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Please read this notice before using the TAIYO YUDEN products.

⚠ REMINDERS

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- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.

- All electronic components or functional modules listed in this catalog are developed, designed and intended for use in general electronics equipment.(for AV, office automation, household, office supply, information service, telecommunications, (such as mobile phone or PC) etc.). Before incorporating the components or devices into any equipment in the field such as transportation,(automotive control, train control, ship control), transportation signal, disaster prevention, medical, public information network (telephone exchange, base station) etc. which may have direct influence to harm or injure a human body, please contact Taiyo Yuden Co., Ltd. for more detail in advance.
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- The contents of this catalog are applicable to the products which are purchased from our sales offices or distributors (so called "TAIYO YUDEN' s official sales channel").
  It is only applicable to the products purchased from any of TAIYO YUDEN' s official sales channel.

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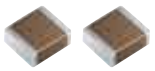
HIGH VALUE MULTILAYER CERAMIC CAPACITORS



WAVE REFLOW

FEATURES

- The use of nickel as electrode material and plating processing improve the solderability and heat resistance characteristics. It also prevents migration and raises the level of reliability.
- Low equivalent series resistance(ESR) provides superior noise absorption characteristics.
- Compared to tantalum or aluminum electrolytic capacitors, multilayer ceramic capacitors offer a number of superior features, including:
  Higher permissible ripple current values
  Smaller case sizes with high rated voltage
  Improved reliability due to higher insulation resistance and breakdown voltage.

APPLICATIONS

- General digital circuit
- Power supply bypass capacitors
  Liquid crystal modules
  Liquid crystal drive voltage lines
  LSI, IC, converters(both for input and output)
- Smoothing capacitors
  DC-DC converters (for both input and output)
  Switching power supplies (secondary side)

PART NUMBER

J M K 3 1 6 △ B J 1 0 6 M L — T △

❶Rated voltage〔VDC〕	
A	4
J	6.3
L	10
E	16
T	25
G	35
U	50

❷Series name	
M	Multilayer ceramic capacitor

❸End termination	
K	Plated

❹Dimension		
Type	(inch)	L×W[mm]
107	(0603)	1.6×0.8
212	(0805)	2.0×1.25
316	(1206)	3.2×1.6
325	(1210)	3.2×2.5

❻Temperature characteristics code	
BJ	B
	X5R
B7	X7R
△F	F
	Y5V

△=Blank space

❼Nominal capacitance〔pF〕	
example	
473	47,000
105	1,000,000

❽Capacitance tolerance	
K	±10%
M	±20%
Z	+80% −20%

❾Thickness〔mm〕	
K	0.45
A	0.8
D	0.85
G	1.25
L	1.6
N	1.9
Y	2.0max
M	2.5

❿Special code	
—	Standard

⓫Packaging	
T	φ178mm Taping (4mm pitch) All types
P	φ178mm Taping (4mm pitch, 1000pcs/reel) 1210Type Thickness : M

⓬Internal code	
△	Standard

△=Blank space

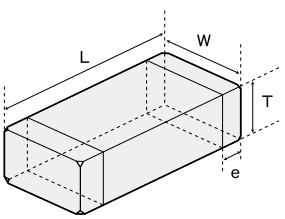
❺Dimension tolerance [mm]

Code	Type	L	W	T
△	ALL	Standard	Standard	Standard
A	107	1.6+0.15/−0.05	0.8+0.15/−0.05	0.8+0.15/−0.05
	212	2.0+0.15/−0.05	1.25+0.15/−0.05	0.45±0.05
				0.85±0.1
				1.25+0.15/−0.05
	316	3.2±0.2	1.6±0.2	0.85±0.1
				1.6±0.2
	325	3.2±0.3	2.5±0.3	2.5±0.3

Code	Type	L	W	T
B	107	1.6+0.2/−0	0.8+0.2/−0	0.45±0.05
				0.8+0.2/−0
	212	2.0+0.2/−0	1.25+0.2/−0	0.85±0.1
				1.25+0.2/−0

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm] L	W	T		e	Standard quantity [pcs] Paper tape	Embossed tape
□MK107 (0603 inch)	1.6±0.10	0.8±0.10	0.45±0.05	K	0.35±0.25	4000	—
			0.8±0.10	A			
□MK212 (0805 inch)	2.0±0.10	1.25±0.10	0.45±0.05	K	0.5±0.25	4000	—
			0.85±0.10	D			
			1.25±0.10	G		—	3000
□MK316 (1206 inch)	3.2±0.15	1.6±0.15	0.85±0.10	D	0.5+0.35/−0.25	4000	—
			1.25±0.10	G		—	3000
			1.6±0.20	L			2000
□MK325 (1210 inch)	3.2±0.30	2.5±0.20	0.85±0.10	D	0.6±0.3	—	2000
			1.9±0.20	N			
			1.9+0.1/−0.2	Y			
			2.5±0.20	M			500(T), 1000(P)

AVAILABLE CAPACITANCE RANGE

Cap〔μF〕	Type	107 X7R					107 B/X5R							107 F/Y5V				212 X7R						212 B/X5R						212 F/Y5V				316 X7R					316 B/X5R							316 F/Y5V				325 X7R					325 B/X5R						325 F/Y5V		
	VDC	50	25	16	10	6.3	50	35	25	16	10	6.3	4	50	25	16	10	50	35	25	16	10	6.3	50	25	16	10	6.3	50	16	10	6.3	50	25	16	10	6.3	50	25	16	10	6.3	4	35	25	16	10	50	25	16	10	6.3	50	35	25	16	10	6.3	16	10	6.3
	(3-digit)																																																																	
0.1	104													A				G						G																																									
0.15	154																																																																
0.22	224	A		A	A	A			A	A	A					A		G						G										L																														
0.33	334																																																																
0.47	474	A	A	A	A	A	A		A	A	A				A	A		G						G						G				L																														
0.68	684																																																																
1	105		A	A	A	A	A	A	A	A	A					A	A	G	G	G	G	G		G						G				L	L				L																											
2.2	225				A				A	A	A	A				A	A			G	G	G			G	G	G			G				L	L	L	L			L	L															N									
3.3	335																																																									N				N				
4.7	475									A	A	A								G	G	G			G	G	G	G			G			L	L		L		L	L	L												M	N	N			M	N	N	N	N				
6.8	685																																																																
10	106										A	A	A									G	G			G	G	G			G	G		L	L	L	L	L		L	L	L	L		L	L	L							N	N			M	N	M.N	N	N				
22	226												A													G	G									L					L	L	L					L		M	M									M	M.Y	Y	N	N		
47	476																											G														L	L											M	M					M	M	M.N			N
100	107																																										L	L																	M	M.Y			

Note : Letters in the table indicate product thickness. X5R only

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For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (http://www.ty-top.com/) or CD catalogs.

●Low Profile Multilayer Ceramic Capacitors

Cap (μF)	Type	107				212											316										325		
		B/X5R				X7R		B/X5R						F/Y5V			B/X5R					F/Y5V					B/X5R		
	VDC	25	16	10	6.3	16	10	50	25	16	10	6.3	50	10	6.3	50	25	16	10	6.3	50	35	10	6.3	25	16	10
	(3-digit)																										
0.1	104																										
0.22	224												D														
0.33	334																										
0.47	474					D			D																		
0.68	684																										
1	105	K	K	K	K	D	D	D	D	D	D					D	D										
2.2	225			K	K	D	D		D	D	D			D		D	D	D			G						
3.3	335																										D
4.7	475			K	K		D		D	D	D.	K	D.K		D	D	D	D	D			G	D				D
6.8	685																										
10	106									D	D		D.K				D	D	D	D				D	D	D	D
22	226												D					D	D	D						D	
47	476																			D							

Note : Letters in the table indicate product thickness. X5R only

Temp.char. Code	Temperature characteristics					Capacitance tolerance(%)
	Applicable standard		Temperature range(℃)	Ref. Temp. (℃)	Capacitance change(%)	
BJ	JIS	B	−25～+85	20	±10	±10(K) ±20(M)
	EIA	X5R	−55～+85	25	±15	
B7	EIA	X7R	−55～+125	25	±15	
F	JIS	F	−25～+85	20	+30/−80	+80 −20(Z)
	EIA	Y5V	−30～+85	25	+22/−82	

■ REPRESENTATIVE PART NUMBERS

●107TYPE

【Temperature Characteristic BJ:B/X5R】

・0.8mm thickness(A)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK107 BJ474□A	UMK107ABJ474□A	X5R	0.47	±10, ±20	10	0.8+0.15/−0.05	R	150%	D	
	UMK107 BJ105□A		X5R	1	±10, ±20	10	0.8±0.1	R	150%		
35V	GMK107 BJ105□A		B/X5R	1	±10, ±20	5	0.8±0.1	R	150%		
25V	TMK107 BJ224□A		B/X5R	0.22	±10, ±20	3.5	0.8±0.1	R/W	200%		
	TMK107 BJ474□A		B/X5R	0.47	±10, ±20	3.5	0.8±0.1	R	150%		
	TMK107 BJ105□A		B/X5R	1	±10, ±20	5	0.8±0.1	R	150%		
	TMK107 BJ225□A	TMK107ABJ225□A	X5R	2.2	±10, ±20	10	0.8+0.15/−0.05	R	150%	D	
16V	EMK107 BJ224□A		B/X5R*1	0.22	±10, ±20	3.5	0.8±0.1	R/W	200%		
	EMK107 BJ474□A		B/X5R*1	0.47	±10, ±20	3.5	0.8±0.1	R	200%		
	EMK107 BJ105□A		B/X5R*1	1	±10, ±20	5	0.8±0.1	R	150%		
	EMK107 BJ225□A		B/X5R	2.2	±10, ±20	10	0.8±0.1	R	150%		
	EMK107 BJ475□A	EMK107ABJ475□A	X5R	4.7	±10, ±20	10	0.8+0.15/−0.05	R	150%	D	
10V	LMK107 BJ224□A		B/X5R*1	0.22	±10, ±20	3.5	0.8±0.1	R/W	200%		
	LMK107 BJ474□A		B/X5R*1	0.47	±10, ±20	3.5	0.8±0.1	R	200%		
	LMK107 BJ105□A		B/X5R*1	1	±10, ±20	5	0.8±0.1	R	200%		
	LMK107 BJ225□A		B/X5R	2.2	±10, ±20	10	0.8±0.1	R	150%		
	LMK107 BJ475□A		X5R	4.7	±10, ±20	10	0.8±0.1	R	150%		
	LMK107 BJ106MA	LMK107BBJ106MA	X5R	10	±20	10	0.8+0.2/−0	R	150%	D	Special code : L
6.3V	JMK107 BJ225□A		B/X5R	2.2	±10, ±20	10	0.8±0.1	R	150%		
	JMK107 BJ475□A		X5R	4.7	±10, ±20	10	0.8±0.1	R	150%		
	JMK107 BJ106MA	JMK107ABJ106MA	X5R	10	±20	10	0.8+0.15/−0.05	R	150%		
4V	AMK107 BJ106MA		X5R	10	±20	10	0.8±0.1	R	150%		
	AMK107 BJ226MA	AMK107BBJ226MA	X5R	22	±20	10	0.8+0.2/−0	R	150%		

・0.45mm thickness(K)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK107 BJ105□K		X5R	1	±10, ±20	10	0.45±0.05	R	150%		
16V	EMK107 BJ105□K		X5R	1	±10, ±20	10	0.45±0.05	R	150%		
10V	LMK107 BJ105□K		B/X5R	1	±10, ±20	10	0.45±0.05	R	150%		
	LMK107 BJ225□K		X5R	2.2	±10, ±20	10	0.45±0.05	R	150%		
	LMK107 BJ475MK	LMK107BBJ475MK	X5R	4.7	±20	10	0.45±0.05	R	150%	D	Special code : L
6.3V	JMK107 BJ105□K		B/X5R	1	±10, ±20	10	0.45±0.05	R	150%		
	JMK107 BJ225□K		X5R	2.2	±10, ±20	10	0.45±0.05	R	150%		
	JMK107 BJ475MK		X5R	4.7	±20	10	0.45±0.05	R	150%		

Capacitance tolerance code is applied to □ of part number.

*1 We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic B7 : X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK107 B7224□A		X7R	0.22	±10, ±20	10	0.8±0.1	R	150%	R	
	UMK107 B7474□A		X7R	0.47	±10, ±20	10	0.8±0.1	R	150%	R	
25V	TMK107 B7474□A		X7R	0.47	±10, ±20	10	0.8±0.1	R	150%	R	
	TMK107 B7105□A		X7R	1	±10, ±20	10	0.8±0.1	R	150%		
16V	EMK107 B7224□A		X7R	0.22	±10, ±20	3.5	0.8±0.1	R/W	150%		
	EMK107 B7474□A		X7R	0.47	±10, ±20	3.5	0.8±0.1	R	150%		
	EMK107 B7105□A		X7R	1	±10, ±20	5	0.8±0.1	R	150%		
10V	LMK107 B7224□A		X7R	0.22	±10, ±20	3.5	0.8±0.1	R/W	200%		
	LMK107 B7474□A		X7R	0.47	±10, ±20	3.5	0.8±0.1	R	200%		
	LMK107 B7105□A		X7R	1	±10, ±20	5	0.8±0.1	R	150%		
	LMK107 B7225□A		X7R	2.2	±10, ±20	10	0.8±0.1	R	150%		
6.3V	JMK107 B7224□A		X7R	0.22	±10, ±20	3.5	0.8±0.1	R/W	200%		
	JMK107 B7474□A		X7R	0.47	±10, ±20	3.5	0.8±0.1	R	200%		
	JMK107 B7105□A		X7R	1	±10, ±20	5	0.8±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.

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REPRESENTATIVE PART NUMBERS

【Temperature Characteristic F : Y5V】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK107 F104ZA		F/Y5V	0.1	+80/−20	7	0.8±0.1	R/W	200%		
25V	TMK107 F474ZA		F/Y5V	0.47	+80/−20	7	0.8±0.1	R/W	200%		
16V	EMK107 F224ZA		F/Y5V	0.22	+80/−20	7	0.8±0.1	R/W	200%		
	EMK107 F474ZA		F/Y5V	0.47	+80/−20	7	0.8±0.1	R/W	200%		
	EMK107 F105ZA		F/Y5V	1	+80/−20	16	0.8±0.1	R	200%		
	EMK107 F225ZA		F/Y5V	2.2	+80/−20	16	0.8±0.1	R	200%		
10V	LMK107 F105ZA		F/Y5V	1	+80/−20	16	0.8±0.1	R	200%		
	LMK107 F225ZA		F/Y5V	2.2	+80/−20	16	0.8±0.1	R	200%		

●212TYPE

【Temperature Characteristic BJ : B/X5R】

・1.25mm thickness(G)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK212 BJ104□G		B/X5R*1	0.1	±10, ±20	3.5	1.25±0.1	R/W	200%		
	UMK212 BJ224□G		B/X5R*1	0.22	±10, ±20	3.5	1.25±0.1	R/W	150%		
	UMK212 BJ474□G		B/X5R*1	0.47	±10, ±20	3.5	1.25±0.1	R/W	150%		
	UMK212 BJ105□G		B/X5R	1	±10, ±20	5	1.25±0.1	R/W	150%		
25V	TMK212 BJ225□G		B/X5R	2.2	±10, ±20	5	1.25±0.1	R	150%		
	TMK212 BJ475□G	TMK212ABJ475□G	X5R	4.7	±10, ±20	10	1.25+0.15/−0.05	R	150%		
16V	EMK212 BJ225□G		B/X5R*1	2.2	±10, ±20	5	1.25±0.1	R	200%		
	EMK212 BJ475□G	EMK212ABJ475□G	B/X5R*1	4.7	±10, ±20	5	1.25+0.15/−0.05	R	150%		
	EMK212 BJ106□G	EMK212ABJ106□G	X5R	10	±10, ±20	10	1.25+0.15/−0.05	R	150%		
10V	LMK212 BJ225□G		B/X5R*1	2.2	±10, ±20	5	1.25±0.1	R	200%		
	LMK212 BJ475□G	LMK212ABJ475□G	B/X5R*1	4.7	±10, ±20	5	1.25+0.15/−0.05	R	200%		
	LMK212 BJ106□G	LMK212ABJ106□G	X5R	10	±10, ±20	10	1.25+0.15/−0.05	R	200%		
	LMK212 BJ226MG	LMK212BBJ226MG	X5R	22	±20	10	1.25+0.2/−0	R	150%		
6.3V	JMK212 BJ475□G	JMK212ABJ475□G	B/X5R	4.7	±10, ±20	5	1.25+0.15/−0.05	R	200%		
	JMK212 BJ106□G	JMK212ABJ106□G	X5R*1	10	±10, ±20	10	1.25+0.15/−0.05	R	200%		
	JMK212 BJ226MG	JMK212ABJ226MG	X5R	22	±20	10	1.25+0.15/−0.05	R	150%		
	JMK212 BJ476MG	JMK212BBJ476MG	X5R	47	±20	10	1.25+0.2/−0	R	150%		

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK212 BJ105□D	UMK212ABJ105□D	X5R	1	±10, ±20	10	0.85±0.1	R	150%	D	
25V	TMK212 BJ474□D		B/X5R	0.47	±10, ±20	3.5	0.85±0.1	R	200%		
	TMK212 BJ105□D		B/X5R	1	±10, ±20	5	0.85±0.1	R	200%		
	TMK212 BJ225□D	TMK212ABJ225□D	B/X5R	2.2	±10, ±20	5	0.85±0.1	R	150%		
	TMK212 BJ475□D	TMK212BBJ475□D	X5R	4.7	±10, ±20	10	0.85±0.1	R	150%	D	
16V	EMK212 BJ105□D		B/X5R*1	1	±10, ±20	5	0.85±0.1	R	200%		
	EMK212 BJ225□D	EMK212ABJ225□D	B/X5R*1	2.2	±10, ±20	5	0.85±0.1	R	200%		
	EMK212 BJ475□D		B/X5R	4.7	±10, ±20	10	0.85±0.1	R	150%		
	EMK212 BJ106□D	EMK212ABJ106□D	X5R	10	±10, ±20	10	0.85±0.1	R	150%	D	
10V	LMK212 BJ105□D		B/X5R*1	1	±10, ±20	3.5	0.85±0.1	R	200%		
	LMK212 BJ225□D		B/X5R*1	2.2	±10, ±20	5	0.85±0.1	R	200%		
	LMK212 BJ475□D		B/X5R	4.7	±10, ±20	10	0.85±0.1	R	200%		
	LMK212 BJ106□D	LMK212ABJ106□D	X5R	10	±10, ±20	10	0.85±0.1	R	150%		
6.3V	JMK212 BJ475□D		X5R	4.7	±10, ±20	10	0.85±0.1	R	200%		
	JMK212 BJ106□D	JMK212ABJ106□D	X5R	10	±10, ±20	10	0.85±0.1	R	200%		
	JMK212 BJ226MD	JMK212ABJ226MD	X5R	22	±20	10	0.85±0.1	R	150%		

・0.45mm thickness(K)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LMK212 BJ475□K	LMK212ABJ475□K	X5R	4.7	±10, ±20	10	0.45±0.05	R	150%		
6.3V	JMK212 BJ475□K	JMK212ABJ475□K	X5R	4.7	±10, ±20	10	0.45±0.05	R	150%		
	JMK212 BJ106MK	JMK212ABJ106MK	X5R	10	±20	10	0.45±0.05	R	150%		

Capacitance tolerance code is applied to □ of part number.

*1 We may provide X7R for some itemes according to the individual specification.

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REPRESENTATIVE PART NUMBERS

【Temperature Characteristic B7 : X7R】
・1.25mm thickness(G)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK212 B7104□G		X7R	0.1	±10, ±20	3.5	1.25±0.1	R/W	200%		
	UMK212 B7224□G		X7R	0.22	±10, ±20	3.5	1.25±0.1	R/W	150%		
	UMK212 B7474□G		X7R	0.47	±10, ±20	3.5	1.25±0.1	R/W	150%		
	UMK212 B7105□G		X7R	1	±10, ±20	10	1.25±0.1	R/W	150%		
35V	GMK212 B7105□G		X7R	1	±10, ±20	3.5	1.25±0.1	R/W	150%		
25V	TMK212 B7105□G		X7R	1	±10, ±20	3.5	1.25±0.1	R/W	150%		
	TMK212 B7225□G		X7R	2.2	±10, ±20	10	1.25±0.1	R	150%	R	
	TMK212 B7475□G	TMK212AB7475□G	X7R	4.7	±10, ±20	10	1.25+0.15/−0.05	R	150%	D	
16V	EMK212 B7105□G		X7R	1	±10, ±20	3.5	1.25±0.1	R/W	200%		
	EMK212 B7225□G		X7R	2.2	±10, ±20	10	1.25±0.1	R	150%		
	EMK212 B7475□G		X7R	4.7	±10, ±20	10	1.25±0.1	R	150%		
10V	LMK212 B7105□G		X7R	1	±10, ±20	3.5	1.25±0.1	R/W	200%		
	LMK212 B7225□G		X7R	2.2	±10, ±20	5	1.25±0.1	R	200%		
	LMK212 B7475□G		X7R	4.7	±10, ±20	10	1.25±0.1	R	150%		
	LMK212 B7106MG	LMK212AB7106MG	X7R	10	±20	10	1.25+0.15/−0.05	R	150%	D	
6.3V	JMK212 B7106□G	JMK212AB7106□G	X7R	10	±10, ±20	10	1.25+0.15/−0.05	R	150%		

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
16V	EMK212 B7474□D		X7R	0.47	±10, ±20	3.5	0.85±0.1	R/W	200%		
	EMK212 B7105□D		X7R	1	±10, ±20	5	0.85±0.1	R	200%		
	EMK212 B7225□D	EMK212AB7225□D	X7R	2.2	±10, ±20	5	0.85±0.1	R	150%		
10V	LMK212 B7105□D		X7R	1	±10, ±20	3.5	0.85±0.1	R	200%		
	LMK212 B7225□D	LMK212AB7225□D	X7R	2.2	±10, ±20	5	0.85±0.1	R	200%		
	LMK212 B7475□D	LMK212AB7475□D	X7R	4.7	±10, ±20	10	0.85±0.1	R	150%	R	

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic F : Y5V】
・1.25mm thickness(G)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK212 F474ZG		F/Y5V	0.47	+80/−20	7	1.25±0.1	R/W	200%		
	UMK212 F105ZG		F/Y5V	1	+80/−20	7	1.25±0.1	R/W	200%		
16V	EMK212 F225ZG		F/Y5V	2.2	+80/−20	7	1.25±0.1	R/W	200%		
10V	LMK212 F475ZG		F/Y5V	4.7	+80/−20	9	1.25±0.1	R	200%		
	LMK212 F106ZG		F/Y5V	10	+80/−20	16	1.25±0.1	R	200%		
6.3V	JMK212 F106ZG		F/Y5V	10	+80/−20	16	1.25±0.1	R	200%		

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK212 F224ZD		F/Y5V	0.22	+80/−20	7	0.85±0.1	R/W	200%		
10V	LMK212 F225ZD		F/Y5V	2.2	+80/−20	9	0.85±0.1	R	200%		
6.3V	JMK212 F475ZD		F/Y5V	4.7	+80/−20	16	0.85±0.1	R	200%		

●316Type

【Temperature Characteristic BJ : B/X5R】
・1.6mm thickness(L)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK316 BJ105□L		B/X5R*1	1	±10, ±20	3.5	1.6±0.2	R	200%		
	UMK316 BJ475□L		X5R	4.7	±10, ±20	10	1.6±0.2	R	150%		
25V	TMK316 BJ225□L		B/X5R*1	2.2	±10, ±20	3.5	1.6±0.2	R	200%		
	TMK316 BJ475□L		B/X5R	4.7	±10, ±20	5	1.6±0.2	R	150%		
	TMK316 BJ106□L		X5R*1	10	±10, ±20	5	1.6±0.2	R	150%		
16V	EMK316 BJ225□L		B/X5R*1	2.2	±10, ±20	3.5	1.6±0.2	R/W	200%		
	EMK316 BJ475□L		B/X5R	4.7	±10, ±20	5	1.6±0.2	R	200%		
	EMK316 BJ106□L		B/X5R*1	10	±10, ±20	5	1.6±0.2	R	150%		
	EMK316 BJ226ML	EMK316ABJ226ML	B/X5R	22	±20	10	1.6±0.2	R	150%		
10V	LMK316 BJ106□L		B/X5R*1	10	±10, ±20	5	1.6±0.2	R	200%		
	LMK316 BJ226ML	LMK316ABJ226ML	B/X5R	22	±20	10	1.6±0.2	R	150%		
	LMK316 BJ476ML	LMK316ABJ476ML	X5R	47	±20	10	1.6±0.2	R	150%		
6.3V	JMK316 BJ106□L		B/X5R*1	10	±10, ±20	5	1.6±0.2	R	200%		
	JMK316 BJ226□L	JMK316ABJ226□L	B/X5R	22	±10, ±20	10	1.6±0.2	R	200%		
	JMK316 BJ476ML	JMK316ABJ476ML	X5R	47	±20	10	1.6±0.2	R	200%		
	JMK316 BJ107ML	JMK316ABJ107ML	X5R	100	±20	10	1.6±0.2	R	150%		
4V	AMK316 BJ107ML	AMK316ABJ107ML	X5R	100	±20	10	1.6±0.2	R	150%		

Capacitance tolerance code is applied to □ of part number.
*1 We may provide X7R for some itemes according to the individual specification.

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REPRESENTATIVE PART NUMBERS

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK316 BJ105□D		B/X5R	1	±10, ±20	3.5	0.85±0.1	R	150%		
	UMK316 BJ225□D		B/X5R	2.2	±10, ±20	3.5	0.85±0.1	R	150%		
	UMK316 BJ475□D	UMK316ABJ475□D	X5R	4.7	±10, ±20	10	0.85±0.1	R	150%	D	
25V	TMK316 BJ105□D		B/X5R	1	±10, ±20	3.5	0.85±0.1	R	200%		
	TMK316 BJ225□D		B/X5R	2.2	±10, ±20	3.5	0.85±0.1	R	150%		
	TMK316 BJ475□D		X5R	4.7	±10, ±20	5	0.85±0.1	R	150%		
	TMK316 BJ106□D	TMK316ABJ106□D	X5R	10	±10, ±20	10	0.85±0.1	R	150%	D	
16V	EMK316 BJ225□D		B/X5R	2.2	±10, ±20	3.5	0.85±0.1	R	200%		
	EMK316 BJ475□D		B/X5R	4.7	±10, ±20	5	0.85±0.1	R	200%		
	EMK316 BJ106□D		X5R	10	±10, ±20	10	0.85±0.1	R	150%		
	EMK316 BJ226MD	EMK316ABJ226MD	X5R	22	±20	10	0.85±0.1	R	150%	D	
10V	LMK316 BJ475□D		B/X5R	4.7	±10, ±20	5	0.85±0.1	R	200%		
	LMK316 BJ106□D		B/X5R	10	±10, ±20	10	0.85±0.1	R	200%		
	LMK316 BJ226MD	LMK316ABJ226MD	X5R	22	±20	10	0.85±0.1	R	150%		
6.3V	JMK316 BJ106□D		B/X5R	10	±10, ±20	10	0.85±0.1	R	200%		
	JMK316 BJ226MD	JMK316ABJ226MD	X5R	22	±20	10	0.85±0.1	R	150%		
	JMK316 BJ476MD	JMK316ABJ476MD	X5R	47	±20	10	0.85±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic B7 : X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK316 B7224□L		X7R	0.22	±10, ±20	2.5	1.6±0.2	R/W	200%		
	UMK316 B7474□L		X7R	0.47	±10, ±20	3.5	1.6±0.2	R/W	200%		
	UMK316 B7105□L		X7R	1	±10, ±20	3.5	1.6±0.2	R	200%		
	UMK316 B7225□L		X7R	2.2	±10, ±20	10	1.6±0.2	R	150%		
	UMK316 B7475□L	UMK316AB7475□L	X7R	4.7	±10, ±20	10	1.6±0.2	R	150%	D	
25V	TMK316 B7105□L		X7R	1	±10, ±20	3.5	1.6±0.2	R/W	200%		
	TMK316 B7225□L		X7R	2.2	±10, ±20	3.5	1.6±0.2	R	200%		
	TMK316 B7475□L	TMK316AB7475□L	X7R	4.7	±10, ±20	10	1.6±0.2	R	200%	D	
	TMK316 B7106□L	TMK316AB7106□L	X7R	10	±10, ±20	10	1.6±0.2	R	150%	D	
16V	EMK316 B7225□L		X7R	2.2	±10, ±20	3.5	1.6±0.2	R/W	200%		
	EMK316 B7106□L	EMK316AB7106□L	X7R	10	±10, ±20	10	1.6±0.2	R	200%	D	
10V	LMK316 B7225□L		X7R	2.2	±10, ±20	3.5	1.6±0.2	R/W	200%		
	LMK316 B7475□L		X7R	4.7	±10, ±20	5	1.6±0.2	R	200%		
	LMK316 B7106□L	LMK316AB7106□L	X7R	10	±10, ±20	10	1.6±0.2	R	200%	D	
	LMK316 B7226ML	LMK316AB7226ML	X7R	22	±20	10	1.6±0.2	R	150%	R	
6.3V	JMK316 B7106□L		X7R	10	±10, ±20	5	1.6±0.2	R	200%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic F : F/Y5V】

・1.6mm thickness(L)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
35V	GMK316 F106ZL		F/Y5V	10	+80/−20	9	1.6±0.2	R	200%		
25V	TMK316 F106ZL		F/Y5V	10	+80/−20	9	1.6±0.2	R	200%		
16V	EMK316 F106ZL		F/Y5V	10	+80/−20	9	1.6±0.2	R	200%		
10V	LMK316 F226ZL		F/Y5V	22	+80/−20	16	1.6±0.2	R	200%		

・1.25mm thickness(G)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK316 F225ZG		F/Y5V	2.2	+80/−20	7	1.25±0.1	R/W	200%		
35V	GMK316 F475ZG		F/Y5V	4.7	+80/−20	7	1.25±0.1	R	200%		

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LMK316 F475ZD		F/Y5V	4.7	+80/−20	9	0.85±0.1	R	200%		
6.3V	JMK316 F106ZD		F/Y5V	10	+80/−20	16	0.85±0.1	R	200%		

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●325Type

【Temperature Characteristic BJ : B/X5R】

・2.5mm thickness(M)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK325 BJ475MM		X5R	4.7	±20	5	2.5±0.2	R	150%		
	UMK325 BJ106MM		X5R	10	±20	5	2.5±0.2	R	150%		
25V	TMK325 BJ106MM		B/X5R*1	10	±20	3.5	2.5±0.2	R	150%		
16V	EMK325 BJ226MM		B/X5R	22	±20	5	2.5±0.2	R	150%		
	EMK325 BJ476MM		X5R	47	±20	10	2.5±0.2	R	150%		
10V	LMK325 BJ226MM		B/X5R	22	±20	5	2.5±0.2	R	200%		
	LMK325 BJ476MM		X5R	47	±20	10	2.5±0.2	R	150%		
	LMK325 BJ107MM	LMK325ABJ107MM	X5R	100	±20	10	2.5±0.3	R	150%		
6.3V	JMK325 BJ476MM		X5R	47	±20	10	2.5±0.2	R	150%		
	JMK325 BJ107MM	JMK325ABJ107MM	X5R	100	±20	10	2.5±0.3	R	150%		

・1.9mm thickness(Y, N)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
35V	GMK325 BJ225MN		B/X5R	2.2	±20	3.5	1.9±0.2	R	200%		
	GMK325 BJ475MN		X5R	4.7	±20	10	1.9±0.2	R	150%		
	GMK325 BJ106MN		B/X5R	10	±20	5	1.9±0.2	R	150%		
25V	TMK325 BJ335MN		B/X5R*1	3.3	±20	3.5	1.9±0.2	R	200%		
	TMK325 BJ475MN		B/X5R*1	4.7	±20	3.5	1.9±0.2	R	200%		
	TMK325 BJ106MN		B/X5R	10	±20	5	1.9±0.2	R	200%		
16V	EMK325 BJ475MN		B/X5R*1	4.7	±20	3.5	1.9±0.2	R	200%		
	EMK325 BJ106MN		B/X5R	10	±20	3.5	1.9±0.2	R	200%		
10V	LMK325 BJ226MY		B/X5R	22	±20	5	1.9+0.1/−0.2	R	150%		
	LMK325 BJ106MN		B/X5R*1	10	±20	3.5	1.9±0.2	R	200%		
6.3V	JMK325 BJ226MY		B/X5R	22	±20	5	1.9+0.1/−0.2	R	200%		
	JMK325 BJ107MY		X5R	100	±20	10	1.9+0.1/−0.2	R	150%		
	JMK325 BJ476MN		X5R	47	±20	10	1.9±0.2	R	150%		

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK325 BJ106MD		B/X5R	10	±20	5	0.85±0.1	R	150%		
16V	EMK325 BJ106MD		B/X5R	10	±20	5	0.85±0.1	R	150%		
	EMK325 BJ226MD		B/X5R	22	±20	10	0.85±0.1	R	150%		
10V	LMK325 BJ335MD		B/X5R	3.3	±20	3.5	0.85±0.1	R	200%		
	LMK325 BJ475MD		B/X5R	4.7	±20	5	0.85±0.1	R	200%		
	LMK325 BJ106MD		B/X5R	10	±20	5	0.85±0.1	R	150%		

*1 We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic B7 : X7R】

・2.5mm thickness(M)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK325 B7475MM		X7R	4.7	±20	5	2.5±0.2	R	150%		
25V	TMK325 B7226MM		X7R	22	±20	10	2.5±0.2	R	150%	R	
16V	EMK325 B7226MM		X7R	22	±20	10	2.5±0.2	R	150%	R	
10V	LMK325 B7476MM		X7R	47	±20	10	2.5±0.2	R	150%	R	
6.3V	JMK325 B7476MM		X7R	47	±20	10	2.5±0.2	R	200%	R	

・1.9mm thickness(Y, N)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK325 B7335MN		X7R	3.3	±20	3.5	1.9±0.2	R	200%		
	TMK325 B7475MN		X7R	4.7	±20	3.5	1.9±0.2	R	150%		
16V	EMK325 B7475MN		X7R	4.7	±20	3.5	1.9±0.2	R	200%		
	EMK325 B7106MN		X7R	10	±20	3.5	1.9±0.2	R	150%		
10V	LMK325 B7106MN		X7R	10	±20	3.5	1.9±0.2	R	200%		

【Temperature Characteristic F : F/Y5V】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
16V	EMK325 F226ZN		F/Y5V	22	+80/−20	16	1.9±0.2	R	200%		
10V	LMK325 F226ZN		F/Y5V	22	+80/−20	16	1.9±0.2	R	200%		
6.3V	JMK325 F476ZN		F/Y5V	47	+80/−20	16	1.9±0.2	R	200%		

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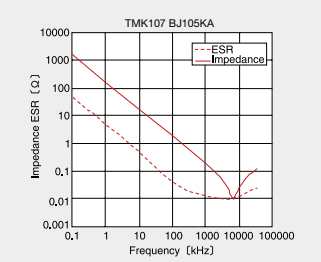
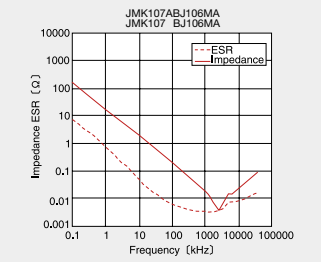
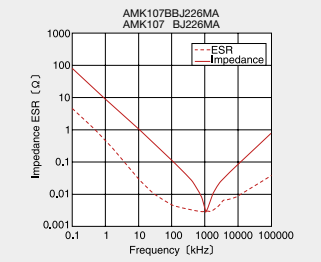
ELECTRICAL CHARACTERISTICS

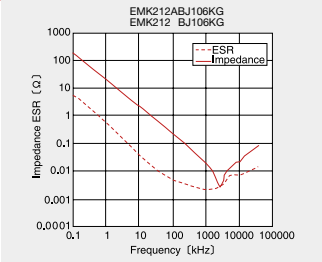
Example of Impedance ESR vs. Frequency characteristics

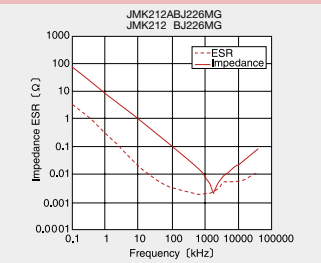
Taiyo Yuden multilayer ceramic capacitor

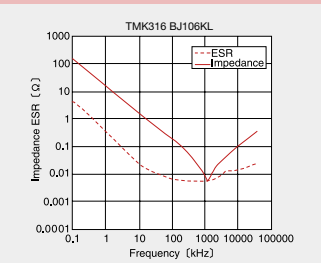


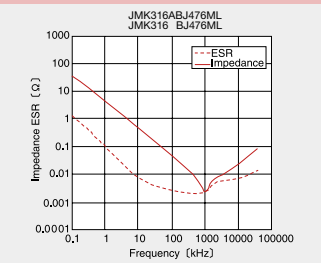


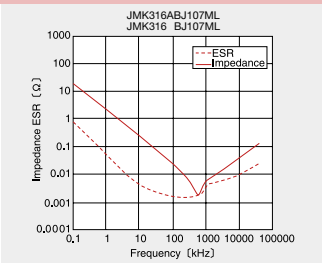


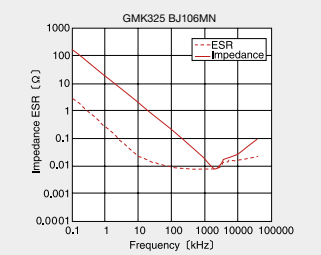


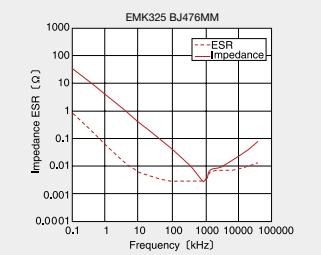


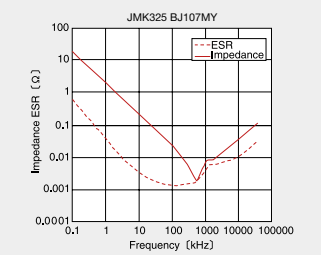


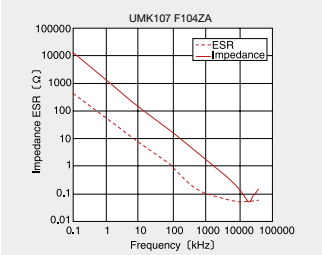


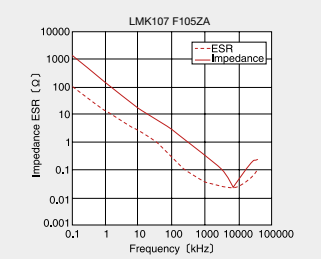


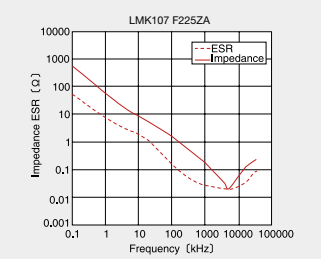


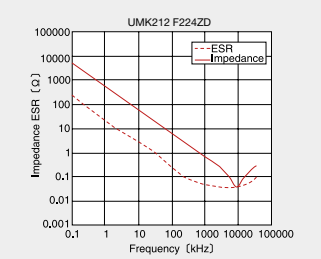


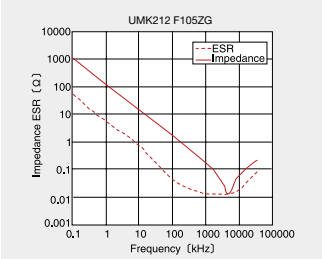


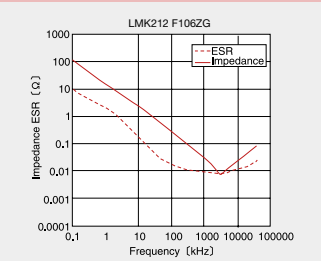


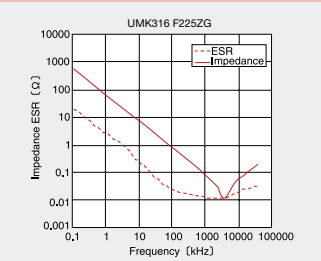


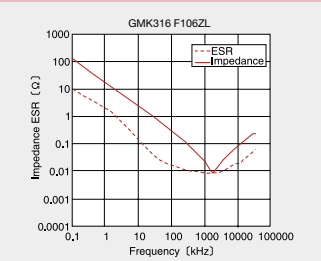


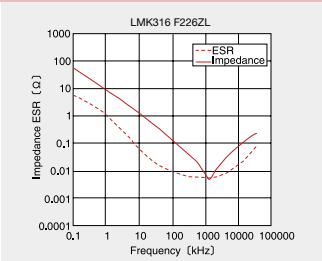


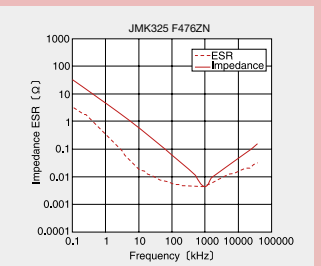












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STANDARD MULTILAYER CERAMIC CAPACITORS (CLASS1:TEMPERATURE COMPENSATING TYPE)

REFLOW

FEATURES

- Improved higher density mounting.
- Monolithic structure provides higher reliability.
- A wide range of capacitance values available in standard case sizes.

APPLICATIONS

- General electronic equipment
- Communication equipment (cellular phone, wireless applications, etc.)

PART NUMBER

U M K 1 0 5 △ C H 1 0 1 J V — F △

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫ ⓬

❶Rated voltage (VDC)

E	16
T	25
U	50

❷Series name

M	Multilayer ceramic capacitor

❸End termination

K	Plated

❹Dimension

Type	(inch)	L×W(mm)
042	(01005)	0.4×0.2
063	(0201)	0.6×0.3
105	(0402)	1.0×0.5

❺Dimension tolerance

△	Standard

△=Blank space

❻Temperature characteristics(ppm/℃)

C□ : 0	CH、CJ、CK	Tolerance H : ±60 J : ±120 K : ±250
R□ : −220	RH	
S□ : −330	SH、SJ、SK	
T□ : −470	TJ、TK	
U□ : −750	UJ、UK	
SL : +350～−1000		

□=Tolerance

❼Nominal capacitance(pF)

example	
0R5	0.5
010	1
100	10

※R=decimal point

❽Capacitance tolerance

C	±0.25pF
D	±0.5pF
F	±1pF
J	±5%
K	±10%

❾Thickness(mm)

C	0.2
P, T	0.3
W, V	0.5

❿Special code

—	Standard

⓫Packaging

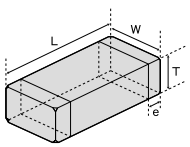
F	φ178mm Taping (2mm pitch)
W	φ178mm Taping (1mm pitch, 042 Type)

⓬Internal code

△	Standard

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm]					Standard quantity [pcs]	
	L	W	T		e	Paper tape	Embossed tape
□MK042 (01005 inch)	0.4±0.02	0.2±0.02	0.2±0.02	C	0.1±0.03	—	40000
□MK063 (0201 inch)	0.6±0.03	0.3±0.03	0.3±0.03	P, T	0.15±0.05	15000	—
□MK105 (0402 inch)	1.0±0.05	0.5±0.05	0.5±0.05	W,V	0.25±0.10	10000	—

AVAILABLE CAPACITANCE RANGE

Cap [pF]	Type	042	063		105					
		C□	C□	U□	C□	U□	SL	R□	S□	T□
	VDC	16V	50V	25V	50V					
	[3-digit]									
0.5	0R5	C	P	T	W	W			W	W
1	010									
1.5	1R5									
2	020									
3	030									
4	040									
5	050									
6	060							W		
7	070									
8	080									
9	090									
10	100									
12	120									
15	150									
18	180									
22	220	C	T		V	V				
27	270									
33	330									
39	390									
47	470									
56	560									
68	680									
82	820									
100	101									
120	121									
150	151									
180	181									
220	221									
270	271									
330	331									
390	391									
470	471									
560	561									
680	681									
820	821									
1000	102									

Note: Letters in the table indicate thickness.

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REPRESENTATIVE PART NUMBERS

●042TYPE

Class1【C△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
16V	EMK042 CK0R5CC		CK	0.5	±0.25pF	410	0.2±0.02	R	200%		
	EMK042 CK010CC		CK	1	±0.25pF	420	0.2±0.02	R	200%		
	EMK042 CK1R5CC		CK	1.5	±0.25pF	430	0.2±0.02	R	200%		
	EMK042 CK020CC		CK	2	±0.25pF	440	0.2±0.02	R	200%		
	EMK042 CJ030CC		CJ	3	±0.25pF	460	0.2±0.02	R	200%		
	EMK042 CH040CC		CH	4	±0.25pF	480	0.2±0.02	R	200%		
	EMK042 CH050CC		CH	5	±0.25pF	500	0.2±0.02	R	200%		
	EMK042 CH060DC		CH	6	±0.5pF	520	0.2±0.02	R	200%		
	EMK042 CH070DC		CH	7	±0.5pF	540	0.2±0.02	R	200%		
	EMK042 CH080DC		CH	8	±0.5pF	560	0.2±0.02	R	200%		
	EMK042 CH090DC		CH	9	±0.5pF	580	0.2±0.02	R	200%		
	EMK042 CH100DC		CH	10	±0.5pF	600	0.2±0.02	R	200%		
	EMK042 CH120JC		CH	12	±5%	640	0.2±0.02	R	200%		
	EMK042 CH150JC		CH	15	±5%	700	0.2±0.02	R	200%		
	EMK042 CH180JC		CH	18	±5%	760	0.2±0.02	R	200%		
	EMK042 CH220JC		CH	22	±5%	840	0.2±0.02	R	200%		
	EMK042 CH270JC		CH	27	±5%	940	0.2±0.02	R	200%		
	EMK042 CH330JC		CH	33	±5%	1000	0.2±0.02	R	200%		
	EMK042 CH390JC		CH	39	±5%	1000	0.2±0.02	R	200%		
	EMK042 CH470JC		CH	47	±5%	1000	0.2±0.02	R	200%		
	EMK042 CH560JC		CH	56	±5%	1000	0.2±0.02	R	200%		
	EMK042 CH680JC		CH	68	±5%	1000	0.2±0.02	R	200%		
	EMK042 CH820JC		CH	82	±5%	1000	0.2±0.02	R	200%		
	EMK042 CH101JC		CH	100	±5%	1000	0.2±0.02	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

●063TYPE

Class1【C△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK063 CK0R5CP		CK	0.5	±0.25pF	410	0.3±0.03	R	200%		Special code:G
	UMK063 CK010CP		CK	1	±0.25pF	420	0.3±0.03	R	200%		Special code:G
	UMK063 CK1R5CP		CK	1.5	±0.25pF	430	0.3±0.03	R	200%		Special code:G
	UMK063 CK020CP		CK	2	±0.25pF	440	0.3±0.03	R	200%		Special code:G
	UMK063 CJ030CP		CJ	3	±0.25pF	460	0.3±0.03	R	200%		Special code:G
	UMK063 CH040CP		CH	4	±0.25pF	480	0.3±0.03	R	200%		Special code:G
	UMK063 CH050CP		CH	5	±0.25pF	500	0.3±0.03	R	200%		Special code:G
	UMK063 CH060DP		CH	6	±0.5pF	520	0.3±0.03	R	200%		Special code:G
	UMK063 CH070DP		CH	7	±0.5pF	540	0.3±0.03	R	200%		Special code:G
	UMK063 CH080DT		CH	8	±0.5pF	560	0.3±0.03	R	200%		
	UMK063 CH090DT		CH	9	±0.5pF	580	0.3±0.03	R	200%		
	UMK063 CH100DT		CH	10	±0.5pF	600	0.3±0.03	R	200%		
	UMK063 CH120JT		CH	12	±5%	640	0.3±0.03	R	200%		
	UMK063 CH150JT		CH	15	±5%	700	0.3±0.03	R	200%		
	UMK063 CH180JT		CH	18	±5%	760	0.3±0.03	R	200%		
	UMK063 CH220JT		CH	22	±5%	840	0.3±0.03	R	200%		
	UMK063 CH270JT		CH	27	±5%	940	0.3±0.03	R	200%		
	UMK063 CH330JT		CH	33	±5%	1000	0.3±0.03	R	200%		
	UMK063 CH390JT		CH	39	±5%	1000	0.3±0.03	R	200%		
	UMK063 CH470JT		CH	47	±5%	1000	0.3±0.03	R	200%		
	UMK063 CH560JT		CH	56	±5%	1000	0.3±0.03	R	200%		
	UMK063 CH680JT		CH	68	±5%	1000	0.3±0.03	R	200%		
	UMK063 CH820JT		CH	82	±5%	1000	0.3±0.03	R	200%		
	UMK063 CH101JT		CH	100	±5%	1000	0.3±0.03	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

