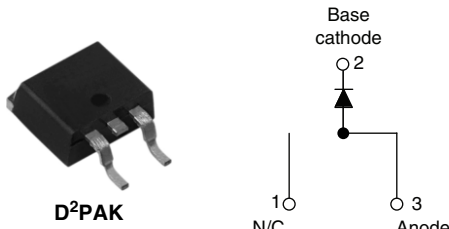




## Schottky Rectifier, 20 A



### 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
- Compliant to RoHS directive 2002/95/EC
- Halogen-free according to IEC 61249-2-21 definition
- AEC-Q101 qualified



**RoHS\***  
COMPLIANT  
HALOGEN  
**FREE**

### PRODUCT SUMMARY

|             |              |
|-------------|--------------|
| $I_{F(AV)}$ | 20 A         |
| $V_R$       | 35 V to 45 V |

### 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.

### 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, $T_J = 125 \text{ }^\circ\text{C}$ | 0.51        | V                |
| $T_J$       | Range                                      | - 55 to 150 | $^\circ\text{C}$ |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | 20TQ035SPbF | 20TQ040SPbF | 20TQ045SPbF | 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 $\mu s$ sine or 3 $\mu s$ rect. pulse                                                                             | 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 $\mu s$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical | 4      | A     |

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

| ELECTRICAL SPECIFICATIONS                     |                |                                                                                  |                                   |        |                  |
|-----------------------------------------------|----------------|----------------------------------------------------------------------------------|-----------------------------------|--------|------------------|
| PARAMETER                                     | SYMBOL         | TEST CONDITIONS                                                                  |                                   | VALUES | UNITS            |
| Maximum forward voltage drop<br>See fig. 1    | $V_{FM}^{(1)}$ | 20 A                                                                             | $T_J = 25\text{ }^\circ\text{C}$  | 0.57   | V                |
|                                               |                | 40 A                                                                             |                                   | 0.73   |                  |
|                                               |                | 20 A                                                                             | $T_J = 125\text{ }^\circ\text{C}$ | 0.51   |                  |
|                                               |                | 40 A                                                                             |                                   | 0.67   |                  |
| Maximum reverse leakage current<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$                                                 | $V_R = \text{Rated } V_R$         | 2.7    | mA               |
|                                               |                | $T_J = 125\text{ }^\circ\text{C}$                                                |                                   | 105    |                  |
| Maximum junction capacitance                  | $C_T$          | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ |                                   | 1400   | pF               |
| Typical series inductance                     | $L_S$          | 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   | $R_{thJC}$     | DC operation<br>See fig. 4           |  | 1.50        | $^\circ\text{C}/\text{W}$ |
| Typical thermal resistance, case to heatsink   | $R_{thCS}$     | 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        |  | 20TQ045S    |                           |

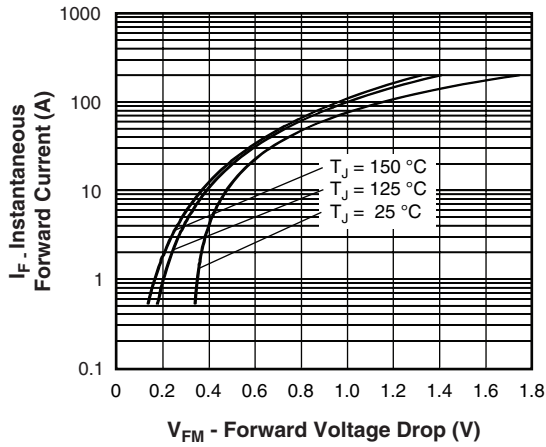


Fig. 1 - Maximum Forward Voltage Drop Characteristics

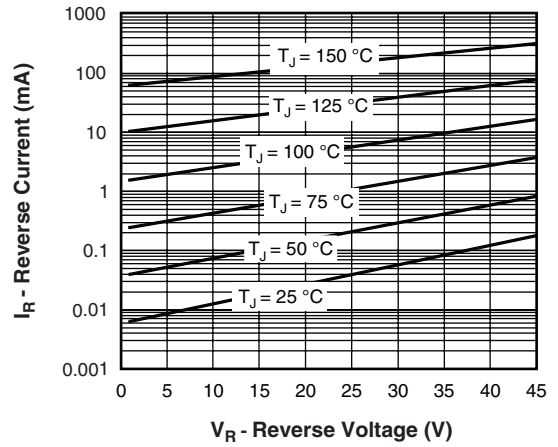


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

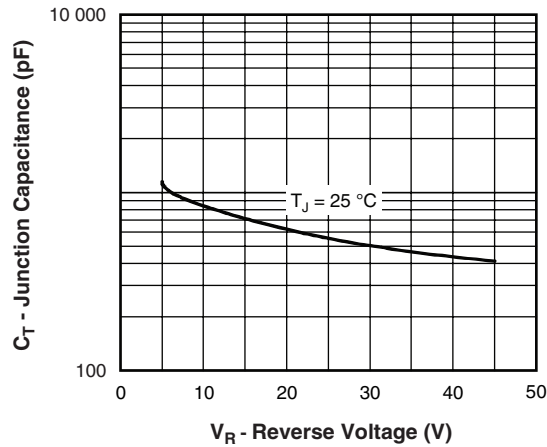


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

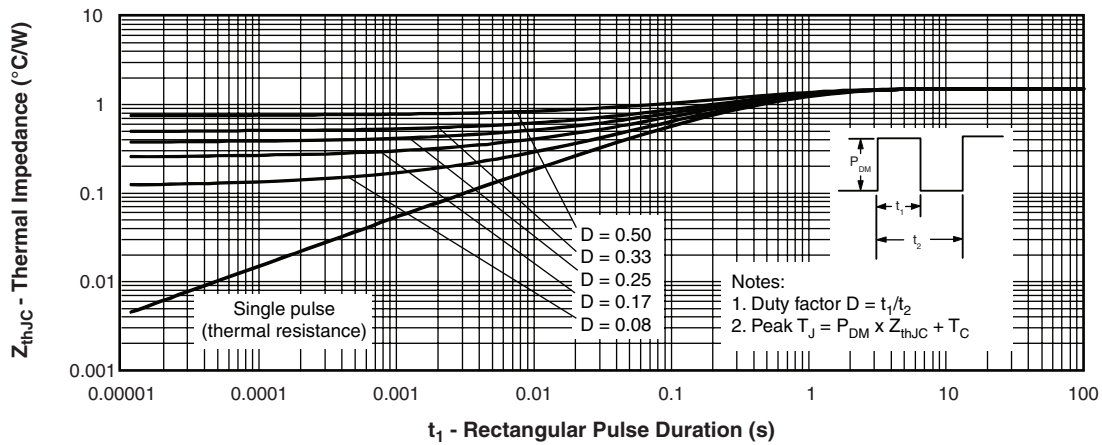


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

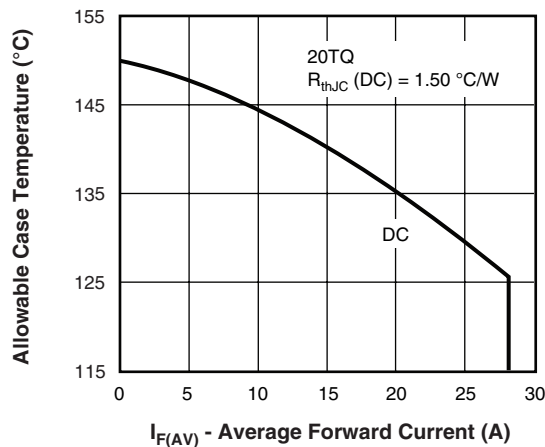


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

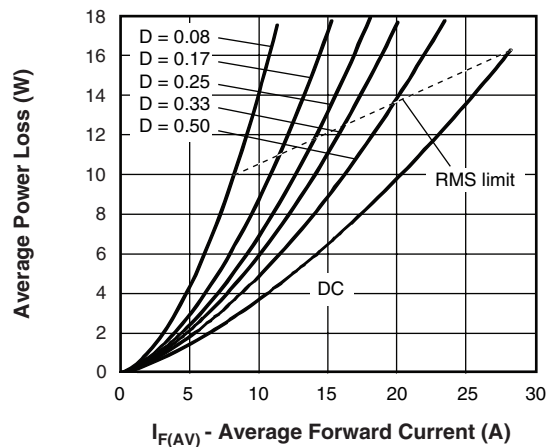


Fig. 6 - Forward Power Loss Characteristics

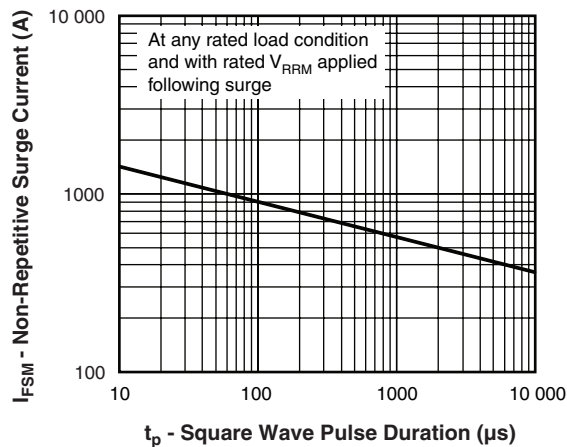


Fig. 7 - Maximum Non-Repetitive Surge Current

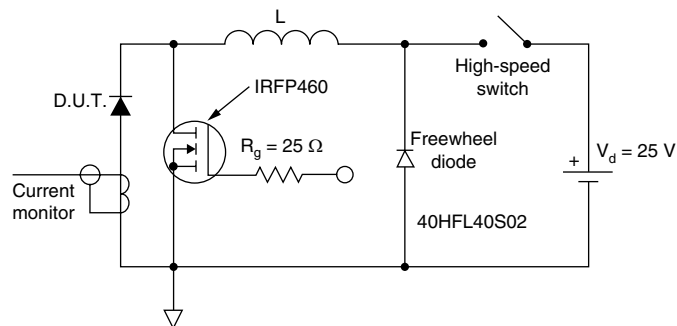


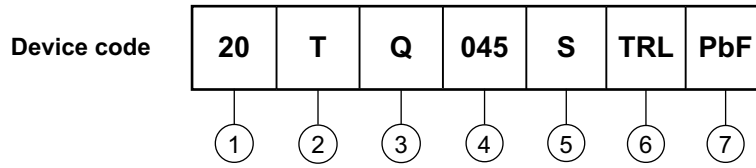
Fig. 8 - Unclamped Inductive Test Circuit



# 20TQ035SPbF, 20TQ040SPbF, 20TQ045SPbF

Schottky Rectifier, 20 A Vishay High Power Products

## ORDERING INFORMATION TABLE



- 1** - Current rating (20 A)
- 2** - Package:  
T = TO-220
- 3** - Schottky "Q" series
- 4** - Voltage ratings
 

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

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



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