



HARRIS

HARRIS SEMICONDUCTOR

RUR1570/1580, RUR1590/15100

56E D ■ 4302271 0042386 209 ■ HAS

15A Ultrafast Diode

August 1991

With Soft Recovery Characteristic

T-03-17

Features

- Ultrafast with Soft Recovery Characteristic ($t_{rr} < 100ns$)
- +175°C Rated Junction Temperature
- Reverse Voltage Up to 1000V
- Avalanche Energy Rated
- Planar Construction

Applications

- Switching Power Supply
- Power Switching Circuits
- General Purpose

Description

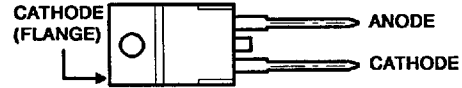
RUR1570, RUR1580, RUR1590, RUR15100 are ultrafast diodes with soft recovery characteristics ($t_{rr} < 100ns$). They have a low forward voltage drop and are silicon nitride passivated, ion-implanted, epitaxial construction.

These devices are intended for use as flywheel/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 ($T_C = +25^\circ C$)

	RUR1570	RUR1580	RUR1590	RUR15100
Peak Repetitive Reverse Voltage..... V_{RRM}	700V	800V	900V	1000V
Working Peak Reverse Voltage..... V_{RWM}	700V	800V	900V	1000V
DC Blocking Voltage..... V_R	700V	800V	900V	1000V
Average Rectified Forward Current..... $I_F(AV)$ ($T_C = +141.25^\circ C$)	15A	15A	15A	15A
Peak Forward Repetitive Current..... I_{FRM} (Square wave 20kHz)	30A	30A	30A	30A
Nonrepetitive Peak Surge Current..... I_{FSM} (Surge applied at rated load condition halfwave 1 phase 60Hz)	200A	200A	200A	200A
Maximum Power Dissipation..... P_D	100W	100W	100W	100W
Operating and Storage Temperature..... T_{STG}, T_J	-65°C to +175°C	-65°C to +175°C	-65°C to +175°C	-65°C to +175°C

12
ULTRA-FAST
RECTIFIERS

Specifications RUR1570, RUR1580, RUR1590, RUR15100

HARRIS SEMICOND SECTOR 56E D 4302271 0042387 145 HAS
 Electrical Characteristics (I_C = +25°C) Unless Otherwise Specified.

T-03-17

SYMBOL	TEST CONDITION	LIMITS											UNITS	
		RUR1570			RUR1580			RUR1590			RUR15100			
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP		MAX
V _F	I _F = 15A T _C = +150°C	-	-	1.50	-	-	1.50	-	-	1.50	-	-	1.50	V
	I _F = 15A T _C = +25°C	-	-	1.80	-	-	1.80	-	-	1.80	-	-	1.80	V
I _R @ T _C = +150°C	V _R = 700V	-	-	500	-	-	-	-	-	-	-	-	-	μA
	V _R = 800V	-	-	-	-	-	500	-	-	-	-	-	-	μA
	V _R = 900V	-	-	-	-	-	-	-	-	500	-	-	-	μA
	V _R = 1000V	-	-	-	-	-	-	-	-	-	-	500	-	μA
I _R @ T _C = +25°C	V _R = 700V	-	-	100	-	-	-	-	-	-	-	-	-	μA
	V _R = 800V	-	-	-	-	-	100	-	-	-	-	-	-	μA
	V _R = 900V	-	-	-	-	-	-	-	-	100	-	-	-	μA
	V _R = 1000V	-	-	-	-	-	-	-	-	-	-	100	-	μA
t _{rr}	I _F = 1A	-	-	100	-	-	100	-	-	100	-	-	100	ns
	I _F = 15A	-	-	125	-	-	125	-	-	125	-	-	125	ns
t _a	I _F = 15A	-	75	-	-	75	-	-	75	-	-	75	-	ns
t _b	I _F = 15A	-	40	-	-	40	-	-	40	-	-	40	-	ns
R _{θJC}		-	-	1.5	-	-	1.5	-	-	1.5	-	-	1.5	°C/W
W _{avl}		-	-	20	-	-	20	-	-	20	-	-	20	mJ

Definitions

V_F = Instantaneous forward voltage (pw = 300μs, D = 2%).

I_R = Instantaneous reverse current (pw = 300μs, D = 2%).

t_{rr} = Reverse recovery time at di/dt = 100A/μs, summation of t_a + t_b.

t_a = Time to reach peak reverse current at di/dt = 100A/μs (See Figure 2).

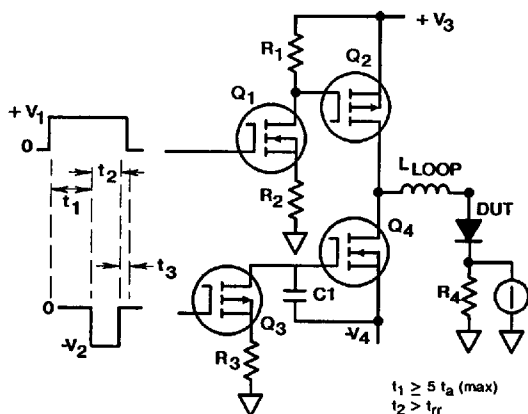
t_b = Time from peak I_{RM} to projected zero crossing of I_{RM} based on a straight line from peak I_{RM} through 25% of I_{RM}. (See Figure 2)

R_{θJC} = Thermal resistance junction to case.

