

**8A, 1000V Ultrafast Diodes**

The MUR8100E and RUR8100 are ultrafast diodes ( $t_{rr} < 75ns$ ) 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 minimize ringing and electrical noise in many power switching circuits, thus reducing power loss in the switching transistor.

Formerly developmental type TA09617.

**Ordering Information**

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

NOTE: When ordering, use entire part number.

**Symbol**



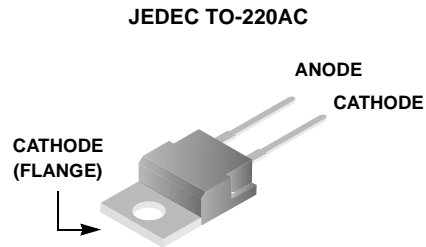
**Features**

- Ultrafast with Soft Recovery . . . . . <75ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 1000V
- Avalanche Energy Rated
- Planar Construction

**Applications**

- Switching Power Supply
- Power Switching Circuits
- General Purpose

**Packaging**



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

|   | MUR8100E<br>RURP8100      | UNITS |
|---|---------------------------|-------|
| 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 . . . . .<br>( $T_C = 155^{\circ}C$ ) | $I_{F(AV)}$ 8             | A     |
| Repetitive Peak Surge Current . . . . .<br>(Square Wave 20kHz)          | $I_{FRM}$ 16              | A     |
| Nonrepetitive Peak Surge Current . . . . .<br>(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 | °C    |

# MUR8100E, RURP8100

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

| SYMBOL          | TEST CONDITION                                       | MIN | TYP | MAX | UNITS                     |
|-----------------|--|-----|-----|-----|---------------------------|
| $V_F$           | $I_F = 8\text{A}$                                    | -   | -   | 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 ( $p_w = 300\mu\text{s}$ ,  $D = 2\%$ ).

$I_R$  = 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.

$p_w$  = Pulse width.

$D$  = Duty cycle.

