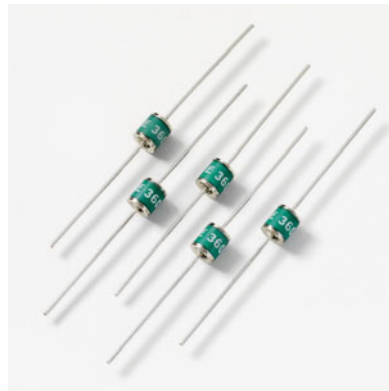




Expertise Applied | Answers Delivered



PRODUCT
CATALOG



GDT

Gas Discharge Tube
Products

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All Littelfuse Product Catalogs at
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Littelfuse Circuit Protection Solutions Portfolio

Consumer Electronics | Telecom | White Goods | Medical Equipment | TVSS and Power Solutions

DESIGN SUPPORT

Live Application Design and Technical Support—Tap into our expertise. Littelfuse engineers are available around the world to help you address design challenges and develop unique, customized solutions for your products.

Product Sampling Programs—Most of our products are available as samples for testing and verification within your circuit design. Visit Littelfuse.com or contact a Littelfuse product representative for additional information.

Product Evaluation Labs and Services—Littelfuse global labs are the hub of our new product development initiatives, and also provide design and compliance support testing as an added-value to our customers.



OVERVOLTAGE SUPPRESSION TECHNOLOGIES (1-6)

1. TVS Diodes — Suppress overvoltage transients such as Electrical Fast Transients (EFT), inductive load switching and lightning in a wide variety of applications in the computer, industrial, telecom and automotive markets.

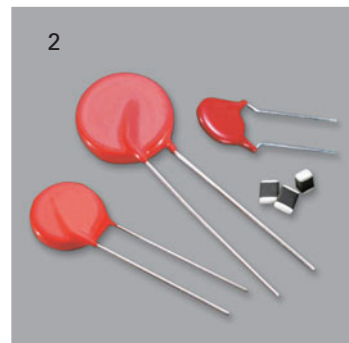
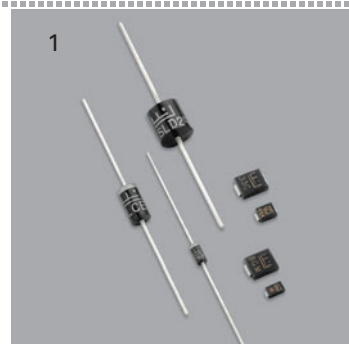
2. Varistors — Multiple forms, from Metal Oxide Varistors (MOVs) that suppress transient voltages to Multi-Layer Varistors (MLVs) designed for applications requiring protection from various transients in computers and handheld devices as well as industrial and automotive applications.

3. SIDACtor® Devices — Complete line of protection thyristor products specifically designed to suppress overvoltage transients in a broad range of telecom and datacom applications.

4. Gas Plasma Arrestors (GDTs) — Available in small footprint leaded and surface mount configurations, Littelfuse GDTs respond fast to transient overvoltage events, reducing the risk of equipment damage.

5. Silicon Protection Arrays — Designed specifically to protect analog and digital signal lines from electrostatic discharge (ESD) and other overvoltage transients.

6. PulseGuard® ESD Suppressors — Available in various surface mount form factors to protect high-speed digital lines without causing signal distortion.



Visit

Protection folio

Supplies | Lighting | General Electronics

SWITCHING TECHNOLOGIES

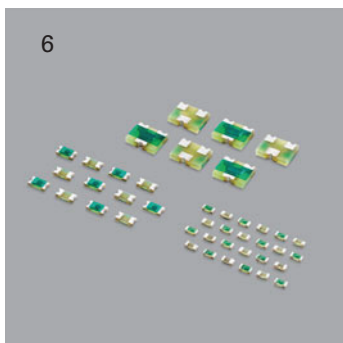
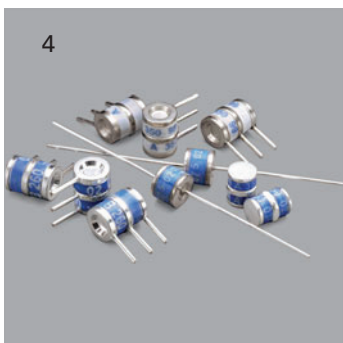
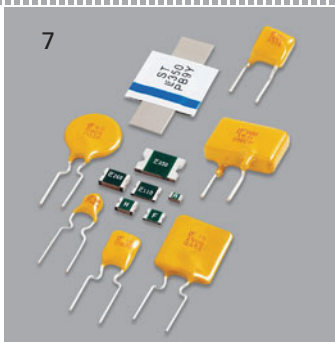
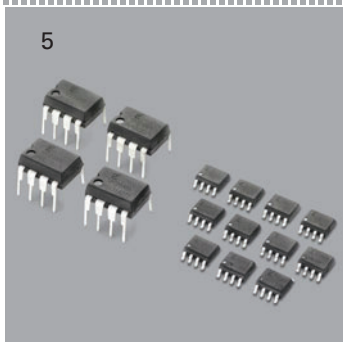
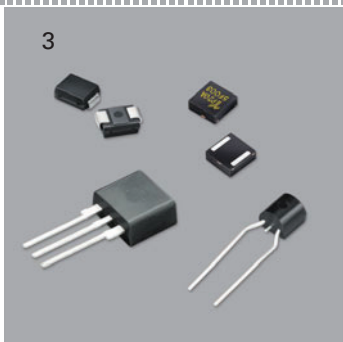
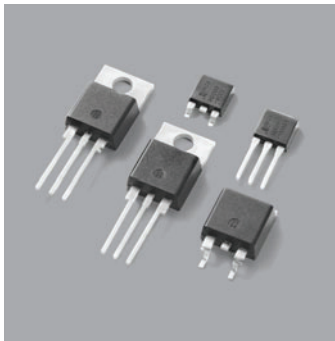
Switching Thyristors—

Solid-state switches used to control the flow of electrical current in applications, capable of withstanding rated blocking/off-state voltage until triggered to on-state.

SPECIAL APPLICATION PRODUCTS

PLED LED Lighting Reliability

Devices — Specialty silicon devices that enable LED lighting strings to continue to function if any single LED fails as an open circuit, and also offer ESD and reverse power protection.



OVERCURRENT PROTECTION TECHNOLOGIES (7-8)

7. Positive Temperature Coefficient Devices (PTCs)—

Provide resettable overcurrent protection for a wide range of applications.

8. Fuses — Full range including surface mount, axial, glass or ceramic, thin-film or Nano²® style, fast-acting or SloBlo[®], MINI[®] and ATO[®] fuses.

www.littelfuse.com for more information.

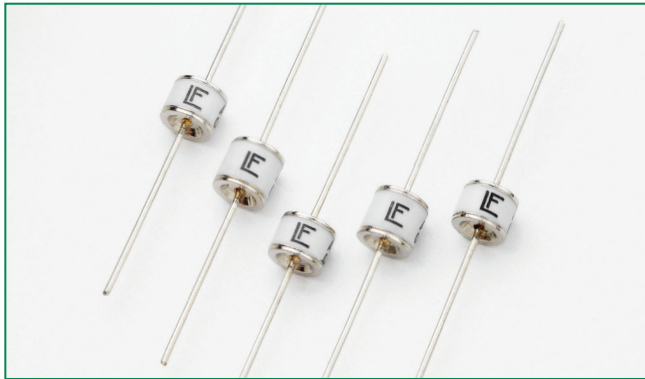
GDT (GAS DISCHARGE TUBE) PRODUCTS www.littelfuse.com/gdt

GDTs dissipate voltage transients through a contained plasma gas. They have high insulation resistance plus low capacitance and leakage to ensure minimal effect on normal operation of equipment. Littelfuse devices offer a small footprint and are available in leaded and surface mount configurations, with high surge handling capability. Their fast response to transient over-voltage events, and ability to dissipate large amounts of energy, translates into reduced risk of equipment damage. The amount of energy they can dissipate makes them a good choice for lightning surge protection, particularly for telecomm equipment located in outdoor structures.

| Series Name ¹ | DC Breakover Voltage Range (Nom V_{BO}) | Max AC Surge Rating | Peak Pulse Current (8x20 μ s) | Max Capacitance | Operating Temperature Range | # Terminals | Mounting Options | | | | | Data Sheet Page | |
|----------------------------------|---|---------------------|-----------------------------------|-----------------|-----------------------------|-------------|------------------|---------|------------|-------------|----------------|-----------------|----------------|
| | | | | | | | Mini Tube | Surface | Axial Lead | Radial Lead | Cartridge Clip | | RoHS Compliant |
| High Voltage GDTs | | | | | | | | | | | | | |
| AC |  285 - 600 | NA | 5000A | 1.5pF | -40°C to +90°C | 2 | | | • | | • | 3 | |
| CG3 | 1000 - 7500 | | 5000A | 1.5pF | | 2 | | | • | | • | 3 | |
| Low to Medium Surge GDTs | | | | | | | | | | | | | |
| CG5 |  90 - 600 | 5A | 5000A | 1.5pF | -40°C to +90°C | 2 | • | • | • | | • | 7 | |
| SL0902A | 90 - 600 | 5A | 5000A | 1.5pF | | 2 | • | • | | | • | • | 7 |
| SL1002A |  75 - 600 | 5A | 5000A | 1.2pF | | 2 | • | • | | | • | • | 28 |
| SL1003A | 90 - 500 | 10A* | 10,000A | 1.2pF | | 3 | • | • | • | | • | • | 33 |
| SL1011A | 75 - 600 | 5A | 5000A | 1.5pF | | 2 | • | • | | | • | • | 41 |
| Medium to High Surge GDTs | | | | | | | | | | | | | |
| SL1122A |  90 - 260 | 10A* | 10000A* | 100-270pF | -40°C to +90°C | 3 | | | • | | • | 38 | |
| SL1021A | 90 - 600 | 10A* | 10000A* | 1.5pF | | 3 | | • | • | | • | • | 12 |
| SL1024A |  90 - 600 | 10A* | 10000A* | 1.5pF | | 3 | | • | • | | • | • | 12 |
| PMT8 | 90 - 400 | 10A* | 20000A* | 1.5pF | | 3 | | • | • | | • | • | 12 |
| SL1011B | 75 - 350 | 10A | 10000A | 1.5pF | | 2 | | • | • | | • | • | 41 |
| SL1411A | 75 - 600 | 10A | 10000A | 1.5pF | | 2 | | • | • | | • | • | 41 |
| PMT3 |  90 - 500 | 20A* | 20000A* | 1.5pF | | 3 | | • | • | | • | | 17 |
| CG/CG2 | 75 - 1000 | 20A | 20000A | 1.5pF | | 2 | • | • | • | | • | | 20 |
| Very High Surge GDTs | | | | | | | | | | | | | |
| SL1021B |  90 - 600 | 10A* | 20000A* | 1.5pF | -40°C to +90°C | 3 | | • | • | | • | • | 12 |
| SL1024B | 90 - 600 | 10A* | 20000A* | 1.5pF | | 3 | | • | • | | • | • | 12 |
| SL1026 |  275 - 700 | 10A* | 20000A* | | | 2 | | | | • | • | • | 26 |

(1) Detailed information about most product series listed here can be found on our web site by entering [www.littelfuse.com/series/\(Series Name\).html](http://www.littelfuse.com/series/(Series Name).html)
 * Total current through center (ground) terminal

RoHS  **AC and CG3 Series**



Agency Approvals

| AGENCY | AGENCY FILE NUMBER |
|---|--------------------|
|  | E320116* |

*NOTE: CG3 7.5 product UL approval is currently pending

2 Electrode GDT Graphical Symbol



Description

Littelfuse AC series two-electrode line protectors provide a high degree of surge protection in AC line applications. The two models, AC120 and AC240 are designed for use with 120VAC and 240VAC lines respectively. They are able to extinguish AC follow-on currents of at least 200A.

Littelfuse CG3 two electrode high voltage (1.0 - 7.5 KV) devices are designed for surge protection and high isolation applications, and for applications for which bias voltages or signal levels of several hundred volts are normally present.

Features

- Rugged ceramic-metal construction
- Available in tape-and-reel packaging
- Low capacitance (<1.5 pF)
- Available with or without leads

Applications

AC Series:

- Long branch circuits (AC wall outlet)
- Short branch circuits (at breaker box, computer, etc)
- Power supplies
- Test equipment
- Submersible pumps
- Medical electronics

CG3 Series:

- CRT terminals
- CATV equipment
- Antennas
- Power supplies
- Medical electronics

Electrical Characteristics

| Part Number | Device Dimension Type | 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/μsec) | Insulation Resistance | Capacitance (@1MHz) | Arc Voltage (on state Voltage) @1Amp Min | Max Follow On Current ³ | Nominal AC Discharge Current (10x1sec @50-60Hz) | AC Discharge Current (1 x 50Hz 9 cycles) | Nominal Impulse Discharge Current ⁴ (@8/20μs) | Max Surge Current ⁵ (@8/20μs) |
| | | MIN | TYP | MAX | MAX | | MIN | MAX | TYP | | | | | |
| AC120 ¹ | A | 230 | 285 | 340 | 500 | 550 | 10 GΩ (at 100V) | <1.5 pf | ~ 25 V | 200 Amps | 5 A | 65 A | 10 shots 5kA | 1 shot 10kA |
| AC240 ¹ | A | 480 | 600 | 720 | 1100 | 1200 | | | | | | | | |
| CG3 1.0 ¹ | A | 800 | 1000 | 1200 | 1400 | 1500 | 10 GΩ (at 100V) | <1.5 pf | ~ 25 V | 200 Amps | N/A | N/A | 10 shots 5kA | 1 shot 10kA |
| CG3 1.1 ¹ | A | 880 | 1100 | 1320 | 1600 | 1700 | | | | | | | | |
| CG3 1.2 ¹ | A | 960 | 1200 | 1440 | 1700 | 1800 | | | | | | | | |
| CG3 1.3 ¹ | A | 1040 | 1300 | 1560 | 1800 | 1900 | | | | | | | | |
| CG3 1.5 ¹ | A | 1200 | 1500 | 1800 | 1800 | 2000 | | | | | | | | |
| CG3 2.0 ¹ | A | 1600 | 2000 | 2400 | 2500 | 2750 | | | | | | | | |
| CG3 2.5 ¹ | A | 2000 | 2500 | 3000 | 3200 | 3500 | | | | | | | | |
| CG3 2.7 ¹ | A | 2160 | 2700 | 3240 | 3600 | 4000 | | | | | | | | |
| CG3 3.0 ¹ | A | 2400 | 3000 | 3600 | 4000 | 4200 | | | | | | | | |
| CG3 3.3 ¹ | A | 2640 | 3300 | 3960 | 4600 | 4700 | | | | | | | | |
| CG3 4.0 ² | B | 3200 | 4000 | 4800 | 5800 | 6000 | | | | | | | | |
| CG3 4.5 ² | B | 3600 | 4500 | 5400 | 6150 | 6500 | | | | | | | | |
| CG3 5.0 ² | B | 4000 | 5000 | 6000 | 7500 | 8000 | | | | | | | | |
| CG3 6.2 ^{2,7} | B | 4960 | 6200 | 7440 | 8100 | 9500 | | | | | | | | |
| CG3 6.5 ^{2,7} | B | 5200 | 6500 | 7800 | 9500 | 10000 | | | | | | | | |
| CG3 7.5 ^{2,6,7} | B | 6000 | 7500 | 9000 | 10000 | 10600 | | | | | | | | |

NOTES:

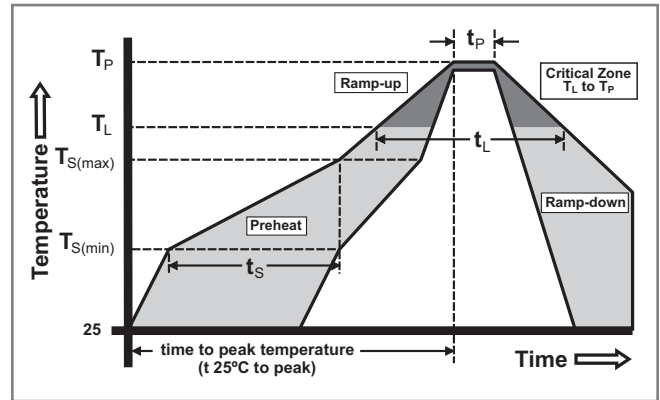
1. Refer to Production Dimensions section, outline A devices
2. Refer to Production Dimensions section, outline B devices
3. Tested to UL1449 Third Edition – 120V r.m.s. for AC120, 230V r.m.s. all others.
Conducted with suitable MOV connected in series.
4. 10 x [5(+) and 5(-)] applications 5kA @ 8/20μs
5. 1 x [1(+) and 1(-)] application 10kA @ 8/20μs
6. CG3 7.5 product UL approval is currently pending
7. When ordering this item, use suffix code D004 when entering the part number.
The older product version without D004 suffix code has been discontinued.
Refer to Part Numbering System section for additional information.

