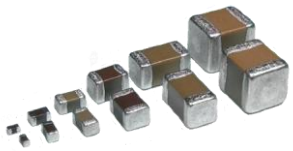
Multilayer Ceramic Chip Capacitors
How to Order

■Features

- Kyocera's series of Multilayer Ceramic Chip Capacitors are designed to meet a wide variety of needs. We offer a complete range of products for both general and specialized applications.
- We have a network worldwide in order to supply our global customer bases quickly and efficiently.
- All our products are highly reliable due to their monolithic structure of high-purity and superfine uniform ceramics and their integral internal electrodes.
- Our stringent quality control in every phase of production from material procurement to shipping ensures consistent manufacturing and superior quality.
- Kyocera components are available in a wide choice of dimensions, temperature characteristics, rated voltages, and terminations to meet specific configurational requirements.



e.g.)

KGM	03	C	R5	0J	225	M	H	□□□□
①	②	③	④	⑤	⑥	⑦	⑧	Option Code (When needed)

*Note: "I" (capital i) and "O" (capital o) are omitted from part numbers to avoid confusion with numbers "1" and "0".

① Series : KGM Series(General)
② Size (EIA) : 0201
③ Thickness (max.) : 0.39mm
④ Dielectric :Operating Temperature Range: -55 to 85℃/ ΔC max.: ±15%/ Standard Temperature: 25℃
⑤ RatedVoltage : 6.3Vdc
⑥ Capacitance : 2.2μF
⑦ Tolerance : ±20%
⑧ Packaging : Taping Material Paper/ Taping Width 8mm/ Cavity Pitch 2mm/ Reel Size ϕ180

① Series Code

Code	Type
KGM	General
KGT	Low Profile
KGU	High-Q
KAM	Automotive
KGN	Three Terminal Capacitors

② Size Code

Code	EIA	JIS
02	01005	0402
03	0201	0603
05	0402	1005
15	0603	1608
21	0805	2012
31	1206	3216
32	1210	3225

③ Thickness (max.)

Thickness Code	Code	EIA	Thickness (mm max.)
A	02	01005	0.22
	03	0201	0.33
	05	0402	0.55
	15	0603	0.9
	21	0805	1.45
	31	1206	1.8
	32	1210	2.7
B	03	0201	0.35
	05	0402	0.65
C	03	0201	0.39
	05	0402	0.7
	15	0603	1.0
D	03	0201	0.55
	05	0402	0.8
F	31	1206	1.75
H	31	1206	1.9
K	21	0805	1.4
X	05	0402	0.22
Y	03	0201	0.22
	05	0402	0.33
Z	05	0402	0.5

④ Dielectric Code

Temperature-Compensating type			
Code	Temperature Range(℃)	ppm/℃	
CG	-55 to 125	0	±30
CH			±60

・All parts of C0G will be marked as "CG" but will conform to the above table.
・Temperature coefficients are determined by calculation based on measurement at 20℃ and 85℃.

High Dielectric Constant Type			
Code	Temperature Range(℃)	ΔC (%)	Reference Temp.℃
R5	-55 to 85	±15	25
S6	-55 to 105	±22	
T6		+22/ -33	
R7	-55 to 125	±15	
K7*		±15	
S7		±22	
T7		+22/ -33	

*Special spec: Change in capacitance under 50% of rated voltage applied.

Measurement conditions for temperature characteristics K7.

Applied voltage and Temperature step

Step	C	Applying Voltage	Temperature℃
1	C0	No bias	Reference Temp.
2	—	50% of Rated voltage	Reference Temp.
3	C1		Min. Operating Temp.
4	C2		Reference Temp.
5	C1		Max. Operating Temp.

ΔC/C(%)=(C1-C2)/C0 × 100

C0:Capacitance value at step 1
C1:Capacitance value from step 3 to 5
C2:Capacitance value at step 4

⑤ Voltage Code

Code	Rated Voltage
0E	2.5 Vdc
0G	4 Vdc
0J	6.3 Vdc
1A	10 Vdc
1C	16 Vdc
1E	25 Vdc
1V	35 Vdc
1H	50 Vdc
2A	100 Vdc

*Products of identical size and capacitance may sometimes be substituted with a higher rated voltage type.

⑥ Capacitance Code (Example)

Code	Capacitance
R50	0.5 pF
1R0	1 pF
100	10 pF
101	100 pF
102	1 nF
103	10 nF
104	0.1 μF
105	1 μF
106	10 μF
107	100 μF

Capacitance expressed in pF.
Two significant digits plus number of zeros.
Example:
102 = 10 (significant digits) followed by 2 zeros = 1,000 pF = 1 nF.

For Values < 10pF,
Letter R denotes decimal point,
Example:
1R0 = 1.0 pF.

⑦ Tolerance Code

Code	Tolerance
A	±0.05 pF
B	±0.1 pF
C	±0.25 pF
D	±0.5 pF
G	±2 %
J	±5 %
K	±10 %
M	±20 %

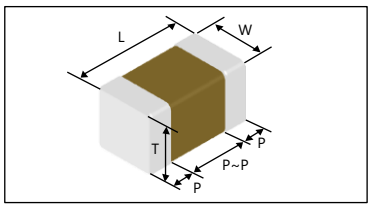
⑧ Packaging Code

Code	Size Code	Pitch	Width	Material	Reel size
T	15 to 31	4mm	8mm	Paper	ϕ180
H	02 to 05	2mm			
Q	03	1mm			
U	21 to 32	4mm	8mm	Plastic	
P	02	1mm	4mm		
M	15 / 21	4mm	8mm	Paper	ϕ330
N	02 to 05	2mm			
W	03	1mm			
L	21 to 32	4mm	8mm	Plastic	

CATM2601YS29130E
As of Dec. 2025

Multilayer Ceramic Chip Capacitors
Dimension

■Two Terminal Capacitors (KGM/KGT/KGU/KAM Series)



