有关敝公司产品的注意事项

【一般电子设备(一般环境)】

请务必在使用敝司产品之前阅读。

⚠ 注 意

- 本产品目录中所记载的内容为2017年10月之内容。因改良等原因，可能会不经预告而变更记载内容，所以请务必在使用前先确认最新的产品信息。未按照本产品目录中所记载的内容或交货规格说明书使用敝公司产品的，即便其致使使用设备发生损害、瑕疵等时，敝公司也不承担任何责任，敬请悉知。

- 就规格相关的详细内容，敝公司备有交货规格说明书，详情请向敝公司咨询。

- 使用敝公司产品时，请务必事先安装到设备之后，在实际使用的环境下进行评估和确认。

- 本产品目录中所记载的产品可使用于一般电子设备 [音像设备、办公自动化设备、家电产品、办公设备、信息/通讯设备 (手机、电脑等)] 以及医疗设备 (国际 (IMDRF) 第一类，第二类) 。因此，若考虑将本产品目录中所记载的产品使用于可能会直接危及生命或身体的设备 [运输用设备 (汽车驱动控制设备、火车控制设备、船舶控制设备等) 、交通信号设备、防灾设备、医疗设备 (国际 (IMDRF) 第三类) 、高公共性信息通信设备 (电话交换机以及电话、无线、广播电视等基站)] 等时，请务必事先向敝公司咨询。

  另外，请勿将敝公司产品使用于对安全性和可靠性要求较高的设备 (航天设备、航空设备※、医疗设备 (国际 (IMDRF) 第四类) 、原子能控制设备、海底设备、军事设备等) 。

  ※ 注释 ： 仅限于对航空设备的安全运行不产生直接干扰的设备[机内娱乐设备、机内照明设备、电动座椅、餐饮设备等]，在满足敝公司另行指定的相关条件时，亦可将敝公司产品用于以上用途。在贵公司考虑将敝公司的产品用于以上用途时，请务必事先向敝公司咨询相关的信息。

  且即便属于一般电子设备，使用于对安全性和可靠性要求较高的设备、电路上时，敝公司建议进行充分的安全评估，并根据需要，在设计时追加保护电路等。

  未经敝公司的事先书面同意，把本产品目录中所记载的产品使用于前述需要向敝公司咨询的设备或敝公司禁止使用的设备，从而给客户或第三方造成损害的，敝公司不承担任何责任，敬请悉知。

- 本产品目录中所记载的信息是用于说明相关产品的典型操作以及相关应用。此类信息的使用不代表对于敝公司以及第三方的知识产权以及其他权利的使用许可或是不侵权保证。

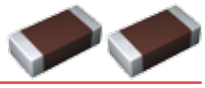
- 敝公司产品的保证范围仅限于交付的敝公司产品单品，就敝公司产品的故障或瑕疵所誘発的损害，敝公司不承担任何责任，敬请悉知。但是，以书面形式另行签署了交易基本合同书，品质保证协定书等时，敝公司将根据该合同等的条件提供保证。

- 本产品目录中所记载的内容适用于从敝公司营业所、销售子公司、销售代理店 (即“正规销售渠道”) 购买的敝公司产品，并不适用于从上述以外的渠道购买的敝公司产品，敬请悉知。

- 出口相关注意事项

  本产品目录中所记载的部分产品在出口时须事先确认《外汇和对外贸易法》以及美国出口管理的相关法规，并办理相关手续。如有不明之处，请向敝公司咨询。

多层陶瓷电容器



波峰焊 回流焊

■型号标示法

J	M	K	3 1 6	△	B J	1 0 6	M	L	—	T	△
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫

△＝空格

①额定电压

代码	额定电压 [VDC]
P	2.5
A	4
J	6.3
L	10
E	16
T	25
G	35
U	50
H	100
Q	250
S	630

②系列名称

代码	系列名称
M	多层电容器
V	高频用多层电容器
W	LW 逆转型多层电容器

③端接类型

代码	端接类型
K	电镀
S	Cu 内部电极

④外型尺寸

规格	L×W [mm]	EIA(inch)
021	0.25× 0.125	008004
042	0.4 × 0.2	01005
063	0.6 × 0.3	0201
105	1.0 × 0.5	0402
	0.52× 1.0 ※	0204
107	1.6 × 0.8	0603
	0.8 × 1.6 ※	0306
212	2.0 × 1.25	0805
	1.25× 2.0 ※	0508
316	3.2 × 1.6	1206
325	3.2 × 2.5	1210
432	4.5 × 3.2	1812

注: ※LW 逆转型 (□WK)

⑤产品尺寸公差

代码	规格	L[mm]	W[mm]	T[mm]
△	所有规格	标准	标准	标准
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	1.6±0.20	0.85±0.10
				1.6±0.20
	325	3.2±0.30	2.5±0.30	2.5±0.30
B	063	0.6±0.09	0.3±0.09	0.3±0.09
	105	1.0+0.15/−0.05	0.5+0.15/−0.05	0.5+0.15/−0.05
	107	1.6+0.20/−0	0.8+0.20/−0	0.45±0.05
				0.8+0.20/−0
	212	2.0+0.20/−0	1.25+0.20/−0	0.45±0.05
				0.85±0.10
				1.25+0.20/−0
	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

注: 参照标准产品的尺寸　　△= 空格

⑥温度特性

■高介电常数【超低失真多层陶瓷电容器 除外】

代码	适用标准		温度范围 [℃]	基准温度 [℃]	静电容量变化率	静电容量允许偏差	允许偏差代码
BJ	JIS	B	−25～＋ 85	20	±10%	±10%	K
						±20%	M
	EIA	X5R	−55～＋ 85	25	±15%	±10%	K
						±20%	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

注: ※LD 低失真大容量多层陶瓷电容器　　△= 空格

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另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■温度补偿用

代码	适用标准		温度范围 [℃]	基准温度 [℃]	静电容量变化率	静电容量允许偏差	允许偏差代码
CG	EIA	C0G	−55～+125	25	0±30ppm/℃	±0.05pF	A
						±0.1pF	B
						±0.25pF	C
						±0.5pF	D
						±5%	J
UJ	JIS	UJ	−55～+125	20	−750±120ppm/℃	±0.25pF	C
						±0.5pF	D
	EIA	U2J		25		±5%	J
UK	JIS	UK	−55～+125	20	−750±250ppm/℃	±0.25pF	C
	EIA	U2K	−55～+125	25			
SL	JIS	SL	−55～+125	20	+350～−1000ppm/℃	±5%	J

⑥系列名称

· 超低失真多层陶瓷电容器

代码	系列名称
SD	标准品

· 中高耐压多层陶瓷电容器

代码	系列名称
SD	标准品

⑦静电容量

代码 (例)	静电容量
0R5	0.5pF
010	1pF
100	10pF
101	100pF
102	1,000pF
103	10,000pF
104	0.1 μF
105	1.0 μF
106	10 μF
107	100 μF

注: R=小数点

⑧静电容量允许偏差

代码	静电容量允许偏差
A	±0.05pF
B	±0.1pF
C	±0.25pF
D	±0.5pF
F	±1pF
G	±2%
J	±5%
K	±10%
M	±20%
Z	+80/−20%

⑨产品厚度

代码	产品厚度 [mm]
K	0.125
H	0.13
E	0.18
C	0.2
D	
P	0.3
T	
K	0.45 (107 型以上)
V	0.5
W	
A	0.8
D	0.85 (212 型以上)
F	1.15
G	1.25
L	1.6
N	1.9
Y	2.0 max
M	2.5

⑩个别规格

代码	个别规格
—	标准

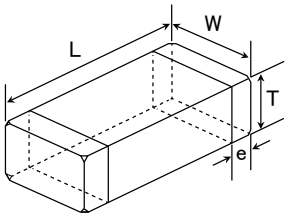
⑪包装

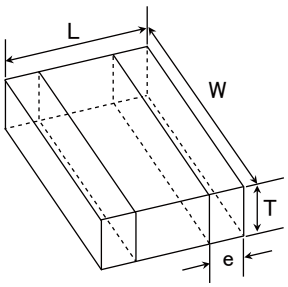
代码	包装规格
F	φ178mm 卷盘带装 (2mm 间距)
T	φ178mm 卷盘带装 (4mm 间距)
P	φ178mm 卷盘带装 (4mm 间距, 1000 个/卷盘) 325 规格 (厚度代码M)
R	φ178mm 卷盘带装 (2mm 间距) 105 规格 (厚度代码E,H)
W	φ178mm 压纹带 (1mm 间距) 021/042 规格专用

