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ANALOG DEVICES

Evaluation Board User Guide
UG-209

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ADXL312 Sensor Evaluation System

FEATURES

Flexible inertial sensor evaluation platform
Main board operates with interchangeable satellite boards
- **Separates device under test (DUT) from controller for accurate environmental testing**

Interrupt driven device communication
- **6.25 Hz to 3200 Hz data sampling**
- **Synchronous sampling for x-, y-, and z-axes**

Continuous stream to file data recording
- **Supports all data rates**

Standard USB cable for power and communications
PC-based graphical user interface (GUI)
Fast, easy installation

INERTIAL SENSOR EVALUATION SYSTEM

Figure 1.

GENERAL DESCRIPTION

The ADXL312 inertial sensor evaluation system is an easy-to-use evaluation tool targeting bench or desktop characterization of Analog Devices, Inc., inertial sensor products. The system consists of the inertial sensor evaluation board (ISEB), or main board, and a satellite board for any Analog Devices inertial sensor product. The ISEB connects directly to a PC via a USB cable, with the USB connection providing both power and communications to the board. The ISEB is connected to the satellite board through a ribbon cable. This cable allows the satellite to be easily manipulated for testing or to be separately placed into an environmental chamber for temperature or humidity testing. Separating the board mitigates corruption of data due to the temperature and humidity effects of other components.

The ISEB is a universal main board and is intended to be used with various satellites of Analog Devices inertial sensors, including analog and digital accelerometers and gyroscopes. The different products are evaluated by means of separate GUIs that are customized for performance and characterization measurements relevant to the inertial sensor being evaluated.

The EVAL-ADXL312Z-M system contains the ISEB and the EVAL-ADXL312Z-S satellite. Also included is a USB A to Mini-B cable to connect the ISEB to a PC and an 18-inch, 20-pin ribbon cable to connect the ISEB to the satellite. A CD is included with the necessary drivers and installers to use the system and to quickly begin evaluating the ADXL312.

INSTALLATION PROCEDURE

The included CD contains all of the software necessary to install the complete inertial sensor evaluation system. Refer to the included ReadMe file for the proper installation procedure. Device drivers, the LabVIEW® run-time environments, and the ADXL312 evaluation GUI must all be installed. After the device drivers and run-time environments are installed, this process does not need to be repeated for any future ISEB evaluation kit purchase. Each installation routine is described in this user guide and should be performed in the following order.

1. Download the **ISEB_USB Drivers**, **LabVIEW Run Time Installation**, and **ADXL312** folders to the PC hard drive.
2. Install the USB drivers for the ISEB.
3. Install the included LabVIEW run-time environments.
4. Install the ADXL312 evaluation system GUI.
5. Configure the ISEB hardware.
6. Launch the ADXL312 evaluation system GUI and test devices.

This user guide provides all the details necessary to install and operate the ADXL312 evaluation system.

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REVISION HISTORY

1/11—Revision 0: Initial Version

INERTIAL SENSOR EVALUATION SYSTEM SETUP

DOWNLOAD FILES

Before proceeding with the installation routine, download the **ADXL312**, the **ISEB_USB Drivers**, and the **LabVIEW Run Time Installation** folders (located on the included CD) to a local folder on the target PC. This can be done as follows:

1. Browse to a destination directory on the host PC.
2. Right-click to select **New/Folder**.
3. Name this folder and copy the CD files into this new location.

ISEB HARDWARE SETUP

Before connecting the ISEB hardware to the PC, drivers must be installed so that the PC properly recognizes the ISEB main board. The USB drivers for the ISEB are available in the **ISEB_USB Drivers** folder.

Installing the USB Drivers for the ISEB

To install the USB drivers, take the following steps:

1. Execute the **ADI_ISEB_USB_Drivers.exe** file located in **ISEB_USB Drivers**.
2. Follow the on-screen instructions to install the drivers.
3. Click **Continue Anyway** when prompted that the drivers are not tested.

Next, connect the ISEB main board to the computer via the included USB cable. If the previously installed drivers are not automatically associated with the device, the drivers may need to be selected manually, as follows:

1. Connect the USB A to Mini-B cable to the PC and then to the ISEB. When the ISEB board is connected, the **Found New Hardware Wizard** window appears.
2. If prompted to install drivers, click **Install from a list or specific location (Advanced)** and click **Next >** (see Figure 2).
3. Select **Don't search. I will choose the driver to install** and click **Next >** (see Figure 3).
4. Select **ADI Inertial Sensor Evaluation System** from the model list and click **Next >** to complete the process (see Figure 4).

The ISEB should be detected automatically in the **Device Manager** as the **ADI Inertial Sensor Evaluation System** under the **Ports (COM & LPT)** selection. It is recommended to open the **Device Manager** to verify hardware detection and to record the communication port associated with the ISEB for use in the GUI.

Figure 2. Found New Hardware Prompt

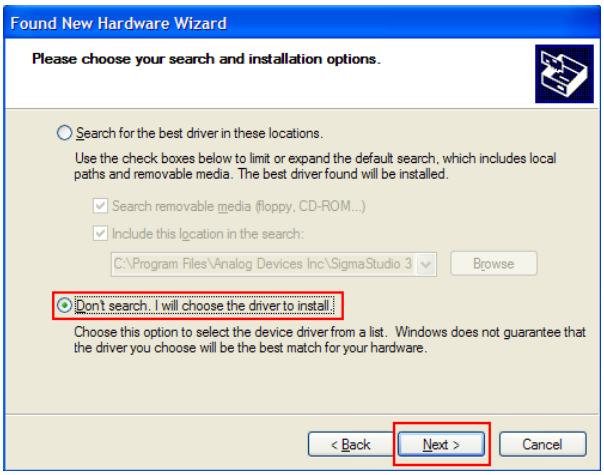

Figure 3. Selection of the Driver to Install

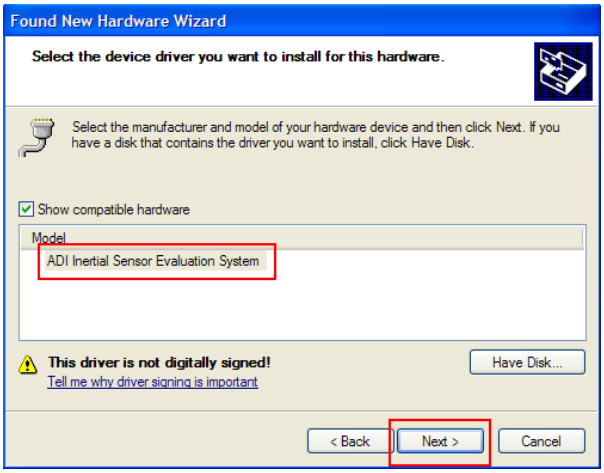

Figure 4. Selection of the ADI Inertial Sensor Evaluation System Drivers

COM PORT VERIFICATION

Installing different firmware revisions, as well as operating the ADXL312 evaluation GUI, requires that the user know the COM port that is assigned to the ISEB main board. With the ISEB main board connected to the PC, perform the following steps to determine the assigned COM port number.

For Windows® Vista,

1. From the **Start** menu, right-click **Computer** and select **Properties**. The window shown in Figure 5 should open.
2. Underneath **Tasks**, select **Device Manager**. Windows Vista may request that the user allow access to this panel, and administrative privileges may also be required. The window shown in Figure 6 should now open.
3. Expand the **Ports (COM & LTP)** folder. The **ADI Inertial Sensor Evaluation System** should be listed with an assigned COM port number in parenthesis.
4. Note the COM port number for future use.

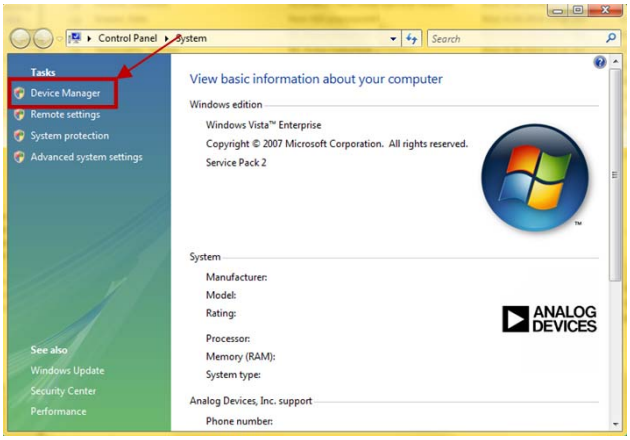

Figure 5. Computer Properties

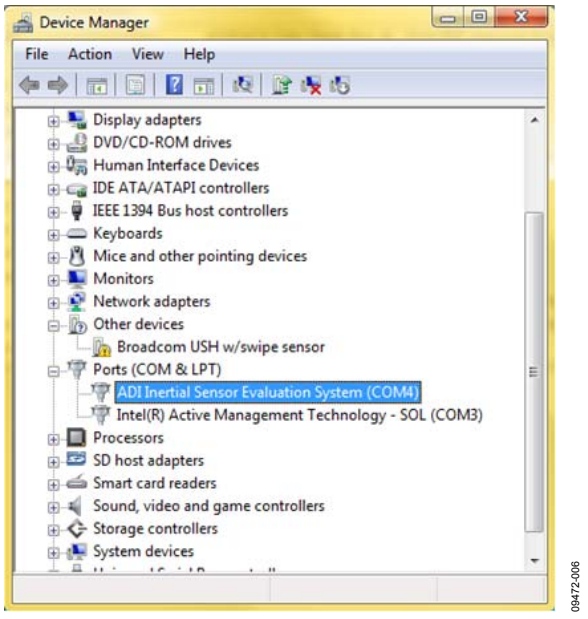

Figure 6. Device Manager Showing the COM Port Number

For Windows XP/2000,

1. From the **Start** menu, right-click **My Computer** and select **Properties**.
2. Click the **Hardware** tab of the **System Properties** window, as shown in Figure 7.
3. Click **Device Manager** to look up the assigned COM port of the ISEB hardware.

The **Device Manager** window should look like the window shown in Figure 6.

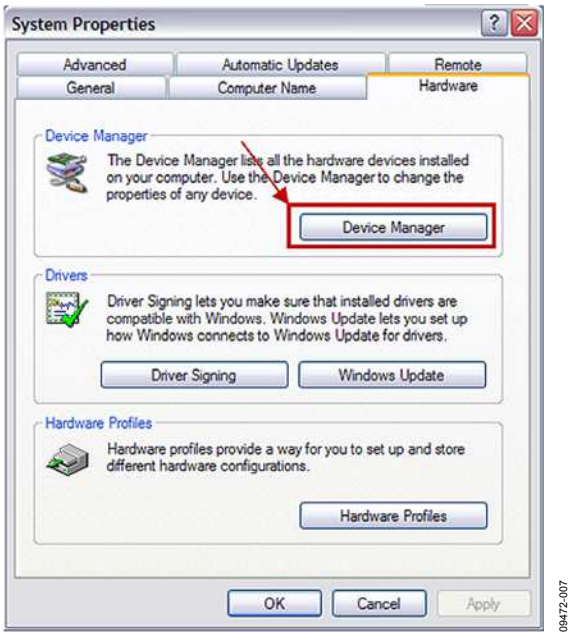

Figure 7. System Properties

INSTALLING OTHER ISEB FIRMWARE REVISIONS

The ISEB evaluation system is designed to allow maximum flexibility for the user. Interchangeable satellite boards are designed to operate with the same ISEB main board. When transitioning between satellite boards, it may be necessary to install a different firmware revision onto the main board. A utility has been included to allow for quick and easy flashing of the appropriate firmware, and the latest firmware revisions are included on the installation CD, located in the **Firmware Utility** folder.

The **ADXL312 - Firmware.hex** file should already be installed on the ISEB main board. To flash the ISEB microcontroller with new firmware, follow these steps:

1. Ensure that the ISEB is connected to and detected by the PC. The COM port on which the device is recognized must also be known, as mentioned in the COM Port Verification section.
2. Run the **ARMWSD.exe** program located in the **Firmware Utility** folder; it displays information about the downloader, as shown in Figure 8.

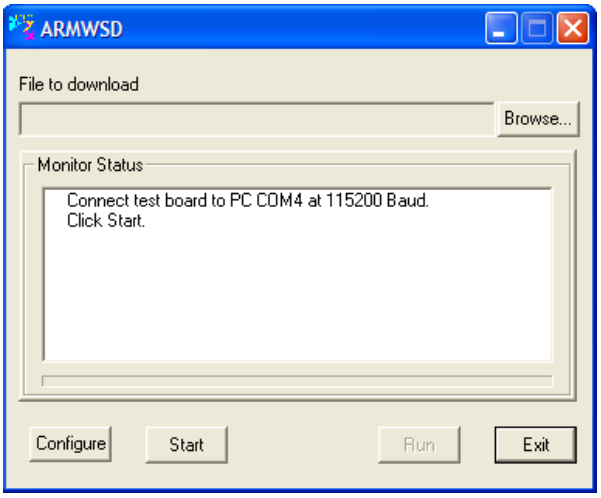

Figure 8. ISEB ARMWSD Firmware Downloader

3. Click **Browse…** and select the firmware associated with the desired product. Each firmware file is named according to the products that it supports.
4. Click **Configure** to display the box shown in Figure 9.

The downloader file should be configured for the ADuC7026 microcontroller. The only option that may need to be changed is the COM port. The user can select the correct port from the **Serial Port** box on the **Comms** tab (see Figure 9).

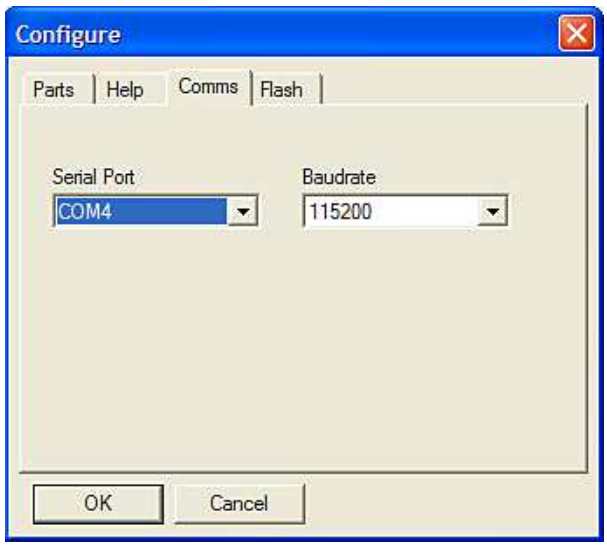

Figure 9. Selecting the Correct COM Port for the Downloader

When the COM port is selected, click **OK** to accept the changes and go back to the ARMWSD box (see Figure 8). The downloader is now fully configured. Follow these steps to flash the firmware:

1. Click **Start** in the ARMWSD box (see Figure 8) to initiate the flashing process.
2. Press the two buttons (shown in Figure 10) on the ISEB in the following order to flash the firmware:
   a. Press and hold down **SW1**.
   b. With **SW1** held down, press and release **SW2**.
   c. Release **SW1**.
3. The download begins and is automatically verified by the downloader.

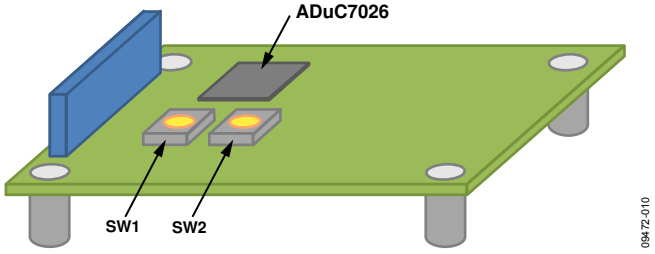

Figure 10. ISEB Switch Locations for Flashing the Microcontroller

4. If the downloading process fails, which is indicated in the **Monitor Status** box (see Figure 8), attempt the download again by repeating Step 1 through Step 3.
5. After the download has completed successfully, click **Run** (shown in Figure 8).

The **ADXL312 - Firmware.hex** firmware has been developed for specific operation with the ADXL312 satellite board. To use the ISEB main board with any other satellite board, simply locate the other device's firmware on the included installation CD and flash it onto the ISEB main board. This allows operation with that device's evaluation GUI.

Installing the LabVIEW Run Time Environment

Located in the **LabVIEW Run Time Installation** folder is an executable file designed to install the LabVIEW environment packages required for operation of the various product GUIs. To begin the installation process, double-click the **LabVIEW Run Time Install.exe** file. Follow the on-screen prompts to successfully install the necessary LabVIEW components.

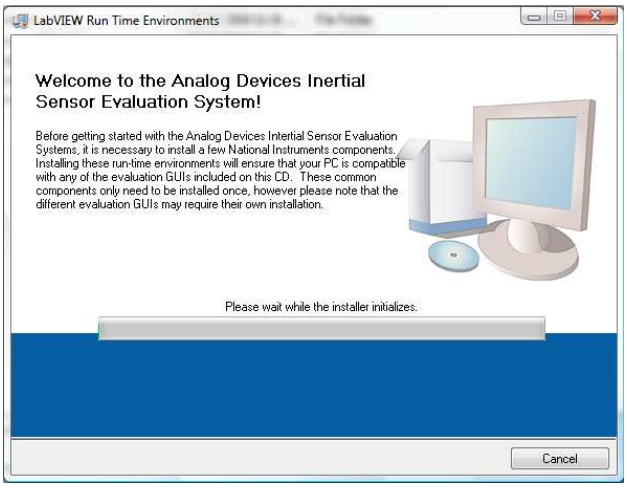

Figure 11. LabVIEW Run Time Environments Installation

ADXL312 Software Evaluation GUI

To run the software GUI installation, double-click the **ADXL312 Install.exe** file located in the **/ADXL312 Eval Software Installation/** folder on the included CD. The window shown in Figure 12 appears.

Complete the following steps to install the evaluation software:

1. Select the **Destination Directory** (see Figure 13). It is recommended to keep the default settings for these fields.
2. Click **Next** >>. The **License Agreement** window then appears/opens.
3. Read the **National Instruments Software License Agreement**. Choose **I accept the License Agreement(s)**, and then click **Next** >>. The installer then lists the required components to be installed on the PC (see Figure 14).
4. Click **Next** >> to start the installation.
5. Click **Finish** to complete the installation.

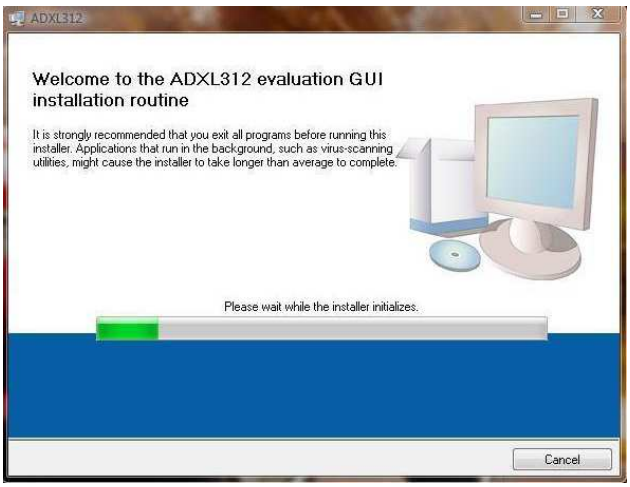

Figure 12. ADXL312 Evaluation Software Installation Welcome

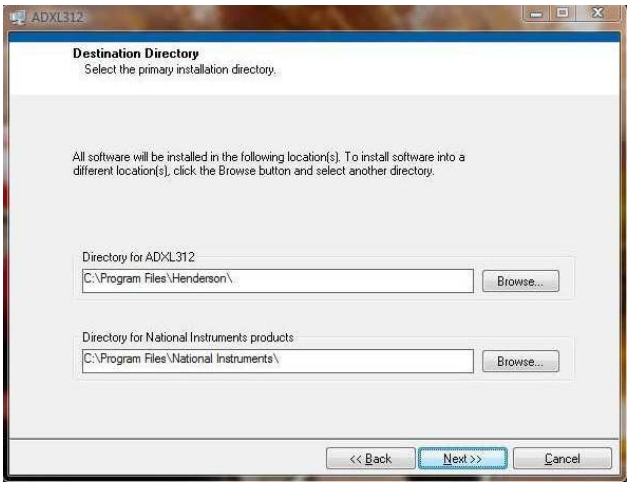

Figure 13. Destination Directory Selection

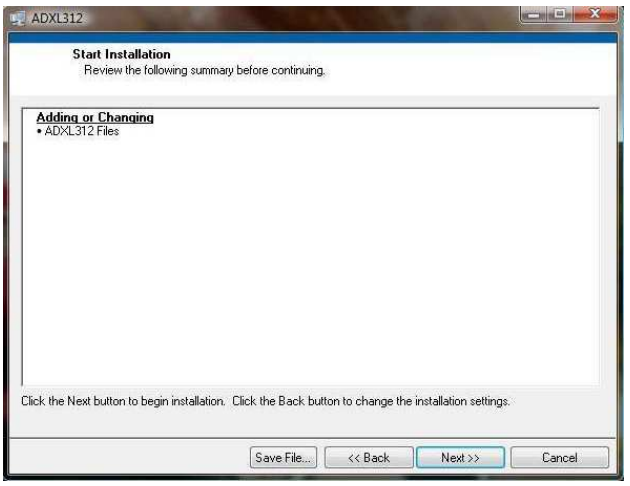

Figure 14. Start Installation (Listing Varies Based on PC Requirements)

HARDWARE CONFIGURATION

The ADXL312 satellite board should be connected to the inertial sensor evaluation board (ISEB), as shown in Figure 16. The red wire of the ribbon cable is designed to connect Pin 1 of the satellite board header to Pin 1 of the ISEB board. Refer to the Header Pinout section for the complete satellite board pinout.

Additionally, several jumpers located on the satellite board can be used to switch the part between I²C and either 3-wire or 4-wire SPI communication. 4-wire SPI operation is required to use the ADXL312 software evaluation GUI. Figure 15 shows the correct jumper settings to configure the satellite board for 4-wire SPI.

The satellite board can be freely connected to any other evaluation system in which 3-wire SPI or I²C operation may be desired. Refer to the Header Pinout section, as well as the satellite board schematic included on the CD, to determine the necessary configuration for a particular application.

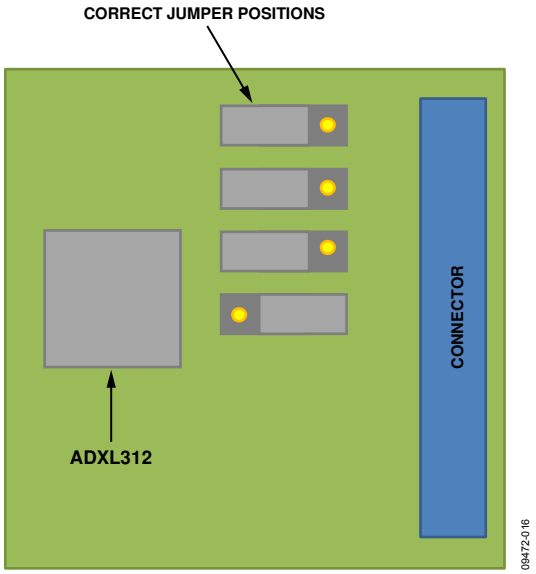

Figure 15. Correct Jumper Positions for the ADXL312 Satellite

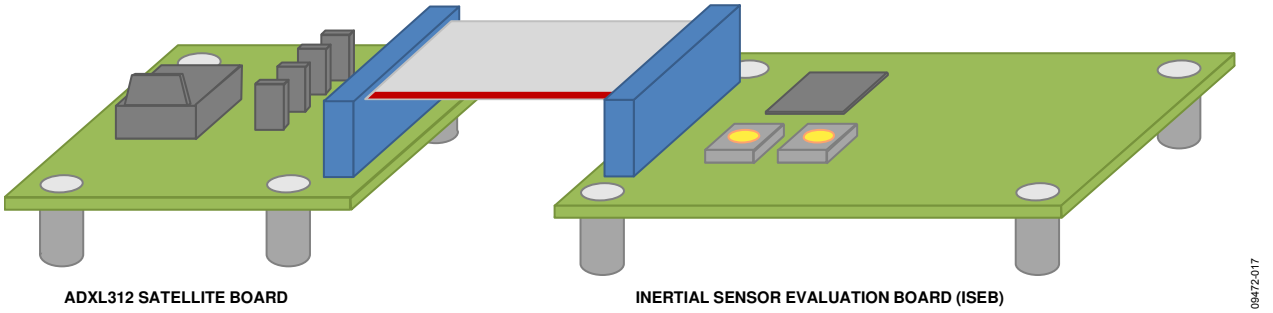

Figure 16. Satellite Board Connection to ISEB

INERTIAL SENSOR EVALUATION SYSTEM GUI

GETTING STARTED

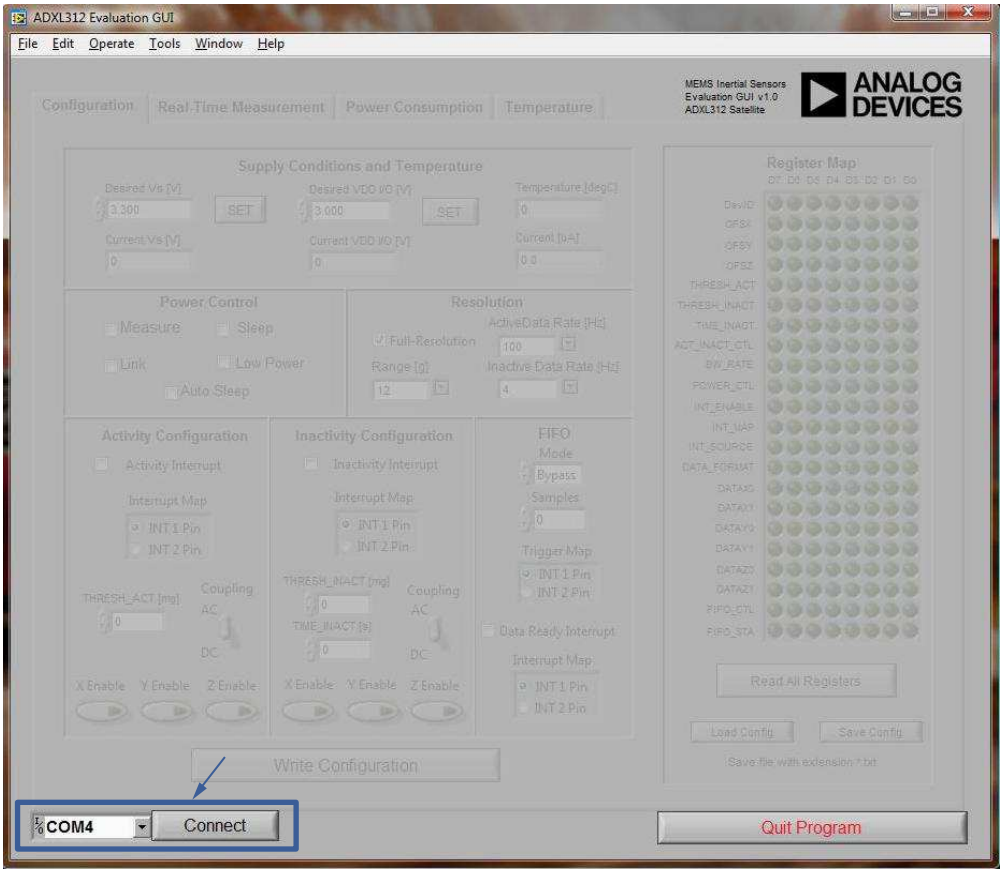

Figure 17. COM Port Selection

As part of the installation routine, a **Start** menu item is created that launches the **ADXL312 Evaluation GUI**. Click the executable, located at **Start** > **All Programs** > **Analog Devices – Inertial Sensor Eval** > **ADXL312 Evaluation Software** > **ADXL312 Eval**.

When opened, you will see the window shown in Figure 17. All functionality is disabled until the COM port selection is complete. From the drop-down menu, select the COM port assigned to the ISEB evaluation board. Refer to the COM Port Verification section for the procedure to verify the COM port assignment. Ensure that a reasonable COM port value (<10) has been assigned to the ISEB hardware. The software does not interact properly with excessively high COM port values.

CONFIGURATION TAB

The **Configuration** tab allows you to set the operating conditions for the ADXL312, as well as read/write the contents of the memory map. Figure 18 shows the **Configuration** tab after the COM port verification step has been completed. The default contents of the memory map can be seen at the right side of the screen. By default, every ADXL312 contains the memory map assignments shown in Table 1.

Table 1. Memory Map Initial Conditions

Register Name	Address	Contents
DevID	0x00	0xE5
BW_RATE	0x2C	0x0A
INT_SOURCE	0x30	0x02

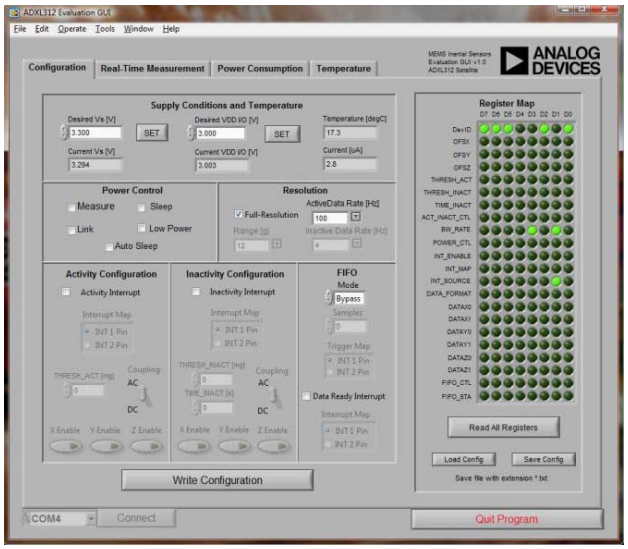

Figure 18. Configuration Panel Initial Conditions

The following actions are available in the **Configuration** panel:

- **SET** (**Vs**) sets the main supply voltage of the ADXL312. The default value is 3.3 V. When the **SET** button is clicked, the ISEB applies the desired supply voltage, and then reads back the voltage using an on-board voltage monitor. This value is displayed in the **Current Vs [V]** text box.
- **SET** (**VDD I/O**) sets the interface voltage of the ADXL312. The default value is 3.0 V. This voltage must be less than the supply voltage **Vs**. When the **SET** button is clicked, the ISEB applies the desired supply voltage, and then reads back the voltage using an on-board voltage monitor. This value is displayed in the **Current VDD I/O [V]** text box.
- Clicking the **Read All Registers** button performs a read back of the entire ADXL312 memory map. The memory map display is refreshed to reflect these contents.
- The memory map contents are changed by interacting with the various front panel controls on the **Configuration** tab. The **Activity Configuration**, **Inactivity Configuration**, **FIFO Mode**, **Resolution**, and more can all be adjusted with these controls. When the desired configuration is achieved, click the **Write Configuration** button to transfer these settings to the ADXL312 memory map. The memory map then refreshes to show the contents that were just written. See Figure 19 for an image of the **Configuration** tab once the **Write Configuration** button has been clicked. Note that the configuration settings from this panel are preloaded (as needed) into the rest of the GUI.

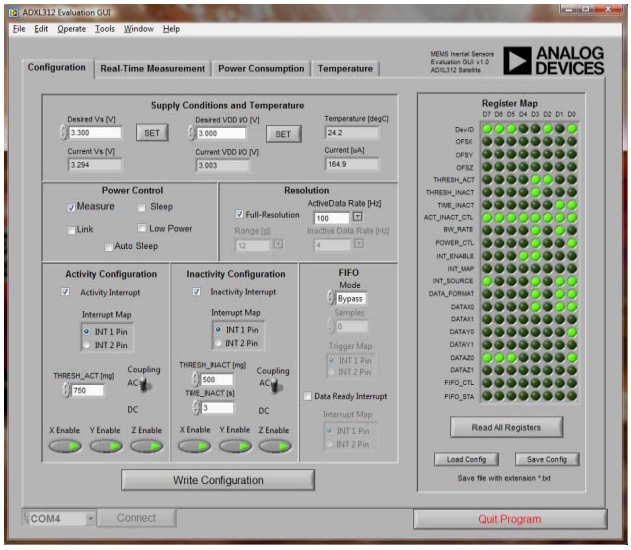

Figure 19. Configuration Panel with Sample Configuration

- Memory map settings can be saved to file for future use. Click **Save Config** to transfer the contents of the **Register Map** (the LED array at the right side of the **Configuration** tab) to file.
- By clicking **Load Config**, any previously saved **Register Map** configurations can be recalled and loaded onto an ADXL312. Performing this routine both refreshes the **Register Map** LED array and affects the values of the **Configuration** tab controls.

REAL-TIME MEASUREMENT TAB

The **Real-Time Measurement** tab is the primary tab for reading/recording data from the ADXL312. The necessary settings that were applied on the **Configuration** panel are carried over to this tab. This includes:

- **Data Rate [Hz]**
- **Range [g]**
- **Full-Resolution**
- **FIFO Mode**
  - Samples
  - Activity threshold

These parameters can also be adjusted as needed, without having to revert to the **Configuration** panel.

Figure 20. Real-Time Measurement Panel

The following functionality is available to the user within the **Real-Time Measurement** tab:

- When entering the **Real-Time Measurement** tab, the supply voltage settings are maintained from the **Configuration** tab. If these settings are adequate, then there is no need to adjust the supply voltage any further. The **Update Supply Voltages** functionality allows you to set the supply voltage in between measurements to observe how the device reacts to changes in supply.
- Data capture on the **Real-Time Measurement** panel is entirely interrupt driven, such that the evaluation GUI only obtains new acceleration data samples when the DATA_RDY interrupt is asserted. The ADXL312 clock, therefore, directly controls the data acquisition rate. Adjusting the **Data Rate [Hz]** value dynamically adjusts the data rate and bandwidth of the ADXL312.
- The device can be configured for 1.5 *g*, 3 *g*, 6 *g*, or 12 *g* operation by choosing a value in the **Range [g]** pull-down menu. If the **Full-Resolution** option is selected, the *g*-range defaults to 12 *g* (13-bit). This offers the equivalent resolution as 1.5 *g* (10-bit) but offers an extended range of operation.
- The **Full-Resolution** [Y/N] adjusts whether or not the **Full-Resolution** mode is enabled. It is recommended to enable this option because it provides the highest possible resolution, while also providing the widest dynamic range.
- **FIFO Mode** allows selection of **Bypass**, **FIFO**, **Stream**, or **Trigger** FIFO modes. Refer to the ADXL312 data sheet for a complete description of each mode.
- **FIFO Samples** select allows selection of the total number of FIFO samples that should be obtained. The behavior is slightly different depending upon the FIFO mode selected. Refer to the ADXL312 data sheet for a complete description of the FIFO samples functionality.
- The activity threshold (trigger mode only) sets the threshold for activity detection when in trigger mode (**THRESH_ACT**). Activity detection is configured for the x-and y-axes only, and is set to dc threshold detection. Refer to the ADXL312 data sheet for a complete description of ac vs. dc activity detection.
- Selecting **Save Data** streams the x-, y-, and z-axis acceleration data to file. When **Start Measurement** is clicked, data streams to the specified file indefinitely, regardless of the selected data rate. Data recording only stops when **Stop Measurement** is clicked.
- Click **Start Measurement** to begin streaming data from the ADXL312. The device is configured as shown in the **Configuration** section on the left side of the window. X-, y-, and z-axis acceleration data is retrieved from the device until **Stop Measurement** is clicked.
- The offset of each axis can be individually adjusted to remove, for example, the effects of the gravity vector from the x-, y-, and/or z-axis. These values can be adjusted between measurements. Click **Set Offset** to apply these settings.
- When **Start Measurement** is clicked, **Self Test** can be clicked to apply a self test force to the ADXL312 beam structure. This functionality is only compatible with data rates between 6.25 Hz and 200 Hz inclusive. The ADXL312 self test routine results in a dc shift to the output of the device, because the beam is physically displaced in a manner equivalent to externally applied acceleration.

REAL-TIME MEASUREMENT PANEL, COMMON USES

Here are some common use conditions that can be applied with the **Real-Time Measurement** tab of the ADXL312 evaluation system.

Apply Self Test

When **Start Measurement** is clicked, the self test functionality can be tested by clicking **Self Test**, which is located directly underneath the acceleration data graph (see Figure 21). Click **Self Test** once to activate the self test force, and click it a second time to deactivate the self test force. The settings in Table 2 are recommended when using the self test functionality.

Table 2. Recommended Settings for Self Test

Parameter	Setting
Data Rate [Hz]	6.25 ~ 200
Range [*g*]	12
Full-Resolution	On
FIFO Mode	Bypass
Set Offset	[0, 0, 0] → [X, Y, Z]

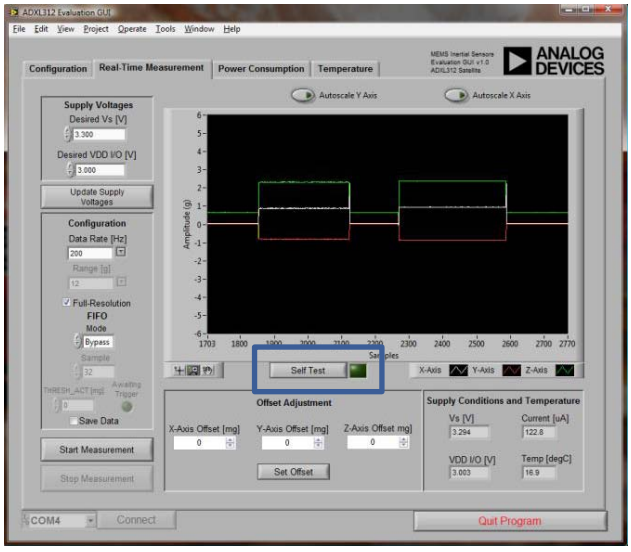

Figure 21. Self Test Toggle

Using Trigger Mode

Trigger mode is designed as follows. The FIFO is continuously filled with acceleration data. As new samples are populated into the FIFO, older samples are pushed out. This is similar to the stream mode of operation. However, when the activity interrupt is asserted, the behavior of the FIFO changes. The FIFO retains the N most recent FIFO samples leading up to the trigger event. Then, the device acquires 32 – N additional samples after the trigger event occurs. The FIFO then stops acquiring new data. The value of N can be adjusted by selecting a value from the **Sample** pull-down menu. In this way, a moment of impact can be captured in the data FIFO for retrieval later.

To properly use the trigger **FIFO** mode, the configuration in Table 3 is recommended.

Table 3. Recommended Settings for FIFO Trigger Mode

Parameter	Setting
Data Rate [Hz]	50 ~ 3200
Range [*g*]	12
Full-Resolution	On
FIFO Mode	Trigger
Samples	8
THRESH_ACT [m*g*]	5000
Set Offset	[0, 0, 0] → [X, Y, Z]

When these settings are established, click **Start Measurement**. The GUI then waits for the trigger event to occur. If the trigger event does not occur within ~10 seconds, the operation times out, and the process must be repeated. When the trigger event occurs, the 32 FIFO samples are plotted, and the measurement stops.

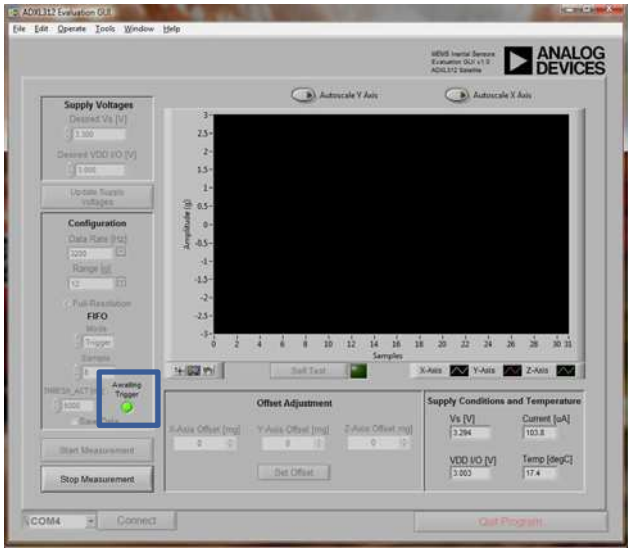

Figure 22. Awaiting Trigger Event

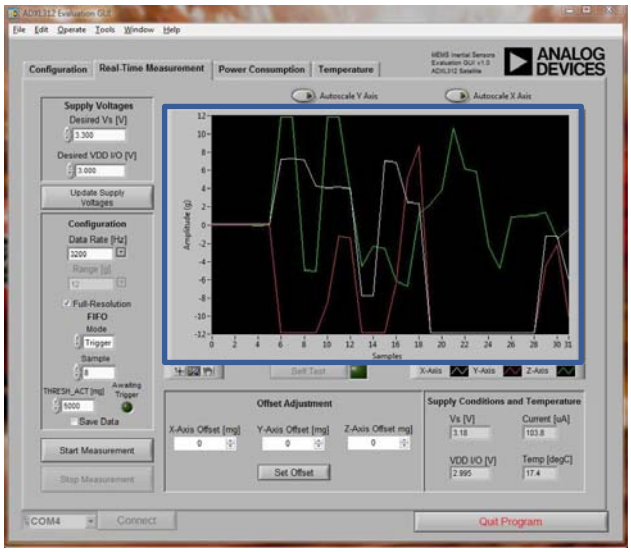

Figure 23. Trigger Data

Observing FIFO Operation

The ADXL312 has an innovative 32-level FIFO that can be used to temporarily store data. After the FIFO has filled, the microcontroller can then perform a burst read of the FIFO data. This style of implementation can result in large system power savings, because the microcontroller can be deactivated until it receives an interrupt command from the ADXL312 device. To witness the FIFO operation, the settings in Table 4 are recommended.

