

## CG/CG2 Series



### Agency Approvals

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

### 2 Electrode GDT Graphical Symbol



### Description

Littelfuse highly reliable CG/CG2 Series GDTs provide a high degree of surge protection in a small size ideal for board level circuit protection.

GDTs function as switches which dissipate a minimum amount of energy and therefore handle currents that far surpass other types of transient voltage protection. Their gas-filled, rugged ceramic metal construction make them well suited to adverse environments.

The CG/CG2 series comes in a variety of forms including surface mount, core, straight and shaped leads, to serve a variety of mounting methods.

The CG Series (75-110V) is ideal for protection of test and communication equipment and other devices in which low voltage limits and extremely low arc voltages are required.

The CG2 Series (145V-1000V) is ideal for protecting equipment where higher voltage limits and holdover voltages are necessary.

### Features

- Rugged Ceramic-Metal construction
- Low Capacitance (<1.5pf)
- Meets REA PE-80
- Available in surface mount, and a variety of lead options options

### Applications

- Communication lines and equipment
- CATV equipment
- Test equipment
- Data lines
- Power supplies
- Instrumentation circuits
- Medical electronics
- ADSL equipment
- Telecom SLIC protection

### 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>(@1 Kv/μsec) | Insulation Resistance           | Capacitance<br>(@1MHz) | Arc Voltage<br>(on state Voltage)<br>@1Amp Min | Surge Life<br>(@500A<br>10/1000μs) | Nominal Impulse Discharge Current<br>(8/20μs) | Nominal AC Discharge Current<br>(10x1sec @50-60Hz) | AC Discharge Current<br>(9 cycle @50Hz) | DC Holdover Voltage <sup>2</sup> | Max Impulse Discharge Current<br>(1 Application @ 10/350μs) |
|                      | MIN                                | TYP  | MAX  | MAX                                       |                                             | MIN                             | MAX                    | TYP                                            |                                    |                                               |                                                    |                                         | TYP                              |                                                             |
| CG75                 | 60                                 | 75   | 90   | 400                                       | 650                                         | 10 <sup>10</sup> Ω<br>(at 50V)  | 1.5 pf                 | 15 V                                           | 400 shots                          | 10 shots<br>(@20kA) <sup>3</sup>              | 20 A                                               | 100 A                                   | 52 V                             | 4kA                                                         |
| CG90                 | 72                                 | 90   | 108  | 400                                       | 600                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG90 SN              | 72                                 | 90   | 108  | 400                                       | 600                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG110                | 88                                 | 110  | 132  | 450                                       | 600                                         | 10 <sup>10</sup> Ω<br>(at 100V) |                        |                                                |                                    |                                               |                                                    |                                         | 2.5kA                            |                                                             |
| CG2145               | 116                                | 145  | 174  | 500                                       | 600                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  | 135 V                                                       |
| CG2145 SN            | 120                                | 145  | 174  | 500                                       | 600                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2230               | 195                                | 230  | 265  | 600                                       | 700                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2230 SN            | 184                                | 230  | 276  | 600                                       | 700                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2250               | 213                                | 250  | 288  | 625                                       | 725                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2250 SN            | 200                                | 250  | 300  | 625                                       | 725                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2300               | 255                                | 300  | 345  | 700                                       | 800                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2300 SN            | 240                                | 300  | 360  | 700                                       | 800                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2350               | 297                                | 350  | 403  | 750                                       | 900                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2350 SN            | 280                                | 350  | 420  | 750                                       | 900                                         |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2420               | 357                                | 420  | 483  | 800                                       | 1000                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2470               | 400                                | 470  | 540  | 850                                       | 1200                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2470 SN            | 376                                | 470  | 564  | 850                                       | 1200                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2600               | 510                                | 600  | 690  | 1000                                      | 1400                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2600 SN            | 480                                | 600  | 720  | 1000                                      | 1400                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG2800 <sup>1</sup>  | 680                                | 800  | 920  | 1200                                      | 1500                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |
| CG21000 <sup>1</sup> | 850                                | 1000 | 1150 | 1500                                      | 1600                                        |                                 |                        |                                                |                                    |                                               |                                                    |                                         |                                  |                                                             |