Class1【U△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK063 UK0R5CT		UK	0.5	±0.25pF	410	0.3±0.03	R	200%		
	TMK063 UK010CT		UK	1	±0.25pF	420	0.3±0.03	R	200%		
	TMK063 UK1R5CT		UK	1.5	±0.25pF	430	0.3±0.03	R	200%		
	TMK063 UK020CT		UK	2	±0.25pF	440	0.3±0.03	R	200%		
	TMK063 UK030CT		UK	3	±0.25pF	460	0.3±0.03	R	200%		
	TMK063 UJ040CT		UJ	4	±0.25pF	480	0.3±0.03	R	200%		
	TMK063 UJ050CT		UJ	5	±0.25pF	500	0.3±0.03	R	200%		
	TMK063 UJ060DT		UJ	6	±0.5pF	520	0.3±0.03	R	200%		
	TMK063 UJ070DT		UJ	7	±0.5pF	540	0.3±0.03	R	200%		
	TMK063 UJ080DT		UJ	8	±0.5pF	560	0.3±0.03	R	200%		
	TMK063 UJ090DT		UJ	9	±0.5pF	580	0.3±0.03	R	200%		
	TMK063 UJ100DT		UJ	10	±0.5pF	600	0.3±0.03	R	200%		
	TMK063 UJ120JT		UJ	12	±5%	640	0.3±0.03	R	200%		
	TMK063 UJ150JT		UJ	15	±5%	700	0.3±0.03	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

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REPRESENTATIVE PART NUMBERS

●105TYPE

Class1【C△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 CK0R5CW		CK	0.5	±0.25pF	410	0.5±0.05	R	200%		
	UMK105 CK010CW		CK	1	±0.25pF	420	0.5±0.05	R	200%		
	UMK105 CK1R5CW		CK	1.5	±0.25pF	430	0.5±0.05	R	200%		
	UMK105 CK020CW		CK	2	±0.25pF	440	0.5±0.05	R	200%		
	UMK105 CJ030CW		CJ	3	±0.25pF	460	0.5±0.05	R	200%		
	UMK105 CH040CW		CH	4	±0.25pF	480	0.5±0.05	R	200%		
	UMK105 CH050CW		CH	5	±0.25pF	500	0.5±0.05	R	200%		
	UMK105 CH060DW		CH	6	±0.5pF	520	0.5±0.05	R	200%		
	UMK105 CH070DW		CH	7	±0.5pF	540	0.5±0.05	R	200%		
	UMK105 CH080DV		CH	8	±0.5pF	560	0.5±0.05	R	200%		
	UMK105 CH090DV		CH	9	±0.5pF	580	0.5±0.05	R	200%		
	UMK105 CH100DV		CH	10	±0.5pF	600	0.5±0.05	R	200%		
	UMK105 CH120JV		CH	12	±5%	640	0.5±0.05	R	200%		
	UMK105 CH150JV		CH	15	±5%	700	0.5±0.05	R	200%		
	UMK105 CH180JV		CH	18	±5%	760	0.5±0.05	R	200%		
	UMK105 CH220JV		CH	22	±5%	840	0.5±0.05	R	200%		
	UMK105 CH270JV		CH	27	±5%	940	0.5±0.05	R	200%		
	UMK105 CH330JV		CH	33	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH390JV		CH	39	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH470JV		CH	47	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH560JV		CH	56	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH680JV		CH	68	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH820JV		CH	82	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH101JV		CH	100	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH121JV		CH	120	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH151JV		CH	150	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH181JV		CH	180	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH221JV		CH	220	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH271JV		CH	270	±5%	1000	0.5±0.05	R	200%		
	UMK105 CH331JV		CH	330	±5%	1000	0.5±0.05	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

Class1【U△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 UK0R5CW		UK	0.5	±0.25pF	410	0.5±0.05	R	200%		
	UMK105 UK010CW		UK	1	±0.25pF	420	0.5±0.05	R	200%		
	UMK105 UK1R5CW		UK	1.5	±0.25pF	430	0.5±0.05	R	200%		
	UMK105 UK020CW		UK	2	±0.25pF	440	0.5±0.05	R	200%		
	UMK105 UK030CW		UK	3	±0.25pF	460	0.5±0.05	R	200%		
	UMK105 UJ040CW		UJ	4	±0.25pF	480	0.5±0.05	R	200%		
	UMK105 UJ050CW		UJ	5	±0.25pF	500	0.5±0.05	R	200%		
	UMK105 UJ060DW		UJ	6	±0.5pF	520	0.5±0.05	R	200%		
	UMK105 UJ070DW		UJ	7	±0.5pF	540	0.5±0.05	R	200%		
	UMK105 UJ080DW		UJ	8	±0.5pF	560	0.5±0.05	R	200%		
	UMK105 UJ090DW		UJ	9	±0.5pF	580	0.5±0.05	R	200%		
	UMK105 UJ100DW		UJ	10	±0.5pF	600	0.5±0.05	R	200%		
	UMK105 UJ120JW		UJ	12	±5%	640	0.5±0.05	R	200%		
	UMK105 UJ150JW		UJ	15	±5%	700	0.5±0.05	R	200%		
	UMK105 UJ180JW		UJ	18	±5%	760	0.5±0.05	R	200%		
	UMK105 UJ220JV		UJ	22	±5%	840	0.5±0.05	R	200%		
	UMK105 UJ270JV		UJ	27	±5%	940	0.5±0.05	R	200%		
	UMK105 UJ330JV		UJ	33	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ390JV		UJ	39	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ470JV		UJ	47	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ560JV		UJ	56	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ680JV		UJ	68	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ820JV		UJ	82	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ101JV		UJ	100	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ121JV		UJ	120	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ151JV		UJ	150	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ181JV		UJ	180	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ221JV		UJ	220	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ271JV		UJ	270	±5%	1000	0.5±0.05	R	200%		
	UMK105 UJ331JV		UJ	330	±5%	1000	0.5±0.05	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

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REPRESENTATIVE PART NUMBERS

Class1【SL characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 SL121JV		SL	120	±5%	1000	0.5±0.05	R	200%		
	UMK105 SL151JV		SL	150	±5%	1000	0.5±0.05	R	200%		
	UMK105 SL181JV		SL	180	±5%	1000	0.5±0.05	R	200%		
	UMK105 SL221JV		SL	220	±5%	1000	0.5±0.05	R	200%		
	UMK105 SL271JV		SL	270	±5%	1000	0.5±0.05	R	200%		
	UMK105 SL331JV		SL	330	±5%	1000	0.5±0.05	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

Class1【RH characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 RH5R6JW		RH	5.6	±5%	512	0.5±0.05	R	200%		
	UMK105 RH6R8JW		RH	6.8	±5%	536	0.5±0.05	R	200%		
	UMK105 RH8R2JW		RH	8.2	±5%	564	0.5±0.05	R	200%		
	UMK105 RH100JW		RH	10	±5%	600	0.5±0.05	R	200%		
	UMK105 RH120JW		RH	12	±5%	640	0.5±0.05	R	200%		
	UMK105 RH150JW		RH	15	±5%	700	0.5±0.05	R	200%		
	UMK105 RH180JW		RH	18	±5%	760	0.5±0.05	R	200%		
	UMK105 RH200JW		RH	20	±5%	800	0.5±0.05	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

Class1【S△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 SK0R5BW		SK	0.5	±0.1pF	410	0.5±0.05	R	200%		
	UMK105 SK010BW		SK	1	±0.1pF	420	0.5±0.05	R	200%		
	UMK105 SK1R2BW		SK	1.2	±0.1pF	424	0.5±0.05	R	200%		
	UMK105 SK1R5BW		SK	1.5	±0.1pF	430	0.5±0.05	R	200%		
	UMK105 SK1R8BW		SK	1.8	±0.1pF	436	0.5±0.05	R	200%		
	UMK105 SK2R2JW		SK	2.2	±5%	444	0.5±0.05	R	200%		
	UMK105 SK2R7JW		SK	2.7	±5%	454	0.5±0.05	R	200%		
	UMK105 SJ3R3JW		SJ	3.3	±5%	466	0.5±0.05	R	200%		
	UMK105 SJ3R9JW		SJ	3.9	±5%	478	0.5±0.05	R	200%		
	UMK105 SH4R7JW		SH	4.7	±5%	494	0.5±0.05	R	200%		
	UMK105 SH5R6JW		SH	5.6	±5%	512	0.5±0.05	R	200%		
	UMK105 SH6R8JW		SH	6.8	±5%	536	0.5±0.05	R	200%		
	UMK105 SH8R2JW		SH	8.2	±5%	564	0.5±0.05	R	200%		
	UMK105 SH100JW		SH	10	±5%	600	0.5±0.05	R	200%		
	UMK105 SH120JW		SH	12	±5%	640	0.5±0.05	R	200%		
	UMK105 SH150JW		SH	15	±5%	700	0.5±0.05	R	200%		
	UMK105 SH180JW		SH	18	±5%	760	0.5±0.05	R	200%		
	UMK105 SH200JW		SH	20	±5%	800	0.5±0.05	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

Class1【T△ characteristic】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 TK0R5BW		TK	0.5	±0.1pF	410	0.5±0.05	R	200%		
	UMK105 TK010BW		TK	1	±0.1pF	420	0.5±0.05	R	200%		
	UMK105 TK1R2BW		TK	1.2	±0.1pF	424	0.5±0.05	R	200%		
	UMK105 TK1R5BW		TK	1.5	±0.1pF	430	0.5±0.05	R	200%		
	UMK105 TK1R8BW		TK	1.8	±0.1pF	436	0.5±0.05	R	200%		
	UMK105 TK2R2JW		TK	2.2	±5%	444	0.5±0.05	R	200%		
	UMK105 TK2R7JW		TK	2.7	±5%	454	0.5±0.05	R	200%		
	UMK105 TK3R3JW		TK	3.3	±5%	466	0.5±0.05	R	200%		
	UMK105 TK3R9JW		TK	3.9	±5%	478	0.5±0.05	R	200%		
	UMK105 TJ4R7JW		TJ	4.7	±5%	494	0.5±0.05	R	200%		
	UMK105 TJ5R6JW		TJ	5.6	±5%	512	0.5±0.05	R	200%		
	UMK105 TJ6R8JW		TJ	6.8	±5%	536	0.5±0.05	R	200%		
	UMK105 TJ8R2JW		TJ	8.2	±5%	564	0.5±0.05	R	200%		
	UMK105 TJ100JW		TJ	10	±5%	600	0.5±0.05	R	200%		
	UMK105 TJ120JW		TJ	12	±5%	640	0.5±0.05	R	200%		
	UMK105 TJ150JW		TJ	15	±5%	700	0.5±0.05	R	200%		
	UMK105 TJ180JW		TJ	18	±5%	760	0.5±0.05	R	200%		
	UMK105 TJ200JW		TJ	20	±5%	800	0.5±0.05	R	200%		

Note: Please contact Taiyo Yuden sales channels about items (capacitance and tolerance) other than listed above.

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STANDARD MULTILAYER CERAMIC CAPACITORS (CLASS2 :HIGH DIELECTRIC CONSTANT TYPE)

REFLOW

FEATURES

- Improved higher density mounting.
- Monolithic structure provides higher reliability.
- A wide range of capacitance values available in standard case sizes.

APPLICATIONS

- General electronic equipment
- Communication equipment (cellular phone, wireless applications, etc.)

PART NUMBER

L M K 1 0 5 △ B J 1 0 4 K V — F △

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫ ⓬

❶Rated voltage [VDC]	
A	4
J	6.3
L	10
E	16
T	25
G	35
U	50

❷Series name	
M	Multilayer ceramic capacitor

❸End termination	
K	Plated

❹Dimension		
Type	(inch)	L×W [mm]
042	(01005)	0.4×0.2
063	(0201)	0.6×0.3
105	(0402)	1.0×0.5

❺Dimension tolerance [mm]				
Code	Type	L	W	T
△	ALL	Standard	Standard	Standard
A	105	1.0±0.1	0.5±0.1	0.5±0.1
B		1.0+0.15/−0.05	0.5+0.15/−0.05	0.5+0.15/−0.05

△=Blank space

❻Temperature characteristics code	
BJ	B
	X5R
B7	X7R
△F	F
	Y5V

△=Blank space

❼Nominal capacitance [pF]	
example	
102	1000
223	22000

❽Capacitance tolerance	
K	±10%
M	±20%
Z	+80 −20 %

❾Thickness [mm]	
C	0.2
P	0.3
V	0.5

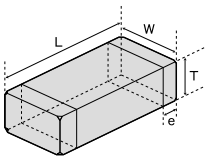
❿Special code	
—	Standard

⓫Packaging	
F	φ178mm Taping (2mm pitch)
W	φ178mm Taping (1mm pitch, 042 Type)

⓬Internal code	
△	Standard

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm]					Standard quantity [pcs]	
	L	W	T		e	Paper tape	Embossed tape
□MK042 (01005 inch)	0.4±0.02	0.2±0.02	0.2±0.02	C	0.1±0.03	—	40000
□MK063 (0201 inch)	0.6±0.03	0.3±0.03	0.3±0.03	P	0.15±0.05	15000	—
□MK105 (0402 inch)	1.0±0.05	0.5±0.05	0.2±0.02	C	0.25±0.10	20000	—
			0.3±0.03	P		15000	—
			0.5±0.05	V		10000	—

AVAILABLE CAPACITANCE RANGE

Multilayer Ceramic Capacitors

Cap [pF]	Type	042			063							105																
		X7R	B/X5R		X7R		B/X5R					X7R					B/X5R							F/Y5V				
	VDC	10	10	6.3	25	16	25	16	10	6.3	4	50	25	16	10	6.3	50	35	25	16	10	6.3	4	50	25	16	10	6.3
	[3-digit]																											
100	101	C	C		P		P																					
150	151	C	C		P		P																					
220	221	C	C		P		P					V					V											
330	331	C	C		P		P					V					V											
470	471	C	C		P		P					V					V											
680	681	C	C		P		P					V					V											
1000	102	C	C		P		P					V					V											
1500	152		C	C		P	P	P				V	V				V											
2200	222		C	C		P	P	P				V	V				V											
3300	332		C	C		P	P	P				V	V				V											
4700	472		C	C		P	P	P				V	V				V											
6800	682		C	C		P	P	P				V	V				V											
10000	103		C	C		P	P	P				V	V				V							V				
15000	153																		V	V								
22000	223			C					P	P				V	V				V	V					V			
33000	333								P	P									V	V								
47000	473								P	P				V	V				V	V						V		
68000	683								P	P										V								
100000	104								P	P				V	V			V	V	V	V					V		
220000	224								P	P	P					V				V	V	V					V	
330000	334										P																	
470000	474										P										V	V						V
1000000	105																			V	V	V						V
2200000	225																					V						
3300000	335																						V					
4700000	475																					V	V					

Note : Letters in the table indicate product thickness. X5R only

Low Profile Multilayer Ceramic Capacitors

Cap [pF]	Type	105			
		B/X5R			
	VDC	25	16	10	6.3
	[3-digit]				
100	101				
150	151				
220	221				
330	331				
470	471				
680	681				
1000	102				
1500	152				
2200	222				
3300	332				
4700	472				
6800	682				
10000	103	P			
15000	153				
22000	223				
33000	333				
47000	473				
68000	683				
100000	104	P		C	
220000	224	P			C
330000	334				
470000	474		P		C
1000000	105				P
2200000	225				
3300000	335				
4700000	475				

Temp.char.Code	Temperature characteristics					Capacitance tolerance [%]
	Applicable standard		Temperature range [℃]	Ref. Temp. [℃]	Capacitance change [%]	
BJ	JIS	B	−25～+85	20	±10	±10 (K) ±20 (M)
	EIA	X5R	−55～+85	25	±15	
B7	EIA	X7R	−55～+125	25	±15	
F	JIS	F	−25～+85	20	+30/−80	+80 −20 (Z)
	EIA	Y5V	−30～+85	25	+22/−82	

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REPRESENTATIVE PART NUMBERS

●042TYPE(01005 case size)

【Temperature Characteristic BJ:B/X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LMK042 BJ101□C		B/X5R*1	100	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ151□C		B/X5R*1	150	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ221□C		B/X5R*1	220	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ331□C		B/X5R*1	330	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ471□C		B/X5R*1	470	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ681□C		B/X5R*1	680	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ102□C		B/X5R*1	1000	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 BJ152□C		X5R	1500	±10, ±20	10	0.2±0.02	R	150%		
	LMK042 BJ222□C		X5R	2200	±10, ±20	10	0.2±0.02	R	150%		
	LMK042 BJ332□C		X5R	3300	±10, ±20	10	0.2±0.02	R	150%		
	LMK042 BJ472□C		X5R	4700	±10, ±20	10	0.2±0.02	R	150%		
	LMK042 BJ682□C		X5R	6800	±10, ±20	10	0.2±0.02	R	150%		
	LMK042 BJ103□C		X5R	10000	±10, ±20	10	0.2±0.02	R	150%		
6.3V	JMK042 BJ152□C		B/X5R*1	1500	±10, ±20	10	0.2±0.02	R	150%		
	JMK042 BJ222□C		B/X5R*1	2200	±10, ±20	10	0.2±0.02	R	150%		
	JMK042 BJ332□C		B/X5R*1	3300	±10, ±20	10	0.2±0.02	R	150%		
	JMK042 BJ472□C		B/X5R*1	4700	±10, ±20	10	0.2±0.02	R	150%		
	JMK042 BJ682□C		B/X5R*1	6800	±10, ±20	10	0.2±0.02	R	150%		
	JMK042 BJ103□C		B/X5R*1	10000	±10, ±20	10	0.2±0.02	R	150%		
	JMK042 BJ223□C		X5R	22000	±10, ±20	10	0.2±0.02	R	150%		

Capacitance tolerance code is applied to □ of part number.
*1 We may provide X7S/X7R for some items according to the individual specification.

【Temperature Characteristic B7 : X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LMK042 B7101□C		X7R	100	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 B7151□C		X7R	150	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 B7221□C		X7R	220	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 B7331□C		X7R	330	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 B7471□C		X7R	470	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 B7681□C		X7R	680	±10, ±20	5	0.2±0.02	R	200%		
	LMK042 B7102□C		X7R	1000	±10, ±20	5	0.2±0.02	R	200%		

Capacitance tolerance code is applied to □ of part number.

●063TYPE(0201 case size)

【Temperature Characteristic BJ:B/X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK063 BJ101□P		B/X5R*1	100	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ151□P		B/X5R*1	150	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ221□P		B/X5R*1	220	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ331□P		B/X5R*1	330	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ471□P		B/X5R*1	470	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ681□P		B/X5R*1	680	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ102□P		B/X5R*1	1000	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 BJ152□P		B/X5R	1500	±10, ±20	5	0.3±0.03	R	200%		
	TMK063 BJ222□P		B/X5R	2200	±10, ±20	5	0.3±0.03	R	200%		
	TMK063 BJ332□P		B/X5R	3300	±10, ±20	5	0.3±0.03	R	200%		
	TMK063 BJ472□P		B/X5R	4700	±10, ±20	5	0.3±0.03	R	200%		
	TMK063 BJ682□P		B/X5R	6800	±10, ±20	5	0.3±0.03	R	200%		
	TMK063 BJ103□P		B/X5R	10000	±10, ±20	5	0.3±0.03	R	200%		
16V	EMK063 BJ152□P		B/X5R*1	1500	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 BJ222□P		B/X5R*1	2200	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 BJ332□P		B/X5R*1	3300	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 BJ472□P		B/X5R*1	4700	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 BJ682□P		B/X5R*1	6800	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 BJ103□P		B/X5R*1	10000	±10, ±20	5	0.3±0.03	R	200%		
10V	LMK063 BJ223□P		B/X5R	22000	±10, ±20	7.5	0.3±0.03	R	150%		
	LMK063 BJ333□P		X5R	33000	±10, ±20	7.5	0.3±0.03	R	150%		
	LMK063 BJ473□P		X5R	47000	±10, ±20	7.5	0.3±0.03	R	150%		
	LMK063 BJ683□P		X5R	68000	±10, ±20	10	0.3±0.03	R	150%		
	LMK063 BJ104□P		X5R	100000	±10, ±20	10	0.3±0.03	R	150%		
	LMK063 BJ224MP		X5R	220000	±20	10	0.3±0.03	R	150%		
6.3V	JMK063 BJ223□P		B/X5R	22000	±10, ±20	7.5	0.3±0.03	R	200%		
	JMK063 BJ333□P		X5R	33000	±10, ±20	7.5	0.3±0.03	R	150%		
	JMK063 BJ473□P		X5R	47000	±10, ±20	7.5	0.3±0.03	R	150%		
	JMK063 BJ683□P		X5R	68000	±10, ±20	10	0.3±0.03	R	150%		
	JMK063 BJ104□P		X5R	100000	±10, ±20	10	0.3±0.03	R	150%		
	JMK063 BJ224MP		X5R	220000	±20	10	0.3±0.03	R	150%		
4V	AMK063 BJ224MP		X5R	220000	±20	10	0.3±0.03	R	150%		
	AMK063 BJ334MP		X5R	330000	±20	10	0.3±0.03	R	150%		*2
	AMK063 BJ474MP		X5R	470000	±20	10	0.3±0.03	R	150%		

Capacitance tolerance code is applied to □ of part number.
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*2 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channels.

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REPRESENTATIVE PART NUMBERS

【Temperature Characteristic B7 : X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK063 B7101□P		X7R	100	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 B7151□P		X7R	150	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 B7221□P		X7R	220	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 B7331□P		X7R	330	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 B7471□P		X7R	470	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 B7681□P		X7R	680	±10, ±20	3.5	0.3±0.03	R	200%		
	TMK063 B7102□P		X7R	1000	±10, ±20	3.5	0.3±0.03	R	200%		
16V	EMK063 B7152□P		X7R	1500	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 B7222□P		X7R	2200	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 B7332□P		X7R	3300	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 B7472□P		X7R	4700	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 B7682□P		X7R	6800	±10, ±20	5	0.3±0.03	R	200%		
	EMK063 B7103□P		X7R	10000	±10, ±20	5	0.3±0.03	R	200%		

Capacitance tolerance code is applied to □ of part number.

