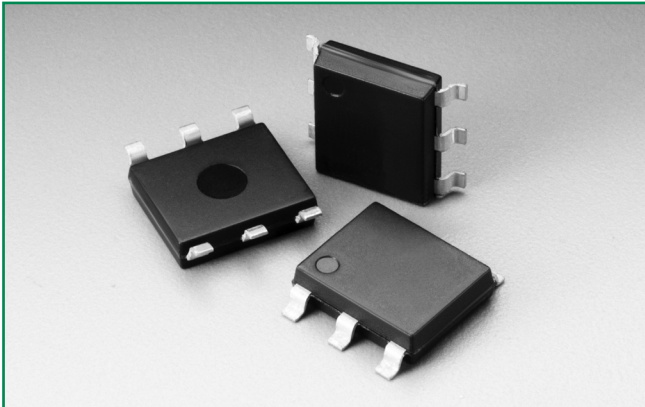


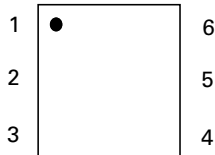
MC Multiport Series - MS-013



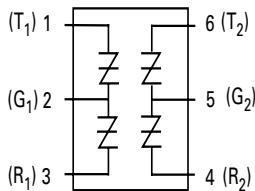
Agency Approvals

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

Pinout Designation



Schematic Symbol



Description

The MC Multiport Series MS-013 are low capacitance SIDACtor® thyristors designed to protect broadband equipment from damaging overvoltage transients.

The series provides a dual port surface mount solution that enables equipment to comply with various global regulatory standards while limiting the impact to broadband signals.

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
- Two-pair protection
- 40% lower capacitance than our Baseband Protectors, for applications that demand greater signal integrity
- Replaces four discrete components
- 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.20/21/45 Enhanced Level
- ITU K.20/21/45 Basic Level
- GR 1089 Intra-building
- IEC 61000-4-5 2nd edition
- YD/T 1082
- YD/T 993
- YD/T 950
- GR 1089 Inter-building

Electrical Characteristics

| Part Number | Marking | V_{DRM} | V_S | V_{DRM} | V_S | I_H | I_S | I_T | V_T | Capacitance |
|--------------|-----------|-------------------------|-----------------|--------------------|-----------------|--------|--------|-------|------------------|------------------------------|
| | | @ $I_{DRM}=5\mu A$ | @ 100V/ μs | @ $I_{DRM}=5\mu A$ | @ 100V/ μs | | | | @ $I_T=2.2$ Amps | |
| | | V | V | V | V | | | | V max | |
| | | Pins 1-2, 3-2, 4-5, 6-5 | | Pins 1-3, 4-6 | | mA min | mA max | A max | | |
| P0084UCMCLxx | P0084UCMC | 6 | 25 | 12 | 50 | 50 | 800 | 2.2 | 8 | See Capacitance Values Table |
| P0304UCMCLxx | P0304UCMC | 25 | 40 | 50 | 80 | 50 | 800 | 2.2 | 8 | |
| P0644UCMCLxx | P0644UCMC | 58 | 77 | 116 | 154 | 150 | 800 | 2.2 | 8 | |
| P0724UCMCLxx | P0724UCMC | 65 | 88 | 130 | 176 | 150 | 800 | 2.2 | 8 | |
| P0904UCMCLxx | P0904UCMC | 75 | 98 | 150 | 196 | 150 | 800 | 2.2 | 8 | |
| P1104UCMCLxx | P1104UCMC | 90 | 130 | 180 | 260 | 150 | 800 | 2.2 | 8 | |
| P1304UCMCLxx | P1304UCMC | 120 | 160 | 240 | 320 | 150 | 800 | 2.2 | 8 | |

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

Table continues on next page.

Electrical Characteristics (continued)

| Part Number | Marking | V_{DRM} @ $I_{DRM}=5\mu A$ | V_S @ 100V/ μs | V_{DRM} @ $I_{DRM}=5\mu A$ | V_S @ 100V/ μs | I_H | I_S | I_T | V_T @ $I_T=2.2$ Amps | Capacitance |
|--------------|-----------|---------------------------------|--------------------------|---------------------------------|--------------------------|--------|--------|-------|------------------------------|------------------------------------|
| | | V | V | V | V | mA min | mA max | A max | V max | |
| | | Pins 1-2, 3-2, 4-5, 6-5 | | | Pins 1-3, 4-6 | | | | | |
| P1504UCMCLxx | P1504UCMC | 140 | 180 | 280 | 360 | 150 | 800 | 2.2 | 8 | See Capacitance Values Table |
| P1804UCMCLxx | P1804UCMC | 170 | 220 | 340 | 440 | 150 | 800 | 2.2 | 8 | |
| P2304UCMCLxx | P2304UCMC | 190 | 260 | 380 | 520 | 150 | 800 | 2.2 | 8 | |
| P2604UCMCLxx | P2604UCMC | 220 | 300 | 440 | 600 | 150 | 800 | 2.2 | 8 | |
| P3104UCMCLxx | P3104UCMC | 275 | 350 | 550 | 700 | 150 | 800 | 2.2 | 8 | |
| P3504UCMCLxx | P3504UCMC | 320 | 400 | 600 | 800 | 150 | 800 | 2.2 | 8 | |

