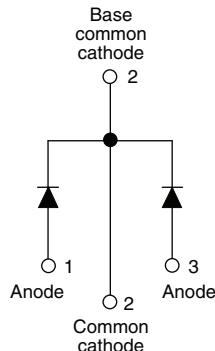
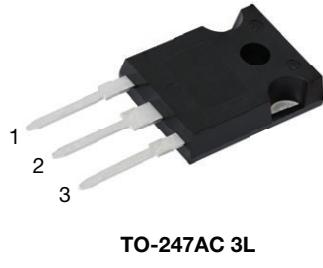


High Performance Schottky Rectifier, 2 x 20 A



FEATURES

- 150 °C T_J operation
- Very 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



RoHS
COMPLIANT
HALOGEN
FREE

PRIMARY CHARACTERISTICS

| | |
|-----------------------|-----------------|
| $I_{F(AV)}$ | 2 x 20 A |
| V_R | 50 V to 60 V |
| V_F at I_F | 0.49 V |
| I_{RM} typ. | 96 mA at 125 °C |
| T_J max. | 150 °C |
| E_{AS} | 18 mJ |
| Package | TO-247AC 3L |
| Circuit configuration | Common cathode |

DESCRIPTION

The VS-40CPQ... center tap Schottky rectifier has been optimized for very low forward voltage drop with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150 °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 | 40 | A |
| V_{RRM} | | 50/60 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 3200 | A |
| V_F | 20 A _{pk} , $T_J = 125$ °C (per leg) | 0.49 | V |
| T_J | | -55 to +150 | °C |

VOLTAGE RATINGS

| PARAMETER | SYMBOL | VS-40CPQ050-N3 | VS-40CPQ060-N3 | UNITS |
|--------------------------------------|-----------|----------------|----------------|-------|
| Maximum DC reverse voltage | V_R | | | |
| Maximum working peak reverse voltage | V_{RWM} | 50 | 60 | V |

ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | TEST CONDITIONS | VALUES | UNITS |
|--|-------------|---|--------|-------|
| Maximum average forward current See fig. 5 | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 120$ °C, rectangular waveform | 40 | A |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | 3200 | |
| | | 10 ms sine or 6 ms rect. pulse | 320 | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25$ °C, $I_{AS} = 2$ A, $L = 9.0$ mH | 18 | 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 | 2 | A |

ELECTRICAL SPECIFICATIONS

| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS |
|--|--------------------------------|---|---------------------------------------|--------|-------|
| Maximum forward voltage drop per leg See fig. 1 | V _{FM} ⁽¹⁾ | 20 A | T _J = 25 °C | 0.53 | V |
| | | 40 A | | 0.68 | |
| | | 20 A | T _J = 125 °C | 0.49 | |
| | | 40 A | | 0.64 | |
| Maximum reverse leakage current per leg | I _{RM} ⁽¹⁾ | T _J = 25 °C | V _R = Rated V _R | 1.7 | mA |
| | | T _J = 125 °C | | 180 | |
| Typical reverse leakage current per leg | I _{RM} ⁽¹⁾ | T _J = 125 °C | V _R = Rated V _R | 96 | mA |
| Maximum junction capacitance per leg | C _T | V _R = 5 V _{DC} (test signal range 100 kHz to 1 MHz) 25 °C | | 1600 | 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/μs |

Note

(1) Pulse width < 300 μs, 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 | °C | |
| Maximum thermal resistance, junction to case per leg | R _{thJC} | DC operation See fig. 4 | | 1.25 | °C/W | |
| Maximum thermal resistance, junction to case per package | | DC operation | | 0.63 | | |
| Typical thermal resistance, case to heatsink | R _{thCS} | Mounting surface, smooth and greased | | 0.24 | | |
| Approximate weight | | | | 6 | g | |
| | | | | 0.21 | oz. | |
| Mounting torque | minimum maximum | Non-lubricated threads | | 6 (5) | kgf · cm (lbf · in) | |
| | | | | 12 (10) | | |
| Marking device | | Case style TO-247AC 3L | | 40CPQ050 | | |
| | | | | 40CPQ060 | | |

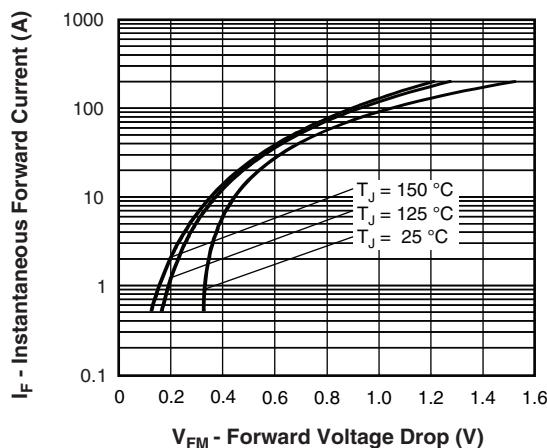


Fig. 1 - Maximum Forward Voltage Drop Characteristics
(Per Leg)

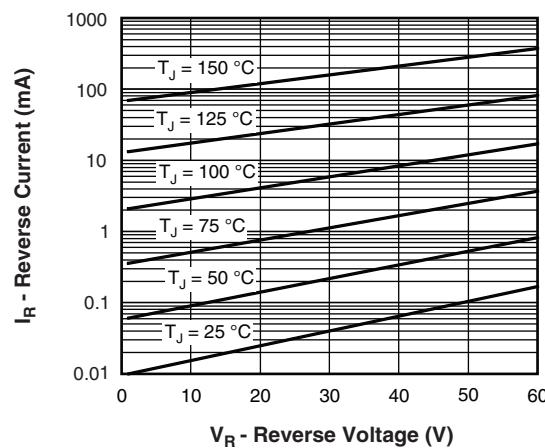


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage
(Per Leg)

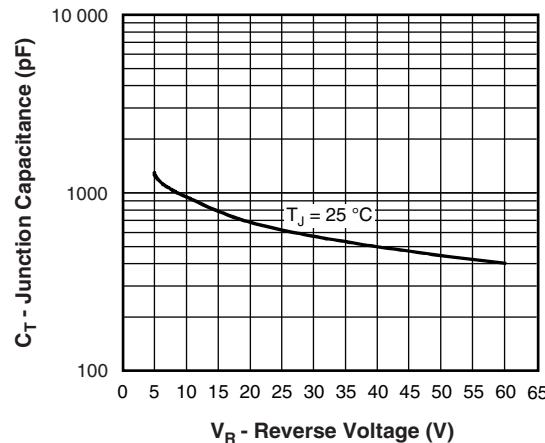


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

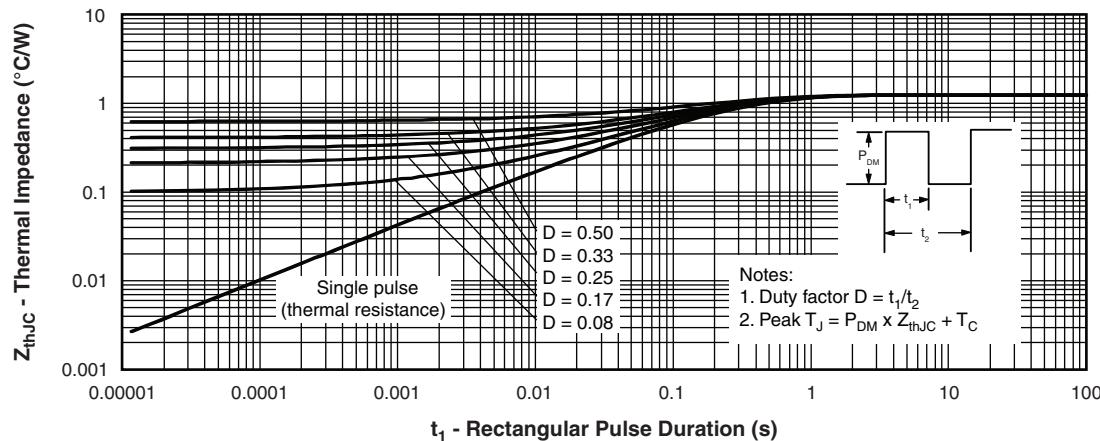


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

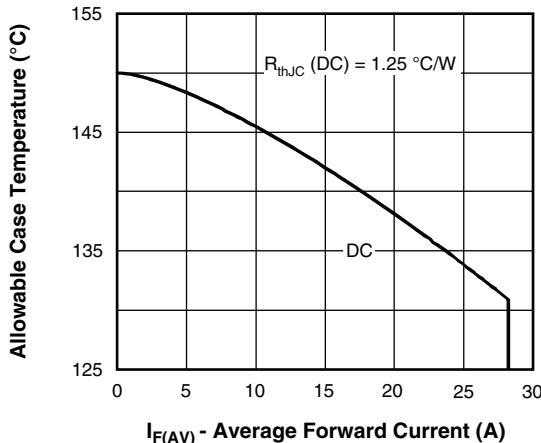


Fig. 5 - Maximum Allowable Case Temperature vs.
Average Forward Current (Per Leg)

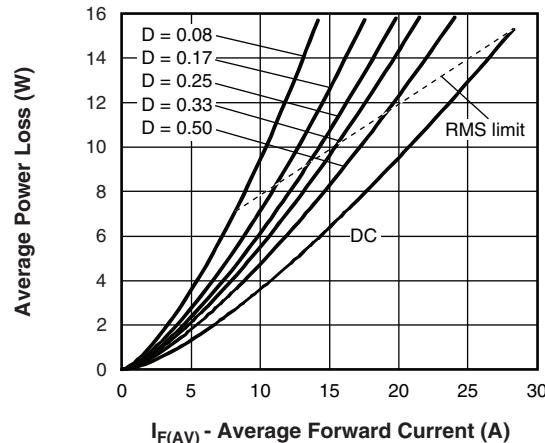


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

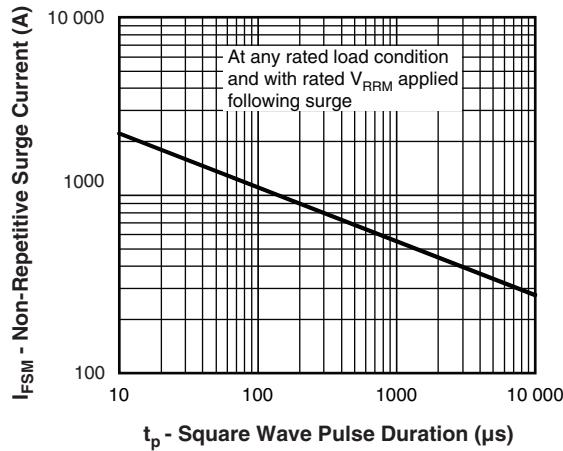


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

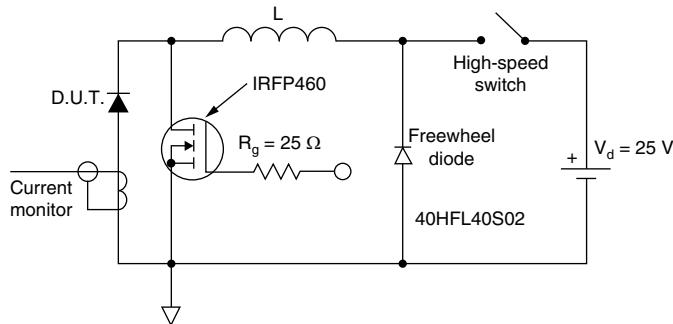


Fig. 8 - Unclamped Inductive Test Circuit

ORDERING INFORMATION TABLE

| | | | | | | | |
|-------------|-----|----|---|---|---|-----|-----|
| Device code | VS- | 40 | C | P | Q | 060 | -N3 |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

- 1** - Vishay Semiconductors product
- 2** - Current rating (40 = 40 A)
- 3** - Circuit configuration:
C = common cathode
- 4** - Package:
P = TO-247
- 5** - Schottky "Q" series
- 6** - Voltage code
 - 050 = 50 V
 - 060 = 60 V
- 7** - Environmental digit
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)

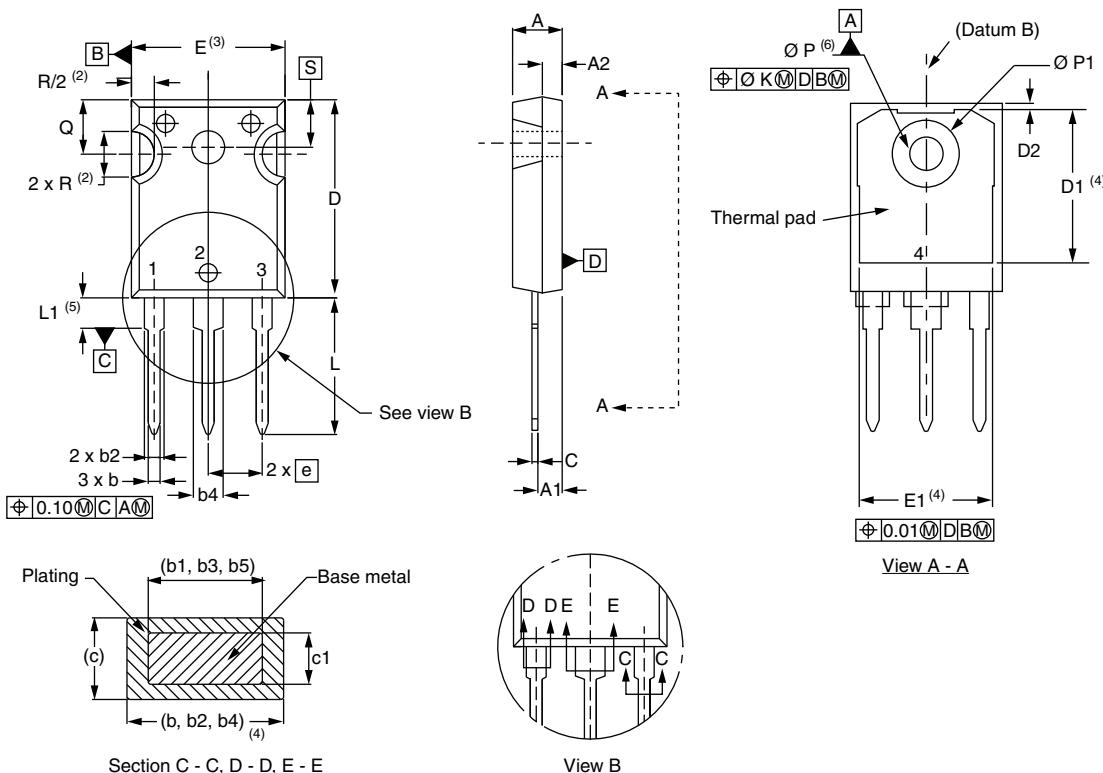
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
|----------------|------------------|------------------------|-------------------------|
| VS-40CPQ050-N3 | 25 | 500 | Antistatic plastic tube |
| VS-40CPQ060-N3 | 25 | 500 | Antistatic plastic tube |

LINKS TO RELATED DOCUMENTS

| | |
|--------------------------|--|
| Dimensions | www.vishay.com/doc?96138 |
| Part marking information | www.vishay.com/doc?95007 |

TO-247AC 3L

DIMENSIONS in millimeters and inches



| SYMBOL | MILLIMETERS | | INCHES | | NOTES | View A - A | 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 Q

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