

## Standard Recovery Diodes, (Stud Version), 70 A



DO-5 (DO-203AB)

### FEATURES

- High surge current capability
- Designed for a wide range of applications
- Stud cathode and stud anode version
- Leaded version available
- Types up to 1600 V  $V_{RRM}$
- 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

### TYPICAL APPLICATIONS

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

### PRIMARY CHARACTERISTICS

|                       |                 |
|-----------------------|-----------------|
| $I_{F(AV)}$           | 70 A            |
| Package               | DO-5 (DO-203AB) |
| Circuit configuration | Single          |

### MAJOR RATINGS AND CHARACTERISTICS

| PARAMETER    | TEST CONDITIONS | 70HF(R)     |              | UNITS            |
|--------------|-----------------|-------------|--------------|------------------|
|              |                 | 10 TO 120   | 140/160      |                  |
| $I_{F(AV)}$  |                 | 70          | 70           | A                |
|              | $T_C$           | 140         | 110          | °C               |
| $I_{F(RMS)}$ |                 | 110         | 110          | A                |
| $I_{FSM}$    | 50 Hz           | 1200        | 1200         | A                |
|              | 60 Hz           | 1250        | 1250         |                  |
| $I^2t$       | 50 Hz           | 7100        | 7100         | A <sup>2</sup> s |
|              | 60 Hz           | 6450        | 6450         |                  |
| $V_{RRM}$    | Range           | 100 to 1200 | 1400 to 1600 | V                |
| $T_J$        |                 | -65 to +180 | -65 to +150  | °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 | $V_{R(BR)}$ , MINIMUM AVALANCHE VOLTAGE<br>V | $I_{RRM}$ MAXIMUM AT $T_J = T_J$ MAXIMUM<br>mA |
|-------------|--------------|----------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------|------------------------------------------------|
| VS-70HF(R)  | 10           | 100                                                      | 200                                                          | 200                                          | 15                                             |
|             | 20           | 200                                                      | 300                                                          | 300                                          |                                                |
|             | 30           | 300                                                      | 400                                                          | 400                                          |                                                |
|             | 40           | 400                                                      | 500                                                          | 500                                          |                                                |
|             | 60           | 600                                                      | 720                                                          | 725                                          | 9                                              |
|             | 80           | 800                                                      | 960                                                          | 950                                          |                                                |
|             | 100          | 1000                                                     | 1200                                                         | 1150                                         |                                                |
|             | 120          | 1200                                                     | 1440                                                         | 1350                                         |                                                |
|             | 140          | 1400                                                     | 1650                                                         | 1550                                         | 4.5                                            |
|             | 160          | 1600                                                     | 1900                                                         | 1750                                         |                                                |



