

**50A, 1200V Ultrafast Diode**

The RURG50120 is an ultrafast diode with soft recovery characteristics ( $t_{rr} < 125\text{ns}$ ). It has low forward voltage drop and is of silicon nitride passivated ion-implanted epitaxial planar construction.

This device is intended for use as a freewheeling/clamping diode and rectifier in a variety of switching power supplies and other power switching applications. Its low stored charge and ultrafast soft recovery minimizes ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

Formerly developmental type TA49099.

**Ordering Information**

PART NUMBER	PACKAGE	BRAND
RURG50120	TO-247	RURG50120

NOTE: When ordering, use the entire part number.

**Symbol**



**Features**

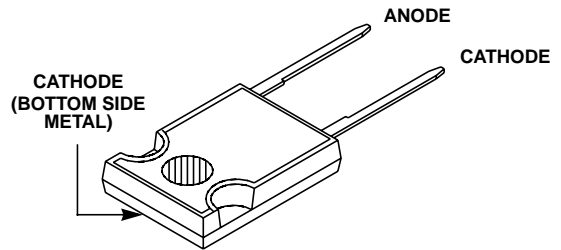
- Ultrafast with Soft Recovery . . . . . <125ns
- Operating Temperature . . . . . 175°C
- Reverse Voltage . . . . . 1200V
- Avalanche Energy Rated
- Planar Construction

**Applications**

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

**Packaging**

JEDEC STYLE 2 LEAD TO-247



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

	RURG50120	UNITS
Peak Repetitive Reverse Voltage . . . . . $V_{RRM}$	1200	V
Working Peak Reverse Voltage . . . . . $V_{RWM}$	1200	V
DC Blocking Voltage . . . . . $V_R$	1200	V
Average Rectified Forward Current . . . . . $I_{F(AV)}$ ( $T_C = 85^\circ\text{C}$ )	50	A
Repetitive Peak Surge Current . . . . . $I_{FRM}$ (Square Wave, 20kHz)	100	A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Halfwave, 1 Phase, 60Hz)	500	A
Maximum Power Dissipation . . . . . $P_D$	170	W
Avalanche Energy (See Figures 10 and 11) . . . . . $E_{AVL}$	50	mJ
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65 to 175	°C

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
$V_F$	$I_F = 50\text{A}$	-	-	2.1	V
	$I_F = 50\text{A}, T_C = 150^\circ\text{C}$	-	-	1.9	V
$I_R$	$V_R = 1200\text{V}$	-	-	250	$\mu\text{A}$
	$V_R = 1200\text{V}, T_C = 150^\circ\text{C}$	-	-	2.0	mA
$t_{rr}$	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	125	ns
	$I_F = 50\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	200	ns
$t_a$	$I_F = 50\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	95	-	ns
$t_b$	$I_F = 50\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	70	-	ns
$Q_{RR}$	$I_F = 50\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	800	-	nC
$C_J$	$V_R = 10\text{V}, I_F = 0\text{A}$	-	160	-	pF
$R_{\theta JC}$		-	-	0.9	$^\circ\text{C}/\text{W}$

