

Pxxx0S3N-A Series

High Surge Current SIDACtor® - DO-214AB



Agency Approvals

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

Schematic Symbol



Description

The automotive grade Pxxx0S3N-A series DO-214AB protection thyristors are components designed to protect AC power line located in hostile environments from overvoltage transients.

The Pxxx0S3N-A series protect exposed interfaces in industrial and ICT applications, such as RS-485 data interfaces or AC and DC power supplies. These components switching voltage V_S are much lower than alternative component.

This Pxxx0S3N-A series are rated 3000 A 8/20 μ s, enabling equipment compliance with regulatory and customer surge requirements.

Features and Benefits

- High reliability application and automotive grade AEC-Q101 qualified
- High surge rating 8/20 μ s 3000 A protection
- High surge SIDACtor designed in a surface mount and compact DO-214AB package
- Low voltage overshoot
- Low on-state voltage
- Fails short circuit when surged in excess of ratings
- Component properties do not degrade after multiple surge events within its limits
- Fast response in microseconds
- 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-STD609A.01)

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, 2nd edition
- YD/T 1082
- YD/T 993
- YD/T 950

Electrical Characteristics

| Part Number | Marking | V_{DRM} @ $I_{DRM} = 5 \mu A$ | V_S @ 100 V/ μ s | I_H | I_S | I_T | V_T @ $I_T = 2.2 A$ | Capacitance @ 1 MHz, 2V bias | |
|---------------|---------|------------------------------------|---------------------------|--------|--------|-------|--------------------------|---------------------------------|--------|
| | | V min | V max | mA min | mA max | A max | V max | pf min | pF max |
| P0640S3NLRP-A | P06N | 58 | 77 | 50 | 800 | 2.2 | 4 | 150 | 550 |
| P0720S3NLRP-A | P07N | 65 | 88 | 50 | 800 | 2.2 | 4 | 150 | 550 |
| P0900S3NLRP-A | P09N | 75 | 98 | 50 | 800 | 2.2 | 4 | 150 | 550 |
| P1100S3NLRP-A | P11N | 90 | 130 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P1300S3NLRP-A | P13N | 120 | 160 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P1500S3NLRP-A | P15N | 140 | 180 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P1900S3NLRP-A | P19N | 155 | 220 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P2100S3NLRP-A | P21N | 170 | 240 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P2300S3NLRP-A | P23N | 180 | 260 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P2600S3NLRP-A | P26N | 220 | 300 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P3100S3NLRP-A | P31N | 275 | 350 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P3500S3NLRP-A | P35N | 320 | 400 | 50 | 800 | 2.2 | 4 | 150 | 450 |
| P3800S3NLRP-A | P38N | 350 | 430 | 50 | 800 | 2.2 | 4 | 150 | 450 |

Notes:

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

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Surge Ratings


| Series | I_{PP} | I_{TSM} 50 / 60 Hz | di/dt |
|--------|--|-------------------------|----------|
| | 8/20 ¹ 1.2/50 ² | | |
| | A min | A min | A/μs max |
| N | 3000 | 250 | 420 |

Notes:

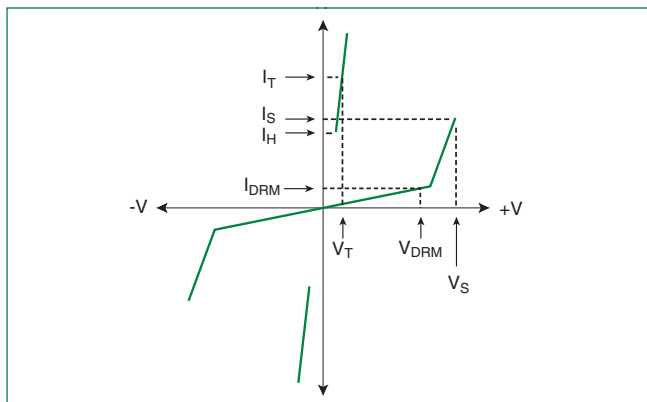
1. Current waveform in μs
2. Voltage waveform in μs

- Peak pulse current rating (I_{PP}) is repetitive and guaranteed for the life of the product.

