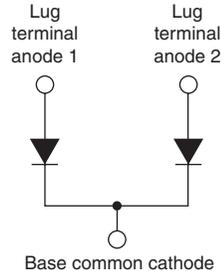


## Schottky Rectifier, 200 A



TO-244



### FEATURES

- 175 °C  $T_J$  operation
- Center tap module
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free
- Designed and qualified for industrial level


**RoHS**  
COMPLIANT

### DESCRIPTION

The 209CNQ 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 175 °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.

### PRODUCT SUMMARY

|             |           |
|-------------|-----------|
| $I_{F(AV)}$ | 200 A     |
| $V_R$       | 135/150 V |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                                       | VALUES      | UNITS            |
|-------------|---|-------------|------------------|
| $I_{F(AV)}$ | Rectangular waveform                                  | 200         | A                |
| $V_{RRM}$   | Range   | 135/150     | V                |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                                  | 10 000      | A                |
| $V_F$       | 100 Apk, $T_J = 125 \text{ }^\circ\text{C}$ (per leg) | 0.71        | V                |
| $T_J$       | Range   | - 55 to 175 | $^\circ\text{C}$ |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 209CNQ135PbF | 209CNQ150PbF | UNITS |
|--------------------------------------|-----------|--------------|--------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 135          | 150          | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |              |              |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER   | SYMBOL      | TEST CONDITIONS   | VALUES | UNITS |
|---|-------------|---|--------|-------|
| Maximum average forward current<br>See fig. 5                             | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 131 \text{ }^\circ\text{C}$ , rectangular waveform  | 100    | A     |
|   |             |   | 200    |       |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse   | 10 000 | A     |
|   |             | 10 ms sine or 6 ms rect. pulse  |        |       |
| Non-repetitive avalanche energy per leg                                   | $E_{AS}$    | $T_J = 25 \text{ }^\circ\text{C}$ , $I_{AS} = 5.5 \text{ A}$ , $L = 1 \text{ mH}$                                   | 15     | mJ    |
| Repetitive avalanche current per leg                                      | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu s$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical | 1      | A     |

| ELECTRICAL SPECIFICATIONS                             |                |   |                                   |        |                  |
|---|----------------|---|-----------------------------------|--------|------------------|
| PARAMETER   | SYMBOL         | TEST CONDITIONS   |                                   | VALUES | UNITS            |
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 100 A   | $T_J = 25\text{ }^\circ\text{C}$  | 1.06   | V                |
|   |                | 200 A   |                                   | 1.33   |                  |
|   |                | 100 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.74   |                  |
|   |                | 200 A   |                                   | 0.88   |                  |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$  | $V_R = \text{Rated } V_R$         | 3      | mA               |
|   |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 45     |                  |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ |                                   | 3000   | 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/ $\mu\text{s}$ |

**Note**(1) Pulse width < 300  $\mu\text{s}$ , 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       |                     |