●105TYPE(0402 case size)

【Temperature Characteristic BJ:B/X5R】
・0.5mm thickness(V)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 BJ221□V		B/X5R*1	220	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ331□V		B/X5R*1	330	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ471□V		B/X5R*1	470	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ681□V		B/X5R*1	680	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ102□V		B/X5R*1	1000	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ152□V		B/X5R*1	1500	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ222□V		B/X5R*1	2200	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ332□V		B/X5R*1	3300	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ472□V		B/X5R*1	4700	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 BJ682□V		B/X5R*1	6800	±10, ±20	2.5	0.5±0.05	R	150%		
	UMK105 BJ103□V		B/X5R*1	10000	±10, ±20	3.5	0.5±0.05	R	200%		
35V	GMK105 BJ104□V		B/X5R	100000	±10, ±20	5	0.5±0.05	R	150%		
25V	TMK105 BJ153□V		B/X5R*1	15000	±10, ±20	3.5	0.5±0.05	R	200%		
	TMK105 BJ223□V		B/X5R*1	22000	±10, ±20	3.5	0.5±0.05	R	200%		
	TMK105 BJ333□V		B/X5R*1	33000	±10, ±20	3.5	0.5±0.05	R	150%		
	TMK105 BJ473□V		B/X5R*1	47000	±10, ±20	3.5	0.5±0.05	R	150%		
	TMK105 BJ104□V		B/X5R	100000	±10, ±20	5	0.5±0.05	R	150%		
16V	EMK105 BJ153□V		B/X5R*1	15000	±10, ±20	3.5	0.5±0.05	R	200%		
	EMK105 BJ223□V		B/X5R*1	22000	±10, ±20	3.5	0.5±0.05	R	200%		
	EMK105 BJ333□V		B/X5R*1	33000	±10, ±20	3.5	0.5±0.05	R	200%		
	EMK105 BJ473□V		B/X5R*1	47000	±10, ±20	3.5	0.5±0.05	R	200%		
	EMK105 BJ683□V		B/X5R	68000	±10, ±20	5	0.5±0.05	R	200%		
	EMK105 BJ104□V		B/X5R*1	100000	±10, ±20	5	0.5±0.05	R	150%		
	EMK105 BJ224□V		B/X5R	220000	±10, ±20	5	0.5±0.05	R	150%		
	EMK105 BJ105□V		X5R	1000000	±10, ±20	10	0.5±0.05	R	150%		
10V	LMK105 BJ104□V		B/X5R	100000	±10, ±20	5	0.5±0.05	R	200%		
	LMK105 BJ224□V		B/X5R	220000	±10, ±20	5	0.5±0.05	R	150%		
	LMK105 BJ474□V		X5R	470000	±10, ±20	10	0.5±0.05	R	150%		
	LMK105 BJ105□V		X5R	1000000	±10, ±20	10	0.5±0.05	R	150%		
6.3V	JMK105 BJ224□V		B/X5R	220000	±10, ±20	5	0.5±0.05	R	150%		
	JMK105 BJ474□V		X5R	470000	±10, ±20	10	0.5±0.05	R	150%		
	JMK105 BJ105□V		X5R	1000000	±10, ±20	10	0.5±0.05	R	150%		
	JMK105 BJ225MV		X5R	2200000	±20	10	0.5±0.05	R	150%		
	JMK105 BJ475MV	JMK105BBJ475MV	X5R	4700000	±20	10	0.5+0.15/−0.05	R	150%	D	
4V	AMK105 BJ335MV		X5R	3300000	±20	10	0.5±0.05	R	150%		*2
	AMK105 BJ475MV	AMK105ABJ475MV	X5R	4700000	±20	10	0.5±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.
*1 We may provide X7R for some items according to the individual specification.
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REPRESENTATIVE PART NUMBERS

・0.3mm thickness(P)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TMK105 BJ103□P		B/X5R	10000	±10, ±20	5	0.3±0.03	R	150%		
	TMK105 BJ104□P		X5R	100000	±10, ±20	10	0.3±0.03	R	150%		
	TMK105 BJ224□P		X5R	220000	±10, ±20	10	0.3±0.03	R	150%		
16V	EMK105 BJ474□P		X5R	470000	±10, ±20	10	0.3±0.03	R	150%		
6.3V	JMK105 BJ105□P		X5R	1000000	±10, ±20	10	0.3±0.03	R	150%		

・0.2mm thickness(C)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LMK105 BJ104□C		X5R	100000	±10, ±20	10	0.2±0.02	R	150%		
6.3V	JMK105 BJ224□C		X5R	220000	±10, ±20	10	0.2±0.02	R	150%		
	JMK105 BJ474□C		X5R	470000	±10, ±20	10	0.2±0.02	R	150%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic B7:X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 B7221□V		X7R	220	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7331□V		X7R	330	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7471□V		X7R	470	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7681□V		X7R	680	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7102□V		X7R	1000	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7152□V		X7R	1500	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7222□V		X7R	2200	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7332□V		X7R	3300	±10, ±20	2.5	0.5±0.05	R	200%		
	UMK105 B7472□V		X7R	4700	±10, ±20	2.5	0.5±0.05	R	150%		
	UMK105 B7682□V		X7R	6800	±10, ±20	2.5	0.5±0.05	R	150%		
	UMK105 B7103□V		X7R	10000	±10, ±20	3.5	0.5±0.05	R	150%		
25V	TMK105 B7152□V		X7R	1500	±10, ±20	2.5	0.5±0.05	R	200%		
	TMK105 B7222□V		X7R	2200	±10, ±20	2.5	0.5±0.05	R	200%		
	TMK105 B7332□V		X7R	3300	±10, ±20	2.5	0.5±0.05	R	200%		
	TMK105 B7472□V		X7R	4700	±10, ±20	2.5	0.5±0.05	R	200%		
	TMK105 B7682□V		X7R	6800	±10, ±20	2.5	0.5±0.05	R	200%		
	TMK105 B7103□V		X7R	10000	±10, ±20	3.5	0.5±0.05	R	200%		
16V	EMK105 B7223□V		X7R	22000	±10, ±20	3.5	0.5±0.05	R	200%		
	EMK105 B7473□V		X7R	47000	±10, ±20	3.5	0.5±0.05	R	200%		
	EMK105 B7104□V		X7R	100000	±10, ±20	5	0.5±0.05	R	150%		
10V	LMK105 B7223□V		X7R	22000	±10, ±20	3.5	0.5±0.05	R	200%		
	LMK105 B7473□V		X7R	47000	±10, ±20	3.5	0.5±0.05	R	200%		
	LMK105 B7104□V		X7R	100000	±10, ±20	5	0.5±0.05	R	150%		
6.3V	JMK105 B7224□V		X7R	220000	±10, ±20	5	0.5±0.05	R	150%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic F:Y5V】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 F103ZV		F/Y5V	10000	+80/−20	5	0.5±0.05	R	200%		
25V	TMK105 F223ZV		F/Y5V	22000	+80/−20	5	0.5±0.05	R	200%		
16V	EMK105 F473ZV		F/Y5V	47000	+80/−20	7	0.5±0.05	R	200%		
	EMK105 F104ZV		F/Y5V	100000	+80/−20	9	0.5±0.05	R	200%		
10V	LMK105 F224ZV		F/Y5V	220000	+80/−20	11	0.5±0.05	R	200%		
6.3V	JMK105 F474ZV		F/Y5V	470000	+80/−20	12.5	0.5±0.05	R	200%		
	JMK105 F105ZV		F/Y5V	1000000	+80/−20	20	0.5±0.05	R	150%		

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MULTILAYER CERAMIC CAPACITORS FOR HIGH FREQUENCY APPLICATIONS(1GHz+)

REFLOW

FEATURES

- Q value in the high frequency range (1 GHz+) is superior compared to other types of multilayer capacitors.
- The 1005(0402) case size is designed for high density mounting and weight reduction in various applications.

APPLICATIONS

- Suitable for those high frequency applications in which a capacitor with both a high Q-value and small size is required such as portable communications and other wireless applications.
  VCO, TCXO etc.
- Adjustment of characteristics in high frequency circuit

PART NUMBER

U V K 1 0 5 △ R H 4 R 3 J W — F △

❶ Rated voltage〔VDC〕

E	16
U	50

❷ Series name

V	Multilayer ceramic capacitor for high frequency

❸ End termination

K	Plated

❹ Dimension

Type	(inch)	L×W〔mm〕
105	(0402)	1.0×0.5

❺ Dimension tolerance

△	Standard

△=Blank Space

❻ Temperature characteristics〔ppm/℃〕

CH	0±60
RH	−220±60

❼ Nominal capacitance〔pF〕

example	
020	2
4R3	4.3

※R=Decimal point

❽ Capacitance tolerance

B	±0.1pF
J	±5%

❾ Thickness〔mm〕

W	0.5

❿ Special code

—	Standard

⓫ Packaging

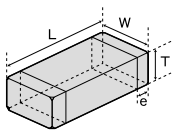
F	φ178mm Taping (2mm pitch)

⓬ Internal code

△	Standard

△=Blank Space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY

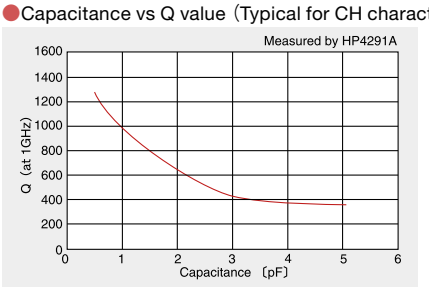


Type	Dimension [mm]				Standard quantity [pcs]	
	L	W	T	e	Paper tape	Embossed tape
□VK105 (0402 inch)	1.0±0.05	0.5±0.05	0.5±0.05	0.25±0.1	10000	—

SPECIFICATIONS

Temperature Characteristics	Operating Temperature range	Temperature Coefficient range [ppm/℃]	Capacitance Tolerance
CH	−55～+125℃	0±60	±0.1pF(～2.0pF) ±5% (2.2pF～)
RH		−220±60	

●Capacitance vs Q value (Typical for CH characteristic)



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PART NUMBERS

Rated Voltage (DC)	Part number		EHS (Environmental Hazardous Substances)	Temperature characteristics		Capacitance (pF)	Capacitance tolerance	Q (at 1GHz) (min.)	Thickness [mm]	Typical Q
				CH	RH					
E: 16V U: 50V	□VK105 CH0R3BW		RoHS	●		0.3	±0.1pF	300	0.5±0.05	1200
	□VK105 CH0R4BW		RoHS	●		0.4		300		1200
	□VK105 CH0R5BW		RoHS	●		0.5		300		1200
	□VK105 CH0R6BW		RoHS	●		0.6		300		1100
	□VK105 CH0R7BW		RoHS	●		0.7		300		1100
	□VK105 CH0R8BW		RoHS	●		0.8		300		1000
	□VK105 CH0R9BW		RoHS	●		0.9		300		950
	□VK105 CH010BW		RoHS	●		1.0		300		950
	□VK105 CH1R1BW		RoHS	●		1.1		280		930
	□VK105 CH1R2BW		RoHS	●		1.2		270		850
	□VK105 CH1R3BW		RoHS	●		1.3		260		740
	□VK105 CH1R5BW		RoHS	●		1.5		240		710
	□VK105 CH1R6BW		RoHS	●		1.6		230		670
	□VK105 CH1R8BW		RoHS	●		1.8		210		650
	□VK105 CH020BW		RoHS	●		2.0		190		610
	□VK105 CH2R2JW		RoHS	●		2.2	±5%	180		530
	□VK105 CH2R4JW		RoHS	●		2.4		170		510
	□VK105 CH2R7JW		RoHS	●		2.7		150		460
	□VK105 CH030JW		RoHS	●		3.0		130		390
	□VK105 CH3R3JW		RoHS	●		3.3		120		370
	□VK105 CH3R6JW		RoHS	●		3.6		110		360
	□VK105 CH3R9JW		RoHS	●		3.9		99		360
	□VK105 CH4R3JW		RoHS	●		4.3		84		360
	□VK105 CH4R7JW		RoHS	●		4.7		84		340
	□VK105 CH5R1JW		RoHS	●		5.1		84		320
	□VK105 RH0R5BW		RoHS		●	0.5	±0.1pF	300		1100
	□VK105 RH0R6BW		RoHS		●	0.6		300		1000
	□VK105 RH0R7BW		RoHS		●	0.7		300		1000
	□VK105 RH0R8BW		RoHS		●	0.8		300		970
	□VK105 RH0R9BW		RoHS		●	0.9		300		950
	□VK105 RH010BW		RoHS		●	1.0		300		900
	□VK105 RH1R1BW		RoHS		●	1.1		280		900
	□VK105 RH1R2BW		RoHS		●	1.2		270		740
	□VK105 RH1R3BW		RoHS		●	1.3		260		700
	□VK105 RH1R5BW		RoHS		●	1.5		240		680
	□VK105 RH1R6BW		RoHS		●	1.6		230		640
	□VK105 RH1R8BW		RoHS		●	1.8		210		620
	□VK105 RH020BW		RoHS		●	2.0		190		570
	□VK105 RH2R2JW		RoHS		●	2.2	±5%	180		480
	□VK105 RH2R4JW		RoHS		●	2.4		170		470
	□VK105 RH2R7JW		RoHS		●	2.7		150		420
	□VK105 RH030JW		RoHS		●	3.0		130		360
	□VK105 RH3R3JW		RoHS		●	3.3		120		350
	□VK105 RH3R6JW		RoHS		●	3.6		110		340
	□VK105 RH3R9JW		RoHS		●	3.9		99		340
	□VK105 RH4R3JW		RoHS		●	4.3		84		340
	□VK105 RH4R7JW		RoHS		●	4.7		84		320
	□VK105 RH5R1JW		RoHS		●	5.1		84		310

□Please specify the Rated Voltage code.

CAPACITORS

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SUPER LOW DISTORTION MULTILAYER CERAMIC CAPACITORS(CFCAP™)

REFLOW

FEATURES

- Newly developed dielectric material and the use of nickel for internal electrodes provide superior temperature characteristics with high capacitance, small case size and low cost.
- Low distortion and low shock noise make these capacitors appropriate for use in analog or digital mobile devices.
- Superior heat-resistance, high breakdown voltage, and mechanical strength make these capacitors appropriate for replacing film capacitors.

APPLICATIONS

- Signal line for AV products
- Analog signal coupling applications
- PLL circuit of mobile phones
- Good temperature characteristics for time constant circuits, oscillation circuits and filters

PART NUMBER

T M K 3 1 6 △ S D 1 0 4 K L — T △

❶ ❷ ❸ ❹ ❺ ❻ ❼ ❽ ❾ ❿ ⓫ ⓬

❶Rated voltage〔VDC〕

U	50
G	35
T	25
E	16
L	10
J	6.3

❷Series name

M	Multilayer ceramic capacitor

❸End termination

K	Plated

❹Dimension

Type	(inch)	L×W〔mm〕
105	(0402)	1.0×0.5
107	(0603)	1.6×0.8
212	(0805)	2.0×1.25
316	(1206)	3.2×1.6

❺Dimension tolerance

△	Standard

△=Blank space

❻Series symbol

SD	Standard

❼Nominal capacitance〔μF〕

example	
223	0.022
104	0.1

❽Capacitance tolerance

K	±10%

❾Thickness〔mm〕

P	0.3
V	0.5
A	0.8
D	0.85
F	1.15
G	1.25
L	1.6

❿Special code

—	Standard

⓫Packaging

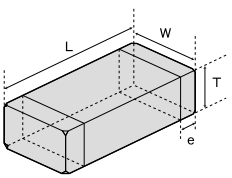
T	φ178mm Taping (4mm pitch) 107, 212, 316 Type
F	φ178mm Taping (2mm pitch) 105 Type

⓬Internal code

△	Standard

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm]					Standard quantity [pcs]	
	L	W	T		e	Paper tape	Embossed tape
□MK105 (0402 inch)	1.0±0.05	0.5±0.05	0.3±0.03	P	0.25±0.10	10000	—
			0.5±0.05	V			
□MK107 (0603 inch)	1.6±0.10	0.8±0.10	0.8±0.10	A	0.35±0.25	4000	—
□MK212 (0805 inch)	2.0±0.10	1.25±0.10	0.85±0.10	D	0.5±0.25	4000	—
			1.25±0.10	G		—	3000
□MK316 (1206 inch)	3.2±0.15	1.6±0.15	1.15±0.10	F	0.5+0.35/−0.25	—	3000
			1.6±0.20	L			2000

AVAILABLE CAPACITANCE RANGE

Cap [pF]	Type	105					107				212				316	
		SD					SD				SD				SD	
	VDC	50V	25V	16V	10V	6.3V	50V	25V	16V	10V	50V	35V	16V	10V	35V	25V
	[3-digit]															
390	391	V														
470	471	V														
560	561	V														
680	681		V													
820	821		V													
1000	102		V				A									
1200	122		V				A									
1500	152			V	P		A									
1800	182			V			A									
2200	222			V			A									
2700	272			V		P	A									
3300	332				V		A									
3900	392				V			A			D					
4700	472				V			A			D					
5600	562								A		D					
6800	682								A		D					
8200	822								A		D					
10000	103								A		D					
12000	123									A		D				
15000	153									A		D				
18000	183									A		G				
22000	223									A		G				
27000	273											G				
33000	333												D		F	
39000	393														F	
47000	473													D		F
56000	563															F
68000	683													G		F
82000	823													G		L
100000	104													G		L

※Letters in the table indicate thickness.

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REPRESENTATIVE PART NUMBERS

●105TYPE

・0.5mm thickness(V)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK105 SD391KV		Standard type	390	±10	0.1	0.5±0.05	R	200%		
	UMK105 SD471KV			470	±10	0.1	0.5±0.05	R	200%		
	UMK105 SD561KV			560	±10	0.1	0.5±0.05	R	200%		
25V	TMK105 SD681KV			680	±10	0.1	0.5±0.05	R	200%		
	TMK105 SD821KV			820	±10	0.1	0.5±0.05	R	200%		
	TMK105 SD102KV			1000	±10	0.1	0.5±0.05	R	200%		
	TMK105 SD122KV			1200	±10	0.1	0.5±0.05	R	200%		
16V	EMK105 SD152KV			1500	±10	0.1	0.5±0.05	R	200%		
	EMK105 SD182KV			1800	±10	0.1	0.5±0.05	R	200%		
	EMK105 SD222KV			2200	±10	0.1	0.5±0.05	R	200%		
	EMK105 SD272KV			2700	±10	0.1	0.5±0.05	R	200%		
10V	LMK105 SD332KV			3300	±10	0.1	0.5±0.05	R	200%		
	LMK105 SD392KV			3900	±10	0.1	0.5±0.05	R	200%		
	LMK105 SD472KV			4700	±10	0.1	0.5±0.05	R	200%		

・0.3mm thickness(P)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LMK105 SD152KP		Standard type	1500	±10	0.1	0.3±0.03	R	200%		
6.3V	JMK105 SD272KP			2700	±10	0.1	0.3±0.03	R	200%		

Note : Capacitance tolerance J (±5%) is also available. Please contact Taiyo Yuden sales channels.

●107TYPE

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK107 SD102KA		Standard type	1000	±10	0.1	0.8±0.1	R	200%		
	UMK107 SD122KA			1200	±10	0.1	0.8±0.1	R	200%		
	UMK107 SD152KA			1500	±10	0.1	0.8±0.1	R	200%		
	UMK107 SD182KA			1800	±10	0.1	0.8±0.1	R	200%		
	UMK107 SD222KA			2200	±10	0.1	0.8±0.1	R	200%		
	UMK107 SD272KA			2700	±10	0.1	0.8±0.1	R	200%		
	UMK107 SD332KA			3300	±10	0.1	0.8±0.1	R	200%		
25V	TMK107 SD392KA			3900	±10	0.1	0.8±0.1	R	200%		
	TMK107 SD472KA			4700	±10	0.1	0.8±0.1	R	200%		
16V	EMK107 SD562KA			5600	±10	0.1	0.8±0.1	R	200%		
	EMK107 SD682KA			6800	±10	0.1	0.8±0.1	R	200%		
	EMK107 SD822KA			8200	±10	0.1	0.8±0.1	R	200%		
	EMK107 SD103KA			10000	±10	0.1	0.8±0.1	R	200%		
10V	LMK107 SD123KA			12000	±10	0.1	0.8±0.1	R	200%		
	LMK107 SD153KA			15000	±10	0.1	0.8±0.1	R	200%		
	LMK107 SD183KA			18000	±10	0.1	0.8±0.1	R	200%		
	LMK107 SD223KA			22000	±10	0.1	0.8±0.1	R	200%		

Note : Capacitance tolerance J (±5%) is also available. Please contact Taiyo Yuden sales channels.

●212TYPE

・1.25mm thickness(G)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
35V	GMK212 SD183KG		Standard type	18000	±10	0.1	1.25±0.1	R	200%		
	GMK212 SD223KG			22000	±10	0.1	1.25±0.1	R	200%		
	GMK212 SD273KG			27000	±10	0.1	1.25±0.1	R	200%		
10V	LMK212 SD683KG			68000	±10	0.1	1.25±0.1	R	200%		
	LMK212 SD823KG			82000	±10	0.1	1.25±0.1	R	200%		
	LMK212 SD104KG			100000	±10	0.1	1.25±0.1	R	200%		

・0.85mm thickness(D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	UMK212 SD392KD		Standard type	3900	±10	0.1	0.85±0.1	R	200%		
	UMK212 SD472KD			4700	±10	0.1	0.85±0.1	R	200%		
	UMK212 SD562KD			5600	±10	0.1	0.85±0.1	R	200%		
	UMK212 SD682KD			6800	±10	0.1	0.85±0.1	R	200%		
	UMK212 SD822KD			8200	±10	0.1	0.85±0.1	R	200%		
	UMK212 SD103KD			10000	±10	0.1	0.85±0.1	R	200%		
35V	GMK212 SD123KD			12000	±10	0.1	0.85±0.1	R	200%		
	GMK212 SD153KD			15000	±10	0.1	0.85±0.1	R	200%		
16V	EMK212 SD333KD			33000	±10	0.1	0.85±0.1	R	200%		
10V	LMK212 SD473KD			47000	±10	0.1	0.85±0.1	R	200%		

Note : Capacitance tolerance J (±5%) is also available. Please contact Taiyo Yuden sales channels.

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REPRESENTATIVE PART NUMBERS

●316TYPE

・1.6mm thickness（L）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance〔pF〕	Capacitance tolerance	tanδ〔%〕	Thickness〔mm〕	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code（P/N 1）	Note
25V	TMK316 SD823KL		Standard type	82000	±10	0.1	1.6±0.2	R	200%		
	TMK316 SD104KL			100000	±10	0.1	1.6±0.2	R	200%		

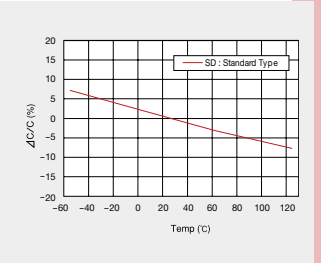
・1.15mm thickness（F）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance〔pF〕	Capacitance tolerance	tanδ〔%〕	Thickness〔mm〕	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code（P/N 1）	Note
35V	GMK316 SD333KF		Standard type	33000	±10	0.1	1.15±0.1	R	200%		
	GMK316 SD393KF			39000	±10	0.1	1.15±0.1	R	200%		
25V	TMK316 SD473KF			47000	±10	0.1	1.15±0.1	R	200%		
	TMK316 SD563KF			56000	±10	0.1	1.15±0.1	R	200%		
	TMK316 SD683KF			68000	±10	0.1	1.15±0.1	R	200%		

Note：Capacitance tolerance J (±5%) is also available. Please contact Taiyo Yuden sales channels.

ELECTRICAL CHARACTERISTICS

Capacitance-temperature characteristics



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Multilayer Ceramic Capacitors and Medium-High Voltage Multilayer Ceramic Capacitors are noted separately.

Super Low Distortion Multilayer Ceramic Capacitors（CFCAP）

1. Operating Temperature Range

Specified Value	−55 to +125℃

2. Storage Temperature Range

Specified Value	−55 to +125℃

3. Rated Voltage

Specified Value	6.3VDC, 10VDC, 16VDC, 25VDC, 35VDC, 50VDC

4. Dielectric Withstanding Voltage（Between terminals）

Specified Value	No breakdown or damage

【Test Methods and Remarks】
Applied voltage: Rated voltage×3
Duration: 1 to 5 sec.
Charge/discharge current: 50mA max.

5. Insulation Resistance

Specified Value	10000 MΩ or 500MΩ μF, whichever is smaller

【Test Methods and Remarks】
Applied voltage: Rated voltage
Duration: 60±5 sec.
Charge/discharge current: 50mA max.

6. Capacitance（Tolerance）

Specified Value	±10%

【Test Methods and Remarks】
Measuring frequency：1kHz±10%
Measuring voltage：1±0.2Vrms
Bias application: None

7. Dissipation Factor

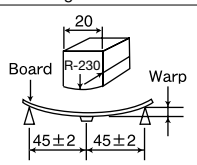
Specified Value	0.1%max

【Test Methods and Remarks】
Measuring frequency：1kHz±10%
Measuring voltage：1±0.2Vrms
Bias application: None

8. Bending Strength

Specified Value	Appearance: No abnormality Capacitance change: ±5%

【Test Methods and Remarks】
Warp: 1mm
Speed: 0.5mm/second
Duration:10 seconds
Test board: glass epoxy resin substrate
Thickness: 1.6mm
Capacitance measurement shall be conducted with the board bent.

