

ISL80410EVAL1Z

User's Manual: Evaluation Board

Industrial Analog and Power

ISL80410EVAL1Z

Evaluation Board

UG157
Rev.0.00
Jan 18, 2018

1. Overview

The ISL80410EVAL1Z evaluation board is designed to demonstrate the performance of the [ISL80410](#) high voltage linear regulator. The evaluation board is available with jumpers to set the output voltage from 2.5V to 12V by configuring a single resistor. The evaluation board can also be configured to give a specific output voltage.

1.1 Key Features

- Wide V_{IN} range of 6V to 40V
- Adjustable output voltage from 2.5V to 12V
- I_{OUT} is 150mA
- Ultra low 18 μ A typical quiescent current
- $\pm 1\%$ accurate voltage reference
- Overcurrent protection
- Over-temperature/thermal protection

1.2 Specifications

The board has been configured and optimized for the following operating conditions:

- $V_{IN} = 6V$ to 40V
- $V_{OUT} = 2.5V$ to 12V
- I_{OUT} maximum is 150mA
- Selectable output by setting jumper pins JP2 through JP8
- JP1 for setting custom output voltage

1.3 Ordering Information

| Part Number | Description |
|----------------|--|
| ISL80410EVAL1Z | 40V Linear Regulator, 150mA evaluation board |

1.4 Related Literature

- For a full list of related documents, visit our website
 - [ISL80410](#) product page

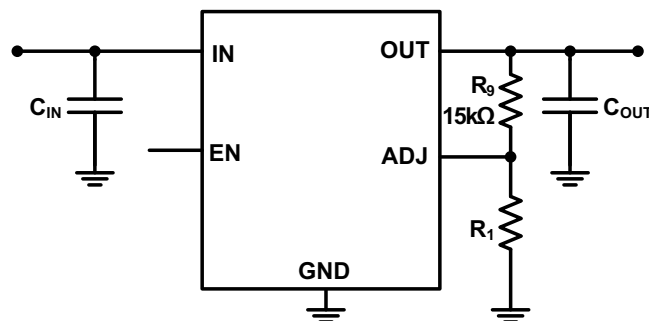


Figure 1. ISL80410EVAL1Z Block Diagram

2. Functional Description

The ISL80410EVAL1Z provides a simple platform to evaluate the performance of the ISL80410, a high input voltage, low quiescent current linear regulator. The ISL80410 can provide 150mA current with only 18μA typical quiescent current. The regulator features a wide input voltage range of 6V to 40V. The output voltage is adjustable from 2.5V to 12V through a feedback resistor divider. The ISL80410 is ideal for applications that need the load to operate under “always-on” or “stay alive” conditions of a high input voltage or under load dump conditions in which the system voltage may peak much higher than normal. In addition, the low dropout performance and high PSRR make this regulator a good choice as a post regulator for a noisy voltage bus.

The ISL80410EVAL1Z evaluation board is set up so that the user can easily configure the device for a specific output voltage with a single jumper. Jumper pins JP4 through JP7 set the output voltage through a discrete range of 2.5V to 12V. When jumper JP1 is set, the user must populate R₁ with a resistor to get a custom output voltage.

The regulator uses a voltage divider to set the feedback reference for setting output voltage. The voltage at the output of the linear regulator when setting a custom output voltage is defined by [Equation 1](#). R₉ is set on the evaluation board at 15kΩ. Rearranging for R₁ yields [Equation 2](#).

$$(EQ. 1) \quad V_{OUT} = 1.223V \times \left(\frac{R_9}{R_1} + 1 \right)$$

$$(EQ. 2) \quad R_1 = \frac{18.3k\Omega}{V_{OUT} - 1.223}$$

Table 1. Evaluation Board Output Voltage

| V _{OUT} (V) | RSET | Jumper Setting |
|----------------------|---|----------------|
| 2.5 | 14kΩ | JP4 |
| 3.3 | 8.66kΩ | JP5 |
| 5 | 4.75kΩ | JP6 |
| 12 | 1.65kΩ | JP7 |
| Custom | R ₁ = 18.3kΩ/(V _{OUT} - 1.223V) | JP1 |

2.1 Quick Start Guide

- (1) Set the appropriate jumper for the desired output voltage.
- (2) Set jumper JP9, shorting pins 1 and 2, to enable the device.
- (3) Connect a supply of +6V to +40V to the VIN and GND terminals.
- (4) Connect VOUT to a load or a multimeter to evaluate the output.

