



**THE DATASHEET OF
VS-85HFR120**





**Standard Recovery Diodes,
(Stud Version), 85 A**



DO-5 (DO-203AB)

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 industrial level
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT

TYPICAL APPLICATIONS

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

| PRIMARY CHARACTERISTICS | |
|-------------------------|-----------------|
| $I_{F(AV)}$ | 85 A |
| Package | DO-5 (DO-203AB) |
| Circuit configuration | Single |

| MAJOR RATINGS AND CHARACTERISTICS | | | | |
|-----------------------------------|-----------------|-------------|--------------|------------------|
| PARAMETER | TEST CONDITIONS | 85HF(R) | | UNITS |
| | | 10 to 120 | 140 to 160 | |
| $I_{F(AV)}$ | | 85 | 85 | A |
| | T_C | 140 | 110 | °C |
| $I_{F(RMS)}$ | | 133 | 133 | A |
| I_{FSM} | 50 Hz | 1700 | 1700 | A |
| | 60 Hz | 1800 | 1800 | |
| I^2t | 50 Hz | 14 500 | 14 500 | A ² s |
| | 60 Hz | 13 500 | 13 500 | |
| 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 V | V_{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V | I_{RRM} MAXIMUM AT $T_J = T_J$ MAXIMUM mA |
| VS-85HF(R) VS-86HF(R) VS-87HF(R) VS-88HF(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 | |
| | 160 | 1600 | 1700 | 4.5 |



| FORWARD CONDUCTION | | | | | | |
|---|---------------|--|---------------------------|-----------|---------|-------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | 85HF(R) | | UNITS |
| | | | | 10 to 120 | 140/160 | |
| Maximum average forward current at case temperature | $I_{F(AV)}$ | 180° conduction, half sine wave | | 85 | | A |
| | | | | 140 | 110 | °C |
| Maximum RMS forward current | $I_{F(RMS)}$ | | | 133 | | A |
| Maximum peak, one-cycle forward, non-repetitive surge current | I_{FSM} | t = 10 ms | No voltage reapplied | 1700 | | A |
| | | t = 8.3 ms | | 1800 | | |
| | | t = 10 ms | 100 % V_{RRM} reapplied | 1450 | | |
| | | t = 8.3 ms | | 1500 | | |
| Maximum I^2t for fusing | I^2t | t = 10 ms | No voltage reapplied | 14 500 | | A ² s |
| | | t = 8.3 ms | | 13 500 | | |
| | | t = 10 ms | 100 % V_{RRM} reapplied | 10 500 | | |
| | | t = 8.3 ms | | 9400 | | |
| Maximum $I^2\sqrt{t}$ for fusing | $I^2\sqrt{t}$ | t = 0.1 ms to 10 ms, no voltage reapplied | | 16 000 | | A ² √s |
| Value of threshold voltage (up to 1200 V) | $V_{F(TO)}$ | $T_J = T_J$ maximum | | 0.68 | | V |
| Value of threshold voltage (for 1400 V, 1600 V) | | | | 0.69 | | |
| Value of forward slope resistance (up to 1200 V) | r_f | $T_J = T_J$ maximum | | 1.62 | | mW |
| Value of forward slope resistance (for 1400 V, 1600 V) | | | | 1.75 | | |
| Maximum forward voltage drop | V_{FM} | $I_{pk} = 267$ A, $T_J = 25$ °C, $t_p = 400$ μs rectangular wave | | 1.2 | 1.4 | V |

