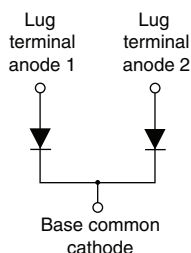



# High Performance Schottky Rectifier, 300 A


**TO-244**


## FEATURES

- 150 °C T<sub>J</sub> operation
- Center tap module
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- UL approved file E222165 
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## PRIMARY CHARACTERISTICS

|                       |                           |
|-----------------------|---------------------------|
| I <sub>F(AV)</sub>    | 300 A                     |
| V <sub>R</sub>        | 45 V                      |
| Package               | TO-244                    |
| Circuit configuration | Two diodes common cathode |

## DESCRIPTION / APPLICATIONS

The VS-300CNQ... center tap Schottky rectifier module series has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 150 °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 <sub>F(AV)</sub> | Rectangular waveform                                    | 300         | A     |
| V <sub>RRM</sub>   |   | 45          | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 µs sine                              | 27 000      | A     |
| V <sub>F</sub>     | 150 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg) | 0.56        | V     |
| T <sub>J</sub>     | Range   | -55 to +150 | °C    |

## VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | VS-300CNQ045PbF | UNITS |
|--------------------------------------|------------------|-----------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | 45              | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                 |       |

## 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> = 111 °C, rectangular waveform   | 150    | A     |
| per leg   |                    |  | 300    |       |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | I <sub>FSM</sub>   | 5 µs sine or 3 µs rect. pulse  | 27 000 |       |
|   |                    | 10 ms sine or 6 ms rect. pulse   | 2400   |       |
| Non-repetitive avalanche energy per leg                                   | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 18 A, L = 1 mH   | 150    | mJ    |
| Repetitive avalanche current per leg                                      | 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 | 30     | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER   | SYMBOL         | TEST CONDITIONS   | VALUES | UNITS      |
|---|----------------|---|--------|------------|
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 150 A   | 0.61   | V          |
|   |                | 300 A   | 0.77   |            |
|   |                | 150 A   | 0.56   |            |
|   |                | 300 A   | 0.75   |            |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | 15     | mA         |
|   |                | $T_J = 125\text{ }^{\circ}\text{C}$   | 1100   |            |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ | 7750   | pF         |
| Typical series inductance per leg                     | $L_S$          | From top of terminal hole to mounting plane   | 6.0    | 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         | MIN.     | TYP. | MAX.     | UNITS                |
|---|----------------|----------|------|----------|----------------------|
| Maximum junction and storage temperature range  | $T_J, T_{Stg}$ | - 55     | -    | 150      | $^{\circ}\text{C}$   |
| Thermal resistance, per leg<br>junction to case | $R_{thJC}$     | -        | -    | 0.28     | $^{\circ}\text{C/W}$ |
|   |                | -        | -    | 0.14     |                      |
| Thermal resistance, case to heatsink            | $R_{thCS}$     | -        | 0.10 | -        |                      |
| Weight  |                | -        | 68   | -        | g                    |
|   |                | -        | 2.4  | -        | oz.                  |
| Mounting torque                                 |                | 35.4 (4) | -    | 53.1 (6) | lbf · in<br>(N · m)  |
| Mounting torque center hole                     |                | 30 (3.4) | -    | 40 (4.6) |                      |
| Terminal torque                                 |                | 30 (3.4) | -    | 44.2 (5) |                      |
| Vertical pull                                   |                | -        | -    | 80       | lbf · in             |
| 2" lever pull                                   |                | -        | -    | 35       |                      |

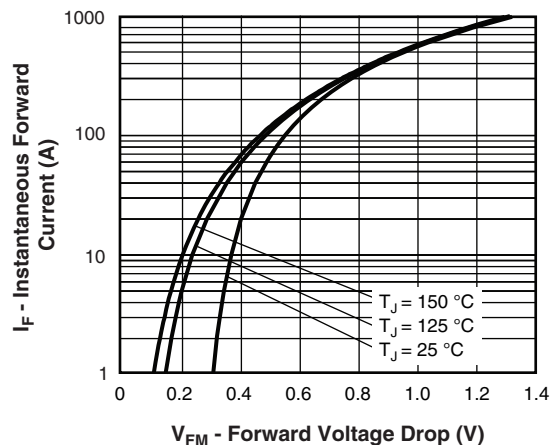


Fig. 1 - Maximum Forward Voltage Drop Characteristics

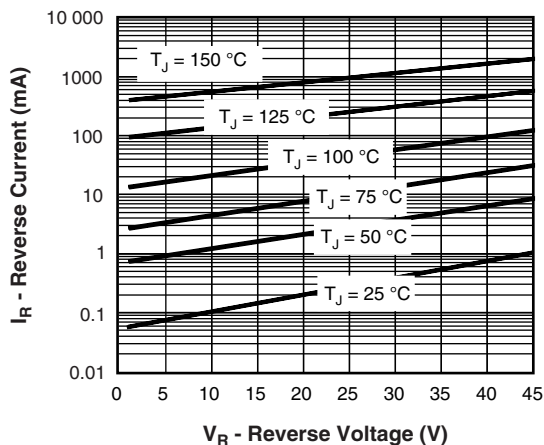


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

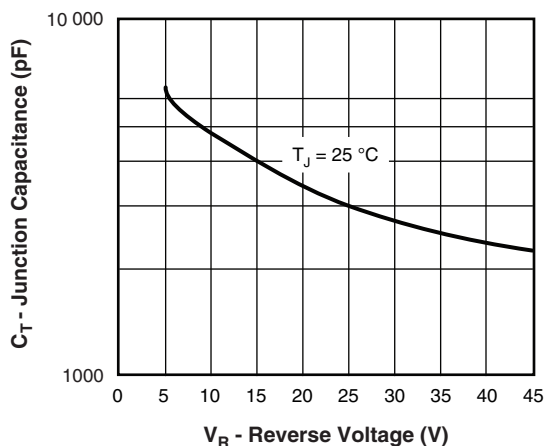


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

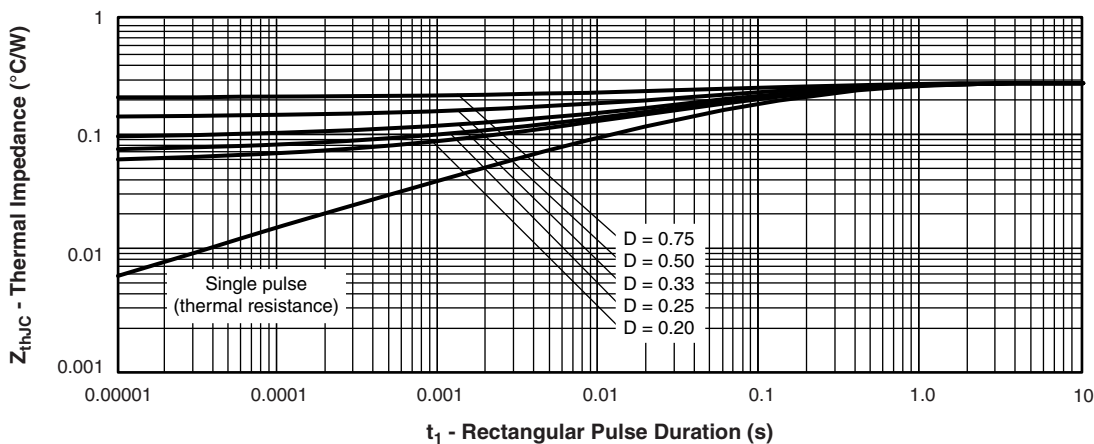
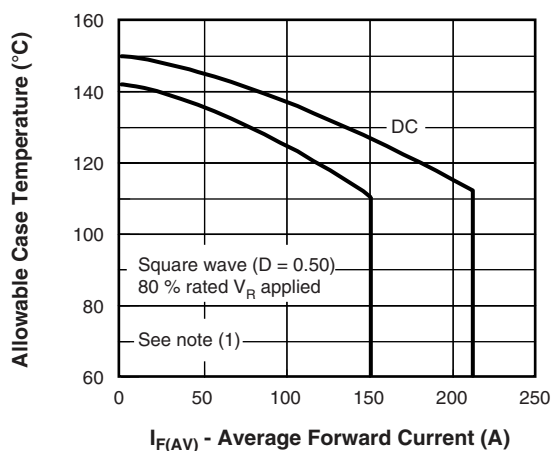

Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics


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

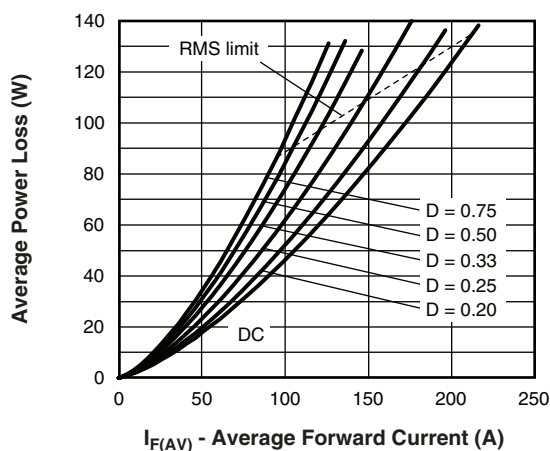


Fig. 6 - Forward Power Loss Characteristics

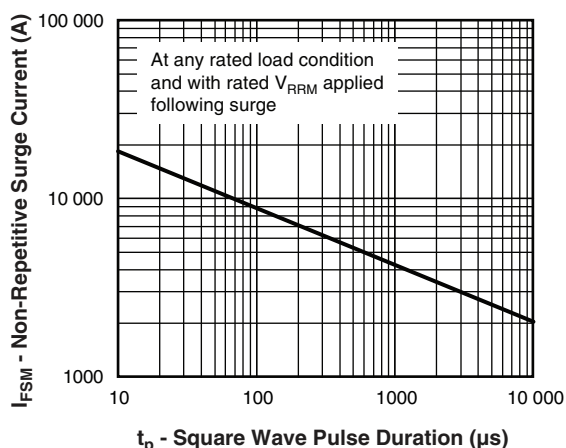


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

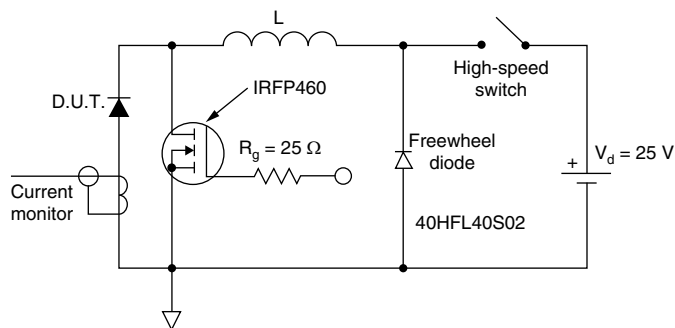


Fig. 8 - Unclamped Inductive Test Circuit

**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  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

| Device code | VS- | 30 | 0 | C | N | Q | 045 | PbF |
|-------------|-----|----|---|---|---|---|-----|-----|
|             | 1   | 2  | 3 | 4 | 5 | 6 | 7   | 8   |

- |   |                                  |
|---|----------------------------------|
| 1 | - Vishay Semiconductors product  |
| 2 | - Average current rating (x 10)  |
| 3 | - Product silicon identification |
| 4 | - C = circuit configuration      |
| 5 | - N = not isolated               |
| 6 | - Q = Schottky rectifier diode   |
| 7 | - Voltage rating (045 = 45 V)    |
| 8 | - Lead (Pb)-free                 |

**LINKS TO RELATED DOCUMENTS**

|            |  |
|------------|--|
| Dimensions | <a href="http://www.vishay.com/doc?95021">www.vishay.com/doc?95021</a> |
|------------|--|



## TO-244

**DIMENSIONS** in millimeters (inches)





## Disclaimer

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