RURP640CC, RURP650CC, RURP660CC

HARRIS SEMICONDUCTOR

April 1995

6A, 400V - 600V Ultrafast Dual Diodes

Features

- **Ultrafast with Soft Recovery . . . . <55ns**
- **Operating Temperature . . . . +175°C**
- **Reverse Voltage Up To 600V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

- **Switching Power Supplies**
- **Power Switching Circuits**
- **General Purpose**

Description

The RURP640CC, RURP650CC, and RURP660CC are ultrafast dual diodes with soft recovery characteristics (t_{RR} < 55ns). 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.

PACKAGE AVAILABILITY

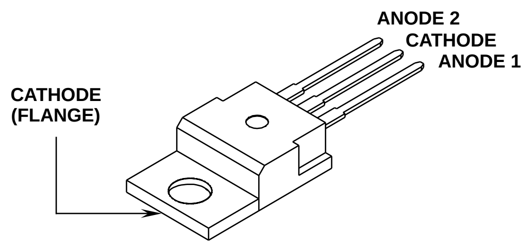
PART NUMBER	PACKAGE	BRAND
RURP640CC	TO-220AB	RURP640C
RURP650CC	TO-220AB	RURP650C
RURP660CC	TO-220AB	RURP660C

NOTE: When ordering, use the entire part number.

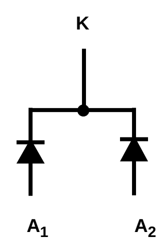
Formerly developmental type TA49038.

Package

JEDEC TO-220AB



Symbol



Absolute Maximum Ratings (per leg) T_C = +25°C, Unless Otherwise Specified

		RURP640CC	RURP650CC	RURP660CC	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	400	500	600	V
Working Peak Reverse Voltage	V_{RWM}	400	500	600	V
DC Blocking Voltage	V_R	400	500	600	V
Average Rectified Forward Current (T_C = +155°C)	$I_{F(AV)}$	6	6	6	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	12	12	12	A
Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz)	I_{FSM}	60	60	60	A
Maximum Power Dissipation	P_D	50	50	50	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	10	10	10	mJ
Operating and Storage Temperature	T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	°C

Electrical Specifications (per leg) $T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	LIMITS									UNITS
		RURP640CC			RURP650CC			RURP660CC			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 6A$, $T_C = +25^oC$	-	-	1.5	-	-	1.5	-	-	1.5	V
	$I_F = 6A$, $T_C = +150^oC$	-	-	1.2	-	-	1.2	-	-	1.2	V
I_R	$V_R = 400V$, $T_C = +25^oC$	-	-	100	-	-	-	-	-	-	µA
	$V_R = 500V$, $T_C = +25^oC$	-	-	-	-	-	100	-	-	-	µA
	$V_R = 600V$, $T_C = +25^oC$	-	-	-	-	-	-	-	-	100	µA
I_R	$V_R = 400V$, $T_C = +150^oC$	-	-	500	-	-	-	-	-	-	µA
	$V_R = 500V$, $T_C = +150^oC$	-	-	-	-	-	500	-	-	-	µA
	$V_R = 600V$, $T_C = +150^oC$	-	-	-	-	-	-	-	-	500	µA
t_{RR}	$I_F = 1A$, $dI_F/dt = 200A/µs$	-	-	55	-	-	55	-	-	55	ns
	$I_F = 6A$, $dI_F/dt = 200A/µs$	-	-	60	-	-	60	-	-	60	ns
t_A	$I_F = 6A$, $dI_F/dt = 200A/µs$	-	28	-	-	28	-	-	28	-	ns
t_B	$I_F = 6A$, $dI_F/dt = 200A/µs$	-	16	-	-	16	-	-	16	-	ns
Q_{RR}	$I_F = 6A$, $dI_F/dt = 200A/µs$	-	150	-	-	150	-	-	150	-	nC
C_J	$V_R = 10V$, $I_F = 0A$	-	25	-	-	25	-	-	25	-	pF
$R_{\theta JC}$		-	-	3	-	-	3	-	-	3	$^oC/W$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, 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).
Q_{RR} = Reverse recovery charge.
C_J = Junction Capacitance.
$R_{\theta JC}$ = Thermal resistance junction to case.
E_{AVL} = Controlled avalanche energy. (See Figures 10 and 11).
pw = pulse width.
D = duty cycle.