⑫管理记号

代码	管理记号
△	标准

■标准产品尺寸





※ LW逆转型

Type (EIA)	标准产品尺寸[mm]				
	L	W	T	*1	e
□MK021(008004)	0.25±0.013	0.125±0.013	0.125±0.013	K	0.0675±0.0275
□VS021(008004)	0.25±0.013	0.125±0.013	0.125±0.013	K	0.0675±0.0275
□MK042(01005)	0.4±0.02	0.2±0.02	0.2±0.02	C	0.1±0.03
				D	
□VS042(01005)	0.4±0.02	0.2±0.02	0.2±0.02	C	0.1±0.03
□MK063(0201)	0.6±0.03	0.3±0.03	0.3±0.03	P	0.15±0.05
				T	
□MK105(0402)	1.0±0.05	0.5±0.05	0.13±0.02	H	0.25±0.10
			0.18±0.02	E	
			0.2±0.02	C	
			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
□WK105(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	
□WK107(0306)※	0.8±0.10	1.6±0.10	0.5±0.05	V	0.25±0.15
□MK212(0805)	2.0±0.10	1.25±0.10	0.45±0.05	K	0.5±0.25
			0.85±0.10	D	
			1.25±0.10	G	
□WK212(0508)※	1.25±0.15	2.0±0.15	0.85±0.10	D	0.3±0.2
□MK316(1206)	3.2±0.15	1.6±0.15	0.85±0.10	D	0.5+0.35/−0.25
			1.15±0.10	F	
			1.6±0.20	L	
□MK325(1210)	3.2±0.30	2.5±0.20	0.85±0.10	D	0.6±0.3
			1.15±0.10	F	
			1.9±0.20	N	
			1.9+0.1/−0.2	Y	
			2.5±0.20	M	
□MK432(1812)	4.5±0.40	3.2±0.30	2.5±0.20	M	0.9±0.6

注: ※LW 逆转型、*1 产品厚度代码

■标准包装

规格	EIA(inch)	产品厚度		标准数量 [pcs]	
		[mm]	代码	纸带	压纹带
021	008004	0.125	K	—	50000
042	01005	0.2	C	—	40000
			D		
063	0201	0.3	P	15000	—
			T		
105	0402	0.13	H	—	20000
		0.18	E	—	15000
		0.2	C	20000	—
		0.3	P	15000	—
		0.5	V	10000	—
			W		
	0204 ※	0.30	P		
107	0603	0.45	K	4000	—
		0.8	A		
	0306 ※	0.50	V	—	4000
212	0805	0.45	K	4000	—
		0.85	D		
		1.25	G	—	3000
	0508 ※	0.85	D	4000	—
316	1206	0.85	D	4000	—
		1.15	F	—	3000
		1.6	L	—	2000
325	1210	0.85	D	—	2000
		1.15	F		
		1.9	N		
		2.0 max	Y		
		2.5	M	—	1000
432	1812	2.5	M	—	500

注: ※LW 逆转型 (□WK)

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中高耐压多层陶瓷电容器

●105型

【温度特性 B7 : X7R】厚度 0.5mm (V)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK105 B7221□V-F		100		X7R	220 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7331□V-F				X7R	330 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7471□V-F				X7R	470 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7681□V-F				X7R	680 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7102□V-F				X7R	1000 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7152□V-F				X7R	1500 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7222□V-F				X7R	2200 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7332□V-F				X7R	3300 p	±10, ±20	2.5	200	0.5±0.05	R
HMK105 B7472□V-F				X7R	4700 p	±10, ±20	2.5	200	0.5±0.05	R

【温度特性 CG : CG/C0G】厚度 0.5mm (V)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	Q (at 1MHz) min	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK105 CG080DV-F		100	CG	C0G	8 p	±0.5pF	560	200	0.5±0.05	R
HMK105 CG090DV-F			CG	C0G	9 p	±0.5pF	580	200	0.5±0.05	R
HMK105 CG100DV-F			CG	C0G	10 p	±0.5pF	600	200	0.5±0.05	R
HMK105 CG120JV-F			CG	C0G	12 p	±5%	640	200	0.5±0.05	R
HMK105 CG150JV-F			CG	C0G	15 p	±5%	700	200	0.5±0.05	R
HMK105 CG180JV-F			CG	C0G	18 p	±5%	760	200	0.5±0.05	R
HMK105 CG220JV-F			CG	C0G	22 p	±5%	840	200	0.5±0.05	R
HMK105 CG240JV-F			CG	C0G	24 p	±5%	880	200	0.5±0.05	R
HMK105 CG270JV-F			CG	C0G	27 p	±5%	940	200	0.5±0.05	R
HMK105 CG330JV-F			CG	C0G	33 p	±5%	1000	200	0.5±0.05	R
HMK105 CG390JV-F			CG	C0G	39 p	±5%	1000	200	0.5±0.05	R
HMK105 CG470JV-F			CG	C0G	47 p	±5%	1000	200	0.5±0.05	R
HMK105 CG560JV-F			CG	C0G	56 p	±5%	1000	200	0.5±0.05	R
HMK105 CG680JV-F			CG	C0G	68 p	±5%	1000	200	0.5±0.05	R
HMK105 CG820JV-F			CG	C0G	82 p	±5%	1000	200	0.5±0.05	R
HMK105 CG101JV-F			CG	C0G	100 p	±5%	1000	200	0.5±0.05	R

●107型

【温度特性 BJ : B/X5R】厚度 0.8mm (A)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK107 BJ102□A-T		100	B	X5R*1	1000 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ152□A-T			B	X5R*1	1500 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ222□A-T			B	X5R*1	2200 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ332□A-T			B	X5R*1	3300 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ472□A-T			B	X5R*1	4700 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ682□A-T			B	X5R*1	6800 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ103□A-T			B	X5R*1	0.01 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ153□A-T			B	X5R*1	0.015 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ223□A-T			B	X5R*1	0.022 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ333□A-T			B	X5R*1	0.033 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ473□A-T			B	X5R*1	0.047 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ104□A-T			B	X5R*1	0.1 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 BJ224□A-TE			B	X5R*1	0.22 μ	±10, ±20	3.5	150	0.8±0.10	R

【温度特性 C7 : X7S 】厚度 0.8mm (A)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK107 C7224□A-TE		100		X7S	0.22 μ	±10, ±20	3.5	150	0.8±0.10	R

【温度特性 B7 : X7R】厚度 0.8mm (A)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK107 B7102□A-T		100		X7R	1000 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7152□A-T				X7R	1500 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7222□A-T				X7R	2200 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7332□A-T				X7R	3300 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7472□A-T				X7R	4700 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7682□A-T				X7R	6800 p	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7103□A-T				X7R	0.01 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7153□A-T				X7R	0.015 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7223□A-T				X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7333□A-T				X7R	0.033 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7473□A-T				X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	R
HMK107 B7104□A-T				X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	R

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另外，有关各产品的详细信息(特性图、可靠性信息、使用时的注意事项等)，请参阅弊司网站(http://www.ty-top.com/)。

■型号一览

【温度特性 SD : Standard】厚度 0.8mm (A)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK107 SD101KA-T		100	Standard Type	100 p	±10	0.1	200	0.8±0.10	R
HMK107 SD121KA-T				120 p	±10	0.1	200	0.8±0.10	R
HMK107 SD151KA-T				150 p	±10	0.1	200	0.8±0.10	R
HMK107 SD181KA-T				180 p	±10	0.1	200	0.8±0.10	R
HMK107 SD221KA-T				220 p	±10	0.1	200	0.8±0.10	R
HMK107 SD271KA-T				270 p	±10	0.1	200	0.8±0.10	R
HMK107 SD331KA-T				330 p	±10	0.1	200	0.8±0.10	R
HMK107 SD391KA-T				390 p	±10	0.1	200	0.8±0.10	R
HMK107 SD471KA-T				470 p	±10	0.1	200	0.8±0.10	R
HMK107 SD561KA-T				560 p	±10	0.1	200	0.8±0.10	R
HMK107 SD681KA-T				680 p	±10	0.1	200	0.8±0.10	R
HMK107 SD821KA-T				820 p	±10	0.1	200	0.8±0.10	R
HMK107 SD102KA-T				1000 p	±10	0.1	200	0.8±0.10	R

● 212型

【温度特性 BJ : B/X5R】厚度 1.25mm (G)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK212 BJ103□G-T		100	B	X5R*1	0.01 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ153□G-T			B	X5R*1	0.015 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ223□G-T			B	X5R*1	0.022 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ333□G-T			B	X5R*1	0.033 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ473□G-T			B	X5R*1	0.047 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ683□G-T			B	X5R*1	0.068 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ104□G-T			B	X5R*1	0.1 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ224□G-T			B	X5R*1	0.22 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 BJ474□G-TE			B	X5R*1	0.47 μ	±10, ±20	3.5	150	1.25±0.10	R
HMK212BBJ105□G-TE			B	X5R*1	1 μ	±10, ±20	3.5	150	1.25+0.20/−0	R
QMK212 BJ472□G-T		250	B	X5R*1	4700 p	±10, ±20	2.5	150	1.25±0.10	R
QMK212 BJ682□G-T			B	X5R*1	6800 p	±10, ±20	2.5	150	1.25±0.10	R
QMK212 BJ103□G-T			B	X5R*1	0.01 μ	±10, ±20	2.5	150	1.25±0.10	R
QMK212 BJ153□G-T			B	X5R*1	0.015 μ	±10, ±20	2.5	150	1.25±0.10	R
QMK212 BJ223□G-T			B	X5R*1	0.022 μ	±10, ±20	2.5	150	1.25±0.10	R

【温度特性 BJ : B/X5R】厚度 0.85 mm (D)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
QMK212 BJ102□D-T		250	B	X5R*1	1000 p	±10, ±20	2.5	150	0.85±0.10	R
QMK212 BJ152□D-T			B	X5R*1	1500 p	±10, ±20	2.5	150	0.85±0.10	R
QMK212 BJ222□D-T			B	X5R*1	2200 p	±10, ±20	2.5	150	0.85±0.10	R
QMK212 BJ332□D-T			B	X5R*1	3300 p	±10, ±20	2.5	150	0.85±0.10	R

【温度特性 C7 : X7S】厚度 1.25mm (G)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK212 C7474□G-TE		100		X7S	0.47 μ	±10, ±20	3.5	150	1.25±0.10	R
HMK212BC7105□G-TE		100		X7S	1 μ	±10, ±20	3.5	150	1.25+0.20/−0	R

【温度特性 B7 : X7R】厚度 1.25mm (G)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK212 B7103□G-T		100		X7R	0.01 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7153□G-T				X7R	0.015 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7223□G-T				X7R	0.022 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7333□G-T				X7R	0.033 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7473□G-T				X7R	0.047 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7683□G-T				X7R	0.068 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7104□G-T				X7R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	R
HMK212 B7224□G-T				X7R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	R
QMK212 B7472□G-T		250		X7R	4700 p	±10, ±20	2.5	150	1.25±0.10	R
QMK212 B7682□G-T				X7R	6800 p	±10, ±20	2.5	150	1.25±0.10	R
QMK212 B7103□G-T				X7R	0.01 μ	±10, ±20	2.5	150	1.25±0.10	R
QMK212 B7153□G-T				X7R	0.015 μ	±10, ±20	2.5	150	1.25±0.10	R
QMK212 B7223□G-T				X7R	0.022 μ	±10, ±20	2.5	150	1.25±0.10	R

【温度特性 B7 : X7R】厚度 0.85mm (D)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
QMK212 B7102□D-T		250		X7R	1000 p	±10, ±20	2.5	150	0.85±0.10	R
QMK212 B7152□D-T				X7R	1500 p	±10, ±20	2.5	150	0.85±0.10	R
QMK212 B7222□D-T				X7R	2200 p	±10, ±20	2.5	150	0.85±0.10	R
QMK212 B7332□D-T				X7R	3300 p	±10, ±20	2.5	150	0.85±0.10	R

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■型号一览

【温度特性 SD : Standard】厚度 0.85mm (D)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK212 SD222KD-T		100	Standard Type	2200 p	±10	0.1	200	0.85±0.10	R
HMK212 SD472KD-T				4700 p	±10	0.1	200	0.85±0.10	R
QMK212 SD101KD-T		250		100 p	±10	0.1	150	0.85±0.10	R
QMK212 SD121KD-T				120 p	±10	0.1	150	0.85±0.10	R
QMK212 SD151KD-T				150 p	±10	0.1	150	0.85±0.10	R
QMK212 SD181KD-T				180 p	±10	0.1	150	0.85±0.10	R
QMK212 SD221KD-T				220 p	±10	0.1	150	0.85±0.10	R
QMK212 SD331KD-T				330 p	±10	0.1	150	0.85±0.10	R
QMK212 SD391KD-T				390 p	±10	0.1	150	0.85±0.10	R
QMK212 SD471KD-T				470 p	±10	0.1	150	0.85±0.10	R
QMK212 SD561KD-T				560 p	±10	0.1	150	0.85±0.10	R
QMK212 SD681KD-T				680 p	±10	0.1	150	0.85±0.10	R
QMK212 SD821KD-T				820 p	±10	0.1	150	0.85±0.10	R
QMK212 SD102KD-T				1000 p	±10	0.1	150	0.85±0.10	R

【温度特性 SD : Standard】厚度 1.25mm (G)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK212 SD392KG-T		100	Standard Type	3900 p	±10	0.1	200	1.25±0.10	R

●316型

【温度特性 BJ : B/X5R】厚度 1.6mm (L)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK316 BJ473□L-T		100	B	X5R*1	0.047 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ683□L-T			B	X5R*1	0.068 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ104□L-T			B	X5R*1	0.1 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ154□L-T			B	X5R*1	0.15 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ224□L-T			B	X5R*1	0.22 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ334□L-T			B	X5R*1	0.33 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ474□L-T			B	X5R*1	0.47 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 BJ105□L-T			B	X5R*1	1 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316ABJ225□L-TE			B	X5R*1	2.2 μ	±10, ±20	3.5	150	1.6±0.20	R
QMK316 BJ333□L-T		250	B	X5R*1	0.033 μ	±10, ±20	2.5	150	1.6±0.20	R
QMK316 BJ473□L-T			B	X5R*1	0.047 μ	±10, ±20	2.5	150	1.6±0.20	R
QMK316 BJ683□L-T			B	X5R*1	0.068 μ	±10, ±20	2.5	150	1.6±0.20	R
QMK316 BJ104□L-T			B	X5R*1	0.1 μ	±10, ±20	2.5	150	1.6±0.20	R
SMK316 BJ153□L-T		630	B	X5R*1	0.015 μ	±10, ±20	2.5	120	1.6±0.20	R
SMK316 BJ223□L-T			B	X5R*1	0.022 μ	±10, ±20	2.5	120	1.6±0.20	R

【温度特性 BJ : B/X5R】厚度 1.15mm (F)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
SMK316 BJ102□F-T		630	B	X5R*1	1000 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 BJ152□F-T			B	X5R*1	1500 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 BJ222□F-T			B	X5R*1	2200 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 BJ332□F-T			B	X5R*1	3300 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 BJ472□F-T			B	X5R*1	4700 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 BJ682□F-T			B	X5R*1	6800 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 BJ103□F-T			B	X5R*1	0.01 μ	±10, ±20	2.5	120	1.15±0.10	R

【温度特性 BJ : C7/X7S】厚度 1.6mm (L)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK316AC7225□L-TE		100		X7S	2.2 μ	±10, ±20	3.5	150	1.6±0.20	R

【温度特性 BJ : B7/X7R】厚度 1.6mm (L)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK316 B7473□L-T		100	X7R	0.047 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7683□L-T			X7R	0.068 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7104□L-T			X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7154□L-T			X7R	0.15 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7224□L-T			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7334□L-T			X7R	0.33 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7474□L-T			X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	R
HMK316 B7105□L-T			X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	R
QMK316 B7333□L-T		250	X7R	0.033 μ	±10, ±20	2.5	150	1.6±0.20	R
QMK316 B7473□L-T			X7R	0.047 μ	±10, ±20	2.5	150	1.6±0.20	R
QMK316 B7683□L-T			X7R	0.068 μ	±10, ±20	2.5	150	1.6±0.20	R
QMK316 B7104□L-T			X7R	0.1 μ	±10, ±20	2.5	150	1.6±0.20	R
SMK316 B7153□L-T		630	X7R	0.015 μ	±10, ±20	2.5	120	1.6±0.20	R
SMK316 B7223□L-T			X7R	0.022 μ	±10, ±20	2.5	120	1.6±0.20	R
SMK316AB7333□L-T			X7R	0.033 μ	±10, ±20	2.5	120	1.6±0.20	R
SMK316AB7473□L-T			X7R	0.047 μ	±10, ±20	2.5	120	1.6±0.20	R

