Important Notes

Restrictions in Use

IDT's ZSSC4151 SSC Evaluation Kit, consisting of the SSC Communication Board (SSC CB), ZSSC415x/6x/7x Evaluation Board (SSC EB), Sensor Replacement Board (SSC RB), and ZSSC41xx Software, is designed for sensor module evaluation, laboratory setup, and module calibration development only. IDT's SSC Evaluation Kit hardware and software must not be used for module production or production test setups.

The related product ZSSC41xx SSC Mass Calibration System is designed only for development, evaluation, and laboratory setup of sensor modules with IDT Sensor Signal Conditioner ICs. The IDT Mass Calibration System hardware and software must not be used for module production and production test setups.

Disclaimer

IDT shall not be liable for any damages arising out of defects resulting from

(i) delivered hardware or software
(ii) non-observance of instructions contained in this manual and in any other documentation provided to user, or
(iii) misuse, abuse, use under abnormal conditions, or alteration by anyone other than IDT.

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1 Introduction

This document guides first-time users through the initial hardware setup, software installation, and basic steps for using the ZSSC4151 IC with the ZSSC4151 SSC Evaluation Kit available from IDT. By following this document, users should gain a quick understanding of the basic operations and options available in the hardware and software and be able to perform a simple calibration and store the results in non-volatile memory (NVM).

Refer to the *ZSSC4151 Evaluation Kit Hardware Manual* for an overview of the hardware, schematics, and details related to the connectors.

The ZSSC4151 Evaluation Kit consists of the following parts:

- SSC Communication Board (SSC CB) V4.1 *
- ZSSC415x/6x/7x SSC Evaluation Board (SSC EB) V1.1
- SSC Sensor Replacement Board (SRB) V2.0
- 6 ZSSC4151 samples (QFN24 4x4mm)
- USB cable
- Vacuum suction pen (provided for safe handling of IC samples)

