

ISL8500EVAL1Z

2A Regulator Standard Buck PWM

AN1372
Rev 0.00
November 21, 2007

Description

The ISL8500EVAL1Z REV A kit is intended for use by individuals with requirements for Point-of-Load applications sourcing from 4.5V to 25V. The ISL8500EVAL1Z evaluation board is used to demonstrate the performance of the ISL8500 standard buck regulator.

The ISL8500 is offered in a 4mmx3mm 12 Ld DFN package with 1mm maximum height. The complete converter occupies less than 0.425in² area.

Features

- Standard Buck Controller with Integrated Switching Power MOSFET
- Integrated Boot Diode
- Input Voltage Range
 - Fixed 5V ±10%
 - Variable 5.5V to 25V
- PWM Output Voltage Adjustable from 0.6V to 20V with Continuous Output Current up to 2A
- Voltage Mode Control with Voltage Feed Forward
- Fixed 500kHz Switching Frequency
- Externally Adjustable Soft-Start Time
- Output Undervoltage Protection
- PGOOD Output
- Overcurrent Protection
- Thermal Overload Protection
- Internal 5V LDO regulator

Applications

- General Purpose
- WLAN Cards-PCMCIA, Cardbus32, MiniPCI Cards-Compact Flash Cards
- Hand-Held Instruments

What's Inside

The Evaluation Board Kit contains the following materials:

- The ISL8500 EVAL REV D board
- The ISL8500 datasheet
- This EVAL KIT document

Recommended Equipment

The following materials are recommended to perform testing:

- 0V to 25V power supply with at least 5A source current capability, battery, notebook AC adapter
- One electronic load 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, the plus terminal to TP1 (VIN) and the negative return to TP2 (GND).
3. Verify that SW1 is on ENABLE.
4. Turn on the power supply.
5. Verify the PG is on and the output voltage is 2.5V for VOUT(TP3).

Evaluating the Other Output Voltage

The ISL8500EVAL kit outputs are preset to 2.5V; however, it can be programmed using resistor dividers using Equation 1:

$$R_2 = \frac{R_1 \cdot 0.6V}{V_{OUT} - 0.6V} \quad (\text{EQ. 1})$$

The output voltage programming resistor R₂ will depend on on the feedback resistor R₁, as referred to in Figure 1. The value of R₁ is typically between 1kΩ and 10kΩ. If the output voltage desired is 0.6V, then R₂ is left opened.

