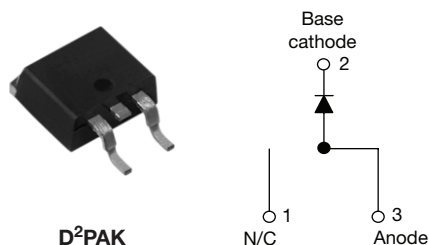


Schottky Rectifier, 6 A



FEATURES

- 175 °C T_J operation
- High frequency operation
- Low forward voltage drop
- 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

| | |
|-------------|--------------|
| $I_{F(AV)}$ | 6 A |
| V_R | 35 V to 45 V |

DESCRIPTION

The VS-6TQ... 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.

MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
|-------------|----------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform | 6 | A |
| V_{RRM} | Range | 35 to 45 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 690 | A |
| V_F | 6 Apk, $T_J = 125^\circ C$ | 0.53 | V |
| T_J | Range | - 55 to 175 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-6TQ035SPbF | VS-6TQ040SPbF | VS-6TQ045SPbF | 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 = 164 °C, rectangular waveform | | 6 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 7 | I _{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V _{RRM} applied | 690 | |
| | | 10 ms sine or 6 ms rect. pulse | | 140 | |
| Non-repetitive avalanche energy | E _{AS} | T _J = 25 °C, I _{AS} = 1.20 A, L = 11.10 mH | | 8 | mJ |
| Repetitive avalanche current | I _{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T _J maximum V _A = 1.5 x V _R typical | | 1.20 | A |

| ELECTRICAL SPECIFICATIONS | | | | | | |
|---|----------------|---|-------------------------------------|--------|-------|--|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS | |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 6 A | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.60 | V | |
| | | 12 A | | 0.73 | | |
| | | 6 A | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.53 | | |
| | | 12 A | | 0.64 | | |
| Maximum reverse leakage current See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$ | $V_R = \text{Rated } V_R$ | 0.8 | mA | |
| | | $T_J = 125\text{ }^{\circ}\text{C}$ | | 7 | | |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J \text{ maximum}$ | | 0.35 | V | |
| Forward slope resistance | r_t | | | 18.23 | mΩ | |
| Maximum junction capacitance | C_T | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz), 25 °C | | 400 | 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 175 | °C |
| Maximum thermal resistance, junction to case | | R _{thJC} | DC operation See fig. 4 | 2.2 | °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 | 6TQ035S | | |
| | | | 6TQ040S | | |
| | | | 6TQ045S | | |