2 Setting up Hardware and Software

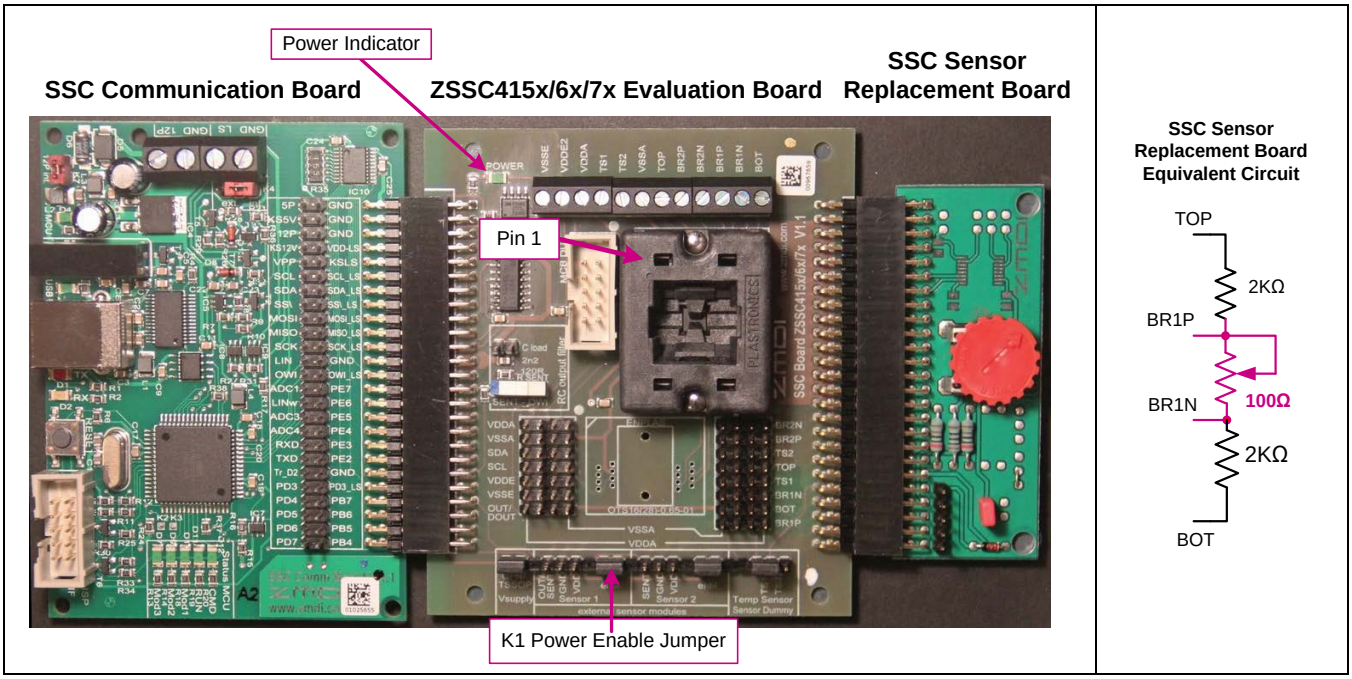
2.1. Hardware Setup

The Evaluation Kit hardware consists of the following three boards as shown in Figure 2.1 and includes samples of the ZSSC4151 (QFN24):

1. SSC Communication Board – Connects to computer through a USB 2.0 cable and handles the I²C™ (trademark of NXP) and OWI interfaces between the PC-based software and the ZSSC4151.
2. ZSSC415x/6x/7x Evaluation Board. This board contains a socket for the ZSSC4151 and convenient access points for connection to instrumentation and external sensor circuitry. Note the location of pin 1 for the QFN24 socket. Jumpers should be installed initially as shown in Figure 2.1.
3. Sensor Replacement Board – See equivalent circuit in Figure 2.1. This board provides a simulated input signal for easy evaluation of functionality without an actual bridge or stimulus. It should be removed when connecting an external sensor bridge (through screw terminals on Evaluation Board).

* For detailed information about SSC Communication Board, please refer to the *SSC Communication Board Data Sheet* available on the IDT website at http://www.IDT.com/ZSSC415xKIT.

Figure 2.1 ZSSC4151 SSC Evaluation Kit Assembly



With the three boards assembled as shown in Figure 2.1, attach the USB cable included in the kit between the SSC Communication Board and a USB port on a PC. In some cases, the user's operating system detects the board type and automatically installs a driver the first time that the SSC Communication Board is connected. For this reason, the PC should be connected to the Internet during the first USB connection so that the operating system can download a driver. If a driver fails to install, contact IDT for assistance.

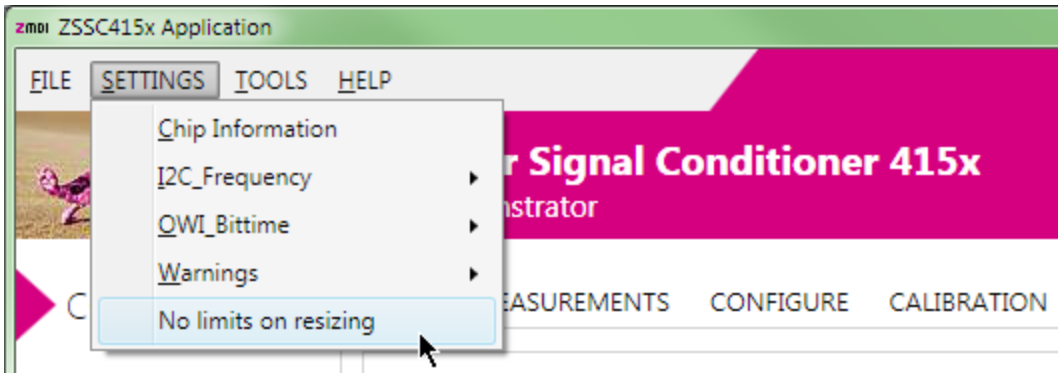
2.2. Software Setup

The *ZSSC4151 Application Software* provides a user-friendly graphical user interface (GUI). It is available for download at www.IDT.com/ZSSC415xKIT. After downloading the software, extract the zip file contents.

Run the *ZSSC415xSetup.exe* file from the unzipped location to install the GUI. Launch the *ZSSC415x* program from the Start Menu in Windows or by clicking the desktop icon created by the installation program.

