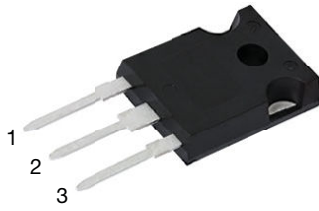
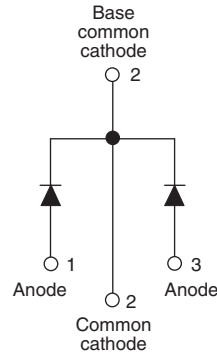


High Performance Schottky Rectifier, 2 x 40 A


TO-247AC 3L


FEATURES

- 150 °C T_J operation
- Optimized for 3.3 V application
- 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


RoHS
 COMPLIANT
 HALOGEN
FREE

| PRIMARY CHARACTERISTICS | |
|-------------------------|-------------------|
| $I_{F(AV)}$ | 2 x 40 A |
| V_R | 20 V |
| V_F at I_F | 0.36 V |
| I_{RM} max. | 1100 mA at 125 °C |
| T_J max. | 150 °C |
| E_{AS} | 27 mJ |
| Package | TO-247AC 3L |
| Circuit configuration | Common cathode |

DESCRIPTION

This center tap Schottky rectifier has been optimized for ultralow forward voltage drop specifically for 3.3 V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 °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 | 80 | A |
| V_{RRM} | | 20 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 2200 | A |
| V_F | 40 A_{pk} , $T_J = 150$ °C (per leg) | 0.32 | V |
| T_J | Range | -55 to +150 | °C |

| VOLTAGE RATINGS | | | |
|--------------------------------------|-----------|----------------|-------|
| PARAMETER | SYMBOL | VS-80CPQ020-N3 | UNITS |
| Maximum DC reverse voltage | V_R | 20 | V |
| Maximum working peak reverse voltage | V_{RWM} | | |

| ABSOLUTE MAXIMUM RATINGS | | | | |
|---|-------------|---|--------|-------|
| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
| Maximum average forward current | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 138$ °C, rectangular waveform | 40 | A |
| | | | 80 | |
| Maximum peak one cycle non-repetitive surge current per leg | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 2200 | A |
| | | 10 ms sine or 6 ms rect. pulse | | |
| | | Following any rated load condition and with rated V_{RRM} applied | 500 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25$ °C, $I_{AS} = 6$ A, $L = 1.5$ mH | 27 | mJ |
| Repetitive avalanche current per leg | I_{AR} | Current decaying linearly to zero in 1 μs Frequency limited by T_J maximum $V_A = 1.5 \times V_R$ typical | 6 | A |



| ELECTRICAL SPECIFICATIONS | | | | | | | |
|---|----------------|--|-----------------------------------|--------|------------|---|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS | | |
| Maximum forward voltage drop per leg | $V_{FM}^{(1)}$ | 40 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.46 | V | | |
| | | 80 A | | 0.55 | | | |
| | | 40 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.36 | | V | |
| | | 80 A | | 0.46 | | | |
| | | 40 A | $T_J = 150\text{ }^\circ\text{C}$ | 0.32 | | | V |
| | | 80 A | | 0.43 | | | |
| Maximum reverse leakage current per leg | $I_{RM}^{(1)}$ | $T_J = 125\text{ }^\circ\text{C}$ | $V_R = 5\text{ V}$ | 110 | mA | | |
| | | $T_J = 150\text{ }^\circ\text{C}$ | $V_R = 10\text{ V}$ | 600 | | | |
| | | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | 5.5 | | | |
| | | $T_J = 125\text{ }^\circ\text{C}$ | | 1100 | | | |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J \text{ maximum}$ | | 0.185 | V | | |
| Maximum junction capacitance per leg | C_T | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C | | 6500 | 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/ 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 | $^\circ\text{C}$ |
| Maximum thermal resistance, junction to case per leg | R_{thJC} | DC operation | | 0.6 | $^\circ\text{C/W}$ |
| Maximum thermal resistance, junction to case per package | | | | 0.3 | |
| Typical thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth and greased | | 0.25 | |
| Approximate weight | | | | 6 | g |
| | | | | 0.21 | oz. |
| Mounting torque | minimum | | | 6 (5) | kgf · cm (lbf · in) |
| | maximum | | | 12 (10) | |
| Marking device | | Case style TO-247AC 3L | | 80CPQ020 | |

