

**8 A, 400 V - 600 V, Ultrafast Diodes**

**Description**

The MUR840, MUR860, RURP840, RURP860 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.

**Ordering Information**

PART NUMBER	PACKAGE	BRAND
MUR840	TO-220AC-2L	MUR840
RURP840	TO-220AC-2L	RURP840
MUR860	TO-220AC-2L	MUR860
RURP860	TO-220AC-2L	RURP860

NOTE: When ordering, use the entire part number.

**Symbol**



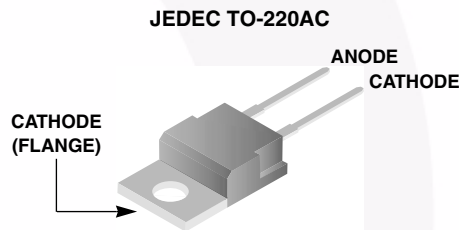
**Features**

- Ultrafast Recovery  $t_{rr} = 70$  ns (@  $I_F = 8$  A)
- Max Forward Voltage,  $V_F = 1.5$  V (@  $T_C = 25^\circ\text{C}$ )
- 400 V, 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

**Applications**

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

**Packaging**



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

	MUR840 RURP840	MUR860 RURP860	UNIT
Peak Repetitive Reverse Voltage . . . . .	400	600	V
Working Peak Reverse Voltage . . . . .	400	600	V
DC Blocking Voltage . . . . .	400	600	V
Average Rectified Forward Current . . . . . ( $T_C = 155^\circ\text{C}$ )	8	8	A
Repetitive Peak Surge Current . . . . . (Square Wave, 20kHz)	16	16	A
Nonrepetitive Peak Surge Current . . . . . (Halfwave, 1 Phase, 60Hz)	100	100	A
Maximum Power Dissipation . . . . .	75	75	W
Avalanche Energy (See Figures 10 and 11) . . . . .	20	20	mJ
Operating and Storage Temperature . . . . .	-65 to 175	-65 to 175	$^\circ\text{C}$
Maximum Lead Temperature for Soldering			
Leads at 0.063 in. (1.6mm) from case for 10s . . . . .	300	300	$^\circ\text{C}$
Package Body for 10s, see Tech Brief 334. . . . .	260	260	$^\circ\text{C}$

# MUR840, MUR860, RURP840, RURP860

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

SYMBOL	TEST CONDITION	MUR840, RURP840			MUR860, RURP860			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 8\text{ A}$	-	-	1.3	-	-	1.5	V
	$I_F = 8\text{ A}, T_C = 150^\circ\text{C}$	-	-	1.0	-	-	1.2	V
$I_R$	$V_R = 400\text{ V}$	-	-	100	-	-	-	$\mu\text{A}$
	$V_R = 600\text{ V}$	-	-	-	-	-	100	$\mu\text{A}$
	$V_R = 400\text{ V}, T_C = 150^\circ\text{C}$	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 600\text{ V}, T_C = 150^\circ\text{C}$	-	-	-	-	-	500	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	60	-	-	60	ns
	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	70	-	-	70	ns
$t_a$	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	32	-	-	32	-	ns
$t_b$	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	21	-	-	21	-	ns
$Q_{rr}$	$I_F = 8\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	195	-	-	195	-	nC
$C_J$	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	25	-	-	25	-	pF
$R_{\theta JC}$		-	-	2	-	-	2	$^\circ\text{C}/\text{W}$

### DEFINITIONS

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

$I_R$  = Instantaneous reverse current.

$T_{rr}$  = Reverse recovery time (See Figure 9), summation of  $t_a + t_b$ .

$t_a$  = Time to reach peak reverse current (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

