OEM7500 Evaluation Kit
IMU Selection Guide

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Proprietary Notice

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Warnings and Restrictions

Federal Communications Commission (FCC) and Innovation, Science and Economic Development (ISED) Canada Notices:

This development kit is designed to allow:

(1) Product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and

(2) Software developers to write software applications for use with the end product. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference.

(3) This kit generates, uses, and can radiate energy and has been tested for compliance with the limits of digital devices pursuant to Part 15 of the FCC and ICES-003 rules which are designed to provide reasonable protection against radio frequency interference.

EU Declaration of Conformity

Hereby, NovAtel Inc. declares that the OEM7500 Evaluation Kit is in compliance with Radio Equipment Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: www.novatel.com/products/compliance.

Chapter 1   OEM7500 Evaluation Kit IMU Selection

The OEM7500 Evaluation Kit supports three different internally connected IMUs. This guide describes how to select the InvenSense IAM-20680 (default), Bosch SMI130 or Epson G320N IMU.

> (i) To use the optional Epson G320N IMU, the IMU must be installed in the OEM7500 Evaluation Kit. See *Mount the Epson G320N IMU* on page 8 for details.

> ▼ **For evaluation only in laboratory/development environments**. The OEM7500 Evaluation Kit is not intended for consumer use. It is intended solely for preliminary evaluation in laboratory or development environments by technically qualified experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. The OEM7500 Evaluation Kit should not be used as all or part of a finished end product.

1.1   OEM7500 User Documentation

For information about the OEM7500, OEM7500 Evaluation Kit, OEM7 logs and commands and OEM7 receiver functionality, consult NovAtel's OEM7 Receiver User Documentation portal: docs.novatel.com/OEM7

Contact NovAtel Customer Service to obtain the OEM7500 Evaluation Kit schematics.

1.2   Customer Support

For any questions or comments regarding the OEM7500 Evaluation Kit, log a support request with NovAtel Customer Support using one of the following methods:

Log a Case and Search Knowledge:

Website: novatel.com/support

Log a Case, Search Knowledge and View Your Case History: (login access required)

Web Portal: https://novatelsupport.force.com/community/login

E-mail:

support.novatel@hexagon.com

Telephone:

U.S. and Canada: 1-800-NOVATEL (1-800-668-2835)
International: +1-403-295-4900
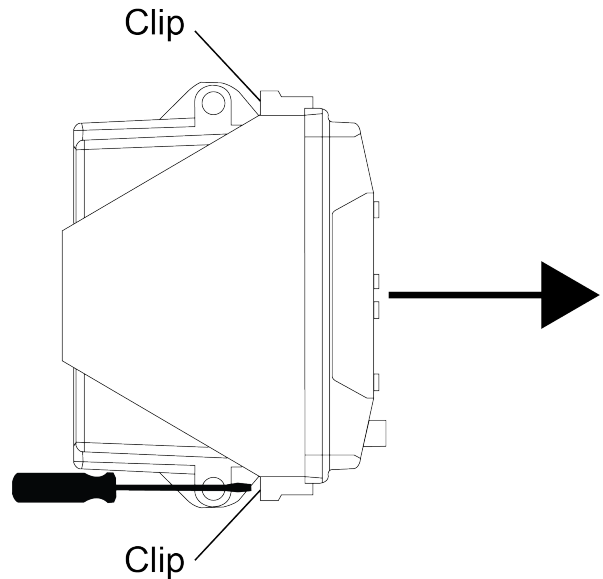
1.3   Set the IMU Selection Switch

> Disconnect all power, data and antenna cables and use proper ESD protection before opening the enclosure body.

1.3.1   Remove the front cover to gain access to the IMU switch

1. Insert a screw driver (flat) into the top of one of the side clips of the enclosure.

2. Press down on the black clip.

3. Twist the screw driver slightly until the clip "pops".

4. Repeat for the other enclosure side.

5. Once both clips are popped, gently pull out the front connector plate.

> The 56-pin connector and antenna cable are still connected to the interface board.

Clip

Clip

1.3.2   Set the IMU Switch

1. Use a small screwdriver to set the IMU DIP switch. See the illustration (right) for the DIP switch selection settings.

> If installing an Epson G320N IMU, either Epson labeled DIP switch setting can be used.

