

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

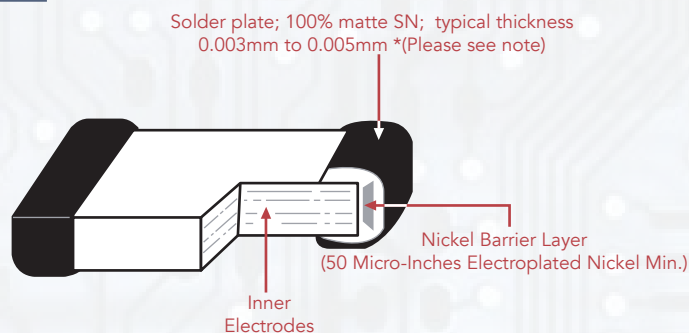
DIELECTRIC TYPE

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	•25°C, VDCW: >100GΩ For 1000QF, whichever is less •125°C, Vocw: >10GΩ For 100QF whichever is less	3 X Vdcw	0% per decade hour	• 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	• 25°C, VDCW: >100GΩ For 1000QF, whichever is less • 125°C, Vocw: >10GΩ For 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	10GΩ 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.

Cal-Chip
Electronics Inc.

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
CAP. RANGE								16
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

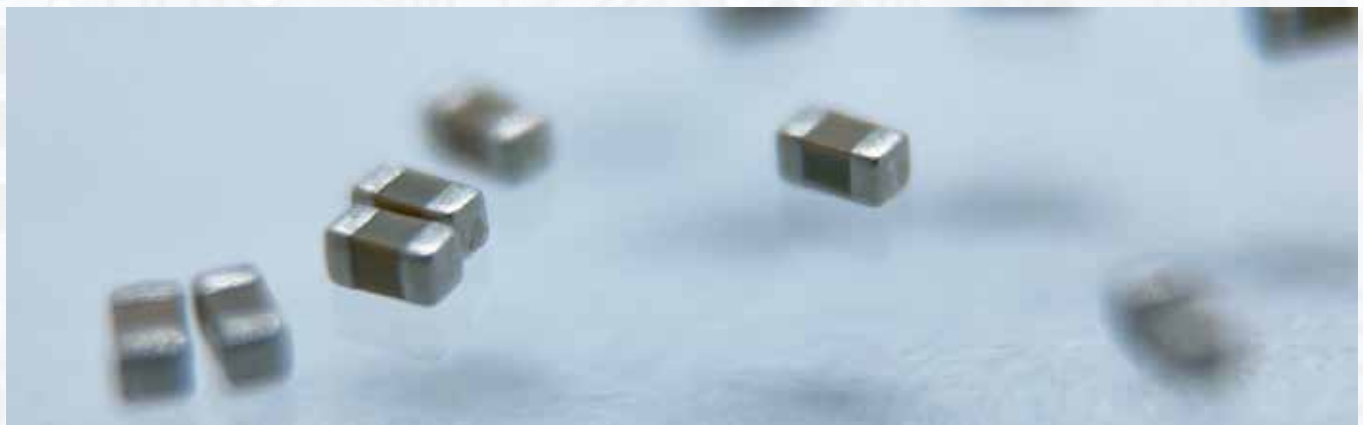
0201

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	0R1												
0.2pF	0R2												
0.3pF	0R3												
0.4	0R4												
0.47	R47												
0.5	0R5												
0.56	R56												
0.6	0R6												
0.7	0R7												
0.75	R75												
0.8	0R8												
0.82	R82												
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												
2.5	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	35	50	6.3/10	16	25	50	100	200	6.3	10	16	25	50	
CAP. RANGE																									
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																								
150	154																								
220	224																								
270	274																								
390	394																								
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																								
5.6	565																								
6.8	685																								
8.2	825																								
10	106																								
15	156																								
22	226																								
33	336																								
47	476																								

****Please note L/W/H deviation for the 10uF is +/- .2mm****

****Please note L/W/H deviation for the 22uF is +/- .3mm****



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																								
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																								
390	391																								
430	431																								
470	471																								
510	511																								
560	561																								
620	621																								
680	681																								
750	751																								
820	821																								
910	911																								

0603

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	4/6.3	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																					
39	393																					
47	473																					
56	563																					
68	683																					
82	823																					
100	104																					
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												
W		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												
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																													
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																												
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																												

Cal-Chip

DIMENSION (MM)		GMC31																							
L(L1)		3.2 ± 0.3				3.2 ± 0.3								3.2 ± 0.3								3.2 ± 0.3			
W		1.6 ± 0.2				1.6 ± 0.2								1.6 ± 0.2								1.6 ± 0.2			
H		1.8 max				1.8 max								1.8 max								1.8 max			
BWL2/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		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																									
0.47pF	0R47																								
0.5	R50																								
0.56	R56																								
0.68	R68																								
0.75	R75																								
0.8	0R8																								
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																								