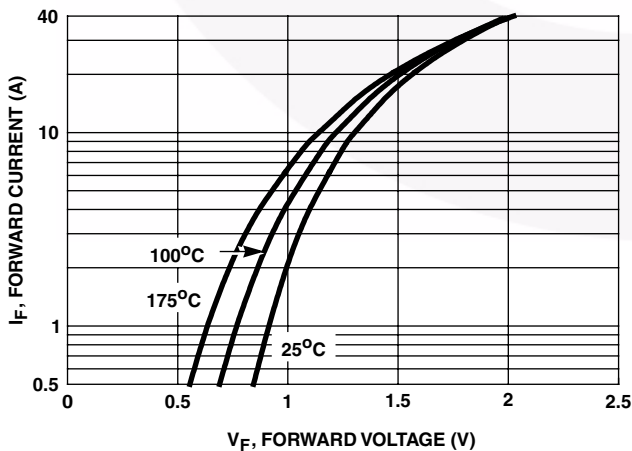


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

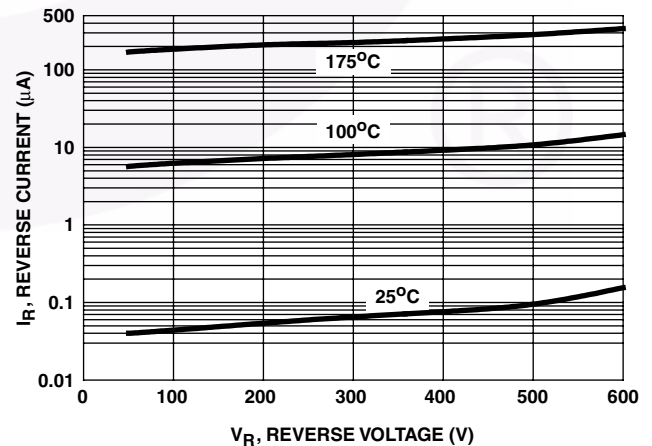


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

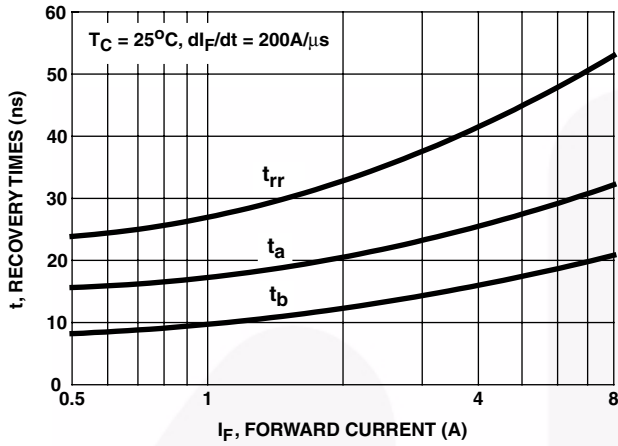


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

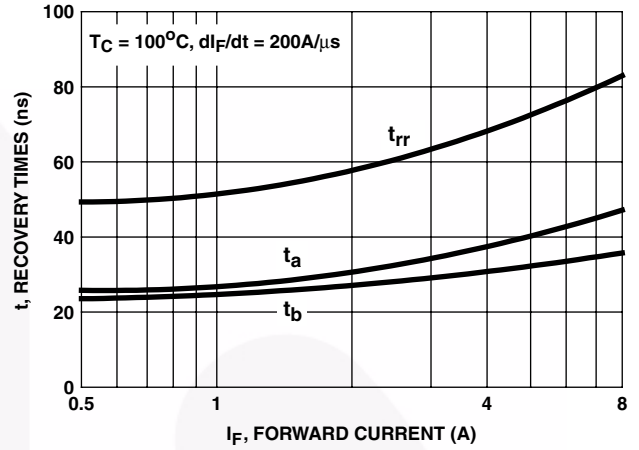


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

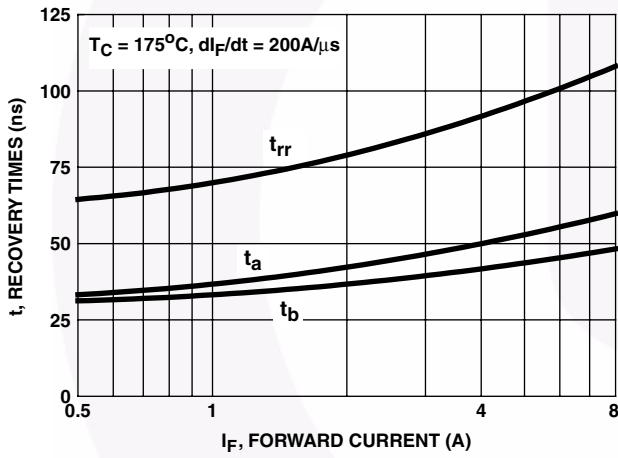


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

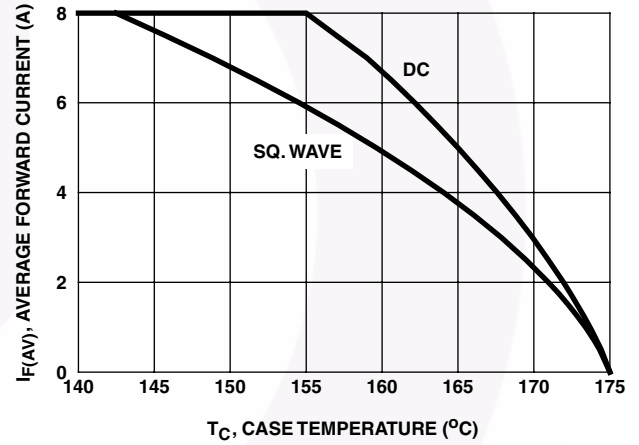


FIGURE 6. CURRENT DERATING CURVE

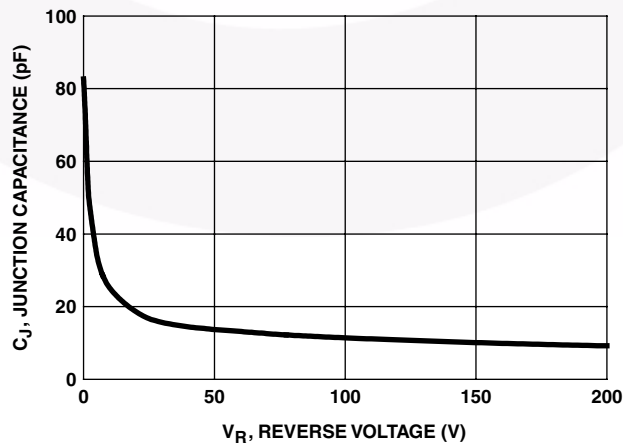


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

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

