



ON Semiconductor®

# ISL9R1560G2-F085 15A, 600V Stealth Rectifier

## Features

- High Speed Switching (  $t_{rr}=26\text{ns(Typ.)}$  @  $I_F=15\text{A}$  )
- Low Forward Voltage(  $V_F=2.2\text{V(Max.)}$  @  $I_F=15\text{A}$  )
- Avalanche Energy Rated
- AEC-Q101 Qualified

## Applications

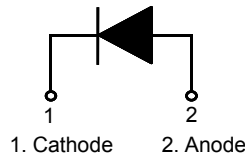
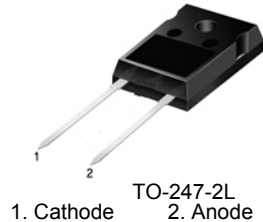
- Automotive DCDC converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

## 15A, 600V Stealth Rectifier

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.

## Pin Assignments



## Absolute Maximum Ratings T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
$V_{RRM}$	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 @ $T_C = 25^\circ\text{C}$	15	A
$I_{FSM}$	Non-repetitive Peak Surge Current (Halfwave 1 Phase 50Hz)	45	A
$E_{AVL}$	Avalanche Energy (1A, 40mH)	20	mJ
$T_J, T_{STG}$	Operating Junction and Storage Temperature	- 55 to +175	°C

## Thermal Characteristics T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.93	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	45	°C/W

## Package Marking and Ordering Information

Device Marking	Device	Package	Tube	Quantity
ISL9R1560G2	ISL9R1560G2-F085	TO-247	-	30

ISL9R1560G2-F085 15A, 600V Stealth Rectifier

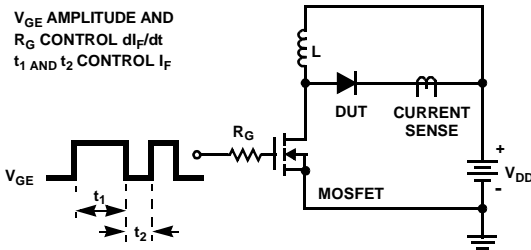
## Electrical Characteristics T<sub>C</sub> = 25°C unless otherwise noted

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

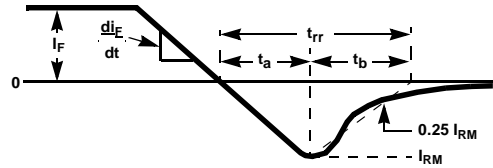
### Notes:

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

### Test Circuit and Waveforms

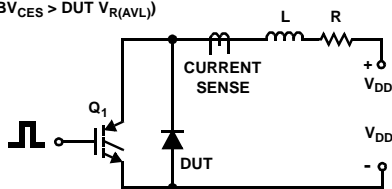


t<sub>rr</sub> Test Circuit

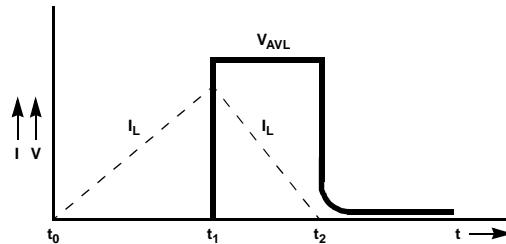


t<sub>rr</sub> Waveforms and Definitions

I = 1A  
L = 40mH  
R < 0.1Ω  
V<sub>DD</sub> = 50V  
E<sub>AVL</sub> = 1/2LI<sup>2</sup> [V<sub>R(AVL)</sub>/(V<sub>R(AVL)</sub> - V<sub>DD</sub>)]  
Q<sub>1</sub> : IGBT (BV<sub>CES</sub> > DUT V<sub>R(AVL)</sub>)



