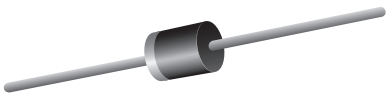
Photovoltaic Solar Cell Protection Schottky Rectifier

Ultra Low V_F = 0.26 V at I_F = 5 A

TMBS®



P600

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
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912

RoHS COMPLIANT

HALOGEN FREE

PRIMARY CHARACTERISTICS	
$I_{F(DC)}$	20 A
V_{RRM}	45 V
I_{FSM}	250 A
V_F at I_F = 20 A	0.40 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 °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 ≤ 1 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 °C unless otherwise noted)						
PARAMETER	**TEST CONDITIONS**		**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Instantaneous forward voltage	I_F = 5.0 A	T_A = 25 °C	V_F (1)	0.39	-	V
	I_F = 10 A			0.42	-	
	I_F = 20 A			0.48	0.56	
	I_F = 5.0 A	T_A = 125 °C		0.26	-	
	I_F = 10 A			0.32	-	
	I_F = 20 A			0.40	0.48	
Reverse current	V_R = 45 V	T_A = 25 °C	I_R (2)	-	5.0	mA
		T_A = 125 °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 °C unless otherwise noted)			
PARAMETER	**SYMBOL**	**VSB20L45**	**UNIT**
Thermal resistance	$R_{\theta JA}$ (1)	55	°C/W
	$R_{\theta JL}$ (1)	3.5	
Typical thermal resistance	$R_{\theta JL}$ (2)	2.5	°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 °C unless otherwise noted)					
STANDARD	**TEST TYPE**	**TEST CONDITIONS**	**SYMBOL**	**CLASS**	**VALUE**
JESD22-A114	Human body model (contact mode)	C = 150 pF, R = 1.5 Ω	V_C	3B	> 8 kV
JESD22-A115	Machine model (contact mode)	C = 200 pF, R = 0 Ω		C	> 400 V
IEC 61000-4-2 (2)	Air discharge mode (1)	C = 150 pF, R = 330 Ω		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 °C unless otherwise noted)

