

### High Surge Current Series - DO-214



#### Agency Approvals

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

#### Pinout Designation

Not Applicable

#### Schematic Symbol



#### Description

The High Surge Current DO-214 Series are SIDACtor® thyristors designed to protect equipment located in hostile environments from overvoltage transients.

The series provides a 200A 10/1000  $\mu$ s rated surface mount solution that enables equipment to comply with enhanced surge requirements now specified in regulatory and customer requirements.

#### 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
  - 200A 10x1000 Surge
- Rating
- 1000A 2x10 Surge Rating
  - 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)

#### Applicable Global Standards

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

#### 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>@ $I_T=2.2A$ | Capacitance<br>@ 1MHz, 2V bias |        |
|-------------|---------|---------------------------------|--------------------------|--------|--------|----------|-----------------------|--------------------------------|--------|
|             |         | V min                           | V max                    | mA min | mA max | A max    | V max                 | pf min                         | pF max |
| P0080SDLRP  | P-8D    | 6                               | 25                       | 50     | 800    | 2.2      | 4                     | 50                             | 150    |
| P0640SDLRP  | P06D    | 58                              | 77                       | 50     | 800    | 2.2      | 4                     | 100                            | 160    |
| P0720SDLRP  | P07D    | 65                              | 88                       | 50     | 800    | 2.2      | 4                     | 100                            | 150    |
| P0900SDLRP  | P09D    | 75                              | 98                       | 50     | 800    | 2.2      | 4                     | 95                             | 140    |
| P1100SDLRP  | P11D    | 90                              | 130                      | 50     | 800    | 2.2      | 4                     | 75                             | 115    |
| P1300SDLRP  | P13D    | 120                             | 160                      | 50     | 800    | 2.2      | 4                     | 65                             | 100    |
| P1500SDLRP  | P15D    | 140                             | 180                      | 50     | 800    | 2.2      | 4                     | 60                             | 90     |
| P1800SDLRP  | P18D    | 170                             | 220                      | 50     | 800    | 2.2      | 4                     | 50                             | 90     |
| P2300SDLRP  | P23D    | 190                             | 260                      | 50     | 800    | 2.2      | 4                     | 50                             | 80     |
| P2600SDLRP  | P26D    | 220                             | 300                      | 50     | 800    | 2.2      | 4                     | 50                             | 75     |
| P3100SDLRP  | P31D    | 275                             | 350                      | 50     | 800    | 2.2      | 4                     | 45                             | 70     |
| P3500SDLRP  | P35D    | 320                             | 400                      | 50     | 800    | 2.2      | 4                     | 45                             | 65     |

#### Notes:

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

- Components are bi-directional (unless otherwise noted).

\*\* Will meet 4.4A power cross requirement without fire hazard.

### Surge Ratings

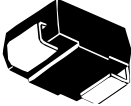
| Series | I <sub>PP</sub>                              |                                        |                                          |                                            |                                            |                                          |                                            |                                              |                                           | I <sub>TSM</sub><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                                     |                              |       |
| D      | —                                            | 1000                                   | 800                                      | —                                          | —                                          | —                                        | —                                          | 200                                          | 350                                       | 50                           | 1000  |

Notes:

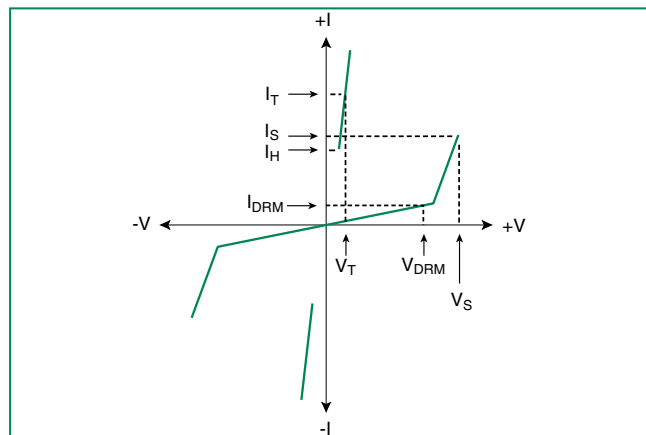
1 Current waveform in μs  
2 Voltage waveform in μs

