

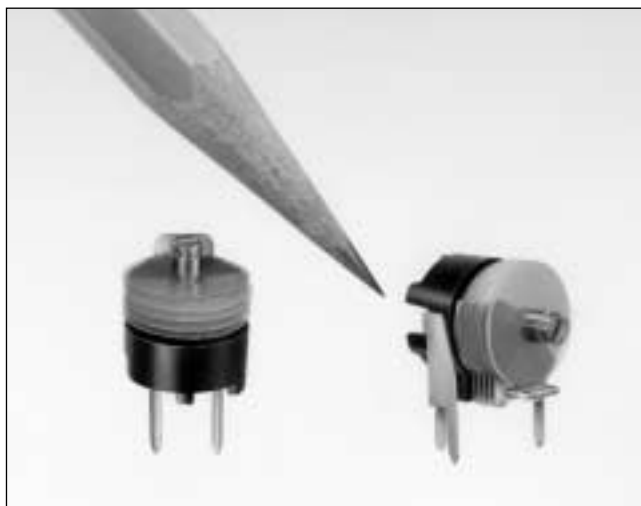
# FILMTRIM<sup>®</sup> PLASTIC DIELECTRIC CAPACITORS

## TYPES

- Six Dielectrics:
  - High temperature PTFE
  - Standard PTFE
  - Polypropylene
  - Polyimide
  - Polycarbonate
  - Polyphenyl sulfide
- SMD and lead-through-hole mounting
- Top, bottom and side mount models
- Wide capacitance ranges
- Compact sizes
- Low cost for commercial/industrial applications
- Linear capacitance change vs. rotation

## APPLICATIONS

- Mobile Radios
- Transmitters
- Pagers
- Instruments
- Electronic Games
- Wireless Security and Fire Alarms
- CATV



## MODIFICATIONS AND VARIATIONS AVAILABLE

- Special capacitance ranges
- Special terminal sizes and shapes
- Extended adjust shafts
- High temperature versions for PTFE
- Silver and/or gold plating



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# 7 mm SURFACE MOUNT NONMAGNETIC

## FEATURES

- Low setting drift
- High Q
- Low cost
- Linear Capacitance change vs. rotation
- Compact size



## SPECIFICATIONS

Relative Permeability: 1.0025 max

Q min (at 10 MHz): 1000

Operating Temperature Range: -25°C to +85°C

Dielectric: PTFE

TCC: N100 ± 100 ppm/°C

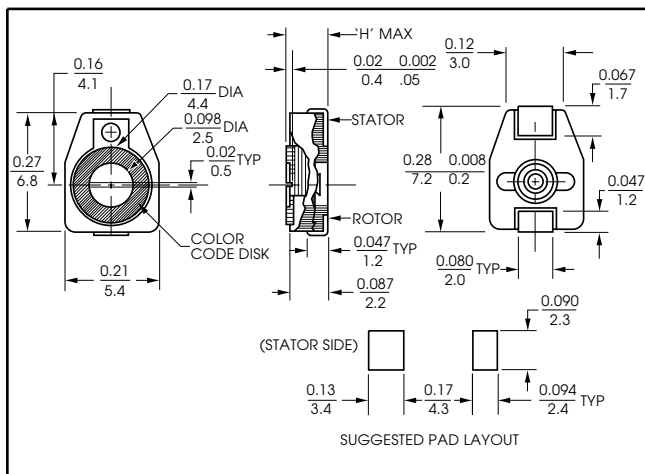
Voltage Rating: 100 VDC

Dielectric Withstanding Voltage: 200 VDC

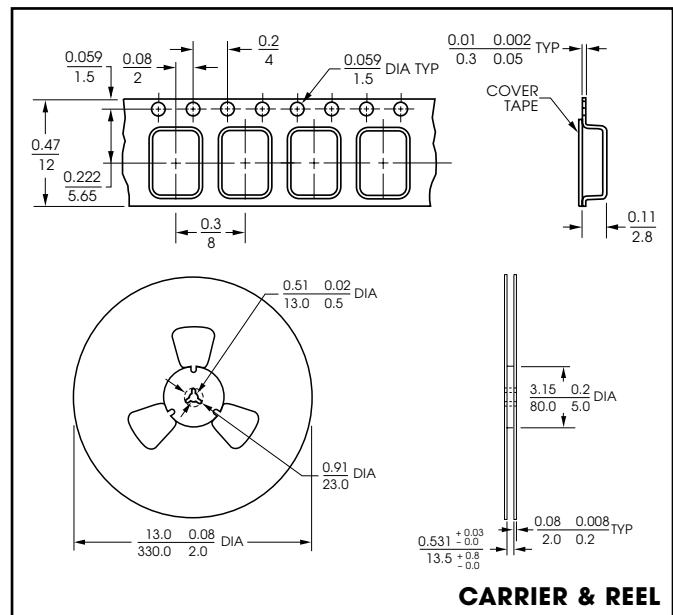
Insulation Resistance: 10<sup>4</sup> megohms min

