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ISL9K3060G3

60 A, 600 V, STEALTH™ Dual Diode

Features

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

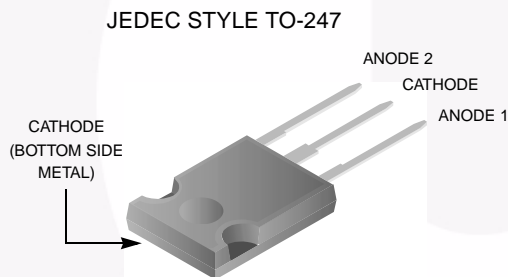
Applications

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

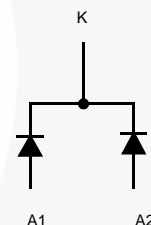
Description

The ISL9K3060G3 is a STEALTH™ dual diode optimized for low loss performance in high frequency hard switched applications. The STEALTH™ 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 turn 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.

Package



Symbol



Device Maximum Ratings (per leg) $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{RRM}	Repetitive Peak 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 ($T_C = 125^\circ\text{C}$)	30	A
	Total Device Current (Both Legs)	60	A
I_{FRM}	Repetitive Peak Surge Current (20kHz Square Wave)	70	A
I_{FSM}	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	325	A
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	$^\circ\text{C}$
T_L	Maximum Temperature for Soldering	300	$^\circ\text{C}$
T_{PKG}	Leads at 0.063in (1.6mm) from Case for 10s Package Body for 10s, See Techbrief TB334	260	$^\circ\text{C}$

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.

Package Marking and Ordering Information

Device Marking	Device	Package	Packing Method	Tape Width	Quantity
K3060G3	ISL9K3060G3	TO-247-3L	Tube	N/A	30

Electrical Characteristics (per leg) $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off State Characteristics

Symbol	Parameter	Test Conditions					
			Min	Typ	Max	Units	
I_R	Instantaneous Reverse Current	$V_R = 600\text{ V}$	$T_C = 25^\circ\text{C}$	-	-	100	μA
			$T_C = 125^\circ\text{C}$	-	-	1.0	mA

On State Characteristics

Symbol	Parameter	Test Conditions					
			Min	Typ	Max	Units	
V_F	Instantaneous Forward Voltage	$I_F = 30\text{ A}$	$T_C = 25^\circ\text{C}$	-	2.1	2.4	V
			$T_C = 125^\circ\text{C}$	-	1.7	2.1	V

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
C_J	Junction Capacitance	$V_R = 10\text{ V}, I_F = 0\text{ A}$	-	120	-	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{rr}	Reverse Recovery Time	$I_F = 1\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	27	35	ns
		$I_F = 30\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, V_R = 30\text{ V}$	-	36	45	ns
t_{rr}	Reverse Recovery Time	$I_F = 30\text{ A},$	-	36	-	ns
I_{rr}	Reverse Recovery Current	$di_F/dt = 200\text{ A}/\mu\text{s},$	-	2.9	-	A
Q_{rr}	Reverse Recovered Charge	$V_R = 390\text{ V}, T_C = 25^\circ\text{C}$	-	55	-	nC
t_{rr}	Reverse Recovery Time	$I_F = 30\text{ A},$	-	110	-	ns
S	Softness Factor (t_b/t_a)	$di_F/dt = 200\text{ A}/\mu\text{s},$	-	1.9	-	
I_{rr}	Reverse Recovery Current	$V_R = 390\text{ V},$	-	6	-	A
Q_{rr}	Reverse Recovered Charge	$T_C = 125^\circ\text{C}$	-	450	-	nC
t_{rr}	Reverse Recovery Time	$I_F = 30\text{ A},$	-	60	-	ns
S	Softness Factor (t_b/t_a)	$di_F/dt = 1000\text{ A}/\mu\text{s},$	-	1.25	-	
I_{rr}	Reverse Recovery Current	$V_R = 390\text{ V},$	-	21	-	A
Q_{rr}	Reverse Recovered Charge	$T_C = 125^\circ\text{C}$	-	730	-	nC
di_M/dt	Maximum di/dt during t_b		-	800	-	$\text{A}/\mu\text{s}$

Thermal Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction to Case		-	-	1.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	TO-247	-	-	30	$^\circ\text{C}/\text{W}$

Typical Performance Curves

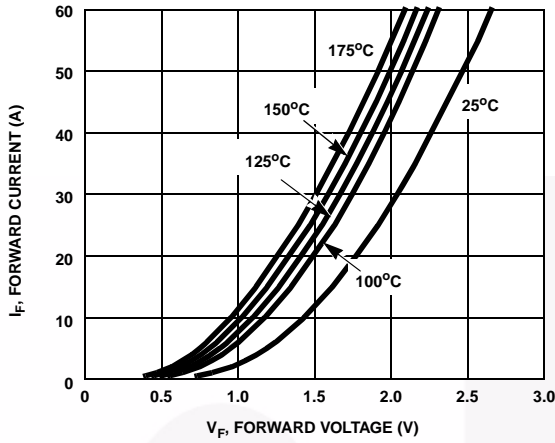


Figure 1. Forward Current vs Forward Voltage

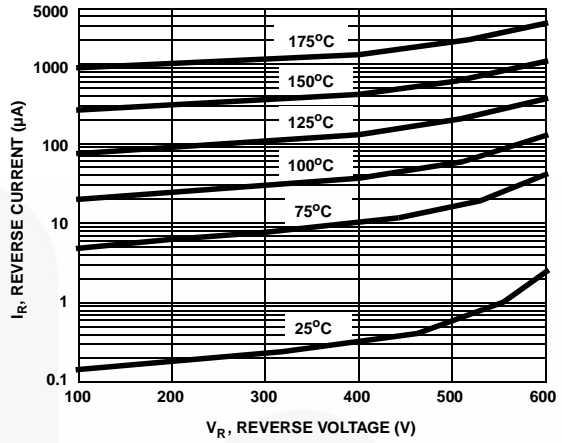


Figure 2. Reverse Current vs Reverse Voltage

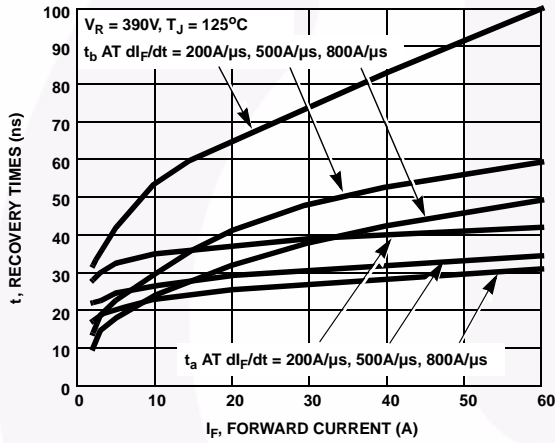


Figure 3. t_a and t_b Curves vs Forward Current

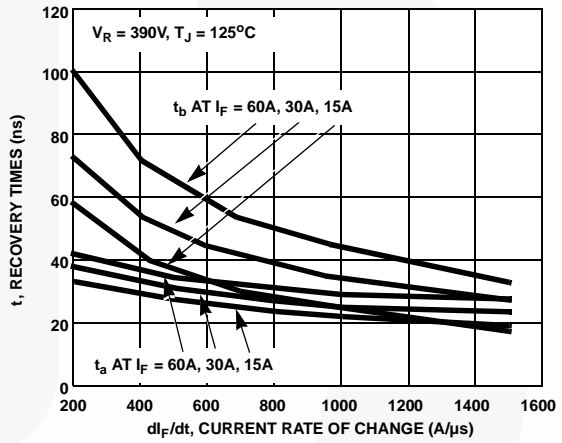


Figure 4. t_a and t_b Curves vs di_F/dt

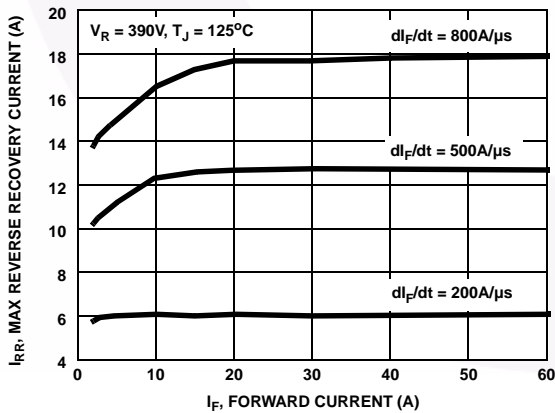


Figure 5. Maximum Reverse Recovery Current vs Forward Current

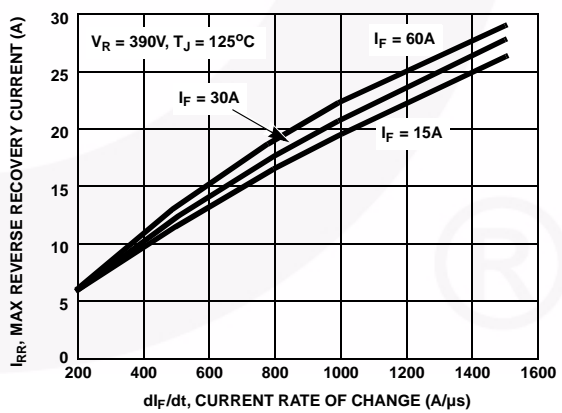


Figure 6. Maximum Reverse Recovery Current vs di_F/dt

Typical Performance Curves (Continued)

