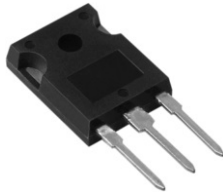
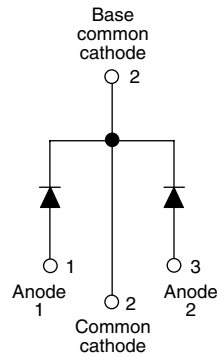


## Schottky Rectifier, 2 x 20 A


**TO-247AC**


### FEATURES

- 150 °C  $T_J$  operation
- Center tap TO-247 package
- Very low forward voltage drop
- High frequency operation
- 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

### DESCRIPTION

The MBR4045WTPbF center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. 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.

### PRODUCT SUMMARY

|             |                 |
|-------------|-----------------|
| $I_{F(AV)}$ | 2 x 20 A        |
| $V_R$       | 45 V            |
| $I_{RM}$    | 85 mA at 125 °C |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                   | VALUES      | UNITS |
|-------------|-----------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform (per device) | 40          | A     |
| $I_{FRM}$   | $T_C = 125\text{ °C}$ (per leg)   | 40          |       |
| $V_{RRM}$   |                                   | 45          | V     |
| $I_{FSM}$   | $t_p = 5\ \mu\text{s}$ sine       | 1020        | A     |
| $V_F$       | 20 Apk, $T_J = 125\text{ °C}$     | 0.56        | V     |
| $T_J$       | Range                             | - 55 to 150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | MBR4045WTPbF | UNITS |
|--------------------------------------|-----------|--------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 45           | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |              |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER   | SYMBOL      | TEST CONDITIONS   | VALUES | UNITS |
|---|-------------|---|--------|-------|
| Maximum average forward current<br>per leg<br>per device                  | $I_{F(AV)}$ | $T_C = 125\text{ °C}$ , 50 % duty cycle, rectangular waveform   | 20     | A     |
|   |             |   | 40     |       |
| Peak repetitive forward current per leg                                   | $I_{FRM}$   | Rated $V_R$ , square wave, 20 kHz, $T_C = 125\text{ °C}$  | 40     |       |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | $I_{FSM}$   | 5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse   | 1020   |       |
|   |             | 10 ms sine or 6 ms rect. pulse  |        | 265   |
| Non-repetitive avalanche energy per leg                                   | $E_{AS}$    | $T_J = 25\text{ °C}$ , $I_{AS} = 3\text{ A}$ , $L = 4.40\text{ mH}$   | 20     | mJ    |
| Repetitive avalanche current per leg                                      | $I_{AR}$    | 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 | 3      | 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  | $T_J = 25\text{ }^\circ\text{C}$  | 0.59   | V                |
|                                       |                | 40 A  |                                   | 0.78   |                  |
|                                       |                | 20 A  | $T_J = 125\text{ }^\circ\text{C}$ | 0.56   |                  |
|                                       |                | 40 A  |                                   | 0.72   |                  |
| Maximum instantaneous reverse current | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$  | Rated DC voltage                  | 1.75   | mA               |
|                                       |                | $T_J = 100\text{ }^\circ\text{C}$   |                                   | 50     |                  |
|                                       |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 85     |                  |
| Threshold voltage                     | $V_{F(TO)}$    | $T_J = T_J$ maximum   |                                   | 0.29   | V                |
| Forward slope resistance              | $r_t$          |   |                                   | 10.3   | m $\Omega$       |
| Maximum junction capacitance          | $C_T$          | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 $^\circ\text{C}$ |                                   | 900    | pF               |
| Typical series inductance             | $L_S$          | Measured from top of terminal to mounting plane                           |                                   | 7.5    | nH               |
| Maximum voltage rate of change        | dV/dt          | Rated $V_R$   |                                   | 10 000 | V/ $\mu\text{s}$ |

**Note**

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

| THERMAL - MECHANICAL SPECIFICATIONS                      |            |                                      |  |             |                        |
|--|------------|--------------------------------------|--|-------------|------------------------|
| PARAMETER  | SYMBOL     | TEST CONDITIONS                      |  | VALUES      | UNITS                  |
| Maximum junction temperature range                       | $T_J$      |                                      |  | - 55 to 150 | $^\circ\text{C}$       |
| Maximum storage temperature range                        | $T_{Stg}$  |                                      |  | - 55 to 175 |                        |
| Maximum thermal resistance, junction to case per package | $R_{thJC}$ | DC operation                         |  | 1.4         | $^\circ\text{C/W}$     |
| Typical thermal resistance, case to heatsink             | $R_{thCS}$ | Mounting surface, smooth and greased |  | 0.7         |                        |
| Approximate weight                                       |            |                                      |  | 6           | g                      |
|  |            |                                      |  | 0.21        | oz.                    |
| Mounting torque  | minimum    |                                      |  | 6 (5)       | kgf · cm<br>(lbf · in) |
|  | maximum    |                                      |  | 12 (10)     |                        |
| Device marking   |            | Case style TO-247AC (JEDEC)          |  | MBR4045WT   |                        |

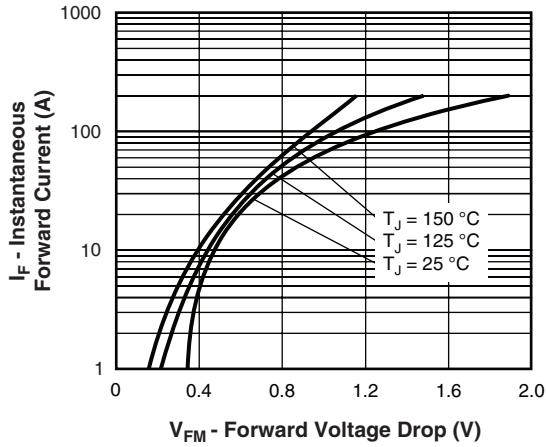


Fig. 1 - Maximum Forward Voltage Drop Characteristics

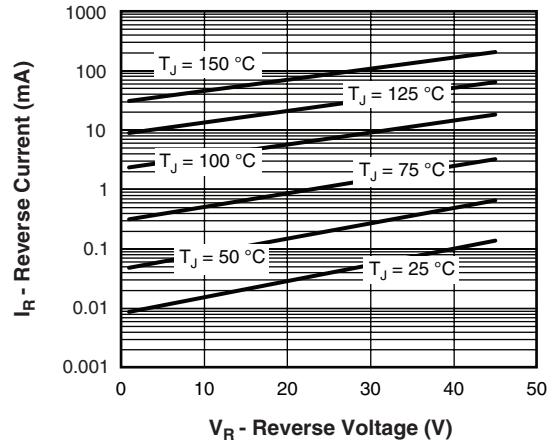


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

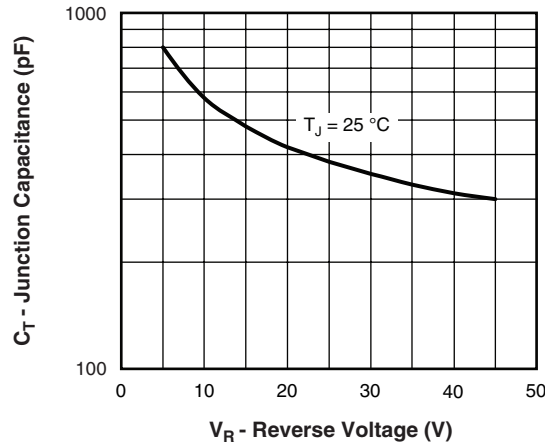


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

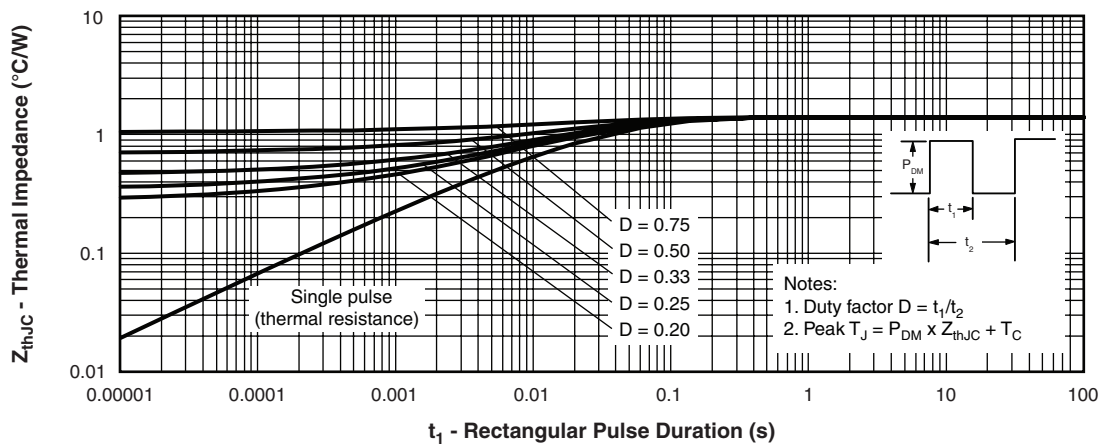


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

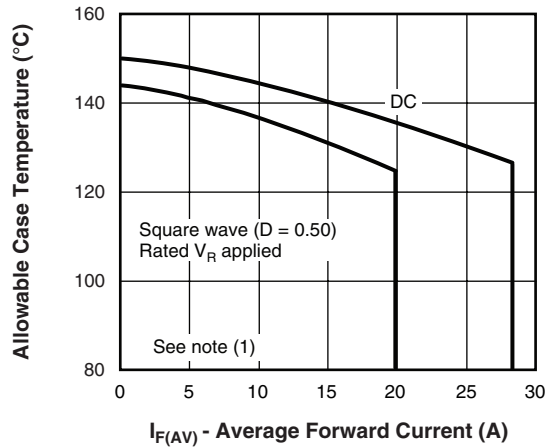


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

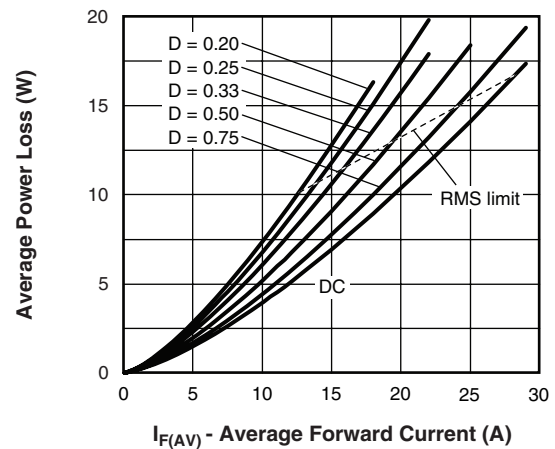


Fig. 6 - Forward Power Loss Characteristics

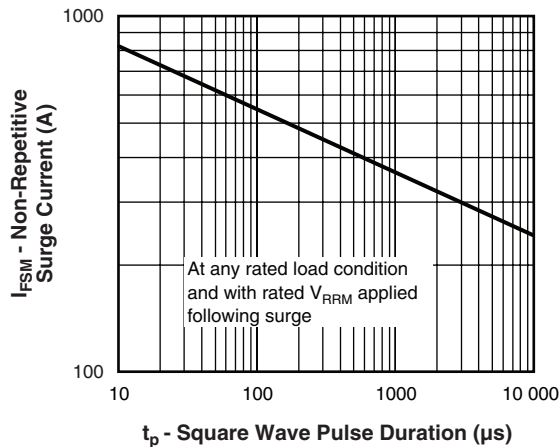


Fig. 7 - Maximum Non-Repetitive Surge Current

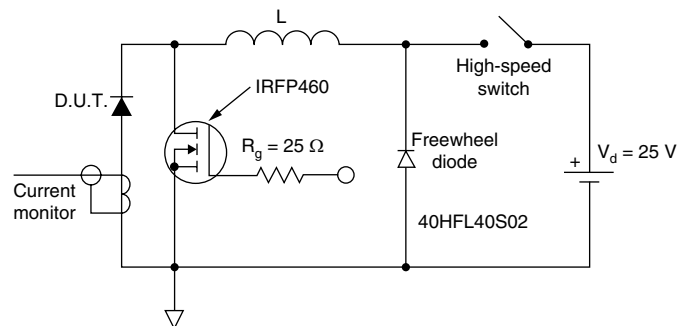


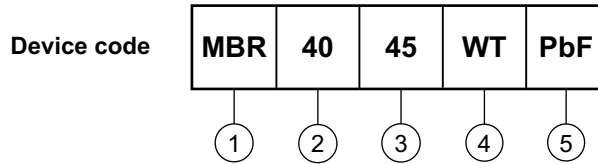
Fig. 8 - Unclamped Inductive Test Circuit

**Note**

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



## ORDERING INFORMATION TABLE



- 1** - Schottky MBR series
- 2** - Current rating (40 = 40 A)
- 3** - Voltage rating (45 = 45 V)
- 4** - Circuit configuration:  
Center tap (dual) TO-247
- 5** -
  - None = Standard production
  - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS |   |
|----------------------------|---|
| Dimensions                 | <a href="http://www.vishay.com/doc?95223">http://www.vishay.com/doc?95223</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95226">http://www.vishay.com/doc?95226</a> |
| SPICE model                | <a href="http://www.vishay.com/doc?95297">http://www.vishay.com/doc?95297</a> |



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