**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**

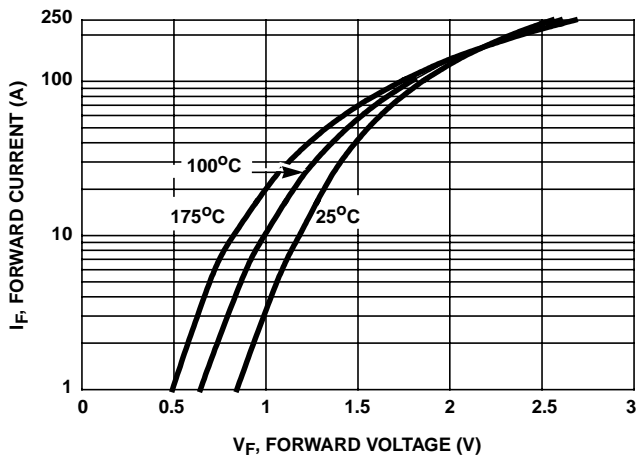


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

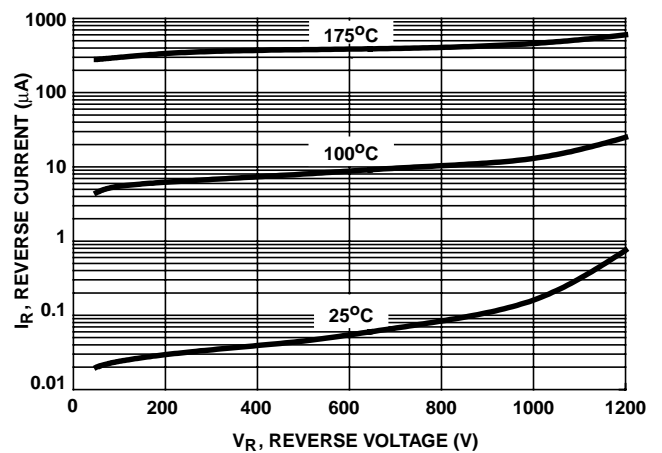


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

Typical Performance Curves (Continued)

