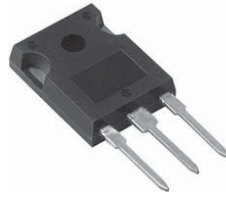
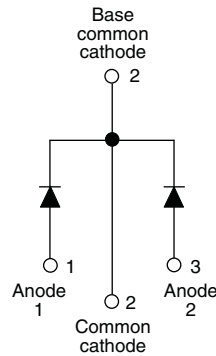


## Schottky Rectifier, 2 x 35 A


**TO-247AC**


### FEATURES

- 150 °C  $T_J$  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
- 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)



### DESCRIPTION

The VS-72CPQ030... 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 150 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

| PRODUCT SUMMARY |                  |
|-----------------|------------------|
| Package         | TO-247AC         |
| $I_{F(AV)}$     | 2 x 35 A         |
| $V_R$           | 30 V             |
| $V_F$ at $I_F$  | 0.43 V           |
| $I_{RM}$ max.   | 450 mA at 125 °C |
| $T_J$ max.      | 150 °C           |
| Diode variation | Common cathode   |
| $E_{AS}$        | 27 mJ            |

| MAJOR RATINGS AND CHARACTERISTICS |  |             |       |
|-----------------------------------|--|-------------|-------|
| SYMBOL                            | CHARACTERISTICS                          | VALUES      | UNITS |
| $I_{F(AV)}$                       | Rectangular waveform                     | 70          | A     |
| $V_{RRM}$                         |  | 30          | V     |
| $I_{FSM}$                         | $t_p = 5 \mu s$ sine                     | 2180        | A     |
| $V_F$                             | 35 Apk, $T_J = 125 \text{ °C}$ (per leg) | 0.43        | V     |
| $T_J$                             | Range                                    | - 55 to 150 | °C    |

| VOLTAGE RATINGS                      |           |                |                |       |
|--------------------------------------|-----------|----------------|----------------|-------|
| PARAMETER                            | SYMBOL    | VS-72CPQ030PbF | VS-72CPQ030-N3 | UNITS |
| Maximum DC reverse voltage           | $V_R$     | 30             | 30             | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |                |                |       |

| ABSOLUTE MAXIMUM RATINGS  |             |   |   |        |       |
|---|-------------|---|---|--------|-------|
| PARAMETER   | SYMBOL      | TEST CONDITIONS   |   | VALUES | UNITS |
| Maximum average forward current<br>See fig. 5                             | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 125 \text{ °C}$ , rectangular waveform  |   | 35     | A     |
|   |             |   |   | 70     |       |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | $I_{FSM}$   | 5 $\mu s$ sine or 3 $\mu s$ rect. pulse   | Following any rated load condition and with rated $V_{RRM}$ applied | 2180   | A     |
|   |             | 10 ms sine or 6 ms rect. pulse  |   | 600    |       |
| Non-repetitive avalanche energy per leg                                   | $E_{AS}$    | $T_J = 25 \text{ °C}$ , $I_{AS} = 6 \text{ A}$ , $L = 1.5 \text{ mH}$   |   | 27     | mJ    |
| Repetitive avalanche current per leg                                      | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu s$<br>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<br>See fig. 1    | $V_{FM}^{(1)}$ | 35 A   | $T_J = 25\text{ }^\circ\text{C}$  | 0.51   | V                |
|   |                | 70 A   |                                   | 0.61   |                  |
|   |                | 35 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.43   |                  |
|   |                | 70 A   |                                   | 0.58   |                  |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$   | $V_R = \text{Rated } V_R$         | 1.9    | mA               |
|   |                | $T_J = 125\text{ }^\circ\text{C}$  |                                   | 450    |                  |
| Threshold voltage                                     | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$  |                                   | 0.25   | V                |
| Forward slope resistance                              | $r_t$          |  |                                   | 4.7    | m $\Omega$       |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) 25 $^\circ\text{C}$ |                                   | 4600   | 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 150 | $^\circ\text{C}$       |
| 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  | minimum        |                                      |  | 6 (5)       | kgf · cm<br>(lbf · in) |
|  | maximum        |                                      |  | 12 (10)     |                        |
| Marking device   |                | Case style TO-247AC (JEDEC)          |  | 72CPQ030    |                        |

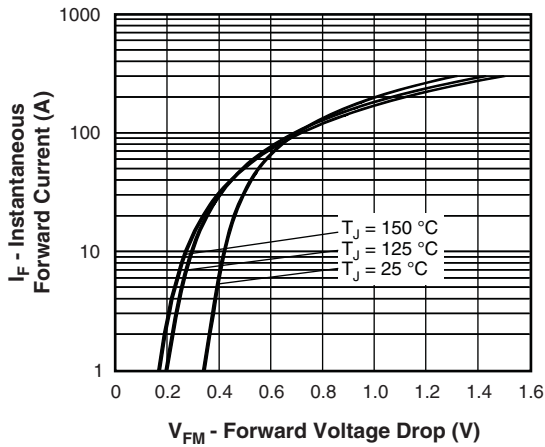


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

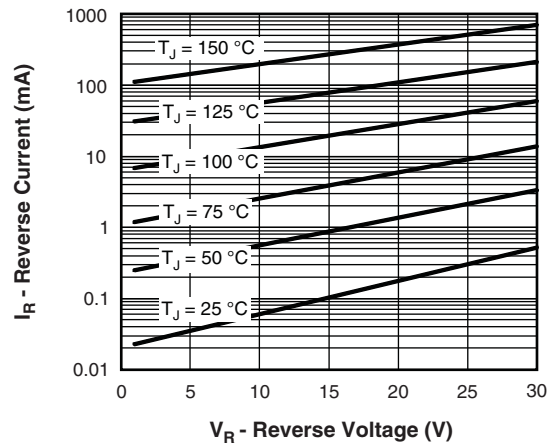


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

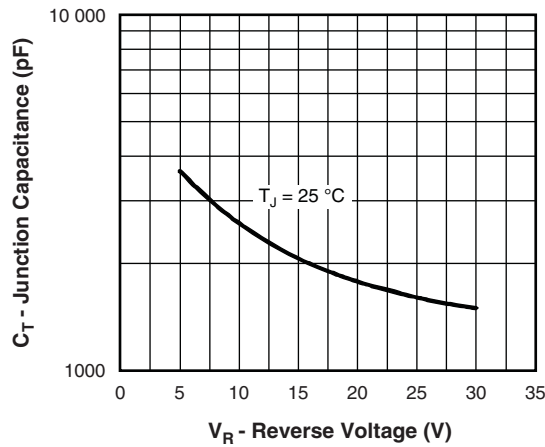


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

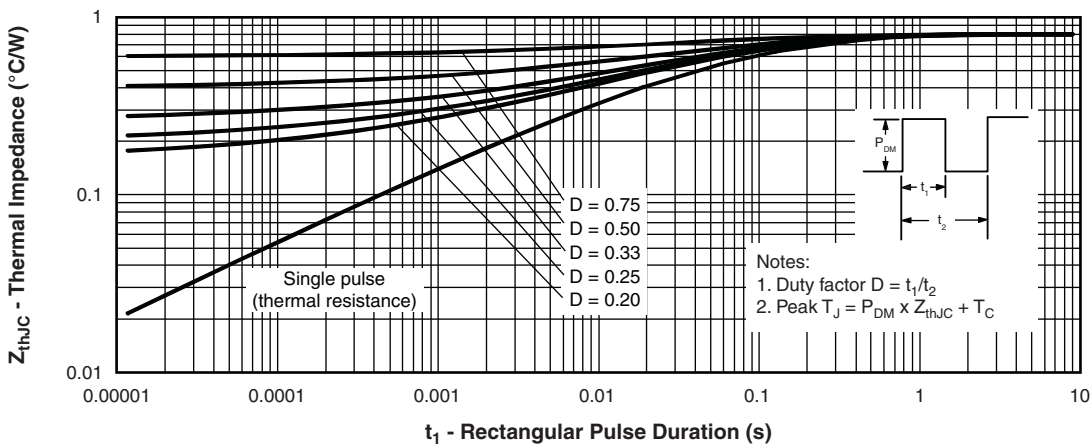


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

