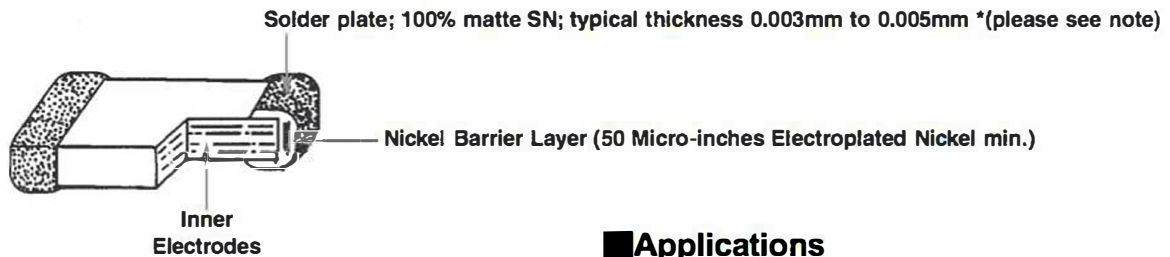




Construction



Introduction

- 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

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.

| 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, V_{DCW}:: >100GΩF or 1000ΩF, whichever is less • 125°C, V_{DCW}:: >10GΩF or 100ΩF whichever is less | 3 X V_{DCW} | 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 $\pm 15\%$ from -55°C to $+125^{\circ}\text{C}$ (-55°C to $+85^{\circ}\text{C}$ 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 | $\pm 15\%$ | X7R/X5R Not Applicable | 2.5% Max, 1.8% Typical | <ul style="list-style-type: none"> • 25°C, V_{DCW}: >100GΩFor 1000ΩF, whichever is less • 125°C, V_{DCW}: >10GΩF or 100ΩF whichever is less | 2.5 X V_{DCW} | <2% per decade hour | 1KHz, 1.0Vrms ± 0.2 Vrms 25°C values > or = to 10uF 1.0Vrms 120Hz |

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 $+85^{\circ}\text{C}$. 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 | Dissipation Factor | Insulation Resistance | Dielectric withstanding Voltage | Aging Rate | Test Parameters |
|--|-------------------------|---------------------------|--|---------------------------------|-------------------------|---|
| -30°C to $+85^{\circ}\text{C}$ | $+22\%$ - -82% | 3.0% Max, 2.0% Typical | 10G Ω or 100 Ω F whichever is less, 25°C , V_{DCW} | 2.5 X V_{DCW} | 3.0% per decade hour | 1KHz, 1Vrms 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 | 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 Below G: See Below Q: See Below |

**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.

PACKAGING 10"/13" REELS ONLY

| Type | D | G | Q |
|-------------|-----|-----|-----|
| 0201 | 50K | | |
| 0402 | 50K | | |
| 0603 | 10K | 15K | |
| 0805 | 10K | 15K | 20K |
| 1206 | 10K | 15K | 20K |
| 1210 | 4K | 8K | 10K |
| 1808 | 8K | | |
| 1812 | 2K | 8K | |
| 1825 | | | |
| 2220 | | | |
| 2225 | | | |

01005



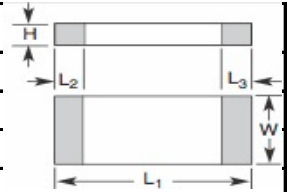
| DIMENSION (MM) | | GMC01 | | | | | |
|----------------|-----|--------------|-------|-----|----|-----|---------|
| L(L1) | | 0.4 ± 0.02 | | | | | |
| W | | 0.2 ± 0.02 | | | | | |
| H | | 0.2 ± 0.02 | | | | | |
| BW(L2/L3) | | 0.07 ~ 0.14 | | | | | |
| dielectric | | NPO/COG | | X7R | | X5R | Y5V/Z5U |
| Rated Voltage | | 6.3 | 10/16 | 6.3 | 10 | 10 | 16 |
| Cap. Range | | | | | | | |
| 0.50F | 0R5 | | | | | | |
| 1 | 1R0 | | | | | | |
| 1.2 | 1R2 | | | | | | |
| 1.5 | 1R5 | | | | | | |
| 1.8 | 1R8 | | | | | | |
| 2.2 | 2R2 | | | | | | |
| 2.7 | 2R7 | | | | | | |
| 3.3 | 3R3 | | | | | | |
| 3.9 | 3R9 | | | | | | |
| 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 | | | | | | |
| 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 | | | | | | |

| 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 | | 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 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | |

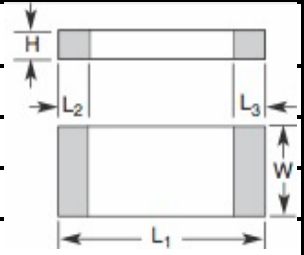
Please note L/W/H deviation for the 22uF is +/- .2mm

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 | | 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 | | | | | | | | | | | | | | | | | | | | | | |
| 0.5pF | OR5 | | | | | | | | | | | | | | | | | | | | | |
| 0.4 | R40 | | | | | | | | | | | | | | | | | | | | | |
| 0.47 | R47 | | | | | | | | | | | | | | | | | | | | | |
| 0.7 | R70 | | | | | | | | | | | | | | | | | | | | | |
| 0.75 | R75 | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | |



| 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 | | COG | | | | X5R | | | | X7R | | | | | | Y5V & Z5U | | | | | |
| Rated Voltage | | 25 | 50 | 100 | 200 | 6.3 | 10 | 16/25 | 35 | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 6.3 | 10 | 16 | 25 | 50 |
| Cap. Range | | | | | | | | | | | | | | | | | | | | | |
| 1.0nF | 102 | | | | | | | | | | | | | | | | | | | | |
| 1.2 | 122 | | | | | | | | | | | | | | | | | | | | |
| 1.5 | 152 | | | | | | | | | | | | | | | | | | | | |
| 1.8 | 182 | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 222 | | | | | | | | | | | | | | | | | | | | |
| 2.7 | 272 | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 332 | | | | | | | | | | | | | | | | | | | | |
| 3.9 | 392 | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 472 | | | | | | | | | | | | | | | | | | | | |
| 5.6 | 562 | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 682 | | | | | | | | | | | | | | | | | | | | |
| 7.5 | 752 | | | | | | | | | | | | | | | | | | | | |
| 8.2 | 822 | | | | | | | | | | | | | | | | | | | | |
| 10 | 103 | | | | | | | | | | | | | | | | | | | | |
| 12 | 123 | | | | | | | | | | | | | | | | | | | | |
| 15 | 153 | | | | | | | | | | | | | | | | | | | | |
| 18 | 183 | | | | | | | | | | | | | | | | | | | | |
| 22 | 223 | | | | | | | | | | | | | | | | | | | | |
| 27 | 273 | | | | | | | | | | | | | | | | | | | | |
| 33 | 333 | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | |
| 5.6 | 565 | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | |
| 8.2 | 825 | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | | | | | | | | | | | | | | | | | | |
| 15 | 156 | | | | | | | | | | | | | | | | | | | | |
| 22 | 226 | | | | | | | | | | | | | | | | | | | | |
| 33 | 336 | | | | | | | | | | | | | | | | | | | | |
| 47 | 476 | | | | | | | | | | | | | | | | | | | | |



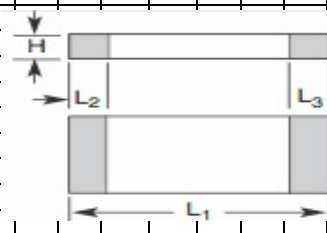
0805 - 1210 X7R



| DIMENSION (MM) | GMC21 | | | | | | | | GMC31 | | | | | | | | GMC32 | | | | | | | |
|----------------|-------------|----|----|----|----|----|-----|-----|-------------|----|----|----|----|-----|-----|-----|-------------|----|----|----|-----|-----|--|--|
| L(L1) | 2.0 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | |
| W | 1.25 ± 0.2 | | | | | | | | 1.6 ± 0.2 | | | | | | | | 2.5 ± 0.3 | | | | | | | |
| H | 1.5 | | | | | | | | 1.8 | | | | | | | | 2.8 | | | | | | | |
| BW(L2/L3) | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | |
| Rated Voltage | 6.3 | 10 | 16 | 25 | 35 | 50 | 100 | 200 | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | 6.3 | 10 | 16 | 25 | 50 | 100 | 200 | | |
| Cap. Range | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 335 | | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 475 | | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 226 | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 336 | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 476 | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 686 | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 107 | | | | | | | | | | | | | | | | | | | | | | | |

