

# STEALTH™ Rectifier

15 A, 600 V

## ISL9R1560G2-F085

### Description

The ISL9R1560G2-F085 is Stealth diode optimized for low loss performance in high frequency hard switched applications. The Stealth family exhibits low reverse recovery current ( $I_{RM(REC)}$ ) 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] diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

### Features

- High Speed Switching ( $t_{rr} = 26$  ns(Typ.) @  $I_F = 15$  A)
- Low Forward Voltage ( $V_F = 2.2$  V(Max) @  $I_F = 15$  A)
- Avalanche Energy Rated
- AEC-Q101 Qualified and PPAP Capable
- This Device is Pb-Free

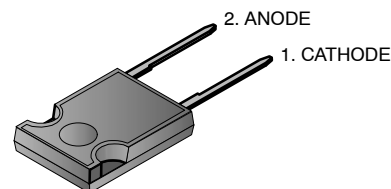
### Applications

- Automotive DC/DC Converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

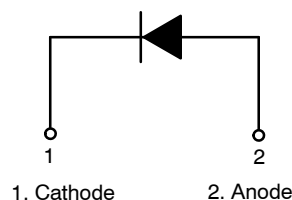


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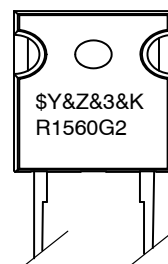
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TO-247-2LD  
CASE 340CL



### MARKING DIAGRAM



\$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
R1560G2	= Specific Device Code

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# ISL9R1560G2–F085

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V <sub>RRM</sub>	600	V
Working Peak Reverse Voltage	V <sub>RWM</sub>	600	V
DC Blocking Voltage	V <sub>R</sub>	600	V
Average Rectified Forward Current (T <sub>C</sub> = 25°C)	I <sub>F(AV)</sub>	15	A
Non-repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)	I <sub>FSM</sub>	45	A
Avalanche Energy (1 A, 40 mH)	E <sub>AVL</sub>	20	mJ
Operating Junction and Storage Temperature	T <sub>J</sub> , T <sub>STG</sub>	-55 to +175	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Tube	Quantity
ISL9R1560G2–F085	R1560G2	TO–247–2LD	–	30

## THERMAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Value	Unit
Maximum Thermal Resistance, Junction to Case	R <sub>θJC</sub>	0.93	°C/W
Maximum Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	45	°C/W

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
Instantaneous Reverse Current	I <sub>R</sub>	V <sub>R</sub> = 600 V	T <sub>C</sub> = 25°C	–	–	100	μA
			T <sub>C</sub> = 175°C	–	–	2	mA
Instantaneous Forward Voltage (Note 1)	V <sub>FM</sub>	I <sub>F</sub> = 15 A	T <sub>C</sub> = 25°C	–	1.8	2.2	V
			T <sub>C</sub> = 175°C	–	1.35	2	V
Reverse Recovery Time (Note 2)	t <sub>rr</sub>	I <sub>F</sub> = 1 A, di/dt = 200 A/μs, V <sub>CC</sub> = 390 V	T <sub>C</sub> = 25°C	–	20	30	ns
			T <sub>C</sub> = 25°C	–	26	40	ns
			T <sub>C</sub> = 175°C	–	114	–	ns
Reverse Recovery Time	t <sub>a</sub>	I <sub>F</sub> = 15 A, di/dt = 200 A/μs, V <sub>CC</sub> = 390 V	T <sub>C</sub> = 25°C	–	15	–	ns
	t <sub>b</sub>			–	11	–	ns
Reverse Recovery Charge	Q <sub>rr</sub>		–	40	–	nC	
Avalanche Energy	E <sub>AVL</sub>	I <sub>AV</sub> = 1 A, L = 40 mH	20	–	–	mJ	

