

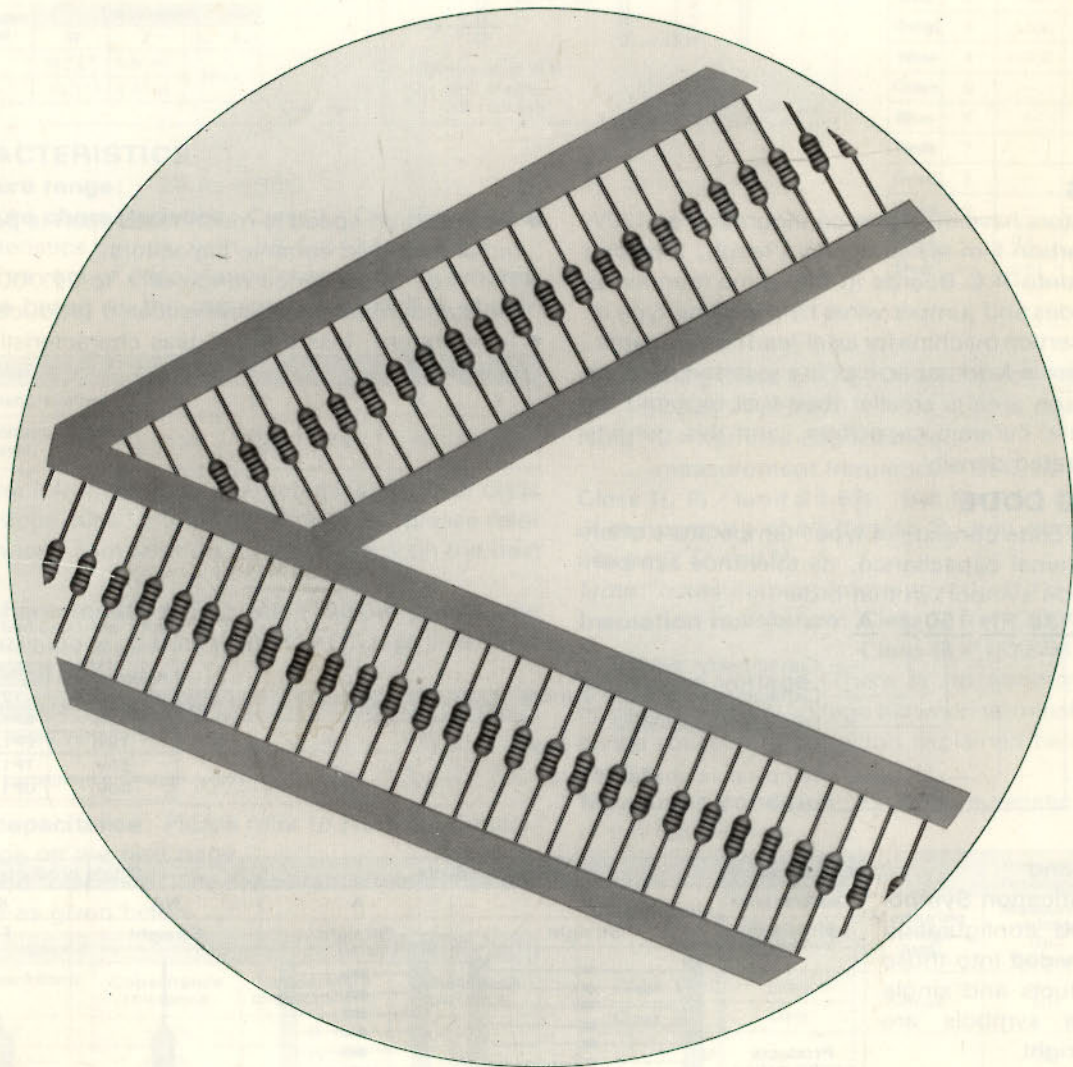


TAIYO YUDEN
PRODUCTS

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.

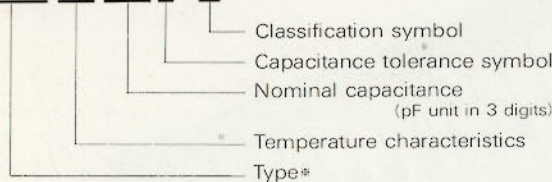
FEATURES

- 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.

