ISL70218SRH Evaluation Board User's Guide

Introduction

The ISL70218SRHMEVAL1Z evaluation board is designed to evaluate the performance of the rad hard ISL70218 40V Precision Low Power Operational Amplifier. The ISL70218 is a single supply, rail-to-rail output, dual amplifier with ground sensing inputs that allow the common mode input voltage to swing 0.5V below the V- rail. The ISL70218 can operate from a single or dual supply with a 3V to 40V supply range. The ISL70218 features very low power, low offset voltage and low temperature drift, making it ideal for applications for precision instrumentation, current sensing and power supply and industrial process controls.

Reference Documents

- ISL70218 Data Sheet, FN7871

Evaluation Board Key Features

- Single Supply Operation: +3V to +40V
- Dual Supply Operation: +1.8V/-1.2V to ±20V
- Singled-Ended or Differential Input Operation
- External VREF Input
- Banana Jack Connectors for Power Supply and VREF Inputs
- BNC Connectors for Op Amp Input and Output Terminals
- Convenient PCB Pads for Op Amp Input/Output Impedance loading.

Power Supplies

External power connections are made through the +V, -V, VREF and Ground connections on the evaluation board. For single supply operation, the -V and Ground pins are tied together to the power supply negative terminal. For split supplies, +V and -V terminals connect to their respective power supply terminals. De-coupling capacitors C2, C3, C4 and C6 connect to their respective supplies through R11 and R15 resistors. These resistors are 100Ω but can be changed by the user to provide additional power supply filtering, or to reduce the voltage rate-of-rise to less than ±1V/μs. Two additional capacitors, C5 and C7, are connected close to the part to filter out high frequency noise. Anti-reverse diode D1 protects the circuit in the momentary case of accidentally reversing the power supplies to the evaluation board. The VREF pin can be connected to ground to establish a ground referenced input for split supply operation, or can be externally set to any reference level for single supply operation.
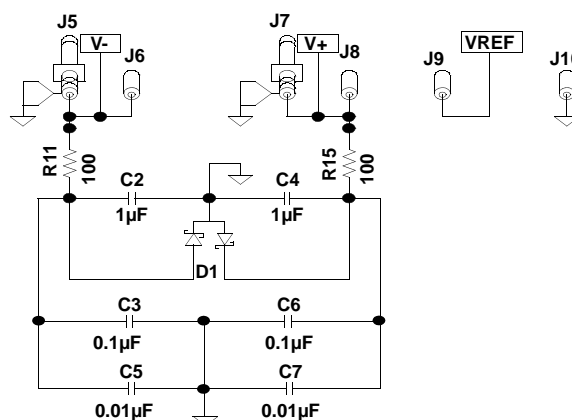

FIGURE 1. POWER SUPPLY CIRCUIT

Amplifier Configuration

A simplified schematic of the evaluation board is shown in Figure 2. The input stage with the components supplied is shown in Figure 3, with a closed loop gain of 10V/V. The differential amplifier gain is expressed in Equation 1:

$$V_{OUT} = (V_{IN+} - V_{IN-}) \bullet (R_F / R_{IN}) + V_{REF} \qquad \text{(EQ. 1)}$$

