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15 A, 600 V, Ultrafast Diode

The RUR1S1560S is an ultrafast diode with low forward voltage drop. This device is intended for use as freewheeling and clamping diodes in a variety of switching power supplies and other power switching applications. It is specially suited for use in switching power supplies and industrial application.

Ordering Information

PART NUMBER	PACKAGE	BRAND
RUR1S1560S	TO-263-3L	RUR1560

NOTE: When ordering, use the entire part number. Add the suffix 9A to obtain the TO-263 variant in tape and reel, i.e. RUR1S1560S9A.

Symbol



Features

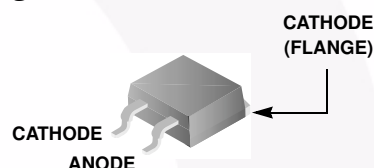
- Ultrafast Recovery $t_{rr} = 60$ ns (@ $I_F = 15$ A)
- Max Forward Voltage, $V_F = 1.5$ V (@ $T_C = 25^\circ\text{C}$)
- 600 V Reverse Voltage and High Reliability
- Avalanche Energy Rated
- RoHS Compliant

Applications

- Switching Power Supplies
- Power Switching Circuits
- General Purpose

Packaging

JEDEC TO-263



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

SYMBOL	PARAMETER	RUR1S1560S	UNIT
V_{RRM}	Peak Repetitive Reverse Voltage	600	V
V_{RWM}	Working Peak Reverse Voltage	600	V
V_R	DC Blocking Voltage	600	V
$I_{F(AV)}$	Average Rectified Forward Current	15	A
I_{FRM}	Repetitive Peak Surge Current (20 kHz Square Wave)	30	A
I_{FSM}	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60 Hz)	200	A
P_D	Power Dissipation	100	W
E_{AVL}	Avalanche Energy (1 A, 40 mH)	20	mJ
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$
T_{pkg}	Leads at 0.063 in (1.6 mm) from Case for 10 s Package Body for 10s, See Techbrief TB334	260	$^\circ\text{C}$
THERMAL SPECIFICATIONS			
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.5	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	60	$^\circ\text{C/W}$

NOTES:

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

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

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
V_F	$I_F = 15\text{ A}$	-	-	1.5	V
	$I_F = 15\text{ A}$, $T_C = 150^\circ\text{C}$	-	-	1.2	V
I_R	$V_R = 600\text{ V}$	-	-	100	μA
	$V_R = 600\text{ V}$, $T_C = 150^\circ\text{C}$	-	-	500	μA
t_{rr}	$I_F = 1\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	-	55	ns
	$I_F = 15\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	-	60	ns
t_a	$I_F = 1\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	20	-	ns
	$I_F = 15\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	30	-	ns
t_b	$I_F = 1\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	15	-	ns
	$I_F = 15\text{ A}$, $dI_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	17	-	ns

DEFINITIONS

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

I_R = Instantaneous reverse current.

T_{rr} = Reverse recovery time (See Figure 9), summation of $t_a + t_b$.

t_a = Time to reach peak reverse current (See Figure 9).

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 9).

p_w = pulse width.

D = duty cycle.



