

# **LDC1000/LDC1001/LDC1041/LDC1051 Evaluation Module**

## **User's Guide**

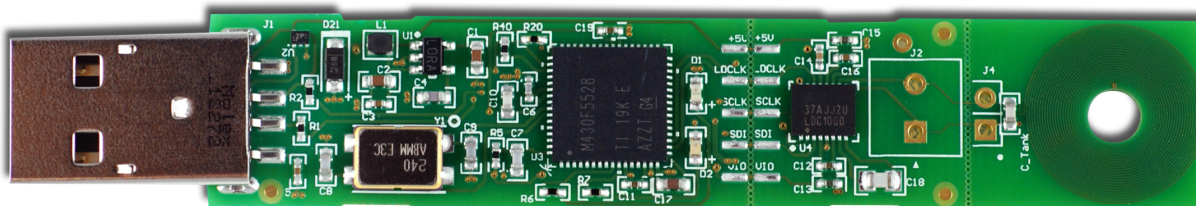


Literature Number: SNAU150B  
September 2013–Revised November 2019

## LDC1000/LDC1001/LDC1041/LDC1051 Evaluation Module

### 1.1 Overview

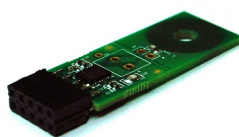
The LDC10xx Evaluation Module is designed to provide an example LC tank and coil structure application which interfaces to a host computer. The module can be used independently of the GUI by the on-board embedded LED, which demonstrates threshold detection.



**Figure 1-1. Evaluation Module**

The EVM includes an example PCB sensor which is a 2 layer, 23 turn, 14mm diameter inductor with a 100pF 1% NP0 capacitor connected in parallel to form an LC tank.

The EVM is perforated at two locations to provide the option to interface to various system configurations. The first perforation, between the coil and the LDC10xx, can be used to snap off the PCB coil and connect a custom coil. The second perforation is between the LDC10xx and the MSP430, and provides the option to connect the LDC10xx and the sensor to a different system or to use multiple sensors in one system for prototyping.



**Figure 1-2. LDC1000+Sensor**

When the evaluation module first powers up from the USB port, it will flash a series of green and red LED lights to indicate self-test. When the self-test is finished, the green LED indicates the status of the LDC10xx INTB pin. When the INTB pin is asserted, the green LED is lit. By default, INTB is configured for threshold detection.

### 1.2 Sensing Solutions EVM GUI

The Sensing Solutions EVM GUI provides direct device register access, user-friendly configuration, and data streaming.

### 1.2.1 System Requirements

The host machine is required for device configuration and data streaming. The following steps are necessary to prepare the EVM for the GUI:

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

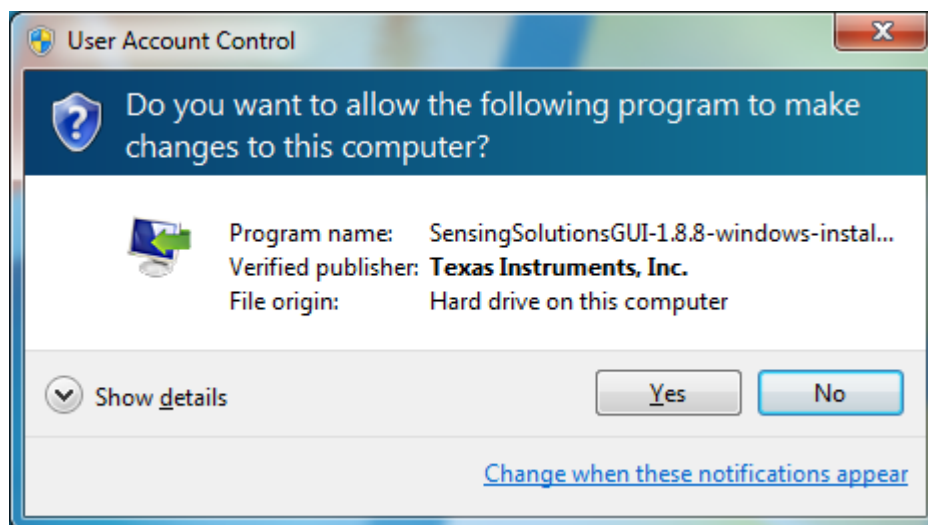
The Sensing Solutions EVM GUI supports the following operating systems (both 32-bit and 64-bit):

- Windows XP
- Windows 7
- Windows 8 and 8.1
- Windows 10

### 1.2.2 Installation Instructions

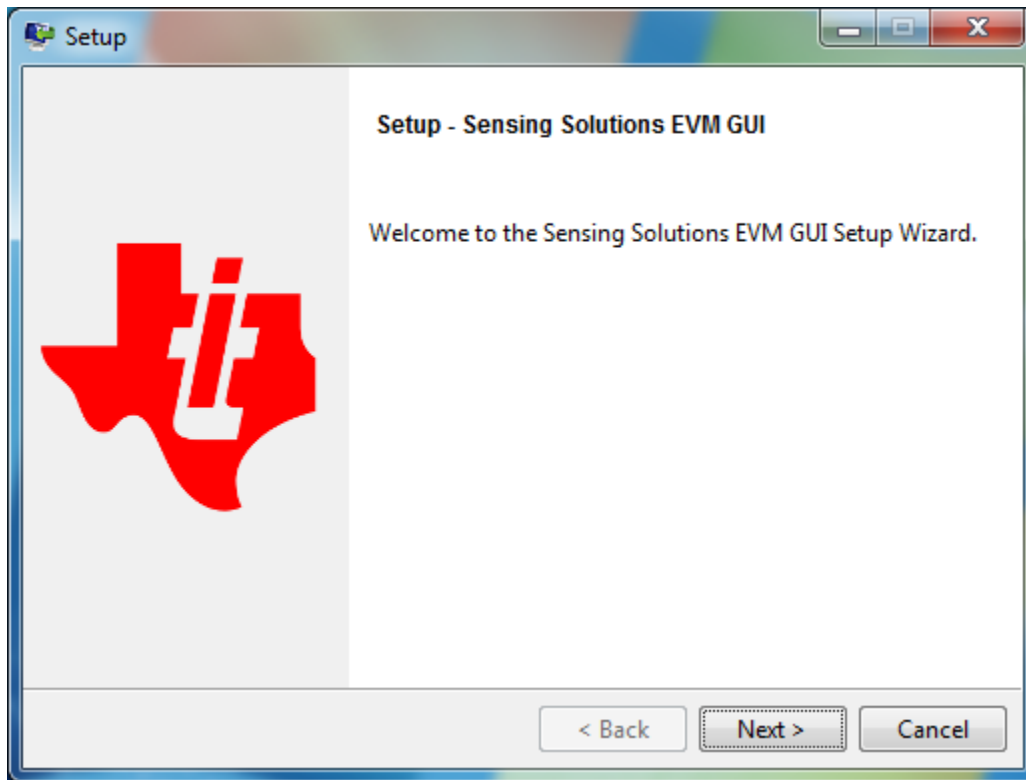
The Sensing Solutions GUI and EVM driver installer is packaged in a zip file. Follow these steps to install the software:

1. Download the software ZIP file from the EVM tool page
2. Extract the downloaded ZIP file
3. Run the included executable
4. If prompted by the User Account Control about making changes to the computer, click "Yes"



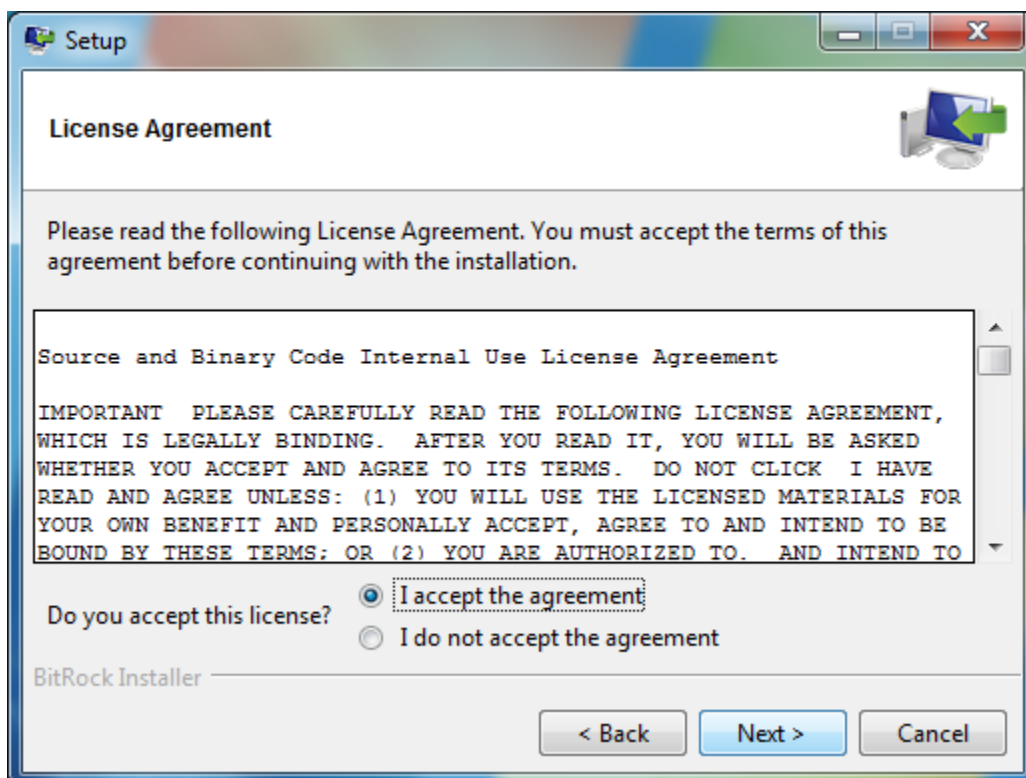
**Figure 1-3. User Account Control Prompt**

5. After the setup wizard starts, click "Next"



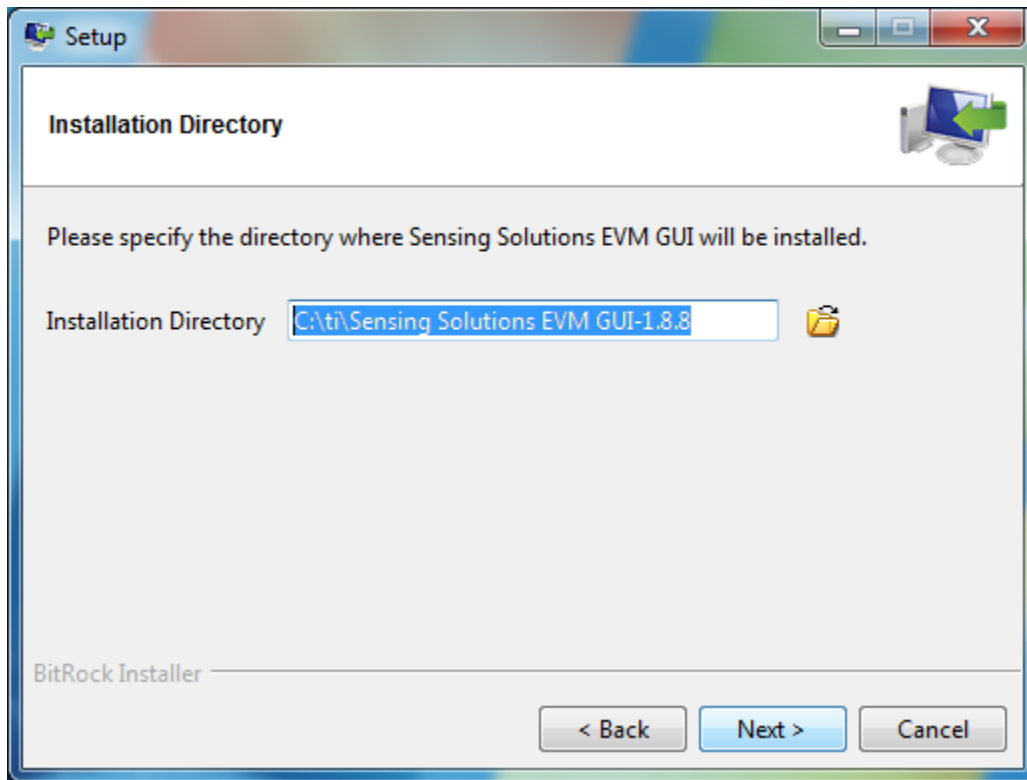
**Figure 1-4. Software Installer Wizard**

6. Read the license agreement, select "I accept the agreement", and click "Next"



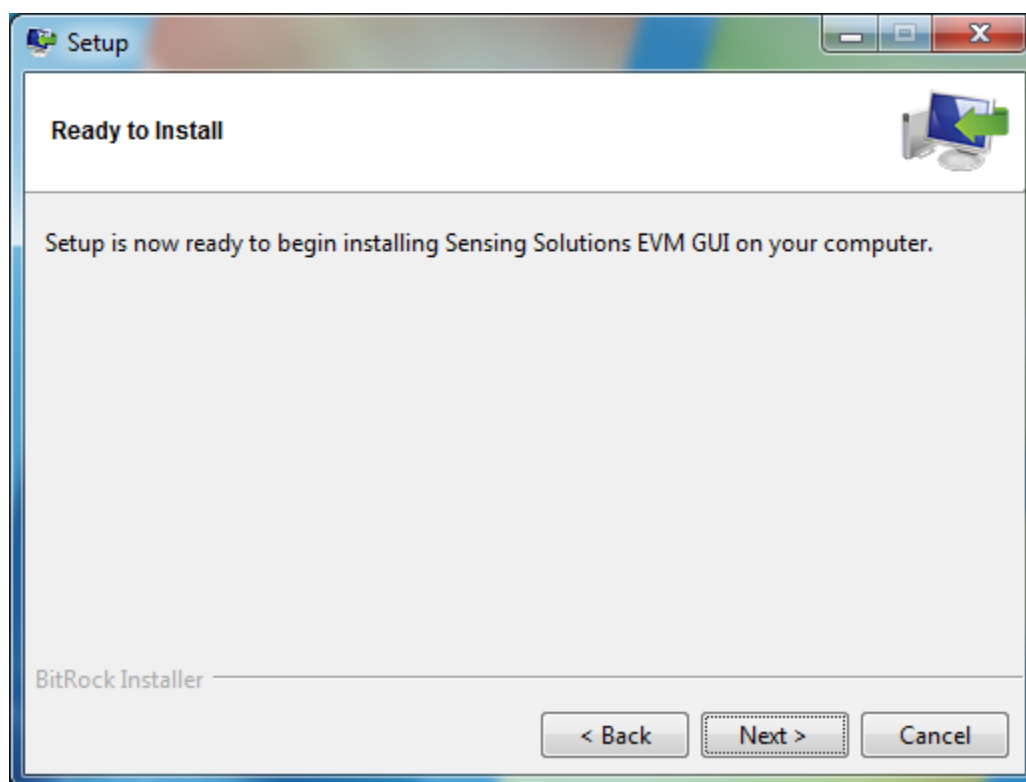
**Figure 1-5. Software Installer License Agreement**

7. Use the preselected installation directory and click "Next"



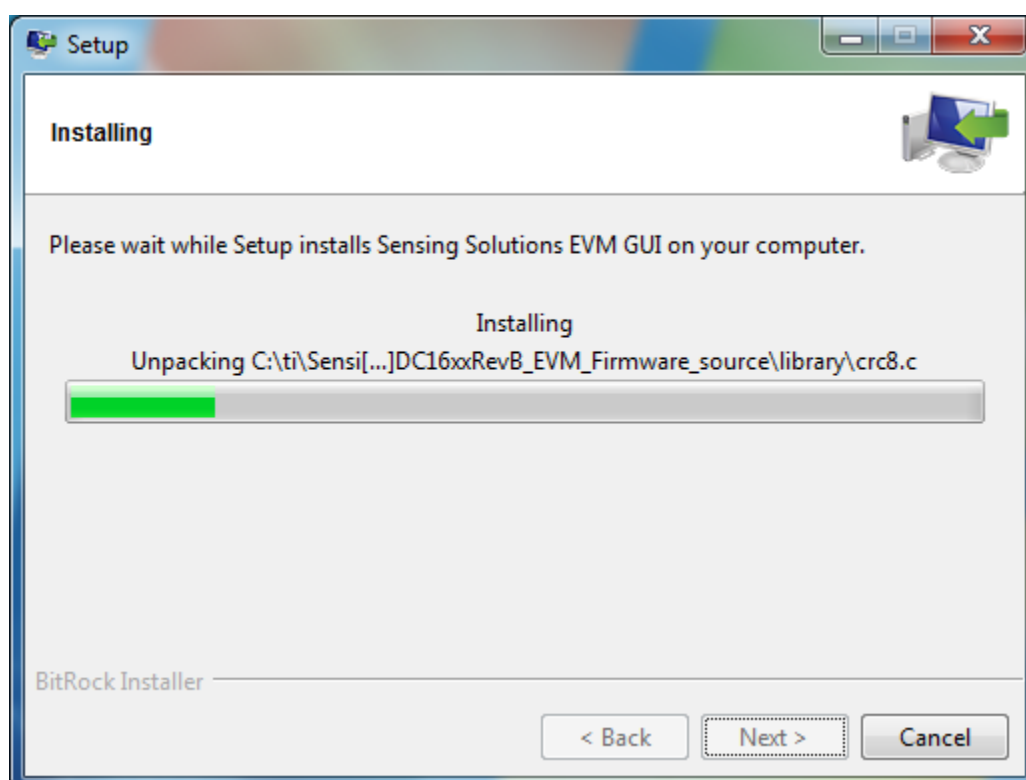
**Figure 1-6. Software Installation Directory**

