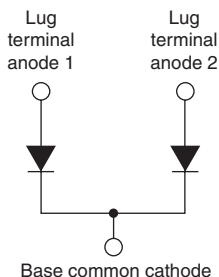


## Schottky Rectifier, 200 A



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
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for industrial level


RoHS  
COMPLIANT

### DESCRIPTION

The 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.

### PRODUCT SUMMARY

|             |       |
|-------------|-------|
| $I_{F(AV)}$ | 200 A |
| $V_R$       | 45 V  |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                        | VALUES      | UNITS |
|-------------|----------------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform                   | 200         | A     |
| $V_{RRM}$   |                                        | 45          | V     |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                   | 26 000      | A     |
| $V_F$       | 100 Apk, $T_J = 125^\circ C$ (per leg) | 0.52        | V     |
| $T_J$       | Range                                  | - 55 to 150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 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<br>per leg<br>See fig. 5                  | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 116^\circ C$ , rectangular waveform                                                       | 100    | A     |
| per device                                                                |             |                                                                                                                     | 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                                                                             | 26 000 | A     |
|                                                                           |             | 10 ms sine or 6 ms rect. pulse                                                                                      |        |       |
| Non-repetitive avalanche energy per leg                                   | $E_{AS}$    | $T_J = 25^\circ C$ , $I_{AS} = 17$ A, $L = 1$ mH                                                                    | 135    | 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 | 20     | A     |

| ELECTRICAL SPECIFICATIONS                             |                                |                                                                               |                                       |        |       |
|-------------------------------------------------------|--------------------------------|-------------------------------------------------------------------------------|---------------------------------------|--------|-------|
| PARAMETER                                             | SYMBOL                         | TEST CONDITIONS                                                               |                                       | VALUES | UNITS |
| Maximum forward voltage drop per leg<br>See fig. 1    | V <sub>FM</sub> <sup>(1)</sup> | 100 A                                                                         | T <sub>J</sub> = 25 °C                | 0.55   | V     |
|                                                       |                                | 200 A                                                                         |                                       | 0.73   |       |
|                                                       |                                | 100 A                                                                         | T <sub>J</sub> = 125 °C               | 0.52   |       |
|                                                       |                                | 200 A                                                                         |                                       | 0.69   |       |
| Maximum reverse leakage current per leg<br>See fig. 2 | I <sub>RM</sub> <sup>(1)</sup> | T <sub>J</sub> = 25 °C                                                        | V <sub>R</sub> = Rated V <sub>R</sub> | 10     | mA    |
|                                                       |                                | T <sub>J</sub> = 125 °C                                                       |                                       | 800    |       |
| Threshold voltage                                     | V <sub>F(TO)</sub>             | T <sub>J</sub> = T <sub>J</sub> maximum                                       |                                       | 0.27   | V     |
| Forward slope resistance                              | r <sub>t</sub>                 |                                                                               |                                       | 2.0    | mΩ    |
| Maximum junction capacitance per leg                  | C <sub>T</sub>                 | V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz) 25 °C |                                       | 5200   | pF    |
| Typical series inductance per leg                     | L <sub>S</sub>                 | From top of terminal hole to mounting plane                                   |                                       | 7.0    | nH    |
| Maximum voltage rate of change                        | dV/dt                          | Rated V <sub>R</sub>                                                          |                                       | 10 000 | V/μs  |

**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, junction to case — 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       |                      |

