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REMINDERS

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Please note that Taiyo Yuden Co., Ltd. shall not be responsible for any defects in products or equipment incorporating such products, which are caused under the conditions other than those specified in this catalog or individual specification.

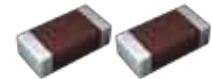
- Please contact Taiyo Yuden Co., Ltd. for further details of product specifications as the individual specification is available.
- Please conduct validation and verification of products in actual condition of mounting and operating environment before commercial shipment of the equipment.
- All electronic 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. Do not incorporate the products into any equipment in fields such as aerospace, aviation, nuclear control, submarine system, military, etc. where higher safety and reliability are especially required.

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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").
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- Caution for export
Certain items in this catalog may require specific procedures for export according to "Foreign Exchange and Foreign Trade Control Law" of Japan, "U.S. Export Administration Regulations", and other applicable regulations. Should you have any question or inquiry on this matter, please contact our sales staff.

MULTILAYER CERAMIC CAPACITORS



WAVE

REFLOW

PARTS NUMBER

J | M | K | 3 | 1 | 6 | | B | J | 1 | 0 | 6 | M | L | | T | |

Blank space

Rated voltage

Code	Rated voltage VDC
P	25
A	4
J	6.3
L	10
E	16
T	25
G	35
U	50
H	100
Q	250
S	630

End termination

Code	End termination
K	Plated
R	High Reliability Application

Dimension L x W

Type	Dimensions L x W mm	EIA inch
042	0.4x 0.2	01005
063	0.6x 0.3	0201
105	1.0x 0.5	0402
	0.52x 1.0	0204
107	1.6x 0.8	0603
	0.8x 1.6	0306
212	2.0x 1.25	0805
	1.25x 2.0	0508
316	3.2x 1.6	1206
325	3.2x 2.5	1210
432	4.5x 3.2	1812

Note: LWreverse type WK only

Series name

Code	Series name
M	Multilayer ceramic capacitor
V	Multilayer ceramic capacitor for high frequency
W	LWreverse type multilayer capacitor

Dimension tolerance

Code	Type	L mm	W mm	T mm
	ALL	Standard	Standard	Standard
A	063	0.6± 0.05	0.3± 0.05	0.3± 0.05
	105	1.0± 0.10	0.5± 0.10	0.5± 0.10
	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± 0.10 1.25 0.15/ 0.05
	316	3.2± 0.20	1.25± 0.20	0.85± 0.10 1.6± 0.20
	325	3.2± 0.30	2.5± 0.30	2.5± 0.30
B	105	1.0 0.15/ 0.05	0.5 0.15/ 0.05	0.5 0.15/ 0.05 0.45± 0.05 0.8 0.20/ 0
	107	1.6 0.20/ 0	0.8 0.20/ 0	0.85± 0.10 1.25 0.20/ 0
	212	2.0 0.20/ 0	1.25 0.20/ 0	1.6± 0.30
	316	3.2± 0.30	1.6± 0.30	1.6± 0.30
C	105	1.0 0.20/ 0	0.5 0.20/ 0	0.5 0.20/ 0

Note: P.6 Standard external dimensions

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Temperature characteristics code

High dielectric type Excluding Super low distortion multilayer ceramic capacitor CFCAP™

Code	Applicable standard		Temperature range	Ref. Temp.	Capacitance change	Capacitance tolerance	Tolerance code
BJ	JIS	B	25 85	20	± 10	± 10 ± 20	K M
	EIA	X5R	55 85	25	± 15	± 10 ± 20	K M
B7	EIA	X7R	55 125	25	± 15	± 10	K
						± 20	M
C6	EIA	X6S	55 105	25	± 22	± 10	K
						± 20	M
C7	EIA	X7S	55 125	25	± 22	± 10	K
						± 20	M
LD()	EIA	X5R	55 85	25	± 15	± 10	K
						± 20	M
F	JIS	F	25 85	20	30/ 80	80/ 20	Z
	EIA	Y5V	30 85	25	22 82	80/ 20	Z

Note: .LD Low distortion high value multilayer ceramic capacitor

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Temperature compensating type

Code	Applicable standard		Temperature range	Ref. Temp.	Capacitance change	Capacitance tolerance	Tolerance code
CH	JIS	CH	55 125	20	0± 60ppm/	± 0.1pF	B
		CQ		25		± 0.25pF	C
	EIA	C0H		20		± 0.5pF	D
				25		1pF	F
				± 5		J	
± 10	K						
CJ	JIS	CJ	55 125	20	0± 120ppm/	± 0.25pF	C
	EIA	C0J		25			
CK	JIS	CK	55 125	20	0± 250ppm/	± 0.25pF	C
	EIA	C0K		25			
UJ	JIS	UJ	55 125	20	750± 120ppm/	± 0.25pF	C
	EIA	U2J		25		± 0.5pF	D
UK	JIS	UK	55 125	20	750± 250ppm/	± 0.5pF	C
	EIA	U2K	55 125	25			
SL	JIS	S	55 125	20	+350 1000ppm/	± 5	J

Series code

Super low distortion multilayer ceramic capacitor CFCAP™ only

Code	Series code
SD	Standard

Nominal capacitance

Code example	Nominal capacitance
CR5	0pF
010	1pF
100	10pF
101	100p
102	1,000pF
103	10,000pF
104	0.1μ F
105	1.0μ F
106	10μ F
107	100μ F

Note : R Decimal point

Capacitance tolerance

Code	Capacitance tolerance
B	± 0.1pF
C	± 0.25pF
D	± 0.5pF
F	± 1pF
J	± 5
K	± 10
M	± 20
Z	80/ 20

Thickness

Code	Thickness mm
C	0.2
D	0.2(Temperature compensating of 042type)
P	0.3
T	
K	0.45
V	0.5
W	
A	0.8
D	0.85(212type or more)
F	1.15
G	1.25
L	1.6
N	1.9
Y	2.0 max
M	2.5

Special code

Code	Special code
	Standard

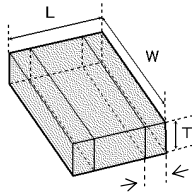
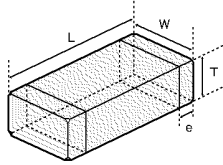
Packaging

Code	Packaging
F	178mm Taping 2mm pitch
T	178mm Taping 4mm pitch
P	178mm Taping 4mm pitch, 1000 pcs/reel 325 type Thickness code M
W	178mm Taping 1mm pitch 042type only

Internal code

Code	Internal code
	Standard

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LWreverse type

Type(EIA)	Dimension [mm]				
			T	*1	e
MK042 01005	0.4± 0.02	0.2± 0.02	0.2± 0.02	C D	0.1± 0.03
MK063 0201	0.6± 0.03	0.3± 0.03	0.3± 0.03	P T	0.15± 0.05
MK105 0402	1.0± 0.05	0.5± 0.05	0.2± 0.02	C	0.25± 0.10
			0.3± 0.03	P	
			0.5± 0.05	V	
VK105 0402	1.0± 0.05	0.5± 0.05	0.5± 0.05	W	0.25± 0.10
VK105 0204	0.52± 0.05	1.0± 0.05	0.3± 0.05	P	0.18± 0.08
MK107 0603	1.6± 0.10	0.8± 0.10	0.45± 0.05	K	0.35± 0.25
			0.8± 0.10	A	
MR107 0603	1.6± 0.10	0.8± 0.10	0.8± 0.10		0.1 0.6
VK107 0306	0.8± 0.10	1.6± 0.10	0.5± 0.05		0.25± 0.15
			0.45± 0.05	K	
			0.85± 0.10	D	
MK212 0805	2.0± 0.10	1.25± 0.10	1.25± 0.10	G	0.5± 0.25
			0.85± 0.10	D	
MR212 0805	2.0± 0.10	1.25± 0.10	1.25± 0.10		0.25 0.75
VK212 0508	1.25± 0.15	2.0± 0.15	0.85± 0.1		0.3± 0.2
			0.85± 0.10	D	
			1.15± 0.10		
			1.25± 0.10	G	
MR316 1206	3.2± 0.15	1.6± 0.15	1.6± 0.20		0.25 0.85
			0.85± 0.10	D	
			1.15± 0.10	F	
			1.25± 0.10	G	
MK325 1210	3.2± 0.30	2.5± 0.20	1.9± 0.20	N	0.6± 0.3
			1.9± 0.1/- 0.2	Y	
			2.5± 0.20	M	
			1.9± 0.20	N	
			2.5± 0.20	M	
MR325 1210	3.2± 0.30	2.5± 0.20	2.5± 0.20	M	0.3 0.9
MK432 1812	4.5± 0.40	3.2± 0.30	2.5± 0.20	M	0.9± 0.6

Note : . LWreverse type, *1.Thickness code

STANDARD QUANTITY

Type	EIA inch	Dimension		Standard quantity pcs	
			Code	Paper tape	Embossed tape
042	01005	0.2	C		4000
			D		
063	0201	0.3	P	15000	
			T		
105	0402	0.2	C	20000	
			P	15000	
		0.3	V	10000	
			W		
			P		
0204	0.30				
107	0603	0.45	K	4000	
			A		
		0.50	V	4000	
212	0805	0.45	K	4000	
			D		
		1.25	G	3000	
316	1206	0.85	D	4000	
		1.15	F	3000	
			G		
325	1210	1.6	L	2000	
		0.85	D	2000	
			F		
			N		
20 max	Y				
432	1812	2.5	M	500 T 1000 P	
			M	500	

Note : .LWReverse type WK

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All the Multilayer Ceramic Capacitors of Catalog Lineup are Compliance RoHS.
Capacitance tolerance code is applied to [] of part number.

Note)

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

*2 The exchange of individual specification is necessary depending on the application and circuit condition. Please contact Taiyo Yuden sales channels.

*3 The size standard should look at Dimension, Dimension tolerance, and Thickness, and P.6 Standard external dimensions.

Multilayer Ceramic Capacitors(High Dielectric Type)

042TYPE

Temperature Characteristic BJ : B/X5R 0.2mm thickness C

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave	
							Rated voltage x			
LMK042 BJ 101[]C-W		10	B X5R ⁻¹	100 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 151[]C-W			B X5R ⁻¹	150 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 221[]C-W			B X5R ⁻¹	220 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 331[]C-W			B X5R ⁻¹	330 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 471[]C-W			B X5R ⁻¹	470 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 681[]C-W			B X5R ⁻¹	680 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 102[]C-W			B X5R ⁻¹	1000 p	± 10 ± 20	5	200	0.2± 0.02	R	
LMK042 BJ 152[]C-W			X5R	1500 p	± 10 ± 20	10	150	0.2± 0.02	R	
LMK042 BJ 222[]C-W			X5R	2200 p	± 10 ± 20	10	150	0.2± 0.02	R	
LMK042 BJ 332[]C-W			X5R	3300 p	± 10 ± 20	10	150	0.2± 0.02	R	
LMK042 BJ 472[]C-W			X5R	4700 p	± 10 ± 20	10	150	0.2± 0.02	R	
LMK042 BJ 682[]C-W			X5R	6800 p	± 10 ± 20	10	150	0.2± 0.02	R	
LMK042 BJ 103[]C-W			X5R	10000 p	± 10 ± 20	10	150	0.2± 0.02	R	
JMK042 BJ 152[]C-W			6.3	B X5R ⁻¹	1500 p	± 10 ± 20	10	150	0.2± 0.02	R
JMK042 BJ 222[]C-W				B X5R ⁻¹	2200 p	± 10 ± 20	10	150	0.2± 0.02	R
JMK042 BJ 332[]C-W				B X5R ⁻¹	3300 p	± 10 ± 20	10	150	0.2± 0.02	R
JMK042 BJ 472[]C-W		B X5R ⁻¹		4700 p	± 10 ± 20	10	150	0.2± 0.02	R	
JMK042 BJ 682[]C-W		B X5R ⁻¹		6800 p	± 10 ± 20	10	150	0.2± 0.02	R	
JMK042 BJ 103[]C-W		B X5R ⁻¹		10000 p	± 10 ± 20	10	150	0.2± 0.02	R	
JMK042 BJ 223[]C-W		X5R	22000 p	± 10 ± 20	10	150	0.2± 0.02	R		
AMK042 BJ 473VC-W		4	X5R	47000 p	± 20	10	150	0.2± 0.02	R	
AMK042 BJ 104VC-W			X5R	01 μ	± 20	10	150	0.2± 0.02	R	

Temperature Characteristic B7 : X7R 0.2mm thickness C

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
LMK042 B7101[]C-W		10	X7R	100 p	± 10 ± 20	5	200	0.2± 0.02	R
LMK042 B7151[]C-W			X7R	150 p	± 10 ± 20	5	200	0.2± 0.02	R
LMK042 B7221[]C-W			X7R	220 p	± 10 ± 20	5	200	0.2± 0.02	R
LMK042 B7331[]C-W			X7R	330 p	± 10 ± 20	5	200	0.2± 0.02	R
LMK042 B7471[]C-W			X7R	470 p	± 10 ± 20	5	200	0.2± 0.02	R
LMK042 B7681[]C-W			X7R	680 p	± 10 ± 20	5	200	0.2± 0.02	R
LMK042 B7102[]C-W			X7R	1000 p	± 10 ± 20	5	200	0.2± 0.02	R

