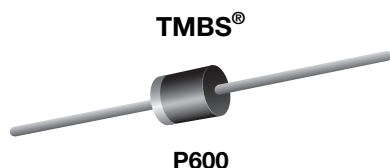


# Photovoltaic Solar Cell Protection Schottky Rectifier

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
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://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 $I_F = 20\text{ A}$	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 ( $T_A = 25\text{ °C}$ 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, $t \leq 1\text{ h}$	$T_J^{(3)}$	$\leq 200$	

## 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 <sub>A</sub> = 25 °C unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Instantaneous forward voltage	I <sub>F</sub> = 5.0 A	T <sub>A</sub> = 25 °C	V <sub>F</sub> <sup>(1)</sup>	0.39	-	V
	I <sub>F</sub> = 10 A			0.42	-	
	I <sub>F</sub> = 20 A			0.48	0.56	
	I <sub>F</sub> = 5.0 A	T <sub>A</sub> = 125 °C		0.26	-	
	I <sub>F</sub> = 10 A			0.32	-	
	I <sub>F</sub> = 20 A			0.40	0.48	
Reverse current	V <sub>R</sub> = 45 V	T <sub>A</sub> = 25 °C	I <sub>R</sub> <sup>(2)</sup>	-	5.0	mA
		T <sub>A</sub> = 125 °C		30	65	
Typical junction capacitance	4.0 V, 1 MHz		C <sub>J</sub>	2470	-	pF

**Notes**(1) Pulse test: 300  $\mu\text{s}$  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 <sup>(2)</sup>	Air discharge mode <sup>(1)</sup>	$C = 150\text{ pF}$ , $R = 330\text{ }\Omega$		4	> 15 kV

**Notes**

(1) Immunity to IEC 61000-4-2 air discharge mode has a typical performance &gt; 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

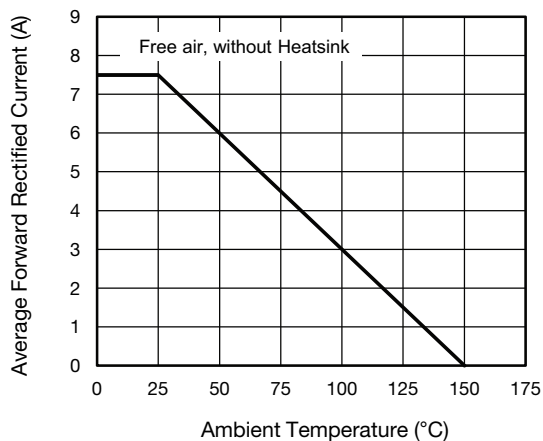
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Forward Current Derating Curve

