

有关敝公司产品的注意事项

请务必在使用敝公司产品之前阅读。



注意

产品目录中的记载内容

本产品目录中所记载的内容为2021年1月的内容。因产品改良等原因，可能会不经预告而变更其记载内容，或是停止供应本产品目录中所记载的产品。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，即便其致使用设备发生损害、不良情况等时，敝公司也不承担任何责任，敬请知悉。

签署交货规格说明书

就本产品目录中所记载产品的产品规格等相关内容，敝公司备有交货规格说明书，详情请向敝公司咨询。在使用敝公司产品前请务必就交货规格说明书之内容确认并批准之。

实装前的事前评估

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

用途的限定

1. 可以使用的设备

本产品目录中所记载的产品预设为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)] 以及面向本产品目录或是交货规格说明书中另行注明的设备通用性、标准性用途。

另外，面向汽车用电子设备、电信基础设施 / 工业设备、医疗设备 (国际 (GHTF) 第一类、第二类、第三类) 方面的应用，敝公司也备有预设的产品线，请参考本产品目录或是交货规格说明书的内容，使用相对应的产品。

2. 需要另行确认的设备

若考虑将本产品目录中所记载的产品使用于当产品发生故障、品质不良，或是由此引起的运转失常而可能会危及生命、身体或是财产，以及有可能给社会造成深刻影响的以下设备 (不包括本产品目录或是交货规格说明书中另行注明可以使用设备) 等时，请务必事先向敝公司咨询。

- (1) 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)
- (2) 交通信号设备
- (3) 防灾 / 保安设备
- (4) 医疗设备 (国际 (GHTF) 第三类)
- (5) 高公共性信息通讯设备 / 信息处理设备 (电话交换机、电话 / 无线 / 广播电视基站等)
- (6) 其他与上述设备有同等品质与可靠性要求的设备

3. 禁止使用的设备

请勿将敝公司产品使用于对安全性和可靠性有着极高要求的以下设备。

- (1) 航天设备 (人工卫星、火箭等)
- (2) 航空设备 ^(注释1)
- (3) 医疗设备 (国际 (GHTF) 第四类)、植体 (体内植入型) 医疗设备 ^(注释2)
- (4) 发电控制设备 (面向核能 / 水力 / 火力发电厂等的设备)
- (5) 海底设备 (海底中继设备、海中的作业设备等)
- (6) 军事设备
- (7) 其他与上述设备有同等品质与可靠性要求的设备

注释1：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。

注释2：包括注入人体内的部分和与此相连接的体外部分。

4. 责任的限制

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非敝公司预设用途的设备、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，敬请知悉。

安全设计

需将敝公司的产品使用于对安全性和可靠性要求较高的设备、电路上时，请进行充分的安全性评估和可靠性评估。另外，请通过设置保护电路、保护装置的系统，设置冗余电路不会被单一故障影响安全性的系统等失效导向安全 (fail-safe) 设计，确保充分的安全性。

有关知识产权

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。

保证范围

敝公司产品的保证范围仅限于已经交付的敝公司产品本身，由敝公司产品故障或不良情况所诱发的损害，敝公司不承担任何责任，敬请知悉。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的条件提供保证。

正规销售渠道

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，并不适用于从其他渠道购买的敝公司产品，敬请知悉。

出口时的注意事项

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》以及美国在出口管理方面的相关法规，并办理相关手续。如有不明之处，请向敝公司咨询。

车载用途使用指引

敝公司将汽车用电子设备划分为如下四个分类。而对于敝公司的每个产品，敝公司都设定了其可以被使用的分类。需在汽车用电子设备上使用敝公司的产品之前，请务必事先确认该产品是否适合使用在该用途上。如有不明之处，请与敝公司取得联系。

分 类	汽车用电子设备（代表实例）
控制系	· 发动机引擎控制装置（ECU） · 巡航定速控制装置 · 四轮转向系统（4WS） · 变速箱 · 动力转向装置 · HEV / PHV / EV 基础控制（电池 / 逆变器 / DC-DC） · 汽车定位器（车辆位置情报提供装置） 等
安全系	· 防锁死刹车系统（ABS） · 车身动态稳定系统（ESC） · 安全气囊 · ADAS（直接控制走动 / 转向 / 停车的装置） 等
车身系	· 雨刷 · 自动门锁 · 电动车窗 · 无钥匙进入系统（智能钥匙） · 电动后视镜 · 汽车电子后视镜 · 车内照明 · 车内空调系统 · LED 车头 / 车尾灯 · 轮胎压力监测系统（TPMS） · 防盗装置 等
情报系	· 车载信息娱乐装置（汽车导航 / 音响等） · 情报通讯装置（ITS / T-BOX） · 汽车仪表 · ADAS（与传感、安全 / 传动系统没有关联的装置） · 行车记录仪（车厂原装配件） 等

多层陶瓷电容器

回流焊

AEC-Q200

■型号标示法

J	M	K	3	1	6	△	B	J	1	0	6	M	L	H	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]
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
J	树脂外部电极品
S	铜内部电极(高频用)
F	高可靠性用途
R	高可靠性用途 (铜外部电极)

④外型尺寸

外型	L × W [mm]	EIA (inch)
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	0.85±0.10
				1.25+0.15/-0.05
	316	3.2±0.20	1.6±0.20	1.6±0.20
B	325	3.2±0.30	2.5±0.30	2.5±0.30
	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	0.8+0.20/-0
	212	2.0+0.20/-0	1.25+0.20/-0	0.85±0.10
C				1.25+0.20/-0
	316	3.2±0.30	1.6±0.30	1.6±0.30
	105	1.0+0.20/-0	0.5+0.20/-0	0.5+0.20/-0
	107	1.6+0.25/-0	0.8+0.25/-0	0.8+0.25/-0
K	212	2.0+0.25/-0	1.25+0.25/-0	1.25+0.25/-0
		2.0±0.15	1.25±0.15	0.85±0.15
	316	3.2±0.20	1.6±0.20	1.15±0.20
				1.6±0.20
	325	3.2±0.50	2.5±0.30	2.5±0.30

注: 参照标准产品尺寸

△=空格

⑥温度特性

■高介电常数

代码	适用标准	温度范围 [°C]	基准温度 [°C]	静电容量变化率	静电容量允许偏差	允许偏差代码
BJ	EIA	X5R	-55~+85	±15%	±10%	K
					±20%	M
C6	EIA	X6S	-55~+105	±22%	±10%	K
					±20%	M
B7	EIA	X7R	-55~+125	±15%	±10%	K
					±20%	M
C7	EIA	X7S	-55~+125	±22%	±10%	K
					±20%	M
D7	EIA	X7T	-55~+125	+22%/-33%	±10%	K
					±20%	M

▶ 由于篇幅有限, 本产品目录中只记载了有代表性的产品规格, 若考虑使用敝公司产品时, 请确认交货规格说明书中的详细规格。
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), 请参阅敝公司网站(<http://www.ty-top.com/>)。

■温度补偿用

代码	适用标准		温度范围 [°C]	基准温度 [°C]	静电容量变化率	静电容量允许偏差	允许偏差代码
CG	JIS	CG	-55~+125	20	0±30ppm/°C	±0.1pF	B
						±0.25pF	C
						±0.5pF	D
						±1pF	F
						±2%	G
CH	JIS	CH	-55~+125	20	0±60ppm/°C	±5%	J
						±0.1pF	B
						±0.25pF	C
						±0.5pF	D
						±1pF	F
CJ	JIS	CJ	-55~+125	20	0±120ppm/°C	±0.25pF	C
CK	JIS	CK	-55~+125	20	0±250ppm/°C	±0.25pF	C

⑦静电容量

代码号 (例)	静电容量
0R5	0.5pF
010	1pF
100	10pF
101	100pF
102	1,000pF
103	0.01 μF
104	0.1 μF
105	1 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
G	±2%
J	±5%
K	±10%
M	±20%

⑨产品厚度

代码	产品厚度 [mm]
P	0.3
T	
V	0.5
C	0.7(107 型以上)
A	0.8
D	0.85(212 型以上)
F	1.15
G	1.25
L	1.6
N	1.9
M	2.5

⑩个别规格

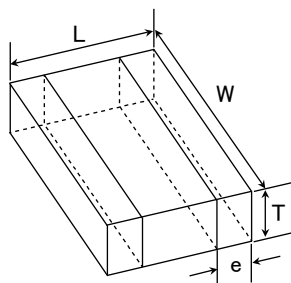
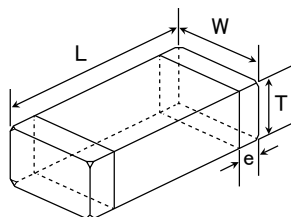
代码	个别规格
-	标准
H	车载用品
8	电信基础设施 / 工业设备、医疗设备用途

⑪包装

代码	包装仕様
F	φ178mm 卷盘带装 (2mm 间距)
R	φ178mm 压模带装 (4mm 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)

⑫管理记号

代码	管理记号
△	标准



※LW 逆转型

Type(EIA)	标准产品尺寸 [mm] (inch)				
	L	W	T	*1	e
□MK063(0201)	0.6±0.03 (0.024±0.001)	0.3±0.03 (0.012±0.001)	0.3±0.03 (0.012±0.001)	T	0.15±0.05 (0.006±0.002)
□MK105(0402)	1.0±0.05 (0.039±0.002)	0.5±0.05 (0.020±0.002)	0.5±0.05 (0.020±0.002)	V	0.25±0.10 (0.010±0.004)
□MF105(0402)	0.52±0.05 (0.020±0.002)	1.0±0.05 (0.039±0.002)	0.3±0.05 (0.012±0.002)	P	0.18±0.08 (0.007±0.003)
□WK105(0204)※	1.6±0.10 (0.063±0.004)	0.8±0.10 (0.031±0.004)	0.8±0.10 (0.031±0.004)	A	0.35±0.25 (0.014±0.010)
□MK107(0603)	1.6±0.10 (0.063±0.004)	0.8±0.10 (0.031±0.004)	0.8±0.10 (0.031±0.004)	A	0.35±0.3/-0.25 (0.014±0.012/-0.010)
□MF107(0603)	1.6±0.10 (0.063±0.004)	0.8±0.10 (0.031±0.004)	0.7±0.10 (0.028±0.004)	C	0.35±0.25 (0.014±0.010)
□VS107(0603)	0.8±0.10 (0.031±0.004)	1.6±0.10 (0.063±0.004)	0.5±0.05 (0.020±0.002)	V	0.25±0.15 (0.010±0.006)
□WK107(0306)※	2.0±0.10 (0.079±0.004)	1.25±0.10 (0.049±0.004)	0.85±0.10 (0.033±0.004)	D	0.5±0.25 (0.020±0.010)
□MK212(0805)	2.0±0.10 (0.079±0.004)	1.25±0.10 (0.049±0.004)	1.25±0.10 (0.049±0.004)	G	
□MF212(0805)			0.85±0.10 (0.033±0.004)	D	0.5±0.35/-0.25 (0.020±0.014/-0.010)
□MJ212(0805)	2.0±0.10 (0.079±0.004)	1.25±0.10 (0.049±0.004)	1.25±0.10 (0.049±0.004)	G	
□VS212(0805)			0.85±0.10 (0.033±0.004)	D	0.5±0.25 (0.020±0.010)
□WK212(0508)※	1.25±0.15 (0.049±0.006)	2.0±0.15 (0.079±0.006)	0.85±0.10 (0.033±0.004)	D	0.3±0.2 (0.012±0.008)
□MK316(1206)	3.2±0.15 (0.126±0.006)	1.6±0.15 (0.063±0.006)	1.15±0.10 (0.045±0.004)	F	0.5±0.35/-0.25 (0.020±0.014/-0.010)
□MF316(1206)			1.6±0.20 (0.063±0.008)	L	
□MJ316(1206)	3.2±0.15 (0.126±0.006)	1.6±0.15 (0.063±0.006)	1.15±0.10 (0.045±0.004)	F	0.6±0.4/-0.3 (0.024±0.016/-0.012)
			1.6±0.20 (0.063±0.008)	L	
□MK325(1210)	3.2±0.30 (0.126±0.012)	2.5±0.20 (0.098±0.008)	1.15±0.10 (0.045±0.004)	F	0.6±0.3 (0.024±0.012)
□MF325(1210)			1.9±0.20 (0.075±0.008)	N	
			2.5±0.20 (0.098±0.008)	M	
□MJ325(1210)	3.2±0.30 (0.126±0.012)	2.5±0.20 (0.098±0.008)	1.9±0.20 (0.075±0.008)	N	0.6±0.4/-0.3 (0.024±0.016/-0.012)
			2.5±0.20 (0.098±0.008)	M	
□MK432(1812)	4.5±0.40 (0.177±0.016)	3.2±0.30 (0.126±0.012)	2.5±0.20 (0.098±0.008)	M	0.9±0.6 (0.035±0.024)

注: ※LW 逆转型、*1 产品厚度代码

规格	EIA (inch)	产品厚度		标准数量 [pcs]	
		[mm]	代码	纸带	压模带
063	0201	0.3	T	15000	—
105	0402	0.5	V	10000	—
	0204 ※	0.3	P		
107	0603	0.7	C	4000	—
		0.8	A		
		0.8	A	3000 (树脂外部电极品)	—
		0.8	A	—	3000 (树脂外部电极品)
	0306 ※	0.5	V	—	4000
	212	0805	0.85	D	4000
1.25			G	—	3000
1.25			G	—	2000 (树脂外部电极品)
0508 ※		0.85	D	4000	—
316	1206	1.15	F	—	3000
		1.6	L	—	2000
325	1210	1.15	F	—	2000
		1.9	N		
		2.5	M	—	500(T), 1000(P)
432	1812	2.5	M	—	500

注: ※LW 逆转型 (□WK)

- 产品目录中的多层陶瓷电容器全部属于RoHS对应品
- 型号的□中将会记入静电容量允许偏差代码。
- 产品目录中的多层陶瓷电容器全部属于回流焊对应品。

注)

- 根据使用电路和机器，需要按照相应规格处理。请务必咨询正规销售渠道。
- 车载(车身系 / 情报系)用途 (AEC-Q200 Qualified) 的产品。有关更多的内容，请务必于“车载用途使用指引”中确认。
 < **AEC-Q200** : AEC-Q200 qualified >
 车载 (车身系/情报系) 用途的多层陶瓷电容器，已就其代表性产品实施了对应AEC-Q200标准的评价测试。
 125°C products: AEC-Q200 Grade1 (已在Grade1的测试条件下评价完毕。)
 105°C products: AEC-Q200 Grade2 (已在Grade2的测试条件下评价完毕。)
 85°C products: AEC-Q200 Grade3 (已在Grade3的测试条件下评价完毕。)
 关于本产品的详细规格和评估测试结果等信息，请咨询正规销售渠道。
 此外，订购时请索取产品规格书，就其内容进行确认并批准之。
- *1: 关于寸规格，请参照型号标示法的④外型尺寸④、⑤产品尺寸公差、⑨产品厚度、以及标准产品的尺寸。

多层陶瓷电容器 (高介电常数)

●063规格

【温度特性 B7 : X7R (- 55 ~ + 125°C) 】 厚度0.3mm (T)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
								额定电压 x %		
TMK063 B7101□PHFE		25	X7R		100 p	±10, ±20	3.5	200	0.3±0.03	
TMK063 B7151□PHFE					150 p	±10, ±20	3.5	200	0.3±0.03	
TMK063 B7221□PHFE					220 p	±10, ±20	3.5	200	0.3±0.03	
TMK063 B7331□PHFE					330 p	±10, ±20	3.5	200	0.3±0.03	
TMK063 B7471□PHFE					470 p	±10, ±20	3.5	200	0.3±0.03	
TMK063 B7102□PHFE					1000 p	±10, ±20	3.5	200	0.3±0.03	
TMK063 B7152□PHFE					1500 p	±10, ±20	5	200	0.3±0.03	
TMK063 B7222□PHFE					2200 p	±10, ±20	5	200	0.3±0.03	
TMK063 B7332□PHFE					3300 p	±10, ±20	5	200	0.3±0.03	
EMK063 B7101□PHFE		16	X7R		100 p	±10, ±20	3.5	200	0.3±0.03	
EMK063 B7151□PHFE					150 p	±10, ±20	3.5	200	0.3±0.03	
EMK063 B7221□PHFE					220 p	±10, ±20	3.5	200	0.3±0.03	
EMK063 B7331□PHFE					330 p	±10, ±20	3.5	200	0.3±0.03	
EMK063 B7471□PHFE					470 p	±10, ±20	3.5	200	0.3±0.03	
EMK063 B7102□PHFE					1000 p	±10, ±20	3.5	200	0.3±0.03	
EMK063 B7152□PHFE					1500 p	±10, ±20	5	200	0.3±0.03	
EMK063 B7222□PHFE					2200 p	±10, ±20	5	200	0.3±0.03	
EMK063 B7332□PHFE					3300 p	±10, ±20	5	200	0.3±0.03	
LMK063 B7101□PHFE		10	X7R		100 p	±10, ±20	3.5	200	0.3±0.03	
LMK063 B7151□PHFE					150 p	±10, ±20	3.5	200	0.3±0.03	
LMK063 B7221□PHFE					220 p	±10, ±20	3.5	200	0.3±0.03	
LMK063 B7331□PHFE					330 p	±10, ±20	3.5	200	0.3±0.03	
LMK063 B7471□PHFE					470 p	±10, ±20	3.5	200	0.3±0.03	
LMK063 B7102□PHFE					1000 p	±10, ±20	3.5	200	0.3±0.03	
LMK063 B7152□PHFE					1500 p	±10, ±20	5	200	0.3±0.03	
LMK063 B7222□PHFE					2200 p	±10, ±20	5	200	0.3±0.03	
LMK063 B7332□PHFE					3300 p	±10, ±20	5	200	0.3±0.03	
LMK063 B7472□PHFE					4700 p	±10, ±20	5	200	0.3±0.03	
LMK063 B7682□PHFE			X7R		6800 p	±10, ±20	5	200	0.3±0.03	
LMK063 B7103□PHFE			X7R		0.01 μ	±10, ±20	5	200	0.3±0.03	

▶ 由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用敝公司产品时，请确认交货规格说明书中的详细规格。
 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)，请参阅敝公司网站 (<http://www.ty-top.com/>)。

● 105规格

【温度特性 BJ : X5R (- 55 ~ + 85°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
							额定电压 x %		
UMK105 BJ471□VHF		50	X5R	470 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 BJ102□VHF			X5R	1000 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 BJ152□VHF			X5R	1500 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 BJ222□VHF			X5R	2200 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 BJ332□VHF			X5R	3300 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 BJ472□VHF			X5R	4700 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 BJ682□VHF			X5R	6800 p	±10, ±20	2.5	150	0.5±0.05	
UMK105 BJ103□VHF			X5R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
UMK105 BJ223□VHF			X5R	0.022 μ	±10, ±20	5	200	0.5±0.05	
UMK105 BJ473□VHF			X5R	0.047 μ	±10, ±20	5	200	0.5±0.05	
UMK105 BJ104□VHF			X5R	0.1 μ	±10, ±20	10	150	0.5±0.05	
TMK105 BJ472□VHF		25	X5R	4700 p	±10, ±20	2.5	200	0.5±0.05	
TMK105 BJ682□VHF			X5R	6800 p	±10, ±20	2.5	200	0.5±0.05	
TMK105 BJ103□VHF			X5R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
TMK105 BJ153□VHF			X5R	0.015 μ	±10, ±20	3.5	200	0.5±0.05	
TMK105 BJ223□VHF			X5R	0.022 μ	±10, ±20	3.5	200	0.5±0.05	
TMK105 BJ333□VHF			X5R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
TMK105 BJ473□VHF			X5R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
TMK105 BJ104□VHF			X5R	0.1 μ	±10, ±20	5	150	0.5±0.05	
TMK105 BJ224□VHF			X5R	0.22 μ	±10, ±20	10	150	0.5±0.05	
TMK105ABJ474□VHF			X5R	0.47 μ	±10, ±20	10	150	0.5±0.10	
EMK105 BJ103□VHF		16	X5R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
EMK105 BJ153□VHF			X5R	0.015 μ	±10, ±20	3.5	200	0.5±0.05	
EMK105 BJ223□VHF			X5R	0.022 μ	±10, ±20	3.5	200	0.5±0.05	
EMK105 BJ333□VHF			X5R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
EMK105 BJ473□VHF			X5R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
EMK105 BJ104□VHF			X5R	0.1 μ	±10, ±20	5	150	0.5±0.05	
EMK105 BJ224□VHF			X5R	0.22 μ	±10, ±20	10	150	0.5±0.05	
EMK105ABJ474□VHF			X5R	0.47 μ	±10, ±20	10	150	0.5±0.10	
EMK105 BJ105□VHF		10	X5R	1 μ	±10, ±20	10	150	0.5±0.05	
LMK105 BJ333□VHF			X5R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
LMK105 BJ473□VHF			X5R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
LMK105 BJ104□VHF			X5R	0.1 μ	±10, ±20	5	150	0.5±0.05	
LMK105 BJ224□VHF			X5R	0.22 μ	±10, ±20	5	150	0.5±0.05	
LMK105ABJ474□VHF			X5R	0.47 μ	±10, ±20	10	150	0.5±0.10	
LMK105 BJ105□VHF			X5R	1 μ	±10, ±20	10	150	0.5±0.05	
LMK105ABJ225□VHF			X5R	2.2 μ	±10, ±20	10	150	0.5±0.10	
JMK105 BJ104□VHF		6.3	X5R	0.1 μ	±10, ±20	5	150	0.5±0.05	
JMK105 BJ224□VHF			X5R	0.22 μ	±10, ±20	5	150	0.5±0.05	
JMK105 BJ474□VHF			X5R	0.47 μ	±10, ±20	10	150	0.5±0.05	
JMK105 BJ105□VHF			X5R	1 μ	±10, ±20	10	150	0.5±0.05	
JMK105 BJ225□VHF			X5R	2.2 μ	±10, ±20	10	150	0.5±0.05	
JMK105BBJ475MVHF			X5R	4.7 μ	±20	10	150	0.5+0.15/-0.05	
AMK105 BJ225□VHF		4	X5R	2.2 μ	±10, ±20	10	150	0.5±0.05	
AMK105BBJ475MVHF			X5R	4.7 μ	±20	10	150	0.5+0.15/-0.05	

