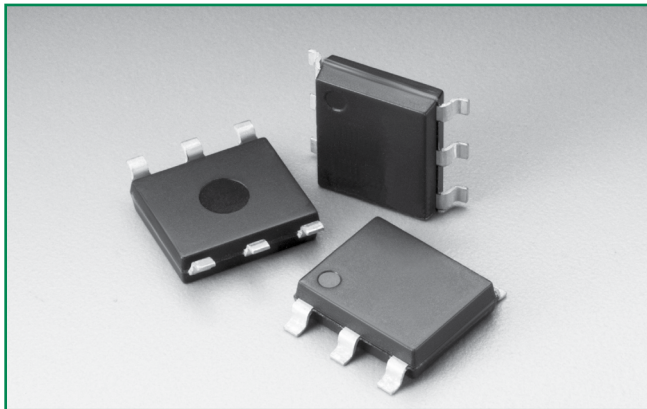


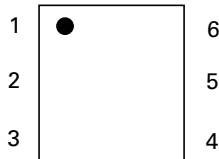
### Asymmetrical Multiport Series - MS-013



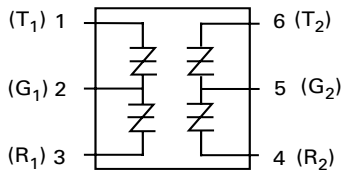
#### Agency Approvals

| Agency  | Agency File Number |
|---|--------------------|
|  | E133083            |

#### Pinout Designation



#### Schematic Symbol



#### Description

Asymmetrical Multiport Series are SIDACtor® components designed to protect LCAS (Line Circuit Access Switch) devices from damaging overvoltage transients.

The series provides a specialized asymmetrical dual port overvoltage protection solution that enables equipment to comply with various global regulatory standards.

#### Features and Benefits

- Low voltage overshoot
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit.
- Fails short circuit when surged in excess of ratings
- Replaces four discrete components
- Two-port protection
- RoHS Compliant, Lead-Free and Halogen Free
- LCAS specific tip and ring thresholds
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin (Sn) (IPC/JEDEC J-STD-609A.01)

#### Applicable Global Standards

- TIA-968-A
- TIA-968-B
- ITU K.20/21 Enhanced Level\*
- ITU K.20/21 Basic Level
- GR 1089 Inter-building\*
- GR 1089 Intra-building
- IEC 61000-4-5 2nd edition
- YD/T 1082
- YD/T 993
- YD/T 950

\*A-rated parts require series resistance

#### Additional Information



Datasheet



Resources



Samples

#### Electrical Characteristics

| Part Number | Part Marking | $V_{DRM} @ I_{DRM} = 5\mu A$ | $V_S @ 100V/\mu s$ | $V_{DRM} @ I_{DRM} = 5\mu A$ | $V_S @ 100V/\mu s$ | $V_T @ I_T = 2.2 \text{ Amps}$ | $I_S$<br>mA | $I_T$<br>A | $I_H$<br>mA |
|-------------|--------------|------------------------------|--------------------|------------------------------|--------------------|--------------------------------|-------------|------------|-------------|
|             |              | V                            | V                  | V                            | V                  | V                              |             |            |             |
|             |              | Pins 2-3, 5-6                |                    | Pins 1-2, 4-5                |                    | Pins 1-2, 2-3, 4-5, 5-6        |             |            |             |
| A1220UA4Lxx | A1220UA4     | 100                          | 130                | 180                          | 220                | 4                              | 800         | 2.2        | 120         |
| A1225UA4Lxx | A1250UA4     | 100                          | 130                | 230                          | 290                | 4                              | 800         | 2.2        | 120         |
| A1220UC4Lxx | A1220UC4     | 100                          | 130                | 180                          | 220                | 4                              | 800         | 2.2        | 120         |
| A1225UC4Lxx | A1250UC4     | 100                          | 130                | 230                          | 290                | 4                              | 800         | 2.2        | 120         |

Notes:  
 - Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).  
 - Components are bi-directional.  
 - All electrical characteristics shown are defined from Tip to Ground (pin 1 to pin 2 and pin 6 to pin 5) and Ring to Ground (pin 3 to pin 2 and pin 4 to pin 5).  
 - XX = Part Number Suffix: 'TP' (Tube Pack) or 'RP' (Reel Pack).

**Capacitance Values**

| Part Number | pF<br>Pin 1-2 / 4-5<br>Ring-Ground |     | pF<br>Pin 3-2 / 6-5<br>Tip-Ground |     | pF<br>Pin 1-3 (4-6)<br>Tip-Ring |     |
|-------------|------------------------------------|-----|-----------------------------------|-----|---------------------------------|-----|
|             | MIN                                | MAX | MIN                               | MAX | MIN                             | MAX |
| A1220UA4Lxx | 15                                 | 25  | 30                                | 50  | 5                               | 20  |
| A1225UA4Lxx | 15                                 | 25  | 30                                | 50  | 5                               | 20  |
| A1220UC4Lxx | 35                                 | 50  | 60                                | 90  | 20                              | 35  |
| A1225UC4Lxx | 35                                 | 50  | 60                                | 90  | 20                              | 35  |

Note: Off-state capacitance (C<sub>o</sub>) is measured at 1 MHz with a 2 V bias.

