

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

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



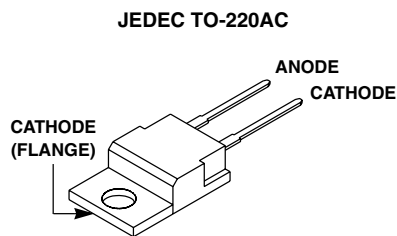
**Features**

- 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**



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

|  | MUR1540<br>RURP1540 | MUR1560<br>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 . . . . . $I_{F(AV)}$<br>( $T_C = 145^\circ C$ ) | 15                  | 15                  | A     |
| Repetitive Peak Surge Current . . . . . $I_{FRM}$<br>(Square Wave 20kHz)           | 30                  | 30                  | A     |
| Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$<br>(Halfwave 1 Phase 60Hz)    | 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 ( $p_w = 300\mu\text{s}$ ,  $D = 2\%$ ).

$I_R$  = Instantaneous reverse current.

$t_{rr}$  = Reverse recovery time at  $dI_F/dt = 100\text{A}/\mu\text{s}$  (See Figure 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.

$p_w$  = pulse width.

$D$  = duty cycle.

### Typical Performance Curves

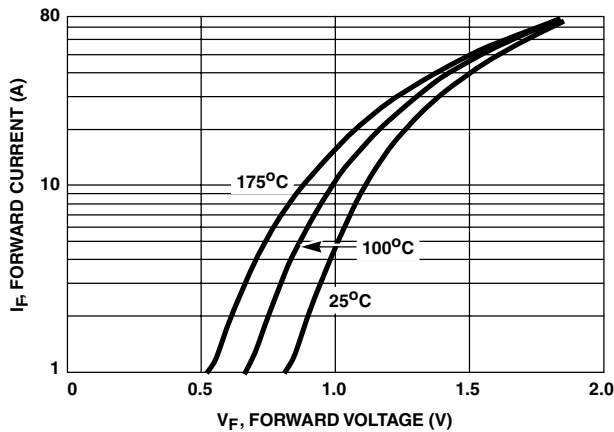


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

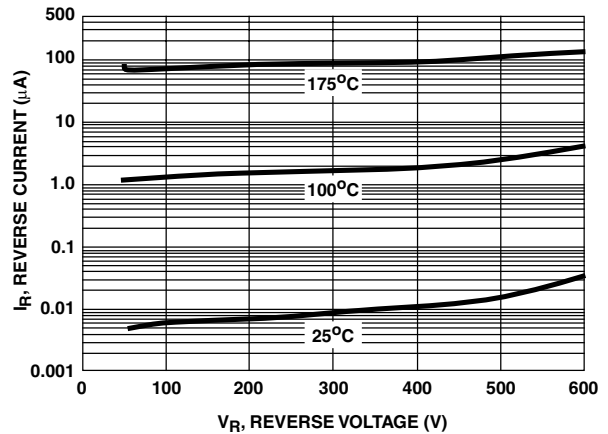


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

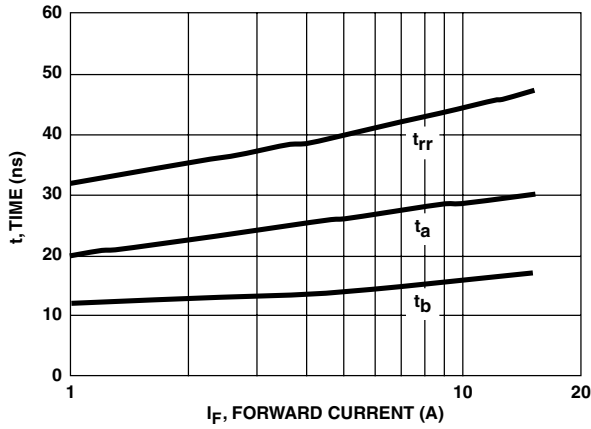


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

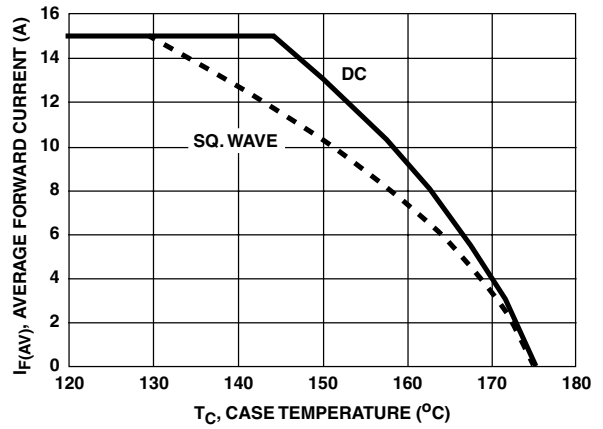


FIGURE 4. CURRENT DERATING CURVE

Test Circuits and Waveforms

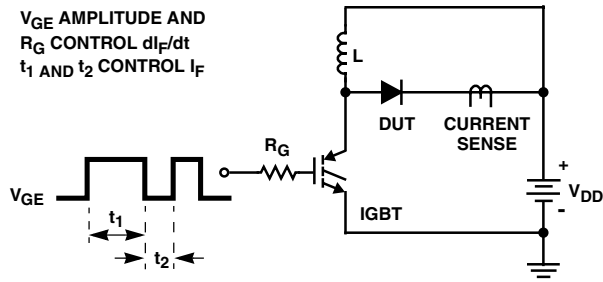


FIGURE 5.  $t_{rr}$  TEST CIRCUIT

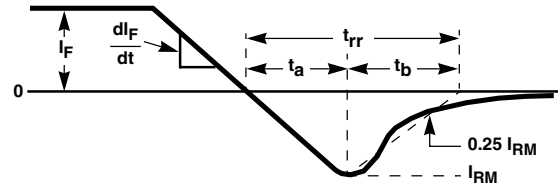


FIGURE 6.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

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

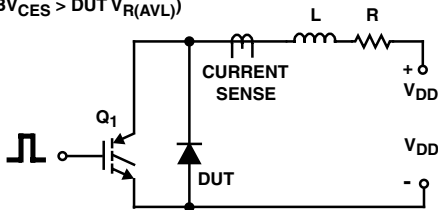


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

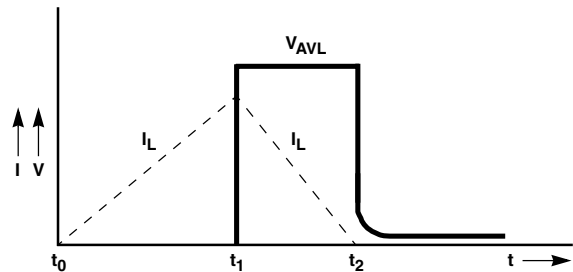


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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