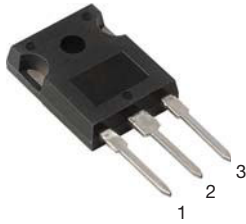
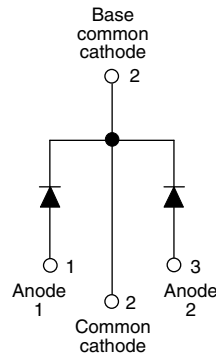


## Schottky Rectifier, 2 x 30 A



TO-247AC



### 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-JESD47
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



| PRODUCT SUMMARY                  |                 |
|----------------------------------|-----------------|
| Package                          | TO-247AC        |
| I <sub>F(AV)</sub>               | 2 x 30 A        |
| V <sub>R</sub>                   | 150 V           |
| V <sub>F</sub> at I <sub>F</sub> | 0.67 V          |
| I <sub>RM</sub> max.             | 25 mA at 125 °C |
| T <sub>J</sub> max.              | 175 °C          |
| Diode variation                  | Common cathode  |
| E <sub>AS</sub>                  | 0.5 mJ          |

### DESCRIPTION

The VS-60CPQ150... 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                                   | 60          | A     |
| V <sub>R</sub>                    |  | 150         | V     |
| I <sub>FSM</sub>                  | t <sub>p</sub> = 5 μs sine                             | 2300        | A     |
| V <sub>F</sub>                    | 30 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg) | 0.67        | V     |
| T <sub>J</sub>                    | Range  | - 55 to 175 | °C    |

| VOLTAGE RATINGS                      |                  |                |                |       |
|--------------------------------------|------------------|----------------|----------------|-------|
| PARAMETER                            | SYMBOL           | VS-60CPQ150PbF | VS-60CPQ150-N3 | UNITS |
| Maximum DC reverse voltage           | V <sub>R</sub>   | 150            | 150            | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                |                |       |

| ABSOLUTE MAXIMUM RATINGS  |                    |  |  |        |       |
|---|--------------------|--|--|--------|-------|
| PARAMETER   | SYMBOL             | TEST CONDITIONS  |  | VALUES | UNITS |
| Maximum average forward current<br>See fig. 5                             | I <sub>F(AV)</sub> | 50 % duty cycle at T <sub>C</sub> = 151 °C, rectangular waveform   |  | 30     | A     |
|   |                    |  |  | 60     |       |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse  | Following any rated load condition and with rated V <sub>RWM</sub> applied | 2300   | A     |
|   |                    | 10 ms sine or 6 ms rect. pulse   |  | 510    |       |
| Non-repetitive avalanche energy per leg                                   | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 1 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      | A     |



| ELECTRICAL SPECIFICATIONS                             |                |   |                                   |        |                  |               |
|---|----------------|---|-----------------------------------|--------|------------------|---------------|
| PARAMETER   | SYMBOL         | TEST CONDITIONS   | TYP.                              | MAX.   | UNITS            |               |
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 30 A  | $T_J = 25\text{ }^\circ\text{C}$  | 0.80   | 0.83             | V             |
|   |                | 60 A  |                                   | 0.93   | 0.99             |               |
|   |                | 30 A  | $T_J = 125\text{ }^\circ\text{C}$ | 0.64   | 0.67             |               |
|   |                | 60 A  |                                   | 0.74   | 0.77             |               |
| 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     | 100              | $\mu\text{A}$ |
|   |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 12     | 25               | mA            |
| Typical junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | -                                 | 820    | 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           | $T_J, T_{Stg}$ |                                      | - 55 to 175 | $^\circ\text{C}$   |
| Maximum thermal resistance, junction to case per leg     | $R_{thJC}$     | DC operation<br>See fig. 4           | 0.8         | $^\circ\text{C/W}$ |
| Maximum thermal resistance, junction to case per package |                | DC operation                         | 0.4         |                    |
| Typical thermal resistance, case to heatsink             | $R_{thCS}$     | Mounting surface, smooth and greased | 0.25        |                    |
| Approximate weight                                       |                |                                      | 6           | g                  |
|  |                |                                      | 0.21        | oz.                |
| Mounting torque  |                |                                      | 6 (5)       | kgf · cm           |
|  |                |                                      | 12 (10)     | (lbf · in)         |
| Marking device   |                | Case style TO-247AC (JEDEC)          | 60CPQ150    |                    |

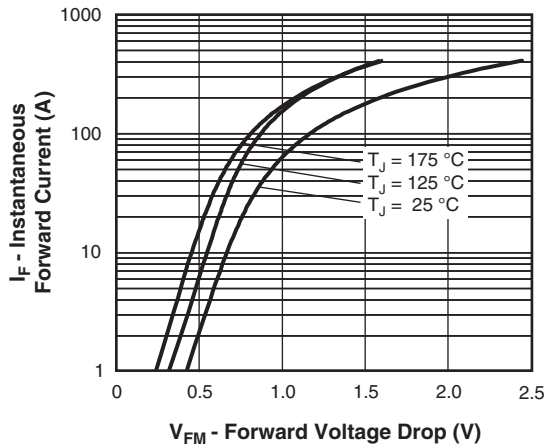


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

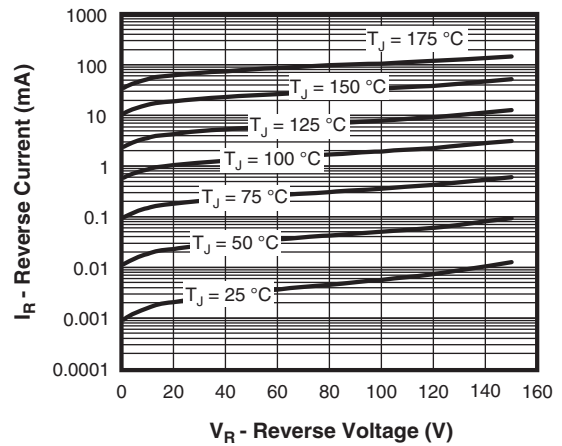


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

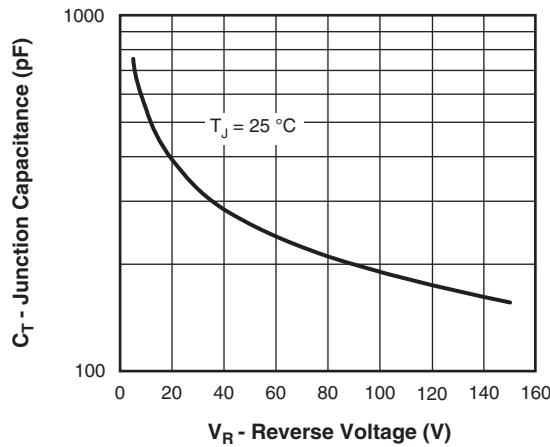


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

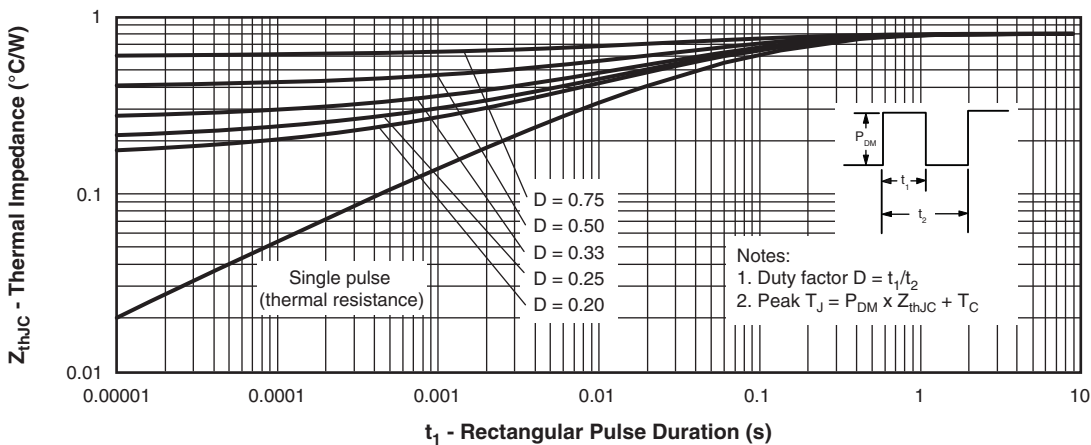


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

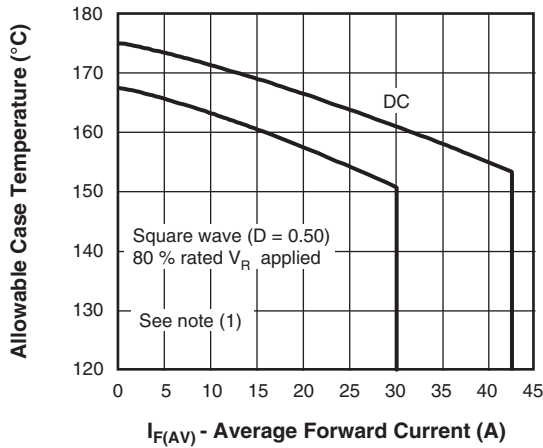


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

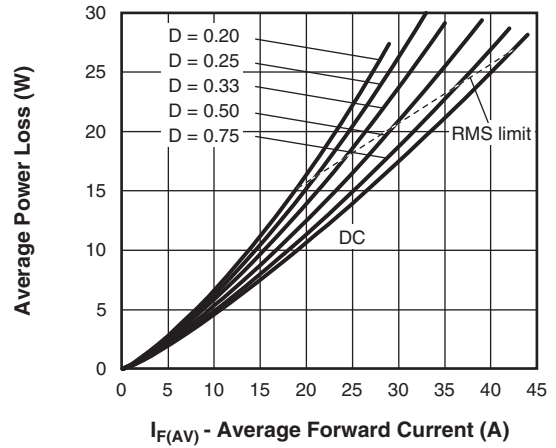


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

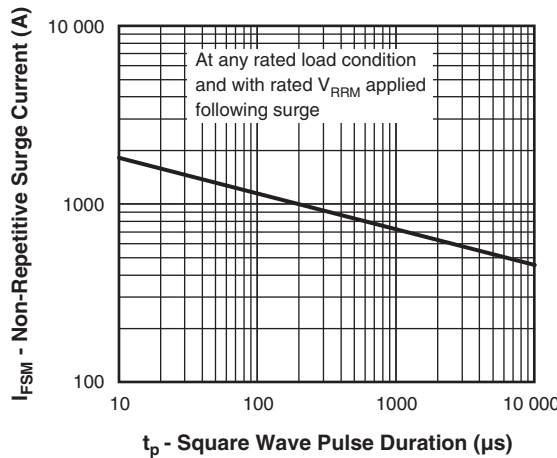


