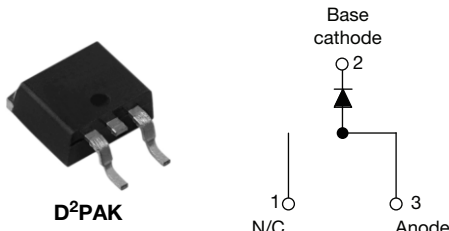




Schottky Rectifier, 20 A



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
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- Halogen-free according to IEC 61249-2-21 definition
- Compliant to RoHS directive 2002/95/EC
- AEC-Q101 qualified



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

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

DESCRIPTION

The VS-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 | VS-20TQ035SPbF | VS-20TQ040SPbF | VS-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 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 non-repetitive surge current See fig. 7 | I_{FSM} | 5 μs sine or 3 μs 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 μs 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 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 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/ μs |

Note

 (1) Pulse width < 300 μs , 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 See fig. 4 | | 1.50 | $^\circ\text{C/W}$ |
| 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 (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | Case style D ² PAK | | 20TQ045S | |



VS-20TQ035SPbF, VS-20TQ040SPbF, VS-20TQ045SPbF

Schottky Rectifier, 20 A Vishay High Power Products

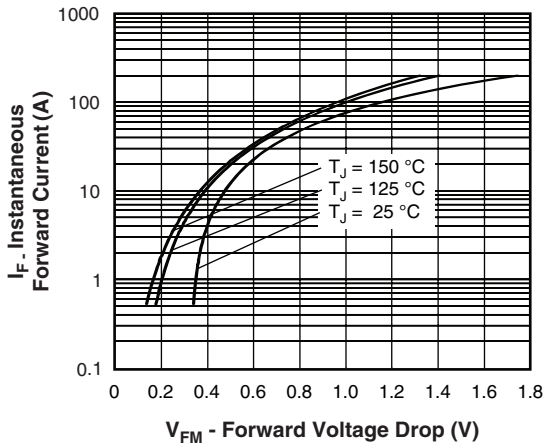


