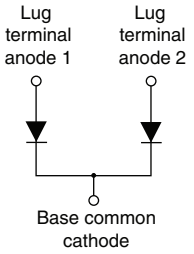
# High Performance Schottky Rectifier, 200 A

TO-244




## FEATURES

- 150 °C $T_J$ 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

RoHS COMPLIANT

| PRIMARY CHARACTERISTICS | |
|---|---|
| $I_{F(AV)}$ | 200 A |
| $V_R$ | 45 V |
| Package | TO-244 |
| Circuit configuration | Two diodes common cathode |

## DESCRIPTION / APPLICATIONS

The VS-200CNQ... 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 |
| $I_{F(AV)}$ | Rectangular waveform | 200 | A |
| $V_{RRM}$ | | 45 | V |
| $I_{FSM}$ | $t_p$ = 5 µs sine | 26 000 | A |
| $V_F$ | 100 $A_{pk}$, $T_J$ = 125 °C (per leg) | 0.52 | V |
| $T_J$ | Range | -55 to +150 | °C |

| VOLTAGE RATINGS | | | |
|---|---|---|---|
| PARAMETER | SYMBOL | VS-200CNQ045PbF | UNITS |
| Maximum DC reverse voltage | $V_R$ | 45 | V |
| Maximum working peak reverse voltage | $V_{RWM}$ | | |

| ABSOLUTE MAXIMUM RATINGS | | | | | | |
|---|---|---|---|---|---|---|
| PARAMETER | | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum average forward current See fig. 5 | per leg | $I_{F(AV)}$ | 50 % duty cycle at $T_C$ = 116 °C, rectangular waveform | | 100 | A |
| | per device | | | | 200 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | | $I_{FSM}$ | 5 µs sine or 3 µs rect. pulse | Following any rated load condition and with rated $V_{RRM}$ applied | 26 000 | A |
| | | | 10 ms sine or 6 ms rect. pulse | | 1550 | |
| Non-repetitive avalanche energy per leg | | $E_{AS}$ | $T_J$ = 25 °C, $I_{AS}$ = 17 A, L = 1 mH | | 135 | mJ |
| Repetitive avalanche current per leg | | $I_{AR}$ | Current decaying linearly to zero in 1 µs Frequency limited by $T_J$ maximum $V_A$ = 1.5 x $V_R$ typical | | 20 | A |

## ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
|---|---|---|---|---|---|
| Maximum forward voltage drop per leg See fig. 1 | $V_{FM}$ (1) | 100 A | $T_J$ = 25 °C | 0.55 | V |
| | | 200 A | | 0.73 | |
| | | 100 A | $T_J$ = 125 °C | 0.52 | |
| | | 200 A | | 0.69 | |
| Maximum reverse leakage current per leg See fig. 2 | $I_{RM}$ (1) | $T_J$ = 25 °C | $V_R$ = Rated $V_R$ | 10 | mA |
| | | $T_J$ = 125 °C | | 800 | |
| Threshold voltage | $V_{F(TO)}$ | $T_J$ = $T_J$ maximum | | 0.27 | V |
| Forward slope resistance | $r_t$ | | | 2.0 | mΩ |
| Maximum junction capacitance per leg | $C_T$ | $V_R$ = 5 $V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °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/µs |

**Note**

(1) Pulse width < 300 µs, duty cycle < 2 %

## THERMAL - MECHANICAL SPECIFICATIONS

| PARAMETER | | SYMBOL | MIN. | TYP. | MAX. | UNITS |
|---|---|---|---|---|---|---|
| Maximum junction and storage temperature range | | $T_J$, $T_{Stg}$ | - 55 | - | 150 | °C |
| Thermal resistance, junction to case | per leg | $R_{thJC}$ | - | - | 0.38 | °C/W |
| | per module | | - | - | 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 (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 | |

