

Description

P0060~P3500SA_B_C Series are low capacitance devices designed to protect broadband equipment such as VOIP, DSL modems and DSLAMs from damaging overvoltage transients.

The 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 with use
- Fails short circuit when surged in excess of ratings
- Low Capacitance

Applicable Global Standards

- TIA-968-A
- ITU K.20/21 Enhanced level*
- ITU K.20/21 Basic Level
- GR 1089 Inter building*
- GR 1089 Inter building
- IEC 6100-4-5
- YD/T 1082
- YD/T 993
- YD/T 950

Electrical Characteristics

| Part Number | V _{DRM} @ I _{DRM} =5μA | V _S @ 100V/μS | V _T @ I _T =2.2Amps | I _S | I _T | I _H | Capacitance @1MHz, 2V bias | |
|-------------|---|-----------------------------|---|----------------|----------------|----------------|-------------------------------|--------|
| | V min | V max | V max | mA max | A max | mA min | pF min | pF max |
| P0060SA | 6 | 25 | 4 | 800 | 2.2 | 50 | 25 | 150 |
| P0080SA | 6 | 25 | 4 | 800 | 2.2 | 50 | 25 | 150 |
| P0220SA | 15 | 32 | 4 | 800 | 2.2 | 50 | 25 | 150 |
| P0300SA | 25 | 40 | 4 | 800 | 2.2 | 50 | 15 | 140 |
| P0640SA | 58 | 77 | 4 | 800 | 2.2 | 150 | 40 | 60 |
| P0720SA | 65 | 88 | 4 | 800 | 2.2 | 150 | 35 | 60 |
| P0900SA | 75 | 98 | 4 | 800 | 2.2 | 150 | 25 | 55 |
| P1100SA | 90 | 130 | 4 | 800 | 2.2 | 150 | 30 | 50 |
| P1300SA | 120 | 160 | 4 | 800 | 2.2 | 150 | 25 | 45 |
| P1500SA | 140 | 180 | 4 | 800 | 2.2 | 150 | 25 | 45 |
| P1800SA | 170 | 220 | 4 | 800 | 2.2 | 150 | 25 | 50 |
| P2300SA | 190 | 260 | 4 | 800 | 2.2 | 150 | 30 | 50 |
| P2600SA | 220 | 300 | 4 | 800 | 2.2 | 150 | 25 | 50 |
| P3100SA | 275 | 350 | 4 | 800 | 2.2 | 150 | 20 | 45 |
| P3500SA | 320 | 400 | 4 | 800 | 2.2 | 150 | 20 | 45 |

Electrical Characteristics

| Part Number | V _{DRM} @ I _{DRM} =5μA | V _S @ 100V/μS | V _T @ I _T =2.2Amps | I _S | I _T | I _H | Capacitance @1MHz, 2V bias | |
|-------------|---|-----------------------------|---|----------------|----------------|----------------|-------------------------------|--------|
| | V min | V max | V max | mA max | A max | mA min | pF min | pF max |
| P0060SB | 6 | 15 | 4 | 800 | 2.2 | 50 | 25 | 80 |
| P0080SB | 6 | 25 | 4 | 800 | 2.2 | 50 | 25 | 80 |
| P0220SB | 15 | 32 | 4 | 800 | 2.2 | 50 | 25 | 100 |
| P0300SB | 25 | 40 | 4 | 800 | 2.2 | 50 | 15 | 140 |
| P0640SB | 58 | 77 | 4 | 800 | 2.2 | 150 | 40 | 80 |
| P0720SB | 65 | 88 | 4 | 800 | 2.2 | 150 | 35 | 75 |
| P0900SB | 75 | 98 | 4 | 800 | 2.2 | 150 | 35 | 70 |
| P1100SB | 90 | 130 | 4 | 800 | 2.2 | 150 | 30 | 70 |
| P1300SB | 120 | 160 | 4 | 800 | 2.2 | 150 | 25 | 70 |
| P1500SB | 140 | 180 | 4 | 800 | 2.2 | 150 | 25 | 70 |
| P1800SB | 170 | 220 | 4 | 800 | 2.2 | 150 | 25 | 70 |
| P2300SB | 190 | 260 | 4 | 800 | 2.2 | 150 | 20 | 70 |
| P2600SB | 220 | 300 | 4 | 800 | 2.2 | 150 | 25 | 70 |
| P3100SB | 275 | 350 | 4 | 800 | 2.2 | 150 | 20 | 65 |
| P3500SB | 320 | 400 | 4 | 800 | 2.2 | 150 | 20 | 55 |

