

AUTOMOTIVE MULTILAYER CERAMIC CHIP CAPACITORS

- GMG SERIES -

SCOPE

- Consists of conducting material and electrodes - to achieve chip-type SMT and small size, high density and high efficiency ceramic condensers are used.
- NPO, X7R, & X5R dielectrics provide product with high electrical precision, stability and reliability
- Assured quality performance in automotive applications

FEATURES

- Wide selection of sizes available
- High capacitance in given case size
- Lead free termination (pure Tin)
- Meets AEC-Q200 requirement

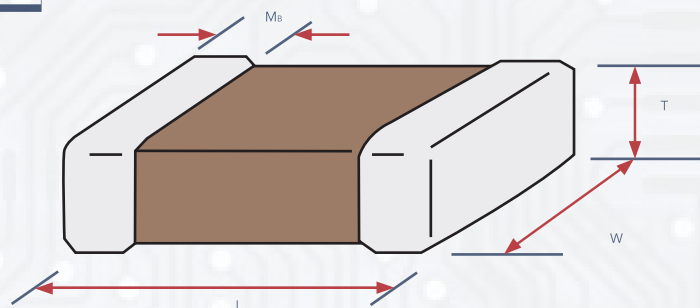
APPLICATIONS

- For navigation and information equipment
- For entertainment equipment
- For comfortable equipment

ORDERING INFORMATION

GMG	04	CG	102	J	50	NT	4
PRODUCT TYPE	SIZE	DIELECTRIC	CAPACITANCE	TOLERANCE	VOLTAGE	PACKAGING CODE	REEL SIZE
Without AEC-Q200 qualification	04 - 0402 10 - 0603 21 - 0805 31 - 1206 32 - 1210 43 - 1812	CG - NPO (COG) X7R - X7R	0R5 - 0.5pF 5R0 - 5pF 100 - 10pF 101 - 100pF 102 - 1000pF 103 - 0.01uF 104 - .1uF 105 - 1.0uF 106 - 10uF	B: ± 0.1pF C: ± 0.25pF D: ± 0.5pF F: ± 1% G: ± 2% J: ± 5% K: ± 10% M: ± 20%	6R3 - 6.3 VDC 10 - 10 VDC 16 - 16 VDC 25 - 25 VDC 50 - 50 VDC 100 - 100 VDC 200 - 200 VDC 250 - 250 VDC	NT: Tape Reel	1: 1K 2: 2K 3: 3K 4: 4K 5: 5K 6: 6K 9: 9K 10: 10K 15: 15K 50: 50K

CONSTRUCTION AND DIMENSIONS



SIZE INCH (MM)	L (MM)	W (MM)	T (MM)	REMARK	M0 (MM)
0402 (1005)	1.00±0.05	0.50±0.05	0.50±0.05	#	0.25±0.05/-0.10
0603 (1608)	1.60±0.10	0.80±0.10	0.80±0.07		0.40±0.15
	1.60±0.15/-0.10	0.80±0.15/-0.10	0.80±0.15/-0.10		
0805 (2012)	2.00±0.15	1.25±0.10	0.60±0.10		0.50±0.20
			0.80±0.10		
	2.00±0.20	1.25±0.20	1.25±0.10	#	
			1.25±0.20	#	
1206 (3216)	3.20±0.15	1.60±0.15	0.80±0.10		0.60±0.20
			0.95±0.10		
			1.15±0.15	#	
	3.20±0.20	1.60±0.20	1.25±0.10	#	
			1.60±0.20	#	
3.20±0.3/-0.1	1.60±0.3/-0.1	1.60±0.30/-0.10	#		
1210 (3225)	3.20±0.30	2.50±0.20	0.95±0.10	#	0.75±0.25
			1.25±0.10	#	
			1.60±0.20	#	
1812 (4532)	4.50±0.40	3.20±0.30	2.00±0.20	#	0.75±0.25
			2.50±0.30	#	
			1.60±0.20	#	

STANDARD ELECTRICAL DATA SPECIFICATIONS

DIELECTRIC	NPO	X7R	X5R
SIZE	0402, 0603, 0805, 1206, 1210, 1812		
CAPACITANCE RANGE*	0.5pF to 0.033uF	100pF to 2.2uF	0.05uF to 10uF
CAPACITANCE TOLERANCE**	Cap≤5pF: B (±0.1pF), C (±0.25pF) 5pF<Cap<10pF: C (±0.25pF), D (±0.5pF) Cap≥10pF: F (±1%), G (±2%), J (±5%)	J (±5%), K (±10%), M (±20%)	
RATED VOLTAGE (VWDC)	16V, 25V, 50V, 100V	10V, 16V, 25V, 50V, 100V, 200V, 250V	6.3V, 10V, 16V, 25V
TAN δ*	Cap<30pF: Q≥400+20C Cap≥30pF: Q≥1000	Note 1	
INSULATION RESISTANCE AT UR	≥10GΩ or RxC≥5000Ω - F whichever is less		
OPERATING TEMPERATURE	-55° to +125°C		
CAPACITANCE CHARACTERISTIC	±30ppm/°C		±15%
TERMINATION	Ni/Si (lead-free termination)		

RATED VOL	D.F. ≤	EXCEPTION OF D.F. ≤
≥50V	≤2.5%	≤3% 0603≥0.047uF; 0805≥0.18uF; 1206≥0.47uF
		≤5% 1210≥4.7uF
		≤10% 0603≥1uF; 0805≥1uF; 1206≥4.7uF; 1210≥10uF
35V	≤3.5%	≤10% 0805≥2uF; 1210≥10uF
		≤5% 0805≥1uF; 1210≥10uF
		≤7% 0603≥0.33uF; 1206≥4.7uF
25V	≤3.5%	≤10% 0402≥0.10uF; 0603≥0.47uF; 0805≥2.2uF; 1206≥6.8uF; 1210≥22uF
		≤5% 0402≥0.033uF; 0603≥0.15uF; 0805≥0.68uF; 1206≥2.2uF; 1210≥4.7uF
		≤10% 0402≥0.22uF; 0603≥0.68uF; 0805≥2.2uF; 1206≥4.7uF; 1210≥22uF
16V	≤3.5%	≤10% 0402≥0.33uF; 0603≥0.33uF; 0805≥2.2uF; 1206≥2.2uF; 1210≥22uF
		≤15% 0402≥1uF
		≤10% 0402≥1uF; 0603≥10uF; 0805≥4.7uF; 1206≥47uF; 1210≥100uF
6.3V	≤10%	≤20% 0402≥2.2uF

*Measured at the condition of 30-70% related humidity.
NPO: Apply 1.0±0.2Vrms, 1.0MHz±10% for Caps1000pF and 1.0±0.2Vrms, 1.0kHz±10% for Cap>1000pF, 25°C at ambient temperature
Measured at 1.0±0.2Vrms, 1.0kHz±10% for Cs10uF; 0.5±0.2Vrms, 120Hz±20% for C> 10uF, 30-70% related humidity, 25°C ambient temperature for X7R, X5R
** Preconditioning for Class II MLCC: Perform a heat treatment at 150±10°C for 1 hour, then leave in ambient condition for 24±2 hours before measurement.
Note 1: X7R, X5R

 NPO / COG

DIELECTRIC		NPO/COG																		
DIMENSION (MM)		GMG04 (0402)					GMG10 (0603)						GMG21 (0805)							
RATED VOLTAGE		10	16	25	50	100	10	16	25	50	100	200	250	10	16	25	50	100	200	250
CAP. RANGE																				
0.5pF	0R5	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
0.6	0R6	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
0.7	0R7	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
0.8	0R8	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
0.9	0R9	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
1	1R0	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
1.2	1R2	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
1.5	1R5	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
1.8	1R8	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
2.2	2R2	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
2.7	2R7	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
3.3	3R3	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
3.9	3R9	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
4.7	4R7	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
5.6	5R6	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
6.8	6R8	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
8.2	8R2	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
10	100	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
12	120	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
15	150	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
18	180	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
22	220	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
27	270	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
33	330	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
39	390	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
47	470	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
56	560	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
68	680	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
82	820	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	B
100	101	A	A	A	A	A	C	C	C	C	C	C	C	B	B	B	B	B	B	D
120	121	A	A	A	A	A	C	C	C	C	C			B	B	B	B	B	D	I
150	151	A	A	A	A	A	C	C	C	C	C			B	B	B	B	B	D	I
180	181	A	A	A	A	A	C	C	C	C	C			B	B	B	B	B	I	I
220	221	A	A	A	A	A	C	C	C	C	C			B	B	B	B	B	I	I
270	271	A	A	A	A	A	C	C	C	C	C			B	B	B	B	B	I	I
330	331						C	C	C	C	C			B	B	B	B	B	I	I
390	391						C	C	C	C	C			D	D	D	D	D	I	I
470	471						C	C	C	C	C			D	D	D	D	D	I	
560	561						C	C	C	C	C			D	D	D	D	D	I	
680	681						C	C	C	C	C			D	D	D	D	D	I	
820	821						C	C	C	C	C			D	D	D	D	D	I	
1000	102						C	C	C	C	C			D	D	D	D	D		
1200	122													D	D	D	D	D		
1500	152													D	D	D	D	D		
1800	182													D	D	D	D	D		
2200	222													D	D	D	D	D		
2700	272													I	I	I	I	I		
3300	332																			

MAX HEIGHT				
A	B	C	D	I
0.55	0.70	0.87	0.90	1.35



DIELECTRIC		NPO/COG																		
DIMENSION (MM)		GMG31 (1206)						GMG32 (1210)						GMG43 (1812)						
RATED VOLTAGE		10	16	25	50	100	200	250	10	16	25	50	100	200	250	16	50	100	200	250
CAP. RANGE																				
1.0pF	1R0																			
1.2	1R2																			
1.5	1R5	D	D	D	D	D	D	D												
1.8	1R8	D	D	D	D	D	D	D												
2.2	2R2	D	D	D	D	D	D	D												
2.7	2R7	D	D	D	D	D	D	D												
3.3	3R3	D	D	D	D	D	D	D												
3.9	3R9	D	D	D	D	D	D	D												
4.7	4R7	D	D	D	D	D	D	D												
5.6	5R6	D	D	D	D	D	D	D												
6.8	6R8	D	D	D	D	D	D	D												
8.2	8R2	D	D	D	D	D	D	D												
10	100	D	D	D	D	D	D	D												
12	120	D	D	D	D	D	D	D				G	G	G			I	I	I	
15	150	D	D	D	D	D	D	D				G	G	G			I	I	I	
18	180	D	D	D	D	D	D	D				G	G	G			I	I	I	
22	220	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
27	270	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
33	330	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
39	390	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
47	470	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
56	560	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
68	680	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
82	820	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
100	101	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
120	121	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
150	151	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
180	181	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
220	221	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
270	271	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
330	331	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
390	391	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
470	471	D	D	D	D	D	D	D	G	G	G	G	G	G	G			I	I	I
560	561	D	D	D	D	D	D	D	G	I	G	G	G	G	G	G		I	I	I
680	681	D	D	D	D	D	D	D	G	I	G	G	G	G	G	G		I	I	I
820	821	D	D	D	D	D	D	D	G	L	G	G	G	G	G	G		I	I	I
1000	102	D	D	D	D	D	D	D	G	L	G	G	G	G	G	I	I	I	I	I
1200	122	D	D	D	D	D	D	D	G		G	G	G	G	G	I	I	I	I	I
1500	152	D	D	D	D	D	D	D	I		G	G	G	G	G	I	I	I	I	I
1800	182	D	D	D	D	D	D	D	I		G	G	G	G	G	I	I	I	I	I
2200	222	D	D	D	D	D	D	D	I		G	G	G	G	G	I	I	I	I	I
2700	272	D	D	D	D	D	D	D			G	G	G	G	G	I	I	I	I	I
3300	332	D	D	D	D	D	D	D			G	G	G	G	G	I		I	I	I
3900	392	D	D	D	D	D	D	D			G	G	G	G	G	I		I	I	I
4700	472	D	D	D	D	D	D	D			G	G	G	G	G			I	I	I
5600	562	D	D	D	D	D	D	D			G	G	G	G	G			I	I	I
6800	682	G	G	G	G						G	G	G	G	G			I	I	I
8200	822	I	I	I	I						G	G	G	G	G			I	I	I
0.010uF	103	I	I	I	I						G	G	G	G	G			I	I	I
0.012	123										G	G	I	I	I			I	I	I
0.015	153										G	G	I	I	I			I	I	I
0.018	183																	I	I	I
0.022	223																	I	I	I
0.027	273																	I	I	I
0.033	333																	I	I	I
0.039	393																	I	I	I

