

### CG6 Series



#### Agency Approvals

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

#### Two Electrode GDT Graphical Symbol



#### Additional Information



**Datasheet**



**Resources**



**Samples**

#### Description

The Littelfuse CG6 series GDT is a miniature surface-mount device with a 3kA 8/20 surge rating. This ITU-T K.12 Class 1, Type 1 GDT provides protection against fast rising transients typically caused by nearby lightning events. 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 crowbarbing 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 1,3, and 5, and IEC 61000-4-5, 2<sup>nd</sup> edition Level 5 and below. It is hermetically sealed using non-radioactive materials and is thus environmentally safe.

#### 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
- 3kA 8/20µs surge capability
- Compact SMD package offered in two squared terminals
- Non-Radioactive
- Ultra Low capacitance (<0.3pF)
- Voltage Range 75V to 600V
- UL recognized
- Characterized according to ITU-T K.12 as a Class X, Type 1 GDT

#### Applications

- Broadband equipment
- CATV/Broadband equipment
- Data lines and Ethernet (up to 10GbE)
- xDSL equipment, including ADSL2, ADSL, VDSL, VDSL2 30a bandplan compatible
- IAD (Integrated Access Device)
- Set Top Box (STB)
- General telecom equipment
- 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
- Aerospace and Automotive

## Electrical Characteristics

| Part Number | Device Specifications (at 25°C) |     |     |                                        |                                        |                       |                     | Life Ratings                                   |                                          |                                   |                                         |                              |                               |
|-------------|---------------------------------|-----|-----|----------------------------------------|----------------------------------------|-----------------------|---------------------|------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------------|------------------------------|-------------------------------|
|             | DC Breakdown in Volts (@100V/s) |     |     | Impulse Break-down in Volts (@100V/μs) | Impulse Break-down In Volts (@1 kV/μs) | Insulation Resistance | Capacitance (@1MHz) | Max Impulse Discharge Current (8/20μs)         | Max Impulse Discharge Current (10/700μs) | AC Discharge Current (50Hz, 1sec) | AC Discharge Current (Single, 9 Cycles) | DC Holdover Voltage (<150ms) | Impulse Life (10/1000μs (50A) |
|             | MIN                             | TYP | MAX | MAX                                    |                                        | MIN                   | MAX                 |                                                |                                          | MIN                               | MIN                                     |                              | MIN                           |
| CG675       | 60                              | 75  | 90  | 600                                    | 700                                    | 1GΩ @50V              | 0.3pf               | 10 Shots @ (3kA) <sup>1</sup><br>1 Shot at 5kA | 10 Shots @ (150A/6kV) <sup>2</sup>       | 3A                                | 6A                                      | 52V                          | 300 Shots                     |
| CG690       | 72                              | 90  | 108 | 600                                    | 700                                    |                       |                     |                                                |                                          |                                   |                                         | 52V                          |                               |
| CG6145      | 116                             | 145 | 174 | 600                                    | 700                                    | 1GΩ @100V             |                     |                                                |                                          |                                   |                                         | 52V                          |                               |
| CG6230      | 186                             | 230 | 276 | 600                                    | 700                                    |                       |                     |                                                |                                          |                                   |                                         | 80V                          |                               |
| CG6250      | 200                             | 250 | 300 | 600                                    | 700                                    |                       |                     |                                                |                                          |                                   |                                         | 80V                          |                               |
| CG6300      | 240                             | 300 | 360 | 650                                    | 800                                    |                       |                     |                                                |                                          |                                   |                                         | 135V                         |                               |
| CG6350      | 280                             | 350 | 420 | 750                                    | 900                                    |                       |                     |                                                |                                          |                                   |                                         | 135V                         |                               |
| CG6400      | 360                             | 400 | 480 | 850                                    | 1000                                   |                       |                     |                                                |                                          |                                   |                                         | 135V                         |                               |
| CG6470      | 376                             | 470 | 564 | 900                                    | 1100                                   |                       |                     |                                                |                                          |                                   |                                         | 135V                         |                               |
| CG6600      | 480                             | 600 | 720 | 1000                                   | 1200                                   |                       |                     |                                                |                                          |                                   |                                         | 1GΩ@250V                     |                               |

