

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

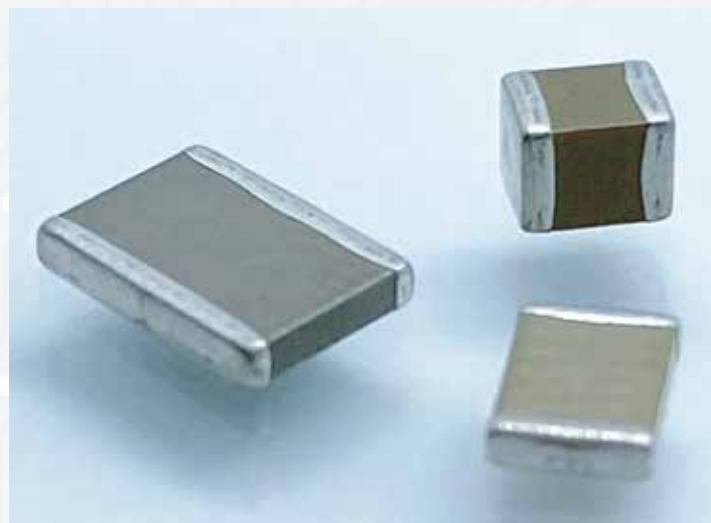
- Large capacitance values in small sizes
- Excellent high frequency characteristics

CHIP CAPACITOR SELECTION

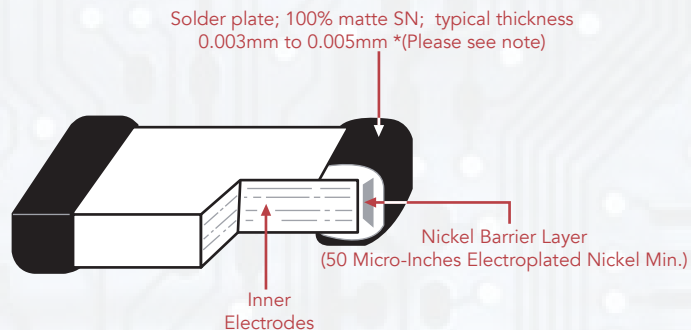
DIELECTRIC TYPE

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	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.



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

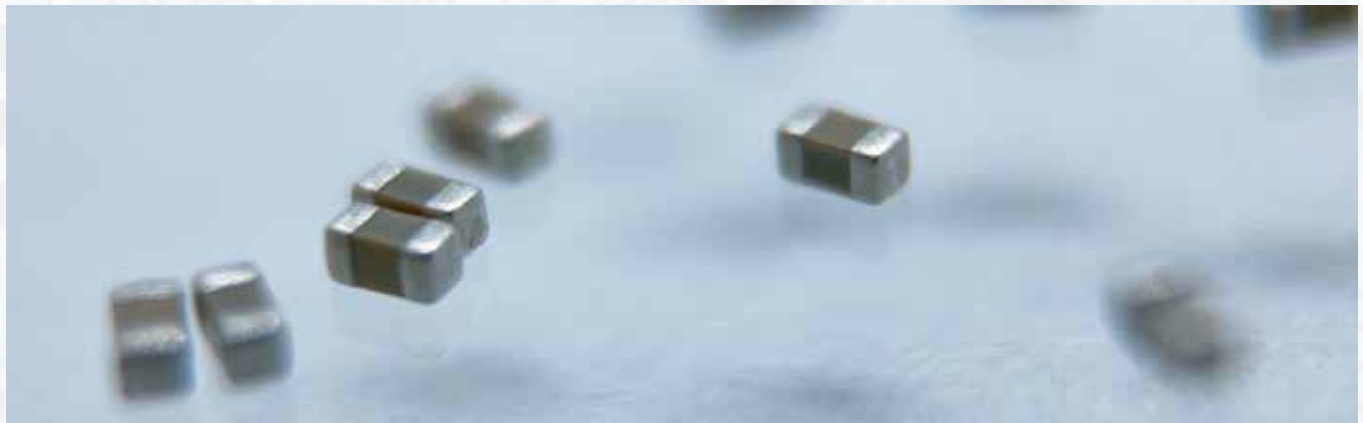
0201

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												
0.2	OR2												
0.3	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												
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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																					
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43	430																					
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56	560																					
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68	680																					
75	750																					
82	820																					
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110	111																					
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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)		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																							
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100	104																							
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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																				
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15	150																				
16	160																				
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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																				
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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																				
9.1	9R1																				
10	100																				
11	110																				
12	120																				
13	130																				
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75	750																				
82	820																				
91	910																				
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150	151																				
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	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																											
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																										
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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																										
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)		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							
	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																								
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																							
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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					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																									
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6.8	682																									
8.2	822																									
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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																									
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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.