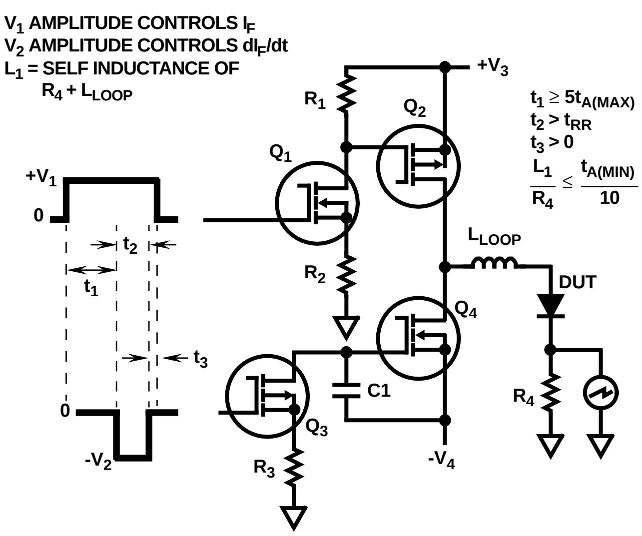


FIGURE 1. t_{RR} TEST CIRCUIT

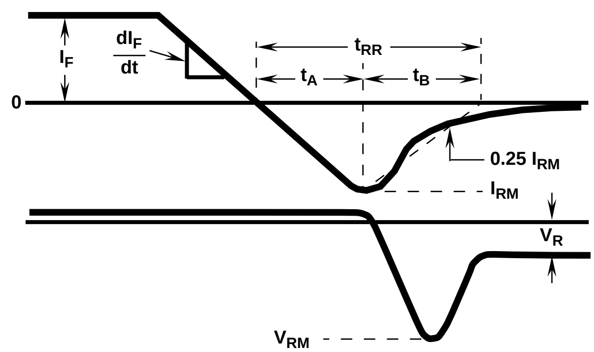


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

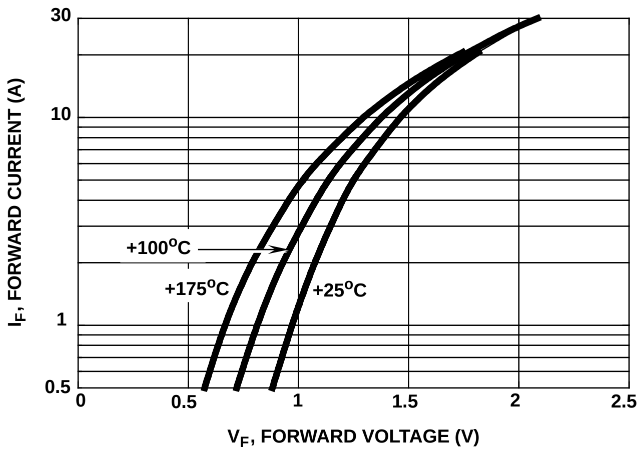


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

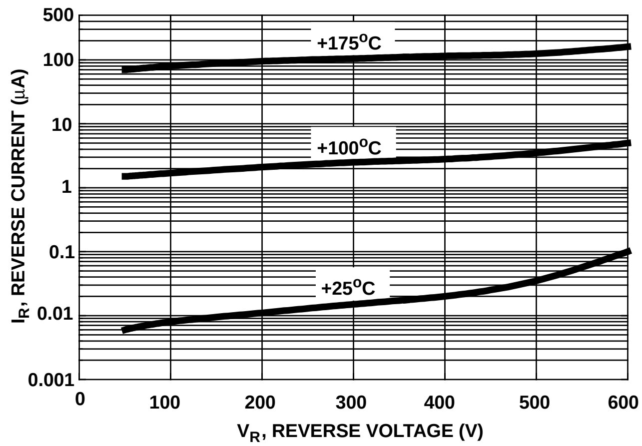


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

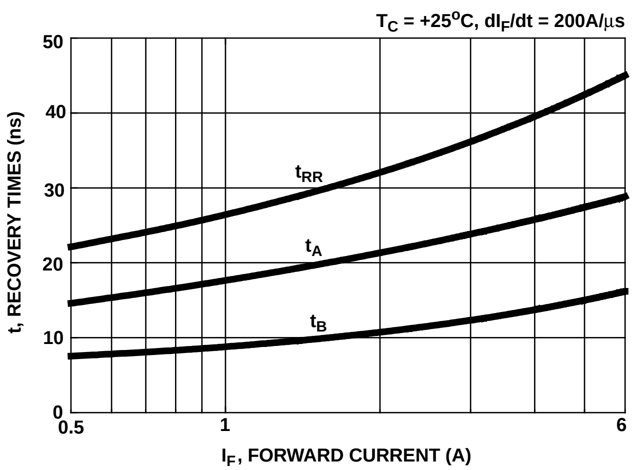


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +25°C

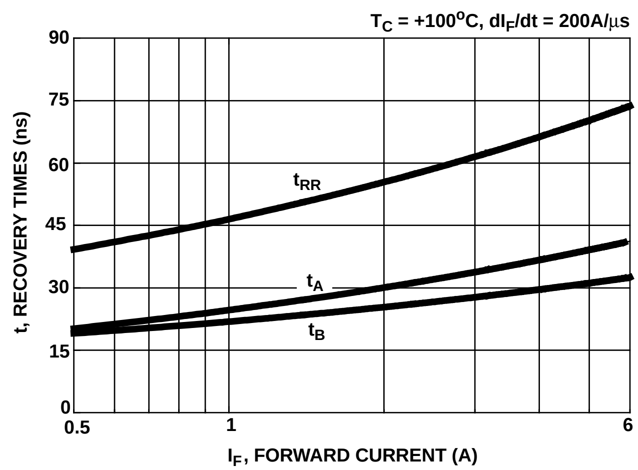


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +100°C

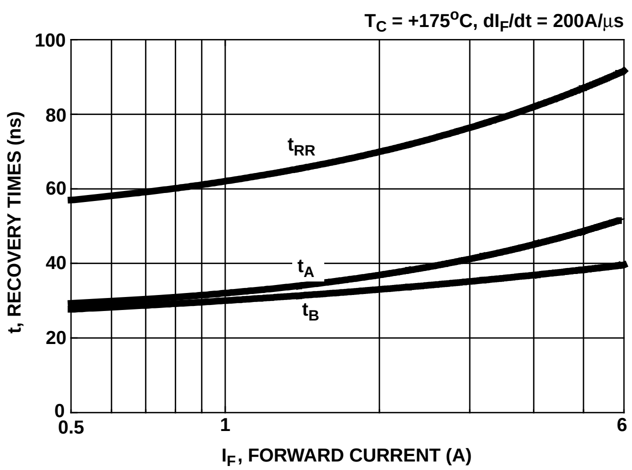


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT +175°C

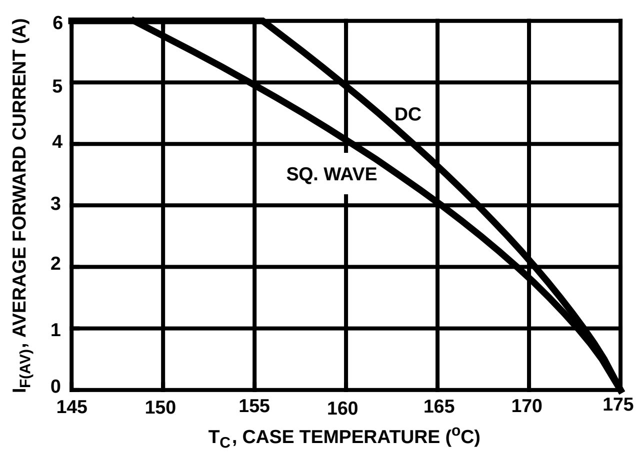


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

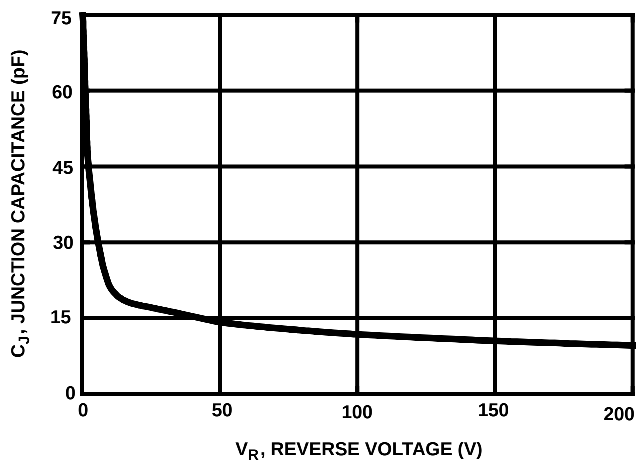


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveforms

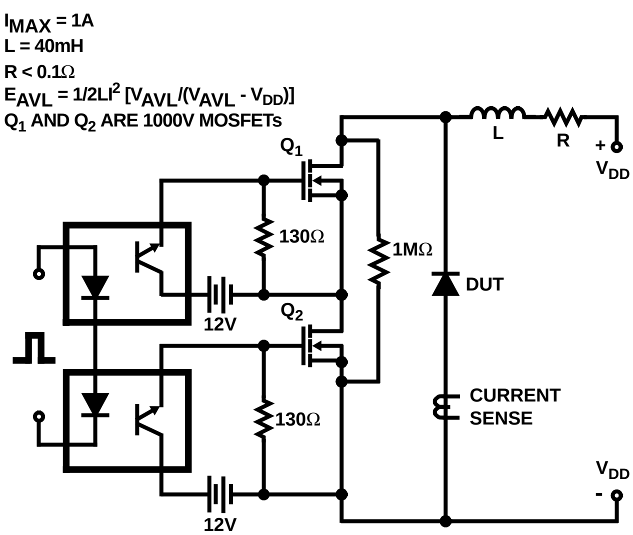


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

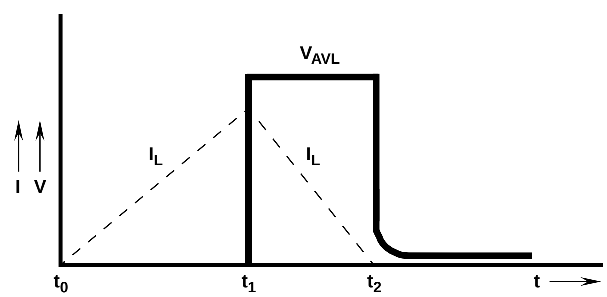


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS