

## 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



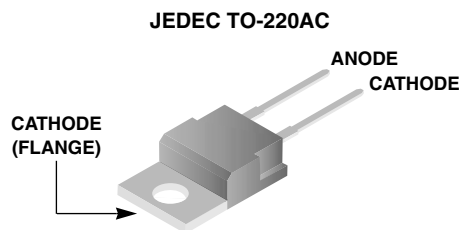
## Features

- 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<br>RURP840 | MUR860<br>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 . . . . . $I_F(AV)$<br>( $T_C = 155^\circ\text{C}$ ) | 8                 | 8                 | A     |
| Repetitive Peak Surge Current . . . . . $I_{FRM}$<br>(Square Wave, 20kHz)              | 16                | 16                | A     |
| Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$<br>(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

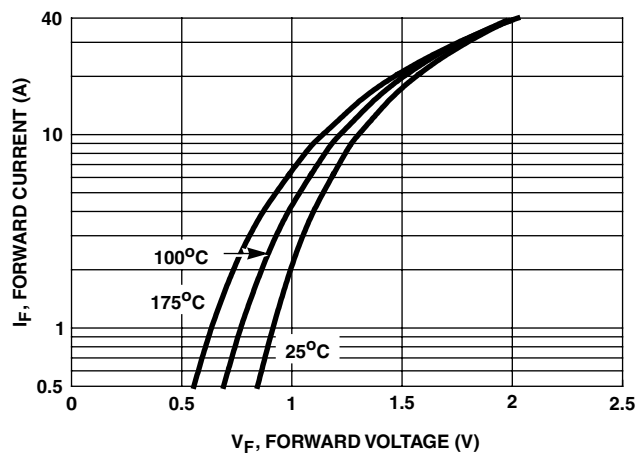


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

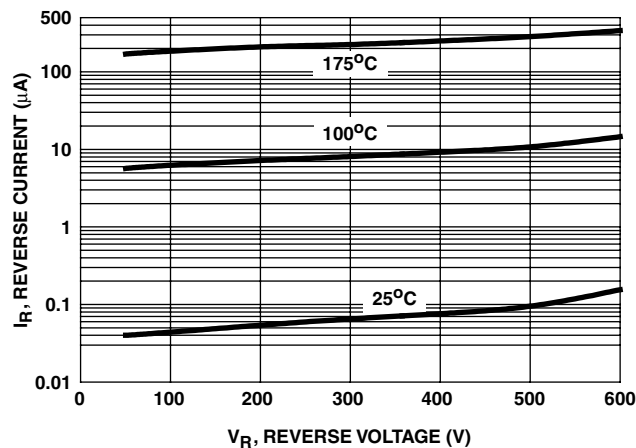


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

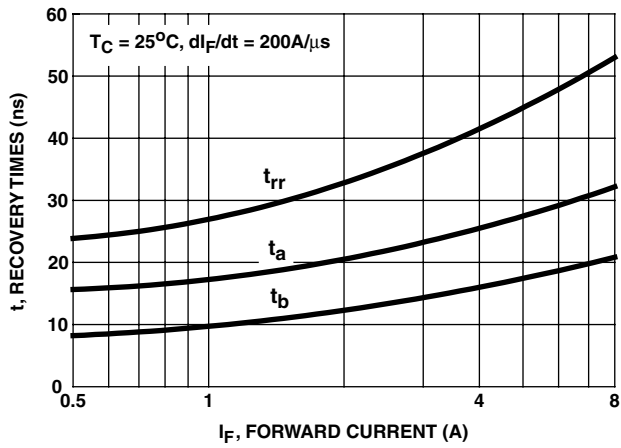


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

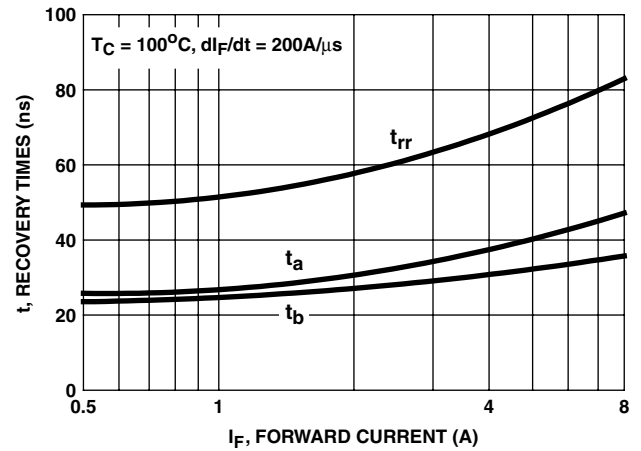


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

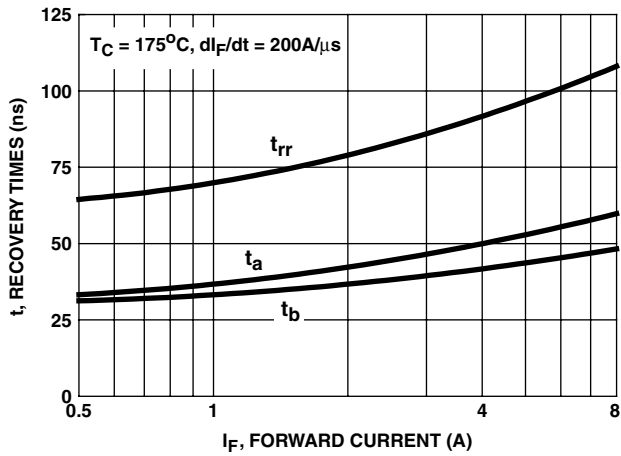