Torque: 20-300 g-cm (0.28 - 4.2 oz-in)

| Capacitance (pF) |      | 'H' max (in/mm) | Color Code | Model Number |
|------------------|------|-----------------|------------|--------------|
| min              | max  |                 |            |              |
| 0.5              | 4.5  | 0.087 / 2.2     | Orange     | GSX364NM     |
| 0.6              | 9.0  | 0.087 / 2.2     | Black      | GSX358NM     |
| 0.8              | 15.0 | 0.094 / 2.4     | Blue       | GSX365NM     |
| 1.0              | 20.0 | 0.100 / 2.6     | Green      | GSX366NM     |



All dimensions are in / mm.



# 6 X 8 mm TOP / BOTTOM & SIDE ADJUST

## FEATURES

- Compact size
- High temperature PTFE dielectric
- Linear capacitance change vs. rotation

## SPECIFICATIONS

Voltage Rating: 300 VDC

Dielectric Withstanding Voltage: 500 VDC

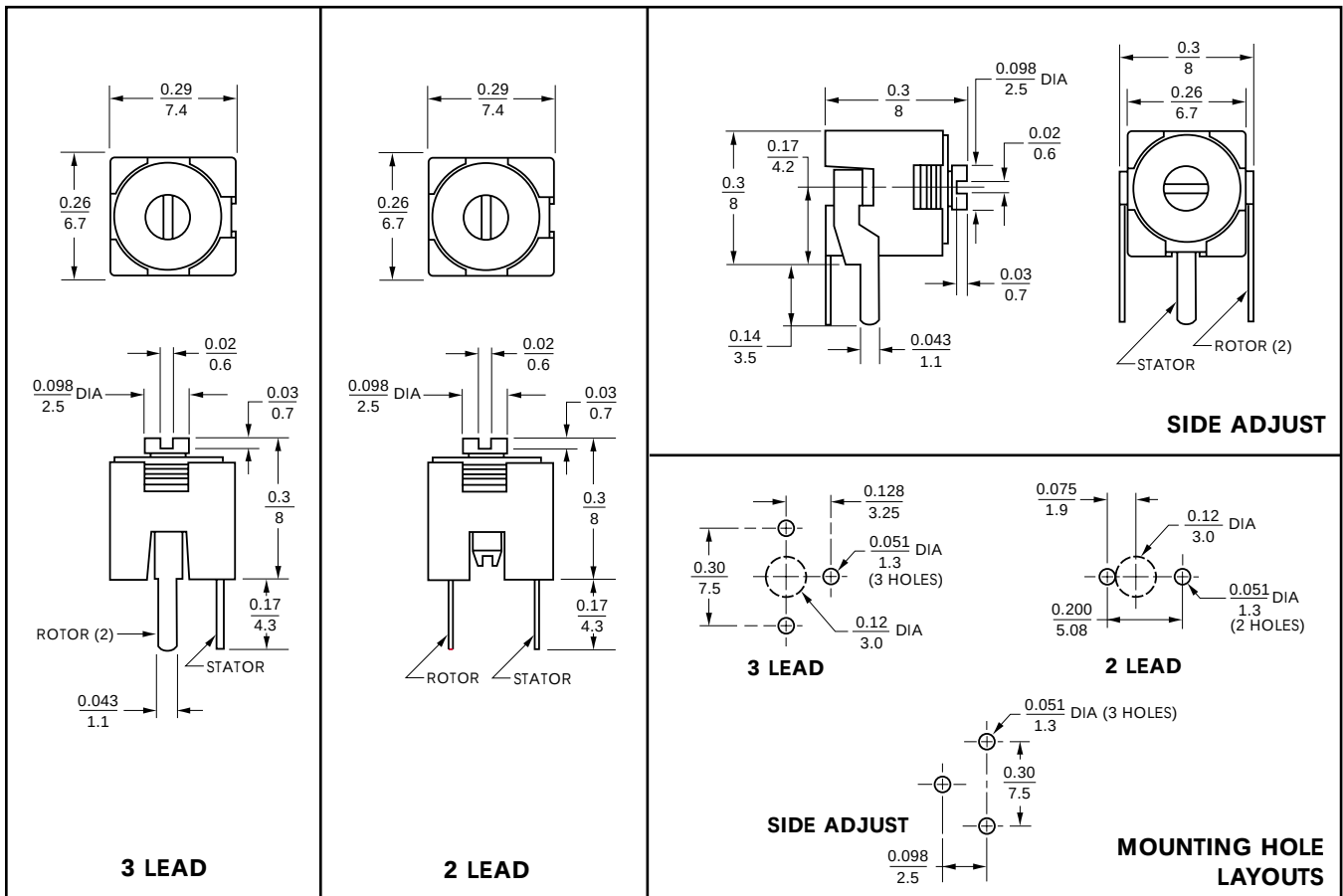
Contact Resistance: 0.010 Ohms max

Insulation Resistance: 10<sup>4</sup> megohms min

Torque: 15 to 245 g-cm (0.21 to 3.4 oz-in)