【温度特性 B7 : X7R (- 55 ~ + 125°C) , D7 : X7T (- 55 ~ + 125°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
UMK105 B7221□VHF		50	X7R	220 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7331□VHF			X7R	330 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7471□VHF			X7R	470 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7681□VHF			X7R	680 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7102□VHF			X7R	1000 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7152□VHF			X7R	1500 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7222□VHF			X7R	2200 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7332□VHF			X7R	3300 p	±10, ±20	2.5	200	0.5±0.05	
UMK105 B7472□VHF			X7R	4700 p	±10, ±20	2.5	150	0.5±0.05	
UMK105 B7682□VHF			X7R	6800 p	±10, ±20	2.5	150	0.5±0.05	
UMK105 B7103□VHF			X7R	0.01 μ	±10, ±20	3.5	150	0.5±0.05	
UMK105 B7153□VHFE			X7R	0.015 μ	±10, ±20	3.5	200	0.5±0.05	
UMK105 B7223□VHF			X7R	0.022 μ	±10, ±20	10	200	0.5±0.05	
UMK105 B7333□VHFE			X7R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
UMK105 B7473□VHF			X7R	0.047 μ	±10, ±20	10	200	0.5±0.05	
UMK105 B7104□VHF			X7R	0.1 μ	±10, ±20	10	150	0.5±0.05	
TMK105 B7472□VHF		25	X7R	4700 p	±10, ±20	2.5	200	0.5±0.05	
TMK105 B7682□VHF			X7R	6800 p	±10, ±20	2.5	200	0.5±0.05	
TMK105 B7103□VHF			X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
TMK105 B7153□VHF			X7R	0.015 μ	±10, ±20	3.5	150	0.5±0.05	
TMK105 B7223□VHF			X7R	0.022 μ	±10, ±20	3.5	150	0.5±0.05	
TMK105 B7333□VHF			X7R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
TMK105 B7473□VHF			X7R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
TMK105 B7104□VHF			X7R	0.1 μ	±10, ±20	10	150	0.5±0.05	
EMK105 B7103□VHF		16	X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
EMK105 B7153□VHF			X7R	0.015 μ	±10, ±20	3.5	150	0.5±0.05	
EMK105 B7223□VHF			X7R	0.022 μ	±10, ±20	3.5	150	0.5±0.05	
EMK105 B7333□VHF			X7R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
EMK105 B7473□VHF			X7R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
EMK105 B7104□VHF			X7R	0.1 μ	±10, ±20	5	150	0.5±0.05	
EMK105 B7224□VHF			X7R	0.22 μ	±10, ±20	10	150	0.5±0.05	
LMK105 B7473□VHF		10	X7R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
LMK105 B7104□VHF			X7R	0.1 μ	±10, ±20	5	150	0.5±0.05	
LMK105 B7224□VHF			X7R	0.22 μ	±10, ±20	10	150	0.5±0.05	
JMK105 B7104□VHF		6.3	X7R	0.1 μ	±10, ±20	5	150	0.5±0.05	
JMK105 B7224□VHF			X7R	0.22 μ	±10, ±20	10	150	0.5±0.05	
JMK105 B7474□VHF			X7R	0.47 μ	±10, ±20	10	150	0.5±0.05	
JMK105CD7105□VHF			X7T	1 μ	±10, ±20	10	150	0.5+0.20/-0	
AMK105 B7474□VHF		4	X7R	0.47 μ	±10, ±20	10	150	0.5±0.05	

●107规格

【温度特性 BJ: X5R (- 55 ~ + 85℃)】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
UMK107 BJ104□AHT		50	X5R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
UMK107 BJ224□AHT			X5R	0.22 μ	±10, ±20	10	150	0.8±0.10	
UMK107 BJ474□AHT			X5R	0.47 μ	±10, ±20	10	150	0.8±0.10	
UMK107ABJ105□AHT			X5R	1 μ	±10, ±20	10	150	0.8+0.15/-0.05	
GMK107 BJ223□AHT			X5R	0.022 μ	±10, ±20	2.5	200	0.8±0.10	
GMK107 BJ473□AHT		35	X5R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
GMK107 BJ104□AHT			X5R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
GMK107 BJ224□AHT			X5R	0.22 μ	±10, ±20	10	150	0.8±0.10	
GMK107ABJ474□AHT			X5R	0.47 μ	±10, ±20	10	150	0.8+0.15/-0.05	
GMK107 BJ105□AHT			X5R	1 μ	±10, ±20	10	150	0.8±0.10	
TMK107 BJ223□AHT		25	X5R	0.022 μ	±10, ±20	2.5	200	0.8±0.10	
TMK107 BJ473□AHT			X5R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
TMK107 BJ104□AHT			X5R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
TMK107 BJ224□AHT			X5R	0.22 μ	±10, ±20	5	150	0.8±0.10	
TMK107 BJ474□AHT			X5R	0.47 μ	±10, ±20	3.5	150	0.8±0.10	
TMK107 BJ105□AHT		16	X5R	1 μ	±10, ±20	10	150	0.8±0.10	
TMK107BBJ225□AHT			X5R	2.2 μ	±10, ±20	10	150	0.8+0.20/-0	
EMK107 BJ104□AHT			X5R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
EMK107 BJ224□AHT			X5R	0.22 μ	±10, ±20	5	150	0.8±0.10	
EMK107 BJ474□AHT			X5R	0.47 μ	±10, ±20	3.5	150	0.8±0.10	
EMK107 BJ105□AHT		10	X5R	1 μ	±10, ±20	5	150	0.8±0.10	
EMK107ABJ225□AHT			X5R	2.2 μ	±10, ±20	10	150	0.8+0.15/-0.05	
EMK107BBJ475□AHT			X5R	4.7 μ	±10, ±20	10	150	0.8+0.20/-0	
LMK107 BJ474□AHT			X5R	0.47 μ	±10, ±20	3.5	150	0.8±0.10	
LMK107 BJ105□AHT			X5R	1 μ	±10, ±20	5	150	0.8±0.10	
LMK107 BJ225□AHT		6.3	X5R	2.2 μ	±10, ±20	10	150	0.8±0.10	
LMK107 BJ475□AHT			X5R	4.7 μ	±10, ±20	10	150	0.8±0.10	
LMK107BBJ106MAHT			X5R	10 μ	±20	10	150	0.8+0.20/-0	
JMK107 BJ105□AHT			X5R	1 μ	±10, ±20	5	150	0.8±0.10	
JMK107 BJ225□AHT			X5R	2.2 μ	±10, ±20	10	150	0.8±0.10	
JMK107 BJ475□AHT		4	X5R	4.7 μ	±10, ±20	10	150	0.8±0.10	
JMK107ABJ106□AHT			X5R	10 μ	±10, ±20	10	150	0.8+0.15/-0.05	
AMK107ABJ106□AHT			X5R	10 μ	±10, ±20	10	150	0.8+0.15/-0.05	
AMK107BBJ226MAHT			X5R	22 μ	±20	10	150	0.8+0.20/-0	

【温度特性 B7: X7R (- 55 ~ + 125℃) , C7: X7S (- 55 ~ + 125℃) , D7: X7T (- 55 ~ + 125℃)】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
UMK107 B7102□AHT		50	X7R	1000 p	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7152□AHT			X7R	1500 p	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7222□AHT			X7R	2200 p	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7332□AHT			X7R	3300 p	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7472□AHT			X7R	4700 p	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7682□AHT			X7R	6800 p	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7103□AHT			X7R	0.01 μ	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7153□AHT			X7R	0.015 μ	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7223□AHT			X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7333□AHT			X7R	0.033 μ	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
UMK107 B7683□AHT			X7R	0.068 μ	±10, ±20	3.5	150	0.8±0.10	
UMK107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
UMK107AC7154□AHT			X7S	0.15 μ	±10, ±20	3.5	150	0.8+0.15/-0.05	
UMK107 C7224□AHT		35	X7S	0.22 μ	±10, ±20	3.5	150	0.8±0.10	
GMK107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
GMK107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
GMK107 B7224□AHT			X7R	0.22 μ	±10, ±20	10	150	0.8±0.10	
GMK107 B7474□AHT			X7R	0.47 μ	±10, ±20	10	150	0.8±0.10	
GMK107AB7105□AHT		25	X7R	1 μ	±10, ±20	10	150	0.8+0.15/-0.05	
TMK107 B7223□AHT			X7R	0.022 μ	±10, ±20	2.5	200	0.8±0.10	
TMK107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
TMK107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
TMK107 B7224□AHT			X7R	0.22 μ	±10, ±20	10	150	0.8±0.10	
TMK107 B7474□AHT		16	X7R	0.47 μ	±10, ±20	10	150	0.8±0.10	
TMK107AB7105□AHT			X7R	1 μ	±10, ±20	10	150	0.8+0.15/-0.05	
EMK107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
EMK107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	150	0.8±0.10	
EMK107 B7224□AHT			X7R	0.22 μ	±10, ±20	5	150	0.8±0.10	
EMK107 B7474□AHT		10	X7R	0.47 μ	±10, ±20	10	150	0.8±0.10	
EMK107 B7105□AHT			X7R	1 μ	±10, ±20	10	150	0.8±0.10	
LMK107 B7224□AHT			X7R	0.22 μ	±10, ±20	5	150	0.8±0.10	
LMK107 B7474□AHT			X7R	0.47 μ	±10, ±20	3.5	150	0.8±0.10	
LMK107 B7105□AHT			X7R	1 μ	±10, ±20	10	150	0.8±0.10	
LMK107BD7225□AHT		6.3	X7T	2.2 μ	±10, ±20	10	200	0.8+0.20/-0	
JMK107 B7105□AHT			X7R	1 μ	±10, ±20	10	150	0.8±0.10	
JMK107 B7225□AHT			X7R	2.2 μ	±10, ±20	10	150	0.8±0.10	

●212规格

【温度特性 BJ :X5R (- 55 ~ + 85℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
								额定电压 x %		
UMK212 BJ104□GHT		50		X5R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 BJ224□GHT				X5R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 BJ474□GHT				X5R	0.47 μ	±10, ±20	3.5	150	1.25±0.10	
UMK212 BJ105□GHT				X5R	1 μ	±10, ±20	5	150	1.25±0.10	
GMK212 BJ104□GHT				X5R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
GMK212 BJ224□GHT		35		X5R	0.22 μ	±10, ±20	3.5	150	1.25±0.10	
GMK212 BJ474□GHT				X5R	0.47 μ	±10, ±20	3.5	150	1.25±0.10	
GMK212 BJ105□GHT				X5R	1 μ	±10, ±20	5	150	1.25±0.10	
GMK212BBJ225□GHT				X5R	2.2 μ	±10, ±20	10	150	1.25±0.10	
TMK212 BJ104□GHT				X5R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
TMK212 BJ224□GHT		25		X5R	0.22 μ	±10, ±20	3.5	150	1.25±0.10	
TMK212 BJ474□GHT				X5R	0.47 μ	±10, ±20	3.5	200	1.25±0.10	
TMK212 BJ105□GHT				X5R	1 μ	±10, ±20	3.5	150	1.25±0.10	
TMK212 BJ225□GHT				X5R	2.2 μ	±10, ±20	5	150	1.25±0.10	
TMK212BBJ475□GHT				X5R	4.7 μ	±10, ±20	10	150	1.25±0.20/-0	
TMK212BBJ106□GHT		16		X5R	10 μ	±10, ±20	10	150	1.25±0.20/-0	
EMK212 BJ105□GHT				X5R	1 μ	±10, ±20	3.5	150	1.25±0.10	
EMK212 BJ225□GHT				X5R	2.2 μ	±10, ±20	5	150	1.25±0.10	
EMK212ABJ475□GHT				X5R	4.7 μ	±10, ±20	10	150	1.25±0.15/-0.05	
EMK212BBJ106□GHT				X5R	10 μ	±10, ±20	10	150	1.25±0.20/-0	
LMK212 BJ225□GHT		10		X5R	2.2 μ	±10, ±20	5	200	1.25±0.10	
LMK212ABJ475□GHT				X5R	4.7 μ	±10, ±20	10	150	1.25±0.15/-0.05	
LMK212ABJ106□GHT				X5R	10 μ	±10, ±20	10	150	1.25±0.15/-0.05	
JMK212ABJ475□GHT				X5R	4.7 μ	±10, ±20	5	200	1.25±0.15/-0.05	
JMK212ABJ106□GHT				X5R	10 μ	±10, ±20	10	150	1.25±0.15/-0.05	
JMK212BBJ226MGHT		6.3		X5R	22 μ	±20	10	150	1.25±0.20/-0	
AMK212ABJ226MGHT				X5R	22 μ	±20	10	150	1.25±0.15/-0.05	
AMK212BBJ476MGHT				X5R	47 μ	±20	10	150	1.25±0.20/-0	

【温度特性 BJ :X5R (- 55 ~ + 85℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
								额定电压 x %		
EMK212 BJ105□DHT		16		X5R	1 μ	±10, ±20	5	200	0.85±0.10	
EMK212ABJ225□DHT				X5R	2.2 μ	±10, ±20	5	150	0.85±0.10	
EMK212BBJ475□DHT				X5R	4.7 μ	±10, ±20	10	150	0.85±0.10	

【温度特性 B7 :X7R (- 55 ~ + 125℃) , C7 :X7S (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
								额定电压 x %		
UMK212 B7103□GHT		50		X7R	0.01 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 B7153□GHT				X7R	0.015 μ	±10, ±20	2.5	200	1.25±0.10	
UMK212 B7223□GHT				X7R	0.022 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 B7333□GHT				X7R	0.033 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 B7473□GHT				X7R	0.047 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 B7683□GHT				X7R	0.068 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212 B7104□GHT				X7R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
UMK212BBJ154□GHTE				X7R	0.15 μ	±10, ±20	3.5	200	1.25±0.2/-0	
UMK212 B7224□GHT				X7R	0.22 μ	±10, ±20	3.5	150	1.25±0.10	
UMK212BC7334□GHTE				X7S	0.33 μ	±10, ±20	3.5	150	1.25±0.2/-0	
UMK212 C7474□GHTE				X7S	0.47 μ	±10, ±20	3.5	150	1.25±0.10	
UMK212CC7684□GHTE				X7S	0.68 μ	±10, ±20	3.5	150	1.25±0.25/-0	
UMK212 B7105□GHT				X7R	1 μ	±10, ±20	10	150	1.25±0.10	
GMK212 B7224□GHT		35		X7R	0.22 μ	±10, ±20	3.5	150	1.25±0.10	
GMK212 B7105□GHT				X7R	1 μ	±10, ±20	10	150	1.25±0.10	
TMK212 B7224□GHT				X7R	0.22 μ	±10, ±20	3.5	150	1.25±0.10	
TMK212 B7334□GHT		25		X7R	0.33 μ	±10, ±20	3.5	200	1.25±0.10	
TMK212 B7474□GHT				X7R	0.47 μ	±10, ±20	3.5	150	1.25±0.10	
TMK212 B7105□GHTR				X7R	1 μ	±10, ±20	10	150	1.25±0.10	
TMK212 B7225□GHT				X7R	2.2 μ	±10, ±20	10	150	1.25±0.10	
EMK212 B7224□GHT				X7R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	
EMK212 B7334□GHT		16		X7R	0.33 μ	±10, ±20	3.5	200	1.25±0.10	
EMK212 B7474□GHT				X7R	0.47 μ	±10, ±20	3.5	200	1.25±0.10	
EMK212 B7105□GHTR				X7R	1 μ	±10, ±20	10	150	1.25±0.10	
EMK212 B7225□GHT				X7R	2.2 μ	±10, ±20	10	150	1.25±0.10	
EMK212AB7475□GHT				X7R	4.7 μ	±10, ±20	10	150	1.25±0.15/-0.05	
LMK212 B7105□GHTR		10		X7R	1 μ	±10, ±20	10	150	1.25±0.10	
LMK212 B7225□GHT				X7R	2.2 μ	±10, ±20	10	150	1.25±0.10	
LMK212 B7475□GHT				X7R	4.7 μ	±10, ±20	10	150	1.25±0.10	
JMK212 B7475□GHT		6.3		X7R	4.7 μ	±10, ±20	10	150	1.25±0.10	
JMK212AB7106□GHT				X7R	10 μ	±10, ±20	10	150	1.25±0.15/-0.05	

▶ 由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用敝公司产品时，请确认交货规格说明书中的详细规格。
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)，请参阅敝公司网站(<http://www.ty-top.com/>)。

● 316规格

【温度特性 BJ : X5R (- 55 ~ + 85℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
UMK316 BJ474□LHT		50	X5R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 BJ105□LHT			X5R	1 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 BJ225□LHT			X5R	2.2 μ	±10, ±20	10	150	1.6±0.20	
UMK316 ABJ475□LHT			X5R	4.7 μ	±10, ±20	10	150	1.6±0.20	
GMK316 BJ105□LHT		35	X5R	1 μ	±10, ±20	3.5	200	1.6±0.20	
GMK316 BJ225□LHT			X5R	2.2 μ	±10, ±20	10	150	1.6±0.20	
GMK316 BJ475□LHT			X5R	4.7 μ	±10, ±20	10	150	1.6±0.20	
GMK316 BBJ106□LHT			X5R	10 μ	±10, ±20	10	150	1.6±0.30	
TMK316 BJ225□LHT		25	X5R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
TMK316 BJ475□LHT			X5R	4.7 μ	±10, ±20	5	150	1.6±0.20	
TMK316 BJ106□LHT			X5R	10 μ	±10, ±20	5	150	1.6±0.20	
EMK316 BJ225□LHT			X5R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
EMK316 BJ475□LHT		16	X5R	4.7 μ	±10, ±20	5	150	1.6±0.20	
EMK316 BJ106□LHT			X5R	10 μ	±10, ±20	5	150	1.6±0.20	
EMK316 BBJ226MLHT			X5R	22 μ	±20	10	150	1.6±0.30	
LMK316 BJ475□LHT			X5R	4.7 μ	±10, ±20	5	150	1.6±0.20	
LMK316 BJ106□LHT		10	X5R	10 μ	±10, ±20	5	150	1.6±0.20	
LMK316 ABJ226□LHT			X5R	22 μ	±10, ±20	10	150	1.6±0.20	
JMK316 BJ106□LHT			X5R	10 μ	±10, ±20	5	200	1.6±0.20	
JMK316 ABJ226□LHT			X5R	22 μ	±10, ±20	10	150	1.6±0.20	
JMK316 ABJ476MLHT		6.3	X5R	47 μ	±20	10	150	1.6±0.20	

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
UMK316 B7473□LHT		50	X7R	0.047 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 B7683□LHT			X7R	0.068 μ	±10, ±20	2.5	200	1.6±0.20	
UMK316 B7104□LHT			X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 B7154□LHT			X7R	0.15 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 B7334□LHT			X7R	0.33 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 B7474□LHT			X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 B7105□LHT			X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
UMK316 BC7155□LHTE			X7S	1.5 μ	±10, ±20	3.5	150	1.6±0.30	
UMK316 B7225□LHT			X7R	2.2 μ	±10, ±20	10	150	1.6±0.20	
UMK316 AC7475□LHTE			X7S	4.7 μ	±10, ±20	2.5	150	1.6±0.20	
GMK316 B7105□LHT		35	X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
GMK316 B7225□LHT			X7R	2.2 μ	±10, ±20	10	150	1.6±0.20	
GMK316 AB7475□LHT			X7R	4.7 μ	±10, ±20	10	150	1.6±0.20	
TMK316 B7105□LHT		25	X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
TMK316 B7225□LHT			X7R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
TMK316 AB7475□LHT			X7R	4.7 μ	±10, ±20	10	150	1.6±0.20	
TMK316 AB7106□LHT			X7R	10 μ	±10, ±20	10	150	1.6±0.20	
EMK316 B7225□LHT		16	X7R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
EMK316 AB7475□LHT			X7R	4.7 μ	±10, ±20	10	150	1.6±0.20	
EMK316 AB7106□LHT			X7R	10 μ	±10, ±20	10	150	1.6±0.20	
LMK316 B7475□LHT		10	X7R	4.7 μ	±10, ±20	5	150	1.6±0.20	
LMK316 AB7106□LHT			X7R	10 μ	±10, ±20	10	150	1.6±0.20	
JMK316 AB7106□LHT		6.3	X7R	10 μ	±10, ±20	10	150	1.6±0.20	
JMK316 AB7226□LHT			X7R	22 μ	±10, ±20	10	150	1.6±0.20	
AMK316 AB7226□LHT		4	X7R	22 μ	±10, ±20	10	150	1.6±0.20	
AMK316 AC7476MLHT			X7S	47 μ	±20	10	150	1.6±0.20	

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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), 请参阅敝公司网站(<http://www.ty-top.com/>)。

● 325规格

【温度特性 BJ : X5R (- 55 ~ + 85°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
UMK325 BJ106□MHP		50	X5R	10 μ	±10, ±20	5	150	2.5±0.20	
GMK325 BJ106□MHP		35	X5R	10 μ	±10, ±20	5	150	2.5±0.20	
TMK325 BJ106□MHP		25	X5R	10 μ	±10, ±20	5	150	2.5±0.20	
EMK325 BJ226□MHP		16	X5R	22 μ	±10, ±20	5	150	2.5±0.20	
EMK325ABJ476□MHP			X5R	47 μ	±10, ±20	10	150	2.5±0.30	
LMK325 BJ226□MHP		10	X5R	22 μ	±10, ±20	5	150	2.5±0.20	
LMK325 BJ476□MHP			X5R	47 μ	±10, ±20	10	150	2.5±0.20	
JMK325 BJ476□MHP		6.3	X5R	47 μ	±10, ±20	10	150	2.5±0.20	

【温度特性 BJ : X5R (- 55 ~ + 85°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
UMK325 BJ475□NHT		50	X5R	4.7 μ	±10, ±20	10	150	1.9±0.20	
GMK325 BJ225MNHT		35	X5R	2.2 μ	±20	3.5	200	1.9±0.20	
GMK325 BJ475□NHT			X5R	4.7 μ	±10, ±20	10	150	1.9±0.20	
TMK325 BJ475□NHT		25	X5R	4.7 μ	±10, ±20	10	150	1.9±0.20	
EMK325 BJ475MNHT		16	X5R	4.7 μ	±20	3.5	200	1.9±0.20	
EMK325 BJ106□NHT			X5R	10 μ	±10, ±20	5	150	1.9±0.20	

【温度特性 B7 : X7R (- 55 ~ + 125°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
UMK325 B7225□MHP		50	X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
UMK325 B7335□MHP			X7R	3.3 μ	±10, ±20	3.5	200	2.5±0.20	
UMK325 B7475□MHP			X7R	4.7 μ	±10, ±20	5	150	2.5±0.20	
UMK325AB7106□MHP			X7R	10 μ	±10, ±20	10	150	2.5±0.30	
GMK325AB7106□MHP		35	X7R	10 μ	±10, ±20	10	150	2.5±0.30	
TMK325 B7335□MHP		25	X7R	3.3 μ	±10, ±20	3.5	200	2.5±0.20	
TMK325AB7106□MHP			X7R	10 μ	±10, ±20	10	150	2.5±0.30	
TMK325 B7226□MHP			X7R	22 μ	±10, ±20	10	150	2.5±0.20	
EMK325 B7226□MHP		16	X7R	22 μ	±10, ±20	10	150	2.5±0.20	
LMK325 B7226□MHP		10	X7R	22 μ	±10, ±20	10	150	2.5±0.20	
JMK325 B7226□MHP		6.3	X7R	22 μ	±10, ±20	10	150	2.5±0.20	
JMK325 B7476□MHP			X7R	47 μ	±10, ±20	10	150	2.5±0.20	

【温度特性 B7 : X7R (- 55 ~ + 125°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
UMK325 B7105□NHT		50	X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	
GMK325 B7225□NHT		35	X7R	2.2 μ	±10, ±20	3.5	200	1.9±0.20	
GMK325 B7475□NHTR			X7R	4.7 μ	±10, ±20	10	150	1.9±0.20	
TMK325 B7475□NHT		25	X7R	4.7 μ	±10, ±20	10	150	1.9±0.20	
EMK325 B7475□NHT		16	X7R	4.7 μ	±10, ±20	3.5	150	1.9±0.20	
EMK325 B7106□NHTR			X7R	10 μ	±10, ±20	10	150	1.9±0.20	

多层陶瓷电容器 (温度补偿用)

●063规格

【温度特性 $C\Delta : C\Delta/C0\Delta$ (- 55 ~ + 125°C)】厚度 0.3mm (T)

