

Evaluating the ADXL362 Digital Accelerometer

FEATURES

- Flexible inertial sensor evaluation platform
 - Single main board operates with interchangeable satellite boards
- Separates DUT from controller for accurate environmental testing
- Continuous stream to file data recording
- Standard USB cable for power and communications
- PC-based graphical user interface (GUI)
- Fast, easy installation

ONLINE RESOURCES

Evaluation Kit Contents

- [EVAL-ADXL362Z-MLP](#)

- An USB A to Mini-B cable

- An 18-inch, 20-pin ribbon cable

Documents Needed

- [ADXL362](#) datasheet

Required Software

- [ADXL362 Evaluation GUI](#)

Design and Integration Files

- [Schematics, layout files, bill of materials](#)

EQUIPMENT NEEDED

- PC running Windows

- USB 2.0 port

GENERAL DESCRIPTION

The iMEMS® ADXL362 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 an USB cable, with the USB connection providing both communications and power 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 separately placed into an environmental chamber for temperature or humidity testing. Separating the boards mitigates corruption of data due to the temperature and humidity effects of other components.

The ISEB is an universal main board and is intended to be used with various satellites of Analog Devices inertial sensors, including analog and digital accelerometers, as well as 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. Since the power consumption of ADXL362 is too low compared with other accelerometers, we have to use different shunt resistor to detect its power consumption, the difference between –M and –MLP is just the circuits for detecting the power consumption of the accelerometer.

The EVAL-ADXL362Z-MLP system contains the ISEB and the EVAL-ADXL362Z-S satellite. Also included is an 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.

TYPICAL SETUP



Figure 1. EVAL-ADXL362Z-MLP Evaluation System



Evaluation Board User Guide

EVAL-ADXL362Z-MLP

One Technology Way • P.O. Box 9106 • Norwood, MA 02062-9106, U.S.A. • Tel: 781.329.4700 • Fax: 781.461.3113 •
www.analog.com

Evaluating the ADXL362 Digital Accelerometer

TABLE OF CONTENTS

Features	1	Evaluation Board Circuitry	7
Online Resources	1	Accelerometer	7
Equipment Needed	1	Microcontroller	7
General Description.....	1	How to Use the Software for Testing	8
Revision History.....	2	Getting Started.....	8
Getting Started.....	3	Real Time Data Tab.....	8
Software Installation Procedures	3	Temperature Tab.....	10
Evaluation Board Setup Procedures	6	Configuration Tab.....	10
Evaluation Board Hardware	6	Inclinometer Tab.....	11
Power Supplies.....	7		
Jumper Settings	7		

REVISION HISTORY

9/12—Revision 0: Initial Version

GETTING STARTED

This section provides quick start procedures for using **EVAL-ADXL362Z-M** board. Both the default and optional settings are described. The steps below should be followed to successfully set up and run the ADXL362 evaluation system:

1. Install the USB drivers for the inertial sensor evaluation system (ISEB).
2. Connect the ISEB hardware to the PC.
3. Install the latest firmware revision into the ISEB hardware (included on the ADI website). This step is unnecessary for most cases since the default firmware can match the default GUI. If you had ever reprogrammed the MCU for other applications or the firmware / GUI is updated by ADI, you need to download the corresponding firmware for evaluating ADXL362. The firmware and GUI installer on website are always match with each other.
4. Install run time engine and the ADXL362 evaluation GUI.
5. Configure the ISEB hardware.
6. Launch the ADXL362 evaluation GUI and test devices.

SOFTWARE INSTALLATION PROCEDURES

Install USB Drivers

To install the USB drivers, follow these steps:

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

After the above steps are complete, you can 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, you may need to select the drivers manually, as follows:

1. Connect the USB A to Mini-B cable to the PC and then to the ISEB. The satellite board does not need to be connected for this step. New hardware is detected upon completion of this step.
2. If prompted to install drivers again, click **Install from a list or specific location (Advanced)** (see Figure 2); then click **Next**.

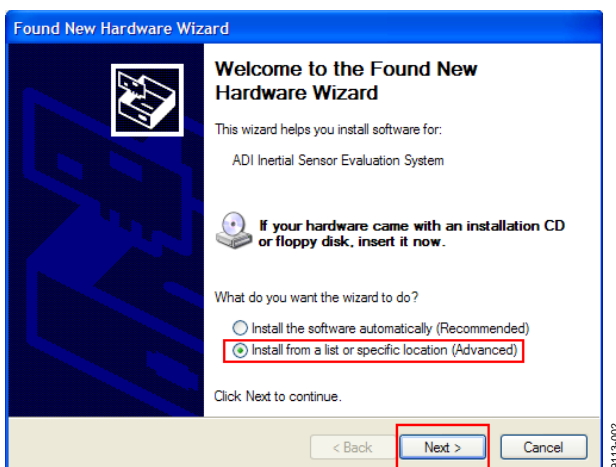


Figure 2. Found New Hardware Prompt

3. Select **Don't search. I will choose the driver to install** (see Figure 3), and click **Next**.
4. Select **ADI Inertial Sensor Evaluation System** from the model list (see Figure 4), and click **Next** to complete the process.

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.

