## Introduction

The ISL2828xEVAL1Z evaluation board is a design platform containing all the circuitry needed to characterize critical performance parameters of the ISL28286 and ISL28288 dual operational amplifiers, using a variety of user defined test circuits.

The ISL2828x amplifiers feature low noise, low distortion, and rail-to-rail output drive capability. They are designed to operate with single and dual supplies from +5 VDC ( $\pm 2.5 \mathrm{VDC})$ down to $+2.4 \mathrm{VDC}( \pm 1.2 \mathrm{VDC})$.

## Reference Documents

- ISL28286 Data Sheet, FN6312
- ISL28288 Data Sheet, FN6339


## Evaluation Board Key Features

The ISL2828xEVAL1Z is designed to enable the IC to operate from a single supply ( +2.4 VDC to +5 VDC ), or from split supplies ( $\pm 1.2 \mathrm{VDC}$ to $\pm 2.5 \mathrm{~V}$ ). The board is configured for 2 independent op amps connected for differential input with a closed loop gain of 10. A single external reference voltage (VREF) pin and provisions for a user-selectable voltage divider (filter is included).

## Power Supplies (Figure 1)

External power connections are made through the $\mathrm{V}+$, V 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 $\mathrm{C}_{12}, \mathrm{C}_{17}$, connect to ground through $\mathrm{R}_{1}, \mathrm{R}_{46}, 0 \Omega$ resistors. Resistors $\mathrm{R}_{40}$ and
$\mathrm{R}_{49}$ are $0 \Omega$ but can be changed by the user to provide additional power supply filtering, or to reduce the voltage rate-of-rise to less than $\pm 1 \mathrm{~V} / \mu \mathrm{s}$. Two additional capacitors, $\mathrm{C}_{10}$ and $\mathrm{C}_{18}$, are connected close to the part to filter out high frequency noise. Anti-reverse diodes $D_{1}, D_{2}$ and zener diode $D_{3}$ protect the circuit in the case of accidental polarity reversal.


FIGURE 1. POWER SUPPLY CIRCUIT

## Amplifier Configuration (Figure 2)

The schematic of each of the 2 op amps with the components supplied is shown in Figure 2. The circuit implements a differential input amp with a closed loop gain of 10. The circuit can operate from a single 2.4 VDC to +5 VDC supply, or from dual supplies from $\pm 1.2 \mathrm{VDC}$ to $\pm 2.5 \mathrm{VDC}$. 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 2. BASIC AMPLIFIER CONFIGURATION

## User-Selectable Options (Figures 3 to 5)

Component pads are included to enable a variety of user-selectable circuits to be added to the amplifier inputs, the VREF input, outputs and the amplifier feedback loops. The outputs (Figure 3) have additional resistor and capacitor placements for loading.

A voltage divider and filter option (Figure 4) can be added to establish a power supply-tracking common mode reference at the VREF input. The inverting and non-inverting inputs have additional resistor placements for adding input attenuation, or to establish input DC offsets through the VREF pin.


FIGURE 3. 1/2 OUTPUT STAGE


FIGURE 4. $1 / 2$ INPUT STAGE

In the standard configuration (Figure 5), $\mathrm{R}_{41}$ and $\mathrm{R}_{45}$ are RF feedback resistors for the two independent amplifiers, set for $A V=10$. Resistors $\mathrm{R}_{47}$ and $\mathrm{R}_{48}$ connect the DUT output to the output circuit (Figure 3). The additional unpopulated components, $\mathrm{R}_{34}$ to $\mathrm{R}_{39}, \mathrm{R}_{42}$ to $\mathrm{R}_{44}, \mathrm{C}_{10}, \mathrm{C}_{11}, \mathrm{C}_{13}$ to $\mathrm{C}_{15}$ and $\mathrm{C}_{18}$ allow the user to configure the board for a variety of other applications such as cascaded gain stages, active feedback loops, etc.


FIGURE 5. OPTIONAL COMPONENTS

## ISL2828xEVAL1Z Components Parts List

| DEVICE NUMBER | DESCRIPTION | COMMENTS |
| :---: | :---: | :---: |
| C9, C12, C17 | CAP-TANTALUM, SMD, D, 4.7 $\mu \mathrm{F}, 50 \mathrm{~V}, 10 \%$, LOW ESR, ROHS | Power supply decoupling |
| C10,C18 | CAP, SMD, 0603, $0.1 \mu \mathrm{~F}, 25 \mathrm{~V}, 10 \%$, X7R, ROHS | Power supply decoupling |
| C6-C25 | CAP, SMD, 0603, DNP-PLACE HOLDER, ROHS | User selectable capacitors not populated |
| D1,D2 | DIODE-RECTIFIER, SMD, SOD-123, 2P, 40V, 0.5A, ROHS | Reverse power protection |
| D3 | DIODE-ZENER, SMD, SOD-123, 2P, 5.1V, 350mV, ROHS | Reverse power protection |
| U1 (ISL28286EVAL1Z) | ISL28286FAZ, IC-RAIL-TO-RAIL PRECISION OP AMP, 16P, QSOP, ROHS |  |
| U1 (ISL28288EVAL1Z) | ISL28288FAZ, IC-RAIL-TO-RAIL PRECISION OP AMP, 16P, QSOP, ROHS |  |
| $\begin{aligned} & \text { R2-R5, R8-R10, R12, R16-R19, } \\ & \text { R24-R27, R29, R31, R34-R39, } \\ & \text { R42-R44, R50-R52, R57, R58 } \end{aligned}$ | RESISTOR,SMD, 0603, 0.1\%, MF, DNP-PLACE HOLDER | User selectable resistors - not populated |
| R1, R11, R13-R15, R24, R25, R32, R40, R46-R49, R55, R56 | RES, SMD, 0603, 0W, 1/10W, TF, ROHS | $0 \Omega$ user selectable resistors |
| R6, R7, R20-R23, R33, R53, R54 | RES, SMD, 0603, 10k, 1/10W, 1\%, TF, ROHS | RG gain resistors |
| R28, R30, R41, R45 | RES, SMD, 0603, 100k, 1/10W, 1\%, TF, ROHS | RF gain resistors |

ISL2828xEVAL1Z Top View


ISL2828xEVAL1Z Schematic Diagram


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