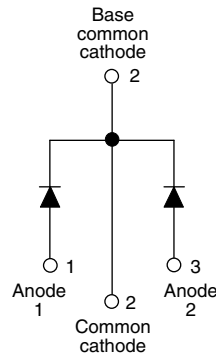


Schottky Rectifier, 2 x 20 A


TO-247AC


FEATURES

- 150 °C T_J operation
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Very low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- Compliant to RoHS Directive 2002/95/EC
- Designed and qualified according to JEDEC-JESD47
- Halogen-free according to IEC 61249-2-21 definition (-N3 only)



| PRODUCT SUMMARY | |
|-----------------|-----------------|
| Package | TO-247AC |
| $I_{F(AV)}$ | 2 x 20 A |
| V_R | 40 V, 45 V |
| V_F at I_F | 0.49 V |
| I_{RM} max. | 80 mA at 100 °C |
| T_J max. | 150 °C |
| Diode variation | Common cathode |
| E_{AS} | 20 mJ |

DESCRIPTION

The VS-40L...CW... 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 parallel switching power supplies.

| MAJOR RATINGS AND CHARACTERISTICS | | | |
|-----------------------------------|---|-------------|-------|
| SYMBOL | CHARACTERISTICS | VALUES | UNITS |
| $I_{F(AV)}$ | Rectangular waveform | 40 | A |
| V_{RRM} | | 40/45 | V |
| I_{FSM} | $t_p = 5 \mu s$ sine | 1240 | A |
| V_F | 20 Apk, $T_J = 125 \text{ °C}$ (per leg, typical) | 0.42 | V |
| T_J | | - 55 to 150 | °C |

| VOLTAGE RATINGS | | | | | | |
|--------------------------------------|-----------|---------------|---------------|---------------|---------------|-------|
| PARAMETER | SYMBOL | VS-40L40CWPbF | VS-40L40CW-N3 | VS-40L45CWPbF | VS-40L45CW-N3 | UNITS |
| Maximum DC reverse voltage | V_R | 40 | 40 | 45 | 45 | V |
| Maximum working peak reverse voltage | V_{RWM} | | | | | |

| ABSOLUTE MAXIMUM RATINGS | | | | | | |
|---|------------|---|---|--------|-------|---|
| PARAMETER | SYMBOL | TEST CONDITIONS | | VALUES | UNITS | |
| Maximum average forward current See fig. 5 | per leg | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 122 \text{ °C}$, rectangular waveform | | 20 | A |
| | per device | | | | 40 | |
| Maximum peak one cycle non-repetitive surge current per leg See fig. 7 | I_{FSM} | 5 μs sine or 3 μs rect. pulse | Following any rated load condition and with rated V_{RRM} applied | 1240 | | |
| | | 10 ms sine or 6 ms rect. pulse | | 350 | | |
| Non-repetitive avalanche energy per leg | E_{AS} | $T_J = 25 \text{ °C}$, $I_{AS} = 3 \text{ A}$, $L = 4.4 \text{ mH}$ | | 20 | 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 | | 3 | A | |



| ELECTRICAL SPECIFICATIONS | | | | | | |
|--|----------------|---|-----------------------------------|------|------------|----|
| PARAMETER | SYMBOL | TEST CONDITIONS | TYP. | MAX. | UNITS | |
| Maximum forward voltage drop per leg See fig. 1 | $V_{FM}^{(1)}$ | 20 A | $T_J = 25\text{ }^\circ\text{C}$ | 0.48 | 0.53 | V |
| | | 40 A | | 0.61 | 0.69 | |
| | | 20 A | $T_J = 125\text{ }^\circ\text{C}$ | 0.42 | 0.49 | |
| | | 40 A | | 0.60 | 0.70 | |
| Reverse leakage current per leg See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$ | $V_R = \text{Rated } V_R$ | - | 1.5 | mA |
| | | $T_J = 100\text{ }^\circ\text{C}$ | | 20 | 80 | |
| Threshold voltage | $V_{F(TO)}$ | $T_J = T_J \text{ maximum}$ | 0.27 | | V | |
| Forward slope resistance | r_f | | 8.72 | | m Ω | |
| Maximum junction capacitance per leg | C_T | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C | - | 1500 | pF | |
| 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 See fig. 4 | 1.6 | $^\circ\text{C/W}$ |
| Maximum thermal resistance, junction to case per package | | DC operation | 0.8 | |
| 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 (JEDEC) | 40L40CW | |
| | | | 40L45CW | |

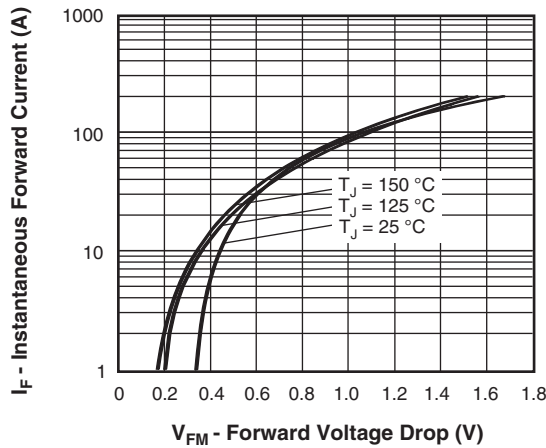


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

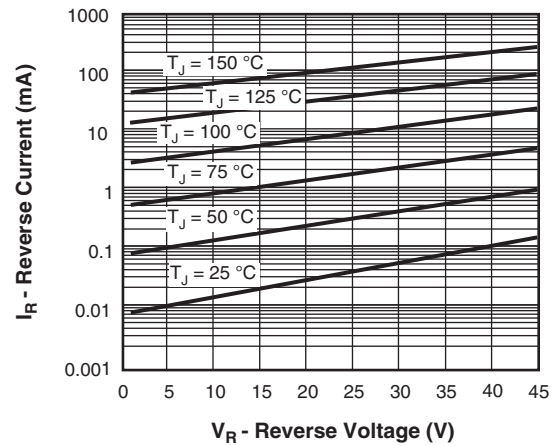


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

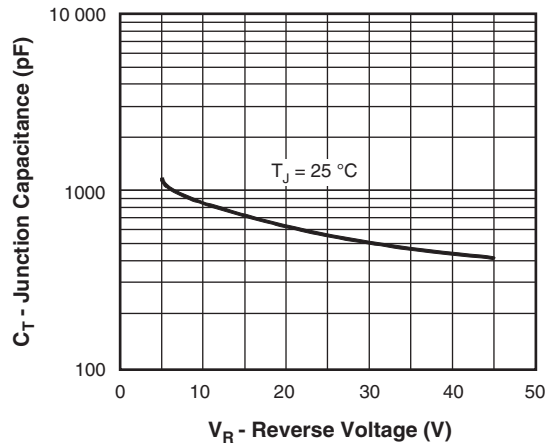


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

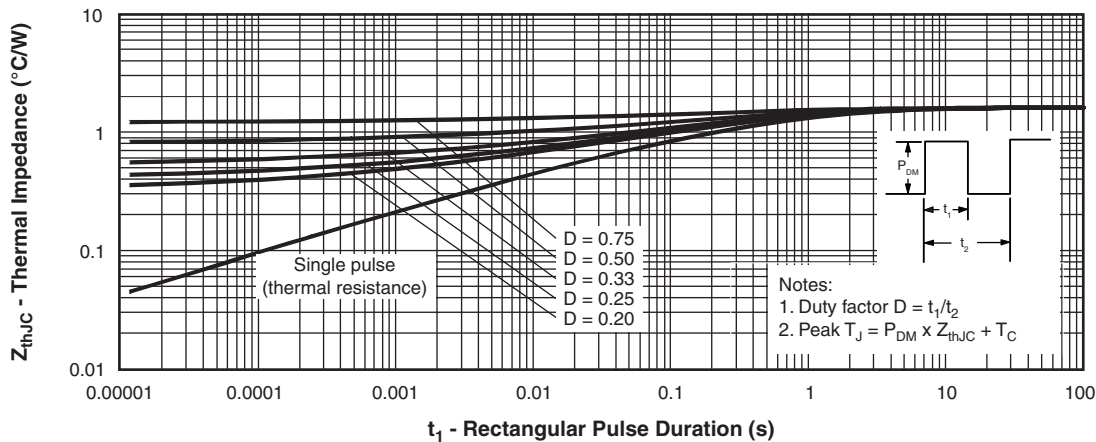


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

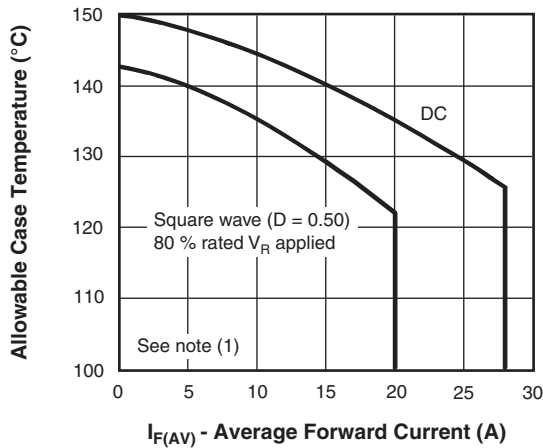


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

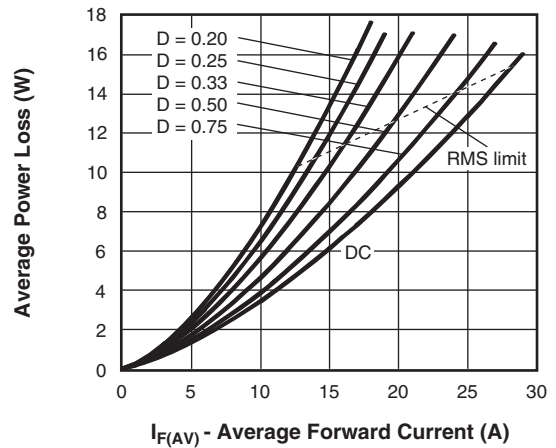


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

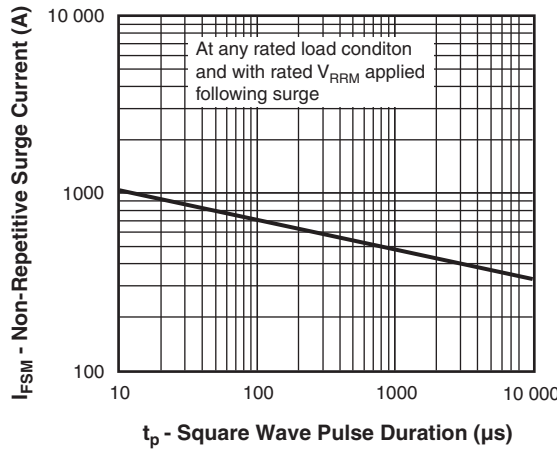


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

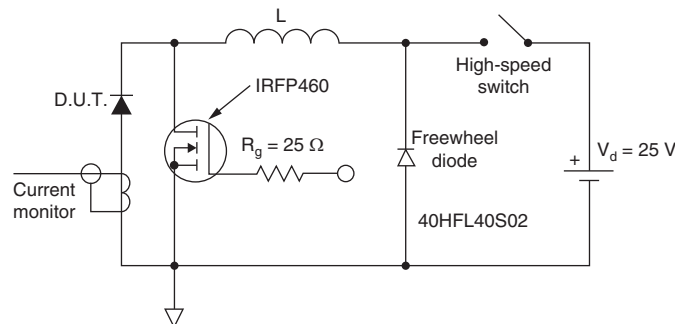


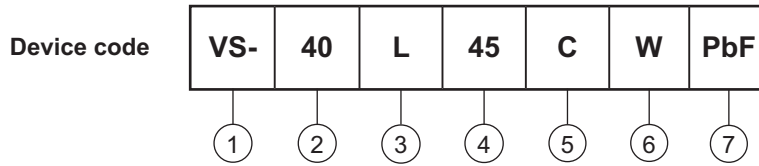
Fig. 8 - Unclamped Inductive Test Circuit

