

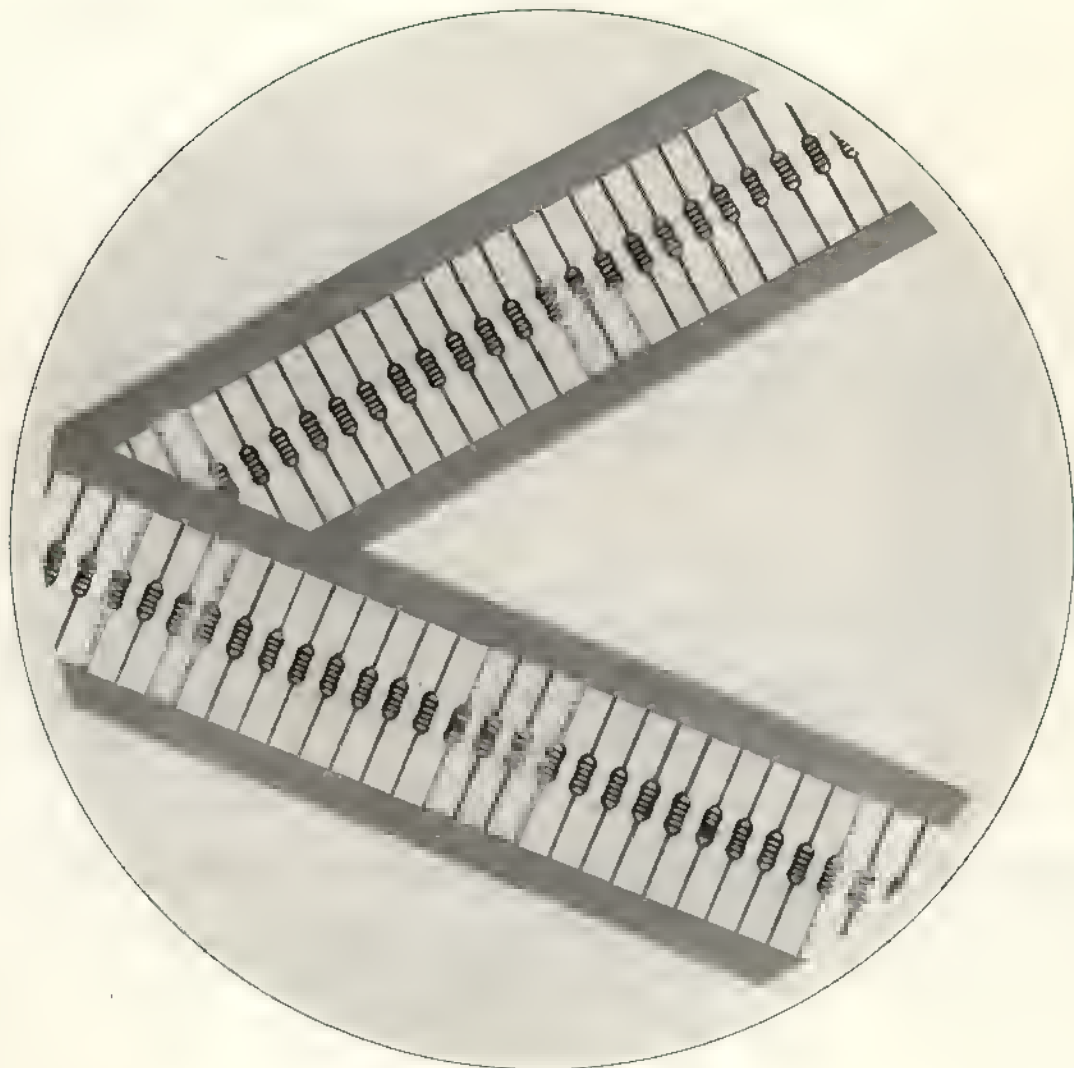


TAIYO YUDEN
PRODUCTS

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.

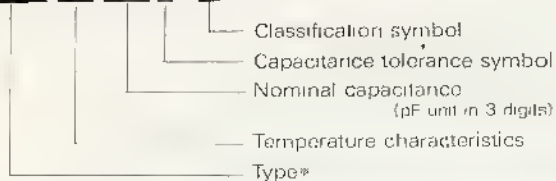
FEATURES

- 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	
18V	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.

