RURG3040, RURG3050, RURG3060

30A, 400V - 600V Ultrafast 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

RURG3040, RURG3050 and RURG3060 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.
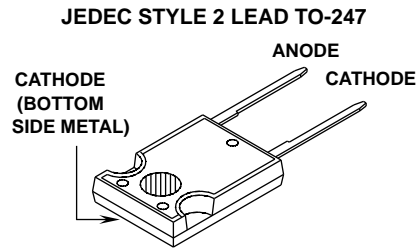
These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

PACKAGING AVAILABILITY

PART NUMBER	PACKAGE	BRAND
RURG3040	TO-247	RURG3040
RURG3050	TO-247	RURG3050
RURG3060	TO-247	RURG3060

NOTE: When ordering, use the entire part number

Package

JEDEC STYLE 2 LEAD TO-247

Symbol

Absolute Maximum Ratings T_C = +25°C, Unless Otherwise Specified

	RURG3040	RURG3050	RURG3060	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 . . . . $I_{F(AV)}$ (T_C = +145°C)	30	30	30	A
Repetitive Peak Surge Current. . . . . I_{FSM} (Square Wave, 20kHz)	70	70	70	A
Nonrepetitive Peak Surge Current . . . . I_{FSM} (Halfwave, 1 Phase, 60Hz)	325	325	325	A
Maximum Power Dissipation . . . . P_D	125	125	125	W
Avalanche Energy (L = 40mH) . . . . E_{AVL}	20	20	20	mj
Operating and Storage Temperature . . . . T_{STG}, T_J	-65 to +175	-65 to +175	-65 to +175	°C

Electrical Specifications T_C = +25°C, Unless Otherwise Specified

		LIMITS									
		RURG3040			RURG3050			RURG3060			
SYMBOL	TEST CONDITION	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	UNITS
V_F	I_F = 30A, T_C = +25°C	-	-	1.5	-	-	1.5	-	-	1.5	V
V_F	I_F = 30A, T_C = +150°C	-	-	1.3	-	-	1.3	-	-	1.3	V
I_R	V_R = 400V, T_C = +25°C	-	-	500	-	-	-	-	-	-	μA
	V_R = 500V, T_C = +25°C	-	-	-	-	-	500	-	-	-	μA
	V_R = 600V, T_C = +25°C	-	-	-	-	-	-	-	-	500	μA
I_R	V_R = 400V, T_C = +150°C	-	-	1	-	-	-	-	-	-	mA
	V_R = 500V, T_C = +150°C	-	-	-	-	-	1	-	-	-	mA
	V_R = 600V, T_C = +150°C	-	-	-	-	-	-	-	-	1	mA
t_{RR}	I_F = 1A, dI_F/dt = 100A/μs	-	-	55	-	-	55	-	-	55	ns
	I_F = 30A, dI_F/dt = 100A/μs	-	-	60	-	-	60	-	-	60	ns
t_A	I_F = 30A, dI_F/dt= 100A/μs	-	30	-	-	30	-	-	30	-	ns
t_B	I_F = 30A, dI_F/dt = 100A/μs	-	20	-	-	20	-	-	20	-	ns
$R_{\theta JC}$		-	-	1.2	-	-	1.2	-	-	1.2	°C/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 7 and 8).
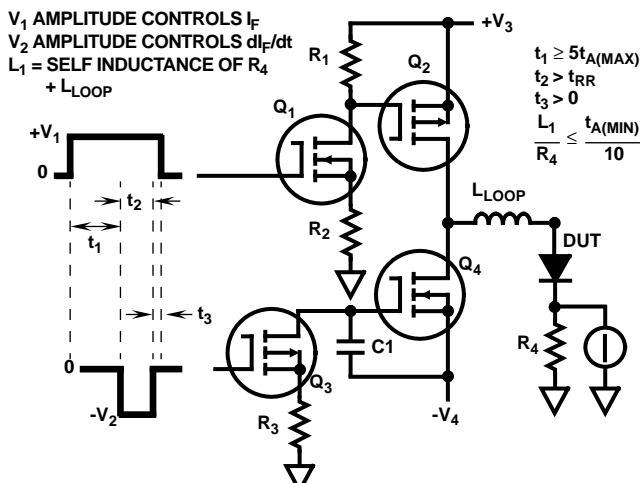
pw = pulse width.

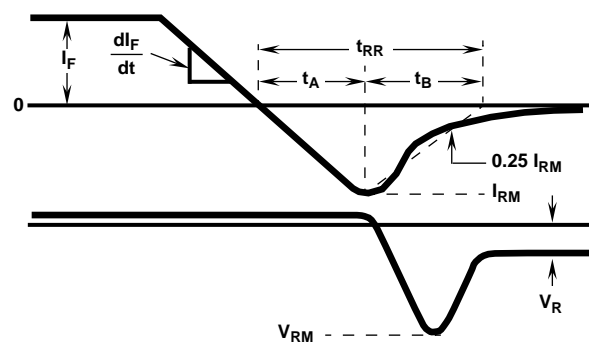D = duty cycle.

FIGURE 1. t_{RR} TEST CIRCUIT

FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS
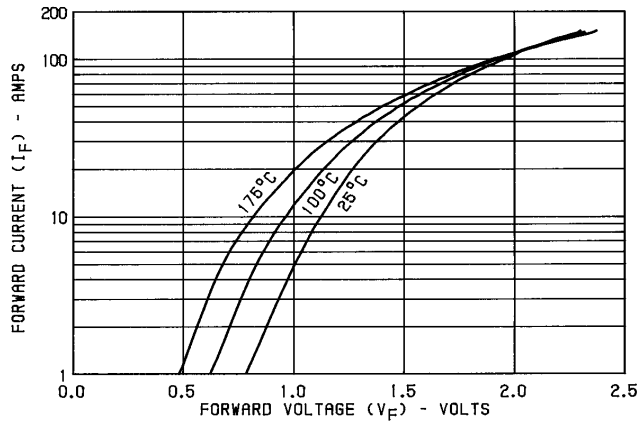
Typical Performance Curves

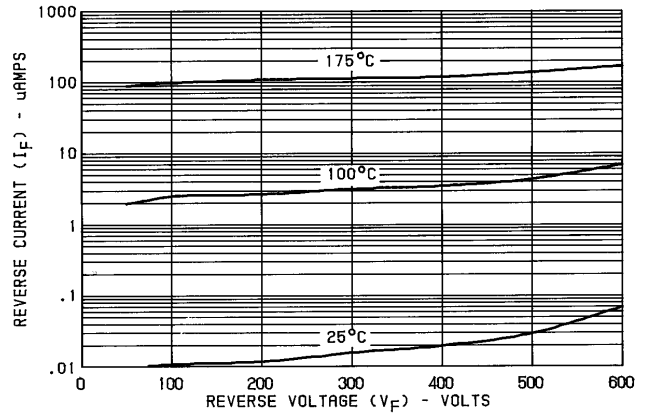FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

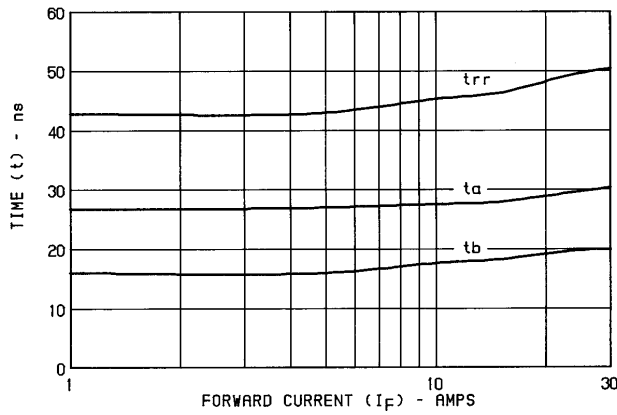FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

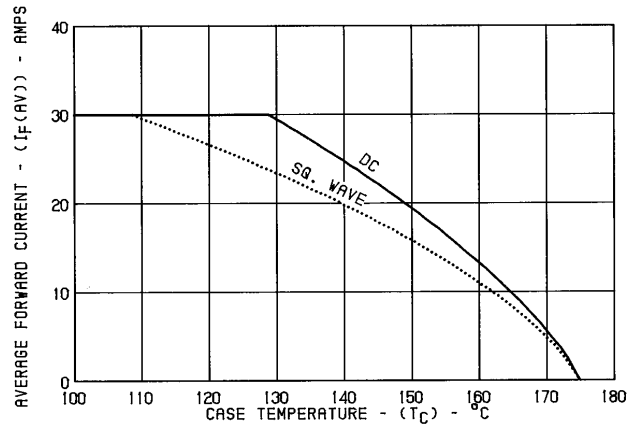FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT

FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

$I_{MAX} = 1A$
$L = 40mH$
$R < 0.1\Omega$
$E_{AVL} = 1/2LI^2[V_{AVL}/(V_{AVL} - V_{DD})]$
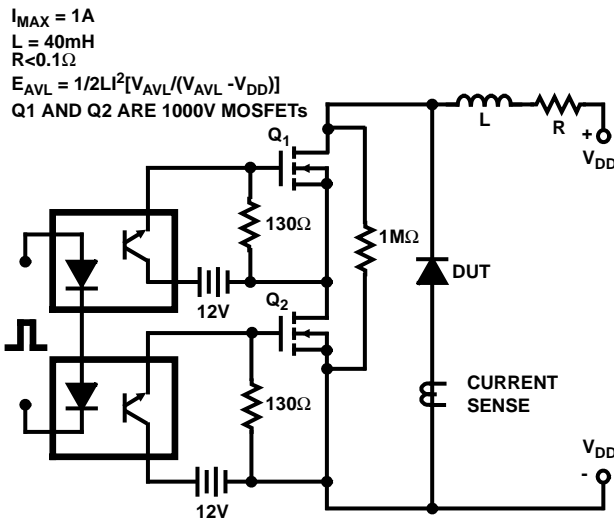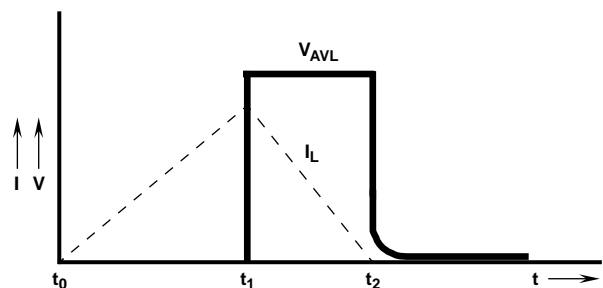Q1 AND Q2 ARE 1000V MOSFETs

FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS