

# User's Guide

## LMH34400 Evaluation Module



### ABSTRACT

The characteristics, operation, and use of the LMH34400DRLEVM is described in this user's guide. This evaluation module (EVM) is an evaluation and development kit for evaluating the LMH34400DRL device, a single-ended transimpedance amplifier for light detection and ranging (LIDAR) applications and laser distance measurement systems. A complete circuit description as well as schematic diagram and bill of materials are included in this document.

Throughout this document, the abbreviation EVM and the term evaluation module are synonymous with LMH34400DRLEVM.

Related documentation is available through the Texas Instruments website at [www.ti.com](http://www.ti.com).



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## Trademarks

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## 1 Introduction

The LMH34400DRLEVM is an evaluation module (EVM) for the LMH34400DRL single-ended transimpedance amplifier. The EVM features standard input power receptacles, coaxial input and output connections, and an optional output bias through a fixed 1VDC LDO regulator. The input is 50  $\Omega$  matched and configured by default to receive a voltage input that is converted to a current through a 4.02 k $\Omega$  resistor, but can be reconfigured to receive a true current input. The EVM also includes easy-to-use jumpers to enable or disable the LDO and control the input bias current cancellation and device shutdown functions.

## 2 Feature Description

- Configured for single-ended voltage input and output with 50  $\Omega$  matched SMA connections
- Optional DC-biased output configuration
- Jumpers included for easy control of output bias voltage, input bias current cancellation, and device power-down
- Designed for single 3.3 V supply operation

## 3 EVM Specifications

**Table 3-1. LMH34400DRLEVM Specifications**

Specification	Typical Value
Single-supply voltage range (VEE = ground)	3 V to 3.45 V
Quiescent current	29 mA
Output voltage swing ( $V_{CC} = 3.3$ V, 100 $\Omega$ load)	2.5 V <sub>pp</sub>
Linear output current ( $V_{CC} = 3.3$ V, 25 $\Omega$ load)	26.6 mA

## 4 Power Connections

The LMH34400DRLEVM is equipped with standard banana style sockets to easily connect power. The positive supply input is labeled 3V3 and ground is labeled GND. The positive supply should be well regulated and stable.

## 5 Input and Output Connections

The LMH34400DRLEVM is equipped with 50  $\Omega$  matched SMA connectors for easy connection of signal generators and analysis equipment. VIN is the signal input connector, while VOUT is the signal output connector. Coaxial SMA connections for the ambient light cancellation (ALC) and power-down circuitry (PD) are included to aid with device characterization. Test points VREF and GND allow for easy measurement of the output bias or for the application of an external voltage bias on the signal output.

### 5.1 Ambient Light Cancellation

The LMH34400 device features an input DC current cancellation circuit that is designed to remove any DC current that is present from a typical current input device such as a photodiode. This feature can be enabled or disabled using the ALC jumper, or by populating R4 with a zero-ohm resistor. By default, the DC current cancellation circuit is enabled.

### 5.2 Power Down Function

The LMH34400 device includes an optional power-down function to put the device in a low-power mode when it is not being used. The EVM ships with jumper PD that can be used to easily enable and disable the device. By default, the board ships with the device enabled.

### 5.3 Optional Output DC Bias Configuration

By default, the EVM is configured with a 50  $\Omega$  series load AC coupled to the output. To use the EVM with the onboard 1VDC output bias, populate R8 and short the EN jumper with the included shunt to enable the LP5912 regulator. To apply an external bias to the output, populate R8 and drive the desired voltage on the VREF test point. For more details and instructions on how to reconfigure the EVM, see the applications section, schematics, and layouts in the [275-MHz, Single-Ended Output, Transimpedance Amplifier with Integrated Clamp data sheet](#).