To enable resizing the window, go to "SETTINGS" on the top menu and check the "No limits on resizing" as shown in Figure 2.2.

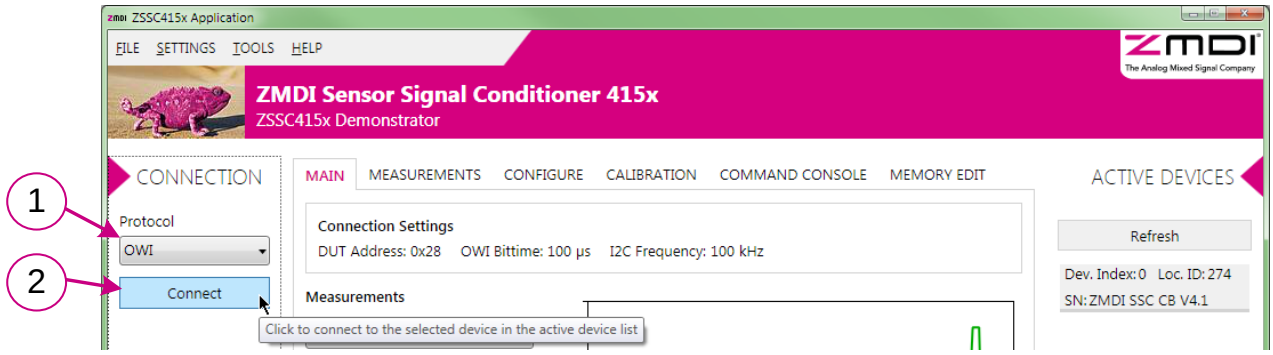
Figure 2.2 Enabling Resizing Window



2.3. Activating the Hardware Connection

1. Select I²C™ or OWI (One Wire Interface) from the drop-down menu below “Protocol” (see Figure 2.3).
2. Click the “Connect” button. On the Evaluation Board, verify that the green LED power indicator turns on. The “ACTIVE DEVICES” list on the right side of the “Main” tab menu shows information about the board and device that are connected.

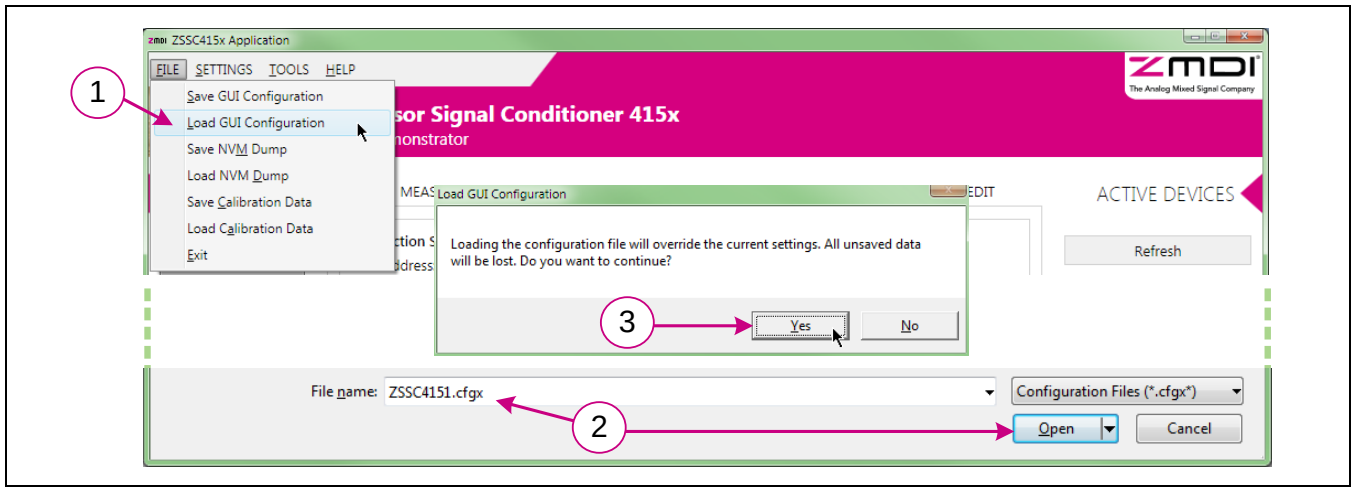
Figure 2.3 Connecting the Hardware via I² C™ or OWI