| Dielectric            | Capacitance (pF) |      | Q min<br>(1MHz) | TCC<br>(ppm / °C) | Operating<br>Temperature<br>(°C) | Color<br>Code | Top/Bottom Adjust<br>3 Lead<br>Model Number | Top/Bottom Adjust<br>2 Lead<br>Model Number | Side Adjust<br>Model Number |
|-----------------------|------------------|------|-----------------|-------------------|----------------------------------|---------------|---------------------------------------------|---------------------------------------------|-----------------------------|
|                       | min              | max  |                 |                   |                                  |               |                                             |                                             |                             |
| PTFE,<br>High<br>Temp | 1.0              | 3.5  | 1500            | 0 ± 350           | -40 to +125                      | Orange        | GXE3R511                                    | GXE3R501                                    | GXQ3R501                    |
|                       | 1.8              | 10.0 | 1500            | 0 ± 350           | -40 to +125                      | White         | GXE10011                                    | GXE10001                                    | GXQ10001                    |
|                       | 2.5              | 18.0 | 1500            | 0 ± 350           | -40 to +125                      | Red           | GXE18011                                    | GXE18001                                    | GXQ18001                    |



All dimensions are in / mm.

# 8 mm TOP / BOTTOM & SIDE ADJUST

## SPECIFICATIONS

Voltage Rating: 200 VDC (High temp PTFE),  
100 VDC (all others)

Dielectric Withstanding Voltage:  
300 VDC (High temp PTFE), 200 VDC (all others)

Contact Resistance: 0.010 Ohms max

Insulation Resistance:  $10^4$  megohms min

Torque: 15 to 250 g-cm (0.21 to 3.5 oz-in)

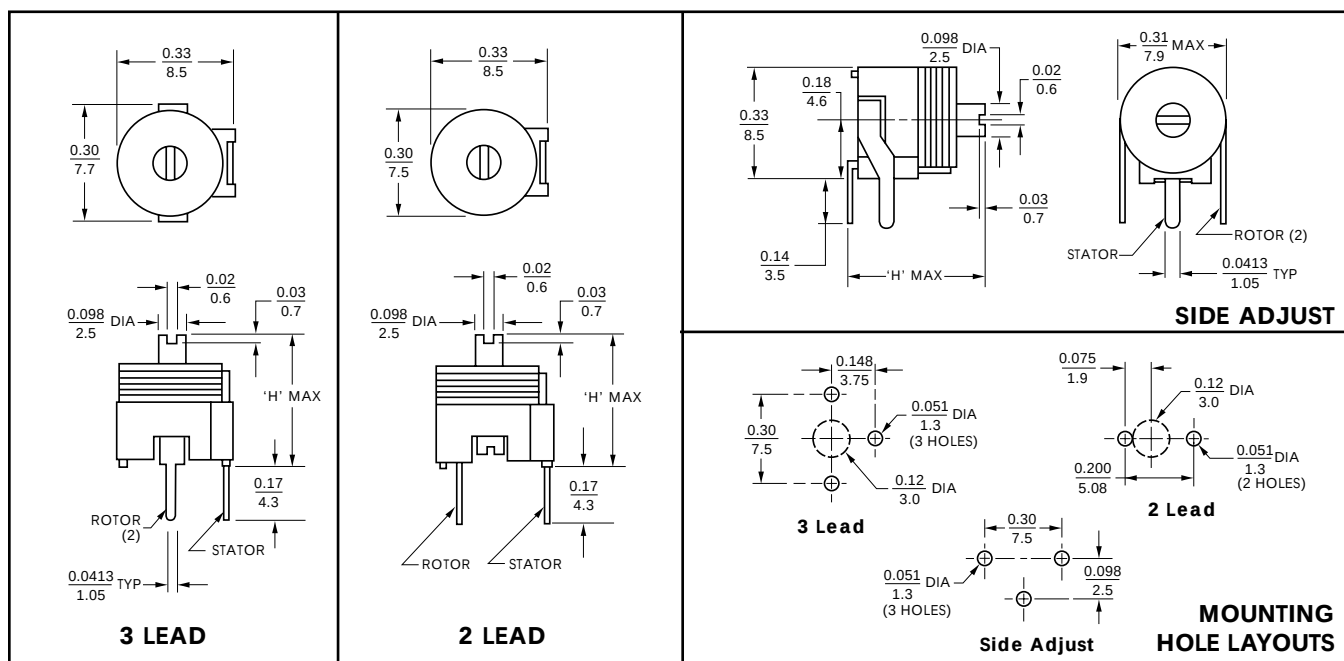
## FEATURES

- Choice of dielectrics: High Temp PTFE, Standard PTFE, Polypropylene, or Polycarbonate
- Linear capacitance change vs. rotation



