

**Battrax® Series Positive/Negative - Modified DO-214**



**Description**

The Battrax® series offers programmable SIDACtor® overvoltage protection devices for SLIC applications. This series is offered in a negative Battrax version and a positive Battrax version. The B1xx0C\_ is for a  $-V_{REF}$  supply and the B2050C\_ is for a  $+V_{REF}$  supply. Designed using an SCR and a gate diode, the B1xx0C\_ Battrax begins to conduct at  $|-V_{REF}| + |-1.2 V|$  while the B2050C\_ Battrax begins to conduct at  $|+V_{REF}| + |1.2 V|$ .

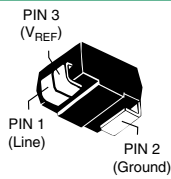
**Features and Benefits**

- 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
- Robust surge current ratings
- Gate triggered tracking devices
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)

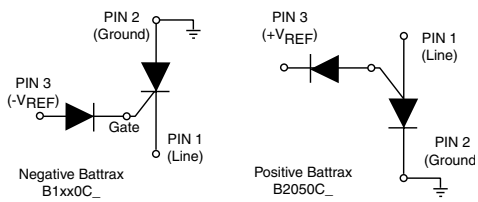
**Agency Approvals**

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

**Pinout Designation**



**Schematic Symbol**



**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 | Marking | $V_{DRM}$            | $V_S$               | $I_H$  | $I_S$  | $I_T$ | $V_T$             | Capacitance* |     |
|-------------|---------|----------------------|---------------------|--------|--------|-------|-------------------|--------------|-----|
|             |         | @ $I_{DRM}=5\mu A$   | @ $100V/\mu s$      |        |        |       | @ $I_T=2.2 A$ mps | pF           |     |
|             |         | V min                | V max               | mA min | mA max | A max | V max             | Min          | Max |
| B1100CALRP  | B10A    | $-V_{REF} +  -1.2V $ | $-V_{REF} +  -10V $ | 100    | 100    | 2.2   | 4                 | 30           | 200 |
| B1160CALRP  | B16A    | $-V_{REF} +  -1.2V $ | $-V_{REF} +  -10V $ | 160    | 100    | 2.2   | 4                 | 30           | 200 |
| B1200CALRP  | B12A    | $-V_{REF} +  -1.2V $ | $-V_{REF} +  -10V $ | 200    | 100    | 2.2   | 4                 | 30           | 200 |
| B2050CALRP  | B25A    | $+V_{REF} +  1.2V $  | $+V_{REF} +  10V $  | 5      | 50     | 2.2   | 4                 | 20           | 200 |
| B1100CCLRP  | B10C    | $-V_{REF} +  -1.2V $ | $-V_{REF} +  -10V $ | 100    | 100    | 2.2   | 4                 | 30           | 200 |
| B1160CCLRP  | B16C    | $-V_{REF} +  -1.2V $ | $-V_{REF} +  -10V $ | 160    | 100    | 2.2   | 4                 | 30           | 200 |
| B1200CCLRP  | B12C    | $-V_{REF} +  -1.2V $ | $-V_{REF} +  -10V $ | 200    | 100    | 2.2   | 4                 | 30           | 200 |
| B2050CCLRP  | B25C    | $+V_{REF} +  1.2V $  | $+V_{REF} +  10V $  | 5      | 50     | 2.2   | 4                 | 20           | 200 |

Notes:  
 - Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).  
 - Devices are uni-directional  
 - All electrical characteristics shown are defined from Tip (pin 1) to Ground (pin 2), and Ring (pin 1) to Ground (pin 2)

$-V_{REF}$  Max Value for the negative Battrax is -200 V.  
 $-V_{REF}$  Max Value for the positive Battrax is 110 V.  
 \* Off-state capacitance ( $C_o$ ) is measured across pins 1 & 2 at 1 MHz with a 2V bias.

**Surge Ratings**

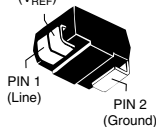
| Series | $I_{PP}$                                     |  |  |  |  |  |  |  |   |       | $I_{TSM}$<br>50/60 Hz | di/dt |          |
|--------|--|--|--|--|--|--|--|--|---|-------|-----------------------|-------|----------|
|        | 0.2x310 <sup>1</sup><br>0.5x700 <sup>2</sup> | 2x10 <sup>1</sup><br>2x10 <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 min |                       |       | A/μs max |
| A      | 20   | 150                                    | 150                                      | 90   | 50   | 75                                       | 75   | 45   | 75  | 20    | 500                   |       |          |
| C      | 50   | 500                                    | 400                                      | 200  | 150  | 200                                      | 175  | 100  | 200                                       | 50    | 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°C to +85°C ( $I_{PP}$  rating assumes  $V_{REF}$  equals +/- 48V)
- The device must initially be in thermal equilibrium with -40°C ≤  $T_J$  ≤ +150°C