## 6 Layout

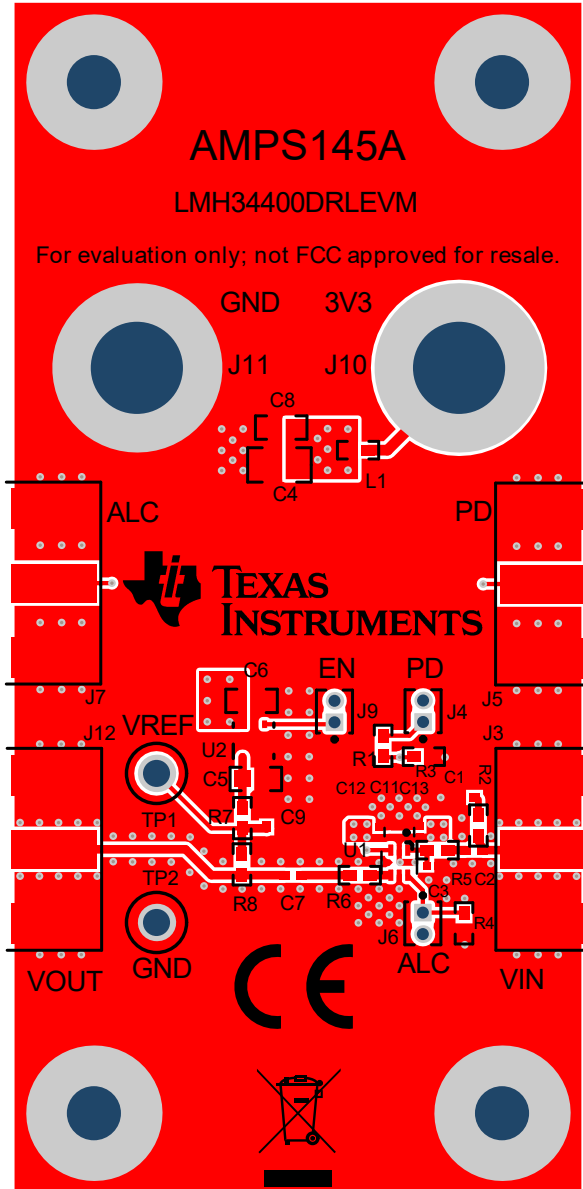


Figure 6-1. Top Layer

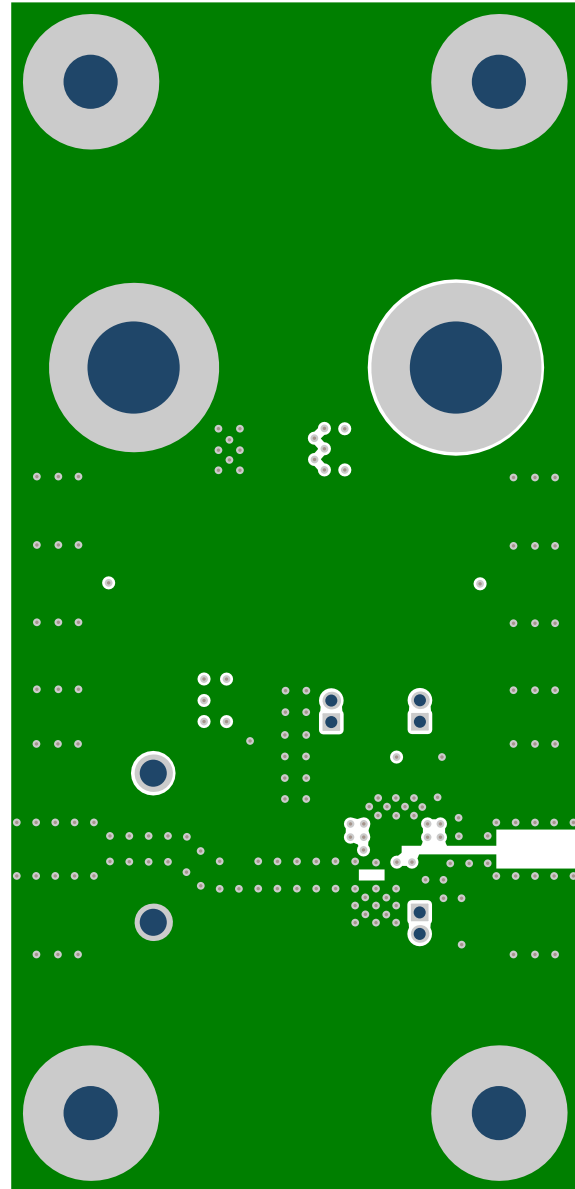


Figure 6-2. Ground Layer

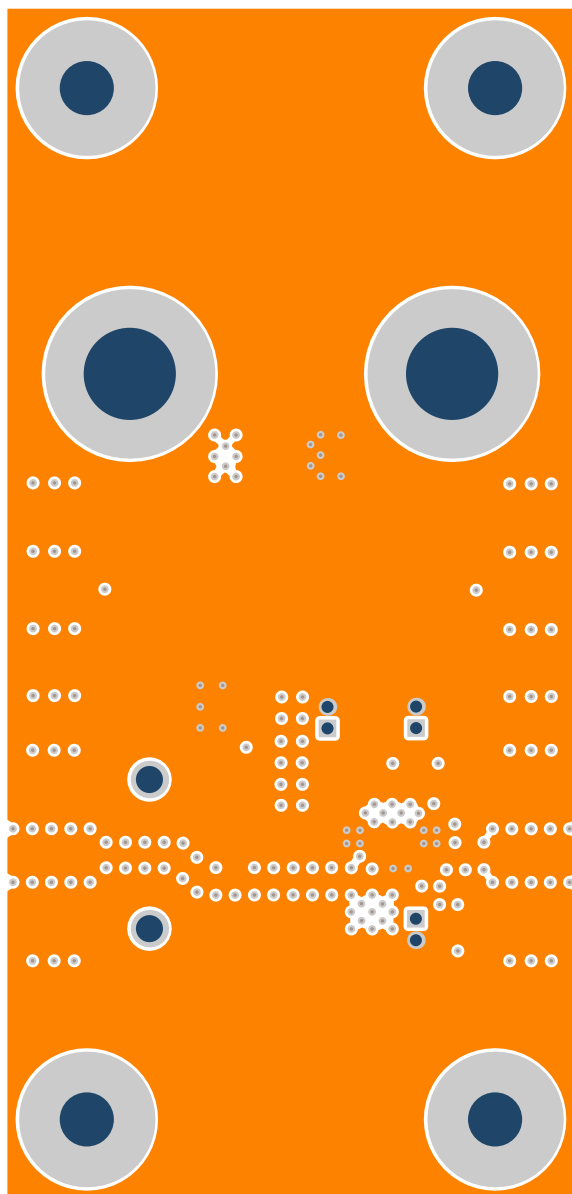


Figure 6-3. Power Layer

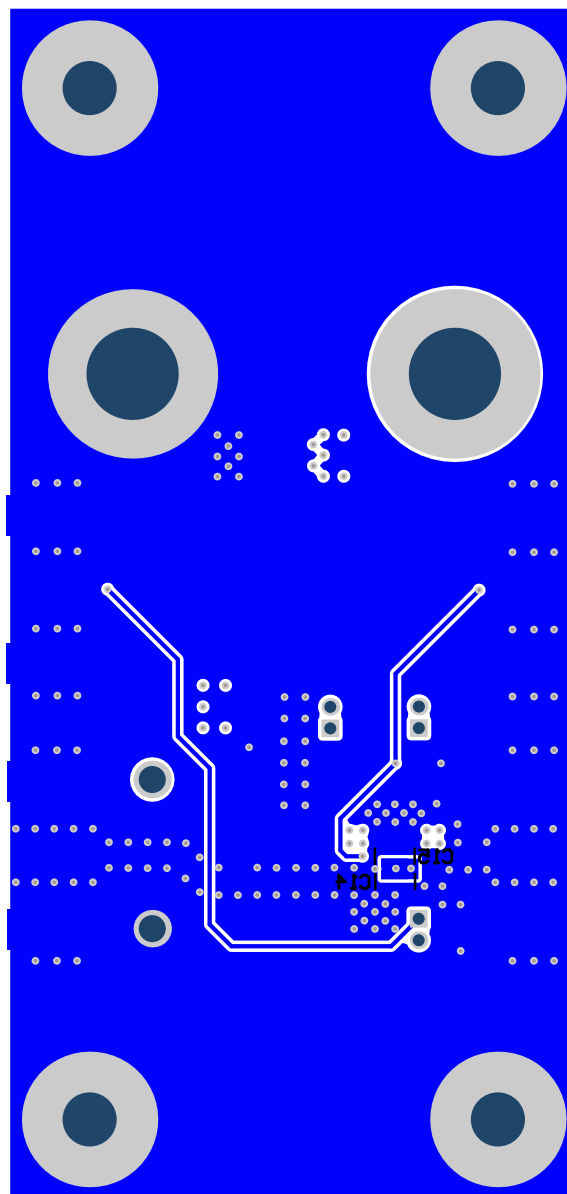


Figure 6-4. Bottom Layer

## 7 Schematic

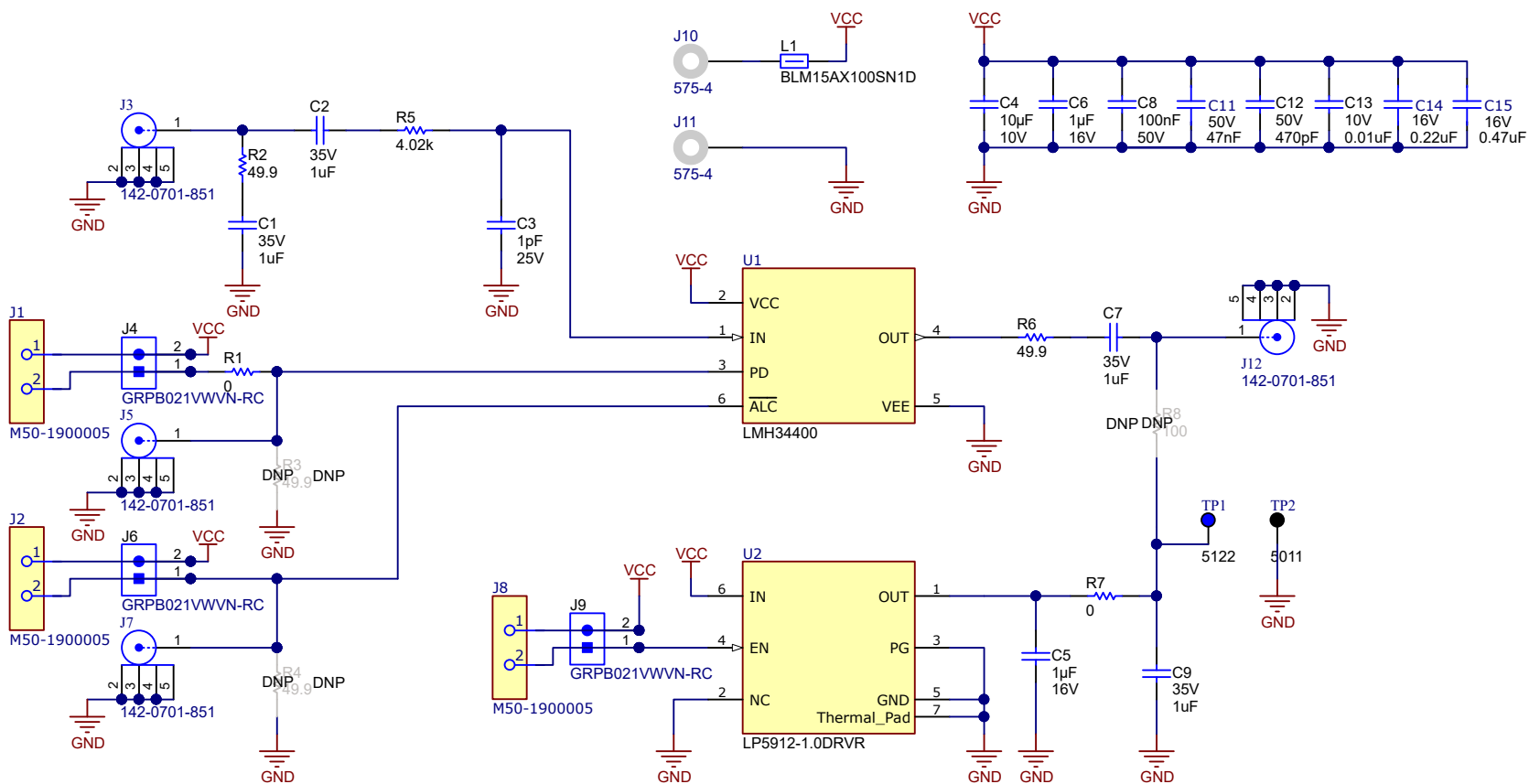


Figure 7-1. Schematic

## 8 Bill of Materials

Item #	Designator	Quantity	Value	Part Number	Manufacturer	Description	Package Reference
1	!PCB1	1		AMPS145	Any	Printed Circuit Board	
2	C1, C2, C7, C9	4	1 $\mu$ F	C1005X5R1V105K050BC	TDK	CAP, CERM, 1 $\mu$ F, 35 V, $\pm$ 10%, X5R, 0402	0402
3	C3	1	1 pF	GJM0335C1E1R0WB01D	MuRata	CAP, CERM, 1 pF, 25 V, $\pm$ 5%, C0G/NP0, 0201	0201
4	C4	1	10 $\mu$ F	GCJ21BR71A106KE01L	MuRata	CAP, CERM, 10 $\mu$ F, 10 V, $\pm$ 10%, X7R, AEC-Q200 Grade 1, 0805	0805
5	C5, C6	2	1 $\mu$ F	CGA3E1X7R1C105K080AC	TDK	CAP, CERM, 1 $\mu$ F, 16 V, $\pm$ 10%, X7R, AEC-Q200 Grade 1, 0603	0603
6	C8	1	0.1 $\mu$ F	C0603C104K5RACAUTO	Kemet	CAP, CERM, 0.1 $\mu$ F, 50 V, $\pm$ 10%, X7R, AEC-Q200 Grade 1, 0603	0603
7	C11	1	47 nF	CGAEA1X7R1H473M030BC	TDK	Cap Ceramic 0.047 $\mu$ F 50 V X7R 20% Wide Terminal SMD 0204 125°C Low ESR Automotive T/R	0204
8	C12	1	470 pF	CGA1A2X7R1H471K030BA	TDK	CAP, CERM, 470 pF, 50 V, $\pm$ 10%, X7R, AEC-Q200 Grade 1, 0201	0201
9	C13	1	0.01 $\mu$ F	CGA1A2X7R1A103K030BA	TDK	CAP, CERM, 0.01 $\mu$ F, 10 V, $\pm$ 10%, X7R, AEC-Q200 Grade 1, 0201	0201
10	C14	1	220 nF	EWK107B7224MV-T	Taiyo Yuden	Multilayer Ceramic Capacitor 0.22 $\mu$ F 20% 16 V X7R 0306	0306