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

Capacitance Values

| Part Number | pF Pin 1-2 / 3-2 (4-5 / 6-5) Tip-Ground, Ring-Ground | | pF Pin 1-3 (4-6) Tip-Ring | |
|--------------|--|-----|---------------------------------|-----|
| | MIN | MAX | MIN | MAX |
| P0084UCMCLxx | 35 | 75 | 20 | 45 |
| P0304UCMCLxx | 25 | 45 | 10 | 25 |
| P0644UCMCLxx | 55 | 85 | 30 | 50 |
| P0724UCMCLxx | 50 | 75 | 25 | 45 |
| P0904UCMCLxx | 45 | 70 | 25 | 40 |
| P1104UCMCLxx | 45 | 70 | 25 | 40 |
| P1304UCMCLxx | 40 | 60 | 20 | 35 |
| P1504UCMCLxx | 35 | 55 | 20 | 35 |
| P1804UCMCLxx | 35 | 50 | 15 | 30 |
| P2304UCMCLxx | 30 | 50 | 15 | 30 |
| P2604UCMCLxx | 30 | 45 | 15 | 30 |
| P3104UCMCLxx | 30 | 45 | 15 | 25 |
| P3504UCMCLxx | 25 | 40 | 15 | 25 |

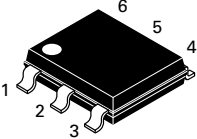
Note: Off-state capacitance (C_o) is measured at 1 MHz with a 2 V bias.

Surge Ratings

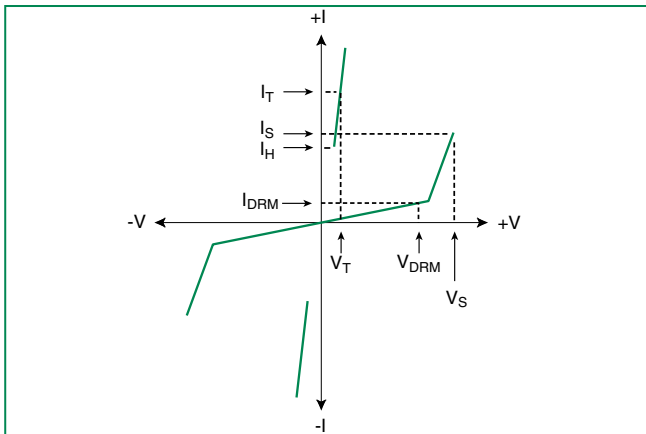
| Series | I_{PP} | | | | | | | | | I_{TSM} 50/60 Hz | di/dt |
|--------|--|--|--|--|--|--|--|--|---|-----------------------|-------|
| | 0.2/310 ¹ 0.5/700 ² | 2/10 ¹ 2/10 ² | 8/20 ¹ 1.2/50 ² | 10/160 ¹ 10/160 ² | 10/560 ¹ 10/560 ² | 5/320 ¹ 9/720 ² | 10/360 ¹ 10/360 ² | 10/1000 ¹ 10/1000 ² | 5/310 ¹ 10/700 ² | | |
| | A min | A min | A min | A min | A min | A min | A min | A min | A min | | |
| C | 50 | 500 | 400 | 200 | 150 | 200 | 175 | 100 | 200 | 30 | 500 |

