

MULTILAYER CERAMIC CHIP CAPACITORS

- GMC SERIES -

APPLICATIONS

- Can be used on surface mount assembly equipment
- Our fully integrated manufacturing and total quality control systems ensure unprecedented high standards of quality and reliability.

FEATURES

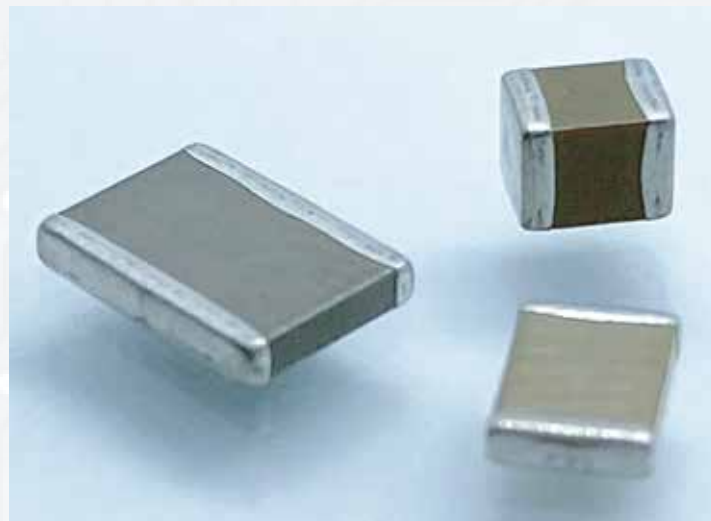
- Large capacitance values in small sizes
- Excellent high frequency characteristics

CHIP CAPACITOR SELECTION

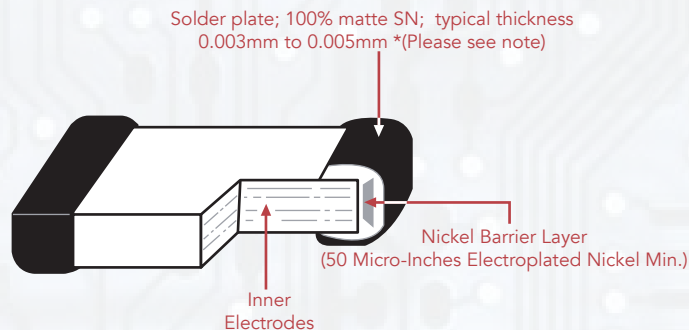
DIELECTRIC TYPE

COG (NPO) - Capacitance change with temperature is 0-30ppm/°C which is less than -0.3%/°C from -55°C to +125°C. Typical capacitance change with life is less than -0.1 % for NPOs, one-fifth that shown by most other dielectrics. NPO formulations show no aging characteristics.

Ultra stable class I dielectric: linear temperature coefficient, low loss, negligible change of electrical properties with time, voltage and frequency.



CONSTRUCTION



OPERATING TEMPERATURE RANGE	TEMPERATURE COEFFICIENT	TEMPERATURE VOLTAGE COEFFICIENT (ΔC_{MAX} @ V_{DCW})	DISSIPATION FACTOR	INSULATION RESISTANCE	DIELECTRIC WITHSTANDING VOLTAGE	AGING RATE	TEST PARAMETERS
-55°C to +125 C	0±30ppm/°C	0±30ppm/°C	0.1% Max, 0.02% Typical	<ul style="list-style-type: none"> •25°C, VDCW: >100GΩ For 1000QF, whichever is less •125°C, Vocw: >10GΩ or 100QF whichever is less 	3 X Vdcw	0% per decade hour	<ul style="list-style-type: none"> • C<1000pF f=1MHz V=1.0Vrms ±0.2Vrms T=25°C • C>1000pF f=1KHz V=1.0Vrms ±0.2Vrms T=25°C

X7R/X5R - Its temperature variation of capacitance is within ±15% from -55°C to +125°C (-55°C to +85°C for X5R). The capacitance change is non-linear.

Stable class II dielectric

OPERATING TEMPERATURE RANGE	TEMPERATURE COEFFICIENT	TEMPERATURE VOLTAGE COEFFICIENT (ΔC_{MAX} @ V_{DCW})	DISSIPATION FACTOR	INSULATION RESISTANCE	DIELECTRIC WITHSTANDING VOLTAGE	AGING RATE	TEST PARAMETERS
X7R=-55C to+125C X5R=-55C to+85C	±15%	X7R/X5R Not Applicable	2.5% Max, 1.8% Typical	<ul style="list-style-type: none"> • 25°C, Vdcw: >100GΩ For 1000QF, whichever is less • 125°C, Vocw: >10GΩ or 100QF whichever is less 	2.5 X Vdcw	<2% per decade hour	1KHz 1.0Vrms ±0.2Vrms 25°C values> or = to 10uF 1.0Vrms 120Hz

CHIP CAPACITOR SELECTION

Z5U - Despite their capacitance instability, Z5U formulations are very popular because of their small size, temperature range low ESL, low ESR and excellent frequency response. These features are particularly important for decoupling application where only a minimum capacitance value is required.

Y5V - Y5V formulations are for general purpose use in a limited temperature range. They have a wide temperature characteristic of +22% - 82% capacitance change over the operating temperature range of -30°C to +85°C. Y5Vs high dielectric constant allows the manufacture of very high capacitance values (up to 22MF) in small physical sizes.