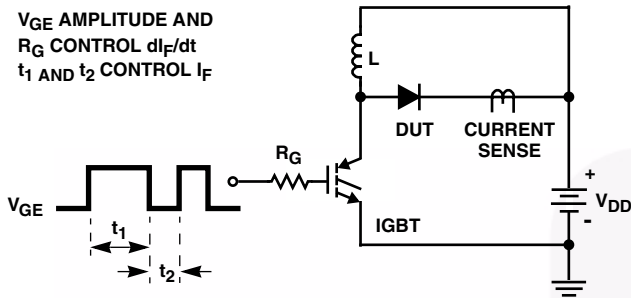


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

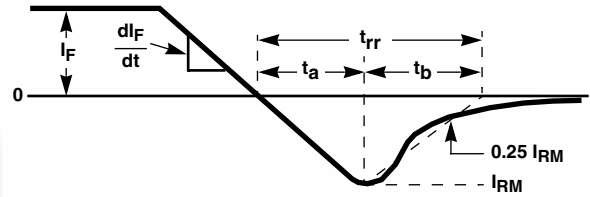


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

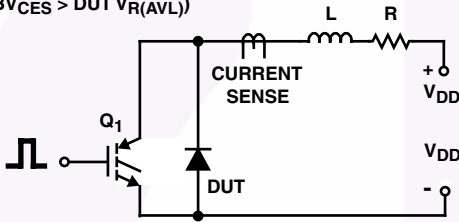


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

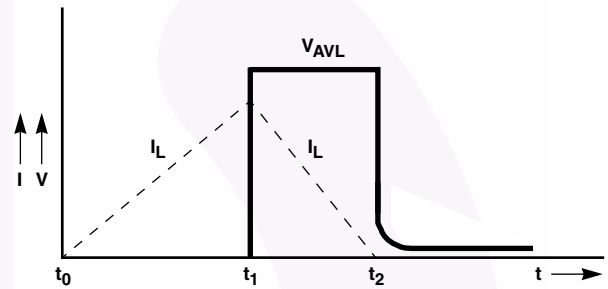
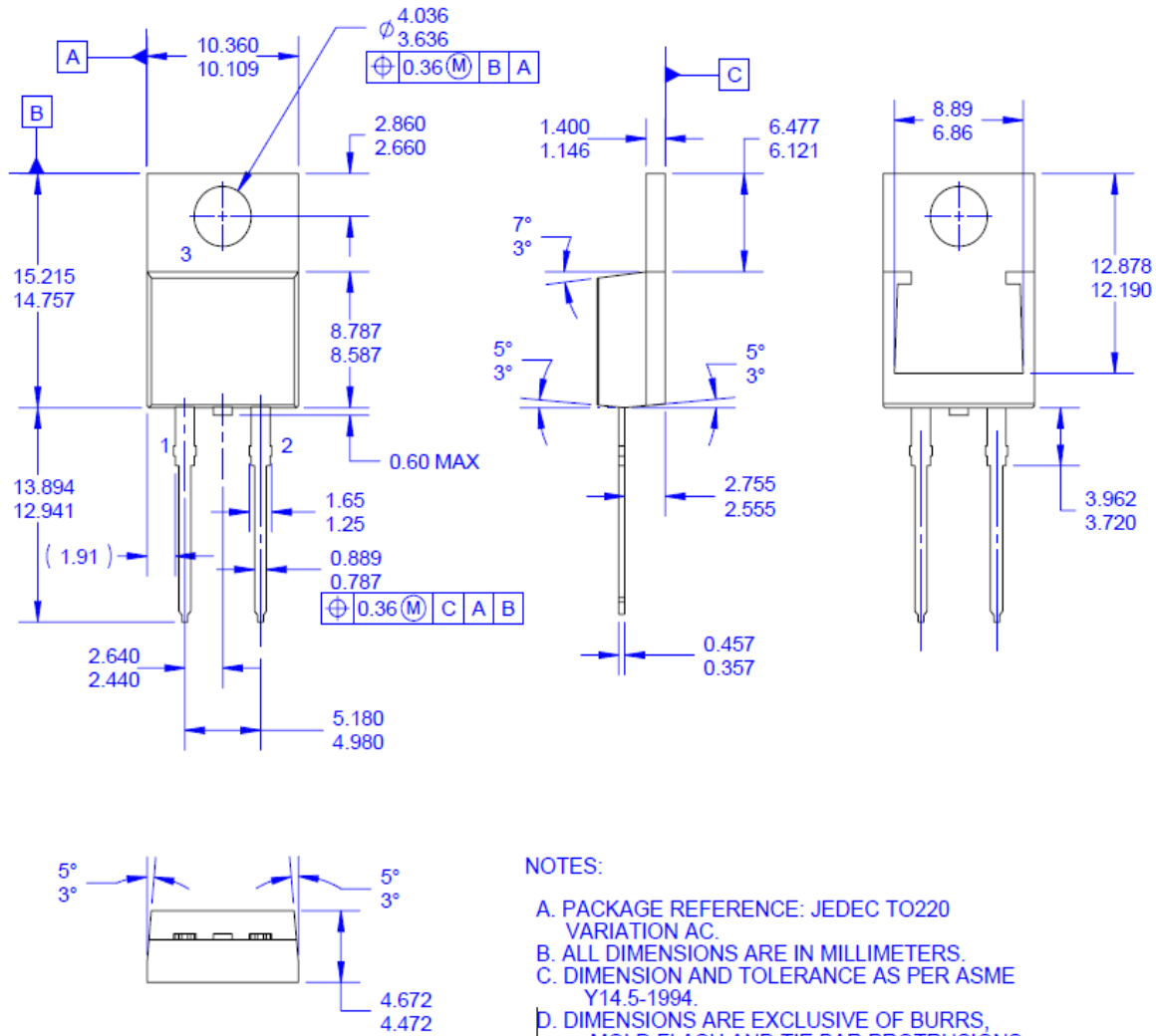


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

**Mechanical Dimensions**



**NOTES:**

- A. PACKAGE REFERENCE: JEDEC TO220 VARIATION AC.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSION AND TOLERANCE AS PER ASME Y14.5-1994.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.
- E. THIS PACKAGE IS FSSZ INTERNAL PRODUCTION AND INTENDED FOR DELTA CUSTOMER ONLY.
- F. DRAWING FILE NAME: TO220B02REV4

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

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| Current Transfer Logic™   | IntelliMAX™                                     | SignalWise™                           | TinyPWM™         |
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| FAST®   | OptoHit™  | SyncFET™                              | VoltagePlus™     |
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| FETBench™   | OPTOPLANAR®                                     |                                       |                  |
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