

November 2013

ISL9R3060G2, ISL9R3060P2 30 A, 600 V, STEALTHTM Diode

Features

- Stealth Recovery t_{rr} = 36ns (@ I_F = 30 A)
- Max Forward Voltage, V_F = 2.4 V (@ T_C = 25°C)
- 600 V Reverse Voltage and High Reliability
- · Avalanche Energy Rated
- RoHS Compliant

Applications

- SMPS
- · Hard Switched PFC Boost Diode
- · UPS Free Wheeling Diode
- · Motor Drive FWD
- SMPS FWD
- Snubber Diode

Description

The ISL9R3060G2, ISL9R3060P2 is a STEALTHTM diode optimized for low loss performance in high frequency hard switched applications. The STEALTHTM family exhibits low reverse recovery current (I_{rr}) and exceptionally soft recovery under typical operating conditions. This device is intended for use as a free wheeling or boost diode in power supplies and other power switching applications. The low I_{rr} and short ta phase reduce loss in switching transistors. The soft recovery minimizes ringing, expanding the range of conditions under which the diode may be operated without the use of additional snubber circuitry. Consider using the STEALTHTM diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

Package JEDEC STYLE 2 LEAD TO-247-2L ANODE CATHODE (BOTTOM SIDE METAL) CATHODE CATHODE CATHODE CATHODE CATHODE CATHODE ANODE CATHODE ANODE

Device Maximum Ratings T_C= 25°C unless otherwise noted

Symbol	Parameter	Ratings	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	30	Α	
I _{FRM}	Repetitive Peak Surge Current (20kHz Square Wave)	70	Α	
I _{FSM}	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	325	Α	
P_{D}	Power Dissipation	200	W	
E _{AVL}	Avalanche Energy (1A, 40mH)	20	mJ	
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to 175	°C	
T _L	Maximum Temperature for Soldering	300	°C	
T_{PKG}	Leads at 0.063in (1.6mm) from Case for 10s Package Body for 10s, See Techbrief TB334	260	°C	

CAUTION: Stresses above those listed in "Device 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.

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
ISL9R3060G2	ISL9R3060G2	TO-247-2L	Tube	N/A	N/A	30
ISL9R3060P2	ISL9R3060P2	TO-220AC-2L	Tube	N/A	N/A	50

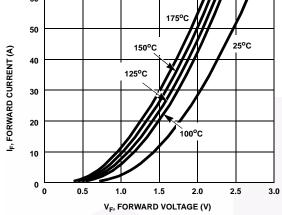
Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Тур	Max	Unit
Off State	Characteristics						
I _R	Instantaneous Reverse Current	V _R = 600 V	$T_C = 25^{\circ}C$	-	-	100	μΑ
N .		, ,	T _C = 125°C	-	-	1.0	m/
On State	Characteristics						
V _F	Instantaneous Forward Voltage	I _F = 30 A	T _C = 25°C	-	2.1	2.4	V
			T _C = 125°C	-	1.7	2.1	V
Dynamic	: Characteristics						
CJ	Junction Capacitance	V _R = 10 V, I _F =	0 A	-	120	_	рF
Switching t _{rr}	g Characteristics Reverse Recovery Time	I _F = 1 A, di _F /dt =	= 100 A/μs, V _R = 30 V	<u> </u>	27	35	ns
٩rr			= 100 A/ μ s, V _R = 30 V	-	36	45	ns
t _{rr}	Reverse Recovery Time	$I_{F} = 30 \text{ A},$ $di_{F}/dt = 200 \text{ A}/\mu\text{s},$ $V_{R} = 390 \text{ V}, T_{C} = 25^{\circ}\text{C}$ $I_{F} = 30 \text{ A},$ $di_{F}/dt = 200 \text{ A}/\mu\text{s},$ $V_{R} = 390 \text{ V},$		-	36	-	ns
I _{rr}	Reverse Recovery Current			-	2.9	-	Α
Q _{rr}	Reverse Recovery Charge			-	55	-	nC
t _{rr}	Reverse Recovery Time			-	110	-	ns
S	Softness Factor (t _b /t _a)			-	1.9	-	
I _{rr}	Reverse Recovery Current			-	6	-	Α
Q _{rr}	Reverse Recovery Charge	T _C = 125°C			450	-	nC
t _{rr}	Reverse Recovery Time			-	60	-	ns
S	Softness Factor (t _b /t _a)			-	1.25	-	
I _{rr}	Reverse Recovery Current			-	21	-	Α
Q _{rr}	Reverse Recovery Charge				730	-	nC
dl _M /dt	Maximum di/dt during t _b				800	_	A/µ

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case		-	-	0.75	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO-247	-	-	30	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO-220	•	-	62	°C/W

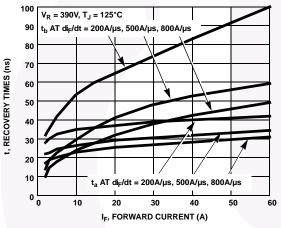
Typical Performance Curves 60 175°C



1000 150°C 150°C 100°C 150°C 100°C 1

Figure 1. Forward Current vs Forward Voltage

Figure 2. Reverse Current vs Reverse Voltage



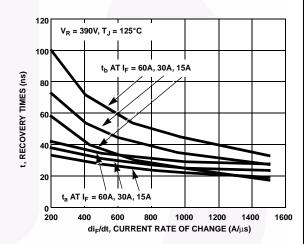
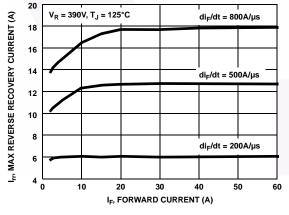


