

Product Summary

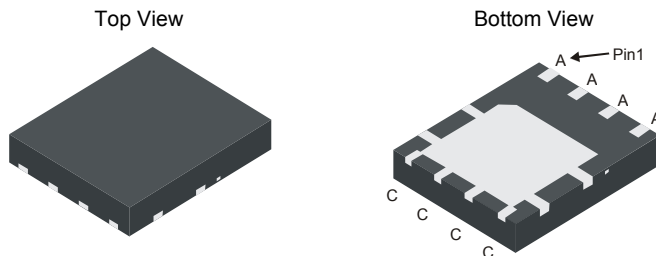
| V_{RRM} (V) | I_o (A) | $V_F(MAX)$ (V) @ +25°C | $I_R(MAX)$ (mA) @ +25°C |
|---------------|-----------|---------------------------|----------------------------|
| 50 | 20 | 0.5 | 0.5 |

Description and Applications

Packaged in the compact thermally efficient POWERDI5060-8 package, the SBRT20U50SLPQ provides very low V_F and excellent reverse leakage stability at high temperatures. It is ideal for use as a rectifier, freewheel diode or blocking diode in:

- Automotive Applications

POWERDI5060-8

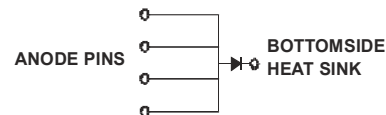


Features and Benefits

- Patented Trench SBR technology provides superior avalanche capability versus Schottky diodes, ensuring more rugged and reliable end applications.
- Reduced ultra-low forward voltage drop (V_F); Better efficiency and cooler operation.
- Reduced high temperature reverse leakage; Increased reliability against thermal runaway failure in high temperature operation.
- Less than 1.1mm package profile – ideal for thin applications.
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free “Green” Device (Note 3)**
- Qualified to AEC-Q101 Standards for High Reliability**
- PPAP Capable (Note 4)**

Mechanical Data

- Case: POWERDI5060-8
- Case Material: Molded Plastic, “Green” Molding compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208
- Polarity: See Below
- Weight: 0.097 grams (approximate)



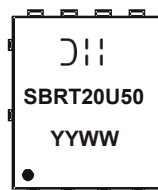
Note: All four anode pins must be electrically connected at the printed circuit board.

Ordering Information (Note 5)

| Part Number | Compliance | Case | Packaging |
|------------------|------------|---------------|------------------|
| SBRT20U50SLPQ-13 | Automotive | POWERDI5060-8 | 2500/Tape & Reel |

- Notes:
- EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
 - See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, “Green” and Lead-free.
 - Halogen- and Antimony-free “Green” products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
 - Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified. For more information, please refer to http://www.diodes.com/quality/product_compliance_definitions/.
 - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

Marking Information



SBRT20U50 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last two digits of year (ex: 14 = 2014)
WW = Week (01-53)

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Single phase, half wave, 60Hz, resistive or inductive load.
For capacitance load, derate current by 20%.

| Characteristic | Symbol | Value | Unit |
|--|--------------|-------|------|
| Peak Repetitive Reverse Voltage | V_{RRM} | 50 | V |
| Working Peak Reverse Voltage | V_{RWM} | | |
| DC Blocking Voltage | V_{RM} | | |
| RMS Reverse Voltage | $V_{R(RMS)}$ | 35 | V |
| Average Rectified Output Current | I_O | 20 | A |
| Non-Repetitive Peak Forward Surge Current 8.3ms Single Half Sine-Wave Superimposed on Rated Load | I_{FSM} | 200 | A |
| Non-Repetitive Avalanche Energy ($T_J = +25^\circ\text{C}$, $I_{AS} = 14.5\text{A}$, $L = 8.5\text{mH}$) | E_{AS} | 640 | mJ |
| Repetitive Peak Avalanche Energy (1 μs , +25 $^\circ\text{C}$) | P_{ARM} | 40000 | W |

Thermal Characteristics

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|--------------------|
| Typical Thermal Resistance Junction to Ambient (Note 6) | $R_{\theta JA}$ | 12 | $^\circ\text{C/W}$ |
| Operating Temperature Range | T_J | -55 to +150 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{STG} | -55 to +175 | $^\circ\text{C}$ |