063TYPE

Temperature Characteristic BJ : B/X5R 0.3mm thickness P

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave	
							Rated voltage x			
UMK063 BJ 101[]P-F		50	B X5R ⁻¹	100 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
UMK063 BJ 151[]P-F			B X5R ⁻¹	150 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
UMK063 BJ 221[]P-F			B X5R ⁻¹	220 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
UMK063 BJ 331[]P-F			B X5R ⁻¹	330 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
UMK063 BJ 471[]P-F			B X5R ⁻¹	470 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
UMK063 BJ 681[]P-F			B X5R ⁻¹	680 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
UMK063 BJ 102[]P-F			B X5R ⁻¹	1000 p	± 10 ± 20	3.5	200	0.3± 0.03	R	
TMK063 BJ 152[]P-F			25	B X5R	1500 p	± 10 ± 20	5	200	0.3± 0.03	R
TMK063 BJ 222[]P-F		B X5R		2200 p	± 10 ± 20	5	200	0.3± 0.03	R	
TMK063 BJ 332[]P-F		B X5R		3300 p	± 10 ± 20	5	200	0.3± 0.03	R	
TMK063 BJ 472[]P-F		B X5R		4700 p	± 10 ± 20	5	200	0.3± 0.03	R	
TMK063 BJ 682[]P-F		B X5R		6800 p	± 10 ± 20	5	200	0.3± 0.03	R	
TMK063 BJ 103[]P-F		B X5R		10000 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 152[]P-F		16	B X5R ⁻¹	1500 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 222[]P-F			B X5R ⁻¹	2200 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 332[]P-F			B X5R ⁻¹	3300 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 472[]P-F			B X5R ⁻¹	4700 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 682[]P-F			B X5R ⁻¹	6800 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 103[]P-F			B X5R ⁻¹	10000 p	± 10 ± 20	5	200	0.3± 0.03	R	
EMK063 BJ 104[]P-F		10	X5R	01 μ	± 10 ± 20	10	150	0.3± 0.03	R	
LMK063 BJ 223[]P-F			B X5R	22000 p	± 10 ± 20	7.5	150	0.3± 0.03	R	
LMK063 BJ 333[]P-F			X5R	33000 p	± 10 ± 20	7.5	150	0.3± 0.03	R	
LMK063 BJ 473[]P-F			X5R	47000 p	± 10 ± 20	7.5	150	0.3± 0.03	R	
LMK063 BJ 683[]P-F			X5R	68000 p	± 10 ± 20	10	150	0.3± 0.03	R	
LMK063 BJ 104[]P-F			X5R	01 μ	± 10 ± 20	10	150	0.3± 0.03	R	
LMK063 BJ 224[]P-F			X5R	0.22 μ	± 10 ± 20	10	150	0.3± 0.03	R	
JMK063 BJ 223[]P-F			6.3	B X5R	22000 p	± 10 ± 20	7.5	150	0.3± 0.03	R
JMK063 BJ 333[]P-F				X5R	33000 p	± 10 ± 20	7.5	150	0.3± 0.03	R
JMK063 BJ 473[]P-F				X5R	47000 p	± 10 ± 20	7.5	150	0.3± 0.03	R
JMK063 BJ 683[]P-F				X5R	68000 p	± 10 ± 20	10	150	0.3± 0.03	R
JMK063 BJ 104[]P-F				X5R	01 μ	± 10 ± 20	10	150	0.3± 0.03	R
JMK063 BJ 224[]P-F		X5R		0.22 μ	± 10 ± 20	10	150	0.3± 0.03	R	
AMK063 BJ 224[]P-F		4	X5R	0.22 μ	± 10 ± 20	10	150	0.3± 0.03	R	
AMK063 BJ 334VP-F *2			X5R	0.33 μ	± 20	10	150	0.3± 0.03	R	
AMK063 BJ 474VP-F			X5R	0.47 μ	± 20	10	150	0.3± 0.03	R	
AMK063BJ 105VP-F			X5R	1 μ	± 20	10	150	0.3± 0.05	R	

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Temperature Characteristic C6 : X6S 0.3mm thickness P

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
JMK063 C6223[P]-F		6.3	X6S	22000 p	± 10 ± 20	7.5	150	0.3± 0.03	R
JMK063 C6333[P]-F			X6S	33000 p	± 10 ± 20	7.5	150	0.3± 0.03	R
JMK063 C6473[P]-F			X6S	47000 p	± 10 ± 20	7.5	150	0.3± 0.03	R
JMK063 C6683[P]-F			X6S	68000 p	± 10 ± 20	10	150	0.3± 0.03	R
JMK063 C6104[P]-F			X6S	0.1 μ	± 10 ± 20	10	150	0.3± 0.03	R
JMK063 C6224[P]-F			X6S	0.22 μ	± 10 ± 20	10	150	0.3± 0.03	R

Temperature Characteristic B7 : X7R 0.3mm thickness P

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
UMK063 B7101[P]-F		50	X7R	100 p	± 10 ± 20	35	200	0.3± 0.03	R
UMK063 B7151[P]-F			X7R	150 p	± 10 ± 20	35	200	0.3± 0.03	R
UMK063 B7221[P]-F			X7R	220 p	± 10 ± 20	35	200	0.3± 0.03	R
UMK063 B7331[P]-F			X7R	330 p	± 10 ± 20	35	200	0.3± 0.03	R
UMK063 B7471[P]-F			X7R	470 p	± 10 ± 20	35	200	0.3± 0.03	R
UMK063 B7681[P]-F			X7R	680 p	± 10 ± 20	35	200	0.3± 0.03	R
UMK063 B7102[P]-F		16	X7R	1000 p	± 10 ± 20	35	200	0.3± 0.03	R
EMK063 B7152[P]-F			X7R	1500 p	± 10 ± 20	5	200	0.3± 0.03	R
EMK063 B7222[P]-F			X7R	2200 p	± 10 ± 20	5	200	0.3± 0.03	R
EMK063 B7332[P]-F			X7R	3300 p	± 10 ± 20	5	200	0.3± 0.03	R
EMK063 B7472[P]-F			X7R	4700 p	± 10 ± 20	5	200	0.3± 0.03	R
EMK063 B7682[P]-F			X7R	6800 p	± 10 ± 20	5	200	0.3± 0.03	R
EMK063 B7103[P]-F		X7R	10000 p	± 10 ± 20	5	200	0.3± 0.03	R	

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Temperature Characteristic BJ : B/X5R 0.5mm thickness V

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
							Rated voltage x			
UMK105 BJ 221[V]-F		50	B X5R ⁻¹	220 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 331[V]-F			B X5R ⁻¹	330 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 471[V]-F			B X5R ⁻¹	470 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 681[V]-F			B X5R ⁻¹	680 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 102[V]-F			B X5R ⁻¹	1000 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 152[V]-F			B X5R ⁻¹	1500 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 222[V]-F			B X5R ⁻¹	2200 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 332[V]-F			B X5R ⁻¹	3300 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 472[V]-F			B X5R ⁻¹	4700 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 BJ 682[V]-F			B X5R ⁻¹	6800 p	± 10 ± 20	25	150	0.5± 0.05	R	
UMK105 BJ 103[V]-F			B X5R ⁻¹	10000 p	± 10 ± 20	35	200	0.5± 0.05	R	
UMK105 BJ 104[V]-F			X5R	0.1 μ	± 10 ± 20	10	150	0.5± 0.05	R	
UMK105 BJ 224[V]-F			X5R	0.22 μ	± 10 ± 20	10	150	0.5± 0.05	R	
UMK105ABJ 474[V]-F			X5R	0.47 μ	± 10 ± 20	10	150	0.5± 0.10	R	
GMK105 BJ 104[V]-F			35	B X5R	0.1 μ	± 10 ± 20	5	150	0.5± 0.05	R
TMK105 BJ 153[V]-F			25	B X5R ⁻¹	15000 p	± 10 ± 20	35	200	0.5± 0.05	R
TMK105 BJ 223[V]-F		B X5R ⁻¹		22000 p	± 10 ± 20	35	200	0.5± 0.05	R	
TMK105 BJ 333[V]-F		B X5R ⁻¹		33000 p	± 10 ± 20	35	150	0.5± 0.05	R	
TMK105 BJ 473[V]-F		B X5R ⁻¹		47000 p	± 10 ± 20	35	150	0.5± 0.05	R	
TMK105 BJ 104[V]-F		B X5R		0.1 μ	± 10 ± 20	5	150	0.5± 0.05	R	
TMK105 BJ 224[V]-F		X5R		0.22 μ	± 10 ± 20	10	200	0.5± 0.05	R	
TMK105ABJ 474[V]-F		X5R	0.47 μ	± 10 ± 20	10	200	0.5± 0.10	R		
TMK105 BJ 105[V]-F		X5R	1 μ	± 10 ± 20	10	150	0.5± 0.05	R		
EMK105 BJ 153[V]-F		16	B X5R ⁻¹	15000 p	± 10 ± 20	35	200	0.5± 0.05	R	
EMK105 BJ 223[V]-F			B X5R ⁻¹	22000 p	± 10 ± 20	35	200	0.5± 0.05	R	
EMK105 BJ 333[V]-F			B X5R ⁻¹	33000 p	± 10 ± 20	35	200	0.5± 0.05	R	
EMK105 BJ 473[V]-F			B X5R ⁻¹	47000 p	± 10 ± 20	35	200	0.5± 0.05	R	
EMK105 BJ 683[V]-F			B X5R	68000 p	± 10 ± 20	5	200	0.5± 0.05	R	
EMK105 BJ 104[V]-F			B X5R ⁻¹	0.1 μ	± 10 ± 20	5	150	0.5± 0.05	R	
EMK105 BJ 224[V]-F		B X5R	0.22 μ	± 10 ± 20	5	150	0.5± 0.05	R		
EMK105ABJ 474[V]-F		X5R	0.47 μ	± 10 ± 20	10	150	0.5± 0.10	R		
EMK105 BJ 105[V]-F		X5R	1 μ	± 10 ± 20	10	150	0.5± 0.05	R		
EMK105ABJ 225W-F		X5R	22 μ	± 20	10	150	0.5± 0.10	R		
LMK105 BJ 104[V]-F		10	B X5R	0.1 μ	± 10 ± 20	5	150	0.5± 0.05	R	
LMK105 BJ 224[V]-F			B X5R	0.22 μ	± 10 ± 20	5	150	0.5± 0.05	R	
LMK105 BJ 474[V]-F			X5R	0.47 μ	± 10 ± 20	10	150	0.5± 0.05	R	
LMK105 BJ 105[V]-F			X5R	1 μ	± 10 ± 20	10	150	0.5± 0.05	R	
LMK105 BJ 225W-F			X5R	22 μ	± 20	10	150	0.5± 0.05	R	
LMK105BBJ 475W/LF			X5R	4.7 μ	± 20	10	150	0.5±0.15/-0.05	R	
JMK105 BJ 224[V]-F		6.3	B X5R	0.22 μ	± 10 ± 20	5	150	0.5± 0.05	R	
JMK105 BJ 474[V]-F			X5R	0.47 μ	± 10 ± 20	10	150	0.5± 0.05	R	
JMK105 BJ 105[V]-F			X5R	1 μ	± 10 ± 20	10	150	0.5± 0.05	R	
JMK105 BJ 225W-F			X5R	22 μ	± 20	10	150	0.5± 0.05	R	
JMK105BBJ 475W-F	JMK105 BJ 475W-FD		X5R	4.7 μ	± 20	10	150	0.5±0.15/-0.05	R	
AMK105 BJ 335W-F			X5R	3.3 μ	± 20	10	150	0.5± 0.05	R	
AMK105ABJ 475W-F	AMK105 BJ 475W-F	X5R	4.7 μ	± 20	10	150	0.5± 0.10	R		
AMK105CBJ 105W-F		X5R	10 μ	± 20	10	150	0.5±0.20/-0	R		

Temperature Characteristic BJ : B/X5R 0.3mm thickness P

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
TMK105 BJ 103[P]-F		25	B X5R	10000 p	± 10 ± 20	5	150	0.3± 0.03	R
TMK105 BJ 104[P]-F			X5R	0.1 μ	± 10 ± 20	10	150	0.3± 0.03	R
TMK105 BJ 224[P]-F			X5R	0.22 μ	± 10 ± 20	10	150	0.3± 0.03	R
TMK105 BJ 474[P]-F			X5R	0.47 μ	± 10 ± 20	10	150	0.3± 0.03	R
EMK105 BJ 474[P]-F		16	X5R	0.47 μ	± 10 ± 20	10	150	0.3± 0.03	R
LMK105 BJ 105[PLF]		10	X5R	1 μ	± 10 ± 20	10	150	0.3± 0.03	R
JMK105 BJ 105[P]-F		6.3	X5R	1 μ	± 10 ± 20	10	150	0.3± 0.03	R

Temperature Characteristic BJ : X5R 0.2mm thickness C

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
LMK105 BJ 104[C]-F		10	X5R	0.1 μ	± 10 ± 20	10	150	0.2± 0.02	R
JMK105 BJ 224[C]-F		6.3	X5R	0.22 μ	± 10 ± 20	10	150	0.2± 0.02	R
JMK105 BJ 474[C]-F			X5R	0.47 μ	± 10 ± 20	10	150	0.2± 0.02	R
JMK105 BJ 105VC-F			X5R	1 μ	± 20	10	150	0.2± 0.02	R

Temperature Characteristic C6 : X6S 0.5mm thickness V

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
EMK105 C6105[V]-F		16	X6S	1 μ	± 10 ± 20	10	150	0.5± 0.05	R
LMK105 C6105[V]-F		10	X6S	1 μ	± 10 ± 20	10	150	0.5± 0.05	R
LMK105AC6225W-F			X6S	2.2 μ	± 20	10	150	0.5± 0.10	R
JMK105 C6105[V]-F		6.3	X6S	1 μ	± 10 ± 20	10	150	0.5± 0.05	R
JMK105 C6225W-F			X6S	2.2 μ	± 20	10	150	0.5± 0.05	R

