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## 8 A, 1000 V Ultrafast Diodes

The MUR8100E, RURP8100 is an ultrafast diode with low forward voltage drop. This device is intended for use as freewheeling and clamping diodes in a variety of switching power supplies and other power switching applications. It is specially suited for use in switching power supplies and industrial application.

### Features

- Ultrafast Recovery  $t_{rr} = 100$  ns (@  $I_F = 8$  A)
- Max Forward Voltage,  $V_F = 1.8$  V (@  $T_C = 25^\circ\text{C}$ )
- 1000 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

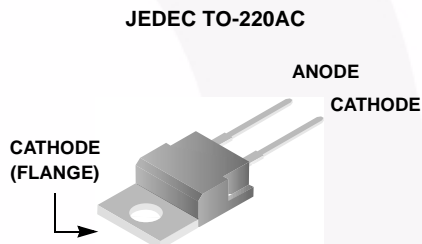
### Packaging

### Ordering Information

PART NUMBER	PACKAGE	BRAND
MUR8100E	TO-220AC	MU8100
RURP8100	TO-220AC	RURP8100

NOTE: When ordering, use entire part number.

### Symbol



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

		MUR8100E RURP8100	UNIT
Peak Repetitive Reverse Voltage	$V_{RRM}$	1000	V
Working Peak Reverse Voltage	$V_{RWM}$	1000	V
DC Blocking Voltage	$V_R$	1000	V
Average Rectified Forward Current ( $T_C = 155^\circ\text{C}$ )	$I_{F(AV)}$	8	A
Repetitive Peak Surge Current (Square Wave 20kHz)	$I_{FRM}$	16	A
Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	$I_{FSM}$	100	A
Maximum Power Dissipation	$P_D$	75	W
Avalanche Energy (See Figures 10 and 11)	$E_{AVL}$	20	mJ
Operating and Storage Temperature	$T_{STG}, T_J$	-55 to 175	$^\circ\text{C}$

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
$V_F$	$I_F = 8\text{ A}$	-	-	1.8	V
	$I_F = 8\text{ A}, T_C = 150^\circ\text{C}$	-	-	1.5	V
$I_R$	$V_R = 1000\text{ V}$	-	-	100	$\mu\text{A}$
	$V_R = 1000\text{ V}, T_C = 150^\circ\text{C}$	-	-	500	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{ A}$	-	-	85	ns
	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	100	ns
$t_a$	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	50	-	ns
$t_b$	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	30	-	ns
$Q_{RR}$	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	500	-	nC
$C_J$	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	30	-	pF
$R_{\theta JC}$		-	-	2.0	$^\circ\text{C}/\text{W}$

**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 9), 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 9).

$t_b$  = 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 9).

$Q_{RR}$  = Reverse recovery charge.

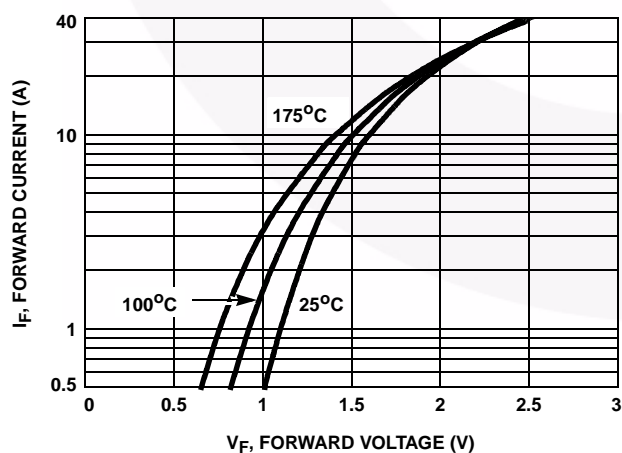
$C_J$  = Junction Capacitance.