Avalanche Energy Test Circuit



Avalanche Current and Voltage Waveforms

## Typical Performance Characteristics

Figure 1. Typical Forward Voltage Drop vs. Forward Current

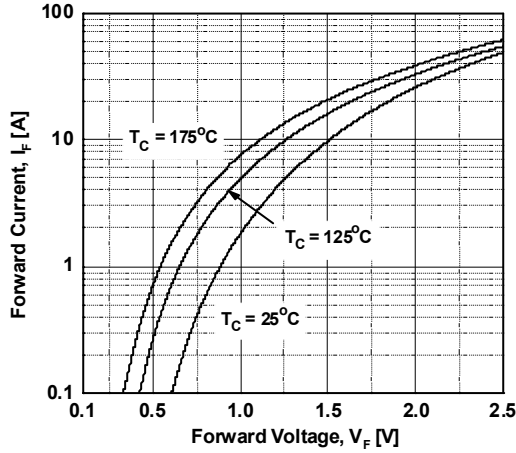


Figure 2. Typical Reverse Current vs. Reverse Voltage

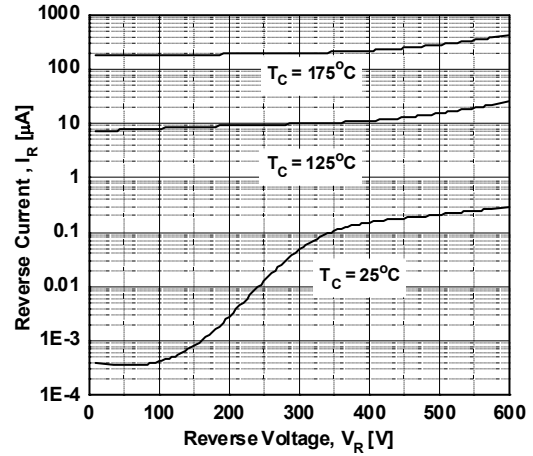


Figure 3. Typical Junction Capacitance

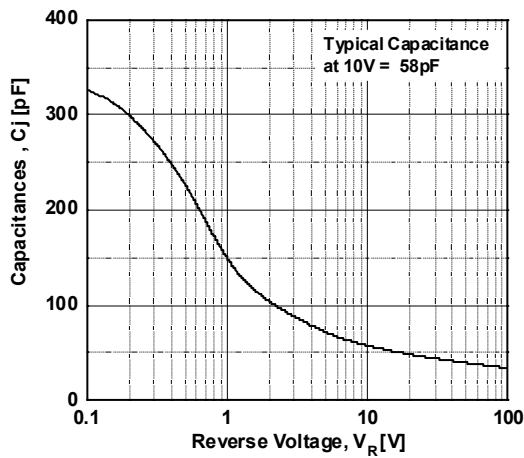


Figure 4. Typical Reverse Recovery Time vs. di/dt

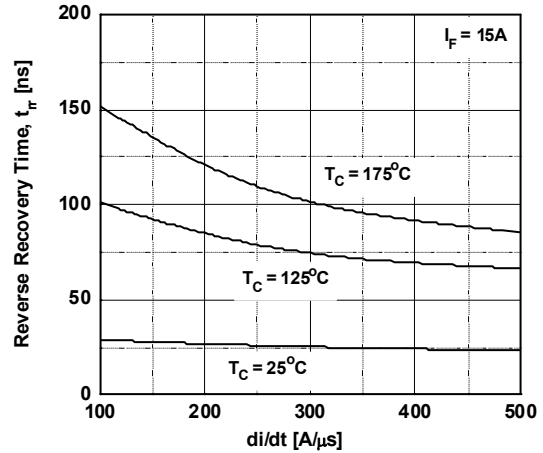


Figure 5. Typical Reverse Recovery Current vs. di/dt

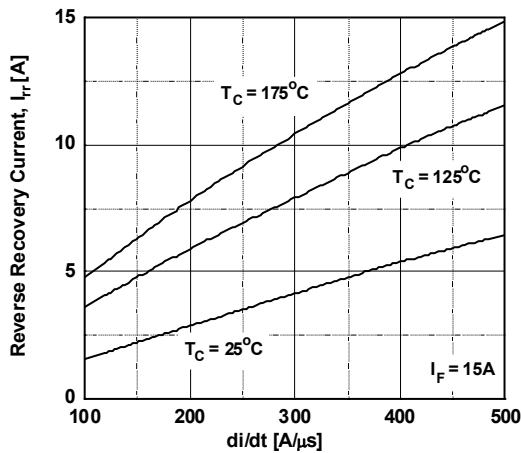
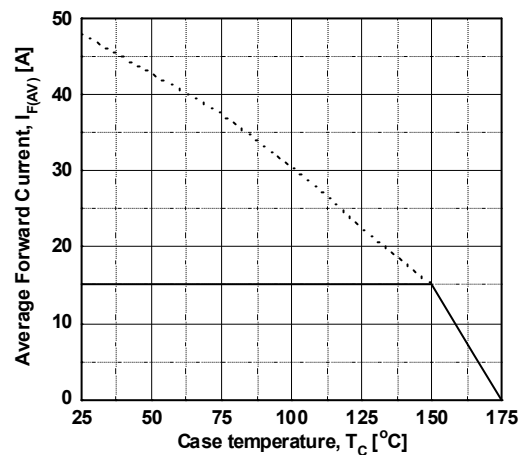


Figure 6. Forward Current Derating Curve



Typical Performance Characteristics (Continued)