High capacitance per unit volume: general purpose product

OPERATING TEMPERATURE RANGE	TEMPERATURE COEFFICIENT	TEMPERATURE VOLTAGE COEFFICIENT (ΔC_{MAX} @ V_{DCW})	DISSIPATION FACTOR	INSULATION RESISTANCE	DIELECTRIC WITHSTANDING VOLTAGE	AGING RATE	TEST PARAMETERS
-30°C to +85°C	+22% -82%	N/A	3.0% Max, 2.0% Typical	10GQ or 100QF whichever is less, 25°C, V_{ocw}	2.5 X V_{DCW}	3.0% per decade hour	1 KHz, 1 Vrms 25°C values > or = to 10uF 1.0Vrms 120Hz

CAPACITANCE VALUE & TOLERANCE

Determined by circuit requirements. Note that chip prices decrease with lower capacitance value and looser tolerance.

VOLTAGE

Determined by circuit requirements. Units are designed to exceed the withstanding voltage specification, i.e., the user need not incorporate an additional safety margin.

CAPACITOR SIZE

Select the smallest unit permitted by the circuit constraints that provides the required capacitance and voltage rating. All Cal-Chip capacitors conform to EIA specifications.

CAPACITOR TERMINATION

Nickel barrier is standard and recommended for units exposed to repeated solder cycles, to minimize leaching of the termination.

GMC	21	CG	102	J	50	NT	D
PRODUCT TYPE	DIMENSIONS	DIELECTRIC	CAPACITANCE	TOLERANCE	VOLTAGE DC	TERMINATION	PACKAGING CODE
	01: 01005 02: 0201 04: 0402 10: 0603 21: 0805 31: 1206 32: 1210 40: 1808 43: 1812 45: 1825 55: 2220 57: 2225	CG: COG/NPO X7R X5R Z5U Y5V	0R5: 0.5pF 5R0: 5.0pF 100: 10pF 101: 100pF 102: 1000pF 103: .01uF 104: .1uF 105: 1.0uF 106: 10uF 107: 100uF	A: +/--.05pF B: +/--.1pF C: +/--.25pF D: +/--.5pF F: +/--1% G: +/--2% J: +/--5% K: +/--10% M: +/--20% Z: -20%/+80%	4R0: 4.0V 6R3: 6.3V 10: 10V 16: 16V 25: 25V 35: 35V 50: 50V 63: 63V 100: 100V 200: 200V	NT: Sn/Ni PT: Pd/Ag	Blank: 7" reel D: See page 19 & 20 G: See page 19 & 20 Q: See page 19 & 20



..Note: Cal-Chip has completed the Lead-Free transition. All parts shipped will be lead-free. The customer designator of "LF" is no longer available. Lead-Free material will continue to have a green RoHS symbol on the label.



DIMENSION (MM)		GMC01							
L(L1)		0.4 ± 0.02							
W		0.2 ± 0.02							
H		0.2 ± 0.02							
BW(L2/L3)		0.07 ~ 0.14							
DIELECTRIC		NPO/COG		X7R			X5R		
RATED VOLTAGE		6.3	10/16	6.3	10	16	6.3	10	16
CAP. RANGE									
0.5pF	0R5								
0.75	R75								
1	1R0								
1.2	1R2								
1.5	1R5								
1.8	1R8								
2	2R0								
2.2	2R2								
2.7	2R7								
3	3R0								
3.3	3R3								
3.6	3R6								
3.9	3R9								
4	4R0								
4.7	4R7								
5	5R0								
5.6	5R6								
6	6R0								
6.8	6R8								
7	7R0								
8	8R0								
8.2	8R2								
10	100								
11	110								
12	120								
15	150								
18	180								
20	200								
22	220								
27	270								
30	300								
33	330								
39	390								
43	430								
47	470								
51	510								
56	560								
62	620								
68	680								
82	820								
100	101								
120	121								
150	151								
180	181								
220	221								
270	271								
330	331								
390	391								
470	471								
560	561								
680	681								
820	821								
1.0nF	102								
1.2	122								
1.5	152								
1.8	182								
2.2	222								
2.7	272								
3.3	332								
3.9	392								
4.7	472								
5.6	562								
6.8	682								
8.2	822								
10	103								
12	123								
15	153								
18	183								
22	223								
27	273								
33	333								
39	393								
47	473								
56	563								
68	683								
82	823								
100	104								
120	124								
220	224								
470	474								
1uf	105								

01005

0201

DIMENSION (MM)		GMC02										
L(L1)		0.6 ± 0.03										
W		0.3 ± 0.03										
H		0.3 ± 0.03										
BW(L2/L3)		0.15 ± 0.05										
DIELECTRIC	NPO/COG	X5R					X7R					Y5V/Z5U
RATED VOLTAGE	25	50	4/6.3V	10	16	25	6.3	10	16	25	50	6.3
CAP. RANGE												
0.1pF	OR1											
0.2pF	OR2											
0.3pF	OR3											
0.4	OR4											
0.47	R47											
0.5	OR5											
0.56	R56											
0.6	OR6											
0.7	OR7											
0.75	R75											
0.8	OR8											
0.82	R82											
0.9	OR9											
1	1R0											
1.2	1R2											
1.3	1R3											
1.5	1R5											
1.6	1R6											
1.8	1R8											
2	2R0											
2.2	2R2											
2.5	2R5											
2.7	2R7											
2.8	2R8											
3.3	3R3											
3.9	3R9											
4.3	4R3											
4.7	4R7											
5.6	5R6											
6.8	6R8											
8.2	8R2											
10	100											
11	110											
12	120											
15	150											
18	180											
20	200											
22	220											
24	240											
27	270											
30	300											
33	330											
39	390											
43	430											
47	470											
51	510											
56	560											
62	620											
68	680											
75	750											
82	820											
100	101											
120	121											
150	151											
180	181											
220	221											
270	271											
330	331											
390	391											
470	471											
560	561											
680	681											
820	821											
1.0nF	102											
1.2	122											
1.5	152											
1.8	182											
2.2	222											
2.7	272											
3.3	332											
3.9	392											
4.7	472											
5.6	562											
6.8	682											
8.2	822											
10	103											
12	123											
15	153											
18	183											
22	223											
27	273											
33	333											
39	393											
47	473											
56	563											
68	683											
82	823											
100	104											
220	224											
470	474											
1.0uF	105											
2.2	225											
4.7	475											