Temperature Characteristic B7 : X7R 0.5mm thickness V

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave	
							Rated voltage x			
UMK105 B7221[V]-F		50	X7R	220 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7331[V]-F			X7R	330 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7471[V]-F			X7R	470 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7681[V]-F			X7R	680 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7102[V]-F			X7R	1000 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7152[V]-F			X7R	1500 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7222[V]-F			X7R	2200 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7332[V]-F			X7R	3300 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7472[V]-F			X7R	4700 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7682[V]-F			X7R	6800 p	± 10 ± 20	25	200	0.5± 0.05	R	
UMK105 B7103[V]-F			X7R	10000 p	± 10 ± 20	35	200	0.5± 0.05	R	
UMK105 B7104[V]-FR			X7R	0.1 μ	± 10 ± 20	10	150	0.5± 0.05	R	
TMK105 B7152[V]-F			25	X7R	1500 p	± 10 ± 20	25	200	0.5± 0.05	R
TMK105 B7222[V]-F				X7R	2200 p	± 10 ± 20	25	200	0.5± 0.05	R
TMK105 B7332[V]-F				X7R	3300 p	± 10 ± 20	25	200	0.5± 0.05	R
TMK105 B7472[V]-F				X7R	4700 p	± 10 ± 20	25	200	0.5± 0.05	R
TMK105 B7682[V]-F		X7R		6800 p	± 10 ± 20	25	200	0.5± 0.05	R	
TMK105 B7103[V]-F		X7R		10000 p	± 10 ± 20	35	200	0.5± 0.05	R	
TMK105 B7224[V]-FR		X7R		0.22 μ	± 10 ± 20	10	150	0.5± 0.05	R	
EMK105 B7223[V]-F		16		X7R	22000 p	± 10 ± 20	35	200	0.5± 0.05	R
EMK105 B7473[V]-F				X7R	47000 p	± 10 ± 20	35	200	0.5± 0.05	R
EMK105 B7104[V]-F		10		X7R	0.1 μ	± 10 ± 20	5	150	0.5± 0.05	R
EMK105 B7224[V]-FR				X7R	0.22 μ	± 10 ± 20	10	150	0.5± 0.05	R
LMK105 B7223[V]-F		10		X7R	22000 p	± 10 ± 20	35	200	0.5± 0.05	R
LMK105 B7473[V]-F				X7R	47000 p	± 10 ± 20	35	200	0.5± 0.05	R
LMK105 B7104[V]-F				X7R	0.1 μ	± 10 ± 20	5	150	0.5± 0.05	R
LMK105 B7224[V]-FR				X7R	0.22 μ	± 10 ± 20	10	150	0.5± 0.05	R
LMK105 B7474[V]-F				X7R	0.47 μ	± 10 ± 20	10	150	0.5± 0.05	R
LMK105 B7224[V]-F			6.3	X7R	0.22 μ	± 10 ± 20	5	150	0.5± 0.05	R
JMK105 B7224[V]-F				X7R	0.22 μ	± 10 ± 20	5	150	0.5± 0.05	R

Temperature Characteristic F : F/Y5V 0.5mm thickness V

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
UMK105 F103ZV-F		50	F Y5V	10000 p	80/- 20	5	200	0.5± 0.05	R
TMK105 F223ZV-F		25	F Y5V	22000 p	80/- 20	5	200	0.5± 0.05	R
EMK105 F473ZV-F		16	F Y5V	47000 p	80/- 20	7	200	0.5± 0.05	R
EMK105 F104ZV-F			F Y5V	0.1 μ	80/- 20	9	200	0.5± 0.05	R
LMK105 F224ZV-F		10	F Y5V	0.22 μ	80/- 20	11	200	0.5± 0.05	R
JMK105 F474ZV-F		6.3	F Y5V	0.47 μ	80/- 20	12.5	200	0.5± 0.05	R
JMK105 F105ZV-F			F Y5V	1 μ	80/- 20	20	150	0.5± 0.05	R

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Temperature Characteristic BJ : B/X5R 0.8mm thickness A

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics	Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ^{*3} [mm]	Soldering R:Reflow W:Wave
							Rated voltage x		
UMK107ABJ 474[A]-T	UMK107 BJ 474[A]-TD	50	X5R	0.47 μ	± 10 ± 20	10	150	0.8±0.15/- 0.05	R
UMK107 BJ 105[A]-T			X5R	1 μ	± 10 ± 20	10	150	0.8± 0.10	R
GMK107 BJ 105[A]-T		35	B X5R	1 μ	± 10 ± 20	5	150	0.8± 0.10	R
TMK107 BJ 224[A]-T			B X5R	0.22 μ	± 10 ± 20	35	200	0.8± 0.10	R/W
TMK107 BJ 474[A]-T		25	B X5R	0.47 μ	± 10 ± 20	35	150	0.8± 0.10	R
TMK107 BJ 105[A]-T			B X5R	1 μ	± 10 ± 20	5	150	0.8± 0.10	R
TMK107ABJ 225[A]-T	TMK107 BJ 225[A]-TD		X5R	2.2 μ	± 10 ± 20	10	150	0.8±0.15/- 0.05	R

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Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan []	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
EMK107 BJ 224[A]-T		16	B	X5R ⁻¹	0.22 μ	± 10 ± 20	35	200	0.8± 0.10	R/W	
EMK107 BJ 474[A]-T			B	X5R ⁻¹	0.47 μ	± 10 ± 20	35	200	0.8± 0.10	R	
EMK107 BJ 105[A]-T			B	X5R ⁻¹	1 μ	± 10 ± 20	5	150	0.8± 0.10	R	
EMK107 BJ 225[A]-T			B	X5R	2.2 μ	± 10 ± 20	10	150	0.8± 0.10	R	
EMK107ABJ 475[A]-T	EMK107 BJ 475[A]-TD				X5R	4.7 μ	± 10 ± 20	10	150	0.8±0.15/-0.05	R
EMK107BBJ 106VA-T					X5R	10 μ	± 20	10	150	0.8±0.20/-0	R
LMK107 BJ 224[A]-T		10	B	X5R ⁻¹	0.22 μ	± 10 ± 20	35	200	0.8± 0.10	R/W	
LMK107 BJ 474[A]-T			B	X5R ⁻¹	0.47 μ	± 10 ± 20	35	200	0.8± 0.10	R	
LMK107 BJ 105[A]-T			B	X5R ⁻¹	1 μ	± 10 ± 20	5	200	0.8± 0.10	R	
LMK107 BJ 225[A]-T			B	X5R	2.2 μ	± 10 ± 20	10	150	0.8± 0.10	R	
LMK107 BJ 475[A]-T					X5R	4.7 μ	± 10 ± 20	10	150	0.8± 0.10	R
LMK107BBJ 106VALT	LMK107 BJ 106VALTD				X5R	10 μ	± 20	10	150	0.8±0.20/-0	R
JMK107 BJ 225[A]-T		6.3	B	X5R	2.2 μ	± 10 ± 20	10	150	0.8± 0.10	R	
JMK107 BJ 475[A]-T					X5R	4.7 μ	± 10 ± 20	10	150	0.8± 0.10	R
JMK107ABJ 106VA-T	JMK107 BJ 106VA-T				X5R	10 μ	± 20	10	150	0.8±0.15/-0.05	R
AMK107 BJ 106VA-T					X5R	10 μ	± 20	10	150	0.8± 0.10	R
AMK107BBJ 226VA-T	AMK107 BJ 226VA-T				X5R	22 μ	± 20	10	150	0.8±0.20/-0	R

Temperature Characteristic BJ : B/X5R 0.45mm thickness K

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan []	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
TMK107 BJ 105[K]-T		25		X5R	1 μ	± 10 ± 20	10	150	0.45± 0.05	R	
EMK107 BJ 105[K]-T		16		X5R	1 μ	± 10 ± 20	10	150	0.45± 0.05	R	
EMK107BBJ 225[K]-T					X5R	2.2 μ	± 10 ± 20	10	150	0.45± 0.05	R
LMK107 BJ 105[K]-T		10	B	X5R	1 μ	± 10 ± 20	10	150	0.45± 0.05	R	
LMK107 BJ 225[K]-T					X5R	2.2 μ	± 10 ± 20	10	150	0.45± 0.05	R
LMK107BBJ 475VKLT	LMK107 BJ 475VKLTD				X5R	4.7 μ	± 20	10	150	0.45± 0.05	R
JMK107 BJ 105[K]-T		6.3	B	X5R	1 μ	± 10 ± 20	10	150	0.45± 0.05	R	
JMK107 BJ 225[K]-T					X5R	2.2 μ	± 10 ± 20	10	150	0.45± 0.05	R
JMK107 BJ 475VK-T					X5R	4.7 μ	± 20	10	150	0.45± 0.05	R
JMK107BBJ 106VK-T					X5R	10 μ	± 20	10	150	0.45± 0.05	R
AMK107BBJ 106VK-T			4		X5R	10 μ	± 20	10	150	0.45± 0.05	R
						X5R	10 μ	± 20	10	150	0.45± 0.05

Temperature Characteristic C6 : X6S 0.8mm thickness A

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan []	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
EMK107 C6105[A]-T		16		X6S	1 μ	± 10 ± 20	5	150	0.8± 0.10	R	
LMK107 C6105[A]-T		10		X6S	1 μ	± 10 ± 20	5	150	0.8± 0.10	R	
JMK107 C6105[A]-T		6.3		X6S	1 μ	± 10 ± 20	5	150	0.8± 0.10	R	
JMK107 C6475[A]-T					X6S	4.7 μ	± 10 ± 20	10	150	0.8± 0.10	R
JMK107BC6106VA-T					X6S	10 μ	± 20	10	150	0.8±0.20/-0	R
AMK107AC6106VA-T		4		X6S	10 μ	± 20	10	150	0.8±0.15/-0.05	R	

Temperature Characteristic B7 : X7R 0.8mm thickness A

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan []	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
UMK107 B7224[A]-TR		50		X7R	0.22 μ	± 10 ± 20	10	150	0.8± 0.10	R	
UMK107 B7474[A]-TR					X7R	0.47 μ	± 10 ± 20	10	150	0.8± 0.10	R
UMK107AB7105[A]-T					X7R	1 μ	± 10 ± 20	10	150	0.8±0.15/-0.05	R
TMK107 B7474[A]-TR		25		X7R	0.47 μ	± 10 ± 20	10	150	0.8± 0.10	R	
TMK107 B7105[A]-T					X7R	1 μ	± 10 ± 20	10	150	0.8± 0.10	R
EMK107 B7224[A]-T		16		X7R	0.22 μ	± 10 ± 20	35	150	0.8± 0.10	R/W	
EMK107 B7474[A]-T					X7R	0.47 μ	± 10 ± 20	35	150	0.8± 0.10	R
EMK107 B7105[A]-T					X7R	1 μ	± 10 ± 20	5	150	0.8± 0.10	R
LMK107 B7224[A]-T		10		X7R	0.22 μ	± 10 ± 20	35	200	0.8± 0.10	R/W	
LMK107 B7474[A]-T					X7R	0.47 μ	± 10 ± 20	35	200	0.8± 0.10	R
LMK107 B7105[A]-T					X7R	1 μ	± 10 ± 20	5	150	0.8± 0.10	R
LMK107 B7225[A]-TR		6.3		X7R	2.2 μ	± 10 ± 20	10	150	0.8± 0.10	R	
JMK107 B7224[A]-T					X7R	0.22 μ	± 10 ± 20	35	200	0.8± 0.10	R/W
JMK107 B7474[A]-T					X7R	0.47 μ	± 10 ± 20	35	200	0.8± 0.10	R
JMK107 B7105[A]-T				X7R	1 μ	± 10 ± 20	5	150	0.8± 0.10	R	

Temperature Characteristic F : F/Y5V 0.8mm thickness A

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan []	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
UMK107 F1042A-T		50	F	Y5V	0.1 μ	80/-20	7	200	0.8± 0.10	R/W	
TMK107 F4742A-T		25	F	Y5V	0.47 μ	80/-20	7	200	0.8± 0.10	R/W	
EMK107 F2242A-T				F	Y5V	0.22 μ	80/-20	7	200	0.8± 0.10	R/W
EMK107 F4742A-T		16	F	Y5V	0.47 μ	80/-20	7	200	0.8± 0.10	R/W	
EMK107 F1052A-T				F	Y5V	1 μ	80/-20	16	200	0.8± 0.10	R
EMK107 F2252A-T				F	Y5V	2.2 μ	80/-20	16	200	0.8± 0.10	R
LMK107 F1052A-T		10	F	Y5V	1 μ	80/-20	16	200	0.8± 0.10	R	
LMK107 F2252A-T				F	Y5V	2.2 μ	80/-20	16	200	0.8± 0.10	R

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Temperature Characteristic BJ : B/X5R 1.25mm thickness G

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan []	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK212 BJ 104[G]-T		50	B	X5R ⁻¹	0.1 μ	± 10 ± 20	35	200	1.25± 0.10	R/W
UMK212 BJ 224[G]-T			B	X5R ⁻¹	0.22 μ	± 10 ± 20	35	200	1.25± 0.10	R/W
UMK212 BJ 474[G]-T			B	X5R ⁻¹	0.47 μ	± 10 ± 20	35	150	1.25± 0.10	R/W
UMK212 BJ 105[G]-T			B	X5R	1 μ	± 10 ± 20	5	150	1.25± 0.10	R/W
UMK212ABJ 225[G]-T			B	X5R	2.2 μ	± 10 ± 20	10	150	1.25±0.15/-0.05	R
UMK212BBJ 475[G]-T			B	X5R	4.7 μ	± 10 ± 20	10	150	1.25±0.20/-0	R

PARTS NUMBER

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
TMK212 BJ 225[G-T]		25	B	X5R	2.2 μ	± 10 ± 20	5	150	1.25± 0.10	R
TMK212ABJ 475[G-T]	TMK212 BJ 475[G-T]		X5R	4.7 μ	± 10 ± 20	10	150	1.25±0.15/- 0.05	R	
TMK212BJ 106VG-T			X5R	10 μ	± 20	10	150	1.25±0.20/- 0	R	
EMK212 BJ 225[G-T]		16	B	X5R ⁻¹	2.2 μ	± 10 ± 20	5	200	1.25± 0.10	R
EMK212ABJ 475[G-T]	EMK212 BJ 475[G-T]		B	X5R ⁻¹	4.7 μ	± 10 ± 20	5	150	1.25±0.15/- 0.05	R
EMK212ABJ 106[G-T]	EMK212 BJ 106[G-T]		X5R	10 μ	± 10 ± 20	10	150	1.25±0.15/- 0.05	R	
EMK212BJ 226VG-T		10	X5R	2.2 μ	± 20	10	150	1.25±0.20/- 0	R	
LMK212 BJ 225[G-T]			B	X5R ⁻¹	2.2 μ	± 10 ± 20	5	200	1.25± 0.10	R
LMK212ABJ 475[G-T]	LMK212 BJ 475[G-T]		B	X5R ⁻¹	4.7 μ	± 10 ± 20	5	200	1.25±0.15/- 0.05	R
LMK212ABJ 106[G-T]	LMK212 BJ 106[G-T]	X5R	10 μ	± 10 ± 20	10	200	1.25±0.15/- 0.05	R		
LMK212BJ 226VG-T	LMK212 BJ 226VG-T	X5R	2.2 μ	± 20	10	150	1.25±0.20/- 0	R		
JMK212ABJ 475[G-T]	JMK212 BJ 475[G-T]	6.3	B	X5R	4.7 μ	± 10 ± 20	5	200	1.25±0.15/- 0.05	R
JMK212ABJ 106[G-T]	JMK212 BJ 106[G-T]		X5R ⁻¹	10 μ	± 10 ± 20	10	200	1.25±0.15/- 0.05	R	
JMK212ABJ 226VG-T	JMK212 BJ 226VG-T		X5R	2.2 μ	± 20	10	150	1.25±0.15/- 0.05	R	
JMK212BJ 476VG-T	JMK212 BJ 476VG-T	X5R	4.7 μ	± 20	10	150	1.25±0.20/- 0	R		

Temperature Characteristic BJ : B/X5R Q85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK212ABJ 105[D-T]	UMK212 BJ 105[D-TD]	50		X5R	1 μ	± 10 ± 20	10	150	0.85± 0.10	R
UMK212BJ 225[D-T]			X5R	2.2 μ	± 10 ± 20	10	150	0.85± 0.10	R	
TMK212 BJ 474[D-T]			B	X5R	0.47 μ	± 10 ± 20	35	200	0.85± 0.10	R
TMK212 BJ 105[D-T]		25	B	X5R	1 μ	± 10 ± 20	5	200	0.85± 0.10	R
TMK212ABJ 225[D-T]	TMK212 BJ 225[D-T]		B	X5R	2.2 μ	± 10 ± 20	5	150	0.85± 0.10	R
TMK212ABJ 475[D-T]	TMK212 BJ 475[D-TD]		X5R	4.7 μ	± 10 ± 20	10	150	0.85± 0.10	R	
EMK212 BJ 105[D-T]		16	B	X5R ⁻¹	1 μ	± 10 ± 20	5	200	0.85± 0.10	R
EMK212ABJ 225[D-T]	EMK212 BJ 225[D-T]		B	X5R ⁻¹	2.2 μ	± 10 ± 20	5	150	0.85± 0.10	R
EMK212 BJ 475[D-T]			B	X5R	4.7 μ	± 10 ± 20	10	150	0.85± 0.10	R
EMK212ABJ 106[D-T]	EMK212 BJ 106[D-TD]	X5R	10 μ	± 10 ± 20	10	150	0.85± 0.10	R		
LMK212 BJ 105[D-T]		10	B	X5R ⁻¹	1 μ	± 10 ± 20	35	200	0.85± 0.10	R
LMK212 BJ 225[D-T]			B	X5R ⁻¹	2.2 μ	± 10 ± 20	5	200	0.85± 0.10	R
LMK212 BJ 475[D-T]			B	X5R	4.7 μ	± 10 ± 20	10	200	0.85± 0.10	R
LMK212ABJ 106[D-T]	LMK212 BJ 106[D-T]	X5R	10 μ	± 10 ± 20	10	150	0.85± 0.10	R		
JMK212 BJ 475[D-T]		6.3	X5R	4.7 μ	± 10 ± 20	10	200	0.85± 0.10	R	
JMK212ABJ 106[D-T]	JMK212 BJ 106[D-T]		X5R	10 μ	± 10 ± 20	10	200	0.85± 0.10	R	
JMK212ABJ 226VD-T	JMK212 BJ 226VD-T		X5R	2.2 μ	± 20	10	150	0.85± 0.10	R	
AMK212BJ 476VD-T		4	X5R	4.7 μ	± 20	10	150	0.85± 0.10	R	

Temperature Characteristic BJ : X5R Q45mm thickness K

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
LMK212ABJ 475[K-T]	LMK212 BJ 475[K-T]	10		X5R	4.7 μ	± 10 ± 20	10	150	0.45± 0.05	R
JMK212ABJ 475[K-T]	JMK212 BJ 475[K-T]	6.3		X5R	4.7 μ	± 10 ± 20	10	150	0.45± 0.05	R
JMK212ABJ 106VK-T *2	JMK212 BJ 106VK-T		X5R	10 μ	± 20	10	150	0.45± 0.05	R	

Temperature Characteristic C6 : X6S 1.25mm thickness G

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
JMK212BC6226VG-T		6.3		X6S	2.2 μ	± 20	10	150	1.25±0.20/- 0	R
AMK212AC6226VG-T			X6S	2.2 μ	± 20	10	150	1.25±0.15/- 0.05	R	
AMK212BC6476VG-T		4		X6S	4.7 μ	± 20	10	150	1.25±0.20/- 0	R

Temperature Characteristic C6 : X6S Q85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
LMK212AC6106[D-T]		10		X6S	10 μ	± 10 ± 20	10	150	0.85± 0.10	R

Temperature Characteristic B7 : X7R 1.25mm thickness G

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK212 B7104[G-T]		50		X7R	0.1 μ	± 10 ± 20	35	200	1.25± 0.10	R/W
UMK212 B7224[G-T]			X7R	0.22 μ	± 10 ± 20	35	150	1.25± 0.10	R/W	
UMK212 B7474[G-T]			X7R	0.47 μ	± 10 ± 20	35	150	1.25± 0.10	R/W	
UMK212 B7105[G-T]		35		X7R	1 μ	± 10 ± 20	10	150	1.25± 0.10	R/W
UMK212BB7225[G-T]			X7R	2.2 μ	± 10 ± 20	10	150	1.25±0.20/- 0	R	
GMK212 B7105[G-T]			X7R	1 μ	± 10 ± 20	35	150	1.25± 0.10	R/W	
TMK212 B7105[G-T]		25		X7R	1 μ	± 10 ± 20	35	150	1.25± 0.10	R
TMK212 B7225[G-TR]			X7R	2.2 μ	± 10 ± 20	10	150	1.25± 0.10	R	
TMK212AB7475[G-T]	TMK212 B7475[G-T]		X7R	4.7 μ	± 10 ± 20	10	150	1.25±0.15/- 0.05	R	
EMK212 B7105[G-T]		16		X7R	1 μ	± 10 ± 20	35	200	1.25± 0.10	R/W
EMK212 B7225[G-T]			X7R	2.2 μ	± 10 ± 20	10	150	1.25± 0.10	R	
EMK212 B7475[G-T]			X7R	4.7 μ	± 10 ± 20	10	150	1.25± 0.10	R	
EMK212BB7106VG-T		10		X7R	10 μ	± 20	10	150	1.25±0.20/- 0	R
LMK212 B7105[G-T]			X7R	1 μ	± 10 ± 20	35	200	1.25± 0.10	R/W	
LMK212 B7225[G-T]			X7R	2.2 μ	± 10 ± 20	5	200	1.25± 0.10	R	
LMK212 B7475[G-T]		6.3		X7R	4.7 μ	± 10 ± 20	10	150	1.25± 0.10	R
LMK212AB7106VG-T	LMK212 B7106VG-TD		X7R	10 μ	± 20	10	150	1.25±0.15/- 0.05	R	
JMK212AB7106[G-T]	JMK212 B7106[G-T]		X7R	10 μ	± 10 ± 20	10	150	1.25±0.15/- 0.05	R	

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Temperature Characteristic B7 : X7R 0.85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK212AB7104[D]-T		50	X7R		0.1 μ	± 10 ± 20	10	150	0.85± 0.10	R
UMK212AB7224[D]-T			X7R		0.22 μ	± 10 ± 20	10	150	0.85± 0.10	R
UMK212AB7474[D]-T			X7R		0.47 μ	± 10 ± 20	10	150	0.85± 0.10	R
UMK212AB7105[D]-T			X7R		1 μ	± 10 ± 20	10	150	0.85± 0.10	R
TMK212AB7225[D]-TR		25	X7R		2.2 μ	± 10 ± 20	10	150	0.85± 0.10	R
EMK212 B7474[D]-T		16	X7R		0.47 μ	± 10 ± 20	35	200	0.85± 0.10	R/W
EMK212 B7105[D]-T			X7R		1 μ	± 10 ± 20	5	200	0.85± 0.10	R
EMK212AB7225[D]-T	EMK212 B7225[D]-T		X7R		2.2 μ	± 10 ± 20	5	150	0.85± 0.10	R
LMK212 B7105[D]-T		10	X7R		1 μ	± 10 ± 20	35	200	0.85± 0.10	R
LMK212AB7225[D]-T	LMK212 B7225[D]-T		X7R		2.2 μ	± 10 ± 20	5	200	0.85± 0.10	R
LMK212AB7475[D]-TR	LMK212 B7475[D]-TR		X7R		4.7 μ	± 10 ± 20	10	150	0.85± 0.10	R

Temperature Characteristic F : F/Y5V 1.25mm thickness G

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK212 F474G-T		50	F	Y5V	0.47 μ	80V-20	7	200	1.25± 0.10	R/W
UMK212 F106G-T			F	Y5V	1 μ	80V-20	7	200	1.25± 0.10	R/W
EMK212 F225G-T		16	F	Y5V	2.2 μ	80V-20	7	200	1.25± 0.10	R/W
LMK212 F475G-T		10	F	Y5V	4.7 μ	80V-20	9	200	1.25± 0.10	R
LMK212 F106G-T			F	Y5V	10 μ	80V-20	16	200	1.25± 0.10	R
JMK212 F106G-T		6.3	F	Y5V	10 μ	80V-20	16	200	1.25± 0.10	R

Temperature Characteristic F : F/Y5V 0.85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK212 F224D-T		50	F	Y5V	0.22 μ	80V-20	7	200	0.85± 0.10	R/W
LMK212 F225D-T		10	F	Y5V	2.2 μ	80V-20	9	200	0.85± 0.10	R
JMK212 F475D-T		6.3	F	Y5V	4.7 μ	80V-20	16	200	0.85± 0.10	R

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Temperature Characteristic BJ : B/Y5R 1.6mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK316 BJ 105[L]-T		50	B	X5R ⁻¹	1 μ	± 10 ± 20	35	200	1.6± 0.20	R
UMK316 BJ 225[L]-T			X5R		2.2 μ	± 10 ± 20	10	150	1.6± 0.20	R
UMK316 BJ 475[L]-T			X5R		4.7 μ	± 10 ± 20	10	150	1.6± 0.20	R
UMK316BBJ 106M-L-T			X5R		10 μ	± 20	10	150	1.6± 0.20	R
TMK316 BJ 225[L]-T		25	B	X5R ⁻¹	2.2 μ	± 10 ± 20	35	200	1.6± 0.20	R
TMK316 BJ 475[L]-T			B	X5R	4.7 μ	± 10 ± 20	5	150	1.6± 0.20	R
TMK316 BJ 106[L]-T			X5R ⁻¹		10 μ	± 10 ± 20	5	150	1.6± 0.20	R
TMK316BBJ 226M-L-T			X5R		2.2 μ	± 20	10	150	1.6± 0.20	R
EMK316 BJ 225[L]-T		16	B	X5R ⁻¹	2.2 μ	± 10 ± 20	35	200	1.6± 0.20	R/W
EMK316 BJ 475[L]-T			B	X5R	4.7 μ	± 10 ± 20	5	200	1.6± 0.20	R
EMK316 BJ 106[L]-T			B	X5R ⁻¹	10 μ	± 10 ± 20	5	150	1.6± 0.20	R
EMK316ABJ 226M-L-T	EMK316 BJ 226M-L-T		B	X5R	2.2 μ	± 20	10	150	1.6± 0.20	R
LMK316 BJ 106[L]-T		10	B	X5R ⁻¹	10 μ	± 10 ± 20	5	200	1.6± 0.20	R
LMK316ABJ 226[L]-T	LMK316 BJ 226[L]-T		B	X5R	2.2 μ	± 10 ± 20	10	150	1.6± 0.20	R
LMK316ABJ 476M-L-T	LMK316 BJ 476M-L-T		X5R		4.7 μ	± 20	10	150	1.6± 0.20	R
JMK316 BJ 106[L]-T		6.3	B	X5R ⁻¹	10 μ	± 10 ± 20	5	200	1.6± 0.20	R
JMK316ABJ 226[L]-T	JMK316 BJ 226[L]-T		B	X5R	2.2 μ	± 10 ± 20	10	200	1.6± 0.20	R
JMK316ABJ 476M-L-T	JMK316 BJ 476M-L-T		X5R		4.7 μ	± 20	10	200	1.6± 0.20	R
JMK316ABJ 107M-L-T	JMK316 BJ 107M-L-T		X5R		100 μ	± 20	10	150	1.6± 0.20	R
AMK316ABJ 107M-L-T	AMK316 BJ 107M-L-T		X5R		100 μ	± 20	10	150	1.6± 0.20	R

Temperature Characteristic BJ : B/Y5R 0.85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK316 BJ 105[D]-T		50	B	X5R	1 μ	± 10 ± 20	35	150	0.85± 0.10	R
UMK316 BJ 225[D]-T			B	X5R	2.2 μ	± 10 ± 20	35	150	0.85± 0.10	R
UMK316ABJ 475[D]-T	UMK316 BJ 475[D]-T		X5R		4.7 μ	± 10 ± 20	10	150	0.85± 0.10	R
TMK316 BJ 105[D]-T			B	X5R	1 μ	± 10 ± 20	35	200	0.85± 0.10	R
TMK316 BJ 225[D]-T		25	B	X5R	2.2 μ	± 10 ± 20	35	150	0.85± 0.10	R
TMK316 BJ 475[D]-T			X5R		4.7 μ	± 10 ± 20	5	150	0.85± 0.10	R
TMK316ABJ 106[D]-T	TMK316 BJ 106[D]-TD		X5R		10 μ	± 10 ± 20	10	150	0.85± 0.10	R
EMK316 BJ 225[D]-T			B	X5R	2.2 μ	± 10 ± 20	35	200	0.85± 0.10	R
EMK316 BJ 475[D]-T		16	B	X5R	4.7 μ	± 10 ± 20	5	200	0.85± 0.10	R
EMK316 BJ 106[D]-T			X5R		10 μ	± 10 ± 20	10	150	0.85± 0.10	R
EMK316ABJ 226M-D-T	EMK316 BJ 226M-D-T		X5R		2.2 μ	± 20	10	150	0.85± 0.10	R
LMK316 BJ 475[D]-T		10	B	X5R	4.7 μ	± 10 ± 20	5	200	0.85± 0.10	R
LMK316 BJ 106[D]-T			B	X5R	10 μ	± 10 ± 20	10	200	0.85± 0.10	R
LMK316ABJ 226M-D-T	LMK316 BJ 226M-D-T		X5R		2.2 μ	± 20	10	150	0.85± 0.10	R
JMK316 BJ 106[D]-T			B	X5R	10 μ	± 10 ± 20	10	200	0.85± 0.10	R
JMK316ABJ 226M-D-T	JMK316 BJ 226M-D-T	6.3	X5R		2.2 μ	± 20	10	150	0.85± 0.10	R
JMK316ABJ 476M-D-T	JMK316 BJ 476M-D-T		X5R		4.7 μ	± 20	10	150	0.85± 0.10	R

