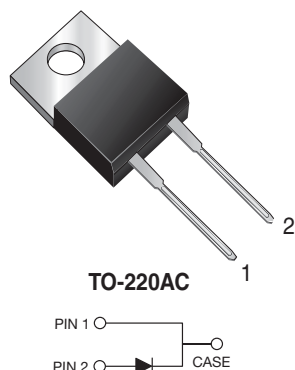


# **TMBS® (Trench MOS Barrier Schottky) Rectifier for PV Solar Cell Bypass Protection**

Ultra Low  $V_F = 0.33$  V at  $I_F = 5$  A



## **FEATURES**

- Trench MOS Schottky technology
- Low forward voltage drop, low power losses
- High efficiency operation
- Solder dip 275 °C max. 10 s, per JESD 22-B106
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**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:** TO-220AC

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:** as marked

**Mounting Torque:** 10 in-lbs maximum

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	20 A
$V_{RRM}$	45 V
$I_{FSM}$	160 A
$V_F$ at $I_F = 20$ A	0.51 V
$T_{OP}$ max. (AC mode)	150 °C
$T_J$ max. (DC forward current)	200 °C
Package	TO-220AC
Circuit configuration	Single

MAXIMUM RATINGS ( $T_A = 25$ °C unless otherwise noted)			
PARAMETER	SYMBOL	VT2045BP	UNIT
Maximum repetitive peak reverse voltage	$V_{RRM}$	45	V
Maximum DC forward bypassing current (fig. 1)	$I_{F(DC)}^{(1)}$	20	A
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load	$I_{FSM}$	160	A
Operating junction temperature range (AC mode)	$T_{OP}$	-40 to +150	°C
Junction temperature in DC forward current without reverse bias, $t \leq 1$ h	$T_J^{(2)}$	$\leq 200$	°C

### **Notes**

(1) With heatsink

(2) 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 A	T <sub>A</sub> = 25 °C	V <sub>F</sub> <sup>(1)</sup>	0.44	-	V	
	I <sub>F</sub> = 10 A			0.49	-		
	I <sub>F</sub> = 20 A			0.57	0.66		
	I <sub>F</sub> = 5 A	T <sub>A</sub> = 125 °C		0.33	-		
	I <sub>F</sub> = 10 A			0.41	-		
	I <sub>F</sub> = 20 A			0.51	0.63		
Reverse current	V <sub>R</sub> = 45 V	T <sub>A</sub> = 25 °C	I <sub>R</sub> <sup>(2)</sup>	-	2000	μA	
		T <sub>A</sub> = 125 °C		10	30	mA	

### **Notes**

(1) Pulse test: 300  $\mu$ s pulse width, 1 % duty cycle

(2) Pulse test: Pulse width  $\leq 40$  ms

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

PARAMETER	SYMBOL	VT2045BP	UNIT
Typical thermal resistance	$R_{\theta JC}$	1.5	$^{\circ}\text{C}/\text{W}$

**ORDERING INFORMATION** (Example)

PACKAGE	PREFERRED P/N	UNIT WEIGHT (g)	PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
TO-220AC	VT2045BP-M3/4W	1.87	4W	50/tube	Tube

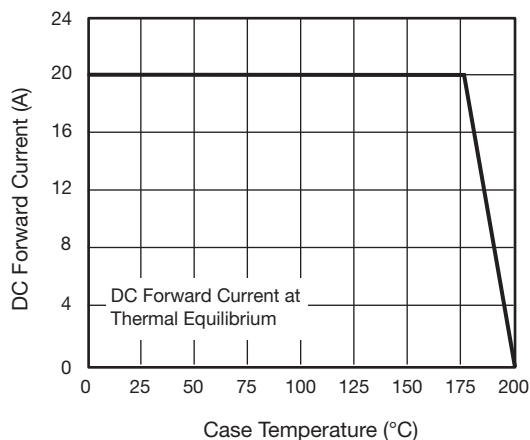
**RATINGS AND CHARACTERISTICS CURVES** ( $T_A = 25\text{ }^{\circ}\text{C}$  unless otherwise noted)


