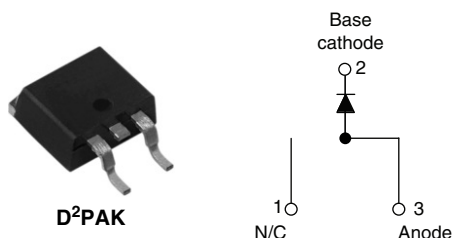


## Schottky Rectifier, 20 A



### FEATURES

- 150 °C  $T_J$  operation
- 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
- Designed and qualified for Q101 level

### DESCRIPTION

The 20TQ... Schottky rectifier series 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, converters, freewheeling diodes, and reverse battery protection.

### PRODUCT SUMMARY

|             |            |
|-------------|------------|
| $I_{F(AV)}$ | 20 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        | 1800        | A     |
| $V_F$       | 20 Apk, $T_J = 125^\circ C$ | 0.51        | V     |
| $T_J$       | Range                       | - 55 to 150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 20TQ035S | 20TQ040S | 20TQ045S | 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 $T_C = 116\text{ }^{\circ}\text{C}$ , rectangular waveform                                             |                                                                           | 20     | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 7 | $I_{FSM}$   | 5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse                                                                       | Following any rated load<br>condition and with rated<br>$V_{RRM}$ applied | 1800   |       |
|                                                                      |             | 10 ms sine or 6 ms rect. pulse                                                                                            |                                                                           | 400    |       |
| Non-repetitive avalanche energy                                      | $E_{AS}$    | $T_J = 25\text{ }^{\circ}\text{C}$ , $I_{AS} = 4\text{ A}$ , $L = 3.40\text{ mH}$                                         |                                                                           | 27     | mJ    |
| Repetitive avalanche current                                         | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu\text{s}$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical |                                                                           | 4      | A     |

| ELECTRICAL SPECIFICATIONS                     |                                |                                                                               |                                       |        |       |
|-----------------------------------------------|--------------------------------|-------------------------------------------------------------------------------|---------------------------------------|--------|-------|
| PARAMETER                                     | SYMBOL                         | TEST CONDITIONS                                                               |                                       | VALUES | UNITS |
| Maximum forward voltage drop<br>See fig. 1    | V <sub>FM</sub> <sup>(1)</sup> | 20 A                                                                          | T <sub>J</sub> = 25 °C                | 0.57   | V     |
|                                               |                                | 40 A                                                                          |                                       | 0.73   |       |
|                                               |                                | 20 A                                                                          | T <sub>J</sub> = 125 °C               | 0.51   |       |
|                                               |                                | 40 A                                                                          |                                       | 0.67   |       |
| Maximum reverse leakage current<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> | 2.7    | mA    |
|                                               |                                | T <sub>J</sub> = 125 °C                                                       |                                       | 105    |       |
| Maximum junction capacitance                  | C <sub>T</sub>                 | V <sub>R</sub> = 5 V <sub>DC</sub> (test signal range 100 kHz to 1 MHz) 25 °C |                                       | 1400   | pF    |
| Typical series inductance                     | 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 150 | °C                     |
| Maximum thermal resistance, junction to case   | R <sub>thJC</sub>                 | DC operation<br>See fig. 4           | 1.50        | °C/W                   |
| 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        | 20TQ035S    |                        |
|                                                |                                   |                                      | 20TQ040S    |                        |
|                                                |                                   |                                      | 20TQ045S    |                        |

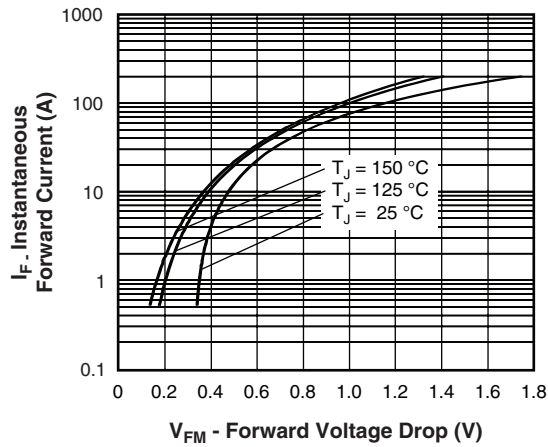


Fig. 1 - Maximum Forward Voltage Drop Characteristics

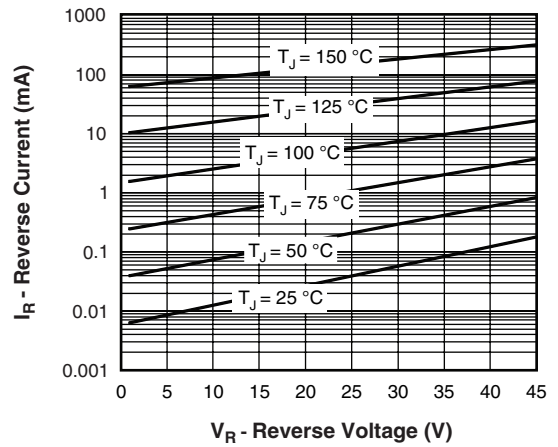


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

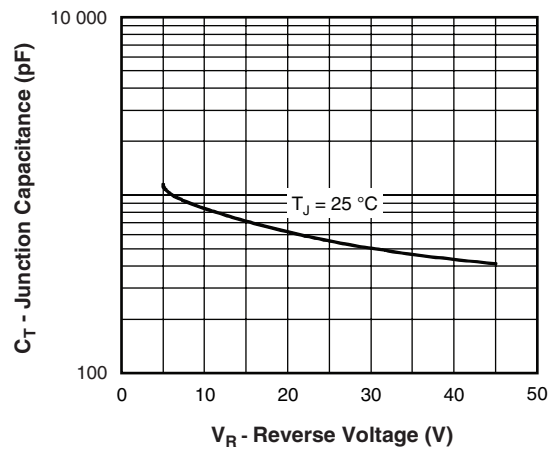
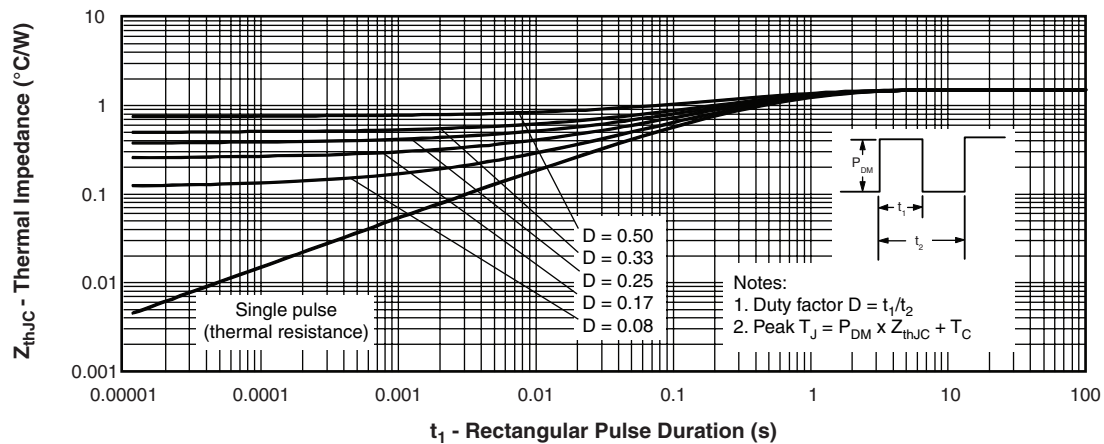


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


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

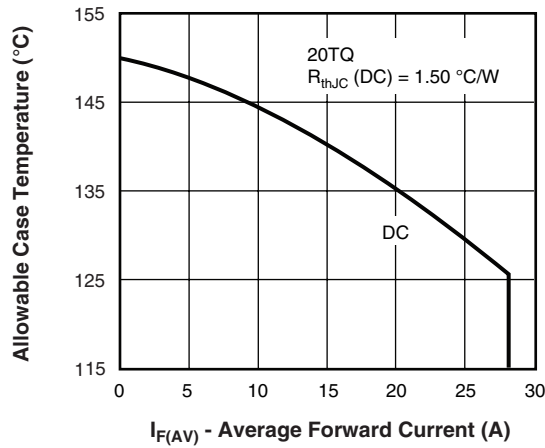


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

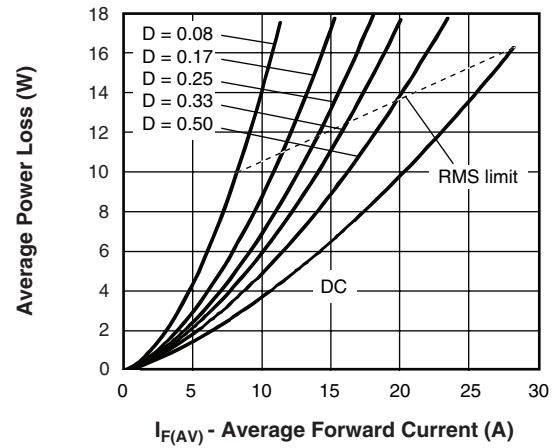


Fig. 6 - Forward Power Loss Characteristics

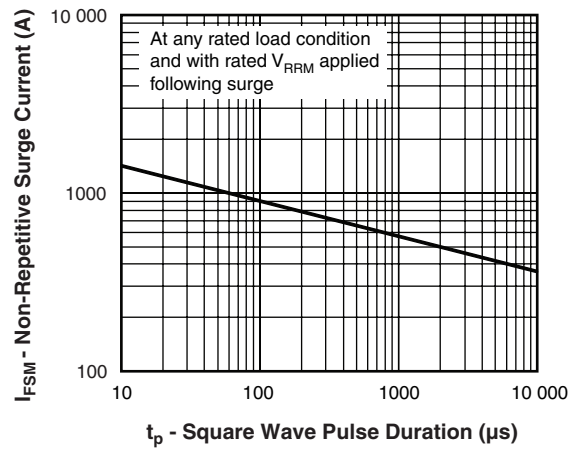


Fig. 7 - Maximum Non-Repetitive Surge Current

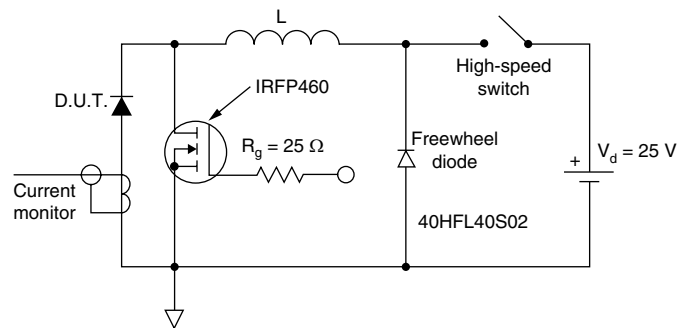


Fig. 8 - Unclamped Inductive Test Circuit

**ORDERING INFORMATION TABLE**

|             |    |                                        |   |     |   |     |   |
|-------------|----|----------------------------------------|---|-----|---|-----|---|
| Device code | 20 | T                                      | Q | 045 | S | TRL | - |
|             | 1  | 2                                      | 3 | 4   | 5 | 6   | 7 |
| 1           | -  | Current rating (20 A)                  |   |     |   |     |   |
| 2           | -  | Package:                               |   |     |   |     |   |
|             |    | T = TO-220                             |   |     |   |     |   |
| 3           | -  | Schottky "Q" series                    |   |     |   |     |   |
| 4           | -  | Voltage ratings                        |   |     |   |     |   |
| 5           | -  | • S = D <sup>2</sup> PAK               |   |     |   |     |   |
| 6           | -  | • None = Tube (50 pieces)              |   |     |   |     |   |
|             |    | • TRL = Tape and reel (left oriented)  |   |     |   |     |   |
|             |    | • TRR = Tape and reel (right oriented) |   |     |   |     |   |
| 7           | -  | • None = Standard production           |   |     |   |     |   |
|             |    | • PbF = Lead (Pb)-free                 |   |     |   |     |   |

|            |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |

| 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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