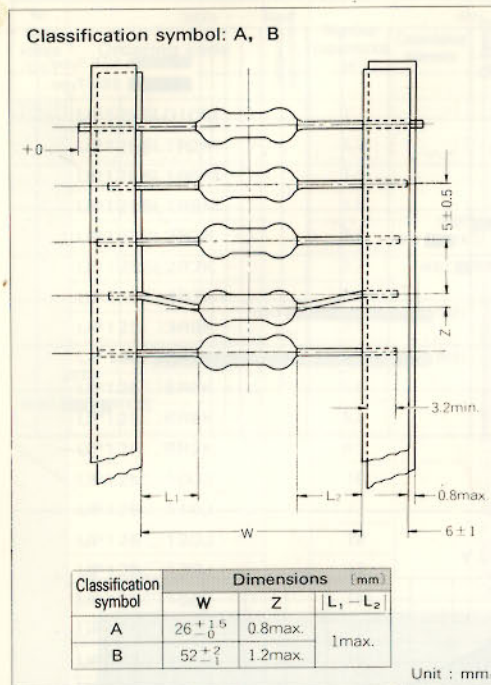
Note: 250-type for taping are available with 52mm taping space only.

Classification	Taped products		Single products	
	Classification symbol	B	A	NA
Lead configuration	Straight		Straight	Formed
Products configuration	<p>Taping space: 52mm Taping space: 25mm</p>			



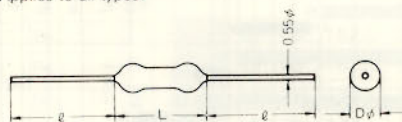
OUTER DIMENSIONS

Taping Dimensions



Dimensions of Single Products

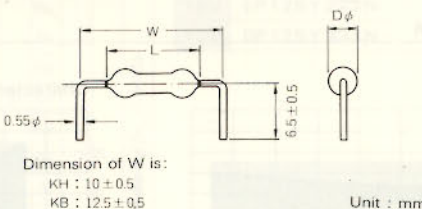
Classification symbol: NA
(Straight lead)
Applies to all types.



Type	Dimensions (mm)		
	L (max)	Dφ (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.



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		
	B	D	V	X	Y
Rate of capacitance change (within)	±10%	+20% -30%	±7.5%	±15%	±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	±20%	B	±10%
2.2 to 8.2	±10%	D	±20%
10 to 180	±5%	V	±10%
—	—	X	±20, ±30%
—	—	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
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	±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	—	±30%	—	X
White	9	—	—	—	SL
Gold	—	0.1	±5%	—	V
Silver	—	0.01	±10%	—	B

Q or tanδ: Class I/Q ≥ 400 + 20 · C for 1 to 27pF.
Q ≥ 1,000 at 30pFmin.

Note: C = nominal capacitance (pF)

measurement frequency = 1 ± 0.1MHz

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

Note: measurement frequency = 1 ± 0.1kHz

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

Class III / 1,000MΩ min.

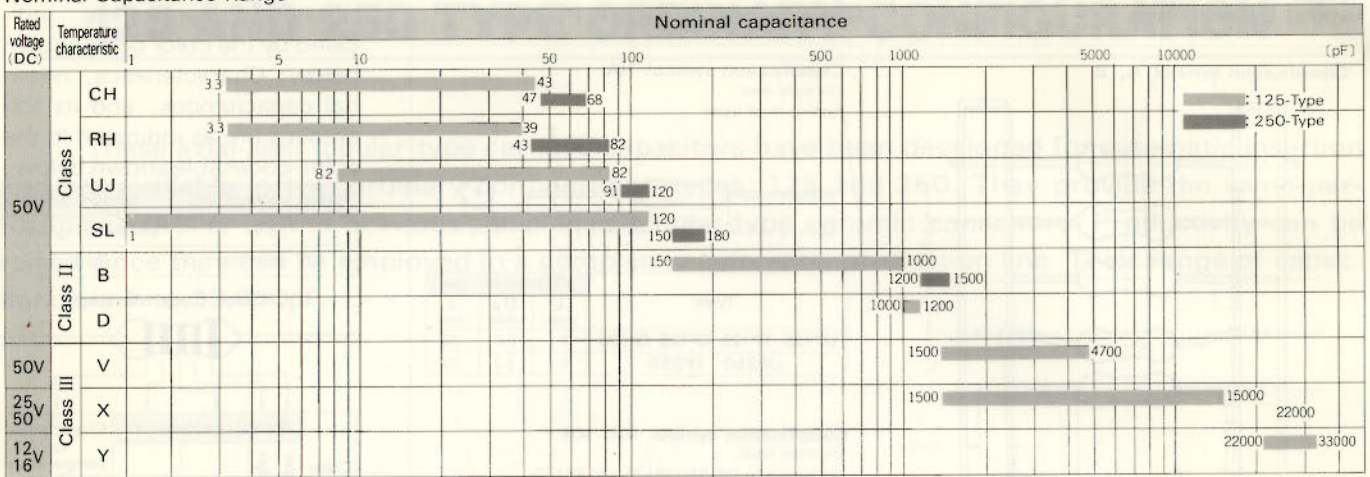
Withstand voltage: There is no abnormality after the application of test voltage between terminals. Please refer to the measuring condition explained below for voltage values.

