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Application Note

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Tips for troubleshooting the MMA865x/MMA845x/MMA8491 Sensor Toolbox Communication Issues

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1 Introduction

The Sensor Toolbox provides a useful and full featured interface for evaluation of many Xtrinsic sensors. It is designed to bring up the appropriate user interface for the sensor present in the hardware. The software component of the Sensor Toolbox recognizes the hardware configuration where it is deployed and adapts the user interface to the appropriate sensor device. However, some users may encounter a situation where the software fails to recognize the hardware and the toolbox becomes unusable for various reasons.

This application note provides some background and guides you through the check of the FTDI driver, the hardware and the software components of the Sensor Toolbox to remedy any underlying incompatibilities. It also includes a fix for a known defect in the Sensor Toolbox user interface relating to the LED display toggles for freefall / motion detection.

2 System Composition

The Sensor Toolbox kit is composed of the Sensor Toolbox hardware and the Sensor Toolbox software. The hardware kit can be ordered, and the software can be downloaded by visiting the Freescale website.

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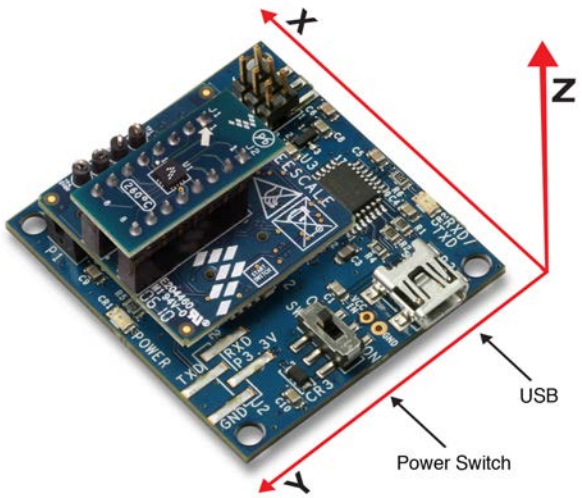


Figure 1. MMA845x Sensor Toolbox Kit

Figure 2 shows, at a high level, how the Sensor Toolbox software (within the box on the left) and the hardware components of the STB (within the box on the right) interact. For the STB kit to work properly on a PC, every component within the system needs to work as intended. To be very specific,

- the FTDI driver (part of the Windows stack) needs to work for the PC to connect with the STB hardware,
- the S08 MCU needs to have the correct firmware to communicate with the STB software, and
- the sensor device needs to be recognized to bring up the correct graphical user interface (GUI) to use.

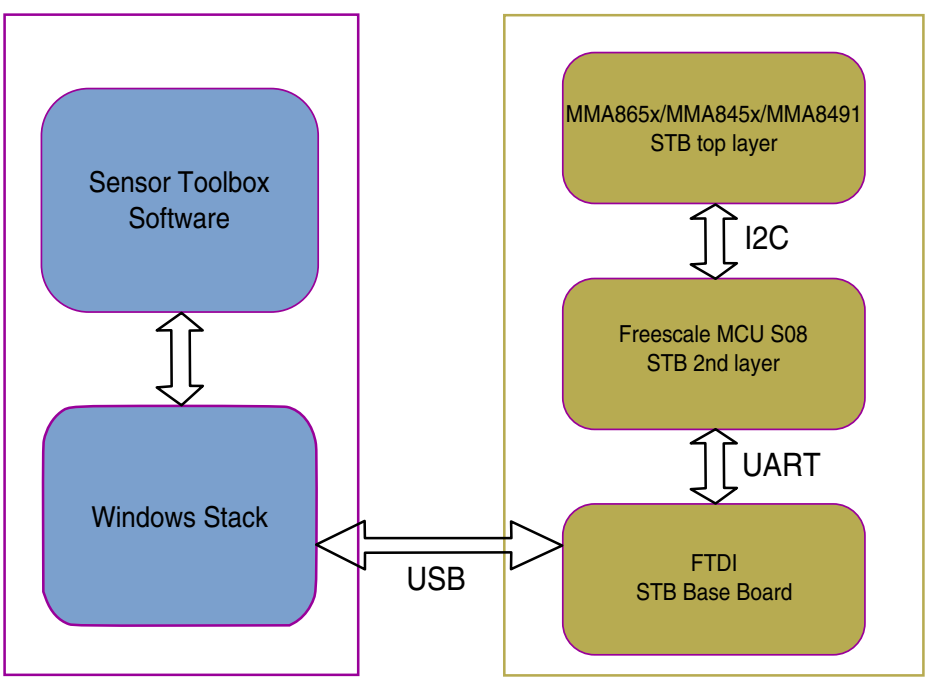


Figure 2. Sensor Toolbox System Architecture

Before proceeding to install and troubleshoot as explained here, the STB software must have already been downloaded from the Freescale website.

