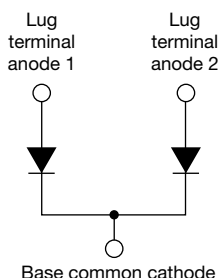


# High Performance Schottky Rectifier, 200 A



TO-244



## FEATURES

- 175 °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>      | 200 A                     |
| V <sub>R</sub>          | 45 V                      |
| Package                 | TO-244                    |
| Circuit configuration   | Two diodes common cathode |

## DESCRIPTION / APPLICATIONS

The VS-201CNQ045PbF center tap Schottky rectifier module 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, converters, freewheeling diodes, welding, and reverse battery protection.

| MAJOR RATINGS AND CHARACTERISTICS |                                                         |             |       |
|-----------------------------------|---------------------------------------------------------|-------------|-------|
| SYMBOL                            | CHARACTERISTICS                                         | VALUES      | UNITS |
| I <sub>F(AV)</sub>                | Rectangular waveform                                    | 200         | A     |
| V <sub>RRM</sub>                  |                                                         | 45          | V     |
| I <sub>FSM</sub>                  | t <sub>p</sub> = 5 μs sine                              | 16 000      | A     |
| V <sub>F</sub>                    | 100 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg) | 0.58        | V     |
| T <sub>J</sub>                    | Range                                                   | -55 to +175 | °C    |

| VOLTAGE RATINGS                      |                  |                 |       |
|--------------------------------------|------------------|-----------------|-------|
| PARAMETER                            | SYMBOL           | VS-201CNQ045PbF | 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> = 146 °C, rectangular waveform                                                                       |                                                                            | 200    | A     |
| per device<br>per leg                                                     |                    |                                                                                                                                        |                                                                            | 100    |       |
| 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                                                                                                          | Following any rated load condition and with rated V <sub>RRM</sub> applied | 16 000 | A     |
|                                                                           |                    | 10 ms sine or 6 ms rect. pulse                                                                                                         |                                                                            | 2000   |       |
| Non-repetitive avalanche energy per leg                                   | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 17 A, L = 1 mH                                                                               |                                                                            | 145    | 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 |                                                                            | 20     | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                             | SYMBOL         | TEST CONDITIONS                                                                           |                                     | VALUES | UNITS      |  |
|-------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------|-------------------------------------|--------|------------|--|
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 100 A                                                                                     | $T_J = 25\text{ }^{\circ}\text{C}$  | 0.67   | V          |  |
|                                                       |                | 200 A                                                                                     |                                     | 0.81   |            |  |
|                                                       |                | 100 A                                                                                     | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.58   |            |  |
|                                                       |                | 200 A                                                                                     |                                     | 0.71   |            |  |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$                                                        | $V_R = \text{Rated } V_R$           | 10     | mA         |  |
|                                                       |                | $T_J = 125\text{ }^{\circ}\text{C}$                                                       |                                     | 90     |            |  |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                     | 5200   | pF         |  |
| Typical series inductance per leg                     | $L_S$          | From top of terminal hole to mounting plane                                               |                                     | 7.0    | nH         |  |
| Maximum voltage rate of change                        | $dV/dt$        | Rated $V_R$                                                                               |                                     | 10 000 | V/ $\mu$ 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     | -    | 175      | $^{\circ}\text{C}$   |
| Thermal resistance, junction to case<br>per leg<br>per module | $R_{thJC}$     | -        | -    | 0.38     | $^{\circ}\text{C/W}$ |
|                                                               |                | -        | -    | 0.19     |                      |
| 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       |                      |

