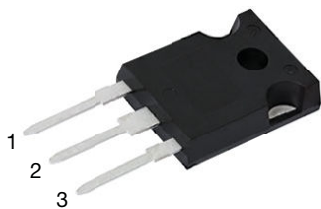
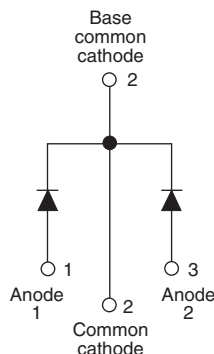


## High Performance Schottky Rectifier, 2 x 40 A


**TO-247AC 3L**


### FEATURES

- 175 °C T<sub>J</sub> 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
- 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 <sub>F(AV)</sub>               | 2 x 40 A        |
| V <sub>R</sub>                   | 150 V           |
| V <sub>F</sub> at I <sub>F</sub> | 0.71 V          |
| I <sub>RM</sub> max.             | 26 mA at 125 °C |
| T <sub>J</sub> max.              | 175 °C          |
| E <sub>AS</sub>                  | 0.5 mJ          |
| Package                          | TO-247AC 3L     |
| Circuit configuration            | Common cathode  |

### DESCRIPTION

The VS-80CPQ150... center tap 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 <sub>F(AV)</sub> | Rectangular waveform                                   | 80          | A     |
| V <sub>RRM</sub>   |                                                        | 150         | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine                             | 1930        | A     |
| V <sub>F</sub>     | 40 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg) | 0.71        | V     |
| T <sub>J</sub>     |                                                        | -55 to +175 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | VS-80CPQ150-N3 | UNITS |
|--------------------------------------|------------------|----------------|-------|
| Maximum DC reverse voltage           | V <sub>R</sub>   | 150            | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                               | SYMBOL             | TEST CONDITIONS                                                                                                                        | VALUES      | UNITS |
|-------------------------------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|
| Maximum average forward current, see fig. 5                             | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 150 °C, rectangular waveform                                                                       | 40<br>80    | A     |
| Maximum peak one cycle non-repetitive surge current per leg, see fig. 7 | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse<br>10 ms sine or 6 ms rect. pulse                                                                        | 1930<br>500 | A     |
| Non-repetitive avalanche energy per leg                                 | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 1.0 A, L = 1 mH                                                                              | 0.5         | mJ    |
| Repetitive avalanche current per leg                                    | I <sub>AR</sub>    | Current decaying linearly to zero in 1 μs<br>Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical | 1.0         | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                             | SYMBOL         | TEST CONDITIONS                                                                           |                                     | TYP. | MAX.   | UNITS            |
|-------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------|-------------------------------------|------|--------|------------------|
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 40 A                                                                                      | $T_J = 25\text{ }^{\circ}\text{C}$  | 0.82 | 0.86   | V                |
|                                                       |                | 80 A                                                                                      |                                     | 0.97 | 1.09   |                  |
|                                                       |                | 40 A                                                                                      | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.67 | 0.71   |                  |
|                                                       |                | 80 A                                                                                      |                                     | 0.80 | 0.85   |                  |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}$       | $T_J = 25\text{ }^{\circ}\text{C}$                                                        | $V_R = \text{Rated } V_R$           | 10   | 200    | $\mu\text{A}$    |
|                                                       |                | $T_J = 125\text{ }^{\circ}\text{C}$                                                       |                                     | 12   | 26     | mA               |
| Typical junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                     | -    | 1100   | pF               |
| Typical series inductance per leg                     | $L_S$          | Measured lead to lead 5 mm from package body                                              |                                     | -    | 7.5    | nH               |
| Maximum voltage rate of change                        | dV/dt          | Rated $V_R$                                                                               |                                     | -    | 10 000 | V/ $\mu\text{s}$ |

**Note**(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                                | SYMBOL                            | TEST CONDITIONS                      | VALUES     | UNITS                  |
|----------------------------------------------------------|-----------------------------------|--------------------------------------|------------|------------------------|
| Maximum junction and storage temperature range           | T <sub>J</sub> , T <sub>Stg</sub> |                                      | -55 to 175 | °C                     |
| Maximum thermal resistance, junction to case per leg     | R <sub>thJC</sub>                 | DC operation<br>See fig. 4           | 0.6        | °C/W                   |
| Maximum thermal resistance, junction to case per package |                                   | DC operation                         | 0.3        |                        |
| Typical thermal resistance, case to heatsink             | R <sub>thCS</sub>                 | Mounting surface, smooth and greased | 0.24       |                        |
| Approximate weight                                       |                                   |                                      | 6          | g                      |
|                                                          |                                   |                                      | 0.21       | oz.                    |
| Mounting torque                                          | minimum                           |                                      | 6 (5)      | kgf · cm<br>(lbf · in) |
|                                                          | maximum                           |                                      | 12 (10)    |                        |
| Marking device                                           |                                   | Case style TO-247AC 3L               | 80CPQ150   |                        |