| THERMAL AND MECHANICAL SPECIFICATIONS | | | | | | |
|--|----------------|---|--|-----------------|-------------|---------------------|
| PARAMETER | SYMBOL | TEST CONDITIONS | | 85HF(R) | | UNITS |
| | | | | 10 to 20 | 140 to 160 | |
| Maximum junction operating and storage temperature range | T_J, T_{Stg} | | | -65 to +180 | -65 to +150 | °C |
| Maximum thermal resistance, junction to case | R_{thJC} | DC operation | | 0.35 | | K/W |
| Maximum thermal resistance, case to heatsink | R_{thCS} | Mounting surface, smooth, flat and greased | | 0.25 | | |
| Maximum shock ⁽¹⁾ | | | | 1500 | | g |
| Maximum constant vibration ⁽¹⁾ | | 50 Hz | | 20 | | |
| Maximum constant acceleration ⁽¹⁾ | | Stud outwards | | 5000 | | |
| Maximum allowable mounting torque + 0 %, - 10 % | | Not lubricated thread, tightening on nut | | 3.4 (30) | | N · m (lbf · in) |
| | | Lubricated thread, tightening on nut | | 2.3 (20) | | |
| | | Not lubricated thread, tightening on hexagon | | 4.2 (37) | | |
| | | Lubricated thread, tightening on hexagon | | 3.2 (28) | | |
| Approximate weight | | Unleaded device | | 17 | | g |
| | | | | 0.6 | | oz. |
| Case style | | See dimensions - link at the end of datasheet | | DO-5 (DO-203AB) | | |

Notes

- (1) Available only for 88HF
- (2) Recommended for pass-through holes
- (3) Recommended for holed threaded heatsinks



| ΔR_{thJC} CONDUCTION | | | | |
|------------------------------|-----------------------|------------------------|---------------------|-------|
| CONDUCTION ANGLE | SINUSOIDAL CONDUCTION | RECTANGULAR CONDUCTION | TEST CONDITIONS | UNITS |
| 180° | 0.10 | 0.08 | $T_J = T_J$ maximum | K/W |
| 120° | 0.11 | 0.11 | | |
| 90° | 0.13 | 0.13 | | |
| 60° | 0.17 | 0.17 | | |
| 30° | 0.26 | 0.26 | | |

