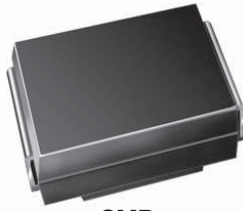


High Performance Schottky Rectifier, 1.0 A


SMB


FEATURES

- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE

DESCRIPTION

The VS-MBRS140-M3 surface mount Schottky rectifier has been designed for applications requiring low forward drop and very small foot prints on PC boards. Typical applications are in disk drives, switching power supplies, converters, freewheeling diodes, battery charging, and reverse battery protection.

| PRODUCT SUMMARY | |
|-----------------|------------------|
| Package | SMB |
| $I_{F(AV)}$ | 1.0 A |
| V_R | 40 V |
| V_F at I_F | 0.53 V |
| I_{RM} max. | 4.0 mA at 125 °C |
| T_J max. | 125 °C |
| Diode variation | Single die |
| E_{AS} | 3.0 mJ |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|--------------------------------------|-------------|-------|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform | 1.0 | A |
| V_{RRM} | | 40 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 380 | A |
| V_F | 1.0 A _{pk} , $T_J = 125$ °C | 0.53 | V |
| T_J | Range | -55 to +150 | °C |

| VOLTAGE RATINGS | | | |
|--------------------------------------|-----------|---------------|-------|
| PARAMETER | SYMBOL | VS-MBRS140-M3 | UNITS |
| Maximum DC reverse voltage | V_R | 40 | V |
| Maximum working peak reverse voltage | V_{RWM} | | |

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|---|-------------|---|---|-------|-----|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS | |
| Maximum average forward current | $I_{F(AV)}$ | 50 % duty cycle at $T_L = 119$ °C, rectangular waveform | 1.0 | A | |
| Maximum peak one cycle non-repetitive surge current | I_{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V_{RRM} applied | | 380 |
| | | 10 ms sine or 6 ms rect. pulse | | | 40 |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25$ °C, $I_{AS} = 1$ A, $L = 6$ mH | 3.0 | mJ | |
| Repetitive avalanche current | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | 1.0 | A | |



| ELECTRICAL SPECIFICATIONS | | | | | | |
|---------------------------------|----------------|--|-----------------------------------|------|--------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | TYP. | MAX. | UNITS |
| Maximum forward voltage drop | $V_{FM}^{(1)}$ | 1 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.52 | 0.6 | V |
| | | 2 A | | 0.70 | 0.77 | |
| | | 1 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.48 | 0.53 | |
| | | 2 A | | 0.63 | 0.71 | |
| Maximum reverse leakage current | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | - | 0.1 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | - | 4.0 | |
| Maximum junction capacitance | C_T | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$ | | - | 80 | pF |
| Typical series inductance | L_S | Measured lead to lead 5 mm from package body | | - | 2.0 | 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 and storage temperature range | $T_J^{(1)}, T_{Stg}$ | | -55 to +150 | $^\circ\text{C}$ |
| Maximum thermal resistance, junction to lead | $R_{thJL}^{(2)}$ | DC operation See fig. 4 | 36 | $^\circ\text{C/W}$ |
| Maximum thermal resistance, junction to ambient | R_{thJA} | DC operation | 80 | |
| Approximate weight | | | 0.10 | g |
| | | | 0.003 | oz. |
| Marking device | | Case style SMB (similar to DO-214AA) | 14 | |

Notes(1) $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{thJA}}$ thermal runaway condition for a diode on its own heatsink