> Setting the IMU DIP switch may be possible without entirely removing the internal interface board. The interface board must be entirely removed to install the Epson G320N IMU. See *Mount the Epson G320N IMU* on page 8 for installation instructions for the Epson IMU.

IMU

Bosch

InvenSense

Epson

Epson

Pin 1
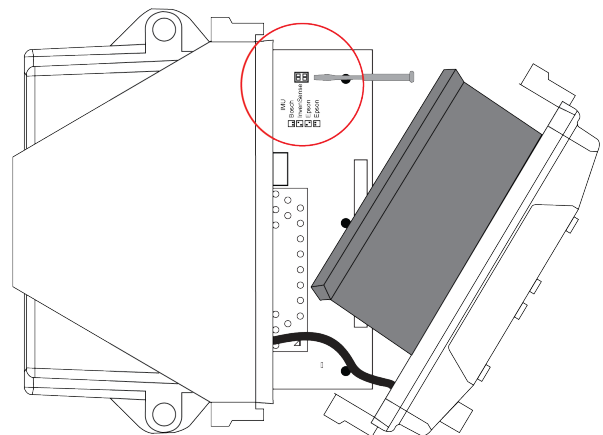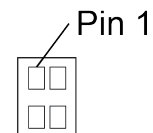
1.3.3   Reassemble

1. Reassemble the OEM7500 Evaluation kit.

2. Power the OEM7500 Evaluation Kit.

3. Open a communication port to the receiver.

4. Send the **FRESET** command to clear any existing IMU configuration settings.

5. Once the IMU resets, configure SPAN as described in *SPAN Setup – InvenSense IAM-20680* below, *SPAN Setup – Bosch SMI130* on the next page or *SPAN Setup – Epson G320N* on page 9.

1.4   Communicate with the OEM7500 Evaluation Kit

Communication is established with the OEM7500 Evaluation Kit using a data terminal or computer connected to a serial or USB port on the OEM7500 Evaluation Kit. When connected, enter commands from the terminal, terminal emulation application or Terminal window in NovAtel Application Suite.

NovAtel Application Suite is set of computer based applications that simplify the configuration and monitoring of NovAtel receivers. The configuration windows within NovAtel Application Suite can be used to configure the OEM7500 Evaluation Kit. For information about installing and using NovAtel Application Suite, refer to the online documentation (docs.novatel.com/Tools).

1.5   SPAN Setup – InvenSense IAM-20680

> (i) It is only necessary to send the commands below if the IMU is changed or a **FRESET** command is sent.

To enable SPAN functionality for the InvenSense IAM-20680, issue the following commands:

1. **SETIMUEVENT IN EVENT1**

2. **CONNECTIMU SPI INVENSENSE_IAM20680**

3. **SETINSPROFILE LAND**

4. **SETINSTRANSLATION ANT1 X Y Z [XSD] [YSD] [ZSD]**

   The values for X, Y and Z are the distances in metres along the X-axis, Y-axis and Z-axis, in the IMU Body frame, from the IMU center of navigation to the phase center of the primary antenna. The values for XSD, YSD and ZSD are the standard deviation values for the distances.

   > ▼ Large standard deviations can lead to an inaccurate position solution. Therefore, it is highly recommended to measure the translation offsets as accurately as possible and to enter translation offset standard deviations that reflect that accuracy.

5. **SETINSROTATION RBV X Y Z [XSD] [YSD] [ZSD]**

   The values for X, Y and Z are the rotations from the IMU body frame (indicated in *Figure 1: InvenSense IAM-20680 Center of Navigation* on the next page) to the vehicle frame. The order of rotations is Z, X, Y. All rotations are right handed.The values for XSD, YSD and ZSD are the standard deviation values for the rotations.

▼ After completing the SPAN setup, an alignment of the SPAN system must be performed. Refer to System Start-Up and Alignment Techniques in the OEM7 User Documentation portal for details on System Alignment. A coarse alignment cannot be used with the OEM7500 Evaluation Kit IMUs.