Figure 7. Reverse Recovery Charge

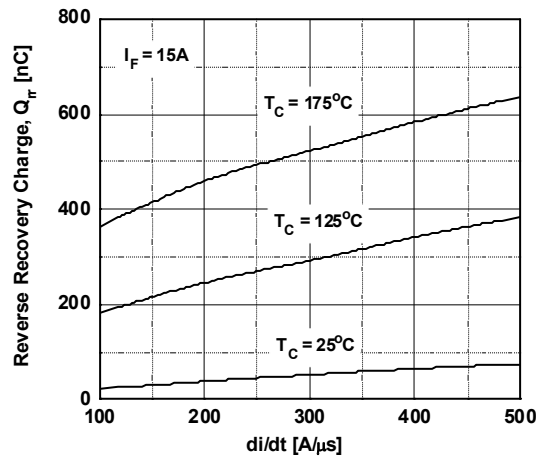
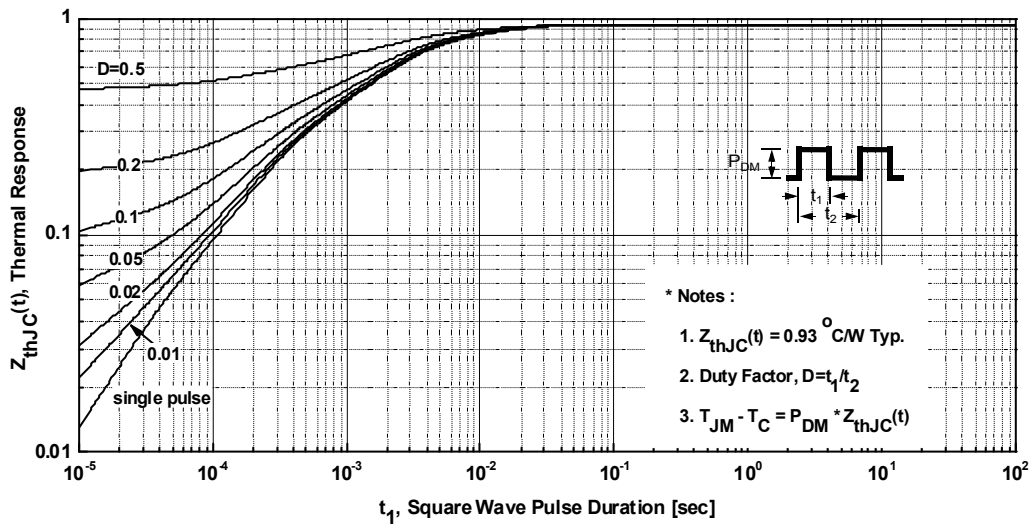
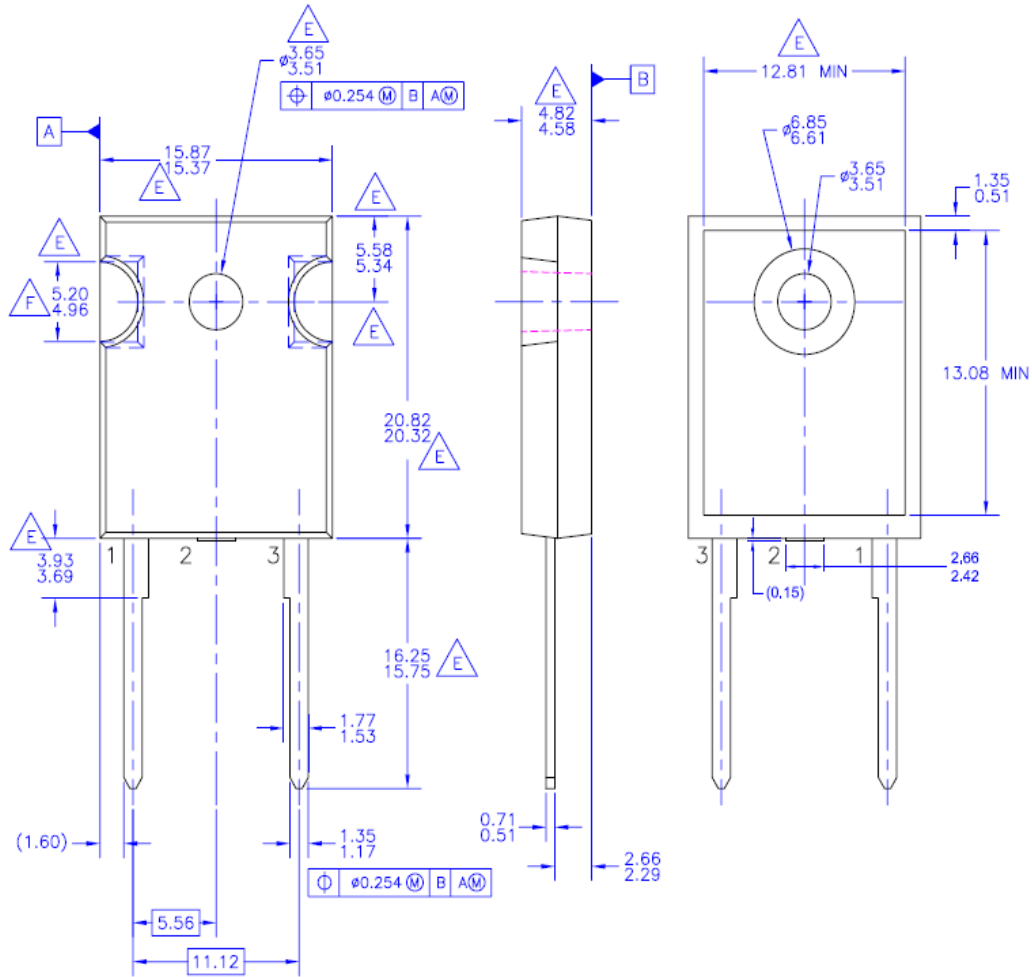


Figure 8. Transient Thermal Response Curve



Mechanical Dimensions

TO-247-2L



- NOTES: UNLESS OTHERWISE SPECIFIED
- A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
  - B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
  - C. ALL DIMENSIONS ARE IN MILLIMETERS.
  - D. DRAWING CONFORMS TO ASME Y14.5 - 1994
- E.** DOES NOT COMPLY JEDEC STANDARD VALUE
- F.** NOTCH MAY BE SQUARE
- G. DRAWING FILENAME: MKT-TO247B02\_REV02

Dimensions in Millimeters

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