

### STANDARD RECOVERY DIODES

Stud Version

#### Features

- High surge current capability
- Avalanche types available
- Stud cathode and stud anode version
- Wide current range
- Types up to 1200V  $V_{RRM}$

12 A

#### Typical Applications

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

#### Major Ratings and Characteristics

Parameters	12F(R)	Units
$I_{F(AV)}$	12	A
@ $T_C$	144	°C
$I_{F(RMS)}$	19	A
$I_{FSM}$ @ 50Hz	265	A
@ 60Hz	280	A
$I^2t$ @ 50Hz	351	A <sup>2</sup> s
@ 60Hz	320	A <sup>2</sup> s
$V_{RRM}$ range	100 to 1200	V
$T_J$ range	- 65 to 175	°C



## 12F(R) Series

Bulletin I20205 rev. A 09/98

International  
**IR** Rectifier

### 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	$V_{R(BR)}$ , minimum avalanche voltage V (1)	$I_{RRM}$ max. @ $T_J = 175^\circ\text{C}$ mA
12F(R)	10	100	150	--	12
	20	200	275	--	
	40	400	500	500	
	60	600	725	750	
	80	800	950	950	
	100	1000	1200	1150	
	120	1200	1400	1350	

(1) Avalanche version only available from  $V_{RRM}$  400V to 1200V.

#### Forward Conduction

Parameter	12F(R)	Units	Conditions
$I_{F(AV)}$ Max. average forward current @ Case temperature	12	A	180° conduction, half sine wave
	144	°C	
$I_{F(RMS)}$ Max. RMS forward current	19	A	
$P_R$ Maximum non-repetitive peak reverse power	7	K/W	10µs square pulse, $T_J = T_J$ max. <b>see note (2)</b>
$I_{FSM}$ Max. peak, one-cycle forward, non-repetitive surge current	265	A	t = 10ms No voltage reappplied
	280		t = 8.3ms
	225		t = 10ms 100% $V_{RRM}$ reappplied
	235		t = 8.3ms
$I^2t$ Maximum $I^2t$ for fusing	351	A <sup>2</sup> s	t = 10ms No voltage reappplied
	320		t = 8.3ms
	250		t = 10ms 100% $V_{RRM}$ reappplied
	226		t = 8.3ms
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	3510	A <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied
$V_{F(TO)1}$ Low level value of threshold voltage	0.77	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$V_{F(TO)2}$ High level value of threshold voltage	0.97		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$r_{f1}$ Low level value of forward slope resistance	10.70	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$r_{f2}$ High level value of forward slope resistance	6.20		$(I > \pi \times I_{F(AV)})$ , $T_J = T_J$ max.
$V_{FM}$ Max. forward voltage drop	1.26	V	$I_{pk} = 38\text{A}$ , $T_J = 25^\circ\text{C}$ , $t_p = 400\mu\text{s}$ rectangular wave

(2) Available only for Avalanche version, all other parameters the same as 12F.

**Thermal and Mechanical Specifications**

Parameter	12F(R)	Units	Conditions
T <sub>J</sub> Max. junction operating temperature range	-65 to 175	°C	
T <sub>stg</sub> Max. storage temperature range	-65 to 200		
R <sub>thJC</sub> Max. thermal resistance, junction to case	2	K/W	DC operation
R <sub>thCS</sub> Max. thermal resistance, case to heatsink	0.5		Mounting surface, smooth, flat and greased
T Mounting torque, ± 10%	1.2 (1.5)	Nm	Lubricated threads (Not lubricated threads)
wt Approximate weight	7 (0.25)	g (oz)	
Case style	DO-203AA (DO-4)		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°	0.33	0.26	K/W	T <sub>J</sub> = T <sub>J</sub> max.
120°	0.41	0.44		
90°	0.53	0.58		
60°	0.78	0.81		
30°	1.28	1.29		

**Ordering Information Table**

**Device Code**

<b>A</b>	<b>12</b>	<b>F</b>	<b>R</b>	<b>120</b>	<b>M</b>
①	②	③	④	⑤	⑥

- 1** - A = Avalanche diode  
None = Standard diode
- 2** - Current rating: Code = I<sub>F(AV)</sub>
- 3** - F = Standard device
- 4** - None = Stud Normal Polarity (Cathode to Stud)  
R = Stud Reverse Polarity (Anode to Stud)
- 5** - Voltage code: Code x 10 = V<sub>RRM</sub> (See Voltage Ratings table)
- 6** - None = Stud base DO-203AA (DO-4) 10-32UNF-2A  
M = Stud base DO-203AA (DO-4) M5 X 0.8 - (Not available for Avalanche diodes)