Note

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

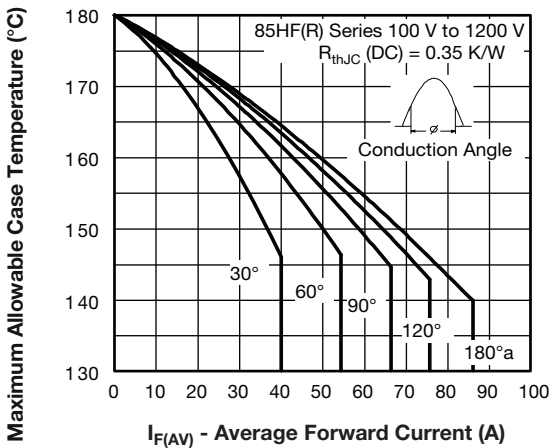


Fig. 1 - Current Ratings Characteristics

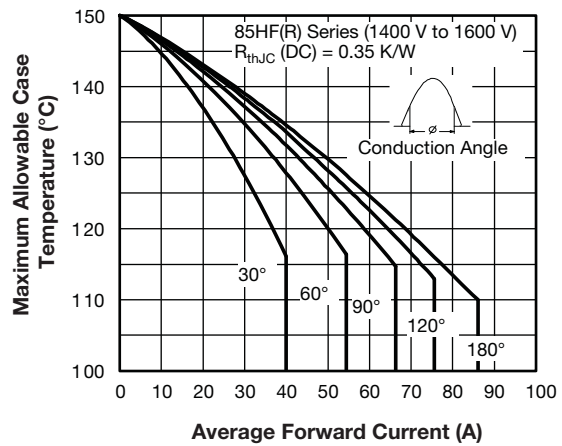


Fig. 3 - Current Ratings Characteristics

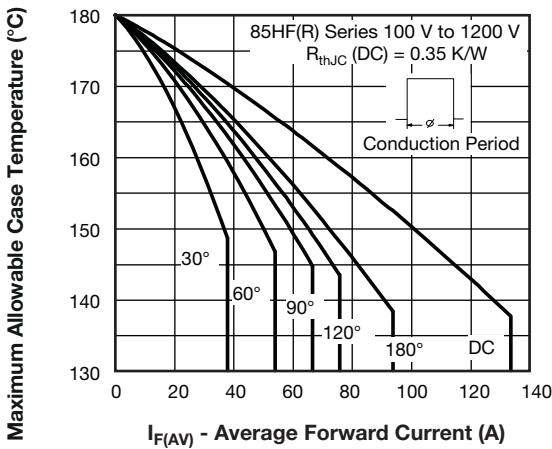


Fig. 2 - Current Ratings Characteristics

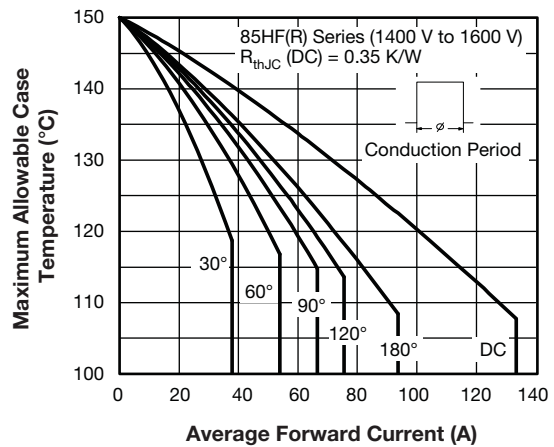


Fig. 4 - Current Ratings Characteristics



VS-85HF(R), VS-86HF(R), VS-87HF(R), VS-88HF(R) Series

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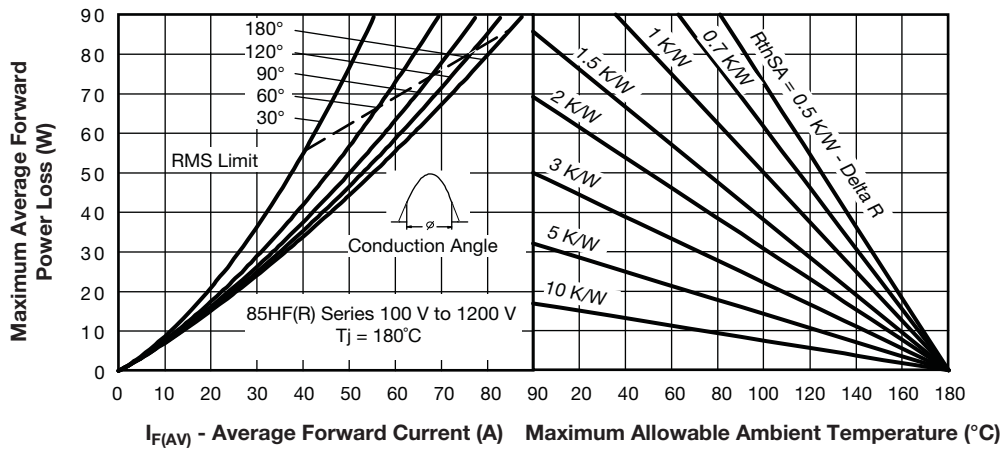