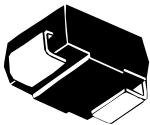
| Part Number | V _{DRM} @ I _{DRM} =5μA | V _S @ 100V/μS | V _T @ I _T =2.2Amps | I _S | I _T | I _H | Capacitance @1MHz, 2V bias | |
|-------------|---|-----------------------------|---|----------------|----------------|----------------|-------------------------------|--------|
| | V min | V max | V max | mA max | A max | mA min | pF min | pF max |
| P0060SC | 6 | 15 | 4 | 800 | 2.2 | 50 | 45 | 100 |
| P0080SC | 6 | 25 | 4 | 800 | 2.2 | 50 | 45 | 100 |
| P0220SC | 15 | 32 | 4 | 800 | 2.2 | 50 | 30 | 110 |
| P0300SC | 25 | 40 | 4 | 800 | 2.2 | 50 | 25 | 80 |
| P0640SC | 58 | 77 | 4 | 800 | 2.2 | 150 | 55 | 155 |
| P0720SC | 65 | 88 | 4 | 800 | 2.2 | 150 | 50 | 150 |
| P0900SC | 75 | 98 | 4 | 800 | 2.2 | 150 | 45 | 140 |
| P1100SC | 90 | 130 | 4 | 800 | 2.2 | 150 | 45 | 115 |
| P1300SC | 120 | 160 | 4 | 800 | 2.2 | 150 | 40 | 115 |
| P1500SC | 140 | 180 | 4 | 800 | 2.2 | 150 | 35 | 110 |
| P1800SC | 170 | 220 | 4 | 800 | 2.2 | 150 | 35 | 110 |
| P2000SC | 180 | 220 | 4 | 800 | 2.2 | 150 | 35 | 120 |
| P2300SC | 190 | 260 | 4 | 800 | 2.2 | 150 | 30 | 120 |
| P2600SC | 220 | 300 | 4 | 800 | 2.2 | 150 | 30 | 120 |
| P3100SC | 275 | 350 | 4 | 800 | 2.2 | 150 | 30 | 110 |
| P3500SC | 320 | 400 | 4 | 800 | 2.2 | 150 | 25 | 110 |

Surge Ratings

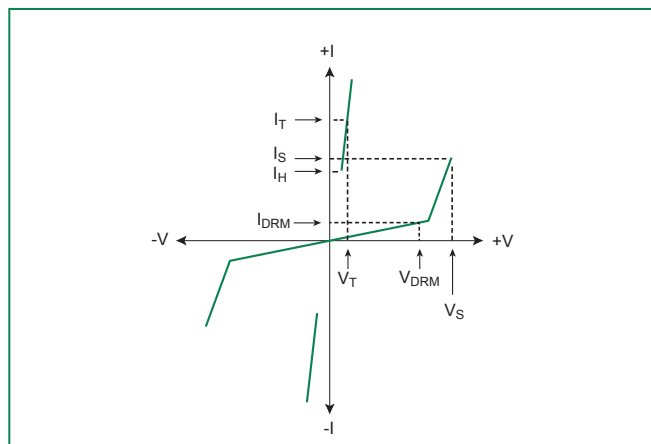
| Series | I _{PP} | | | | | ITSM 50/60 Hz | di/dt |
|--------|-----------------|---------|-----------|-----------|------------|------------------|----------|
| | 2x10 μs | 8x20 μs | 10x160 μs | 10x560 μs | 10x1000 μs | | |
| | A min | A min | A min | A min | A min | A min | A/μs max |
| A | 150 | 150 | 90 | 50 | 45 | 20 | 500 |
| B | 250 | 250 | 150 | 100 | 80 | 30 | 500 |
| C | 500 | 400 | 200 | 150 | 100 | 50 | 500 |