- 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  
- The component must initially be in thermal equilibrium with -40°C ≤  $T_J$  ≤ +150°C

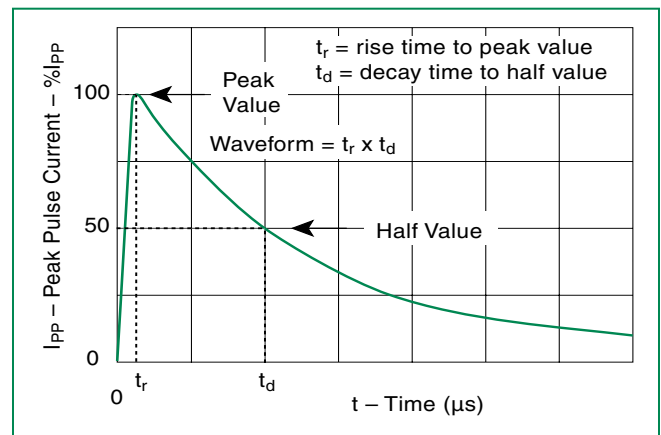
### Thermal Considerations

| 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 |

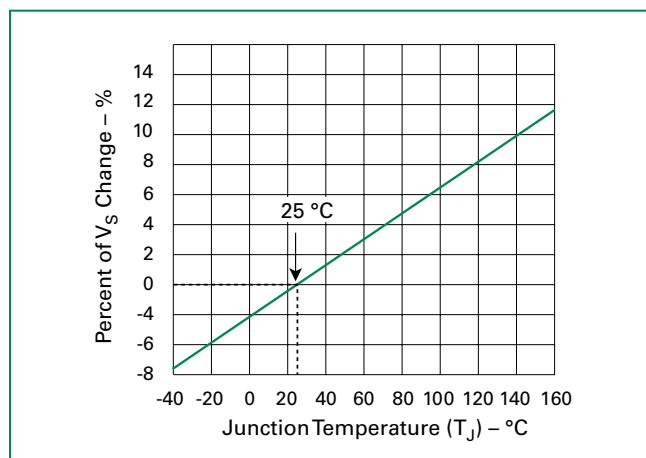
### V-I Characteristics



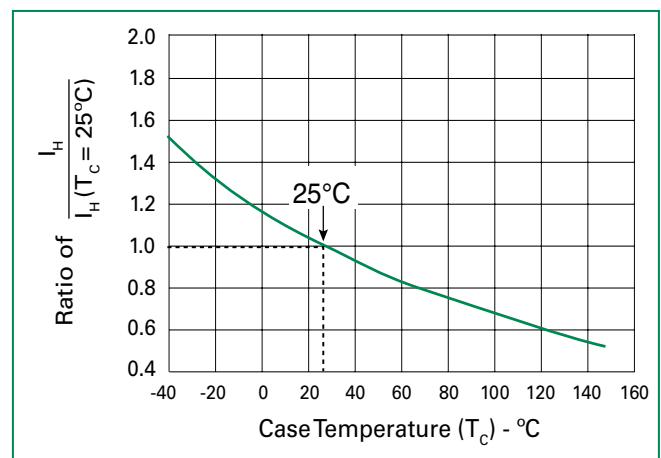
### $t_r \times t_d$ Pulse Waveform



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

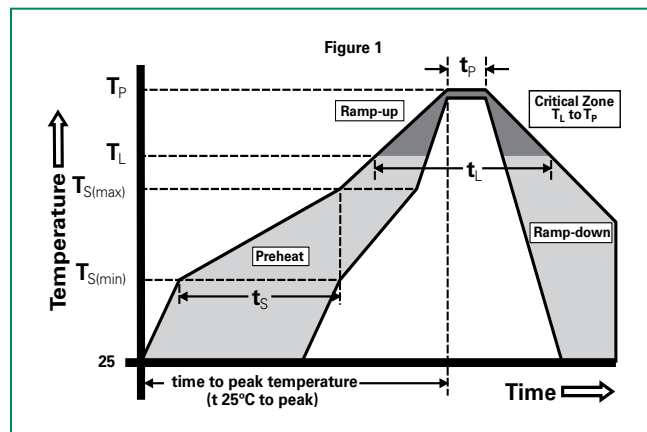


### Normalized DC Holding Current vs. Case Temperature



## 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                        |



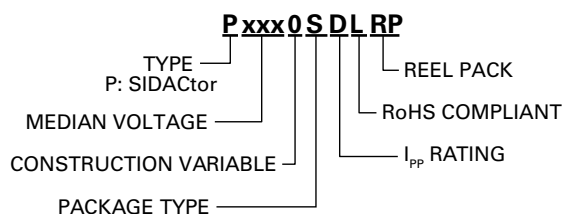
## Physical Specifications

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

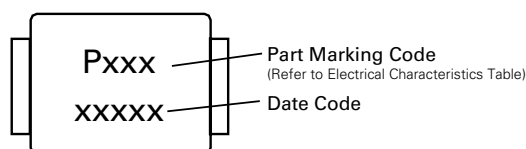
## Environmental Specifications

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