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

1. Pulse: Test Pulse Width = 300 μs, Duty Cycle = 2%
2. Guaranteed by design.

TYPICAL PERFORMANCE CHARACTERISTICS

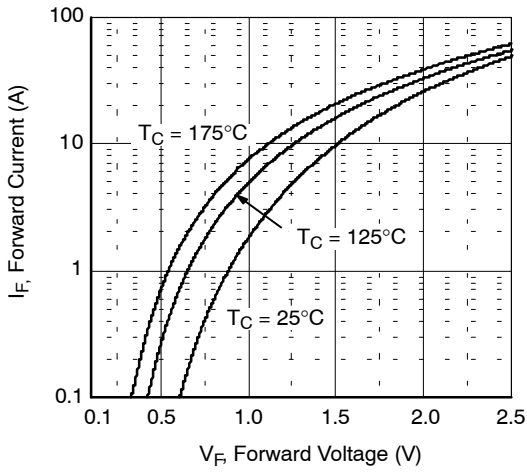


Figure 1. Typical Forward Voltage Drop vs. Forward Current

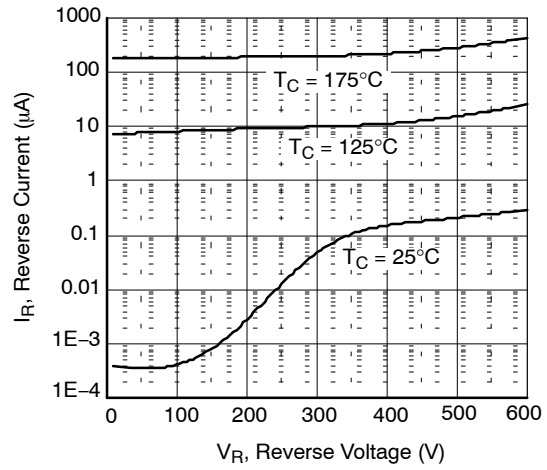


Figure 2. Typical Reverse Current vs. Reverse Voltage

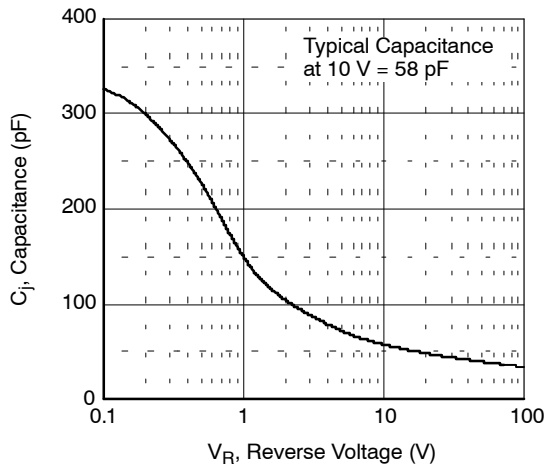


Figure 3. Typical Junction Capacitance

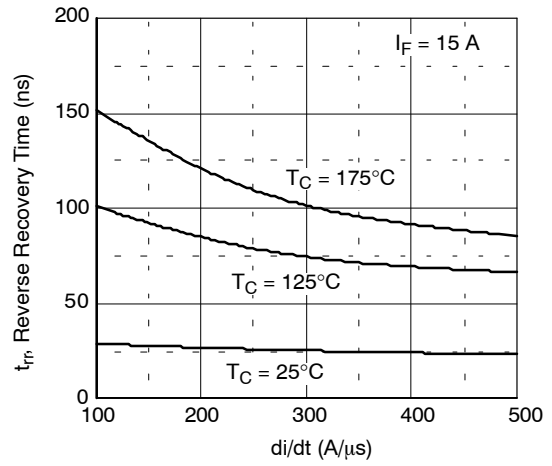


Figure 4. Typical Reverse Recovery Time vs. di/dt

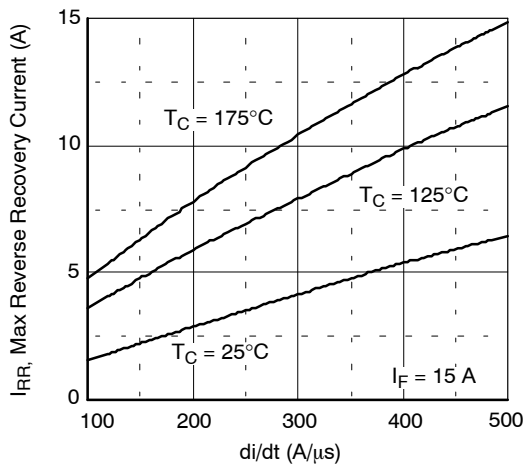


Figure 5. Typical Reverse recovery Current vs. di/dt

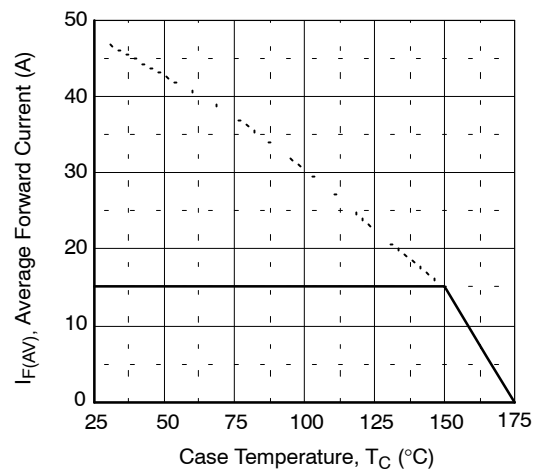


Figure 6. Maximum Reverse Recovery Current vs.  $dI_F/dt$

# ISL9R1560G2-F085

## TYPICAL PERFORMANCE CHARACTERISTICS (continued)

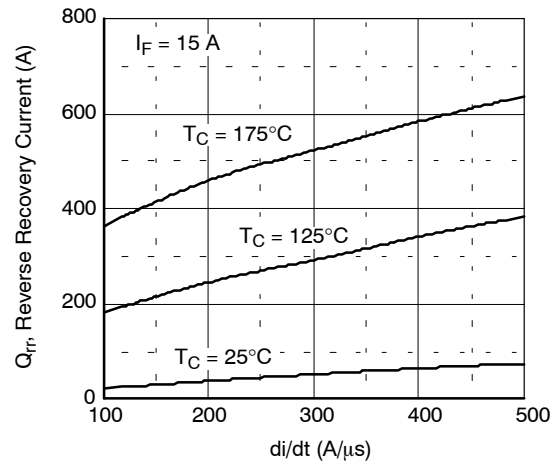


