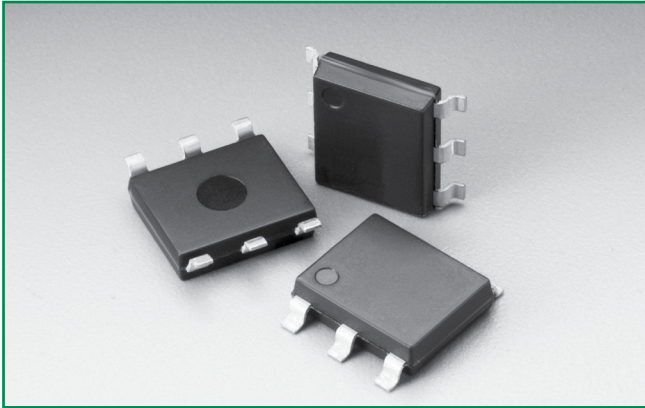


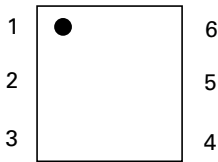
Battrax® Series - Dual Port Negative - MS-013



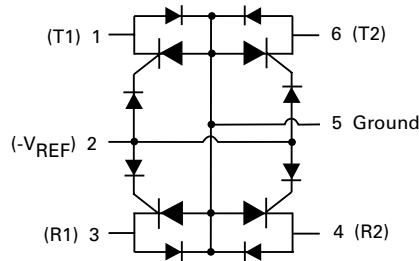
Agency Approvals

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

Pinout Designation



Schematic Symbol



Electrical Characteristics

| Part Number | Marking | V_{DRM} @ $I_{DRM} = 5\mu A$ | V_S @ 100V/ μs | I_H | I_S | I_T | V_T @ $I_T = 2.2$ Amps | V_F | Capacitance* | |
|-------------|----------|-----------------------------------|--------------------------|--------|--------|-------|-----------------------------|-------|--------------|--------|
| | | V min | V max | mA min | mA max | A max | V max | V max | pF min | pF max |
| B1101UC4Lxx | B1101UC4 | $-I-V_{REF} + I - 1.2VI$ | $-I-V_{REF} + I - 10VI$ | 100 | 100 | 2.2 | 4 | 5 | 30 | 200 |
| B1161UC4Lxx | B1161UC4 | $-I-V_{REF} + I - 1.2VI$ | $-I-V_{REF} + I - 10VI$ | 160 | 100 | 2.2 | 4 | 5 | 30 | 200 |
| B1201UC4Lxx | B1201UC4 | $-I-V_{REF} + I - 1.2VI$ | $-I-V_{REF} + I - 10VI$ | 200 | 100 | 2.2 | 4 | 5 | 30 | 200 |

Notes:
 - Absolute maximum ratings measured at $T_A = 25^\circ C$ (unless otherwise noted).
 - Components are uni-directional
 - All electrical characteristics shown are defined from Tip (pin 1 & 6) to Ground (pin 5) and Ring (pin 3 & 4) to Ground (pin 5)
 - Components are polarity sensitive and are not appropriate for positive ringing systems.

Description

The Dual Port Negative Battrax® Protection Thyristor Series are programmable SIDACtor® components designed to protect SLICs (Subscriber Line Interface Circuit) from damaging overvoltage transients.

Dual port protection is provided by a programmable device that is referenced to a negative voltage source while internal diodes provide protection from positive surge events.

Features and Benefits

- Low voltage overshoot
- Low on-state voltage
- Does not degrade surge capability after multiple surge events within limit.
- RoHS Compliant and Lead-Free
- Dual-port protection
- Gate trigger tracking device
- Fails short circuit when surged in excess of ratings
- Integrated diode for positive voltage surges
- 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

Additional Information



Datasheet



Resources



Samples

- V_{REF} Max Value for the negative Battrax is -200 V.
 - XX = Part Number Suffix: 'TP' (Tube Pack) or 'RP' (Reel Pack).

* Off-state capacitance (C_o) is measured across pins 1 & 5, 3 & 5, 4 & 5, and 6 & 5 at 1 MHz with a 2V bias.

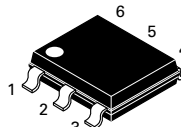
Surge Ratings

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

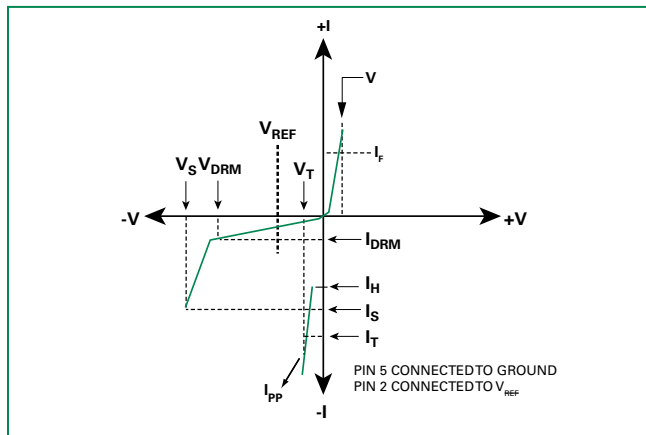
Notes:

