

Bulletin I20202 rev. A 05/98

# 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  $V_{RRM}$

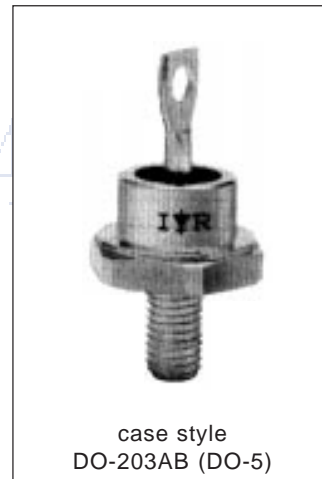
#### Typical Applications

- 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



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**IR** Rectifier**ELECTRICAL SPECIFICATIONS**

## Voltage Ratings

Type number	Voltage Code	V <sub>RRM</sub> , maximum repetitive peak reverse voltage V	V <sub>RSM</sub> , maximum non-repetitive peak reverse voltage V	V <sub>R(BR)</sub> , minimum avalanche voltage V (1)	I <sub>RRM</sub> max. @ T <sub>J</sub> = T <sub>J</sub> max. mA
70HF(R)	10	100	200	--	15
	20	200	300	--	
	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	

(1) Avalanche version only available from V<sub>RRM</sub> 400V to 1600V.

## Forward Conduction

Parameter	70HF(R)		Units	Conditions
	10 to 120	140 to 160		
I <sub>F(AV)</sub> Max. average forward current @ Case temperature	70	70	A	180° conduction, half sine wave
I <sub>F(RMS)</sub> Max. RMS forward current	140	110	A	DC @ T <sub>C</sub> = 25°C
P <sub>R</sub> Maximum non-repetitive peak reverse power	20	20	K·W	10µs square pulse, T <sub>J</sub> = T <sub>J</sub> max. <b>see note (2)</b>
I <sub>FSM</sub> Max. peak, one-cycle forward, non-repetitive surge current	1200	A	A	t = 10ms No voltage reappplied
	1250			t = 8.3ms 100% V <sub>RRM</sub> reappplied
	1000			t = 10ms 100% V <sub>RRM</sub> reappplied
	1050			t = 8.3ms 100% V <sub>RRM</sub> reappplied
I <sup>2</sup> t Maximum I <sup>2</sup> t for fusing	7100	A <sup>2</sup> s	A <sup>2</sup> s	t = 10ms No voltage reappplied
	6450			t = 8.3ms 100% V <sub>RRM</sub> reappplied
	5000			t = 10ms 100% V <sub>RRM</sub> reappplied
	4550			t = 8.3ms 100% V <sub>RRM</sub> reappplied
I <sup>2</sup> √t Maximum I <sup>2</sup> √t for fusing	71000	A <sup>2</sup> √s	A <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied
V <sub>F(TO)1</sub> Low level value of threshold voltage	0.79	V	V	(16.7% × π × I <sub>F(AV)</sub> ) < I < π × I <sub>F(AV)</sub> , T <sub>J</sub> = T <sub>J</sub> max.
V <sub>F(TO)2</sub> High level value of threshold voltage	1.00			(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> max.
r <sub>f1</sub> Low level value of forward slope resistance	2.33	mΩ	mΩ	(16.7% × π × I <sub>F(AV)</sub> ) < I < π × I <sub>F(AV)</sub> , T <sub>J</sub> = T <sub>J</sub> max.
r <sub>f2</sub> High level value of forward slope resistance	1.53			(I > π × I <sub>F(AV)</sub> ), T <sub>J</sub> = T <sub>J</sub> max.
V <sub>FM</sub> Max. forward voltage drop	1.35	V	V	I <sub>pk</sub> = 220A, T <sub>J</sub> = 25°C, t <sub>p</sub> = 10ms 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**

<b>70</b>	<b>HF</b>	<b>R</b>	<b>160</b>	<b>M</b>
1	2	3	4	5

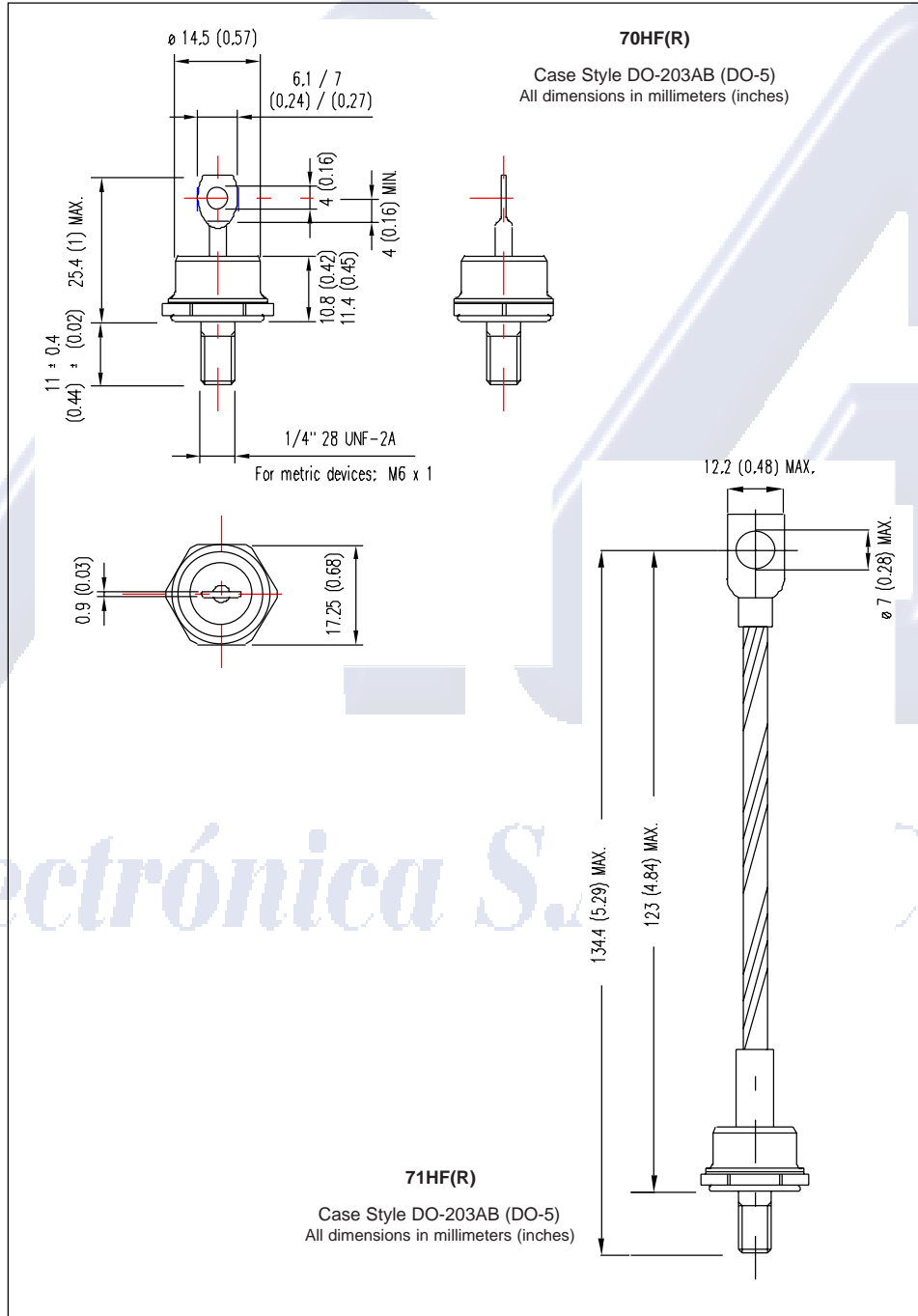
- 1** - 70 = Standard device  
 71 = Not isolated lead  
 72 = Isolated lead with silicone sleeve  
 (Red = Reverse polarity)  
 (Blue = Normal polarity)
- 2** - HF = Standard diode  
 HA = Avalanche diode
- 3** - None = Stud Normal Polarity (Cathode to Stud)  
 R = Stud Reverse Polarity (Anode to Stud)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

