ISL71444MEVAL1Z

Evaluation Board

UG108
Rev.0.00
Jan 27, 2017

Introduction

The ISL71444MEVAL1Z evaluation platform is designed to evaluate the ISL71444M. The ISL71444M contains four high speed and low power op amps designed to take advantage of its full dynamic input and output voltage range with rail-to-rail operation. By offering low power, low offset voltage, and low temperature drift coupled with its high bandwidth and enhanced slew rates upwards of 50V/µs, these op amps make it ideal for applications requiring both high DC accuracy and AC performance. This amplifier is designed to operate over a single supply range of 2.7V to 40V or a split supply voltage range of ±1.35V to ±20V. The ISL71444M is manufactured in Intersil's PR40, silicon on insulator, BiCMOS process. This process ensures the device is immune to a single event latch-up and provides excellent radiation tolerance. This makes it the ideal choice for high reliability applications in harsh radiation-prone environments.

Related Literature

- For a full list of related documents, visit our website
  - ISL71444M product page

Evaluation Board Key Features

- Wide VIN range single or dual supply operation
  - ±1.35V to ±20V
  - 2.7V to 40V
- Singled-ended or differential input operation with gain (G = 10V/V)
- 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

Ordering Information

PART NUMBER	DESCRIPTION
ISL71444MEVAL1Z	ISL71444MEVAL1Z evaluation board

Specifications

- V+ range: 1.35V to 20V
- V- range: -1.35V to -20V

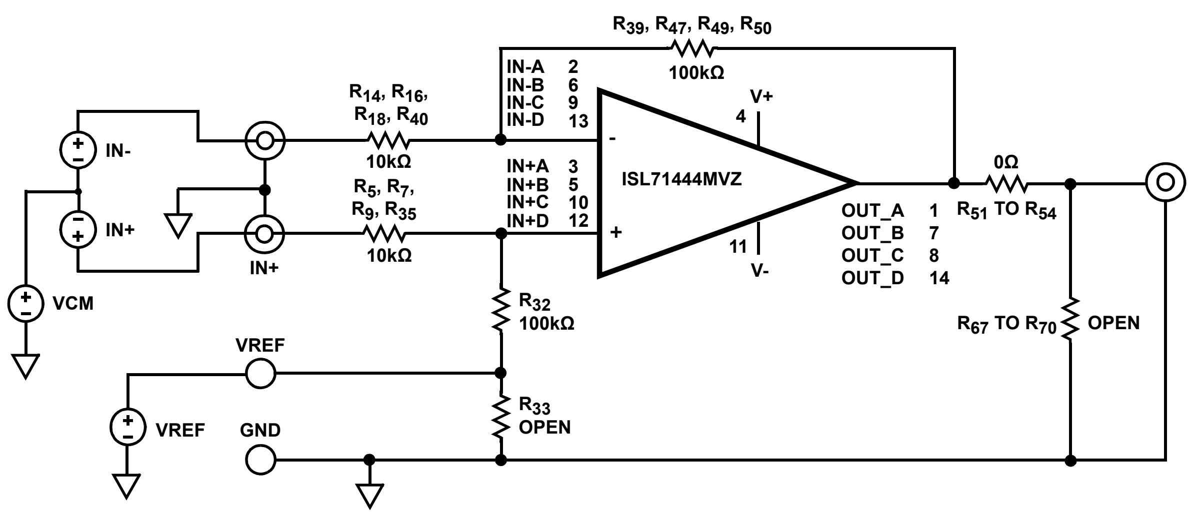

FIGURE 1. BASIC DIFFERENTIAL AMPLIFIER CONFIGURATION

Power Supply Connections

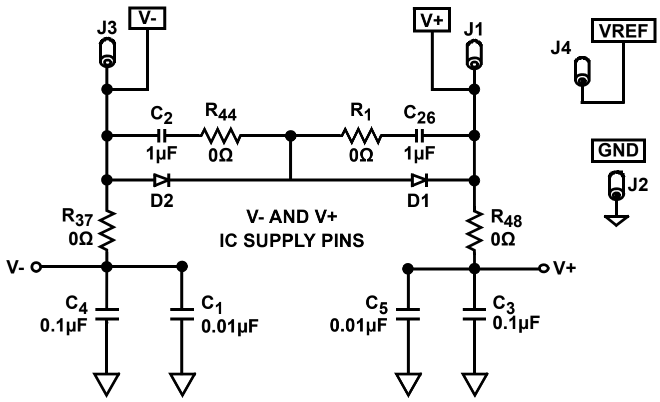

FIGURE 2. POWER SUPPLY CIRCUIT

Figure 2 demonstrates the power supply connections, decoupling and protection circuitry. External power connections are made through the V+, V-, VREF, and GND banana jack connections on the evaluation board. Decoupling capacitors C_2 and C_{26} provide low-frequency power-supply filtering, while additional capacitors (C_1, C_3, C_4, and C_5, connected close to the part) filter out high-frequency noise, and are connected to their respective supplies through R_{37} and R_{48} resistors. These resistors