

**SIDACTor® Series - DO-214**



**Agency Approvals**

| AGENCY | AGENCY FILE NUMBER |
|--------|--------------------|
|        | E133083            |

**Pinout Designation**

Not Applicable

**Schematic Symbol**



**Description**

SIDACTor® Series DO-214AA are 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 surge capability after multiple surge events within limit.
- Fails short circuit when surged in excess of ratings
- Low capacitance

**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/B-rated parts require series resistance

**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 |
| P0080SALRP  | P-8A    | 6                               | 25                       | 50     | 800    | 2.2   | 4                         | 25                             | 150    |
| P0220SALRP  | P22A    | 15                              | 32                       | 50     | 800    | 2.2   | 4                         | 25                             | 150    |
| P0300SALRP  | P03A    | 25                              | 40                       | 50     | 800    | 2.2   | 4                         | 15                             | 140    |
| P0640SALRP  | P06A    | 58                              | 77                       | 150    | 800    | 2.2   | 4                         | 40                             | 60     |
| P0720SALRP  | P07A    | 65                              | 88                       | 150    | 800    | 2.2   | 4                         | 35                             | 60     |
| P0900SALRP  | P09A    | 75                              | 98                       | 150    | 800    | 2.2   | 4                         | 25                             | 55     |
| P1100SALRP  | P11A    | 90                              | 130                      | 150    | 800    | 2.2   | 4                         | 30                             | 50     |
| P1300SALRP  | P13A    | 120                             | 160                      | 150    | 800    | 2.2   | 4                         | 25                             | 45     |
| P1500SALRP  | P15A    | 140                             | 180                      | 150    | 800    | 2.2   | 4                         | 25                             | 40     |
| P1800SALRP  | P18A    | 170                             | 220                      | 150    | 800    | 2.2   | 4                         | 25                             | 35     |
| P2100SALRP  | P21A    | 180                             | 240                      | 150    | 800    | 2.2   | 4                         | 20                             | 35     |
| P2300SALRP  | P23A    | 190                             | 260                      | 150    | 800    | 2.2   | 4                         | 25                             | 35     |
| P2600SALRP  | P26A    | 220                             | 300                      | 150    | 800    | 2.2   | 4                         | 20                             | 35     |
| P3100SALRP  | P31A    | 275                             | 350                      | 150    | 800    | 2.2   | 4                         | 20                             | 35     |
| P3500SALRP  | P35A    | 320                             | 400                      | 150    | 800    | 2.2   | 4                         | 20                             | 35     |
| P0080SBLRP  | P-8B    | 6                               | 25                       | 50     | 800    | 2.2   | 4                         | 25                             | 150    |
| P0220SBLRP  | P22B    | 15                              | 32                       | 50     | 800    | 2.2   | 4                         | 25                             | 150    |
| P0300SBLRP  | P03B    | 25                              | 40                       | 50     | 800    | 2.2   | 4                         | 15                             | 140    |
| P0640SBLRP  | P06B    | 58                              | 77                       | 150    | 800    | 2.2   | 4                         | 40                             | 80     |
| P0720SBLRP  | P07B    | 65                              | 88                       | 150    | 800    | 2.2   | 4                         | 35                             | 75     |

Table continues on next page.

### Electrical Parameters (continued)

| Part Number | Marking | $V_{DRM}$          | $V_S$           | $I_H$  | $I_S$  | $I_T$ | $V_T$            | Capacitance     |        |
|-------------|---------|--------------------|-----------------|--------|--------|-------|------------------|-----------------|--------|
|             |         | @ $I_{DRM}=5\mu A$ | @ 100V/ $\mu s$ |        |        |       | @ $I_T=2.2$ Amps | @ 1MHz, 2V bias |        |
|             |         | V min              | V max           | mA min | mA max | A max | V max            | pF min          | pF max |
| P0900SBLRP  | P09B    | 75                 | 98              | 150    | 800    | 2.2   | 4                | 35              | 70     |
| P1100SBLRP  | P11B    | 90                 | 130             | 150    | 800    | 2.2   | 4                | 30              | 70     |
| P1300SBLRP  | P13B    | 120                | 160             | 150    | 800    | 2.2   | 4                | 25              | 60     |
| P1500SBLRP  | P15B    | 140                | 180             | 150    | 800    | 2.2   | 4                | 25              | 55     |
| P1800SBLRP  | P18B    | 170                | 220             | 150    | 800    | 2.2   | 4                | 25              | 50     |
| P2100SBLRP  | P21B    | 180                | 240             | 150    | 800    | 2.2   | 4                | 20              | 35     |
| P2300SBLRP  | P23B    | 190                | 260             | 150    | 800    | 2.2   | 4                | 25              | 50     |
| P2600SBLRP  | P26B    | 220                | 300             | 150    | 800    | 2.2   | 4                | 20              | 45     |
| P3100SBLRP  | P31B    | 275                | 350             | 150    | 800    | 2.2   | 4                | 20              | 45     |
| P3500SBLRP  | P35B    | 320                | 400             | 150    | 800    | 2.2   | 4                | 20              | 40     |
| P0080SCLRP  | P-8C    | 6                  | 25              | 50     | 800    | 2.2   | 4                | 45              | 260    |
| P0220SCLRP  | P22C    | 15                 | 32              | 50     | 800    | 2.2   | 4                | 30              | 240    |
| P0300SCLRP  | P03C    | 25                 | 40              | 50     | 800    | 2.2   | 4                | 25              | 250    |
| P0640SCLRP  | P06C    | 58                 | 77              | 150    | 800    | 2.2   | 4                | 55              | 155    |
| P0720SCLRP  | P07C    | 65                 | 88              | 150    | 800    | 2.2   | 4                | 50              | 150    |
| P0900SCLRP  | P09C    | 75                 | 98              | 150    | 800    | 2.2   | 4                | 45              | 140    |
| P1100SCLRP  | P11C    | 90                 | 130             | 150    | 800    | 2.2   | 4                | 45              | 115    |
| P1300SCLRP  | P13C    | 120                | 160             | 150    | 800    | 2.2   | 4                | 40              | 105    |
| P1500SCLRP  | P15C    | 140                | 180             | 150    | 800    | 2.2   | 4                | 35              | 95     |
| P1800SCLRP  | P18C    | 170                | 220             | 150    | 800    | 2.2   | 4                | 35              | 90     |
| P2100SCLRP  | P21C    | 180                | 240             | 150    | 800    | 2.2   | 4                | 30              | 90     |
| P2300SCLRP  | P23C    | 190                | 260             | 150    | 800    | 2.2   | 4                | 30              | 80     |
| P2600SCLRP  | P26C    | 220                | 300             | 150    | 800    | 2.2   | 4                | 30              | 80     |
| P3100SCLRP  | P31C    | 275                | 350             | 150    | 800    | 2.2   | 4                | 30              | 70     |
| P3500SCLRP  | P35C    | 320                | 400             | 150    | 800    | 2.2   | 4                | 25              | 65     |
| P4500SCLRP  | P45C    | 400                | 530             | 150    | 800    | 2.2   | 4                | 25              | 65     |

