

FDC1004 GUI User Guide

User's Guide



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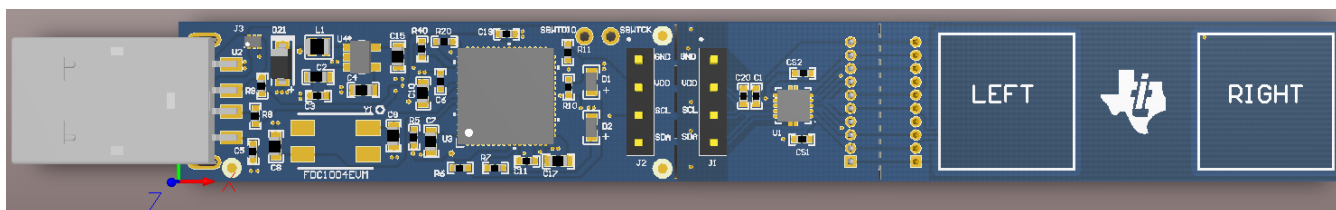
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FDC1004 Evaluation Module Overview

The FDC1004 Evaluation Module (EVM) enables the user to evaluate the FDC1004. The EVM is a USB device used with a host computer and accessed using the Graphical User Interface (GUI) software.

To quickly get started with the FDC1004 GUI, follow the steps below to load and configure a device.



Evaluation Module

2.1 Set Up Requirements

- The FDC1004 GUI and drivers must be installed on the host PC (download the software from TI web site)
- The USB port of the EVM must be connected to the host PC.

2.2 Loading and Running

1. Plug the EVM into the host computer. The host computer should automatically detect the device as FDC1004EVM.
2. Launch the GUI. It automatically reads all the configuration registers, and begins streaming data of the 4 channels.