■Packaging Code

20kp （E 8 / 2）

kp means 1000pieces

Taping Material	
Code	Material
E	Plastic
P	Paper

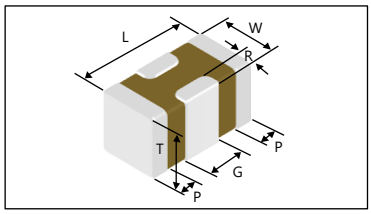
Taping Width	
Code	Width
4	4mm
8	8mm

Pitch	
Code	Pitch
1	1mm
2	2mm
4	4mm

Size	Code		Thickness Code	Dimension (mm)						Quantity per reel	
	EIA	JIS		L	W	T	P min.	P max.	P ～ P min.	ϕ180 Reel	ϕ330 Reel
02	01005	0402	A	0.4 ±0.02	0.2 ±0.02	0.2 ±0.02	0.07	0.14	0.13	40kp (E4/1)	-
										20kp (P8/2)	80kp (P8/2)
03	0201	0603	Y	0.6 ±0.03	0.3 ±0.03	0.22 max.	0.1	0.2	0.2	30kp (P8/1)	150kp (P8/1)
			A			0.3 ±0.03				15kp (P8/2)	50kp (P8/2)
			B	0.6 ±0.05	0.3 ±0.05	0.3 ±0.05	0.13	0.23	0.19		
			Y*	0.6 ±0.09	0.3 ±0.09	0.22 max.	0.13	0.23	0.19	15kp (P8/2)	50kp (P8/2)
			C			0.3 ±0.09					
			D	0.6 ±0.09	0.3 ±0.09	0.5 ±0.05	0.13	0.23	0.19	10kp (P8/2)	-
			D*				0.1	0.25	0.19		
05	0402	1005	Y	1.0 ±0.05	0.5 ±0.05	0.33 max.	0.15	0.35	0.3	10kp (P8/2)	50kp (P8/2)
			A			0.5 ±0.05					
			X	1.0 ±0.1	0.5 ±0.05	0.22 max.	0.15	0.35	0.3	10kp (P8/2)	50kp (P8/2)
			B	1.0 ±0.15	0.5 ±0.15	0.5 ±0.15				10kp (P8/2)	40kp (P8/2)
			Y*	1.0 ±0.2	0.5 ±0.2	0.33 max.	0.15	0.35	0.3	10kp (P8/2)	-
			Z			0.5 max.					50kp (P8/2)
			A*			0.55 max.					50kp (P8/2)
			C	1.0 ±0.2	0.5 ±0.2	0.5 ±0.2	0.15	0.35	0.3	10kp (P8/2)	40kp (P8/2)
			D			0.8 max.					30kp (P8/2)
15	0603	1608	A	1.6 ±0.1	0.8 ±0.1	0.8 ±0.1	0.2	0.6	0.5	4kp (P8/4)	10kp (P8/4)
			C	1.6 ±0.2	0.8 ±0.2	0.8 ±0.2					
21	0805	2012	K	2.0 ±0.15	1.25 ±0.15	1.25 ±0.15	0.2	0.75	0.7	3kp (E8/4)	10kp (E8/4)
			A	2.0 ±0.2	1.25 ±0.2	1.25 ±0.2					
31	1206	3216	F	3.2 ±0.2	1.6 ±0.15	1.6 ±0.15	0.3	0.85	1.4	2.5kp (E8/4)	5kp (E8/4)
			A		1.6 ±0.2	1.6 ±0.2					
			H	3.2 ±0.3	1.6 ±0.3	1.6 ±0.3	0.3	0.85	1.9	2kp (E8/4)	-
32	1210	3225	A	3.2 ±0.3	2.5 ±0.2	2.5 ±0.2	0.3	1.0	1.4	1kp (E8/4)	4kp (E8/4)

·If there is a "*" in the thickness code indicates the same thickness (T-dimension) but different L/W or P-dimension.

■Three Terminal Capacitors (KGN Series)



Size	Code		Thickness Code	Dimension (mm)						Quantity per reel	
	EIA	JIS		L	W	T	G	P	R	ϕ180 Reel	ϕ330 Reel
05	0402	1005	Z	1.0 ±0.1	0.5 ±0.2	0.5 max.	0.3±0.1	0.15±0.1	≧0.05	10kp (P8/2)	-
			B	1.0 ±0.15	0.5 ±0.15	0.5 ±0.15					
			C	1.0 ±0.2	0.5 ±0.2	0.5 ±0.2					

■tanδ Code

tanδ Code	tanδ max.
3	5 %
5	7.5 %
7	10 %
8	12.5 %
9	15 %
10	20 %

Multilayer Ceramic Chip Capacitors

Low Profile **KGT Series**

RoHS

KYOCERA AVX

■Features

This low profile series is ideal where height clearance is limited.

■Applications

Circuits requiring a compact, low-profile design, such as module and memory cards.

Class2 : High Dielectric Constant type

X5R (EIA) [R5]

● Capacitance chart ■ Standard Spec.1 ■ Standard Spec .2

X5R (EIA) [R5]								
EIA Size (Series Code)	Voltage [Vdc] (Code)	Capacitance (Code)						
		0.1μF (104)	0.22μF (224)	0.47μF (474)	1μF (105)	2.2μF (225)	4.7μF (475)	10μF (106)
0201 (KGT03)	6.3 (0J)	Y8			Y*7			
0402 (KGT05)	6.3 (0J)				Y8	Y8	Y*9	Z9

·If there is a "*" in the thickness code indicates the same thickness (T-dimension) but different L/W or P-dimension.

Class2 : High Dielectric Constant type

X6S (EIA) [S6]

● Capacitance chart ■ Standard Spec .2

X6S (EIA) [S6]								
EIA Size (Series Code)	Voltage [Vdc] (Code)	Capacitance (Code)						
		0.1μF (104)	0.22μF (224)	0.47μF (474)	1μF (105)	2.2μF (225)	4.7μF (475)	10μF (106)
0201 (KGT03)	4 (0G)	Y8						

Class2 : High Dielectric Constant type

X6T (EIA) [T6]

● Capacitance chart ■ Standard Spec .2

X6T (EIA) [T6]								
EIA Size (Series Code)	Voltage [Vdc] (Code)	Capacitance (Code)						
		0.1μF (104)	0.22μF (224)	0.47μF (474)	1μF (105)	2.2μF (225)	4.7μF (475)	10μF (106)
0201 (KGT03)	4 (0G)				Y*8			
0402 (KGT05)	4 (0G)				X8			
	2.5 (0E)							Z8

·If there is a "*" in the thickness code indicates the same thickness (T-dimension) but different L/W or P-dimension.

The code in the Capacitance chart represents product thickness (T-dimension) and tan delta.
For details, please refer to the "Part number list".
High Dielectric Constant type : R5 Dielectric : [KGT series Class2 : High Dielectric Constant type X5R(EIA) [R5]]
S6 Dielectric : [KGT series Class2 : High Dielectric Constant type X6S(EIA) [S6]]
T6 Dielectric : [KGT series Class2 : High Dielectric Constant type X6T(EIA) [T6]]

(Example) In case of "Y8" for KGT03;T: 0.22max., tanδ: 12.5% max.

For test items , specifications , and measurement conditions , please refer to "Test Conditions and Standards".
High Dielectric Constant type : Standard Spec.1 : [High Dielectric Constant type(Class2) KGM/KGT Series (Standard Spec.1)]
Standard Spec.2 : [High Dielectric Constant type(Class2) KGM/KGT Series (Standard Spec.2)]

Please contact for capacitance value other than standard.

Multilayer Ceramic Chip Capacitors

Low Profile **KGT Series** RoHS

KYOCERA AVX

Class2 : High Dielectric Constant type

X5R (EIA) [R5]

Part number list

Thin KGT03 to 05 Series Temperature Characteristic: R5 Tolerance □: K: ±10%/ M: ±20%

■ Standard Spec.1 ■ Standard Spec .2

EIA Size (Series Code)	Voltage [Vdc]	Capacitance	Tolerance Code :□	Part Number	Thickness /tanδ Code	Dimension[mm]						tanδ max. [%]	Load Life	Packaging Code (QTY):#	
						L	W	T	P min.	P max.	P ～ P min.			ϕ180 Reel	ϕ330 Reel
0201 (KGT03)	6.3	0.1 μF	K/M	KGT03YR50J104□#	**Y8**	0.6±0.03	0.3±0.03	0.22max.	0.1	0.2	0.2	12.5	×1.3	H(15kp) / Q(30kp)	N(50kp) / W(150kp)
		1 μF	K/M	KGT03YR50J105□#	**Y*7**	0.6±0.09	0.3±0.09	0.22max.	0.13	0.23	0.19	10	×1.0	H(15kp)	N(50kp)
0402 (KGT05)	6.3	1 μF	K/M	KGT05YR50J105□#	**Y8**	1.0±0.05	0.5±0.05	0.33max.	0.15	0.35	0.3	12.5	×1.0	H(10kp)	N(50kp)
		2.2 μF	M	KGT05YR50J225M#											
		4.7 μF	M	KGT05YR50J475MH	**Y*9**	1.0±0.2	0.5±0.2	0.33max.	0.15	0.35	0.3	15	×1.0	H(10kp)	−(−)
		10 μF	M	KGT05ZR50J106M#	**Z9**	1.0±0.2	0.5±0.2	0.5max.	0.15	0.35	0.3	15	×1.0	H(10kp)	N(50kp)

・If there is a "*" in the thickness code indicates the same thickness (T-dimension) but different L/W or P-dimension.

