



Introduction

The STEVAL-MKI005V1 is a demonstration kit designed to provide the user with a complete, ready-to-use platform to demonstrate the LIS3LV02DL low power 3-axis linear accelerometer with digital output. The device includes a sensing element and an IC interface capable of translating information from the sensing element into a measured signal that can be used for external applications.

In addition to the MEMS sensor, the demonstration board features an ST7-USB microcontroller that functions as a bridge between the sensor and the PC, on which it is possible to use the graphical user interface (GUI) downloadable from the web site, or dedicated software routines for customized applications.

This user manual describes the hardware included with the demonstration kit and provides the information required to install and run the demonstration kit user interface.

For details regarding the features of the LIS3LV02DL sensor, please refer to the datasheet for this device and application note AN2381.

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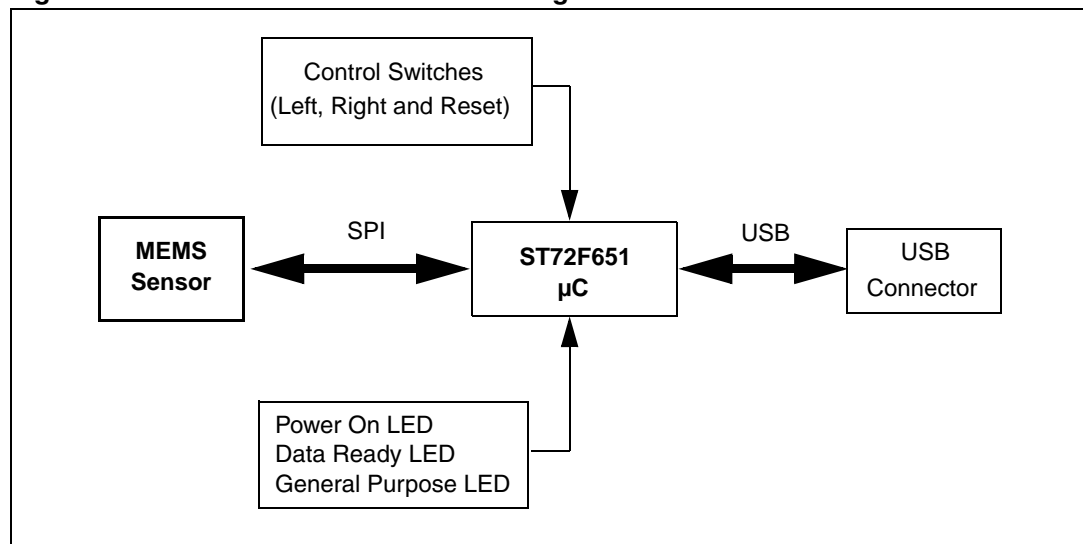
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1 Demonstration kit description

The STEVAL-MKI005V1 is a complete demonstration kit which allows users to evaluate the performance of the LIS3LV02DL low power 3-axis linear accelerometer with digital output.

The block diagram of the demonstration kit is shown in [Figure 1](#).

Figure 1. Demonstration board block diagram



The ST7-USB microcontroller included on the board allows communication between the sensor device and the PC. The user can interact with the hardware either through the GUI provided with the kit, or through dedicated software routines to run customized applications.

Switches and LED indicators are used to control and monitor the functionality of the board.

The top silk-screen view and photo of the full board, respectively, are shown in [Figure 2](#) and [Figure 3](#).

Figure 2. Top silk-screen of the STEVAL-MKI005V1 kit

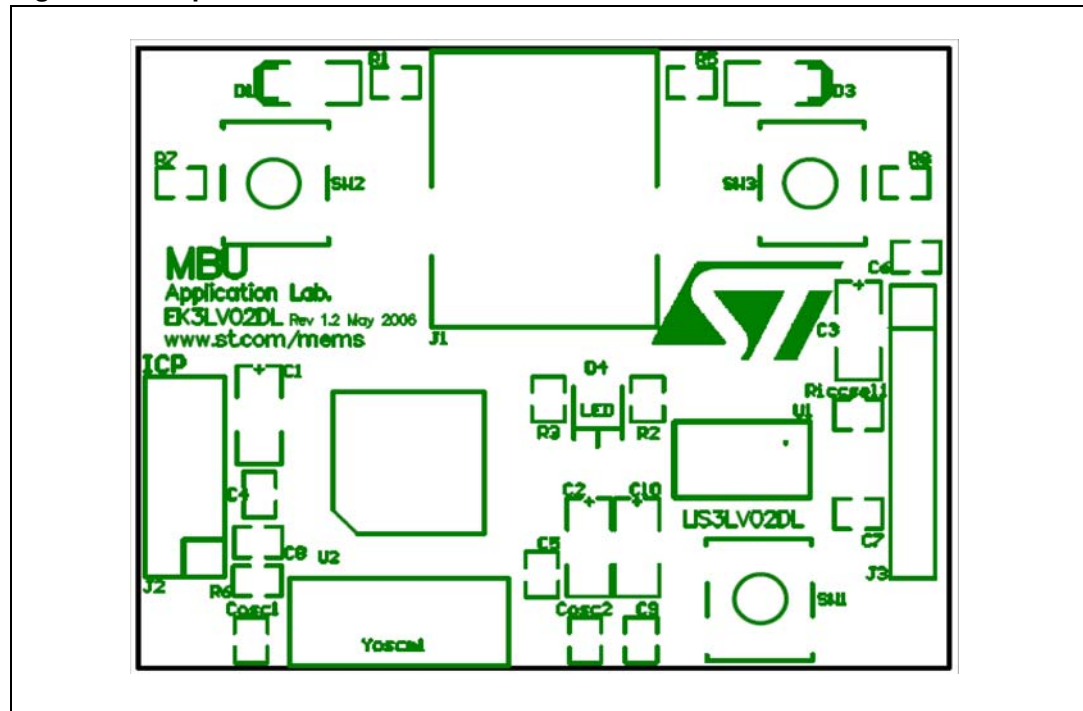
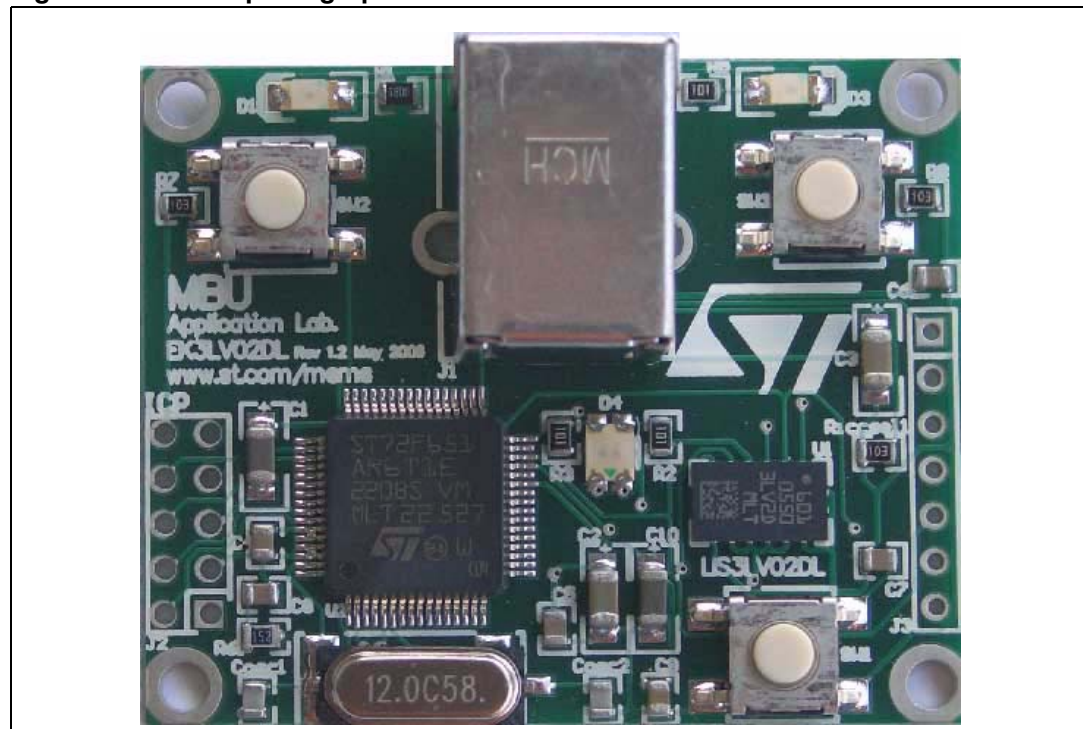


Figure 3. Board photograph



Operation of the STEVAL-MKI005V1 demonstration kit requires the installation of a dedicated driver which is included on the installation pack, together with a GUI interface which allows simple interaction with the sensor. The steps required for driver and software installation are described in the following section.

2 STEVAL-MKI005V1 GUI installation

The installation of the graphical user interface (GUI) for the STEVAL-MKI005V1 requires two steps:

1. installation on the PC the software downloaded to EK web page.
2. installation of the Virtual COM driver needed to use the demonstration kit board.

2.1 PC system requirements

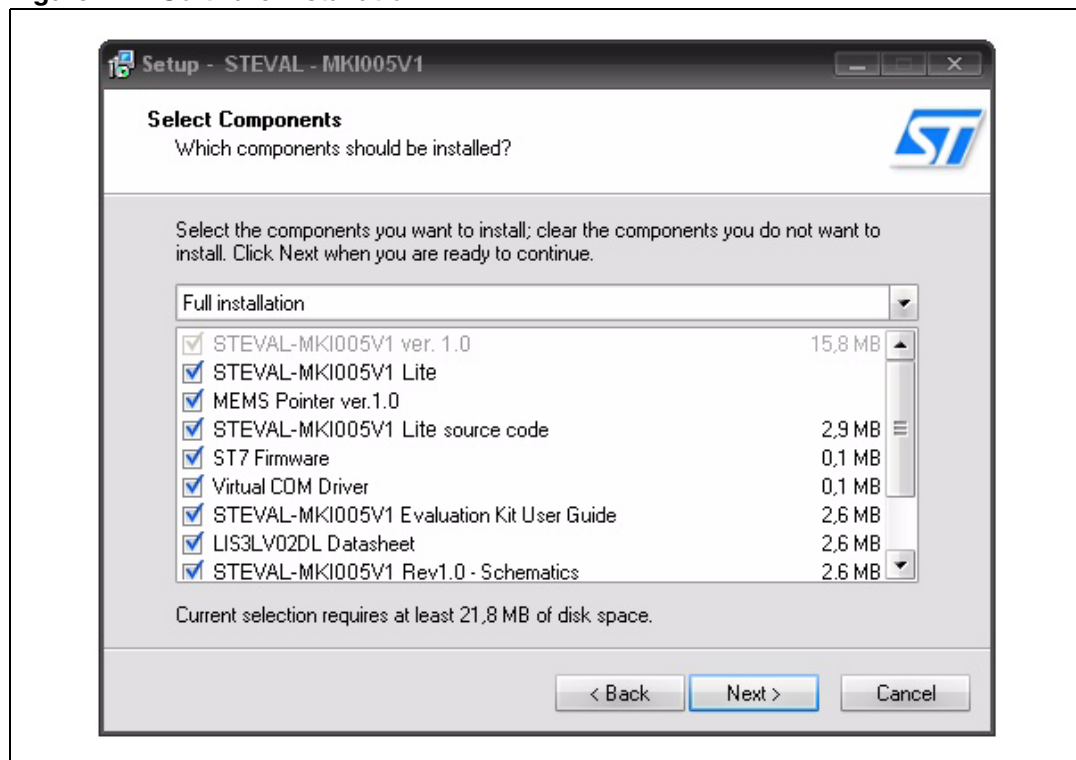
Both the hardware and software that compose the STEVAL-MKI005V1 demonstration kit have been designed to operate with Microsoft® Windows XP and Microsoft® Windows Vista.