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

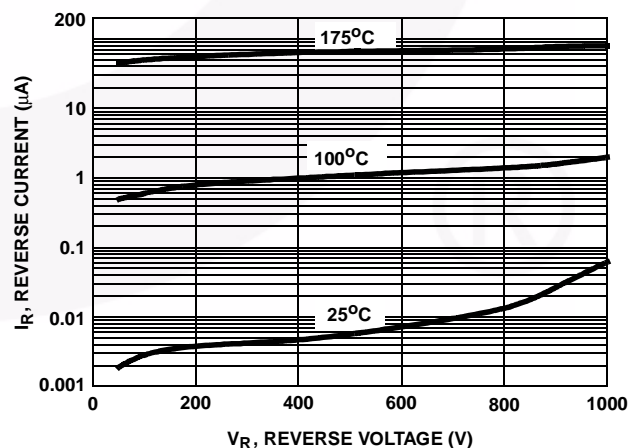
pw = Pulse width.

D = Duty cycle.

**Typical Performance Curves**



**FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE**



**FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE**

Typical Performance Curves (Continued)

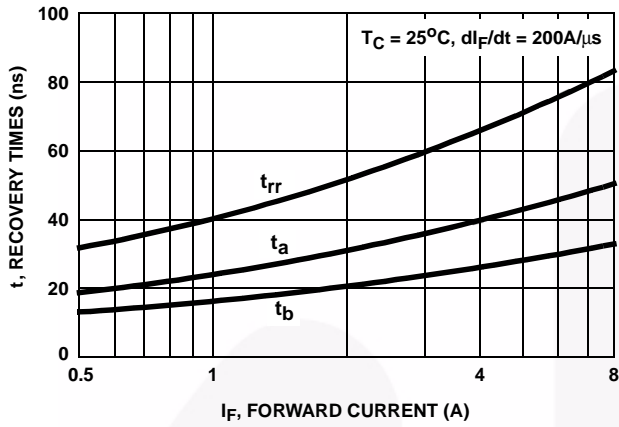


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

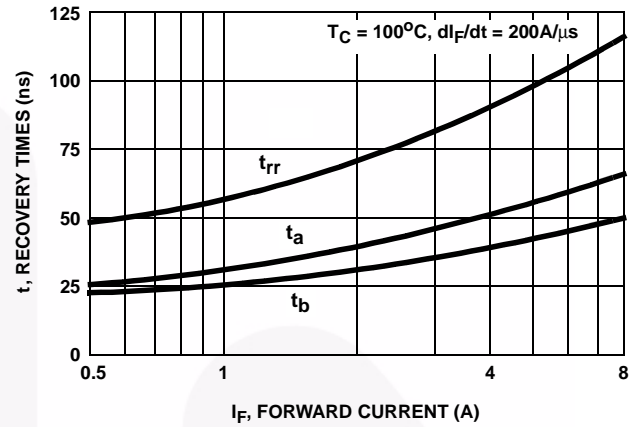


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

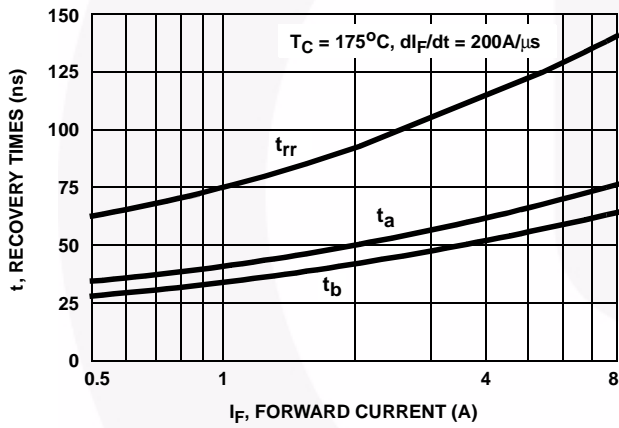