Product Characteristics

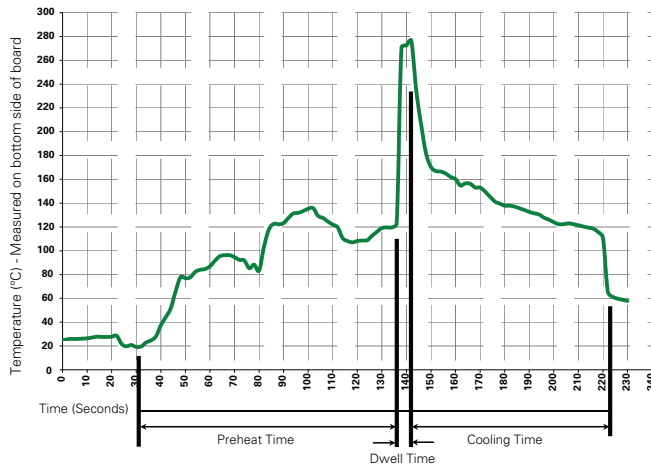
| | |
|--|--|
| Materials | Core Outline A & B items: Device: Tin Plated 17.5±12.5 Microns Axial Outline A items: Device: Nickel Plated 2–5 Microns Wire: Tin Plated 17.5±12.5 Microns Axial Outline B items: Device & Wire: Tin Plated 17.5±12.5 Microns |
| Product Marking | LF Logo, Voltage and date code; Black ink positive print |
| Glow to arc transition current | < 0.5Amps |
| Glow Voltage | ~ 140 Volts |
| Storage and Operational Temperature | -40 to +90 |

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 ^{+0/-5} °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)



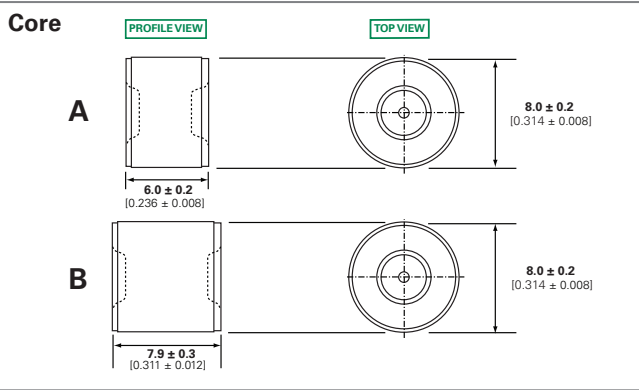
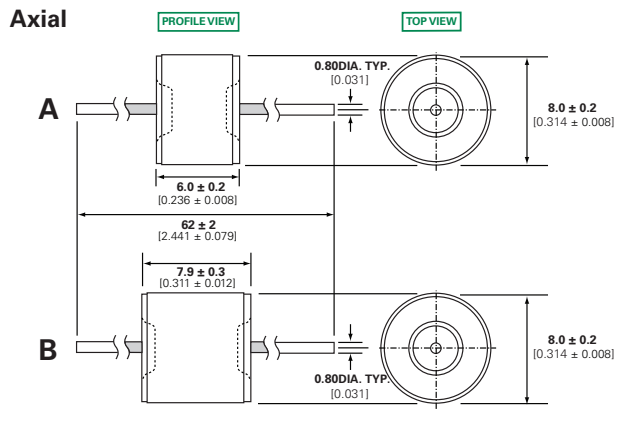
Recommended Process Parameters:

| Wave Parameter | Lead-Free Recommendation |
|---|--------------------------|
| Preheat: (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 |

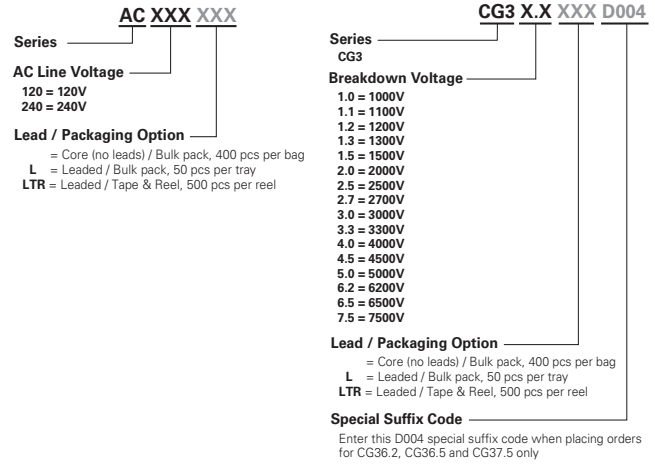
Soldering Parameters - Hand Soldering

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

Device Dimensions

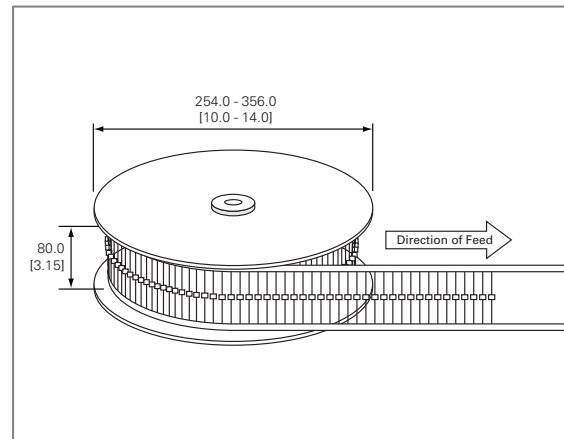
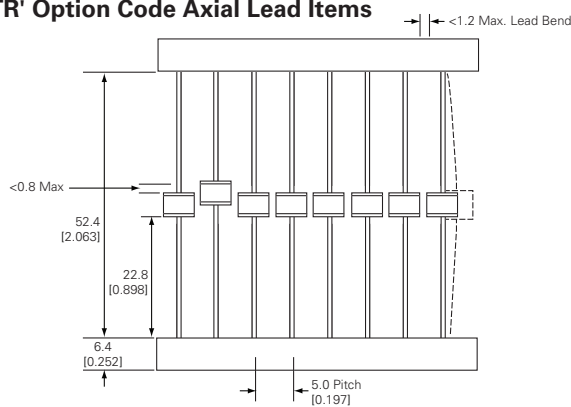


Part Numbering System and Ordering Information

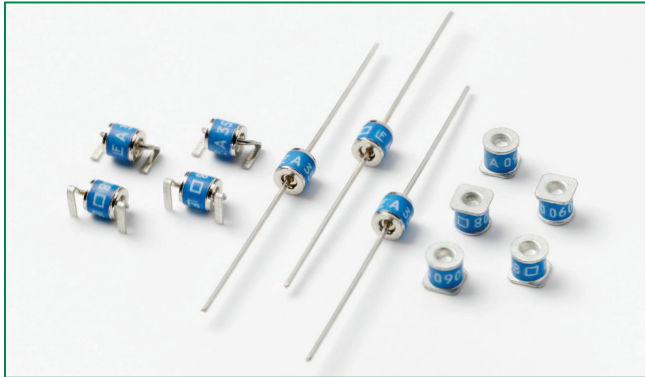


Packaging Dimensions

For 'LTR' Option Code Axial Lead Items



RoHS  **CG5 and SL0902A Series**




Description

Littelfuse Broadband Optimized™ SL0902A Series offers high surge ratings in a miniature package. Special design features provide high levels of protection against fast rising transients in the 100V/μs to 1kV/μs range usually caused by lightning disturbances. Low insertion loss is perfectly suited to broadband equipment applications. The capacitance does not vary with voltage, and will not cause operational problems with ADSL2+, where capacitance variation across Tip and Ring is undesirable. These devices are extremely robust and are able to divert a 2500A pulse without destruction. For AC Power Cross of long duration, overcurrent protection is recommended.

Littelfuse CG5 MS mini surge arresters are specifically designed for protection of electrical and communication equipment against over voltage transients in surface mount assembly applications. This series offers the most cutting edge protection using non-radioactive elements.

Agency Approvals

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

2 Electrode GDT Graphical Symbol



Features

- RoHS compliant and Lead-free
- GHz working frequency
- Excellent stability on multiple pulse duty cycle
- Excellent response to fast rising transients.
- Ultra Low Insertion Loss
- 2.5KA surge capability tested with 8/20μS pulse as defined by IEC 61000-4-5
- Ultra small devices offered in a variety of mounting lead forms
- Non-Radioactive
- Low capacitance (<1pF)
- Voltage Ranges 90V to 600V
- UL recognized
- Conforms to ITU-T K12, IEC 1000-4-5

Applications

- Communication equipment
- CATV equipment
- Test equipment
- Data lines
- Power supplies
- Telecom SLIC protection
- Broadband equipment
- ADSL equipment, including ADSL2+
- XDSL equipment
- Satellite and CATV equipment
- General telecom equipment

Electrical Characteristics

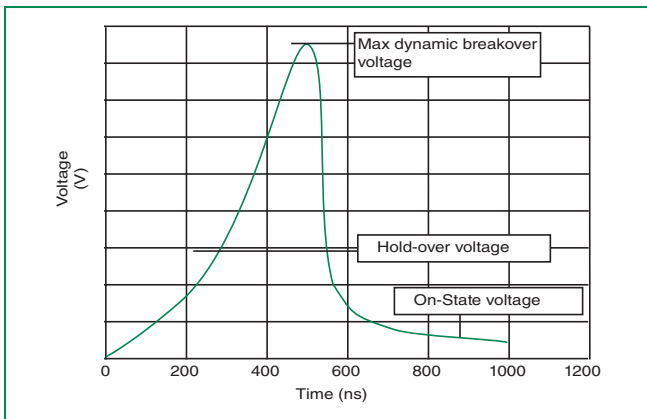
| Part Number | Device Specifications (at 25°C) | | | | | | Life Ratings | | | | | |
|----------------------|---------------------------------|-----|-----|---------------------------------------|---|------------------------------|---------------------|------------------------|--|---|--------------------------------------|--|
| | DC Breakdown in Volts (@100V/s) | | | Impulse Breakdown in Volts (@100V/μs) | Impulse Breakdown In Volts (@1 Kv/μsec) | Insulation Resistance | Capacitance (@1MHz) | Surge Life (10/1000μs) | Nominal Impulse Discharge Current (8/20μs) | Nominal AC Discharge Current (10x1sec @50-60Hz) | AC Discharge Current (9 cycle @50Hz) | Max Impulse Discharge Current (1 Application @ 10/350μs) |
| | MIN | TYP | MAX | MAX | | MIN | MAX | | | | | |
| SL0902A90 CG590 | 72 | 90 | 108 | 550 | 700 | 10 ¹⁰ Ω (at 50V) | | 300 shots (@100A) | 10 shots (@5kA) ⁵ | 5 A | 10 A | 0.5kA |
| CG5145 | 116 | 145 | 174 | 550 | 650 | 10 ¹⁰ Ω (at 100V) | 1.5 pf | 300 shots (@100A) | 10 shots (@5kA) ⁵ | 5 A | 10 A | 0.5kA |
| CG5150 | 120 | 150 | 180 | 550 | | | | | | | | |
| SL0902A230 CG5230 | 184 | 230 | 276 | 550 | 650 | | | | | | | |
| CG5250 | 200 | 250 | 300 | 600 | | | | | | | | |
| CG5270 | 216 | 270 | 324 | 650 | | | | | | | | |
| SL0902A350 CG5350 | 280 | 350 | 420 | 800 | 900 | | | | | | | |
| CG5400 | 320 | 400 | 480 | 900 | | | | | | | | |
| SL0902A420 | 336 | 420 | 504 | 900 | 1000 | | | | | | | |
| CG5550 | 440 | 550 | 660 | 1350 | | | | | | | | |
| SL0902A600 CG5600 | 480 | 600 | 720 | 1350 | 1500 | | | | | | | |

Product Characteristics

| | |
|------------------|---|
| Materials | CG5xxxLS (Outline 500), CG5xxxLTR & CG5350L-03TR (Outline 502), and CG5xxxL-02 (Outline 503): Device Nickel Plated 2–5 Microns Wire Tin Plated 17.5±12.5 Microns Construction Ceramic Insulator. |
| | CG5xxx (Outline 501), and CG5xxxMS & SL0902AxxxSM (Outline 505): Device Tin Plated 17.5±12.5 Microns Construction Ceramic Insulator. |

| | |
|--|--------------------------------|
| Product Marking | LF Logo, Voltage and date code |
| Glow to arc transition current | < 0.5Amps |
| Glow Voltage | 140 Volts |
| Storage and Operational Temperature | -40 to +90 |

Voltage vs. Time Characteristic

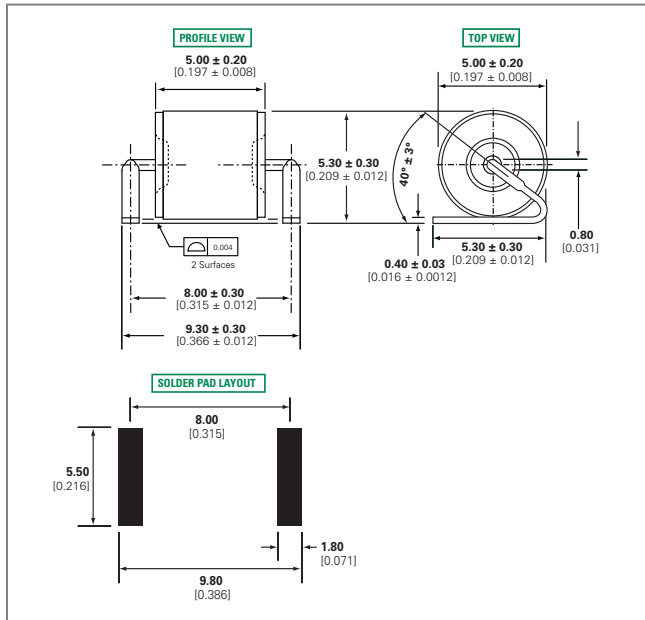


Typical Insertion Loss

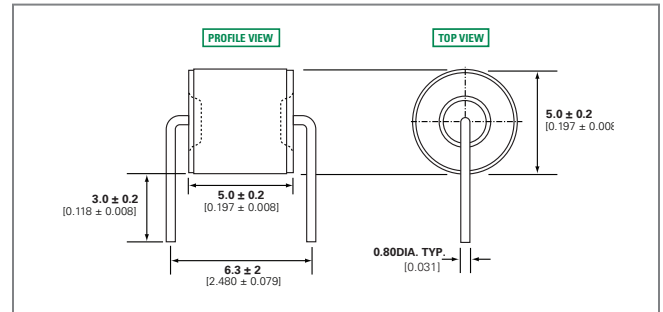
| |
|---------------------|
| @ 1.0 GHz = 0.01 dB |
| @ 1.4GHz = 0.1 dB |
| @ 1.8 GHz = 0.53 dB |
| @ 2.1 GHz = 0.81 dB |
| @ 2.45 GHz = 1 dB |
| @ 2.8 GHz = 1.2 dB |
| @ 3.1 GHz = 1.5 dB |
| @ 3.5 GHz = 2.1 dB |

Device Dimensions

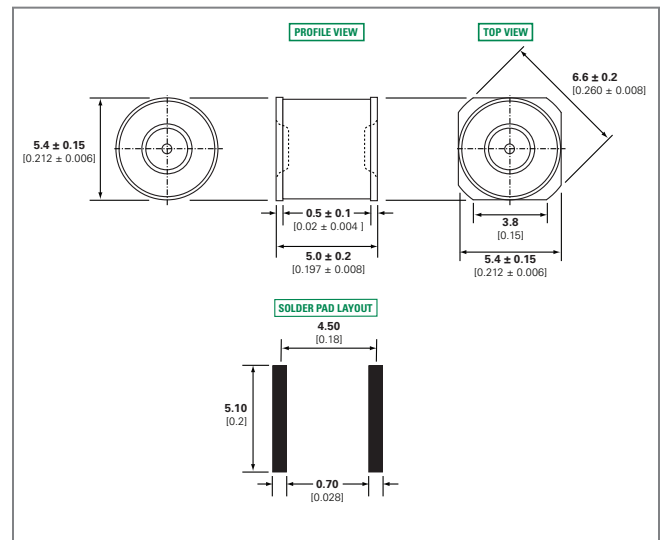
Outline 500 - CG5xxxLS



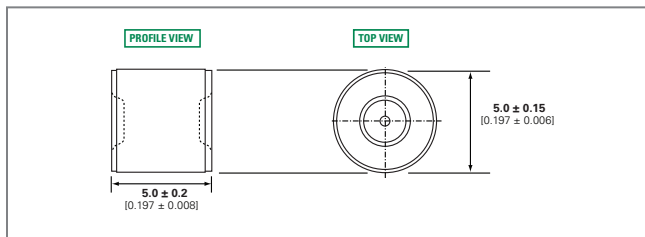
Outline 503 - CG5xxxL-02 (except CG5600L-02, see Outline 502)



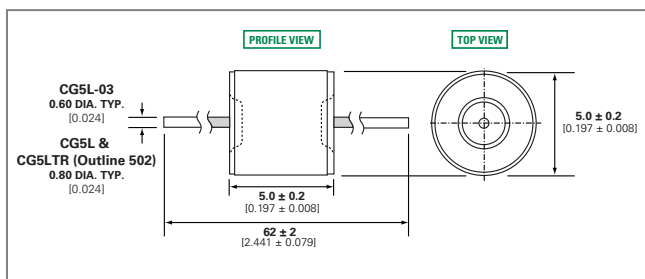
Outline 505 - CG5xxxMS and SL0902AxxxSM



Outline 501 - CG5xxx

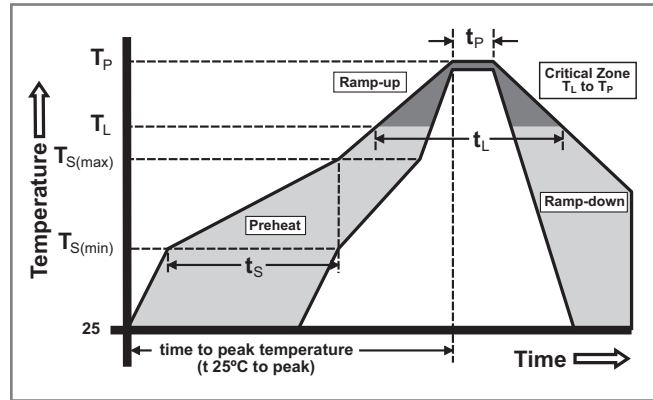


Outline 502 - CG5xxxLTR (also CG5350L-03TR, CG5600L-02)



Soldering Parameters - Reflow Soldering (Surface Mount Devices)

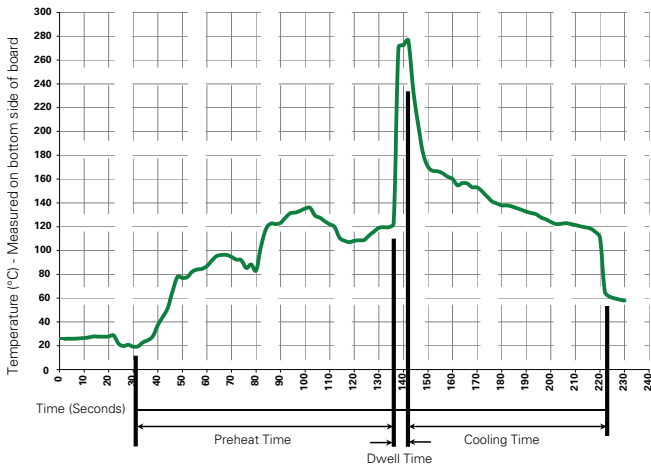
| | | |
|--|------------------------------------|-------------------------|
| Reflow Condition | | Pb – Free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (Min to Max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus 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 ^{+0/-5} °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 - Hand Soldering

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

Soldering Parameters - Wave Soldering (Thru-Hole Devices)

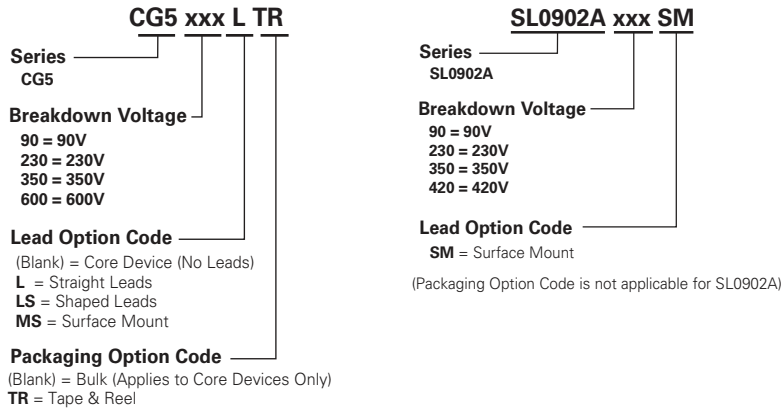


Recommended Process Parameters:

| Wave Parameter | Lead-Free Recommendation |
|---|-----------------------------------|
| Preheat: (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 |

Note: These devices are not recommended for IR or Convection Reflow process.