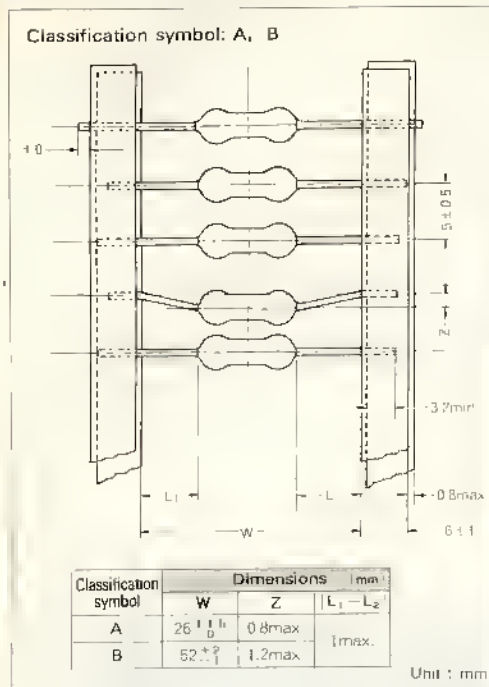
Note: 250-type for taping are available with 52mm taping space only

Classification	Taped products		Single products	
	B	A	NA	KH KB
Classification symbol				
Lead configuration	Straight	Straight	Straight	Formed
Products configuration				
	Taping space: 52mm	Taping space: 76mm		



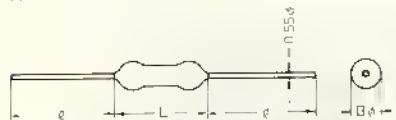
■ OUTER DIMENSIONS

Taping Dimensions



Dimensions of Single Products

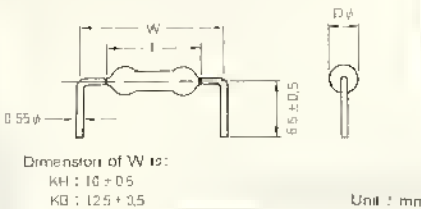
Classification symbol: NA
(Straight lead)
Applies to all types



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



■ 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)			Characteristic or Temperature coefficient	
	First figure	Second figure	Power	Tolerance	
				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

■ 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, 130%
		Y	±30%

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.

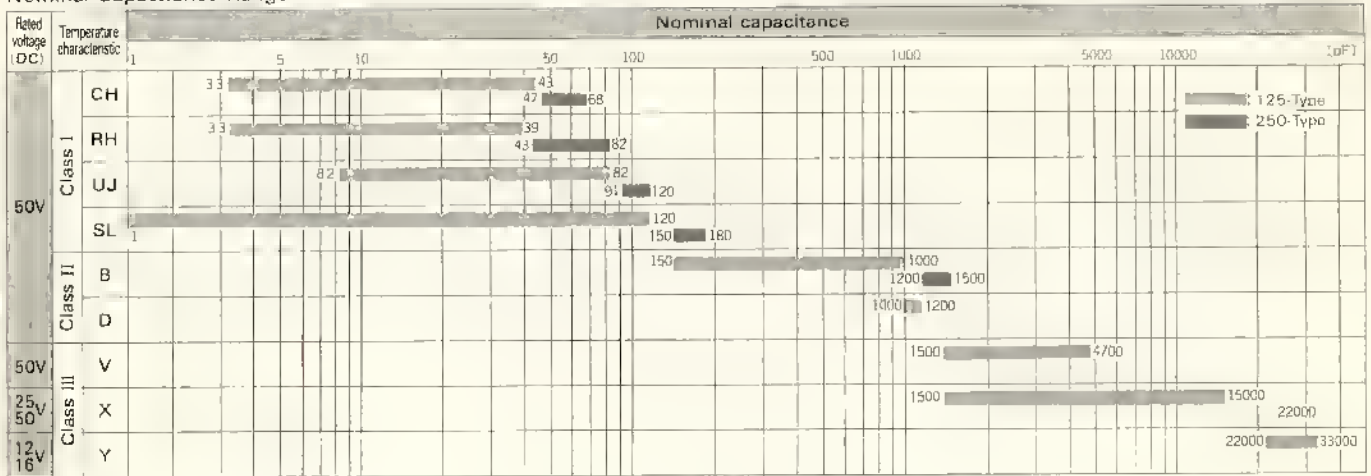
Withstand voltage: There is no abnormality after the application of test voltage between terminals. Please refer to the measuring condition explained below for voltage values.

