

## Low IH Series- Pxxx0SxLHL



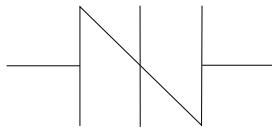
### Agency Approvals

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

### Pinout Designation

Not Applicable

### Schematic Symbol



### Description

The low IH series is designed to protect baseband equipment such as modems, line cards, CPE and DSL from damaging overvoltage transients.

The series provides a surface mount solution that enables equipment to comply with global regulatory standards.

### Features and Benefits

- Low voltage overshoot
- Low on-state voltage
- Does not degrade in surge capability after multiple surge events within limit.
- Halogen free and RoHS compliant
- Fails short circuit when surged in excess of ratings
- Low capacitance
- UL Recognized to UL 497B as an Isolated Loop Circuit Protector

### 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 2nd Edition
- YD/T 1082
- YD/T 993
- YD/T 950

### 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<br>@ 1MHz, 2V bias |        |
|--------------|---------|-----------------------------------|--------------------------|--------|--------|-------|-----------------------------|--------------------------------|--------|
|              |         | V min                             | V max                    | mA min | mA max | A max | V max                       | pF min                         | pF max |
| P4500SBLHLRP | P45BL   | 400                               | 570                      | 20*    | 800    | 2.2   | 4                           | 10                             | 50     |
| P4500SCLHLRP | P45L    | 400                               | 530                      | 50     | 800    | 2.2   | 4                           | 20                             | 50     |
| P3100SDLHLRP | P31DL   | 275                               | 380                      | 10     | 800    | 2.2   | 4                           | 30                             | 65     |
| P4500SDLHLRP | P45DL   | 400                               | 570                      | 10     | 800    | 2.2   | 4                           | 25                             | 65     |

**Notes:**

- Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).
- Components are bi-directional.
- \*P4500SBLHLRP  $I_H$  max is 50mA

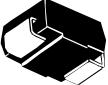
### Surge Ratings

| Series | $I_{PP}$                                     |  |  |  |  |  |  |   | $I_{TSM}$<br>50/60 Hz | di/dt          |
|--------|--|--|--|--|--|--|--|---|-----------------------|----------------|
|        | 0.2/310 <sup>1</sup><br>0.5/700 <sup>2</sup> | 2/10 <sup>1</sup><br>2/10 <sup>2</sup> | 8/20 <sup>1</sup><br>1.2/50 <sup>2</sup> | 10/160 <sup>1</sup><br>10/160 <sup>2</sup> | 5/320 <sup>1</sup><br>9/720 <sup>2</sup> | 10/360 <sup>1</sup><br>10/360 <sup>2</sup> | 10/1000 <sup>1</sup><br>10/1000 <sup>2</sup> | 5/310 <sup>1</sup><br>10/700 <sup>2</sup> |                       |                |
|        | A min  | A min                                  | A min                                    | A min                                      | A min                                    | A min                                      | A min  | A min                                     | A min                 | A/ $\mu s$ max |
| B      | 25   | 250                                    | 250                                      | 150  | 100                                      | 125  | 65   | 100                                       | 25                    | 500            |
| C      | 50   | 500                                    | 400                                      | 200  | 200                                      | 175  | 100  | 150                                       | 35                    | 500            |
| D      | -  | 600                                    | 550                                      | -  | -  | -  | 130  | 250                                       | 50                    | 500            |

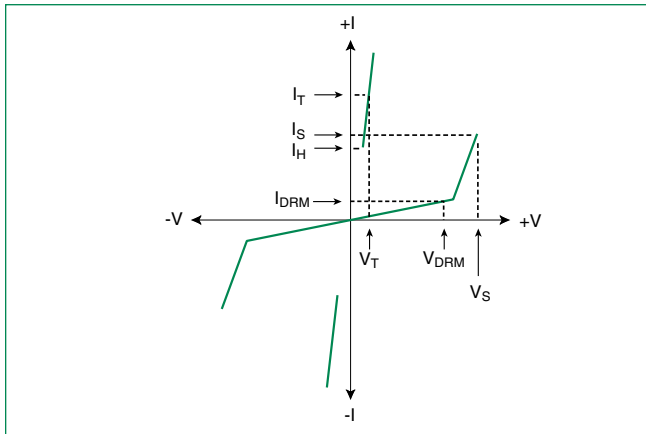
**Notes:**

- 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  $-40^\circ C$  to  $+85^\circ C$
- The component must initially be in thermal equilibrium with  $-40^\circ C \leq T_J \leq +150^\circ C$