Notes:
 1 Current waveform in μs - Peak pulse current rating (I_{pp}) is repetitive and guaranteed for the life of the product.
 2 Voltage waveform in μs - I_{pp} ratings applicable over temperature range of -40°C to +85°C
 - The device must initially be in thermal equilibrium with -40°C ≤ T_J ≤ +150°C

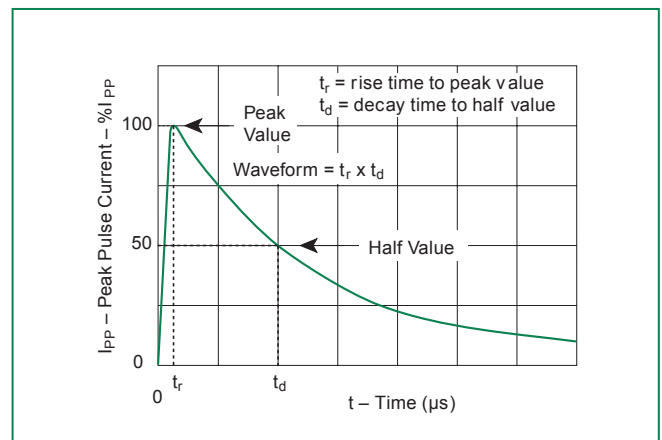
Thermal Considerations

| 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 _{θJA} | Thermal Resistance: Junction to Ambient | 90 | °C/W |

