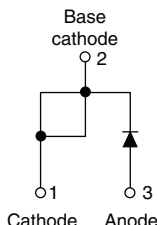


## Schottky Rectifier, 10 A


**TO-220AC**


### FEATURES

- 150 °C  $T_J$  operation
- TO-220 and D<sup>2</sup>PAK packages
- High frequency operation
- Low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level


**RoHS\***  
COMPLIANT

### PRODUCT SUMMARY

|             |                 |
|-------------|-----------------|
| $I_{F(AV)}$ | 10 A            |
| $V_R$       | 35/45 V         |
| $I_{RM}$    | 15 mA at 125 °C |

### DESCRIPTION

This Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                   | VALUES      | UNITS |
|-------------|-----------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform              | 10          | A     |
| $I_{FRM}$   | $T_C = 135\text{ °C}$             | 20          |       |
| $V_{RRM}$   |                                   | 35/45       | V     |
| $I_{FSM}$   | $t_p = 5\text{ }\mu\text{s}$ sine | 1060        | A     |
| $V_F$       | 10 Apk, $T_J = 125\text{ °C}$     | 0.57        | V     |
| $T_J$       | Range                             | - 65 to 150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | MBR1035PbF | MBR1045PbF | UNITS |
|--------------------------------------|-----------|------------|------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 35         | 45         | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |            |            |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                         | SYMBOL      | TEST CONDITIONS                                                                                                           | VALUES | UNITS |
|-----------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current   | $I_{F(AV)}$ | $T_C = 135\text{ °C}$ , rated $V_R$                                                                                       | 10     | A     |
| Peak repetitive forward current   | $I_{FRM}$   | Rated $V_R$ , square wave, 20 kHz, $T_C = 135\text{ °C}$                                                                  | 20     |       |
| Non-repetitive peak surge current | $I_{FSM}$   | 5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse                                                                       | 1060   | A     |
|                                   |             | Following any rated load condition and with rated $V_{RRM}$ applied                                                       | 150    |       |
| Non-repetitive avalanche energy   | $E_{AS}$    | $T_J = 25\text{ °C}$ , $I_{AS} = 2\text{ A}$ , $L = 4\text{ mH}$                                                          | 8      | mJ    |
| Repetitive avalanche current      | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu\text{s}$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical | 2      | A     |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

| ELECTRICAL SPECIFICATIONS             |                |                                                                                           |                                     |        |       |
|---------------------------------------|----------------|-------------------------------------------------------------------------------------------|-------------------------------------|--------|-------|
| PARAMETER                             | SYMBOL         | TEST CONDITIONS                                                                           |                                     | VALUES | UNITS |
| Maximum forward voltage drop          | $V_{FM}^{(1)}$ | 20 A                                                                                      | $T_J = 25\text{ }^{\circ}\text{C}$  | 0.84   | V     |
|                                       |                | 10 A                                                                                      | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.57   |       |
|                                       |                | 20 A                                                                                      |                                     | 0.72   |       |
| Maximum instantaneous reverse current | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                                        | Rated DC voltage                    | 0.1    | mA    |
|                                       |                | $T_J = 125\text{ }^{\circ}\text{C}$                                                       |                                     | 15     |       |
| Threshold voltage                     | $V_{F(TO)}$    | $T_J = T_J$ maximum                                                                       |                                     | 0.354  | V     |
| Forward slope resistance              | $r_t$          |                                                                                           |                                     | 17.6   | mΩ    |
| Maximum junction capacitance          | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                     | 600    | pF    |
| Typical series inductance             | $L_S$          | Measured from top of terminal to mounting plane                                           |                                     | 8.0    | nH    |
| Maximum voltage rate of change        | dV/dt          | Rated $V_R$                                                                               |                                     | 10 000 | V/μs  |

## Note

<sup>(1)</sup> Pulse width < 300 μs, duty cycle < 2 %

| THERMAL - MECHANICAL SPECIFICATIONS          |         |                   |                                                        |             |                        |
|----------------------------------------------|---------|-------------------|--------------------------------------------------------|-------------|------------------------|
| PARAMETER                                    |         | SYMBOL            | TEST CONDITIONS                                        | VALUES      | UNITS                  |
| Maximum junction temperature range           |         | T <sub>J</sub>    |                                                        | - 65 to 150 | °C                     |
| Maximum storage temperature range            |         | T <sub>Stg</sub>  |                                                        | - 65 to 175 |                        |
| Maximum thermal resistance, junction to case |         | R <sub>thJC</sub> | DC operation                                           | 2.0         | °C/W                   |
| Typical thermal resistance, case to heatsink |         | R <sub>thCS</sub> | Mounting surface, smooth and greased (only for TO-220) | 0.50        |                        |
| Approximate weight                           |         |                   |                                                        | 2           | g                      |
|                                              |         |                   |                                                        | 0.07        | oz.                    |
| Mounting torque                              | minimum |                   |                                                        | 6 (5)       | kgf · cm<br>(lbf · in) |
|                                              | maximum |                   |                                                        | 12 (10)     |                        |
| Marking device                               |         |                   | Case style TO-220AC                                    | MBR1045     |                        |

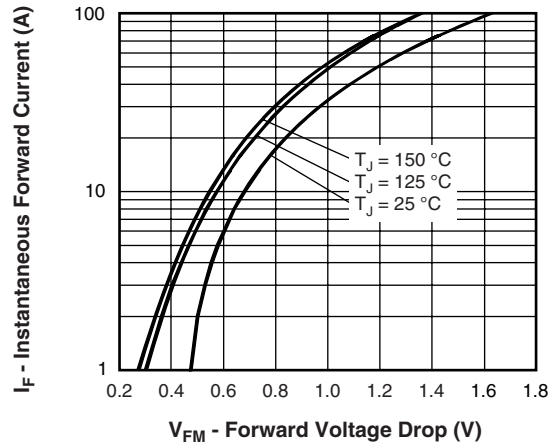


Fig. 1 - Maximum Forward Voltage Drop Characteristics

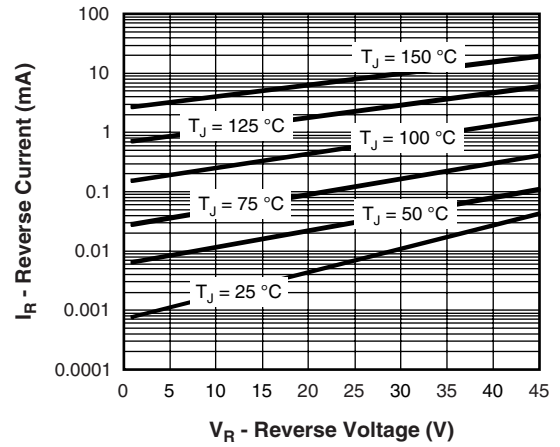


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

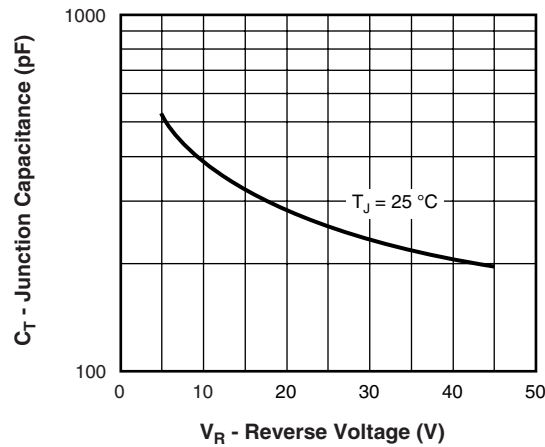


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

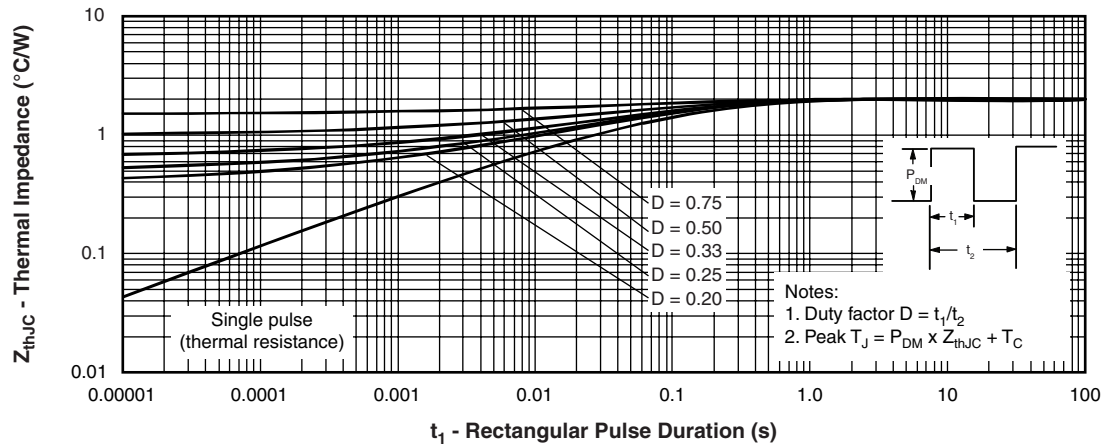


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

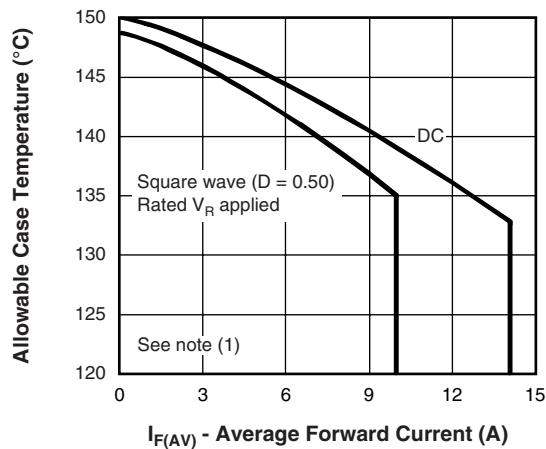


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

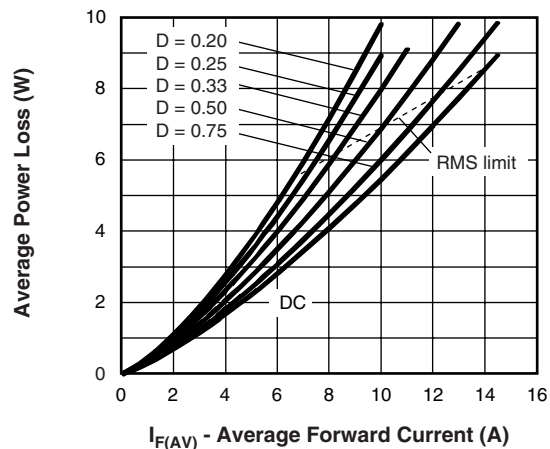


Fig. 6 - Forward Power Loss Characteristics

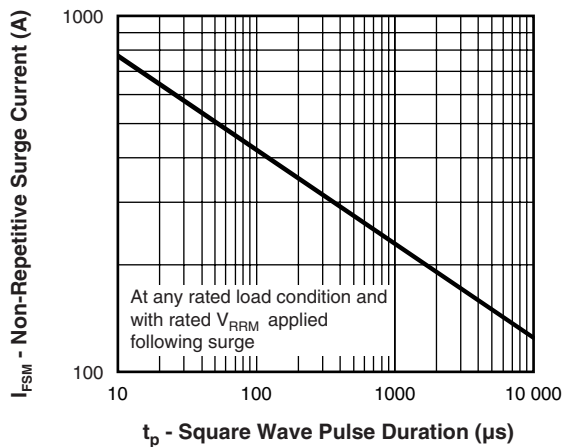


Fig. 7 - Maximum Non-Repetitive Surge Current

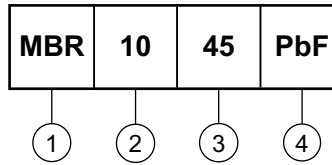
## Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;  
 $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{d_{REV}}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1}$  = Rated  $V_R$



### ORDERING INFORMATION TABLE

Device code



- |          |   |                                                        |                        |
|----------|---|--------------------------------------------------------|------------------------|
| <b>1</b> | - | Schottky MBR series                                    |                        |
| <b>2</b> | - | Current rating (10 = 10 A)                             |                        |
| <b>3</b> | - | Voltage ratings                                        | 35 = 35 V<br>45 = 45 V |
| <b>4</b> | - | • None = Standard production<br>• PbF = Lead (Pb)-free |                        |

| LINKS TO RELATED DOCUMENTS |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95221">http://www.vishay.com/doc?95221</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95216">http://www.vishay.com/doc?95216</a> |
| SPICE model                | <a href="http://www.vishay.com/doc?95293">http://www.vishay.com/doc?95293</a> |



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