

# ISL70219ASEH Evaluation Board User's Guide

## Introduction

The ISL70219ASEHEV1Z evaluation platform is designed to evaluate the ISL70219ASEH. The ISL70219ASEH contains two very high precision amplifiers featuring the perfect combination of low noise vs power consumption. Low offset voltage, low I<sub>BIAS</sub> current and low temperature drift making them the ideal choice for applications requiring both high DC accuracy and AC performance. The combination of high precision, low noise, low power and small footprint provides the user with outstanding value and flexibility relative to similar competitive parts.

Applications for these amplifiers include precision active filters, medical and analytical instrumentation, precision power supply controls, and industrial controls.

The ordering number for this board is ISL70219ASEHEV1Z. Please go to ordering tab on the landing page for the ISL70219ASEH.

## Reference Documents

- [ISL70219ASEH](#) Datasheet
- ISL70219ASEH SMD [5962-14226](#)
- ISL70219ASEH Radiation Test Report
- [TR002](#) Single Event Effects (SEE) Testing of the ISL70219ASEH Dual Operational Amplifier

## Key Features

- Wide V<sub>IN</sub> range single supply or dual supply
  - ±2.25V to ±18V
  - +4.5V to +36V
- 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.

## Specifications

- V+ range: +2.25V to 18V
- V- range: -2.25V to -18V
- Common mode input range: 2V within V+ and V- rails.