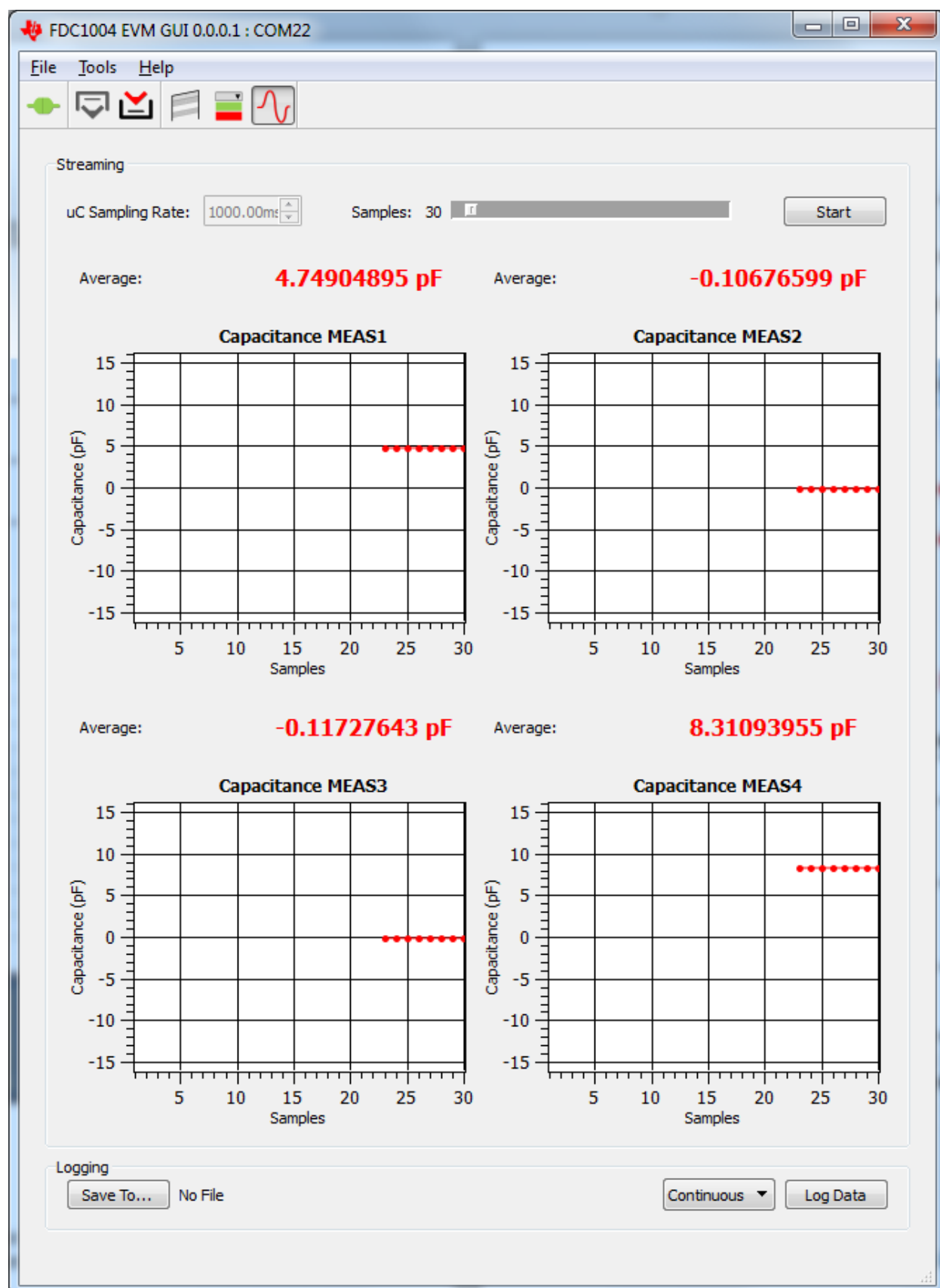


Figure 2-1. Streaming Section

2.3 Reloading the Device

If the EVM is disconnected from the host at any time, reconnect the device and the GUI will automatically discover and re-establish the streaming abilities with the device.

2.4 Configuring the Device Manually

1. The GUI puts the device in streaming mode by default. To configure the internal registers of the FDC1004 the streaming of the data must be stopped. Click on "Stop" in the Streaming Section to stop streaming.

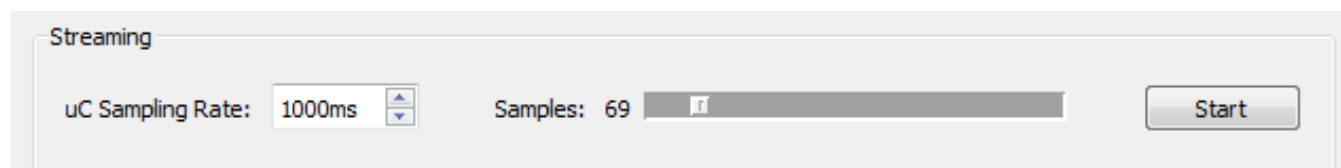


Figure 2-2. Stop Streaming

2. Click on the "Configuration Section" icon in the main window toolbar.



Figure 2-3. Configuration Section Icon

3. Select the parameter to change. Changes are applied immediately.

Configuration

Read All Restore from Defaults

MEAS1 Configuration: MEAS1 CAPDAC 0.000 pF	Offset Calibration CH1 0.000000pF
MEAS1 Configuration: MEAS1 CHA CH1	Offset Calibration CH2 0.000000pF
MEAS1 Configuration: MEAS1 CHB DISABLED	Offset Calibration CH3 0.000000pF
MEAS2 Configuration: MEAS2 CAPDAC 0.000 pF	Offset Calibration CH4 0.000000pF
MEAS2 Configuration: MEAS2 CHA CH2	Gain Calibration CH1 1.00000000
MEAS2 Configuration: MEAS2 CHB DISABLED	Gain Calibration CH2 1.00000000
MEAS3 Configuration: MEAS3 CAPDAC 0.000 pF	Gain Calibration CH3 1.00000000
MEAS3 Configuration: MEAS3 CHA CH3	Gain Calibration CH4 1.00000000
MEAS3 Configuration: MEAS3 CHB DISABLED	Manufacturer ID 21577 (0x5449)
MEAS4 Configuration: MEAS4 CAPDAC 0.000 pF	Device ID 4100 (0x1004)
MEAS4 Configuration: MEAS4 CHA CH4	
MEAS4 Configuration: MEAS4 CHB -----	

Figure 2-4. Configuration Section

2.5 Saving Device Configuration

1. Click on the "Save" icon in the toolbar.



Figure 2-5. Save Icon

2. Type a name for the file.

2.6 Configuring the Device with Configuration File Defaults

1. To configure the FDC1004 with a configuration file the streaming must be stopped.
2. Click on the "Open" icon in the toolbar.



Figure 2-6. Open Icon

3. Select the configuration file and press open.

After the configuration file is loaded, the values are written once to all supported registers. To restore default values (values load at power on of the EVM), click on "Restore from Defaults".

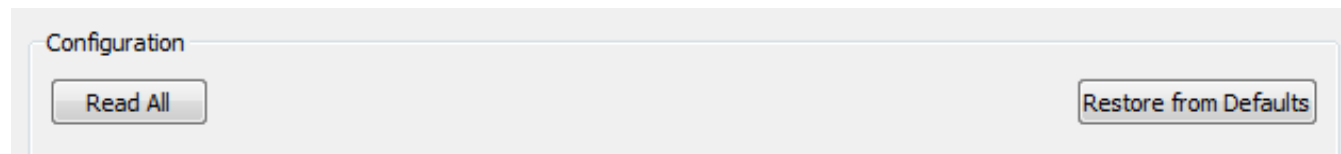


Figure 2-7. Restore Defaults

Capacitive Sensing GUI Overview

The capacitive-sensing GUI provides graphical configuration and streaming support for the FDC1004. The GUI package includes drivers for use with the FDC1004 Evaluation Modules (EVM). The EVM provides a device abstraction layer for the GUI to communicate with the FDC1004 through I2c, and includes other extended functionalities.

3.1 Host Platform Requirements

The FDC1004EVM GUI supports:

- 32-bit and 64-bit Windows 7
- 32-bit and 64-bit Windows XP

The host machine is required for device configuration and data streaming.

3.2 EVM Information

The TI FDC1004 EVM allows the GUI to:

- Configure register data through I2C (SCL, SDA)
- Stream register data through I2C

3.3 Hardware Setup

Below are the steps which are necessary to prepare the EVM for the GUI:

- The GUI must be installed on the host.
- The EVM driver must be installed on the host.
- The EVM must be connected to a full speed USB port (1.0 or above).

3.4 Icon Toolbar

The icon toolbar contains various icons which navigate between sections and perform various functions.



Figure 3-1. Icon Toolbar

Table 3-1. Icon Toolbar

Name	Description	Icon
Connection Information	Indicates whether an EVM is connected to the PC, and if so, provides details of the connected device.	EVM is connected:  EVM is disconnected: 

Table 3-1. Icon Toolbar (continued)