Typical Performance Curves

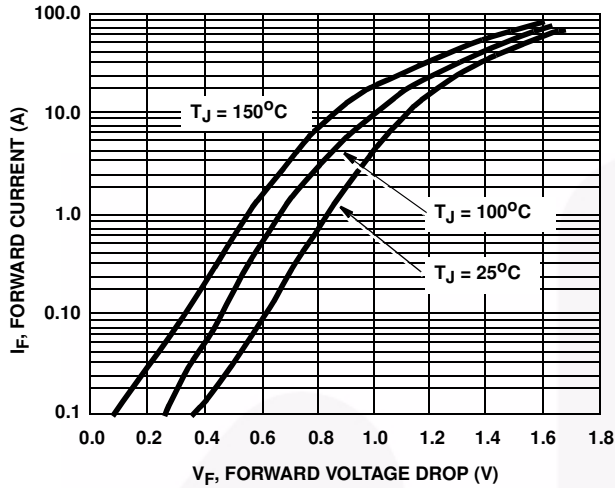


FIGURE 1. FORWARD VOLTAGE vs FORWARD CURRENT CHARACTERISTIC

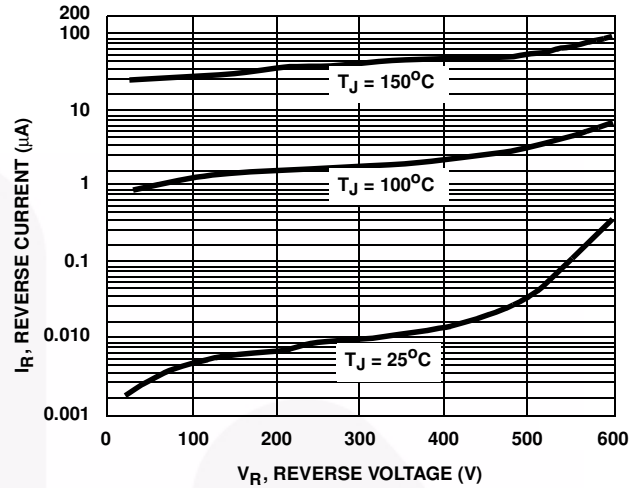


FIGURE 2. REVERSE VOLTAGE vs REVERSE CURRENT CHARACTERISTIC

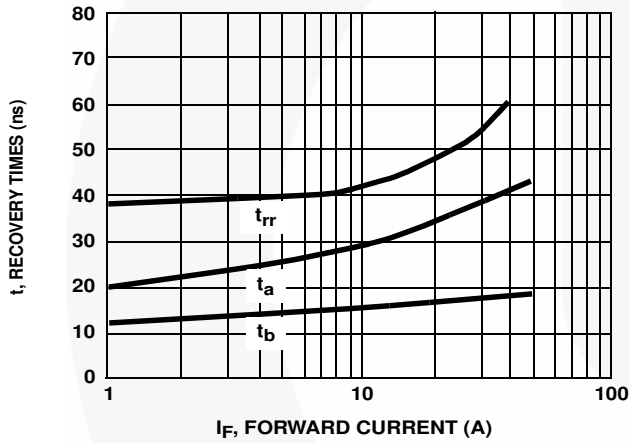


FIGURE 3. 5. TYPICAL t_{RR} , t_A AND t_B CURVES vs FORWARD CURRENT

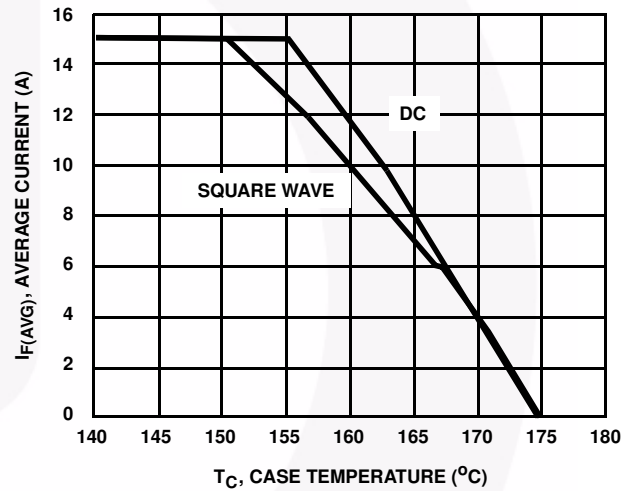


FIGURE 4. 6. TYPICAL CURRENT DERATING CURVE vs CASE TEMPERATURE

Test Circuits and Waveforms

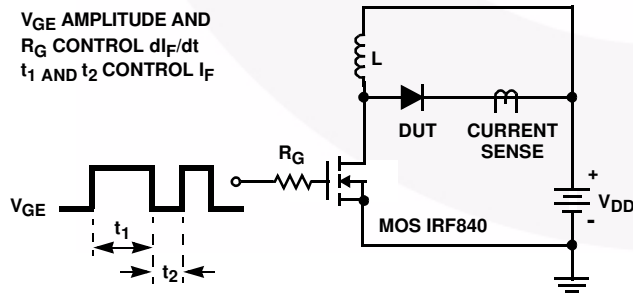


FIGURE 5. t_{rr} TEST CIRCUIT

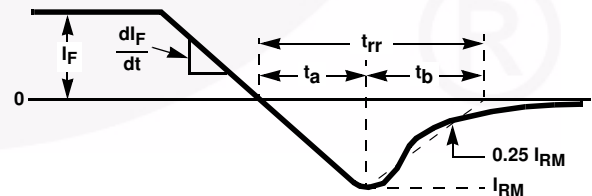


FIGURE 6. t_{rr} WAVEFORMS AND DEFINITIONS

Test Circuits and Waveforms (Continued)