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

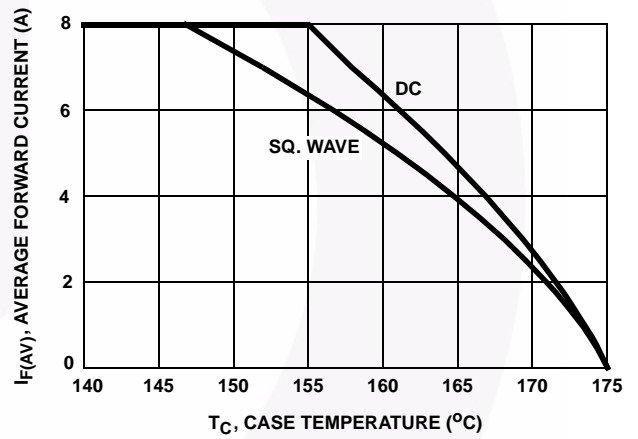


FIGURE 6. CURRENT DERATING CURVE

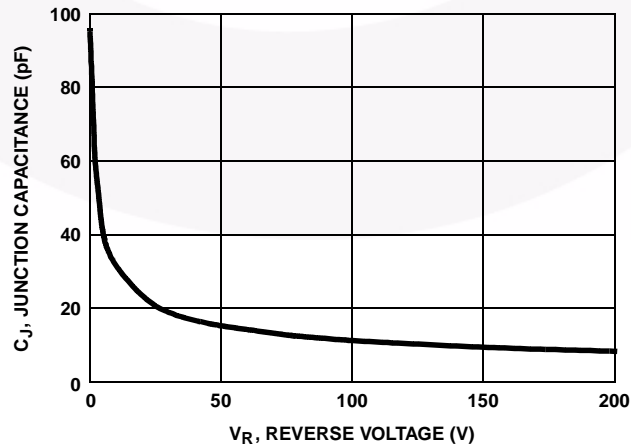


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuits and Waveforms

$V_{GE}$  AMPLITUDE AND  
 $R_G$  CONTROL  $di_F/dt$   
 $t_1$  AND  $t_2$  CONTROL  $I_F$

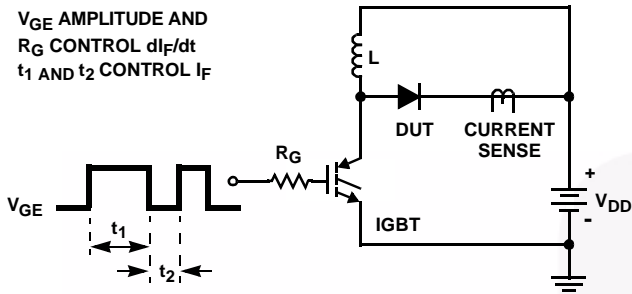


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

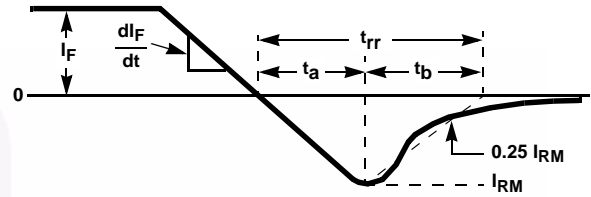


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I = 1A$   
 $L = 40mH$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