型号1	型号2	额定电压 [V]	温度特性		静电容量 [F]	静电容量允许误差	Q值 [at 1MHz] (Min)	高温负载	厚度 ^{*1} [mm]	注释
								额定电压 x %		
UMK063 CK0R5CTHF		50	CK	C0K	0.5 p	±0.25pF	410	200	0.3±0.03	
UMK063 CK010CTHF			CK	C0K	1 p	±0.25pF	420	200	0.3±0.03	
UMK063 CK1R5CTHF			CK	C0K	1.5 p	±0.25pF	430	200	0.3±0.03	
UMK063 CK020CTHF			CK	C0K	2 p	±0.25pF	440	200	0.3±0.03	
UMK063 CJO30CTHF			CJ	C0J	3 p	±0.25pF	460	200	0.3±0.03	
UMK063 CH040CTHF			CH	C0H	4 p	±0.25pF	480	200	0.3±0.03	
UMK063 CH050CTHF			CH	C0H	5 p	±0.25pF	500	200	0.3±0.03	
UMK063 CH060DTHF			CH	C0H	6 p	±0.5pF	520	200	0.3±0.03	
UMK063 CH070DTHF			CH	C0H	7 p	±0.5pF	540	200	0.3±0.03	
UMK063 CH080DTHF			CH	C0H	8 p	±0.5pF	560	200	0.3±0.03	
UMK063 CH090DTHF			CH	C0H	9 p	±0.5pF	580	200	0.3±0.03	
UMK063 CH100DTHF			CH	C0H	10 p	±0.5pF	600	200	0.3±0.03	
UMK063 CH120JTHF			CH	C0H	12 p	±5%	640	200	0.3±0.03	
UMK063 CH150JTHF			CH	C0H	15 p	±5%	700	200	0.3±0.03	
UMK063 CH180JTHF			CH	C0H	18 p	±5%	760	200	0.3±0.03	
UMK063 CH220JTHF			CH	C0H	22 p	±5%	840	200	0.3±0.03	
UMK063 CH270JTHF			CH	C0H	27 p	±5%	940	200	0.3±0.03	
UMK063 CH330JTHF			CH	C0H	33 p	±5%	1000	200	0.3±0.03	
UMK063 CH390JTHF			CH	C0H	39 p	±5%	1000	200	0.3±0.03	
UMK063 CH470JTHF			CH	C0H	47 p	±5%	1000	200	0.3±0.03	
UMK063 CH560JTHF			CH	C0H	56 p	±5%	1000	200	0.3±0.03	
UMK063 CH680JTHF			CH	C0H	68 p	±5%	1000	200	0.3±0.03	
UMK063 CH820JTHF			CH	C0H	82 p	±5%	1000	200	0.3±0.03	
UMK063 CH101JTHF			CH	C0H	100 p	±5%	1000	200	0.3±0.03	
UMK063 CH121JTHF			CH	C0H	120 p	±5%	1000	200	0.3±0.03	
UMK063 CH151JTHF			CH	C0H	150 p	±5%	1000	200	0.3±0.03	
UMK063 CH181JTHF			CH	C0H	180 p	±5%	1000	200	0.3±0.03	
UMK063 CH221JTHF			CH	C0H	220 p	±5%	1000	200	0.3±0.03	
TMK063 CH121JTHF		25	CH	C0H	120 p	±5%	1000	200	0.3±0.03	
TMK063 CH151JTHF			CH	C0H	150 p	±5%	1000	200	0.3±0.03	
TMK063 CH181JTHF			CH	C0H	180 p	±5%	1000	200	0.3±0.03	
TMK063 CH221JTHF			CH	C0H	220 p	±5%	1000	200	0.3±0.03	

●105规格

【温度特性 $C\Delta : C\Delta/C0\Delta$ (- 55 ~ + 125°C)】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]	静电容量允许误差	Q值 [at 1MHz] (Min)	高温负载	厚度 ^{*1} [mm]	注释
								额定电压 x %		
UMK105 CK0R5CVHF		50	CK	C0K	0.5 p	±0.25pF	410	200	0.5±0.05	
UMK105 CK010CVHF			CK	C0K	1 p	±0.25pF	420	200	0.5±0.05	
UMK105 CK1R5CVHF			CK	C0K	1.5 p	±0.25pF	430	200	0.5±0.05	
UMK105 CK020CVHF			CK	C0K	2 p	±0.25pF	440	200	0.5±0.05	
UMK105 CJO30CVHF			CJ	C0J	3 p	±0.25pF	460	200	0.5±0.05	
UMK105 CH040CVHF			CH	C0H	4 p	±0.25pF	480	200	0.5±0.05	
UMK105 CH050CVHF			CH	C0H	5 p	±0.25pF	500	200	0.5±0.05	
UMK105 CH060DVHF			CH	C0H	6 p	±0.5pF	520	200	0.5±0.05	
UMK105 CH070DVHF			CH	C0H	7 p	±0.5pF	540	200	0.5±0.05	
UMK105 CH080DVHF			CH	C0H	8 p	±0.5pF	560	200	0.5±0.05	
UMK105 CH090DVHF			CH	C0H	9 p	±0.5pF	580	200	0.5±0.05	
UMK105 CH100DVHF			CH	C0H	10 p	±0.5pF	600	200	0.5±0.05	
UMK105 CH120JVHF			CH	C0H	12 p	±5%	640	200	0.5±0.05	
UMK105 CH150JVHF			CH	C0H	15 p	±5%	700	200	0.5±0.05	
UMK105 CH180JVHF			CH	C0H	18 p	±5%	760	200	0.5±0.05	
UMK105 CH220JVHF			CH	C0H	22 p	±5%	840	200	0.5±0.05	
UMK105 CH270JVHF			CH	C0H	27 p	±5%	940	200	0.5±0.05	
UMK105 CH330JVHF			CH	C0H	33 p	±5%	1000	200	0.5±0.05	
UMK105 CH390JVHF			CH	C0H	39 p	±5%	1000	200	0.5±0.05	
UMK105 CH470JVHF			CH	C0H	47 p	±5%	1000	200	0.5±0.05	
UMK105 CH560JVHF			CH	C0H	56 p	±5%	1000	200	0.5±0.05	
UMK105 CH680JVHF			CH	C0H	68 p	±5%	1000	200	0.5±0.05	
UMK105 CH820JVHF			CH	C0H	82 p	±5%	1000	200	0.5±0.05	
UMK105 CH101JVHF			CH	C0H	100 p	±5%	1000	200	0.5±0.05	
UMK105 CH121JVHF			CH	C0H	120 p	±5%	1000	200	0.5±0.05	
UMK105 CH151JVHF			CH	C0H	150 p	±5%	1000	200	0.5±0.05	
UMK105 CH181JVHF			CH	C0H	180 p	±5%	1000	200	0.5±0.05	
UMK105 CH221JVHF			CH	C0H	220 p	±5%	1000	200	0.5±0.05	
UMK105 CH271JVHF			CH	C0H	270 p	±5%	1000	200	0.5±0.05	
UMK105 CH331JVHF			CH	C0H	330 p	±5%	1000	200	0.5±0.05	
UMK105 CH391JVHF			CH	C0H	390 p	±5%	1000	200	0.5±0.05	
UMK105 CH471JVHF			CH	C0H	470 p	±5%	1000	200	0.5±0.05	
UMK105 CH561JVHF			CH	C0H	560 p	±5%	1000	200	0.5±0.05	
UMK105 CH681JVHF			CH	C0H	680 p	±5%	1000	200	0.5±0.05	
UMK105 CH821JVHF			CH	C0H	820 p	±5%	1000	200	0.5±0.05	
UMK105 CH102JVHF			CH	C0H	1000 p	±5%	1000	200	0.5±0.05	

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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), 请参阅敝公司网站(<http://www.ty-top.com/>)。

中高耐压多层陶瓷电容器

●105规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
								额定电压 x %		
HMK105 B7221□VHFE		100		X7R	220 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7331□VHFE				X7R	330 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7471□VHFE				X7R	470 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7681□VHFE				X7R	680 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7102□VHFE				X7R	1000 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7152□VHFE				X7R	1500 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7222□VHFE				X7R	2200 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7332□VHFE				X7R	3300 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7472□VHFE				X7R	4700 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7682□VHFE				X7R	6800 p	±10, ±20	3.5	200	0.5±0.05	
HMK105 B7103□VHFE				X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	

●107规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
								额定电压 x %		
HMK107 B7102□AHT		100		X7R	1000 p	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7152□AHT				X7R	1500 p	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7222□AHT				X7R	2200 p	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7332□AHT				X7R	3300 p	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7472□AHT				X7R	4700 p	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7682□AHT				X7R	6800 p	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7103□AHT				X7R	0.01 μ	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7153□AHT				X7R	0.015 μ	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7223□AHT				X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7333□AHT				X7R	0.033 μ	±10, ±20	3.5	200	0.8±0.10	
HMK107 B7473□AHT				X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
HMK107AB7683□AHTE				X7R	0.068 μ	±10, ±20	3.5	200	0.8±0.15/-0.05	
HMK107 B7104□AHT				X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
HMK107AC7154□AHTE				X7S	0.15 μ	±10, ±20	3.5	150	0.8±0.15/-0.05	
HMK107 C7224□AHTE				X7S	0.22 μ	±10, ±20	3.5	150	0.8±0.10	

●212规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
								额定电压 x %		
HMK212 B7472□GHT		100		X7R	4700 p	±10, ±20	2.5	200	1.25±0.10	
HMK212 B7682□GHT				X7R	6800 p	±10, ±20	2.5	200	1.25±0.10	
HMK212 B7103□GHT				X7R	0.01 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212 B7153□GHT				X7R	0.015 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212 B7223□GHT				X7R	0.022 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212 B7333□GHT				X7R	0.033 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212 B7473□GHT				X7R	0.047 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212 B7683□GHT				X7R	0.068 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212 B7104□GHT				X7R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212BB7154□GHTE				X7R	0.15 μ	±10, ±20	3.5	200	1.25±0.20/-0	
HMK212 B7224□GHT				X7R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	
HMK212BC7334□GHTE				X7S	0.33 μ	±10, ±20	3.5	150	1.25±0.20/-0	
HMK212 C7474□GHTE				X7S	0.47 μ	±10, ±20	3.5	150	1.25±0.10	
HMK212CG7684□GHTE				X7S	0.68 μ	±10, ±20	3.5	150	1.25±0.25/-0	
HMK212BC7105□GHTE				X7S	1 μ	±10, ±20	3.5	150	1.25±0.20/-0	
QMK212 B7472□GHT		250		X7R	4700 p	±10, ±20	2.5	150	1.25±0.10	
QMK212 B7682□GHT				X7R	6800 p	±10, ±20	2.5	150	1.25±0.10	
QMK212 B7103□GHT				X7R	0.01 μ	±10, ±20	2.5	150	1.25±0.10	
QMK212 B7153□GHT				X7R	0.015 μ	±10, ±20	2.5	150	1.25±0.10	
QMK212 B7223□GHT				X7R	0.022 μ	±10, ±20	2.5	150	1.25±0.10	

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
								额定电压 x %		
HMK212 B7102□DHT		100		X7R	1000 p	±10, ±20	2.5	200	0.85±0.10	
HMK212 B7152□DHT				X7R	1500 p	±10, ±20	2.5	200	0.85±0.10	
HMK212 B7222□DHT				X7R	2200 p	±10, ±20	2.5	200	0.85±0.10	
HMK212 B7332□DHT				X7R	3300 p	±10, ±20	2.5	200	0.85±0.10	
QMK212 B7102□DHT		250		X7R	1000 p	±10, ±20	2.5	150	0.85±0.10	
QMK212 B7152□DHT				X7R	1500 p	±10, ±20	2.5	150	0.85±0.10	
QMK212 B7222□DHT				X7R	2200 p	±10, ±20	2.5	150	0.85±0.10	
QMK212 B7332□DHT				X7R	3300 p	±10, ±20	2.5	150	0.85±0.10	

● 316规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
HMK316 B7473□LHT		100	X7R	0.047 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7683□LHT			X7R	0.068 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7104□LHT			X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7154□LHT			X7R	0.15 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7334□LHT			X7R	0.33 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7474□LHT			X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316 B7105□LHT			X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
HMK316BC7155□LHTE			X7S	1.5 μ	±10, ±20	3.5	150	1.6±0.30	
HMK316AC7225□LHTE			X7S	2.2 μ	±10, ±20	3.5	150	1.6±0.20	
QMK316 B7223□LHT		250	X7R	0.022 μ	±10, ±20	2.5	150	1.6±0.20	
QMK316 B7333□LHT			X7R	0.033 μ	±10, ±20	2.5	150	1.6±0.20	
QMK316 B7473□LHT			X7R	0.047 μ	±10, ±20	2.5	150	1.6±0.20	
QMK316 B7683□LHT			X7R	0.068 μ	±10, ±20	2.5	150	1.6±0.20	
QMK316 B7104□LHT			X7R	0.1 μ	±10, ±20	2.5	150	1.6±0.20	
SMK316 B7153□LHT		630	X7R	0.015 μ	±10, ±20	2.5	120	1.6±0.20	
SMK316 B7223□LHT			X7R	0.022 μ	±10, ±20	2.5	120	1.6±0.20	
SMK316AB7333□LHT			X7R	0.033 μ	±10, ±20	2.5	120	1.6±0.20	
SMK316AB7473□LHT			X7R	0.047 μ	±10, ±20	2.5	120	1.6±0.20	

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
SMK316 B7102□FHT		630	X7R	1000 p	±10, ±20	2.5	120	1.15±0.10	
SMK316 B7152□FHT			X7R	1500 p	±10, ±20	2.5	120	1.15±0.10	
SMK316 B7222□FHT			X7R	2200 p	±10, ±20	2.5	120	1.15±0.10	
SMK316 B7332□FHT			X7R	3300 p	±10, ±20	2.5	120	1.15±0.10	
SMK316 B7472□FHT			X7R	4700 p	±10, ±20	2.5	120	1.15±0.10	
SMK316 B7682□FHT			X7R	6800 p	±10, ±20	2.5	120	1.15±0.10	
SMK316 B7103□FHT			X7R	0.01 μ	±10, ±20	2.5	120	1.15±0.10	

● 325规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
HMK325 B7225□MHP		100	X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
HMK325 C7475□MHPE			X7S	4.7 μ	±10, ±20	3.5	150	2.5±0.20	

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
HMK325 B7224□NHT		100	X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
HMK325 B7474□NHT			X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	
HMK325 B7684□NHT			X7R	0.68 μ	±10, ±20	3.5	200	1.9±0.20	
HMK325 B7105□NHT			X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	
QMK325 B7473□NHT			X7R	0.047 μ	±10, ±20	2.5	150	1.9±0.20	
QMK325 B7104□NHT		250	X7R	0.1 μ	±10, ±20	2.5	150	1.9±0.20	
QMK325 B7154□NHT			X7R	0.15 μ	±10, ±20	2.5	150	1.9±0.20	
QMK325 B7224□NHT			X7R	0.22 μ	±10, ±20	2.5	150	1.9±0.20	
SMK325 B7223□NHT			X7R	0.022 μ	±10, ±20	2.5	120	1.9±0.20	
SMK325 B7333□NHT		630	X7R	0.033 μ	±10, ±20	2.5	120	1.9±0.20	
SMK325 B7473□NHT			X7R	0.047 μ	±10, ±20	2.5	120	1.9±0.20	

● 432规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ⁻¹ [mm]	注释
							额定电压 x %		
HMK432 B7474□MHT		100	X7R	0.47 μ	±10, ±20	3.5	200	2.5±0.20	
HMK432 B7105□MHT			X7R	1 μ	±10, ±20	3.5	200	2.5±0.20	
HMK432 B7155□MHT			X7R	1.5 μ	±10, ±20	3.5	200	2.5±0.20	
HMK432 B7225□MHT			X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
QMK432 B7104□MHT		250	X7R	0.1 μ	±10, ±20	2.5	150	2.5±0.20	
QMK432 B7224□MHT			X7R	0.22 μ	±10, ±20	2.5	150	2.5±0.20	
QMK432 B7334□MHT			X7R	0.33 μ	±10, ±20	2.5	150	2.5±0.20	
QMK432 B7474□MHT			X7R	0.47 μ	±10, ±20	2.5	150	2.5±0.20	
SMK432 B7473□MHT			X7R	0.047 μ	±10, ±20	2.5	120	2.5±0.20	
SMK432 B7683□MHT		630	X7R	0.068 μ	±10, ±20	2.5	120	2.5±0.20	
SMK432 B7104□MHT			X7R	0.1 μ	±10, ±20	2.5	120	2.5±0.20	

高频中高压多层陶瓷电容器

● 105规格

【温度特性 CG: CG/C0G (- 55 ~ + 125°C) 】 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]	静电容量允许误差	Q值 [at 1MHz] (Min)	高温负载 额定电压 × %	厚度 ¹ [mm]	注释
QVS105 CG0R5[VHF]		250	CG	C0G	0.5 p	±0.1pF, ±0.25pF	810	200	0.5±0.05	
QVS105 CG0R6[VHF]			CG	C0G	0.6 p	±0.1pF, ±0.25pF	812	200	0.5±0.05	
QVS105 CG0R7[VHF]			CG	C0G	0.7 p	±0.1pF, ±0.25pF	814	200	0.5±0.05	
QVS105 CGR75[VHF]			CG	C0G	0.75 p	±0.1pF, ±0.25pF	815	200	0.5±0.05	
QVS105 CG0R8[VHF]			CG	C0G	0.8 p	±0.1pF, ±0.25pF	816	200	0.5±0.05	
QVS105 CG0R9[VHF]			CG	C0G	0.9 p	±0.1pF, ±0.25pF	818	200	0.5±0.05	
QVS105 CG010[VHF]			CG	C0G	1 p	±0.1pF, ±0.25pF	820	200	0.5±0.05	
QVS105 CG1R1[VHF]			CG	C0G	1.1 p	±0.1pF, ±0.25pF	822	200	0.5±0.05	
QVS105 CG1R2[VHF]			CG	C0G	1.2 p	±0.1pF, ±0.25pF	824	200	0.5±0.05	
QVS105 CG1R3[VHF]			CG	C0G	1.3 p	±0.1pF, ±0.25pF	826	200	0.5±0.05	
QVS105 CG1R5[VHF]			CG	C0G	1.5 p	±0.1pF, ±0.25pF	830	200	0.5±0.05	
QVS105 CG1R6[VHF]			CG	C0G	1.6 p	±0.1pF, ±0.25pF	832	200	0.5±0.05	
QVS105 CG1R8[VHF]			CG	C0G	1.8 p	±0.1pF, ±0.25pF	836	200	0.5±0.05	
QVS105 CG020[VHF]			CG	C0G	2 p	±0.1pF, ±0.25pF	840	200	0.5±0.05	
QVS105 CG2R2[VHF]			CG	C0G	2.2 p	±0.1pF, ±0.25pF	844	200	0.5±0.05	
QVS105 CG2R4[VHF]			CG	C0G	2.4 p	±0.1pF, ±0.25pF	848	200	0.5±0.05	
QVS105 CG2R7[VHF]			CG	C0G	2.7 p	±0.1pF, ±0.25pF	854	200	0.5±0.05	
QVS105 CG030[VHF]			CG	C0G	3 p	±0.1pF, ±0.25pF	860	200	0.5±0.05	
QVS105 CG3R3[VHF]			CG	C0G	3.3 p	±0.1pF, ±0.25pF	866	200	0.5±0.05	
QVS105 CG3R6[VHF]			CG	C0G	3.6 p	±0.1pF, ±0.25pF	872	200	0.5±0.05	
QVS105 CG3R9[VHF]			CG	C0G	3.9 p	±0.1pF, ±0.25pF	878	200	0.5±0.05	
QVS105 CG4R3[VHF]			CG	C0G	4.3 p	±0.1pF, ±0.25pF	886	200	0.5±0.05	
QVS105 CG4R7[VHF]			CG	C0G	4.7 p	±0.1pF, ±0.25pF	894	200	0.5±0.05	
QVS105 CG5R1[VHF]			CG	C0G	5.1 p	±0.25pF, ±0.5pF	902	200	0.5±0.05	
QVS105 CG5R6[VHF]			CG	C0G	5.6 p	±0.25pF, ±0.5pF	912	200	0.5±0.05	
QVS105 CG6R2[VHF]			CG	C0G	6.2 p	±0.25pF, ±0.5pF	924	200	0.5±0.05	
QVS105 CG6R8[VHF]			CG	C0G	6.8 p	±0.25pF, ±0.5pF	936	200	0.5±0.05	
QVS105 CG7R5[VHF]			CG	C0G	7.5 p	±0.25pF, ±0.5pF	950	200	0.5±0.05	
QVS105 CG8R2[VHF]			CG	C0G	8.2 p	±0.25pF, ±0.5pF	964	200	0.5±0.05	
QVS105 CG9R1[VHF]			CG	C0G	9.1 p	±0.25pF, ±0.5pF	982	200	0.5±0.05	
QVS105 CG100JVHF			CG	C0G	10 p	±5%	1000	200	0.5±0.05	
QVS105 CG110JVHF			CG	C0G	11 p	±5%	1020	200	0.5±0.05	
QVS105 CG120JVHF			CG	C0G	12 p	±5%	1040	200	0.5±0.05	
QVS105 CG130JVHF			CG	C0G	13 p	±5%	1060	200	0.5±0.05	
QVS105 CG150JVHF			CG	C0G	15 p	±5%	1100	200	0.5±0.05	
QVS105 CG160JVHF			CG	C0G	16 p	±5%	1120	200	0.5±0.05	
QVS105 CG180JVHF			CG	C0G	18 p	±5%	1160	200	0.5±0.05	
QVS105 CG200JVHF			CG	C0G	20 p	±5%	1200	200	0.5±0.05	
QVS105 CG220JVHF			CG	C0G	22 p	±5%	1240	200	0.5±0.05	
QVS105 CG240JVHF			CG	C0G	24 p	±5%	1280	200	0.5±0.05	
QVS105 CG270JVHF			CG	C0G	27 p	±5%	1340	200	0.5±0.05	
QVS105 CG300JVHF			CG	C0G	30 p	±5%	1400	200	0.5±0.05	
QVS105 CG330JVHF			CG	C0G	33 p	±5%	1400	200	0.5±0.05	