$I = 1\text{A}$

$L = 40\text{mH}$

$R < 0.1\Omega$

$V_{DD} = 50\text{V}$

$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$

$Q_1 = \text{IGBT (}BV_{CES} > \text{DUT } V_{R(AVL)}\text{)}$

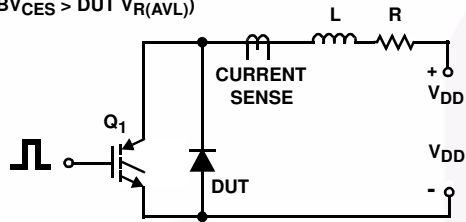


FIGURE 7. AVALANCHE ENERGY TEST CIRCUIT

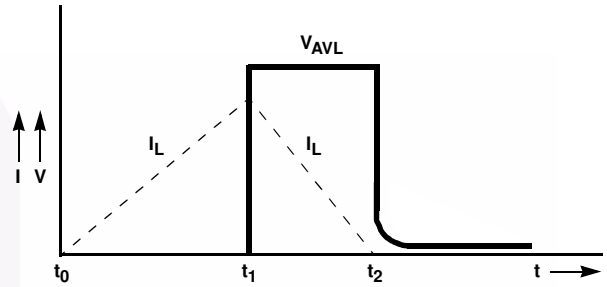


FIGURE 8. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Mechanical Dimensions

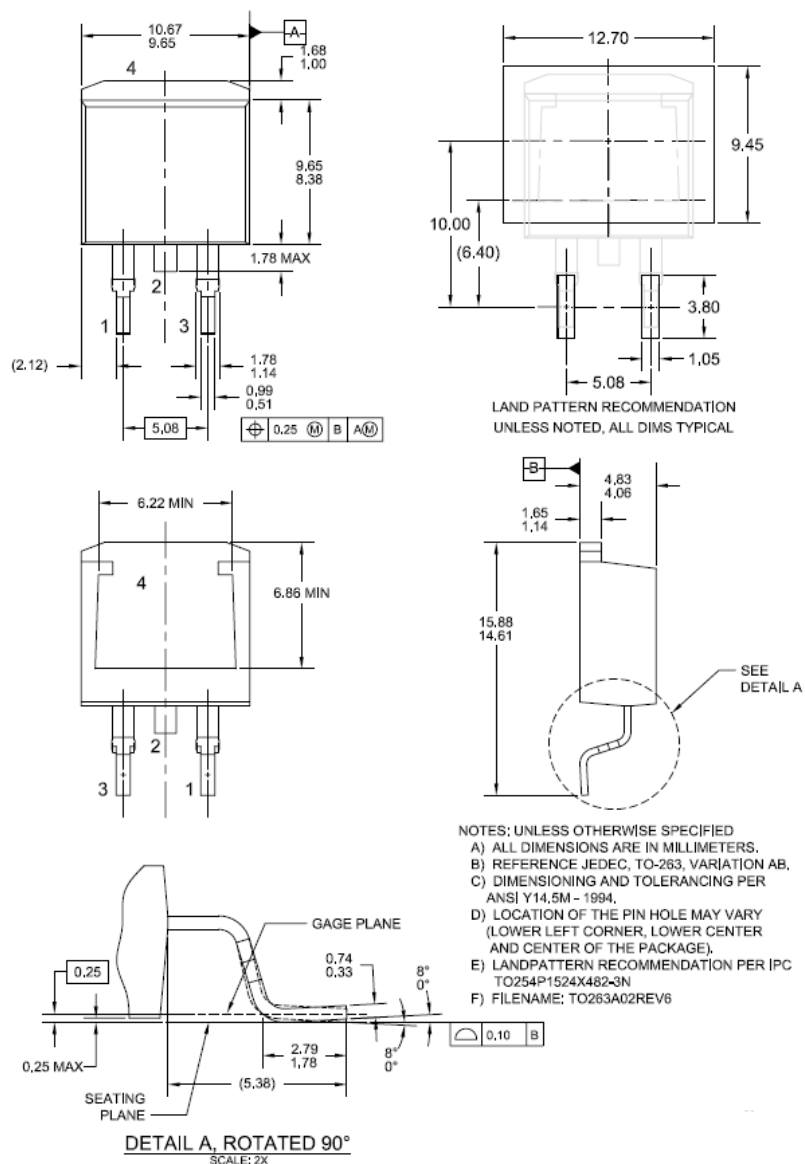


Figure 9. TO-263 2L (D²-PAK) - 2LD, TO263, SURFACE MOUNT



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