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ADIS1648x
Mechanical Design Tips
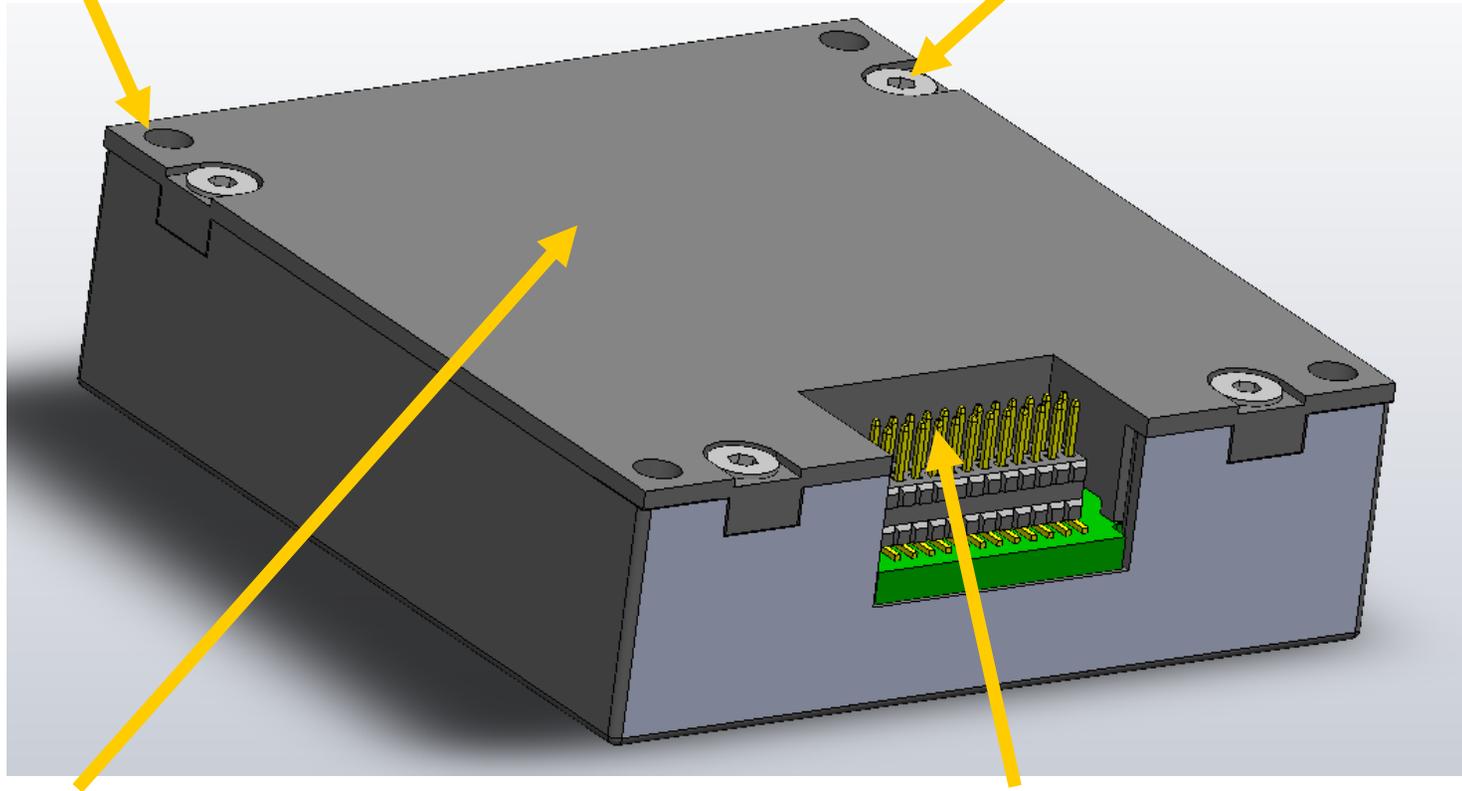
November 2013

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ADIS16375/48x Package Features
Connector-up View

Fastener for internal package construction, 4x (Not used for installation)