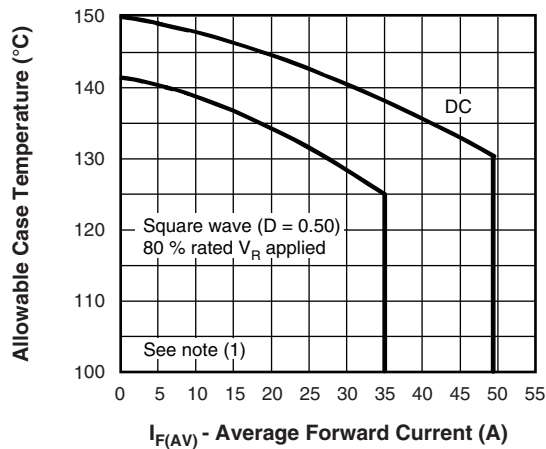


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

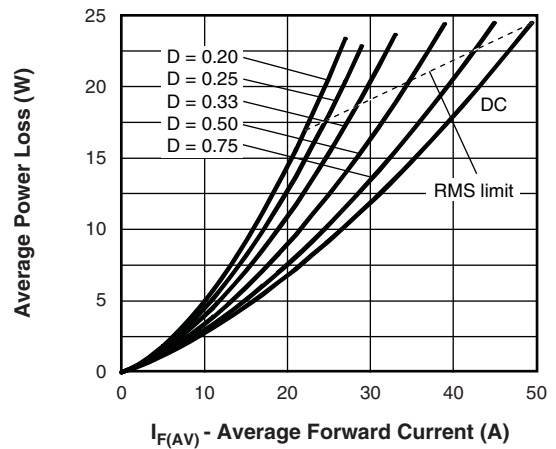


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

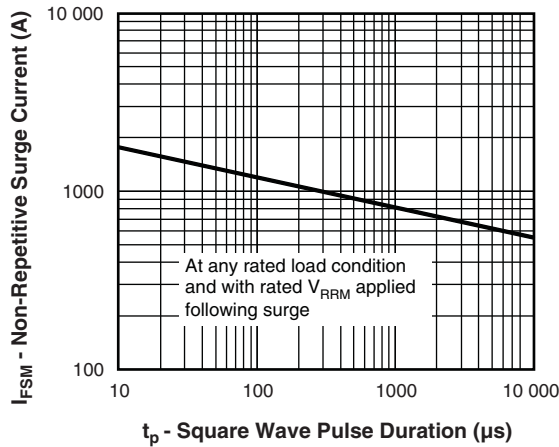


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

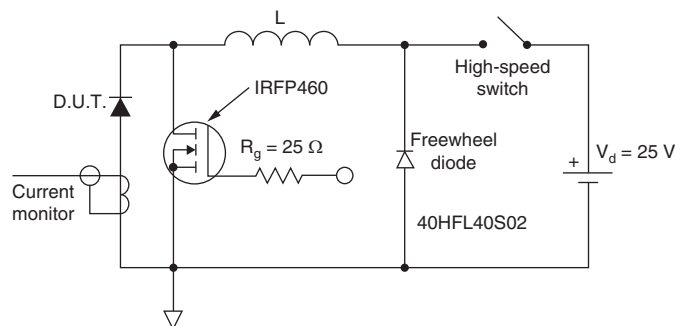


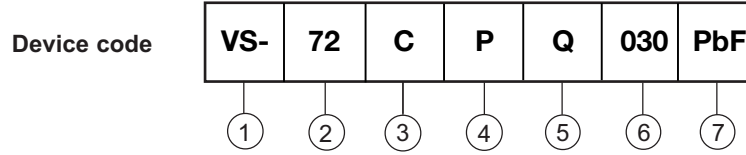
Fig. 8 - Unclamped Inductive Test Circuit