Figure 1: InvenSense IAM-20680 Center of Navigation
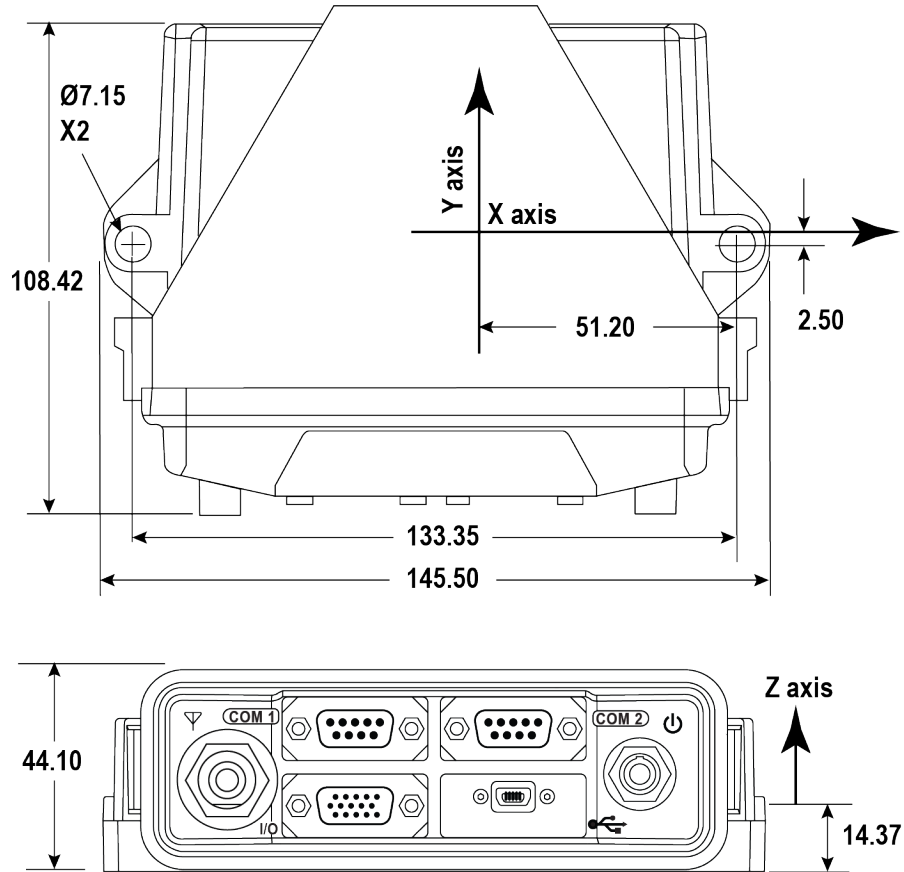
1.6   SPAN Setup – Bosch SMI130

ⓘ It is only necessary to send the commands below if the IMU is changed or a **FRESET** command is sent.

To enable SPAN functionality for the Bosch SMI130 IMU, issue the following commands:

1. **SETIMUEVENT IN EVENT2**
2. **SETIMUEVENT IN2 EVENT1**
3. **SPICONTROL IMU CS2**
4. **SPICONTROL IMU2 CS1**
5. **CONNECTIMU SPI BOSCH_SMI130**
6. **SETINSPROFILE LAND**
7. **SETINSTRANSLATION ANT1 X Y Z [XSD] [YSD] [ZSD]**

The values for X, Y and Z are the distances in metres along the X-axis, Y-axis and Z-axis, in the IMU Body frame, from the IMU center of navigation to the phase center of the primary antenna. The values for XSD, YSD and ZSD are the standard deviation values for the distances.

> Large standard deviations can lead to an inaccurate position solution. Therefore, it is highly recommended to measure the translation offsets as accurately as possible and to enter translation offset standard deviations that reflect that accuracy.

8. **`SETINSROTATION RBV X Y Z [XSD] [YSD] [ZSD]`**

The values for X, Y and Z are the rotations from the IMU body frame (indicated in *Figure 2: Bosch SMI130 Center of Navigation* below) to the vehicle frame. The order of rotations is Z, X, Y. All rotations are right handed. The values for XSD, YSD and ZSD are the standard deviation values for the rotations.

