

## Standard Recovery Diodes, (Stud Version), 40 A



DO-203AB (DO-5)

### FEATURES

- High surge current capability
- Stud cathode and stud anode version
- Leaded version available
- Types up to 1600 V  $V_{RRM}$
- Designed and qualified for multiple level
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### TYPICAL APPLICATIONS

- Battery charges
- Converters
- Power supplies
- Machine tool controls
- Welding

### PRODUCT SUMMARY

|                       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 40 A            |
| Package               | DO-203AB (DO-5) |
| Circuit configuration | Single diode    |

### MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER    | TEST CONDITIONS | 40HF(R)     |              | UNITS            |
|--------------|-----------------|-------------|--------------|------------------|
|              |                 | 10 TO 120   | 140/160      |                  |
| $I_{F(AV)}$  |                 | 40          | 40           | A                |
|              | $T_C$           | 140         | 110          | °C               |
| $I_{F(RMS)}$ |                 | 62          | 62           | A                |
| $I_{FSM}$    | 50 Hz           | 570         | 570          | A                |
|              | 60 Hz           | 595         | 595          |                  |
| $I^2t$       | 50 Hz           | 1600        | 1600         | A <sup>2</sup> s |
|              | 60 Hz           | 1450        | 1450         |                  |
| $V_{RRM}$    | Range           | 100 to 1200 | 1400 to 1600 | V                |
| $T_J$        |                 | -65 to 190  | -65 to 160   | °C               |

### ELECTRICAL SPECIFICATIONS

#### VOLTAGE RATINGS

| TYPE NUMBER | VOLTAGE CODE | $V_{RRM}$ , MAXIMUM REPETITIVE PEAK REVERSE VOLTAGE<br>V | $V_{RSM}$ , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM<br>mA |
|-------------|--------------|----------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------|
| VS-40HF(R)  | 10           | 100                                                      | 200                                                          | 9                                              |
|             | 20           | 200                                                      | 300                                                          |                                                |
|             | 40           | 400                                                      | 500                                                          |                                                |
|             | 60           | 600                                                      | 700                                                          |                                                |
|             | 80           | 800                                                      | 900                                                          |                                                |
|             | 100          | 1000                                                     | 1100                                                         |                                                |
|             | 120          | 1200                                                     | 1300                                                         |                                                |
|             | 140          | 1400                                                     | 1500                                                         | 4.5                                            |
|             | 160          | 1600                                                     | 1700                                                         |                                                |



| FORWARD CONDUCTION                                            |                     |                                                                                           |                      |                                                                       |           |         |                   |
|---------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------|----------------------|-----------------------------------------------------------------------|-----------|---------|-------------------|
| PARAMETER                                                     | SYMBOL              | TEST CONDITIONS                                                                           |                      |                                                                       | 40HF(R)   |         | UNITS             |
|                                                               |                     |                                                                                           |                      |                                                                       | 10 TO 120 | 140/160 |                   |
| Maximum average forward current at case temperature           | I <sub>F(AV)</sub>  | 180° conduction, half sine wave                                                           |                      |                                                                       | 40        | 40      | A                 |
|                                                               |                     |                                                                                           |                      |                                                                       | 140       | 110     | °C                |
| Maximum RMS forward current                                   | I <sub>F(RMS)</sub> |                                                                                           |                      |                                                                       | 62        |         | A                 |
| Maximum peak, one-cycle forward, non-repetitive surge current | I <sub>FSM</sub>    | t = 10 ms                                                                                 | No voltage reapplied | Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum | 570       |         | A                 |
|                                                               |                     | t = 8.3 ms                                                                                |                      |                                                                       | 595       |         |                   |
|                                                               |                     | t = 10 ms                                                                                 |                      |                                                                       | 480       |         |                   |
|                                                               |                     | t = 8.3 ms                                                                                |                      |                                                                       | 500       |         |                   |
| Maximum I <sup>2</sup> t for fusing                           | I <sup>2</sup> t    | t = 10 ms                                                                                 | No voltage reapplied |                                                                       | 1600      |         | A <sup>2</sup> s  |
|                                                               |                     | t = 8.3 ms                                                                                |                      |                                                                       | 1450      |         |                   |
|                                                               |                     | t = 10 ms                                                                                 |                      |                                                                       | 1150      |         |                   |
|                                                               |                     | t = 8.3 ms                                                                                |                      |                                                                       | 1050      |         |                   |
| Maximum I <sup>2</sup> √t for fusing                          | I <sup>2</sup> √t   | t = 0.1 ms to 10 ms, no voltage reapplied                                                 |                      |                                                                       | 16 000    |         | A <sup>2</sup> √s |
| Value of threshold voltage (up to 1200 V)                     | V <sub>F(TO)</sub>  | T <sub>J</sub> = T <sub>J</sub> maximum                                                   |                      |                                                                       | 0.65      |         | V                 |
| Value of threshold voltage (for 1400 V/1600 V)                | V <sub>F(TO)</sub>  |                                                                                           |                      |                                                                       | 0.76      |         |                   |
| Value of forward slope resistance (up to 1200 V)              | r <sub>f</sub>      | T <sub>J</sub> = T <sub>J</sub> maximum                                                   |                      |                                                                       | 4.29      |         | mΩ                |
| Value of forward slope resistance (for 1400 V/1600 V)         | r <sub>f</sub>      |                                                                                           |                      |                                                                       | 3.8       |         |                   |
| Maximum forward voltage drop                                  | V <sub>FM</sub>     | I <sub>pk</sub> = 125 A, T <sub>J</sub> = 25 °C, t <sub>o</sub> = 400 μs rectangular wave |                      |                                                                       | 1.30      | 1.50    | V                 |

