



Schottky Rectifier, 1 A



DO-204AL



FEATURES

- Low profile, axial leaded outline
- 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 for commercial level
- Halogen-free according to IEC 61249-2-21 definition (-M3 only)



RoHS COMPLIANT
HALOGEN FREE Available

| PRODUCT SUMMARY | |
|-----------------|-------------------|
| Package | DO-204AL (DO-41) |
| $I_{F(AV)}$ | 1 A |
| V_R | 50 V, 60 V |
| V_F at I_F | 0.65 V |
| I_{RM} max. | 10.0 mA at 125 °C |
| T_J max. | 150 °C |
| Diode variation | Single die |
| E_{AS} | 2.0 mJ |

DESCRIPTION

The VS-MBR... axial leaded Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. 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 | 1.0 | A |
| V_{RRM} | | 50/60 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 150 | A |
| V_F | 1 Apk, $T_J = 125 \text{ }^\circ\text{C}$ | 0.65 | V |
| T_J | Range | - 40 to 150 | °C |

| VOLTAGE RATINGS | | | | | | |
|--------------------------------------|-----------|-----------|--------------|-----------|--------------|-------|
| PARAMETER | SYMBOL | VS-MBR150 | VS-MBR150-M3 | VS-MBR160 | VS-MBR160-M3 | UNITS |
| Maximum DC reverse voltage | V_R | 50 | 50 | 60 | 60 | V |
| Maximum working peak reverse voltage | V_{RWM} | | | | | |

| ABSOLUTE MAXIMUM RATINGS | | | | | |
|--|-------------|--|---|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum average forward current See fig. 4 | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 75 \text{ }^\circ\text{C}$, rectangular waveform | | 1.0 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 6 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V_{RRM} applied | 150 | |
| | | 10 ms sine or 6 ms rect. pulse | | 25 | |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25 \text{ }^\circ\text{C}$, $I_{AS} = 1 \text{ A}$, $L = 4 \text{ mH}$ | | 2.0 | 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 | | VALUES | UNITS |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 1 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.75 | V |
| | | 2 A | | 0.9 | |
| | | 3 A | | 1.0 | |
| | | 1 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.65 | |
| | | 2 A | | 0.75 | |
| | | 3 A | | 0.82 | |
| Maximum reverse leakage current See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 0.5 | mA |
| | | $T_J = 100\text{ }^\circ\text{C}$ | | 5 | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 10 | |
| Typical junction capacitance | C_T | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | | 55 | pF |
| Typical series inductance | L_S | Measured lead to lead 5 mm from package body | | 8.0 | nH |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10 000 | V/ μ s |

Note

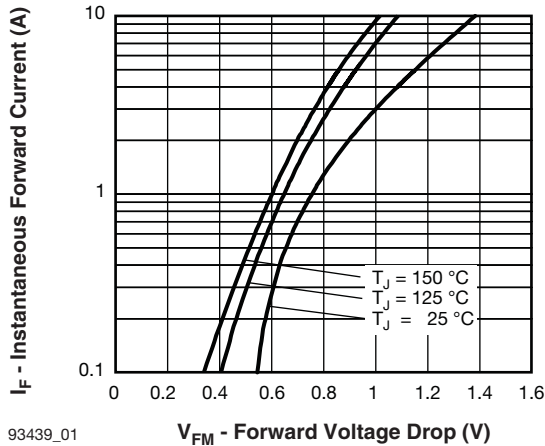
(1) Pulse width < 300 μ s, duty cycle < 2 %

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|--|----------------------|-----------------------------|--|-------------|--------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum junction and storage temperature range | $T_J^{(1)}, T_{Stg}$ | | | - 40 to 150 | $^\circ\text{C}$ |
| Maximum thermal resistance, junction to lead | $R_{thJL}^{(2)}$ | DC operation See fig. 4 | | 80 | $^\circ\text{C/W}$ |
| Approximate weight | | | | 0.33 | g |
| | | | | 0.012 | oz. |
| Marking device | | Case style DO-204AL (DO-41) | | MBR150 | |
| | | | | MBR160 | |

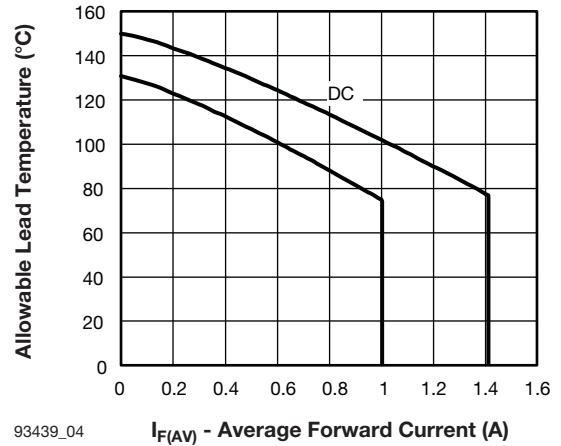
Notes

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

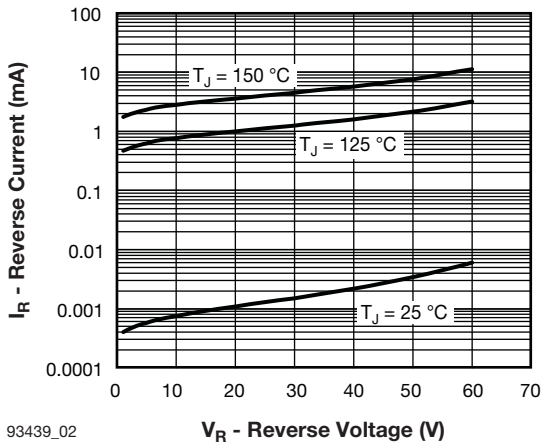
(2) Mounted 1" square PCB, thermal probe connected to lead 2 mm from package