| FORWARD CONDUCTION                                            |                     |                                                                                                          |                                   |                                                                       |           |         |                   |
|---------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------|-----------|---------|-------------------|
| PARAMETER                                                     | SYMBOL              | TEST CONDITIONS                                                                                          |                                   |                                                                       | 70HF(R)   |         | UNITS             |
|                                                               |                     |                                                                                                          |                                   |                                                                       | 10 to 120 | 140/160 |                   |
| Maximum average forward current at case temperature           | I <sub>F(AV)</sub>  | 180° conduction, half sine wave                                                                          |                                   |                                                                       | 70        |         | A                 |
|                                                               |                     |                                                                                                          |                                   |                                                                       | 140       | 110     | °C                |
| Maximum RMS forward current                                   | I <sub>F(RMS)</sub> |                                                                                                          |                                   |                                                                       | 110       |         | A                 |
| Maximum peak, one cycle forward, non-repetitive surge current | I <sub>FSM</sub>    | t = 10 ms                                                                                                | No voltage reappplied             | Sinusoidal half wave, initial T <sub>J</sub> = T <sub>J</sub> maximum | 1200      |         | A                 |
|                                                               |                     | t = 8.3 ms                                                                                               |                                   |                                                                       | 1250      |         |                   |
|                                                               |                     | t = 10 ms                                                                                                | 100 % V <sub>RRM</sub> reappplied |                                                                       | 1000      |         |                   |
|                                                               |                     | t = 8.3 ms                                                                                               |                                   |                                                                       | 1050      |         |                   |
| Maximum I <sup>2</sup> t for fusing                           | I <sup>2</sup> t    | t = 10 ms                                                                                                | No voltage reappplied             |                                                                       | 7100      |         | A <sup>2</sup> s  |
|                                                               |                     | t = 8.3 ms                                                                                               |                                   |                                                                       | 6450      |         |                   |
|                                                               |                     | t = 10 ms                                                                                                | 100 % V <sub>RRM</sub> reappplied |                                                                       | 5000      |         |                   |
|                                                               |                     | t = 8.3 ms                                                                                               |                                   |                                                                       | 4550      |         |                   |
| Maximum I <sup>2</sup> √t for fusing                          | I <sup>2</sup> √t   | t = 0.1 ms to 10 ms, no voltage reappplied                                                               |                                   |                                                                       | 71 000    |         | A <sup>2</sup> √s |
| Low level value of threshold voltage                          | V <sub>F(TO)1</sub> | (16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum |                                   |                                                                       | 0.79      |         | V                 |
| High level value of threshold voltage                         | V <sub>F(TO)2</sub> | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum                                   |                                   |                                                                       | 1.00      |         |                   |
| Low level value of forward slope resistance                   | r <sub>f1</sub>     | (16.7 % × π × I <sub>F(AV)</sub> < I < π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum |                                   |                                                                       | 2.33      |         | mΩ                |
| High level value of forward slope resistance                  | r <sub>f2</sub>     | (I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> maximum                                   |                                   |                                                                       | 1.53      |         |                   |
| Maximum forward voltage drop                                  | V <sub>FM</sub>     | I <sub>pk</sub> = 220 A, T <sub>J</sub> = 25 °C, t <sub>p</sub> = 400 μs rectangular wave                |                                   |                                                                       | 1.35      | 1.46    | V                 |

| THERMAL AND MECHANICAL SPECIFICATIONS           |                                   |                                                             |                 |             |                     |
|-------------------------------------------------|-----------------------------------|-------------------------------------------------------------|-----------------|-------------|---------------------|
| PARAMETER                                       | SYMBOL                            | TEST CONDITIONS                                             | 70HF(R)         |             | UNITS               |
|                                                 |                                   |                                                             | 10 to 120       | 140/160     |                     |
| Maximum junction and storage temperature range  | T <sub>J</sub> , T <sub>Stg</sub> |                                                             | -65 to +180     | -65 to +150 | °C                  |
| Maximum thermal resistance, junction to case    | R <sub>thJC</sub>                 | DC operation                                                | 0.45            |             | K/W                 |
| 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-5 (DO-203AB) |             |                     |

**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°                         | 0.08                  | 0.06                   | $T_J = T_J$ maximum | K/W   |
| 120°                         | 0.10                  | 0.11                   |                     |       |
| 90°                          | 0.13                  | 0.14                   |                     |       |
| 60°                          | 0.19                  | 0.20                   |                     |       |
| 30°                          | 0.30                  | 0.30                   |                     |       |

