

Evaluating the *iCoupler* ADuM144xARQZ with the EVAL-ADuM144x-EVB evaluation system

FEATURES

- Access to all 4 data channels
- Multiple Connection Options
- Support for Tektronix Active probes
- Provision for cable terminations
- Support for PCB edge moud coax connectors
- Easy Configuration
- Installed ADuM1441 *iCoupler* in the QSOP package

SUPPORTED *iCoupler*® MODELS

- ADuM1440ARQZ
- ADuM1441ARQZ
- ADuM1442ARQZ
- ADuM1445ARQZ
- ADuM1446ARQZ
- ADuM1447ARQZ

GENERAL DESCRIPTION

The EVAL-ADuM144x-EBZ supports the ADuM144x family of ultra low power, quad channel isolators. It provides a JEDEC standard QSOP16 pad layout, support for signal distribution, loop back, bypass capacitors and loads referenced to V_{DDX} or GND_x . Signal sources can be wired onto the board as well as brought in through Edge mounted SMA connectors (not provided) or terminal blocks for power connections. The board includes 200 mil header positions for compatibility with Tektronix active probes.

The board follows best PCB design practices for four layer boards, including a full power and ground plane on each side of the isolation barrier. No other EMI or noise mitigation practices are included in this board.

EVALUATION BOARD

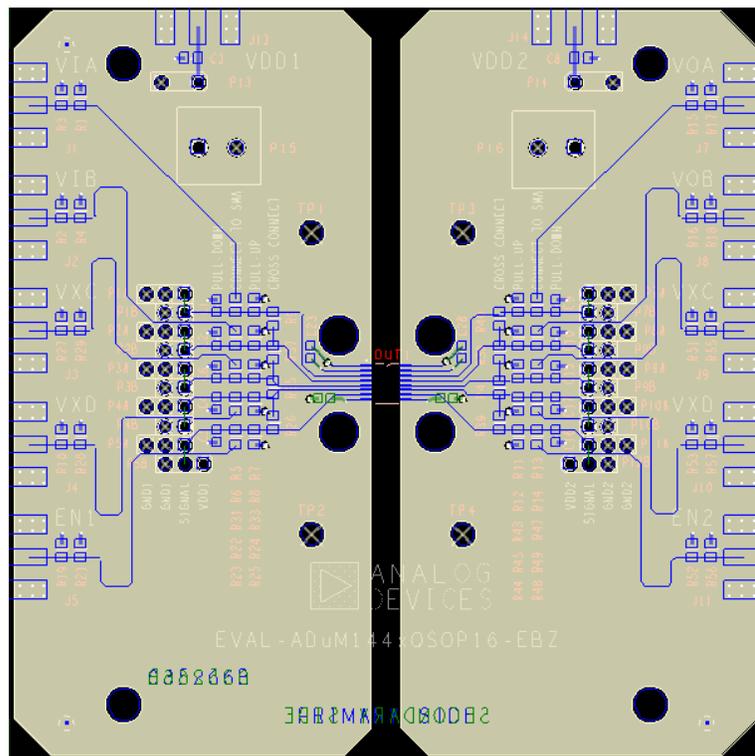


Figure 1. EVAL-ADuM144xQSOP16-EBZ Evaluation Board

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REVISION HISTORY

10/12—Revision 0: Initial Version

PCB EVALUATION GOALS

This board is intended to achieve several goals.

- 1) Evaluate the full range of iCoupler data transfer functions
- 2) Power each side independently
- 3) Allow high differential voltage to be applied between the two sides of the iCoupler
- 4) Allow easy connections of data power and instrumentation

While the evaluation board comes with the ADuM1441 installed, it is compatible with the entire ADuM144x family and the user can substitute other components in the family.

CONNECTORS

This evaluation system evaluates many of different aspects of performance. Connections to power and instrumentation are critical to performing accurate measurements without creating artificial ringing, reflections, ripple and EMI.

The PCB provides support for three types of interconnect, SMA edge connectors and through hole signal ground pairs and terminal blocks for power. With these three options, both temporary and permanent connections to the board are easily made. When coax connections are desired, SMA connector positions are available for V_{DD1} and V_{DD2} power input as well as all inputs and outputs. Due the expense of populating so many connectors that the customer may not require, these positions are left to the customer to populate. These connectors, shown in Figure 2, were chosen because they are low profile and provide excellent mechanical connections to the PCB and support 50 ohm coax cabling. Most lab equipment is geared toward use of BNC connectors, so adaptors will be required to use the on board connectors.

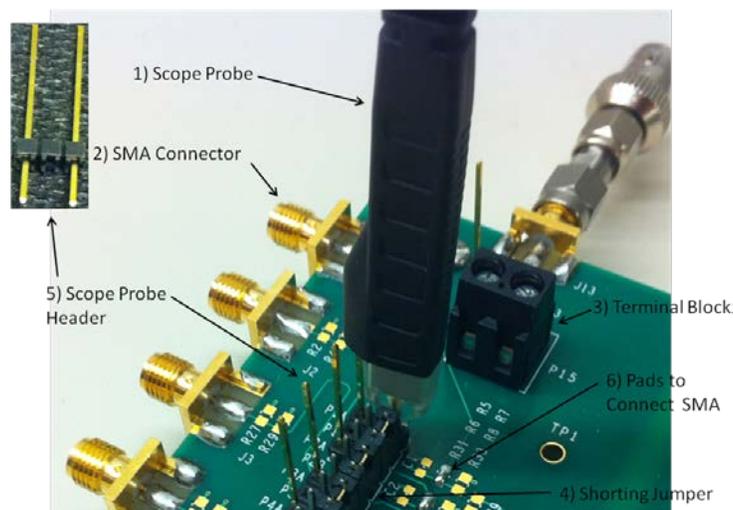


Figure 2 Optional Components

Power can be connected through the terminal blocks provided, or directly wired to the PCB via the through hole connectors P6 and P7. These provide a power ground pair with the power on the pin 1 hole. These through holes are

on 200mil centers which matches the pin spacing required for Tektronix active probes. If scope probe connection is desired, the header shown in Figure 2 can be soldered into the through holes positions and the signal pin trimmed to match the height requirements of a Tektronix Active probe.

POWER INPUT

Each side of the ADuM144x requires an off board power source. These must be independent if common voltages are to be applied across the isolation barrier. Sharing a single supply for both sides of the part will not harm the isolator, and is useful for functional testing of the ADuM144x when common mode voltages will not be present.

Power can be connected through the terminal blocks P1 and P2. In addition, 200mil header locations (P13 and P14) are provided for installation of a Scope probe header or direct wiring to the PCB. A bypass capacitor position and a pad layout for an SMA connector are provided to install optional components.

A Power and Ground plane are present on layers 2 and 3 of the PCB on each side of the isolation barrier. Power connects to V_{DD1A} and V_{DD1B} for side 1, V_{DD2A} and V_{DD2B} for side 2. The A and B power pins on each side cannot be powered separately.

DATA I/O STRUCTURES

Each data channel has a variety of structures to help configuring loading and monitoring both the input and output. Figure 4 shows one of the data paths from external connection to the DUT pin. Each channel has similar connections.

Starting at the external connection, the signal path is

- 1) A pad layout for a PCB board edge mounted SMA connector
- 2) Two 0805 pads are provided where 100Ω resistors to ground can be installed. The combined resistance will be 50Ω to provide a termination for a standard coax cable.
- 3) A standard 0805 pad layout that allows the coax and termination structures to be connected to the rest of the signal path.
- 4) An 0605 pad layout between the signal path and VDD can be used for installing a pull-up resistor.
- 5) A populated two-pin header provides a signal ground pair that can be used for clip leads or shorting a channel to ground temporarily.
- 6) There is a grouping of three open through holes, consisting of a signal and two ground connections. This can be used for hard wiring signal wires into the PCB, installing a header to accept a Tektronix active probe, or installing a two pin header to allow adjacent channels to be temporarily shorting them together.

