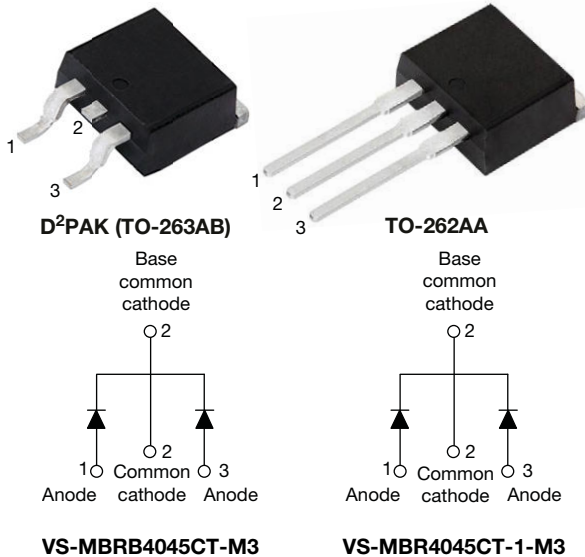


High Performance Schottky Rectifier, 2 x 20 A



FEATURES

- 150 °C T_J operation
- Low forward voltage drop
- High frequency operation
- Center tap TO-220, D²PAK and TO-262 packages
- 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 245 °C
- 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

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.

| PRIMARY CHARACTERISTICS | |
|----------------------------------|---|
| 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 |
| E _{AS} | 20 mJ |
| Package | D ² PAK (TO-263AB), TO-262AA |
| Circuit configuration | Common cathode |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|--|-------------|-------|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| I _{F(AV)} | Rectangular waveform (per device) | 40 | A |
| I _{FRM} | T _C = 118 °C (per leg) | 40 | |
| V _R | | 45 | V |
| I _{FSM} | t _p = 5 μs 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-MBRB4045CT-M3 VS-MBR4045CT-1-M3 | 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 = 118 °C | | 40 | |
| Maximum peak one cycle non-repetitive peak surge current per leg | I _{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V _{RRM} applied | 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 | |
| Repetitive avalanche current per leg | I _{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T _J maximum V _A = 1.5 x 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 °C | 0.60 | V |
| | | 40 A | | 0.78 | |
| | | 20 A | T _J = 125 °C | 0.58 | |
| | | 40 A | | 0.75 | |
| Maximum instantaneous reverse current | I _{RM} ⁽¹⁾ | T _J = 25 °C | Rated DC voltage | 1 | mA |
| | | T _J = 100 °C | | 50 | |
| | | T _J = 125 °C | | 95 | |
| Maximum junction capacitance | C _T | V _R = 5 V _{DC} (test signal range 100 kHz to 1 MHz), 25 °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/μs |

Note

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

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|--|-------------------|--|--|-------------|------------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum junction temperature range | T _J | | | -65 to 150 | °C |
| Maximum storage temperature range | T _{Stg} | | | -65 to 175 | |
| Maximum thermal resistance, junction to case per leg | R _{thJC} | DC operation | | 1.5 | °C/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 maximum | | Non-lubricated threads | | 6 (5) | kgf · cm (lbf · in) |
| | | | | 12 (10) | |
| Marking device | | Case style D ² PAK (TO-263AB) | | MBRB4045CT | |
| | | Case style TO-262 | | MBR4045CT-1 | |

