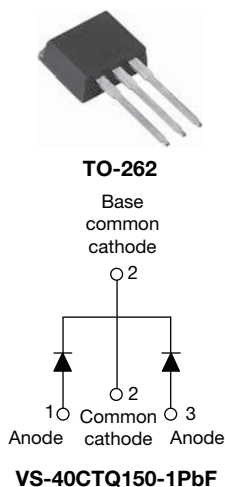
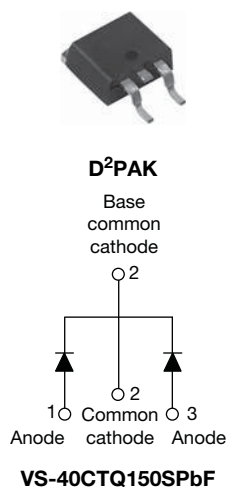


Schottky Rectifier, 2 x 20 A



FEATURES

- AEC-Q101 qualified
- Very low forward voltage drop
- Halogen-free according to IEC 61249-2-21 definition
- 175 °C T_J operation
- Center tap TO-220 package
- 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
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE

PRODUCT SUMMARY

| | |
|-----------------|----------------------------|
| Package | TO-262AA, TO-263AB (D²PAK) |
| $I_{F(AV)}$ | 2 x 20 A |
| V_R | 150 V |
| V_F at I_F | 0.71 V |
| I_{RM} | 15 mA at 125 °C |
| T_J max. | 175 °C |
| Diode variation | Common cathode |
| E_{AS} | 1 mJ |

DESCRIPTION

The VS-40CTQ... center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. 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 | 40 | A |
| V_{RRM} | | 150 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 1500 | A |
| V_F | 20 Apk, $T_J = 125$ °C (per leg) | 0.71 | V |
| T_J | | - 55 to 175 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-40CTQ150SPbF VS-40CTQ150-1PbF | UNITS |
|--------------------------------------|-----------|-------------------------------------|-------|
| Maximum DC reverse voltage | V_R | 150 | 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 $T_C = 140\text{ }^\circ\text{C}$, rectangular waveform | 20 | A |
| | | | 40 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 1500 | |
| | | 10 ms sine or 6 ms rect. pulse | 250 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25\text{ }^\circ\text{C}$, $I_{AS} = 1.5\text{ A}$, $L = 0.9\text{ mH}$ | 1.0 | mJ |
| Repetitive avalanche current per leg | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | 1.5 | A |

ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|---|----------------|--|--------|------------------|
| Maximum forward voltage drop per leg See fig. 1 | $V_{FM}^{(1)}$ | 20 A | 0.93 | V |
| | | 40 A | 1.16 | |
| | | 20 A | 0.71 | |
| | | 40 A | 0.85 | |
| Maximum reverse leakage current per leg See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | 50 | μA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | 15 | mA |
| Maximum junction capacitance per leg | C_T | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$ | 450 | 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/ 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 per leg | R _{thJC} | DC operation See fig. 4 | 1.5 | °C/W |
| Maximum thermal resistance, junction to case per package | | DC operation | 0.75 | |
| Typical thermal resistance, case to heatsink | R _{thCS} | Mounting surface, smooth and greased | 0.5 | |
| Approximate weight | | | 2 | g |
| | | | 0.07 | oz. |
| Mounting torque | minimum | Non-lubricated threads | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | 12 (10) | |
| Marking device | | Case style D ² PAK | 40CTQ150S | |
| | | Case style TO-262 | 40CTQ150-1 | |