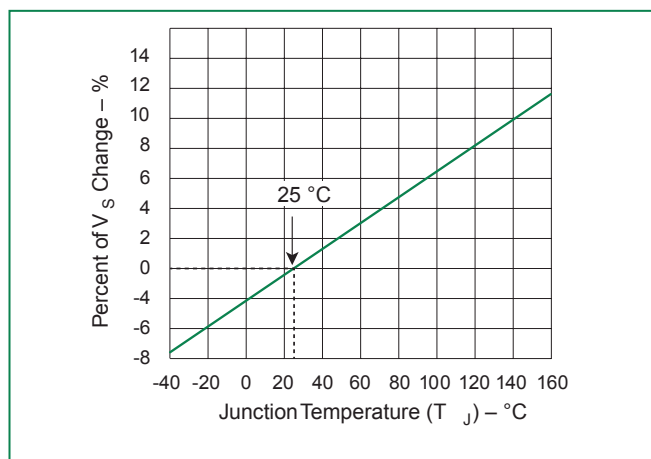
V-I Characteristics



t_r x t_d Pulse Waveform



Normalized V_S Change vs. Junction Temperature



Normalized DC Holding Current vs. Case Temperature

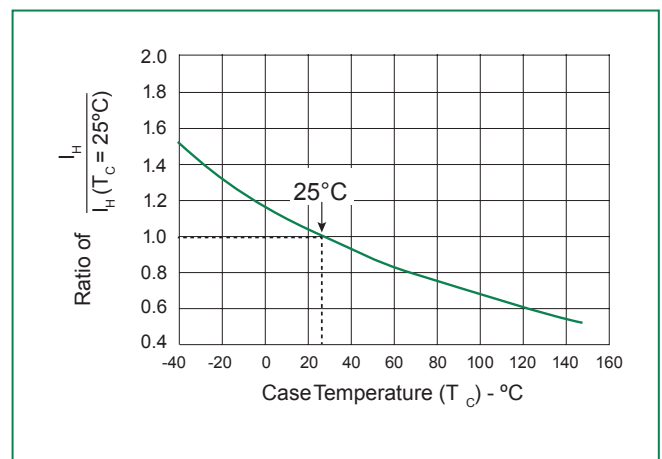
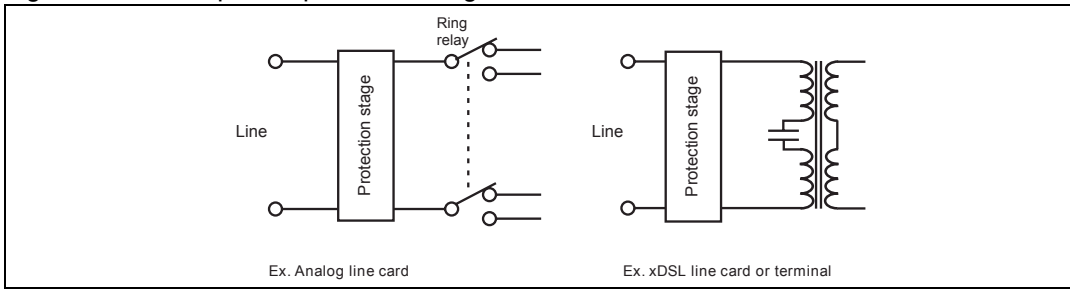


Figure 1.E examples of protection stages for line cards



In such a stage, parallel function is assumed by one or several Trisil, and is used to protect against short duration surge (lightning). During this kind of surges the Trisil limits the voltage across the device to be protected at its break over value and then fires. The fuse assumes the series function, and is used to protect the module against long duration or very high current mains disturbances (50/60Hz). It acts by safe circuit opening. Lightning surge and mains disturbance surges are defined by standards like GR1089, FCC part 68, ITU-T K20.

