

AMC130x Evaluation Module

This user's guide describes the characteristics, operation, and use of the AMC130xEVM. This evaluation module (EVM) is an evaluation and development kit for evaluating the [AMC1300](#) or [AMC1301](#), precision isolation amplifiers. A complete circuit description as well as schematic diagram and bill of materials are included.

The following related documents are available through the Texas Instruments web site at www.ti.com.

Related Documentation

Device	Literature Number
AMC1300	SBAS895
AMC1301	SBAS667
AMC1302	SBAS812
SN6501	SLLSEA0

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1 EVM Overview

1.1 Features

This EVM supports the following features:

- Full-featured evaluation board for the AMC1300, AMC1301, or AMC1302 single-channel precision isolation amplifier
- Screw terminals for easy access to analog inputs and outputs
- Optional isolated power to VDD1 from VDD2

1.2 Introduction

The AMC1300, AMC1301, and AMC1302 are precision isolation amplifiers with an output separated from the input circuitry by a silicon dioxide (SiO₂) barrier that is highly resistant to magnetic interference. This barrier has been certified to provide basic galvanic isolation of up to 7000 V_{PEAK} according to UL1577 and IEC60747-5-2 specifications.

For use in high-resolution measurement applications, the input of the AMC1300, AMC1301, and AMC1302 is optimized for direct connection to shunt resistors or other low-level signal sources.

Throughout this document, the abbreviation *EVM* and the term *evaluation module* are synonymous with the AMC130xEVM.

2 Analog Interface

The analog inputs to the AMC1300, AMC1301, and AMC1302 are routed from the two-wire screw terminal at J1. These screw terminals provide access to the inverting and noninverting inputs of the AMC130x device installed at U2.

2.1 Analog Inputs

The analog inputs to the AMC130xEVM printed-circuit board (PCB) consists of optional RC filter circuit. By default, R1 and R2 on the analog input are populated as 0-Ω resistors. Capacitors C4, C5, and C8 are not installed. An example input circuit for the AMC130x is shown in [Figure 1](#).

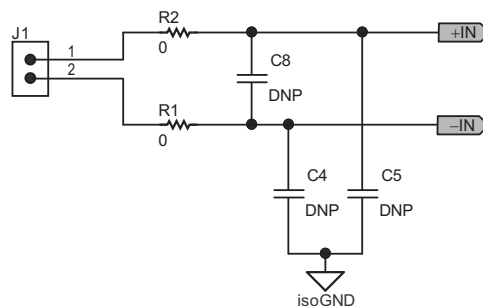


Figure 1. AMC130xEVM Schematic: Analog Input Section

2.2 Analog Outputs

The analog outputs from the AMC130xEVM board are fully-differential signals centered at $VDD2 / 2$. The outputs are available on the two screw terminals of J4, as Figure 2 shows.

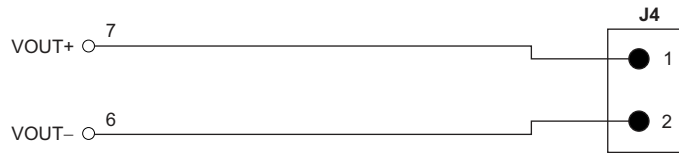


Figure 2. AMC130xEVM Schematic: Analog Output Section

3 Power Supplies

The AMC130xEVM require two separate power rails, VDD1 and VDD2. VDD1 is on the high voltage side of the amplifier. VDD2 is on the user side of the amplifier.

3.1 VDD1 Input

J2 provides access to the to the VDD1 supply. For power provided from high-side isolated rails (such as from a gate-drive supply), move the shunt on jumper JP1 to cover pins 1 and 2. Use a voltage between 4.5 VDC and 5.5 VDC for the user-applied VDD1 supply. In the EVM default configuration, VDD1 is provided from VDD2 by means of an isolation transformer and U3, an SN6501 transformer driver. In the default configuration, apply 5 V to VDD2 through J3. The input power is shown in Figure 3.