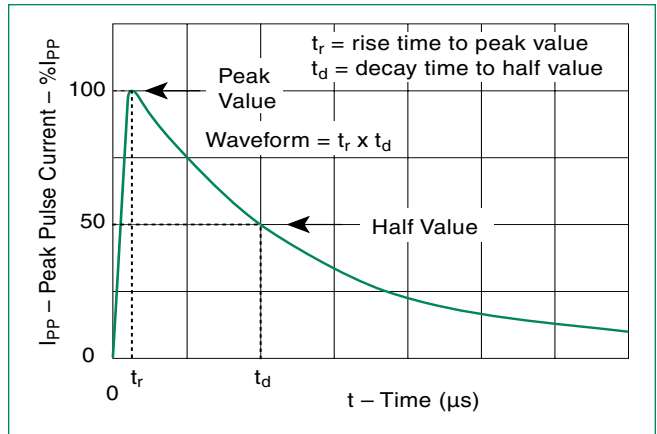
**Thermal Considerations**

| Package   | Symbol          | Parameter                               | Value       | Unit |
|---|-----------------|---|-------------|------|
|  | $T_J$           | 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 | 90          | °C/W |

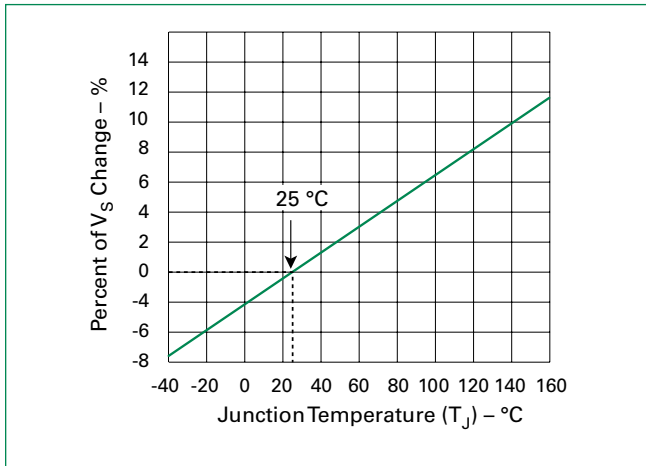
**V-I Characteristics**



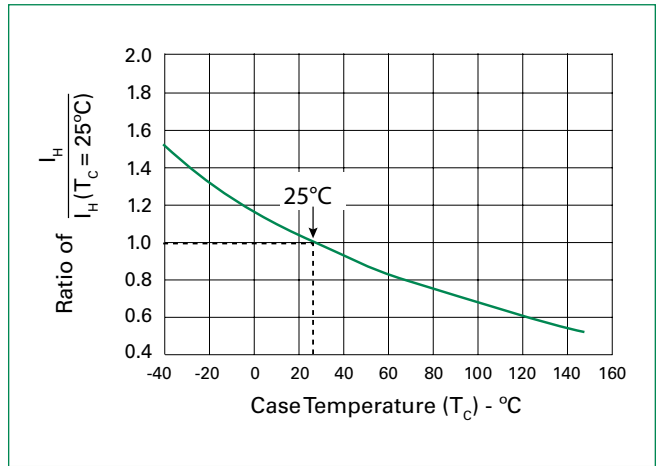
**$t_r \times t_d$  Pulse Waveform**



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

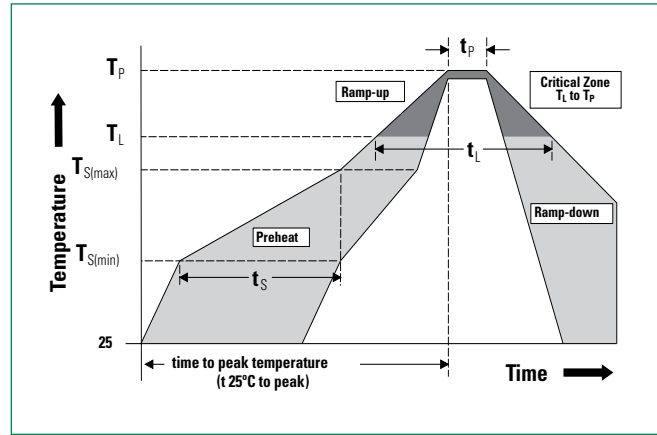


**Normalized DC Holding Current vs. Case Temperature**



**Figure 1. Soldering Parameters**

|  |                                    |                  |
|--|------------------------------------|------------------|
| <b>Reflow Condition</b>  |                                    | Pb-Free assembly |
| <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           |



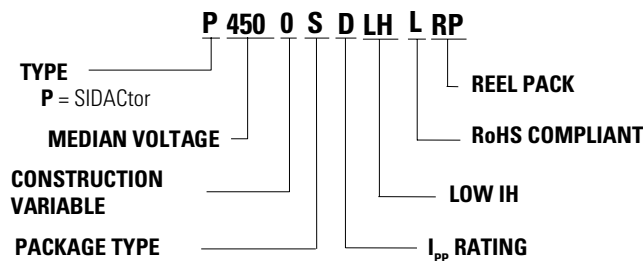
**Physical Specifications**

|                        |  |
|------------------------|--|
| <b>Lead Material</b>   | Copper Alloy   |
| <b>Terminal Finish</b> | 100% Matte-Tin Plated                                  |
| <b>Body Material</b>   | UL Recognized compound meeting flammability rating V-0 |

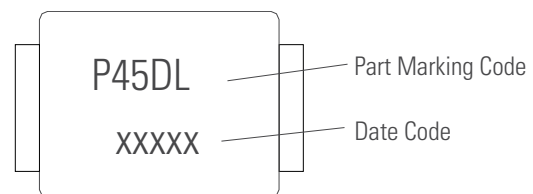
**Environmental Specifications**

|   |   |
|---|---|
| <b>High Temp V oltage Blocking</b>      | 80% Rated $V_{DRM}$ ( $V_{AC}$ Peak) +125°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101 |