Fig. 5 - Forward Power Loss Characteristics

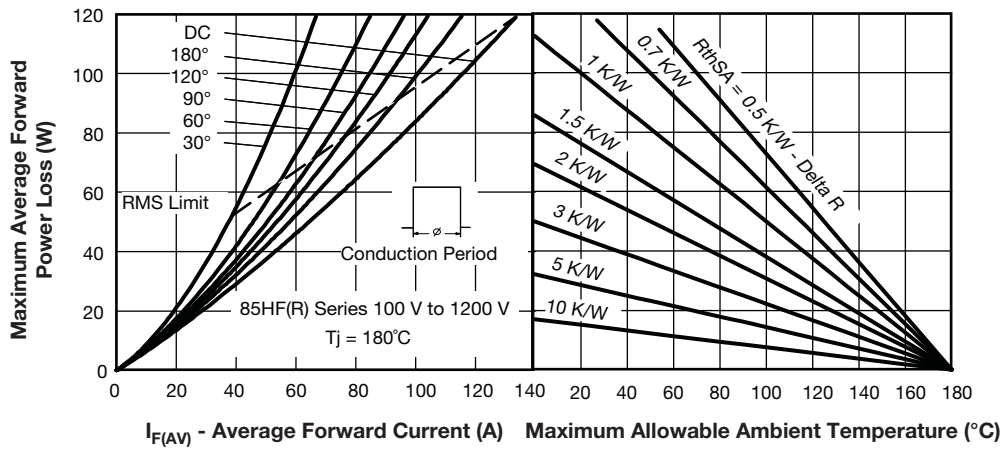


Fig. 6 - Forward Power Loss Characteristics

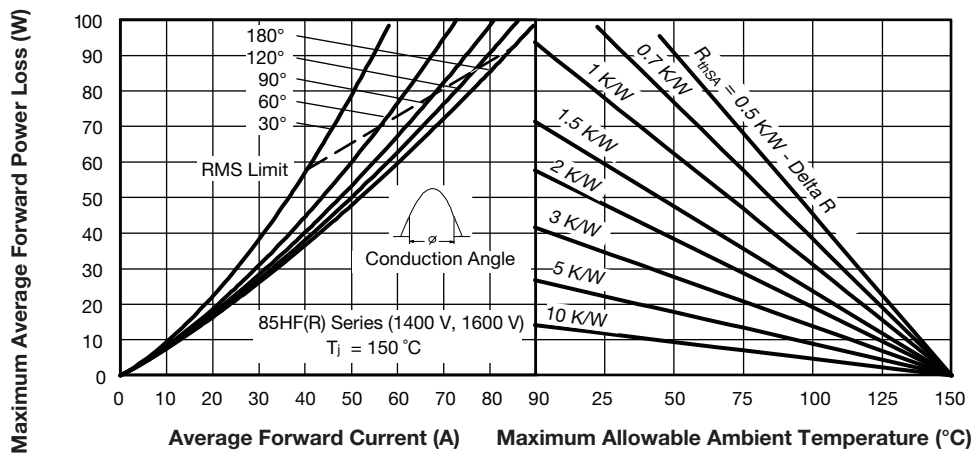


Fig. 7 - Forward Power Loss Characteristics

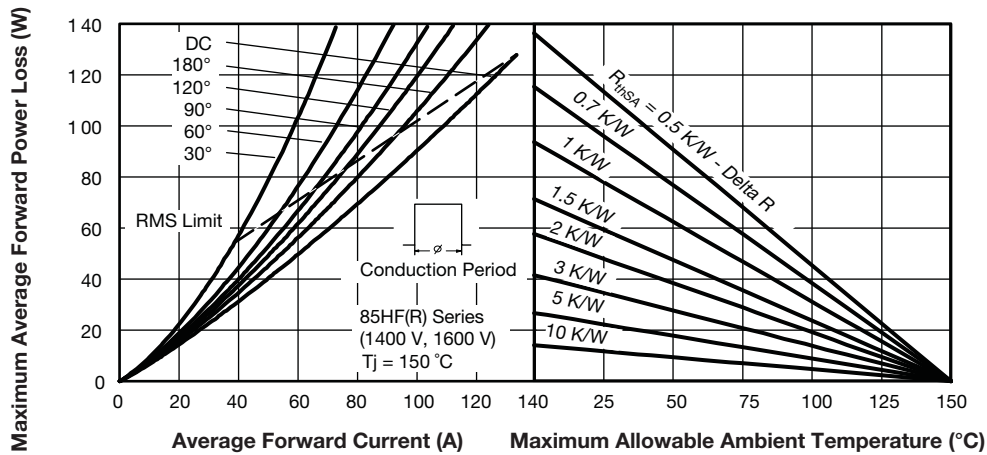


Fig. 8 - Forward Power Loss Characteristics

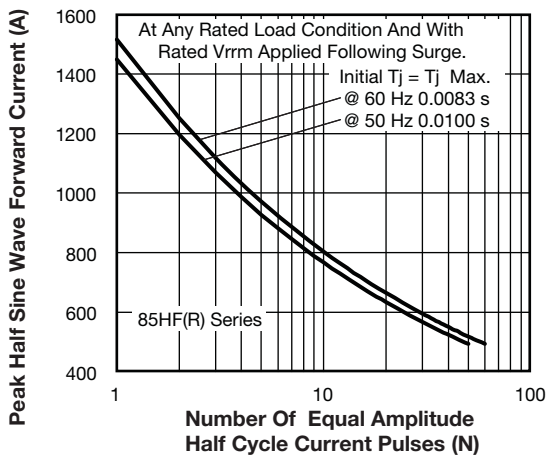


Fig. 9 - Maximum Non-Repetitive Surge Current

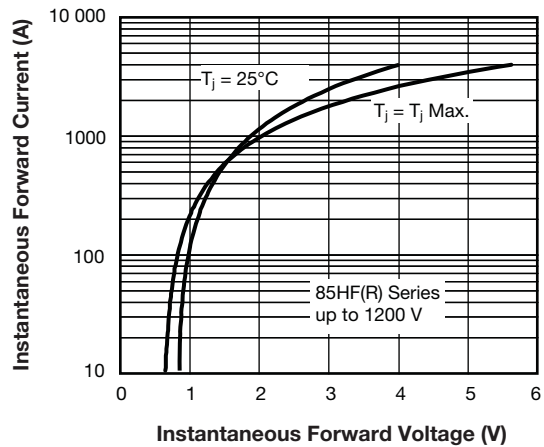


Fig. 11 - Forward Voltage Drop Characteristics