3. PCB Layout Guidelines

Good PCB layout is important to achieve expected performance. Take care when placing the components and routing the trace to minimize the ground impedance and keep the parasitic inductance low. The input and output capacitors should have a good ground connection and be placed as close to the IC as possible. The ADJ feedback trace should be away from other noisy traces. Connect the exposed pad to the ground plane using as many vias as possible within the pad for the best thermal relief.

3.1 ISL80410EVAL1Z Evaluation Board



Figure 2. ISL80410EVAL1Z Evaluation Board (Top)

3.2 ISL80410EVAL1Z Schematic

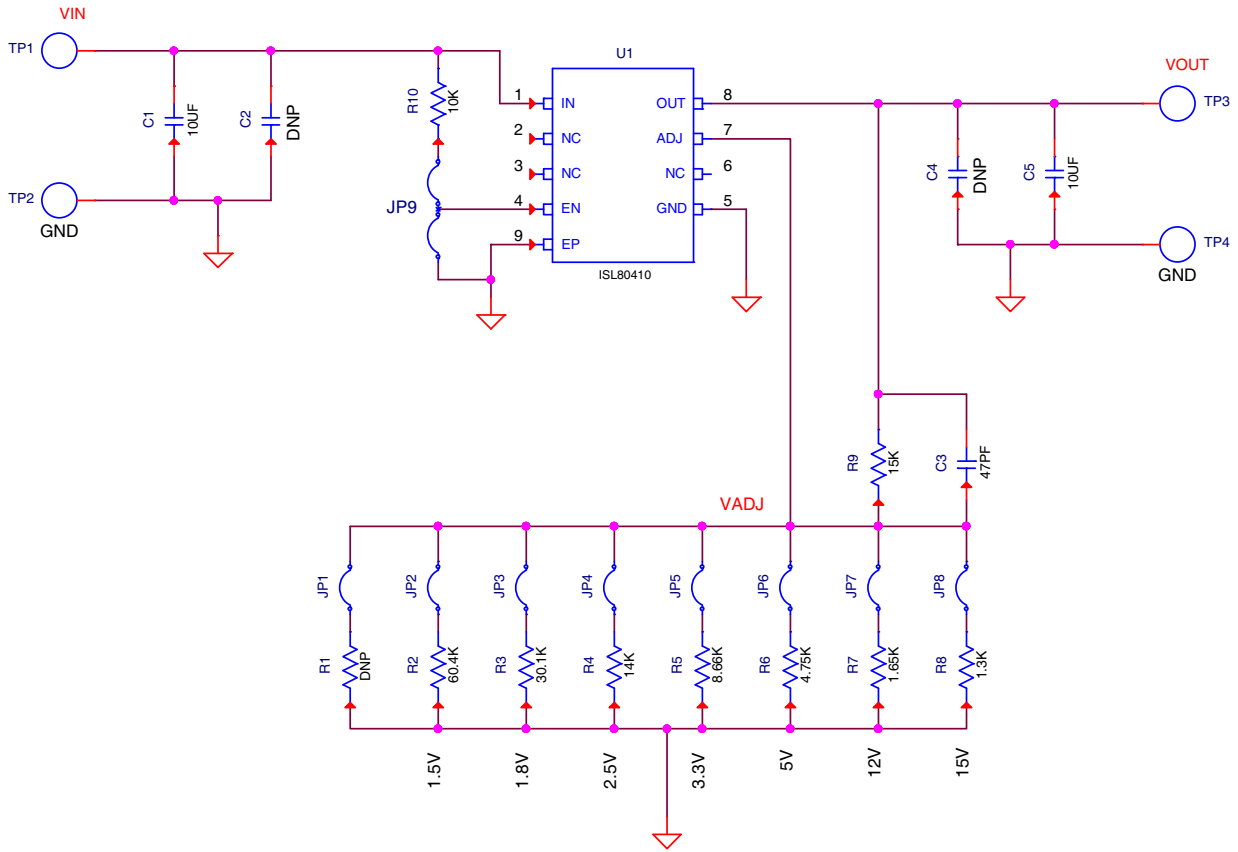


Figure 3. Schematic

3.3 Bill of Materials

| Qty | Reference Designator | Description | Manufacturer | Manufacturer Part Number |
|-----|--|---|--------------|--------------------------|
| 1 | C3 | CAP, SMD, 0603, 47pF, 50V, 5%, C0G, NP0, ROHS | AVX | 06035A470JAT2A |
| 4 | C1, C2, C4, C5 | CAP, SMD, 1206, 10µF, 50V, 10%, X5R, ROHS | TDK | C3216X5R1H106K |
| 4 | TP1, TP2, TP3, TP4 | CONN-TURRET, TERMINAL POST, TH, ROHS | Keystone | 1514-2 |
| 1 | JP9 | CONN-HEADER, 1x3, BREAKAWY 1x36, 2.54mm, ROHS | Berg/FCI | 68000-236HLF |