| Dielectric       | Capacitance (pF) |      | Q min (1MHz) | TCC (ppm / °C) | Operating Temperature (°C) | 'H' max in/mm | Color Code | Top/Bottom Adjust 3 Lead | Top/Bottom Adjust 2 Lead | Side Adjust  |
|------------------|------------------|------|--------------|----------------|----------------------------|---------------|------------|--------------------------|--------------------------|--------------|
|                  | min              | max  |              |                |                            |               |            | Model Number             | Model Number             | Model Number |
| PTFE*, High Temp | 1.5              | 5.0  | 1500         | 0 ± 250        | -40 to +125                | .402/10.2     | Clear      | GXE5R000                 | GXE5R002                 | GXR5R000     |
|                  | 1.8              | 9.0  | 1500         | 0 ± 250        | -40 to +125                | .402/10.2     | Yellow     | GXE9R000                 | GXE9R002                 | GXR9R000     |
|                  | 2.6              | 18.0 | 1500         | 0 ± 250        | -40 to +125                | .402/10.2     | Green      | GXE18000                 | GXE18002                 | GXR18000     |
|                  | 3.5              | 27.0 | 1500         | 0 ± 250        | -40 to +125                | .402/10.2     | Red        | GXE27000                 | GXE27002                 | GXR27000     |
|                  | 4.5              | 36.0 | 1500         | 0 ± 250        | -40 to +125                | .449/11.4     | Violet     | GXE36000                 | GXE36002                 | GXR36000     |
|                  | 5.0              | 45.0 | 1500         | 0 ± 250        | -40 to +125                | .449/11.4     | Orange     | GXE45000                 | GXE45002                 | GXR45000     |
| PTFE             | 1.6              | 5.0  | 1500         | 0 ± 350        | -40 to +85                 | .402/10.2     | Clear      | GXA5R000                 | GXA5R002                 | GXB5R000     |
|                  | 2.0              | 9.0  | 1500         | 0 ± 350        | -40 to +85                 | .402/10.2     | Yellow     | GXA9R000                 | GXA9R002                 | GXB9R000     |
|                  | 2.0              | 18.0 | 1500         | 0 ± 300        | -40 to +85                 | .402/10.2     | Green      | GXA18000                 | GXA18002                 | GXB18000     |
|                  | 3.9              | 27.0 | 1500         | 0 ± 300        | -40 to +85                 | .402/10.2     | Red        | GXA27000                 | GXA27002                 | GXB27000     |
|                  | 4.5              | 36.0 | 1500         | 0 ± 300        | -40 to +85                 | .449/11.4     | Violet     | GXA36000                 | GXA36002                 | GXB36000     |
|                  | 5.0              | 45.0 | 1500         | 0 ± 300        | -40 to +85                 | .449/11.4     | Orange     | GXA45000                 | GXA45002                 | GXB45000     |
| PP               | 1.6              | 5.0  | 1000         | 0 ± 300        | -40 to +70                 | .402/10.2     | Clear      | GYA5R000                 | GYA5R002                 | GYB5R000     |
|                  | 2.0              | 10.0 | 1000         | 0 ± 300        | -40 to +70                 | .402/10.2     | Yellow     | GYA10000                 | GYA10002                 | GYB10000     |
|                  | 2.0              | 15.0 | 1000         | 0 ± 400        | -40 to +70                 | .402/10.2     | Blue       | GYA15000                 | GYA15002                 | GYB15000     |
|                  | 2.2              | 22.0 | 1000         | 0 ± 400        | -40 to +70                 | .402/10.2     | Green      | GYA22000                 | GYA22002                 | GYB22000     |
|                  | 2.3              | 27.0 | 1000         | 0 ± 350        | -40 to +70                 | .402/10.2     | Red        | GYA27000                 | GYA27002                 | GYB27000     |
|                  | 3.0              | 36.0 | 1000         | 0 ± 300        | -40 to +70                 | .402/10.2     | Violet     | GYA36000                 | GYA36002                 | N/A          |
| PC               | 2.5              | 30.0 | 200          | 100 ± 300      | -40 to +85                 | .402/10.2     | Red        | GZA30000                 | GZA30002                 | GZB30000     |
|                  | 4.0              | 40.0 | 200          | 100 ± 300      | -40 to +85                 | .402/10.2     | Violet     | GZA40000                 | GZA40002                 | GZB40000     |

\* Gold plated metal parts are standard on GXE and GXR models shown above.



All dimensions are in / mm.