Figure 7. Reverse Recovery Charge

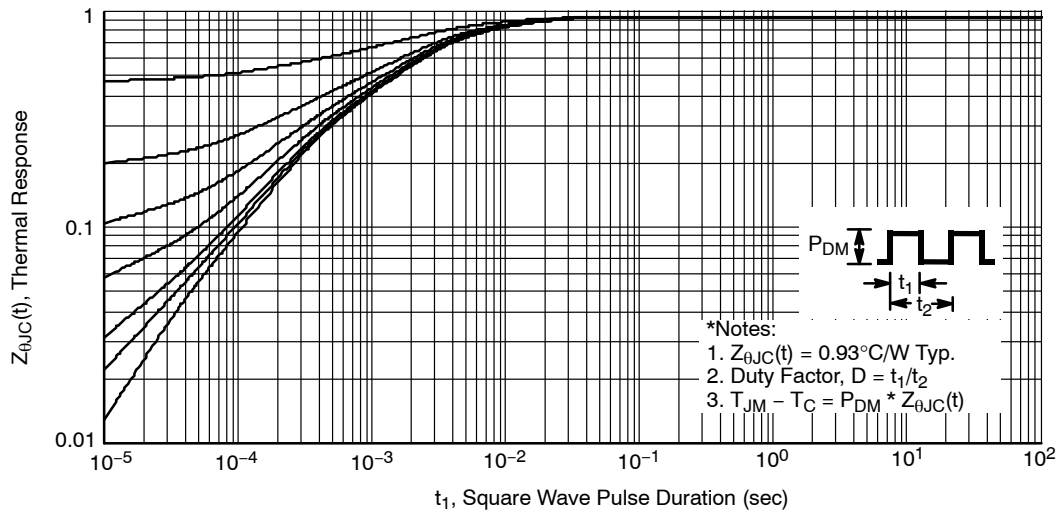


Figure 8. Transient Thermal Response Curve

TEST CIRCUIT AND WAVEFORMS

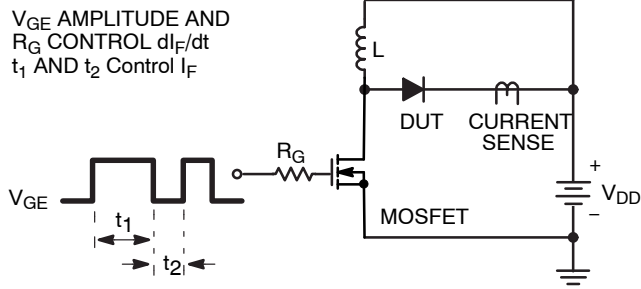


Figure 9.  $t_{rr}$  Test Circuit

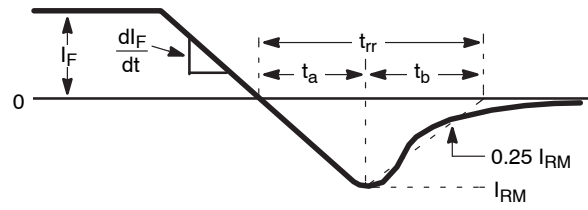


Figure 10.  $t_{rr}$  Waveforms and Definitions

$I = 1 \text{ A}$   
 $L = 40 \text{ mH}$   
 $R < 0.1 \Omega$   
 $V_{DD} = 50 \text{ V}$   
 $E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)} - V_{DD})]$   
 $Q_1 = \text{IGBT } (BV_{CES} > \text{DUT } V_{R(AVL)})$

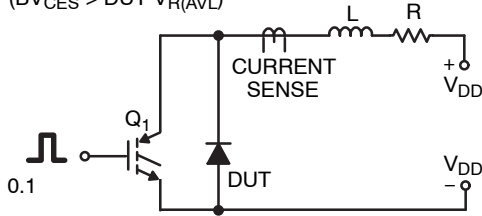


Figure 11. Avalanche Energy Test Circuit

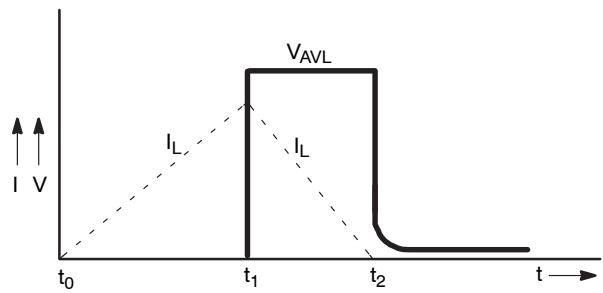


Figure 12. Avalanche Current and Voltage Waveforms

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

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TO-247-2LD  
CASE 340CL  
ISSUE A

DATE 03 DEC 2019

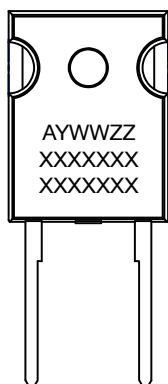


⊕ 0.25 (M) B A (M)

NOTES: UNLESS OTHERWISE SPECIFIED.

- A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- B. ALL DIMENSIONS ARE IN MILLIMETERS.
- C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
- D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
- E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

### GENERIC MARKING DIAGRAM\*



XXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
ZZ = Assembly Lot Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.29	2.40	2.66
A2	1.30	1.50	1.70
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	16.37	16.57	16.77
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
∅P	3.51	3.58	3.65
∅P1	6.61	6.73	6.85
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

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