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

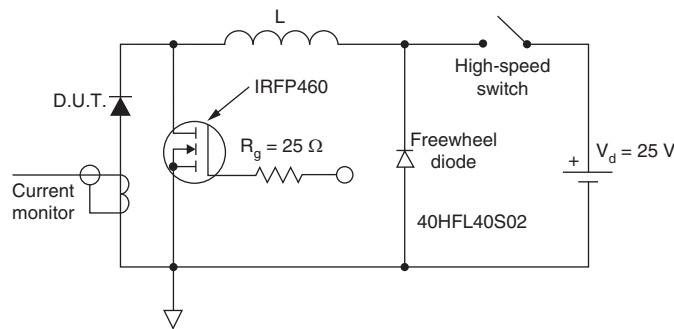


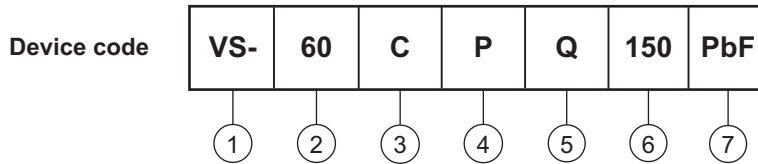
Fig. 8 - Unclamped Inductive Test Circuit

**Note**

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



## ORDERING INFORMATION TABLE



- 1** - Vishay Semiconductors product
- 2** - Current rating (60 = 60 A)
- 3** - Circuit configuration:  
C = Common cathode
- 4** - Package:  
P = TO-247
- 5** - Schottky "Q" series
- 6** - Voltage code (150 = 150 V)
- 7** - Environmental digit
  - PbF = Lead (Pb)-free and RoHS compliant
  - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

