RURD440, RURD450, RURD460, RURD440S, RURD450S, RURD460S

April 1995

4A, 400V - 600V Ultrafast Diodes

Features

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

Applications

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

Description

RURD440, RURD450, RURD460, RURD440S, RURD450S and RURD460S (TA49035) are ultrafast 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.

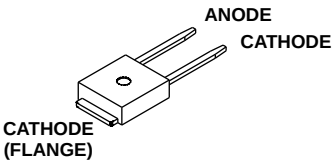
PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURD440	TO-251	RUR440
RURD450	TO-251	RUR450
RURD460	TO-251	RUR460
RURD440S	TO-252	RUR440
RURD450S	TO-252	RUR450
RURD460S	TO-252	RUR460

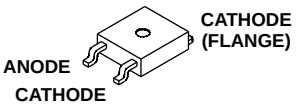
NOTE: When ordering, use the entire part number.

Package

JEDEC STYLE TO-251



JEDEC STYLE TO-252



Symbol

Absolute Maximum Ratings

T_C = +25^{o}C, Unless Otherwise Specified

	RURD440 RURD440S	RURD450 RURD450S	RURD460 RURD460S	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 = +160^{o}C) . . . . . $I_{F(AV)}$	4	4	4	A
Repetitive Peak Surge Current (Square Wave, 20kHz) . . . . . I_{FSM}	8	8	8	A
Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz) . . . . . I_{FSM}	40	40	40	A
Maximum Power Dissipation . . . . . P_D	50	50	50	W
Avalanche Energy (L = 40mH) . . . . . E_{AVL}	10	10	10	mj
Operating and Storage Temperature . . . . . T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	^{o}C

File Number **3140.2**

Electrical Specifications $T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	LIMITS									UNITS
		RURD440, RURD440S			RURD450, RURD450S			RURD460, RURD460S			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 4A, T_C = +25^oC$	-	-	1.5	-	-	1.5	-	-	1.5	V
V_F	$I_F = 4A, T_C = +150^oC$	-	-	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}	$I_F = 1A, dI_F/dt = 100A/µs$	-	-	55	-	-	55	-	-	55	ns
	$I_F = 4A, dI_F/dt = 100A/µs$	-	-	60	-	-	60	-	-	60	ns
t_A	$I_F = 4A, dI_F/dt = 100A/µs$	-	32	-	-	32	-	-	32	-	ns
t_B	$I_F = 4A, dI_F/dt = 100A/µs$	-	15	-	-	15	-	-	15	-	ns
Q_{RR}	$I_F = 4A, dI_F/dt = 100A/µs$	-	50	-	-	50	-	-	50	-	nC
C_J	$V_R = 10V, I_F = 0A$	-	15	-	-	15	-	-	15	-	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).

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

E_{AVL} = Controlled avalanche energy (See Figures 9 and 10).

pw = pulse width.

D = duty cycle.