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

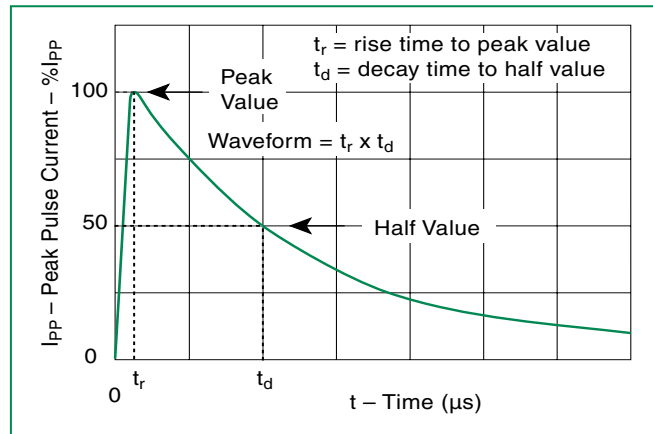
Thermal Considerations

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

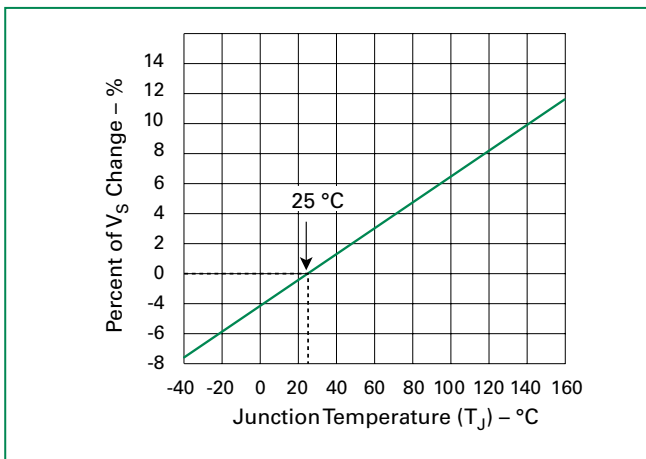
V-I Characteristics



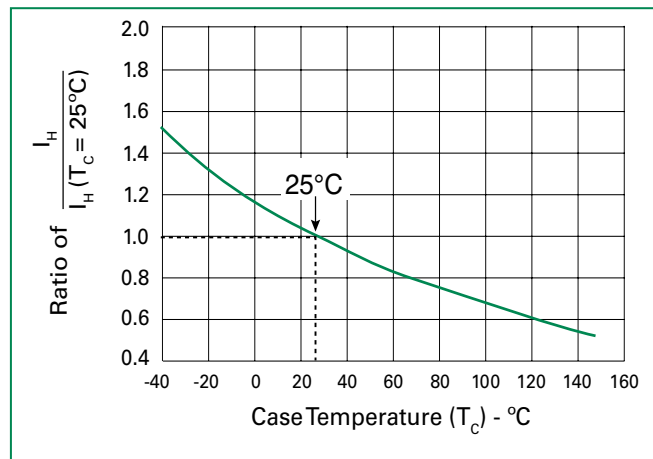
$t_r \times t_d$ Pulse Waveform



Normalized V_S Change vs. Junction Temperature



Normalized DC Holding Current vs. Case Temperature



Additional Information



Datasheet



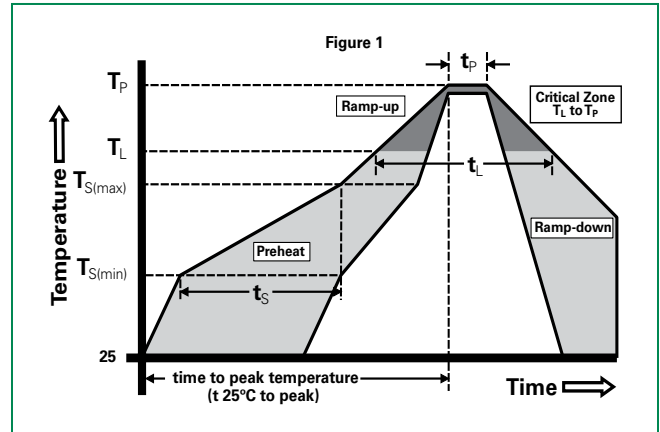
Resources



Samples

Soldering Parameters

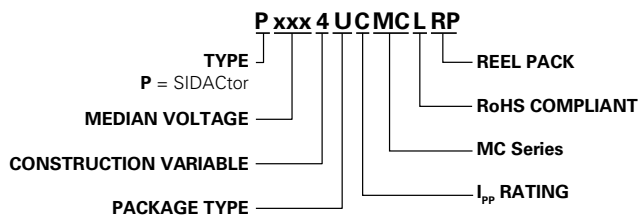
| | | |
|--|-----------------------------------|-------------------------------|
| Reflow Condition | | Pb-Free assembly (see Fig. 1) |
| Pre Heat | -Temperature Min ($T_{s(min)}$) | +150°C |
| | -Temperature Max ($T_{s(max)}$) | +200°C |
| | -Time (Min to Max) (t_s) | 60-180 secs. |
| Average ramp up 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

| | |
|------------------------|---|
| Lead Material | Copper Alloy |
| Terminal Finish | 100% Matte-Tin Plated |
| Body Material | UL Recognized epoxy meeting flammability classification V-0 |

Part Numbering



Environmental Specifications

| | |
|---|--|
| High Temp Voltage Blocking | 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 |
| Temp Cycling | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104 |
| Biased Temp & Humidity | 52 V_{DC} (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101 |
| High Temp Storage | +150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101 |
| Low Temp Storage | -65°C, 1008 hrs. |
| Thermal Shock | 0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106 |
| Autoclave (Pressure Cooker Test) | +121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102 |
| Resistance to Solder Heat | +260°C, 30 secs. MIL-STD-750 (Method 2031) |
| Moisture Sensitivity Level | 85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1 |

Part Marking