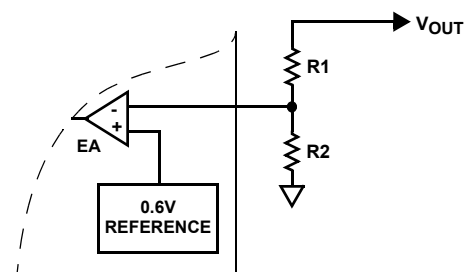
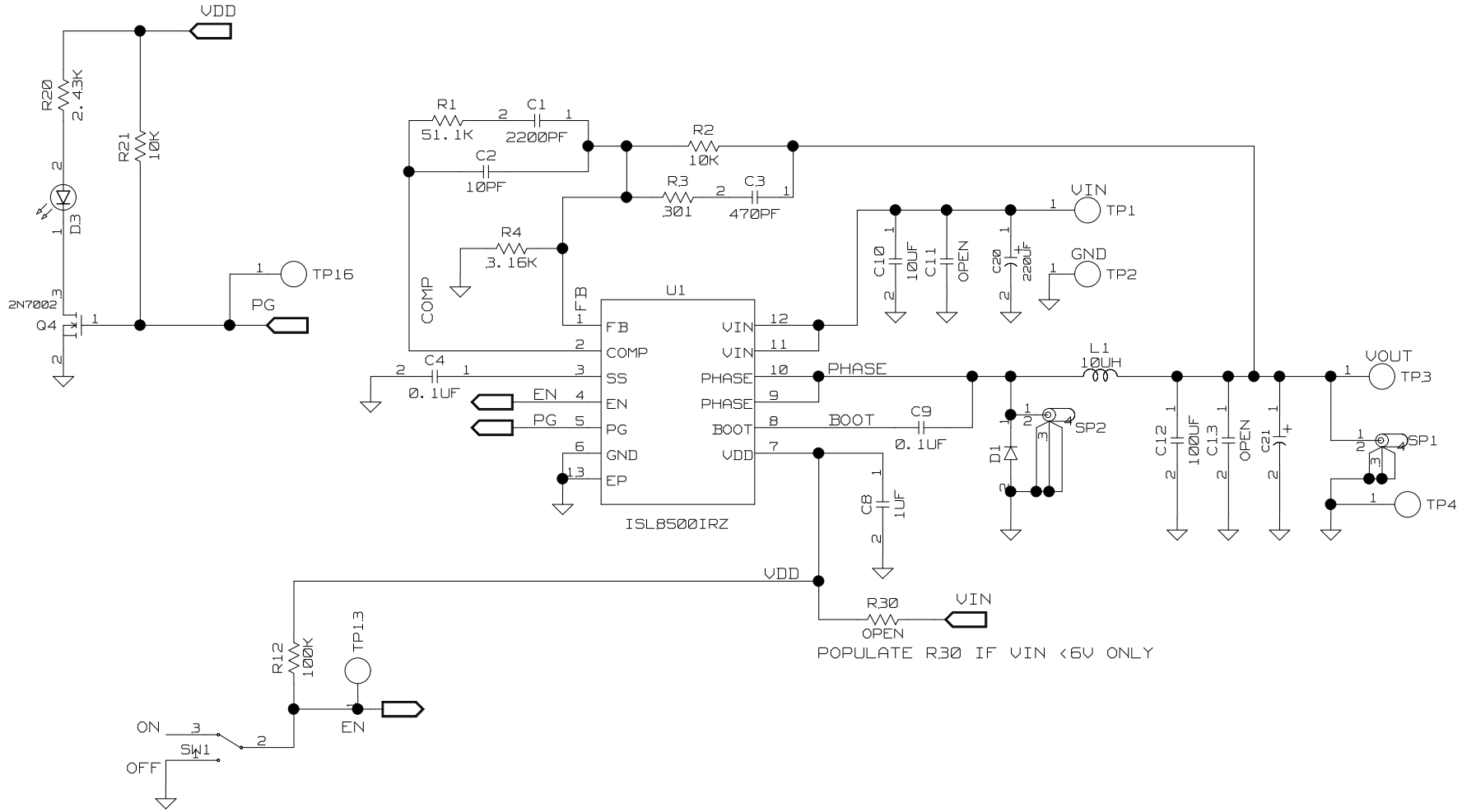


FIGURE 1. EXTERNAL RESISTOR DIVIDER

TABLE 1. SWITCH 1 SETTINGS

SW1	ENABLE	OPERATING MODE
1	SW1	Enable or disable the buck controller

Schematic



ISL8500EVAL1Z Bill of Materials

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
ISL8500EVAL1ZREVAPCB	1	ea		PWB-PCB, ISL8500EVAL1Z, REVA, ROHS	TITAN	ISL8500EVAL1ZREVAPCB
H1044-00222-50V10-T	1	ea	C1	CAP, SMD, 0402, 2200pF, 50V, 10%, X7R, ROHS	PANASONIC	ECJ-0EB1H222K
H1065-00106-25V10-T	1	ea	C10	CAP, SMD, 1206, 10µF, 25V, 10%, X5R, ROHS	VENKEL	C1206X5R250-106KNE
DNP	0	ea	C11, C13, C20, C21	DO NOT POPULATE OR PURCHASE		
H1082-00107-6R3V20-T	1	ea	C12	CAP, SMD, 1210, 100µF, 6.3V, 20%, X5R, ROHS	TDK	C3225X5R0J107M
					PANASONIC	ECJ-4YB0J107M
					AVX	12106D107MAT
H1044-00100-50V5-T	1	ea	C2	CAP, SMD, 0402, 10pF, 50V, 5%, NPO, ROHS	VENKEL	C0402COG500-100JNE
H1044-00471-50V10-T	1	ea	C3	CAP, SMD, 0402, 470pF, 50V, 10%, X7R, ROHS	PANASONIC	ECJ-0EB1H471K
					VENKEL	C0402X74500-471KNE
H1044-00104-16V10-T	1	ea	C4	CAP, SMD, 0402, 0.1µF, 16V, 10%, X7R, ROHS	MURATA	GRM36X7R104K016AD
					VENKEL	C0402X7R160-104KNE
H1045-00105-6R3V10-T	1	ea	C8	CAP, SMD, 0603, 1µF, 6.3V, 10%, X5R, ROHS	PANASONIC	ECJ1VB0J105K
C1608X7R1H104K-T	1	ea	C9	CAPACITOR, SMD, 0603, 0.10µF, 50V, 10%, X7R	TDK	C1608X7R1H104K
B340LB-13-F-T	1	ea	D1	DIODE-SCHOTTKY SMD, SMB, 2P, 40V, 3A LOW VF, ROHS	DIODES INC.	B340LB-13-F
LTST-C170CKT	1	ea	D3	LED-GaAs RED, SMD, 2x1.25mm, 100mW, 40mA, 10mcd, ROHS	LITEON/VISHAY	LTST-C170CKT
					ROHM	SML-210LTT86
					STANLEY ELECTRIC	BR112H-TR
IHLP2525CZRZ100M01	1	ea	L1	COIL-PWR INDUCTOR, SMD, 6.9x6.5, 10µH, 20%, 3A, ROHS	VISHAY	IHLP2525CZRZ100M01
2N7002-7-F-T	1	ea	Q4	TRANSISTOR,N-CHANNEL, 3LD, SOT-23, 60V, 115mA, ROHS	DIODES, INC.	2N7002-7-F
					ON SEMICONDUCTOR	2N7002LT1G
H2510-05112-1/16W1-T	1	ea	R1	RES, SMD, 0402, 51.1k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF5112X
					VENKEL	CR0402-16W-5112FT
H2510-01003-1/16W1-T	1	ea	R12	RES, SMD, 0402, 100k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ2RKF1003
H2510-01002-1/16W1-T	1	ea	R2	RES, SMD, 0402, 10k, 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF1002
					VENKEL	CR0402-16W-1002FT
H2511-02431-1/10W1-T	1	ea	R20	RES, SMD, 0603, 2.43k, 1/10W, 1%, TF, ROHS	VENKEL	CR0603-10W-2431FT
					YAGEO	RC0603FR-072K43L
H2511-01002-1/10W1-T	1	ea	R21	RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS	KOA	RK73H1JT1002F
					VENKEL	CR0603-10W-1002FT

ISL8500EVAL1Z Bill of Materials (Continued)

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
H2510-03010-1/16W1-T	1	ea	R3	RES, SMD, 0402, 301 Ω , 1/16W, 1%, TF, ROHS	PANASONIC	ERJ-2RKF3010X
					VENKEL	CR0402-16W-3010-FT
H2511-DNP	0	ea	R30	RES, SMD, 0603, DNP-PLACE HOLDER, ROHS		
H2510-03161-1/16W1-T	1	ea	R4	RES, SMD, 0402, 3.16k, 1/16W, 1%, TF, ROHS	VENKEL	CR0402-16W-3161FT
					PANASONIC	ERJ-2RKF3161X
					VISHAY/DALE	CRCW04023K16FKED
131-4353-00	2	ea	SP1,SP2	CONN-SCOPE PROBE TEST PT, COMPACT, PCB MNT, ROHS	TEKTRONIX	131-4353-00
GT11MSCBE-T	1	ea	SW1	SWITCH-TOGGLE, SMD, ULTRAMINI, 1P, SPST MINI	C&K COMPONENTS	GT11MSCKE
5002	2	ea	TP13,TP16	CONN-MINI TEST POINT, VERTICAL, WHITE, ROHS	KEYSTONE	5002
1514-2	4	ea	TP1-TP4	CONN-TURRET, TERMINAL POST, TH, ROHS	KEYSTONE	1514-2
ISL8500IRZ	1	ea	U1	IC-2A BUCK REGULATOR, 12P, DFN, 4x3, ROHS	INTERSIL	ISL8500IRZ