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■型号一览

【温度特性 B7 : X7R】厚度 1.15mm (F)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
SMK316 B7102□F-T		630		X7R	1000 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 B7152□F-T				X7R	1500 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 B7222□F-T				X7R	2200 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 B7332□F-T				X7R	3300 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 B7472□F-T				X7R	4700 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 B7682□F-T				X7R	6800 p	±10, ±20	2.5	120	1.15±0.10	R
SMK316 B7103□F-T				X7R	0.01 μ	±10, ±20	2.5	120	1.15±0.10	R

【温度特性 SD : Standard】厚度1.6mm (L)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK316 SD223KL-T		100	Standard Type	0.022 μ	±10	0.1	200	1.6±0.20	R
QMK316 SD103KL-T		250		0.01 μ	±10	0.1	150	1.6±0.20	R

●325型

【温度特性 BJ : B/X5R】厚度 2.5mm (M)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 BJ225□M-P		100	B	X5R*1	2.2 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK325 BJ475□M-PE		100	B	X5R*1	4.7 μ	±10, ±20	3.5	150	2.5±0.20	R

【温度特性 BJ : B/X5R】厚度 1.9mm (N)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 BJ154□N-T		100	B	X5R*1	0.15 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 BJ224□N-T			B	X5R*1	0.22 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 BJ334□N-T			B	X5R*1	0.33 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 BJ474□N-T			B	X5R*1	0.47 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 BJ684□N-T			B	X5R*1	0.68 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 BJ105□N-T			B	X5R*1	1 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 BJ475□N-TE			B	X5R*1	4.7 μ	±10, ±20	3.5	150	1.9±0.20	R
QMK325 BJ473□N-T		250	B	X5R*1	0.047 μ	±10, ±20	2.5	150	1.9±0.20	R
QMK325 BJ104□N-T			B	X5R*1	0.1 μ	±10, ±20	2.5	150	1.9±0.20	R
QMK325 BJ154□N-T			B	X5R*1	0.15 μ	±10, ±20	2.5	150	1.9±0.20	R
QMK325 BJ224□N-T			B	X5R*1	0.22 μ	±10, ±20	2.5	150	1.9±0.20	R
SMK325 BJ223□N-T		630	B	X5R*1	0.022 μ	±10, ±20	2.5	120	1.9±0.20	R
SMK325 BJ333□N-T			B	X5R*1	0.033 μ	±10, ±20	2.5	120	1.9±0.20	R
SMK325 BJ473□N-T			B	X5R*1	0.047 μ	±10, ±20	2.5	120	1.9±0.20	R

【温度特性 BJ : B/X5R】厚度 1.15mm (F)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 BJ104□F-T		100	B	X5R*1	0.1 μ	±10, ±20	3.5	200	1.15±0.10	R

【温度特性 B7 : X7R】厚度 2.5mm (M)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 B7225□M-P		100		X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	R

【温度特性 B7 : X7R】厚度 1.9mm (N)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 B7154□N-T		100		X7R	0.15 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 B7224□N-T				X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 B7334□N-T				X7R	0.33 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 B7474□N-T				X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 B7684□N-T				X7R	0.68 μ	±10, ±20	3.5	200	1.9±0.20	R
HMK325 B7105□N-T				X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	R
QMK325 B7473□N-T		250		X7R	0.047 μ	±10, ±20	2.5	150	1.9±0.20	R
QMK325 B7104□N-T				X7R	0.1 μ	±10, ±20	2.5	150	1.9±0.20	R
QMK325 B7154□N-T				X7R	0.15 μ	±10, ±20	2.5	150	1.9±0.20	R
QMK325 B7224□N-T				X7R	0.22 μ	±10, ±20	2.5	150	1.9±0.20	R
SMK325 B7223□N-T		630		X7R	0.022 μ	±10, ±20	2.5	120	1.9±0.20	R
SMK325 B7333□N-T				X7R	0.033 μ	±10, ±20	2.5	120	1.9±0.20	R
SMK325 B7473□N-T				X7R	0.047 μ	±10, ±20	2.5	120	1.9±0.20	R

【温度特性 C7 : X7S】厚度 2.5mm (M)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 C7475□M-PE		100		X7S	4.7 μ	±10, ±20	3.5	150	2.5±0.20	R

【温度特性 C7 : X7S】厚度 1.9mm (N)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 C7475□N-TE		100		X7S	4.7 μ	±10, ±20	3.5	150	1.9±0.20	R

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■型号一览

【温度特性 B7 : X7R】厚度 1.15 mm (F)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK325 B7104□F-T		100		X7R	0.1 μ	±10, ±20	3.5	200	1.15±0.10	R

●432型

【温度特性 BJ : B/X5R】厚度 2.5mm (M)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK432 BJ474□M-T		100	B	X5R*1	0.47 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK432 BJ105□M-T			B	X5R*1	1 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK432 BJ155□M-T			B	X5R*1	1.5 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK432 BJ225□M-T			B	X5R*1	2.2 μ	±10, ±20	3.5	200	2.5±0.20	R
QMK432 BJ104□M-T		250	B	X5R*1	0.1 μ	±10, ±20	2.5	150	2.5±0.20	R
QMK432 BJ224□M-T			B	X5R*1	0.22 μ	±10, ±20	2.5	150	2.5±0.20	R
QMK432 BJ334□M-T			B	X5R*1	0.33 μ	±10, ±20	2.5	150	2.5±0.20	R
QMK432 BJ474□M-T			B	X5R*1	0.47 μ	±10, ±20	2.5	150	2.5±0.20	R
SMK432 BJ473□M-T		630	B	X5R*1	0.047 μ	±10, ±20	2.5	120	2.5±0.20	R
SMK432 BJ683□M-T			B	X5R*1	0.068 μ	±10, ±20	2.5	120	2.5±0.20	R
SMK432 BJ104□M-T			B	X5R*1	0.1 μ	±10, ±20	2.5	120	2.5±0.20	R

【温度特性 B7 : X7R】厚度 2.5mm (M)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许偏差 [%]	tan δ [%]	高温负载 额定电压 x %	厚度*3 [mm]	焊接方式 R: 回流焊 W: 波峰焊
HMK432 B7474□M-T		100		X7R	0.47 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK432 B7105□M-T				X7R	1 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK432 B7155□M-T				X7R	1.5 μ	±10, ±20	3.5	200	2.5±0.20	R
HMK432 B7225□M-T				X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	R
QMK432 B7104□M-T		250		X7R	0.1 μ	±10, ±20	2.5	150	2.5±0.20	R
QMK432 B7224□M-T				X7R	0.22 μ	±10, ±20	2.5	150	2.5±0.20	R
QMK432 B7334□M-T				X7R	0.33 μ	±10, ±20	2.5	150	2.5±0.20	R
QMK432 B7474□M-T				X7R	0.47 μ	±10, ±20	2.5	150	2.5±0.20	R
SMK432 B7473□M-T		630		X7R	0.047 μ	±10, ±20	2.5	120	2.5±0.20	R
SMK432 B7683□M-T				X7R	0.068 μ	±10, ±20	2.5	120	2.5±0.20	R
SMK432 B7104□M-T				X7R	0.1 μ	±10, ±20	2.5	120	2.5±0.20	R