VS-6TQ035SPbF, VS-6TQ040SPbF, VS-6TQ045SPbF

Schottky Rectifier, 6 A Vishay High Power Products

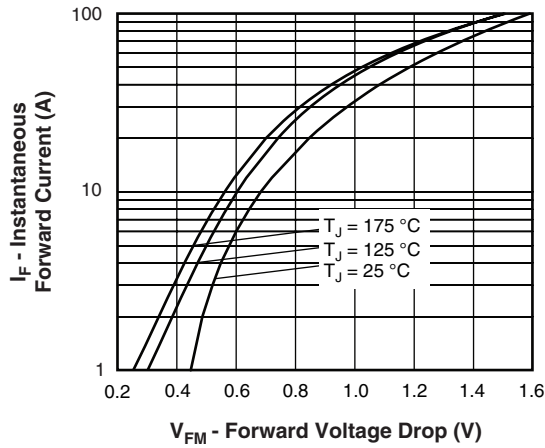


Fig. 1 - Maximum Forward Voltage Drop Characteristics

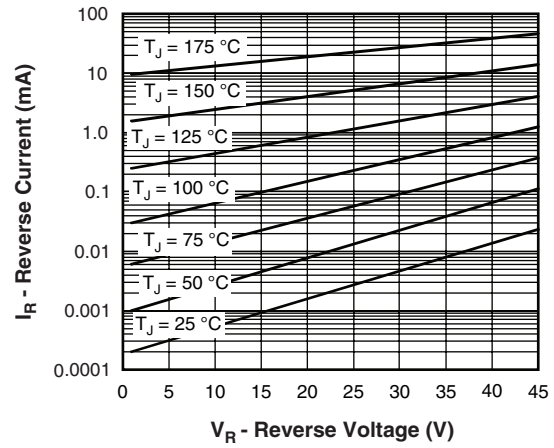


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

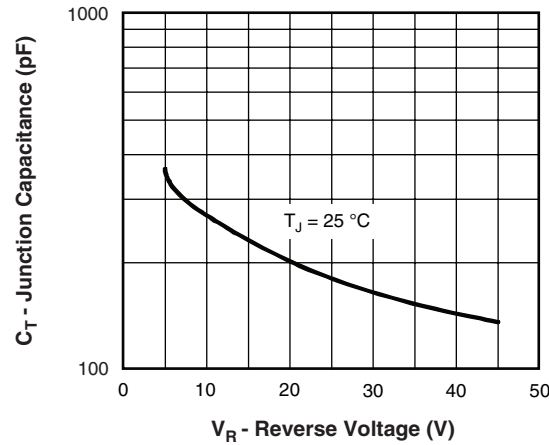


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

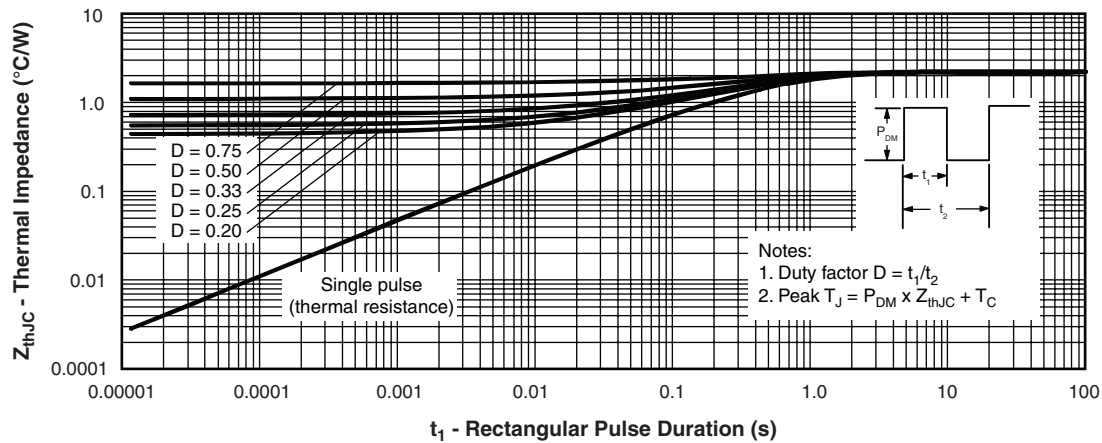


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

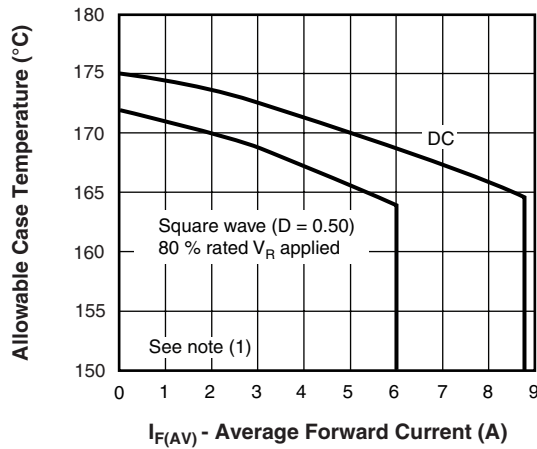


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

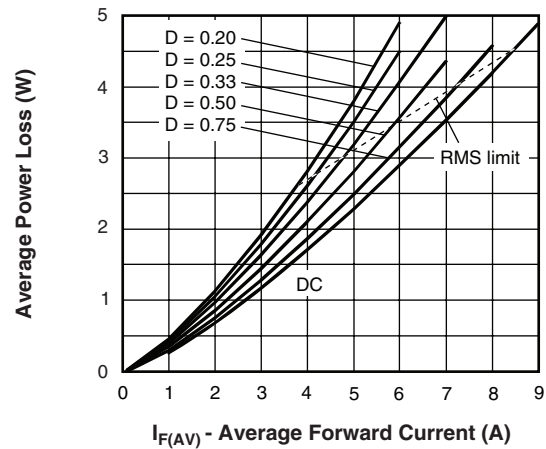


Fig. 6 - Forward Power Loss Characteristics

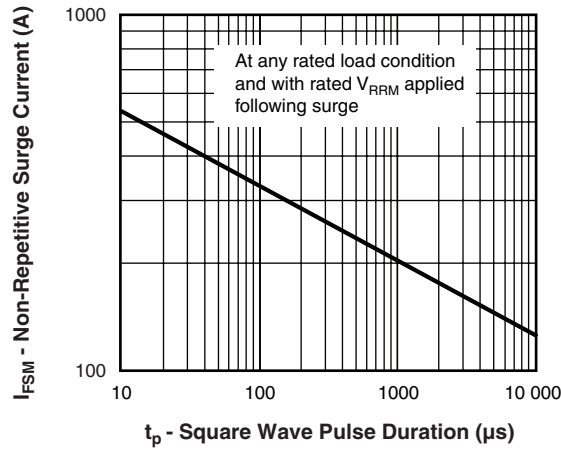


Fig. 7 - Maximum Non-Repetitive Surge Current

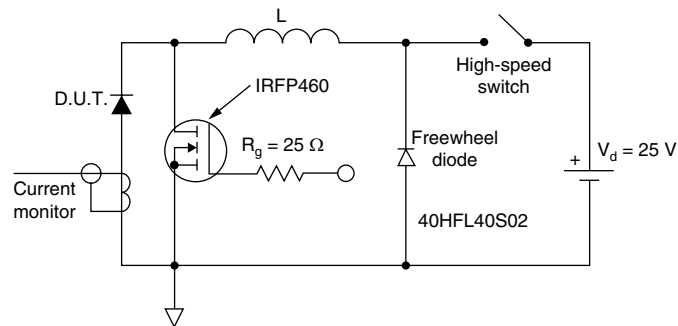


Fig. 8 - Unclamped Inductive Test Circuit

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 = $V_{R1} \times I_{R1} (1 - D)$; I_{R1} at $V_{R1} = 80\%$ rated V_R



VS-6TQ035SPbF, VS-6TQ040SPbF, VS-6TQ045SPbF

Schottky Rectifier, 6 A Vishay High Power Products

ORDERING INFORMATION TABLE

| | | | | | | | | |
|-------------|--|---|---|---|-----|---|-----|-----|
| Device code | VS- | 6 | T | Q | 045 | S | TRL | PbF |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | - HPP product suffix | | | | | | | |
| 2 | - Current rating (6 A) | | | | | | | |
| 3 | - Package: T = TO-220 | | | | | | | |
| 4 | - Schottky "Q" series | | | | | | | |
| 5 | - Voltage ratings | | | | | | | |
| 6 | - S = D ² PAK | | | | | | | |
| 7 | - • None = Tube (50 pieces) • TRL = Tape and reel (left oriented) • TRR = Tape and reel (right oriented) | | | | | | | |
| 8 | - PbF = Lead (Pb)-free | | | | | | | |

