# ISL85001EVAL1Z

1A Regulator Standard Buck PWM

AN1443
Rev 0.00
Dec 1, 2008

The ISL85001EVAL1Z REV A kit is intended for use by individuals with requirements for Point-of-Load applications sourcing from 4.5V to 25V. The ISL85001EVAL1Z evaluation board is used to demonstrate the performance of the ISL85001 standard buck regulator.

The ISL85001 is offered in a 4mmx3mm 12 Ld DFN package with 1mm maximum height. The complete converter occupies less than 0.425in$^2$ 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 19V with Continuous Output Current up to 1A
- Voltage Mode Control with Voltage Feed-Forward
- Fixed 500kHz Switching Frequency
- Externally Adjustable Soft-Start Time
- Output Undervoltage Protection
- Enable Inputs
- 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
- LCD Panel
- Set-top Box

## What's Inside

The Evaluation Board Kit contains the following materials:

- The ISL85001 EVAL REV A board
- The ISL85001 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 ISL85001EVAL 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 $R_2$ will depend on on the feedback resistor $R_1$, as referred to in Figure 1. The value of $R_1$ is typically between 1kΩ and 10kΩ. If the output voltage desired is 0.6V, then $R_2$ is left opened.

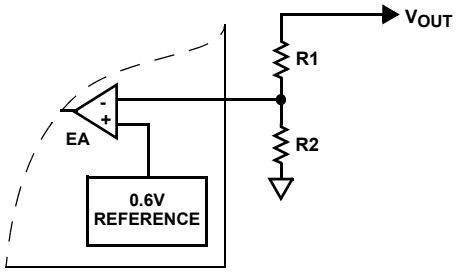
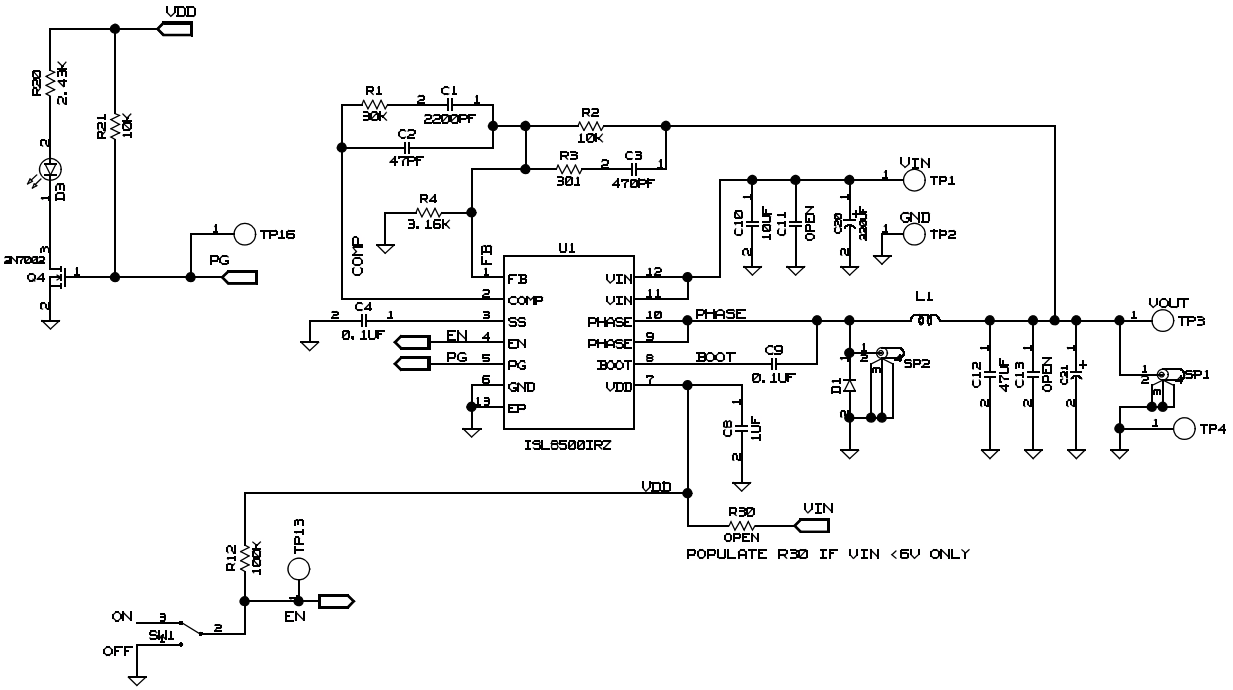