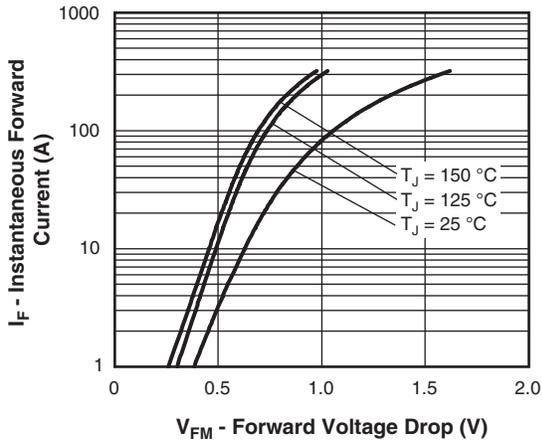


Fig. 1 - Maximum Forward Voltage Drop Characteristics

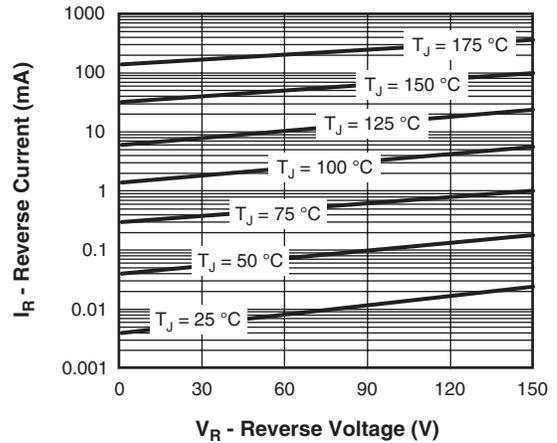


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

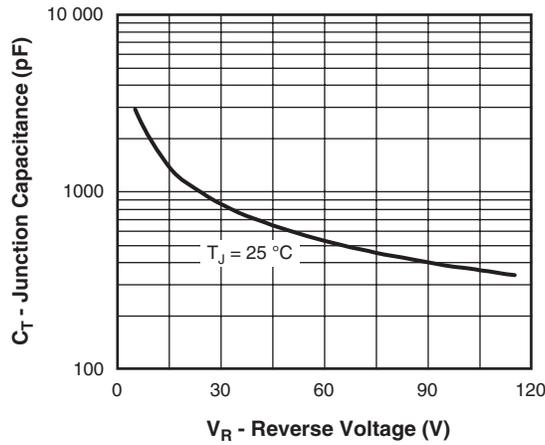


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

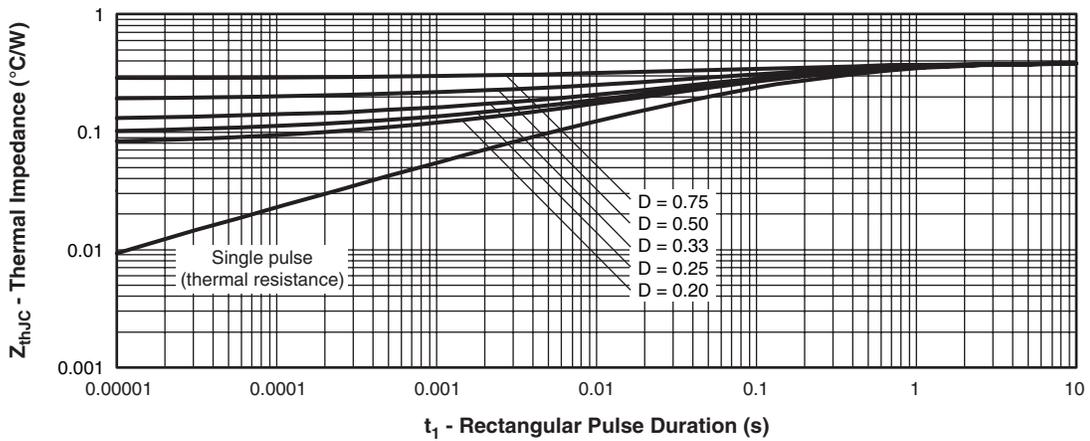


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

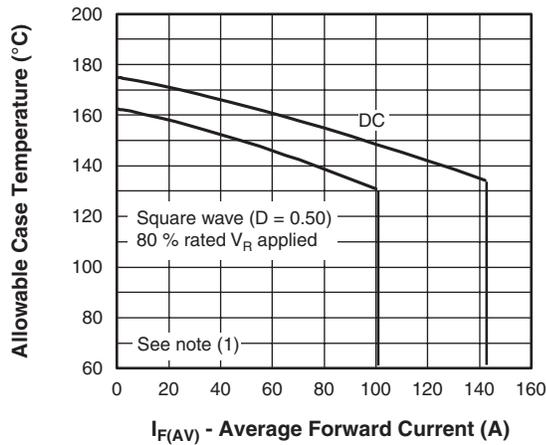


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

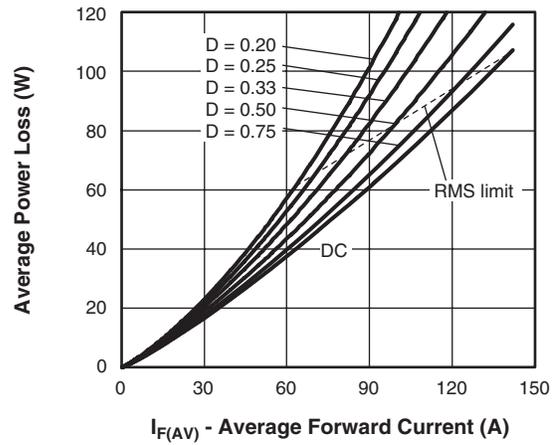


Fig. 6 - Forward Power Loss Characteristics

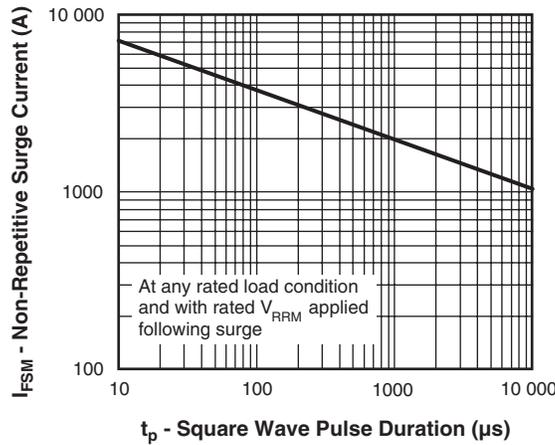


Fig. 7 - Maximum Non-Repetitive Surge Current

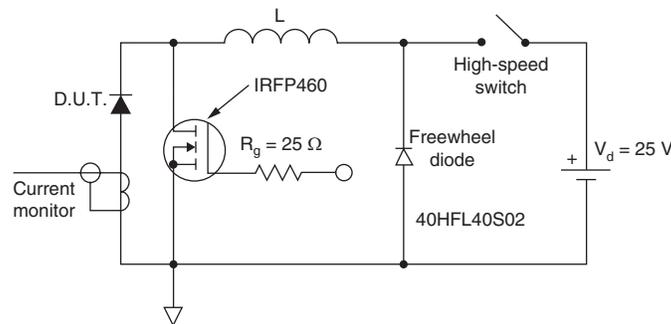


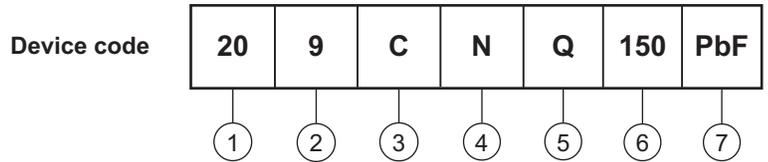
Fig. 8 - Unclamped Inductive Test Circuit

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



**ORDERING INFORMATION TABLE**



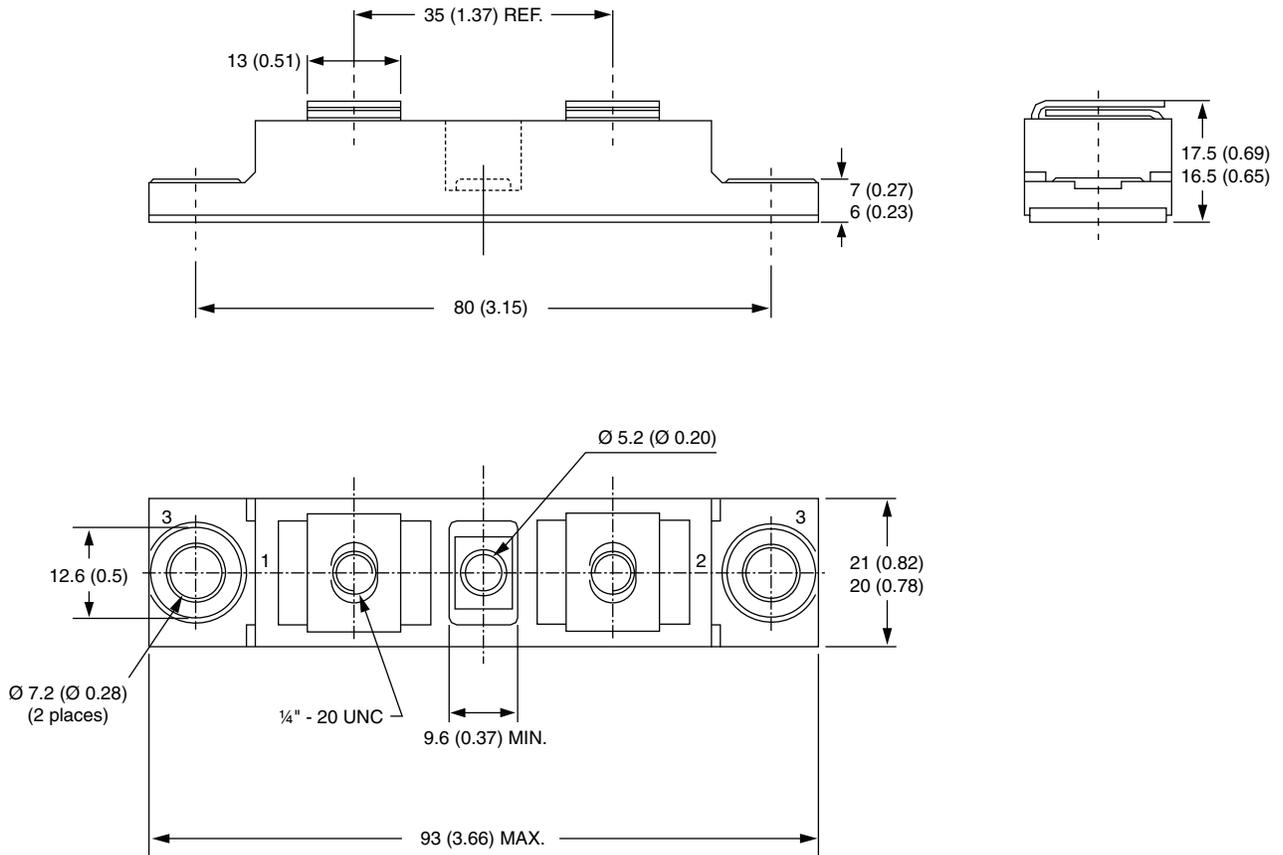
- 1** - Average current rating (x 10)
- 2** - Product silicon identification
- 3** - C = Circuit configuration
- 4** - N = Not isolated
- 5** - Q = Schottky rectifier diode
- 6** - Voltage ratings 

|             |
|-------------|
| 135 = 135 V |
| 150 = 150 V |
- 7** - Lead (Pb)-free

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

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**DIMENSIONS** in millimeters (inches)





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