Fig. 1 - Maximum Forward Current Derating Curve

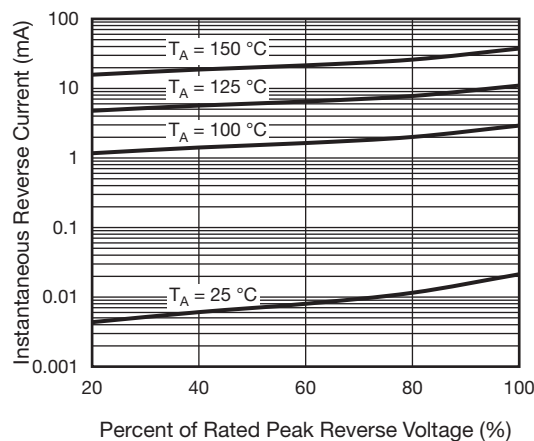


Fig. 3 - Typical Reverse Characteristics

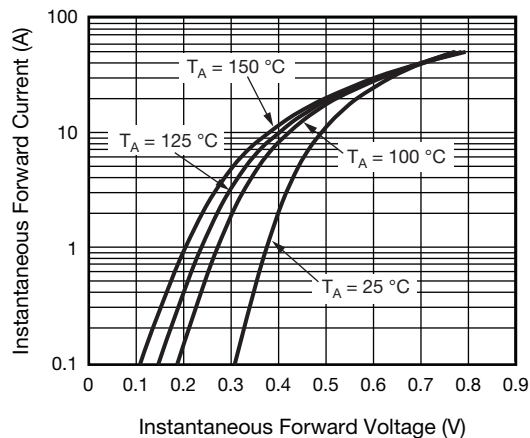


Fig. 2 - Typical Instantaneous Forward Characteristics

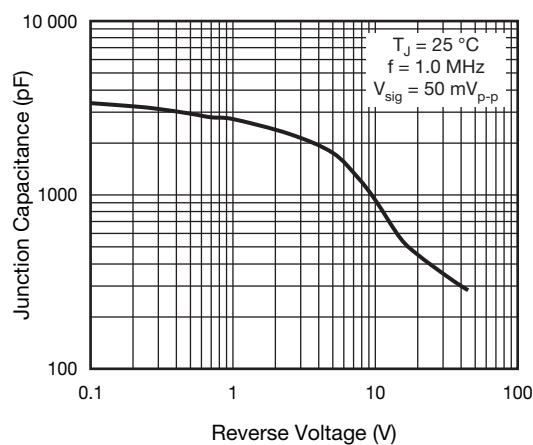


Fig. 4 - Typical Junction Capacitance

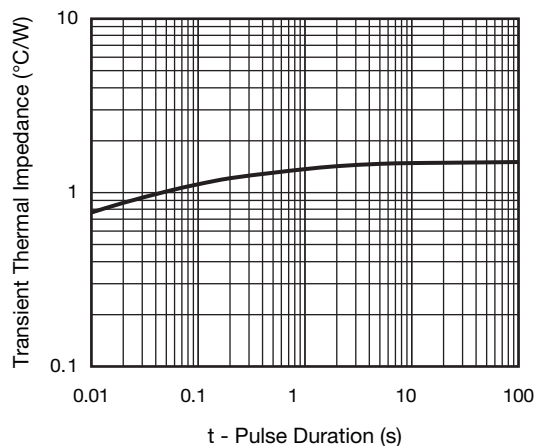
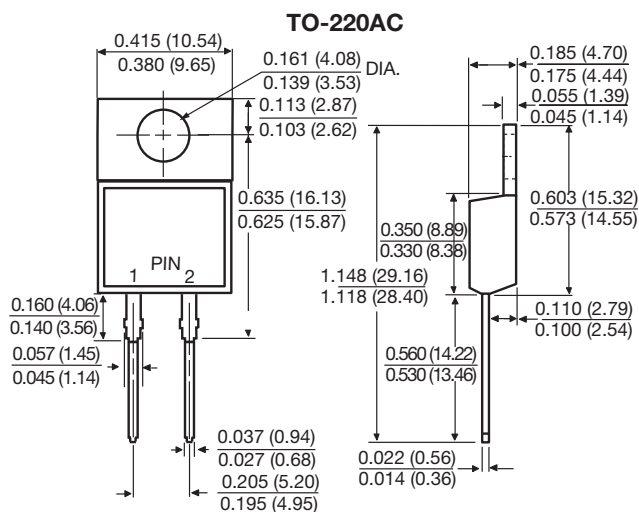


Fig. 5 - Typical Transient Thermal Impedance

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




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