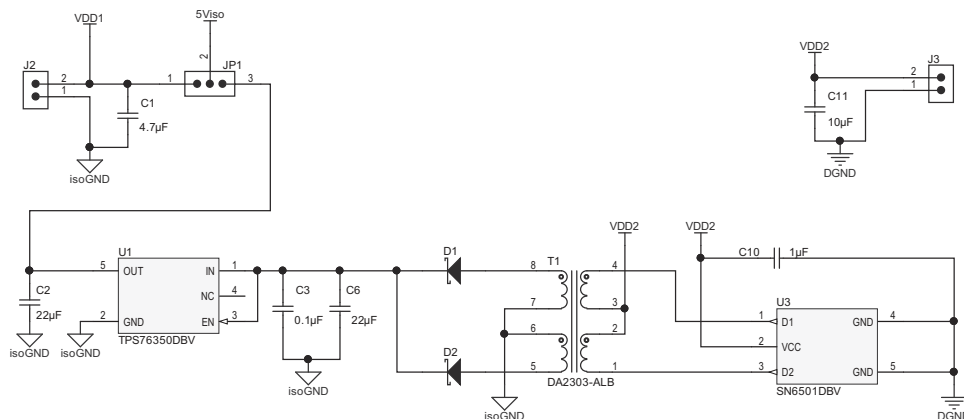


Figure 3. VDD1 Input

3.2 VDD2 Input

The user side of the AMC1300, AMC1301, and AMC1302 isolation amplifier is rated for 2.7 V_{DC} to 5.5 V_{DC} and is applied to the amplifier using J3. Figure 4 illustrates the power input for VDD2.

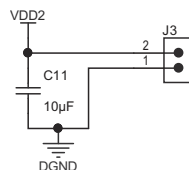


Figure 4. VDD2 Input Connector

4 EVM Operation

This section describes the general operation of the AMC130xEVM.

4.1 Isolated Power and Analog Inputs: J1 and J2

The analog input to the AMC130xEVM board can be applied directly to J1 pins 1 and 2.

CAUTION

For the limitations of the analog input range, and to ensure that the appropriate analog and digital voltages are applied before connecting any analog input to the EVM, see [AMC1301 Fully-Differential Isolation Amplifier](#).

[Table 1](#) summarizes the details of J1.

Table 1. J1: Analog Inputs

Pin Number	Signal	Description
J1.1	IN+	Noninverting input to the AMC1300, AMC1301, or AMC1302 (pin 2)
J1.2	IN-	Inverting analog input to the AMC1300, AMC1301, or AMC1302 (pin 3)

The isolated power input to the AMC130xEVM PCB can be applied directly to J2, pins 1 and 2. [Table 2](#) lists the details of J2.

Table 2. J2: Isolated Power

Pin Number	Signal	Description
J2.1	GND1	Connection to the AMC1300, AMC1301, or AMC1302 GND1 terminal (pin 4)
J2.2	VDD1	Connection to the AMC1300, AMC1301, or AMC1302 VDD1 terminal (pin 1)

4.2 User Power and Analog Output: J3 and J4

The VDD2 power input to the AMC130xEVM PCB can be applied directly to J3, pins 1 and 2. [Table 3](#) lists the details of J3.

Table 3. J3: VDD2 Power

Pin Number	Signal	Description
J3.1	GND2	Connection to the AMC1300, AMC1301, or AMC1302 GND2 terminal (pin 5)
J3.2	VDD2	Connection to the AMC1300, AMC1301, or AMC1302 VDD2 terminal (pin 8)

The analog output from the AMC130xEVM board is applied directly to J4, pins 1 and 2. [Table 4](#) summarizes the details of J4.

Table 4. J4: Analog Output

Pin Number	Signal	Description
J4.1	VOU-	Inverting analog output from the AMC1300, AMC1301, or AMC1302 (pin 7)
J4.2	VOU+	Noninverting output from the AMC1300, AMC1301, or AMC1302 (pin 6)

4.3 Device Operation

After the VDD1 and VDD2 power is applied to the AMC130xEVM, the analog outputs are available with a fixed gain and a dc offset equal to 1.44 V.

