

ADIS16IMU5/PCBZ MEMS IMU Breakout Board

FEATURES

- ▶ Breakout board for [ADIS16575](#), [ADIS16576](#), and [ADIS16577](#)
- ▶ Compatible with [ADIS16460](#), [ADIS16465](#), and [ADIS16467](#)
- ▶ Easy prototyping interface for SPI-compatible processor platforms
- ▶ Dual-row, 16-pin header for simple 1 mm ribbon cable connections
- ▶ PC Windows connection with [EVAL-ADIS-FX3](#)
- ▶ Four mounting holes for secure attachment
- ▶ Optimized layout for high signal integrity
- ▶ Includes necessary setup hardware (ribbon cable, screws, washers, nuts, and spacers)

ADIS16IMU5/PCBZ KIT CONTENTS

- ▶ ADIS16IMU5/PCBZ breakout board
- ▶ 16-conductor, double-ended ribbon cable with 2 mm, pitch IDC connectors
- ▶ Box and custom foam insert
- ▶ M2 × 0.4 mm × 16 mm machine screws (4 pieces)
- ▶ M2 washers (4 pieces)
- ▶ M2 × 0.4 mm nuts (4 pieces)
- ▶ Spacer, custom, G10 material (1 piece)
- ▶ The IMU is not included; must be ordered separately

EVALUATION BOARD PHOTOGRAPH



Figure 1. ADIS16IMU5/PCBZ IMU Top View

OVERVIEW

The ADIS16IMU5/PCBZ breakout board offers a straightforward method for developing a prototype connection between various Analog Devices, Inc., inertial measurement units (IMUs) and serial peripheral interface (SPI)-compatible embedded processor platforms. The ADIS16IMU5/PCBZ also provides a convenient method for connecting the same microelectromechanical systems (MEMS) IMUs to the EVAL-ADIS-FX3 for PC Windows®-based data acquisition and configuration. For a complete list of supported IMUs, refer to the [Compatible-MEMS IMUs](#) section.

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REVISION HISTORY

9/2024—Revision 0: Initial Version

INTRODUCTION

GETTING STARTED

System Integration Considerations

For users intending to use the ADIS16IMU5/PCBZ breakout board with an embedded processor platform, this platform requires a SPI communication capability.

For users intending to use the ADIS16IMU5/PCBZ breakout board with the [EVAL-ADIS-FX3](#) evaluation board, a USB connection is needed for power and data transfer.

Compatible-MEMS IMUs

The ADIS16IMU5/PCBZ breakout board is compatible with a range of IMUs, allowing for versatile applications and ease of integration. The following IMU models are fully supported:

- ▶ [ADIS16460AMLZ](#)
- ▶ [ADIS16465-1BMLZ](#)
- ▶ [ADIS16465-2BMLZ](#)
- ▶ [ADIS16465-3BMLZ](#)
- ▶ [ADIS16467-1BMLZ](#)
- ▶ [ADIS16467-2BMLZ](#)
- ▶ [ADIS16467-3BMLZ](#)
- ▶ [ADIS16575-2BMLZ](#)
- ▶ [ADIS16576-2BMLZ](#)
- ▶ [ADIS16576-3BMLZ](#)
- ▶ [ADIS16577-2BMLZ](#)
- ▶ [ADIS16577-3BMLZ](#)

Each of these models can be easily integrated into a data acquisition setup, allowing users to leverage the full capabilities of the evaluation system for a specific application needs.

Safety Information

Do the following to ensure safety:

- ▶ Ensure all connections are made with the power off to prevent damage.
- ▶ When an IMU is connected, handle the ADIS16IMU5/PCBZ with care to avoid static discharge.

ADIS16IMU5/PCBZ BREAKOUT BOARD COMPONENTS

The ADIS16IMU5/PCBZ breakout board is specifically designed to facilitate simple access to the features of the [ADIS16575](#), [ADIS16576](#), or [ADIS16577](#) MEMS IMU for development, testing, and integration into embedded systems. [Figure 2](#) shows the components on the ADIS16IMU5/PCBZ.

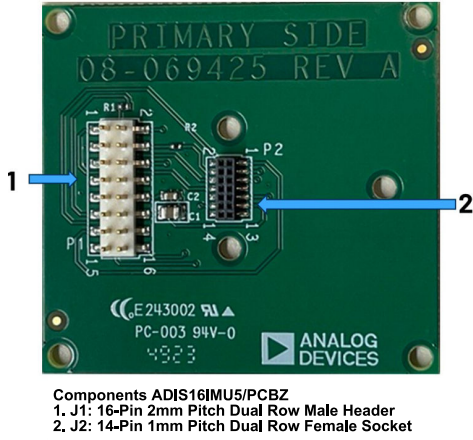


Figure 2. ADIS16IMU5/PCBZ Components

The 16-pin header (J1 connector) is a standard 16-pin connector that allows a simple interface with external systems via a 2 mm pitch ribbon cable. This header facilitates electrical connection and communication between the IMU and an embedded processor platform or evaluation system. Pin assignments include signals

for power (VDD), ground (GND), SPI communication (SCLK, \overline{CS} , DOUT, and DIN), reset (\overline{RST}), and additional functions, such as data ready (DR), watermark (WM), and synchronization (SYNC). See [Table 1](#) for additional details on the J1 connector interface. J2 is a 2 × 7 socket with 1 mm spacing, which provides a direct connection to the IMU.

Table 1. 16-Pin J1 Connector Interface Summary

Pin Number	Mnemonic	Description
1	\overline{RST}	Reset, active low
2	SCLK	Serial clock (SPI)
3	\overline{CS}	Chip select (SPI), active low
4	DOUT	Data output (SPI)
5	DNC	Do not connect
6	DIN	Data input (SPI)
7	AGND	Analog ground
8	AGND	Analog ground
9	AGND	Analog ground
10	VCC	Power supply, 3.3 V
11	VCC	Power supply, 3.3 V
12	VCC	Power supply, 3.3 V
13	DR	Data ready
14	SYNC	Synchronization input
15	WM	Watermark interrupt
16	DIO	Digital input output

ELECTRICAL SCHEMATIC, J1 AND J2 CONNECTOR PIN CONFIGURATION

Figure 3 provides a schematic for the ADIS16IMU5/PCBZ, including the connections between the two connectors (J1 and J2).