Part Numbering System and Ordering Information



Packaging

| Part Number and Device Type | | Device Dimensions Reference | Quantity and Packaging Description |
|-----------------------------|----------------------|-----------------------------|------------------------------------|
| CG5xxx | Core | Outline 501 | 1000pcs/bag in bulk packaging |
| CG5xxxLS | Shaped Leads | Outline 500 | 900pcs/reel in carrier and tape* |
| CG5xxxLTR CG5xxxL-03TR** | Straight Axial Leads | Outline 502 | 1000pcs/reel in tape and reel* |
| CG5xxxL-02** | Bent Radial Leads | Outline 503 | 50pcs/tray in tray and cover |
| CG5xxxMS SL0902AxxxSM | Surface mount | Outline 505 | 900pcs/reel in carrier and tape* |

* For tape specifications and dimensions, please contact factory.
 ** Special order items not available for general sale. Please contact Littelfuse for details.

RoHS  **SL1021A/B, SL1024A/B and PMT8 Series**



Description

GDT circuit protection devices dissipate electrical surge energy safely within a contained plasma gas. Commonly used to help protect sensitive telecom and networking equipment and lines, GDTs protect from damage that may result from lightning strikes and equipment switching operations.

The Littelfuse GDT series described in this document are available in a variety of leaded and surface mount forms and offered with and without optional fail-safe clip. Please refer to the electrical specifications, dimension and packaging options section of this document for additional information.

SL1021A/B and SL1024A/B Series:

SL1021A/B and SL1024A/B series GDTs are designed to offer high levels of performance on fast rising transients in the range of 100V/μS to 1KV/μS, which are those most likely created by induced lightning disturbances.

These devices feature ultra low capacitance (typically 1.5pF or less) and are extremely robust with SL102xA devices able to divert a 10,000 Amp pulse without destruction, and SL102xB suffix devices able to divert a 20,000 Amp pulse without destruction.

These series offer optimized internal geometry which provide low insertion loss at high frequencies, ideal for the protection of broadband and other high speed transmission equipment.

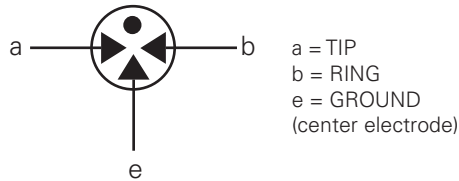
PMT8 Series:

PMT8 GDT's are telecom grade devices designed to meet the recommendations in CCITT-K12 and Bellcore GR-1361-CORE. The three electrode configuration is used in applications where simultaneous crowbar action of two signal lines is required.

Agency Approvals

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

3 Electrode GDT Graphical Symbol



Features

- RoHS compliant
- Low insertion loss
- Excellent response to fast rising transients
- Ultra low capacitance
- 10KA (A suffix devices) / 20KA (B suffix devices) surge capability tested with 8/20μs pulse as defined by IEC 61000-4-5
- Available with thermal failsafe option (add 'F' suffix to part number)

Applications

SL1021 / SL1024:

- Broadband equipment
- ADSL equipment
- XDSL equipment
- Satellite and CATV equipment
- Splitters
- General telecom equipment

PMT8:

- Telecom network interfaces
- Telephone line cards
- Repeaters
- Modems
- Line test equipment

Product Characteristics

| | |
|--|---|
| Materials | Dull Tin Plate 17.5 ± 12.5 Microns. with ceramic insulator |
| Product Marking | 'LF' mark, voltage & date code: SL102xA - Red/White text SL102xB & PMT8 - Blue/White text |
| Glow to arc transition current | ~ 1Amp |
| Glow Voltage | ~60-200 Volts |
| Storage and Operation Temperature | -40 to +90°C |
| Transverse Voltage (Delay Time) | < 0.2μSec (Tested to ITU-T Rec. K.12) |
| Arc Voltage | ~10 to 35 Volts |
| Holdover Voltage | <150mS (Tested to ITU-T Rec. K.12) |

Electrical Characteristics

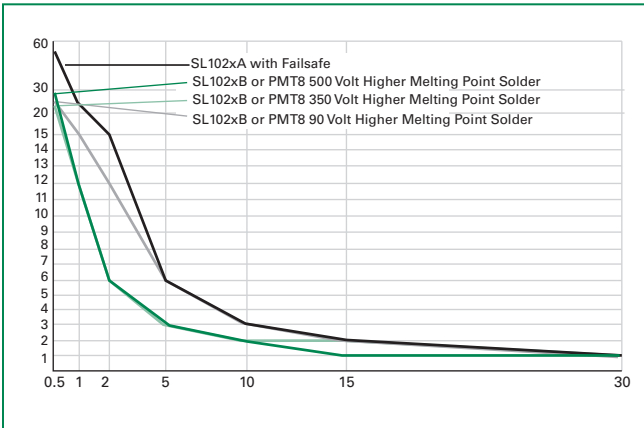
| Device Specifications (at 25°C) | | | | | | | Life Ratings | | | | | |
|---|----------------------|-----|-----|------------------------|----------------------|-------------------------------|------------------------------|--|---|--|--|--|
| Part Number* | DC Voltage 100V/Sec. | | | DC Voltage 100 V/μSec. | DC Voltage 1kV/μSec. | Capacitance (@1Mhz) | Insulation Resistance | AC Current 50Hz 1Sec.x10 ¹ | Surge Current 8/20μSec x10 ¹ | Max Single Surge 8/20μSec ¹ | Max Single Surge 10/350μSec ¹ | Surge Life 10/1000 μSecx300 ¹ |
| | MIN | TYP | MAX | | | | | | | | | |
| SL1021A090 SL1024A090 SL1021B090 SL1024B090 PMT 8 090 | 72 | 90 | 108 | 500 | 650 | <1.5pF | >10 ¹⁰ Ω (at 50V) | 10Amps | 10kA ² 20kA ³ | 15kA ² 25kA ³ | 4kA ² 5kA ³ | 200Amps |
| SL1021A145 SL1024A145 SL1021B145 SL1024B145 | 116 | 145 | 174 | | 600 | | | | | | 2.5kA ² 5kA ³ | |
| SL1021A150 SL1024A150 SL1021B150 SL1024B150 | 120 | 150 | 180 | | 650 | | | | | | | |
| SL1021A200 | 150 | 200 | 250 | | 700 | | | | | | | |
| SL1021A230 SL1024A230 SL1021B230 SL1024B230 PMT 8 230 | 184 | 230 | 276 | 450 | 850 | >10 ¹⁰ Ω (at 100V) | 10Amps | 10kA ² 20kA ³ | 15kA ² 25kA ³ | 2.5kA ² 5kA ³ | 200Amps | |
| SL1021A250 SL1024A250 SL1021B250 SL1024B250 PMT 8 250 | 200 | 250 | 300 | 500 | 900 | | | | | | | |
| SL1021A260 SL1024A260 SL1021B260 SL1024B260 | 210 | 260 | 310 | 550 | 950 | | | | | | | |
| SL1021A300 SL1024A300 SL1021B300 SL1024B300 | 240 | 300 | 360 | 650 | 1000 | | | | | | | |
| SL1021A350 SL1024A350 SL1021B350 SL1024B350 PMT 8 350 | 280 | 350 | 420 | 700 | 1100 | | | | | | | |
| SL1021A400 SL1024A400 SL1021B400 SL1024B400 PMT 8 400 | 320 | 400 | 480 | 850 | 1200 | | | | | | | |
| SL1021A420 SL1024A420 SL1021B420 SL1024B420 | 345 | 420 | 500 | | | | | | | | | |
| SL1021A450 SL1024A450 SL1021B450 SL1024B450 | 360 | 450 | 540 | 900 | | | | | | | | |
| SL1021A500 SL1024A500 SL1021B500 SL1024B500 | 400 | 500 | 600 | 950 | | | | | | | | |
| SL1021A600 SL1024A600 | 480 | 600 | 720 | 1000 | | | | | | | | |

NOTES:

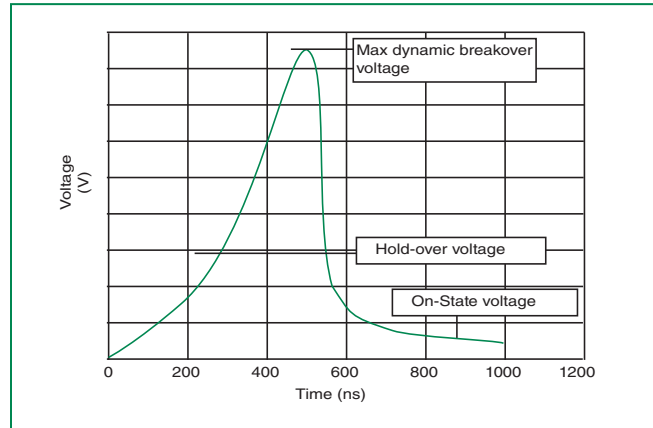
*Max capacitance is 1.5 pF, measured at 1 MHz.

1. Total current through centre electrode, tested in accordance with ITU-T Rec K.12
2. SL A series
3. SL B series & PMT 8 series

Time vs. Current for Failsafe

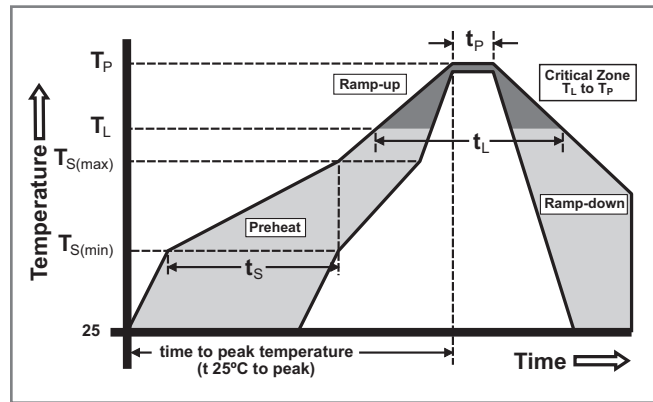


Voltage vs. Time Characteristic



Soldering Parameters - Reflow Soldering (Surface Mount Devices)

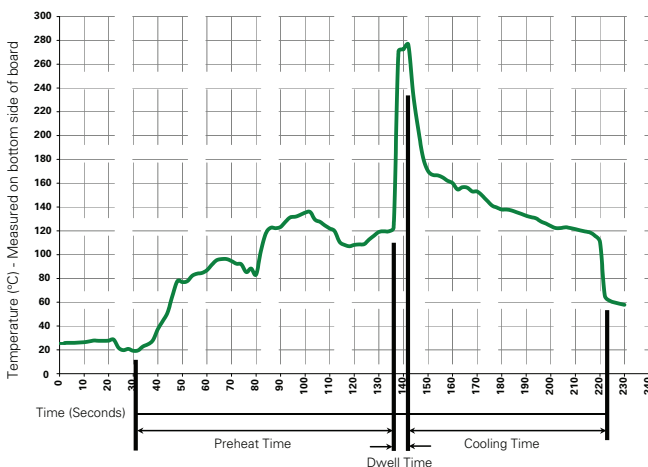
| | | |
|--|------------------------------------|-------------------------|
| Reflow Condition | | Pb – Free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (Min to Max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus 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 ^{+0/-5} °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 - Hand Soldering

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

Soldering Parameters - Wave Soldering (Thru-Hole Devices)



Recommended Process Parameters:

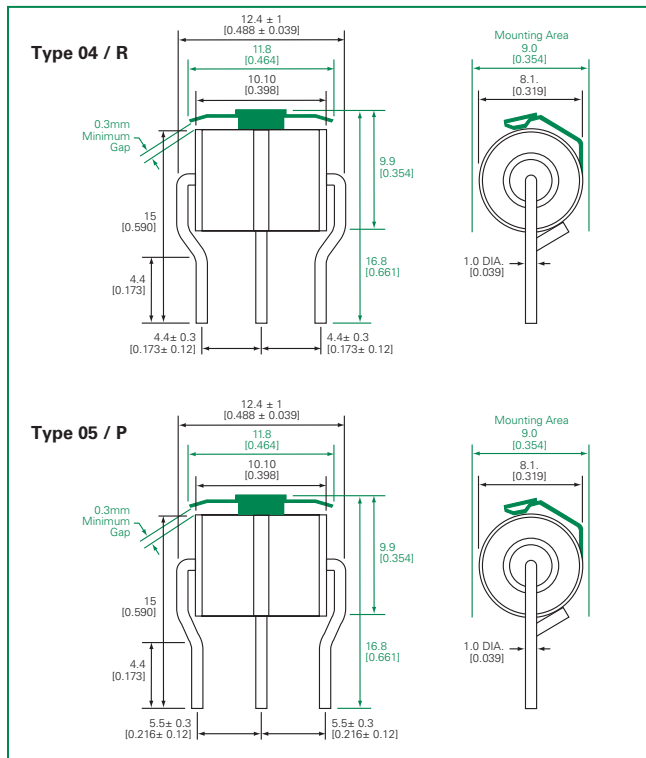
| Wave Parameter | Lead-Free Recommendation |
|---|--------------------------|
| Preheat: (Depends on Flux Activation Temperature) (Typical Industry Recommendation) | |
| Temperature Minimum: | 100° C |
| Temperature Maximum: | 150° C |
| Preheat Time: | 60-180 seconds |
| Solder Pot Temperature: | 280°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

Note: Surge Arrestors with a Failsafe mechanism should be individually examined after soldering

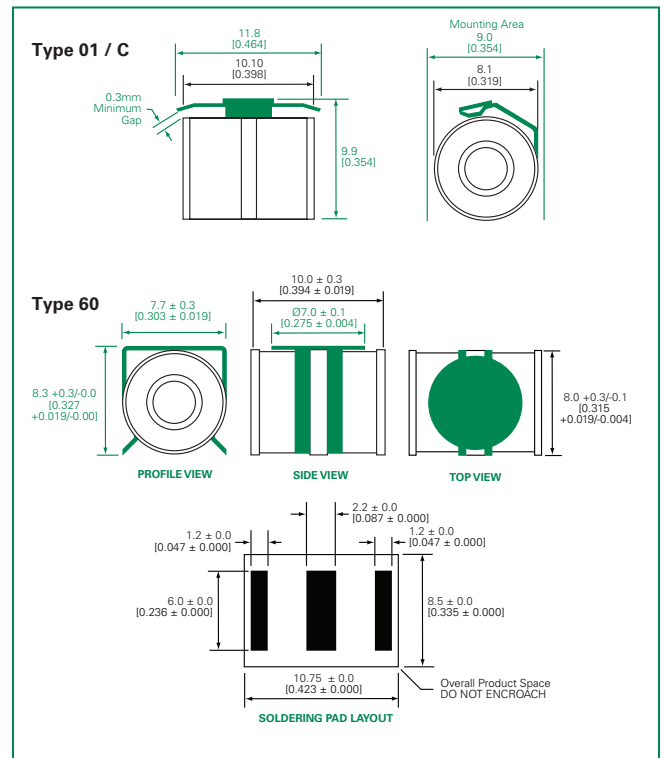
Device Dimensions

NOTE: Failsafe option dimensions shown in green.