MAX HEIGHT			
D	G	I	L
0.90	1.05	1.35	1.80





DIELECTRIC		X7R															
DIMENSION (MM)		GMG04 (0402)				GMG10 (0603)					GMG21 (0805)						
RATED VOLTAGE		10	16	25	50	10	16	25	50	100	10	16	25	50	100	200	250
CAP. RANGE																	
100pF	101	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
120	121	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
150	151	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
180	181	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
220	221	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
270	271	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
330	331	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
390	391	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
470	471	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
560	561	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
680	681	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
820	821	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
1000	102	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
1200	122	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
1500	152	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
1800	182	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
2200	222	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
2700	272	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
3300	332	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
3900	392	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
4700	472	A	A	A	A	C	C	C	C	C	E	E	E	E	E	E	E
5600	562	A	A	A	A	C	C	C	C	C	E	E	E	E	E	J	J
6800	682	A	A	A	A	C	C	C	C	C	E	E	E	E	E	J	J
8200	822	A	A	A	A	C	C	C	C	C	E	E	E	E	E	J	J
0.010uF	103	A	A	A	A	C	C	C	C	C	E	E	E	E	E	J	J
0.012	123	A	A	A		C	C	C	C		E	E	E	E	E	J	J
0.015	153	A	A	A		C	C	C	C		E	E	E	E	E	J	J
0.018	183	A	A	A		C	C	C	C		E	E	E	E	E	J	J
0.022	223	A	A	A		C	C	C	C		E	E	E	E	E	J	J
0.027	273	A	A	A		C	C	C	C		E	E	E	E	J		
0.033	333	A	A	A		C	C	C	F		E	E	E	E	J		
0.039	393	A	A	A		C	C	C	F		E	E	E	E	J		
0.047	473	A	A	A		C	C	C	F		E	E	E	E	J		
0.056	563	A	A			C	C	C	F		E	E	E	E	J		
0.068	683	A	A			C	C	C	F		E	E	E	E	J		
0.082	823	A	A			C	C	C	F		E	E	E	E	J		
0.10uF	104	A	A			C	C	C	F		E	E	E	E	J		
0.12	124					C	C	F			J	J	J	J			
0.15	154					C	C	F			J	J	J	J			
0.18	184					C	C	F			J	J	J	J			
0.22	224					C	C	F			J	J	J	J			
0.27	274					F	F				J	J	J				
0.33	334					F	F				J	J	J				
0.39	394					F	F				J	J	J				
0.47	474					F	F				J	J	J				
0.56	564										J	J	J				
0.68	684										J	J	J				
0.82	824										J	J	J				
1.00	105										J						