Mounting Holes 2.4mm diameter, 4x
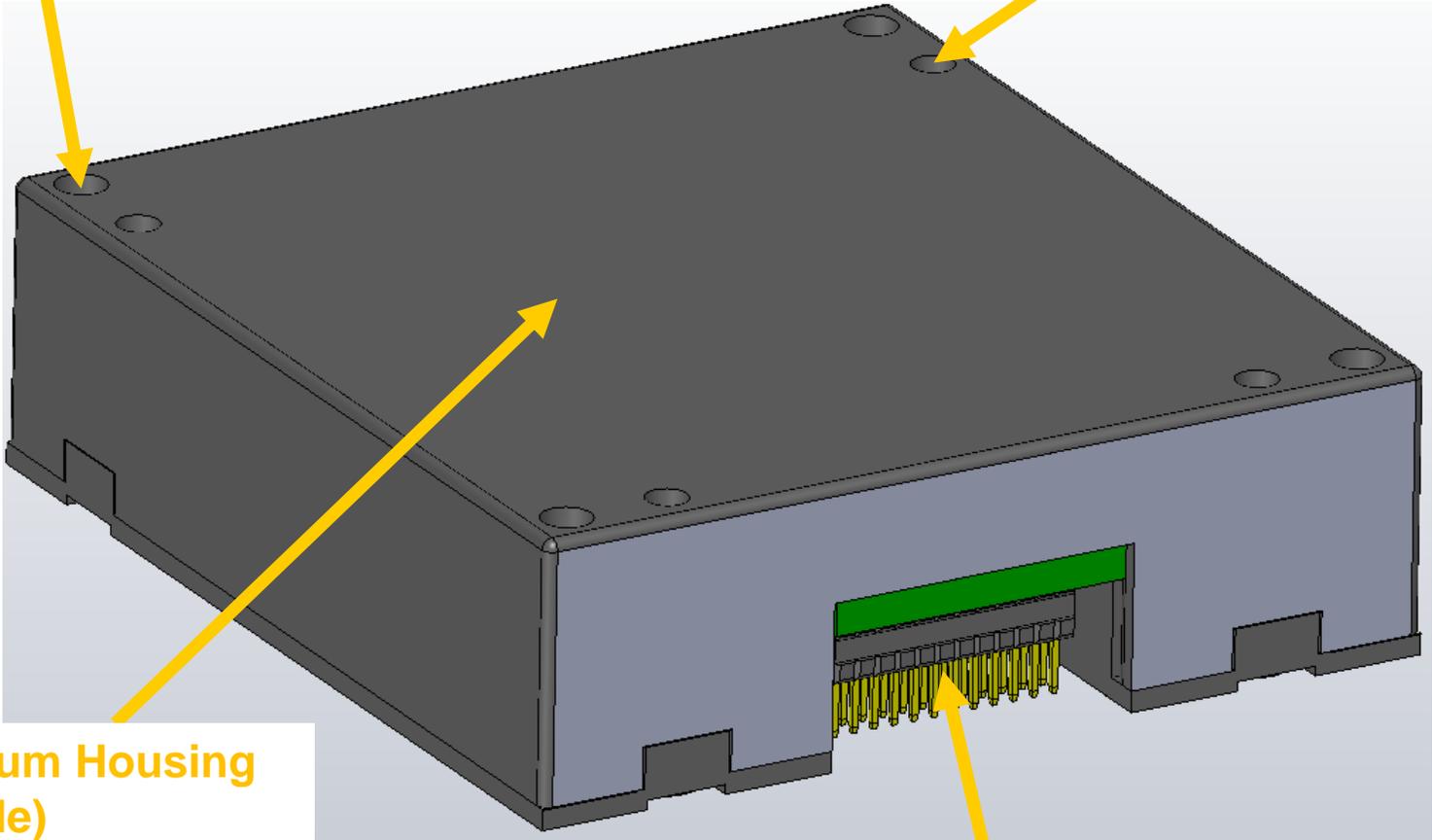
Aluminum Housing (Connector Side)