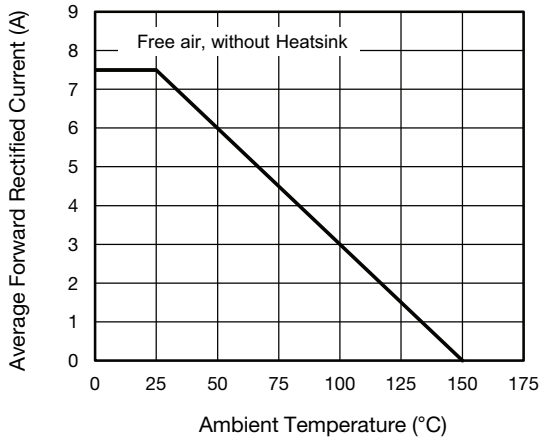


Fig. 1 - Forward Current Derating Curve

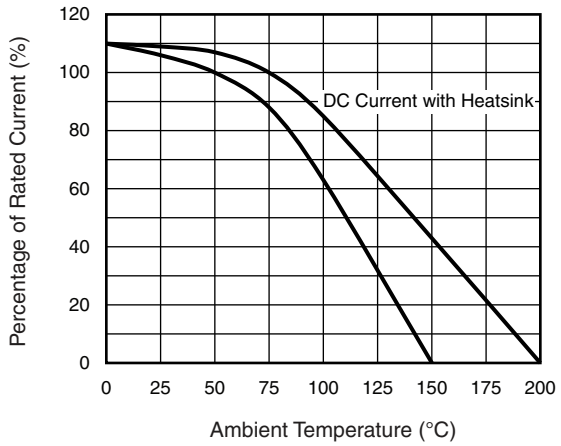


Fig. 2 - Rated Forward Current vs. Ambient Temperature

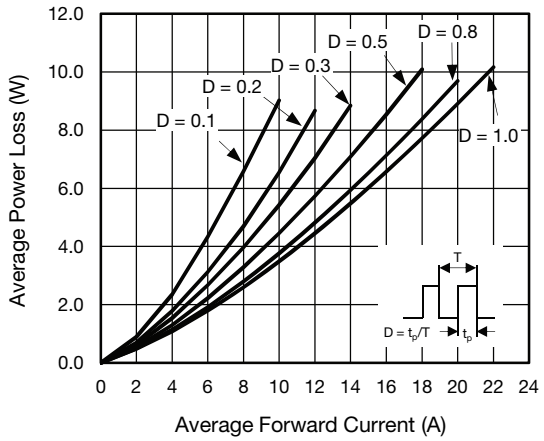


Fig. 3 - Forward Power Loss Characteristics

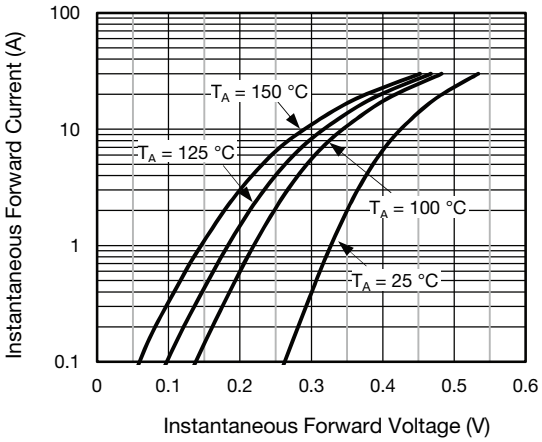


Fig. 4 - Typical Instantaneous Forward Characteristics

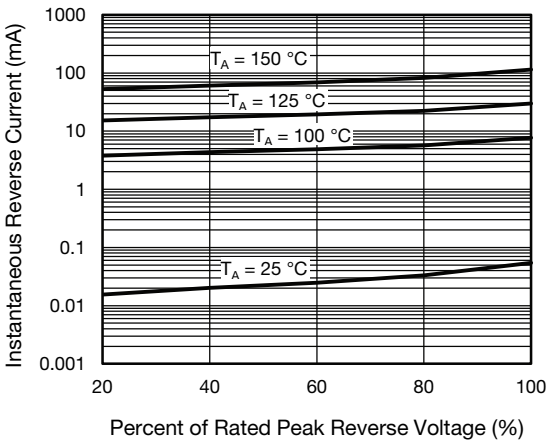


Fig. 5 - Typical Reverse Leakage Characteristics

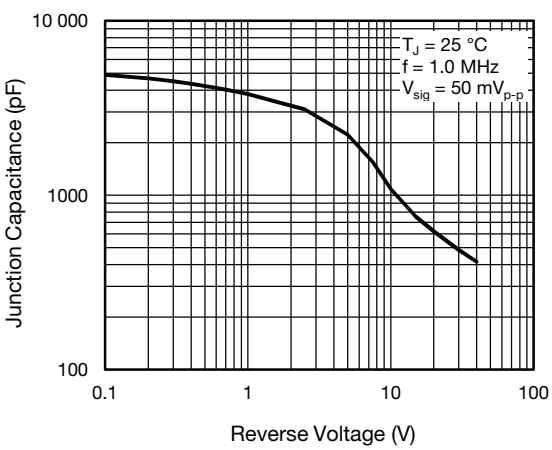
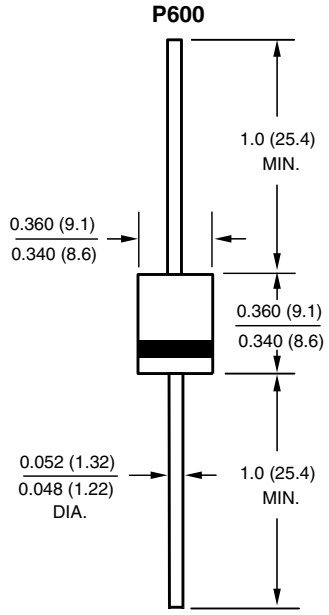


Fig. 6 - Typical Junction Capacitance

PACKAGE OUTLINE DIMENSIONS in inches (millimeters)



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