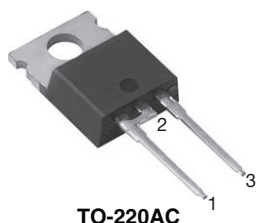
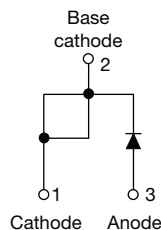




High Performance Schottky Rectifier, 10 A



TO-220AC



FEATURES

- 175 °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
- Meet JESD 201 class 2 whisker test
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

PRIMARY CHARACTERISTICS

| | |
|-----------------------|------------------|
| $I_{F(AV)}$ | 10 A |
| V_R | 35 V, 40 V, 45 V |
| V_F at I_F | 0.49 V |
| I_{RM} | 15 mA at 125 °C |
| T_J max. | 175 °C |
| E_{AS} | 13 mJ |
| Package | TO-220AC |
| Circuit configuration | Single |

DESCRIPTION

The VS-10TQ... 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 | 10 | A |
| V_{RRM} | | 35/45 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 1050 | A |
| V_F | 10 A _{pk} , $T_J = 125$ °C | 0.49 | V |
| T_J | Range | -55 to +175 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-10TQ035HN3 | VS-10TQ040HN3 | VS-10TQ045HN3 | 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 $T_C = 151$ °C, rectangular waveform | 10 | A |
| Maximum peak one cycle non-repetitive surge current See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 1050 | |
| | | 10 ms sine or 6 ms rect. pulse | 280 | |
| Non-repetitive avalanche energy | E_{AS} | $T_J = 25$ °C, $I_{AS} = 2$ A, $L = 6.5$ mH | 13 | 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 | 2 | A |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
|---|--------------------------------|---|---------------------------------------|--------|-------|
| Maximum forward voltage drop See fig. 1 | V _{FM} ⁽¹⁾ | 10 A | T _J = 25 °C | 0.57 | V |
| | | 20 A | | 0.67 | |
| | | 10 A | T _J = 125 °C | 0.49 | |
| | | 20 A | | 0.61 | |
| Maximum reverse leakage current See fig. 2 | I _{RM} ⁽¹⁾ | T _J = 25 °C | V _R = Rated V _R | 2 | mA |
| | | T _J = 125 °C | | 15 | |
| Maximum junction capacitance | C _T | V _R = 5 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/μs |

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 +175 | °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 TO-220AC | 10TQ035H | |
| | | | 10TQ040H | |
| | | | 10TQ045H | |