| THERMAL AND MECHANICAL SPECIFICATIONS                    |                                   |                                                             |                 |            |                     |
|----------------------------------------------------------|-----------------------------------|-------------------------------------------------------------|-----------------|------------|---------------------|
| PARAMETER                                                | SYMBOL                            | TEST CONDITIONS                                             | 40HF(R)         |            | UNITS               |
|                                                          |                                   |                                                             | 10 to 120       | 140 to 160 |                     |
| Maximum junction operating and storage temperature range | T <sub>J</sub> , T <sub>Stg</sub> |                                                             | -65 to 190      | -65 to 160 | °C                  |
| Maximum thermal resistance, junction to case             | R <sub>thJC</sub>                 | DC operation                                                | 0.95            |            | K/W                 |
| Maximum thermal resistance, case to heatsink             | R <sub>thCS</sub>                 | Mounting surface, smooth, flat and greased                  | 0.25            |            |                     |
| Maximum allowable mounting torque (+0 %, -10 %)          |                                   | Not lubricated thread, tightening on nut <sup>(1)</sup>     | 3.4 (30)        |            | N · m<br>(lbf · in) |
|                                                          |                                   | Lubricated thread, tightening on nut <sup>(1)</sup>         | 2.3 (20)        |            |                     |
|                                                          |                                   | Not lubricated thread, tightening on hexagon <sup>(2)</sup> | 4.2 (37)        |            |                     |
|                                                          |                                   | Lubricated thread, tightening on hexagon <sup>(2)</sup>     | 3.2 (28)        |            |                     |
| Approximate weight                                       |                                   |                                                             | 17              |            | g                   |
|                                                          |                                   |                                                             | 0.6             |            | oz.                 |
| Case style                                               |                                   | See dimensions - link at the end of datasheet               | DO-203AB (DO-5) |            |                     |

**Notes**

- (1) Recommended for pass-through holes  
 (2) Recommended for holed threaded heatsinks

| $\Delta R_{thJC}$ CONDUCTION |                       |                        |                     |       |
|------------------------------|-----------------------|------------------------|---------------------|-------|
| CONDUCTION ANGLE             | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS     | UNITS |
| 180°                         | 0.14                  | 0.10                   | $T_J = T_J$ maximum | K/W   |
| 120°                         | 0.16                  | 0.17                   |                     |       |
| 90°                          | 0.21                  | 0.22                   |                     |       |
| 60°                          | 0.30                  | 0.31                   |                     |       |
| 30°                          | 0.50                  | 0.50                   |                     |       |