Table 4. Recommended Settings for FIFO Operation

Parameter	Setting
Data Rate [Hz]	50 ~ 100
Range [*g*]	12
Full-Resolution	On
FIFO Mode	FIFO
Samples	32
Set Offset	[0, 0, 0] → [X, Y, Z]

The FIFO can be used at any data rate; however, 50 Hz ~ 100 Hz is recommended because its operation can be observed visually.

When **Start Measurement** is clicked, the evaluation GUI begins retrieving acceleration data from the device. However, data is only retrieved when the FIFO has filled to contain 32 samples. At this point, all 32 levels of the FIFO is read, and the entirety of its contents is updated on the acceleration data graph.

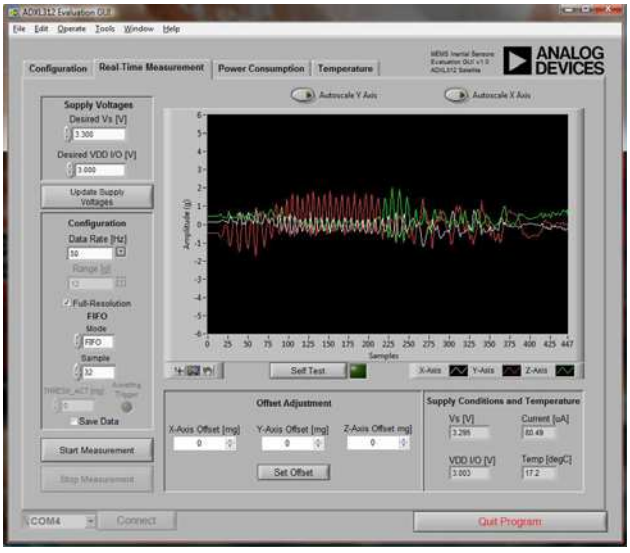

Figure 24. FIFO Operation

POWER CONSUMPTION TAB

When used properly, the ADXL312 offers extremely low system level power consumption. The innovative **Auto Sleep** functionality allows the device to sleep and wake up based on externally applied acceleration. Additionally, a low power mode provides normal operation at a reduced level of current consumption, with only a slight increase to the rms noise. As with the **Real-Time Measurement** tab, the necessary configuration settings are imported from the **Configuration** tab.

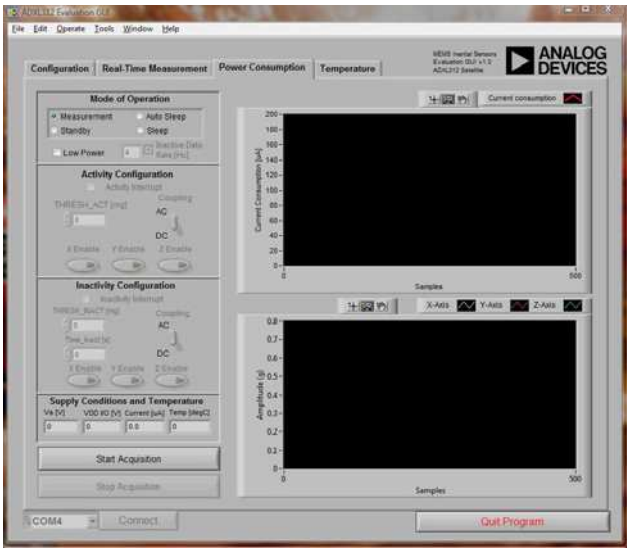

Figure 25. Power Consumption Panel

The following functionality is available to you within the **Power Consumption** tab:

- The **Mode of Operation** options allow you to configure the device for **Measurement**, **Auto Sleep**, **Standby**, or **Sleep**. Each of these options corresponds to different device behaviors and different power consumption levels.
- **Low Power** allows you to toggle **Low Power** mode. **Low Power** mode can be applied in addition to any of the **Modes of Operation** previously described.
- The **Inactive Data Rate [Hz]** drop-down menu controls the data rate that is used when the device is in sleep mode. This selection is compatible with both **Sleep** and **Auto Sleep** modes of operation.
- The **Activity Interrupt Configuration** options are enabled when **Auto Sleep** mode is selected. The **Activity Interrupt Configuration** options adjust the settings that determine what level of activity is required to wake the device from **Sleep** mode. When in **Auto Sleep** mode, activity can only be detected after inactivity.
- The **Inactivity Interrupt Configuration** options are enabled when **Auto Sleep** mode is selected. The **Inactivity Interrupt Configuration** options adjust the settings that control what level of inactivity is required to put the device into **Sleep** mode. When in **Auto Sleep** mode, inactivity can only be detected after activity.

POWER CONSUMPTION TAB, COMMON USES

Here are some **Power Consumption** common use conditions that can be applied with the ADXL312 evaluation system.

Auto Sleep Behavior

To observe the behavior of the device when in **Auto Sleep** mode, the settings in Table 5 can be applied (see Figure 26).

Table 5. Recommended Settings for Auto Sleep Operation

Parameter	Setting
Mode of Operation	Auto Sleep
Low Power	Off
Inactive Data Rate [Hz]	4
Activity Configuration	
Activity Interrupt	On
THRESH_ACT [m*g*]	750
Coupling	AC
X Enable	On
Y Enable	On
Z Enable	On
Inactivity Configuration	
Inactivity Interrupt	On
THRESH_INACT [m*g*]	750
Time_Inact [s]	3
Coupling	AC
X Enable	On
Y Enable	On
Z Enable	On

When the settings are applied, click **Start Acquisition**.

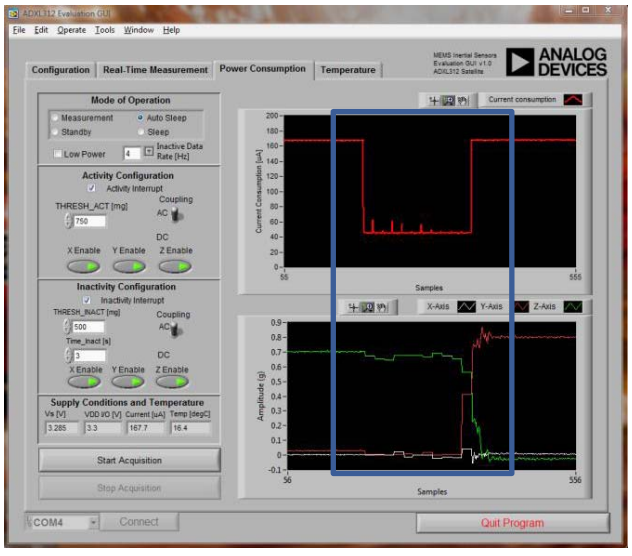

Figure 26. Auto Sleep Operation

Next, follow these steps to observe the auto sleep behavior:

1. Doing nothing for >3 seconds causes the inactivity interrupt to assert, sending the device into sleep mode.
   a. During sleep mode, the device data rate is reduced. The acceleration data appears different from when the part is awake.
2. Turn the satellite board onto its side.
   a. This redirects the gravity vector to another axis, trips the activity interrupt, and returns the device to measurement mode.

