AMC1203EVM

This user's guide describes the characteristics, operation, and use of the AMC1203EVM. The AMC1203EVM is designed for prototyping and evaluation. A complete circuit description, schematic diagram, and bill of materials are included.

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

Device	Literature Number
AMC1203	SBAS427
AMC1210	SBAS372

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1 AMC1203EVM Overview

1.1 Features

AMC1203EVM:

- Full-featured evaluation module for the AMC1203 single-channel, ΔΣ modulator
- 9-pin sub-D connector for interfacing to the AMC1210 digital filter evaluation module
- Screw terminals for easy access to analog inputs

1.2 Introduction

The AMC1203 is a 1-bit modulator with an output buffer separated from the input interface circuitry by a silicon dioxide (SiO_2) isolation barrier. The isolation barrier provides galvanic isolation of up to 4000 V_{PEAK}. When used in combination with the AMC1210 or other digital filter, the AMC1203 can be used to achieve 16-bit analog-to-digital (A/D) conversion with no missing codes.

For use in high-resolution measurement applications, an effective accuracy of 14 bits can be obtained with a digital filter bandwidth of 20 kHz at a modulator rate of 10 MHz.

Throughout this document, the abbreviation *EVM* and the term *evaluation module* are synonymous with the AMC1203EVM.

2 Analog Interface

The analog input to the AMC1203 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 AMC1203.

2.1 Analog Inputs

The analog input to the AMC1203EVM board consists of simple R/C filter circuits. The input circuit for the AMC1203 is shown in Figure 1.

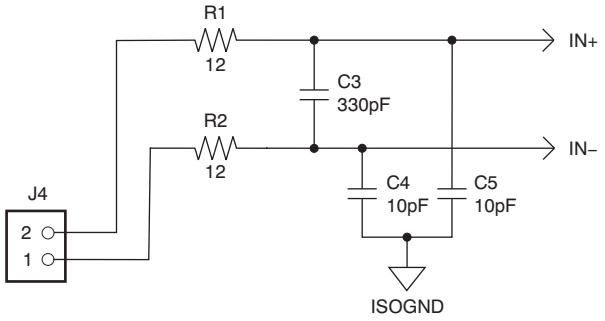


Figure 1. AMC1203EVM Schematic: Analog Input Section

3 Digital Interface

The AMC1203EVM is designed for use with digital filters such as the AMC1210. The output and power for the AMC1203 are routed to a 9-pin, female D-type connector. Both the analog and digital power for the AMC1203, as well as the modulator data and clock outputs from the device under test, are routed to J2, as Figure 2 illustrates.

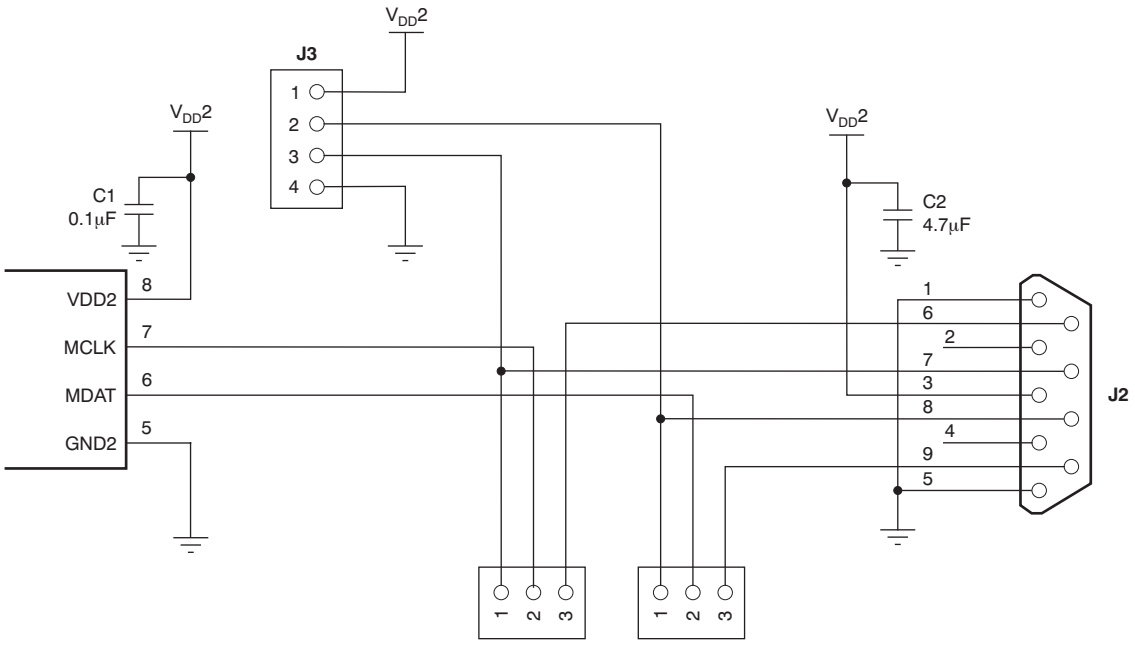


Figure 2. Power and Digital Outputs

Connector J3 and jumpers W1 and W2 can be used to connect up to two AMC1203EVMs together, providing power, MCLK, and MDAT signals to the AMC1210 filter chip using a single 9-pin, female, D-type connector.