## Ordering Information

PART NUMBER	DESCRIPTION
ISL70219ASEHEV1Z	Evaluation Board

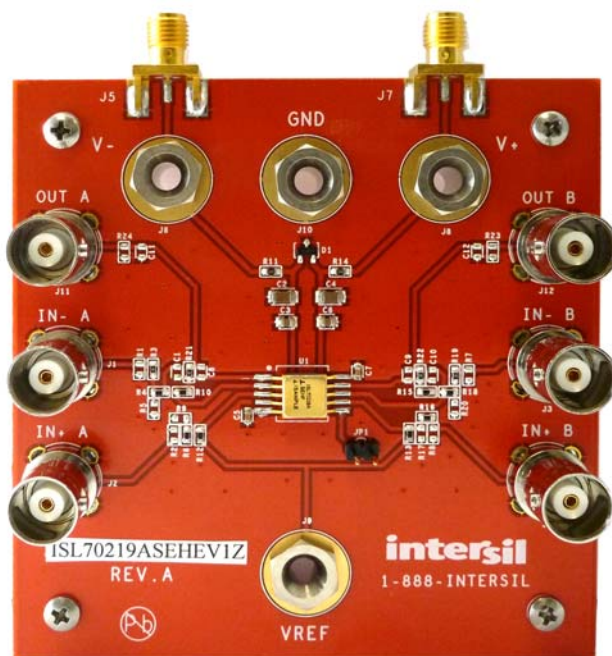


FIGURE 1. ISL70219ASEHEV1Z EVALUATION BOARD

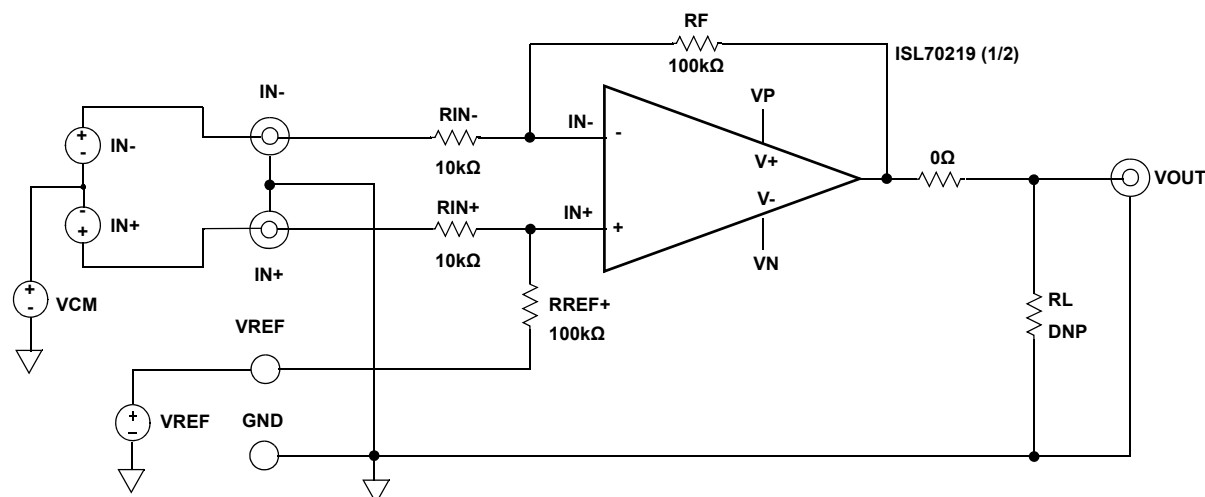


FIGURE 2. BASIC AMPLIFIER CONFIGURATION

## 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. Decoupling capacitors C<sub>2</sub>, C<sub>3</sub>, C<sub>4</sub> and C<sub>6</sub> connect to their respective supplies through R<sub>11</sub> and R<sub>15</sub> 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, C<sub>5</sub> and C<sub>7</sub>, are connected close to the part to filter out high frequency noise. Anti-reverse diode D<sub>1</sub> 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.

## Amplifier Configuration

A simplified schematic of the evaluation board is shown in Figure 3. The input stage with the components supplied is shown in Figure 4, with a closed loop gain of 10V/V. The differential amplifier gain is expressed in Equation 1:

$$V_{OUT} = (V_{IN+} - V_{IN-}) \cdot (R_F/R_{IN}) + V_{REF} \quad (EQ. 1)$$

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. The 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 R<sub>5</sub> 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. The VREF should not be left floating.

## PCB Layout Considerations

There are a few layout constraints to consider when using the ISL70219ASEH, but this will generally apply to any generic operational amplifier. Analog circuits can conduct noise through paths that connect it to the “outside world”. These paths include the V+, V-, IN+, IN- and OUT terminals. It's important to make sure these paths are kept away from known noise sources to ensure optimal performance of the part. If the ISL70219ASEH resides on the same boards as digital circuitry it is necessary to decouple the power pins on the analog as well as the digital circuitry. This is done on the evaluation board with C<sub>2</sub> through C<sub>7</sub>, with the lower value capacitors, C<sub>5</sub> and C<sub>7</sub>, placed near the V- and V+ pins respectively to minimize high frequency noise.

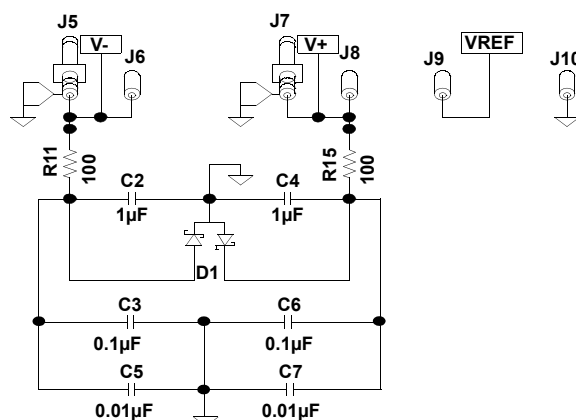


FIGURE 3. POWER SUPPLY CIRCUIT

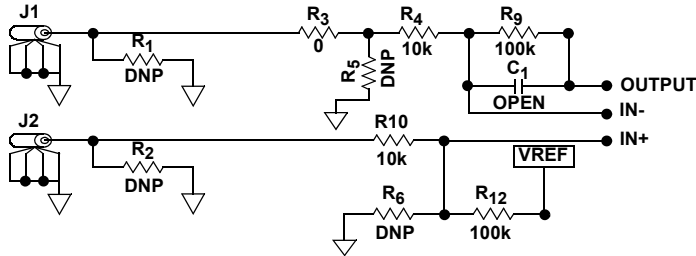


FIGURE 4. INPUT STAGE (1/2)

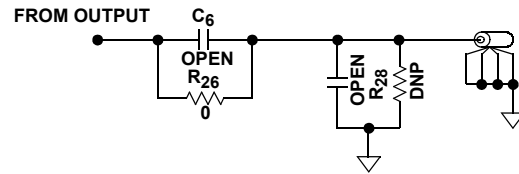


FIGURE 5. OUTPUT STAGE (1/2)

## 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 4, R<sub>6</sub> and R<sub>12</sub>) can be added to establish a power supply-tracking common mode reference using the VREF input. The input stages (see Figure 4) have additional resistor and/or capacitor pads that may be used to

add voltage divider networks or feedback networks for adding input attenuation, or to establish input DC offsets through the VREF pin. The output stages (see Figure 5) 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.

