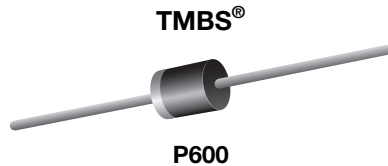


Photovoltaic Solar Cell Protection Schottky Rectifier

 Ultra Low $V_F = 0.30\text{ V}$ at $I_F = 5.0\text{ A}$


FEATURES

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- High forward surge capability
- ESD capability
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- T_J 200 °C max. in solar bypass mode application
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE

| PRIMARY CHARACTERISTICS | |
|---------------------------------|------------|
| $I_{F(AV)}$ | 20 A |
| V_{RRM} | 45 V |
| I_{FSM} | 250 A |
| V_F at $I_F = 20\text{ A}$ | 0.42 V |
| T_{OP} max. (AC mode) | 150 °C |
| T_J max. (DC forward current) | 200 °C |
| Package | P600 |
| Diode variation | Single die |

TYPICAL APPLICATIONS

For use in solar cell junction box as a bypass diode for protection, using DC forward current without reverse bias.

MECHANICAL DATA

Case: P600

Molding compound meets UL 94 V-0 flammability rating
 Base P/N-M3 - halogen-free, RoHS-compliant, and commercial grade

Terminals: Matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 suffix meets JESD 201 class 1A whisker test

Polarity: Color band denotes cathode end

| MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted) | | | |
|--|-------------------|-------------|------|
| PARAMETER | SYMBOL | VSB2045 | UNIT |
| Device marking code | | V2045 | |
| Maximum repetitive peak reverse voltage | V_{RRM} | 45 | V |
| Maximum average forward rectified current (fig. 1) | $I_{F(AV)}^{(1)}$ | 20 | A |
| | $I_{F(AV)}^{(2)}$ | 6.5 | |
| Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load | I_{FSM} | 250 | A |
| Operating junction temperature range | T_{OP} | -40 to +150 | °C |
| Storage temperature range | T_{STG} | -40 to +175 | °C |
| Junction temperature in DC forward current without reverse bias, $t \leq 1\text{ h}$ | $T_J^{(3)}$ | ≤ 200 | °C |

Notes

(1) With heatsink

(2) With heatsink, free air

(3) Meets the requirements of IEC 61215 ed. 2 bypass diode thermal test



| ELECTRICAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | | |
|---|----------------------|-----------------------------------|-------------|------|------|---------------|
| PARAMETER | TEST CONDITIONS | | SYMBOL | TYP. | MAX. | UNIT |
| Instantaneous forward voltage | $I_F = 5.0\text{ A}$ | $T_A = 25\text{ }^\circ\text{C}$ | $V_F^{(1)}$ | 0.44 | - | V |
| | $I_F = 10\text{ A}$ | | | 0.46 | - | |
| | $I_F = 20\text{ A}$ | | | 0.50 | 0.58 | |
| | $I_F = 5.0\text{ A}$ | $T_A = 125\text{ }^\circ\text{C}$ | | 0.30 | - | |
| | $I_F = 10\text{ A}$ | | | 0.35 | - | |
| | $I_F = 20\text{ A}$ | | | 0.42 | 0.50 | |
| Reverse current | $V_R = 45\text{ V}$ | $T_A = 25\text{ }^\circ\text{C}$ | $I_R^{(2)}$ | 23.4 | 1200 | μA |
| | | $T_A = 125\text{ }^\circ\text{C}$ | | 11.9 | 35 | mA |
| Typical junction capacitance | 4.0 V, 1 MHz | | C_J | 2050 | - | pF |

Notes

- (1) Pulse test: 300 μs pulse width, 1 % duty cycle
(2) Pulse test: 40 ms pulse width

| THERMAL CHARACTERISTICS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | |
|--|-----------------------|---------|--------------------|
| PARAMETER | SYMBOL | VSB2045 | UNIT |
| Thermal resistance | $R_{\theta JA}^{(1)}$ | 55 | $^\circ\text{C/W}$ |
| | $R_{\theta JL}^{(1)}$ | 3.5 | |
| Typical thermal resistance | $R_{\theta JL}^{(2)}$ | 2.5 | $^\circ\text{C/W}$ |

