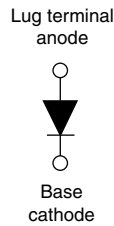


High Performance Schottky Rectifier, 120 A


HALF-PAK (D-67)


FEATURES

- 175 °C T_J operation
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Designed and qualified for industrial level
- UL approved file E222165
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
COMPLIANT

| PRIMARY CHARACTERISTICS | |
|-------------------------|-----------------|
| $I_{F(AV)}$ | 120 A |
| V_R | 100 V |
| Package | HALF-PAK (D-67) |
| Circuit configuration | Single |

DESCRIPTION

The VS-123NQ.. high current Schottky rectifier module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in high current switching power supplies, plating power supplies, UPS systems, converters, freewheeling diodes, welding, and reverse battery protection.

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|--|-------------|-------|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform | 120 | A |
| V_{RRM} | | 100 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 12 800 | A |
| V_F | 120 A _{pk} , $T_J = 125 \text{ }^\circ\text{C}$ | 0.73 | V |
| T_J | Range | -55 to +175 | °C |

| VOLTAGE RATINGS | | | |
|--------------------------------------|-----------|----------------|-------|
| PARAMETER | SYMBOL | VS-123NQ100PbF | UNITS |
| Maximum DC reverse voltage | V_R | 100 | V |
| Maximum working peak reverse voltage | V_{RWM} | | |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|--|-------------|---|---|--------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Maximum average forward current See fig. 5 | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 133 \text{ }^\circ\text{C}$, rectangular waveform | 120 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V_{RRM} applied | 12 800 |
| | | 10 ms sine or 6 ms rect. pulse | | 1800 |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25 \text{ }^\circ\text{C}$, $I_{AS} = 5.5 \text{ A}$, $L = 1 \text{ mH}$ | 15 | 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 | A |



| ELECTRICAL SPECIFICATIONS | | | | | |
|---|----------------|--|-----------------------------------|--------|------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 120 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.91 | V |
| | | 240 A | | 1.26 | |
| | | 120 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.73 | |
| | | 240 A | | 0.9 | |
| Maximum reverse leakage current See fig. 2 | I_{RM} | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 3 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 40 | |
| Maximum junction capacitance | C_T | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | | 2650 | pF |
| Typical series inductance | L_S | From top of terminal hole to mounting plane | | 7.0 | nH |
| Maximum voltage rate of change | dV/dt | Rated V_R | | 10 000 | V/ μs |

Note

(1) Pulse width = 500 μs

| THERMAL - MECHANICAL SPECIFICATIONS | | | | | |
|--|----------------|--------------------------------------|-------------|---------------------------|--|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS | |
| Maximum junction and storage temperature range | T_J, T_{Stg} | | -55 to +175 | $^\circ\text{C}$ | |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation See fig. 4 | 0.38 | $^\circ\text{C}/\text{W}$ | |
| Typical thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth and greased | 0.05 | | |
| Approximate weight | | | 30 | g | |
| | | | 1.06 | oz. | |
| Mounting torque | minimum | Non-lubricated threads | 3 (26.5) | N · m (lbf · in) | |
| | maximum | | 4 (35.4) | | |
| Terminal torque | minimum | | 3.4 (30) | | |
| | maximum | | 5 (44.2) | | |
| Case style | | | | HALF-PAK module | |