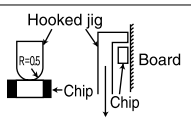


（Unit: mm）

9. Adhesive Force of Terminal Electrodes

Specified Value	Terminal electrodes shall be no exfoliation or a sign of exfoliation.

【Test Methods and Remarks】
Applied force: 5N
Duration: 30 ±5 seconds



10. Solderability

Specified Value	At least 95% of terminal electrode is covered by new solder.

【Test Methods and Remarks】

	Solder type	Solder temperature	Duration
Eutectic solder	H60A or H63A	230±5℃	4±1 sec.
Lead-free solder	Sn−3.0Ag−0.5Cu	245±3℃	

11. Resistance to Soldering Heat

Specified Value	Appearance: No abnormality Capacitance change: ±2.5% max. Dissipation factor : Initial value Insulation resistance: Initial value Withstanding voltage（between terminals）: No abnormality

【Test Methods and Remarks】
Solder temp.: 270 ±5℃
Duration: 3 ±0.5 sec.
Preheating conditions：80 to 100℃, 2 to 5 min. or 5 to 10 min.
150 to 200℃, 2 to 5 min. or 5 to 10 min.
Measurement shall be conducted： 24±2hrs under the standard condition Note1

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12. Temperature Cycle (Thermal Shock)	
Specified Value	Appearance: No abnormality Capacitance change: ±2.5% max Dissipation factor : Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality

【Test Methods and Remarks】
Conditions for 1 cycle／ Step 1: Minimum operating temperature $^{+0}_{-3}$℃ 30±3 min.
Step 2: Normal temperature 2 to 3 min.
Step 3: Maximum operating temperature $^{+0}_{-3}$℃ 30±3 min.
Step 4: Normal temperature 2 to 3 min.
Number of cycles: 5 times
Measurement shall be conducted : 24±2hrs under the standard condition Note1

13. Humidity (Steady state)	
Specified Value	Appearance: No abnormality Capacitance change: ±5% max Dissipation factor : 0.5% max Insulation resistance 50MΩμF or 1000MΩ, whichever is smaller

【Test Methods and Remarks】
Temperature:40±2℃
Humidity:90 to 95% RH
Duration:500 $^{+24}_{-0}$ hrs
Measurement shall be conducted : 24 ±2hrs under the standard condition Note1

14. Humidity Loading	
Specified Value	Appearance: No abnormality Capacitance change: ±7.5% max Dissipation factor : 0.5% max Insulation resistance: 25MΩμF or 500MΩ, whichever is smaller

【Test Methods and Remarks】
According to JIS C 5102 clause 9.9.
Temperature:40±2℃ Humidity:90 to 95% RH
Duration:500 $^{+24}_{-0}$ hrs
Applied voltage: Rated voltage
Charge/discharge current:50mA max
Measurement shall be conducted : 24 ±2hrs under the standard condition Note1

15. High Temperature Loading	
Specified Value	Appearance: No abnormality Capacitance change: ±3% max Dissipation factor : 0.35% max Insulation resistance: 50MΩμF or 1000MΩ, whichever is smaller

【Test Methods and Remarks】
According to JIS C 5102 clause 9.10.
Temperature:125±3℃
Duration:1000 $^{+48}_{-0}$ hrs
Applied voltage: Rated voltage x 2
Charge/discharge current:50mA max
Measurement shall be conducted : 24 ±2hrs under the standard condition Note1

Note1 Standard condition: Temperature: 5 to 35℃, Relative humidity: 45 to 85 % RH, Air pressure: 86 to 106kPa
When there are questions concerning measurement results, in order to provide correlation data, the test shall be conducted under the following condition.
Temperature: 20±2℃, Relative humidity: 60 to 70 % RH, Air pressure: 86 to 106kPa
Unless otherwise specified, all the tests are conducted under the "standard condition".

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MEDIUM-HIGH VOLTAGE MULTILAYER CERAMIC CAPACITORS

REFLOW

FEATURES

- The use of nickel as electrode material prevents migration and provides high reliability.
- Small case sizes with high rated voltage.

APPLICATIONS

- General telephone exchange
- Inverter
- Wireless and Telecommunication base
- For DC/DC Converter

PART NUMBER

H M K 3 1 6 △ B J 1 0 4 K L — T △

❶ Rated voltage〔VDC〕

H	100
Q	250
S	630

❷ Series name

M	Multilayer ceramic capacitor

❸ End termination

K	Plated

❹ Dimension

Type	(inch)	L×W [mm]
107	(0603)	1.6×0.8
212	(0805)	2.0×1.25
316	(1206)	3.2×1.6
325	(1210)	3.2×2.5
432	(1812)	4.5×3.2

❺ Dimension tolerance

△	Standard

△=Blank space

❻ Temperature characteristics code

BJ	B
	X5R
C7	X7S
B7	X7R

❼ Nominal capacitance〔pF〕

example	
104	100,000
105	1,000,000

❽ Special code

K	±10%
M	±20%

❾ Thickness〔mm〕

A	0.8
D	0.85
G	1.25
F	1.15
L	1.6
N	1.9
M	2.5

❿ Special code

—	Standard

⓫ Packaging

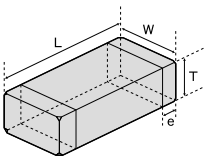
T	φ178mm Taping (4mm pitch)

⓬ Internal code

△	Standard

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm]					Standard quantity [pcs]	
	L	W	T		e	Paper tape	Embossed tape
□MK107 (0603 inch)	1.6±0.10	0.8±0.10	0.8±0.10	A	0.35±0.25	4000	—
□MK212 (0805 inch)	2.0±0.10	1.25±0.10	0.85±0.10	D	0.5±0.25	4000	—
			1.25±0.10	G		—	3000
□MK316 (1206 inch)	3.2±0.15	1.6±0.15	1.15±0.10	F	0.5 +0.35/−0.25	—	3000
			1.6±0.20	L			2000
□MK325 (1210 inch)	3.2±0.3	2.5±0.20	1.15±0.10	F	0.6±0.3	—	2000
			1.9±0.20	N			
□MK432 (1812 inch)	4.5±0.4	3.2±0.30	2.5±0.20	M	0.9±0.6	—	500

AVAILABLE CAPACITANCE RANGE

Cap [μF]	Type	107			212				316						325						432					
		X7R	X7S	B/X5R	X7R		B/X5R		X7R			B/X5R			X7R			B/X5R			X7R			B/X5R		
	VDC	100	100	100	100	250	100	250	100	250	630	100	250	630	100	250	630	100	250	630	100	250	630	100	250	630
	[3-digit]																									
0.001	102	A		A		D		D			F			F												
0.0015	152	A		A		D		D			F			F												
0.0022	222	A		A		D		D			F			F												
0.0033	332	A		A		D		D			F			F												
0.0047	472	A		A		G		G			F			F												
0.0068	682	A		A		G		G			F			F												
0.01	103	A		A	G	G	G	G			F			F												
0.015	153	A		A	G	G	G	G			L			L												
0.022	223	A		A	G	G	G	G			L			L			N			N						
0.033	333	A		A	G		G			L			L				N			N						
0.047	473				G		G		L	L		L	L			N	N		N	N			M			M
0.068	683				G		G		L	L		L	L										M			M
0.1	104		A	A	G		G		L	L		L	L		F	N		F	N			M	M		M	M
0.15	154								L			L			N	N		N	N							
0.22	224				G		G		L			L			N	N		N	N			M			M	
0.33	334								L			L			N			N				M			M	
0.47	474								L			L			N			N			M	M		M	M	
0.68	684														N			N								
1.0	105								L			L			N			N			M			M		
1.5	155																				M			M		
2.2	225														N			N			M			M		

※Letters in the table indicate thickness.

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AVAILABLE CAPACITANCE RANGE

Temp.char.Code	Temperature characteristics					Capacitance tolerance [%]
	Applicable standard		Temperature range [℃]	Ref. Temp. [℃]	Capacitance change [%]	
BJ	JIS	B	−25～+85	20	±10	±10 (K) ±20 (M)
	EIA	X5R	−55～+85	25	±15	
C7	EIA	X7S	−55～+125	25	±22	
B7	EIA	X7R	−55～+125	25	±15	

REPRESENTATIVE PART NUMBERS

●107TYPE

【Temperature Characteristic BJ:B/X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance [pF]	Capacitance tolerance [%]	tanδ [%]	Thickness [mm]	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK107 BJ102□A		B/X5R*1	1000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ152□A		B/X5R*1	1500	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ222□A		B/X5R*1	2200	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ332□A		B/X5R*1	3300	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ472□A		B/X5R*1	4700	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ682□A		B/X5R*1	6800	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ103□A		B/X5R*1	10000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ153□A		B/X5R*1	15000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ223□A		B/X5R*1	22000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ333□A		B/X5R*1	33000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 BJ104□A		B/X5R*1	100000	±10, ±20	3.5	0.8±0.1	R	200%		

Capacitance tolerance code is applied to □ of part number.
*1 We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic B7 : X7R, C7 : X7S】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance [pF]	Capacitance tolerance [%]	tanδ [%]	Thickness [mm]	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK107 B7102□A		X7R	1000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7152□A		X7R	1500	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7222□A		X7R	2200	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7332□A		X7R	3300	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7472□A		X7R	4700	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7682□A		X7R	6800	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7103□A		X7R	10000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7153□A		X7R	15000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7223□A		X7R	22000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 B7333□A		X7R	33000	±10, ±20	3.5	0.8±0.1	R	200%		
	HMK107 C7104□A		X7S	100000	±10, ±20	3.5	0.8±0.1	R	200%		

Capacitance tolerance code is applied to □ of part number.

●212TYPE

【Temperature Characteristic BJ : B/X5R】

・1.25mm thickness (G)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance [pF]	Capacitance tolerance [%]	tanδ [%]	Thickness [mm]	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK212 BJ103□G		B/X5R*1	10000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ153□G		B/X5R*1	15000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ223□G		B/X5R*1	22000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ333□G		B/X5R*1	33000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ473□G		B/X5R*1	47000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ683□G		B/X5R*1	68000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ104□G		B/X5R*1	100000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 BJ224□G		B/X5R*1	220000	±10, ±20	3.5	1.25±0.1	R	200%		
250V	QMK212 BJ472□G		B/X5R*1	4700	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 BJ682□G		B/X5R*1	6800	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 BJ103□G		B/X5R*1	10000	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 BJ153□G		B/X5R*1	15000	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 BJ223□G		B/X5R*1	22000	±10, ±20	2.5	1.25±0.1	R	150%		

・0.85mm thickness (D)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance [pF]	Capacitance tolerance [%]	tanδ [%]	Thickness [mm]	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
250V	QMK212 BJ102□D		B/X5R*1	1000	±10, ±20	2.5	0.85±0.1	R	150%		
	QMK212 BJ152□D		B/X5R*1	1500	±10, ±20	2.5	0.85±0.1	R	150%		
	QMK212 BJ222□D		B/X5R*1	2200	±10, ±20	2.5	0.85±0.1	R	150%		
	QMK212 BJ332□D		B/X5R*1	3300	±10, ±20	2.5	0.85±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.
*1 We may provide X7R for some itemes according to the individual specification.

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REPRESENTATIVE PART NUMBERS

【Temperature Characteristic　B7：X7R】
・1.25mm thickness（G）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK212 B7103□G		X7R	10000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7153□G		X7R	15000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7223□G		X7R	22000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7333□G		X7R	33000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7473□G		X7R	47000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7683□G		X7R	68000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7104□G		X7R	100000	±10, ±20	3.5	1.25±0.1	R	200%		
	HMK212 B7224□G		X7R	220000	±10, ±20	3.5	1.25±0.1	R	200%		
250V	QMK212 B7472□G		X7R	4700	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 B7682□G		X7R	6800	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 B7103□G		X7R	10000	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 B7153□G		X7R	15000	±10, ±20	2.5	1.25±0.1	R	150%		
	QMK212 B7223□G		X7R	22000	±10, ±20	2.5	1.25±0.1	R	150%		

・0.85mm thickness（D）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
250V	QMK212 B7102□D		X7R	1000	±10, ±20	2.5	0.85±0.1	R	150%		
	QMK212 B7152□D		X7R	1500	±10, ±20	2.5	0.85±0.1	R	150%		
	QMK212 B7222□D		X7R	2200	±10, ±20	2.5	0.85±0.1	R	150%		
	QMK212 B7332□D		X7R	3300	±10, ±20	2.5	0.85±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.

●316TYPE

【Temperature Characteristic　BJ：B/X5R】
・1.6mm thickness（L）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK316 BJ473□L		B/X5R*1	47000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ683□L		B/X5R*1	68000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ104□L		B/X5R*1	100000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ154□L		B/X5R*1	150000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ224□L		B/X5R*1	220000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ334□L		B/X5R*1	330000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ474□L		B/X5R*1	470000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 BJ105□L		B/X5R*1	1000000	±10, ±20	3.5	1.6±0.2	R	200%		
250V	QMK316 BJ333□L		B/X5R*1	33000	±10, ±20	2.5	1.6±0.2	R	150%		
	QMK316 BJ473□L		B/X5R*1	47000	±10, ±20	2.5	1.6±0.2	R	150%		
	QMK316 BJ683□L		B/X5R*1	68000	±10, ±20	2.5	1.6±0.2	R	150%		
	QMK316 BJ104□L		B/X5R*1	100000	±10, ±20	2.5	1.6±0.2	R	150%		
630V	SMK316 BJ153□L		B/X5R*1	15000	±10, ±20	2.5	1.6±0.2	R	120%		
	SMK316 BJ223□L		B/X5R*1	22000	±10, ±20	2.5	1.6±0.2	R	120%		

・1.15mm thickness（F）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
630V	SMK316 BJ102□F		B/X5R*1	1000	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 BJ152□F		B/X5R*1	1500	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 BJ222□F		B/X5R*1	2200	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 BJ332□F		B/X5R*1	3300	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 BJ472□F		B/X5R*1	4700	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 BJ682□F		B/X5R*1	6800	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 BJ103□F		B/X5R*1	10000	±10, ±20	2.5	1.15±0.1	R	120%		

Capacitance tolerance code is applied to □ of part number.
*1　We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic　B7：X7R】
・1.6mm thickness（L）

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK316 B7473□L		X7R	47000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7683□L		X7R	68000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7104□L		X7R	100000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7154□L		X7R	150000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7224□L		X7R	220000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7334□L		X7R	330000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7474□L		X7R	470000	±10, ±20	3.5	1.6±0.2	R	200%		
	HMK316 B7105□L		X7R	1000000	±10, ±20	3.5	1.6±0.2	R	200%		
250V	QMK316 B7333□L		X7R	33000	±10, ±20	2.5	1.6±0.2	R	150%		
	QMK316 B7473□L		X7R	47000	±10, ±20	2.5	1.6±0.2	R	150%		
	QMK316 B7683□L		X7R	68000	±10, ±20	2.5	1.6±0.2	R	150%		
	QMK316 B7104□L		X7R	100000	±10, ±20	2.5	1.6±0.2	R	150%		
630V	SMK316 B7153□L		X7R	15000	±10, ±20	2.5	1.6±0.2	R	120%		
	SMK316 B7223□L		X7R	22000	±10, ±20	2.5	1.6±0.2	R	120%		

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REPRESENTATIVE PART NUMBERS

・1.15mm thickness(F)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
630V	SMK316 B7102□F		X7R	1000	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 B7152□F		X7R	1500	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 B7222□F		X7R	2200	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 B7332□F		X7R	3300	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 B7472□F		X7R	4700	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 B7682□F		X7R	6800	±10, ±20	2.5	1.15±0.1	R	120%		
	SMK316 B7103□F		X7R	10000	±10, ±20	2.5	1.15±0.1	R	120%		

Capacitance tolerance code is applied to □ of part number.

●325TYPE

【Temperature Characteristic　BJ : B/X5R】

・1.9mm thickness(N)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK325 BJ154□N		B/X5R*1	150000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 BJ224□N		B/X5R*1	220000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 BJ334□N		B/X5R*1	330000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 BJ474□N		B/X5R*1	470000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 BJ684□N		B/X5R*1	680000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 BJ105□N		B/X5R*1	1000000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 BJ225□N		B/X5R*1	2200000	±10, ±20	3.5	1.9±0.2	R	200%		
250V	QMK325 BJ473□N		B/X5R*1	47000	±10, ±20	2.5	1.9±0.2	R	150%		
	QMK325 BJ104□N		B/X5R*1	100000	±10, ±20	2.5	1.9±0.2	R	150%		
	QMK325 BJ154□N		B/X5R*1	150000	±10, ±20	2.5	1.9±0.2	R	150%		
	QMK325 BJ224□N		B/X5R*1	220000	±10, ±20	2.5	1.9±0.2	R	150%		
630V	SMK325 BJ223□N		B/X5R*1	22000	±10, ±20	2.5	1.9±0.2	R	120%		
	SMK325 BJ333□N		B/X5R*1	33000	±10, ±20	2.5	1.9±0.2	R	120%		
	SMK325 BJ473□N		B/X5R*1	47000	±10, ±20	2.5	1.9±0.2	R	120%		

・1.15mm thickness(F)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK325 BJ104□F		B/X5R*1	100000	±10, ±20	3.5	1.15±0.1	R	200%		

Capacitance tolerance code is applied to □ of part number.

*1　We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic　B7 : X7R】

・1.9mm thickness(N)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK325 B7154□N		X7R	150000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 B7224□N		X7R	220000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 B7334□N		X7R	330000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 B7474□N		X7R	470000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 B7684□N		X7R	680000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 B7105□N		X7R	1000000	±10, ±20	3.5	1.9±0.2	R	200%		
	HMK325 B7225□N		X7R	2200000	±10, ±20	3.5	1.9±0.2	R	200%		
250V	QMK325 B7473□N		X7R	47000	±10, ±20	2.5	1.9±0.2	R	150%		
	QMK325 B7104□N		X7R	100000	±10, ±20	2.5	1.9±0.2	R	150%		
	QMK325 B7154□N		X7R	150000	±10, ±20	2.5	1.9±0.2	R	150%		
	QMK325 B7224□N		X7R	220000	±10, ±20	2.5	1.9±0.2	R	150%		
630V	SMK325 B7223□N		X7R	22000	±10, ±20	2.5	1.9±0.2	R	120%		
	SMK325 B7333□N		X7R	33000	±10, ±20	2.5	1.9±0.2	R	120%		
	SMK325 B7473□N		X7R	47000	±10, ±20	2.5	1.9±0.2	R	120%		

・1.15mm thickness(F)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK325 B7104□F		X7R	100000	±10, ±20	3.5	1.15±0.1	R	200%		

Capacitance tolerance code is applied to □ of part number.

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REPRESENTATIVE PART NUMBERS

●432TYPE

【Temperature Characteristic　BJ : B/X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK432 BJ474□M		B/X5R*1	470000	±10, ±20	3.5	2.5±0.2	R	200%		
	HMK432 BJ105□M		B/X5R*1	1000000	±10, ±20	3.5	2.5±0.2	R	200%		
	HMK432 BJ155□M		B/X5R*1	1500000	±10, ±20	3.5	2.5±0.2	R	200%		
	HMK432 BJ225□M		B/X5R*1	2200000	±10, ±20	3.5	2.5±0.2	R	200%		
250V	QMK432 BJ104□M		B/X5R*1	100000	±10, ±20	2.5	2.5±0.2	R	150%		
	QMK432 BJ224□M		B/X5R*1	220000	±10, ±20	2.5	2.5±0.2	R	150%		
	QMK432 BJ334□M		B/X5R*1	330000	±10, ±20	2.5	2.5±0.2	R	150%		
	QMK432 BJ474□M		B/X5R*1	470000	±10, ±20	2.5	2.5±0.2	R	150%		
630V	SMK432 BJ473□M		B/X5R*1	47000	±10, ±20	2.5	2.5±0.2	R	120%		
	SMK432 BJ683□M		B/X5R*1	68000	±10, ±20	2.5	2.5±0.2	R	120%		
	SMK432 BJ104□M		B/X5R*1	100000	±10, ±20	2.5	2.5±0.2	R	120%		

Capacitance tolerance code is applied to □ of part number.
*1　We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic　B7 : X7R】

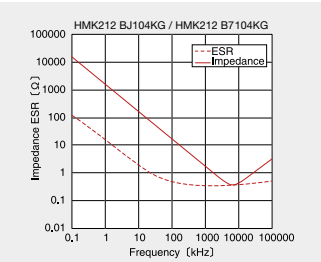
Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance (%)	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
100V	HMK432 B7474□M		X7R	470000	±10, ±20	3.5	2.5±0.2	R	200%		
	HMK432 B7105□M		X7R	1000000	±10, ±20	3.5	2.5±0.2	R	200%		
	HMK432 B7155□M		X7R	1500000	±10, ±20	3.5	2.5±0.2	R	200%		
	HMK432 B7225□M		X7R	2200000	±10, ±20	3.5	2.5±0.2	R	200%		
250V	QMK432 B7104□M		X7R	100000	±10, ±20	2.5	2.5±0.2	R	150%		
	QMK432 B7224□M		X7R	220000	±10, ±20	2.5	2.5±0.2	R	150%		
	QMK432 B7334□M		X7R	330000	±10, ±20	2.5	2.5±0.2	R	150%		
	QMK432 B7474□M		X7R	470000	±10, ±20	2.5	2.5±0.2	R	150%		
630V	SMK432 B7473□M		X7R	47000	±10, ±20	2.5	2.5±0.2	R	120%		
	SMK432 B7683□M		X7R	68000	±10, ±20	2.5	2.5±0.2	R	120%		
	SMK432 B7104□M		X7R	100000	±10, ±20	2.5	2.5±0.2	R	120%		

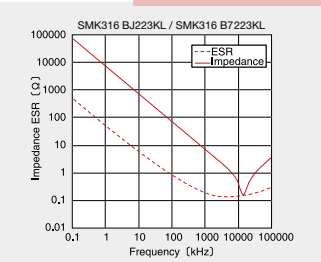
Capacitance tolerance code is applied to □ of part number.

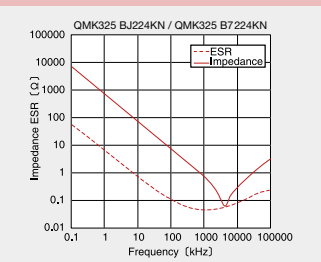
ELECTRICAL CHARACTERISTICS

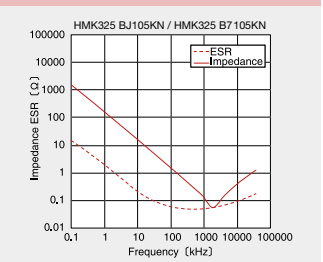
●Example of Impedance ESR vs. Frequency characteristics

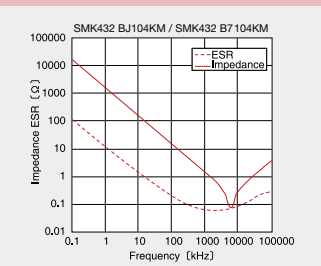
Taiyo Yuden medium-high voltage ceramic capacitor

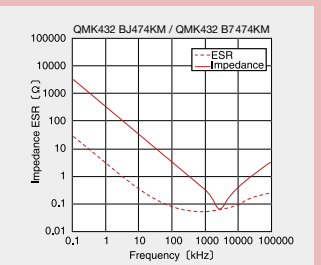




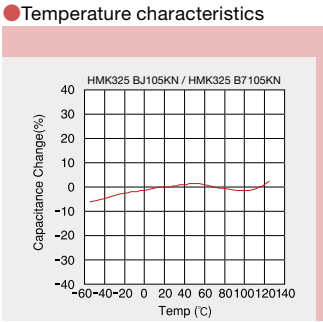








●Temperature characteristics



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Multilayer Ceramic Capacitors and Super Low Distortion Multilayer Ceramic Capacitors are noted separately.

Medium－High Voltage Multilayer Ceramic Capacitor

1. Operating Temperature Range

Specified Value	X7R, X7S：－55～＋125℃　X5R：－55～＋85℃　B：－25～＋85℃

2. Storage Temperature Range

Specified Value	X7R, X7S：－55～＋125℃　X5R：－55～＋85℃　B：－25～＋85℃

3. Rated Voltage

Specified Value	100VDC, 250VDC, 630VDC

4. Withstanding Voltage（Between terminals）

Specified Value	No breakdown or damage

【Test Methods and Remarks】
Applied voltage:Rated voltage×2.5（HMK）, Rated voltage×2（QMK）, Rated voltage×1.2（SMK）
Duration：1 to 5sec.
Charge/discharge current：50mA max.