**Note**

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

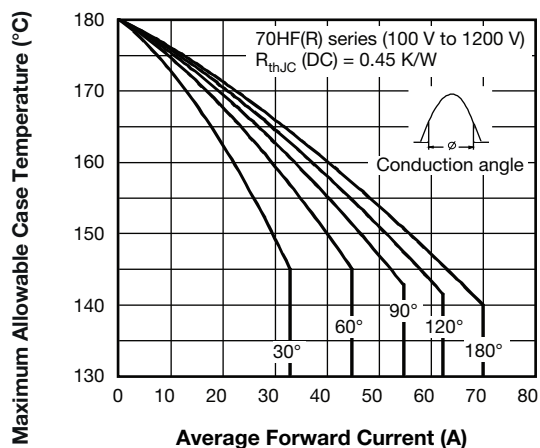


Fig. 1 - Current Ratings Characteristics

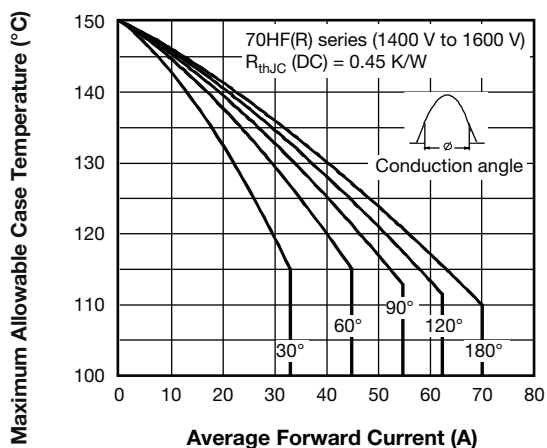


Fig. 3 - Current Ratings Characteristics

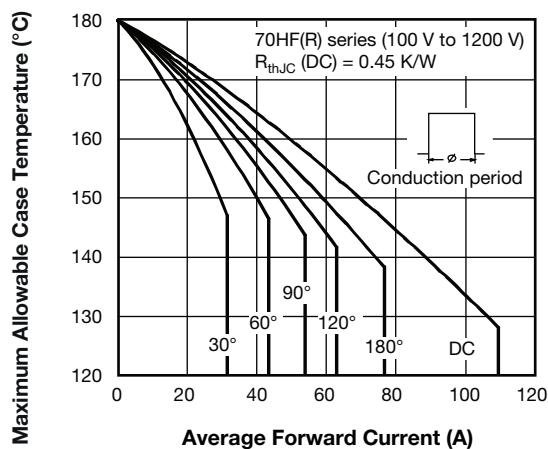


Fig. 2 - Current Ratings Characteristics

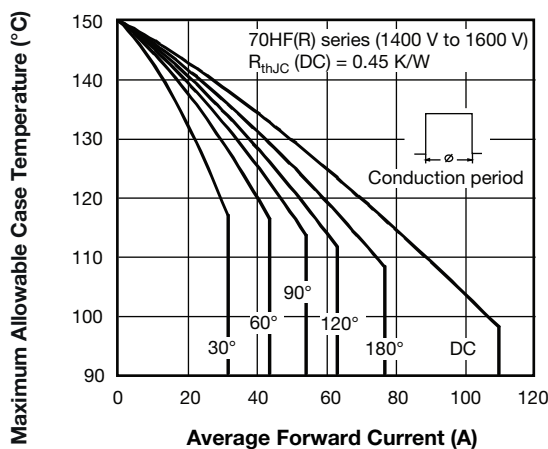


Fig. 4 - Current Ratings Characteristics

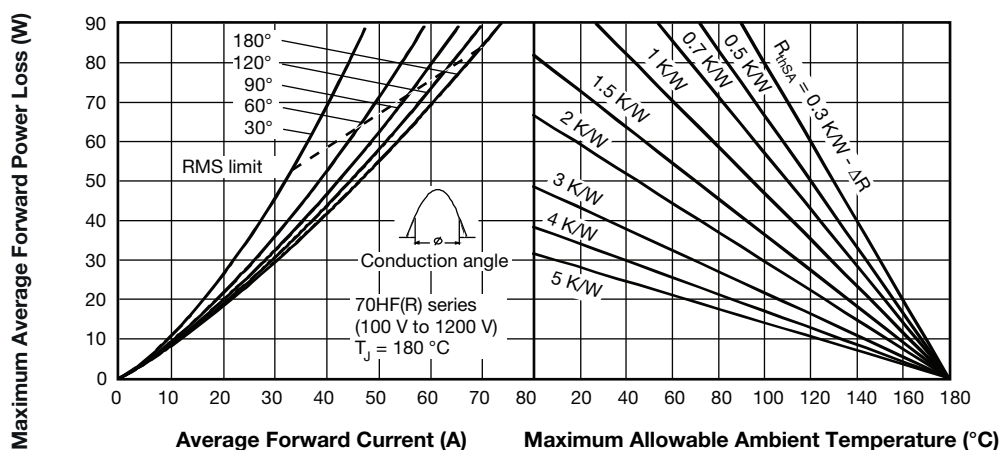


Fig. 5 - Forward Power Loss Characteristics

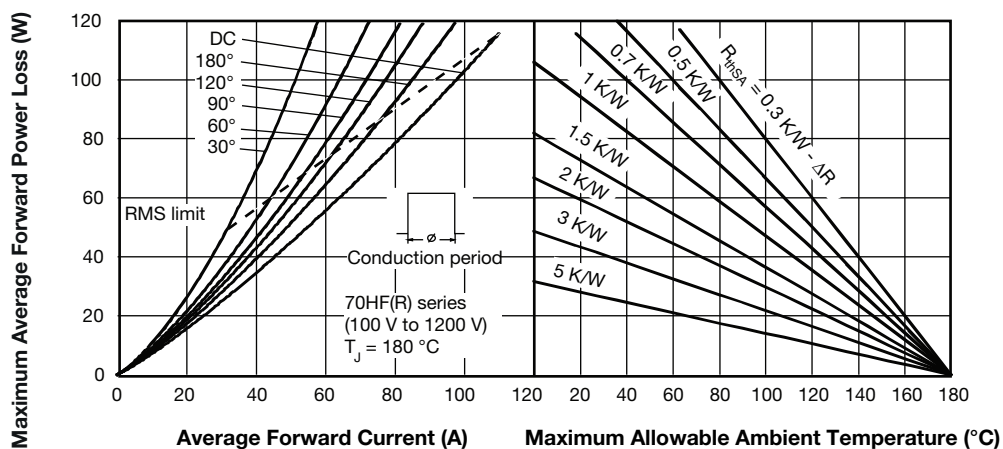


Fig. 6 - Forward Power Loss Characteristics

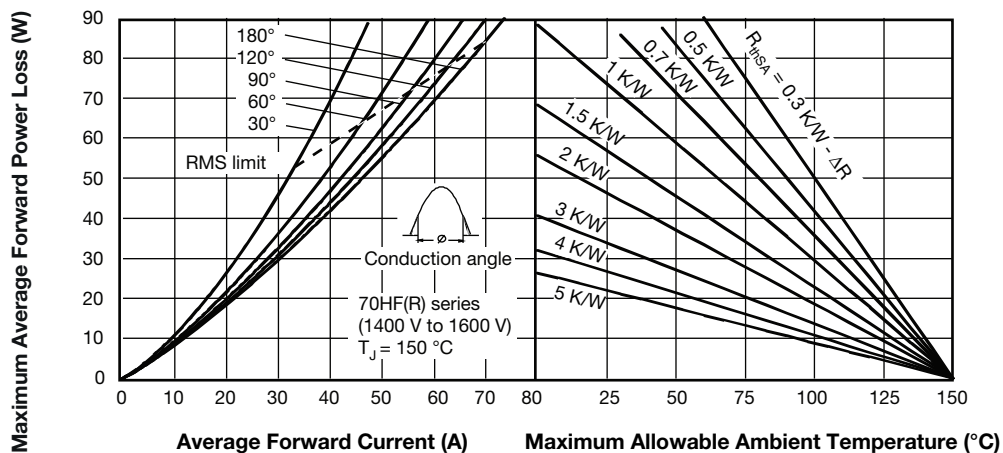


Fig. 7 - Forward Power Loss Characteristics

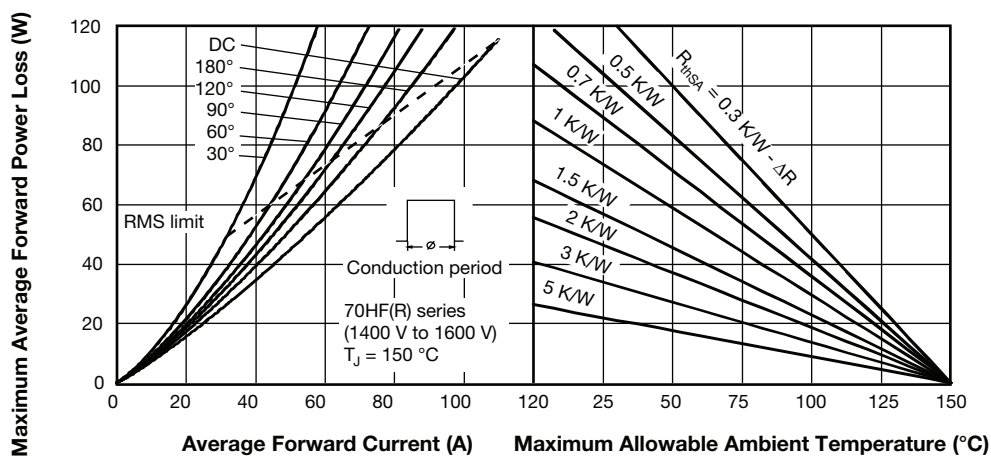


Fig. 8 - Forward Power Loss Characteristics