**FIGURE 1. EXTERNAL RESISTOR DIVIDER**

**TABLE 1. SWITCH 1 SETTINGS**

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

## *ISL85001EVAL1Z Schematic*



## *ISL85001EVAL1Z Bill of Materials*

| PART NUMBER | QTY | UNITS | REFERENCE DESIGNATOR | DESCRIPTION | MFR | MANUFACTURER PART |
|---|---|---|---|---|---|---|
| ISL85001EVAL1ZREVAPCB | 1 | ea | See Label-Rename Board | PWB-PCB, ISL85001EVAL1Z, REVA, ROHS | TITAN | ISL85001EVAL1ZREVAPCB |
| C1608X7R1H104K-T | 1 | ea | C9 | CAPACITOR, SMD, 0603, 0.10µF, 50V, 10%, X7R | TDK | C1608X7R1H104K |
| H1044-00104-16V10-T | 1 | ea | C4 | CAP, SMD, 0402, 0.1µF, 16V, 10%, X7R, ROHS | MURATA | GRM36X7R104K016AD |
| H1044-00222-50V10-T | 1 | ea | C1 | CAP, SMD, 0402, 2200pF, 50V, 10%, X7R, ROHS | PANASONIC | ECJ-0EB1H222K |
| H1044-00470-50V5-T | 1 | ea | C2 | CAP, SMD, 0402, 47pF, 50V, 5%, NPO, ROHS | MURATA | GRM36COG470J050AQ |
| H1044-00471-50V10-T | 1 | ea | C3 | CAP, SMD, 0402, 470pF, 50V, 10%, X7R, ROHS | PANASONIC | ECJ-0EB1H471K |
| H1045-00105-6R3V10-T | 1 | ea | C8 | CAP, SMD, 0603, 1µF, 6.3V, 10%, X5R, ROHS | PANASONIC | ECJ1VB0J105K |
| H1065-00106-25V10-T | 1 | ea | C10 | CAP, SMD,1206,10µF, 25V, 10%, X5R, ROHS | VENKEL | C1206X5R250-106KNE |
| H1082-00476-16V20-T | 1 | ea | C12 | CAP, SMD, 1210, 47µF, 16V, 20%, x5R, ROHS | TDK | C3225X5R1C476M |
| IHLP2525CZER220M11 | 1 | ea | L1 | COIL-PWR INDUCTOR, SMD, 6.9x6.5, 22µH, 20%, 7A, ROHS | VISHAY | IHLP2525CZER220M11 |
| 131-4353-00 | 2 | ea | SP1, SP2 | CONN-SCOPE PROBE TEST PT, COMPACT, PCB MNT, ROHS | TEKTRONIX | 131-4353-00 |
| 1514-2 | 4 | ea | TP1 to TP4 | CONN-TURRET, TERMINAL POST, TH, ROHS | KEYSTONE | 1514-2 |
| 5002 | 2 | ea | TP13, TP16 | CONN-MINI TEST POINT, VERTICAL, WHITE, ROHS | KEYSTONE | 5002 |
| 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 |
| ISL85001IRZ | 1 | ea | U1 | IC-2A BUCK REGULATOR, 12P, DFN, 4x3, ROHS | INTERSIL | ISL85001IRZ |
| 2N7002-7-F-T | 1 | ea | Q4 | TRANSISTOR, N-CHANNEL, 3LD, SOT-23, 60V, 115mA, ROHS | DIODES,INC. | 2N7002-7-F |
| H2510-01002-1/16W1-T | 1 | ea | R2 | RES, SMD, 0402, 10k, 1/16W, 1%, TF, ROHS | PANASONIC | ERJ-2RKF1002 |
| H2510-01003-1/16W1-T | 1 | ea | R12 | RES, SMD, 0402, 100k, 1/16W, 1%, TF, ROHS | PANASONIC | ERJ2RKF1003 |
| H2510-03002-1/16W1-T | 1 | ea | R1 | RES, SMD, 0402, 30k, 1/16W, 1%, TF, ROHS | YAGEO | RC0402FR-0730KL |
| H2510-03010-1/16W1-T | 1 | ea | R3 | RES, SMD, 0402, 301Ω, 1/16W, 1%, TF, ROHS | PANASONIC | ERJ-2RKF3010X |

