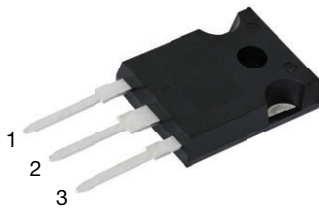
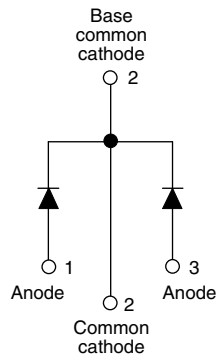


High Performance Schottky Rectifier, 2 x 20 A


TO-247AC 3L


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
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE

| PRIMARY CHARACTERISTICS | |
|-------------------------|------------------|
| $I_{F(AV)}$ | 2 x 20 A |
| V_R | 45 V |
| V_F at I_F | 0.56 V |
| I_{RM} max. | 110 mA at 125 °C |
| T_J max. | 150 °C |
| E_{AS} | 20 mJ |
| Package | TO-247AC 3L |
| Circuit configuration | Common cathode |

DESCRIPTION

The VS-MBR4045WT... 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 (per device) | 40 | A |
| I_{FRM} | $T_C = 125$ °C (per leg) | 40 | |
| V_{RRM} | | 45 | V |
| I_{FSM} | $t_p = 5$ μ s sine | 1020 | A |
| V_F | 20 A _{pk} , $T_J = 125$ °C | 0.56 | V |
| T_J | Range | -55 to +150 | °C |

| VOLTAGE RATINGS | | | |
|--------------------------------------|-----------|-----------------|-------|
| PARAMETER | SYMBOL | VS-MBR4045WT-N3 | 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 | $I_{F(AV)}$ | $T_C = 125$ °C, 50 % duty cycle, rectangular waveform | 20 | A |
| | | | 40 | |
| Peak repetitive forward current per leg | I_{FRM} | Rated V_R , square wave, 20 kHz, $T_C = 125$ °C | 40 | A |
| Maximum peak one cycle non-repetitive surge current per leg, see fig. 7 | I_{FSM} | 5 μ s sine or 3 μ s rect. pulse | 1020 | |
| | | 10 ms sine or 6 ms rect. pulse | 265 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25$ °C, $I_{AS} = 3$ A, $L = 4.40$ mH | 20 | mJ |
| Repetitive avalanche current per leg | I_{AR} | Current decaying linearly to zero in 1 μ s Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | 3 | A |



| 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 | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 110 | |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J$ maximum | | 0.29 | V |
| Forward slope resistance | r_t | | | 10.3 | $\text{m}\Omega$ |
| Maximum junction capacitance | C_T | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | | 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 | $\text{V}/\mu\text{s}$ |

Note(1) Pulse width < 300 μs , 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 | $^\circ\text{C}/\text{W}$ |
| 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 (lbf · in) |
| | maximum | | | 12 (10) | |
| Device marking | | Case style TO-247AC 3L | | MBR4045WT | |

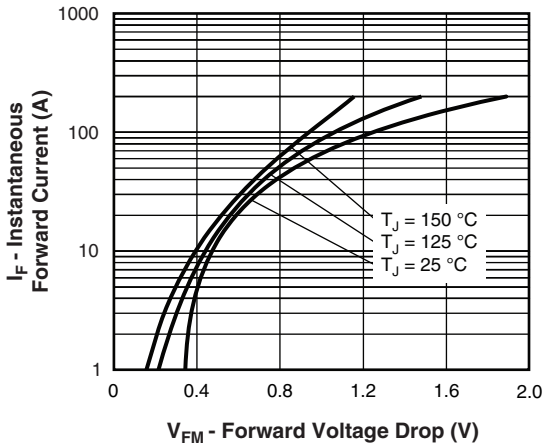


Fig. 1 - Maximum Forward Voltage Drop Characteristics

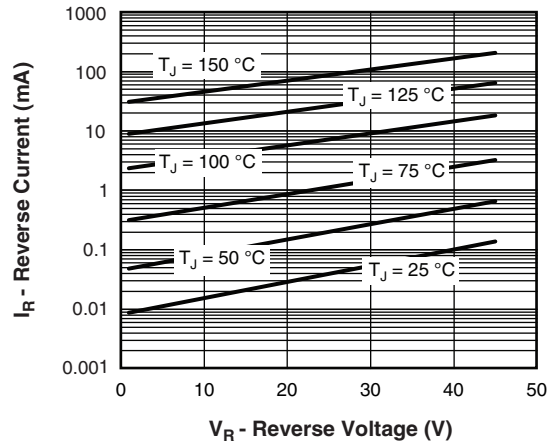


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

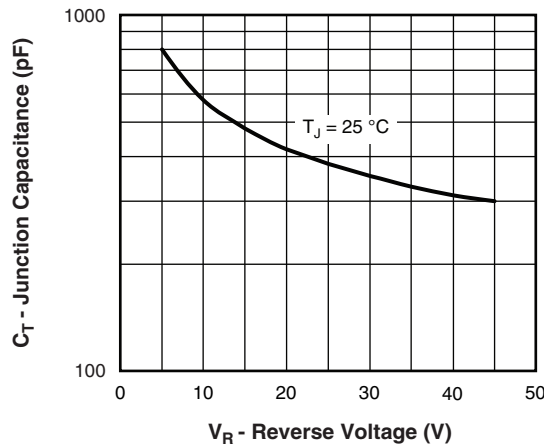


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

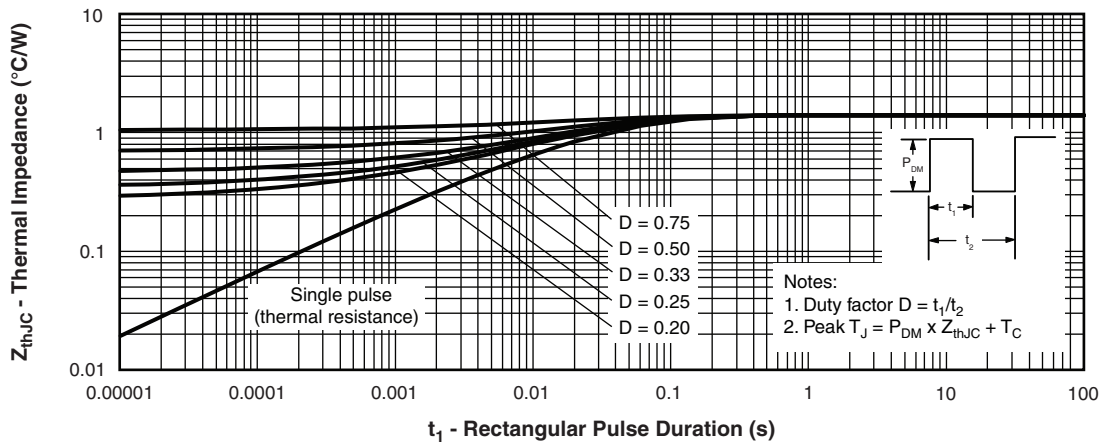


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

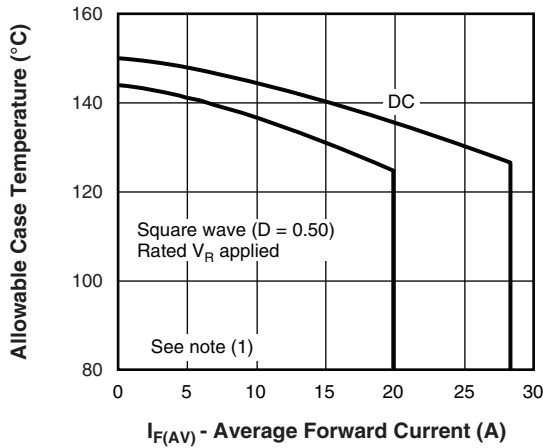


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

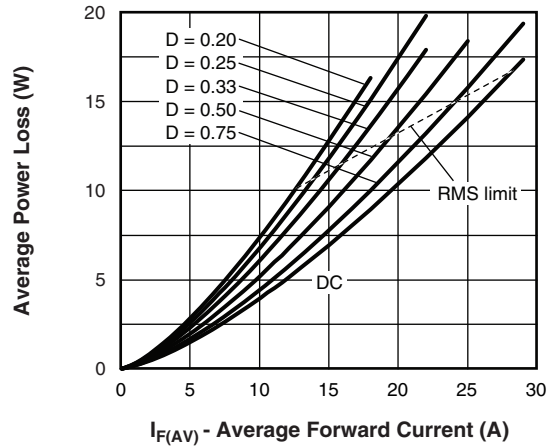


Fig. 6 - Forward Power Loss Characteristics

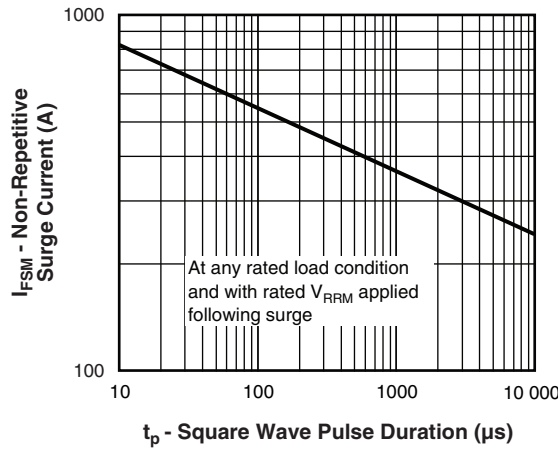


Fig. 7 - Maximum Non-Repetitive Surge Current



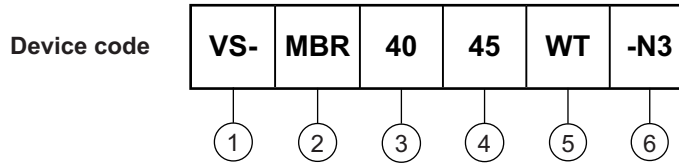
Fig. 8 - Unclamped Inductive Test Circuit

Note

- (2) 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** - Vishay Semiconductors product
- 2** - Schottky MBR series
- 3** - Current rating (40 = 40 A)
- 4** - Voltage rating (45 = 45 V)
- 5** - Circuit configuration:
Center tap (dual) TO-247
- 6** - Environmental digit
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-MBR4045WT-N3 | 25 | 500 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96138 |
