Bulletin PD-20895 rev. A 12/05

International
IOR Rectifier

MUR2020CTPbF

Ultrafast Rectifier

Features

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

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

Description/ Applications

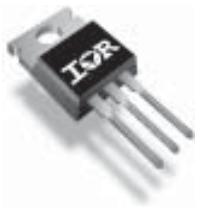
International Rectifier's MUR.. series are the state of the art Ultra fast recovery rectifiers specifically designed with optimized performance of forward voltage drop and ultra fast recovery time.
The planar structure and the platinum doped life time control, guarantee the best overall performance, 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.

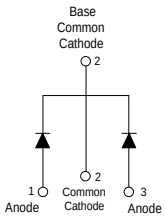
Absolute Maximum Ratings

	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

MUR2020CTPbF





TO-220AB

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	-	175	°C
T_{Stg}	Max. Storage Temperature Range	- 65	-	175	
R_{thJC}	Thermal Resistance, Junction to CasePer 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
	Marking Device	MUR2020CT			

① Mounting Surface, Flat, Smooth and Greased

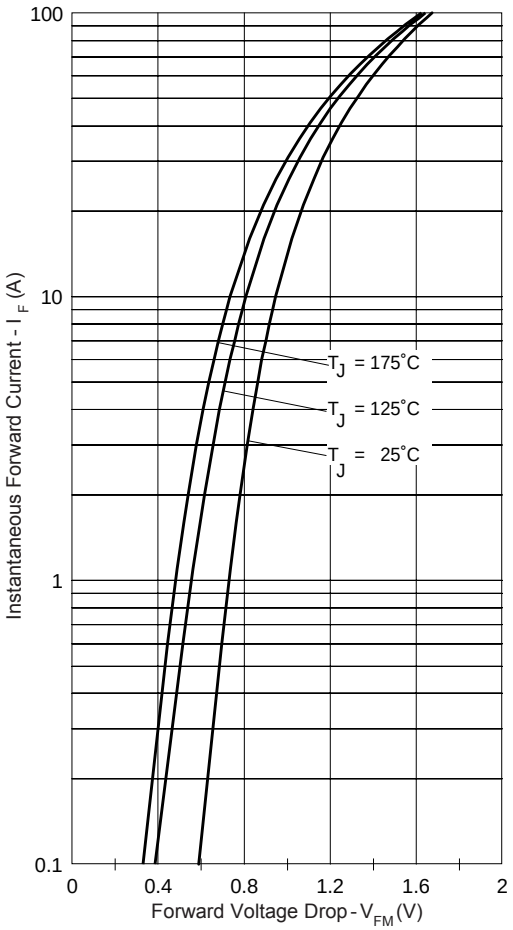


Fig. 1 - Typical Forward Voltage Drop Characteristics

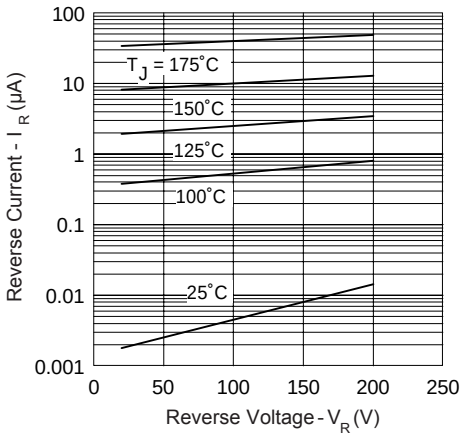


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

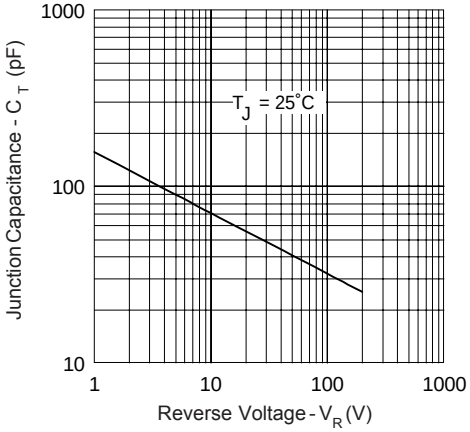