Electrical Interface Connector Dual-row, 24-pin, 1mm

ADIS16375/48x Package Features
Connector-down View

**Mounting Holes
2.4mm diameter, 4x**

**Fastener hole for internal
package construction, 4x
(Not used for installation)**

**Aluminum Housing
(Lid Side)**

**Electrical Interface Connector
Dual-row, 24-pin, 1mm**

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ADIS16375/48x Package Basics
Mechanical sensitivity

- ◆ **This package supports both connector-down and connector-up approaches**

- ◆ **Connector-down refers to when the mating connector is on the same plane as the mounting surface**

- ◆ **Connector-up refers to when the mating connector is not on the same plane as the mounting surface**

- ◆ **KEY INSIGHT: Mounting approach can influence bias repeatability performance.**

- ◆ **TIPS:**
  - ● **Apply mounting force only to the four corners**
  - ● **Avoid residual stress on the connector**
  - ● **Use 40 inch-ounces of torque on mounting screws**
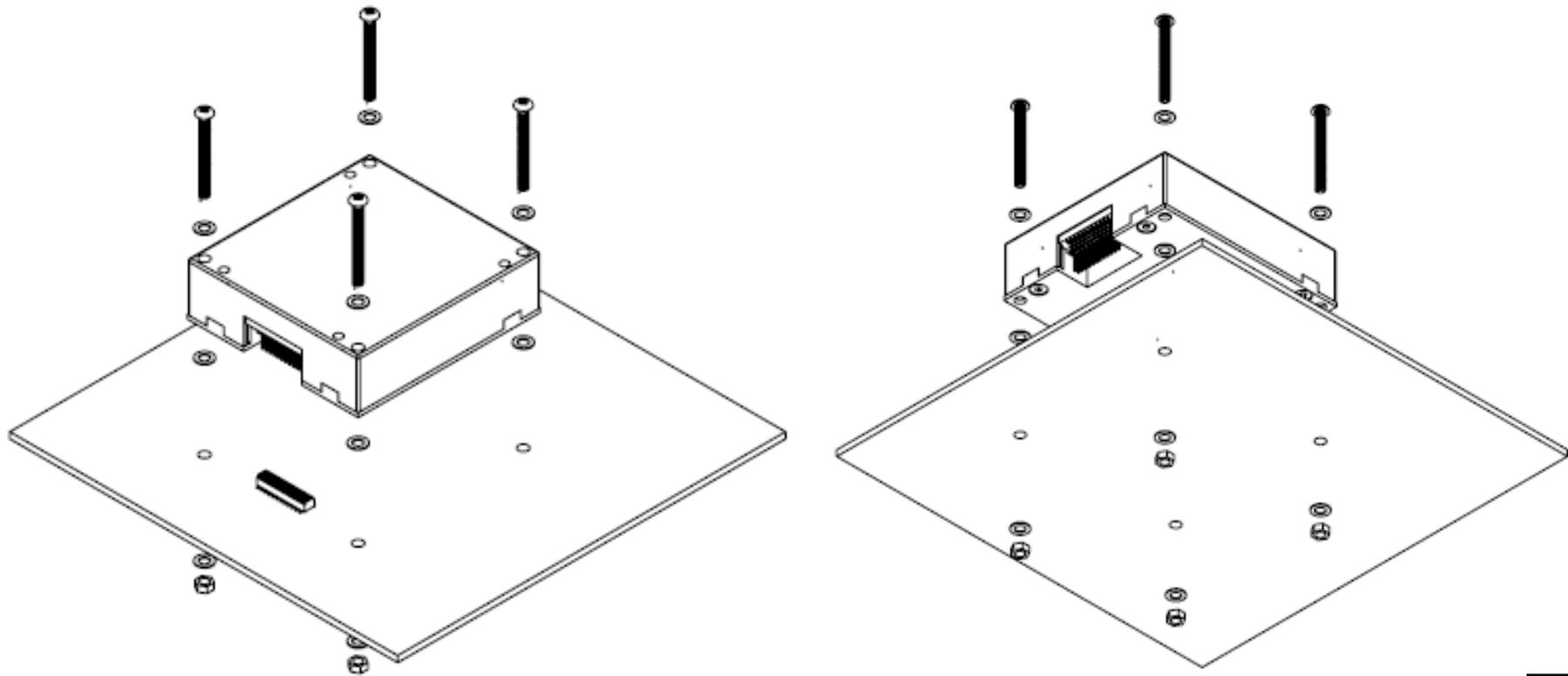
ADIS16375/48x Package Basics
Mounting hole locations