2.2 Software installation

To install the software downloaded to EK web page:

1. double-click on "Setup.exe"
2. follow the on screen instructions ([Figure 4](#))

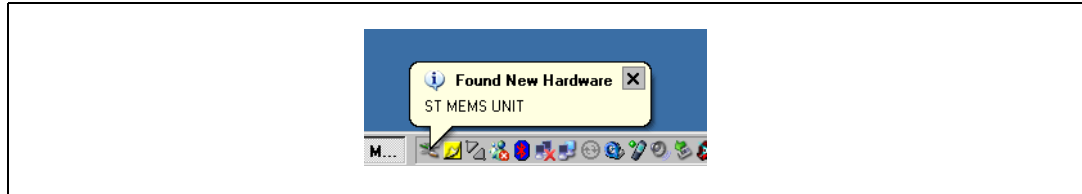
Figure 4. Software installation



2.3 Hardware installation

To install the virtual COM driver, insert the demonstration kit board into a free USB port. The “Notify” icon should appear as in [Figure 5](#).

Figure 5. Notify icon



If the “Hardware Update Wizard” window appears ([Figure 7](#)), follow the instructions on the screen. Otherwise, the installation can be performed by following the instructions indicated in [Figure 6](#) and [Figure 7](#).

Figure 6. Driver installation using the device manager

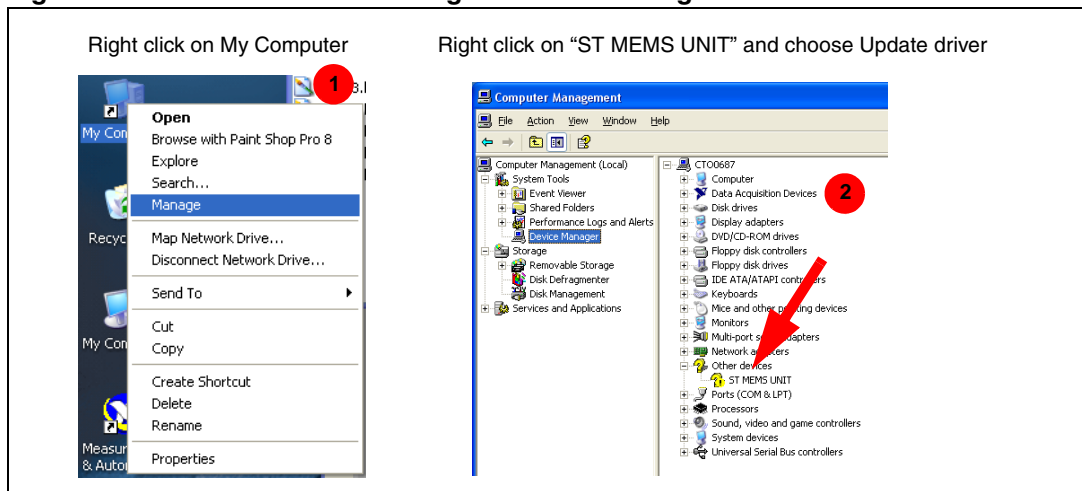
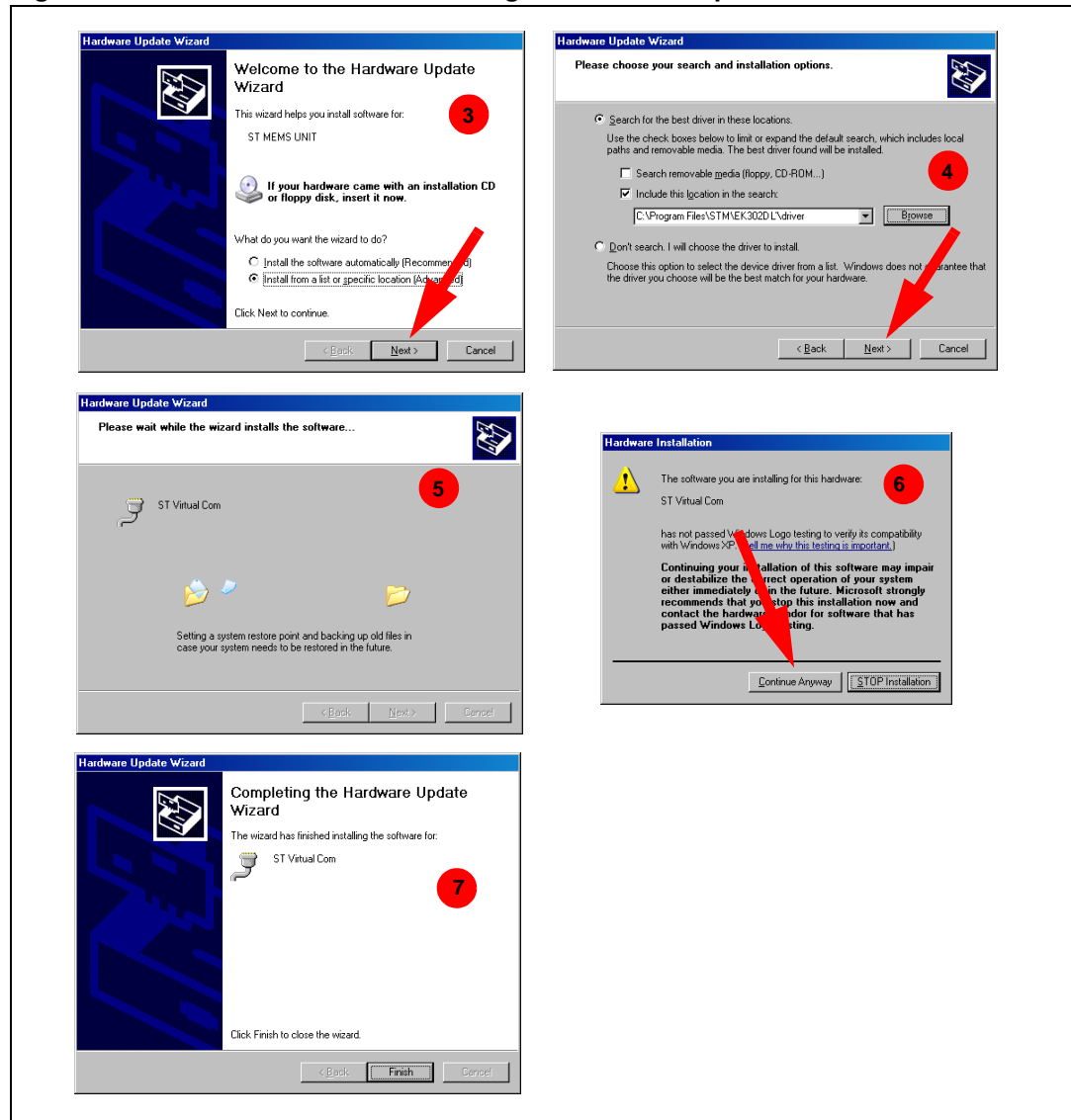
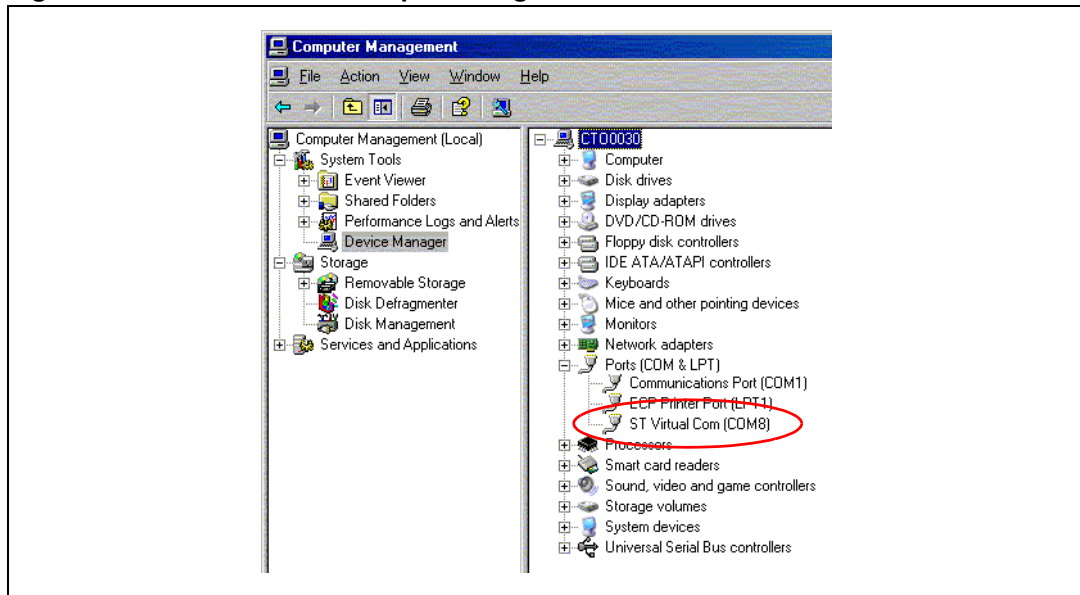


Figure 7. USB driver installation using the hardware update wizard



Once the installation is complete, a COM port number is assigned to the ST Virtual COM driver ([Figure 8](#)). This number should be retained as it is required to run the STEVAL-MKI005V1 demonstration software GUI. For additional details, see [section 3.1](#).