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

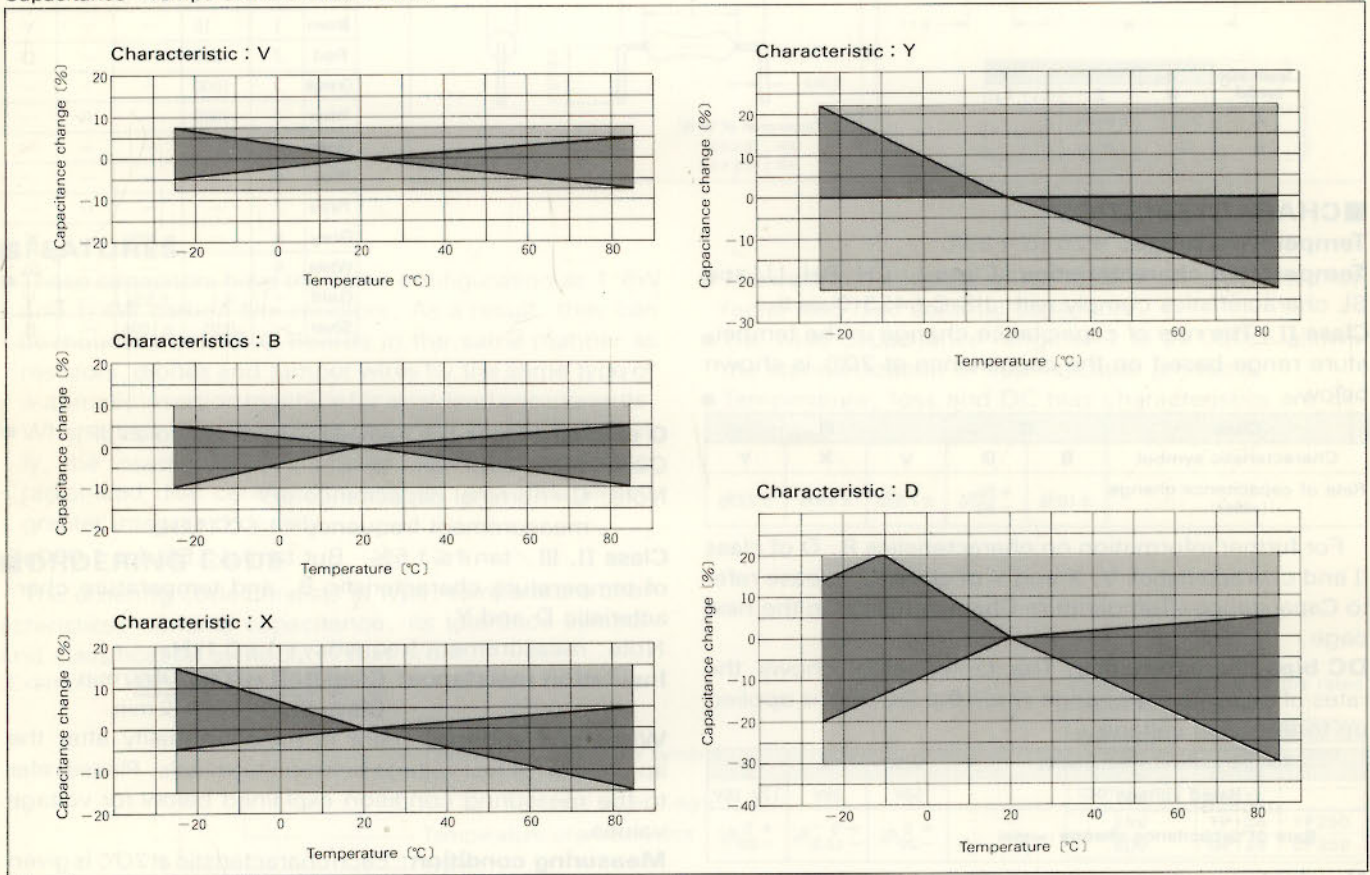
Classification	Capacitance		Insulation resistance	Withstand voltage
	Measuring frequency	Measuring voltage (RMS)		
Class I	1MHz	5Vmax.	50V	150V
Class II	1kHz	5Vmax.		
Class III	V	1 ± 0.5V	50V	Rated voltage × 1.5
	X		Rated voltage value	
	Y		Rated voltage value	



Nominal Capacitance Range



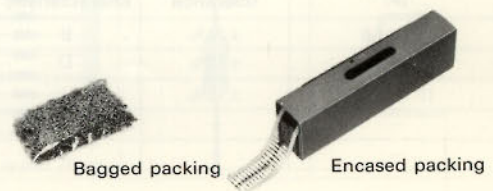
Capacitance-Temperature Characteristics



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

★CH, UJ, SL *1 tan δ ≤ 2.5%

*2 tan δ ≤ 1.5%

*Insulation resistance = 1,000MΩ 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.