## Bill of Materials

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	ISL70219ASEH, DUAL OP AMP, 10Ld. FLATPACK	
R1, R2, R5-R8, R14, R20, R23, R24,	RESISTOR, SMD, 0603, 0.1%, MF, DNP PLACEHOLDER	User selectable resistors - not populated
R3, R20-R22	RES, SMD, 0603, 0Ω, 1/10W,TF, ROHS	0Ω 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

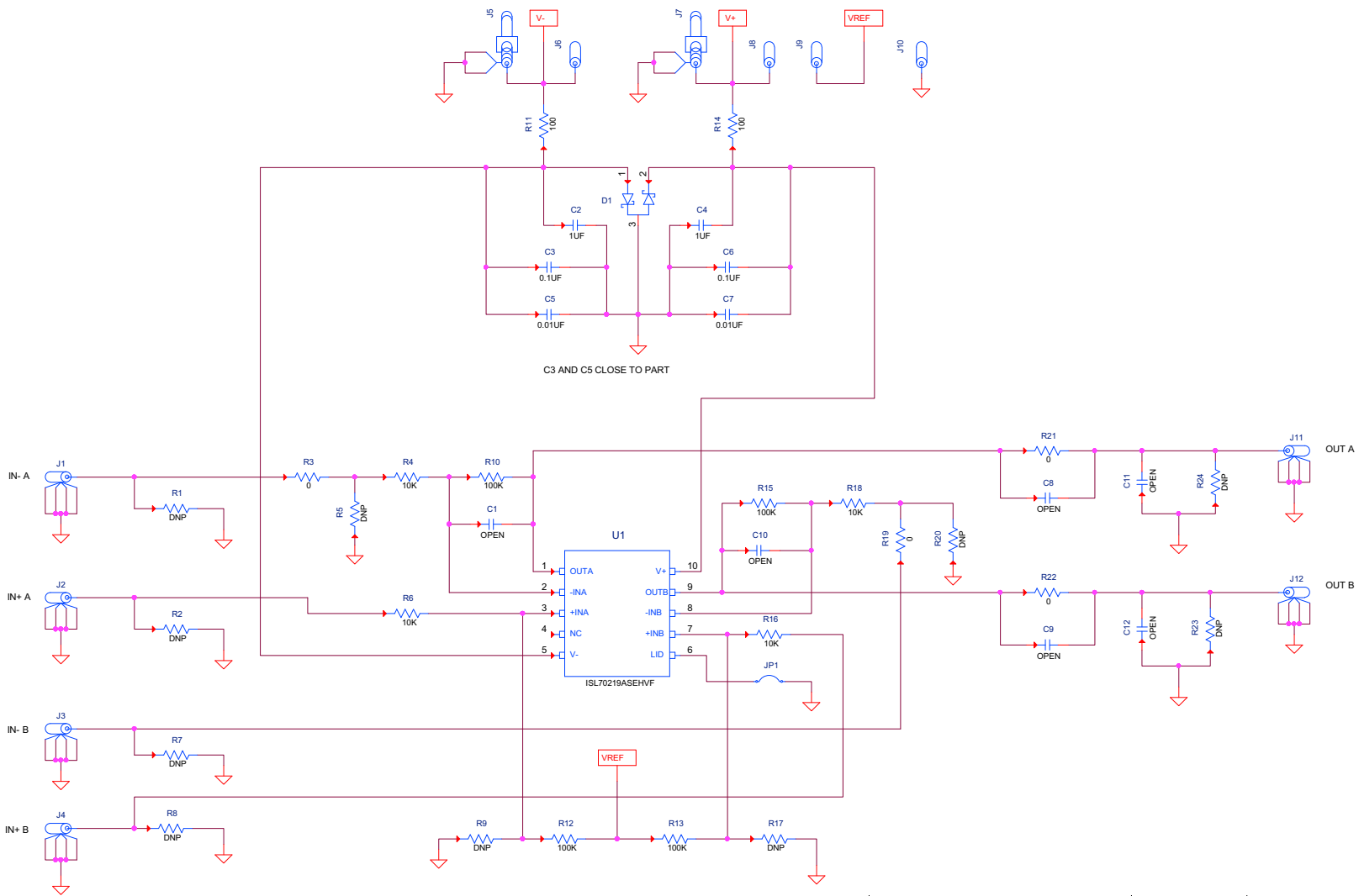


FIGURE 6. ISL70219ASEHV1Z SCHEMATIC DIAGRAM

# ISL70219ASEH Board Layout

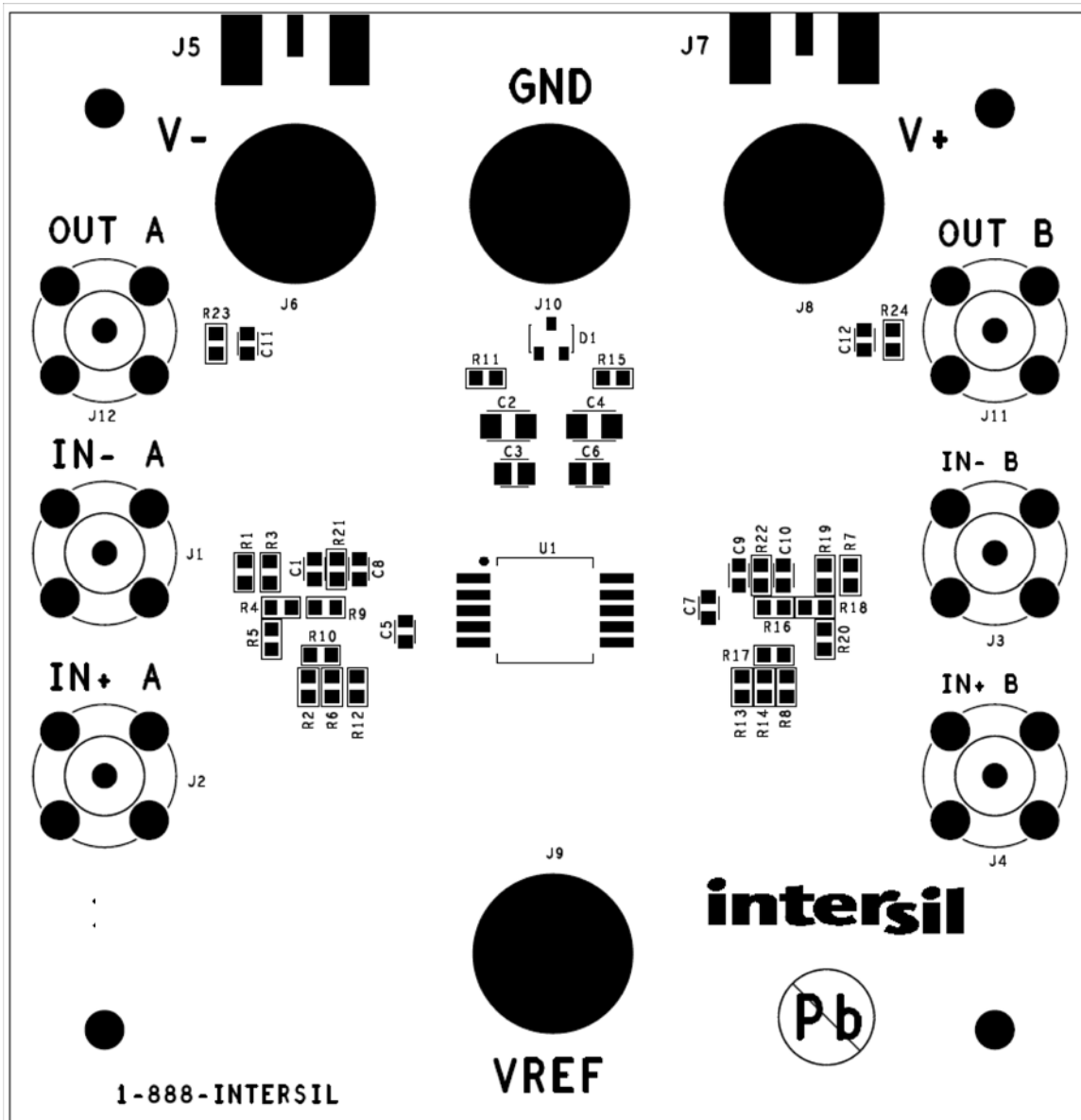


FIGURE 7. TOP VIEW

# Typical Performance Curves

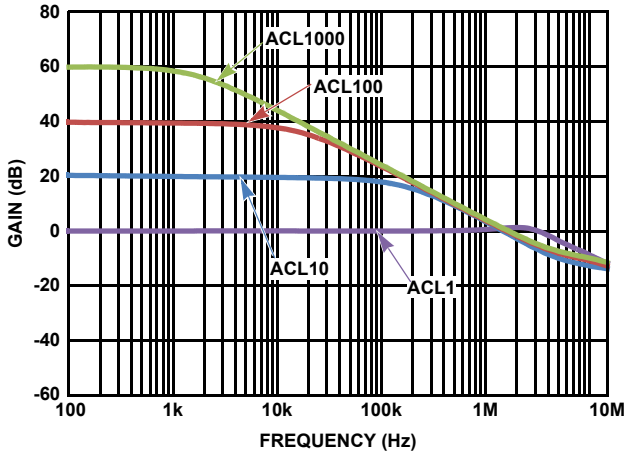