DIMENSION (MM)		GMC04																				
L(L1)		1.0 ± 0.05																				
W		0.5 ± 0.05																				
H		0.5 ± 0.1																				
BW(L2/LW)		0.1 ~ 0.35																				
DIELECTRIC		NPO/COG					X5R					X7R					Y5V & Z5U					
RATED VOLTAGE		6.3/10	16	25	50	100	200	6.3	10	16	25	50	6.3/10	16/25	50	100	200	6.3	10	16	25	50
CAP. RANGE																						
0.47	R47																					
0.5	0R5																					
0.56	R56																					
0.6	0R6																					
0.68	R68																					
0.7	0R7																					
0.75	R75																					
0.8	0R8																					
0.9	0R9																					
1	1R0																					
1.2	1R2																					
1.3	1R3																					
1.5	1R5																					
1.6	1R6																					
1.8	1R8																					
2	2R0																					
2.2	2R2																					
2.4	2R4																					
2.7	2R7																					
3	3R0																					
3.3	3R3																					
3.5	3R5																					
3.6	3R6																					
3.9	3R9																					
4	4R0																					
4.3	4R3																					
4.7	4R7																					
5	5R0																					
5.1	5R1																					
5.6	5R6																					
6	6R0																					
6.2	6R2																					
6.8	6R8																					
7	7R0																					
7.5	7R5																					
8	8R0																					
8.2	8R2																					
9	9R0																					
9.1	9R1																					
10	100																					
11	110																					
12	120																					
13	130																					
15	150																					
18	180																					
20	200																					
22	220																					
24	240																					
27	270																					
30	300																					
33	330																					
36	360																					
39	390																					
43	430																					
47	470																					
51	510																					
56	560																					
62	620																					
68	680																					
75	750																					
82	820																					
91	910																					
100	101																					
110	111																					
120	121																					
130	131																					
150	151																					
180	181																					
200	201																					
220	221																					
240	241																					
270	271																					
300	301																					
330	331																					
360	361																					
390	391																					
430	431																					
470	471																					
560	561																					
680	681																					
750	751																					
820	821																					
1.0nF	102																					
1.2	122																					
1.5	152																					
1.8	182																					

DIMENSION (MM)		GMC10																			
L(L1)		1.6 ± 0.2																			
W		0.8 ± 0.2																			
H		1.0 max																			
BW(L2/LW)		0.1 ~ 0.4																			
DIELECTRIC		NPO/COG				X5R				X7R				Y5V & Z5U							
RATED VOLTAGE		25	50	100	200	6.3	10	16	25	6.3	10	16	25	50	100	200	6.3	10	16	25	50
CAP. RANGE																					
0.4PF	R40																				
0.47	R47																				
0.5	0R5																				
0.6	0R6																				
0.7	R70																				
0.75	R75																				
0.8	0R8																				
1	1R0																				
1.2	1R2																				
1.3	1R3																				
1.5	1R5																				
1.8	1R8																				
2	2R0																				
2.2	2R2																				
2.4	2R4																				
2.7	2R7																				
3	3R0																				
3.3	3R3																				
3.6	3R6																				
3.9	3R9																				
4	4R0																				
4.3	4R3																				
4.7	4R7																				
5	5R0																				
5.1	5R1																				
5.6	5R6																				
6	6R0																				
6.2	6R2																				
6.8	6R8																				
7	7R0																				
7.5	7R5																				
8	8R0																				
8.2	8R2																				
9	9R0																				
9.1	9R1																				
10	100																				
11	110																				
12	120																				
13	130																				
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180	181																				
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220	221																				
240	241																				
270	271																				
300	301																				
330	331																				
390	391																				
430	431																				
470	471																				
510	511																				
560	561																				
620	621																				
680	681																				
750	751																				
820	821																				
910	911																				

DIMENSION (MM)		GMC10																			
L(L1)		1.6 ± 0.2																			
W		0.8 ± 0.2																			
H		1.0 max																			
BW(L2/LW)		0.1 ~ 0.4																			
DIELECTRIC		NPO/COG				X5R				X7R						Y5V & Z5U					
RATED VOLTAGE		25	50	100	200	6.3	10	16/25	35	6.3	10	16	25	50	100	200	6.3	10	16	25	50
CAP. RANGE																					
1.0nF	102																				
1.2	122																				
1.5	152																				
1.8	182																				
2.2	222																				
2.7	272																				
3.3	332																				
3.9	392																				
4.7	472																				
5.6	562																				
6.8	682																				
7.5	752																				
8.2	822																				
10	103																				
12	123																				
15	153																				
18	183																				
22	223																				
27	273																				
33	333																				
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56	563																				
68	683																				
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120	124																				
150	154																				
220	224																				
270	274																				
330	334																				
470	474																				
560	564																				
680	684																				
820	824																				
1.0 uF	105																				
2.2	225																				
2.7	275																				
3.3	335																				
3.9	395																				
4.7	475																				
10	106																				
22	226																				
47	476																				