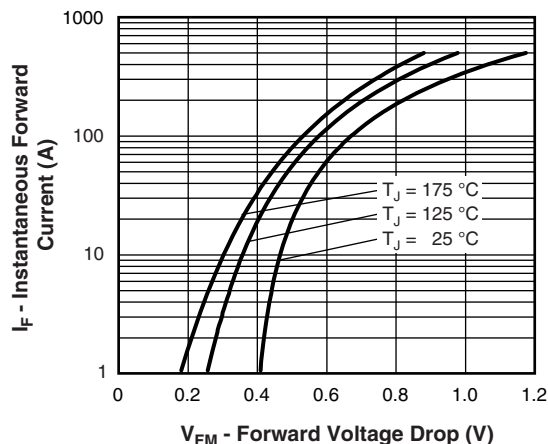


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

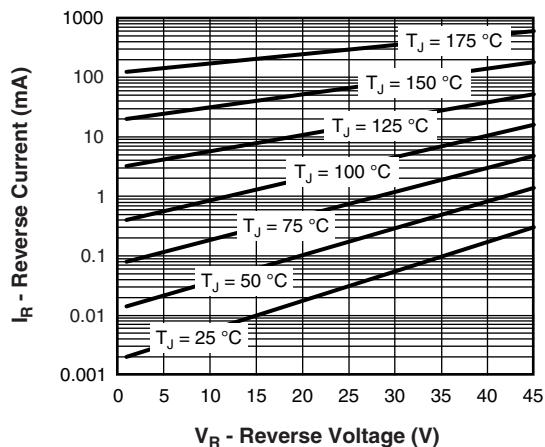


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

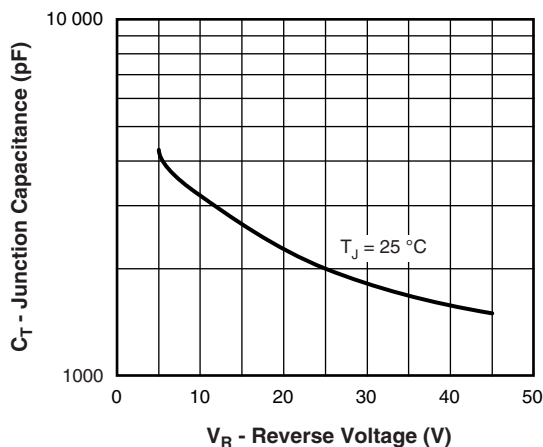


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

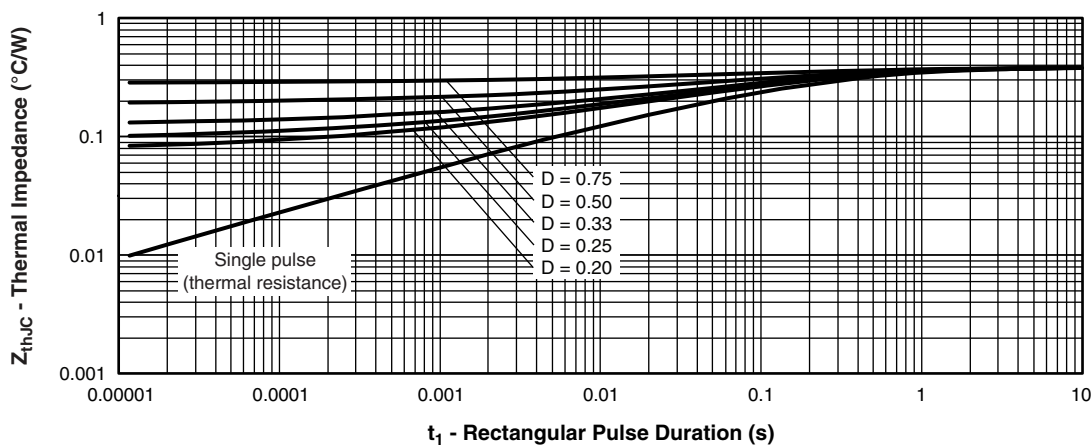


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

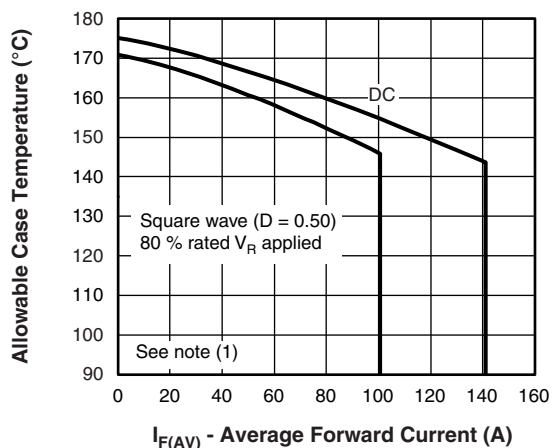


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

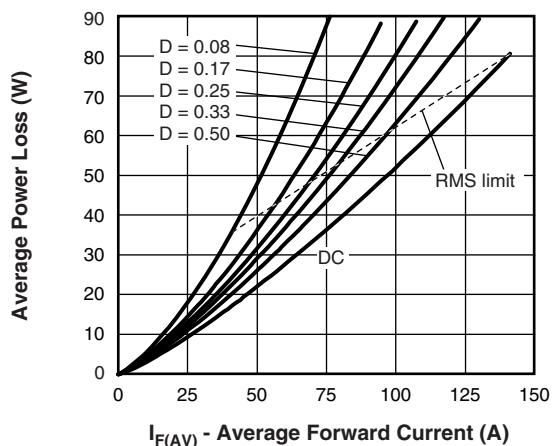


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

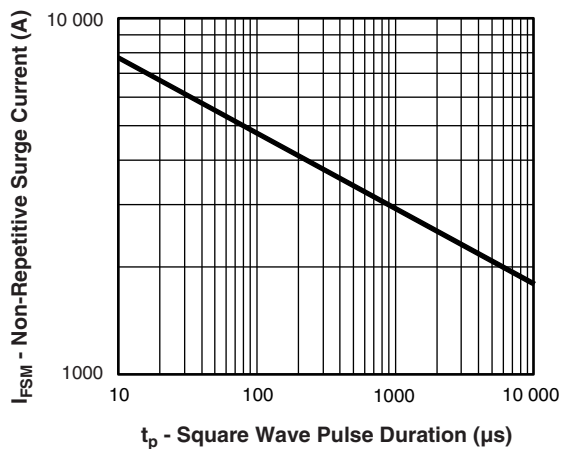


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

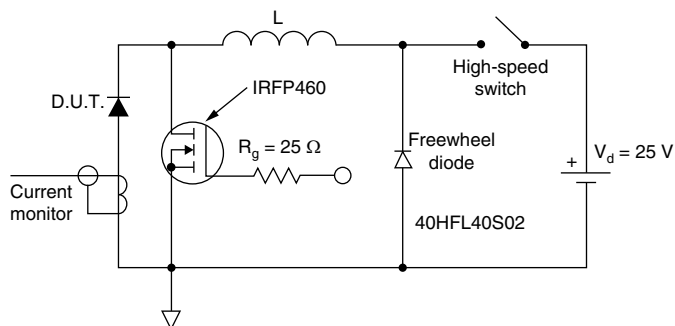


Fig. 8 - Unclamped Inductive Test Circuit

#### 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- | 20 | 1 | C | N | Q | 045 | PbF |
|             | 1   | 2  | 3 | 4 | 5 | 6 | 7   | 8   |

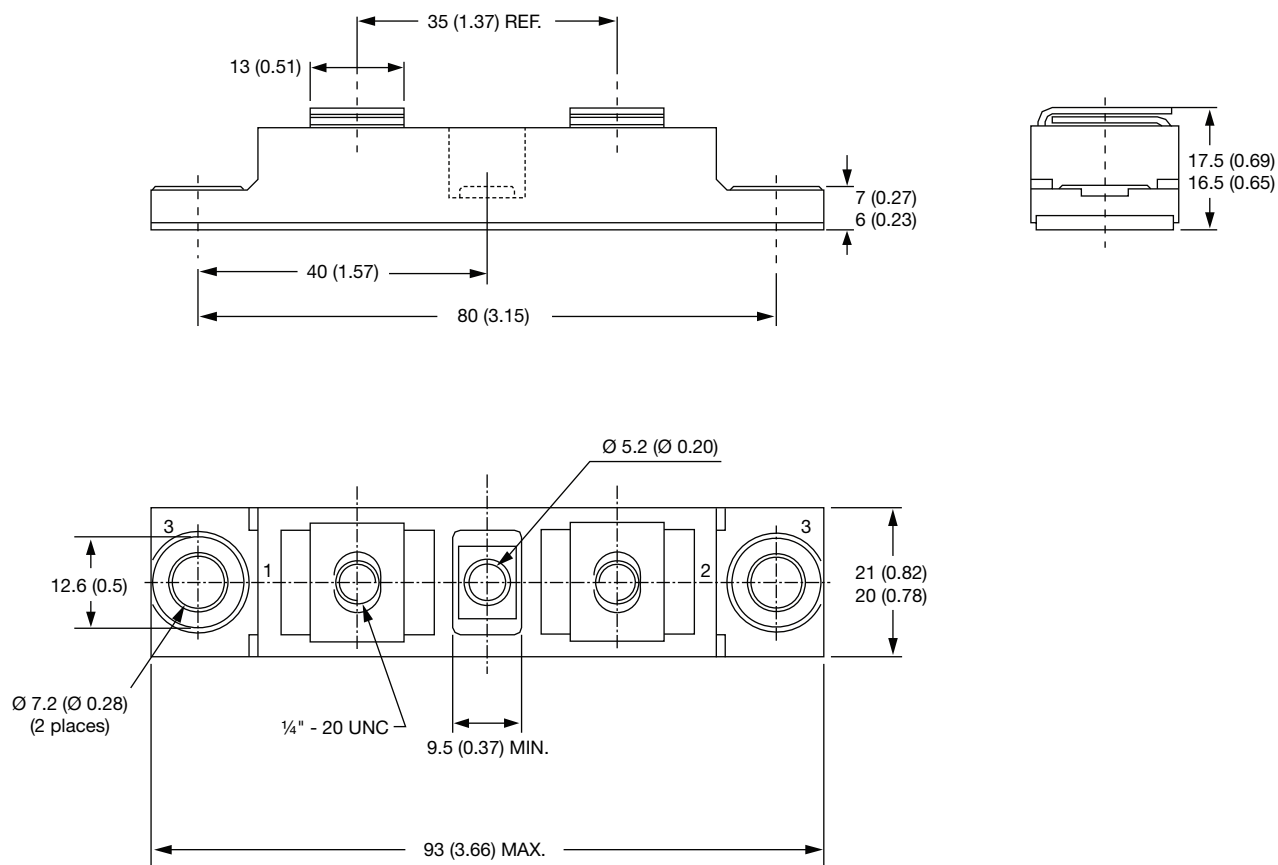
- |   |   |                                |
|---|---|--------------------------------|
| 1 | - | Vishay Semiconductors product  |
| 2 | - | Average current rating (x 10)  |
| 3 | - | Product silicon identification |
| 4 | - | C = circuit configuration      |
| 5 | - | N = not isolated               |
| 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)





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