GMC40

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

GMC43

DIMENSION (MM)		GMC43	
L(L1)	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
H	2.2 max	3 max	3 max
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75	0.25 ~ 0.75
DIELECTRIC	NPO/COG	X7R	X5R
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		

1812

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																		
	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																		
	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	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														
	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														

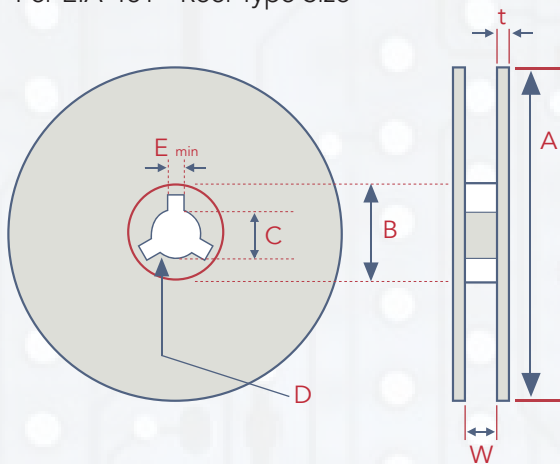
DIMENSION (MM)		GMC55																			
L(L1)	5.7 ± 0.4	5.7 ± 0.4					5.7 ± 0.4					5.7 ± 0.4									
W	5.0 ± 0.4	5.0 ± 0.4					5.0 ± 0.4					5.0 ± 0.4									
H	2.2 max	3.5 max					3.5 max					3.5 max									
BW(L2/L3)	0.25 ~ 0.75	0.25 ~ 0.75					0.25 ~ 0.75					0.25 ~ 0.75									
DIELECTRIC	NPO/COG	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																				
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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																				
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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)

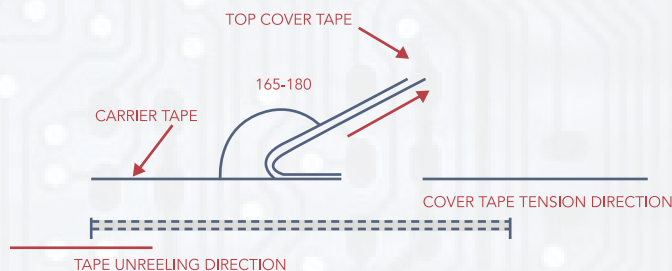
Per EIA-481 - Reel Type Size



UNIT: mm

SYMBOL	TAPE WIDTH	A	B	C	D	E	W	t
7" Reel	4mm	$\phi 178 \pm 2.0$	MIN $\phi 50$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	5 ± 0.5	1.2 ± 0.2
	8mm	$\phi 178 \pm 2.0$	MIN $\phi 50$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	10 ± 0.5	0.9 ± 0.2
	12mm	$\phi 178 \pm 2.0$	MIN $\phi 50$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	13 ± 0.5	1.2 ± 0.2
10" Reel	8mm	$\phi 258 \pm 2.0$	MIN $\phi 70$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	10 ± 0.5	1.8 ± 0.2
	12mm	$\phi 330 \pm 2.0$	MIN $\phi 70$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	10 ± 0.5	1.8 ± 0.2
13" Reel	8mm	$\phi 330 \pm 2.0$	MIN $\phi 70$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	10 ± 0.5	1.8 ± 0.2
	12mm	$\phi 330 \pm 2.0$	MIN $\phi 70$	$\phi 13 \pm 0.5$	21 ± 0.8	2.0 ± 0.5	13 ± 0.5	2.2 ± 0.2

CarrierTape (Standard)



