



May 1991

Features

- Ultrafast with Soft Recovery Characteristic ($t_{rr} < 45\text{ns}$)
- +175°C Rated Junction Temperature
- Reverse Voltage Up to 200V
- Avalanche Energy Rated

Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

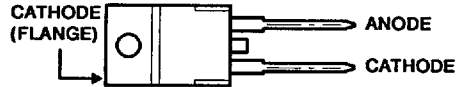
Description

RUR3010, RUR3015, RUR3020 are ultrafast diodes ($t_{rr} < 45\text{ns}$) with soft recovery characteristics ($t_a/t_b \approx 1$). They have a low forward voltage drop and are of planar, silicon nitride passivated, ion-implanted, epitaxial construction.

These devices are intended for use as energy steering/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 characteristics minimizes ringing and electrical noise in many power switching circuits thus reducing power loss in the switching transistor.

All are supplied in TO-220AC packages.

Package

TO-220AC
TOP VIEW

Symbol



Absolute Maximum Ratings ($T_C = +25^\circ\text{C}$)

	RUR3010	RUR3015	RUR3020
Peak Repetitive Reverse Voltage	V_{RRM} 100V	150V	200V
Working Peak Reverse Voltage	V_{RWM} 100V	150V	200V
DC Blocking Voltage	V_R 100V	150V	200V
Average Rectified Forward Current	$I_{F(AV)}$ 30A	30A	30A
(Total device forward current at rated V_R and $T_C = 150^\circ\text{C}$)			
Peak Forward Repetitive Current	I_{FRM} 70A	70A	70A
(Rated V_F , square wave 20kHz)			
Nonrepetitive Peak Surge Current	I_{FSM} 325A	325A	325A
(Surge Applied at rated load condition halfwave 1phase 60Hz)			
Operating and Storage Temperature	T_{STG}, T_J -55°C to +175°C	-55°C to +175°C	-55°C to +175°C

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Electrical Characteristics ($T_C = +25^\circ\text{C}$) Unless Otherwise Specified.

SYMBOL	TEST CONDITION	RUR3010 LIMITS			RUR3015 LIMITS			RUR3020 LIMITS			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 30\text{A}$ $T_C = +150^\circ\text{C}$	-	-	0.85	-	-	0.85	-	-	0.85	V
	$I_F = 30\text{A}$ $T_C = +25^\circ\text{C}$	-	-	1.00	-	-	1.00	-	-	1.00	V
$I_R @$ $T_C = +150^\circ\text{C}$	$V_R = 100\text{V}$	-	-	500	-	-	-	-	-	-	μA
	$V_R = 150\text{V}$	-	-	-	-	-	500	-	-	-	μA
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	500	μA
$I_R @$ $T_C = +25^\circ\text{C}$	$V_R = 100\text{V}$	-	-	30	-	-	-	-	-	-	μA
	$V_R = 150\text{V}$	-	-	-	-	-	30	-	-	-	μA
	$V_R = 200\text{V}$	-	-	-	-	-	-	-	-	30	μA
t_{rr}	$I_F = 1\text{A}$	-	-	45	-	-	45	-	-	45	ns
	$I_F = 30\text{A}$	-	-	50	-	-	50	-	-	50	ns
t_a	$I_F = 1\text{A}$	-	24	-	-	24	-	-	24	-	ns
	$I_F = 30\text{A}$	-	28	-	-	28	-	-	28	-	ns
t_b	$I_F = 1\text{A}$	-	17	-	-	17	-	-	17	-	ns
	$I_F = 30\text{A}$	-	20	-	-	20	-	-	20	-	ns
$R_{\theta jc}$		-	-	1.2	-	-	1.2	-	-	1.2	$^\circ\text{C}/\text{W}$
W_{avl}	see Fig. 7&8	-	-	20	-	-	20	-	-	20	mj

Definitions

V_F = Instantaneous forward voltage ($p_w = 300\mu\text{s}$, $D = 2\%$).

I_R = Instantaneous reverse current ($p_w = 300\mu\text{s}$, $D = 2\%$).

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.

W_{avl} = Controlled avalanche energy (See Figures 7 & 8).

p_w = pulse width.

D = duty cycle.