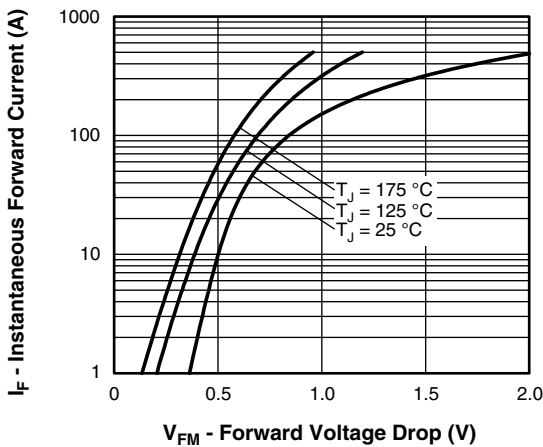


Fig. 1 - Maximum Forward Voltage Drop Characteristics

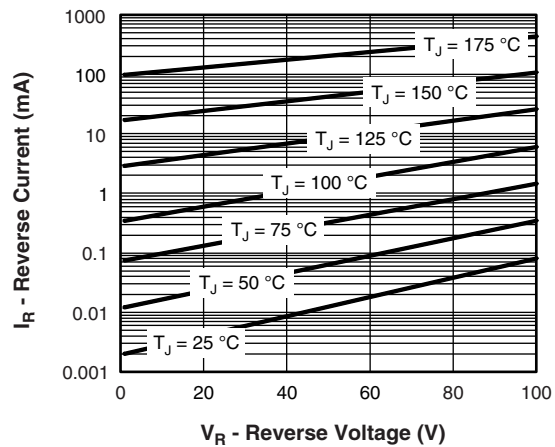


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

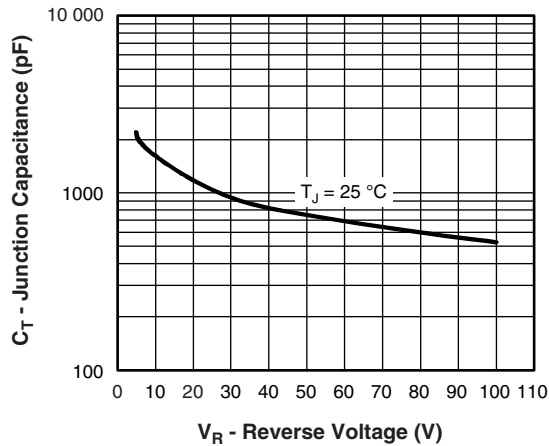


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

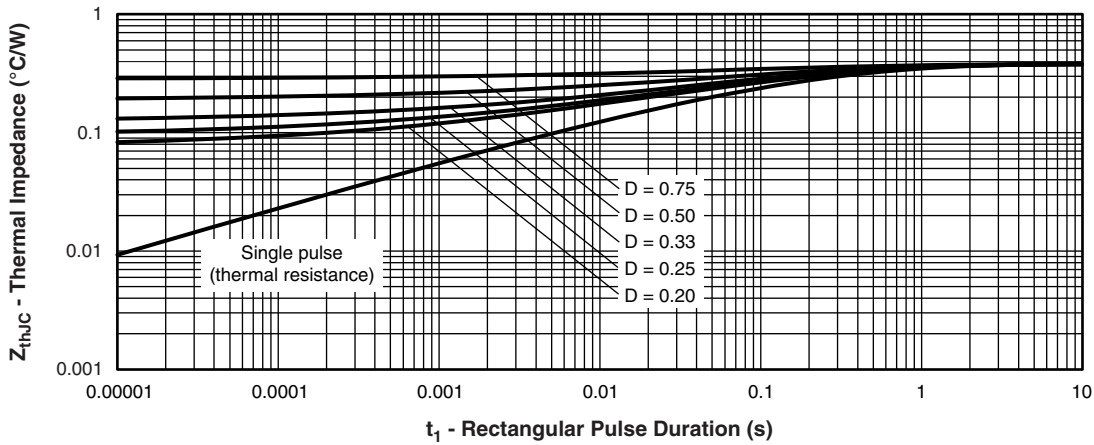


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

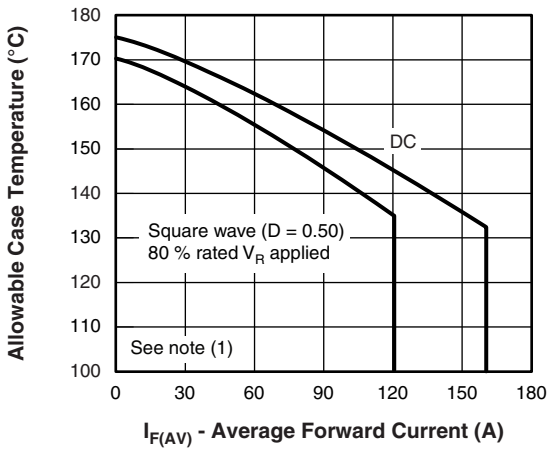


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

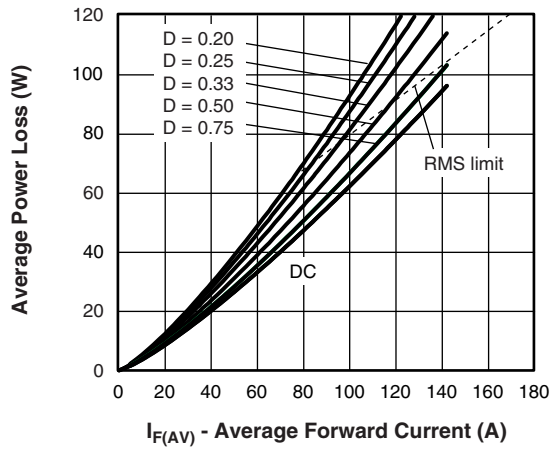


Fig. 6 - Forward Power Loss Characteristics

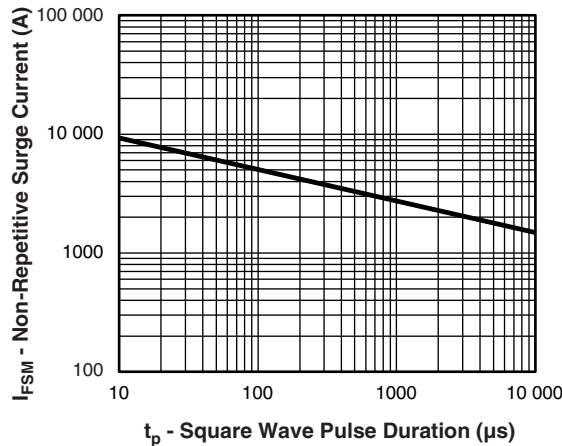


Fig. 7 - Maximum Non-Repetitive Surge Current

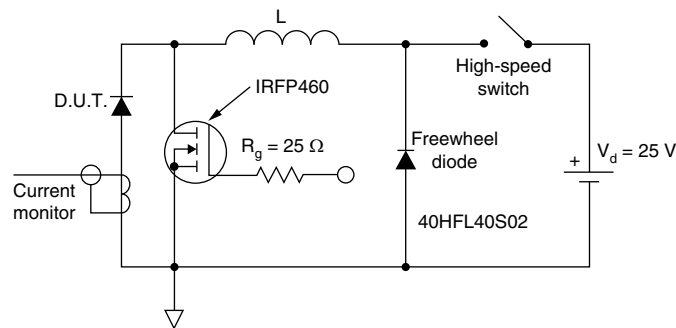


Fig. 8 - Unclamped Inductive Test Circuit

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

