected in series were measured in the frequency range of above 50MHz to 100MHz and the results are indicated as reference values by broken lines. (Measurements were made by an admittance bridge.)



Measuring Instrument and Jig

Push-pull gauge; Model 4030



100-TYPE MINIATURIZED CONFIGURATION

100-type miniaturized-configuration capacitors provide the same characteristics as the 125 and 250-type ordinary-configuration capacitors and are available in a wide capacitance range of 1 to 10,000pF. Miniaturization has resulted in a narrow lead pitch of 7.5mm and an improvement in integrated density has been further realized.

ORDERING CODE

The ordering code consists of type, temperature characteristics, nominal capacitance, its tolerance symbol, and classification symbol, in that order.
[Example]

UP100 RH 150 J - A

Classification symbol
Capacitance tolerance symbol
Nominal capacitance
(pF unit in 3 digits)
Temperature characteristics
Type*

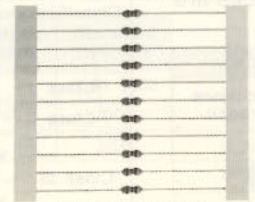
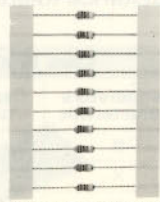
* Types are classified by the rated voltage as listed below.

Rated voltage (DC)	Type
16V	EP100
25V	TP100
50V	UP100

Configuration and

Classification Symbol

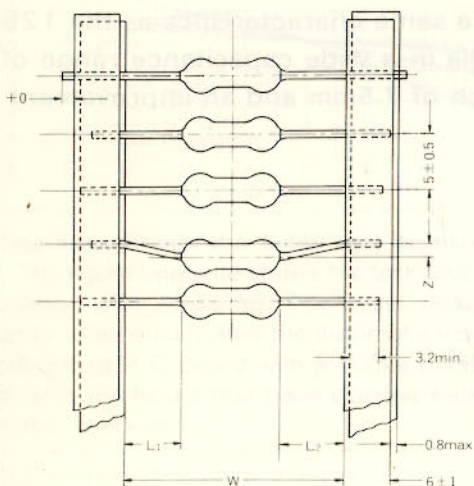
The classified configuration symbols are divided into those for taped products and single products. The symbols are shown on the right.

Classification	Taped products		Single products	
Classification symbol	B	A	NA	KH KE
Lead configuration	Straight	Straight	Straight	Formed
Products configuration	 Taping space: 52mm	 Taping space: 26mm		

OUTER DIMENSIONS

Taping Dimensions

Classification symbol: A, B

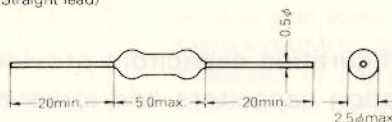


Classification symbol	W	Z	L ₁ - L ₂
A	26 ^{+1.5} ₋₀	0.8max.	1max.
B	52 ⁺² ₋₁	1.2max.	

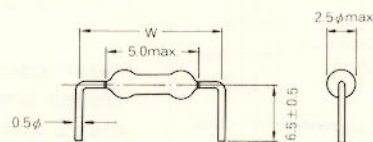
Unit : mm

Dimensions of Single Products

Classification symbol: NA
(Straight lead)



Classification symbol: KH, KB
(Formed lead)



Dimension of W is:
KH : 10.0±0.5
KB : 7.5±0.5

Unit : mm

CHARACTERISTICS

Temperature range: -25 to +85°C

Temperature characteristics: Class I/CH, RH, UJ and SL characteristics comply with JIS-C-6423(Class I).

Class II/ The rate of capacitance change in the temperature range based on the capacitance at 20°C is shown below.

Class	II	III
Characteristic symbol	B	X Y
Rate of capacitance change (within)	±10%	±15% ±22%

For further information on characteristics D of class II and characteristics X, and Y of class III, please refer to Capacitance - Temperature Characteristics on the next page.