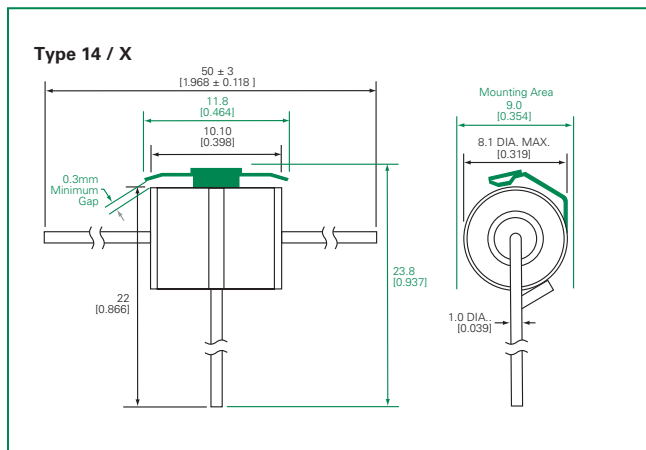
Shaped Radial Ledged Devices:



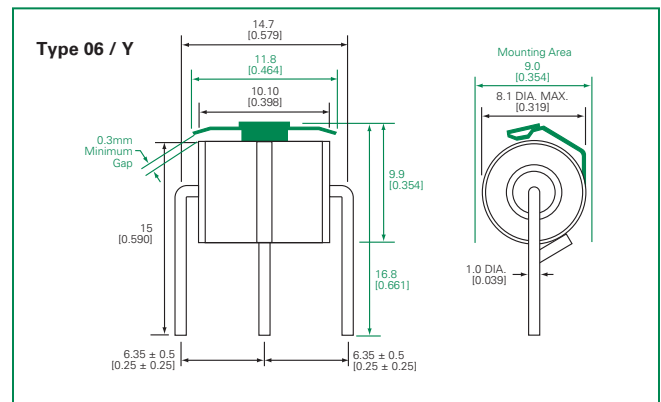
Surface Mount Devices:



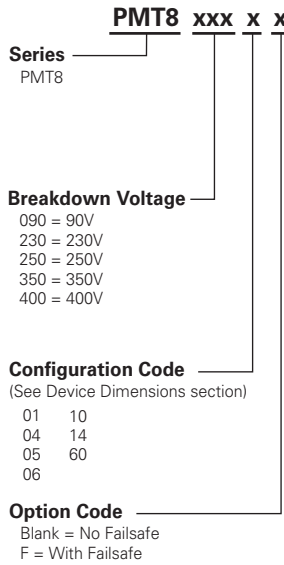
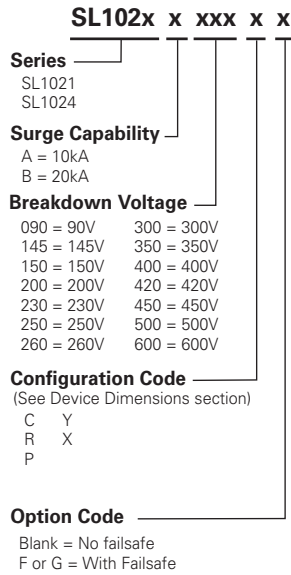
Straight "T" Ledged Devices:



Straight Radial Ledged Devices:



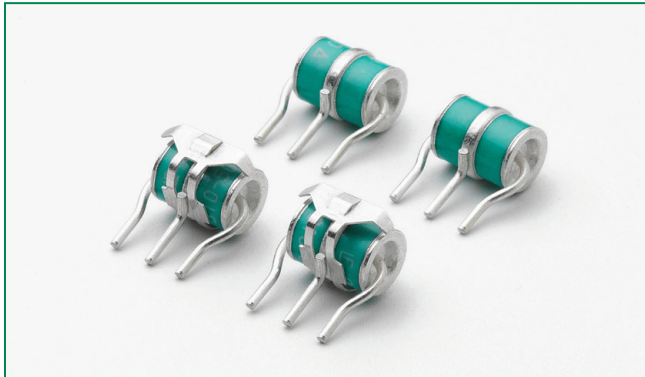
Part Numbering System and Ordering Information



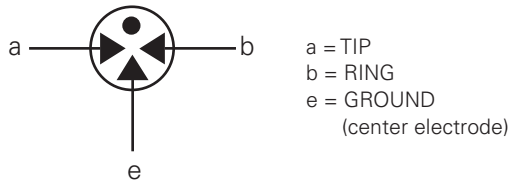
Packaging

| Device Type | Description | Quantity |
|-------------|------------------------------------|----------|
| Type 01 / C | 100pcs/tray x 5 trays per carton | 500 |
| Type 04 / R | 100pcs/tray x 5 trays per carton | 500 |
| Type 05 / P | 100pcs/tray x 5 trays per carton | 500 |
| Type 06 / Y | 100pcs/tray x 5 trays per carton | 500 |
| Type 14 / X | 50pcs/tray x 5 trays per carton | 250 |
| Type 60 | 500pcs/reel* x 10 reels per carton | 5000 |

* For tape and reel specifications, please contact factory.

RoHS  PMT3(310) Series

Agency Approvals

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

3 Electrode GDT Graphical Symbol

Description

Littelfuse three electrode PMT3(310) series GDTs are designed primarily to protect telecommunications equipment requiring simultaneous crowbar action of two signal lines. GDTs function as switches; dissipating a minimum amount of energy and can handle much higher currents than other types of transient voltage protection.

Features

- Rugged ceramic-metal construction
- Available with or without leads
- Low capacitance (<1.5 pF)
- Available with various lead spacings
- Available with or without fail-safe clip
- Tested to REA PE-80

Applications

- Telephone interface
- Modems
- Telephone line cards
- Line test equipment
- Repeaters

Electrical Characteristics

| Part Number | Device Specifications | | | | | | Life Ratings | | | | | | |
|--------------|-----------------------------|-----|-----|------------------------|----------------------|---|---------------------|---|--|---|---|---|--|
| | DC Breakdown (I-g) @500V/μs | | | DC Voltage 100 V/μSec. | DC Voltage 1kV/μSec. | Insulation Resistance Min | Capacitance (@1Mhz) | AC Current 11 cycles @ 50-60Hz ¹ | AC Current 50Hz 1Sec. x10 ¹ | Surge Current 8/20μSec x10 ¹ | Max Single Surge 8/20 μSec ¹ | Max Single Surge 10/350 μSec ¹ | Surge Life 10/1000 μSec x 400 ¹ |
| | Min | Typ | Max | | | | | | | | | | |
| PMT3(310)075 | 60 | 75 | 90 | 500 | 650 | 10 ¹⁰ Ω (at 50V) 10 ¹⁰ Ω (at 100V) | 1.5 pf | 130Amps | 20Amps | 20kA | 25kA | 5kA | 1kA |
| PMT3(310)090 | 72 | 90 | 108 | 500 | 650 | | | | | | | | |
| PMT3(310)150 | 120 | 150 | 180 | 500 | 600 | | | | | | | | |
| PMT3(310)230 | 184 | 230 | 276 | 600 | 700 | | | | | | | | |
| PMT3(310)250 | 200 | 250 | 300 | 600 | 700 | | | | | | | | |
| PMT3(310)350 | 280 | 350 | 420 | 900 | 1000 | | | | | | | | |
| PMT3(310)400 | 320 | 400 | 480 | 900 | 1000 | | | | | | | | |
| PMT3(310)500 | 400 | 500 | 600 | 1100 | 1200 | | | | | | | | |

NOTES:

- Total current through center electrode, tested in accordance with ITU-T Rec K.12 and REA PE 80
- End of life DC: 50% of minimum initial DC breakdown voltage to 150% of maximum initial DC breakdown voltage limit.
- Impulse: less than 150% of initial impulse breakdown down limit.

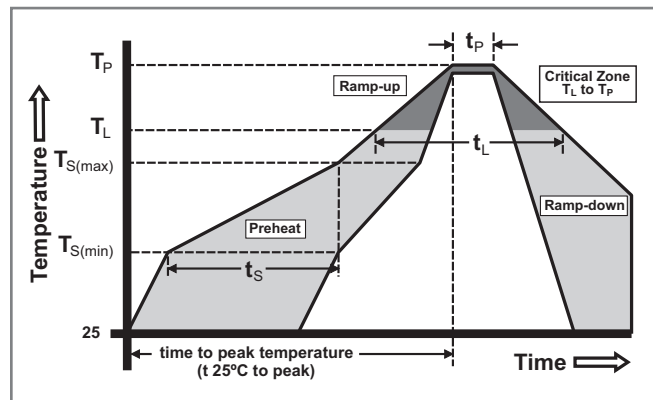
Product Characteristics

| | |
|---------------------------------------|---|
| Materials | Dull Tin Plate 17.5 ± 12.5 Microns with Ceramic Insulator |
| Product Marking | Littelfuse 'LF' marking, Voltage and date code. |
| Glow to arc transition current | ~ 1Amp |
| Glow Voltage | ~ 60-200 Volts |

| | |
|---|------------------|
| Storage and Operational Temperature | -40 to +90°C |
| Transverse Voltage (Delay Time) Tested to ITU-T Rec. K.12 | < 0.2µSec |
| Arc Voltage | ~ 10 to 35 Volts |
| Holdover Voltage Tested to ITU-T Rec. K.12 & REA PE 80 | < 150mS |

Soldering Parameters - Reflow Soldering (Surface Mount Devices)

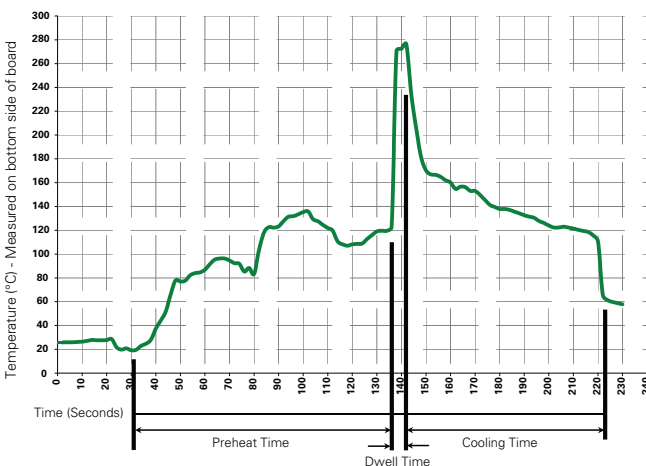
| | | |
|--|------------------------------------|-------------------------|
| Reflow Condition | | Pb – Free assembly |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | 150°C |
| | - Temperature Max ($T_{s(max)}$) | 200°C |
| | - Time (Min to Max) (t_s) | 60 – 180 secs |
| Average ramp up rate (Liquidus 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 ^{+0/-5} °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 - Hand Soldering

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

Soldering Parameters - Wave Soldering (Thru-Hole Devices)



Recommended Process Parameters:

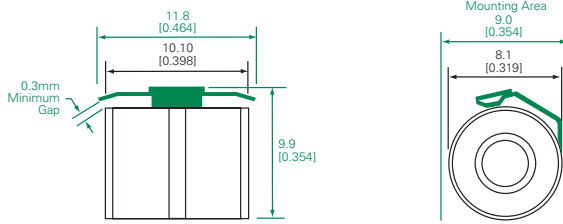
| Wave Parameter | Lead-Free Recommendation |
|---|--------------------------|
| Preheat: (Depends on Flux Activation Temperature) (Typical Industry Recommendation) | |
| Temperature Minimum: | 100° C |
| Temperature Maximum: | 150° C |
| Preheat Time: | 60-180 seconds |
| Solder Pot Temperature: | 280°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

Note: Surge Arrestors with a Failsafe mechanism should be individually examined after soldering

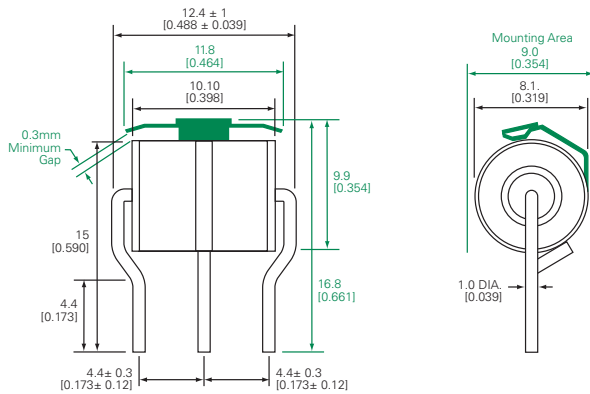
Device Dimensions

NOTE: Failsafe option dimensions shown in green.

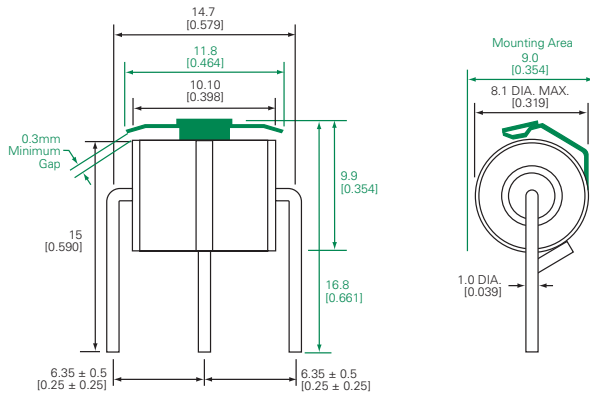
Type 01 - Surface Mount Core



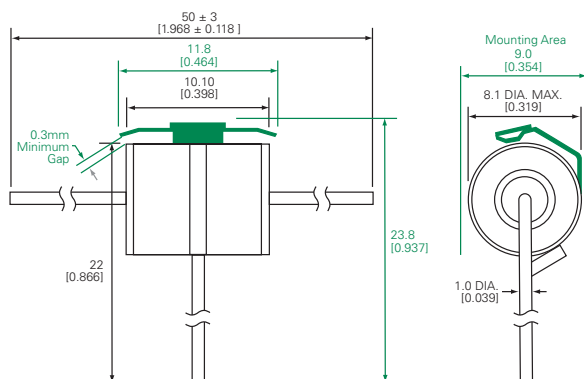
Type 04 - Shaped Radial Leads



Type 06 - Straight Radial Leads



Type 14 - Straight "T" Leads



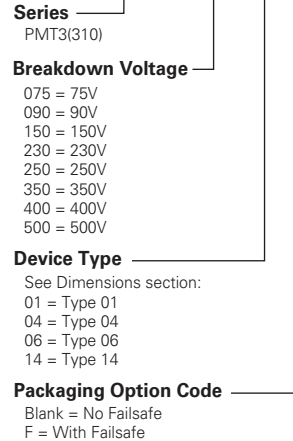
Packaging

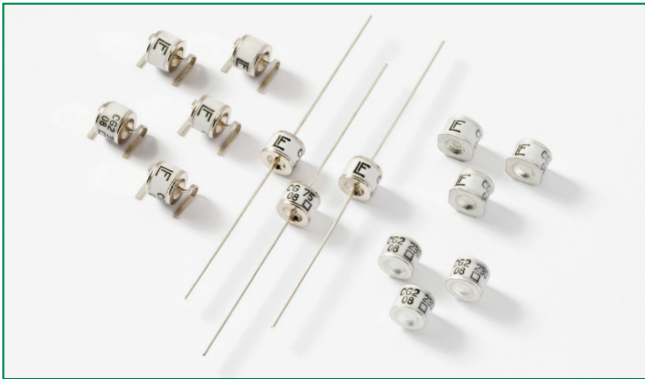
| Device Type | Description | Quantity |
|-------------|----------------------------------|----------|
| Type 01 | 100pcs/tray x 5 trays per carton | 500 |
| Type 04 | 100pcs/tray x 5 trays per carton | 500 |
| Type 06 | 100pcs/tray x 5 trays per carton | 500 |
| Type 14 | 50pcs/tray x 5 trays per carton | 250 |

| Part Number | Available Package Option | | | |
|--------------|--------------------------|---------|---------|---------|
| | Type 01 | Type 04 | Type 06 | Type 14 |
| PMT3(310)075 | | X | | |
| PMT3(310)090 | | X | | |
| PMT3(310)150 | X | X | X | X |
| PMT3(310)230 | | X | X | |
| PMT3(310)250 | X | X | X | X |
| PMT3(310)350 | | X | X | |
| PMT3(310)400 | | X | X | |
| PMT3(310)500 | | X | X | |

Part Numbering System

PMT3(310) XXX XX X





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.

Agency Approvals

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

2 Electrode GDT Graphical Symbol



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 (@100V/s) | | | Impulse Break-down in Volts (@100V/μs) | Impulse Break-down In Volts (@1 Kv/μsec) | Insulation Resistance | Capacitance (@1MHz) | Arc Voltage (on state Voltage) @1Amp Min | Surge Life (@500A 10/1000μs) | Nominal Impulse Discharge Current (8/20μs) | Nominal AC Discharge Current (10x1 sec @50-60Hz) | AC Discharge Current (9 cycle @50Hz) | DC Holdover Voltage ² | Max Impulse Discharge Current (1 Application @ 10/350μs) |
| | MIN | TYP | MAX | MAX | | MIN | MAX | TYP | | | | | TYP | |
| CG75 | 60 | 75 | 90 | 400 | 650 | 10 ¹⁰ Ω (at 50V) | | | | | | | 52 V | 4kA |
| CG90 | 72 | 90 | 108 | 400 | 600 | | | | | | | | | |
| CG90 SN | 72 | 90 | 108 | 400 | 600 | | | | | | | | | |
| CG110 | 88 | 110 | 132 | 450 | 600 | 10 ¹⁰ Ω (at 100V) | 1.5 pf | 15 V | 400 shots | 10 shots (@20kA) ³ | 20 A | 100 A | 135 V | 2.5kA |
| CG2145 | 116 | 145 | 174 | 500 | 600 | | | | | | | | | |
| 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 ¹ | 680 | 800 | 920 | 1200 | 1500 | | | | | | | | | |
| CG21000 ¹ | 850 | 1000 | 1150 | 1500 | 1600 | | | | | | | | | |

NOTES:

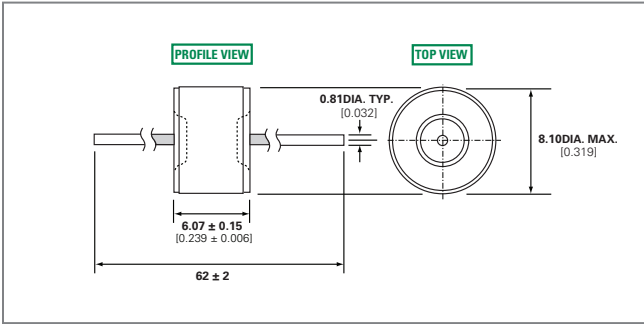
- Tested to UL1449 Third Edition
- Reference REA PE-80, 0.2A. Tested to ITU-T Rec K.12 and REA PE 80 < 150 mSec.
- Leaded devices = 5x(5+) or 5 (-) applications 20kA 8/20μSec. (75 to 600 volt devices.)
MS and Core devices = 10x(5+) and 5(-) applications 10kA 8/20μS (800 to 1000 volt devices.)

