

ISL8013EVAL1

Monolithic DC/DC Evaluation Board Setup Procedure

AN1241
Rev 1.00
Jun 1, 2006

This document describes the setup procedure for the ISL8013EVAL1 Rev A board.

Description

The General Purpose market requires maximum flexibility in its power management solutions due to the large variety of applications produced each year. The ISL8013 services this need by offering a multitude of functionality, combined with features that allow it to work in many different application spaces.

From a functional standpoint, the ISL8013 is an ideal controller for designers that want a "plug and play" solution. It delivers a regulated output voltage from 0.8V to 5.5V at a maximum current of 3A, with 11 or fewer total components. Its 14 Ld HTSSOP package, combined with integrated MOSFET switches and compensation, yield a solution size below 0.36in². This small form factor makes the ISL8013 a desirable solution for any application where board space is a premium (PDAs, cell phones, etc.).

Additional features include a power good (PG) indicator for output voltage monitoring, and a clock frequency synchronizing input (SYNC). The SYNC input allows the regulator to switch anywhere between the nominal 1.4MHz frequency and 12MHz. Synchronizing multiple switching devices on the same bus eliminates beat-frequency oscillations that can be detrimental to noise-sensitive applications.

The ISL8013 supports power up into applications with pre-biased loads by allowing Pulse Frequency Modulation (PFM) during the soft-start period.

Overall, the ISL8013 delivers a robust, highly integrated DC/DC buck converter for a variety of General Purpose applications. For a more detailed description of the ISL8013, refer to the data sheet [1].

The Intersil General Purpose family of monolithic switching power supplies continues to expand with new selections to better fit our customer's needs.

References

- [1] Refer to our website for updated information and the ISL8013 data sheet: www.intersil.com.

Features

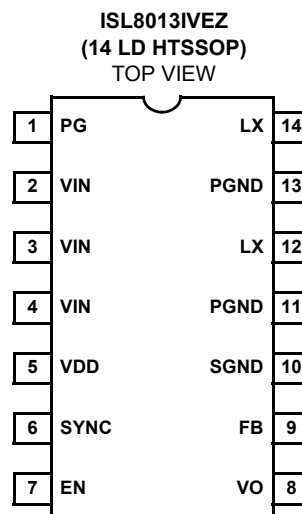
- Less than 0.36in² footprint for the complete 3A converter
- Components on one side of PCB
- Max height 1.2mm HTSSOP14
- Power-Good (PG) output
- Internally-compensated voltage mode controller
- Up to 95% efficiency
- <1μA shut-down current
- Hiccup mode overcurrent and over-temperature protection
- External synchronization up to 12MHz
- Pb-free plus anneal available (RoHS compliant)

Ordering Information

PART NUMBER (Note)	TAPE & REEL	PACKAGE (Pb-Free)	PKG. DWG. #
ISL8013IVEZ	-	14 Ld HTSSOP	MDP0048
ISL8013IVEZ-T7	7"	14 Ld HTSSOP	MDP0048
ISL8013IVEZ-T13	13"	14 Ld HTSSOP	MDP0048

NOTE: Intersil Pb-free plus anneal products employ special Pb-free material sets; molding compounds/die attach materials and 100% matte tin plate termination finish, which are RoHS compliant and compatible with both SnPb and Pb-free soldering operations. Intersil Pb-free products are MSL classified at Pb-free peak reflow temperatures that meet or exceed the Pb-free requirements of IPC/JEDEC J STD-020.

Pinout



What's Inside

The Evaluation Board Kit contains the following materials:

- The ISL8013EVAL1 Rev A Evaluation Board
- The ISL8013 data sheet
- The ISL8013 Evaluation Board Setup Procedure (this document)

What is Needed

The following materials will be needed to perform testing:

- 1 electronic load [see note]
- 1 power supply: 0-6V @ 5A (see note)
- 2 precision digital multimeters
- Oscilloscope

NOTE: amperage rating of power supplies and loads are determined by maximum expected loading plus a percentage margin of error

Quick Setup Guide

- Step 1:** Set the +VIN power supply to +3.3V and place in the "STANDBY" or "OFF" position. Set the supply current limit to 5A. Connect the positive terminal (+) of the supply to the VIN terminal P4 and the negative terminal (-) of the supply to GND P5.
- Step 2:** Connect the positive terminal (+) of a DMM to the VIN terminal P4 and the negative terminal (-) to the GND terminal P5.
- Step 3:** Connect the positive terminal (+) of the electronic load to the VOUT terminal P7. Connect the negative terminal (-) of the electronic load to the GND terminal P8. Make sure the electronic load is set to the 0A condition.
- Step 4:** Connect the positive terminal (+) of a DMM to the VOUT terminal P7 and the negative terminal (-) to the GND terminal P8.
- Step 5:** Check to ensure all jumpers and switches are in their default positions prior to application of power (refer to Table 1).
- Step 6:** Set all power supplies to the "ON" position. LED D1 should be off. Check all DMM displays for correct voltage levels. Adjust if necessary.
- Step 7:** Turn the ENABLE switch S1 to the "ON" position. LED D1 should glow red. The VOUT DMM should read 1.80V ($\pm 5\%$).

At this point the board has been properly powered up. Normal testing can begin.

NOTE: If you need technical assistance, or other assistance, with the ISL8013 Evaluation Board, call 1-888-INTERSIL (468-3774).

TABLE 1. DETAILED DESCRIPTION OF SWITCH SETTINGS

SWITCH	POSITION	FUNCTION
S1	ON	ENABLE ISL8013
	OFF (default)	DISABLE ISL8013

TABLE 2. DETAILED DESCRIPTION OF TEST POINTS

REF DES	TYPE	FUNCTION
P1	Test Point	SYNC Input: HIGH = Force PWM LOW = Auto PFM/PWM Switching = Clock Sync
P2	Test Point	GND
P3	Test Point	PGOOD Output
P6	Test Point	External Enable NOT. S1 is required to be in the ON position.
J1	Oscilloscope	Kelvin LX Measurement
J2	Oscilloscope	Kelvin VOUT Measurement
P4	Binding Post	GND
P5	Binding Post	VIN
P7	Binding Post	VOUT
P8	Binding Post	GND

EVAL Board Information

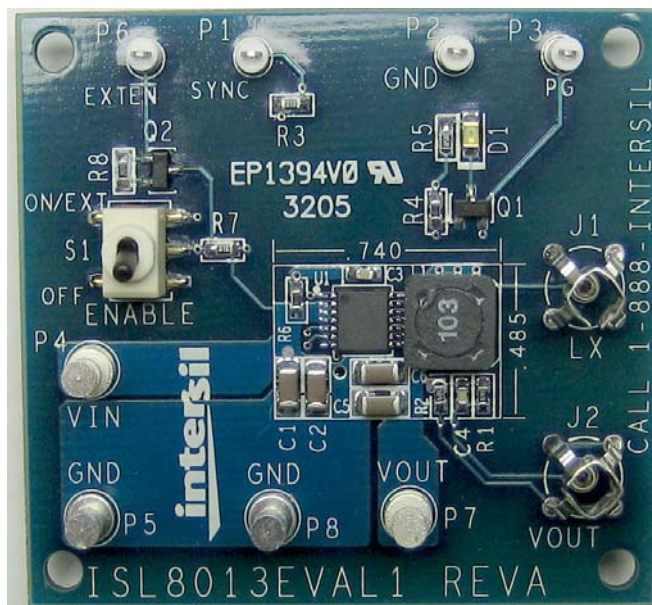


FIGURE 1. ISL8013EVAL1 REV A EVALUATION BOARD



TABLE 3. BILL OF MATERIALS

ITEM	QTY	REFERENCE	VALUE	TYPE	FOOTPRINT	VOLTAGE
1	1	U1		Intersil ISL8013	HTSSOP14	
2	2	J1, J2		Tektronix Scope Jack		
3	2	Q1, Q2		N-Channel MOSFET: 2N7002	SOT-23	
4	4	C1, C2, C5, C6	10 μ F	Generic ceramic capacitor	1206	6.3V
5	1	C3	1 μ F	Generic ceramic capacitor	0603	6.3V
6	1	C4	470pF	Generic ceramic capacitor	0603	6.3V
7	1	L1	1 μ H	Pulse: P1166.162		
8	1	S1		SPDT Switch: GT11MSCKE		
9	1	R1	124k Ω	Generic thick film chip resistor	0603	
10	1	R2	100k Ω	Generic thick film chip resistor	0603	
11	3	R3, R7, R8	1k Ω	Generic thick film chip resistor	0603	
12	1	R4	10k Ω	Generic thick film chip resistor	0603	
13	1	R5	750 Ω	Generic thick film chip resistor	0603	
14	1	R6	10 Ω	Generic thick film chip resistor	0603	
15	1	D1		Liteon: LTST-C170CKT	0603	
16	4	P1, P2, P3, P6		Test Points		
17	4	P4, P5, P7, P8		Binding Posts		

Eval Board Layout

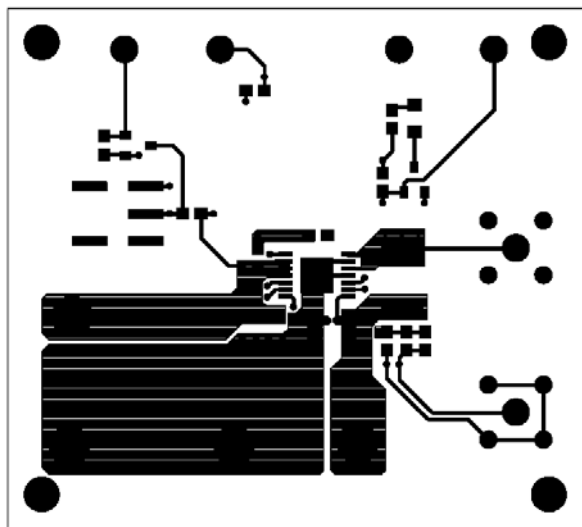


FIGURE 2. EVAL BOARD TOP LAYER ROUTING (ETCH)

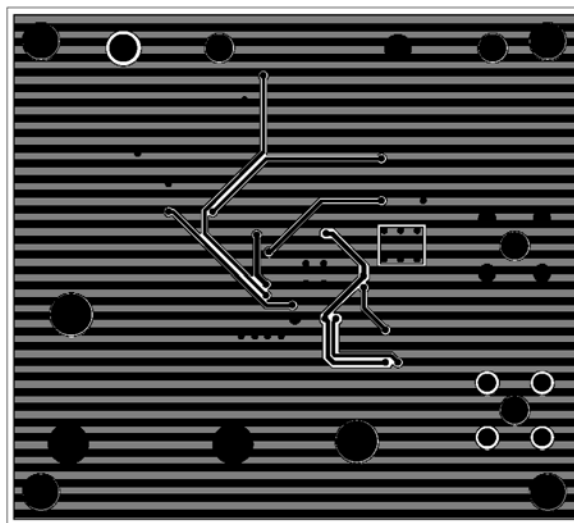


FIGURE 3. EVAL BOARD BOTTOM LAYER ROUTING (ETCH)

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
 2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
 3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
 4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
 5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
 6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
 7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
 8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
 9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
 10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
 11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
 12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.
- (Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.
- (Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)



SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852-2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886-2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338