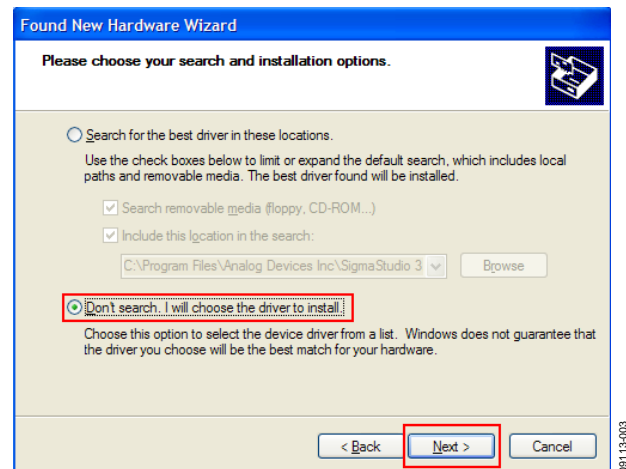


Figure 3. Selection of the Driver to Install

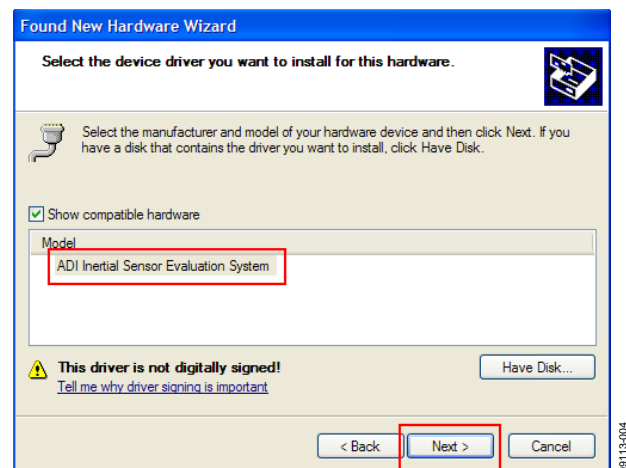


Figure 4. Selection of the ADI Inertial Sensor Evaluation System Drivers

Com Port Verification

Installing the latest firmware revision, as well as operating the ADXL362 evaluation GUI, requires that you know the communications port that is assigned to the ISEB main board. With the ISEB main board connected to the PC, you should perform the following steps to determine the assigned COM port number.

1. From the **Start** menu, right click **My Computer** and select **Properties**.

- Click the **Hardware** tab of the **System Properties** window, as shown in Figure 5.
- Select **Device Manager**, expand the **Ports (COM & LPT)** menu item as shown in Figure 6. **ADI Inertial Sensor Evaluation System** should be listed with an assigned COM port number in parenthesis.
- Note the COM port number for future use.

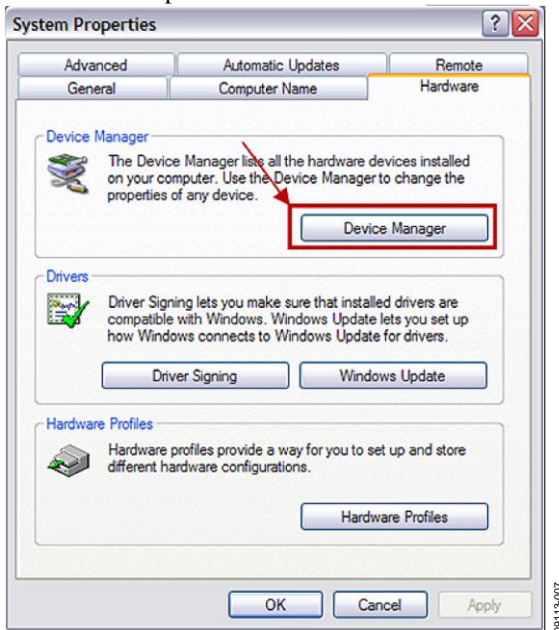


Figure 5. System Properties

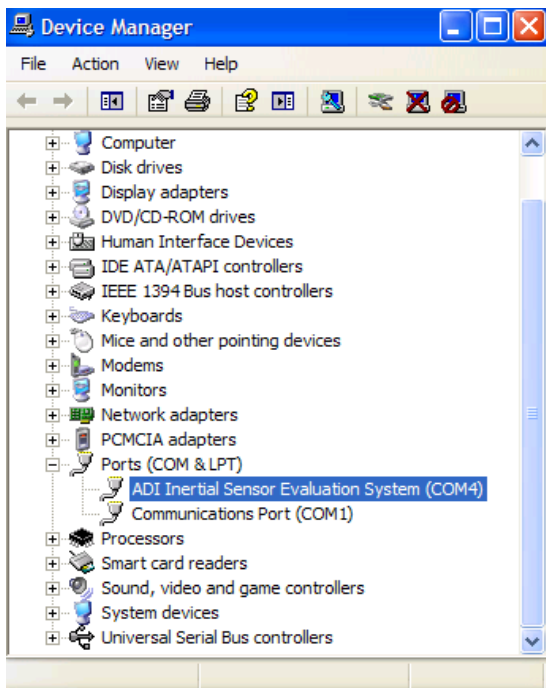


Figure 6. Device Manager Showing the COM Port Number

Installing the Latest ISEB Firmware

The latest ISEB firmware is included on the website. To successfully use the ISEB evaluation hardware, this firmware should be flashed to the ISEB controller. ADI website contains

the firmware itself and the utility that allows you to flash a new version of the firmware onto the ISEB microcontroller. In addition, as new firmware is made available, it can be downloaded from the Analog Devices FTP (ftp://ftp.analog.com/pub/iMEMS_Sensor_Eval/).

To flash the ISEB microcontroller, follow these steps:

- Ensure that the ISEB is connected to and detected by the PC. The COM port on which the device is recognized should also be obtained, as mentioned in the Com Port Verification section.
- Run the **ARMWSD.exe** program (it can be downloaded from the ftp://ftp.analog.com/pub/iMEMS_Sensor_Eval/), it displays information about the downloader, as shown in Figure 7.

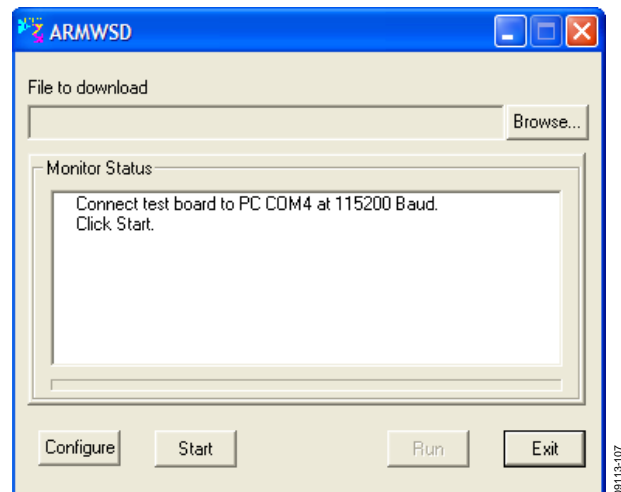


Figure 7. ISEB ARMWSD Firmware Downloader

- Click **Browse...** and select the **ADI_ISEB_FW_XL362.hex** file.
- Click **Configure** to display the box shown in Figure 8.

The downloader file should be configured for the **ADuC7026** microcontroller on the ISEB. This can be selected in the **Parts** tab. The other option you may need to change is the COM port. You can select the correct port from the **Serial Port** menu on the **Comms** tab (see Figure 8). If you cannot download the .hex file correctly, please try to make the **Baudrate** lower and retry. "Program" and "Verify" and suggested to check at the same time in **Commands** tab.

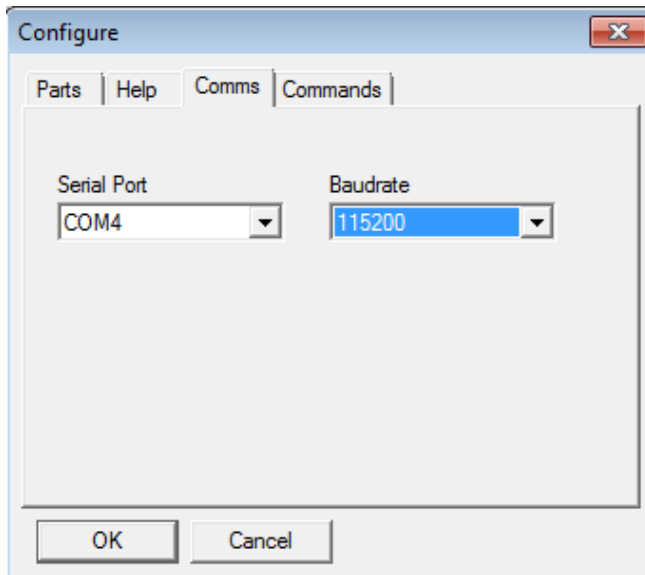


Figure 8. Selecting the Correct COM Port for the Downloader

When the COM port is selected, click **OK** to accept the changes and go back to the ARMWSD box (shown in Figure 7).

When the ISEB is connected, the correct firmware is selected, and the downloader is fully configured, follow these steps to flash the firmware:

1. Click **Start** in the ARMWSD box (see Figure 7) to initiate the flashing process. After clicking **Start**, click the two buttons (shown in Figure 9) on the ISEB in the following order to flash the firmware:

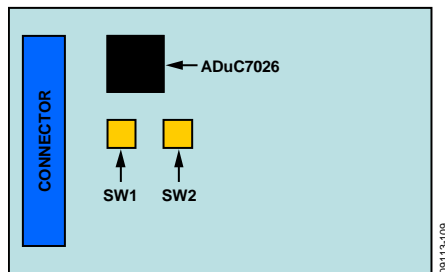
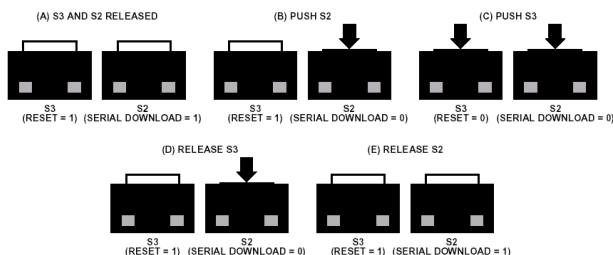


Figure 9. ISEB Switch Locations for Flashing the Microcontroller

- a. Press and hold down **SW1** (Serial Download).
- b. With **SW1** held down, press and release **SW2** (Reset).
- c. Release **SW1**.



The download begins and is automatically verified by the downloader.

2. If the downloading process fails, which is indicated in the **Monitor Status** box (see Figure 7), attempt the download

again by clicking **Start** and then pressing the appropriate switch combination. It may take a few attempts to reprogram the board successfully.

3. After the download has completed successfully, click **Run** (as shown in Figure 7) to reset the ISEB and to begin running the new firmware. When this step is complete, the board is updated correctly.

Updating the firmware may require that a new evaluation GUI be obtained. If the firmware on the website is used to flash the ISEB, the evaluation GUI on the corresponding website is sufficient. If the firmware used is obtained from the Analog Devices website, the most recent version of the evaluation GUI, which is also located on the website, should be used.