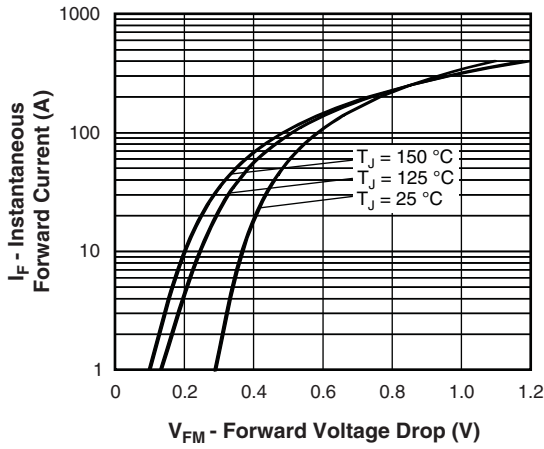


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

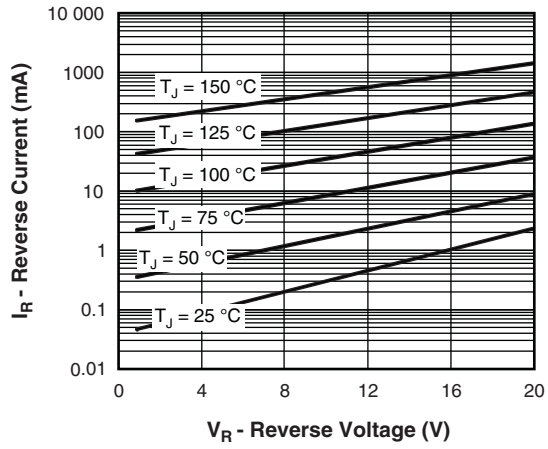


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

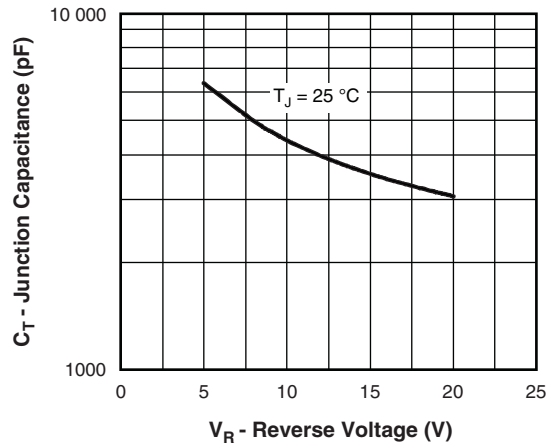


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

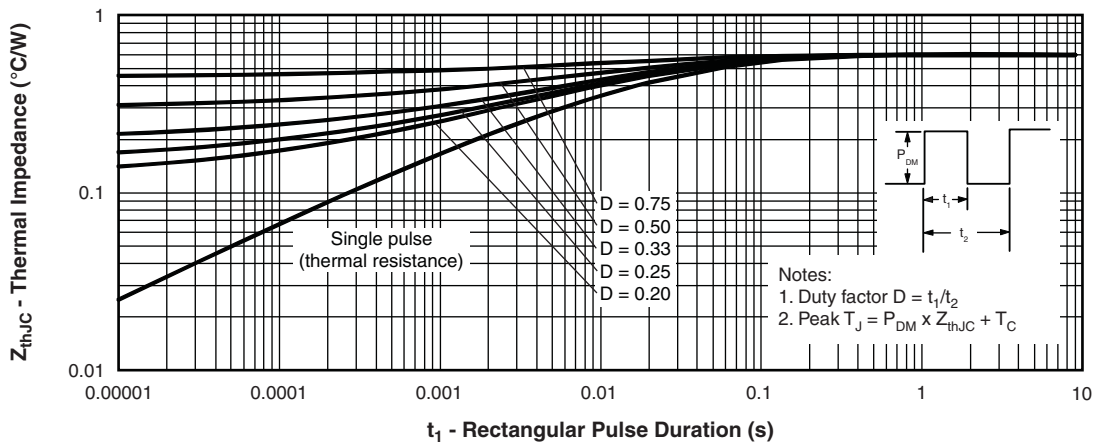


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

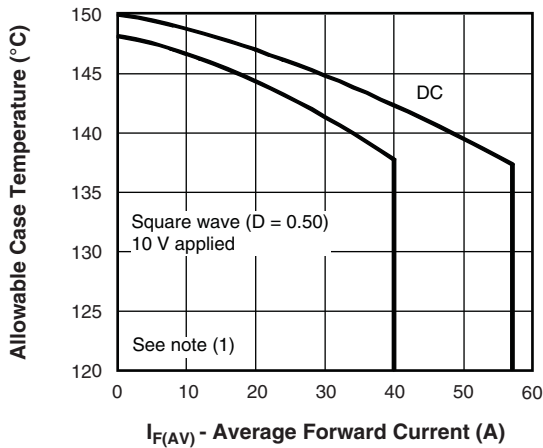


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

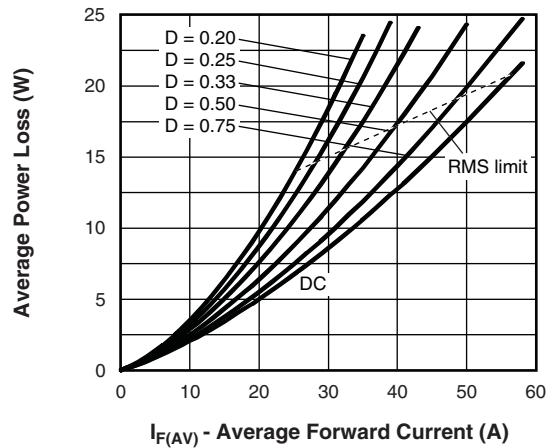


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

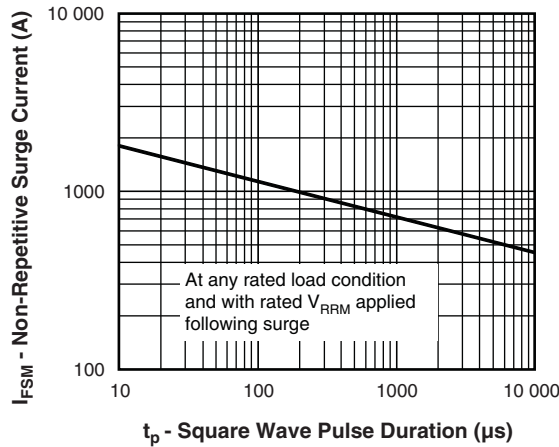


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

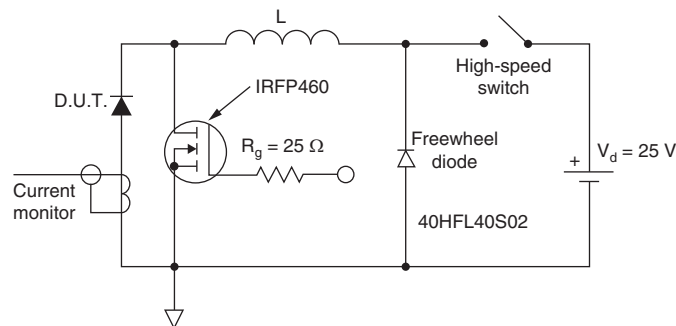


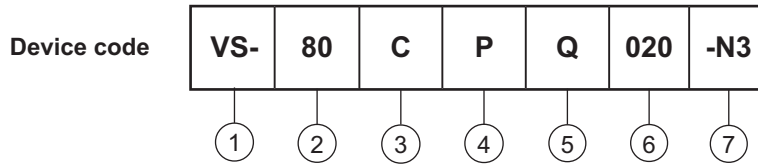
Fig. 8 - Unclamped Inductive Test Circuit

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 $V_{R1} = 10 V$



ORDERING INFORMATION TABLE



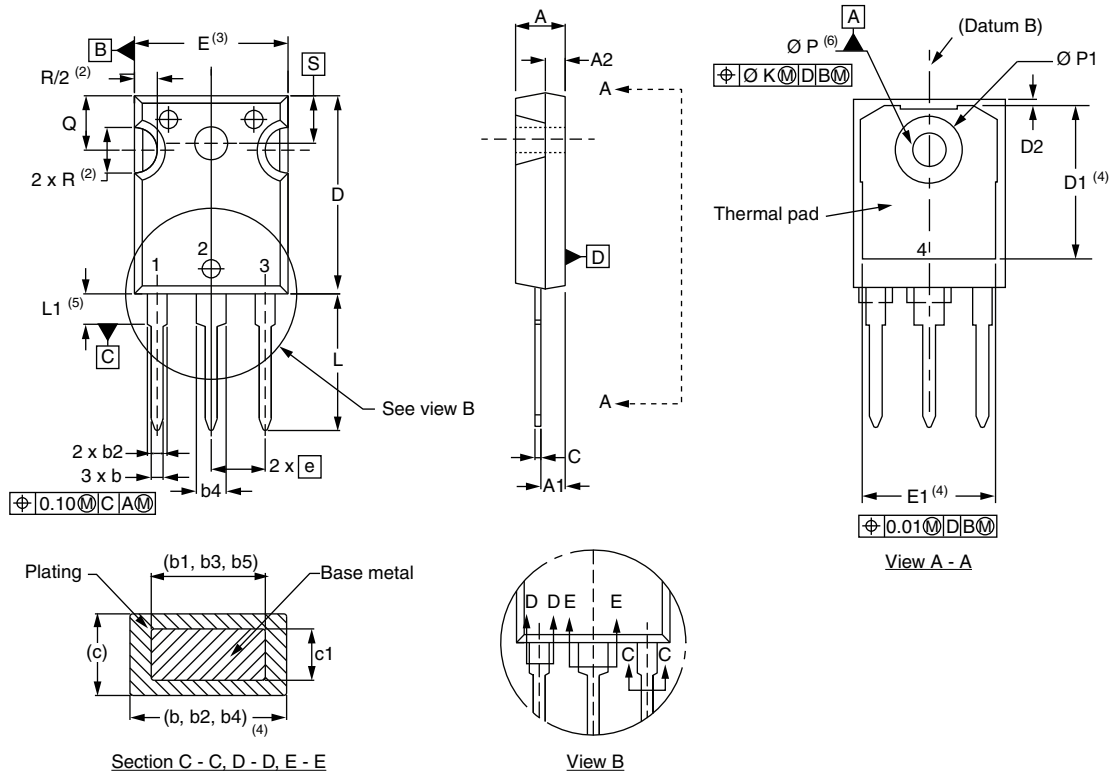
- 1** - Vishay Semiconductors product
- 2** - Current rating (80 = 80 A)
- 3** - Circuit configuration:
C = common cathode
- 4** - Package:
P = TO-247
- 5** - Schottky "Q" series
- 6** - Voltage code (020 = 20 V)
- 7** - Environmental digit
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-80CPQ020-N3 | 25 | 500 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?96138 |
| Part marking information | www.vishay.com/doc?95007 |
| SPIICE model | www.vishay.com/doc?95289 |

TO-247AC 3L

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 | | $\varnothing K$ | 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 | | $\varnothing P$ | 3.56 | 3.66 | 0.14 | 0.144 | |
| b5 | 2.59 | 3.38 | 0.102 | 0.133 | | $\varnothing P1$ | - | 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) $\varnothing P$ 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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