

## Product Summary

| $V_{RRM}$ (V) | $I_O$ (A) | $V_F$ (typ) @ +125°C (V) | $I_R$ (MAX) @ $V_{RRM}$ (mA) |
|---------------|-----------|--------------------------|------------------------------|
| 45            | 12        | 0.38                     | 0.3                          |

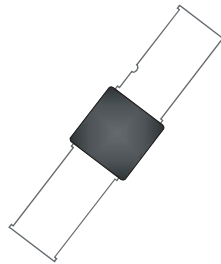
## Description

The SBR12U45LH1 uses SBR patented technology that offers ultra-low  $V_F$  to reduce forward power loss and improve efficiency. Encapsulated in the new PDI-5SP package with a 0.75mm low height profile and protruding leads for easy soldering, it is especially suited for use as a bypass diode in solar panels.

## Applications

- Solar Bypass Diode

POWERDI5SP



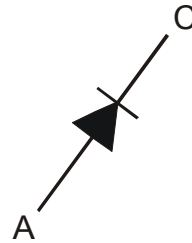
Top View

## Features

- Designed as bypass diodes for solar panels
- Low profile height (0.75mm) and 7.6mm protruding leads, enabling the package to be integrated within the solar glass panel
- Selectively rated for +200°C maximum junction temperature for high thermal reliability and excellent high temperature stability
- Patented Super Barrier Rectifier technology
- Ultra low forward voltage drop to minimize forward power losses
- Very low reverse leakage to ensures maximum efficiency of solar panel
- Lead-Free Finish; RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)**

## Mechanical Data

- Case: POWERDI5SP-B
- Case Material: Molded Plastic, UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Polarity: Cathode bar mark on top and cathode notch on lead
- Weight: 0.199 grams (approximate)



Pin Configuration

## Ordering Information (Note 4)

| Part Number    | Case         | Packaging          |
|----------------|--------------|--------------------|
| SBR12U45LH1-13 | POWERDI5SP-B | 3000 / 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](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.
  - For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information



12U45LH1 = Product Type Marking Code  
 11 = Manufacturers' Code Marking  
 YYWWK = Date Code Marking  
 YY = Last Two Digits of Year (ex: 14 for 2014)  
 WW = Week Code (01 ~ 53)  
 K = Factory Designator

**Maximum Ratings** (@T<sub>A</sub> = +25°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<br>Working Peak Reverse Voltage<br>DC Blocking Voltage              | V <sub>RRM</sub><br>V <sub>RWM</sub><br>V <sub>RM</sub> | 45    | V    |
| Average Rectified Output Current                                                                    | I <sub>O</sub>                                          | 12    | A    |
| Non-Repetitive Peak Forward Surge Current 8.3ms<br>Single Half Sine-Wave Superimposed on Rated Load | I <sub>FSM</sub>                                        | 300   | A    |

**Thermal Characteristics**

| Characteristic                                          | Symbol           | Value                                                | Unit |
|---------------------------------------------------------|------------------|------------------------------------------------------|------|
| Typical Thermal Resistance Junction to Ambient (Note 5) | R <sub>θJA</sub> | 66                                                   | °C/W |
| Operating Temperature Range                             | T <sub>J</sub>   | V <sub>R</sub> ≤ 80% V <sub>RRM</sub><br>-65 to +150 | °C   |
|                                                         |                  | DC Forward Mode (Note 7)<br>≤ 175                    |      |
|                                                         |                  | DC Forward Mode (Note 8)<br>≤ 200                    |      |
| Storage Temperature Range                               | T <sub>STG</sub> | -65 to +175                                          | °C   |

