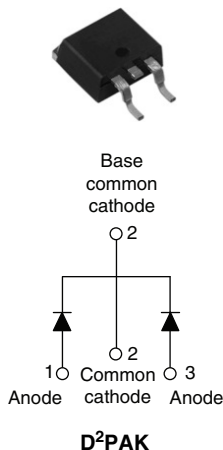
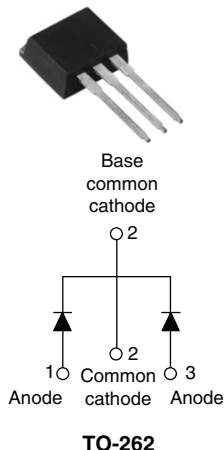


## Schottky Rectifier, 2 x 10 A

20CTQ...SPbF



20CTQ...-1PbF



### FEATURES

- 175 °C  $T_J$  operation
- Center tap TO-220 package
- Low forward voltage drop
- High frequency operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- Lead (Pb)-free ("PbF" suffix)
- Designed and qualified for Q101 level



**RoHS\***  
COMPLIANT

### DESCRIPTION

The 20CTQ.. center tap Schottky rectifier 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 switching power supplies, converters, freewheeling diodes, and reverse battery protection.

### PRODUCT SUMMARY

|             |            |
|-------------|------------|
| $I_{F(AV)}$ | 2 x 10 A   |
| $V_R$       | 35 to 45 V |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                       | VALUES      | UNITS |
|-------------|---------------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform                  | 20          | A     |
| $V_{RRM}$   | Range                                 | 35 to 45    | V     |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                  | 1060        | A     |
| $V_F$       | 10 Apk, $T_J = 125^\circ C$ (per leg) | 0.57        | V     |
| $T_J$       | Range                                 | - 55 to 175 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 20CTQ035SPbF<br>20CTQ035-1PbF | 20CTQ040SPbF<br>20CTQ040-1PbF | 20CTQ045SPbF<br>20CTQ045-1PbF | UNITS |
|--------------------------------------|-----------|-------------------------------|-------------------------------|-------------------------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 35                            | 40                            | 45                            | 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 $T_C = 145^\circ C$ , rectangular waveform                                                       | 20     | A     |
| Maximum peak one cycle non-repetitive<br>surge current per leg<br>See fig. 7 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse                                                                             | 1060   |       |
|                                                                              |             | 10 ms sine or 6 ms rect. pulse                                                                                      | 265    |       |
| Non-repetitive avalanche energy per leg                                      | $E_{AS}$    | $T_J = 25^\circ C$ , $I_{AS} = 2.0$ A, $L = 6.5$ mH                                                                 | 13     | 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 | 2.0    | A     |

\* Pb containing terminations are not RoHS compliant, exemptions may apply

| 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> | 10 A                                                                          | T <sub>J</sub> = 25 °C                | 0.64   | V     |
|                                                       |                                | 20 A                                                                          |                                       | 0.76   |       |
|                                                       |                                | 10 A                                                                          | T <sub>J</sub> = 125 °C               | 0.57   |       |
|                                                       |                                | 20 A                                                                          |                                       | 0.68   |       |
| 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> | 2      | mA    |
|                                                       |                                | T <sub>J</sub> = 125 °C                                                       |                                       | 15     |       |
| 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 |                                       | 900    | pF    |
| Typical series inductance per leg                     | L <sub>S</sub>                 | Measured lead to lead 5 mm from package body                                  |                                       | 8.0    | 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                            | TEST CONDITIONS                      | VALUES      | UNITS                  |
| Maximum junction and storage temperature range           | T <sub>J</sub> , T <sub>Stg</sub> |                                      | - 55 to 175 | °C                     |
| Maximum thermal resistance, junction to case per leg     | R <sub>thJC</sub>                 | DC operation<br>See fig. 4           | 3.25        | °C/W                   |
| Maximum thermal resistance, junction to case per package |                                   | DC operation                         | 1.63        |                        |
| Typical thermal resistance, case to heatsink             | R <sub>thCS</sub>                 | Mounting surface, smooth and greased | 0.50        |                        |
| Approximate weight                                       |                                   |                                      | 2           | g                      |
|                                                          |                                   |                                      | 0.07        | oz.                    |
| Mounting torque                                          | minimum                           |                                      | 6 (5)       | kgf · cm<br>(lbf · in) |
|                                                          | maximum                           |                                      | 12 (10)     |                        |
| Marking device                                           |                                   | Case style D <sup>2</sup> PAK        | 20CTQ045S   |                        |
|                                                          |                                   | Case style TO-262                    | 20CTQ045-1  |                        |