MAX HEIGHT				
A	C	E	F	J
0.55	0.87	0.90	0.95	1.40



DIELECTRIC		X7R																							
DIMENSION (MM)		GMG31 (1206)						GMG32 (1210)						GMG43 (1812)											
RATED VOLTAGE		10	16	25	50	100	200	250	10	16	25	50	100	200	250	10	16	25	50	100	200	250			
CAP. RANGE																									
100pF	101																								
120	121																								
150	151	D	D	D	D	D	I	I																	
180	181	D	D	D	D	D	I	I																	
220	221	D	D	D	D	D	I	I																	
270	271	D	D	D	D	D	I	I																	
330	331	D	D	D	D	D	I	I																	
390	391	D	D	D	D	D	I	I																	
470	471	D	D	D	D	D	I	I																	
560	561	D	D	D	D	D	I	I																	
680	681	D	D	D	D	D	I	I																	
820	821	D	D	D	D	D	I	I																	
1000	102	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
1200	122	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
1500	152	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
1800	182	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
2200	222	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
2700	272	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
3300	332	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
3900	392	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
4700	472	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
5600	562	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
6800	682	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
8200	822	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.010uF	103	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.012	123	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.015	153	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.018	183	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.022	223	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.027	273	D	D	D	D	D	I	I	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.033	333	D	D	D	D	D	L	L	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.039	393	D	D	D	D	D	L	L	G	G	G	G	G	G	G	I	I	I	I	I	I	I			
0.047	473	D	D	D	D	D	L	L	G	G	G	G	G	G	I	I	I	I	I	I	I	I			
0.06	563	D	D	D	D	D	L	L	G	G	G	G	G	I	I	I	I	I	I	I	I	I			
0.068	683	D	D	D	D	D	L	L	G	G	G	G	G	L	L	I	I	I	I	I	I	I			
0.082	823	D	D	D	D	I	L	L	G	G	G	G	G	L	L	I	I	I	I	I	I	I			
0.10uF	104	D	D	D	D	I	L	L	G	G	G	G	G	L	L	I	I	I	I	I	I	I			
0.12	124	D	D	D	D	I			G	G	G	G	G	L	L	I	I	I	I	I	I	I			
0.15	154	G	G	G	G	L			G	G	G	G	I	O	O	I	I	I	I	I	N	N			
0.18	184	G	G	G	G	L			G	G	G	G	I	O	O	I	I	I	I	I	N	N			
0.22	224	G	G	G	G	L			G	G	G	G	I	O	O	I	I	I	I	I	N	N			
0.27	274	G	G	G	I				G	G	G	G	L	O	O	I	I	I	I	I	N	N			
0.33	334	G	G	G	I				G	G	G	I	L	O	O	I	I	I	I	I	N	N			
0.39	394	G	G	H	M				G	G	G	I	O	O	O	I	I	I	I	I	N	N			
0.47	474	H	H	H	M				G	G	G	I	O	O	O	I	I	I	I	I	N	N			
0.56	564	H	H	H	M				I	I	I	I	O			I	I	I	I	I	N				
0.68	684	H	H	H	M				I	I	I	I	N			I	I	I	I	N	N				
0.82	824	H	H	H	M				I	I	I	I	N			I	I	I	I	N	N				
1.00	105	H	H	H	M				I	I	I	I	N			I	I	I	I	N	N				
1.50	155	H	H	M					N	N	L											N			
2.20	225	H	H	M					N	N	L											O			

MAX HEIGHT							
D	G	H	I	L	M	N	O
0.90	1.05	1.30	1.35	1.80	1.90	2.20	2.80





DIELECTRIC		X5R																
DIMENSION (MM)		GMG04 (0402)			GMG10 (0603)				GMG21 (0805)				GMG31 (1206)				GMG32 (1210)	
RATED VOLTAGE		6.3	10	16	6.3	10	16	25	6.3	10	16	25	6.3	10	16	25	10	16
CAP. RANGE																		
0.027uF	273																	
0.033	333																	
0.039	393																	
0.047	473																	
0.056	563		A															
0.068	683		A															
0.082	823		A															
0.10uF	104		A	A														
0.15	154		A	A														
0.22	224	A	A	A														
0.27	274	A	A		F	F	F											
0.33	334	A	A		F	F	F											
0.39	394	A			F	F	F											
0.47	474	A			F	F	F											
0.68	684	A			F	F	F											
0.82	824	A			F	F	F	F										
1.0uF	105				F	F	F	F										
1.5	155								K	K			H	H	M	N	N	
2.2	255								K	K	K	K	H	H	M	N	N	
3.3	335										K	K	M	M	M	M	N	N
4.7	475										K	K	M	M	M	M	N	N
6.8	685												M	M				
10	106												M	M				
22	226																	

MAX HEIGHT					
A	F	H	K	M	N
0.55	0.95	1.30	1.45	1.90	2.20



RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	ITEM	TEST CONDITION	REQUIREMENTS																																				
1.	Visual and Mechanical	----	- No remarkable defect. - Dimensions to conform to individual specification sheet.																																				
2.	Capacitance	Class I: NP0 Cap \leq 1000pF, 1.0 \pm 0.2Vrms 1MHz \pm 10% Cap $>$ 1000pF, 1.0 \pm 0.2Vrms 1KHz \pm 10% Class II: X7R, X5R Cap \leq 10 μ F, 1.0 \pm 0.2Vrms 1KHz \pm 10% Cap $>$ 10 μ F, 0.5 \pm 0.2Vrms 120Hz \pm 20%	- Shall not exceed the limits given in the detailed spec. NP0: Cap \geq 30pF, Q \geq 1000; Cap \geq 30pF, Q \geq 400+20C X7R, X5R:																																				
3.	Q/D.F. (Dissipation Factor)		<table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>D.F. \leq</th> <th>EXCEPTION OF D.F. \leq</th> </tr> </thead> <tbody> <tr> <td rowspan="2">\geq50V</td> <td>\leq3%</td> <td>0603\geq0.047μF; 0805\geq0.18μF; 1206\geq0.47μF</td> </tr> <tr> <td>\leq5%</td> <td>1210\geq4.7μF</td> </tr> <tr> <td rowspan="2">35V</td> <td>\leq10%</td> <td>0603\geq1μF; 0805\geq1μF; 1206\geq4.7μF; 1210\geq10μF</td> </tr> <tr> <td>\leq5%</td> <td>0805\geq2.2μF; 1210\geq10μF</td> </tr> <tr> <td rowspan="2">25V</td> <td>\leq7%</td> <td>0805\geq1μF; 1210\geq10μF</td> </tr> <tr> <td>\leq3.5%</td> <td>0603\geq0.33μF; 1206\geq4.7μF</td> </tr> <tr> <td rowspan="2">16V</td> <td>\leq10%</td> <td>0402\geq0.10μF; 0603\geq0.47μF; 0805\geq2.2μF; 1206\geq6.8μF; 1210\geq22μF</td> </tr> <tr> <td>\leq3.5%</td> <td>0402\geq0.033μF; 0603\geq0.15μF; 0805\geq0.68μF; 1206\geq2.2μF; 1210\geq4.7μF</td> </tr> <tr> <td rowspan="2">10V</td> <td>\leq10%</td> <td>0402\geq0.22μF; 0603\geq0.68μF; 0805\geq2.2μF; 1206\geq4.7μF; 1210\geq22μF</td> </tr> <tr> <td>\leq5%</td> <td>0402\geq1μF</td> </tr> <tr> <td rowspan="2">6.3V</td> <td>\leq15%</td> <td>0402\geq1μF; 0603\geq10μF; 0805\geq4.7μF; 1206\geq47μF</td> </tr> <tr> <td>\leq10%</td> <td>1210\geq100μF</td> </tr> <tr> <td>4V</td> <td>\leq15%</td> <td>0402\geq2.2μF</td> </tr> </tbody> </table>	RATED VOL.	D.F. \leq	EXCEPTION OF D.F. \leq	\geq 50V	\leq 3%	0603 \geq 0.047 μ F; 0805 \geq 0.18 μ F; 1206 \geq 0.47 μ F	\leq 5%	1210 \geq 4.7 μ F	35V	\leq 10%	0603 \geq 1 μ F; 0805 \geq 1 μ F; 1206 \geq 4.7 μ F; 1210 \geq 10 μ F	\leq 5%	0805 \geq 2.2 μ F; 1210 \geq 10 μ F	25V	\leq 7%	0805 \geq 1 μ F; 1210 \geq 10 μ F	\leq 3.5%	0603 \geq 0.33 μ F; 1206 \geq 4.7 μ F	16V	\leq 10%	0402 \geq 0.10 μ F; 0603 \geq 0.47 μ F; 0805 \geq 2.2 μ F; 1206 \geq 6.8 μ F; 1210 \geq 22 μ F	\leq 3.5%	0402 \geq 0.033 μ F; 0603 \geq 0.15 μ F; 0805 \geq 0.68 μ F; 1206 \geq 2.2 μ F; 1210 \geq 4.7 μ F	10V	\leq 10%	0402 \geq 0.22 μ F; 0603 \geq 0.68 μ F; 0805 \geq 2.2 μ F; 1206 \geq 4.7 μ F; 1210 \geq 22 μ F	\leq 5%	0402 \geq 1 μ F	6.3V	\leq 15%	0402 \geq 1 μ F; 0603 \geq 10 μ F; 0805 \geq 4.7 μ F; 1206 \geq 47 μ F	\leq 10%	1210 \geq 100 μ F	4V	\leq 15%	0402 \geq 2.2 μ F
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4.	Dielectric Strength	- To apply (\leq 100V) 250% - Duration 1 to 5 seconds - Charge and discharge current less than 50mA.	- No evidence of damage or flas over during test.																																				
5.	Insulation Resistance	- To apply rated voltage for max. 120 seconds	10G Ω or RxC \geq 500QF Which ever is smaller <table border="1"> <thead> <tr> <th>RATED VOLTAGE</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td>10GΩ or RxC\geq100 Q.F whichever is smaller.</td> </tr> <tr> <td>16V: 0402\geq0.22μF</td> <td></td> </tr> <tr> <td>10V: 0402\geq0.47μF, 0603\geq0.47μF, 0805\geq2.2μF, 1206\geq4.7μF; 1210\geq47μF</td> <td></td> </tr> <tr> <td>6.3V</td> <td></td> </tr> </tbody> </table>	RATED VOLTAGE	INSULATION RESISTANCE	100V: X7R	10G Ω or RxC \geq 100 Q.F whichever is smaller.	16V: 0402 \geq 0.22 μ F		10V: 0402 \geq 0.47 μ F, 0603 \geq 0.47 μ F, 0805 \geq 2.2 μ F, 1206 \geq 4.7 μ F; 1210 \geq 47 μ F		6.3V																											
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6.	Temperature Coefficient	- With no electrical load. <table border="1"> <thead> <tr> <th>T.C.</th> <th>CAPACITANCE CHANGE</th> </tr> </thead> <tbody> <tr> <td>NP0</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X7R</td> <td>-55~125°C at 25°C</td> </tr> <tr> <td>X5R</td> <td>-55~85°C at 25°C</td> </tr> </tbody> </table>	T.C.	CAPACITANCE CHANGE	NP0	-55~125°C at 25°C	X7R	-55~125°C at 25°C	X5R	-55~85°C at 25°C	<table border="1"> <thead> <tr> <th>T.C.</th> <th>CAPACITANCE CHANGE</th> </tr> </thead> <tbody> <tr> <td>NP0</td> <td>Within \pm33ppm/°C</td> </tr> <tr> <td>X7R</td> <td>Within \pm15%</td> </tr> <tr> <td>X5R</td> <td>Withink \pm15%</td> </tr> </tbody> </table>	T.C.	CAPACITANCE CHANGE	NP0	Within \pm 33ppm/°C	X7R	Within \pm 15%	X5R	Withink \pm 15%																				
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7.	Adhesive Strength of Termination	- Pressurizing force: 5N (\leq 0603) and 10N ($>$ 0603) - Test time: 10 \pm 1 sec.	- No remarkable damage or removal of the terminations.																																				
8.	Vibration Resistance	- Vibration frequency: 10-55 Hz/min. - Total amplitude: 1.5mm - Test time: 6hrs. (Two hrs each in three mutually perpendicular directions.) - Measurement to be made after keeping at room temp. for 24 \pm 2 hrs.	- No remarkable damage - Cap change and Q/D.F.: To meet initial spec.																																				
9.	Solderability	- Solder temperature: 235 \pm 5°C - Dipping time 2 \pm 0.5 sec.	- 95% min. coverage of all metalized area.																																				
10.	Bending Test	- The middle part of substrate shall be pressurized by means of the pressurizing rod at a rate of about 1 mm per second until the deflection becomes 1 mm and then the pressure shall be maintained for 5 \pm 1 sec. - Measurement to be made after keeping at room temp. for 24 \pm 2 hrs..	- No remarkable damage - Cap change: NP0: within \pm 5% or 0.5pF whichever is larger X7R, X5R: within \pm 12.5% (This capacitance change the means change of capacitance under specified flexure of substrate from the capacitance measured before the test.)																																				
11.	Resistance to Soldering Heat	- Solder temperature: 260 \pm 5°C - Dipping time: 10 \pm 1sec - Preheating: 120 to 150°C for 1 minute before immerse the capacitor in a eutectic solder - Before initial measurement (Class II only): Perform 150+0/-10°C for 1 hr and then set for 24 \pm 2 hrs at room temp. - Measurement to be made after keeping at room temp. for 24 \pm 2 hrs.	- No remarkable damage - Cap change: NP0: within \pm 2.5% or \pm 0.25pF whichever is larger X7R, X5R: within \pm 7.5% - Q/D.F., I.R. and dielectric strength: To meet initial requirements. - 25% max. leaching on each edge.																																				
12.	Temperature Cycle	- Conduct the five cycles according to the temperatures and time. <table border="1"> <thead> <tr> <th>STEP</th> <th>TEMP. (°C)</th> <th>TIME (MIN.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Min. operating temp. +0/-3</td> <td>30\pm3</td> </tr> <tr> <td>2</td> <td>Room Temp</td> <td>2~3</td> </tr> <tr> <td>3</td> <td>Min. operating temp. +0/-3</td> <td>30\pm3</td> </tr> <tr> <td>4</td> <td>Room Temp</td> <td>2~3</td> </tr> </tbody> </table> - Before initial measurement (Class II only): perform 150+0/-10°C for 1 hr and then set for 24 \pm 2 hrs at room temp. - Measurement to be made after keeping at room temp. for 24 \pm 2 hrs	STEP	TEMP. (°C)	TIME (MIN.)	1	Min. operating temp. +0/-3	30 \pm 3	2	Room Temp	2~3	3	Min. operating temp. +0/-3	30 \pm 3	4	Room Temp	2~3	- No remarkable damage - Cap change: NP0: within \pm 2.5% or \pm 0.25pF whichever is larger X7R, X5R: within \pm 7.5% - Q/D.F., I.R. and dielectric strength: To meet initial requirements.																					
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RELIABILITY TEST CONDITIONS AND DIMENSIONS

NO.	ITEM	TEST CONDITION	REQUIREMENTS																																								
13.	Humidity (Damp Heat) Steady State	<ul style="list-style-type: none"> - Test temp.: 40±2°C - Humidity 90~95% RH - Test time: 500+24/-0 hrs - Before initial measurement (Class II only): Perform 150+0/-10C for 1 hr and then set for 24±2 hrs at room temp. - Measurement to be made after keeping at room temp. for 24±2 hrs. 	<ul style="list-style-type: none"> - No remarkable damage - Cap change: <ul style="list-style-type: none"> NPO: within ±5% or ±0.5pF whichever is larger X7R, X5R: ≥10V**, within ±12.5%; 6.3V within ±25%; C≥ 1μF, within ±25% **10V: 0603≥4.7μF; 0402≥1μF; 0201≥0.1μF, within ±25%; - Q/D.F. value: <ul style="list-style-type: none"> NPO: More than 30pF Q≥350, 10pF≤C≤30pF, Q≥275+2.5C Less than 10pF Q≥200+10C <p>X7R, X5R:</p> <table border="1"> <thead> <tr> <th>RATED</th> <th>D.F. ≤</th> <th>EXCEPTION OF D.F. ≤</th> </tr> </thead> <tbody> <tr> <td rowspan="3">≥50V</td> <td rowspan="3">≤3%</td> <td>≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF</td> </tr> <tr> <td>≤10% 1210≥4.7μF</td> </tr> <tr> <td>≤20% 0603≥0.1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">35V</td> <td rowspan="2">≤5%</td> <td>≤20% 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>≤10% 0805≥1μF; 1210≥10μF</td> </tr> <tr> <td rowspan="2">25V</td> <td rowspan="2">≤5%</td> <td>≤14% 0603≥0.33μF; 1206≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">16V</td> <td rowspan="2">≤5%</td> <td>≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF</td> </tr> <tr> <td>≤15% 0402≥0.33μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF</td> </tr> <tr> <td rowspan="2">10V</td> <td rowspan="2">≤7.5%</td> <td>≤15% 0402≥0.33μF 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF</td> </tr> <tr> <td>≤20% 0402≥1μF</td> </tr> <tr> <td>6.3V</td> <td>≤15%</td> <td>≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF</td> </tr> <tr> <td>4V</td> <td>≤20%</td> <td>---</td> </tr> </tbody> </table> <p>*I.R.: ≥10V, 1GΩ OR 50 Ω-F whichever is smaller Class II (X7R, X5R):</p> <table border="1"> <thead> <tr> <th>RATED VOL.</th> <th>INSULATION RESISTANCE</th> </tr> </thead> <tbody> <tr> <td>100V: X7R</td> <td rowspan="7">1GΩ or RxC≥10 Ω-F whichever is smaller.</td> </tr> <tr> <td>50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF</td> </tr> <tr> <td>35V: 0805≥2.2μF; 1210≥10μF</td> </tr> <tr> <td>25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF</td> </tr> <tr> <td>16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF</td> </tr> <tr> <td>10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF</td> </tr> <tr> <td>6.3V: 4V</td> </tr> </tbody> </table>	RATED	D.F. ≤	EXCEPTION OF D.F. ≤	≥50V	≤3%	≤6% 0603≥0.047μF; 0805≥0.18μF; 1206≥0.47μF	≤10% 1210≥4.7μF	≤20% 0603≥0.1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF	35V	≤5%	≤20% 0805≥2.2μF; 1210≥10μF	≤10% 0805≥1μF; 1210≥10μF	25V	≤5%	≤14% 0603≥0.33μF; 1206≥4.7μF	≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF	16V	≤5%	≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF	≤15% 0402≥0.33μF; 0603≥0.68μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥22μF	10V	≤7.5%	≤15% 0402≥0.33μF 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF	≤20% 0402≥1μF	6.3V	≤15%	≤30% 0402≥1μF; 0603≥10μF; 0805≥4.7μF; 1206≥47μF; 1210≥100μF	4V	≤20%	---	RATED VOL.	INSULATION RESISTANCE	100V: X7R	1GΩ or RxC≥10 Ω-F whichever is smaller.	50V: 0603≥1μF; 0805≥1μF; 1206≥4.7μF; 1210≥4.7μF	35V: 0805≥2.2μF; 1210≥10μF	25V: 0402≥1μF; 0603≥2.2μF; 0805≥2.2μF; 1206≥10μF; 1210≥10μF	16V: 0402≥0.22μF; 0603≥1μF; 0805≥2.2μF; 1206≥10μF; 1210≥47μF	10V: 0402≥0.47μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥4.7μF; 1210≥47μF	6.3V: 4V
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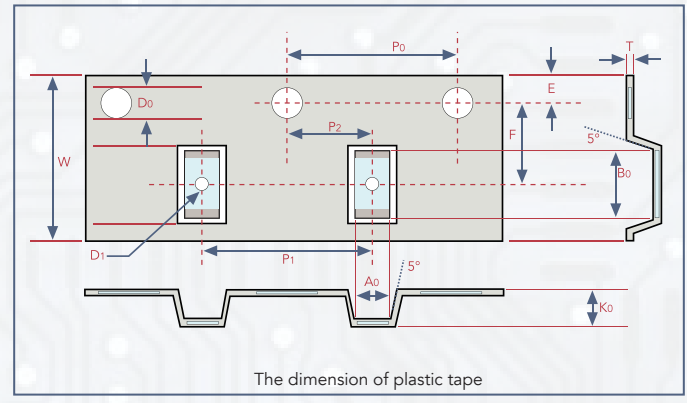
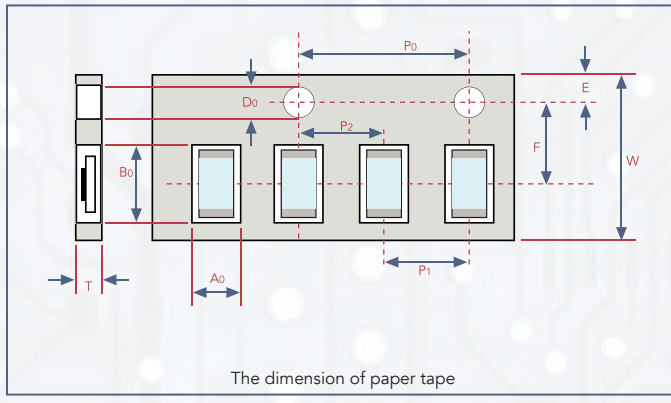
RELIABILITY TEST CONDITIONS AND DIMENSIONS

