

International  
**IR** Rectifier

MUR1520PbF

Ultrafast Rectifier

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature
- Lead-Free ("PbF" suffix)

$t_{rr} = 35ns$   
 $I_{F(AV)} = 15Amp$   
 $V_R = 200V$

Description/ Applications

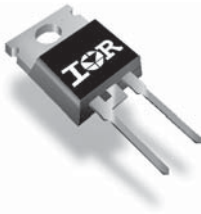
International Rectifier's MUR.. series are the state of the art Ultra fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time. The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics. These devices are intended for use in the output rectification stage of SMPS, UPS, DC-DC converters as well as free-wheeling diode in low voltage inverters and chopper motor drives. Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

Absolute Maximum Ratings

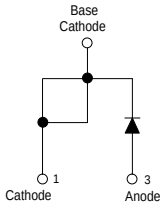
| Parameters                                                                                            | Max        | Units       |
|-------------------------------------------------------------------------------------------------------|------------|-------------|
| $V_{RRM}$ Peak Repetitive Peak Reverse Voltage                                                        | 200        | V           |
| $I_{F(AV)}$ Average Rectified Forward Current<br>Total Device, (Rated $V_R$ ), $T_C = 150^{\circ}C$   | 15         | A           |
| $I_{FSM}$ Non Repetitive Peak Surge Current                                                           | 200        |             |
| $I_{FM}$ Peak Repetitive Forward Current<br>(Rated $V_R$ , Square wave, 20 KHz), $T_C = 150^{\circ}C$ | 30         |             |
| $T_J, T_{STG}$ Operating Junction and Storage Temperatures                                            | -65 to 175 | $^{\circ}C$ |

Case Styles

MUR1520PbF



TO-220AC



**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

| Parameters                                                           | Min | Typ | Max  | Units | Test Conditions                                               |
|----------------------------------------------------------------------|-----|-----|------|-------|---------------------------------------------------------------|
| V <sub>BR</sub> , V <sub>r</sub> Breakdown Voltage, Blocking Voltage | 200 | -   | -    | V     | I <sub>R</sub> = 100μA                                        |
| V <sub>F</sub> Forward Voltage                                       | -   | -   | 1.05 | V     | I <sub>F</sub> = 15A                                          |
|                                                                      | -   | -   | 0.85 | V     | I <sub>F</sub> = 15A, T <sub>J</sub> = 150°C                  |
| I <sub>R</sub> Reverse Leakage Current                               | -   | -   | 10   | μA    | V <sub>R</sub> = V <sub>R</sub> Rated                         |
|                                                                      | -   | -   | 500  | μA    | T <sub>J</sub> = 150°C, V <sub>R</sub> = V <sub>R</sub> Rated |
| C <sub>T</sub> Junction Capacitance                                  | -   | 55  | -    | pF    | V <sub>R</sub> = 200V                                         |
| L <sub>S</sub> Series Inductance                                     | -   | 8.0 | -    | nH    | Measured lead to lead 5mm from package body                   |

**Dynamic Recovery Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

| Parameters                              | Min | Typ | Max | Units | Test Conditions                                                           |
|-----------------------------------------|-----|-----|-----|-------|---------------------------------------------------------------------------|
| t <sub>rr</sub> Reverse Recovery Time   | -   | -   | 35  | ns    | I <sub>F</sub> = 1.0A, di <sub>F</sub> /dt = 50A/μs, V <sub>R</sub> = 30V |
|                                         | -   | 22  | -   |       | T <sub>J</sub> = 25°C                                                     |
|                                         | -   | 39  | -   |       | T <sub>J</sub> = 125°C                                                    |
| I <sub>RRM</sub> Peak Recovery Current  | -   | 1.6 | -   | A     | T <sub>J</sub> = 25°C                                                     |
|                                         | -   | 4.1 | -   |       | T <sub>J</sub> = 125°C                                                    |
| Q <sub>rr</sub> Reverse Recovery Charge | -   | 19  | -   | nC    | T <sub>J</sub> = 25°C                                                     |
|                                         | -   | 90  | -   |       | T <sub>J</sub> = 125°C                                                    |

**Thermal - Mechanical Characteristics**

| Parameters                                                          | Min     | Typ  | Max | Units  |
|---------------------------------------------------------------------|---------|------|-----|--------|
| T <sub>J</sub> Max. Junction Temperature Range                      | - 65    | -    | 175 | °C     |
| T <sub>Stg</sub> Max. Storage Temperature Range                     | - 65    | -    | 175 |        |
| R <sub>thJC</sub> Thermal Resistance, Junction to Case              | -       | -    | 1.5 | °C/ W  |
| R <sub>thJA</sub> Thermal Resistance, Junction to Ambient           | -       | -    | 50  |        |
| R <sub>thCS</sub> <sup>①</sup> Thermal Resistance, Case to Heatsink | -       | 0.5  | -   |        |
| Wt Weight                                                           | -       | 2.0  | -   | g      |
|                                                                     | -       | 0.07 | -   | (oz)   |
| Mounting Torque                                                     | 6.0     | -    | 12  | Kg-cm  |
|                                                                     | 5.0     | -    | 10  | lbf.in |
| Marking Device                                                      | MUR1520 |      |     |        |

① Mounting Surface, Flat, Smooth and Greased

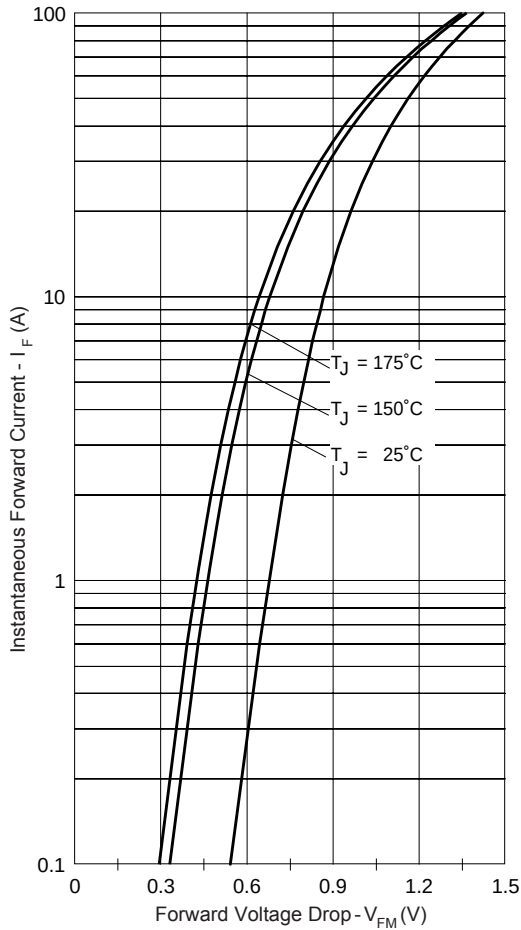


Fig. 1 - Typical Forward Voltage Drop Characteristics

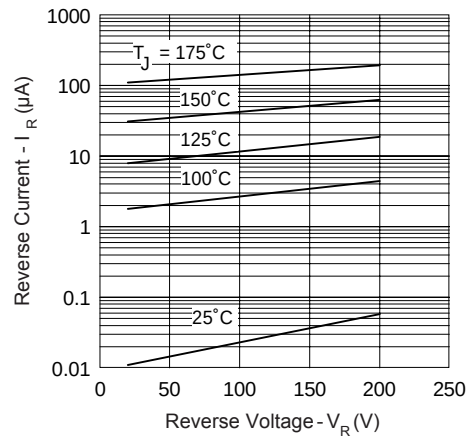


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

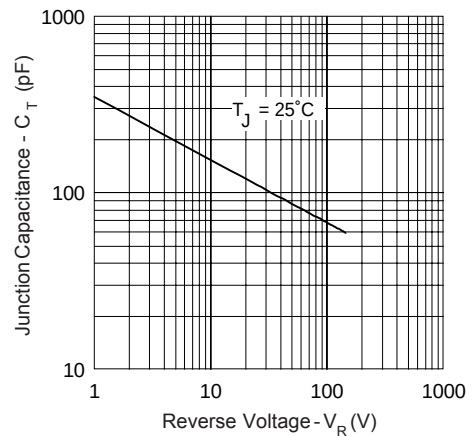


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

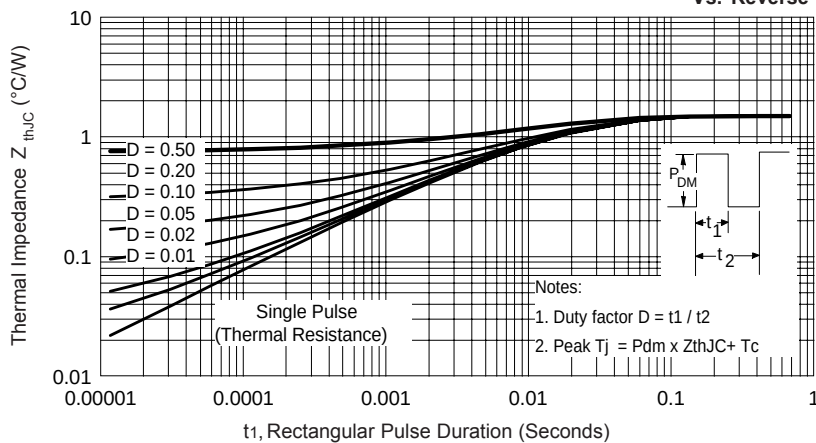
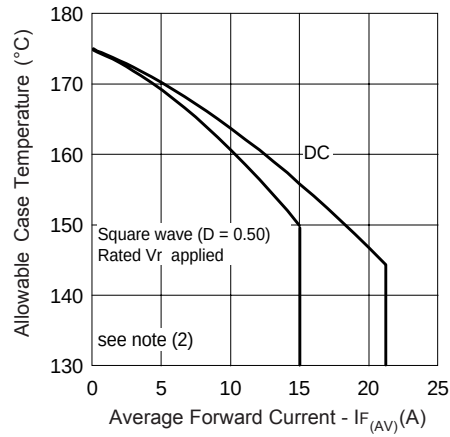
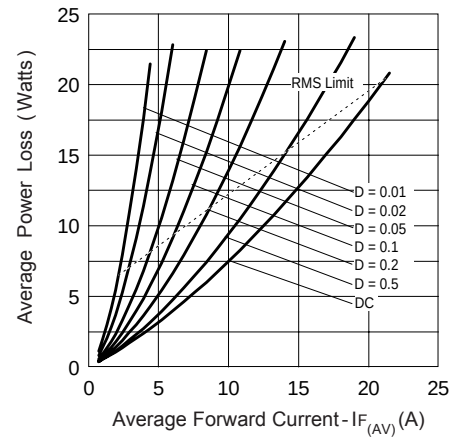


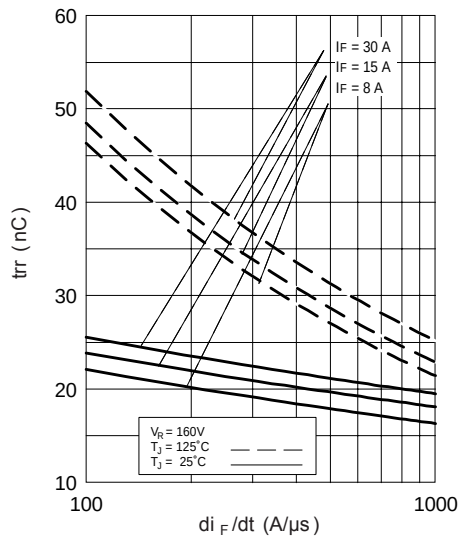
Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics



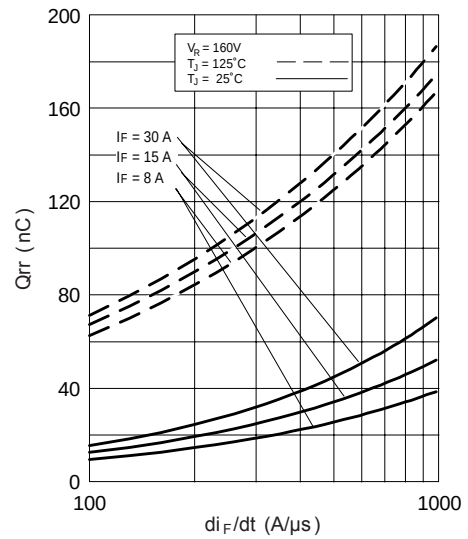
**Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current**



**Fig. 6 - Forward Power Loss Characteristics**



**Fig. 7 - Typical Reverse Recovery vs.  $di_F/dt$**

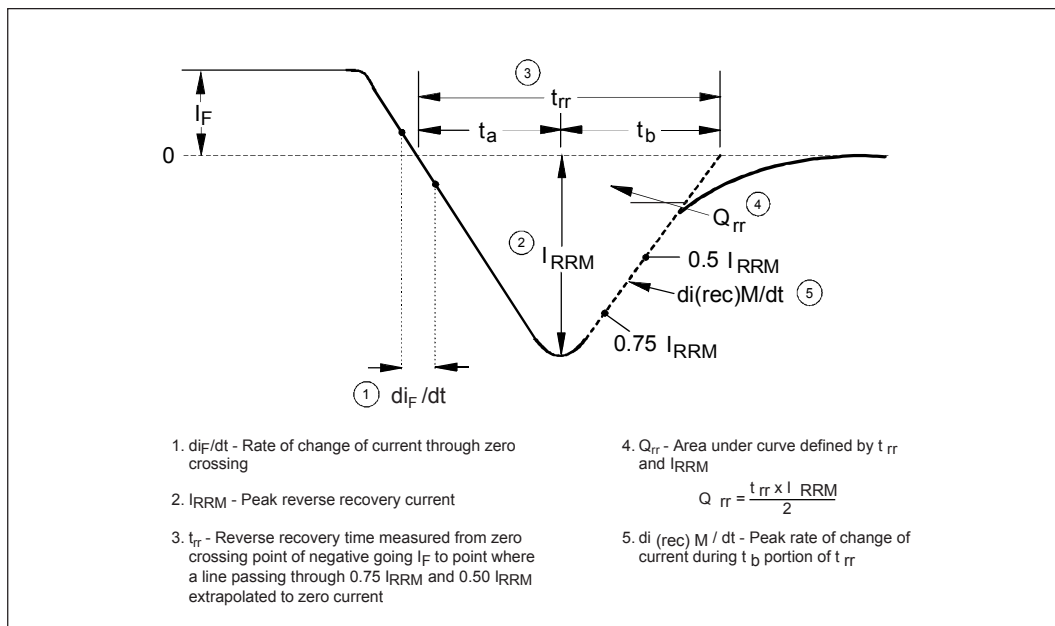
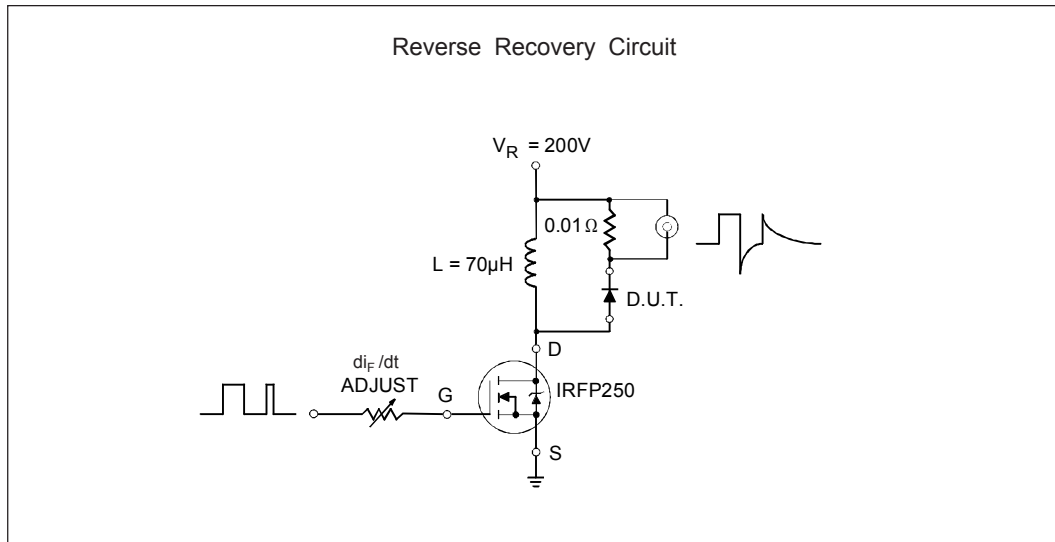


