AMC1204EVM

This user's guide describes the characteristics, operation, and use of the AMC1204EVM. The AMC1204EVM 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.

Table 1. Related Documentation

Device	Literature Number
AMC1204	SBAS512
AMC1210	SBAS372
SN6501	SLLSEA0

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1 Overview

1.1 Features

- Full-featured evaluation module for the AMC1204 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
- Two package options included:
  - AMC1204DW
  - AMC1204DWV
- Optional isolated power to VDD1 from VDD2

1.2 Introduction

The AMC1204 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 AMC1204 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 AMC1204EVM.

2 Analog Interface

There are two AMC1204 devices installed on the EVM. Both of the analog inputs to the AMC1204 are routed from the two-wire screw terminals at J3 and J4. These screw terminals give the user access to the inverting and noninverting inputs of the AMC1204 devices installed at U1 and U2.

2.1 Analog Inputs

The analog inputs to the AMC1204EVM printed circuit board (PCB) consists of simple RC filter circuits. Connectors J3 and J4 have identical configurations. An example input circuit for the AMC1204 is shown in Figure 1.

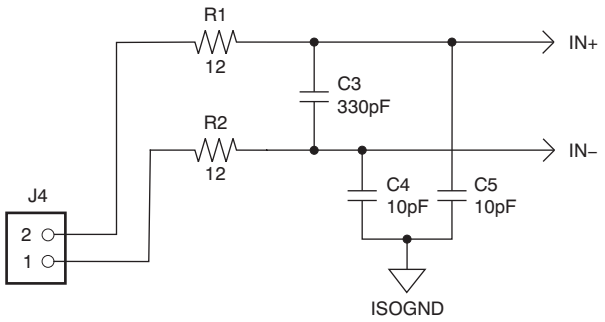


Figure 1. AMC1204EVM Schematic: Analog Input Section

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3 Digital Interface

The AMC1204EVM is designed for use with digital filters such as the AMC1210. The output and power for the two AMC1204 devices are routed to a 9-pin, female, D-type connector. The VDD2 power to the AMC1204 devices, as well as the modulator data and clock outputs from the devices under test, are routed to J2, as Figure 2 illustrates.

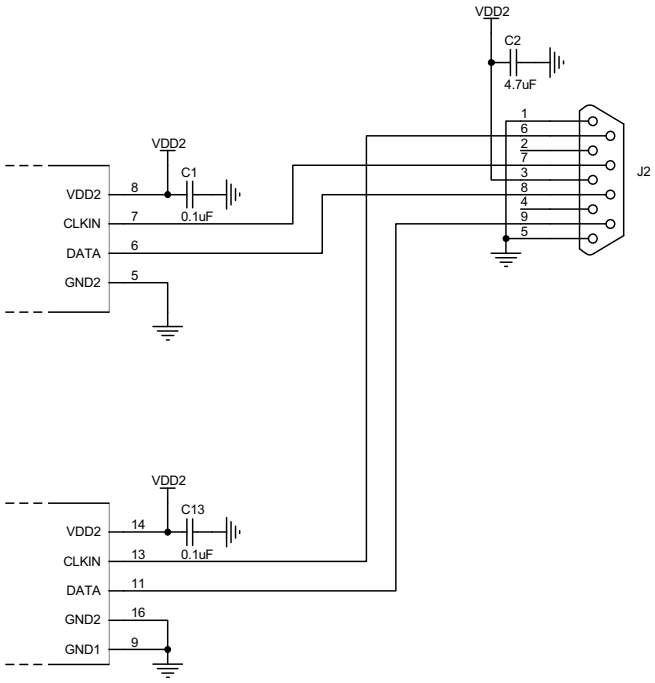


Figure 2. Power and Digital Outputs

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 2 describes the pinout for J2.

Table 2. 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	CLKIN for U4
CLKIN for U1	7	8	DATA output for U1
DATA output for U4	9	—	N/A

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.

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5 EVM Set-up and Operation

This section describes the general operation of the AMC1204EVM.

5.1 Isolated Power and Analog Inputs: J1, J3, and J4

In the EVM default configuration, VDD1 is provided by VDD2 by means of an isolation transformer and the SN6501 transformer driver. This configuration provides a regulated 5-V source to VDD1. 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. The isolated power input to the AMC1204EVM printed circuit board (PCB) can be applied directly to J1, pins 1 and 2. Table 3 lists the details of J1.

