

ISL8009AEVAL1Z

1.5A Synchronous Buck Regulator with Integrated MOSFETs

AN1388 Rev 1.00 October 9, 2008

Description

The ISL8009AEVAL1Z kit is intended for use by individuals with requirements for Point-of-Load applications sourcing from 2.7V to 5.5V. The ISL8009EVAL1Z evaluation board demonstrates the performance of the ISL8009A low quiescent current mode converter.

The ISL8009A is offered in a 2mmx3mm 8 Ld DFN package with 1mm maximum height. The complete converter occupies less than 1cm² area.

Key Features

- High Efficiency Synchronous Buck Regulator With up to 95% Efficiency
- 2ms Reset Timer
- · Soft Discharge Output Cap During Disable
- · 2.7V to 5.5V Supply Voltage
- 3% Output Accuracy Over-Temperature/Load/Line
- · 1.5A Guaranteed Output Current
- 17µA Quiescent Supply Current in PFM Mode
- · Selectable Forced PWM Mode and PFM Mode
- Less Than 1µA Logic Controlled Shutdown Current
- 90% Maximum Duty Cycle for Lowest Dropout
- · Internal Current Mode Compensation
- · Internal Digital Soft-Start
- · Peak Current Limiting, Short Circuit Protection
- · Over-Temperature Protection
- Enable
- · Small 8 Ld 2mmx3mm DFN
- · Pb-Free (RoHS Compliant)

Recommended Equipment

The following materials are recommended to perform testing:

- 0V to 10V power supply with at least 5A source current capability, battery, notebook AC adapter
- · Two electronic loads capable of sinking current up to 5A
- · Digital Multimeters (DMMs)
- 100MHz quad-trace oscilloscope
- · Signal generator

Quick Setup Guide

- 1. Ensure that the circuit is correctly connected to the supply and loads prior to applying any power.
- 2. Connect the bias supply to VIN. Plus terminal to P4(VIN) and negative return to P5(GND).
- 3. Verify that position is ON for SW1.
- 4. Turn on the power supply.
- 5. Verify the output voltage is 1.8V for VOLT

Evaluating the Other Output Voltage

The ISL8009AEVALIZ kit output is preset to 1.8V; however, output voltages can be adjusted from 0.8V to 3.3V by following Equations 1 and 2:

$$V_{OUT} = 0.8 \left(1 + \frac{R_1}{R_2} \right)$$
 (EQ. 1)

Let's set R_1 = 124 $k\Omega$:

$$R_2 = \frac{(R_1)}{(\frac{V_{OUT}}{0.8}) - 1}$$
 (EQ. 2)

If desired output is 0.8V then short R_1 and open R_2 .

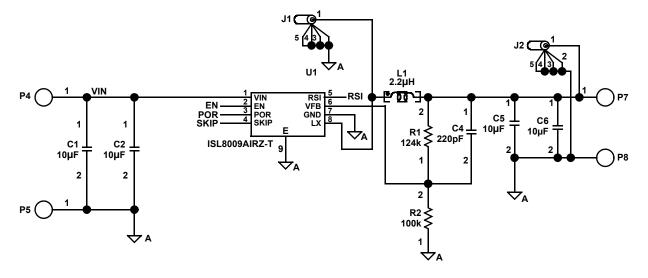
Mode Control

The ISL8009A has a SKIP pin that controls the operation mode. When the SKIP pin is driven to low or shorted to ground, the regulator operates in a forced PWM mode. The forced PWM mode remains the fixed PWM frequency at light load instead of entering the skip mode.

TABLE 1. SWITCH 1 SETTINGS

SW1	SKIP	FUNCTION					
1	PWM	Fixed PWM frequency at light load					
3	PFM	Force continuous mode					
SW2	ENABLE	ON/OFF CONTROL					
1	OFF	Disable V _{OUT}					
3	ON	Enable V _{OUT}					

