

AMC1200EVM

This user's guide describes the characteristics, operation, and use of the AMC1200EVM. This evaluation module (EVM) is an evaluation and development kit for evaluating the [AMC1200](#), 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
AMC1200	SBAS542
SN6501	SLLSEA0

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1 EVM Overview

1.1 Features

- Full-featured evaluation board for the AMC1200 single-channel precision isolation amplifier
- Screw terminals for easy access to analog inputs and outputs
- Two package options included:
 - AMC1200BDUB
 - AMC1200BDWV
- Optional isolated power to VDD1 from VDD2

1.2 Introduction

The AMC1200 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 $4000 V_{\text{PEAK}}$ according to UL1577 and IEC60747-5-2 specifications.

For use in high-resolution measurement applications, the input of the AMC1200 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 AMC1200EVM.

2 Analog Interface

There are two AMC1200 devices installed on the EVM. Both of the analog inputs to the AMC1200 are routed from the two-wire screw terminals at J2 and J5. These screw terminals give the user access to the inverting and noninverting inputs of the AMC1200 devices installed at U1 and U2.

2.1 Analog Inputs

The analog inputs to the AMC1200EVM printed circuit board (PCB) consists of simple RC filter circuits. Connectors J2 and J4 have identical configurations. An example input circuit for the AMC1200 is shown in Figure 1.

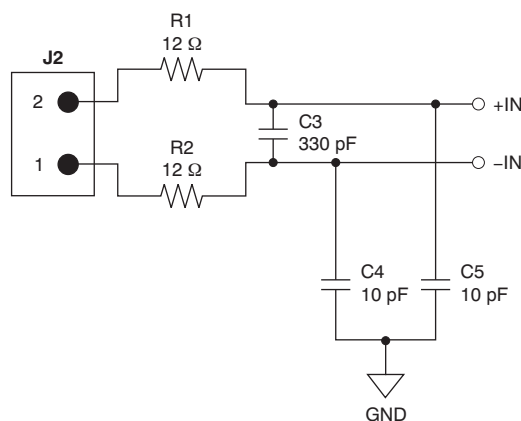


Figure 1. AMC1200EVM Schematic: Analog Input Section

2.2 Analog Outputs

The analog outputs from the AMC1200EVM board are fully-differential signals centered at $VDD2 / 2$. The outputs are available on the two screw terminals of J4, as Figure 2 shows.

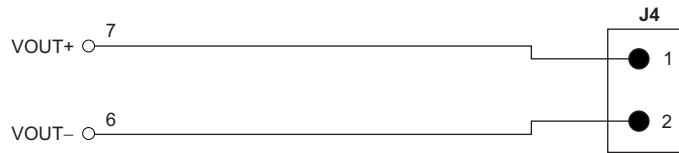


Figure 2. AMC1200EVM Schematic: Analog Output Section

3 Power Supplies

The AMC1200 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

J1 provides access 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 the SN6501 transformer driver. In the default configuration, apply 5 V to VDD2 through J3. The input power is shown in Figure 3.