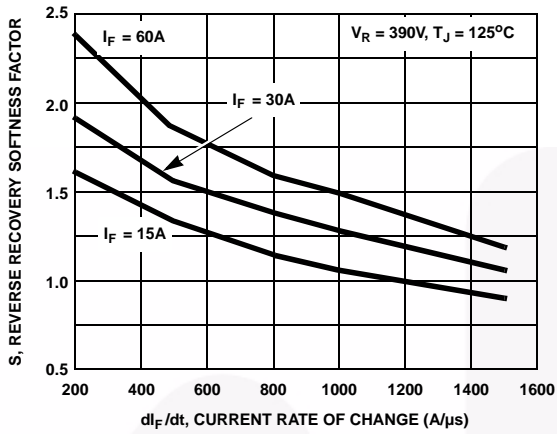


Figure 7. Reverse Recovery Softness Factor vs di_F/dt

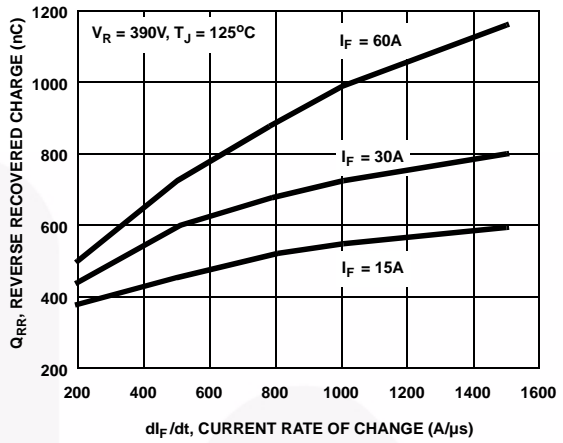


Figure 8. Reverse Recovered Charge vs di_F/dt

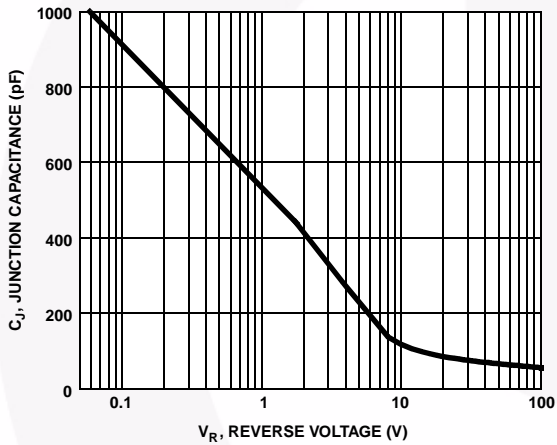


Figure 9. Junction Capacitance vs Reverse Voltage

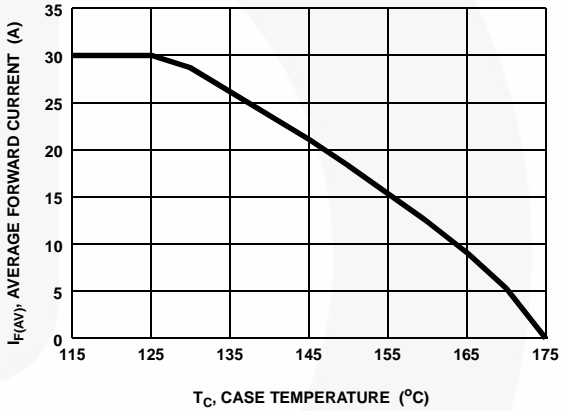


Figure 10. DC Current Derating Curve

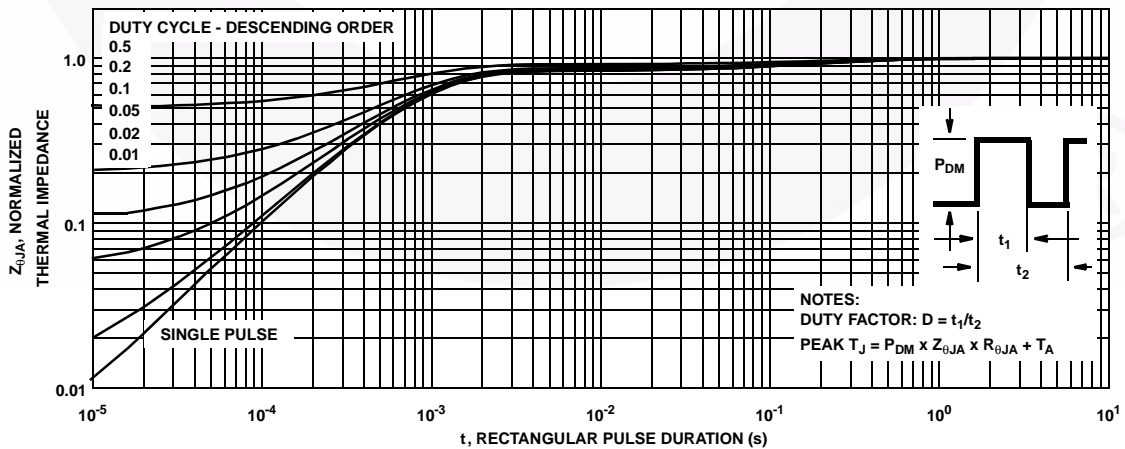


