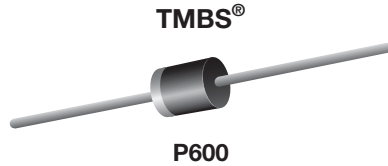


Photovoltaic Solar Cell Protection Schottky Rectifier

 Ultra Low $V_F = 0.26\text{ V}$ at $I_F = 5\text{ A}$


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 by-pass mode application
- Compliant to RoHS Directive 2011/65/EU
- **Halogen-free according to IEC 61249-2-21 definition**


RoHS
 COMPLIANT
 HALOGEN
FREE

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

PRIMARY CHARACTERISTICS	
$I_{F(DC)}$	20 A
V_{RRM}	45 V
I_{FSM}	250 A
V_F at $I_F = 20\text{ A}$	0.40 V
T_{OP} max. (AC mode)	150 °C
T_J max. (DC forward current)	200 °C

MAXIMUM RATINGS ($T_A = 25\text{ °C}$ unless otherwise noted)			
PARAMETER	SYMBOL	VSB20L45	UNIT
Device marking code		V20L45	
Maximum repetitive peak reverse voltage	V_{RRM}	45	V
Maximum average forward rectified current (fig. 1)	$I_{F(AV)}^{(1)}$	20	A
	$I_{F(AV)}^{(2)}$	7.5	
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	I_{FSM}	250	
Operating junction temperature range (AC mode)	T_{OP}	- 40 to + 150	°C
Storage temperature range	T_{STG}	- 40 to + 175	
Junction temperature in DC forward current without reverse bias, $t \leq 1\text{ h}$	$T_J^{(3)}$	≤ 200	

Notes

- (1) With heatsink
- (2) Without 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	$I_F = 5.0\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.39	-	V
	$I_F = 10\text{ A}$			0.42	-	
	$I_F = 20\text{ A}$			0.48	0.56	
	$I_F = 5.0\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.26	-	
	$I_F = 10\text{ A}$			0.32	-	
	$I_F = 20\text{ A}$			0.40	0.48	
Reverse current	$V_R = 45\text{ V}$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	-	5.0	mA
		$T_A = 125\text{ }^\circ\text{C}$		30	65	
Typical junction capacitance	4.0 V, 1 MHz	C_J	2470	-	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	VSB20L45	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
VSB20L45-M3/54	1.88	54	800	13" diameter paper tape and reel
VSB20L45-M3/73	1.88	73	300	Ammo pack packaging