FIGURE 8. FREQUENCY RESPONSE vs ACL ( $\pm 5.0V$ )

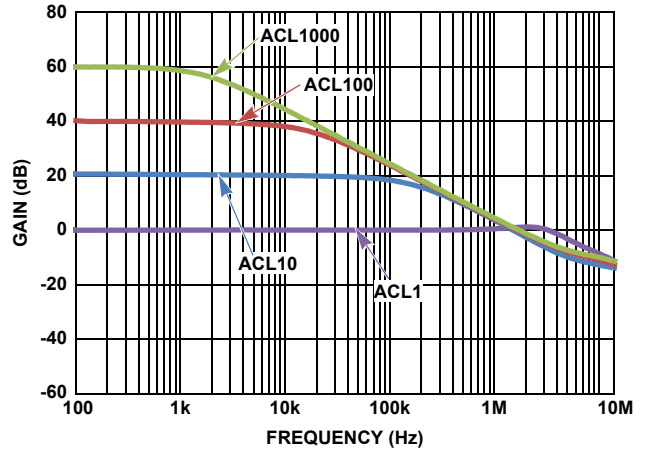


FIGURE 9. FREQUENCY RESPONSE vs ACL ( $\pm 18.0V$ )

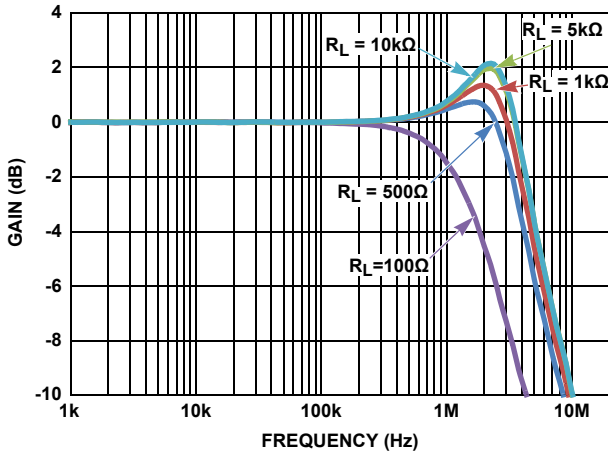


FIGURE 10. FREQUENCY RESPONSE vs  $R_L$  ( $\pm 5.0V$ )

