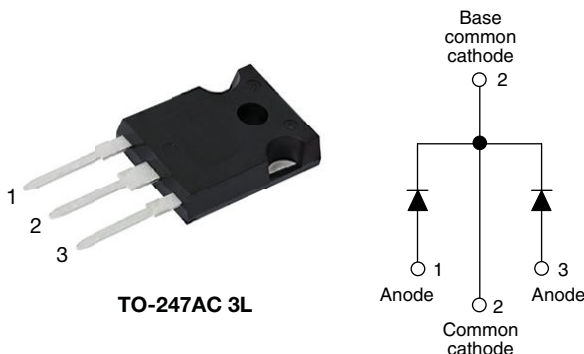


## High Performance Schottky Rectifier, 2 x 20 A



### 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

### PRIMARY CHARACTERISTICS

|                       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 2 x 20 A        |
| $V_R$                 | 40 V            |
| $V_F$ at $I_F$        | 0.43 V          |
| $I_{RM}$ max.         | 60 mA at 100 °C |
| $T_J$ max.            | 150 °C          |
| $E_{AS}$              | 27 mJ           |
| Package               | TO-247AC 3L     |
| Circuit configuration | Common cathode  |

### DESCRIPTION

The VS-STPS40L40CW... 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     |
| $V_{RRM}$   |   | 40          | V     |
| $I_{FSM}$   | $t_p = 5 \mu s$ sine                          | 3500        | A     |
| $V_F$       | 20 A <sub>pk</sub> , $T_J = 125$ °C (per leg) | 0.43        | V     |
| $T_J$       |   | -55 to +150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | VS-STPS40L40CW-N3 | UNITS |
|--------------------------------------|-----------|-------------------|-------|
| Maximum DC reverse voltage           | $V_R$     | 40                | 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 $T_C = 120$ °C, rectangular waveform   | 40     | A     |
| 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   | 3500   |       |
|   |             | 10 ms sine or 6 ms rect. pulse  | 430    |       |
| Non-repetitive avalanche energy per leg                                   | $E_{AS}$    | $T_J = 25$ °C, $I_{AS} = 4$ A, $L = 3.4$ 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 | 4      | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER   | SYMBOL         | TEST CONDITIONS   |                                     | VALUES | UNITS      |
|---|----------------|---|-------------------------------------|--------|------------|
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 20 A  | $T_J = 25\text{ }^{\circ}\text{C}$  | 0.49   | V          |
|   |                | 40 A  |                                     | 0.59   |            |
|   |                | 20 A  | $T_J = 125\text{ }^{\circ}\text{C}$ | 0.43   |            |
|   |                | 40 A  |                                     | 0.56   |            |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^{\circ}\text{C}$  | $V_R = \text{Rated } V_R$           | 0.8    | mA         |
|   |                | $T_J = 100\text{ }^{\circ}\text{C}$   |                                     | 60     |            |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^{\circ}\text{C}$ |                                     | 1850   | 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/ $\mu$ s |

**Note**(1) Pulse width < 300  $\mu$ s, duty cycle < 2 %**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER  | SYMBOL                            | TEST CONDITIONS                      | VALUES      | UNITS                  |
|--|-----------------------------------|--------------------------------------|-------------|------------------------|
| Maximum junction and storage temperature range           | T <sub>J</sub> , T <sub>Stg</sub> |                                      | -55 to 150  | °C                     |
| Maximum thermal resistance, junction to case per leg     | R <sub>thJC</sub>                 | DC operation<br>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 <sub>thCS</sub>                 | Mounting surface, smooth and greased | 0.24        |                        |
| Approximate weight                                       |                                   |                                      | 6           | g                      |
|  |                                   |                                      | 0.21        | oz.                    |
| Mounting torque  | minimum                           | Non-lubricated threads               | 6 (5)       | kgf · cm<br>(lbf · in) |
|  | maximum                           |                                      | 12 (10)     |                        |
| Marking device   |                                   | Case style TO-247AC 3L               | STPS40L40CW |                        |

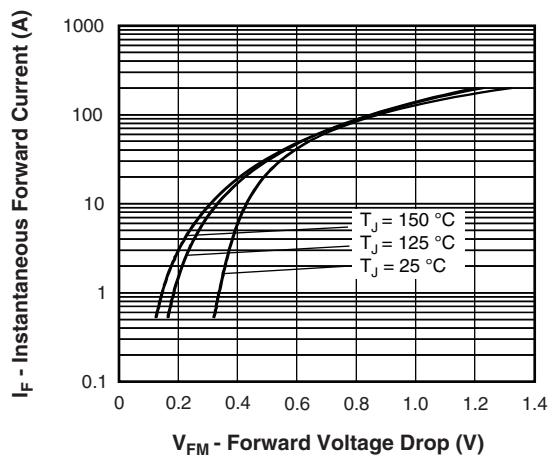


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

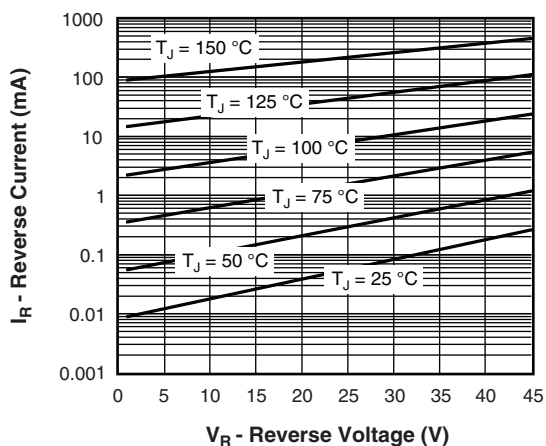


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

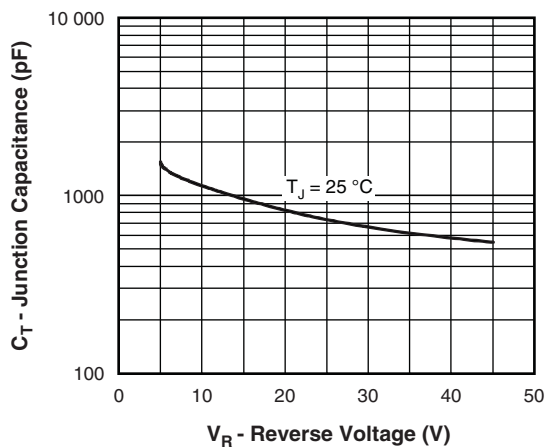


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

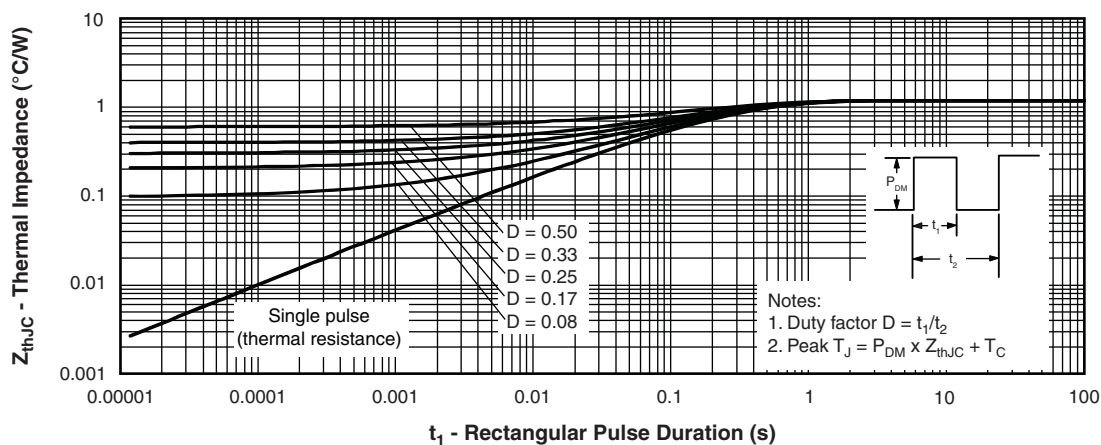


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

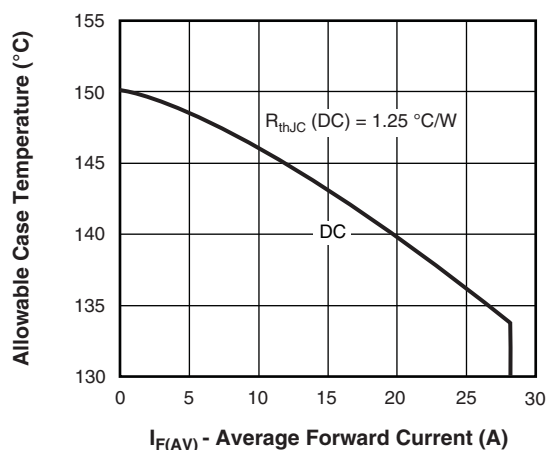


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

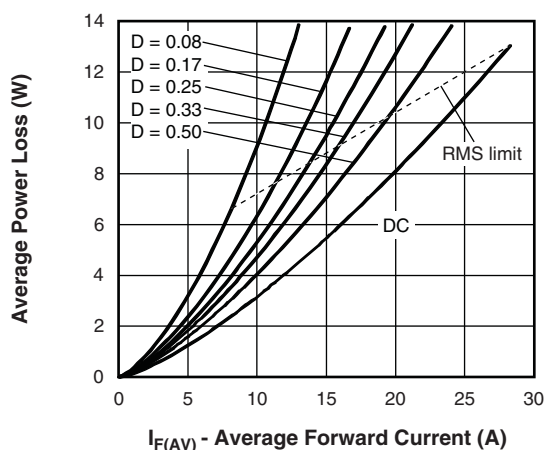


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

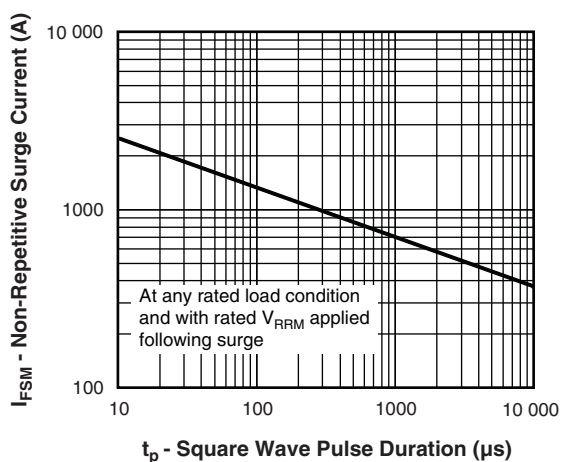


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

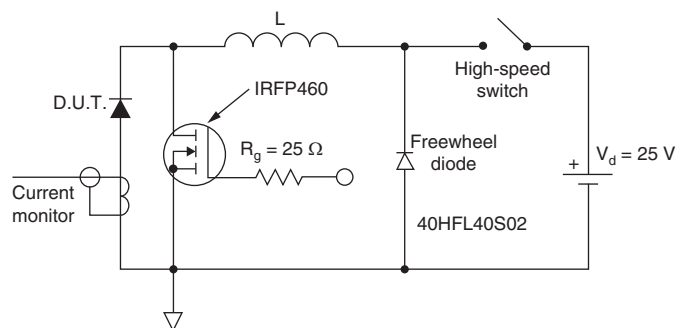


Fig. 8 - Unclamped Inductive Test Circuit



## ORDERING INFORMATION TABLE

|             |     |      |    |   |    |    |     |
|-------------|-----|------|----|---|----|----|-----|
| Device code | VS- | STPS | 40 | L | 40 | CW | -N3 |
|             | 1   | 2    | 3  | 4 | 5  | 6  | 7   |