RATINGS AND CHARACTERISTICS CURVES

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

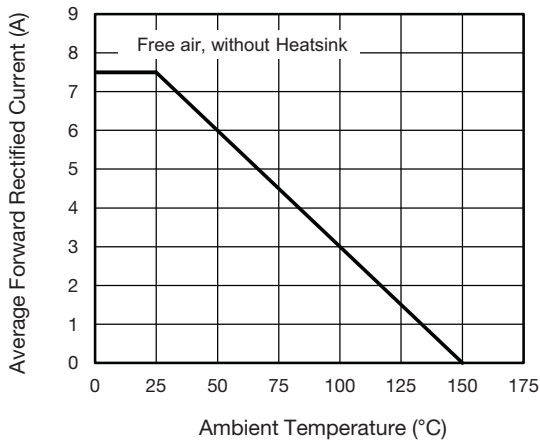


Fig. 1 - Forward Current Derating Curve

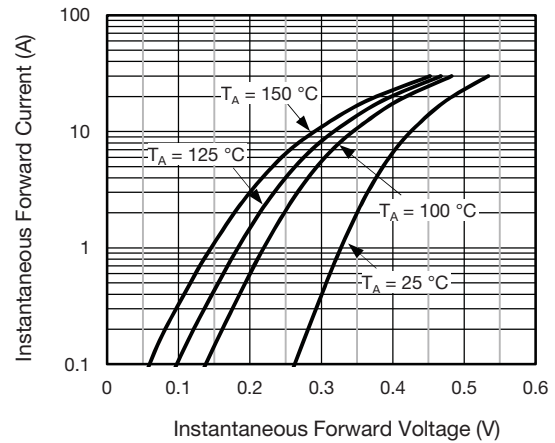


Fig. 4 - Typical Instantaneous Forward Characteristics

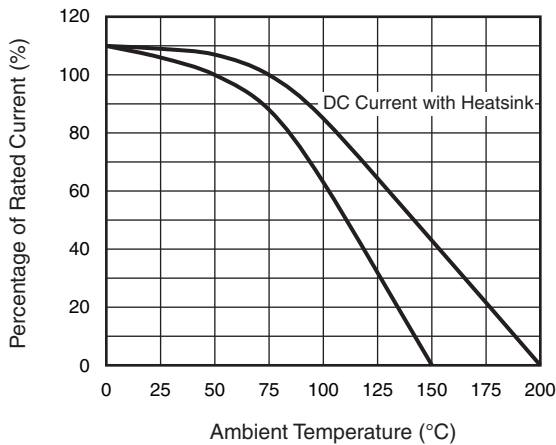


Fig. 2 - Rated Forward Current vs. Ambient Temperature

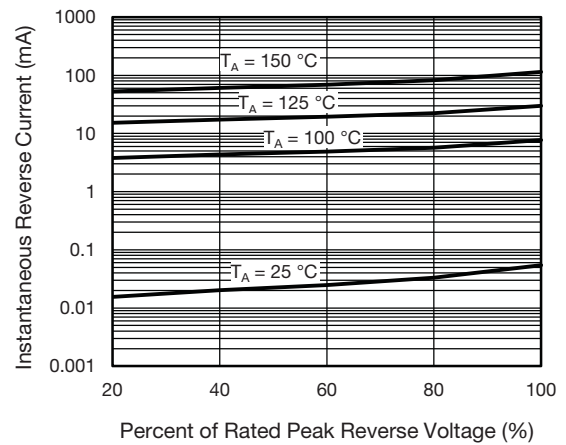


Fig. 5 - Typical Reverse Leakage Characteristics

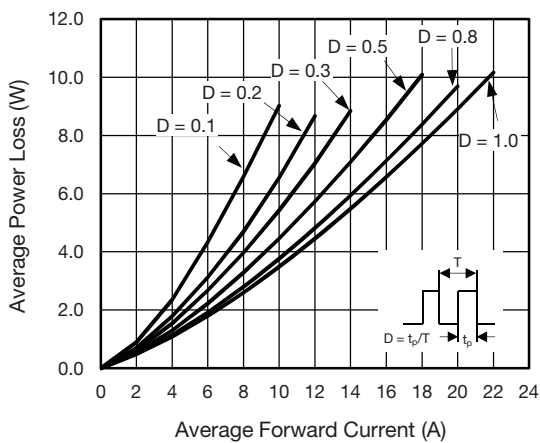


Fig. 3 - Forward Power Loss Characteristics

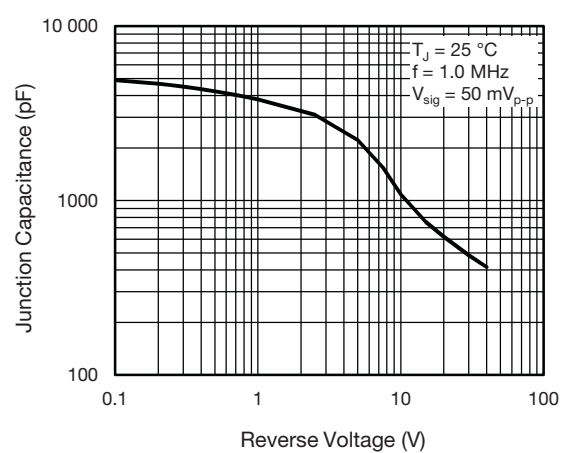
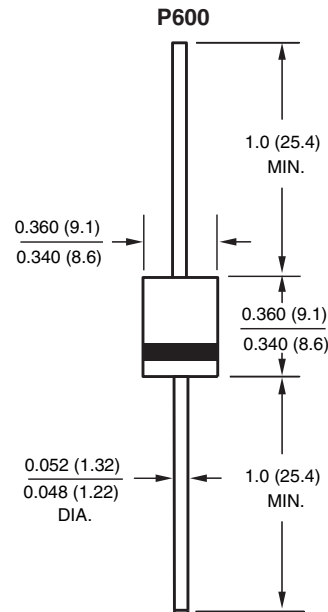


Fig. 6 - Typical Junction Capacitance



PACKAGE OUTLINE DIMENSIONS in inches (millimeters)





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