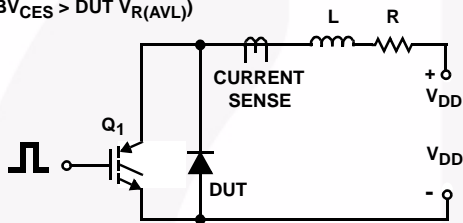


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

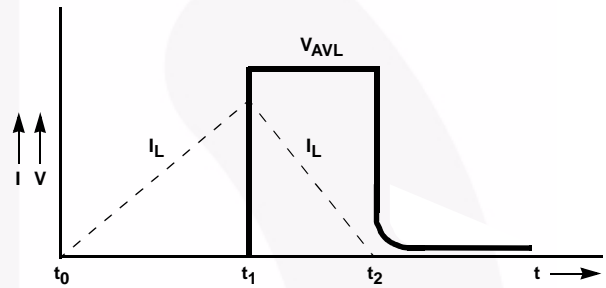


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Mechanical Dimensions

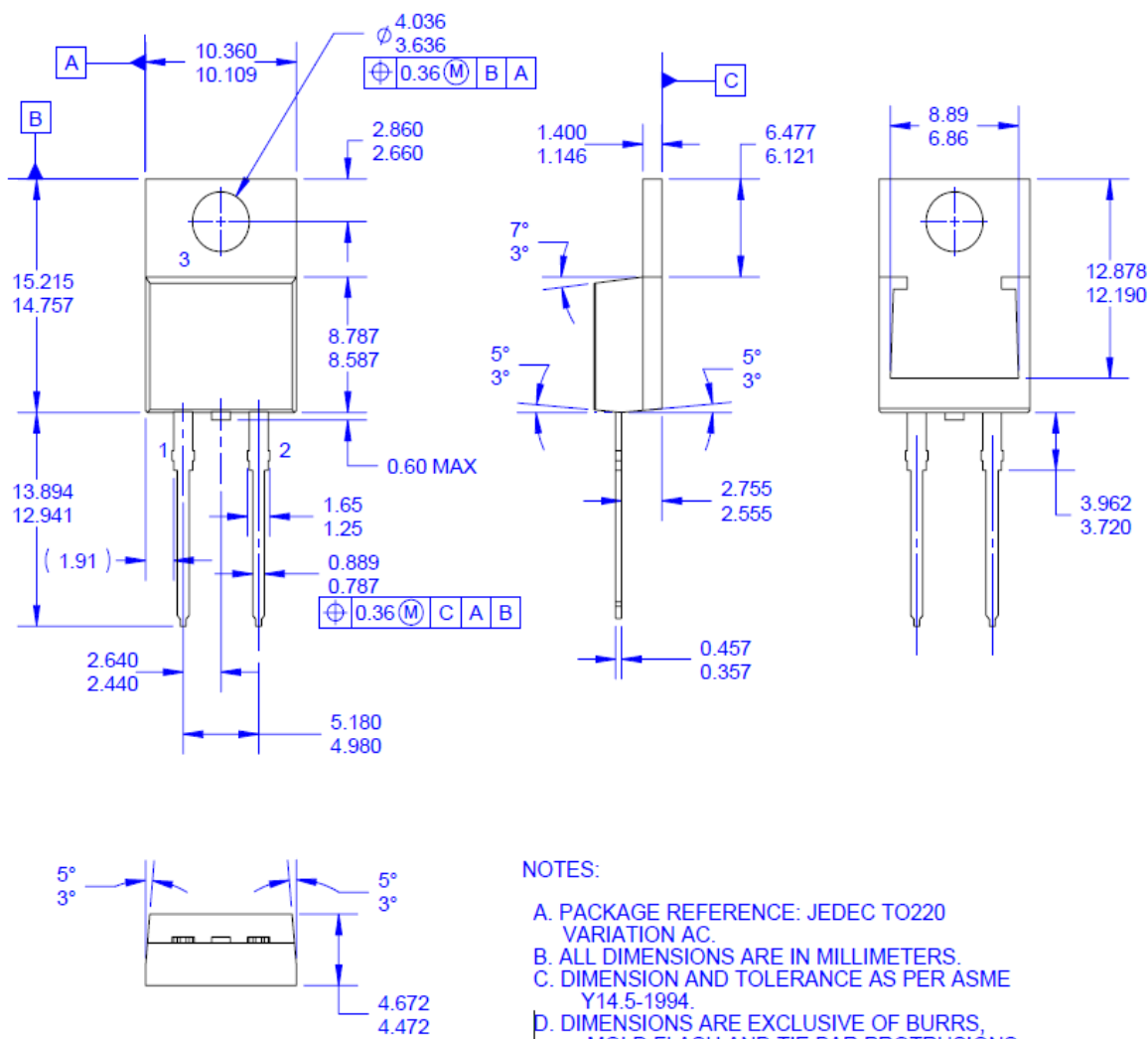


Figure 12. TO-220 2L - TO-220, MOLDED, 2LD

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