

International  
**IR** Rectifier

**70HF(R) SERIES**

**STANDARD RECOVERY DIODES**

**Stud Version**

**Features**

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

**Typical Applications**

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

70 A

**Major Ratings and Characteristics**

| Parameters   | 70HF(R)   |                               | Units            |
|--------------|-----------|-------------------------------|------------------|
|              | 10 to 120 | 140 to 160                    |                  |
| $I_{F(AV)}$  | 70        | 70                            | A                |
| @ $T_C$      | 140       | 110                           | °C               |
| $I_{F(RMS)}$ | 110       |                               | A                |
| $I_{FSM}$    | @ 50Hz    | 1200                          | A                |
|              | @ 60Hz    | 1250                          | A                |
| $I^2t$       | @ 50Hz    | 7100                          | A <sup>2</sup> s |
|              | @ 60Hz    | 6540                          | A <sup>2</sup> s |
| $V_{RRM}$    | range     | 100 to 1200      1400 to 1600 | V                |
| $T_J$        | range     | - 65 to 180      - 65 to 150  | °C               |



case style  
DO-203AB (DO-5)

**70HF(R) Series**

Bulletin I20202 rev. A 05/98

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**IR** Rectifier**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 (1) | $I_{RRM}$ max.<br>@ $T_J = T_J \text{ max.}$<br>mA |
|-------------|--------------|----------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|
| 70HF(R)     | 10           | 100                                                      | 200                                                          | --                                               | 15                                                 |
|             | 20           | 200                                                      | 300                                                          | --                                               |                                                    |
|             | 40           | 400                                                      | 500                                                          | 500                                              |                                                    |
|             | 60           | 600                                                      | 720                                                          | 725                                              |                                                    |
|             | 80           | 800                                                      | 960                                                          | 950                                              | 9                                                  |
|             | 100          | 1000                                                     | 1200                                                         | 1150                                             |                                                    |
|             | 120          | 1200                                                     | 1440                                                         | 1350                                             |                                                    |
|             | 140          | 1400                                                     | 1650                                                         | 1550                                             |                                                    |
|             | 160          | 1600                                                     | 1900                                                         | 1750                                             | 4.5                                                |

(1) Avalanche version only available from  $V_{RRM}$  400V to 1600V.

## Forward Conduction

| Parameter     |                                                               | 70HF(R)   |            | Units             | Conditions                                                                                |                |                                                               |  |
|---------------|---------------------------------------------------------------|-----------|------------|-------------------|-------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------|--|
|               |                                                               | 10 to 120 | 140 to 160 |                   |                                                                                           |                |                                                               |  |
| $I_{F(AV)}$   | Max. average forward current<br>@ Case temperature            | 70        | 70         | A                 | 180° conduction, half sine wave                                                           |                |                                                               |  |
|               |                                                               | 140       | 110        | °C                |                                                                                           |                |                                                               |  |
| $I_{F(RMS)}$  | Max. RMS forward current                                      | 110       |            | A                 | DC @ $T_C = 25^\circ\text{C}$                                                             |                |                                                               |  |
| $P_R$         | Maximum non-repetitive<br>peak reverse power                  | 20        |            | K · W             | 10μs square pulse, $T_J = T_J \text{ max.}$<br><b>see note (2)</b>                        |                |                                                               |  |
| $I_{FSM}$     | Max. peak, one-cycle forward,<br>non-repetitive surge current | 1200      |            | A                 | t = 10ms                                                                                  | No voltage     | Sinusoidal half wave,<br><br>Initial $T_J = T_J \text{ max.}$ |  |
|               |                                                               | 1250      |            |                   | t = 8.3ms                                                                                 | reapplied      |                                                               |  |
|               |                                                               | 1000      |            |                   | t = 10ms                                                                                  | 100% $V_{RRM}$ |                                                               |  |
|               |                                                               | 1050      |            |                   | t = 8.3ms                                                                                 | reapplied      |                                                               |  |
| $I^2t$        | Maximum $I^2t$ for fusing                                     | 7100      |            | A <sup>2</sup> s  | t = 10ms                                                                                  | No voltage     |                                                               |  |
|               |                                                               | 6450      |            |                   | t = 8.3ms                                                                                 | reapplied      |                                                               |  |
|               |                                                               | 5000      |            |                   | t = 10ms                                                                                  | 100% $V_{RRM}$ |                                                               |  |
|               |                                                               | 4550      |            |                   | t = 8.3ms                                                                                 | reapplied      |                                                               |  |
| $I^2\sqrt{t}$ | Maximum $I^2\sqrt{t}$ for fusing                              | 71000     |            | A <sup>2</sup> √s | t = 0.1 to 10ms, no voltage reapplied                                                     |                |                                                               |  |
| $V_{F(TO)1}$  | Low level value of threshold<br>voltage                       | 0.79      |            | V                 | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$ |                |                                                               |  |
| $V_{F(TO)2}$  | High level value of threshold<br>voltage                      | 1.00      |            |                   | $(I > \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$                                      |                |                                                               |  |
| $r_{f1}$      | Low level value of forward<br>slope resistance                | 2.33      |            | mΩ                | $(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$ |                |                                                               |  |
| $r_{f2}$      | High level value of forward<br>slope resistance               | 1.53      |            |                   | $(I > \pi \times I_{F(AV)}), T_J = T_J \text{ max.}$                                      |                |                                                               |  |
| $V_{FM}$      | Max. forward voltage drop                                     | 1.35      |            | V                 | $I_{pk} = 220A, T_J = 25^\circ\text{C}, t_p = 10\text{ms}$ sinusoidal wave                |                |                                                               |  |