Product Characteristics

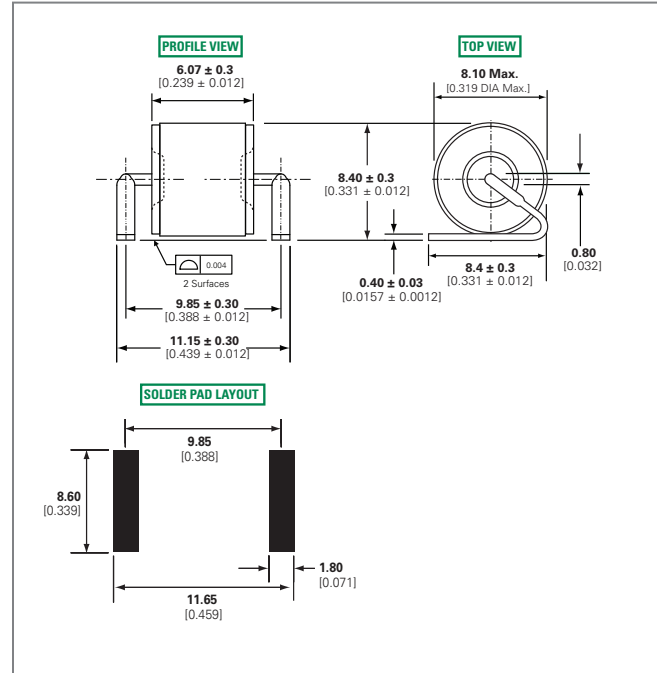
| | | | |
|------------------------|---|--|---|
| Materials | LS, Axial: Device: Nickel Plated 2–5 Microns Lead Wires: Tin Plated 17.5 ± 12.5 Microns Construction: Ceramic Insulator | Glow to arc transition current | < 0.5Amps |
| | Core: Device: Tin Plated 17.5 ± 12.5 Microns. Construction: Ceramic Insulator | MS: Device: Dull Tin Plated 7–9 Microns Construction: Ceramic Insulator | Glow Voltage |
| Product Marking | LF Logo, Voltage and date code; Black in positive print | Storage and Operational Temperature | -40 to +90 |
| | | Maximum Follow On Current¹ | 230 Volts r.m.s, 200 Amps. (800V and 1000V devices tested to UL1449 3rd edition) |

Device Dimensions

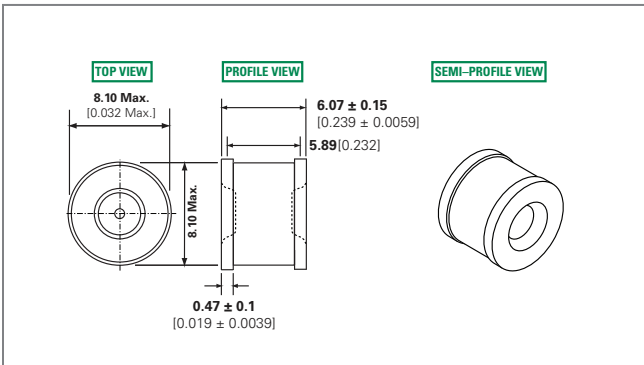
Leaded 'L' Type Straight Axial Devices



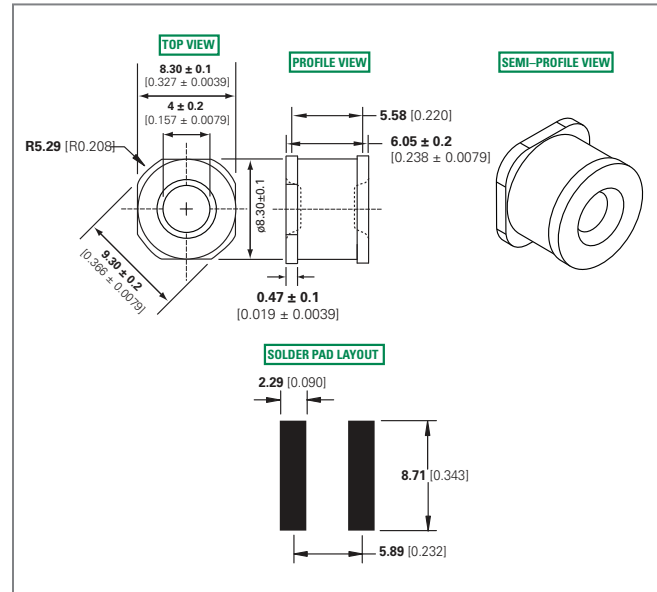
Leaded 'LS' Type Shaped Lead Devices



Core Devices

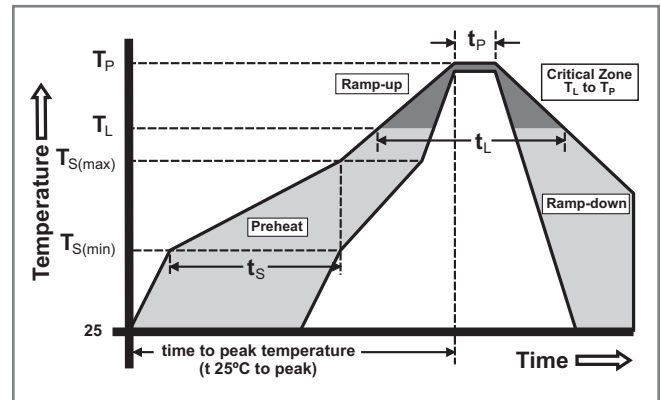


'MS' Type Devices

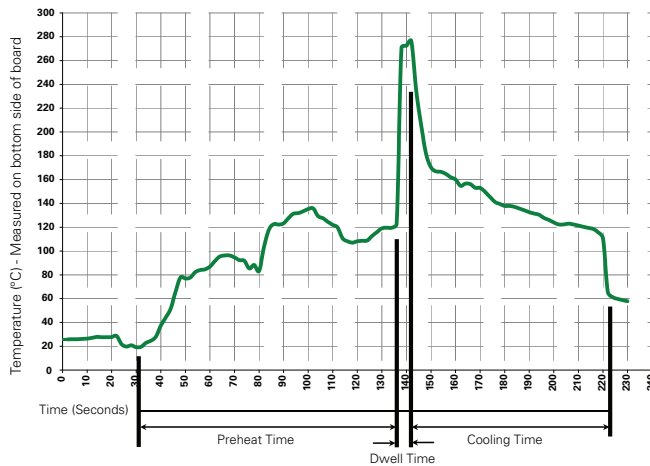


Soldering Parameters - Reflow Soldering (Surface Mount Devices)

| | | |
|--|------------------------------------|-------------------------|
| 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 ^{+0/-5} °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:

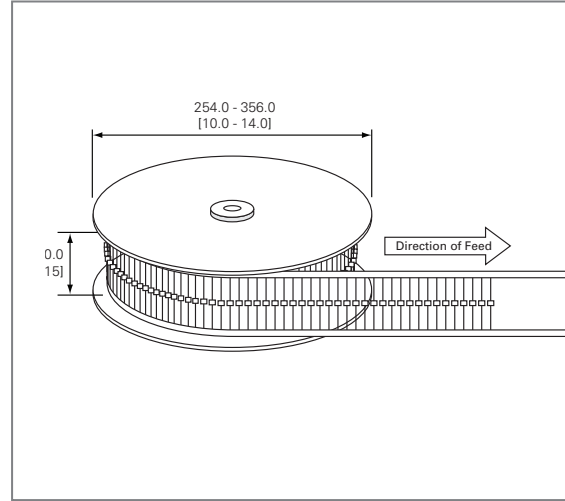
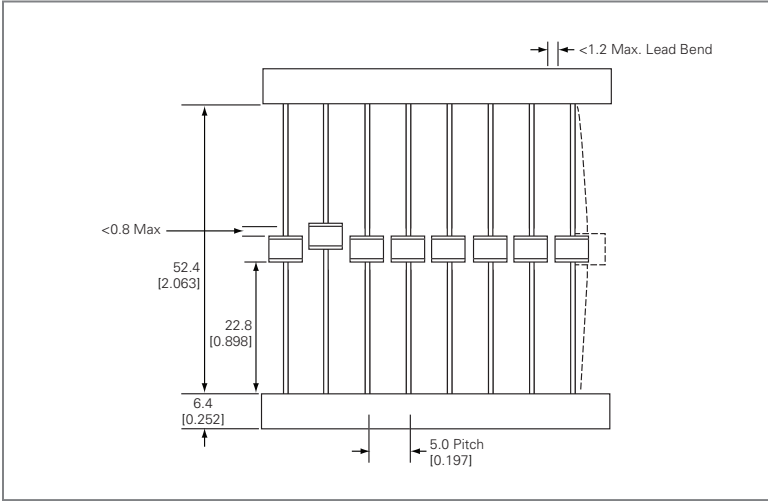
| Wave Parameter | Lead-Free Recommendation |
|---|--------------------------|
| Preheat: (Depends on Flux Activation Temperature) (Typical Industry Recommendation) | |
| Temperature Minimum: | 100° C |
| Temperature Maximum: | 150° C |
| Preheat Time: | 60-180 seconds |
| Solder Pot Temperature: | 280°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

Soldering Parameters - Hand Soldering

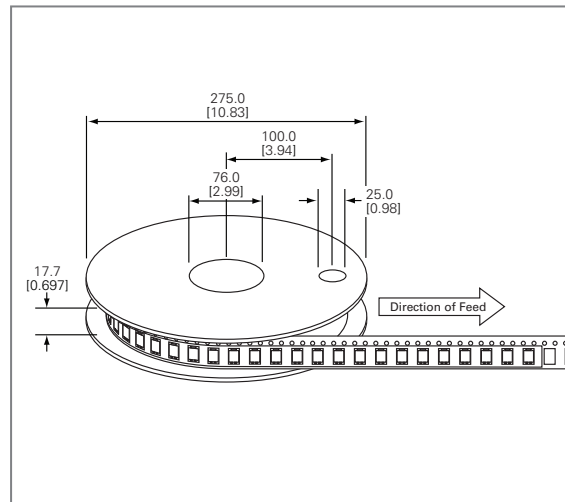
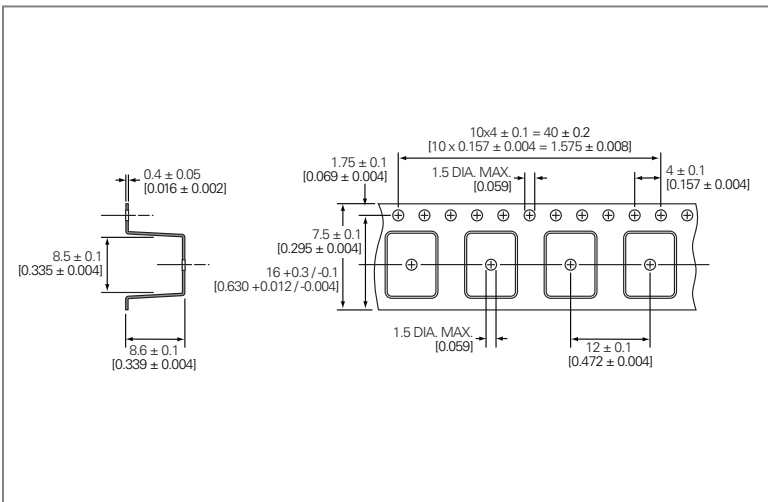
Solder Iron Temperature: 350° C +/- 5°C
 Heating Time: 5 seconds max.

Packaging Dimensions

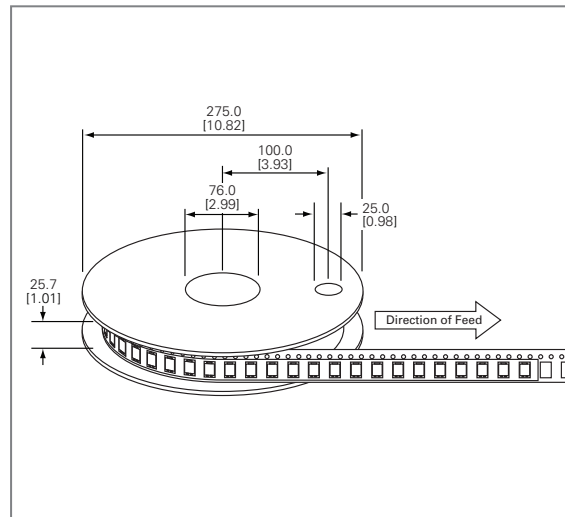
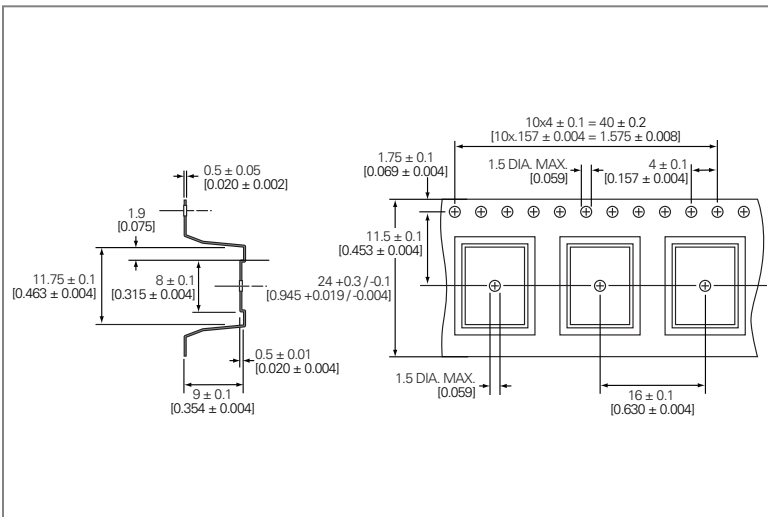
For 'L' Type Axial Lead Items



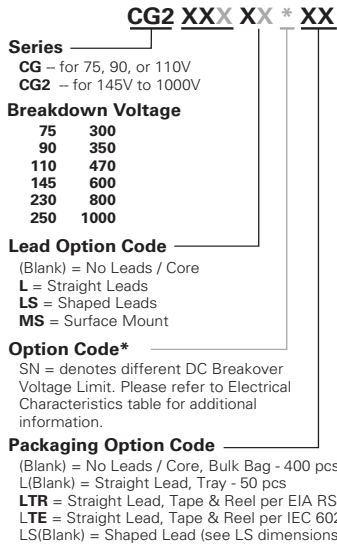
Core and 'MS' Type Items



For 'LS' Type Shaped Lead Items



Part Numbering System and Ordering Information



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:

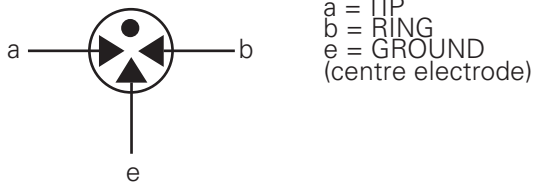
CG/CG2 devices with other breakdown voltages in the 75-1000 V range are available upon request.



Agency Approvals

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

3 Electrode GDT Graphical Symbol



Description

The SL1026 Series is a heavy-duty transient suppressor using Gas Plasma technology. In response to transients that exceed the device's breakover voltage, the device changes from a very high impedance state to a low impedance state to conduct harmful current away from the protected system. The SL1026 is designed to protect electrical and electronic equipment such as communications, control and railway systems. Carefully designed geometry ensures against short circuiting if a failure occurs due to conditions and events beyond the design criteria. Optional electrical mounting clip (part SL1053) is available to aid mounting and connection.

Features

- RoHS compliant
- 55 kA surge capability (single shot) tested with 8/20 μ S pulse as defined by IEC 61000-4-5
- 40 kA surge capability (repetitive)
- Will protect against Trapezoidal waveforms as specified in RIA 12.
- Will protect against capacitor discharge voltage transient waveforms as specified in RIA 12.
- Will protect against double exponential voltage transient waveforms as specified in IEC 571.

Applications

- Signaling equipment.
- Communication equipment
- Control gear.
- Trackside cabinets.
- Cell phone base stations

Electrical Characteristics

| Part Number* | DC Voltage 100 V/sec | | DC Voltage 1kV/ μ s | ¹ AC Current 9 cycles @ 50-60Hz (Amps) | ¹ AC Current 50Hz 1 sec x10 (Amps) | ¹ Surge Current 8/20 μ Sec x 10 (kAmps) | ^{1,2} Max Single Surge 8/20 μ Sec (kAmps) | ¹ Max Single Surge 10/350 μ Sec (kAmps) | ¹ 150(+) and 150(-) 10/1000 μ Sec (Amps) |
|--------------|-------------------------|-----|-------------------------------|---|---|--|--|---|---|
| | MIN | MAX | | | | | | | |
| SL1026-275 | 200 | 350 | 800 | 200 | 10 | 20 | 40 | 8 | 200 |
| SL1026-400 | 300 | 500 | 900 | 200 | 10 | 20 | 40 | 8 | 200 |
| SL1026-700 | 560 | 840 | 1300 | 200 | 10 | 20 | 40 | 8 | 200 |

NOTES:

End of life limits

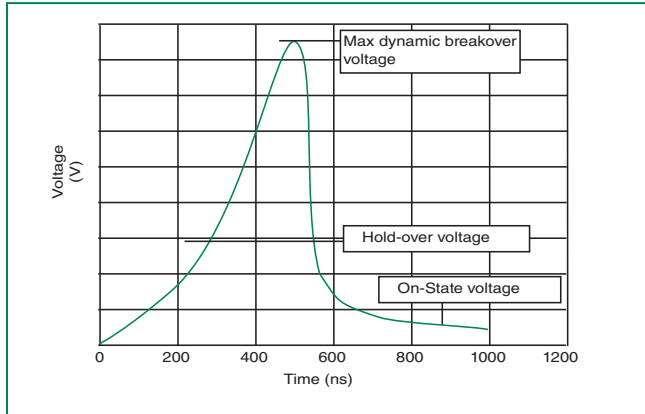
– DC: 50% of minimum initial DC breakdown voltage limit to 150% of maximum initial DC breakdown voltage limit.

– Impulse: less than 150% of initial impulse breakdown voltage limit.

1. Total current through center electrode, tested using SL1053B-NL holder

2. Exceeds capability of SL1053B-NL holder

Voltage vs. Time Characteristic



Electrical Specifications

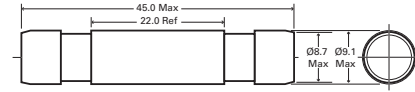
| | |
|--|--|
| Insulation Resistance | > 10GΩ at 100 Volts |
| Capacitance: | <=2.5pf, 1MHz 0 Volts Bias |
| Holdover Voltage: | <150mS, tested at 130 volts according to ITU-T Rec. K.12 & REA PE 80 |
| Arc Voltage: | ~35 Volts, On State Voltage at 1 Amp (Depending on Voltage Type) |
| Glow to Arc Transition Current: | ~1 Amp |
| Glow Voltage: | > 150 Volts, depending on Voltage Type |

Physical Specifications

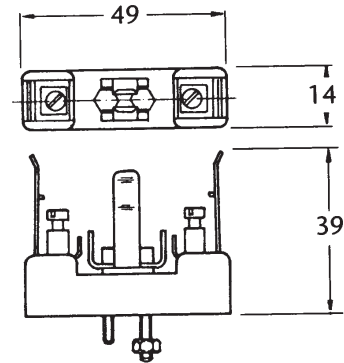
| | |
|---|--|
| Weight: | 11g (0.388 oz.) |
| Materials: | Electrode Base: Nickel Iron Alloy Electrode Plating: Nickel Body: Ceramic |
| Part Marking: | Color coded body SL1026-275: Black/Black SL1026-400: Black/Yellow SL1026-700: Black/Red |
| Storage and Operating Temperature: | -40°C to +90°C |

Product Dimensions

SL1026 GDT Series Profile



Type 1053 Holder Profile



All dimensions in mm

Part Numbering System

SL 1026 | □ | □ | □ | □ | □
Voltage ————

Packaging

GDT devices are provided as bulk pack in poly bag – 20 pieces per bag and 5 bags per carton.


