

**RoHS SIDACtor® Balanced Multiport Series - MS-013**



**Agency Approvals**

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

**Pinout Designation**



**Schematic Diagram**



**Description**

SIDACtor® Balanced Multiport Series MS-013 are designed to protect baseband equipment from overvoltage transients. The patented “Y” configuration ensures balanced overvoltage protection.

The series provides a dual port surface mount solution that enables voice through DS-1 equipment to comply with various global regulatory standards.

**Features and Benefits**

- Low voltage overshoot
- Low on-state voltage
- Does not degrade with use
- Fails short circuit when surged in excess of ratings
- Low Capacitance
- Replaces six discrete devices
- Balanced overvoltage protection
- Meets UL/IEC 60950-1 creepage and clearance
- Two-port protection

**Applicable Global Standards**

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

\*A/B-rated parts require series resistance

**Electrical Characteristics**

| Part Number | Marking  | $V_{DRM}$            | $V_S$           | $V_{DRM}$            | $V_S$           | $V_T$           | $I_H$ | $I_S$ | $I_T$ | Capacitance                  |
|-------------|----------|----------------------|-----------------|----------------------|-----------------|-----------------|-------|-------|-------|------------------------------|
|             |          | @ $I_{DRM} = 5\mu A$ | @ 100V/ $\mu s$ | @ $I_{DRM} = 5\mu A$ | @ 100V/ $\mu s$ | @ $I_T = 2.2 A$ | $mA$  | $mA$  | $A$   |                              |
|             |          | V min                | V max           | V min                | V max           | V max           | min   | max   | max   |                              |
| A2106UA6Lxx | A2106UA6 | 170                  | 250             | 50                   | 80              | 8               | 120   | 800   | 2.2   | See Capacitance Values Table |
| A5030UA6Lxx | A5030UA6 | 400                  | 550             | 270                  | 340             | 8               | 150   | 800   | 2.2   |                              |
| A2106UB6Lxx | A2106UB6 | 170                  | 250             | 50                   | 80              | 8               | 120   | 800   | 2.2   |                              |
| A5030UB6Lxx | A5030UB6 | 400                  | 550             | 270                  | 340             | 8               | 150   | 800   | 2.2   |                              |
| A2106UC6Lxx | A2106UC6 | 170                  | 250             | 50                   | 80              | 8               | 120   | 800   | 2.2   |                              |
| A5030UC6Lxx | A5030UC6 | 400                  | 550             | 270                  | 340             | 8               | 150   | 800   | 2.2   |                              |
| P1556UALxx  | P1556UA  | 130                  | 180             | 130                  | 180             | 8               | 150   | 800   | 2.2   |                              |
| P1806UALxx  | P1806UA  | 150                  | 210             | 150                  | 210             | 8               | 150   | 800   | 2.2   |                              |
| P2106UALxx  | P2106UA  | 170                  | 250             | 170                  | 250             | 8               | 150   | 800   | 2.2   |                              |
| P2356UALxx  | P2356UA  | 200                  | 270             | 200                  | 270             | 8               | 150   | 800   | 2.2   |                              |
| P2706UALxx  | P2706UA  | 230                  | 300             | 230                  | 300             | 8               | 150   | 800   | 2.2   |                              |
| P3206UALxx  | P3206UA  | 270                  | 350             | 270                  | 350             | 8               | 150   | 800   | 2.2   |                              |
| P3406UALxx  | P3406UA  | 300                  | 400             | 300                  | 400             | 8               | 150   | 800   | 2.2   |                              |

Table continues on next page.

