

April 1995

15A, 1200V Ultrafast Dual Diode

Features

- Ultrafast with Soft Recovery <100ns
- Operating Temperature +175°C
- Reverse Voltage 1200V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Description

The RURG15120CC (TA49097) are ultrafast dual diodes with soft recovery characteristics ($t_{RR} < 100\text{ns}$). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

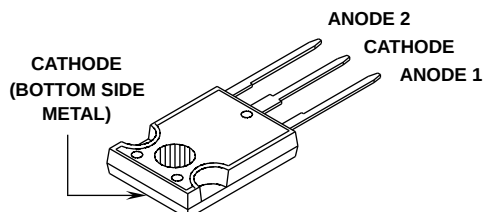
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURG15120CC	TO-247	URG15120C

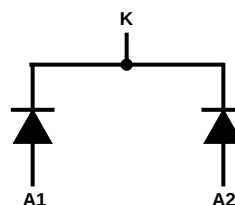
NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-247



Symbol



Absolute Maximum Ratings (per leg) $T_C = +25^\circ\text{C}$, Unless Otherwise Specified

	RURG15120CC	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 $I_{F(AV)}$ ($T_C = +140^\circ\text{C}$)	15	A
Repetitive Peak Surge Current I_{FSM} (Square Wave, 20kHz)	30	A
Nonrepetitive Peak Surge Current I_{FSM} (Halfwave, 1 phase, 60Hz)	200	A
Maximum Power Dissipation P_D	100	W
Avalanche Energy ($L = 40\text{mH}$) E_{AVL}	20	mj
Operating and Storage Temperature T_{STG}, T_J	-65 to +175	$^\circ\text{C}$

Specifications RURG15120CC

Electrical Specifications (per leg) $T_C = +25^{\circ}\text{C}$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 15\text{A}$, $T_C = +25^{\circ}\text{C}$	-	-	2.1	V
	$I_F = 15\text{A}$, $T_C = +150^{\circ}\text{C}$	-	-	1.9	V
I_R	$V_R = 1200\text{V}$, $T_C = +25^{\circ}\text{C}$	-	-	100	μA
	$V_R = 1200\text{V}$, $T_C = +150^{\circ}\text{C}$	-	-	500	μA
t_{RR}	$I_F = 1\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	-	100	ns
	$I_F = 15\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	-	130	ns
t_A	$I_F = 15\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	65	-	ns
t_B	$I_F = 15\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	40	-	ns
Q_{RR}	$I_F = 15\text{A}$, $di_F/dt = 100\text{A}/\mu\text{s}$	-	400	-	nC
C_J	$V_R = 10\text{V}$, $I_F = 0\text{A}$	-	56	-	pF
$R_{\theta JC}$		-	-	1.5	$^{\circ}\text{C}/\text{W}$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300 μs , D = 2%).

I_R = Instantaneous reverse current.

t_{RR} = Reverse recovery time (See Figure 2), summation of $t_A + t_B$.

t_A = Time to reach peak reverse current (See Figure 2).

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 2).

$R_{\theta JC}$ = Thermal resistance junction to case.

E_{AVL} = Controlled avalanche energy (See Figures 10 and 11).

pw = pulse width.

D = duty cycle.