#### NOTES:

1. Tested to UL1449 Third Edition

2. Reference REA PE-80, 0.2A. Tested to ITU-T Rec K.12 and REA PE 80 < 150 mSec.

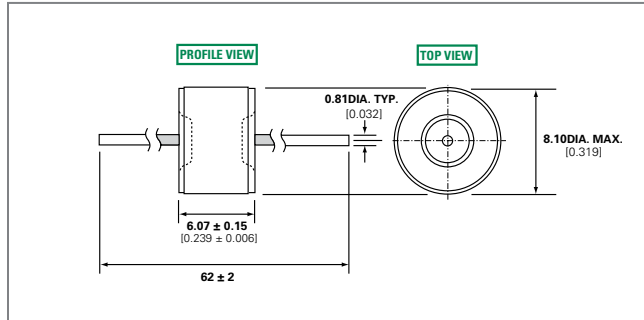
### Product Characteristics

|                        |                                                                                                                                                                                                                                                                                                                            |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Materials</b>       | <b>LS, Axial:</b><br>Device: Tin Plated 2–5 Microns<br>Lead Wires: Tin Plated 17.5 ± 12.5 Microns<br>Construction: Ceramic Insulator<br><b>Core:</b><br>Device: Tin Plated 17.5 ± 12.5 Microns.<br>Construction: Ceramic Insulator<br><b>MS:</b><br>Device: Dull Tin Plated 7–9 Microns<br>Construction: Ceramic Insulator |
| <b>Product Marking</b> | LF Logo, Voltage and date code; Black in positive print                                                                                                                                                                                                                                                                    |

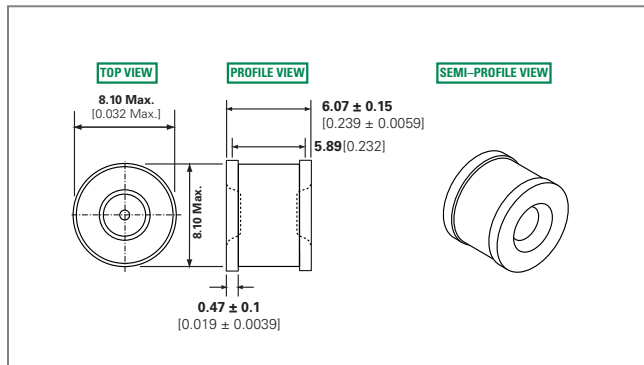
|                                              |                                                                                     |
|----------------------------------------------|-------------------------------------------------------------------------------------|
| <b>Glow to arc transition current</b>        | < 0.5Amps                                                                           |
| <b>Glow Voltage</b>                          | 60-160 Volts                                                                        |
| <b>Storage and Operational Temperature</b>   | -40 to +90                                                                          |
| <b>Maximum Follow On Current<sup>1</sup></b> | 230 Volts r.m.s, 200 Amps.<br>(800V and 1000V devices tested to UL1449 3rd edition) |

### Device Dimensions

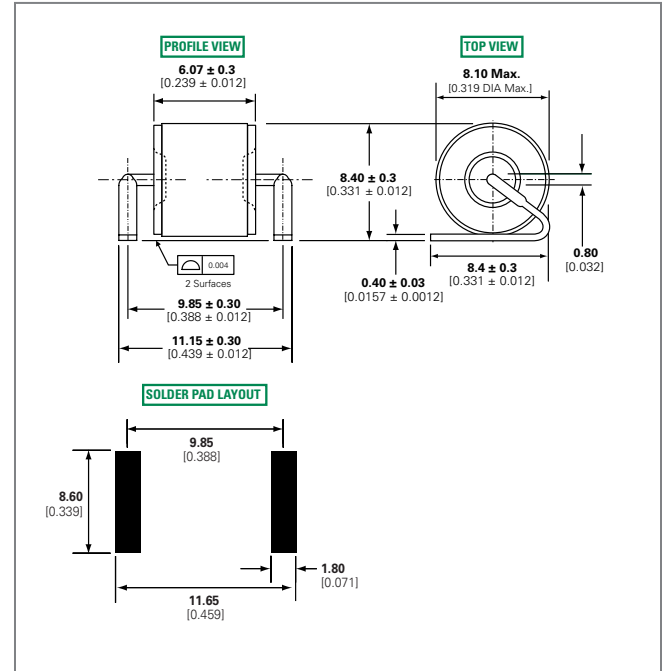
#### Leaded 'L' Type Straight Axial Devices



