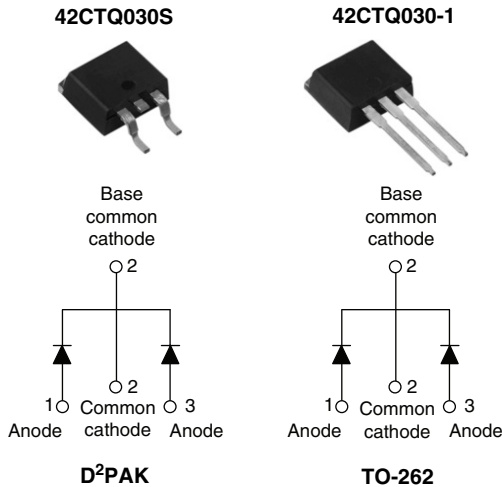


## Schottky Rectifier, 2 x 20 A



### FEATURES

- 150 °C T<sub>J</sub> operation
- Center tap configuration
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Designed and qualified for Q101 level

### DESCRIPTION

This center tap Schottky rectifier module has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °C junction temperature. Typical applications are in switching power supplies, freewheeling diodes, and reverse battery protection.

### PRODUCT SUMMARY

|                    |          |
|--------------------|----------|
| I <sub>F(AV)</sub> | 2 x 20 A |
| V <sub>R</sub>     | 30 V     |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL             | CHARACTERISTICS                           | VALUES      | UNITS |
|--------------------|---|-------------|-------|
| I <sub>F(AV)</sub> | Rectangular waveform                      | 40          | A     |
| V <sub>RRM</sub>   |   | 30          | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine                | 1100        | A     |
| V <sub>F</sub>     | 20 Apk, T <sub>J</sub> = 125 °C (per leg) | 0.38        | V     |
| T <sub>J</sub>     | Range                                     | - 55 to 150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | 42CTQ030S<br>42CTQ030-1 | UNITS |
|--------------------------------------|------------------|-------------------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | 30                      | 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> = 121 °C, rectangular waveform   | 20     | A     |
|   |                    |  | 40     |       |
| 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  | 110    | A     |
|   |                    | 10 ms sine or 6 ms rect. pulse   | 360    |       |
| Non-repetitive avalanche energy per leg                                   | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 3 A, L = 2.90 mH   | 13     | 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 | 3      | A     |

| ELECTRICAL SPECIFICATIONS                             |                |  |                                   |        |                  |
|---|----------------|--|-----------------------------------|--------|------------------|
| PARAMETER   | SYMBOL         | TEST CONDITIONS  |                                   | VALUES | UNITS            |
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 20 A   | $T_J = 25\text{ }^\circ\text{C}$  | 0.48   | V                |
|   |                | 40 A   |                                   | 0.57   |                  |
|   |                | 20 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.38   |                  |
|   |                | 40 A   |                                   | 0.51   |                  |
| 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               |
|   |                | $T_J = 125\text{ }^\circ\text{C}$  |                                   | 183    |                  |
| Threshold voltage                                     | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$  |                                   | 0.22   | V                |
| Forward slope resistance                              | $r_t$          |  |                                   | 6.76   | m $\Omega$       |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 $^\circ\text{C}$ |                                   | 2840   | pF               |
| Typical series inductance per leg                     | $L_S$          | Measured lead to lead 5 mm from package body                                     |                                   | 8.0    | 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         | TEST CONDITIONS   |                               | VALUES      | UNITS                  |
| Maximum junction and storage temperature range           | $T_J, T_{Stg}$ |   |                               | - 55 to 150 | $^\circ\text{C}$       |
| Maximum thermal resistance, junction to case per leg     | $R_{thJC}$     | DC operation  |                               | 2.0         | $^\circ\text{C/W}$     |
| Maximum thermal resistance, junction to case per package |                |   |                               | 1.0         |                        |
| Typical thermal resistance, case to heatsink             | $R_{thCS}$     | Mounting surface, smooth and greased<br>(Only for TO-262) |                               | 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 | 42CTQ030S   |                        |
|  |                |   | Case style TO-262             | 42CTQ030-1  |                        |

