

ISL9R3060G2, ISL9R3060P2

30A, 600V Stealth™ Diode

General Description

The ISL9R3060G2 and ISL9R3060P2 are Stealth[™] diodes optimized for low loss performance in high frequency hard switched applications. The Stealth[™] family exhibits low reverse recovery current (I_{RRM}) 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_{RRM} and short t_a 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 Stealth $^{\text{TM}}$ diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

Formerly developmental type TA49411.

Features

•	Soft Recovery t_b / t_a > 1.2
•	Fast Recovery
•	Operating Temperature
•	Reverse Voltage
•	Avalanche Energy Rated

Applications

- Switch Mode Power Supplies
- · Hard Switched PFC Boost Diode
- UPS Free Wheeling Diode
- Motor Drive FWD
- SMPS FWD
- · Snubber Diode

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

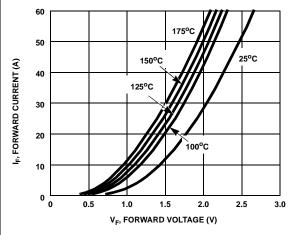
Device Maximum Ratings T_C= 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{RRM}	Peak Repetitive Reverse Voltage	600	V
V _{RWM}	V _{RWM} Working Peak Reverse Voltage V _R DC Blocking Voltage		V
V _R			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
TL	Maximum Temperature for Soldering		
T_{PKG}^{-}	Leads at 0.063in (1.6mm) from Case for 10s	300	°C
	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.

Device	Marking	Device	Package	Tape Width			Quan	itity
R30	60G2	ISL9R3060G2	TO-247	-			-	-
R30	60P2	ISL9R3060P2	TO-220AC	-			-	
Electric	al Cha	racteristics T _C = 25°C	unless otherwise	noted				
Symbol		Parameter	1	Conditions	Min	Тур	Max	Units
Off State	Characte	eristics						
I _R	Instantaneous Reverse Current		V _R = 600V	T _C = 25°C	-	-	100	μА
IX.				T _C = 125°C	-	-	1.0	mA
On State	Characte	eristics						
V _F	Instantaneous Forward Voltage		I _F = 30A	T _C = 25°C	-	2.1	2.4	V
•			1	T _C = 125°C	-	1.7	2.1	V
Dvnamic	Characte	eristics						
C _{.l}		Sapacitance	$V_R = 10V, I_F = 0$)A	-	120	_	pF
	Charact	·						
t _{rr}		Recovery Time	I_ = 1A d,_/dt =	100A/μs, V _R = 30V	_	27	35	ns
41	-		$I_F = 30A$, $d_{IF}/dt = 100A/\mu s$, $V_R = 30V$		-	36	45	ns
t _{rr}	Reverse R	Recovery Time	I _F = 30A,		-	36	-	ns
I _{RRM}		Reverse Recovery Current	$d_{IF}/dt = 200A/\mu s,$		-	2.9	-	Α
Q _{RR}	Reverse R	Recovery Charge	V _R = 390V, T _C = 25°C			55	-	nC
t _{rr}	Reverse R	Recovery Time	I _F = 30A,		-	110	-	ns
S	Softness F	actor (t _b /t _a)	$d_{IF}/dt = 200A/\mu s,$		-	1.9	-	
I _{RRM}	Maximum	Reverse Recovery Current	$V_{R} = 390V,$		-	6	-	Α
Q _{RR}	Reverse R	Recovery Charge	T _C = 125°C		-	450	-	nC
t _{rr}	Reverse R	Recovery Time	$ \begin{aligned} & _{F} = 30A, \\ & d_{ F}/dt = 1000A/\mu s, \\ & V_{R} = 390V, \\ & T_{C} = 125^{\circ}C \end{aligned} $		-	60	-	ns
S	Softness F	actor (t _b /t _a)			-	1.25	-	
I _{RRM}	Maximum	Reverse Recovery Current			-	21	-	Α
Q _{RR}	Reverse R	Recovery Charge				730	-	nC
dI _M /dt	Maximum	di/dt during t _b			-	800	-	A/µs
Thermal	Characte	eristics						
$R_{\theta JC}$	Thermal R	Resistance Junction to Case			-	-	0.75	°C/W
$R_{\theta JA}$	Thermal R	esistance Junction to Ambien	t TO-247		-	-	30	°C/W
$R_{\theta JA}$	Thermal R	tesistance Junction to Ambien	pient TO-220		-	-	62	°C/W