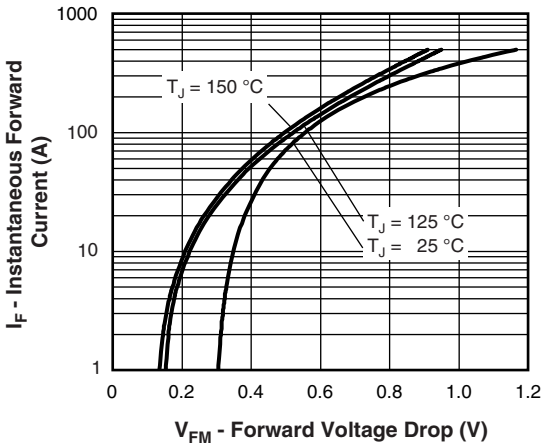



Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

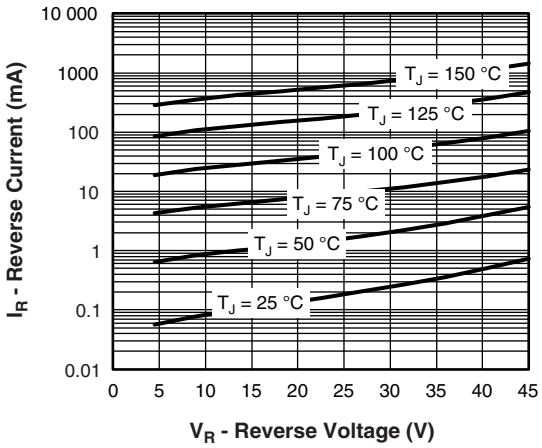



Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

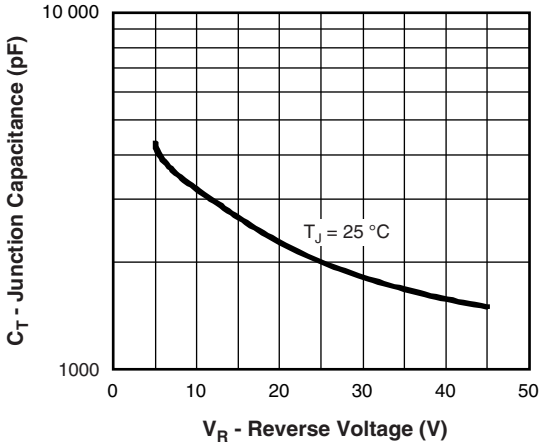



Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

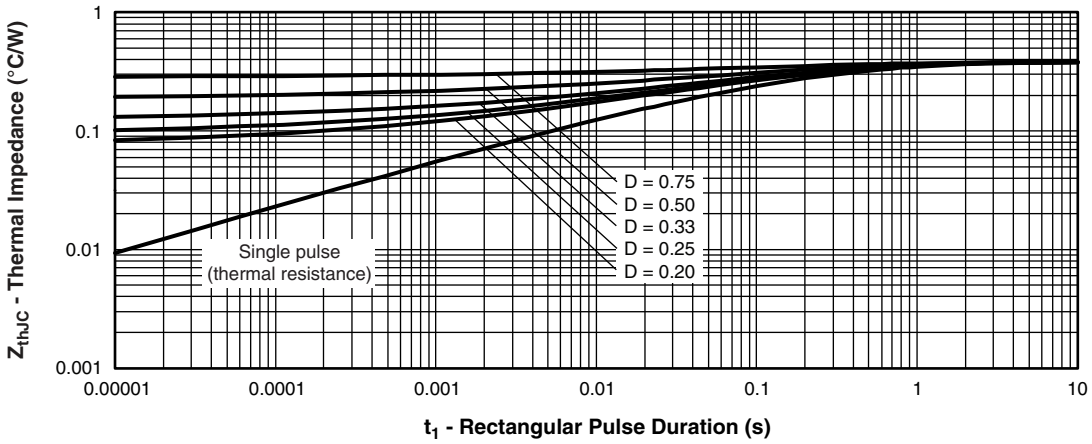



Fig. 4 - Maximum Thermal Impedance $Z_{thJC}$ Characteristics (Per Leg)

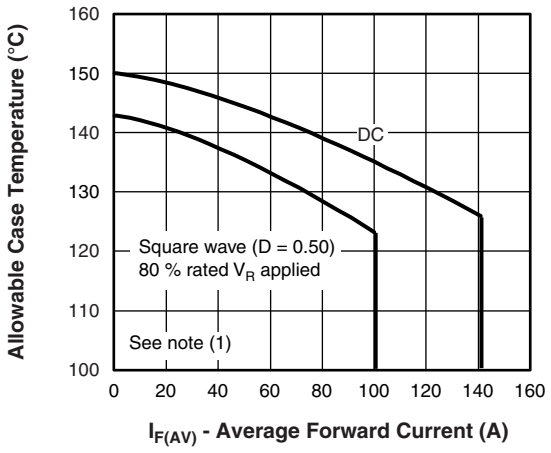



Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

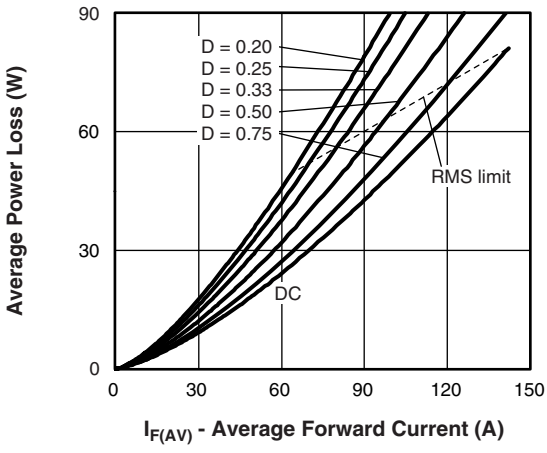



Fig. 6 - Forward Power Loss Characteristics (Per Leg)

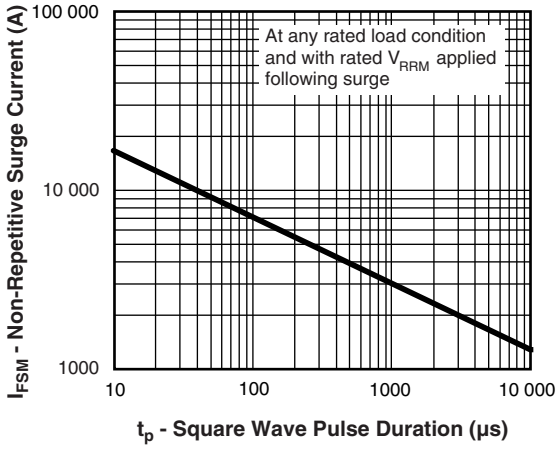



Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

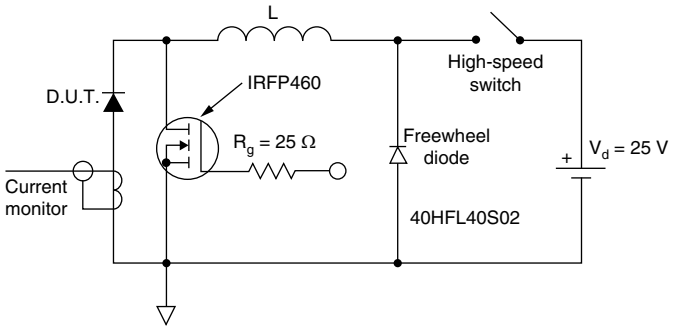



Fig. 8 - Unclamped Inductive Test Circuit

**Note**

(1) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = forward power loss = $I_{F(AV)} \times V_{FM}$ at ($I_{F(AV)}$/D) (see fig. 6);
$Pd_{REV}$ = inverse power loss = $V_{R1} \times I_R (1 - D)$; $I_R$ at $V_{R1}$ = 80 % rated $V_R$

## ORDERING INFORMATION TABLE

**Device code**

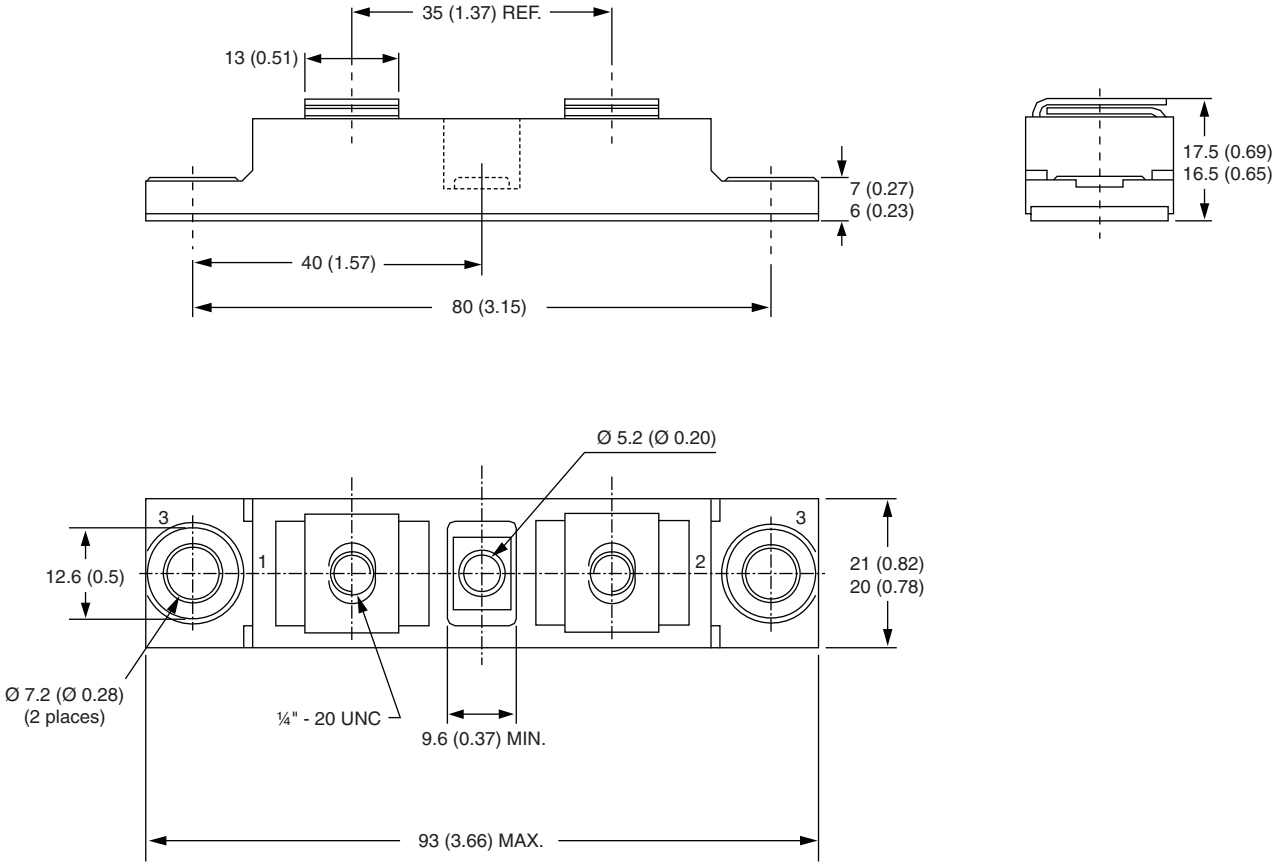
| VS- | 20 | 0 | C | N | Q | 045 | PbF |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

| | | |
|---|---|---|
| 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 | www.vishay.com/doc?95021 |

# TO-244

**DIMENSIONS** in millimeters (inches)



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