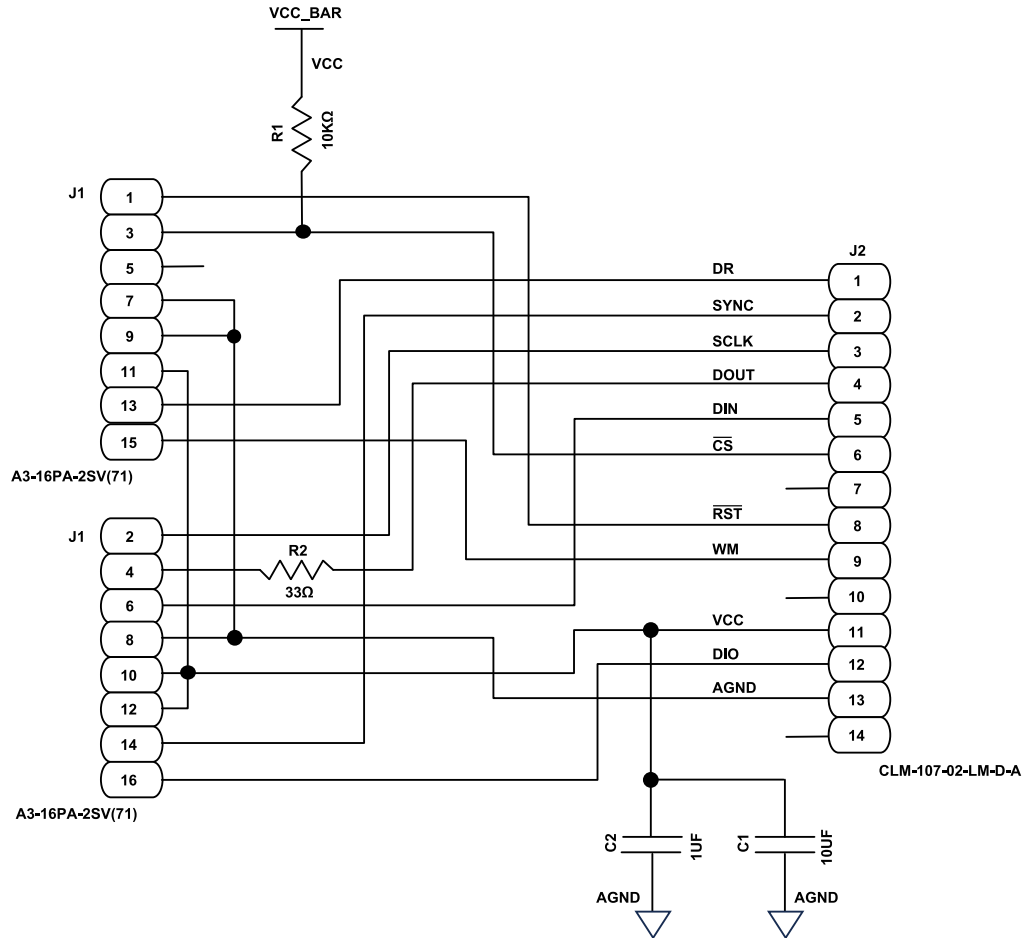


Figure 3. Electrical Schematic for the ADIS16IMU5/PCBZ

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RIBBON CABLE CONNECTION BETWEEN THE ADIS16IMU5/PCBZ AND EVAL-ADIS-FX3**ADIS16IMU5/PCBZ AND EVAL-ADIS-FX3 CONNECTION**

Figure 4 illustrates the connection setup between the ADIS16IMU5/PCBZ evaluation board and the EVAL-ADIS-FX3 evaluation system used for data collection through the **FX3 Evaluation Graphical User Interface (GUI)** software (see the EVAL-ADIS-FX3 web page for further information on the software). The ADIS16IMU5/PCBZ is designed to interface seamlessly with the EVAL-ADIS-FX3, allowing for quick and efficient data capture and analysis. In this setup, the EVAL-ADIS-FX3 acts as a bridge, facilitating communication between the IMU sensor (in this case, the **ADIS16575**) and the **FX3 Evaluation GUI** software.

While Figure 4 shows the IMU of the EVAL-ADIS-FX3, note that the ADIS16IMU5/PCBZ is compatible with a range of other IMUs. This versatility makes the combination of the ADIS16IMU5/PCBZ and EVAL-ADIS-FX3 a powerful tool for quickly evaluating various IMU sensors.

The primary focus of this user guide is on the ADIS16IMU5/PCBZ, and Figure 4 highlights how it can be used in conjunction with the EVAL-ADIS-FX3 to streamline the data collection process. This setup allows users to connect the ADIS16IMU5/PCBZ to a PC, where the **FX3 Evaluation GUI** software can be used to visualize and analyze the data in real-time, making it easier to perform quick evaluation and assessment of different IMU sensors.

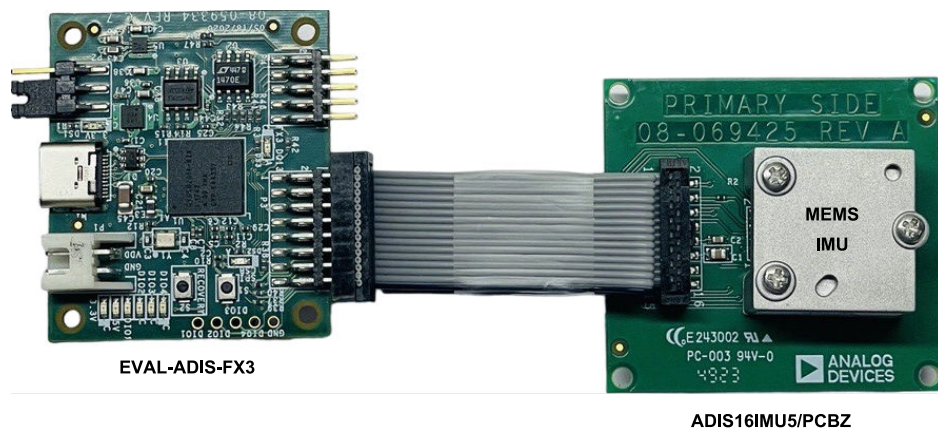


Figure 4. ADIS16IMU5/PCBZ and EVAL-ADIS-FX3 Connections

RIBBON CABLE CONNECTION BETWEEN THE ADIS16IMU5/PCBZ AND EVAL-ADIS-FX3

CABLING

Connect a 2.00 mm, insulation displacement connector (IDC) ribbon cable assembly to the J1 connector on the ADIS16IMU5/PCBZ breakout board.

Analog Devices recommends for this initial release to use the Samtec TCSD-10-S-01.00-01-N ribbon cable assembly. This cable is a reliable choice for establishing a connection; however, other compatible options can also be used based on the specific requirements of a user.

COMPATIBILITY WITH THE EVALUATION SYSTEM

The ADIS16IMU5/PCBZ is designed for seamless integration with the [EVAL-ADIS-FX3](#) the open-source evaluation platform. This evaluation system enhances the capabilities of the ADIS16IMU5/PCBZ, facilitating rapid prototype development and testing.

For the latest information on the EVAL-ADIS-FX3, FX3 *iSensor*[®] evaluation system, its features, and its resources for supporting the development process of users, see the [EVAL-ADIS-FX3](#) web page.

EVAL-ADIS-FX3 SYSTEM SETUP AND TROUBLESHOOTING

When using the EVAL-ADIS-FX3 evaluation system with any of the supported IMUs, follow the steps outlined in the [EVAL-ADIS-FX3 Setup and Troubleshooting Guide](#) to properly configure the hardware, install the software, and troubleshoot any issues that may arise.

This guide covers essential topics, such as:

- ▶ Initial hardware assembly and connections
- ▶ Software setup and configuration
- ▶ Diagnosing and resolving common error messages

If further assistance is needed with problems not covered in this guide, contact [Analog Devices Technical Support](#).

In addition, regularly check for the latest version of the EVAL-ADIS-FX3 evaluation system and for any firmware updates to ensure compatibility and optimal performance with the specific IMU.



Figure 5. EVAL-ADIS-FX3 Evaluation Board

ADIS16IMU5/PCBZ DATA ACQUISITION

Data handling with the ADIS16IMU5/PCBZ breakout board includes the following:

- ▶ Direct access to the IMU via the J1 connector. The ADIS16IMU5/PCBZ breakout board provides direct access to compatible IMUs through the J1 connector, allowing straightforward integration and data retrieval from the IMU.
- ▶ Data acquisition and transfer. When connected to the [EVAL-ADIS-FX3](#) evaluation system, the ADIS16IMU5/PCBZ breakout board utilizes the microcontroller on the EVAL-ADIS-FX3 to manage the flow of data from the connected IMU. The microcontroller processes the raw sensor data in real-time, filtering and converting the data into usable formats for various applications.
- ▶ Communication interfaces. Data from the IMU can be sent to other systems or devices using different connectors. For direct data transfer to computers, use the USB connector on the EVAL-ADIS-FX3 with the ADIS16IMU5/PCBZ and EVAL-ADIS-

FX3 connections. This setup allows for seamless data acquisition and transfer, making analyzing IMU data on a connected PC simple.

