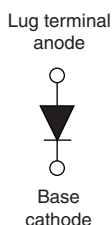


# High Performance Schottky Rectifier, 240 A


**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](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

| PRIMARY CHARACTERISTICS |                 |
|-------------------------|-----------------|
| $I_{F(AV)}$             | 240 A           |
| $V_R$                   | 150 V           |
| Package                 | HALF-PAK (D-67) |
| Circuit configuration   | Single diode    |

## DESCRIPTION

The VS-249NQ.. 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                      | 240         | A     |
| $V_{RRM}$                         |                                           | 150         | V     |
| $I_{FSM}$                         | $t_p = 5 \mu s$ sine                      | 20 000      | A     |
| $V_F$                             | 240 A <sub>pk</sub> , $T_J = 125^\circ C$ | 0.78        | V     |
| $T_J$                             | Range                                     | -55 to +175 | °C    |

| VOLTAGE RATINGS                      |           |                |       |
|--------------------------------------|-----------|----------------|-------|
| PARAMETER                            | SYMBOL    | VS-249NQ150PbF | UNITS |
| Maximum DC reverse voltage           | $V_R$     | 150            | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |                |       |

| ABSOLUTE MAXIMUM RATINGS                                             |                    |                                                                                                                                        |                                                                                  |        |       |
|----------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|--------|-------|
| PARAMETER                                                            | SYMBOL             | TEST CONDITIONS                                                                                                                        |                                                                                  | VALUES | UNITS |
| Maximum average forward current<br>See fig. 5                        | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 121 °C, rectangular waveform                                                                       |                                                                                  | 240    | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 7 | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse                                                                                                          | Following any rated<br>load condition and with<br>rated V <sub>RRM</sub> applied | 20 000 |       |
|                                                                      |                    | 10 ms sine or 6 ms rect. pulse                                                                                                         |                                                                                  | 2300   |       |
| Non-repetitive avalanche energy                                      | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 5.5 A, L = 1 mH                                                                              |                                                                                  | 15     | mJ    |
| Repetitive avalanche current                                         | I <sub>AR</sub>    | Current decaying linearly to zero in 1 μs<br>Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical |                                                                                  | 1      | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                             | SYMBOL         | TEST CONDITIONS                                                                           | VALUES | UNITS      |
|-------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------|--------|------------|
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 240 A                                                                                     | 1.21   | V          |
|                                                       |                | 480 A                                                                                     | 1.65   |            |
|                                                       |                | 240 A                                                                                     | 0.78   |            |
|                                                       |                | 480 A                                                                                     | 0.94   |            |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}$       | $T_J = 25\text{ }^{\circ}\text{C}$                                                        | 6      | mA         |
|                                                       |                | $T_J = 125\text{ }^{\circ}\text{C}$                                                       | 85     |            |
| Maximum junction capacitance                          | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ | 6000   | pF         |
| Typical series inductance                             | $L_S$          | From top of terminal hole to mounting plane                                               | 5.0    | nH         |
| Maximum voltage rate of change                        | dV/dt          | Rated $V_R$                                                                               | 10 000 | V/ $\mu$ s |

**Note**(1) Pulse width < 300  $\mu$ s, duty cycle < 2 %**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                      | SYMBOL                            | TEST CONDITIONS                      | VALUES          | UNITS               |
|------------------------------------------------|-----------------------------------|--------------------------------------|-----------------|---------------------|
| Maximum junction and storage temperature range | T <sub>J</sub> , T <sub>Stg</sub> |                                      | -55 to 175      | °C                  |
| Maximum thermal resistance, junction to case   | R <sub>thJC</sub>                 | DC operation<br>See fig. 4           | 0.19            | °C/W                |
| Typical thermal resistance, case to heatsink   | R <sub>thCS</sub>                 | 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<br>(lbf · in) |
|                                                | maximum                           |                                      | 4 (35.4)        |                     |
| Terminal torque                                | minimum                           |                                      | 3.4 (30)        |                     |
|                                                | maximum                           |                                      | 5 (44.2)        |                     |
| Case style                                     |                                   |                                      | HALF-PAK module |                     |