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#### Outlines Table



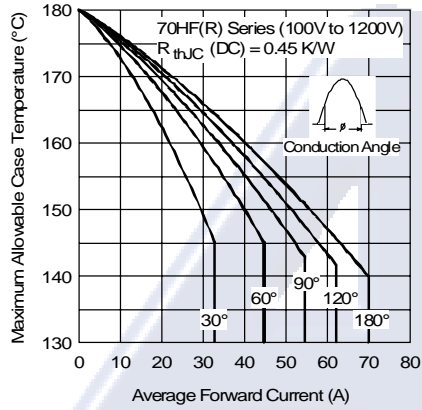


Fig. 1 - Current Ratings Characteristics

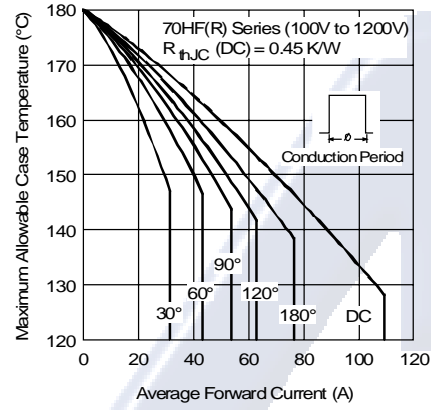


Fig. 2 - Current Ratings Characteristics

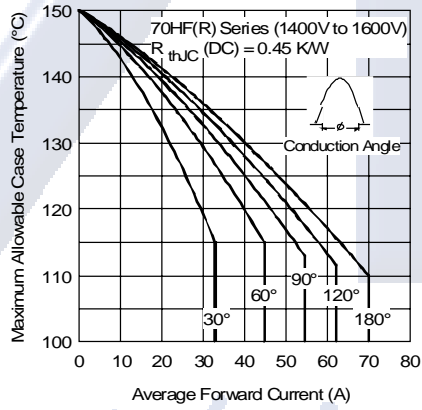


Fig. 3 - Current Ratings Characteristics

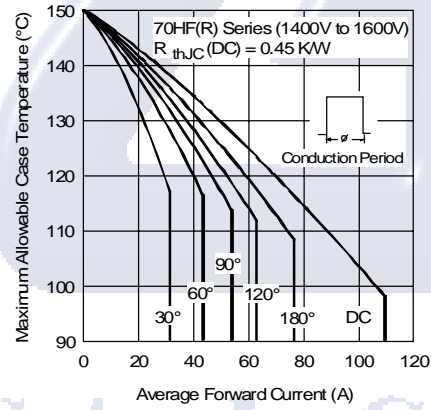


Fig. 4 - Current Ratings Characteristics

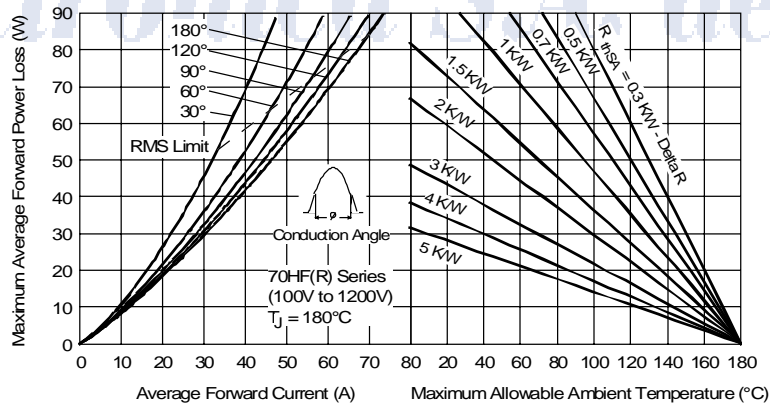


Fig. 5 - Forward Power Loss Characteristics

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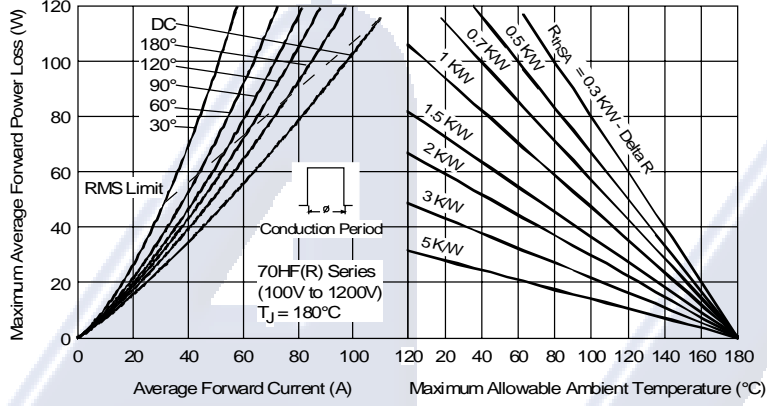