3 Troubleshooting communication issues

To troubleshoot failures in bringing up the STB user interface, it is recommended that the following verification checks are performed in sequence.

1. Reinstall/Verify the FTDI Driver.
2. Check the Sensor Toolbox Hardware.
3. Check the Sensor Toolbox Software Operation.

3.1 Reinstall/Verify the FTDI Driver

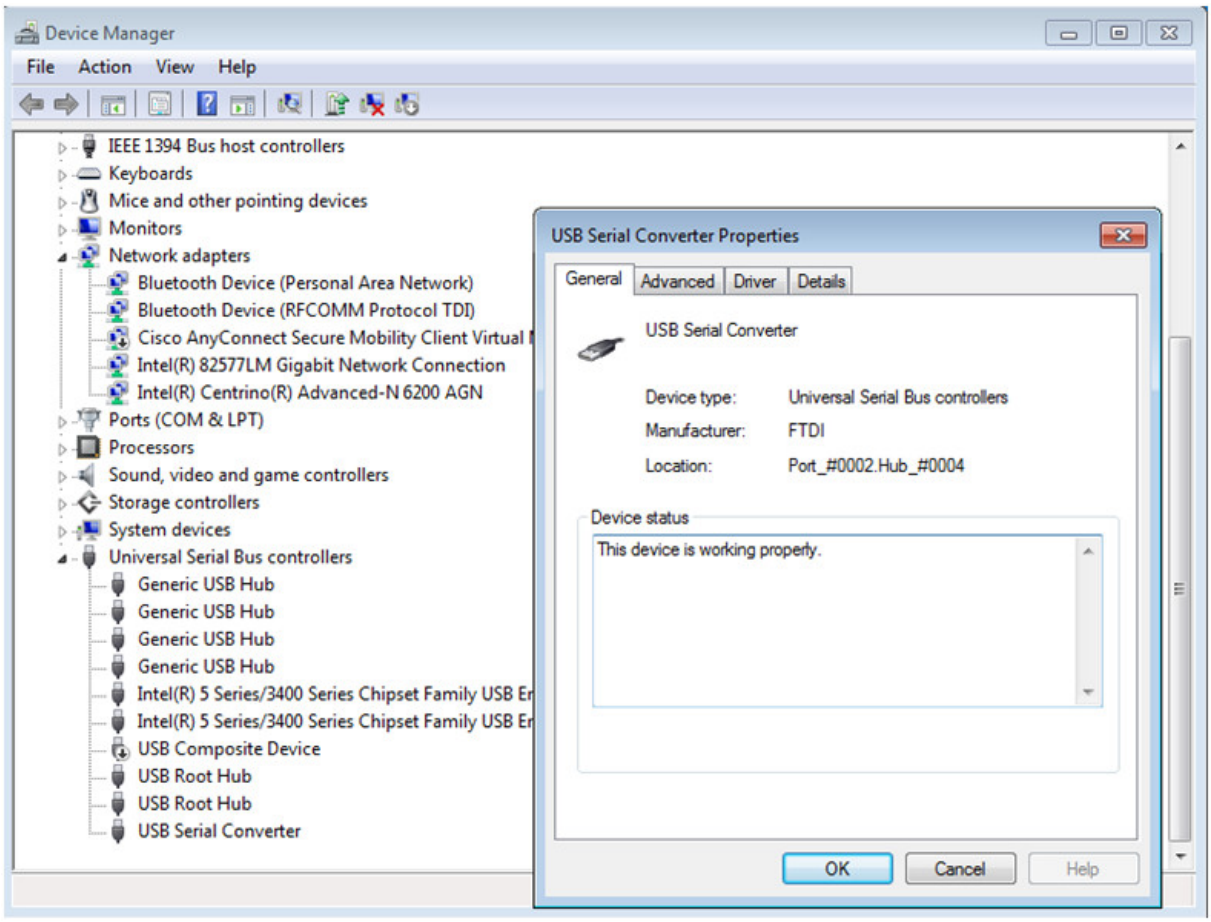
The FTDI driver for Windows is an essential component for the Sensor Toolbox kit to work since it enables the STB software to recognize the STB board. If the proper FTDI is not installed, the STB software will not recognize the STB hardware, and the software does not advance past the point of trying to identify the board.