Class2 : High Dielectric Constant type

X6S (EIA) [S6]

Part number list

Thin KGT03 Series Temperature Characteristic: S6 Tolerance □: K: ± 10%/ M: ±20%

■ Standard Spec .2

EIA Size (Series Code)	Voltage [Vdc]	Capacitance	Tolerance Code :□	Part Number	Thickness /tanδ Code	Dimension[mm]						tanδ max. [%]	Load Life	Packaging Code (QTY):#	
						L	W	T	P min.	P max.	P ～ P min.			ϕ180 Reel	ϕ330 Reel
0201 (KGT03)	4	0.1 μF	K/M	KGT03YS60G104□#	**Y8**	0.6±0.03	0.3±0.03	0.22max.	0.1	0.2	0.2	12.5	×1.0	H(15kp) / Q(30kp)	N(50kp) / W(150kp)

Class2 : High Dielectric Constant type

X6T (EIA) [T6]

Part number list

Thin KGT03 to 05 Series Temperature Characteristic: T6 Tolerance : M: ±20%

■ Standard Spec .2

EIA Size (Series Code)	Voltage [Vdc]	Capacitance	Tolerance Code	Part Number	Thickness /tanδ Code	Dimension[mm]						tanδ max. [%]	Load Life	Packaging Code (QTY):#	
						L	W	T	P min.	P max.	P ～ P min.			ϕ180 Reel	ϕ330 Reel
0201 (KGT03)	4	1 μF	M	KGT03YT60G105M#	**Y*8**	0.6±0.09	0.3±0.09	0.22max.	0.13	0.23	0.19	12.5	×1.0	H(15kp)	N(50kp)
0402 (KGT05)	4	1 μF	M	KGT05XT60G105M#	**X8**	1.0±0.1	0.5±0.05	0.22max.	0.15	0.35	0.3	12.5	×1.0	H(10kp)	N(50kp)
	2.5	10 μF	M	KGT05ZT60E106M#	**Z8**	1.0±0.2	0.5±0.2	0.5max.	0.15	0.35	0.3	12.5	×1.5		

・If there is a "*" in the thickness code indicates the same thickness (T-dimension) but different L/W or P-dimension.

For test items , specifications , and measurement conditions , please refer to “Test Conditions and Standards”.
High Dielectric Constant type : Standard Spec.1 : [High Dielectric Constant type(Class2) KGM/KGT Series (Standard Spec.1)]
Standard Spec.2 : [High Dielectric Constant type(Class2) KGM/KGT Series (Standard Spec.2)]

Load Life: Applied voltage in the load life test, expressed as a multiple of the rated voltage.

Please contact for capacitance value other than standard.

Multilayer Ceramic Chip Capacitors
Test Conditions and Standards

Specifications and Test Conditions for High Dielectric Constant type (Class2)
KGM/KGT Series (■Standard Spec.1)　X5R [R5] / X7R [R7] / X7S [S7]

<table>
<tr><th colspan="2">Test Items</th><th>Specifications</th><th>Test Conditions (Complies with JIS C5101/ IEC60384)</th></tr>
<tr><td colspan="2">Capacitance</td><td>Within tolerance</td><td rowspan="2">Measure after heat treatment
<table><tr><th>Capacitance</th><th>Measuring Frequency</th><th>Measuring Voltage</th></tr><tr><td rowspan="2">C≦10μF</td><td rowspan="2">1kHz ±10%</td><td>1.0±0.2Vrms</td></tr><tr><td>*0.5±0.1Vrms</td></tr><tr><td>C＞10μF</td><td>120Hz ±10%</td><td>0.5±0.1Vrms</td></tr></table>*KGM02AR50J104
The charge and discharge current of the capacitor must not exceed 50mA.</td></tr>
<tr><td colspan="2">tanδ</td><td>Refer to part number list</td></tr>
<tr><td colspan="2">Insulation Resistance</td><td>Over 10000MΩ or 500MΩ・μF, whichever is less</td><td>Measure after applying rated voltage for 1 minute in normal temperature and humidity.
The charge and discharge current of the capacitor must not exceed 50mA.</td></tr>
<tr><td colspan="2">Dielectric Strength</td><td>Resist without problem</td><td>Apply *2.5 times of the rated voltage for 1 to 5 seconds.
*KGM31AR52A225, KGM31AS72A225 : twice of the rated voltage for 1 to 5 seconds.
The charge and discharge current of the capacitor must not exceed 50mA.</td></tr>
<tr><td colspan="2">Appearance</td><td>No problem observed</td><td>Microscope</td></tr>
<tr><td colspan="2">Termination Strength</td><td>No problem observed</td><td>Apply a sideward force of 5N to a PCB-mounted sample.
note : 2N for 0201 size, and 1N for 01005 size.
Exclude KGT series.</td></tr>
<tr><td colspan="2">Bending Strength</td><td>No significant damage with 1mm bending</td><td>Glass epoxy PCB (90mm fulcrum spacing), 10 seconds duration time.
Exclude KGT series.</td></tr>
<tr><td rowspan="3">Vibration</td><td>Appearance</td><td>No problem observed</td><td rowspan="3">Take the initial value after heat treatment. Vibration frequency: 10 to 55 (Hz)
Amplitude: 1.5mm
Sweeping condition: 10→55→10Hz/ 1 minute in X, Y and Z directions: 2 hours each, 6 hours in total, then measure the sample after heat treatment.</td></tr>
<tr><td>Capacitance</td><td>Within tolerance</td></tr>
<tr><td>tanδ</td><td>Within tolerance</td></tr>
<tr><td rowspan="5">Resistance to Solder Heat</td><td>Appearance</td><td>No problem observed</td><td rowspan="5">Take the initial value after heat treatment.
Soak the sample in 260±5°C solder for 10±0.5 seconds, and measure after heat treatment.
(Pre-heating conditions before soak)
<table><tr><th>Order</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>80 to 100°C</td><td>2 minutes</td></tr><tr><td>2</td><td>150 to 200°C</td><td>2 minutes</td></tr></table>The charge and discharge current of the capacitor must not exceed 50mA for IR and dielectric strength measurement.</td></tr>
<tr><td>Capacitance Variation</td><td>Within±7.5%</td></tr>
<tr><td>tanδ</td><td>Within tolerance</td></tr>
<tr><td>Insulation Resistance</td><td>Over 10000MΩ or 500MΩ・μF, whichever is less</td></tr>
<tr><td>Dielectric Strength</td><td>Resist without problem</td></tr>
<tr><td colspan="2">Solderability</td><td>Solder coverage : 95% min.</td><td>Soaking condition
<table><tr><th>Solder Type</th><th>Temperature</th><th>Time</th></tr><tr><td>Sn-3.0Ag-0.5Cu</td><td>245±5°C</td><td>3±0.5 sec.</td></tr></table></td></tr>
</table>

Multilayer Ceramic Chip Capacitors
Test Conditions and Standards

Specifications and Test Conditions for High Dielectric Constant type (Class2)
KGM/KGT Series (■Standard Spec.1)　X5R [R5] / X7R [R7] / X7S [S7]

Test Items		Specifications	Test Conditions (Complies with JIS C5101/ IEC60384)
Temperature Cycle	Appearance	No problem observed	Take the initial value after heat treatment. (Cycle) Lowest operation temperature (30 min.)→ Room temperature (3 min.)→ Highest operation temperature (30 min.)→ Room temperature (3 min.) After 5 cycles, measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR and dielectric strength measurement.
	Capacitance Variation	Within±7.5%	
	tanδ	Within tolerance	
	Insulation Resistance	Over 10000MΩ or 500MΩ・μF, whichever is less	
	Dielectric Strength	Resist without problem	
Load Humidity	Appearance	No problem observed	Take the initial value after heat treatment. Apply rated voltage for 500+12/ -0 hours in 40±2°C and 90 to 95%RH, and measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.
	Capacitance Variation	Within±12.5%	
	tanδ	200% max. of initial value	
	Insulation Resistance	Over 500MΩ or 25MΩ・μF, whichever is less	
Load Life	Appearance	No problem observed	Take the initial value after heat treatment. Apply *1.5 times the rated voltage at the highest operation temperature for 1000+12/ −0 hours, and measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement. *Products listed below shall apply each indicated voltage.
	Capacitance Variation	Within±12.5%	
	tanδ	200% max. of initial value	
	Insulation Resistance	Over 1000MΩ or 50MΩ・μF, whichever is less	
Heat treatment		Expose sample in the temperature of 150+0/ −10°C for 1 hour and leave the sample in normal temperature and humidity for 24±2 hours.	

