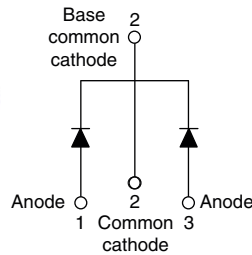


## High Performance Schottky Rectifier, 2 x 30 A



### FEATURES

- 175 °C T<sub>J</sub> 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
- 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

### DESCRIPTION

This center tap Schottky rectifier has been optimized for low reverse leakage at high temperature. The proprietary barrier technology allows for reliable operation up to 175 °C junction temperature. Typical applications are in switching power supplies, converters, freewheeling diodes, and reverse battery protection.

| PRIMARY CHARACTERISTICS          |                  |
|----------------------------------|------------------|
| I <sub>F(AV)</sub>               | 2 x 30 A         |
| V <sub>R</sub>                   | 35 V, 40 V, 45 V |
| V <sub>F</sub> at I <sub>F</sub> | 0.57 V           |
| I <sub>RM</sub> max.             | 40 mA at 125 °C  |
| T <sub>J</sub> max.              | 175 °C           |
| E <sub>AS</sub>                  | 27 mJ            |
| Package                          | TO-220AB 3L      |
| Circuit configuration            | Common cathode   |

| MAJOR RATINGS AND CHARACTERISTICS |  |             |       |
|-----------------------------------|--|-------------|-------|
| SYMBOL                            | CHARACTERISTICS                              | VALUES      | UNITS |
| I <sub>F(AV)</sub>                | Rectangular waveform (per device)            | 60          | A     |
| V <sub>RRM</sub>                  |  | 35 to 45    | V     |
| I <sub>FRM</sub>                  | T <sub>C</sub> = 142 °C (per leg)            | 60          | A     |
| I <sub>FSM</sub>                  | t <sub>p</sub> = 5 μs sine                   | 2600        |       |
| V <sub>F</sub>                    | 30 A <sub>pk</sub> , T <sub>J</sub> = 125 °C | 0.57        | V     |
| T <sub>J</sub>                    | Range  | -65 to +175 | °C    |

| VOLTAGE RATINGS                      |                  |                |                |                |       |
|--------------------------------------|------------------|----------------|----------------|----------------|-------|
| PARAMETER                            | SYMBOL           | VS-61CTQ035-M3 | VS-61CTQ040-M3 | VS-61CTQ045-M3 | UNITS |
| Maximum DC reverse voltage           | V <sub>R</sub>   | 35             | 40             | 45             | V     |
| Maximum working peak reverse voltage | V <sub>RWM</sub> |                |                |                |       |

| ABSOLUTE MAXIMUM RATINGS                                    |                    |  |        |       |
|---|--------------------|--|--------|-------|
| PARAMETER   | SYMBOL             | TEST CONDITIONS  | VALUES | UNITS |
| Maximum average forward current                             | I <sub>F(AV)</sub> | T <sub>C</sub> = 142 °C, rated V <sub>R</sub>  | 30     | A     |
|   |                    |  | 60     |       |
| Peak repetitive forward current per leg                     | I <sub>FRM</sub>   | Rated V <sub>R</sub> , square wave, 20 kHz, T <sub>C</sub> = 142 °C  | 60     |       |
| Maximum peak one cycle non-repetitive surge current per leg | I <sub>FSM</sub>   | 5 μs sine or 3 μs rect. pulse  | 2600   |       |
|   |                    | 10 ms sine or 6 ms rect. pulse   | 350    |       |
| Non-repetitive avalanche energy per leg                     | E <sub>AS</sub>    | T <sub>J</sub> = 25 °C, I <sub>AS</sub> = 4 A, L = 3.4 mH  | 27     | mJ    |
| Repetitive avalanche current per leg                        | I <sub>AR</sub>    | Current decaying linearly to zero in 1 μs<br>Frequency limited by T <sub>J</sub> maximum V <sub>A</sub> = 1.5 x V <sub>R</sub> typical | 4      | A     |



