

## Product Summary

| $V_{RRM}$ (V) | $I_O$ (A) | $V_F$ MAX (V) @+25°C | $I_R$ MAX (mA) @+25°C |
|---------------|-----------|----------------------|-----------------------|
| 45            | 10        | 0.47                 | 0.3                   |

## Description and Applications

This Super Barrier Rectifier (SBR<sup>®</sup>) diode has been designed to meet the stringent requirements of Automotive Applications. It is ideally suited to use as :

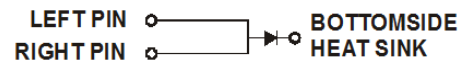
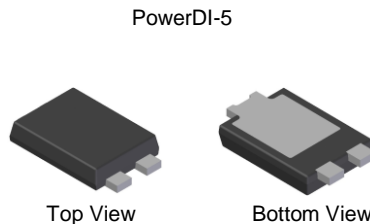
- Polarity Protection Diode
- Re-Circulating Diode
- Switching Diode

## Features and Benefits

- 100% Avalanche Tested
- Patented SBR technology provides a superior avalanche capability than 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 at high temperature
- **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: PowerDI<sup>®</sup>-5
- 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 (3)
- Weight: 0.093 grams (Approximate)



**Note: Pins Left & Right must be electrically connected at the printed circuit board.**

## Ordering Information (Note 5)

| Part Number     | Compliance | Case      | Packaging        |
|-----------------|------------|-----------|------------------|
| SBR10U45SP5Q-13 | Automotive | PowerDI-5 | 5000/Tape & Reel |

- Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
  2. See <http://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/>.
  5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information



S10U45S = Product Type Marking Code  
 ⌋⌋⌋ = Manufacturers' Code Marking  
 K = Factory Designator  
 YYWW = Date Code Marking  
 YY = Last Two Digits of Year (ex: 18 for 2018)  
 WW = Week Code (01 to 53)

### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

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

| Characteristic  | Symbol              | Value | Unit |
|---|---------------------|-------|------|
| Peak Repetitive Reverse Voltage   | V <sub>RRM</sub>    | 45    | V    |
| Working Peak Reverse Voltage  | V <sub>RWM</sub>    |       |      |
| DC Blocking Voltage   | V <sub>RM</sub>     |       |      |
| RMS Reverse Voltage   | V <sub>R(RMS)</sub> | 32    | V    |
| Average Rectified Output Current  | I <sub>O</sub>      | 10    | A    |
| Non-Repetitive Peak Forward Surge Current 8.3ms<br>Single Half Sine-Wave Superimposed on Rated Load | I <sub>FSM</sub>    | 275   | A    |
| Repetitive Peak Avalanche Power (1μs, +25°C)  | P <sub>ARM</sub>    | 5630  | W    |
| Non-Repetitive Avalanche Energy<br>(T <sub>J</sub> = +25°C, I <sub>AS</sub> = 12A, L = 10mH)        | E <sub>AS</sub>     | 530   | mJ   |

### Thermal Characteristics

| Characteristic                                  | Symbol           | Value       | Unit |
|---|------------------|-------------|------|
| Maximum Thermal Resistance                      |                  |             |      |
| Thermal Resistance Junction to Ambient (Note 6) | R <sub>θJA</sub> | 73          | °C/W |
| Thermal Resistance Junction to Ambient (Note 7) | R <sub>θJA</sub> | 31          |      |
| Storage Temperature Range                       | T <sub>STG</sub> | -55 to +150 | °C   |

### Electrical Characteristics (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                     | Symbol             | Min | Typ  | Max  | Unit | Test Condition                                |
|------------------------------------|--------------------|-----|------|------|------|---|
| Reverse Breakdown Voltage (Note 8) | V <sub>(BR)R</sub> | 45  | —    | —    | V    | I <sub>R</sub> = 0.3mA                        |
| Forward Voltage Drop               | V <sub>F</sub>     | —   | 0.41 | —    | V    | I <sub>F</sub> = 8A, T <sub>J</sub> = +25°C   |
|                                    |                    | —   | 0.44 | 0.47 |      | I <sub>F</sub> = 10A, T <sub>J</sub> = +25°C  |
|                                    |                    | —   | 0.38 | —    |      | I <sub>F</sub> = 10A, T <sub>J</sub> = +125°C |
| Leakage Current (Note 8)           | I <sub>R</sub>     | —   | 0.09 | 0.3  | mA   | V <sub>R</sub> = 45V, T <sub>J</sub> = +25°C  |
|                                    |                    | —   | 30   | —    |      | V <sub>R</sub> = 45V, T <sub>J</sub> = +125°C |

- Notes:
6. FR-4 PCB, 2oz. Copper. Minimum recommended pad layout per <http://www.diodes.com/package-outlines.html>.
  7. Polyimide PCB, 2oz. Copper. Cathode pad dimensions 18.8mm x 14.4mm. Anode pad dimensions 5.6mm x 14.4mm.
  8. Short duration pulse test used to minimize self-heating effect.

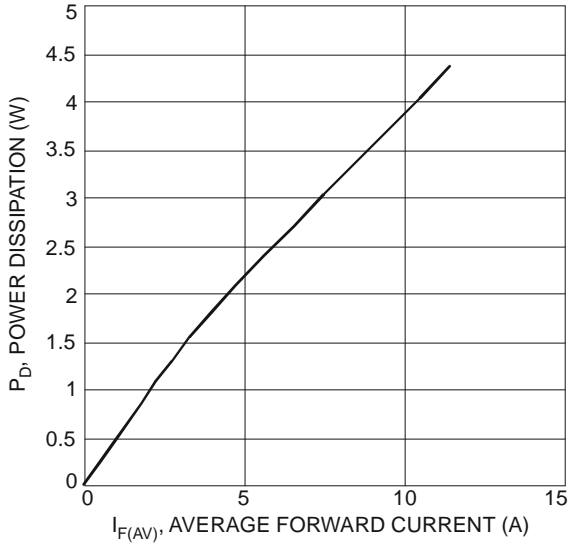


Figure 1 Forward Power Dissipation

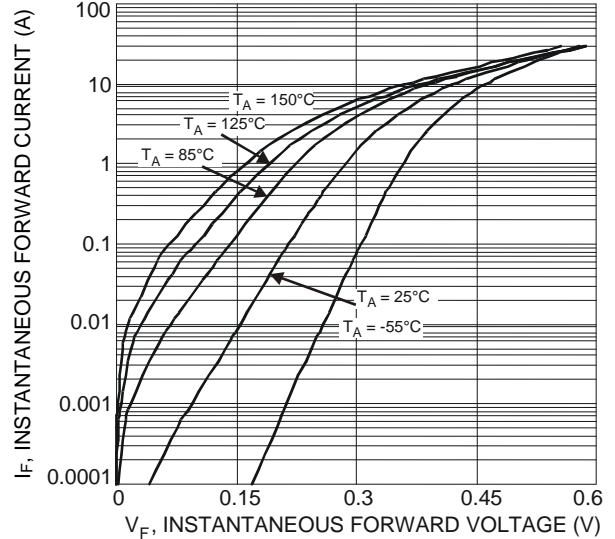


Figure 2 Typical Forward Characteristics

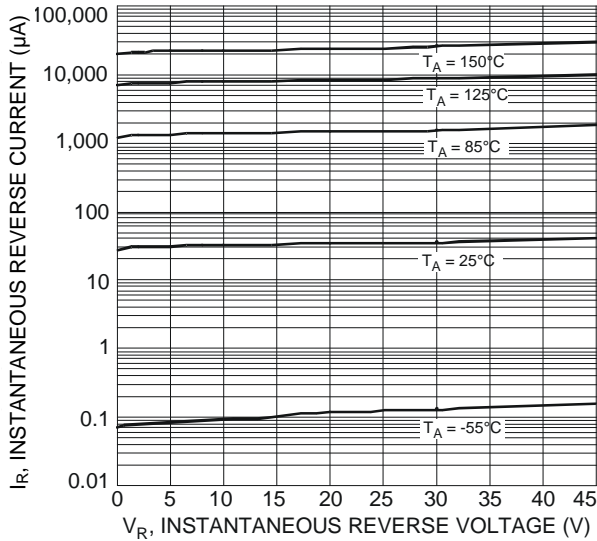


Figure 3 Typical Reverse Characteristics

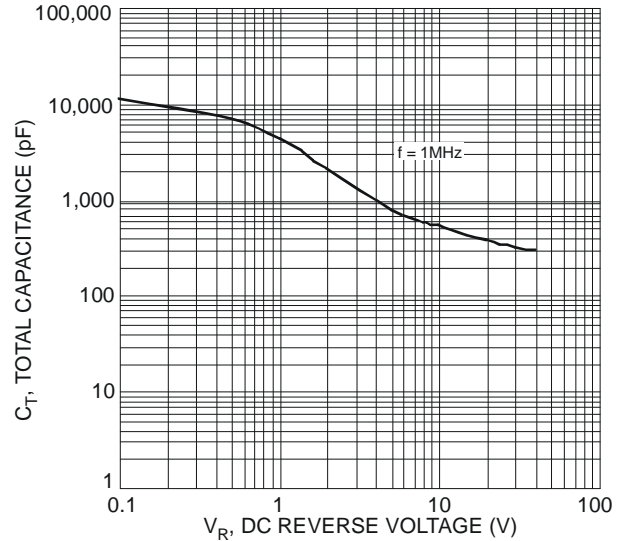


Figure 4 Total Capacitance vs. Reverse Voltage

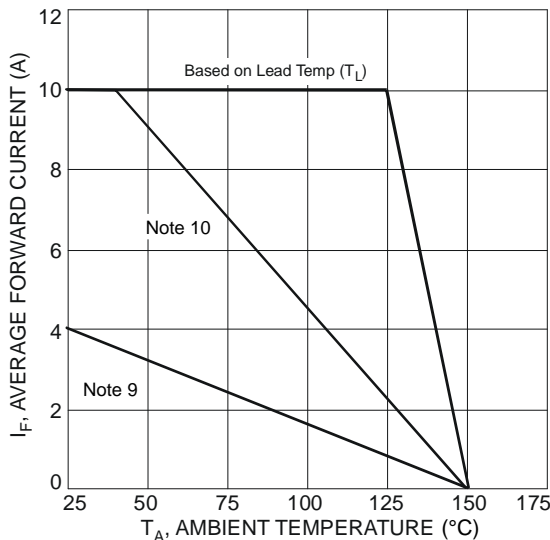


Figure 5 Forward Current Derating Curve

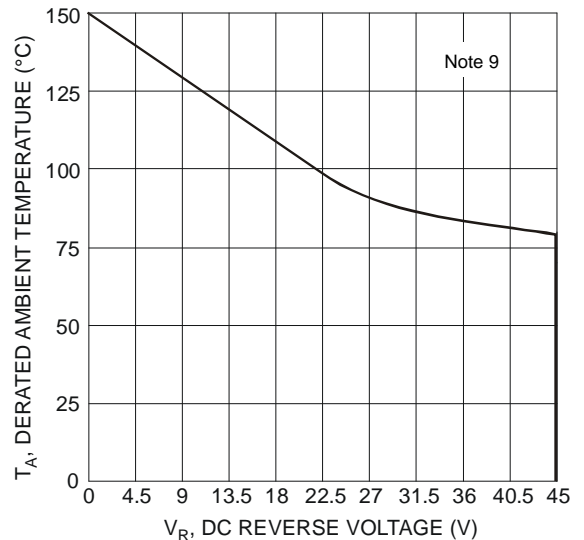


Figure 6 Operating Temperature Derating

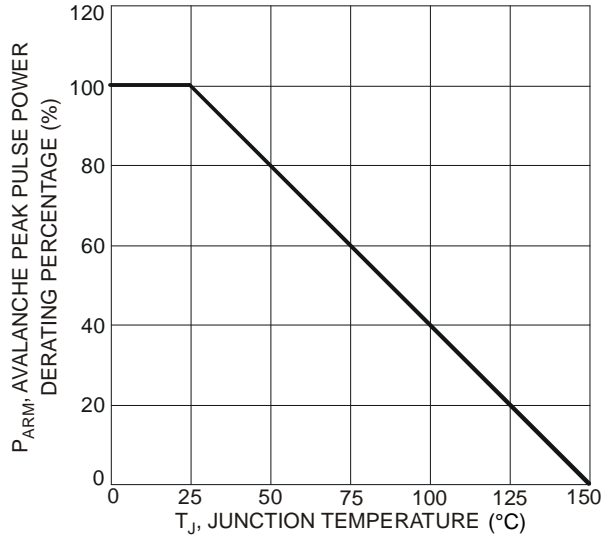


Figure 7 Pulse Derating Curve

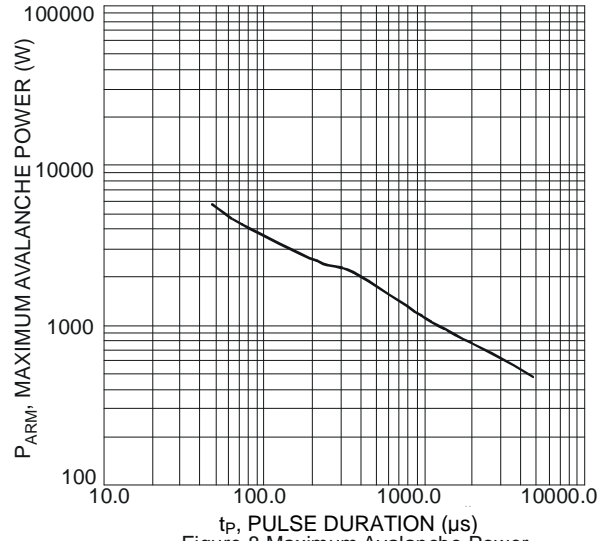


Figure 8 Maximum Avalanche Power

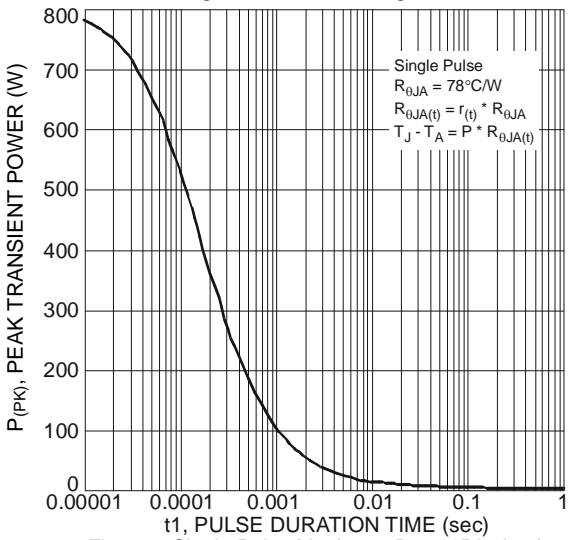


Figure 9 Single Pulse Maximum Power Dissipation

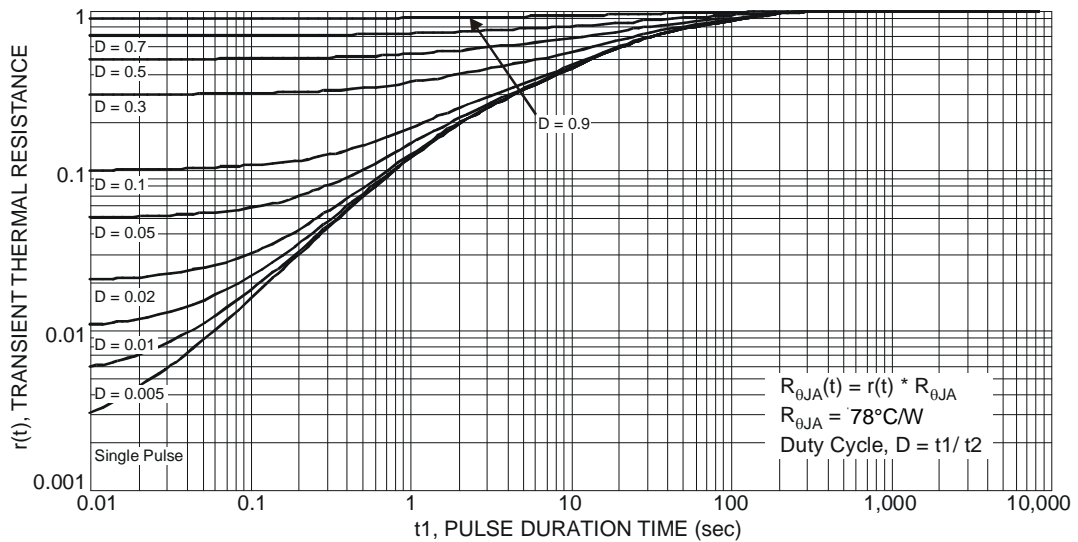


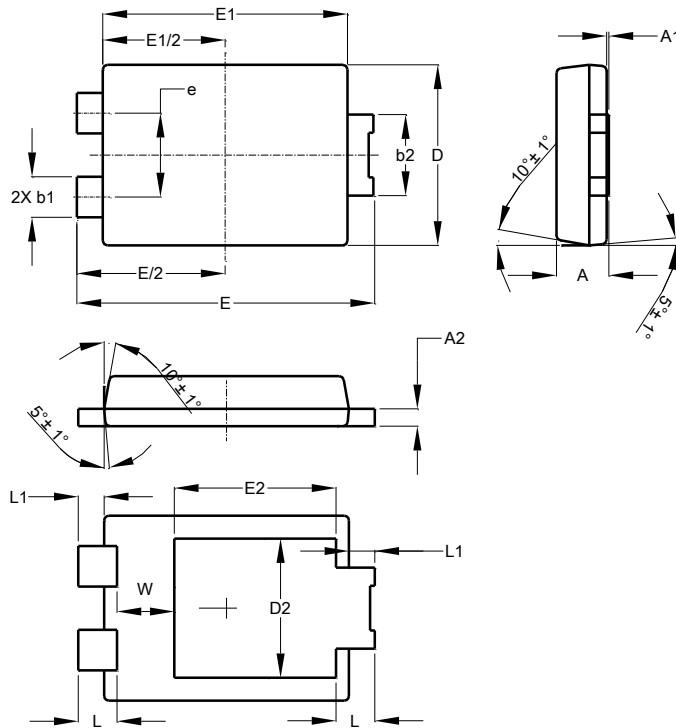
Figure 10 Transient Thermal Resistance

Notes: 9. Device mounted on FR-4 substrate, 2oz copper, with minimum recommended pad layout.  
10. Device mounted on FR-4 substrate, 2oz copper, with 10cm x 10cm pad layout.

**Package Outline Dimensions**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**PowerDI-5**

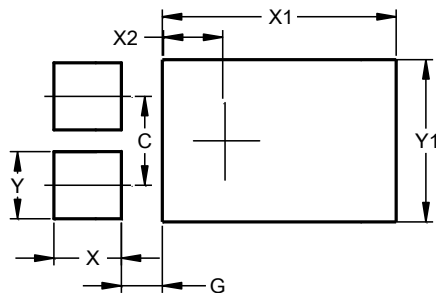


| PowerDI-5            |      |      |       |
|----------------------|------|------|-------|
| Dim                  | Min  | Max  | Typ   |
| A                    | 1.05 | 1.15 | 1.10  |
| A1                   | 0.00 | 0.05 | --    |
| A2                   | 0.33 | 0.43 | 0.381 |
| b1                   | 0.80 | 0.99 | 0.89  |
| b2                   | 1.70 | 1.88 | 1.78  |
| D                    | 3.90 | 4.05 | 3.966 |
| D2                   | --   | --   | 3.054 |
| E                    | 6.40 | 6.60 | 6.51  |
| e                    | --   | --   | 1.84  |
| E1                   | 5.30 | 5.45 | 5.37  |
| E2                   | --   | --   | 3.549 |
| L                    | 0.75 | 0.95 | 0.85  |
| L1                   | 0.50 | 0.65 | 0.57  |
| W                    | 1.10 | 1.41 | 1.255 |
| All Dimensions in mm |      |      |       |

**Suggested Pad Layout**

Please see <http://www.diodes.com/package-outlines.html> for the latest version.

**PowerDI-5**



| Dimensions | Value (in mm) |
|------------|---------------|
| C          | 1.840         |
| G          | 0.852         |
| X          | 1.400         |
| X1         | 4.860         |
| X2         | 1.310         |
| Y          | 1.390         |
| Y1         | 3.360         |

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