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit and Waveforms

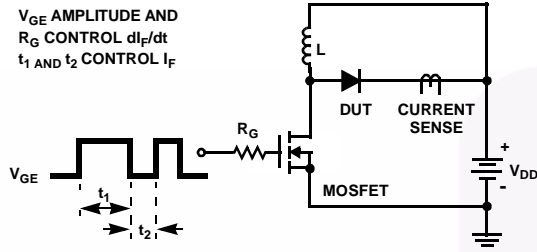


Figure 12. t_{rr} Test Circuit

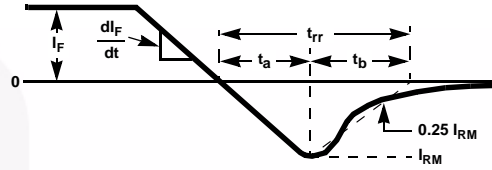


Figure 13. t_{rr} Waveforms and Definitions

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

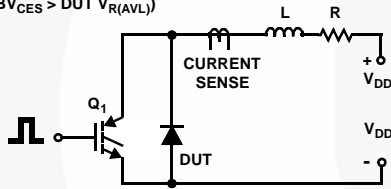


Figure 14. Avalanche Energy Test Circuit

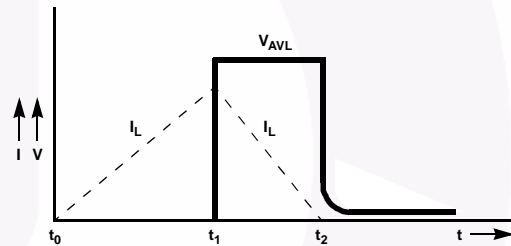
