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## 6 A, 600 V, Ultrafast Diode

The RURD660, RURD660S 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.

### Features

- Ultrafast Recovery  $t_{rr} = 60$  ns (@  $I_F = 6$  A)
- Max Forward Voltage,  $V_F = 1.5$  V (@  $T_C = 25^\circ\text{C}$ )
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

### Ordering Information

PART NUMBER	PACKAGE	BRAND
RURD660	TO-251-2L	RUR660
RURD660S	TO-252-3L	RUR660

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-252 variant in the tape and reel, i.e., RURD660S9A.

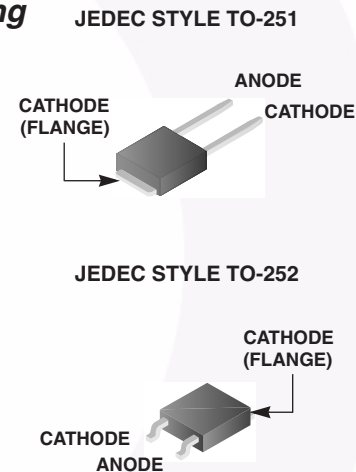
### Symbol



### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

### Packaging



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

	RURD660	RURD660S	UNIT
Peak Repetitive Reverse Voltage	600	600	V
Working Peak Reverse Voltage	600	600	V
DC Blocking Voltage	600	600	V
Average Rectified Forward Current ( $T_C = 155^\circ\text{C}$ )	6	6	A
Repetitive Peak Surge Current (Square Wave, 20 kHz)	12	12	A
Nonrepetitive Peak Surge Current (Halfwave, 1 Phase, 60 Hz)	60	60	A
Maximum Power Dissipation	50	50	W
Avalanche Energy (See Figures 10 and 11)	10	10	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	$^\circ\text{C}$

# RURD660, RURD660S

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
$V_F$	$I_F = 6\text{ A}$	-	-	1.5	V
	$I_F = 6\text{ A}, T_C = 150^\circ\text{C}$	-	-	1.2	V
$I_R$	$V_R = 600\text{ V}$	-	-	100	$\mu\text{A}$
	$V_R = 600\text{ V}, T_C = 150^\circ\text{C}$	-	-	500	$\mu\text{A}$
$t_{rr}$	$I_F = 1\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	55	ns
	$I_F = 6\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	-	60	ns
$t_a$	$I_F = 6\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	28	-	ns
$t_b$	$I_F = 6\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	16	-	ns
$Q_{RR}$	$I_F = 6\text{ A}, dI_F/dt = 200\text{ A}/\mu\text{s}$	-	150	-	nC
$C_J$	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	25	-	pF
$R_{\theta JC}$		-	-	3	$^\circ\text{C}/\text{W}$