DIMENSION (MM)		GMC21																											
L(L1)	2.0 ± 0.3	2.0 ± 0.3								2.0 ± 0.3								2.0 ± 0.3								2.0 ± 0.3			
W	1.25 ± 0.2	1.25 ± 0.2								1.25 ± 0.2								1.25 ± 0.2								1.25 ± 0.2			
H	1.4	1.5								1.5								1.5								1.5			
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75								0.25 ~ 0.75								0.25 ~ 0.75								0.25 ~ 0.75			
DIELECTRIC	NPO/COG	X7R								X5R								Y5V/Z5U											
RATED VOLTAGE	16 25 50 100 200	6.3 10 16 25 35 50 100 200	4 6.3 10 16 25 35 50 63	6.3 10 16 25 50																									
CAP. RANGE																													
0.4pF	0R4																												
0.47	R47																												
0.5	R50																												
0.56	R56																												
0.75	R75																												
0.8	0R8																												
0.82	R82																												
1	1R0																												
1.1	1R1																												
1.2	1R2																												
1.3	1R3																												
1.5	1R5																												
1.6	1R6																												
1.8	1R8																												
2	2R0																												
2.2	2R2																												
2.4	2R4																												
2.7	2R7																												
3	3R0																												
3.3	3R3																												
3.6	3R6																												
3.9	3R9																												
4	4R0																												
4.3	4R3																												
4.7	4R7																												
5	5R0																												
5.1	5R1																												
5.6	5R6																												
6	6R0																												
6.2	6R2																												
6.8	6R8																												
7	7R0																												
7.5	7R5																												
8	8R0																												
8.2	8R2																												
9	9R0																												
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10	100																												
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160	161																												
180	181																												
200	201																												
220	221																												
240	241																												
270	271																												
300	301																												

DIMENSION (MM)		GMC21																								
L(L1)	2.0 ± 0.3	2.0 ± 0.3										2.0 ± 0.3					2.0 ± 0.3									
W	1.25 ± 0.2	1.25 ± 0.2										1.25 ± 0.2					1.25 ± 0.2									
H	1.4 max	1.5 max										1.5 max					1.5 max									
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75										0.25 ~ 0.75					0.25 ~ 0.75									
DIELECTRIC	NPO/COG					X7R										X5R					Y5V/Z5U					
RATED VOLTAGE	16	25	50	100	200	6.3	10	16	25	35	50	100	200	4	6.3	10	16	25	35	50	63	6.3	10	16	25	50
CAP. RANGE																										
330	331																									
360	361																									
390	391																									
430	431																									
470	471																									
510	511																									
560	561																									
620	621																									
680	681																									
750	751																									
820	821																									
910	911																									
1.0nF	102																									
1.2	122																									
1.5	152																									
1.8	182																									
2.2	222																									
2.4	242																									
2.7	272																									
3.3	332																									
3.9	392																									
4.7	472																									
5.6	562																									
6.8	682																									
8.2	822																									
10	103																									
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68	683																									
82	823																									
100	104																									
120	124																									
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270	274																									
330	334																									
390	394																									
470	474																									
560	564																									
680	684																									
820	824																									
1.0 uF	105																									
1.2	125																									
1.5	155																									
1.8	185																									
2.2	225																									
3.3	335																									
4.7	475																									
4.7	475																									
6.8	685																									
10	106																									
15	156																									
22	226																									
33	336																									
47	476																									
100	107																									
150	157																									
220	227																									
330	337																									

DIMENSION (MM)		GMC32																			
L(L1)	3.2 ± 0.3	3.2 ± 0.3					3.2 ± 0.3					3.2 ± 0.3					3.2 ± 0.3				
W	2.5 ± 0.3	2.5 ± 0.3					2.5 ± 0.3					2.5 ± 0.3					2.5 ± 0.3				
H	2.2 max	2.8 max					2.8 max					2.8 max					2.8 max				
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75					0.25 ~ 0.75					0.25 ~ 0.75					0.25 ~ 0.75				
DIELECTRIC	NPO/COG	X7R					X5R					Y5V/Z5U									
RATED VOLTAGE	16 25 50 100 200	6.3 10 16 25 50 100 200	4 6.3 10 16 25 50	6.3 10 16 25 50																	
CAP. RANGE																					
0.5pF	0R5																				
0.4	R40																				
0.47	R47																				
0.7	R70																				
0.75	R75																				
1	1R0																				
1.1	1R1																				
1.2	1R2																				
1.3	1R3																				
1.5	1R5																				
1.6	1R6																				
1.8	1R8																				
2	2R0																				
2.2	2R2																				
2.4	2R4																				
2.7	2R7																				
3	3R0																				
3.3	3R3																				
3.6	3R6																				
3.9	3R9																				
4	4R0																				
4.3	4R3																				
4.7	4R7																				
5	5R0																				
5.1	5R1																				
5.6	5R6																				
6	6R0																				
6.2	6R2																				
6.8	6R8																				
7	7R0																				
7.5	7R5																				
8	8R0																				
8.2	8R2																				
9	9R0																				
9.1	9R1																				
10	100																				
11	110																				
12	120																				
13	130																				
15	150																				
16	160																				
18	180																				
20	200																				
22	220																				
24	240																				
27	270																				
30	300																				
33	330																				
36	360																				
39	390																				
43	430																				
47	470																				
51	510																				
56	560																				
62	620																				
68	680																				
75	750																				
82	820																				
91	910																				
100	101																				
120	121																				
130	131																				
150	151																				
160	161																				
180	181																				
200	201																				
220	221																				
240	241																				
270	271																				
300	301																				
330	331																				

