Bulletin PD-20738 04/00

International
IOR Rectifier

MUR1020CT
MURB1020CT
MURB1020CT-1

Ultrafast Rectifier

Features

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

t_{rr} = 25ns
$I_{F(AV)}$ = 10Amp
V_R = 200V

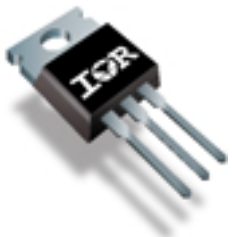
Description/ Applications

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	5	A
	Total Device, (Rated V_R), T_C = 149°C	Total Device	10	
I_{FSM}	Non Repetitive Peak Surge Current	Per Leg	50	
I_{FM}	Peak Repetitive Forward Current	Per Leg	10	
	(Rated V_R, Square wave, 20 KHz), T_C = 149°C			
T_J, T_{STG}	Operating Junction and Storage Temperatures		- 65 to 175	°C

Case Styles

MUR1020CT	MURB1020CT	MURB1020CT-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	-	0.87	0.99	V	I_F = 5A, T_J = 125°C
		-	1.02	1.20	V	I_F = 10A, T_J = 125°C
		-	1.12	1.25	V	I_F = 10A, T_J = 25°C
I_R	Reverse Leakage Current	-	-	10	µA	V_R = V_R Rated
		-	-	250	µA	T_J = 150°C, V_R = V_R Rated
C_T	Junction Capacitance	-	8	-	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/µA, V_R = 30V	
		-	-	25		I_F = 0.5A, I_R = 1.0A, I_{REC} = 0.25A	
		-	24	-		T_J = 25°C	I_F = 5A V_R = 160V di_F/dt = 200A/µs
			35			T_J = 125°C	
I_{RRM}	Peak Recovery Current	-	3.3	-	A	T_J = 25°C	
		-	5.0	-		T_J = 125°C	
Q_{rr}	Reverse Recovery Charge	-	33	-	nC	T_J = 25°C	
		-	76	-		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	-	-	5	°C/W
R_{thJA} ①	Thermal Resistance, Junction to Ambient	Per Leg	-	-	50	
R_{thCS} ②	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 Typical Socket Mount
② Mounting Surface, Flat, Smooth and Greased

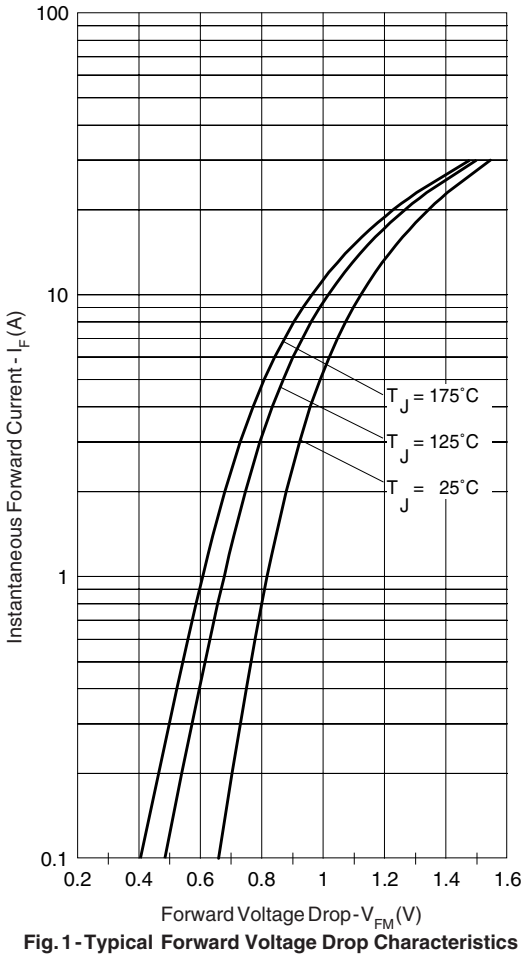


Fig. 1 - Typical Forward Voltage Drop Characteristics

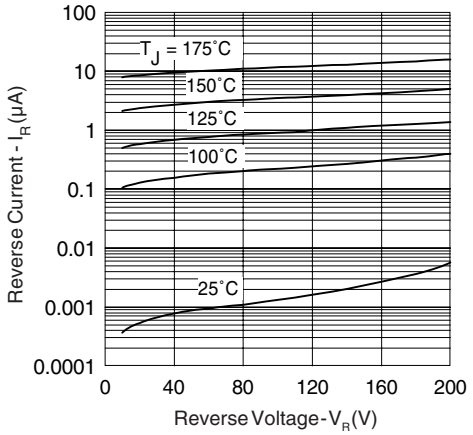


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage

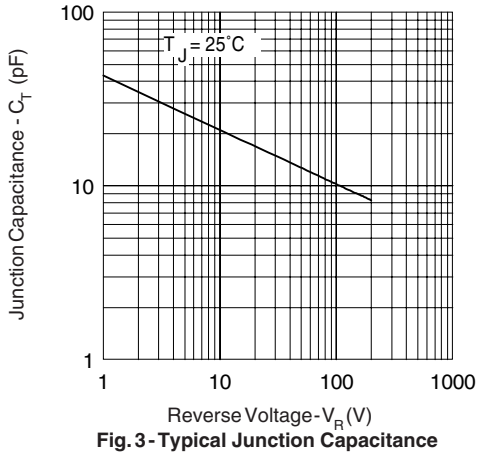


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

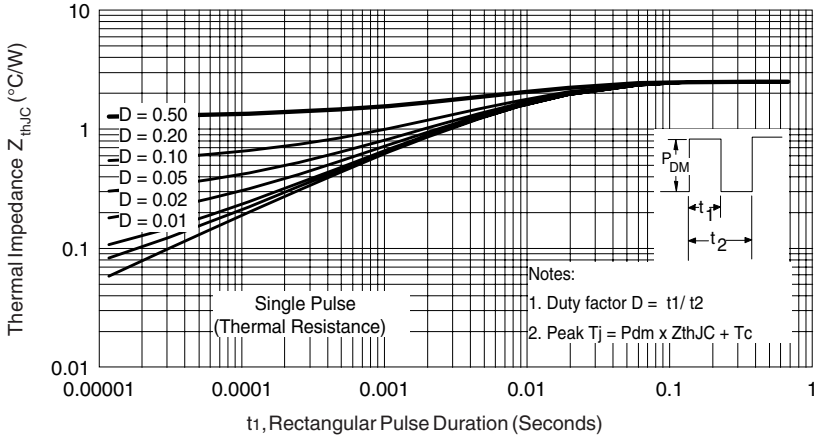


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics

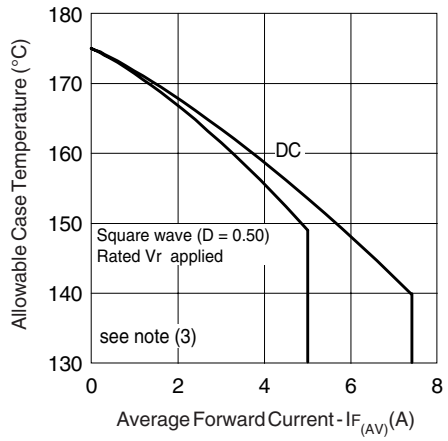