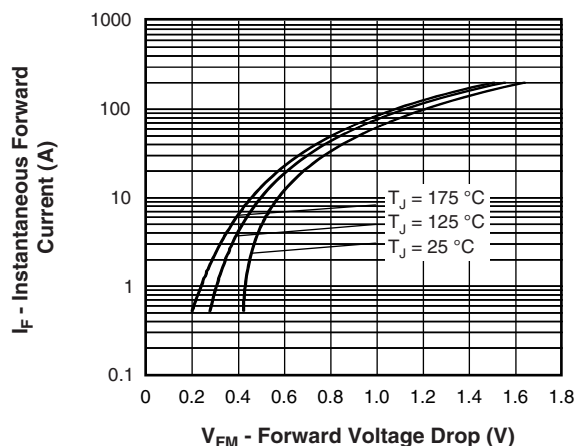


Fig. 1 - Maximum Forward Voltage Drop Characteristics

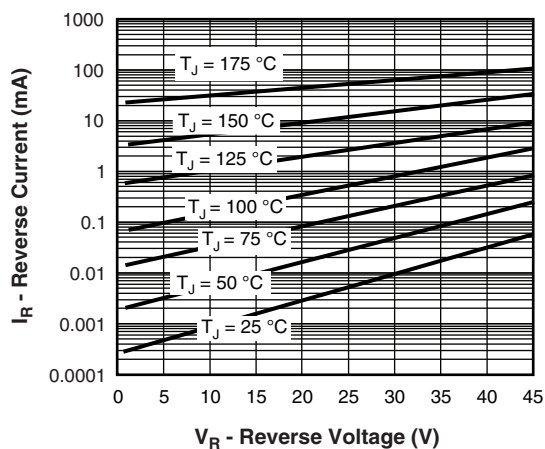


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

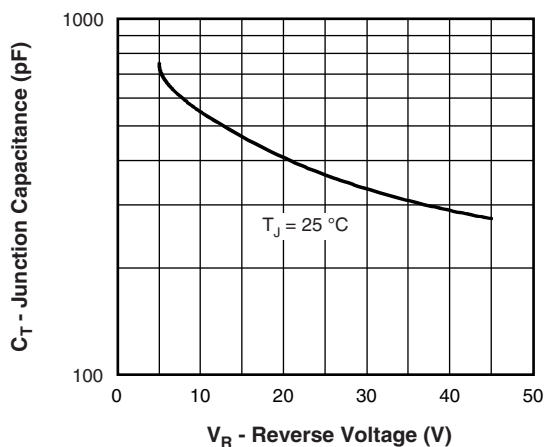


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

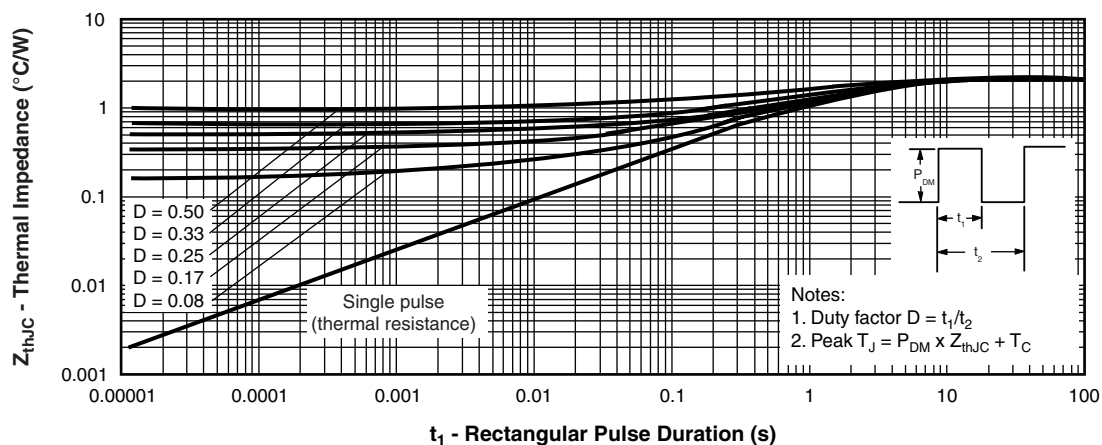


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

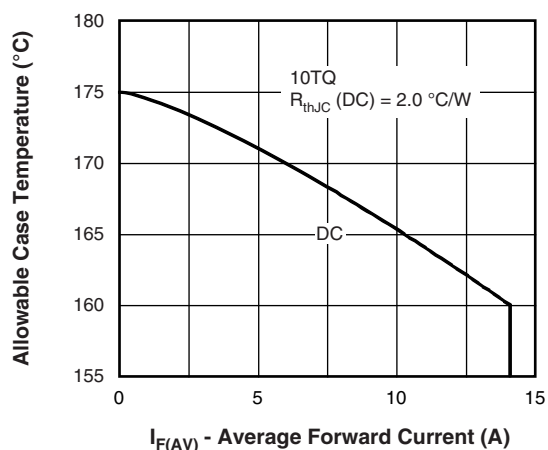


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

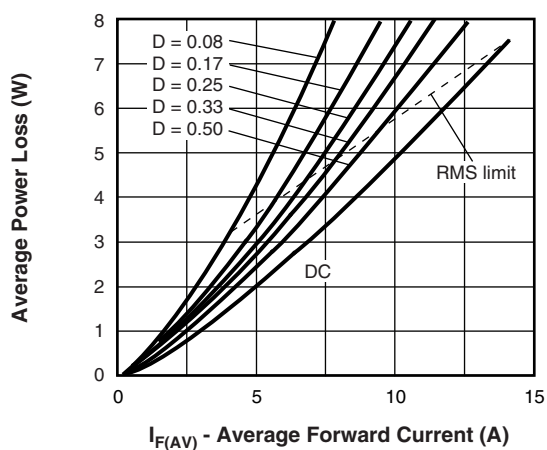


Fig. 6 - Forward Power Loss Characteristics

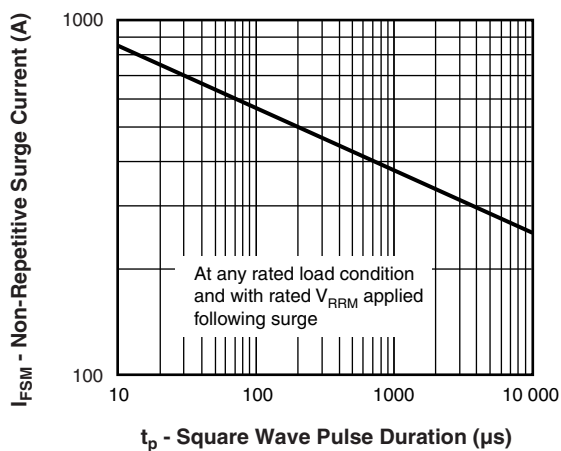


Fig. 7 - Maximum Non-Repetitive Surge Current

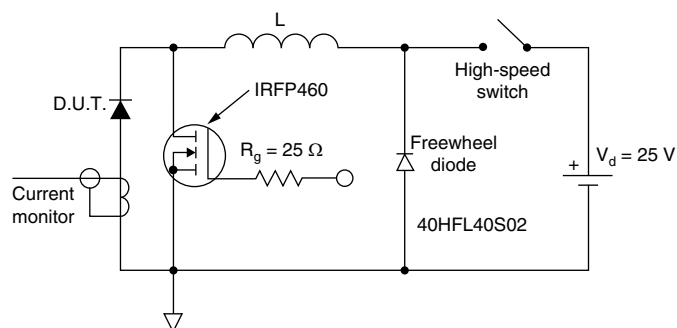


Fig. 8 - Unclamped Inductive Test Circuit



ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|-----|----|---|---|-----|---|----|
| Device code | VS- | 10 | T | Q | 045 | H | N3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

- | | | | |
|----------|---|---|------------|
| 1 | - | Vishay Semiconductors product | |
| 2 | - | Current rating (10 = 10 A) | |
| 3 | - | Package: | |
| | | T = TO-220 | |
| 4 | - | Schottky "Q" series | |
| 5 | - | Voltage ratings | 035 = 35 V |
| 6 | - | H = AEC-Q101 qualified | 040 = 40 V |
| 7 | - | Environmental digit | 045 = 45 V |
| | | • N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free | |