125-Type

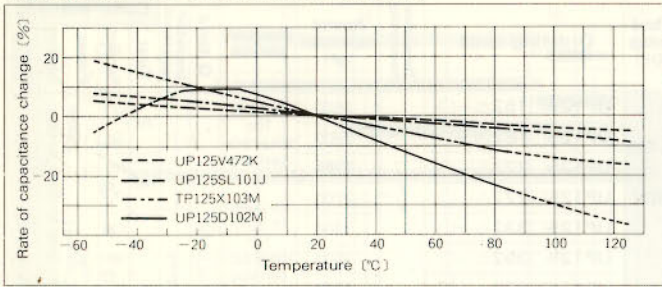
Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Color marking						
						Insulation resistance	First	Second	Power	Tolerance	Characteristic	
50V	UP125 152△	V	1500	±10% for characteristic Y	tan δ ≤ 1.5%	10000MΩ min.	Br	Gn				
	UP125 182△		1800				Br	Gr				
	UP125 222△		2200				Re	Re				
	UP125 272△		2700				Pu	Pu				
	UP125 332△		3300				Or	Or				
	UP125 392△		3900				Wh	Wh				
	UP125 472△		4700				Ye	Pu				
25V	TP125X562△	X	5600	±20% ±30%	tan δ ≤ 1.5%	10000MΩ min.	Gn	Bl				
	TP125X682△		6800				Bl	Gr				
	TP125X822△		8200				Gr	Re				
	TP125X103△		10000				Br	Bk				
TP125X153△	15000	Gr	Re									
16V	EP125Y223N	Y	22000	±30%	*1							
12V	BP125Y333N	Y	33000	±30%	*1							

250-Type

Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Color marking						
						Insulation resistance	First	Second	Power	Tolerance	Characteristic	
50V	UP250RH430J	RH	43	±5%	Q ≥ 1000	10000MΩ min.						
	UP250 470J		47				Ye	Pu				
	UP250 510J		51				Gn	Br				
	UP250 560J	CH	56				Bl	Bl				
	UP250 620J	RH	62				Bl	Re				
	UP250 680J		68				Bl	Gr				
	UP250RH750J	RH	75				Pu	Gn				
	UP250RH820J	RH	82				Gr	Re				
	UP250UJ910J		91				Wh	Br				
	UP250UJ101J	UJ	100					Bk				
	UP250UJ121J		120					Re				
	UP250SL151J	SL	150					Gn	Br			
	UP250SL181J		180					Gr				
	UP250 B 122K	B	1200					Re	Gr			
	UP250 B 152K		1500					Gn	Re			
25V	TP250 X 223N	X	22000	±30%	*2							

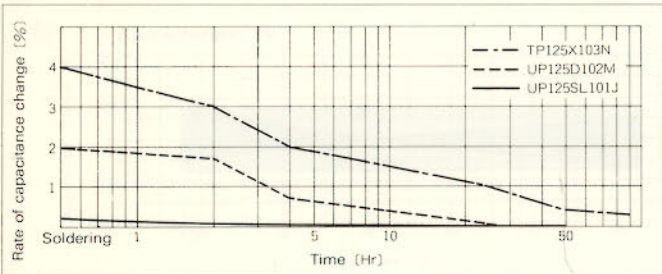
VARIOUS CHARACTERISTIC

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.



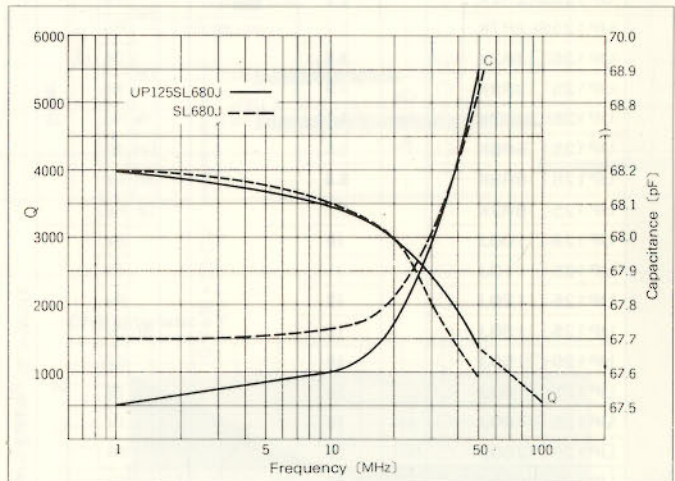
Body Strength Test

(No. of samples=50)

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

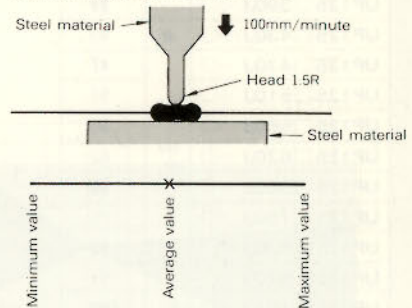
Capacitance - Frequency Characteristics

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





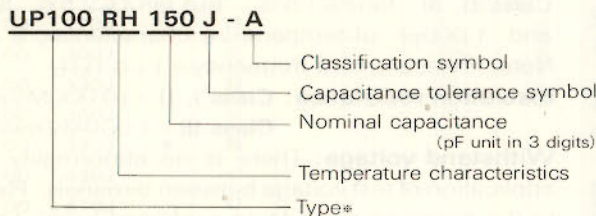
100-TYPE MINIATURIZED CONFIGURATION

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.