An analog input signal may be applied directly at screw terminal J2. Refer to [Figure 1](#) and [Table 1](#) for details. For the AMC1300EVM and AMC1301EVM the differential analog input range, (VIN+) – (VIN–), is specified at ±250 mV with a maximum of ±320 mV before clipping occurs.

The analog output has a nominal gain of 8 through the AMC1300 or AMC1301 isolation amplifier. With an input voltage of ±250 mV, the nominal output is therefore ±2.0 V.

For the AMC1302EVM, the differential analog input range is specified at ±50 mV with a maximum of ±64 mV with a fixed gain of 41 V/V. With an input voltage of ±50 mV, the nominal output is also ±2.0 V. The output voltage of the AMC130xEVM is centered on VDD / 2 and provides a convenient analog input range to the embedded analog-to-digital converters (ADCs) of the [MSP430](#) and [TMS320C2000](#) series of digital processors.

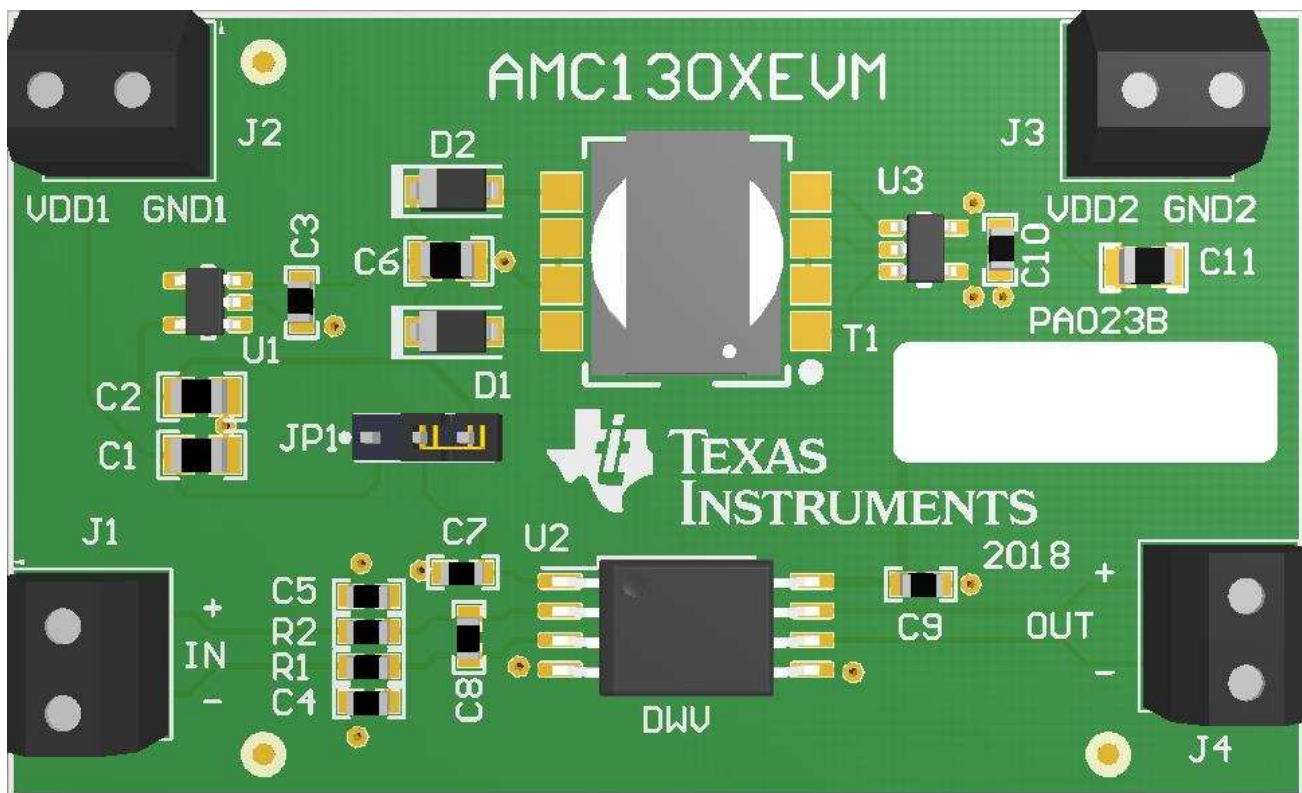
5 Layout, BOM, and Schematic

This sections contains the PCB layout, [bill of materials](#), and [schematic](#) of the AMC130xEVM.

5.1 Layout

[Figure 5](#) shows the AMC130xEVM PCB layout.

NOTE: Board layout is not to scale. This figure is intended to show how the board is laid out; it is not intended to be used for manufacturing AMC130xEVM PCBs.



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Figure 5. AMC130x Top Layer Silkscreen

5.2 Bill of Material

The bills of material is listed in [Table 5](#).

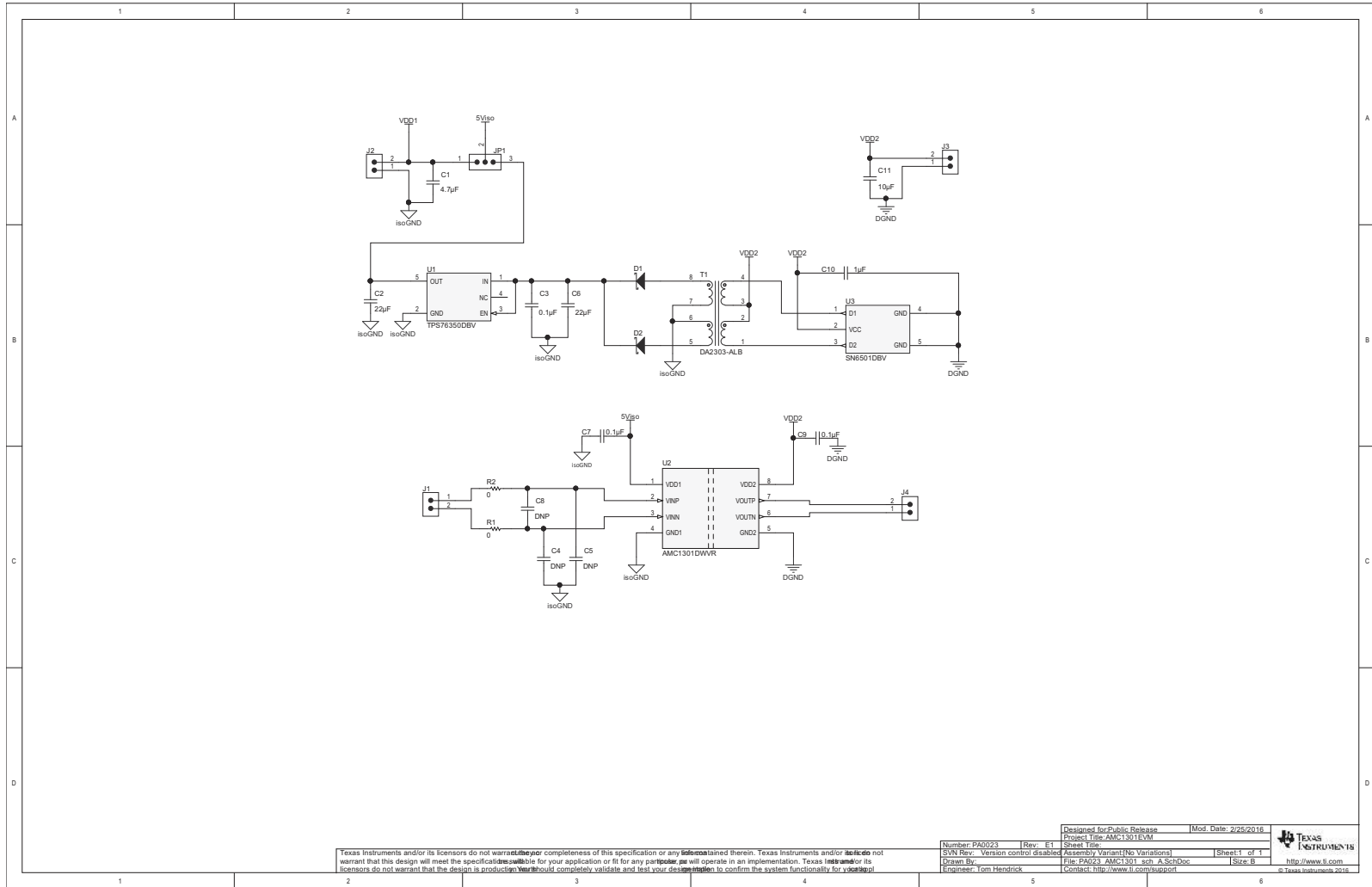
NOTE: All components should be RoHS compliant. Some part numbers may be either leaded or RoHS. Verify that purchased components are RoHS compliant.


