Bulletin PD-20729 rev. D 12/05

International
IOR Rectifier

MUR2020CT
MURB2020CT
MURB2020CT-1

Ultrafast Rectifier

Features

- Ultrafast Recovery Time
- Low Forward Voltage Drop
- Low Leakage Current
- 175°C Operating Junction Temperature

t_{rr} = 25ns
$I_{F(AV)}$ = 20Amp
V_R = 200V

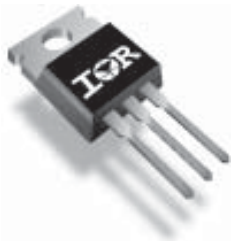
Description/ Applications

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	Per Leg	10	A
	Total Device, (Rated V_R), T_C = 145°C	Total Device	20	
I_{FSM}	Non Repetitive Peak Surge Current	Per Leg	100	
I_{FM}	Peak Repetitive Forward Current	Per Leg	20	
	(Rated V_R, Square wave, 20 KHz), T_C = 145°C			
T_J, T_{STG}	Operating Junction and Storage Temperatures		-65 to 175	°C

Case Styles

MUR2020CT	MURB2020CT	MURB2020CT-1
		
TO-220AB	D^2PAK	TO-262

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Parameters		Min	Typ	Max	Units	Test Conditions
V_{BR}, V_r	Breakdown Voltage, Blocking Voltage	200	-	-	V	I_R = 100µA
V_F	Forward Voltage	-	-	0.85	V	I_F = 8A, T_J = 125°C
		-	-	1.15	V	I_F = 16A, T_J = 25°C
		-	-	1.05	V	I_F = 16A, T_J = 125°C
I_R	Reverse Leakage Current	-	-	15	µA	V_R = V_R Rated
		-	-	250	µA	T_J = 150°C, V_R = V_R Rated
C_T	Junction Capacitance	-	55	-	pF	V_R = 200V
L_S	Series Inductance	-	8.0	-	nH	Measured lead to lead 5mm from package body

Dynamic Recovery Characteristics @ T_J = 25°C (unless otherwise specified)

Parameters		Min	Typ	Max	Units	Test Conditions	
t_{rr}	Reverse Recovery Time	-	-	35	ns	I_F = 1.0A, di_F/dt = 50A/µs, V_R = 30V	
		-	-	25		I_F = 0.5A, I_R = 1.0A, I_{REC} = 0.25A	
		-	21	-		T_J = 25°C	I_F = 10A V_R = 160V di_F/dt = 200A/µs
			35			T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	1.9	-	A	T_J = 25°C	
		-	4.8	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	25	-	nC	T_J = 25°C	
		-	78	-		T_J = 125°C	

Thermal - Mechanical Characteristics

Parameters			Min	Typ	Max	Units
T_J	Max. Junction Temperature Range		-	-	- 65 to 175	°C
T_{Stg}	Max. Storage Temperature Range		-	-	- 65 to 175	
R_{thJC}	Thermal Resistance, Junction to Case	Per Leg	-	-	2.5	°C/W
R_{thJA}	Thermal Resistance, Junction to Ambient	Per Leg	-	-	50	
R_{thCS} ①	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