> After completing the SPAN setup, an alignment of the SPAN system must be performed. Refer to System Start-Up and Alignment Techniques in the OEM7 User Documentation portal for details on System Alignment. A coarse alignment cannot be used with the OEM7500 Evaluation Kit IMUs.
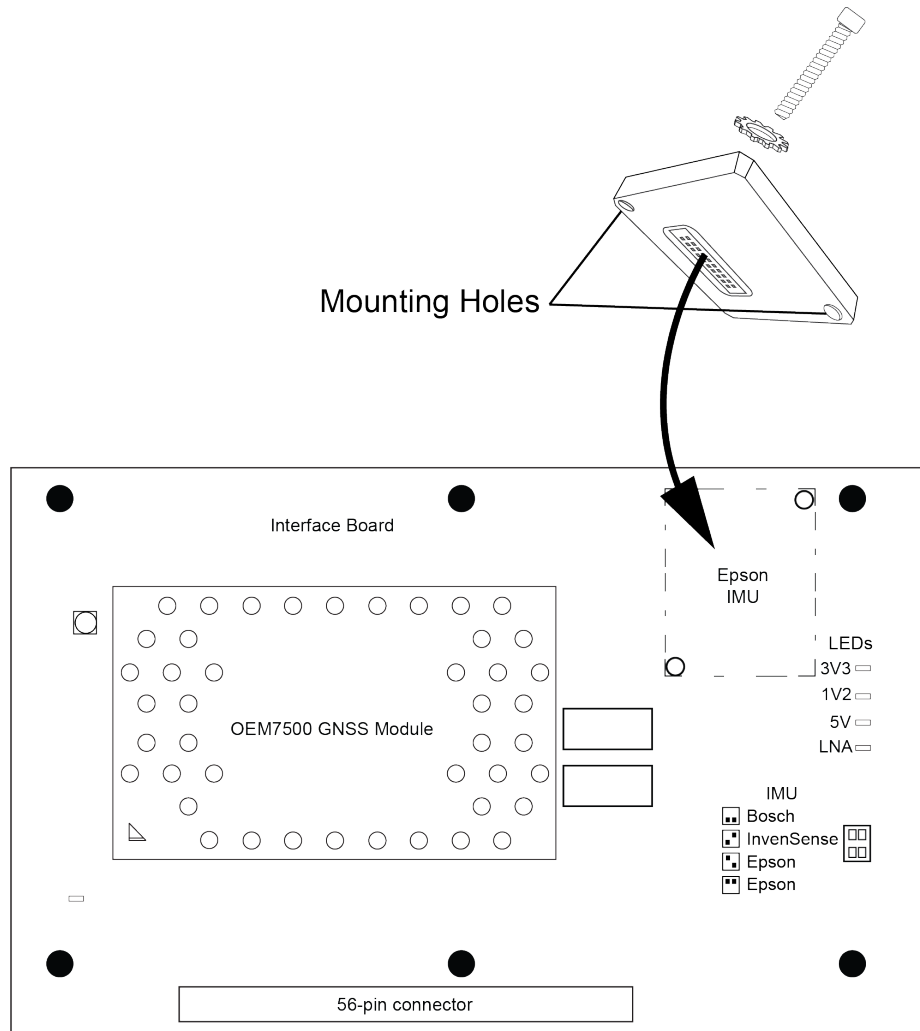
Figure 2: Bosch SMI130 Center of Navigation
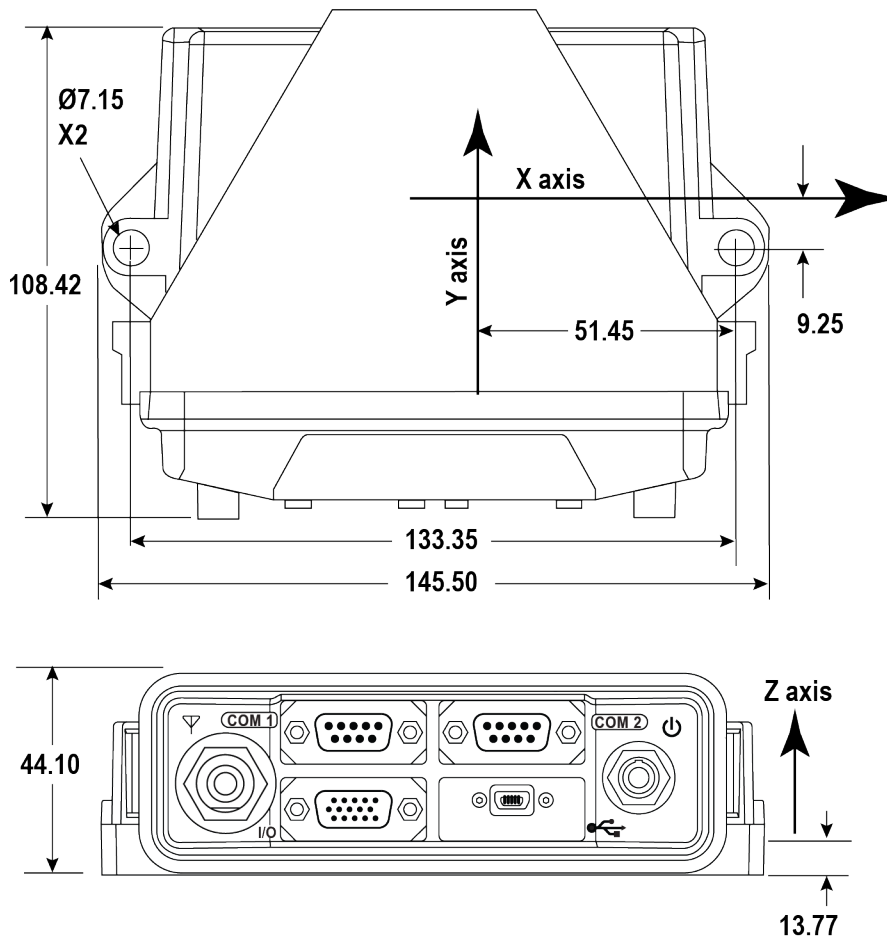
1.7   Mount the Epson G320N IMU