# 10 mm TOP / BOTTOM & SIDE ADJUST

## SPECIFICATIONS

Voltage Rating: 200 VDC (High temp PTFE),  
100 VDC (all others)

Dielectric Withstanding Voltage:  
300 VDC (High temp PTFE), 200 VDC (all others)

Contact Resistance: 0.010 Ohms max

Insulation Resistance: 10<sup>4</sup> megohms min

Torque: 15 to 360 g-cm (0.2 to 5 oz-in)

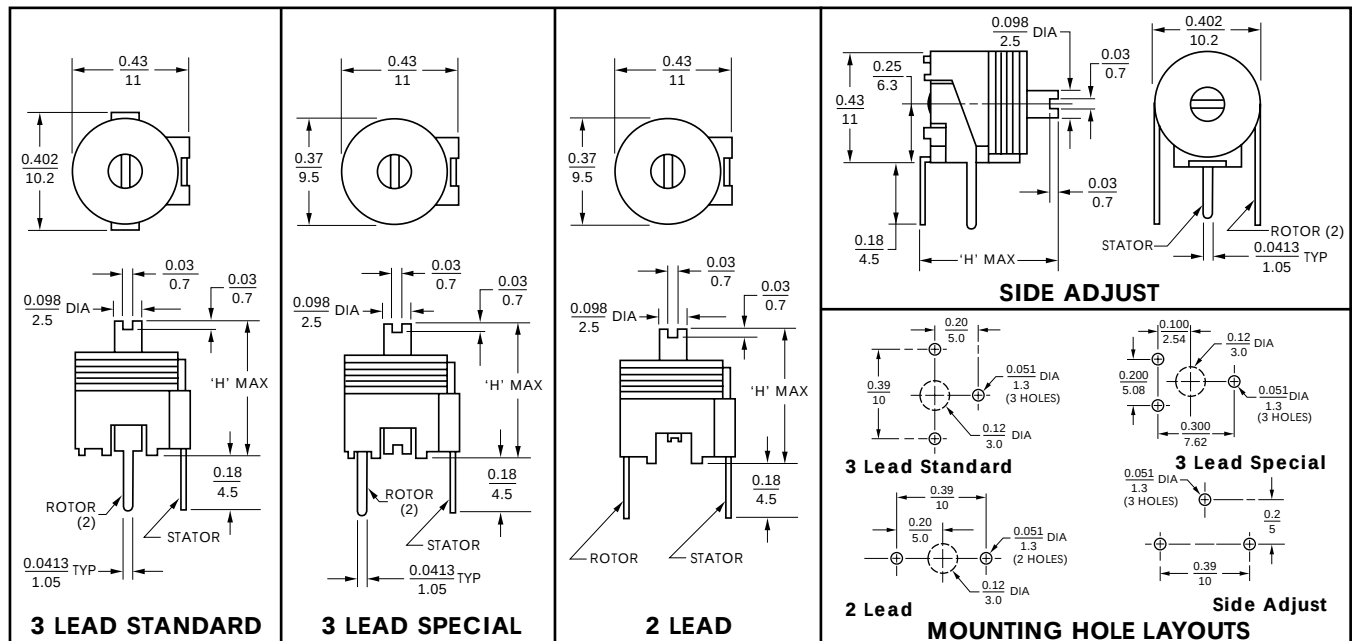
## FEATURES

- Choice of dielectrics: High Temp PTFE, Standard PTFE, Polypropylene (PP), or Polycarbonate (PC)
- Linear capacitance change vs. rotation
- Wide capacitance ranges



