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.

Related Documentation

Device	Literature Number
AMC1200	SBAS542

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1 EVM Overview

1.1 Features

AMC1200EVM:

- Full-featured evaluation board for the AMC1200 single-channel precision isolation amplifier
- Screw terminals for easy access to analog inputs and outputs

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_{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

The analog input to the AMC1200 is routed from a two-wire screw terminal screw at J4. This screw terminal gives the user access to the inverting and noninverting inputs of the AMC1200.

2.1 Analog Inputs

The analog input to the AMC1200EVM printed circuit board (PCB) consists of simple RC filter circuits. The input circuit for the AMC1200 is shown in Figure 1.

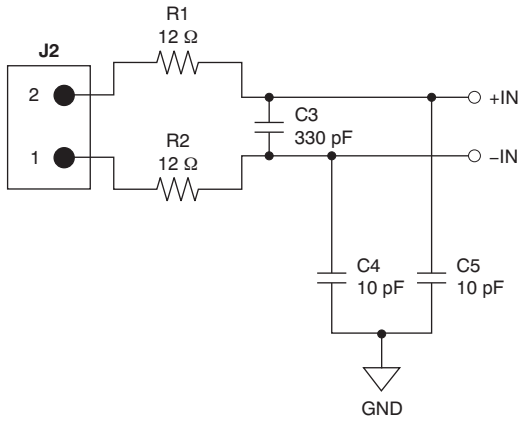


Figure 1. AMC1200EVM Schematic: Analog Input Section

2.2 Analog Output

The analog output from the AMC1200EVM board is a fully-differential signal centered at VDD2/2. The output is available on the two screw terminals of J4 as Figure 2 shows.

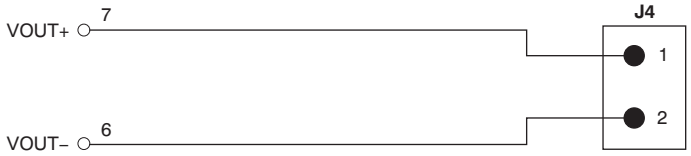


Figure 2. AMC1200EVM Schematic: Analog Output Section

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 to the VDD1 supply. For power provided from high-side isolated rails, such as from a gate drive supply, zener diode D1 may be installed by the user. Depending on the characteristics of the zener diode, resistor R1 (default 0 Ω) may need to be resized and replaced. The VDD1 supply should be between 4.5 V_{DC} and 5.5 V_{DC}. The input power is shown in Figure 3.

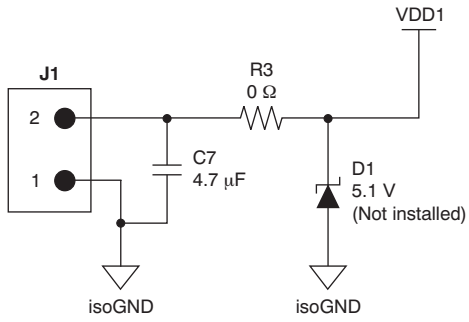


Figure 3. VDD1 Input

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.

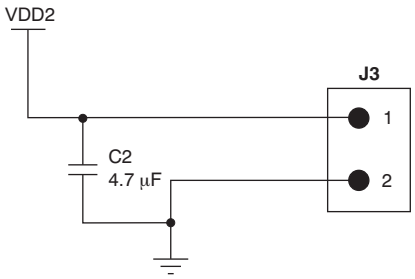


Figure 4. VDD2 Input Connector

4 EVM Operation

This section describes the general operation of the AMC1200EVM.

4.1 Isolated Power and Analog Inputs: J1 and J2

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

Table 1. J3: VDD2 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 2 summarizes the details of J2.

Table 2. J2: Analog Inputs

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

4.2 User Power and Analog Outputs: J3 and J4

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

The analog output from the AMC1200EVM 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	VOUT+	Noninverting analog output from the AMC1200 (pin 7)
J4.2	VOUT–	Inverting output from the AMC1200 (pin 6)

4.3 Device Operation

Once the VDD1 and VDD2 power is applied to the AMC1200EVM, the analog output is 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 AMC1200 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 BOM, Schematic, and Layout

A full-size schematic for the AMC1200EVM board is appended to 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.

