

# Pxxx2SxL Series

## Two-Chip Broadband Optimized™ SIDACtor® DO-214AA



### Description

Pxxx2SxL Series Two-Chip SIDACtor® DO-214AA are very low capacitance SIDACtor® Protection thyristors designed to protect broadband ICT equipment such as VoIP, xDSL 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
- 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

### Additional Information



Resources



Accessories



Samples

### Agency Approvals

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

### Applicable Global Standards

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

\* Additional series resistance may be required to comply

### Schematic Symbol



# Pxxx2SxL Series

## Two-Chip Broadband Optimized™ SIDACtor® DO-214AA

### 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     | X                                                                                   |
| P0722SALRP  | P072A   | 65                              | 88                      | 120    | 800    | 2.2   | 8                         | 20              | 45     | X                                                                                   |
| P0902SALRP  | P092A   | 75                              | 98                      | 120    | 800    | 2.2   | 8                         | 20              | 40     | X                                                                                   |
| P1102SALRP  | P112A   | 90                              | 130                     | 120    | 800    | 2.2   | 8                         | 15              | 35     | X                                                                                   |
| P1302SALRP  | P132A   | 120                             | 160                     | 120    | 800    | 2.2   | 8                         | 15              | 35     | X                                                                                   |
| P1502SALRP  | P152A   | 140                             | 180                     | 120    | 800    | 2.2   | 8                         | 15              | 30     | X                                                                                   |
| P1802SALRP  | P182A   | 170                             | 220                     | 120    | 800    | 2.2   | 8                         | 10              | 30     | X                                                                                   |
| P2302SALRP  | P232A   | 190                             | 260                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P2602SALRP  | P262A   | 220                             | 300                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P3002SALRP  | P302A   | 280                             | 360                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P3502SALRP  | P352A   | 320                             | 400                     | 120    | 800    | 2.2   | 8                         | 10              | 20     | X                                                                                   |
| P4202SALRP  | P422A   | 380                             | 500                     | 120    | 800    | 2.2   | 8                         | 10              | 20     | X                                                                                   |
| P4802SALRP  | P482A   | 440                             | 600                     | 120    | 800    | 2.2   | 8                         | 5               | 20     | X                                                                                   |
| P6002SALRP  | P602A   | 550                             | 700                     | 120    | 800    | 2.2   | 8                         | 5               | 20     | X                                                                                   |
| P0642SBLRP  | P062B   | 58                              | 77                      | 120    | 800    | 2.2   | 8                         | 25              | 45     | X                                                                                   |
| P0722SBLRP  | P072B   | 65                              | 88                      | 120    | 800    | 2.2   | 8                         | 20              | 45     | X                                                                                   |
| P0902SBLRP  | P092B   | 75                              | 98                      | 120    | 800    | 2.2   | 8                         | 20              | 40     | X                                                                                   |
| P1102SBLRP  | P112B   | 90                              | 130                     | 120    | 800    | 2.2   | 8                         | 15              | 35     | X                                                                                   |
| P1302SBLRP  | P132B   | 120                             | 160                     | 120    | 800    | 2.2   | 8                         | 15              | 35     | X                                                                                   |
| P1502SBLRP  | P152B   | 140                             | 180                     | 120    | 800    | 2.2   | 8                         | 15              | 30     | X                                                                                   |
| P1802SBLRP  | P182B   | 170                             | 220                     | 120    | 800    | 2.2   | 8                         | 10              | 30     | X                                                                                   |
| P2302SBLRP  | P232B   | 190                             | 260                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P2602SBLRP  | P262B   | 220                             | 300                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P3002SBLRP  | P302B   | 280                             | 360                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P3502SBLRP  | P352B   | 320                             | 400                     | 120    | 800    | 2.2   | 8                         | 10              | 20     | X                                                                                   |
| P4202SBLRP  | P422B   | 380                             | 500                     | 120    | 800    | 2.2   | 8                         | 10              | 20     | X                                                                                   |
| P4802SBLRP  | P482B   | 440                             | 600                     | 120    | 800    | 2.2   | 8                         | 5               | 20     | X                                                                                   |
| P6002SBLRP  | P602B   | 550                             | 700                     | 120    | 800    | 2.2   | 8                         | 5               | 20     | X                                                                                   |
| 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     | X                                                                                   |
| P3502SCLRP  | P352C   | 320                             | 400                     | 120    | 800    | 2.2   | 8                         | 20              | 30     | X                                                                                   |
| P4202SCLRP  | P422C   | 380                             | 500                     | 120    | 800    | 2.2   | 8                         | 15              | 30     | X                                                                                   |
| P4802SCLRP  | P482C   | 440                             | 600                     | 120    | 800    | 2.2   | 8                         | 15              | 30     | X                                                                                   |
| P6002SCLRP  | P602C   | 550                             | 700                     | 120    | 800    | 2.2   | 8                         | 10              | 25     | X                                                                                   |
| P7002SCLRP  | P702C   | 640                             | 850                     | 120    | 800    | 2.2   | 8                         | 10              | 30     | X                                                                                   |

#### Notes:

- Absolute maximum ratings measured at  $T_A = 25^\circ C$  (unless otherwise noted).
- Components are bi-directional.
- Test results on models P8002SBLRP and P9002SBLRP exhibited values of greater than 1000 Vdc. Since UL 497B limits components to less than 1000 Vdc, UL has removed these components from the investigation.