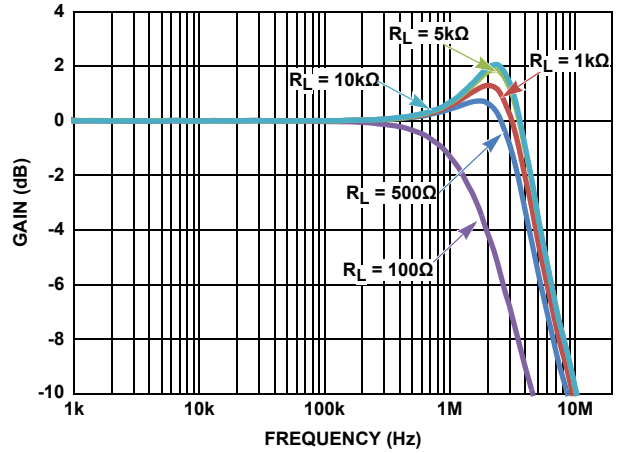


FIGURE 11. FREQUENCY RESPONSE vs  $R_L$  ( $\pm 18.0V$ )

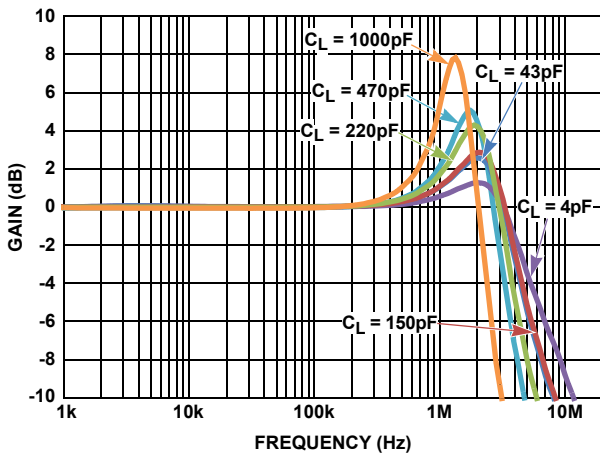


FIGURE 12. FREQUENCY RESPONSE vs  $C_L$  ( $\pm 5.0V$ )

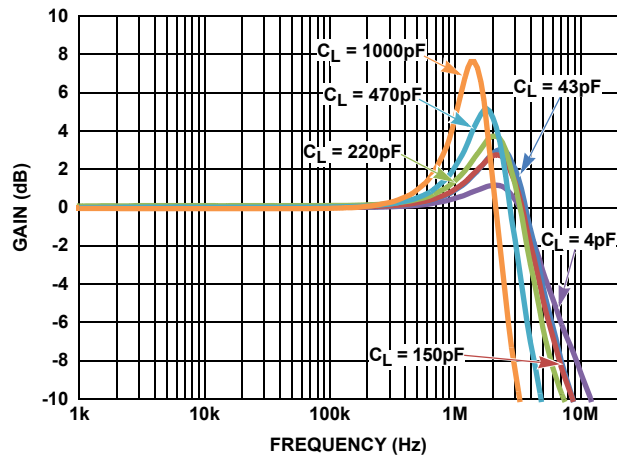


FIGURE 13. FREQUENCY RESPONSE vs  $C_L$  ( $\pm 18.0V$ )

Typical Performance Curves (Continued)

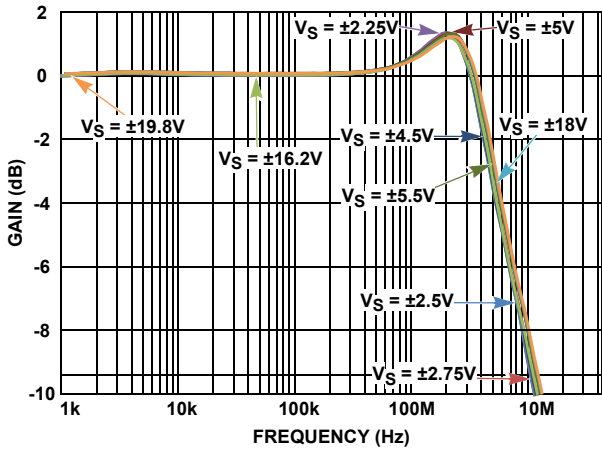


FIGURE 14. FREQUENCY RESPONSE vs SUPPLY VOLTAGE (+25 °C)