**Electrical Characteristics** (continued)

| Part Number | Marking | $V_{DRM}$               | $V_S$           | $V_{DRM}$            | $V_S$           | $V_T$                   | $I_H$  | $I_S$  | $I_T$ | Capacitance                        |
|-------------|---------|-------------------------|-----------------|----------------------|-----------------|-------------------------|--------|--------|-------|------------------------------------|
|             |         | @ $I_{DRM} = 5\mu A$    | @ 100V/ $\mu s$ | @ $I_{DRM} = 5\mu A$ | @ 100V/ $\mu s$ | @ $I_T = 2.2 A$         |        |        |       |                                    |
|             |         | V min                   | V max           | V min                | V max           | V max                   | mA min | mA max | A max |                                    |
|             |         | Pins 1-2, 3-2, 4-5, 6-5 |                 | Pins 1-3, 4-6        |                 | Pins 1-2, 3-2, 4-5, 6-5 |        |        |       |                                    |
| P5106UALxx  | P5106UA | 420                     | 600             | 420                  | 600             | 8                       | 150    | 800    | 2.2   | See<br>Capacitance<br>Values Table |
| P1556UBLxx  | P1556UB | 130                     | 180             | 130                  | 180             | 8                       | 150    | 800    | 2.2   |                                    |
| P1806UBLxx  | P1806UB | 150                     | 210             | 150                  | 210             | 8                       | 150    | 800    | 2.2   |                                    |
| P2106UBLxx  | P2106UB | 170                     | 250             | 170                  | 250             | 8                       | 150    | 800    | 2.2   |                                    |
| P2356UBLxx  | P2356UB | 200                     | 270             | 200                  | 270             | 8                       | 150    | 800    | 2.2   |                                    |
| P2706UBLxx  | P2706UB | 230                     | 300             | 230                  | 300             | 8                       | 150    | 800    | 2.2   |                                    |
| P3206UBLxx  | P3206UB | 270                     | 350             | 270                  | 350             | 8                       | 150    | 800    | 2.2   |                                    |
| P3406UBLxx  | P3406UB | 300                     | 400             | 300                  | 400             | 8                       | 150    | 800    | 2.2   |                                    |
| P5106UBLxx  | P5106UB | 420                     | 600             | 420                  | 600             | 8                       | 150    | 800    | 2.2   |                                    |
| P1556UCLxx  | P1556UC | 130                     | 180             | 130                  | 180             | 8                       | 150    | 800    | 2.2   |                                    |
| P1806UCLxx  | P1806UC | 150                     | 210             | 150                  | 210             | 8                       | 150    | 800    | 2.2   |                                    |
| P2106UCLxx  | P2106UC | 170                     | 250             | 170                  | 250             | 8                       | 150    | 800    | 2.2   |                                    |
| P2356UCLxx  | P2356UC | 200                     | 270             | 200                  | 270             | 8                       | 150    | 800    | 2.2   |                                    |
| P2706UCLxx  | P2706UC | 230                     | 300             | 230                  | 300             | 8                       | 150    | 800    | 2.2   |                                    |
| P3206UCLxx  | P3206UC | 270                     | 350             | 270                  | 350             | 8                       | 150    | 800    | 2.2   |                                    |
| P3406UCLxx  | P3406UC | 300                     | 400             | 300                  | 400             | 8                       | 150    | 800    | 2.2   |                                    |
| P5106UCLxx  | P5106UC | 420                     | 600             | 420                  | 600             | 8                       | 150    | 800    | 2.2   |                                    |

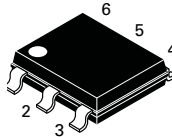
Notes:  
 - Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).  
 - Devices are bi-directional (some are asymmetrical).  
 - XX = Part Number Suffix: 'TP' (Tube Pack) or 'RP' (Reel Pack).