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15.	High Temperature Load (Endurance)	- Test temp.: NP0, X7R: 125±3°C X5R: 85±3°C - Test time: 1000+24/-0 hrs - To apply voltage: (1) ≤6.3V or C≥10μF: 150% of rated voltage. (2) 10V≤Ur<500V: 200% of rated voltage. (3) 500V: 150% of rated voltage. (4) Ur≥630V: 120% of rated voltage. (5) 100% of rated voltage for below range.	- No remarkable damage - Cap change: NP0: ±3.0% or ±0.3pF whichever is larger X7R, X7E, X5R: ≥10V**, within ±12.5%; ≤6.3V within ±25%; C≥ 1uF, within ±25% **10V: 0603≥4.7μF; 0402≥1μF; 0201≥0.1μF, within ±25%; Q/D.F. value: NP0: More than 30pF, Q≥350 10pF≤C<30pF, Q≥275+2.5C Less than 10pF, Q≥200+10C X7R, X5R:																																																				
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35V	≤5%	≤20% 0603>1μF; 0805≥1μF; 1206≥4.7μF; 1210≥10μF																																																					
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		≤14% 0603≥0.33μF; 1206≥4.7μF																																																					
16V	≤5%	≤15% 0402≥0.10μF; 0603≥0.47μF; 0805≥2.2μF; 1206≥6.8μF; 1210≥22μF																																																					
		≤10% 0603≥0.15μF; 0805≥0.68μF; 1206≥2.2μF; 1210≥4.7μF																																																					
10V	≤7.5%	≤15% 0402≥0.33μF; 0603≥0.33μF; 0805≥2.2μF; 1206≥2.2μF; 1210≥22μF																																																					
		≤20% 0402≥1μF																																																					
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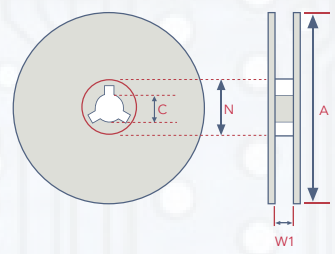
PACKAGING STYLE AND QUANTITY

