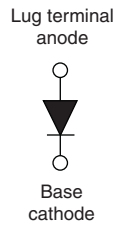


High Performance Schottky Rectifier, 120 A


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 | 45 V |
| Package | HALF-PAK (D-67) |
| Circuit configuration | Single diode |

DESCRIPTION

The VS-121NQ.. 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 _{R(RRM)} | | 45 | V |
| I _{F(SM)} | t _p = 5 μs sine | 16 000 | A |
| V _F | 120 A _{pk} , T _J = 125 °C | 0.6 | V |
| T _J | Range | -55 to +175 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-121NQ045PbF | 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 See fig. 5 | I _{F(AV)} | 50 % duty cycle at T _C = 137 °C, rectangular waveform | 120 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 7 | I _{F(SM)} | 5 μs sine or 3 μs rect. pulse | 16 000 | A |
| | | 10 ms sine or 6 ms rect. pulse | | |
| Non-repetitive avalanche energy | E _{AS} | T _J = 25 °C, I _{AS} = 13 A, L = 1 mH | 81 | mJ |
| Repetitive avalanche current | I _{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T _J maximum V _A = 1.5 x V _R typical | 13 | A |



| ELECTRICAL SPECIFICATIONS | | | | | |
|---|----------------|--|-----------------------------------|--------|------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 120 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.65 | V |
| | | 240 A | | 0.82 | |
| | | 120 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.6 | |
| | | 240 A | | 0.76 | |
| Maximum reverse leakage current See fig. 2 | I_{RM} | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 10 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 90 | |
| Maximum junction capacitance | C_T | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | | 5200 | 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 | $^\circ\text{C/W}$ | | |
| 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 | |

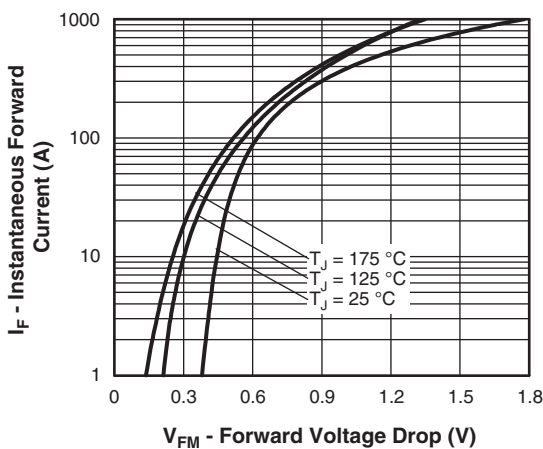


Fig. 1 - Maximum Forward Voltage Drop Characteristics

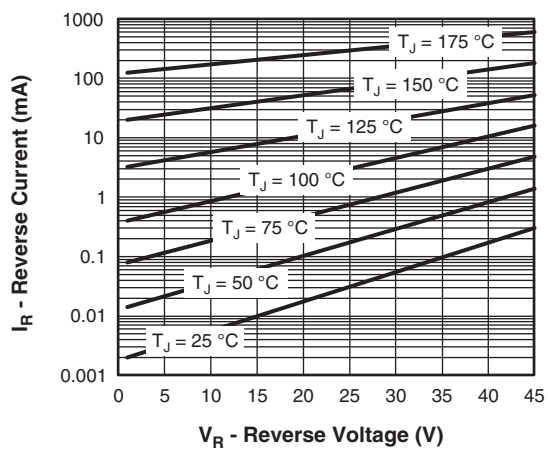


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

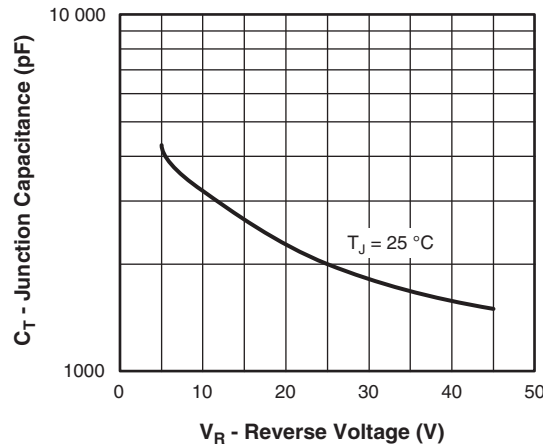


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

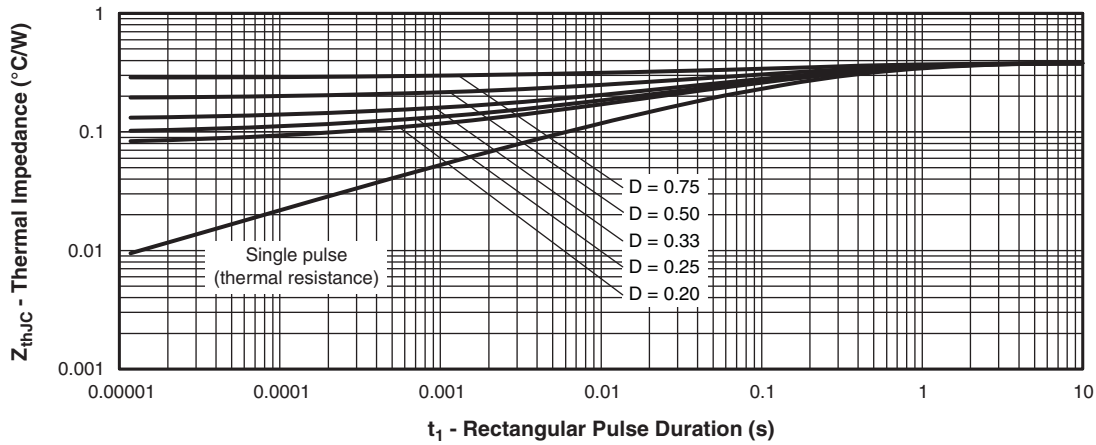


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

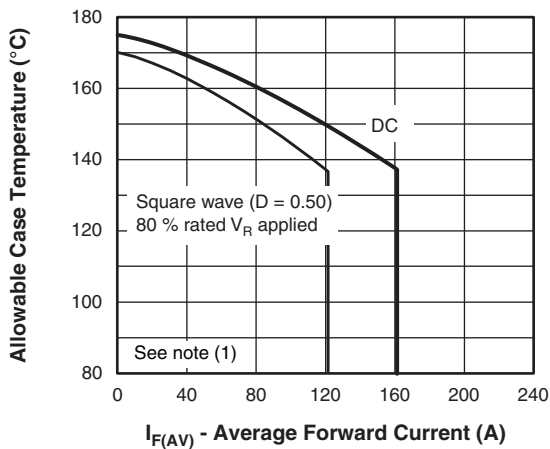


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

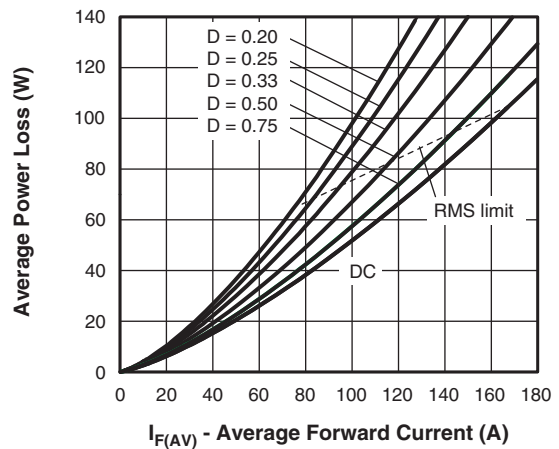


Fig. 6 - Forward Power Loss Characteristics

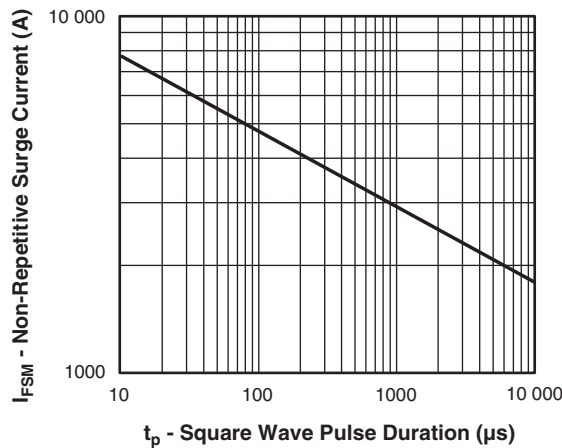


Fig. 7 - Maximum Non-Repetitive Surge Current

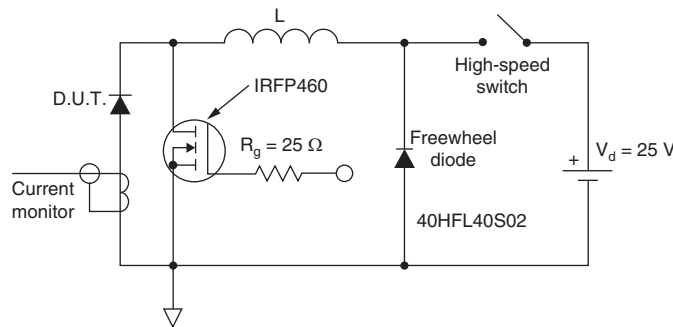


Fig. 8 - Unclamped Inductive Test Circuit

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 | 1 | N | Q | 045 | PbF |
| | ① | ② | ③ | ④ | ⑤ | ⑥ | ⑦ |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | - | - | - | - | - | - | - |
| | Vishay Semiconductors product | Average current rating (x 10) | Product silicon identification | N = not isolated | Q = Schottky rectifier diode | Voltage rating (045 = 45 V) | 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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