RoHS  **SL1002A Series**



Description

The Broadband Optimized™ SL1002A series has been especially developed for use in broadband equipment. Special design features provide high levels of protection against fast rising transients in the 100V/μs to 1kV/μs range usually caused by lightning disturbances. These devices have ultra low capacitance (typically 1.2pF or less) and present insignificant signal losses up to 1.5GHz. These devices are extremely robust and are able to divert a 5000A pulse without destruction. For AC Power Cross of long duration, overcurrent protection is recommended.

Agency Approvals

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

2 Electrode GDT Graphical Symbol



Features

- RoHS compliant/Lead-free
- Ultra low insertion loss
- Surface mountable
- 5kA surge capability tested with 8/20μS–Pulse as defined by IEC 61000-4-5
- Excellent response to fast rising transients
- Can be used to meet Telcordia GR1089 without series resistance
- 10/700 6kV capability, as per ITU-T Rec. K.21, enhanced test level
- 2000 A 2/10μs surge rating
- Meet FCC part 68 10/160μs waveform, 200A test and 10/560μs waveform 100A test
- Halogen-free

Applications

- Broadband equipment
- ADSL equipment
- XDSL equipment
- Satellite and CATV equipment
- General telecom equipment

Electrical Characteristics

| Part Number | Device Specifications (at 25°C) | | | | | | | Life Ratings | | | | | | |
|--------------|--|-----|-----|--|---|-----------------------------|-----------------------------|--|------------------------------|---|---|----------------------------------|---|-------------|
| | DC Breakdown in Volts ^{1,2} (@100V/s) | | | Impulse Breakdown in Volts ^{3,4} (@100V/μs) | Impulse Breakdown in Volts ^{3,4} (@1kV/μs) | Insulation Resistance | Capacitance (@1MHz 0V Bias) | Arc Voltage (on state voltage) @1Amp Min | Surge Life (@100A 10/1000μs) | Nominal Impulse Discharge Current (@20μs) | Nominal AC Discharge Current (10x1s @50-60Hz) | DC Holdover Voltage ⁵ | Max Impulse Discharge Current (1 Application) | |
| | MIN | TYP | MAX | MAX | | MIN | MAX | TYP | | | | TYP | @ 2/10 μs | @ 10/350 μs |
| SL1002A075 | 60 | 75 | 90 | 400 | 650 | 10 ⁹ Ω (at 50V) | 1.2 pF | ~15 V | 300 shots ⁶ | 10 shots ⁷ (@ 5kA) | 5 A | 50 V | 2 kA | 1.5 kA |
| SL1002A090 | 72 | 90 | 108 | | | | | | | | | | | |
| SL1002A230 | 184 | 230 | 276 | 600 | 700 | 10 ⁹ Ω (at 100V) | 1.2 pF | ~15 V | 300 shots ⁶ | 10 shots ⁷ (@ 5kA) | 5 A | 135 V | 2 kA | 1.5 kA |
| SL1002A250 | 200 | 250 | 300 | | | | | | | | | | | |
| SL1002A260 | 210 | 260 | 310 | | | | | | | | | | | |
| SL1002A350 | 280 | 350 | 420 | | | | | | | | | | | |
| SL1002A470 | 376 | 470 | 564 | | | | | | | | | | | |
| SL1002A600 | 480 | 600 | 720 | 1100 | 1200 | 10 ⁹ Ω (at 500V) | 1.2 pF | ~15 V | 300 shots ⁶ | 10 shots ⁷ (@ 5kA) | 5 A | 135 V | 2 kA | 1.5 kA |
| SL1002A600SP | 570 | 600 | 780 | 1200 | 1300 | | | | | | | | | |

Notes:

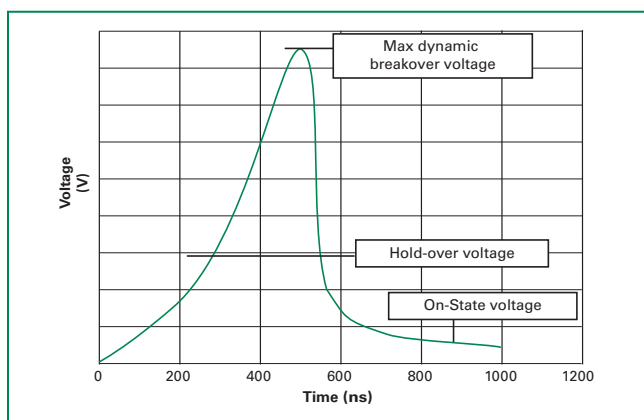
- At delivery AQL 0.65 level II, DIN ISO 2859
- In ionized mode
- In ionized mode, tested according to ITU-T Rec. K.12
- Comparable to the silicon measurement Switching Voltage (Vs)
- Reference REA PE-80, 0.2A. Tested to ITU-T Rec. K.12 and REA PE-80 < 150 msec.
- 300 Applications [150(+) & 150(-)]
- 10x[5x (+) & 5x (-)] Applications

Product Characteristics

| | |
|------------------------|--|
| Materials | Construction = Ceramic Insulator Device Finish = Dull Tin-plated 17.5 +/-12.5 microns |
| Product Marking | Littelfuse 'LF' Mark, voltage and date code |

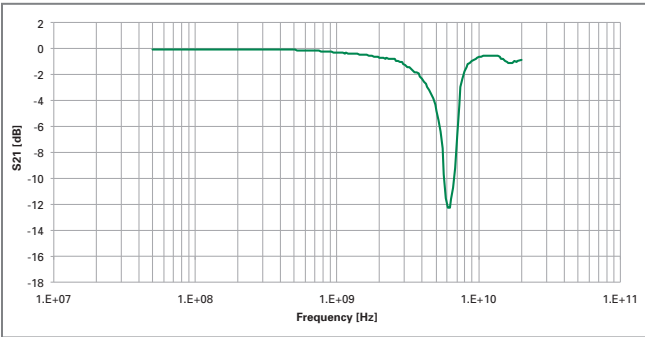
| | |
|--|-----------------|
| Glow to Arc Transition Current | < 0.5 Amps |
| Glow Voltage | ~60 - 140 Volts |
| Storage and Operational Temperature | -40 to +90°C |

Voltage vs. Time Characteristics

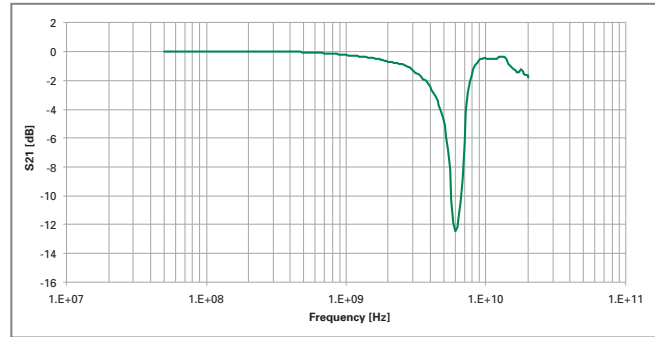


Insertion Loss Characteristics

Typical Insertion Loss Characteristics (90V)

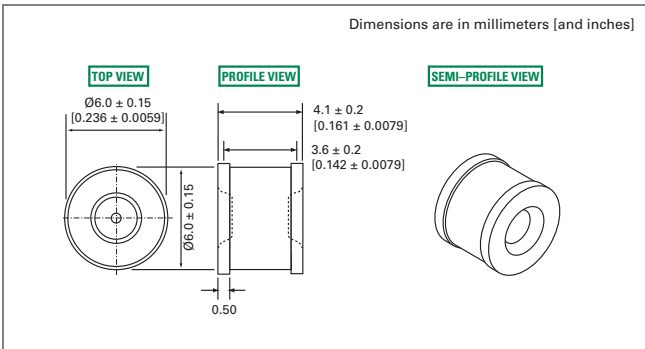


Typical Insertion Loss Characteristics (600V)

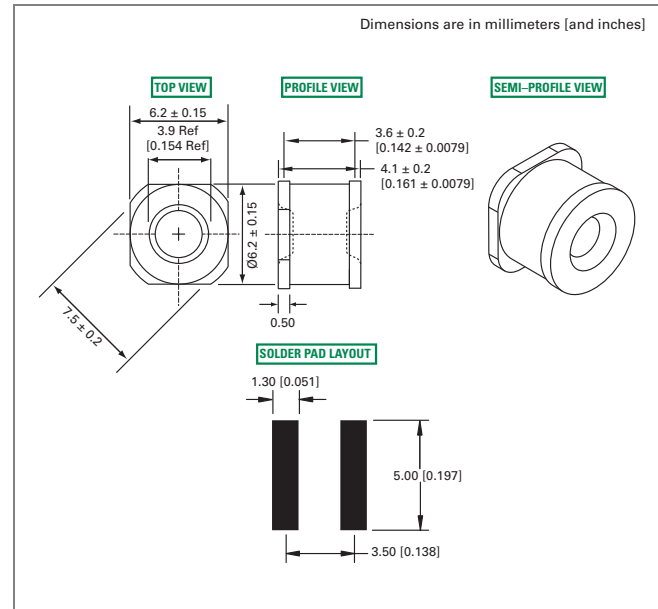


Device Dimensions

'C' Type Core Devices

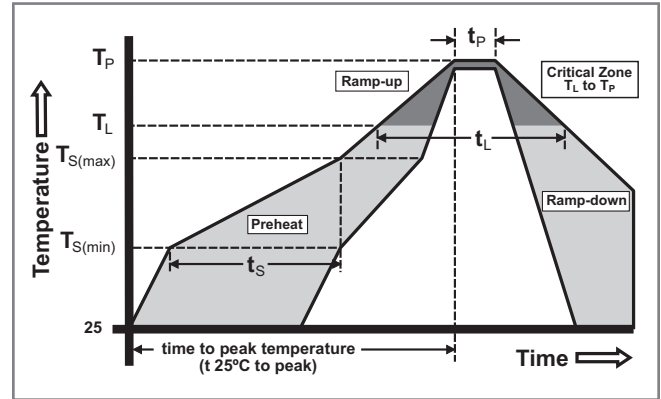


'SM' Type Surface Mount Devices

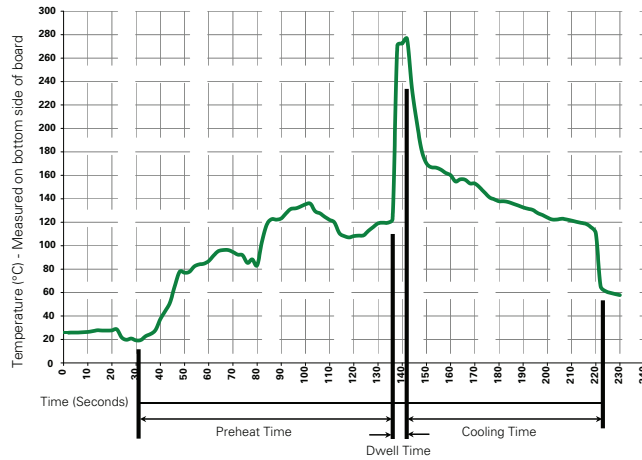


Soldering Parameters - Reflow Soldering (Surface Mount Devices)

| | | |
|--|------------------------------------|-------------------------|
| 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 seconds |
| 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 ^{+0/-5} °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 |
|--|-----------------------------------|
| Preheat: | |
| (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 |

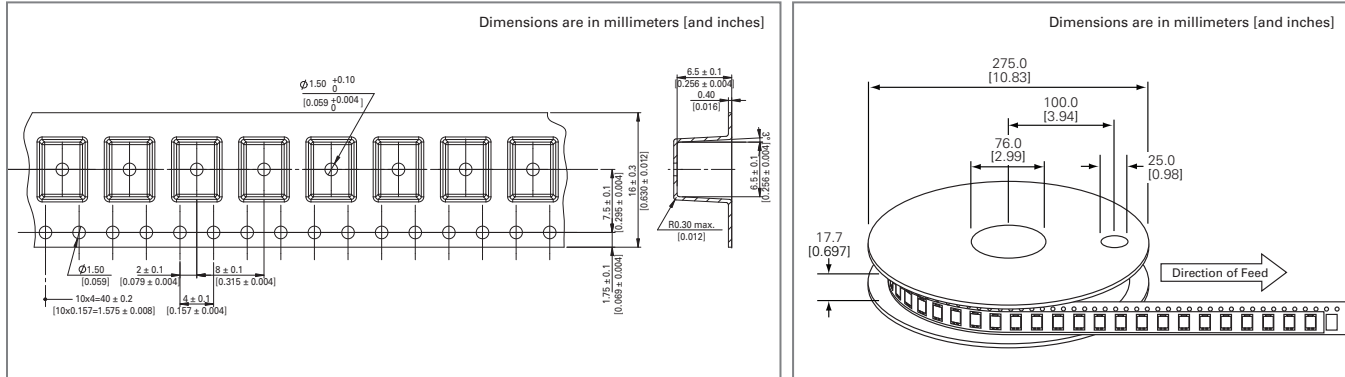
Soldering Parameters - Hand Soldering

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

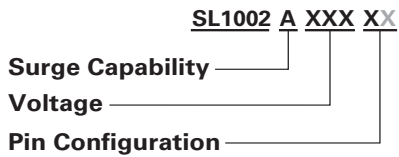
Packaging

'C' Type Core Items: Package bulk pack in polybag, 1000 pcs/bag

'SM' Type Surface Mount Items: Packaged tape and reel carrier, 1000 pcs/reel (specifications below)

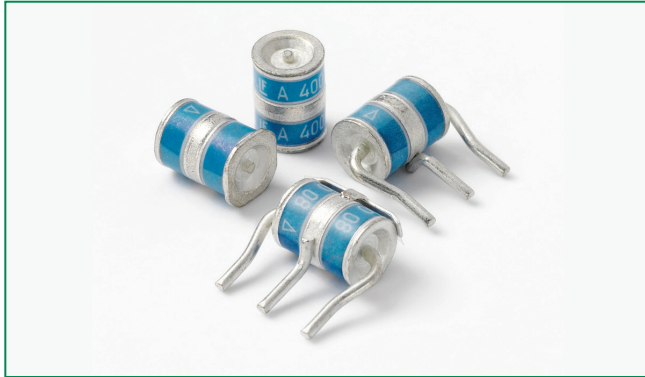


Part Numbering System and Ordering Information



- C** = Core (Packed in polybag, 1000pcs/bag)
- SM** = Surface Mount (Packed in carrier and tape, 1000pcs/reel)

RoHS  **SL1003A Series**




Description

The SL1003A series has been especially developed for Broadband equipment. Special design features provide high levels of protection against fast rising transients in the 100V/μs to 1kV/μs range usually caused by lightning disturbances.

These devices have ultra low capacitance 1.5pF and present insignificant signal losses up to 1.5GHz. These devices are extremely robust and are able to divert a 5000A pulse without destruction. For AC Power Cross of long duration, over-current protection is recommended.

Agency Approvals

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

3 Electrode GDT Graphical Symbol



Features

- RoHS compliant
- Low insertion loss
- Surface mountable
- 5kA surge capability tested with 8/20/μs pulse as defined by IEC 61000-4-5
- GHz working frequency
- Excellent response to fast rising transients
- Can be used to meet Telcordia GR1089 without series resistance
- 10/700 6kV capability, as per ITU-Tk.21, enhanced test level
- 2000 Amp 2/10μs surge rating

Applications

- Broadband equipment
- ADSL equipment
- XDSL equipment
- Satellite and CATV equipment
- General telecom equipment

Electrical Characteristics

| Part Number | Device Specifications (at 25°C) | | | | | | | | Life Ratings | | | | | | | | | | | | | |
|-------------|---|-----|-----|---|--|-------------------------------|-----------------------------------|---|------------------------------------|---|--|--|----------------------------------|--|--------------------------------|--|--|--|--|--|--|--|
| | DC Breakdown in Volts ^{1,2,3} (@100V/s) | | | Impulse Breakdown in Volts ^{2,3} (@100V/μs) | Impulse Breakdown In Volts ^{2,3} (@1kV/μs) | Insulation Resistance | Capacitance (@1MHz 0V Bias) | Arc Voltage (on state Voltage) @1Amp Min | Surge Life (@200A 10/1000μs) | Nominal Impulse Discharge Current (8/20μs) | Nominal AC Discharge Current (10x1s @50Hz) | AC Discharge Current (9 Cycles @ 50Hz) | DC Holdover Voltage ⁴ | Max Impulse Discharge Current (1 Application) | | | | | | | | |
| | MIN | TYP | MAX | MAX | | MIN | MAX | TYP | | | | | TYP | @ 10/350μs | | | | | | | | |
| SL1003A090 | 72 | 90 | 108 | 600 | 700 | 10 ⁹ Ω (at 50V) | 1.5 pF | ~10 to 35 V | 300 shots | 10 shots (@10kA) | 10 A | 30 A | 50 V | 2 kA | | | | | | | | |
| SL1003A230 | 184 | 230 | 276 | | | | | | | | | | | | | | | | | | | |
| SL1003A250 | 200 | 250 | 300 | | | | | | | | | | | | | | | | | | | |
| SL1003A260 | 210 | 260 | 310 | | 750 | | | | | | | | | | | | | | | | | |
| SL1003A300 | 240 | 300 | 360 | | 750 | | | | | | | | 850 | | | | | | | | | |
| SL1003A350 | 280 | 350 | 420 | | 800 | | | | | | | | 900 | | 10 ⁹ Ω (at 100V) | | | | | | | |
| SL1003A400 | 320 | 400 | 480 | | 850 | | | | | | | | 950 | | | | | | | | | |
| SL1003A450 | 360 | 450 | 540 | | 900 | | | | | | | | 1000 | | | | | | | | | |
| SL1003A500 | 400 | 500 | 600 | 1100 | 1400 | | | | | | | | | | | | | | | | | |

Notes:

1. At delivery AQL 0.65 level II, DIN ISO 2859
2. In ionized mode, tested according to ITU-T Rec. K.12
3. Comparable to the silicon measurement Switching Voltage (Vs)
4. Reference REA PE-80, 0.2A. Tested to ITU-T Rec. K.12 and REA PE-80 < 150 msec.