### 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> | 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   |

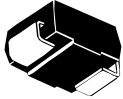
#### Notes:

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 that remains in thermal equilibrium.
  - $I_{PP}$  ratings applicable over temperature range of  $-40^\circ C$  to  $+85^\circ C$
  - The component must initially be in thermal equilibrium with  $-40^\circ C \leq T_J \leq +150^\circ C$

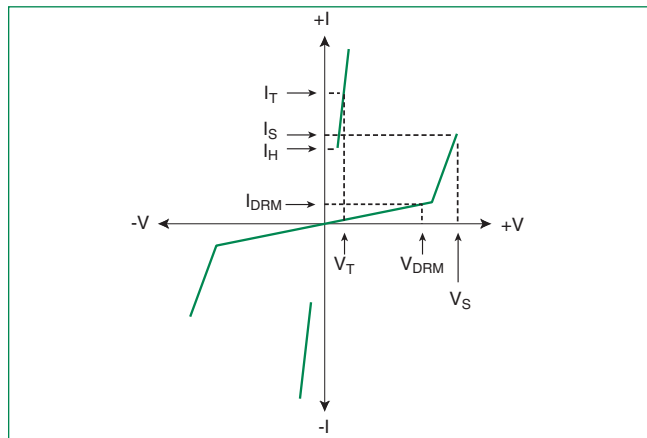
# Pxxx2SxL Series

## Two-Chip Broadband Optimized™ SIDACtor® DO-214AA

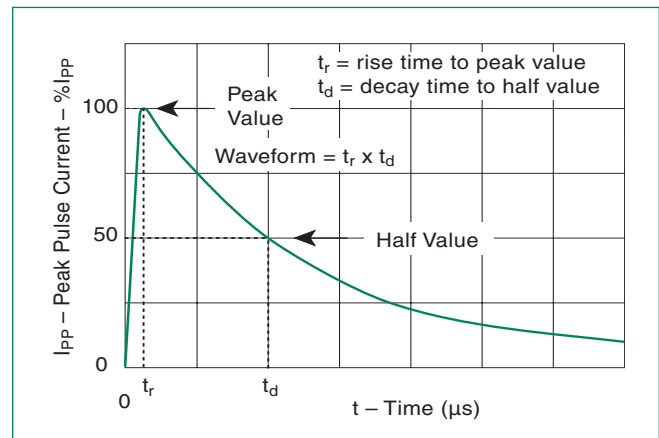
### Thermal Considerations

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

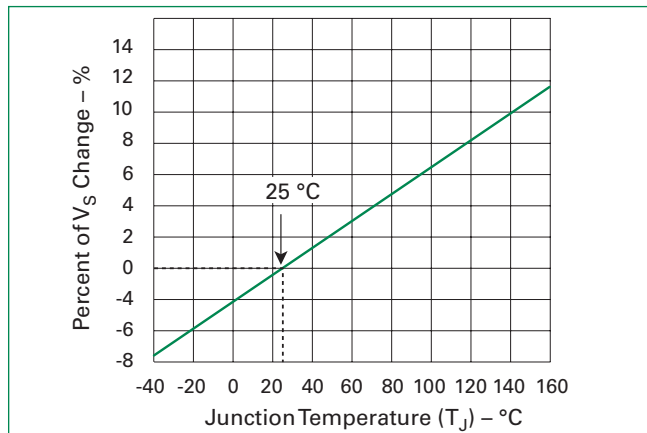
### V-I Characteristics



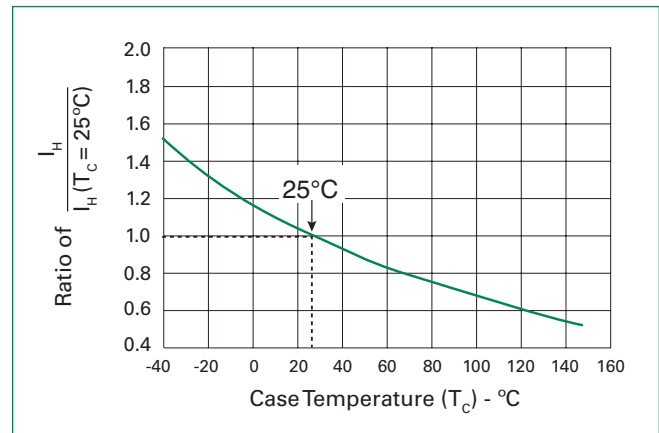
### $t_r \times t_d$ Pulse Waveform



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



### Normalized DC Holding Current vs. Case Temperature

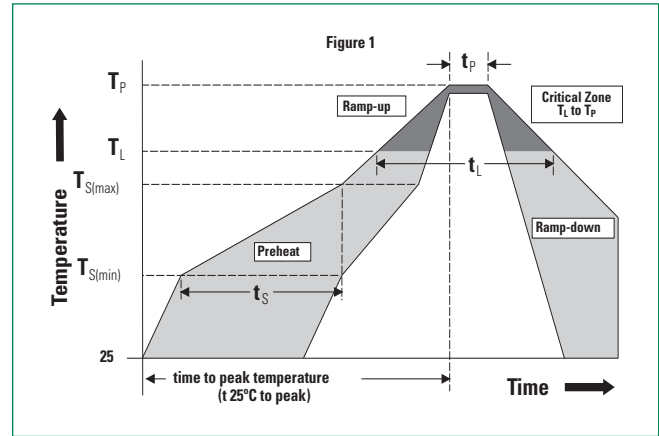


# Pxxx2SxL Series

## Two-Chip Broadband Optimized™ SIDACtor® DO-214AA

### Soldering Parameters

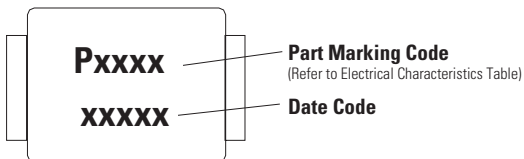
|                                                                        |                                    |                  |
|------------------------------------------------------------------------|------------------------------------|------------------|
| <b>Reflow Condition</b>                                                |                                    | 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 epoxy meeting flammability classification UL94-V0 |

### Part Marking



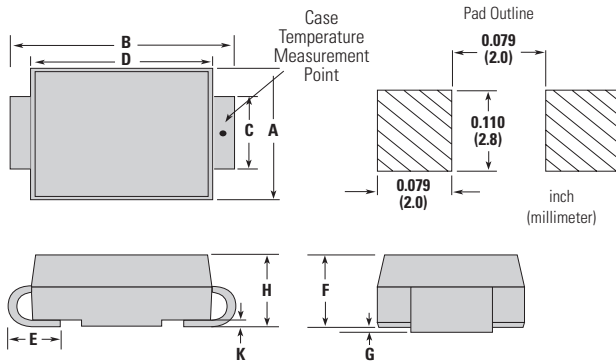
### Environmental Specifications

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

# Pxxx2SxL Series

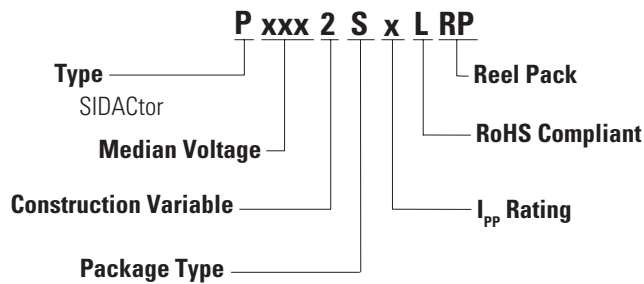
## Two-Chip Broadband Optimized™ SIDACtor® DO-214AA

### 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 |

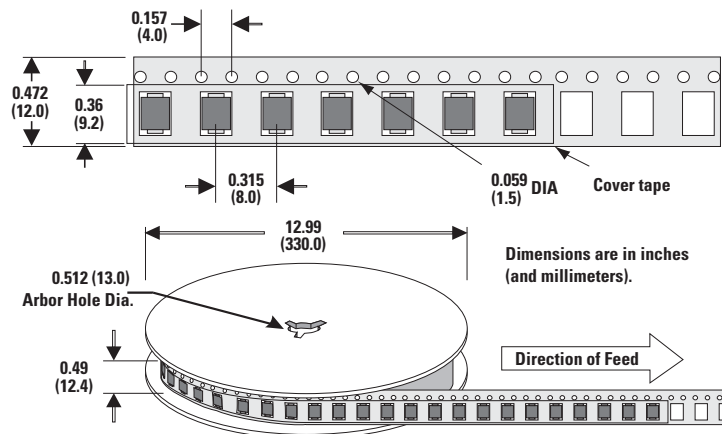
### Part Numbering



### 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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