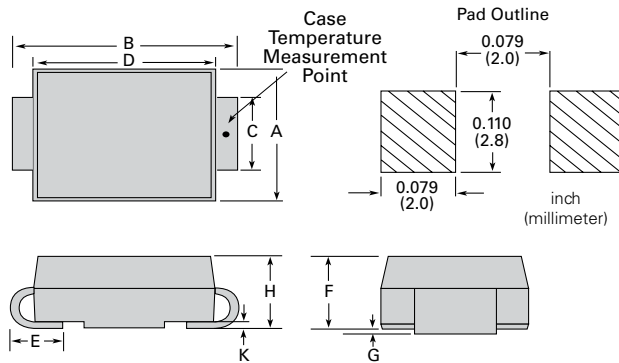
## Part Numbering



## Part Marking



### Dimensions — DO-214AA

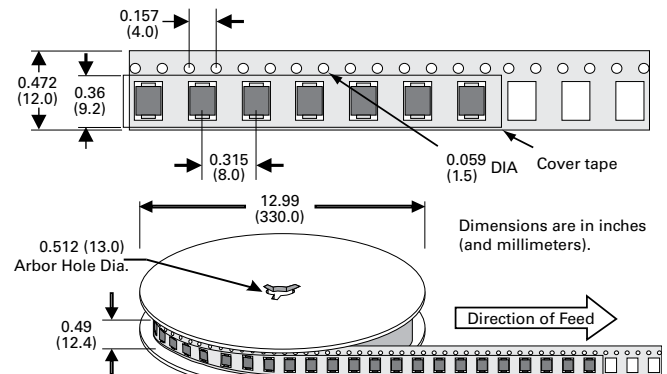


| Dimensions | Inches |       | Millimeters |      |
|------------|--------|-------|-------------|------|
|            | Min    | Max   | Min         | Max  |
| A          | 0.130  | 0.156 | 3.30        | 3.95 |
| B          | 0.201  | 0.220 | 5.10        | 5.60 |
| C          | 0.077  | 0.087 | 1.95        | 2.20 |
| D          | 0.159  | 0.181 | 4.05        | 4.60 |
| E          | 0.030  | 0.063 | 0.75        | 1.60 |
| F          | 0.075  | 0.096 | 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 |

### Packing Options

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

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



### Additional Information



Datasheet



Resources



Samples

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