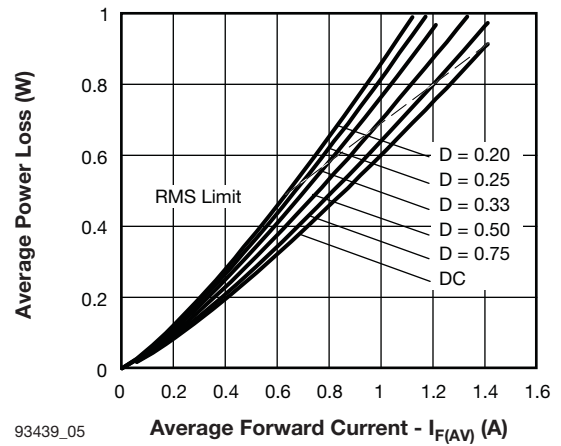
93439_01 **V_{FM} - Forward Voltage Drop (V)**
Fig. 1 - Maximum Forward Voltage Drop Characteristics



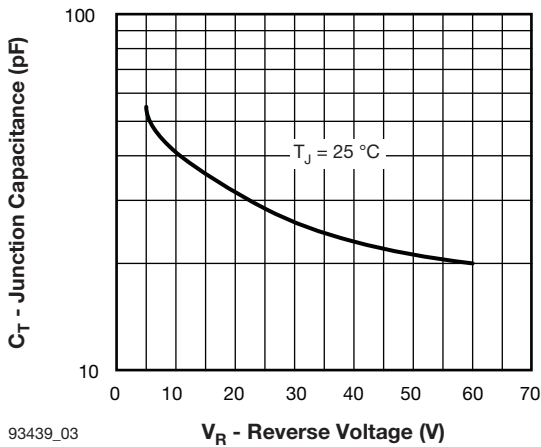
93439_04 **I_{F(AV)} - Average Forward Current (A)**
Fig. 4 - Maximum Ambient Temperature vs. Average Forward Current, Printed Circuit Board Mounted



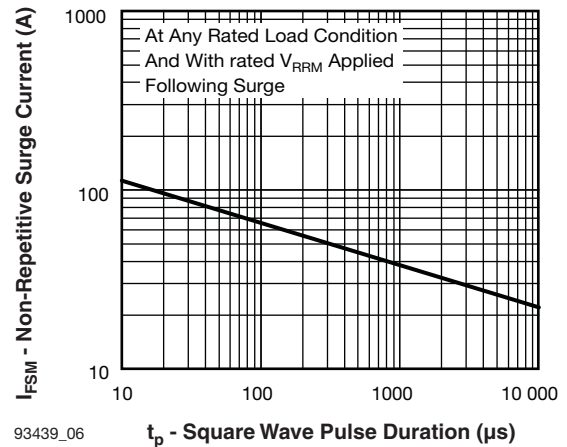
93439_02 **V_R - Reverse Voltage (V)**
Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage



93439_05 **Average Forward Current - I_{F(AV)} (A)**
Fig. 5 - Forward Power Loss Characteristics



93439_03 **V_R - Reverse Voltage (V)**
Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage



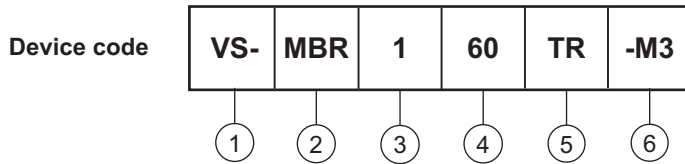
93439_06 **t_p - Square Wave Pulse Duration (μs)**
Fig. 6 - Maximum Non-Repetitive Surge Current

Note

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



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Schottky MBR series
- 3** - Current rating: 1 = 1 A
- 4** - Voltage rating

| |
|-----------|
| 50 = 50 V |
| 60 = 60 V |
- 5** - TR = Tape and reel package
None = Bulk package
- 6** - Environmental digit
 - None = Lead (Pb)-free and RoHS compliant
 - -M3 = Halogen-free, RoHS compliant, and terminations lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-----------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-MBR150 | 1000 | 1000 | Bulk |
| VS-MBR150TR | 5000 | 5000 | Tape and reel |
| VS-MBR150-M3 | 1000 | 1000 | Bulk |
| VS-MBR150TR-M3 | 5000 | 5000 | Tape and reel |
| VS-MBR160 | 1000 | 1000 | Bulk |
| VS-MBR160TR | 5000 | 5000 | Tape and reel |
| VS-MBR160-M3 | 1000 | 1000 | Bulk |
| VS-MBR160TR-M3 | 5000 | 5000 | Tape and reel |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95241 |
| Part marking information | www.vishay.com/doc?95304 |
| Packaging information | www.vishay.com/doc?95338 |



Axial DO-204AL (DO-41)

DIMENSIONS in millimeters (inches)





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