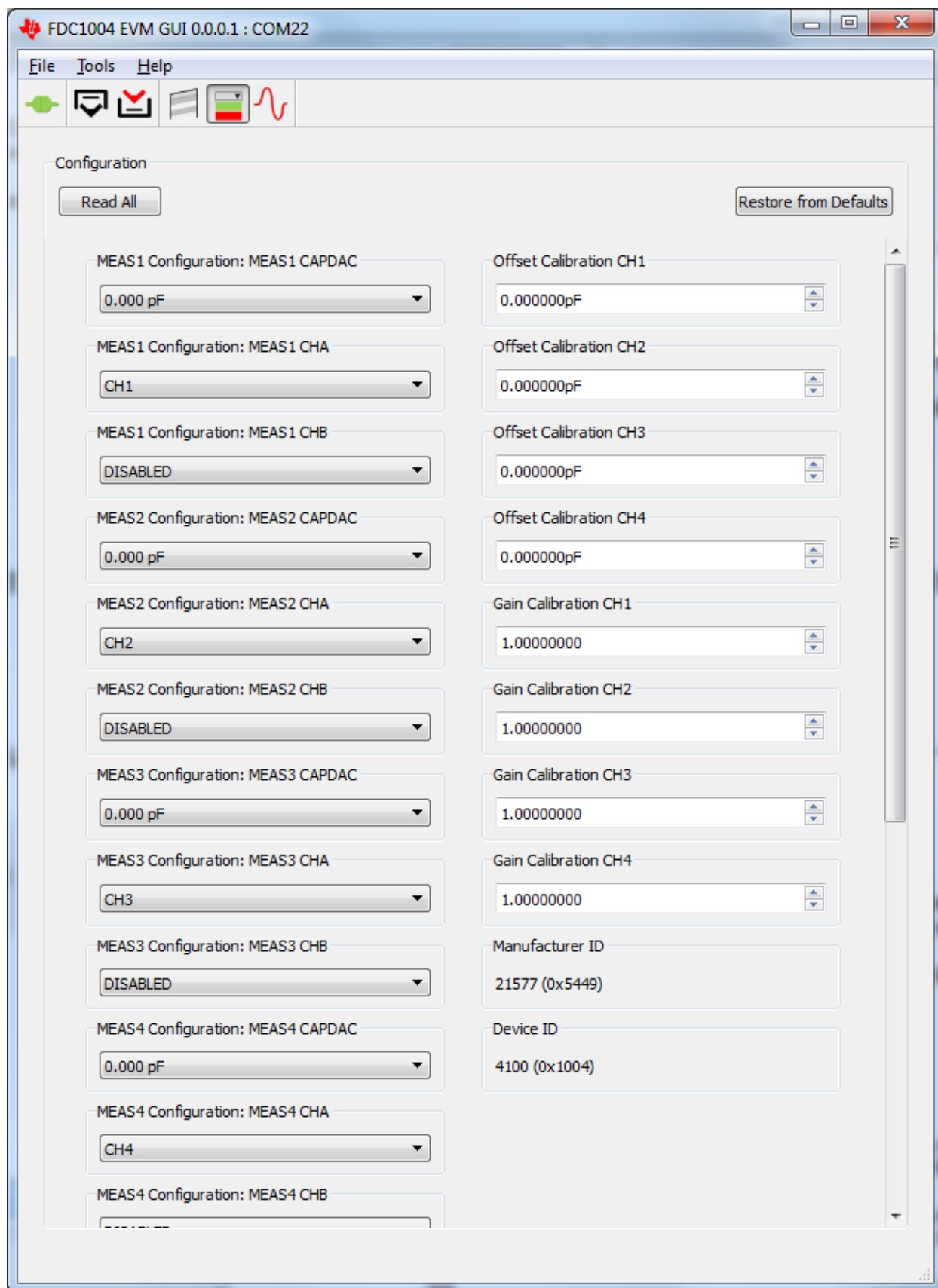
Name	Description	Icon
Open	Opens saved register settings and defaults	
Save	Saves all current register settings and defaults	
Register Settings	Shows Register Settings Section	
Configuration	Shows Configuration Section	
Streaming	Shows Streaming Section	

3.5 Connecting and Disconnecting

Device discovery, connection, and disconnection are performed automatically.

3.6 General Configuration

In the configuration section, all registers of the device can be accessed. To access this section, streaming must be stopped.



The screenshot shows the 'FDC1004 EVM GUI 0.0.0.1 : COM22' window. The 'Configuration' tab is active, displaying a 'Read All' button and a 'Restore from Defaults' button. The configuration is organized into two columns. The left column contains settings for MEAS1, MEAS2, MEAS3, and MEAS4, each with CAPDAC, CHA, and CHB options. The right column contains offset and gain calibration values for channels 1 through 4, along with Manufacturer ID and Device ID fields.