DC bias characteristics: The table below shows the rates of capacitance change when the DC bias is applied up to the rated voltage.

Temperature characteristic	X	Y
Rated voltage (DC)	25V	16V
Rate of capacitance change (within)	+5 -12.5%	+5 -20%

Nominal capacitance: Please refer to Nominal Capacitance Range on the next page.

Capacitance tolerance: The capacitance tolerances are in principle as given below.

Class I		Class II, III	
Nominal capacitance (pF)	Capacitance tolerance	Temperature characteristic	Capacitance tolerance
1 to 1.8	±20%	B	±10%
2.2 to 8.2	±10%	X	±20%
10 to 100	±5%	Y	±30%

MARKING

Rated voltages are indicated by the color code shown below: Characteristics, nominal capacitances, and its tolerances are as indicated in the color-code table shown below.

Rated voltage (DC)	Body color
50 V	Yellowish green
16V and 25V	Pink

Color Code Marking

Color	Nominal capacitance (pF)		Tolerance	Characteristic or Temperature coefficient	
	First figure	Second figure		T.C.	Characteristic
Black	0	1	±20%	C	—
Brown	1	10	—	—	Y
Red	2	100	—	—	—
Orange	3	1000	—	—	—
Yellow	4	10000	—	R	—
Green	5	—	—	—	—
Blue	6	—	—	—	—
Purple	7	—	—	U	—
Grey	8	—	±30%	—	X
White	9	—	—	—	SL
Gold	—	0.1	±5%	—	—
Silver	—	0.01	±10%	—	B

Q or tanδ: Class I/Q ≥ 400 + 20 · C for 1 to 27pF.

Q ≥ 1,000 at 30pF min.

Note: C = nominal capacitance (pF)

measurement frequency = 1 ± 0.1MHz

Class II, III/ tanδ ≤ 1.5% But tanδ ≤ 2.5% for 820pF and 1,000pF of temperature characteristic B and Y.

Note: measurement frequency = 1 ± 0.1kHz

Insulation resistance: Class I, II/10,000MΩ min.

Class III/1,000MΩ min.

Withstand voltage: There is no abnormality after the application of test voltage between terminals. Please refer to the measuring condition explained below for voltage values.

Measuring condition: Each characteristic at 20°C is given in the table below.

Classification	Capacitance		Insulation resistance	Withstand voltage
	Measuring frequency	Measuring voltage (RMS)	Measuring voltage (DC) 60 sec.	Test voltage (DC) 1 to 5 sec.
Class I	1MHz	5Vmax.	50V	150V
Class II	1kHz			
Class III	X	1 ± 0.5V	25V	37.5V
	Y		16V	18V

Nominal Capacitance Range

Rated voltage (DC)		Temperature characteristic	Nominal capacitance													
			1	3	5	10	30	50	100	300	500	1000	3000	5000	10000 (pF)	
50V	Class I	CH		3.3				36								
		RH		3.3				39								
		UJ				8.2		56								
		SL	1						100							
50V	Class II	B							120			1000				
25V	Class III	X										1500		6800		
16V	Class III	Y												8200	10000	

TABLE OF ORDERING CODES AND CHARACTERISTICS

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking					
							First	Second	Power	Tolerance	Characteristic	
50V	UP100 SL 010M	SL	1.0	± 20%	Q ≥ 400 + 20 · C (C : Nominal capacitance)	10000MΩ min		Bk.				
	UP100 SL 1R2M						Re.					
	UP100 SL 1R5M		Br				Gn.			Black	White	
	UP100 SL 1R8M						Gr.					
	UP100 SL 2R2K						Re.					
	UP100 SL 2R7K						Pu.					
	UP100 □ 3R3K	CH RH SL	3.3	± 10%				Or.	Or.		Gold	
	UP100 □ 3R9K						Wh.				Silver	
	UP100 □ 4R7K						Ye.	Pu.				
	UP100 □ 5R6K						Gn.	Bl.				
	UP100 □ 6R8K						Bl.	Gr.				
	UP100 □ 8R2K						Gr.	Re.				
	UP100 □ 100J	CH RH SL UJ	10	± 5%				Bk.				
	UP100 □ 110J						Br.					
	UP100 □ 120J						Re.					
	UP100 □ 130J						Br.	Or.				
	UP100 □ 150J						Gn.					
	UP100 □ 160J						Bl.					
	UP100 □ 180J						Gr.					
	UP100 □ 200J						Bk.					
	UP100 □ 220J						Re.	Re.				
	UP100 □ 240J						Ye.	Pu.		Black		
	UP100 □ 270J						Pu.				Gold	
	UP100 □ 300J						Bk.					
	UP100 □ 330J						Or.	Or.				
	UP100 □ 360J						Bl.					
	UP100 □ 390J	★	39				Wh.					
	UP100 □ 430J		43				Ye.	Or.				
	UP100 □ 470J	UJ SL	47				Pu.					
	UP100 □ 510J			Gn.			Br.					
	UP100 □ 560J			Bl.								

CH = Black RH = Yellow UJ = Purple SL = White

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking						
							First	Second	Power	Tolerance	Charac-		
50V	UP100 SL 620J	SL	62	±5%	Q ≥ 1000	10000MΩ min.	Bl.	Re	Black	Gold	White		
	UP100 SL 680J		68				Gr.						
	UP100 SL 750J		75				Pu. Gn.						
	UP100 SL 820J		82				Gr. Re						
	UP100 SL 910J		91				Wh. Br.						
	UP100 SL 101J		100				Bk.						
	UP100 B 121K	B	120	±10%			tan δ ≤ 1.5%	10000MΩ min.	Br.	Re	Brown	Silver	Silver
	UP100 B 151K		150						Gn.				
	UP100 B 181K		180						Gr.				
	UP100 B 221K		220						Re				
	UP100 B 271K		270						Pu.				
	UP100 B 331K		330						Or.				
	UP100 B 391K		390						Wh.				
	UP100 B 471K		470						Ye.				
	UP100 B 561K		560						Gn. Bl.				
	UP100 B 681K		680						Bl. Gr.				
	UP100 B 821K		820						Gr. Re.				
	UP100 B 102K		1000						Bk.				
25V	TP100 X 152N	X	1500	±30%	tan δ ≤ 1.5%	10000MΩ min.	Br.	Gn.	Red	Grey	Grey		
	TP100 X 182N		1800				Gr.						
	TP100 X 222N		2200				Re						
	TP100 X 272N		2700				Re.						
	TP100 X 332N		3300				Or.						
	TP100 X 392N		3900				Or. Wh.						
	TP100 X 472N		4700				Ye. Pu.						
	TP100 X 562N		5600				Gn. Bl.						
	TP100 X 682N		6800				Bl. Gr.						
16V	EP100 Y 822N	Y	8200	±30%	*	10000MΩ min.	Gr.	Re.			Br.		
	EP100 Y 103N		10000				Br. Bk.	Or.					

Note 1: Bold-faced nominal capacitances are standard

Note 2: The symbols are as follows:

□ : Temperature characteristic

★ : RH, UJ, SL

* : $\tan \delta \leq 2.5\%$

Note 3: Br., Re., Or., Ye., Gn., Bl., Gr., Pu., Wh., Bk. are the abbreviations of Brown, Red, Orange, Yellow, Green, Blue, Grey, Purple, White, and Black respectively.

PACKING

Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

Kind of Packing	Classification symbol	Standard quantity
Encased packing	A B	3000 5000
Bagged packing	NA	1000
	KH KE	3000



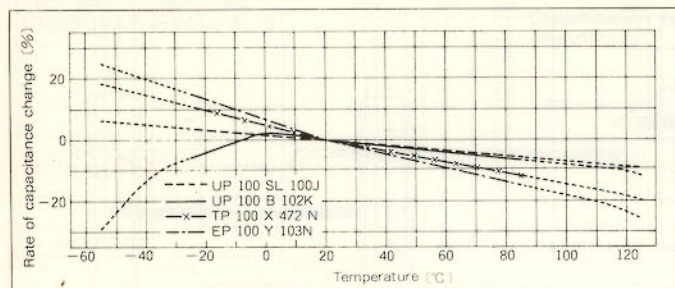
Bagged packing



Encased packing

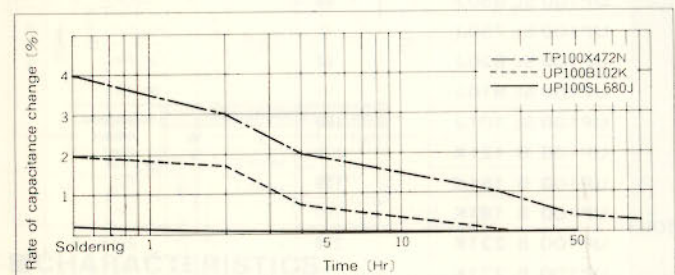
VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



Capacitance Change after Solder Heat Resistance

The figure opposite shows the test data for capacitance change after soldering. The initial value is the capacitance immediately after the automatic insertion of a sample onto a P.C.Board with a 10mm pitch. The time indicates the hours that have elapsed following the automatic insertion.



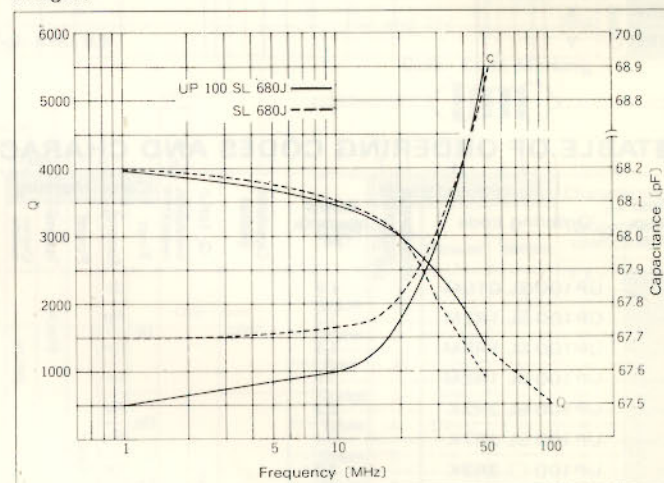
Body Strength Test

(No. of samples=50)

Sample name	Breakdown strength [kg wt.]											
	4	5	6	7	8	9	10	11	12			
UP100 RH 4R7K												
UP100 CH 220J												
UP100 CH 330J												
UP100 SL 680J												
UP100 SL 101J												
UP100 B 102K												
TP 100 X 222N												
TP 100 X 472N												
EP 100 Y 103N												

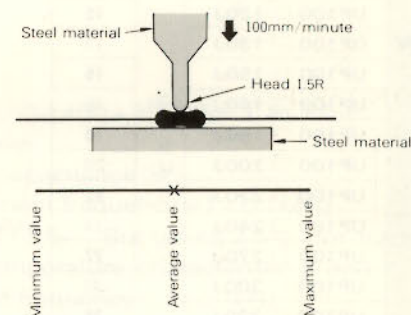
Capacitance - Frequency Characteristics

Single products with lead wires cut at a length of 5mm on one side were measured in the Frequency range of 1MHz to 50MHz. Three products connected in series were measured in the frequency range of above 50MHz to 100MHz and the results are indicated as reference values by broken lines. (Measurements were made by an admittance bridge.)



Measuring Instrument and Jig

Push-pull gauge: Model 4030



050-TYPE SUPER-MINIATURIZED CONFIGURATION

050-type super-miniaturized capacitors provide the same characteristics and performance as the ordinary-configuration and miniaturized-configuration capacitors. The range of capacitance covered is a wide 1.0 to 10,000pF, lead pitch has been narrowed to 5mm, and the integrated density has been improved.