| <b>ELECTRICAL SPECIFICATIONS</b>      |                |   |                                   |      |                  |    |
|---------------------------------------|----------------|---|-----------------------------------|------|------------------|----|
| PARAMETER                             | SYMBOL         | TEST CONDITIONS   | TYP.                              | MAX. | UNITS            |    |
| Maximum forward voltage drop          | $V_{FM}^{(1)}$ | 30 A  | $T_J = 25\text{ }^\circ\text{C}$  | 0.57 | 0.61             | V  |
|                                       |                | 60 A  |                                   | 0.72 | 0.76             |    |
|                                       |                | 30 A  | $T_J = 125\text{ }^\circ\text{C}$ | 0.53 | 0.57             |    |
|                                       |                | 60 A  |                                   | 0.70 | 0.74             |    |
| Maximum instantaneous reverse current | $I_{RM}$       | $T_J = 25\text{ }^\circ\text{C}$  | Rated DC voltage                  | 0.06 | 1                | mA |
|                                       |                | $T_J = 125\text{ }^\circ\text{C}$   |                                   | 21   | 40               |    |
| Maximum junction capacitance          | $C_T$          | $V_R = 5\text{ }V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ | 1900                              |      | pF               |    |
| Typical series inductance             | $L_S$          | Measured from top of terminal to mounting plane   | 8.0                               |      | 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 %

| <b>THERMAL - MECHANICAL SPECIFICATIONS</b>           |                |                                      |             |                        |
|--|----------------|--------------------------------------|-------------|------------------------|
| PARAMETER  | SYMBOL         | TEST CONDITIONS                      | VALUES      | UNITS                  |
| Maximum junction and storage temperature range       | $T_J, T_{Stg}$ |                                      | -65 to +175 | $^\circ\text{C}$       |
| Maximum thermal resistance, junction to case per leg | $R_{thJC}$     | DC operation                         | 1.2         | $^\circ\text{C/W}$     |
| Typical thermal resistance, case to heatsink         | $R_{thCS}$     | Mounting surface, smooth and greased | 0.50        |                        |
| Approximate weight                                   |                |                                      | 2           | g                      |
|  |                |                                      | 0.07        | oz.                    |
| Mounting torque                                      | minimum        | Non-lubricated threads               | 6 (5)       | kgf · cm<br>(lbf · in) |
|  | maximum        |                                      | 12 (10)     |                        |
| Marking device                                       |                | Case style TO-220AB 3L               | 61CTQ035    |                        |
|  |                |                                      | 61CTQ040    |                        |
|  |                |                                      | 61CTQ045    |                        |

