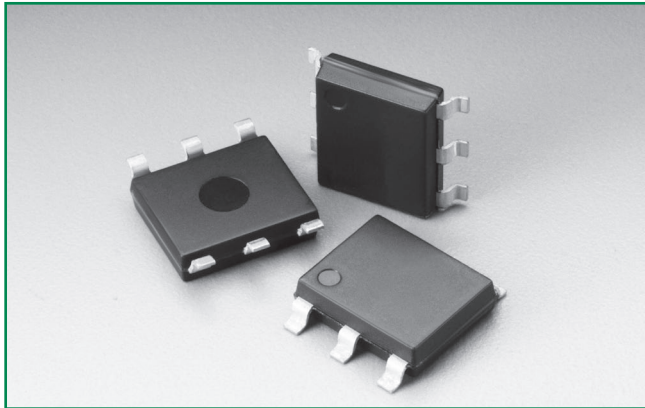


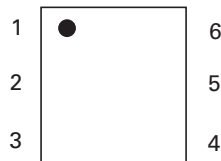
## Asymmetrical Multiport Series - MS-013



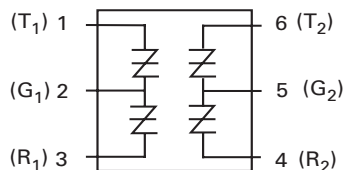
### Agency Approvals

Agency	Agency File Number
	E133083

### Pinout Designation



### Schematic Symbol



### Description

Asymmetrical Multiport Series are SIDACtor® devices 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 devices
- Two-port protection
- LCAS specific tip and ring thresholds
- 2nd level interconnect is Pb-free per 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
- YD/T 1082
- YD/T 993
- YD/T 950

\*A-rated parts require series resistance

### Electrical Characteristics

Part Number	Part Marking	$V_{DRM} @ I_{DRM} = 5\mu A$	$V_S @ 100V/\mu s$	$V_{DRM} @ I_{DRM} = 5\mu A$	$V_S @ 100V/\mu s$	$V_T @ I_T = 2.2 \text{ Amps}$	$I_S$ mA	$I_T$ A	$I_H$ 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).
  - Devices 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 Pin 1-2 / 4-5 Ring-Ground		pF Pin 3-2 / 6-5 Tip-Ground		pF Pin 1-3 (4-6) 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 ( $C_o$ ) is measured at 1 MHz with a 2 V bias.

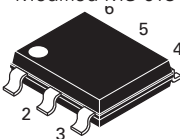
**Surge Ratings**

Series	$I_{PP}$										$I_{TSM}$ 50/60 Hz	di/dt
	0.2x310 <sup>1</sup> 0.5x700 <sup>2</sup>	2x10 <sup>1</sup> 2x10 <sup>2</sup>	8x20 <sup>1</sup> 1.2x50 <sup>2</sup>	10x160 <sup>1</sup> 10x160 <sup>2</sup>	10x560 <sup>1</sup> 10x560 <sup>2</sup>	5x320 <sup>1</sup> 9x720 <sup>2</sup>	10x360 <sup>1</sup> 10x360 <sup>2</sup>	10x1000 <sup>1</sup> 10x1000 <sup>2</sup>	5x310 <sup>1</sup> 10x700 <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	

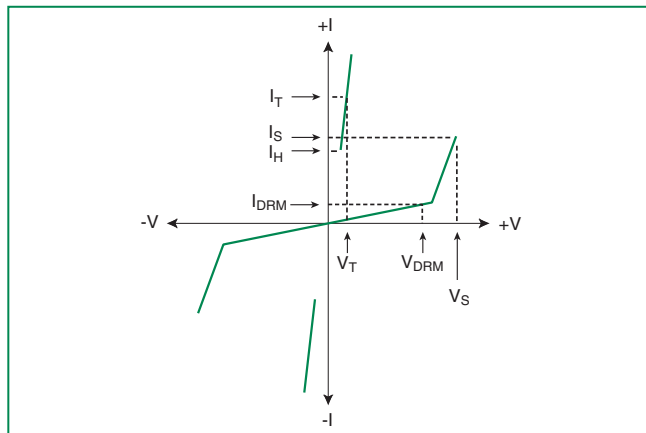
Notes:

- 1 Current waveform in  $\mu s$
- 2 Voltage waveform in  $\mu s$
- Peak pulse current rating ( $I_{pp}$ ) is repetitive and guaranteed for the life of the product.
- $I_{pp}$  ratings applicable over temperature range of  $-40^\circ C$  to  $+85^\circ C$
- The device must initially be in thermal equilibrium with  $-40^\circ C \leq T_j \leq +150^\circ C$