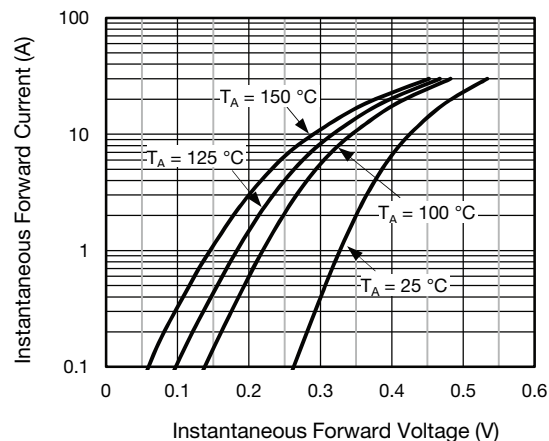


Fig. 4 - Typical Instantaneous Forward Characteristics

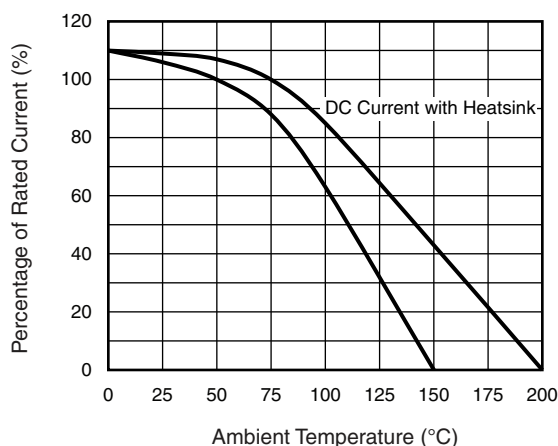


Fig. 2 - Rated Forward Current vs. Ambient Temperature

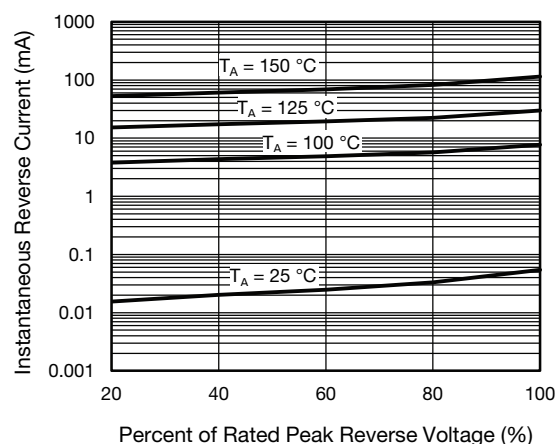


Fig. 5 - Typical Reverse Leakage Characteristics

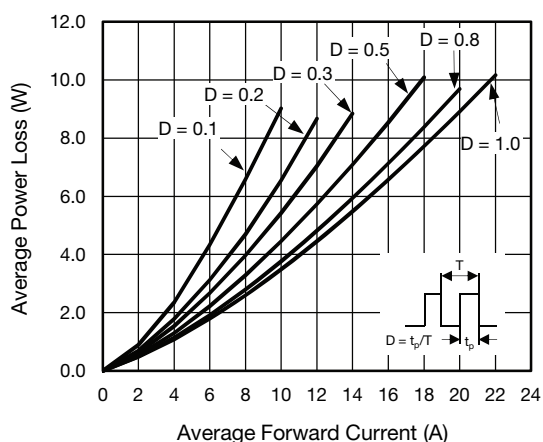


Fig. 3 - Forward Power Loss Characteristics

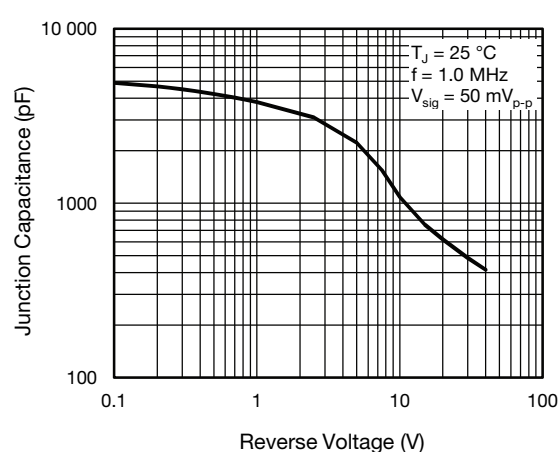
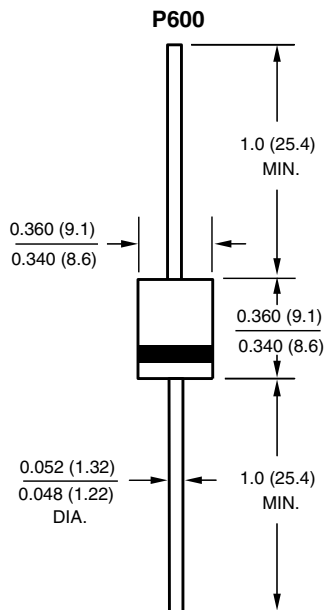


Fig. 6 - Typical Junction Capacitance



**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Vishay:

[VSB20L45-M3/54](#) [VSB20L45-M3/73](#)