Notes

- (1) Without heatsink, free air; units mounted on PCB with 2 mm x 2 mm copper pad areas at 9.5 mm lead length
(2) Leads clipped at 3 mm lead length from plastic body on 7.0 cm x 2.2 cm x 1.9 cm x 2 heatsink

| IMMUNITY TO ELECTRICAL STATIC DISCHARGE TO THE FOLLOWING STANDARDS ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted) | | | | | |
|--|-----------------------------------|---|--------|-------|---------|
| STANDARD | TEST TYPE | TEST CONDITIONS | SYMBOL | CLASS | VALUE |
| JESD22-A114 | Human body model (contact mode) | $C = 150\text{ pF}$, $R = 1.5\text{ }\Omega$ | V_C | 3B | > 8 kV |
| JESD22-A115 | Machine model (contact mode) | $C = 200\text{ pF}$, $R = 0\text{ }\Omega$ | | C | > 400 V |
| IEC 61000-4-2 ⁽²⁾ | Air discharge mode ⁽¹⁾ | $C = 150\text{ pF}$, $R = 330\text{ }\Omega$ | | 4 | > 15 kV |

Notes

- (1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance > 25 kV
(2) System ESD standard

| ORDERING INFORMATION (Example) | | | | |
|--------------------------------|-----------------|------------------------|---------------|----------------------------------|
| PREFERRED P/N | UNIT WEIGHT (g) | PREFERRED PACKAGE CODE | BASE QUANTITY | DELIVERY MODE |
| VSB2045-M3/54 | 1.88 | 54 | 800 | 13" diameter paper tape and reel |
| VSB2045-M3/73 | 1.88 | 73 | 300 | Ammo pack packaging |

RATINGS AND CHARACTERISTICS CURVES ($T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)