Product Characteristics

| | |
|------------------------|---|
| Materials | Leaded Device: Nickel-plated with Tin-plated wires Core and Surface Mount: Dull Tin-plated |
| Product Marking | Littelfuse 'LF' Mark, voltage and date code |

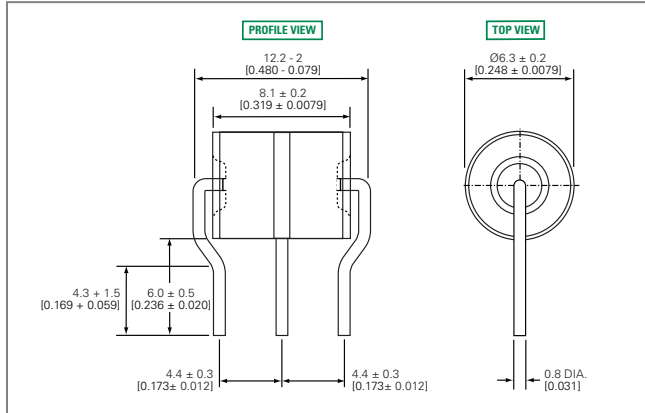
| | |
|--|------------------|
| Glow to Arc Transition Current | ~1 Amp |
| Glow Voltage | ~60 to 200 Volts |
| Storage and Operational Temperature | -40 to +90°C |

Device Dimensions

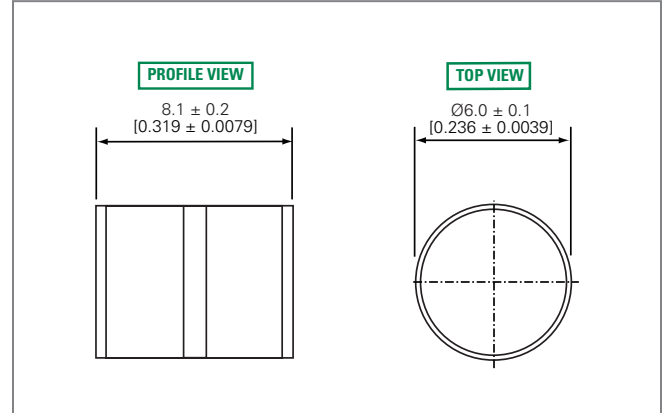
For SL1003A series:

Dimensions are in millimeters [and inches]

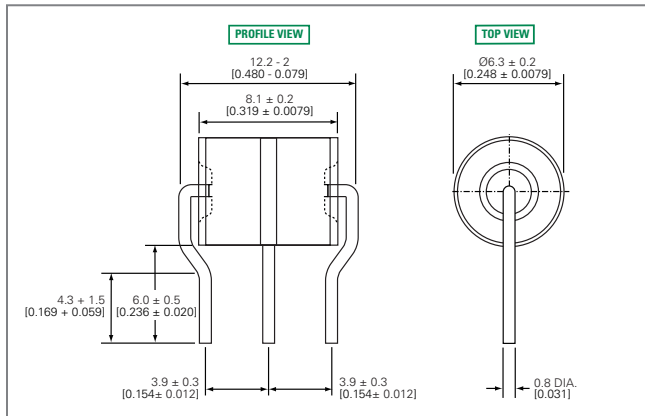
'R' Type Radial Lead Devices (SL1003AxxxR-001)



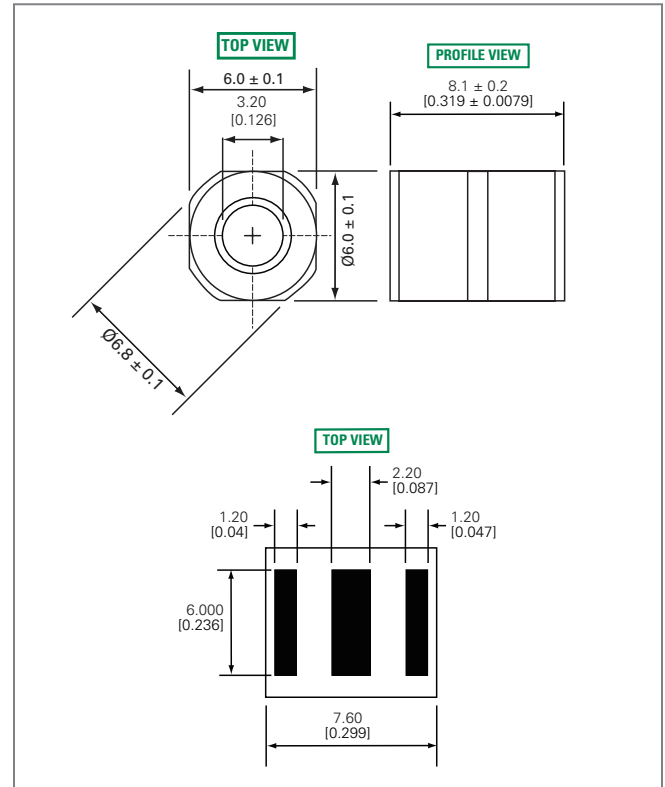
'C' Type Core Devices



'R' Type Radial Lead Devices (SL1003AxxxR and SL1003AxxxRF)

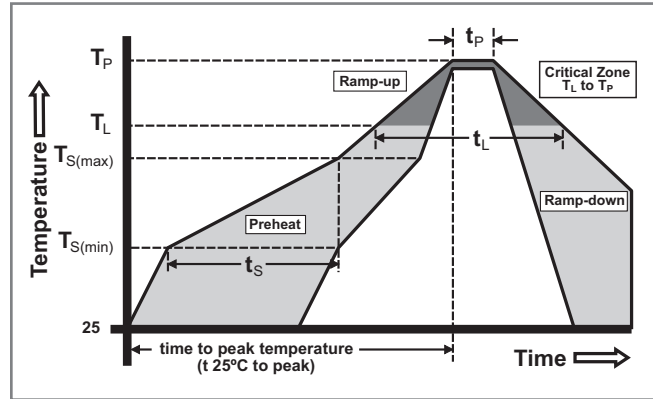


'SM' Type Surface Mount Devices

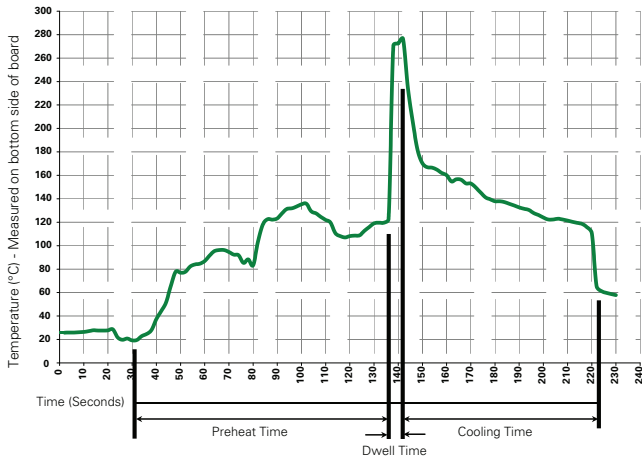


Soldering Parameters - Reflow Soldering (Surface Mount Devices)

| | | |
|--|------------------------------------|-------------------------|
| 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 seconds |
| 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 ^{+0/-5} °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 |
|--|-----------------------------------|
| Preheat: | |
| (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

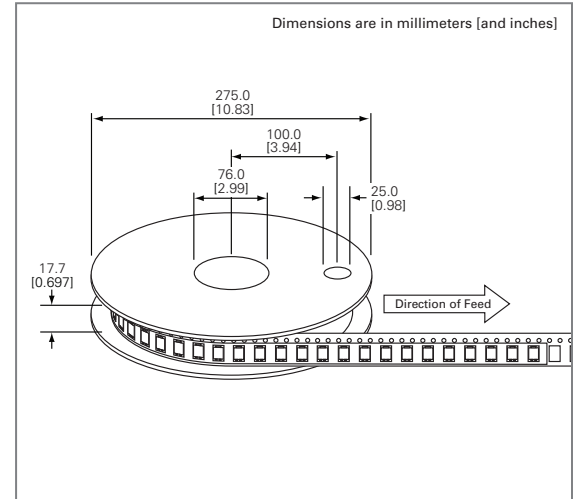
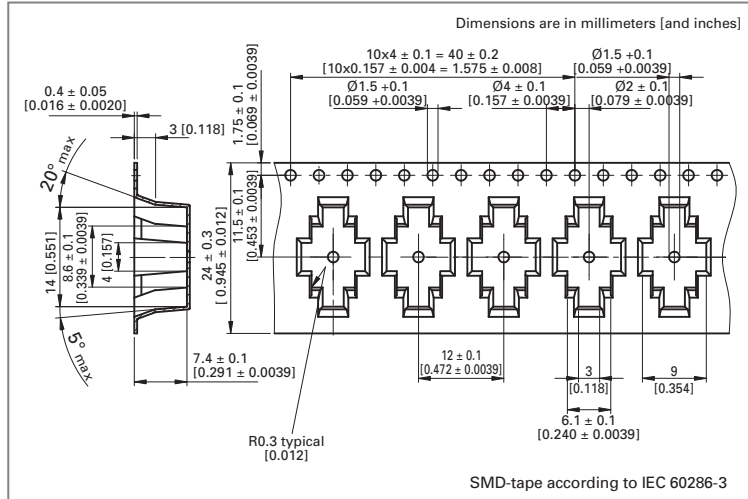
Solder Iron Temperature: 350° C +/- 5°C
 Heating Time: 5 seconds max.

Packaging

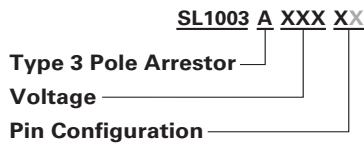
'C' Type Core Items: Package bulk pack in polybag, 500 pcs/bag

'R' and 'RF' Type Radial Lead Items: Packed in tray, 100 pcs/tray

'SM' Type Surface Mount Items: Packaged tape and reel carrier, 700 pcs/reel (specifications below)



Part Numbering System and Ordering Information



- C** = Core type (Packed in polybag, 500pcs/bag)
- R** = Radial Lead without Failsafe (Packed in tray, 100pcs/tray)
- RF** = Radial Lead with Failsafe (Packed in tray, 100pcs/tray)
- SM** = Surface Mount (Packed in carrier and tape, 700pcs/reel)

RoHS SL1122A Series Hybrid



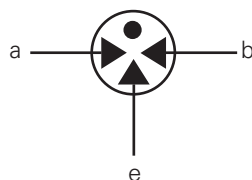
Description

The SL1122A series Hybrid features a high performance Alpha Gas Plasma Tube in conjunction with a MOV. These devices are matched so that high speed pulses are initially clamped by the MOV, then as the current rises, the transient energy is switched through the gas tube. The Hybrid offers high levels of performance on fast rising transients in the domain of 100V/μs to 10 kV/μs, so eliminates the dv/dt switching delay normally exhibited by standard GDTs. These devices are extremely robust and are able to divert a 10,000 Amp pulse without destruction.

Agency Approvals

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

2 Electrode GDT Graphical Symbol



a = TIP
b = RING
e = GROUND
(centre electrode)

Features

- RoHs Compliant
- Excellent response to fast rising transients
- Flat response up to 10kV/μs
- 10kA surge capability tested with 8/20μs pulse as defined by IEC 61000-4-5
- Thermal failsafe

Applications

- MDF protection
- ADSL equipment
- XDSL equipment
- Alarm panels
- General telecom equipment

Electrical Characteristics

| Part Number | Device Specifications (at 25°C) | | | | | | Life Ratings | | | | |
|-------------|--|-----|-----|--|-------------------------------|--|--|--|--|--|----------------------------------|
| | DC Breakdown in Volts ^{1,2} (@100V/s) | | | DC Voltage ² (1kV/μs Ignition Time) | Insulation Resistance | Capacitance (@1MHz, 0V bias, 1V oscillation) | Arc Voltage (on state voltage) @1Amp Min | Surge Life ¹ (10/1000μs 300x +/-) | Surge Current ¹ (8/20μs x 10) | Nominal AC Discharge Current ¹ (10x1s@50Hz) | DC Holdover Voltage (<150msecs.) |
| | MIN | TYP | MAX | | MIN | MAX | TYP | | | TYP | |
| SL1122A090 | 72 | 90 | 108 | 200 (< 10μs) | > 10 ⁸ Ω (at 50V) | 270 pF | ~10 to 35 Volts | 200 A | 10 kA | 10 A | 50 V |
| SL1122A230 | 184 | 230 | 276 | 350 (< 10μs) | > 10 ⁸ Ω (at 100V) | 100 pF | | | | | 135 V |
| SL1122A260 | 210 | 260 | 310 | 400 (< 10μs) | | | | | | | |

Tested in accordance with ITU-T Rec K.12

Notes:

1. Total current through centre electrode
2. Maximum Peak Break Over Voltage

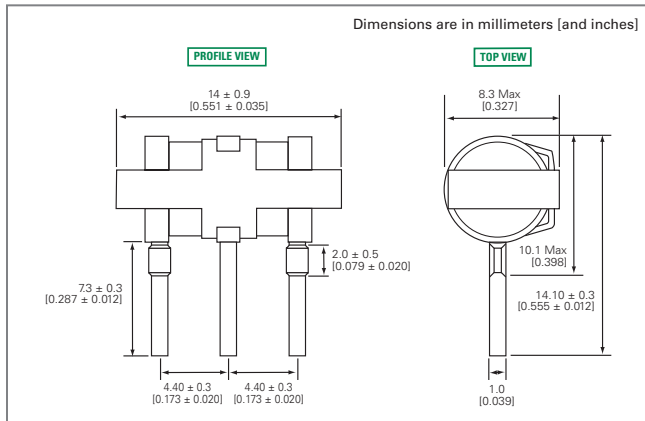
Product Characteristics

| | |
|------------------------|--|
| Materials | Electrode Base: Nickel Iron Alloy Electrode Plating: Bright Tin Body: Ceramic |
| Product Marking | Littelfuse 'LF' Mark, voltage and date code. Red. |

| | |
|--|---|
| Glow to Arc Transition Current | ~1 Amp |
| Glow Voltage | ~60 to 200 Volts |
| Storage and Operational Temperature | -40 to +90°C |
| Transverse Voltage (Delay Time) | < 0.2 μSec. (Tested to ITU-T Rec.K.12) |

Device Dimensions

Radial Lead Devices



Packaging Dimensions

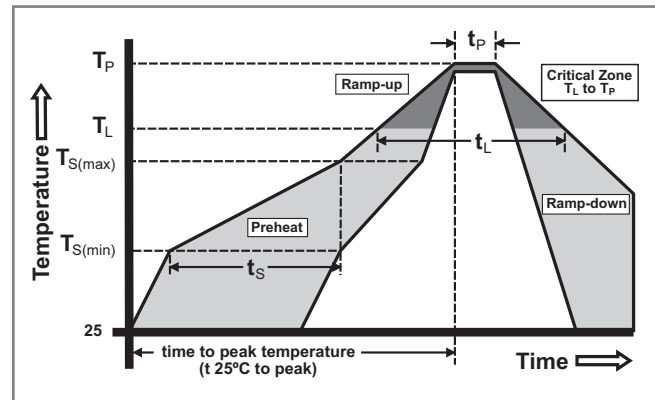
For Radial Lead Items: Packed in tray (100 pcs)

Part Numbering System and Ordering Information



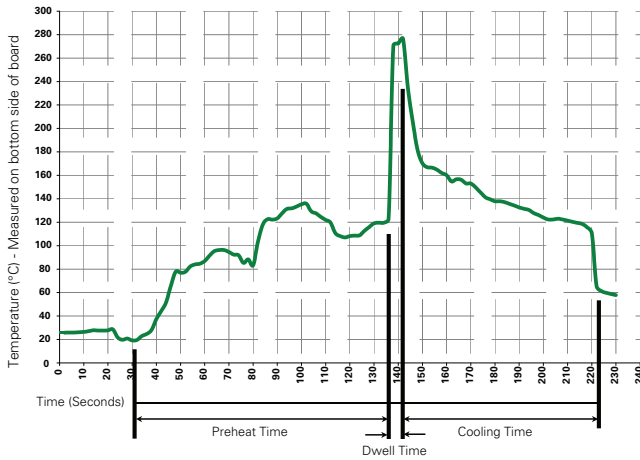
Soldering Parameters - Reflow Soldering

| | | |
|--|------------------------------------|-------------------------|
| 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 seconds |
| 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 ^{+0/-5} °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 |



* Devices that are soldered require inspection before use.

Soldering Parameters - Wave Soldering (Thru-Hole Devices)



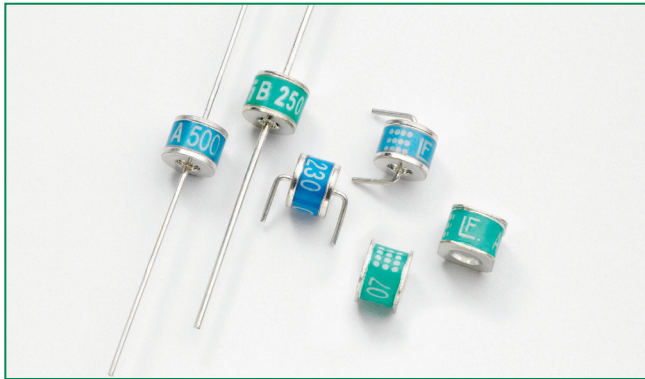
Recommended Process Parameters:

| Wave Parameter | Lead-Free Recommendation |
|--|-----------------------------------|
| Preheat: | |
| (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.

RoHS  **SL1011A/B and SL1411A Series**



Description

The SL1011A/B and SL1411A series provides high levels of protection against fast rising transients in the 100V/μs to 1kV/μs range usually caused by lightning disturbances.

The SL1011A/B and SL1411A series offers low capacitance (< 1.5pf) which provides low insertion loss at high frequencies.

SL1011A offers 5kA protection without destruction whereas the SL1011B and SL1411A offer 10kA surge protection without destruction (maximum single surge of 12kA @ 8/20μs).