- 1 Current waveform in μ s
- 2 Voltage waveform in μ s
- 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°C to +85°C (I_{PP} rating assumes V_{REF} equals -48 V)
- The component must initially be in thermal equilibrium with -40°C $\leq T_J \leq$ +150°C

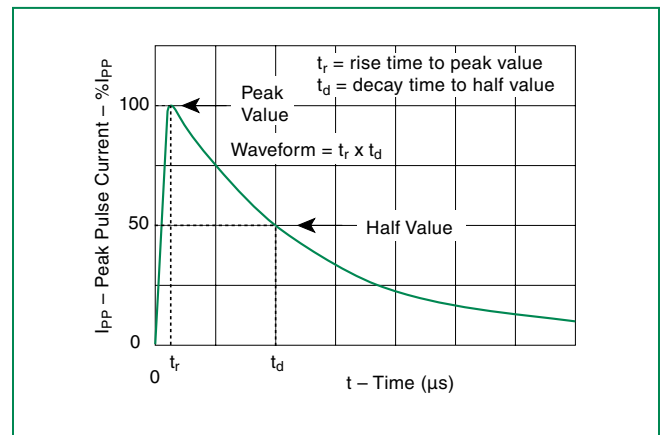
Thermal Considerations

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

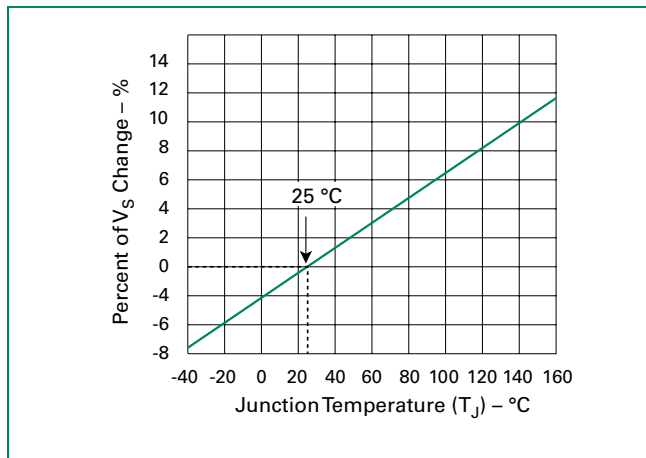
V-I Characteristics



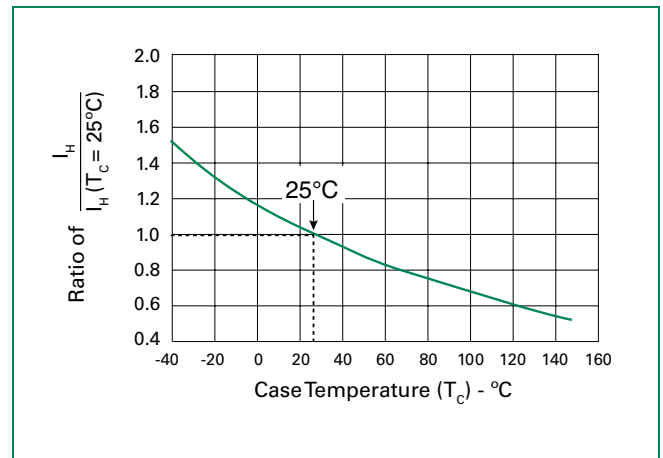
$t_r \times t_d$ Pulse Waveform



Normalized V_S Change vs. Junction Temperature

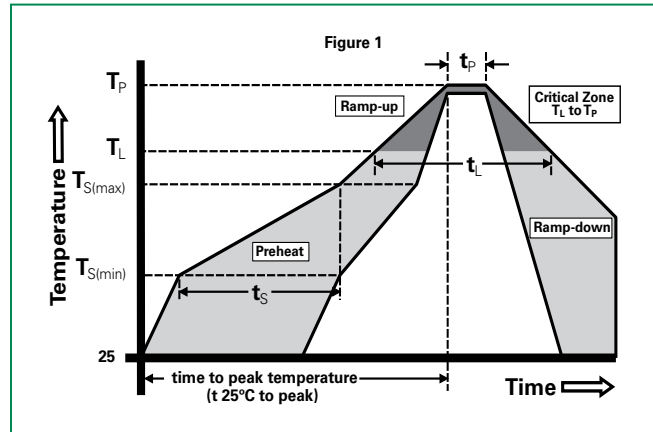


Normalized DC Holding Current vs. Case Temperature



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 |



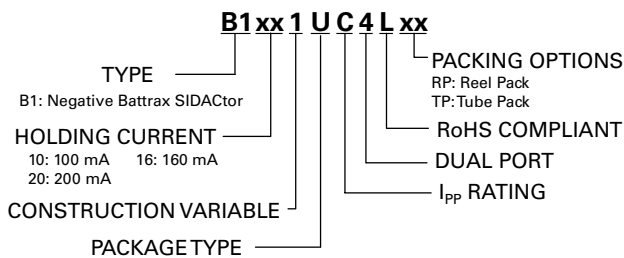
Physical Specifications

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

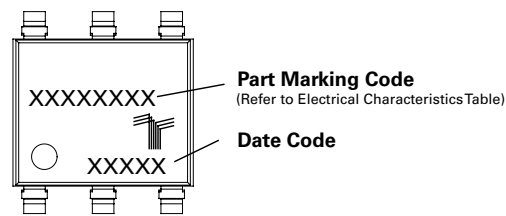
Environmental Specifications

| | |
|---|---|
