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## 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



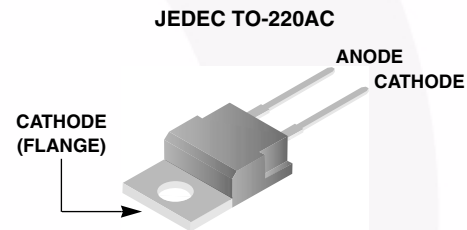
### Features

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

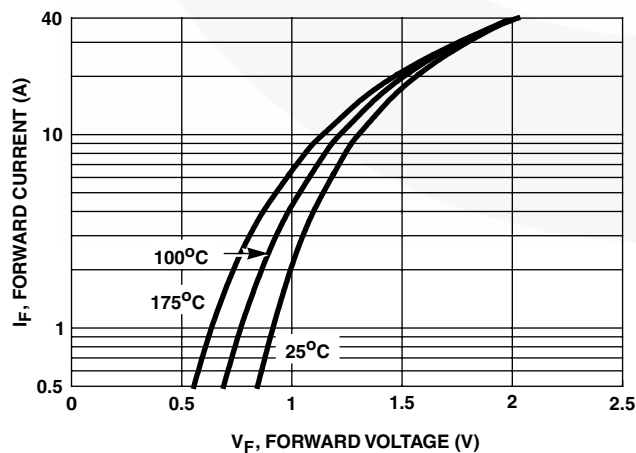


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

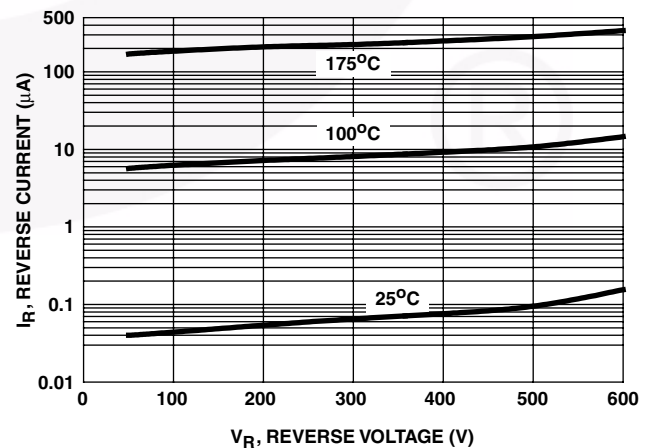


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

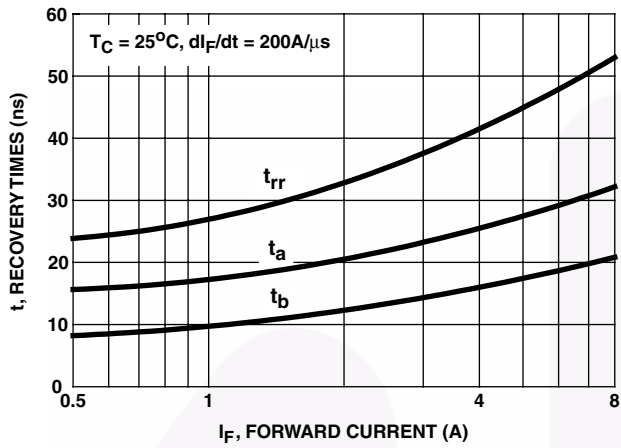


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

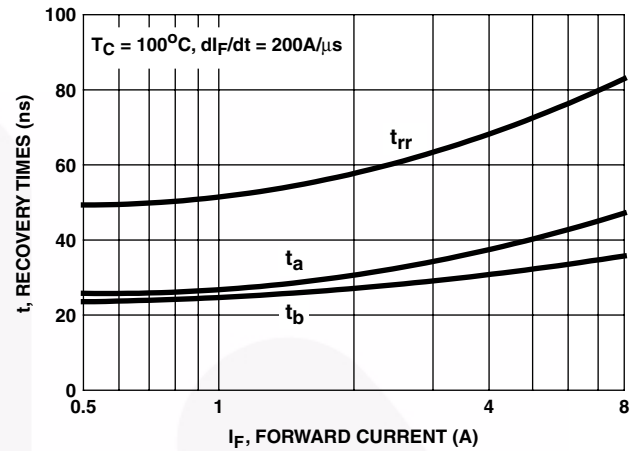


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

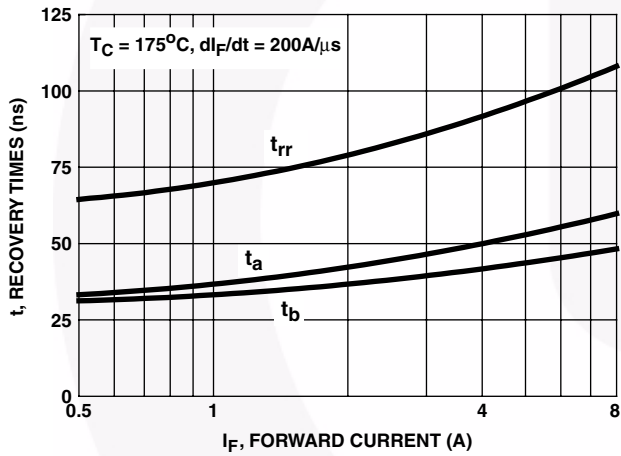


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

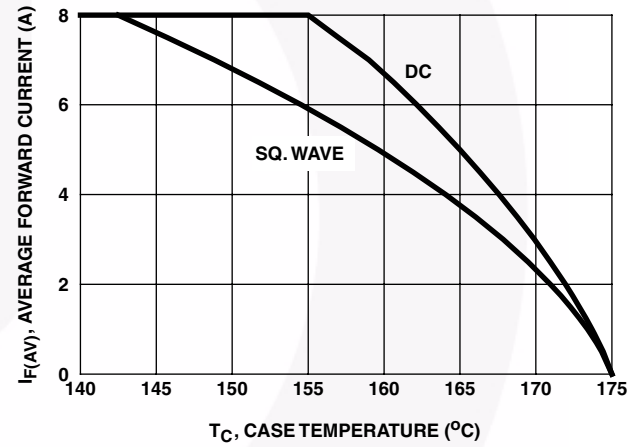


FIGURE 6. CURRENT DERATING CURVE

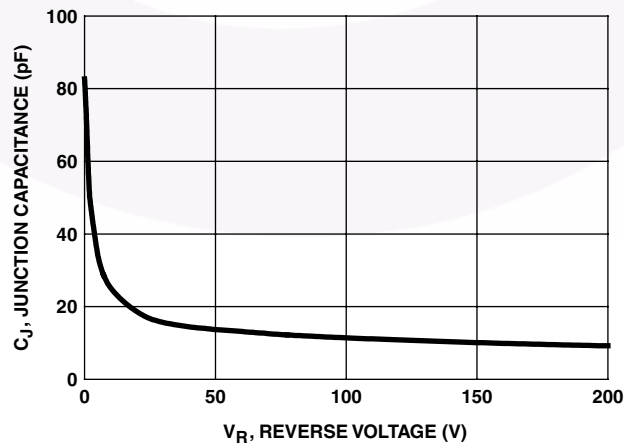


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

## Test Circuits and Waveforms

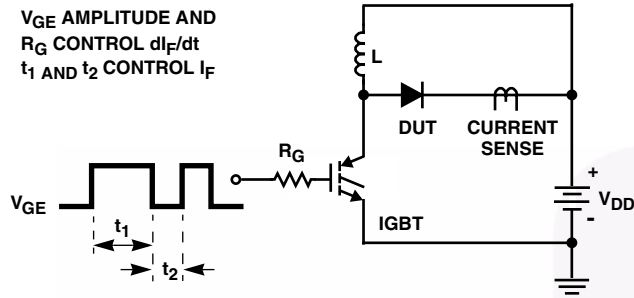


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

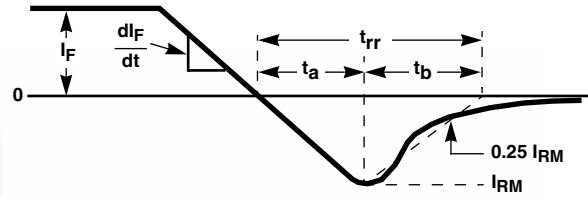


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

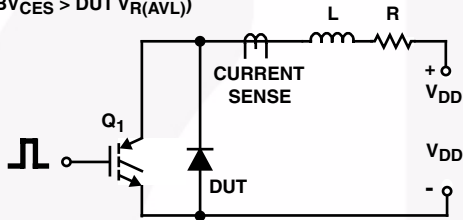


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

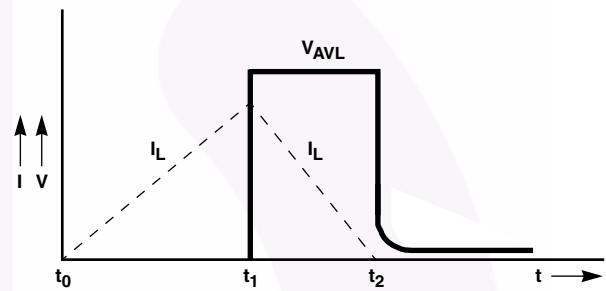
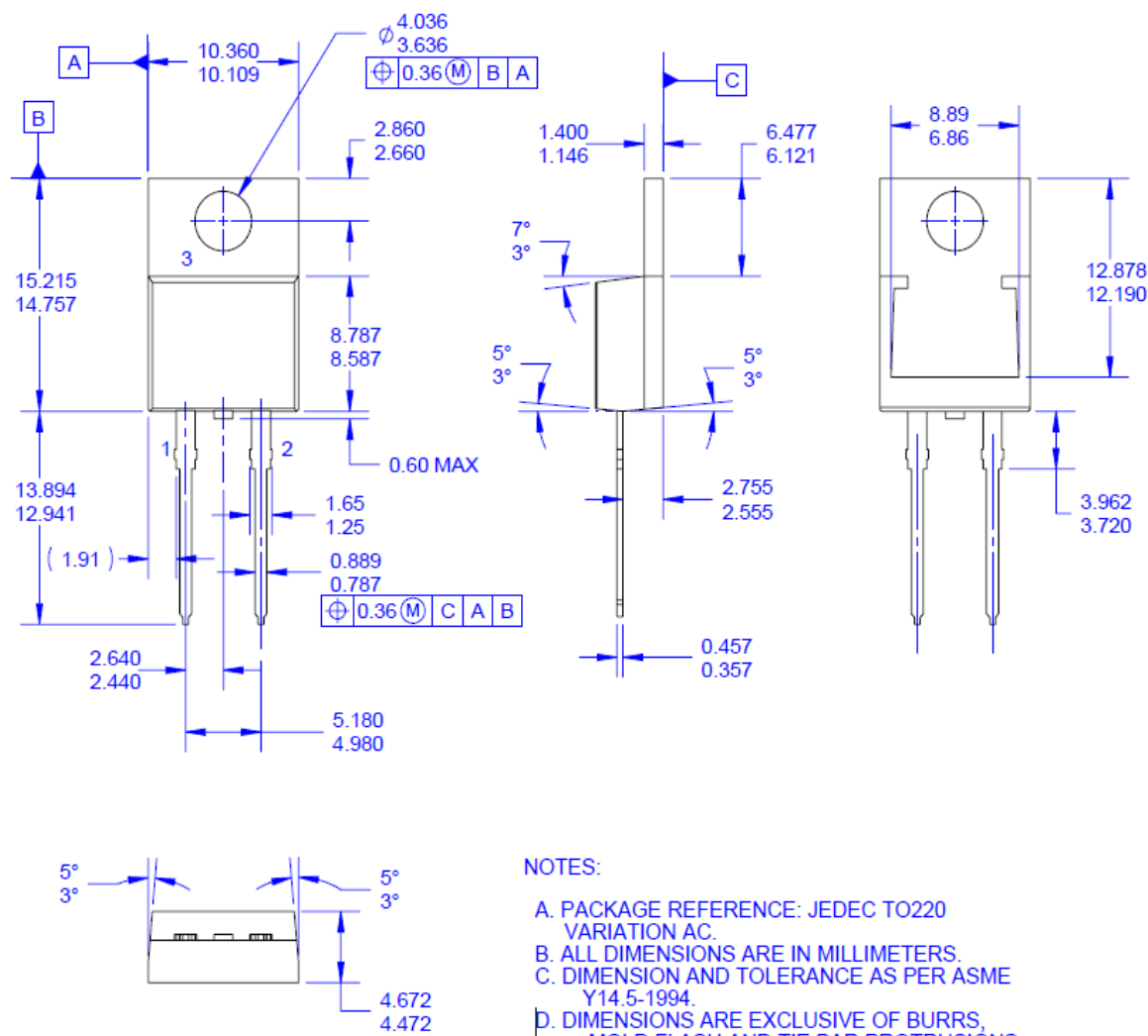


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## 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.
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- 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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