2.4. Creating and Loading the Default Configuration File

1. On the top menu, select *FILE > Load GUI Configuration* to load a configuration file (Figure 2.4).
2. A default configuration file, *ZSSC4151.cfgx*, is provided with the software as shown in the “File name” field in Figure 2.4. If necessary, browse to the file location and click the “Open” button.
3. In the resulting “Load GUI Configuration” window, click the “Yes” button to accept overwriting the current configuration settings.

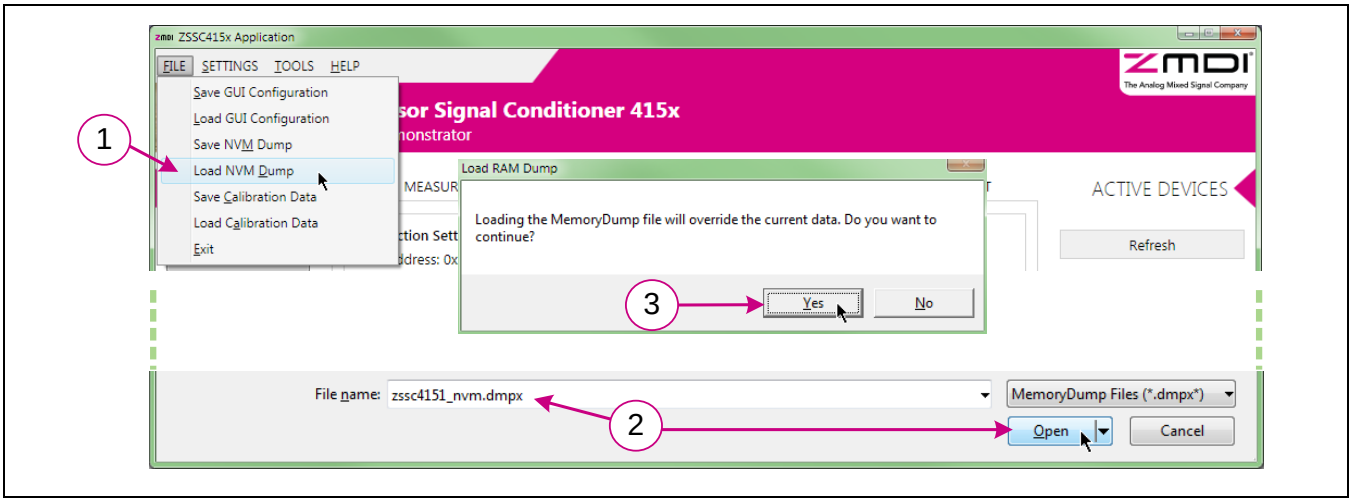
Figure 2.4 Loading the GUI Configuration File



2.5. Loading the NVM Dump File

1. On the top menu, select *FILE > Load NVM Dump* to load a file containing the NVM data (see Figure 2.5).
2. A default NVM file, *zssc4151_nvm.dmpx*, is provided with the software as shown in the “File name” field in Figure 2.5. Browse to the file location, and click the “Open” button.
3. In the resulting “Load RAM Dump” window, click the “Yes” button to accept overwriting current data.