Figure 8. Virtual COM driver port assignment

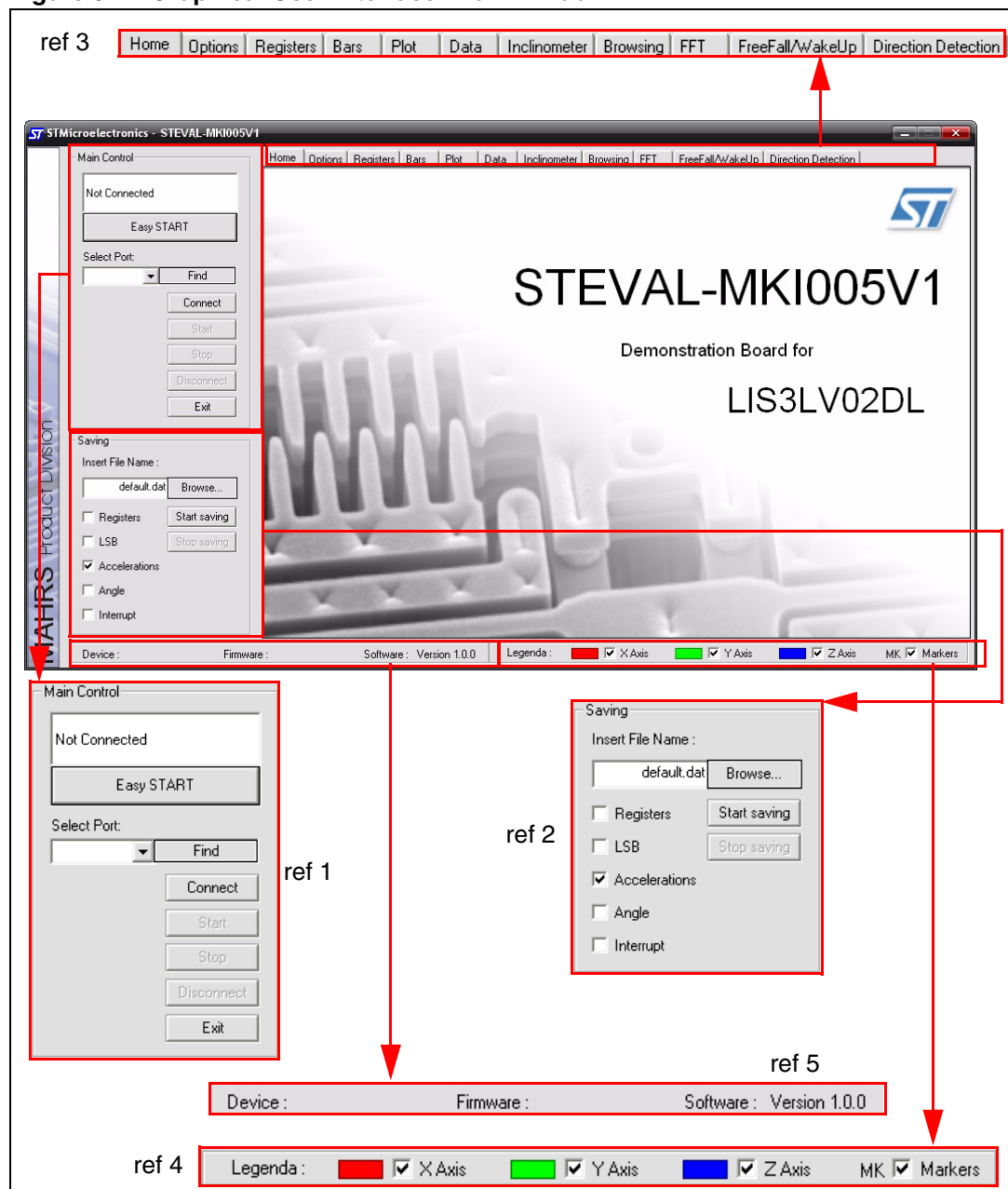
3 Graphical user interface

To execute the STEVAL-MKI005V1 demonstration software GUI:

1. Click on Start > All Programs
2. Select ST EVAL > STEVAL-MKI005V1 > Executables
3. Launch the program "STEVAL-MKI005V1 Ver. 1.0"

The GUI main window appears as shown in [Figure 9](#).

Figure 9. Graphical User Interface: main window



The functions of the four main sections of the window are described below:

1. “Main Control” ([Figure 9](#), ref 1) - Connects/disconnects the board and starts acquisition via the Start/Stop buttons
2. “Saving” box ([Figure 9](#), ref 2) - Allows the user to save the data to a specified text file, choosing the data type to write. Data type available are:
 - a) RAW: for each axes the software writes the data read directly from the sensor output registers (OUTX_H, OUTX_L, OUTY_H, OUTY_L and OUTZ_H, OUTZ_L)
 - b) LSB: the data read directly from the sensor are converted from 2’s complement to Sign and Magnitude
 - c) Acceleration: LSB data are multiplied by the sensitivity to obtain the acceleration expressed in mg
 - d) Angle: LSB data converted to tilting angle of the board expressed in degrees
 - e) Interrupt: status of the interrupt
3. “Tab Selector” ([Figure 9](#), ref 3) - Used to toggle between the different functions of the demonstration kit
4. “Legenda” ([Figure 9](#), ref 4) - In this box is possible to Enable/Disable the axes view
5. “Details” ([Figure 9](#), ref 5) - Shows the details of demonstration kit, the name of sensor, the version of firmware loaded on microcontroller and the version of PC software

3.1 Connecting to the Virtual COM port

Before using the functions of the demonstration kit software it is necessary to open the connection with the STEVAL-MKI005V1 board. This is achieved through the following procedure:

1. connect the STEVAL-MKI005V1 to the desired USB port
2. in the “Select COM” drop-down menu ([Figure 9](#) ref 1), choose the Virtual COM number to which the board has been mapped. For additional information on how to obtain this number, see section [2.3](#)
3. open the connection by clicking on “Connect” ([Figure 9](#) ref 1)

At this point the user can acquire, plot and save the acceleration data measured by the sensor and access the content of the registers embedded in the device.

Clicking the "Find" button ([Figure 9](#) ref 1), the GUI attempts to automatically find the COM Number assigned to the demonstration kit and shows it in the list box as selected item.

The following sections provide details regarding the functions of the tabs in [Figure 9](#), ref 1.

3.2 “Easy Start” button

When the "Easy Start" button ([Figure 9](#), ref 1) is clicked, the GUI attempts to automatically find the COM number assigned to the demonstration kit and starts the acquisition.

3.3 “Options” tab

The options tab allows the user to control the following parameters:

1. Full Scale (FS) - Sets the maximum acceleration value measurable by the device. It is possible to select either 2g or 6g ([Figure 10](#), ref 1)
2. Operating Mode (OM) - This control allows to customer to select the operating mode: Normal Mode or Power Down Mode ([Figure 10](#), ref 2)
3. Block Data Update (BDU) - this function is used to inhibit output registers update until both upper and lower register parts are read ([Figure 10](#), ref 3)
4. High-Pass Filter (HP) - This control activates the High Pass Filter on the device and selects the cut-off frequency ([Figure 10](#), ref 5)
5. Data Rate (DR) - In this box the rate at which each acceleration sample is produced can be selected. The possible values are 40, 160, 640 or 2560 Hz ([Figure 10](#), ref 5)
6. Tri-State (TS) - Permits switching the SPI lines of the ST7-USB microcontroller mounted on the demonstration kit between 3-state (i.e. high-impedance) and normal mode ([Figure 10](#), ref 6). This function makes it possible to isolate the sensor mounted on the board from the microprocessor, in case any external control (from a different microcontroller mounted on a separate user board) is needed. This function is inhibited during the acquisition
7. Big/Little Endian (BLE) - is used to select Big Endian or Little Endian representation for output registers ([Figure 10](#), ref 7)
8. Data Alignment Selection (DAS) - permits to decide between 12 bit right justified and 16 bit left justified representation of data coming from the device ([Figure 10](#), ref 8)

Figure 10. Options tab

The screenshot shows the 'Options' tab interface with the following elements and reference markers:

- ref 1:** Points to the 'Full Scale (FS)' section, which includes a dropdown menu labeled 'Select Full Scale' currently set to '2 g'.
- ref 2:** Points to the 'Operating Mode (OM)' section, which includes a dropdown menu labeled 'Select operating mode' currently set to 'Normal Mode'.
- ref 3:** Points to the 'Block Data Update (BDU)' section, which includes a label 'Inhibit output registers update until both upper and lower register parts are read' and two radio buttons: 'BDU Enable' and 'BDU Disable' (selected).
- ref 4:** Points to the 'High-Pass Filter (HP)' section, which includes a checkbox labeled 'Enable HP Filter'.
- ref 5:** Points to the 'Data Rate (DR)' section, which includes a dropdown menu labeled 'Select the data rate at which acceleration samples are produced' currently set to '40 Hz'.
- ref 6:** Points to the 'Tri-State (TS)' section, which includes a label 'Activate / Deactivate the Tri-State on the ST7-USB SPI Lines' and two radio buttons: 'TS Enable' and 'TS Disable' (selected).
- ref 7:** Points to the 'Big/Little Endian (BLE)' section, which includes a label 'Select Big Endian or Little Endian representation for output registers' and two radio buttons: 'BLE Enable' and 'BLE Disable' (selected).
- ref 8:** Points to the 'Data Alignment Selection (DAS)' section, which includes a label 'Select 12 bit right justified or 16 bit left justified representation of data' and two radio buttons: '12 Bit right' and '16 Bit left' (selected).