**Note**

- The table above shows the increment of thermal resistance  $R_{thJC}$  when devices operate at different conduction angles than DC

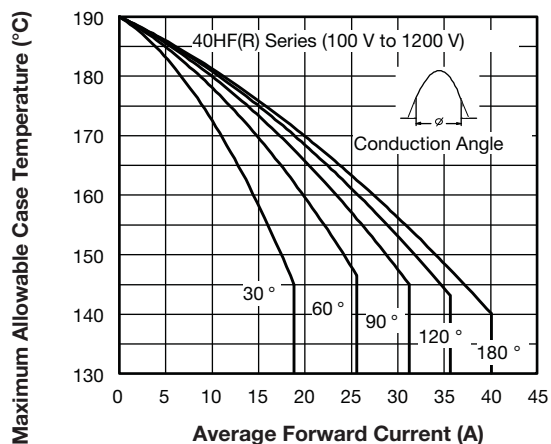


Fig. 1 - Current Ratings Characteristics

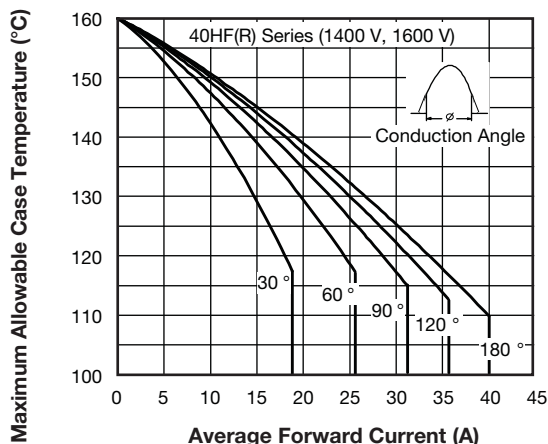


Fig. 3 - Current Ratings Characteristics

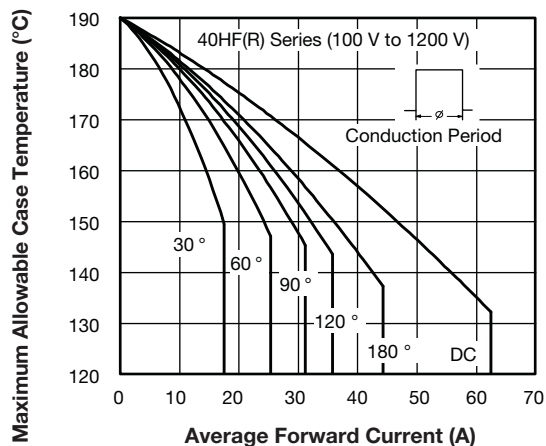