### 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

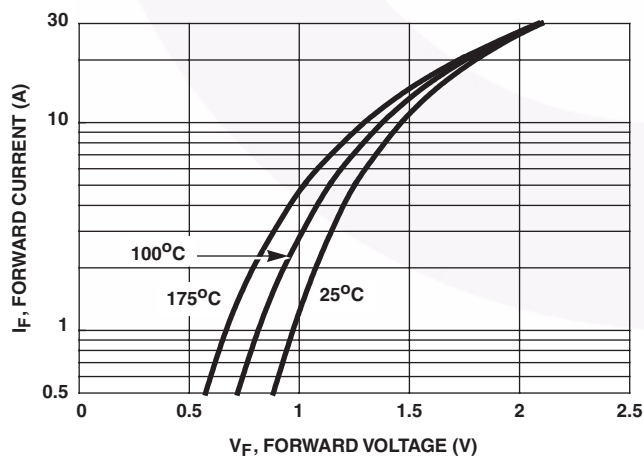


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

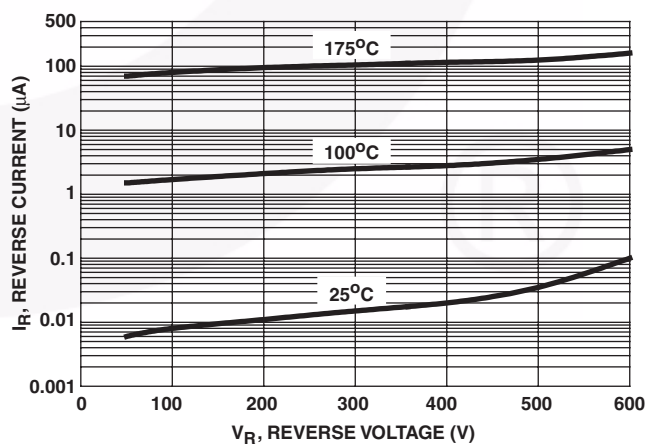


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

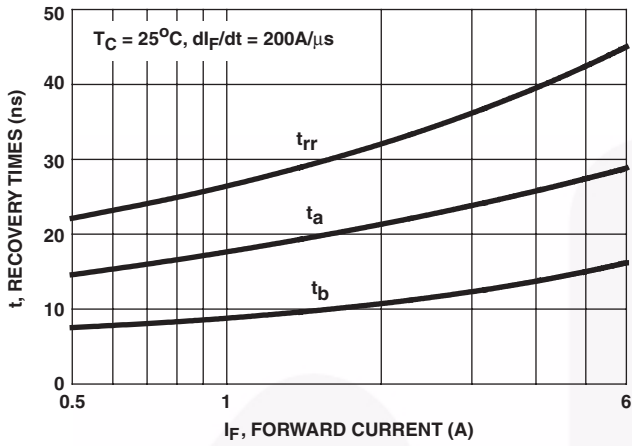


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

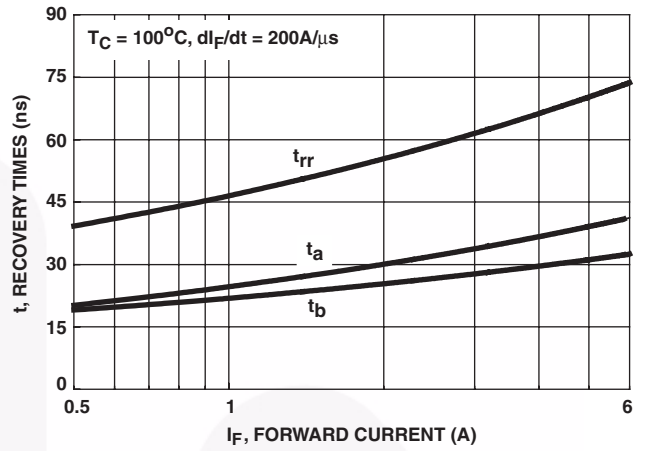


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

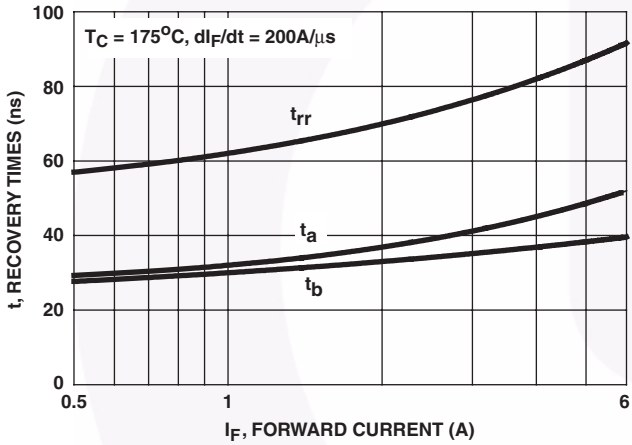


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

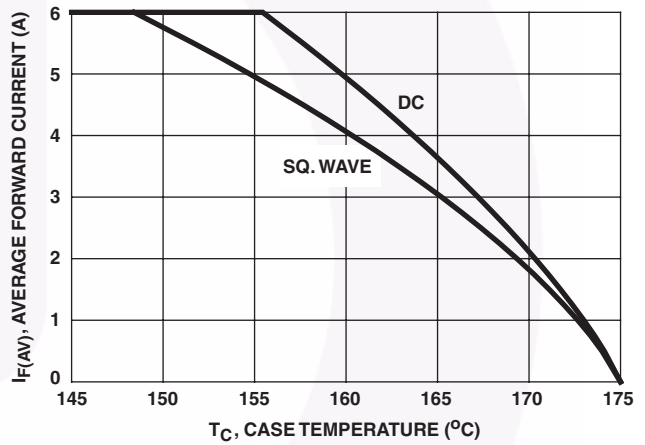