(2) Available only for Avalanche version, all other parameters the same as 70HF.

Thermal and Mechanical Specifications

| Parameter         |                                           | 70HF(R)        |            | Units             | Conditions                                 |
|-------------------|-------------------------------------------|----------------|------------|-------------------|--------------------------------------------|
|                   |                                           | 10 to 120      | 140 to 160 |                   |                                            |
| T <sub>j</sub>    | Max. junction operating temperature range | -65 to 180     | -65 to 150 | °C                |                                            |
| T <sub>stg</sub>  | Max. storage temperature range            | -65 to 180     | -65 to 150 |                   |                                            |
| R <sub>thJC</sub> | Max. thermal resistance, junction to case | 0.45           |            | K/W               | DC operation                               |
| R <sub>thCS</sub> | Max. thermal resistance, case to heatsink | 0.25           |            |                   | Mounting surface, smooth, flat and greased |
| T                 | Max. allowed mounting torque ±10%         | 2.3 - 3.4      |            | Nm                | Not lubricated threads                     |
|                   |                                           | 20 - 30        |            | lbf·in            |                                            |
| wt                | Approximate weight                        | 17 (0.6)       |            | g (oz)            |                                            |
| Case style        |                                           | DO-203AB (DO5) |            | See Outline Table |                                            |

ΔR<sub>thJC</sub> Conduction

(The following table shows the increment of thermal resistance R<sub>thJC</sub> when devices operate at different conduction angles than DC)

| Conduction angle | Sinusoidal conduction | Rectangular conduction | Units | Conditions                           |
|------------------|-----------------------|------------------------|-------|--------------------------------------|
| 180°             | 0.08                  | 0.06                   | K/W   | T <sub>j</sub> = T <sub>j</sub> max. |
| 120°             | 0.10                  | 0.11                   |       |                                      |
| 90°              | 0.13                  | 0.14                   |       |                                      |
| 60°              | 0.19                  | 0.20                   |       |                                      |
| 30°              | 0.30                  | 0.30                   |       |                                      |

Ordering Information Table

| Device Code                                                                                                                                                          |    |   |     |   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|-----|---|
| 70                                                                                                                                                                   | HF | R | 160 | M |
| 1                                                                                                                                                                    | 2  | 3 | 4   | 5 |
| <div>1 - 70 = Standard device<br/>71 = Not isolated lead<br/>72 = Isolated lead with silicone sleeve<br/>(Red = Reverse polarity)<br/>(Blue = Normal polarity)</div> |    |   |     |   |
| <div>2 - HF = Standard diode<br/>HA = Avalanche diode</div>                                                                                                          |    |   |     |   |
| <div>3 - None = Stud Normal Polarity (Cathode to Stud)<br/>R = Stud Reverse Polarity (Anode to Stud)</div>                                                           |    |   |     |   |
| <div>4 - Voltage code: Code x 10 = V<sub>RRM</sub> (See Voltage Ratings table)</div>                                                                                 |    |   |     |   |
| <div>5 - None = Stud base DO-203AB (DO-5) 1/4" 28UNF-2A<br/>M = Stud base DO-203AB (DO-5) M6 X 1 - (Not available for Avalanche diodes)</div>                        |    |   |     |   |

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**IOR** Rectifier

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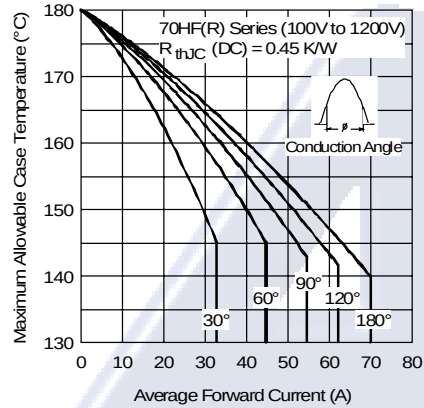