are 0Ω but can be changed by the user to provide additional power supply filtering, or to reduce the supply voltage rate-of-rise time. Anti-reverse diodes D1 and D2 protect the circuit in case of momentarily reversing the power supplies accidentally to the evaluation board. The VREF pin can be connected to ground to establish a ground referenced input for split supply operation.

Amplifier Configuration

A simplified schematic of the evaluation board is shown in Figure 1 on page 1. The input stage with the components supplied is shown in Figure 3. The circuit implements a Hi-Z differential input with unbalanced common-mode impedance. The differential amplifier gain is expressed in Equation 1:

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

For a 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 must be connected to a reference voltage between the V+ and V- supply rails. For a non-inverting operation with G = 11V/V, the negative input (IN-) is grounded and the signal is supplied to the positive input (IN+). 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_{11} pad.

User-Selectable Options

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.

A voltage divider can be added to establish a power supply-tracking common-mode reference using the VREF input. The inverting and noninverting inputs have additional resistor and capacitor placements for adding input attenuation or feedback capacitors (Figure 3).

The outputs (Figure 4) also have additional resistor and capacitor placements for filtering and 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.

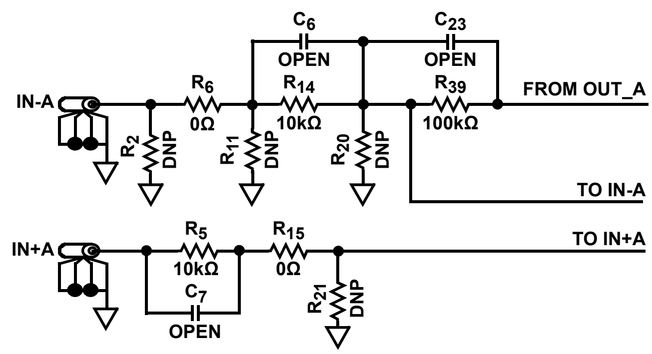

FIGURE 3. INPUT STAGE

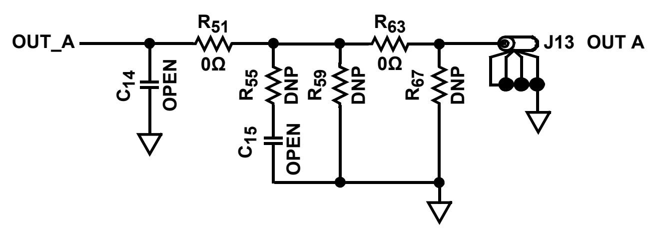

FIGURE 4. OUTPUT STAGE

PCB Layout Guidelines

Analog circuits can conduct noise through paths that connect it to the “outside world”. To minimize the effects of any noise through the power lines, it is recommended to decouple the power supply pins (V+ and V-). If the trace lines to the power supply pins are long, it is recommended to place high frequency decoupling capacitors (i.e., 0.1µF) right next to the power supply in, and a larger capacitor value (i.e., 1µF) at the point of entry for the power supply.