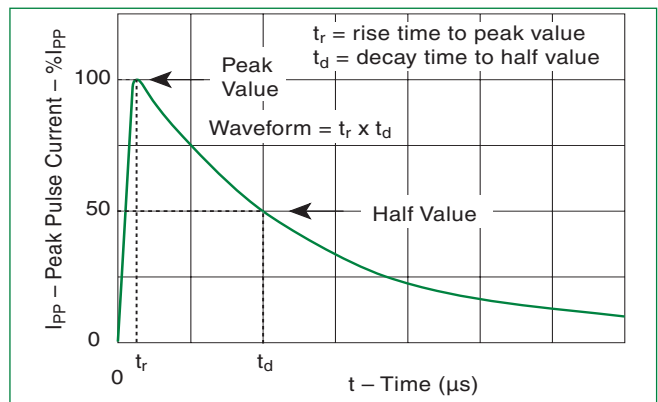
Thermal Considerations

| Package | Symbol | Parameter | Value | Unit |
|---|-----------------|---|-------------|------|
| DO-214AB  | T_J | Operating Junction Temperature Range | -65 to +125 | °C |
| | T_S | Storage Temperature Range | -65 to +150 | °C |
| | $R_{\theta JA}$ | Thermal Resistance: Junction to Ambient | 75 | °C/W |

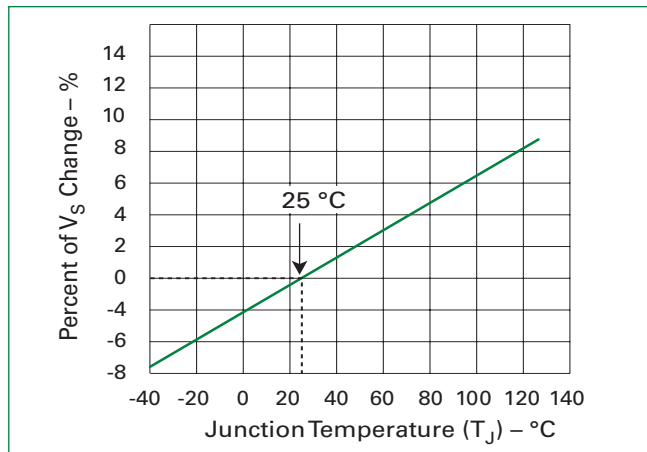
V-I Characteristics



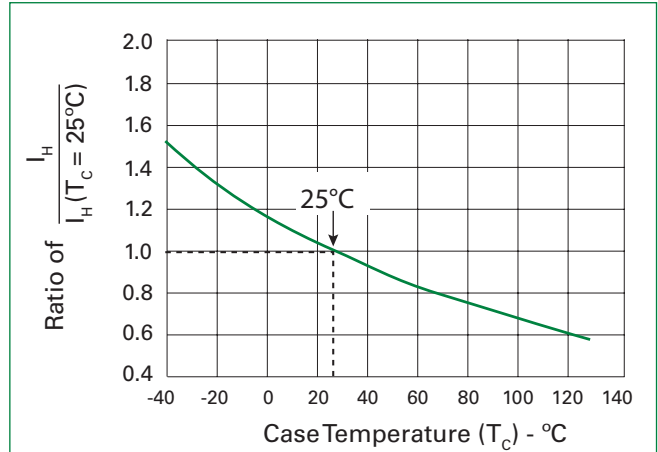
tr x td Pulse Waveform



Normalized V_S Change vs. Junction Temperature



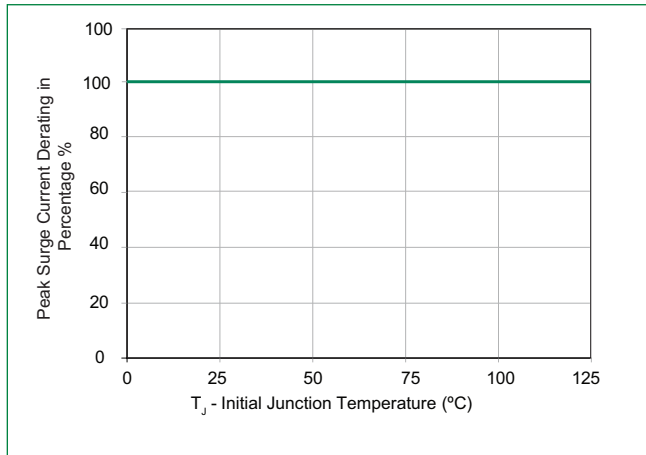
Normalized DC Holding Current vs. Case Temperature



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Peak Surge Current Derating Curve

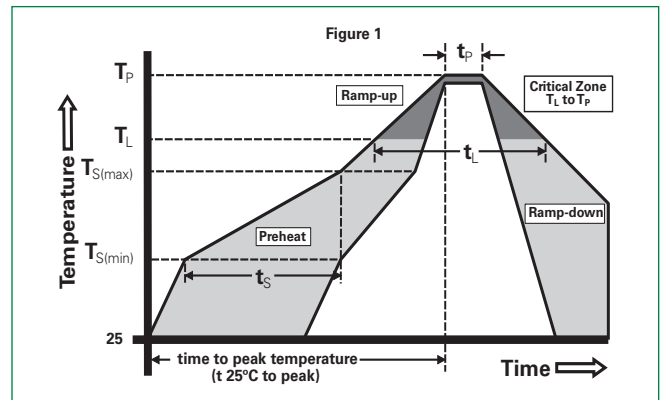


Physical Specifications

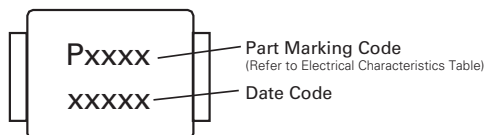
| | |
|------------------------|---|
| Lead Material | Copper alloy |
| Terminal Finish | 100 % Matte-tin plated |
| Body Material | UL recognized epoxy meeting flammability classification V-0 |

Soldering Parameters

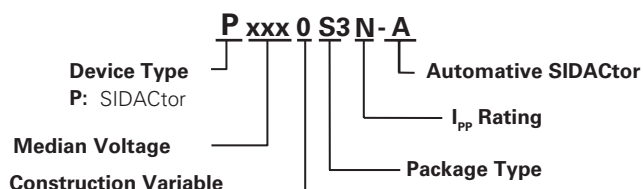
| | | |
|--|------------------------------------|-------------------------------|
| Reflow Condition | | Pb-free assembly (see Fig. 1) |
| Pre Heat | - Temperature Min ($T_{s(min)}$) | +150 °C |
| | - Temperature Max ($T_{s(max)}$) | +200 °C |
| | - Time (Min to Max) (t_s) | 60-120 secs. |
| Average 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 |



Part Marking



Part Numbering



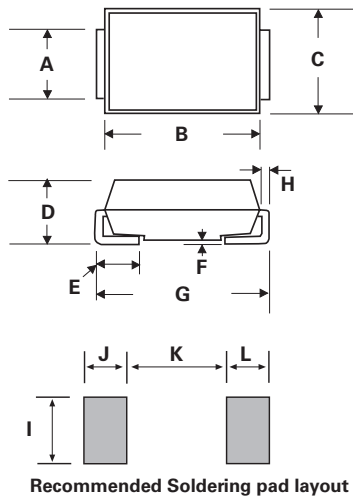
Environmental Specifications

| | |
|-----------------------------------|---|
| High Temp Voltage Blocking | 80 % rated V_{DRM} (V_{AC} Peak) +125 °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 | 80 % rated V_{DRM} (+85 °C) 85 %RH, and not exceed 100 V or limit of chamber. 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 |
| Unbiased HAST | 96 hrs. at $T_A = 130$ °C/85 %RH or 264 hrs. at $T_A = 110$ °C/85 %RH. TEST before and after UHAST, JEDEC, JESD22-A-118 |
| 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 |

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Dimensions — DO-214AB

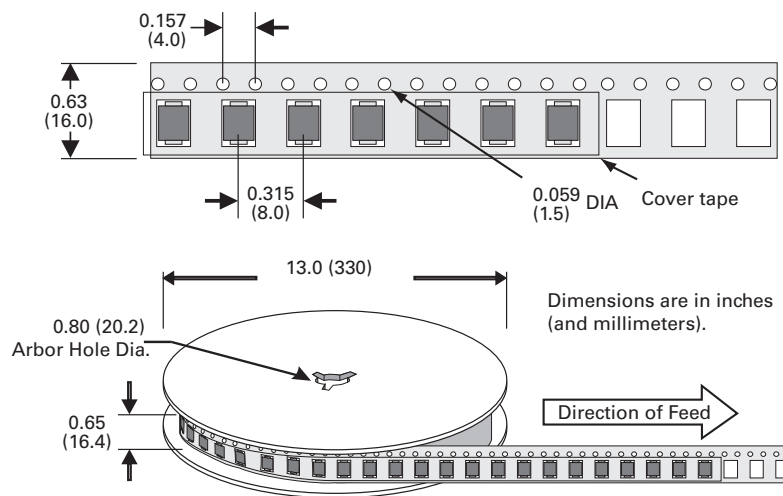


| Dimensions | Inches | | Millimeters | |
|------------|--------|-------|-------------|-------|
| | Min | Max | Min | Max |
| A | 0.114 | 0.126 | 2.900 | 3.200 |
| B | 0.260 | 0.280 | 6.600 | 7.110 |
| C | 0.220 | 0.245 | 5.590 | 6.220 |
| D | 0.079 | 0.103 | 2.060 | 2.620 |
| E | 0.030 | 0.060 | 0.760 | 1.520 |
| F | - | 0.008 | - | 0.203 |
| G | 0.305 | 0.320 | 7.750 | 8.130 |
| H | 0.006 | 0.012 | 0.152 | 0.305 |
| I | 0.129 | - | 3.300 | - |
| J | 0.094 | - | 2.400 | - |
| K | - | 0.165 | - | 4.200 |
| L | 0.094 | - | 2.400 | - |

Packing Options

| Package Type | Description | Quantity | Industry Standard |
|--------------|-----------------------------|----------|---------------------------------------|
| S3 | DO-214AB tape and reel pack | 3000 | EIA-481-D tape and reel specification |

Tape and Reel Specification — DO-214AB



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