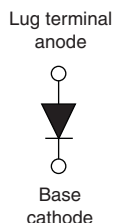


# High Performance Schottky Rectifiers, 120 A


**HALF-PAK (D-67)**


## FEATURES

- 125 °C  $T_J$  operation ( $V_R < 5$  V)
- 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

## PRODUCT SUMMARY

|             |                 |
|-------------|-----------------|
| $I_{F(AV)}$ | 120 A           |
| $V_R$       | 15 V            |
| Package     | HALF-PAK (D-67) |
| Circuit     | Single diode    |

## DESCRIPTION

The VS-125NQ.. 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 125 °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     |
| $V_{RRM}$   |                                      | 15         | V     |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                 | 10 800     | A     |
| $V_F$       | 120 A <sub>pk</sub> , $T_J = 125$ °C | 0.37       | V     |
| $T_J$       | Range                                | -55 to 125 | °C    |

## VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | VS-125NQ015PbF | UNITS |
|--------------------------------------|-----------|----------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 15             | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ | 25             |       |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                            | SYMBOL      | TEST CONDITIONS                                                                                                     | VALUES | UNITS |
|----------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current<br>See fig. 5                        | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 74$ °C, rectangular waveform                                                              | 120    | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 7 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse                                                                             | 10 800 |       |
|                                                                      |             | 10 ms sine or 6 ms rect. pulse                                                                                      | 1700   |       |
| Non-repetitive avalanche energy                                      | $E_{AS}$    | $T_J = 25$ °C, $I_{AS} = 5$ A, $L = 1$ mH                                                                           | 12     | mJ    |
| Repetitive avalanche current                                         | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu s$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical | 2      | A     |


**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                             | SYMBOL         | TEST CONDITIONS                                                                           |                                    | VALUES | UNITS            |
|-------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------|------------------------------------|--------|------------------|
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 120 A                                                                                     | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.43   | V                |
|                                                       |                | 240 A                                                                                     |                                    | 0.58   |                  |
|                                                       |                | 120 A                                                                                     | $T_J = 75\text{ }^{\circ}\text{C}$ | 0.37   |                  |
|                                                       |                | 240 A                                                                                     |                                    | 0.52   |                  |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                                        | $V_R = \text{Rated } V_R$          | 40     | mA               |
|                                                       |                | $T_J = 100\text{ }^{\circ}\text{C}$                                                       |                                    | 2000   |                  |
| Maximum junction capacitance                          | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                    | 7700   | 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/ $\mu\text{s}$ |

**Note**
<sup>(1)</sup> Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                    | SYMBOL            | TEST CONDITIONS                      | VALUES          | UNITS               |
|----------------------------------------------|-------------------|--------------------------------------|-----------------|---------------------|
| Maximum junction temperature range           | T <sub>J</sub>    |                                      | -55 to 125      | °C                  |
| Maximum storage temperature range            | T <sub>Stg</sub>  |                                      | -55 to 150      |                     |
| Maximum thermal resistance, junction to case | R <sub>thJC</sub> | DC operation<br>See fig. 4           | 0.38            | °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 |                     |