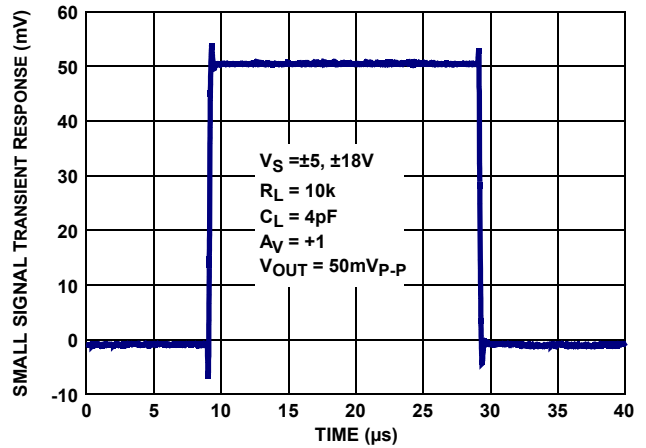


FIGURE 15. SMALL SIGNAL TRANSIENT RESPONSE (+25 °C)

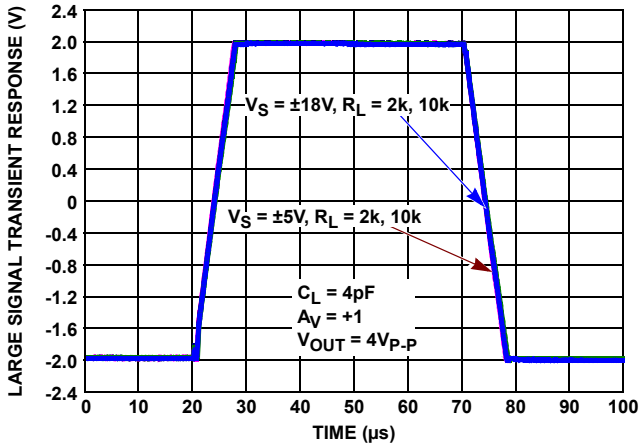


FIGURE 16. LARGE SIGNAL TRANSIENT RESPONSE (+25 °C)