(2) Mounted 1" square PCB

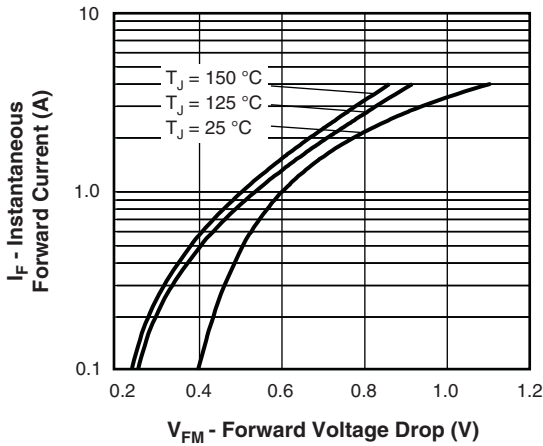


Fig. 1 - Maximum Forward Voltage Drop Characteristics

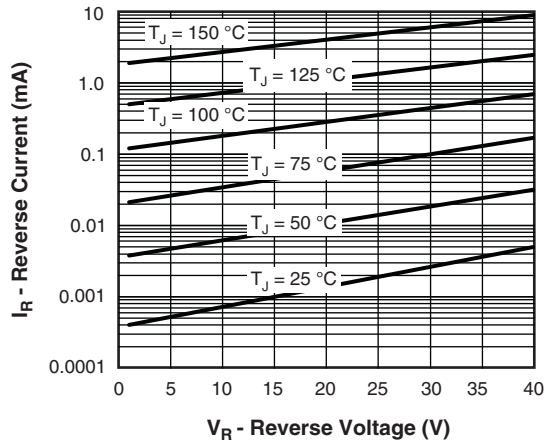


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

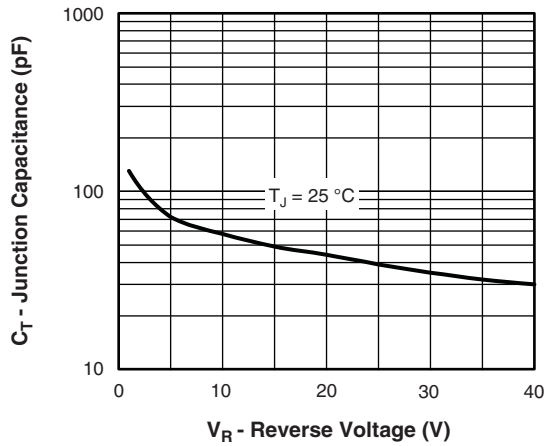


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

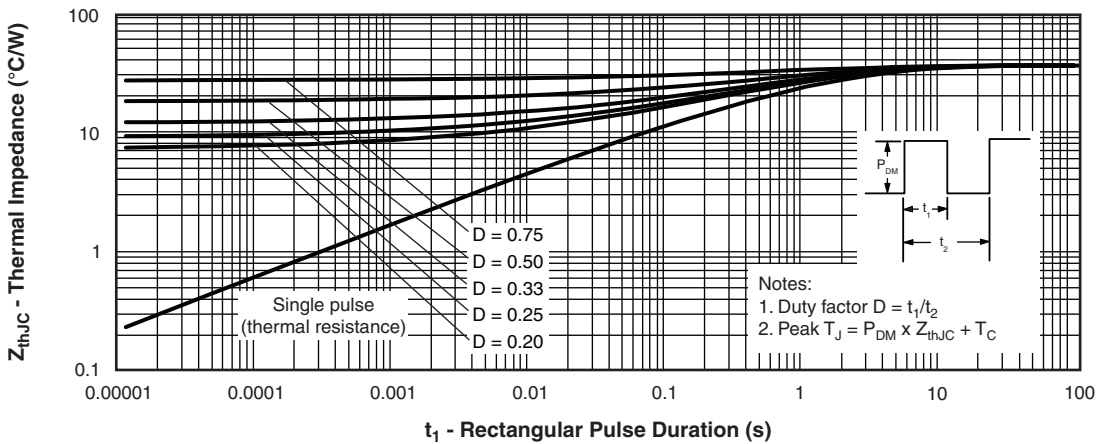


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

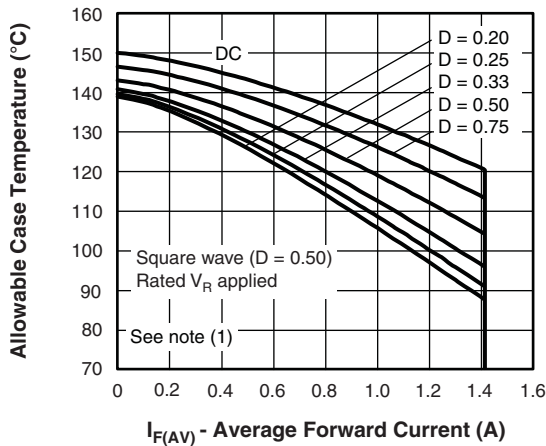


Fig. 5 - Maximum Average Forward Current vs. Allowable Lead Temperature

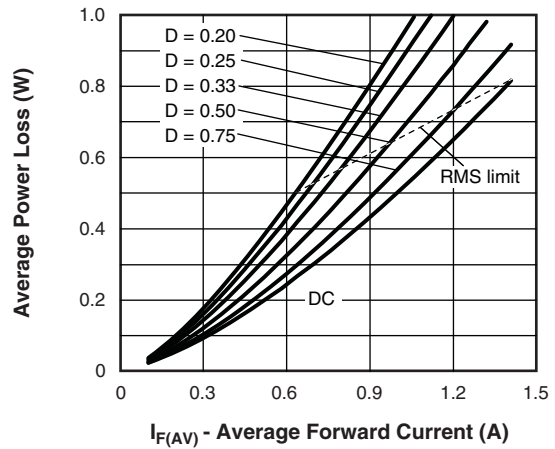


Fig. 6 - Maximum Average Forward Dissipation vs. Average Forward Current

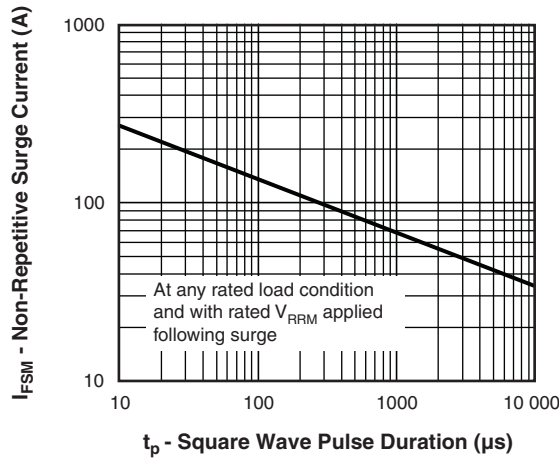


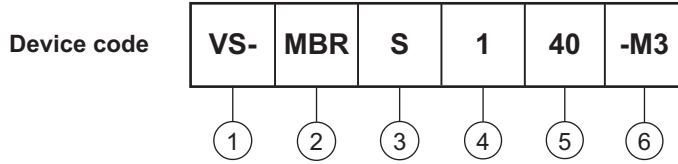
Fig. 7 - Maximum Peak Surge Forward Current vs. Pulse Duration

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 $V_{R1} = 80\%$ rated V_R



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors products
- 2** - Schottky MBR series
- 3** - S = SMB
- 4** - Current rating (1 = 1 A)
- 5** - Voltage rating (40 = 40 V)
- 6** - -M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|---------------------------------------|-------------------------------|-------------------------------|------------------------------------|
| PREFERRED P/N | PREFERRED PACKAGE CODE | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-MBRS140-M3/5BT | 5BT | 3200 | 13" diameter plastic tape and reel |

| LINKS TO RELATED DOCUMENTS | |
|-----------------------------------|--|
| Dimensions | www.vishay.com/doc?95401 |
| Part marking information | www.vishay.com/doc?95403 |
| Packaging information | www.vishay.com/doc?95404 |
| SPIICE model | www.vishay.com/doc?95299 |

SMB

DIMENSIONS in inches (millimeters)





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Тел: +7 (812) 336 43 04 (многоканальный)
Email: org@lifeelectronics.ru