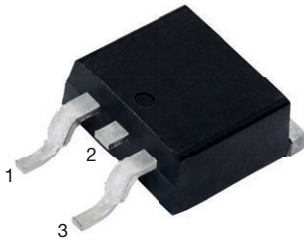
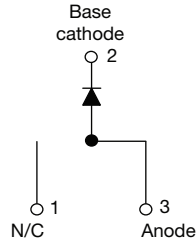


High Performance Schottky Rectifier, 15 A


D²PAK (TO-263AB)


FEATURES

- 150 °C T_J operation
- Very 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 245 °C
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


**RoHS
COMPLIANT
HALOGEN
FREE**

PRIMARY CHARACTERISTICS

| | |
|----------------------------------|-------------------------------|
| I _{F(AV)} | 15 A |
| V _R | 35 V, 40 V, 45 V |
| V _F at I _F | 0.50 V |
| I _{RM} typ. | 70 mA at 125 °C |
| T _J max. | 150 °C |
| E _{AS} | 16 mJ |
| Package | D ² PAK (TO-263AB) |
| Circuit configuration | Single |

DESCRIPTION

The VS-12TQ...S-M3 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 | 15 | A |
| V _{RRM} | Range | 35 to 45 | V |
| I _{FSM} | t _p = 5 μs sine | 990 | A |
| V _F | 15 A _{pk} , T _J = 125 °C | 0.50 | V |
| T _J | Range | -55 to +150 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-12TQ035S-M3 | VS-12TQ040S-M3 | VS-12TQ045S-M3 | 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 = 120 °C, rectangular waveform | 15 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 7 | I _{FSM} | 5 μs sine or 3 μs rect. pulse | 990 | A |
| | | 10 ms sine or 6 ms rect. pulse | 250 | |
| Non-repetitive avalanche energy | E _{AS} | T _J = 25 °C, I _{AS} = 2.4 A, L = 5.5 mH | 16 | 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 | 2.4 | A |



| ELECTRICAL SPECIFICATIONS | | | | | |
|--|----------------|--|-----------------------------------|--------|------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
| Maximum forward voltage drop See fig. 1 | $V_{FM}^{(1)}$ | 15 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.56 | V |
| | | 30 A | | 0.71 | |
| | | 15 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.50 | |
| | | 30 A | | 0.64 | |
| Maximum reverse leakage current | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 1.75 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 110 | |
| Typical reverse leakage current | $I_{RM}^{(1)}$ | $T_J = 125\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 70 | mA |
| Maximum junction capacitance | C_T | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz), $25\text{ }^\circ\text{C}$ | | 900 | 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/ μ s |

Note

(1) Pulse width < 300 μ 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 See fig. 4 | | 2.0 | $^\circ\text{C/W}$ |
| 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 (lb · in) |
| | maximum | | | 12 (10) | |
| Marking device | | Case style D ² PAK (TO-263AB) | | 12TQ030S 12TQ044S 12TQ045S | |