Table 5. AMC130xEVM Bill of Materials

Item	Qty	Ref Des	Description	Manufacturer	Part Number
1	1	C1	CAP, CERM, 4.7uF, 50V, +/-10%, X5R, 0805	TDK	C2012X5R1H475K125AB
2	2	C2, C6	CAP, CERM, 22uF, 6.3V, +/-20%, X5R, 0805	Taiyo Yuden	JMK212BJ226MG-T
3	3	C3, C7, C9	CAP, CERM, 0.1uF, 25V, +/-10%, X7R, 0603	TDK	C1608X7R1E104K
4	1	C10	CAP, CERM, 1uF, 16V, +/-10%, X5R, 0603	TDK	C1608X5R1C105K
5	1	C11	CAP, CERM, 10uF, 10V, +/-10%, X5R, 0805	Murata	GRM219R61A106KE44D
6	2	D1, D2	Diode, Schottky, 20V, 0.5A, SOD-123	ON Semiconductor	MBR0520LT1G
7	4	J1, J2, J3, J4	Terminal Block, 6A, 3.5mm Pitch, 2-Pos, TH	On-Shore Technology	ED555/2DS
8	1	JP1	3x1 2mm male header	Samtec	TMM-103-01-T-S
9	2	R1, R2	RES, 0 ohm, 5%, 0.1W, 0603	Rohm	MCR03EZPJ000
10	1	T1	Isolation Transformer	Coilcraft	DA2303-ALB
11	1	U1	TPS76350DBV	TI	TPS76350DBV
12	1	U2	AMC1300BDWV or AMC1301BDWV	TI	AMC1300BDWV or AMC1301BDWV
13	1	U3	SN6501DBV	TI	SN6501DBV
14	0	C4, C5	DNP - Optional CAP, CERM, 10pF, 50V, +/-5%, C0G/NP0, 0603	AVX	06035A100JAT2A
15	0	C8	DNP - Optional CAP, CERM, 330pF, 50V, +/-5%, C0G/NP0, 0603	TDK	C1608C0G1H331J
16	1	N/A	Shunt	Samtec	2SN-BK-G

5.3 Schematic

Figure 6 shows the AMC130xEVM schematic.



Designed for Public Release | Mod. Date: 2/25/2016 |  TEXAS INSTRUMENTS

Project Title: AMC1301EVM

Number: PA0023 | Rev: E1 | Sheet Title: | Sheet 1 of 1

SVN Rev: Version control disabled | Assembly: Variant (No Variation) | File: PA0023_AMC1301_evm_A_SchDoc | Size: 8 | <http://www.ti.com>

Drawn By: | Engineer: Tom Hendrick | Contact: <http://www.ti.com/support> | © Texas Instruments 2016

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Figure 6. AMC130xEVM Schematic

Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

Changes from B Revision (May 2018) to C Revision	Page
• Added AMC1302 device to user's guide	1
• Changed <i>Device Operation</i> section to differentiate between the AMC1300EVM and AMC1301EVM functionality and the AMC1302EVM functionality	5

Revision History

Changes from A Revision (August 2016) to B Revision	Page
• Changed user's guide title from AMC1301EVM to AMC130xEVM to include additional devices	1
• Added AMC1300 device to user's guide	1

Revision History

Changes from Original (May 2016) to A Revision	Page
• Changed dc offset statement in first paragraph of the <i>Device Operation</i> section	5

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