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

| Characteristic           | Symbol         | Min | Typ  | Max  | Unit | Test Condition                                |
|--------------------------|----------------|-----|------|------|------|-----------------------------------------------|
| Forward Voltage Drop     | V <sub>F</sub> | —   | 0.40 | 0.48 | V    | I <sub>F</sub> = 10A, T <sub>J</sub> = +25°C  |
|                          |                | —   | 0.42 | 0.50 |      | I <sub>F</sub> = 12A, T <sub>J</sub> = +25°C  |
|                          |                | —   | 0.38 | 0.45 |      | I <sub>F</sub> = 12A, T <sub>J</sub> = +125°C |
| Leakage Current (Note 6) | I <sub>R</sub> | —   | 70   | 200  | μA   | V <sub>R</sub> = 40V, T <sub>J</sub> = +25°C  |
|                          |                | —   | 90   | 300  |      | V <sub>R</sub> = 45V, T <sub>J</sub> = +25°C  |
|                          |                | —   | 19   | —    | mA   | V <sub>R</sub> = 45V, T <sub>J</sub> = +125°C |
|                          |                | —   | 60   | —    |      | V <sub>R</sub> = 45V, T <sub>J</sub> = +150°C |

Notes: 5. FR-4 PCB, 2oz. Copper, minimum recommended pad layout per <http://www.diodes.com.pdf>.  
6. Short duration pulse test used to minimize self-heating effect.  
7. Max junction temperature +175°C guaranteed for 2 hours at maximum output.  
8. Max junction temperature +200°C guaranteed for 2 hours at maximum output.