4 Power-Supplies

J2 provides access to the +5 VA for the $V_{DD}2$ supply. All power to the board should be sourced from a well-regulated, linear supply that has current limiting capabilities. Power is to be applied through J2. Table 1 describes the pinout for J2.

Table 1. J2: Power Supply and Digital Outputs

Signal	Pin Number		Signal
Ground	1	2	Not used
4.5 to 5.5 $V_{DD}2$ supply	3	4	Not used
Ground	5	6	Optional MCLK output
MCLK default	7	8	MDAT default
Optional MDAT output	9		

For standalone operation, power sources can also be applied via a mating connector to J2, and the digital output data stream can be wired directly to an FPGA or other digital filter module for further processing. Refer to Figure 2 or the schematic appended to the end of this document for additional details.

5 EVM Set-up and Operation

This section describes the general operation of the AMC1203EVM.

5.1 Isolated Power and Analog Inputs: J1 and J4

The isolated power input to the AMC1203EVM printed circuit board (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	ISOGND	Connection to the AMC1203 GND1 pin
J1.2	5 V_{ISO}	Connection to the AMC1203 VDD1 terminal

The analog input to the AMC1203EVM PCB can be applied directly to J4 pins 1 and 2. Table 3 lists the details of J4.

CAUTION

Carefully review the AMC1203 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. J4: Analog Inputs

Pin Number	Signal	Description
J4.1	CHA+	Noninverting analog input to the AMC1203
J4.2	CHA–	Inverting input to the AMC1203

5.2 Device Operation

Once the analog and digital power sources are applied to the AMC1203EVM, the digital outputs become active. The AMC1203 is configured to use its onboard modulator clock. The internal reference of the AMC1203 is used as the conversion reference.

Additionally, an analog input signal may be applied directly at screw terminal J1. See Figure 1 and Table 3 for more details. The analog input range, (VIN+) – (VIN–), is ±320 mV.

As the input voltage approaches the maximum input level of +320mV, the 1s density of the modulator output approaches 92%. Likewise, when the input voltage approaches the lower limit of –320 mV, the 1s density is approximately 8%.

6 BOM, Schematic, and Layout

This section contains the complete bill of materials, schematic diagram, and PCB layout for the AMC1203EVM.

NOTE: Board layouts are not to scale. These are intended to show how the board is laid out; they are not intended to be used for manufacturing AMC1203EVM PCBs.

6.1 Schematic

The AMC1203EVM schematic is appended to this document.