Fig. 1 - Maximum Forward Voltage Drop Characteristics

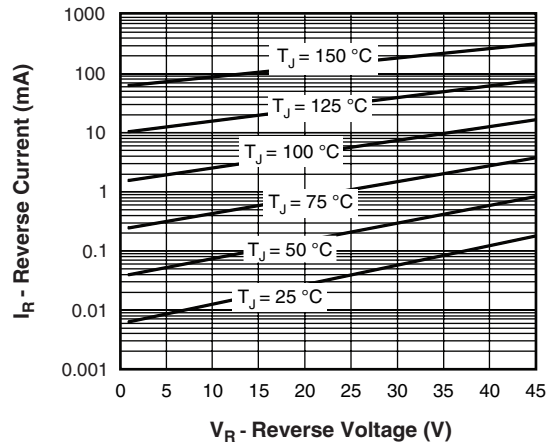


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

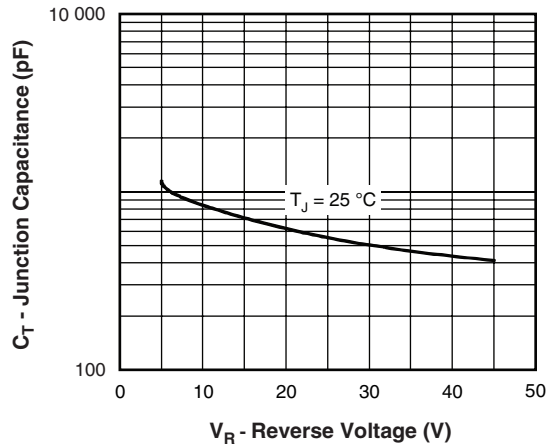


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

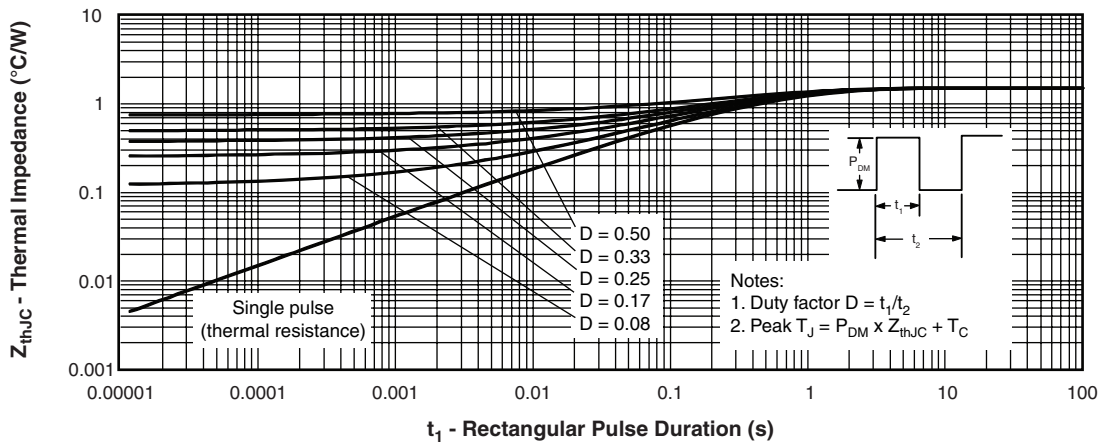


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

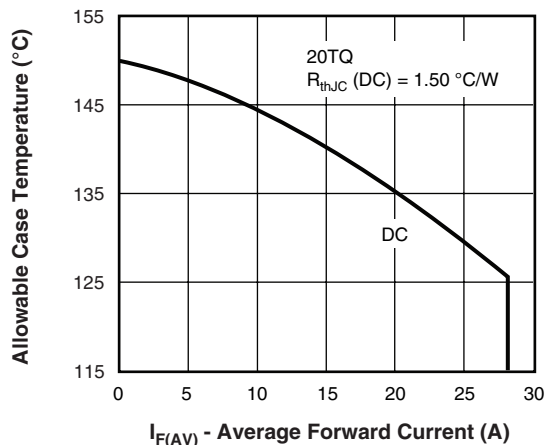


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

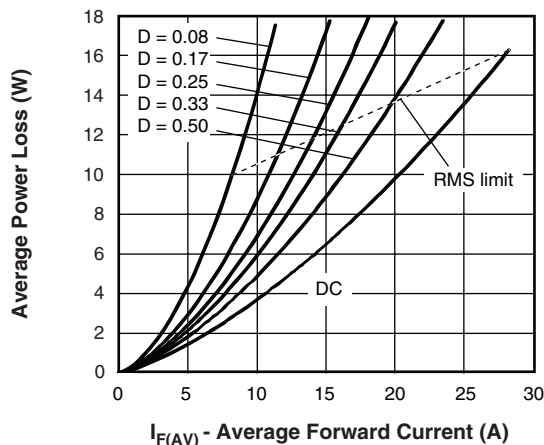


Fig. 6 - Forward Power Loss Characteristics

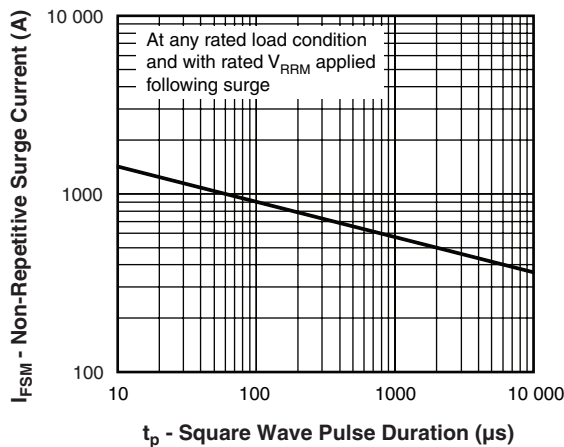


Fig. 7 - Maximum Non-Repetitive Surge Current

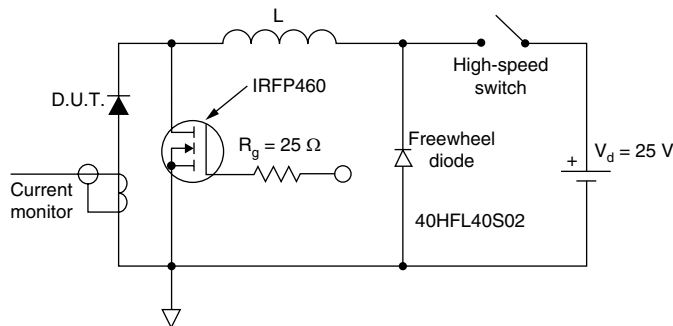


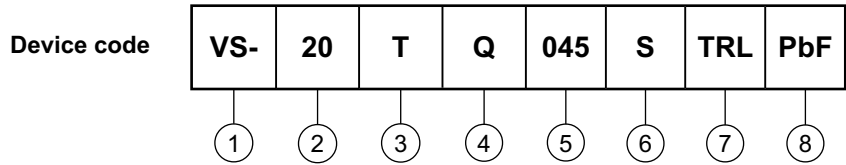
Fig. 8 - Unclamped Inductive Test Circuit



VS-20TQ035SPbF, VS-20TQ040SPbF, VS-20TQ045SPbF

Schottky Rectifier, 20 A Vishay High Power Products

ORDERING INFORMATION TABLE



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

| |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |
- 6** - S = D²PAK
- 7** -
 - None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented)
 - TRR = Tape and reel (right oriented)
- 8** - PbF = Lead (Pb)-free

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95014 |
| Part marking information | www.vishay.com/doc?95008 |
| Packaging information | www.vishay.com/doc?95032 |



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