**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 (70 A)
- 3** - Circuit configuration:  
C = Common cathode
- 4** - Package:  
P = TO-247
- 5** - Schottky "Q" series
- 6** - Voltage code (030 = 30 V)
- 7** - Environmental digit
  - PbF = Lead (Pb)-free and RoHS compliant
  - -N3 = Halogen-free, RoHS compliant, and totally lead (Pb)-free

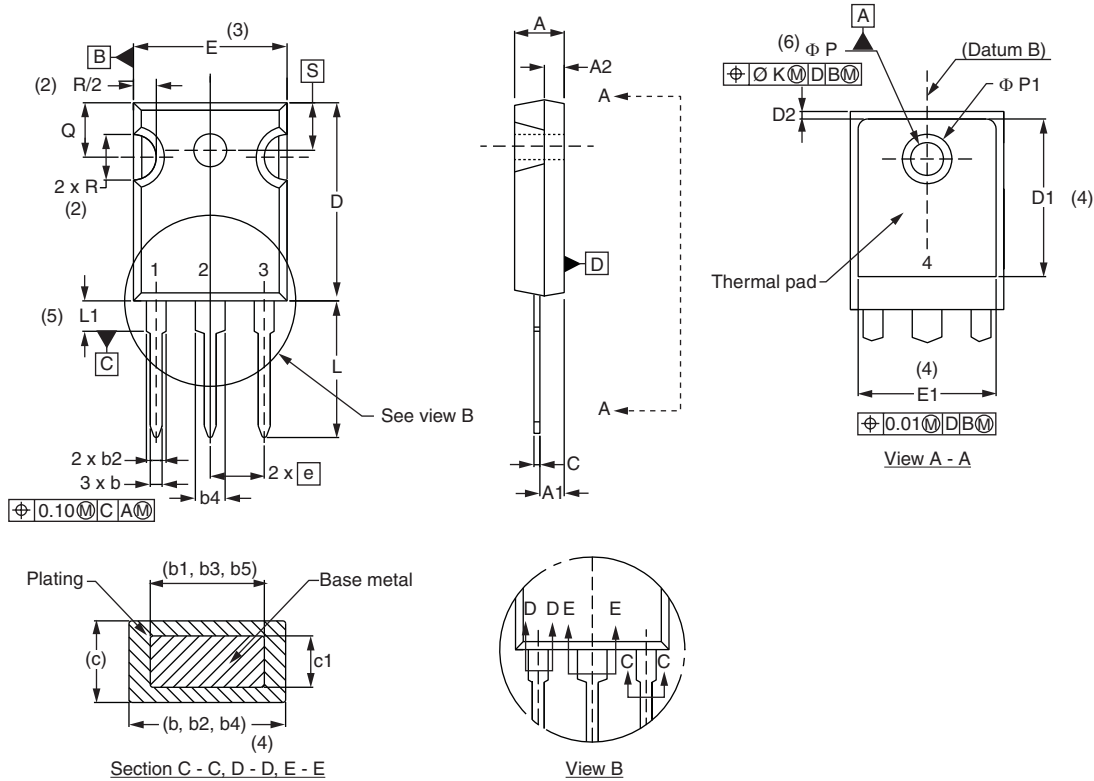
| ORDERING INFORMATION (Example) |                  |                        |                         |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N                  | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-72CPQ030PbF                 | 25               | 500                    | Antistatic plastic tube |
| VS-72CPQ030-N3                 | 25               | 500                    | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS |              |  |
|----------------------------|--------------|--|
| Dimensions                 |              | <a href="http://www.vishay.com/doc?95223">www.vishay.com/doc?95223</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

**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 |       | Ø 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 |       | Ø P    | 3.56        | 3.66  | 0.14      | 0.144 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       | Ø 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) 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



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