| 8 | JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8 | CONN-HEADER, 1X2, RETENTIVE, 2.54mm, 0.230x 0.120, ROHS | Berg/FCI | 69190-202HLF |
| 2 | JP6, JP9-Pins 1 and 2 | CONN-JUMPER, SHORTING, 2PIN, BLACK, GOLD, ROHS | Sullins | SPC02SYAN |
| 1 | U1 | IC-40V LDO ADJ. LINEAR REGULATOR, 8P, EPSOIC, ROHS | Renesas | ISL80410 |
| 1 | R10 | RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS | KOA | RK73H1JT1002F |
| 1 | R8 | RES, SMD, 0603, 1.3k, 1/10W, 1%, TF, ROHS | Vishay/Dale | CRCW06031K30FKTA |
| 1 | R4 | RES, SMD, 0603, 14k, 1/10W, 1%, TF, ROHS | Venkel | CR0603-10W-1402FT |
| 1 | R9 | RES, SMD, 0603, 15k, 1/10W, 1%, TF, ROHS | Panasonic | ERJ-3EKF1502V |
| 1 | R7 | RES, SMD, 0603, 1.65k, 1/10W, 1%, TF, ROHS | Panasonic | ERJ-3EKF1651V |
| 1 | R3 | RES, SMD, 0603, 30.1k, 1/10W, 1%, TF, ROHS | Venkel | CR0603-10W-3012FT |
| 1 | R6 | RES, SMD, 0603, 4.75k, 1/10W, 1%, TF, ROHS | Venkel | CR0603-10W-4751FT |
| 1 | R2 | RES, SMD, 0603, 60.4k, 1/10W, 1%, TF, ROHS | Yageo | RC0603FR-0760K4L |
| 1 | R5 | RES, SMD, 0603, 8.66k, 1/10W, 1%, TF, ROHS | Panasonic | ERJ-3EKF8661V |
| 0 | R1 | RES, SMD, 0603, DNP-PLACE HOLDER, ROHS | | |