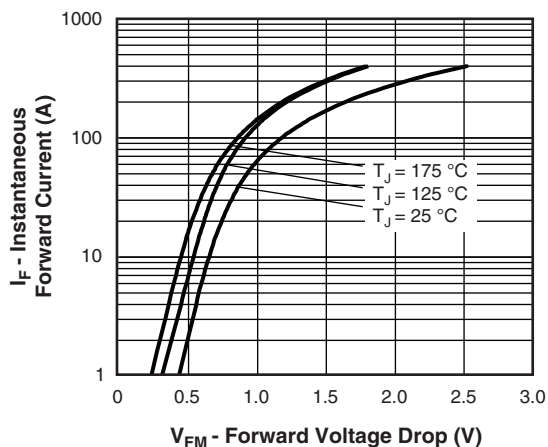


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

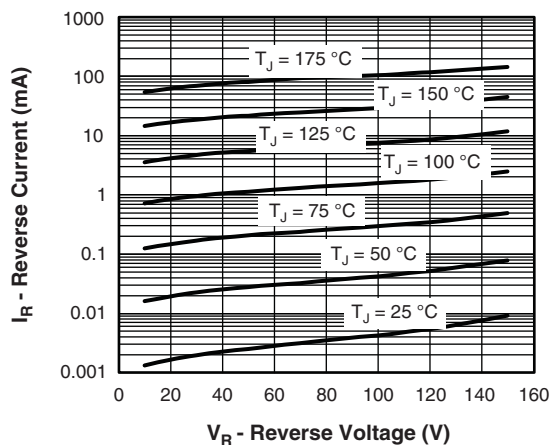


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

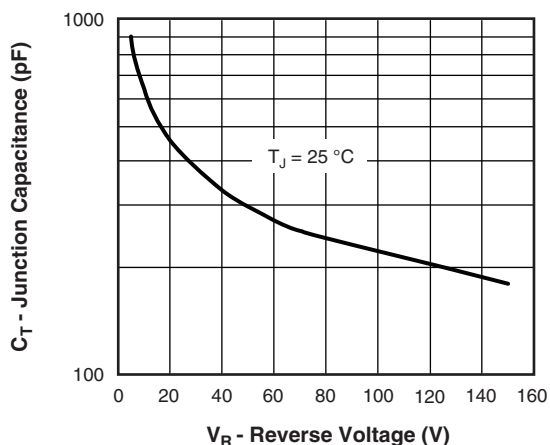


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

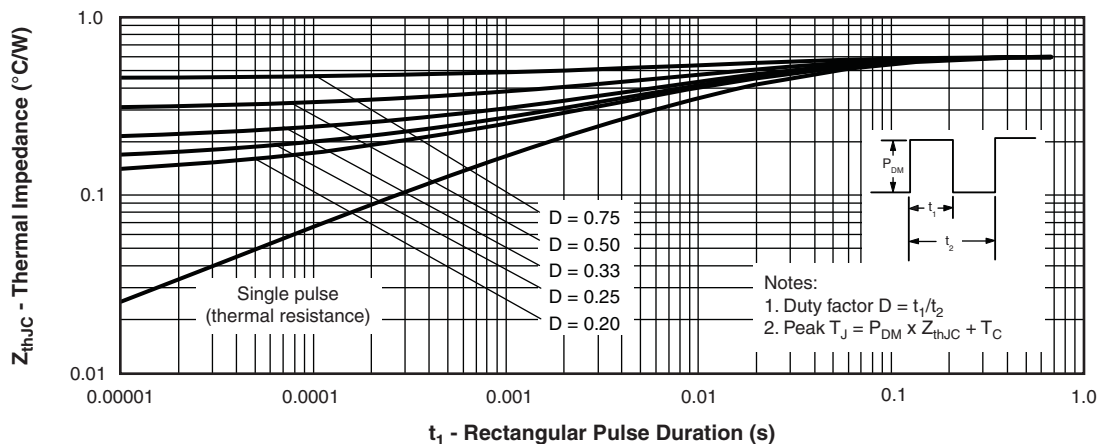


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

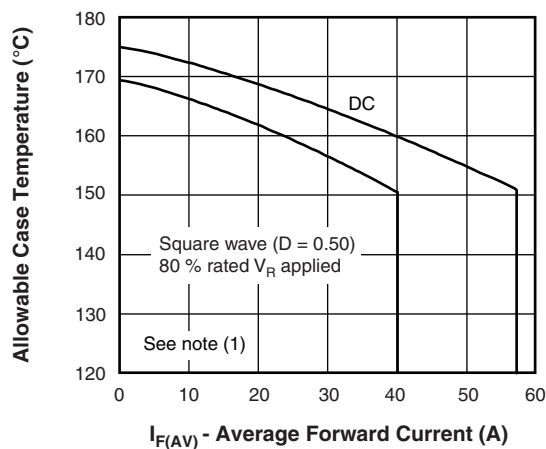


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

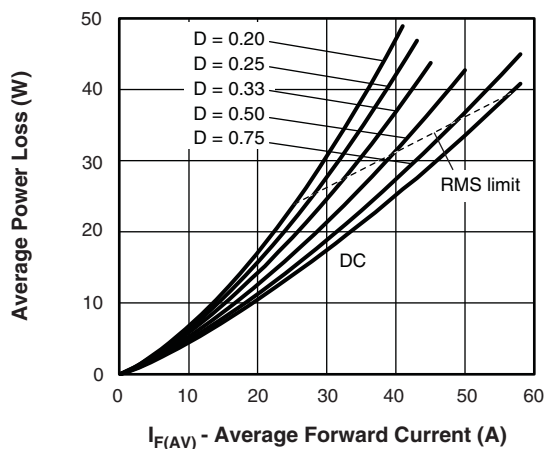


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

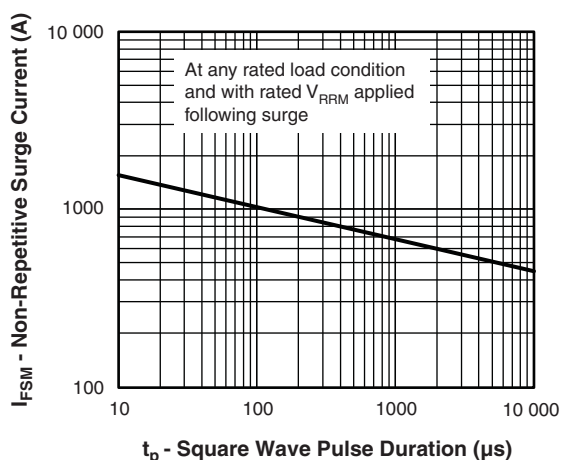