| High Temp Voltage Blocking | 80% Rated V_{DRM} (V_{DC} 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 |

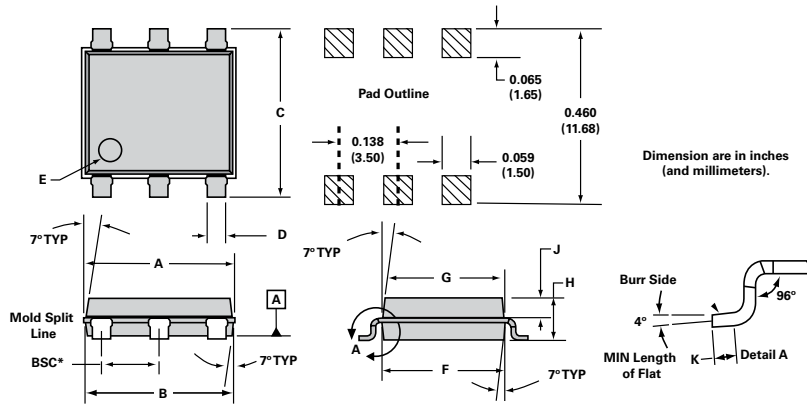
Part Numbering



Part Marking



Dimensions – MS-013



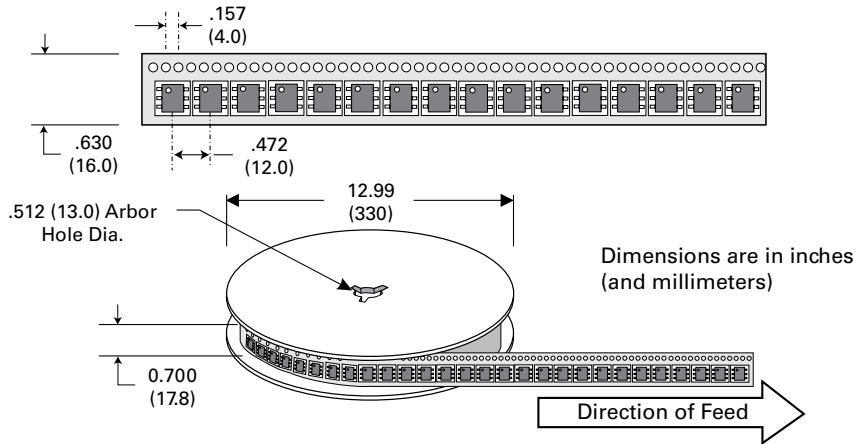
| Dimensions | Inches | | Millimeters | |
|-------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.360 | 0.364 | 9.14 | 9.25 |
| B | 0.352 | 0.356 | 8.94 | 9.04 |
| C | 0.400 | 0.412 | 10.16 | 10.46 |
| D | 0.043 | 0.045 | 1.09 | 1.13 |
| E | 0.047 | 0.055 | 1.19 | 1.40 |
| 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 | — |
| BSC* | 0.133 | 0.143 | 3.38 | 3.63 |

* BSC = Basic Spacing between Centers

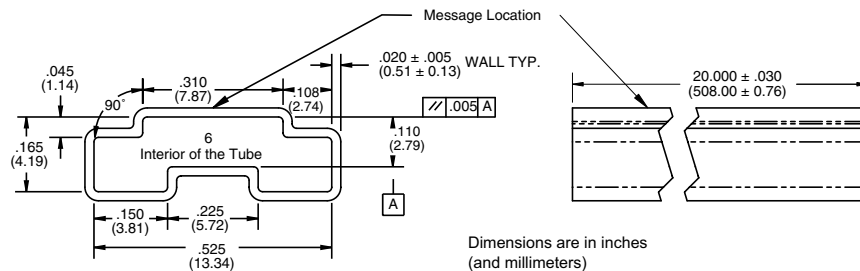
Packing Options

| 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 (50 per tube) | TP | N/A |

Tape and Reel Specification – MS-013



Tube Pack Specification – MS-013



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