RENESAS

USER'S MANUAL

ISL2853xEV2Z, ISL2863xEV2Z

Evaluation Boards User Guide

AN1880 Rev.2.00 Feb 23, 2016

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 <u>ISL28533</u>, <u>ISL28534</u>, <u>ISL28535</u> are differential input, single-ended output instrumentation amplifiers. The <u>ISL28633</u>, <u>ISL28634</u>, <u>ISL28635</u> 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 <u>1V/V</u> to <u>1</u>,000V/V using only two logic inputs. Refer to the <u>ISL2853x</u>, <u>ISL2863x</u> 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 $1k\Omega$ resistors to V+ and V- to preset the output reference voltage to midscale of supply voltage.
- Set gain of instrumentation amplifier by setting the GO and G1 gain switches into proper state as shown in <u>Table 2</u>.
- 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/°C
Gain Accuracy	0.05	%
Gain Drift	10	ppm/°C
0.1Hz to 10Hz Noise Peak-to-Peak	0.25	μV _{P-P}
Input Noise Density, f = 1kHz	20	nV/√Hz
CMRR	120	dB
Gain Bandwidth Product	2	MHz



		GAIN			
G1	GO	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 2. PROGRAMMABLE GAIN SWITCHING

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







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	0.01µF SMD Capacitor; 10%; 25V	Murata	
H1044-00104-16V10	C8, C11	0.1µF SMD Capacitor; 10%; 16V	Generic	
DNP	C1-C4, C13-C18	DNP; Placeholder	Generic	
H1045-00105-16V20	C6, C10	1µF SMD Capacitor; 20%; 16V	Generic	
H1046-00475-10V20	C5, C9	4.7µF 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	0Ω SMD Resistor; 1%; 1/16W	Generic	
H2510-01001-1/16W1	R8, R9, R12, R13, R19, R24	1kΩ SMD Resistor; 1%; 1/16W	Generic	
DNP	R1, R16, R21, R22	DNP; Placeholder	Generic	
H2512-00R00-1/10W	R4	0Ω SMD Resistor; 1%; 1/10W	Generic	
ET03SD1CBE	S1, S2	SEALED SUBMINIATURE TOGGLE SWITCH	ITT CANNON - C&K	



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(Rev.4.0-1 November 2017)



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