Temperature Characteristic C6 : X6S 0.85mm thickness L

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
EMK316BC6226M-L-T		16	X6S		22 μ	± 20	10	150	1.6± 0.20	R
JMK316AC6476M-L-T		6.3	X6S		4.7 μ	± 20	10	150	1.6± 0.20	R
AMK316AC6476M-L-T		4	X6S		4.7 μ	± 20	10	200	1.6± 0.20	R
AMK316AC6107M-L-T			X6S		100 μ	± 20	10	150	1.6± 0.20	R

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Temperature Characteristic B7 : X7R 1.6mm thickness L

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK316 B7224[L-T		50		X7R	0.22 μ	± 10 ± 20	25	200	1.6± 0.20	R/W
UMK316 B7474[L-T				X7R	0.47 μ	± 10 ± 20	35	200	1.6± 0.20	R/W
UMK316 B7105[L-T				X7R	1 μ	± 10 ± 20	35	200	1.6± 0.20	R
UMK316 B7225[L-T				X7R	2.2 μ	± 10 ± 20	10	150	1.6± 0.20	R
UMK316AB7475[L-T	UMK316 B7475[L-T			X7R	4.7 μ	± 10 ± 20	10	150	1.6± 0.20	R
TMK316 B7105[L-T		25		X7R	1 μ	± 10 ± 20	35	200	1.6± 0.20	R/W
TMK316 B7225[L-T				X7R	2.2 μ	± 10 ± 20	35	200	1.6± 0.20	R
TMK316AB7475[L-T	TMK316 B7475[L-T			X7R	4.7 μ	± 10 ± 20	10	200	1.6± 0.20	R
TMK316AB7105[L-T	TMK316 B7105[L-TD			X7R	10 μ	± 10 ± 20	10	150	1.6± 0.20	R
EMK316 B7225[L-T			16		X7R	2.2 μ	± 10 ± 20	35	200	1.6± 0.20
EMK316AB7105[L-T	EMK316 B7105[L-TD			X7R	10 μ	± 10 ± 20	10	200	1.6± 0.20	R
LMK316 B7225[L-T				X7R	2.2 μ	± 10 ± 20	35	200	1.6± 0.20	R/W
LMK316 B7475[L-T				X7R	4.7 μ	± 10 ± 20	5	200	1.6± 0.20	R
LMK316AB7105[L-T	LMK316 B7105[L-TD	10			X7R	10 μ	± 10 ± 20	10	200	1.6± 0.20
LMK316AB7226[L-TR	LMK316 B7226[L-TD			X7R	22 μ	± 10 ± 20	10	150	1.6± 0.20	R
JMK316 B7105[L-T			6.3		X7R	10 μ	± 10 ± 20	5	200	1.6± 0.20

Temperature Characteristic B7 : X7R 0.85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK316 B7225[D-T		50		X7R	2.2 μ	± 10 ± 20	10	150	0.85± 0.10	R
TMK316AB7475[D-T		25		X7R	4.7 μ	± 10 ± 20	10	150	0.85± 0.10	R
LMK316AB7105[D-T		10		X7R	10 μ	± 20	10	150	0.85± 0.10	R

Temperature Characteristic F : F/Y5V 1.6mm thickness L

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
GMK316 F106ZL-T		35	F	Y5V	10 μ	80/-20	9	200	1.6± 0.20	R
TMK316 F106ZL-T		25	F	Y5V	10 μ	80/-20	9	200	1.6± 0.20	R
EMK316 F106ZL-T		16	F	Y5V	10 μ	80/-20	9	200	1.6± 0.20	R
LMK316 F226ZL-T		10	F	Y5V	22 μ	80/-20	16	200	1.6± 0.20	R

Temperature Characteristic F : F/Y5V 1.25mm thickness G

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK316 F225ZG-T		50	F	Y5V	2.2 μ	80/-20	7	200	1.25± 0.10	R/W
GMK316 F475ZG-T		35	F	Y5V	4.7 μ	80/-20	7	200	1.25± 0.10	R

Temperature Characteristic F : F/Y5V 0.85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
LMK316 F475ZD-T		10	F	Y5V	4.7 μ	80/-20	9	200	0.85± 0.10	R
JMK316 F106ZD-T		6.3	F	Y5V	10 μ	80/-20	16	200	0.85± 0.10	R

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Temperature Characteristic BJ : B/X5R 2.5mm thickness M

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
UMK325 BJ 475[M-T		50		X5R	4.7 μ	± 10 ± 20	5	150	2.5± 0.20	R	
UMK325 BJ 106[M-T				X5R	10 μ	± 10 ± 20	5	150	2.5± 0.20	R	
TMK325 BJ 106[M-T			25	B	X5R ⁻¹	10 μ	± 10 ± 20	35	150	2.5± 0.20	R
TMK325 BJ 226[M-T					X5R	22 μ	± 10 ± 20	10	150	2.5± 0.20	R
EMK325 BJ 226[M-T					B	X5R	22 μ	± 10 ± 20	5	150	2.5± 0.20
EMK325 BJ 476[M-T		16		X5R	4.7 μ	± 20	10	150	2.5± 0.20	R	
LMK325 BJ 226[M-T				B	X5R	22 μ	± 10 ± 20	5	200	2.5± 0.20	R
LMK325 BJ 476[M-T			10		X5R	4.7 μ	± 20	10	150	2.5± 0.20	R
LMK325ABJ 107[M-T	LMK325 BJ 107[M-T				X5R	100 μ	± 20	10	150	2.5± 0.30	R
JMK325 BJ 476[M-T				6.3		X5R	4.7 μ	± 20	10	150	2.5± 0.20
JMK325ABJ 107[M-T	JMK325 BJ 107[M-T		X5R		100 μ	± 20	10	150	2.5± 0.30	R	
AMK325ABJ 227[M-T		4			X5R	220 μ	± 20	10	150	2.5± 0.30	R

Temperature Characteristic BJ : B/X5R 1.9mm thickness Y,N

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [δ]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
UMK325 BJ 475[N-T		50		X5R	4.7 μ	± 10 ± 20	10	150	1.9± 0.20	R	
GMK325 BJ 225[M-N-T		35	B	X5R	2.2 μ	± 20	35	200	1.9± 0.20	R	
GMK325 BJ 475[N-T				X5R	4.7 μ	± 10 ± 20	10	150	1.9± 0.20	R	
GMK325 BJ 106[N-T				B	X5R	10 μ	± 10 ± 20	5	150	1.9± 0.20	R
TMK325 BJ 335[M-N-T		25	B	X5R ⁻¹	3.3 μ	± 20	35	200	1.9± 0.20	R	
TMK325 BJ 475[N-T				B	X5R ⁻¹	4.7 μ	± 10 ± 20	35	200	1.9± 0.20	R
TMK325 BJ 106[N-T				B	X5R	10 μ	± 10 ± 20	5	200	1.9± 0.20	R
EMK325 BJ 475[N-T		16		X5R ⁻¹	4.7 μ	± 10 ± 20	35	200	1.9± 0.20	R	
EMK325 BJ 106[N-T				B	X5R	10 μ	± 10 ± 20	35	200	1.9± 0.20	R
EMK325 BJ 476[M-T				X5R	4.7 μ	± 20	10	150	1.9± 0.1/- 0.2	R	
LMK325 BJ 226[M-T			10	B	X5R	22 μ	± 20	5	150	1.9± 0.1/- 0.2	R
LMK325 BJ 106[N-T					B	X5R	10 μ	± 10 ± 20	35	200	1.9± 0.20
JMK325 BJ 226[M-T		6.3		B	X5R	22 μ	± 20	5	200	1.9± 0.1/- 0.2	R
JMK325 BJ 107[M-T				X5R	100 μ	± 20	10	150	1.9± 0.1/- 0.2	R	
JMK325 BJ 476[M-N-T				X5R	4.7 μ	± 20	10	150	1.9± 0.20	R	

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Temperature Characteristic BJ : B/X5R 0.85mm thickness D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
TMK325 BJ 106J]D-T		25	B	X5R	10 μ	± 10 ± 20	5	150	0.85± 0.10	R
EMK325 BJ 106J]D-T		16	B	X5R	10 μ	± 10 ± 20	5	150	0.85± 0.10	R
EMK325 BJ 226MD-T			B	X5R	22 μ	± 20	10	150	0.85± 0.10	R
LMK325 BJ 335J]D-T		10	B	X5R	3.3 μ	± 10 ± 20	35	200	0.85± 0.10	R
LMK325 BJ 475J]D-T			B	X5R	4.7 μ	± 10 ± 20	5	200	0.85± 0.10	R
LMK325 BJ 106J]D-T			B	X5R	10 μ	± 10 ± 20	5	150	0.85± 0.10	R

Temperature Characteristic C6 : X6S 2.5mm thickness M

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
JMK325AC6107MM-T		6.3		X6S	100 μ	± 20	10	150	2.5± 0.30	R

Temperature Characteristic B7 : X7R 2.5mm thickness M

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
UMK325 B7475J]M-T		50		X7R	4.7 μ	± 10 ± 20	5	150	2.5± 0.20	R
UMK325AB7106J]M-T					X7R	10 μ	± 10 ± 20	10	150	2.5± 0.30
TMK325AB7106MM-T		25		X7R	10 μ	± 20	10	150	2.5± 0.30	R
TMK325 B7226J]M-TR					X7R	22 μ	± 10 ± 20	10	150	2.5± 0.20
EMK325 B7226J]M-TR		16		X7R	22 μ	± 10 ± 20	10	150	2.5± 0.20	R
LMK325 B7476J]M-TR		10		X7R	47 μ	± 10 ± 20	10	150	2.5± 0.20	R
JMK325 B7476J]M-TR		6.3		X7R	47 μ	± 10 ± 20	10	200	2.5± 0.20	R

Temperature Characteristic B7 : X7R 1.9mm thickness N

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave	
								Rated voltage x			
UMK325 B7475J]N-TR		50		X7R	4.7 μ	± 10 ± 20	10	150	1.9± 0.20	R	
TMK325 B7335J]N-T		25		X7R	3.3 μ	± 10 ± 20	35	200	1.9± 0.20	R	
TMK325 B7475J]N-T					X7R	4.7 μ	± 10 ± 20	35	150	1.9± 0.20	R
TMK325 B7106J]N-TR		16		X7R	10 μ	± 10 ± 20	10	150	1.9± 0.20	R	
EMK325 B7475J]N-T					X7R	4.7 μ	± 10 ± 20	35	200	1.9± 0.20	R
EMK325 B7106J]N-T					X7R	10 μ	± 10 ± 20	35	150	1.9± 0.20	R
LMK325 B7106J]N-T		10		X7R	10 μ	± 10 ± 20	35	200	1.9± 0.20	R	

Temperature Characteristic F : F/Y5V 1.9mm thickness N

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	tan [%]	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
EMK325 F226Z-N-T		16	F	Y5V	22 μ	80/-20	16	200	1.9± 0.20	R
LMK325 F226Z-N-T		10	F	Y5V	22 μ	80/-20	16	200	1.9± 0.20	R
JMK325 F476Z-N-T		6.3	F	Y5V	47 μ	80/-20	16	200	1.9± 0.20	R

Multilayer Ceramic Capacitors (Temperature compensating type)