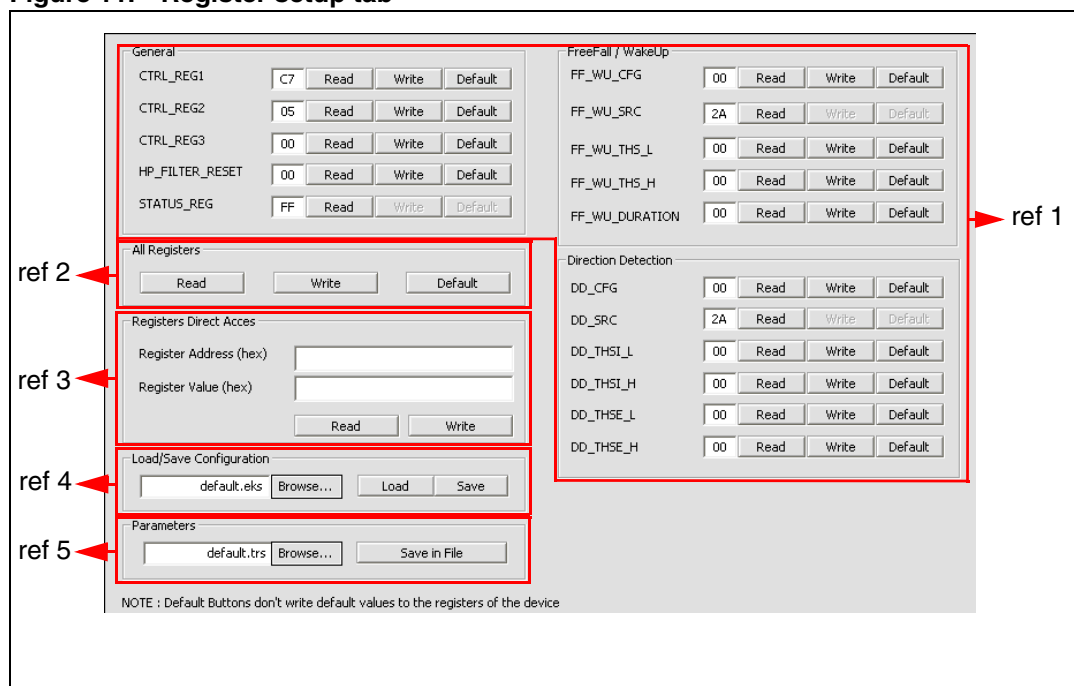
3.4 “Register Setup” tab

The register setup tab shown in [Figure 11](#) allows read/write access to the content of the registers embedded in the LIS3LV02DL MEMS sensor mounted on the demonstration kit. The tab is divided into five sections:

1. “General” ([Figure 11](#), ref 1) - Provides access to the registers which control the main settings of the device. This section contains the control registers (CTRL_REG1, CTRL_REG2 and CTRL_REG3) and the registers that control the generation of inertial interrupt signals. It is possible to read and write the contents of each register. To restore the default value for a given register, press the “Default” button
2. “All Registers” ([Figure 11](#), ref 2) - Permits the user to read, write and recall the default content for all the registers shown in ref 1 with a single click on the read/write/default button
3. “Registers Direct Access” ([Figure 11](#), ref 3) - Provides access to any register in the device. To read a generic register, insert the address in the “Register Address” text box, then click on the “Read” button. The retrieved content of the register is displayed in the “Register Value” field. As with writing to a register, the user must specify the address and the data to be written inside the fields marked “Register Address” and “Register Value”, respectively, and then press the “Write” button
4. “Load/Save Configuration” ([Figure 11](#), ref 5) - Lets the user save/load a specific configuration to/from a file
5. “Parameters” ([Figure 11](#), ref 4) - Allows the user to save the register configuration to a text file, which includes a detailed description of the resulting configuration for each register

Note: By pressing the “Default” button, the default values for the registers are recalled in the registers field. To write the values to the registers of the device, the user has to press the “Write” button after the “Default” one.

Figure 11. Register setup tab



3.5 “Bars” tab

The bars tab ([Figure 12](#)) displays the acceleration data measured by the LIS3LV02DL sensor in bar chart format. The accelerations along the X, Y and Z axes correspond respectively to the RED, GREEN and BLUE bars.

The height of each bar is determined by the amplitude of the acceleration signal measured along the related axis. The full scale of the graph depends on the FS bit in CTRL_REG2 bits of CTRL_REG4, which may be changed through both the Options ([Figure 10](#), ref 1) and the Register Setup tabs ([Figure 11](#), ref 1).

Click on the desired bar to zoom: the selected bar is shown at the center of the screen together with the acceleration as a numerical value. To return to the default view, click on the center of the bar ([Figure 13](#)).

Figure 12. Bars tab

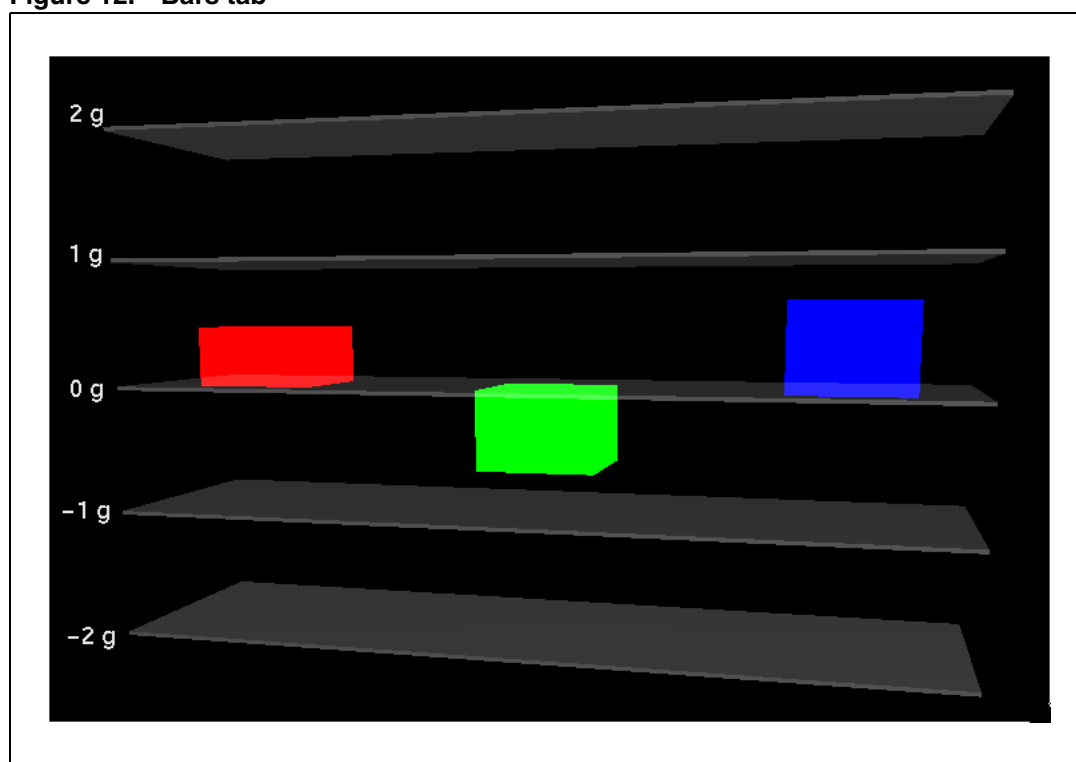
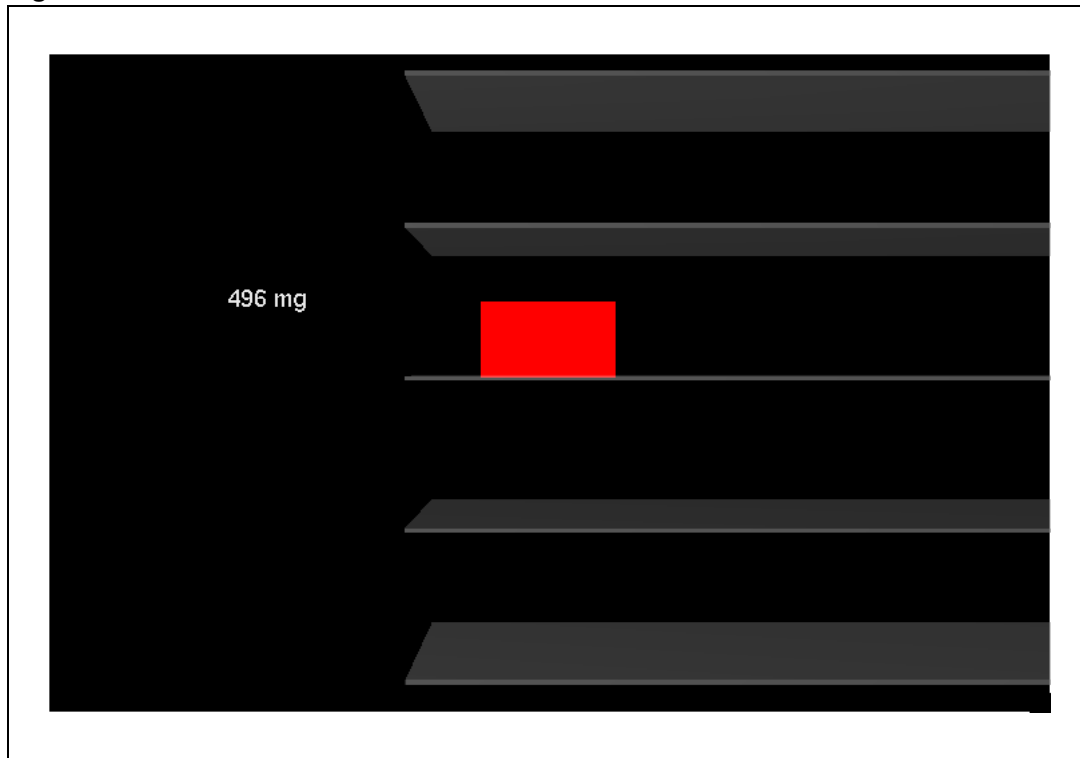


Figure 13. Bars tab



3.6 “Plot” tab

The Plot tab ([Figure 14](#)) shows the sequence of acceleration samples that have been measured by the LIS3LV02DL MEMS sensor in the demonstration kit. This tab shows:

1. “Acceleration Value” ([Figure 14](#), ref 1) - Shows the numeric values of the acceleration samples measured by the sensor
2. “Information” ([Figure 14](#), ref 2) - Legend of the current status. Reported items are the Operating Mode, Data Rate and Full scale

To zoom in on the waveform, select the desired zone with the left button of the mouse ([Figure 15](#)). Click again with the right button to return to the default view.