**Surge Ratings**

| Series | $I_{PP}$                                     |  |  |  |  |  |  |  |   | $I_{TSM}$<br>50/60 Hz | di/dt |
|--------|--|--|--|--|--|--|--|--|---|-----------------------|-------|
|        | 0.2x310 <sup>1</sup><br>0.5x700 <sup>2</sup> | 2x10 <sup>1</sup><br>2x10 <sup>2</sup> | 8x20 <sup>1</sup><br>1.2x50 <sup>2</sup> | 10x160 <sup>1</sup><br>10x160 <sup>2</sup> | 10x560 <sup>1</sup><br>10x560 <sup>2</sup> | 5x320 <sup>1</sup><br>9x720 <sup>2</sup> | 10x360 <sup>1</sup><br>10x360 <sup>2</sup> | 10x1000 <sup>1</sup><br>10x1000 <sup>2</sup> | 5x310 <sup>1</sup><br>10x700 <sup>2</sup> |                       |       |
|        | 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   |
| B      | 25   | 250                                    | 250                                      | 150  | 100  | 100                                      | 125  | 80   | 100                                       | 25                    | 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  $-40$  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<br> | $T_J$           | Operating Junction Temperature Range    | -40 to +150 | $^\circ C$   |
|  | $T_S$           | Storage Temperature Range               | -65 to +150 | $^\circ C$   |
|  | $R_{\theta JA}$ | Thermal Resistance: Junction to Ambient | 60          | $^\circ C/W$ |

**Capacitance Values**

| Part Number | pF<br>Pin 1-2 / 3-2 (4-5 / 6-5)<br>Tip-Ground, Ring-Ground |     | pF<br>Pin 1-3 (4-6)<br>Tip-Ring |     |
|-------------|--|-----|---------------------------------|-----|
|             | MIN  | MAX | MIN                             | MAX |
|             | A2106UA6Lxx  | 20  | 60                              | 10  |
| A5030UA6Lxx | 15   | 35  | 10                              | 45  |
| A2106UB6Lxx | 20   | 60  | 10                              | 30  |
| A5030UB6Lxx | 15   | 35  | 10                              | 45  |
| A2106UC6Lxx | 20   | 70  | 10                              | 45  |
| A5030UC6Lxx | 25   | 40  | 20                              | 35  |
| P1556UALxx  | 20   | 45  | 10                              | 30  |
| P1806UALxx  | 20   | 40  | 10                              | 30  |
| P2106UALxx  | 15   | 35  | 10                              | 25  |
| P2356UALxx  | 15   | 35  | 10                              | 25  |
| P2706UALxx  | 15   | 35  | 10                              | 25  |
| P3206UALxx  | 15   | 30  | 10                              | 20  |
| P3406UALxx  | 15   | 30  | 10                              | 20  |
| P5106UALxx  | 10   | 20  | 5                               | 15  |
| P1556UBLxx  | 20   | 45  | 10                              | 30  |
| P1806UBLxx  | 20   | 40  | 10                              | 30  |
| P2106UBLxx  | 15   | 35  | 10                              | 25  |
| P2356UBLxx  | 15   | 35  | 10                              | 25  |
| P2706UBLxx  | 15   | 35  | 10                              | 25  |
| P3206UBLxx  | 15   | 30  | 10                              | 20  |
| P3406UBLxx  | 15   | 30  | 10                              | 20  |
| P5106UBLxx  | 10   | 20  | 5                               | 15  |
| P1556UCLxx  | 30   | 55  | 20                              | 35  |
| P1806UCLxx  | 30   | 50  | 15                              | 35  |
| P2106UCLxx  | 30   | 45  | 15                              | 30  |
| P2356UCLxx  | 25   | 40  | 15                              | 30  |
| P2706UCLxx  | 25   | 40  | 15                              | 30  |
| P3206UCLxx  | 20   | 35  | 15                              | 25  |
| P3406UCLxx  | 20   | 35  | 15                              | 25  |
| P5106UCLxx  | 20   | 30  | 10                              | 20  |

Note: Off-state capacitance ( $C_o$ ) is measured at 1 MHz with a 2 V bias.