Voltage to be applied in the Load Life (Applied voltage is the multiple of the rated voltage)

Applied Voltage	Series	Dielectric	Rated Voltage	Products
×1.0	KGM02	R5	10 Vdc	KGM02AR51A104
	KGM21	R7	16 Vdc	KGM21AR71C106
	KGM31	R5	100 Vdc	KGM31AR52A225
		S7	100 Vdc	KGM31AS72A225
×1.3	KGM02	R5	6.3 Vdc	KGM02AR50J153-104
	KGT03	R5	6.3 Vdc	KGT03YR50J104

Multilayer Ceramic Chip Capacitors
Test Conditions and Standards

Specifications and Test Conditions for High Dielectric Constant type (Class2)
KGM/KGT Series (Standard Spec.2)　X5R [R5] / X6S [S6] / X6T [T6] / X7R [R7,K7] / X7S [S7] / X7T [T7]

<table>
<tr><th colspan="2">Test Items</th><th>Specifications</th><th>Test Conditions (Complies with JIS C5101/ IEC60384)</th></tr>
<tr><td colspan="2">Capacitance</td><td>Within tolerance</td><td>Measure after heat treatment
<table><tr><th>Capacitance</th><th>Measuring Frequency</th><th>Measuring Voltage</th></tr><tr><td rowspan="2">C≤10μF</td><td rowspan="2">1kHz ±10%</td><td>1.0±0.2Vrms</td></tr><tr><td>*0.5±0.1Vrms</td></tr><tr><td>C＞10μF</td><td>120Hz ±10%</td><td>0.5±0.1Vrms</td></tr></table></td></tr>
<tr><td colspan="2">tanδ</td><td>Refer to part number list</td><td>The table below lists the applicable product numbers for measurement voltages marked with an asterisk (*).
The charge and discharge current of the capacitor must not exceed 50mA.</td></tr>
<tr><td colspan="2">Insulation Resistance</td><td>Over 50MΩ・μF</td><td>Measure after applying rated voltage for 1 minute in normal temperature and humidity.
The charge and discharge current of the capacitor must not exceed 50mA.</td></tr>
<tr><td colspan="2">Dielectric Strength</td><td>Resist without problem</td><td>Apply *2.5 times of the rated voltage for 1 to 5 seconds.
*KGM21AS72A105, KGM31HS72A475
KGM31AK72A225, KGM31HK72A475 : twice of the rated voltage for 1 to 5 seconds.
The charge and discharge current of the capacitor must not exceed 50mA.</td></tr>
<tr><td colspan="2">Appearance</td><td>No problem observed</td><td>Microscope</td></tr>
<tr><td colspan="2">Termination Strength</td><td>No problem observed</td><td>Apply a sideward force of 5N to a PCB-mounted sample.
note : 2N for 0201 size, and 1N for 01005 size.
Exclude KGT series.</td></tr>
<tr><td colspan="2">Bending Strength</td><td>No significant damage with 1mm bending</td><td>Glass epoxy PCB (90mm fulcrum spacing), 10 seconds duration time.
Exclude KGT series.</td></tr>
<tr><td rowspan="3">Vibration</td><td>Appearance</td><td>No problem observed</td><td rowspan="3">Take the initial value after heat treatment.
Vibration frequency: 10 to 55 (Hz) Amplitude: 1.5mm
Sweeping condition: 10→55→10Hz/ 1 minute in X, Y and Z directions: 2 hours each, 6 hours in total, then measure the sample after heat treatment.</td></tr>
<tr><td>Capacitance</td><td>Within tolerance</td></tr>
<tr><td>tanδ</td><td>Within tolerance</td></tr>
<tr><td rowspan="5">Resistance to Solder Heat</td><td>Appearance</td><td>No problem observed</td><td rowspan="5">Take the initial value after heat treatment.
Soak the sample in 260±5°C solder for 10±0.5 seconds and measure after heat treatment.
(Pre-heating conditions before soak)
<table><tr><th>Order</th><th>Temperature</th><th>Time</th></tr><tr><td>1</td><td>80 to 100°C</td><td>2 minutes</td></tr><tr><td>2</td><td>150 to 200°C</td><td>2 minutes</td></tr></table>The charge and discharge current of the capacitor must not exceed 50mA for IR and dielectric strength measurement.</td></tr>
<tr><td>Capacitance Variation</td><td>Within±7.5%</td></tr>
<tr><td>tanδ</td><td>Within tolerance</td></tr>
<tr><td>Insulation Resistance</td><td>Over 50MΩ・μF</td></tr>
<tr><td>Dielectric Strength</td><td>Resist without problem</td></tr>
<tr><td colspan="2">Solderability</td><td>Solder coverage : 95% min.</td><td>Soaking condition
<table><tr><th>Solder Type</th><th>Temperature</th><th>Time</th></tr><tr><td>Sn-3.0Ag-0.5Cu</td><td>245±5°C</td><td>3±0.5 sec.</td></tr></table></td></tr>
</table>

Applicable Product Numbers for Measurement Voltage 0.5±0.1Vrms

Series	Dielectric	Rated Voltage	Products
KGM02	R5	6.3 Vdc	KGM02AR50J474
KGM03	R5	6.3 Vdc	KGM03CR50J225, KGM03BR50J225, KGM03DR50J475
		4 Vdc	KGM03CR50G475, KGM03DR50G106
	S6	2.5 Vdc	KGM03DS60E475
	T6	4 Vdc	KGM03CT60G225
		2.5 Vdc	KGM03BT60E105, KGM03CT60E225
	S7	6.3 Vdc	KGM03AS70J104□#AX00
KGM05	R5	6.3 Vdc	KGM05CR50J106
	S6	6.3 Vdc	KGM05CS60J106
	R7	6.3 Vdc	KGM05AR70J474
KGT03	R5	6.3 Vdc	KGT03YR50J105
	T6	4 Vdc	KGT03YT60G105
KGT05	R5	6.3 Vdc	KGT05ZR50J106, KGT05YR50J475
	T6	4 Vdc	KGT05XT60G105
		2.5 Vdc	KGT05ZT60E106

Multilayer Ceramic Chip Capacitors
Test Conditions and Standards

Specifications and Test Conditions for High Dielectric Constant type (Class2)
KGM/KGT Series (■ Standard Spec.2)　X5R [R5] / X6S [S6] / X6T [T6] / X7R [R7,K7] / X7S [S7] / X7T [T7]

Test Items		Specifications	Test Conditions (Complies with JIS C5101/ IEC60384)
Temperature Cycle	Appearance	No problem observed	Take the initial value after heat treatment. (Cycle) Lowest operation temperature (30 min.)→ Room temperature (3 min.)→ Highest operation temperature (30 min.)→ Room temperature (3 min.) After 5 cycles, measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR and dielectric strength measurement.
	Capacitance Variation	Within±7.5%	
	tanδ	Within tolerance	
	Insulation Resistance	Over 50MΩ・μF	
	Dielectric Strength	Resist without problem	
Load Humidity	Appearance	No problem observed	Take the initial value after heat treatment. Apply rated voltage for 500+12/ −0 hours in 40±2℃ and 90 to 95%RH, and measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement.
	Capacitance Variation	Within±12.5%	
	tanδ	200% max. of initial value	
	Insulation Resistance	Over 10MΩ・μF	
Load Life	Appearance	No problem observed	Take the initial value after heat treatment. Apply *One time the rated voltage at the highest operation temperature for 1000+12/ -0 hours, and measure after heat treatment. The charge and discharge current of the capacitor must not exceed 50mA for IR measurement. *Products listed below shall apply each indicated voltage.
	Capacitance Variation	Within±12.5%	
	tanδ	200% max. of initial value	
	Insulation Resistance	Over 10MΩ・μF	
Heat treatment		Expose sample in the temperature of 150+0/ −10℃ for 1 hour and leave the sample in normal temperature and humidity for 24±2 hours.	