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current

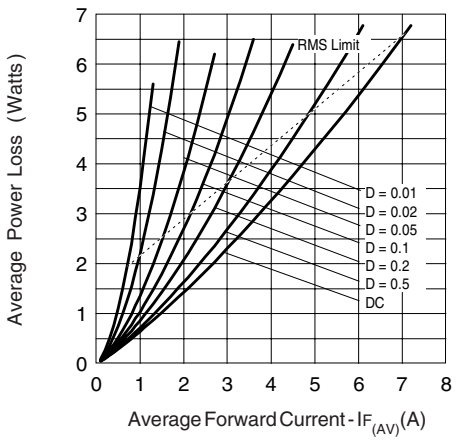


Fig. 6 - Forward Power Loss Characteristics

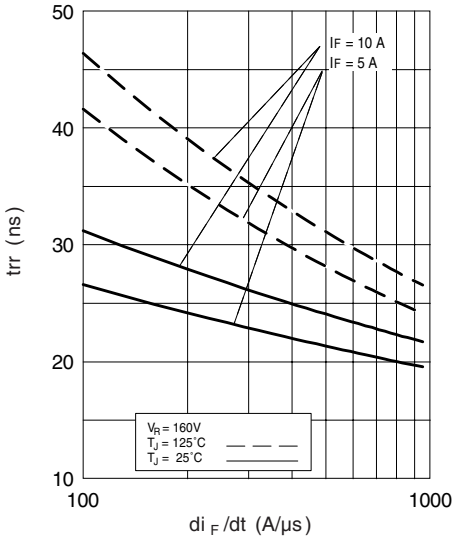


Fig. 7 - Typical Reverse Recovery vs. di_F/dt

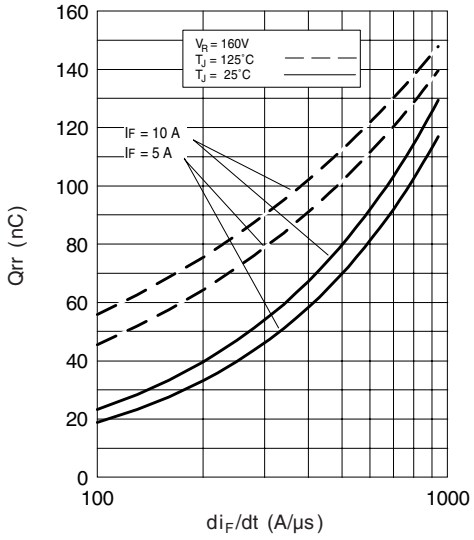


Fig. 8 - Typical Stored Charge vs. di_F/dt

(3) 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

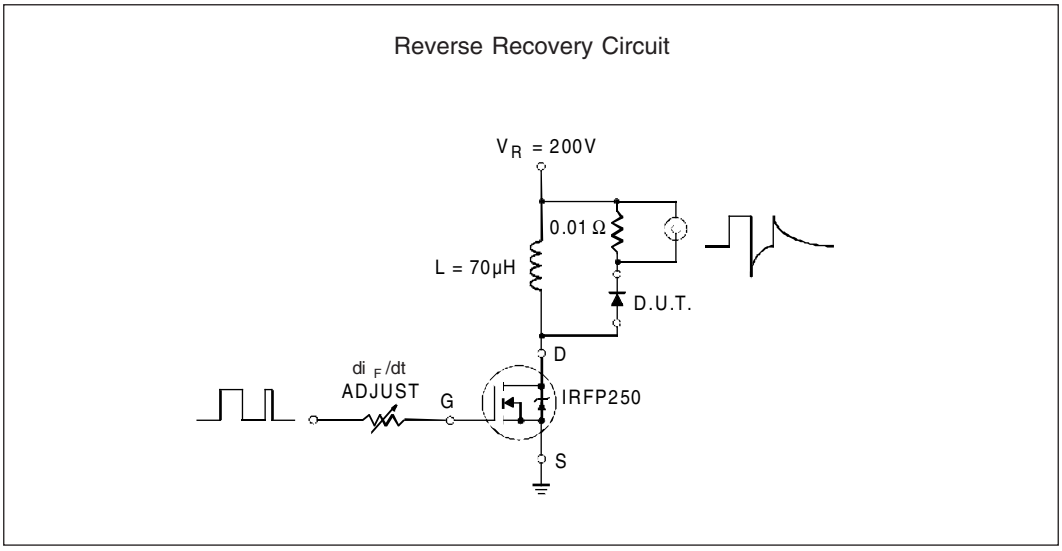
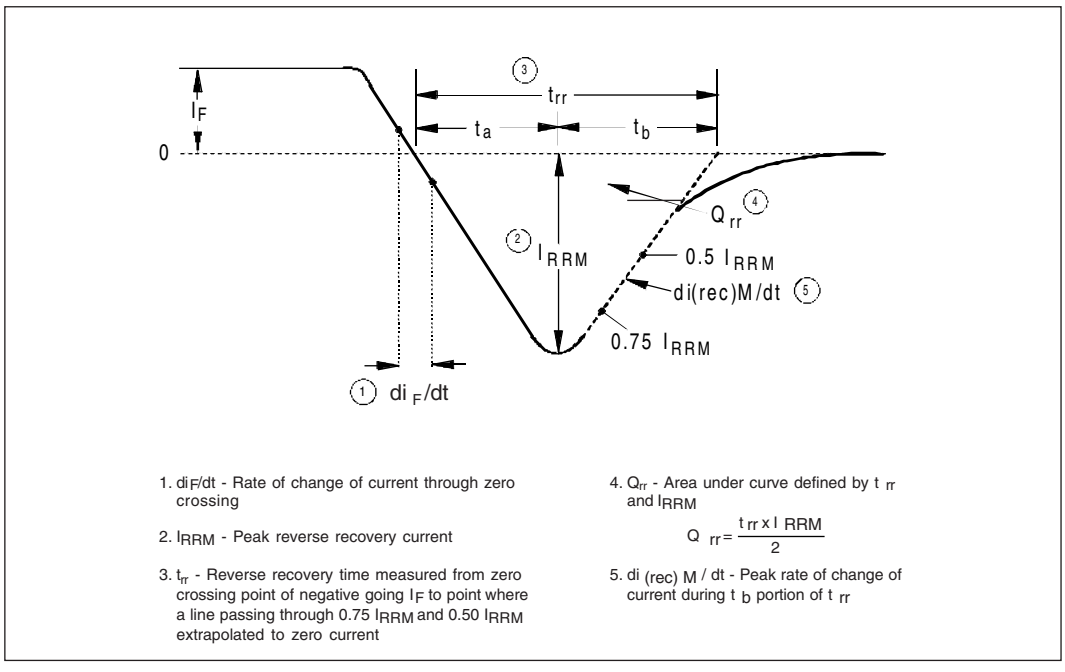


