

April 1995

15A, 700V - 1000V Ultrafast Dual Diodes

### Features

- Ultrafast with Soft Recovery . . . . . <100ns
- Operating Temperature . . . . . +175°C
- Reverse Voltage Up to . . . . . 1000V
- Avalanche Energy Rated
- Planar Construction

### Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

### Description

RURG1570CC, RURG1580CC, RURG1590CC and RURG15100CC are ultrafast dual diodes with soft recovery characteristics ( $t_{RR} < 100ns$ ). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

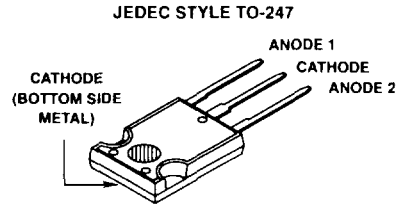
These devices are intended for use as freewheel/clamping diode and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching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

#### PACKAGING AVAILABILITY

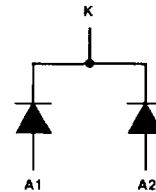
PART NUMBER	PACKAGE	BRAND
RURG1570CC	TO-247	RURG1570C
RURG1580CC	TO-247	RURG1580C
RURG1590CC	TO-247	RURG1590C
RURG15100CC	TO-247	URG15100C

NOTE: When ordering, use the entire part number.

### Package



### Symbol



### Absolute Maximum Ratings

$T_C = +25^\circ C$ , Unless Otherwise Specified

	RURG1570CC	RURG1580CC	RURG1590CC	RURG15100CC
Peak Repetitive Reverse Voltage . . . . . $V_{RRM}$	700V	800V	900V	1000V
Working Peak Reverse Voltage . . . . . $V_{RWM}$	700V	800V	900V	1000V
DC Blocking Voltage . . . . . $V_R$	700V	800V	900V	1000V
Average Rectified Forward Current (Per Leg) . . . . . $I_{F(AV)}$ (Total device forward current at rated $V_R$ and $T_C = +150^\circ C$ )	15A	15A	15A	15A
Peak Forward Repetitive Current . . . . . $I_{FRM}$ (Rated $V_R$ , square wave 20kHz)	30A	30A	30A	30A
Nonrepetitive Peak Surge Current . . . . . $I_{FSM}$ (Surge applied at rated load condition halfwave 1 phase 60Hz)	200A	200A	200A	200A
Maximum Power Dissipation . . . . . $P_D$	100W	100W	100W	100W
Operating and Storage Temperature . . . . . $T_{STG}, T_J$	-65°C to +175°C	-65°C to +175°C	-65°C to +175°C	-65°C to +175°C

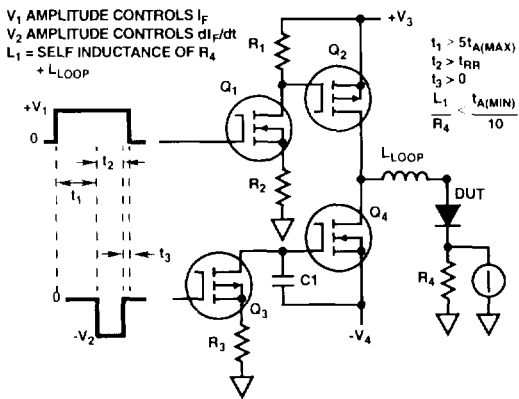
**Specifications RURG1570CC, RURG1580CC, RURG1590CC, RURG15100CC**

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

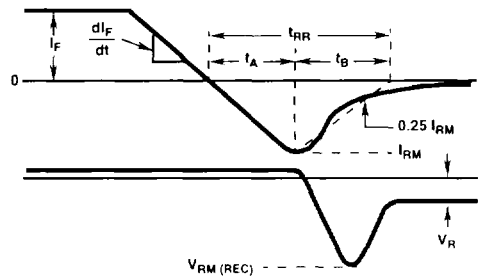
SYMBOL	TEST CONDITION	LIMITS												UNITS
		RURG1570CC			RURG1580CC			RURG1590CC			RURG15100CC			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
$V_F$	$I_F = 15\text{A}$ $T_C = +150^\circ\text{C}$	-	-	1.50	-	-	1.50	-	-	1.50	-	-	1.50	V
	$I_F = 15\text{A}$ $T_C = +25^\circ\text{C}$	-	-	1.80	-	-	1.80	-	-	1.80	-	-	1.80	V
$I_R$ at $T_C = +150^\circ\text{C}$	$V_R = 700\text{V}$	-	-	500	-	-	-	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 800\text{V}$	-	-	-	-	-	500	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 900\text{V}$	-	-	-	-	-	-	-	-	500	-	-	-	$\mu\text{A}$
	$V_R = 1000\text{V}$	-	-	-	-	-	-	-	-	-	-	500	-	$\mu\text{A}$
$I_R$ at $T_C = +25^\circ\text{C}$	$V_R = 700\text{V}$	-	-	100	-	-	-	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 800\text{V}$	-	-	-	-	-	100	-	-	-	-	-	-	$\mu\text{A}$
	$V_R = 900\text{V}$	-	-	-	-	-	-	-	-	100	-	-	-	$\mu\text{A}$
	$V_R = 1000\text{V}$	-	-	-	-	-	-	-	-	-	-	100	-	$\mu\text{A}$
$t_{RR}$	$I_F = 1\text{A}$	-	-	100	-	-	100	-	-	100	-	-	100	ns
	$I_F = 15\text{A}$	-	-	125	-	-	125	-	-	125	-	-	125	ns
$t_A$	$I_F = 15\text{A}$	-	75	-	-	75	-	-	75	-	-	75	-	ns
$t_B$	$I_F = 15\text{A}$	-	40	-	-	40	-	-	40	-	-	40	-	ns
$R_{\theta JC}$		-	-	1.5	-	-	1.5	-	-	1.5	-	-	1.5	$^\circ\text{C/W}$
$E_{AVL}$		-	-	20	-	-	20	-	-	20	-	-	20	mJ

**DEFINITIONS**

- $V_F$  = Instantaneous forward voltage (pw = 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 2), 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 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 7 and 8).
- pw = pulse width.
- D = duty cycle.



**FIGURE 1.  $t_{RR}$  TEST CIRCUIT**



**FIGURE 2. DEFINITIONS OF  $t_{RR}$ ,  $t_A$  AND  $t_B$**

**6**

**ULTRAFAST  
DUAL DIODES**

Typical Performance Curves

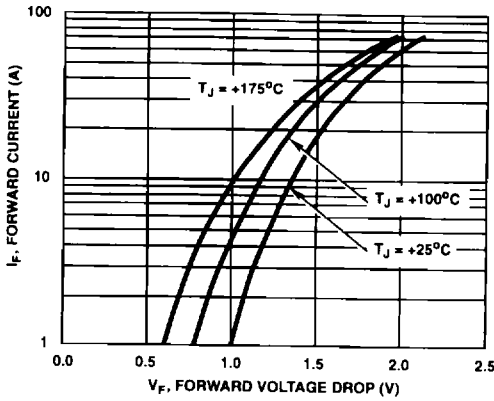


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

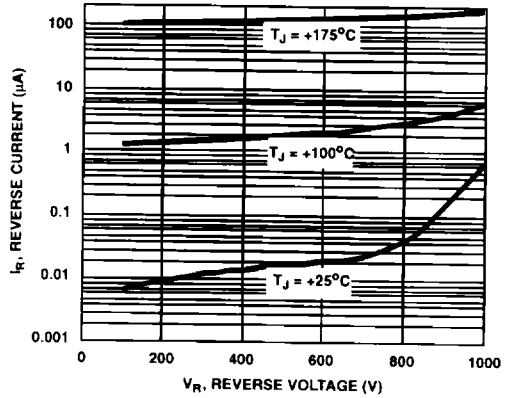


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

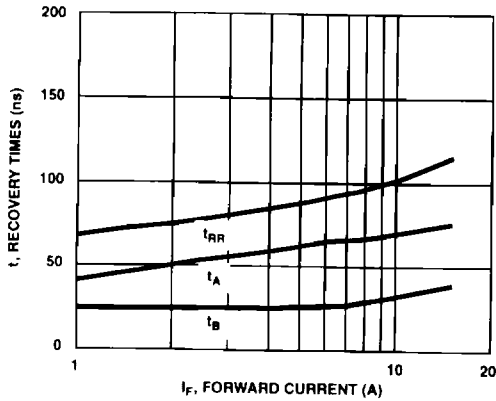


FIGURE 5. TYPICAL  $t_{RR}$ ,  $t_A$  AND  $t_B$  CURVES vs FORWARD CURRENT

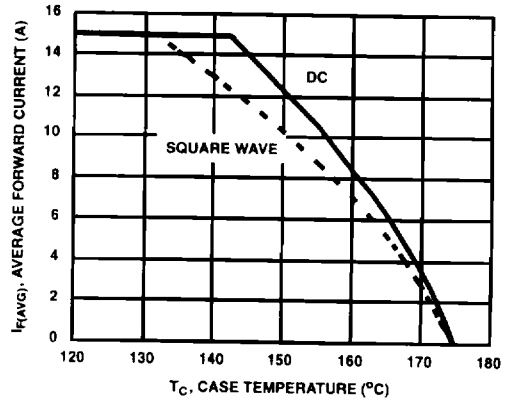


FIGURE 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

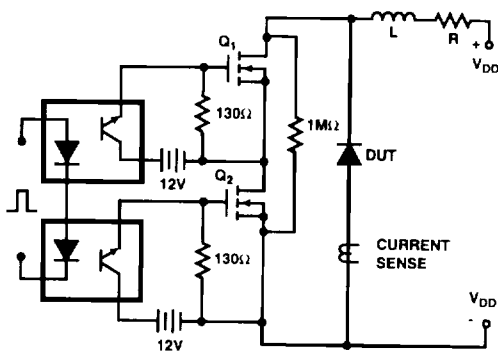


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

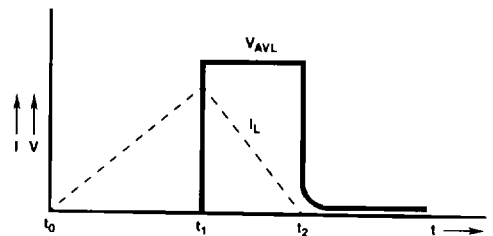


FIGURE 8. CURRENT VOLTAGE WAVEFORM

$$I_{L\text{peak}} = 1\text{A}, L = 40\text{mH}, R < 0.1\Omega, E_{AVL} = \left(\frac{1}{2}\right) L I^2 \left[\frac{V_{AVL}}{(V_{AVL} - V_{DD})}\right]$$

Q1 AND Q2 ARE 1000V MOSFETS