ISL8009AEVAL1Z: 1.5A Synchronous Buck Regulator with Integrated MOSFETs

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 1cm^2 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 V_{OUT}

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:

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

Let's set R_1= 124kΩ:

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

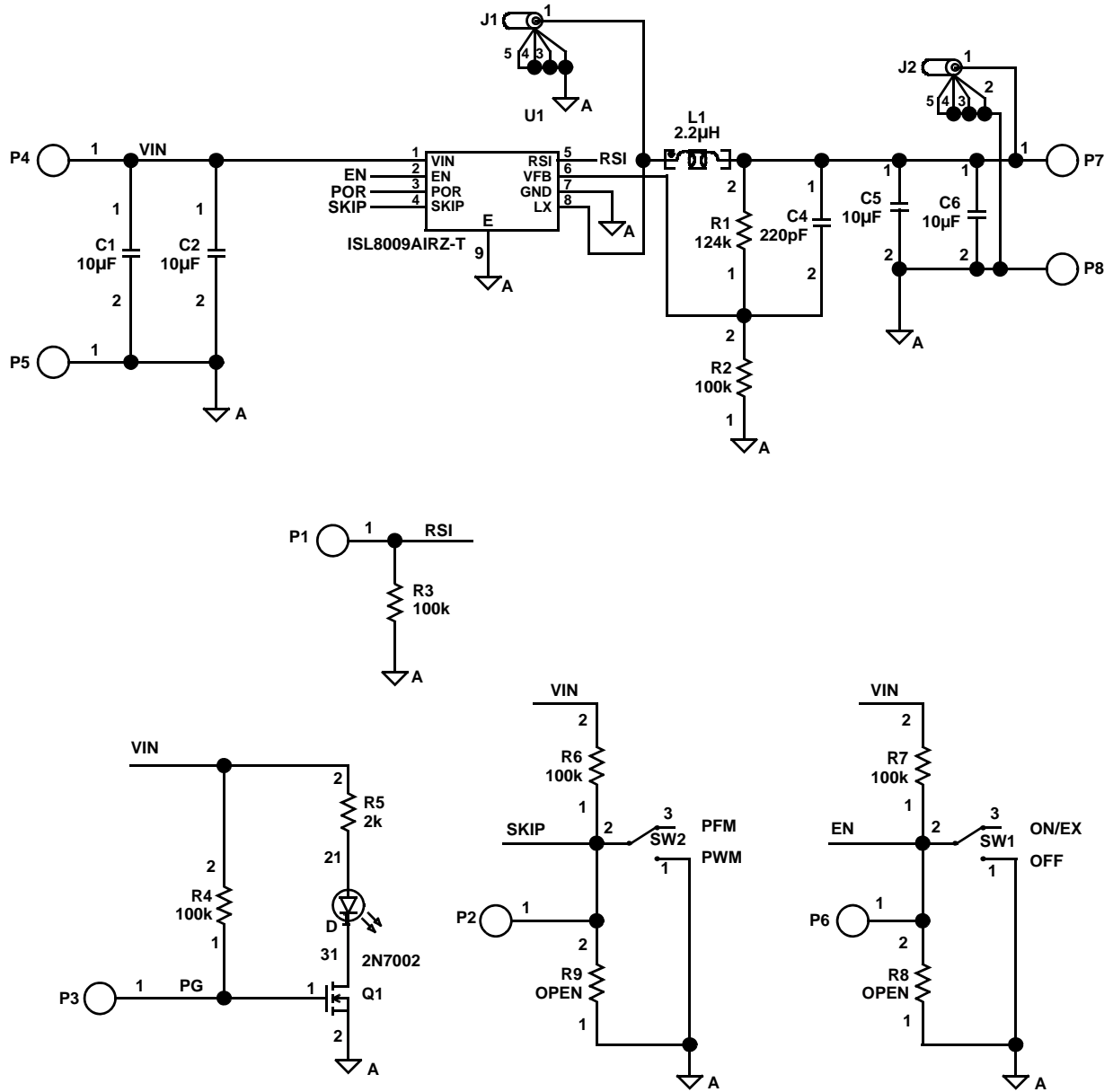*If desired output is 0.8V then short R_1 and open R_2.*