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

### Surge Ratings

| Series | $I_{PP}$             |                   |                     |                     |                     |                    |                     |                      |                     | $I_{TSM}$<br>50/60 Hz | di/dt             |
|--------|----------------------|-------------------|---------------------|---------------------|---------------------|--------------------|---------------------|----------------------|---------------------|-----------------------|-------------------|
|        | 0.2x310 <sup>1</sup> | 2x10 <sup>1</sup> | 8x20 <sup>1</sup>   | 10x160 <sup>1</sup> | 10x560 <sup>1</sup> | 5x320 <sup>1</sup> | 10x360 <sup>1</sup> | 10x1000 <sup>1</sup> | 5x310 <sup>1</sup>  |                       |                   |
|        | 0.5x700 <sup>2</sup> | 2x10 <sup>2</sup> | 1.2x50 <sup>2</sup> | 10x160 <sup>2</sup> | 10x560 <sup>2</sup> | 9x720 <sup>2</sup> | 10x360 <sup>2</sup> | 10x1000 <sup>2</sup> | 10x700 <sup>2</sup> |                       |                   |
|        | A min                | A min             | A min               | A min               | A min               | A min              | A min               | A min                | A min               | A min                 | Amps/ $\mu s$ max |
| 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 <sup>3</sup>    | 30                    | 500               |

Notes:  
 1 Current waveform in  $\mu s$   
 2 Voltage waveform in  $\mu s$   
 3 For surge rating of P4500SCLRP 10x700 $\mu s$  min=150A & typical=180A  
 - 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 device must initially be in thermal equilibrium with  $-40^\circ C \leq T_J \leq +150^\circ C$

**Thermal Considerations**

| Package   | Symbol          | Parameter                               | Value       | Unit |
|---|-----------------|---|-------------|------|
| <br>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**



**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 (LiquidusTemp ( $T_L$ ) 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 PeakTemp ( $t_p$ )          | 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**

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

**Environmental Specifications**

|                                  |  |
|----------------------------------|--|
| High Temp Voltage Blocking       | 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 |
| Temp Cycling                     | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104                  |
| Biased Temp & Humidity           | 52 $V_{DC}$ (+85°C) 85%RH, 504 up to 1008 hrs. EIA/JEDEC, JESD22-A-101   |
| High Temp Storage                | +150°C 1008 hrs. MIL-STD-750 (Method 1031) JEDEC, JESD22-A-101   |
| Low Temp Storage                 | -65°C, 1008 hrs.   |
| Thermal Shock                    | 0°C to +100°C, 5 min. dwell, 10 sec. transfer, 10 cycles. MIL-STD-750 (Method 1056) JEDEC, JESD22-A-106                |
| Autoclave (Pressure Cooker Test) | +121°C, 100%RH, 2atm, 24 up to 168 hrs. EIA/JEDEC, JESD22-A-102  |
| Resistance to Solder Heat        | +260°C, 30 secs. MIL-STD-750 (Method 2031)   |
| Moisture Sensitivity Level       | 85%RH, +85°C, 168 hrs., 3 reflow cycles (+260°C Peak). JEDEC-J-STD-020, Level 1  |

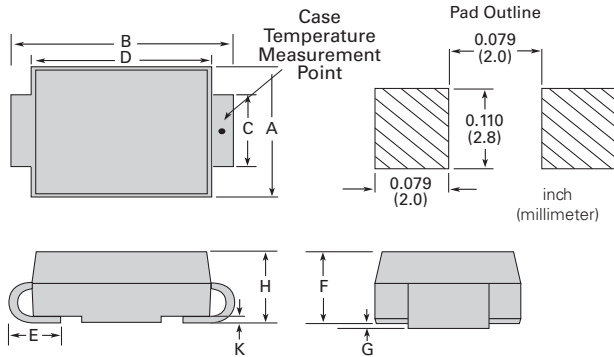
**Part Numbering**



**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<br>Tape & Reel Pack | 2500     | RP           | EIA-481-D         |

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



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