TABLE OF ORDERING CODES AND CHARACTERISTICS

ORDERING CODE

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



* 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	
	B	A	NA	KH KE
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	25 ^{+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

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

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% ±30%
10 to 100	±5%	Y	±30%

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									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

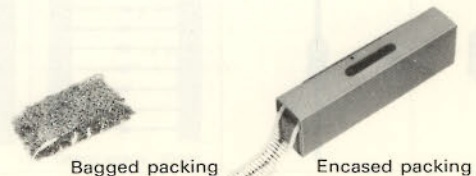
Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking											
							First	Second	Power	Tolerance	Characteristic							
50V	UP100 SL 010M	SL	1.0	±20%	Q ≥ 400 + 20·C (C: Nominal capacitance)	10000MΩ min	Bk.											
	UP100 SL 1R2M		1.2				Br.											
	UP100 SL 1R5M		1.5				Gn.											
	UP100 SL 1R8M		1.8				Gr.											
	UP100 SL 2R2K		2.2				Re.											
	UP100 SL 2R7K		2.7				Pu.											
	UP100 □ 3R3K	3.3	CH RH SL	3.3			±10%											
	UP100 □ 3R9K	3.9		Or.														
	UP100 □ 4R7K	4.7		Ye.														
	UP100 □ 5R6K	5.6		Gn.														
	UP100 □ 6R8K	6.8		Bl.														
	UP100 □ 8R2K	8.2		Gr.														
	UP100 □ 100J	10																
	UP100 □ 110J	11																
	UP100 □ 120J	12																
	UP100 □ 130J	13																
	UP100 □ 150J	15																
	UP100 □ 160J	16																
	UP100 □ 180J	18																
	UP100 □ 200J	20																
	UP100 □ 220J	22																
	UP100 □ 240J	24		±5%														
	UP100 □ 270J	27																
	UP100 □ 300J	30																
UP100 □ 330J	33																	
UP100 □ 360J	36																	
UP100 □ 390J	39																	
UP100 □ 430J	43	★	43	±5%														
UP100 □ 470J	47																	
UP100 □ 510J	51																	
UP100 □ 560J	56		56															
50V	UP100 SL 620J	SL	62	±5%	Q ≥ 1000	10000MΩ min												
	UP100 SL 680J		68				Bl.											
	UP100 SL 750J		75				Pu.											
	UP100 SL 820J		82				Gr.											
	UP100 SL 910J		91				Wh.											
	UP100 SL 101J		100				Bk.											
	UP100 B 121K	120	B	120			±10%											
	UP100 B 151K	150		Br.														
	UP100 B 181K	180		Gn.														
	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.														
	UP100 B 681K	680		Bl.														
	UP100 B 821K	820		Gr.														
	UP100 B 102K	1000		Bk.														
25V	TP100 X 152N	X	1500	±30%														
	TP100 X 182N		1800		Br.													
	TP100 X 222N		2200		Gr.													
	TP100 X 272N		2700		Re.													
	TP100 X 332N		3300		Or.													
	TP100 X 392N		3900		Wh.													
	TP100 X 472N		4700		Ye.													
	TP100 X 562N		5600		Gn.													
	TP100 X 682N		6800		Bl.													
	TP100 X 822N		8200		Gr.													
16V	EP100 Y 822N	Y	8200	±30%														
	EP100 Y 103N		10000		Br.													

Note 1: Bold-faced nominal capacitances are standard
 Note 2: The symbols are as follows:
 □ : Temperature characteristic
 ★ : RH, UJ, SL
 * : tan δ ≤ 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

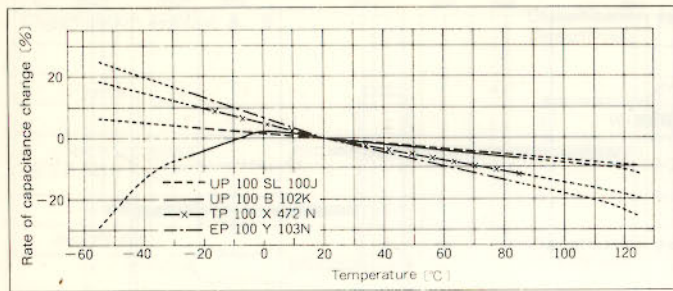
Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