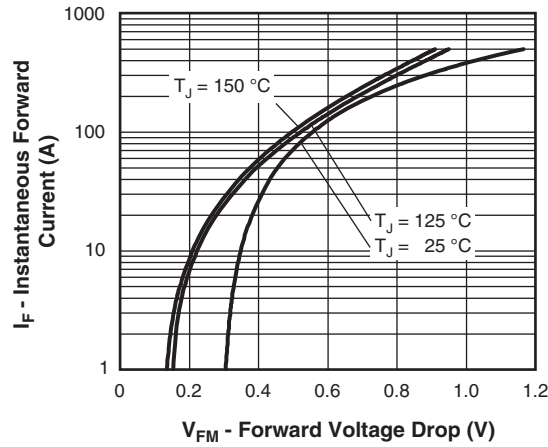


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

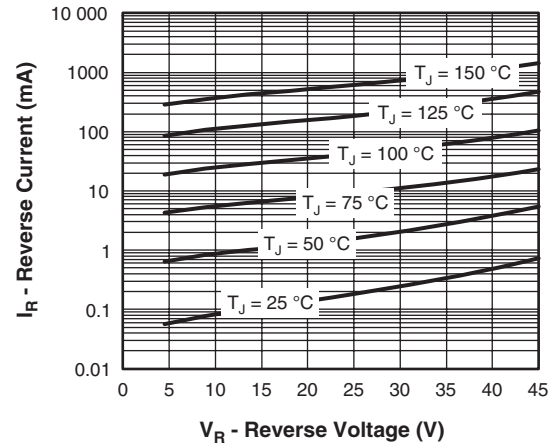


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

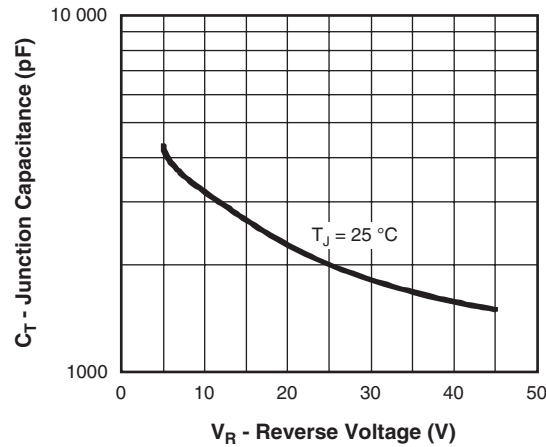


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

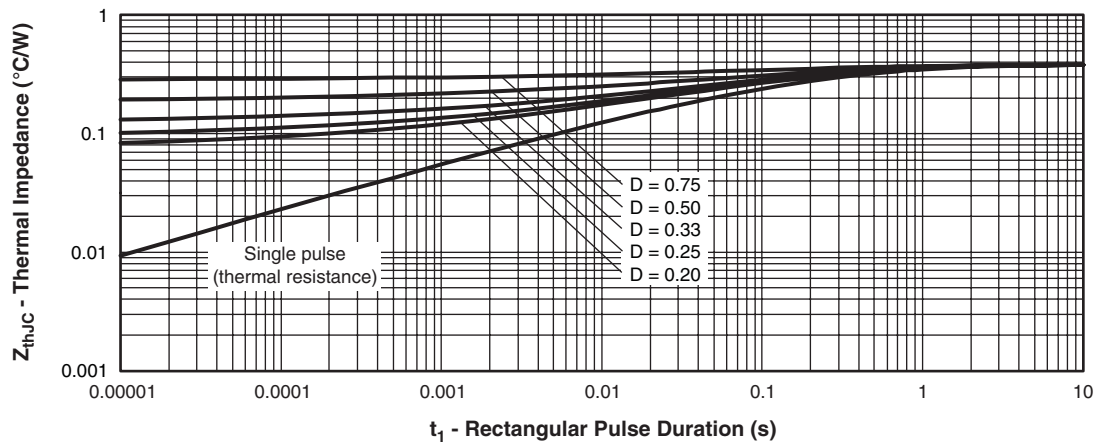


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

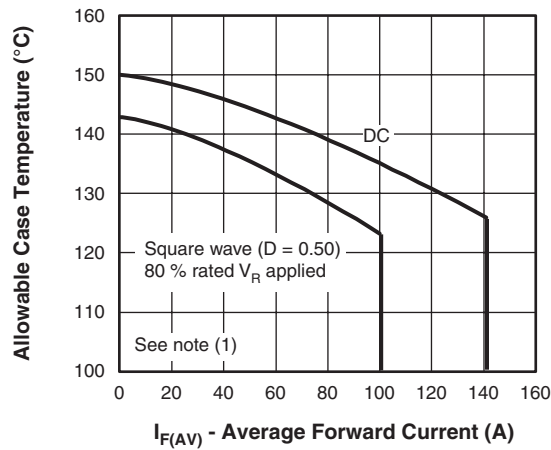


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

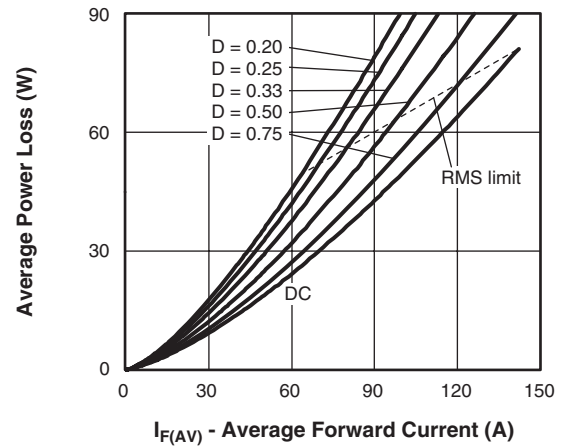


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

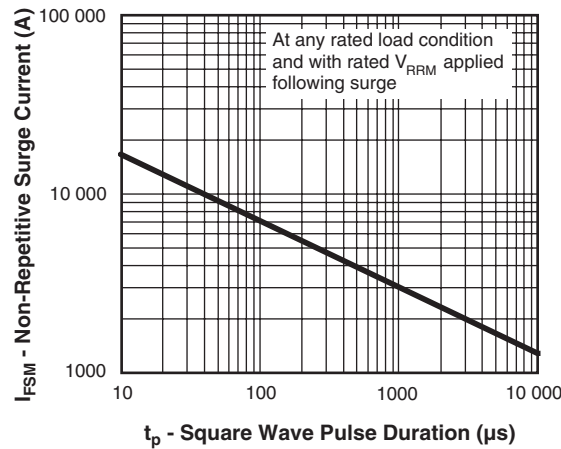


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

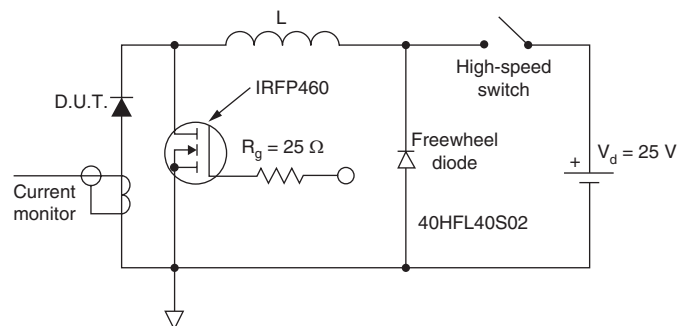


Fig. 8 - Unclamped Inductive Test Circuit

### 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

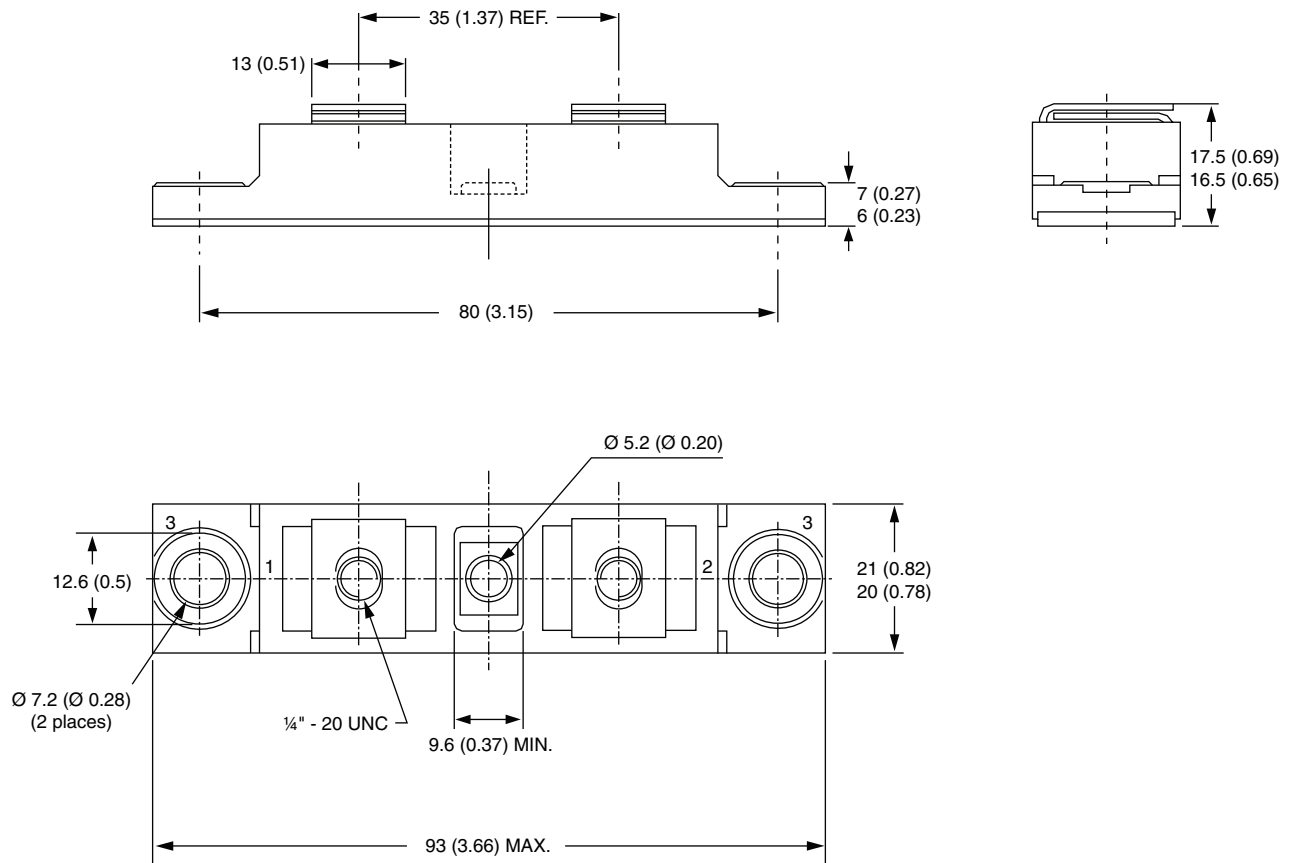
|             |    |   |   |   |   |     |     |
|-------------|----|---|---|---|---|-----|-----|
| Device code | 20 | 0 | C | N | Q | 045 | PbF |
|             | 1  | 2 | 3 | 4 | 5 | 6   | 7   |

- |   |   |                                |
|---|---|--------------------------------|
| 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 rating (045 = 45 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> |

## TO-244

**DIMENSIONS** in millimeters (inches)





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