To ensure that an incorrect FTDI driver is not causing the STB to hang, it is best to re-install the FTDI driver and verify that it is installed as described below.

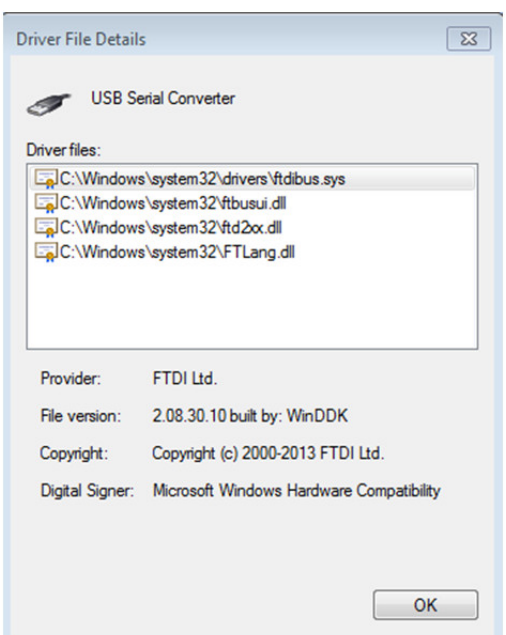
Install the STB software by launching the installer. Check the checkbox for Install the FTDI driver, when prompted, to force the installation of the FTDI driver. After installation is complete, when the STB kit is connected to the PC, a message on the Windows task tray showing that the board has been recognized will appear, and Windows will try to install the correct driver for it.

To verify that the FTDI driver is installed correctly, follow these steps.

1. Close all Sensor Toolbox software windows.
2. Open the Device Manager by opening the Windows Start menu and then enter "device manager" in the Search programs and files field.
3. In the Device Manager, expand Universal Serial Bus controllers.
4. Right-click on USB Serial Converter, then select properties.
5. Verify the manufacturer is FTDI. If the manufacturer is not FTDI, reinstall the STB software, remembering to select the checkbox to install the FTDI driver, and then repeat this verification procedure.



6. Select the Driver tab, and then click Driver Details.
7. Verify that four driver files are listed as shown in the image below.



If the driver file details are different than those in the preceding procedure, reinstall the Sensor Toolbox software making sure you check the checkbox for Install the FTDI driver, and then repeat this verification procedure.