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

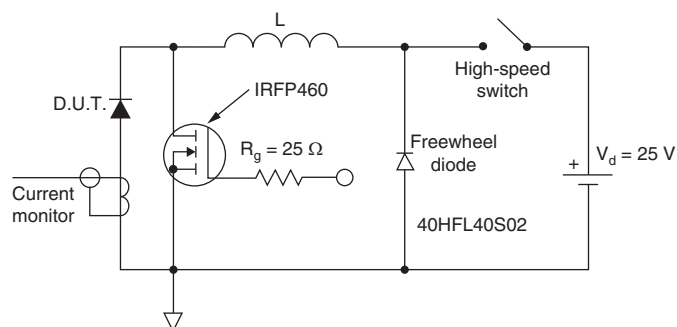


Fig. 8 - Unclamped Inductive Test Circuit

#### Note

- (1) Formula used:  $T_C = T_J - (P_d + P_{dREV}) \times R_{thJC}$ ;  
 $P_d$  = forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);  
 $P_{dREV}$  = inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

**ORDERING INFORMATION TABLE**

|             |     |    |   |   |   |     |     |
|-------------|-----|----|---|---|---|-----|-----|
| Device code | VS- | 80 | C | P | Q | 150 | -N3 |
|             | 1   | 2  | 3 | 4 | 5 | 6   | 7   |

- |          |   |                                                                                       |
|----------|---|---------------------------------------------------------------------------------------|
| <b>1</b> | - | Vishay Semiconductors product                                                         |
| <b>2</b> | - | Current rating (80 = 80 A)                                                            |
| <b>3</b> | - | Circuit configuration:<br>C = common cathode                                          |
| <b>4</b> | - | Package:<br>P = TO-247                                                                |
| <b>5</b> | - | Schottky "Q" series                                                                   |
| <b>6</b> | - | Voltage code (150 = 150 V)                                                            |
| <b>7</b> | - | Environmental digit<br>-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free |

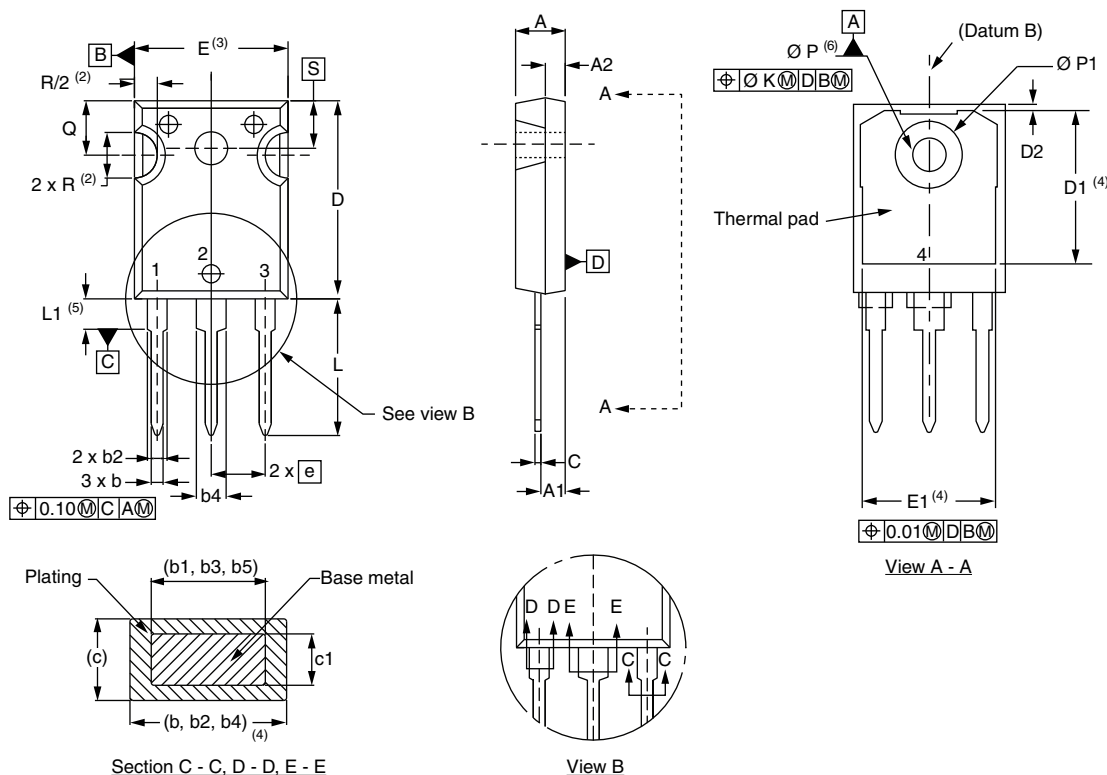
| <b>ORDERING INFORMATION</b> (Example) |                  |                        |                         |
|---------------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N                         | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-80CPQ150-N3                        | 25               | 500                    | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?96138">www.vishay.com/doc?96138</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |



## TO-247AC 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       |
| A2     | 1.17        | 1.37  | 0.046  | 0.054 |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     |
| D1     | 13.08       | -     | 0.515  | -     | 4     |

| SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| D2     | 0.51        | 1.35  | 0.020     | 0.053 |       |
| E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| E1     | 13.46       | -     | 0.53      | -     |       |
| e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| Ø K    | 0.254       |       | 0.010     |       |       |
| L      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| Ø P1   | -           | 7.39  | -         | 0.291 |       |
| Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| S      | 5.51 BSC    |       | 0.217 BSC |       |       |

## Notes

- (1) Dimensioning and tolerancing per ASME Y14.5M-1994
- (2) Contour of slot optional
- (3) 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 outermost extremes of the plastic body
- (4) Thermal pad contour optional with dimensions D1 and E1
- (5) Lead finish uncontrolled in L1
- (6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
- (7) Outline conforms to JEDEC® outline TO-247 with exception of dimension Q



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