



April 1995

15A, 100V - 200V Ultrafast Diodes

Features

- Ultrafast with Soft Recovery Characteristic ($t_{RR} < 30\text{ns}$)
- +175°C Rated Junction Temperature
- Reverse Voltage Up to 200V
- Avalanche Energy Rated

Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

Description

MUR1510, MUR1515, MUR1520 and RURP1510, RURP1515, RURP1520 are ultrafast dual diodes ($t_{RR} < 30\text{ns}$) with soft recovery characteristics. They have a low forward voltage drop and are of planar, silicon nitride passivated, ion-implanted, epitaxial construction.

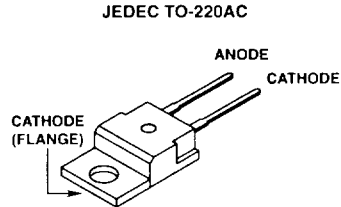
These devices are intended for use as energy steering/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristics minimizes ringing and electrical noise in many power switching circuits thus reducing power loss in the switching transistor.

PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
MUR1510	TO-220AC	MUR1510
RURP1510	TO-220AC	RURP1510
MUR1515	TO-220AC	MUR1515
RURP1515	TO-220AC	RURP1515
MUR1520	TO-220AC	MUR1520
RURP1520	TO-220AC	RURP1520

NOTE: When ordering, use the entire part number.

Package



Symbol



Absolute Maximum Ratings $T_C = +25^\circ\text{C}$, Unless Otherwise Specified

	MUR1510 RURP1510	MUR1515 RURP1515	MUR1520 RURP1520
Peak Repetitive Reverse Voltage	100V	150V	200V
Working Peak Reverse Voltage	100V	150V	200V
DC Blocking Voltage	100V	150V	200V
Average Rectified Forward Current (Total device forward current at rated V_F and $T_C = +150^\circ\text{C}$)	15A	15A	15A
Peak Forward Repetitive Current (Rated V_F , Square Wave 20kHz)	30A	30A	30A
Nonrepetitive Peak Surge Current (Surge applied at rated load condition halfwave 1 phase 60Hz)	200A	200A	200A
Operating and Storage Temperature	T_{STG}, T_J -55°C to +175°C	-55°C to +175°C	-55°C to +175°C

Specifications MUR1510, MUR1515, MUR1520, RURP1510, RURP1515, RURP1520

Electrical Specifications $T_C = +25^\circ\text{C}$, Unless Otherwise Specified.

SYMBOL	TEST CONDITION	LIMITS									UNITS
		MUR1510, RURP1510			MUR1515, RURP1515			MUR1520, RURP1520			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 15\text{A}$ $T_C = +150^\circ\text{C}$	-	-	0.85	-	-	0.85	-	-	0.85	V
	$I_F = 15\text{A}$ $T_C = +25^\circ\text{C}$	-	-	1.05	-	-	1.05	-	-	1.05	V
I_R at $T_C = +150^\circ\text{C}$	$V_R = 100\text{V}$	-	-	500	-	-	-	-	-	-	μA
	$V_R = 150\text{V}$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	500	μA
I_R at $T_C = +25^\circ\text{C}$	$V_R = 100\text{V}$	-	-	100	-	-	-	-	-	-	μA
	$V_R = 150\text{V}$	-	-	-	-	-	100	-	-	-	μA
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	100	μA
t_{RR}	$I_F = 1\text{A}$	-	-	30	-	-	30	-	-	30	ns
	$I_F = 15\text{A}$	-	-	35	-	-	35	-	-	35	ns
t_A	$I_F = 1\text{A}$	-	18	-	-	18	-	-	18	-	ns
	$I_F = 15\text{A}$	-	20	-	-	20	-	-	20	-	ns
t_B	$I_F = 1\text{A}$	-	9	-	-	9	-	-	9	-	ns
	$I_F = 15\text{A}$	-	10	-	-	10	-	-	10	-	ns
$R_{\theta JC}$		-	-	1.5	-	-	1.5	-	-	1.5	$^\circ\text{C/W}$
E_{AVL}	See Fig. 7 & 8	-	-	20	-	-	20	-	-	20	mJ

DEFINITIONS

V_F = Instantaneous forward voltage ($p_w = 300\mu\text{s}$, $D = 2\%$).

I_R = Instantaneous reverse current.

t_{RR} = Reverse recovery time at $dI_F/dt = 100\text{A}/\mu\text{s}$ (See Figure 2), summation of $t_A + t_B$.

t_A = Time to reach peak reverse current at $dI_F/dt = 100\text{A}/\mu\text{s}$ (See Figure 2).

t_B = Time from peak I_{RM} to projected zero crossing of I_{RM} based on a straight line from peak I_{RM} through 25% of I_{RM} (See Figure 2).

$R_{\theta JC}$ = Thermal resistance junction to case.

E_{AVL} = Controlled avalanche energy (See Figures 7 and 8).

p_w = pulse width.

D = duty cycle.