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

pw = pulse width.

D = duty cycle.



V₁ amplitude controls I_F
 V₂ amplitude controls di/dt
 L₁ = self inductance of R₄

$$t_1 \geq 5 t_a \text{ (max)}$$

$$t_2 > t_{rr}$$

$$t_3 > 0$$

$$\frac{L_1}{R_4} \leq \frac{t_a \text{ (min)}}{10}$$

FIGURE 1. t_{rr} TEST CIRCUIT

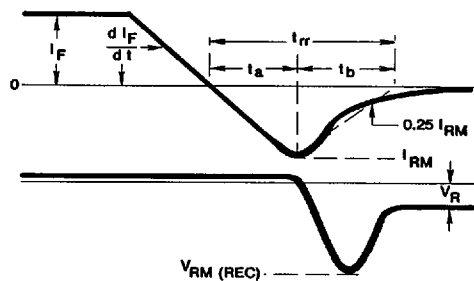


FIGURE 2. DEFINITIONS OF t_{rr}, t_a AND t_b

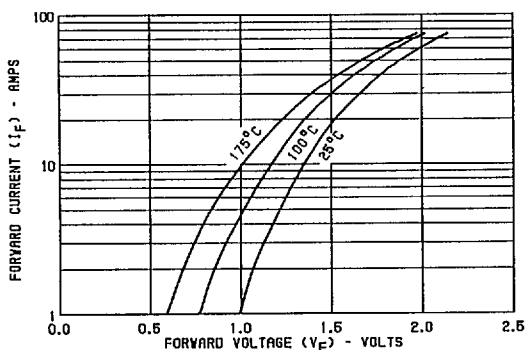


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

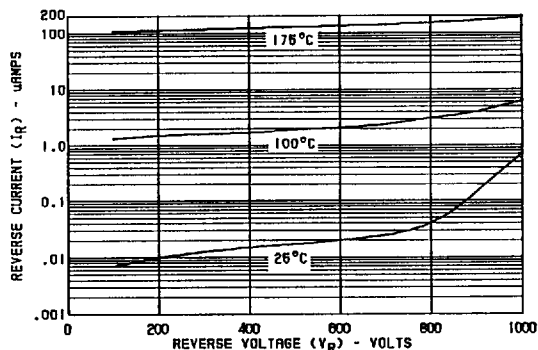


FIGURE 4. TYPICAL REVERSE CURRENT vs VOLTAGE

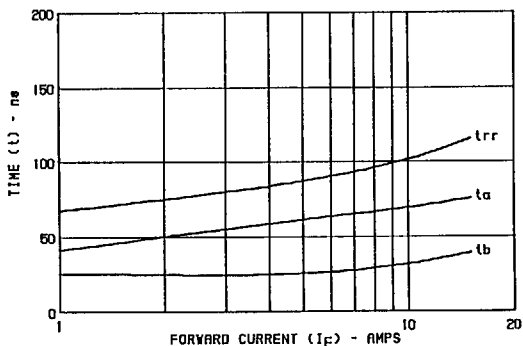


FIGURE 5. TYPICAL t_{tr} , t_a AND t_b CURVES vs FORWARD CURRENT

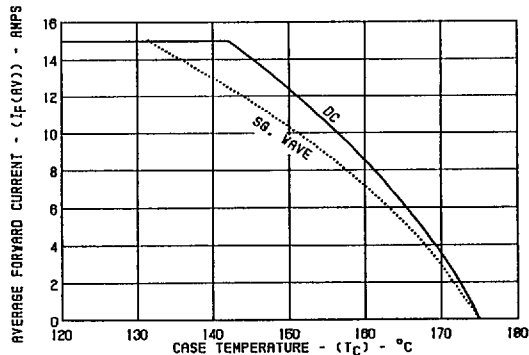


FIGURE 6. CURRENT DERATING CURVE FOR ALL TYPES

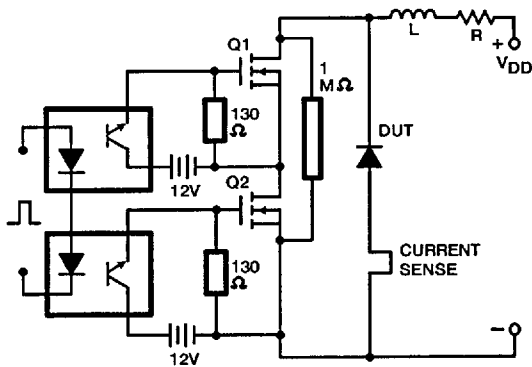


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

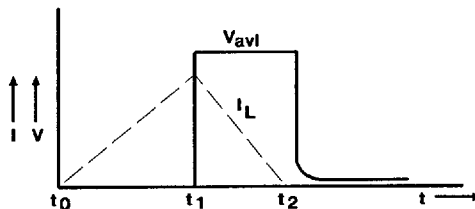


FIGURE 8. AVALANCHE CURRENT & VOLTAGE WAVEFORM

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

Q1 and Q2 are 1000V MOSFETS

ULTRA-FAST RECTIFIERS