DIMENSION (MM)		GMC31																							
L(L1)		3.2 ± 0.3				3.2 ± 0.3								3.2 ± 0.3						3.2 ± 0.3					
W		1.6 ± 0.2				1.6 ± 0.2								1.6 ± 0.2						1.6 ± 0.2					
H		1.8 max				1.8 max								1.8 max						1.8 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		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	6.3	10
CAP. RANGE																									
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																								
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																								
4.7	475																								
6.8	685																								
10	106																								
15	156																								
22	226																								
33	336																								
47	476																								
68	686																								
100	107																								
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				
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																									
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																								

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

DIMENSION (MM)		GMC40							
L(L1)		4.57 ± 0.25				4.57 ± 0.25			
W		2.03 ± 0.25				2.03 ± 0.25			
H		2.1 max				3 max			
BW(L2/L3)		0.25 ~ 0.75				0.25 ~ 0.75			
DIELECTRIC		NPO/COG				X7R			
RATED VOLTAGE		50	100	200	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								
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								
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								

1808

DIMENSION (MM)		GMC43																	
L(L1)		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				
H		2.2 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				
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																			
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																		
360	361																		

1825

DIMENSION (MM)		GMC45							
L(L1)		4.5 ± 0.35			4.5 ± 0.35				
W		6.3 ± 0.4			6.3 ± 0.4				
H		2.2 max			3.2 max				
BW(L2/L3)		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								
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								

DIMENSION (MM)		GMC55																			
L(L1)		5.7 ± 0.4				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				5.0 ± 0.4			
H		2.2 max				3.5 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				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		
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																				
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																				
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																				

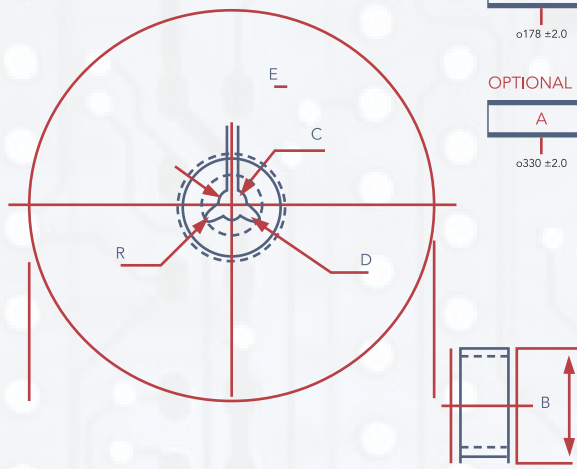
2225

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

A	B	C	D	E	W	t	R
$\phi 178 \pm 2.0$	$\phi 50 \text{ min}$	$\phi 13.0 \pm 0.5$	$\phi 21.0 \pm 0.8$	2.0 ± 0.5	$10.2-9\text{mm}$ $14.0-12\text{mm}$ ± 1.5	0.8 ± 0.2	1.0

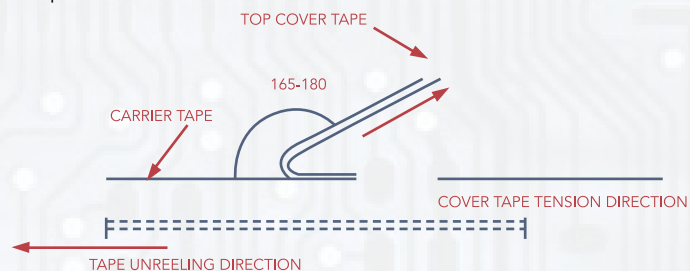
UNIT: mm

OPTIONAL 10/13 INCH REELS

A	B	C	D	E	W	t	R
$\phi 330 \pm 2.0$	$\phi 50 \text{ min}$	$\phi 13.0 \pm 0.5$	$\phi 21.0 \pm 0.8$	2.0 ± 0.5	10.0 ± 1.5	0.8 ± 0.2	1.0

UNIT: mm

CarrierTape (Standard)



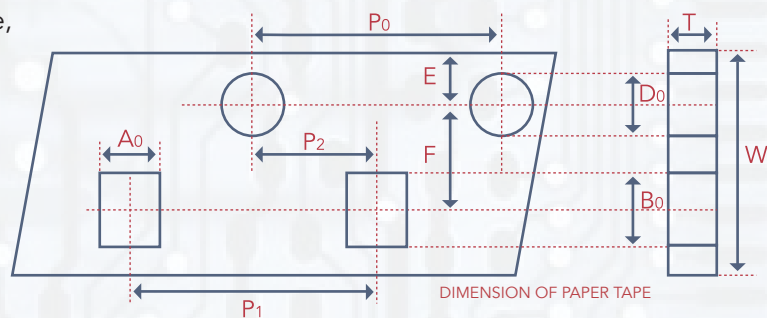
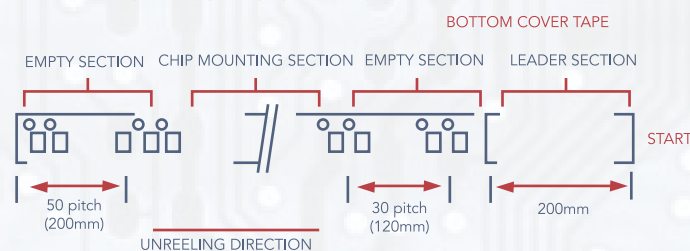
- To peel off the cover tape by the method shown in the right figure apply a peel-off force of 20GF - 60GF (card board); 10GF - 75GF (plastic tape).