Figure 3. t_a and t_b Curves vs Forward Current

Figure 4. t_a and t_b Curves vs di_F/dt



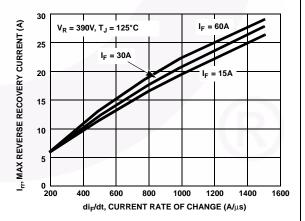
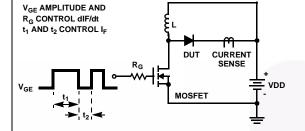


Figure 5. Maximum Reverse Recovery Current vs Forward Current

Figure 6. Maximum Reverse Recovery Current vs di_F/dt

Typical Performance Curves (Continued) 1200 REVERSE RECOVERY SOFTNESS FACTOR $V_R = 390V, T_J = 125^{\circ}C$ $V_R = 390V, T_J = 125^{\circ}C$ I_F = 60A Q_{RR}, REVERSE RECOVERY CHARGE (nC) I_F = 60A $I_F = 30A$ 2.0 I_F = 30A I_F = 15A 1.0 200 200 400 800 1000 1200 1400 200 1000 1200 1400 800 di_F/dt, CURRENT RATE OF CHANGE (A/µs) di_F/dt, CURRENT RATE OF CHANGE (A/μs) Figure 8. Reverse Recovery Charge vs di_F/dt Figure 7. Reverse Recovery Softness Factor vs di_F/dt 90 1000 Average Forward Current, IF(AV) (A) C_J, JUNCTION CAPACITANCE (pF) 60 600 45 400 30 200 15 25 50 75 VR, REVERSE VOLTAGE (V) Case temperature, T_C (o_C) Figure 10. Forward Current Derating Curve Figure 9. Junction Capacitance vs Reverse Voltage DUTY CYCLE - DESCENDING ORDER 0.5 1.0 0.2 0.1 0.05 Z_{0,JA}, NORMALIZED THERMAL IMPEDANCE 0.02 0.01 NOTES: DUTY FACTOR: $D = t_1/t_2$ PEAK $T_J = P_{DM} \times Z_{\theta JA} \times R_{\theta JA} + T_A$ 0.01 10-4 10-3 10-2 10-1 100 101 10-5 t, RECTANGULAR PULSE DURATION (s) Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveforms



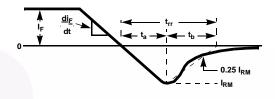
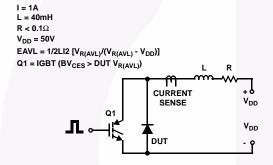


Figure 12. t_{rr} Test Circuit

Figure 13. t_{rr} Waveforms and Definitions



V_{AVL}

Figure 14. Avalanche Energy Test Circuit

Figure 15. Avalanche Current and Voltage Waveforms

Mechanical Dimensions

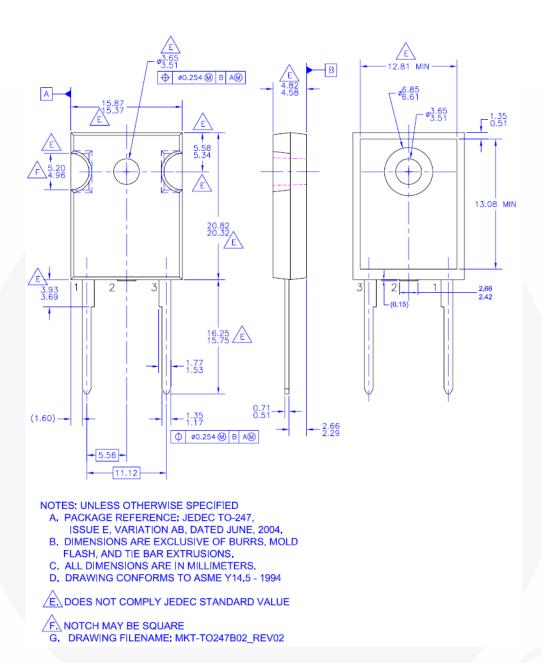


Figure 16. TO-247 2L - TO247, MOLDED, 2LD, JEDEC OPTION AB

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Mechanical Dimensions

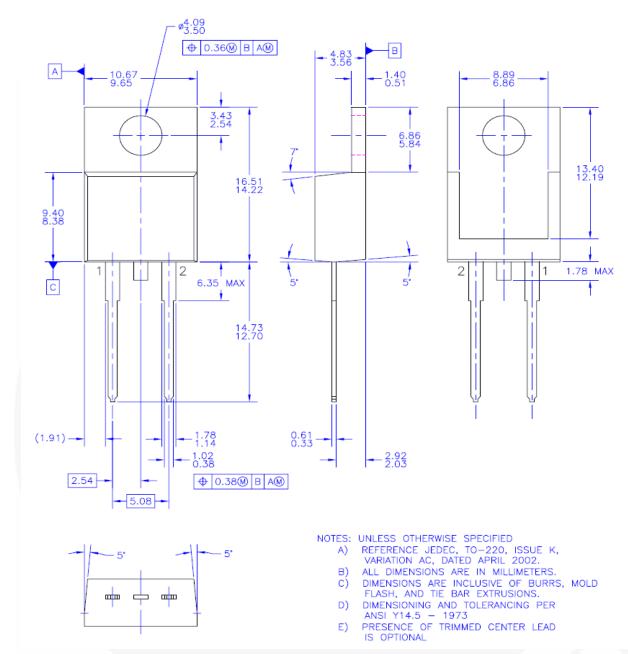


Figure 17. TO-220 2L - 2LD,TO220,JEDEC TO-220 VARIATION AC

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