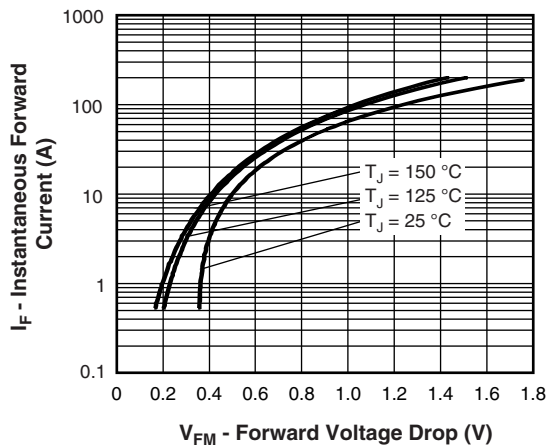


Fig. 1 - Maximum Forward Voltage Drop Characteristics

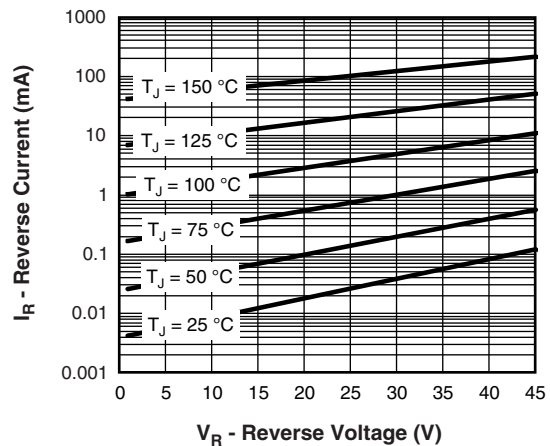


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

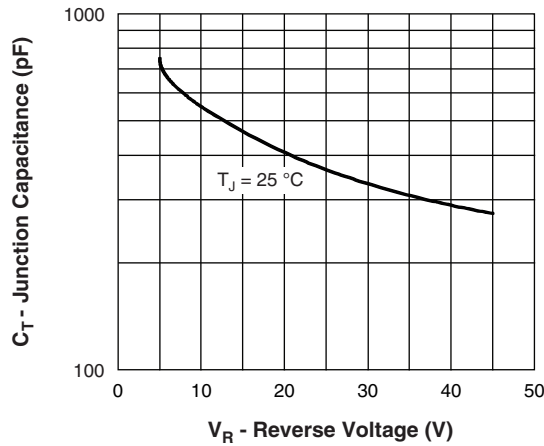


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

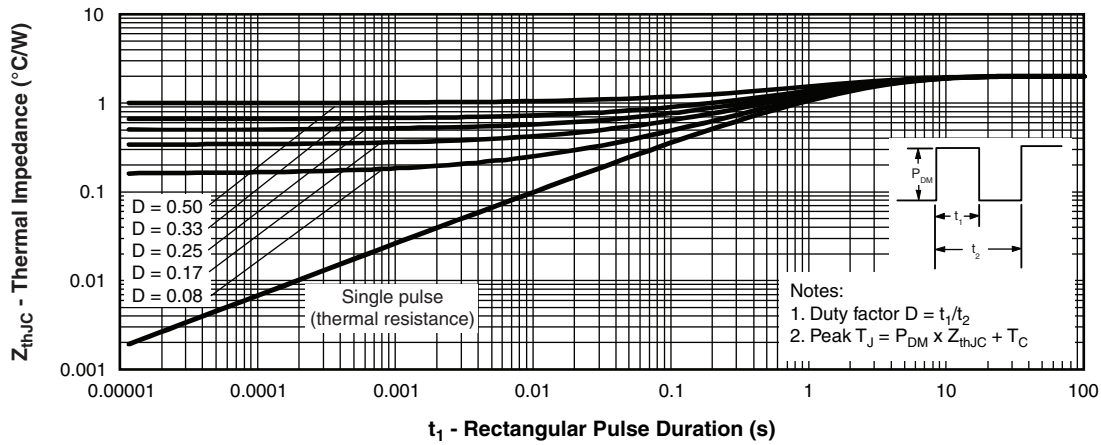


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

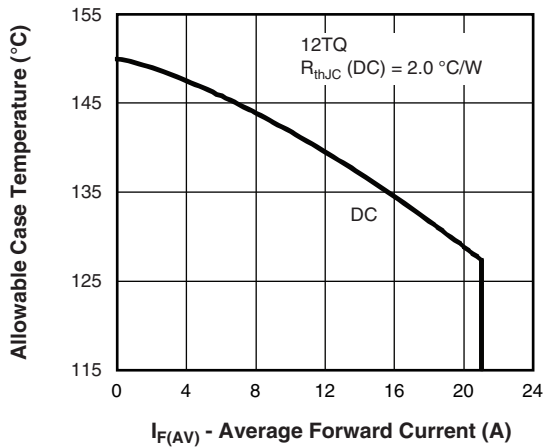


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

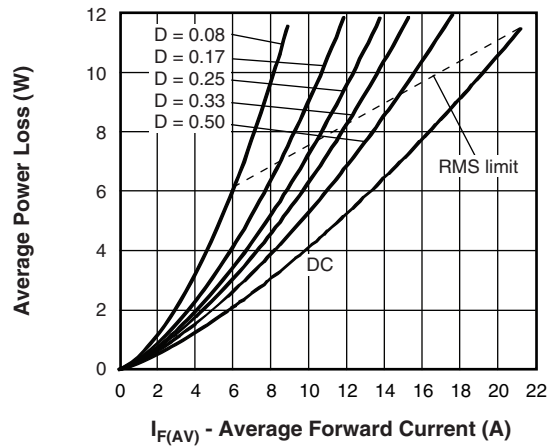


Fig. 6 - Forward Power Loss Characteristics

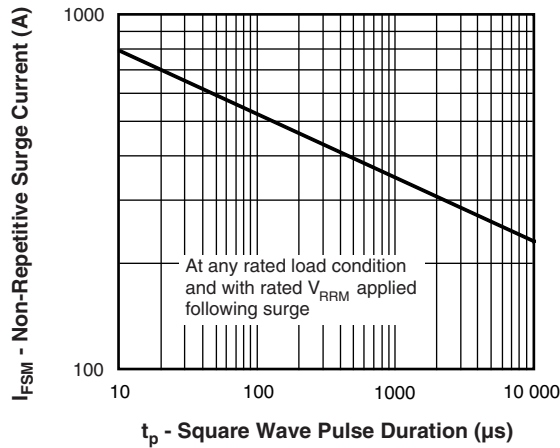


Fig. 7 - Maximum Non-Repetitive Surge Current

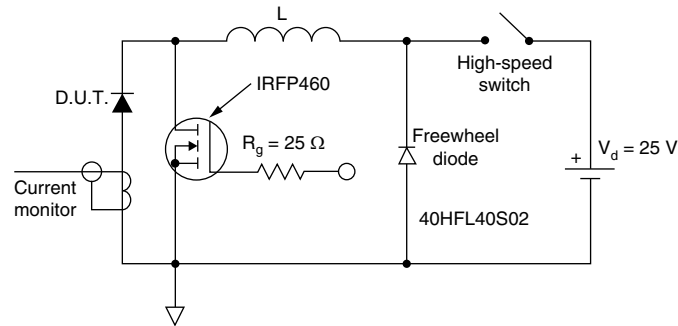
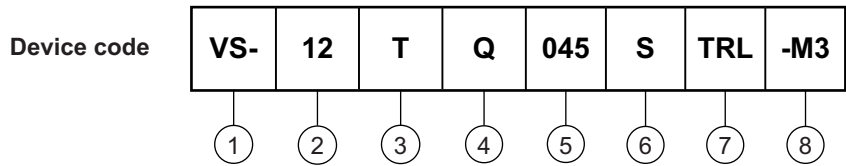


Fig. 8 - Unclamped Inductive Test Circuit



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating
- 3** - Package: T = TO-220
- 4** - Schottky "Q" series
- 5** - Voltage ratings

| |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |
- 6** - S = D²PAK (TO-263AB)
- 7** -
 - None = tube
 - TRL = tape and reel (left oriented)
 - TRR = tape and reel (right oriented)
- 8** - -M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| ORDERING INFORMATION | | |
|----------------------|---------------|------------------------------------|
| PREFERRED P/N | BASE QUANTITY | PACKAGING DESCRIPTION |
| VS-12TQ035S-M3 | 50 | Antistatic plastic tubes |
| VS-12TQ035STRL-M3 | 800 | 13" diameter plastic tape and reel |
| VS-12TQ035STRR-M3 | 800 | 13" diameter plastic tape and reel |
| VS-12TQ040S-M3 | 50 | Antistatic plastic tubes |
| VS-12TQ040STRL-M3 | 800 | 13" diameter plastic tape and reel |
| VS-12TQ040STRR-M3 | 800 | 13" diameter plastic tape and reel |