Note:

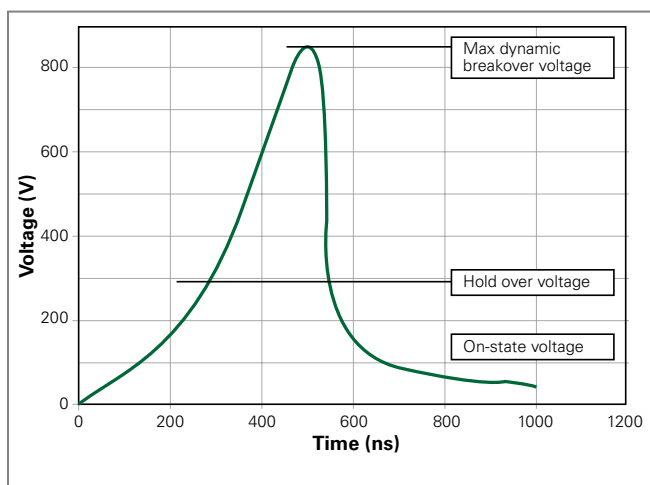
1. 5 x (+) and 5 x (-) applications of 3kA 8/20μs sec.

2. 5 x (+) and 5 x (-) applications of 150A 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

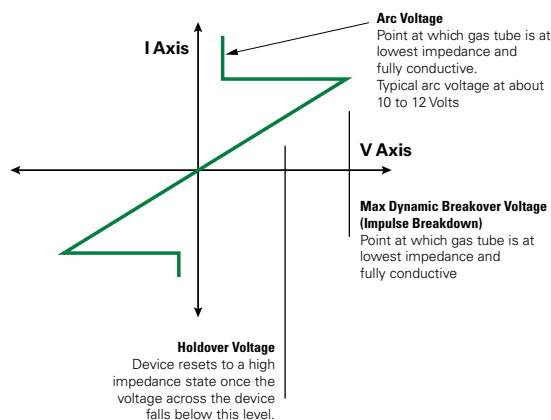
## Typical Insertion Loss

|                  |
|------------------|
| @1.0GHz = 0.03dB |
| @1.4GHz = 0.06dB |
| @1.8GHz = 0.09dB |
| @2.0GHz = 0.11dB |
| @2.4GHz = 0.13dB |
| @2.8GHz = 0.15dB |
| @3.1GHz = 0.17dB |
| @3.5GHz = 0.19dB |
| @4.0GHz = 0.22dB |