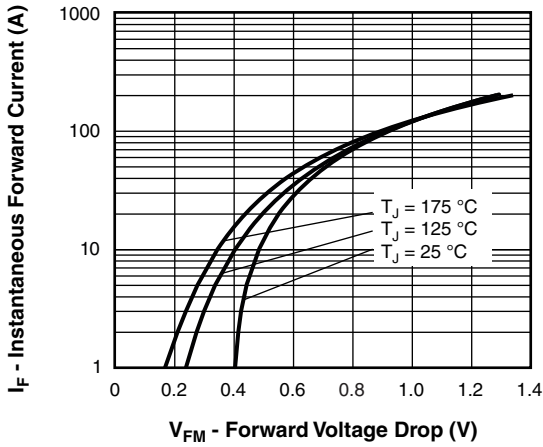


Fig. 1 - Maximum Forward Voltage Drop Characteristics

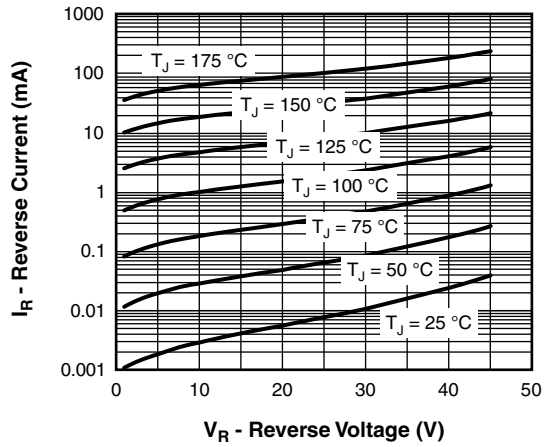


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

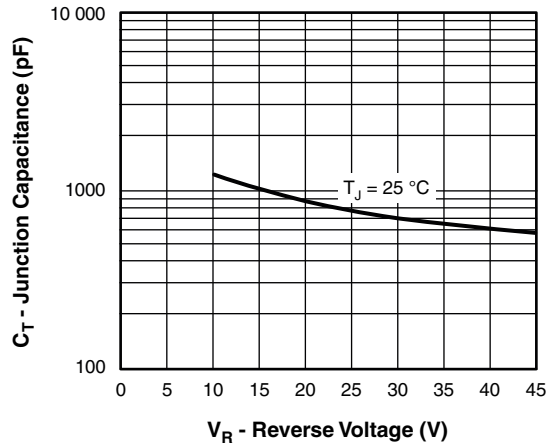


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

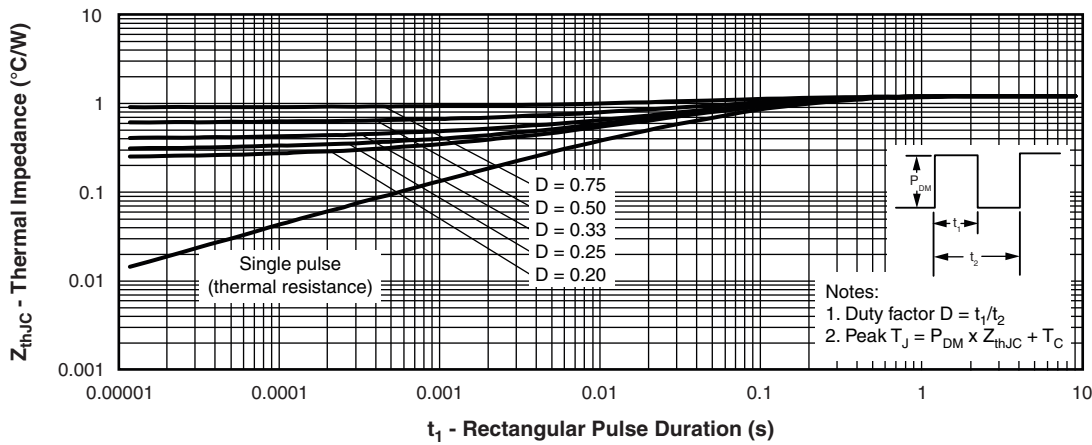


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

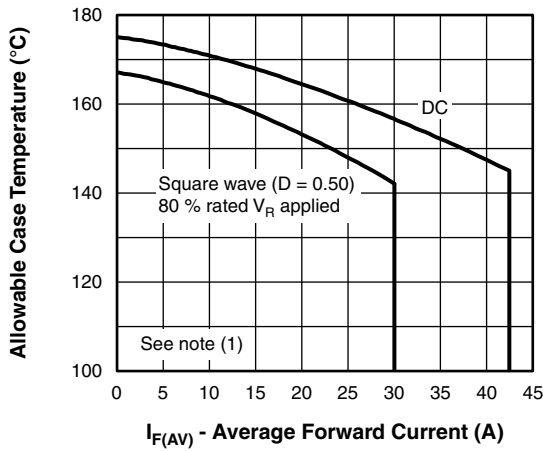


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

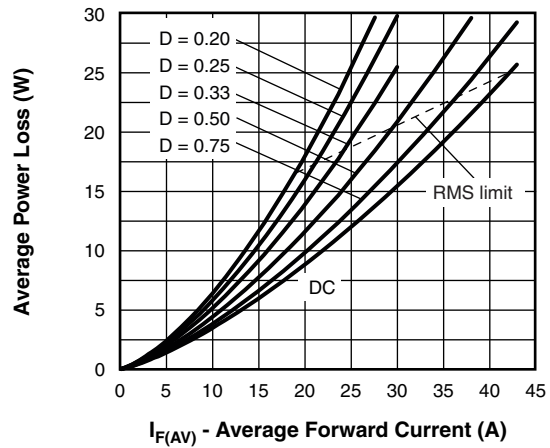


Fig. 6 - Forward Power Loss Characteristics

