

### 15A, 400V - 600V Ultrafast Diodes

The MUR1540, MUR1560, RURP1540, and RURP1560 are ultrafast diodes ( $t_{rr} < 55\text{ns}$ ) 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.

Formerly developmental type TA09905.

### Ordering Information

PART NUMBER	PACKAGE	BRAND
MUR1540	TO-220AC	MUR1540
RURP1540	TO-220AC	RURP1540
MUR1560	TO-220AC	MUR1560
RURP1560	TO-220AC	RURP1560

NOTE: When ordering, use the entire part number

### Symbol



### Features

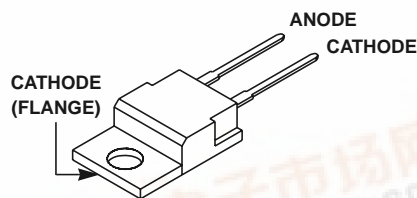
- Ultrafast with Soft Recovery . . . . . <55ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage Up to . . . . . 600V
- Avalanche Energy Rated
- Planar Construction

### Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

### Packaging

JEDEC TO-220AC



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

	MUR1540 RURP1540	MUR1560 RURP1560	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 . . . . . ( $T_C = 145^\circ\text{C}$ )	$I_{F(AV)}$ 15	15	A
Repetitive Peak Surge Current . . . . . (Square Wave 20kHz)	$I_{FRM}$ 30	30	A
Nonrepetitive Peak Surge Current . . . . . (Halfwave 1 Phase 60Hz)	$I_{FSM}$ 200	200	A
Maximum Power Dissipation . . . . .	$P_D$ 100	100	W
Avalanche Energy (See Figures 7 and 8) . . . . .	$E_{AVL}$ 20	20	mJ
Operating and Storage Temperature . . . . .	$T_{STG}, T_J$ -55 to 175	-55 to 175	°C

## MUR1540, MUR1560, RURP1540, RURP1560

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

SYMBOL	TEST CONDITION	MUR1540, RURP1540			MUR1560, RURP1560			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 15\text{A}$	-	-	1.25	-	-	1.5	V
	$I_F = 15\text{A}, T_C = 150^\circ\text{C}$	-	-	1.12	-	-	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	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	-	55	-	-	55	ns
	$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	-	60	-	-	60	ns
$t_a$	$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	30	-	-	30	-	ns
$t_b$	$I_F = 15\text{A}, di_F/dt = 100\text{A}/\mu\text{s}$	-	17	-	-	20	-	ns
$R_{\theta JC}$		-	-	1.5	-	-	1.5	$^\circ\text{C}/\text{W}$

#### 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 6), 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 6).

$t_b$  = 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 6).

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

pw = pulse width.

D = duty cycle.