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



- 1** - Vishay Semiconductors product
- 2** - Current rating (40 = 40 A)
- 3** - Schottky "L" series
- 4** - Voltage code 40 = 40 V
45 = 45 V
- 5** - Circuit configuration:
C = Common cathode
- 6** - Package:
W = TO-247
- 7** - Environmental digit
 - PbF = Lead (Pb)-free and RoHS compliant
 - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

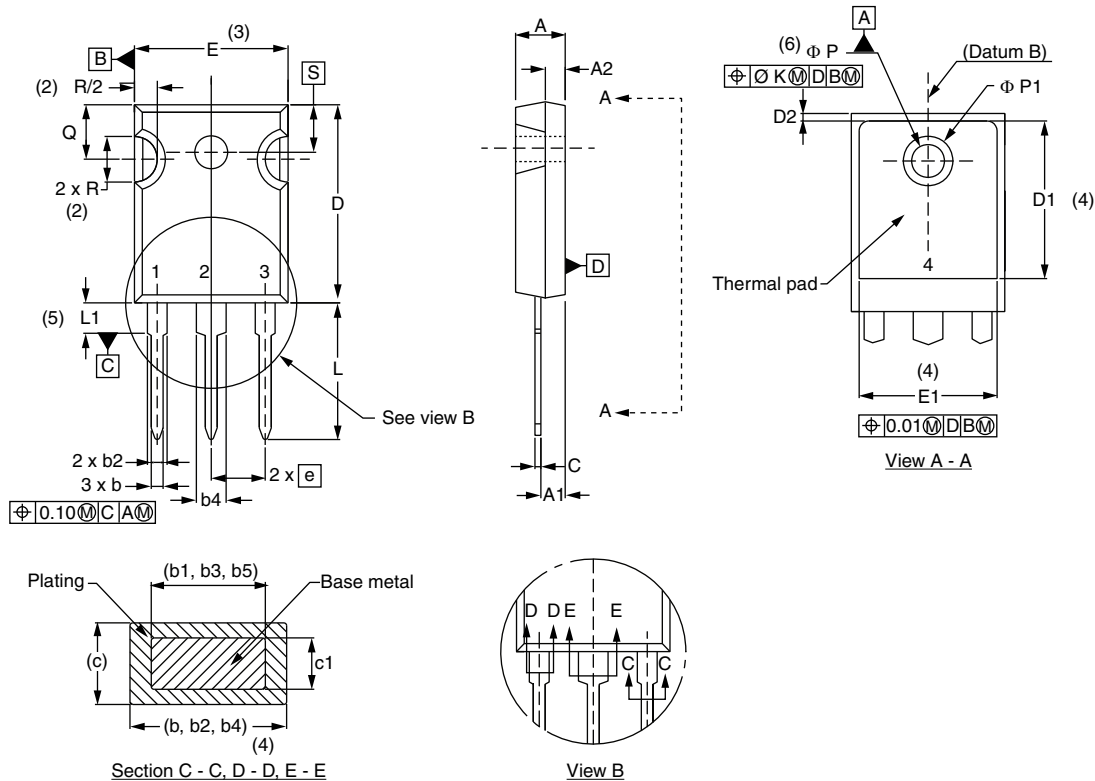
| ORDERING INFORMATION (Example) | | | |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION |
| VS-40L40CWPbF | 25 | 500 | Antistatic plastic tube |
| VS-40L40CW-N3 | 25 | 500 | Antistatic plastic tube |
| VS-40L45CWPbF | 25 | 500 | Antistatic plastic tube |
| VS-40L45CW-N3 | 25 | 500 | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|---|
| Dimensions | www.vishay.com/doc?95223 |
| Part marking information | TO-247AC PbF www.vishay.com/doc?95226 |
| | TO-247AC -N3 www.vishay.com/doc?95007 |



TO-247AC

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 | 1.30 | 0.020 | 0.051 | |
| A1 | 2.21 | 2.59 | 0.087 | 0.102 | | E | 15.29 | 15.87 | 0.602 | 0.625 | 3 |
| A2 | 1.50 | 2.49 | 0.059 | 0.098 | | E1 | 13.72 | - | 0.540 | - | |
| 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 | 2.54 | | 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 | - | 6.98 | - | 0.275 | |
| 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 c



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