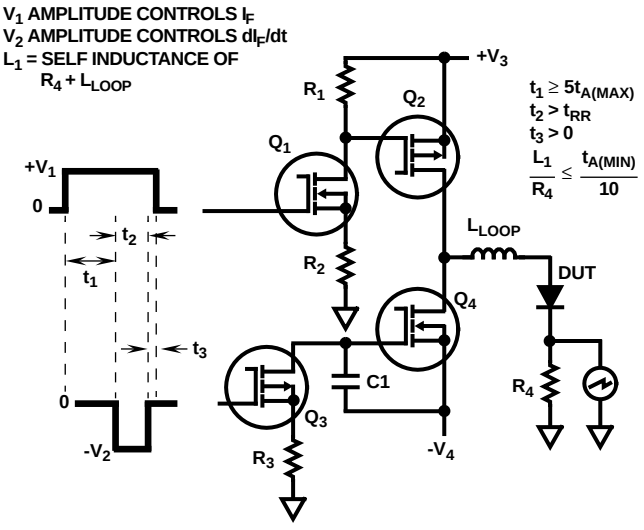


FIGURE 1. t_{RR} TEST CIRCUIT

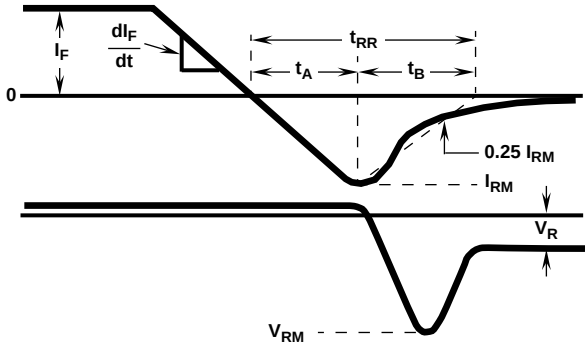


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

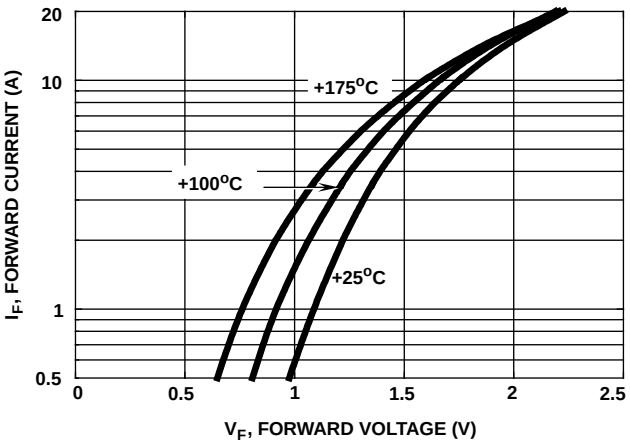


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

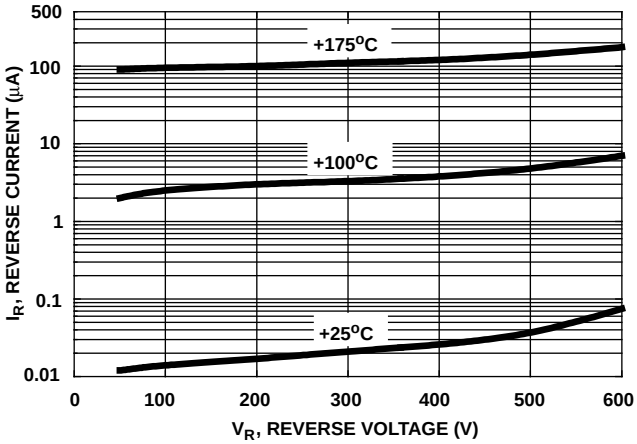


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

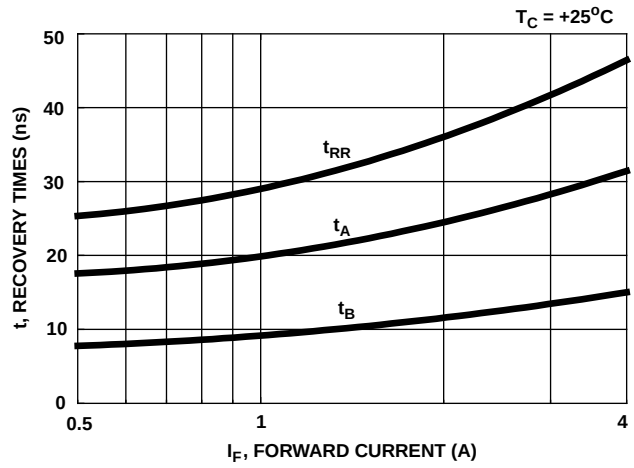


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