FIGURE 6. CURRENT DERATING CURVE

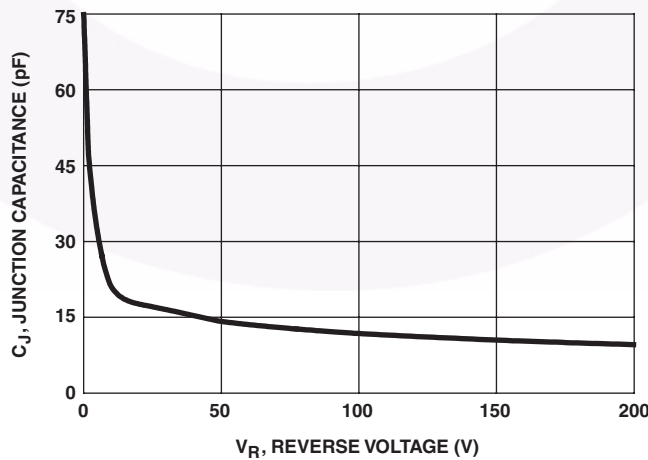


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

**Test Circuits and Waveforms**

$V_{GE}$  AMPLITUDE AND  
 $R_G$  CONTROL  $di_F/dt$   
 $t_1$  AND  $t_2$  CONTROL  $I_F$

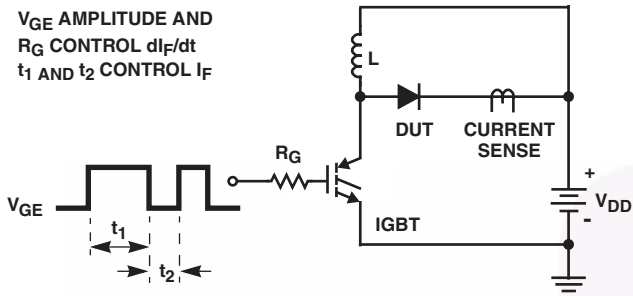


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

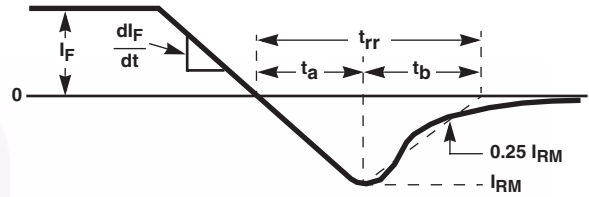


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I = 1A$   
 $L = 20mH$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2Li^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

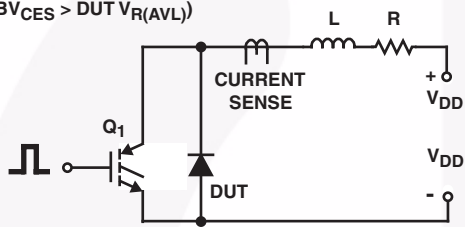


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

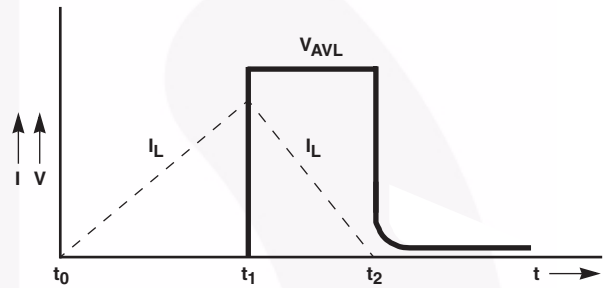
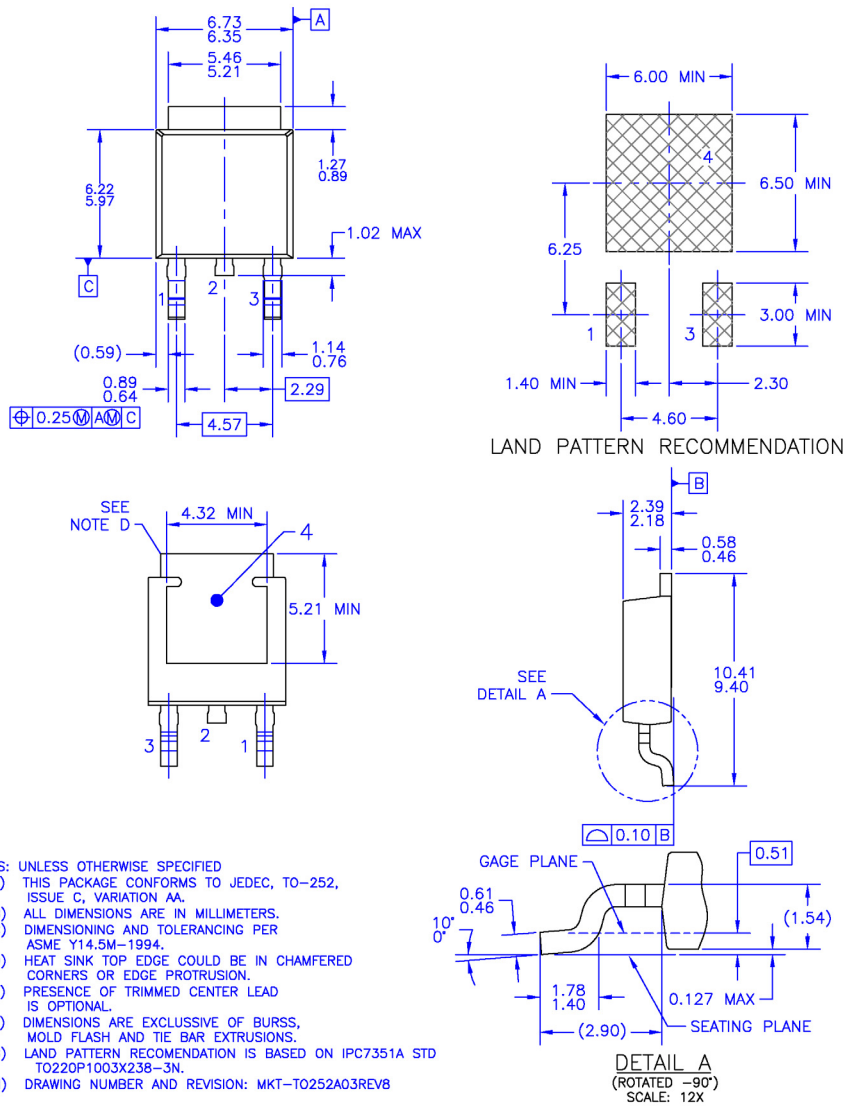


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

## Mechanical Dimensions



**Figure 9. TO-252 3L (DPAK) - TO252 (D-PAK), MOLDED, 3 LEAD, OPTION AA&AB**

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| Build it Now™  | GreenBridge™            | QFET®   | TinyBuck®   |
| CorePLUS™  | Green FPS™              | QS™   | TinyCalc™   |
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