

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

The MUR840, MUR860, RURP840 and RURP860 are low forward voltage drop ultrafast recovery rectifiers ( $t_{rr} < 60\text{ns}$ ). They use a glass-passivated ion-implanted, epitaxial construction.

These devices are intended for use as output rectifiers and flywheel diodes in a variety of high-frequency pulse-width modulated switching regulators. Their low stored charge and attendant fast reverse-recovery behavior minimize electrical noise generation and in many circuits markedly reduce the turn-on dissipation of the associated power switching transistors.

Formerly developmental type TA09616.

### Ordering Information

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

NOTE: When ordering, use the entire part number.

### Symbol



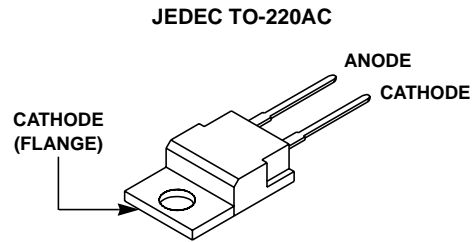
### Features

- Ultrafast with Soft Recovery . . . . . <60ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 600V
- Avalanche Energy Rated
- Planar Construction

### 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	UNITS
Peak Repetitive Reverse Voltage . . . . . $V_{RRM}$	400	600	V
Working Peak Reverse Voltage . . . . . $V_{RWM}$	400	600	V
DC Blocking Voltage . . . . . $V_R$	400	600	V
Average Rectified Forward Current . . . . . $I_{F(AV)}$ ( $T_C = 155^\circ\text{C}$ )	8	8	A
Repetitive Peak Surge Current . . . . . $I_{FRM}$ (Square Wave, 20kHz)	16	16	A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	100	100	A
Maximum Power Dissipation . . . . . $P_D$	75	75	W
Avalanche Energy (See Figures 10 and 11) . . . . . $E_{AVL}$	20	20	mJ
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65 to 175	-65 to 175	°C
Maximum Lead Temperature for Soldering			
Leads at 0.063 in. (1.6mm) from case for 10s . . . . . $T_L$	300	300	°C
Package Body for 10s, see Tech Brief 334. . . . . $T_{PKG}$	260	260	°C

# MUR840, MUR860, RURP840, RURP860

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

SYMBOL	TEST CONDITION	MUR840, RURP840			MUR860, RURP860			UNITS
		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 ( $p_w = 300\mu\text{s}$ ,  $D = 2\%$ ).

$I_R$  = 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.

$p_w$  = pulse width.

$D$  = duty cycle.