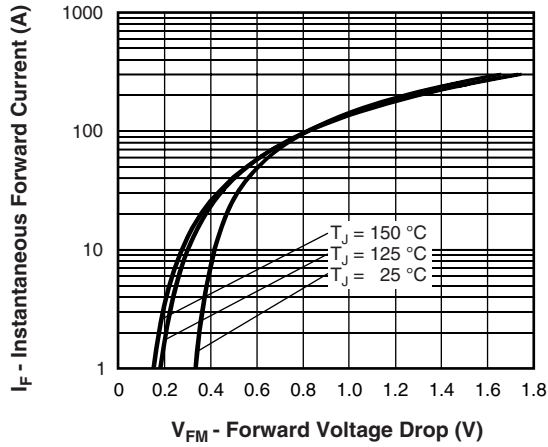


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

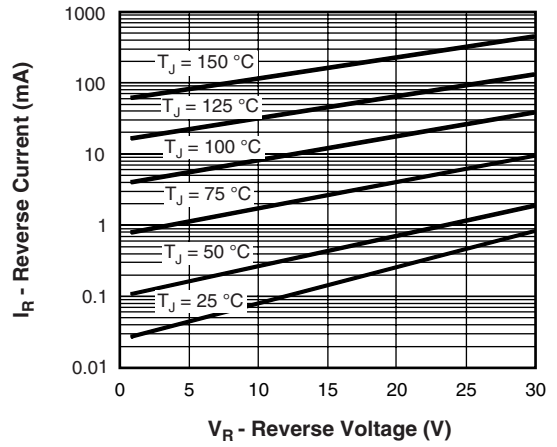


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

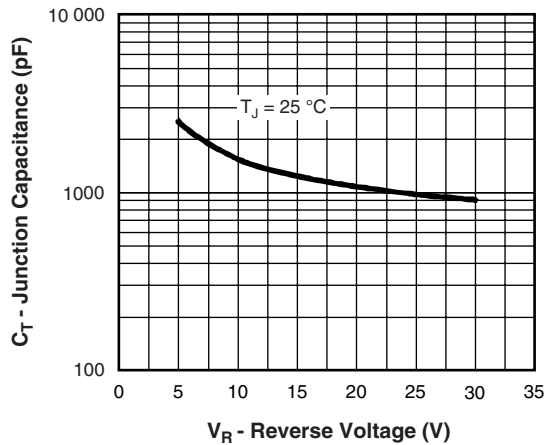


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

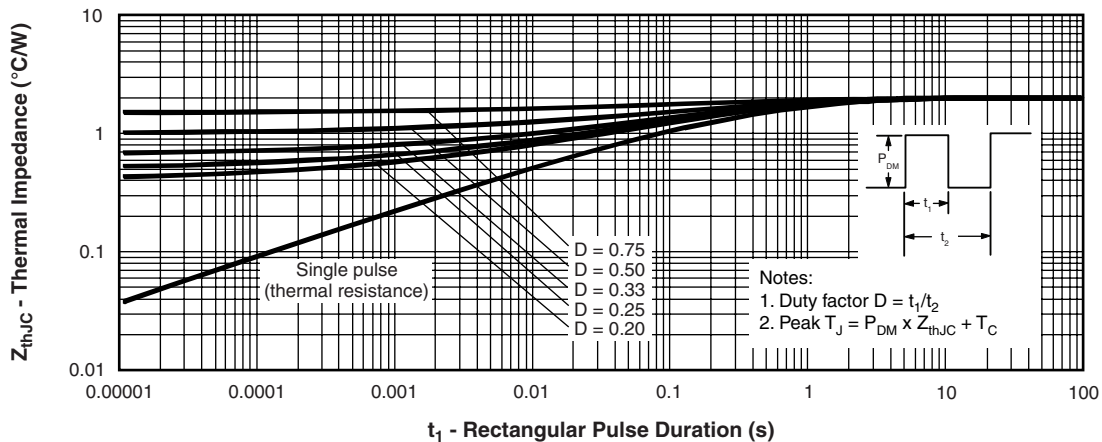


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

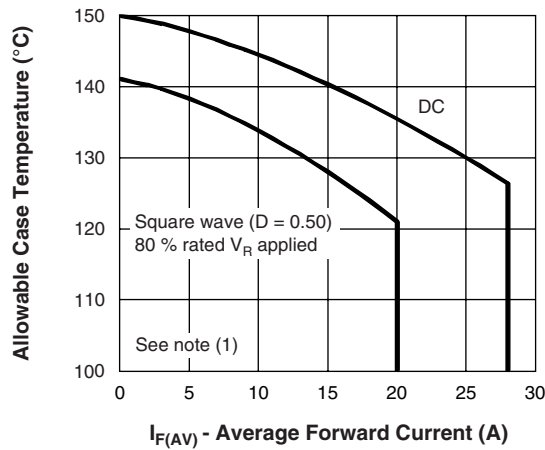


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

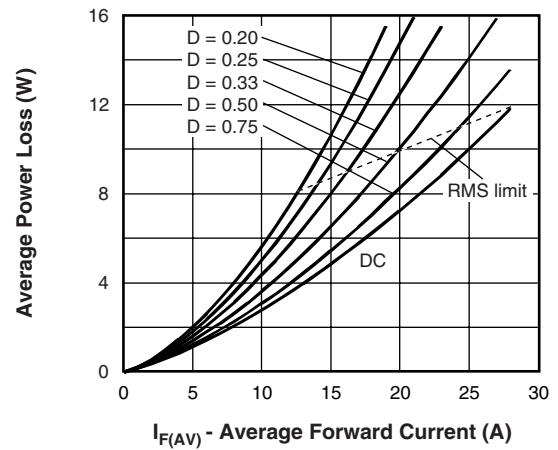


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

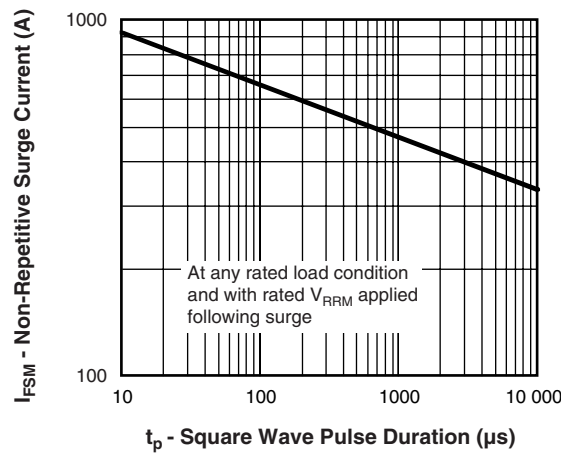


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

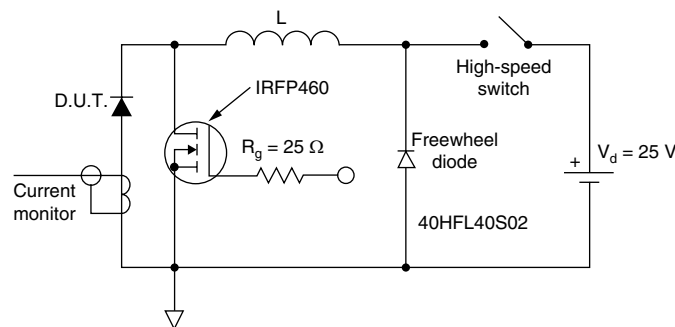


Fig. 8 - Unclamped Inductive Test Circuit

**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  $V_{R1} = 10 V$



## ORDERING INFORMATION TABLE

|             |           |          |          |          |            |          |            |          |
|-------------|-----------|----------|----------|----------|------------|----------|------------|----------|
| Device code | <b>42</b> | <b>C</b> | <b>T</b> | <b>Q</b> | <b>030</b> | <b>S</b> | <b>TRL</b> | <b>-</b> |
|             | ①         | ②        | ③        | ④        | ⑤          | ⑥        | ⑦          | ⑧        |

- 1** - Current rating (40 A)
- 2** - Circuit configuration:
  - C = Common cathode
- 3** - T = TO-220
- 4** - Schottky "Q" series
- 5** - Voltage rating (030 = 30 V)
- 6** -
  - S = D<sup>2</sup>PAK
  - -1 = TO-262
- 7** -
  - None = Tube (50 pieces)
  - TRL = Tape and reel (left oriented - for D<sup>2</sup>PAK only)
  - TRR = Tape and reel (right oriented - for D<sup>2</sup>PAK only)
- 8** -
  - None = Standard production
  - 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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