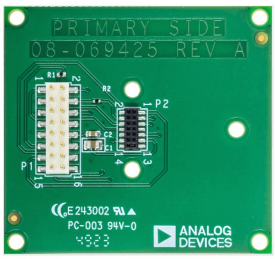
ANALOG DEVICES

ADIS16IMU5-PCBZ MEMS IMU Breakout Board

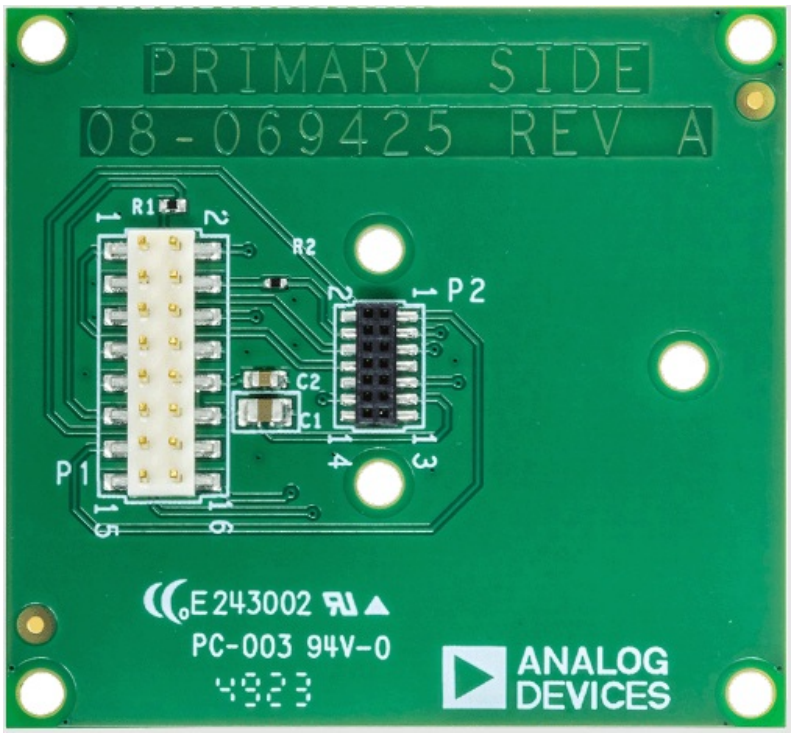


ANALOG DEVICES ADIS16IMU5-PCBZ MEMS IMU Breakout Board User Guide

Contents

ANALOG DEVICES

ANALOG DEVICES ADIS16IMU5-PCBZ MEMS IMU Breakout Board



Product Information

Specifications

- 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)

Product Usage Instructions

Getting Started

Before using the ADIS16IMU5/PCBZ breakout board, ensure that you have the necessary components and tools for setup. Follow the steps below to get started:

1. Identify the compatible MEMS IMU model for your application from the list provided in the user manual.
2. If using an embedded processor platform, ensure it has SPI communication capability.
3. If using the EVAL-ADIS-FX3 evaluation board, connect it to the breakout board via USB for power and data transfer.

Cabling and Connection

Follow these steps to set up the cabling and connections:

1. Use the provided 16-conductor ribbon cable to connect the breakout board to the EVAL-ADIS-FX3 board.

2. Securely attach the breakout board to your platform using the mounting holes.
3. Ensure proper alignment and connection integrity before powering on the system.

Data Acquisition
Once the hardware setup is complete, you can begin data acquisition using the ADIS16IMU5/PCBZ breakout board. Refer to the user manual for specific instructions on data acquisition and system configuration.

FAQs

- **Q: What are the compatible MEMS IMU models for the ADIS16IMU5/PCBZ breakout board?**
  A: The compatible MEMS IMU models include ADIS16460AMLZ, ADIS16465 series, ADIS16467 series, ADIS16575 series, ADIS16576 series, and ADIS16577 series.
- **Q: How do I connect the breakout board to an embedded processor platform?**
  A: Ensure that your embedded processor platform has SPI communication capability and use the provided ribbon cable for connection.

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.

INTRODUCTION

GETTING STARTED

- **System Integration Considerations**

  For users intending to use the ADIS16IMU5/PCBZ breakout board with an embedded processor platform, this platform requires an 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 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 com-ponents on the ADIS16IMU5/PCBZ.

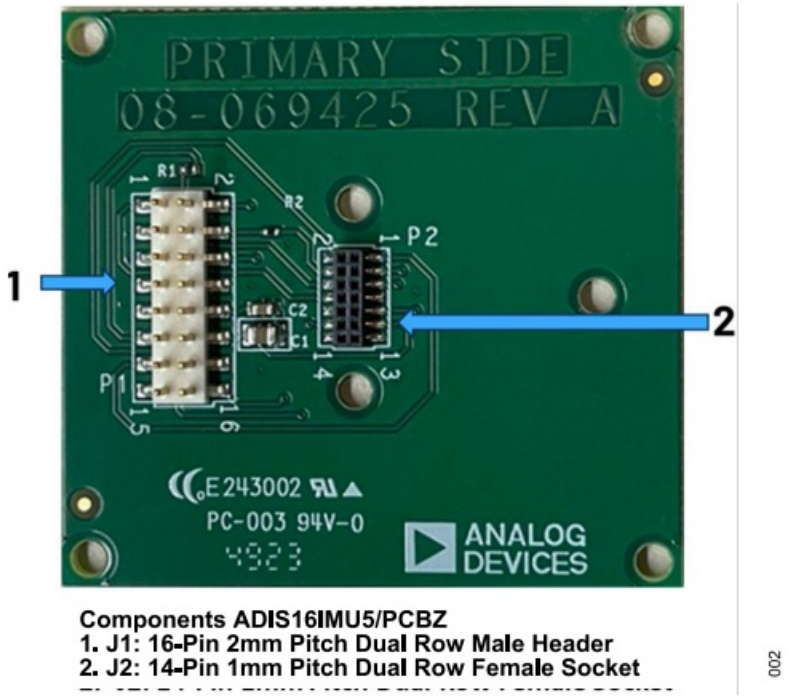


Figure 2. ADIS16IMU5/PCBZ Components

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, CS, DOUT, and DIN), reset (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

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).

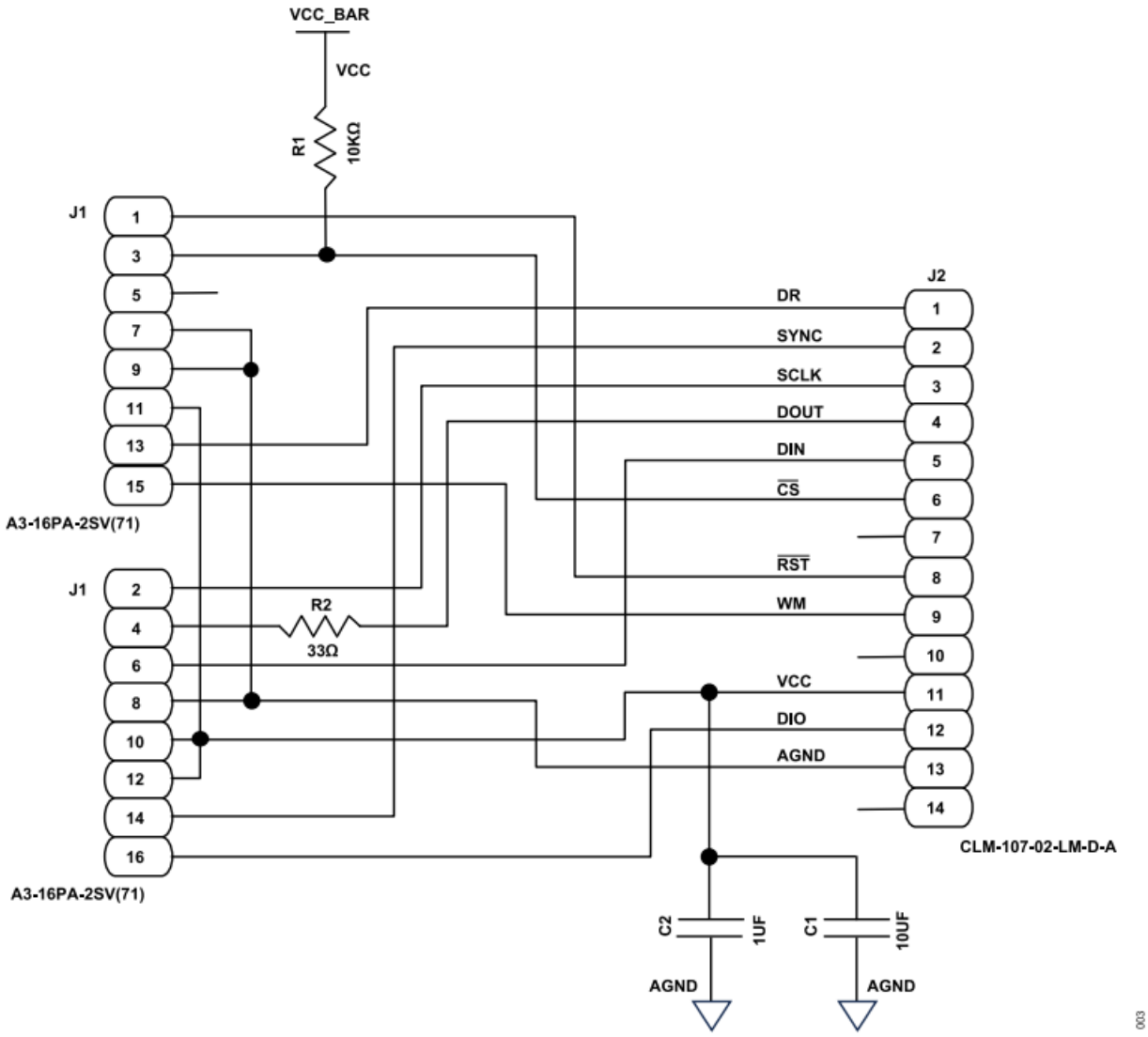


Figure 3. Electrical Schematic for the ADIS16IMU5/PCBZ

RIBBON CABLE CONNECTION

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.