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

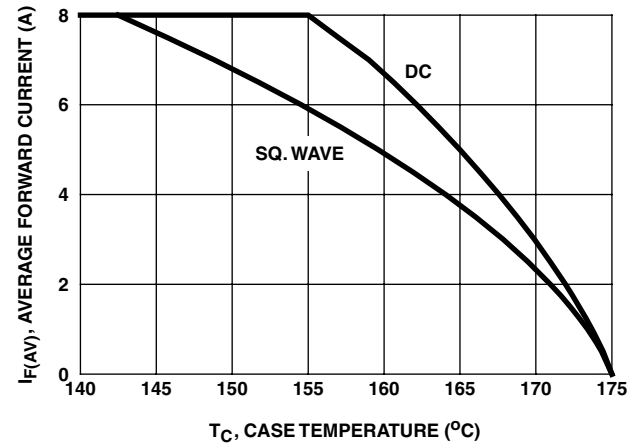


FIGURE 6. CURRENT DERATING CURVE

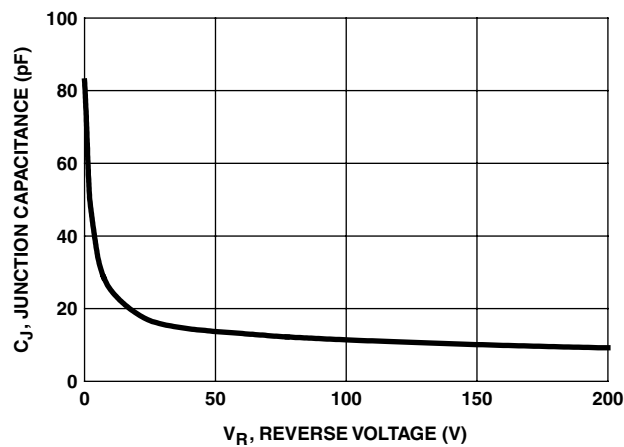


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuits and Waveforms

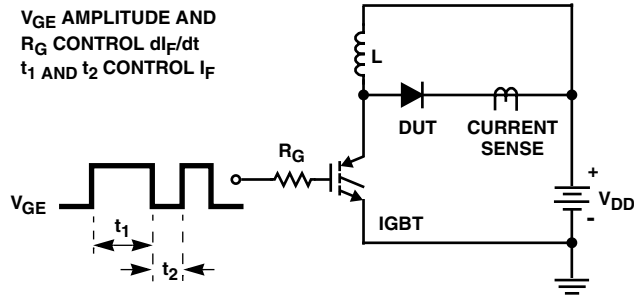


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

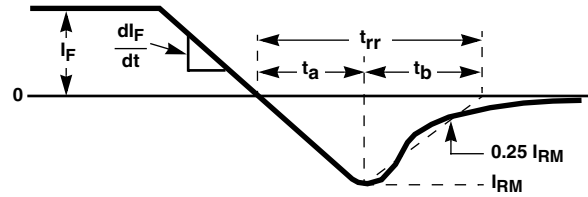


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

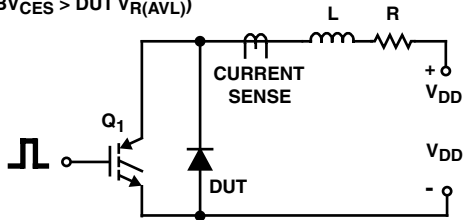


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

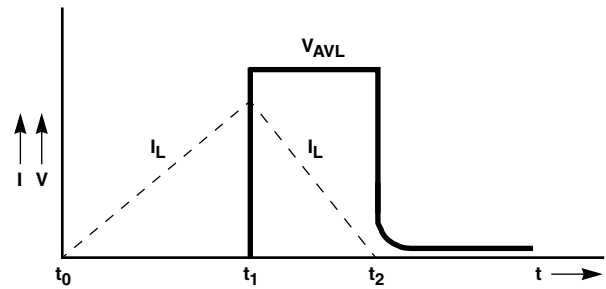


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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| CROSSVOLT™           | GlobalOptoisolator™ | POP™                         | SuperSOT™-3           |      |
| DenseTrench™         | GTO™                | Power247™                    | SuperSOT™-6           |      |
| DOME™                | HiSeC™              | PowerTrench <sup>®</sup>     | SuperSOT™-8           |      |
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