● 107规格

【温度特性 CG:CG/C0G (−55 ~ +125°C)】厚度 0.7mm (C)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许误差	Q值 [at 1MHz] (Min)	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
QVS107 CG0R2□CHT		250	CG C0G	0.2 p	±0.05pF, ±0.1pF	804	200	0.7±0.10	
QVS107 CG0R3□CHT			CG C0G	0.3 p	±0.05pF, ±0.1pF	806	200	0.7±0.10	
QVS107 CG0R4□CHT			CG C0G	0.4 p	±0.05pF, ±0.1pF	808	200	0.7±0.10	
QVS107 CG0R5□CHT			CG C0G	0.5 p	±0.1pF, ±0.25pF	810	200	0.7±0.10	
QVS107 CG0R6□CHT			CG C0G	0.6 p	±0.1pF, ±0.25pF	812	200	0.7±0.10	
QVS107 CG0R7□CHT			CG C0G	0.7 p	±0.1pF, ±0.25pF	814	200	0.7±0.10	
QVS107 CGR75□CHT			CG C0G	0.75 p	±0.1pF, ±0.25pF	815	200	0.7±0.10	
QVS107 CG0R8□CHT			CG C0G	0.8 p	±0.1pF, ±0.25pF	816	200	0.7±0.10	
QVS107 CG0R9□CHT			CG C0G	0.9 p	±0.1pF, ±0.25pF	818	200	0.7±0.10	
QVS107 CG010□CHT			CG C0G	1 p	±0.1pF, ±0.25pF	820	200	0.7±0.10	
QVS107 CG1R1□CHT			CG C0G	1.1 p	±0.1pF, ±0.25pF	822	200	0.7±0.10	
QVS107 CG1R2□CHT			CG C0G	1.2 p	±0.1pF, ±0.25pF	824	200	0.7±0.10	
QVS107 CG1R3□CHT			CG C0G	1.3 p	±0.1pF, ±0.25pF	826	200	0.7±0.10	
QVS107 CG1R5□CHT			CG C0G	1.5 p	±0.1pF, ±0.25pF	830	200	0.7±0.10	
QVS107 CG1R6□CHT			CG C0G	1.6 p	±0.1pF, ±0.25pF	832	200	0.7±0.10	
QVS107 CG1R8□CHT			CG C0G	1.8 p	±0.1pF, ±0.25pF	836	200	0.7±0.10	
QVS107 CG020□CHT			CG C0G	2 p	±0.1pF, ±0.25pF	840	200	0.7±0.10	
QVS107 CG2R2□CHT			CG C0G	2.2 p	±0.1pF, ±0.25pF	844	200	0.7±0.10	
QVS107 CG2R4□CHT			CG C0G	2.4 p	±0.1pF, ±0.25pF	848	200	0.7±0.10	
QVS107 CG2R7□CHT			CG C0G	2.7 p	±0.1pF, ±0.25pF	854	200	0.7±0.10	
QVS107 CG030□CHT			CG C0G	3 p	±0.1pF, ±0.25pF	860	200	0.7±0.10	
QVS107 CG3R3□CHT			CG C0G	3.3 p	±0.1pF, ±0.25pF	866	200	0.7±0.10	
QVS107 CG3R6□CHT			CG C0G	3.6 p	±0.1pF, ±0.25pF	872	200	0.7±0.10	
QVS107 CG3R9□CHT			CG C0G	3.9 p	±0.1pF, ±0.25pF	878	200	0.7±0.10	
QVS107 CG4R3□CHT			CG C0G	4.3 p	±0.1pF, ±0.25pF	886	200	0.7±0.10	
QVS107 CG4R7□CHT			CG C0G	4.7 p	±0.1pF, ±0.25pF	894	200	0.7±0.10	
QVS107 CG5R1□CHT			CG C0G	5.1 p	±0.25pF, ±0.5pF	902	200	0.7±0.10	
QVS107 CG5R6□CHT			CG C0G	5.6 p	±0.25pF, ±0.5pF	912	200	0.7±0.10	
QVS107 CG6R2□CHT			CG C0G	6.2 p	±0.25pF, ±0.5pF	924	200	0.7±0.10	
QVS107 CG6R8□CHT			CG C0G	6.8 p	±0.25pF, ±0.5pF	936	200	0.7±0.10	
QVS107 CG7R5□CHT			CG C0G	7.5 p	±0.25pF, ±0.5pF	950	200	0.7±0.10	
QVS107 CG8R2□CHT			CG C0G	8.2 p	±0.25pF, ±0.5pF	964	200	0.7±0.10	
QVS107 CG9R1□CHT			CG C0G	9.1 p	±0.25pF, ±0.5pF	982	200	0.7±0.10	
QVS107 CG100□CHT			CG C0G	10 p	±2%, ±5%	1000	200	0.7±0.10	
QVS107 CG110JCHT			CG C0G	11 p	±5%	1020	200	0.7±0.10	
QVS107 CG120JCHT			CG C0G	12 p	±5%	1040	200	0.7±0.10	
QVS107 CG130JCHT			CG C0G	13 p	±5%	1060	200	0.7±0.10	
QVS107 CG150JCHT			CG C0G	15 p	±5%	1100	200	0.7±0.10	
QVS107 CG160JCHT			CG C0G	16 p	±5%	1120	200	0.7±0.10	
QVS107 CG180JCHT			CG C0G	18 p	±5%	1160	200	0.7±0.10	
QVS107 CG200JCHT			CG C0G	20 p	±5%	1200	200	0.7±0.10	
QVS107 CG220JCHT			CG C0G	22 p	±5%	1240	200	0.7±0.10	
QVS107 CG240JCHT			CG C0G	24 p	±5%	1280	200	0.7±0.10	
QVS107 CG270JCHT			CG C0G	27 p	±5%	1340	200	0.7±0.10	
QVS107 CG300JCHT			CG C0G	30 p	±5%	1400	200	0.7±0.10	
QVS107 CG330JCHT			CG C0G	33 p	±5%	1400	200	0.7±0.10	
QVS107 CG360JCHT			CG C0G	36 p	±5%	1400	200	0.7±0.10	
QVS107 CG390JCHT			CG C0G	39 p	±5%	1400	200	0.7±0.10	
QVS107 CG430JCHT			CG C0G	43 p	±5%	1400	200	0.7±0.10	
QVS107 CG470JCHT			CG C0G	47 p	±5%	1400	200	0.7±0.10	
QVS107 CG510JCHT			CG C0G	51 p	±5%	1400	200	0.7±0.10	
QVS107 CG560JCHT			CG C0G	56 p	±5%	1400	200	0.7±0.10	
QVS107 CG620JCHT			CG C0G	62 p	±5%	1400	200	0.7±0.10	
QVS107 CG680JCHT			CG C0G	68 p	±5%	1400	200	0.7±0.10	
QVS107 CG750JCHT			CG C0G	75 p	±5%	1400	200	0.7±0.10	
QVS107 CG820JCHT			CG C0G	82 p	±5%	1400	200	0.7±0.10	
QVS107 CG910JCHT			CG C0G	91 p	±5%	1400	200	0.7±0.10	
QVS107 CG101JCHT			CG C0G	100 p	±5%	1400	200	0.7±0.10	

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● 212规格

【温度特性 CG:CG/COG (-55 ~ +125°C)】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]	静电容量允许误差	Q值 [at 1MHz] (Min)	高温负载	厚度*1 [mm]	注释
								额定电压 x %		
QVS212 CG0R3[DHT]		250	CG	COG	0.3 p	±0.1pF, ±0.25pF	806	200	0.85±0.10	
QVS212 CG0R4[DHT]			CG	COG	0.4 p	±0.1pF, ±0.25pF	808	200	0.85±0.10	
QVS212 CG0R5[DHT]			CG	COG	0.5 p	±0.1pF, ±0.25pF	810	200	0.85±0.10	
QVS212 CG0R6[DHT]			CG	COG	0.6 p	±0.1pF, ±0.25pF	812	200	0.85±0.10	
QVS212 CG0R7[DHT]			CG	COG	0.7 p	±0.1pF, ±0.25pF	814	200	0.85±0.10	
QVS212 CGR75[DHT]			CG	COG	0.75 p	±0.1pF, ±0.25pF	815	200	0.85±0.10	
QVS212 CG0R8[DHT]			CG	COG	0.8 p	±0.1pF, ±0.25pF	816	200	0.85±0.10	
QVS212 CG0R9[DHT]			CG	COG	0.9 p	±0.1pF, ±0.25pF	818	200	0.85±0.10	
QVS212 CG010[DHT]			CG	COG	1 p	±0.1pF, ±0.25pF	820	200	0.85±0.10	
QVS212 CG1R1[DHT]			CG	COG	1.1 p	±0.1pF, ±0.25pF	822	200	0.85±0.10	
QVS212 CG1R2[DHT]			CG	COG	1.2 p	±0.1pF, ±0.25pF	824	200	0.85±0.10	
QVS212 CG1R3[DHT]			CG	COG	1.3 p	±0.1pF, ±0.25pF	826	200	0.85±0.10	
QVS212 CG1R5[DHT]			CG	COG	1.5 p	±0.1pF, ±0.25pF	830	200	0.85±0.10	
QVS212 CG1R6[DHT]			CG	COG	1.6 p	±0.1pF, ±0.25pF	832	200	0.85±0.10	
QVS212 CG1R8[DHT]			CG	COG	1.8 p	±0.1pF, ±0.25pF	836	200	0.85±0.10	
QVS212 CG020[DHT]			CG	COG	2 p	±0.1pF, ±0.25pF	840	200	0.85±0.10	
QVS212 CG2R2[DHT]			CG	COG	2.2 p	±0.1pF, ±0.25pF	844	200	0.85±0.10	
QVS212 CG2R4[DHT]			CG	COG	2.4 p	±0.1pF, ±0.25pF	848	200	0.85±0.10	
QVS212 CG2R7[DHT]			CG	COG	2.7 p	±0.1pF, ±0.25pF	854	200	0.85±0.10	
QVS212 CG036[DHT]			CG	COG	3 p	±0.1pF, ±0.25pF	860	200	0.85±0.10	
QVS212 CG3R3[DHT]			CG	COG	3.3 p	±0.1pF, ±0.25pF	866	200	0.85±0.10	
QVS212 CG3R6[DHT]			CG	COG	3.6 p	±0.1pF, ±0.25pF	872	200	0.85±0.10	
QVS212 CG3R9[DHT]			CG	COG	3.9 p	±0.1pF, ±0.25pF	878	200	0.85±0.10	
QVS212 CG4R3[DHT]			CG	COG	4.3 p	±0.1pF, ±0.25pF	886	200	0.85±0.10	
QVS212 CG4R7[DHT]			CG	COG	4.7 p	±0.1pF, ±0.25pF	894	200	0.85±0.10	
QVS212 CG5R1[DHT]			CG	COG	5.1 p	±0.25pF, ±0.5pF	902	200	0.85±0.10	
QVS212 CG5R6[DHT]			CG	COG	5.6 p	±0.25pF, ±0.5pF	912	200	0.85±0.10	
QVS212 CG6R2[DHT]			CG	COG	6.2 p	±0.25pF, ±0.5pF	924	200	0.85±0.10	
QVS212 CG6R8[DHT]			CG	COG	6.8 p	±0.25pF, ±0.5pF	936	200	0.85±0.10	
QVS212 CG7R5[DHT]			CG	COG	7.5 p	±0.25pF, ±0.5pF	950	200	0.85±0.10	
QVS212 CG8R2[DHT]			CG	COG	8.2 p	±0.25pF, ±0.5pF	964	200	0.85±0.10	
QVS212 CG9R1[DHT]			CG	COG	9.1 p	±0.25pF, ±0.5pF	982	200	0.85±0.10	
QVS212 CG100JDHT			CG	COG	10 p	±5%	1000	200	0.85±0.10	
QVS212 CG110JDHT			CG	COG	11 p	±5%	1020	200	0.85±0.10	
QVS212 CG120JDHT			CG	COG	12 p	±5%	1040	200	0.85±0.10	
QVS212 CG130JDHT			CG	COG	13 p	±5%	1060	200	0.85±0.10	
QVS212 CG150JDHT			CG	COG	15 p	±5%	1100	200	0.85±0.10	
QVS212 CG160JDHT			CG	COG	16 p	±5%	1120	200	0.85±0.10	
QVS212 CG180JDHT			CG	COG	18 p	±5%	1160	200	0.85±0.10	
QVS212 CG200JDHT			CG	COG	20 p	±5%	1200	200	0.85±0.10	
QVS212 CG220JDHT			CG	COG	22 p	±5%	1240	200	0.85±0.10	
QVS212 CG240JDHT			CG	COG	24 p	±5%	1280	200	0.85±0.10	
QVS212 CG270JDHT			CG	COG	27 p	±5%	1340	200	0.85±0.10	
QVS212 CG300JDHT			CG	COG	30 p	±5%	1400	200	0.85±0.10	
QVS212 CG330JDHT			CG	COG	33 p	±5%	1400	200	0.85±0.10	
QVS212 CG360JDHT			CG	COG	36 p	±5%	1400	200	0.85±0.10	
QVS212 CG390JDHT			CG	COG	39 p	±5%	1400	200	0.85±0.10	
QVS212 CG430JDHT			CG	COG	43 p	±5%	1400	200	0.85±0.10	
QVS212 CG470JDHT			CG	COG	47 p	±5%	1400	200	0.85±0.10	
QVS212 CG510JDHT			CG	COG	51 p	±5%	1400	200	0.85±0.10	
QVS212 CG560JDHT			CG	COG	56 p	±5%	1400	200	0.85±0.10	
QVS212 CG620JDHT			CG	COG	62 p	±5%	1400	200	0.85±0.10	
QVS212 CG680JDHT			CG	COG	68 p	±5%	1400	200	0.85±0.10	
QVS212 CG750JDHT			CG	COG	75 p	±5%	1400	200	0.85±0.10	
QVS212 CG820JDHT			CG	COG	82 p	±5%	1400	200	0.85±0.10	
QVS212 CG910JDHT			CG	COG	91 p	±5%	1400	200	0.85±0.10	
QVS212 CG101JDHT			CG	COG	100 p	±5%	1400	200	0.85±0.10	

树脂外部电极多层陶瓷电容器

●107规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
							额定电压 x %		
TMJ107BB7473□AHT		25	X7R	0.047 μ	±10, ±20	3.5	200	0.8+0.20/-0	
TMJ107BB7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8+0.20/-0	
TMJ107BB7224□AHT			X7R	0.22 μ	±10, ±20	10	150	0.8+0.20/-0	
TMJ107BB7474□AHT			X7R	0.47 μ	±10, ±20	10	150	0.8+0.20/-0	
TMJ107CB7105□AHR			X7R	1 μ	±10, ±20	10	150	0.8+0.25/-0	
GMJ107BB7473□AHT		35	X7R	0.047 μ	±10, ±20	3.5	200	0.8+0.20/-0	
GMJ107BB7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8+0.20/-0	
GMJ107BB7224□AHT			X7R	0.22 μ	±10, ±20	10	150	0.8+0.20/-0	
GMJ107BB7474□AHT			X7R	0.47 μ	±10, ±20	10	150	0.8+0.20/-0	
GMJ107CB7105□AHR			X7R	1 μ	±10, ±20	10	150	0.8+0.25/-0	
UMJ107AB7102□AHT		50	X7R	1000 p	±10, ±20	3.5	200	0.8+0.15/-0.05	
UMJ107AB7222□AHT			X7R	2200 p	±10, ±20	3.5	200	0.8+0.15/-0.05	
UMJ107BB7472□AHT			X7R	4700 p	±10, ±20	3.5	200	0.8+0.20/-0	
UMJ107BB7103□AHT			X7R	0.01 μ	±10, ±20	3.5	200	0.8+0.20/-0	
UMJ107BB7223□AHT			X7R	0.022 μ	±10, ±20	3.5	200	0.8+0.20/-0	
UMJ107BB7473□AHT		100	X7R	0.047 μ	±10, ±20	3.5	200	0.8+0.20/-0	
UMJ107BB7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8+0.20/-0	
HMJ107AB7102□AHT			X7R	1000 p	±10, ±20	3.5	200	0.8+0.15/-0.05	
HMJ107AB7222□AHT			X7R	2200 p	±10, ±20	3.5	200	0.8+0.15/-0.05	
HMJ107BB7472□AHT			X7R	4700 p	±10, ±20	3.5	200	0.8+0.20/-0	
HMJ107BB7103□AHT		100	X7R	0.01 μ	±10, ±20	3.5	200	0.8+0.20/-0	
HMJ107BB7223□AHT			X7R	0.022 μ	±10, ±20	3.5	200	0.8+0.20/-0	
HMJ107BB7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8+0.20/-0	
HMJ107BB7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8+0.20/-0	

●212规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) , C7 : X7S (- 55 ~ + 125℃) 】 厚度 0.85mm (D)、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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
							额定电压 x %		
JMJ212CB7106□GHT		6.3	X7R	10 μ	±10, ±20	10	150	1.25+0.25/-0	
EMJ212CB7225□GHT		16	X7R	2.2 μ	±10, ±20	10	150	1.25+0.25/-0	
EMJ212CB7475□GHT			X7R	4.7 μ	±10, ±20	10	150	1.25+0.25/-0	
TMJ212CB7225□GHT		25	X7R	2.2 μ	±10, ±20	10	150	1.25+0.25/-0	
GMJ212CB7105□GHT		35	X7R	1 μ	±10, ±20	10	150	1.25+0.25/-0	
UMJ212BB7103□GHT		50	X7R	0.01 μ	±10, ±20	3.5	200	1.25+0.20/-0	
UMJ212BB7223□GHT			X7R	0.022 μ	±10, ±20	3.5	200	1.25+0.20/-0	
UMJ212BB7473□GHT			X7R	0.047 μ	±10, ±20	3.5	200	1.25+0.20/-0	
UMJ212BB7104□GHT			X7R	0.1 μ	±10, ±20	3.5	200	1.25+0.20/-0	
UMJ212BB7224□GHT			X7R	0.22 μ	±10, ±20	3.5	200	1.25+0.20/-0	
UMJ212CC7474□GHTE		100	X7S	0.47 μ	±10, ±20	3.5	150	1.25+0.25/-0	
UMJ212CB7105□GHT			X7R	1 μ	±10, ±20	10	150	1.25+0.25/-0	
HMJ212KB7102□DHT			X7R	1000 p	±10, ±20	3.5	200	0.85±0.15	
HMJ212KB7222□DHT			X7R	2200 p	±10, ±20	3.5	200	0.85±0.15	
HMJ212BB7472□GHT			X7R	4700 p	±10, ±20	3.5	200	1.25+0.20/-0	
HMJ212BB7103□GHT		100	X7R	0.01 μ	±10, ±20	3.5	200	1.25+0.20/-0	
HMJ212BB7223□GHT			X7R	0.022 μ	±10, ±20	3.5	200	1.25+0.20/-0	
HMJ212BB7473□GHT			X7R	0.047 μ	±10, ±20	3.5	200	1.25+0.20/-0	
HMJ212BB7104□GHT			X7R	0.1 μ	±10, ±20	3.5	200	1.25+0.20/-0	
HMJ212BB7224□GHT			X7R	0.22 μ	±10, ±20	3.5	200	1.25+0.20/-0	
HMJ212CC7474□GHTE		250	X7S	0.47 μ	±10, ±20	3.5	150	1.25+0.25/-0	
HMJ212DC7105□GHTE			X7S	1 μ	±10, ±20	3.5	150	1.25+0.30/-0	
QMJ212KB7102□DHT			X7R	1000 p	±10, ±20	2.5	150	0.85±0.15	
QMJ212KB7222□DHT			X7R	2200 p	±10, ±20	2.5	150	0.85±0.15	
QMJ212BB7472□GHT			X7R	4700 p	±10, ±20	2.5	150	1.25+0.20/-0	
QMJ212BB7103□GHT		250	X7R	0.01 μ	±10, ±20	2.5	150	1.25+0.20/-0	
QMJ212BB7223□GHT			X7R	0.022 μ	±10, ±20	2.5	150	1.25+0.20/-0	

● 316规格

【温度特性 B7: X7R (- 55 ~ + 125℃) , C7: X7S (- 55 ~ + 125℃) 】 厚度 1.15mm (F) 、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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
								额定电压 x %		
LMJ316BB7226□LHT		10		X7R	22 μ	±10, ±20	10	150	1.6±0.30	
EMJ316BB7475□LHT		16		X7R	4.7 μ	±10, ±20	10	150	1.6±0.30	
EMJ316BB7106□LHT				X7R	10 μ	±10, ±20	10	150	1.6±0.30	
TMJ316BB7474□LHT				X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.30	
TMJ316BB7475□LHT		25		X7R	4.7 μ	±10, ±20	10	150	1.6±0.30	
TMJ316BB7106□LHT				X7R	10 μ	±10, ±20	10	150	1.6±0.30	
GMJ316BB7474□LHT				X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.30	
GMJ316AB7225□LHT		35		X7R	2.2 μ	±10, ±20	10	150	1.6±0.20	
GMJ316BB7475□LHT				X7R	4.7 μ	±10, ±20	10	150	1.6±0.30	
GMJ316BB7106□LHT				X7R	10 μ	±10, ±20	10	150	1.6±0.30	
UMJ316BB7473□LHT		50		X7R	0.047 μ	±10, ±20	3.5	200	1.6±0.30	
UMJ316BB7104□LHT				X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.30	
UMJ316BB7224□LHT				X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.30	
UMJ316BB7474□LHT		100		X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.30	
UMJ316BB7105□LHT				X7R	1 μ	±10, ±20	3.5	200	1.6±0.30	
UMJ316AB7225□LHT				X7R	2.2 μ	±10, ±20	10	150	1.6±0.20	
UMJ316BC7475□LHTE		250		X7S	4.7 μ	±10, ±20	2.5	150	1.6±0.30	
HMJ316 B7102□FHT				X7R	1000 p	±10, ±20	3.5	200	1.15±0.10	
HMJ316 B7222□FHT				X7R	2200 p	±10, ±20	3.5	200	1.15±0.10	
HMJ316 B7472□FHT		630		X7R	4700 p	±10, ±20	3.5	200	1.15±0.10	
HMJ316KB7103□FHT				X7R	0.01 μ	±10, ±20	3.5	200	1.15±0.20	
HMJ316BB7223□LHT				X7R	0.022 μ	±10, ±20	3.5	200	1.6±0.30	
HMJ316BB7473□LHT		250		X7R	0.047 μ	±10, ±20	2.5	150	1.6±0.30	
HMJ316BB7104□LHT				X7R	0.1 μ	±10, ±20	2.5	150	1.6±0.30	
HMJ316BC7225□LHTE				X7S	2.2 μ	±10, ±20	3.5	150	1.6±0.30	
QMJ316 B7102□FHT		630		X7R	1000 p	±10, ±20	2.5	150	1.15±0.10	
QMJ316 B7222□FHT				X7R	2200 p	±10, ±20	2.5	150	1.15±0.10	
QMJ316 B7472□FHT				X7R	4700 p	±10, ±20	2.5	150	1.15±0.10	
QMJ316KB7103□FHT		250		X7R	0.01 μ	±10, ±20	2.5	150	1.15±0.20	
QMJ316BB7223□LHT				X7R	0.022 μ	±10, ±20	2.5	150	1.6±0.30	
QMJ316BB7473□LHT				X7R	0.047 μ	±10, ±20	2.5	150	1.6±0.30	
QMJ316BB7104□LHT		630		X7R	0.1 μ	±10, ±20	2.5	150	1.6±0.30	
SMJ316 B7102□FHT				X7R	1000 p	±10, ±20	2.5	120	1.15±0.10	
SMJ316 B7222□FHT				X7R	2200 p	±10, ±20	2.5	120	1.15±0.10	
SMJ316 B7472□FHT		250		X7R	4700 p	±10, ±20	2.5	120	1.15±0.10	
SMJ316KB7103□FHT				X7R	0.01 μ	±10, ±20	2.5	120	1.15±0.20	
SMJ316BB7223□LHT				X7R	0.022 μ	±10, ±20	2.5	120	1.6±0.30	

● 325规格

【温度特性 B7: X7R (- 55 ~ + 125℃) , C7: X7S (- 55 ~ + 125℃) 】 厚度 1.9mm (N) 、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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
								额定电压 x %		
JMJ325KB7476□MHP		6.3		X7R	47 μ	±10, ±20	10	150	2.5±0.30	
EMJ325KB7226□MHP		16		X7R	22 μ	±10, ±20	10	150	2.5±0.30	
TMJ325AB7475□MHP		25		X7R	4.7 μ	±10, ±20	5	150	2.5±0.30	
TMJ325KB7106□MHP				X7R	10 μ	±10, ±20	10	150	2.5±0.30	
GMJ325AB7475□MHP				X7R	4.7 μ	±10, ±20	5	150	2.5±0.30	
GMJ325KB7106□MHP		35		X7R	10 μ	±10, ±20	10	150	2.5±0.30	
UMJ325AB7225□MHP				X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.30	
UMJ325AB7475□MHP				X7R	4.7 μ	±10, ±20	5	150	2.5±0.30	
UMJ325KB7106□MHP		50		X7R	10 μ	±10, ±20	10	150	2.5±0.30	
HMJ325 B7223□NHT				X7R	0.022 μ	±10, ±20	3.5	200	1.9±0.20	
HMJ325 B7473□NHT				X7R	0.047 μ	±10, ±20	3.5	200	1.9±0.20	
HMJ325 B7104□NHT		100		X7R	0.1 μ	±10, ±20	3.5	200	1.9±0.20	
HMJ325 B7224□NHT				X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
HMJ325 B7474□NHT				X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	
HMJ325 B7105□NHT		250		X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	
HMJ325AB7225□MHP				X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.30	
HMJ325KC7475□MHPE				X7S	4.7 μ	±10, ±20	3.5	150	2.5±0.30	
QMJ325 B7223□NHT		630		X7R	0.022 μ	±10, ±20	2.5	150	1.9±0.20	
QMJ325 B7473□NHT				X7R	0.047 μ	±10, ±20	2.5	150	1.9±0.20	
QMJ325 B7104□NHT				X7R	0.1 μ	±10, ±20	2.5	150	1.9±0.20	
QMJ325 B7224□NHT		250		X7R	0.22 μ	±10, ±20	2.5	150	1.9±0.20	
SMJ325 B7223□NHT				X7R	0.022 μ	±10, ±20	2.5	120	1.9±0.20	
SMJ325 B7473□NHT				X7R	0.047 μ	±10, ±20	2.5	120	1.9±0.20	

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LW逆转型多层陶瓷电容器(LWDC™)

● 105规格

【温度特性 B1: X5R (- 55 ~ + 85°C)】厚度 0.3mm (P)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许误差 [%]	tanδ [%]	高温负载 额定电压 x %	厚度*1 [mm]	注释
TWK105 BJ104MPHF		25	X5R	0.1 μ	±20	5	150	0.3±0.05	
EWK105 BJ224MPHF		16	X5R	0.22 μ	±20	10	150	0.3±0.05	
LWK105 BJ474MPHF		10	X5R	0.47 μ	±20	10	150	0.3±0.05	
AWK105 BJ105MPHF		4	X5R	1 μ	±20	10	150	0.3±0.05	

【温度特性 C6: X6S (- 55 ~ + 105°C), C7: X7S (- 55 ~ + 125°C)】厚度 0.3mm (P)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许误差 [%]	tanδ [%]	高温负载 额定电压 x %	厚度*1 [mm]	注释
EWK105 C6104MPHF		16	X6S	0.1 μ	±20	5	150	0.3±0.05	
LWK105 C7104MPHF		10	X7S	0.1 μ	±20	5	150	0.3±0.05	
LWK105 C6224MPHF			X6S	0.22 μ	±20	10	150	0.3±0.05	
JWK105 C7104MPHF			X7S	0.1 μ	±20	5	150	0.3±0.05	
JWK105 C7224MPHF		6.3	X7S	0.22 μ	±20	10	150	0.3±0.05	
JWK105 C6474MPHF			X6S	0.47 μ	±20	10	150	0.3±0.05	
AWK105 C7224MPHF		4	X7S	0.22 μ	±20	10	150	0.3±0.05	
AWK105 C6474MPHF			X6S	0.47 μ	±20	10	150	0.3±0.05	

● 107规格

【温度特性 B1: X5R (- 55 ~ + 85°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载 额定电压 x %	厚度*1 [mm]	注释
LWK107 BJ105MVHT		10	X5R	1 μ	±20	10	150	0.5±0.05	
JWK107 BJ225MVHT		6.3	X5R	2.2 μ	±20	10	150	0.5±0.05	
JWK107 BJ475MVHT			X5R	4.7 μ	±20	10	150	0.5±0.05	

【温度特性 B7: X7R (- 55 ~ + 125°C), C6: X6S (- 55 ~ + 105°C), C7: X7S (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载 额定电压 x %	厚度*1 [mm]	注释
TWK107 B7104MVHT		25	X7R	0.1 μ	±20	5	150	0.5±0.05	
EWK107 B7224MVHT		16	X7R	0.22 μ	±20	5	150	0.5±0.05	
EWK107 B7474MVHT			X7R	0.47 μ	±20	5	150	0.5±0.05	
LWK107 B7474MVHT		10	X7R	0.47 μ	±20	5	150	0.5±0.05	
JWK107 C7105MVHT		6.3	X7S	1 μ	±20	10	150	0.5±0.05	
AWK107 C6225MVHT		4	X6S	2.2 μ	±20	10	150	0.5±0.05	
AWK107 C6475MVHT			X6S	4.7 μ	±20	10	150	0.5±0.05	

● 212规格

【温度特性 B1: X5R (- 55 ~ + 85°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载 额定电压 x %	厚度*1 [mm]	注释
LWK212 BJ475□DHT		10	X5R	4.7 μ	±10, ±20	10	150	0.85±0.10	
JWK212 BJ106MDHT		6.3	X5R	10 μ	±20	10	150	0.85±0.10	
AWK212 BJ226MDHT		4	X5R	22 μ	±20	10	150	0.85±0.10	

【温度特性 C6: X6S (- 55 ~ + 105°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载 额定电压 x %	厚度*1 [mm]	注释
JWK212 C6475□DHT		6.3	X6S	4.7 μ	±10, ±20	10	150	0.85±0.10	

- 产品目录中的多层陶瓷电容器全部属于RoHS对应品。
- 型号的 □ 中将会记入静电容量允许偏差代码。
- 产品目录中的多层陶瓷电容器全部属于回流焊对应品。

(注)

- 根据使用电路和机器，需要按照相应规格处理。请务必咨询正规销售渠道
- 车载(控制系 / 安全系)用途(AEC-Q200 qualified)的产品。有关更多的内容，请务必于“车载用途使用指引”中确认。
 < AEC-Q200 : AEC-Q200 qualified >
 车载(控制系 / 安全系)用途的多层陶瓷电容器，已就其代表性产品实施了对应AEC-Q200标准的评价测试。
 125°C products: AEC-Q200 Grade1 (已在Grade1的测试条件下评价完毕。)
 关于本产品的详细规格和评估测试结果等信息，请咨询正规销售渠道。
 此外，订购时请索取产品规格书，就其内容进行确认并批准之。
- *1: 关于寸规格，请参照型号标示法的4外形尺寸④、⑤产品尺寸公差、⑨产品厚度、以及标准产品的尺寸。

高可靠性用途多层陶瓷电容器

● 105规格

【温度特性 B7: X7R (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
UMF105 B7102□VHF		50	X7R	1000 p	±10, ±20	2.5	200	0.5±0.05	
UMF105 B7222□VHF			X7R	2200 p	±10, ±20	2.5	200	0.5±0.05	
UMF105 B7472□VHF			X7R	4700 p	±10, ±20	2.5	150	0.5±0.05	
UMF105 B7103□VHF			X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
TMF105 B7102□VHF		25	X7R	1000 p	±10, ±20	2.5	200	0.5±0.05	
TMF105 B7222□VHF			X7R	2200 p	±10, ±20	2.5	200	0.5±0.05	
TMF105 B7472□VHF			X7R	4700 p	±10, ±20	2.5	200	0.5±0.05	
TMF105 B7103□VHF			X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
TMF105 B7223□VHF		16	X7R	0.022 μ	±10, ±20	3.5	150	0.5±0.05	
TMF105 B7473□VHF			X7R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
EMF105 B7102□VHF			X7R	1000 p	±10, ±20	2.5	200	0.5±0.05	
EMF105 B7222□VHF			X7R	2200 p	±10, ±20	2.5	200	0.5±0.05	
EMF105 B7472□VHF		10	X7R	4700 p	±10, ±20	2.5	200	0.5±0.05	
EMF105 B7103□VHF			X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
EMF105 B7223□VHF			X7R	0.022 μ	±10, ±20	3.5	200	0.5±0.05	
EMF105 B7473□VHF			X7R	0.047 μ	±10, ±20	3.5	200	0.5±0.05	
LMF105 B7102□VHF		10	X7R	1000 p	±10, ±20	2.5	200	0.5±0.05	
LMF105 B7222□VHF			X7R	2200 p	±10, ±20	2.5	200	0.5±0.05	
LMF105 B7472□VHF			X7R	4700 p	±10, ±20	2.5	200	0.5±0.05	
LMF105 B7103□VHF			X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
LMF105 B7223□VHF		10	X7R	0.022 μ	±10, ±20	3.5	200	0.5±0.05	
LMF105 B7473□VHF			X7R	0.047 μ	±10, ±20	3.5	200	0.5±0.05	
LMF105 B7104□VHF			X7R	0.1 μ	±10, ±20	5	200	0.5±0.05	

● 107规格

【温度特性 B7: X7R (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
UMF107 B7223□AHT		50	X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
UMF107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
UMF107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
TMF107 B7223□AHT			X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
TMF107 B7473□AHT		25	X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
TMF107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
TMF107 B7224□AHT			X7R	0.22 μ	±10, ±20	10	150	0.8±0.10	
TMF107 B7474□AHT			X7R	0.47 μ	±10, ±20	10	150	0.8±0.10	
EMF107 B7223□AHT		16	X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
EMF107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
EMF107 B7104□AHT			X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
EMF107 B7224□AHT			X7R	0.22 μ	±10, ±20	5	200	0.8±0.10	
EMF107 B7474□AHT		10	X7R	0.47 μ	±10, ±20	10	150	0.8±0.10	
EMF107 B7105□AHT			X7R	1 μ	±10, ±20	10	150	0.8±0.10	
LMF107 B7223□AHT			X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
LMF107 B7473□AHT			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
LMF107 B7104□AHT		10	X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
LMF107 B7224□AHT			X7R	0.22 μ	±10, ±20	5	200	0.8±0.10	
LMF107 B7474□AHT			X7R	0.47 μ	±10, ±20	10	150	0.8±0.10	
LMF107 B7105□AHT			X7R	1 μ	±10, ±20	10	150	0.8±0.10	

▶ 由于篇幅有限，本产品目录中只记载了有代表性的产品规格，若考虑使用敝公司产品时，请确认交货规格说明书中的详细规格。
 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)，请参阅敝公司网站 (<http://www.ty-top.com/>)。

●212规格

【温度特性 B7 : X7R (- 55 ~ + 125°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
HMF212 B7103□GHT		100	X7R	0.01 μ	±10, ±20	3.5	200	1.25±0.10	
HMF212 B7223□GHT			X7R	0.022 μ	±10, ±20	3.5	200	1.25±0.10	
HMF212 B7473□GHT			X7R	0.047 μ	±10, ±20	3.5	200	1.25±0.10	
HMF212 B7104□GHT			X7R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
HMF212 B7224□GHT			X7R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	
UMF212 B7103□GHT		50	X7R	0.01 μ	±10, ±20	3.5	200	1.25±0.10	
UMF212 B7223□GHT			X7R	0.022 μ	±10, ±20	3.5	200	1.25±0.10	
UMF212 B7473□GHT			X7R	0.047 μ	±10, ±20	3.5	200	1.25±0.10	
UMF212 B7104□GHT			X7R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
UMF212 B7224□GHT			X7R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	
UMF212 B7105□GHT		25	X7R	1 μ	±10, ±20	10	150	1.25±0.10	
TMF212 B7103□GHT			X7R	0.01 μ	±10, ±20	3.5	200	1.25±0.10	
TMF212 B7223□GHT			X7R	0.022 μ	±10, ±20	3.5	200	1.25±0.10	
TMF212 B7473□GHT			X7R	0.047 μ	±10, ±20	3.5	200	1.25±0.10	
TMF212 B7104□GHT			X7R	0.1 μ	±10, ±20	3.5	200	1.25±0.10	
TMF212 B7224□GHT		16	X7R	0.22 μ	±10, ±20	3.5	200	1.25±0.10	
TMF212 B7474□GHT			X7R	0.47 μ	±10, ±20	3.5	200	1.25±0.10	
TMF212 B7105□GHT			X7R	1 μ	±10, ±20	10	200	1.25±0.10	
TMF212 B7225□GHT			X7R	2.2 μ	±10, ±20	10	200	1.25±0.10	
TMF212 B7475□GHT			X7R	4.7 μ	±10, ±20	10	150	1.25±0.10	
JMF212AB7106□GHT		6.3	X7R	10 μ	±10, ±20	10	150	1.25±0.10	

●316规格

【温度特性 B7 : X7R (- 55 ~ + 125°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
HMF316 B7102□FHT		100	X7R	1000 p	±10, ±20	2.5	200	1.15±0.10	
HMF316 B7222□FHT			X7R	2200 p	±10, ±20	2.5	200	1.15±0.10	
HMF316 B7472□FHT			X7R	4700 p	±10, ±20	2.5	200	1.15±0.10	
HMF316 B7103□FHT			X7R	0.01 μ	±10, ±20	2.5	200	1.15±0.10	
UMF316 B7102□FHT			X7R	1000 p	±10, ±20	2.5	200	1.15±0.10	
UMF316 B7222□FHT		50	X7R	2200 p	±10, ±20	2.5	200	1.15±0.10	
UMF316 B7472□FHT			X7R	4700 p	±10, ±20	2.5	200	1.15±0.10	
UMF316 B7103□FHT			X7R	0.01 μ	±10, ±20	2.5	200	1.15±0.10	

【温度特性 B7 : X7R (- 55 ~ + 125°C) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
HMF316 B7104□LHT		100	X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.20	
HMF316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	150	1.6±0.20	
HMF316 B7474□LHT			X7R	0.47 μ	±10, ±20	3.5	150	1.6±0.20	
UMF316 B7104□LHT			X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.20	
UMF316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	
UMF316 B7474□LHT		50	X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
UMF316 B7105□LHT			X7R	1 μ	±10, ±20	3.5	150	1.6±0.20	
TMF316 B7104□LHT			X7R	0.1 μ	±10, ±20	3.5	200	1.6±0.20	
TMF316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	
TMF316 B7474□LHT			X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
TMF316 B7105□LHT		25	X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
TMF316 B7225□LHT			X7R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
TMF316AB7475□LHT			X7R	4.7 μ	±10, ±20	10	150	1.6±0.20	
EMF316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	
EMF316 B7474□LHT			X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
EMF316 B7105□LHT		16	X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
EMF316 B7225□LHT			X7R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
EMF316AB7475□LHT			X7R	4.7 μ	±10, ±20	10	200	1.6±0.20	
EMF316AB7106□LHT			X7R	10 μ	±10, ±20	10	150	1.6±0.20	
LMF316 B7224□LHT			X7R	0.22 μ	±10, ±20	3.5	200	1.6±0.20	
LMF316 B7474□LHT		10	X7R	0.47 μ	±10, ±20	3.5	200	1.6±0.20	
LMF316 B7105□LHT			X7R	1 μ	±10, ±20	3.5	200	1.6±0.20	
LMF316 B7225□LHT			X7R	2.2 μ	±10, ±20	3.5	200	1.6±0.20	
LMF316AB7475□LHT			X7R	4.7 μ	±10, ±20	10	200	1.6±0.20	
LMF316AB7106□LHT			X7R	10 μ	±10, ±20	10	150	1.6±0.20	
JMF316AB7106□LHT		6.3	X7R	10 μ	±10, ±20	10	200	1.6±0.20	

● 325规格

【温度特性 B7 : X7R (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
							额定电压 x %		
HMF325 B7225□MHP		100	X7R	2.2 μ	±10, ±20	3.5	150	2.5±0.20	
UMF325 B7225□MHP		50	X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
UMF325 B7475□MHP			X7R	4.7 μ	±10, ±20	5	150	2.5±0.20	
TMF325 B7225□MHP			X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
TMF325 B7475□MHP			X7R	4.7 μ	±10, ±20	5	200	2.5±0.20	
TMF325 B7106□MHP		16	X7R	10 μ	±10, ±20	10	150	2.5±0.20	
EMF325 B7225□MHP			X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
EMF325 B7475□MHP			X7R	4.7 μ	±10, ±20	5	200	2.5±0.20	
EMF325 B7106□MHP			X7R	10 μ	±10, ±20	10	200	2.5±0.20	
LMF325 B7225□MHP		10	X7R	2.2 μ	±10, ±20	3.5	200	2.5±0.20	
LMF325 B7475□MHP			X7R	4.7 μ	±10, ±20	5	200	2.5±0.20	
LMF325 B7106□MHP			X7R	10 μ	±10, ±20	10	200	2.5±0.20	

【温度特性 B7 : X7R (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ^{*1} [mm]	注释
							额定电压 x %		
HMF325 B7223□NHT		100	X7R	0.022 μ	±10, ±20	2.5	200	1.9±0.20	
HMF325 B7473□NHT			X7R	0.047 μ	±10, ±20	2.5	200	1.9±0.20	
HMF325 B7104□NHT			X7R	0.1 μ	±10, ±20	3.5	200	1.9±0.20	
HMF325 B7224□NHT			X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
UMF325 B7223□NHT		50	X7R	0.022 μ	±10, ±20	2.5	200	1.9±0.20	
UMF325 B7473□NHT			X7R	0.047 μ	±10, ±20	2.5	200	1.9±0.20	
UMF325 B7104□NHT			X7R	0.1 μ	±10, ±20	3.5	200	1.9±0.20	
UMF325 B7224□NHT			X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
UMF325 B7474□NHT			X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	
UMF325 B7105□NHT			X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	
TMF325 B7224□NHT		25	X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
TMF325 B7474□NHT			X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	
TMF325 B7105□NHT			X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	
EMF325 B7224□NHT			X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
EMF325 B7474□NHT		16	X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	
EMF325 B7105□NHT			X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	
LMF325 B7224□NHT		10	X7R	0.22 μ	±10, ±20	3.5	200	1.9±0.20	
LMF325 B7474□NHT			X7R	0.47 μ	±10, ±20	3.5	200	1.9±0.20	
LMF325 B7105□NHT			X7R	1 μ	±10, ±20	3.5	200	1.9±0.20	

高可靠性用途铜外部电极多层陶瓷电容器

●063规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 厚度 0.3mm (P)

型号1	型号2	额定电压 [V]	温度特性	静电容量 [F]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
TMR063 B7101□P-F		25	X7R	100 p	±10, ±20	3.5	200	0.3±0.03	
TMR063 B7151□P-F			X7R	150 p	±10, ±20	3.5	200	0.3±0.03	
TMR063 B7221□P-F			X7R	220 p	±10, ±20	3.5	200	0.3±0.03	
TMR063 B7331□P-F			X7R	330 p	±10, ±20	3.5	200	0.3±0.03	
TMR063 B7471□P-F			X7R	470 p	±10, ±20	3.5	200	0.3±0.03	
TMR063 B7102□P-F			X7R	1000 p	±10, ±20	3.5	200	0.3±0.03	
TMR063 B7152□P-F			X7R	1500 p	±10, ±20	5	200	0.3±0.03	
TMR063 B7222□P-F			X7R	2200 p	±10, ±20	5	200	0.3±0.03	
TMR063 B7332□P-F			X7R	3300 p	±10, ±20	5	200	0.3±0.03	
EMR063 B7101□P-F		16	X7R	100 p	±10, ±20	3.5	200	0.3±0.03	
EMR063 B7151□P-F			X7R	150 p	±10, ±20	3.5	200	0.3±0.03	
EMR063 B7221□P-F			X7R	220 p	±10, ±20	3.5	200	0.3±0.03	
EMR063 B7331□P-F			X7R	330 p	±10, ±20	3.5	200	0.3±0.03	
EMR063 B7471□P-F			X7R	470 p	±10, ±20	3.5	200	0.3±0.03	
EMR063 B7102□P-F			X7R	1000 p	±10, ±20	3.5	200	0.3±0.03	
EMR063 B7152□P-F			X7R	1500 p	±10, ±20	5	200	0.3±0.03	
EMR063 B7222□P-F			X7R	2200 p	±10, ±20	5	200	0.3±0.03	
EMR063 B7332□P-F			X7R	3300 p	±10, ±20	5	200	0.3±0.03	
LMR063 B7101□P-F		10	X7R	100 p	±10, ±20	3.5	200	0.3±0.03	
LMR063 B7151□P-F			X7R	150 p	±10, ±20	3.5	200	0.3±0.03	
LMR063 B7221□P-F			X7R	220 p	±10, ±20	3.5	200	0.3±0.03	
LMR063 B7331□P-F			X7R	330 p	±10, ±20	3.5	200	0.3±0.03	
LMR063 B7471□P-F			X7R	470 p	±10, ±20	3.5	200	0.3±0.03	
LMR063 B7102□P-F			X7R	1000 p	±10, ±20	3.5	200	0.3±0.03	
LMR063 B7152□P-F			X7R	1500 p	±10, ±20	5	200	0.3±0.03	
LMR063 B7222□P-F			X7R	2200 p	±10, ±20	5	200	0.3±0.03	
LMR063 B7332□P-F			X7R	3300 p	±10, ±20	5	200	0.3±0.03	
LMR063 B7472□P-F			X7R	4700 p	±10, ±20	5	200	0.3±0.03	
LMR063 B7682□P-F			X7R	6800 p	±10, ±20	5	200	0.3±0.03	
LMR063 B7103□P-F			X7R	0.01 μ	±10, ±20	5	200	0.3±0.03	

●105规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
HMR105 B7221□V-F		100	X7R	220 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7331□V-F			X7R	330 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7471□V-F			X7R	470 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7681□V-F			X7R	680 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7102□V-F			X7R	1000 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7152□V-F			X7R	1500 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7222□V-F			X7R	2200 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7332□V-F			X7R	3300 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7472□V-F			X7R	4700 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7682□V-F			X7R	6800 p	±10, ±20	3.5	200	0.5±0.05	
HMR105 B7103□V-F			X7R	0.01 μ	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7221□V-F		50	X7R	220 p	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7331□V-F			X7R	330 p	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7471□V-F			X7R	470 p	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7681□V-F			X7R	680 p	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7153□V-F			X7R	0.015 μ	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7223□V-F			X7R	0.022 μ	±10, ±20	3.5	200	0.5±0.05	
UMR105 B7333□V-F			X7R	0.033 μ	±10, ±20	3.5	150	0.5±0.05	
UMR105 B7473□V-F			X7R	0.047 μ	±10, ±20	3.5	150	0.5±0.05	
JMR105CD7105□V-F		6.3	X7R	1 μ	±10, ±20	10	150	0.5±0.2/-0	

●107规格

【温度特性 B7 : X7R (- 55 ~ + 125℃) 】 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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度 ¹ [mm]	注释
							额定电压 x %		
HMR107 B7102□A-T		100	X7R	1000 p	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7152□A-T			X7R	1500 p	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7222□A-T			X7R	2200 p	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7332□A-T			X7R	3300 p	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7472□A-T			X7R	4700 p	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7682□A-T			X7R	6800 p	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7103□A-T			X7R	0.01 μ	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7153□A-T			X7R	0.015 μ	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7223□A-T			X7R	0.022 μ	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7333□A-T			X7R	0.033 μ	±10, ±20	3.5	200	0.8±0.10	
HMR107 B7473□A-T			X7R	0.047 μ	±10, ±20	3.5	200	0.8±0.10	
HMR107AB7104□A-T			X7R	0.1 μ	±10, ±20	3.5	200	0.8±0.10	
UMR107AC7224□A-T		50	X7R	0.22 μ	±10, ±20	3.5	200	0.8±0.15/-0.05	

■ 型号一览

● 212规格

【温度特性 C7 : X7S (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
HMR212AC7474□G-T		100	X7S	0.47 μ	±10, ±20	3.5	150	1.25±0.15/-0.05	
HMR212CC7105□G-T			X7S	1 μ	±10, ±20	3.5	150	1.25±0.25/-0	

● 316规格

【温度特性 C7 : X7S (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
HMR316BC7225□L-T		100	X7S	2.2 μ	±10, ±20	3.5	150	1.6±0.30	
UMR316BC7225□L-T		50	X7S	2.2 μ	±10, ±20	3.5	150	1.6±0.30	
UMR316BC7475□L-T			X7S	4.7 μ	±10, ±20	3.5	150	1.6±0.30	

● 325规格

【温度特性 B7 : X7R (- 55 ~ + 125°C)】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]	静电容量允许误差 [%]	tanδ [%]	高温负载	厚度*1 [mm]	注释
							额定电压 x %		
HMR325AC7475□M-P		100	X7S	4.7 μ	±10, ±20	3.5	150	2.5±0.30	
UMR325AC7106□M-P		50	X7S	10 μ	±10, ±20	3.5	150	2.5±0.30	

Multilayer Ceramic Capacitors

PACKAGING

① Minimum Quantity

● Taped package

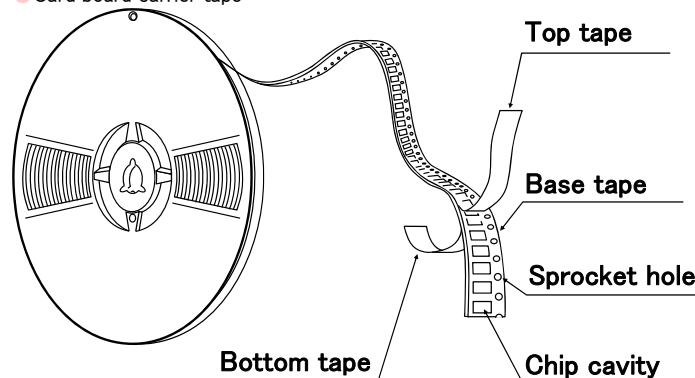
Type(EIA)	Thickness		Standard quantity [pcs]	
	mm	code	Paper tape	Embossed tape
□MK021(008004)	0.125	K	—	50000
□VS021(008004)				
□MK042(01005)	0.2	C, D	—	40000
□VS042(01005)	0.2	C		
□MK063(0201)	0.3	P, T	15000	—
□WK105(0204) ※	0.3	P	10000	—
□MK105(0402) □MF105(0402)	0.13	H	—	20000
	0.18	E	—	15000
	0.2	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)	0.45	K	4000	—
□WK212(0508) ※	0.85	D		
□MF212(0805)	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		
□MJ325(1210)	2.5	M	—	1000
	1.9	N	—	2000
	2.5	M	—	500(T), 1000(P)
□MK432(1812)	2.5	M	—	500

Note : ※ LW Reverse type.

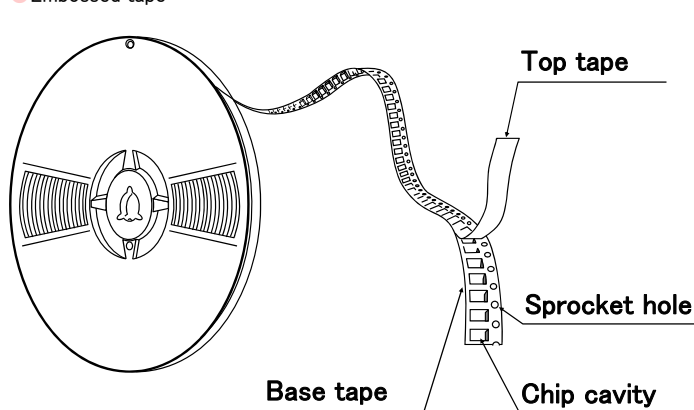
② Taping material

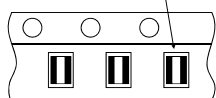
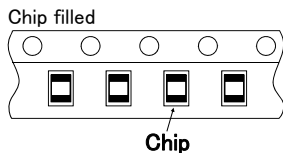
※No bottom tape for pressed carrier tape

● Card board carrier tape



● Embossed tape





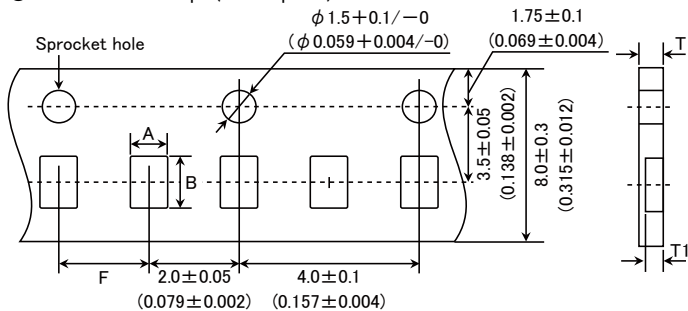
※ LW Reverse type.

③ Representative taping dimensions

● Paper Tape (8mm wide)

● Pressed carrier tape (2mm pitch)

Unit: mm (inch)



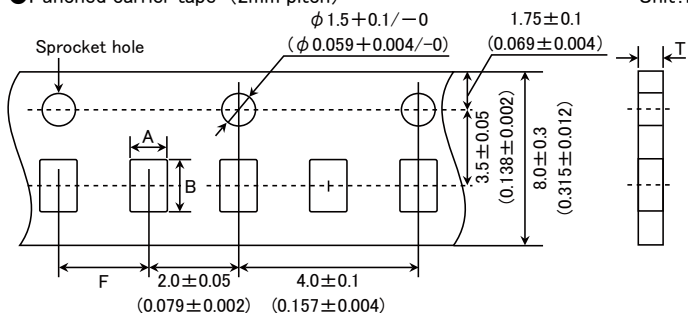
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	T	T1
□MK063(0201)	0.37	0.67	2.0±0.05	0.45max.	0.42max.
□WK105(0204) ※	0.65	1.15		0.4max.	0.3max.
□MK105(0402) (*1 C)				0.45max.	0.42max.
□MK105(0402) (*1 P)					

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

Unit: mm

● Punched carrier tape (2mm pitch)

Unit: mm (inch)

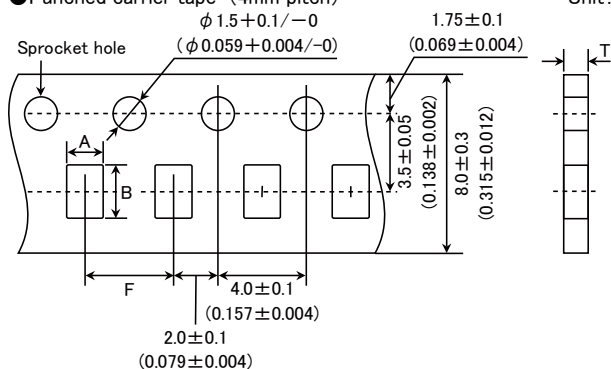


Type(EIA)	Chip Cavity		Insertion Pitch F	Tape Thickness T
	A	B		
□MK105 (0402)	0.65	1.15	2.0±0.05	0.8max.
□MF105 (0402)				
□VK105 (0402)				

Unit: mm

● Punched carrier tape (4mm pitch)

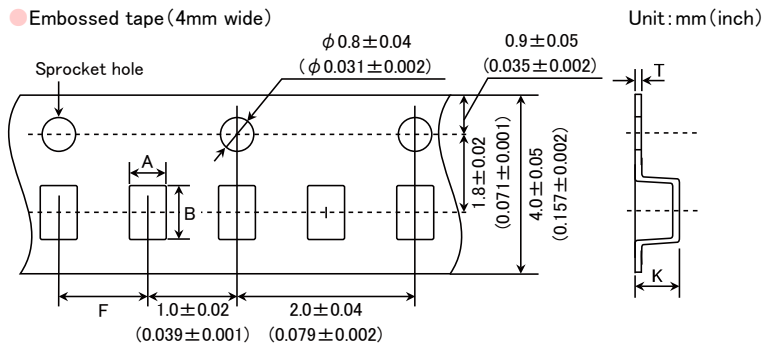
Unit: mm (inch)



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		

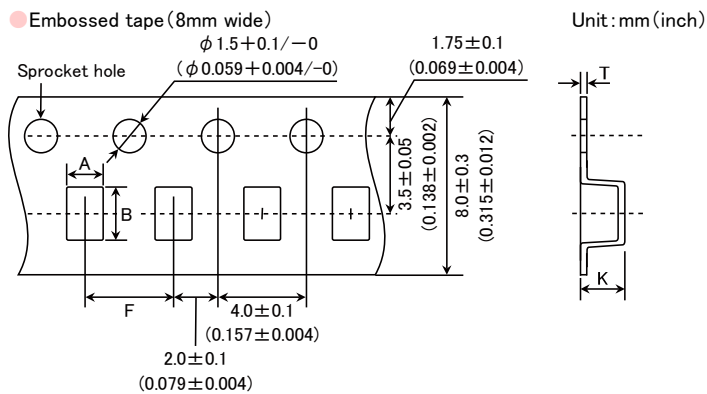
Note: Taping size might be different depending on the size of the product. ※ LW Reverse type.

Unit: mm



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

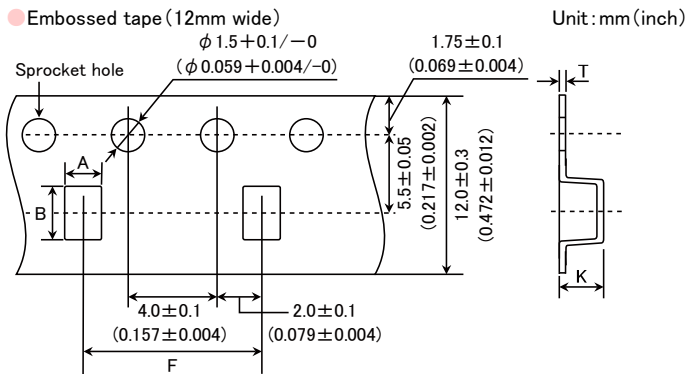
Unit: mm



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

Note: ※ LW Reverse type.

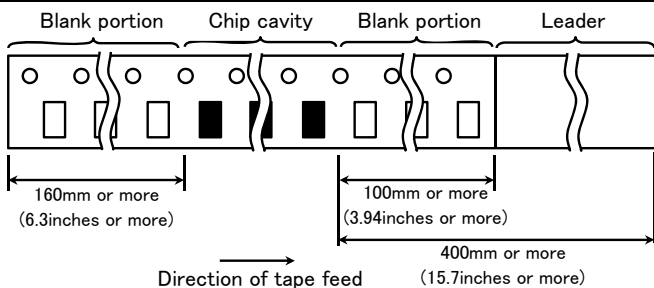
Unit: mm



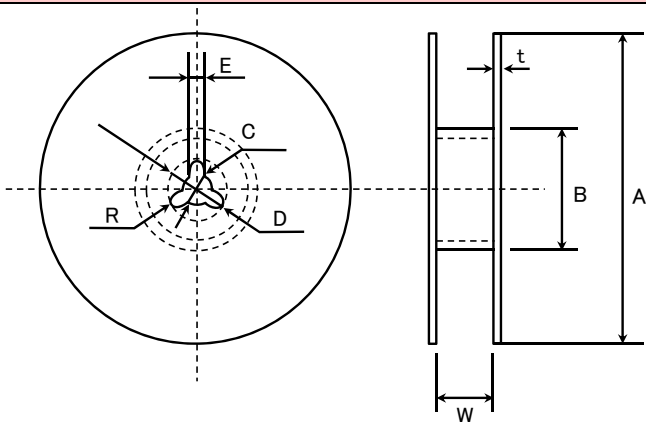
Type(EIA)	Chip Cavity		Insertion Pitch	Tape Thickness	
	A	B	F	K	T
□MK325(1210)	3.1	4.0	8.0 ± 0.1	4.0max.	0.6max.
□MK432(1812)	3.7	4.9	8.0 ± 0.1	4.0max.	0.6max.

Unit: mm

④Trailer and Leader



⑤Reel size



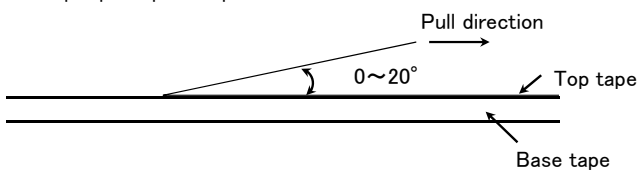
A	B	C	D	E	R
$\phi 178 \pm 2.0$	$\phi 50 \text{ min.}$	$\phi 13.0 \pm 0.2$	$\phi 21.0 \pm 0.8$	2.0 ± 0.5	1.0

	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.



Multilayer Ceramic Capacitors

RELIABILITY DATA

1.Operating Temperature Range				
Specified Value	Temperature Compensating(Class1)	Standard	−55 to +125℃	
		High Frequency Type		
	High Permittivity (Class2)			
		BJ	Specification	Temperature Range
B			−25 to +85℃	
X5R			−55 to +85℃	
B7			−55 to +125℃	
C6			−55 to +105℃	
C7			−55 to +125℃	
D7	−55 to +125℃			
LD(※)	X5R	−55 to +85℃		
Note: ※LD Low distortion high value multilayer ceramic capacitor				

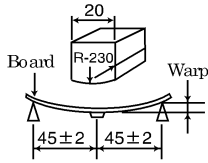
2. Storage Conditions				
Specified Value	Temperature Compensating(Class1)	Standard	−55 to +125°C	
		High Frequency Type		
	High Permittivity (Class2)			
Note: ※LD Low distortion high value multilayer ceramic capacitor				

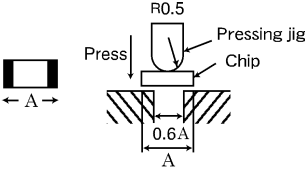
3. Rated Voltage			
Specified Value	Temperature Compensating(Class1)	Standard	50VDC, 25VDC
		High Frequency Type	50VDC, 25VDC
	High Permittivity (Class2)		50VDC, 35VDC, 25VDC, 16VDC, 10VDC, 6.3VDC, 4VDC, 2.5VDC

4. Withstanding Voltage (Between terminals)			
Specified Value	Temperature Compensating(Class1)	Standard	No breakdown or damage
		High Frequency Type	
	High Permittivity (Class2)		
Test Methods and Remarks		Class 1	Class 2
	Applied voltage	Rated volta × 3	Rated voltage × 2.5
	Duration	1 to 5 sec.	
	Charge/discharge current	50mA max.	

5. Insulation Resistance			
Specified Value	Temperature Compensating(Class1)	Standard	10000 MΩ min.
		High Frequency Type	
		High Permittivity (Class2) Note 1	
Test Methods and Remarks	Applied voltage : Rated voltage		
	Duration : 60±5 sec.		
	Charge/discharge current : 50mA max.		

6. Capacitance (Tolerance)														
Specified Value	Temperature Compensating(Class1)	Standard	<table><tr><td>C□</td><td>$0.2\text{pF} \leq C \leq 5\text{pF}$</td><td>: $\pm 0.25\text{pF}$</td></tr><tr><td>U□</td><td>$0.2\text{pF} \leq C \leq 10\text{pF}$</td><td>: $\pm 0.5\text{pF}$</td></tr><tr><td>SL</td><td>$C > 10\text{pF}$</td><td>: $\pm 5\%$ or $\pm 10\%$</td></tr></table>			C□	$0.2\text{pF} \leq C \leq 5\text{pF}$	: $\pm 0.25\text{pF}$	U□	$0.2\text{pF} \leq C \leq 10\text{pF}$	: $\pm 0.5\text{pF}$	SL	$C > 10\text{pF}$	: $\pm 5\%$ or $\pm 10\%$
		C□	$0.2\text{pF} \leq C \leq 5\text{pF}$	: $\pm 0.25\text{pF}$										
	U□	$0.2\text{pF} \leq C \leq 10\text{pF}$	: $\pm 0.5\text{pF}$											
	SL	$C > 10\text{pF}$	: $\pm 5\%$ or $\pm 10\%$											
High Frequency Type	<table><tr><td>CH</td><td>$0.3\text{pF} \leq C \leq 2\text{pF}$</td><td>: $\pm 0.1\text{pF}$</td></tr><tr><td></td><td>$C > 2\text{pF}$</td><td>: $\pm 5\%$</td></tr></table>			CH	$0.3\text{pF} \leq C \leq 2\text{pF}$	: $\pm 0.1\text{pF}$		$C > 2\text{pF}$	: $\pm 5\%$					
CH	$0.3\text{pF} \leq C \leq 2\text{pF}$	: $\pm 0.1\text{pF}$												
	$C > 2\text{pF}$	: $\pm 5\%$												
High Permittivity (Class2)		BJ, B7, C6, C7, D7, LD(※): $\pm 10\%$ or $\pm 20\%$ Note: ※LD Low distortion high value multilayer ceramic capacitor												
Test Methods and Remarks		Class 1		Class 2										
		Standard	High Frequency Type	$C \leq 10\mu\text{F}$	$C > 10\mu\text{F}$									
	Preconditioning	None		Thermal treatment (at 150°C for 1hr) Note 2										
	Measuring frequency	1MHz $\pm 10\%$		1kHz $\pm 10\%$	120 $\pm 10\text{Hz}$									
	Measuring voltage Note	0.5 to 5Vrms		1 $\pm 0.2\text{Vrms}$	0.5 $\pm 0.1\text{rms}$									
	Bias application	None												
7. Q or Dissipation Factor														
Specified Value	Temperature Compensating(Class1)	Standard	$C < 30\text{pF}$: $Q \geq 400 + 20C$ $C \geq 30\text{pF}$: $Q \geq 1000$ (C:Nominal capacitance)											
		High Frequency Type	Refer to detailed specification											
	High Permittivity (Class2) Note 1		BJ, B7, C6, C7, D7: 2.5% max.											
Test Methods and Remarks		Class 1		Class 2										
		Standard	High Frequency Type	$C \leq 10\mu\text{F}$	$C > 10\mu\text{F}$									
	Preconditioning	None		Thermal treatment (at 150°C for 1hr) Note 2										
	Measuring frequency	1MHz $\pm 10\%$	1GHz	1kHz $\pm 10\%$	120 $\pm 10\text{Hz}$									
	Measuring voltage Note 1	0.5 to 5Vrms		1 $\pm 0.2\text{Vrms}$	0.5 $\pm 0.1\text{Vrms}$									
	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/°C]		Tolerance [ppm/°C]									
			C□ : 0	CG,CH, C J, CK	G : ± 30									
			U□ : -750	UJ, UK	H : ± 60									
			SL : +350 to -1000		J : ± 120									
					K : ± 250									
		High Frequency Type	Temperature Characteristic [ppm/°C]		Tolerance [ppm/°C]									
			C□ : 0	CH	H : ± 60									
	High Permittivity (Class2)			Specification	Capacitance change	Reference temperature	Temperature Range							
		BJ	B	$\pm 10\%$	20°C	-25 to +85°C								
			X5R	$\pm 15\%$	25°C	-55 to +85°C								
B7		X7R	$\pm 15\%$	25°C	-55 to +125°C									
C6		X6S	$\pm 22\%$	25°C	-55 to +105°C									
C7		X7S	$\pm 22\%$	25°C	-55 to +125°C									
D7		X7S	+22/-33%	25°C	-55 to +125°C									
LD(※)		X5R	$\pm 15\%$	25°C	-55 to +85°C									
Note : ※LD Low distortion high value multilayer ceramic capacitor														
Test Methods and Remarks	Class 1 : Capacitance at 20°C and 85°C shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation. $\frac{(C_{85}-C_{20})}{C_{20} \times \Delta T} \times 10^6 (\text{ppm}/^\circ\text{C}) \quad \Delta T=65$													
	Class 2 : Capacitance at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.													
	Step	B	X5R, X7R, X6S, X7S, X7T											
	1	Minimum operating temperature												
	2	20°C	25°C											
	3	Maximum operating temperature												
	$\frac{(C-C_2)}{C_2} \times 100 (\%)$													
	C : Capacitance in Step 1 or Step 3													
	C2 :Capacitance in Step 2													

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 Capaitance change : Within±0.5 pF																		
	High Permittivity (Class2)		Appearance : No abnormality Capacitance change : Within ±12.5%(BJ, B7, C6, C7, D7, LD(※)) Note: ※LD Low distortion high value multilayer ceramic capacitor																		
Test Methods and Remarks	<table><tr><td></td><td colspan="2">Multilayer Ceramic Capacitors</td></tr><tr><td></td><td>042, 063, ※105 Type</td><td>The other types</td></tr><tr><td>Board</td><td colspan="2">Glass epoxy-resin substrate</td></tr><tr><td>Thickness</td><td>0.8mm</td><td>1.6mm</td></tr><tr><td>Warp</td><td colspan="2">1mm (Soft Termination type:3mm)</td></tr><tr><td>Duration</td><td colspan="2">10 sec.</td></tr></table>			Multilayer Ceramic Capacitors			042, 063, ※105 Type	The other types	Board	Glass epoxy-resin substrate		Thickness	0.8mm	1.6mm	Warp	1mm (Soft Termination type:3mm)		Duration	10 sec.		 (Unit: mm) Capacitance measurement shall be conducted with the board bent
		Multilayer Ceramic Capacitors																			
	042, 063, ※105 Type	The other types																			
Board	Glass epoxy-resin substrate																				
Thickness	0.8mm	1.6mm																			
Warp	1mm (Soft Termination type:3mm)																				
Duration	10 sec.																				
	※1: 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.	

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 Capacitanceceange : 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 Capactace change : Within $\pm 7.5\%$ (BJ, B7, C6, C7, D7, LD(※)) 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°C, 1 to 2 min.	80 to 100°C, 2 to 5 min. 150 to 200°C, 2 to 5 min.	
	Solder temp.	270 $\pm$ 5°C		
	Duration	3 $\pm$ 0.5 sec.		
	Recovery	6 to 24 hrs (Standard condition) Noe 5		
		Class 2		
		042, 063 Type	105, 107, 212 Type	316, 325 Type
	Preconditioning	Thermal treatment (at 150°C for 1 hr) Note 2		
	Preheating	150°C, 1 to 2 min.	80 to 100°C, 2 to 5 min. 150 to 200°C, 2 to 5 min.	80 to 100°C, 5 to 10 min. 150 to 200°C, 5 to 10 min.
	Solder temp.	270 $\pm$ 5°C		
	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, D7, LD(※)) 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°C for 1 hr) Note 2															
	1 cycle	<table><tr><td>Step</td><td>Temperature(°C)</td><td>Time(min.)</td></tr><tr><td>1</td><td>Minimum operating temperature</td><td>30±3</td></tr><tr><td>2</td><td>Normal temperature</td><td>2 to 3</td></tr><tr><td>3</td><td>Maximum operating temperature</td><td>30±3</td></tr><tr><td>4</td><td>Normal temperature</td><td>2 to 3</td></tr></table>			Step	Temperature(°C)	Time(min.)	1	Minimum operating temperature	30±3	2	Normal temperature	2 to 3	3	Maximum operating temperature	30±3	4	Normal temperature	2 to 3
		Step	Temperature(°C)	Time(min.)															
		1	Minimum operating temperature	30±3															
		2	Normal temperature	2 to 3															
3		Maximum operating temperature	30±3																
4	Normal temperature	2 to 3																	
Number of cycles	5 times																		
Recovery	6 to 24 hrs (Standard condition) Note 5		24±2 hrs (Standard condition) Note 5																

15. Humidity (Steady State)				
Specified Value	Temperature Compensating(Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 5\%$ or $\pm 0.5\text{pF}$, whichever is larger. Q : $C < 10\text{pF} : Q \geq 200 + 10C$ $10 \leq C < 30\text{pF} : Q \geq 275 + 2.5C$ $C \geq 30\text{pF} : Q \geq 350 (C : \text{Nominal capacitance})$ Insulation resistance : $1000 \text{ M}\Omega \text{ min.}$	
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 0.5\text{pF}$, Insulation resistance : $1000 \text{ M}\Omega \text{ min.}$	
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ (BJ, B7, C6, C7, D7, LD(※)) Dissipation factor : 5.0% max. (BJ, B7, C6, C7, D7, LD(※)) Insulation resistance : $50 \text{ M}\Omega \mu\text{F}$ or $1000 \text{ M}\Omega$ 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°C for 1 hr) Note 2
	Temperature	$40 \pm 2^\circ\text{C}$	$60 \pm 2^\circ\text{C}$	$40 \pm 2^\circ\text{C}$
	Humidity	90 to 95%RH		90 to 95%RH
	Duration	$500 + 24 / - 0 \text{ hrs}$		$500 + 24 / - 0 \text{ hrs}$
	Recovery	6 to 24 hrs (Standard condition) Note 5		$24 \pm 2 \text{ hrs}$ (Standard condition) Note 5

16. Humidity Loading				
Specified Value	Temperature Compensating(Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 7.5\%$ or $\pm 0.75\text{pF}$, whichever is larger. Q : $C < 30\text{pF} : Q \geq 100 + 10C/3$ $C \geq 30\text{pF} : Q \geq 200 (C : \text{Nominal capacitance})$ Insulation resistance : $500 \text{ M}\Omega \text{ min.}$	
		High Frequency Type	Appearance : No abnormality Capacitance change : $C \leq 2\text{pF} : \text{Within } \pm 0.4 \text{ pF}$ $C > 2\text{pF} : \text{Within } \pm 0.75 \text{ pF} (C : \text{Nominal capacitance})$ Insulation resistance : $500 \text{ M}\Omega \text{ min.}$	
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ (BJ, B7, C6, C7, D7, LD(※)) Dissipation factor : 5.0% max. (BJ, B7, C6, C7, D7, LD(※)) Insulation resistance : $25 \text{ M}\Omega \mu\text{F}$ or $500 \text{ M}\Omega$, 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°C) Note 3
	Temperature	$40 \pm 2^\circ\text{C}$	$60 \pm 2^\circ\text{C}$	$40 \pm 2^\circ\text{C}$
	Humidity	90 to 95%RH		90 to 95%RH
	Duration	$500 + 24 / - 0 \text{ hrs}$		$500 + 24 / - 0 \text{ hrs}$
	Applied voltage	Rated voltage		Rated voltage
	Charge/discharge current	50mA max.		50mA max.
	Recovery	6 to 24 hrs (Standard condition) Note 5		$24 \pm 2 \text{ hrs}$ (Standard condition) Note 5

17. High Temperature Loading

► This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
 For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>) .

Specified Value	Temperature Compensating(Class1)	Standard	Appearance : No abnormality Capacitance change : Within $\pm 3\%$ or $\pm 0.3\text{pF}$, whichever is larger. Q : $C < 10\text{pF}$: $Q \geq 200 + 10C$ $10 \leq C < 30\text{pF}$: $Q \geq 275 + 2.5C$ $C \geq 30\text{pF}$: $Q \geq 350$ (C: Nominal capacitance) Insulation resistance : $1000 \text{ M}\Omega \text{ min.}$
		High Frequency Type	Appearance : No abnormality Capacitance change : Within $\pm 3\%$ or $\pm 0.3\text{pF}$, whichever is larger. Insulation resistance : $1000 \text{ M}\Omega \text{ min.}$
	High Permittivity (Class2) Note 1		Appearance : No abnormality Capacitance change : Within $\pm 12.5\%$ (BJ, B7, C6, C7, D7, LD(※)) Dissipation factor : 5.0% max. (BJ, B7, C6, C7, D7, LD(※)) Insulation resistance : $50 \text{ M}\Omega \mu\text{F}$ or $1000 \text{ M}\Omega$, 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(※)	C6	B7, C7, D7
	Preconditioning	None		Voltage treatment (Twice the rated voltage shall be applied for 1 hour at 85°C, 105°C or 125°C) Note 3, 4		
	Temperature	Maximum operating temperature		Maximum operating temperature		
	Duration	1000+48/—0 hrs		1000+48/—0 hrs		
	Applied voltage	Rated voltage × 2		Rated voltage × 2 Note 4		
	Charge/discharge current	50mA max.		50mA max.		
	Recovery	6 to 24hr (Standard condition) Note 5		24±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 $150 \pm 0 / -10^\circ\text{C}$ for an hour and kept at room temperature for 24 ± 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 ± 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°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: $20 \pm 2^\circ\text{C}$, Relative humidity: 60 to 70 % RH, Air pressure: 86 to 106kPa Unless otherwise specified, all the tests are conducted under the "standard condition".

Medium-High Voltage Multilayer Ceramic Capacitor

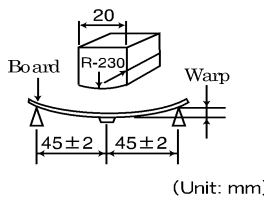
RELIABILITY DATA

1. Operating Temperature Range	
Specified Value	Temperature Compensating(High Frequency type) CG(C0G) : -55 to +125°C
	High permittivity X7R, X7S : -55 to +125°C X5 : -55 to +85°C B : -25 to +85°C
2. Storage Temperature Range	
Specified Value	Temperature Compensating(High Frequency type) CG(C0G) : -55 to +125°C
	High permittivity X7R, X7S : -55 to +125°C X5R : -55 to +85°C B : -25 to +85°C
3. Rated Voltage	
Specified Value	100VDC(HMK,HMJ), 250VDC(QMK,QMJ,QVS), 630VDC(SMK,SMJ)
4. Withstanding Voltage (Between terminals)	
Specified Value	No breakdown or damage
Test Methods and Remarks	Applied voltage : Rated voltage × 2.5 (HMK,HMJ), Rated voltage × 2 (QMK,QMJ,QVS), Rated voltage × 1.2 (SMK,SMJ) Duration : 1 to 5sec. Charge/discharge current : 50mA max.
5. Insulation Resistance	
Specified Value	Temperature Compensating(High Frequency type) 10000MΩ min
	High permittivity 100MΩ μF or 10GΩ, whichever is smaller.
Test Methods and Remarks	Applied voltage : Rated voltage (HMK,HMJ, QMK,QMJ,QVS), 500V (SMK,SMJ) Duration : 60±5sec. Charge/discharge current : 50mA max.
6. Capacitance (Tolerance)	
Specified Value	Temperature Compensating(High Frequency type) ±0.1pF (C<5pF) ±0.25pF (C<10pF) ±0.5pF (5pF≤C<10pF) ±2%(C=10pF) ±5%(C≥10pF)
	High permittivity ±10%, ±20%
Test Methods and Remarks	Temperature Compensating(High Frequency type) Measuring frequency : 1MHz±10% Measuring voltage : 0.5 to 5Vrms Bias application : None
	High permittivity Measuring frequency : 1kHz±10% Measuring voltage : 1±0.2Vrms Bias application : None

► This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

7. Q or Dissipation Factor	
Specified Value	Temperature Compensating(High Frequency type) $C < 30\text{pF} : Q \geq 800 + 20C$ $C \geq 30\text{pF} : Q \geq 1400$ C:Normal Capacitance(/pF) High permittivity 3.5%max (HMK,HMJ) 2.5%max (QMK,QMJ, SMK,SMJ)
Test Methods and Remarks	Temperature Compensating(High Frequency type) Measuring frequency : 1MHz±10% Measuring voltage : 0.5 to 5Vrms Bas application : None High permittivity Measuring frequency : 1kHz±10% Measuring voltage : 1±0.2Vrms Bas application : None

8. Temperature Characteristic of Capacitance		
Specified Value	Temperature Compensating(High Frequency type)	
	C0G : ±30ppm(25 to +125°C)	
	High permittivity	
	B : ±10%(−25 to +85°C)	
	X5R : ±15%(−55 to +85°C)	
Test Methods and Remarks	X7R : ±15%(−55 to +125°C)	
	X7S : ±22%(−55 to +125°C)	
	Temperature Compensating(High Frequency type)	
	Capacitance at 25°C and 85°C shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.	
	$\frac{(C_{85}-C_{25})}{C_{25} \times \Delta T} \times 10^6 \times [\text{ppm}/^{\circ}\text{C}]$	
	High permittivity	
	Capacitance value at each step shall be measured in thermal equilibrium, and the temperature characteristic shall be calculated from the following equation.	
	Step	B X5R、X7R、X7S
	1	Minimum operating tempeature
	2	20°C 25°C
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(High Frequency type) Appearance : No abnormality Capacitance change : ±5% or ±0.5pF, whichever is larger. High permittivity Appearance : No abnormality Capacitance change : Within ±10%
Test Methods and Remarks	Warp : 1mm (Soft Termination type:3mm) Duration : 10sec. Test board : Glass epoxy-resin substrate Thicknss : 1.6mm  Capacitance measurement shall be conducted with the board bent.

10. Adhesive Strength of Terminal Electrodes			
Specified Value	No terminal separation or its indication.		
Test Methods and Remarks	Temperature Compensating(High Frequency type) Applied force : 2N Duration : 10±1sec.		
	High permittivity Applied force : 5N Duration : 30±5sec.		
11. Solderability			
Specified Value	At least 95% of terminal electrode is covered by new solder		
Test Methods and Remarks		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(High Frequency type) Appearance : No abnormality Capacitance change : C※≤10pF :±0.25pF C※>10pF :±2.5% ※Normal capacitance Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality		
	High permittivity Appearance : No abnormality Capacitance change : Within±15%(HMK,HMJ), ±10%(QMK,QMJ, SMK,SMJ) Dissipation factor : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality		
Test Methods and Remarks	Preconditioning	: Thermal treatment(at 150℃ for 1hr) Note1 (Only High permittivity)	
	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 stadard condition Note3	
13. Temperature Cycle (Thermal Shock)			
Specified Value	Temperature Compensating(High Frequency type) Appearance : No abnormality Capacitance change : C※≤10pF :±0.25% C※>10pF :±2.5% Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality		
	High permittivity Appearance : No abnormality Capacitance change : Within±15%(HMK,HMJ), ±7.5%(QMK,QMJ, SMK,SMJ) Dissipation factor : Initial value Insulation resistance : Initial value Withstanding voltage (between terminals) : No abnormality		
Test Methods and Remarks	Preconditioning : Thermal treatment (at 150℃ for 1hr) Note1		
	Conditions for 1 cycle		
	Step	temperature(℃)	Time (min.)
	1	Minimum operating temperature	30±3min.
	2	Normal temperature	2 to 3min.
	3	Maximum operating temperature	30±3min.
	4	Normal temperature	2 to 3min.
Number of cycles : 5 times			
Recovery : 24±2hrs under the standard condition Note3			

14. Humidity (Steady state)	
Specified Value	Temperature Compensating(High Frequency type) Appearance : No abnormality Capacitance change : $C \times \leq 10\text{pF} : \pm 0.5\text{pF}$ $C \times > 10\text{pF} : \pm 5\%$ $\times$ Normal capacitance Insulation resistance : $1000\text{M}\Omega \text{ min}$
	High permittivity Appearance : No abnormality Capacitance change : Within $\pm 15\%$ Dissipation factor : $7\% \text{max (HMK,HMJ)}$, $5\% \text{max (QMK,QMJ, SMK,SMJ)}$. Insulation resistance : $25\text{M}\Omega \mu\text{F}$ or $1000\text{M}\Omega$, whichever is smaller.
Test Methods and Remarks	Preconditioning : Thermal treatment(at 150°C for 1hr) Note1 (Only High permittivity) Temperature : $40 \pm 2^\circ\text{C}$ Humidity : 90 to 95%RH Duration : 500 +24/—0 hrs Recovery : $24 \pm 2\text{hrs}$ under the standard condition Note3

15. Humidity Loading	
Specified Value	Temperature Compensating(High Frequency type) Appearance : No abnormality Capacitance change : $C \times \leq 2.0\text{pF} : \pm 0.4\text{pF}$ $2.0\text{pF} < C \leq 10\text{pF} : \pm 0.75\text{pF}$ $C \times > 10\text{pF} : \pm 7.5\%$ Insulation resistance : $500\text{M}\Omega \text{ min}$
	High permittivity Appearance : No abnormality Capacitance change : Within $\pm 15\%$ Dissipation factor : $7\% \text{max (HMK,HMJ)}$, $5\% \text{max (QMK,QMJ, SMK,SMJ)}$. Insulation resistance : $10\text{M}\Omega \mu\text{F}$ or $500\text{M}\Omega$, whichever is smaller.
Test Methods and Remarks	According to JIS 5102 clause 9.9. Preconditioning : Voltage treatment Note2 (Only High permittivity) Temperature : $40 \pm 2^\circ\text{C}$ Humidity : 90 to 95%RH Applied voltage : Rated voltage Charge/discharge current : 50mA max. Duration : 500 +24/—0 hrs Recovery : $24 \pm 2\text{hrs}$ under the standard condition Note3

16. High Temperature Loading	
Specified Value	Temperature Compensating(High Frequency type) Appearance : No abnormality Capacitance change : $C \times \leq 10\text{pF} : \pm 0.3\text{pF}$ $C \times > 10\text{pF} : \pm 3\%$ Insulation resistance : $1000\text{M}\Omega \text{ min}$
	High permittivity Appearance : No abnormality Capacitance change : Within $\pm 15\%$ Dissipation factor : $7\% \text{max (HMK,HMJ)}$, $5\% \text{max (QMK,QMJ, SMK,SMJ)}$. Insulation resistance : $50\text{M}\Omega \mu\text{F}$ or $1000\text{M}\Omega$, whichever is smaller.
Test Methods and Remarks	According to JIS 5102 clause 9.10. Preconditioning : Voltage treatment Note2 (Only High permittivity) Temperature : Maximum operating temperature Applied voltage : Rated voltage $\times 2$ (HMK,HMJ,QVS) Rated voltage $\times 1.5$ (QMK,QMJ) Rated voltage $\times 1.2$ (SMK,SMJ) Charge/discharge current : 50mA max. Duration : 1000 +24/—0 hrs Recovery : $24 \pm 2\text{hrs}$ under the standard condition Note3

Note1 Thermal treatment : Initial value shall be measured after test sample is heat-treated at $150 \pm 0/ - 10^\circ\text{C}$ for an hour and kept at room temperature for $24 \pm 2\text{hours}$.

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 $24 \pm 2\text{hours}$.

Note3 Standard condition : Temperature: 5 to 35°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: $20 \pm 2^\circ\text{C}$, 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

- ◆Verification of operating environment, electrical rating and performance
 1. A malfunction of equipment in fields such as medical, aerospace, nuclear control, etc. may cause serious harm to human life or have severe social ramifications.
Therefore, any capacitors to be used in such equipment may require higher safety and reliability, and shall be clearly differentiated from them used in general purpose applications.
- ◆Operating Voltage (Verification of Rated voltage)
 1. The operating voltage for capacitors must always be their rated voltage or less.
If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages shall be the rated voltage or less.
For a circuit where an AC or a pulse voltage may be used, the sum of their peak voltages shall also be the rated voltage or less.
 2. Even if an applied voltage is the rated voltage or less reliability of capacitors may be deteriorated in case that either a high frequency AC voltage or a pulse voltage having rapid rise time is used in a circuit.

2. PCB Design

Precautions

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

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

Technical considerations

- ◆Pattern configurations (Design of Land-patterns)

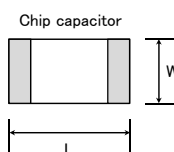
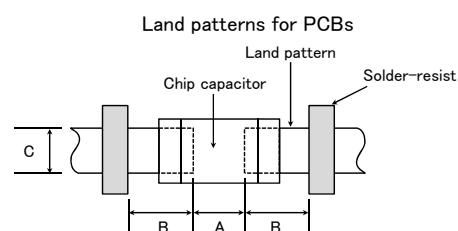
The following diagrams and tables show some examples of recommended land patterns to prevent excessive solder amounts.

(1) Recommended land dimensions for typical chip capacitors

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

Wave-soldering

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



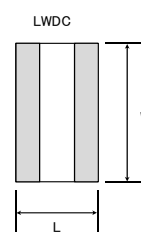
Reflow-soldering

Type	042	063	105	107	212	316	325	432
Size	L	0.4	0.6	1.0	1.6	2.0	3.2	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

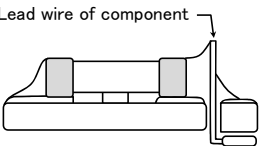
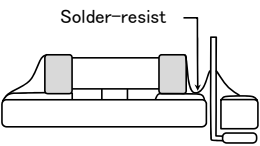
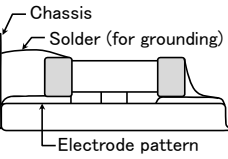
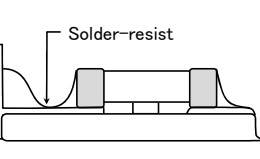
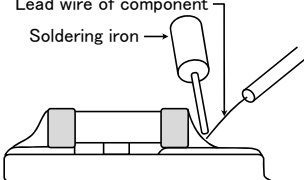
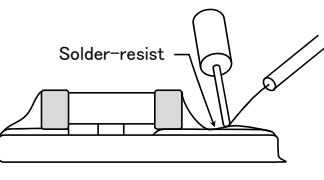
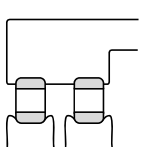
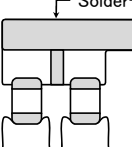
Note: Recommended land size might be different according to the allowance of the size of the product.

●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

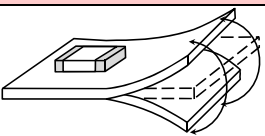
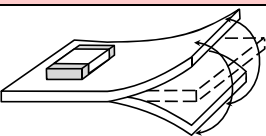


(2) Examples of good and bad solder application

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		

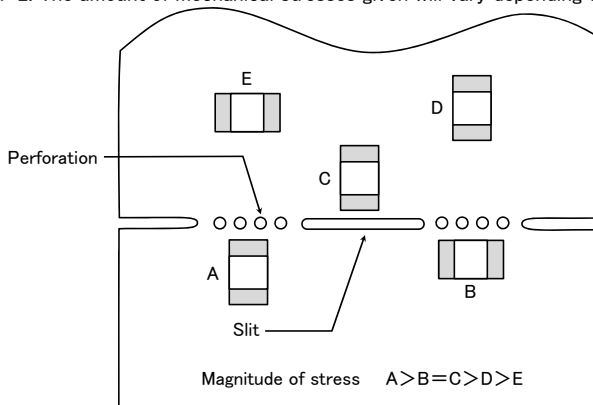
◆ Pattern configurations (Capacitor layout on PCBs)

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.

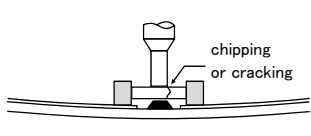
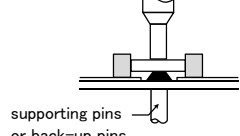
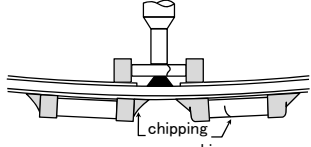
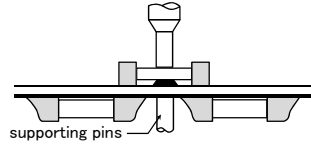
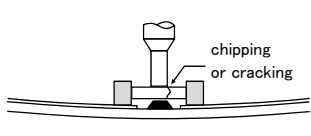
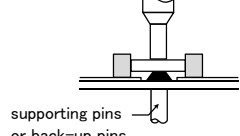
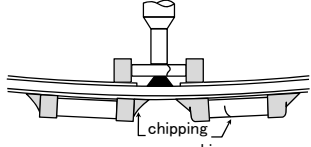
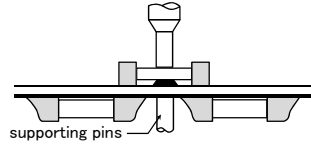
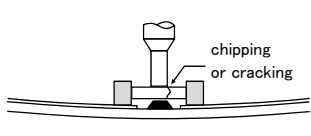
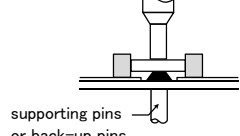
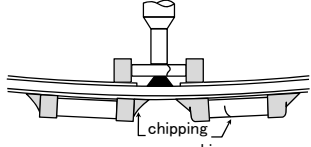
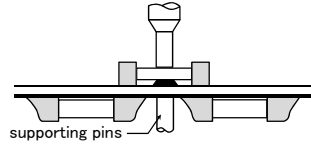
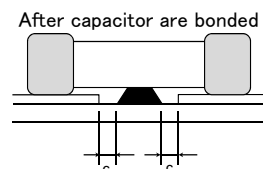
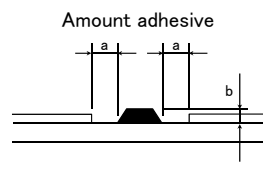
3. Mounting

◆ Adjustment of mounting machine

- 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.

◆ Selection of Adhesives

- 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.

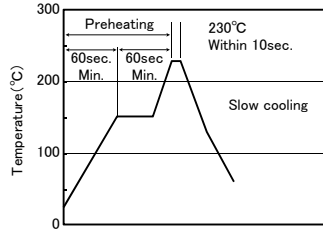
Technical considerations	◆Adjustment of mounting machine 1. When the bottom dead center of a pick-up nozzle is too low, excessive force is imposed on capacitors and causes damages. To avoid this, the following points shall be considerable. (1) The bottom dead center of the pick-up nozzle shall be adjusted 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: <table><tr><th>Items</th><th>Not recommended</th><th>Recommended</th></tr><tr><td>Single-sided mounting</td><td></td><td></td></tr><tr><td>Double-sided mounting</td><td></td><td></td></tr></table>	Items	Not recommended	Recommended	Single-sided mounting			Double-sided mounting		
	Items	Not recommended	Recommended							
	Single-sided mounting									
Double-sided mounting										
2. As the alignment pin is worn out, adjustment of the nozzle height can cause chipping or cracking of capacitors because of mechanical impact on the capacitors. To avoid this, the monitoring of the width between the alignment pins in the stopped position, maintenance, check and replacement of the pin shall be conducted periodically. ◆Selection of Adhesives Some adhesives may cause IR deterioration. The different shrinkage percentage of between the adhesive and the capacitors may result in stresses on the capacitors and lead to cracking. Moreover, too little or too much adhesive applied to the board may adversely affect components. Therefore, the following precautions shall be noted in the application of adhesives. (1) Required adhesive characteristics - 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] <table><tr><th>Figure</th><th>212/316 case sizes as examples</th></tr><tr><td>a</td><td>0.3mm min</td></tr><tr><td>b</td><td>100 to 120 μm</td></tr><tr><td>c</td><td>Adhesives shall not contact land</td></tr></table> 	Figure	212/316 case sizes as examples	a	0.3mm min	b	100 to 120 μm	c	Adhesives shall not contact land		
Figure	212/316 case sizes as examples									
a	0.3mm min									
b	100 to 120 μm									
c	Adhesives shall not contact land									
4. Soldering										
Precautions	◆Selection of Flux Since flux may have a significant effect on the performance of capacitors, it is necessary to verify the following conditions prior to use; (1) Flux used shall be less than or equal to 0.1 wt% (in Cl equivalent) of halogenated content. Flux having a strong acidity content shall not be applied. (2) When shall capacitors are soldered on boards, the amount of flux applied shall be controlled at the optimum level. (3) When water-soluble flux is used, special care shall be taken to properly clean the boards. ◆Soldering Temperature, time, amount of solder, etc. shall be set in accordance with their recommended conditions. Sn-Zn solder paste can adversely affect MLCC reliability. Please contact us prior to usage of Sn-Zn solder.									
Technical considerations	◆Selection of Flux 1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate flux, or highly acidic flux is used, it may lead to corrosion of terminal electrodes or degradation of insulation resistance on the surfaces of the capacitors. 1-2. Flux is used to increase solderability in wave soldering. However if too much flux is applied, a large amount of flux gas may be emitted and may adversely affect the solderability. To minimize the amount of flux applied, it is recommended to use a flux-bubbling system. 1-3. Since the residue of water-soluble flux is easily dissolved in moisture in the air, the residues on the surfaces of capacitors in high humidity conditions may cause a degradation of insulation resistance and reliability of the capacitors. Therefore, the cleaning methods and the capability of the machines used shall also be considered carefully when water-soluble flux is used.									

◆Soldering

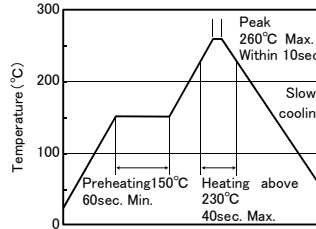
- Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling.
- Therefore, the soldering must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock.
- Preheating : Capacitors shall be preheated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

[Reflow soldering]

【Recommended conditions for eutectic soldering】

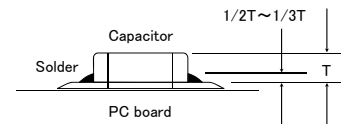


【Recommended condition for Pb-free soldering】



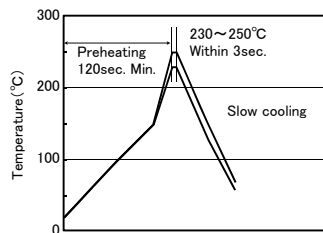
Caution

- 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.
- ③Allowable number of reflow soldering : 2 times max.

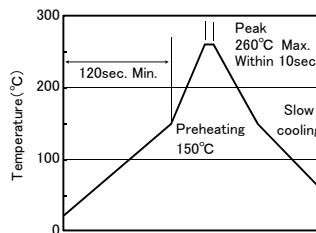


[Wave soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】

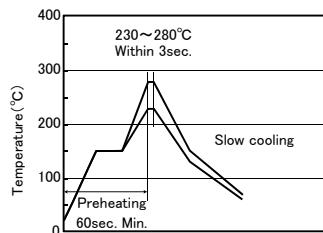


Caution

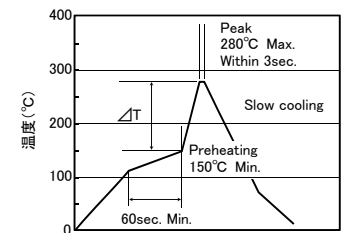
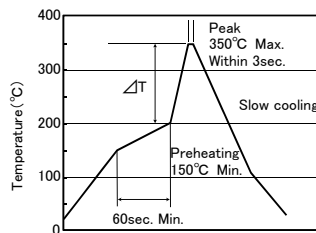
- ①Wave soldering must not be applied to capacitors designated as for reflow soldering only.
- ②Allowable number of wave soldering : 1 times max.

[Hand soldering]

【Recommended conditions for eutectic soldering】



【Recommended condition for Pb-free soldering】



	ΔT
316type or less	$\Delta T \leq 150^{\circ}\text{C}$

	ΔT
325type or more	$\Delta T \leq 130^{\circ}\text{C}$

Caution

- ①Use a 50W soldering iron with a maximum tip diameter of 1.0 mm.
- ②The soldering iron shall not directly touch capacitors.
- ③Allowable number of hand soldering : 1 times max.

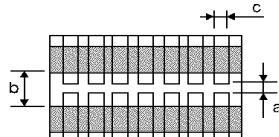
5. Cleaning	
Precautions	◆Cleaning conditions - When PCBs are cleaned after capacitors mounting, please select the appropriate cleaning solution in accordance with the intended use of the cleaning. (e.g. to remove soldering flux or other materials from the production process.) - Cleaning condition shall be determined after it is verified by using actual cleaning machine that the cleaning process does not affect capacitor's characteristics.
Technical considerations	- 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/l or less Ultrasonic frequency : 40 kHz or less Ultrasonic washing period : 5 min. or less
6. Resin coating and mold	
Precautions	- 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. - 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 - 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. - 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 - 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°C Humidity : Below 70% RH The ambient temperature must be kept below 40°C. 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. - 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°C for 1 hour.
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.	

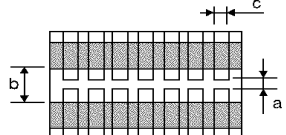
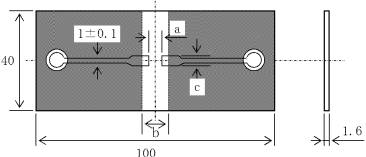
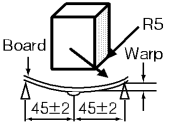
High Reliability Application Multilayer Ceramic Capacitors

■ RELIABILITY DATA

1. Operating Temperature Range	
Specified Value	X7R(−55°C to +125°C)
Test Methods and Remarks	Continuous use is available in this range. (reference temperature : 25°C)
2. Highest Operating temperature Range	
Specified Value	X7R(−55°C to +125°C)
Test Methods and Remarks	Maximum operating temperature at which capacitors can be continuously used with rated voltage applied.
3. Rated Voltage	
Specified Value	Please refer to the page of the "PART NUMBERS".
Test Methods and Remarks	Continuous maximum applied voltage. If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages should be lower than the rated voltage of the capacitor.
4. Shape and Dimensions	
Specified Value	Please refer to the page of the "EXTERNAL DIMENSIONS".
5. Heat Treatment (Class II)	
Test Methods and Remarks	Initial value shall be measured after test sample is heat-treated at 150+0/−10°C for an hour and kept at room temperature for 24 ± 2 hours.
6. Voltage Treatment (Class II)	
Test Methods and Remarks	Initial value shall be measured after test sample is voltage-treated for an hour at temperature and voltage which are specified as test conditions, and kept at room temperature for 24 ± 2 hours.
7. Dielectric Withstanding Voltage (between terminals)	
Specified Value	No abnormality.
Test Methods and Remarks	Applied voltage : Rated voltage × 2.5 Duration : 1 to 5 seconds. Charging and discharging current shall be 50mA max.
8. Insulation Resistance	
Specified Value	Larger than whichever smaller of 500 MΩ · μF or 10 ⁴ MΩ
Test Methods and Remarks	Applied voltage : Rated voltage Duration : 60±5 seconds. Charging and discharging current shall be 50mA max.
9. Capacitance and Tolerance	
Specified Value	Please refer to the page of the "PART NUMBERS".
Test Methods and Remarks	Measurement frequency : 1kHz±10% (C≤10 μF) Measurement voltage : 1±0.2Vrms (C≤10 μF) 0.5±0.1V (6.3V rated voltage)
10. Q or Dissipation factor (tan δ)	
Specified Value	Please refer to the page of the "PART NUMBERS".
Test Methods and Remarks	Measurement frequency : 1kHz±10% (C≤10 μF) Measurement voltage : 1±0.2Vrms (C≤10 μF) 0.5±0.1V (6.3V rated voltage)

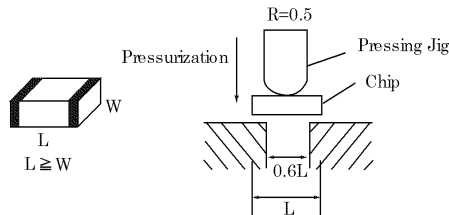
▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

11. Temperature Characteristic (without DC bias)					
Specified Value	X7R(−55℃ to +125℃) : ±15%				
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to measurement. Change of the maximum capacitance deviation in step 1 to 5.				
	step	Temperature(℃)			
	1	+25			
	2	Minimum operating temperature			
	3	+25			
	4	Maximum operating temperature			
	5	+25			
12. Adhesive Force of Terminal Electrodes					
Specified Value	Appearance: Terminal electrodes shall be no exfoliation or a sign of exfoliation.				
Test Methods and Remarks		1608 size	larger than 2012 size		
	Applying force	5N	10N		
	Duration	30±5 seconds.			
	Board	Glass epoxy-resin substrate			
	Thickness	1.6mm			
	Solder lands refer to fig.1.				
					
	Fig.1				
		Dimension	Case size		
			1608	2012	3216
	a	1.0	1.2	2.2	2.2
	b	3.0	4.0	5.0	5.0
	c	1.2	1.65	2.0	2.9
13. Vibration					
Specified Value	Appearance	: No abnormality			
	Capacitance change	: Initial value shall be satisfied.			
	Dissipation factor	: Initial value shall be satisfied.			
	Insulation resistance	: Initial value shall be satisfied.			
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is heat treated as specified in No.5.				
	Solder lands refer to figure 1.				
	Direction of the vibration test	: X, Y, Z each of 3 orientations for 2 hours respectively (total 6 hours)			
	Vibration frequency	: 10 to 55 to 10Hz (1 minutes each)			
	Total amplitude	: 1.5 mm			
	Measurement after the test shall be made after test sample is kept at room temperature for 24 ±2 hours.				
14. Resistance to Soldering Heat					
Specified Value	Appearance	: No abnormality			
	Capacitance change	: ≤ ±7.5%			
	Dissipation factor	: Initial value shall be satisfied.			
	Insulation resistance	: Initial value shall be satisfied.			
	Dielectric withstanding voltage	(between terminals) : No abnormality			
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to test.				
	Immerse test sample in an solder solution (Sn-3Ag-0.5Cu).				
	Soldering temperature	: 270℃±5℃			
	Duration	: 3±0.5 seconds			
	Soaking position	: Test sample is soaked until the terminal electrode is covered in solder solution.			
	Preheating condition	: 3216 size or smaller size: 120 to 150℃ for 1 minute, 3225 size: 100 to 120℃ for 1 minute, 170 to 200℃ for 1 minute.			
	Measurement after the test shall be made after test sample is kept at room temperature for 24 ±2 hours.				
15. Solderability					
Specified Value	More than 95% of terminal electrode shall be covered with fresh solder.				
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to test.				
	Immerse test sample in an solder solution(Sn-3Ag-0.5Cu).				
	Soldering temperature	: 245℃±3℃			
	Duration	: 4±1 seconds			
	Dipping position	: Test sample is immersed until the terminal electrode is covered in solder solution.			

16. Thermal shock																									
Specified Value	Appearance : No abnormality Capacitance change : $\leq \pm 7.5\%$ Dissipation factor : Initial value shall be satisfied. Insulation resistance : Initial value shall be satisfied. Dielectric withstanding voltage (between terminals) : No abnormality																								
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is heat treated as specified in No.5. condition of the one cycle (Air—Air)																								
	<table><tr><th>Step</th><th>Temperature(°C)</th><th>Time(min.)</th><th>Transfer time</th></tr><tr><td>1</td><td>Minimum usage temperature</td><td>15</td><td>within 20 seconds</td></tr><tr><td>2</td><td>Maximum usage temperature</td><td>15</td><td>within 20 seconds</td></tr></table>	Step	Temperature(°C)	Time(min.)	Transfer time	1	Minimum usage temperature	15	within 20 seconds	2	Maximum usage temperature	15	within 20 seconds												
	Step	Temperature(°C)	Time(min.)	Transfer time																					
1	Minimum usage temperature	15	within 20 seconds																						
2	Maximum usage temperature	15	within 20 seconds																						
Test cycles: 100 times. Measurement after the test shall be made after test sample is kept at room temperature for 24 ± 2 hours.																									
	<table><tr><th rowspan="2">Dimension</th><th colspan="4">Case size</th></tr><tr><th>1608</th><th>2012</th><th>3216</th><th>3225</th></tr><tr><td>a</td><td>0.6</td><td>0.8</td><td>2.0</td><td>2.0</td></tr><tr><td>b</td><td>2.2</td><td>3.0</td><td>4.4</td><td>4.4</td></tr><tr><td>c</td><td>0.9</td><td>1.3</td><td>1.7</td><td>2.6</td></tr></table> Fig.2	Dimension	Case size				1608	2012	3216	3225	a	0.6	0.8	2.0	2.0	b	2.2	3.0	4.4	4.4	c	0.9	1.3	1.7	2.6
Dimension	Case size																								
	1608	2012	3216	3225																					
a	0.6	0.8	2.0	2.0																					
b	2.2	3.0	4.4	4.4																					
c	0.9	1.3	1.7	2.6																					
17. Humidity Loading																									
Specified Value Note1	Appearance : No abnormality Capacitance change : $\leq \pm 12.5\%$ Dissipation factor : 5.0%max. Insulation resistance : Larger than whichever smaller of $25M\Omega \cdot \mu F$ or $500M\Omega$																								
Test Methods and Remarks	Test condition : $85^{\circ}C/85\%RH$. Duration : $1000 + 48/-0$ hours. DC bias : Applied rated voltage. Voltage treatment specified in No.6 of the specification shall be conducted prior to test. Measurement after the test shall be made after test sample is kept at room temperature for 24 ± 2 hours.																								
18. High Temperature Loading																									
Specified Value Note1	Appearance : No abnormality Capacitance change : $\leq \pm 12.5\%$ Dissipation factor : 5.0%max. Insulation resistance : Larger than whichever smaller of $50M\Omega \cdot \mu F$ or $1000M\Omega$																								
Test Methods and Remarks	Voltage treatment specified in No.6 of the specification shall be conducted prior to test. Test sample shall be put in thermostatic oven with maximum temperature. Applied voltage : Rated voltage x 2 Duration : $1000 + 48/-0$ hours. Charging and discharging current shall be 50mA or less. Measurement after the test shall be made after test sample is kept at room temperature for 24 ± 2 hours.																								
19. Resistance to Flexure of substrate																									
Specified Value	Appearance : No abnormality Capacitance change : $\leq \pm 12.5\%$ Dissipation factor : 5.0%max. Insulation resistance : Initial value shall be satisfied.																								
Test Methods and Remarks	Warp : 1mm Testing board : Glass epoxy - resin substrate Thickness : 1.6mm Test board and solder lands : Refer to fig. 3.																								
	<table><tr><th rowspan="2">Dimension</th><th colspan="4">Case size</th></tr><tr><th>1608</th><th>2012</th><th>3216</th><th>3225</th></tr><tr><td>a</td><td>0.6</td><td>0.8</td><td>2.0</td><td>2.0</td></tr><tr><td>b</td><td>2.2</td><td>3.0</td><td>4.4</td><td>4.4</td></tr><tr><td>c</td><td>0.9</td><td>1.3</td><td>1.7</td><td>2.6</td></tr></table> Fig.3	Dimension	Case size				1608	2012	3216	3225	a	0.6	0.8	2.0	2.0	b	2.2	3.0	4.4	4.4	c	0.9	1.3	1.7	2.6
	Dimension		Case size																						
1608		2012	3216	3225																					
a	0.6	0.8	2.0	2.0																					
b	2.2	3.0	4.4	4.4																					
c	0.9	1.3	1.7	2.6																					
	 Fig.4 Capacitance measurement shall be conducted with the board bent. (fig.4)																								

20. High Temperature Exposure		
Specified Value Note1	Appearance : No abnormality Capacitance change : $\leq \pm 12.5\%$ Dissipation factor : 5.0%max. Insulation resistance : Larger than whichever smaller of $500\text{M}\Omega \cdot \mu\text{F}$ or $10000\text{M}\Omega$	
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to test. Test sample shall be put in thermostatic oven with maximum temperature. Duration : 1000 +48/—0 hours. Initial value shall be measured after test sample is heat—treated specified No.5. Measurement after the test shall be made after test sample is kept at room temperature for 24 ± 2 hours.	

21. Temperature Cycling		
Specified Value Note1	Appearance : No abnormality Capacitance change : $\leq \pm 7.5\%$ Dissipation factor : Initial value shall be satisfied Insulation resistance : Initial value shall be satisfied	
Test Methods and Remarks	Heat treatment specified in No.5 of the specification shall be conducted prior to test. Measurement shall be conducted after test sample is heat treated as specified in No.5. condition of the one cycle	
	Step	Temperature(°C)
	1	Minimum usage temperature
	2	+25
	3	Maximum usage temperature
	4	+25
	Time(min.)	
		30 ± 3
		2 to 3
		30 ± 3
		2 to 3
	Test cycles:200 times Solder lands refer to fig. 2. Measurement after the test shall be made after test sample is kept at room temperature for 24 ± 2 hours.	

22. Body strength	
Specified Value	No mechanical damage
Test Methods and Remarks	Applying force : 5N Applying time : 10 seconds 

Note 1 The figures indicate typical specifications. Please refer to individual specifications in detail.

Note 1 The figures indicate typical specifications. Please refer to individual specifications in detail.

Precautions on the use of High Reliability Application Multilayer Ceramic Capacitors

■ PRECAUTIONS

1. Circuit Design

- Precautions**
- ◆ Verification of operating environment, electrical rating and performance
 1. A malfunction in medical equipment, spacecraft, nuclear reactors, etc. may cause serious harm to human life or have severe social ramifications.
As such, any capacitors to be used in such equipment may require higher safety and/or reliability considerations and should be clearly differentiated from components used in general purpose applications.
 - ◆ Operating Voltage (Verification of Rated voltage)
 1. The operating voltage for capacitors must always be lower than their rated values.
If an AC voltage is loaded on a DC voltage, the sum of the two peak voltages should be lower than the rated value of the capacitor chosen. For a circuit where both an AC and a pulse voltage may be present, the sum of their peak voltages should also be lower than the capacitor's rated voltage.
 2. Even if the applied voltage is lower than the rated value, the reliability of capacitors might be reduced if either a high frequency AC voltage or a pulse voltage having rapid rise time is present in the circuit.

2. PCB Design

- Precautions**
- ◆ Pattern configurations (Design of Land-patterns)
 1. When capacitors are mounted on a PCB, the amount of solder used (size of fillet) can directly affect capacitor performance. Therefore, the following items must be carefully considered in the design of solder land patterns:
 - (1) The amount of solder applied can affect the ability of chips to withstand mechanical stresses which may lead to breaking or cracking. Therefore, when designing land-patterns it is necessary to consider the appropriate size and configuration of the solder pads which in turn determines the amount of solder necessary to form the fillets.
 - (2) When more than one part is jointly soldered onto the same land or pad, the pad must be designed so that each component's soldering point is separated by solder-resist.
 - ◆ Pattern configurations (Capacitor layout on panelized [breakaway] PC boards)
 1. After capacitors have been mounted on the boards, chips can be subjected to mechanical stresses in subsequent manufacturing processes (PCB cutting, board inspection, mounting of additional parts, assembly into the chassis, wave soldering the reflow soldered boards etc.) For this reason, planning pattern configurations and the position of SMD capacitors should be carefully performed to minimize stress.

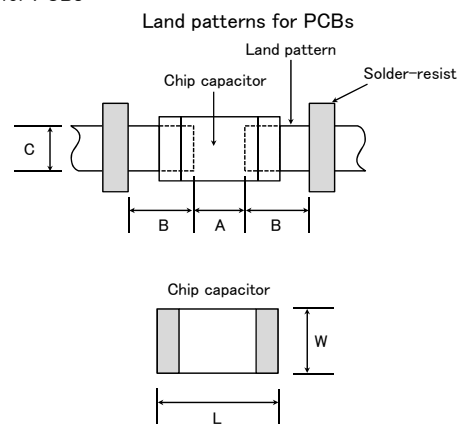
Technical considerations

- ◆ Pattern configurations (Design of Land-patterns)
 1. The following diagrams and tables show some examples of recommended patterns to prevent excessive solder amounts. (larger fillets which extend above the component end terminations) Examples of improper pattern designs are also shown.

(1) Recommended land dimensions for a typical chip capacitor land patterns for PCBs

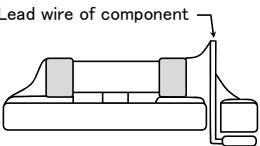
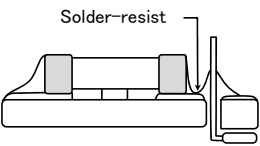
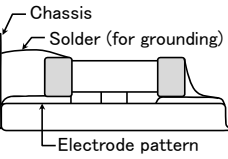
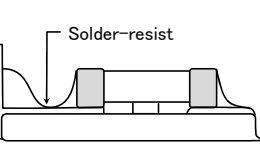
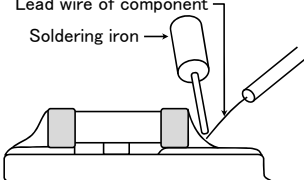
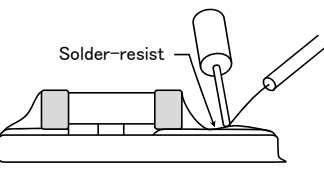
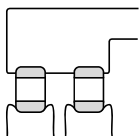
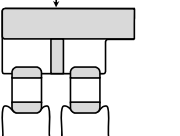
Recommended land dimensions for reflow-soldering (unit: mm)

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		0.8~1.0	0.8~1.2	1.8~2.5	1.8~2.5
B		0.6~0.8	0.8~1.2	1.0~1.5	1.0~1.5
C		0.6~0.8	0.9~1.6	1.2~2.0	1.8~3.2



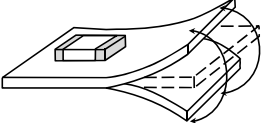
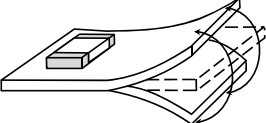
Excess solder can affect the ability of chips to withstand mechanical stresses. Therefore, please take proper precautions when designing land-patterns.

(2) Examples of good and bad solder application

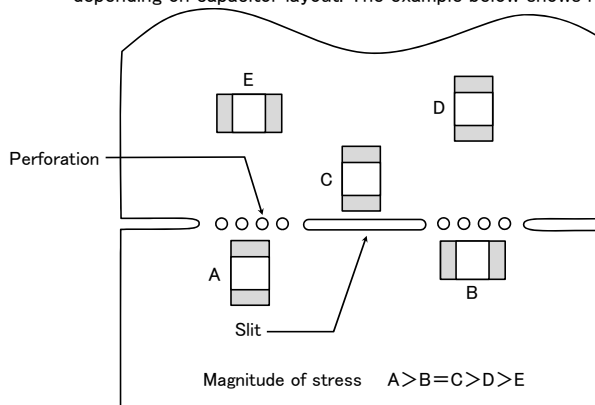
Items	Not recommended	Recommended
Mixed mounting of SMD and leaded components		
Component placement close to the chassis		
Hand-soldering of leaded components near mounted components		
Horizontal component placement		

◆Pattern configurations (Capacitor layout on panelized [breakaway] PC boards)

1-1. The following is examples of good and bad capacitor layout; SMD capacitors should 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. To layout the capacitors for the breakaway PC board, it should be noted that the amount of mechanical stresses given will vary depending on capacitor layout. The example below shows recommendations for better design.



1-3. When breaking PC boards along their perforations, 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, any ideal SMD capacitor layout must also consider the PCB splitting procedure.

Precautions	◆ Selection of Flux 1. 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 should be with less than or equal to 0.1 wt% (equivalent to chlorine) of halogenated content. Flux having strong acidity content should not be applied. (2) When soldering capacitors on the board, the amount of flux applied should be controlled at the optimum level. (3) When using water-soluble flux, special care should be taken to properly clean the boards. ◆ Soldering 1. Temperature, time, amount of solder, etc. are specified in accordance with the following recommended conditions. Sn-Zn solder paste can affect MLCC reliability performance. Please contact us prior to usage.
Technical considerations	◆ Selection of Flux 1-1. When too much halogenated substance (Chlorine, etc.) content is used to activate the flux, or highly acidic flux is used, an excessive amount of residue after soldering may lead to corrosion of the terminal electrodes or degradation of insulation resistance on the surface of the capacitors. 1-2. Flux is used to increase solderability in flow soldering, but if too much is applied, a large amount of flux gas may be emitted and may detrimentally affect 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 by water content in the air, the residue on the surface of capacitors in high humidity conditions may cause a degradation of insulation resistance and therefore affect the reliability of the components. The cleaning methods and the capability of the machines used should also be considered carefully when selecting water-soluble flux. ◆ Soldering 1-1. Preheating when soldering Heating: Ceramic chip components should be preheated to within 100 to 130°C of the soldering. Cooling: The temperature difference between the components and cleaning process should not be greater than 100°C. Ceramic chip capacitors are susceptible to thermal shock when exposed to rapid or concentrated heating or rapid cooling. Therefore, the soldering process must be conducted with great care so as to prevent malfunction of the components due to excessive thermal shock. 【Recommended conditions for soldering】 [Reflow soldering] Temperature profile 【Recommended conditions for Pd Free soldering】 ※Ceramic chip components should be preheated to within 100 to 130°C of the soldering. ※Assured to be reflow soldering for 2 times. Caution ①The ideal condition is to have solder mass (fillet) controlled to 1/2 to 1/3 of the thickness of the capacitor, as shown below: ②Because excessive dwell times can detrimentally affect solderability, soldering duration should be kept as close to recommended times as possible.