Figure 14. Plot tab

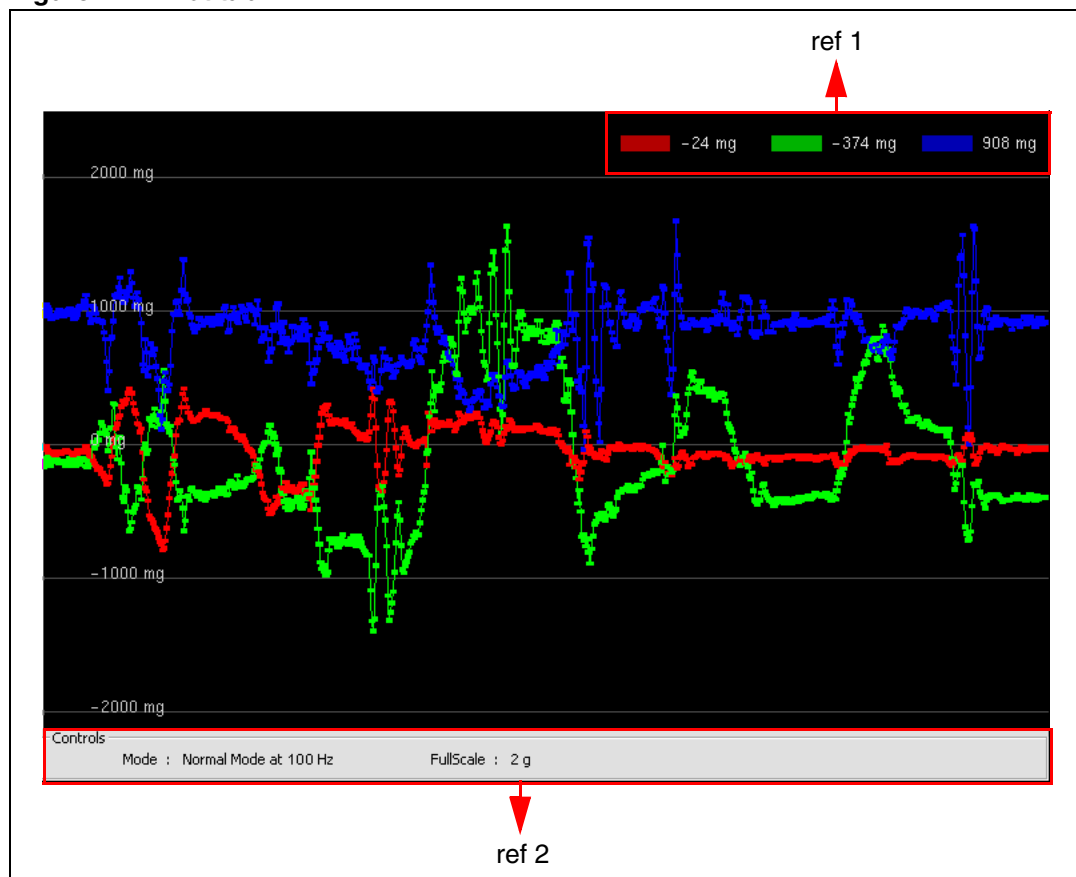


Figure 15. Plot tab - Zoom

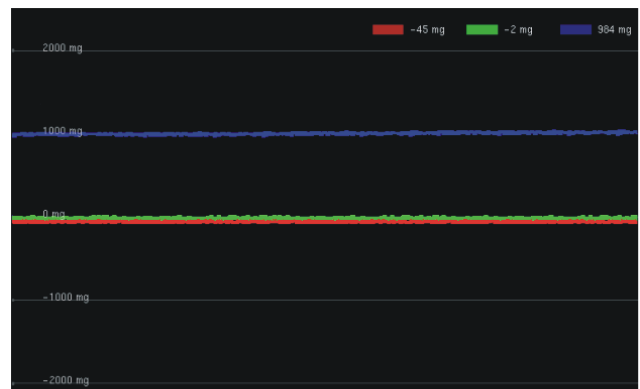
1) Select one point on the screen and click the LEFT mouse button



2) Holding the LEFT mouse button down, move the cursor to obtain an area on the screen



3) Release the button to terminate the zoom procedure; a new area is visible on the screen



4) To return to the previous view, click on the screen with the RIGHT mouse button



3.7 “Data” tab

The Data tab ([Figure 16](#)) shows the acceleration values measured by the LIS3LV02DL sensor. The tab is divided into three boxes:

1. “ADC Out” ([Figure 16](#), ref 1) - Displays the acceleration data provided by the sensor after its conversion from 2’s complement to magnitude and sign
2. “Acceleration Value” ([Figure 16](#), ref 2) - Represents the acceleration data measured by the sensor, expressed in mg
3. “Angle” ([Figure 16](#), ref 3) - Returns the tilt angle, expressed in degrees, that is inferred from the “ADC Out” data

Note: *To increase data readability, the values shown in the boxes described above are based on an average of 50 samples.*

Figure 16. Data tab

The figure shows a graphical user interface for the 'Data' tab, divided into three horizontal sections, each highlighted with a red border and a red arrow pointing to a reference label (ref 1, ref 2, and ref 3).

ADC Out (ref 1): This section displays acceleration data converted from 2's complement to magnitude and sign. It includes a descriptive text box and three input fields for X, Y, and Z axes.

Axis	Value
X	66
Y	-12
Z	1002

Acceleration Value (ref 2): This section displays acceleration data in mg. It includes a descriptive text box and three input fields for X, Y, and Z axes.

Axis	Value	Unit
X	64	mg
Y	-11	mg
Z	978	mg

Angle (ref 3): This section displays the tilt angle in degrees. It includes a descriptive text box and three input fields for X, Y, and Z axes.

Axis	Value	Unit
X	3	°
Y	0	°
Z	82	°

3.8 “Inclinometer” tab

The Inclinometer tab ([Figure 17](#)) represents the acceleration data measured by the sensor in the form of an artificial horizon.

Figure 17. Inclinometer tab

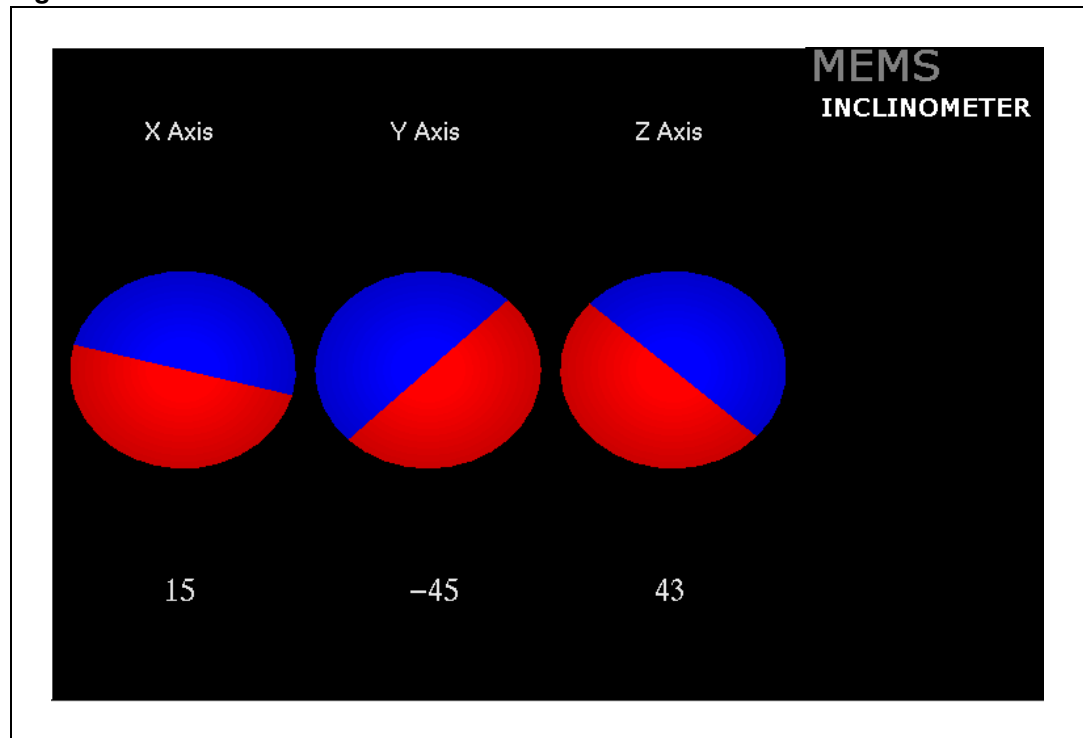
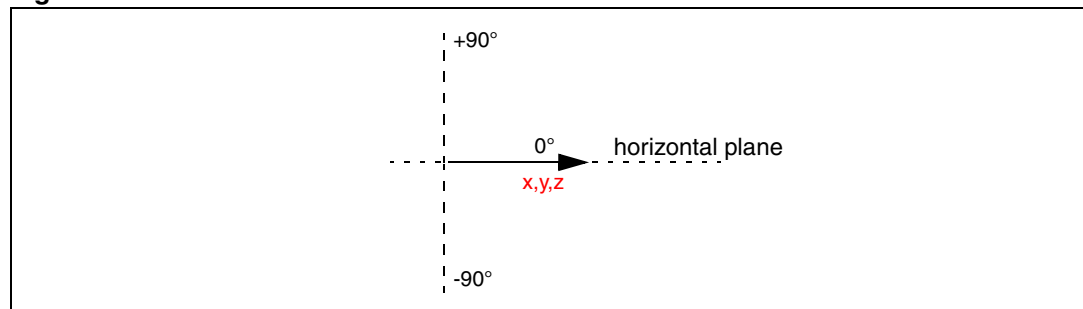


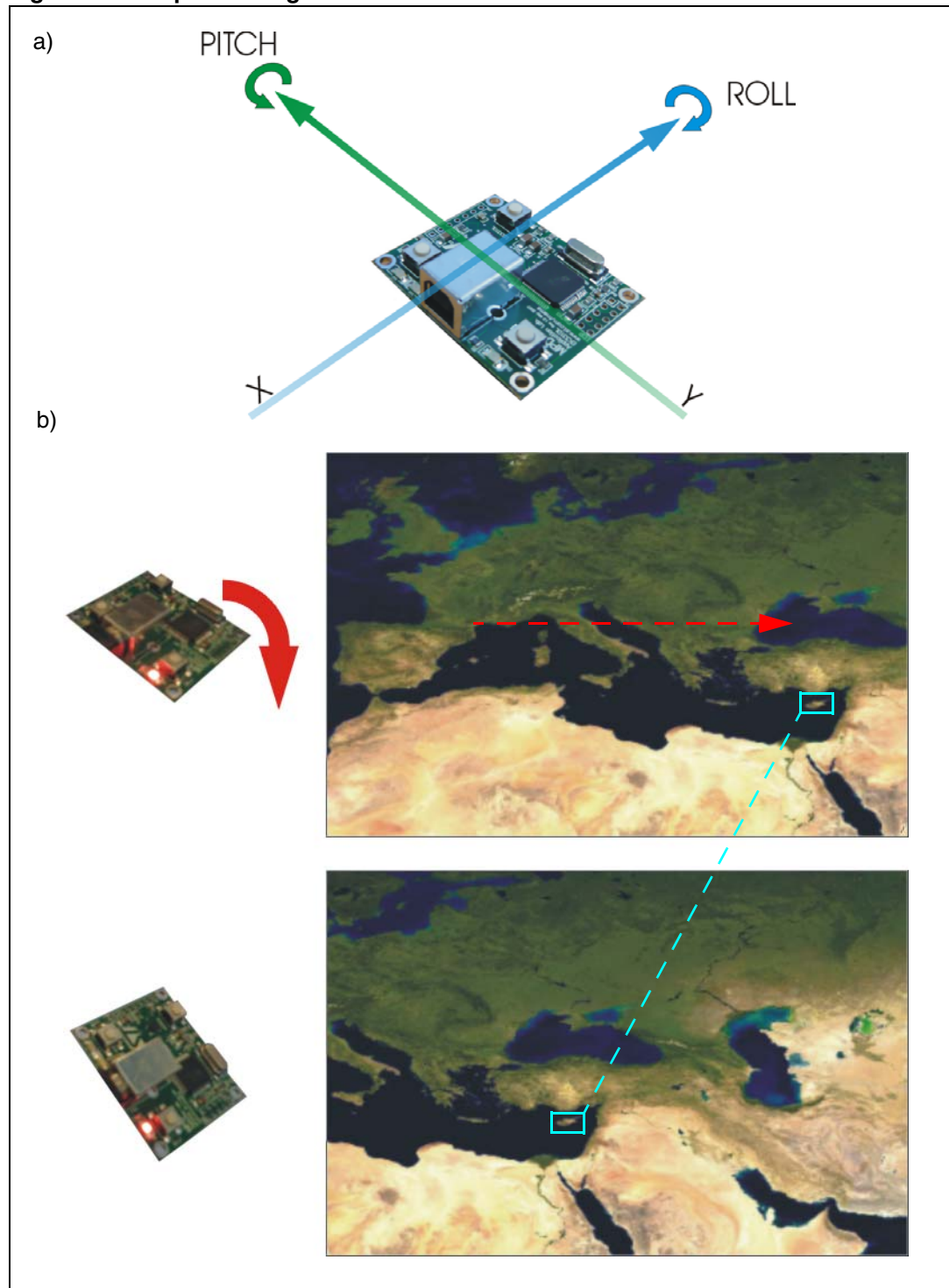
Figure 18. Axis inclination



3.9 “Map Browsing” tab

The Map browsing tab demonstrates the capability of using the acceleration data obtained from the sensor to scroll a map (or other type of document) on the screen.

