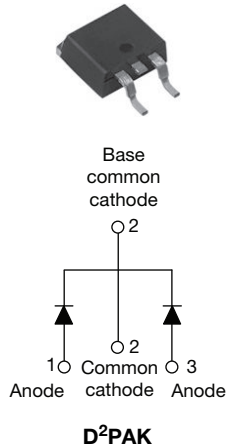
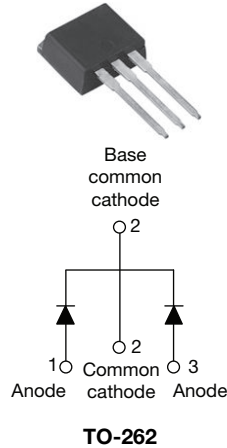


Schottky Rectifier, 2 x 20 A

VS-MBRB4045CTHM3

VS-MBR4045CT-1HM3

FEATURES

- 150 °C T_J operation
- 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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified, meets JESD 201 class 1A whisker test
- Material categorization: For definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
PRODUCT SUMMARY

| | |
|-----------------|---|
| Package | TO-263AB (D ² PAK), TO-262AA |
| $I_{F(AV)}$ | 2 x 20 A |
| V_R | 45 V |
| V_F at I_F | 0.58 V |
| I_{RM} max. | 95 mA at 125 °C |
| T_J max. | 150 °C |
| Diode variation | Common cathode |
| E_{AS} | 20 mJ |

DESCRIPTION

The center tap 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 (per device) | 40 | A |
| I_{FRM} | $T_C = 117$ °C (per leg) | 40 | |
| V_{RRM} | | 45 | V |
| I_{FSM} | $t_p = 5$ μ s sine | 900 | A |
| V_F | 20 A_{pk} , $T_J = 125$ °C | 0.58 | V |
| T_J | Range | -65 to 150 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-MBRB4045CTHM3 VS-MBR4045CT-1HM3 | 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 _____ per leg _____ per device | $I_{F(AV)}$ | $T_C = 118$ °C, rated V_R | 20 | A |
| | | | 40 | |
| Peak repetitive forward current per leg | I_{FRM} | Rated V_R , square wave, 20 kHz, $T_C = 117$ °C | 40 | |
| Maximum peak one cycle non-repetitive peak surge current per leg | I_{FSM} | 5 μ s sine or 3 μ s rect. pulse | 900 | |
| | | 10 ms sine or 6 ms rect. pulse | 210 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25$ °C, $I_{AS} = 3$ A, $L = 4.4$ 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 | $T_J = 25\text{ }^\circ\text{C}$ | 0.60 | V |
| | | 40 A | | 0.80 | |
| | | 20 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.58 | |
| | | 40 A | | 0.80 | |
| Maximum instantaneous reverse current | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | Rated DC voltage | 1 | mA |
| | | $T_J = 100\text{ }^\circ\text{C}$ | | 50 | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 95 | |
| 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 | | 8.0 | nH |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10 000 | V/ μ s |

Note

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

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|--|------------|--|------------------------|--------------|---------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum junction temperature range | T_J | | | -65 to 150 | $^\circ\text{C}$ |
| Maximum storage temperature range | T_{Stg} | | | -65 to 175 | |
| Maximum thermal resistance, junction to case per leg | R_{thJC} | DC operation | | 1.5 | $^\circ\text{C}/\text{W}$ |
| Typical thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth and greased (Only for TO-220) | | 0.50 | |
| Maximum thermal resistance, junction to ambient | R_{thJA} | DC operation (For D ² PAK and TO-262) | | 50 | |
| Approximate weight | | | | 2 | g |
| | | | | 0.07 | oz. |
| Mounting torque | minimum | | Non-lubricated threads | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | Case style D ² PAK | | MBRB4045CTH | |
| | | Case style TO-262 | | MBR4045CT-1H | |