### Typical Performance Curves

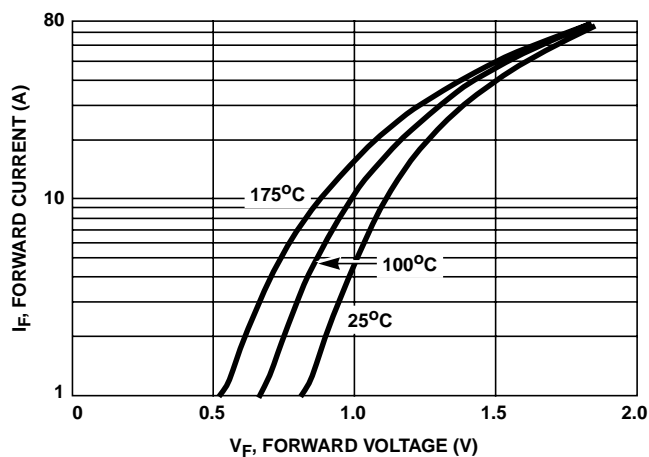


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

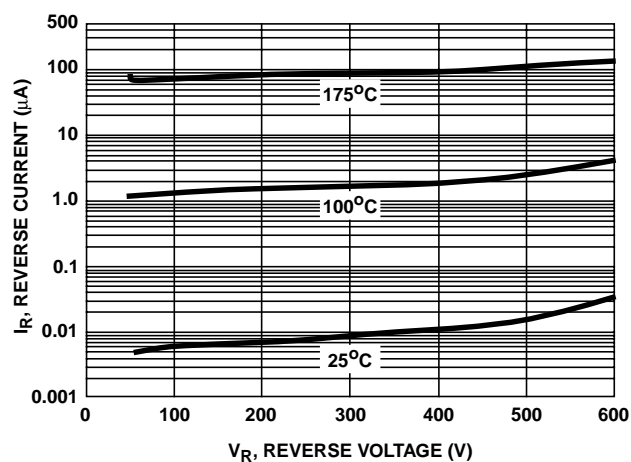


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

# MUR1540, MUR1560, RURP1540, RURP1560

## Typical Performance Curves (Continued)

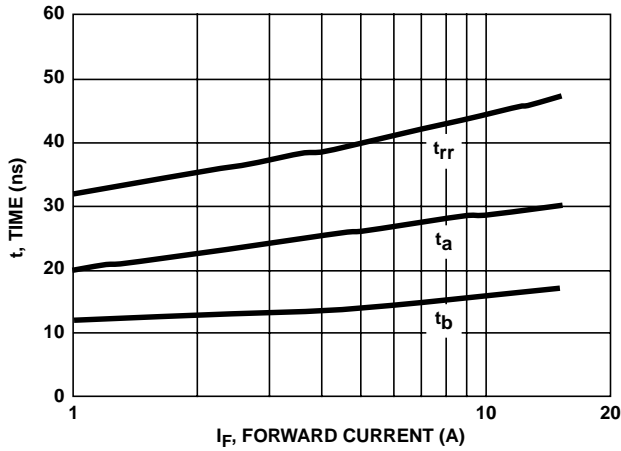


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

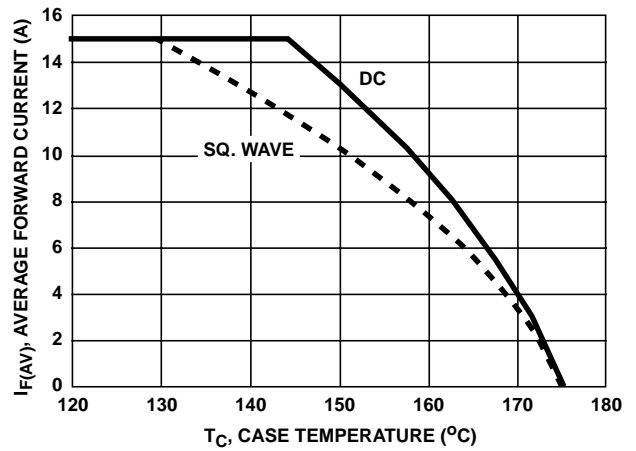


FIGURE 4. CURRENT DERATING CURVE

## Test Circuits and Waveforms

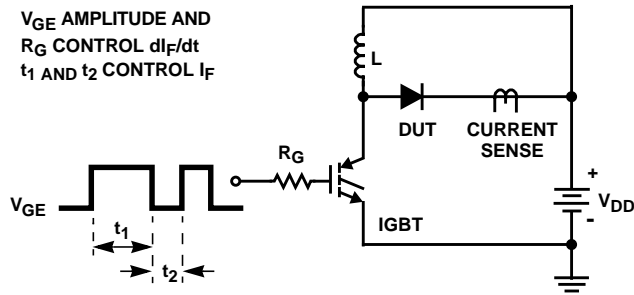


FIGURE 5.  $t_{rr}$  TEST CIRCUIT

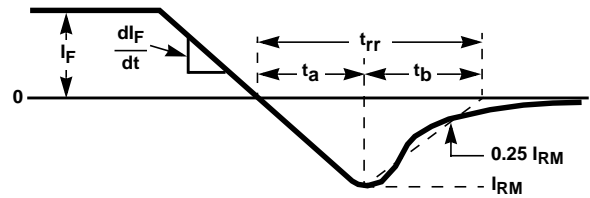


FIGURE 6.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

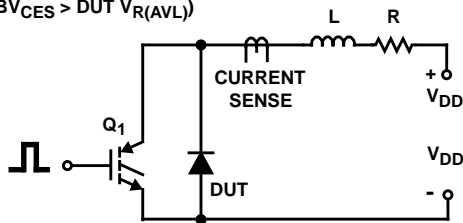


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

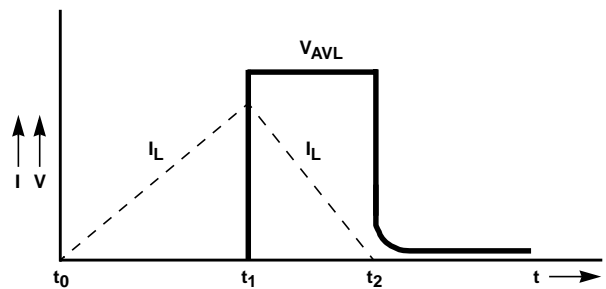


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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