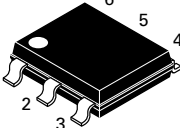
**Surge Ratings**

| Series | I <sub>PP</sub>                              |  |  |  |  |  |  |  |   |       | I <sub>TSM</sub><br>50/60 Hz | di/dt |
|--------|--|--|--|--|--|--|--|--|---|-------|------------------------------|-------|
|        | 0.2/310 <sup>1</sup><br>0.5/700 <sup>2</sup> | 2/10 <sup>1</sup><br>2/10 <sup>2</sup> | 8/20 <sup>1</sup><br>1.2/50 <sup>2</sup> | 10/160 <sup>1</sup><br>10/160 <sup>2</sup> | 10/560 <sup>1</sup><br>10/560 <sup>2</sup> | 5/320 <sup>1</sup><br>9/720 <sup>2</sup> | 10/360 <sup>1</sup><br>10/360 <sup>2</sup> | 10/1000 <sup>1</sup><br>10/1000 <sup>2</sup> | 5/310 <sup>1</sup><br>10/700 <sup>2</sup> |       |                              |       |
|        | A min  | A min                                  | A min                                    | A min                                      | A min                                      | A min                                    | A min                                      | A min  | A min                                     | A min |                              |       |
| A      | 20   | 150                                    | 150                                      | 90   | 50   | 75                                       | 75   | 45   | 75  | 20    | 500                          |       |
| C      | 50   | 500                                    | 400                                      | 200  | 150  | 200                                      | 175  | 100  | 200                                       | 30    | 500                          |       |

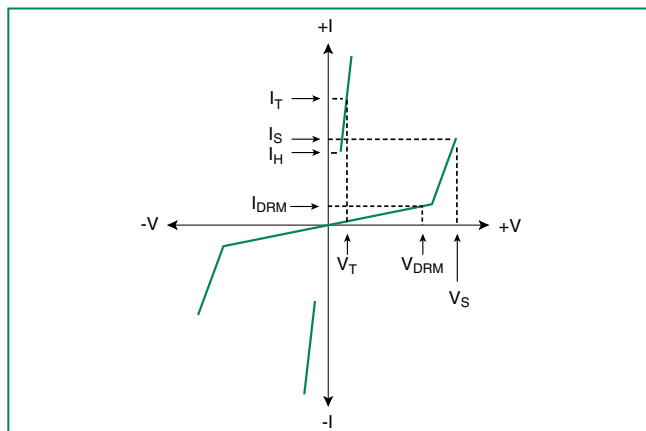
Notes:

- 1 Current waveform in  $\mu$ s
- 2 Voltage waveform in  $\mu$ s
- Peak pulse current rating (I<sub>pp</sub>) is repetitive and guaranteed for the life of the product.
- I<sub>pp</sub> ratings applicable over temperature range of -40°C to +85°C
- The component must initially be in thermal equilibrium with -40°C  $\leq$  T<sub>J</sub>  $\leq$  +150°C

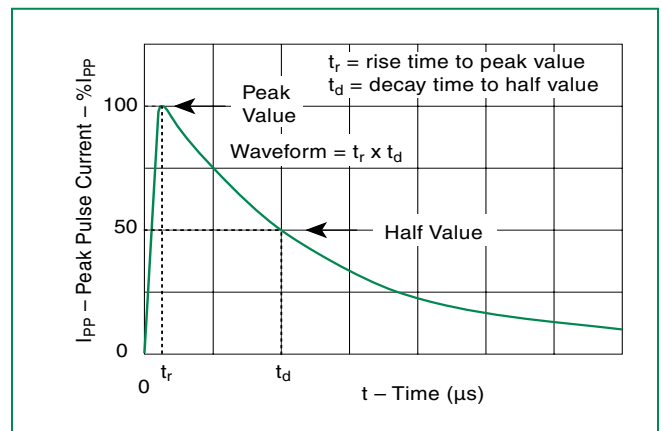
**Thermal Considerations**

| Package  | Symbol           | Parameter                               | Value       | Unit |
|--|------------------|---|-------------|------|
| Modified MS-013<br> | T <sub>J</sub>   | Operating Junction Temperature Range    | -40 to +125 | °C   |
|  | T <sub>S</sub>   | Storage Temperature Range               | -65 to +150 | °C   |
|  | R <sub>θJA</sub> | Thermal Resistance: Junction to Ambient | 60          | °C/W |

