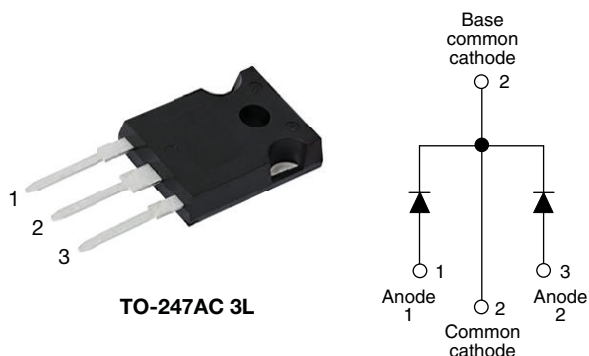


## High Performance Schottky Rectifier, 2 x 20 A



TO-247AC 3L

### FEATURES

- 125 °C  $T_J$  operation ( $V_R < 5$  V)
- Optimized for OR-ing applications
- Ultra 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             |
| $V_R$                 | 15 V                 |
| $V_F$ at $I_F$        | See Electrical table |
| $I_{RM}$ max.         | 600 mA at 100 °C     |
| $T_J$ max.            | 125 °C               |
| $E_{AS}$              | 10 mJ                |
| Package               | TO-247AC 3L          |
| Circuit configuration | Common cathode       |

### DESCRIPTION

The VS-STPS40L15CW... center tap Schottky rectifier module has been optimized for ultra low forward voltage drop specifically for the OR-ing of parallel power supplies. The proprietary barrier technology allows for reliable operation up to 125 °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                                   | 40          | A     |
| $V_{RRM}$   |                                                        | 15          | V     |
| $I_{FSM}$   | $t_p = 5$ $\mu$ s sine                                 | 700         | A     |
| $V_F$       | 19 A <sub>pk</sub> , $T_J = 125$ °C (per leg, typical) | 0.25        | V     |
| $T_J$       |                                                        | -55 to +125 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL    | TEST CONDITIONS | VS-STPS40L15CW-N3 | UNITS |
|--------------------------------------|-----------|-----------------|-------------------|-------|
| Maximum DC reverse voltage           | $V_R$     | $T_J = 100$ °C  | 15                | V     |
| Maximum working peak reverse voltage | $V_{RWM}$ |                 |                   |       |

### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                               | SYMBOL      | TEST CONDITIONS                                                                                                     | VALUES | UNITS |
|-------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------|--------|-------|
| Maximum average forward current, see fig. 5                             | $I_{F(AV)}$ | 50 % duty cycle at $T_C = 86$ °C, rectangular waveform                                                              | 20     | A     |
|                                                                         |             |                                                                                                                     | 40     |       |
| Maximum peak one cycle non-repetitive surge current per leg, see fig. 7 | $I_{FSM}$   | 5 $\mu$ s sine or 3 $\mu$ s rect. pulse                                                                             | 700    |       |
|                                                                         |             | 10 ms sine or 6 ms rect. pulse                                                                                      | 330    |       |
| Non-repetitive avalanche energy per leg                                 | $E_{AS}$    | $T_J = 25$ °C, $I_{AS} = 2$ A, $L = 5$ mH                                                                           | 10     | 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 | 2      | A     |