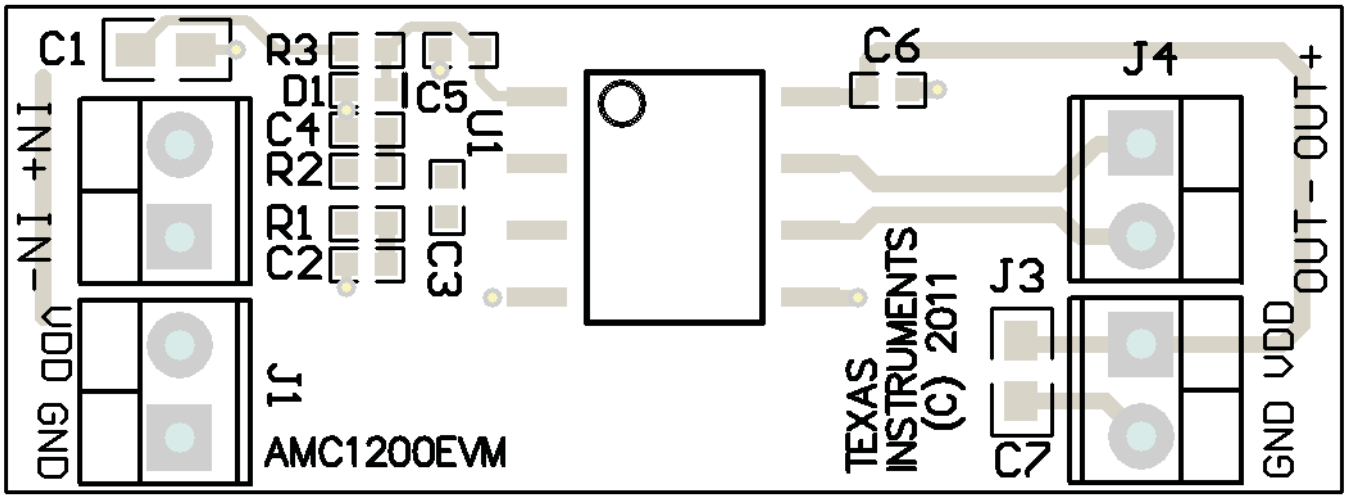


Figure 5. AMC1200 Silkscreen Drawing

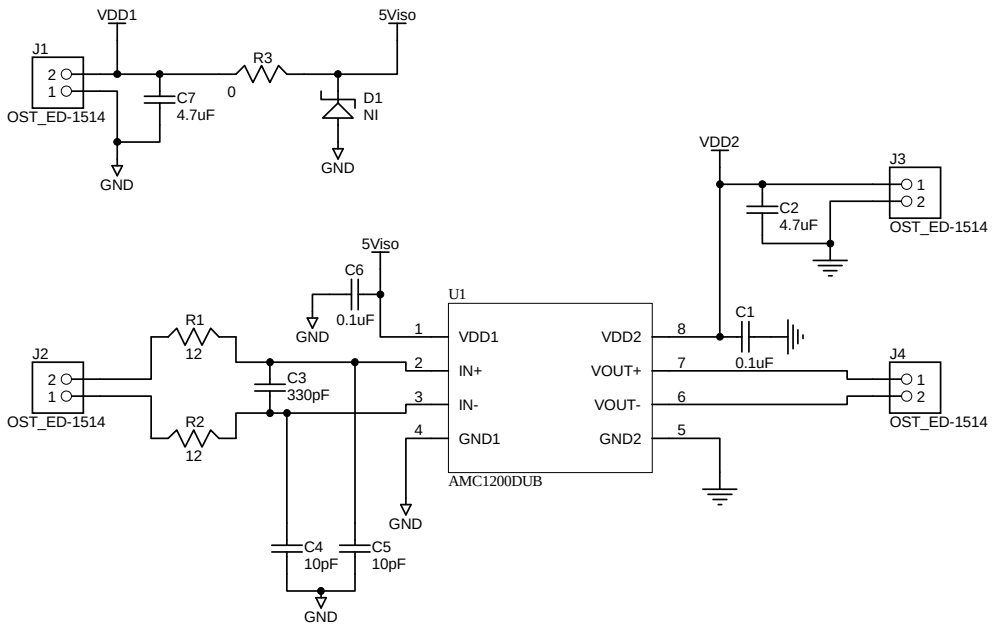
5.1 Bill of Material

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

Table 5. AMC1200EVM Bill of Materials

Item	Qty	Ref Des	Description	Manufacturer	Part Number
1	1	N/A	Printed wiring board	TI	6525452
2	1	C1	Capacitor, ceramic 10000 pF 50V X7R 10% 0805	TDK	C2012X7R1H103K
3	2	C2	Capacitor, ceramic 4.7 µF 16V X5R 10% 0603	Taiyo Yuden	EMK107ABJ475KA-T
4	1	C3	Capacitor, ceramic 330 pF 50V C0G 5% 0603	TDK	C1608C0G1H331J
5	2	C4, C5	Capacitor, ceramic 10 pF 50V C0G 0603	TDK	C1608C0G1H100D
6	1	C6	Capacitor, ceramic 0.1 µF 50V 10% X7R 0603	Murata	GRM188R71H104KA93D
7	1	C7	Capacitor, ceramic 4.7 µF 16V X5R 0805	Murata	GRM21BR61C475KA88L
8	0	D1	Not installed	—	—
9	4	J1, J2, J3, J4	Terminal block 3.5MM 2POS PCB	On Shore	ED555/2DS
10	2	R1, R2	Resistor, 12.0 Ω 1/10W 1% 0603 SMD	Yageo	RC0603FR-0712RL
11	1	R3	Resistor, 0.0 Ω 1/10W 0603 SMD	Yageo	RC0603JR-070RL
12	1	U1	IC Delta-Sigma Modulator, 1-bit 8-SOP	TI	AMC1200DUB

REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED



TEXAS INSTRUMENTS

Precision Analog
HIGH-PERFORMANCE ANALOG DIVISION
SEMICONDUCTOR GROUP

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DRAWN BY **Tom Hendrick**			
DOCUMENT CONTROL NO.**TBD**	SIZE **A**	DATE **05AUG10**	REV **A**
SHEET **1** OF **1**	FILE **AMC1200EVM**		

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It is important to operate this EVM within the input voltage range of 0V to +5V and the output voltage range of 0V to +5V.

Exceeding the specified input range may cause unexpected operation and/or irreversible damage to the EVM. If there are questions concerning the input range, please contact a TI field representative prior to connecting the input power.

Applying loads outside of the specified output range may result in unintended operation and/or possible permanent damage to the EVM. Please consult the EVM User's Guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative.

During normal operation, some circuit components may have case temperatures greater than +30°C. The EVM is designed to operate properly with certain components above +50°C as long as the input and output ranges are maintained. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors. These types of devices can be identified using the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during operation, please be aware that these devices may be very warm to the touch.

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