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■PACKAGING

①Minimum Quantity

●Taped package

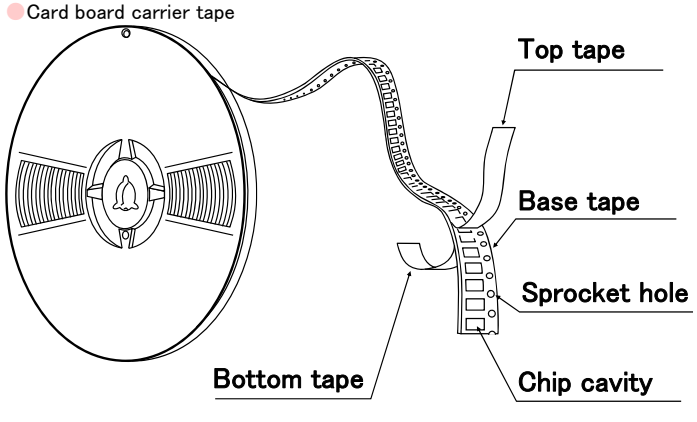
Type(EIA)	Thickness		Standard quantity [pcs]	
	mm	code	Paper tape	Embossed tape
□MK021(008004)	0.125	K	—	50000
□VS021(008004)				
□MK042(01005)	0.2	C, D	—	40000
□VS042(01005)	0.2	C		
□MK063(0201)	0.3	P,T	15000	—
□WK105(0204) ※	0.3	P	10000	—
□MK105(0402) □MF105(0402)	0.13	H	—	20000
	0.18	E	—	15000
	0.2	C	20000	—
	0.3	P	15000	—
	0.5	V	10000	—
□VK105(0402)	0.5	W	10000	—
□MK107(0603)	0.45	K	4000	—
□WK107(0306) ※	0.5	V	—	4000
□MF107(0603)	0.8	A	4000	—
□VS107(0603)	0.7	C	4000	—
□MJ107(0603)	0.8	A	3000	3000
□MK212(0805) □WK212(0508) ※ □MF212(0805)	0.45	K	4000	—
	0.85	D		
	1.25	G	—	3000
□VS212(0805)	0.85	D	4000	—
□MJ212(0805)	0.85	D	4000	—
	1.25	G	—	2000
□MK316(1206) □MF316(1206)	0.85	D	4000	—
	1.15	F	—	3000
	1.6	L	—	2000
□MJ316(1206)	1.15	F	—	3000
	1.6	L	—	2000
□MK325(1210) □MF325(1210)	0.85	D	—	2000
	1.15	F		
	1.9	N		
	2.0max.	Y		
	2.5	M	—	1000
□MJ325(1210)	1.9	N	—	2000
	2.5	M	—	500(T), 1000(P)
□MK432(1812)	2.5	M	—	500

Note : ※ LW Reverse type.

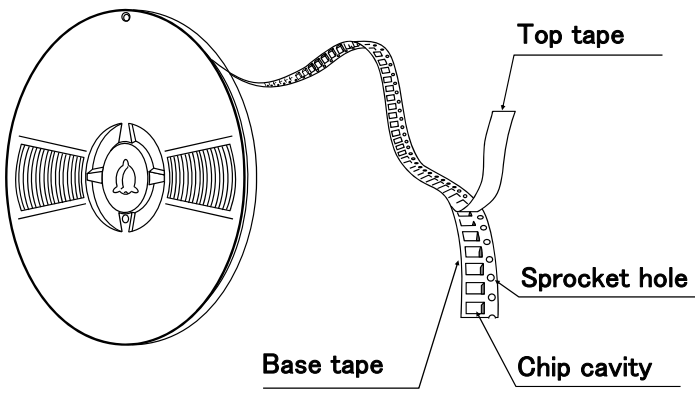
②Taping material

※No bottom tape for pressed carrier tape

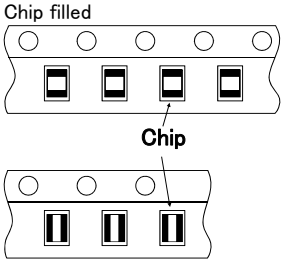
●Card board carrier tape



●Embossed tape



Chip filled



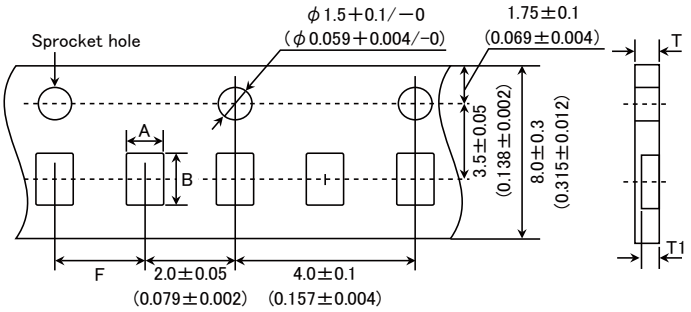
※ LW Reverse type.

③Representative taping dimensions

●Paper Tape(8mm wide)

●Pressed carrier tape(2mm pitch)

Unit:mm(inch)



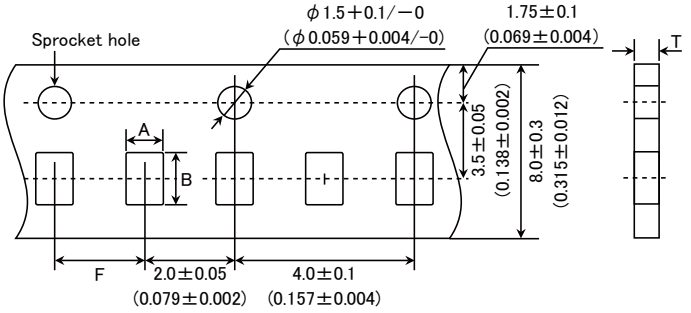
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	T	T1
□MK063(0201)	0.37	0.67	2.0±0.05	0.45max.	0.42max.
□WK105(0204) ※	0.65	1.15			
□MK105(0402) (*1 C)				0.4max.	0.3max.
□MK105(0402) (*1 P)				0.45max.	0.42max.

Note *1 Thickness, C:0.2mm ,P:0.3mm. ※ LW Reverse type.

Unit:mm

●Punched carrier tape (2mm pitch)

Unit:mm(inch)

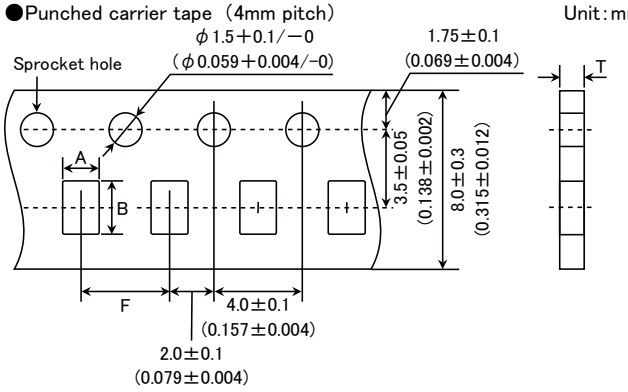


Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
□MK105 (0402) □MF105 (0402) □VK105 (0402)	0.65	1.15	2.0±0.05	0.8max.

Unit:mm

●Punched carrier tape (4mm pitch)

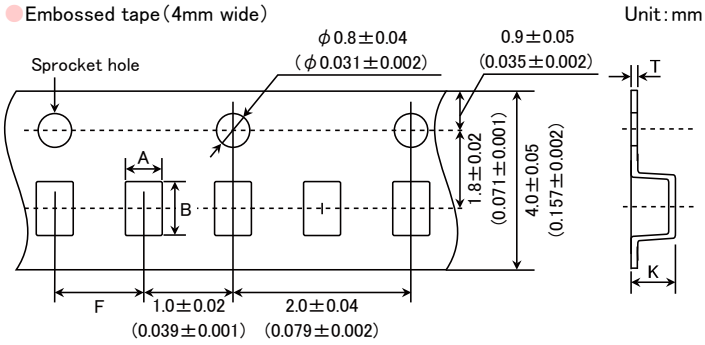
Unit:mm(inch)



Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness
	A	B	F	T
□MK107(0603) □WK107(0306) ※ □MF107(0603)	1.0	1.8	4.0±0.1	1.1max.
□MK212(0805) □WK212(0508) ※	1.65	2.4		1.1max.
□MK316(1206)	2.0	3.6		

Note : Taping size might be different depending on the size of the product. ※ LW Reverse type. Unit : mm

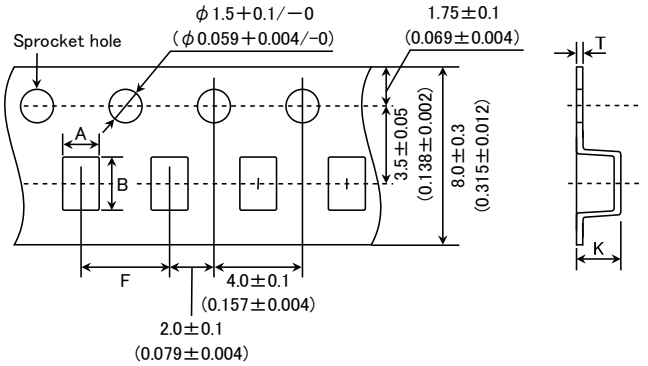
● Embossed tape (4mm wide) Unit : mm (inch)



Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□MK021(008004)	0.135	0.27	1.0±0.02	0.5max.	0.25max.
□VS021(008004)					
□MK042(01005)	0.23	0.43			
□VS042(01005)					

Unit : mm

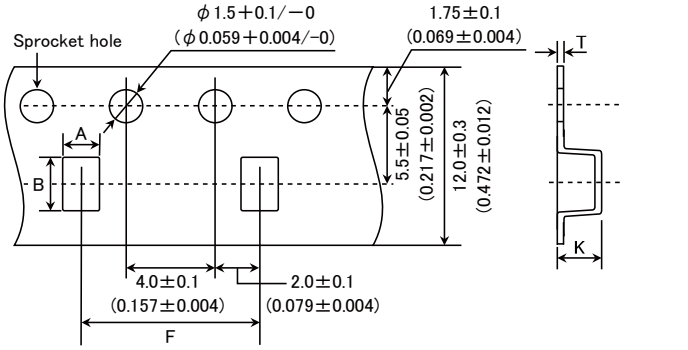
● Embossed tape (8mm wide) Unit : mm (inch)



Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□MK105(0402)	0.6	1.1	2.0±0.1	0.6max	0.2±0.1
□WK107(0306) ※	1.0	1.8	4.0±0.1	1.3max.	0.25±0.1
□MK212(0805) □MF212(0805)	1.65	2.4		3.4max.	0.6max.
□MK316(1206) □MF316(1206)	2.0	3.6			
□MK325(1210) □MF325(1210)	2.8	3.6			

Note : ※ LW Reverse type. Unit : mm

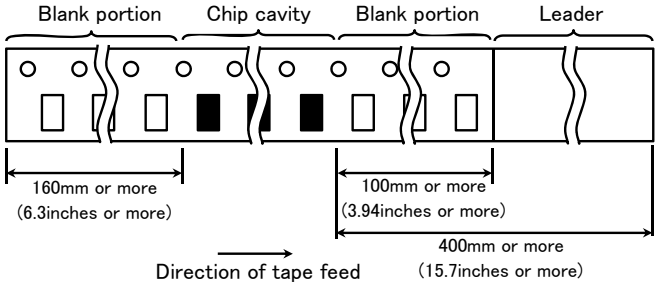
● Embossed tape (12mm wide)　　Unit : mm (inch)



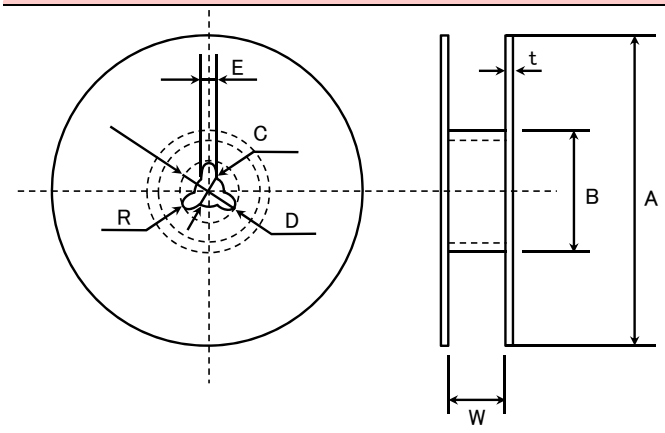
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□MK325(1210)	3.1	4.0	8.0±0.1	4.0max.	0.6max.
□MK432(1812)	3.7	4.9	8.0±0.1	4.0max.	0.6max.

Unit : mm

④Trailer and Leader



⑤Reel size



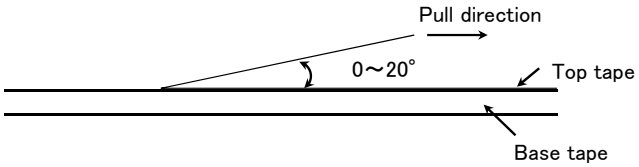
A	B	C	D	E	R
φ178±2.0	φ50min.	φ13.0±0.2	φ21.0±0.8	2.0±0.5	1.0

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

Unit : mm

⑥Top Tape Strength

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



Medium-High Voltage Multilayer Ceramic Capacitor

■RELIABILITY DATA

1. Operating Temperature Range		
Specified Value	Temperature Compensating(Class1)	CG : −55 to +125℃
	High Permittivity (Class2)	X7R, X7S : −55 to +125℃ X5R : −55 to +85℃ B : −25 to +85℃ SD : −55 to +125℃

2. Storage Temperature Range		
Specified Value	Temperature Compensating(Class1)	CG : −55 to +125℃
	High Permittivity (Class2)	X7R, X7S : −55 to +125℃ X5R : −55 to +85℃ B : −25 to +85℃ SD : −55 to +125℃

3. Rated Voltage		
Specified Value	Temperature Compensating(Class1)	100VDC(HMK)
	High Permittivity (Class2)	100VDC(HMK), 250VDC(QMK), 630VDC(SMK)

4. Withstanding Voltage(Between terminals)		
Specified Value	No breakdown or damage	
Test Methods and Remarks	Applied voltage Duration Charge/discharge current	: Rated voltage×2.5(HMK), Rated voltage×2(QMK), Rated voltage×1.2(SMK) : 1 to 5sec. : 50mA max.

5. Insulation Resistance		
Specified Value	Temperature Compensating(Class1)	10000 MΩ min.
	High Permittivity (Class2)	100MΩ･μF or 10GΩ whichever is smaller.
Test Methods and Remarks	Applied voltage Duration Charge/discharge current	: Rated voltage(HMK, QMK), 500V(SMK) : 60±5sec. : 50mA max.

6. Capacitance (Tolerance)		
Specified Value	Temperature Compensating(Class1)	0.2pF≦C≦5pF : ±0.25pF 0.2pF≦C≦10pF : ±0.5pF C＞10pF : ±5% or ±10%
	High Permittivity (Class2)	±10%, ±20%
Test Methods and Remarks	Temperature Compensating(Class1)	Measuring frequency : 1MHz±10% Measuring voltage : 0.5～5Vrms Bias application : None
	High Permittivity (Class2)	Measuring frequency : 1kHz±10% Measuring voltage : 1±0.2Vrms Bias application : None

7. Q or Dissipation Factor		
Specified Value	Temperature Compensating(Class1)	C＜30pF : Q≧400+20C C≧30pF : Q≧1000 (C:Nominal capacitance)
	High Permittivity (Class2)	3.5%max(HMK),2.5%max(QMK, SMK)
Test Methods and Remarks	Temperature Compensating(Class1)	Measuring frequency : 1MHz±10% Measuring voltage : 0.5～5Vrms Bias application : None
	High Permittivity (Class2)	Measuring frequency : 1kHz±10% Measuring voltage : 1±0.2Vrms Bias application : None

8. Temperature Characteristic of Capacitance

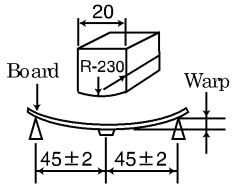
Specified Value	Temperature Compensating(Class1)	CG :0±30ppm/℃(−55 to +125℃)
	High Permittivity (Class2)	B : ±10%(−25 to +85℃) X5R : ±15%(−55 to +85℃) X7R : ±15%(−55 to +125℃ X7S : ±22%(−55 to +125℃) SD : − (−55 to +125℃)
Test Methods and Remarks	Capacitance value at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.	

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

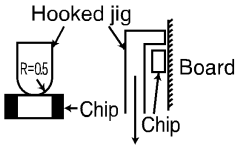
$$\frac{(C-C_2)}{C_2} \times 100(\%)$$

C : Capacitance value in Step 1 or Step 3
C2 : Capacitance value in Step 2

9. Deflection

Specified Value	Temperature Compensating(Class1)	Appearance : No abnormality Capacitance change : Within ±5% or ±0.5 pF, whichever is larger.
	High Permittivity (Class2)	Appearance : No abnormality Capacitance change : Within±10%
Test Methods and Remarks	Warp : 1mm Duration : 10sec. Test board : Glass epoxy-resin substrate Thickness : 1.6mm	 (Unit: mm) Capacitance measurement shall be conducted with the board bent.