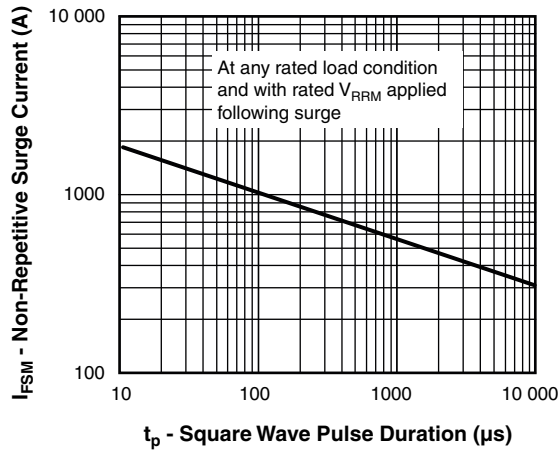


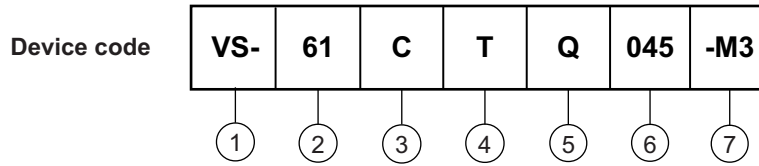
Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

**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 (60 = 60 A)
- 3** - Circuit configuration  
C = common cathode
- 4** - Package  
T = TO-220
- 5** - Schottky "Q" series
- 6** - Voltage ratings
 

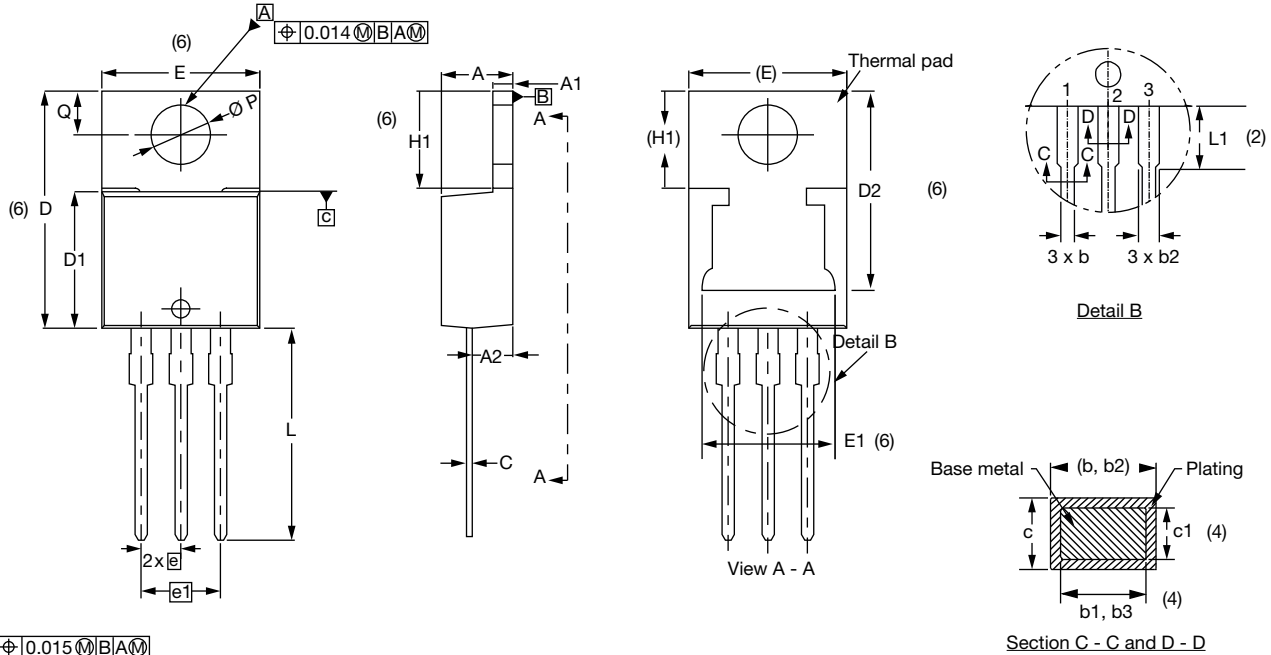
|            |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |
- 7** - Environmental digit  
-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