1808 - 2225 (X7R) (cont)

| DIMENSION (MM) | | GMC40 | | | | GMC43 | | | | GMC45 | | | | GMC55 | | | | GMC57 | | | | | | | | |
|----------------|-----|-------------|----|-----|-----|-------------|----|----|----|-------------|-----|----|----|-------------|-----|-----|----|-------------|----|-----|-----|----|----|----|-----|-----|
| L(L1) | | 4.57 ± 0.25 | | | | 4.5 ± 0.35 | | | | 4.5 ± 0.35 | | | | 5.7 ± 0.4 | | | | 5.7 ± 0.4 | | | | | | | | |
| W | | 2.03 ± 0.25 | | | | 3.2 ± 0.3 | | | | 6.3 ± 0.4 | | | | 5.0 ± 0.4 | | | | 6.3 ± 0.4 | | | | | | | | |
| H | | 3 | | | | 3 | | | | 3.2 | | | | 3.5 | | | | 3.5 | | | | | | | | |
| BW(L2/L3) | | 0.25 ~ 0.75 | | | | 0.25 ~ 0.75 | | | | 0.25 ~ 0.75 | | | | 0.25 ~ 0.75 | | | | 0.25 ~ 0.75 | | | | | | | | |
| Rated Voltage | | 25 | 50 | 100 | 200 | 10 | 16 | 25 | 50 | 100 | 200 | 16 | 25 | 50 | 100 | 200 | 16 | 25 | 50 | 100 | 200 | 16 | 25 | 50 | 100 | 200 |
| Cap. Range | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 335 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 226 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 336 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 476 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 686 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 107 | | | | | | | | | | | | | | | | | | | | | | | | | |



0805- 2220 (X5R)

| DIMENSION (MM) | GMC21 | | | | | | | | GMC31 | | | | | | | | GMC32 | | | | | | | | GMC43 | | | | | | | | GMC55 | | | | | | | |
|----------------|-------------|-----|----|----|----|----|----|----|-------------|-----|----|----|----|----|---|-----|-------------|----|----|----|-----|----|----|----|-------------|-----|----|----|----|----|-----|----|-------------|----|----|--|--|--|--|--|
| L(L1) | 2.0 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 4.5 ± 0.35 | | | | | | | | 5.7 ± 0.4 | | | | | | | |
| W | 1.25 ± 0.2 | | | | | | | | 1.6 ± 0.2 | | | | | | | | 2.5 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 5.0 ± 0.4 | | | | | | | |
| H | 1.5 | | | | | | | | 1.8 | | | | | | | | 2.8 | | | | | | | | 3 | | | | | | | | 3.5 | | | | | | | |
| BW(L2/L3) | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | |
| Rated Voltage | 4 | 6.3 | 10 | 16 | 25 | 35 | 50 | 63 | 4 | 6.3 | 10 | 16 | 25 | 50 | 4 | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 180 nF | 184 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 224 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 270 | 274 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 390 | 394 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 470 | 474 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 560 | 564 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 680 | 684 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 820 | 824 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.0 uF | 105 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 225 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 335 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.7 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | 156 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 226 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 336 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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.

0805- 2220 (Y5V/Z5U)