Fig. 1 - Current Ratings Characteristics

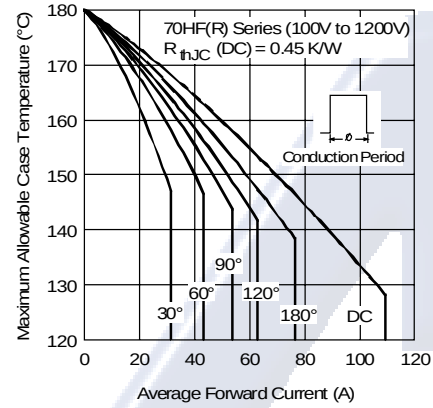


Fig. 2 - Current Ratings Characteristics

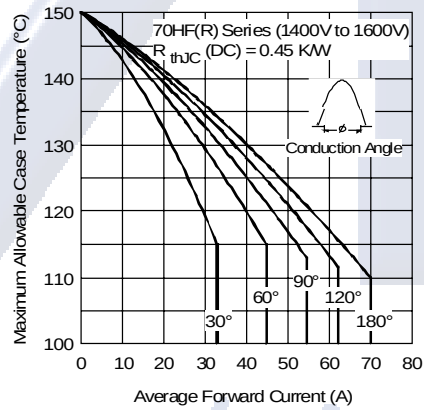


Fig. 3 - Current Ratings Characteristics

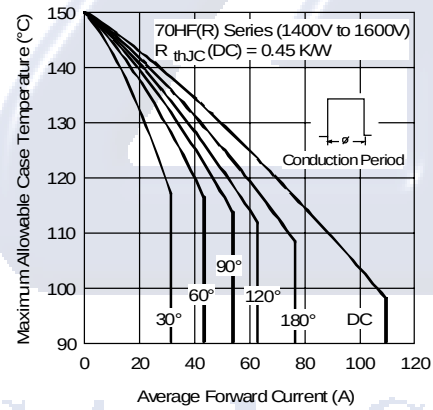


Fig. 4 - Current Ratings Characteristics

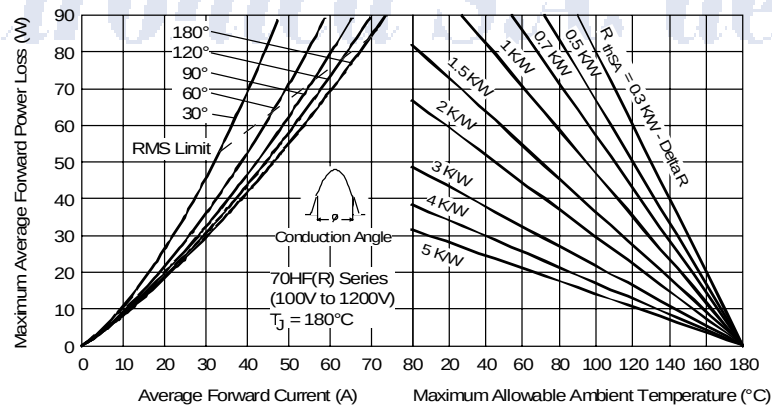


Fig. 5 - Forward Power Loss Characteristics

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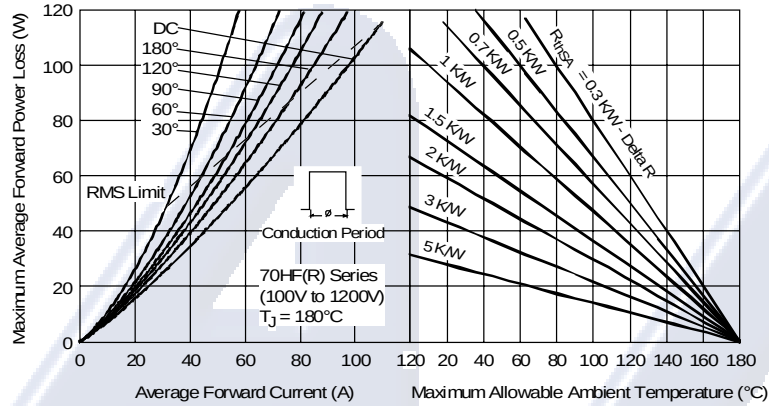
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Fig. 6 - Forward Power Loss Characteristics