| ORDERING INFORMATION (Example) |               |                          |
|--------------------------------|---------------|--------------------------|
| PREFERRED P/N                  | BASE QUANTITY | PACKAGING DESCRIPTION    |
| VS-61CTQ035-M3                 | 50            | Antistatic plastic tubes |
| VS-61CTQ040-M3                 | 50            | Antistatic plastic tubes |
| VS-61CTQ045-M3                 | 50            | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?96154">www.vishay.com/doc?96154</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95028">www.vishay.com/doc?95028</a> |

### TO-220AB 3L

**DIMENSIONS** in millimeters and inches



Conforms to JEDEC® outline TO-220AB

| SYMBOL | MILLIMETERS |       | INCHES |       | NOTES |
|--------|-------------|-------|--------|-------|-------|
|        | MIN.        | MAX.  | MIN.   | MAX.  |       |
| A      | 4.25        | 4.65  | 0.167  | 0.183 |       |
| A1     | 1.14        | 1.40  | 0.045  | 0.055 |       |
| A2     | 2.50        | 2.92  | 0.098  | 0.115 |       |
| b      | 0.69        | 1.01  | 0.027  | 0.040 |       |
| b1     | 0.38        | 0.97  | 0.015  | 0.038 | 4     |
| b2     | 1.20        | 1.73  | 0.047  | 0.068 |       |
| b3     | 1.14        | 1.73  | 0.045  | 0.068 | 4     |
| c      | 0.36        | 0.61  | 0.014  | 0.024 |       |
| c1     | 0.36        | 0.56  | 0.014  | 0.022 | 4     |
| D      | 14.85       | 15.35 | 0.585  | 0.604 | 3     |
| D1     | 8.38        | 9.02  | 0.330  | 0.355 |       |
| D2     | 11.68       | 13.30 | 0.460  | 0.524 | 6, 7  |
| E      | 10.11       | 10.51 | 0.398  | 0.414 | 3, 6  |
| E1     | 6.86        | 8.89  | 0.270  | 0.350 | 6     |
| e      | 2.41        | 2.67  | 0.095  | 0.105 |       |
| e1     | 4.88        | 5.28  | 0.192  | 0.208 |       |
| H1     | 6.09        | 6.48  | 0.240  | 0.255 | 6     |
| L      | 13.52       | 14.02 | 0.532  | 0.552 |       |
| L1     | 3.32        | 3.82  | 0.131  | 0.150 | 2     |
| Ø P    | 3.54        | 3.91  | 0.139  | 0.154 |       |
| Q      | 2.60        | 3.00  | 0.102  | 0.118 |       |

**Notes**

- (1) Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, 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) Dimension b1, b3, and c1 apply to base metal only
- (5) Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2



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