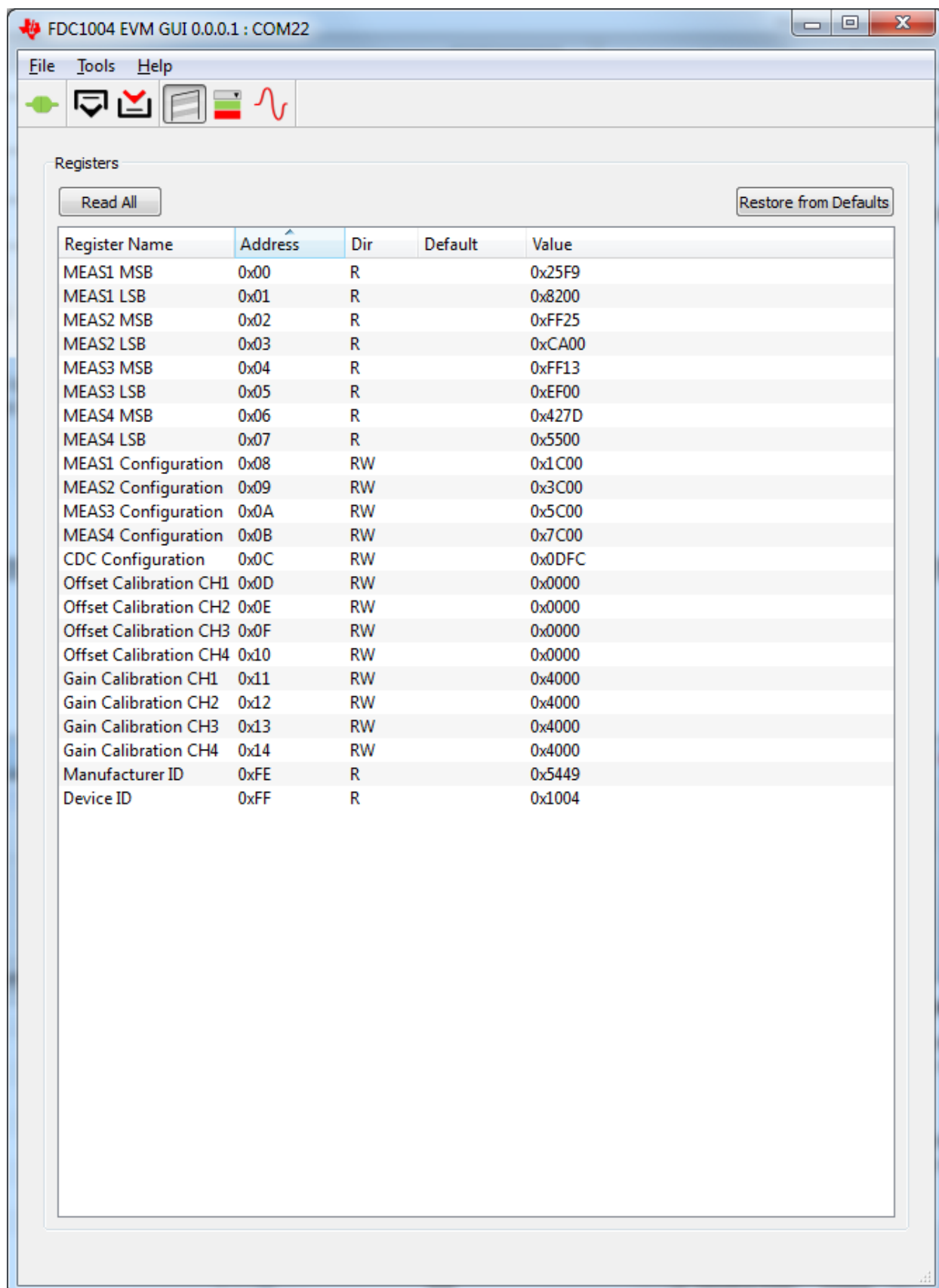
MEAS Configuration	Offset Calibration	Gain Calibration
MEAS1 Configuration: MEAS1 CAPDAC: 0.000 pF	Offset Calibration CH1: 0.000000pF	Gain Calibration CH1: 1.00000000
MEAS1 Configuration: MEAS1 CHA: CH1	Offset Calibration CH2: 0.000000pF	Gain Calibration CH2: 1.00000000
MEAS1 Configuration: MEAS1 CHB: DISABLED	Offset Calibration CH3: 0.000000pF	Gain Calibration CH3: 1.00000000
MEAS2 Configuration: MEAS2 CAPDAC: 0.000 pF	Offset Calibration CH4: 0.000000pF	Gain Calibration CH4: 1.00000000
MEAS2 Configuration: MEAS2 CHA: CH2		
MEAS2 Configuration: MEAS2 CHB: DISABLED		
MEAS3 Configuration: MEAS3 CAPDAC: 0.000 pF		
MEAS3 Configuration: MEAS3 CHA: CH3		
MEAS3 Configuration: MEAS3 CHB: DISABLED		
MEAS4 Configuration: MEAS4 CAPDAC: 0.000 pF		
MEAS4 Configuration: MEAS4 CHA: CH4		
MEAS4 Configuration: MEAS4 CHB: -----		
	Manufacturer ID: 21577 (0x5449)	Device ID: 4100 (0x1004)

Figure 3-2. Configuration Section

In the configuration window, select the parameter to change. Changes are applied immediately. Press "Read All" to refresh all configuration, status, and data. Press "Restore Defaults" to write values from the default column (if they exist) to the current register value.