| VS-12TQ045S-M3 | 50 | Antistatic plastic tubes |
| VS-12TQ045STRL-M3 | 800 | 13" diameter plastic tape and reel |
| VS-12TQ045STRR-M3 | 800 | 13" diameter plastic tape and reel |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96164 |
| Part marking information | www.vishay.com/doc?95444 |
| Packaging information | www.vishay.com/doc?96424 |

D²PAK

DIMENSIONS in millimeters and inches

Conforms to JEDEC® outline D²PAK (SMD-220)



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.06 | 4.83 | 0.160 | 0.190 | | D1 | 6.86 | 8.00 | 0.270 | 0.315 | 3 |
| A1 | 0.00 | 0.254 | 0.000 | 0.010 | | E | 9.65 | 10.67 | 0.380 | 0.420 | 2, 3 |
| b | 0.51 | 0.99 | 0.020 | 0.039 | | E1 | 7.90 | 8.80 | 0.311 | 0.346 | 3 |
| b1 | 0.51 | 0.89 | 0.020 | 0.035 | 4 | e | 2.54 BSC | | 0.100 BSC | | |
| b2 | 1.14 | 1.78 | 0.045 | 0.070 | | H | 14.61 | 15.88 | 0.575 | 0.625 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 | L | 1.78 | 2.79 | 0.070 | 0.110 | |
| c | 0.38 | 0.74 | 0.015 | 0.029 | | L1 | - | 1.65 | - | 0.066 | 3 |
| c1 | 0.38 | 0.58 | 0.015 | 0.023 | 4 | L2 | 1.27 | 1.78 | 0.050 | 0.070 | |
| c2 | 1.14 | 1.65 | 0.045 | 0.065 | | L3 | 0.25 BSC | | 0.010 BSC | | |
| D | 8.51 | 9.65 | 0.335 | 0.380 | 2 | L4 | 4.78 | 5.28 | 0.188 | 0.208 | |

Notes

- Dimensioning and tolerancing per ASME Y14.5 M-1994
- 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
- Thermal pad contour optional within dimension E, L1, D1 and E1
- Dimension b1 and c1 apply to base metal only
- Datum A and B to be determined at datum plane H
- Controlling dimension: inch
- Outline conforms to JEDEC® outline TO-263AB



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