For single-ended input with an inverting gain G = -10V/V, the IN+ input is grounded and the signal is supplied to the IN- input. VREF can be connected to a reference voltage between the V+ and V- supply rails. For non-inverting operation with G = 11V/V, the IN- input is grounded and the signal is supplied to the IN+ input. The non-inverting gain is strongly dependent on any resistance from IN- to GND. For good gain accuracy, a 0Ω resistor should be installed on the empty R5 pad. The VREF pin must be connected to ground to establish a ground referenced input for dual supply operation, or can be externally set to any reference level for single supply operation. VREF should not be left floating.
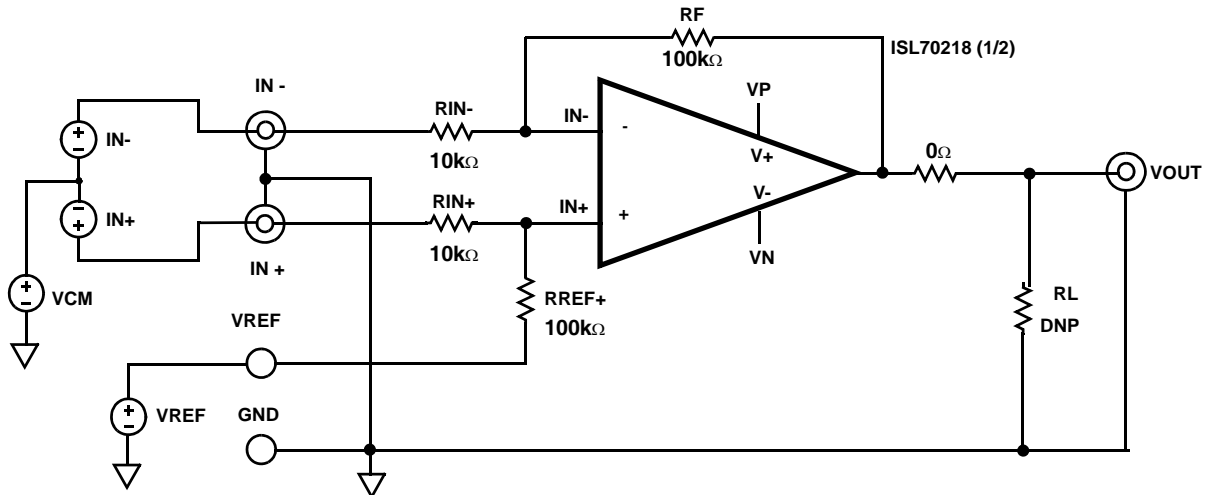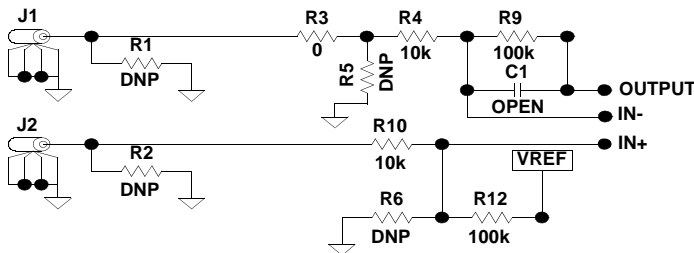
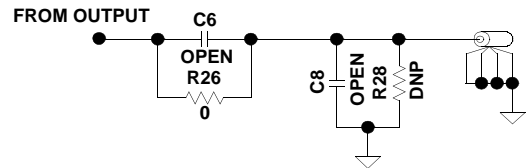FIGURE 2. BASIC AMPLIFIER CONFIGURATION

FIGURE 3. INPUT STAGE (1/2)

FIGURE 4. OUTPUT STAGE (1/2)

User-selectable Options

Component pads are included to enable a variety of user-selectable circuits to be added to the amplifier VREF, inputs, outputs, and the amplifier feedback loops.

A voltage divider (Figure 3, R6 and R12) can be added to establish a power supply-tracking common mode reference using the VREF input. The input stages (see Figure 3) have additional resistor and/or capacitor pads that maybe used to add voltage divider networks or feedback networks for adding input attenuation, or to establish input DC offsets through the VREF pin. The ouptut stages (see Figure 4) have additional resistor and capacitor placements for loading.

NOTE: Operational amplifiers are sensitive to output capacitance and may oscillate. In the event of oscillation, reduce output capacitance by using shorter cables, or add a resistor in series with the output.