3.2 Check the Sensor Toolbox Hardware

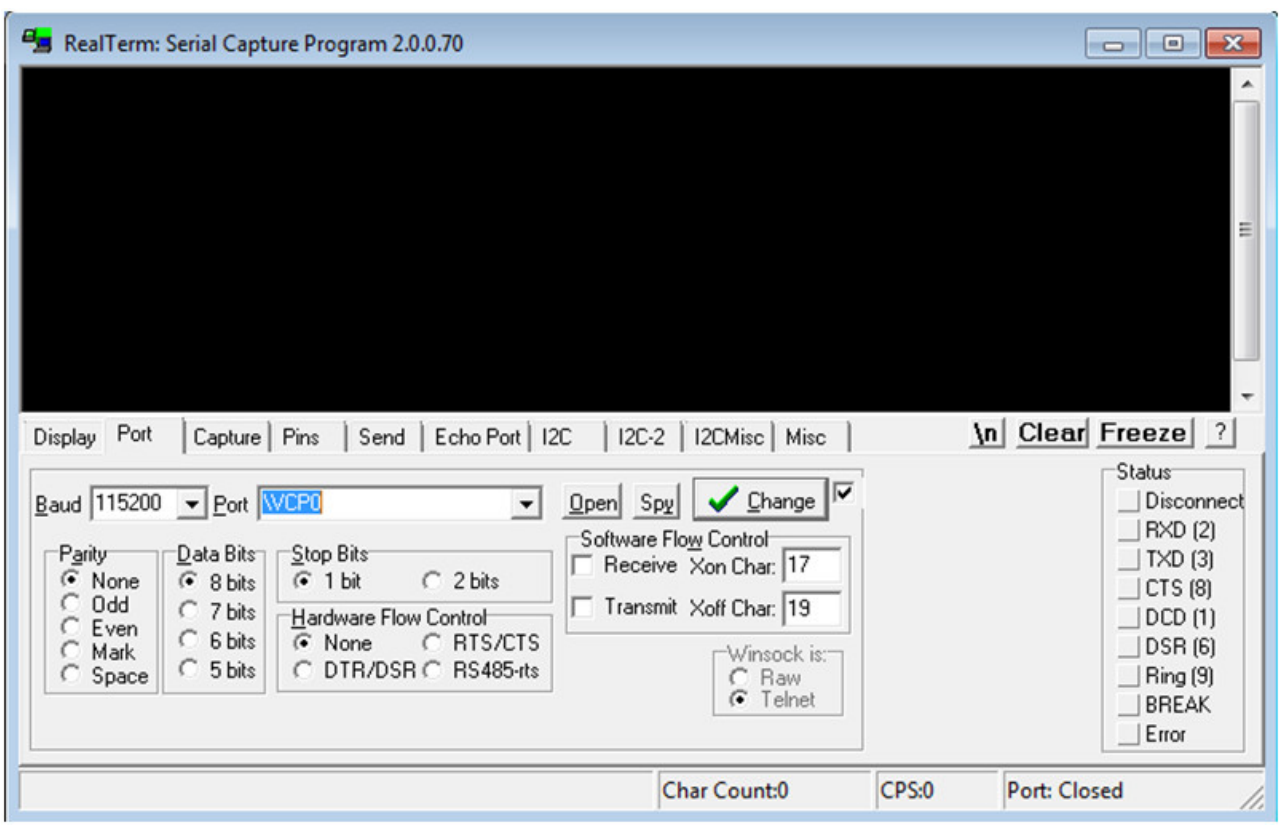
The reasons for STB hardware failure may be related to incorrect settings for the serial port or to an incorrect version of the boot loader (for the target S08 MCU) present on the base board. Note that the boot loader that ships with the evaluation kit (in the shrink wrap contained in the package shipped from Freescale) will be correct and should work. In most cases when users encounter a failure issue, it is because the STB for another sensor is being re-purposed for use with MMA865x/ MMA845x/MMA8491 .

To ensure that the STB hardware boots up and can communicate with the STB software, it is best to verify that communication settings for the port are correct and that the correct boot loader for the sensor device is present on the base board by following the procedure below:

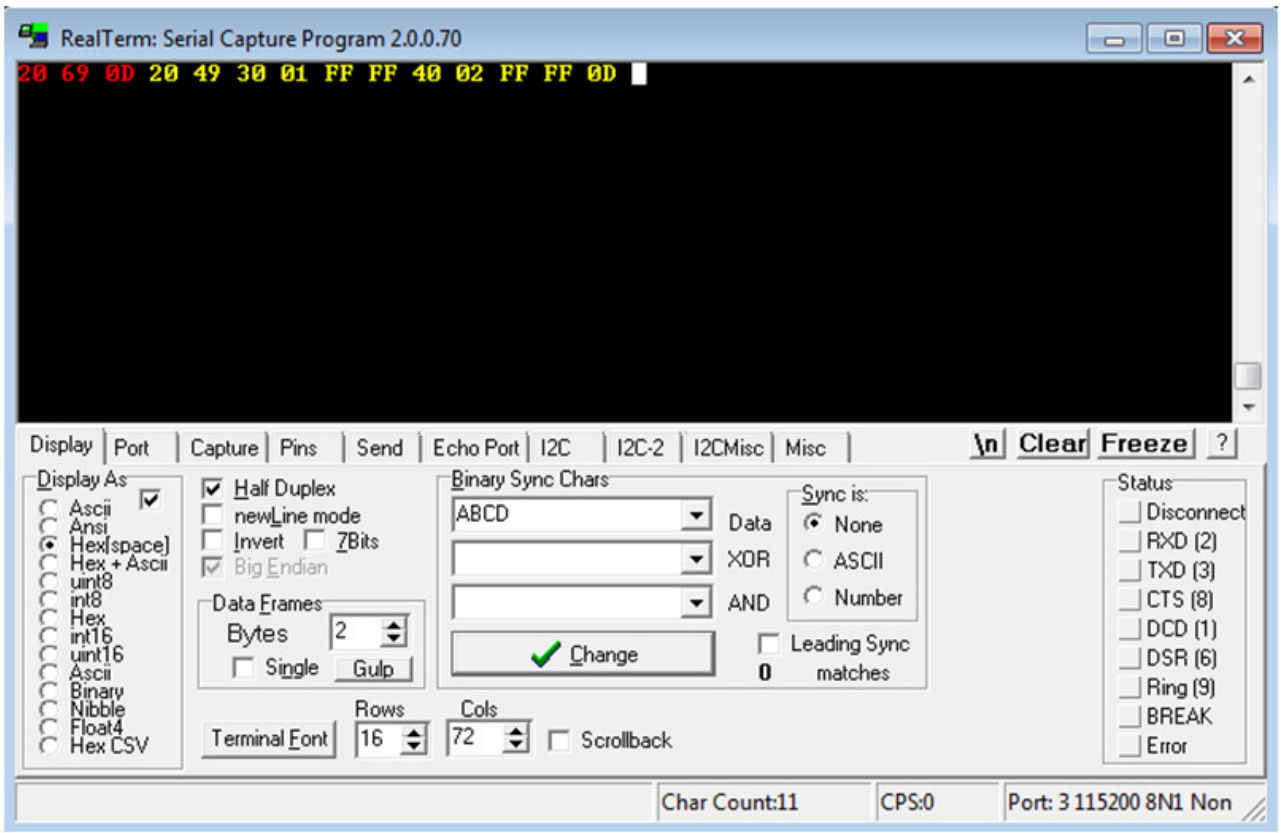
NOTE

This procedure can be completed successfully using most terminal programs. For illustration purposes, this procedure uses the terminal program RealTerm.

1. Open the RealTerm terminal program. Select the **Port** tab and then configure the port as shown.
   Baud: 115200
   Port: \VCP0. Or if you know the port the STB hardware to connect to, type in the number.
   Parity: None
   Data Bits: 8
   Stop Bits: 1
   Hardware Flow Control: None



2. In the terminal console, enter **[Space]i[Enter]**. This displays in the terminal console in hex as “20 69 0D”
3. The expected return from the MCU is **[Space]I[8 bytes of data][Enter]**. This displays in the terminal console in hex as “20 49 xx1 xx2 xx3 xx4 xx5 xx6 xx7 xx8 0D”.



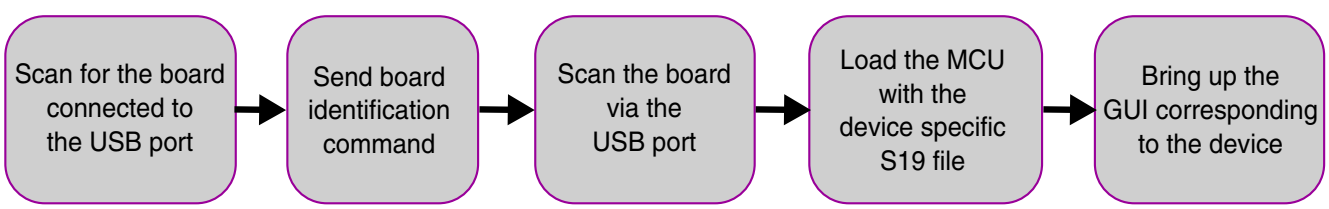
If the hardware kit does not respond correctly, the boot loader is not what the STB software expects, and the boards need to be replaced with new boards. To have your boards replaced to fix this issue, contact your Freescale Field Applications Engineer or contact Freescale customer support.

3.3 Check the Sensor Toolbox Software Operation

The STB software installer contains all the necessary files:

- the software executable,
- DLL libraries that support the GUI, and
- the S19 binary files (for the target S08 MCU) that can be downloaded to the base board. (Note: several S19 binary files are included with the kit since a separate binary file is required for each supported device.)

The STB software executes the tasks shown in the image below to determine which user interface to bring up. The first two tasks were alluded to earlier in the context of the FTDI driver. The third task is to identify the device that is currently mounted on the second layer of the STB kit. The STB software will only render the main user interface window if the MCU successfully communicates with the MMA865x/MMA845x/MMA8491 devices over the I2C bus, and receives the correct device ID.



Ensure that the DIP boards are inserted in the correct orientation. You can identify the orientation by matching the arrow on the DIP board to the arrow on the second layer of the STB kit.

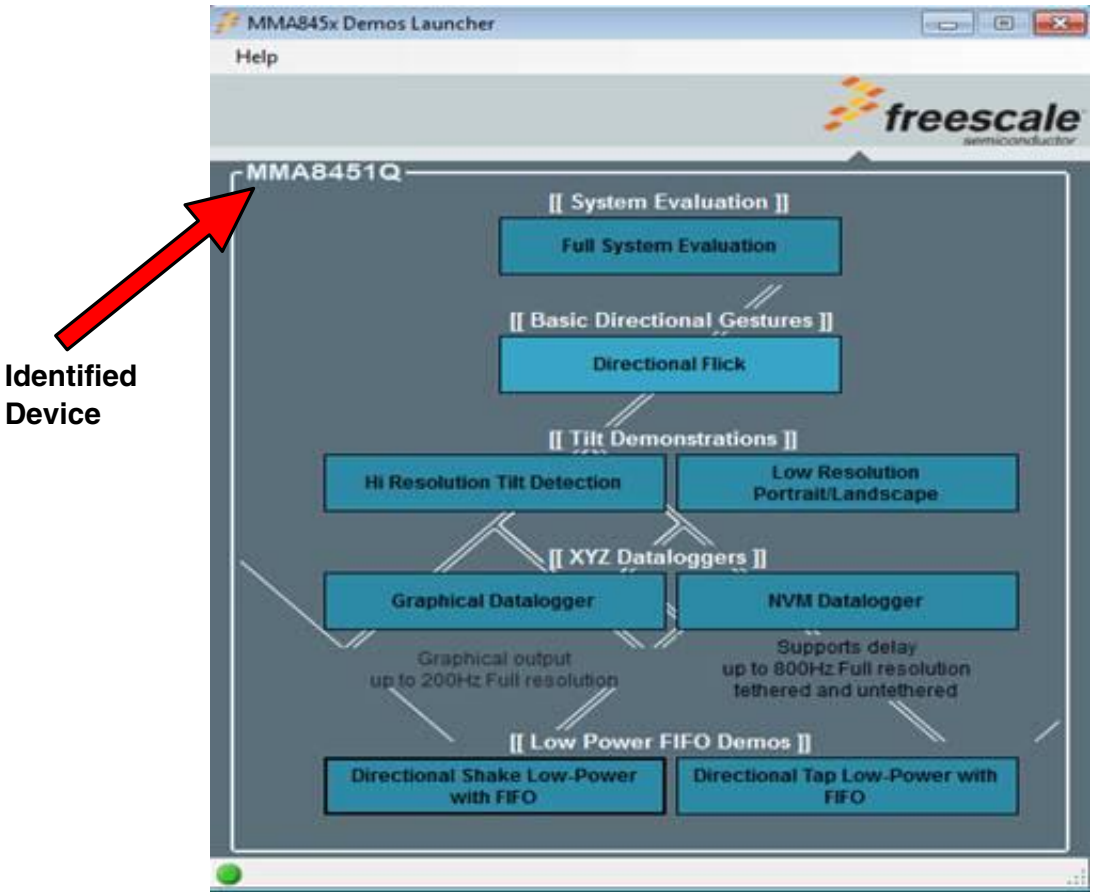
The sequence of images below were captured in the Windows 7 environment at different stages of the software bring-up - they are the expected results if the steps in the STB software complete without error.

1. The software is searching for the STB hardware; the message in the splash window updates as the software checks the COM ports.

2. When the splash screen below appears, the base board has been found, and the STB software is trying to recognize the sensor device present in the DIP board.

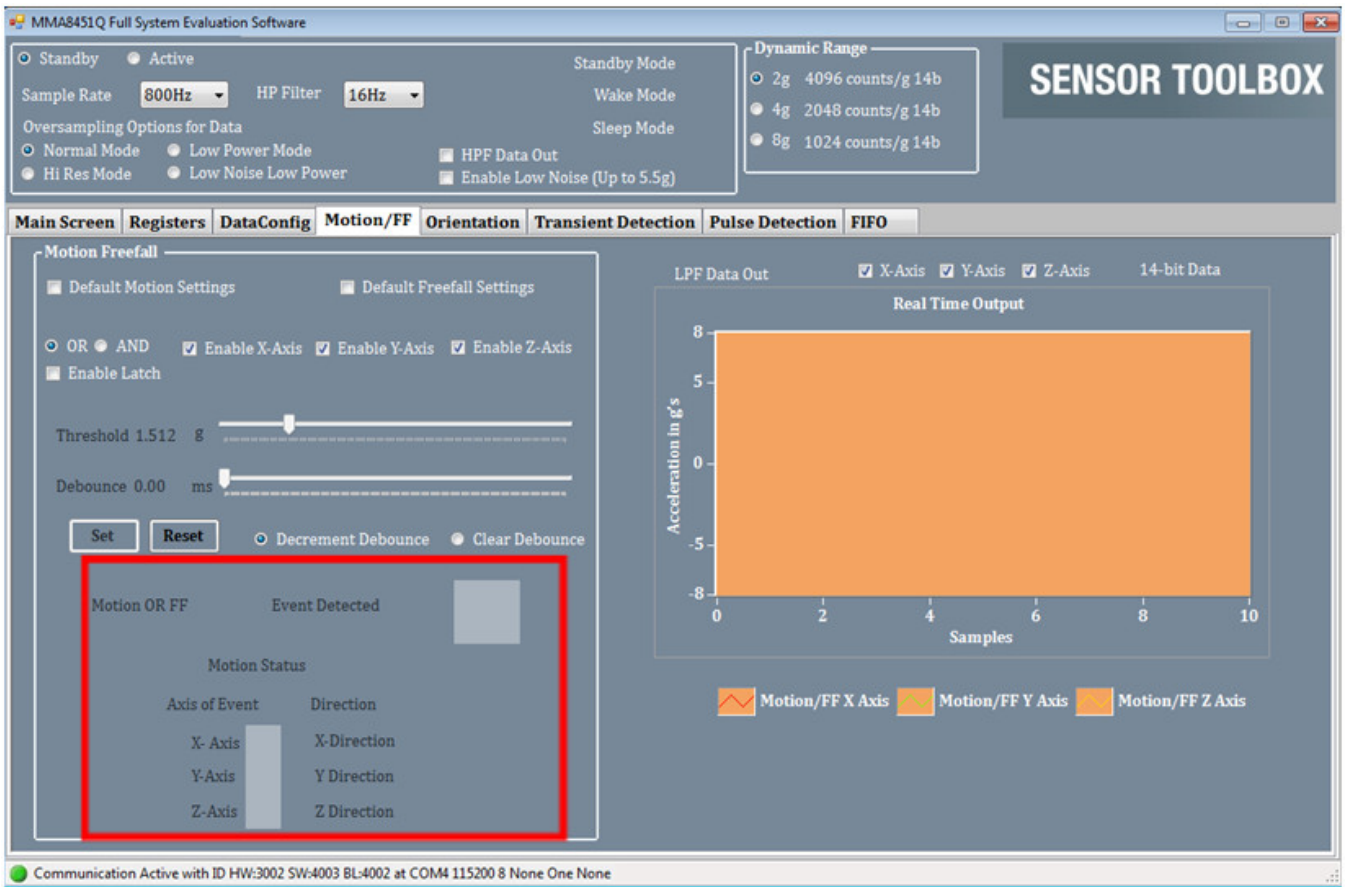
3. When the splash screen below appears, the base board has been found on COM port 3, and the STB software has not yet identified the device.

4. The screen below appears when the device has been identified, and the main window shows the identified device; in this case it is the MMA8451Q accelerometer.