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

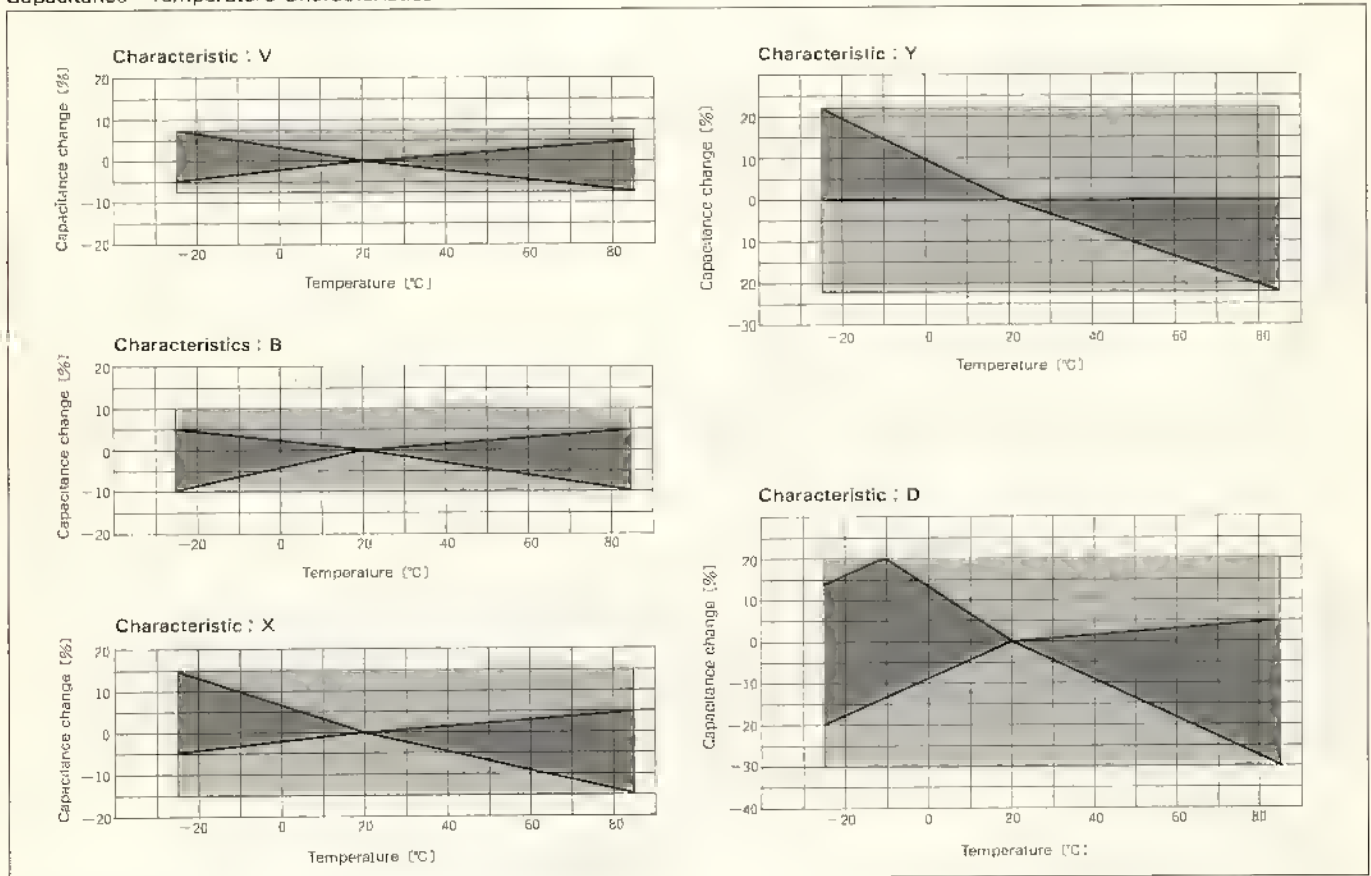
Classification	Capacitance		Insulation resistance	Withstand voltage
	Measuring frequency	Measuring voltage (RMS)	Measuring voltage (DC) 60 sec.	Test voltage (DC) 1 to 5 sec.
Class I	1MHz	5Vmax.	50V	150V
Class II	1kHz			
Class III	V	1<Hz	1+0.5V	Rated voltage value × 1.5
	X			
	Y			



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	Characteristics		
50V	UP125SL010M ○	SL	1	+20%	Q ≥ 400 + 20°C, 1.0 : nominal capacitance	10000MΩ min.	Bk						
	UP125SL1R2M ○		1.2				Br						
	UP125SL1R5M ○		1.5				Gn						
	UP125SL1R8M ○		1.8				Gr						
	UP125SL2R2K ○		2.2				Re						
	UP125SL2R7K ○		2.7				Pu						
	UP125□3R3K ○		3.3				Or						
	UP125□3R9K ○		3.9				Wh						
	UP125□4R7K ○		4.7				Ye						
	UP125□5R6K ○		5.6				Gn						
	UP125□6R8K ○	6.8	B										
	UP125□8R2K ○	8.2	Gr										
	UP125□100J ○	10	CH RH SL	11		+10%	10000MΩ min.	Bk					
	UP125□110J ○	11		Br									
	UP125□120J ○	12		Re									
	UP125□130J ○	13		Or									
	UP125□150J ○	15		Gr									
	UP125□160J ○	16		Bl									
	UP125□180J ○	18		Gr									
	UP125□200J ○	20		Bk									
	UP125□220J ○	22		Rc									
	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 ○	43	Or										
	UP125□470J ○	47	Ye										
	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	Wn										
	UP125SL101J ○	100	Bk										
	UP125SL121J ○	120	Re										
	UP125 B 151K ○	150	Br										
	UP125 B 181K ○	180	Gn										
UP125 B 221K ○	220	Gr											
UP125 B 271K ○	270	Re											
UP125 B 331K ○	330	Pu											
UP125 B 391K ○	390	Or											
UP125 B 471K ○	470	Wh											
UP125 B 561K ○	560	Ye											
UP125 B 681K ○	680	Gn											
UP125 B 821K ○	820	Bl											
UP125 B 102K ○	1000	Gr											
UP125 B 152K ○	1500	Bk											
UP125 D 102M ○	1000	Br											
UP125 D 122M ○	1200	Re											