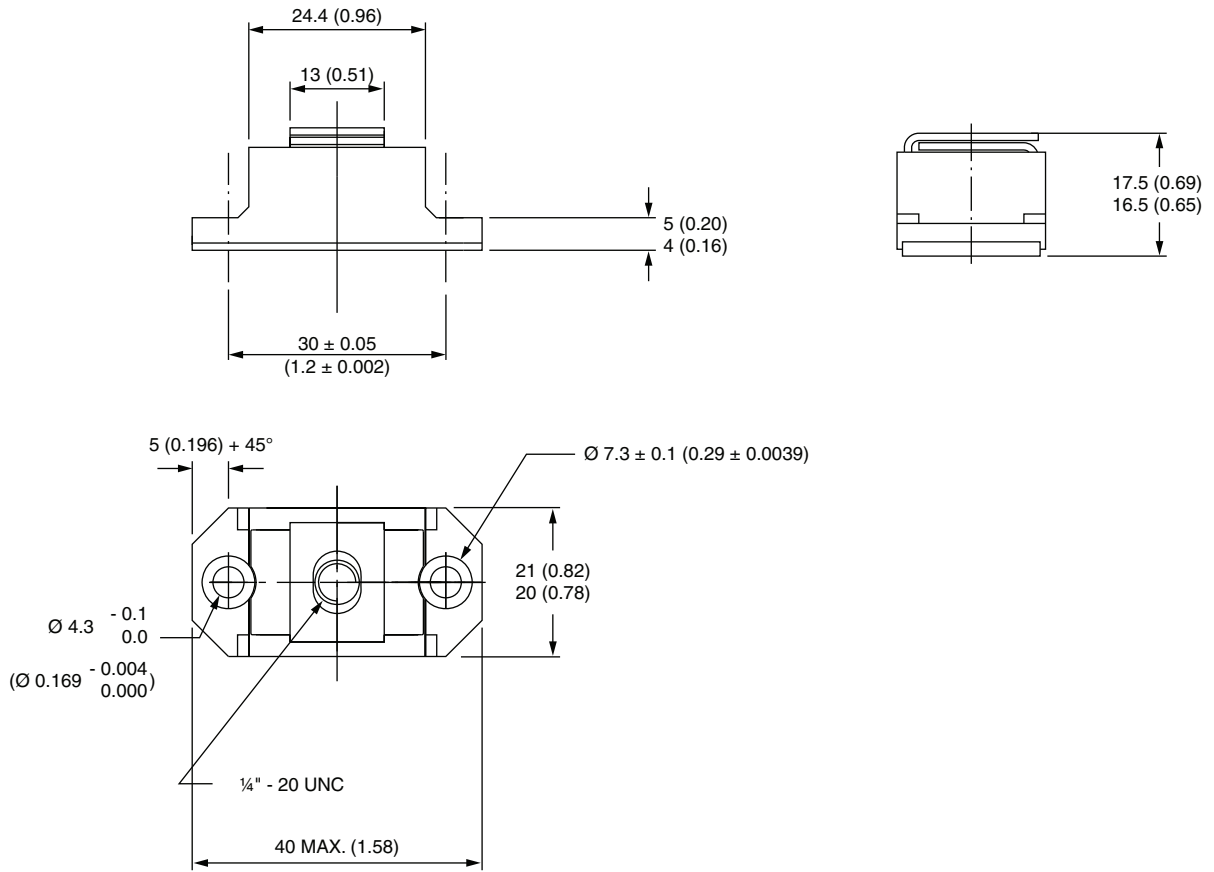
ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|------------|-----------|--------------------------------|----------|----------|------------|------------|
| Device code | VS- | 12 | 3 | N | Q | 100 | PbF |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
| | 1 | - | Vishay Semiconductors product | | | | |
| | 2 | - | Average current rating (x 10) | | | | |
| | 3 | - | Product silicon identification | | | | |
| | 4 | - | N = not isolated | | | | |
| | 5 | - | Q = Schottky rectifier diode | | | | |
| | 6 | - | Voltage rating (100 = 100 V) | | | | |
| | 7 | - | Lead (Pb)-free | | | | |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95020 |

D-67 HALF-PAK

DIMENSIONS in millimeters (inches)





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