ORDERING CODE

The ordering code consists of type, temperature characteristics, nominal capacitance, its tolerance symbol, and classification symbol, in that order.

[Example]

UP050 RH 150 J - A

Classification symbol
Capacitance tolerance symbol
Nominal capacitance
(pF unit in 3 digits)
Temperature characteristics
Type*

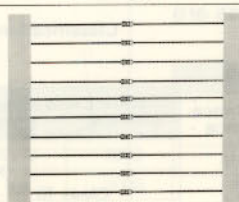
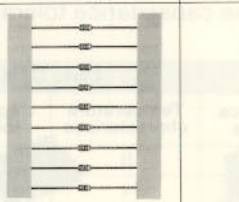
* Types are classified by the rated voltage as listed below.

Rated voltage (DC)	Type
16V	EP050
50V	UP050

Configuration and

Classification Symbol

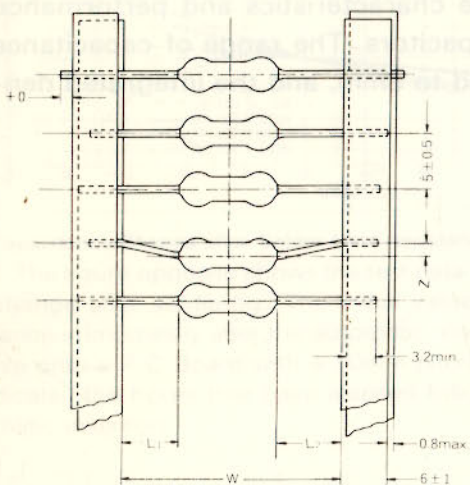
The classified configuration symbols are divided into those for taped products and single products. The symbols are shown on the right.

Classification	Taped products		Single products	
Classification symbol	B	A	NA	KF KE
Lead configuration	Straight	Straight	Straight	Formed
Products configuration				
	Taping space: 52mm	Taping space: 26mm		

OUTER DIMENSIONS

Taping Dimensions

Classification symbol: A, B

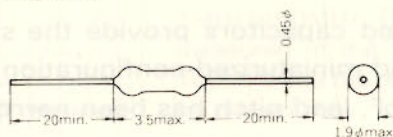


Classification symbol	W	Z	L ₁ - L ₂
A	26 ^{+0.5} ₋₀	0.8max.	0.5max.
B	52 ⁺² ₋₁	1.2max.	

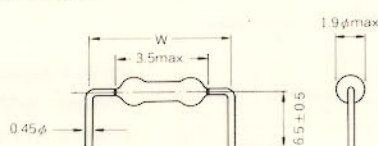
Unit : mm

Dimensions of Single Products

Classification symbol: NA
(Straight lead)



Classification symbol: KH, KB
(Formed lead)



Dimension of W is:
KF : 5 ± 0.5
KE : 7.5 ± 0.5

Unit : mm

MARKING

Rated voltages are indicated by the color code shown below: Characteristics, nominal capacitances, and its tolerances are as indicated in the color-code table shown below.

Rated voltage (DC)	Body color
50 V	Yellowish green
16V and 25V	Pink

Color Code Marking



Color	Nominal capacitance (pF)		Power	Tolerance	Characteristic or Temperature coefficient	
	First figure	Second figure			T.C.	Characteristic
Black	0	1	±20%		C	—
Brown	1	10	—	—	—	Y
Red	2	100	—	—	—	—
Orange	3	1000	—	—	—	—
Yellow	4	10000	—	—	R	—
Green	5	—	—	—	—	—
Blue	6	—	—	—	—	—
Purple	7	—	—	—	U	—
Grey	8	—	±30%	—	—	X
White	9	—	—	—	—	SL
Gold	—	0.1	±5%	—	—	—
Silver	—	0.01	±10%	—	—	B

CHARACTERISTICS

Temperature range: -25 to +85°C

Temperature characteristics: Class I/CH, RH, UJ and SL characteristics comply with JIS-C-6423 (Class I).