**ELECTRICAL SPECIFICATIONS**

| PARAMETER                                          | SYMBOL         | TEST CONDITIONS                                                    | TYP.   | MAX. | UNITS |
|----------------------------------------------------|----------------|--------------------------------------------------------------------|--------|------|-------|
| Maximum forward voltage drop per leg<br>See fig. 1 | $V_{FM}^{(1)}$ | 19 A                                                               | -      | 0.41 | V     |
|                                                    |                | 40 A                                                               |        | 0.52 |       |
|                                                    |                | 19 A                                                               | 0.25   | 0.33 |       |
|                                                    |                | 40 A                                                               |        | 0.50 |       |
| Reverse leakage current per leg<br>See fig. 2      | $I_{RM}^{(1)}$ | $T_J = 25\text{ °C}$                                               | -      | 10   | mA    |
|                                                    |                | $T_J = 100\text{ °C}$                                              | -      | 600  |       |
| Threshold voltage                                  | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$                                        | 0.182  |      | V     |
| Forward slope resistance                           | $r_t$          |                                                                    | 7.6    |      | mΩ    |
| Maximum junction capacitance per leg               | $C_T$          | $V_R = 5\text{ V}_{DC}$ (test signal range 100 kHz to 1 MHz) 25 °C | -      | 2000 | pF    |
| Typical series inductance per leg                  | $L_S$          | Measured lead to lead 5 mm from package body                       | 8      | -    | nH    |
| Maximum voltage rate of change                     | dV/dt          | Rated $V_R$                                                        | 10 000 |      | V/μs  |

**Note**

<sup>(1)</sup> Pulse width < 300 μs, duty cycle < 2 %

**THERMAL - MECHANICAL SPECIFICATIONS**

| PARAMETER                                                   | SYMBOL            | TEST CONDITIONS                      | VALUES      | UNITS                  |
|-------------------------------------------------------------|-------------------|--------------------------------------|-------------|------------------------|
| Maximum junction temperature range                          | T <sub>J</sub>    |                                      | - 55 to 125 | °C                     |
| Maximum storage temperature range                           | T <sub>Stg</sub>  |                                      | - 55 to 150 |                        |
| Maximum thermal resistance,<br>junction to case per leg     | R <sub>thJC</sub> | DC operation<br>See fig. 4           | 1.4         | °C/W                   |
| Maximum thermal resistance,<br>junction to case per package |                   | DC operation                         | 0.7         |                        |
| Typical thermal resistance,<br>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               | STPS40L15CW |                        |

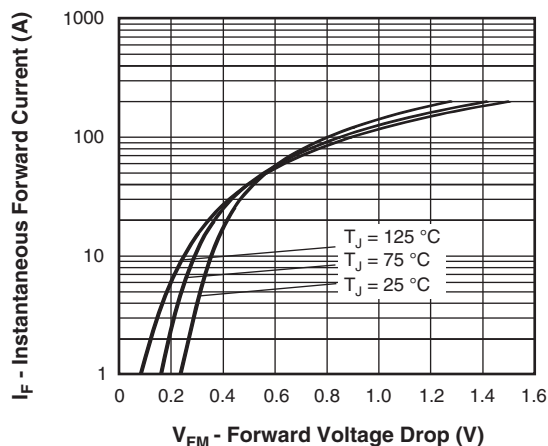


Fig. 1 - Maximum Forward Voltage Drop Characteristics

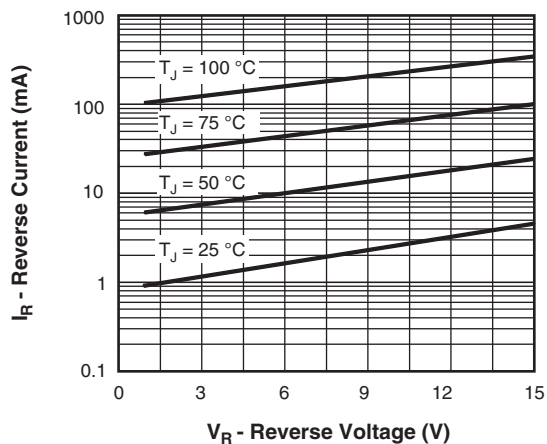


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

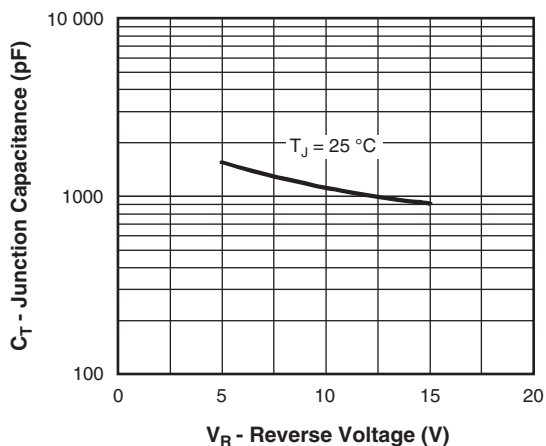
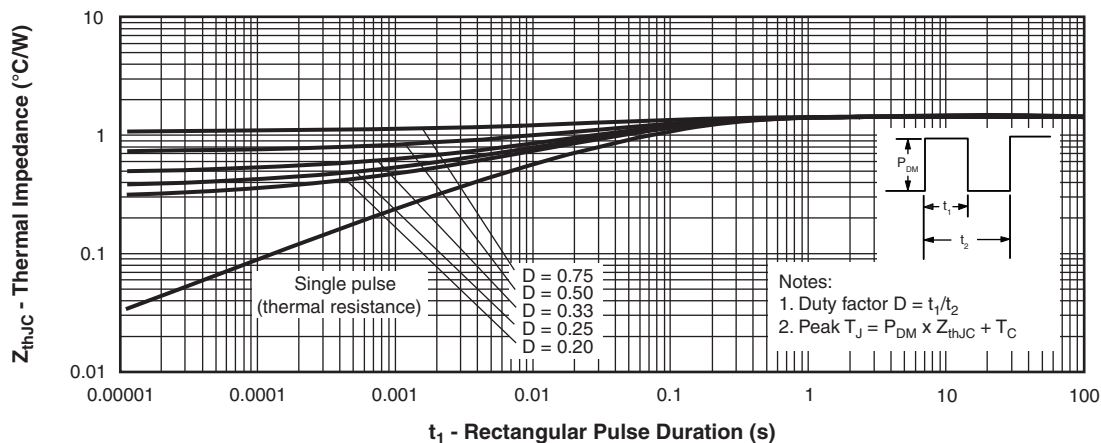


