

### CG7 Series



#### Agency Approvals

| AGENCY | AGENCY FILE NUMBER |
|--------|--------------------|
|        | E128662            |
|        | E320116            |

#### Two Electrode GDT Graphical Symbol



#### Additional Information



Datasheet



Resources



Samples

#### Description

The Littelfuse CG7 series GDT is a miniature surface mount device with a 1kA 8/20 $\mu$ S surge rating. Its low insertion loss and thus low off-state capacitance makes it compatible with high bandwidth applications up to the GHz RF range. This GDT's crowbarring characteristic protects sensitive ICs from surges as defined in ITU K.20/21/45 Basic and Enhanced Recommendations, GR-1089-CORE first level lightning Port Type 1 and 3, and IEC 61000-4-5 2<sup>nd</sup> edition. It is hermetically sealed using non-radioactive materials Classes 1-3 and some Class 4 & 5 cases and is thus environmentally safe. Its 2.8mm diameter size makes it the world's smallest two-electrode single chamber GDT available.

#### Features

- RoHS compliant and Lead-free
- Excellent Surge Withstanding Capability
- Excellent response to fast rising transients.
- Ultra Low Insertion Loss and low off-state capacitance for GHz bandwidth compatibility
- Ultra small devices offered in SMD package
- 1kA 8/20 $\mu$ S surge capability pulse as defined by IEC 61000-4-5 2<sup>nd</sup> edition
- Ultra Low capacitance (<0.3pF)
- Voltage Range 75V to 470V
- UL recognized

#### Applications

- Set top box
- Cable Modem
- Embedded Multimedia Terminal Adapter (EMTA)
- RF Connector
- Multimedia over Coax Alliance (MoCA)
- Base Station RF antenna transmitter
- G.Fast 106MHz and 212 MHz bandplans compatible
- CATV/Broadband equipment
- Data lines and Ethernet (up to 10GbE)
- Telecom line protection
- Broadband equipment
- xDSL equipment, including ADSL2, ADSL, VDSL, VDSL2 30a bandplan compatible
- IAD (Integrated Access Device)
- Aerospace and Automotive

### Electrical Characteristics

| Part Number | Device Specifications (at 25°C)    |     |     |                                           |                                          |                       |                        | Life Ratings                                         |                                             |                                         |                                            |                                    |
|-------------|------------------------------------|-----|-----|-------------------------------------------|------------------------------------------|-----------------------|------------------------|------------------------------------------------------|---------------------------------------------|-----------------------------------------|--------------------------------------------|------------------------------------|
|             | DC Breakdown in Volts<br>(@100V/s) |     |     | Impulse Break-down in Volts<br>(@100V/μs) | Impulse Break-down In Volts<br>(@1kV/μs) | Insulation Resistance | Capacitance<br>(@1MHz) | Max Impulse Discharge Current<br>(8/20μs)            | Max Impulse Discharge Current<br>(10/700μs) | AC Discharge Current<br>(9 cycle @50Hz) | DC Holdover Voltage<br>( $<150\text{ms}$ ) | Impulse Life<br>(8/20μs)<br>(100A) |
|             | MIN                                | TYP | MAX | MAX                                       |                                          | MIN                   | MAX                    |                                                      |                                             | MIN                                     |                                            | MIN                                |
| CG775       | 60                                 | 75  | 90  | 600                                       | 700                                      | 1GΩ@50V               | 0.3pf                  | 10 Shots<br>(@1kA) <sup>1</sup><br><br>1 Shot at 2kA | 10 Shots<br>(@ 100A/4kV) <sup>2</sup>       | 1A                                      | 52V                                        | 300 Shots                          |
| CG790       | 72                                 | 90  | 108 | 600                                       | 700                                      |                       |                        |                                                      |                                             |                                         | 52V                                        |                                    |
| CG7120      | 96                                 | 120 | 144 | 600                                       | 700                                      | 1GΩ@100V              |                        |                                                      |                                             |                                         | 80V                                        |                                    |
| CG7150      | 120                                | 150 | 180 | 600                                       | 700                                      |                       |                        |                                                      |                                             |                                         | 80V                                        |                                    |
| CG7200      | 160                                | 200 | 240 | 600                                       | 700                                      |                       |                        |                                                      |                                             |                                         | 135V                                       |                                    |
| CG7230      | 186                                | 230 | 276 | 600                                       | 700                                      |                       |                        |                                                      |                                             |                                         | 135V                                       |                                    |
| CG7250      | 200                                | 250 | 300 | 600                                       | 700                                      |                       |                        |                                                      |                                             |                                         | 135V                                       |                                    |
| CG7350      | 280                                | 350 | 420 | 750                                       | 900                                      |                       |                        |                                                      |                                             |                                         | 135V                                       |                                    |
| CG7400      | 360                                | 400 | 480 | 850                                       | 1000                                     |                       |                        |                                                      |                                             |                                         | 135V                                       |                                    |
| CG7470      | 376                                | 470 | 564 | 900                                       | 1100                                     |                       |                        |                                                      |                                             |                                         | 1GΩ@250V                                   |                                    |

Notes:

UL Pending for CG775 and CG7470.

