

## Pxxx2SxL Series



### Agency Approvals

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

### Pinout Designation

NOT APPLICABLE

### Schematic Symbol



### Description

Pxxx2SxL Series in DO-214 are very low capacitance SIDACtor® components designed to protect broadband equipment such as VoIP, DSL modems and DSLAMs from damaging overvoltage transients. This series provides a surface mount solution that enables equipment to comply with 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.
- Low distortion
- Fails short circuit when surged in excess of ratings
- 40% lower than comparable product
- RoHS Compliant and Halogen-Free
- Pb-free E3 means 2nd level interconnect is Pb-free and the terminal finish material is tin(Sn) (IPC/JEDEC J-STD-609A.01)
- Recognized to UL 497B as an Isolated Loop Circuit Protector

### Applicable Global Standards

- TIA/968-A/B
- TU K.20/21/45
- EC 61000-4-5 2<sup>nd</sup> edition
- GR 1089 Intra-building
- YD/T 1082
- YD/T 993
- YD/T 950ITU K.20/21/45
- Enhanced\*
- GR 1089 Inter-building\*

\* Additional series resistance may be required to comply

### 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 | @ 1MHz, 2V bias |        |
|-------------|---------|---------------------------------|-------------------------|--------|--------|-------|---------------------------|-----------------|--------|
|             |         | V min                           | V max                   | mA min | mA max | A max | V max                     | pF min          | pF max |
| P0642SALRP  | P062A   | 58                              | 77                      | 120    | 800    | 2.2   | 8                         | 25              | 45     |
| P0722SALRP  | P072A   | 65                              | 88                      | 120    | 800    | 2.2   | 8                         | 20              | 45     |
| P0902SALRP  | P092A   | 75                              | 98                      | 120    | 800    | 2.2   | 8                         | 20              | 40     |
| P1102SALRP  | P112A   | 90                              | 130                     | 120    | 800    | 2.2   | 8                         | 15              | 35     |
| P1302SALRP  | P132A   | 120                             | 160                     | 120    | 800    | 2.2   | 8                         | 15              | 35     |
| P1502SALRP  | P152A   | 140                             | 180                     | 120    | 800    | 2.2   | 8                         | 15              | 30     |
| P1802SALRP  | P182A   | 170                             | 220                     | 120    | 800    | 2.2   | 8                         | 10              | 30     |
| P2302SALRP  | P232A   | 190                             | 260                     | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P2602SALRP  | P262A   | 220                             | 300                     | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P3002SALRP  | P302A   | 280                             | 360                     | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P3502SALRP  | P352A   | 320                             | 400                     | 120    | 800    | 2.2   | 8                         | 10              | 20     |
| P4202SALRP  | P422A   | 380                             | 500                     | 120    | 800    | 2.2   | 8                         | 10              | 20     |
| P4802SALRP  | P482A   | 440                             | 600                     | 120    | 800    | 2.2   | 8                         | 5               | 20     |
| P6002SALRP  | P602A   | 550                             | 700                     | 120    | 800    | 2.2   | 8                         | 5               | 20     |

Table continues on next page.

