

ADIS16445/ADIS16448 Mechanical Design Guidelines and Examples

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INTRODUCTION

The [ADIS16445](#) and [ADIS16448](#) are low profile, fully calibrated, MEMS inertial measurement units (IMU). Figure 1 provides a top view of the IMU package, which provides four mounting holes, with recessed mounting ledges that help manage the overall height of the attachment hardware. The mounting holes provide enough clearance for M2 × 0.4 mm or 2-56 machine screws.

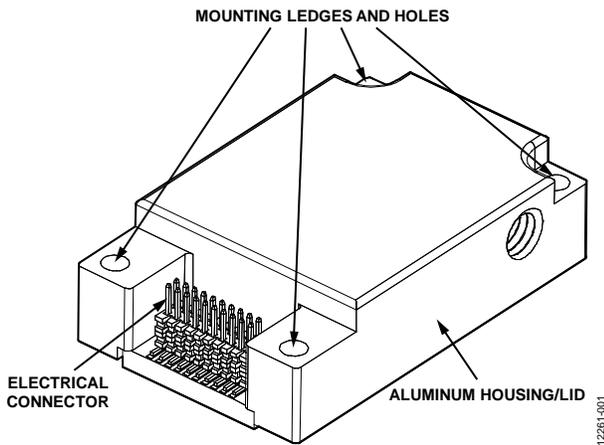


Figure 1. [ADIS16448 AMLZ](#), Top View

Figure 2 provides a bottom view of this package. The substrate, which supports the internal sensors, extends beyond the bottom of the aluminum housing. On the bottom, the mounting holes have a countersunk opening to help minimize the height associated with mounting hardware when using countersunk machine screws.

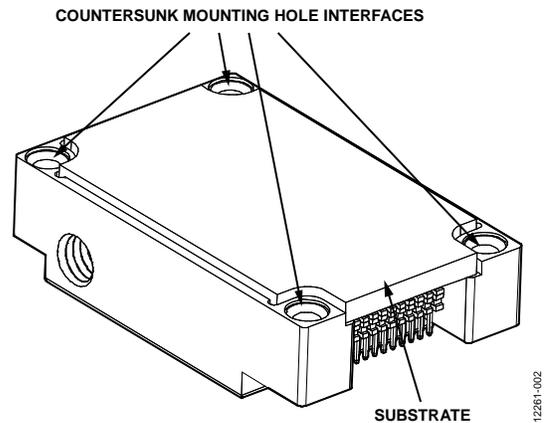


Figure 2. [ADIS16448 AMLZ](#), Bottom View

BEST PRACTICES

To preserve the best bias repeatability performance in the gyroscopes, use the following guidelines when developing an attachment approach for the [ADIS16445](#) or [ADIS16448](#):

- Focus mounting force at the machine screw locations.
- Avoid direct force application on the substrate.
- Avoid placing mounting pressure on the package lid, except for the edges that border the exposed side of the substrate.
- Use a consistent mounting torque of 28 inch-ounces on mounting hardware.
- Avoid placing translational forces on the electrical connector.

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REVISION HISTORY

4/14—Revision 0: Initial Version

CONNECTOR-UP MOUNTING

Figure 3 provides an example of a connector-up mounting approach. In this example, the ADIS16445 or ADIS16448 device sits on a bracket (included with the ADIS16IMU2/PCBZ), which rests on the mounting surface. The bracket only makes contact with the bottom edge of the IMU aluminum housing and has holes that allow the machine screws to pass through to the mounting surface.

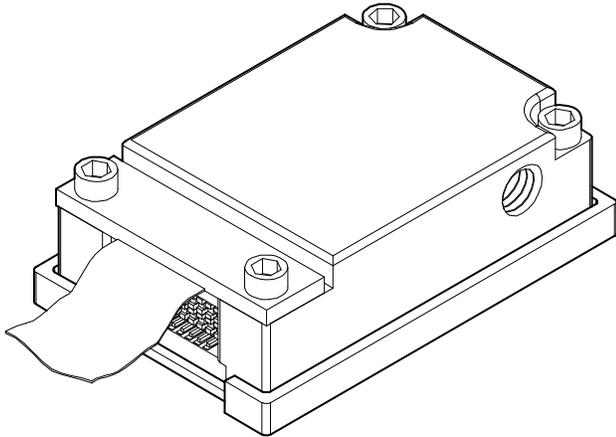


Figure 3. Connector-Up Example

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Bracket Design

When using the connector-up mounting approach, the primary objective for the bracket is to spread the mounting force across the entire bottom edge of the ADIS16445 or ADIS16448 aluminum housing, while preventing direct contact with the substrate. Figure 4 illustrates the conceptual view of this bracket, which uses a mounting ledge to manage the mechanical contact with the bottom edge of the aluminum housing of the IMU. Note that this type of design can also be part of a system baseplate, which would eliminate the need for a separate bracket.