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



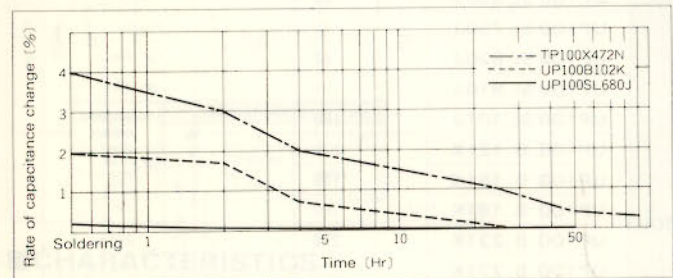
VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



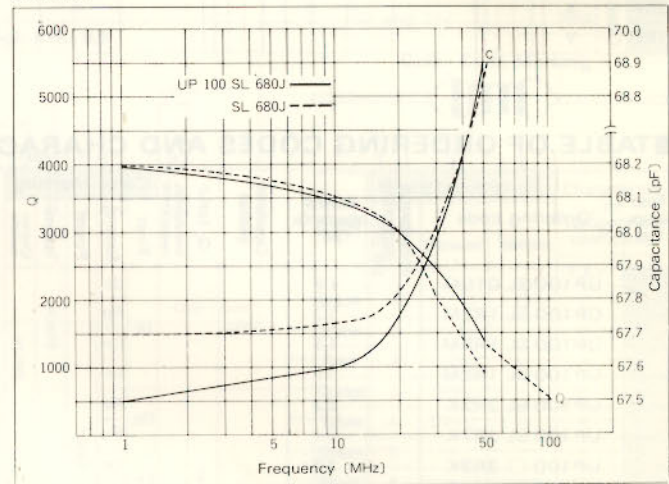
Capacitance Change after Solder Heat Resistance

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.



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.)



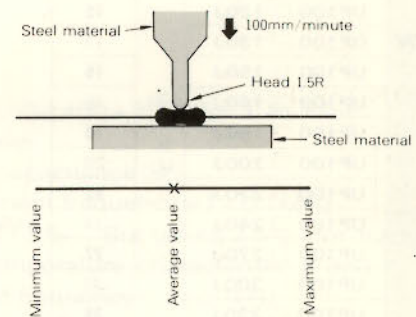
Body Strength Test

(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													

Measuring Instrument and Jig

Push-pull gauge: Model 4030





NEW PRODUCT

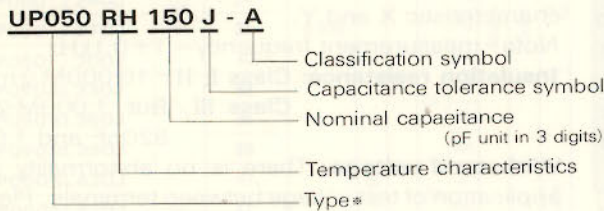
050-TYPE SUPER-MINIATURIZED CONFIGURATION

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.

TABLE OF ORDERING CODES AND CHARACTERISTICS

ORDERING CODE

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



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

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

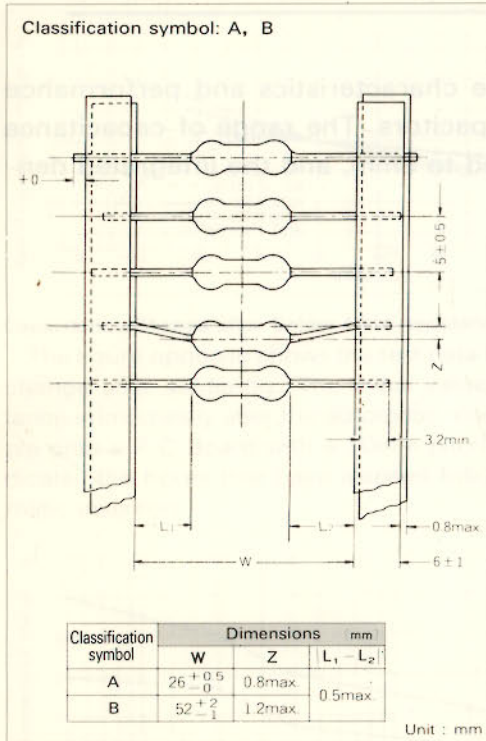
Configuration and Classification Symbol

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

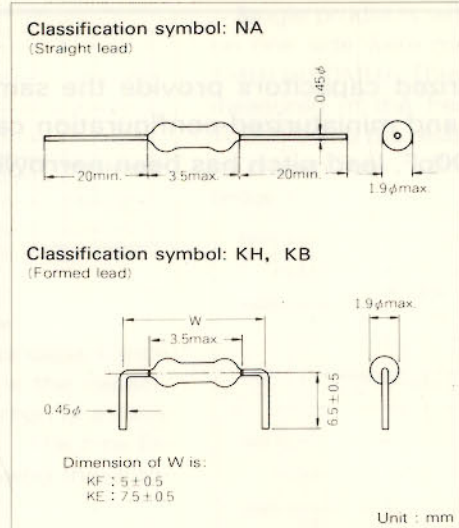
Classification	Taped products		Single products	
	B	A	NA	KF KE
Classification symbol	B	A	NA	KF KE
Lead configuration	Straight	Straight	Straight	Formed
Products configuration				
	Taping space: 52mm	Taping space: 26mm		