3.7 Register Settings

In the register settings section, all registers of the device can be accessed. To read/write registers, streaming must first be stopped by pressing the "Stop" button.


Figure 3-3. Register Settings

Double-click on a register in the table to read/write. If a register is read only (indicated by a "R" in the Dir column), the selected register is read immediately and the table value updated. If the register is read/write (indicated by a "RW" in the Dir column), a dialog pops up and the user can choose a new register value. If the value is not changed, it will default to a read.

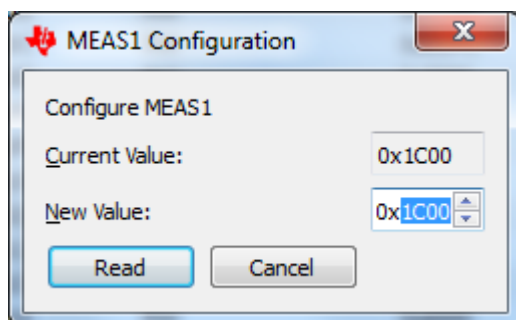


Figure 3-4. Read/Write Register Dialog

Press "Read All" to refresh all configuration, status, and data.

Press "Restore Defaults" to write values from the default column (if they exist) to the current register value.

3.8 Data Streaming

Data is streamed from the EVM to the GUI when the "Start" button is pressed. The sampling rate of the EVM and the number of samples to plot can be configured.

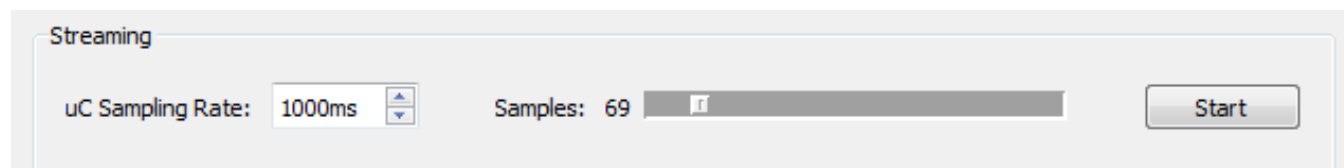


Figure 3-5. Streaming Configuration

The sampling rate can only be set when streaming is stopped. The max sample rate supported by the streaming is 100S/s.

3.9 Average, Point, Min, Max Values

Average is the default display type. To toggle between sample point, min, and max values, right-click the display.

Display Style	Description
Average	The average value of all data points currently in the plot
Point	The newest data point currently in the plot
Min	The minimum data point value currently in the plot
Max	The maximum data point value currently in the plot

A larger number of samples results in a larger averaging window.

3.10 Zooming and Scaling

Plots are interactive. Zooming options are available by right-clicking the plot and selecting an option from the context menu.

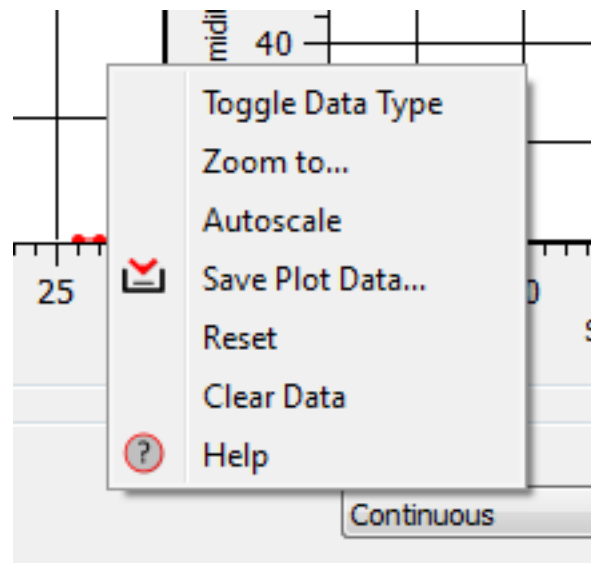


Figure 3-6. Plot Context Menu

Selection	Description
Zoom to...	Selects a region of the plot.
Autoscale	Sets the Y-axis range to fit the data range in the plot window
Reset	Resets the Zoom window to its default setting
Help	Displays shortcut keys and mouse mappings for scaling and zooming

3.11 Saving and Loading

3.11.1 Configurations

Configurations can be saved and loaded. To save a configuration, click on the "Save" icon. To load a configuration, click on the "Open" icon.