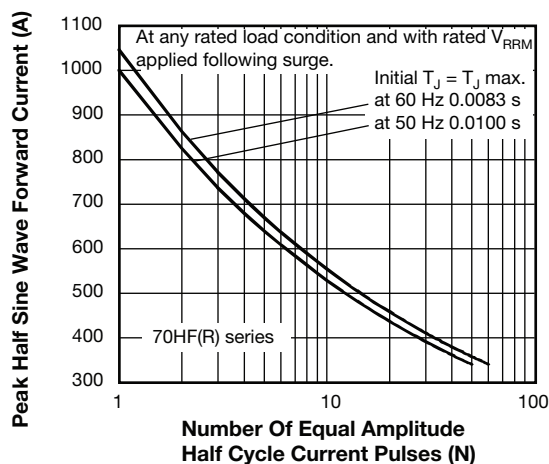


Fig. 9 - Maximum Non-Repetitive Surge Current

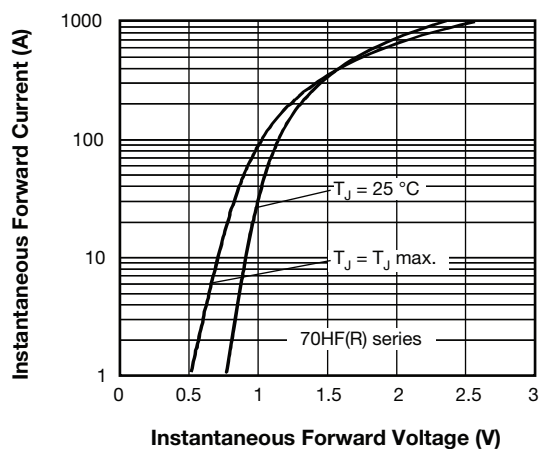


Fig. 11 - Forward Voltage Drop Characteristics

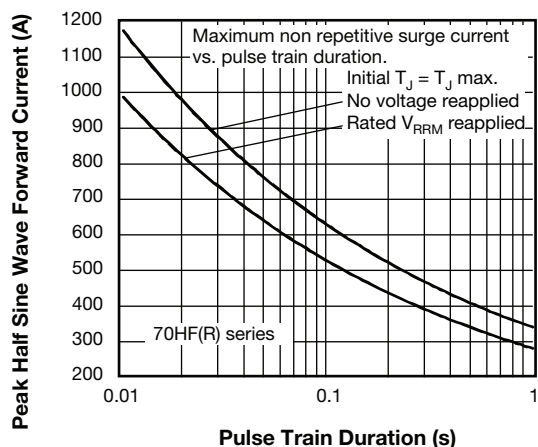


Fig. 10 - Maximum Non-Repetitive Surge Current

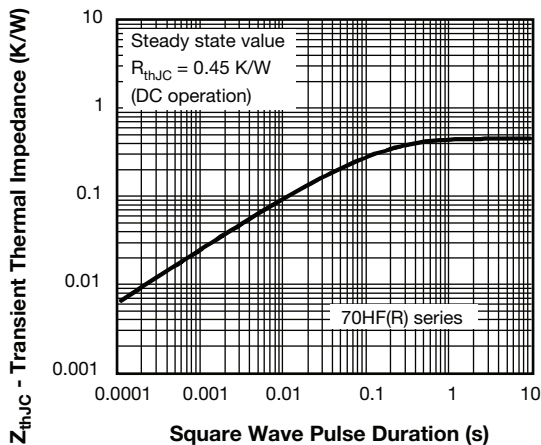
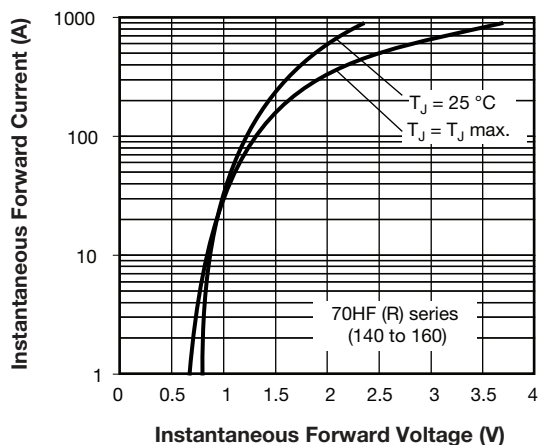

