



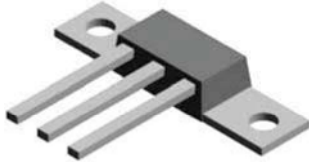
**THE DATASHEET OF  
VS-80CNQ045APBF**



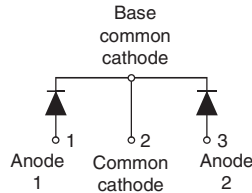


## High Performance Schottky Rectifier, New Generation 3, D-61 Package, 2 x 40 A

VS-80CNQ...APbF



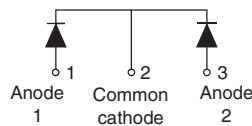
D-61-8



VS-80CNQ...ASMPbF



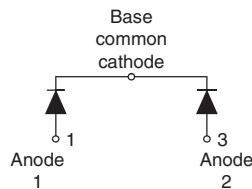
D-61-8-SM



VS-80CNQ...ASLPbF



D-61-8-SL



### FEATURES

- 150 °C T<sub>J</sub> operation
- Center tap module
- Very low forward voltage drop
- High frequency operation
- High power discrete
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- Guard ring for enhanced ruggedness and long term reliability
- New fully transfer-mould low profile, small footprint, high current package
- Through-hole versions are currently available for use in lead (Pb)-free applications (“PbF” suffix)
- Designed and qualified for industrial level
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT

### DESCRIPTION

The center tap Schottky rectifier module series 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.

### PRODUCT SUMMARY

|                                  |                  |
|----------------------------------|------------------|
| Package                          | D-61             |
| I <sub>F(AV)</sub>               | 2 x 40 A         |
| V <sub>R</sub>                   | 35 V, 40 V, 45 V |
| V <sub>F</sub> at I <sub>F</sub> | 0.51 V           |
| I <sub>RM</sub> max.             | 250 mA at 125 °C |
| T <sub>J</sub> max.              | 150 °C           |
| Diode variation                  | Common cathode   |
| E <sub>AS</sub>                  | 54 mJ            |

### MAJOR RATINGS AND CHARACTERISTICS

| SYMBOL             | CHARACTERISTICS  | VALUES      | UNITS |
|--------------------|--|-------------|-------|
| I <sub>F(AV)</sub> | Rectangular waveform                                   | 80          | A     |
| V <sub>R(RM)</sub> | Range  | 35 to 45    | V     |
| I <sub>FSM</sub>   | t <sub>p</sub> = 5 μs sine                             | 5800        | A     |
| V <sub>F</sub>     | 40 A <sub>pk</sub> , T <sub>J</sub> = 125 °C (per leg) | 0.47        | V     |
| T <sub>J</sub>     | Range  | -55 to +150 | °C    |

### VOLTAGE RATINGS

| PARAMETER                            | SYMBOL           | VS-80CNQ035APbF | VS-80CNQ040APbF | VS-80CNQ045APbF | 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<br>See fig. 5                             | $I_{F(AV)}$ | per leg   | 50 % duty cycle at $T_C = 114\text{ }^\circ\text{C}$ , rectangular waveform | 40     | A     |
|   |             | per device  |   | 80     |       |
| Maximum peak one cycle non-repetitive surge current per leg<br>See fig. 7 | $I_{FSM}$   | 5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse   | Following any rated load condition and with rated $V_{RRM}$ applied         | 5800   |       |
|   |             | 10 ms sine or 6 ms rect. pulse  |   | 750    |       |
| Non-repetitive avalanche energy per leg                                   | $E_{AS}$    | $T_J = 25\text{ }^\circ\text{C}$ , $I_{AS} = 8\text{ A}$ , $L = 1.7\text{ mH}$  |   | 54     | mJ    |
| Repetitive avalanche current per leg                                      | $I_{AR}$    | Current decaying linearly to zero in 1 $\mu\text{s}$<br>Frequency limited by $T_J$ maximum $V_A = 1.5 \times V_R$ typical |   | 8      | A     |