Table 3. J1: Isolated Power

Pin Number	Signal	Description
J1.1	5 V_{ISO}	Connection to the AMC1204 VDD1 terminal
J1.2	ISOGND	Connection to the AMC1204 GND1 pin

The analog inputs to the AMC1204EVM PCB can be applied directly to J3 and J4, pins 1 and 2. Table 4 lists the details of J3 and J4.

CAUTION

Carefully review the AMC1204 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 4. J3 and J4: Analog Inputs

Pin Number	Signal	Description
J3.1	IN+	Noninverting input to U4
J3.2	IN–	Inverting input to U4
J4.1	IN+	Noninverting input to U1
J4.2	IN–	Inverting input to U1

5.2 Device Operation

Once the analog and digital power sources are applied to the AMC1204EVM, the digital outputs become active upon the application of an external modulator clock source. The internal reference of the AMC1204 is used as the conversion reference.

Additionally, an analog input signal may be applied directly at screw terminals J3 and J4. See Figure 1 and Table 4 for more details. The analog input range, (VIN+) – (VIN–), is ±250 mV.

As the input voltage approaches the maximum input level of +250 mV, the 1s density of the modulator output approaches 92%. Likewise, when the input voltage approaches the lower limit of –250 mV, the 1s density is approximately 8%.

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6 BOM, Schematic, and Layout

This section contains the complete bill of materials, schematic diagram, and PCB layout for the AMC1204EVM.

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 AMC1204EVM PCBs.

6.1 Printed Circuit Board Layout

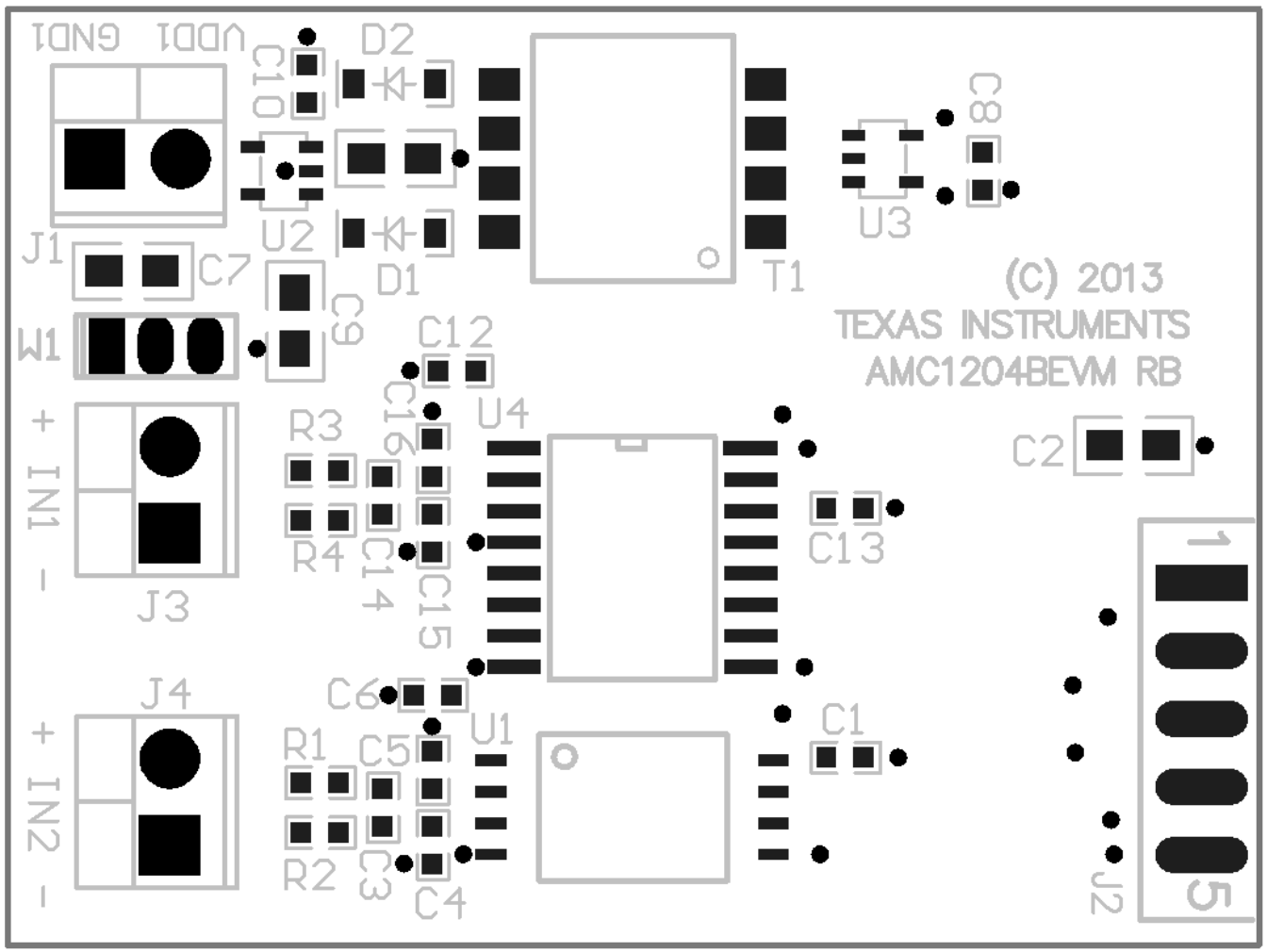


Figure 3. AMC1204EVM Silk Screen Drawing

6.2 Schematic

The AMC1204EVM schematic is appended to the end of this document.

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6.3 Bill of Materials

Table 5. AMC1204EVM Bill of Materials

Item	Qty	Reference Designator	Description	Manufacturer	Mfr Part Number
1	1	—	Printed circuit board	Any	6520713
2	5	C1, C6, C10, C12, C13	CAP, CERM, 0.1uF, 50V, +/-10%, X7R, 0603	AVX	06035C104KAT2A
3	2	C2, C7	CAP, CERM, 4.7uF, 25V, +/-10%, X5R, 0805	TDK	C2012X5R1E475K 125AB
4	2	C3, C14	CAP, CERM, 330pF, 50V, +/-5%, C0G/NP0, 0603	TDK	C1608C0G1H331J
5	4	C4, C5, C15, C16	CAP, CERM, 10pF, 50V, +/-5%, C0G/NP0, 0603	TDK	C1608C0G1H100D
6	1	C8	CAP, CERM, 1uF, 25V, +/-10%, X7R, 0603	TDK	C1608X7R1E105K 080AB
7	2	C9, C11	CAP, TA, 10uF, 16V, +/-20%, 1.5 ohm, SMD	AVX	F971C106MCC
8	2	D1, D2	Diode, Schottky, 20V, 0.5A, SOD-123	ON Semiconductor	MBR0520LT1G
9	3	J1, J3, J4	Terminal Block, 6A, 3.5mm Pitch, 2-Pos, TH	On Shore Techonology	ED555/2DS
10	1	J2	CONN DB9 FEMALE R/A SOLDER SMD	NorComp	190-009-263R001
11	1	JP1	Header, TH, 100mil, 3x1, Gold plated, 230 mil above insulator	Samtec	TSW-103-07-G-S
12	4	R1, R2, R3, R4	RES, 12.0 ohm, 1%, 0.1W, 0603	Yageo America	RC0603FR-0712RL
13	1	T1	Transformer, 45.6 uH SMT	Coilcraft	DA2303-ALB
14	1	U1	20MHz, Second-Order, Isolated Delta-Sigma Modulator for Current-Shunt Measurement, DWV0008A	Texas Instruments	AMC1204BDWV
15	1	U2	LOW-POWER 150-mA LOW-DROPOUT LINEAR REGULATOR, DBV0005A	Texas Instruments	TPS76350DBV
16	1	U3	Transformer Driver for Isolated Power Supplies, DBV0005A	Texas Instruments	SN6501DBV
17	1	U4	20MHz, Second-Order, Isolated Delta-Sigma Modulator for Current-Shunt Measurement, DW0016A	Texas Instruments	AMC1204BDW

