

High Performance Schottky Rectifier, 1.5 A


SMA (DO-214AC)


FEATURES

- Low forward voltage drop
- Guard ring for enhanced ruggedness and long term reliability
- Small footprint, surface mountable
- High frequency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Meets JESD 201 class 2 whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Switching power supplies
- Meter protection
- Reverse protection for power input to PC board circuits
- Battery isolation and charging
- Low threshold voltage diode
- Freewheeling or by-pass diode
- Low voltage clamp

DESCRIPTION

The VS-15MQ040HM3 Schottky rectifier is designed to be used for low power applications where a reverse voltage of 40 V is encountered and surface mountable is required.

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-------------|----------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform | 1.5 | A |
| V_{RRM} | | 40 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 330 | A |
| V_F | $2 A_{pk}$, $T_J = 125^\circ C$ | 0.43 | V |
| T_J | Range | -40 to +150 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-15MQ040HM3 | 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 See fig. 4 | $I_{F(AV)}$ | 50 % duty cycle at $T_L = 105^\circ C$, rectangular waveform On PC board 9 mm ² island (0.013 mm thick copper pad area) | 2.1 | A |
| | | 50 % duty cycle at $T_L = 113^\circ C$, rectangular waveform On PC board 9 mm ² island (0.013 mm thick copper pad area) | 1.5 | |
| Maximum peak one cycle non-repetitive surge current See fig. 6 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 330 | A |
| | | 10 ms sine or 6 ms rect. pulse | 140 | |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25^\circ C$, $I_{AS} = 1 A$, $L = 12 mH$ | 6.0 | 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 | $V_{FM}^{(1)}$ | 1.5 A | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.43 |
| | | 2 A | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.49 |
| | | 1.5 A | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.34 |
| | | 2 A | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.43 |
| Maximum reverse leakage current See fig. 2 | I_{RM} | $T_J = 25\text{ }^{\circ}\text{C}$ | $V_R = \text{Rated } V_R$ | 0.5 |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | $V_R = \text{Rated } V_R$ | 20 |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J \text{ maximum}$ | | 0.26 |
| Forward slope resistance | r_t | | | 64.6 |
| Typical junction capacitance | C_T | $V_R = 10\text{ V}_{DC}, T_J = 25\text{ }^{\circ}\text{C}, \text{ test signal} = 1\text{ MHz}$ | | 134 |
| Typical series inductance | L_S | Measured lead to lead 5 mm from package body | | 2.0 |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10 000 |

Note

(1) Pulse width = 300 μs , 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 ambient | R_{thJA} | DC operation | 80 | $^{\circ}\text{C/W}$ |
| Approximate weight | | | 0.07 | g |
| | | | 0.002 | oz. |
| Marking device | | Case style SMA (DO-214AC) | XF | |