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

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.

- **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 require-ments 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.

Figure 5. EVAL-ADIS-FX3 Evaluation Board

- **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.

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 man-age 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).

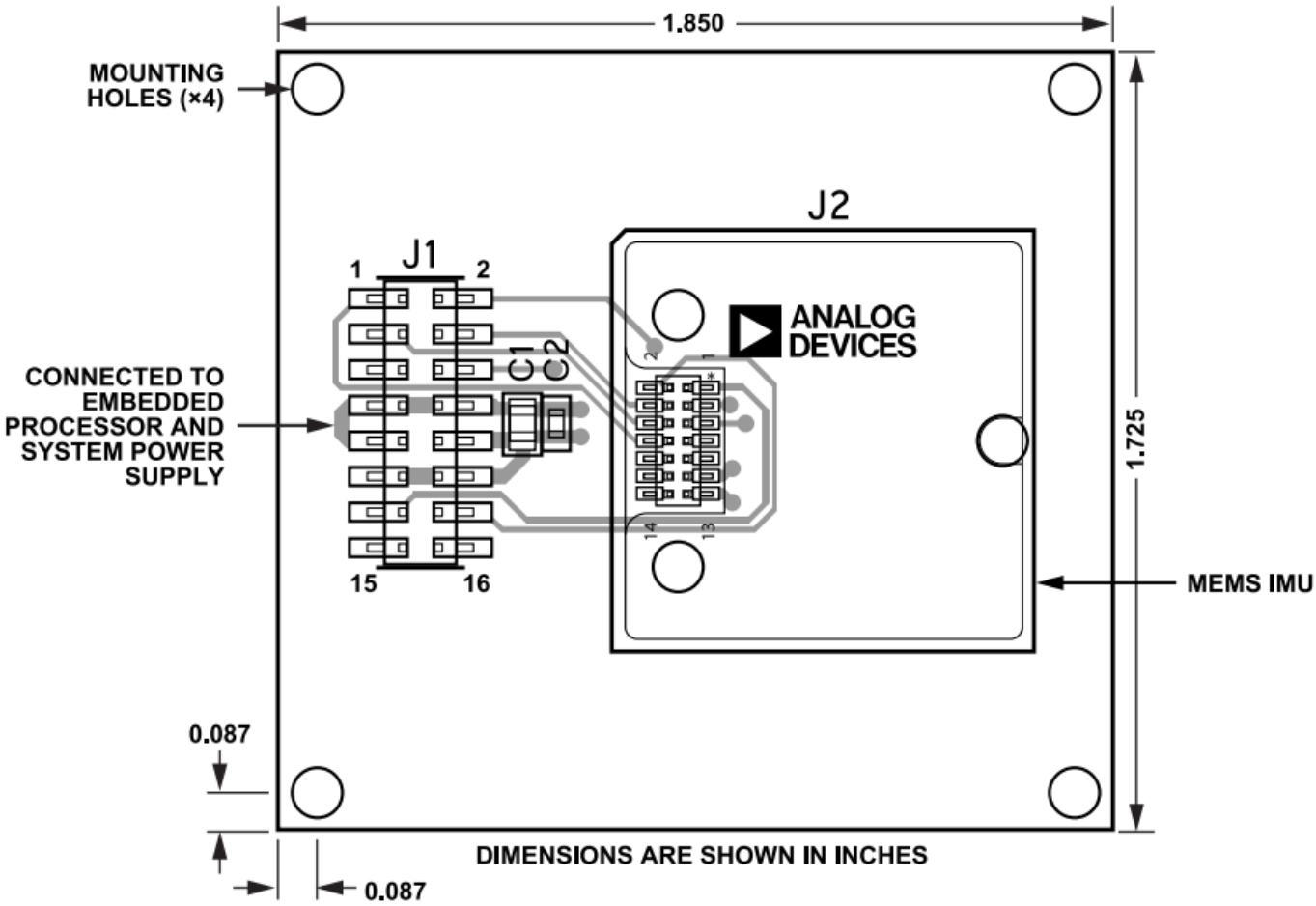


Figure 6. Dimensions and Mounting Holes

ORDERING INFORMATION
BILL OF MATERIAL
Table 2. Bill of Materials:

Reference Designation	Part Description
C1	10 µF, 10%, 10 V, X7R, 0805, suface-mounted capacitor
C2	1 µF, 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 kΩ, 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 × 0.4 mm × 16 mm machine screws (4 pieces)
Not applicable	M2 washers (four pieces)
Not applicable	M2 × 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.