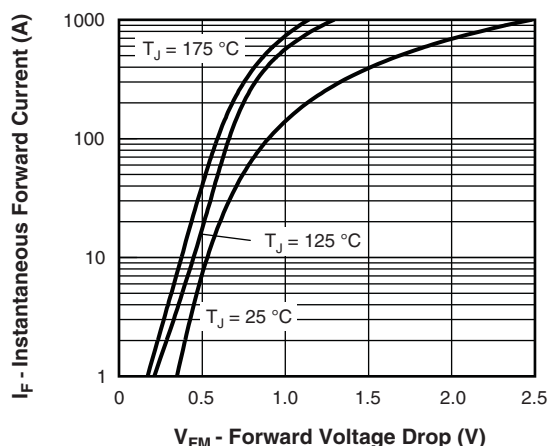


Fig. 1 - Maximum Forward Voltage Drop Characteristics

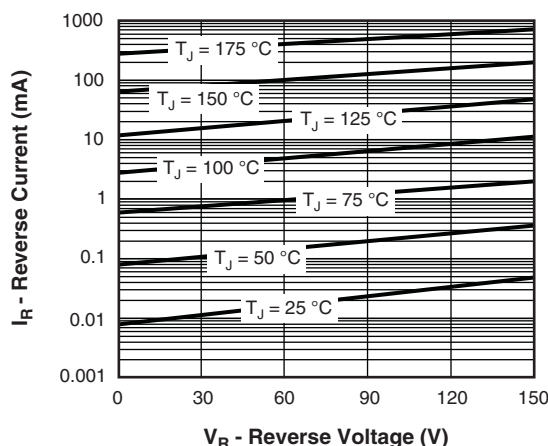


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

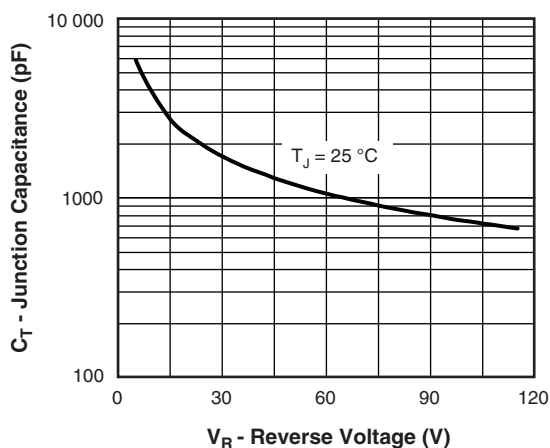


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

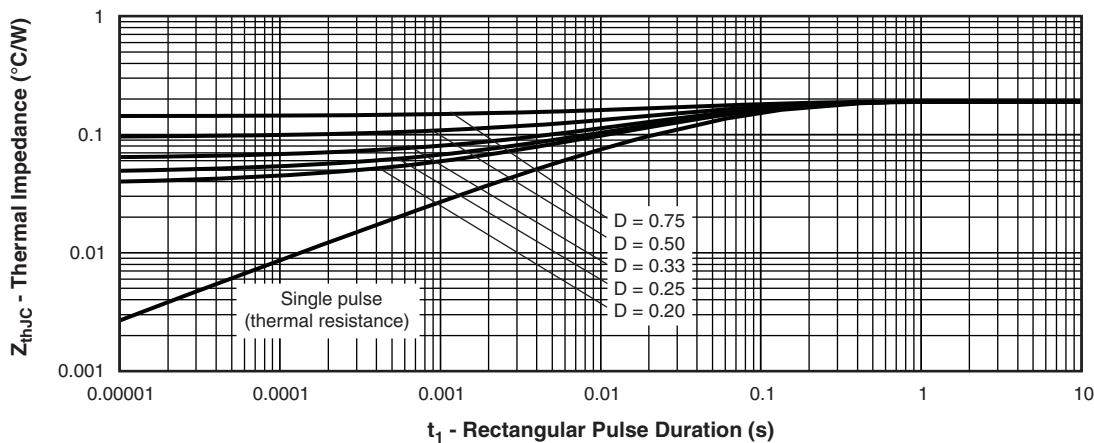
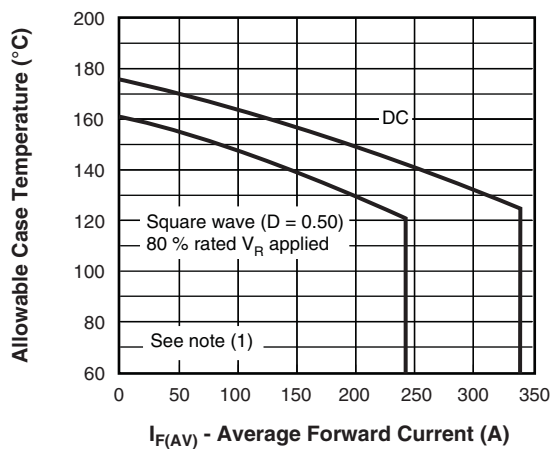