If using the optional Epson G320N IMU with the OEM7500 Evaluation Kit, the IMU must be mounted on the OEM7500 Evaluation Kit board.

1. Open the OEM7500 Evaluation Kit and remove the OEM7500 Evaluation Kit board. See *Set the IMU Selection Switch* on page 4.

2. Align the connector on the G320N IMU with the connector on the OEM7500 Evaluation Kit board and gently press the IMU down.

Mounting Holes

Interface Board

Epson
IMU

LEDs
3V3
1V2
5V
LNA

OEM7500 GNSS Module

IMU
Bosch
InvenSense
Epson
Epson

56-pin connector

3. Place the lock tooth washer on the IMU.

4. Insert the provided socket cap screw through the washer and into the G320N IMU.

5. Repeat for the second mounting hole.

6. Use a 2 mm hex bit to tighten the screws to 6 in-lbs of torque.

7. Reassemble the OEM7500 Evaluation Kit.

1.8   SPAN Setup – Epson G320N

> (i) The Epson G320N must be mounted on the OEM7500 Evaluation Kit board before starting this procedure. See *Mount the Epson G320N IMU* on the previous page.

> (i) It is only necessary to send the commands below if the IMU is changed or a **FRESET** command is sent.

To enable the SPAN functionality for the Epson G320N IMU, send the following commands:

1. **SETIMUEVENT IN EVENT1**

2. **CONNECTIMU SPI EPSON_G320**

3. **SETINSPROFILE LAND**

4. **SETINSTRANSLATION ANT1 X Y Z [XSD] [YSD] [ZSD]**

   The values for X, Y and Z are the distances in metres along the X-axis, Y-axis and Z-axis, in the IMU Body frame, from the IMU center of navigation to the phase center of the primary antenna. The values for XSD, YSD and ZSD are the standard deviation values for the distances.

   > ▼ Large standard deviations can lead to an inaccurate position solution. Therefore, it is highly recommended to measure the translation offsets as accurately as possible and to enter translation offset standard deviations that reflect that accuracy.

5. **SETINSROTATION RBV X Y Z [XSD] [YSD] [ZSD]**

   The values for X, Y and Z are the rotations from the IMU body frame (indicated in *Figure 3: Epson G320N Center of Navigation* on the next page) to the vehicle frame. The order of rotations is Z, X, Y. All rotations are right handed. The values for XSD, YSD and ZSD are the standard deviation values for the rotations.

> ▼ After completing the SPAN setup, an alignment of the SPAN system must be performed. Refer to System Start-Up and Alignment Techniques in the OEM7 User Documentation portal for details on System Alignment. A coarse alignment cannot be used with the OEM7500 Evaluation Kit IMUs.

Figure 3: Epson G320N Center of Navigation