| Part marking information | www.vishay.com/doc?95007 |
| SPICE model | www.vishay.com/doc?95297 |

TO-247AC 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.65 | 5.31 | 0.183 | 0.209 | | D2 | 0.51 | 1.35 | 0.020 | 0.053 | |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 | | E | 15.29 | 15.87 | 0.602 | 0.625 | 3 |
| A2 | 1.17 | 1.37 | 0.046 | 0.054 | | E1 | 13.46 | - | 0.53 | - | |
| b | 0.99 | 1.40 | 0.039 | 0.055 | | e | 5.46 BSC | | 0.215 BSC | | |
| b1 | 0.99 | 1.35 | 0.039 | 0.053 | | Ø K | 0.254 | | 0.010 | | |
| b2 | 1.65 | 2.39 | 0.065 | 0.094 | | L | 14.20 | 16.10 | 0.559 | 0.634 | |
| b3 | 1.65 | 2.34 | 0.065 | 0.092 | | L1 | 3.71 | 4.29 | 0.146 | 0.169 | |
| b4 | 2.59 | 3.43 | 0.102 | 0.135 | | Ø P | 3.56 | 3.66 | 0.14 | 0.144 | |
| b5 | 2.59 | 3.38 | 0.102 | 0.133 | | Ø P1 | - | 7.39 | - | 0.291 | |
| c | 0.38 | 0.89 | 0.015 | 0.035 | | Q | 5.31 | 5.69 | 0.209 | 0.224 | |
| c1 | 0.38 | 0.84 | 0.015 | 0.033 | | R | 4.52 | 5.49 | 0.178 | 0.216 | |
| D | 19.71 | 20.70 | 0.776 | 0.815 | 3 | S | 5.51 BSC | | 0.217 BSC | | |
| D1 | 13.08 | - | 0.515 | - | 4 | | | | | | |

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension Q



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