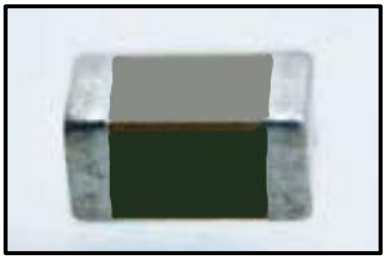
GMC Series

Dielectric X5R



Features

- Large capacitance values in small sizes
- Excellent high frequency characteristics
- All PPI Caps conform to EIA Specifications

Applications

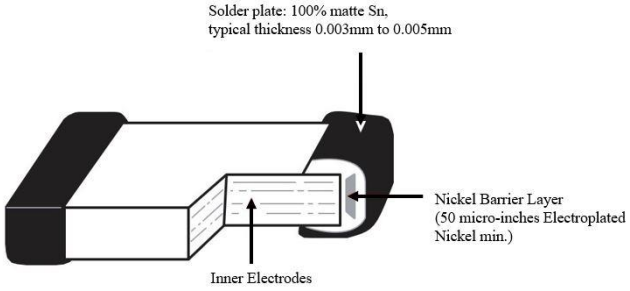
- Can be used on surface mount assembly equipment
- Our fully integrated manufacturing and total quality control systems ensure uprecedented high standards of quality and reliability.

Notes

- Capacitance Value & Tolerance are determined by circuit requirements
- Voltage is determined by circuit requirements
- Capacitor Size select the smallest unit permitted by the circuit constraints that provides the required capacitance and voltage rating
- Nickel Barrier is standard and recommended for units exposed to repeated solder cycles, to minimize leaching of the termination.
- All capacitors conform to EIA specifications.

Construction

Constructed by screen printing alternative layers of internal metallic electrodes onto ceramic dielectric materials and firing into a concrete monolithic body, then completed by application of metal end terminations which are fired to assure permanent bonding with the individual internal electrodes.



Please note that the contents of this document are subject to change at any time at PPI's sole discretion. The most up-to-date version of this document is available at www.passiveplus.com

GMC Series

Dielectric X5R

NP0/ COG

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 NP0s, one-fifth that shown by most other dielectrics. NP0 formulations show no aging characteristics.

Part Numbering

PPI-GMC 02 X5R 103 J 500 NT D

- PPI-GMC: PPI Series
- 02: Case Size Code — See Table
- X5R: Dielectric CG=NP0
- 103: Capacitor Code — 100=10x10⁰=10pF, 1R0=1.0pF
- J: Capacitance Tolerance: *See Table*
- 500: Rated Voltage *See Table*
- NT: Termination Type *See Table*
- D: Packaging *See Table*

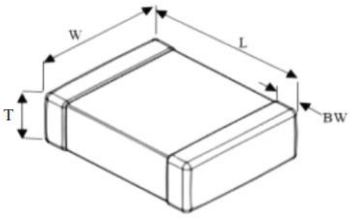
RoHS

Dielectric

Ultra Stable Class I Dielectric: Linear temperature coefficient, low loss, negligible change of electrical properties with time, voltage and frequency.

Dimensions (mm)

		Dimensions (mm)			
Code	**Size**	**L**	**W**	**T**	**BW**
01	**01005**	0.40 ± 0.02	0.20 ± 0.02	0.20 ± 0.02	0.07 ~ 0.14
02	**0201**	0.60 ± 0.03	0.30 ± 0.03	0.30 ± 0.03	0.15 ± 0.05
04	**0402**	1.00 ± 0.05	0.50 ± 0.05	0.50 ± 0.10	0.10 ~ 0.35
10	**0603**	1.60 ± 0.20	0.80 ± 0.20	1.0 max	0.10 ~ 0.40
21	**0805**	2.00 ± 0.30	1.25 ± 0.20	1.40	0.25 ~ 0.75
31	**1206**	3.20 ± 0.30	2.50 ± 0.20	2.20	0.25 ~ 0.75
32	**1210**	3.20 ± 0.30	1.60 ± 0.20	1.80	0.25 ~ 0.75
40	**1808**	4.50 ± 0.35	3.20 ± 0.30	2.20	0.25 ~ 0.75
43	**1812**	3.20 ± 0.30	1.6 ± 0.20	1.80	0.25 ~ 0.75
45	**1825**	5.70 ± 0.40	5.01 ± 0.40	1.80	0.25 ~ 0.75
55	**2220**	5.70 ± 0.40	6.30 ± 0.40	2.20	0.25 ~ 0.75
57	**2225**	4.50 ± 0.35	6.30 ± 0.40	2.20	0.25 ~ 0.75