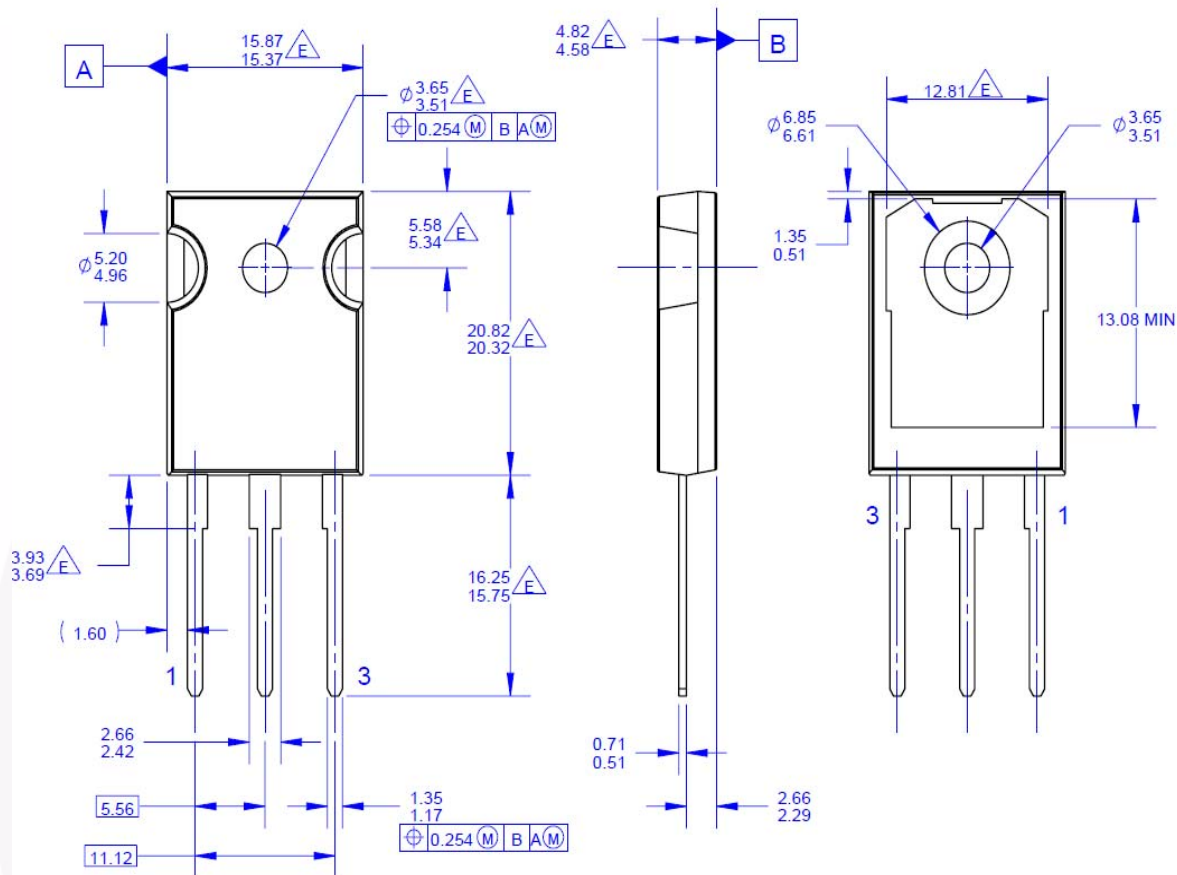


Figure 15. Avalanche Current and Voltage Waveforms

TO247-3L



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- D. DRAWING CONFORMS TO ASME Y14.5 - 1994

E DOES NOT COMPLY JEDEC STANDARD VALUE
 F. DRAWING FILENAME: MKT-TO247A03_REV03

Figure 16. TO-247, Molded, 3LD, Jecdec Option AB

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