- 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.



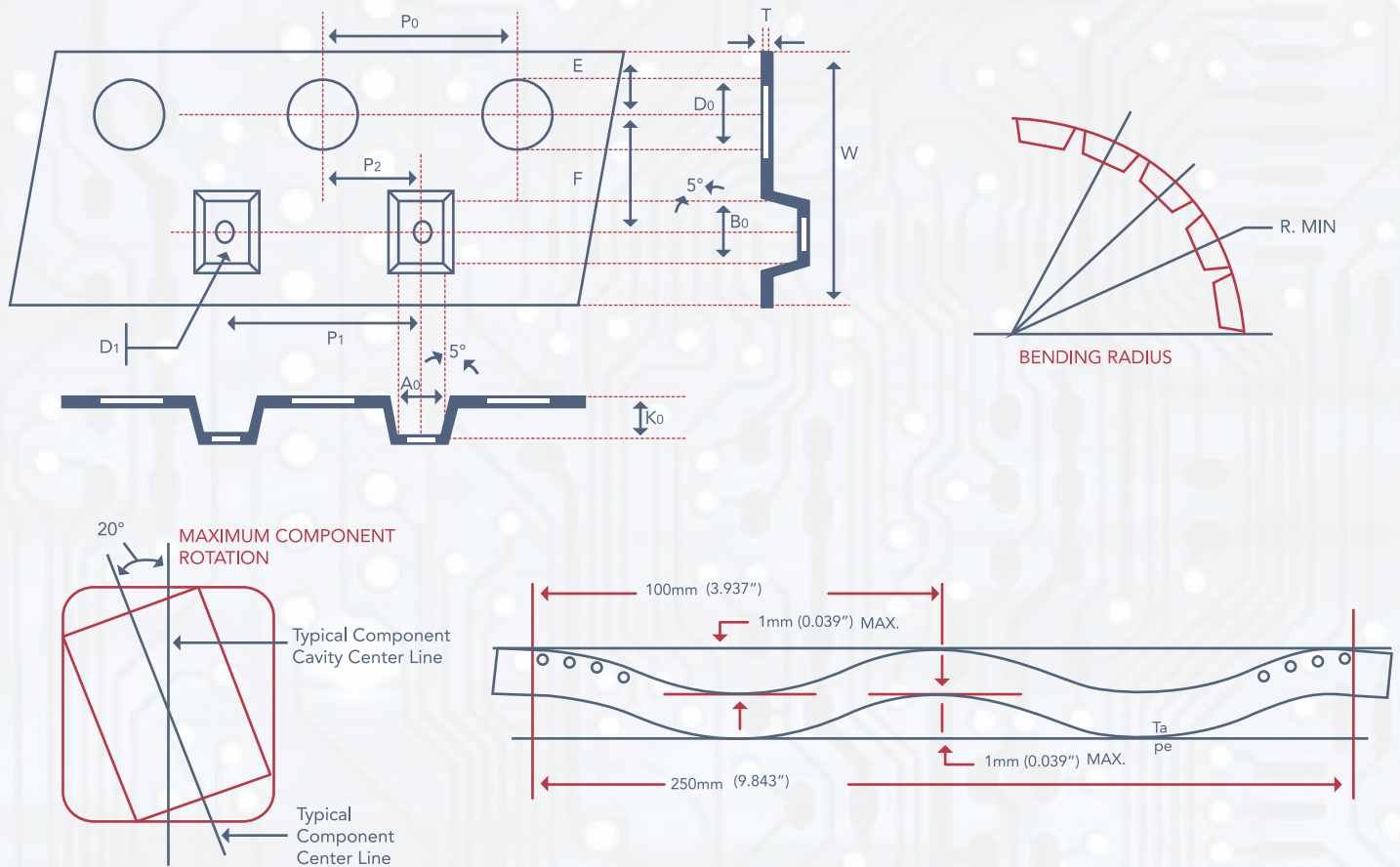
CARDBOARD CARRIER TAPE FOR 01005, 0201, 0402, 0603, 0805, 1206

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.

Cal-Chip
Electronics Inc.