DIMENSION (MM)		GMC32																								
L(L1)	3.2 ± 0.3	3.2 ± 0.3					3.2 ± 0.3					3.2 ± 0.3														
W	2.5 ± 0.3	2.5 ± 0.3					2.5 ± 0.3					2.5 ± 0.3														
H	2.2 max	2.8 max					2.8 max					2.8 max														
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75					0.25 ~ 0.75					0.25 ~ 0.75														
DIELECTRIC	NPO/COG	X7R										X5R					Y5V/Z5U									
RATED VOLTAGE		16	25	50	100	200	6.3	10	16	25	50	100	200	4	6.3	10	16	25	50	6.3	10	16	25	50		
CAP. RANGE																										
360	361																									
390	391																									
430	431																									
470	471																									
510	511																									
560	561																									
680	681																									
750	751																									
820	821																									
910	911																									
1.0nF	102																									
1.2	122																									
1.5	152																									
1.8	182																									
2.2	222																									
2.4	242																									
2.7	272																									
3.3	332																									
3.9	392																									
4.7	472																									
5.6	562																									
6.8	682																									
8.2	822																									
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120	124																									
150	154																									
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270	274																									
330	334																									
390	394																									
470	474																									
560	564																									
680	684																									
820	824																									
1.0 uF	105																									
1.2	125																									
1.5	155																									
1.8	185																									
2.2	225																									
2.7	275																									
3.3	335																									
4.7	475																									
4.7	475																									
6.8	685																									
8.2	825																									
10	106																									
15	156																									
22	226																									
33	336																									
47	476																									
68	686																									
100	107																									
150	157																									
220	227																									
330	337																									

For GMC32X5R (1210) size (L) tolerance for values > 100uf, tolerance increases to 3.2mm +/- 0.4 mm.

1812

DIMENSION (MM)		GMC43																	
L(L1)	4.5 ± 0.35	4.5 ± 0.35				4.5 ± 0.35				4.5 ± 0.35				4.5 ± 0.35					
W	3.2 ± 0.3	3.2 ± 0.3				3.2 ± 0.3				3.2 ± 0.3				3.2 ± 0.3					
H	2.2 max	3 max				3 max				3 max				3 max					
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75				0.25 ~ 0.75				0.25 ~ 0.75				0.25 ~ 0.75					
DIELECTRIC	NPO/COG	X7R								X5R				Y5V/Z5U					
RATED VOLTAGE		50	100	200	10	16	25	50	100	200	6.3	10	16	25	6.3	10	16	25	50
CAP. RANGE																			
390	391																		
430	431																		
470	471																		
510	511																		
560	561																		
680	681																		
750	751																		
820	821																		
910	911																		
1.0nF	102																		
1.2	122																		
1.5	152																		
1.8	182																		
2.2	222																		
2.4	242																		
2.7	272																		
3.3	332																		
3.9	392																		
4.7	472																		
5.6	562																		
6.8	682																		
8.2	822																		
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15	153																		
18	183																		
22	223																		
27	273																		
33	333																		
39	393																		
47	473																		
56	563																		
68	683																		
82	823																		
100	104																		
120	124																		
150	154																		
180	184																		
220	224																		
270	274																		
330	334																		
470	474																		
560	564																		
680	684																		
820	824																		
1.0 uF	105																		
1.2	125																		
1.5	155																		
1.8	185																		
2.2	225																		
2.7	275																		
3.3	335																		
4.7	475																		
6.8	685																		
10	106																		
15	156																		
22	226																		
33	336																		
47	476																		
68	686																		
100	107																		
150	157																		
220	227																		
330	337																		

1825

DIMENSION (MM)		GMC45							
L(L1)	4.5 ± 0.35	4.5 ± 0.35				4.5 ± 0.35			
W	6.3 ± 0.4	6.3 ± 0.4				6.3 ± 0.4			
H	2.2 max	3.2 max				3.2 max			
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75				0.25 ~ 0.75			
DIELECTRIC	NPO/COG	X7R							
RATED VOLTAGE		50	100	200	16	25	50	100	200
CAP. RANGE									
9.1	9R1								
10	100								
11	110								
12	120								
13	130								
15	150								
16	160								
18	180								
20	200								
22	220								
24	240								
27	270								
30	300								
33	330								
36	360								
39	390								
43	430								
47	470								
51	510								
56	560								
62	620								
68	680								
75	750								
82	820								
91	910								
100	101								
120	121								
130	131								
150	151								
160	161								
180	181								
200	201								
220	221								
240	241								
270	271								
300	301								
330	331								
360	361								
390	391								
430	431								
470	471								
510	511								
560	561								
680	681								
750	751								
820	821								
910	911								
1.0nF	102								
1.2	122								
1.5	152								
1.8	182								
2.2	222								
2.4	242								
2.7	272								
3.3	332								
3.9	392								
4.7	472								
5.6	562								
6.8	682								
8.2	822								
10	103								
12	123								
15	153								
18	183								
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33	333								
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100	104								
120	124								
150	154								
180	184								
220	224								
270	274								
330	334								
470	474								
560	564								
680	684								
820	824								
1.0 uF	105								
1.2	125								
1.5	155								
1.8	185								
2.2	225								
2.7	275								
3.3	335								
4.7	475								
6.8	685								
10	106								
15	156								
22	226								
33	336								
47	476								
68	686								
100	107								
150	157								
220	227								
330	337								