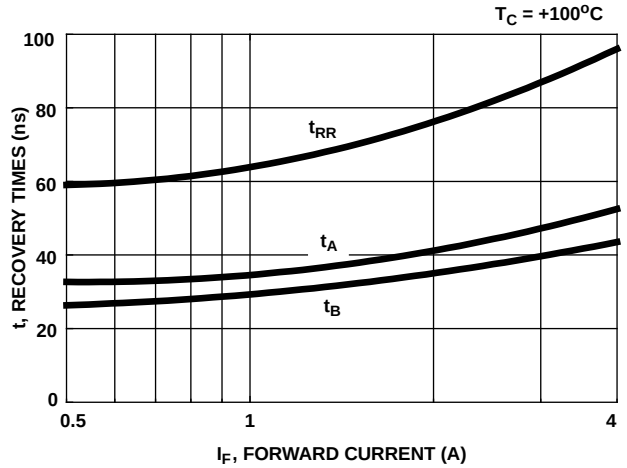


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

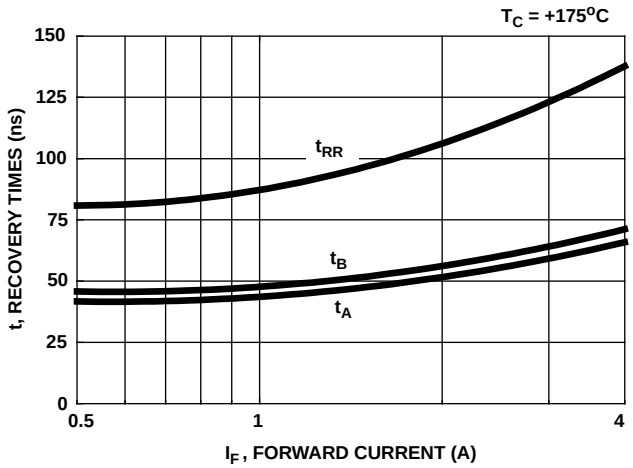


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

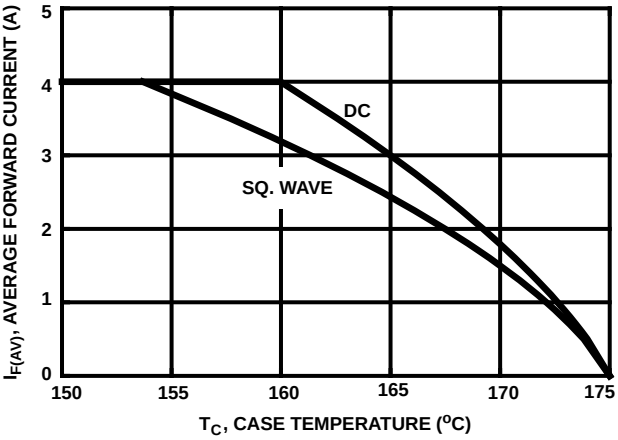


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

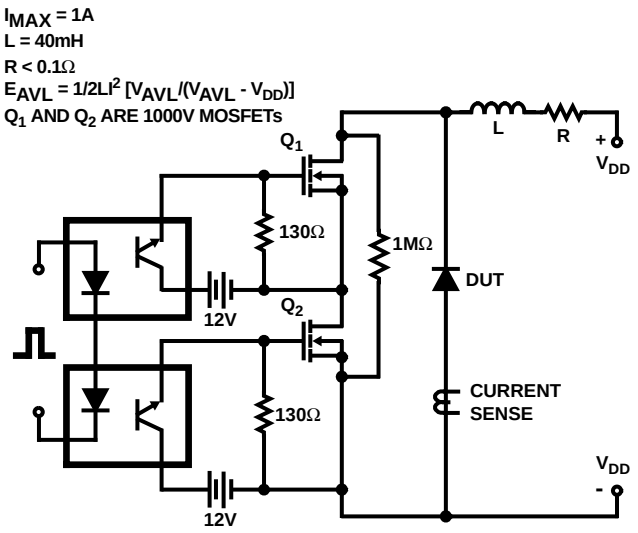


FIGURE 9. AVALANCHE ENERGY TEST CIRCUIT

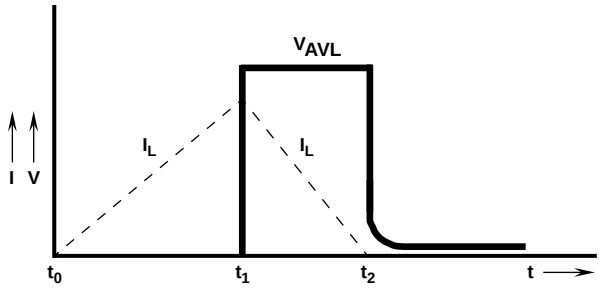


FIGURE 10. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS