

### 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  $V_{RRM}$

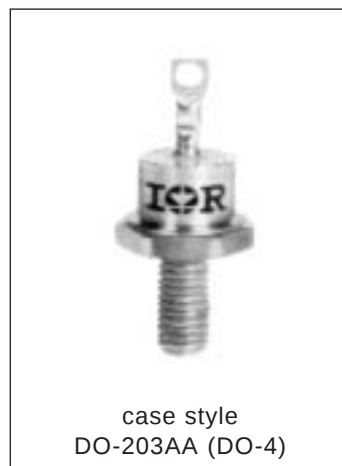
12 A

#### 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<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>@ $T_J = 175^\circ\text{C}$<br>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<br>144 | A<br>°C | 180° conduction, half sine wave                                                   |
| $I_{F(RMS)}$ 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.<br><b>see note (2)</b>                        |
| $I_{FSM}$ Max. peak, one-cycle forward, non-repetitive surge current | 265       | A       | t = 10ms No voltage                                                               |
|                                                                      | 280       |         | t = 8.3ms reappplied                                                              |
|                                                                      | 225       |         | t = 10ms 100% $V_{RRM}$                                                           |
|                                                                      | 235       |         | t = 8.3ms reappplied                                                              |
| $I^2t$ Maximum $I^2t$ for fusing                                     | 351       | A²s     | t = 10ms No voltage                                                               |
|                                                                      | 320       |         | t = 8.3ms reappplied                                                              |
|                                                                      | 250       |         | t = 10ms 100% $V_{RRM}$                                                           |
|                                                                      | 226       |         | t = 8.3ms reappplied                                                              |
| $I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing                       | 3510      | A²√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       | $I_{pk} = 38A, T_J = 25^\circ\text{C}, t_p = 400\mu\text{s}$ rectangular wave     |

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

### Thermal and Mechanical Specifications

| Parameter                                            | 12F(R)          | Units  | Conditions                                     |
|------------------------------------------------------|-----------------|--------|------------------------------------------------|
| $T_J$ Max. junction operating temperature range      | -65 to 175      | °C     |                                                |
| $T_{stg}$ Max. storage temperature range             | -65 to 200      |        |                                                |
| $R_{thJC}$ Max. thermal resistance, junction to case | 2               | K/W    | DC operation                                   |
| $R_{thCS}$ Max. thermal resistance, case to heatsink | 0.5             |        | Mounting surface, smooth, flat and greased     |
| T Mounting torque, $\pm 10\%$                        | 1.2<br>(1.5)    | Nm     | Lubricated threads<br>(Not lubricated threads) |
| wt Approximate weight                                | 7 (0.25)        | g (oz) |                                                |
| Case style                                           | DO-203AA (DO-4) |        | See Outline Table                              |

### $\Delta R_{thJC}$ Conduction

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

| Conduction angle | Sinusoidal conduction | Rectangular conduction | Units | Conditions                 |
|------------------|-----------------------|------------------------|-------|----------------------------|
| 180°             | 0.33                  | 0.26                   | K/W   | $T_J = T_{J \text{ max.}}$ |
| 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

| Digit | Code |
|-------|------|
| 1     | A    |
| 2     | 12   |
| 3     | F    |
| 4     | R    |
| 5     | 120  |
| 6     | M    |

- 1** - A = Avalanche diode  
None = Standard diode
- 2** - Current rating: Code =  $I_{F(AV)}$
- 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 =  $V_{RRM}$  (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

