

30A, 1000V Ultrafast Diode

The RURP30100 is an ultrafast diode with soft recovery characteristics ($t_{rr} < 110\text{ns}$). It has a low forward voltage drop and is of silicon nitride passivated, ion-implanted, epitaxial construction.

This device is intended for use as a flywheel/clamping diode and rectifier in a variety of switching power supplies and other power switching applications. Its 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.

Formerly developmental type TA09904.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RURP30100	TO-220AC	RUR30100

NOTE: When ordering, use the entire part number.

Symbol



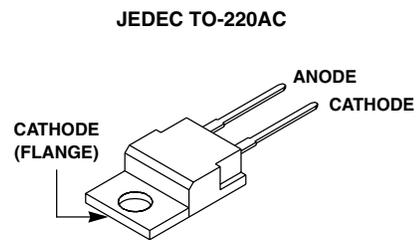
Features

- Ultrafast with Soft Recovery <110ns
- Operating Temperature 175°C
- Reverse Voltage 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

Packaging



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, Unless Otherwise Specified

	RURP30100	UNITS
Peak Repetitive Reverse Voltage V_{RRM}	1000	V
Working Peak Reverse Voltage V_{RWM}	1000	V
DC Blocking Voltage V_R	1000	V
Average Rectified Forward Current $I_F(AV)$ ($T_C = 120^\circ\text{C}$)	30	A
Repetitive Peak Surge Current I_{FRM} (Square Wave 20kHz)	60	A
Nonrepetitive Peak Surge Current I_{FSM} (Halfwave 1 Phase 60Hz)	300	A
Maximum Power Dissipation P_D	125	W
Avalanche Energy (See Figures 7 and 8) E_{AVL}	30	mJ
Operating and Storage Temperature T_{STG}, T_J	-65 to 175	°C

RURP30100

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 30\text{A}$	-	-	1.8	V
	$I_F = 30\text{A}, T_C = 150^\circ\text{C}$	-	-	1.6	V
I_R	$V_R = 1000\text{V}$	-	-	250	μA
	$V_R = 1000\text{V}, T_C = 150^\circ\text{C}$	-	-	1	mA
t_{rr}	$I_F = 1\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	110	ns
	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	-	150	ns
t_a	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	90	-	ns
t_b	$I_F = 30\text{A}, dI_F/dt = 100\text{A}/\mu\text{s}$	-	45	-	ns
$R_{\theta JC}$		-	-	1.2	$^\circ\text{C}/\text{W}$

DEFINITIONS

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

I_R = Instantaneous reverse current.

t_{rr} = Reverse recovery time at $dI_F/dt = 100\text{A}/\mu\text{s}$ (See Figure 6), 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 6).

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 6).

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

p_w = pulse width.

D = duty cycle.

Typical Performance Curves

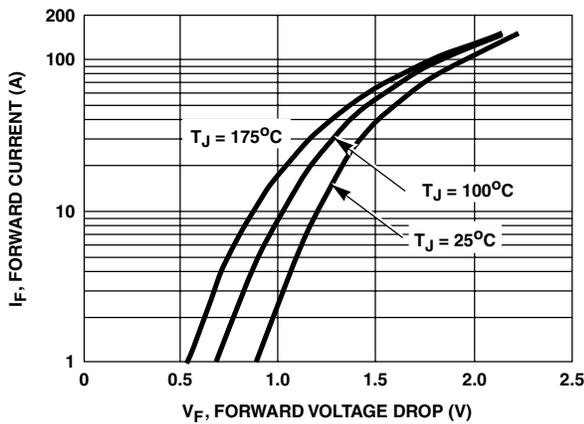


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

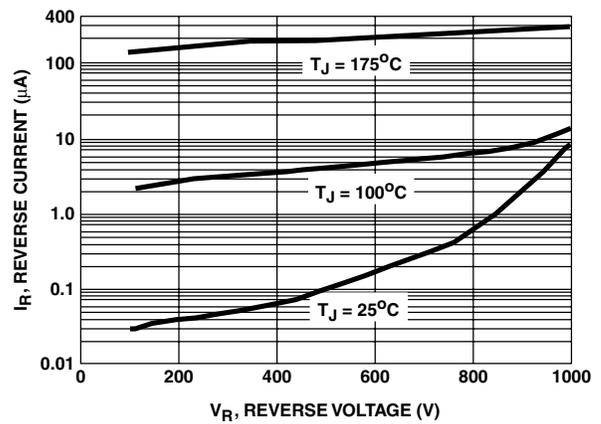


FIGURE 2. REVERSE VOLTAGE vs REVERSE CURRENT

Typical Performance Curves (Continued)