Typical Performance Curves



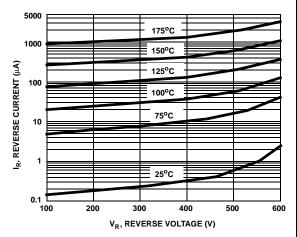
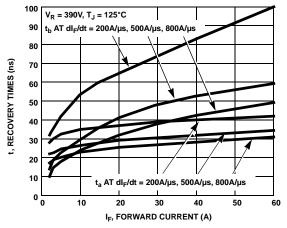


Figure 1. Forward Current vs Forward Voltage

Figure 2. Reverse Current vs Reverse Voltage



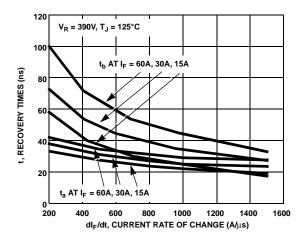
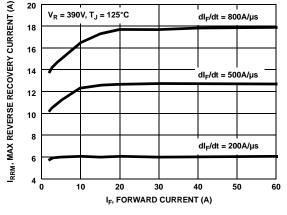


Figure 3. t_a and t_b Curves vs Forward Current

Figure 4. t_a and t_b Curves vs dl_F/dt



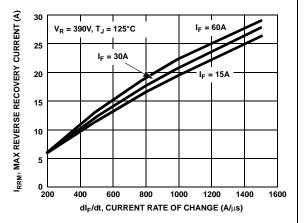
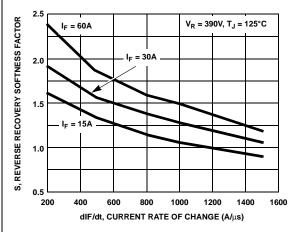


Figure 5. Maximum Reverse Recovery Current vs
Forward Current

Figure 6. Maximum Reverse Recovery Current vs dl_F/dt

Typical Performance Curves (Continued)



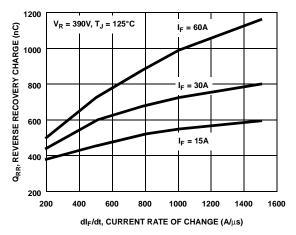


Figure 7. Reverse Recovery Softness Factor vs dI_F/dt

Figure 8. Reverse Recovery Charge vs $\mathrm{dI}_{\mathrm{F}}/\mathrm{dt}$

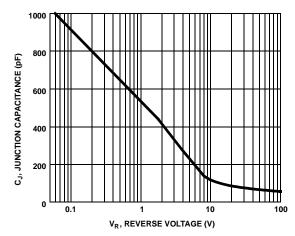


Figure 9. Junction Capacitance vs Reverse Voltage

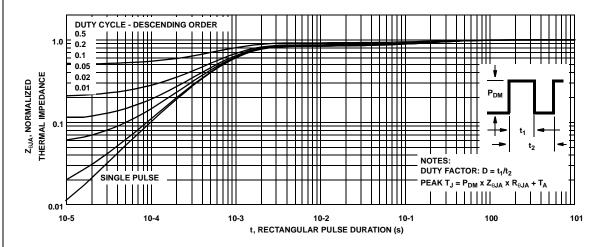
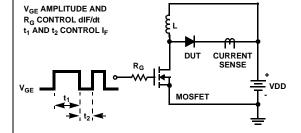


Figure 10. Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveforms



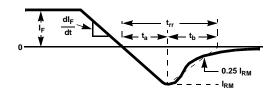


Figure 11. t_{rr} Test Circuit

Figure 12. t_{rr} Waveforms and Definitions

```
I = 1A
L = 40mH
R < 0.1Ω
V<sub>DD</sub> = 50V
EAVL = 1/2L12 [V<sub>R(AVL)</sub>/(V<sub>R(AVL)</sub> - V<sub>DD</sub>)]
Q1 = IGBT (BV<sub>CES</sub> > DUT V<sub>R(AVL)</sub>)

CURRENT
SENSE
V<sub>DD</sub>
```

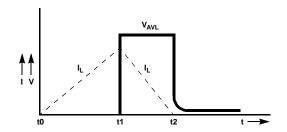


Figure 13. Avalanche Energy Test Circuit

Figure 14. Avalanche Current and Voltage Waveforms

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	CoolFET™	FRFET™	MicroFET™	QFET®	SuperSOT™-8
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	EnSigna™	<i>i-</i> Lo [™]	OCX^{TM}	RapidConnect™	UHC™
	FACT™	ImpliedDisconnect™	OCXPro™	μSerDes™	UltraFET®
FACT Quiet Series [™]		OPTOLOGIC®	SILENT SWITCHER®	VCX TM	
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The Power Franchise®		PACMAN™	SPM TM		
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Stealth™

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.
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