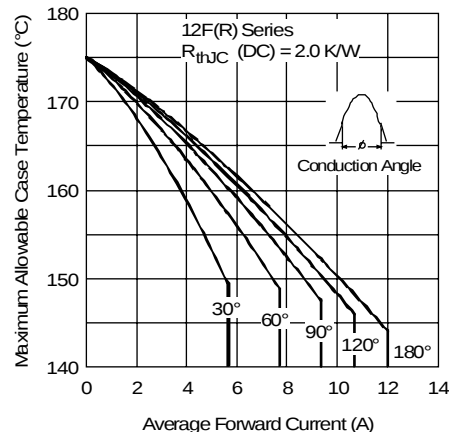
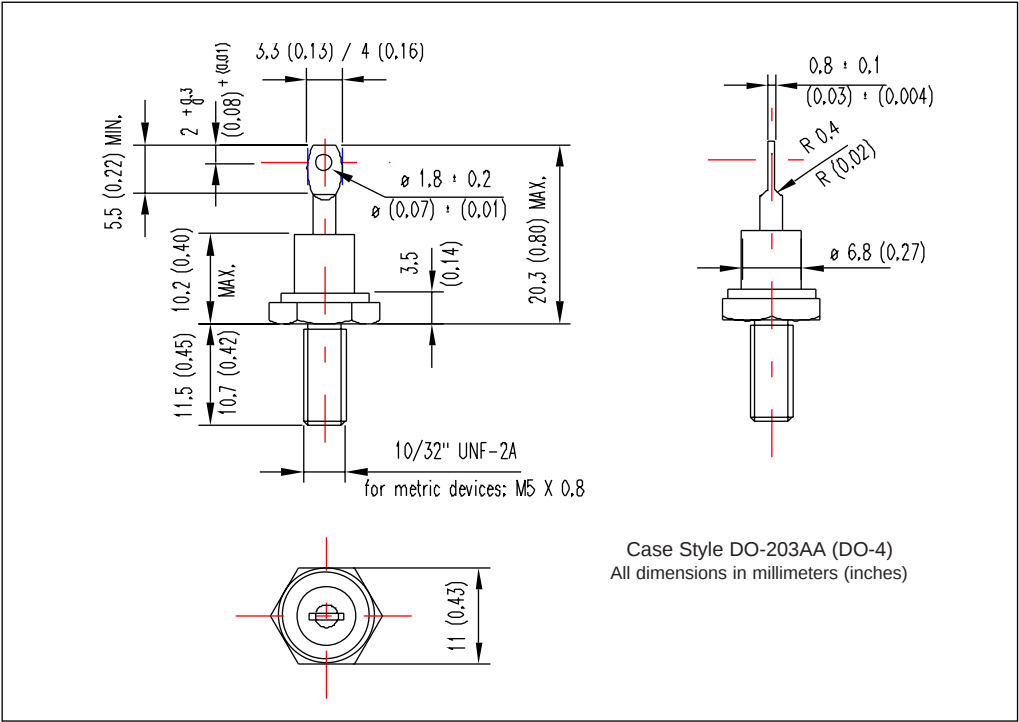


