

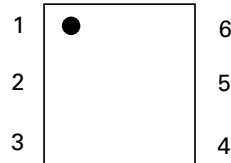
**RoHS Battrax® Single Port Positive/Negative - MS-013**



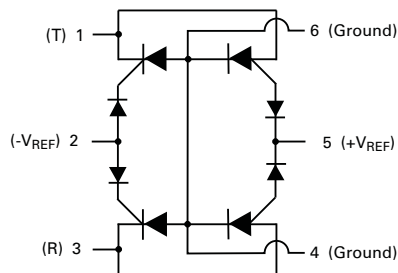
**Agency Approvals**

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

**Pinout Designation**



**Schematic Symbol**



**Electrical Characteristics**

| Part Number | Marking | $V_{DRM}$<br>@ $I_{DRM}=5\mu A$  | $V_S$<br>@ $100V/\mu s$         | $I_H$  | $I_S$  | $I_T$ | $V_T$<br>@ $I_T=2.2$ Amps | Capacitance* |        |
|-------------|---------|----------------------------------|---------------------------------|--------|--------|-------|---------------------------|--------------|--------|
|             |         | V min                            | V max                           | mA min | mA max | A max | V max                     | pF min       | pF max |
| B3104UCLxx  | B3104UC | $  \pm V_{REF}   +   \pm 1.2V  $ | $  \pm V_{REF}   +   \pm 10V  $ | 100    | 100    | 2.2   | 4                         | 30           | 200    |
| B3164UCLxx  | B3164UC | $  \pm V_{REF}   +   \pm 1.2V  $ | $  \pm V_{REF}   +   \pm 10V  $ | 160    | 100    | 2.2   | 4                         | 30           | 200    |
| B3204UCLxx  | B3204UC | $  \pm V_{REF}   +   \pm 1.2V  $ | $  \pm V_{REF}   +   \pm 10V  $ | 200    | 100    | 2.2   | 4                         | 30           | 200    |

**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 (pin 1) to Ground (pin 4 & 6) and Ring (pin 3) to Ground (pin 4 & 6)

- $V_{REF}$  Max Value for the negative Battrax is -200 V.
- $V_{REF}$  Max Value for the positive Battrax is +110 V.
- **XX** = Part Number Suffix: 'TP' (Tube Pack) or 'RP' (Reel Pack).

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

**Description**

The Single Port Positive/Negative Battrax Series are programmable SIDACtor® devices designed to protect SLICs (Subscriber Line Interface Circuit) from damaging overvoltage transients.

This series is designed specifically to protect SLIC devices utilizing positive and negative ringing signals. This one device will protect a single port.

**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
- Positive and negative ringing compatible
- Single-port protect
- Gate trigger tracking device

**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

## Surge Ratings

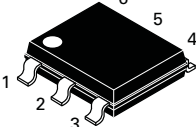
| Series | $I_{PP}$                                     |                                        |                                          |                                            |                                            |                                          |                                            |                                              |                                           | $I_{TSM}$<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                                     |                       |       |
| C      | 50                                           | 500                                    | 400                                      | 200                                        | 150                                        | 200                                      | 175                                        | 100                                          | 200                                       | 50                    | 500   |

Notes:

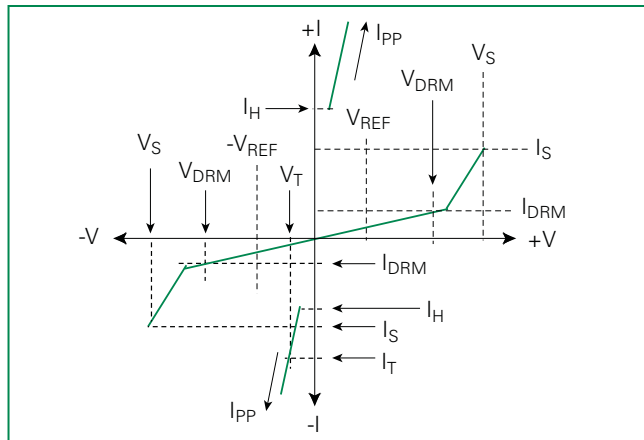
1 Current waveform in  $\mu$ s  
2 Voltage waveform in  $\mu$ s

- 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°C to +85°C ( $I_{PP}$  rating assumes  $V_{REF}$  equals +/- 48 V)  
- The device must initially be in thermal equilibrium with -40°C  $\leq T_J \leq$  +150°C