Class II/The rate of capacitance change in the temperature range based on the capacitance at 20°C is shown below.

Class	II	III
Characteristic symbol	B	X Y
Rate of capacitance change (Within)	±10%	±15% ±22%

For further information on characteristics B of class II and characteristics X and Y of class III, please refer to Capacitance-Temperature Characteristics on the next page.

DC bias characteristics: The table below shows the rates of capacitance change when the DC bias is applied up to the rated voltage.

Temperature characteristic	X	Y
Rated voltage (DC)	16V	16V
Rate of capacitance change (within)	+5% -12.5%	+5% -20%

Nominal capacitance: Please refer to Nominal Capacitance Range on the next page.

Capacitance tolerance: The capacitance tolerances are in principle as given below.

Class I		Class II, III	
Nominal capacitance (pF)	Capacitance tolerance	Temperature characteristic	Capacitance tolerance
1 to 1.8	±20%	B	±10%
2.2 to 8.2	±10%	X	±20%
10 to 68	±5%	Y	±30%

Q or tan δ: Class I/Q ≥ 400 + 20 · C for 1 to 30pF.

But Q ≥ 500 at 16pF min of temperature characteristic RH Q ≥ 500 at 33pF min.

Note: C = nominal capacitance (pF)

measurement frequency = 1 ± 0.1MHz

Class II, III/tan δ ≤ 1.5% But tan δ ≤ 2.5% for 470 to 1,000pF of temperature characteristic B and temperature characteristic X and Y.

Note: measurement frequency = 1 ± 0.1kHz

Insulation resistance: Class I, II/10,000M Ω min.

Class III/But 1,000M Ω min for 820pF and 1,000pF.

Withstand voltage: There is no abnormality after the application of test voltage between terminals. Please refer to the measuring condition explained below for voltage values.

Measuring condition: Each characteristic at 20°C is given in the table below.

Classification	Capacitance		Insulation resistance	Withstand voltage
	Measuring frequency	Measuring voltage (RMS)	Measuring voltage (DC) 60 sec.	Test voltage (DC) 1 to 5 sec.
Class I	1MHz	5Vmax.	50V	150V
Class II	1kHz		16V	18V
Class III	X	1 ± 0.5V	16V	18V
	Y		16V	18V

Nominal Capacitance Range

Rated voltage (DC)	Temperature characteristic	Nominal capacitance													
		1	3	5	10	30	50	100	300	500	1000	3000	5000	10000	[pF]
50V	Class I	CH						20							
		RH					18								
		UJ	2.2				30								
		SL	1					68							
50V	Class II	B					75			1000					
16V	Class III	X								1200		6800			
		Y											8200	10000	

