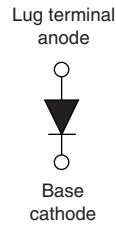


## High Performance Schottky Rectifiers, 120 A


**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 $A_{pk}$ , $T_J = 125$ °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                          | $C_T$          | $V_R = 5 V_{DC}$ (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**

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

| THERMAL - MECHANICAL SPECIFICATIONS          |            |                                      |  |                 |                           |
|--|------------|--------------------------------------|--|-----------------|---------------------------|
| PARAMETER                                    | SYMBOL     | TEST CONDITIONS                      |  | VALUES          | UNITS                     |
| Maximum junction temperature range           | $T_J$      |                                      |  | -55 to 125      | $^\circ\text{C}$          |
| Maximum storage temperature range            | $T_{Stg}$  |                                      |  | -55 to 150      |                           |
| Maximum thermal resistance, junction to case | $R_{thJC}$ | DC operation<br>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<br>(lbf · in)       |
|  | maximum    |                                      |  | 4 (35.4)        |                           |
| Terminal torque                              | minimum    |                                      |  | 3.4 (30)        |                           |
|  | maximum    |                                      |  | 5 (44.2)        |                           |
| Case style                                   |            |                                      |  | HALF-PAK module |                           |

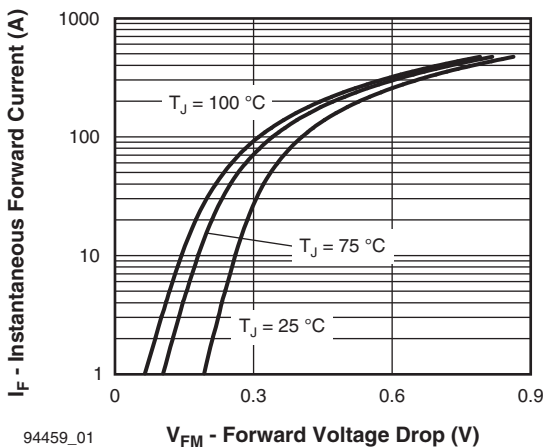


Fig. 1 - Maximum Forward Voltage Drop Characteristics

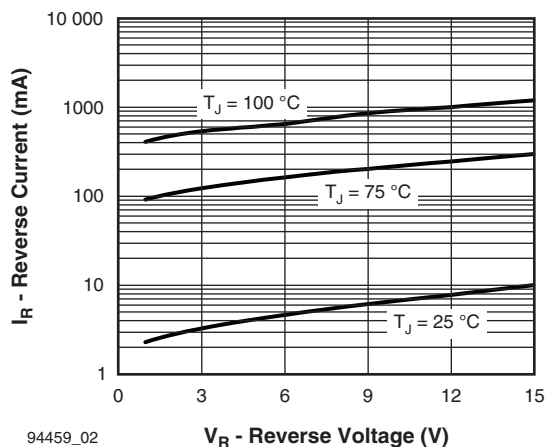


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

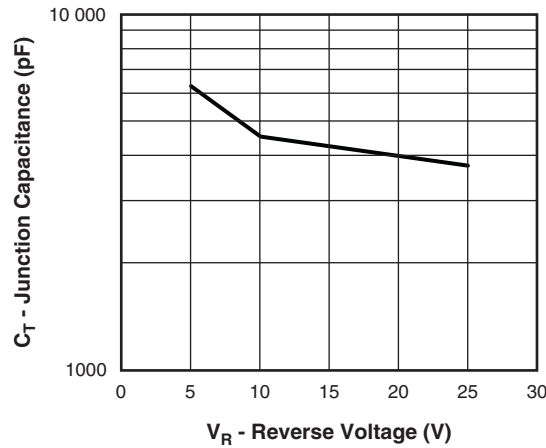


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

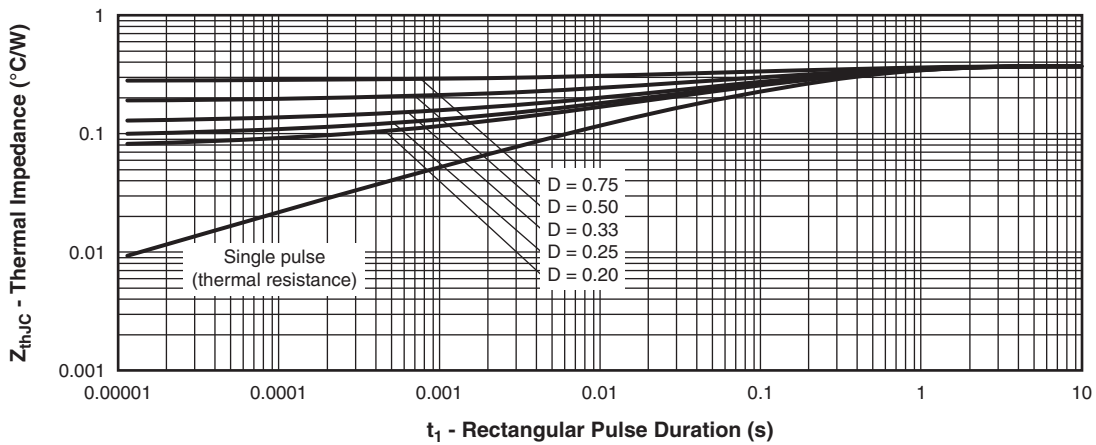


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

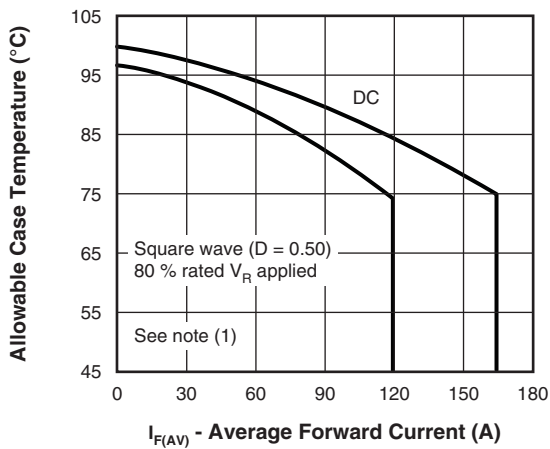


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

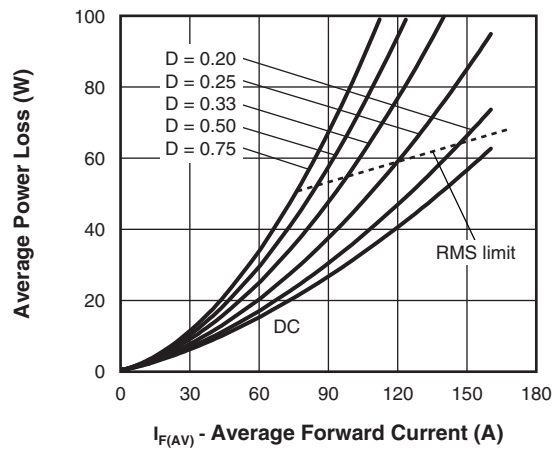


Fig. 6 - Forward Power Loss Characteristics

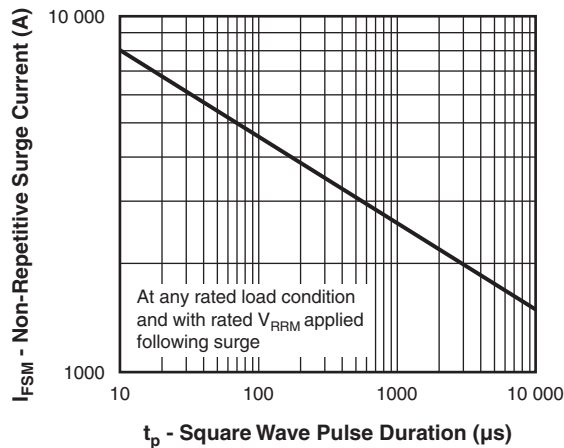


Fig. 7 - Maximum Non-Repetitive Surge Current

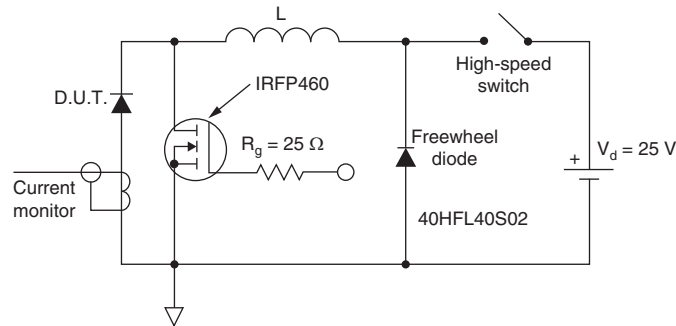


Fig. 8 - Unclamped Inductive Test Circuit

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;
- $P_d$  = 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**

