



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.

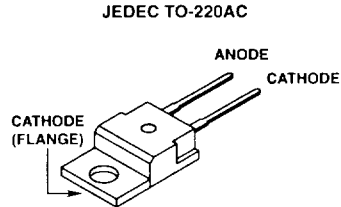
These devices are intended for use as energy steering/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristics minimizes ringing and electrical noise in many power 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 .....	$V_{RRM}$ 100V	150V	200V
Working Peak Reverse Voltage .....	$V_{RWM}$ 100V	150V	200V
DC Blocking Voltage .....	$V_R$ 100V	150V	200V
Average Rectified Forward Current .....	$I_{F(AV)}$ 15A	15A	15A
(Total device forward current at rated $V_R$ and $T_C = +150^\circ\text{C}$ )			
Peak Forward Repetitive Current .....	$I_{FRM}$ 30A	30A	30A
(Rated $V_R$ , Square Wave 20kHz)			
Nonrepetitive Peak Surge Current .....	$I_{FSM}$ 200A	200A	200A
(Surge applied at rated load condition halfwave 1 phase 60Hz)			
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	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 150\text{V}$	-	-	-	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	500	$\mu\text{A}$
$I_R$ at $T_C = +25^\circ\text{C}$	$V_R = 100\text{V}$	-	-	100	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 150\text{V}$	-	-	-	-	-	100	-	-	-	$\mu\text{A}$
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	100	$\mu\text{A}$
$t_{RR}$	$I_F = 1\text{A}$	-	-	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.

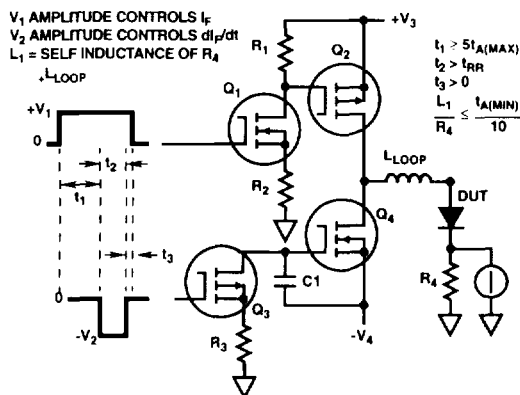


FIGURE 1.  $t_{RR}$  TEST CIRCUIT

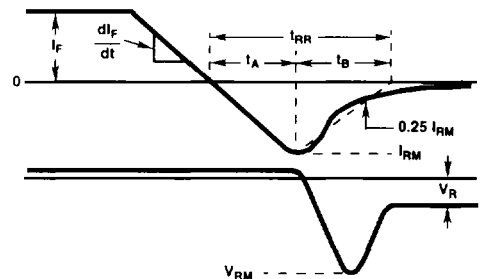


FIGURE 2. DEFINITIONS OF  $t_{RR}$ ,  $t_A$  AND  $t_B$

Typical Performance Curves

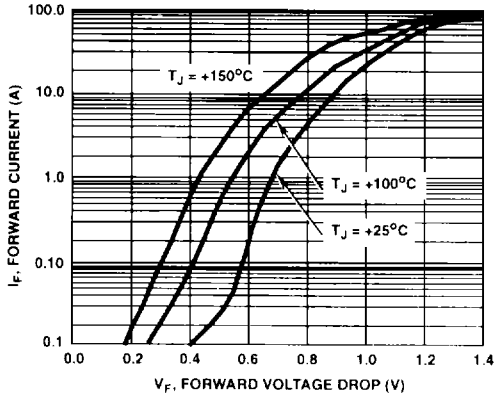


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

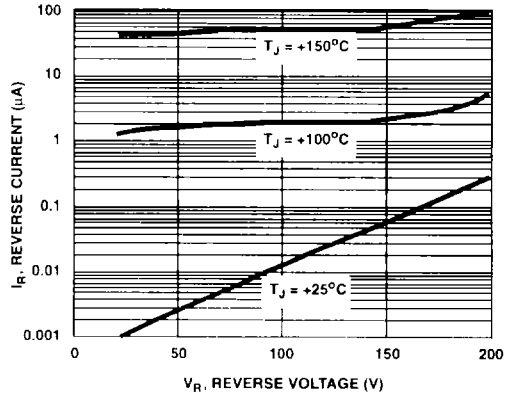


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

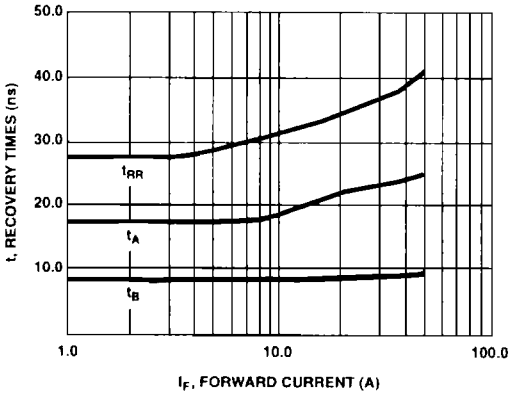


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

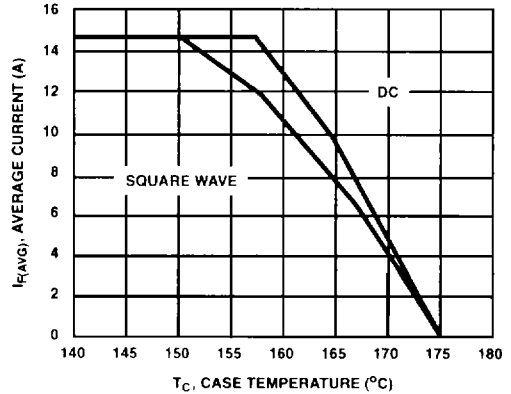


FIGURE 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

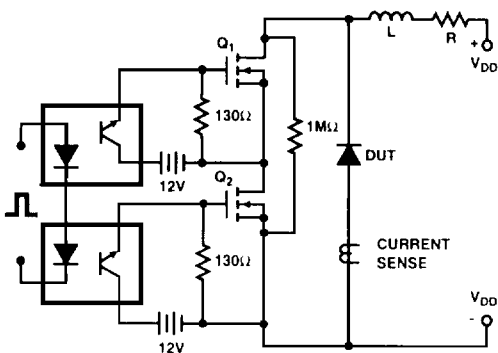


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

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

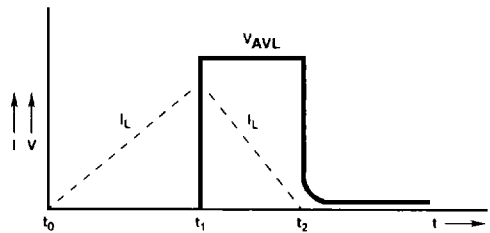


FIGURE 8. CURRENT VOLTAGE WAVEFORM