3.4 Board Layout

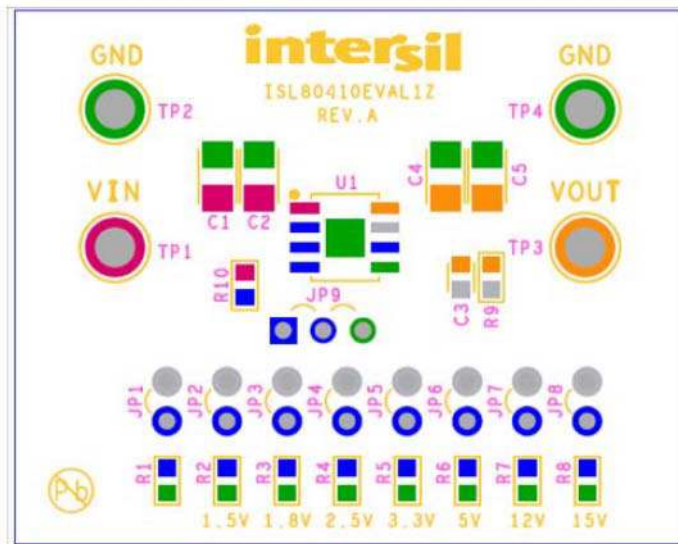


Figure 4. ISL80410EVAL1Z Silkscreen Top

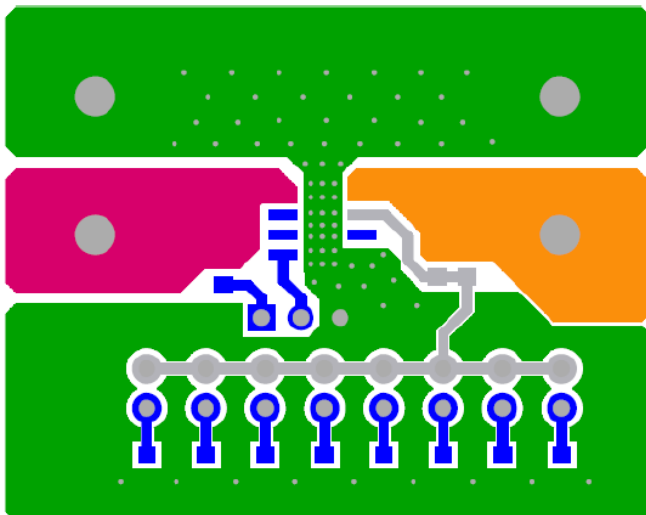


Figure 5. ISL80410EVAL1Z Top

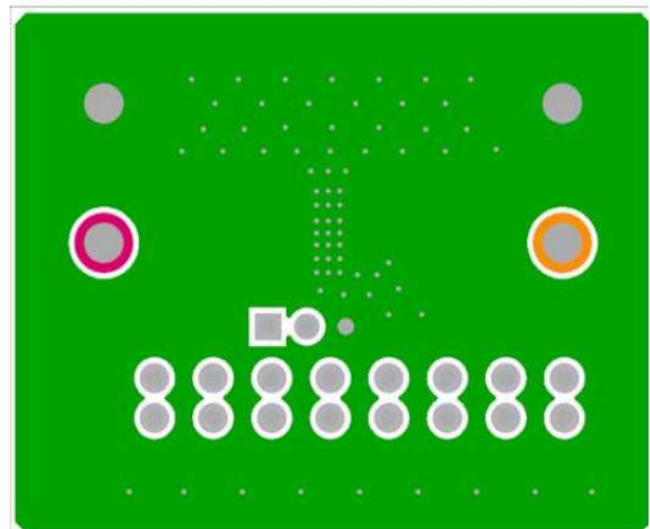


Figure 6. ISL80410EVAL1Z Bottom

4. Typical Performance Curves

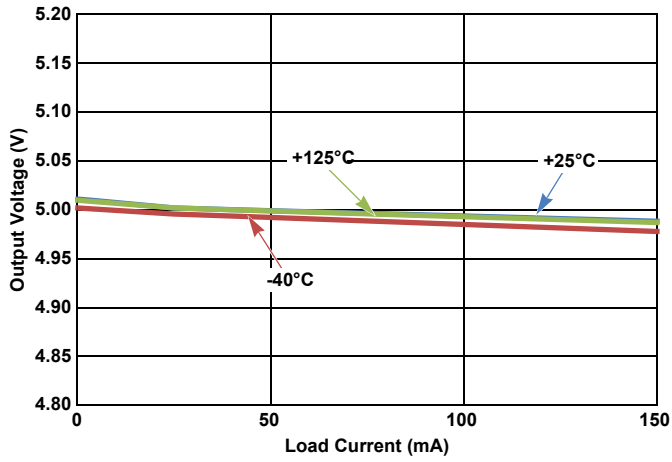


Figure 7. ISL80410 Output Voltage vs Load Current

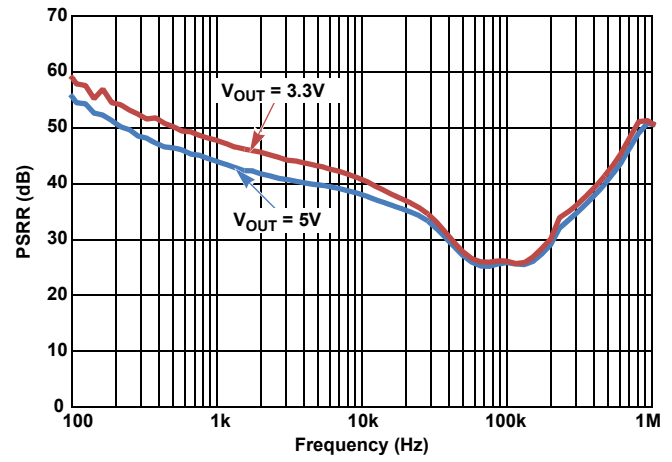


Figure 8. ISL80410 PSRR vs Frequency for Various Output Voltages, (Load = 150mA)

5. Revision History

| Rev. | Date | Description |
|------|--------------|-----------------|
| 0.00 | Jan 18, 2018 | Initial release |

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

ISL80410EVAL1Z