| ELECTRICAL SPECIFICATIONS                             |                |  |                                   |        |                  |
|---|----------------|--|-----------------------------------|--------|------------------|
| PARAMETER   | SYMBOL         | TEST CONDITIONS  |                                   | VALUES | UNITS            |
| Maximum forward voltage drop per leg<br>See fig. 1    | $V_{FM}^{(1)}$ | 40 A   | $T_J = 25\text{ }^\circ\text{C}$  | 0.52   | V                |
|   |                | 80 A   |                                   | 0.66   |                  |
|   |                | 40 A   | $T_J = 125\text{ }^\circ\text{C}$ | 0.47   |                  |
|   |                | 80 A   |                                   | 0.61   |                  |
| Maximum reverse leakage current per leg<br>See fig. 2 | $I_{RM}^{(1)}$ | $T_J = 25\text{ }^\circ\text{C}$   | $V_R = \text{Rated } V_R$         | 5      | mA               |
|   |                | $T_J = 125\text{ }^\circ\text{C}$  |                                   | 250    |                  |
| Threshold voltage                                     | $V_{F(TO)}$    | $T_J = T_J \text{ maximum}$  |                                   | 0.26   | V                |
| Forward slope resistance                              | $r_t$          |  |                                   | 3.93   | m $\Omega$       |
| Maximum junction capacitance per leg                  | $C_T$          | $V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz) $25\text{ }^\circ\text{C}$ |                                   | 2600   | pF               |
| Typical series inductance per leg                     | $L_S$          | Measured lead to lead 5 mm from package body                                     |                                   | 5.5    | 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,<br>junction to case | $R_{thJC}$     | DC operation (see fig. 4)  |  | 0.85        | $^\circ\text{C/W}$     |
|   |                | DC operation   |  | 0.42        |                        |
| Typical thermal resistance, case to heatsink    | $R_{thCS}$     | Mounting surface, smooth and greased<br>Device flatness < 5 mils |  | 0.30        |                        |
| Approximate weight                              |                |  |  | 7.8         | g                      |
|   |                |  |  | 0.28        | oz.                    |
| Mounting torque                                 |                | minimum  |  | 40 (35)     | kgf · cm<br>(lbf · in) |
|   |                | maximum  |  | 58 (50)     |                        |
| Marking device                                  |                | Case style D-61  |  | 80CNQ035A   |                        |
|   |                |  |  | 80CNQ040A   |                        |
|   |                |  |  | 80CNQ045A   |                        |
|   |                | Case style D-61-8-SM   |  | 80CNQ035ASM |                        |
|   |                |  |  | 80CNQ040ASM |                        |
|   |                |  |  | 80CNQ045ASM |                        |
|   |                | Case style D-61-8-SL   |  | 80CNQ035ASL |                        |
|   |                |  |  | 80CNQ040ASL |                        |
|   |                |  |  | 80CNQ045ASL |                        |

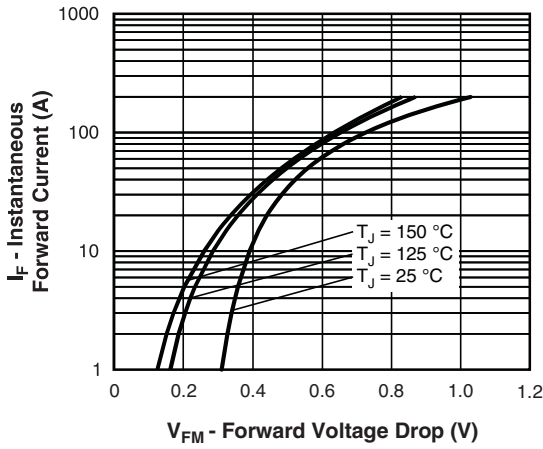


Fig. 1 - Maximum Forward Voltage Drop Characteristics (Per Leg)

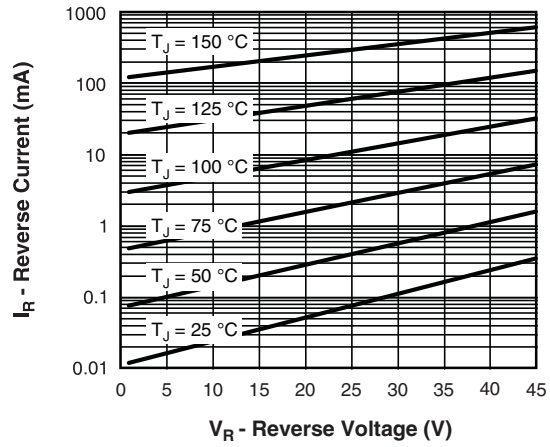


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage (Per Leg)