10. Adhesive Strength of Terminal Electrodes

Specified Value	Temperature Compensating(Class1) High Permittivity (Class2)	No terminal separation or its indication.
Test Methods and Remarks	Applied force : 5N Duration : 30±5sec.	

11. Solderability

Specified Value	Temperature Compensating(Class1) High Permittivity (Class2)	At least 95% of terminal electrode is covered by new solder

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.	

12. Resistance to Soldering

Specified Value

Temperature Compensating(Class1)	Appearance	: No abnormality
	Capacitance change	: Within ±2.5% or ±0.25pF, whichever is larger.(HMK)
	Q	: Initial value
	Insulation resistance	: Initial value
	Withstanding voltage	(between terminals) : No abnormality
High Permittivity (Class2)	Appearance	: No abnormality
	Capacitance change	: Within±15%(HMK), ±10%(QMK, SMK)
	Dissipation facto	: Initial value
	Insulation resistance	: Initial value
	Withstanding voltage	(between terminals) : No abnormality

Test Methods and Remarks

	Temperature Compensating(Class1)
Preconditioning	None
Solder temperature	270±5℃
Duration	3±0.5sec.
Preheating conditions	80 to 100℃, 2 to 5 min. 150 to 200℃, 2 to 5min.
Recovery	24±2hrs under the standard condition Note3

	High Permittivity (Class2)
Preconditioning	Thermal treatment(at 150℃ for 1hr) Note1
Solder temperature	270±5℃
Duration	3±0.5sec.
Preheating conditions	80 to 100℃, 2 to 5 min. 150 to 200℃, 2 to 5min.
Recovery	24±2hrs under the standard condition Note3

13. Temperature Cycle (Thermal Shock)

Specified Value

Temperature Compensating(Class1)	Appearance	: No abnormality
	Capacitance change	: Within ±2.5% or ±0.25pF, whichever is larger.(HMK)
	Q	: Initial value
	Insulation resistance	: Initial value
	Withstanding voltage	(between terminals) : No abnormality
High Permittivity (Class2)	Appearance	: No abnormality
	Capacitance change	: Within±15%(HMK), ±10%(QMK, SMK)
	Dissipation facto	: Initial value
	Insulation resistance	: Initial value
	Withstanding voltage	(between terminals) : No abnormality

Test Methods and Remarks

	Class 1	Class 2
Preconditioning	None	Thermal treatment (at 150℃ for 1 hr) Note 1
1 cycle	Step 1: Minimum operating temperature, 30±3 Step 2: Normal temperature, 2 to 3 Step 3: Maximum operating temperature, 30±3 Step 4: Normal temperature, 2 to 3	
Number of cycles	5 times	
Recovery	6 to 24 hrs (Standard condition) Note 3	24±2 hrs (Standard condition) Note 3

14. Humidity (Steady state)

Specified Value

Temperature Compensating(Class1)	Appearance	: No abnormality
	Capacitance change	: Within ±5% or ±0.5pF, whichever is larger.(HMK)
	Q	: C＜10pF : Q≧200＋10C 10≦C＜30pF : Q≧275＋2.5C C≧30pF:Q≧350(C:Nominal capacitance)
	Insulation resistance	: 1000 MΩmin.
High Permittivity (Class2)	Appearance	: No abnormality
	Capacitance change	: Within±15%
	Dissipation factor	: 7%max(HMK), 5%max(QMK, SMK).
	Insulation resistance	: 25MΩμF or 1000MΩ whichever is smaller.

Test Methods and Remarks

	Class 1	Class 2
Preconditioning	None	Thermal treatment(at 150℃ for 1 hr) Note 1
Temperature	40±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 3	24±2 hrs (Standard condition) Note 3

15. Humidity Loading

Specified Value	Temperature Compensating(Class1)	Appearance	: No abnormality
		Capacitance change	: Within ±7.5% or ±0.75pF, whichever is larger (HMK).
		Q	: C＜30pF : Q≧100＋10C/3 C≧30pF : Q≧200 (C : Nominal capacitance)
		Insulation resistance	: 500 MΩ min.
	High Permittivity (Class2)	Appearance	: No abnormality
		Capacitance change	: Within±15%
		Dissipation factor	: 7%max(HMK), 5%max(QMK, SMK).
		Insulation resistance	: 10MΩμF or 500MΩ whichever is smaller.

Test Methods and Remarks

According to JIS 5101-1.

	Class 1	Class 2
Preconditioning	None	Voltage treatment (Rated voltage are applied for 1 hour at 40℃) Note 2
Temperature	40±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 3	24±2 hrs(Standard condition) Note 3

16. High Temperature Loading

Specified Value	Temperature Compensating(Class1)	Appearance	: No abnormality
		Capacitance change	: Within ±7.5% or ±0.75pF, whichever is larger.(HMK)
		Q	: C＜30pF : Q≧100＋10C/3 C≧30pF : Q≧200 (C : Nominal capacitance)
		Insulation resistance	: 500 MΩ min.
	High Permittivity (Class2)	Appearance	: No abnormality
		Capacitance change	: Within±15%
		Dissipation factor	: 7%max(HMK), 5%max(QMK, SMK).
		Insulation resistance	: 50MΩμF or 1000MΩ whichever is smaller.

Test Methods and Remarks

According to JIS 5101-1.

	Class 1	Class 2
Preconditioning	None	Voltage treatment Note 2
Temperature	Maximum operating temperature	Maximum operating temperature
Duration	1000＋48/－0 hrs	1000＋48/－0 hrs
Applied voltage	Rated voltage×2(HMK)	Rated voltage×2(HMK), Rated voltage×1.5(QMK), Rated voltage×1.2(SMK)
Charge/discharge current	50mA max.	50mA max.
Recovery	6 to 24hr (Standard condition) Note 3	24±2 hrs (Standard condition) Note 3

Note1 Thermal treatment : Initial value shall be measured after test sample is heat-treated at 150＋0/－10℃ for an hour and kept at room temperature for 24±2hours.

Note2 Voltage treatment : Initial value shall be measured after test sample is voltage-treated for an hour at both the temperature and voltage specified in the test conditions, and kept at room temperature for 24±2hours.

Note3 Standard condition : Temperature: 5 to 35℃, Relative humidity: 45 to 85 % RH, Air pressure: 86 to 106kPa
When there are questions concerning measurement results, in order to provide correlation data, the test shall be conducted under the following condition.
Temperature: 20±2℃, Relative humidity: 60 to 70 % RH, Air pressure: 86 to 106kPa
Unless otherwise specified, all the tests are conducted under the "standard condition".

Precautions on the use of Multilayer Ceramic Capacitors

■PRECAUTIONS

1. Circuit Design

Precautions

◆Verification of operating environment, electrical rating and performance

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

◆Operating Voltage (Verification of Rated voltage)

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

2. PCB Design

Precautions

◆Pattern configurations (Design of Land-patterns)

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

◆Pattern configurations (Capacitor layout on PCBs)

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

Technical considerations

◆Pattern configurations (Design of Land-patterns)

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

(1) Recommended land dimensions for typical chip capacitors

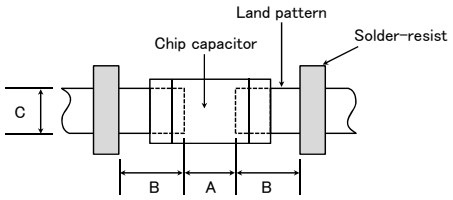
●Multilayer Ceramic Capacitors : Recommended land dimensions

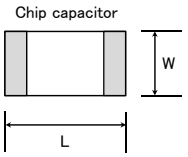
(unit: mm)

Wave-soldering

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

Land patterns for PCBs





Reflow-soldering

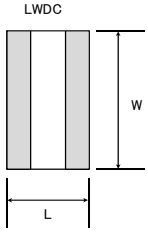
Type		021	042	063	105	107	212	316	325	432
Size	L	0.25	0.4	0.6	1.0	1.6	2.0	3.2	3.2	4.5
	W	0.125	0.2	0.3	0.5	0.8	1.25	1.6	2.5	3.2
A		0.095～0.135	0.15～0.25	0.20～0.30	0.45～0.55	0.8～1.0	0.8～1.2	1.8～2.5	1.8～2.5	2.5～3.5
B		0.085～0.125	0.15～0.20	0.20～0.30	0.40～0.50	0.6～0.8	0.8～1.2	1.0～1.5	1.0～1.5	1.5～1.8
C		0.110～0.150	0.15～0.30	0.25～0.40	0.45～0.55	0.6～0.8	0.9～1.6	1.2～2.0	1.8～3.2	2.3～3.5