ISL71444MEVAL1Z Evaluation Board

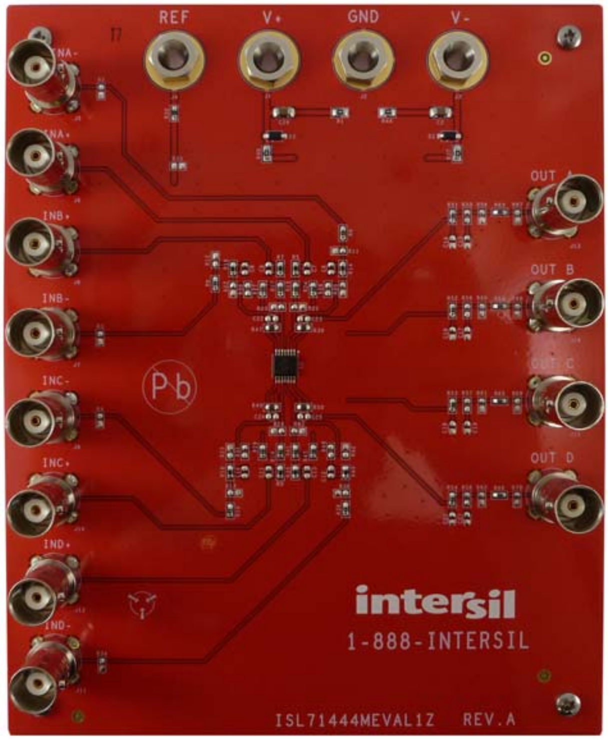

FIGURE 5. ISL71444MEVAL1Z EVALUATION BOARD, TOP VIEW

FIGURE 6. ISL71444MEVAL1Z EVALUATION BOARD, BOTTOM VIEW

ISL71444MEVAL1Z Schematic Diagram

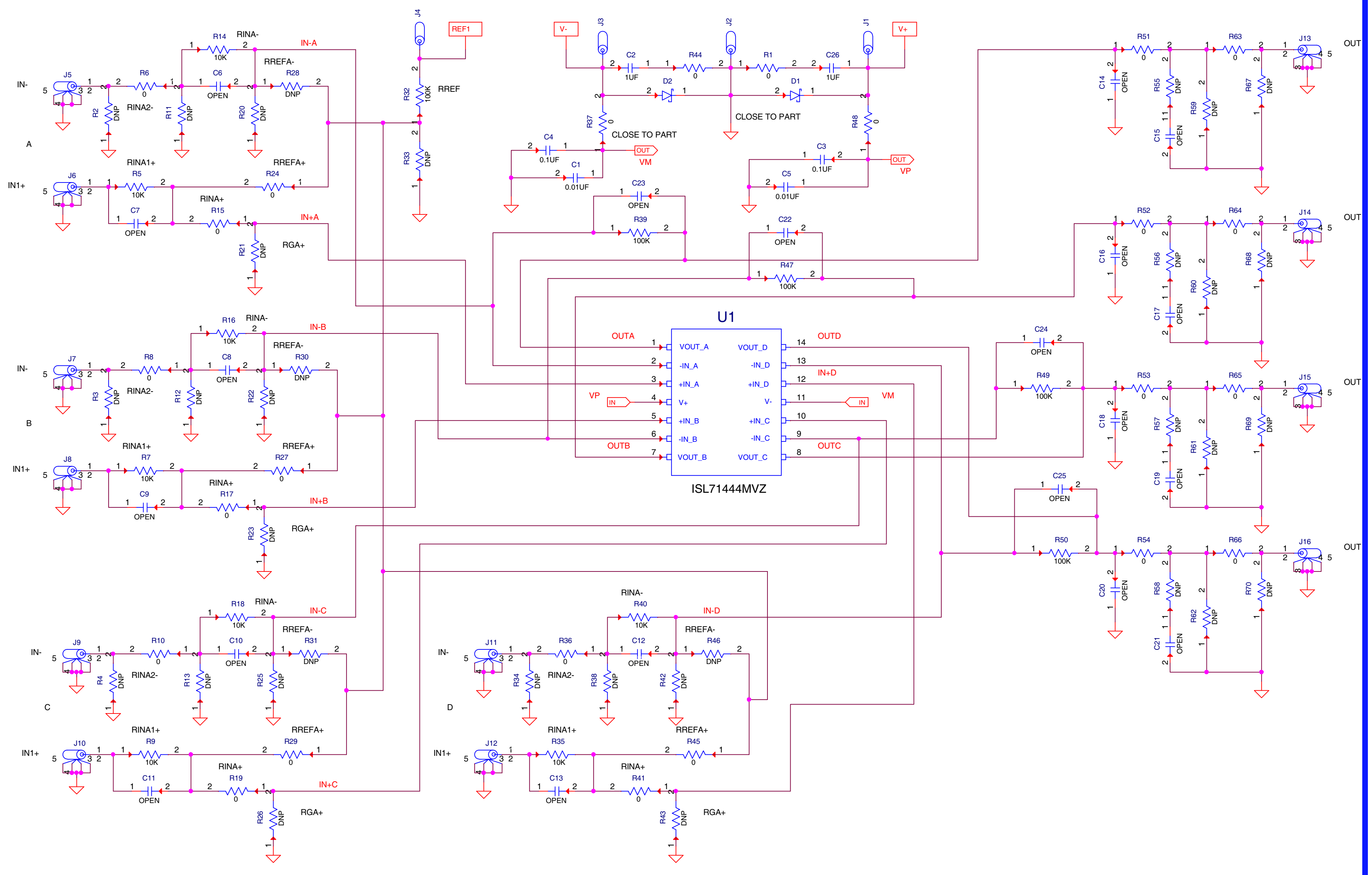

FIGURE 7. ISL71444MEVAL1Z SCHEMATIC

ISL71444MEVAL1Z Bill of Materials

PART NUMBER	QTY	UNITS	REFERENCE DESIGNATOR	DESCRIPTION	MANUFACTURER	MANUFACTURER PART
ISL71444MEVAL1ZREVAPCB	1	ea		PWB-PCB, ISL71444MEVAL1Z, REVA, ROHS	IMAGINEERING INC	ISL71444MEVAL1ZREVAPCB
H1045-00103-50V10-T	2	ea	C1, C5	CAP, SMD, 0603, 0.01µF, 50V, 10%, X7R, ROHS	MURATA	GRM39X7R103K050
H1045-00104-25V10-T	2	ea	C3, C4	CAP, SMD, 0603, 0.1µF, 25V, 10%, X7R, ROHS	MURATA	GRM188R71E104KA01D
H1045-DNP	0	ea	C6-C25	CAP, SMD, 0603, DNP-PLACE HOLDER, ROHS		
H1065-00105-50V10-T	2	ea	C2, C26	CAP, SMD, 1206, 1µF, 50V, 10%, X7R, ROHS	VENKEL	C1206X7R500-105KNE
108-0740-001	4	ea	J1-J4	CONN-JACK, BANANA-SS-SDRLESS, VERTICAL, 0.53Length, ROHS	JOHNSON COMPONENTS	108-0740-001
31-5329-52RFX	12	ea	J5-J16	CONN-BNC, RECEPTACLE, TH, 4 POST, 50Ω, GOLDCONTACT, ROHS	AMPHENOL	31-5329-52RFX
MBR0540T1G-T	2	ea	D1, D2	DIODE-SHOTTKEY RECTIFIER, SMD, SOD-123, 40V, 0.5A, ROHS	ON SEMICONDUCTOR	MBR0540T1G
H2505-DNP	0	ea	a) R2-R4, R11-R13, R20-R23, R25, R26, R28	RESISTOR, SMD, 0603, 0.1%, MF, DNP-PLACE HOLDER		
