

April 1995

**15A, 100V - 200V Ultrafast Dual 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**

MUR3010PT, MUR3015PT, MUR3020PT and RURH1510CC, RURH1515CC, RURH1520CC 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.

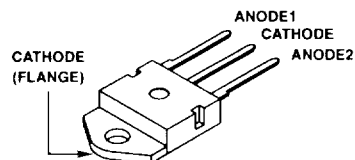
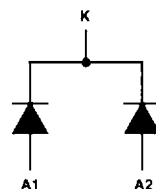
**PACKAGING AVAILABILITY**

PART NUMBER	PACKAGE	BRAND
MUR3010PT	TO-218AC	MUR3010PT
RURH1510CC	TO-218AC	RURH1510C
MUR3015PT	TO-218AC	MUR3015PT
RURH1515CC	TO-218AC	RURH1515C
MUR3020PT	TO-218AC	MUR3020PT
RURH1520CC	TO-218AC	RURH1520C

NOTE: When ordering, use the entire part number.

**Package**

JEDEC TO-218AC


**Symbol**

**Absolute Maximum Ratings**  $T_C = +25^\circ\text{C}$ 

	MUR3010PT RURH1510CC	MUR3015PT RURH1515CC	MUR3020PT RUR1520CC
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 . . . . . $I_{F(AV)}$ (Total device forward current at rated $V_R$ and $T_C = 150^\circ\text{C}$ )	15A	15A	15A
Peak Forward Repetitive Current . . . . . $I_{FRM}$ (Rated $V_R$ , square wave 20kHz)	30A	30A	30A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Surge applied at rated load condition halfwave 1phase 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

**MUR3010PT, MUR3015PT, MUR3020PT, RURH1510CC, RURH1515CC, RURH1520CC**

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

SYMBOL	TEST CONDITION	LIMITS									UNITS
		MUR3010PT, RURH1510CC			MUR3015PT, RURH1515CC			MUR3020PT, RURH1520CC			
		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
IR 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	$\mu\text{A}$
IR 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 (pw = 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).

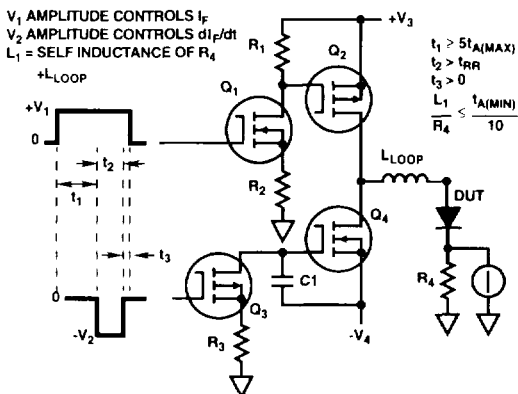
$t_B$  = Time from peak  $I_{RM}$  to projected zero crossing of  $I_{RM}$  based on a straight line from peak  $I_{RM}$  through 25% of  $I_{RM}$  (See Figure 2).

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

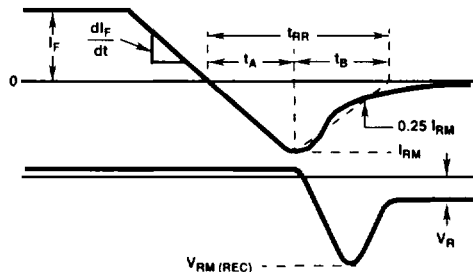
$E_{AVL}$  = Controlled avalanche energy (See Figures 7 and 8).

pw = pulse width.

D = duty cycle.



**FIGURE 1.  $t_{RR}$  TEST CIRCUIT**



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

**6**  
**ULTRAFAST DUAL DIODES**

Typical Performance Curves

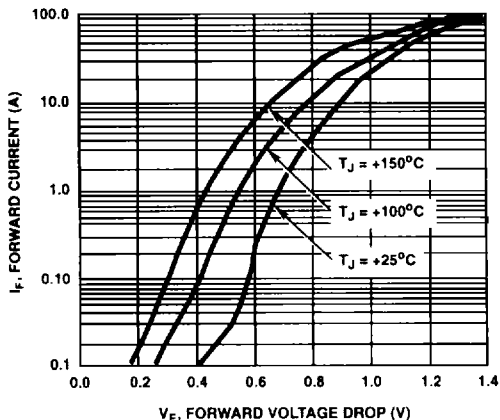


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

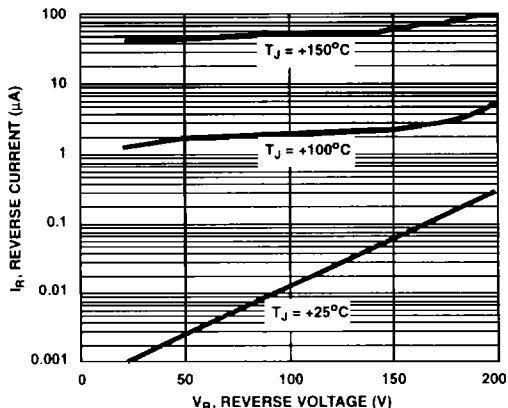


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

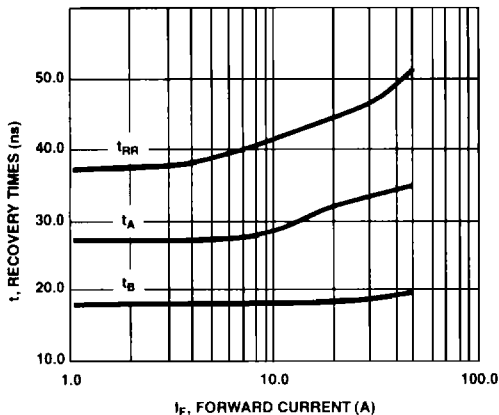


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

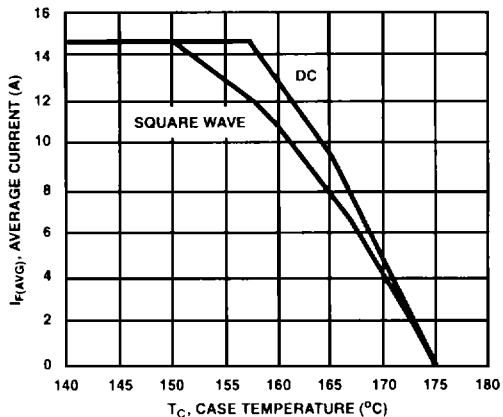


FIGURE 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

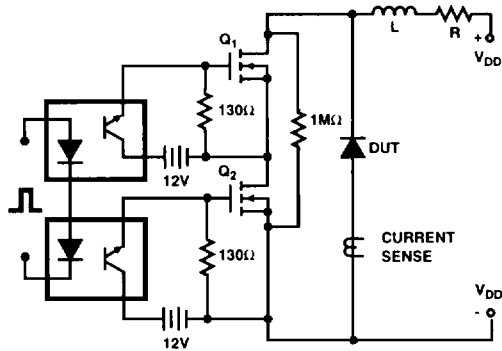


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

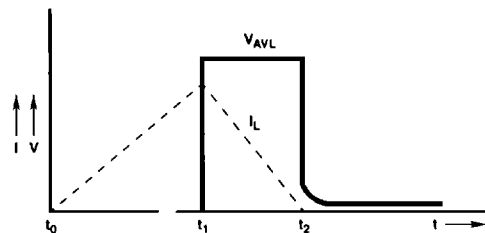


FIGURE 8. CURRENT VOLTAGE WAVEFORM

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