*Ch, UJ, SL *1 tan δ ≤ 7%

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	Characteristics
50V	UP125□152△ ○	V	1500	±10% for characteristic Y	1000V·Ω min	Br	Gn				
	UP125□182△ ○		1800			Br	Gr				
	UP125□222△ ○		2200			Re	Re				
	UP125□272△ ○		2700			Pu					
	UP125□332△ ○		3300			Or	Or				
	UP125□392△ ○		3900			Wh	Wh				
	UP125□472△ ○		4700			Ye	Pu				
	TP125X562△ ○		5600			Gn	Bl				
	TP125X682△ ○		6800			Bl	Gr				
	TP125X822△ ○		8200			Gr	Re				
25V	TP125X103△ ○	X	10000	±20% ±30%	1000V·Ω min	Br	Bk				
	TP125X153△ ○		15000			Gr	Gn				
	EP125Y223N ○		22000			Re	Re				
16V	EP125Y223N ○	Y	22000	±30%	†1	Orange	Gr				
12V	BP125Y333N ○		33000			Orange	Gr				

250-Type

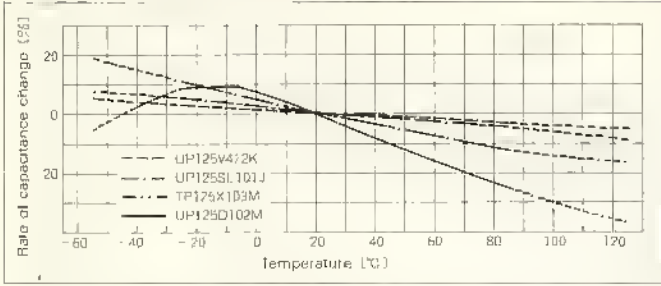
Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Color marking						
						Insulation resistance	First	Second	Power	Tolerance	Characteristics	
50V	UP250RH430J ○	RH	43	±5%	Q ≥ 1000	10000MΩ min	Ye	Or				
	UP250□470J ○		47				Ye	Pu				
	UP250□510J ○		51				Gn	Br				
	UP250□560J ○	CH	56				Bl	Bl				
	UP250□620J ○	RH	62				Bl	Rc				
	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				
	UP250SL181J ○		180					Gr				
	UP250 B 122K ○	B	1200					Re				
	UP250 B 152K ○		1500					Gr				
25V	TP250 X 223N ○	X	22000	±30%	†2	☆	Re	Or	Gr	Gr	Gr	

*2 tan δ ≤ 1.5% ☆ Insulation resistance = 10000MΩ 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, Gr, Gr., Pu, Or., Wh, Br, are the abbreviations of Yellow, Blue, Red, Black, Green, Grey, Purple, Orange, White, Brown respectively.

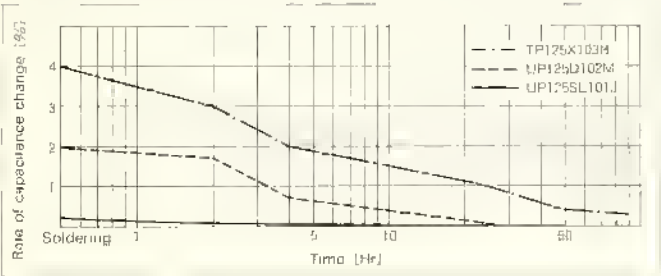
■ VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



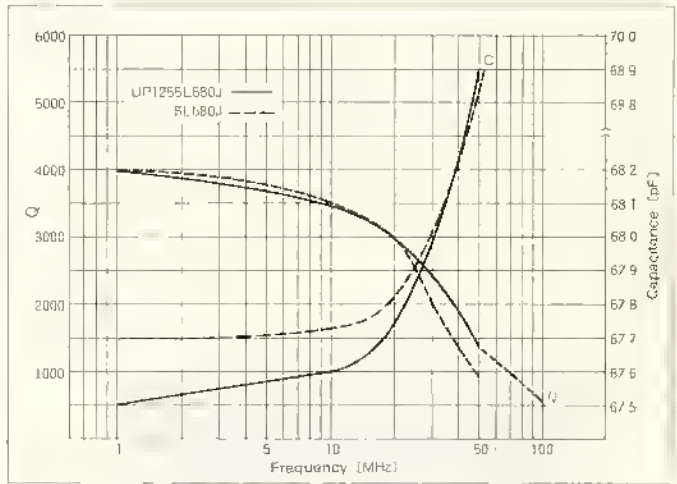
Capacitance Change after Solder Heat Resistance

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.