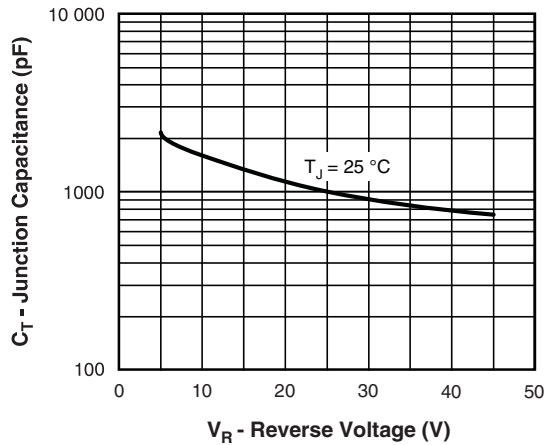


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage (Per Leg)

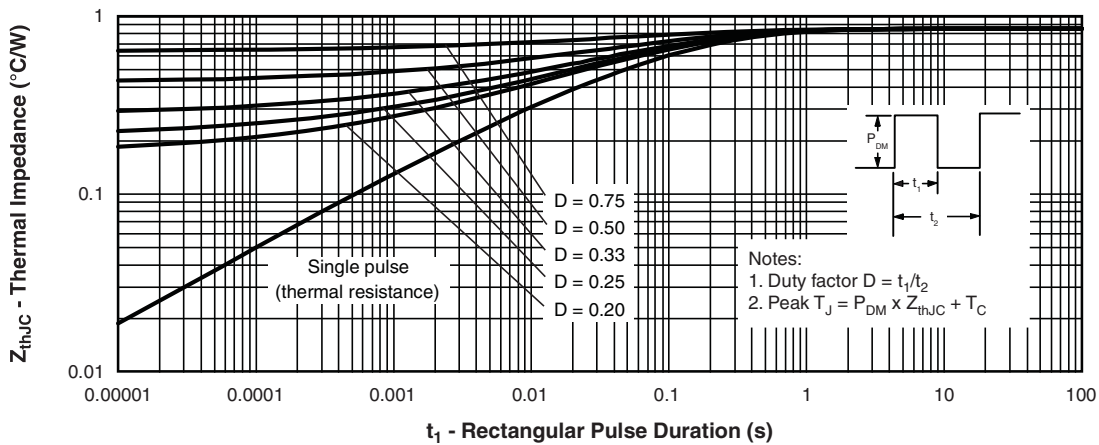


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

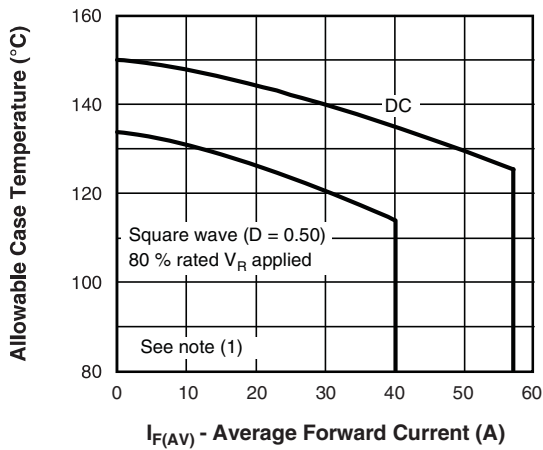


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current (Per Leg)