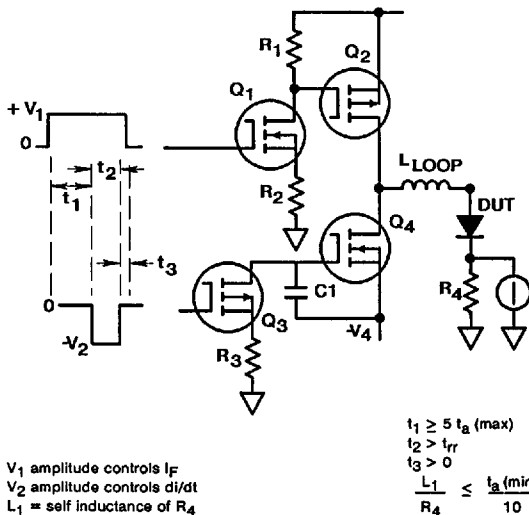


FIGURE 1. t_{rr} TEST CIRCUIT

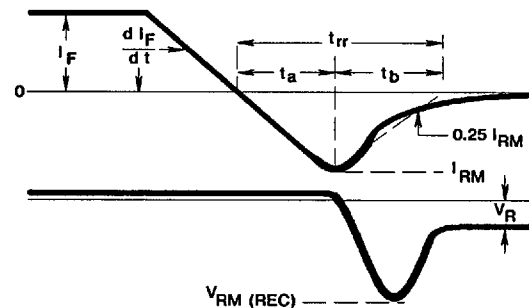


FIGURE 2. DEFINITIONS OF t_{rr} , t_a AND t_b

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 ULTRA-FAST
 RECTIFIERS

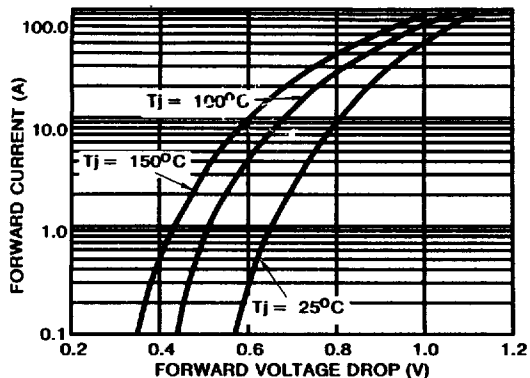


FIGURE 3. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

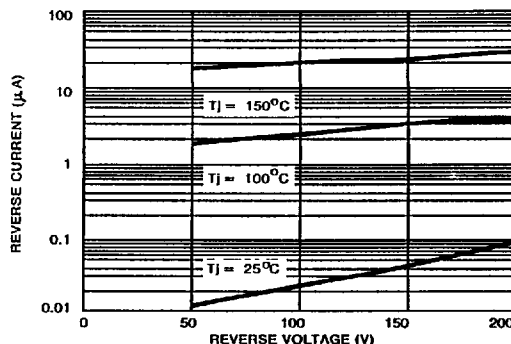


FIGURE 4. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

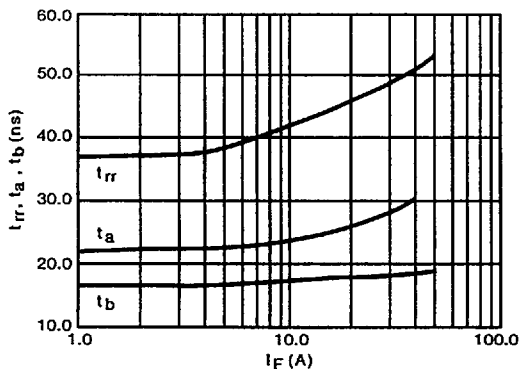


FIGURE 5. TYPICAL t_{rr} , t_a , t_b vs FORWARD CURRENT

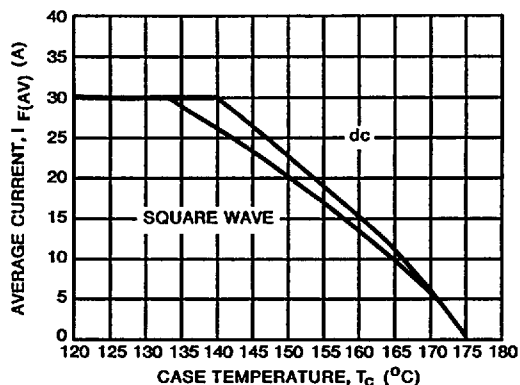


FIGURE 6. TYPICAL CURRENT DERATING CURVE w.r.t. CASE TEMPERATURE

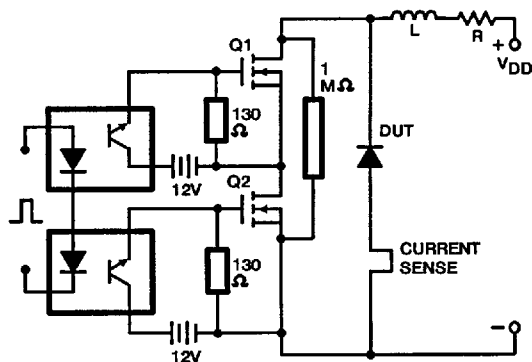


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

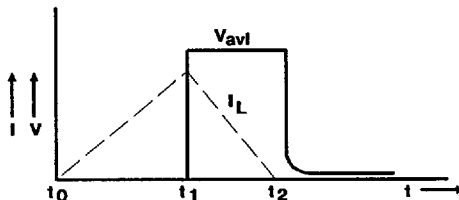


FIGURE 8. CURRENT VOLTAGE WAVEFORM

$$I_{peak} = 1A, L = 40mH, R < 0.1\Omega, W_{avl} = (1/2) LI^2[V_{avl}/(V_{avl}-V_{dd})]$$