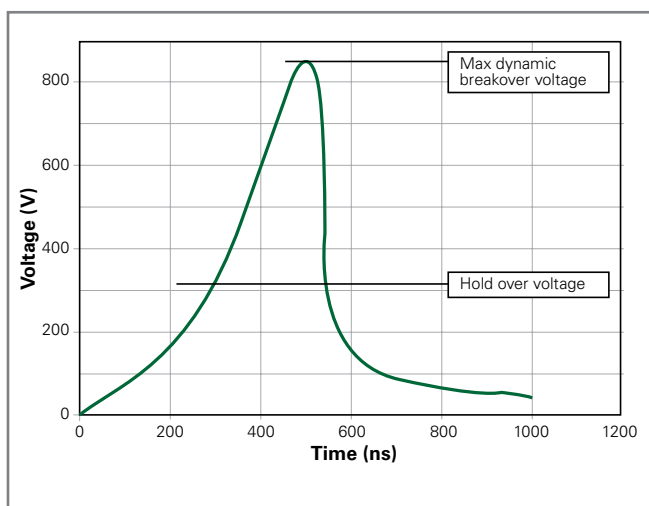
1. 5 x (+) and 5 x (-) applications of 1kA 8/20μs sec.

2. 5 x (+) and 5 x (-) applications of 100A 10/700μs sec.

### Product Characteristics

|                                            |                                                                          |
|--------------------------------------------|--------------------------------------------------------------------------|
| <b>Materials</b>                           | Device Tin Plated 17.5 ± 12.5 Microns<br>Construction: Ceramic Insulator |
| <b>Storage and Operational Temperature</b> | -40 to +90°C                                                             |

### Voltage Vs. Time Characteristic



Note: Tested per 1kV/μs waveform

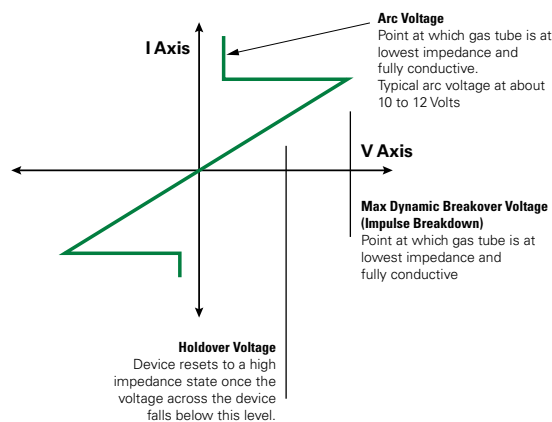
### Typical Insertion Loss

|                  |
|------------------|
| @1.0GHz = 0.02dB |
| @1.4GHz = 0.03dB |
| @1.8GHz = 0.05dB |
| @2.0GHz = 0.06dB |
| @2.4GHz = 0.07dB |
| @2.8GHz = 0.08dB |
| @3.1GHz = 0.09dB |
| @3.5GHz = 0.10dB |
| @4.0GHz = 0.12dB |

Note: Insertion data for customer reference only, application testing needed for verification.

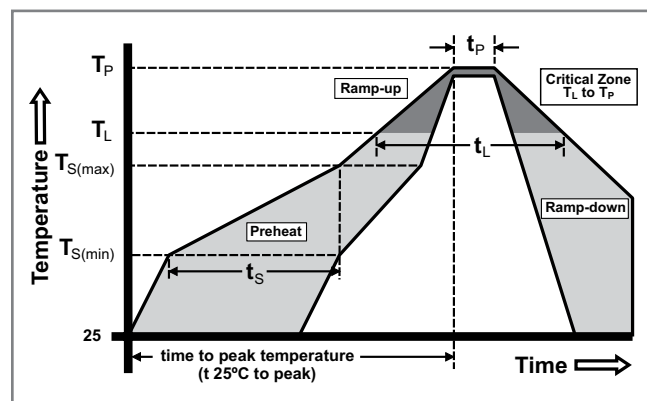
### V-I Characteristic Curve

Characteristics of Gas Plasma -response to transient condition



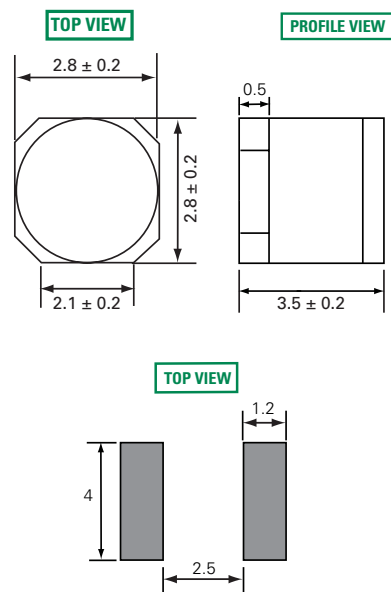
### Soldering Parameters - Reflow Soldering (Surface Mount Devices)