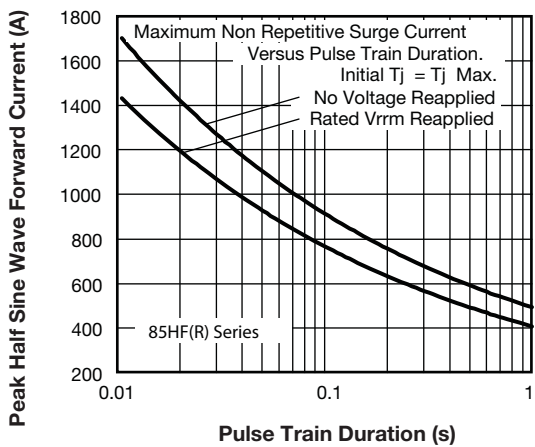


Fig. 10 - Maximum Non-Repetitive Surge Current

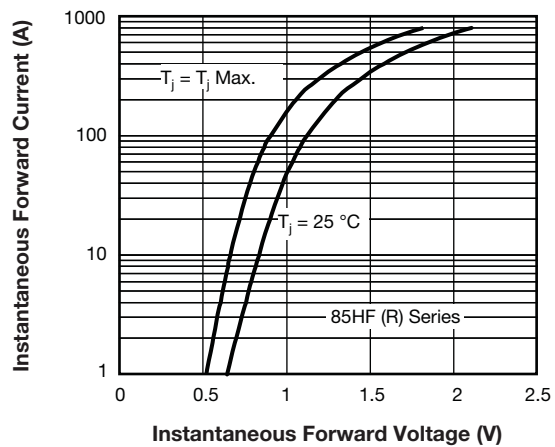


Fig. 12 - Forward Voltage Drop Characteristics (for 1400 V, 1600 V)

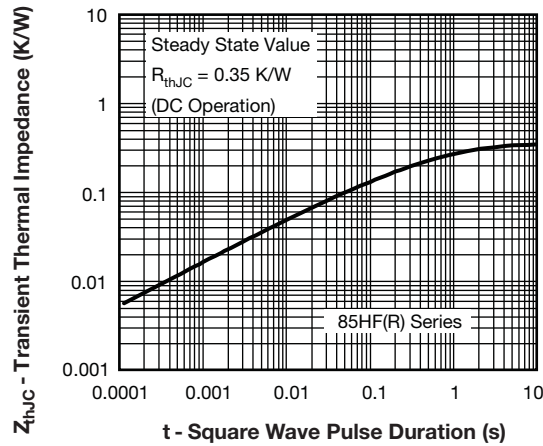


Fig. 13 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

| | | | | | | |
|-------------|------------|-----------|-----------|----------|------------|----------|
| Device code | VS- | 85 | HF | R | 160 | M |
| | ① | ② | ③ | ④ | ⑤ | ⑥ |

