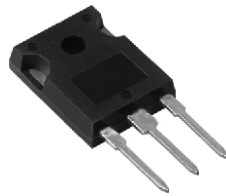
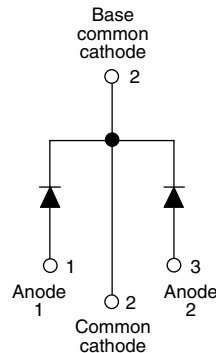


## Schottky Rectifier, 2 x 20 A



TO-247AC



### FEATURES

- 150 °C  $T_J$  operation
- 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
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)



| PRODUCT SUMMARY |                  |
|-----------------|------------------|
| Package         | TO-247AC         |
| $I_{F(AV)}$     | 2 x 20 A         |
| $V_R$           | 60 V             |
| $V_F$ at $I_F$  | 0.62 V           |
| $I_{RM}$ max.   | 100 mA at 125 °C |
| $T_J$ max.      | 150 °C           |
| Diode variation | Common cathode   |
| $E_{AS}$        | 13 mJ            |

### DESCRIPTION

The VS-MBR4060WT... 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.

| MAJOR RATINGS AND CHARACTERISTICS |                                  |             |       |
|-----------------------------------|----------------------------------|-------------|-------|
| SYMBOL                            | CHARACTERISTICS                  | VALUES      | UNITS |
| $I_{F(AV)}$                       | Rectangular waveform             | 40          | A     |
| $V_{RRM}$                         |                                  | 60          | V     |
| $I_{FSM}$                         | $t_p = 5 \mu s$ sine             | 1020        | A     |
| $V_F$                             | 20 Apk, $T_J = 125$ °C (per leg) | 0.62        | V     |
| $T_J$                             | Range                            | - 55 to 150 | °C    |

| VOLTAGE RATINGS                      |           |                 |                 |       |
|--------------------------------------|-----------|-----------------|-----------------|-------|
| PARAMETER                            | SYMBOL    | VS-MBR4060WTPbF | VS-MBR4060WT-N3 | UNITS |
| Maximum DC reverse voltage           | $V_R$     | 60              | 60              | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |                 |                 |       |

| ABSOLUTE MAXIMUM RATINGS                                    |             |   |   |        |       |
|---|-------------|---|---|--------|-------|
| PARAMETER   | SYMBOL      | TEST CONDITIONS   |   | VALUES | UNITS |
| Maximum average forward current                             | $I_{F(AV)}$ | $T_C = 108$ °C, 50 % duty cycle, rectangular waveform   |   | 20     | A     |
|   |             |   |   | 40     |       |
| Maximum peak one cycle non-repetitive surge current per leg | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse   | Following any rated load condition and with rated $V_{RRM}$ applied | 1020   |       |
|   |             | 10 ms sine or 6 ms rect. pulse  |   | 265    |       |
| Non-repetitive avalanche energy per leg                     | $E_{AS}$    | $T_J = 25$ °C, $I_{AS} = 1.5$ A, $L = 11.5$ mH  |   | 13     | mJ    |
| Repetitive avalanche current per leg                        | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu s$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical |   | 1.5    | A     |



| ELECTRICAL SPECIFICATIONS             |                                |   |                         |        |       |
|---------------------------------------|--------------------------------|---|-------------------------|--------|-------|
| PARAMETER                             | SYMBOL                         | TEST CONDITIONS   |                         | VALUES | UNITS |
| Maximum forward voltage drop          | V <sub>FM</sub> <sup>(1)</sup> | 20 A  | T <sub>J</sub> = 25 °C  | 0.72   | V     |
|                                       |                                |   | T <sub>J</sub> = 125 °C | 0.62   |       |
| Maximum instantaneous reverse current | I <sub>RM</sub>                | T <sub>J</sub> = 25 °C  | Rated DC voltage        | 1.0    | mA    |
|                                       |                                | T <sub>J</sub> = 125 °C   |                         | 100    |       |
| Maximum junction capacitance          | C <sub>T</sub>                 | V <sub>R</sub> = 5 V <sub>DC</sub> , (test signal range 100 kHz to 1 MHz) 25 °C |                         | 720    | pF    |
| Typical series inductance             | L <sub>S</sub>                 | Measured from top of terminal to mounting plane                                 |                         | 7.5    | nH    |
| Maximum voltage rate of change        | dV/dt                          | Rated V <sub>R</sub>  |                         | 10 000 | V/μs  |

Note

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

| THERMAL - MECHANICAL SPECIFICATIONS                      |                                   |                                      |  |             |                        |
|--|-----------------------------------|--------------------------------------|--|-------------|------------------------|
| PARAMETER  | SYMBOL                            | TEST CONDITIONS                      |  | VALUES      | UNITS                  |
| Maximum junction and storage temperature range           | T <sub>J</sub> , T <sub>Stg</sub> |                                      |  | - 55 to 150 | °C                     |
| Maximum thermal resistance, junction to case per package | R <sub>thJC</sub>                 | DC operation                         |  | 2.20        | °C/W                   |
| Typical thermal resistance, case to heatsink             | R <sub>thCS</sub>                 | Mounting surface, smooth and greased |  | 1.10        |                        |
| Maximum thermal resistance, junction to ambient          | R <sub>thJA</sub>                 | DC operation                         |  | 50          |                        |
| Approximate weight                                       |                                   |                                      |  | 6           | g                      |
|  |                                   |                                      |  | 0.21        | oz.                    |
| Mounting torque  | minimum<br>maximum                |                                      |  | 6 (5)       | kgf · cm<br>(lbf · in) |
|  |                                   |                                      |  | 12 (10)     |                        |
| Marking device   |                                   | Case style TO-247AC                  |  | MBR4060WT   |                        |

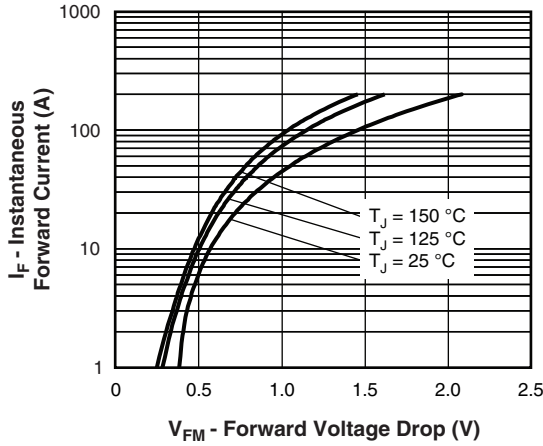


Fig. 1 - Maximum Forward Voltage Drop Characteristics

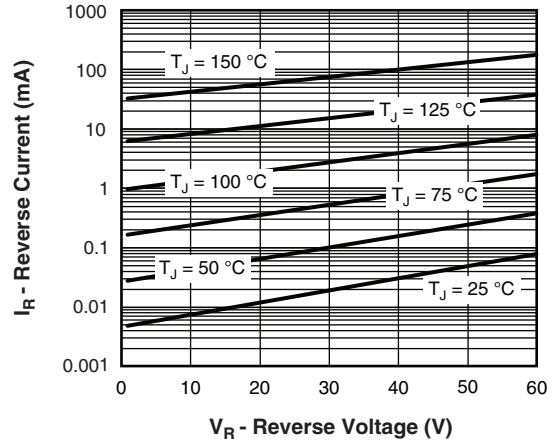


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

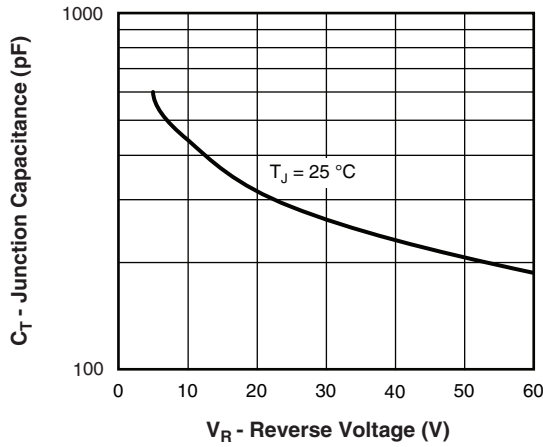


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

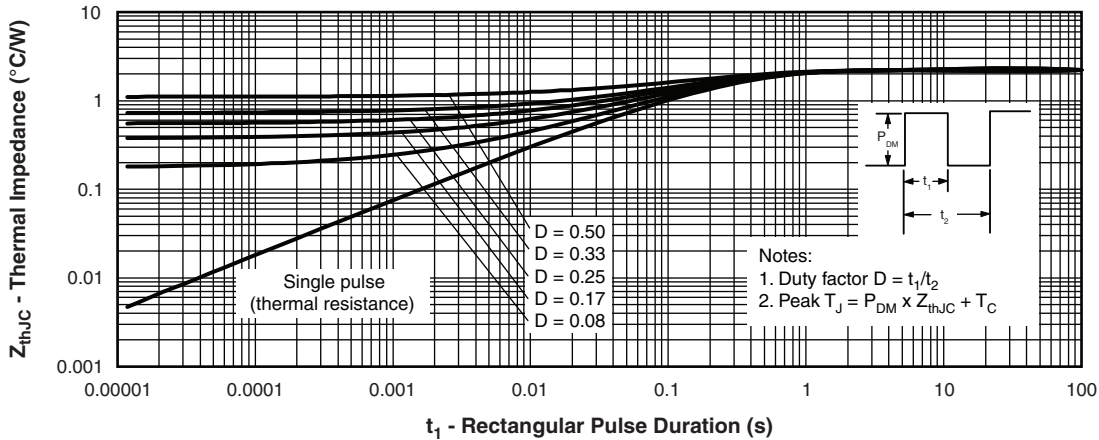


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

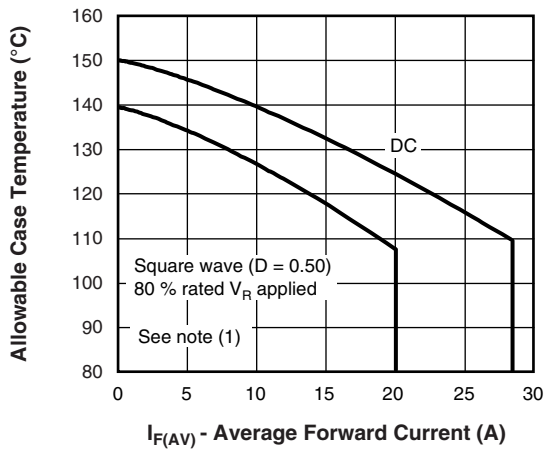


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

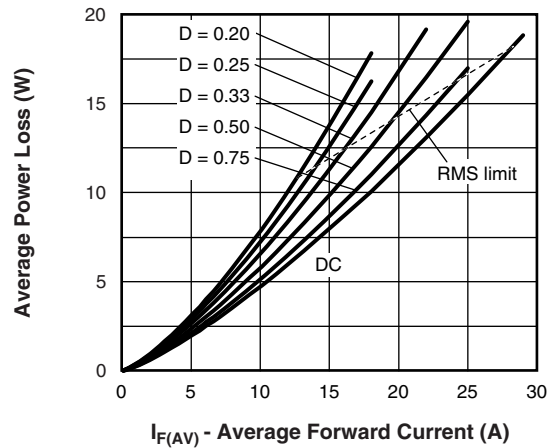


Fig. 6 - Forward Power Loss Characteristics

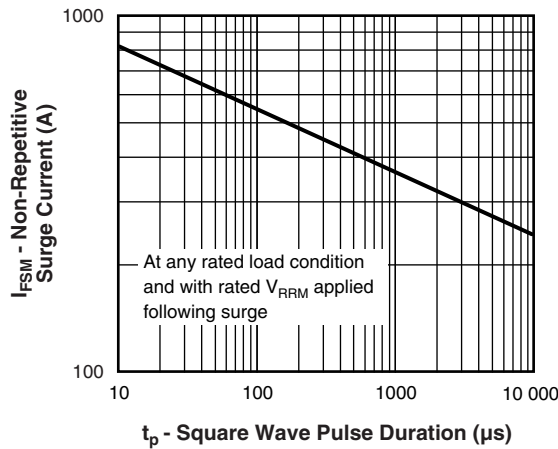


Fig. 7 - Maximum Non-Repetitive Surge Current

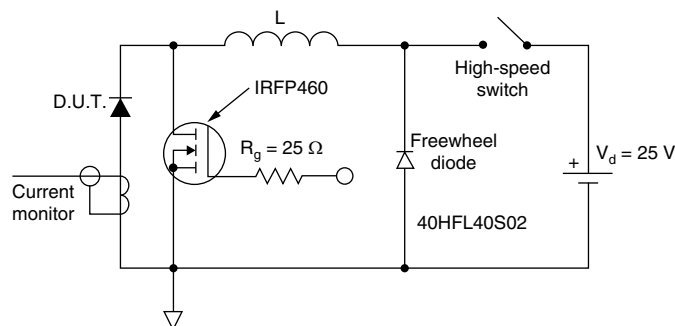


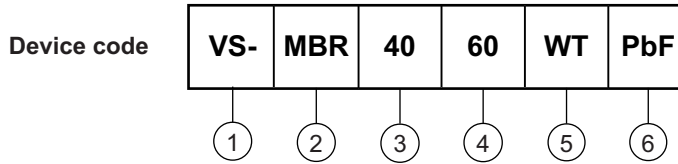
Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$ ;
- $Pd$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);
- $Pd_{REV}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Schottky MBR series
- 3** - Current rating (40 = 40 A)
- 4** - Voltage rating (60 = 60 V)
- 5** - Circuit configuration:  
Center tap (dual) TO-247
- 6** - Environmental digit
  - PbF = Lead (Pb)-free and RoHS compliant
  - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

| <b>ORDERING INFORMATION</b> (Example) |                         |                               |                              |
|---------------------------------------|-------------------------|-------------------------------|------------------------------|
| <b>PREFERRED P/N</b>                  | <b>QUANTITY PER T/R</b> | <b>MINIMUM ORDER QUANTITY</b> | <b>PACKAGING DESCRIPTION</b> |
| VS-MBR4060WTPbF                       | 25                      | 500                           | Antistatic plastic tube      |
| VS-MBR4060WT-N3                       | 25                      | 500                           | Antistatic plastic tube      |

| <b>LINKS TO RELATED DOCUMENTS</b> |   |
|-----------------------------------|---|
| Dimensions                        | <a href="http://www.vishay.com/doc?95223">www.vishay.com/doc?95223</a>              |
| Part marking information          | TO-247AC PbF <a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a> |
|                                   | TO-247AC -N3 <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |





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