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

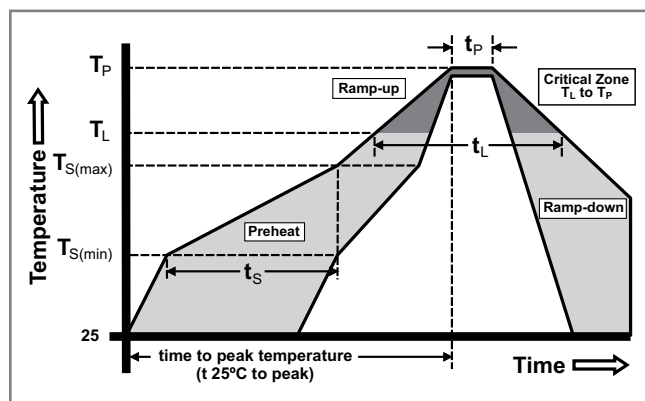
## V-I Characteristic Curve

Characteristics of Gas Plasma -response to transient condition



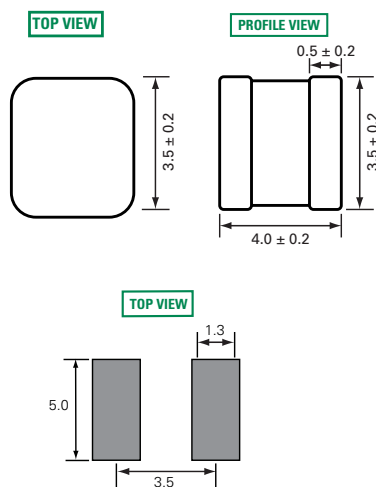
### Soldering Parameters - Reflow Soldering (Surface Mount Devices)

|                                                       |                                    |                         |
|-------------------------------------------------------|------------------------------------|-------------------------|
| 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                   |



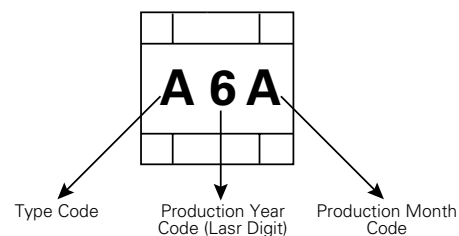
### Device Dimensions

Dimensions in millimeters



Recommended Soldering Pad Layout

### Product Marking



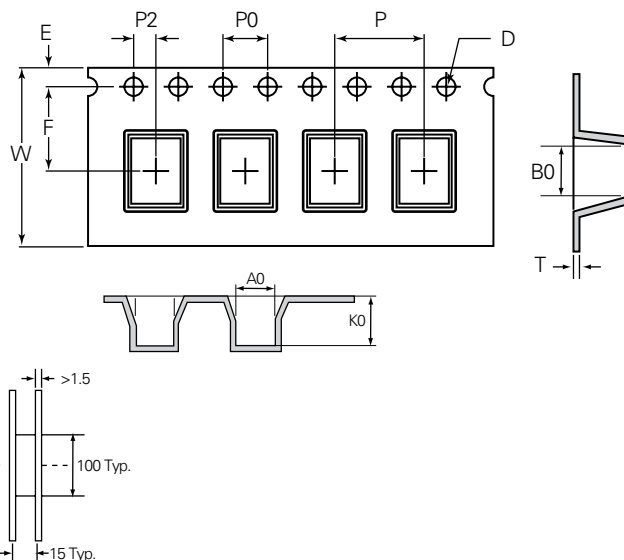
| Type Code |        |
|-----------|--------|
| A         | CG675  |
| B         | CG690  |
| S         | CG6145 |
| D         | CG6230 |
| R         | CG6250 |
| E         | CG6300 |
| G         | CG6350 |
| I         | CG6400 |
| P         | CG6470 |
| V         | CG6600 |

| 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

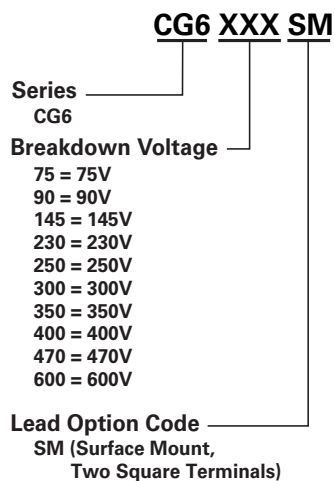
Unit = mm

| 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   | $4.5 \pm 0.1$     |
| W    | $12.0 \pm 0.3$ | K0   | $3.9 \pm 0.1$     |
| F    | $5.5 \pm 0.1$  | T    | $0.4 \pm 0.1$     |
| A0   | $3.9 \pm 0.1$  | 10P0 | $4.0 \pm 0.2$     |



**Packaging Quantity:**  
2000 pcs per reel (13")  
1 reels per inner box  
10 inners box per carton  
20,000 pcs per full carton

### Part Numbering System and Ordering Information



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