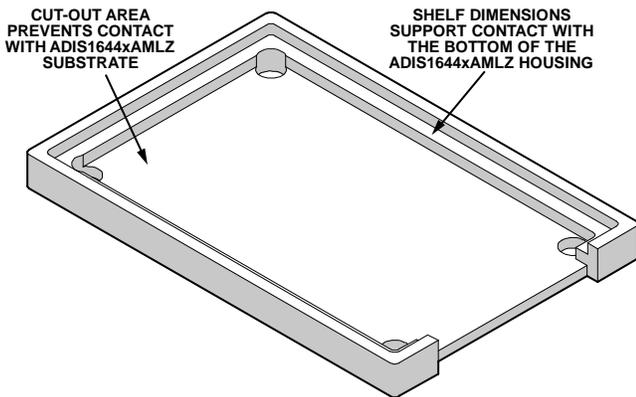


Figure 4. Bracket Features

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Printed Circuit Board Design

In Figure 3, the mating connector for the electrical connection is on rigid substrate that is part of a flexible cable assembly. This particular substrate is wide enough to rest on the ADIS16445 or ADIS16448 mounting ledges and provides pass through holes for the machine screws and for the mating pins, so that they do not bottom out and place elevated or non-uniform force on the electrical connector. Because the mounting hardware holds the PCB in place, this approach provides a solid connection for highly dynamic inertial conditions. Figure 5 and Figure 6 provide design information for the PCB.

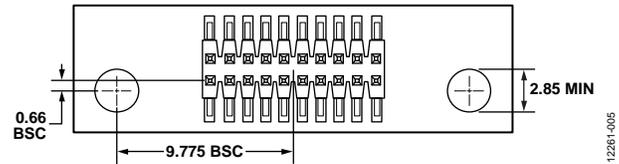


Figure 5. Rigid PCB Design: Connector/Hole Locations

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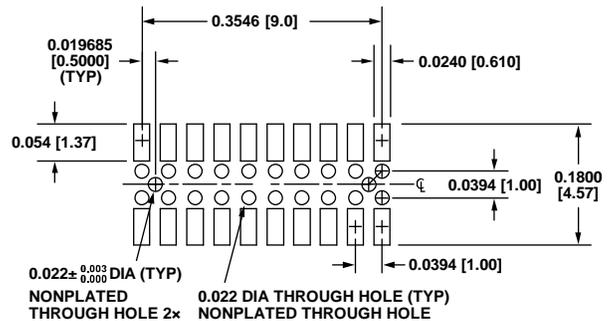


Figure 6. Mating Connector PCB Pattern

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CONNECTOR-DOWN MOUNTING

Figure 7 offers a conceptual drawing for a connector-down mounting approach. In this approach, the mating connector is on a PCB that rests on the raised level part of the system baseplate per Figure 8. Two mechanical spacers support the mounting ledges on the other side of the [ADIS16445](#) or [ADIS16448](#) package, which are not resting on the PCB. The primary objective is to raise the IMU off the baseplate surface, so that the baseplate does not contact the top side of the package. Some basic guidelines for using this type of approach are as follows:

- The spacers height should be the same as the distance between the PCB surface and the lower level of the baseplate as shown in Figure 8.
- The maximum diameter for cylindrical spacers is 4.3 mm to accommodate the smallest mounting ledge dimension.
- The mounting holes have a counter-sunk opening. This enables a complementary machine screw to slide into the opening, which minimizes the height increase in the finished solution.
- Use 28 inch-ounces of mounting torque on all four machine screws.
- Use nominal locations for the mounting holes in the [ADIS16445](#) or [ADIS16448](#) package drawing to establish the location of the tapped holes in the baseplate.
- To allow contact-free pass through for the machine screws, use a minimum diameter of 2.85 mm for the pass through holes in the PCB.
- Secure the [ADIS16445](#) or [ADIS16448](#) first. Secure the PCB to the baseplate second, if possible. This helps reduce translational force on the electrical connector.

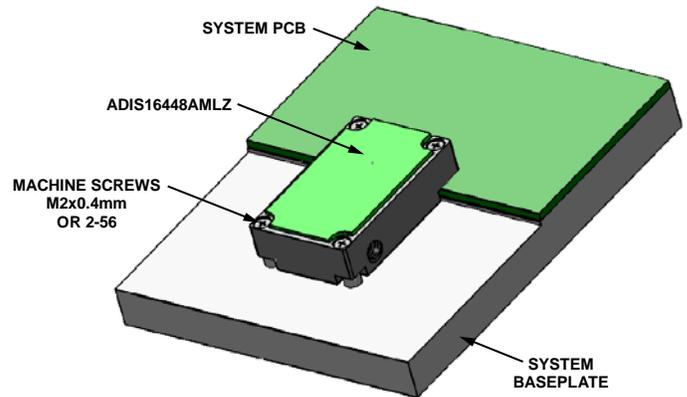


Figure 7. Connector-Down Concept View

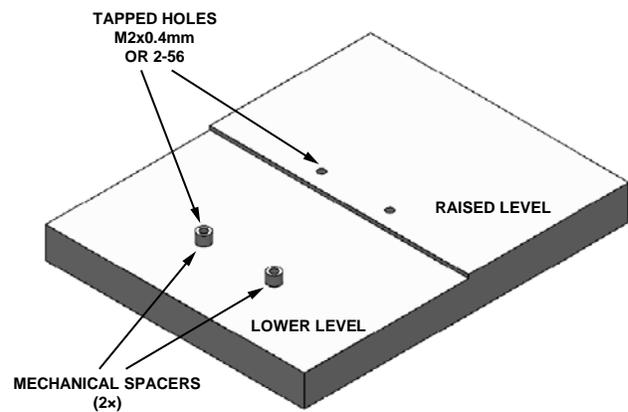


Figure 8. Bracket and Spacer Detail View

DESIGN TOOLS

Go to the [ADIS16445](#) or [ADIS16448](#) product pages or to the [EngineerZone](#)® to find 3D models, additional drawings, PCB CAD library parts, and recent application content.