11	C15	1	470 nF	EWK107B7474MVHT	Taiyo Yuden	Multilayer Ceramic Capacitor 0.47 $\mu$ F 20% 16 V X7R 0306	0306
12	H1, H3, H5, H7	4		1902C	Keystone	Standoff, Hex, 0.5"L #4-40 Nylon	Standoff
13	H2, H4, H6, H8	4		NY PMS 440 0025 PH	B&F Fastener Supply	Machine Screw, Round, #4-40 x 1/4, Nylon, Philips panhead	Screw
14	J1, J2, J8	3		M50-1900005	Harwin		CONN_JUMPER_HDR2
15	J3, J5, J7, J12	4		142-0701-851	Cinch Connectivity	Connector, End launch SMA, 50 $\Omega$ , SMT	SMA End Launch
16	J4, J6, J9	3		GRPB021VWVN-RC	Sullins Connector Solutions	Header, 50mil, 2x1, Gold, TH	2x1 Header
17	J10, J11	2		575-4	Keystone	Standard Banana Jack, Uninsulated, 5.5 mm	Keystone_575-4
18	L1	1	10 $\Omega$	BLM15AX100SN1D	MuRata	Ferrite Bead, 10 $\Omega$ at 100 MHz, 1.74 A, 0402	0402
19	R1, R7	2	0	CRCW04020000Z0EDHP	Vishay-Dale	RES, 0, 0%, 0.2 W, AEC-Q200 Grade 0, 0402	0402
20	R2, R6	2	49.9	RC0402FR-0749R9L	Yageo America	RES, 49.9, 1%, 0.063 W, 0402	0402
21	R5	1	4.02k	CRCW04024K02FKED	Vishay-Dale	RES, 4.02 k, 1%, 0.063 W, AEC-Q200 Grade 0, 0402	0402
22	TP1	1		5122	Keystone	Test Point, Compact, Blue, TH	Blue Compact Testpoint
23	TP2	1		5011	Keystone	Test Point, Multipurpose, Black, TH	Black Multipurpose Testpoint
24	U1	1		LMH34400	Texas Instruments	LMH34400	SOT6
25	U2	1		LP5912-1.0DRVR	Texas Instruments	Linear Voltage Regulator IC Positive Fixed 1 Output 500 mA 6-WSON	WSON6
26	R3, R4	0	49.9	RC0402FR-0749R9L	Yageo America	RES, 49.9, 1%, 0.063 W, 0402	0402
27	R8	0	100	MCS0402MD1000BE100	Vishay/Beyschlag	RES, 100, 0.1%, 0.1 W, AEC-Q200 Grade 0, 0402	0402

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