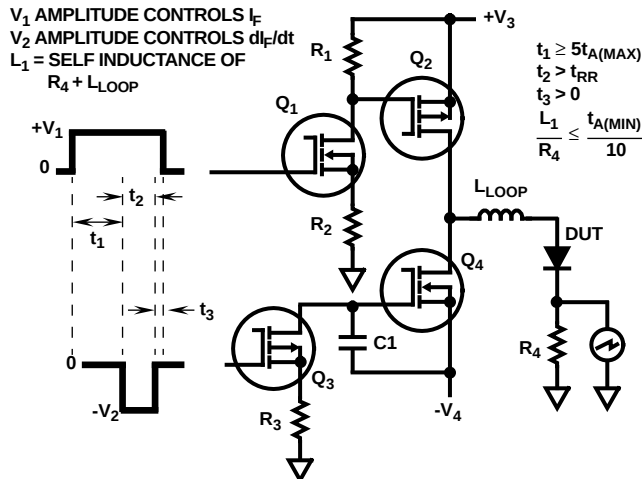


FIGURE 1. t_{RR} TEST CIRCUIT

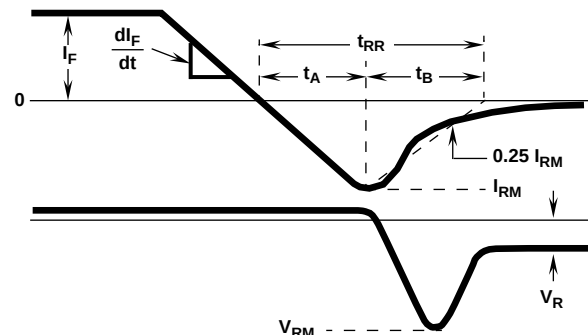


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

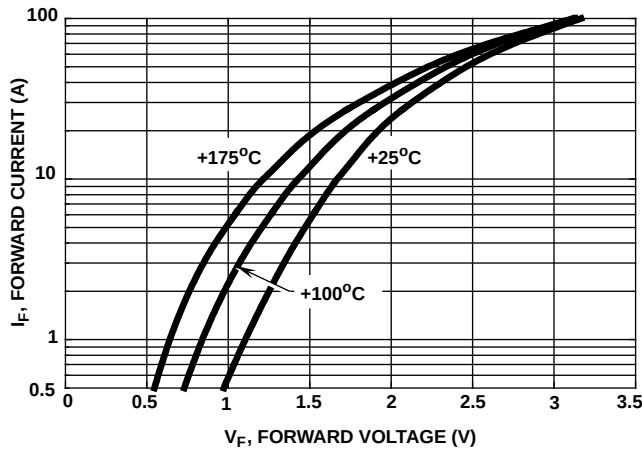


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

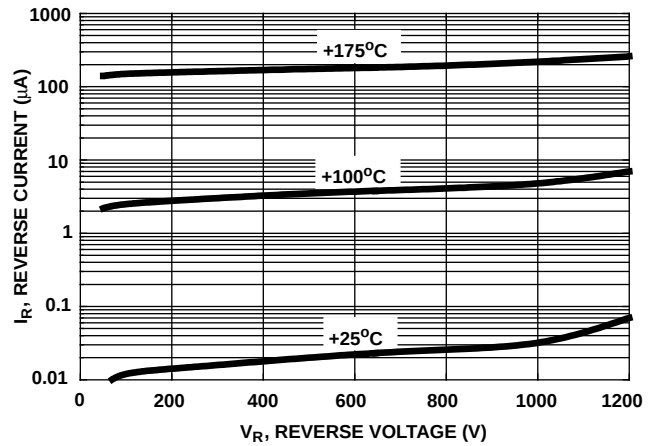


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

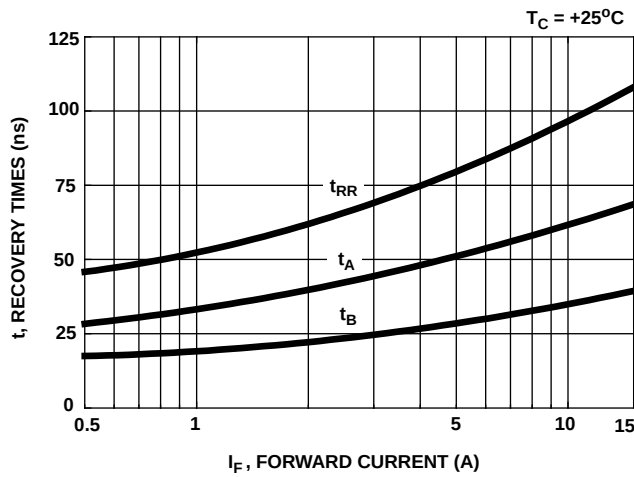


FIGURE 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

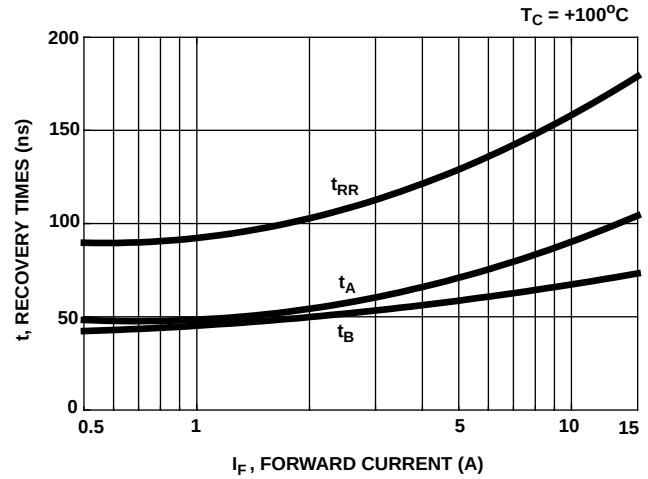


FIGURE 6. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

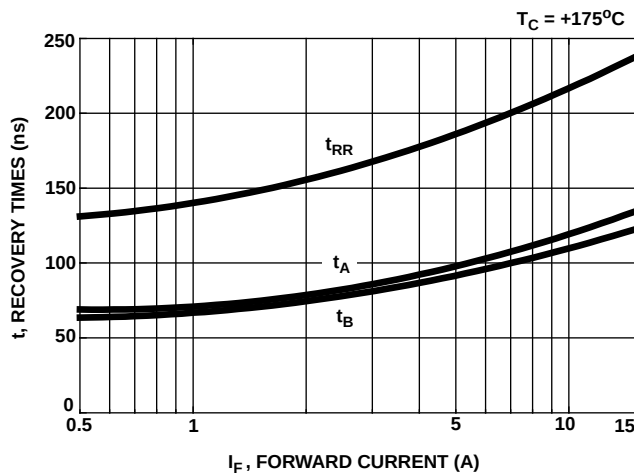


FIGURE 7. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

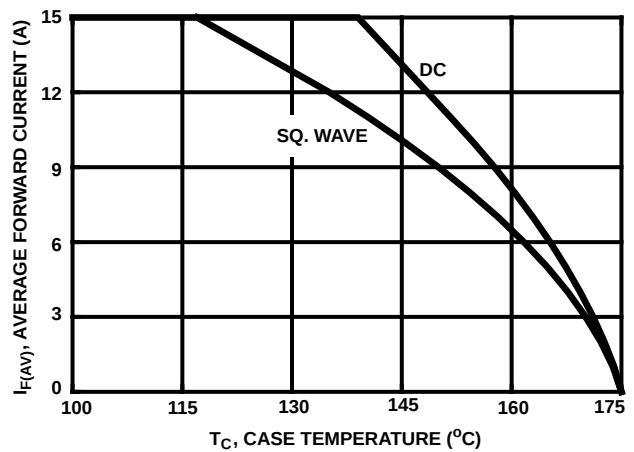


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

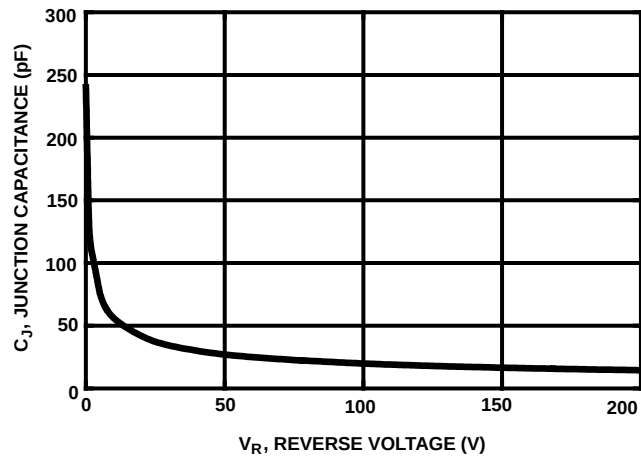


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveforms

$I_{MAX} = 1A$
 $L = 40mH$
 $R < 0.1\Omega$
 $E_{AVL} = 1/2LI^2 [V_{AVL}/(V_{AVL} - V_{DD})]$
 Q_1 AND Q_2 ARE 1000V MOSFETs

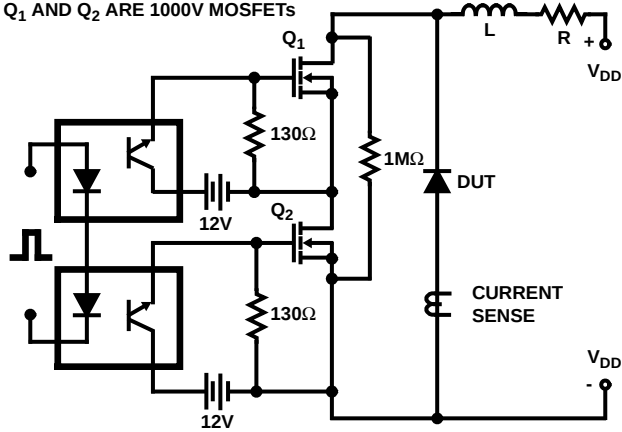


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

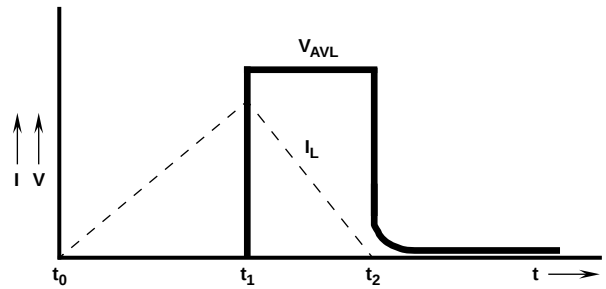


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS