AMC1301 Evaluation Module

This user's guide describes the characteristics, operation, and use of the AMC1301EVM. This evaluation module (EVM) is an evaluation and development kit for evaluating the AMC1301, a precision isolation amplifier. 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.

Table 1. Related Documentation

Device	Literature Number
AMC1301	SBAS667
SN6501	SLLSEA0

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1 EVM Overview

1.1 Features

This EVM supports the following features:

- Full-featured evaluation board for the AMC1301 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 AMC1301 is a precision isolation amplifier with an output separated from the input circuitry by a silicon dioxide (SiO_2) 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 AMC1301 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 AMC1301EVM.

2 Analog Interface

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

2.1 Analog Inputs

The analog inputs to the AMC1301EVM 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 AMC1301 is shown in Figure 1.

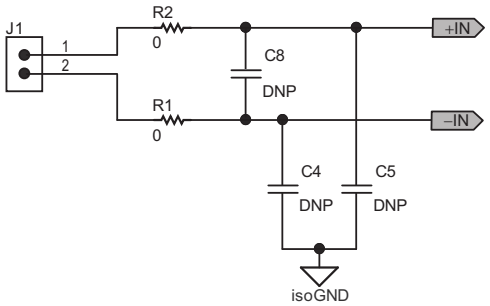

Figure 1. AMC1301EVM Schematic: Analog Input Section

2.2 Analog Outputs

The analog outputs from the AMC1301EVM board are fully-differential signals centered at VDD2 / 2. The outputs are available on the two screw terminals of J4, as Figure 2 shows.

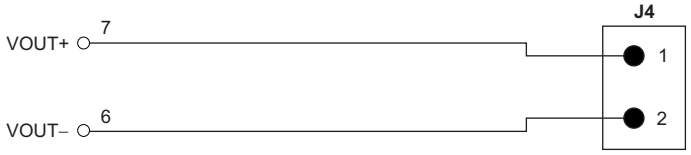

Figure 2. AMC1301EVM Schematic: Analog Output Section

3 Power Supplies

The AMC1301 requires 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.

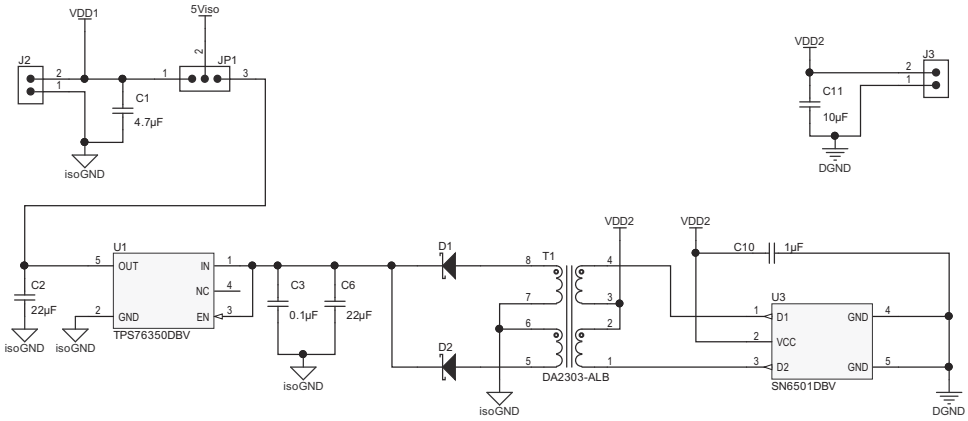

Figure 3. VDD1 Input

3.2 VDD2 Input

The user side of the AMC1301 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.

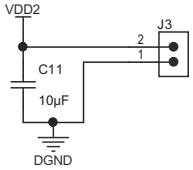

Figure 4. VDD2 Input Connector

4 EVM Operation

This section describes the general operation of the AMC1301EVM.

4.1 Isolated Power and Analog Inputs: J1 and J2

The analog input to the AMC1301EVM board can be applied directly to J1 pins 1 and 2.

CAUTION

Carefully review the AMC1301 product data sheet for the limitations of the analog input range, and ensure that the appropriate analog and digital voltages are applied before connecting any analog input to the EVM.

Table 2 summarizes the details of J1.

Table 2. J1: Analog Inputs

Pin Number	Signal	Description
J1.1	IN+	Noninverting input to the AMC1301 (pin 2)
J1.2	IN–	Inverting analog input to the AMC1301 (pin 3)

The isolated power input to the AMC1301EVM PCB can be applied directly to J2, pins 1 and 2. Table 3 lists the details of J2.

Table 3. J2: Isolated Power

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

4.2 User Power and Analog Output: J3 and J4

The VDD2 power input to the AMC1301EVM PCB can be applied directly to J3, pins 1 and 2. Table 4 lists the details of J3.

Table 4. J3: VDD2 Power

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

The analog output from the AMC1301EVM board is applied directly to J4, pins 1 and 2. Table 5 summarizes the details of J4.

Table 5. J4: Analog Output

Pin Number	Signal	Description
J4.1	VOUT–	Inverting analog output from the AMC1301 (pin 7)
J4.2	VOUT+	Noninverting output from the AMC1301 (pin 6)

4.3 Device Operation

After the VDD1 and VDD2 power is applied to the AMC1301EVM, the analog outputs are available with a fixed gain of 8 and a dc offset equal to VDD2 / 2.

An analog input signal may be applied directly at screw terminal J2. Refer to Figure 1 and Table 2 for details. 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 AMC1301 isolation amplifier. With an input voltage of ±250 mV, the nominal output is therefore ±2.0 V. The output voltage 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 AMC1301 EVM.

5.1 Layout

Figure 5 shows the AMC1301 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 AMC1301EVM PCBs.

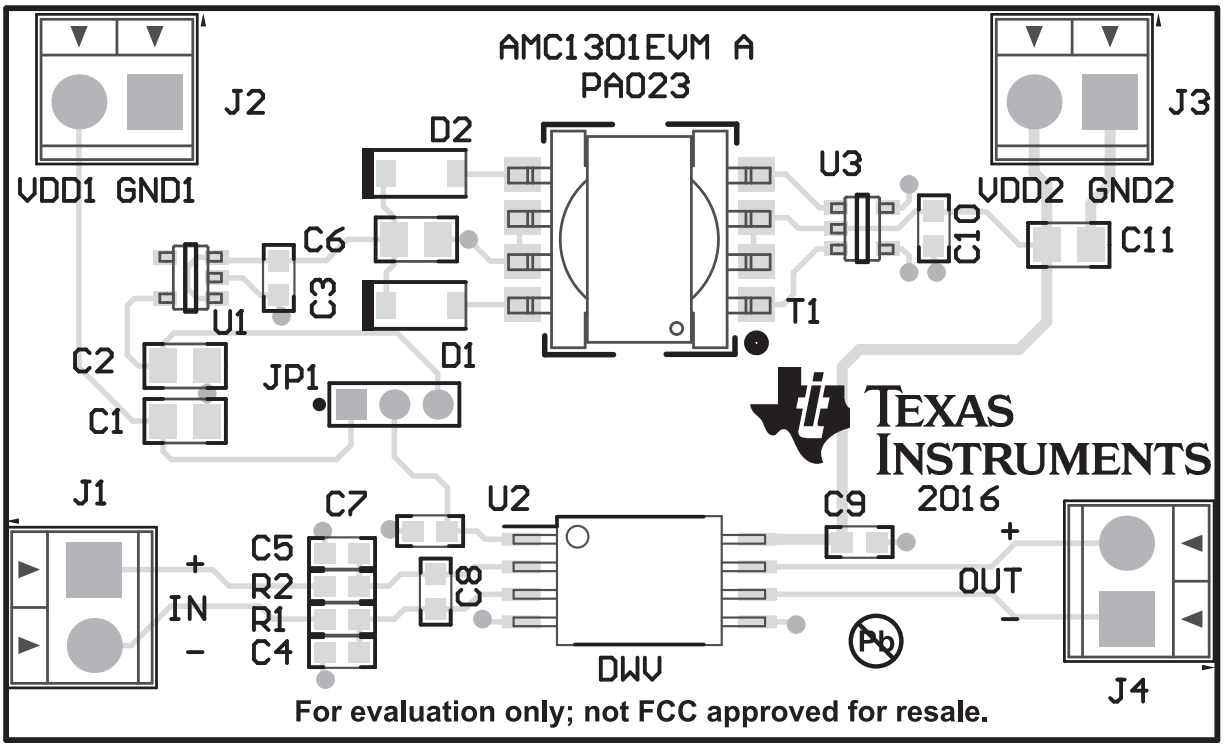

Figure 5. AMC1301 Silkscreen Drawing

5.2 Bill of Material

The bills of material is listed in Table 6.

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

Table 6. AMC1301EVM 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	AMC1301BDWV	TI	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 illustrates the AMC1301EVM schematic.

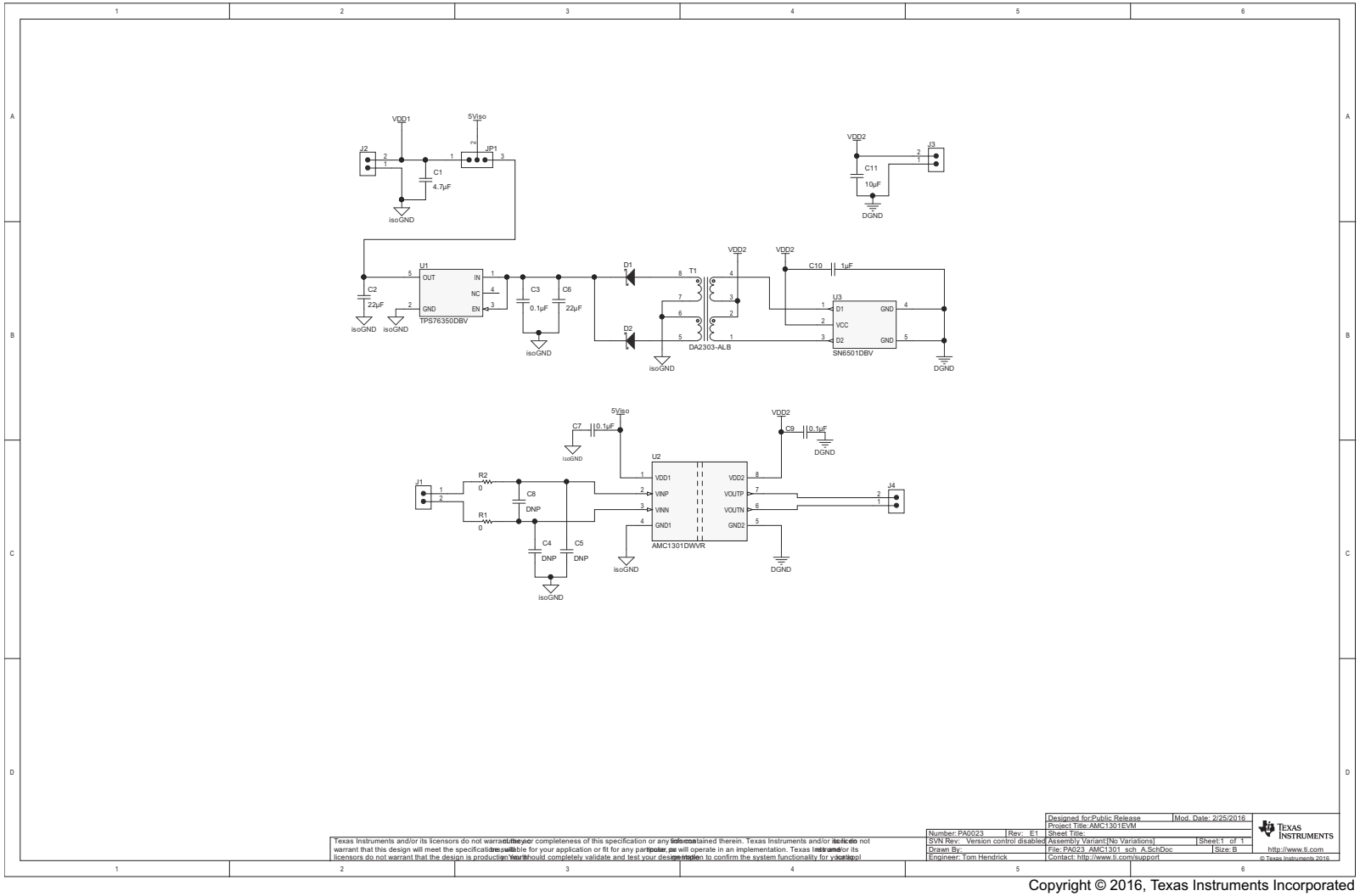

Figure 6. AMC1301EVM Schematic

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- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210*

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Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

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2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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