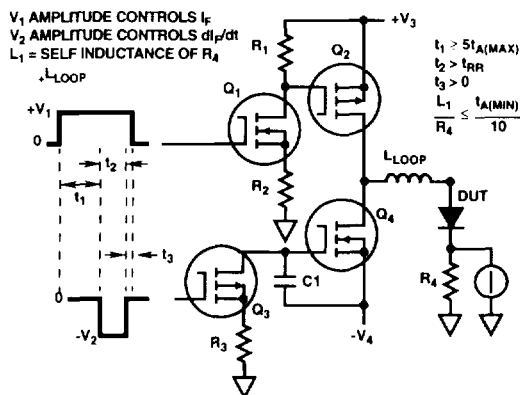


FIGURE 1. t_{RR} TEST CIRCUIT

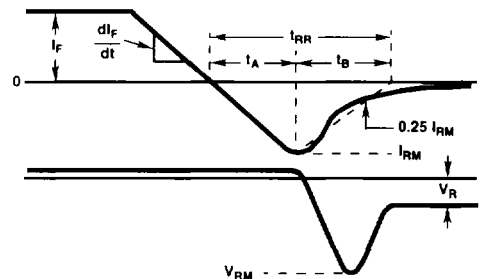


FIGURE 2. DEFINITIONS OF t_{RR} , t_A AND t_B

Typical Performance Curves

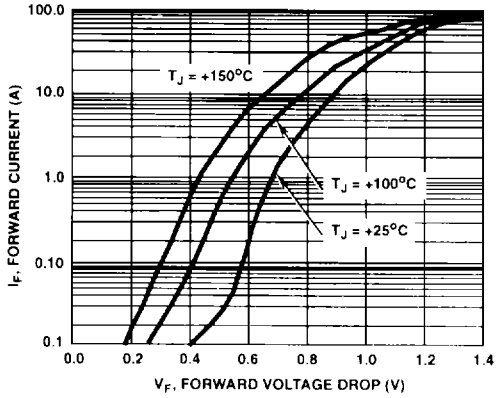


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

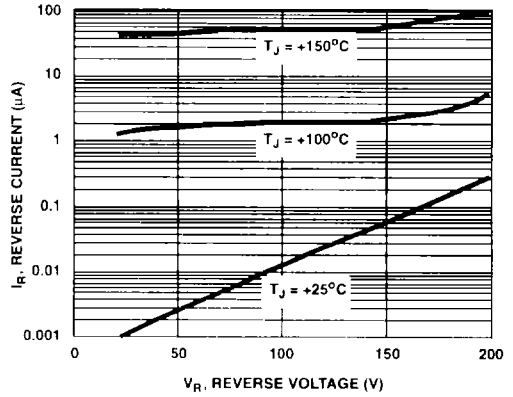


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

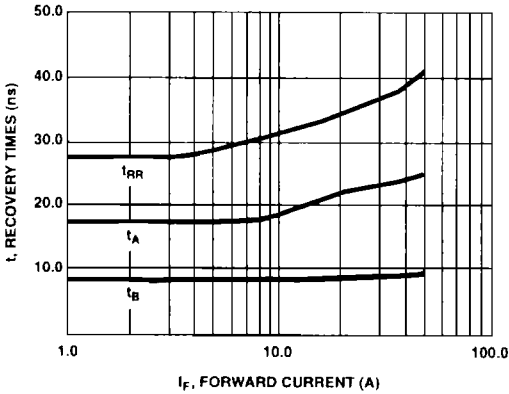


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

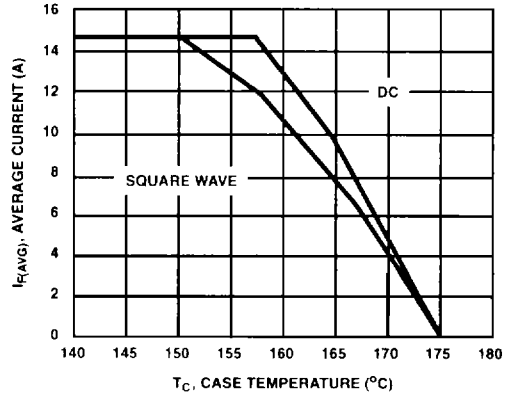


FIGURE 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

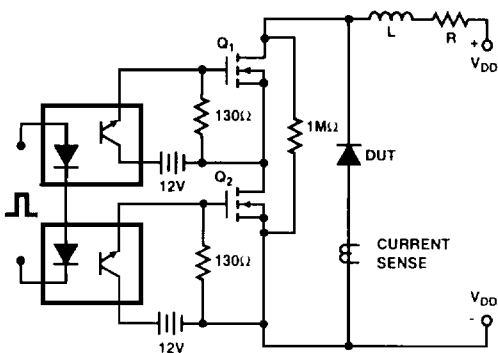


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

$$I_{L\text{peak}} = 1A, L = 40mH, R < 0.1\Omega, E_{AVL} = (1/2) L I^2 [V_{AVL}/(V_{AVL} - V_{DD})]$$

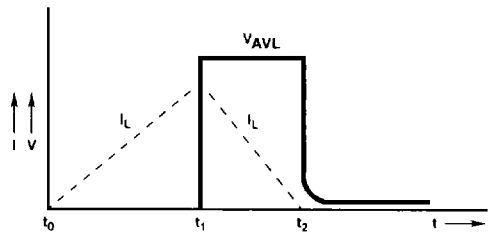


FIGURE 8. CURRENT VOLTAGE WAVEFORM