Fig. 1 - Current Ratings Characteristics

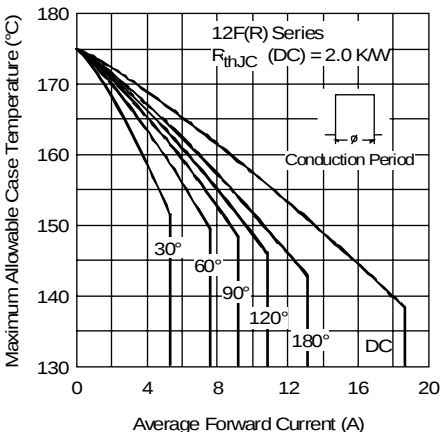


Fig. 2 - Current Ratings Characteristics

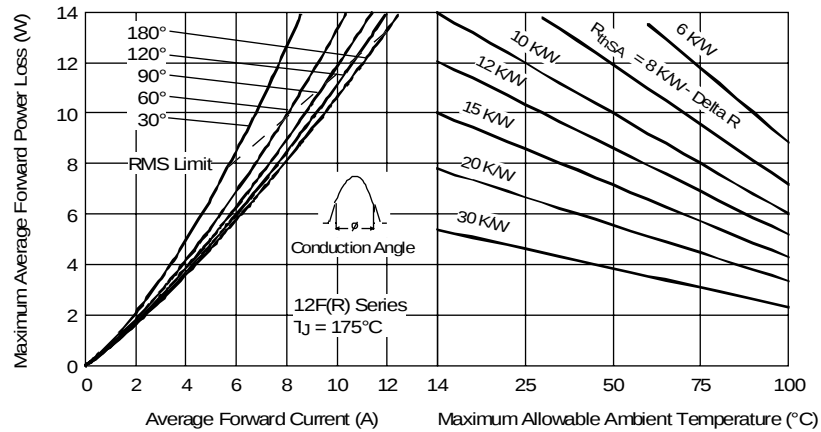


Fig. 3 - Forward Power Loss Characteristics

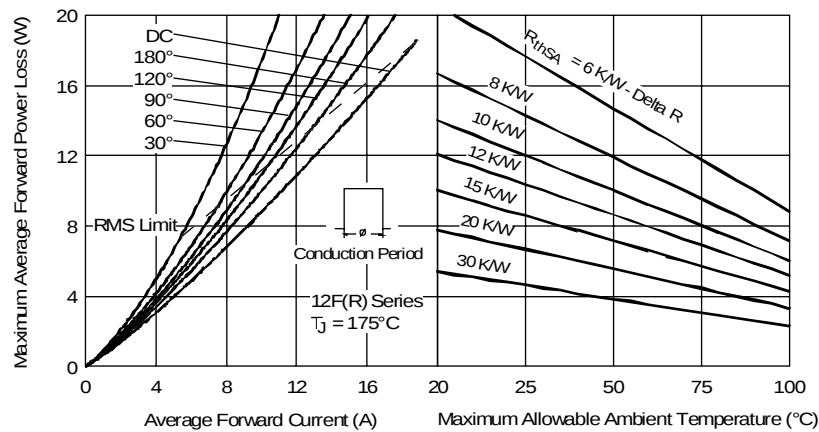


Fig. 4 - Forward Power Loss Characteristics

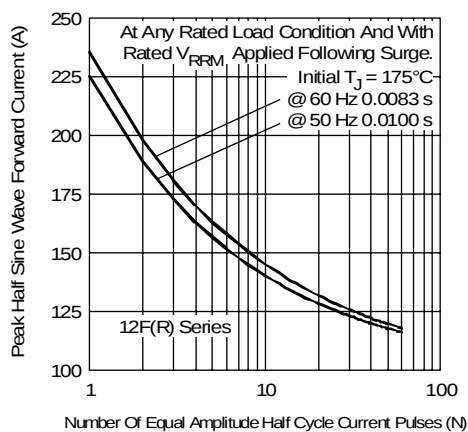


Fig. 5 - Maximum Non-Repetitive Surge Current

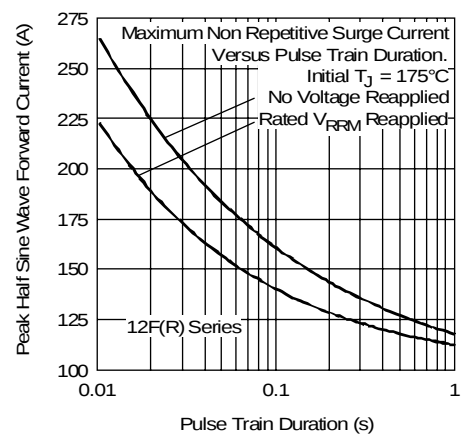


Fig. 6 - Maximum Non-Repetitive Surge Current

## 12F(R) Series

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International  
**IOR** Rectifier

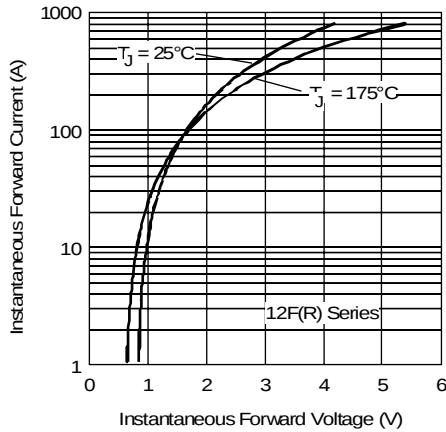


Fig. 7 - Forward Voltage Drop Characteristics

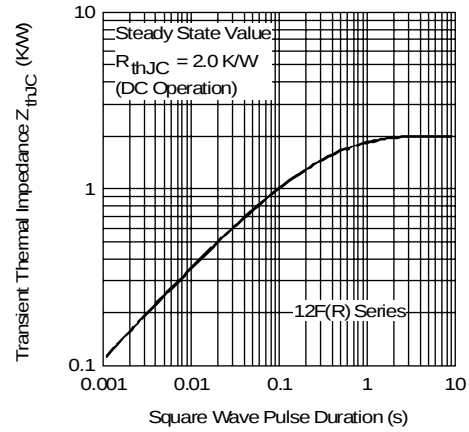


Fig. 8 - Thermal Impedance  $Z_{thJC}$  Characteristics

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**WORLD HEADQUARTERS:** 233 Kansas St., El Segundo, California 90245 U.S.A. Tel: (310) 322 3331. Fax: (310) 322 3332.  
**EUROPEAN HEADQUARTERS:** Hurst Green, Oxted, Surrey RH8 9BB, U.K. Tel: ++ 44 1883 732020. Fax: ++ 44 1883 733408.  
**IR CANADA:** 15 Lincoln Court, Brampton, Markham, Ontario L6T3Z2. Tel: (905) 453 2200. Fax: (905) 475 8801.  
**IR GERMANY:** Saalburgstrasse 157, 61350 Bad Homburg. Tel: ++ 49 6172 96590. Fax: ++ 49 6172 965933.  
**IR ITALY:** Via Liguria 49, 10071 Borgaro, Torino. Tel: ++ 39 11 4510111. Fax: ++ 39 11 4510220.  
**IR FAR EAST:** K&H Bldg., 2F, 30-4 Nishi-Ikebukuro 3-Chome, Toshima-Ku, Tokyo, Japan 171. Tel: 81 3 3983 0086.  
**IR SOUTHEAST ASIA:** 1 Kim Seng Promenade, Great World City West Tower, 13-11, Singapore 237994. Tel: ++ 65 838 4630.  
**IR TAIWAN:** 16 Fl. Suite D.207, Sec. 2, Tun Haw South Road, Taipei, 10673, Taiwan. Tel: 886 2 2377 9936.

<http://www.irf.com>

Fax-On-Demand: +44 1883 733420

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### Офис по работе с юридическими лицами:

105318, г.Москва, ул.Щербаковская д.3, офис 1107, 1118, ДЦ «Щербаковский»

Телефон: +7 495 668-12-70 (многоканальный)

Факс: +7 495 668-12-70 (доб.304)

E-mail: [info@moschip.ru](mailto:info@moschip.ru)

Skype отдела продаж:

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