## *ISL85001EVAL1Z Bill of Materials* (Continued)

| PART NUMBER | QTY | UNITS | REFERENCE DESIGNATOR | DESCRIPTION | MFR | MANUFACTURER PART |
|---|---|---|---|---|---|---|
| H2510-03161-1/16W1-T | 1 | ea | R4 | RES, SMD, 0402, 3.16k, 1/16W, 1%, TF, ROHS | VENKEL | CR0402-16W-3161FT |
| H2511-01002-1/10W1-T | 1 | ea | R21 | RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS | KOA | RK73H1JT1002F |
| H2511-02431-1/10W1-T | 1 | ea | R20 | RES, SMD, 0603, 2.43k, 1/10W, 1%, TF, ROHS | VENKEL | CR0603-10W-2431FT |
| H2511-DNP | 0 | ea | R30 | RES, SMD, 0603, DNP-PLACE HOLDER, ROHS | | |
| GT11MSCBE-T | 1 | ea | SW1 | SWITCH-TOGGLE, SMD, ULTRAMINI, 1P, SPST MINI | C&K COMPONENTS | GT11MSCKE |
| 4-40x1/2-SCREW | 4 | ea | Four corners | SCREW, 4-40x1/2in, PAN, NYLON, PHILLIPS, ROHS | | |
| 4-40x3/4-STANDOFF | 4 | ea | Four corners | STANDOFF, 4-40x3/4in, F/F, HEX, NYLON | KEYSTONE | 1902D |
| 5x8-STATIC-BAG | 1 | ea | Place assy in bag. | BAG, STATIC, 5x8, ZIP LOC | INTERSIL | 212403-013 |
| DNP | 0 | ea | C11, C13, C20, C21 | DO NOT POPULATE OR PURCHASE | | |
| LABEL-RENAME BOARD | 1 | ea | RENAME PCB TO: ISL85001EVAL1Z | LABEL, TO RENAME BRD | | |
| LABEL-SERIAL NUMBER | 1 | ea | | LABEL, FOR SERIAL NUMBER AND BOM REV # | | |