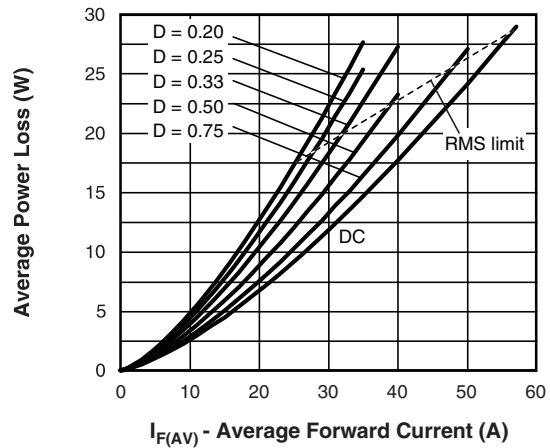


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

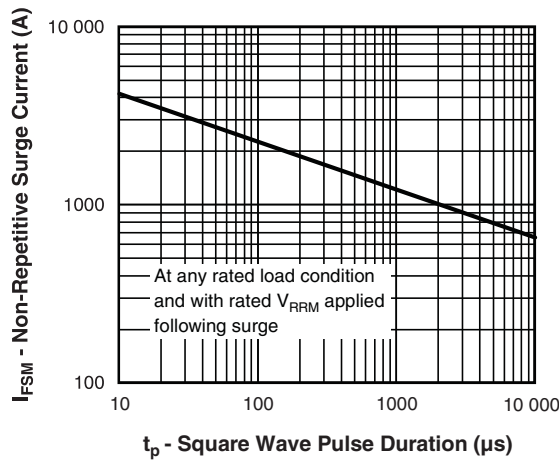


Fig. 7 - Maximum Non-Repetitive Surge Current (Per Leg)

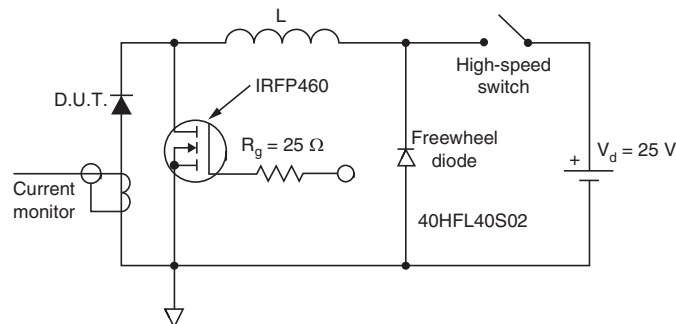


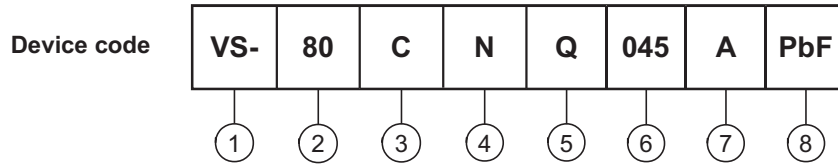
Fig. 8 - Unclamped Inductive Test Circuit

**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 (80 A)
- 3** - Circuit configuration:  
C = common cathode
- 4** - Package:  
N = D-61
- 5** - Schottky "Q" series
- 6** - Voltage ratings
 

|            |
|------------|
| 035 = 35 V |
| 040 = 40 V |
| 045 = 45 V |
- 7** - Package style:
  - A = D-61-8
  - ASM = D-61-8-SM
  - ASL = D-61-8-SL
- 8** -
  - None = standard production
  - PbF = lead (Pb)-free