Capacitance Code

Cap Code	Value	Cap Code	Value	Cap Code	Value	Cap Code	Value
0R5	0.5pF	**100**	10pF	**104**	0.1uF	**106**	10uF
5R0	5.0pF	**103**	0.01uF	**105**	1.0uF	**107**	100uF

Capacitance Tolerances

Code	B	C	D	F	G	J	K	M	Z
Tol.	±0.1pF	±0.25pF	±0.5pF	±1%	±2%	±5%	±10%	±20%	-20% + 80%

Rated Voltages

Code	Voltage	Code	Voltage
4R0	4.0V	35	35V
6R3	6.3V	50	50V
10	10V	63	63V
16	16V	100	100V
25	25V	200	200V

Terminations

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

Code	Description
NT	Sn/Ni
PT	Pd/Ag

Stable Class II Dielectric

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

Electrical Specifications

Operating Temperature Range	-55°C to +85°C
Temperature Coefficient (TC)	±15%
Temperature Voltage Coefficient (ΔcMax @ V_{DCW})	Not Applicable
Dissipation Factor	2.5% Max, 1.80% Typical
Insulation Resistance (IR)	25°C, V_{DCW}; > 100GQF or 1000QF, whichever is less 125°C V_{DCW}; > 10GQF or 100QF, whichever is less
Dielectric Withstanding Voltage	2.5 X V_{DCW}
Aging Rate	< 2% per decade hour
Test Parameters	1KHz 1.0Vrms ±0.2Vrms 25°C values > or = to 10uF 1.0 Vrms 120Hz

01005: PPI-GMC01

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
150 pF	151	K,M	10V	1.5	152	K,M	10V	15	153	K,M	10V
180	181			1.8	182			18	183		
220	221			2.2	222			22	223		
270	271			2.7	272			27	273		
330	331			3.3	332			33	333		
390	391			3.9	392			39	393		
470	471			4.7	472			47	473		
560	561			5.6	562			56	563		
680	681			6.8	682			68	683		
820	821			8.2	822			82	823		
1.0 nF	102			10	103			100	104		
1.2	122			12	123						

0201: PPI-GMC02

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 pF	101	K,M	6.3V or 10V or 16V or 25V	1.5	152	K,M	6.3V or 10V or 16V or 25V	27	273	K,M	6.3V or 10V or 16V or 25V
120	121			1.8	182			33	333		
150	151			2.2	222			39	393		
180	181			3.3	332			47	473		
220	221			3.9	392			56	563		
270	271			4.7	472			68	683		
330	331			5.6	562			82	823		
390	391			6.8	682			100	104		
470	471			8.2	822			220	224		
560	561			10	103			470	474		6.3V or 10V
680	681			12	123			1.0 uF	105		6.3V or 10V or 16V or 25V
820	821			15	153			2.2	225		6.3V
1.0 nF	102			18	183			4.7	475		
1.2	122			22	223						

0402: PPI-GMC04

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
1.0 nF	102	K,M	6.3V or 10V or 16V or 25V or 35V or 50V	15	153	K,M	6.3V or 10V or 16V or 25V or 35V or 50V	270	274	K,M	6.3V or 10V or 16V or 25V or 35V
1.2	122			18	183			390	394		
1.5	152			22	223			470	474		6.3V or 10V or 16V or 25V or 35V or 50V
1.8	182			27	273			560	564		6.3V or 10V or 16V or 25V
2.2	222			33	333			680	684		6.3V or 10V or 16V or 25V or 35V
2.7	272			39	393			820	824		6.3V or 10V or 16V or 25V
3.3	332			47	473			1.0 uF	105		6.3V or 10V or 16V or 25V or 35V
3.9	392			56	563			2.2	225		
4.7	472			68	683			3.3	335		6.3V or 10V or 16V
5.6	562			82	823			3.9	395		6.3V or 10V
6.8	682			100	103			4.7	475		6.3V or 10V or 16V
8.2	822			150	154		6.3V or 10V or 16V or 25V or 35V	10	106		6.3V or 10V
10	103			220	224		6.3V or 10V or 16V or 25V or 35V or 50V	22	226		6.3V
12	123										