Figure 2. Typical circuits

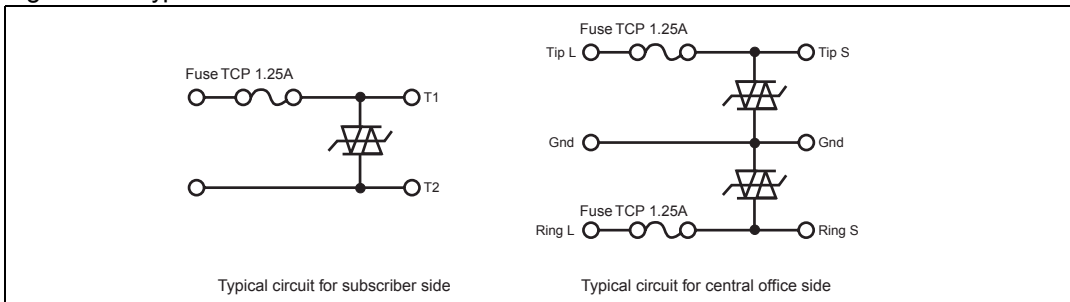


Figure 3.T est circuit 1 for Dynamic I_{BO} and V_{BO} parameters

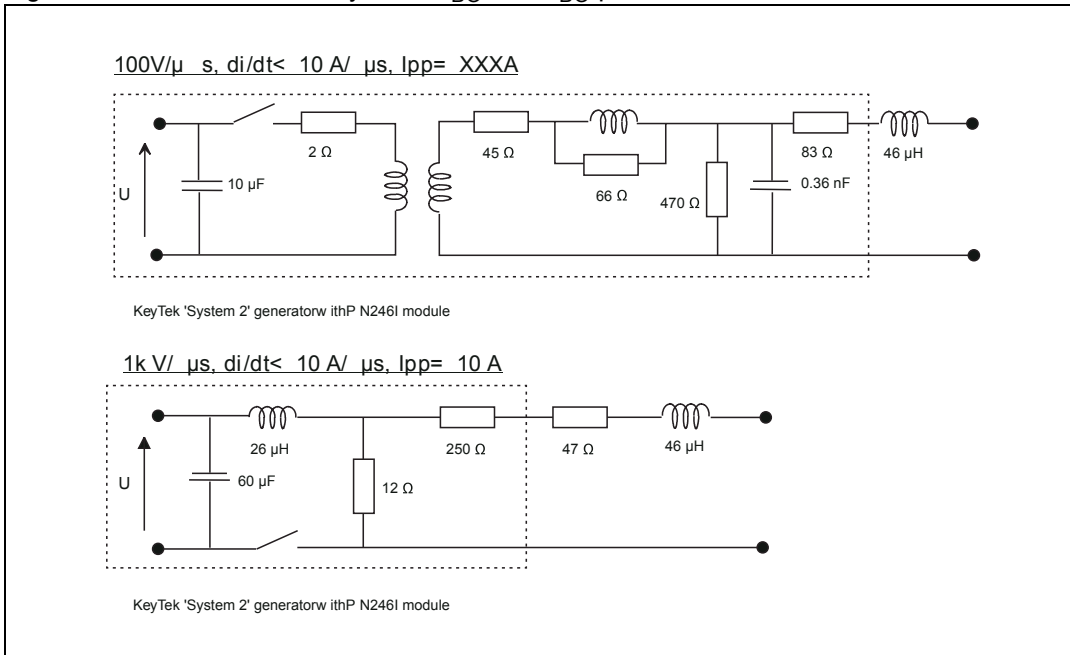


Figure 4. Test circuit 2 for I_{BO} and V_{BO} parameters

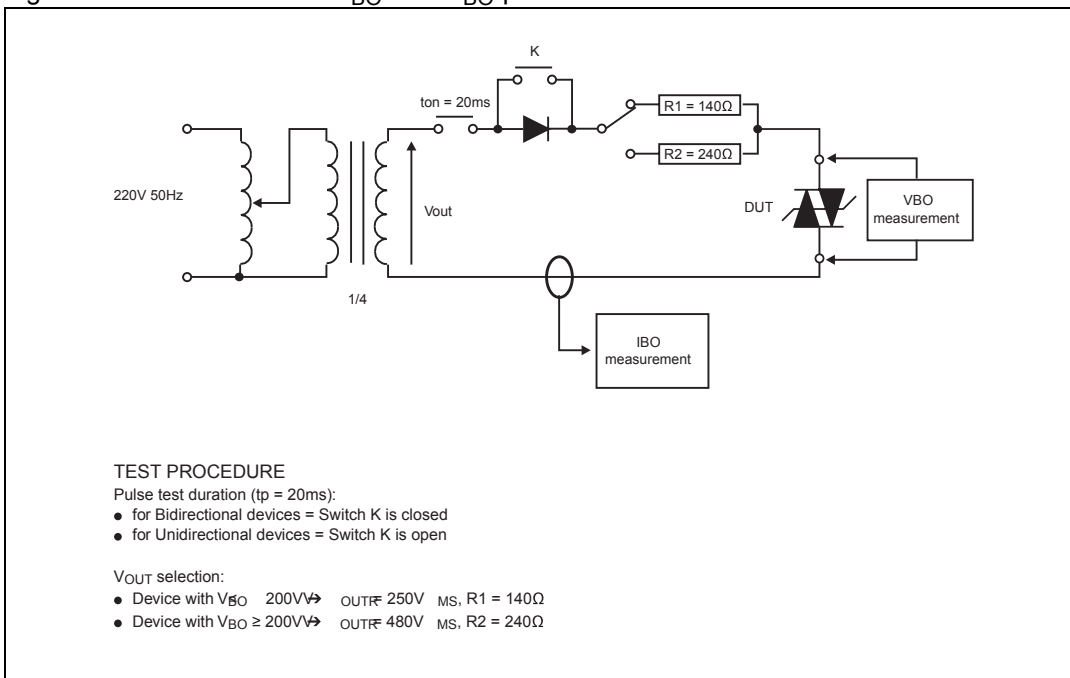
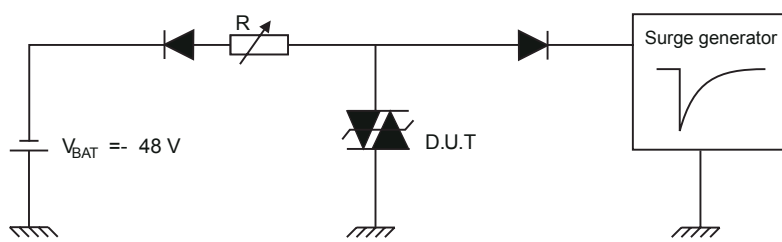