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

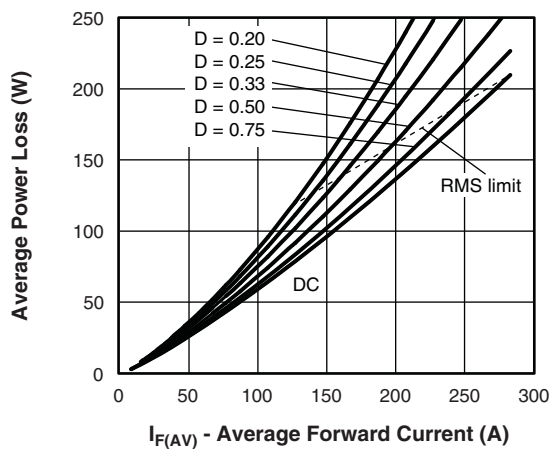


Fig. 6 - Forward Power Loss Characteristics

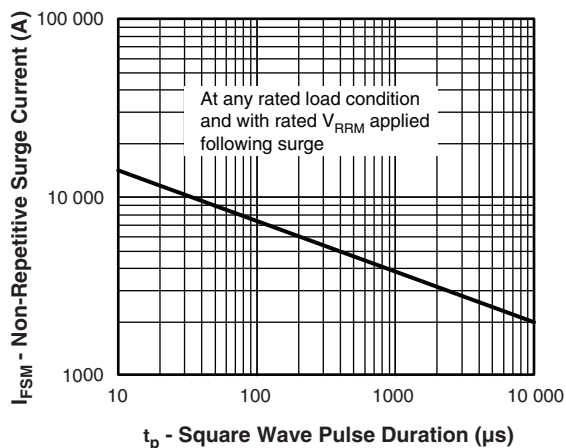


Fig. 7 - Maximum Non-Repetitive Surge Current

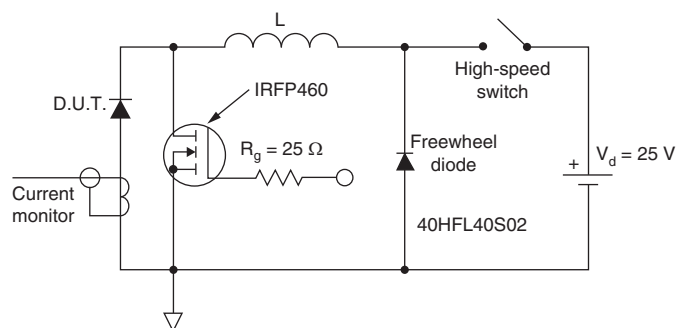


Fig. 8 - Unclamped Inductive Test Circuit

### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = 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  $V_{R1}$  = rated  $V_R$