Fig. 12 - Thermal Impedance  $Z_{thJC}$  Characteristics


Fig. 13 - Forward Voltage Drop Characteristics



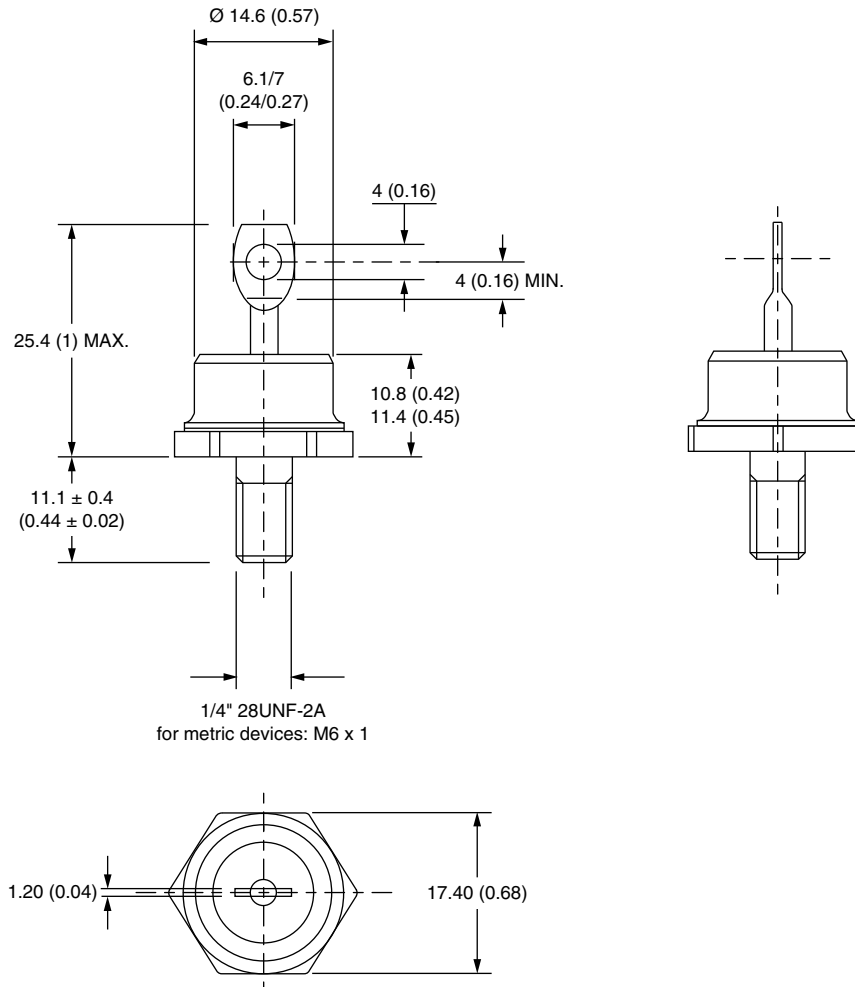
## ORDERING INFORMATION TABLE

| Device code | VS-                                                         | 70 | HF | R | 160 | M |
|-------------|-------------------------------------------------------------|----|----|---|-----|---|
|             | 1                                                           | 2  | 3  | 4 | 5   | 6 |
| 1           | - Vishay Semiconductors product                             |    |    |   |     |   |
| 2           | - 70 = standard device                                      |    |    |   |     |   |
|             | 71 = not isolated lead                                      |    |    |   |     |   |
|             | 72 = isolated lead with silicone sleeve                     |    |    |   |     |   |
|             | (red = reverse polarity)                                    |    |    |   |     |   |
|             | (blue = normal polarity)                                    |    |    |   |     |   |
| 3           | - HF = standard diode                                       |    |    |   |     |   |
| 4           | - • None = stud normal polarity (cathode to stud)           |    |    |   |     |   |
|             | • R = stud reverse polarity (anode to stud)                 |    |    |   |     |   |
| 5           | - Voltage code x 10 = $V_{RRM}$ (see Voltage Ratings table) |    |    |   |     |   |
| 6           | - • None = stud base DO-5 (DO-203AB) 1/4" 28UNF-2A          |    |    |   |     |   |
|             | • M = stud base DO-5 (DO-203AB) M6 x 1                      |    |    |   |     |   |

| LINKS TO RELATED DOCUMENTS |                                                                        |
|----------------------------|------------------------------------------------------------------------|
| Dimensions                 | <a href="http://www.vishay.com/doc?95343">www.vishay.com/doc?95343</a> |

## DO-203AB (DO-5) for 70HF(R) and 71HF(R) Series

### DIMENSIONS FOR 70HF(R) SERIES in millimeters (inches)



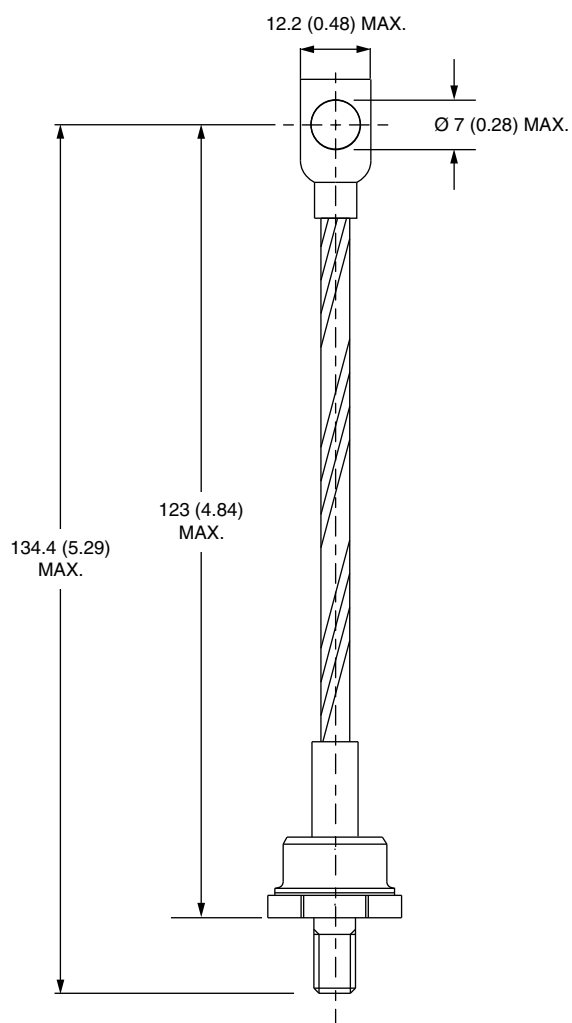
# Outline Dimensions

Vishay Semiconductors

DO-203AB (DO-5) for 70HF(R)  
and 71HF(R) Series



## **DIMENSIONS FOR 71HF(R) SERIES** in millimeters (inches)





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