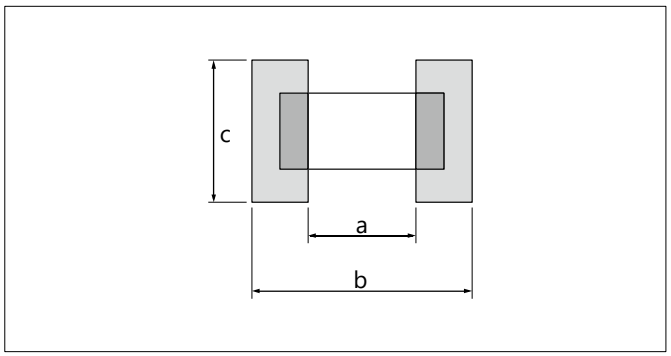
Voltage to be applied in the Load Life (Applied voltage is the multiple of the rated voltage)

Applied Voltage	Series	Dielectric	Rated Voltage	Products
×1.2	KGM03	R5	6.3 Vdc	KGM03BR50J105
×1.3	KGM03	R5	10 Vdc	KGM03AR51A223-224
			6.3 Vdc	KGM03AR50J474
×1.5	KGM03	R5	10 Vdc	KGM03CR51A105
		T6	2.5 Vdc	KGM03CT60E225
	KGM05	R5	16 Vdc	KGM05AR51C105
			10 Vdc	KGM05AR51A474-225, KGM05CR51A475
			6.3 Vdc	KGM05AR50J225
		S6	6.3 Vdc	KGM05CS60J475
		R7	6.3 Vdc	KGM05AR70J474, KGM05AR70J105
		S7	6.3 Vdc	KGM05AS70J105
	KGM15	R5	16 Vdc	KGM15CR51C106
		S6	10 Vdc	KGM15CS61A106
		R7	25 Vdc	KGM15AR71E105
		T7	10 Vdc	KGM15CT71A475
			6.3 Vdc	KGM15CT70J106
	KGM21	R5	10 Vdc	KGM21AR51A226
		S6	6.3 Vdc	KGM21AS60J226
		R7	25 Vdc	KGM21AR71E475
		T7	6.3 Vdc	KGM21AT70J226
	KGM31	R7	50 Vdc	KGM31AR71H475
			25 Vdc	KGM31AR71E106
	KGT05	T6	2.5 Vdc	KGT05ZT60E106
×2.0	KGM31	R7	25 Vdc	KGM31AR71E475

Multilayer Ceramic Chip Capacitors
Test Conditions and Standards

Substrate for Adhesion Strength Test, Vibration Test, Soldering Heat Resistance Test, Temperature Cycle Test, Load Humidity Test, High-Temperature with Loading Test.

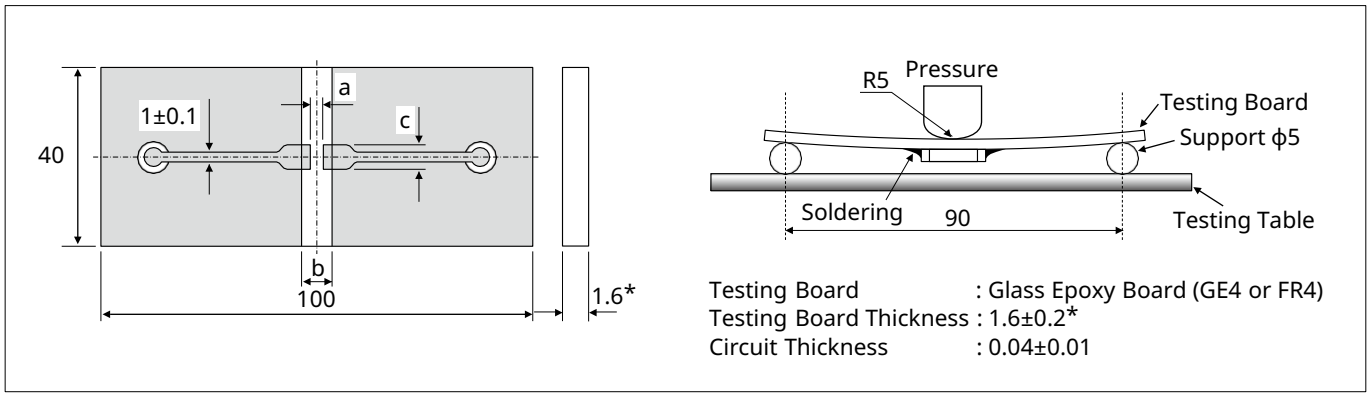
(Unit: mm)



EIA Size (Size Code)	a	b	c
01005 (02)	0.15	0.5	0.2
0201 (03)	0.26	0.92	0.32
0402 (05)	0.4	1.4	0.5
0603 (15)	1.0	3.0	1.2
0805 (21)	1.2	4.0	1.65
1206 (31)	2.2	5.0	2.0
1210 (32)	2.2	5.0	2.9

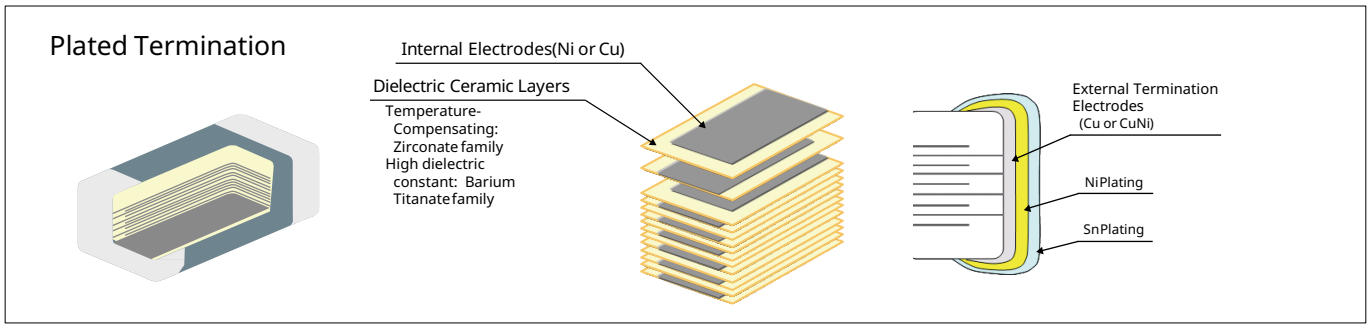
Substrate for Bending Test

(Unit: mm)



* 02, 03, 05 size 0.8±0.1mm

Structure



■ Certification status

<ISO>

Acquired ISO 9001 quality management system certification.

<IATF>

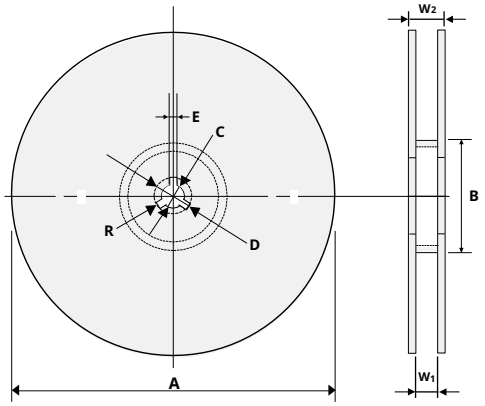
Acquired IATF 16949 quality management system certification.

■Production plant

Kagoshima Kokubu plant

Multilayer Ceramic Chip Capacitors
Packaging Options Tape and Reel

Reel



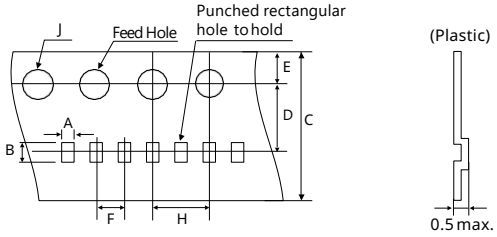
(Unit: mm)

Code / Reel	A	B	C	D
ϕ180 Reel (Code: T, H, Q, U)	180 +0 -2.0	ϕ60 min.	13 ±0.5	21±0.8
ϕ180 Reel (Code: P)	178 ±2.0			
ϕ330 Reel (Code: L, M, N, W)	330 ±2.0			
Code / Reel	**E**	**W_1**	**W_2**	**R**
ϕ180 Reel (Code: T, H, Q, U)	2.0 ±0.5	10.5 ±1.5	16.5 max.	1.0
ϕ180 Reel (Code: P)		4.35 ±0.3	6.95 ±1.0	
ϕ330 Reel (Code: L, M, N, W)		9.5 ±1.0	16.5 max.	

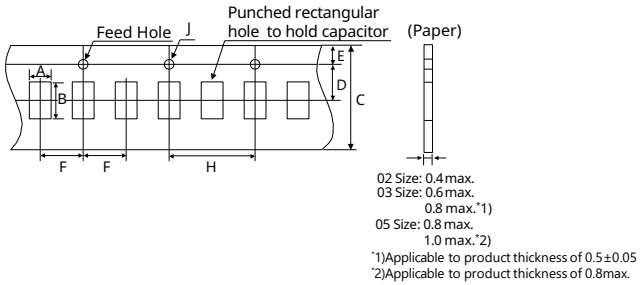
Carrier Tape

(Unit: mm)

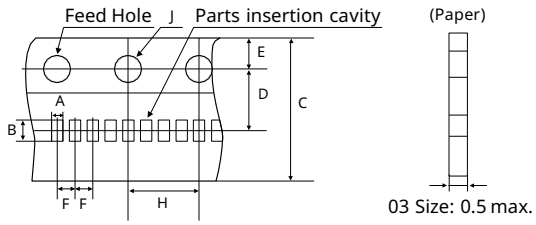
F = 1mm (02 Size)



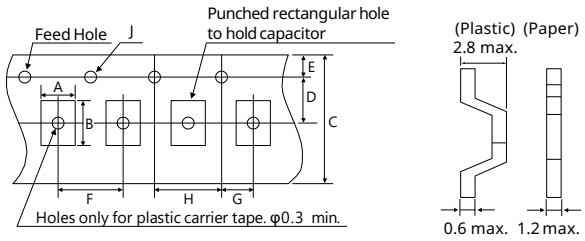
F = 2mm (02, 03, 05 Size)



F = 1mm (03 Size)



F = 4mm (15, 21, 31, 32 Size)

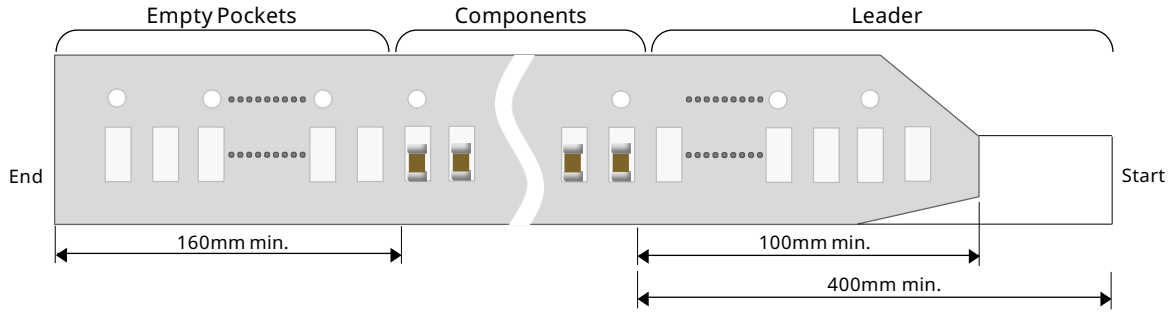


(Unit: mm)

EIA Size (Size Code)	A	B	C	D	E	F	G	H	J	Carrier Tape	
										Width	Material
01005 (02)*	0.24 ±0.02	0.44 ±0.02	4.0 ±0.08	1.8 ±0.02	0.9 ±0.05	1.0 ±0.02	-	2.0 ±0.04	0.8±0.04	4	Plastic
	0.25 ±0.03	0.45 ±0.03	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05		4.0 ±0.1	1.5+0.1/-0	8	Paper
0201 (03)*	0.37 ±0.03	0.67 ±0.03	8.0+0.3/-0.1	3.5 ±0.05	1.75 ±0.1	1.0 ±0.05	-	4.0 ±0.05	1.5+0.1/-0	8	Paper
			8.0 ±0.3			2.0 ±0.05		4.0 ±0.1			
	0.39 ±0.03	0.69 ±0.03	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05	-	4.0 ±0.1	1.5+0.1/-0		
	0.42 ±0.03	0.72 ±0.03									
	0.44 ±0.05	0.74 ±0.05									
0402 (05)*	0.65 ±0.1	1.15 ±0.1	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	2.0 ±0.05	-	4.0 ±0.1	1.5+0.1/-0	8	Paper
	0.75 ±0.1										
	0.8 ±0.1	1.3 ±0.1									
0603 (15)*	1.0 ±0.2	1.8 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	1.5+0.1/-0	8	Paper
	1.1 ±0.2	1.9 ±0.2									
0805 (21)	1.5 ±0.2	2.3 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	1.5+0.1/-0	8	Paper
											Plastic
1206 (31)	2.0 ±0.2	3.6 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	1.5+0.1/-0	8	Paper
											Plastic
1210 (32)	2.9 ±0.2	3.6 ±0.2	8.0 ±0.3	3.5 ±0.05	1.75 ±0.1	4.0 ±0.1	2.0 ±0.05	4.0 ±0.1	1.5+0.1/-0	8	Plastic

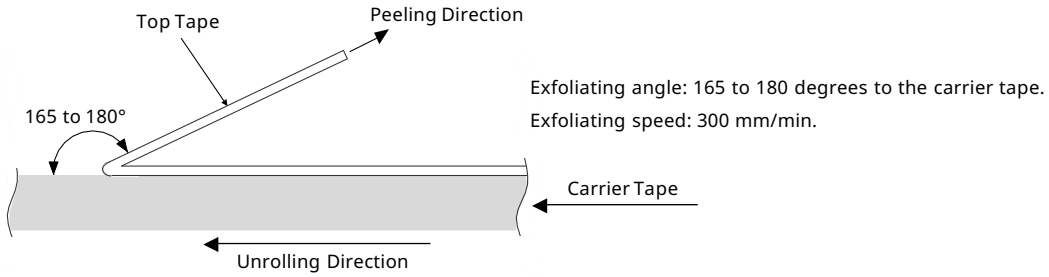
* Option

Detail of leader and trailer



Adhesive tape

1) The exfoliative strength when peeling off the top tape from the carrier tape by the method of the following figure shall be *0.1 to 0.7N. *02 Size: 0.1 to 0.5N
2) When the top tape is peeled off, the adhesive stays on the top tape.
3) Chip capacitors will be in a state free without being stuck on the thermal adhesive tape.



Exfoliating angle: 165 to 180 degrees to the carrier tape.
Exfoliating speed: 300 mm/min.

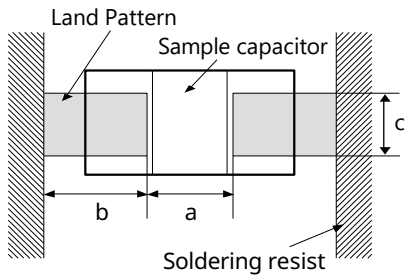
Carrier tape

1) Chip will not fall off from carrier tape or carrier tape will not be damaged by bending than within a radius of 25mm.
2) The chip are inserted continuously without any empty pocket.
3) Chip will not be mis-mounted because of too big clearance between components and cavity. Also the waste of carrier tape will not fill a nozzle hole of mounting machine.

Dimensions for recommended typical land

Since the amount of solder (size of fillet) to be used has direct influence on the capacitor after mounting, the sufficient consideration is necessary.
When the amounts of solder is too much, the stress that a capacitor receives becomes larger. It may become the cause of a crack in the capacitor. When the land design of printed wiring board is considered, it is necessary to set up the form and size of land pattern so that the amount of solder is suitable.

(Two Terminal Capacitors)



Two Terminal Capacitors

(Unit: mm)

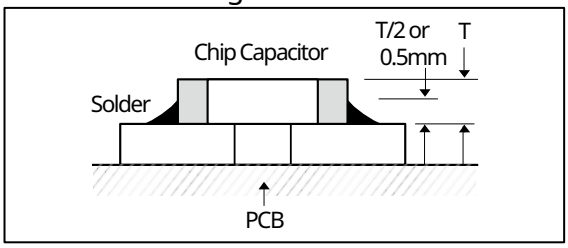
EIA Size (Size Code)	Dimension		Recommended land dimensions		
	L	W	a	b	c
01005 (02)	0.4 ±0.02	0.2 ±0.02	0.13 to 0.2	0.12 to 0.18	0.2 to 0.23
0201 (03)	0.6 ±0.03	0.3 ±0.03	0.2 to 0.25	0.25 to 0.35	0.3 to 0.4
	0.6 ±0.05	0.3 ±0.05			
	0.6 ±0.09	0.3 ±0.09	0.23 to 0.3	0.25 to 0.35	0.3 to 0.45
0402 (05)	1.0 ±0.05	0.5 ±0.05	0.3 to 0.5	0.35 to 0.45	0.4 to 0.6
	1.0 ±0.15	0.5 ±0.15	0.4 to 0.6	0.4 to 0.5	0.5 to 0.75
	1.0 ±0.2	0.5 ±0.2			
0603 (15)	1.6 ±0.1	0.8 ±0.1	0.7 to 1.0	0.8 to 1.0	0.6 to 0.9
	1.6 ±0.2	0.8 ±0.2	0.8 to 1.0	0.8 to 1.0	0.8 to 1.1
0805 (21)	2.0 ±0.2	1.25 ±0.2	1.0 to 1.3	1.0 to 1.2	1.25 to 1.55
1206 (31)	3.2 ±0.2	1.6 ±0.15	2.1 to 2.5	1.1 to 1.3	1.4 to 1.9
	3.2 ±0.2	1.6 ±0.2	2.1 to 2.5	1.1 to 1.3	1.6 to 2.0
	3.2 ±0.3	1.6 ±0.3			
1210 (32)	3.2 ±0.3	2.5 ±0.2	2.1 to 2.5	1.1 to 1.3	1.9 to 2.8

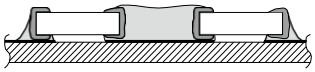
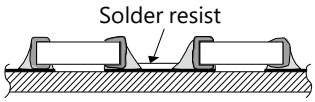
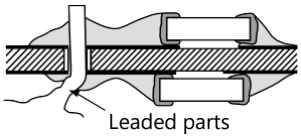
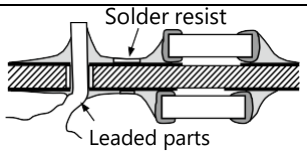
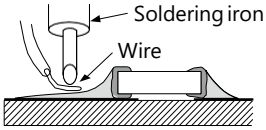
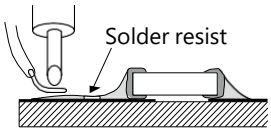
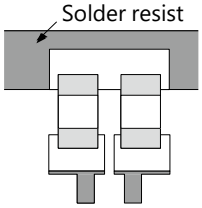
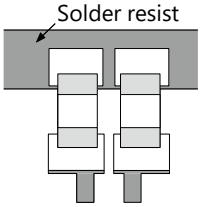
* Recommended land dimensions may differ depending on dimensional tolerance.

Design of printed circuit and Soldering

The recommended fillet height shall be 1/2 of the thickness of capacitors or 0.5mm. When mounting two or more capacitors in the common land, it is necessary to separate the land with the solder resist strike so that it may become the exclusive land of each capacitor.

Ideal Solder Height

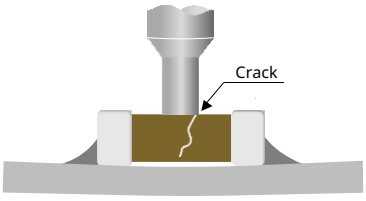
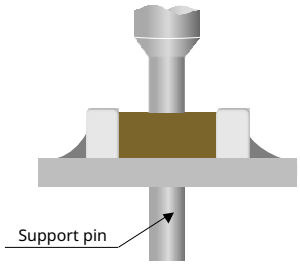


Item	Prohibited	Recommended example : Separation by solder resist
Multiple parts mount		
Mount with leaded parts		
Wire soldering after mounting		
Side by side layout		

Multilayer Ceramic Chip Capacitors
Surface Mounting Information

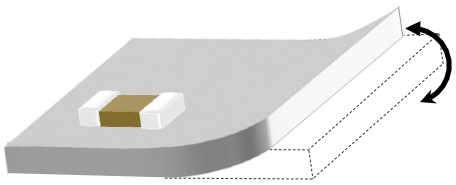
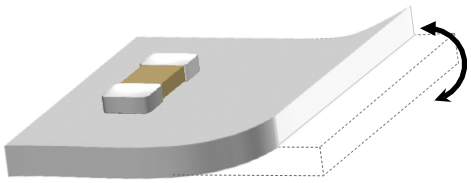
Actual Mounting

1) If the position of the vacuum nozzle is too low, a large force may be applied to the chip capacitor during mounting, resulting in cracking.
2) During mounting, set the nozzle pressure to a static load of 1 to 3 N.
3)To minimize the shock of the vacuum nozzle, provide a support pin on the back of the PCB to minimize PCB flexure.
4) Bottom position of pick up nozzle should be adjusted to the top surface of a substrate which camber is corrected.

Not recommended	Ideal
	

Mounting Design

After soldering capacitors to the PCB, bending of the board during subsequent processes — such as board cutting, breaking, inspection, component mounting, chassis assembly, or flow soldering of the reverse side after reflow — or during handling, may cause chip cracking. To prevent damage, position the capacitors to minimize stress from PCB flexure.

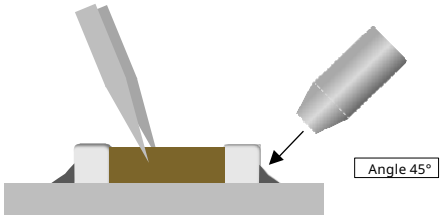
Not recommended	Ideal
	

Soldering Method

1) Ceramic is easily damaged by rapid heating or cooling. If some heat shock is unavoidable, preheat enough to limit the temperature difference (Delta T) to within 150 degree Celsius.
2) The product size 1.6×0.8mm to 3.2×1.6mm can be used in reflow and wave soldering, and the product size of bigger than 3.2×1.6mm, or smaller than 1.6×0.8mm can be used in reflow.
   Circuit shortage and smoking can be created by using capacitors which are used neglecting the above caution.
3) Please see our recommended soldering conditions.
4) In case of using Sn-Zn Solder, please contact us in advance.
5) The following condition is recommended for spot heater application.