## ORDERING INFORMATION TABLE

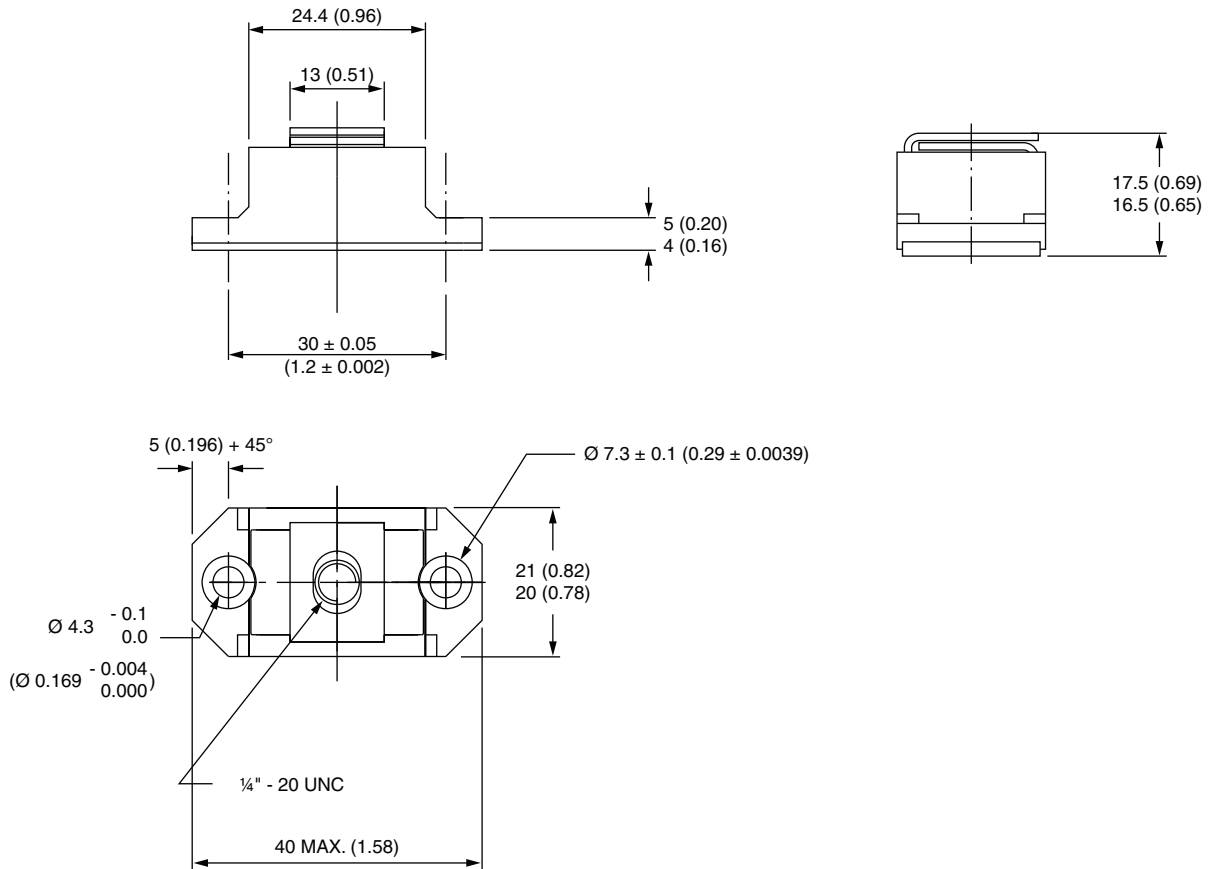
| Device code | VS- | 24 | 9 | N | Q | 150 | PbF |
|-------------|-----|----|---|---|---|-----|-----|
|             | 1   | 2  | 3 | 4 | 5 | 6   | 7   |

- 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 (150 = 150 V)
- 7 - Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95020">www.vishay.com/doc?95020</a> |

## D-67 HALF-PAK

**DIMENSIONS** in millimeters (inches)





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