Figure 5. Test circuit 3 for dynamic I_H parameter



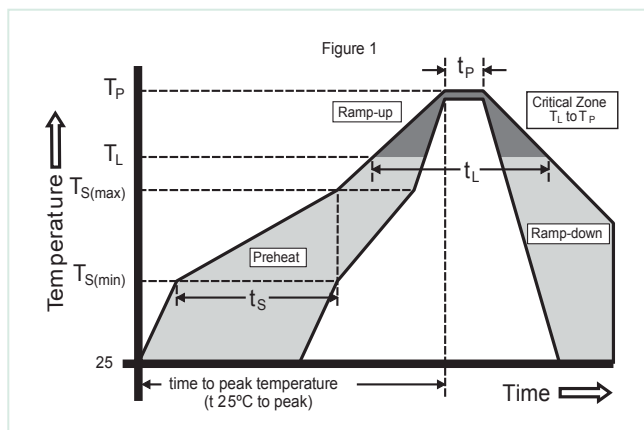
This is a GO-NOGO test which allows to confirm the holding current (I_H) level in a functional test circuit.

TEST PROCEDURE

- 1/ Adjust the current level at the I_H value by short circuiting the AK of the D.U.T.
- 2/ Fire the D.U.T. with a surge current $\rightarrow I_{PP} = 10A, 10/1000\mu s$.
- 3/ The D.U.T. will come back off-state within 50ms maximum.