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.)



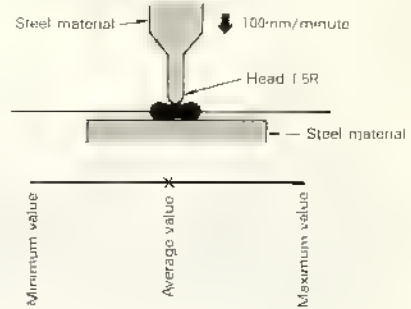
Body Strength Test

(No. of samples = 50)

Sample name	Breakdown strength					
	9	10	11	12	13	14
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		

Measuring Instrument and Jig

Push-pull gage: Model 4030





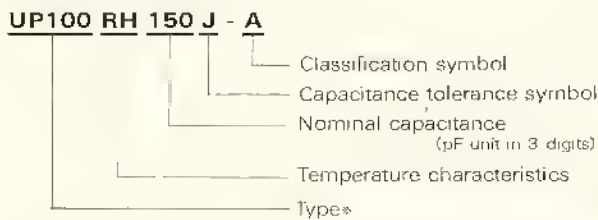
100-TYPE MINIATURIZED CONFIGURATION

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]



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

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

Configuration and Classification Symbol

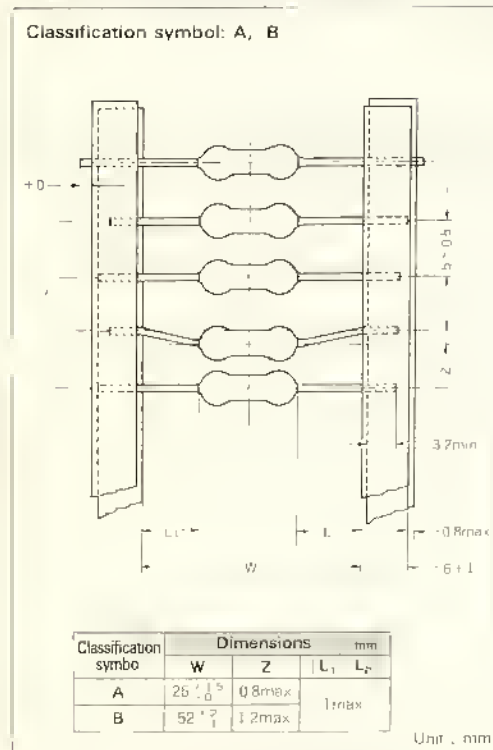
The classified configuration symbols are divided into those for taped products and single products. The symbols are shown on the right.

Classification	Taped products		Single products	
	B	A	NA	KH KE
Lead configuration	Straight	Straight	Straight	Formed
Products configuration				
	Taping space: 53mm	Taping space: 26mm		

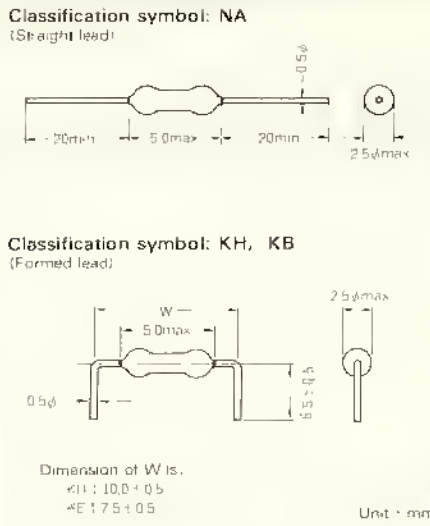


■ OUTER DIMENSIONS

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
50V	Yellowish green
15V 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	—	01	±5%	—	—
Silver	—	001	±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 18	±20%	B	±10%
22 to 82	±10%	X	±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 (nF)	
50V	Class I	CH	33					36							
		RH	33					39							
		UJ				82			56						
		SL							100						
50V	Class II	B							120			1000			
25V	Class III	X										1500		6800	
16V	Class III	Y											6200	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	10	±20%	Q ≥ 400 ± 20% (C: Nominal capacitance)	1000MΩ min	Bk					
	UP100 SL 1R2M		12				Br					
	UP100 SL 1R5M		15				Gr					
	UP100 SL 1R8M		18				Gr					
	UP100 SL 2R2K		22				Re					
	UP100 SL 2R7K		27				Pu					
	UP100 □ 3R3K		33				Or					
	UP100 □ 3R9K		39				Wh					
	UP100 □ 4R7K		47				Yc					
	UP100 □ 5R6K		56				Gn					
	UP100 □ 6R8K	68	Bl									
	UP100 □ 8R2K	82	Gr									
	UP100 □ 100J	10					Bk					
	UP100 □ 110J	11					Bk					
	UP100 □ 120J	12					Re					
	UP100 □ 130J	13					Br					
	UP100 □ 150J	15	Class I		±10%	Q ≥ 400 ± 20% (C: Nominal capacitance)	1000MΩ min	Gn				
	UP100 □ 160J	16		Bl								
	UP100 □ 180J	18		Gr								
	UP100 □ 200J	20		Bk								
	UP100 □ 220J	22		Re								
	UP100 □ 240J	24		Ye								
	UP100 □ 270J	27		Pi								
	UP100 □ 300J	30		Bk								
	UP100 □ 330J	33		Or								
	UP100 □ 360J	36		Bl								
UP100 □ 390J	39	Wh										
UP100 □ 430J	43	Or										
UP100 □ 470J	47	Ye										
UP100 □ 510J	51	Pu										
UP100 □ 560J	56	Bk										