Fig. 2 - Current Ratings Characteristics

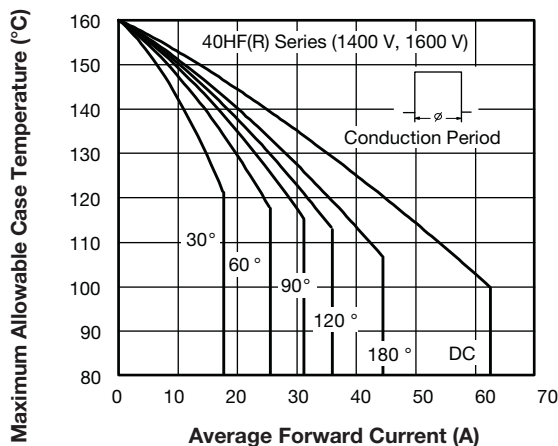


Fig. 4 - Current Ratings Characteristics

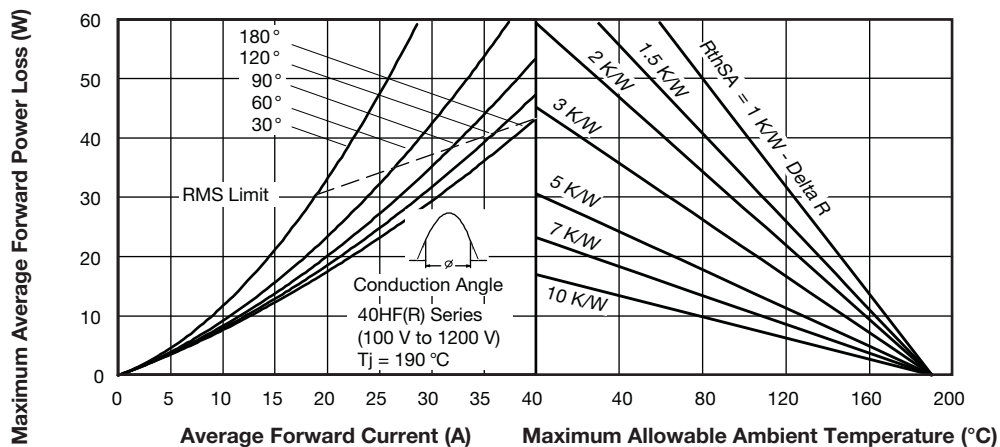


Fig. 5 - Forward Power Loss Characteristics

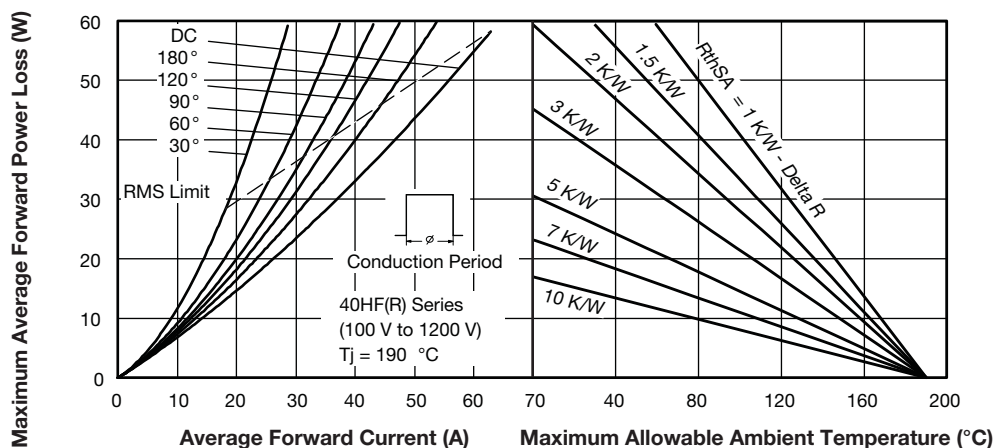


Fig. 6 - Forward Power Loss Characteristics

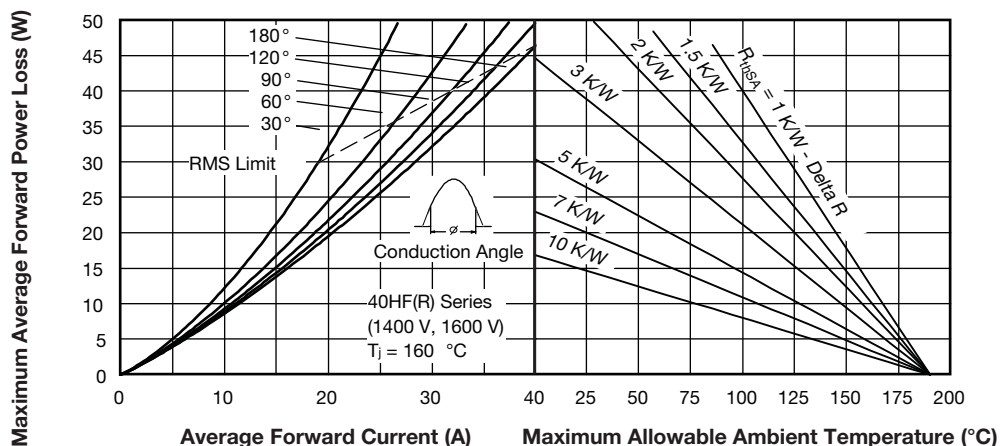


Fig. 7 - Forward Power Loss Characteristics

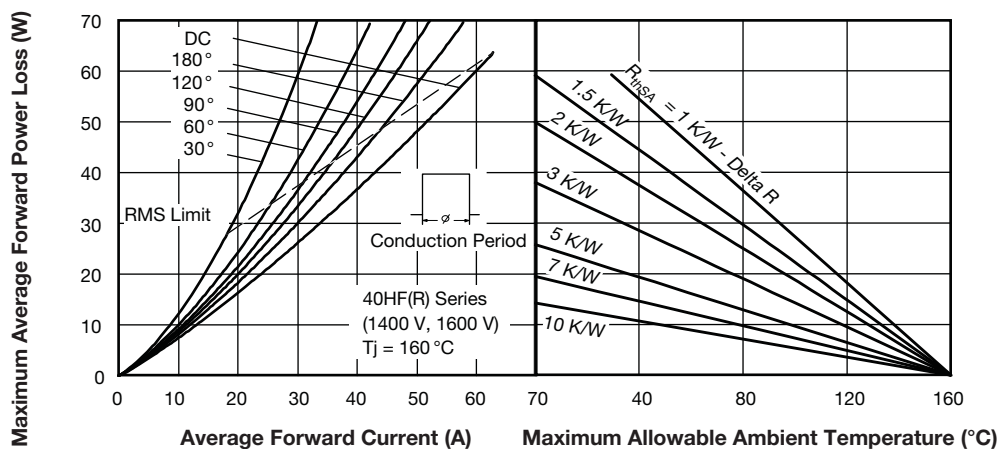


Fig. 8 - Forward Power Loss Characteristics

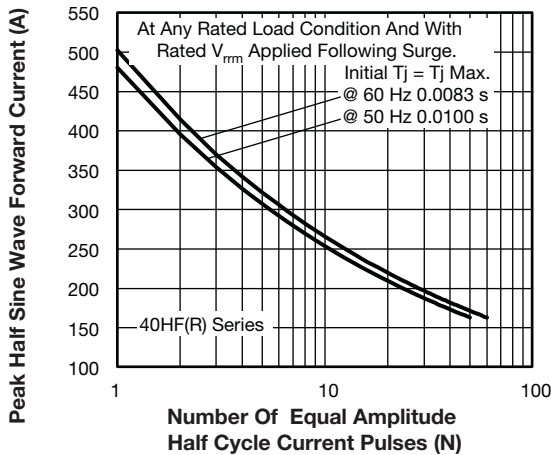


Fig. 9 - Maximum Non-Repetitive Surge Current

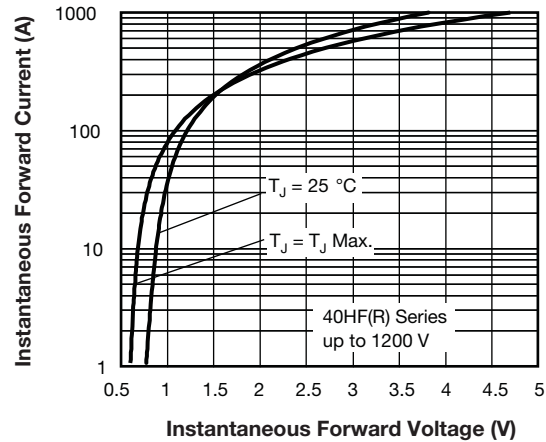


Fig. 11 - Forward Voltage Drop Characteristics (Up To 1200 V)

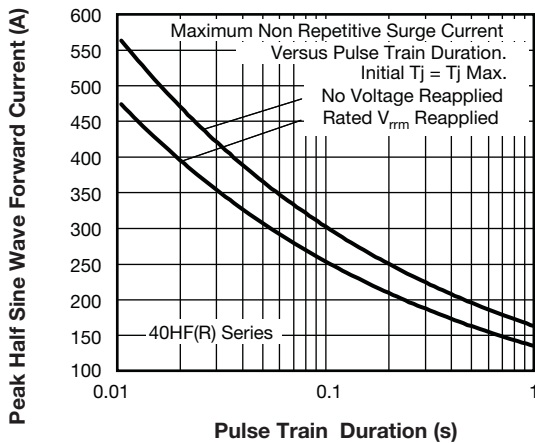


Fig. 10 - Maximum Non-Repetitive Surge Current

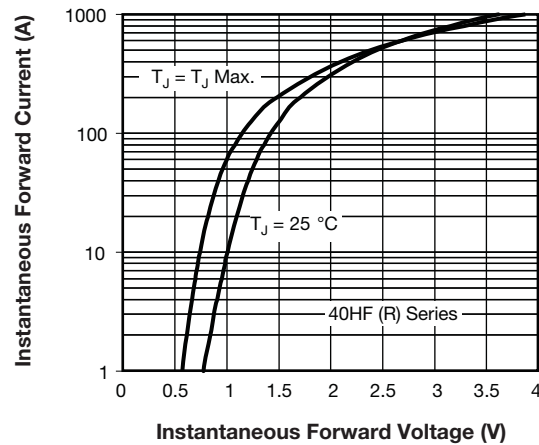


Fig. 12 - Forward Voltage Drop Characteristics (For 1400 V/1600 V)

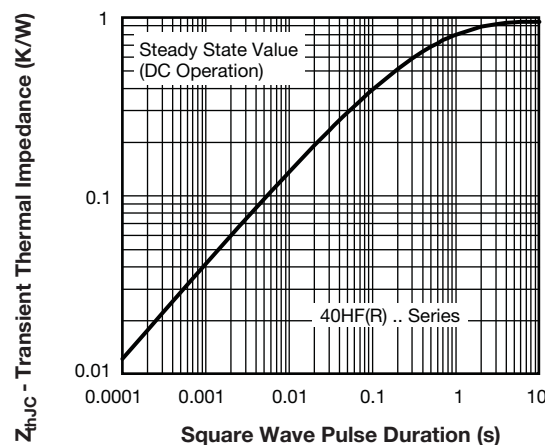


Fig. 13 - Thermal Impedance  $Z_{thJC}$  Characteristics



## ORDERING INFORMATION TABLE

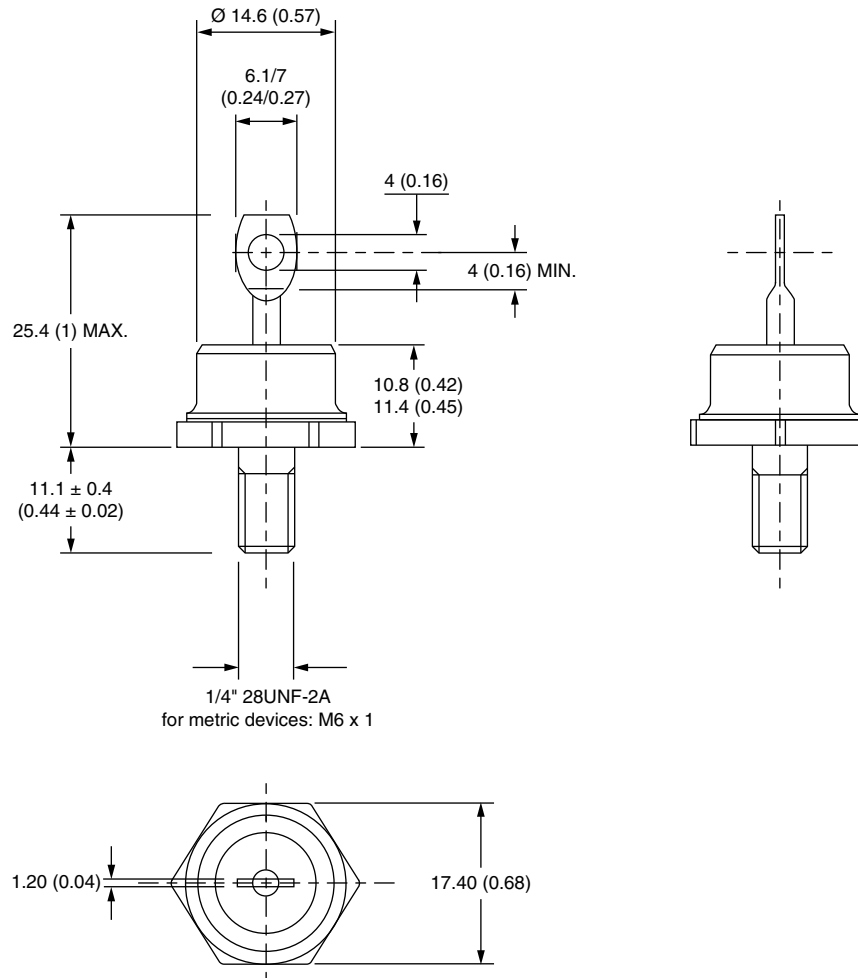
|             |     |    |    |   |     |   |
|-------------|-----|----|----|---|-----|---|
| Device code | VS- | 40 | HF | R | 160 | M |
|             | 1   | 2  | 3  | 4 | 5   | 6 |

- |          |   |                                                                                                                                                                                                                     |
|----------|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b> | - | Vishay Semiconductors product                                                                                                                                                                                       |
| <b>2</b> | - | <ul style="list-style-type: none"><li>• 40 = Standard device</li><li>• 41 = Not isolated lead</li><li>• 42 = Isolated lead with silicone sleeve<br/>(red = Reverse polarity)<br/>(blue = Normal polarity)</li></ul> |
| <b>3</b> | - | HF = Standard diode                                                                                                                                                                                                 |
| <b>4</b> | - | <ul style="list-style-type: none"><li>• None = Stud normal polarity (cathode to stud)</li><li>• R = Stud reverse polarity (anode to stud)</li></ul>                                                                 |
| <b>5</b> | - | Voltage code x 10 = $V_{RRM}$ (see Voltage Ratings table)                                                                                                                                                           |
| <b>6</b> | - | <ul style="list-style-type: none"><li>• None = Stud base DO-203AB (DO-5) 1/4" 28UNF-2A</li><li>• M = Stud base DO-203AB (DO-5) M6 x 1</li></ul>                                                                     |

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95344">www.vishay.com/doc?95344</a> |

## DO-203AB (DO-5) for 40HF(R) and 41HF(R) Series

### DIMENSIONS FOR 40HF(R) SERIES in millimeters (inches)



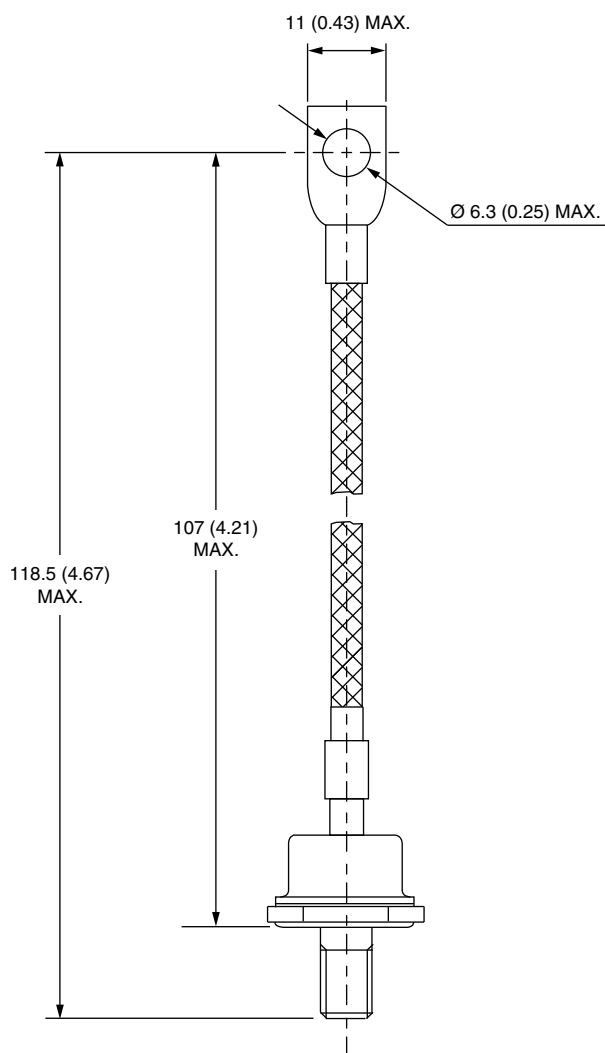
# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for 40HF(R)  
and 41HF(R) Series



## **DIMENSIONS FOR 41HF(R) SERIES** in millimeters (inches)







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