■ OUTER DIMENSIONS

Taping Dimensions



Dimensions of Single Products



■ 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	
	B	X	Y	X	Y
Characteristic symbol	B	X	Y	X	Y
Rate of capacitance change (Within)	±10%	±15%	±22%	±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 18	±20%	B	±10%
22 to 8.2	±10%	X	±20% ±30%
10 to 68	±5%	Y	

Q or tanδ: 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/tanδ ≤ 1.5% But tanδ ≤ 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/10,000MΩ min.

Class III/But 1,000MΩ 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			
Class III	X	1 ± 0.5V	16V	18V
	Y			16V



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	68													
50V	Class II	B	75										1000			
16V	Class III	X											1200		6800	
		Y													8200 10000	

TABLE OF ORDERING CODES AND CHARACTERISTICS

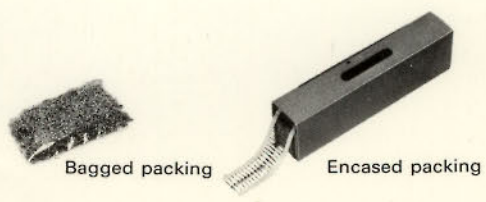
Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Color marking					Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Color marking															
						Insulation resistance	First	Second	Power	Tolerance							Characteristic	Insulation resistance	First	Second	Power	Tolerance	Characteristic									
50V	UP050 □ 010M	CH	1.0	±20%	Q ≥ 400 + 20·C·(C: Nominal capacitance) but Q ≥ 500 at 16pF min of characteristic RH 10000MΩ min.	10000MΩ min.	Bk.	Black	Silver	SL = White	☆1	50V	UP050 B 750 K	B	75	±10%	tan δ ≤ 1.5% 10000MΩ min.	Pu.	Gn.	Black												
	UP050 □ 1R2M		1.2				Gr.						Re.																			
	UP050 □ 1R5M		1.5				Wh.						Br.																			
	UP050 □ 1R8M		1.8				Bk.						Re.																			
	UP050 □ 2R2K	2.2	RH	2.7			±10%						Re.		Pu.			Gold	Silver		SL = White	☆1	50V	UP050 B 101 K	B	91	±10%	tan δ ≤ 1.5% 10000MΩ min.	Wh.	Br.	Black	
	UP050 □ 2R7K	2.7		Br.									Re.																			
	UP050 □ 3R3K	3.3		Gr.									Gr.																			
	UP050 □ 3R9K	3.9		Or.									Or.																			
	UP050 □ 4R7K	4.7	UJ	5.6			±10%						10000MΩ min.		10000MΩ min.			Ye.	Silver		SL = White	☆1	50V	UP050 B 121 K	B	120	±10%	tan δ ≤ 1.5% 10000MΩ min.	Br.	Re.	Black	
	UP050 □ 5R6K	5.6		Gr.														Gr.														
	UP050 □ 6R8K	6.8		Gr.														Gr.														
	UP050 □ 8R2K	8.2		Gr.														Re.														
	UP050 □ 100J	10	SL	11			±5%						Q ≥ 500		10000MΩ min.			Gn.	Black		Silver	SL = White	☆1	50V	UP050 B 151 K	B	150	±10%	tan δ ≤ 1.5% 10000MΩ min.	Br.	Re.	Black
	UP050 □ 110J	11		Br.														Re.														
	UP050 □ 120J	12		Re.														Or.														
	UP050 □ 130J	13		Br.														Or.														
	UP050 □ 150J	15	CH	16			±5%						Q ≥ 500		10000MΩ min.			Gn.	Black		Silver	SL = White	☆1	50V	UP050 B 181 K	B	180	±10%	tan δ ≤ 1.5% 10000MΩ min.	Gr.	Gr.	Black
	UP050 □ 160J	16		Bl.														Bl.														
	UP050 □ 180J	18		Gr.														Gr.														
	UP050 □ 200J	20		Bk.														Bk.														
	UP050 □ 220J	22	RH	22			±5%						Q ≥ 500		10000MΩ min.			Re.	Black		Silver	SL = White	☆1	50V	UP050 B 221 K	B	220	±10%	tan δ ≤ 1.5% 10000MΩ min.	Re.	Pu.	Brown
	UP050 □ 240J	24		Ye.														Pu.														
	UP050 □ 270J	27		Gn.														Bl.														
	UP050 □ 300J	30		Bl.														Gr.														
	UP050 □ 330J	33	UJ	36			±5%						Q ≥ 500		10000MΩ min.			Or.	Black		Silver	SL = White	☆1	50V	UP050 B 271 K	B	270	±10%	tan δ ≤ 1.5% 10000MΩ min.	Or.	Or.	Brown
	UP050 □ 360J	36		Bl.														Bl.														
	UP050 □ 390J	39		Wh.														Wh.														
	UP050 □ 430J	43		Or.														Or.														
UP050 □ 470J	47	SL	47	±5%	Q ≥ 500	10000MΩ min.	Ye.	Black	Silver	SL = White	☆1	50V	UP050 B 331 K	B	330	±10%	tan δ ≤ 1.5% 10000MΩ min.	Ye.	Pu.	Brown												
UP050 □ 560J	56		Gn.				Bl.																									
UP050 □ 620J	62		Re.				Re.																									
UP050 □ 680J	68		Bl.				Gr.																									
16V	EP050 X 122 △	X	1200	±20%	Q ≥ 400 + 20·C·(C: Nominal capacitance) but Q ≥ 500 at 16pF min of characteristic RH 10000MΩ min.	10000MΩ min.	10000MΩ min.	Black	Silver	SL = White	☆2	16V	EP050 X 152 △	X	1500	±30%	tan δ ≤ 2.5% 10000MΩ min.	Br.	Re.	Grey												
	EP050 X 182 △		1800										Gr.		Gr.																	
	EP050 X 222 △		2200										Re.		Re.																	
	EP050 X 272 △		2700										Re.		Pu.																	
	EP050 X 332 △		3300										Or.		Or.																	
	EP050 X 392 △		3900										Wh.		Wh.																	
	EP050 X 472 △		4700										Ye.		Pu.																	
	EP050 X 562 △		5600										Gn.		Bl.																	
	EP050 X 682 △		6800										Bl.		Gr.																	
	EP050 Y 822 △		8200										Gr.		Re.																	
	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