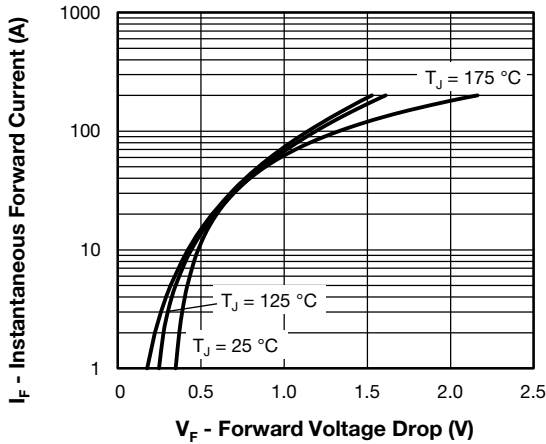


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

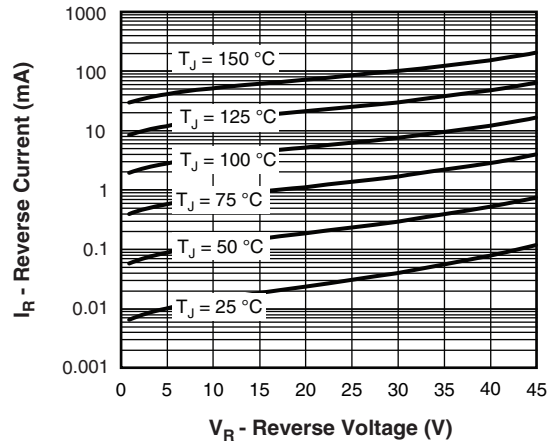


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

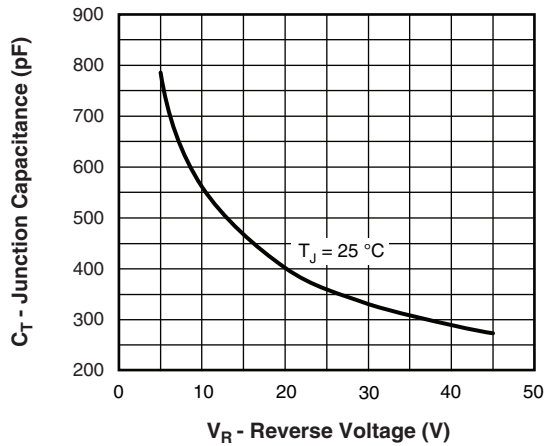


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

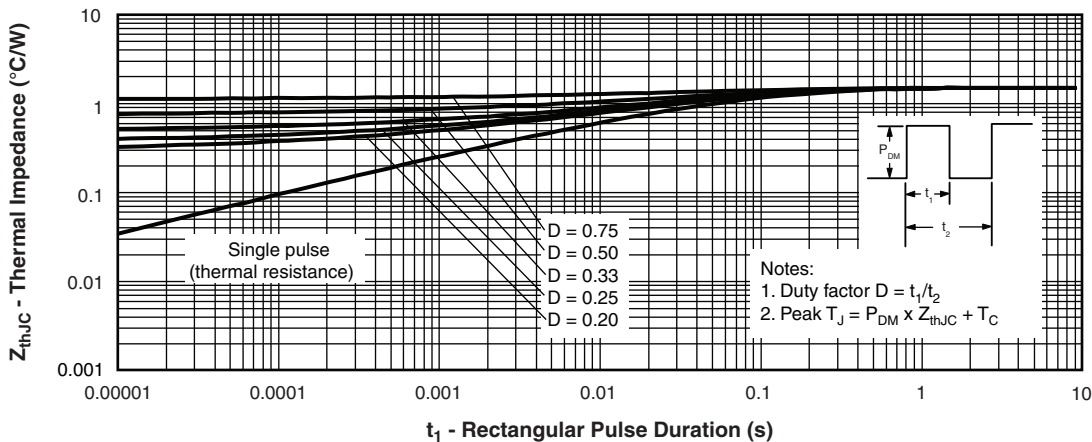


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

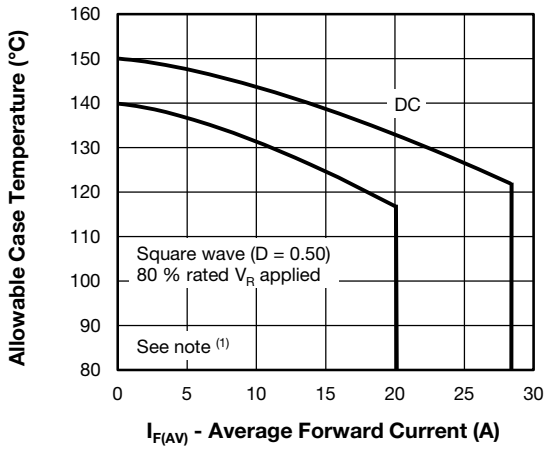


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

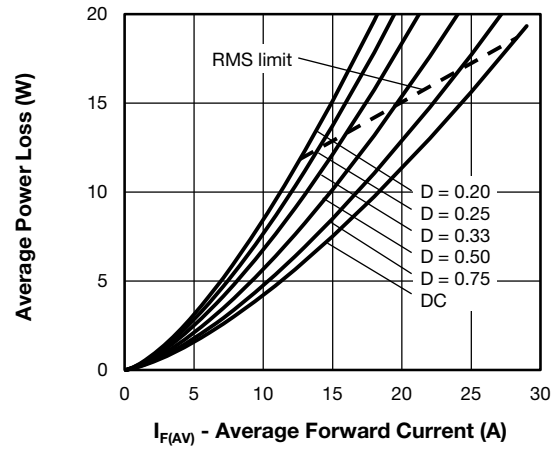


Fig. 6 - Forward Power Loss Characteristics

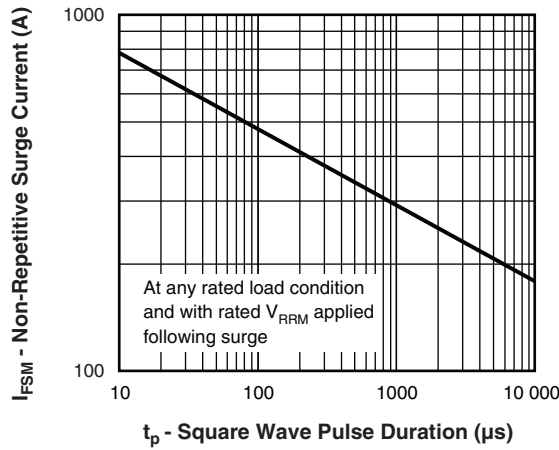


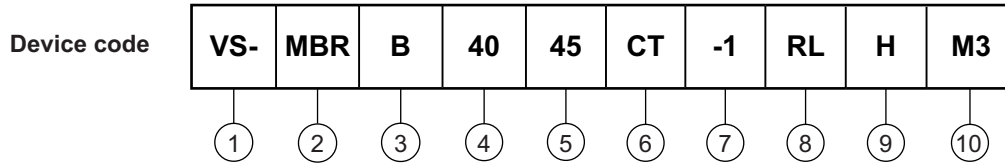
Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

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



- 1** - Vishay Semiconductors product
- 2** - Essential part number
- 3** -
 - B = D²PAK **7** None
 - None = TO-262 **7** = -1
- 4** - Current rating (40 = 40 A)
- 5** - Voltage rating (45 = 45 V)
- 6** - CT = Essential part number
- 7** -
 - None = D²PAK **3** = B
 - -1 = TO-262 **3** None
- 8** -
 - None = Tube
 - L = Tape and reel (left oriented - for D²PAK only)
 - R = Tape and reel (right oriented - for D²PAK only)
- 9** - H = AEC-Q101 qualified
- 10** - Environmental digit:
M3 = Halogen-free, RoHS-compliant and termination lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-MBRB4045CTHM3 | 50 | 1000 | Antistatic plastic tube |
| VS-MBR4045CT-1HM3 | 50 | 1000 | Antistatic plastic tube |
| VS-MBRB4045CTLHM3 | 800 | 800 | 13" diameter reel |
| VS-MBRB4045CTRHM3 | 800 | 800 | 13" diameter reel |

| LINKS TO RELATED DOCUMENTS | | |
|----------------------------|-------------------------------|--|
| Dimensions | TO-263AB (D ² PAK) | www.vishay.com/doc?95046 |
| | TO-262AA | www.vishay.com/doc?95419 |
| Part marking information | TO-263AB (D ² PAK) | www.vishay.com/doc?95444 |
| | TO-262AA | www.vishay.com/doc?95443 |
| Packaging information | TO-263AB (D ² PAK) | www.vishay.com/doc?95032 |

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | | D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | | E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| b | 0.51 | 0.99 | 0.020 | 0.039 | | E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 | e | 2.54 BSC | | 0.100 BSC | | |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | | H | 14.61 | 15.88 | 0.575 | 0.625 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 | L | 1.78 | 2.79 | 0.070 | 0.110 | |
| c | 0.38 | 0.74 | 0.015 | 0.029 | | L1 | - | 1.65 | - | 0.066 | 3 |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 | L2 | 1.27 | 1.78 | 0.050 | 0.070 | |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | | L3 | 0.25 BSC | | 0.010 BSC | | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 | L4 | 4.78 | 5.28 | 0.188 | 0.208 | |

Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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 outmost extremes of the plastic body
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB

TO-262

DIMENSIONS in millimeters and inches

Modified JEDEC® outline TO-262



$\oplus 0.010 \text{ M} \text{ A} \text{ M} \text{ B}$



Lead assignments

- Diodes**
 1. - Anode (two die)/open (one die)
 2., 4. - Cathode
 3. - Anode



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | |
| A1 | 2.03 | 3.02 | 0.080 | 0.119 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 | |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.38 | 0.74 | 0.015 | 0.029 | |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 |
| D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| e | 2.54 BSC | | 0.100 BSC | | |
| L | 13.46 | 14.10 | 0.530 | 0.555 | |
| L1 | - | 1.65 | - | 0.065 | 3 |
| L2 | 3.36 | 3.71 | 0.132 | 0.146 | |

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) 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 outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Controlling dimension: inches
- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum), D1 (minimum) and L2 where dimensions derived the actual package outline



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