Installing the ADXL362 Software Evaluation GUI

The software GUI installation did not include National Instruments drivers and run-time engines that are necessary for proper operation. If there is no such run-time engines in your computer, please also install it before installing the ADXL362 software evaluation GUI. The run-time engine installer can be found in the **/Run Time Engine/** folder on the ADI website. To run the software GUI installation routine, double-click the **setup.exe** file located in the **/ADXL362 Evaluation Software/** folder on the website. The window shown in Figure 10 is displayed.

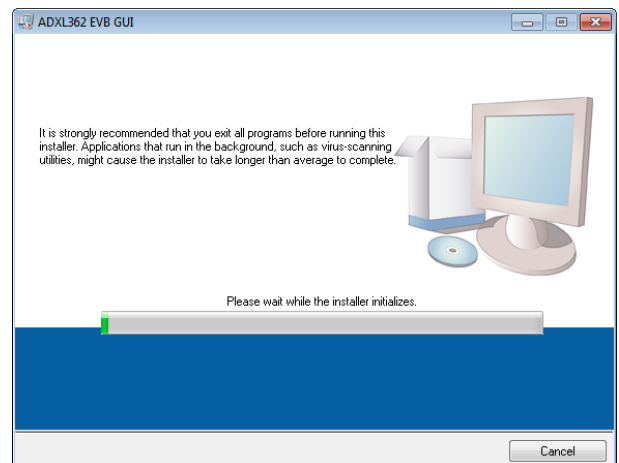


Figure 10. ADXL362 Evaluation Software Installation Welcome

From this point, complete the following steps to install the evaluation software:

1. Select the destination directory. The installer autopopulates the names of the directories in which to store the software GUI and required National Instruments products (see Figure 11). You can change these directories; however, most installations can proceed with the default values.
2. When you finish selecting a directory, click **Next**. The National Instruments Software License Agreement is displayed.
3. Read the license agreement before accepting it; then, click **Next**. The installer lists the required components to install on your PC (see Figure 12).
4. To start the installation, click **Next**. The installer completes installation of the software evaluation GUI and all required National Instruments drivers and run-time engines. After

the installation is complete, the box shown in Figure 13 is displayed.

5. Click **Finish** to complete the installation.

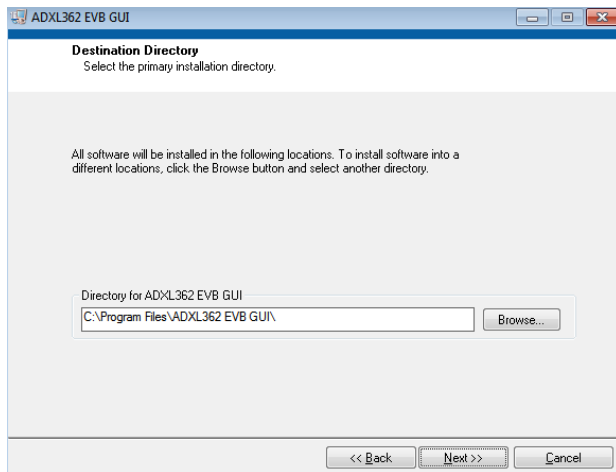


Figure 11. ADXL362 EVB GUI Destination Directory Selection

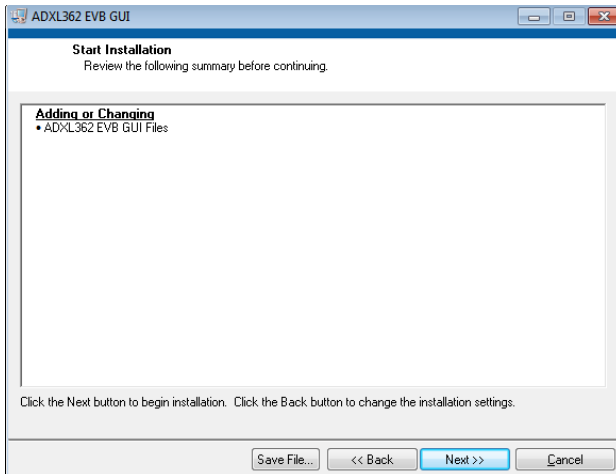


Figure 12. ADXL362 EVB GUI Start Installation (Listing Varies Based on PC Requirements)

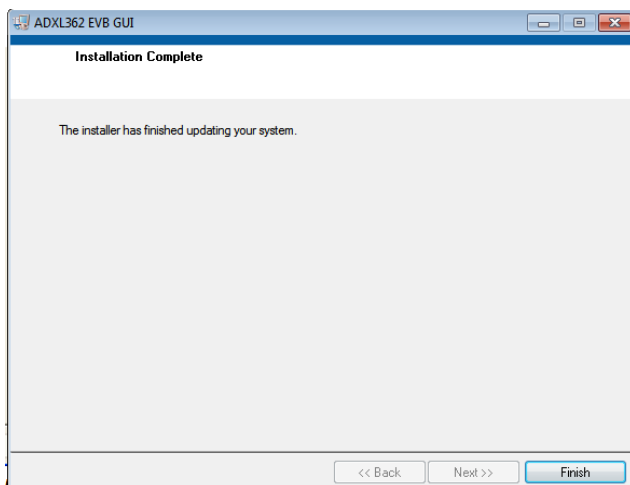


Figure 13. ADXL362 EVB GUI Installation Complete

EVALUATION BOARD SETUP PROCEDURES

Before using the software for testing, configure the evaluation board as follows:

1. Place the ADXL362 accelerometer into the socket on the satellite board. The Socket Pin 1 Indicator is located inside the socket close to the hinge, as shown in Figure 14. This pin indicator should match up with the Pin 1 Indicator on the ADXL362.