Schematic



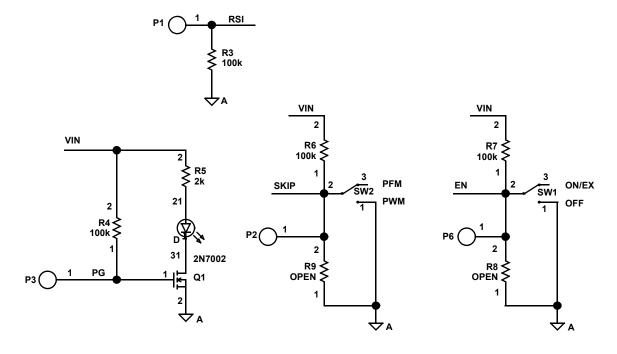


TABLE 2. COMPONENT LIST

REF DES	QTY	VALUE	TOL.	VOLTAGE	PACKAGE	PART NUMBER	MANUFACTURER	DESCRIPTION
C1, C2, C5, C6	4	10µF	10%	10V	1206	GRM31CR71A106KA01L-T	MURATA	CAP, SMD, 1206, 10µF, 10V, 10%, X7R, ROHS, MONOLITHIC
C4	1	220pF	5%	50V	0603	H1045-00221-50V5-T	VENKEL	CAP, SMD, 0603, 220pF, 50V, 5%, C0G, ROHS
L1	1	2.2µH	20%		7.6x6	DR73-2R2-R	COOPER ELECTRONIC TECH.	COIL-PWR INDUCTOR, SMD, 7.6x6, 2.2µH, 20%, 4.15A, ROHS
D1	1				2mmx1.25mm	LTST-C170CKT	LITEON/VISHAY	LED-GaAs RED, SMD, 2mmx1.25mm, 100mW, 40mA, 10mcd, ROHS
U1	1				2x3	ISL8009AIRZ	INTERSIL	IC-1.5A SYNC BUCK REGULATOR, 8P, DFN, 2x3, ROHS
Q1	1		-	60V	N-CHANNEL	2N7002-7-F-T	DIODES, INC.	TRANSISTOR, N-CHANNEL, 3 LD SOT-23, 60V, 115mA, ROHS
R2-R4, R6, R7	5	100k	1%	100V	0603	H2511-01003-1/10W1-T		RES, SMD, 0603, 100k, 1/10W, 1%, TF, ROHS
R1	1	124k	1%	100V	0603	H2511-01243-1/10W1-T	YAGEO	RES, SMD, 0603, 124k,1/10W,1%, TF, ROHS
R5	1	2k	1%	100V	0603	H2511-02001-1/10W1-T	KOA	RES, SMD, 0603, 2k, 1/10W, 1%, TF, ROHS
R8, R9	0			100V	0603	H2511-DNP		RES, SMD, 0603, DNP-PLACE HOLDER, ROHS
SW1, SW2	2	-	-	-	-	GT11MSCBE-T	C&K COMPONENTS	SWITCH-TOGGLE, SMD, ULTRAMINI, 1P, SPST MINI



ISL8009AEVAL1Z Board Layout

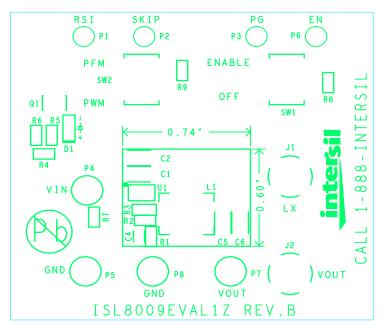


FIGURE 1. TOP COMPONENTS

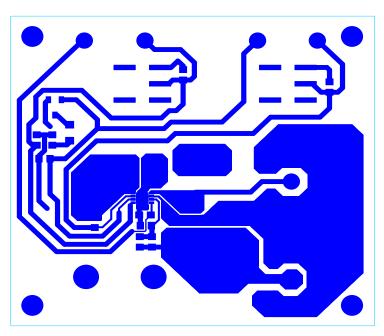


FIGURE 2. TOP LAYER ETCH

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ISL8009AEVAL1Z Board Layout (Continued)

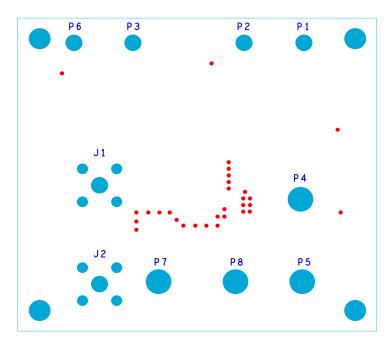


FIGURE 3. BOTTOM LAYER COMPONENTS (MIRRORED)

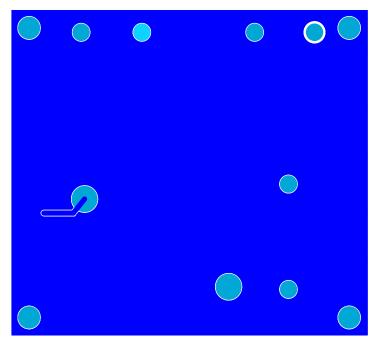


FIGURE 4. BOTTOM LAYER ETCH (MIRRORED)

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