Fig. 6 - Forward Power Loss Characteristics

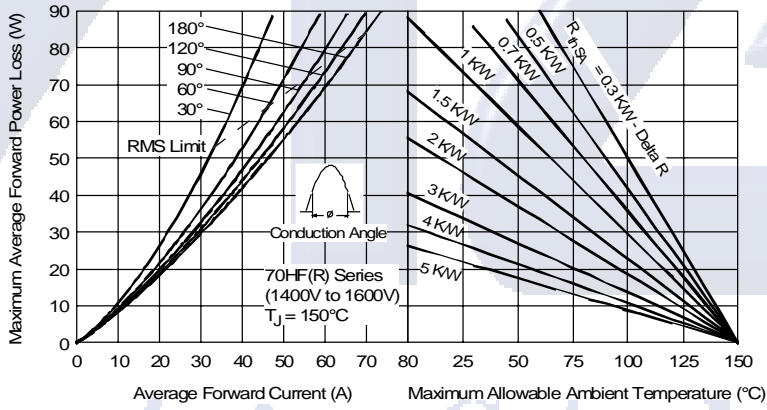


Fig. 7 - Forward Power Loss Characteristics

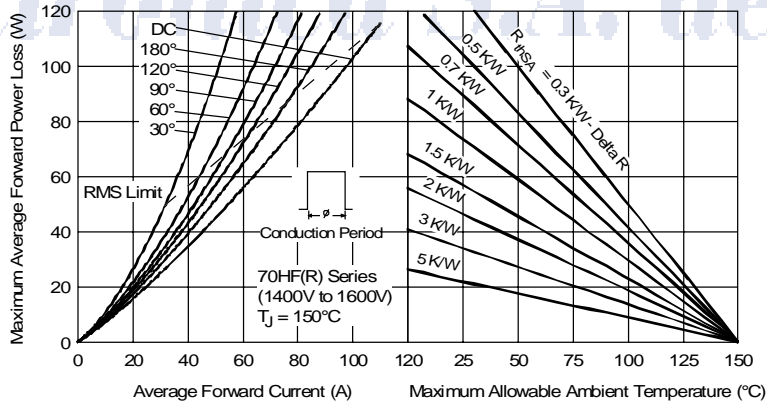


Fig. 8 - Forward Power Loss Characteristics

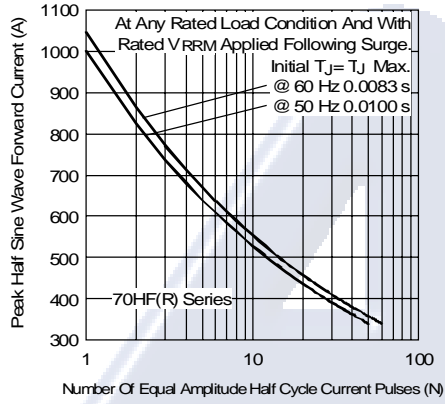


Fig. 9 - Maximum Non-Repetitive Surge Current

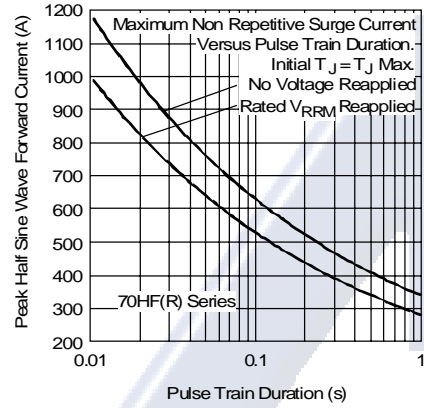


Fig. 10 - Maximum Non-Repetitive Surge Current

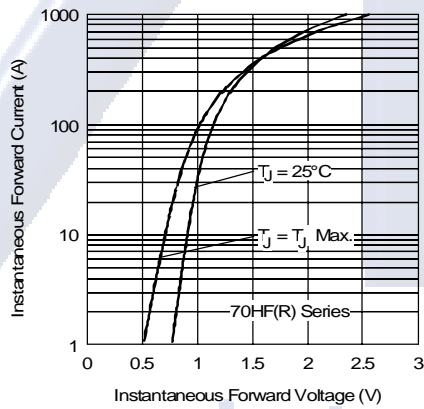


Fig. 11 - Forward Voltage Drop Characteristics

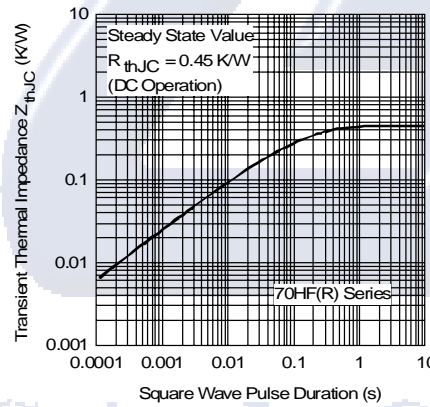


Fig. 12 - Thermal Impedance  $Z_{thJC}$  Characteristics