## Typical Performance Curves

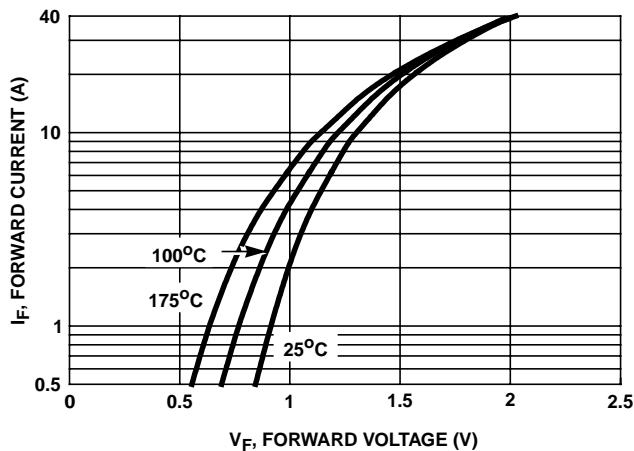


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

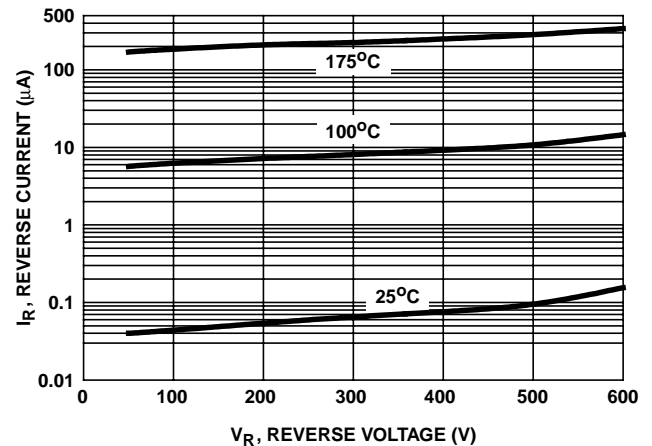


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

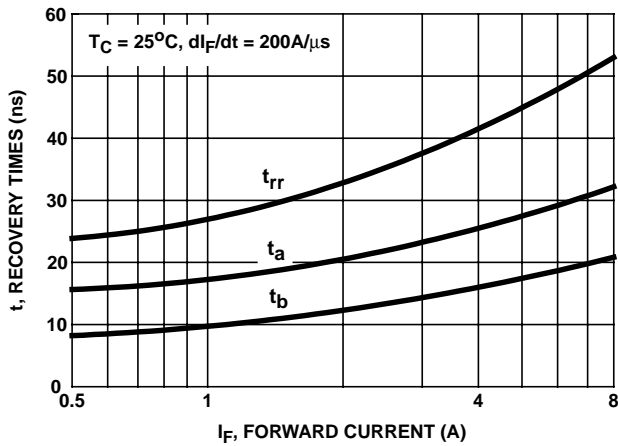


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

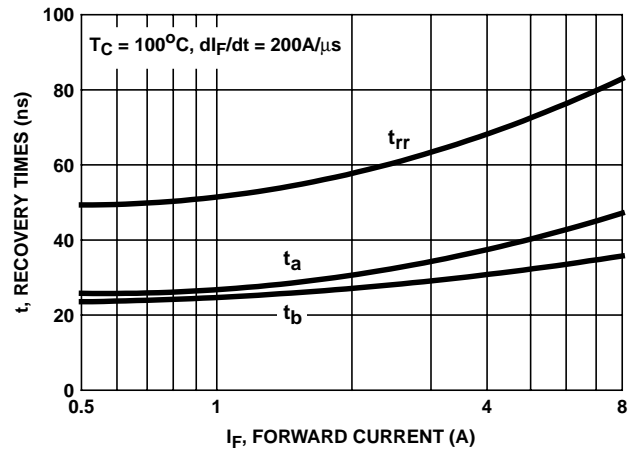


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

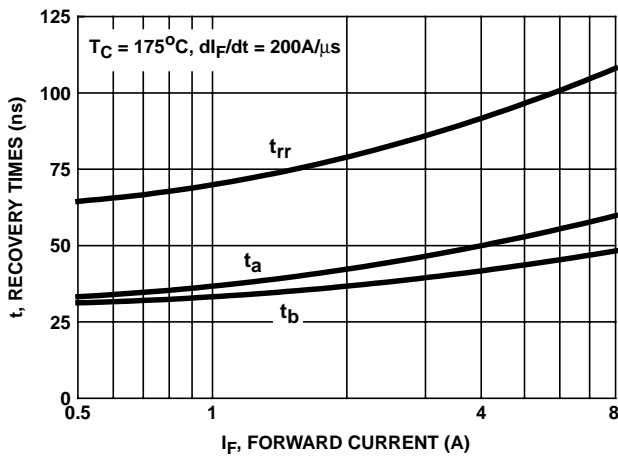


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

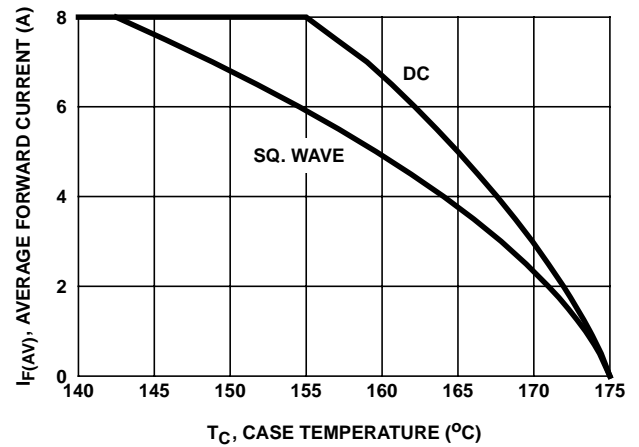


FIGURE 6. CURRENT DERATING CURVE

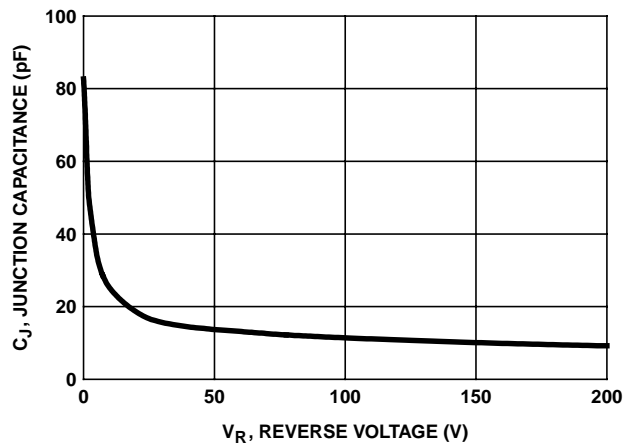


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

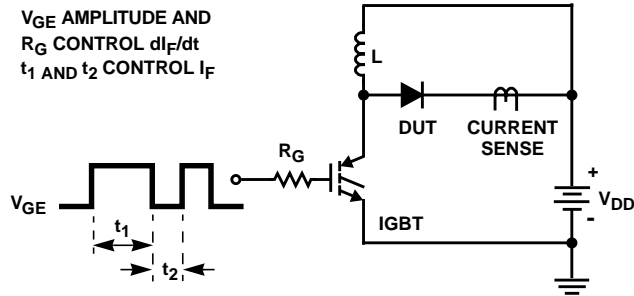


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

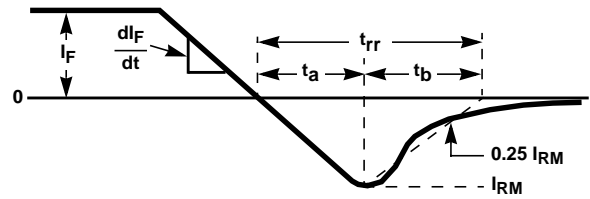


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

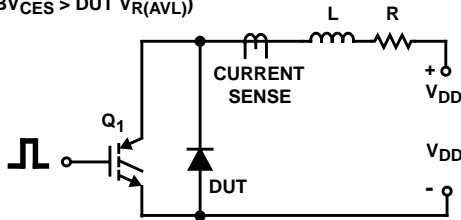


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

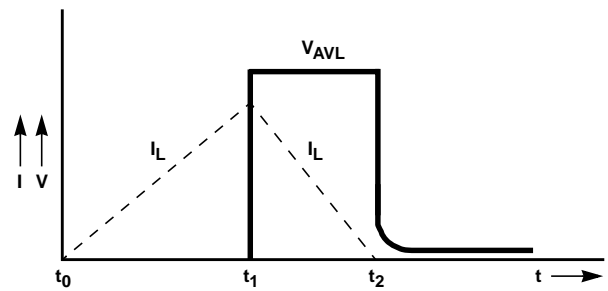


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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