5. Insulation Resistance

Specified Value	100MΩμF or 10GΩ, whichever is smaller.

【Test Methods and Remarks】
Applied voltage:Rated voltage（HMK, QMK）, 500V（SMK）
Duration：60±5sec.
Charge/discharge current：50mA max.

6. Capacitance（Tolerance）

Specified Value	±10%、±20%

【Test Methods and Remarks】
Measuring frequency:1kHz±10%
Measuring voltage:1±0.2Vrms
Bias application:None

7. Dissipation Factor

Specified Value	3.5%max（HMK） 2.5%max（QMK, SMK）

【Test Methods and Remarks】
Measuring frequency:1kHz±10%
Measuring voltage:1±0.2Vrms
Bias application:None

8. Temperature Characteristic of Capacitance

Specified Value	B：　±10%（－25～＋85℃） X5R：±15%（－55～＋85℃） X7R：±15%（－55～＋125℃） X7S：±22%（－55～＋125℃）

【Test Methods and Remarks】
Capacitance value at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.

Step	B	X5R、X7R、X7S
1	Minimum operating temperature	
2	20℃	25℃
3	Maximum operating temperature	

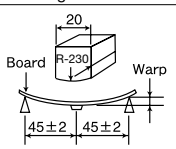
$$\frac{(C-C_2)}{C_2} \times 100(\%)$$

C　：Capacitance value in Step 1 or Step 3
C_2　：Capacitance value in Step 2

9. Deflection

Specified Value	Appearance:No abnormality Capacitance change:Within±10%

【Test Methods and Remarks】
Warp:1mm
Duration:10sec.
Test board:glass epoxy-resin substrate
Thickness:1.6mm
Capacitance measurement shall be conducted with the board bent.

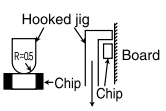


(Unit: mm)

10. Adhesive Strength of Terminal Electrodes

Specified Value	No terminal separation or its indication.

【Test Methods and Remarks】
Applied force:5N
Duration:30±5sec.



11. Solderability

Specified Value	At least 95% of terminal electrode is covered by new solder

【Test Methods and Remarks】

	Solder type	Solder temperature	Duration
Eutectic solder	H60A or H63A	230±5℃	4±1 sec.
Lead-free solder	Sn－3.0Ag－0.5Cu	245±3℃	

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12. Resistance to Soldering		
Specified Value	Appearance:	No abnormality
	Capacitance change:	Within±15%(HMK), ±10%(QMK, SMK)
	Dissipation factor :	Initial value
	Insulation resistance:	Initial value
	Withstanding voltage(between terminals):	No abnormality

【Test Methods and Remarks】
Preconditioning:Thermal treatment(at 150℃ for 1hr) Note1
Solder temperature:270±5℃
Duration:3±0.5sec.
Preheating conditions: 80 to 100℃, 2 to 5 min.
150 to 200℃, 2 to 5min.
Recovery : 24±2hrs under the standard condition Note3

13. Temperature Cycle(Thermal Shock)		
Specified Value	Appearance:	No abnormality
	Capacitance change:	Within±15%(HMK), ±7.5%(QMK, SMK)
	Dissipation factor:	Initial value
	Insulation resistance:	Initial value

【Test Methods and Remarks】
Preconditioning:Thermal treatment(at 150℃ for 1hr) Note1
Conditions for 1 cycle／ Step 1: Minimum operating temperature $^{+0}_{-3}$℃ 30±3min.
Step 2: Normal temperature 2 to 3min.
Step 3: Maximum operating temperature $^{+0}_{-3}$℃ 30±3min.
Step 4: Normal temperature 2 to 3min.
Number of cycles:5 times
Recovery : 24±2hrs under the standard condition Note3

14. Humidity(Steady state)		
Specified Value	Appearance:	No abnormality
	Capacitance change:	Within±15%
	Dissipation factor :	7%max(HMK), 5%max(QMK, SMK).
	Insulation resistance:	25MΩμF or 1000MΩ, whichever is smaller.

【Test Methods and Remarks】
Preconditioning:Thermal treatment(at 150℃ for 1hr) Note1
Temperature:40±2℃
Humidity : 90 to 95%RH
Duration: 500 $^{+24}_{-0}$ hrs
Recovery : 24±2hrs under the standard condition Note3

15. Humidity Loading		
Specified Value	Appearance:	No abnormality
	Capacitance change:	Within±15%
	Dissipation factor:	7%max(HMK), 5%max(QMK, SMK).
	Insulation resistance:	10MΩμF or 500MΩ, whichever is smaller.

【Test Methods and Remarks】
According to JIS 5102 clause 9.9.
Preconditioning:Voltage treatment Note2
Temperature:40±2℃
Humidity : 90 to 95%RH
Applied voltage:Rated voltage
Charge/discharge current : 50mA max.
Duration: 500 $^{+24}_{-0}$ hrs
Recovery : 24±2hrs under the standard condition Note3

16. High Temperature Loading		
Specified Value	Appearance:	No abnormality
	Capacitance change:	Within±15%
	Dissipation factor:	7%max(HMK), 5%max(QMK, SMK).
	Insulation resistance:	50MΩμF or 1000MΩ, whichever is smaller.

【Test Methods and Remarks】
According to JIS 5102 clause 9.10.
Preconditioning:Voltage treatment Note2
Temperature:125±3℃ (B7, C7), 85±2℃(BJ)
Applied voltage:Rated voltage×2(HMK)
Rated voltage×1.5(QMK)
Rated voltage×1.2(SMK)
Charge/discharge current : 50mA max.
Duration: 1000 $^{+24}_{-0}$ hrs
Recovery : 24±2hrs under the standard condition Note3

Note1 Thermal treatment : Initial value shall be measured after test sample is heat-treated at 150+0/−10℃ for an hour and kept at room temperature for 24±2hours.
Note2 Voltage treatment : Initial value shall be measured after test sample is voltage-treated for an hour at both the temperature and voltage specified in the test conditions, and kept at room temperature for 24±2hours.
Note3 Standard condition: Temperature: 5 to 35℃, Relative humidity: 45 to 85 % RH, Air pressure: 86 to 106kPa
When there are questions concerning measurement results, in order to provide correlation data, the test shall be conducted under the following condition.
Temperature: 20±2℃, Relative humidity: 60 to 70 % RH, Air pressure: 86 to 106kPa
Unless otherwise specified, all the tests are conducted under the "standard condition".

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LW REVERSAL DECOUPLING CAPACITORS (LWDC™)

REFLOW

FEATURES

- Low equivalent series resistance (ESR).
- Low equivalent series inductor (ESL).
- The effect of noise removal in the high frequency.
- Decreased ripple voltage.
- Small size with high capacitance.

APPLICATIONS

- Decoupling capacitors
- Filtering capacitors

PART NUMBER

J W K 2 1 2 △ B J 1 0 6 M D — T △

❶ Rated voltage〔VDC〕

A	4
J	6.3
L	10
E	16
T	25

❷ Series name

W	LW Reverse Type

❸ End termination

K	Plated

❹ Dimension

Type	(inch)	L×W〔mm〕
105	(0204)	0.52×1.0
107	(0306)	0.8×1.6
212	(0508)	1.25×2.0

❺ Dimension tolerance

△	Standard

△=Blank space

❻ Temperature characteristics code

BJ	B
	X5R
C6	X6S
C7	X7S
B7	X7R

❼ Nominal capacitance〔μF〕

example	
105	1.0
106	10.0

❽ Capacitance tolerance

K	±10%
M	±20%

❾ Thickness〔mm〕

P	0.3
V	0.5
D	0.85

❿ Special code

—	Standard

⓫ Packaging

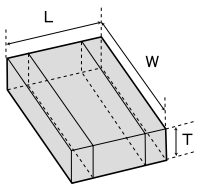
F	φ178mm Taping (2mm pitch) 0204 Type
T	φ178mm Taping (4mm pitch) 0306, 0508 Type

⓬ Internal code

△	Standard

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm]				Standard quantity [pcs]	
	L	W	T		Paper tape	Embossed tape
□WK105 (0204 inch)	0.52±0.05	1.00±0.05	0.30±0.05	P	10000	—
			0.50±0.05	V		
□WK107 (0306 inch)	0.80±0.10	1.60±0.10	0.50±0.05	V	—	4000
□WK212 (0508 inch)	1.25±0.15	2.00±0.15	0.85±0.10	D	4000	—

AVAILABLE CAPACITANCE RANGE

Cap [μF]	Type	105												107									212			
		X7S			X6S				X5R					X7R		X7S		X6S	X5R				X6S		X5R	
	VDC	10	6.3	4	16	10	6.3	4	25	16	10	6.3	4	25	16	6.3	4	4	25	16	10	6.3	6.3	4	10	6.3
	[3-digit]																									
0.10	104	P	P		P				P			P		V					V							
0.22	224		P	P		P				P			P		V					V						
0.47	474						P	P			P	P			V					V						
1.0	105						V	P,V			V	P,V				V					V	V				
2.2	225																V				V	V				
4.7	475																	V				V	D		D	
10	106																						D		D	
22	226																							D		D

※Letters in the table indicate thickness.

Temp.char.Code	Temperature characteristics					Capacitance tolerance〔%〕
	Applicable standard		Temperature range〔℃〕	Ref. Temp.〔℃〕	Capacitance change〔%〕	
BJ	JIS	B	−25～+85	20	±10	±10(K) ±20(M)
	EIA	X5R	−55～+85	25	±15	
C6	EIA	X6S	−55～+105	25	±22	
C7	EIA	X7S	−55～+125	25	±22	
B7	EIA	X7R	−55～+125	25	±15	

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REPRESENTATIVE PART NUMBERS

●105TYPE(0204 case size)

【Temperature Characteristic BJ:X5R】

・0.5mm thickness(V)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LWK105 BJ105MV		X5R	1	±20	10	0.5±0.05	R	150%		
6.3V	JWK105 BJ105MV		X5R*1	1	±20	10	0.5±0.05	R	150%		

・0.3mm thickness(P)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TWK105 BJ104MP		X5R	0.1	±20	5	0.3±0.05	R	150%		
16V	EWK105 BJ224MP		X5R	0.22	±20	10	0.3±0.05	R	150%		
10V	LWK105 BJ474MP		X5R	0.47	±20	10	0.3±0.05	R	150%		
6.3V	JWK105 BJ104MP		X5R*1	0.1	±20	5	0.3±0.05	R	150%		
	JWK105 BJ474MP		X5R*1	0.47	±20	10	0.3±0.05	R	150%		
	JWK105 BJ105MP		X5R	1	±20	10	0.3±0.05	R	150%		
4V	AWK105 BJ224MP		X5R*1	0.22	±20	10	0.3±0.05	R	150%		

*1 We may provide X6S/X7S for some itemes according to the individual specification.

【Temperature Characteristic C6:X6S C7:X7S】

・0.5mm thickness(V)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
6.3V	JWK105 C6105MV		X6S	1	±20	10	0.5±0.05	R	150%		
4V	AWK105 C6105MV		X6S	1	±20	10	0.5±0.05	R	150%		

・0.3mm thickness(P)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
16V	EWK105 C6104MP		X6S	0.1	±20	5	0.3±0.05	R	150%		
10V	LWK105 C7104MP		X7S	0.1	±20	10	0.3±0.05	R	150%		
	LWK105 C6224MP		X6S	0.22	±20	10	0.3±0.05	R	150%		
6.3V	JWK105 C7104MP		X7S	0.1	±20	5	0.3±0.05	R	150%		
	JWK105 C7224MP		X7S	0.22	±20	10	0.3±0.05	R	150%		
	JWK105 C6474MP		X6S	0.47	±20	10	0.3±0.05	R	150%		
4V	AWK105 C6224MP		X6S	0.22	±20	10	0.3±0.05	R	150%		
	AWK105 C6474MP		X6S	0.47	±20	10	0.3±0.05	R	150%		
	AWK105 C6105MP		X6S	1	±20	10	0.3±0.05	R	150%		

●107TYPE(0306 case size)

【Temperature Characteristic BJ:X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TWK107 BJ104MV		X5R	0.1	±20	5	0.5±0.05	R	150%		
16V	EWK107 BJ224MV		X5R	0.22	±20	5	0.5±0.05	R	150%		
	EWK107 BJ474MV		X5R	0.47	±20	5	0.5±0.05	R	150%		
10V	LWK107 BJ105MV		X5R	1	±20	10	0.5±0.05	R	150%		
	LWK107 BJ225MV		X5R	2.2	±20	10	0.5±0.05	R	150%		
6.3V	JWK107 BJ105MV		X5R*1	1	±20	10	0.5±0.05	R	150%		
	JWK107 BJ225MV		X5R	2.2	±20	10	0.5±0.05	R	150%		
	JWK107 BJ475MV		X5R	4.7	±20	10	0.5±0.05	R	150%		

*1 We may provide X7R/X7S for some itemes according to the individual specification.

【Temperature Characteristic B7:X7R C7:X7S C6:X6S】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	TWK107 B7104MV		X7R	0.1	±20	5	0.5±0.05	R	150%		
16V	EWK107 B7224MV		X7R	0.22	±20	5	0.5±0.05	R	150%		
	EWK107 B7474MV		X7R	0.47	±20	5	0.5±0.05	R	150%		
6.3V	JWK107 C7105MV		X7S	1	±20	10	0.5±0.05	R	150%		
4V	AWK107 C7225MV		X7S	2.2	±20	10	0.5±0.05	R	150%		
	AWK107 C6475MV		X6S	4.7	±20	10	0.5±0.05	R	150%		

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REPRESENTATIVE PART NUMBERS

●212TYPE(0508 case size)

【Temperature Characteristic BJ:X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	LWK212 BJ475□D		X5R	4.7	±10, ±20	10	0.85±0.1	R	150%		
	LWK212 BJ106MD		X5R	10	±20	10	0.85±0.1	R	150%		
6.3V	JWK212 BJ226MD		X5R	22	±20	10	0.85±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic C6:X6S】

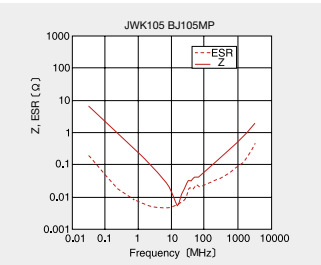
Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
6.3V	JWK212 C6475□D		X6S	4.7	±10, ±20	10	0.85±0.1	R	150%		
	JWK212 C6106MD		X6S	10	±20	10	0.85±0.1	R	150%		
4V	AWK212 C6226MD		X6S	22	±20	10	0.85±0.1	R	150%		

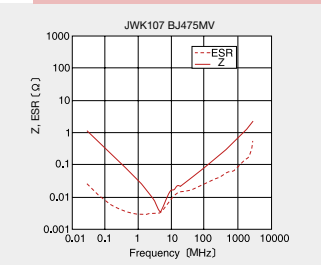
Capacitance tolerance code is applied to □ of part number.

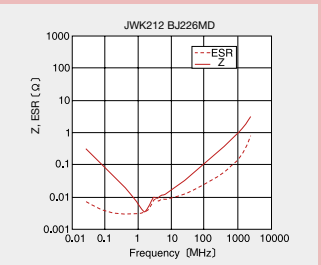
ELECTRICAL CHARACTERISTICS

●Example of Impedance ESR vs. Frequency characteristics

Taiyo Yuden multilayer ceramic capacitor







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ARRAY TYPE MULTILAYER CERAMIC CAPACITORS

REFLOW

FEATURES

- High density and high efficiency mounting.
- Internal electrodes are composed of nickel for improved cost performance and reliability.

APPLICATIONS

- General electronic equipment
- Communication equipment (cellular phone, wireless applications, etc.)

PART NUMBER

E 4 K 2 1 2 △ B J 1 0 4 M D — T △

❶ Rated voltage〔VDC〕

A	4
J	6.3
L	10
E	16
T	25
U	50

❷ Series name

2	2 circuits multilayer capacitor
4	4 circuits multilayer capacitor

❸ End termination

K	Plated

❹ Dimension

Type	(inch)	L×W[mm]
096	(0302)	0.9×0.6
110	(0504)	1.37×1.0
212	(0805)	2.0×1.25

❺ Dimension tolerance

△	Standard

△=Blank space

❻ Temperature characteristics code

BJ	B
	X5R
B7	X7R
CH	CH
	C0H

❼ Nominal capacitance〔pF〕

example	
104	100,000
105	1,000,000

❽ Capacitance tolerance

F	±1pF
K	±10%
M	±20%

❾ Thickness〔mm〕

P	0.3
K	0.45
V	0.5
B	0.6
A	0.8
D	0.85

❿ Special code

—	Standard

⓫ Packaging

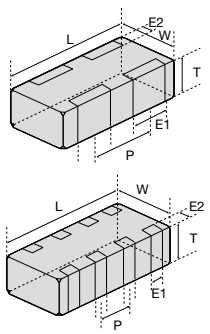
T	φ178mm Taping (4mm pitch) 0504, 0805 Type
F	φ178mm Taping (2mm pitch) 0302 Type

⓬ Internal code

△	Standard

△=Blank space

STANDARD EXTERNAL DIMENSIONS/STANDARD QUANTITY



Type	Dimension [mm]							Standard quantity [pcs]	
	L	W	E1	E2	P	T		Paper tape	Embossed tape
□2K096 (0302 inch)	0.9±0.05	0.6±0.05	0.23±0.10	0.125±0.075	0.45±0.05	P	0.30±0.03	10000	—
						K	0.45±0.05		
□2K110 (0504 inch)	1.37±0.07	1.00±0.08	0.36±0.10	0.2±0.10	0.64±0.10	V	0.50±0.05	4000	—
						B	0.60±0.06		
						A	0.80±0.08		
□2K212 (0805 inch)	2.00±0.10	1.25±0.10	0.50±0.20	0.25±0.15	1.00±0.10	D	0.85±0.10	4000	—
□4K212 (0805 inch)	2.00±0.10	1.25±0.10	0.25±0.10	0.25±0.15	0.50±0.10	D	0.85±0.10	4000	—

AVAILABLE CAPACITANCE RANGE

BJ/B7

Cap [μF]	Type	096 2 circuits □2K096			110 2 circuits □2K110										212 2 circuits □2K212		212 4circuits □4K212				
		B/X5R	X5R		X7R			B/X5R				X5R			B/X5R	X5R	X7R	B/X5R			X5R
	VDC	10V	6.3V	4V	50V	25V	16V	50V	25V	16V	10V	16V	10V	6.3V	25V	10V	16V	25V	16V	10V	10V
	[3-digit]																				
0.001	102				B			B													
0.0022	222				B			B													
0.0047	472				B			B													
0.01	103	P				B			B												
0.022	223					B			B												
0.047	473		K				B			B											
0.1	104		K				B		B	B							D	D	D		
0.22	224		K								B									D	
0.47	474		K								A									D	
1.0	105			K								A	A,V	V	D						D
2.2	225													A		D					

※Letters in the table indicate thickness.

CH

Cap [pF]	Type	096 2 circuits □2K096	110 2 circuits □2K110
		CH	CH
	VDC	25V	50V
	[3-digit]		
10	100	P	B
12	120	P	B
15	150	P	B
18	180	P	B
22	220	P	B
27	270	P	B
33	330	P	B
39	390	P	B
47	470	P	B
56	560	P	B
68	680	P	B
82	820	P	B
100	101	P	B

※Letters in the table indicate thickness.

Temp.char.Code	Temperature characteristics					Capacitance tolerance〔%〕
	Applicable standard		Temperature range〔℃〕	Ref. Temp.〔℃〕	Capacitance change	
BJ	JIS	B	−25～+85	20	±10〔%〕	±10 (K) ±20 (M)
	EIA	X5R	−55～+85	25	±15〔%〕	
B7	EIA	X7R	−55～+125	25	±15〔%〕	
CH	JIS	CH	−55～+125	20	±60〔ppm/℃〕	±10 (K)
	EIA	C0H	−55～+125	25	±60〔ppm/℃〕	

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REPRESENTATIVE PART NUMBERS

●096TYPE 2 circuits type

【Temperature Characteristic BJ : B/X5R】

・0.45mm thickness(K)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
6.3V	J2K096 BJ473□K		X5R	0.047	±10, ±20	5	0.45±0.05	R	150%		
	J2K096 BJ104□K		X5R	0.1	±10, ±20	5	0.45±0.05	R	150%		
	J2K096 BJ224MK		X5R	0.22	±20	10	0.45±0.05	R	150%		
	J2K096 BJ474MK		X5R	0.47	±20	10	0.45±0.05	R	150%		
4V	A2K096 BJ105MK		X5R	1	±20	10	0.45±0.05	R	150%		

・0.3mm thickness(P)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	L2K096 BJ103□P		B/X5R	0.01	±10, ±20	5	0.3±0.03	R	200%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic CH : CH/C0H】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	T2K096 CH100FP		CH/C0H	10	±1pF	600	0.3±0.03	R	200%		
	T2K096 CH120KP		CH/C0H	12	±10%	640	0.3±0.03	R	200%		
	T2K096 CH150KP		CH/C0H	15	±10%	700	0.3±0.03	R	200%		
	T2K096 CH180KP		CH/C0H	18	±10%	760	0.3±0.03	R	200%		
	T2K096 CH220KP		CH/C0H	22	±10%	840	0.3±0.03	R	200%		
	T2K096 CH270KP		CH/C0H	27	±10%	940	0.3±0.03	R	200%		
	T2K096 CH330KP		CH/C0H	33	±10%	1000	0.3±0.03	R	200%		
	T2K096 CH390KP		CH/C0H	39	±10%	1000	0.3±0.03	R	200%		
	T2K096 CH470KP		CH/C0H	47	±10%	1000	0.3±0.03	R	200%		
	T2K096 CH560KP		CH/C0H	56	±10%	1000	0.3±0.03	R	200%		
	T2K096 CH680KP		CH/C0H	68	±10%	1000	0.3±0.03	R	200%		
	T2K096 CH820KP		CH/C0H	82	±10%	1000	0.3±0.03	R	200%		
	T2K096 CH101KP		CH/C0H	100	±10%	1000	0.3±0.03	R	200%		

Capacitance tolerance code is applied to □ of part number.

●110TYPE 2 circuits type

【Temperature Characteristic BJ : B/X5R】

・0.8mm thickness(A)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
16V	E2K110 BJ105□A		X5R	1	±10, ±20	10	0.8±0.08	R	150%		
10V	L2K110 BJ474□A		B/X5R	0.47	±10, ±20	5	0.8±0.08	R	200%		
	L2K110 BJ105□A		X5R	1	±10, ±20	10	0.8±0.08	R	150%		
6.3V	J2K110 BJ225□A		X5R	2.2	±10, ±20	10	0.8±0.08	R	150%		

・0.6mm thickness(B)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	U2K110 BJ102□B		B/X5R*1	0.001	±10, ±20	3.5	0.6±0.06	R	200%		
	U2K110 BJ222□B		B/X5R*1	0.0022	±10, ±20	3.5	0.6±0.06	R	200%		
	U2K110 BJ472□B		B/X5R*1	0.0047	±10, ±20	3.5	0.6±0.06	R	200%		
25V	T2K110 BJ103□B		B/X5R*1	0.01	±10, ±20	3.5	0.6±0.06	R	200%		
	T2K110 BJ223□B		B/X5R*1	0.022	±10, ±20	3.5	0.6±0.06	R	200%		
	T2K110 BJ104□B		B/X5R	0.1	±10, ±20	5	0.6±0.06	R	200%		
16V	E2K110 BJ473□B		B/X5R*1	0.047	±10, ±20	3.5	0.6±0.06	R	200%		
	E2K110 BJ104□B		B/X5R*1	0.1	±10, ±20	5	0.6±0.06	R	200%		
10V	L2K110 BJ224□B		B/X5R	0.22	±10, ±20	5	0.6±0.06	R	200%		

・0.5mm thickness(V)

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
10V	L2K110 BJ105MV		X5R	1	±20	10	0.5±0.05	R	150%		
6.3V	J2K110 BJ105□V		X5R	1	±10, ±20	10	0.5±0.05	R	150%		

Capacitance tolerance code is applied to □ of part number.