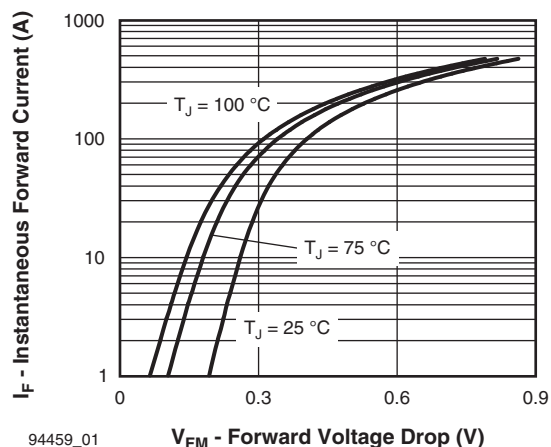


Fig. 1 - Maximum Forward Voltage Drop Characteristics

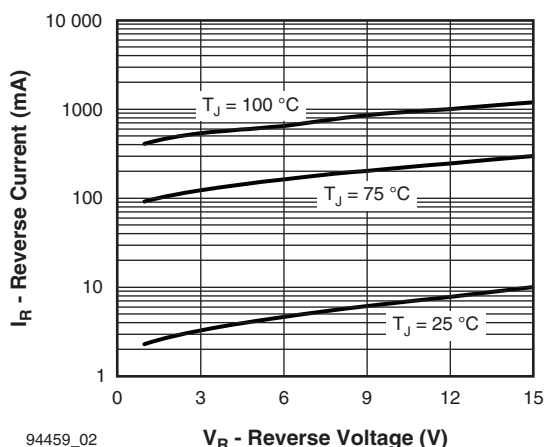


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

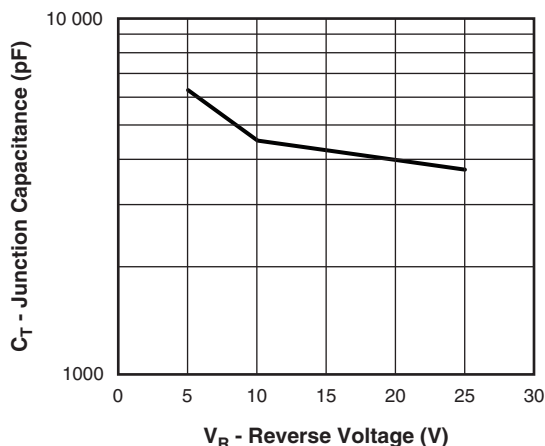


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

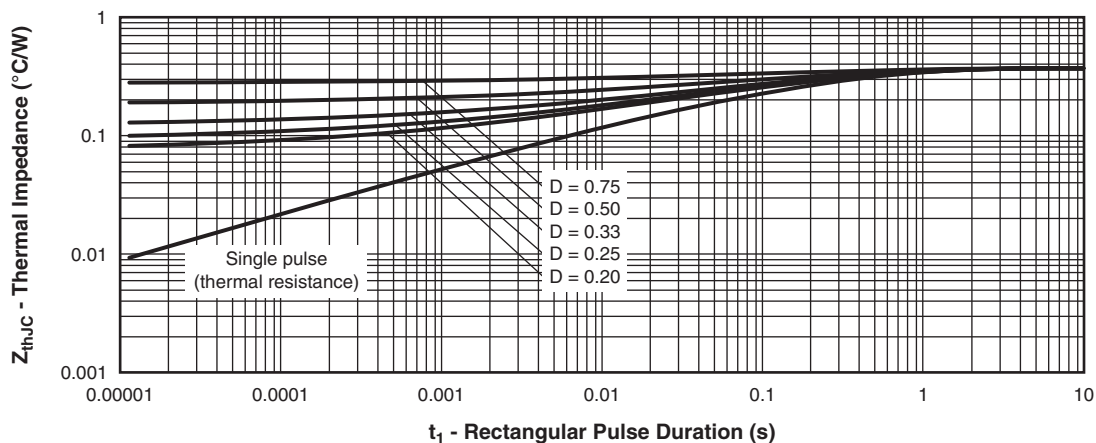


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

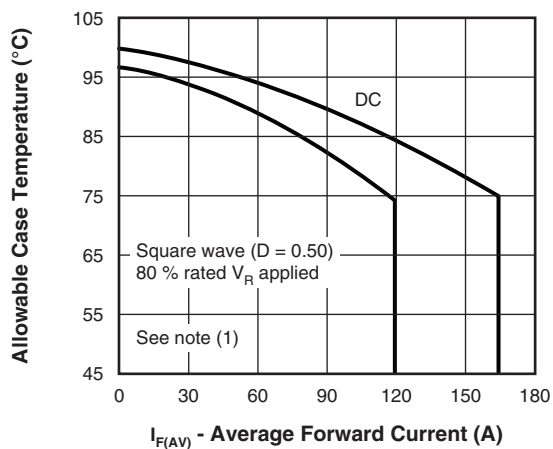


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

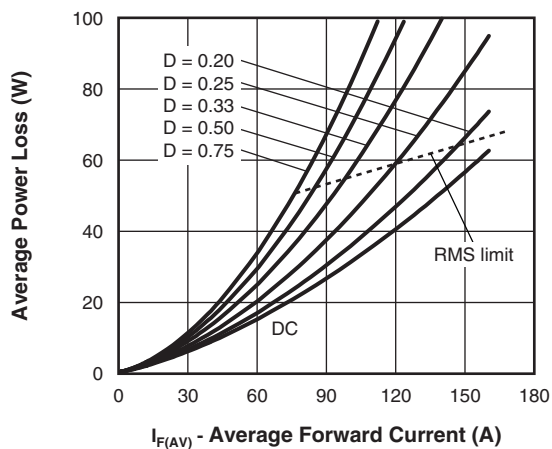


Fig. 6 - Forward Power Loss Characteristics

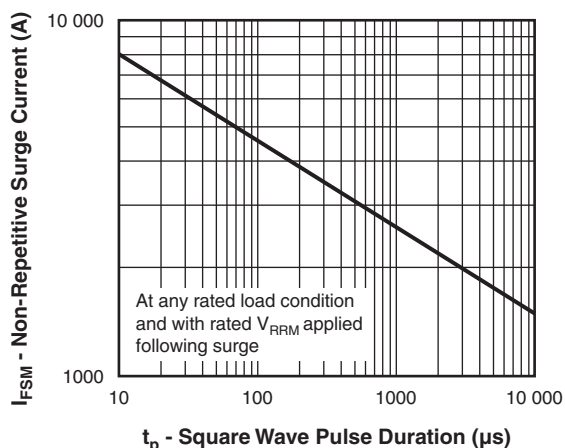