| Dielectric       | Capacitance (pF) |       | Q min (1MHz) | TCC (ppm/°C) | Operating Temperature (°C) | 'H' max in/mm | Color Code | Top/Bottom 3 Lead-Std. Model No. | Top/Bottom 3 Lead-Spec. Model No. | Top/Bottom 2 Leads Model No. | Side Model No. |
|------------------|------------------|-------|--------------|--------------|----------------------------|---------------|------------|----------------------------------|-----------------------------------|------------------------------|----------------|
|                  | min              | max   |              |              |                            |               |            |                                  |                                   |                              |                |
| PTFE*, High Temp | 2.5              | 15.0  | 1500         | 0 ± 250      | -40 to +125                | 0.402/10.2    | Red        | GXF15000                         | GXF15003                          | GXF15004                     | GXT15000       |
|                  | 3.0              | 25.0  | 1500         | 0 ± 250      | -40 to +125                | 0.402/10.2    | Clear      | GXF25000                         | GXF25003                          | GXF25004                     | GXT25000       |
|                  | 4.0              | 40.0  | 1500         | 0 ± 250      | -40 to +125                | 0.402/10.2    | Yellow     | GXF40000                         | GXF40003                          | GXF40004                     | GXT40000       |
|                  | 5.5              | 60.0  | 1500         | 0 ± 250      | -40 to +125                | 0.449/11.4    | Blue       | GXF60000                         | GXF60003                          | GXF60004                     | GXT60000       |
|                  | 6.0              | 75.0  | 1500         | 0 ± 250      | -40 to +125                | 0.449/11.4    | Violet     | GXF75000                         | GXF75003                          | GXF75004                     | GXT75000       |
|                  | 8.0              | 90.0  | 1500         | 0 ± 250      | -40 to +125                | 0.488/12.4    | Orange     | GXF90000                         | GXF90003                          | GXF90004                     | GXT90000       |
| PTFE             | 2.0              | 13.0  | 1500         | 0 ± 400      | -40 to +85                 | 0.402/10.2    | Blue       | GXC13000                         | GXC13003                          | GXC13004                     | GXD13000       |
|                  | 3.0              | 26.0  | 1500         | 0 ± 350      | -40 to +85                 | 0.402/10.2    | Green      | GXC26000                         | GXC26003                          | GXC26004                     | GXD26000       |
|                  | 3.5              | 38.0  | 1500         | 0 ± 300      | -40 to +85                 | 0.402/10.2    | Clear      | GXC38000                         | GXC38003                          | GXC38004                     | GXD38000       |
|                  | 6.0              | 60.0  | 1500         | 0 ± 300      | -40 to +85                 | 0.449/11.4    | Yellow     | GXC60000                         | GXC60003                          | GXC60004                     | GXD60000       |
|                  | 7.0              | 75.0  | 1500         | 0 ± 300      | -40 to +85                 | 0.449/11.4    | Red        | GXC75000                         | GXC75003                          | GXC75004                     | GXD75000       |
|                  | 8.0              | 90.0  | 1500         | 0 ± 300      | -40 to +85                 | 0.488/12.4    | Violet     | GXC90000                         | GXC90003                          | GXC90004                     | GXD90000       |
|                  | 10.0             | 150.0 | 1500         | 0 ± 300      | -40 to +85                 | 0.488/12.4    | Orange     | GXC15100                         | GXC15103                          | GXC15104                     | N/A            |
|                  |                  |       |              |              |                            |               |            |                                  |                                   |                              |                |
| PP               | 2.0              | 15.0  | 1000         | 0 ± 400      | -40 to +70                 | 0.402/10.2    | Blue       | GYC15000                         | GYC15003                          | GYC15004                     | GYD15000       |
|                  | 3.0              | 20.0  | 1000         | 0 ± 400      | -40 to +70                 | 0.402/10.2    | Green      | GYC20000                         | GYC20003                          | GYC20004                     | GYD20000       |
|                  | 3.5              | 40.0  | 1000         | 0 ± 350      | -40 to +70                 | 0.402/10.2    | Clear      | GYC40000                         | GYC40003                          | GYC40004                     | GYD40000       |
|                  | 4.5              | 65.0  | 1000         | 0 ± 350      | -40 to +70                 | 0.402/10.2    | Yellow     | GYC65000                         | GYC65003                          | GYC65004                     | GYD65000       |
| PC               | 8.0              | 80.0  | 200          | 0 ± 200      | -40 to +85                 | 0.402/10.2    | Red        | GZC80000                         | GZC80003                          | GZC80004                     | GZD80000       |
|                  | 9.0              | 100.0 | 200          | 0 ± 400      | -40 to +85                 | 0.449/11.4    | Violet     | GZC10100                         | GZC10103                          | GZC10104                     | GZD10100       |
|                  | 9.0              | 120.0 | 200          | 0 ± 350      | -40 to +85                 | 0.449/11.4    | Orange     | GZC12100                         | GZC12103                          | GZC12104                     | GZD12100       |
|                  | 10.0             | 150.0 | 200          | 0 ± 350      | -40 to +85                 | 0.472/12.0    | Orange     | GZC15100                         | GZC15103                          | GZC15104                     | GZD15100       |
|                  | 12.0             | 180.0 | 200          | 0 ± 350      | -40 to +85                 | 0.472/12.0    | Orange     | GZC18100                         | GZC18103                          | GZC18104                     | GZD18100       |
|                  |                  |       |              |              |                            |               |            |                                  |                                   |                              |                |

\* Gold plated metal parts are standard on GXF and GXT models shown above.



All dimensions are in / mm.

