



HARRIS

MUR1510 RUR1510
MUR1515 RUR1515
MUR1520 RUR1520

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15A Ultrafast Diode

With Soft Recovery Characteristic

May 1991

HARRIS SEMICONDUCTOR

T-03-17

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

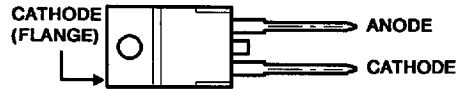
MUR1510, MUR1515, MUR1520 and RUR1510, RUR1515, RUR1520 are ultrafast dual diodes ($t_{rr} < 30\text{ns}$) with soft recovery characteristics ($t_a/t_b \approx 1$). They have a low forward voltage drop and are of planar, silicon nitride passivated, ion-implanted, epitaxial construction.

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.

All are supplied in TO-220AC packages.

Package

TO-220AC
TOP VIEW



Symbol



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

	MUR1510 RUR1510	MUR1515 RUR1515	MUR1520 RUR1520
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_F and $T_C = 150^\circ\text{C}$)	15A	15A	15A
Peak Forward Repetitive Current..... I_{FRM} (Rated V_F , 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

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ULTRA-FAST
RECTIFIERS

Electrical Characteristics (T_C = +25°C) Unless Otherwise Specified.

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SYMBOL	TEST CONDITION	LIMITS									UNITS
		MUR1510, RUR1510			MUR1515, RUR1515			MUR1520, RUR1520			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V _F	I _F = 15A T _C = +150°C	-	-	0.85	-	-	0.85	-	-	0.85	V
	I _F = 15A T _C = +25°C	-	-	1.05	-	-	1.05	-	-	1.05	V
I _R @ T _C = +150°C	V _R = 100V	-	-	500	-	-	-	-	-	-	μA
	V _R = 150V	-	-	-	-	-	500	-	-	-	μA
	V _R = 200V	-	-	-	-	-	-	-	-	500	μA
I _R @ T _C = +25°C	V _R = 100V	-	-	10	-	-	-	-	-	-	μA
	V _R = 150V	-	-	-	-	-	10	-	-	-	μA
	V _R = 200V	-	-	-	-	-	-	-	-	10	μA
t _{rr}	I _F = 1A	-	-	30	-	-	30	-	-	30	ns
	I _F = 15A	-	-	35	-	-	35	-	-	35	ns
t _a	I _F = 1A	-	18	-	-	18	-	-	18	-	ns
	I _F = 15A	-	20	-	-	20	-	-	20	-	ns
t _b	I _F = 1A	-	9	-	-	9	-	-	9	-	ns
	I _F = 15A	-	10	-	-	10	-	-	10	-	ns
R _{θjc}		-	-	1.5	-	-	1.5	-	-	1.5	°C/W
W _{avl}	see Fig. 7&8	-	-	20	-	-	20	-	-	20	mJ

Definitions

V_F = Instantaneous forward voltage (p_w = 300μs, D = 2%).

I_R = Instantaneous reverse current (p_w = 300μs, D = 2%).

t_{rr} = Reverse recovery time at di_F/dt = 100A/μs (See Figure 2), summation of t_a + t_b.

t_a = Time to reach peak reverse current at di_F/dt = 100A/μs (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_{θjc} = Thermal resistance junction to case.

W_{avl} = Controlled avalanche energy (See Figures 7 & 8).

p_w = pulse width.

D = duty cycle.