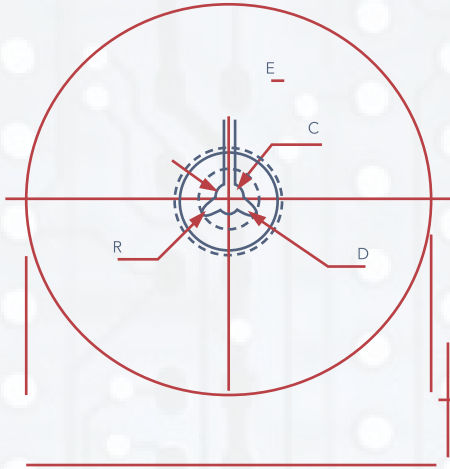
DIMENSION (MM)		GMC55																			
L(L1)	5.7 ± 0.4	5.7 ± 0.4					5.7 ± 0.4					5.7 ± 0.4									
W	5.0 ± 0.4	5.0 ± 0.4					5.0 ± 0.4					5.0 ± 0.4									
H	2.2 max	3.5 max					3.5 max					3.5 max									
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75					0.25 ~ 0.75					0.25 ~ 0.75									
DIELECTRIC	NPO/COG	X7R					X5R					Y5V/Z5U									
RATED VOLTAGE	50 100 200	16 25 50 100 200	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	6.3 10 16 25 50	
CAP. RANGE																					
270pF	271																				
300	301																				
330	331																				
360	361																				
390	391																				
430	431																				
470	471																				
510	511																				
560	561																				
680	681																				
750	751																				
820	821																				
910	911																				
1.0nF	102																				
1.2	122																				
1.5	152																				
1.8	182																				
2.2	222																				
2.4	242																				
2.7	272																				
3.3	332																				
3.9	392																				
4.7	472																				
5.6	562																				
6.8	682																				
8.2	822																				
10	103																				
12	123																				
15	153																				
18	183																				
22	223																				
27	273																				
33	333																				
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47	473																				
56	563																				
68	683																				
82	823																				
100	104																				
120	124																				
150	154																				
180	184																				
220	224																				
270	274																				
330	334																				
390	394																				
470	474																				
560	564																				
680	684																				
820	824																				
1.0 uF	105																				
1.2	125																				
1.5	155																				
1.8	185																				
2.2	225																				
2.7	275																				
3.3	335																				
3.9	395																				
4.7	475																				
5.6	565																				
6.8	685																				
8.2	825																				
10	106																				
15	156																				
22	226																				
33	336																				
47	476																				
68	686																				
100	107																				
150	157																				
220	227																				
330	337																				

2225

DIMENSION (MM)		GMC57											
L(L1)	5.7 ± 0.4	5.7 ± 0.4						5.7 ± 0.4					
W	6.3 ± 0.4	5.0 ± 0.4						5.0 ± 0.4					
H	2.2 max	3.5 max						3.5 max					
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75						0.25 ~ 0.75					
BW(L2/L3)	NPO/COG	X7R						Y5V/Z5U					
DIELECTRIC	50 100 200	16	25	50	100	200	6.3	10	16	25	50		
RATED VOLTAGE													
CAP. RANGE													
270	271												
300	301												
330	331												
360	361												
390	391												
430	431												
470	471												
510	511												
560	561												
620	621												
680	681												
750	751												
820	821												
910	911												
1.0nF	102												
1.2	122												
1.5	152												
1.8	182												
2.2	222												
2.4	242												
2.7	272												
3.3	332												
3.9	392												
4.7	472												
5.6	562												
6.8	682												
7.5	752												
8.2	822												
10	103												
12	123												
15	153												
18	183												
22	223												
27	273												
33	333												
39	393												
47	473												
56	563												
68	683												
82	823												
100	104												
120	124												
150	154												
180	184												
220	224												
270	274												
330	334												
390	394												
470	474												
560	564												
680	684												
820	824												
1.0 uF	105												
1.2	125												
1.5	155												
1.8	185												
2.2	225												
2.7	275												
3.3	335												
4.7	475												
5.6	565												
6.8	685												
8.2	825												
10	106												
15	156												
22	226												
33	336												
47	476												
68	686												
100	107												
150	157												
220	227												
330	337												

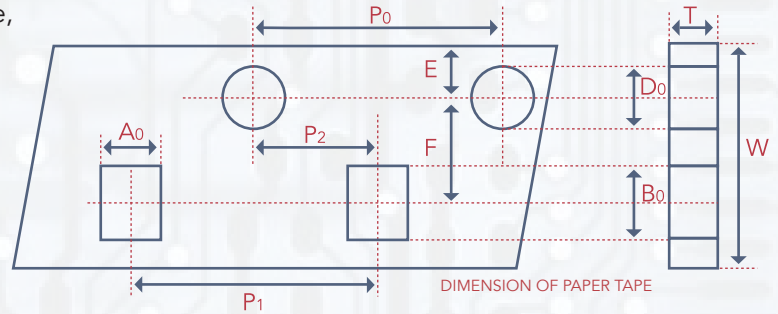
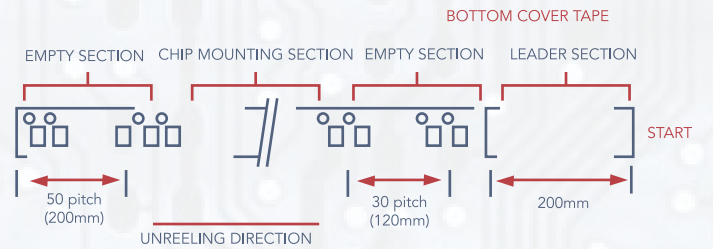
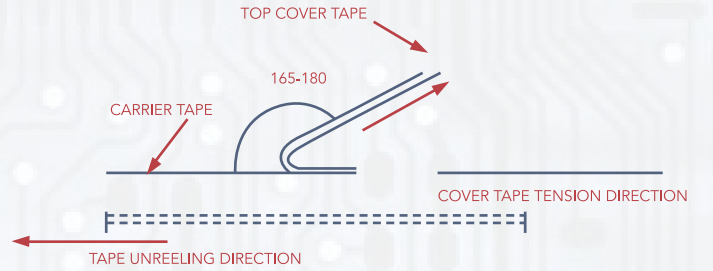
PACKAGING (TAPING)