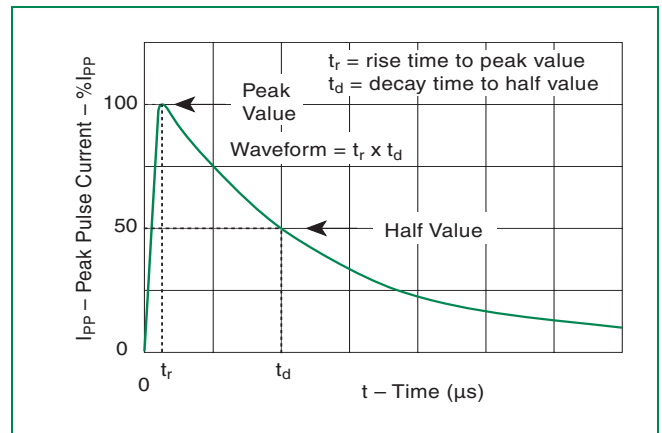
**Thermal Considerations**

Package	Symbol	Parameter	Value	Unit
Modified MS-013 	$T_J$	Operating Junction Temperature Range	-40 to +125	$^\circ C$
	$T_S$	Storage Temperature Range	-65 to +150	$^\circ C$
	$R_{\theta JA}$	Thermal Resistance: Junction to Ambient	60	$^\circ C/W$

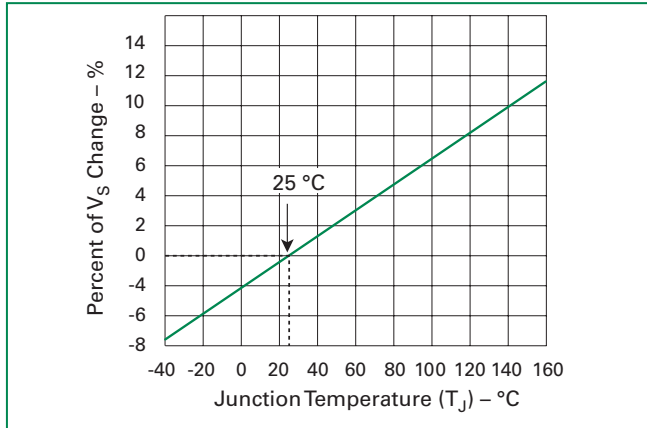
**V-I Characteristics**



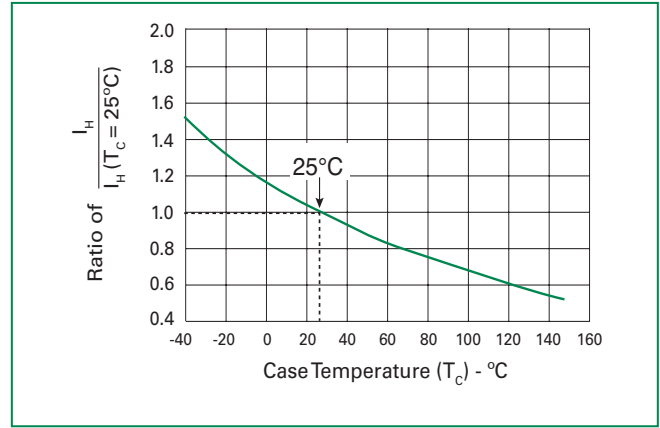
**$t_r \times t_d$  Pulse Waveform**



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

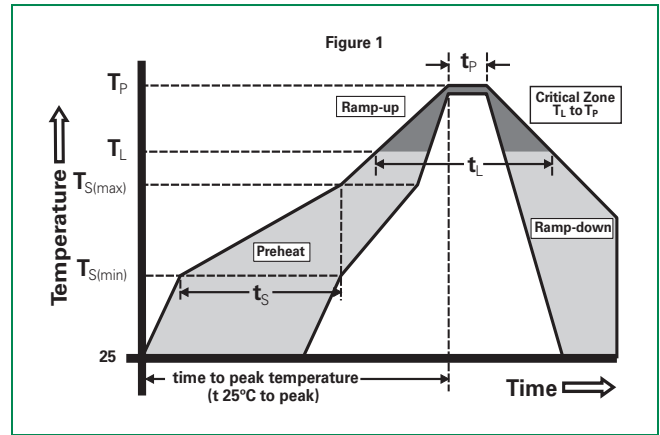


**Normalized DC Holding Current vs. Case Temperature**



**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	



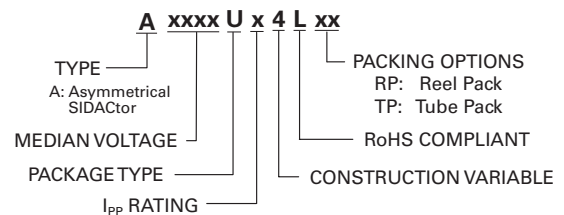
**Environmental Specifications**

<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-A104
<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