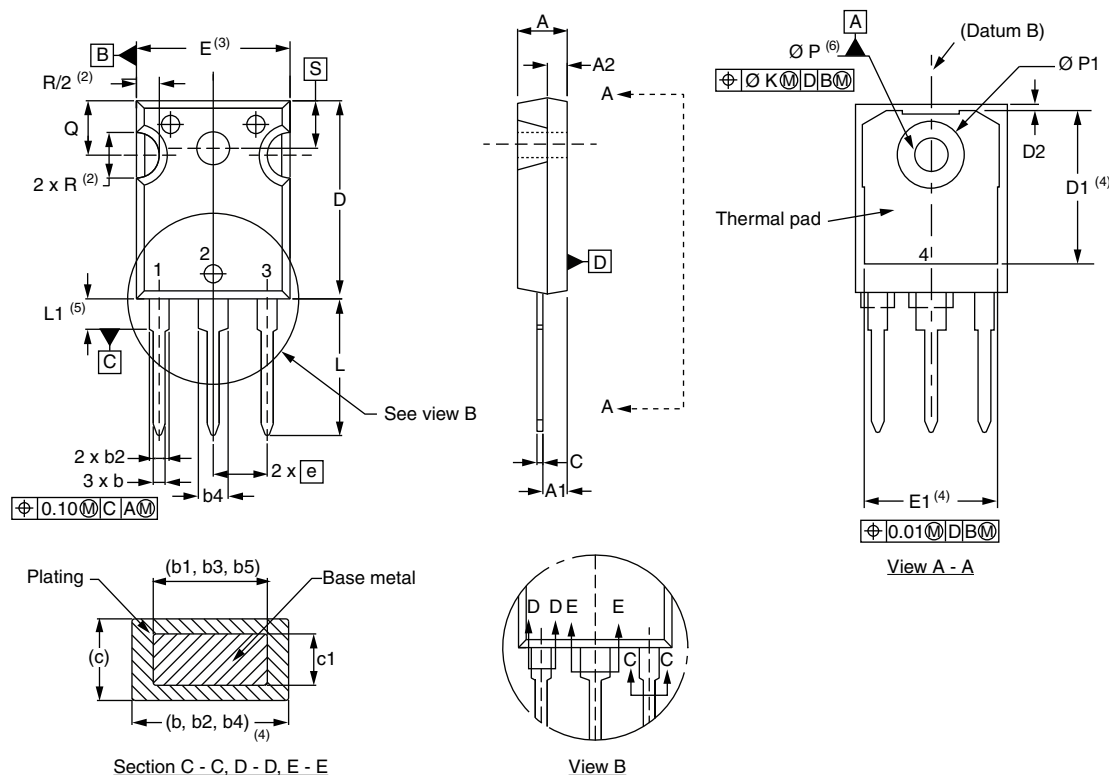
- 1** - Vishay Semiconductors product
- 2** - Schottky STPS series
- 3** - Current ratings (40 = 40 A)
- 4** - L = low forward voltage
- 5** - Voltage code (40 = 40 V)
- 6** - Package:  
CW = TO-247
- 7** - Environmental digit  
-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

| ORDERING INFORMATION (Example) |                  |                        |                         |
|--------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N                  | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-STPS40L40CW-N3              | 25               | 500                    | Antistatic plastic tube |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?96138">www.vishay.com/doc?96138</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95007">www.vishay.com/doc?95007</a> |

# TO-247AC 3L

**DIMENSIONS** in millimeters and inches



| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
| A      | 4.65        | 5.31  | 0.183  | 0.209 |       |
| A1     | 2.21        | 2.59  | 0.087  | 0.102 |       |
| A2     | 1.17        | 1.37  | 0.046  | 0.054 |       |
| b      | 0.99        | 1.40  | 0.039  | 0.055 |       |
| b1     | 0.99        | 1.35  | 0.039  | 0.053 |       |
| b2     | 1.65        | 2.39  | 0.065  | 0.094 |       |
| b3     | 1.65        | 2.34  | 0.065  | 0.092 |       |
| b4     | 2.59        | 3.43  | 0.102  | 0.135 |       |
| b5     | 2.59        | 3.38  | 0.102  | 0.133 |       |
| c      | 0.38        | 0.89  | 0.015  | 0.035 |       |
| c1     | 0.38        | 0.84  | 0.015  | 0.033 |       |
| D      | 19.71       | 20.70 | 0.776  | 0.815 | 3     |
| 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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