**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 |

**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 PeakTemp ( $t_p$ )           | 30 secs. Max.                      |              |
| Ramp-down Rate   | 6°C/sec. Max.                      |              |
| Time 25°C to PeakTemp ( $T_p$ )                        | 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-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                                       |

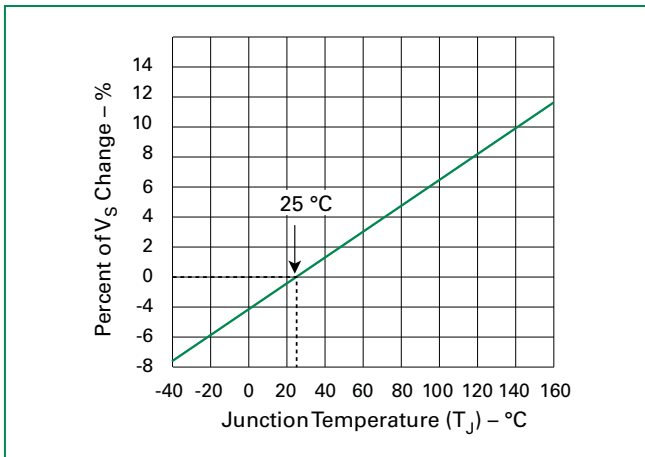
**V-I Characteristics**



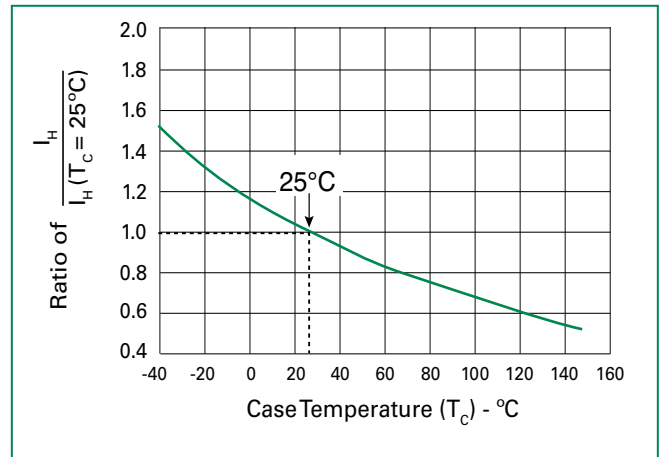
**$t_r \times t_d$  Pulse Waveform**



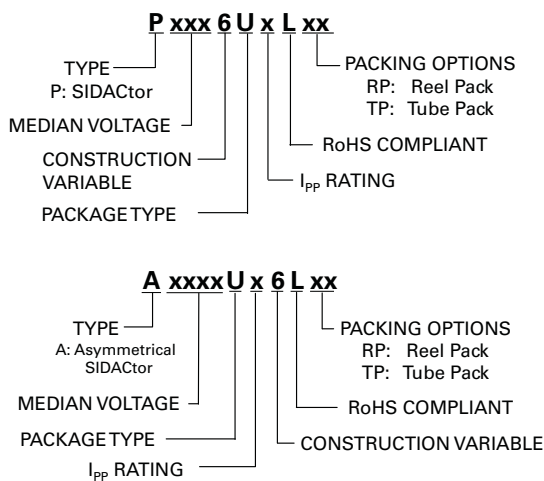
**Normalized  $V_S$  Change vs. Junction Temperature**



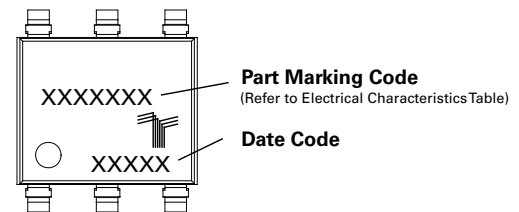
**Normalized DC Holding Current vs. Case Temperature**



**Part Numbering**



**Part Marking**



**Dimensions — MS-013**



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

\* BSC = Basic Spacing between Centers

**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<br>(50 per tube) | TP           | N/A               |

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



**Tube Pack Specification — MS-013**



## Данный компонент на территории Российской Федерации

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Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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