| <b>Temp Cycling</b>                     | -55°C to +150°C, 15 min. dwell, 1000 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104               |
| <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>Autoclave (Pressure Cooker Test)</b> | +121°C, 100%RH, 2atm, 96 hrs. EIA/JEDEC, JESD22-A-102   |
| <b>Resistance to Solder Heat</b>        | +260°C, 10 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                             |

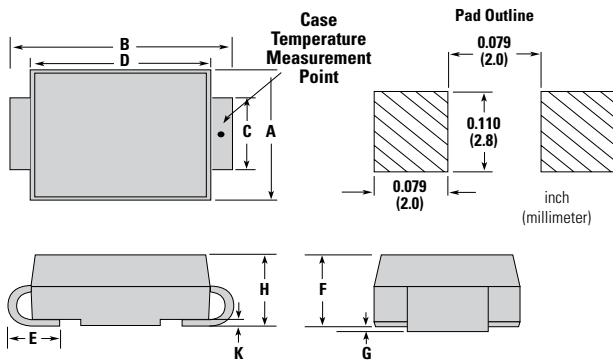
**Part Numbering**



**Part Marking**



**Dimensions — DO-214AA**



| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 0.130  | 0.156 | 3.30        | 3.95 |
| B          | 0.201  | 0.220 | 5.10        | 5.60 |
| C          | 0.077  | 0.087 | 1.95        | 2.20 |
| D          | 0.159  | 0.181 | 4.05        | 4.60 |
| E          | 0.030  | 0.063 | 0.75        | 1.60 |
| F          | 0.075  | 0.087 | 1.90        | 2.20 |
| G          | 0.002  | 0.008 | 0.05        | 0.20 |
| H          | 0.077  | 0.094 | 1.95        | 2.40 |
| K          | 0.006  | 0.016 | 0.15        | 0.41 |

**Packing Options**

| Package Type | Description                  | Quantity | Added Suffix | Industry Standard |
|--------------|------------------------------|----------|--------------|-------------------|
| S            | DO-214AA<br>Tape & Reel Pack | 2500     | RP           | EIA-481-D         |

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