Per EIA-481 - Reel Type Size



STANDARD REEL								UNIT: mm
A	B	C	D	E	W	t	R	
$\phi 178 \pm 2.0$	$\phi 50 \text{ min}$	$\phi 130 \pm 0.5$	$\phi 210 \pm 0.8$	2.0 ± 0.5	10.2-9mm 14.0-12mm ± 1.5	0.8 ± 0.2	1.0	
OPTIONAL 10/13 INCH REELS								UNIT: mm
A	B	C	D	E	W	t	R	
$\phi 330 \pm 2.0$	$\phi 50 \text{ min}$	$\phi 130 \pm 0.5$	$\phi 210 \pm 0.8$	2.0 ± 0.5	10.0 ± 1.5	0.8 ± 0.2	1.0	

CarrierTape (Standard)



- To peel off the cover tape by the method shown in the right figure apply a peel-off force of 20GF - 60GF (card board); 10GF - 75GF (plastic tape).
- The cover tape should not touch the top or bottom of the chip.
- If the cover tape has been peeled off it may be difficult to remove the chip due to punch-hole clearance, dirt, and debris. Make sure therefore that no paper waste will adhere to and block the absorption nozzle.
- If the cover tape has been peeled off from the top, stick it back on with a suitable adhesive.
- Follow the illustration for the start and end of the winding operation.

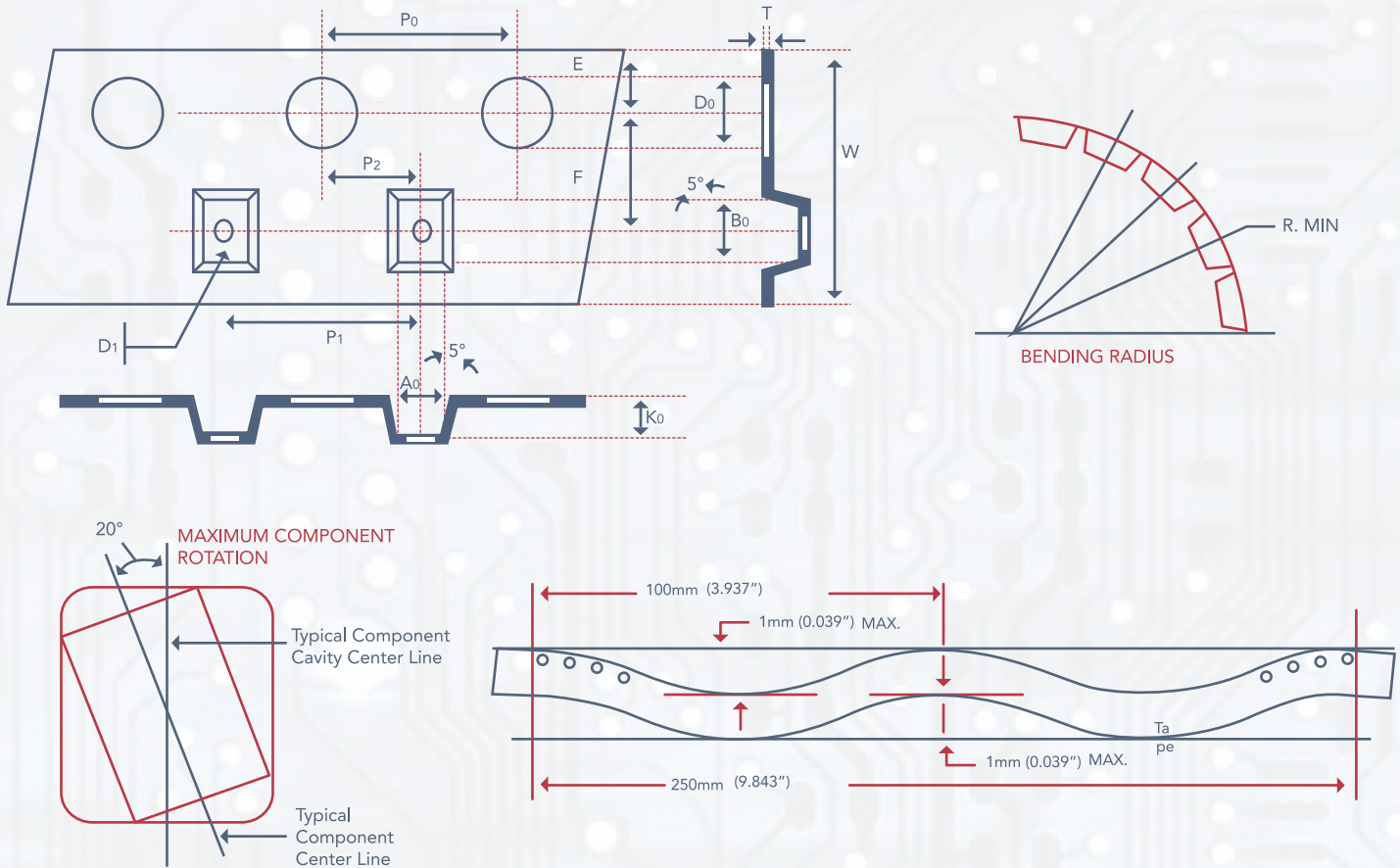
CARDBOARD CARRIER TAPE FOR 01005, 0201, 0402, 0603, 0805, 1206