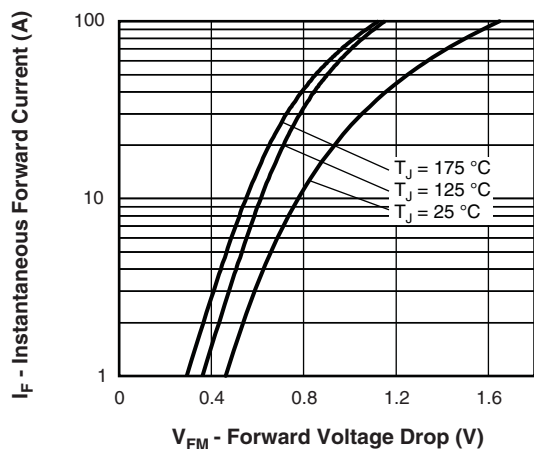


Fig. 1 - Maximum Forward Voltage Drop Characteristics

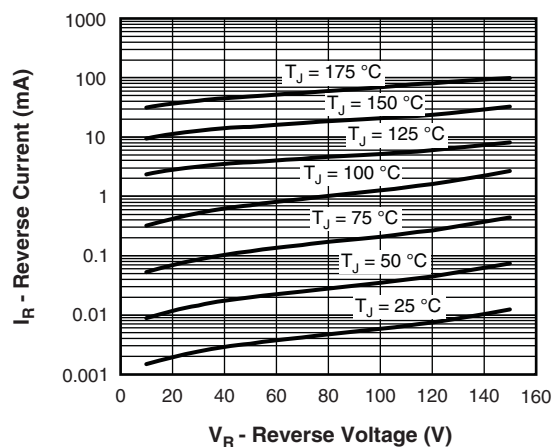


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

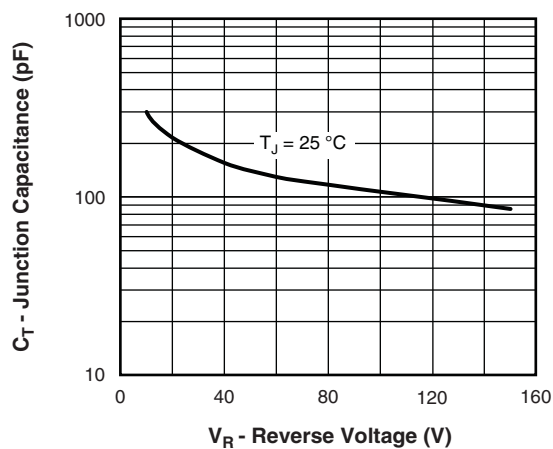


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

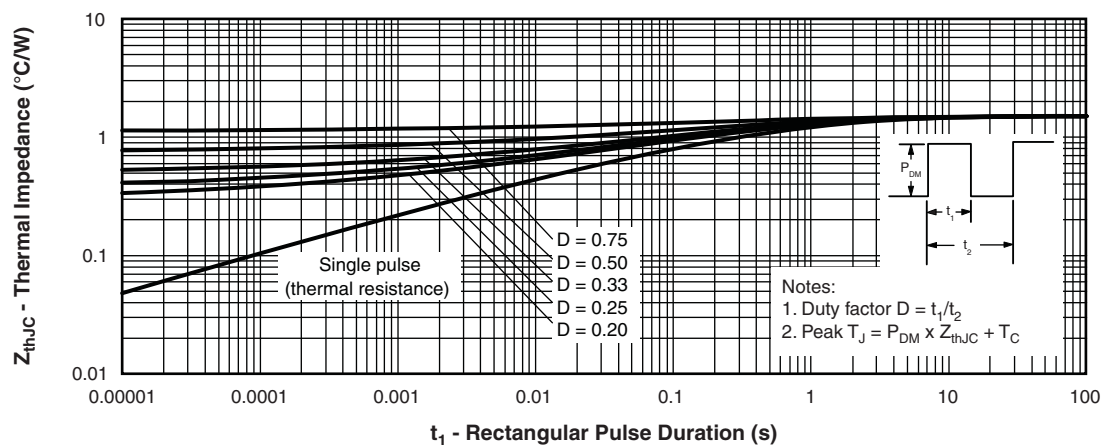


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

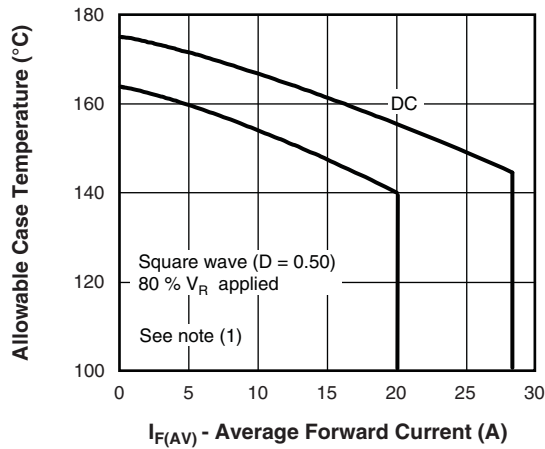


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

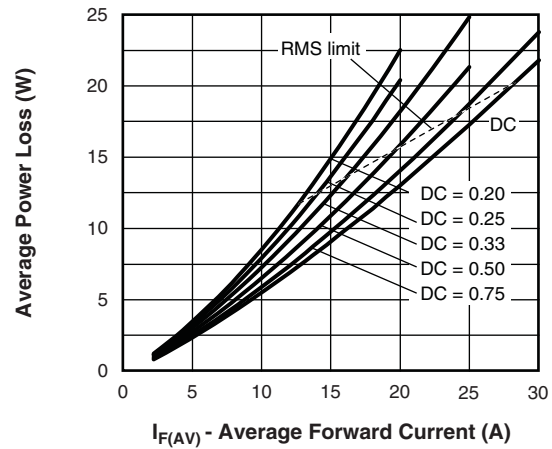


Fig. 6 - Forward Power Loss Characteristics

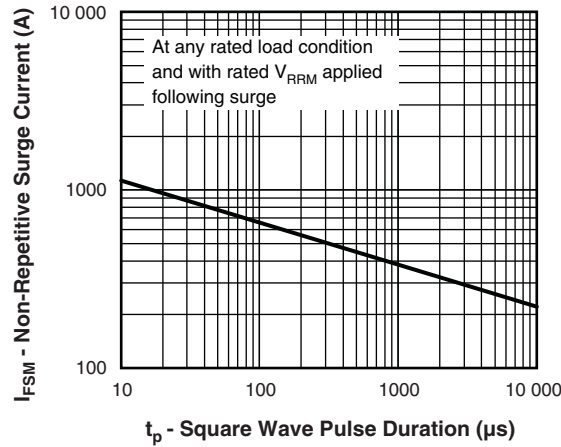


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

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 $V_{R1} = 80\% V_R$ applied



VS-40CTQ150SPbF, VS-40CTQ150-1PbF

Schottky Rectifier, 2 x 20 A

Vishay Semiconductors

ORDERING INFORMATION TABLE

| Device code | VS- | 40 | C | T | Q | 150 | S | TRL | PbF |
|-------------|-----|----|---|---|---|-----|---|-----|-----|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

- 1** - Vishay Semiconductors product
- 2** - Current rating (40 A)
- 3** - Circuit configuration:
C = Common cathode
- 4** - T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage rating (150 = 150 V)
- 7** -
 - S = D²PAK
 - -1 = TO-262
- 8** -
 - None = Tube (50 pieces)
 - TRL = Tape and reel (left oriented - for D²PAK only)
 - TRR = Tape and reel (right oriented - for D²PAK only)
- 9** - 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 |
| SPIICE model | www.vishay.com/doc?95434 |

D²PAK, TO-262

DIMENSIONS FOR D²PAK in millimeters and inches

Conforms to JEDEC outline D²PAK (SMD-220)



DIMENSIONS FOR TO-262 in millimeters and inches



| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | |
| A1 | 2.03 | 3.02 | 0.080 | 0.119 | |
| 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 |
| 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 | | |
| L | 13.46 | 14.10 | 0.530 | 0.555 | |
| L1 | - | 1.65 | - | 0.065 | 3 |
| L2 | 3.56 | 3.71 | 0.140 | 0.146 | |

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-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) Controlling dimension: inches

- (6) Outline conform to JEDEC TO-262 except A1 (maximum), b (minimum) and D1 (minimum) where dimensions derived the actual package outline



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