|                                                       |                                    |                         |
|-------------------------------------------------------|------------------------------------|-------------------------|
| Reflow Condition                                      |                                    | Pb – Free assembly      |
| Pre Heat                                              | - Temperature Min ( $T_{s(min)}$ ) | 150°C                   |
|                                                       | - Temperature Max ( $T_{s(max)}$ ) | 200°C                   |
|                                                       | - Time (Min to Max) ( $t_s$ )      | 60 – 180 secs           |
| Average ramp up rate (Liquidus Temp ( $T_L$ ) to peak |                                    | 3°C/second max          |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                  |                                    | 5°C/second max          |
| Reflow                                                | - Temperature ( $T_L$ ) (Liquidus) | 217°C                   |
|                                                       | - Temperature ( $t_L$ )            | 60 – 150 seconds        |
| Peak Temperature ( $T_p$ )                            |                                    | 260 <sup>+0/-5</sup> °C |
| Time within 5°C of actual peak Temperature ( $t_p$ )  |                                    | 10 – 30 seconds         |
| Ramp-down Rate                                        |                                    | 6°C/second max          |
| Time 25°C to peak Temperature ( $T_p$ )               |                                    | 8 minutes Max.          |
| Do not exceed                                         |                                    | 260°C                   |



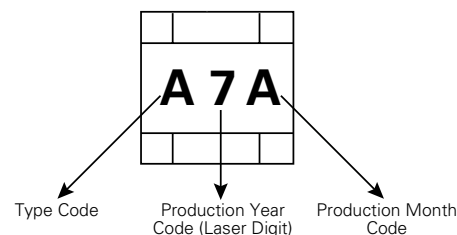
### Device Dimensions

Dimensions in millimeters



Recommended Soldering Pad Layout

### Product Marking



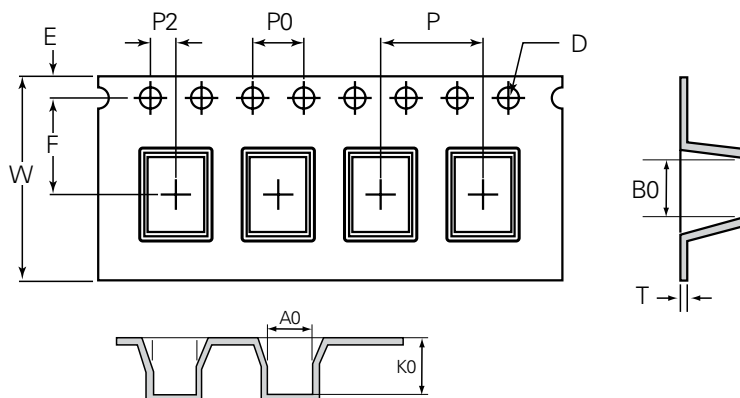
| Type Code |        |
|-----------|--------|
| A         | CG775  |
| B         | CG790  |
| T         | CG7120 |
| C         | CG7150 |
| O         | CG7200 |
| D         | CG7230 |
| R         | CG7250 |
| G         | CG7350 |
| I         | CG7400 |
| P         | CG7470 |

| Month Code |           |
|------------|-----------|
| A          | January   |
| B          | February  |
| C          | March     |
| D          | April     |
| E          | May       |
| F          | June      |
| G          | July      |
| H          | August    |
| I          | September |
| J          | October   |
| K          | November  |
| L          | December  |

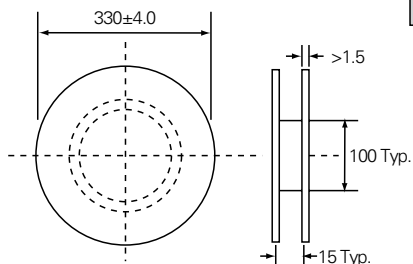
## Taping and Reel Specifications

Unit = mm

| Item | Spec           | Item | Spec              |
|------|----------------|------|-------------------|
| P    | $8.0 \pm 0.1$  | E    | $1.75 \pm 0.1$    |
| P0   | $4.0 \pm 0.1$  | D    | $1.50 + 0.1/-0.0$ |
| P2   | $2.0 \pm 0.1$  | B0   | $3.9 \pm 0.1$     |
| W    | $12.0 \pm 0.3$ | K0   | $3.2 \pm 0.1$     |
| F    | $5.5 \pm 0.1$  | T    | $0.4 \pm 0.1$     |
| A0   | $3.2 \pm 0.1$  | 10P0 | $4.0 \pm 0.2$     |



**Packaging Quantity:**  
2500 pcs per reel (13")  
1 reels per inner box  
10 inner boxes per carton  
25,000 pcs per full carton



## Part Numbering System and Ordering Information

**CG7 XXX MS**

**Series**

CG7

**Breakdown Voltage**

70 = 70V

90 = 90V

120 = 120V

150 = 150V

200 = 200V

230 = 230V

350 = 350V

400 = 400V

470 = 470V

**Surface Mount**

**Disclaimer Notice** - Information furnished is believed to be accurate and reliable. However, users should independently evaluate the suitability of and test each product selected for their own applications. Littelfuse products are not designed for, and may not be used in, all applications. Read complete Disclaimer Notice at: [www.littelfuse.com/disclaimer-electronics](http://www.littelfuse.com/disclaimer-electronics).