6.2 Printed Circuit Board Layout

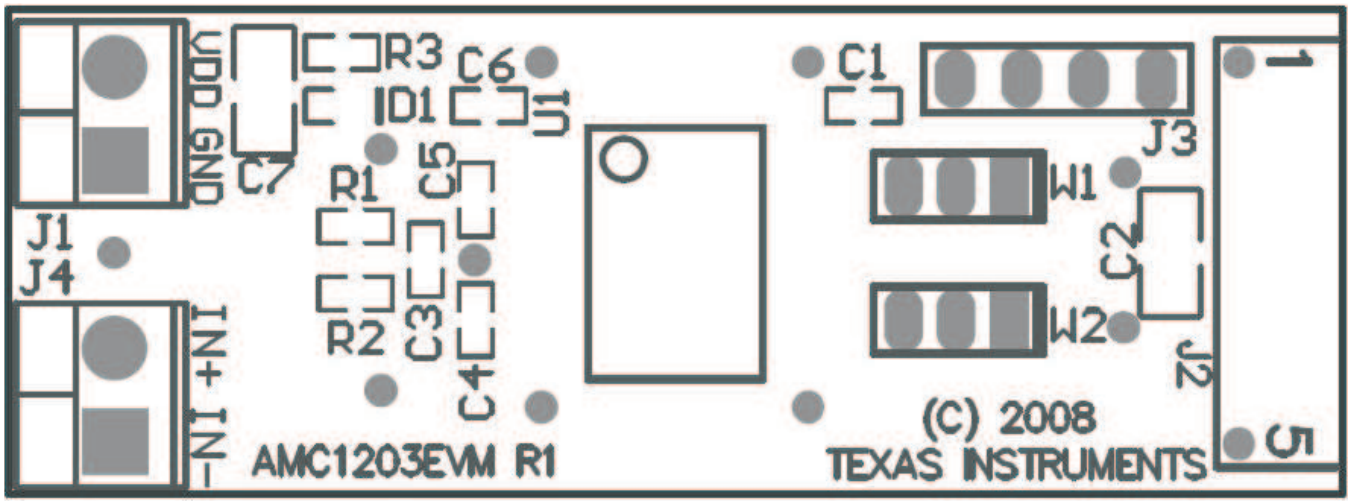


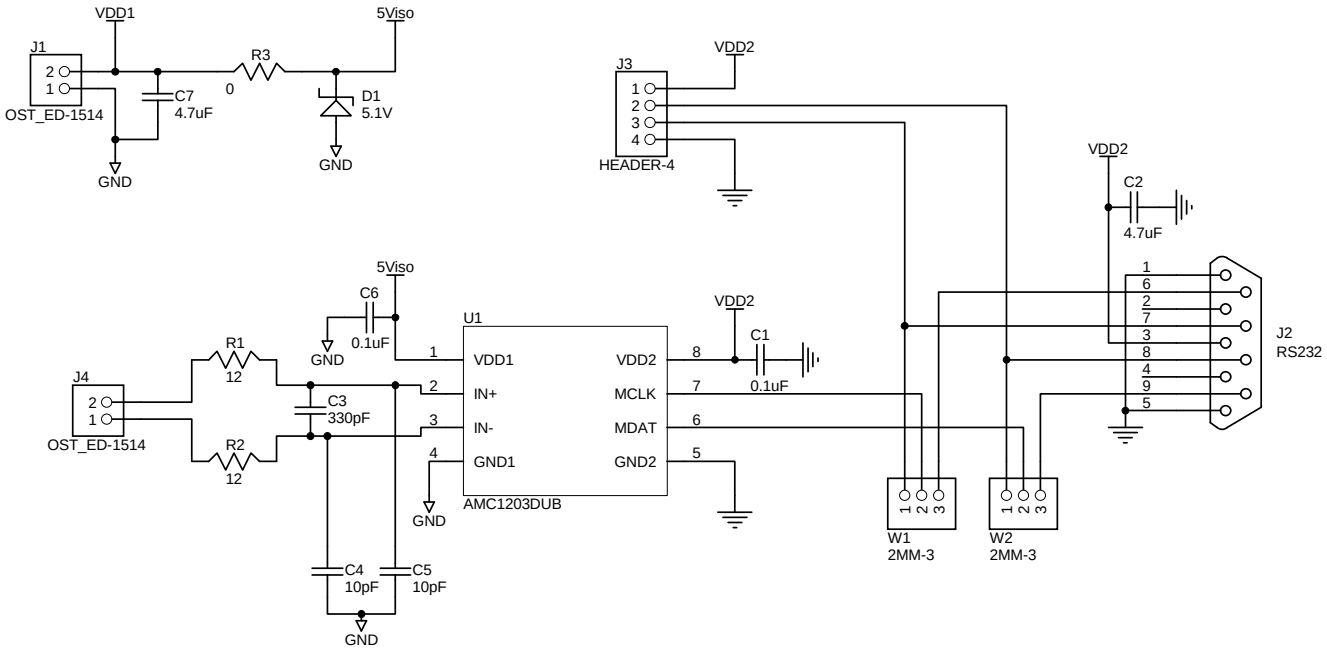
Figure 3. AMC1203EVM Silk Screen Drawing

6.3 Bill of Materials

Table 4. AMC1203EVM Bill of Materials

Reference Designator	Description	Manufacturer	Mfr Part Number
C1, C6	Capacitor, ceramic 0.10 μF 50 V X7R 10% 0603	TDK	C1608X7R1H104K
C2, C7	Capacitor, ceramic 4.7 μF 25 V X5R 0805	TDK	C2012X5R1E475K
C3	Capacitor, ceramic 330 pF 50 V C0G 5% 0603	TDK	C1608C0G1H331J
C4, C5	Capacitor, ceramic 10 pF 50 V C0G 0603	TDK	C1608C0G1H100D
D1	Not installed	—	—
J1, J4	Terminal block 3.5 mm 2-pos PCB	On Shore	ED555/2DS
J2	Connector, DB-9 female solder cup tin	Norcomp	172-009-202R001
J3	4-pin, single row header	Samtec	TSW-104-07-L-S
R1, R2	Resistor, 12.0 Ω 1/10W 1% 0603 SMD	Yageo	RC0603FR-0712RL
R3	Resistor, 0..0 Ω 1/10W 5% 0603 SMD	Yageo	RC0603JR-070RL
W1, W2	Not installed, solder short pins 1 and 2	—	—
U1	IC Delta-Sigma Mod 1bit 8-SOP	TI	AMC1203BDUB

REVISION HISTORY		
REV	ENGINEERING CHANGE NUMBER	APPROVED



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DRAWN BY **Tom Hendrick**			
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EVM Warnings and Restrictions

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 +30°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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