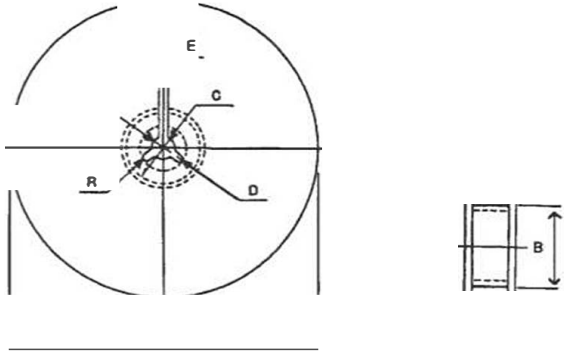
| DIMENSION (MM) | GMC21 | | | | | | | | GMC31 | | | | | | | | GMC32 | | | | | | | | GMC43 | | | | | | | | GMC55 | | | | | | | |
|----------------|-------------|----|----|----|----|-----|----|----|-------------|----|-----|----|----|----|----|-----|-------------|----|----|----|-----|----|----|----|-------------|-----|----|----|----|----|-----|----|-------------|----|----|--|--|--|--|--|
| L(L1) | 2.0 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 4.5 ± 0.35 | | | | | | | | 5.7 ± 0.4 | | | | | | | |
| W | 1.25 ± 0.2 | | | | | | | | 1.6 ± 0.2 | | | | | | | | 2.5 ± 0.3 | | | | | | | | 3.2 ± 0.3 | | | | | | | | 5.0 ± 0.4 | | | | | | | |
| H | 1.5 | | | | | | | | 1.8 | | | | | | | | 2.8 | | | | | | | | 3 | | | | | | | | 3.5 | | | | | | | |
| BW(L2/L3) | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | | 0.25 ~ 0.75 | | | | | | | |
| Rated Voltage | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 nF | 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2.2 | 225 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3.3 | 335 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4.7 | 475 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6.8 | 685 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 106 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 22 | 226 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | 336 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | 476 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 68 | 686 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 100 | 107 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220 | 227 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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

Packaging (Taping)

Per EIA-481

(Reel Type-Size)



Standard Reel

Unit:mm

| A | B | C | D | E | W | t | R |
|--------------|-------------|---------------|---------------|-------------|-------------------------------|-------------|-----|
| ø178 ±2.0 | ø50 min. | ø13.0 ±0.5 | ø21.0 ±0.8 | 2.0 ±0.5 | 10.2-8mm 14.0-12mm +1.5 | 0.8 ±0.2 | 1.0 |

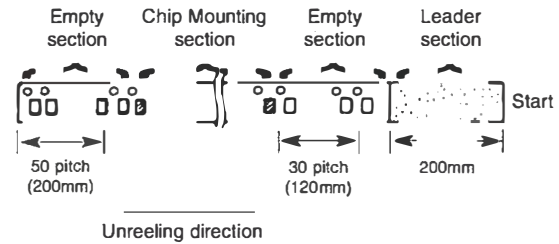
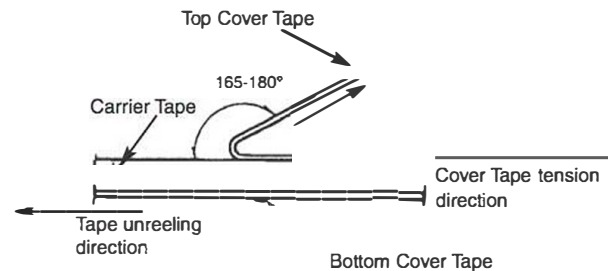
optional 10/13 inch reels

Unit:mm

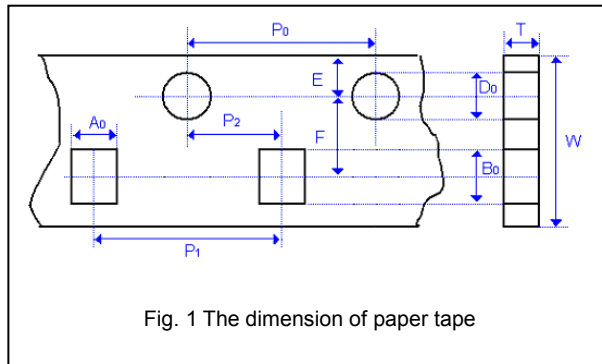
| A | B | C | D | E | W | t | R |
|--------------|-------------|---------------|---------------|-------------|--------------|-------------|-----|
| ø330 +2.0 | ø50 min. | ø13.0 ±0.5 | ø21.0 ±0.8 | 2.0 ±0.5 | 10.0 ±1.5 | 0.8 ±0.2 | 1.0 |

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

Carrier Tape (Standard)