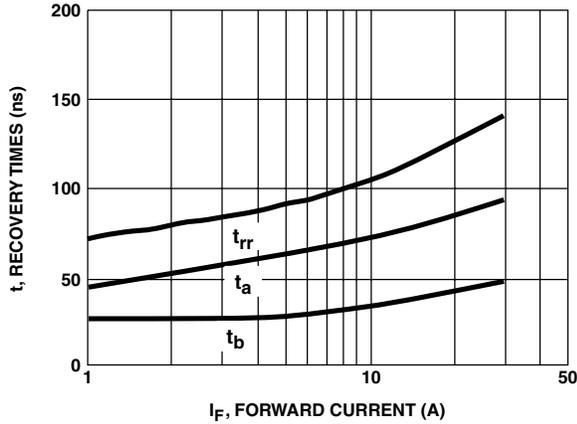


FIGURE 3. t_{rr} , t_a AND t_b CURVES vs FORWARD CURRENT

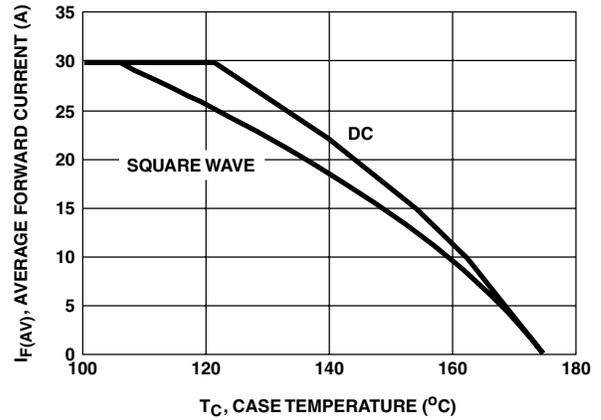


FIGURE 4. CURRENT DERATING CURVE

Test Circuits and Waveforms

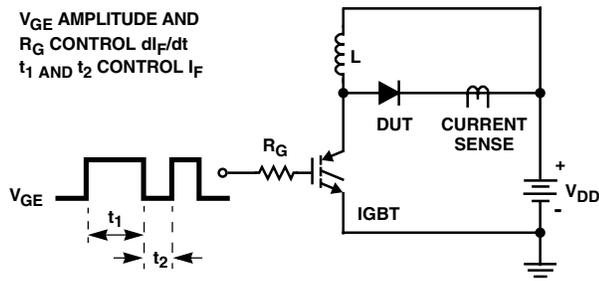


FIGURE 5. t_{rr} TEST CIRCUIT

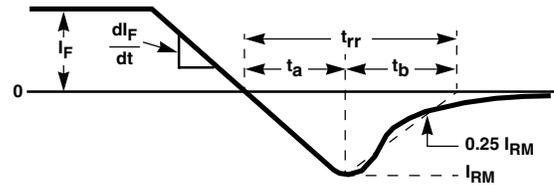


FIGURE 6. t_{rr} WAVEFORMS AND DEFINITIONS

- $I = 1.225A$
- $L = 40mH$
- $R < 0.1\Omega$
- $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$
- $Q_1 = IGBT (BV_{CES} > DUT V_{R(AVL)})$

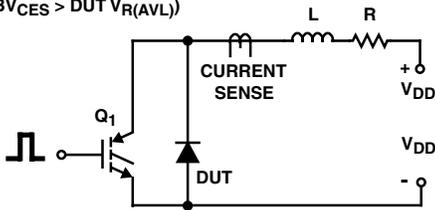


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

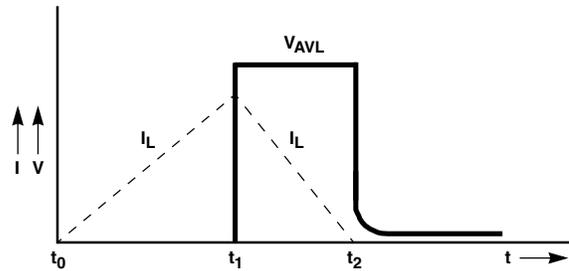


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

TRADEMARKS

The following are registered and unregistered trademarks Fairchild Semiconductor owns or is authorized to use and is not intended to be an exhaustive list of all such trademarks.

ACE _x TM	FAST [®]	PACMAN TM	SuperSOT TM -3
Bottomless TM	FAST _r TM	POP TM	SuperSOT TM -6
CoolFET TM	GlobalOptoisolator TM	PowerTrench [®]	SuperSOT TM -8
CROSSVOLT TM	GTO TM	QFET TM	SyncFET TM
DenseTrench TM	HiSeC TM	QS TM	TinyLogic TM
DOMET TM	ISOPLANAR TM	QT Optoelectronics TM	UHC TM
EcoSPARK TM	LittleFET TM	Quiet Series TM	UltraFET TM
E ² CMOS TM	MicroFET TM	SILENT SWITCHER [®]	VCX TM
EnSigna TM	MICROWIRE TM	SMART START TM	
FACT TM	OPTOLOGIC TM	Star* Power TM	
FACT Quiet Series TM	OPTOPLANAR TM	Stealth TM	

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.