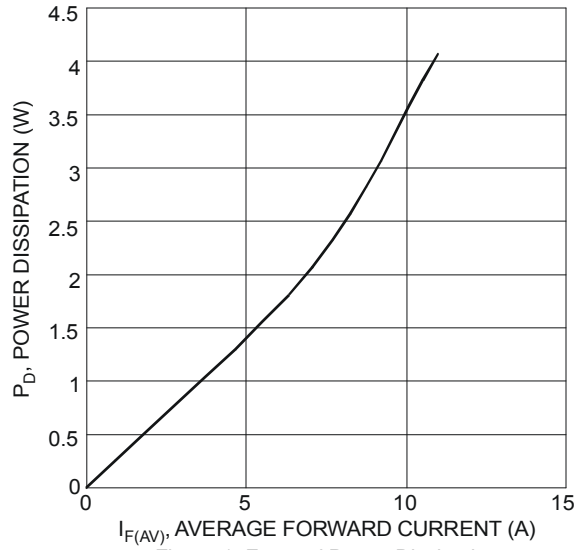


Figure 1 Forward Power Dissipation

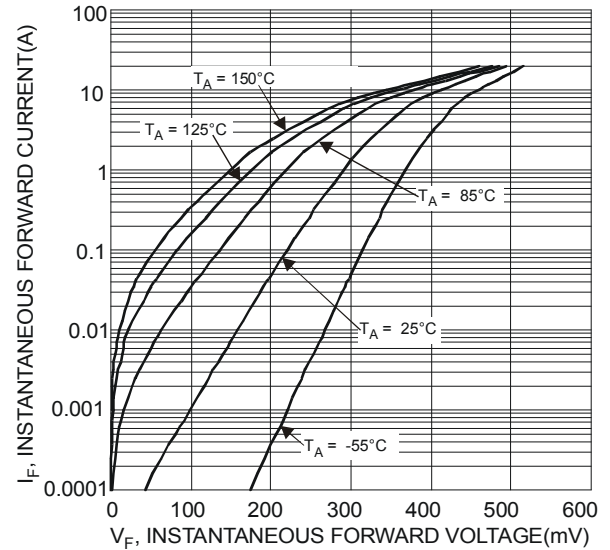


Figure 2 Typical Forward Characteristics

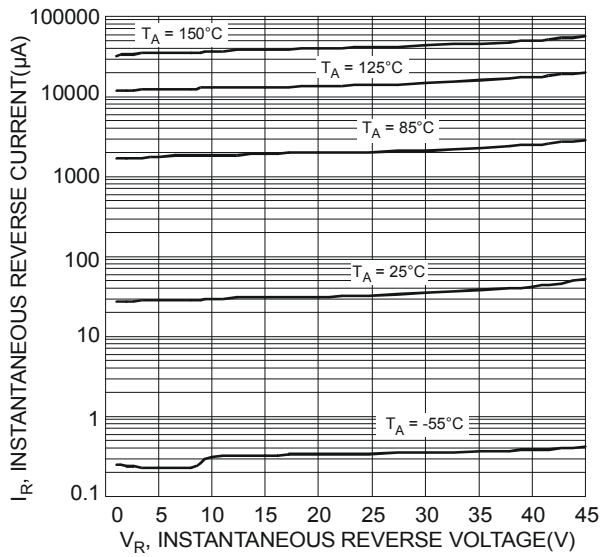


Figure 3 Typical Reverse Characteristics

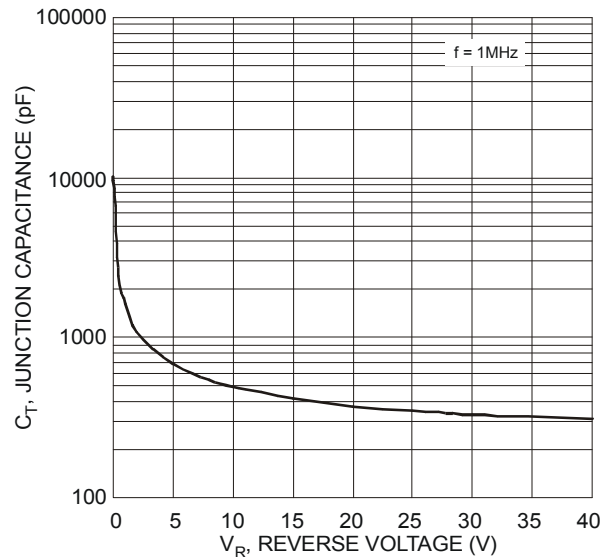


Figure 4 Typical Junction Capacitance

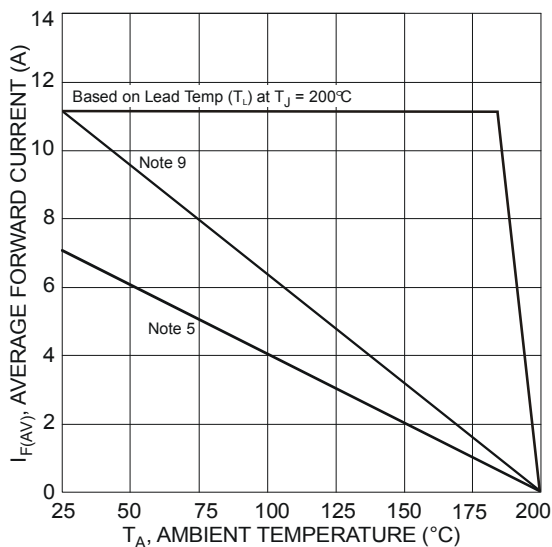


Figure 5 Forward Current Derating Curve

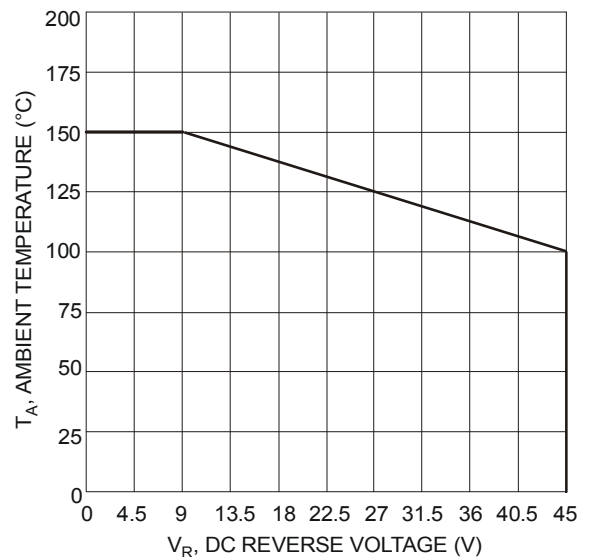
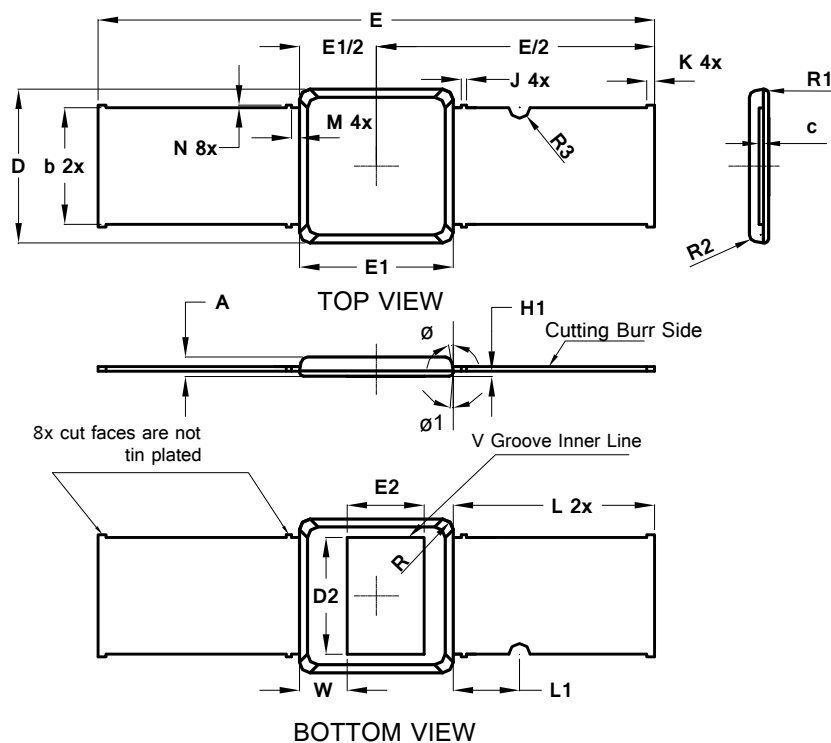


Figure 6 Operating Temperature Derating

## Package Outline Dimensions

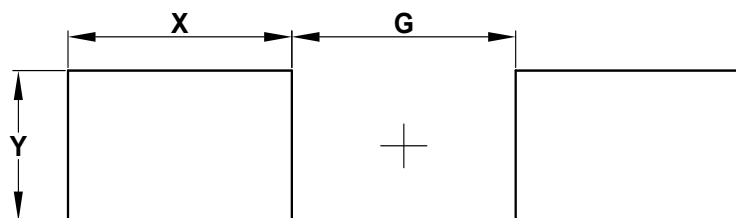
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| POWERDI <sup>®</sup> 5SP<br>Type B |       |       |      |
|------------------------------------|-------|-------|------|
| Dim                                | Min   | Max   | Typ  |
| A                                  | —     | 0.75  | —    |
| B                                  | 4.30  | 4.50  | 4.40 |
| C                                  | 0.155 | 0.191 | —    |
| D                                  | 5.70  | 5.90  | 5.80 |
| D2                                 | 4.40  | —     | —    |
| E                                  | 20.8  | 21.2  | 21.0 |
| E1                                 | 5.70  | 5.90  | 5.80 |
| E2                                 | 2.90  | —     | —    |
| H1                                 | 0.19  | 0.21  | 0.20 |
| J                                  | —     | —     | 0.20 |
| K                                  | —     | —     | 0.30 |
| L                                  | —     | —     | 7.60 |
| L1                                 | —     | —     | 2.50 |
| M                                  | —     | —     | 0.30 |
| N                                  | 0     | 0.20  | —    |
| R                                  | —     | —     | 0.40 |
| R1                                 | —     | —     | 0.15 |
| R2                                 | —     | —     | 0.25 |
| R3                                 | —     | —     | 0.40 |
| W                                  | 1.63  | 1.97  | 1.80 |
| Ø                                  | 8°    | 12°   | —    |
| Ø 1                                | 3°    | 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<br>(in mm) |
|------------|------------------|
| G          | 8.101            |
| X          | 8.100            |
| Y          | 5.100            |

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