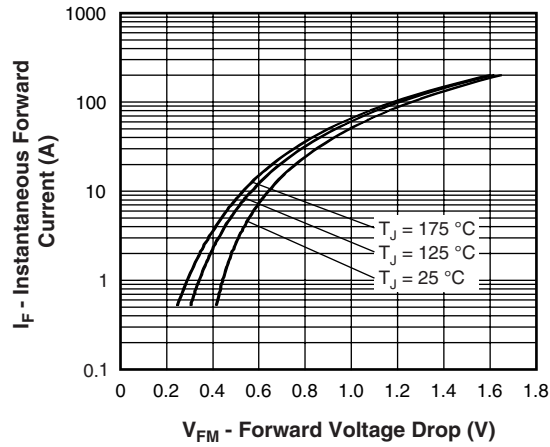


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

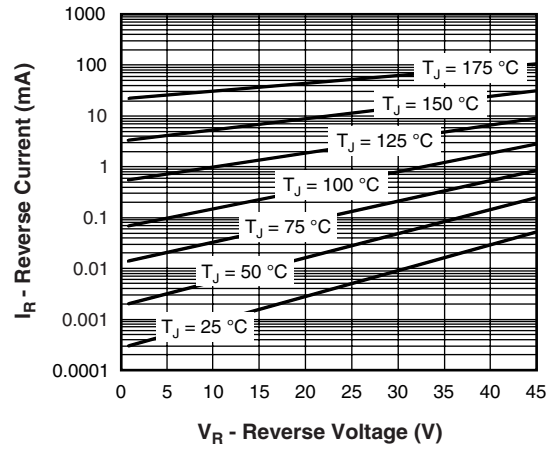


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

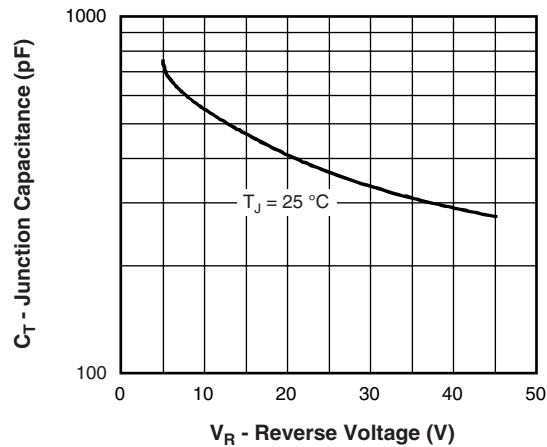


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

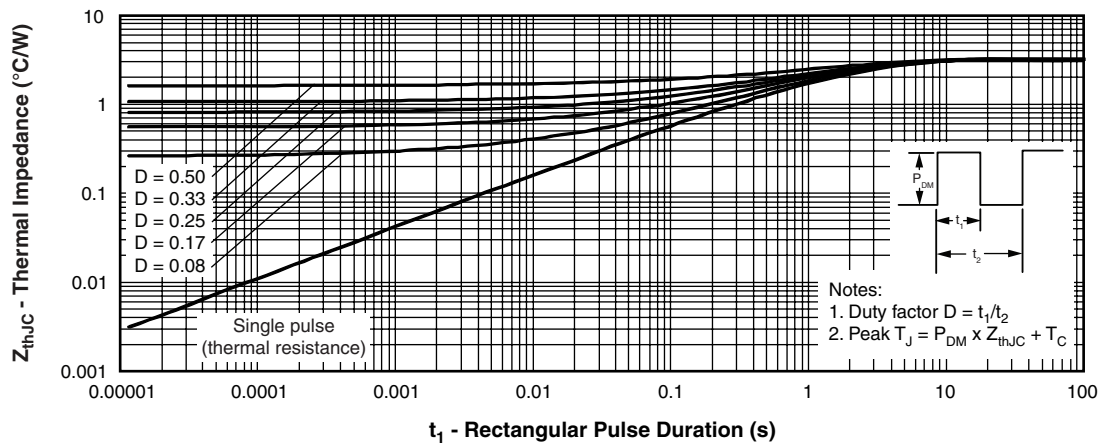


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

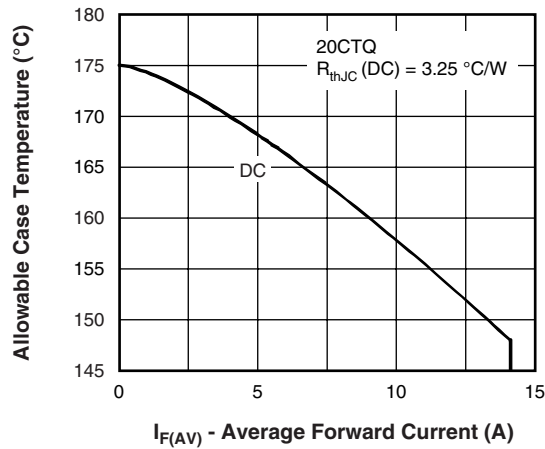


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

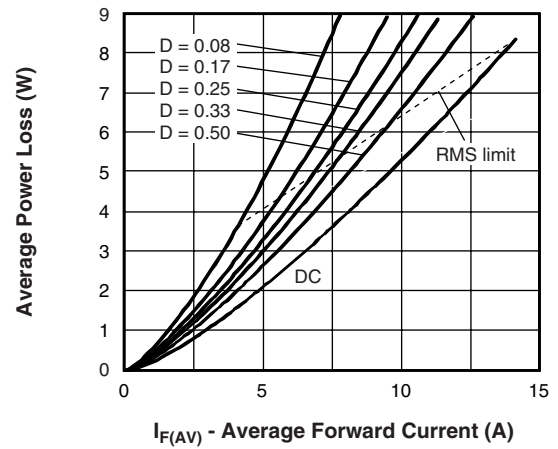


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

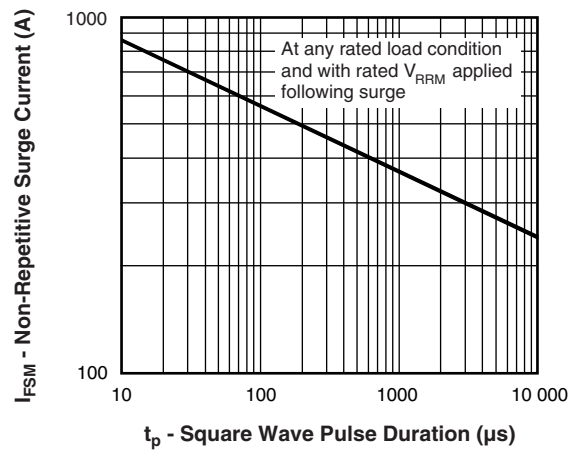


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

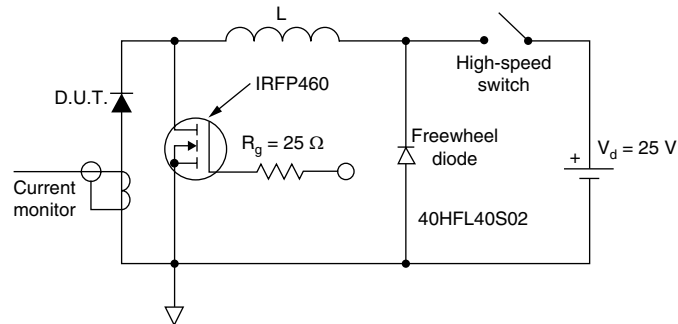


Fig. 8 - Unclamped Inductive Test Circuit



### ORDERING INFORMATION TABLE

|             |    |   |   |   |     |   |     |     |
|-------------|----|---|---|---|-----|---|-----|-----|
| Device code | 20 | C | T | Q | 045 | S | TRL | PbF |
|             | 1  | 2 | 3 | 4 | 5   | 6 | 7   | 8   |

- |          |   |                                                                                                                                                                          |                                        |
|----------|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <b>1</b> | - | Current rating (20 A)                                                                                                                                                    |                                        |
| <b>2</b> | - | Circuit configuration:<br>C = Common cathode                                                                                                                             |                                        |
| <b>3</b> | - | T = TO-220                                                                                                                                                               |                                        |
| <b>4</b> | - | Schottky "Q" series                                                                                                                                                      |                                        |
| <b>5</b> | - | Voltage ratings                                                                                                                                                          | 035 = 35 V<br>040 = 40 V<br>045 = 45 V |
| <b>6</b> | - | • S = D <sup>2</sup> PAK<br>• -1 = TO-262                                                                                                                                |                                        |
| <b>7</b> | - | • None = Tube (50 pieces)<br>• TRL = Tape and reel (left oriented - for D <sup>2</sup> PAK only)<br>• TRR = Tape and reel (right oriented - for D <sup>2</sup> PAK only) |                                        |
| <b>8</b> | - | • None = Standard production<br>• PbF = Lead (Pb)-free                                                                                                                   |                                        |

| LINKS TO RELATED DOCUMENTS |                                                                               |
|----------------------------|-------------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95014">http://www.vishay.com/doc?95014</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95008">http://www.vishay.com/doc?95008</a> |
| Packaging information      | <a href="http://www.vishay.com/doc?95032">http://www.vishay.com/doc?95032</a> |



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