Tape & reel dimensions

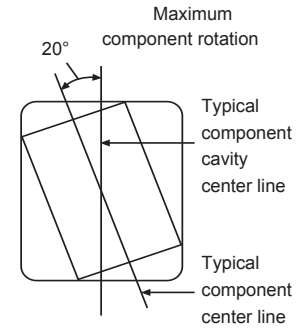
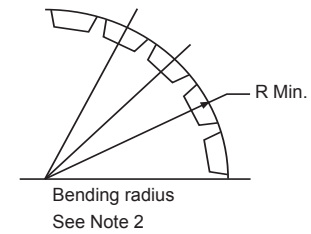
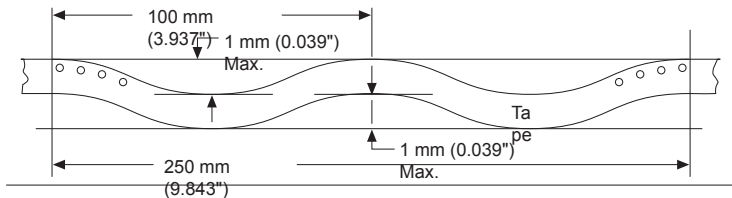
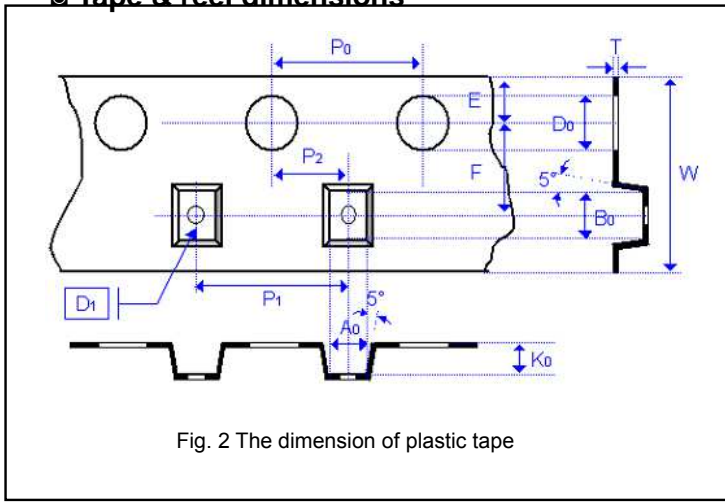


Cardboard carrier tape for 01005, 0201, 0402, 0603, 0805, 1206

Unit=mm

| Type | A0 | B0 | T | Ko | W | P0 | 10xPo | P1 | P2 | D0 | D1 | 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 |
| 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 |
| 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 50,000 |
| 0603 | 1.1±0.20 | 1.9±0.20 | ≤1.20 | * | 8.0±0.10 | 4.0±0.10 | 40.0±0.20 | 4.0±0.10 | 2.0±0.05 | 1.55±0.05 | * | 1.75±0.05 | 3.5±0.05 | | 4,000 | 10,000 15,000 |
| 0805 | 1.65±0.20 | 2.4±0.20 | ≤01.30 | * | 8.0±0.10 | 4.0±0.10 | 40.0±0.20 | 4.0±0.10 | 2.0±0.05 | 1.55±0.05 | * | 1.75±0.05 | 3.5±0.05 | | 4,000 | 10,000 20,000 |
| 1206 | 2.0±0.20 | 3.6±0.20 | ≤01.30 | * | 8.0±0.10 | 4.0±0.10 | 40.0±0.20 | 4.0±0.10 | 2.0±0.05 | 1.55±0.05 | * | 1.75±0.05 | 3.5±0.05 | | 4,000 | 10,000 20,000 |

■ Tape & reel dimensions



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

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") |
|------|----------------|----------------|-----------|----------------|-----------|----------------|-------------------|----------------|----------------|----------------|----------------|-----------|----------|-----------------------|-----------------------|----------------------------|
| 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 15,000 |
| 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 10,000 |
| 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 8,000 10,000 |
| 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 | 6,000 8,000 |
| 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 | Angular Embossed Hole | 500 1,000 | 2,000 |
| 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 | 1,500 |
| 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 | 1,500 |
| 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 | 1,000 |

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- 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.

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