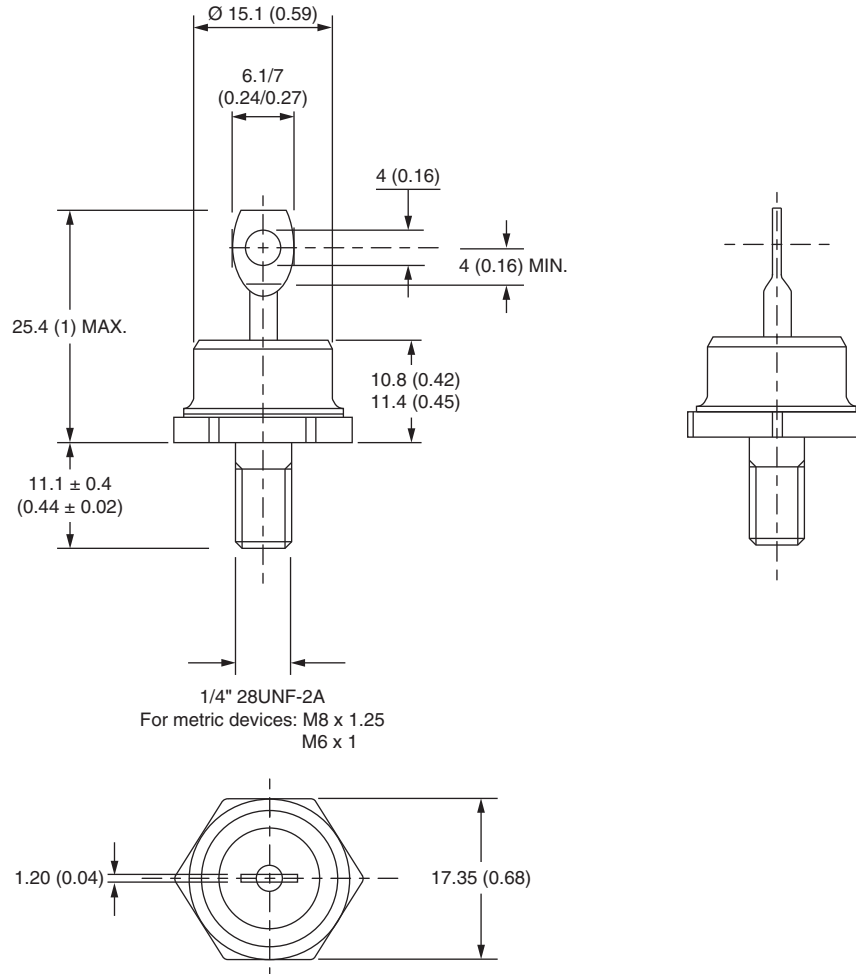
- 1** - Vishay Semiconductors product
- 2** - 85 = standard device
86 = not isolated lead
87 = isolated lead with silicone sleeve
(red = Reverse polarity)
(blue = Normal polarity)
88 = type for rotating application
- 3** - HF = standard diode
- 4** - None = stud normal polarity (cathode to stud)
R = 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 (not available for 88HF)
M8 = stud base DO-5 (DO-203AB) M8 x 1.25 (not available for 88HF)

| LINKS TO RELATED DOCUMENTS | |
|----------------------------|--|
| Dimensions | www.vishay.com/doc?95342 |