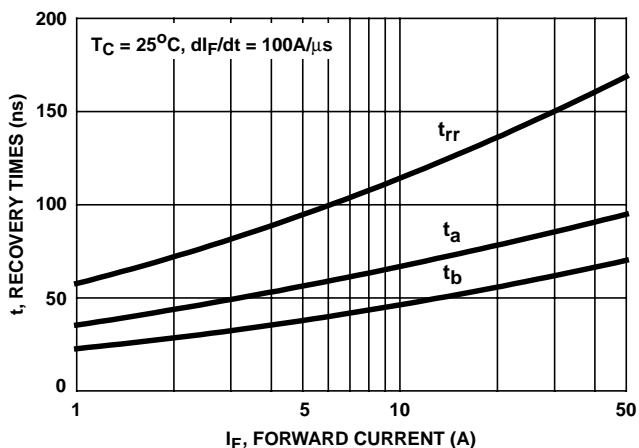


FIGURE 3.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

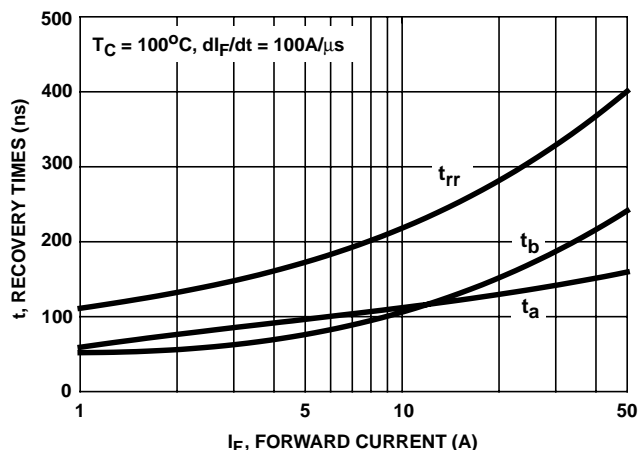


FIGURE 4.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

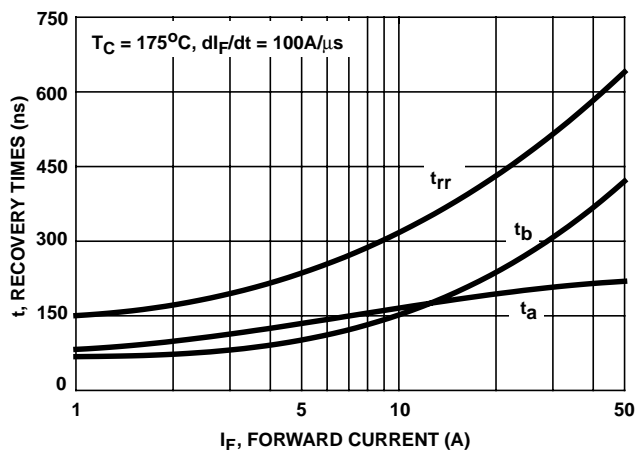


FIGURE 5.  $t_{rr}$ ,  $t_a$  AND  $t_b$  CURVES vs FORWARD CURRENT

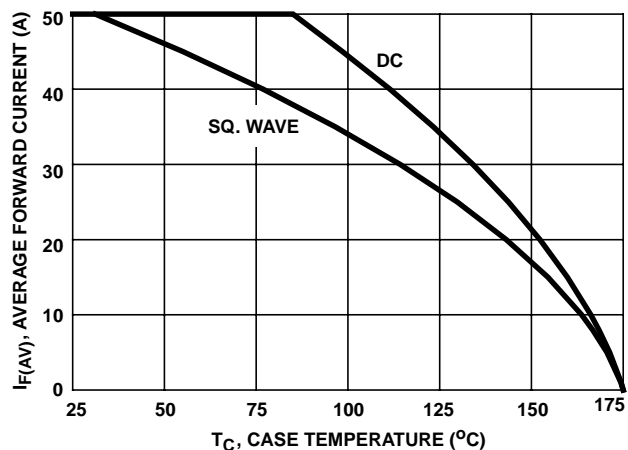


FIGURE 6. CURRENT DERATING CURVE

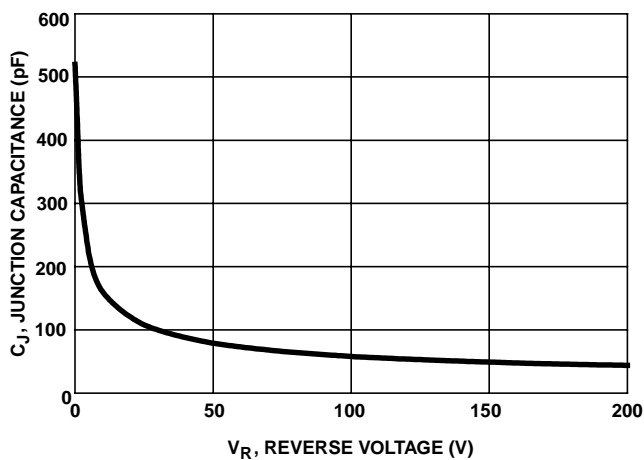


FIGURE 7. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuits and Waveforms

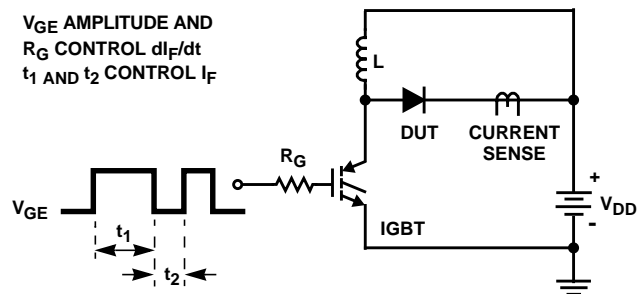


FIGURE 8.  $t_{rr}$  TEST CIRCUIT

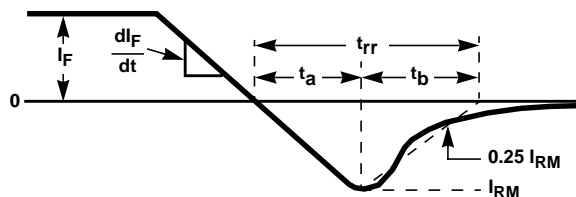


FIGURE 9.  $t_{rr}$  WAVEFORMS AND DEFINITIONS

$I = 1.6A$   
 $L = 40mH$   
 $R < 0.1\Omega$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

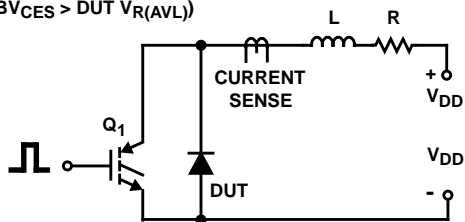


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

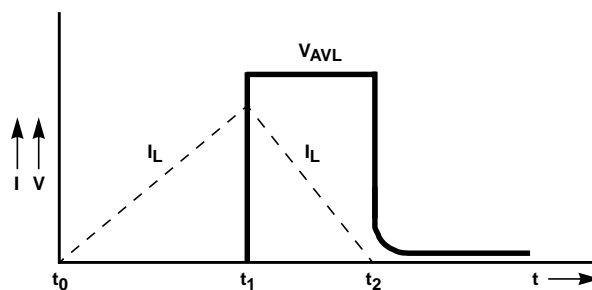


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

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