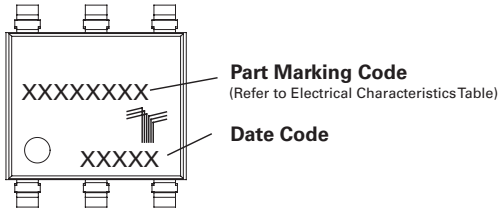
**Physical Specifications**

<b>Lead Material</b>	Copper Alloy
<b>Terminal Finish</b>	100% Matte-Tin Plated
<b>Body Material</b>	UL recognized epoxy meeting flammability classification 94V-0

**Part Numbering**



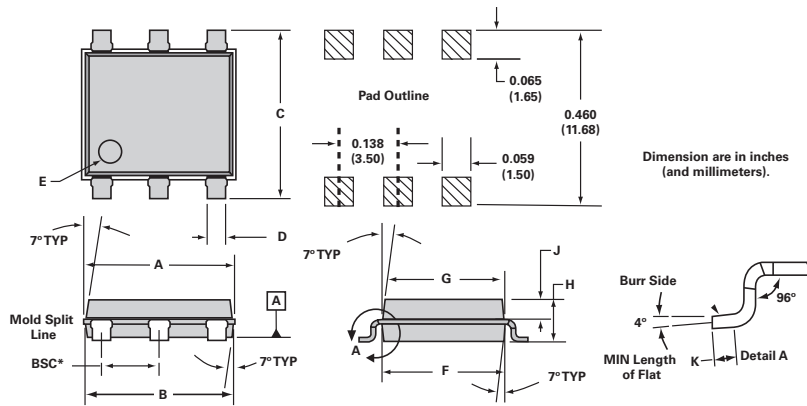
**Part Marking**



**Packing Options**

Package Type	Description	Quantity	Added Suffix	Industry Standard
U	Modified MS-013 6-pin Tape and Reel Pack	1500	RP	EIA-481-D
	Modified MS-013 6-pin Tube Pack	500 (50 per tube)	TP	N/A

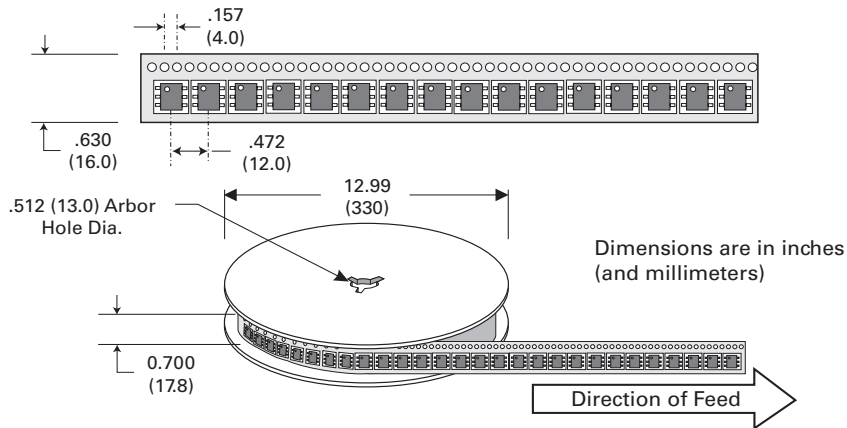
**Dimensions — MS-013**



Dimensions	Inches		Millimeters	
	Min	Max	Min	Max
A	0.360	0.364	9.14	9.25
B	0.352	0.356	8.94	9.04
C	0.400	0.412	10.16	10.46
D	0.043	0.045	1.09	1.13
E	0.047	0.055	1.19	1.40
F	0.293	0.297	7.44	7.54
G	0.289	0.293	7.34	7.44
H	0.089	0.093	2.26	2.36
J	0.041	0.049	1.04	1.24
K	0.020		0.51	
<b>BSC*</b>	0.133	0.143	3.38	3.63

\* BSC = Basic Spacing between Centers

**Tape and Reel Specification — MS-013**



**Tube Pack Specification — MS-013**