0603: PPI-GMC10

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
100 nF	104	K,M	6.3V or 10V or 25V or 35V	560	564	K,M	6.3V or 10V or 25V or 35V	3.9	395	K,M	6.3V or 10V or 25V or 35V
120	124			680	684			4.7	475		
150	154			820	824			10	106		
220	224			1.0 uF	105			22	226		6.3V or 10V
270	274			2.2	225			47	476		6.3V
330	334			2.7	275						
470	474			3.3	335						

Dielectric X5R

0805: PPI-GMC21

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
180 nF	184	K,M	4V or 6.3V or 10V or 16V or 25V or 35V or 50V	820	824	K,M	4V or 6.3V or 10V or 16V or 25V or 35V or 50V	15	156	K,M	4V or 6.3V or 10V or 16V or 25V or 35V
220*	224			1.0 uF*	105			22	226		
270	274			2.2*	225			33	336		4V or 6.3V or 10V
390	394			3.3	335			47	476		
470*	474			4.7*	475			100	107		4V or 6.3V
560	564			6.8	685		4V or 6.3V or 10V or 16V or				
680	684			10	106						

*Also available in 63V

1206: PPI-GMC31

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
180 nF	184	K,M	4V or 6.3V or 10V or 16V or 25V or 50V	820	824	K,M	4V or 6.3V or 10V or 16V or 25V or 50V	15	156	K,M	4V or 6.3V or 10V or 16V or 25V
220	224			1.0 uF	105			22	226		
270	274			2.2	225			33	336		
390	394			3.3	335			47	476		
470	474			4.7	475			100	107		4V or 6.3V or 10V
560	564			6.8	685			150	157		4V
680	684			10	106						

1210: PPI-GMC32

Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
180 nF	184	K,M	4V or 6.3V or 10V or 16V or 25V or 50V	1.0 uF	105	K,M	4V or 6.3V or 10V or 16V or 25V or 50V	33	336	K,M	4V or 6.3V or 10V or 16V or 25V
220	224			2.2	225			47	476		
270	274			3.3	335			100	107		4V or 6.3V or 10V or 16V
390	394			4.7	475			150	157		4V or 6.3V
470	474			6.8	685			220	227		
560	564			10	106			330	337		4V
680	684			15	156		4V or 6.3V or 10V or 16V or				
820	824			22	226						

1812: PPI-GMC43

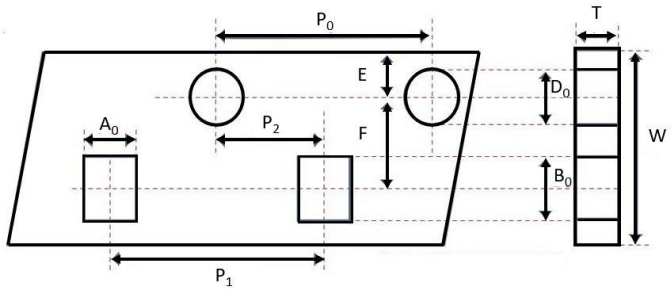
Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC	Value	Code	Tol.	Rated WVDC
10 nF	106	K,M	10V or 16V or 25V	22	226	K,M	10V or 16V or 25V	47	476	K,M	6.3V or 10V
15	156			33	336		6.3V or 10V or 16V	100	107		

EIA Case Sizes: 01005, 0201, 0402, 0603, 0805, 1206

Packaging

Size		Code	Description	
		D	**G**	**Q**
	Qty per 7" Reel	*Qty per 10/13" Reel*		
01005	20K	50K		
0201	10K/ 15K	50K		
0402	10K	40K	50K	
0603	4K	10K	15K	
0805	2K, 3K, 4K	10K	15K	20K
1206	2K, 3K, 4K	10K	15K	20K
1210	500,1K, 2K, 3K	4K	8K	
1808	1K, 2K, 3K			
1812	500, 1K	3K		
1825	500, 1K			
2220	500, 1K			
2225	500, 750			