3,000 D

UNIT=mm

TYPE	A ₀	B ₀	T	K ₀	W	P ₀	10XP ₀	P ₁	P ₂	D ₀	D ₁	E	F	MOUNTING HOLE	STD. REEL QTY 7"	OPTIONAL REEL QTY (10/13")
01005	0.25±0.04	0.45±0.04	0.36±0.05	*	8.0±0.30	4.0±0.10	40.0±0.10	2.0±0.05	2.0±0.05	1.5±0.1	*	1.75±0.1	3.5±0.05	Angular Punch Hole	20,000	50,000 D
0201	0.39±0.07	0.69±0.07	<0.50	*	8.0±0.10	4.0±0.10	40.0±0.10	2.0±0.05	2.0±0.05	1.55±0.05	*	1.75±0.05	3.5±0.05		10,000 15,000	50,000 D
0402	0.7±0.20	1.2±0.20	<0.80	*	8.0±0.10	4.0±0.10	40.0±0.10	2.0±0.05	2.0±0.05	1.55±0.05	*	1.75±0.05	3.5±0.05		10,000	40,000 D 50,000 G
0603	1.1±0.20	1.9±0.20	<1.20	*	8.0±0.10	4.0±0.10	40.0±0.10	2.0±0.05	2.0±0.05	1.55±0.05	*	1.75±0.05	3.5±0.05		4,000	10,000 D 15,000 G
0805	1.65±0.20	2.4±0.20	<01.30	*	8.0±0.10	4.0±0.10	40.0±0.10	2.0±0.05	2.0±0.05	1.55±0.05	*	1.75±0.05	3.5±0.05		4,000	10,000 D 15,000 G 20,000 Q
1206	2.0±0.20	3.6±0.20	<01.30	*	8.0±0.10	4.0±0.10	40.0±0.10	2.0±0.05	2.0±0.05	1.55±0.05	*	1.75±0.05	3.5±0.05		4,000	10,000 D 15,000 G 20,000 Q

Tape & Reel Dimensions



• Embossed plastic carrier tape for 0805/1206/1210/1808/1812/1825/2220 AND 2225 type

TYPE	A ₀	B ₀	T	K ₀	W	P ₀	10XP ₀	P ₁	P ₂	D ₀	D ₁	E	F	MOUNTING HOLE	STD. REEL QTY 7"	OPTIONAL REEL QTY (10/13")
0805	<1.80	<2.70	0.23±0.10	<2.50	8.0±0.20	4.0±0.10	40.0±0.20	4.0±0.10	2.0±0.05	1.5±0.10	1.0±0.10	1.75±0.10	3.5±0.05	Angular Embossed Hole	2,000 3,000	10,000 D 15,000 G
1206	<2.30	<4.00	0.23±0.10	<2.50	8.0±0.20	4.0±0.10	40.0±0.20	4.0±0.10	2.0±0.05	1.5±0.10	1.0±0.10	1.75±0.10	3.5±0.05		2,000 3,000	8,000 D 10,000 G
1210	<3.20	<3.95	0.23±0.10	<3.00	8.0±0.20	4.0±0.10	40.0±0.20	4.0±0.10	2.0±0.05	1.5±0.10	1.0±0.10	1.75±0.10	3.5±0.05		500 1,000 2,000 3,000	4,000 D 8,000 G
1808	<2.50	<5.30	0.25±0.10	<2.50	12.0±0.20	4.0±0.10	40.0±0.20	4.0±0.10	2.0±0.05	1.5±0.10	1.0±0.10	1.75±0.10	5.5±0.10		1,000 2,000 3,000	
1812	<3.90	<5.30	0.25±0.10	<3.50	12.0±0.20	4.0±0.10	40.0±0.20	8.0±0.10	2.0±0.05	1.5±0.10	1.5±0.10	1.75±0.10	5.5±0.10		500 1,000	3,000 D
1825	<6.80	<5.30	0.30±0.10	<3.10	12.0±0.20	4.0±0.10	40.0±0.20	8.0±0.10	2.0±0.05	1.5±0.10	1.5±0.10	1.75±0.10	5.5±0.10		500 1,000	
2220	<5.80	<6.50	0.30±0.10	<3.10	12.0±0.20	4.0±0.10	40.0±0.20	8.0±0.10	2.0±0.05	1.5±0.10	1.5±0.10	1.75±0.10	5.5±0.10		500 1,000	
2225	<6.80	<6.50	0.30±0.10	<3.10	12.0±0.20	4.0±0.10	40.0±0.20	8.0±0.10	2.0±0.05	1.5±0.10	1.5±0.10	1.75±0.10	5.5±0.10		500 700	

WARRANTY: All passive components supplied by Calchip Electronics, 59 Steamwhistle Drive, Ivyland, PA. 18974, are under warranty for a period of 2 years from the date of manufacture. Product will meet or exceed all reliability and test specifications expressed by Calchip for the above mentioned time period provided storage conditions (stated below) are met. Product Storage Instructions:
 1) Product must be kept away from direct sunlight.
 2) Product must be stored in the following conditions- Temperature; 5 to 35 degrees Celsius / 40 to 95 degrees Fahrenheit Humidity; 45 to 85%
 3) Product to be kept free of moisture, dirt and debris.

WHEN THESE CONDITIONS ARE NOT MET, PRODUCT LIFE COULD BE SHORTENED**

NOTICE: Specifications are subject to change without notice. Contact your nearest Cal-Chip Sales Office for the latest specifications. All statements, information and data given herein are believed to be accurate and reliable, but are presented without guarantee, warranty, or responsibility of any kind, expressed or implied. Statements or suggestions concerning possible use of our products are made without representation or warranty that any such use is free of patent infringement and are not recommendations to infringe any patent. The user should not assume that all safety measures are indicated or that other measures may not be required. Specifications are typical and may not apply to all applications.