Fig. 9- Reverse Recovery Parameter Test Circuit



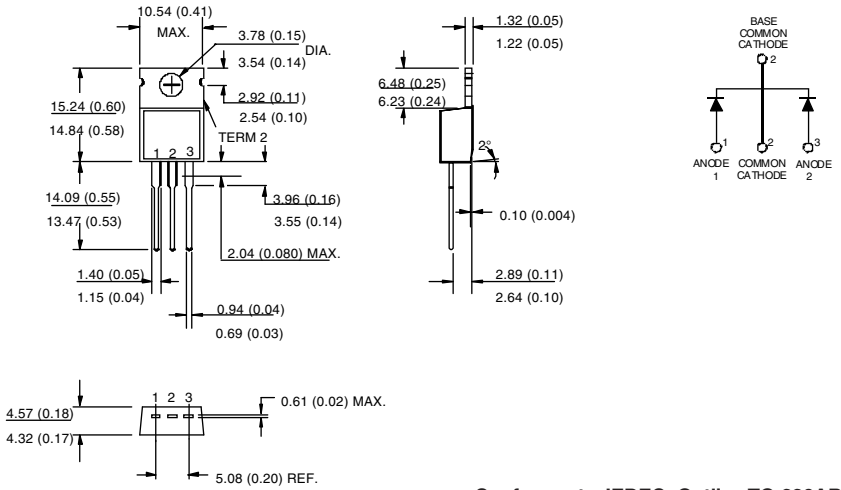
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr}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