H2505-DNP	0	ea	b) R30, R31, R33, R34, R38, R42, R43, R46	RESISTOR, SMD, 0603, 0.1%, MF, DNP-PLACE HOLDER		
H2505-DNP	0	ea	c) R55-R62, R67-R70	RESISTOR, SMD, 0603, 0.1%, MF, DNP-PLACE HOLDER		
H2511-00R00-1/10W-T	20	ea	a) R6, R8, R10, R15, R17, R19, R24, R27, R29	RES, SMD, 0603, 0Ω, 1/10W, TF, ROHS	VENKEL	CR0603-10W-000T
H2511-00R00-1/10W-T	0	ea	b) R36, R41, R45, R51-R54, R63-R66	RES, SMD, 0603, 0Ω, 1/10W, TF, ROHS	VENKEL	CR0603-10W-000T
H2511-01002-1/10W1-T	8	ea	R5, R7, R9, R14, R16, R18, R35, R40	RES, SMD, 0603, 10k, 1/10W, 1%, TF, ROHS	VENKEL	CR0603-10W-1002FT
H2511-01003-1/10W1-T	5	ea	R32, R39, R47, R49, R50	RES, SMD, 0603, 100k, 1/10W, 1%, TF, ROHS	VENKEL	CR0603-10W-1003FT
H2512-00R00-1/8W-T	4	ea	R1, R37, R44, R48	RES, SMD, 0805, 0Ω, 1/8W, TF, ROHS	YAGEO	RC0805JR-070RL
4-40X1/4-SCREW-SS	4	ea	Four corners	SCREW, 4-40X1/4in, PHILLIPS, PANHEAD, STAINLESS, ROHS	BUILDING FASTENERS	PMSSS 440 0025 PH
4-40X3/4-STANDOFF-METAL	4	ea	Four corners	STANDOFF, 4-40X3/4in, F/F, HEX, ALUMINUM, 0.25 OD, ROHS	KEYSTONE	2204
8X8-STATIC-BAG	1	ea	Place assy in bag	BAG, STATIC, 8x8, ZIP LOC, ROHS	ULINE	S-5092
ISL71444MVZ	1	ea	U1	IC-PLASTIC QUAD OP-AMP TRANSCEIVER, 14P, TSSOP, ROHS	INTERSIL	ISL71444MVZ
LABEL-DATE CODE	1	ea	AFFIX TO BACK OF PCB	LABEL-DATE CODE_LINE 1: YRWK/REV#, LINE 2: BOM NAME	INTERSIL	LABEL-DATE CODE