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

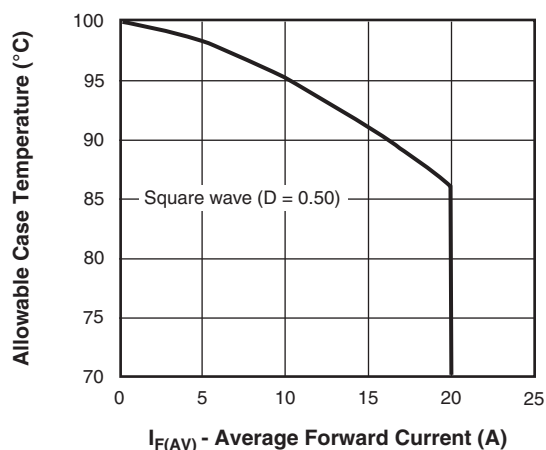


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

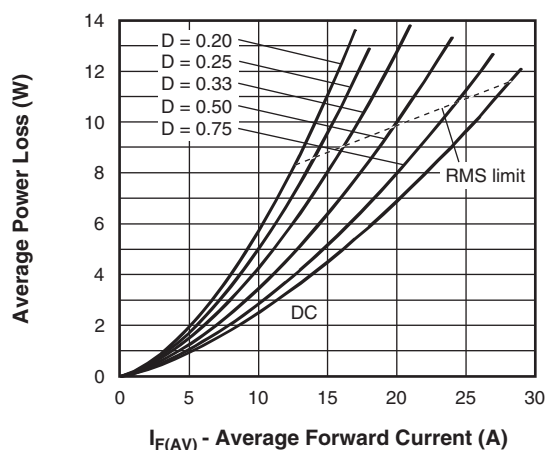


Fig. 6 - Forward Power Loss Characteristics

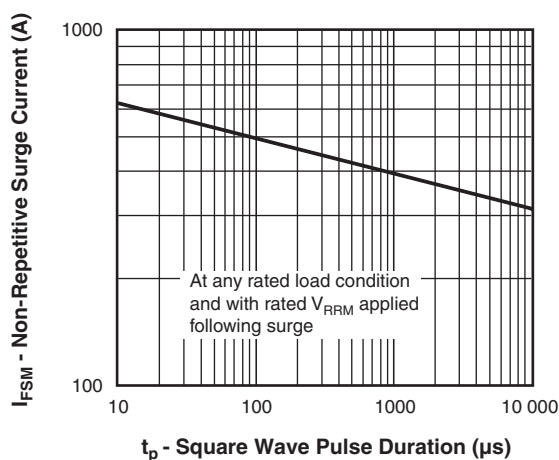


Fig. 7 - Maximum Non-Repetitive Surge Current

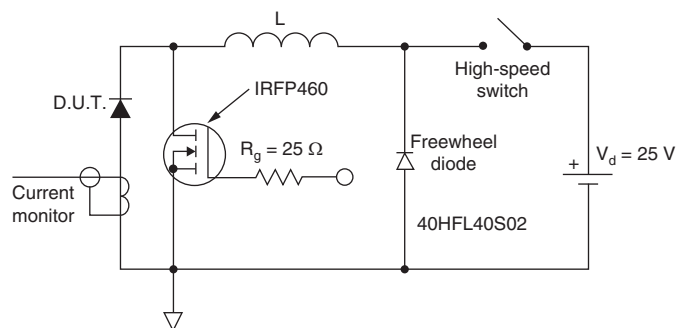


Fig. 8 - Unclamped Inductive Test Circuit

**ORDERING INFORMATION TABLE**

|             |            |             |           |          |           |           |            |
|-------------|------------|-------------|-----------|----------|-----------|-----------|------------|
| Device code | <b>VS-</b> | <b>STPS</b> | <b>40</b> | <b>L</b> | <b>15</b> | <b>CW</b> | <b>-N3</b> |
|             | 1          | 2           | 3         | 4        | 5         | 6         | 7          |

- |          |   |                                                                                       |
|----------|---|---------------------------------------------------------------------------------------|
| <b>1</b> | - | Vishay Semiconductors product                                                         |
| <b>2</b> | - | Schottky STPS series                                                                  |
| <b>3</b> | - | Current ratings (40 = 40 A)                                                           |
| <b>4</b> | - | L = low forward voltage                                                               |
| <b>5</b> | - | Voltage code (15 = 15 V)                                                              |
| <b>6</b> | - | Package:<br>CW = TO-247                                                               |
| <b>7</b> | - | Environmental digit<br>-N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free |

| <b>ORDERING INFORMATION</b> (Example) |                  |                        |                         |
|---------------------------------------|------------------|------------------------|-------------------------|
| PREFERRED P/N                         | QUANTITY PER T/R | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION   |
| VS-STPS40L15CW-N3                     | 25               | 500                    | Antistatic plastic tube |

| <b>LINKS TO RELATED DOCUMENTS</b> |                                                                        |
|-----------------------------------|------------------------------------------------------------------------|
| 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     |

| SYMBOL    | MILLIMETERS |       | INCHES    |       | NOTES |
|-----------|-------------|-------|-----------|-------|-------|
|           | MIN.        | MAX.  | MIN.      | MAX.  |       |
| D2        | 0.51        | 1.35  | 0.020     | 0.053 |       |
| E         | 15.29       | 15.87 | 0.602     | 0.625 | 3     |
| E1        | 13.46       | -     | 0.53      | -     |       |
| e         | 5.46 BSC    |       | 0.215 BSC |       |       |
| $\phi K$  | 0.254       |       | 0.010     |       |       |
| L         | 14.20       | 16.10 | 0.559     | 0.634 |       |
| L1        | 3.71        | 4.29  | 0.146     | 0.169 |       |
| $\phi P$  | 3.56        | 3.66  | 0.14      | 0.144 |       |
| $\phi P1$ | -           | 7.39  | -         | 0.291 |       |
| Q         | 5.31        | 5.69  | 0.209     | 0.224 |       |
| R         | 4.52        | 5.49  | 0.178     | 0.216 |       |
| S         | 5.51 BSC    |       | 0.217 BSC |       |       |

## 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)  $\phi P$  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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