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|-------------------------------|----------|-----|-------|-------|------|---|
| Forward Voltage Drop (Note 7) | V_F | — | 0.375 | 0.420 | V | $I_F = 10\text{A}$, $T_J = +25^\circ\text{C}$ |
| | | — | 0.445 | 0.500 | | $I_F = 20\text{A}$, $T_J = +25^\circ\text{C}$ |
| Leakage Current (Note 7) | I_R | — | 0.144 | 0.500 | mA | $V_R = 50\text{V}$, $T_J = +25^\circ\text{C}$ |
| | | — | — | 100 | | $V_R = 50\text{V}$, $T_J = +125^\circ\text{C}$ |
| Total Capacitance | C_T | — | 350 | — | pF | $V_R = 50\text{V}$, $f = 1\text{MHz}$ |
| Reverse Recovery Time | t_{rr} | — | 48 | — | ns | $I_F = 0.5\text{A}$, $I_R = 1.0\text{A}$, $I_{rr} = 0.25\text{A}$, RG1 |

Notes: 6. Device mounted on Al substrate PCB (30mm*30mm) with additional heat sink (Al 48mm*35mm*80mm)
7. Short duration pulse test used to minimize self-heating effect.

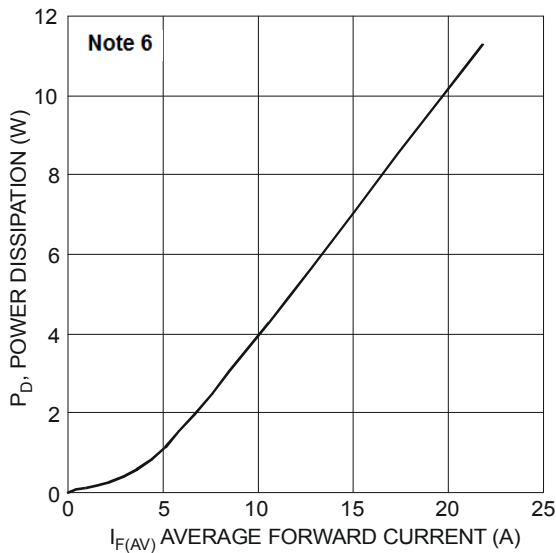


Figure 1 Forward Power Dissipation

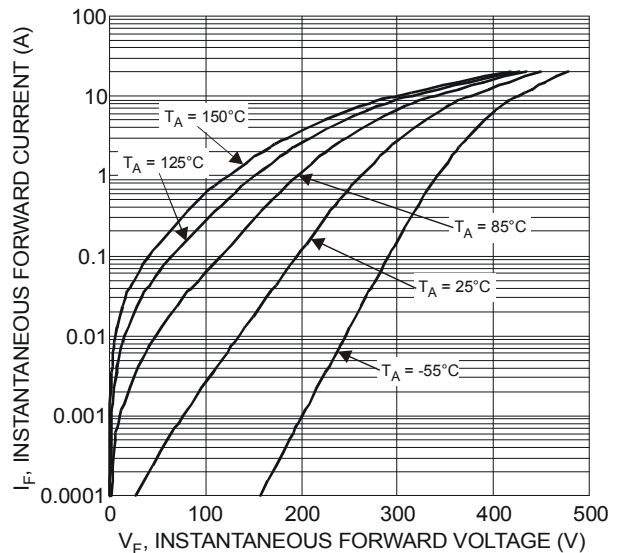


Figure 2 Typical Forward Characteristics

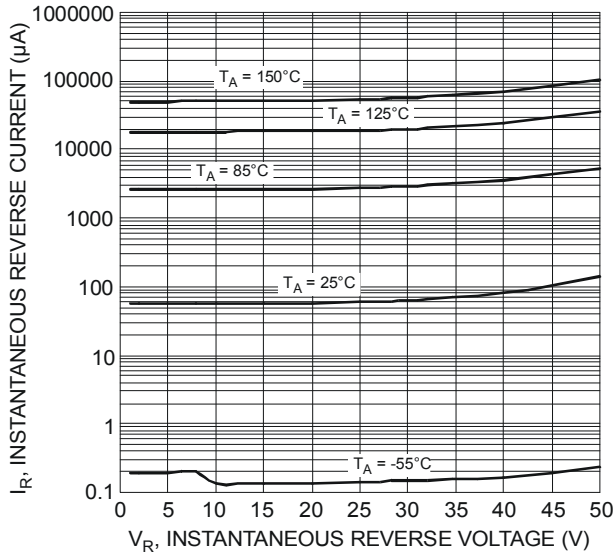


Figure 3 Typical Reverse Characteristics

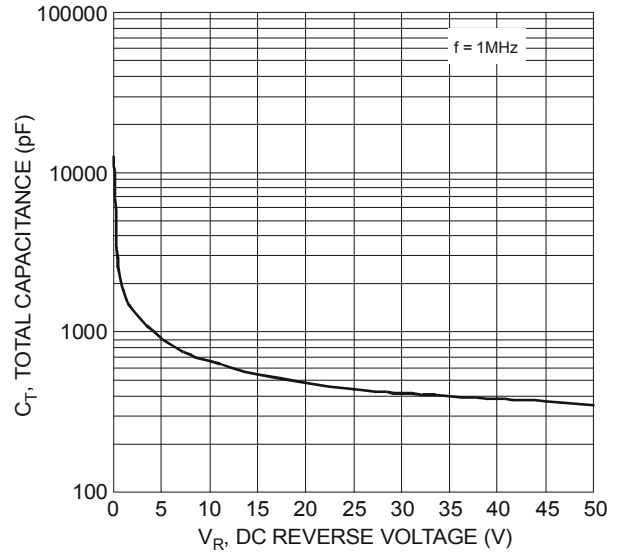


Figure 4 Total Capacitance vs. Reverse Voltage

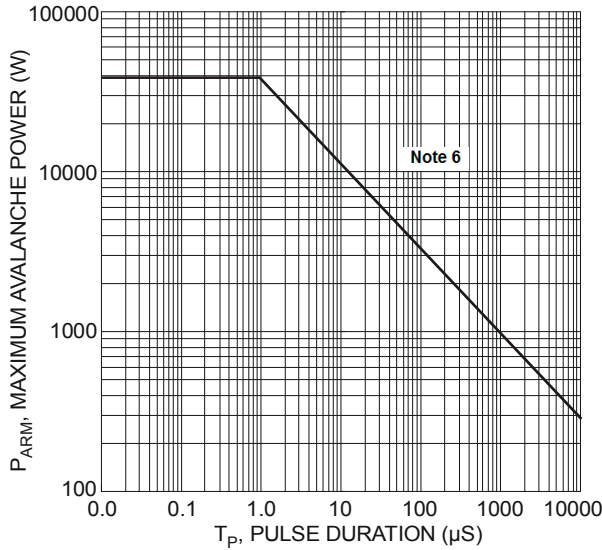


Figure 5 Maximum Avalanche Power Curve

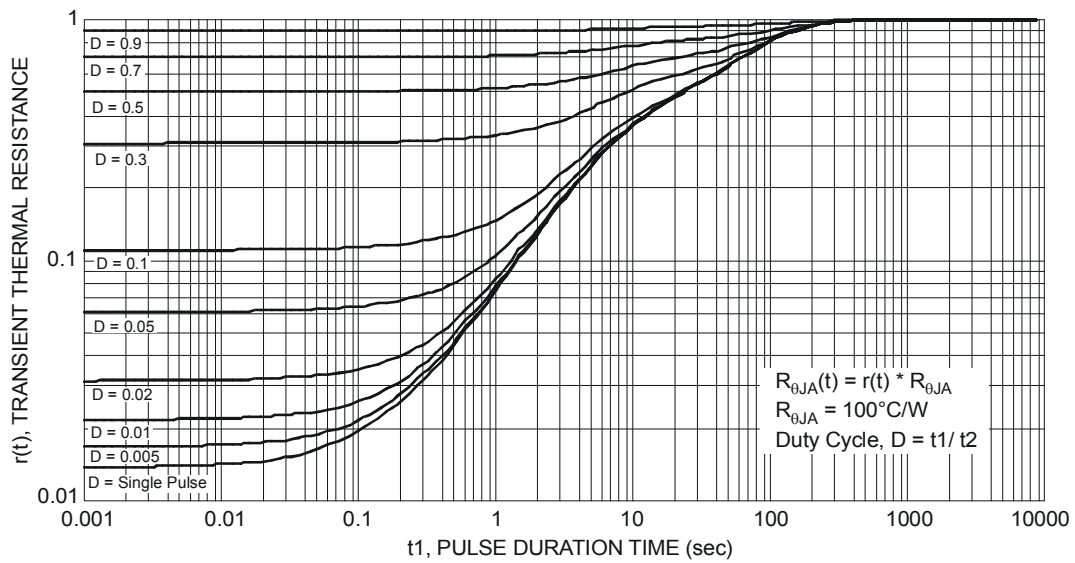
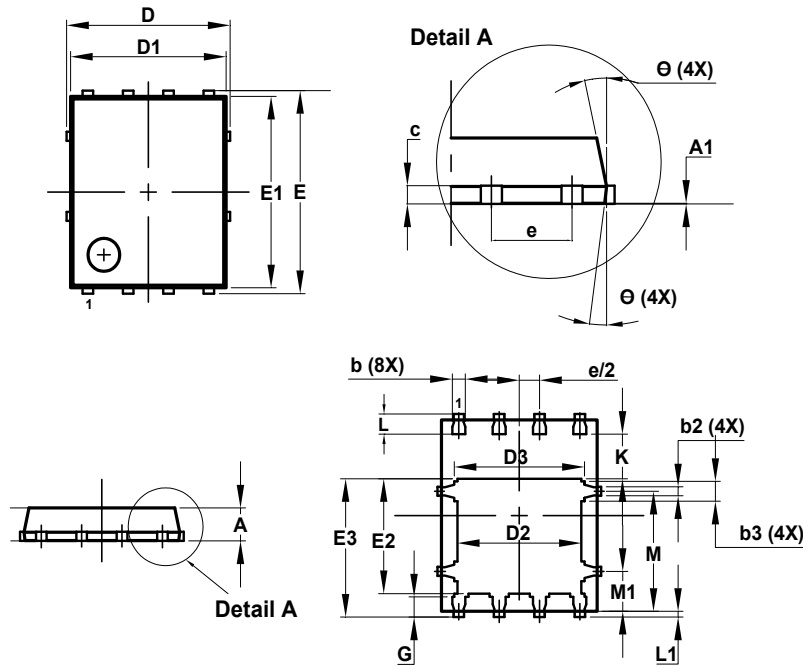


Figure 6 Transient Thermal Resistance

Package Outline Dimensions

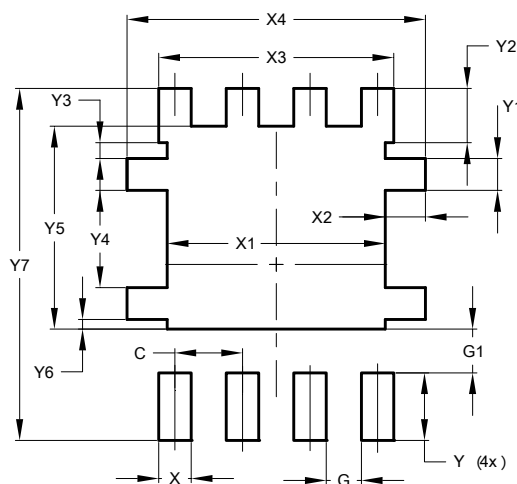
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| POWERDI5060-8 | | | |
|----------------------|----------|-------|-------|
| Dim | Min | Max | Typ |
| A | 0.90 | 1.10 | 1.00 |
| A1 | 0.00 | 0.05 | — |
| b | 0.33 | 0.51 | 0.41 |
| b2 | 0.200 | 0.350 | 0.273 |
| b3 | 0.40 | 0.80 | 0.60 |
| c | 0.230 | 0.330 | 0.277 |
| D | 5.15 BSC | | |
| D1 | 4.70 | 5.10 | 4.90 |
| D2 | 3.70 | 4.10 | 3.90 |
| D3 | 3.90 | 4.30 | 4.10 |
| E | 6.15 BSC | | |
| E1 | 5.60 | 6.00 | 5.80 |
| E2 | 3.28 | 3.68 | 3.48 |
| E3 | 3.99 | 4.39 | 4.19 |
| e | 1.27 BSC | | |
| G | 0.51 | 0.71 | 0.61 |
| K | 0.51 | — | — |
| L | 0.51 | 0.71 | 0.61 |
| L1 | 0.050 | 0.20 | 0.175 |
| M | 3.235 | 4.035 | 3.635 |
| M1 | 1.00 | 1.40 | 1.21 |
| θ | 10° | 12° | 11° |
| θ 1 | 6° | 8° | 7° |
| All Dimensions in mm | | | |

Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



| Dimensions | Value (in mm) |
|------------|---------------|
| C | 1.270 |
| G | 0.660 |
| G1 | 0.820 |
| X | 0.610 |
| X1 | 4.100 |
| X2 | 0.755 |
| X3 | 4.420 |
| X4 | 5.610 |
| Y | 1.270 |
| Y1 | 0.600 |
| Y2 | 1.020 |
| Y3 | 0.295 |
| Y4 | 1.825 |
| Y5 | 3.810 |
| Y6 | 0.180 |
| Y7 | 6.610 |

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