Configurations include all register names, current values, and default values. They are saved in Comma Separated Files (*.csv) and can be modified using a text or spreadsheet editor.

3.11.2 Plot Data

Right-click a plot and select "Save Data..."

Data can be saved to a new file or an existing one. If an existing file is chosen, data will be appended.

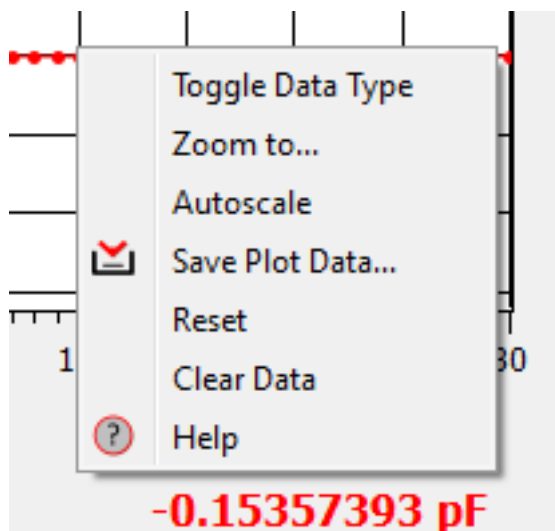


Figure 3-7. Saving Data from a Plot

3.11.3 Data Log

It is also possible to save all the data collected by the GUI in a log file. First of all click on the "Save To..." button to create and name a data log file. Next click the "Log Data" button. The data will be saved in the Comma Separated Value format.

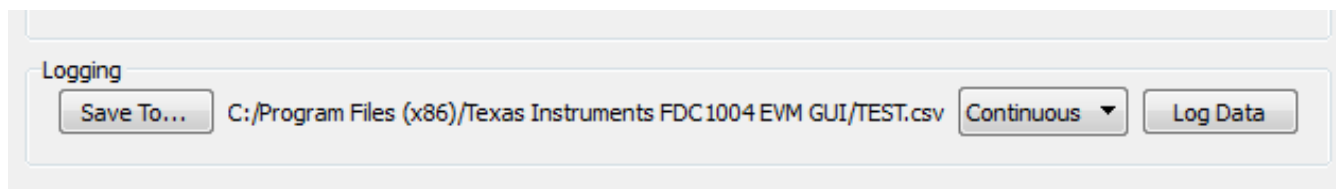


Figure 3-8. Data Log

Allowed Configurations

The GUI controls the configurations of all the FDC1004 registers.

While the FDC1004 can be configured with 1 to 4 measurement setups, the GUI expects all 4 of the measurement setups to be configured. For an application which needs less than four measurement setups (e.g. a fluid level sensing which only needs 3 measurement setups), it is still necessary to configure any unused measurement setups. A good approach for any unconfigured measurement setups is to duplicate the first measurement setup (e.g. for a fluid level sensing application which has 3 measurement setups; the fourth measurement still needs to be configured, so set the fourth measurement setup with the same configuration as the first setup). Refer to the [Datasheet](#) for further details on how to configure the FDC1004 channels.

The FDC1004EVM has been designed to support a sub set of the FDC1004 configuration. The following list shows the supported configurations:

- (a) CIN_n, n=1..4 vs. GND, CAPDAC disabled;
- (b) CIN_n, n=1,2 vs. GND, CAPDAC enabled;
- (c) CIN1 vs. CIN_m, m=3,4 (COFF in the EVM schematic is populated and sensor module is connected or when the sensor module is removed and a sensor is connected to CIN3);
- (d) CIN2 vs. CIN_m, m=3,4 (only when the sensor module is removed and a sensor is connected to CIN2);

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