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 | |



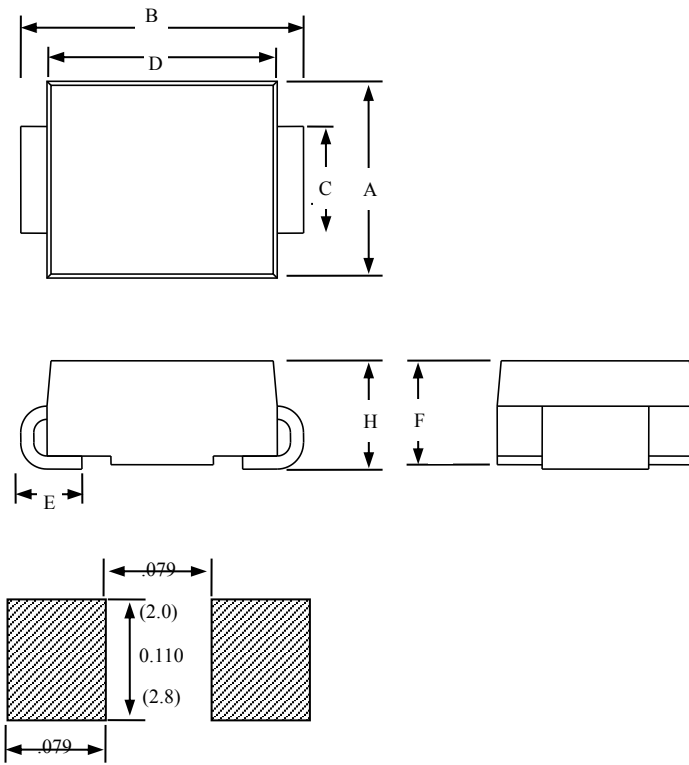
Physical Specifications

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

Environmental Specifications

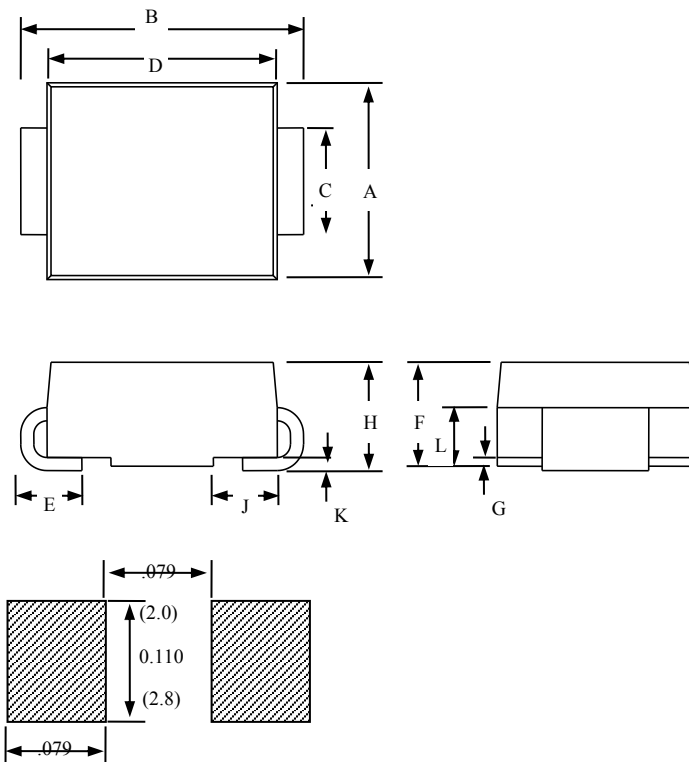
| | |
|----------------------------------|---|
| High Temp Voltage Blocking | 80% Rated V_{DRM} (V_{AC} Peak) +125°C or +150°C, 504 or 1008 hrs. MIL-STD-750 (Method 1040) JEDEC, JESD22-A-101 |
| Temp Cycling | -65°C to +150°C, 15 min. dwell, 10 up to 100 cycles. MIL-STD-750 (Method 1051) EIA/JEDEC, JESD22-A104 |
| 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 |

Dimensions



| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.098 | 0.114 | 2.50 | 2.90 |
| B | 0.188 | 0.208 | 4.80 | 5.28 |
| C | 0.055 | 0.062 | 1.40 | 1.60 |
| D | 0.157 | 0.181 | 4.00 | 4.60 |
| E | 0.030 | 0.060 | 0.76 | 1.52 |
| F | 0.078 | 0.096 | 2.00 | 2.44 |
| H | 0.080 | 0.104 | 2.051 | 2.643 |

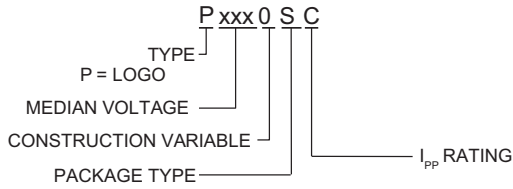
(2.0) DO-214AC (SMA)



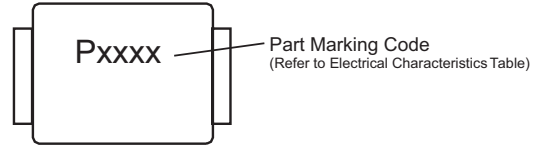
| Dimension | Inches | | Millimeters | |
|-----------|--------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.134 | 0.155 | 3.40 | 3.94 |
| B | 0.205 | 0.22 | 5.21 | 5.59 |
| C | 0.075 | 0.083 | 1.90 | 2.11 |
| D | 0.166 | 0.185 | 4.22 | 4.70 |
| E | 0.036 | 0.056 | 0.91 | 1.42 |
| F | 0.073 | 0.087 | 1.85 | 2.2 |
| G | 0.002 | 0.008 | 0.05 | 0.20 |
| H | 0.077 | 0.094 | 1.95 | 2.40 |
| J | 0.043 | 0.053 | 1.09 | 1.35 |
| K | 0.008 | 0.014 | 0.20 | 0.35 |
| L | 0.039 | 0.049 | 0.99 | 1.24 |

(2.0) DO-214AA (SMB)

Part Numbering



Part Marking



Packing Options

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

Tape and Reel Specification — DO-214AA