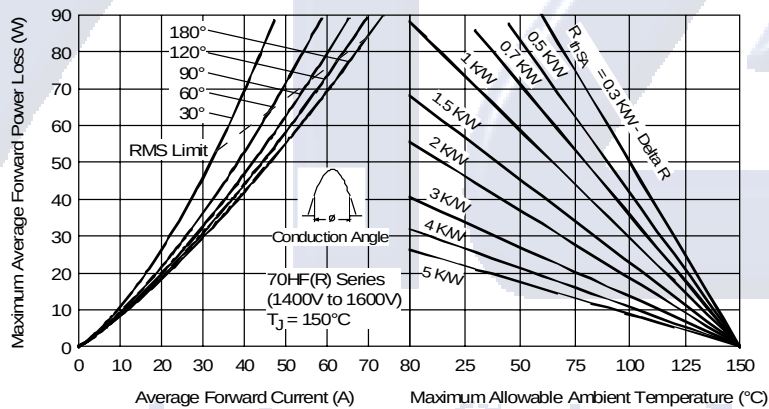


Fig. 7 - Forward Power Loss Characteristics

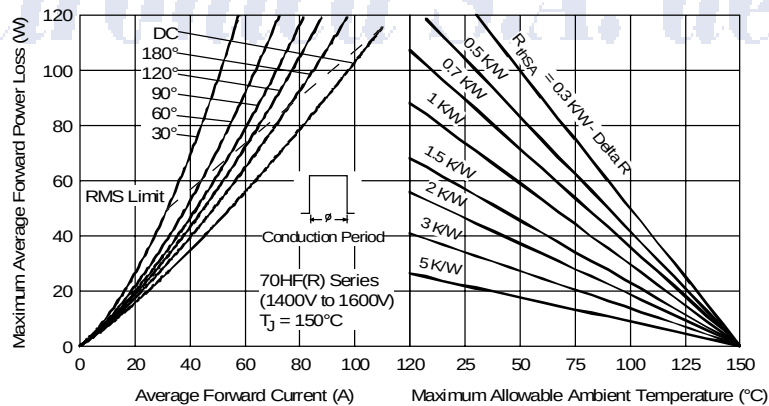


Fig. 8 - Forward Power Loss Characteristics

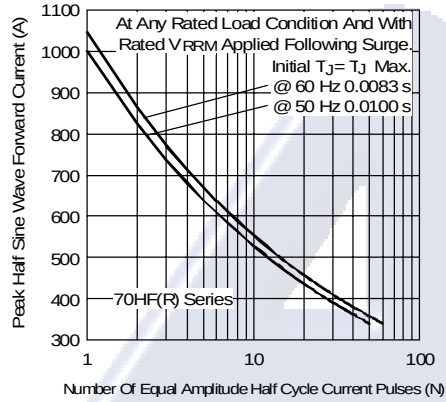


Fig. 9 - Maximum Non-Repetitive Surge Current

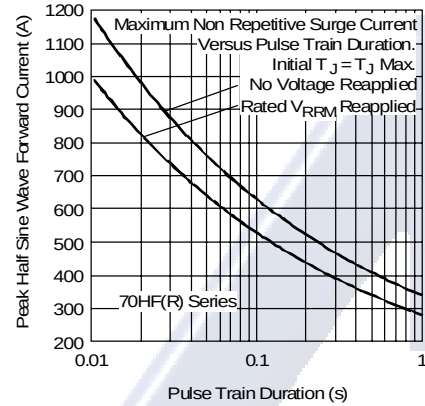


Fig. 10 - Maximum Non-Repetitive Surge Current

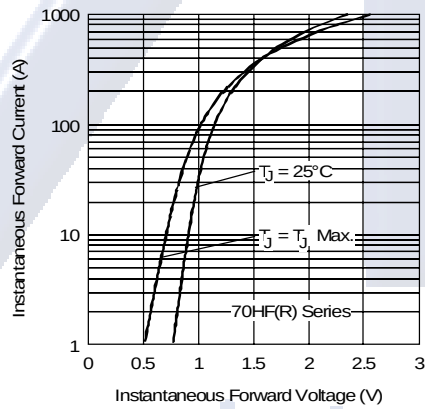
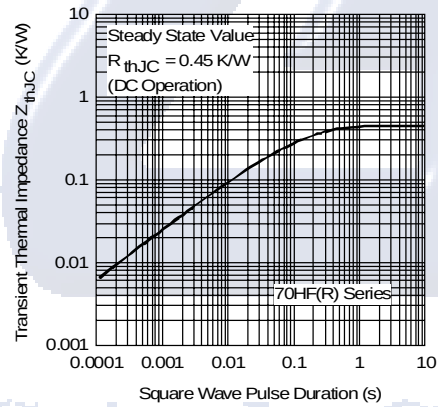


Fig. 11 - Forward Voltage Drop Characteristics

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