ISL8500EVAL1Z Board Layout

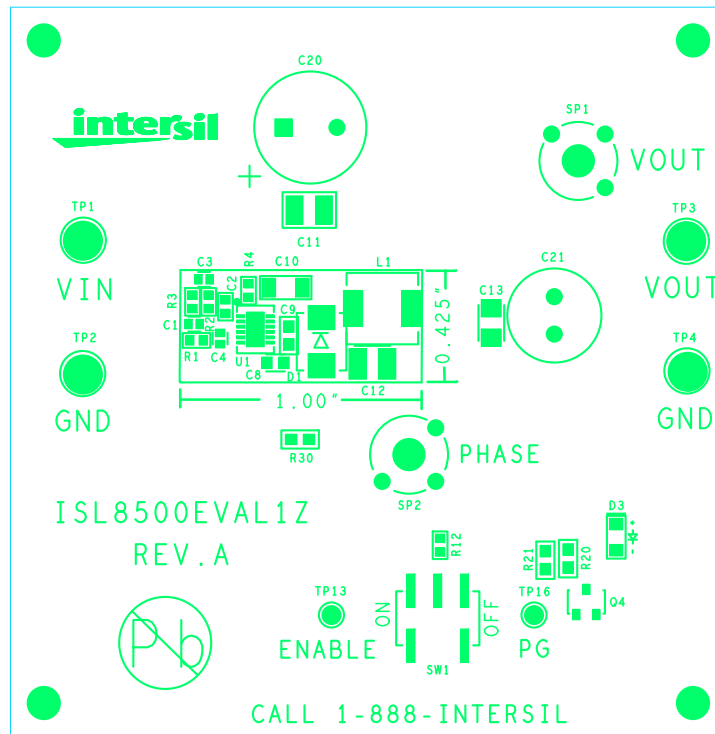


FIGURE 2. TOP COMPONENTS

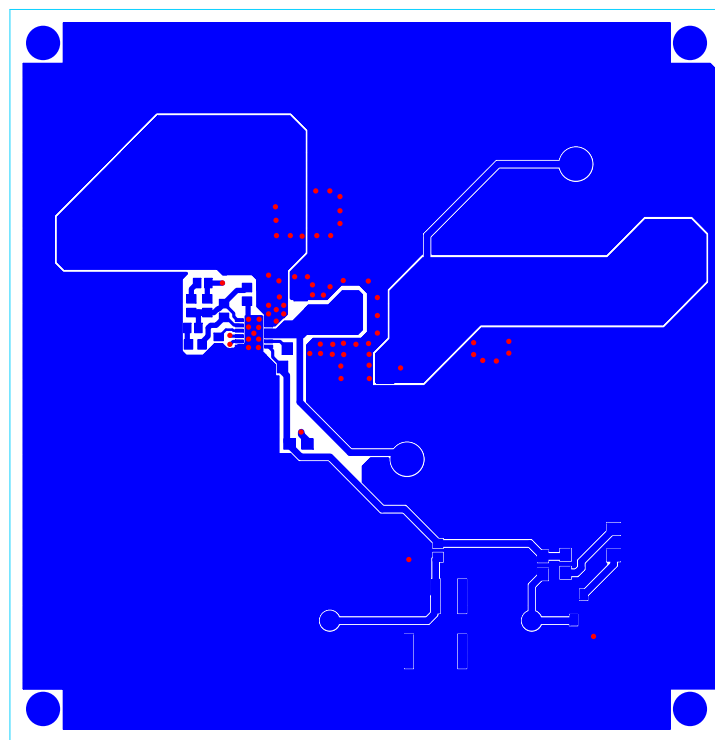


FIGURE 3. TOP LAYER ETCH

ISL8500EVAL1Z Board Layout (Continued)