# 12F(R) Series

Bulletin I20205 rev. A 09/98

## Outlines Table

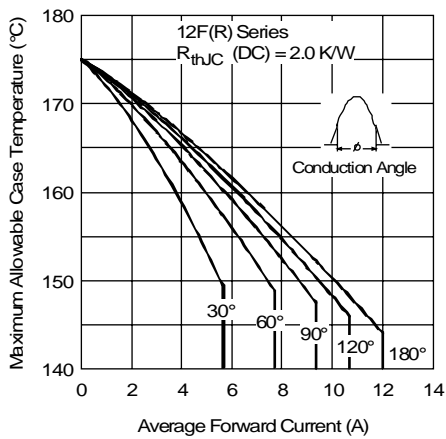
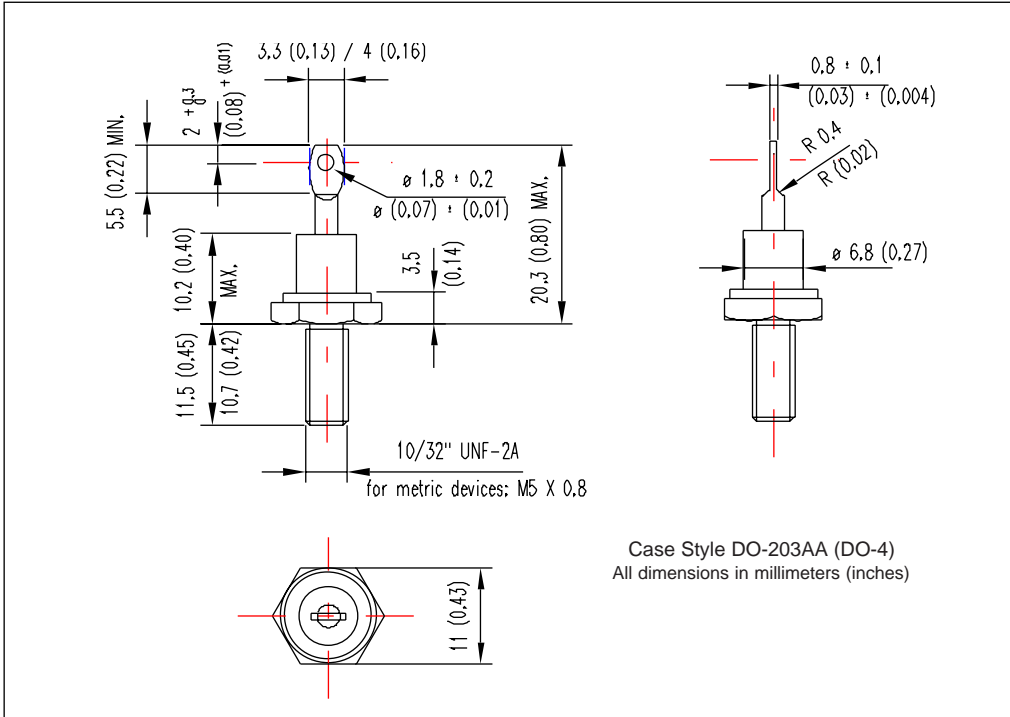


Fig. 1 - Current Ratings Characteristics

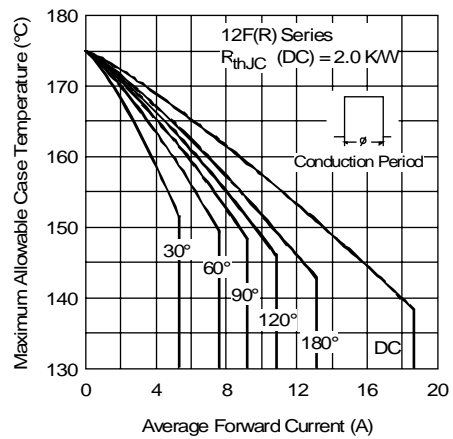


Fig. 2 - Current Ratings Characteristics

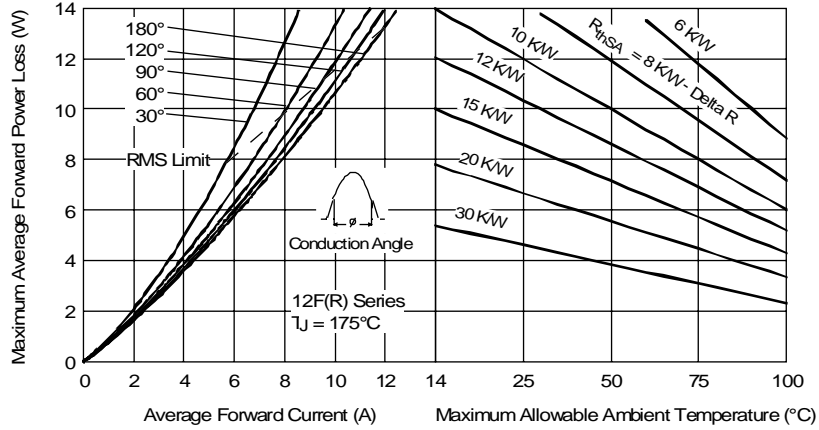


Fig. 3 - Forward Power Loss Characteristics

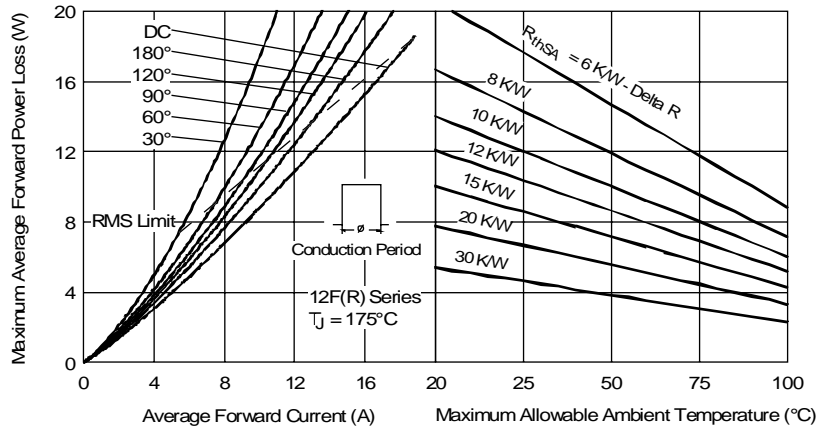


Fig. 4 - Forward Power Loss Characteristics

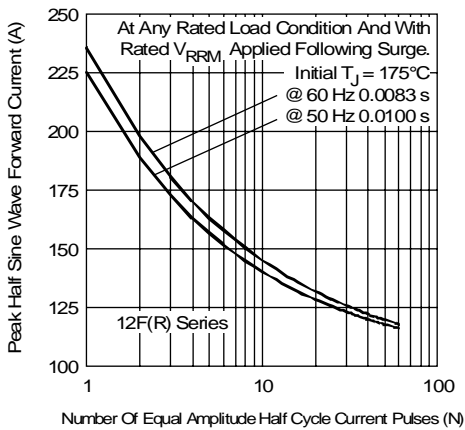


Fig. 5 - Maximum Non-Repetitive Surge Current

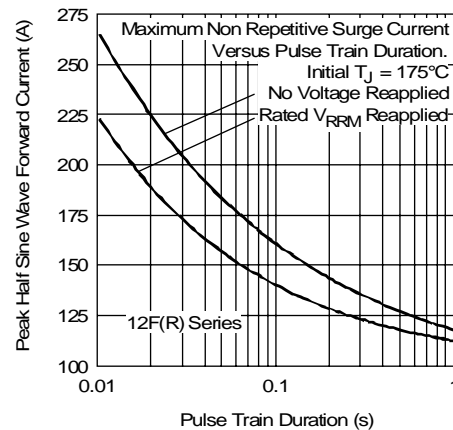


Fig. 6 - Maximum Non-Repetitive Surge Current

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International  
**IR** Rectifier

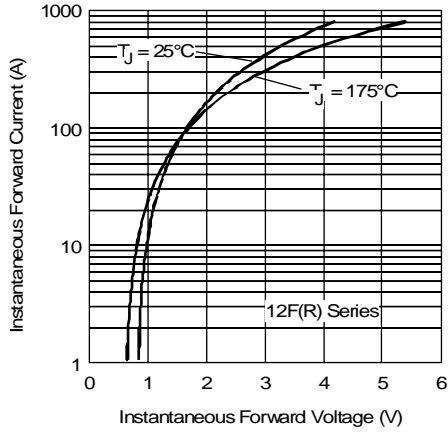


Fig. 7 - Forward Voltage Drop Characteristics

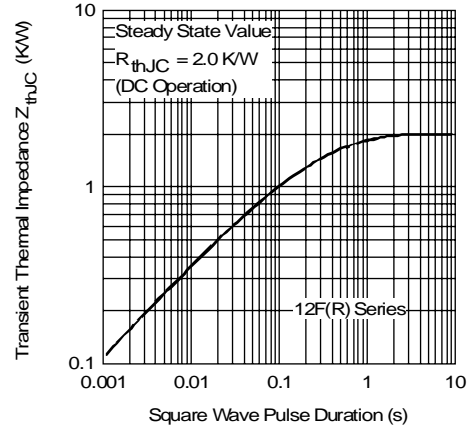


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

International  
**IR** Rectifier

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Data and specifications subject to change without notice.