Observing Low Power Behavior

To observe the behavior of the device in low power mode, as opposed to measurement mode, the following procedure can be performed:

1. Select **Measurement** in the **Mode of Operation** section.
2. Click **Start Acquisition**.
3. Allow the acceleration/current consumption graphs to fill with information.
4. Click **Stop Acquisition**.
5. Select **Low Power**.
6. Click **Start Acquisition**.

This process results in a step change to the current consumption of the ADXL312 and is reflected in the waveform graphs. Additionally, the acceleration/current graphs are designed to update synchronously, allowing you to observe any changes to the acceleration data behavior as a result of enabling low power mode. Figure 27 illustrates both the decrease in current consumption and the slight increase to the rms noise of the acceleration data.

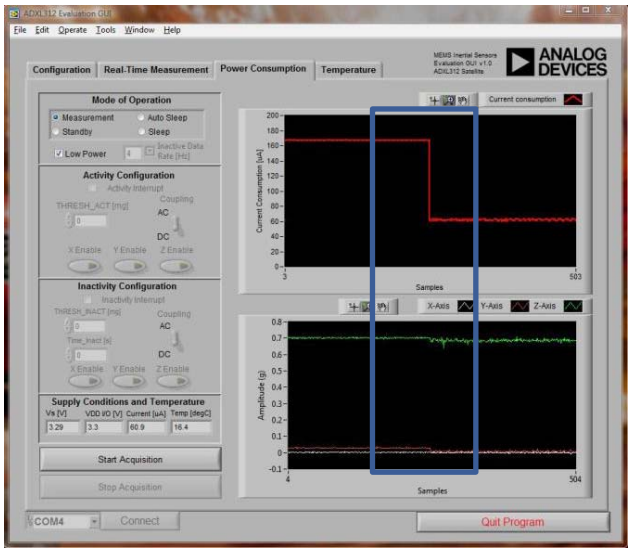

Figure 27. Low Power Operation

TEMPERATURE TAB

The **Temperature** tab is designed to facilitate temperature testing of the ADXL312. This panel can be used to easily determine the device offset stability with respect to temperature. An ADT7301 temperature sensor is included on the satellite board for accurate temperature measurement of the environment near the ADXL312 device.

For this tab, the ADXL312 data rate is fixed to 100 Hz, with the effective data rate observed by the user determined by the **Number of Samples** box. The default number of samples is set to 100, resulting in an effective data rate of 1 Hz, and an effective bandwidth of 0.5 Hz. Low data rates are desirable for temperature testing because offset stability vs. temperature is a predominantly dc behavior.

Figure 28. Temperature Test Panel

To avoid measurement error, the following precautions should be used:

- The temperature sweep ramp rate should be kept low (<2°C/minute) to avoid false temperature hysteresis.
  - The physical separation of the ADT7301 and the ADXL312 results in a temperature differential, because each device takes longer to reach equilibrium with the temperature of the environmental chamber. Reducing the temperature ramp rate helps to minimize this effect.
- Ensure that the device remains stable during the temperature sweep.
  - Any motion induced during the temperature sweep results in erroneous data samples.

TROUBLESHOOTING TIPS

The following tips are helpful for ensuring proper operation of the ISEB evaluation system, as well as recovery from any potential software/hardware errors.

- Connect the ISEB to the PC in this order:
  1. Connect the satellite board to the main board (ribbon cable)
  2. Connect the main board to the PC (USB cable)
  3. Start the evaluation GUI on the PC by clicking: **Start** > **All Programs** > **Analog Devices – Inertial Sensor Eval** >**ADXL312 Evaluation Software** > **ADXL312 Eval**.
- Make sure that the proper firmware is loaded onto the microcontroller (the software may appear to freeze if this step has not been completed). **ADXL312 - Firmware.hex** is required for proper operation of this evaluation system.
- Only press the reset button (SW2) when new firmware is being flashed onto the microcontroller. There is no other intended use for this button.
- Ensure that a low COM port number (<10) has been assigned to the ISEB. The software does not properly recognize excessively high COM port values.
- To properly reset the evaluation system, take the following steps:
  1. Exit the ADXL312 evaluation software.
  2. Disconnect the ISEB (unplug the USB cable from the PC).
  3. Reconnect the ISEB.
  4. Restart the ADXL312 evaluation software.
- Ensure that the satellite board jumpers are in their proper configuration. Refer to the Hardware Configuration section for more details.

HEADER PINOUT

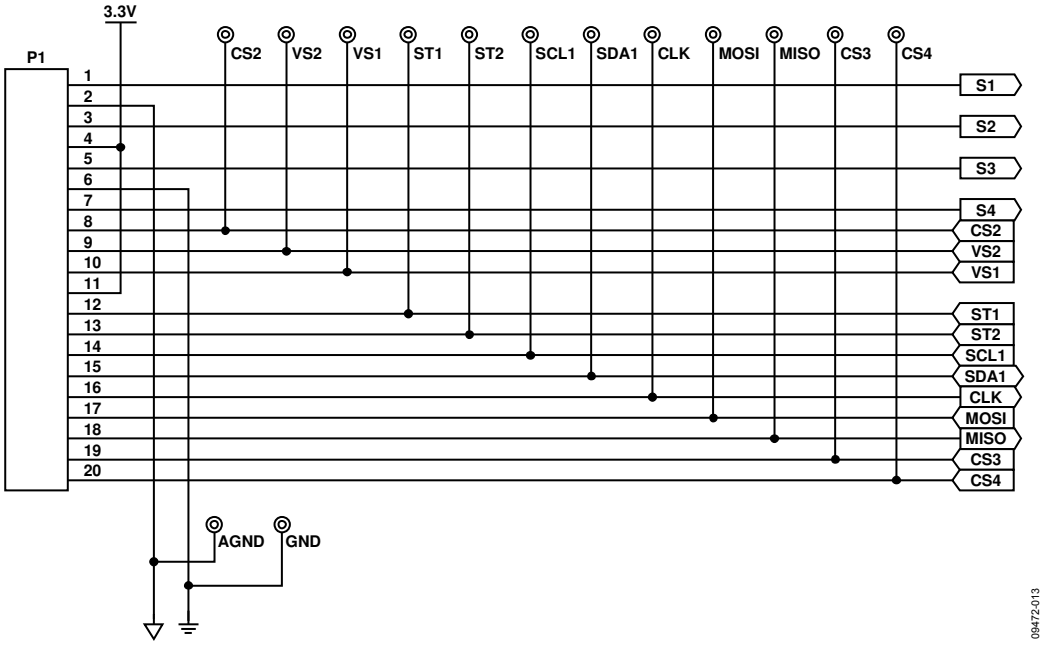

Figure 29. ISEB 20-Pin Header Pinout

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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