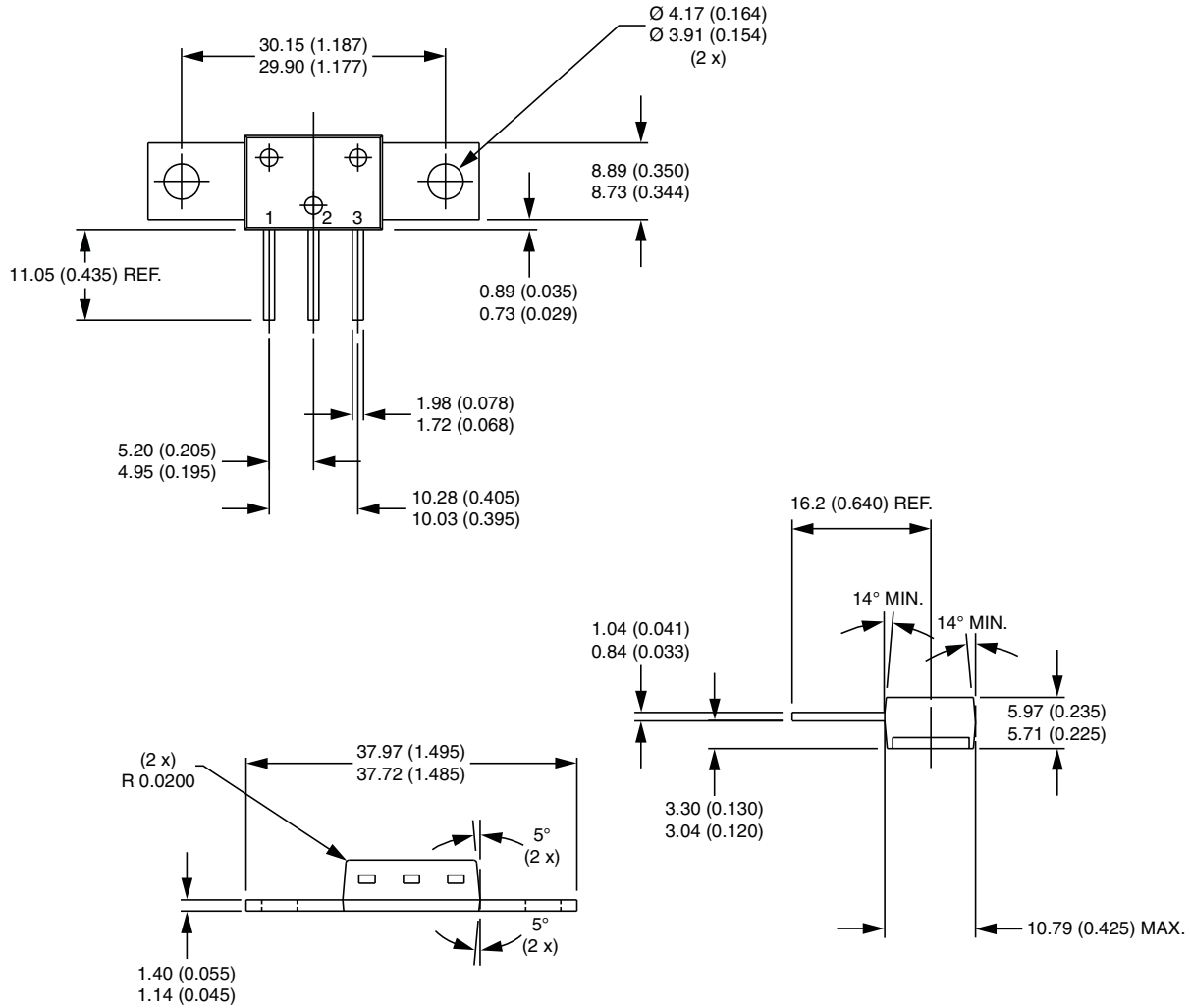
| ORDERING INFORMATION (Example) |                   |                        |                          |
|--------------------------------|-------------------|------------------------|--------------------------|
| PREFERRED P/N                  | QUANTITY PER REEL | MINIMUM ORDER QUANTITY | PACKAGING DESCRIPTION    |
| VS-80CNQ035PBF                 | 10                | 200                    | Antistatic plastic tubes |
| VS-80CNQ035ASLPBF              | 20                | 400                    | Antistatic plastic tubes |
| VS-80CNQ035ASMPBF              | 20                | 400                    | Antistatic plastic tubes |
| VS-80CNQ040APBF                | 10                | 200                    | Antistatic plastic tubes |
| VS-80CNQ040ASLPBF              | 20                | 400                    | Antistatic plastic tubes |
| VS-80CNQ040ASMPBF              | 20                | 400                    | Antistatic plastic tubes |
| VS-80CNQ035APBF                | 10                | 200                    | Antistatic plastic tubes |
| VS-80CNQ035ASLPBF              | 20                | 400                    | Antistatic plastic tubes |
| VS-80CNQ035ASMPBF              | 20                | 400                    | Antistatic plastic tubes |

| LINKS TO RELATED DOCUMENTS |  |
|----------------------------|--|
| Dimensions                 | <a href="http://www.vishay.com/doc?95354">www.vishay.com/doc?95354</a> |
| Part marking information   | <a href="http://www.vishay.com/doc?95356">www.vishay.com/doc?95356</a> |



