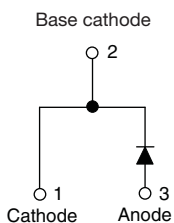


# High Performance Schottky Rectifier, 19 A



## FEATURES

- 125 °C  $T_J$  operation ( $V_R < 5$  V)
- Optimized for OR-ing applications
- Ultralow forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
FREE

## PRIMARY CHARACTERISTICS

|                       |                  |
|-----------------------|------------------|
| $I_{F(AV)}$           | 19 A             |
| $V_R$                 | 15 V             |
| $V_F$ at $I_F$        | 0.32 V           |
| $I_{RM}$ max.         | 522 mA at 100 °C |
| $T_J$ max.            | 125 °C           |
| $E_{AS}$              | 6.75 mJ          |
| Package               | 2L TO-220AC      |
| Circuit configuration | Single           |

## DESCRIPTION

The VS-19TQ015... Schottky rectifier has been optimized for ultralow forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary barrier technology allows for reliable operation up to 125 °C junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

## MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL      | CHARACTERISTICS                    | VALUES      | UNITS |
|-------------|------------------------------------|-------------|-------|
| $I_{F(AV)}$ | Rectangular waveform               | 19          | A     |
| $V_{RRM}$   |                                    | 15          | V     |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine               | 700         | A     |
| $V_F$       | 19 A <sub>pk</sub> , $T_J = 75$ °C | 0.32        | V     |
| $T_J$       | Range                              | -55 to +125 | °C    |

## VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | VS-19TQ015-M3 | UNITS |
|--------------------------------------|-----------|---------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 15            | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |               |       |

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER  | SYMBOL      | TEST CONDITIONS   | VALUES | UNITS |
|--|-------------|---|--------|-------|
| Maximum average forward current<br>See fig. 5                        | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 80$ °C, rectangular waveform  | 19     | A     |
| Maximum peak one cycle<br>non-repetitive surge current<br>See fig. 7 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse   | 700    |       |
|  |             | 10 ms sine or 6 ms rect. pulse  | 330    |       |
| Non-repetitive avalanche energy                                      | $E_{AS}$    | $T_J = 25$ °C, $I_{AS} = 1.50$ A, $L = 6$ mH  | 6.75   | mJ    |
| Repetitive avalanche current   | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu s$<br>Frequency limited by $T_J$ maximum $V_A = 3 \times V_R$ typical | 1.50   | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                     | SYMBOL         | TEST CONDITIONS   |                                    | VALUES | UNITS      |
|---|----------------|---|------------------------------------|--------|------------|
| Maximum forward voltage drop<br>See fig. 1    | $V_{FM}^{(1)}$ | 19 A  | $T_J = 25\text{ }^{\circ}\text{C}$ | 0.36   | V          |
|   |                | 38 A  |                                    | 0.46   |            |
|   |                | 19 A  | $T_J = 75\text{ }^{\circ}\text{C}$ | 0.32   |            |
|   |                | 38 A  |                                    | 0.43   |            |
| Maximum reverse leakage current<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 100\text{ }^{\circ}\text{C}, V_R = 12\text{ V}$                                    |                                    | 465    | mA         |
|   |                | $T_J = 100\text{ }^{\circ}\text{C}, V_R = 5\text{ V}$                                     |                                    | 285    |            |
|   |                | $T_J = 25\text{ }^{\circ}\text{C}$  | $V_R = \text{Rated } V_R$          | 10.5   |            |
|   |                | $T_J = 100\text{ }^{\circ}\text{C}$   |                                    | 522    |            |
| Maximum junction capacitance                  | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                    | 2000   | 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/ $\mu$ s |

**Note**

<sup>(1)</sup> Pulse width < 300  $\mu$ s, duty cycle < 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                    | SYMBOL            | TEST CONDITIONS                      | VALUES     | UNITS                  |
|--|-------------------|--------------------------------------|------------|------------------------|
| Maximum junction temperature range           | T <sub>J</sub>    |                                      | -55 to 125 | °C                     |
| Maximum storage temperature range            | T <sub>Stg</sub>  |                                      | -55 to 150 |                        |
| Maximum thermal resistance, junction to case | R <sub>thJC</sub> | DC operation<br>See fig. 4           | 1.50       | °C/W                   |
| Typical thermal resistance, case to heatsink | R <sub>thCS</sub> | Mounting surface, smooth and greased | 0.50       |                        |
| Approximate weight                           |                   |                                      | 2          | g                      |
|  |                   |                                      | 0.07       | oz.                    |
| Mounting torque                              | minimum           |                                      | 6 (5)      | kgf · cm<br>(lbf · in) |
|  | maximum           |                                      | 12 (10)    |                        |
| Marking device                               |                   | Case style 2L TO-220AC               | 19TQ015    |                        |