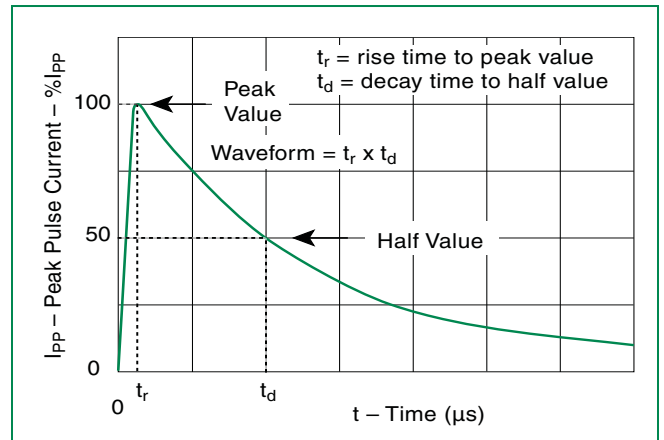
## Thermal Considerations

| Package                                                                                              | Symbol          | Parameter                               | Value       | Unit |
|------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------|-------------|------|
| Modified MS-013<br> | $T_J$           | 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 |

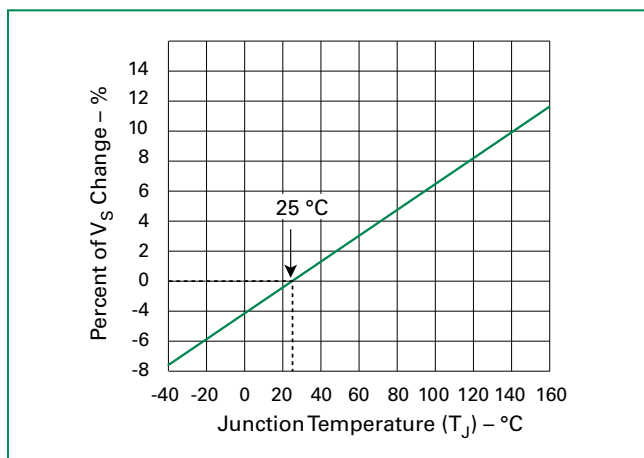
## V-I Characteristics



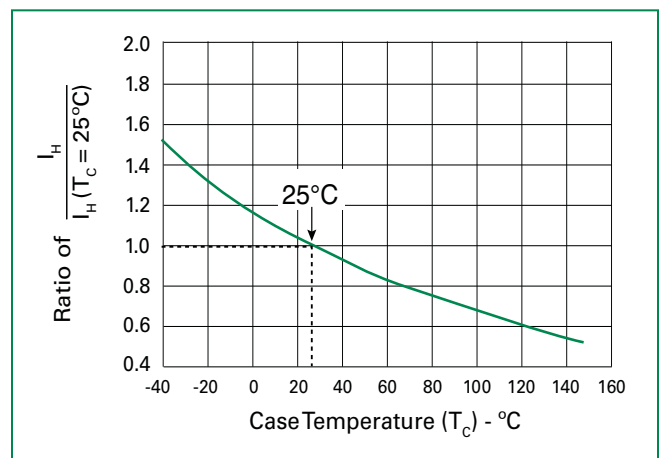
## $t_r \times t_d$ Pulse Waveform



## Normalized $V_S$ Change vs. Junction Temperature

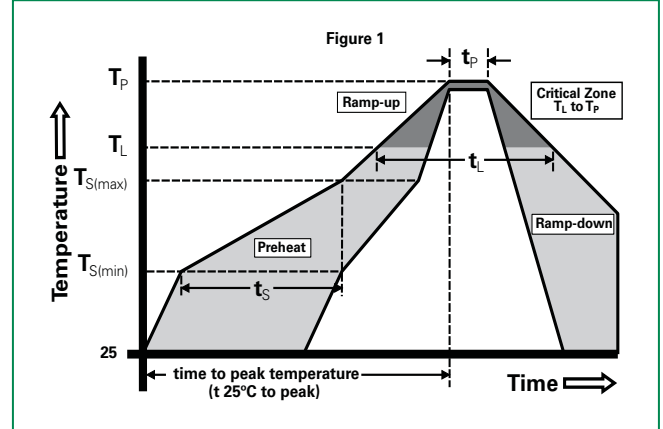


## Normalized DC Holding Current vs. Case Temperature



## 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                        |



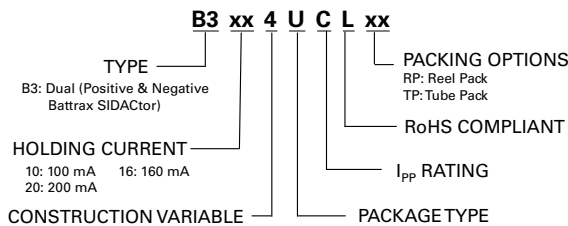
## Physical Specifications

|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| <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 |