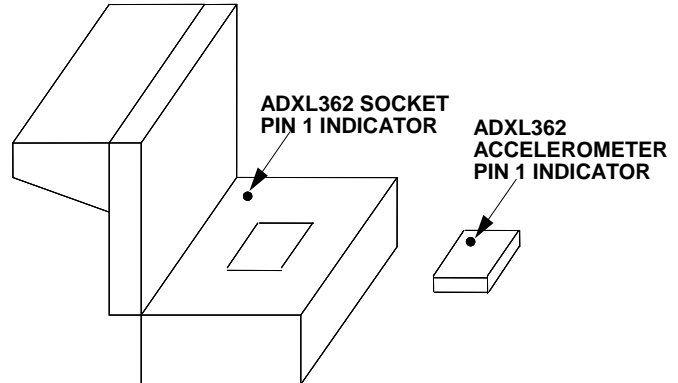


Figure 14. Location of Pin 1 Indicators for the ADXL362 Accelerometer and Socket

2. After positioning the ADXL362 in the socket, firmly close the socket until it latches.
3. Connect the ISEB to the ADXL362 satellite using the 18-inch, 20-pin ribbon cable. This cable is keyed to prevent inserting it backwards and causing damage to the system.
4. Connect the ADXL362 satellite to the opposite end of the ribbon cable.
5. Connect the ISEB to the USB cable.
6. Plug the USB A to Mini-B cable into the PC, if prompted to install the device, see the Install USB Drivers section for details on how to install and select the correct driver.

The ADXL362 evaluation system should now be set up and ready to use.

EVALUATION BOARD HARDWARE

The EVAL-ADXL362Z-MLP provides all of the support circuitry required to operate the ADXL362 in its various modes of configurations. Figure 1 shows typical bench characterization setup used to evaluate the EVAL-ADXL362Z-MLP.

Firstly, the EVAL-ADXL362Z-MLP could be used to study and evaluate ADXL362. User can view and save the real time output of ADXL362 on PC for algorithm developing; check the power consumption of ADXL362 under different work mode; view and save ADXL362 temperature drift data; change the power supply and check the ADXL362 performance under different power supply.

Secondly, the EVAL-ADXL362Z-MLP could be used to do secondary development by user. You can realize different reference design based on it, just like the inclinometer demo that we offered based on it.

POWER SUPPLIES

All kinds of EVAL-ADXL362Z-MLP functions can be supported by USB directly, no other power supply needed to run the board. There are on board DC-DC, LDO and Voltage References to adjust the supply for each part on the evaluation board.

JUMPER SETTINGS

Set the jumper settings/link options on the evaluation board for the required operating modes before powering on the board. The functions of the jumpers are described in Table 1.

Table 1. Jumper Settings

Jumper	Description
P1	Interface for connecting mother board and satellite board.
J1	Interface for sync trigger input. For applications that require a precisely timed acceleration measurement, the ADXL362 features an option to synchronize acceleration sampling to an external trigger. To evaluate this function, customers need to offer external trigger signal and reprogram the ADXL362 by themselves.
J2	Interface for external clock input. ADXL362 has a built-in clock that, by default, is used for clocked internal operations. To use an external clock, customers need to offer external clock and reprogram the ADXL362 by themselves.
JP1	This jumper is used to control whether showing the INT2 pin status of ADXL362 with LED.
JP2	This jumper is used to control whether showing the INT1 pin status of ADXL362 with LED.

EVALUATION BOARD CIRCUITRY

This section describes the key parts on the development board.

ACCELEROMETER

The ADXL362 is an ultralow power, 3-axis MEMS accelerometer that consumes less than 2uA at a 100Hz output data rate and 270nA when in motion triggered wake-up mode. Unlike accelerometers that use power duty cycling to achieve low power consumption, the ADXL362 does not alias input signals by undersampling; it samples the full bandwidth of the sensor at all data rates.

MICROCONTROLLER

The microcontroller on EVAL-ADXL362Z-MLP is [ADUC7026](http://www.analog.com/en/processors-dsp/analog-microcontrollers/ADUC7026/products/dt-software-configurable-products/MicroConverter_Development_Tools/resources/fca.html). It is fully integrated, 1MSPS, 12-bit data acquisition systems incorporating high performance twelve channel ADCs, 32-bit MCU, and Flash/EE memory on a single chip. There are also four channel 12-bit voltage output DAC on ADUC7026 which are used to control the power supply of ADXL362. The development tools, like ARMWSD serial downloader, evaluation version IAR, evaluation version Keil etc., are available online and they can be found from the address: http://www.analog.com/en/processors-dsp/analog-microcontrollers/ADUC7026/products/dt-software-configurable-products/MicroConverter_Development_Tools/resources/fca.html.

HOW TO USE THE SOFTWARE FOR TESTING GETTING STARTED

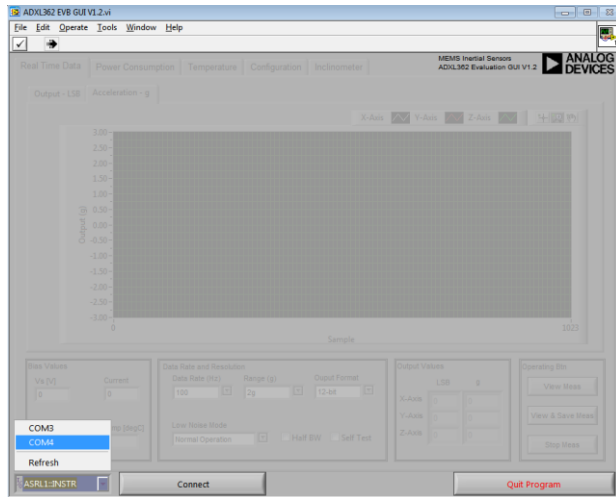


Figure 15. ADXL362 Evaluation GUI Startup

Before running the software evaluation GUI, it is a good idea to reset the ISEB by pressing the SW2 button described in the Installing the Latest ISEB Firmware section. This removes any errors that may be lingering due to an improper shutdown or disconnection from the PC.

After completion of the software GUI installation routine, a shortcut to launch the executable is added to the **Program Menu->Analog Devices – Inertial Sensor Eval**. To launch the evaluation GUI, click **ADXL362 EVB GUI**. A window similar to the one shown in Figure 15 is displayed.

At this point, the functionality of the GUI is completely deactivated. Before testing any devices, you must associate the software GUI with the previously installed hardware through the COM port. See **PC Device Manager** under the **Ports (COM & LTP)** submenu to determine which COM port is assigned to the Analog Devices inertial sensor evaluation system. Select this COM port from the drop-down menu, and click **Connect** to begin using the GUI.

After the COM port is connected, the full functionality of the software evaluation GUI is available for you to use. The following sections describe the purpose of each tab of the GUI. You can exit the GUI at any time by clicking **Quit Program** located in the lower right of the startup window.

Note that you should not press the reset button (SW2) while the GUI is running. This causes the ISEB and the software GUI to lose sync and also causes the evaluation system to no longer function properly. Additionally, if for any reason the ISEB board and the software evaluation GUI do not appear to be properly communicating, you should perform the following reset routine:

1. Close the software GUI by clicking the **Quit Program** or by selecting **File/Exit**.
2. When the software GUI is closed, reset the ISEB evaluation board by pressing the reset button (SW2).
3. Restart the software GUI.

REAL TIME DATA TAB

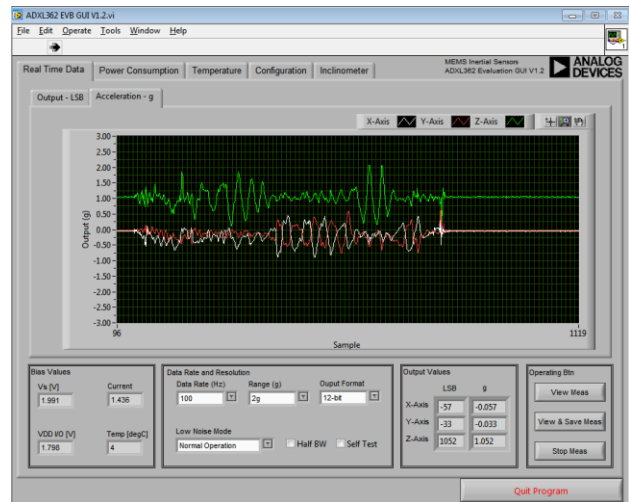


Figure 16. Real Time Data Tab

The **Real Time Data** tab configures the inertial sensor evaluation system and the ADXL362 for real-time acceleration monitoring. The tab contains an oscilloscope-like interface that you can use to view the output of the accelerometer and adjust the relevant parameters, such as data rate (bandwidth), range, and offset (see Figure 16).

The **Self Test** checkbox toggles the self-test bit of the ADXL362. When self-test is activated, the sensor beam is deflected. The electronics detect this by means of a shift in all three axes. The **Half BW** checkbox toggles the HALF_BW bit of the ADXL362. When halved bandwidth is activated, the bandwidth of the antialiasing filters is set to ¼ the output data rate for more conservative filtering.

The temperature shown in the GUI is tested with the ADXL362 built in temperature sensor. This temperature sensor is used to monitor the chip internal temperature variation but not absolute temperature. To use this temperature sensor to monitor absolute temperature, it is recommended that its initial bias is measured and calibrated.

After configuration, you can begin real-time measurement by clicking the **View Meas**. This causes many of the options and tabs to be grayed out or to disappear, to prevent software conflicts, until the **Stop Meas** button is clicked. The accelerometer output data then begins to flow across the screen at the selected output data rate.

Clicking **View & Save Meas** performs the same basic function as **View Meas**; however, it allows you to continuously stream the data to eleven .txt file. This is useful for recording the response of the part even during long term events. The first .txt file is named and located by user, the other ten .txt files are named based on the first .txt file and located in the same folder.

Eg: If user named XL362Test.txt in pop-up dialog box and saved it on desktop, then other ten .txt files which named XL362Test_1.txt, XL362Test_2.txt, ... XL362Test_10.txt will be built automatically on desktop. Once XL362Test.txt saved 64K samples, the following data will be saved in XL362Test_1.txt, the rest can be deduced by analogy. When go

to the last file XL362Test_10.txt, the data will be saved continuously even its size is bigger than 64K samples. If user just test the sensor in short time and the samples smaller than 64K, then the files without any data saved will be deleted automatically when **Stop Meas** button is clicked.

Each .txt file created contains a header with the date and time. X, Y, Z axes acceleration data, in gravity, are aligned in tab-delimited columns.

POWER CONSUMPTION TAB

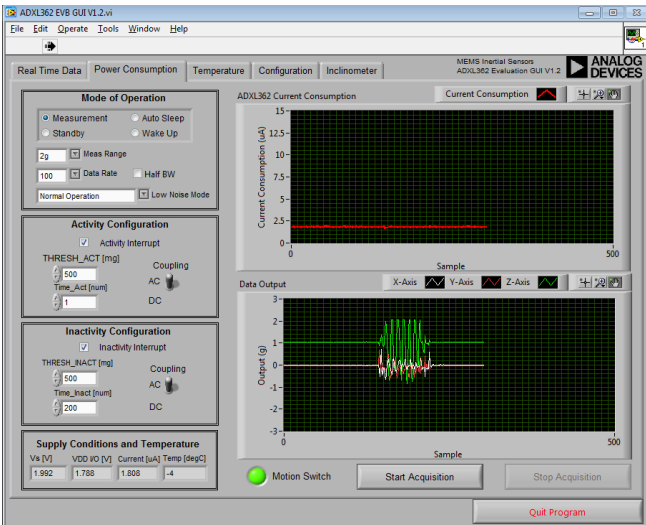


Figure 17. Power Consumption Tab

When used properly, the ADXL362 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, ADXL362 provides two lower noise operating modes at the expense of only a small increase in current consumption.

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

The **Mode of Operation** allows you to configure the device for Measurement, Auto Sleep, Standby, or Wake Up mode. Each of these options corresponds to different device behaviors and different power consumption levels.

The **Activity Configuration** options are enabled when Measurement and 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. When the accelerometer is in Auto Sleep mode, the TIME_ACT value is ignored and activity is detected based on a single acceleration sample.

The **Inactivity Configuration** options are enabled when Auto Sleep mode is selected. The Inactivity Interrupt Configuration options adjust the settings that control what level of inactivity and how long 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 ADXL362 evaluation system.

Auto Sleep Behavior

To observe the behavior of the device when in Auto Sleep mode, the setting in Table 2 can be applied (see Figure 18).

Table 2. Recommended Settings for Auto Sleep Operation

Parameter	Setting
Mode of Operation	Auto Sleep
Meas Range	8g
Data Rate	100
Half BW	Off
Low Noise Mode	Normal Operation
Activity Configuration	
Activity Interrupt	On
THRESH_ACT [mg]	500
Time_Act [num]	1
Coupling	AC
Inactivity Configuration	
Inactivity Interrupt	On
THRESH_INACT [mg]	500
Time_Inact [num]	200
Coupling	AC

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

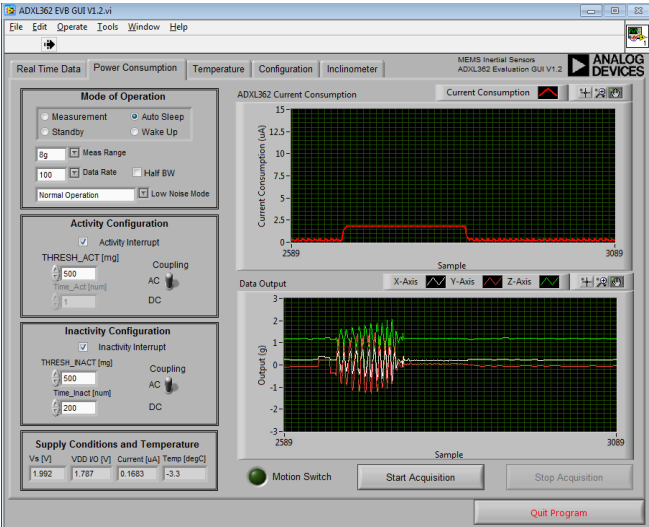


Figure 18. Auto Sleep Operation

You can find that if you shake or turn the satellite board, to make the acceleration variation on any axis > 500mg, that will trigger the activity interrupt, and make the device to measurement mode.

If you do nothing with the satellite board for >2 seconds, that will cause the inactivity interrupt to assert, sending the device into sleep mode. During sleep mode, the device data rate is reduced. The acceleration data appears different from when the part is awake.

TEMPERATURE TAB

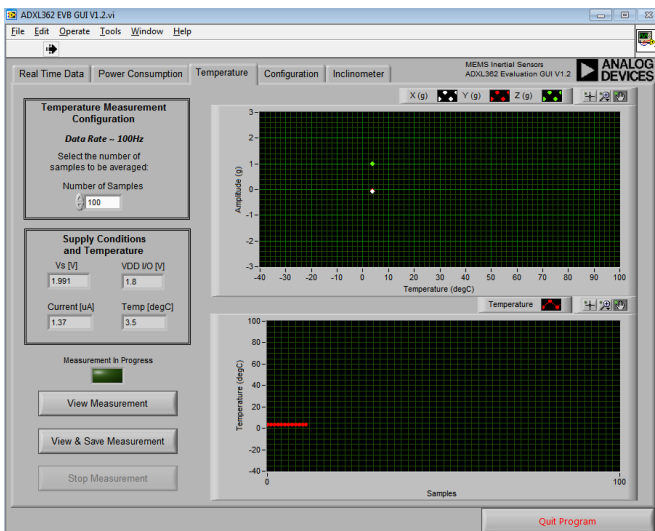


Figure 19. Temperature Tab

The **Temperature** tab as shown in Figure 19 is designed to facilitate temperature testing of the ADXL362. This panel can be used to easily determine the device offset stability with respect to temperature. ADXL362 built in temperature sensor is used to test the temperature variation. As introduced in **Real Time Data** tab section, this temperature sensor is used to monitor the chip internal temperature variation but not absolute temperature. So the initial bias may cannot match the absolute ambient temperature.

For this tab, the ADXL362 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. The operation about **View Measurement**, **View & Save Measurement**, **Stop Measurement** is the same as described in **Real Time Data** tab.

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

1. The temperature sweep ramp rate should be kept low ($<2^{\circ}\text{C}/\text{minute}$) to avoid false temperature hysteresis.
2. Ensure that the device remains stable during the temperature sweep. Any motion induced during the temperature sweep results in erroneous data samples.

CONFIGURATION TAB

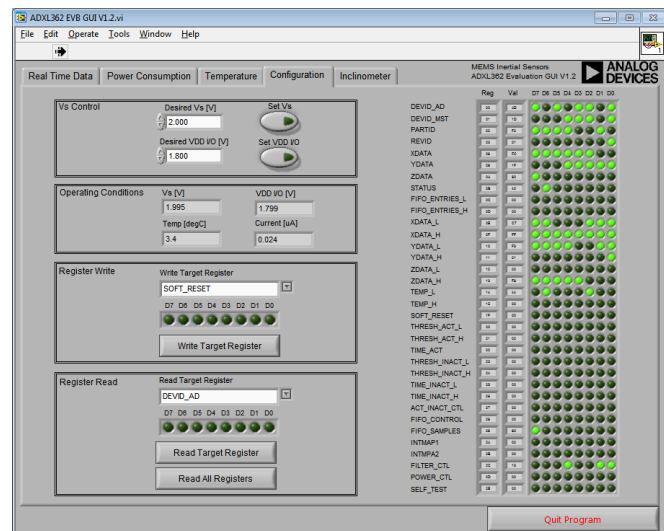


Figure 20. Configuration Tab

The **Configuration** tab allows you to set the operating conditions for the ADXL362, as well as read/write the contents of the memory map. Figure 20 shows the **Configuration** tab after the COM port verification step has been completed.

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

Set Vs sets the main voltage of the ADXL362. The default value is 2.0V. When the **Set Vs** knob is clicked, the ISEB applies the desired supply voltage, and then reads back the ADXL362 operating voltage, interface voltage, operating temperature and current consumption. These values are displayed in the **Operating Conditions** box.

Set VDD I/O sets the interface voltage of the ADXL362. The default value is 1.8V. When the **Set VDD I/O** knob is clicked, the ISEB applies the desired interface voltage, and then reads back the ADXL362 operating voltage, interface voltage, operating temperature and current consumption. These values are displayed in the **Operating Conditions** box.

To write a value to a register, select the register from the **Write Target Register** menu and click the D7 through D0 indicators to set the value. If an indicator is lit, the value written to that bit is a Logic 1, whereas an unlit indicator indicates a Logic 0. When the register is configured correctly, click the **Write Target Register** button to send the value to the ADXL362. Note that the D7 through D0 indicators under **Write Target Register** are not updated based on the value stored in that register.

To read a value from a register, select the register from the **Read Target Register** menu and click the **Read Target Register** button, the indicators in **Register Read** box will be refreshed to reflect the target register content.

Clicking the **Read All Registers** button performs a read back of the entire ADXL362 memory map. This action updates all register values and indicators on the right side of the screen.

INCLINOMETER TAB

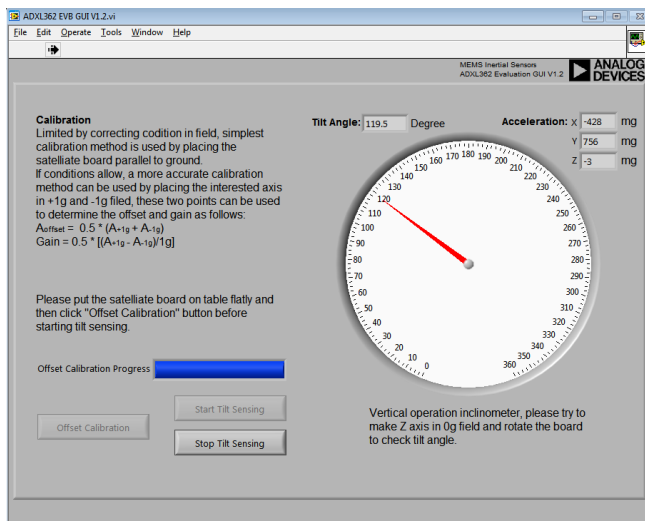


Figure 21. Inclinator Demo

ADXL362 evaluation GUI also support inclinometer demo. Go to **Inclinometer** tab, read the notes firstly. Then, put the ADXL362 satellite board on table flatly to make it parallel with the ground (z axis in 1g field), click **Offset Calibration** button, wait around eleven seconds to finish offset calibration. After that, click **Start Tilt Sensing** button to test the evaluation board tilt angle (please try to make z axis in 0g field when playing tilt sensing). You can click **Stop Tilt Sensing** button to stop tilt sensing function at any time (See Figure 21).

NOTES



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 One Technology Way, Norwood, MA 02062, USA. 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. 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. Customer may not disassemble, decompile or reverse engineer chips on the Evaluation Board. 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. 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 NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS. IN NO EVENT WILL ADI AND ITS LICENSORS BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES RESULTING FROM 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.

©2010–2011 Analog Devices, Inc. All rights reserved. Trademarks and registered trademarks are the property of their respective owners.

UG08658-0-3/11(A)



www.analog.com