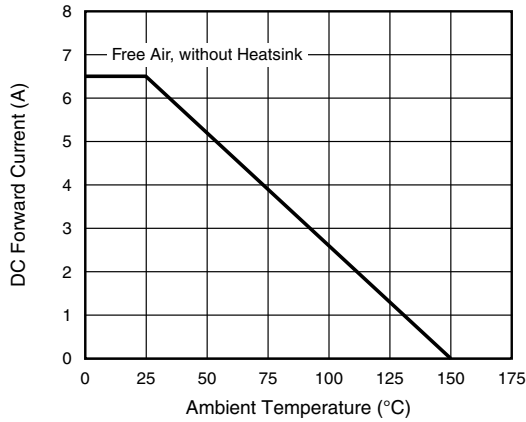


Fig. 1 - Forward Current Derating Curve

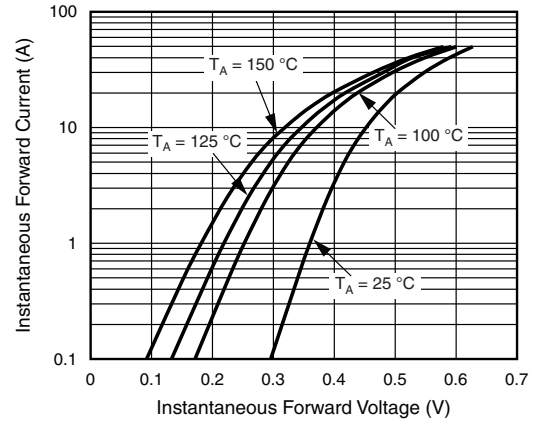


Fig. 4 - Typical Instantaneous Forward Characteristics

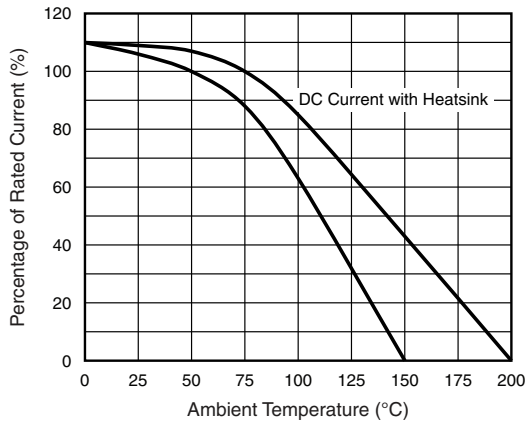


Fig. 2 - Rated Forward Current vs. Ambient Temperature

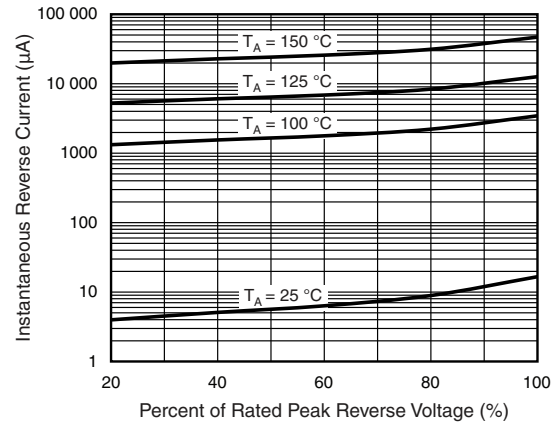


Fig. 5 - Typical Reverse Leakage Characteristics

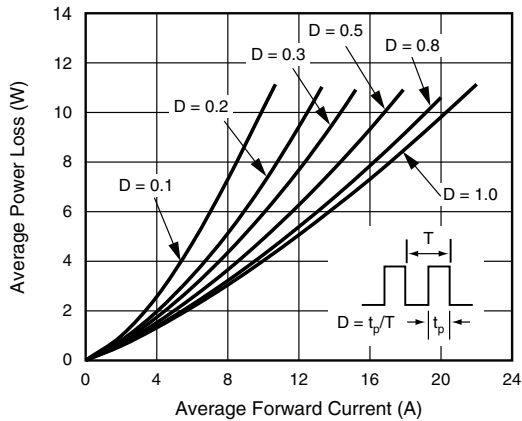


Fig. 3 - Forward Power Loss Characteristics

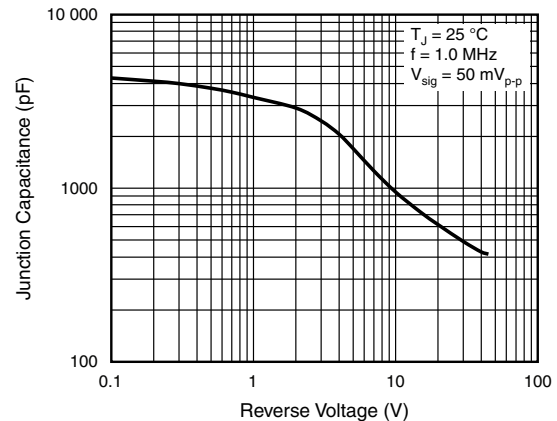
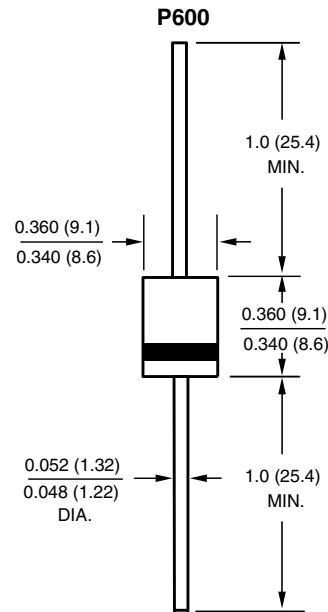


Fig. 6 - Typical Junction Capacitance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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