



ABSTRACT

This user's guide describes the characteristics, operation, and use of the AMC3306EVM and AMC3336EVM. This evaluation module (EVM) is an evaluation and development kit for evaluating the [AMC3306](#) or the [AMC3336](#) device, a precision isolation modulator with an integrated DC/DC converter which powers the high side of the modulator. 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 |
|-------------------------|-------------------------|
| AMC3306 | SBAS996 |
| AMC3336 | SBASA70 |

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1 EVM Overview

1.1 Features

This EVM supports the following features:

- Full-featured evaluation board for the AMC3306 or AMC3336 single-channel precision isolation modulator with integrated DC/DC converter
- Screw terminals for easy access to analog inputs and digital outputs

1.2 Introduction

The AMC3306 and AMC3336 are precision isolation modulators with an output separated from the input circuitry by a silicon dioxide (SiO₂) 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 AMC3306 and AMC3336 are 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 AMC3306EVM and the AMC3336EVM. Additionally, the designator AMC33xxEVM or AMC33xx will be used when a description is applicable to both the AMC3306EVM and the AMC3336EVM or their respective devices.

2 Analog Interface

The analog inputs to the AMC33xx are routed from the two-wire screw terminal at J2. These screw terminals provide access to the inverting and noninverting inputs and high-side ground of the AMC33xx device installed at U1.

2.1 Analog Inputs

The analog inputs to the AMC33xxEVM printed-circuit board (PCB) consists of an RC filter circuit. By default, R7 and R11 on the analog input are populated as 49.9-Ω resistors. Capacitor C10, is populated with a 33-pF capacitor. [Figure 2-1](#) shows an example input circuit for the AMC3306EVM. The analog input to the AMC3336EVM is identical to the AMC3306EVM, except the input range is ±1 V.

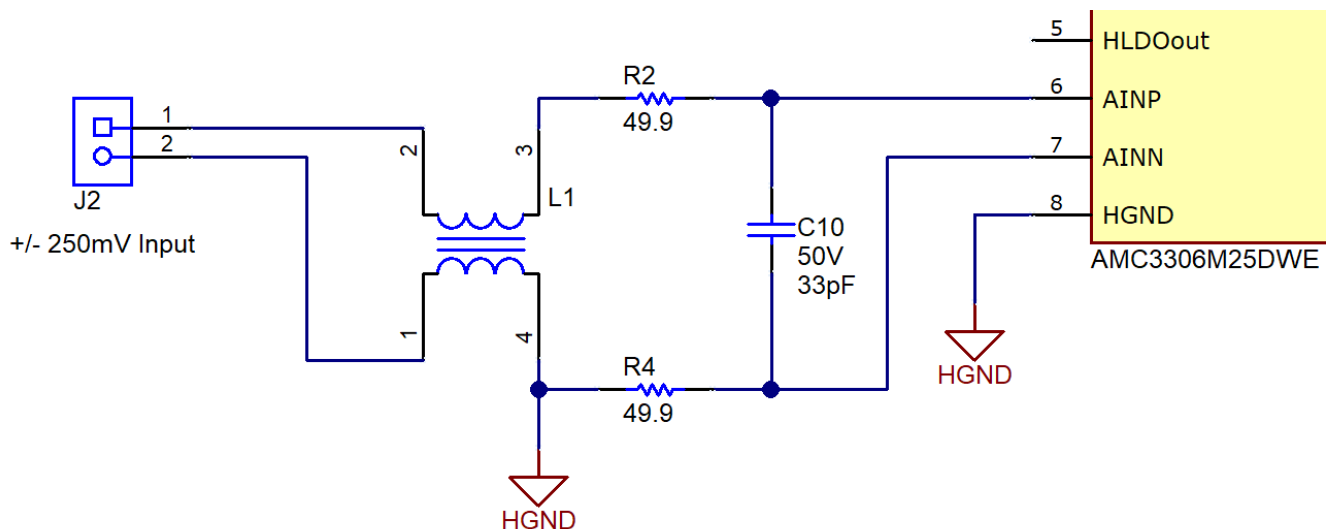


Figure 2-1. AMC3306EVM Schematic: Analog Input Section

2.2 Digital Input and Output

The digital CLKIN input for the AMC33xxEVM is accessible on the three-wire screw terminal at J3 on pin 3. The CLKIN input should be supplied with a 5–21 MHz square wave which alternates between 0 V and VDD.

The digital output from the AMC33xxEVM board is a bitstream with a ones density proportional to the differential input voltage. Figure 2-2 illustrates that the DOUT output is available at pin 1 of J3 .

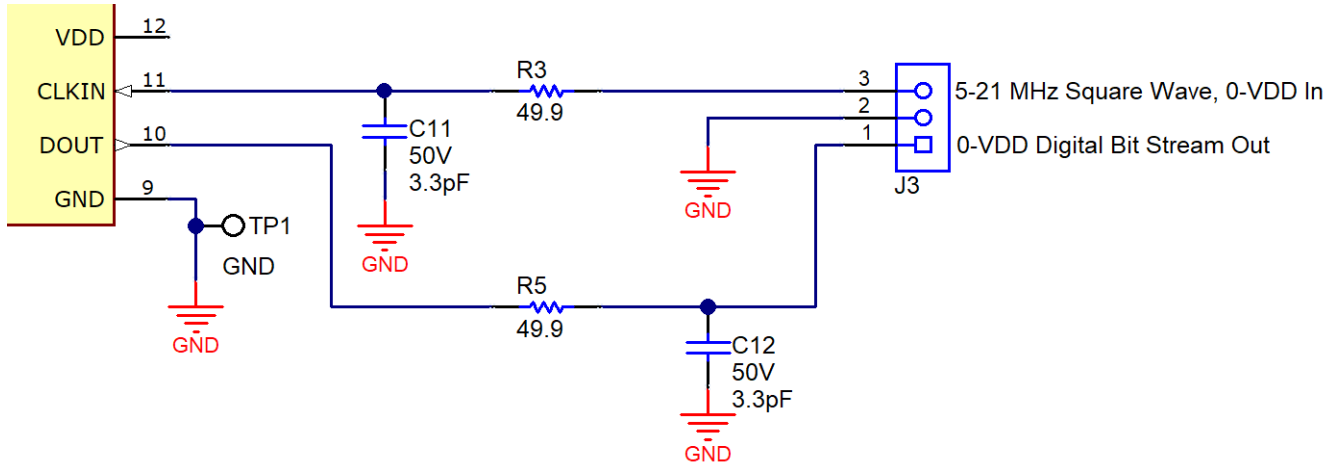


Figure 2-2. AMC33xxEVM Schematic: Digital Input and Output Section

3 Power Supplies

The AMC33xxEVM requires a single power rail, VDD. VDD is on the low-voltage side of the amplifier. Power for the high side of the amplifier is generated internally via the DC/DC converter circuit employed in the AMC33xx device.

3.1 VDD Input

J1 provides access to the VDD supply. Use a voltage between 3.0 VDC and 5.5 VDC for the user-applied VDD supply. Figure 3-1 shows the input power.

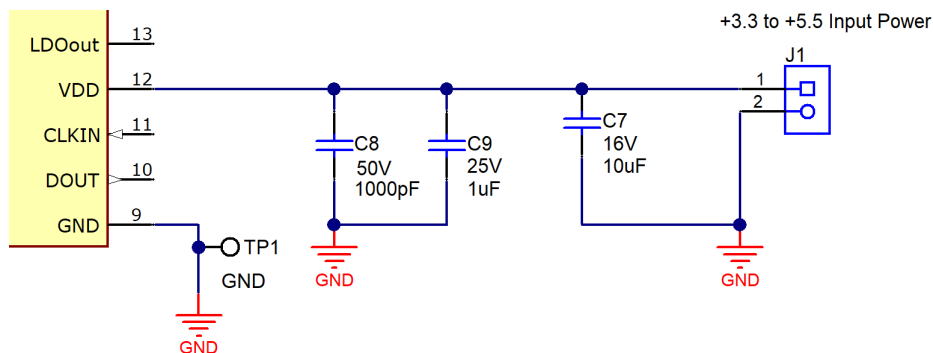


Figure 3-1. VDD Input

4 EVM Operation

This section describes the general operation of the AMC33xxEVM.

4.1 Analog Inputs: J2

The analog input to the AMC33xxEVM board can be applied directly to J2 pins 1 and 2.

CAUTION

For the limitations of the analog input range, and to ensure that the appropriate analog and digital voltages are applied before connecting any analog input to the EVM, refer to the datasheet for your device.

Related Documentation

| Device | Datasheet |
|-------------------------|-------------------------|
| AMC3306 | SBAS996 |
| AMC3336 | SBASA70 |

Table 4-1 summarizes the details of J2.

Table 4-1. J2: Analog Inputs

| Pin Number | Signal | Description |
|------------|--------|--|
| J2.1 | IN+ | Non-inverting input to the AMC33xx device (pin 6) |
| J2.2 | IN- | Inverting analog input to the AMC33xx device (pin 7) |

4.2 User Power and Digital Input and Output: J1 and J3

The VDD power input to the AMC33xxEVM PCB can be applied directly to J1, pins 1 and 2. Table 4-2 lists the details of J1.

Table 4-2. J1: VDD Power

| Pin Number | Signal | Description |
|------------|--------|---|
| J1.1 | VDD | Connection to the AMC33xx VDD terminal (pin 12) |
| J1.2 | GND | Connection to the AMC33xx GND terminal (pin 9) |

The digital clock input and the bitstream output from the AMC33xxEVM board are available directly at J3, pins 1 and 3. Table 4-3 summarizes the details of J3.

Table 4-3. J3: Digital Input and Output

| Pin Number | Signal | Description |
|------------|--------|---|
| J3.1 | DOUT | Digital bistream output from the AMC33xx (pin 10) |
| J3.2 | GND | Ground reference |
| J3.3 | CLKIN | Digital clock input on AMC33xx (pin 11) |

4.3 Device Operation

After the VDD power and the external clock input at CLKIN are applied to the AMC33xxEVM, the DOUT pin will begin to generate a bitstream output.

An analog input signal may be applied directly at screw terminal J2. See [Figure 2-1](#) and [Table 4-1](#) for details. For the AMC3306EVM, the differential analog input range, (VIN+) – (VIN–), is specified at ± 250 mV with a maximum of ± 320 mV before clipping occurs. For the AMC3336EVM, the differential analog input range, (VIN+) – (VIN–), is specified at ± 1 V with a maximum of ± 1.25 V before clipping occurs.

The digital output is a bitstream that alternates between 0 V and VDD. Using the AMC3306 for example, a differential input signal of 0 V ideally produces a stream of ones and zeros that are high 50% of the time, while a differential input of 250 mV produces a bitstream that is high 89.06% of the time. If the input is less than -320 mV or greater than 320 mV, the output modulator clips with a stream of only zeros or ones. In this case, however, the AMC3306 generates a single one or zero every 128 clock cycles to indicate proper device function.

5 Layout, BOM, and Schematic

This sections contains the PCB layout, [bill of materials](#), and [schematic](#) of the AMC33xxEVM.

5.1 Layout

[Figure 5-1](#) shows the AMC33xxEVM 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 AMC33xxEVM PCBs.

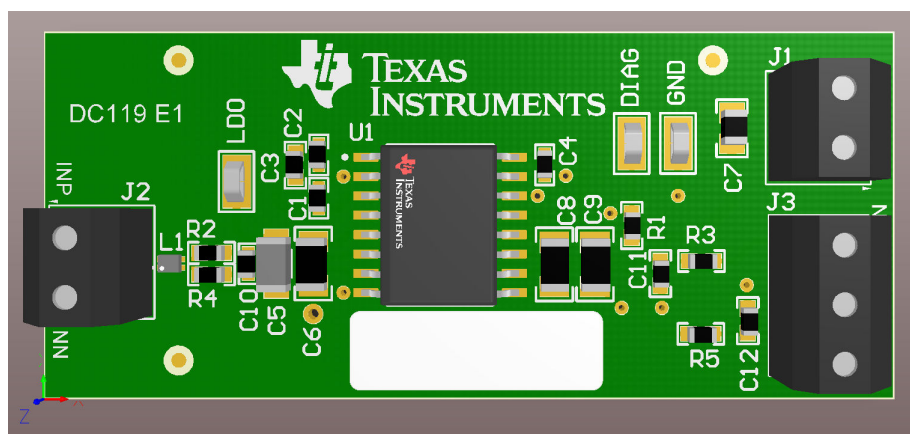


Figure 5-1. AMC33xxEVM Top Layer Silkscreen

5.2 Bill of Material

Table 5-1 lists the bill of materials.

Note

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

Table 5-1. AMC33xxEVM Bill of Materials

| Item | Qty | Ref Des | Description | Manufacturer | Part Number |
|------|-----|----------------|--|---------------------|-----------------------------|
| 1 | 2 | C1, C4 | CAP, CERM, 0.1 μ F, 50 V, \pm 10%, X7R, AEC-Q200 Grade 1, 0603 | Kemet | C0603C104K5RACAUTO |
| 2 | 1 | C2 | CAP, CERM, 1 μ F, 25 V, \pm 10%, X7R, AEC-Q200 Grade 1, 0603 | TDK | CGA3E1X7R1E105K080AC |
| 3 | 1 | C3 | CAP, CERM, 1000 pF, 50 V, \pm 10%, X7R, 0603 | Kemet | C0603C102K5RACTU |
| 4 | 1 | C5 | CAP, CERM, 0.1 μ F, 50 V, \pm 5%, C0G/NP0, 1206_190 | TDK | C3216NP01H104J160AA |
| 5 | 2 | C6, C8 | CAP, CERM, 1000 pF, 50 V, \pm 10%, X7R, 1206 | AVX | 12065C102KAT2A |
| 6 | 1 | C7 | CAP, CERM, 10 μ F, 16 V, \pm 10%, X5R, 0805 | Taiyo Yuden | EMK212BJ106KG-T |
| 7 | 1 | C9 | CAP, CERM, 1 μ F, 25 V, \pm 10%, X7R, 1206 | AVX | 12063C105KAT2A |
| 8 | 1 | C10 | CAP, CERM, 33 pF, 50 V, \pm 5%, C0G/NP0, 0603 | Kemet | C0603C330J5GACTU |
| 9 | 2 | C11, C12 | CAP, CERM, 3.3 pF, 50 V, \pm 8%, C0G/NP0, 0603 | AVX | 06035A3R3CAT2A |
| 10 | 3 | DIAG, GND, LDO | Test Point, Miniature, SMT | Keystone | 5015 |
| 11 | 2 | J1, J2 | Terminal Block, 3.5 mm Pitch, 2x1, TH | On-Shore Technology | ED555/2DS |
| 12 | 1 | J3 | Terminal Block, 3.5 mm Pitch, 3x1, TH | On-Shore Technology | ED555/3DS |
| 13 | 1 | L1 | Coupled inductor, 0.1 A, 4.5 Ω , SMD | Taiyo Yuden | MCF12102G900-T |
| 14 | 1 | LBL1 | Thermal Transfer Printable Labels, 0.650" W x 0.200" H - 10,000 per roll | Brady | THT-14-423-10 |
| 15 | 1 | R1 | RES, 47 k, 5%, 0.1 W, 0603 | Yageo | RC0603JR-0747KL |
| 16 | 4 | R2, R3, R4, R5 | RES, 49.9, 1%, 0.1 W, AEC-Q200 Grade 0, 0603 | Panasonic | ERJ-3EKF49R9V |
| 17 | 1 | U1 | AMC33xx - High-precision, reinforced isolated delta-sigma modulators with integrated DC/DC converter and high CMTI | Texas Instruments | AMC3306M25DWE or AMC3336DWE |

5.3 Schematic

Figure 5-2 shows the AMC3306EVM schematic.

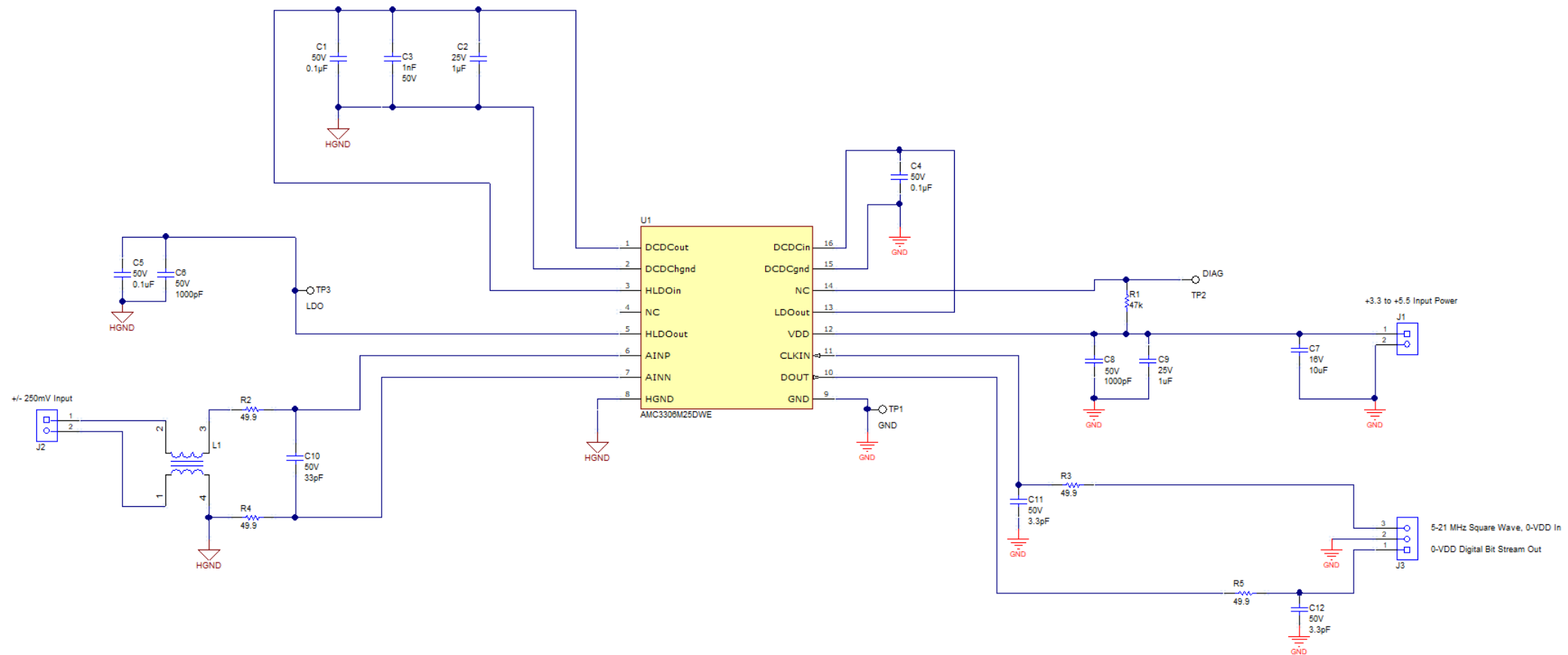


Figure 5-2. AMC3306EVM Schematic

Revision History

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

| Changes from Revision * (March 2020) to Revision A (August 2020) | Page |
|---|-------------------|
| • Added AMC3336EVM throughout document..... | 2 |

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