Note

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

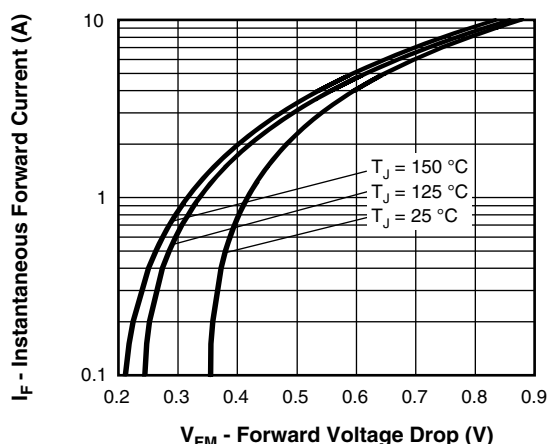


Fig. 1 - Maximum Forward Voltage Drop Characteristics

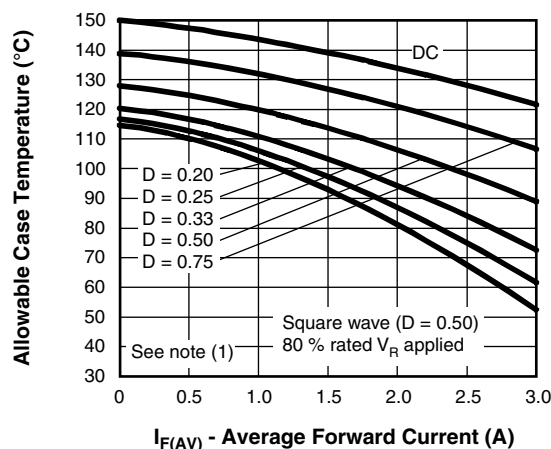


Fig. 4 - Maximum Average Forward Current vs. Allowable Lead Temperature

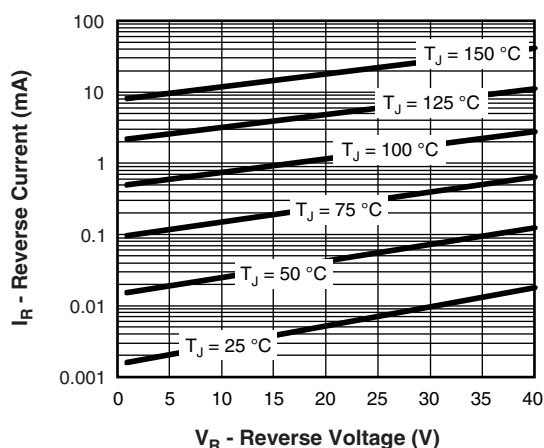


Fig. 2 - Typical Peak Reverse Current vs. Reverse Voltage

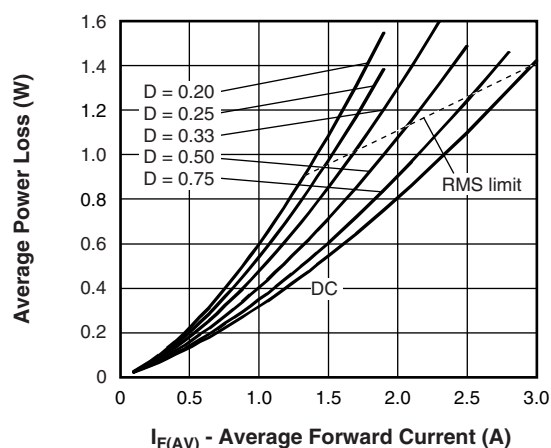


Fig. 5 - Maximum Average Forward Dissipation vs. Average Forward Current

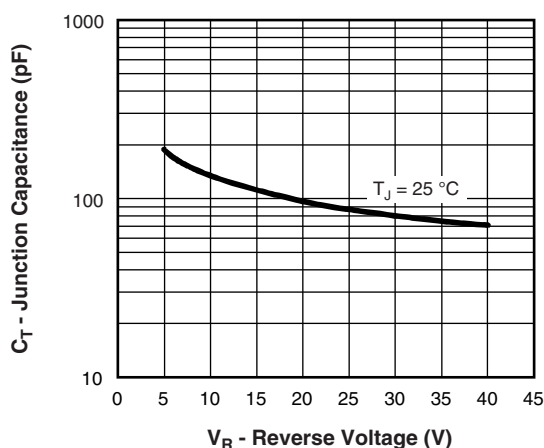


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

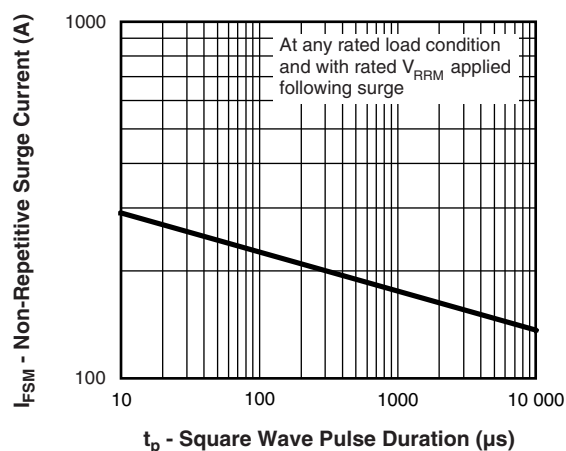


Fig. 6 - Maximum Peak Surge Forward Current vs. Pulse Duration

Note

- (1) 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 $V_{R1} = 80\%$ rated V_R



ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|-----|----|---|---|-----|---|----|
| Device code | VS- | 15 | M | Q | 040 | H | M3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

- 1** - Vishay Semiconductors product
- 2** - Current rating
- 3** - M = SMA
- 4** - Q = Schottky "Q" series
- 5** - Voltage rating (040 = 40 V)
- 6** - H = AEC-Q101 qualified
- 7** - Environmental digit:
M3 = Halogen-free, RoHS-compliant and terminations lead (Pb)-free

ORDERING INFORMATION (Example)

| PREFERRED P/N | PREFERRED PACKAGE CODE | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
|-------------------|------------------------|------------------------|------------------------------------|
| VS-15MQ040HM3/5AT | 5AT | 7500 | 13" diameter plastic tape and reel |

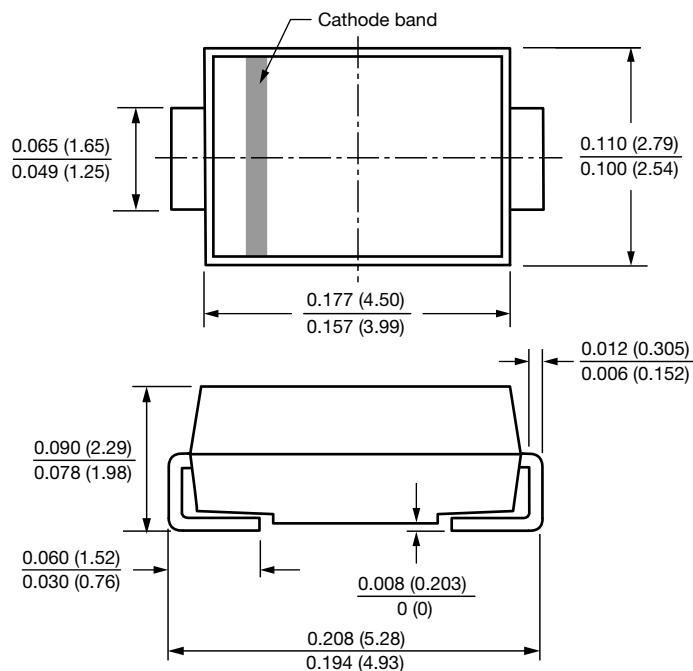
LINKS TO RELATED DOCUMENTS

| | |
|--------------------------|--|
| Dimensions | www.vishay.com/doc?95400 |
| Part marking information | www.vishay.com/doc?95403 |
| Packaging information | www.vishay.com/doc?95404 |

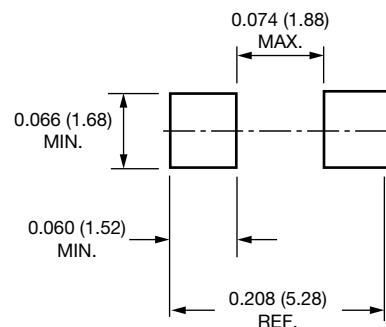
SMA

DIMENSIONS in inches (millimeters)

DO-214AC (SMA)



Mounting Pad Layout





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