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

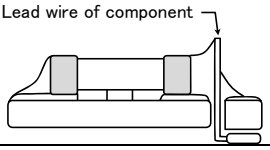
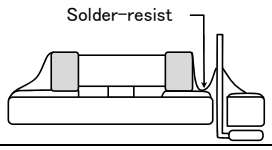
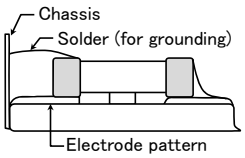
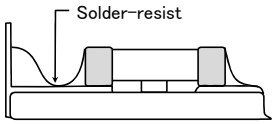
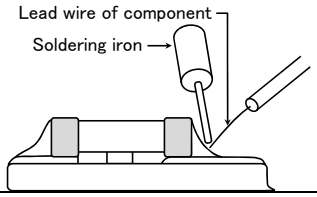
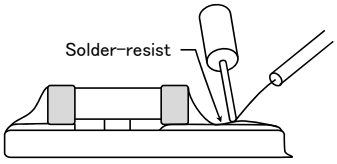
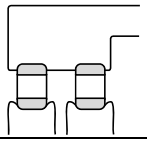
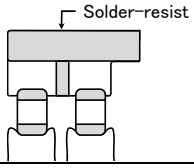
●LWDC: Recommended land dimensions for reflow-soldering

(unit: mm)

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

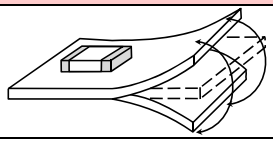
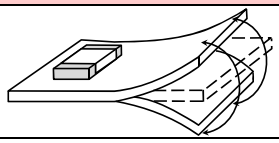


(2)Examples of good and bad solder application

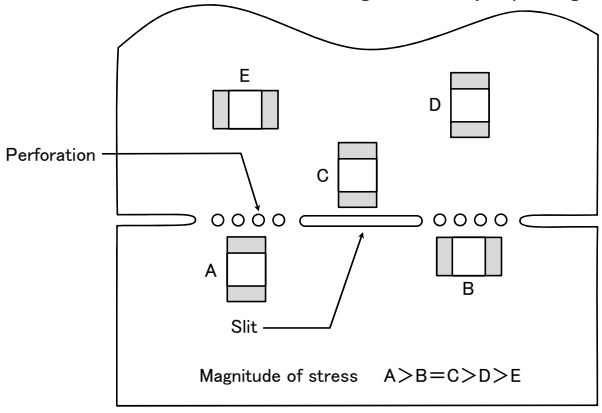
Item	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

◆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

◆Adjustment of mounting machine

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

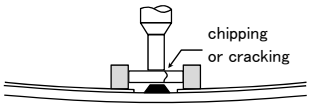
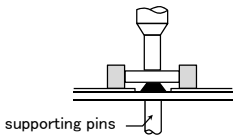
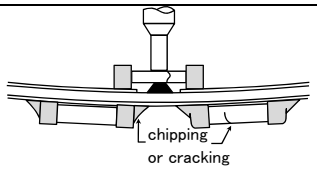
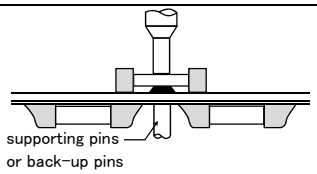
◆Selection of Adhesives

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

Technical considerations

◆Adjustment of mounting machine

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

Item	Improper method	Proper method
Single-sided mounting		
Double-sided mounting		

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

◆Selection of Adhesives

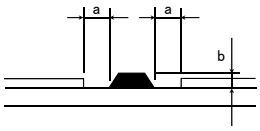
Some adhesives may cause IR deterioration. The different shrinkage percentage of between the adhesive and the capacitors may result in stresses on the capacitors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect components. Therefore, the following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

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

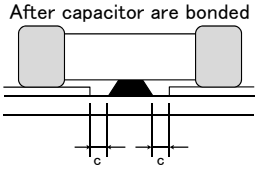
(2) The recommended amount of adhesives is as follows;
   [Recommended condition]

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

Amount adhesive



After capacitor are bonded



4. Soldering

Precautions

◆Selection of Flux

Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use;
(1) Flux used shall be less than or equal to 0.1 wt%(in Cl equivalent) of halogenated content. Flux having a strong acidity content shall not be applied.
(2) When shall capacitors are soldered on boards, the amount of flux applied shall be controlled at the optimum level.
(3) When water-soluble flux is used, special care shall be taken to properly clean the boards.

◆Soldering

Temperature, time, amount of solder, etc. shall be set in accordance with their recommended conditions.
Sn-Zn solder paste can adversely affect MLCC reliability.
Please contact us prior to usage of Sn-Zn solder.

Technical considerations

◆Selection of Flux

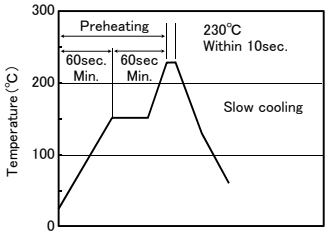
1-1. When too much halogenated substance(Chlorine, etc.) content is used to activate flux, or highly acidic flux is used, it may lead to corrosion of terminal electrodes or degradation of insulation resistance on the surfaces of the capacitors.
1-2. Flux is used to increase solderability in wave soldering. However if too much flux is applied, a large amount of flux gas may be emitted and may adversely affect the solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system.
1-3. Since the residue of water-soluble flux is easily dissolved in moisture in the air, the residues on the surfaces of capacitors in high humidity conditions may cause a degradation of insulation resistance and reliability of the capacitors. Therefore, the cleaning methods and the capability of the machines used shall also be considered carefully when water-soluble flux is used.

◆Soldering

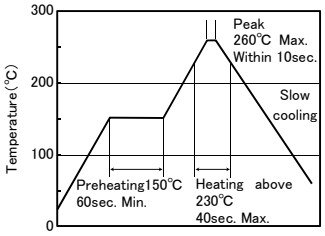
- Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling.
- Therefore, the soldering must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.
- Preheating : Capacitors shall be preheated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

[Reflow soldering]

【Recommended conditions for eutectic soldering】



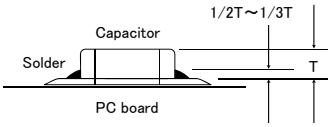
【Recommended condition for Pb-free soldering】



Caution

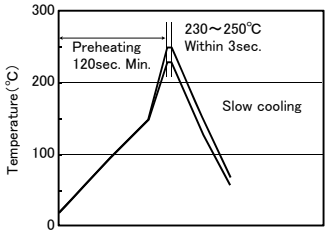
①The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of a capacitor.

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

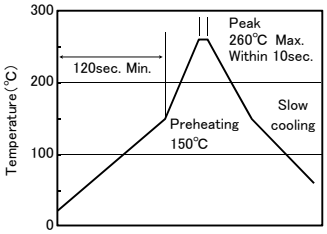


[Wave soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】

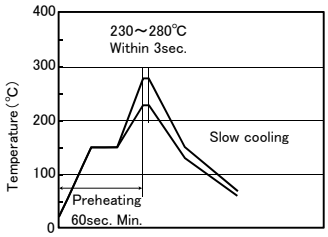


Caution

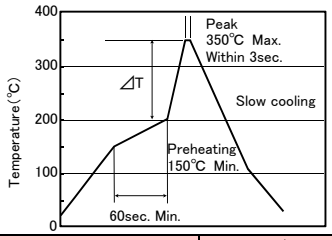
①Wave soldering must not be applied to capacitors designated as for reflow soldering only. soldering for 1 times.

[Hand soldering]

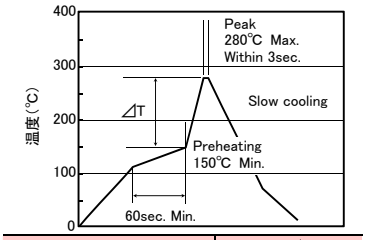
【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】



	⊿T
316type or less	⊿T≦150℃



	⊿T
325type or more	⊿T≦130℃

Caution

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

②The soldering iron shall not directly touch capacitors. soldering for 1 times.

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

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

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

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

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