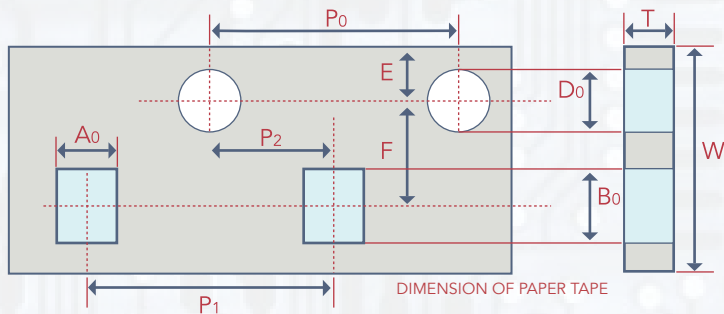
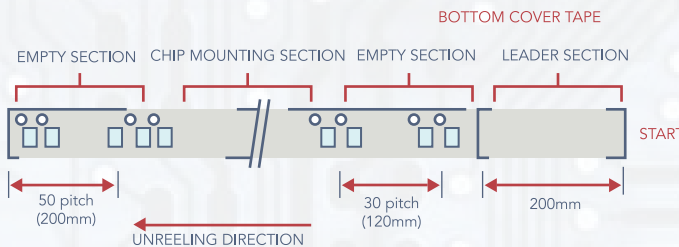
- To peel off the cover tape by the method shown in the right figure apply a peel-off force of 20GF - 60GF (card board); 10GF - 75GF (plastic tape).

-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.



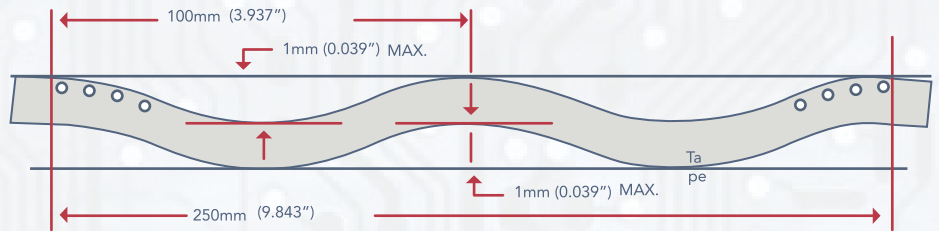
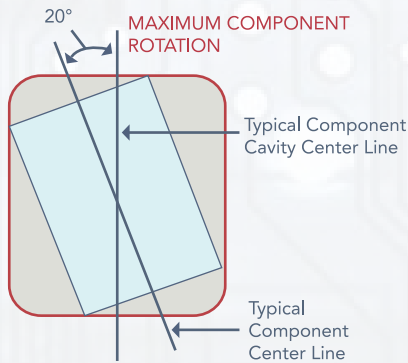
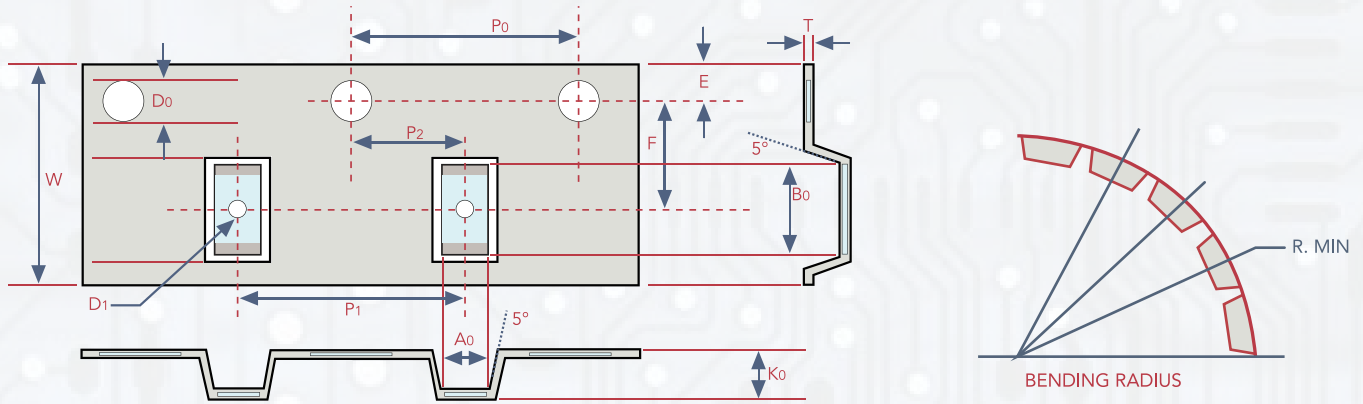
CARDBOARD CARRIER TAPE FOR 01005, 0201, 0402, 0603, 0805, 1206

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

PACKAGING (TAPING)

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**

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