### Electrical Characteristics (continued)

| 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 | @ 1MHz, 2V bias |        |
|-------------|---------|---------------------------------|--------------------------|--------|--------|-------|---------------------------|-----------------|--------|
|             |         | V min                           | V max                    | mA min | mA max | A max | V max                     | pF min          | pF max |
| P0642SBLRP  | P062B   | 58                              | 77                       | 120    | 800    | 2.2   | 8                         | 25              | 45     |
| P0722SBLRP  | P072B   | 65                              | 88                       | 120    | 800    | 2.2   | 8                         | 20              | 45     |
| P0902SBLRP  | P092B   | 75                              | 98                       | 120    | 800    | 2.2   | 8                         | 20              | 40     |
| P1102SBLRP  | P112B   | 90                              | 130                      | 120    | 800    | 2.2   | 8                         | 15              | 35     |
| P1302SBLRP  | P132B   | 120                             | 160                      | 120    | 800    | 2.2   | 8                         | 15              | 35     |
| P1502SBLRP  | P152B   | 140                             | 180                      | 120    | 800    | 2.2   | 8                         | 15              | 30     |
| P1802SBLRP  | P182B   | 170                             | 220                      | 120    | 800    | 2.2   | 8                         | 10              | 30     |
| P2302SBLRP  | P232B   | 190                             | 260                      | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P2602SBLRP  | P262B   | 220                             | 300                      | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P3002SBLRP  | P302B   | 280                             | 360                      | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P3502SBLRP  | P352B   | 320                             | 400                      | 120    | 800    | 2.2   | 8                         | 10              | 20     |
| P4202SBLRP  | P422B   | 380                             | 500                      | 120    | 800    | 2.2   | 8                         | 10              | 20     |
| P4802SBLRP  | P482B   | 440                             | 600                      | 120    | 800    | 2.2   | 8                         | 5               | 20     |
| P6002SBLRP  | P602B   | 550                             | 700                      | 120    | 800    | 2.2   | 8                         | 5               | 20     |
| P8002SBLRP  | P802B   | 735                             | 960                      | 120    | 1400   | 2.2   | 8                         | 10              | 30     |
| P9002SBLRP  | P902B   | 800                             | 960                      | 120    | 1400   | 2.2   | 8                         | 10              | 25     |
| P3002SCLRP  | P302C   | 280                             | 360                      | 120    | 800    | 2.2   | 8                         | 20              | 35     |
| P3502SCLRP  | P352C   | 320                             | 400                      | 120    | 800    | 2.2   | 8                         | 20              | 30     |
| P4202SCLRP  | P422C   | 380                             | 500                      | 120    | 800    | 2.2   | 8                         | 15              | 30     |
| P4802SCLRP  | P482C   | 440                             | 600                      | 120    | 800    | 2.2   | 8                         | 15              | 30     |
| P6002SCLRP  | P602C   | 550                             | 700                      | 120    | 800    | 2.2   | 8                         | 10              | 25     |
| P7002SCLRP  | P702C   | 640                             | 850                      | 120    | 800    | 2.2   | 8                         | 10              | 30     |

#### Notes:

- Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).
- Components are bi-directional (unless otherwise noted).

### Surge Ratings

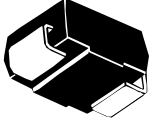
| Series | $I_{PP}$                                     |                                        |                                          |                                            |                                            |                                          |                                            |                                              |                                           | $I_{TSM}$<br>50/60 Hz | di/dt<br>A/ $\mu s$ |
|--------|----------------------------------------------|----------------------------------------|------------------------------------------|--------------------------------------------|--------------------------------------------|------------------------------------------|--------------------------------------------|----------------------------------------------|-------------------------------------------|-----------------------|---------------------|
|        | 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> | 10/560 <sup>1</sup><br>10/560 <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      | 20                                           | 150                                    | 150                                      | 90                                         | 50                                         | 75                                       | 75                                         | 45                                           | 75                                        | 20                    | 500                 |
| B      | 25                                           | 250                                    | 250                                      | 150                                        | 100                                        | 100                                      | 125                                        | 80                                           | 100                                       | 25                    | 500                 |
| C      | 50                                           | 500                                    | 400                                      | 200                                        | 150                                        | 200                                      | 175                                        | 100                                          | 200                                       | 30                    | 500                 |

#### Notes:

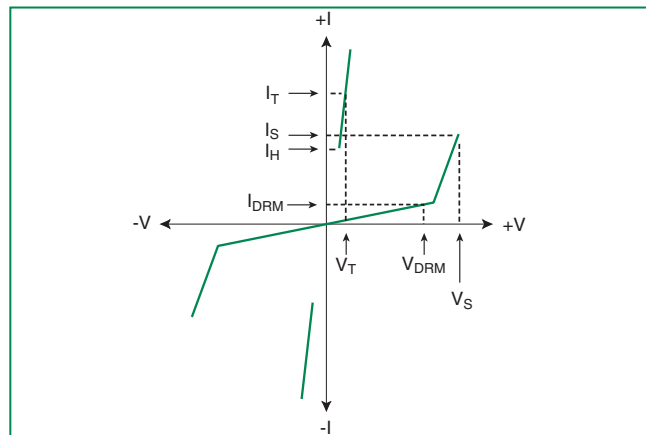
- 1 Current waveform in  $\mu s$   
 2 Voltage waveform in  $\mu s$