8. Start the installation by clicking "Next"



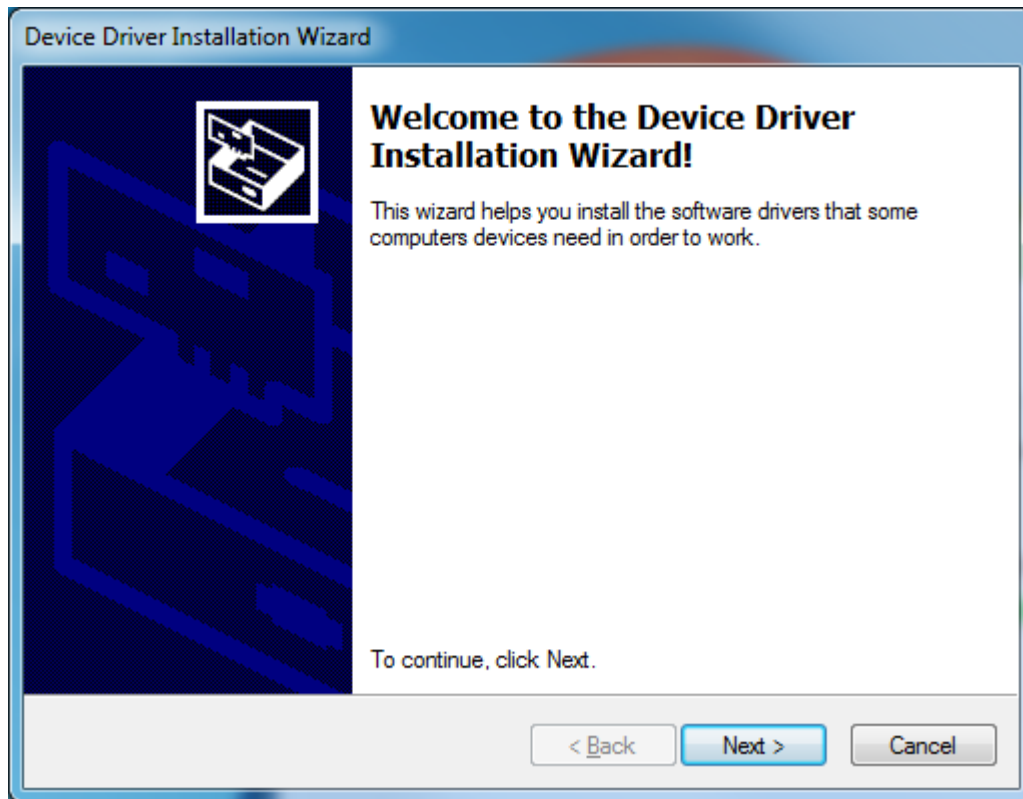
**Figure 1-7. Software Installer Ready**

9. Wait for the installation to complete



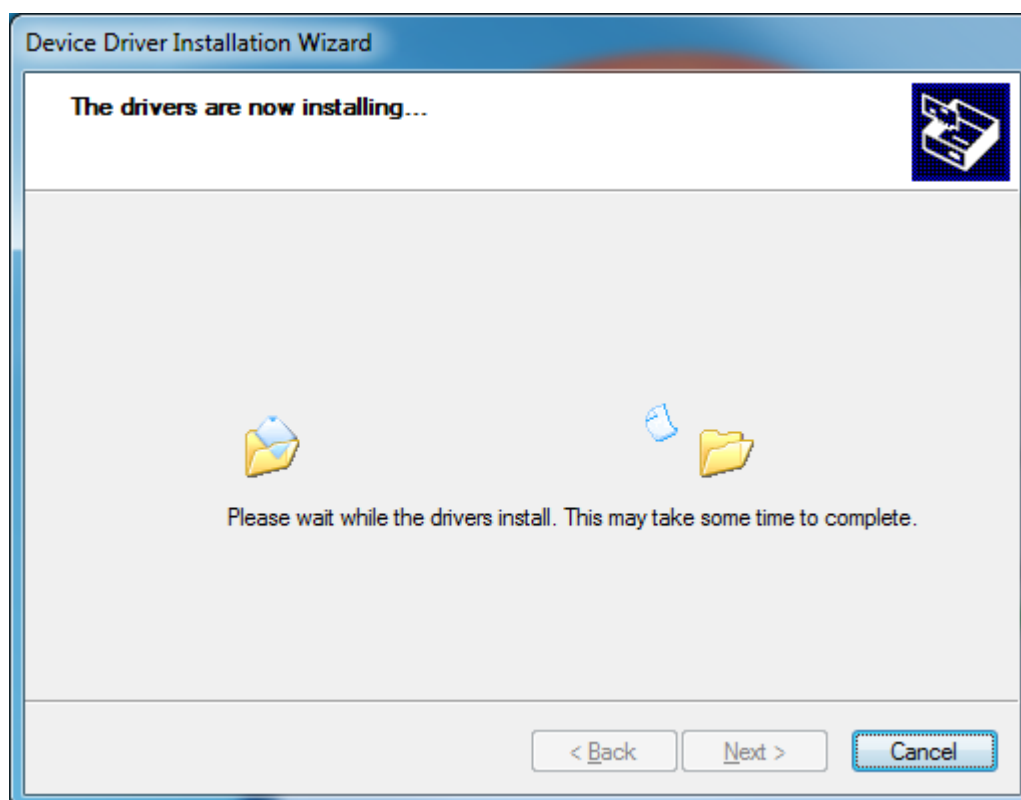
**Figure 1-8. Software Installer In Progress**

10. When the "Device Driver Installation Wizard" appears, click "Next" to install the EVM driver



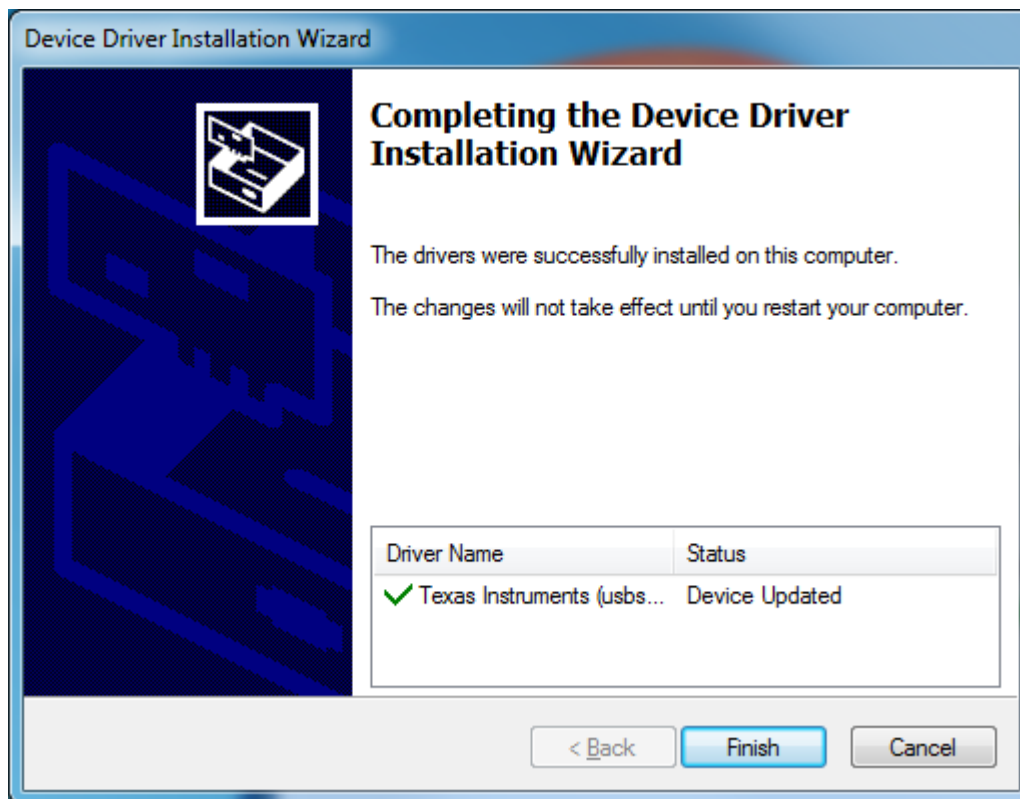
**Figure 1-9. Device Driver Installer Wizard**

11. Wait for the driver installation to complete



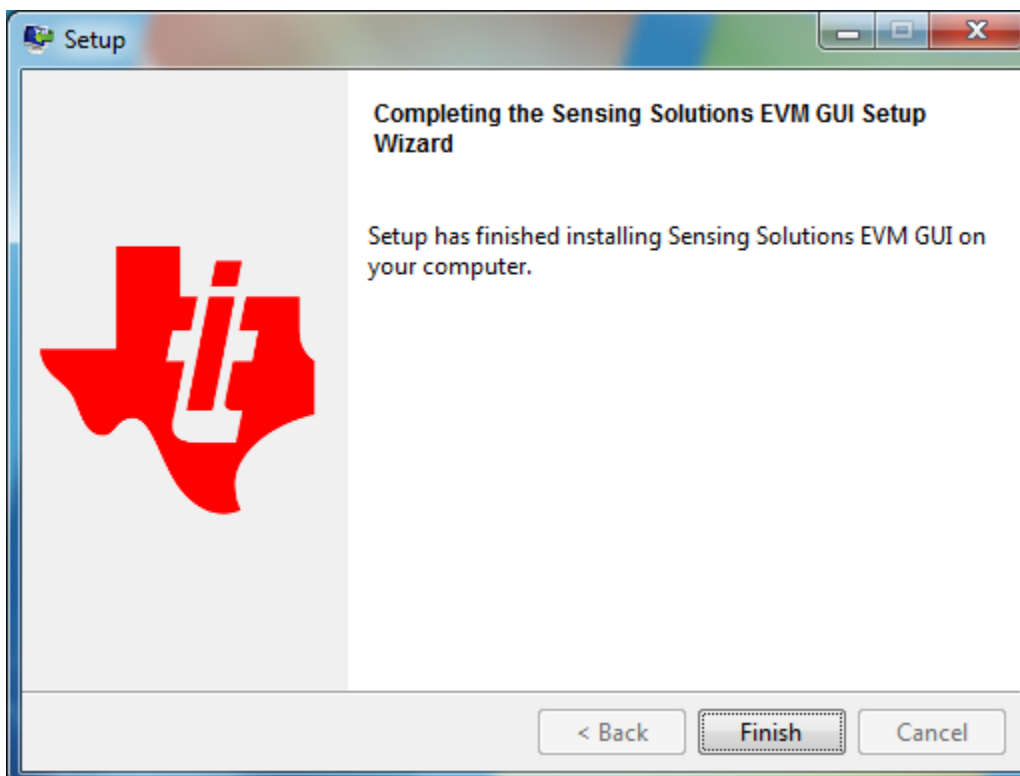
**Figure 1-10. Device Driver Installer In Progress**

12. After the driver installation is completed, click "Finish"



**Figure 1-11. Device Driver Installer Completed**

13. Click "Finish" to complete the installation

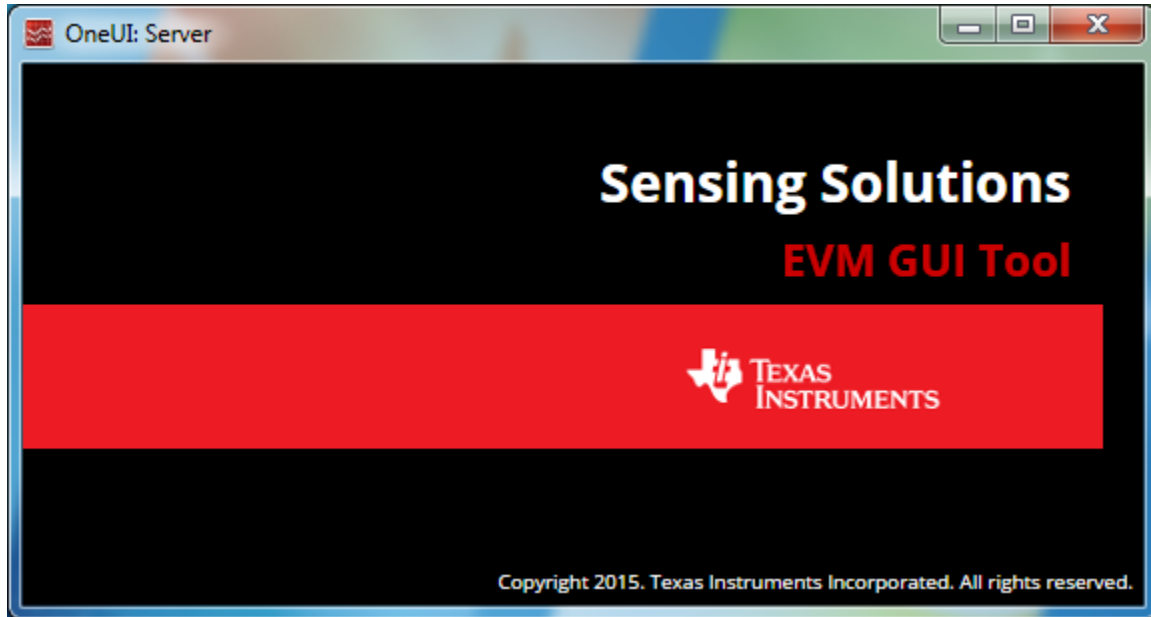


**Figure 1-12. Software Installer Completed**

### 1.2.3 Starting the GUI

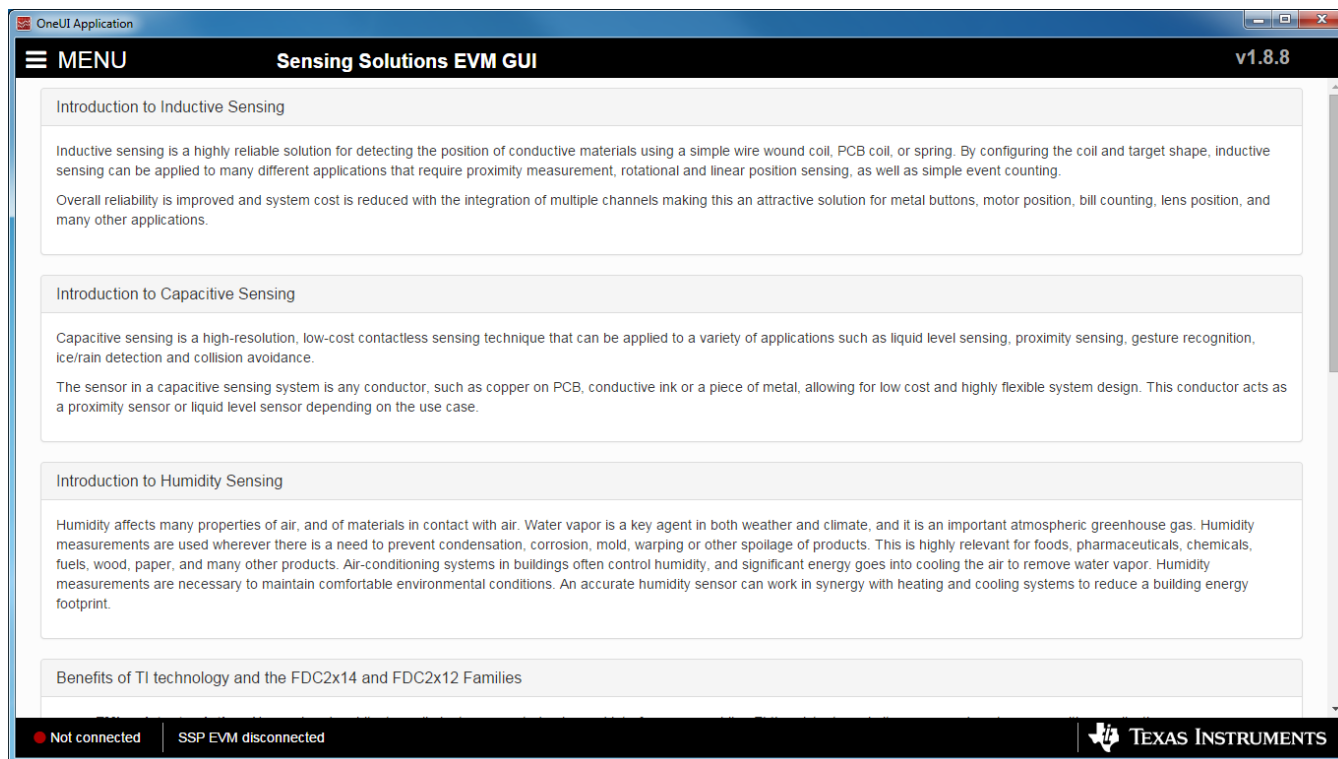
Follow these steps to start the GUI:

1. Select the Windows start menu
2. Select "All programs"
3. Select "Texas Instruments"
4. Select "Sensing Solutions EVM GUI"
5. Click "Sensing Solutions EVM GUI"
6. Splash screen will appear for at least two seconds



**Figure 1-13. Splash Screen**

7. After the splash screen is displayed the main window will open



**Figure 1-14. Introduction Page**

### 1.2.4 Navigating the GUI

To navigate to different pages of the GUI follow these steps:

1. Click "Menu" in the upper left corner

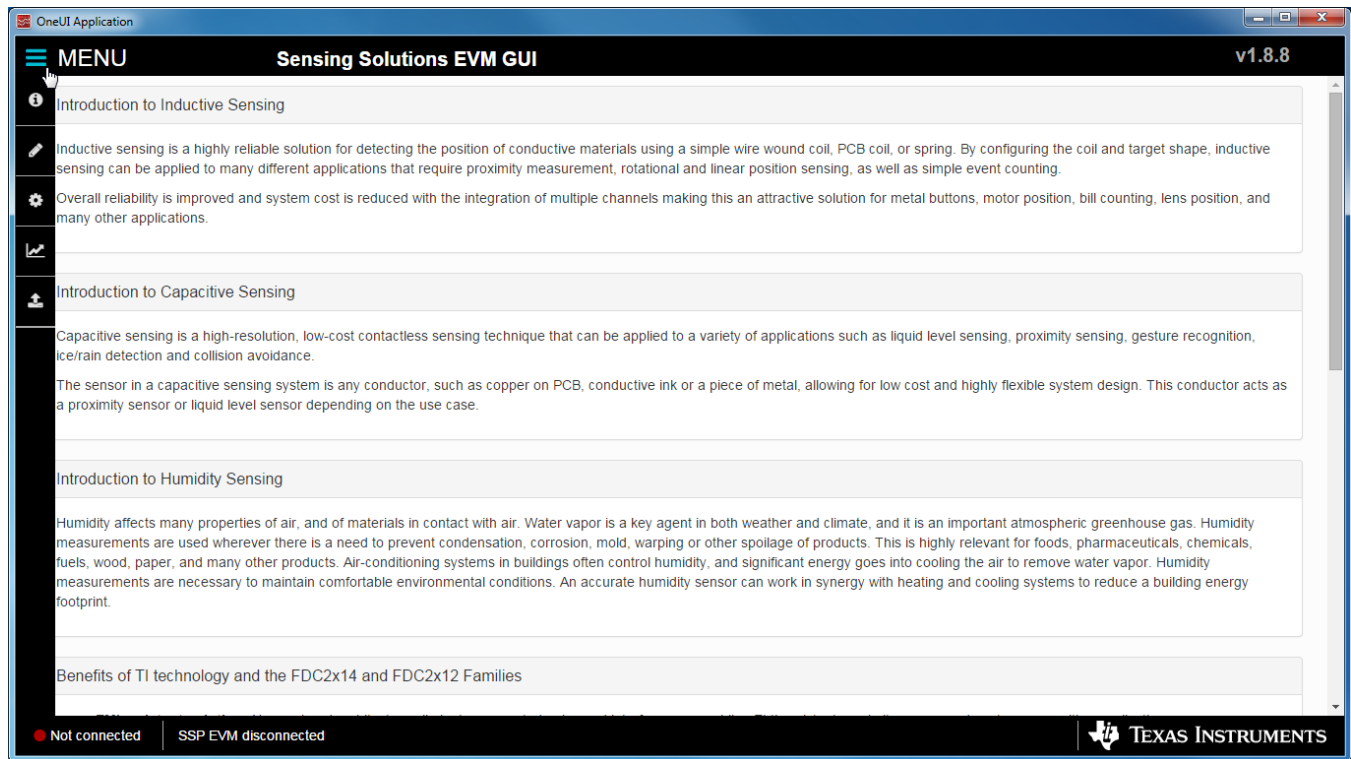


Figure 1-15. Mouse Hovered Over Menu Button

2. Select the desired page from the menu shown on the left

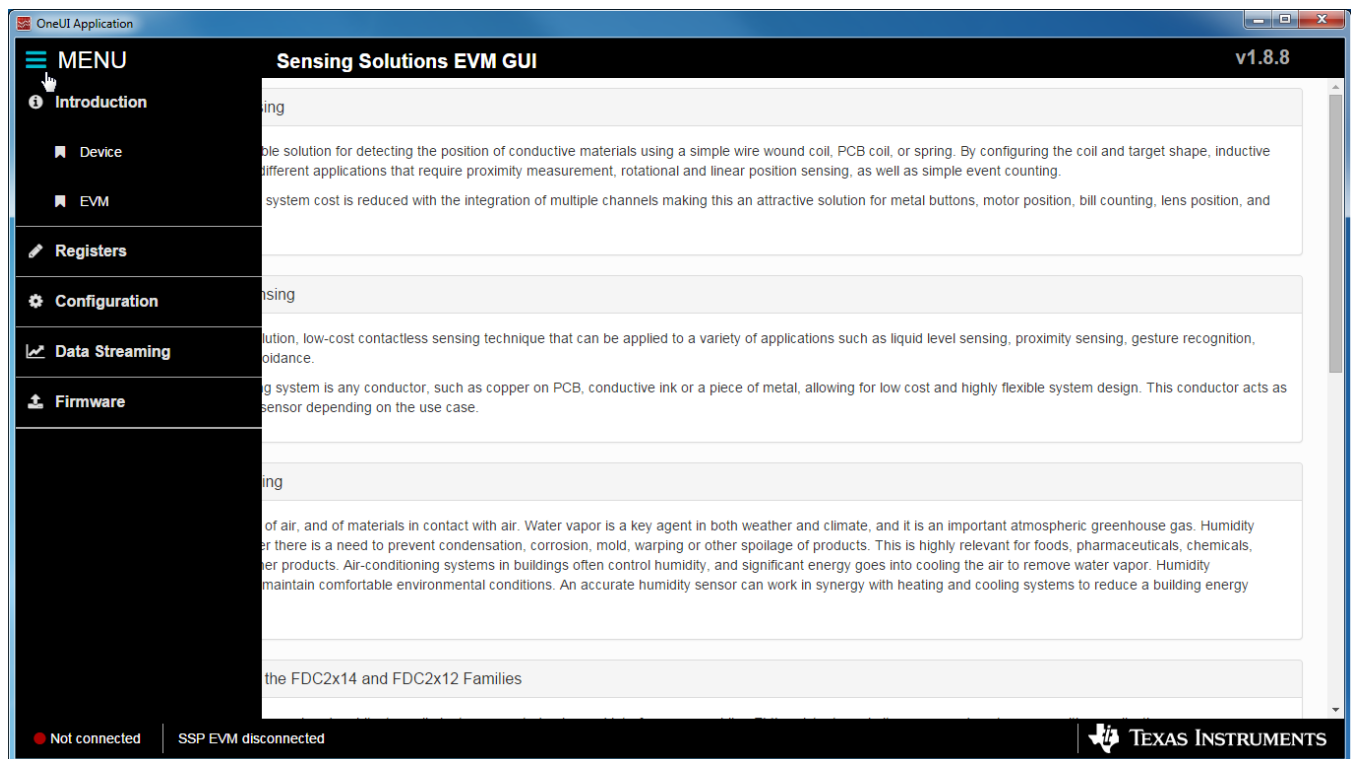


Figure 1-16. Menu Display After Clicking Button

## 1.2.5 Connecting the EVM

Follow these steps to connect the EVM to the GUI:

1. Attach the EVM to the computer via USB
2. The GUI always shows the connection status on the bottom left corner of the GUI

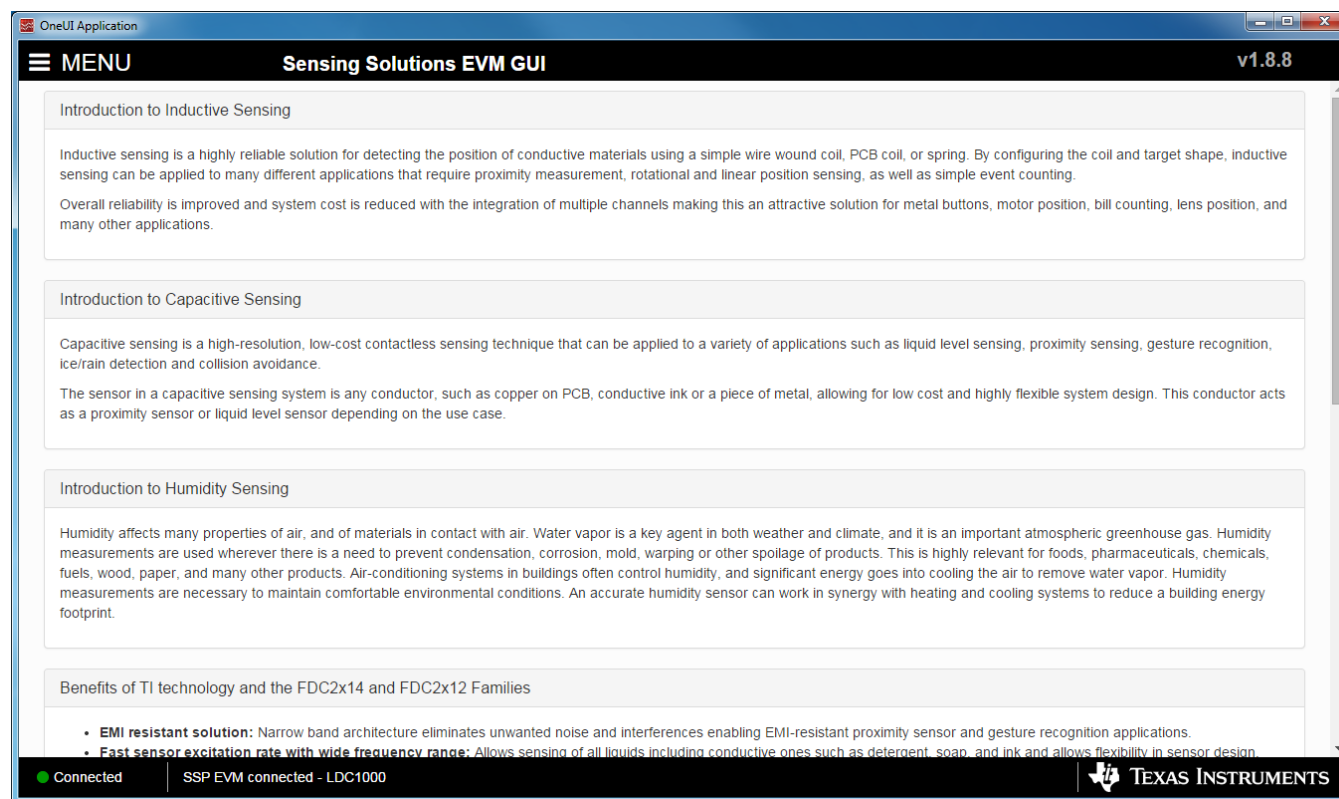


Figure 1-17. EVM Connected to GUI

## 1.2.6 Configuring the EVM Using the Register Page

The register page allows users to control the device directly with the register values. The user may also use this page to read the current register values on the device.

### 1.2.6.1 Automatically Update GUI Register Values Using Auto-Read

Autoread will periodically request the register values on the device. Click the dropdown box next to “Auto Read” to select the update interval.

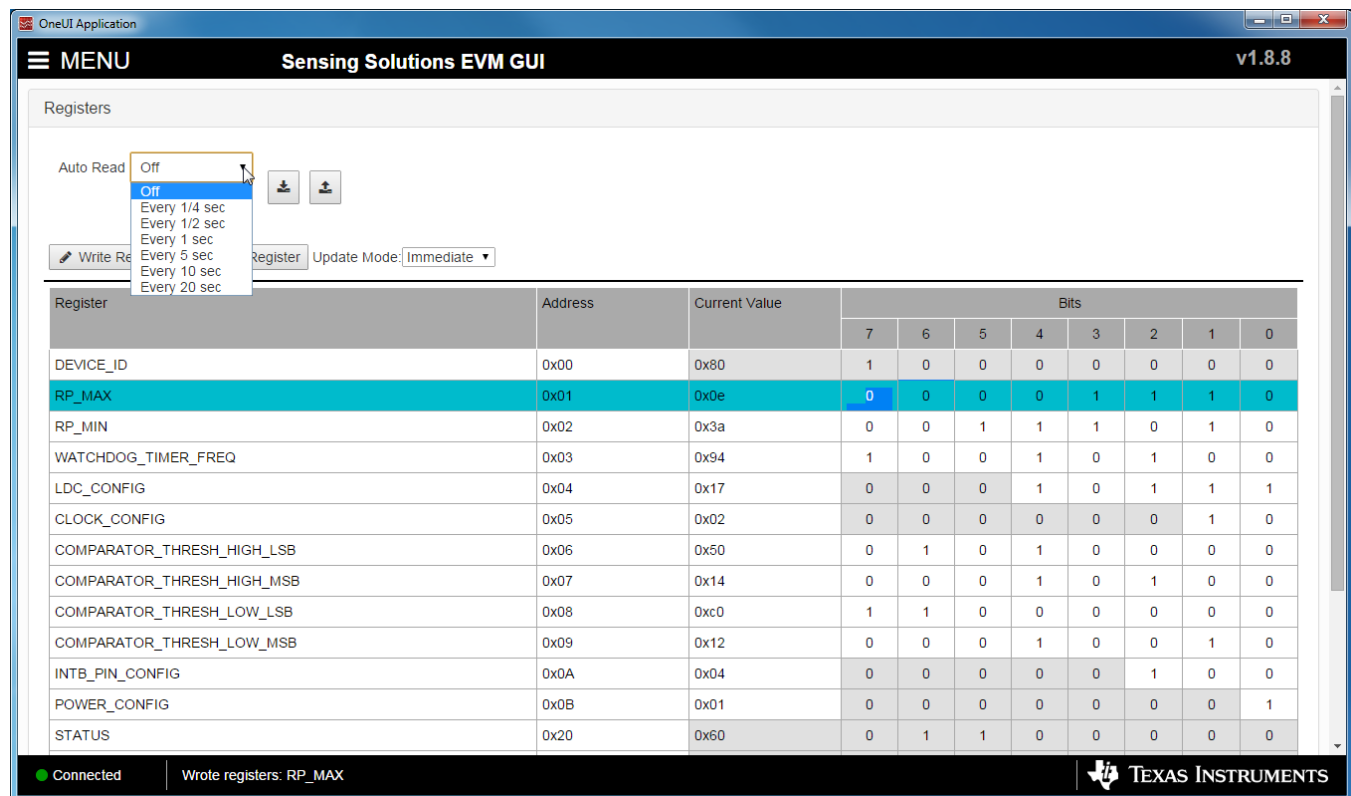
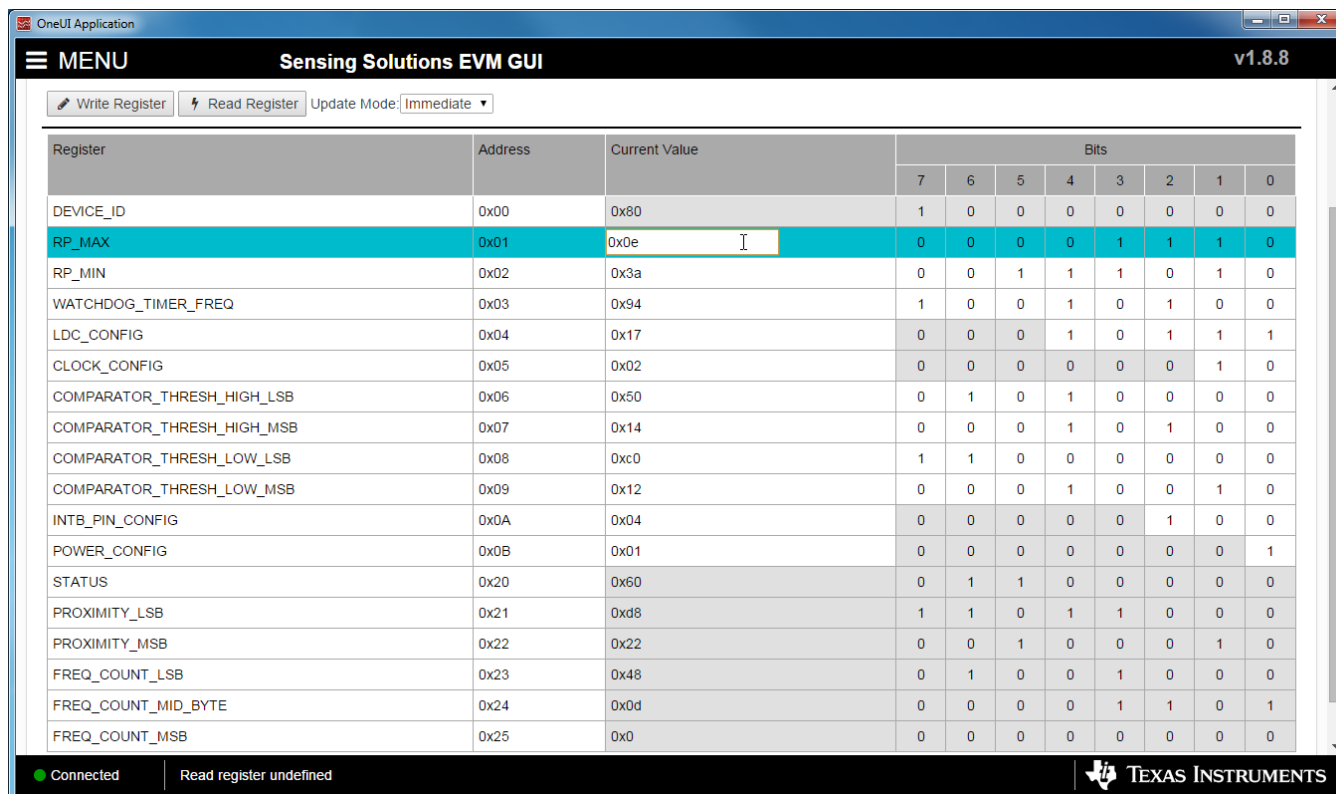


Figure 1-18. Selecting Auto-Read Interval on Register Page

### 1.2.6.2 Manually Update Device Register Values

There are two methods to change register values: update the entire register value or change a single bit within the register. The recommended update mode is always “Immediate” and not “Deferred”. To update register values, follow these steps.

1. Double-click the current value of the register that needs to be changed. The text will turn into an editable text box

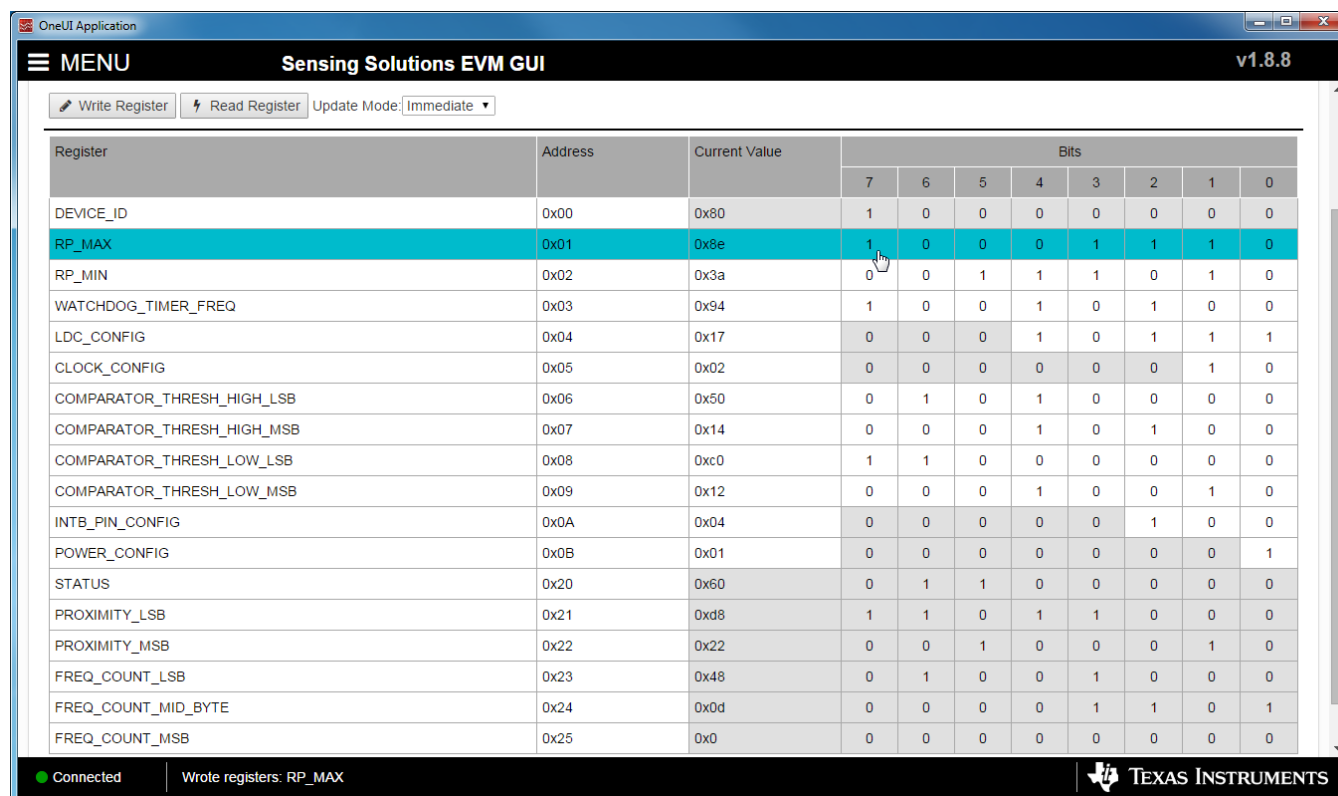


**Figure 1-19. Selecting a Register's Current Value for Editing on Register Page**

2. Type the new hexadecimal value into the box and click enter. The text box changes to normal text and the GUI will send a command to the EVM to update the device register

To change individual bit values rather than entire register values follow these steps.

1. Hover the mouse over the desired bit to change



| Register                   | Address     | Current Value | Bits     |          |          |          |          |          |          |          |
|----------------------------|-------------|---------------|----------|----------|----------|----------|----------|----------|----------|----------|
|                            |             |               | 7        | 6        | 5        | 4        | 3        | 2        | 1        | 0        |
| DEVICE_ID                  | 0x00        | 0x80          | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| <b>RP_MAX</b>              | <b>0x01</b> | <b>0x8e</b>   | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> | <b>1</b> | <b>1</b> | <b>0</b> |
| RP_MIN                     | 0x02        | 0x3a          | 0        | 0        | 1        | 1        | 1        | 0        | 1        | 0        |
| WATCHDOG_TIMER_FREQ        | 0x03        | 0x94          | 1        | 0        | 0        | 1        | 0        | 1        | 0        | 0        |
| LDC_CONFIG                 | 0x04        | 0x17          | 0        | 0        | 0        | 1        | 0        | 1        | 1        | 1        |
| CLOCK_CONFIG               | 0x05        | 0x02          | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 0        |
| COMPARATOR_THRESH_HIGH_LSB | 0x06        | 0x50          | 0        | 1        | 0        | 1        | 0        | 0        | 0        | 0        |
| COMPARATOR_THRESH_HIGH_MSB | 0x07        | 0x14          | 0        | 0        | 0        | 1        | 0        | 1        | 0        | 0        |
| COMPARATOR_THRESH_LOW_LSB  | 0x08        | 0xc0          | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |
| COMPARATOR_THRESH_LOW_MSB  | 0x09        | 0x12          | 0        | 0        | 0        | 1        | 0        | 0        | 1        | 0        |
| INTB_PIN_CONFIG            | 0x0A        | 0x04          | 0        | 0        | 0        | 0        | 0        | 1        | 0        | 0        |
| POWER_CONFIG               | 0x0B        | 0x01          | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        |
| STATUS                     | 0x20        | 0x60          | 0        | 1        | 1        | 0        | 0        | 0        | 0        | 0        |
| PROXIMITY_LSB              | 0x21        | 0xd8          | 1        | 1        | 0        | 1        | 1        | 0        | 0        | 0        |
| PROXIMITY_MSB              | 0x22        | 0x22          | 0        | 0        | 1        | 0        | 0        | 0        | 1        | 0        |
| FREQ_COUNT_LSB             | 0x23        | 0x48          | 0        | 1        | 0        | 0        | 1        | 0        | 0        | 0        |
| FREQ_COUNT_MID_BYTE        | 0x24        | 0x0d          | 0        | 0        | 0        | 0        | 1        | 1        | 0        | 1        |
| FREQ_COUNT_MSB             | 0x25        | 0x0           | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |

Connected | Wrote registers: RP\_MAX | TEXAS INSTRUMENTS

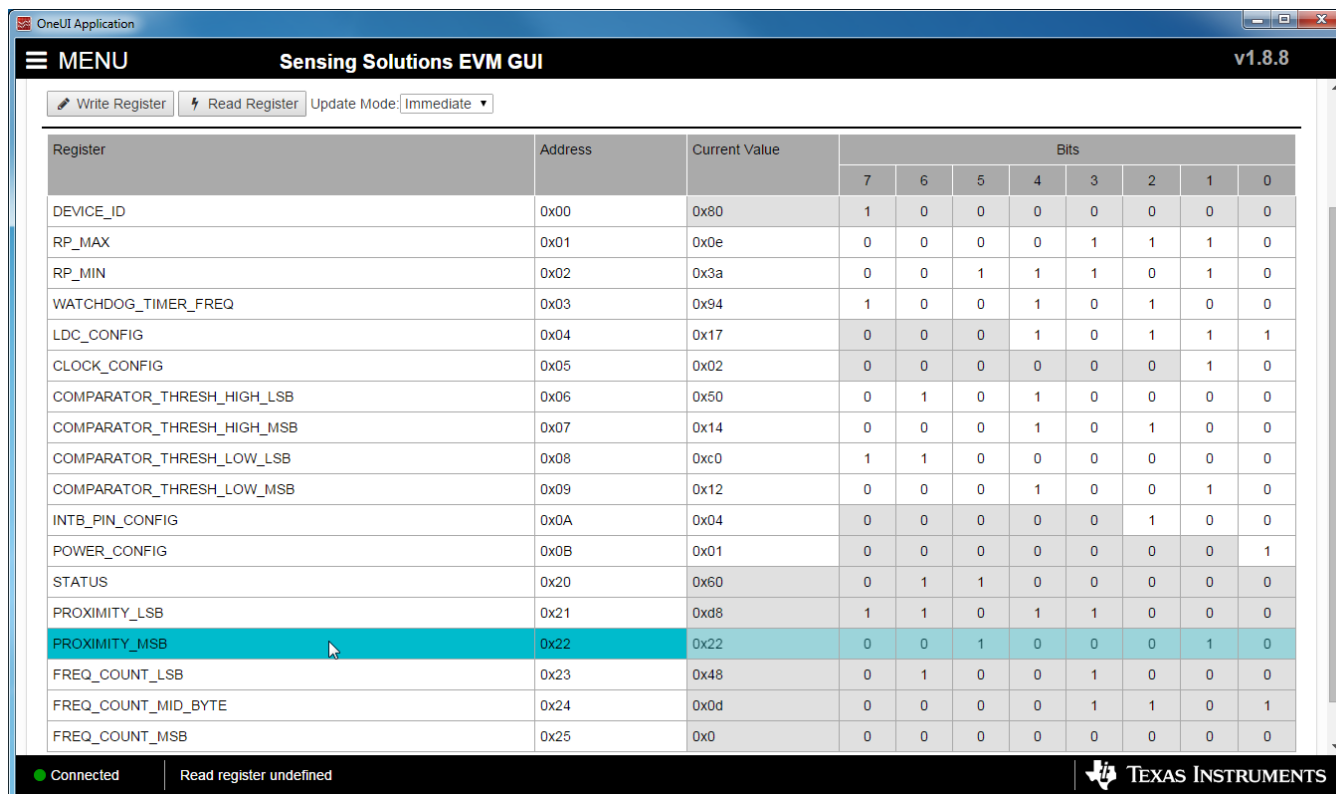
**Figure 1-20. Hovering Mouse Over Register Bit Value on Register Page**

- Double-click the bit to toggle its value and the register's current value will update automatically

### 1.2.6.3 Reading Register Values without Auto-Read

To read register values follow these steps.

- Select the register to update by clicking any column of the register row in the table



OneUI Application

**Sensing Solutions EVM GUI** v1.8.8

Write Register Read Register Update Mode: Immediate

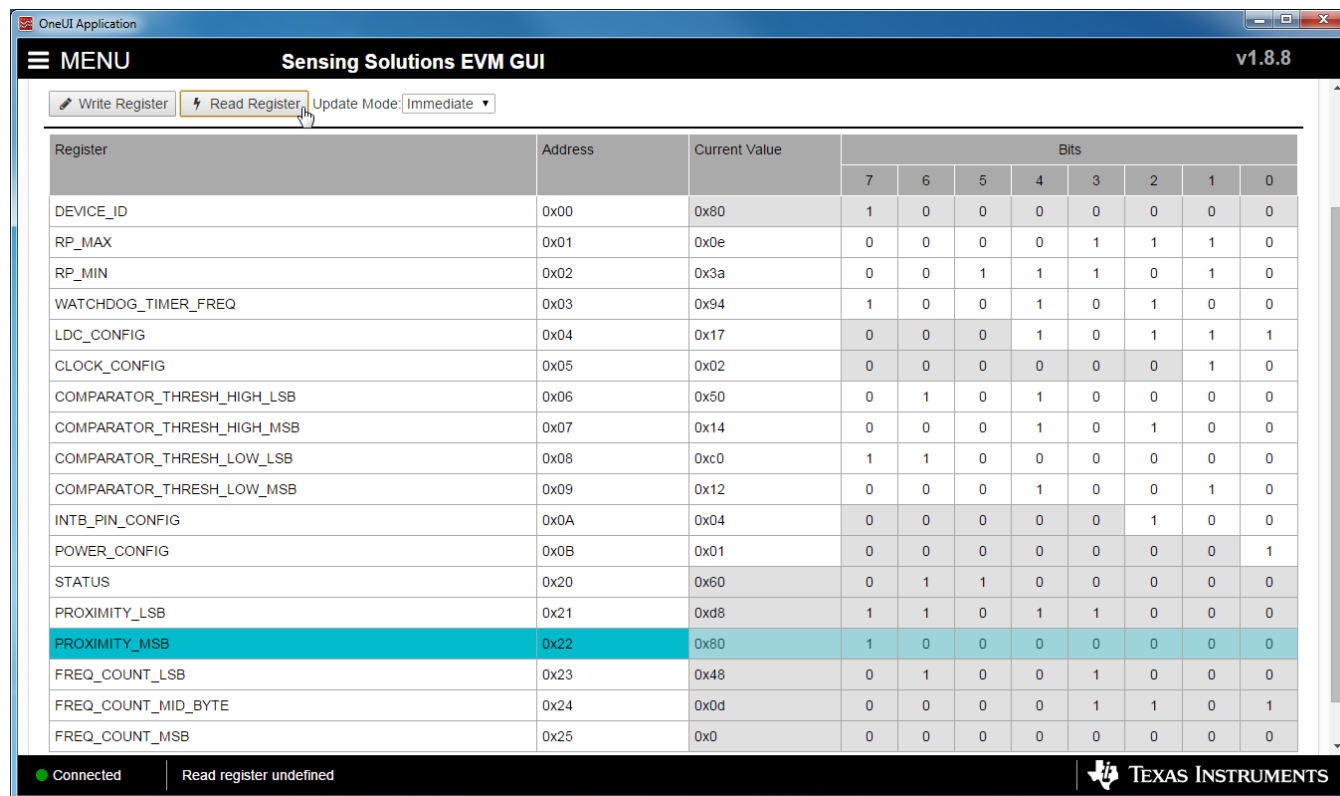
| Register                   | Address     | Current Value | Bits     |          |          |          |          |          |          |          |
|----------------------------|-------------|---------------|----------|----------|----------|----------|----------|----------|----------|----------|
|                            |             |               | 7        | 6        | 5        | 4        | 3        | 2        | 1        | 0        |
| DEVICE_ID                  | 0x00        | 0x80          | 1        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |
| RP_MAX                     | 0x01        | 0x0e          | 0        | 0        | 0        | 0        | 1        | 1        | 1        | 0        |
| RP_MIN                     | 0x02        | 0x3a          | 0        | 0        | 1        | 1        | 1        | 0        | 1        | 0        |
| WATCHDOG_TIMER_FREQ        | 0x03        | 0x94          | 1        | 0        | 0        | 1        | 0        | 1        | 0        | 0        |
| LDC_CONFIG                 | 0x04        | 0x17          | 0        | 0        | 0        | 1        | 0        | 1        | 1        | 1        |
| CLOCK_CONFIG               | 0x05        | 0x02          | 0        | 0        | 0        | 0        | 0        | 0        | 1        | 0        |
| COMPARATOR_THRESH_HIGH_LSB | 0x06        | 0x50          | 0        | 1        | 0        | 1        | 0        | 0        | 0        | 0        |
| COMPARATOR_THRESH_HIGH_MSB | 0x07        | 0x14          | 0        | 0        | 0        | 1        | 0        | 1        | 0        | 0        |
| COMPARATOR_THRESH_LOW_LSB  | 0x08        | 0xc0          | 1        | 1        | 0        | 0        | 0        | 0        | 0        | 0        |
| COMPARATOR_THRESH_LOW_MSB  | 0x09        | 0x12          | 0        | 0        | 0        | 1        | 0        | 0        | 1        | 0        |
| INTB_PIN_CONFIG            | 0x0A        | 0x04          | 0        | 0        | 0        | 0        | 0        | 1        | 0        | 0        |
| POWER_CONFIG               | 0x0B        | 0x01          | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 1        |
| STATUS                     | 0x20        | 0x60          | 0        | 1        | 1        | 0        | 0        | 0        | 0        | 0        |
| PROXIMITY_LSB              | 0x21        | 0xd8          | 1        | 1        | 0        | 1        | 1        | 0        | 0        | 0        |
| <b>PROXIMITY_MSB</b>       | <b>0x22</b> | <b>0x22</b>   | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>1</b> | <b>0</b> |
| FREQ_COUNT_LSB             | 0x23        | 0x48          | 0        | 1        | 0        | 0        | 1        | 0        | 0        | 0        |
| FREQ_COUNT_MID_BYTE        | 0x24        | 0x0d          | 0        | 0        | 0        | 0        | 1        | 1        | 0        | 1        |
| FREQ_COUNT_MSB             | 0x25        | 0x0           | 0        | 0        | 0        | 0        | 0        | 0        | 0        | 0        |

Connected Read register undefined

TEXAS INSTRUMENTS

**Figure 1-21. Selecting a Register on Register Page**

- Click the “Read Register” button to update the selected register’s current value and bit values in the table



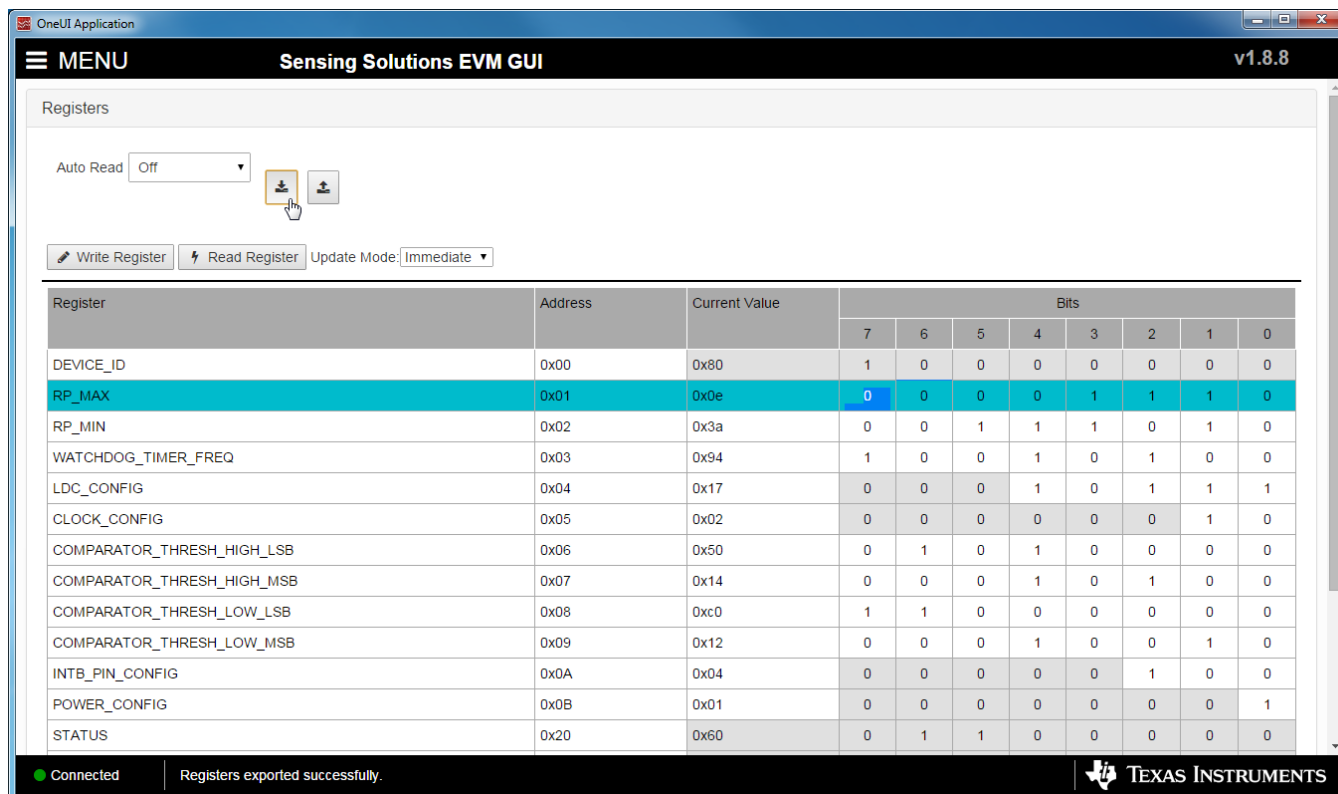
| Register                   | Address | Current Value | Bits |   |   |   |   |   |   |   |
|----------------------------|---------|---------------|------|---|---|---|---|---|---|---|
|                            |         |               | 7    | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| DEVICE_ID                  | 0x00    | 0x80          | 1    | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| RP_MAX                     | 0x01    | 0x0e          | 0    | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| RP_MIN                     | 0x02    | 0x3a          | 0    | 0 | 1 | 1 | 1 | 0 | 1 | 0 |
| WATCHDOG_TIMER_FREQ        | 0x03    | 0x94          | 1    | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| LDC_CONFIG                 | 0x04    | 0x17          | 0    | 0 | 0 | 1 | 0 | 1 | 1 | 1 |
| CLOCK_CONFIG               | 0x05    | 0x02          | 0    | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| COMPARATOR_THRESH_HIGH_LSB | 0x06    | 0x50          | 0    | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| COMPARATOR_THRESH_HIGH_MSB | 0x07    | 0x14          | 0    | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| COMPARATOR_THRESH_LOW_LSB  | 0x08    | 0xc0          | 1    | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| COMPARATOR_THRESH_LOW_MSB  | 0x09    | 0x12          | 0    | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| INTB_PIN_CONFIG            | 0x0A    | 0x04          | 0    | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| POWER_CONFIG               | 0x0B    | 0x01          | 0    | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| STATUS                     | 0x20    | 0x60          | 0    | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| PROXIMITY_LSB              | 0x21    | 0xd8          | 1    | 1 | 0 | 1 | 1 | 0 | 0 | 0 |
| PROXIMITY_MSB              | 0x22    | 0x80          | 1    | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FREQ_COUNT_LSB             | 0x23    | 0x48          | 0    | 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| FREQ_COUNT_MID_BYTE        | 0x24    | 0x0d          | 0    | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| FREQ_COUNT_MSB             | 0x25    | 0x0           | 0    | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Figure 1-22. Reading the Current Device Register Value on Register Page

#### 1.2.6.4 Saving Device Configurations

To save the current register settings of the device follow these steps.

1. Click the button immediately right to the “Auto-Read” selection dropdown



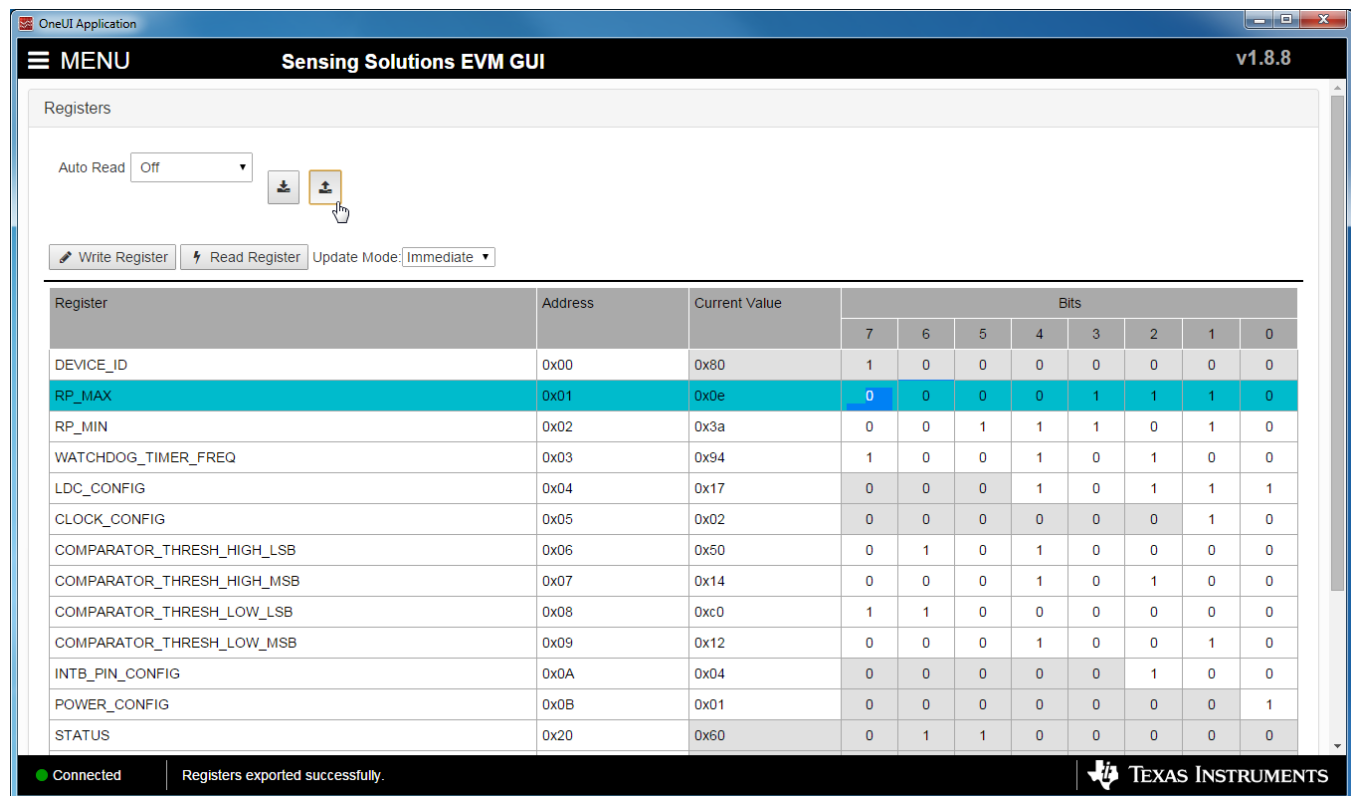
**Figure 1-23. Save Register Values to File on Register Page**

2. Choose a name for the JSON file and the directory to save it within. Then click “Save”

### 1.2.6.5 Loading Previously Saved Configurations

To load previously saved register settings from a JSON file follow these steps.

1. Click the button furthest right from the “Auto-Read” selection dropdown

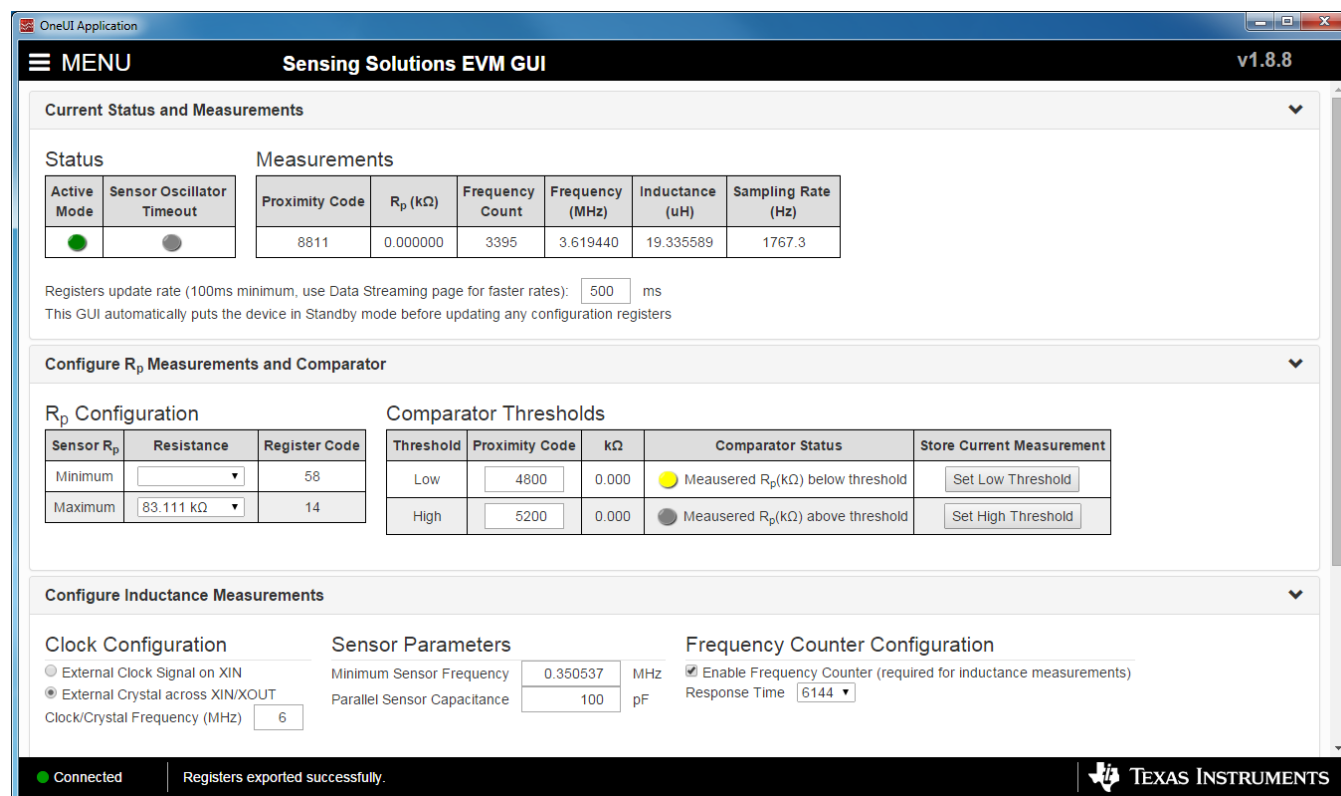


**Figure 1-24. Loading Previously Saved Register Values from File on Register Page**

2. Select the JSON file with the desired settings and click “Open”

### 1.2.7 Configuring the EVM Using the Configuration Page

The Sensing Solutions GUI is capable on configuring the device more intuitively than the direct register values. The "Configuration" page provides an easy-to-use tool for updating the device configuration and provides additional information about how the device will perform.



**Figure 1-25. Sensor Properties and Input Adjustments on Configuration Page**

## 1.2.8 Streaming Measurement Data

The Sensing Solutions GUI and EVM provide a tool to capture, display, and log measurement data. The section describes how to use the data measurement tools from the "Data Streaming" page accessible from the GUI menu.

### 1.2.8.1 Choosing the Graph and Visible Channels

Select the drop down menu on top of the y-axis to choose the graph to display.



**Figure 1-26. Select the Data Graph on Data Streaming Page**

To select which channel measurements are displayed in the graph, check or uncheck the available channels shown next to the graph units. Selecting or not selecting the channels only affects the graph and not the data logged to a file. If a channel is not enabled in the Configuration page it will not appear on the Data Streaming page.

### 1.2.8.2 Logging Data to a File

Follow these steps to log measurement data to a file.

1. Click the button in the upper right under next to "Click to Select Log File"



**Figure 1-27. Select Log File Button on Data Streaming Page**

2. Select a file name and directory to save the data to and then click the “Save” button
3. Whenever data streaming is running the data for all channels will be logged to this file. The selected file is shown next to the button.

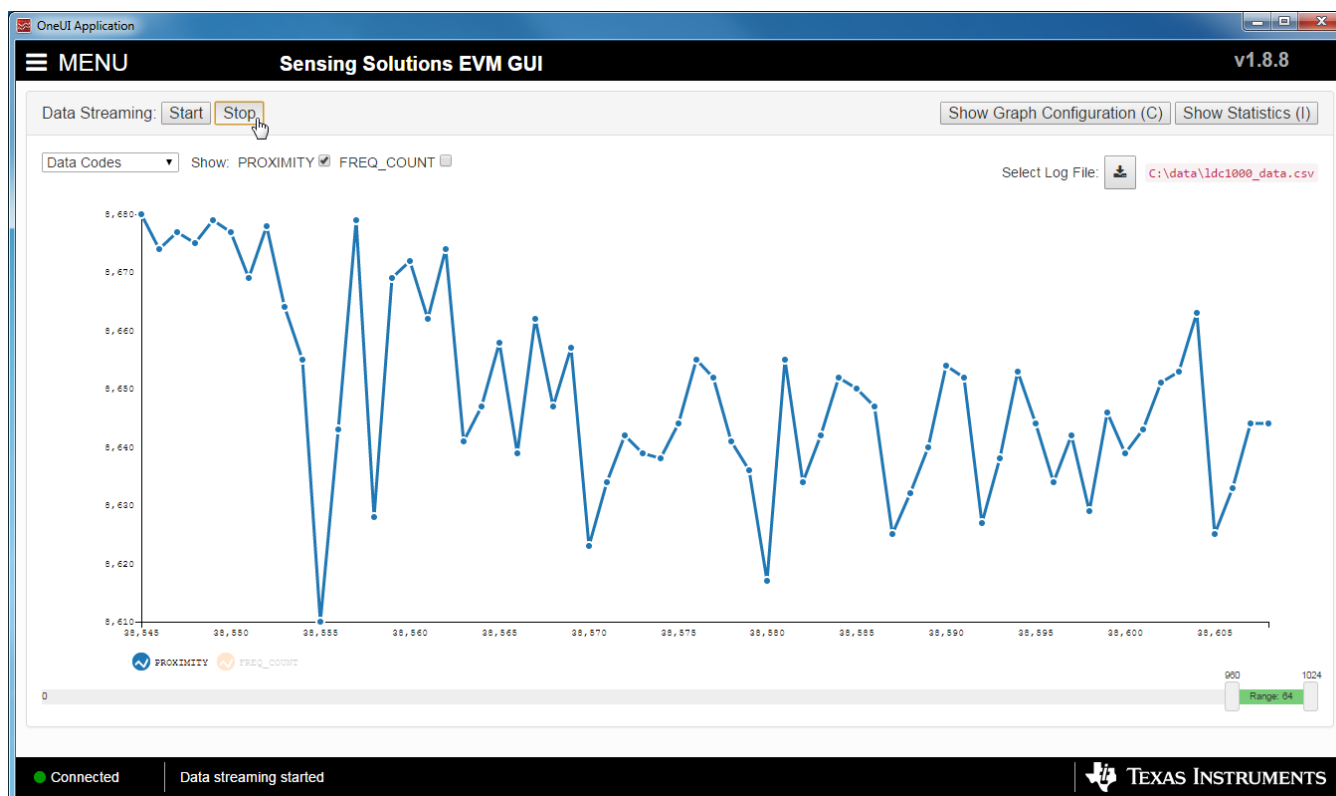
### 1.2.8.3 Starting and Stopping Data Streaming

To start data streaming click the “Start” button.



**Figure 1-28. Start Button on Data Streaming Page**

To stop data streaming click the “Stop” button.



**Figure 1-29. Stop Button on Data Streaming Page**

#### 1.2.8.4 Data Statistics

Click the “Show Statistics” button to view the measurement statistics.



**Figure 1-30. Show Statistics Button on Data Streaming Page**

Click the “Hide Statistics” button to hide the measurement statistics.

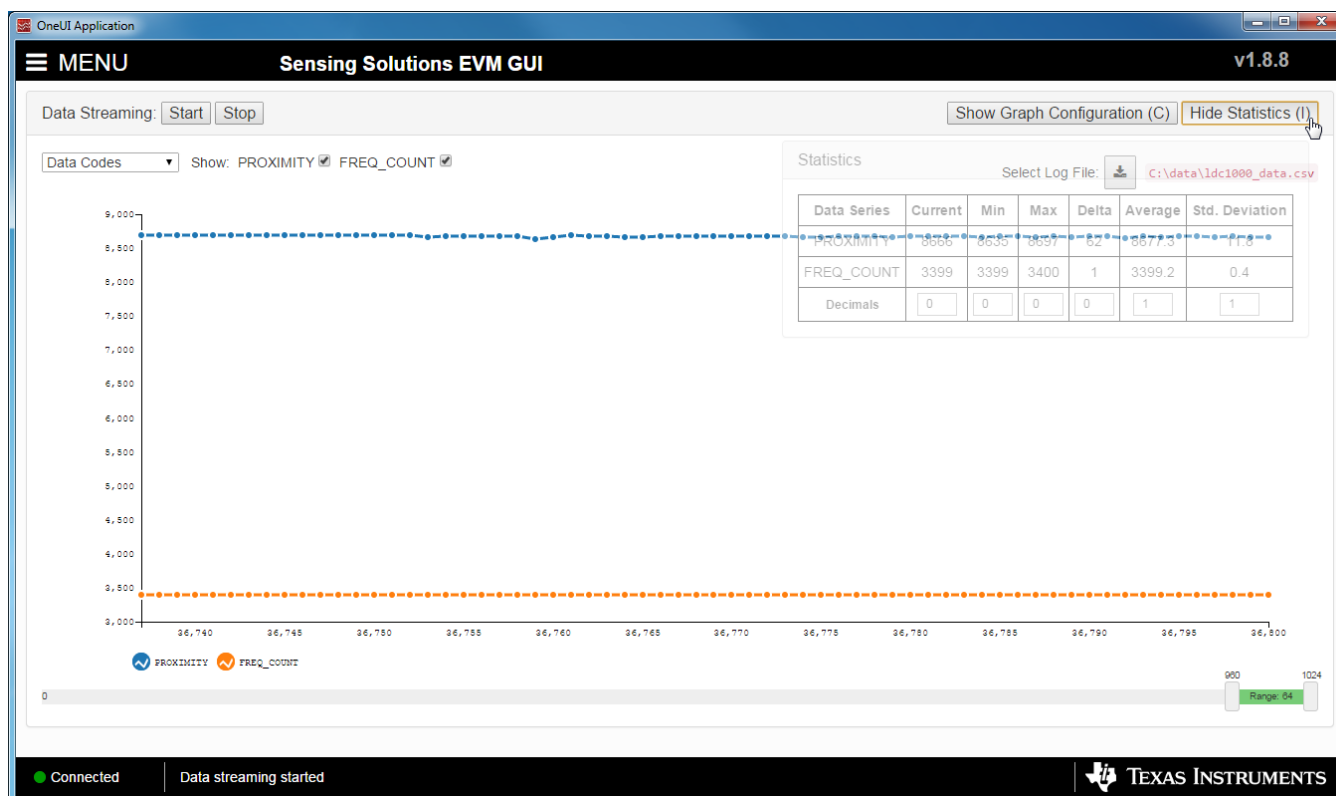


Figure 1-31. Hide Statistics Button on Data Streaming Page

### 1.2.8.5 Configuring the Graph

To configure the graph, click the "Show Graph Configuration" button.

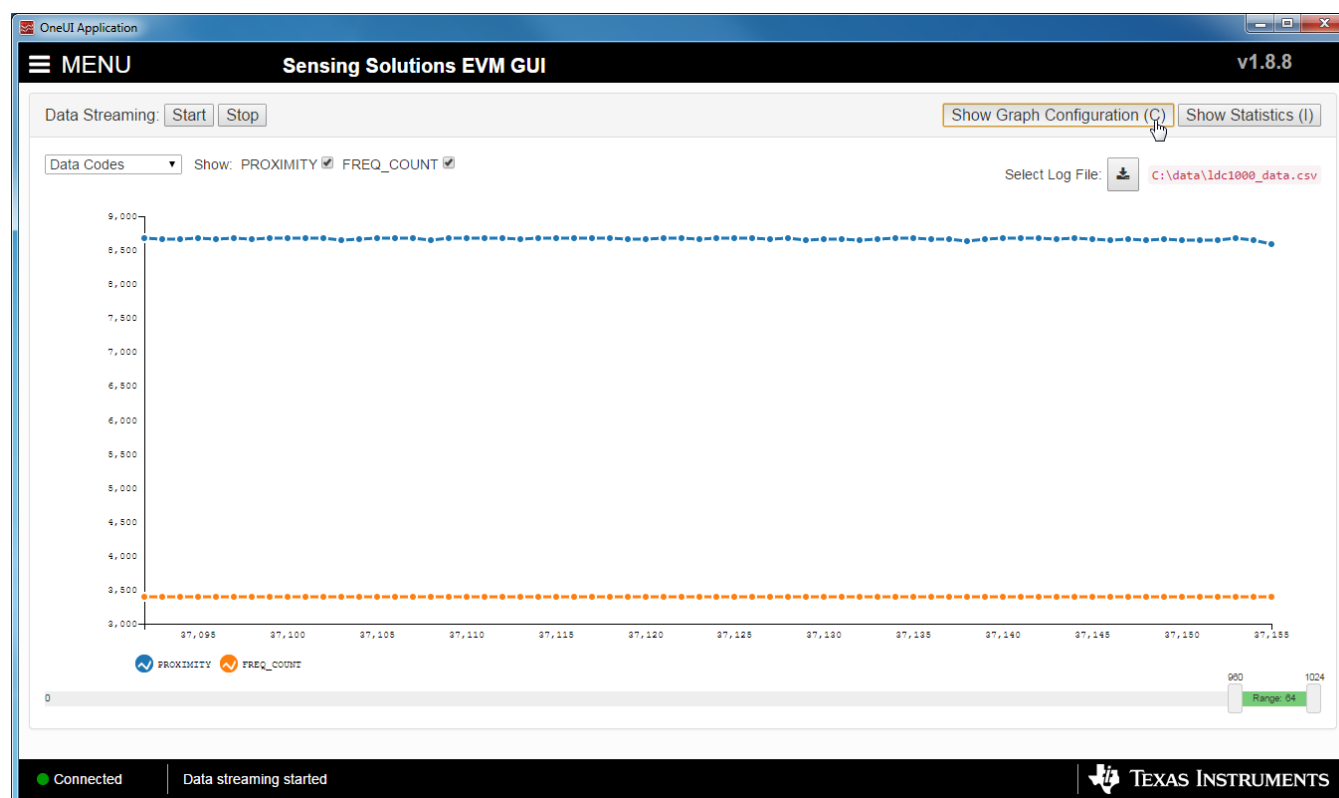


Figure 1-32. Show Graph Configuration Button on Data Streaming Page

### Graph Configuration

**Display Frame Rate**  
16.0 ms = 62.5 Hz

**New Data Sample Rate**  
☐ EVM Output Rate (Infinity ms = 0.0 Hz)  
☒ Add sample to graph every  ms

**Vertical Scaling**  
*Vertical Left Axis (Y1)*  
Minimum:   
Maximum:   
☒ Autoscale

**Sample Counts**  
Display:  ≈ 0.000 s  
Buffer:  ≈ 0.000 s

**Figure 1-33. Graph Configuration Button on Data Streaming Page**

The configuration window displays the actual frame rate of the graph, the rate at which data is added to the graph, the vertical scaling, and the sample buffer size. The display rate is the rate at which the graph updates on the computer display and is not configurable. It is automatically optimized by the GUI.

The "New Data Sample Rate" allows the user to choose when new data is added to the graph. Selecting "EVM Output Rate" will display data on the graph as fast as is available from the EVM. This should not be confused with the actual sampling rate of the device on the EVM which could be different. The "Add sample to graph every ... ms" will add a new sample to the graph at the specified rate.

The "Verical Scaling" allows the user to either manually set the minimum and maximum values of the y-axis on the graph or use auto-scaling. The "Autoscale & Lock" button scales the graph based on the data of the current display and then locks those vertical scaling settings.

The "Sample Counts" allows the user to specify the number of samples displayed on the graph and the total number of samples stored in the buffer. Please note the buffer size does not affect data logging to a file.

To hide the configuration window, click the "Hide Graph Configuration" button.

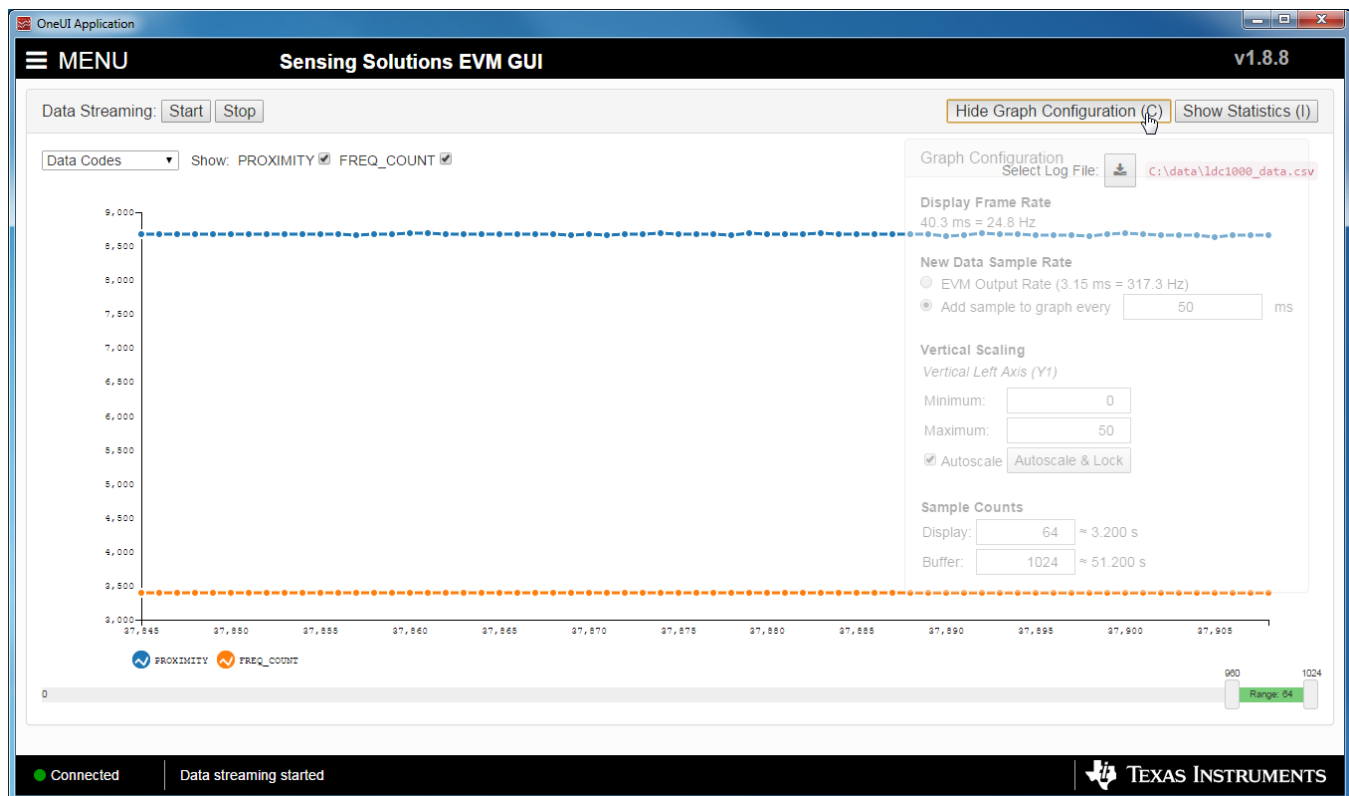
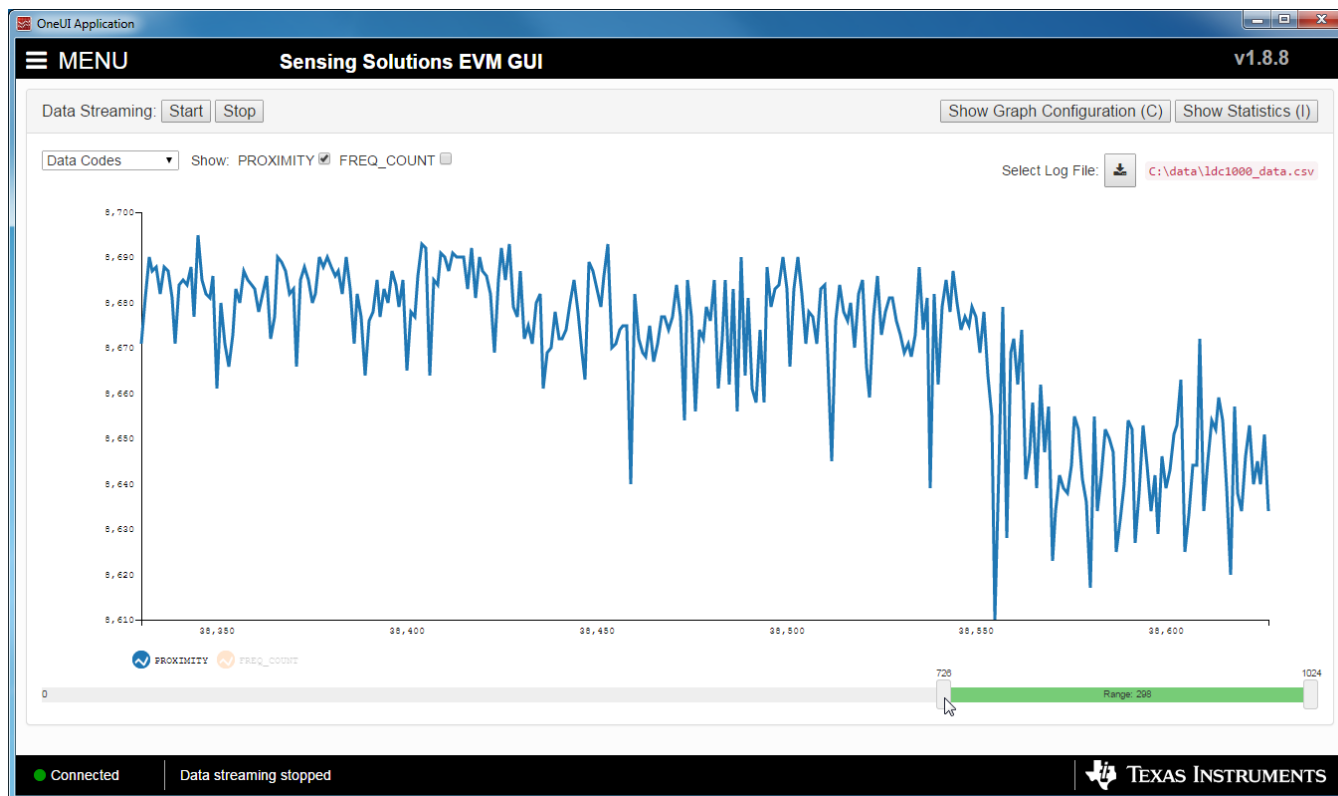


Figure 1-34. Hide Graph Configuration Button on Data Streaming Page

### 1.2.8.6 Navigating the Data Streaming Buffer

The Sensing Solutions EVM GUI stores a buffer of data samples and then displays a subset of those samples in the graph. The data buffer can be navigated using the horizontal slider below the graph. To adjust the samples displayed in the graph, click either the slider on the left or right side of the green bar and drag it closer or further from the other slider. The number of samples displayed is shown between the left and right sliders in the green bar.



**Figure 1-35. Changing Number of Samples Displayed in Data Graph**

By clicking on the green bar sliders and dragging the mouse left or right, the displayed region of buffered LDC data can be adjusted.

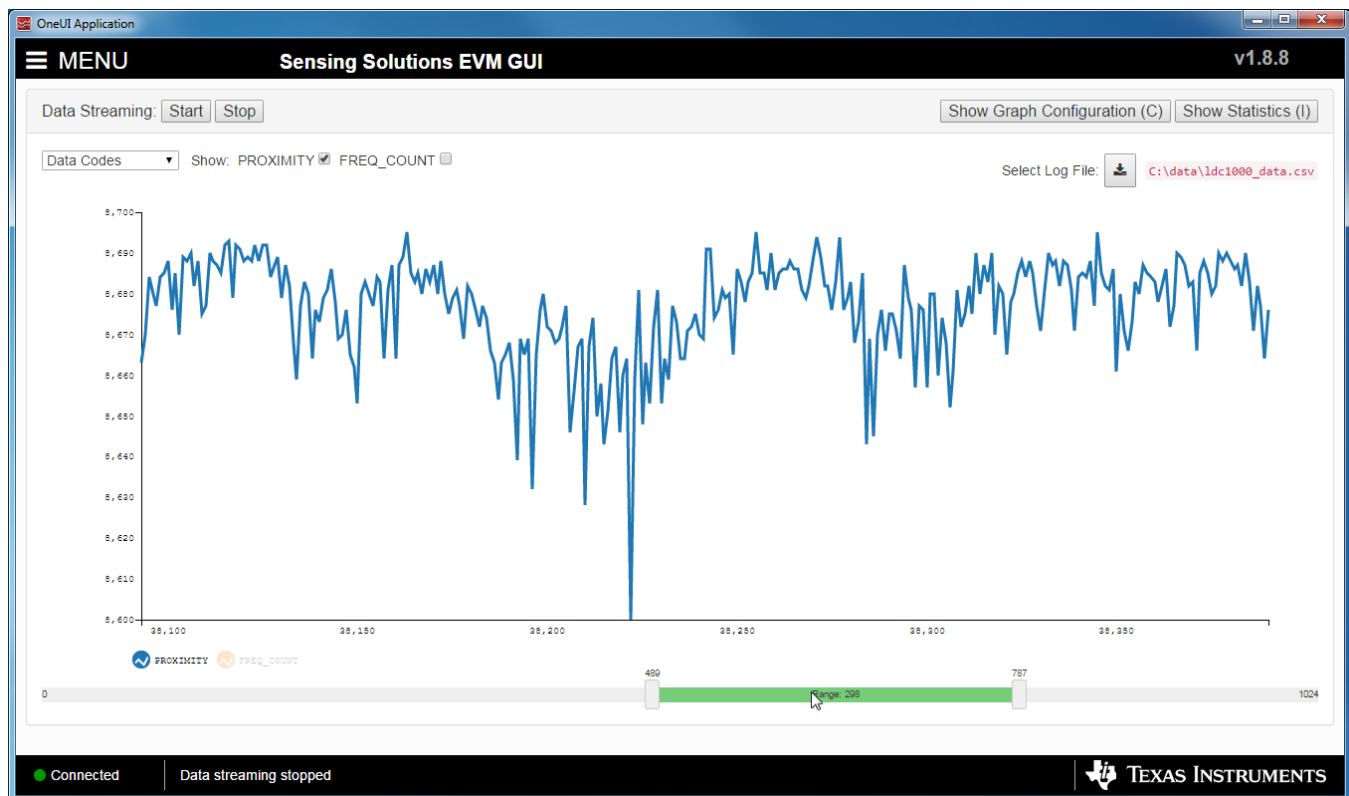
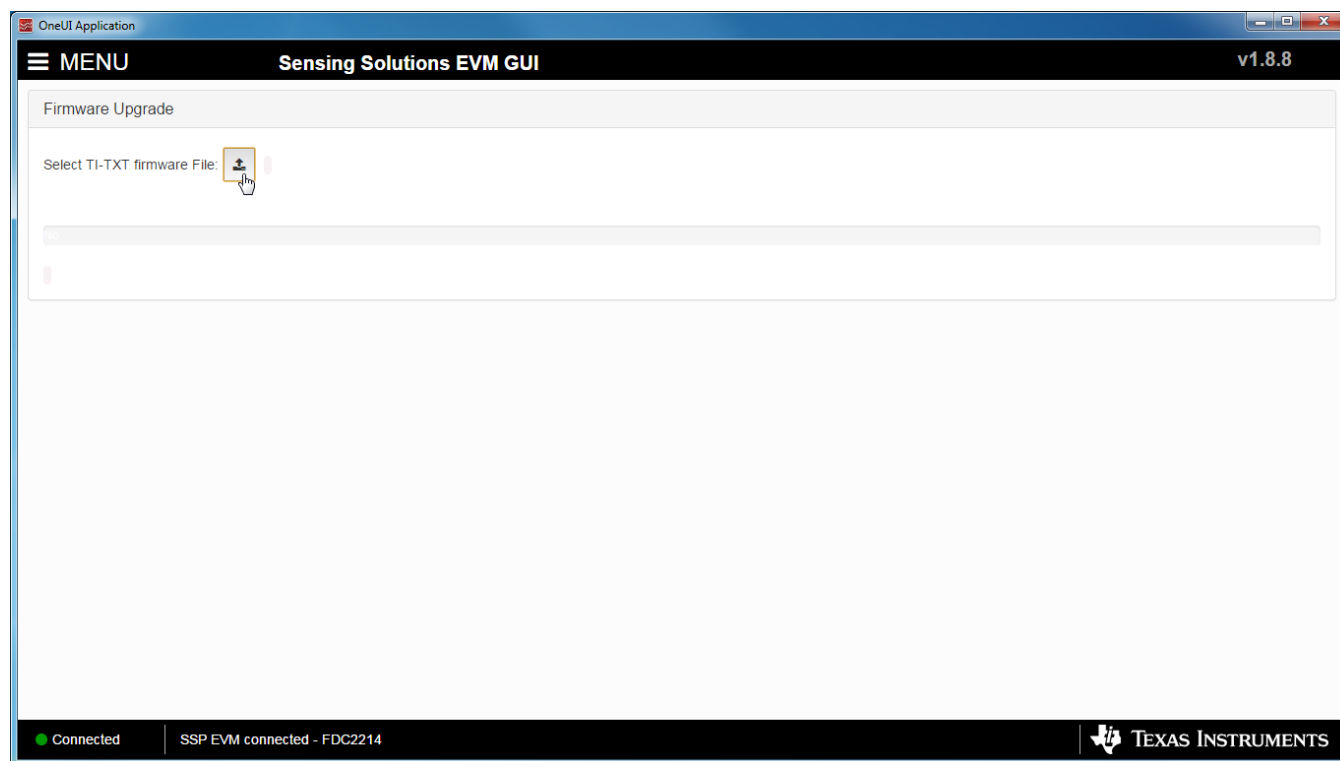


Figure 1-36. Displaying Previous Data Samples on the Data Streaming Page

### 1.2.9 Updating the EVM Firmware

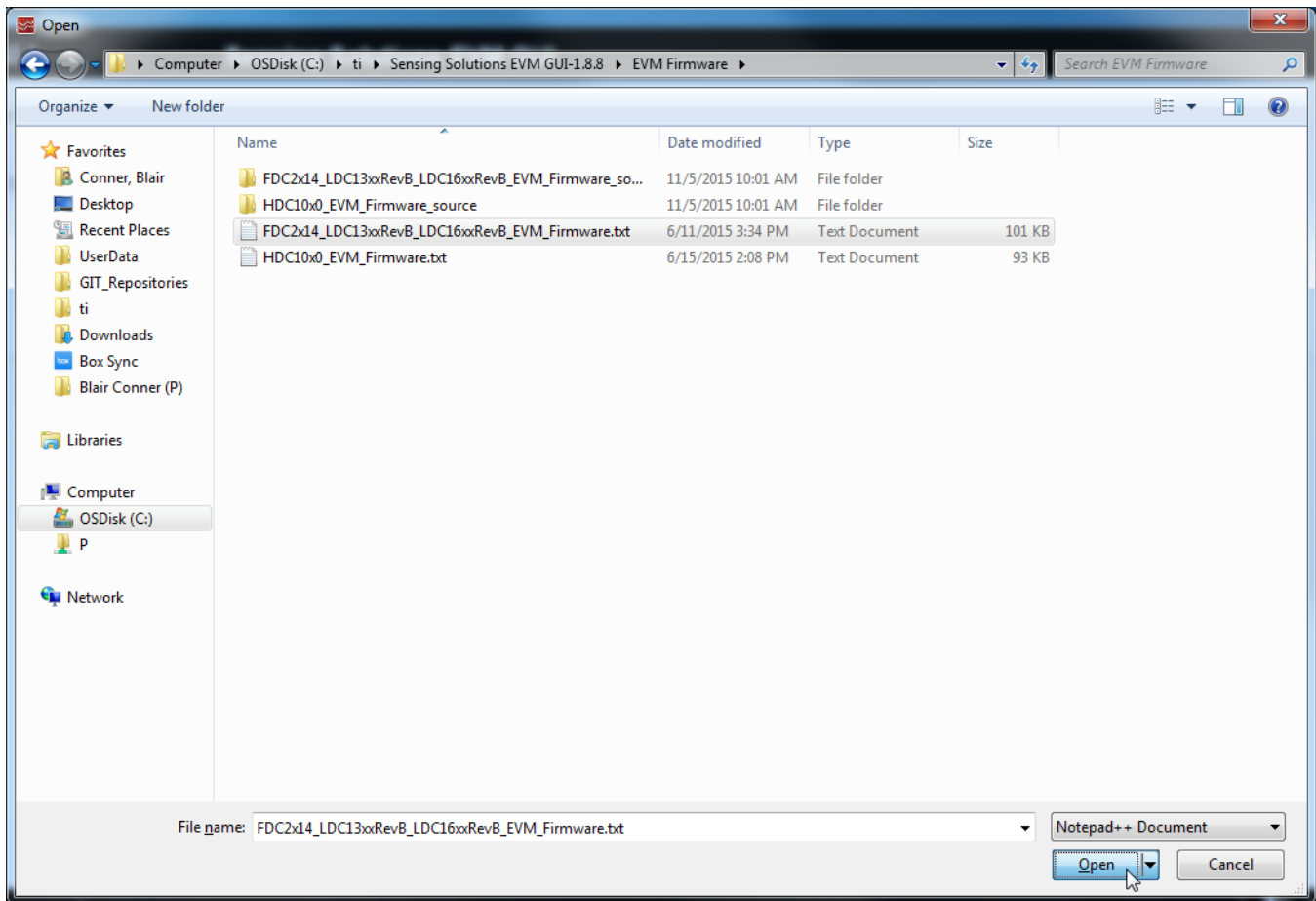
To upload new firmware to the EVM, navigate to the "Firmware" page from the GUI menu and follow these steps. The images below show uploading the FDC2214 EVM firmware, but the steps are identical for any LDC, FDC, or HDC EVM when using their respective firmware files.

1. Click the button to select a TI-TXT firmware file



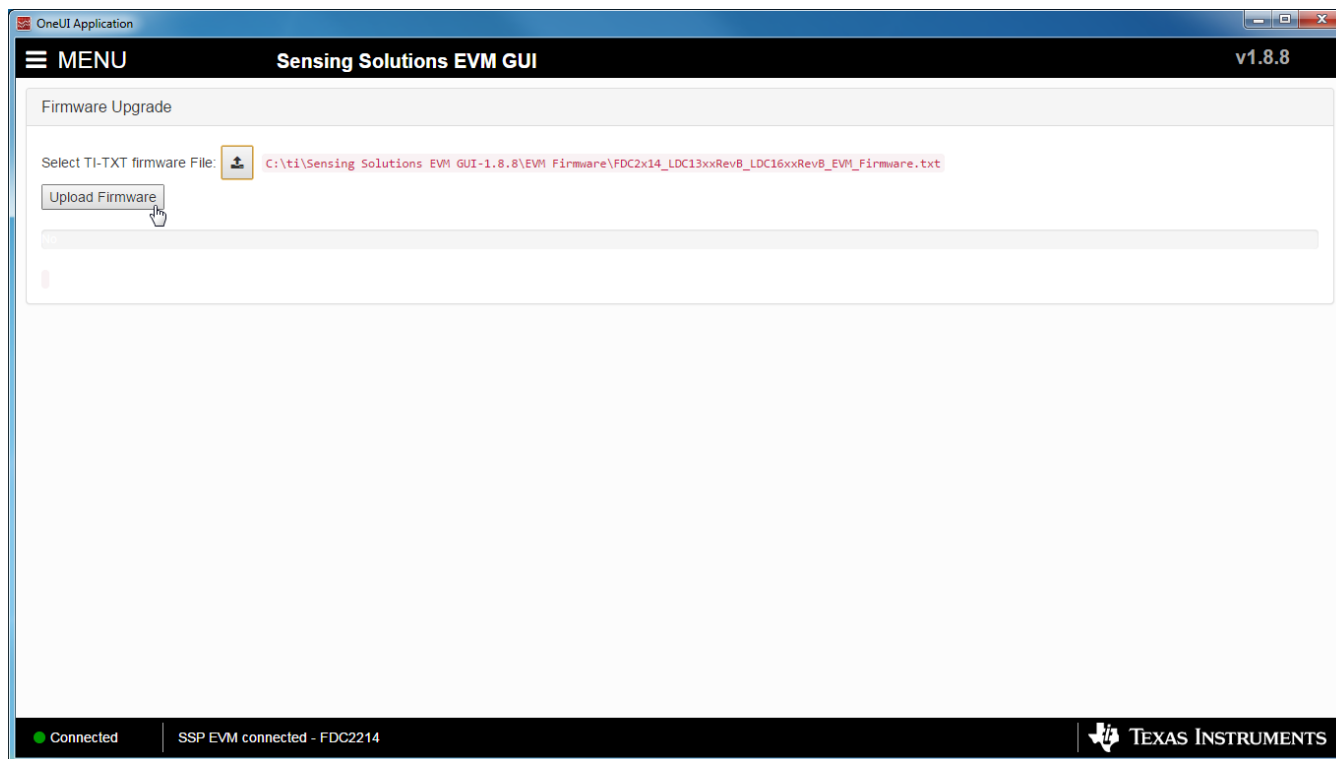
**Figure 1-37. Select TI-TXT File Button on Firmware Upload Page**

2. Select the firmware file and click "Open"



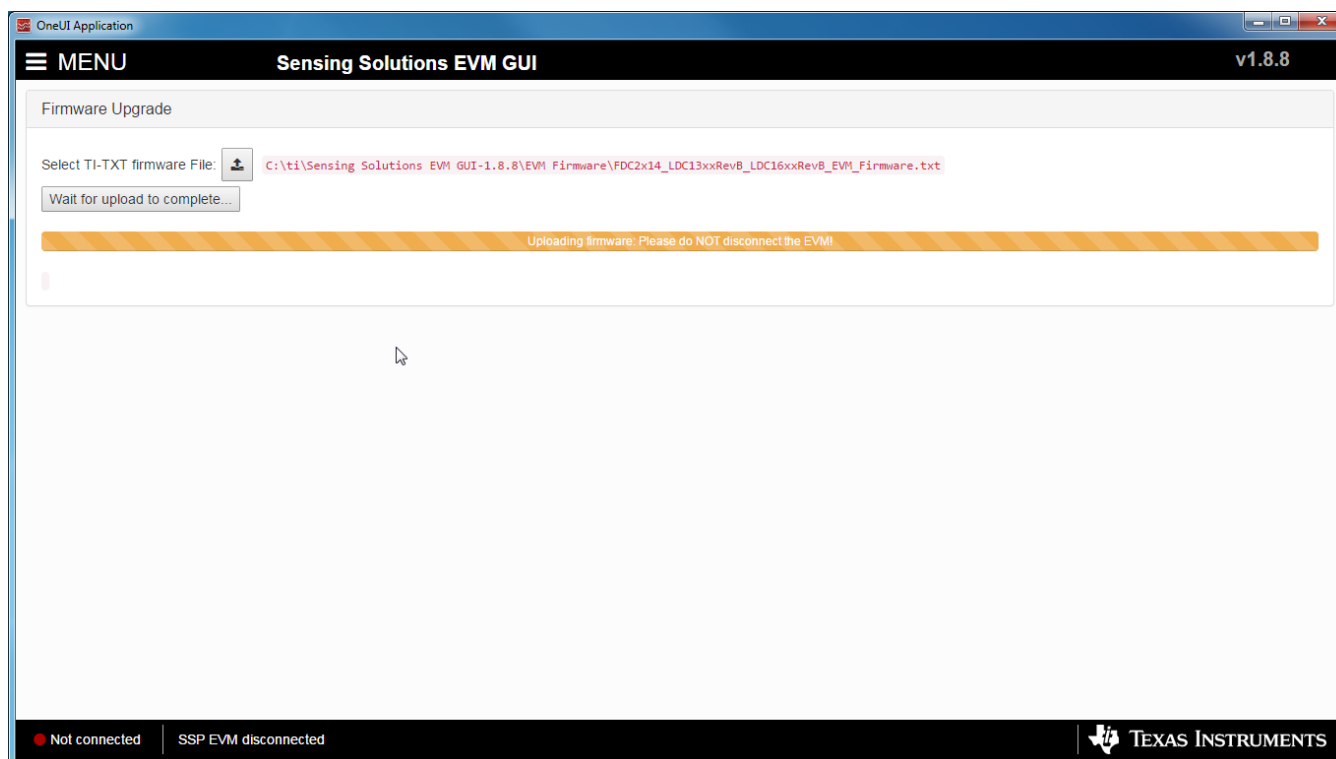
**Figure 1-38. Selecting TI-TXT Firmware File for Upload to EVM**

3. Click the “Upload Firmware” button

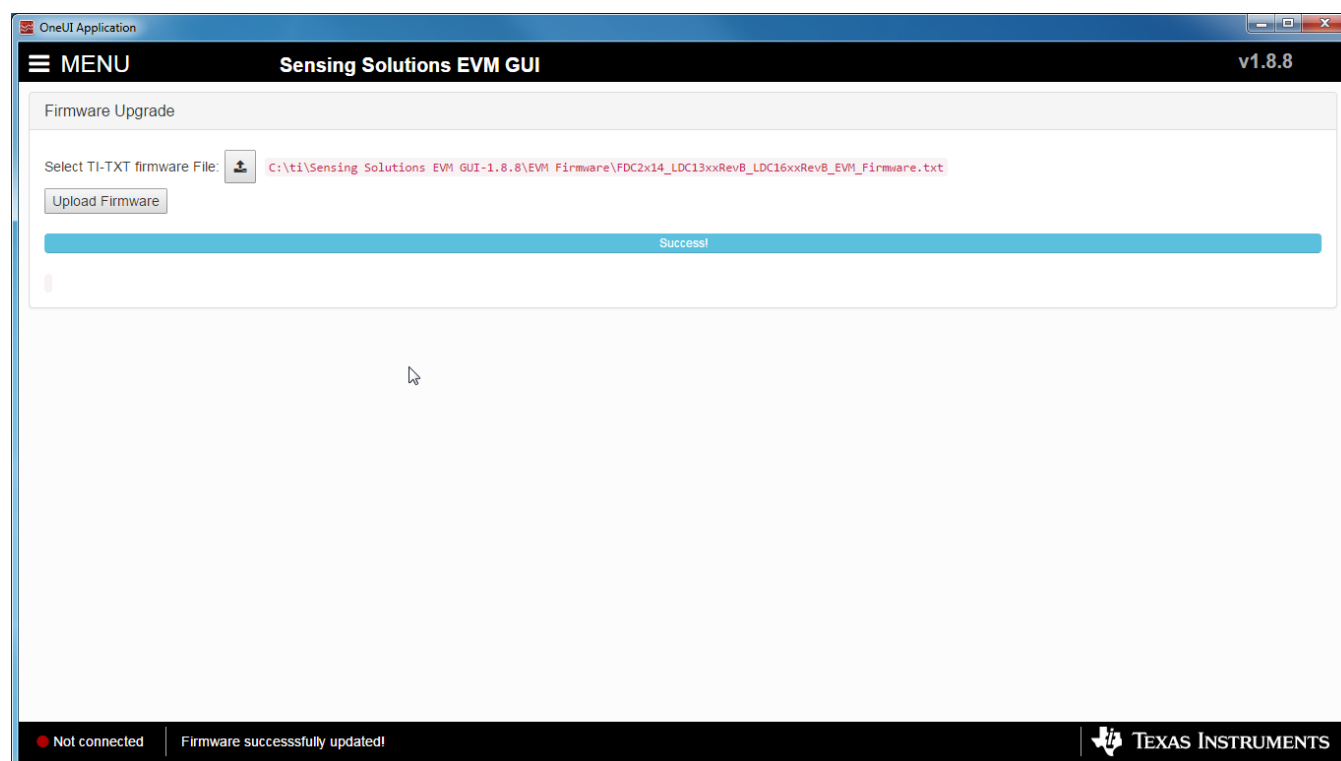


**Figure 1-39. Upload Firmware Button on Firmware Upload Page**

4. Wait for the firmware to upload. Do NOT disconnect the EVM from the PC at this time! Also note that the GUI will disconnect from the EVM. The upload process should not take more than one minute. If the upload fails or lasts longer than one minute, unplug the EVM and restart the GUI.



**Figure 1-40. Firmware Upload in Progress**



**Figure 1-41. Firmware Upload Success**

## Schematics

### 2.1 LDC10xx EVM Schematics

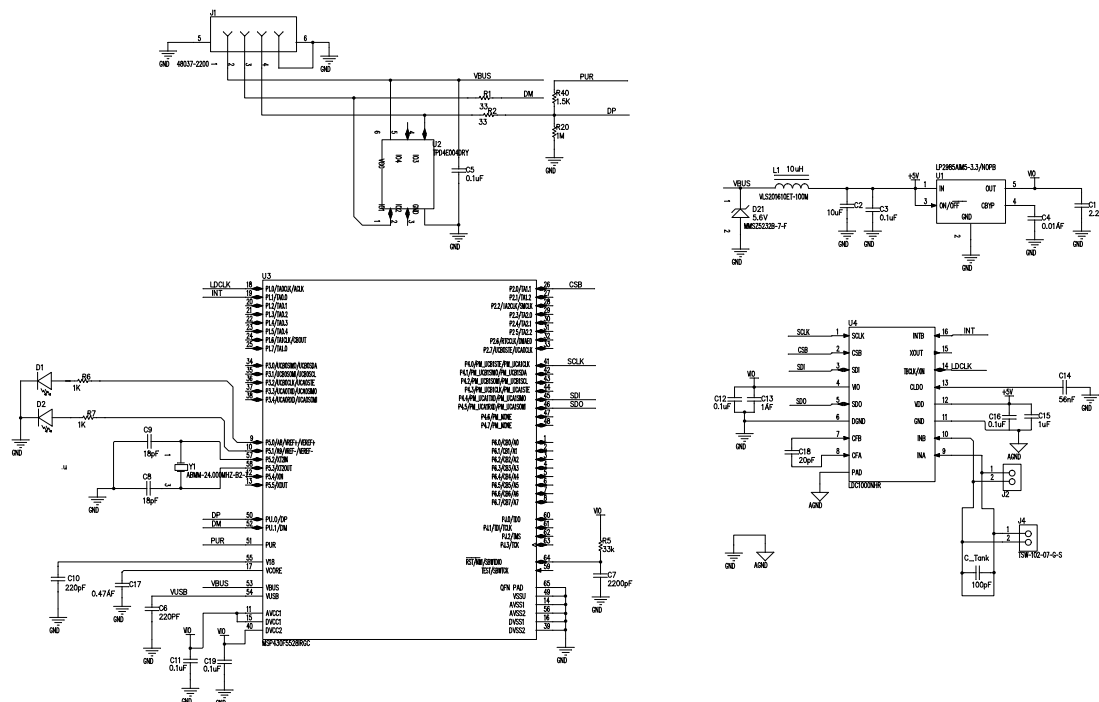


Figure 2-1. EVM Layout

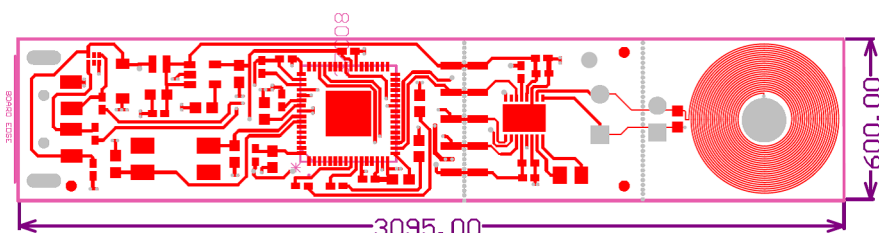


Figure 2-2. Top Layer

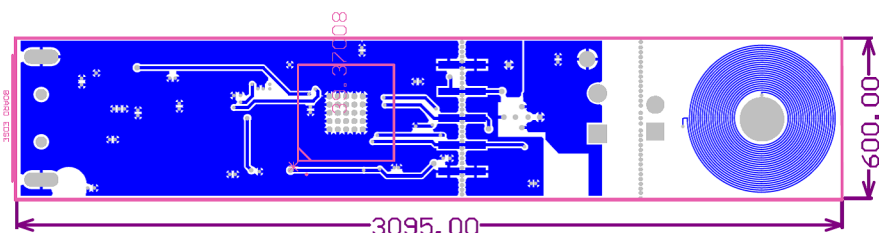


Figure 2-3. Bottom Layer

## Bill of Materials

| Designator                 | Quantity | Description                                      | Manufacturer                     | Part Number         |
|----------------------------|----------|--------------------------------------------------|----------------------------------|---------------------|
| C1                         | 1        | CAP, CERM, 2.2uF, 10V, +/-10%, X5R, 0603         | Kemet                            | C0603C225K8PACTU    |
| C2                         | 1        | CAP CER 10UF 10V 10% X5R 0603                    | TDK Corporation                  | C1608X5R1A106K080AC |
| C3, C5, C11, C12, C16, C19 | 6        | CAP CER 0.1UF 16V 5% X7R 0402                    | Murata Electronics North America | GRM155R71C104JA88D  |
| C4                         | 1        | CAP, CERM, 0.01uF, 25V, +/-5%, C0G/NP0, 0603     | TDK                              | C1608C0G1E103J      |
| C6                         | 1        | CAP CER 220PF 50V 1% NP0 0402                    | TDK Corporation                  | C1005C0G1H221F050BA |
| C7                         | 1        | CAP, CERM, 2200pF, 50V, +/-10%, X7R, 0603        | Kemet                            | C0603X222K5RACTU    |
| C8, C9                     | 2        | CAP CER 18PF 100V 5% NP0 0603                    | MuRata                           | GRM1885C2A180JA01D  |
| C10                        | 1        | CAP, CERM, 220pF, 50V, +/-1%, C0G/NP0, 0603      | AVX                              | 06035A221FAT2A      |
| C13, C15                   | 2        | CAP, CERM, 1uF, 10V, +/-10%, X5R, 0402           | MuRata                           | GRM155R61A105KE15D  |
| C14                        | 1        | CAP CER 0.056UF 16V 5% X7R 0402                  | Kemet                            | C0402C563J4RACTU    |
| C17                        | 1        | CAP, CERM, 0.47uF, 10V, +/-10%, X7R, 0603        | Kemet                            | C0603C474K8RACTU    |
| C18                        | 1        | CAP CER 20PF 50V 5% NP0 0805                     | Kemet                            | C0805C200J5GACTU    |
| C_Tank                     | 1        | CAP CER 100PF 50V 1% NP0 0603                    | AVX Corporation                  | 06035A101FAT2A      |
| D1                         | 1        | LED SMARTLED GREEN 570NM 0603                    | OSRAM Opto Semiconductors Inc    | LG L29K-G2J1-24-Z   |
| D2                         | 1        | LED 660NM SUPER RED DIFF 0603SMD                 | Lumex Opto/Components Inc        | SML-LX0603SRW-TR    |
| D21                        | 1        | Diode, Zener, 5.6V, 500mW, SOD-123               | Diodes Inc.                      | MMSZ5232B-7-F       |
| FID1, FID2, FID3           | 3        | Fiducial mark. There is nothing to buy or mount. | N/A                              | N/A                 |
| J1                         | 1        | Connector, USB Type A, 4POS R/A, SMD             | Molex                            | 48037-2200          |
| L1                         | 1        | INDUCTOR POWER 10UH .45A SMD                     | TDK Corporation                  | VLS201610ET-100M    |
| R1, R2                     | 2        | RES, 33 ohm, 5%, 0.063W, 0402                    | Vishay-Dale                      | CRCW040233R0JNED    |
| R5                         | 1        | RES, 33k ohm, 5%, 0.063W, 0402                   | Vishay-Dale                      | CRCW040233K0JNED    |
| R6, R7                     | 2        | RES 1K OHM 1/10W 5% 0402 SMD                     | Panasonic Electronic Components  | ERJ-2GEJ102X        |
| R20                        | 1        | RES, 1M ohm, 5%, 0.063W, 0402                    | Yageo                            | RC0402JR-071ML      |

| Designator | Quantity | Description                                                                              | Manufacturer        | Part Number         |
|------------|----------|------------------------------------------------------------------------------------------|---------------------|---------------------|
| R40        | 1        | RES 1.5K OHM 1/16W<br>5% 0402 SMD                                                        | Vishay Dale         | CRCW04021K50JNED    |
| U1         | 1        | Micropower 150 mA Low-<br>Noise Ultra Low-Dropout<br>Regulator, 5-pin SOT-23,<br>Pb-Free | Texas Instruments   | LP2985AIM5-3.3/NOPB |
| U2         | 1        | 4-CHANNEL ESD-<br>PROTECTION ARRAY<br>FOR HIGH-SPEED DATA<br>INTERFACES, DRY006A         | Texas Instruments   | TPD4E004DRY         |
| U3         | 1        | MCU                                                                                      | Texas Instruments   | MSP430F5528IRGCR    |
| U4         | 1        | Inductance to Digital<br>Converter                                                       | Texas instruments   | LDC1000             |
| Y1         | 1        | CRYSTAL 24.000MHZ<br>18PF SMD                                                            | Abracon Corporation | ABMM-24.000MHZ-B2-T |
| J2         | 0        | TERM BLOCK 2POS<br>3.81MM PCB HORIZ                                                      | FCI                 | 20020327-D021B01LF  |
| J4         | 0        | Header, TH, 100mil, 2x1,<br>Gold plated, 230 mil<br>above insulator                      | Samtec, Inc.        | TSW-102-07-G-S      |

## Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

| Changes from A Revision (March 2014) to B Revision                     | Page               |
|------------------------------------------------------------------------|--------------------|
| • Added new part number LDC1001.....                                   | <a href="#">2</a>  |
| • Updated GUI instructions to v1.8.8 .....                             | <a href="#">3</a>  |
| • Updated <i>Choosing the Graph and Visible Channels</i> section ..... | <a href="#">21</a> |

| Changes from Original (September 2013) to A Revision                   | Page               |
|------------------------------------------------------------------------|--------------------|
| • Added new part numbers LDC1041/LDC1051 .....                         | <a href="#">2</a>  |
| • Changed Changed Schematic to Vector graphic for better display. .... | <a href="#">37</a> |

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