Legal Terms and Conditions

By using the evaluation board discussed herein (together with any tools, components documentation or support materials, the “Evaluation Board”), you are agreeing to be bound by the terms and conditions set forth below (“Agreement”) unless you have purchased the Evaluation Board, in which case the Analog Devices Standard Terms and Conditions of Sale shall govern. Do not use the Evaluation Board until you have read and agreed to the Agreement. Your use of the Evaluation Board shall signify your acceptance of the Agreement. This Agreement is made by and between you (“Customer”) and Analog Devices, Inc. (“ADI”), with its principal place of business at Subject to the terms and conditions of the Agreement, ADI hereby grants to Customer a free, limited, personal, temporary, non-exclusive, non-sublicensable, non-transferable license to use the Evaluation Board FOR EVALUATION PURPOSES ONLY. Customer understands and agrees that the Evaluation Board is provided for the sole and exclusive purpose referenced above, and agrees not to use the Evaluation Board for any other purpose. Furthermore, the license granted is expressly made subject to the following additional limitations: Customer shall not (i) rent, lease, display, sell, transfer, assign, sublicense, or distribute the Evaluation Board; and (ii) permit any Third Party to access the Evaluation Board. As used herein, the term “Third Party” includes any entity other than ADI, Customer, their employees, affiliates and in-house consultants. The Evaluation Board is NOT sold to Customer; all rights not expressly granted herein, including ownership of the Evaluation Board, are reserved by ADI. CONFIDENTIALITY. This Agreement and the Evaluation Board shall all be considered the confidential and proprietary information of ADI. The customer may not disclose or transfer any portion of the Evaluation Board to any other party for any reason. Upon discontinuation of use of the Evaluation Board or termination of this Agreement, Customer agrees to promptly return the Evaluation Board to ADI. ADDITIONAL RESTRICTIONS. Customers may not disassemble, decompile or reverse engineer chips on the Evaluation Board. The customer shall inform ADI of any occurred damages or any modifications or alterations it makes to the Evaluation Board, including but not limited to soldering or any other activity that affects the material content of the Evaluation Board. Modifications to the Evaluation Board must comply with applicable law, including but not limited to the RoHS Directive. TERMINATION. ADI may terminate this Agreement at any time upon giving written notice to Customer. The customer agrees to return to ADI the Evaluation Board at that time.

LIMITATION OF LIABILITY. THE EVALUATION BOARD PROVIDED HEREUNDER IS PROVIDED “AS IS” AND ADI MAKES NO WARRANTIES OR REPRESENTATIONS OF ANY KIND WITH RESPECT TO IT. ADI SPECIFICALLY DISCLAIMS ANY REPRESENTATIONS, ENDORSEMENTS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, RELATED TO THE EVALUATION BOARD INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTY OF MERCHANTABILITY, TITLE, FITNESS FOR A PARTICULAR PURPOSE OR NONINFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE CUSTOMER’S POSSESSION OR USE OF THE EVALUATION BOARD, INCLUDING BUT NOT LIMITED TO LOST PROFITS, DELAY COSTS, LABOR COSTS OR LOSS OF GOODWILL. ADI’S TOTAL LIABILITY FROM

ANY AND ALL CAUSES SHALL BE LIMITED TO THE AMOUNT OF ONE HUNDRED US DOLLARS ($100.00).

EXPORT
Customer agrees that it will not directly or indirectly export the Evaluation Board to another country and that it will comply with all applicable United States federal laws and regulations relating to exports. GOVERNING LAW. This Agreement shall be governed by and construed in accordance with the substantive laws of the Commonwealth of Massachusetts (excluding conflict of law rules). Any legal action regarding this Agreement will be heard in the state or federal courts having jurisdiction in Suffolk County, Massachusetts, and Customer hereby submits to the personal jurisdiction and venue of such courts. The United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement and is expressly disclaimed.

Documents / Resources

	ANALOG DEVICES ADIS16IMU5-PCBZ MEMS IMU Breakout Board [pdf] User Guide ADIS16IMU5-PCBZ, ADIS16IMU5-PCBZ MEMS IMU Breakout Board, MEMS IMU Breakout Board, IMU Breakout Board, Breakout Board, Board

References

- Mixed-signal and digital signal processing ICs | Analog Devices
- Releases · analogdevicesinc/iSensor-FX3-Eval · GitHub
- EVAL-ADIS-FX3 Setup and Troubleshooting Guide [Analog Devices Wiki]
- Support | Analog Devices
- User Manual