# 11 X 13 mm TOP / BOTTOM ADJUST

## FEATURES

- Housing protected
- High capacitance range
- Linear capacitance change vs. rotation

## SPECIFICATIONS

Voltage Rating: 100 VDC

Dielectric Withstanding Voltage: 200 VDC

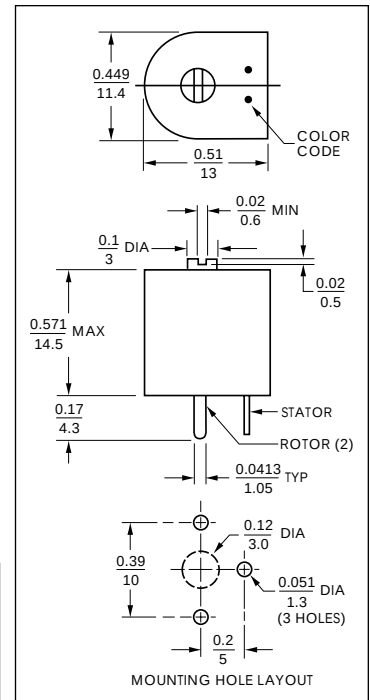
Contact Resistance: 0.010 Ohms max

Insulation Resistance: 10<sup>4</sup> megohms min

Torque: 20 to 360 g-cm (0.28 to 5 oz-in)



| Dielectric | Capacitance (pF) |       | Q min (1MHz) | TCC (ppm / °C) | Operating Temperature (°C) | Color Code     | Model Number |
|------------|------------------|-------|--------------|----------------|----------------------------|----------------|--------------|
|            | min              | max   |              |                |                            |                |              |
| PC         | 15.0             | 230.0 | 200          | 0 ± 400        | -40 to +85                 | Orange - 1 dot | GZC23112     |
|            | 30.0             | 430.0 | 150          | 0 ± 350        | -40 to +85                 | Orange - 2 dot | GZC43112     |



# 16 mm TOP / SIDE ADJUST

## FEATURES

- Highest capacitance range
- Linear capacitance change vs. rotation

## SPECIFICATIONS

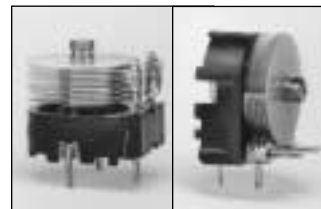
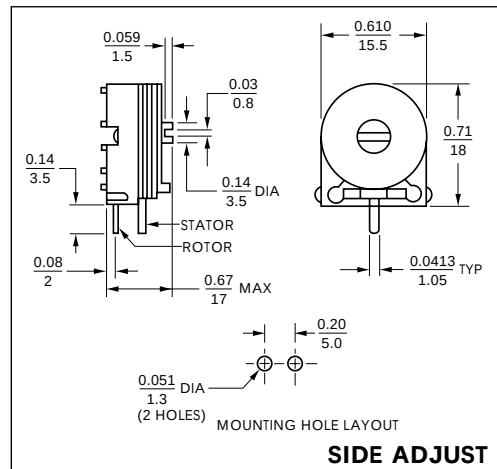
Voltage Rating: 150 VDC

Dielectric Withstanding Voltage: 300 VDC

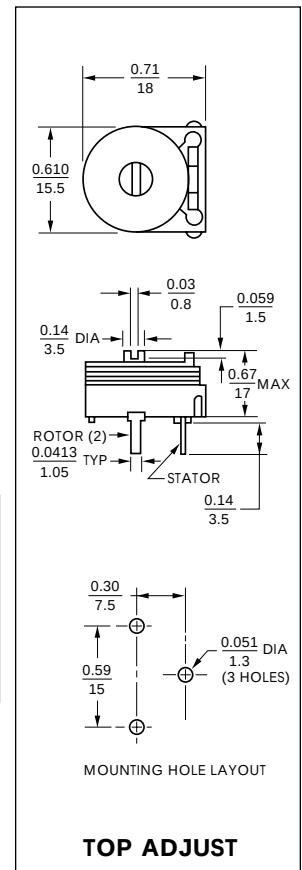
Contact Resistance: 0.010 Ohms max

Insulation Resistance: 10<sup>4</sup> megohms min

Torque: 20 to 360 g-cm (0.28 to 5 oz-in)



| Dielectric | Capacitance (pF) |       | Q min (1MHz) | TCC (ppm / °C) | Operating Temperature (°C) | Color Code | Top Adjust Model Number | Side Adjust Model Number |
|------------|------------------|-------|--------------|----------------|----------------------------|------------|-------------------------|--------------------------|
|            | min              | max   |              |                |                            |            |                         |                          |
| PC         | 9.0              | 200.0 | 200          | 0 ± 300        | -40 to +85                 | Orange     | GZN20100                | GZP20100                 |
|            | 18.0             | 300.0 | 200          | 0 ± 300        | -40 to +85                 | Clear      | GZN30100                | GZP30100                 |
| PI         | 25.0             | 600.0 | 150          | 0 ± 350        | -40 to +85                 | None       | GZN60100                | GZP60100                 |



All dimensions are in / mm.