- 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  $-40^\circ C \leq T_J \leq +150^\circ C$

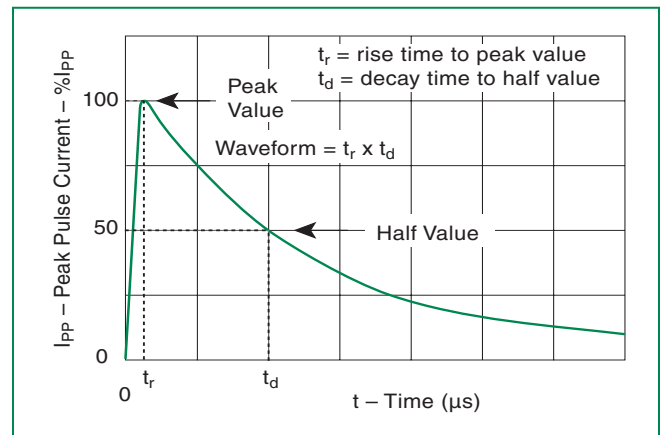
## Thermal Considerations

| Package                                                                                       | Symbol          | Parameter                               | Value       | Unit |
|-----------------------------------------------------------------------------------------------|-----------------|-----------------------------------------|-------------|------|
| DO-214AA<br> | $T_J$           | 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 |

