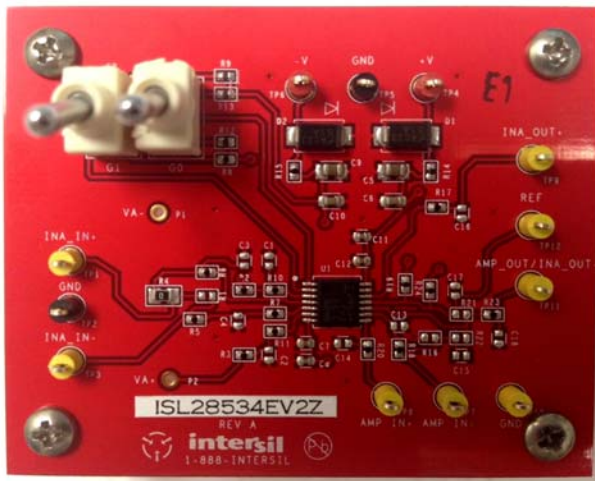


Introduction

The ISL2853xEV2Z and ISL2863xEV2Z boards allow simple evaluation of the ISL2853x and ISL2863x 5V zero drift programmable gain instrumentation amplifiers. The boards are designed with all necessary components to easily connect the high performance amplifier to an external signal and can operate from a single supply of +2.5V to +5.5V or dual supply of $\pm 1.25V$ to $\pm 2.75V$.

The [ISL28533](#), [ISL28534](#), [ISL28535](#) are differential input, single-ended output instrumentation amplifiers. The [ISL28633](#), [ISL28634](#), [ISL28635](#) are differential input, differential output instrumentation amplifiers, suited to drive differential ADCs. The amplifier can be programmed with 9 gain settings over a range of 1V/V to 1,000V/V using only two logic inputs. Refer to the [ISL2853x](#), [ISL2863x](#) datasheet for more information on programming the gain of the instrumentation amplifier.



Reference Documents

- [ISL2853x](#), [ISL2863x](#) datasheet

High Precision Amplifier

The ISL2853x and ISL2863x family of instrumentation amplifiers offer very low offset, noise and offset drift using zero drift amplifier circuitry. With precision matched internal gain resistors these amplifiers offer high gain accuracy while reducing the need for additional external resistors in applications that need different gain settings. Combined with rail-to-rail input and output, the ISL2853x and ISL2863x instrumentation amplifiers are ideal for single supply low noise, high precision amplification and signal conditioning.

Input Common Mode Range

The ISL2853x and ISL2863x are designed using the 3 op-amp topology that has a first stage differential amplifier (gain) and second stage difference amplifier (common-mode rejection). Since the common-mode voltage is buffered in the first stage and eliminated in the second stage it is important not to saturate the output of the first stage. An input signal with high V_{CM} will have limited gain range before saturation. Refer to [ISL2853x](#), [ISL2863x](#) datasheet for more information on V_{CM} vs V_{OUT} limitations of the instrumentation amplifier.

VA+ and VA- Pinouts

Unique to the ISL2853x and ISL2863x, instrumentation amplifiers are the outputs of the first stage differential amplifier pinned out of the device called VA+ and VA- for the INA+ and INA- inputs respectively. As the common mode voltage is buffered, the VA pins can be used to sense the input V_{CM} . This is important for sensor applications that track the V_{CM} voltage for sensor health monitors. Refer to [ISL2853x](#), [ISL2863x](#) datasheet for more information on monitoring the input V_{CM} .

Getting Started

- Connect power supply to V+ and V- pins. Single supply +2.5V to +5V. Dual supply $\pm 1.25V$ to $\pm 2.5V$.
- Connect voltage to the REF pin for setting the output reference. The board has 1k Ω resistors to V+ and V- to preset the output reference voltage to midscale of supply voltage.
- Set gain of instrumentation amplifier by setting the G0 and G1 gain switches into proper state as shown in [Table 2](#).
- Connect the differential input voltage to the left side of the eval board.
- Measure the output voltage of the instrumentation amplifier on the right side of the evaluation board.
- (IMPORTANT) For the ISL2853xEV2Z boards, the additional op amp inputs (AMP IN+ and AMP IN-) are floating. If the op amp is not used, for proper operation place a 0 Ω at R22 and terminate AMP IN+ to ground through C14 or TP8.

TABLE 1. KEY PERFORMANCE SPECIFICATION

PARAMETER	VALUE	UNITS
Input Offset Voltage	5	μV
Input Offset Drift	50	nV/ $^{\circ}C$
Gain Accuracy	0.05	%
Gain Drift	10	ppm/ $^{\circ}C$
0.1Hz to 10Hz Noise Peak-to-Peak	0.25	μV_{p-p}
Input Noise Density, f = 1kHz	20	nV/ \sqrt{Hz}
CMRR	120	dB
Gain Bandwidth Product	2	MHz

TABLE 2. PROGRAMMABLE GAIN SWITCHING

G1	G0	GAIN		
		ISL28533 ISL28633	ISL28534 ISL28634	ISL28535 ISL28635
0	0	1	1	1
0	Z	2	2	100
0	1	4	10	120
Z	0	5	50	150
Z	Z	10	100	180
Z	1	20	200	200
1	0	40	300	300
1	Z	50	500	500
1	1	100	1000	1000

TABLE 3. ORDERING INFORMATION

BOARD PART NUMBER	OUTPUT	GAIN RANGE
ISL28533EV2Z	Single-ended	1 to 100
ISL28534EV2Z		1 to 1,000
ISL28535EV2Z		1 to 1,000
ISL28633EV2Z	Differential	1 to 100
ISL28634EV2Z		1 to 1,000
ISL28635EV2Z		1 to 1,000

ISL2853xEV2Z, ISL2863xEV2Z Evaluation Boards Layout

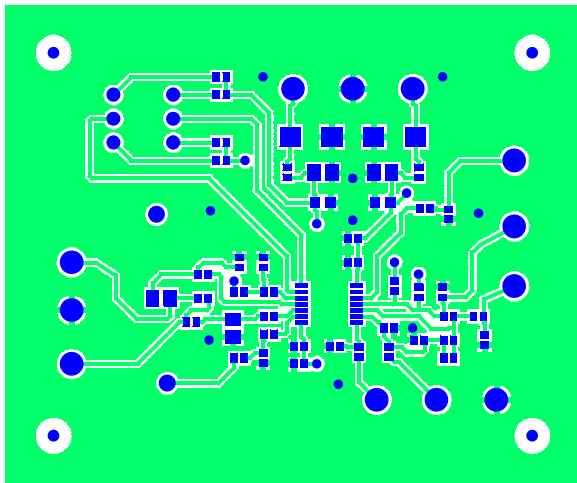


FIGURE 1. TOP LAYER PCB

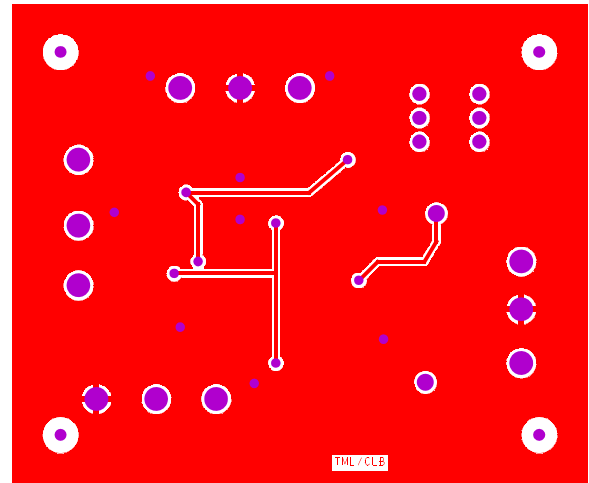


FIGURE 2. BOTTOM LAYER PCB

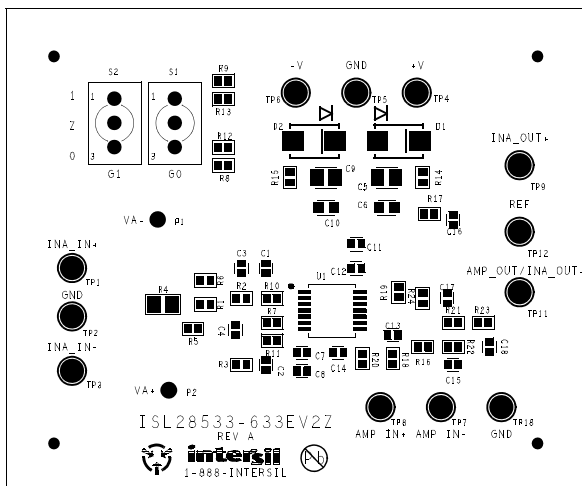


FIGURE 3. ASSEMBLY TOP LAYER

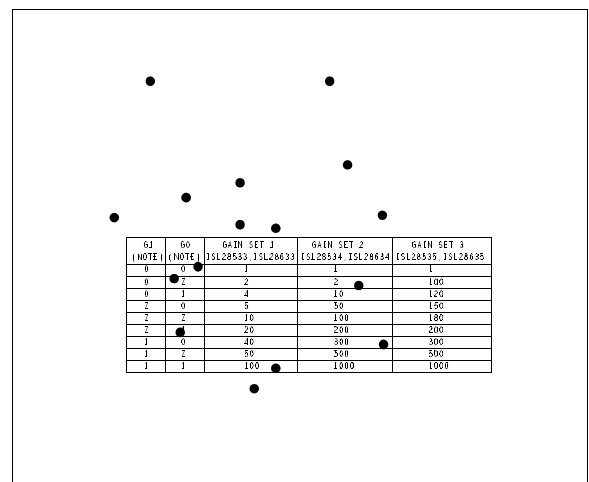


FIGURE 4. BOTTOM LAYER SILKSCREEN

ISL2853xEV2Z, ISL2863xEV2Z Schematic

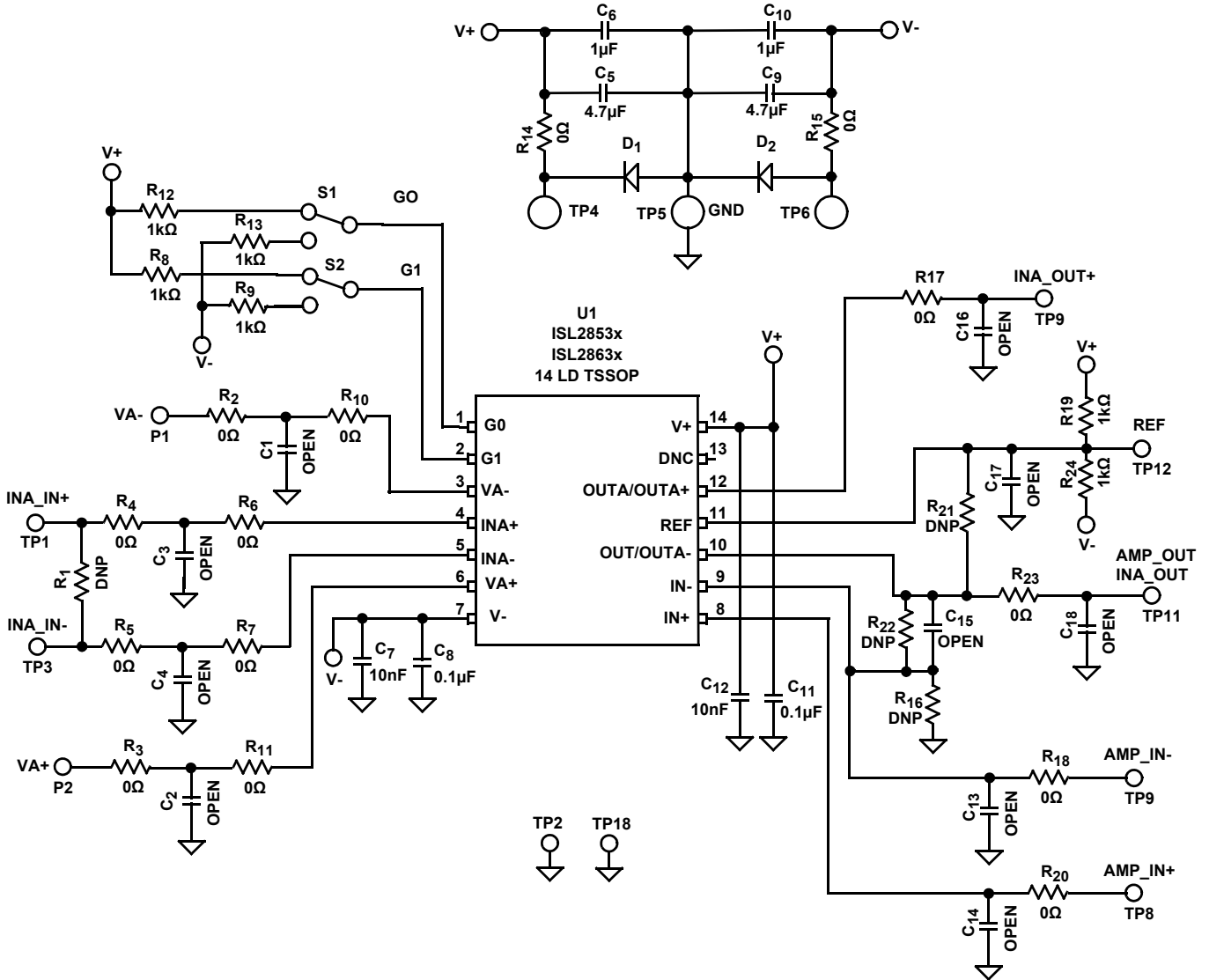


FIGURE 5. SCHEMATIC FOR ISL2853x AND ISL2863x EVALUATION BOARDS

TABLE 4. BILL OF MATERIALS

PART #	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER
ISL28533FVZ ISL28534FVZ ISL28535FVZ ISL28633FVZ ISL28634FVZ ISL28635FVZ	U1	Programmable Zero Drift Instrumentation Amplifier	Intersil
GRM155R71E103KA01	C7, C12	0.01 μ F SMD Capacitor; 10%; 25V	Murata
H1044-00104-16V10	C8, C11	0.1 μ F SMD Capacitor; 10%; 16V	Generic
DNP	C1-C4, C13-C18	DNP; Placeholder	Generic
H1045-00105-16V20	C6, C10	1 μ F SMD Capacitor; 20%; 16V	Generic
H1046-00475-10V20	C5, C9	4.7 μ F SMD Capacitor; 20%; 10V	Generic
S1A	D1, D2	1A SMD Rectifier Diode	DIODES-INC
H2510-00R00-1/16W	R2, R3, R5-R7, R10, R11, R14, R15, R17, R18, R20, R23	0 Ω SMD Resistor; 1%; 1/16W	Generic
H2510-01001-1/16W1	R8, R9, R12, R13, R19, R24	1k Ω SMD Resistor; 1%; 1/16W	Generic
DNP	R1, R16, R21, R22	DNP; Placeholder	Generic
H2512-00R00-1/10W	R4	0 Ω SMD Resistor; 1%; 1/10W	Generic
ET03SD1CBE	S1, S2	SEALED SUBMINIATURE TOGGLE SWITCH	ITT CANNON - C&K

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