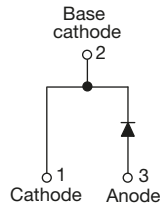




High Performance Schottky Rectifier, 15 A



2L TO-220AC



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
- 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

DESCRIPTION

The VS-12TQ... 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.

| 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} max. | 70 mA at 125 °C |
| T _J max. | 150 °C |
| E _{AS} | 16 mJ |
| Package | 2L TO-220AC |
| Circuit configuration | Single |

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|--|-------------|-------|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| I _{F(AV)} | Rectangular waveform | 15 | A |
| V _R | 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-12TQ035-M3 | VS-12TQ040-M3 | VS-12TQ045-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 | Following any rated load condition and with rated V _{RWM} applied | 990 | |
| | | 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 See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 1.75 | mA |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 70 | |
| Maximum junction capacitance | C_T | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °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 | °C |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation See fig. 4 | | 2.0 | °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 2L TO-220AC | | 12TQ035 | |
| | | | | 12TQ040 | |
| | | | | 12TQ045 | |

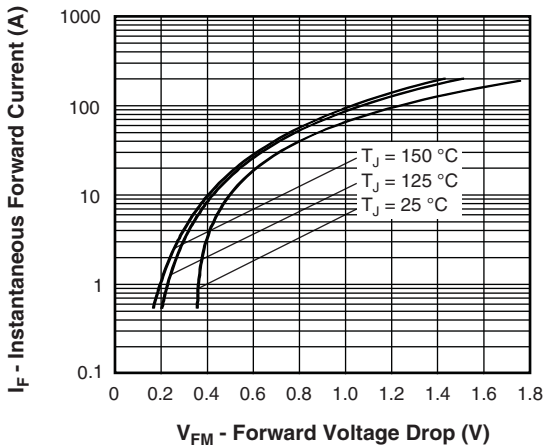


Fig. 1 - Maximum Forward Voltage Drop Characteristics

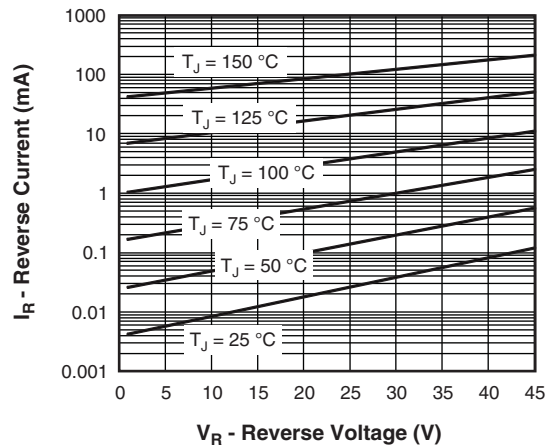


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

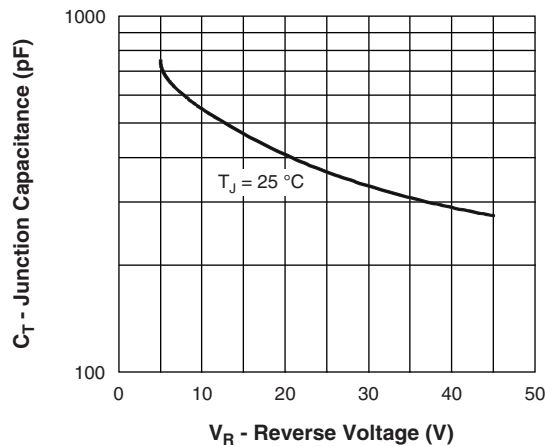


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

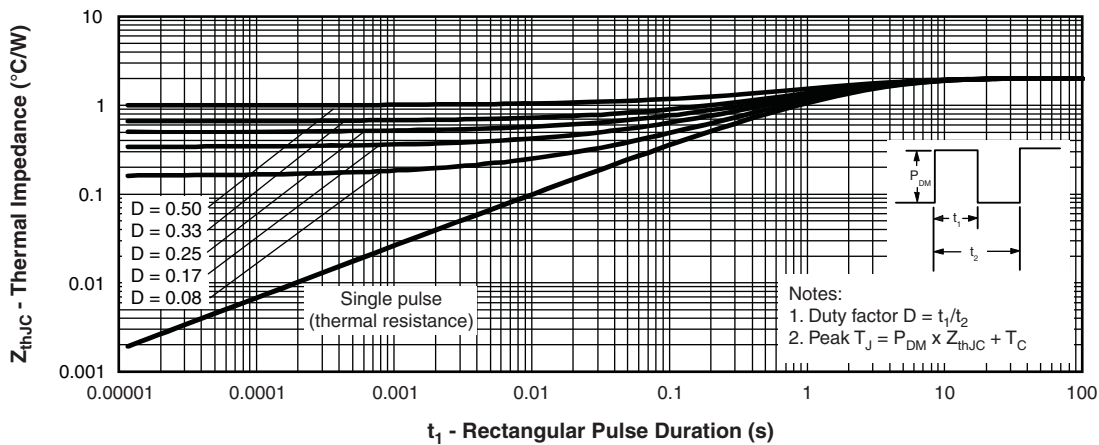


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

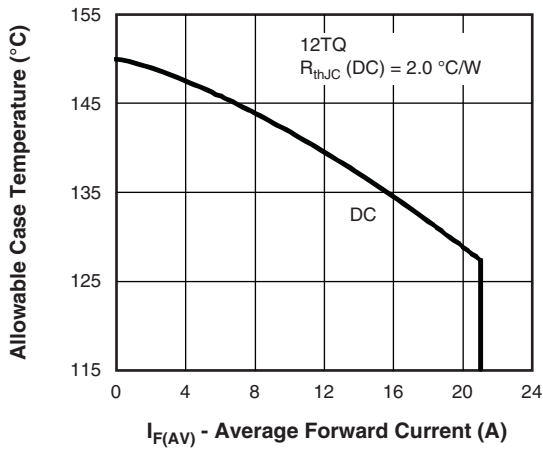


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

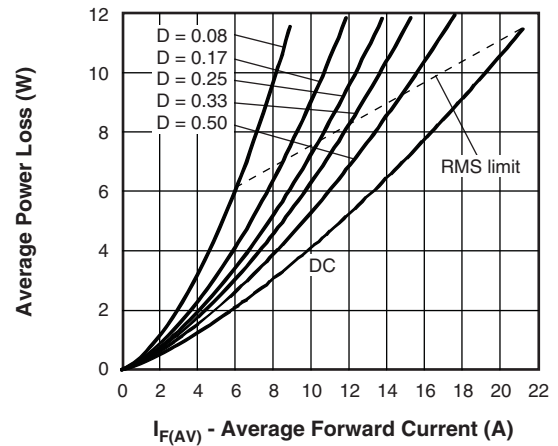


Fig. 6 - Forward Power Loss Characteristics

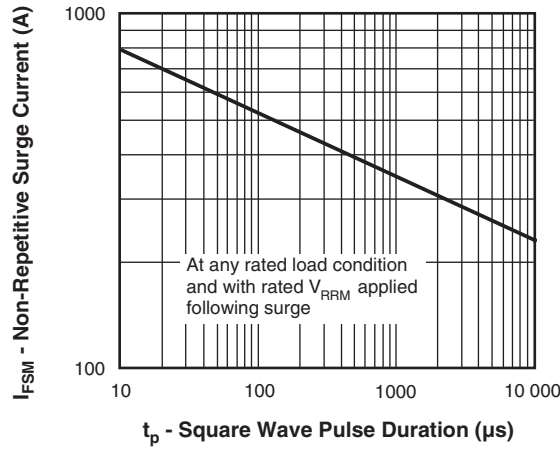


Fig. 7 - Maximum Non-Repetitive Surge Current