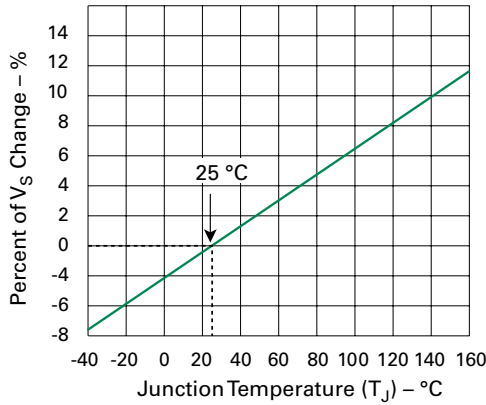
**V-I Characteristics**



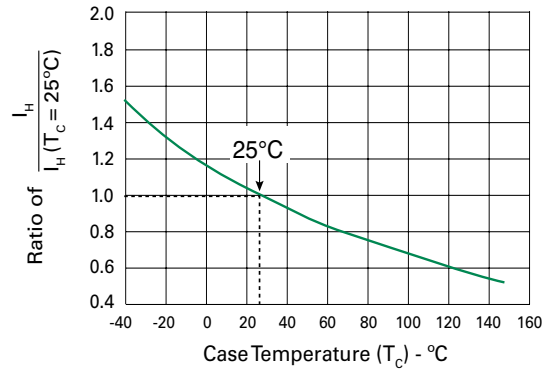
**t<sub>r</sub> x t<sub>d</sub> Pulse Waveform**



**Normalized  $V_s$  Change vs. Junction Temperature**

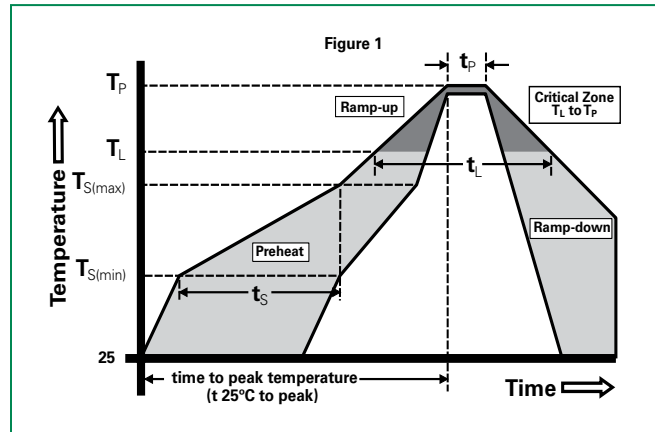


**Normalized DC Holding Current vs. Case Temperature**



**Soldering Parameters**

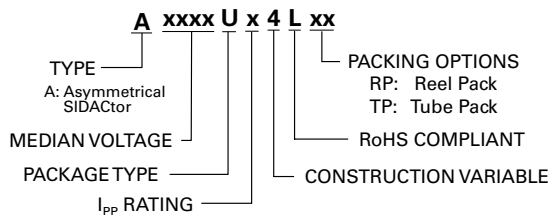
|  |                                   |                               |
|--|-----------------------------------|-------------------------------|
| Reflow Condition                                       |                                   | Pb-Free assembly (see Fig. 1) |
| Pre Heat   | -Temperature 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/sec. Max.                 |
| $T_{s(max)}$ to $T_L$ - Ramp-up Rate                   |                                   | 3°C/sec. Max.                 |
| Reflow   | -Temperature ( $T_L$ ) (Liquidus) | +217°C                        |
|  | -Temperature ( $t_L$ )            | 60-150 secs.                  |
| Peak Temp ( $T_p$ )                                    |                                   | +260(+0/-5)°C                 |
| Time within 5°C of actual Peak Temp ( $t_p$ )          |                                   | 30 secs. Max.                 |
| Ramp-down Rate   |                                   | 6°C/sec. Max.                 |
| Time 25°C to Peak Temp ( $T_p$ )                       |                                   | 8 min. Max.                   |
| Do not exceed  |                                   | +260°C                        |



**Physical Specifications**

|                        |   |
|------------------------|---|
| <b>Lead Material</b>   | Copper Alloy  |
| <b>Terminal Finish</b> | 100% Matte-Tin Plated                                       |
| <b>Body Material</b>   | UL recognized epoxy meeting flammability classification V-0 |

**Part Numbering**



**Environmental Specifications**

|   |   |
|---|---|
| <b>High Temp Voltage Blocking</b>       | 80% Rated $V_{DRM}$ ( $V_{AC, Peak}$ ) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101 |
| <b>Temp Cycling</b>                     | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A-104                  |
| <b>Biased Temp &amp; Humidity</b>       | 52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101  |
| <b>High Temp Storage</b>                | +150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101  |
| <b>Low Temp Storage</b>                 | -65°C, 1008 hrs.  |
| <b>Thermal Shock</b>                    | 0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106                 |
| <b>Autoclave (Pressure Cooker Test)</b> | +121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102   |
| <b>Resistance to Solder Heat</b>        | +260°C, 30 secs. MIL-STD-750 (Method 2031)  |
| <b>Moisture Sensitivity Level</b>       | 85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1   |