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

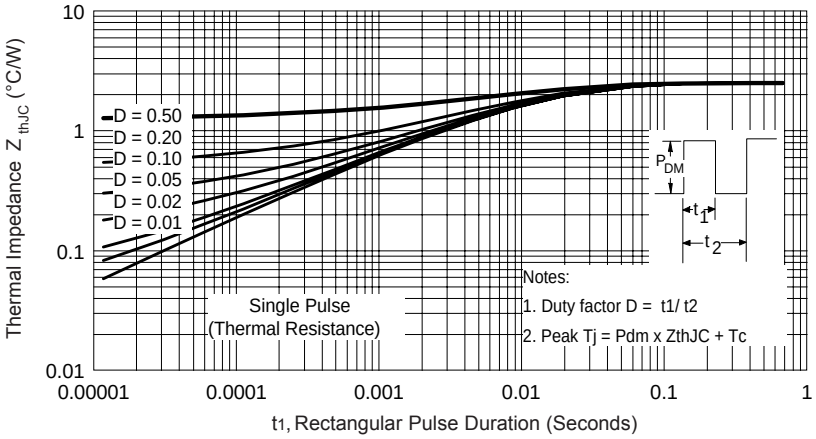


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

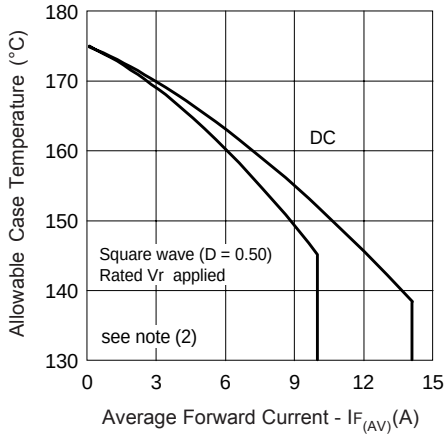


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

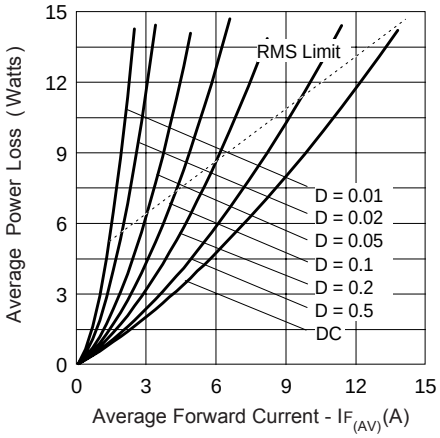


Fig. 6 - Forward Power Loss Characteristics

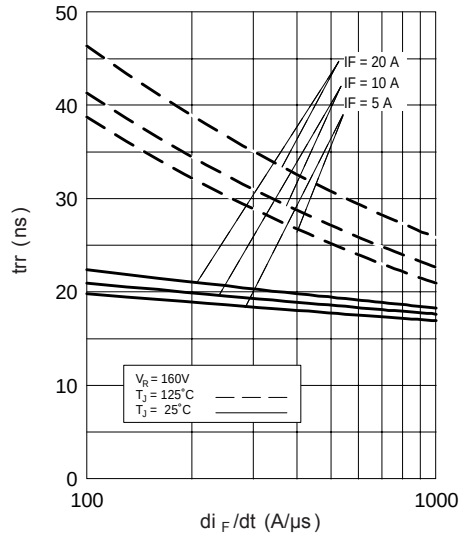


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

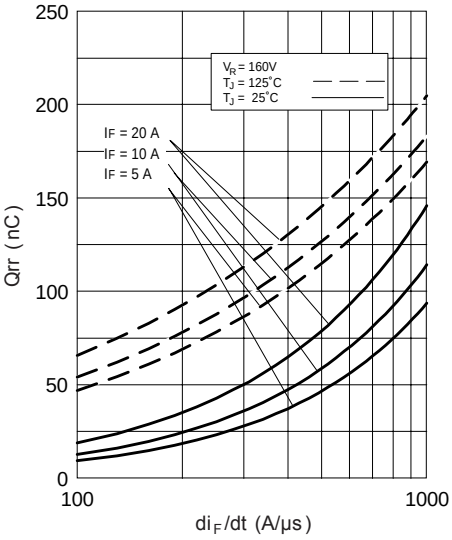


Fig. 8 - Typical Stored Charge vs. di_F/dt

(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

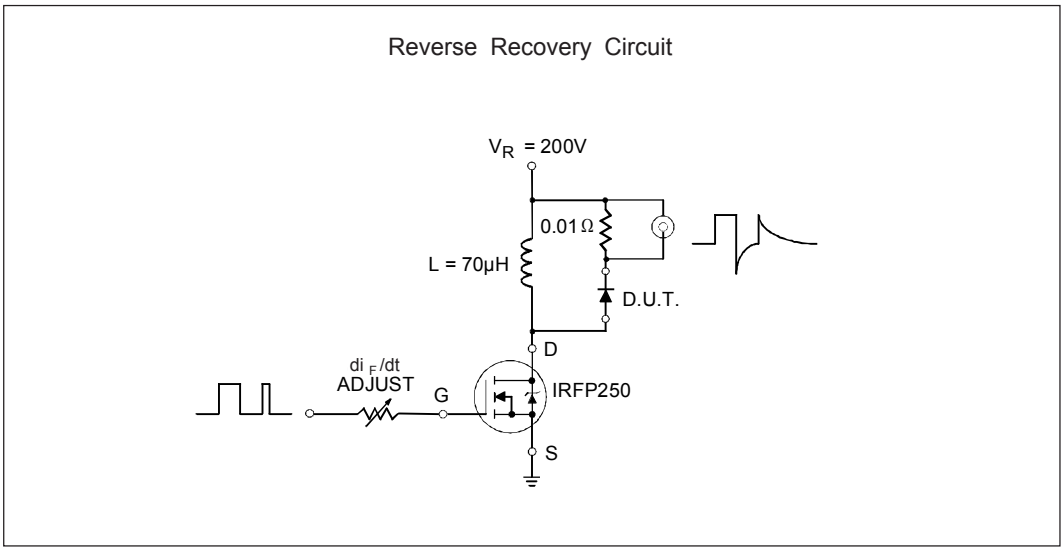
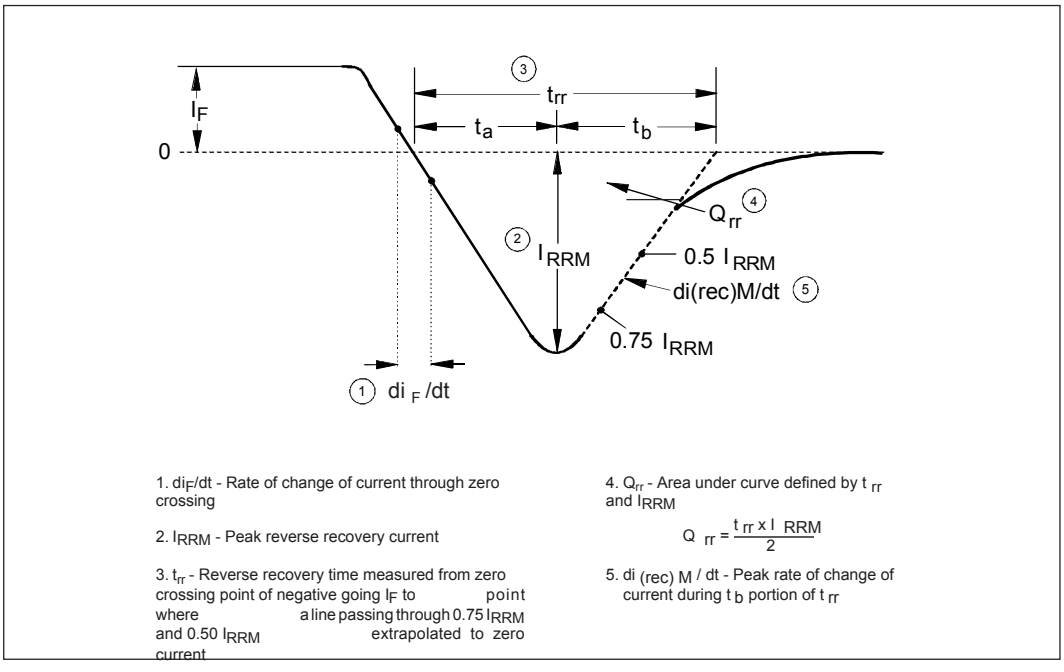