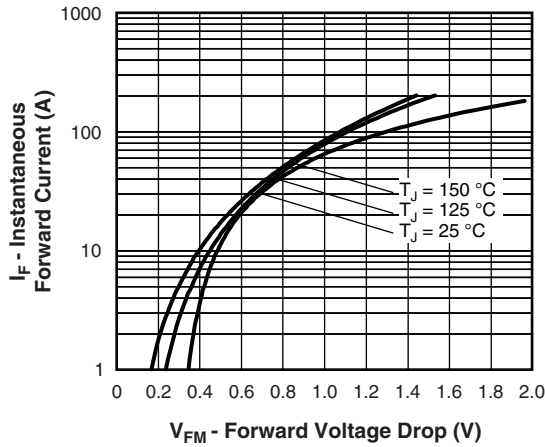


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

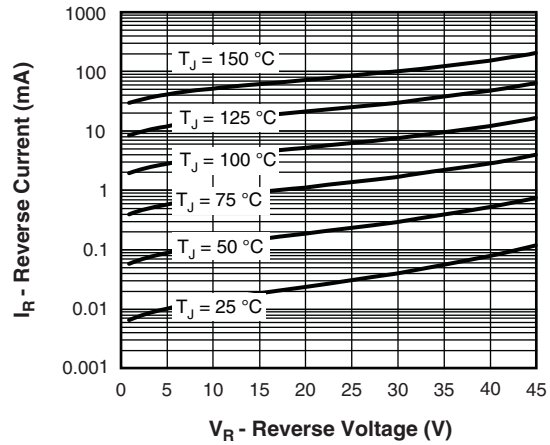


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

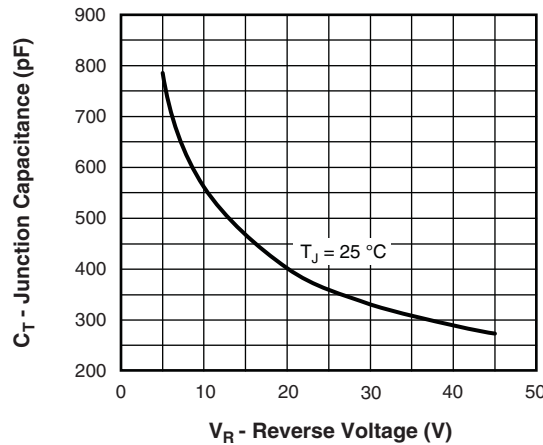


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

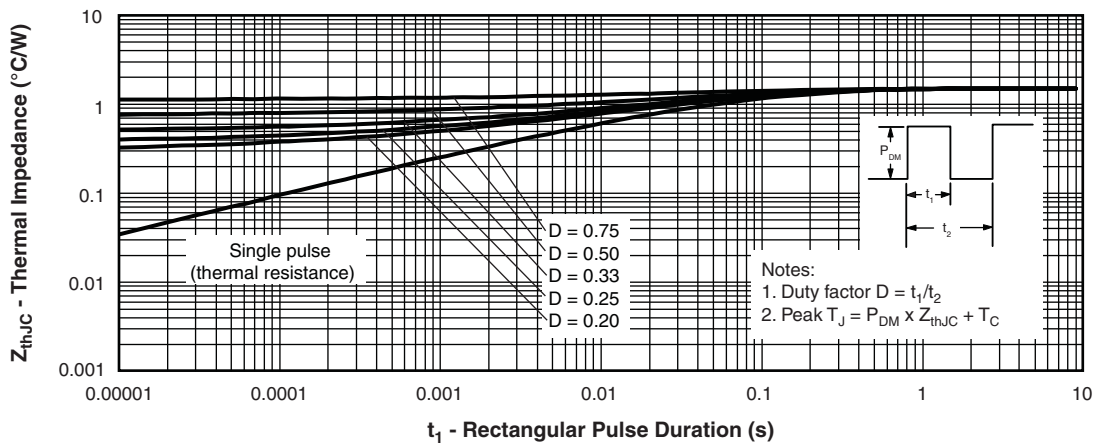


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

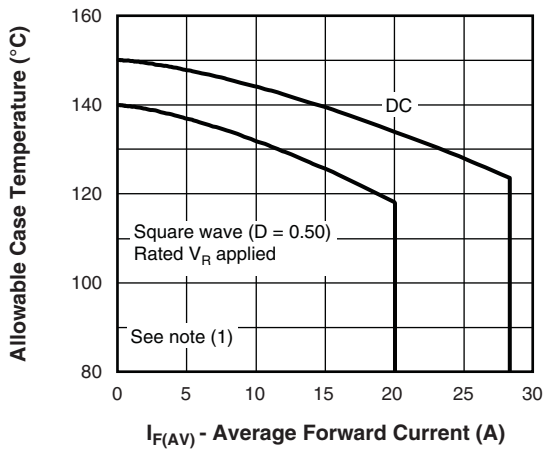


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

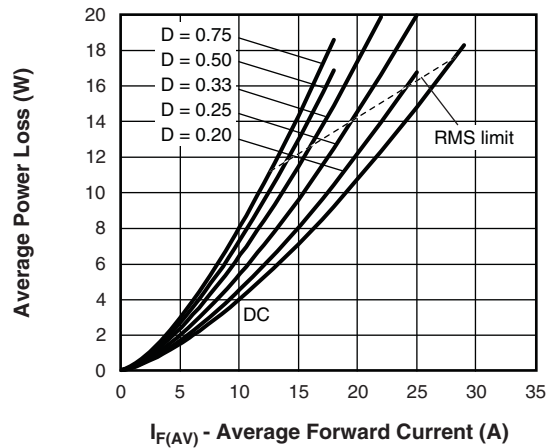


Fig. 6 - Forward Power Loss Characteristics

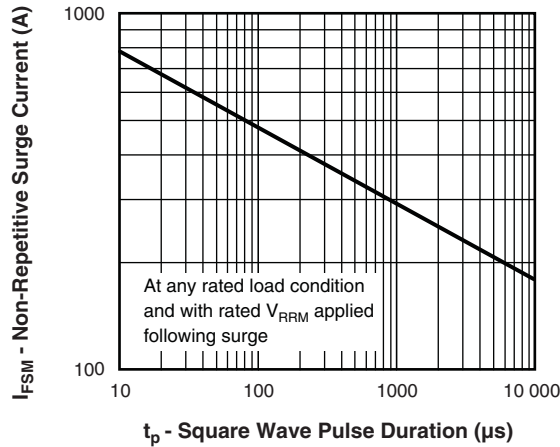


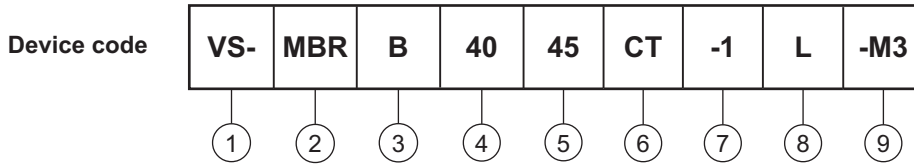
Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

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** - -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-MBRB4045CT-M3 | 50 | 1000 | Antistatic plastic tube |
| VS-MBRB4045CTR-M3 | 800 | 800 | 13" diameter reel |
| VS-MBRB4045CTL-M3 | 800 | 800 | 13" diameter reel |
| VS-MBR4045CT-1-M3 | 50 | 1000 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | | |
|----------------------------|-------------------------------|--|
| Dimensions | D ² PAK (TO-263AB) | www.vishay.com/doc?96164 |
| | TO-262AA | www.vishay.com/doc?96165 |
| Part marking information | D ² PAK (TO-263AB) | www.vishay.com/doc?95444 |
| | TO-262AA | www.vishay.com/doc?95443 |
| Packaging information | | www.vishay.com/doc?96424 |
| SPIICE model | | www.vishay.com/doc?95296 |

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

- (1) Dimensioning and tolerancing per ASME Y14.5 M-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) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inches
- (7) Outline conforms to JEDEC® outline TO-263AB

TO-262AA

DIMENSIONS in millimeters and inches

Modified JEDEC® outline TO-262



| 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 | 3.56 | 3.71 | 0.140 | 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 (max.), b (min., max.), b1 (min.), b2 (max.), c (min.), c1(min.), c2 (max.), D (min.), E (max.), L1 (max.), L2 (min., max.)



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