*1 We may provide X7R for some itemes according to the individual specification.

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REPRESENTATIVE PART NUMBERS

【Temperature Characteristic　B7 : X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	U2K110 B7102□B		X7R	0.001	±10, ±20	3.5	0.6±0.06	R	200%		
	U2K110 B7222□B		X7R	0.0022	±10, ±20	3.5	0.6±0.06	R	200%		
	U2K110 B7472□B		X7R	0.0047	±10, ±20	3.5	0.6±0.06	R	200%		
25V	T2K110 B7103□B		X7R	0.01	±10, ±20	3.5	0.6±0.06	R	200%		
	T2K110 B7223□B		X7R	0.022	±10, ±20	3.5	0.6±0.06	R	200%		
16V	E2K110 B7473□B		X7R	0.047	±10, ±20	3.5	0.6±0.06	R	200%		
	E2K110 B7104□B		X7R	0.1	±10, ±20	5	0.6±0.06	R	200%		

Capacitance tolerance code is applied to □ of part number.

【Temperature Characteristic　CH : CH/C0H】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (pF)	Capacitance tolerance	Q	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
50V	U2K110 CH100FB		CH/C0H	10	±1pF	600	0.6±0.06	R	200%		
	U2K110 CH120KB		CH/C0H	12	±10%	640	0.6±0.06	R	200%		
	U2K110 CH150KB		CH/C0H	15	±10%	700	0.6±0.06	R	200%		
	U2K110 CH180KB		CH/C0H	18	±10%	760	0.6±0.06	R	200%		
	U2K110 CH220KB		CH/C0H	22	±10%	840	0.6±0.06	R	200%		
	U2K110 CH270KB		CH/C0H	27	±10%	940	0.6±0.06	R	200%		
	U2K110 CH330KB		CH/C0H	33	±10%	1000	0.6±0.06	R	200%		
	U2K110 CH390KB		CH/C0H	39	±10%	1000	0.6±0.06	R	200%		
	U2K110 CH470KB		CH/C0H	47	±10%	1000	0.6±0.06	R	200%		
	U2K110 CH560KB		CH/C0H	56	±10%	1000	0.6±0.06	R	200%		
	U2K110 CH680KB		CH/C0H	68	±10%	1000	0.6±0.06	R	200%		
	U2K110 CH820KB		CH/C0H	82	±10%	1000	0.6±0.06	R	200%		
	U2K110 CH101KB		CH/C0H	100	±10%	1000	0.6±0.06	R	200%		

●212TYPE　2 circuits type

【Temperature Characteristic　BJ : B/X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	T2K212 BJ105□D		B/X5R	1	±10, ±20	5	0.85±0.1	R	200%		
10V	L2K212 BJ225MD		X5R	2.2	±20	10	0.85±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.

●212TYPE　4 circuits type

【Temperature Characteristic　BJ : B/X5R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
25V	T4K212 BJ104□D		B/X5R	0.1	±10, ±20	5	0.85±0.1	R	200%		
16V	E4K212 BJ104□D		B/X5R*1	0.1	±10, ±20	5	0.85±0.1	R	200%		
10V	L4K212 BJ224□D		B/X5R	0.22	±10, ±20	5	0.85±0.1	R	200%		
	L4K212 BJ474□D		B/X5R	0.47	±10, ±20	5	0.85±0.1	R	200%		
	L4K212 BJ105□D		X5R	1	±10, ±20	10	0.85±0.1	R	150%		

Capacitance tolerance code is applied to □ of part number.
*1　We may provide X7R for some itemes according to the individual specification.

【Temperature Characteristic　B7 : X7R】

Rated voltage	Part number 1	Part number 2	Temp. char.	Capacitance (μF)	Capacitance tolerance	tanδ (%)	Thickness (mm)	Soldering R:Reflow W:Wave	HALT % Rated voltage	Internal code (P/N 1)	Note
16V	E4K212 B7104□D		X7R	0.1	±10, ±20	5	0.85±0.1	R	200%		

Capacitance tolerance code is applied to □ of part number.

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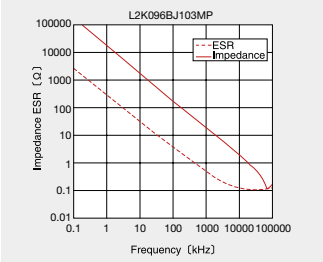
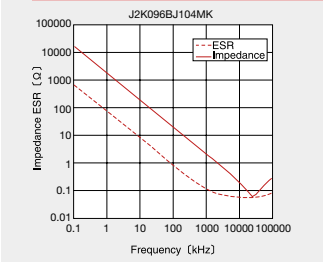
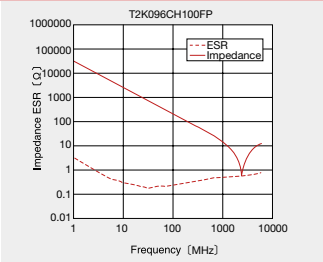
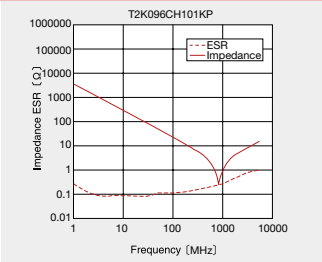
●Example of Impedance ESR vs. Frequency characteristics

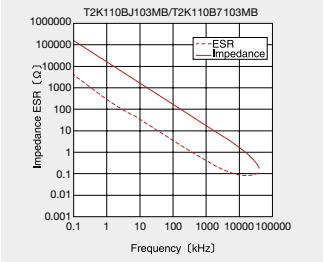
Taiyo Yuden multilayer ceramic capacitor

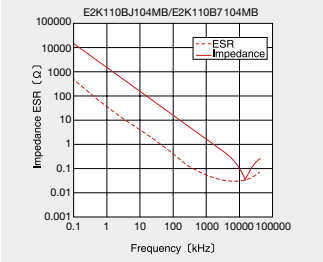


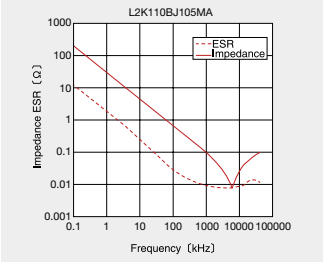


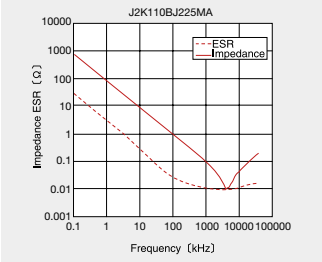


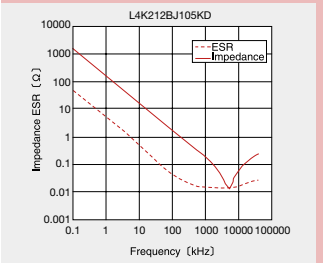












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PACKAGING

①Minimum Quantity

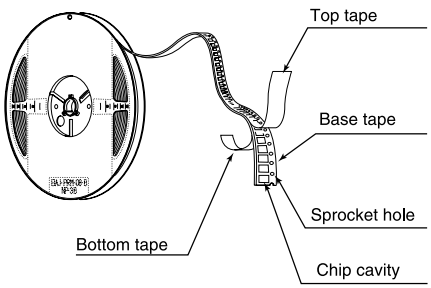
● Taped package

Type	Thickness		Standard quantity [pcs]	
	mm	code	Paper tape	Embossed tape
□MK042	0.2	C	—	40000
□MK063	0.3	P,T	15000	—
□2K096	0.3	P	10000	
	0.45	K		
□WK105	0.3	P		
	0.5	V		
□MK105	0.2	C	20000	
	0.3	P	15000	
	0.5	V, W	10000	
□VK105	0.5	W		
□MK107 □WK107	0.45	K	4000	
	0.5	V	—	4000
	0.8	A	4000	—
□2K110	0.5	V		
	0.6	B		
	0.8	A		
□MK212 □WK212	0.45	K		
	0.85	D		
	1.25	G	—	3000
□4K212	0.85	D	4000	—
□2K212	0.85	D		
□MK316	0.85	D		
	1.15	F	—	3000
	1.25	G		
	1.6	L		2000
□MK325	0.85	D	—	
	1.15	F		
	1.9	N		
	2.0max	Y		
	2.5	M		500(T), 1000(P)
□MK432	2.5	M	—	500

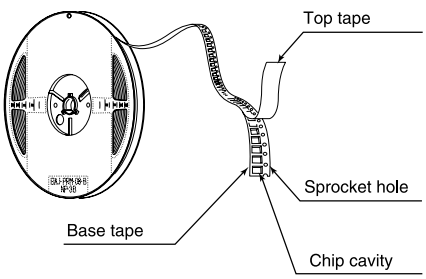
②Taping material

※No bottom tape for pressed carrier tape

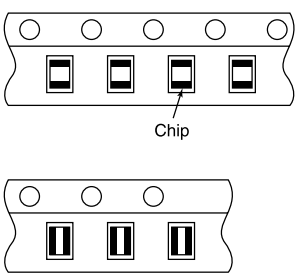
● Paper tape



● Embossed tape



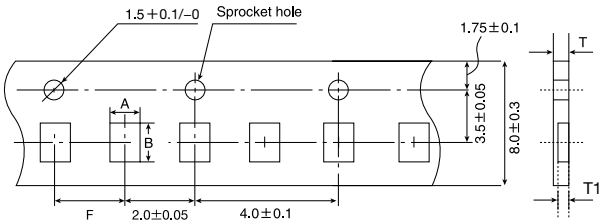
● Chip filled



③Representative taping dimensions

● Paper Tape (8mm wide)

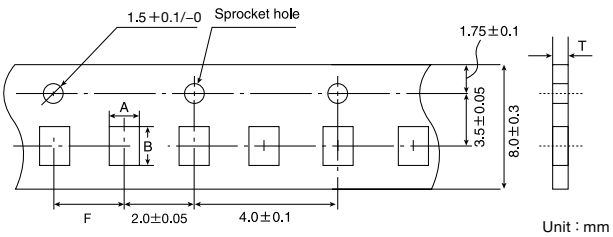
● Pressed carrier tape (2mm pitch)



Unit : mm

Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	T	T1
□MK063	0.37	0.67	2.0±0.05	0.45max.	0.42max.
□WK105	0.65	1.15		0.45max.	0.42max.

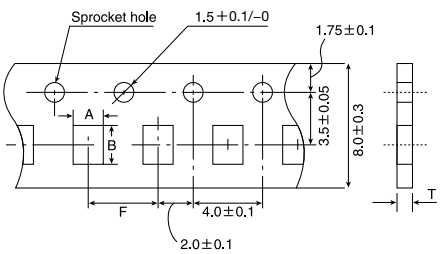
● Punched carrier tape (2mm pitch)



Unit : mm

Type	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
□2K096	0.72	1.02	2.0±0.05	0.45max. 0.6max.
□MK105 □VK105	0.65	1.15		0.8max.

● Punched carrier tape (4mm pitch)



Unit : mm

Type	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
□MK107 □WK107	1.0	1.8	4.0±0.1	1.1max.
□2K110	1.15	1.55		1.0max.
□MK212 □WK212	1.65	2.4		1.1max.
□4K212 □2K212				
□MK316	2.0	3.6		

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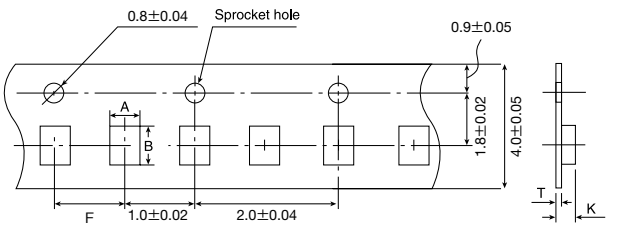
PACKAGING

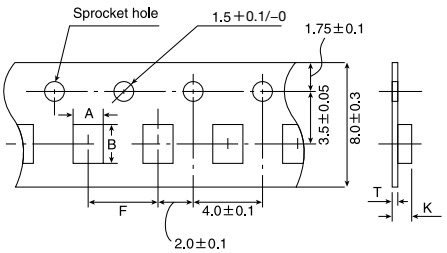
● Embossed tape (4mm wide)



Unit : mm

Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□MK042	0.23	0.43	1.0±0.02	0.5max.	0.25max.

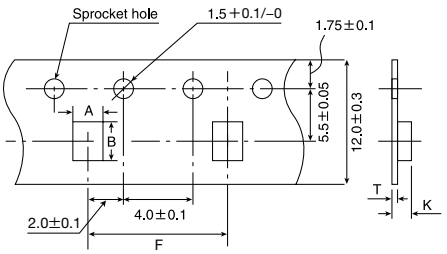
● Embossed tape (8mm wide)



Unit : mm

Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□WK107	1.0	1.8	4.0±0.1	1.3max	0.25±0.1
□MK212	1.65	2.4		3.4max.	0.6max.
□MK316	2.0	3.6			
□MK325	2.8	3.6			

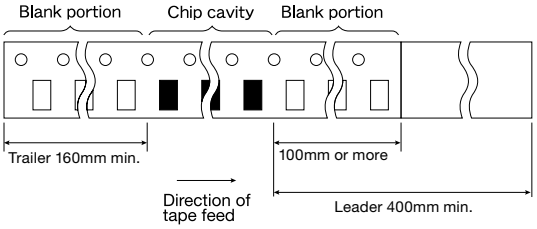
● Embossed tape (12mm wide)



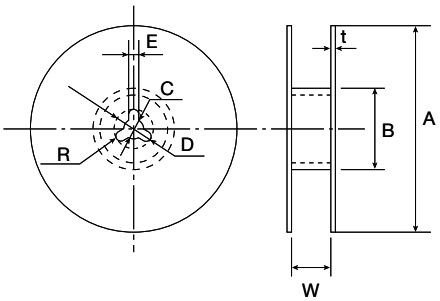
Unit : mm

Type	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□MK432	3.7	4.9	8.0±0.1	4.0max.	0.6max.

④Trailer and Leader



⑤Reel size



Unit : mm

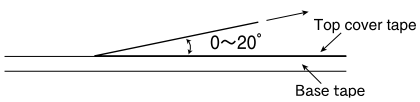
A	B	C
φ178±2.0	φ50min.	φ13.0±0.2

D	E	R
φ21.0±0.8	2.0±0.5	1.0

	t	W
4mm wide tape	1.5max.	5±1.0
8mm wide tape	2.5max.	10±1.5
12mm wide tape	2.5max.	14±1.5

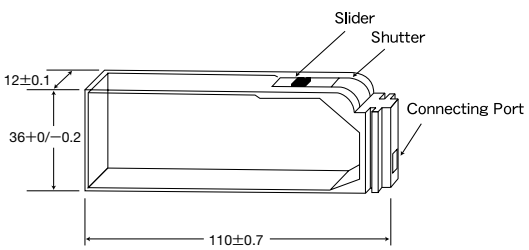
⑥Top Tape Strength

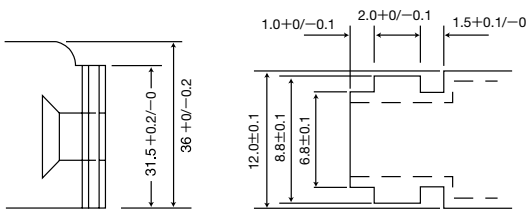
The top tape requires a peel-off force of 0.1 to 0.7N in the direction of the arrow as illustrated below.



⑦Bulk Cassette

The exchange of individual specification is necessary.
Please contact Taiyo Yuden sales channels.





Unit : mm

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Multilayer Ceramic Capacitors

Super Low Distortion Multilayer Ceramic Capacitors and Medium-High Voltage Multilayer Ceramic Capacitors are noted separately.

1.Operating Temperature Range

Specified Value	Temperature Compensating (Class 1)	Standard	−55 to +125℃
		High Frequency Type	
	High Permittivity (Class 2)		

	Specification	Temperature Range
BJ	B	−25 to +85℃
	X5R	−55 to +85℃
B7	X7R	−55 to +125℃
C6	X6S	−55 to +105℃
C7	X7S	−55 to +125℃
F	F	−25 to +85℃
	Y5V	−30 to +85℃

2. Storage Conditions

Specified Value	Temperature Compensating (Class 1)	Standard	−55 to +125℃
		High Frequency Type	
	High Permittivity (Class 2)		

	Specification	Temperature Range
BJ	B	−25 to +85℃
	X5R	−55 to +85℃
B7	X7R	−55 to +125℃
C6	X6S	−55 to +105℃
C7	X7S	−55 to +125℃
F	F	−25 to +85℃
	Y5V	−30 to +85℃

3. Rated Voltage

Specified Value	Temperature Compensating (Class 1)	Standard	50VDC, 25VDC, 16VDC
		High Frequency Type	50VDC, 16VDC
	High Permittivity (Class 2)		50VDC, 35VDC, 25VDC, 16VDC, 10VDC, 6.3VDC, 4VDC

4. Withstanding Voltage (Between terminals)

Specified Value	Temperature Compensating (Class 1)	Standard	No breakdown or damage
		High Frequency Type	
	High Permittivity (Class 2)		

【Test Methods and Remarks】

	Class 1	Class 2
Applied voltage	Rated voltage×3	Rated voltage×2.5
Duration	1 to 5 sec.	
Charge/discharge current	50mA max.	

5. Insulation Resistance

Specified Value	Temperature Compensating (Class 1)	Standard	10000 MΩ min.
		High Frequency Type	
	High Permittivity (Class 2) Note 1		C≦0.047μF : 10000 MΩ min. C>0.047μF : 500MΩ・μF

【Test Methods and Remarks】
Applied voltage: Rated voltage
Duration: 60±5 sec.
Charge/discharge current: 50mA max.

6. Capacitance (Tolerance)

Specified Value	Temperature Compensating (Class 1)	Standard	C△ U△: 0.5pF≦C≦5pF : ±0.25pF; 0.5pF<C≦10pF : ±0.5pF; C>10pF : ±5% RH S△ T△: 0.5pF≦C≦2pF : ±0.1pF; C>2pF : ±5%
		High Frequency Type	CH RH: 0.5pF≦C≦2pF : ±0.1pF; C>2pF : ±5%
	High Permittivity (Class 2)		BJ, B7, C6,C7 : ±10% or ±20%, F : −20%／+80%

【Test Methods and Remarks】

	Class 1		Class 2	
	Standard	High Frequency Type	C≦10μF	C>10μF
Preconditioning	None		Thermal treatment (at 150℃ for 1hr) Note 2	
Measuring frequency	1MHz±10%		1kHz±10%	120±10Hz
Measuring voltage Note 1	0.5 to 5Vrms		1±0.2Vrms	0.5±0.1Vrms
Bias application	None			

7. Q or Dissipation Factor

Specified Value	Temperature Compensating (Class 1)	Standard	C<30 pF : Q≧400+20C、C≧30 pF : Q≧1000 (C : Nominal capacitance)
		High Frequency Type	Refer to detailed specification
	High Permittivity (Class 2) Note 1		BJ, B7, C6,C7 : 2.5% max., F : 7% max.

【Test Methods and Remarks】

	Class 1		Class 2	
	Standard	High Frequency Type	C≦10μF	C>10μF
Preconditioning	None		Thermal treatment (at 150℃ for 1hr) Note 2	
Measuring frequency	1MHz±10%	1GHz	1kHz±10%	120±10Hz
Measuring voltage Note 1	0.5 to 5Vrms		1±0.2Vrms	0.5±0.1Vrms
Bias application	None			

High Frequency Type
Measuring equipment: HP4291A
Measuring jig: HP16192A

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8. Temperature Characteristic (Without voltage application)

Specified Value

Temperature Compensating (Class 1) — Standard / High Frequency Type

Temperature Characteristic [ppm/℃]		Tolerance
C□ : 0	CH, CJ, CK	H±60 J±120 K±250
R□ : −220	RH	
S□ : −330	SH, SJ, SK	
T□ : −470	TJ, TK	
U□ : −750	UJ, UK	
SL : +350 to −1000		

High Permittivity (Class 2)

	Specification	Capacitance change	Reference temperature	Temperature Range
BJ	B	±10%	20℃	−25 to +85℃
	X5R	±15%	25℃	−55 to +85℃
B7	X7R	±15%	25℃	−55 to +125℃
C6	X6S	±22%	25℃	−55 to +105℃
C7	X7S	±22%	25℃	−55 to +125℃
F	F	+30/−80%	20℃	−25 to +85℃
	Y5V	+22/−82%	25℃	−30 to +85℃

【Test Methods and Remarks】

Class 1

Capacitance at 20℃ and 85℃ shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.

$$\frac{(C_{85}-C_{20})}{C_{20}\times\triangle T}\times 10^6\ (\text{ppm/℃}) \qquad \triangle T=65$$

Class 2

Capacitance at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.

Step	B、F	X5R、X7R、X6S、X7S、Y5V
1	Minimum operating temperature	
2	20℃	25℃
3	Maximum operating temperature	

$$\frac{(C-C_2)}{C_2}\times 100\ (\%)$$

C : Capacitance in Step 1 or Step 3

C_2 : Capacitance in Step 2

9. Deflection

Specified Value

Temperature Compensating (Class 1) — Standard	Appearance :	No abnormality
	Capacitance change :	Within ±5% or ±0.5 pF, whichever is larger.
Temperature Compensating (Class 1) — High Frequency Type	Appearance :	No abnormality
	Capacitance change :	Within±0.5 pF
High Permittivity (Class 2)	Appearance :	No abnormality
	Capacitance change :	Within ±12.5% (BJ, B7, C6, C7), Within ±30% (F)

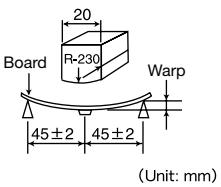
【Test Methods and Remarks】

Multilayer Ceramic Capacitors

	Board	Thickness	Warp	Duration
042、063 Type	glass epoxy-resin substrate	0.8mm	1mm	10 sec.
The other types		1.6mm		

Array Type

	Board	Thickness	Warp	Duration
096、110、212 Type	glass epoxy-resin substrate	1.6mm	1mm	10 sec.



Capacitance measurement shall be conducted with the board bent

10. Body Strength

Specified Value

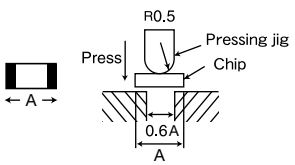
Temperature Compensating (Class 1)	Standard	—
	High Frequency Type	No mechanical damage.
High Permittivity (Class 2)		—

【Test Methods and Remarks】

High Frequency Type

Applied force: 5N

Duration: 10 sec.



11. Adhesive Strength of Terminal Electrodes

Specified Value

Temperature Compensating (Class 1)	Standard	No terminal separation or its indication.
	High Frequency Type	
High Permittivity (Class 2)		

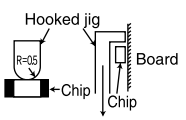
【Test Methods and Remarks】

Multilayer Ceramic Capacitors

	Applied force	Duration
042、063 Type	2N	30±5 sec.
105 Type or more	5N	

Array Type

	Applied force	Duration
096 Type	2N	30±5 sec.
110、212 Type	5N	



12. Solderability

Specified Value

Temperature Compensating (Class 1)	Standard	At least 95% of terminal electrode is covered by new solder.
	High Frequency Type	
High Permittivity (Class 2)		

【Test Methods and Remarks】

	Solder type	Solder temperature	Duration
Eutectic solder	H60A or H63A	230±5℃	4±1 sec.
Lead-free solder	Sn-3.0Ag−0.5Cu	245±3℃	

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13. Resistance to Soldering

Specified Value	Temperature Compensating (Class 1)	Standard	Appearance: No abnormality Capacitance change: Within ±2.5% or ±0.25pF, whichever is larger. Q: Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality
		High Frequency Type	Appearance: No abnormality Capacitance change: Within ±2.5% Q: Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality
	High Permittivity (Class 2) Note 1		Appearance: No abnormality Capacitance change: Within ±7.5% (BJ, B7, C6, C7) Within ±20% (F) Dissipation factor: Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality

【Test Methods and Remarks】

Class 1

	042, 063 Type	105 Type Array (096, 110 Type)
Preconditioning	None	
Preheating	150℃, 1 to 2 min.	80 to 100℃, 2 to 5 min. 150 to 200℃, 2 to 5 min.
Solder temp.	270±5℃	
Duration	3±0.5 sec.	
Recovery	6 to 24 hrs (Standard condition) Note 5	

Class 2

	042、063 Type	105, 107, 212 Type Array (096, 110,212 Type)	316, 325 Type
Preconditioning	Thermal treatment (at 150℃ for 1 hr) Note 2		
Preheating	150℃, 1 to 2 min.	80 to 100℃, 2 to 5 min. 150 to 200℃, 2 to 5 min.	80 to 100℃, 5 to 10 min. 150 to 200℃, 5 to 10 min.
Solder temp.	270±5℃		
Duration	3±0.5 sec.		
Recovery	24±2 hrs (Standard condition) Note 5		

14. Temperature Cycle (Thermal Shock)

Specified Value	Temperature Compensating (Class 1)	Standard	Appearance: No abnormality Capacitance change: Within ±2.5% or ±0.25pF, whichever is larger. Q: Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality
		High Frequency Type	Appearance: No abnormality Capacitance change: Within ±0.25pF Q: Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality
	High Permittivity (Class 2) Note 1		Appearance: No abnormality Capacitance change: Within ±7.5% (BJ, B7, C6, C7) Within ±20% (F) Dissipation factor: Initial value Insulation resistance: Initial value Withstanding voltage (between terminals): No abnormality

【Test Methods and Remarks】

	Class 1	Class 2
Preconditioning	None	Thermal treatment (at 150℃ for 1 hr) Note 2
1 cycle		

Step	Temperature (℃)	Time (min.)
1	Lowest operating temperature +0/−3	30±3
2	Normal temperature	2 to 3
3	Highest operating temperature +0/−3	30±3
4	Normal temperature	2 to 3

Number of cycles	5 times	
Recovery	6 to 24 hrs (Standard condition) Note 5	24±2 hrs (Standard condition) Note 5

15. Humidity (Steady State)

Specified Value	Temperature Compensating (Class 1)	Standard	Appearance: No abnormality Capacitance change: Within ±5% or ±0.5pF, whichever is larger. Q: C<10pF: Q≧200+10C 10≦C<30pF: Q≧275+2.5C C≧30pF: Q≧350 (C: Nominal capacitance) Insulation resistance: 1000 MΩ min.
		High Frequency Type	Appearance: No abnormality Capacitance change: Within ±0.5pF, Insulation resistance: 1000 MΩ min.
	High Permittivity (Class 2) Note 1		Appearance: No abnormality Capacitance change: Within ±12.5% (BJ, B7, C6, C7) Within ±30% (F) Dissipation factor: 5.0% max. (BJ, B7, C6, C7) 11.0% max. (F) Insulation resistance: 50 MΩμF or 1000 MΩ whichever is smaller.

【Test Methods and Remarks】

Class 1

	Standard	High Frequency Type
Preconditioning	None	
Temperature	40±2℃	60±2℃
Humidity	90 to 95%RH	
Duration	500+24/−0 hrs	
Recovery	6 to 24 hrs (Standard condition) Note 5	

Class 2

	All items
Preconditioning	Thermal treatment (at 150℃ for 1 hr) Note 2
Temperature	40±2℃
Humidity	90 to 95%RH
Duration	500+24/−0 hrs
Recovery	24±2 hrs (Standard condition) Note 5

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16. Humidity Loading

Specified Value	Temperature Compensating (Class 1)	Standard	Appearance: No abnormality Capacitance change: Within ±7.5% or ±0.75pF, whichever is larger. Q : C<30pF : Q≧100+10C/3 C≧30pF : Q≧200 (C : Nominal capacitance) Insulation resistance: 500 MΩ min.
		High Frequency Type	Appearance: No abnormality Capacitance change: C≦2pF : Within ±0.4 pF C>2pF : Within ±0.75 pF (C : Nominal capacitance) Insulation resistance: 500 MΩ min.
	High Permittivity (Class 2) Note 1		Appearance: No abnormality Capacitance change: Within ±12.5% (BJ, B7, C6, C7) Within ±30% (F) Dissipation factor : 5.0% max. (BJ, B7, C6, C7) 11.0% max. (F) Insulation resistance: 25 MΩμF or 500 MΩ, whichever is smaller.

【Test Methods and Remarks】

Class 1

	Standard	High Frequency Type
Preconditioning	None	
Temperature	40±2℃	60±2℃
Humidity	90 to 95%RH	
Duration	500+24/−0 hrs	
Applied voltage	Rated voltage	
Charge/discharge current	50mA max.	
Recovery	6 to 24 hrs (Standard condition) Note 5	

Class 2

	All items
Preconditioning	Voltage treatment (Rated voltage are applied for 1 hour at 40℃) Note 3
Temperature	40±2℃
Humidity	90 to 95%RH
Duration	500+24/−0 hrs
Applied voltage	Rated voltage
Charge/discharge current	50mA max.
Recovery	24±2 hrs (Standard condition) Note 5

17. High Temperature Loading

Specified Value	Temperature Compensating (Class 1)	Standard	Appearance: No abnormality Capacitance change: Within ±3% or ±0.3pF, whichever is larger. Q : C<10pF : Q≧200+10C 10≦C<30pF : Q≧275+2.5C C≧30pF : Q≧350 (C : Nominal capacitance) Insulation resistance: 1000 MΩ min.
		High Frequency Type	Appearance: No abnormality Capacitance change: Within ±3% or ±0.3pF, whichever is larger. Insulation resistance: 1000 MΩ min.
	High Permittivity (Class 2) Note 1		Appearance: No abnormality Capacitance change: Within ±12.5% (BJ, B7, C6, C7) Within ±30% (F) Dissipation factor : 5.0% max. (BJ, B7, C6, C7) 11.0% max. (F) Insulation resistance: 50 MΩμF or 1000 MΩ, whichever is smaller.

【Test Methods and Remarks】

Class 1

	Standard	High Frequency Type
Preconditioning	None	
Temperature	125±3℃	
Duration	1000+48/−0 hrs	
Applied voltage	Rated voltage×2	
Charge/discharge current	50mA max.	
Recovery	6 to 24hr (Standard condition) Note 5	

Class 2

	BJ, F	C6	B7, C7
Preconditioning	Voltage treatment (Twice the rated voltage shall be applied for 1 hour at 85℃, 105℃ or 125℃) Note 3, 4		
Temperature	85±2℃	105±3℃	125±3℃
Duration	1000+48/−0 hrs		
Applied voltage	Rated voltage×2 Note 4		
Charge/discharge current	50mA max.		
Recovery	24±2 hrs (Standard condition) Note 5		

Note 1 The figures indicate typical specifications. Please refer to individual specifications in detail.
Note 2 Thermal treatment : Initial value shall be measured after test sample is heat-treated at 150+0/−10℃ for an hour and kept at room temperature for 24±2hours.
Note 3 Voltage treatment : Initial value shall be measured after test sample is voltage-treated for an hour at both the temperature and voltage specified in the test conditions, and kept at room temperature for 24±2hours.
Note 4 Standard condition: Temperature: 5 to 35℃, Relative humidity: 45 to 85 % RH, Air pressure: 86 to 106kPa
When there are questions concerning measurement results, in order to provide correlation data, the test shall be conducted under the following condition.
Temperature: 20±2℃, Relative humidity: 60 to 70 % RH, Air pressure: 86 to 106kPa
Unless otherwise specified, all the tests are conducted under the "standard condition".

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PRECAUTIONS

Precautions on the use of Multilayer Ceramic Capacitors

1. Circuit Design

Precautions

◆Verification of operating environment, electrical rating and performance

1. A malfunction of equipment in fields such as medical, aerospace, nuclear control, etc. may cause serious harm to human life or have severe social ramifications. Therefore, any capacitors to be used in such equipment may require higher safety and reliability, and shall be clearly differentiated from them used in general purpose applications.

◆Operating Voltage (Verification of Rated voltage)

1. The operating voltage for capacitors must always be their rated voltage or less.
   If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages shall be the rated voltage or less.
   For a circuit where an AC or a pulse voltage may be used, the sum of their peak voltages shall also be the rated voltage or less.
2. Even if an applied voltage is the rated voltage or less reliability of capacitors may be deteriorated in case that either a high frequency AC voltage or a pulse voltage having rapid rise time is used in a circuit.

2. PCB Design

Precautions

◆Pattern configurations (Design of Land-patterns)

1. When capacitors are mounted on PCBs, the amount of solder used (size of fillet) can directly affect the capacitor performance. Therefore, the following items must be carefully considered in the design of land patterns:
   (1) Excessive solder applied can cause mechanical stresses which lead to chip breaking or cracking. Therefore, please consider appropriate land-patterns for proper amount of solder.
   (2) When more than one component are jointly soldered onto the same land, each component's soldering point shall be separated by solder-resist.

◆Pattern configurations (Capacitor layout on PCBs)

After capacitors are mounted on boards, they can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting, board inspection, mounting of additional parts, assembly into the chassis, wave soldering of the boards, etc.). For this reason, land pattern configurations and positions of capacitors shall be carefully considered to minimize stresses.

Technical considerations

◆Pattern configurations (Design of Land-patterns)

The following diagrams and tables show some examples of recommended land patterns to prevent excessive solder amounts.

(1) Recommended land dimensions for typical chip capacitors

●Multilayer Ceramic Capacitors : Recommended land dimensions (unit: mm)

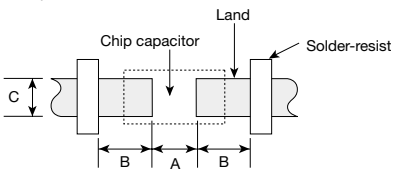
Wave-soldering

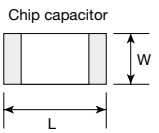
Type		107	212	316	325
Size	L	1.6	2.0	3.2	3.2
	W	0.8	1.25	1.6	2.5
A		0.8 to 1.0	1.0 to 1.4	1.8 to 2.5	1.8 to 2.5
B		0.5 to 0.8	0.8 to 1.5	0.8 to 1.7	0.8 to 1.7
C		0.6 to 0.8	0.9 to 1.2	1.2 to 1.6	1.8 to 2.5

Reflow-soldering

Type		042	063	105	107	212	316	325	432
Size	L	0.4	0.6	1.0	1.6	2.0	3.2	3.2	4.5
	W	0.2	0.3	0.5	0.8	1.25	1.6	2.5	3.2
A		0.15 to 0.25	0.20 to 0.30	0.45 to 0.55	0.8 to 1.0	0.8 to 1.2	1.8 to 2.5	1.8 to 2.5	2.5 to 3.5
B		0.15 to 0.20	0.20 to 0.30	0.40 to 0.50	0.6 to 0.8	0.8 to 1.2	1.0 to 1.5	1.0 to 1.5	1.5 to 1.8
C		0.15 to 0.30	0.25 to 0.40	0.45 to 0.55	0.6 to 0.8	0.9 to 1.6	1.2 to 2.0	1.8 to 3.2	2.3 to 3.5

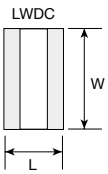
Land patterns for PCBs





●LWDC: Recommended land dimensions for reflow-soldering (unit: mm)

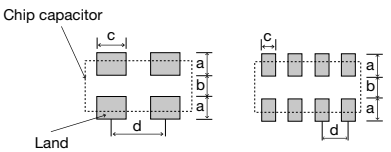
Type		105	107	212
Size	L	0.52	0.8	1.25
	W	1.0	1.6	2.0
A		0.18 to 0.22	0.25 to 0.3	0.5 to 0.7
B		0.2 to 0.25	0.3 to 0.4	0.4 to 0.5
C		0.9 to 1.1	1.5 to 1.7	1.9 to 2.1



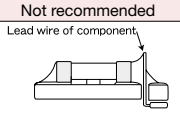
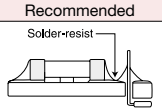
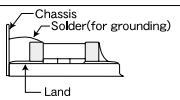
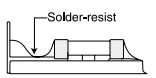
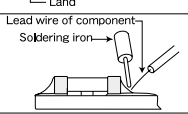
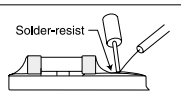
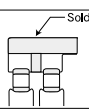
●Array type: Recommended land dimensions for reflow-soldering (unit: mm)

Type		096 (2 circuits)	110 (2 circuits)	212 (2 circuits)	212 (4 circuits)
Size	L	0.9	1.37	2.0	2.0
	W	0.6	1.0	1.25	1.25
a		0.25 to 0.35	0.35 to 0.45	0.5 to 0.6	0.5 to 0.6
b		0.15 to 0.25	0.55 to 0.65	0.5 to 0.6	0.5 to 0.6
c		0.15 to 0.25	0.3 to 0.4	0.5 to 0.6	0.2 to 0.3
d		0.45	0.64	1.0	0.5

2 circuits 4 circuits



(2) Examples of good and bad solder application

Items	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

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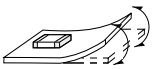
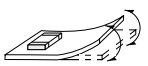
Precautions on the use of Multilayer Ceramic Capacitors

2. PCB Design

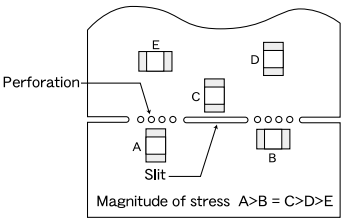
Technical considerations

◆Pattern configurations (Capacitor layout on PCBs)

1-1. The following is examples of good and bad capacitor layouts ; capacitors shall be located to minimize any possible mechanical stresses from board warp or deflection.

Items	Not recommended	Recommended
Deflection of board		 Position the component at a right angle to the direction of the mechanical stresses that are anticipated.

1-2. The amount of mechanical stresses given will vary depending on capacitor layout. Please refer to diagram below.



1-3. When PCB is split, the amount of mechanical stress on the capacitors can vary according to the method used. The following methods are listed in order from least stressful to most stressful: push-back, slit, V-grooving, and perforation. Thus, please consider the PCB, split methods as well as chip location.

3. Mounting

Precautions

◆Adjustment of mounting machine

1. When capacitors are mounted on PCB, excessive impact load shall not be imposed on them.
2. Maintenance and inspection of mounting machines shall be conducted periodically.

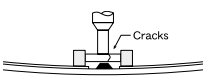
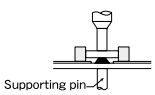
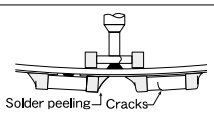
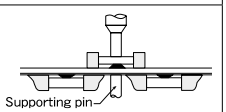
◆Selection of Adhesives

1. When chips are attached on PCBs with adhesives prior to soldering, it may cause capacitor characteristics degradation unless the following factors are appropriately checked : size of land patterns, type of adhesive, amount applied, hardening temperature and hardening period. Therefore, please contact us for further information.

Technical considerations

◆Adjustment of mounting machine

1. When the bottom dead center of a pick-up nozzle is too low, excessive force is imposed on capacitors and causes damages. To avoid this, the following points shall be considerable.
   (1) The bottom dead center of the pick-up nozzle shall be adjusted to the surface level of PCB without the board deflection.
   (2) The pressure of nozzle shall be adjusted between 1 and 3 N static loads.
   (3) To reduce the amount of deflection of the board caused by impact of the pick-up nozzle, supporting pins or back-up pins shall be used on the other side of the PCB. The following diagrams show some typical examples of good and bad pick-up nozzle placement:

Items	Not recommended	Recommended
Single-sided mounting		
Double-sided mounting		

2. As the alignment pin is worn out, adjustment of the nozzle height can cause chipping or cracking of capacitors because of mechanical impact on the capacitors. To avoid this, the monitoring of the width between the alignment pins in the stopped position, maintenance, check and replacement of the pin shall be conducted periodically.

◆Selection of Adhesives

Some adhesives may cause IR deterioration. The different shrinkage percentage of between the adhesive and the capacitors may result in stresses on the capacitors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect components. Therefore, the following precautions shall be noted in the application of adhesives.

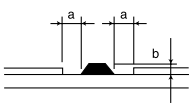
(1) Required adhesive characteristics
   a. The adhesive shall be strong enough to hold parts on the board during the mounting & solder process.
   b. The adhesive shall have sufficient strength at high temperatures.
   c. The adhesive shall have good coating and thickness consistency.
   d. The adhesive shall be used during its prescribed shelf life.
   e. The adhesive shall harden rapidly.
   f. The adhesive shall have corrosion resistance.
   g. The adhesive shall have excellent insulation characteristics.
   h. The adhesive shall have no emission of toxic gasses and no effect on the human body.

(2) The recommended amount of adhesives is as follows;

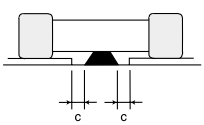
[Recommended condition]

Figure	212/316 case sizes as examples
a	0.3mm min
b	100 to 120 μm
c	Adhesives shall not contact land

Amount of adhesive



After capacitors are bonded



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Precautions on the use of Multilayer Ceramic Capacitors

4. Soldering

Precautions

◆Selection of Flux

Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use;

(1) Flux used shall be less than or equal to 0.1 wt% (in Cl equivalent) of halogenated content. Flux having a strong acidity content shall not be applied.

(2) When shall capacitors are soldered on boards, the amount of flux applied shall be controlled at the optimum level.

(3) When water-soluble flux is used, special care shall be taken to properly clean the boards.

◆Soldering

Temperature, time, amount of solder, etc. shall be set in accordance with their recommended conditions.

Sn-Zn solder paste can adversely affect MLCC reliability.
Please contact us prior to usage of Sn-Zn solder.

Technical considerations

◆Selection of Flux

1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate flux, or highly acidic flux is used, it may lead to corrosion of terminal electrodes or degradation of insulation resistance on the surfaces of the capacitors.

1-2. Flux is used to increase solderability in wave soldering. However if too much flux is applied, a large amount of flux gas may be emitted and may adversely affect the solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.

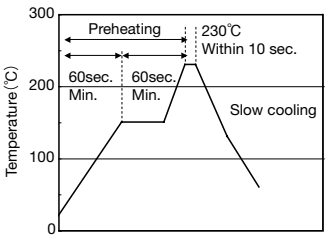
1-3. Since the residue of water-soluble flux is easily dissolved in moisture in the air, the residues on the surfaces of capacitors in high humidity conditions may cause a degradation of insulation resistance and reliability of the capacitors. Therefore, the cleaning methods and the capability of the machines used shall also be considered carefully when water-soluble flux is used.

◆Soldering

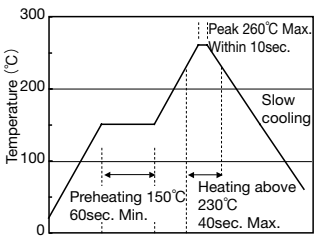
- Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling.
- Therefore, the soldering must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.
- Preheating : Capacitors shall be preheated sufficiently, and the temperature difference between the capacitors and solder shall be within 100 to 130℃.
- Cooling : The temperature difference between the capacitors and cleaning process shall not be greater than 100℃.

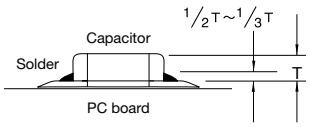
[Reflow soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】





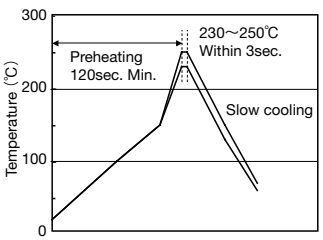
Caution

①The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of a capacitor.

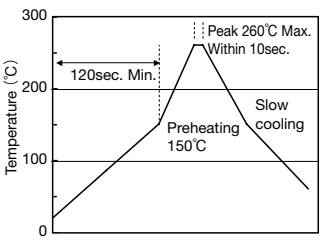
②Because excessive dwell times can adversely affect solderability, soldering duration shall be kept as close to recommended times as possible.

[Wave soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】

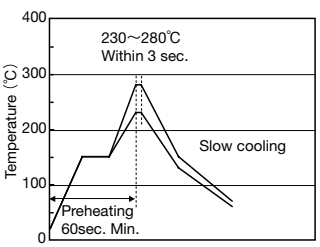


Caution

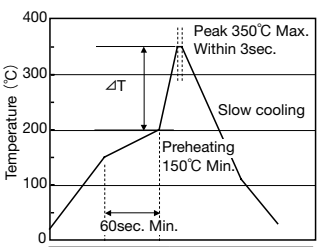
①Wave soldering must not be applied to capacitors designated as for reflow soldering only.

[Hand soldering]

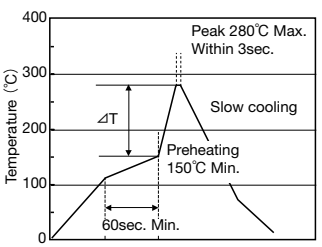
【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】



	⊿T
316type or less	⊿T≦150℃



	⊿T
325type or more	⊿T≦130℃

Caution

①Use a 50W soldering iron with a maximum tip diameter of 1.0 mm.

②The soldering iron shall not directly touch capacitors.

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Precautions on the use of Multilayer Ceramic Capacitors

5. Cleaning	
Precautions	◆Cleaning conditions 1. When PCBs are cleaned after capacitors mounting, please select the appropriate cleaning solution in accordance with the intended use of the cleaning. (e.g. to remove soldering flux or other materials from the production process.) 2. Cleaning condition shall be determined after it is verified by using actual cleaning machine that the cleaning process does not affect capacitor's characteristics.
Technical consider-ations	1. The use of inappropriate cleaning solutions can cause foreign substances such as flux residue to adhere to capacitors or deteriorate their outer coating, resulting in a degradation of the capacitor's electrical properties (especially insulation resistance). 2. Inappropriate cleaning conditions (insufficient or excessive cleaning) may adversely affect the performance of the capacitors. In the case of ultrasonic cleaning, too much power output can cause excessive vibration of PCBs which may lead to the cracking of capacitors or the soldered portion, or decrease the terminal electrodes' strength. Therefore, the following conditions shall be carefully checked; Ultrasonic output : 20 W/ℓ or less Ultrasonic frequency : 40 kHz or less Ultrasonic washing period : 5 min. or less

6. Resin coating and mold	
Precautions	1. With some type of resins, decomposition gas or chemical reaction vapor may remain inside the resin during the hardening period or while left under normal storage conditions resulting in the deterioration of the capacitor's performance. 2. When a resin's hardening temperature is higher than capacitor's operating temperature, the stresses generated by the excessive heat may lead to damage or destruction of capacitors. The use of such resins, molding materials etc. is not recommended.

7. Handling	
Precautions	◆Splitting of PCB 1. When PCBs are split after components mounting, care shall be taken so as not to give any stresses of deflection or twisting to the board. 2. Board separation shall not be done manually, but by using the appropriate devices. ◆Mechanical considerations Be careful not to subject capacitors to excessive mechanical shocks. (1) If ceramic capacitors are dropped onto a floor or a hard surface, they shall not be used. (2) Please be careful that the mounted components do not come in contact with or bump against other boards or components.

8. Storage conditions	
Precautions	◆Storage 1. To maintain the solderability of terminal electrodes and to keep packaging materials in good condition, care must be taken to control temperature and humidity in the storage area. Humidity should especially be kept as low as possible. ・Recommended conditions Ambient temperature : Below 30℃ Humidity : Below 70% RH The ambient temperature must be kept below 40℃. Even under ideal storage conditions, solderability of capacitor is deteriorated as time passes, so capacitors shall be used within 6 months from the time of delivery. ・Ceramic chip capacitors shall be kept where no chlorine or sulfur exists in the air. 2. The capacitance values of high dielectric constant capacitors will gradually decrease with the passage of time, so care shall be taken to design circuits . Even if capacitance value decreases as time passes, it will get back to the initial value by a heat treatment at 150℃ for 1hour.
Technical consider-ations	If capacitors are stored in a high temperature and humidity environment, it might rapidly cause poor solderability due to terminal oxidation and quality loss of taping/packaging materials. For this reason, capacitors shall be used within 6 months from the time of delivery. If exceeding the above period, please check solderability before using the capacitors.

※RCR-2335B (Safety Application Guide for fixed ceramic capacitors for use in electronic equipment) is published by JEITA.
Please check the guide regarding precautions for deflection test, soldering by spot heat, and so on.

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