TABLE 1. ISL70218SRHMEVAL1Z COMPONENTS PARTS LIST

| DEVICE #	DESCRIPTION	COMMENTS
C2, C4	CAP, SMD, 1210, 1µF, 50V, 10%, X7R, ROHS	Power Supply Decoupling
C3, C6	CAP, SMD, 0805, 0.1µF, 50V, 10%, X7R, ROHS	Power Supply Decoupling
C5, C7	CAP, SMD, 0603, 0.01µF, 50V, 10%, X7R, ROHS	Power Supply Decoupling
C1, C8-C12	CAP, SMD, 0603, DNP-PLACE HOLDER, ROHS	User selectable capacitors - not populated
D1	DIODE-RECTIFIER, SMD, SOD-123, 2P, 40V, 0.5A, ROHS	Reverse Power Protection
U1	ISL70218SRHM, DUAL OP-AMP, 10Ld. FLATPAK	
R1, R2, R5-R8, R14, R20, R23, R24,	RESISTOR, SMD, 0603, 0.1%, MF, DNP-PLACE HOLDER	User selectable resistors - not populated
R3, R20-R22	RES, SMD, 0603, 0Ω, 1/10W,TF, ROHS	Zero ohm user selectable resistors
R4, R10, R17, R18	RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS	Gain resistors
R10, R12, R13, R16	RES, SMD, 0603, 100k, 1/10W, 1%, TF, ROHS	Gain resistors
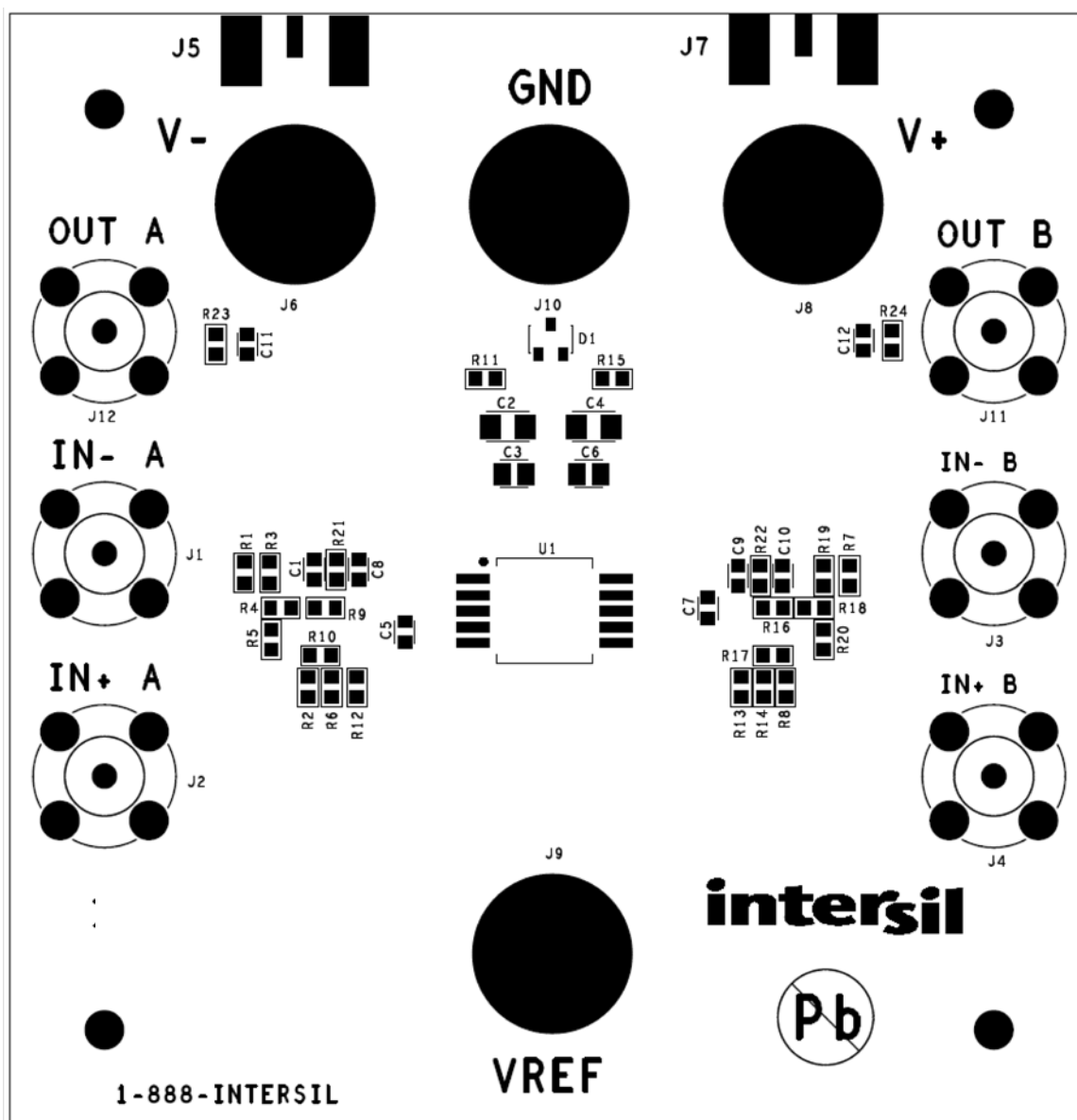
FIGURE 5. ISL70218SRHMEVAL1Z TOP VIEW