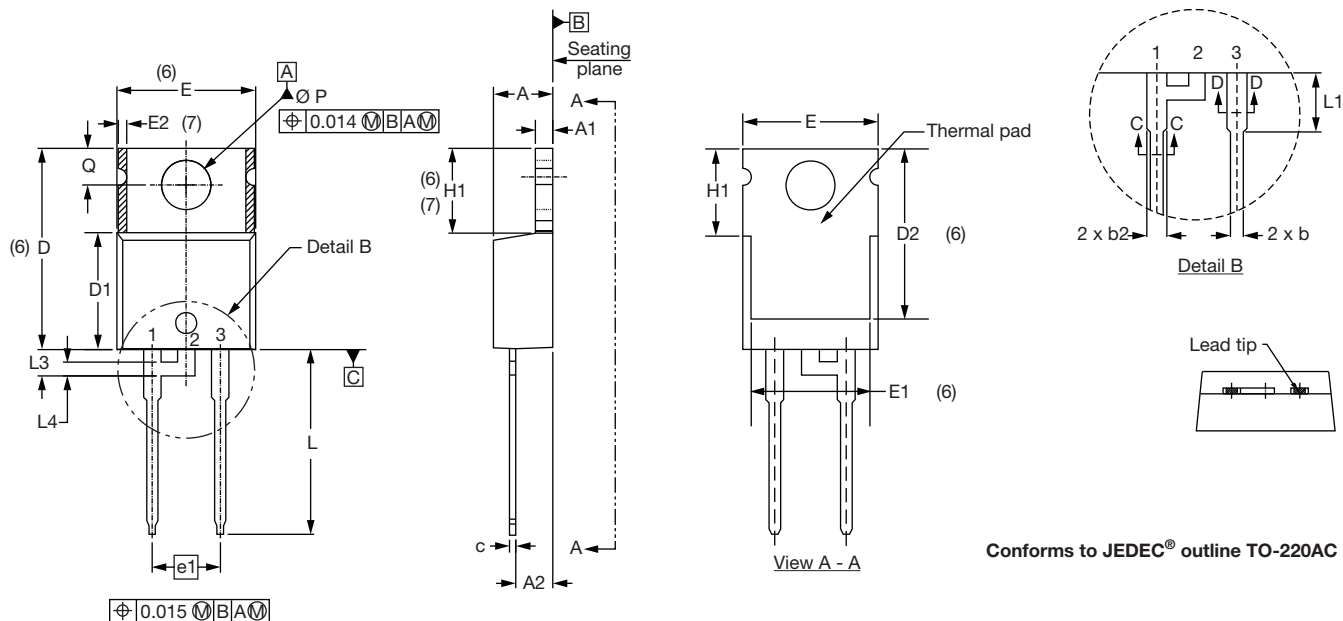
| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-10TQ035HN3 | 50 | 1000 | Antistatic plastic tube |
| VS-10TQ040HN3 | 50 | 1000 | Antistatic plastic tube |
| VS-10TQ045HN3 | 50 | 1000 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95221 |
| Part marking information | www.vishay.com/doc?95068 |



TO-220AC

DIMENSIONS in millimeters and inches



Conforms to JEDEC® outline TO-220AC

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| A | 4.25 | 4.65 | 0.167 | 0.183 | |
| A1 | 1.14 | 1.40 | 0.045 | 0.055 | |
| A2 | 2.56 | 2.92 | 0.101 | 0.115 | |
| b | 0.69 | 1.01 | 0.027 | 0.040 | |
| b1 | 0.38 | 0.97 | 0.015 | 0.038 | 4 |
| b2 | 1.20 | 1.73 | 0.047 | 0.068 | |
| b3 | 1.14 | 1.73 | 0.045 | 0.068 | 4 |
| c | 0.36 | 0.61 | 0.014 | 0.024 | |
| c1 | 0.36 | 0.56 | 0.014 | 0.022 | 4 |
| D | 14.85 | 15.25 | 0.585 | 0.600 | 3 |
| D1 | 8.38 | 9.02 | 0.330 | 0.355 | |
| D2 | 11.68 | 12.88 | 0.460 | 0.507 | 6 |
| E | 10.11 | 10.51 | 0.398 | 0.414 | 3, 6 |

| SYMBOL | MILLIMETERS | | INCHES | | NOTES |
|--------|-------------|-------|--------|-------|-------|
| | MIN. | MAX. | MIN. | MAX. | |
| E1 | 6.86 | 8.89 | 0.270 | 0.350 | 6 |
| E2 | - | 0.76 | - | 0.030 | 7 |
| e1 | 4.88 | 5.28 | 0.192 | 0.208 | |
| H1 | 5.84 | 6.86 | 0.230 | 0.270 | 6, 7 |
| L | 13.52 | 14.02 | 0.532 | 0.552 | |
| L1 | 3.32 | 3.82 | 0.131 | 0.150 | 2 |
| L3 | 1.78 | 2.13 | 0.070 | 0.084 | |
| L4 | 0.76 | 1.27 | 0.030 | 0.050 | 2 |
| Ø P | 3.54 | 3.73 | 0.139 | 0.147 | |
| Q | 2.60 | 3.00 | 0.102 | 0.118 | |

Notes

- Dimensioning and tolerancing as per ASME Y14.5M-1994
- Lead dimension and finish uncontrolled in L1
- 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
- Dimension b1, b3 and c1 apply to base metal only
- Controlling dimension: inches
- Thermal pad contour optional within dimensions E, H1, D2 and E1
- Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
- Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline



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