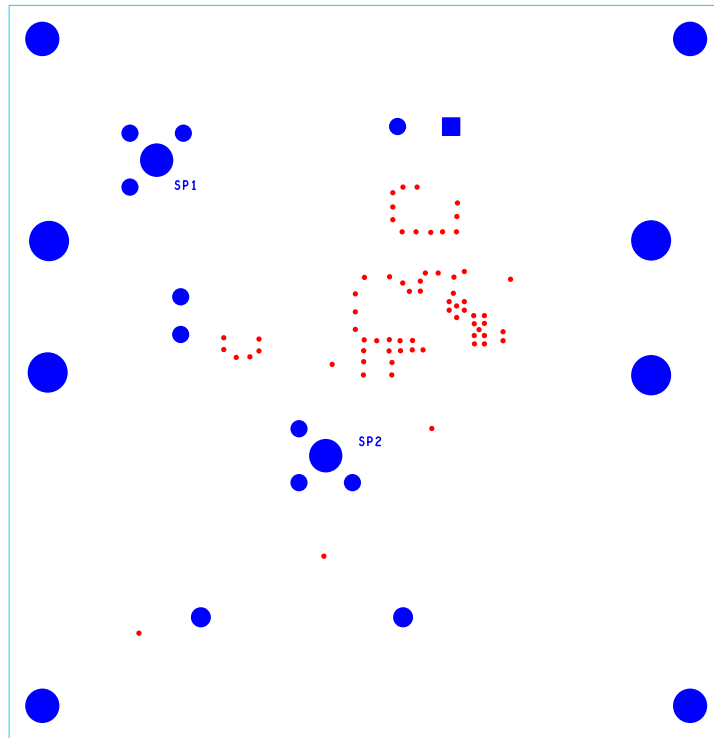


FIGURE 4. BOTTOM LAYER COMPONENTS (MIRRORED)

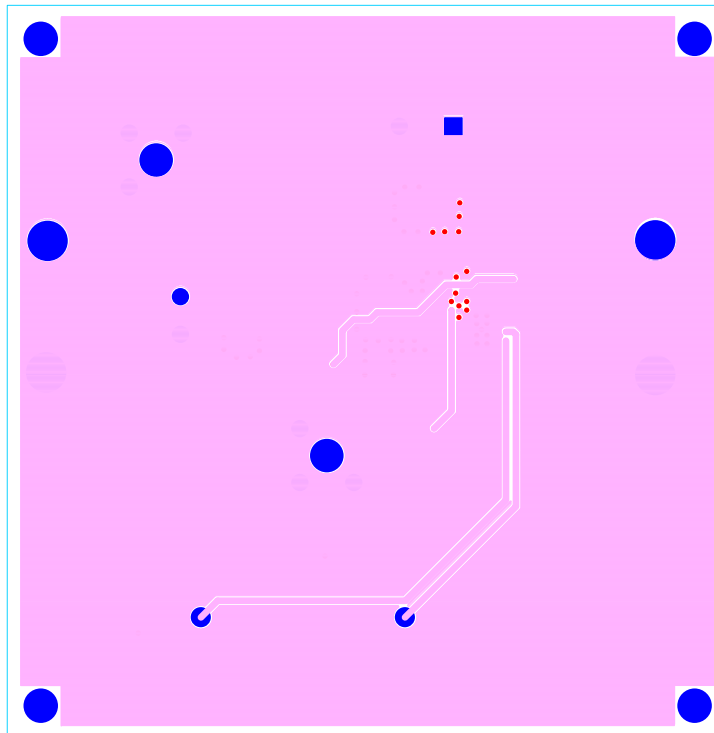


FIGURE 5. BOTTOM LAYER ETCH (MIRRORED)

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