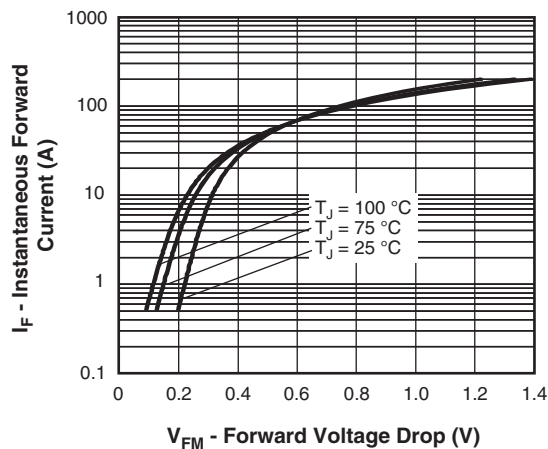


Fig. 1 - Maximum Forward Voltage Drop Characteristics

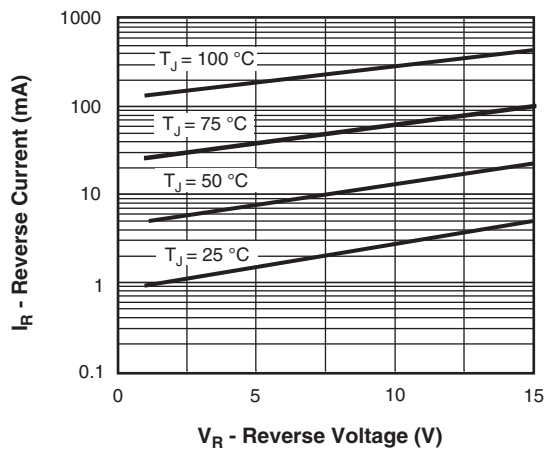


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

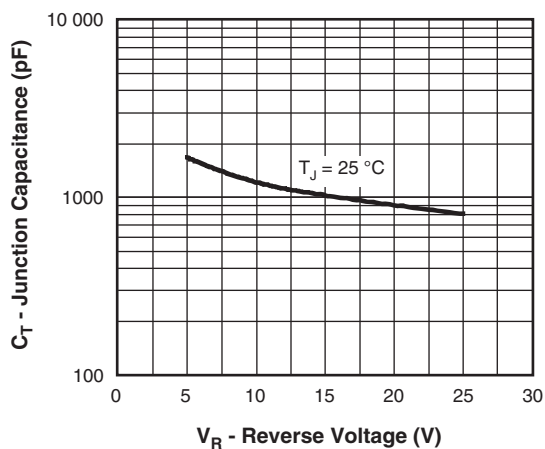


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

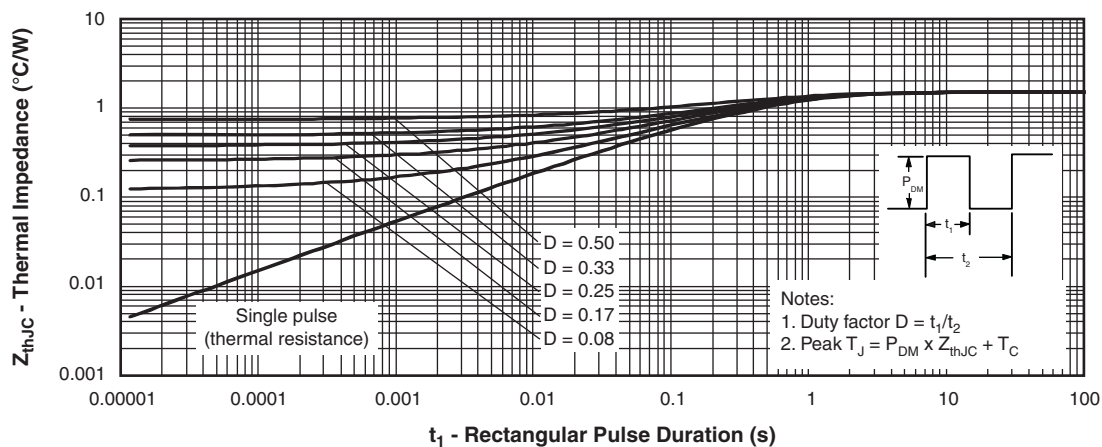


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

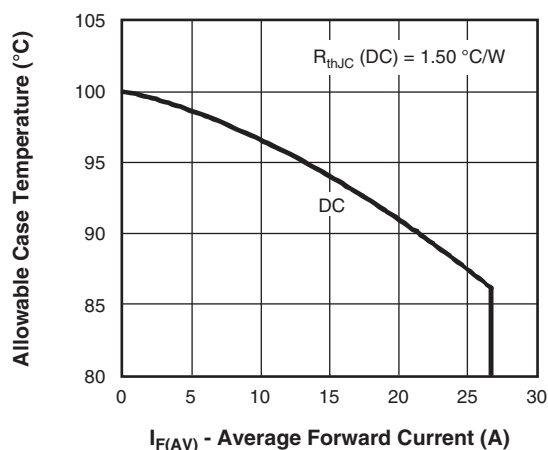


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

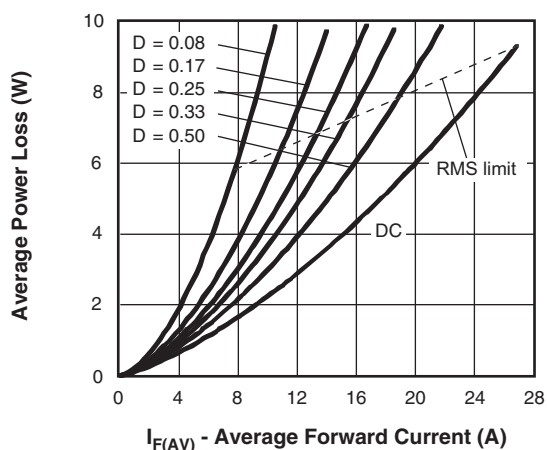


Fig. 6 - Forward Power Loss Characteristics

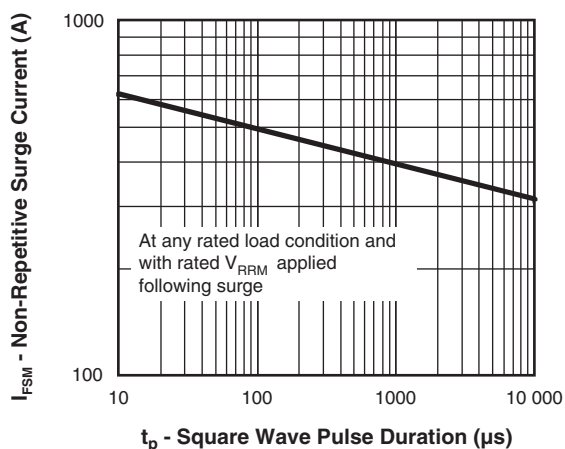


Fig. 7 - Maximum Non-Repetitive Surge Current

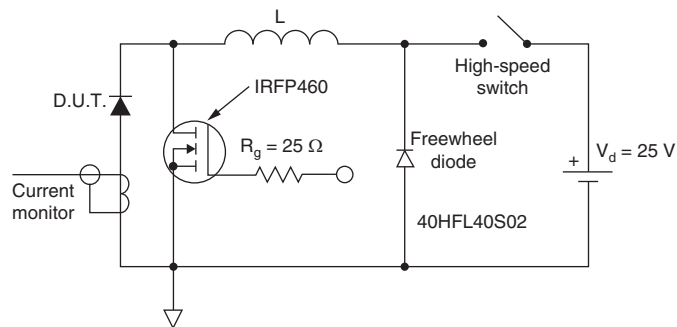


Fig. 8 - Unclamped Inductive Test Circuit



**ORDERING INFORMATION TABLE**

|             |            |           |          |          |            |            |
|-------------|------------|-----------|----------|----------|------------|------------|
| Device code | <b>VS-</b> | <b>19</b> | <b>T</b> | <b>Q</b> | <b>015</b> | <b>-M3</b> |
|             | 1          | 2         | 3        | 4        | 5          | 6          |

- 1** - Vishay Semiconductors product
- 2** - Current rating (19 = 19 A)
- 3** - Package:  
T = TO-220
- 4** - Schottky "Q" series
- 5** - Voltage rating (015 = 15 V)
- 6** - Environmental digit  
-M3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

| <b>ORDERING INFORMATION</b> (Example) |                  |                        |                         |
|---------------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N                         | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-19TQ015-M3                         | 50               | 1000                   | Antistatic plastic tube |

| <b>LINKS TO RELATED DOCUMENTS</b> |  |
|-----------------------------------|--|
| Dimensions                        | <a href="http://www.vishay.com/doc?96156">www.vishay.com/doc?96156</a> |
| Part marking information          | <a href="http://www.vishay.com/doc?95391">www.vishay.com/doc?95391</a> |
| SPICE model                       | <a href="http://www.vishay.com/doc?96005">www.vishay.com/doc?96005</a> |

### TO-220AC

**DIMENSIONS** in millimeters and inches



| 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     |
| e      | 2.41        | 2.67  | 0.095      | 0.105 |       |
| e1     | 4.88        | 5.28  | 0.192      | 0.208 |       |
| H1     | 6.09        | 6.48  | 0.240      | 0.255 | 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 |       |
| θ      | 90° to 93°  |       | 90° to 93° |       |       |

#### 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 dimension: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2 and E1
- (7) Dimension E2 x H1 define a zone where stamping and singulation irregularities are allowed
- (8) Outline conforms to JEDEC TO-220, D2 (minimum) where dimensions are derived from the actual package outline



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