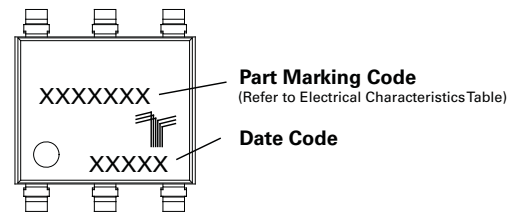
## Environmental Specifications

|                                         |                                                                                                                       |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>High Temp Voltage Blocking</b>       | 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 |
| <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                                       |

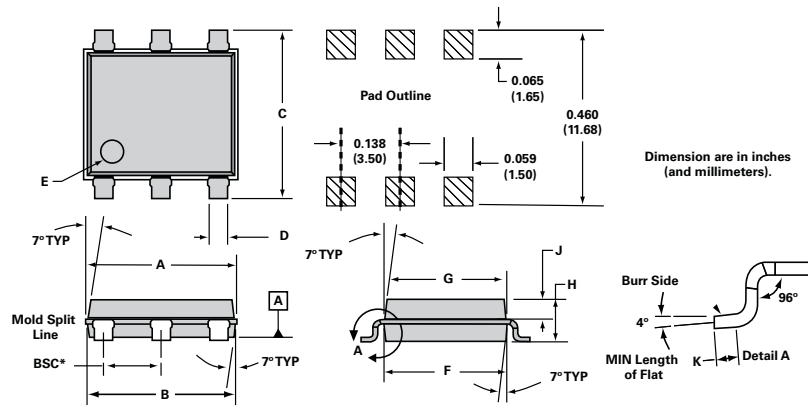
## Part Numbering



## Part Marking



## Dimensions — MS-013



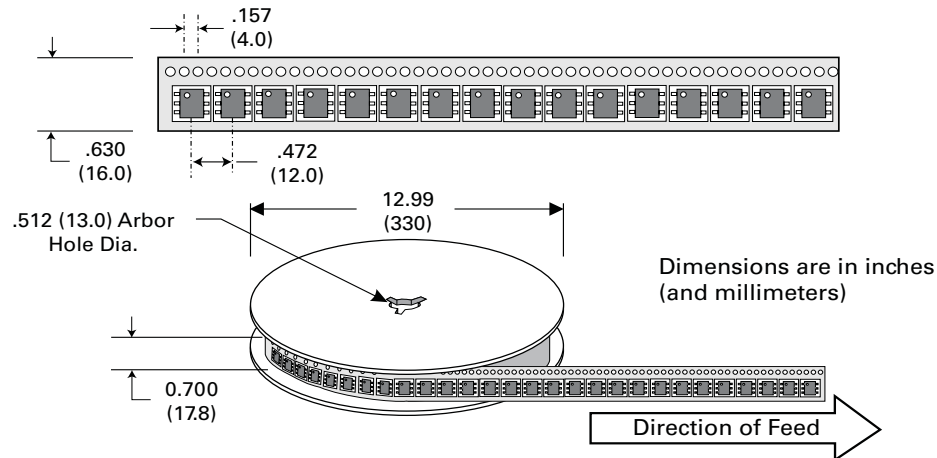
| Dimensions  | Inches |       | Millimeters |       |
|-------------|--------|-------|-------------|-------|
|             | Min    | Max   | Min         | Max   |
| <b>A</b>    | 0.360  | 0.364 | 9.14        | 9.25  |
| <b>B</b>    | 0.352  | 0.356 | 8.94        | 9.04  |
| <b>C</b>    | 0.400  | 0.412 | 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

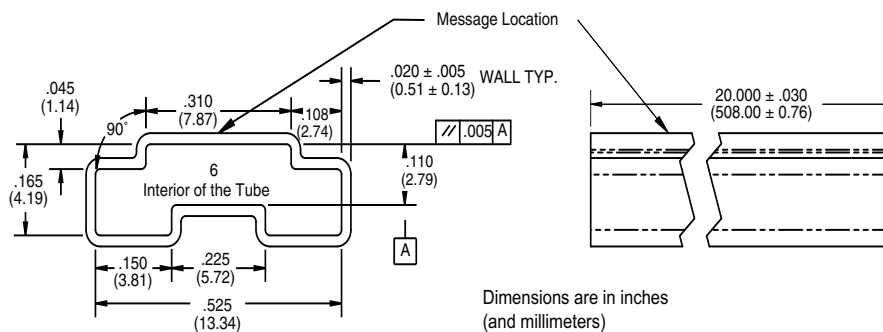
## Packing Options

| 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





Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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