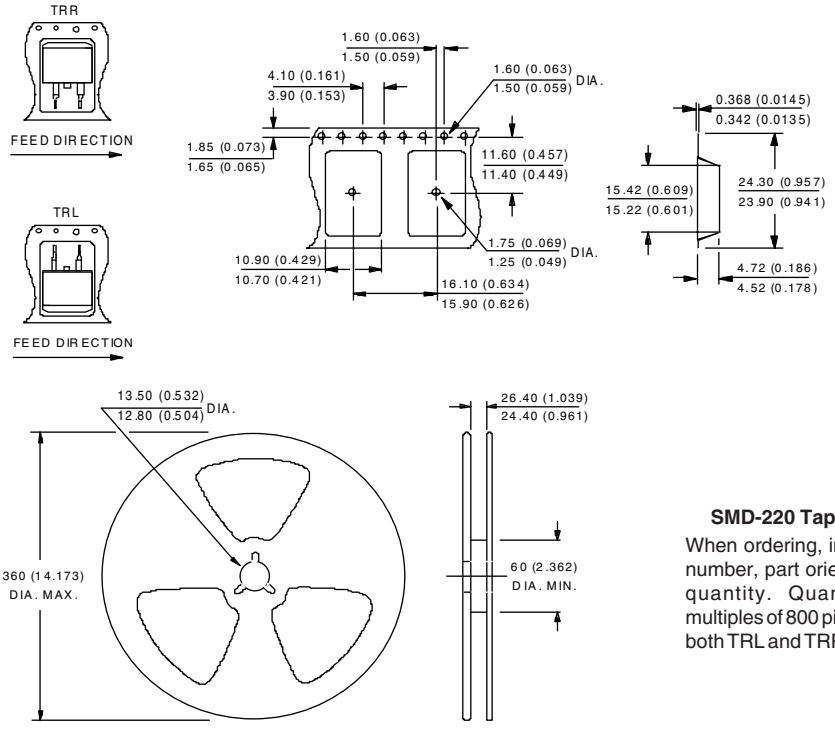
Fig. 10 - Reverse Recovery Waveform and Definitions

Outline Table



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

Tape & Reel Information

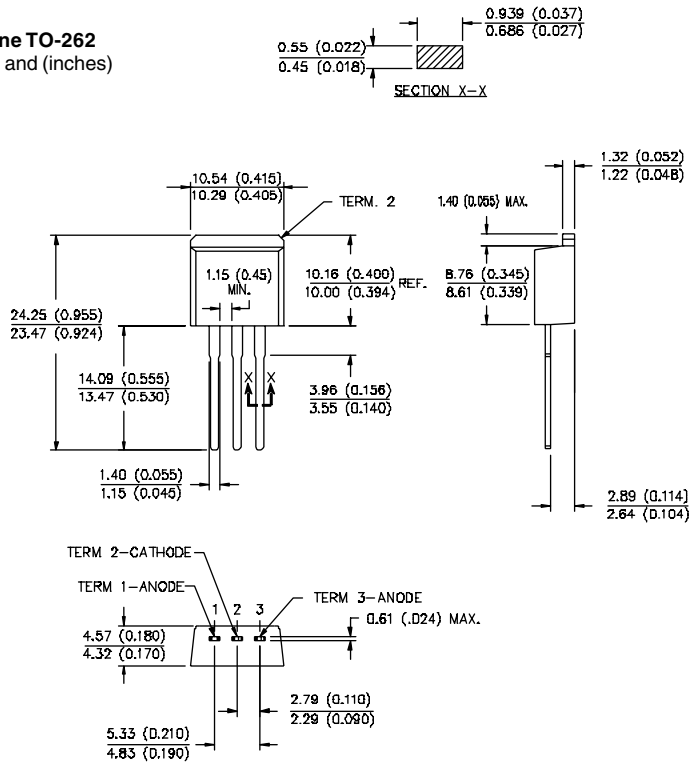


SMD-220 Tape & Reel

When ordering, indicate the part number, part orientation and the quantity. Quantities are in multiples of 800 pieces per reel for both TRL and TRR.

Outline Table

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



Ordering Information Table

Device Code

MUR	B	10	20	CT	-1	TRL
①	②	③	④	⑤	⑥	⑦

1 - Ultrafast MUR Series

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

3 - Current Rating (10 = 10A)

4 - Voltage Rating (20 = 200V)

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

6 - "-1" = TO-262 Option

7 - Tape & Reel Suffix

TR = Tape & Reel
TRL = Tape & Reel (Left Oriented)
TRR = Tape & Reel (Right Oriented)

International
IOR Rectifier

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.