O42TYPE

Temperature Characteristic C : C /CO 0.2mm thickness C,D

Part number 1	Part number 2	Rated voltage [V]	Temperature characteristics		Capacitance [F]	Capacitance tolerance [%]	Q	HALT	Thickness ⁻³ [mm]	Soldering R:Reflow W:Wave
								Rated voltage x		
EMK042 CKQR4CD-W		16	CK	COK	0.4 p	± 0.25pF	408	200	0.2± 0.02	R
EMK042 CKQR5CD-W			CK	COK	0.5 p	± 0.25pF	410	200	0.2± 0.02	R
EMK042 CKQR6CD-W			CK	COK	0.6 p	± 0.25pF	412	200	0.2± 0.02	R
EMK042 CKQR7CD-W			CK	COK	0.7 p	± 0.25pF	414	200	0.2± 0.02	R
EMK042 CKR75CD-W			CK	COK	0.75 p	± 0.25pF	415	200	0.2± 0.02	R
EMK042 CKQR8CD-W			CK	COK	0.8 p	± 0.25pF	416	200	0.2± 0.02	R
EMK042 CKQR9CD-W			CK	COK	0.9 p	± 0.25pF	418	200	0.2± 0.02	R
EMK042 CKO10CD-W			CK	COK	1 p	± 0.25pF	420	200	0.2± 0.02	R
EMK042 CK1R1CD-W			CK	COK	1.1 p	± 0.25pF	422	200	0.2± 0.02	R
EMK042 CK1R2CD-W			CK	COK	1.2 p	± 0.25pF	424	200	0.2± 0.02	R
EMK042 CK1R3CD-W			CK	COK	1.3 p	± 0.25pF	426	200	0.2± 0.02	R
EMK042 CK1R4CD-W			CK	COK	1.4 p	± 0.25pF	428	200	0.2± 0.02	R
EMK042 CK1R5CD-W			CK	COK	1.5 p	± 0.25pF	430	200	0.2± 0.02	R
EMK042 CK1R6CD-W			CK	COK	1.6 p	± 0.25pF	432	200	0.2± 0.02	R
EMK042 CK1R7CD-W			CK	COK	1.7 p	± 0.25pF	434	200	0.2± 0.02	R
EMK042 CK1R8CD-W			CK	COK	1.8 p	± 0.25pF	436	200	0.2± 0.02	R
EMK042 CK1R9CD-W			CK	COK	1.9 p	± 0.25pF	438	200	0.2± 0.02	R
EMK042 CKQ20CD-W			CK	COK	2 p	± 0.25pF	440	200	0.2± 0.02	R
EMK042 CK2R1CD-W			CK	COK	2.1 p	± 0.25pF	442	200	0.2± 0.02	R
EMK042 CK2R2CD-W			CK	COK	2.2 p	± 0.25pF	444	200	0.2± 0.02	R
EMK042 CK2R3CD-W			CK	COK	2.3 p	± 0.25pF	446	200	0.2± 0.02	R
EMK042 CK2R4CD-W			CK	COK	2.4 p	± 0.25pF	448	200	0.2± 0.02	R
EMK042 CK2R5CD-W			CK	COK	2.5 p	± 0.25pF	450	200	0.2± 0.02	R
EMK042 CK2R6CD-W			CK	COK	2.6 p	± 0.25pF	452	200	0.2± 0.02	R
EMK042 CK2R7CD-W			CK	COK	2.7 p	± 0.25pF	454	200	0.2± 0.02	R
EMK042 CK2R8CD-W			CK	COK	2.8 p	± 0.25pF	456	200	0.2± 0.02	R
EMK042 CK2R9CD-W			CK	COK	2.9 p	± 0.25pF	458	200	0.2± 0.02	R
EMK042 CJQ30CD-W			CJ	COJ	3 p	± 0.25pF	460	200	0.2± 0.02	R
EMK042 CJ3R1CD-W			CJ	COJ	3.1 p	± 0.25pF	462	200	0.2± 0.02	R
EMK042 CJ3R2CD-W			CJ	COJ	3.2 p	± 0.25pF	464	200	0.2± 0.02	R
EMK042 CJ3R3CD-W			CJ	COJ	3.3 p	± 0.25pF	466	200	0.2± 0.02	R
EMK042 CJ3R4CD-W			CJ	COJ	3.4 p	± 0.25pF	468	200	0.2± 0.02	R
EMK042 CJ3R5CD-W			CJ	COJ	3.5 p	± 0.25pF	470	200	0.2± 0.02	R
EMK042 CJ3R6CD-W			CJ	COJ	3.6 p	± 0.25pF	472	200	0.2± 0.02	R
EMK042 CJ3R7CD-W			CJ	COJ	3.7 p	± 0.25pF	474	200	0.2± 0.02	R
EMK042 CJ3R8CD-W			CJ	COJ	3.8 p	± 0.25pF	476	200	0.2± 0.02	R
EMK042 CJ3R9CD-W			CJ	COJ	3.9 p	± 0.25pF	478	200	0.2± 0.02	R

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Multilayer Ceramic Capacitors

PACKAGING

Minimum Quantity

Taped package

Type(EIA)	Thickness		Standard quantity [pcs]	
	mm	code	Paper tape	Embossed tape
MK042(01005)	0.2	C, D		40000
MK063(0201)	0.3	P, T	15000	
VK105(0204)	0.3	P	10000	
MK105(0402)	0.2	C	20000	
	0.3	P	15000	
	0.5	V	10000	
VK105(0402)	0.5	W		
MK107(0603)	0.45	K	4000	
VK107(0306)	0.5	V		4000
MR107(0603)	0.8	A		
MK212(0805)	0.45	K	4000	
	0.85	D		
	1.25	G		3000
MK316(1206)	0.85	D	4000	
	1.15	F		
	1.25	G		3000
MR316(1206)	1.6	L		
	0.85	D		
	1.15	F		2000
MK325(1210)	1.9	N		
	2.0max.	Y		
	2.5	M		500 T , 1000 P
MR325(1210)	2.5	M		500

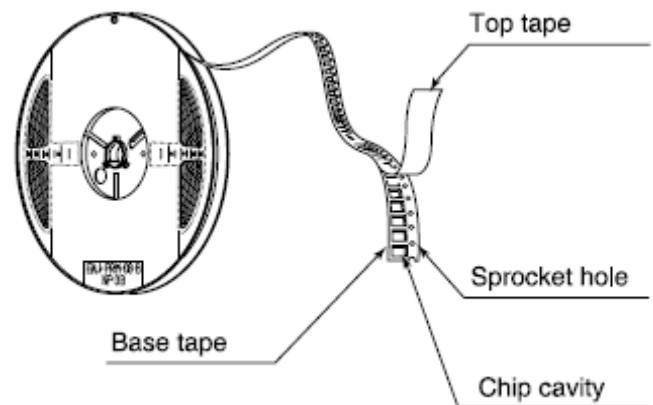
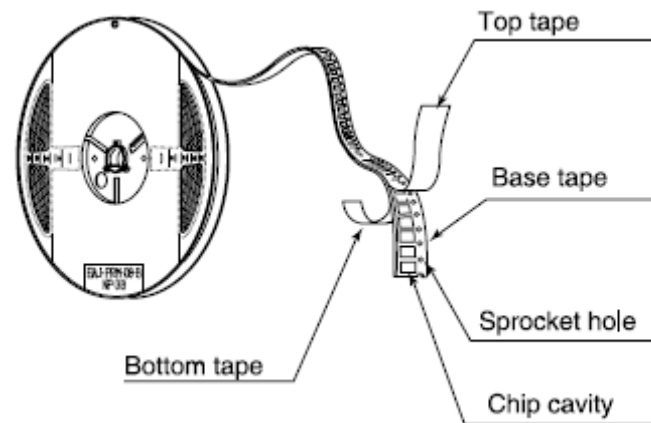
Note : LWRReverse type.

Taping material

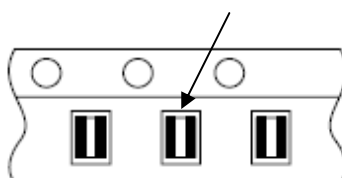
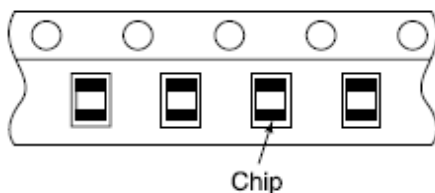
No bottom tape for pressed carrier tape

Card board carrier tape

Embossed tape



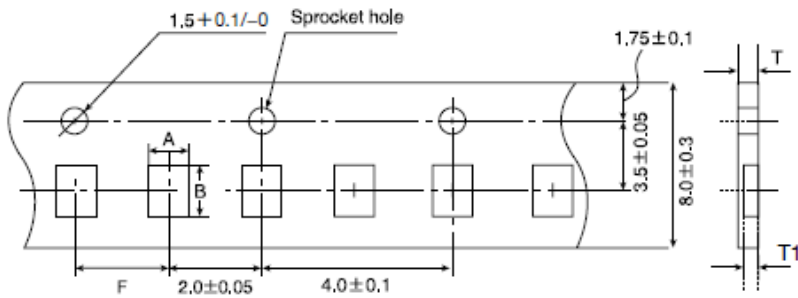
Chip filled



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Representative taping dimensions

Paper Tape 8mm wide
 Pressed carrier tape 2mm pitch

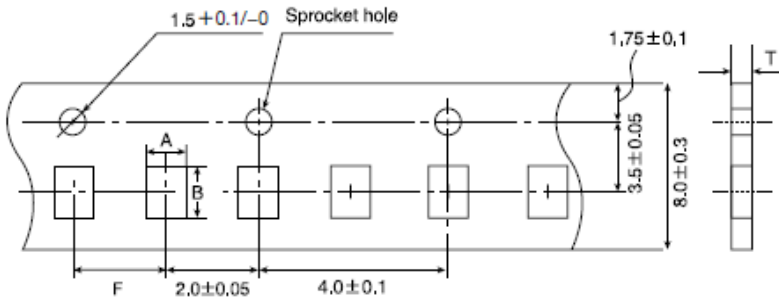


Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
					T1
MK063(0201)	0.37	0.67	20± 0.05	0.45max.	0.42max.
VK105(0204)	0.65	1.15		0.4max.	0.3max.
MK105(0402) *1 C				0.45max.	0.42max.
MK105(0402) *1 P					

Note *1 Thickness, C 0.2mm, P 0.3mm LWRReverse type.

Unit mm

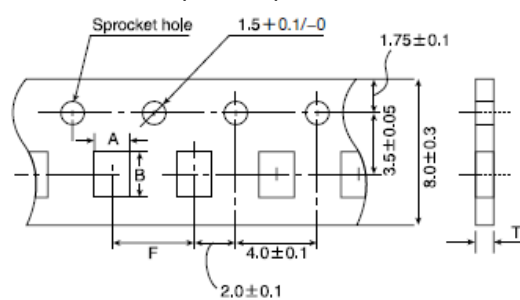
Punched carrier tape 2mm pitch



Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness
MK105 (0402)	0.65	1.15	20± 0.05	0.8max.
VK105 (0402)				

Unit

Punched carrier tape 4mm pitch



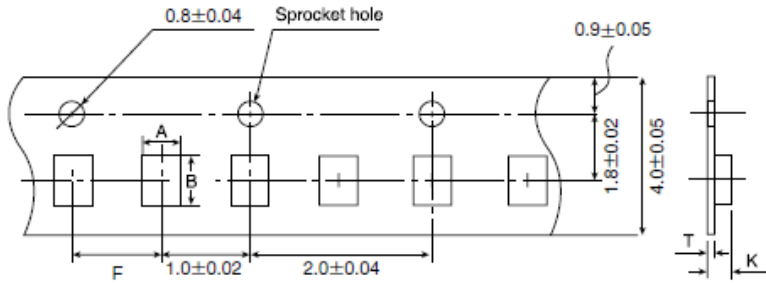
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness
MK107(0603)	1.0	1.8	40± 0.1	1.1max.
VK107(0306)				
MR107(0603)				
MK212(0805)	1.65	2.4		1.1max.
VK212(0508)				
MK316(1206)	2.0	3.6		

Note Taping size might be different depending on the size of the product.

LWRReverse type.

Unit mm

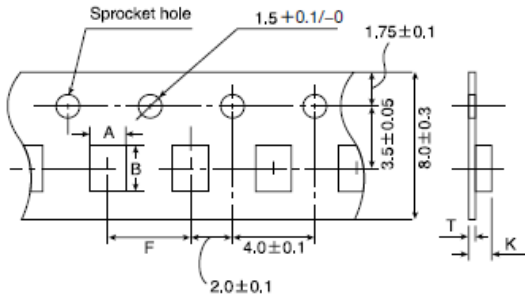
Embossed tape 4mm wide



Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	Q23	Q43		K	T
MK042(01005)			1.0± 0.02	0.5max.	0.25max.

Unit mm

Embossed tape 8mm wide

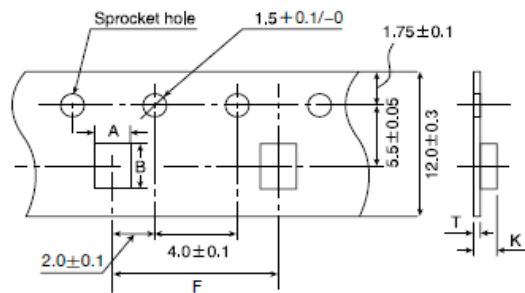


Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
				K	T
WK107(0306)	1.0	1.8	4.0± 0.1	1.3max.	0.25± 0.1
MK212(0805)	1.65	2.4		3.4max.	0.6max.
MR212(0805)					
MK316(1206)	2.0	3.6			
MR316(1206)					
MK325(1210)	2.8	3.6			
MR325(1210)					

Unit mm

Note LWRReverse type.

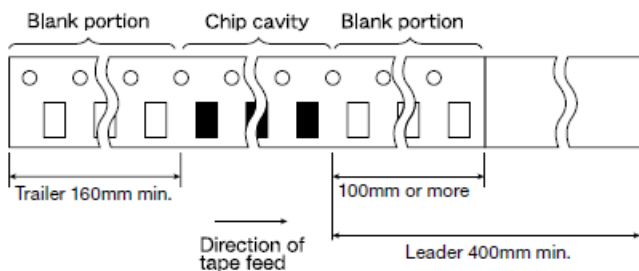
Embossed tape 12mm wide



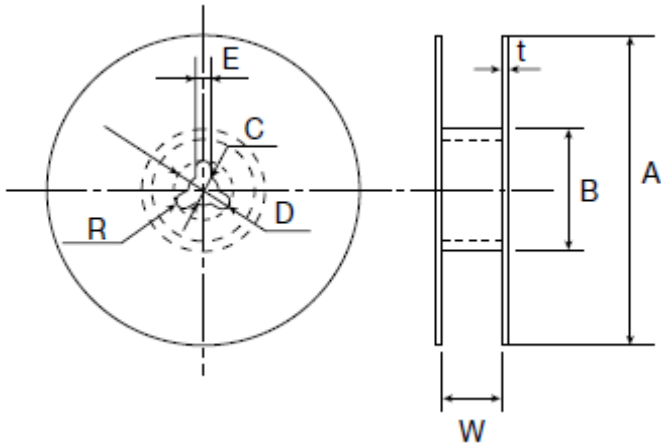
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
				K	T
MK432(1812)	3.7	4.9	8.0± 0.1	4.0max.	0.6max.