ISL71444MEVAL1Z Layout

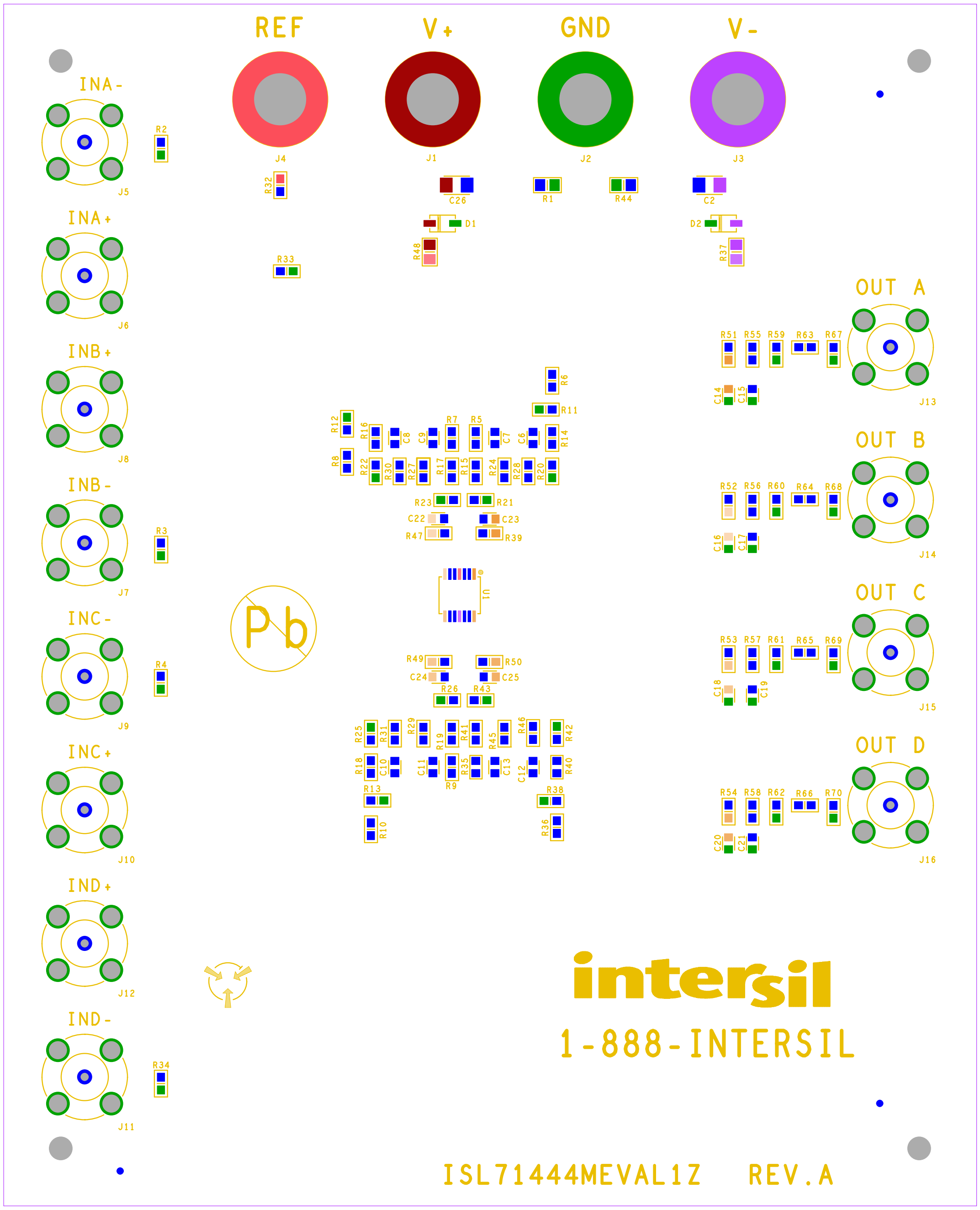

FIGURE 8. TOP VIEW

ISL71444MEVAL1Z Layout (Continued)