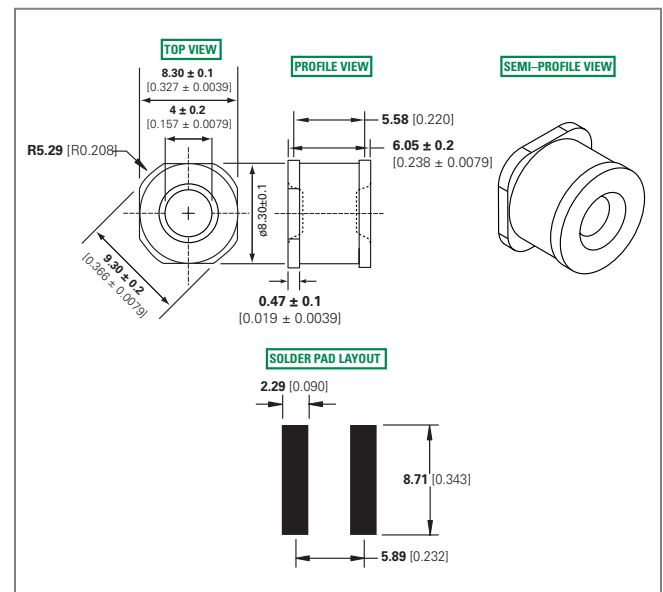
#### Core Devices



#### Leaded 'LS' Type Shaped Lead Devices

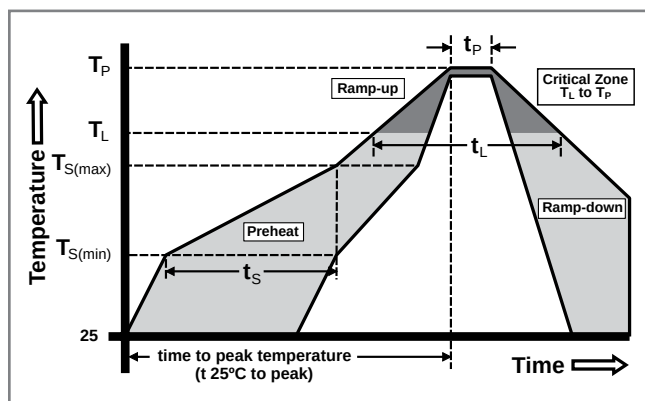


#### 'MS' Type Devices

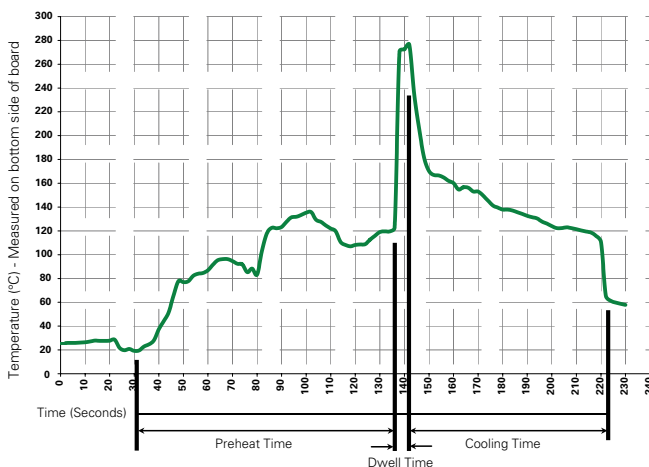


### Soldering Parameters - Reflow Soldering (Surface Mount Devices)

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



### Soldering Parameters - Wave Soldering (Thru-Hole Devices)



### Recommended Process Parameters:

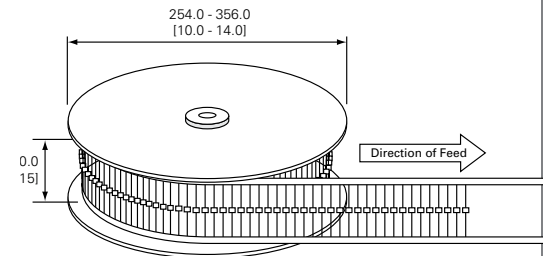
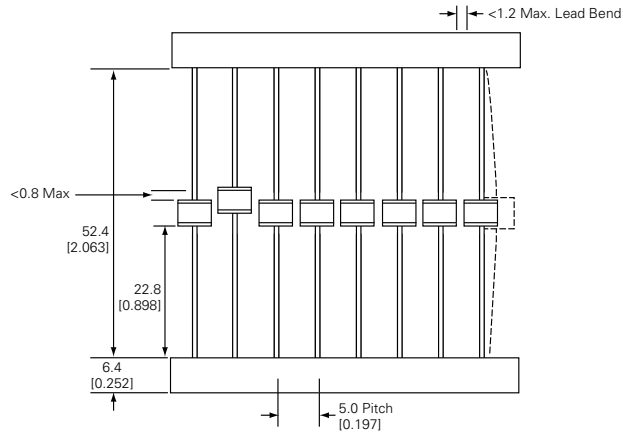
| Wave Parameter                                              | Lead-Free Recommendation |
|-------------------------------------------------------------|--------------------------|
| <b>Preheat:</b><br>(Depends on Flux Activation Temperature) |                          |
| (Typical Industry Recommendation)                           |                          |
| Temperature Minimum:                                        | 100° C                   |
| Temperature Maximum:                                        | 150° C                   |
| Preheat Time:                                               | 60-180 seconds           |
| Solder Pot Temperature:                                     | 280° C Maximum           |
| Solder Dwell Time:                                          | 2-5 seconds              |