## *ISL85001EVAL1Z Board Layout*

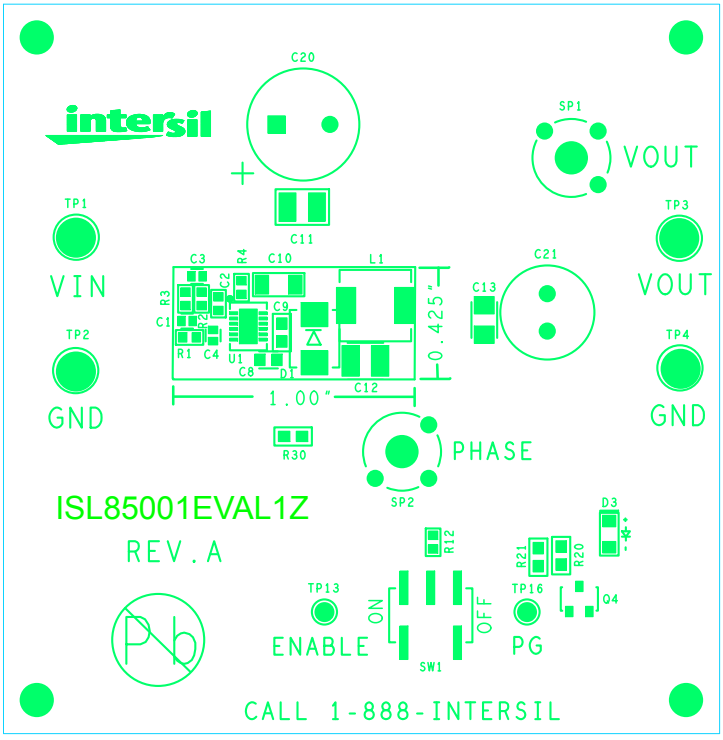



**FIGURE 2. TOP COMPONENTS**

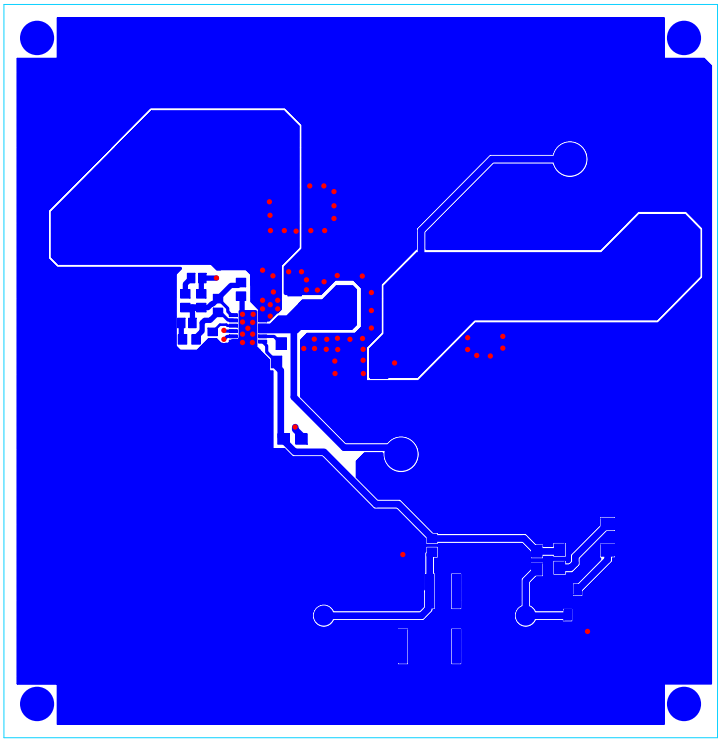


**FIGURE 3. TOP LAYER ETCH**

## *ISL85001EVAL1Z Board Layout* (Continued)

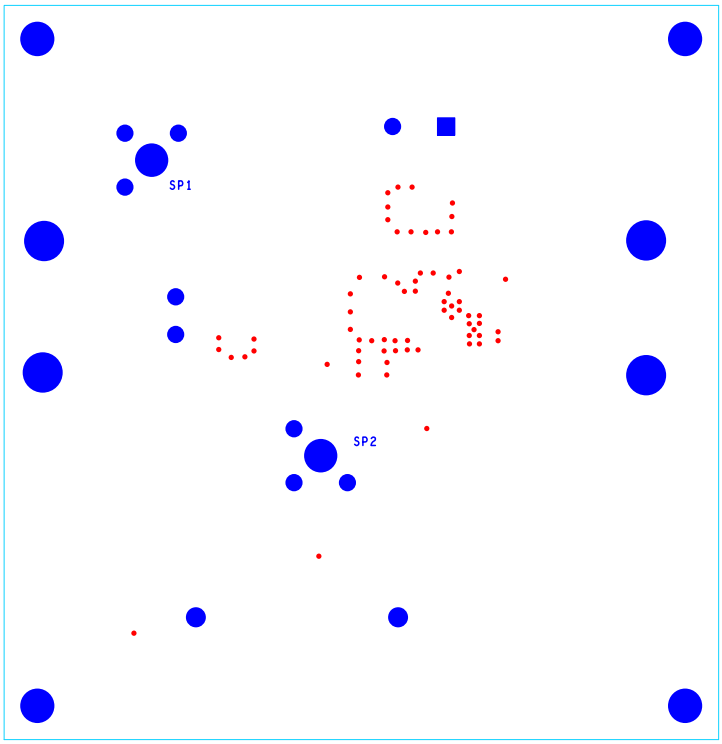



FIGURE 4. BOTTOM LAYER COMPONENTS (MIRRORED)

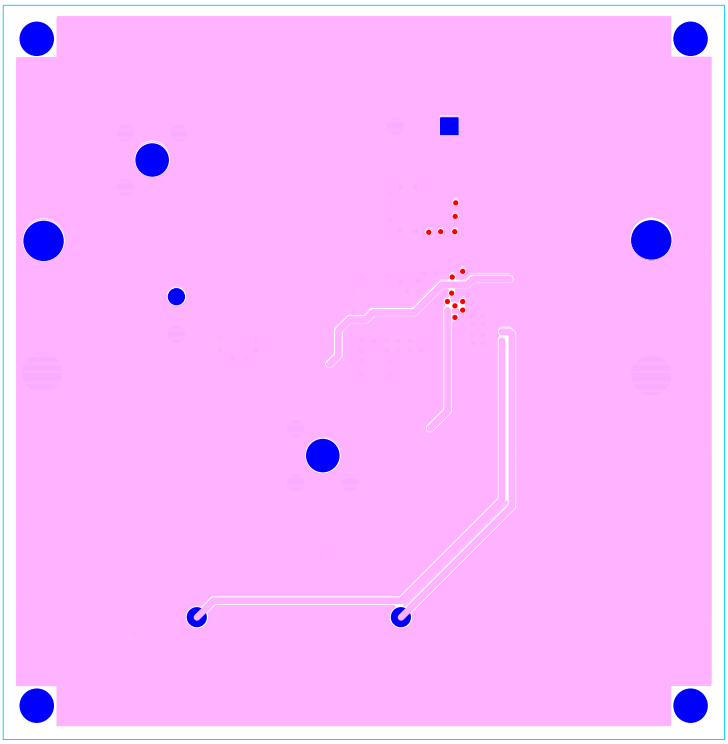


FIGURE 5. BOTTOM LAYER ETCH (MIRRORED)

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