① Mounting Surface, Flat, Smooth and Greased

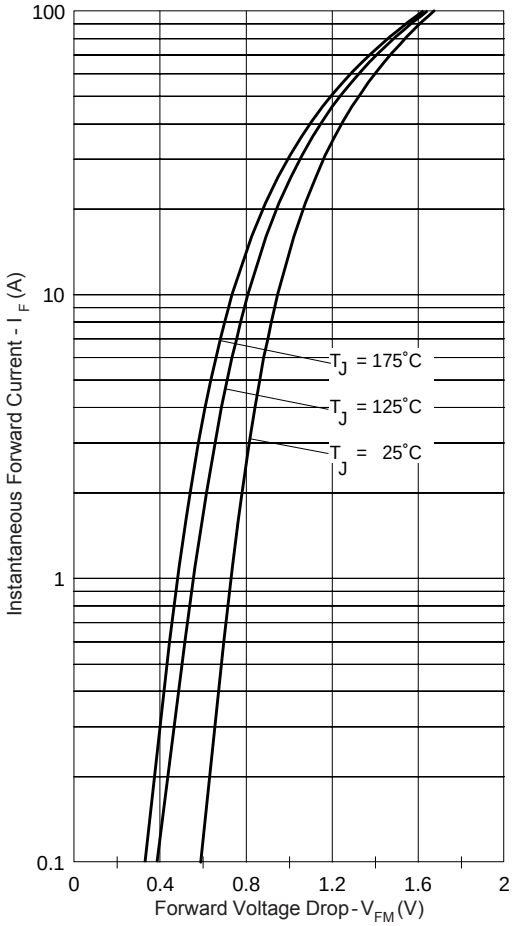


Fig. 1 - Typical Forward Voltage Drop Characteristics

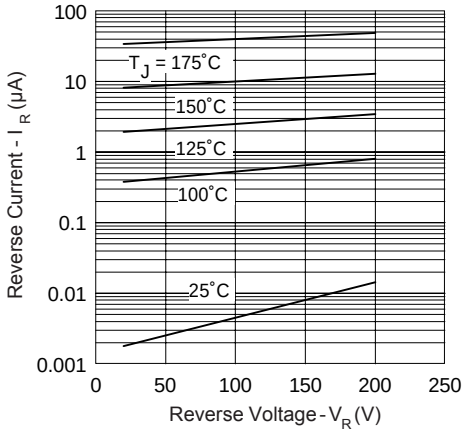


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

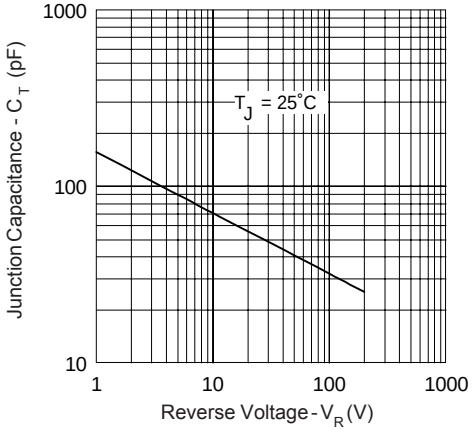


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

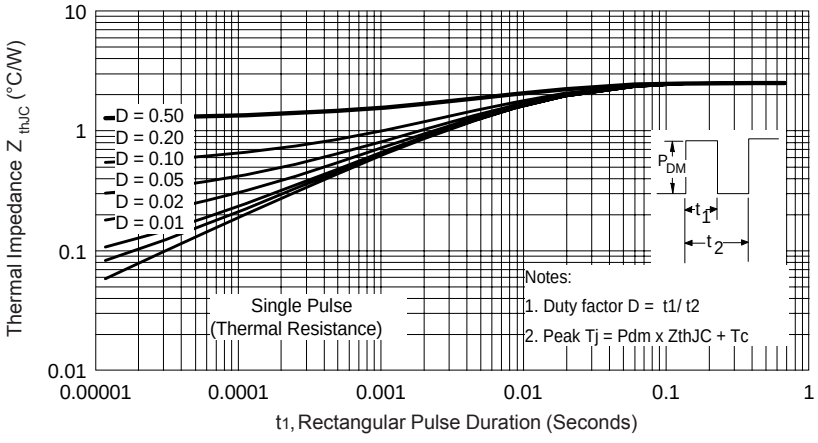


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

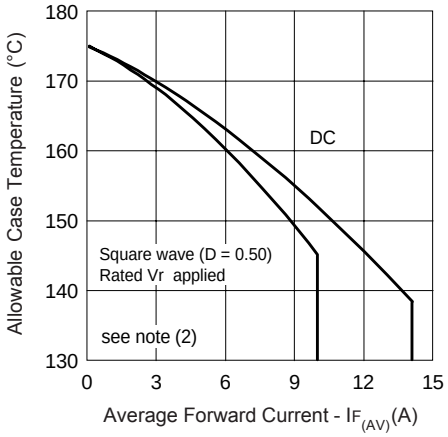


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

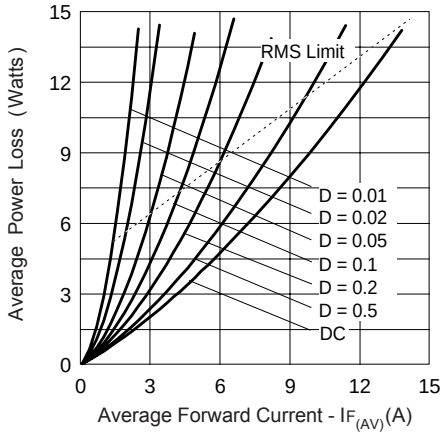