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 620J	SL	62	±5%	Q ≥ 1000	10000MΩ min	Bl	Re			
	UP100 SL 680J		68				Pu	Gn	Black		
	UP100 SL 750J		75				Gr	Re	Gold		
	UP100 SL 820J		82				Wh	Br	White		
	UP100 SL 910J		91								
	UP100 SL 101J		100								
	UP100 B 121K		120								
	UP100 B 151K		150								
	UP100 B 181K		180								
	UP100 B 221K		220								
	UP100 B 271K	270									
	UP100 B 331K	330	Class II		+10%	tan δ ≤ 1.5%	1000MΩ min	Or	Wh	Brown	Silver
	UP100 B 391K	390		Ye				Pu	Silver	Silver	
	UP100 B 471K	470		Gn				Bl			
	UP100 B 561K	560		Bl				Gr			
	UP100 B 681K	680		Gr				Re			
	UP100 B 821K	820									
	UP100 B 102K	1000									
	TP100 X 152N	1500									
	TP100 X 182N	1800									
TP100 X 222N	2200										
TP100 X 272N	2700	Class III		±30%	tan δ ≤ 1.5%	1000MΩ min	Re	Re			
TP100 X 332N	3300		Or				Wh	Red	Grey		
TP100 X 392N	3900		Or				Wh				
TP100 X 472N	4700		Ye				Pu				
TP100 X 562N	5600										
TP100 X 682N	6800										
EP100 Y 822N	8200	Class III					Gr	Re			
EP100 Y 103N	10000		Br				Bk	Gr	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

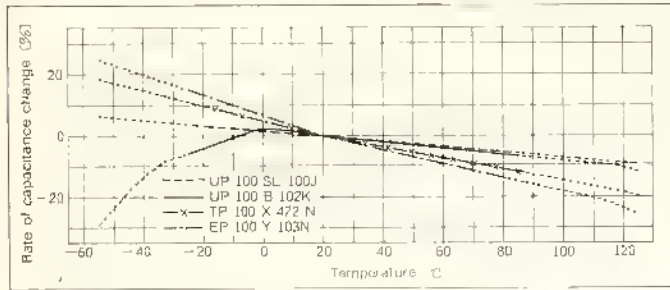
Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

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



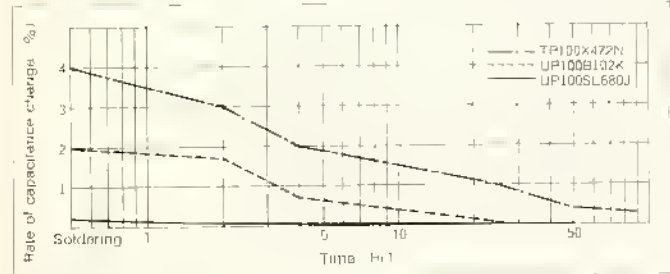
■ VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



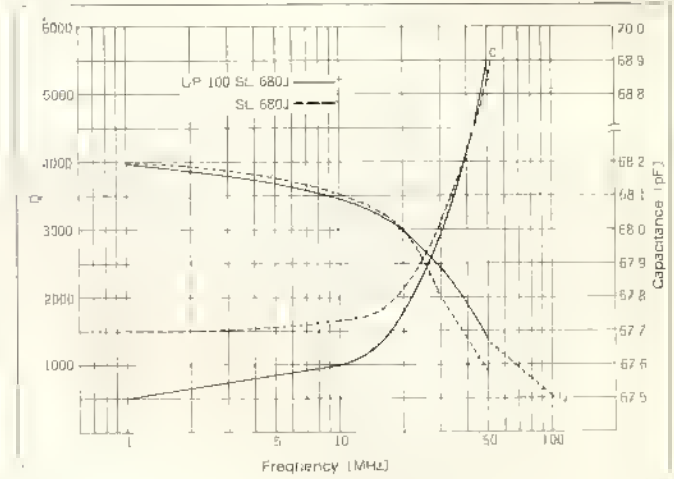
Capacitance Change after Solder Heat Resistance

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.)