Performance enhancements provided by this setup include the following:

- ▶ Precision and accuracy. The microcontroller on the EVAL-ADIS-FX3 helps calibrate and compensate the data received from the connected IMU, enhancing the precision and accuracy of the measurements, which is particularly crucial for navigation and motion analysis applications where data accuracy is paramount.
- ▶ Signal integrity. The layout and design of the ADIS16IMU5/PCBZ breakout board is optimized to minimize noise and interference, ensuring high signal integrity and reliable data transmission. This design ensures that the data collected from the IMU remains accurate and consistent, even in challenging environments.

DIMENSIONS AND MOUNTING HOLES

The ADIS16IMU5/PCBZ breakout board has four mounting holes (one in each corner) that support attachment to another surface with M2 machine screws (see [Figure 6](#)).

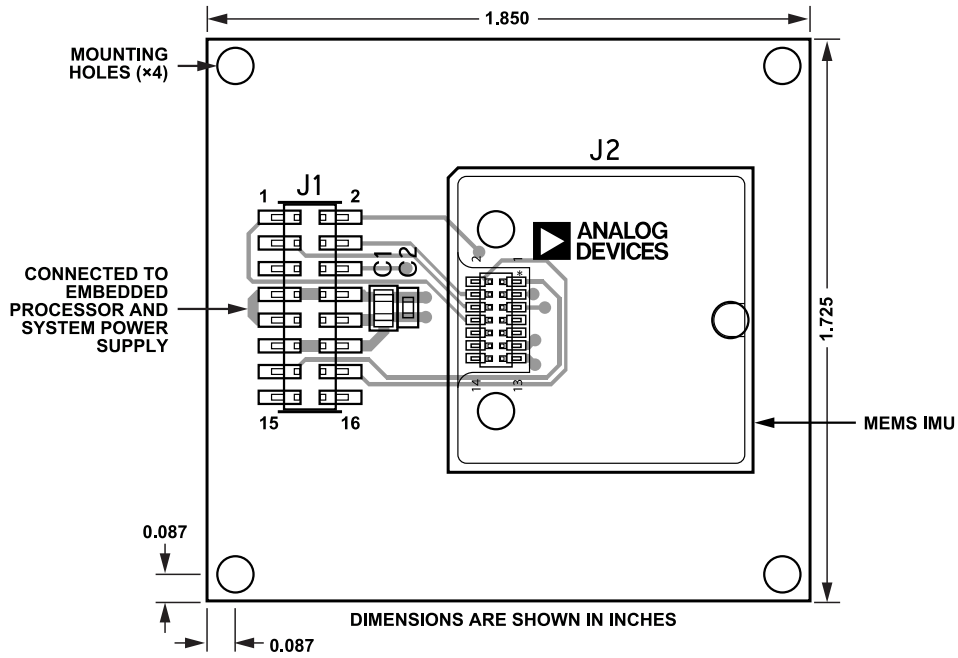


Figure 6. Dimensions and Mounting Holes

ORDERING INFORMATION

BILL OF MATERIAL

Table 2. Bill of Materials

Reference Designation	Part Description
C1	10 μ F, 10%, 10 V, X7R, 0805, surface-mounted capacitor
C2	1 μ F, 10%, 10 V, X7R, 0603, surface-mounted capacitor
J1	16-pin, 2 mm pitch, dual-row male header
J2	14-pin, 1 mm pitch, dual-row female socket
R1	10 k Ω , 1%, 0.1 W, 0402, AEC-Q200, surface-mounted resistor
R2	33 Ω , 1%, 0.1 W, 0402, AEC-Q200, surface-mounted resistor
Not applicable	Box and custom foam insert
Not applicable	M2 \times 0.4 mm \times 16 mm machine screws (4 pieces)
Not applicable	M2 washers (four pieces)
Not applicable	M2 \times 0.4 mm nuts (four pieces)
Not applicable	16-conductor, double-ended, ribbon cable with 2 mm pitch IDC connectors
Not applicable	Spacer, custom, G10 material (four pieces)

**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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