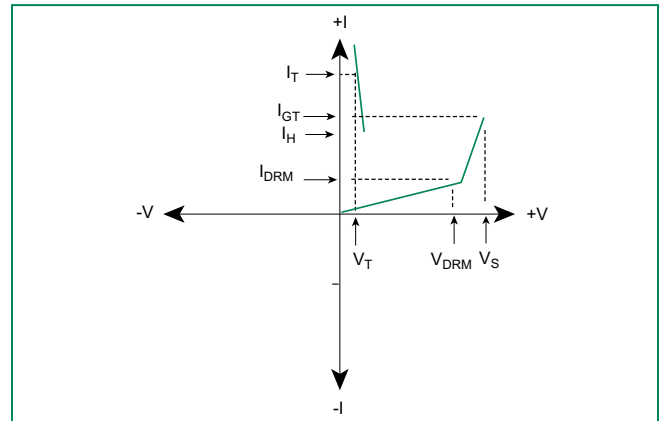
**Thermal Considerations**

| Package   | Symbol    | Parameter                               | Value       | Unit |
|---|-----------|---|-------------|------|
| Modified DO-214AA<br>PIN 3 (V <sub>REF</sub> )<br><br>PIN 1 (Line)<br>PIN 2 (Ground) | $T_J$     | Operating Junction Temperature Range    | -40 to +150 | °C   |
|   | $T_S$     | Storage Temperature Range               | -65 to +150 | °C   |
|   | $R_{θJA}$ | Thermal Resistance: Junction to Ambient | 85          | °C/W |

**V-I Characteristics - Negative BattraX**



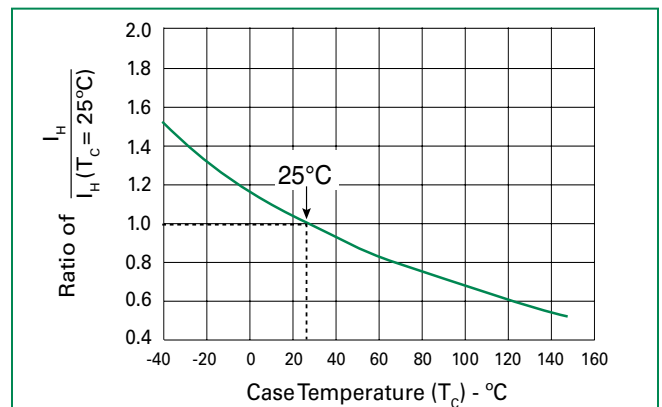
**V-I Characteristics - Positive BattraX**



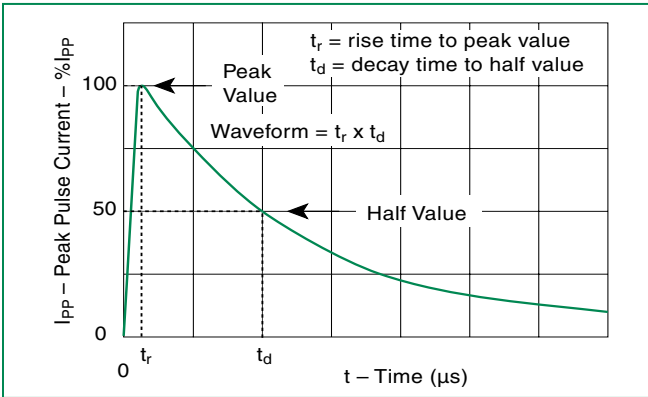
**Normalized  $V_S$  Change vs. Junction Temperature**



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



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



**Physical Specifications**

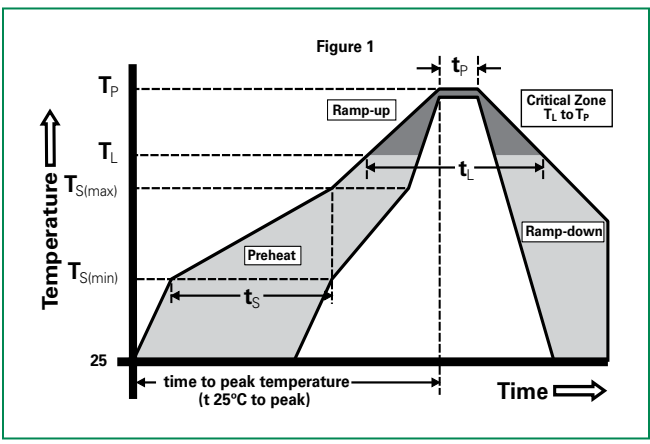
|                        |   |
|------------------------|---|
| <b>Lead Material</b>   | Copper Alloy  |
| <b>Terminal Finish</b> | 100% Matte-Tin Plated   |
| <b>Body Material</b>   | UL recognized epoxy meeting flammability classification 94V-0 |