Figure 19. Map Browsing tab



To move the map on the screen, tilt the evaluation kit ([Figure 19](#), a):

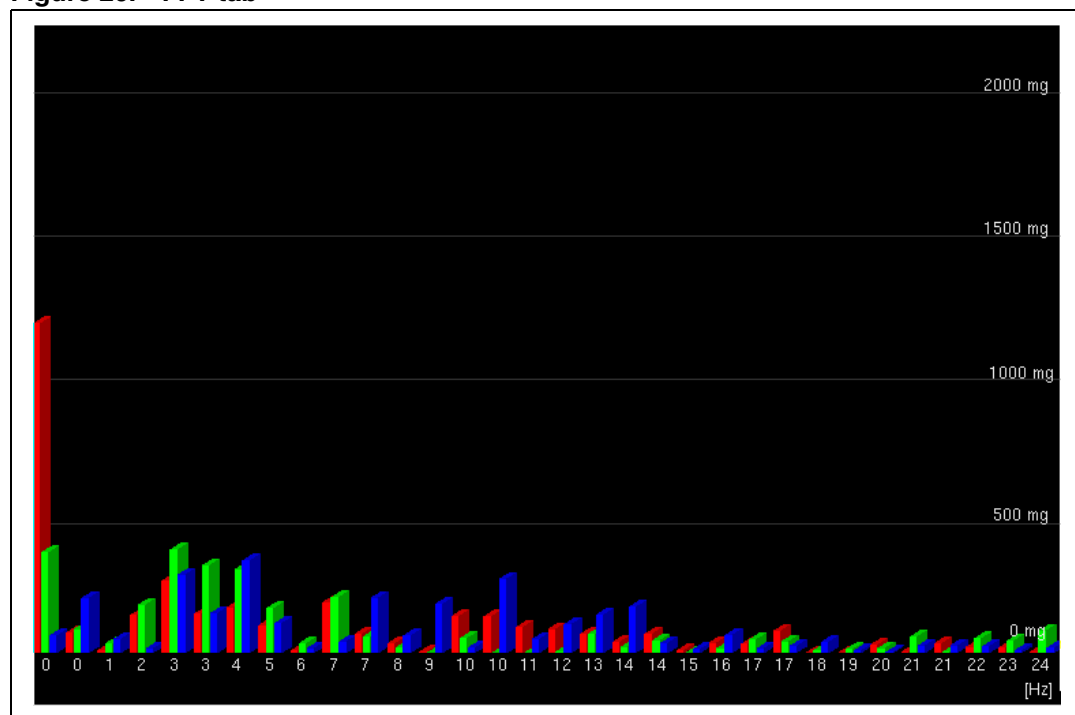
1. along the X axis (PITCH) to move the map in the top/bottom direction on the screen
2. along the Y axis (ROLL) to move the map in right/left direction on the screen

As the example in [Figure 19](#) (b) shows, when the board is tilted along the X axes (positive ROLL), the map on the screen is moved to the right.

3.10 “FFT” tab

The FFT tab ([Figure 20](#)) shows the FFT of the acceleration signals acquired by the sensor. The spectral data are updated every sample and are calculated on a 64-sample moving window.

Figure 20. FFT tab



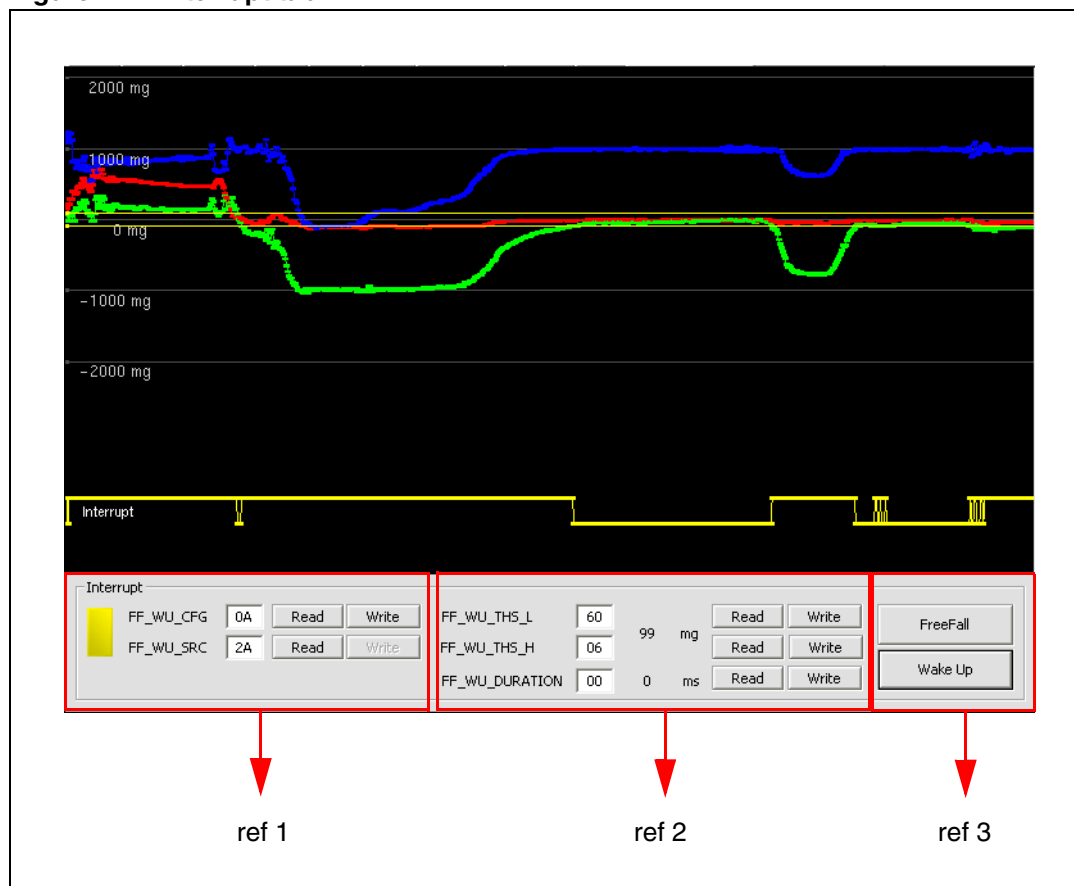
3.11 “Interrupt” tab

The Interrupt tab ([Figure 21](#)) provides a tool for evaluating the interrupt generation features of the LIS3LV02DL MEMS sensor. In this section of the GUI it is possible to configure the characteristics of the inertial events that must be recognized by the device and to visualize, in real-time, the level of the two interrupt lines together with the acceleration signals that are measured by the device.

The GUI provides direct access to the registers (FF_WU_CFG, FF_WU_SRC, FF_WU_THS and FF_WU_DURATION) that allow the configuration ([Figure 21](#), ref 1) of the interrupt sources of the device. Conversion boxes are located on the right most side of the FF_WU_THS and FF_WU_DURATION registers ([Figure 21](#), ref 2). These boxes are intended to show, respectively, the threshold value expressed in mg and the duration value converted in msec for better readability and understanding.

Finally, two buttons are provided for each interrupt line to set the suggested default values for free-fall and wake-up detection. Those buttons are marked “Free-fall” and “Wake Up”, respectively ([Figure 21](#), ref 3).

Figure 21. Interrupt tab



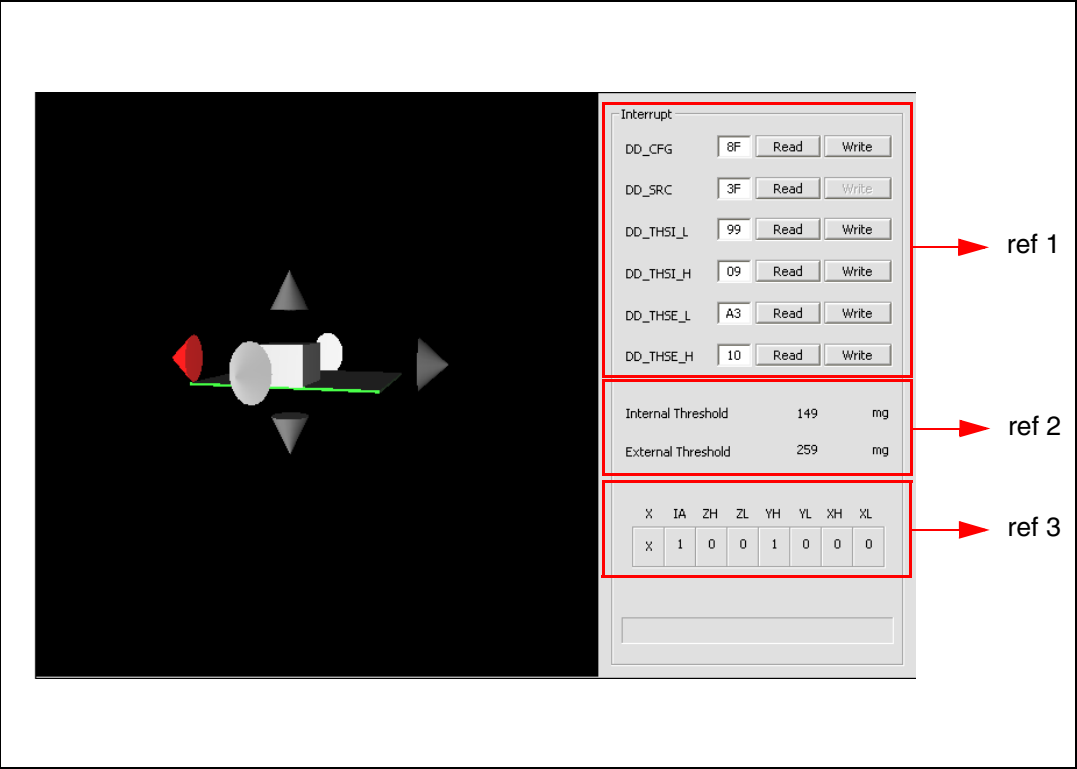
3.12 “Direction detection” tab

The Direction detection tab ([Figure 22](#)) allows the implementation of motion-controlled functions such as gaming and terminal control while requiring reduced computational power of the application controller.