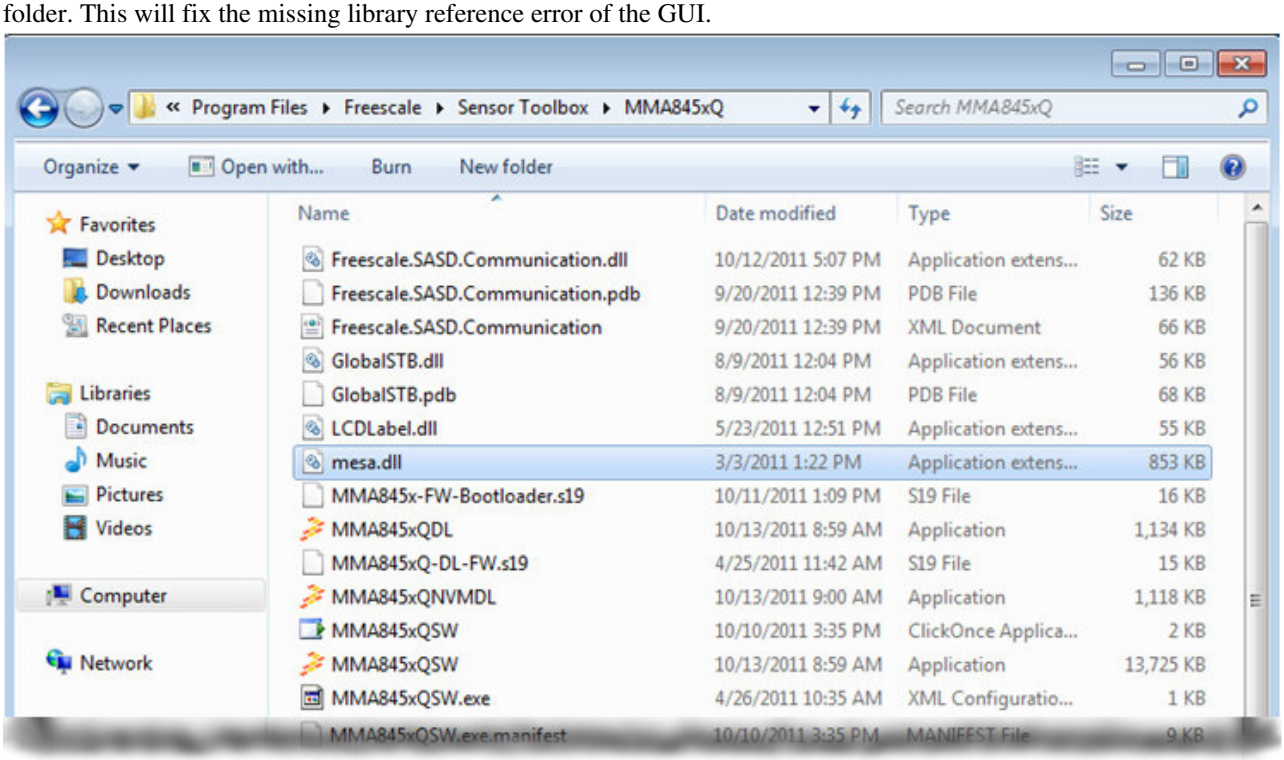
4 Fixing the status indicator error

The STB software release (Rev. 4.2.0.8) has a defect which affects the use of the STB kit for evaluation of MMA845x/ MMA865x accelerometers. The defect results in missing Motion status LEDs in the **Motion/FF** tab (see below.) This occurs due to a DLL reference library missing in the installer. It can be easily fixed.



Follow these steps to fix the issue:

1. Copy the mesa.dll file from the Sensor Toolbox software program directory's MMA8450 folder to the MMA845x folder. This will fix the missing library reference error of the GUI.



2. Close the sensor toolbox software and restart it. The library will be dynamically linked when the software starts up.

In the following image, the Motion/FF LED indicator appears since the STB software was able to link with the correct reference library, and the green lights show the expected motion was recognized and the appropriate LEDs displayed as expected.

5 Conclusion

In this application note, we have provided troubleshooting tips for communication issues users might experience with the MMA865x/MMA845x/MMA8491 Sensor Toolbox kit by doing the following:

- reinstalling and verifying the FTDI driver (part of the Windows stack),
- checking the STB hardware, and
- checking the software operation.

Additionally, a simple procedure has been provided to fix a display error in the STB user interface.

If you need additional support, please contact customer support by visiting http://www.freescale.com/support.

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Home Page:
freescale.com

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freescale.com/support

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