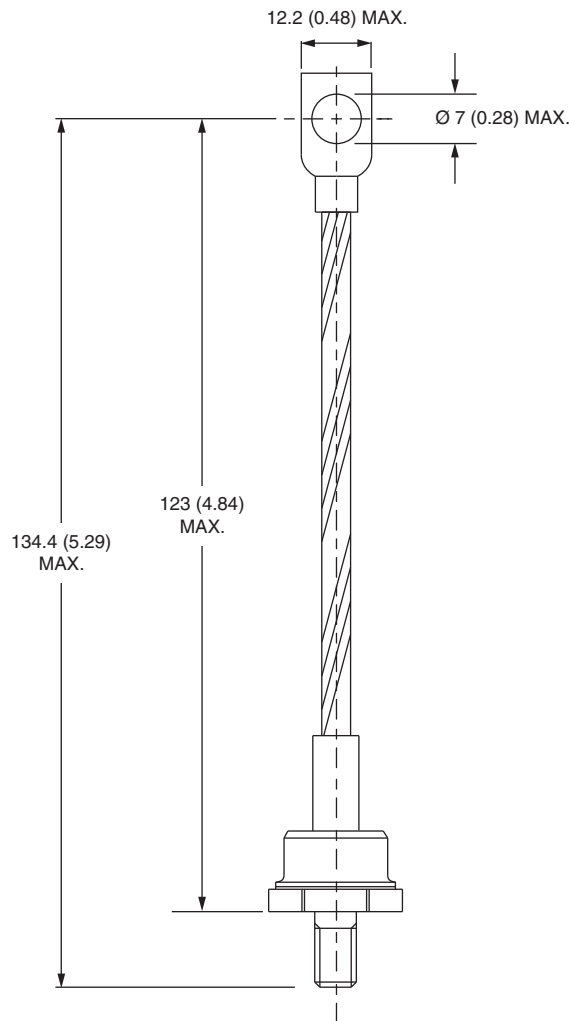
DO-5 (DO-203AB) for 85HF(R), 86HF(R) and 88HF(R) Series

DIMENSIONS FOR 85HF(R) SERIES in millimeters (inches)



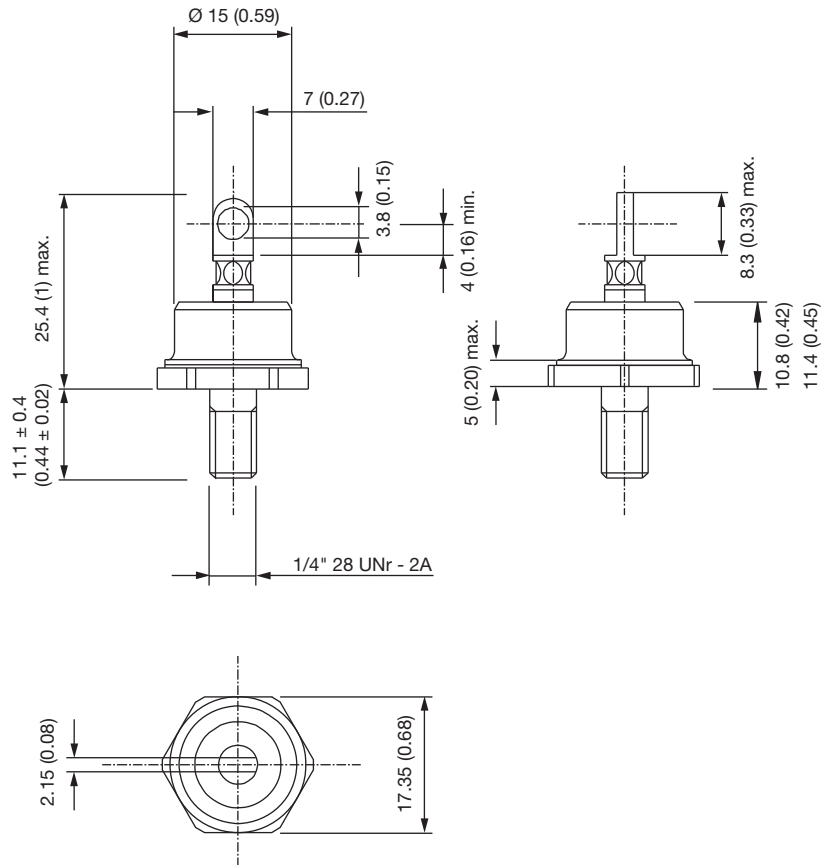


DIMENSIONS FOR 86HF(R) SERIES in millimeters (inches)





DIMENSIONS 88HF(R) SERIES in millimeters (inches)





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