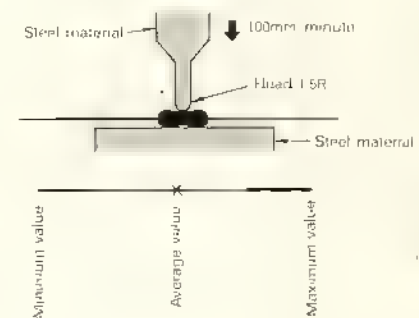
Body Strength Test

(No. of samples=50)

Sample name	Breakdown strength												
	4	5	6	7	8	9	10	11	12	13	14	15	
UP100 RH 4R7K													
UP100 CH 220J													
UP100 CH 330J													
UP100 SL 680J													
UP100 SL 101J													
UP100 B 102K													
TP100 X 222N													
TP100 X 472N													
EP 100 Y 103N													

Measuring Instrument and Jig

Push pin gauge: Model 4030





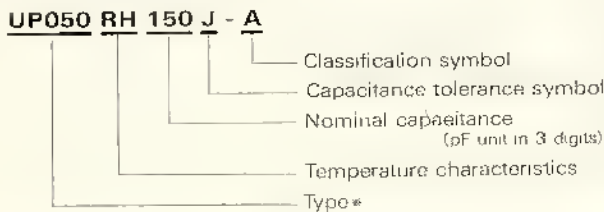
050-TYPE SUPER-MINIATURIZED CONFIGURATION

NEW PRODUCT

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]

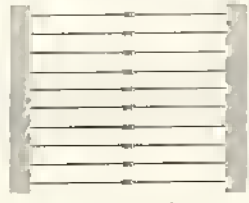





* Types are classified by the rated voltage as listed below

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.

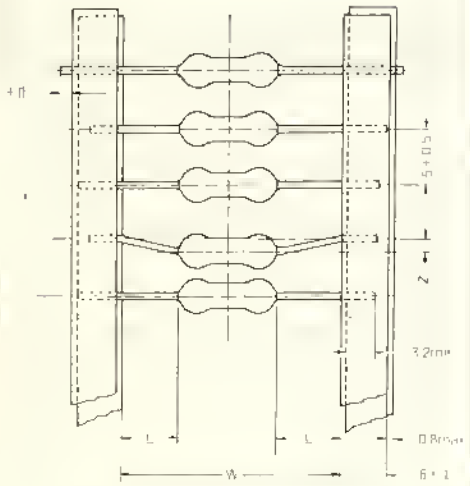
Classification	Taped products		Single products	
	B	A	NA	KF KE
Classification symbol	B	A	NA	KF KE
Lead configuration	Straight	Straight	Straight	Formed
Products configuration				
	Taping space: 92mm	Taping space: 26mm		



■ OUTER DIMENSIONS

Taping Dimensions

Classification symbol: A, B

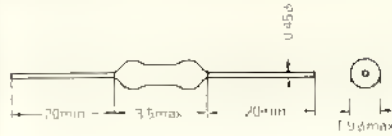


Classification symbol	Dimensions mm			
	W	Z	L ₁	L ₂
A	26 ^{+0.5} _{-0.2}	0.8max	0.5max	
B	52 ⁺² ₋₁	1.2max	0.5max	

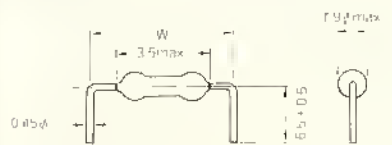
Unit: mm

Dimensions of Single Products

Classification symbol: NA
Straight lead



Classification symbol: KH, KB
Formed lead



Dimension of W is
KF: 1.10±
KE: 0.75±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
50V	Yellowish green
16V and 25V	Pink

Color Code Marking



Color	Nominal capacitance (pF)			Characteristic or Temperature coefficient	
	First figure	Second figure	Tolerance	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 18	±20%	B	±10%
22 to 82	+10%	X	+20%
10 to 68	±5%	Y	±30%

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/10,000Ω 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		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
50V	Class I	CH	20										
		RH	18										
		UJ	30										
		SL	68										
50V	Class II	B	75										
16V	Class III	X	1200										
		Y	6800										
			8200										
			10000										

TABLE OF ORDERING CODES AND CHARACTERISTICS

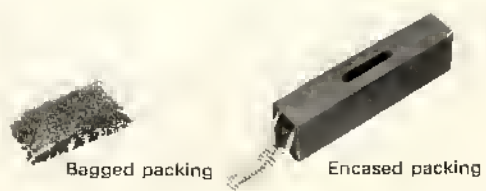
Rated voltage (DC)	Ordering code	Temperature characteristics	Nominal capacitance (pF)	Capacitance tolerance	Q, tan δ	Insulation resistance	Color marking													
							First	Second	Power	Tolerance	Characteristic									
50V	UP050 □ 010M	CH RH SL	1.0	± 20%	Q ≥ 400 + 20 · C · f (C: Nominal capacitance)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

Note 1: Bold-faced nominal capacitances are standard
 Note 2: The symbols are as follows:
 □ : Temperature characteristic
 Δ : 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