PACKING

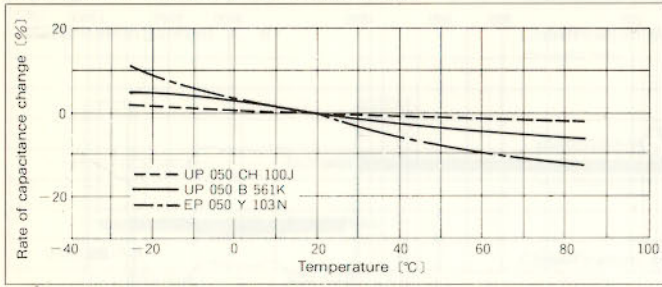
Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

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



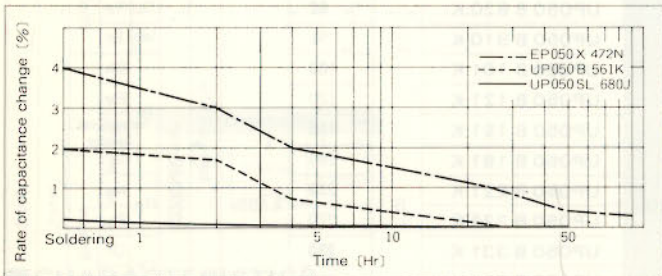
■ VARIOUS CHARACTERISTIC

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.



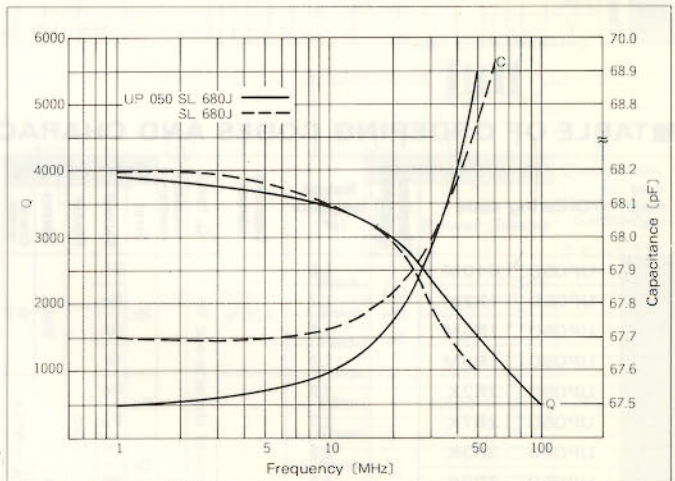
Body Strength Test

(No. of samples = 50)

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

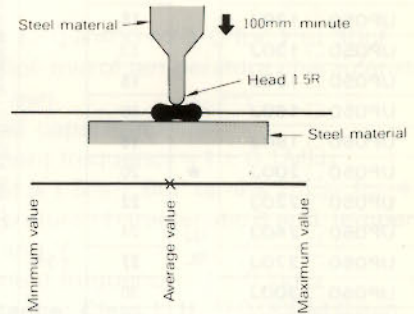
Capacitance - Frequency Characteristics

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





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