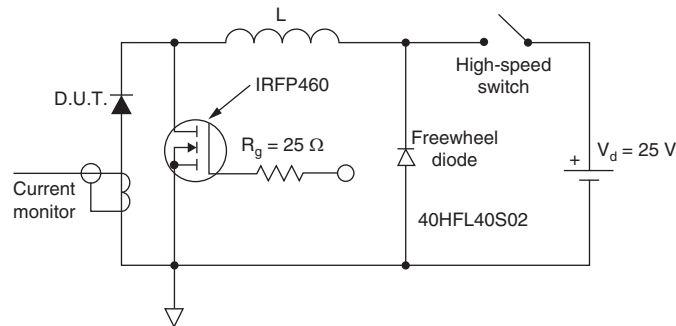
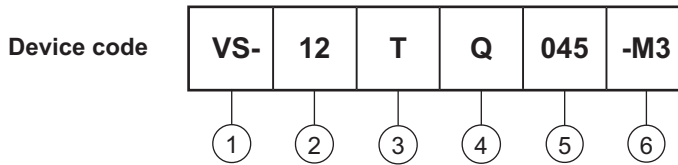


Fig. 8 - Unclamped Inductive Test Circuit



ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
 - 2** - Current rating (15 A)
 - 3** - Package:
T = TO-220
 - 4** - Schottky "Q" series
 - 5** - Voltage ratings
 - 6** - Environmental digit
- | |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |
- M3 = halogen-free, RoHS-compliant, and terminations lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-12TQ035-M3 | 50 | 1000 | Antistatic plastic tube |
| VS-12TQ040-M3 | 50 | 1000 | Antistatic plastic tube |
| VS-12TQ045-M3 | 50 | 1000 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96156 |
| Part marking information | www.vishay.com/doc?95391 |



2L TO-220AC

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AC

| SYMBOL | MILLIMETERS | | INCHES | | NOTES | SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | | | MIN. | MAX. | MIN. | MAX. | |
| A | 4.25 | 4.65 | 0.167 | 0.183 | | D2 | 11.68 | 12.88 | 0.460 | 0.507 | 6 |
| A1 | 1.14 | 1.40 | 0.045 | 0.055 | | E | 10.11 | 10.51 | 0.398 | 0.414 | 3, 6 |
| A2 | 2.50 | 2.92 | 0.098 | 0.115 | | E1 | 6.86 | 8.89 | 0.270 | 0.350 | 6 |
| b | 0.69 | 1.01 | 0.027 | 0.040 | | e | 2.41 | 2.67 | 0.095 | 0.105 | |
| b1 | 0.38 | 0.97 | 0.015 | 0.038 | 4 | e1 | 4.88 | 5.28 | 0.192 | 0.208 | |
| b2 | 1.20 | 1.73 | 0.047 | 0.068 | | H1 | 6.09 | 6.48 | 0.240 | 0.255 | 6, 7 |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 | L | 13.52 | 14.02 | 0.532 | 0.552 | |
| c | 0.36 | 0.61 | 0.014 | 0.024 | | L1 | 3.32 | 3.82 | 0.131 | 0.150 | 2 |
| c1 | 0.36 | 0.56 | 0.014 | 0.022 | 4 | ∅ P | 3.54 | 3.91 | 0.139 | 0.154 | |
| D | 14.85 | 15.35 | 0.585 | 0.604 | 3 | Q | 2.60 | 3.00 | 0.102 | 0.118 | |
| D1 | 8.38 | 9.02 | 0.330 | 0.355 | | | | | | | |

Notes

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, 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 outermost extremes of the plastic body
- (4) Dimension b1, b3, and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2 (minimum)



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