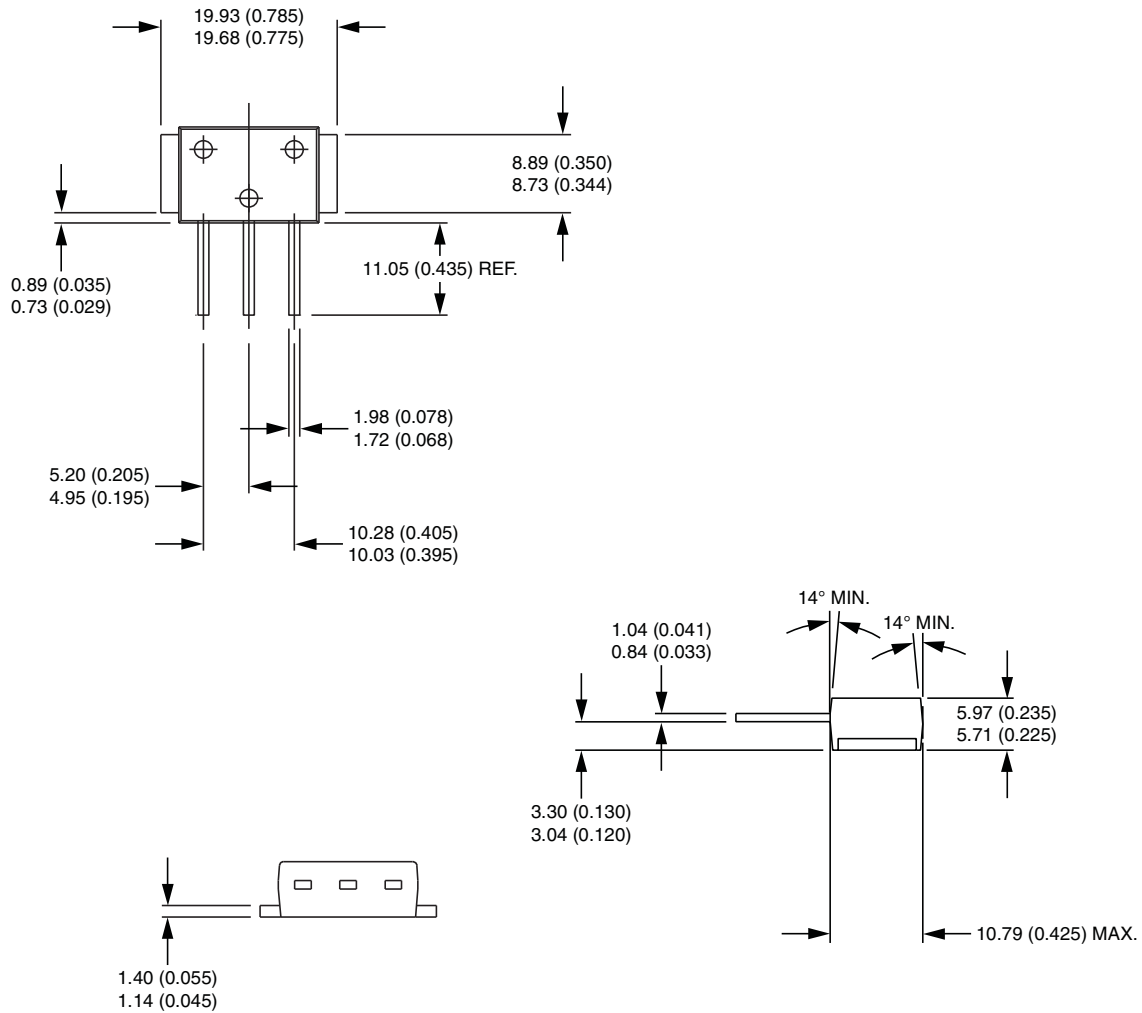
## D-61-8, D-61-8-SM, D-61-8-SL

**DIMENSIONS - D-61-8** in millimeters (inches)



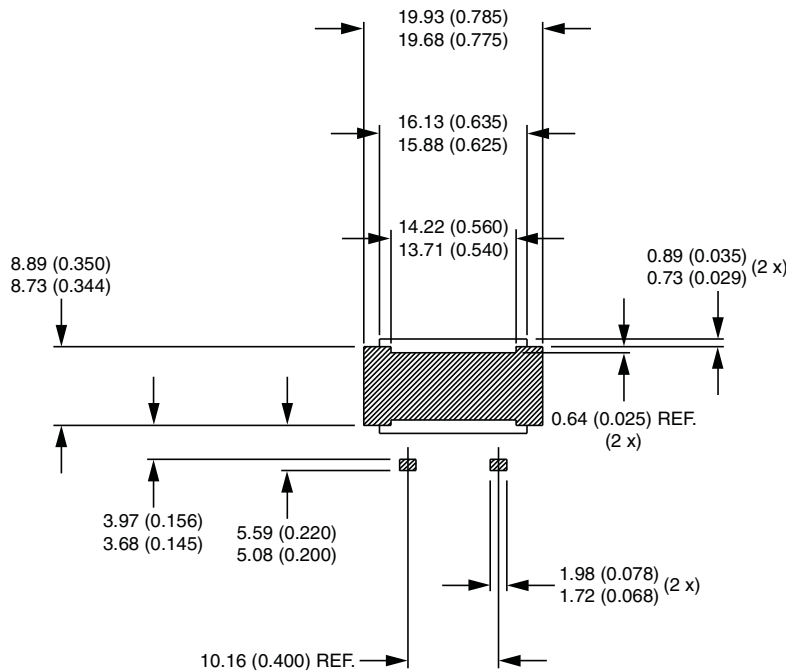
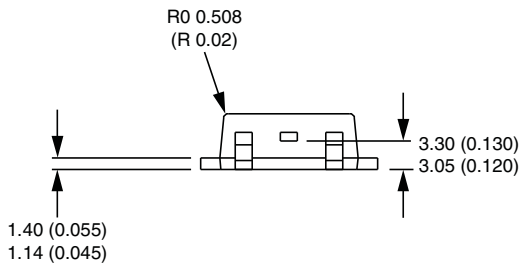
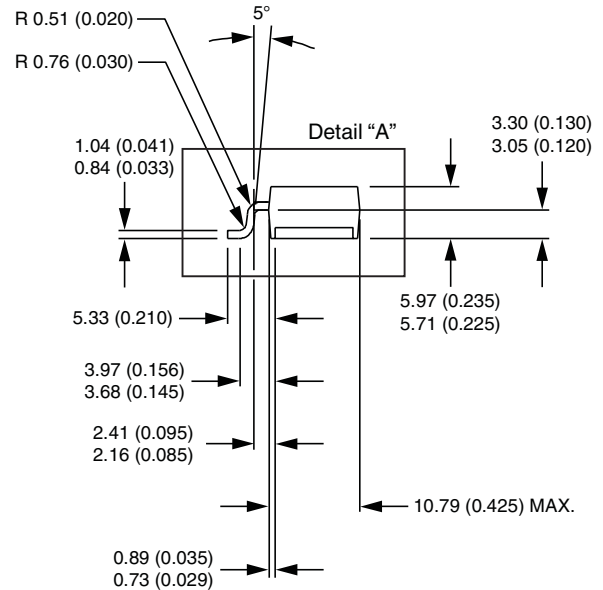
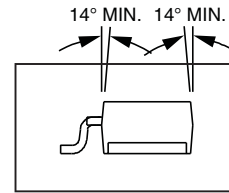
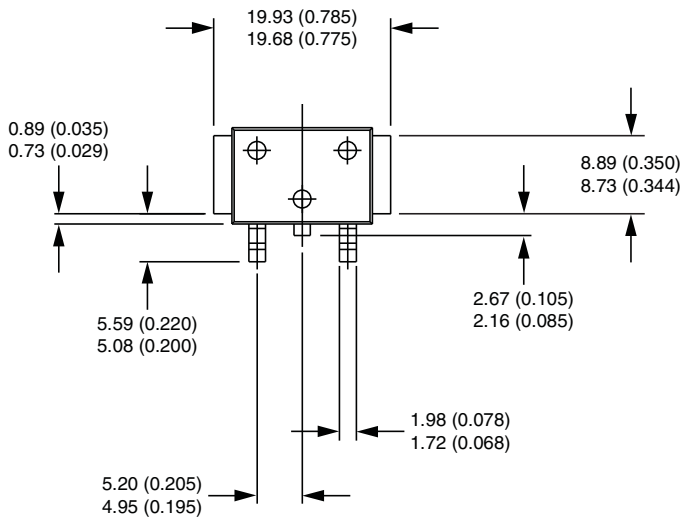


## DIMENSIONS - D-61-8-SM in millimeters (inches)





### DIMENSIONS - D-61-8-SL in millimeters (inches)





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