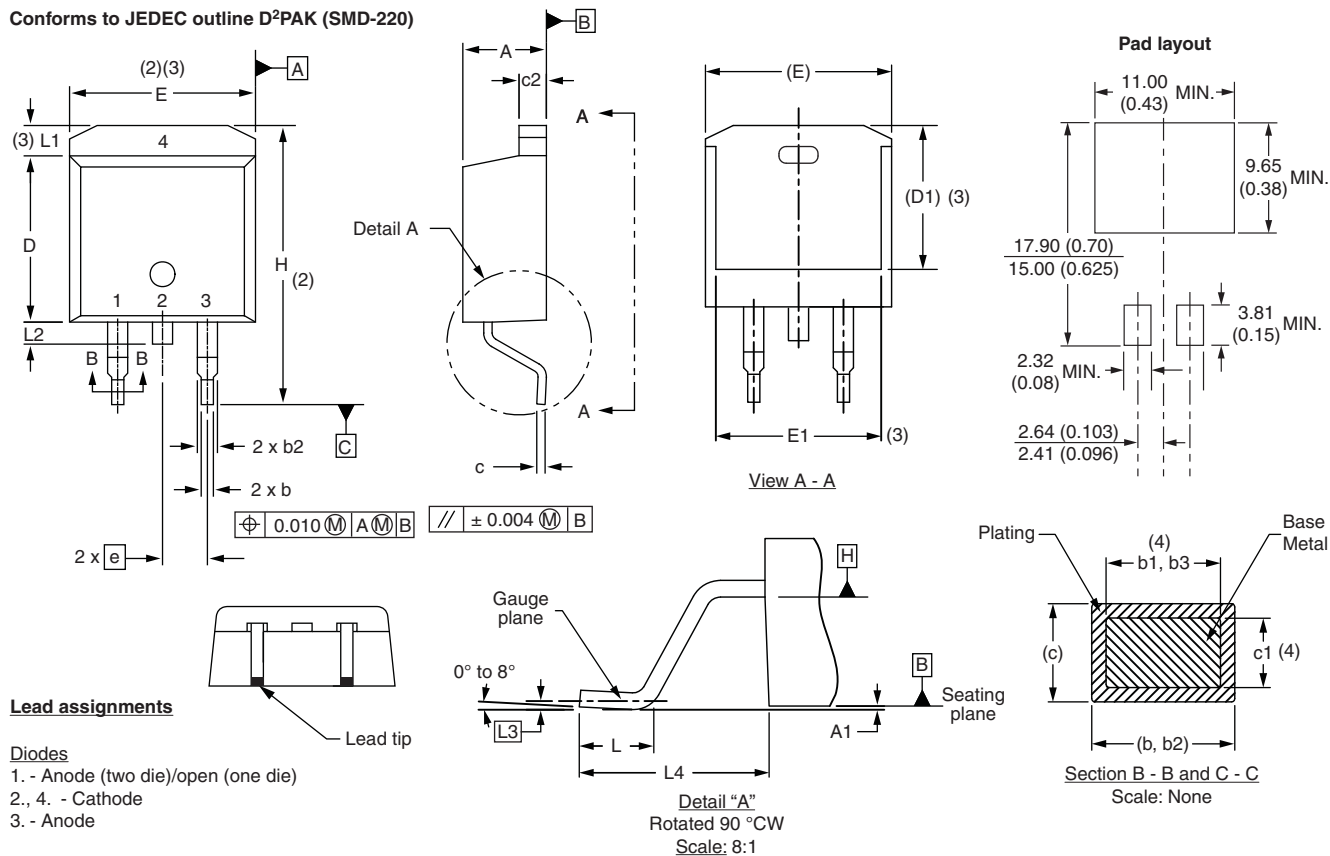
| |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95046 |
| Part marking information | www.vishay.com/doc?95054 |
| Packaging information | www.vishay.com/doc?95032 |

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | |
| b | 0.51 | 0.99 | 0.020 | 0.039 | |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.38 | 0.74 | 0.015 | 0.029 | |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 |

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| e | 2.54 BSC | | 0.100 BSC | | |
| H | 14.61 | 15.88 | 0.575 | 0.625 | |
| L | 1.78 | 2.79 | 0.070 | 0.110 | |
| L1 | - | 1.65 | - | 0.066 | 3 |
| L2 | 1.27 | 1.78 | 0.050 | 0.070 | |
| L3 | 0.25 BSC | | 0.010 BSC | | |
| L4 | 4.78 | 5.28 | 0.188 | 0.208 | |

Notes

- (1) Dimensioning and tolerancing per ASME Y14.5 M-1994
- (2) Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body
- (3) Thermal pad contour optional within dimension E, L1, D1 and E1
- (4) Dimension b1 and c1 apply to base metal only
- (5) Datum A and B to be determined at datum plane H
- (6) Controlling dimension: inch
- (7) Outline conforms to JEDEC outline TO-263AB



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