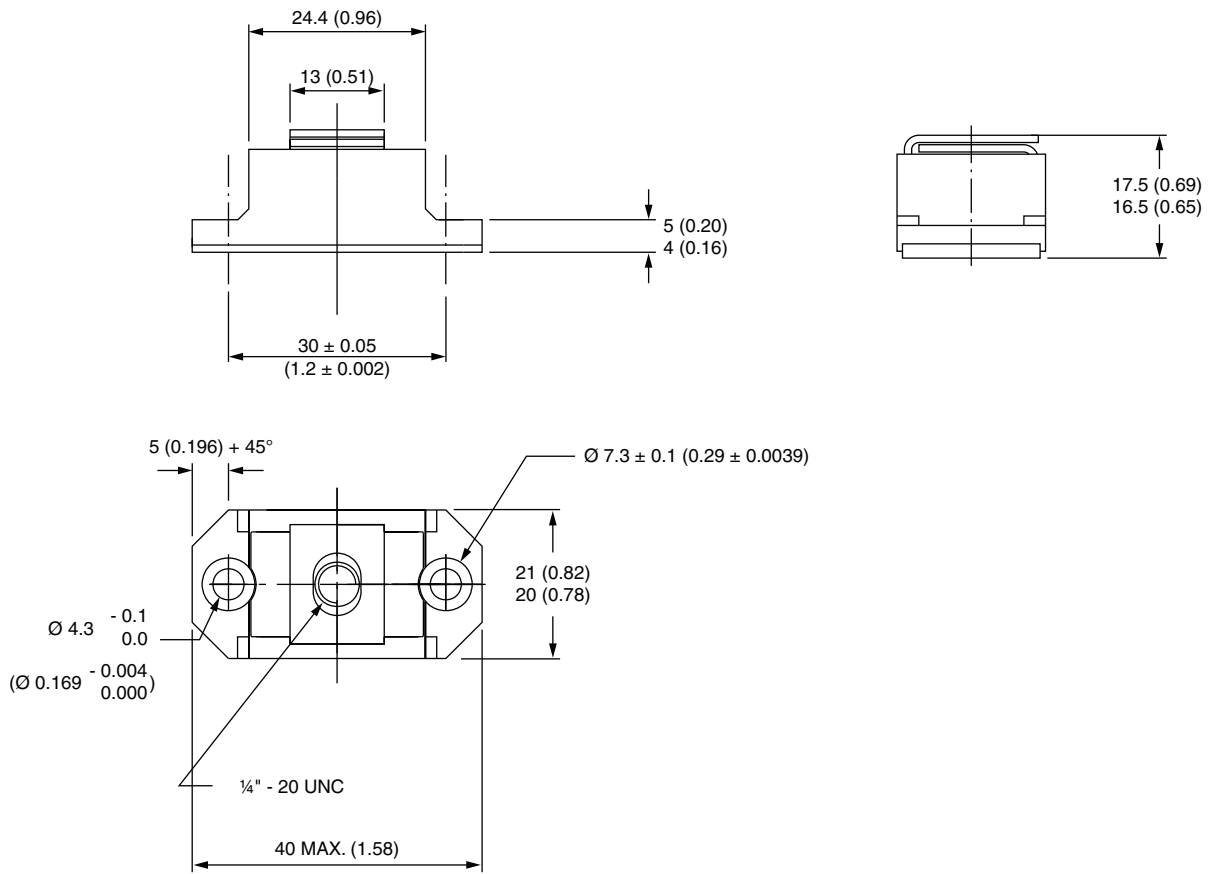
|             |            |           |          |          |          |            |            |
|-------------|------------|-----------|----------|----------|----------|------------|------------|
| Device code | <b>VS-</b> | <b>12</b> | <b>5</b> | <b>N</b> | <b>Q</b> | <b>015</b> | <b>PbF</b> |
|             | 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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Поставка электронных компонентов

**Юридический адрес организации:**  
198099, г. Санкт-Петербург, ул. Калинина, дом 2, кор. 4, лит А.  
**Фактический адрес организации:**  
198099, г. Санкт-Петербург, ул. Калинина, дом 2, кор. 4, лит А.  
ИНН 780277764  
КПП 780501001  
Р/С 40702810422510004035 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в Санкт-Петербурге К/С 30101810900000000703  
БИК 044030703  
**Телефон:** 8 (812) 309-44-11 (многоканальный)  
**Факс:** 8 (812) 309-44-11  
**Электронная почта:** [sales@timechips.ru](mailto:sales@timechips.ru)  
**Сайт:** [timechips.ru](http://timechips.ru)

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**Телефон: +7 (812) 309-44-11 доб. 141**

**Факс: +7 (812) 309-44-11 доб. 152**

**Моб. Тел. +7 (905) 232-40-65**

**Skype: time.chips5**

**Электронная почта: [manager1@timechips.ru](mailto:manager1@timechips.ru)**

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