The device may be programmed to generate an interrupt signal when a tilt is detected and to return the information regarding the direction in which the sensor has been tilted. With the same feature, the LIS3LV02DL sensor is capable of returning the information about the spatial orientation of the board without requiring the reading and the further post-processing of the acceleration data.

The right side of the tab contains the registers used to configure the direction detection function ([Figure 22](#), ref 1), the threshold values expressed in mg ([Figure 22](#), ref 2) and the DD_SRC expressed as a bit vectors ([Figure 22](#), ref 3).

Figure 22. Direction detection tab



4 “Data acquisition” quick start

This section describes the basic steps that must be performed to acquire the acceleration data from the STEVAL-MKI005V1:

1. connect the STEVAL-MKI005V1 to the USB port
2. start the STEVAL-MKI005V1 GUI
3. select the Virtual COM port and click on the “Connect” button ([Figure 9](#), ref 1)
4. select the destination file to which the acceleration data must be saved by clicking “Save” ([Figure 9](#), ref 2) in Main Control section (optional)
5. use the Tab Menu to display the desired function
6. click on the “START” (or ”STOP”) button to activate (or stop) the sensor data collection, saving to file, and screen plotting functions
7. to close the application, click on “Disconnect” and then click on “Exit”

5 EK Lite

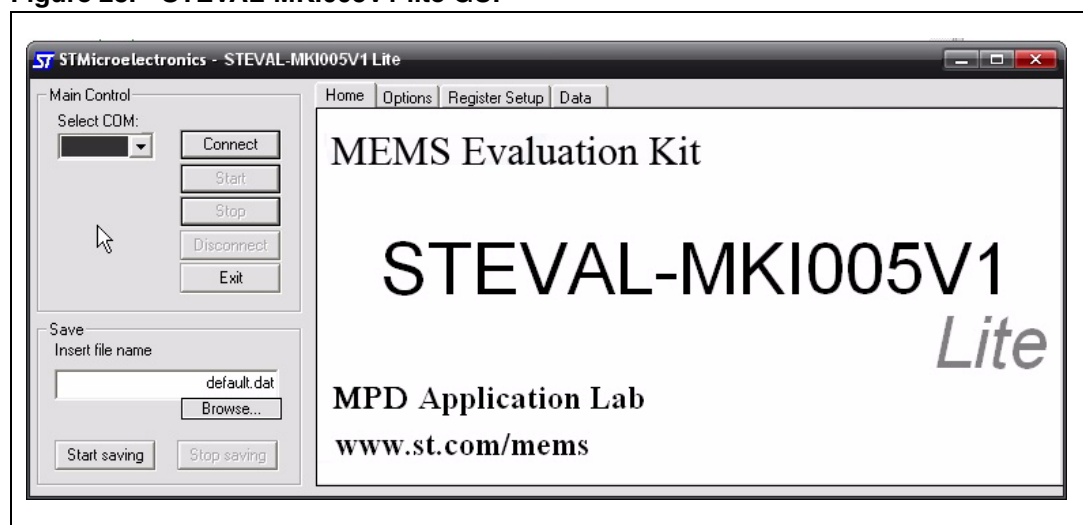
The installation pack also includes a “lite” version of the GUI together with its source code. The source code can be found in the directory: (\$Home)\STM\STEVAL-MKI005V1\STEVAL-MKI005V1_lite, where (\$Home) is the directory in which the software that comes with the demonstration kit is installed (C:\Program Files by default).

The purpose of the lite version is to provide the user a base for the development of a customized application.

The lite version of the demonstration kit is started by launching the STEVAL-MKI005V1 lite executable file located in the STEVAL-MKI005V1 > Executables folder.

An example of the GUI of the EK lite application is shown in [Figure 23](#).

Figure 23. STEVAL-MKI005V1 lite GUI



To use the software, follow these instructions:

1. Connect the STEVAL-MKI005V1 to the USB port
2. Launch the GUI for STEVAL-MKI005V1 lite
3. Select the Virtual COM port and click on the “Connect” button
4. Select the destination file to which the acceleration data must be saved (optional)
5. Click on the “START” (or “STOP”) button to activate (or stop) the sensor data collection, saving to file, and screen plotting functions
6. To close the application, click on “Disconnect” and then click on “Exit”

The GUI also gives read/write access to the registers embedded in the LIS3LV02DL device and allows a single read of the acceleration data measured by sensor.

6 MEMS pointer

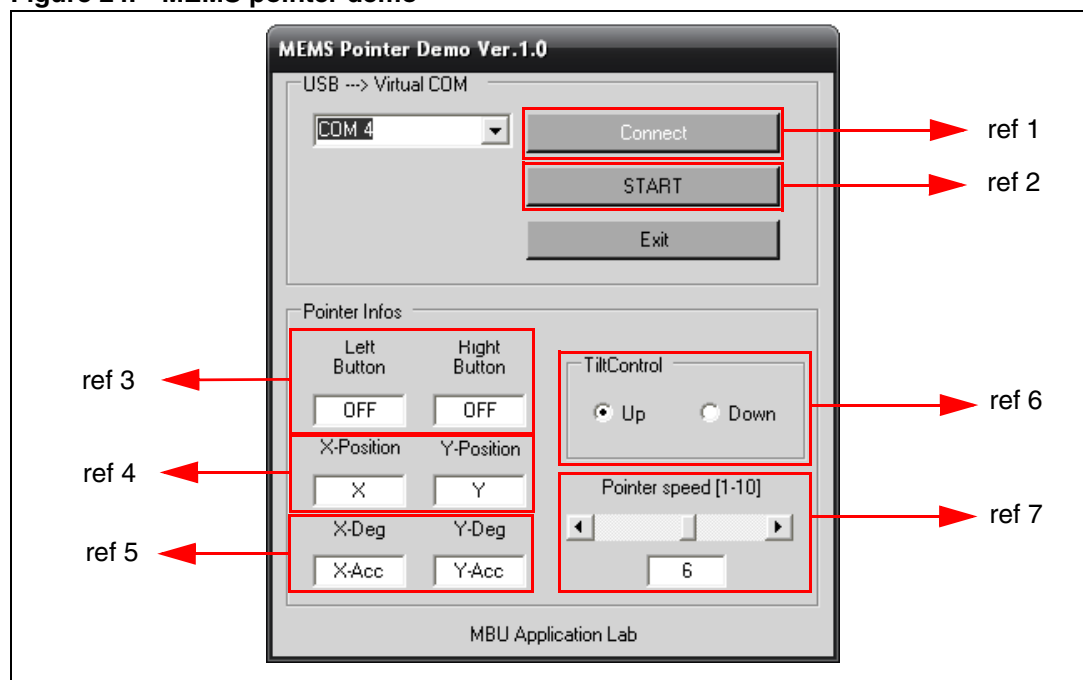
This section describes how to use a simple pointer application, which utilizes acceleration data provided by the LIS3LV02DL MEMS 3-axis linear accelerometer to control the position of a pointer on the screen of the PC. The software provided with the kit allows the STEVAL-MKI005V1 demonstration kit board to be used as an inertial mouse, where the tilt of the board is translated into movement of the pointer. The board also emulates the left and right buttons of the mouse.

6.1 GUI description

The GUI window (see [Figure 24](#)) is divided into two sections. The top section contains the main controls to open the connection to the demonstration kit and to start/stop the data acquisition (ref 1). The bottom section contains the demonstration kit details (device and firmware, ref 2).

The section on the right shows the same data and the mouse speed control.

Figure 24. MEMS pointer demo



6.1.1 Left side: main controls

The buttons on the right side of the GUI and their related functions are described below:

1. Connect/Disconnect control - selects the COM port on which the EK board is connected
2. Acquisition control - starts and stops acquisition
3. Exit - exits the MEMS pointer demo application

6.1.2 Left side: pointer application controls

The controls on the left side of the GUI and their related functions are as follows:

1. Left button/right buttons - indicates when the left/right button on the demonstration kit is pressed (ref 3)
2. X/Y-position - shows the current x/y coordinates of the mouse pointer on the PC screen (ref 4)
3. X/Y-deg - shows the tilt of the demonstration kit along the X and Y axes (ref 5)
4. Tilt control (ref 6) - Allows the user to select the direction of the vertical displacement on the screen vs. the direction in which the board is tilted. For example, by selecting "Up", the pointer moves upward when the demonstration kit is tilted forward. Conversely, by selecting "Down" the pointer moves downward when the board is tilted backward.
5. Pointer speed - sets the sensitivity of the pointer to the inclination of the board (ref 7)

7 Supported commands

The microcontroller mounted on the STEVAL-MKI005V1 board is equipped with dedicated firmware which supports a set of commands that allow the control of the 3-axis digital output MEMS sensor and permit the acquisition of the measured acceleration data. The firmware also handles the communication between the EK board and the PC through the USB bus. These features allow users to easily write their own applications to exploit the capabilities of the accelerometer.

This section describes the commands that are supported by the firmware for the microcontroller of the STEVAL-MKI005V1 demonstration kit.

7.1 Getting started

Before using the commands supported by the firmware, the following procedure must be performed:

1. Connect the STEVAL-MKI005V1 to the USB port
2. Launch an application which allows the sending of commands through the Virtual serial port. The remainder of this document assumes the use of the Microsoft® Hyper Terminal program integrated in the Windows® XP® operating system
3. Create a new connection, enter a name (ex. "STEVAL-MKI005V1"), and click "OK"
4. In the "Connect Using" field, select the Virtual COM port to which the USB port has been mapped, and click "OK"
5. In Port Settings, set Bits per second to 115200, Data bits to 8, Parity to None, Stop bits to 1, and Flow control to None. Click "OK"
6. In the Hyper Terminal select Files > Properties > Settings and then click onto the "ASCII Setup" button
7. Select "Send line ends with line feeds" and "Echo typed characters locally"
8. Click the "OK" button to close the "ASCII Setup" window
9. Click the "OK" button to close the "Properties" window

Once this procedure has been completed the user can utilize the commands described in the following sections by typing them into the "Hyper Terminal" window.

7.2 Supported commands

The table below lists the commands supported by the STEVAL-MKI005V1 firmware:

Table 1. Supported commands

Command	Description	Returned value
*start	Starts continuous data acquisition	s t xh xl yh yl zh zl l1 l2 s
*debug	Returns the acceleration data in readable text format	x=XX y=YY z=ZZ
*stop	Stops data acquisition	
*rAA	Register read	RAAhDDh

Table 1. Supported commands (continued)

Command	Description	Returned value
*wAADD	Register write	
*bwAA<0:7><0 1>	Single bit write	
*Zon	Force 3-state	
*Zoff	Exit from 3-state	
*dev	Device name	LIS3LV02DL
*ver	Firmware version	3LV02DL 1.0

Note: AA: register address
DD: data
S: service field
XX, YY, ZZ: Acceleration data returned for the X, Y and Z axes
I1, I2 : interrupt value on each axes.

7.2.1 Start command

The *start command initiates the continuous data acquisition. When this command is sent to the board, it returns the acceleration data measured by the LIS3LV02DL device. The acceleration data are packed in a string composed of eight bytes: "s t X Y Z I1 I2 s". The first two bytes are always "s" and "t" which correspond to the hexadecimal values {73 74}, while "X" "Y" "Z" represent, respectively, the acceleration data for the X, Y, Z axes.

"I1" and "I2" contain the values of FF_WU_SRC and DD_SRC, where each bit is a specific interrupt.

The last byte "s" returns information about the switches mounted on the board. Specifically, bit#1 and bit#0 of the "service data" correspond to the status of SW3 and SW2 on the demonstration kit board, and they are set to 1 when the corresponding switch is pressed.

7.2.2 Debug command

The *debug command starts the continuous data acquisition in debug mode. When this command is sent to the board it returns the acceleration data measured by the LIS3LV02DL device in readable text format. The values shown on the screen correspond to the content of the output data registers and are shown as a hexadecimal number. A TAB is employed as a separator between the different fields.

7.2.3 Stop command

The *stop command interrupts any acquisition session that has been started with either the *start or *debug commands.

7.2.4 Register read

The *rAA command allows the contents of the LIS3LV02DL device registers in the demonstration kit board to be read. AA, expressed as hexadecimal value and written upper-case, represents the address of the register to be read.

Once the read command is issued, the board returns RAAhDDh, where AA is the address sent by the user and DD is the data present in the register.

For example, to read the CTRL_REG1 the user would issue the command *r20, which returns R20hC7h.

7.2.5 Register write

The *wAADD command is used to write to the contents of the LIS3LV02DL device registers. AA and DD, expressed as hexadecimal values and written in upper-case, represent (respectively) the address of the register and the data to be written. To write 0xC7 to the CTRL_REG1, for example, the user issues the command *w20C7.

7.2.6 Single bit write

Using this command it is possible to set/reset a single bit in a given register. The command *bwAA<0:7><0|1> requires the user to specify the address AA of the register in which to change the bit, with AA expressed as a hexadecimal value and written in lower-case, followed by the position of the bit to be changed, an integer between 0 and 7, and the value, either 0 or 1, to be associated to the specified bit.

For example, to set the FS bit to 1 within the CTRL_REG2, the user would issue the command *bw2171.

7.2.7 Zon and Zoff

The *Zon and *Zoff commands are employed respectively to put into 3-state (i.e. high-impedance) and to exit (i.e. normal mode) the SPI lines of the ST7-USB microcontroller mounted on the demonstration kit. These commands allow the isolation of the sensor from the microprocessor in the event that an external control (from a different microcontroller mounted on a separate board) is needed.

By default, when the kit is first turned on, the SPI lines are in 3-state mode and the user is required to send the command *Zoff to allow the communication between the sensor and the microcontroller.

7.2.8 Device name

The *dev command retrieves the name of the device mounted on the demonstration kit connected to the PC. For the STEVAL-MKI005V1, the returned value is "LIS3LV02DL".

7.2.9 Firmware version

The *ver command queries the demonstration kit and returns information on the version of the firmware loaded in the microprocessor.

7.3 Quick start

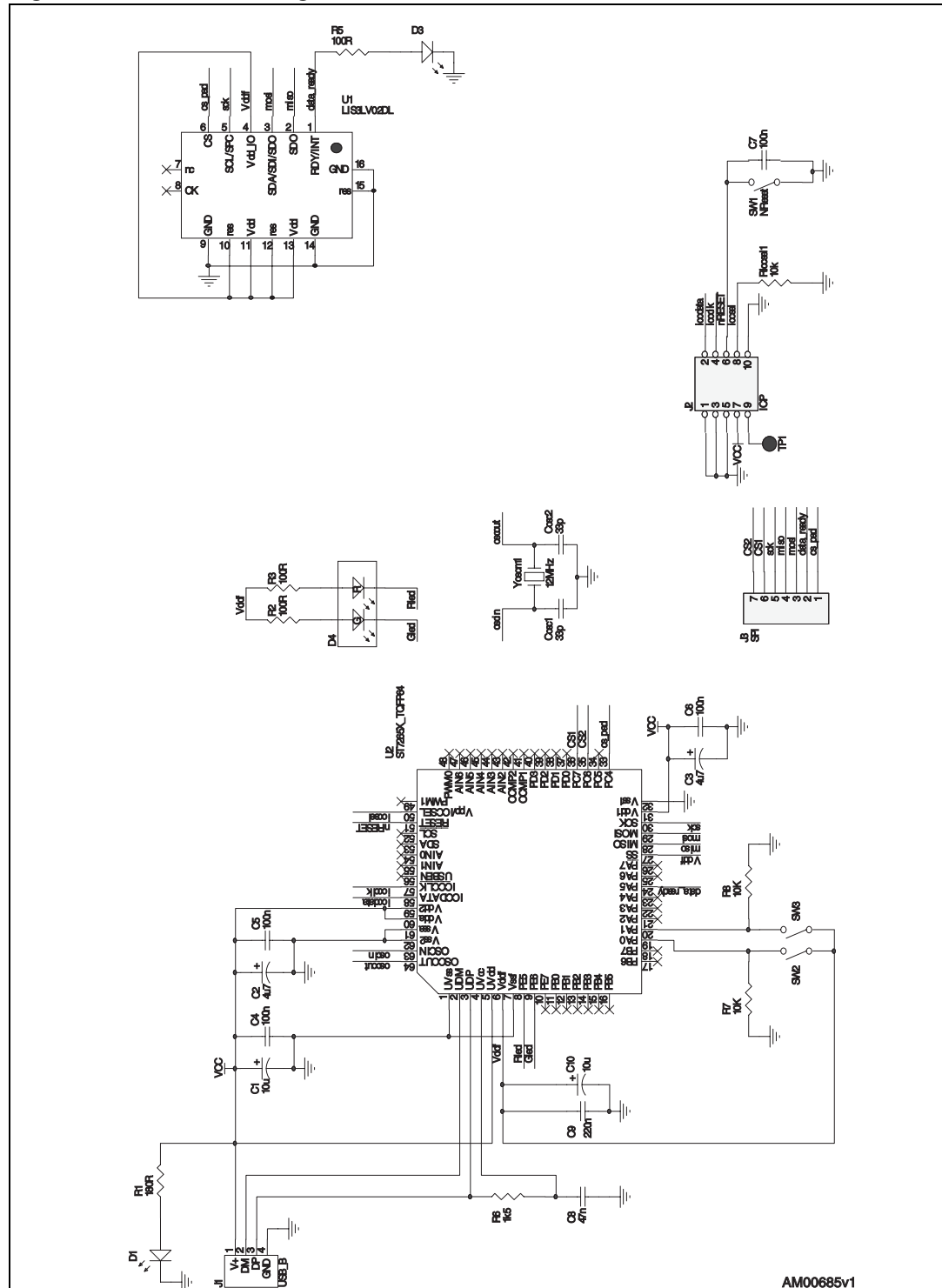
This section shows the basic sequence of commands to start a data communication session and to retrieve the acceleration data from the demonstration kit:

1. Connect the STEVAL-MKI005V1 to the USB port
2. Start “Microsoft® Hyper Terminal” and configure it as described in section [7.1](#)
3. Inside the “Hyper Terminal” window, enter the command *Zoff to enable the control of the SPI line from the ST7-USB microcontroller
4. Send the *debug command to get the acceleration data measured from the sensor
5. Send *stop to end the continuous acquisition and visualization

8 Schematic diagram

The schematic diagram of the STEVAL-MKI005V1 demonstration kit is shown in [Figure 25](#).

Figure 25. Schematic diagram of the STEVAL-MKI005V1 board



9 Bill of materials

Table 2 lists the bill of materials for the STEVAL-MKI005V1 demonstration kit.

Table 2. Bill of materials

Designator	Description	Comment	Footprint
C1	Capacitor	10 μ C	C1206_POL
C2	Capacitor	4 μ C	C1206_POL
C3	Capacitor	4 μ C	C1206_POL
C4	Capacitor	100 nC	0805
C5	Capacitor	100 nC	0805
C6	Capacitor	100 nC	0805
C7	Capacitor	100 nC	0805
C8	Capacitor	47 nC	0805
C9	Capacitor	220 nC	0805
C10	Capacitor	10 μ C	C1206_POL
Cosc1	Capacitor	33 pC	0805
Cosc2	Capacitor	33 pC	0805
D1	Led	SMD_LED green	SMD_LED
D2	Led	SMD_LED 3C	SMD_LED_3C
D3	Led	SMD_LED green	SMD_LED
D4	Led	SMD_LED red	SMD_LED
J1	USB connector	USB_B_mini	USB_B_mini
J2	Header, 5X2	ICP	HEADER_5X2_A
J3	Header, 7-Pin	SPI	HDR1X7
R1	Resistor	180 Ω	0805
R2	Resistor	100 Ω	0805
R3	Resistor	100 Ω	0805
R4	Resistor	100 Ω	0805
R5	Resistor	100 Ω	0805
R6	Resistor	1 k Ω	0805
R7	Resistor	10 k Ω	0805
R8	Resistor	10 k Ω	0805
Riccsel	Resistor	10 k Ω	0805
SW1	Button	NReset	SMT_Button
SW2	Button	SMT_Button	SMT_Button
SW3	Button	SMT_Button	SMT_Button
U1		LIS3LV02DL	TLGA_7x5x1
U2		ST72F651AR6T1E	TQFP64_10x10
Yoscm1	Crystal	12 MHz	OSC_SMD

10 Revision history

Table 3. Document revision history

Date	Revision	Changes
07-Nov-2008	1	Initial release

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