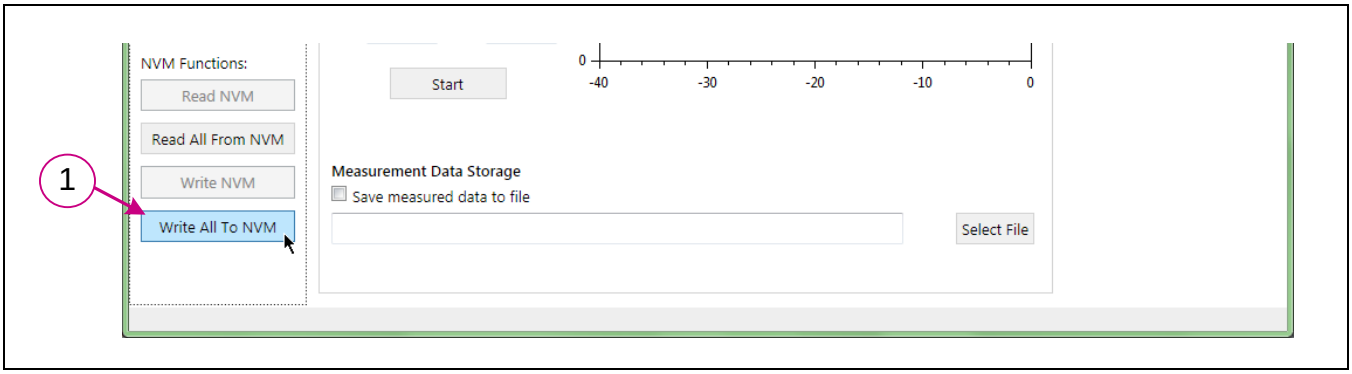
Figure 2.5 Load the NVM Data into GUI



2.6. Writing the Memory Contents to NVM

1. Click the “Write All To NVM” button to download the NVM data into the ZSSC4151 (see Figure 2.6).

Figure 2.6 Writing the Configuration into the ZSSC4151 NVM

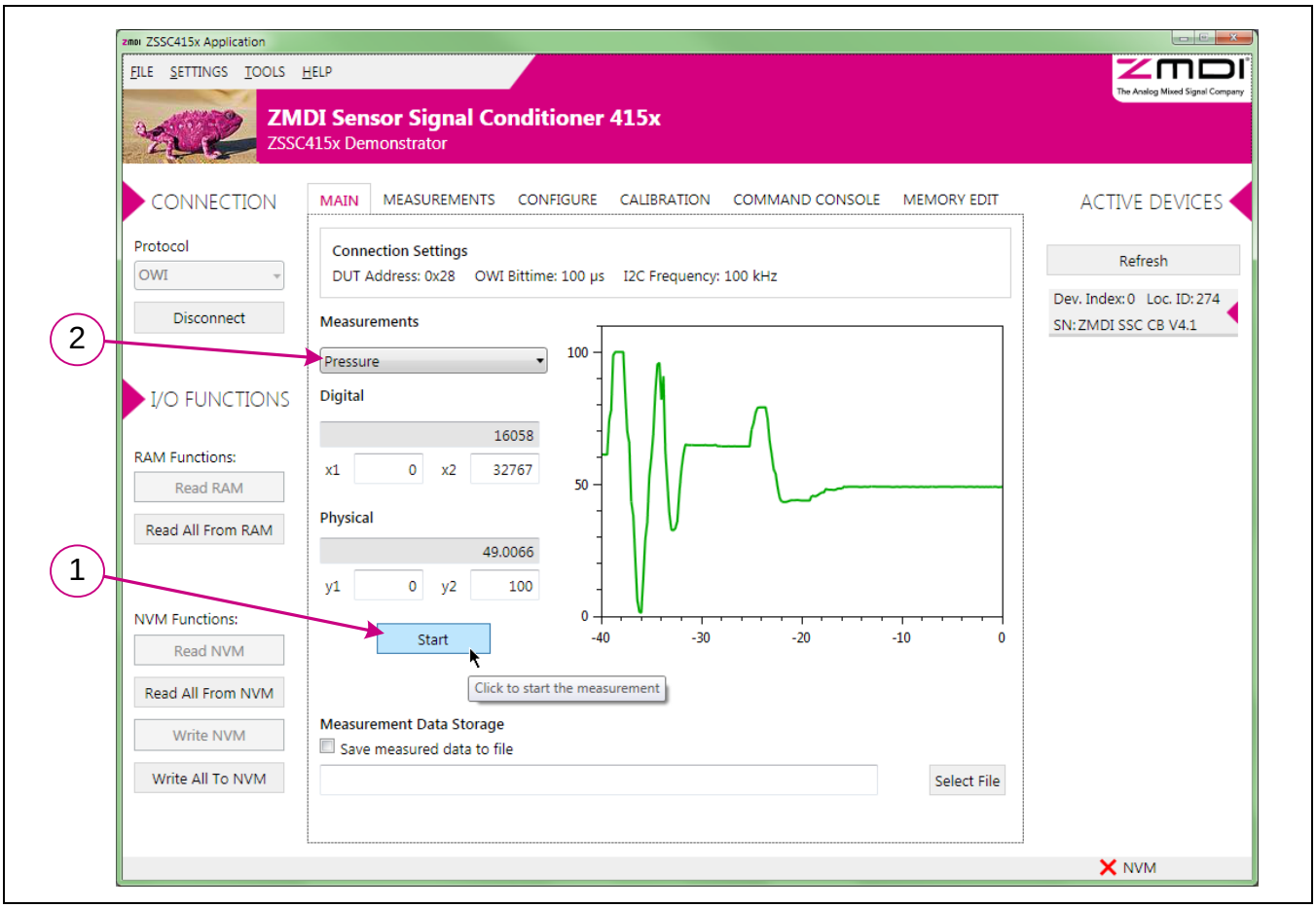


2.7. Taking Measurements

Note: The GUI refers to the bridge sensor measurand as “Pressure,” but this can be any type of resistive sensor signal. The ZSSC4151 is designed for almost all types of resistive full and half bridge sensors.

1. Click the “Start” button to begin acquiring and recording measurements (see Figure 2.7).
2. With the “Pressure” selected in the “Measurements” pulldown, turn the red knob on the Sensor Replacement Board (Figure 2.1). The “Pressure” (Green) waveform plot should move up and down with the knob rotation. The “Temperature” and “Pressure Raw” waveforms can also be displayed using the “Measurements” pulldown selector, but only one waveform at a time will be displayed.
3. Click the “Stop” button to discontinue measurements.