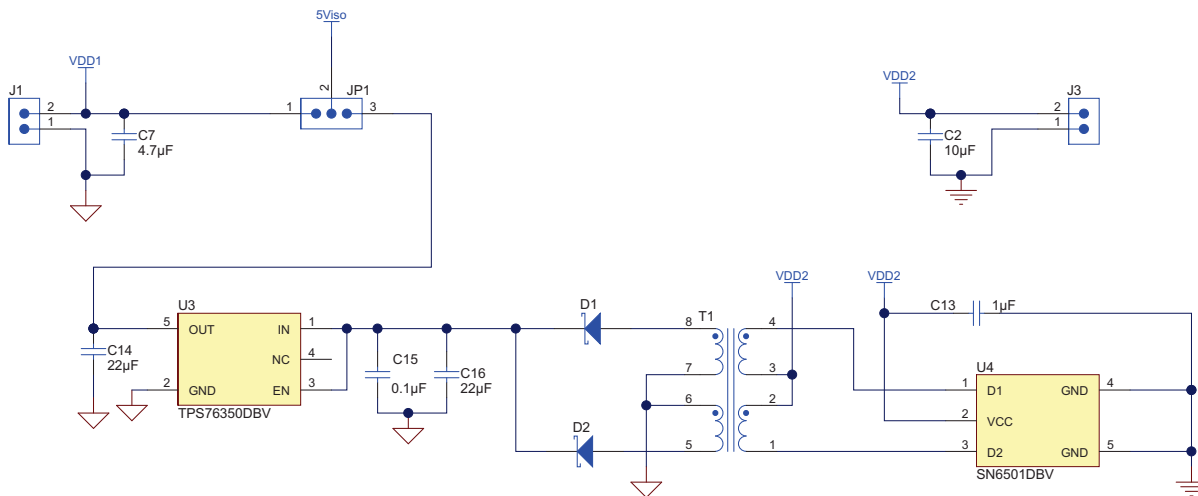


Figure 3. VDD1 Input

3.2 VDD2 Input

The user side of the AMC1200 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.

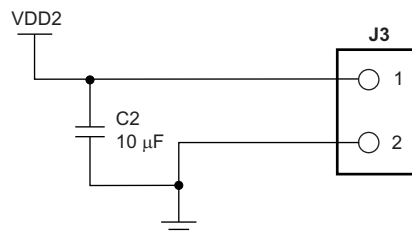


Figure 4. VDD2 Input Connector

4 EVM Operation

This section describes the general operation of the AMC1200EVM.

4.1 Isolated Power and Analog Inputs: J1, J2 and J5

The isolated power input to the AMC1200EVM PCB can be applied directly to J1, pins 1 and 2. [Table 2](#) lists the details of J1.

Table 2. J1: Isolated Power

Pin Number	Signal	Description
J1.1	GND1	Connection to the AMC1200 GND1 terminal (pin 4)
J1.2	VDD1	Connection to the AMC1200 VDD1 terminal (pin 1)

The analog input to the AMC1200EVM board can be applied directly to J2 pins 1 and 2.

CAUTION

Carefully review the [AMC1200 product data sheet](#) for the limitations of the analog input range, and ensure that the appropriate analog/digital voltages are applied before connecting any analog input to the EVM.

[Table 3](#) summarizes the details of J2 and J5.

Table 3. J2 and J5: Analog Inputs

Pin Number	Signal	Description
J2.1 and J5.1	IN+	Inverting input to the AMC1200 (pin 2)
J2.2 and J5.2	IN-	Noninverting analog input to the AMC1200 (pin 3)

4.2 User Power and Analog Outputs: J3, J4, and J6

The VDD2 power input to the AMC1200EVM 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 AMC1200 GND2 terminal (pin 5)
J3.2	VDD2	Connection to the AMC1200 VDD2 terminal (pin 8)

The analog output from the AMC1200EVM board is applied directly to J4, pins 1 and 2. [Table 5](#) summarizes the details of J4.

Table 5. J4 and J6: Analog Outputs

Pin Number	Signal	Description
J4.1 and J6.1	VOUT+	Noninverting analog output from the AMC1200 (pin 7)
J4.2 and J6.2	VOUT-	Inverting output from the AMC1200 (pin 6)

4.3 Device Operation

After the VDD1 and VDD2 power is applied to the AMC1200EVM, 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 or J5. Refer to [Figure 1](#) and [Table 3](#) 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 outputs have a nominal gain of 8 through the AMC1200 isolation amplifiers. With an input voltage of ± 250 mV, the nominal output is therefore ± 2.0 V. The output voltage is centered on $V_{DD} / 2$ 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 BOM, Schematic, and Layout

A full-size schematic for the AMC1200EVM board is appended to the end of this user's guide. The bills of material is provided in [Section 5.1](#). [Figure 5](#) shows the AMC1200 PCB layout.

NOTE: Board layouts are not to scale. These figures are intended to show how the board is laid out; they are not intended to be used for manufacturing AMC1200EVM PCBs.

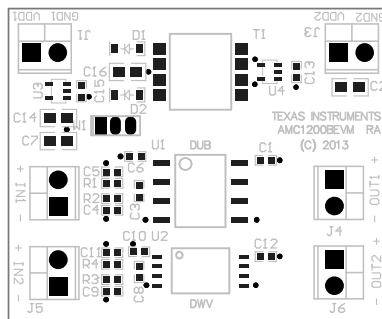


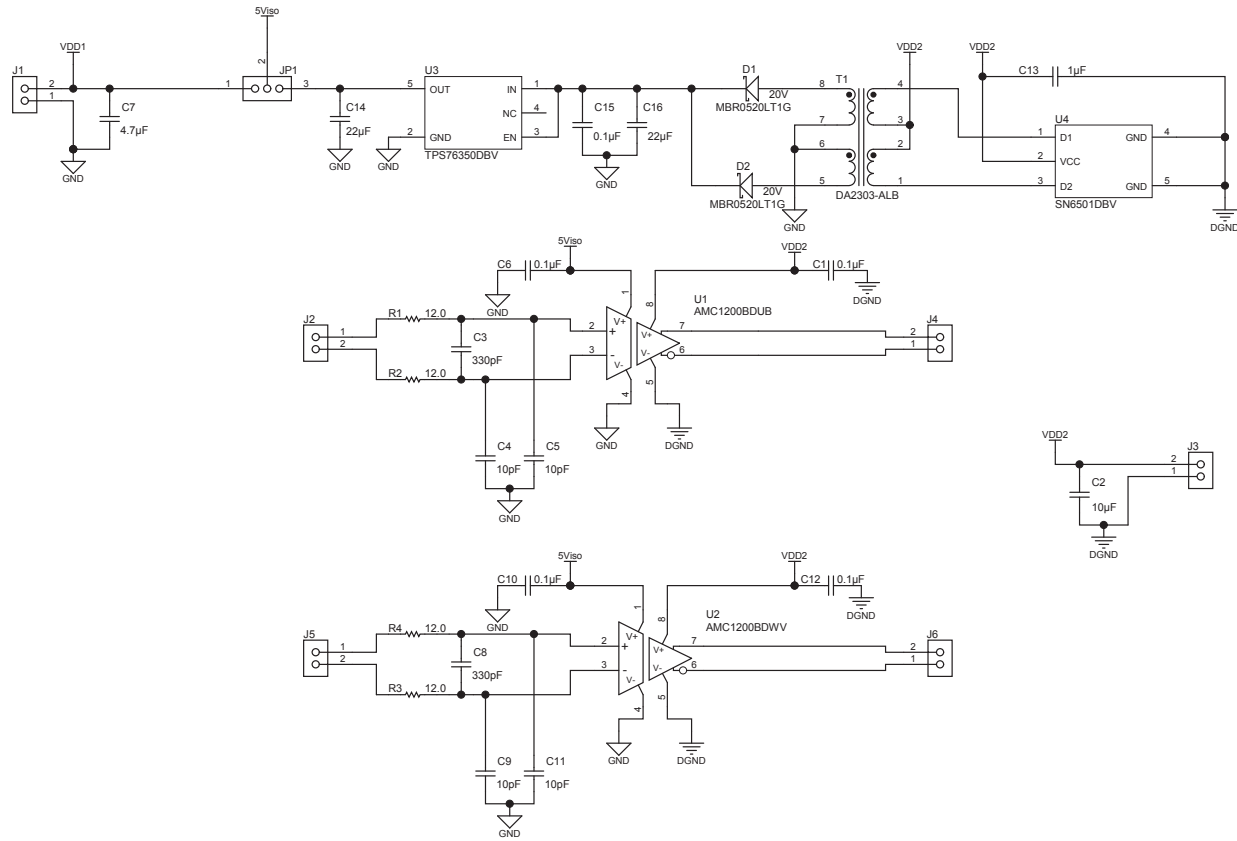
Figure 5. AMC1200 Silkscreen Drawing

5.1 Bill of Material

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. AMC1200EVM Bill of Materials

Item	Qty	Ref Des	Description	Manufacturer	Part Number
1	3	C1, C10, C12	CAP, CERM, 0.1uF, 25V, +/-10%, X7R, 0603	TDK	C1608X7R1E104K
2	1	C2	CAP, CERM, 10uF, 10V, +/-10%, X5R, 0805	Murata	GRM219R61A106KE44D
3	2	C3, C8	CAP, CERM, 330pF, 50V, +/-5%, C0G/NP0, 0603	TDK	C1608C0G1H331J
4	4	C4, C5, C9, C11	CAP, CERM, 10pF, 50V, +/-5%, C0G/NP0, 0603	AVX	06035A100JAT2A
5	2	C6, C15	CAP, CERM, 0.1uF, 25V, +/-10%, X7R, 0603	AVX	06033C104KAT2A
6	1	C7	CAP, CERM, 4.7uF, 50V, +/-10%, X5R, 0805	TDK	C2012X5R1H475K125AB
7	1	C13	CAP, CERM, 1uF, 16V, +/-10%, X5R, 0603	TDK	C1608X5R1C105K
8	2	C14, C16	CAP, CERM, 22uF, 6.3V, +/-20%, X5R, 0805	Taiyo Yuden	JMK212BJ226MG-T
9	2	D1, D2	Diode, Schottky, 20V, 0.5A, SOD-123	ON Semiconductor	MBR0520LT1G
10	6	J1, J2, J3, J4, J5, J6	Terminal Block, 6A, 3.5mm Pitch, 2-Pos, TH	On-Shore Technology	ED555/2DS
11	1	JP1	3x1 2mm male header	Samtec	TMM-103-01-T-S
12	4	R1, R2, R3, R4	RES, 12.0 ohm, 1%, 0.1W, 0603	Yageo America	RC0603FR-0712RL
13	1	T1	Isolation Transformer	Coilcraft	DA2303-ALB
14	1	U1	AMC1200DUB	TI	AMC1200BDUB
15	1	U2	AMC1200BDWV	TI	AMC1200BDWV
16	1	U3	TPS76350DBV	TI	TPS76350DBV
17	1	U4	SN6501DBV	TI	SN6501DBV
18	1	N/A	Shunt	Samtec	2SN-BK-G



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Number: 6525452	Rev: B	Designed for Public Release	Mod Date: 10/25/2013
SVN Rev: Not in version control	Assembly Variant: Variant name not interpreted	Project Title: Change in menu Project\Project Options\Parameter	Sheet Title:
Drawn By:	File: 6525452_amc1200_sch_b.SchDoc	Engineer: Enter name of project lead	Contact: http://www.ti.com/support
Size: B		http://www.ti.com	
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Revision History

Changes from Original (April 2011) to A Revision	Page
• Added SN6501 device to Table 1	1
• Added two new bullets to Section 1.1	2
• Changed Section 2	2
• Changed Section 2.1	2
• Changed Section 2.2	3
• Changed Section 3.1	3
• Changed Figure 3	3
• Changed Figure 4	3
• Added J5 to Section 4.1	4
• Changed Table 2 title (typo)	4
• Added J5 to Table 3	4
• Changed rows in Table 3	4
• Added J6 to Section 4.2	4
• Changed rows in Table 4	4
• Added J6 to Table 5	4
• Changed Section 4.3	4
• Changed Figure 5	5
• Changed BOM (Table 6)	6
• Changed schematic	6

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

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Caution

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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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.

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This Class A or B digital apparatus complies with Canadian ICES-003.

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Only those TI components which TI has specifically designated as military grade or "enhanced plastic" are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components which have **not** been so designated is solely at the Buyer's risk, and that Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

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