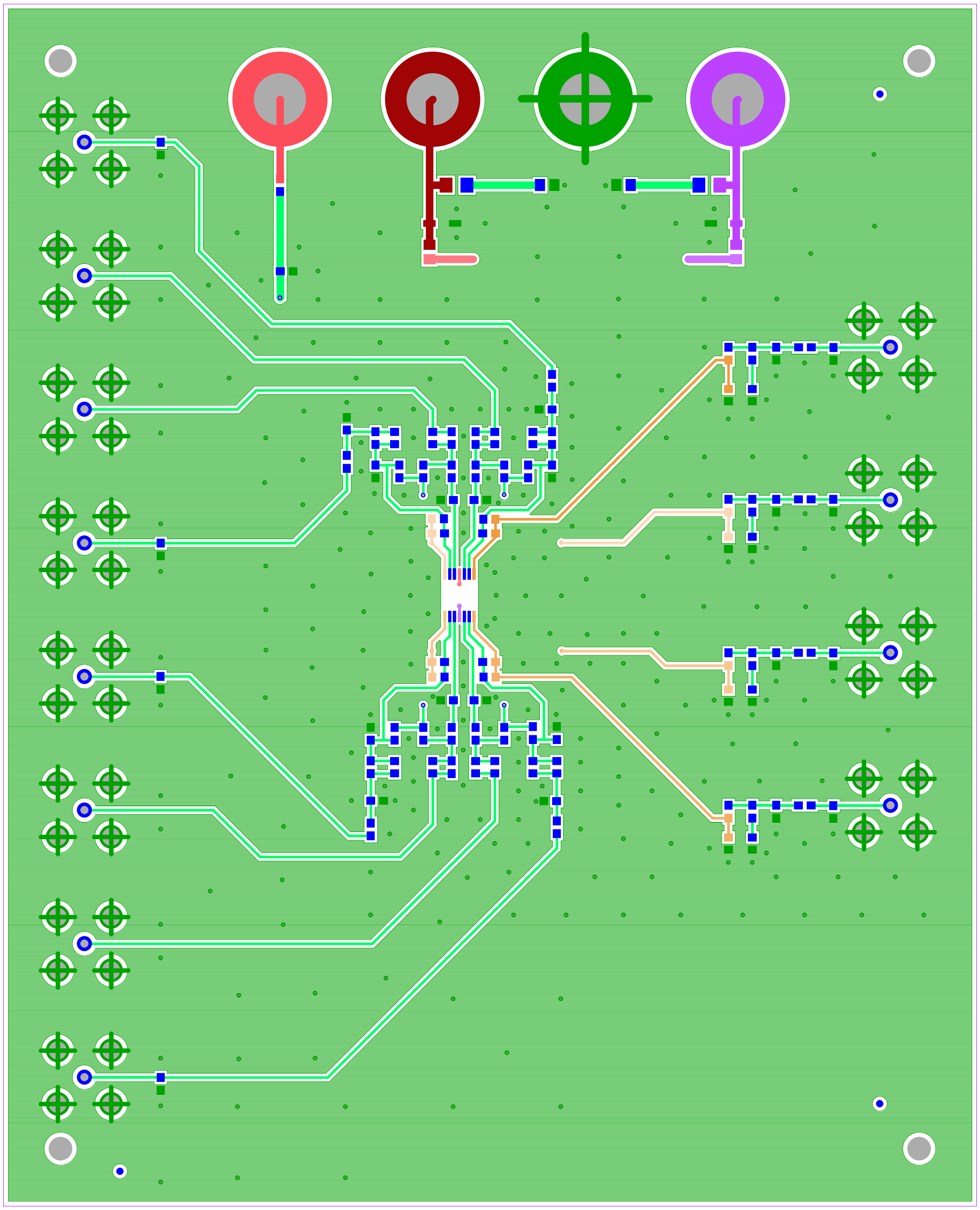

FIGURE 9. TOP LAYER

ISL71444MEVAL1Z Layout (Continued)

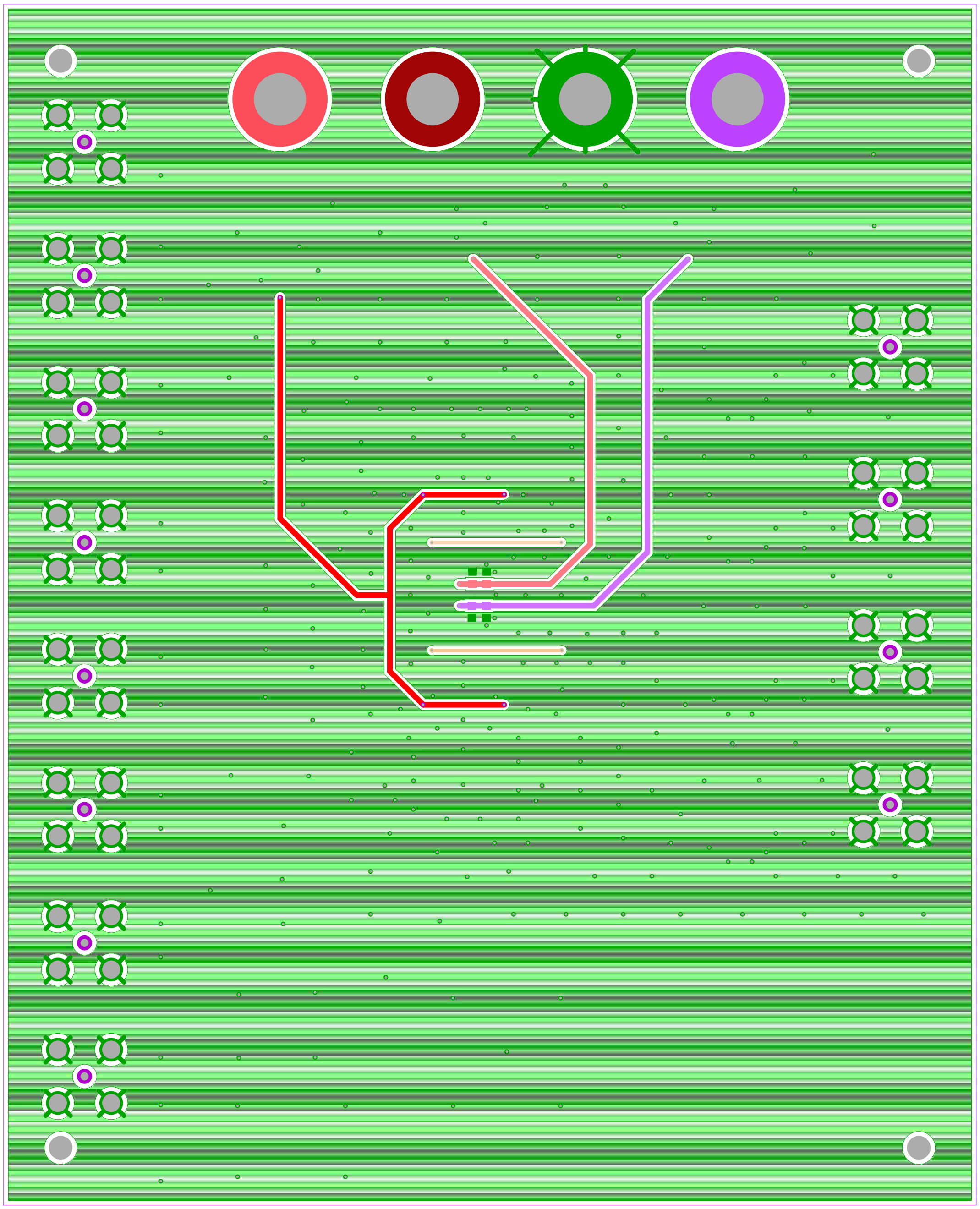

FIGURE 10. BOTTOM LAYER

Typical Performance

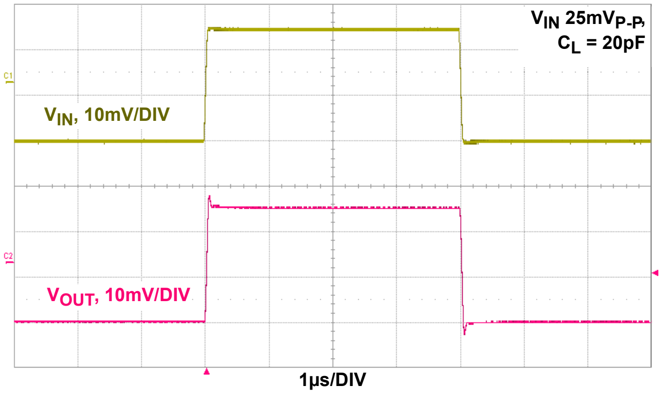

FIGURE 11. SMALL SIGNAL STEP RESPONSE (±18V)

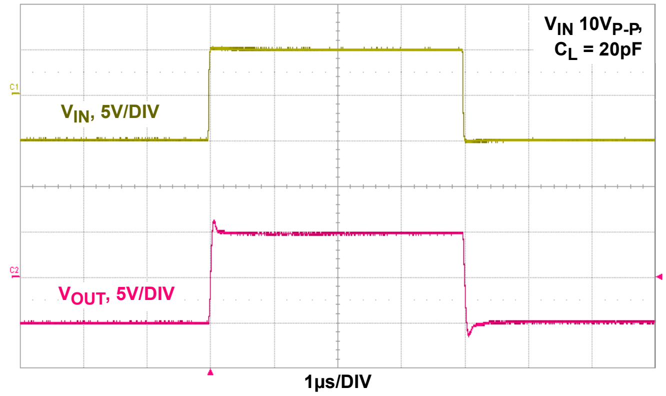

FIGURE 12. LARGE SIGNAL STEP RESPONSE (±18V)

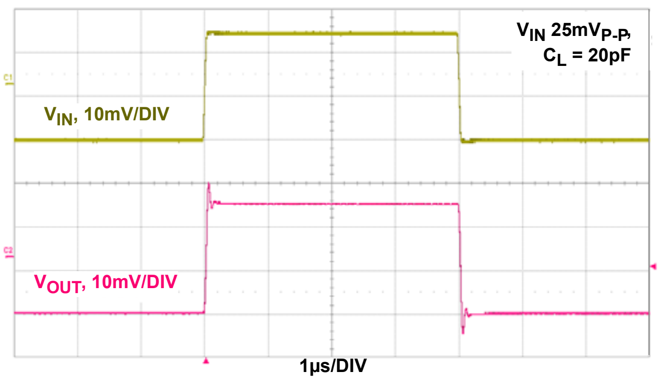

FIGURE 13. SMALL SIGNAL STEP RESPONSE (±2.5V)

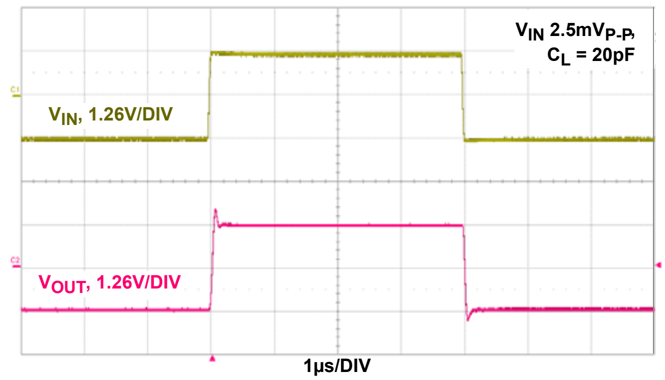

FIGURE 14. LARGE SIGNAL STEP RESPONSE (±2.5V)

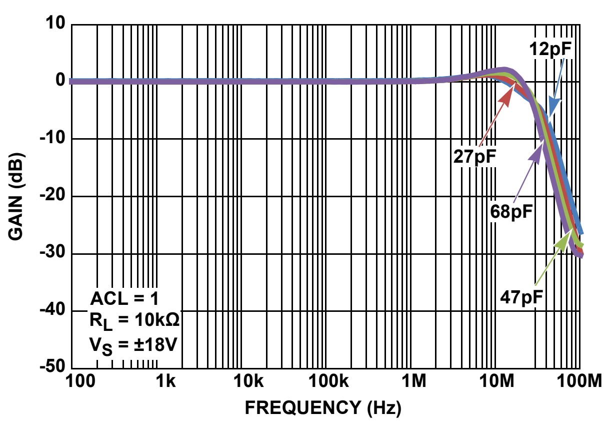

FIGURE 15. (V_S = ±18V) UNITY GAIN RESPONSE vs CL

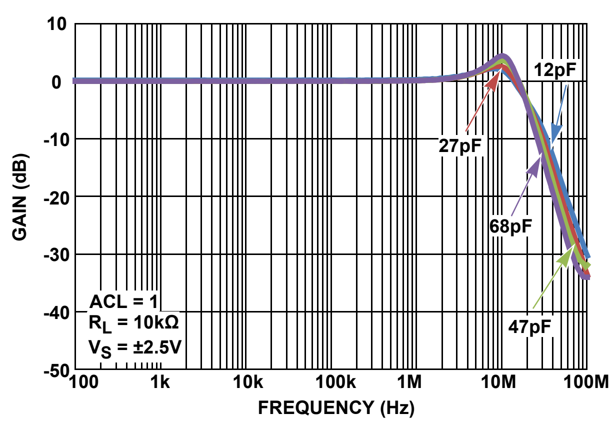

FIGURE 16. (V_S = ±2.5V) UNITY GAIN RESPONSE vs CL

Typical Performance (Continued)

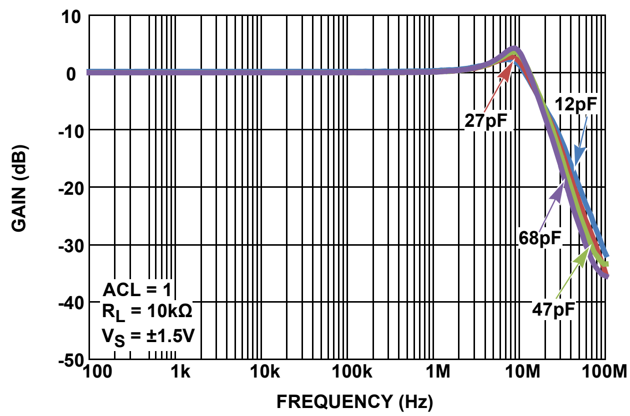

FIGURE 17. (V_S = ±1.5V) UNITY GAIN RESPONSE vs CL