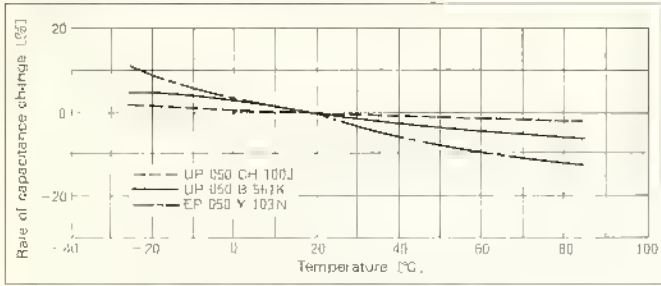
Taped products are packed in cardboard boxes and single products are packed in vinyl bags. Standard packing quantities are shown on the right.

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



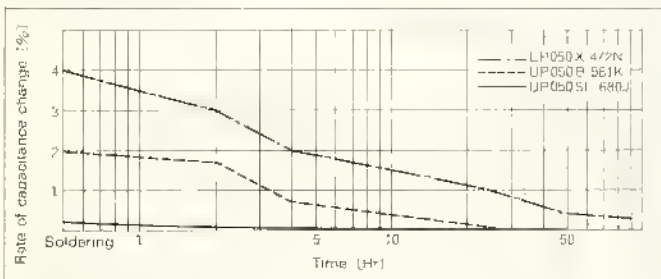
■ VARIOUS CHARACTERISTIC

Capacitance - Temperature Characteristic



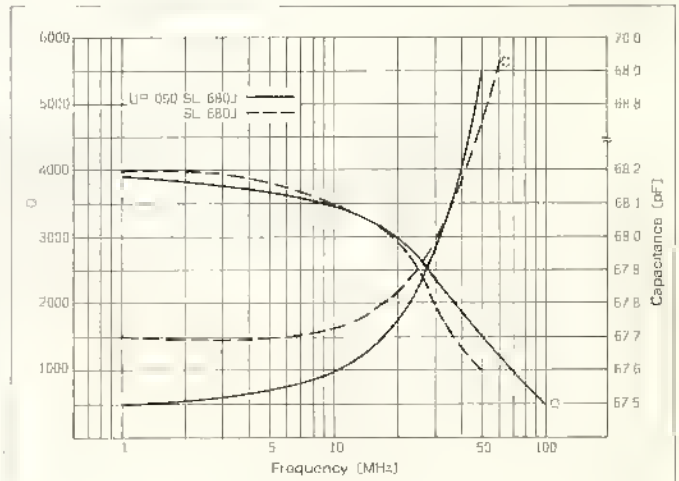
Capacitance Change after Solder Heat Resistance

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.



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.)



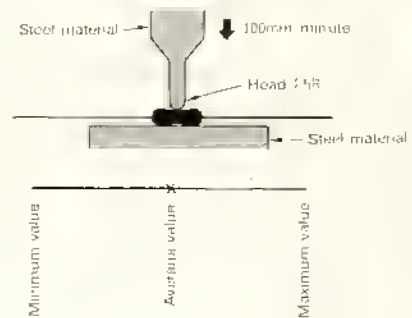
Body Strength Test

(No. of samples=50)

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

Measuring Instrument and Jig

Push-pull gauge Model 4030





TAIYO YUDEN CO., LTD.

HEAD OFFICE: 2-12, Ueno 1-chome, Taito-ku, Tokyo, Japan, Postal Code 110
Phone : Tokyo 833-5441 Telex : 265-5169 YUDEN J

TAIYO YUDEN (U.S.A.) INC.: Arlington Center, 714 West Algonquin Road, Arlington Hts., Ill. 60005 U.S.A.
Phone : U.S.A. (312) 364-6104 Telex : 910-687-0378 TAIYO U.S.A. ARHT

HONG KONG TAIYO YUDEN CO. LTD.: Rm. 2312-13, Park-In Commercial Center, 56, Dundas Street,
Mongkok, Kowloon, Hong Kong Phone : 3-315214 Telex : 75001 HKTYO HX

TAIYO YUDEN (U.K.) LTD.: 9 Blenheim Road, Cressex Industrial Estate, High Wycombe, Bucks, HP12 3RT, England.
Phone : (0494)36113 Telex : 83440 ECC UK G

TAIYO YUDEN (DEUTSCHLAND) GmbH.: Puscher Strasse 8, 8500 Nürnberg 10, West Germany
Phone : (0911) 521004 Telex : 626696 TAIYO D

TAIWAN TAIYO YUDEN CO. LTD.: 15, Lane 91, Sec. 1, Nei-Hu Road, Taipei, Taiwan
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TAIYO YUDEN (SINGAPORE) PTE. LTD.: 14, Joo Koon Circle, Jurong Town, Singapore 2262
Phone : Singapore 2684400 Telex : RS 25918 STYO

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