## PART NUMBERING SYSTEM

| <b>GX</b>         |                                             | <b>A</b>           |                                                          | <b>9R0</b>                         | <b>00</b>                                                                                         |
|-------------------|---------------------------------------------|--------------------|----------------------------------------------------------|------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Dielectric</b> |                                             | <b>Form Factor</b> |                                                          | <b>Cap Code</b>                    | <b>Modifications<br/>(Top Adjust Models)</b>                                                      |
| <b>Symbol</b>     | <b>Description</b>                          | <b>Symbol</b>      | <b>Description</b>                                       | <b>Industry Standard,<br/>i.e.</b> | <b>Symbol</b> <b>Description</b>                                                                  |
| GC                | PPS<br>(Polyphenyl Sulfide)                 | A                  | 8 mm Top/Bottom Adjust                                   | 1R6 = 1.6 pF,                      | 01 6 x 8 mm, 2 leads,<br>GXE and GXQ series<br>only                                               |
| GSX**             | PTFE<br>(Polytetrafluor-<br>oethylene)      | B                  | 8 mm Side Adjust                                         | 400 = 40.0 pF,                     | 02 8 mm, 2 leads                                                                                  |
|                   |                                             | C                  | 10 mm Top/Bottom Adjust,<br>11 x 13 mm Top/Bottom Adjust | 301 = 300.0 pF                     | 03 10 mm, 3 lead, special                                                                         |
| GX                | PTFE<br>(Polytetrafluor-<br>oethylene)      | D                  | 10 mm Side Adjust                                        |                                    | 04 10 mm, 2 leads                                                                                 |
| GY                | PP<br>(Polypropylene)                       | E*                 | 6 x 8 mm Top/Bottom Adjust,<br>8 mm Top/Bottom Adjust    |                                    | 11 6 x 8 mm, 3 leads                                                                              |
| GZ                | PC or PI<br>(Polycarbonate<br>or Polyimide) | F*                 | 10 mm Top/Bottom Adjust                                  |                                    | 12 11 x 13 mm,<br>housing protected<br>(available on all 10 mm<br>top and bottom adjust<br>units) |
|                   |                                             | L                  | 5 mm Top Adjust,<br>7 mm Economy                         |                                    | 25 Ammo pack version for<br>GCL only                                                              |
|                   |                                             | N                  | 16 mm Top Adjust                                         |                                    |                                                                                                   |
|                   |                                             | P                  | 16 mm Side Adjust                                        |                                    |                                                                                                   |
|                   |                                             | Q*                 | 6 x 8 mm Side Adjust                                     |                                    |                                                                                                   |
|                   |                                             | R*                 | 8 mm Side Adjust                                         |                                    |                                                                                                   |
|                   |                                             | T*                 | 10 mm Side Adjust                                        |                                    |                                                                                                   |

\* Extended temperature range: -40°C to +125°C

\*\* GSX parts do not conform to part numbering system above.

For other modifications such as high temperature base material or special lead plating, contact factory.

### SPECIFICATION NOTES

- Parts are 100% tested for capacitance range and dielectric withstanding voltage.
- Capacitance range specified is that which is guaranteed, and is measured at 1 MHz at room temperature.
- Q factor is measured at maximum rated capacitance and at room temperature.
- Dielectric strength is measured at maximum rated capacitance and room temperature, with test voltage (as listed for each model) applied for 60 seconds.
- Insulation resistance is measured at maximum rated capacitance and room temperature and at rated voltage, unless otherwise specified.
- Temperature coefficient of capacitance (TCC) is measured at 1 MHz over the operating temperature range, with capacitor set at maximum rated capacitance.
- Axial load during tuning should not exceed 200 grams force. At maximum axial load, capacitance change is no more than 15%.
- Capacitors should not be operated outside of rated capacitance range and working voltage.

### Soldering and Cleaning

#### of FILMTRIM® Trimmer Capacitors

#### Soldering Methods

- Reflow soldering for GSX series  
Pre-heat: 140°C ±10°C for 2 to 3 minutes.  
Soldering: 200 to 250°C within 25 seconds.  
(Peak soldering temperature: 250°C maximum).
- Dip soldering (does not apply to GSX models)  
260°C ±10°C for 7 seconds maximum.
- Hand soldering (for lead-through-hole models)  
Soldering: Tip temperature 350°C ±10°C for 3 to 4 seconds
- Hand soldering (GSX models)  
Preheating: Fully preheat on a hot plate with a surface temperature of 100 to 150°C.  
Soldering: 260°C ±10°C for 5 seconds maximum.

#### Cleaning

- Water soluble fluxes and detergents with a water flush after soldering of the boards can be used for GX, GY and GZ models.
- Do not immerse FILMTRIM models in chlorinated or fluorinated hydrocarbon solvents as this would adversely affect the plastic dielectrics and base materials. Some customers have successfully used GX models in scrubbers or sprayers where only the bottom of the printed circuit boards is exposed to solvents. If the process requires immersion in solvents for cleaning boards, the FILMTRIM capacitors should be hand soldered to board after the boards have been cleaned.