**Environmental Specifications**

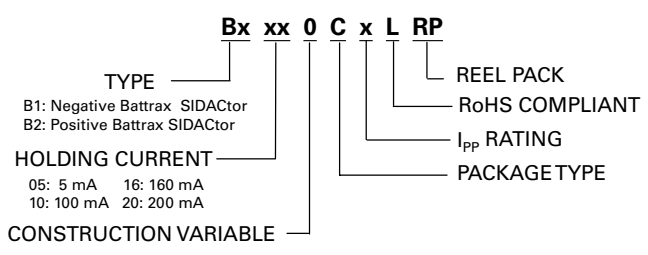
|   |  |
|---|--|
| <b>High Temp Voltage Blocking</b>       | 80% Rated $V_{REF}$ Max. ( $V_{DC}$ Peak) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101 |
| <b>Temp Cycling</b>                     | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 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  |

**Soldering Parameters**

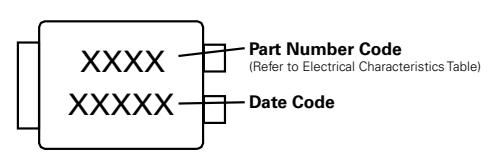
|  |                                   |              |
|--|-----------------------------------|--------------|
| <b>Reflow Condition</b>  | Pb-Free assembly (see Fig. 1)     |              |
| <b>Pre Heat</b>  | -Temperature Min ( $T_{s(min)}$ ) | +150°C       |
|  | -Temperature Max ( $T_{s(max)}$ ) | +200°C       |
|  | -Time (Min to Max) ( $t_s$ )      | 60-180 secs. |
| <b>Average ramp up rate (Liquidus Temp (<math>T_L</math>) to peak)</b> | 3°C/sec. Max.                     |              |
| <b><math>T_{s(max)}</math> to <math>T_L</math> - Ramp-up Rate</b>      | 3°C/sec. Max.                     |              |
| <b>Reflow</b>  | -Temperature ( $T_L$ ) (Liquidus) | +217°C       |
|  | -Temperature ( $t_L$ )            | 60-150 secs. |
| <b>Peak Temp (<math>T_p</math>)</b>                                    | +260(+0/-5)°C                     |              |
| <b>Time within 5°C of actual Peak Temp (<math>t_p</math>)</b>          | 30 secs. Max.                     |              |
| <b>Ramp-down Rate</b>  | 6°C/sec. Max.                     |              |
| <b>Time 25°C to Peak Temp (<math>T_p</math>)</b>                       | 8 min. Max.                       |              |
| <b>Do not exceed</b>   | +260°C                            |              |



**Part Numbering**



**Part Marking**



**Dimensions — Modified DO-214AA**



| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| <b>A</b>   | 0.130  | 0.156 | 3.30        | 3.95 |
| <b>B</b>   | 0.201  | 0.220 | 5.10        | 5.60 |
| <b>C</b>   | 0.077  | 0.087 | 1.95        | 2.20 |
| <b>D</b>   | 0.159  | 0.181 | 4.05        | 4.60 |
| <b>E</b>   | 0.030  | 0.063 | 0.75        | 1.60 |
| <b>F</b>   | 0.075  | 0.096 | 1.90        | 2.45 |
| <b>G</b>   | 0.002  | 0.008 | 0.05        | 0.20 |
| <b>H</b>   | 0.077  | 0.104 | 1.95        | 2.65 |
| <b>K</b>   | 0.006  | 0.016 | 0.15        | 0.41 |
| <b>M</b>   | 0.022  | 0.028 | 0.56        | 0.71 |
| <b>N</b>   | 0.027  | 0.033 | 0.69        | 0.84 |
| <b>P</b>   | 0.052  | 0.058 | 1.32        | 1.47 |

**Packing Options**

| Package Type | Description                                   | Quantity | Added Suffix | Industry Standard |
|--------------|---|----------|--------------|-------------------|
| C            | Modified DO-214AA 3-leaded Tape and Reel Pack | 2500     | RP           | EIA-481-D         |

**Tape and Reel Specification — Modified DO-214AA**



**Additional Information**



**Datasheet**



**Resources**



**Samples**



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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