## Typical Performance Curves

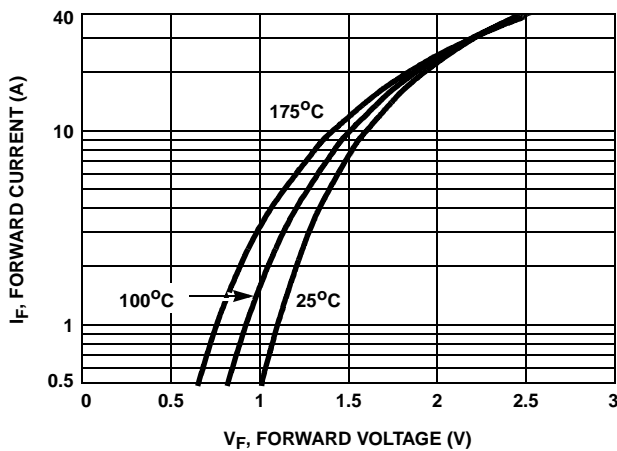


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

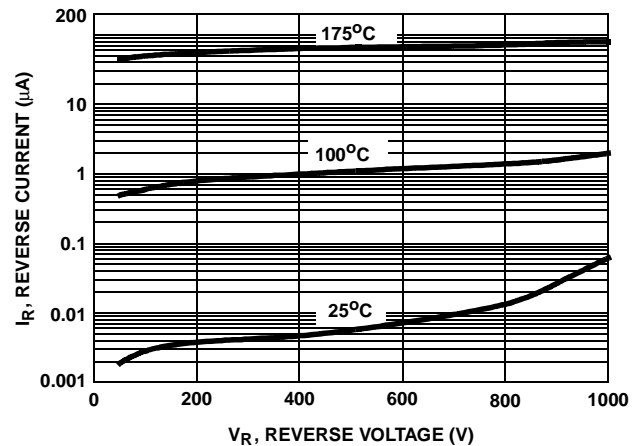


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

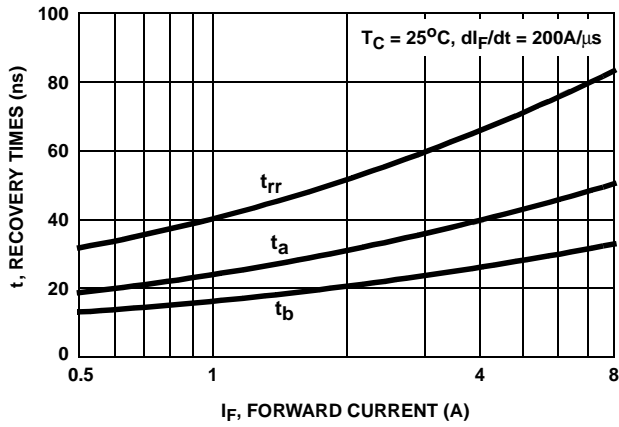


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

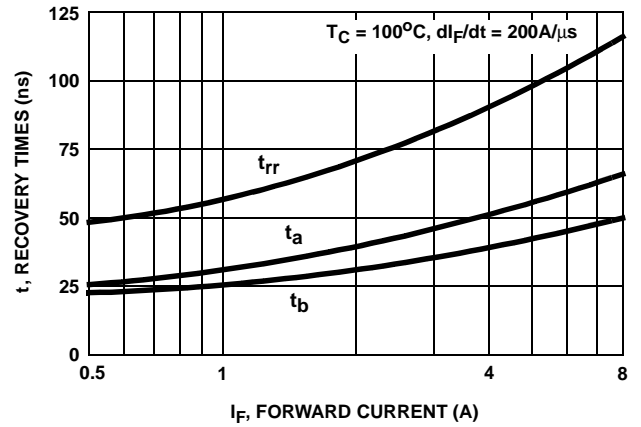


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

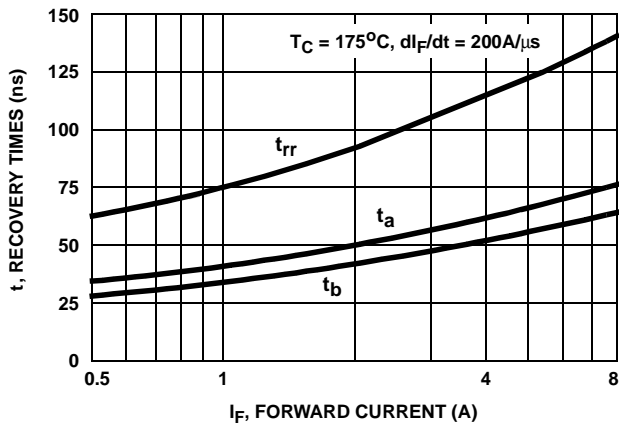


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

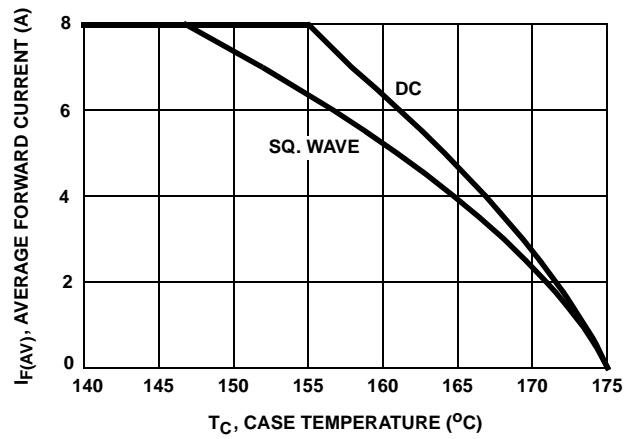


FIGURE 6. CURRENT DERATING CURVE

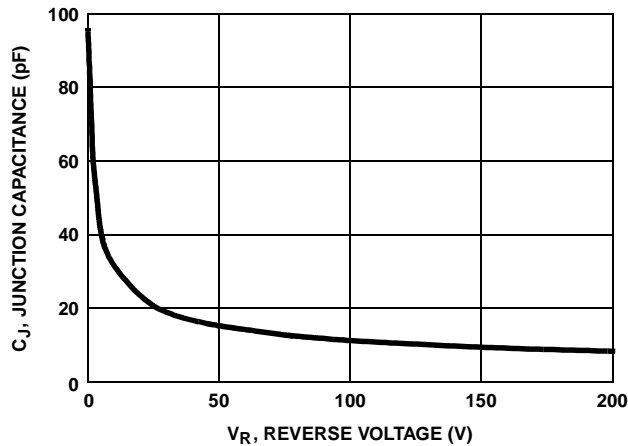


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

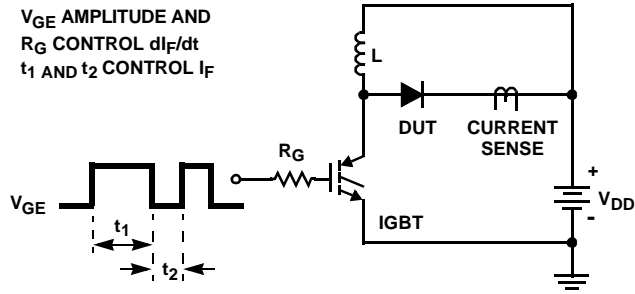


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

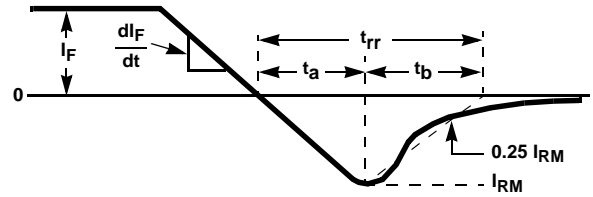


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

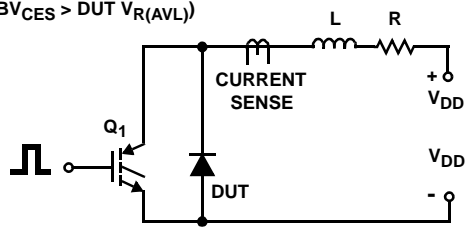


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

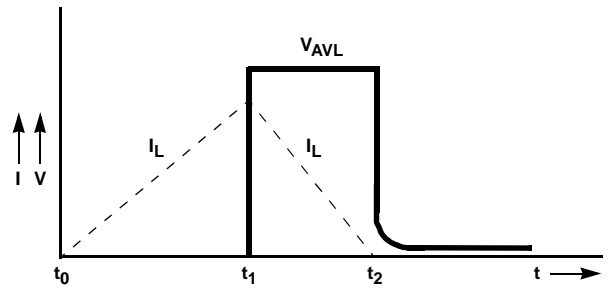


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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| CoolFET™                             | FASTr™              | MicroFET™          | PowerTrench®        | SuperSOT™-6     |
| CROSSVOLT™                           | FRFET™              | MicroPak™          | QFET™               | SuperSOT™-8     |
| DOME™                                | GlobalOptoisolator™ | MICROWIRE™         | QS™                 | SyncFET™        |
| EcoSPARK™                            | GTO™                | MSX™               | QT Optoelectronics™ | TinyLogic™      |
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| EnSigna™                             | µC™                 | OCX™               | RapidConfigure™     | UHC™            |
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|--------------------------|------------------------|---|
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