TABLE OF ORDERING CODES AND CHARACTERISTICS

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking					
							First	Second	Power	Tolerance	Characteristic	
50V	UP050 □ 010M	CH RH SL	1.0	±20%	Q ≥ 400 + 20·C (C: Nominal capacitance) but Q ≥ 500 at 16pF min of characteristic RH 10000MΩ min.	Br.	Bk.	Black	☆1			
	UP050 □ 1R2M		1.2				Re.					
	UP050 □ 1R5M		1.5				Gn.					
	UP050 □ 1R8M		1.8				Gr.					
	UP050 □ 2R2K	CH RH UJ SL	2.2	±10%		Q ≥ 400 + 20·C (C: Nominal capacitance) but Q ≥ 500 at 16pF min of characteristic RH 10000MΩ min.	Re.	Re.	Gold	SL = White		
	UP050 □ 2R7K		2.7					Pu.				
	UP050 □ 3R3K		3.3					Or.				
	UP050 □ 3R9K		3.9					Wh.				
	UP050 □ 4R7K		4.7					Ye.				
	UP050 □ 5R6K		5.6					Gn.				
	UP050 □ 6R8K		6.8					Bl.				
	UP050 □ 8R2K		8.2					Gr.				
	UP050 □ 100J		10					Bk.			CH = Black RH = Yellow UJ = Purple	
	UP050 □ 110J		11					Br.				
	UP050 □ 120J		12					Re.				
	UP050 □ 130J		13					Br.				
	UP050 □ 150J	15	Gn.									
	UP050 □ 160J	16	Bl.									
	UP050 □ 180J	18	Gr.									
	UP050 □ 200J	★	20	Bk.								
	UP050 □ 220J	UJ SL	22	±5%		Q ≥ 500	Re.	Re.	Black	☆2		
	UP050 □ 240J		24					Ye.				
	UP050 □ 270J		27					Pu.				
	UP050 □ 300J		30					Bk.				
	UP050 SL330J	SL	33	±5%		Q ≥ 500	Or.	Or.	Gold	☆3		
	UP050 SL360J		36					Bl.				
	UP050 SL390J		39					Wh.				
	UP050 SL430J		43					Or.				
	UP050 SL470J		47					Ye.				
	UP050 SL510J		51					Pu.				
	UP050 SL560J		56					Gn.				
	UP050 SL620J		62					Re.				
	UP050 SL680J		68				Bl.	Gr.	White			
50V	UP050 B 750 K	B	75	±10%	tan δ ≤ 1.5% 10000MΩ min.	Pu.	Gn.	Black				
	UP050 B 820 K		82				Gr.			Re.		
	UP050 B 910 K		91				Wh.			Br.		
	UP050 B 101 K		100				Bk.					
	UP050 B 121 K		120				Br.			Re.		
	UP050 B 151 K		150				Gn.					
	UP050 B 181 K		180				Gr.					
	UP050 B 221 K		220				Re.			Re.		
	UP050 B 271 K		270				Pu.					
	UP050 B 331 K		330				Or.			Or.		
	UP050 B 391 K		390				Ye.			Pu.		
	UP050 B 471 K		470				Gn.			Bl.		
	UP050 B 561 K		560				Bl.			Gr.		
	UP050 B 681 K		680				Gr.			Re.		
	UP050 B 821 K		820				Gr.			Re.		
	UP050 B 102 K		1000				Bk.					
	16V	EP050 X 122 △	X	1200		±20% ±30%	tan δ ≤ 2.5% 1000MΩ min.	Br.	Re.	Red	M = Black N = Grey	
		EP050 X 152 △		1500					Gn.			
		EP050 X 182 △		1800					Gr.			
		EP050 X 222 △		2200					Re.			Re.
		EP050 X 272 △		2700					Pu.			
		EP050 X 332 △		3300					Or.			Or.
		EP050 X 392 △		3900					Ye.			Pu.
		EP050 X 472 △		4700					Gn.			Bl.
		EP050 X 562 △		5600					Bl.			Gr.
		EP050 X 682 △		6800					Gr.			Re.
		EP050 Y 822 △		8200					Br.			Bk.
		EP050 Y 103 △		10000					Br.			Bk.

Note 1: Bold-faced nominal capacitances are standard

Note 2: The symbols are as follows:
□ : Temperature characteristic
△ : Capacitance tolerance change
★ : SL, CH, UJ
☆1 : SL=White, CH=Black, RH=Yellow
☆2 : SL=White, CH=Black, UJ=Purple
☆3 : SL=White, UJ=Purple

Note 1: Bold-faced nominal capacitances are standard

Note 2: The symbols are as follows:

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△ : Capacitance tolerance change

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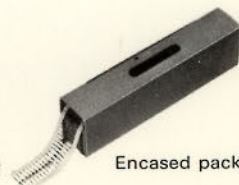
PACKING

Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

Kind of Packing	Classification symbol	Standard quantity
Encased packing	A B	4000
Bagged packing	NA	2000
	KF KE	5000