Fig. 7 - Maximum Non-Repetitive Surge Current

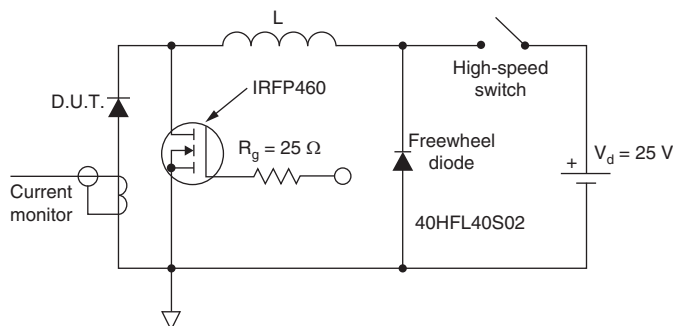


Fig. 8 - Unclamped Inductive Test Circuit

### 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

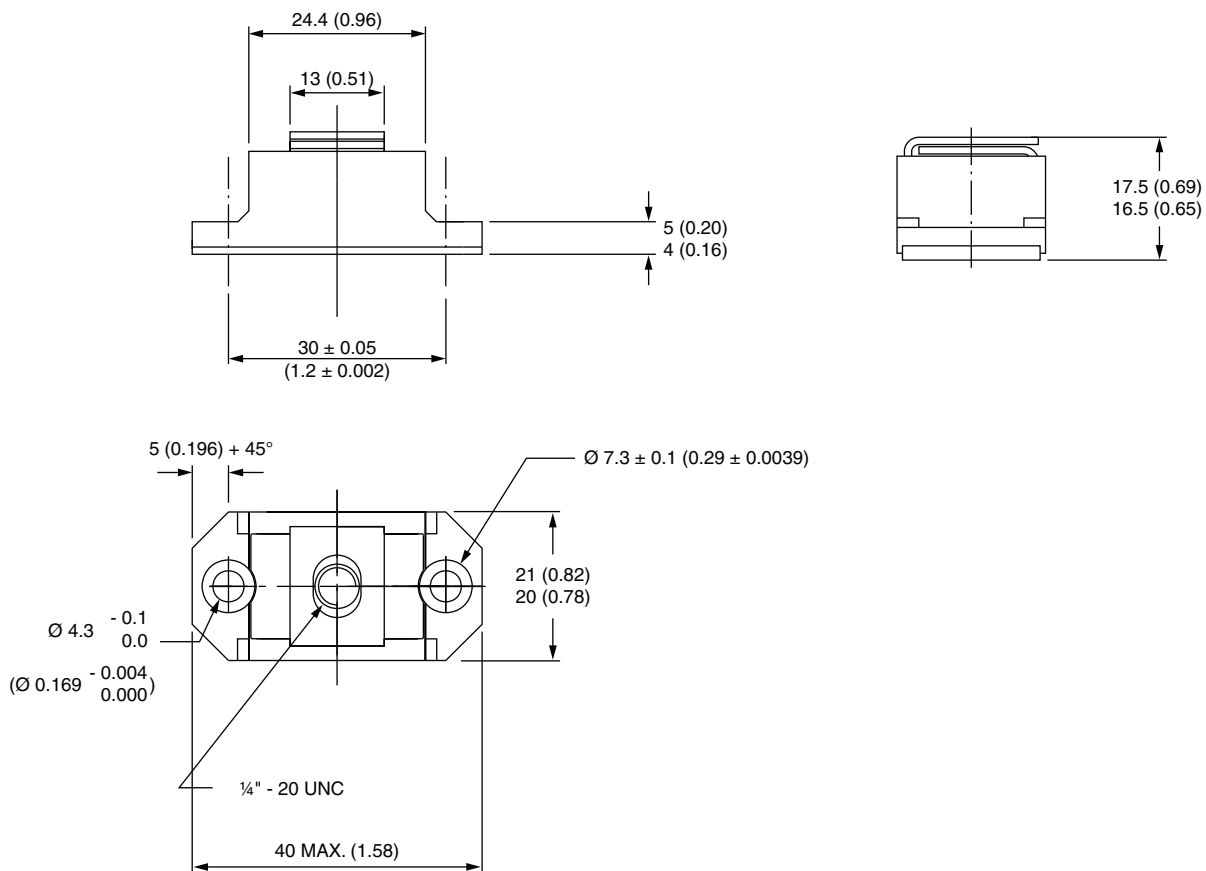
| Device code | VS- | 12 | 5 | N | Q | 015 | PbF |
|-------------|-----|----|---|---|---|-----|-----|
|             | 1   | 2  | 3 | 4 | 5 | 6   | 7   |

- 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 (015 = 15 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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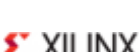
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