### Soldering Parameters - Hand Soldering

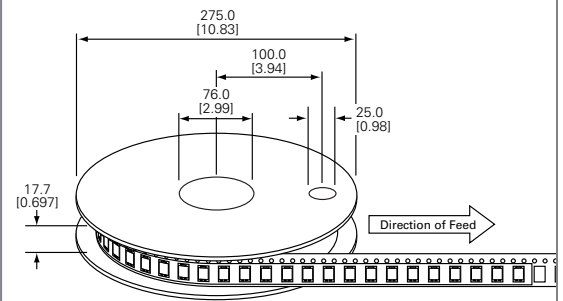
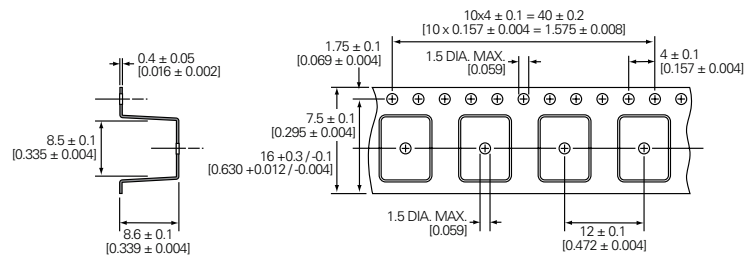
Solder Iron Temperature: 350° C +/- 5°C  
Heating Time: 5 seconds max.

### Packaging Dimensions

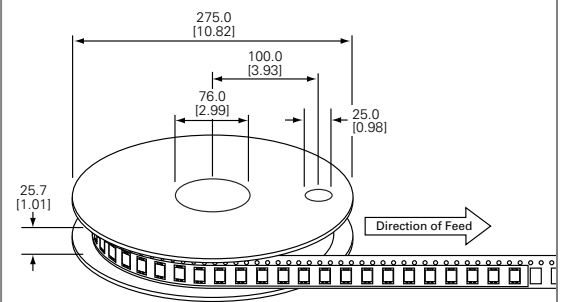
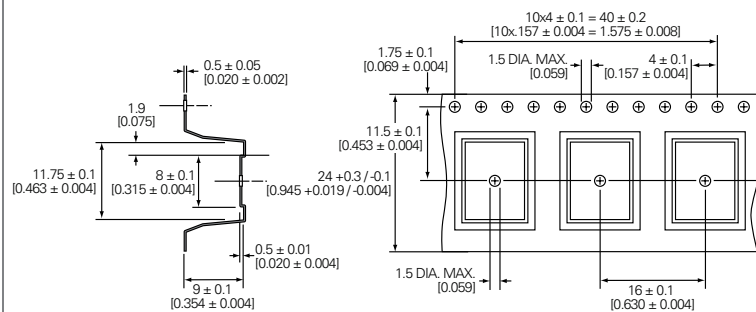
#### For 'L' Type Axial Lead Items



#### Core and 'MS' Type Items



#### For 'LS' Type Shaped Lead Items



### Part Numbering System and Ordering Information

| <b>CG2 XXX XX * XX</b>                                                                                                           |      |
|----------------------------------------------------------------------------------------------------------------------------------|------|
| <b>Series</b>                                                                                                                    |      |
| CG – for 75, 90, or 110V                                                                                                         |      |
| CG2 – for 145V to 1000V                                                                                                          |      |
| <b>Breakdown Voltage</b>                                                                                                         |      |
| 75                                                                                                                               | 300  |
| 90                                                                                                                               | 350  |
| 110                                                                                                                              | 470  |
| 145                                                                                                                              | 600  |
| 230                                                                                                                              | 800  |
| 250                                                                                                                              | 1000 |
| <b>Lead Option Code</b>                                                                                                          |      |
| (Blank) = No Leads / Core                                                                                                        |      |
| L = Straight Leads                                                                                                               |      |
| LS = Shaped Leads                                                                                                                |      |
| MS = Surface Mount                                                                                                               |      |
| <b>Option Code*</b>                                                                                                              |      |
| SN = may have different DC Breakover Voltage Limit. Please refer to Electrical Characteristics table for additional information. |      |
| <b>Packaging Option Code</b>                                                                                                     |      |
| (Blank) = No Leads / Core, Bulk Bag - 400 pcs                                                                                    |      |
| L(Blank) = Straight Lead, Tray - 50 pcs                                                                                          |      |
| LTR = Straight Lead, Tape & Reel per EIA RS-296-E - 500 per reel                                                                 |      |
| LTE = Straight Lead, Tape & Reel per IEC 60286-1 - 500 per reel                                                                  |      |
| LS(Blank) = Shaped Lead (see LS dimensions), Tape & Reel - 500 per reel                                                          |      |

#### Examples:

**CG75** – A non-leaded 75V device

**CG2230L** – A leaded 230V device

**CG2800LTR** – A leaded 800V device, tape-and-reel (per EIA standard RS-296-D)

#### Notes:

CG/CG2 devices with other breakdown voltages in the 75-1000 V range are available upon request.

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