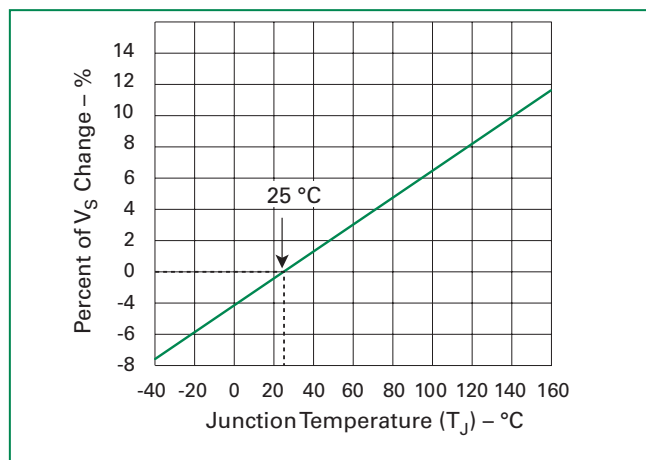
## V-I Characteristics



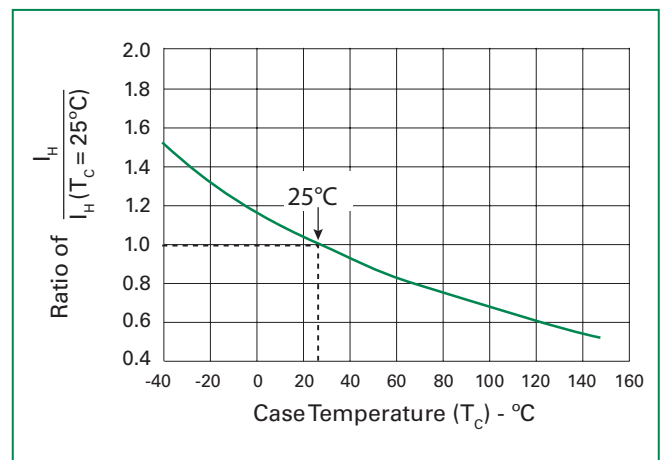
## $t_r \times t_d$ Pulse Waveform



## Normalized $V_S$ Change vs. Junction Temperature

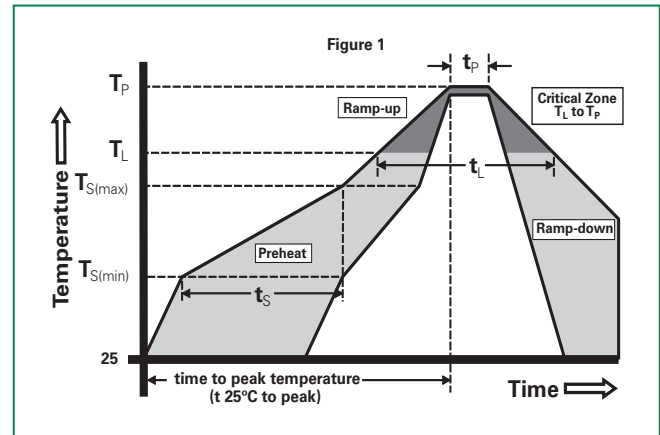


## Normalized DC Holding Current vs. Case Temperature



## Soldering Parameters

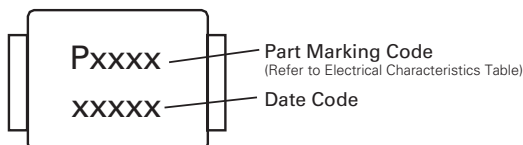
|                                                        |                                   |                               |
|--------------------------------------------------------|-----------------------------------|-------------------------------|
| Reflow Condition                                       |                                   | 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 compound meeting flammability rating V-0 |

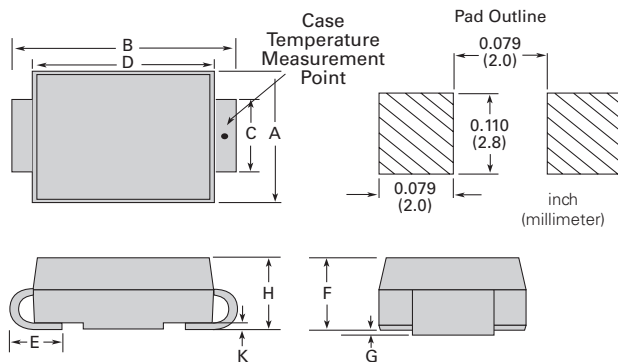
## Part Marking



## Environmental Specifications

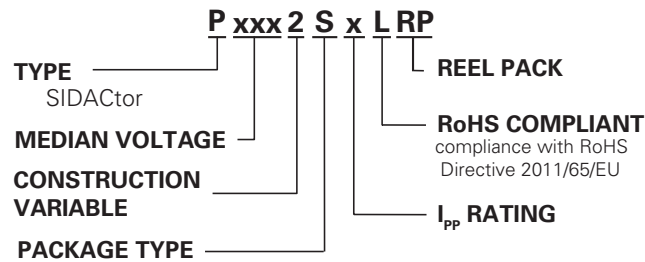
|                                         |                                                                                                                       |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|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

## 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  | 0.096 | 1.90        | 2.45 |
| G          | 0.002  | 0.008 | 0.05        | 0.20 |
| H          | 0.077  | 0.104 | 1.95        | 2.65 |
| K          | 0.006  | 0.016 | 0.15        | 0.41 |

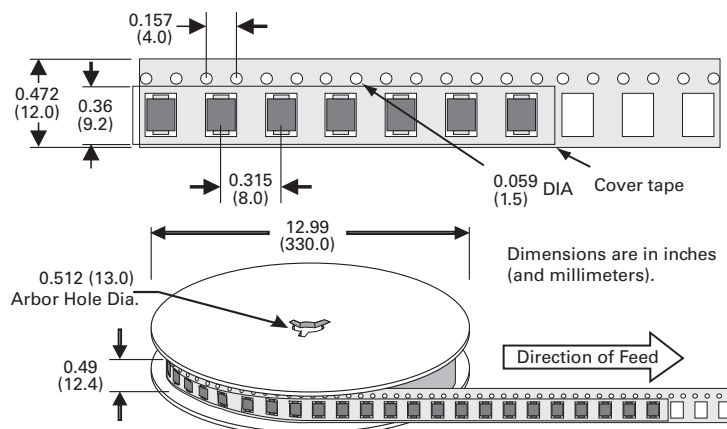
## Part Numbering



## Packing Options

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

## Tape and Reel Specification — DO-214AA



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