Fig. 6 - Forward Power Loss Characteristics

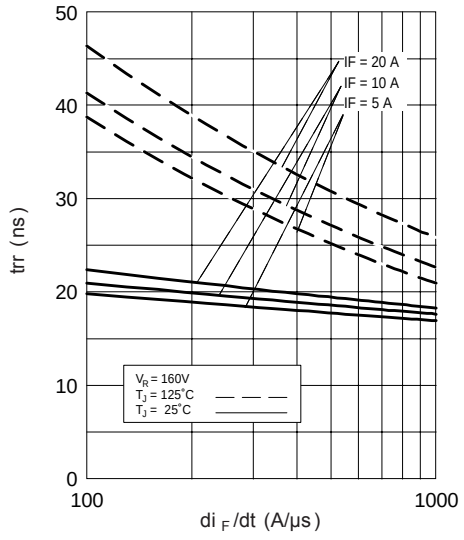


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

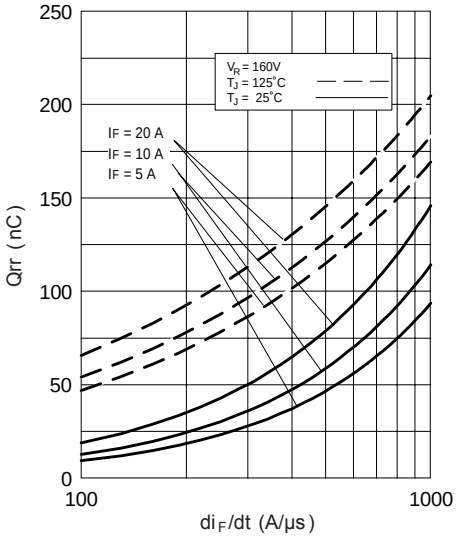


Fig. 8 - Typical Stored Charge vs. di_F/dt

(2) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward Power Loss = $I_{F(AV)} \times V_{FM}$ @ ($I_{F(AV)}$ / D) (see Fig. 6);
Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R$ (1 - D); I_R @ V_{R1} = rated V_R

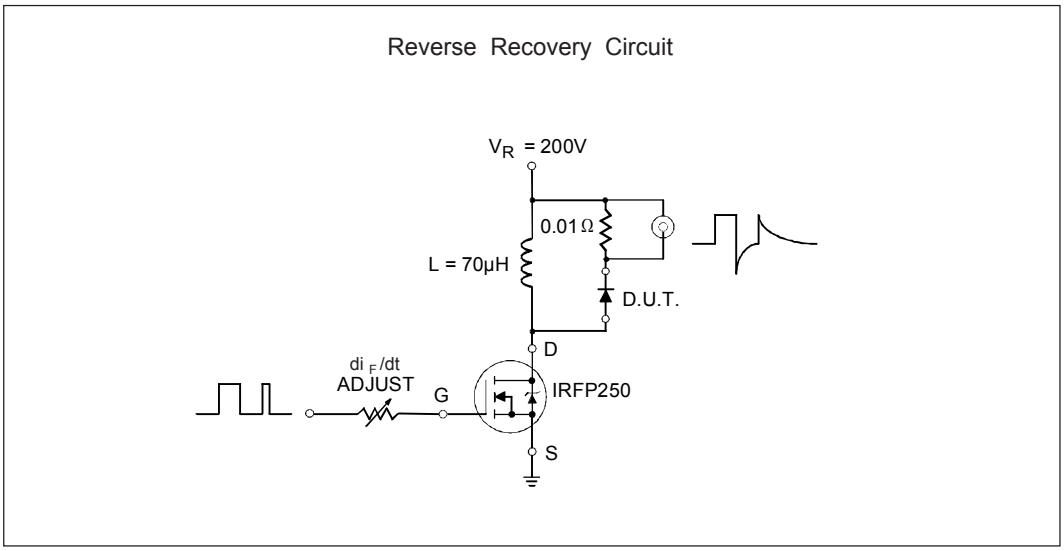
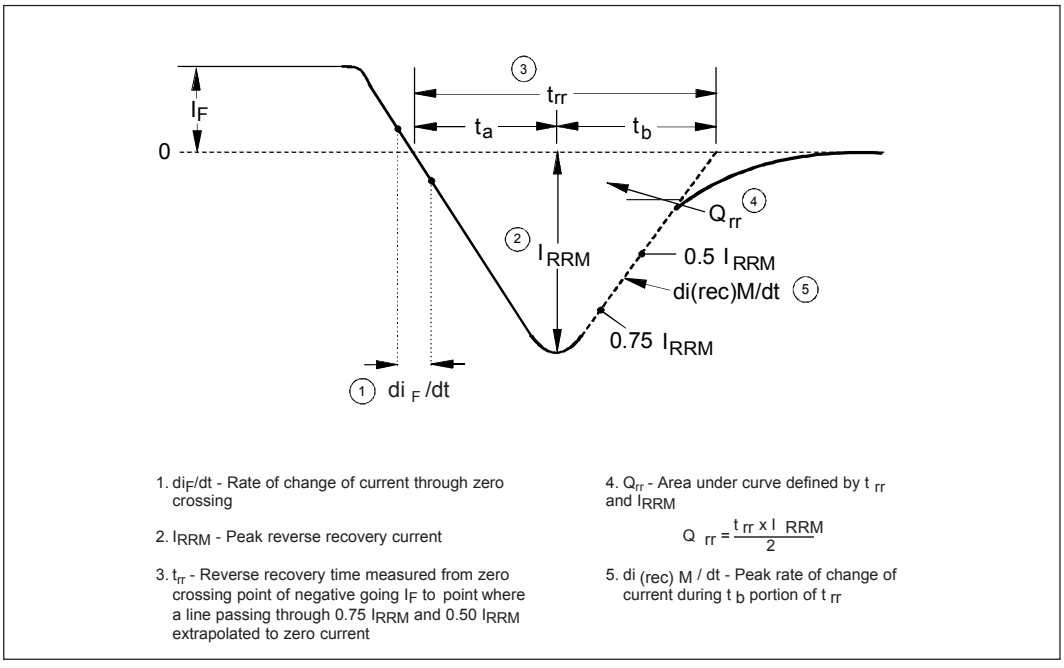