Agency Approvals

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

2 Electrode GDT Graphical Symbol



Features

- RoHS compliant
- Low insertion loss
- Excellent response to fast rising transients
- Ultra low capacitance
- 5kA (SL1011A) or 10kA (SL1011B & SL1411A) surge capability tested with 8/20μs pulse as defined by IEC 61000-4-5

Applications

- Broadband equipment
- ADSL equipment
- XDSL equipment
- Satellite and CATV equipment
- General telecom equipment

Electrical Characteristics

| Part Number | Device Specifications (at 25°C) | | | | | | | | Life Ratings | | | | | | |
|-------------|--|-----|-----|--|--------------------------------------|------------------------------|---------------------|--|------------------------------|---|---|--|----------------------------------|---|------------|
| | DC Breakdown in Volts ^{1,2} (@100V/s) | | | Impulse Breakdown in Volts ³ (@100V/μs) | Impulse Breakdown In Volts (@1kV/μs) | Insulation Resistance | Capacitance (@1MHz) | Arc Voltage (on state Voltage) @1Amp Min | Surge Life (@100A 10/1000μs) | Nominal Impulse Discharge Current (@20μs) | Nominal AC Discharge Current (10x1s @50-60Hz) | AC Discharge Current (9 Cycles @ 50Hz) | DC Holdover Voltage ⁴ | Max Impulse Discharge Current (1 Application) | |
| | MIN | TYP | MAX | MAX | | MIN | MAX | TYP | | | | | TYP | @ 8/20μs | @ 10/350μs |
| SL1011A075 | 60 | 75 | 90 | 500 | 700 | 10 ¹⁰ Ω (at 50V) | 1.5 pF | ~20 V | 300 shots | SL1011A: 10 shots (@5kA) | SL1011A: 5 A | SL1011A: 20 A | 50 V | SL1011B & SL1411A: 12 kA | 1 kA |
| SL1011B075 | | | | | | | | | | | | | | | |
| SL1411A075 | | | | | | | | | | | | | | | |
| SL1011A090 | 72 | 90 | 108 | 500 | 600 | | | | | | | | | | |
| SL1011B090 | | | | | | | | | | | | | | | |
| SL1411A090 | | | | | | | | | | | | | | | |
| SL1011A145 | 116 | 145 | 174 | 500 | 650 | | | | | | | | | | |
| SL1011B145 | | | | | | | | | | | | | | | |
| SL1011A150 | | | | | | | | | | | | | | | |
| SL1011B150 | | | | | | | | | | | | | | | |
| SL1011A230 | 184 | 230 | 276 | 550 | 700 | | | | | | | | | | |
| SL1011B230 | | | | | | | | | | | | | | | |
| SL1411A230 | | | | | | | | | | | | | | | |
| SL1011A250 | 200 | 250 | 300 | 600 | 800 | 10 ¹⁰ Ω (at 100V) | 1.5 pF | ~20 V | 300 shots | SL1011B & SL1411A: 10 shots (@10kA) | SL1011B & SL1411A: 10 A | SL1011B & SL1411A: 65 A | 135 V | SL1011B & SL1411A: 12 kA | 1 kA |
| SL1011B250 | | | | | | | | | | | | | | | |
| SL1411A250 | | | | | | | | | | | | | | | |
| SL1011A260 | 210 | 260 | 310 | 600 | 800 | | | | | | | | | | |
| SL1011B260 | | | | | | | | | | | | | | | |
| SL1011A350 | | | | | | | | | | | | | | | |
| SL1011B350 | | | | | | | | | | | | | | | |
| SL1411A350 | | | | | | | | | | | | | | | |
| SL1011A470 | 376 | 470 | 564 | 1000 | 1100 | | | | | | | | | | |
| SL1411A470 | | | | | | | | | | | | | | | |
| SL1011A500 | 400 | 500 | 600 | 1100 | 1200 | | | | | | | | | | |
| SL1011A600 | 480 | 600 | 720 | 1200 | 1400 | | | | | | | | | | |
| SL1411A600 | | | | | | | | | | | | | | | |

- Notes:
- At delivery AQL 0.65 level II, DIN ISO 2859
 - In ionized mode
 - Comparable to the silicon measurement Switching Voltage (Vs)
 - Tested according to ITU-T Rec. K.12 < 150 msec.

Product Characteristics

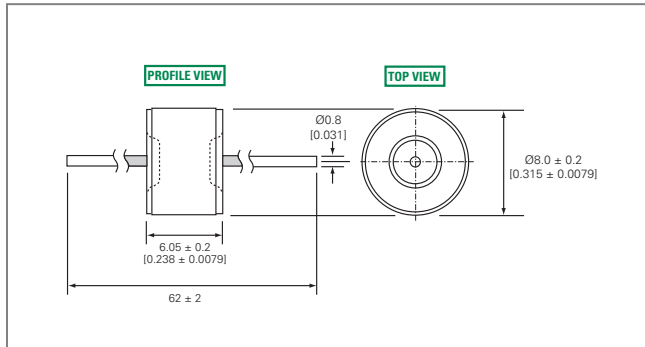
| | |
|------------------------|---|
| Materials | Leaded Device: Nickel-plated with Tin-plated wires Core and Surface Mount: Dull Tin-plated |
| Product Marking | Littelfuse 'LF' Mark, voltage and date code |

| | |
|--|--------------|
| Glow to Arc Transition Current | < 0.5 Amps |
| Glow Voltage | ~60 Volts |
| Storage and Operational Temperature | -40 to +90°C |

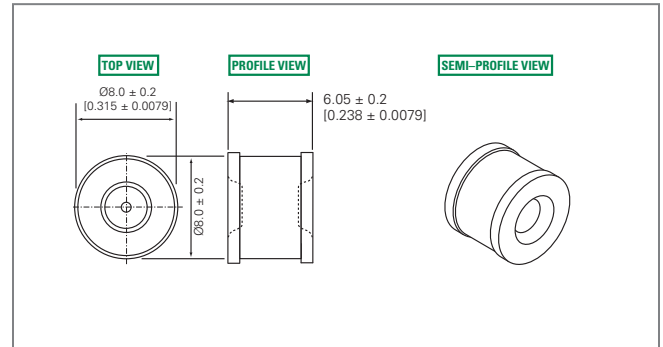
Device Dimensions

For SL1011A/SL1011B series:

'A' Type Axial Lead Devices

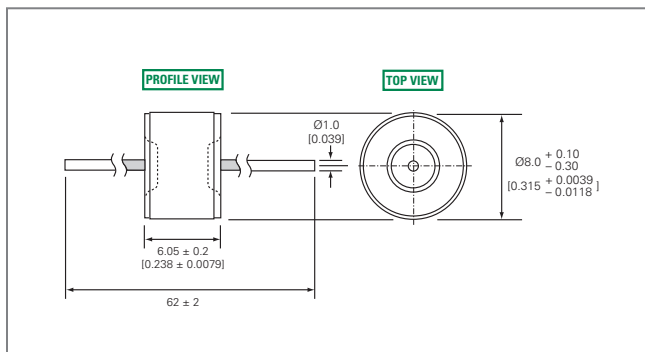


'C' Type Core Devices

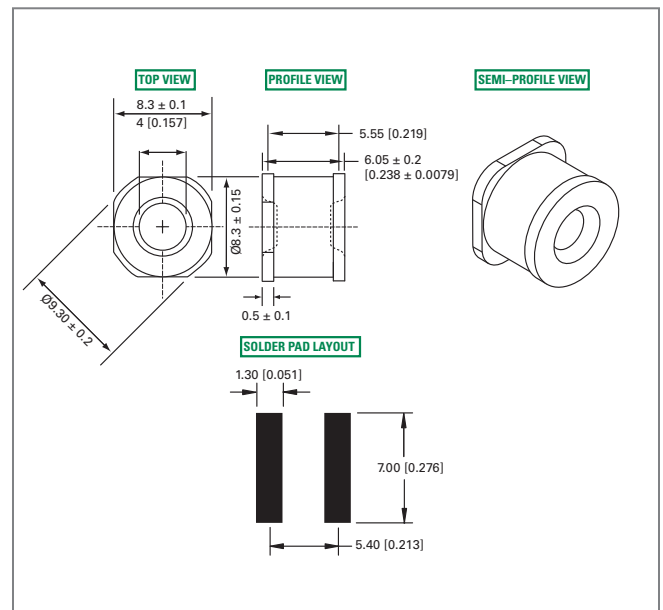


For SL1411A series:

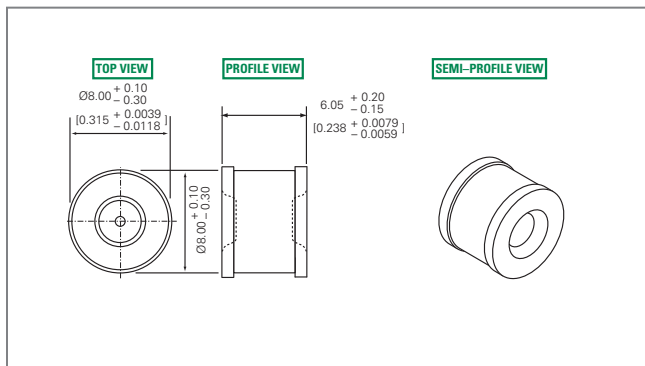
'A' Type Axial Lead Devices



'SM' Type Surface Mount Devices

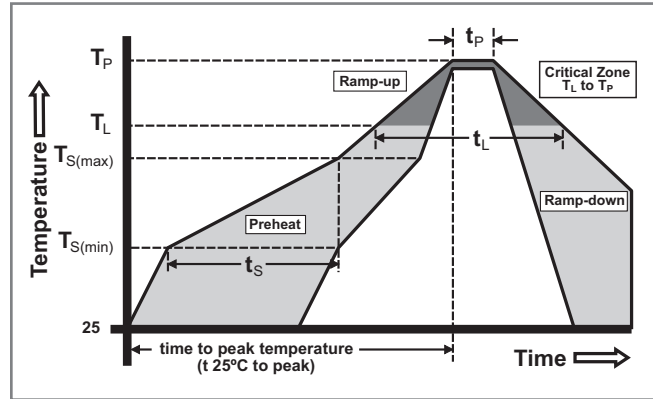


'C' Type Core Devices

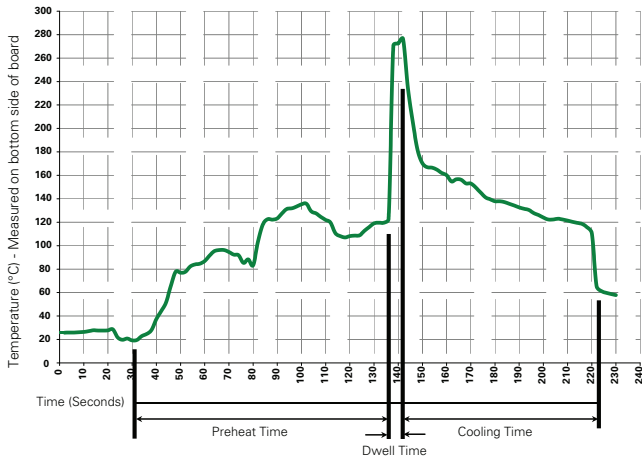


Soldering Parameters - Reflow Soldering (Surface Mount Devices)

| | | |
|--|------------------------------------|-------------------------|
| 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 seconds |
| 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 ^{+0/-5} °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:

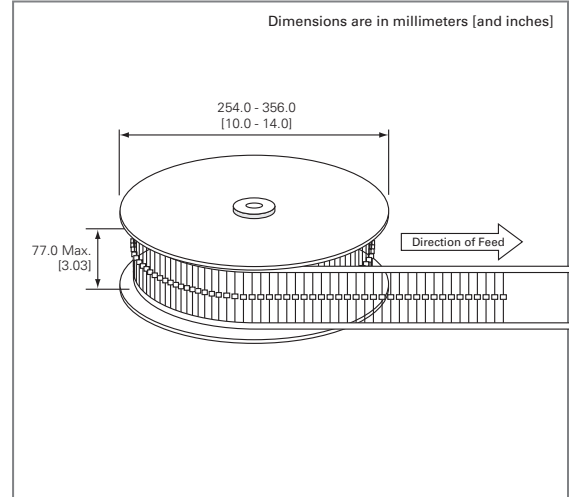
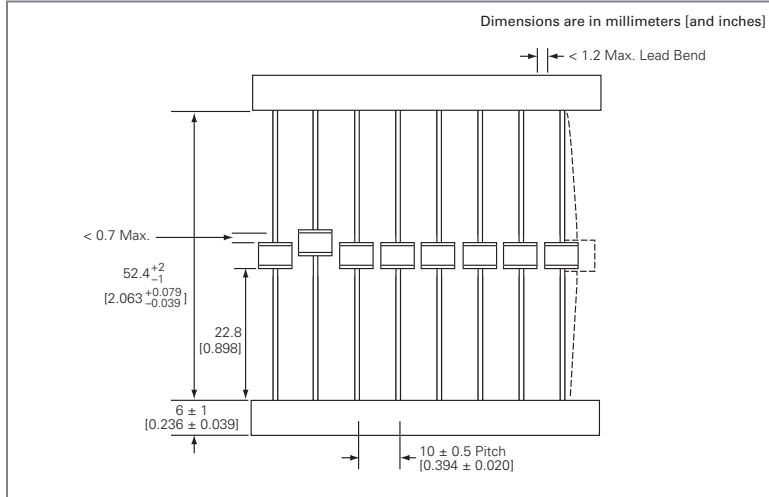
| Wave Parameter | Lead-Free Recommendation |
|--|-----------------------------------|
| Preheat: | |
| (Depends on Flux Activation Temperature) | (Typical Industry Recommendation) |
| Temperature Minimum: | 100° C |
| Temperature Maximum: | 150° C |
| Preheat Time: | 60-180 seconds |
| Solder Pot Temperature: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

Soldering Parameters - Hand Soldering

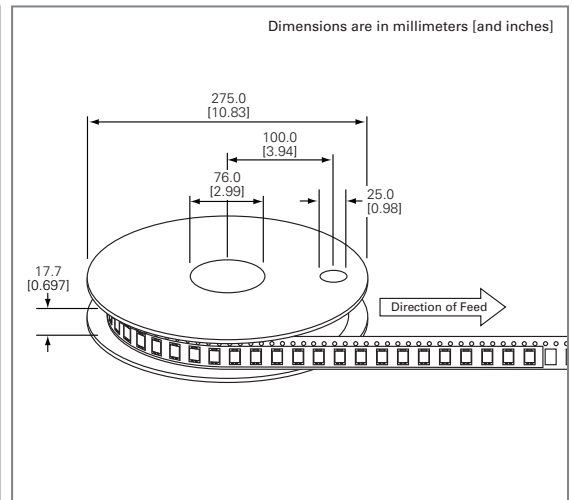
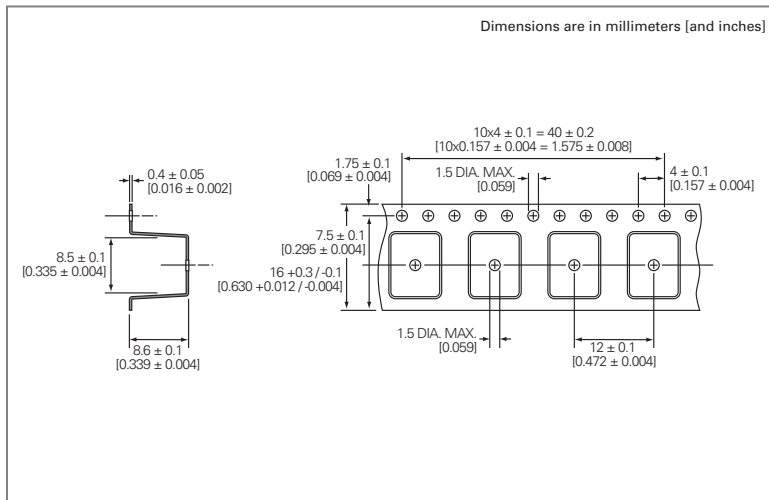
Solder Iron Temperature: 350° C +/- 5°C
 Heating Time: 5 seconds max.

Packaging Dimensions

For 'A' Type Axial Lead Items



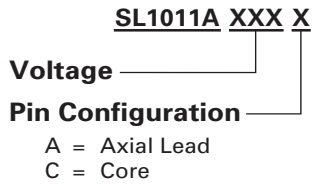
For 'SM' Type Surface Mount Items (SL1411A series only)



For 'C' Type Core Items: Packed in plastic bag (500 pcs)

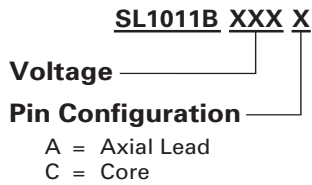
Part Numbering System and Ordering Information

For SL1011A series:



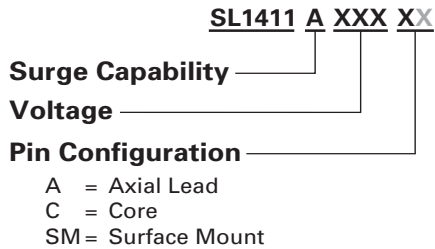
Remarks: Formed leads are available on request

For SL1011B series:



Remarks: Formed leads are available on request

For SL1411A series:





http://littelfuse.com

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- > Application Notes
- > Application Testing
- > SPICE Models
- > Local Technical Support
- > Product Samples
- > Technical Articles
- > Certification Documents
- > Data Sheets



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Littelfuse offers technologies that protect electronic and electrical circuits and their users against electrostatic discharge (ESD), load switching surges, lightning strike effects, overloads, short circuits, power faults, ground faults and other threats.

Overcurrent Protection Products:

Fuses Littelfuse offers the world's broadest range of fuse types and ratings, including cartridge, leaded, surface mount and thin film designs

PTCs Positive Temperature Coefficient thermistor technology provides resettable current-limiting protection

Protection Relays Electronic and microprocessor-based protection relays minimize damage to equipment and personnel caused by electrical faults

Overvoltage Protection Products:

Varistors Littelfuse offers surface mount Multi-Layer Varistors (MLVs) and industrial Metal Oxide Varistors (MOVs) to protect against transients

GDTs Gas Discharge Tubes (GDTs) to dissipate transient voltage through a contained plasma gas

Thyristors Solid state switches that control the flow of current in a wide range of appliances, tools and equipment

SIDACTor® Devices Overvoltage protection specifically designed for legacy telecom and today's broadband connections

TVS Diodes Silicon Transient Voltage Suppression (TVS) devices

SPA™ Silicon Protection Arrays designed for analog and digital signal line protection

PulseGuard® ESD Suppressors Small, fast-acting Electrostatic Discharge (ESD) suppressors

Special Application Products:

PLED LED Protectors LED string reliability devices that offer open LED bypass, ESD protection and reverse connection protection



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