**Fig. 8 - Typical Stored Charge vs.  $di_F/dt$**

(2) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

$P_d$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

$P_{d_{REV}}$  = Inverse Power Loss =  $V_{R1} \times I_{R1} (1 - D)$ ;  $I_{R1} @ V_{R1}$  = rated  $V_R$

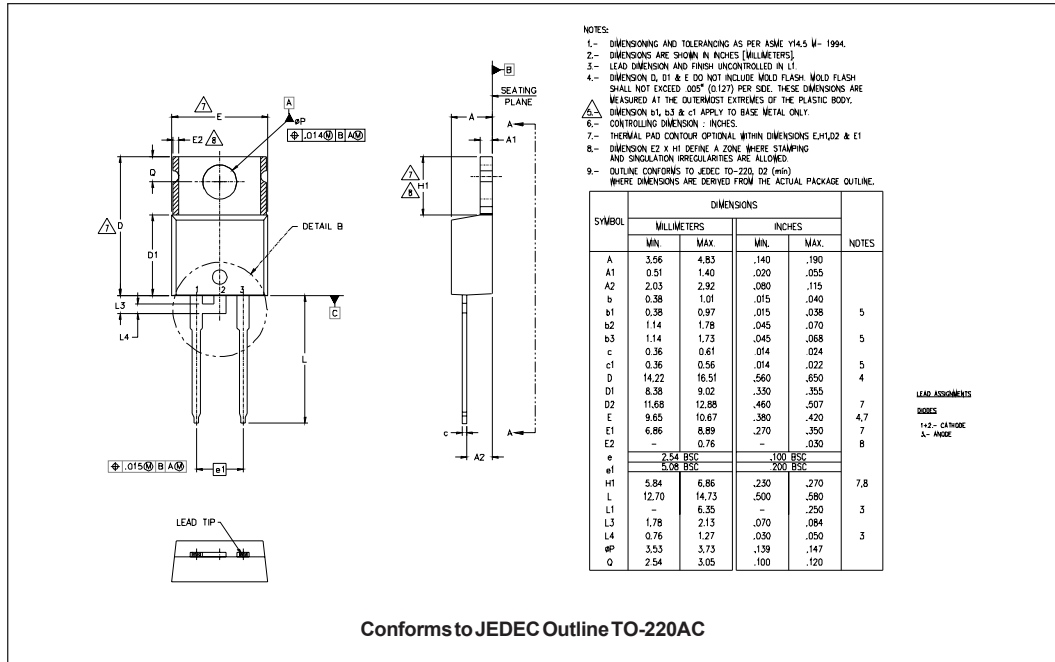


# MUR1520PbF

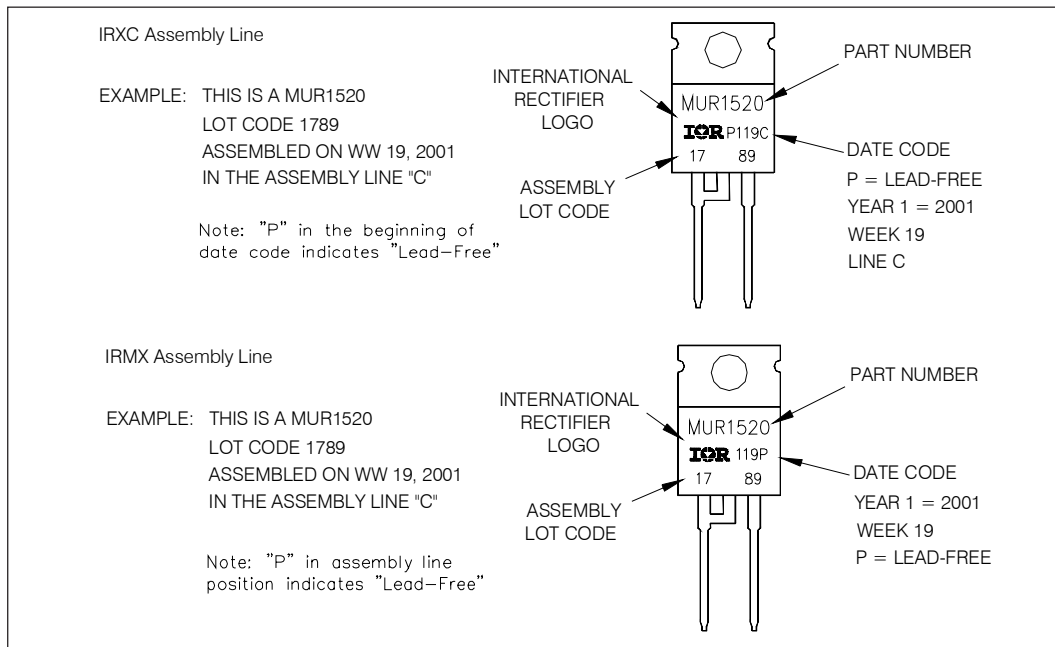
Bulletin PD-20895 rev. A 02/06

International  
**IOR** Rectifier

## Outline Table



## Part Marking Information



## Ordering Information Table

## Device Code

|     |    |    |     |
|-----|----|----|-----|
| MUR | 15 | 20 | PbF |
| ①   | ②  | ③  | ④   |

**1**

- Ultrafast MUR Series

**2**

- Current Rating (15 = 15A)

- Voltage Rating (20 = 200V)

**3**

- • none = Standard Production

**4**

• PbF = Lead-Free

Tube Standard Pack Quantity: 50 pieces

```

MUR1520
*****
* SPICE Model Diode *
*****
.SUBCKT MUR1520 ANO CAT
D1 ANO 1 CAT
*Define diode model
.MODEL DMOD D Is=16.9E-09 N=1.332 Rs=4.439E-03 Ikf=.232 Xti=2 Eg=1.11
Cjo=700.3E-09 M=.3715 Vj=.1784 Fc=.5 Isr=1.389E-09
Nr=3.002 Bv=270 Ibv=95.79E-6 Tt=10.49E-9)

*****

.ENDS MUR1520

Thermal Model Subcircuit
.SUBCKT MUR1520 5 1

CTHERM1 5 4 2.23E+01
CTHERM2 4 3 1.23E+02
CTHERM3 3 2 3.35E+02
CTHERM4 2 1 4.75E+02

RTHERM1 5 4 7.55E-01
RTHERM2 4 3 5.90E-02
RTHERM1 3 2 1.01E-01
RTHERM1 2 1 5.43E-02

.ENDS MUR1520

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MUR1520PbF

Bulletin PD-20895 rev. A 02/06

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**IOR** Rectifier

Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level and Lead-Free.  
Qualification Standards can be found on IR's Web site.

International  
**IOR** Rectifier

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