Unit mm

Trailer and Leader



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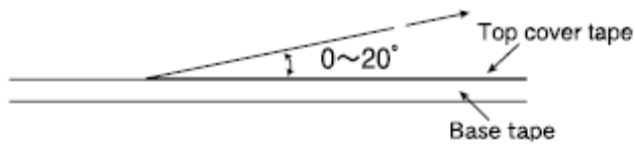
A	B	C	D	E	R
178± 20	50min.	130± 0.2	21.0± 0.8	20± 0.5	1.0

	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

Unit mm

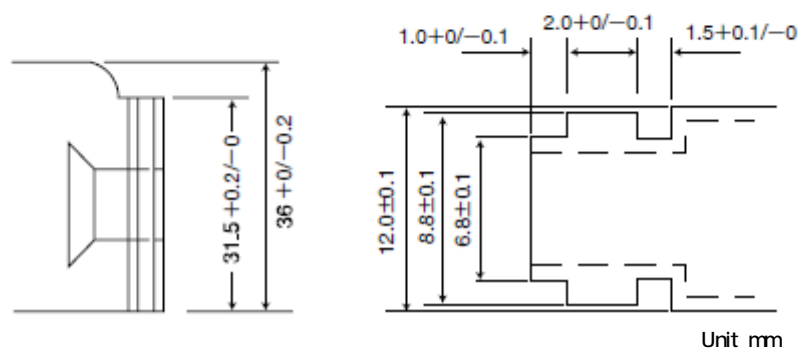
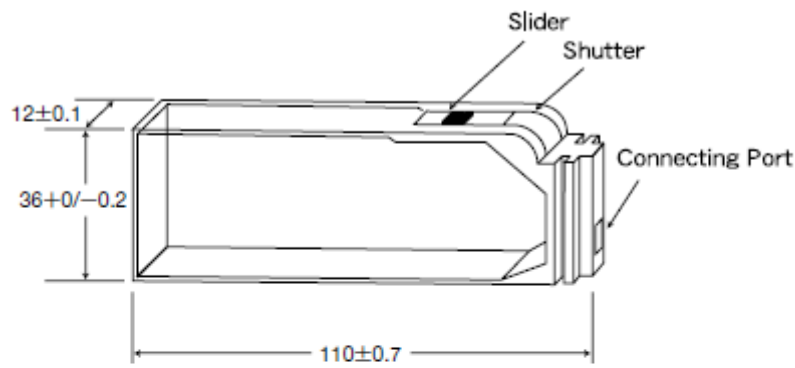
Top Tape Strength

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



Bulk Cassette

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



Unit mm

Multilayer Ceramic Capacitors

RELIABILITY DATA

1. Operating Temperature Range

Specified Value	Temperature Compensating Class1	Standard	55 to 125	
		High Frequency Type		
Specified Value	High Permittivity Class2		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
		LD()	X5R	55 to 85
		F	F	25 to 85
Y5V	30 to 85			
Note: LD Low distortion high value multilayer ceramic capacitor				

2. Storage Conditions

Specified Value	Temperature Compensating Class1	Standard	55 to 125	
		High Frequency Type		
Specified Value	High Permittivity Class2		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
		LD()	X5R	55 to 85
		F	F	25 to 85
Y5V	30 to 85			
Note: LD Low distortion high value multilayer ceramic capacitor				

3. Rated Voltage

Specified Value	Temperature Compensating Class1	Standard	50VDC, 25VDC, 16VDC
		High Frequency Type	50VDC, 16VDC
	High Permittivity Class2		50VDC, 35VDC, 25VDC, 16VDC, 10VDC, 6.3VDC, 4VDC, 2.5VDC

4. Withstanding Voltage Between terminals

Specified Value	Temperature Compensating Class1	Standard	No breakdown or damage
		High Frequency Type	
Test Methods and Remarks	High Permittivity Class2		
		Class 1	Class 2
	Applied voltage	Rated voltage \times 3	Rated voltage \times 2.5
	Duration	1 to 5 sec.	
Charge/discharge current	50mA max.		

5. Insulation Resistance

Specified Value	Temperature Compensating Class1	Standard	10000 M min.
		High Frequency Type	
Specified Value	High Permittivity Class2	Note 1	C 0047 μ F : 10000 M min. C 0047 μ F : 500M μ F
	Test Methods and Remarks	Applied voltage	: Rated voltage
	Duration	: 60 \pm 5 sec.	
	Charge/discharge current	: 50mA max.	

6. Capacitance Tolerance							
Specified Value	Temperature Compensating Class1	Standard	C	0.2pF C 5pF : ± 0.25pF			
			U	0.2pF C 10pF : ± 0.5pF			
Specified Value	High Frequency Type	Standard	SL	C 10pF : ± 5%or ± 10%			
			CH	0.3pF C 2pF : ± 0.1pF			
Specified Value	High Permittivity Class2	Standard	RH	C 2pF : ± 5%			
			BJ, B7, C6, C7, LD() : ± 10%or ± 20% F : 80/ 20% Note: LD Lowdistortion high value multilayer ceramic capacitor				
Test Methods and Remarks		Class 1		Class 2			
		Standard	High Frequency Type	C 10μ F	C 10μ F		
		Preconditioning			Thermal treatment at 150 for 1hr Note 2		
		Measuring frequency			1 Hz± 10%	120± 10Hz	
		Measuring voltage Note			0.5 to 5Vrms	1± 0.2Vrms	
Bias application			one				

7. Q or Dissipation Factor							
Specified Value	Temperature Compensating Class1	Standard	C 30pF : Q 400 20C	C 30pF : Q 1000 C Nominal capacitance			
			High Frequency Type	Refer to detailed specification			
Specified Value	High Permittivity Class2	Standard	Note 1				
			BJ, B7, C6, C7 25%max., F 7%max.				
Test Methods and Remarks		Class 1		Class 2			
		Standard	High Frequency Type	C 10μ F	C 10μ F		
		Preconditioning			Thermal treatment at 150 for 1hr Note 2		
		Measuring frequency			1 Hz± 10%	1GHz	
		Measuring voltage Note 1			0.5 to 5Vrms	1± 0.2Vrms	
Bias application			None				
High Frequency Type							
Measuring equipment : HP4291A							
Measuring jig : HP16192A							

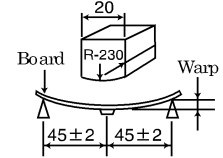
8. Temperature Characteristic Without voltage application																																																		
Specified Value	Temperature Compensating Class1	Standard	Temperature Characteristic ppm/		Tolerance ppm/																																													
			C : 0	CH, CJ, CK	H : ± 60																																													
Specified Value	High Frequency Type	Standard	U : 750	UJ, UK	J : ± 120																																													
			SL : 350 to 1000	K : ± 250																																														
Specified Value	High Permittivity Class2	Standard	Temperature Characteristic ppm/		Tolerance ppm/																																													
			C : 0	CH	H : ± 60																																													
Specified Value	High Permittivity Class2	Standard	R : 220	RH																																														
			<table border="1"> <thead> <tr> <th></th> <th>Specification</th> <th>Capacitance change</th> <th>Reference temperature</th> <th>Temperature Range</th> </tr> </thead> <tbody> <tr> <td rowspan="2">BJ</td> <td>B</td> <td>± 10%</td> <td>20</td> <td>25 to 85</td> </tr> <tr> <td>X5R</td> <td>± 15%</td> <td>25</td> <td>55 to 85</td> </tr> <tr> <td rowspan="2">B7</td> <td>X7R</td> <td>± 15%</td> <td>25</td> <td>55 to 125</td> </tr> <tr> <td>X7S</td> <td>± 22%</td> <td>25</td> <td>55 to 125</td> </tr> <tr> <td rowspan="2">C6</td> <td>X6S</td> <td>± 22%</td> <td>25</td> <td>55 to 105</td> </tr> <tr> <td>X7S</td> <td>± 22%</td> <td>25</td> <td>55 to 125</td> </tr> <tr> <td rowspan="2">LD()</td> <td>F</td> <td>± 15%</td> <td>25</td> <td>55 to 85</td> </tr> <tr> <td>Y5V</td> <td>30/ 80%</td> <td>20</td> <td>25 to 85</td> </tr> <tr> <td rowspan="2">F</td> <td>Y5V</td> <td>22/ 82%</td> <td>25</td> <td>30 to 85</td> </tr> </tbody> </table>						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	X7S	± 22%	25	55 to 125	C6	X6S	± 22%	25	55 to 105	X7S	± 22%	25	55 to 125	LD()	F	± 15%	25	55 to 85	Y5V	30/ 80%	20	25 to 85	F	Y5V
	Specification	Capacitance change	Reference temperature	Temperature Range																																														
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C6	X6S	± 22%	25	55 to 105																																														
	X7S	± 22%	25	55 to 125																																														
LD()	F	± 15%	25	55 to 85																																														
	Y5V	30/ 80%	20	25 to 85																																														
F	Y5V	22/ 82%	25	30 to 85																																														
	Note : LD Lowdistortion high value multilayer ceramic capacitor																																																	
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.																																													
	$\frac{C_{85} - C_{20}}{C_{20} \times T} \times 10^6 \text{ ppm/}$				T 65																																													
Test Methods and Remarks	Class 2				Capacitance at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.																																													
	<table border="1"> <thead> <tr> <th>Step</th> <th>B F</th> <th>X5R X7R X6S X7S Y5V</th> </tr> </thead> <tbody> <tr> <td>1</td> <td colspan="2">Minimum operating temperature</td> </tr> <tr> <td>2</td> <td>20</td> <td>25</td> </tr> <tr> <td>3</td> <td colspan="2">Maximum operating temperature</td> </tr> </tbody> </table>						Step	B F	X5R X7R X6S X7S Y5V	1	Minimum operating temperature		2	20	25	3	Maximum operating temperature																																	
Step	B F	X5R X7R X6S X7S Y5V																																																
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	$\frac{C - C_2}{C_2} \times 100 \%$ <p>C Capacitance in Step 1 or Step 3 C2 Capacitance in Step 2</p>
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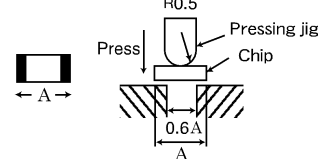
9. Deflection

Specified Value	Temperature Compensating Class1	Standard	Appearance : No abnormality Capacitance change : Within ± 5% or ± 0.5 pF, whichever is larger.
		High Frequency Type	Appearance : No abnormality Capacitance change : Within ± 0.5 pF
	High Permittivity Class2		Appearance : No abnormality Capacitance change : Within ± 12.5% BJ, B7, C6, C7, LD() Within ± 30% F Note: LD Low distortion high value multilayer ceramic capacitor

Test Methods and Remarks	Multilayer Ceramic Capacitors		 <p>(Unit: mm) Capacitance measurement shall be conducted with the board bent</p>	
		042, 063, 105 Type		The other types
	Board	Glass epoxy-resin substrate		
	Thickness	0.8mm		1.6mm
	Warp	1mm		
Duration	10 sec.			
105 Type thickness, C 0.2mm, P 0.3mm				

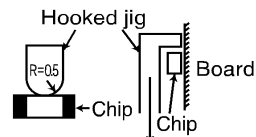
10. Body Strength

Specified Value	Temperature Compensating Class1	Standard	
		High Frequency Type	No mechanical damage.
	High Permittivity Class2		

Test Methods and Remarks	High Frequency Type Applied force : 5N Duration : 10 sec.	

11. Adhesive Strength of Terminal Electrodes

Specified Value	Temperature Compensating Class1	Standard	No terminal separation or its indication.
		High Frequency Type	
	High Permittivity Class2		

Test Methods and Remarks	Multilayer Ceramic Capacitors			
		042, 063 Type		105 Type or more
	Applied force	2N		5N
	Duration	30 ± 5 sec.		

12. Solderability

Specified Value	Temperature Compensating Class1	Standard	At least 95% of terminal electrode is covered by new solder.
		High Frequency Type	
	High Permittivity Class2		

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

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13. Resistance to Soldering

Specified Value	Temperature Compensating Class1	Standard	Appearance : No abnormality Capacitance change : Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$, 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 $\pm 2.5\%$ Q : Initial value Insulation resistance : Initial value Withstanding voltage between terminals : No abnormality
	High Permittivity Class2 Note 1	Appearance : No abnormality Capacitance change : Within $\pm 7.5\%$ BJ, B7, C6, C7, LD () Within $\pm 20\%$ F Dissipation factor : Initial value Insulation resistance : Initial value Withstanding voltage between terminals : No abnormality Note: LD Low distortion high value multilayer ceramic capacitor	

Test Methods and Remarks	Class 1			
	042, 063 Type	105 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 \pm 5		
	Duration	3 \pm 0.5 sec.		
	Recovery	6 to 24 hrs Standard condition Note 5		
	Class 2			
	042, 063 Type	105, 107, 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 \pm 5		
	Duration	3 \pm 0.5 sec.		
	Recovery	24 \pm 2 hrs Standard condition Note 5		

14. Temperature Cycle (Thermal Shock)

Specified Value	Temperature Compensating Class1	Standard	Appearance : No abnormality Capacitance change : Within $\pm 2.5\%$ or $\pm 0.25\text{pF}$, 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 $\pm 0.25\text{pF}$ Q : Initial value Insulation resistance : Initial value Withstanding voltage between terminals : No abnormality
	High Permittivity Class2 Note 1	Appearance : No abnormality Capacitance change : Within $\pm 7.5\%$ BJ, B7, C6, C7, LD () Within $\pm 20\%$ F Dissipation factor : Initial value Insulation resistance : Initial value Withstanding voltage between terminals : No abnormality Note: LD Low distortion high value multilayer ceramic capacitor	

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	Minimum operating temperature	30 \pm 3	
		2	Normal temperature	2 to 3	
3		Maximum operating temperature	30 \pm 3		
4	Normal temperature	2 to 3			
Number of cycles	5 times				
Recovery	6 to 24 hrs Standard condition Note 5		24 \pm 2 hrs Standard condition Note 5		

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15. Humidity Steady State

Specified Value	Temperature Compensating Class1	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 25C C 30pF : Q 350 C Nominal capacitance Insulation resistance : 1000 M min.
		High Frequency Type	Appearance : No abnormality Capacitance change : Within ± 0.5pF, Insulation resistance : 1000 M min.
	High Permittivity Class2 Note 1		Appearance : No abnormality Capacitance change : Within ± 12.5% BJ, B7, C6, C7, LD() Within ± 30% F Dissipation factor : 5.0%max. BJ, B7, C6, C7, LD() 11.0%max. F Insulation resistance : 50 M μ F or 1000 M whichever is smaller. Note: LD Low distortion high value multilayer ceramic capacitor

Test Methods and Remarks		Class 1		Class 2
		Standard	High Frequency Type	All items
	Preconditioning	None		Thermal treatment at 150 for 1 hr Note 2
	Temperature	40± 2	60± 2	40± 2
	Humidity	90 to 95%RH		90 to 95%RH
	Duration	500 24/ 0 hrs		500 24/ 0 hrs
	Recovery	6 to 24 hrs	Standard condition Note 5	24± 2 hrs Standard condition Note 5