Fig. 9- Reverse Recovery Parameter Test Circuit



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

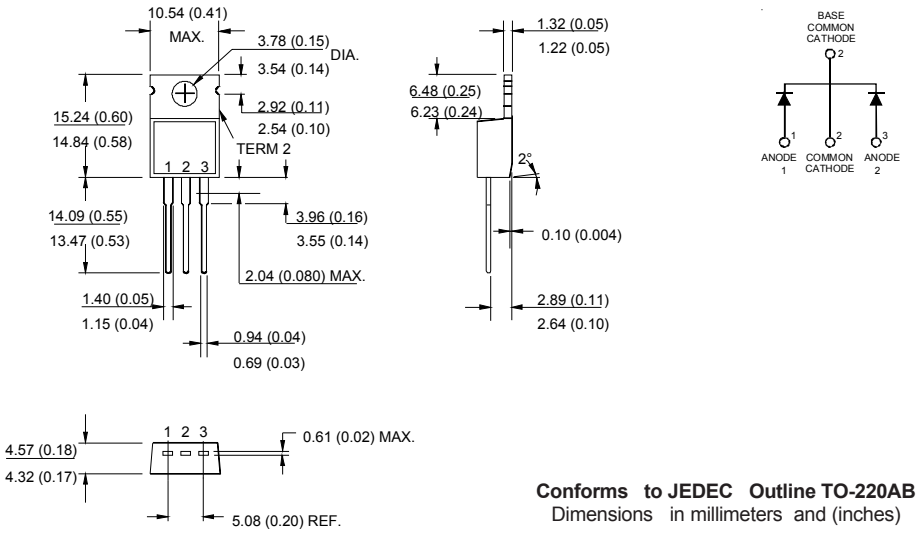
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

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

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



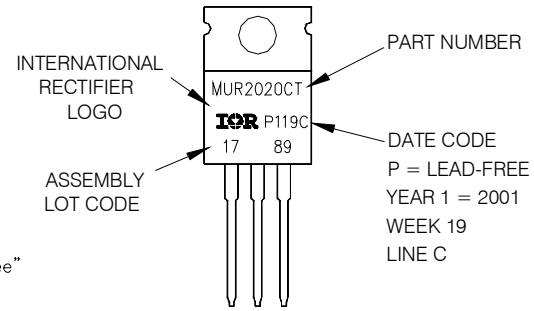
Conforms to JEDEC Outline TO-220AB
Dimensions in millimeters and (inches)

Part Marking Information

IRXC Assembly Line

EXAMPLE: THIS IS A MU2020CT
LOT CODE 1789
ASSEMBLED ON WW 19, 2001
IN THE ASSEMBLY LINE "C"

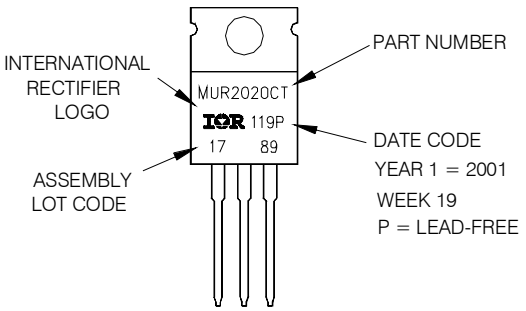
Note: "P" in the beginning of
date code indicates "Lead–Free"



IRMX Assembly Line

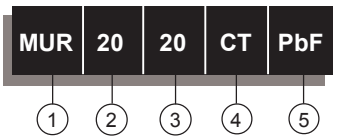
EXAMPLE: THIS IS A MUR2020CT
LOT CODE 1789
ASSEMBLED ON WW 19, 2001

Note: "P" in assembly line
position indicates "Lead–Free"



Ordering Information Table

Device Code



1	-	Ultrafast MUR Series
2	-	Current Rating (20 = 20A)
3	-	Voltage Rating (20 = 200V)
4	-	CT = Center Tap (Dual)
5	-	• none = Standard Production • PbF = Lead-Free

Tube Standard Pack Quantity : 50 pieces

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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)


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.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
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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
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