◆ **Design for the "basic" dimension and make sure any pass-through holes account for all IMU and mating surface tolerances.**

◆ **2.85mm minimum diameter suggested as a starting point**
  - **2.4mm = diameter of holes in package**
  - **±0.3mm of tolerance IMU connector to hole location**
  - **±0.3mm of tolerance PCB connector to hole location**
  - **2.4mm + sqrt($0.3^2 + 0.3^2$) = 2.85mm**

◆ **REMINDER/KEY OBJECTIVE**
  - **Protect connector from translational force, after attachment.**
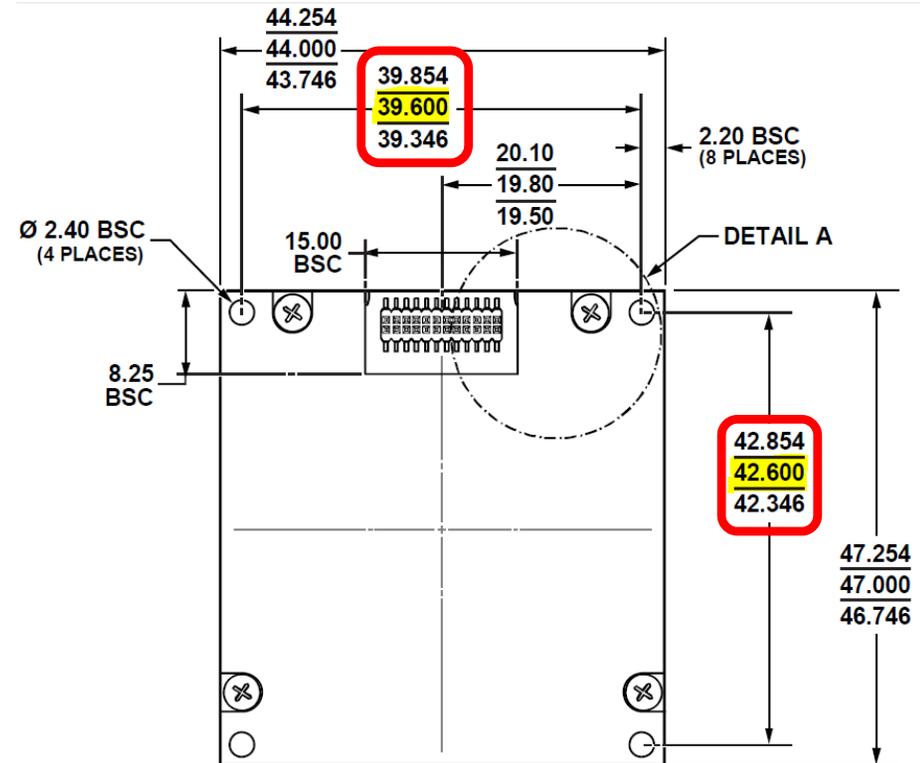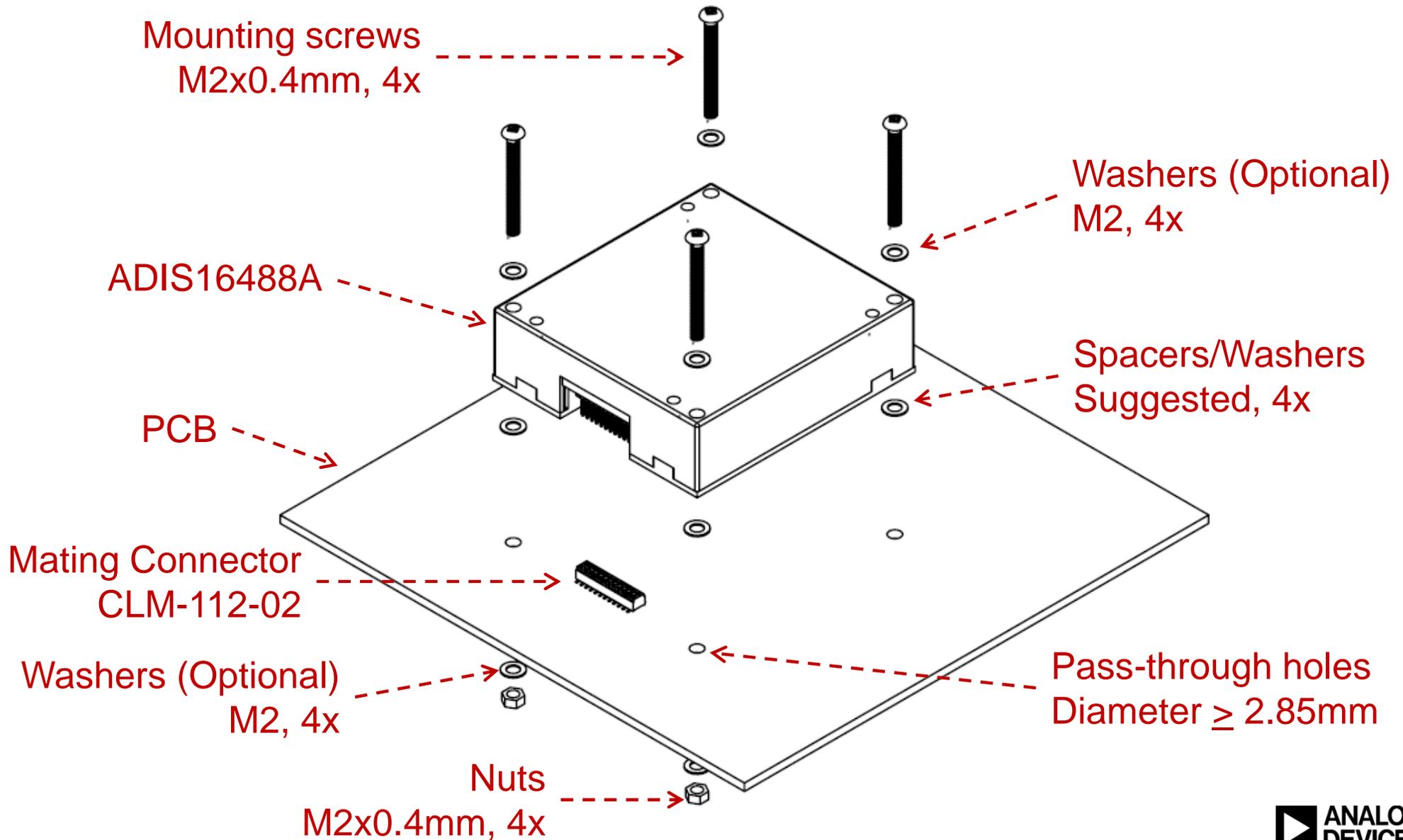
ADIS16375/48x Mounting Example #1
Connector-down, resting on washers, Overview

- ◆ **In this example, the PCB that contains the mating connector is also the mounting surface.**
- ◆ **The IMU rests on four washers, which set the IMU body off of the PCB surface.**

ADIS16375/48x Mounting Example #1
Key components/attributes

Mounting screws
M2x0.4mm, 4x

Washers (Optional)
M2, 4x

ADIS16488A

Spacers/Washers
Suggested, 4x

PCB

Mating Connector
CLM-112-02

Washers (Optional)
M2, 4x

Pass-through holes
Diameter $\geq$ 2.85mm

Nuts
M2x0.4mm, 4x

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ADIS16375/48x Mounting Example #1
Connector-down, resting on washers

◆ **The washers between the IMU and PCB surface need to be thick enough make sure that the body of the IMU does not contact the mounting surface anywhere, except where it contacts the washers**

- **IMU package flatness is approximately 0.01" (maximum observed)**
- **PCB flatness is a consideration as well**

◆ **Make sure that the mating connector does not "bottom-out" when mating with the IMU's electrical connector. This would cause a force imbalance.**

- **The CLM-112-02 series from Samtec offers enough clearance.**
- **The MLE-112-02 series from Samtec offers greater "mating coverage" but might require additional IMU elevation. Do not allow connector bases to contact each other (residual force likely)**

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ADIS16375/48x Mounting Example #1
Connector-down, resting on washers

◆ **Due to a stack-up of independent, mechanical tolerances, using threaded holes in the PCB for mounting the IMU can cause translational stress on the electrical connector.**

◆ **For best bias repeatability, use a nut/washer combination on the other side of the PCB and make the holes large enough to manage all of the tolerances of the IMU and PCB.**

◆ **For the IMU, all of the relevant tolerances can reach ±0.3mm.**

- **If we assume that PCB tolerances are the same and combine the errors using a root-sum-square, then the PCB hole diameter would need to be a minimum of 2.85mm**

◆ **After installing the IMU to the PCB, make sure that any additional assembly activity avoids placing mechanical force on the IMU's connector.**

ADIS16375/48x Mounting Example #2
Connector-down, resting on a PCB with a cut-out

◆ **Using a PCB with a cut-out offers the advantages of minimum height and does not require the use of washers.**
  - **NOTE: holes are still pass-through, suggest 2.85mm min diameter.**

◆ **The shape of the cut-out will depend on a number of factors, including PCB thickness, PCB fabrication design rules, etc.**

◆ **The following figures are intended to provide ideas, not a specific "required" approach.**
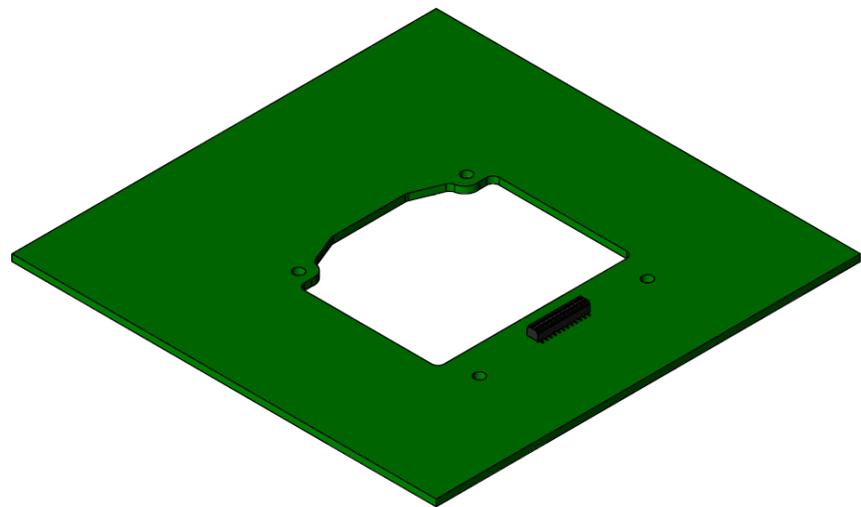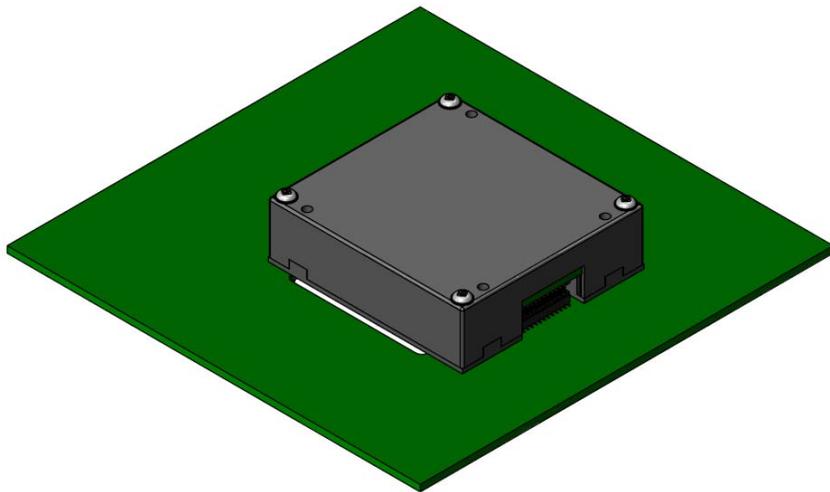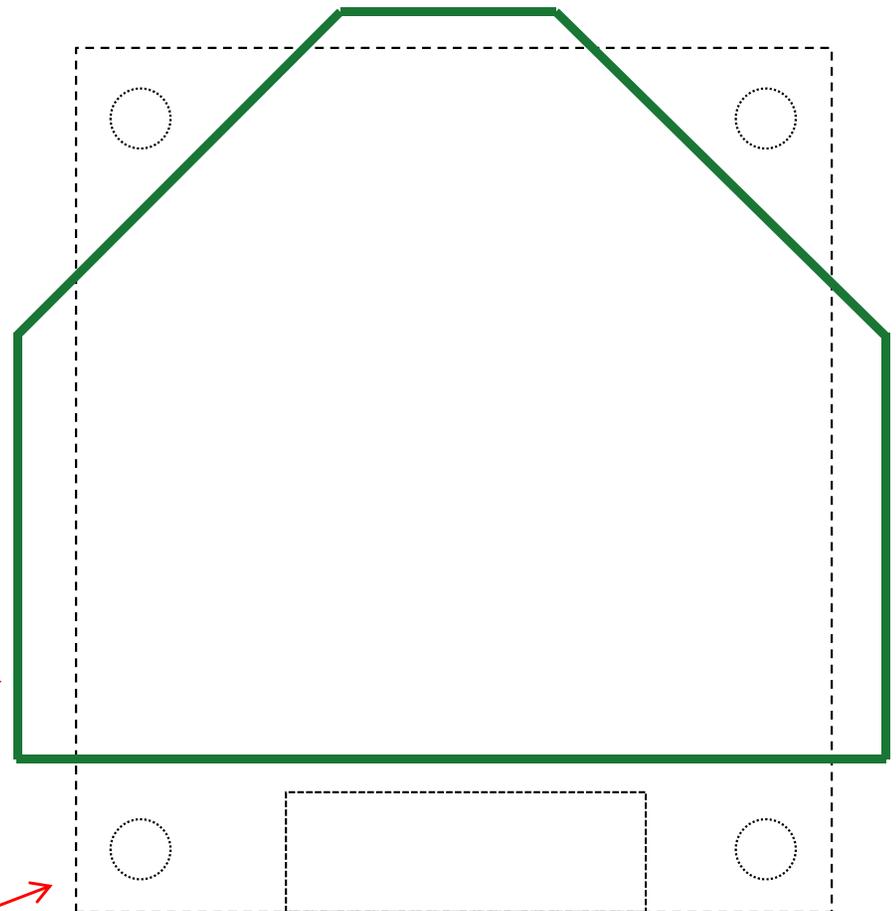
ADIS16375/48x Mounting Example #2
Connector-down, resting on a PCB with a cut-out

- **This figure provides a top-level view of an example PCB cut-out area.**
- **The cut-out geometry is flexible.**
- **Each situation may require specific attention.**
- **Key consideration is to focus the attachment force away from the center of the IMU body.**

PCB Cut-out Outline Example:
Make the width of the opening large
enough to prevent force application in
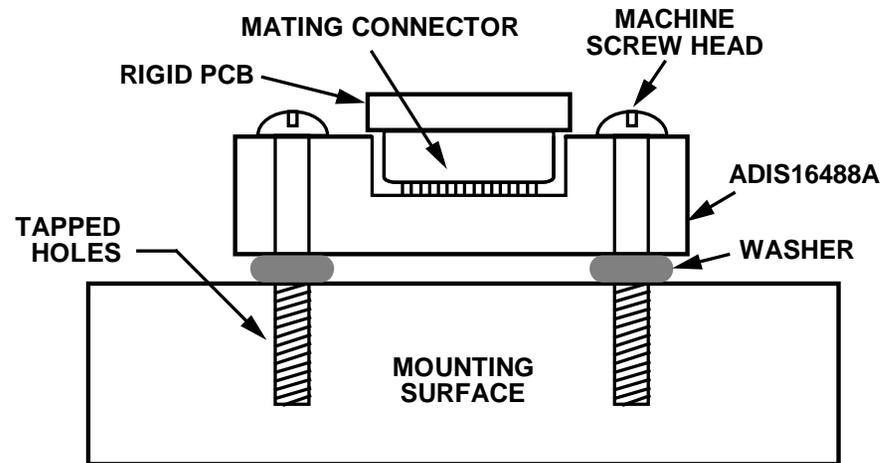away from the corners and connector

IMU Package Outline

ADIS16375/48x Mounting Example #3
Connector-up, flex cable interface

◆ **In this configuration, the connector faces away from the mounting surface and the IMU rests on four washers, which set the IMU body off of the mounting surface.**

NOTES
1. MACHINE SCREWS WILL NOT BE VISIBLE CROSS SECTION VIEW FOR ILLUSTRATION PURPOSES ONLY.
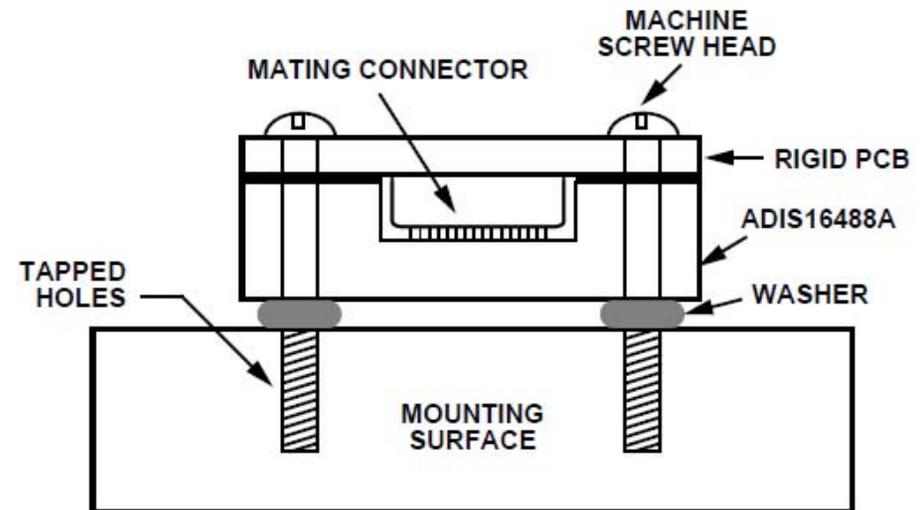
ADIS16375/48x Mounting Example #3
Connector-up, flex cable interface

◆ **The washers need to be thick enough make sure that the body of the IMU does not contact the mounting surface anywhere, except where it contacts the washers**
  - **IMU package flatness is approximately 0.01" (maximum observed)**
  - **Mounting surface flatness is a consideration as well**
  - **Key objective = only physical contact with the mating surface is at the location of the washers.**

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ADIS16375/48x Mounting Example #4
Connector-up, flex cable interface with hardware

- ◆ **In this configuration, the connector faces away from the mounting surface and the IMU rests on four washers, which set the IMU body off of the mounting surface.**

- ◆ **All of the same attributes apply, but in this case, the flexible connector has a rigid end on it, with matching mounting holes, so that the connector mate is held in place by the mounting hardware**

MACHINE SCREW HEAD

MATING CONNECTOR

RIGID PCB

ADIS16488A

TAPPED HOLES

WASHER

MOUNTING SURFACE

NOTES
1. MACHINE SCREWS WILL NOT BE VISIBLE CROSS SECTION VIEW FOR ILLUSTRATION PURPOSES ONLY.

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ADIS16375/48x Mounting Example #4
Connector-up, flex cable interface with hardware

◆ **The washers need to be thick enough make sure that the body of the IMU does not contact the mounting surface anywhere, except where it contacts the washers**

- **IMU package flatness is approximately 0.01" (maximum observed)**
- **Mounting surface flatness is a consideration as well**
- **Key objective = only physical contact with the mating surface is at the location of the washers.**

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