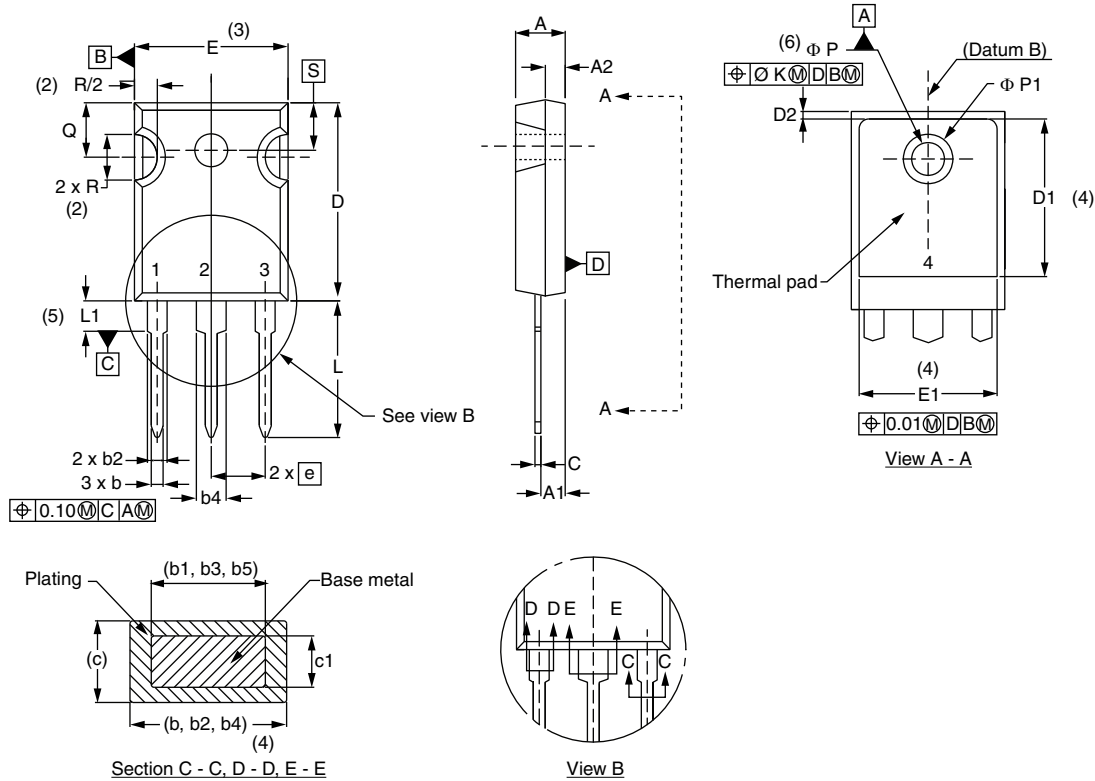
| ORDERING INFORMATION (Example) |                  |                        |                         |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N                  | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-60CPQ150PbF                 | 25               | 500                    | Antistatic plastic tube |
| VS-60CPQ150-N3                 | 25               | 500                    | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS |   |
|----------------------------|---|
| Dimensions                 | <a href="http://www.vishay.com/doc?95542">www.vishay.com/doc?95542</a>              |
| Part marking information   | TO-247AC PbF <a href="http://www.vishay.com/doc?95226">www.vishay.com/doc?95226</a> |
|                            | TO-247AC -N3 <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |



TO-247AC - 50 mils L/F

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES | SYMBOL | MILLIMETERS |       | INCHES    |       | NOTES |
|--------|-------------|-------|--------|-------|-------|--------|-------------|-------|-----------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |        | MIN.        | MAX.  | MIN.      | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       | D2     | 0.51        | 1.35  | 0.020     | 0.053 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       | E      | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| A2     | 1.17        | 1.37  | 0.046  | 0.054 |       | E1     | 13.46       | -     | 0.53      | -     |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       | e      | 5.46 BSC    |       | 0.215 BSC |       |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       | Ø K    | 0.254       |       | 0.010     |       |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       | L      | 14.20       | 16.10 | 0.559     | 0.634 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       | L1     | 3.71        | 4.29  | 0.146     | 0.169 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       | Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       | Ø P1   | -           | 7.39  | -         | 0.291 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       | Q      | 5.31        | 5.69  | 0.209     | 0.224 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       | R      | 4.52        | 5.49  | 0.178     | 0.216 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     | S      | 5.51 BSC    |       | 0.217 BSC |       |       |
| D1     | 13.08       | -     | 0.515  | -     | 4     |        |             |       |           |       |       |

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 c and Q



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