- 7) This is an 0805 pad layout between the signal and ground where a load capacitor or resistor can be installed.
- 8) Pads to the adjacent channels are provided to allow permanent connection of adjacent channels. Inputs can be fanned out to several channels, or inputs and outputs can be connected together to allow looping back of signals.

Figure 2 shows many of the optional components installed, and how jumpers can be used to temporarily connect channels. This figure shows a signal connected to the first channel SMA and then fanned out to the top three channels and monitored by an active scope probe.

BYPASS ON THE PCB

Several positions and structures are provided to allow optimum bypass of the evaluation board. Provision has been made for optional surface mount bulk capacitors to be installed near the power connectors to compensate for long

cables to the power supply or external load. Parallel bypass capacitors are installed near the ADuM144x consisting of a 0.1uF capacitor for V_{DDPA} on the top side and V_{DDPB} on the bottom side of the board.

The PCB also implements distributed capacitive bypass on PCB. This consists of power and ground planes closely spaced on the inner layers of the PCB. This minimizes the condition of noise and transmission of EMI without extraordinary design features.

HIGH VOLTAGE CAPABILITY

This PCB is designed in line with 2500V basic insulation practices. High voltage testing beyond 2500V is not recommended. Appropriate care must be taken when using this evaluation board at high voltages, and it should not be relied on for safety functions since it has not been hi-pot tested or certified for safety.

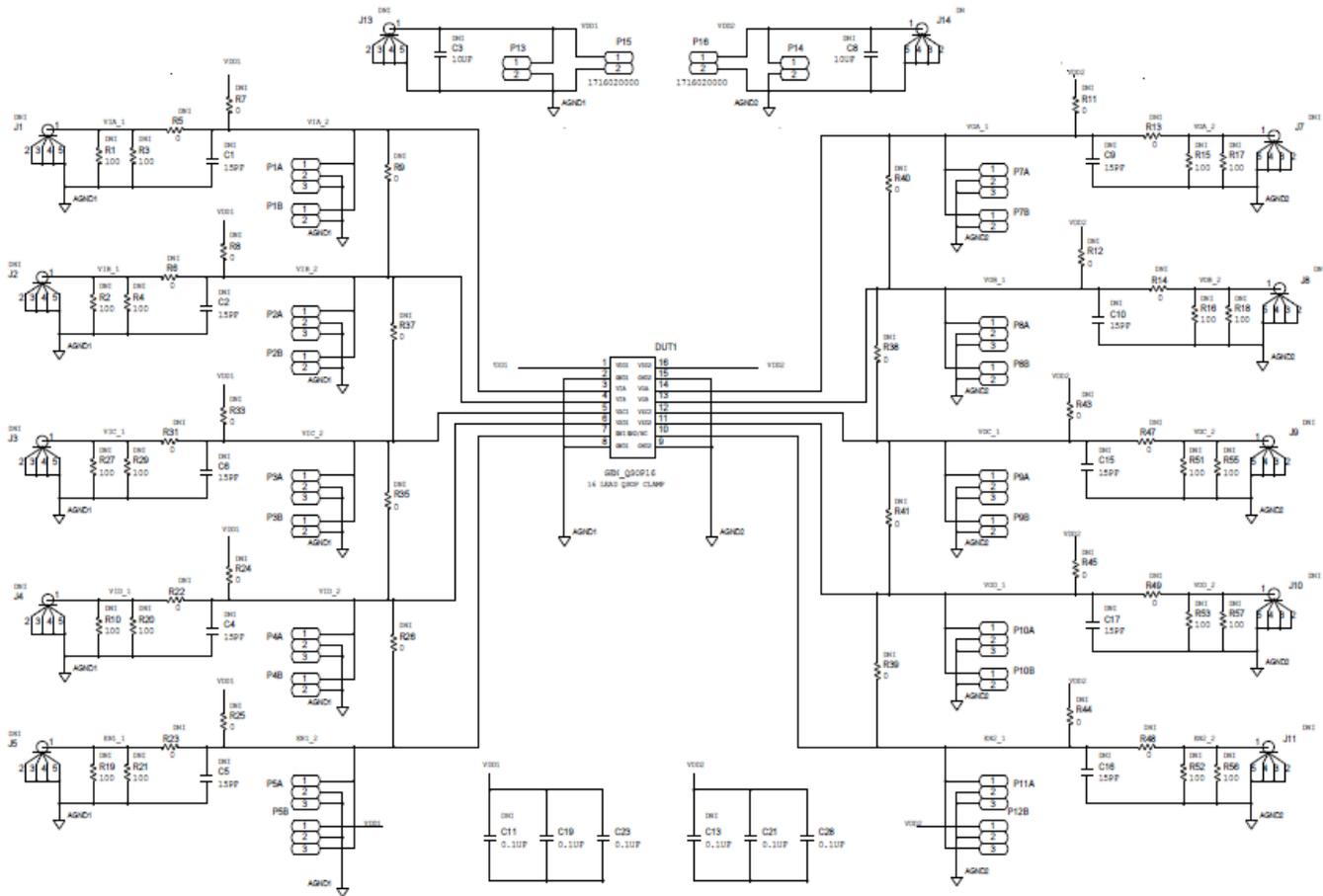


Figure 3. ADuM144xEBZ Schematic

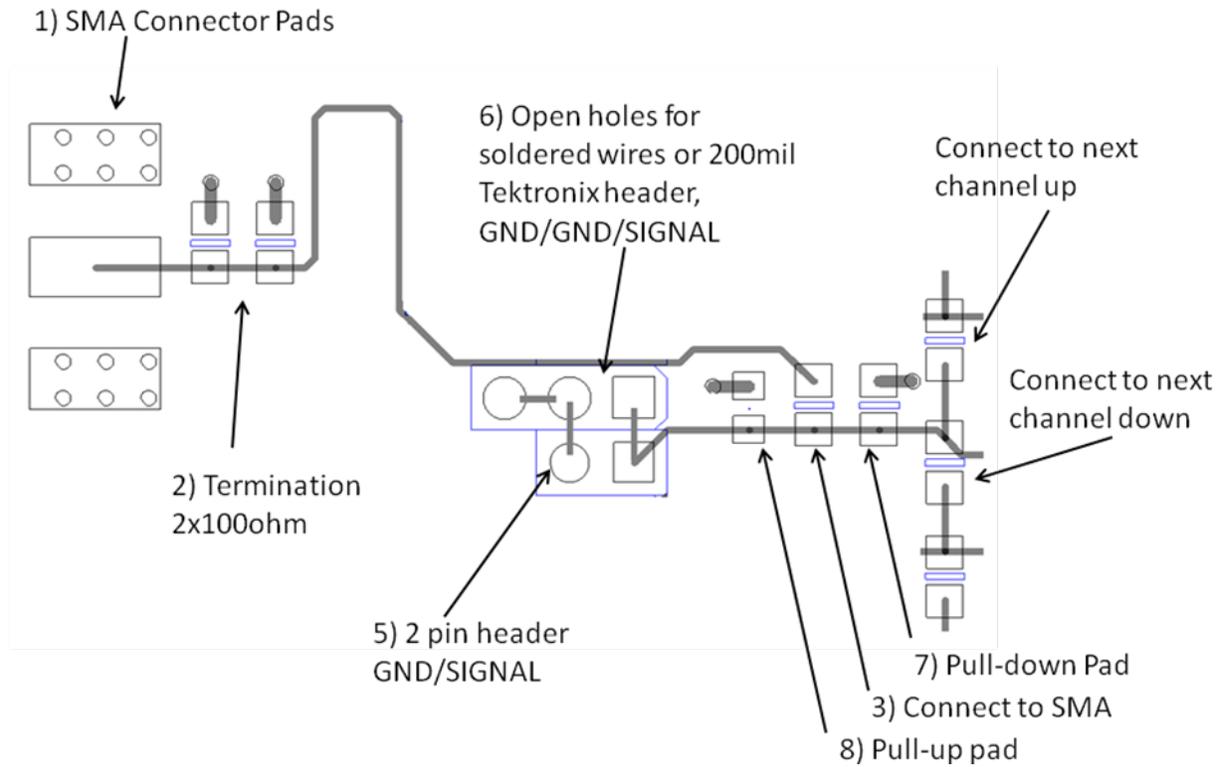


Figure 4 Configuration and monitoring structures

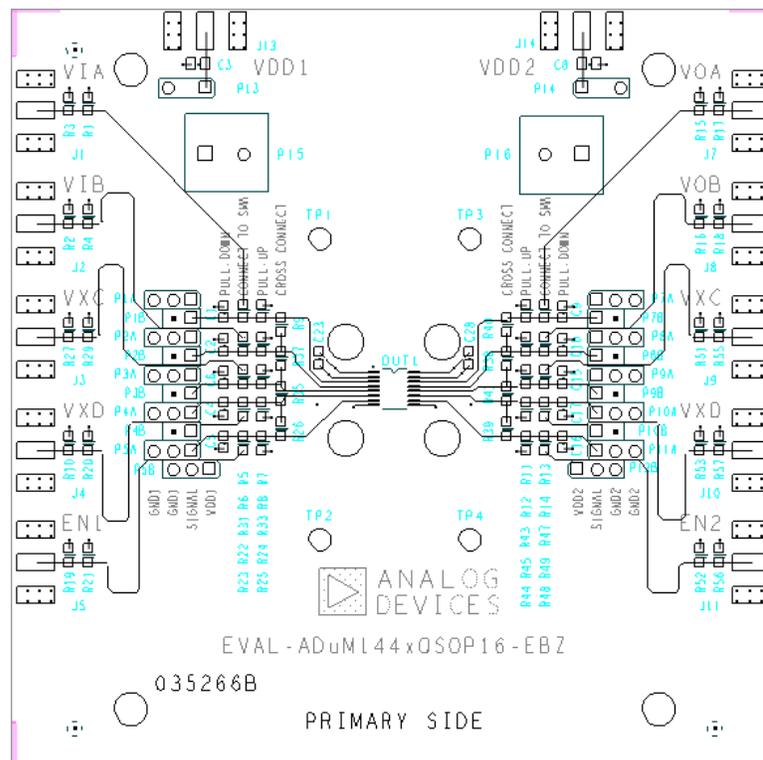


Figure 5 Top side layout

BILL OF MATERIALS**Table 1.**

Quantity	Reference Designator		Description
1	U1	ADuM144x	DUT
2	C23 C28		0.1 μ F, 16 V, 10%, 0603
2	C3, C8		0603 bypass capacitor position (Not Installed)
42	R1-R27,29,31,33, 43-45,47-49,51-53, 55-57		0805 pad for customer use
10	C1-C5, C15-C16		0603 pad for customer use
2	P1, P2	ED2609-ND	Terminal Block
12	P1A-P12A, P13, P14	MTSW202-12-G-S	Two Pin Header 200 mil spacing (Not Installed)
2	P5B, P12B	90726-403HLF	Three Pin Header 100mil spacing
8	P1B-P4B, P7B-P10B	HTSW-102-07-T-S	Two Pin Header 100mil spacing
12	J1-J5, J7-J11,J13,J14	JOHNSON142-0701-851	SMA edge connector, (Not Installed)

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ESD Caution

ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

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