Tape & Reel Specifications



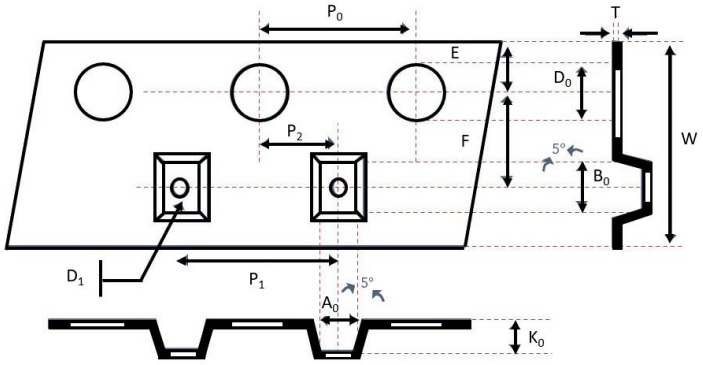
Cardboard carrier tape for EIA case sizes: 01005, 0201, 0402, 0603, 0805, 1206

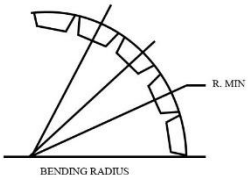
Unit: mm

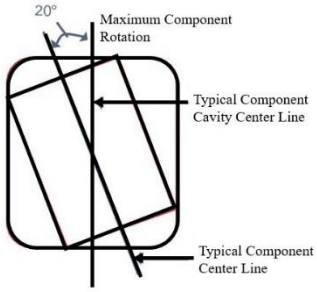
Size	A_0	B_0	T	K_0	W	P_0	10XPo	P_1	P_2	Do	D_1	E	F
01005	0.25 ± 0.04	0.45 ± 0.04	0.36 ± 0.05	*	8.00 ± 0.30	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	*	1.75 ± 0.10	3.50 ± 0.05
0201	0.39 ± 0.07	0.69 ± 0.07	<0.50	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
0402	0.70 ± 0.20	1.20 ± 0.20	<0.80	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
0603	1.10 ± 0.20	1.90 ± 0.20	<1.20	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
0805	1.65 ± 0.20	2.40 ± 0.20	<1.30	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05
1206	2.00 ± 0.20	3.60 ± 0.20	<1.30	*	8.00 ± 0.10	4.00 ± 0.10	40.00 ± 0.10	2.00 ± 0.05	2.00 ± 0.05	1.55 ± 0.05	*	1.75 ± 0.05	3.50 ± 0.05

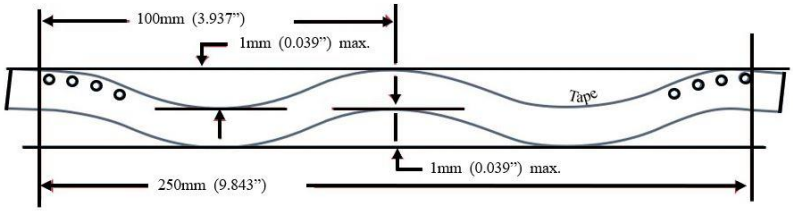
0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225

Tape & Reel Specifications









Embossed plastic carrier tape for case sizes: 0805, 1206, 1210, 1808, 1812, 1825, 2220, 2225

Unit: mm

Size	A_0	B_0	T	K_0	W	P_0	10XPo	P_1	P_2	Do	D_1	E	F
0805	<1.80	<2.70	0.23 ± 0.10	<2.50	8.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	3.50 ± 0.05
1206	<2.30	<4.00	0.23 ± 0.10	<2.50	8.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	3.50 ± 0.05
1210	<3.20	<3.95	0.23 ± 0.10	<3.00	8.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	3.50 ± 0.05
1808	<2.50	<5.30	0.25 ± 0.10	<2.50	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.00 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
1812	<3.90	<5.30	0.25 ± 0.10	<3.50	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
1825	<6.80	<5.30	0.30 ± 0.10	<3.10	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
2220	<5.80	<6.50	0.30 ± 0.10	<3.10	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10
2225	<6.80	<6.50	0.30 ± 0.10	<3.10	12.00 ± 0.20	4.00 ± 0.10	40.00 ± 0.20	2.00 ± 0.05	2.00 ± 0.05	1.50 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.10