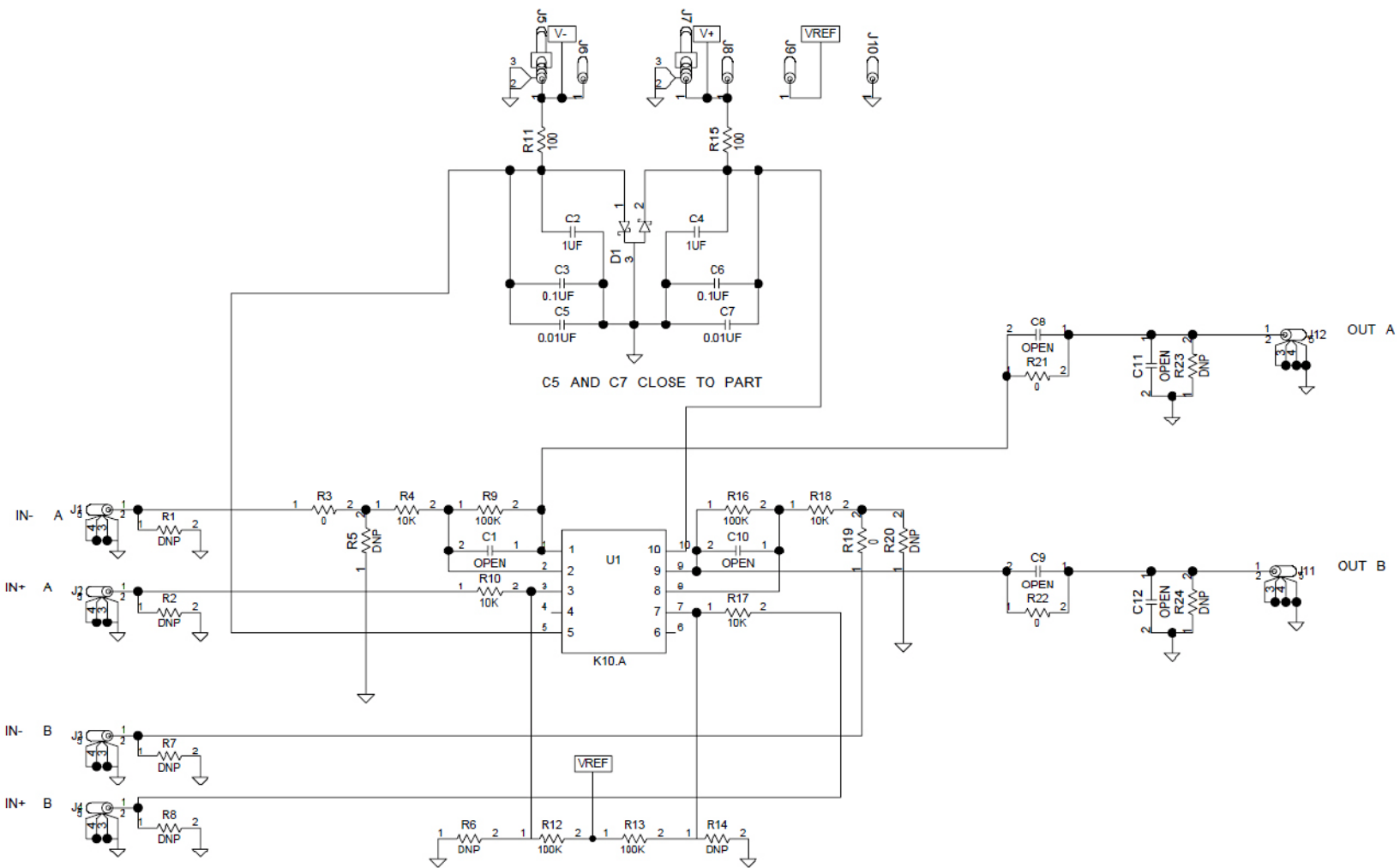For information regarding Intersil Corporation and its products, see www.intersil.com

FIGURE 6. ISL70218SRHMEVAL1Z SCHEMATIC DIAGRAM