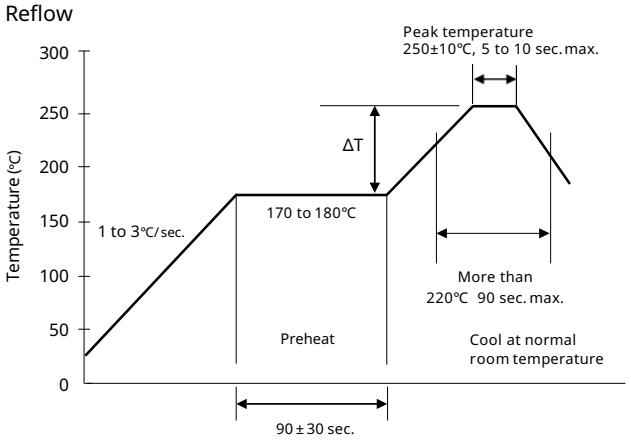
Recommended spot heater condition

Item	Condition
Distance	5mm min.
Angle	45°
Projection Temp.	400°C max.
Flow rate	Set at the minimum
Nozzle diameter	2ϕ to 4ϕ
Application time	10 sec. max. (1206 and smaller) 30 sec. max. (1210 and larger)

How to point spot heater


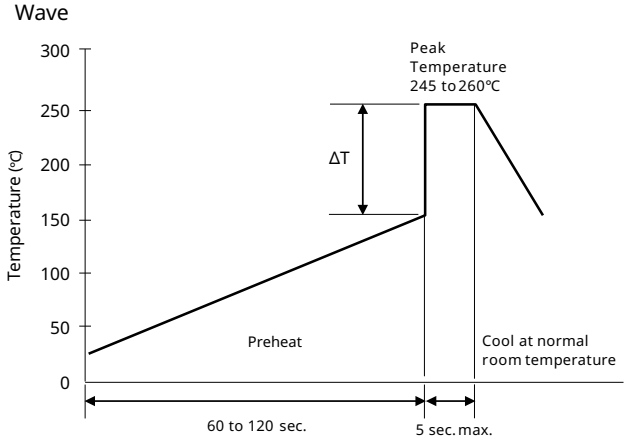
Recommended Temperature Profile (Sn-3.0Ag-0.5Cu)

Reflow



① Minimize soldering time.
② Ensure that allowable temperature difference does not exceed 150℃.
③ Ensure that allowable temperature difference does not exceed 130℃ for 3.2×2.5mm size or larger.
④ MLCC can withstand the above reflow conditions up to 3 times.
⑤ N_2 atmosphere is recommended for reflow of products of 0.4mm×0.2mm size or smaller.

Wave



① Ensure that the chip capacitor is preheated adequately.
② Ensure that the temperature difference (ΔT) does not exceed 150℃.
③ Cool naturally after soldering.
④ Wave soldering is not applicable for chips with size of 3.2×2.5mm or larger of 1.0×0.5mm or smaller and capacitor arrays.

Precautions after board mounting

Excessive board warpage during the mounting of chip capacitors, or when breaking the board after mounting, may cause cracks or fractures in the capacitors. Please ensure that board warpage is kept to an absolute minimum.

Resin Mold

1) If a large amount of resin is used for molding the chip, cracks may occur due to contraction stress during curing. To avoid such cracks, use a low shrinkage resin.
2)The insulation resistance of the chip will degrade due to moisture absorption. Use a low moisture absorption resin.
3) Check carefully that the resin does not generate a decomposition gas or reaction gas during the curing process or during normal storage. Such gases may crack the chip capacitor or damage the device itself.
4) If used in an environment containing sulfur compounds, silver migration may occur, leading to insulation degradation.

Multilayer Ceramic Chip Capacitors Precautions

Circuit Design

1. Once application and assembly environments have been checked, the capacitor may be used in conformance with the rating and performance which are provided in both the catalog and the specifications. Use exceeding that which is specified may result in inferior performance or cause a short, open, smoking, or flaming to occur, etc.

2. Please consult the manufacturer in advance when the capacitor is used in devices such as: devices which deal with human life, i.e. medical devices; devices which are highly public orientated; and devices which demand a high standard of liability.
   Accident or malfunction of devices such as medical devices, space equipment and devices having to do with atomic power could generate grave consequence with respect to human lives or, possibly, a portion of the public. Capacitors used in these devices may require high reliability design different from that of general purpose capacitors.

3. Please use the capacitors in conformance with the operating temperature provided in both the catalog and the specifications.
   Be especially cautious not to exceed the maximum temperature. In the situation the maximum temperature set forth in both the catalog and specifications is exceeded, the capacitor's insulation resistance may deteriorate, power may suddenly surge and short-circuit may occur.
   The capacitor has a loss, and may self-heat due to equivalent series resistance when alternating electric current is passed therethrough. As this effect becomes especially pronounced in high frequency circuits, please exercise caution.
   When using the capacitor in a (self-heating) circuit, please make sure the surface of the capacitor remains under the maximum temperature for usage. Also, please make certain temperature rises remain below 20℃.

4. Please keep voltage under the rated voltage which is applied to the capacitor. Also, please make certain the peak voltage remains below the rated voltage when AC voltage is super-imposed to the DC voltage.
   In the situation where AC or pulse voltage is employed, ensure average peak voltage does not exceed the rated voltage.
   Exceeding the rated voltage provided in both catalog and specifications may lead to defective withstanding voltage or, in worst case situations, may cause the capacitor to smoke or flame.

5. When the capacitor is to be employed in a circuit in which there is continuous application of a high frequency voltage or a steep pulse voltage, even though it is within the rated voltage, please inquire to the manufacturer.
   In the situation the capacitor is to be employed using a high frequency AC voltage or a extremely fast rising pulse voltage, even though it is within the rated voltage, it is possible capacitor reliability will deteriorate.

6. It is a common phenomenon of high-dielectric products to have a deteriorated amount of static electricity due to the application of DC voltage.
   Due caution is necessary as the degree of deterioration varies depending on the quality of capacitor materials, capacity, as well as the load voltage at the time of operation.

7. Do not use the capacitor in an environment where it might easily exceed the respective provisions concerning shock and vibration specified in the catalog and specifications.
   In addition, it is a common piezo phenomenon of high dielectric products to have some voltage due to vibration or to have noise due to voltage change. Please contact sales in such case.

8. If the electrostatic capacity value of the delivered capacitor is within the specified tolerance, please consider this when designing the respective product in order that the assembled product function appropriately.

9. Please contact us upon using conductive adhesives.

Storage

Please note the following regarding the storage of delivered products.

1. Set the storage temperature to + 5 to + 40 °C and humidity to 20 ~ 70% RH. Other meteorological conditions are in accordance with classification 1 K2 of JIS C 60721 -3 -1.

2. Store in a place where corrosive gas (H_2S, SO_2, NO_2, Cl_2, etc.) does not exist in the atmosphere. Also, avoid exposure to salty moisture. In either case, this may cause oxidation corrosion of the terminal electrode, reducing solderability.

If you store the above delivered products according to the conditions listed above, it will satisfy the solderability standard for 6 months from the shipping date.

Safety application guideline and detailed information of electrical properties are also provided in kyocera web site;

URL: https://ele.kyocera.com/en/product/capacitor/

Multilayer Ceramic Chip Capacitors
Notes for Using the Catalog

1. Contents described herein are as of December 2025.
2. Contents in this catalog are subject to change without notice. It is recommended to confirm the latest information at the time of usage. We may not be able to accept requests based on old catalogs.
3. The products described in this catalog are intended for use in general electronic equipment (Information equipment, communication equipment, audio and video equipment, measurement equipment, home appliances, automotive equipment, etc.). If you plan to use the product in any equipment or system that requires special quality and reliability of those beyond catalog spec and whose failure or malfunction may directly threaten human life or cause physical harm (Safety equipment, aerospace, nuclear power control, medical equipment including life support equipment, etc.), please contact our company sales representative before using the product.
4. Even though we strive for improvements of quality and reliability of products, it is requested to design with enough safety margin in equipment or systems in order not to threaten human lives directly or damage human bodies or properties by an accidental result of products.
5. It is requested to design based on guaranteed specifications for such as maximum ratings, operating voltage and operating temperature. It is not the scope of our guarantee for unsatisfactory results due to misuse or inadequate usage of products in this catalog.
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