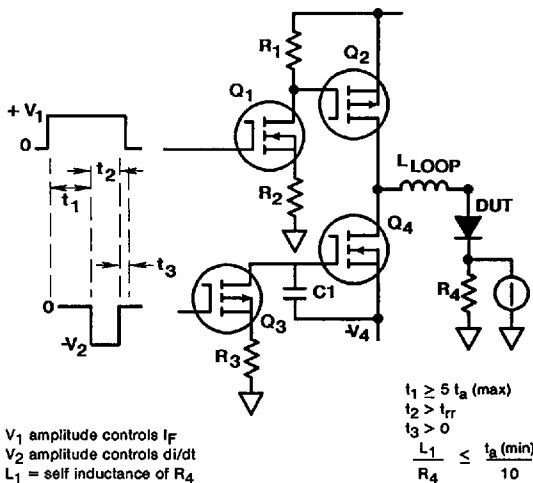


FIGURE 1. t_{rr} TEST CIRCUIT

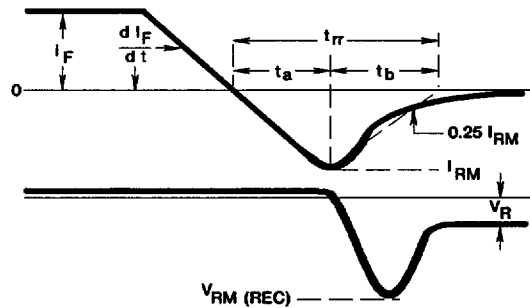


FIGURE 2. DEFINITIONS OF t_{rr}, t_a AND t_b

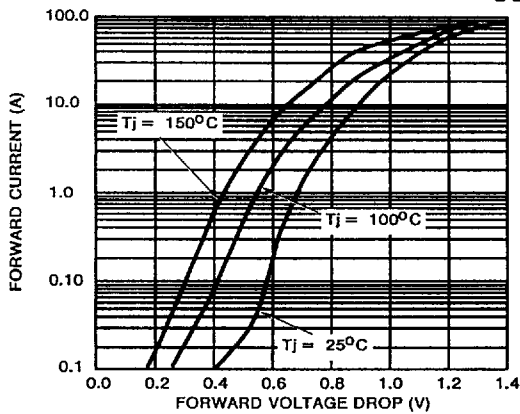


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

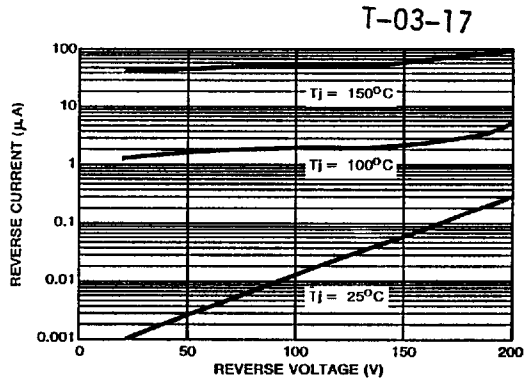


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

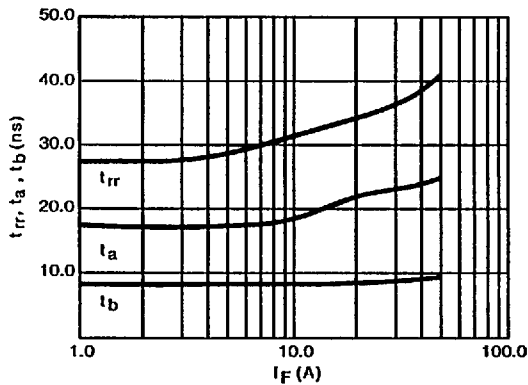


FIGURE 5. TYPICAL t_{rr} , t_a , t_b vs FORWARD CURRENT

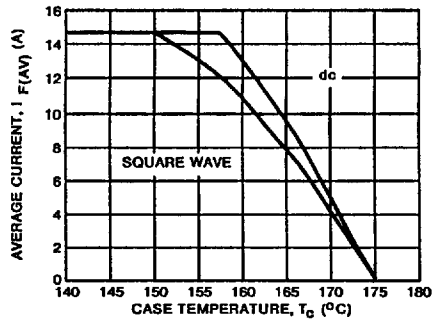


FIGURE 6. TYPICAL CURRENT DERATING CURVE w.r.t. CASE TEMPERATURE

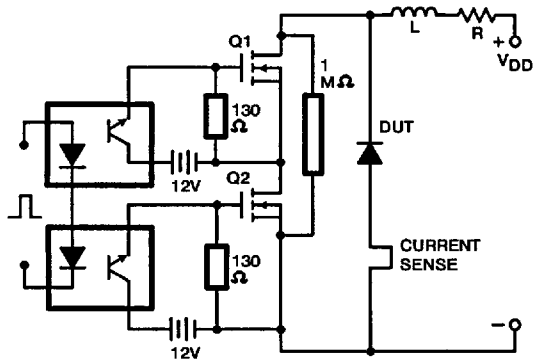


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

$$I_{L\text{peak}} = 1A, L = 40mH, R < 0.1\Omega, W_{\text{av1}} = (1/2) LI^2 [V_{\text{av1}} / (V_{\text{av1}} - V_{\text{DD}})]$$

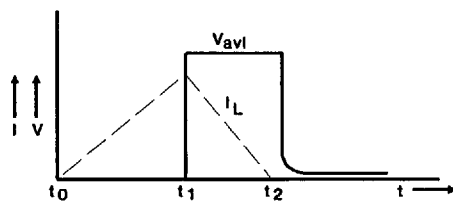


FIGURE 8. CURRENT VOLTAGE WAVEFORM

ULTRA-FAST RECTIFIERS