Fig. 9- Reverse Recovery Parameter Test Circuit



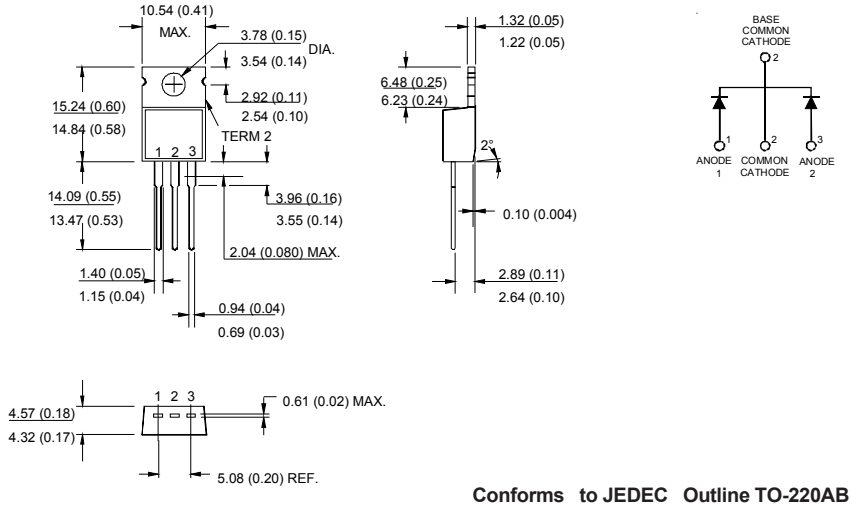
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

5. $di_{(rec)M}/dt$ - Peak rate of change of current during t_b portion of t_{rr}

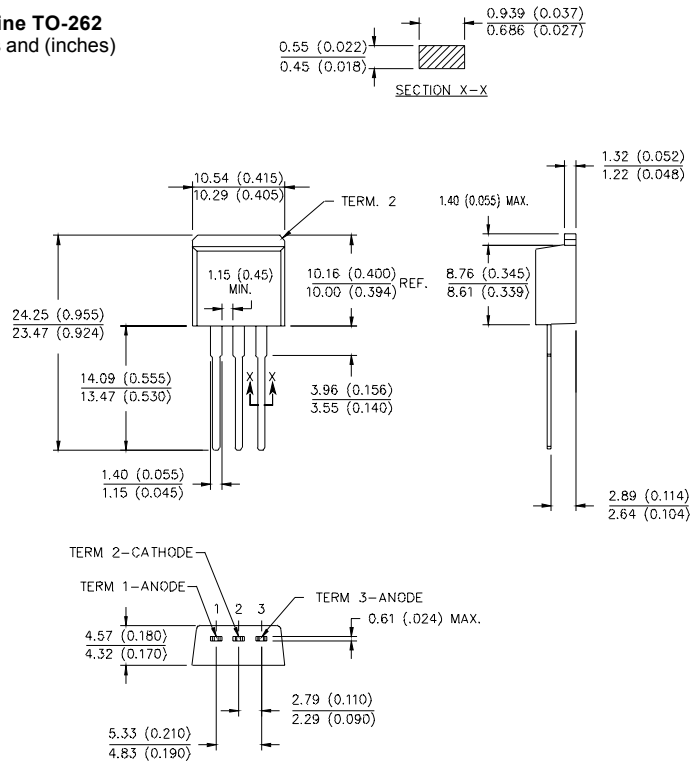
Fig. 10 - Reverse Recovery Waveform and Definitions

Outline Table

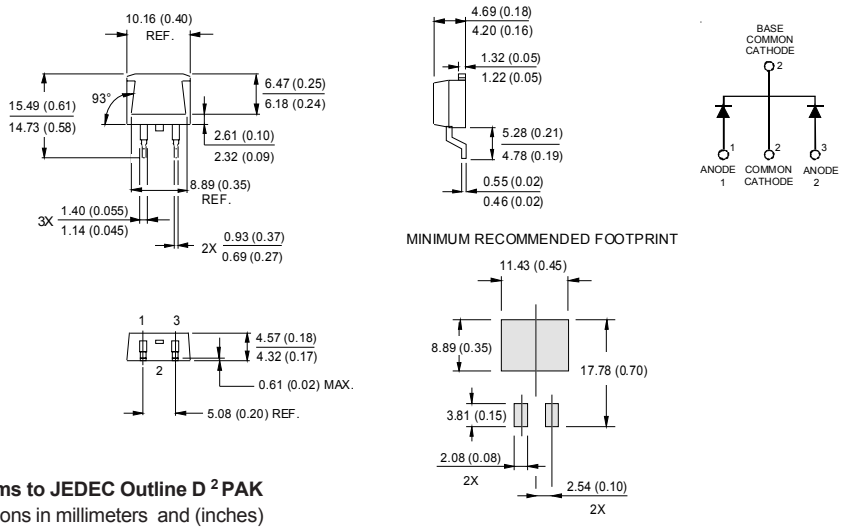


Conforms to JEDEC Outline TO-220AB
Dimensions in millimeters and (inches)

Modified JEDEC outline TO-262
Dimensions in millimeters and (inches)



Outline Table



Conforms to JEDEC Outline D ^{2}PAK
Dimensions in millimeters and (inches)

Ordering Information Table

Device Code

MUR	B	20	20	CT	-1
1	2	3	4	5	6

1 - Ultrafast MUR Series

2 - B = D^{2}Pak / TO-262
None = TO-220AB

3 - Current Rating (20 = 20A)

4 - Voltage Rating (20 = 200V)

5 - CT = Center Tap (Dual) TO-220 /D^{2}PAK/ TO-262

6 - "-1" = TO-262 Option

```
MUR2020
******************************************
* SPICE Model Diode                      *
******************************************
.SUBCKT MUR2020 ANO CAT
D1 ANO 1 CAT
*Define diode model
.MODEL DMOD D (IS=1.04703N N=1.44364 BV=280 IBV=100P RS=7.57994M
              + CJO=218.618P VJ=700M M=399.212M EG=1.11 RL=17.4782G)


******************************************


.ENDS MUR2020


Thermal Model Subcircuit
.SUBCKT MUR2020  5 1

CTHERM1     5    4     3.93E+01
CTHERM2     4    3     2.67E+02
CTHERM3     3    2     5.20E+02
CTHERM4     2    1     1.66E+03

RTHERM1     5    4     1.12E+00
RTHERM2     4    3     1.04E+00
RTHERM1     3    2     1.57E-01
RTHERM1     2    1     1.89E-01


.ENDS MUR2020
```


International
IOR Rectifier

IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7309
12/05

Notice

The products described herein were acquired by Vishay Intertechnology, Inc., as part of its acquisition of International Rectifier's Power Control Systems (PCS) business, which closed in April 2007. Specifications of the products displayed herein are pending review by Vishay and are subject to the terms and conditions shown below.

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.

International Rectifier®, IR®, the IR logo, HEXFET®, HEXSense®, HEXDIP®, DOL®, INTERO®, and POWIRTRAIN® are registered trademarks of International Rectifier Corporation in the U.S. and other countries. All other product names noted herein may be trademarks of their respective owners.