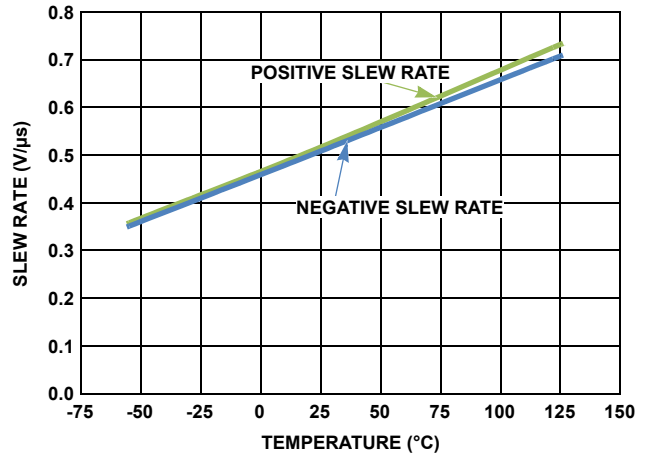


FIGURE 17. SLEW RATE vs TEMPERATURE VS = ±5V

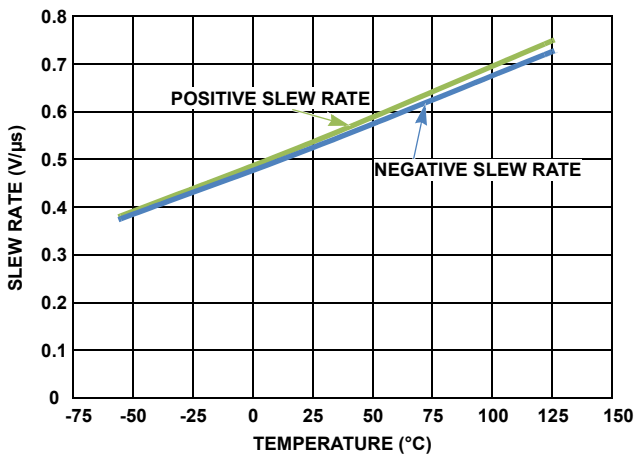


FIGURE 18. SLEW RATE vs TEMPERATURE VS = ±18V

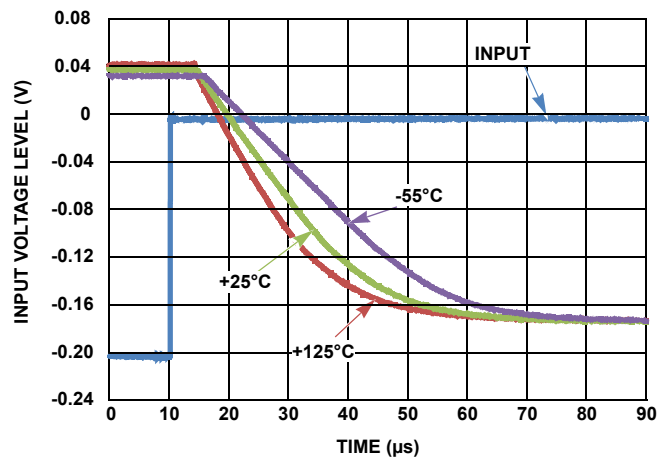


FIGURE 19. ±18V POSITIVE SATURATION RECOVERY TIME (+25 °C)

Typical Performance Curves (Continued)

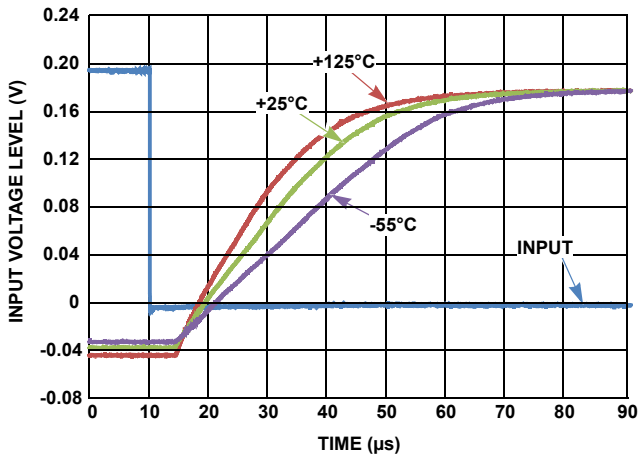


FIGURE 20. ±18V NEGATIVE SATURATION RECOVERY TIME (+25 °C)

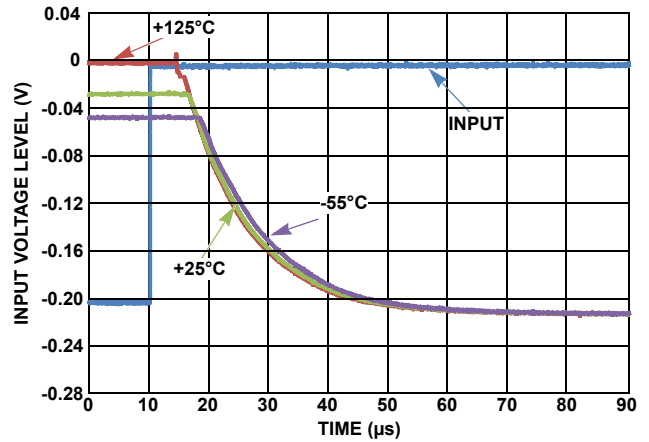


FIGURE 21. ±5V POSITIVE SATURATION RECOVERY TIME (+25 °C)

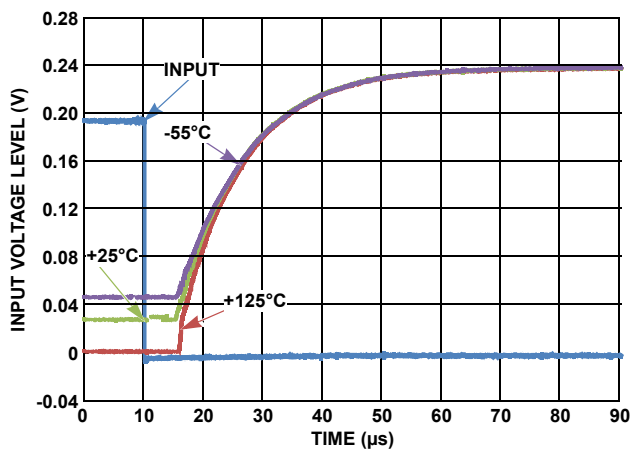


FIGURE 22. ±5V NEGATIVE SATURATION RECOVERY TIME (+25 °C)

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