Figure 2.7 Starting and Monitoring the Measurement Sequence



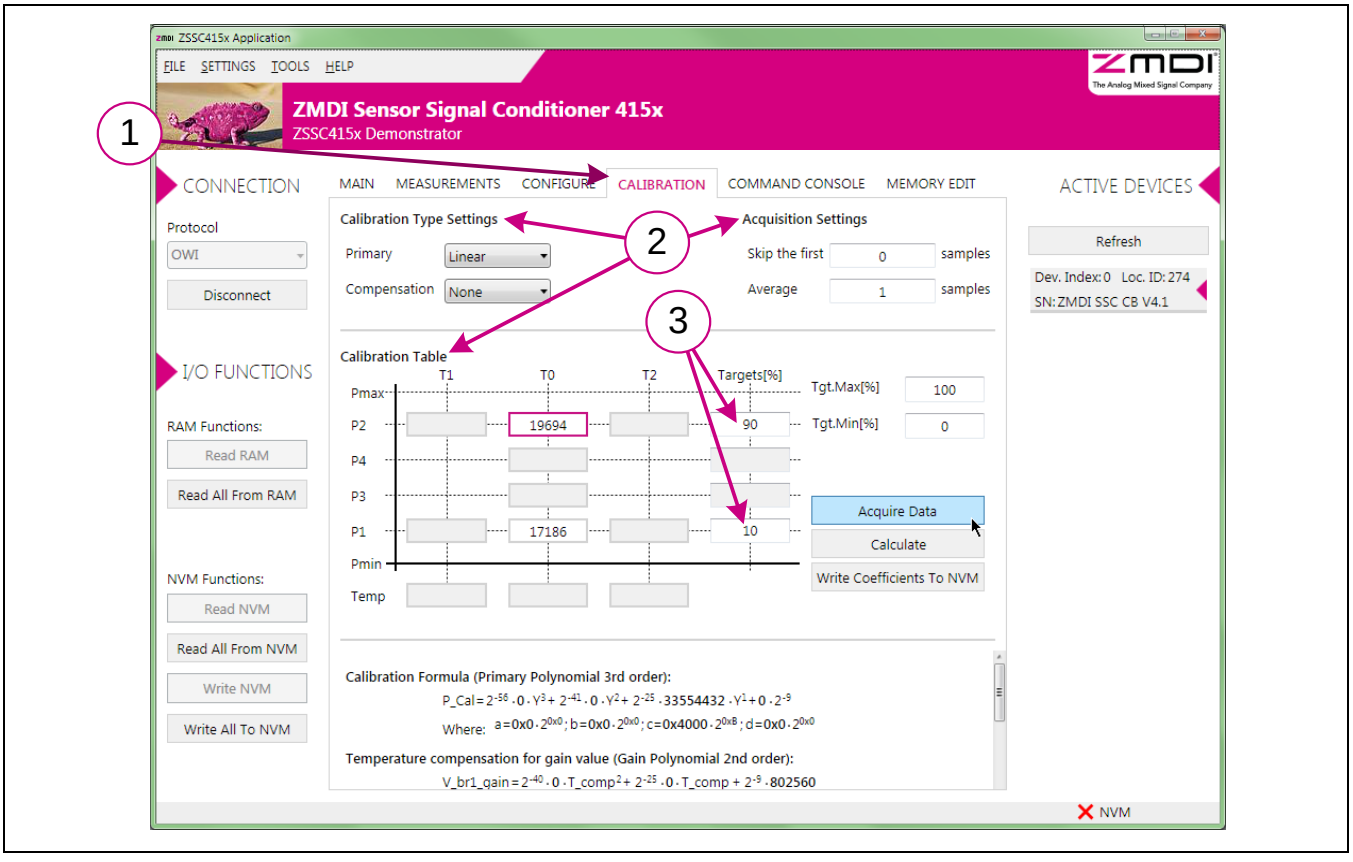
3 Performing a Sample Calibration

This section describes the basic operations to perform a simple, two-point linear calibration at a single temperature. Higher order calibrations are performed similarly, but with additional points taken over the bridge measurand and temperature.

3.1. Setting up the Calibration and Acquiring Data

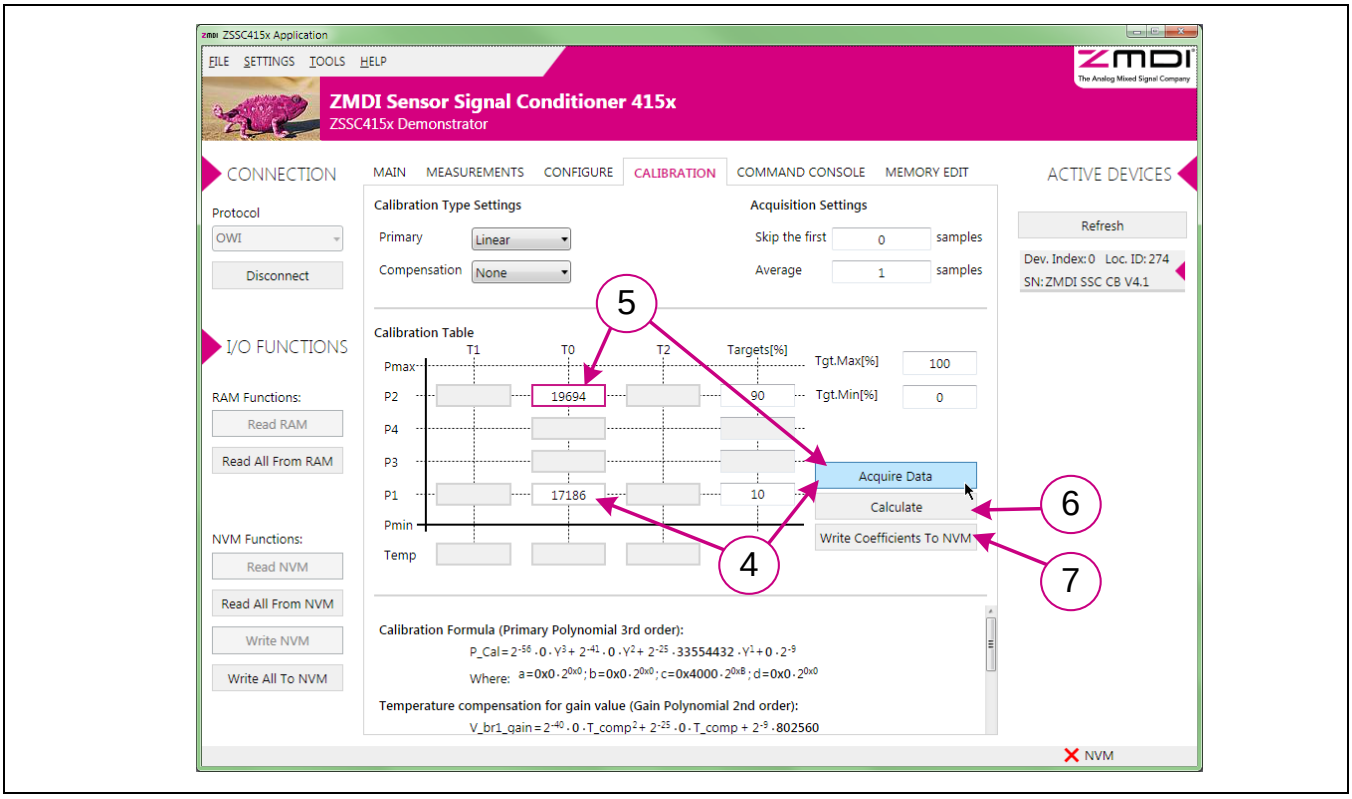
1. Select the “Calibration” tab to display the “Calibration” window (see Figure 3.1).
2. Ensure that the “Calibration Type Settings” and “Acquisition Settings” are set as shown in Figure 3.1. The “Calibration Table” shows that there are only two points required to complete the calibration in this case.
3. Set the upper and lower “Target” limits to 90% and 10%. **DO NOT** change the “Tgt.Min” and “Tgt.Max” fields.

Figure 3.1 Using the Calibration Window Tab to Set Upper and Lower Target Limits



4. Turn the red knob on the Sensor Replacement Board fully counterclockwise. Select the “P1” field and click the “Acquire Data” button (see Figure 3.2).
5. Turn the red knob on the Sensor Replacement Board fully clockwise. Select the “P2” field and click the “Acquire Data” button.
6. Click the Calculate button. The coefficients for the calibration will be calibrated and updated in the calibration formula textbox at the bottom of the window. HINT: Scroll to the bottom of the textbox so that the “Output” button appears. Move the cursor over the “Output” button. A popup window will appear showing the complete set of calibration coefficients.
7. Click the “Write Coefficients To NVM” button. This will download the updated coefficients to the NVM of the ZSSC4151.

Figure 3.2 Using the Calibration Window Tab to Acquire Data and Calculate Coefficients



3.2. Checking the Calibration

The calibration can be checked in the “Main” tab.

1. Click the “Start” button in this window and observe the reading to verify readings. If the red knob of the Sensor Replacement Board has been left in the fully clockwise position as in step 5 in section 3.1, the calibration at the “P2” calibration point can be verified by checking that the output for “Pressure” is 90%.
2. Similarly, if the red knob is turned fully counterclockwise, the reading should be 10%.

3.3. Saving the NVM Data and GUI Configuration Settings

The GUI settings and NVM contents for this example can be saved to new configuration and NVM dump files. Select *FILE > Save GUI Configuration* from the top menu, and save the configuration under a new name. In a similar way, the NVM dump file can be saved using *FILE > Save NVM Dump* and creating a new name.

4 Related Documents and Tools

4.1. IDT Related Documents and Tools

Document
ZSSC4151 Data Sheet
ZSSC4151 Feature Sheet
ZSSC415x Graphical User Interface Operation Manual
ZSSC4151 SSC Evaluation Kit Hardware Manual

Visit www.IDT.com/ZSSC4151 and www.IDT.com/ZSSC415xKIT or contact your nearest sales office for the latest version of these documents.

5 Glossary

Term	Description
DUT	Device Under Test
GUI	Graphical User Interface
NVM	Nonvolatile Memory
OWI	One-Wire Interface
SSC	Sensor Signal Conditioner
USB	Universal Serial Bus

6 Document Revision History

Revision	Date	Description
1.00	September 14, 2015	First release.
	March 11, 2016	Changed to IDT branding.

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