SIZE	THICKNESS (mm)/SYMBOL	PAPER TAPE		PLASTIC TAPE	
		7" REEL	13" REEL	7" REEL	13" REEL
0402 (1005)	0.50±0.5	10k	50k		
0603 (1608)	0.80±0.07	4k	15k		
	0.80±0.15/-0.10	4k	15k		
0805 (2012)	0.60±0.10	4k	15		
	0.80±0.10	4k	15k		
	1.25±0.10			3k	10k
1206 (3216)	1.25±0.20			3k	10k
	0.80±0.10	4k	15k		
	0.95±0.10			3k	10k
	1.15±0.15			3k	10k
	1.25±0.10			3k	10k
1210 (3225)	1.60±0.20			2k	10k
	1.60±0.30/-0.10			2k	9k
	0.95±0.10			3k	10k
	01.25±0.10			3k	10k
1812 (4532)	01.60±0.20			2k	
	2.00±0.20			1k	6k
	2.50±0.30			1k	6k
1812 (4532)	1.25±0.10			1k	5k
	1.60±0.20			1k	

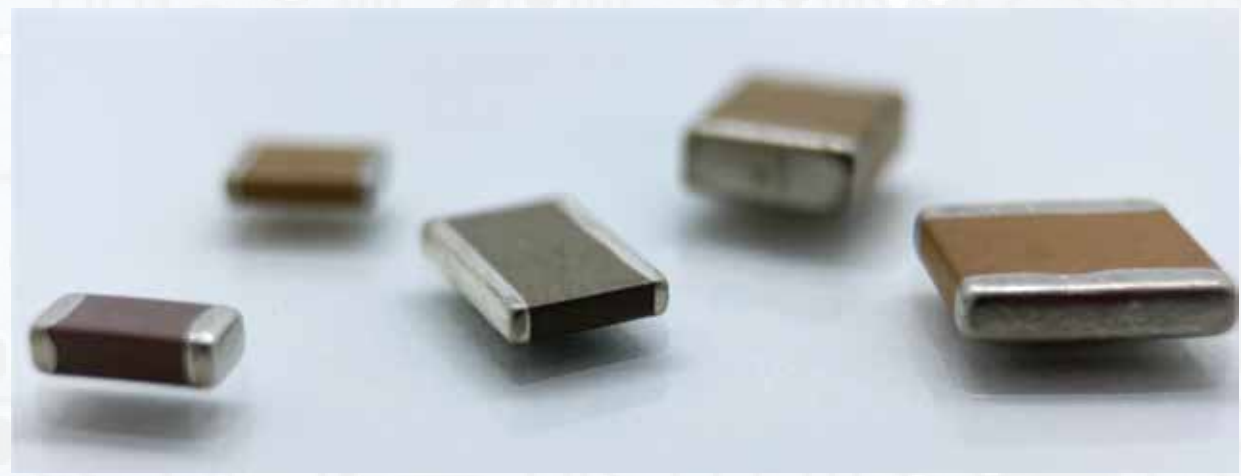
PACKAGING



SIZE	0402	0603	0805			1206			1210		1812
THICKNESS	N	S, B	A	X	M, C, I	X	M, J, C	E	M, C, E	G	C, F
A ₀	0.62±0.05	1.02±0.05	1.05±0.10	1.05±0.10	<1.57	2.00±0.10	<1.85	<1.95	<2.97	<2.97	<2.97
B ₀	1.12±0.05	1.80±0.05	2.30±0.10	2.30±0.10	<2.40	3.50±0.10	<3.43	<3.67	<3.73	<3.73	<3.73
T	0.60±0.05	0.95±0.05	0.75±0.05	0.95±0.05	0.23±0.05	0.95±0.05	0.23±0.05	0.23±0.05	0.23±0.5	0.23±0.05	0.235±0.1
K ₀	-	-	-	-	<2.50	-	<2.50	<2.50	<2.50	<3.00	<3.00
W	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10	8.00±0.10
P ₀	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.100	4.00±0.10	4.00±0.10
10 X P ₀	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10	40.00±0.10
P ₁	2.00±0.05	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10	4.00±0.10
P ₂	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05	2.00±0.05
D ₀	1.55±0.05	1.55±0.05	1.55±0.05	1.55±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05	1.50±0.05
D ₁	-	-	-	-	1.00±0.10	-	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10	1.00±0.10
E	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.05	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.10	1.75±0.05	1.75±0.10
F	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	3.50±0.05	5.50±0.10



SIZE	0402, 0603, 0805, 1206, 1210		1812
REEL SIZE	7"	13"	7"
C	13.0±0.5/-0.2	13.0±0.5/-0.2	13.0±0.5/-0.2
W ₁	8.4±1.5/-0	8.4±1.5/-0	12.4±2.0/-0
A	178.0±1.0	330.0±1.0	178.0±1.0
N	60.0±1.0/-0	100±1.0	60.0±1.0/-0



STORAGE AND HANDLING CONDITIONS

- (1) To store products at 5 to 40°C ambient temperature and 20 to 70% related humidity conditions.
- (2) The product is recommended to be used within one year after shipment. Check solderability in case of shelf life extension is needed.

Cautions:

- a. The corrosive gas reacts on the terminal electrodes of capacitors, and results in the poor solderability. Do not store the capacitors in the ambience of corrosive gas (e.g., hydrogen sulfide, sulfur dioxide, chlorine, ammonia gas etc.)
- b. In corrosive atmosphere, solderability might be degraded, and silver migration might occur to cause low reliability.
- c. Due to the dewing by rapid humidity change, or the photochemical change of the terminal electrode by direct sunlight, the solderability and electrical performance may deteriorate. Do not store capacitors under direct sunlight or dewing condition. To store products on the shelf and avoid exposure to moisture.

RECOMMENDED SOLDERING CONDITIONS

The lead-free termination MLCCs are not only to be used on SMT against lead-free solder paste, but also suitable against lead-containing solder paste. If the optimized solder joint is requested, increasing soldering time, temperature and concentration of N₂ within oven are recommended.