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

J1

U1

ISL8009AIRZ-T

1	VIN	
2	EN	
3	POR	
4	SKIP	

RSI
VFB
GND
LX

5
6
7
8

E

9

L1
2.2µH

J2

P4 — 1 — VIN

P5 — 1

C1
10µF

C2
10µF

EN
POR
SKIP

R1
124k

C4
220pF

R2
100k

C5
10µF

C6
10µF

P7 — 1

P8

A

A

P1 — 1 — RSI

R3
100k

A

VIN

R4
100k

D1

R5
2k

2N7002

Q1

P3 — 1 — PG

A

VIN

R6
100k

SKIP

SW2

PFM

PWM

P2 — 1

R9
OPEN

A

VIN

R7
100k

EN

SW1

ON/EX

OFF

P6 — 1

R8
OPEN

A

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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
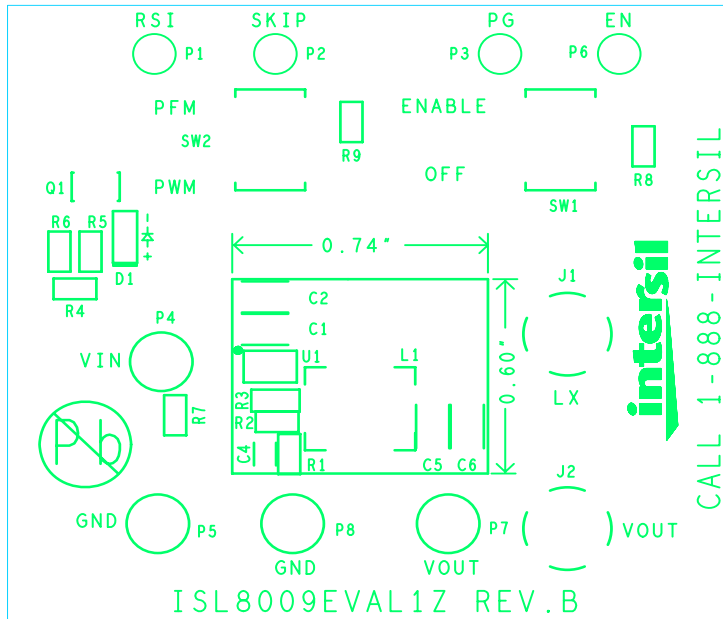
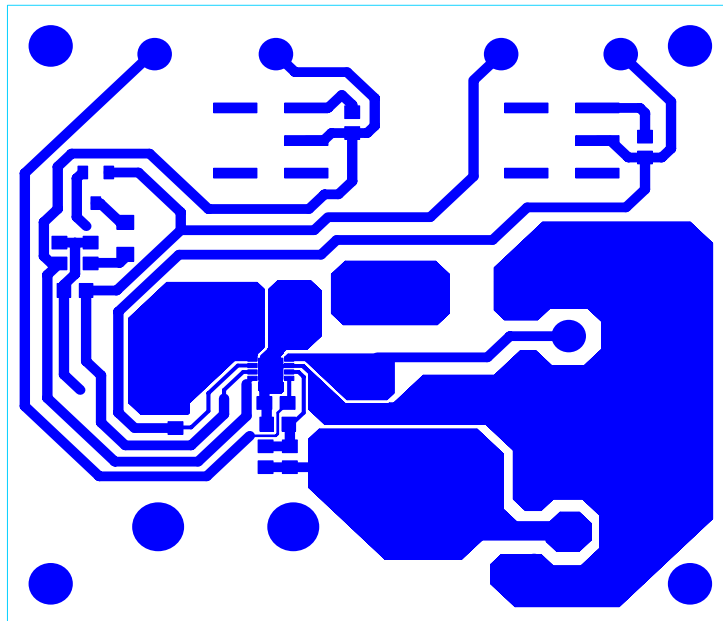**FIGURE 1. TOP COMPONENTS**

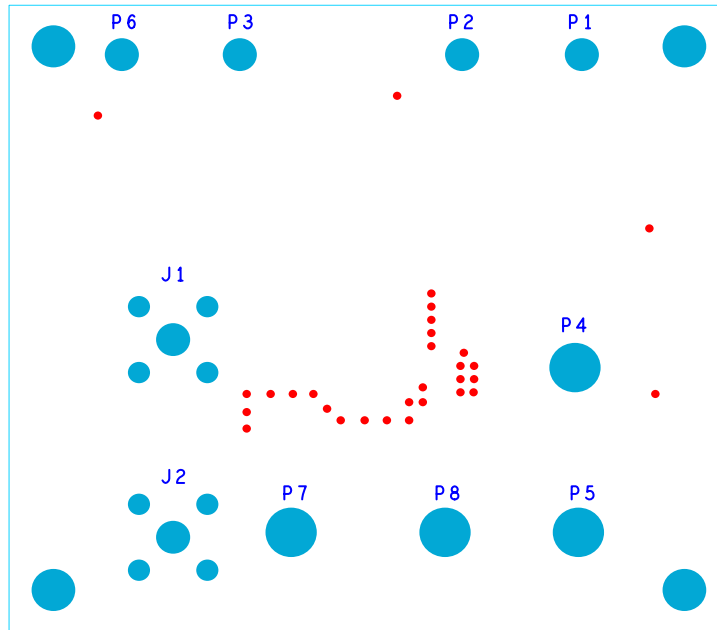**FIGURE 2. TOP LAYER ETCH**

ISL8009AEVAL1Z Board Layout (Continued)
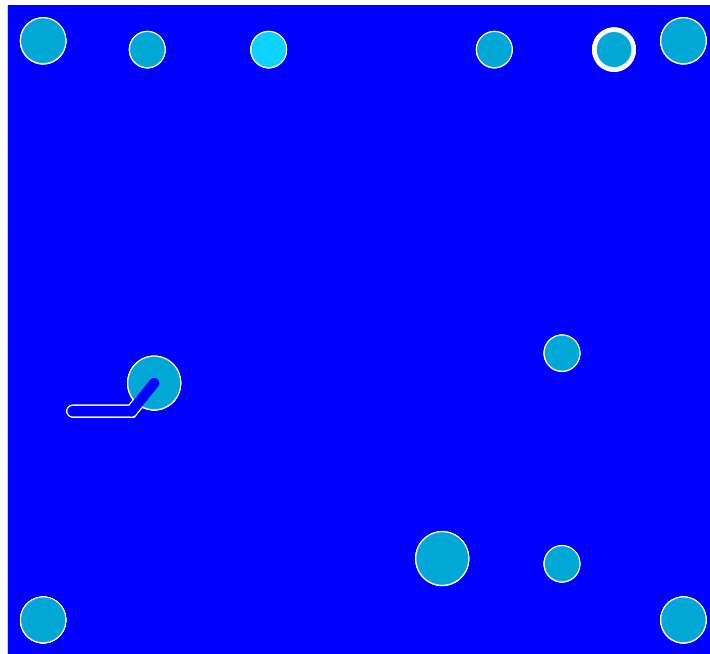

FIGURE 3. BOTTOM LAYER COMPONENTS (MIRRORED)

FIGURE 4. BOTTOM LAYER ETCH (MIRRORED)

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