16. Humidity Loading

Specified Value	Temperature Compensating Class1	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 M 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 M min.
	High Permittivity Class2 Note 1		Appearance : No abnormality Capacitance change : Within ± 12.5% BJ, B7, C6, C7, LD() Within ± 30% F Dissipation factor : 5.0%max. BJ, B7, C6, C7, LD() 11.0%max. F Insulation resistance : 25 M μ F or 500 M , whichever is smaller. Note: LD Low distortion high value multilayer ceramic capacitor

Test Methods and Remarks		Class 1		Class 2
		Standard	High Frequency Type	All items
	Preconditioning	None		Voltage treatment Rated voltage are applied for 1 hour at 40 Note 3
	Temperature	40± 2	60± 2	40± 2
	Humidity	90 to 95%RH		90 to 95%RH
	Duration	500 24/ 0 hrs		500 24/ 0 hrs
	Applied voltage	Rated voltage		Rated voltage
	Charge/discharge current	50mA max.		50mA max.
Recovery	6 to 24 hrs	Standard condition Note 5	24± 2 hrs Standard condition Note 5	

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17. High Temperature Loading

Specified Value	Temperature Compensating Class1	Standard	Appearance : No abnormality Capacitance change : Within $\pm 3\%$ or $\pm 0.3pF$, whichever is larger. Q : C 10pF Q 200 10C 10 C 30pF Q 275 25C C 30pF Q 350 C Nominal capacitance Insulation resistance : 1000 M min.
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 3\%$ or $\pm 0.3pF$, whichever is larger. Insulation resistance : 1000 M min.
	High Permittivity Class2 Note 1		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ BJ, B7, C6, C7, LD() Within $\pm 30\%$ F Dissipation factor : 5.0%max. BJ, B7, C6, C7, LD() 11.0%max. F Insulation resistance : 50 M μF or 1000 M , whichever is smaller. Note: LD Low distortion high value multilayer ceramic capacitor

Test Methods and Remarks		Class 1		Class 2		
		Standard	High Frequency Type	BJ, LD(), F	C6	B7, C7
	Preconditioning	None		Voltage treatment Twice the rated voltage shall be applied for 1 hour at 85 , 105 or 125 Note 3, 4		
	Temperature	Maximum operating temperature		Maximum operating temperature		
	Duration	1000 48/ 0hrs		1000 48/ 0hrs		
	Applied voltage	Rated voltage $\times 2$		Rated voltage $\times 2$ Note 4		
	Charge/discharge current	50mA max.		50mA max.		
	Recovery	6 to 24hr Standard condition Note 5		24 \pm 2 hrs Standard condition Note 5		

Note: LD Low distortion high value multilayer ceramic capacitor

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 $^{\circ}C$ for 10 min for an hour and kept at room temperature for 24 \pm 2 hours.

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 \pm 2 hours.

Note 4 150% of rated voltage is applicable to some items. Please refer to their specifications for further information.

Note 5 Standard condition: Temperature: 5 to 35 $^{\circ}C$, 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 \pm 2 $^{\circ}C$, Relative humidity: 60 to 70 %RH, Air pressure: 86 to 106kPa Unless otherwise specified, all the tests are conducted under the "standard condition".

Precautions on the use of Multilayer Ceramic Capacitors

PRECAUTIONS

1. Circuit Design

Precautions	<p>Verification of operating environment, electrical rating and performance</p> <p>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.</p> <p>Operating Voltage Verification of Rated voltage</p> <p>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.</p> <p>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.</p>
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2. PCB Design

Precautions	<p>Pattern configurations Design of Land-patterns</p> <p>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:</p> <p>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.</p> <p>2 When more than one component are jointly soldered onto the same land, each component's soldering point shall be separated by solder-resist.</p> <p>Pattern configurations Capacitor layout on PCBs</p> <p>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.</p>
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Pattern configurations Design of Land-patterns
The following diagrams and tables show some examples of recommended land patterns to prevent excessive solder amounts.

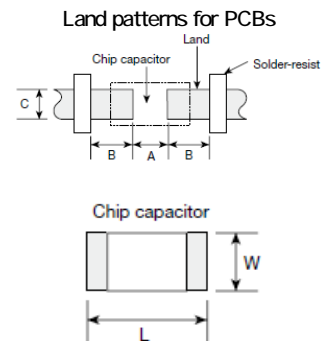
1 Recommended land dimensions for typical chip capacitors

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

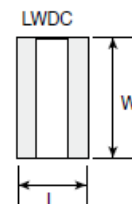
Type	042	063	105	107	212	316	325	432
Size	L	0.4	0.6	1.0	1.6	2.0	3.2	4.5
	W	0.2	0.3	0.5	0.8	1.25	1.6	3.2
A	0.15 to 0.25	0.20 to 0.30	0.45 to 0.55	0.8 to 1.0	0.8 to 1.2	1.8 to 2.5	1.8 to 2.5	2.5 to 3.5
B	0.15 to 0.20	0.20 to 0.30	0.40 to 0.50	0.6 to 0.8	0.8 to 1.2	1.0 to 1.5	1.0 to 1.5	1.5 to 1.8
C	0.15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

Note Recommended land size might be different according to the allowance of the size of the product.

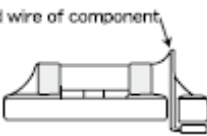
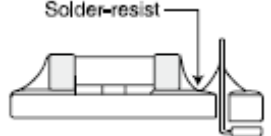
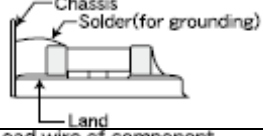
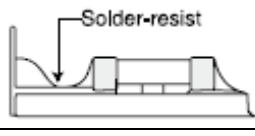
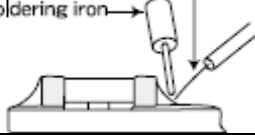
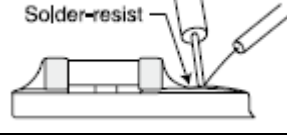
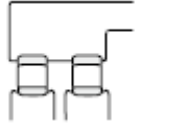
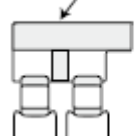
LWDC: Recommended land dimensions for reflow-soldering

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	





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		

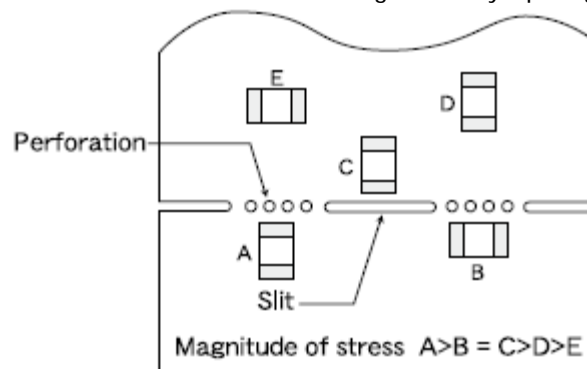
Pattern configurations Capacitor layout on PCBs

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		

Place the product at a right angle to the direction of the anticipated mechanical stress.


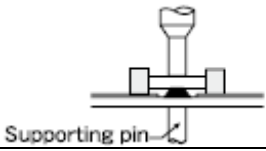
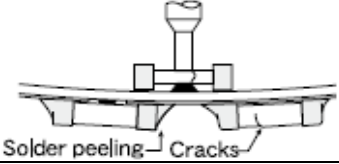
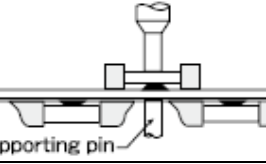
1-2. The amount of mechanical stresses given will vary depending on capacitor layout. Please refer to diagram below



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	<p>Adjustment of mounting machine</p> <ol style="list-style-type: none"> When capacitors are mounted on PCB, excessive impact load shall not be imposed on them. Maintenance and inspection of mounting machines shall be conducted periodically. <p>Selection of Adhesives</p> <ol style="list-style-type: none"> 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	<p>Adjustment of mounting machine</p> <ol style="list-style-type: none"> 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. <ol style="list-style-type: none"> The bottom dead center of the pick-up nozzle shall be adjusted to the surface level of PCB without the board deflection. The pressure of nozzle shall be adjusted between 1 and 3 N static loads. 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	 Cracks	 Supporting pin
Double-sided mounting	 Solder peeling Cracks	 Supporting pin

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.

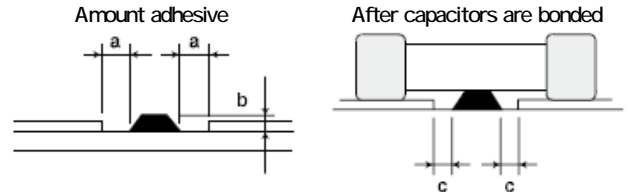
1 Required adhesive characteristics

- The adhesive shall be strong enough to hold parts on the board during the mounting & solder process.
- The adhesive shall have sufficient strength at high temperatures.
- The adhesive shall have good coating and thickness consistency.
- The adhesive shall be used during its prescribed shelf life.
- The adhesive shall harden rapidly.
- The adhesive shall have corrosion resistance.
- The adhesive shall have excellent insulation characteristics.
- 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 μ m
c	Adhesives shall not contact land



4. Soldering

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;

Precautions

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

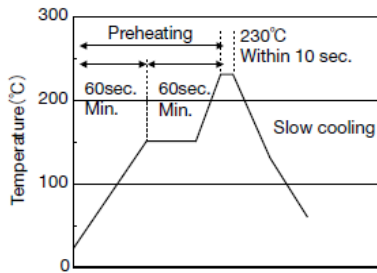
Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.

Preheating: Capacitors shall be preheated sufficiently, and the temperature difference between the capacitors and solder shall be within 100 to 130 .

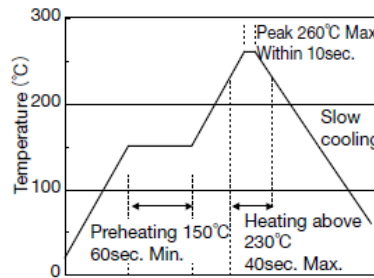
Cooling: The temperature difference between the capacitors and cleaning process shall not be greater than 100 .

Reflow soldering

Recommended conditions for eutectic soldering

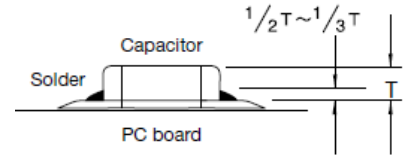


Recommended condition for Pb-free soldering



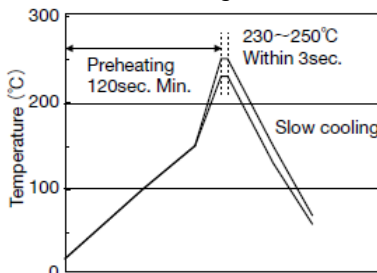
Caution

The ideal condition is to have solder mass fillet controlled to 1/2 to 1/3 of the thickness of a capacitor. Because excessive dwell times can adversely affect solderability, soldering duration shall be kept as close to recommended times as possible.

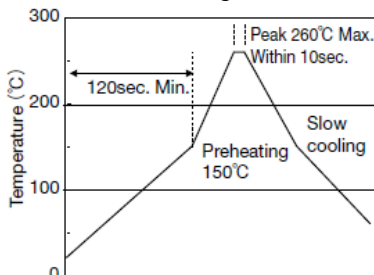


Wave soldering

Recommended conditions for eutectic soldering



Recommended condition for Pb-free soldering

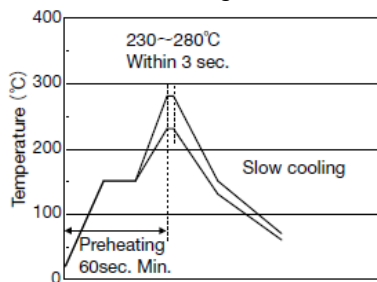


Caution

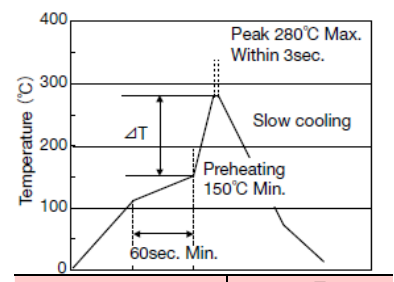
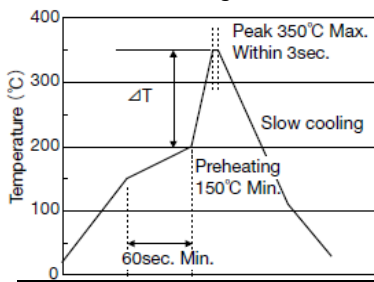
Wave soldering must not be applied to capacitors designated as for reflow soldering only.

Hand soldering

Recommended conditions for eutectic soldering



Recommended condition for Pb-free soldering



Caution

Use a 50W soldering iron with a maximum tip diameter of 1.0 mm. The soldering iron shall not directly touch capacitors.

	T
316 type or less	T 150

	T
325 type or more	T 130

5. Cleaning

Cleaning conditions

- 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.
- Cleaning condition shall be determined after it is verified by using actual cleaning machine that the cleaning process does not affect capacitor's characteristics.

Precautions

- 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.
- 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 or less

Ultrasonic frequency : 40 kHz or less

Ultrasonic washing period : 5 min. or less

6. Resin coating and mold	
Precautions	<p>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.</p> <p>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.</p> <p>The use of such resins, molding materials etc. is not recommended.</p>
7. Handling	
Precautions	<p>Splitting of PCB</p> <p>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.</p> <p>2. Board separation shall not be done manually, but by using the appropriate devices.</p> <p>Mechanical considerations</p> <p>Be careful not to subject capacitors to excessive mechanical shocks.</p> <p>1. If ceramic capacitors are dropped onto a floor or a hard surface, they shall not be used.</p> <p>2. Please be careful that the mounted components do not come in contact with or bump against other boards or components.</p>
8. Storage conditions	
Precautions	<p>Storage</p> <p>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.</p> <p>Recommended conditions</p> <p>Ambient temperature : Below 30</p> <p>Humidity : Below 70%RH</p> <p>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.</p> <p>Ceramic chip capacitors shall be kept where no chlorine or sulfur exists in the air.</p> <p>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.</p>
Technical considerations	<p>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.</p>
<p>RCR- 2335B Safety Application Guide for fixed ceramic capacitors for use in electronic equipment is published by JEITA.</p> <p>Please check the guide regarding precautions for deflection test, soldering by spot heat, and so on.</p>	