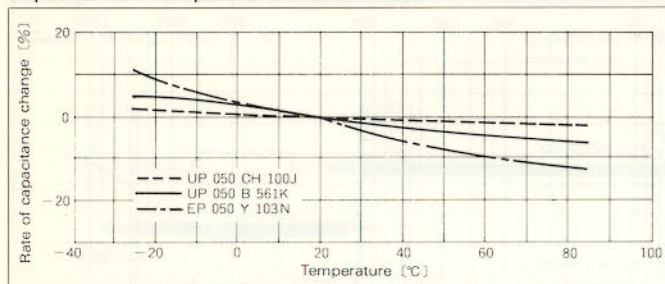
Bagged packing



Encased packing

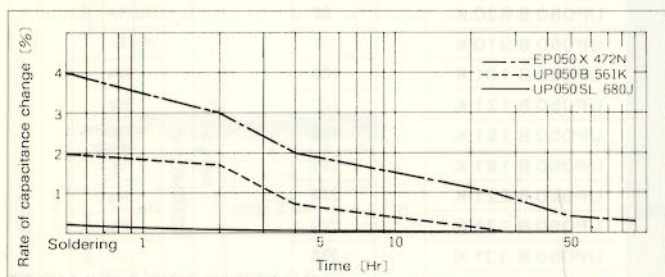
VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



Capacitance Change after Solder Heat Resistance

The figure opposite shows the test data for capacitance change after soldering. The initial value is the capacitance immediately after the automatic insertion of a sample onto a P.C. Board with a 10mm pitch. The time indicates the hours that have elapsed following the automatic insertion.



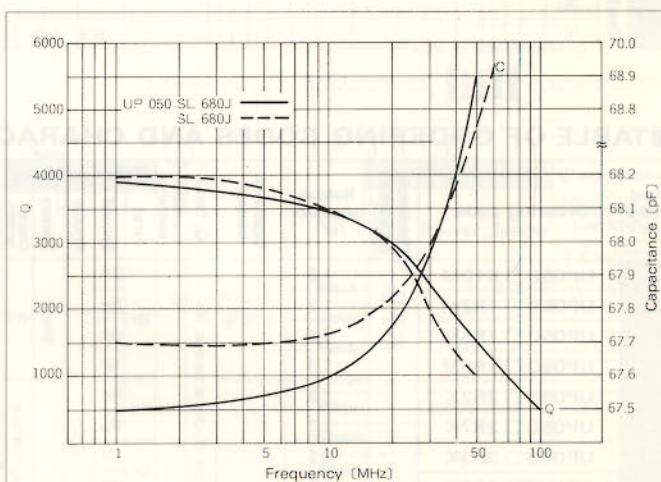
Body Strength Test

(No. of samples = 50)

Sample name	Breakdown strength (kg wt)					
	6	7	8	9	10	11
UP050 CH 200J			X			
UP050 B 821K			X			
EP050 Y 103N				X		

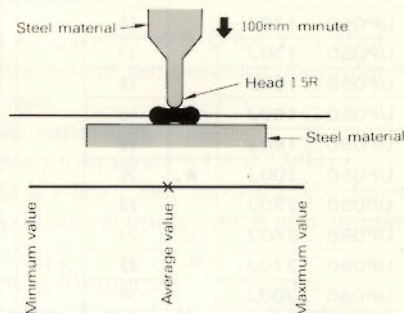
Capacitance - Frequency Characteristics

Single products with lead wires cut at a length of 5mm on one side were measured in the Frequency range of 1MHz to 50MHz. Three products connected in series were measured in the frequency range of above 50MHz to 100MHz and the results are indicated as reference values by broken lines. (Measurements were made by an admittance bridge.)



Measuring Instrument and Jig

Push-pull gauge: Model 4030



VARIOUS CHARACTERISTIC

Characteristics of Various Characteristic



Characteristics of various capacitor types are shown in the following graphs. The graphs show the relationship between frequency and various characteristics for different capacitor types. The graphs show the relationship between frequency and various characteristics for different capacitor types.



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