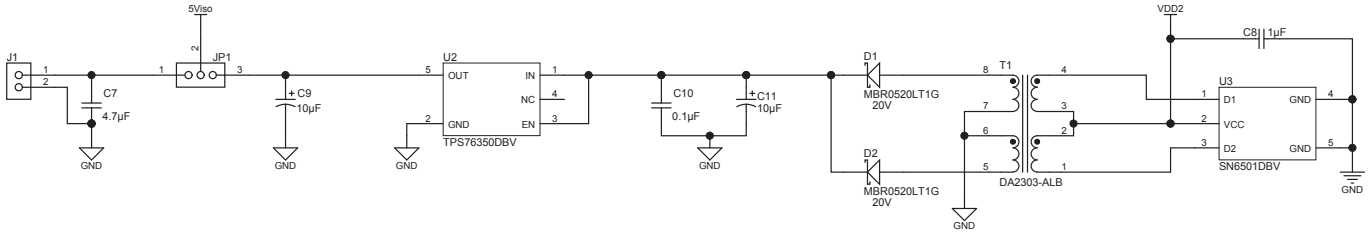
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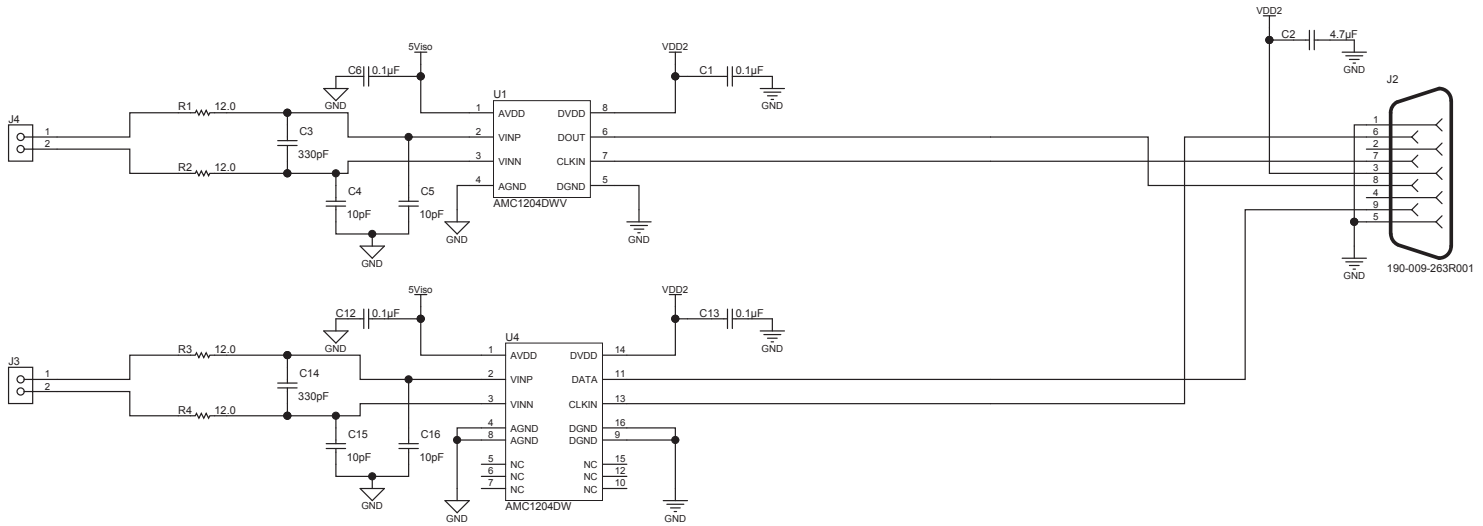
Revision History

Changes from Original (August 2010) 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 3	3
• Changed Figure 2	3
• Changed Table 2	3
• Changed Section 5.1	4
• Changed Table 4	4
• Changed schematic diagram	5
• Changed Figure 3	5

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

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Designed for: Public Release		Mod. Date: 2/10/2014	
Project Title: Change in menu Project|Project Options|Parameter			
Number: 6520713	Rev: B	Sheet Title:	
SVN Rev: Not in version control		Assembly Variant: Variant name not interpreted	Sheet: 1 of 1
Drawn By:		File: amc1204_b.SchDoc	Size: B
Engineer: Enter name of project lead		Contact: http://www.ti.com/support	

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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.

Industry Canada Compliance (English)

For EVMs Annotated as IC – INDUSTRY CANADA Compliant:

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

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 device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

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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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