

SSC Evaluation Kit

Rev. 1.00 / March 2012

ZSSC3154

Automotive Sensor Signal Conditioner
with Dual Analog Output





Important Notes

Restrictions in Use

ZMDI's ZSSC3154 SSC Evaluation Kit, consisting of a Communication Board (SSC CB), an IC-specific evaluation circuit board (SSC EB), and the calibration software, is designed for sensor module evaluation, laboratory setup, and module calibration development only.

ZMDI's Evaluation Kit hardware and software must not be used for module production and production test setups.

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- (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 ZMD AG.

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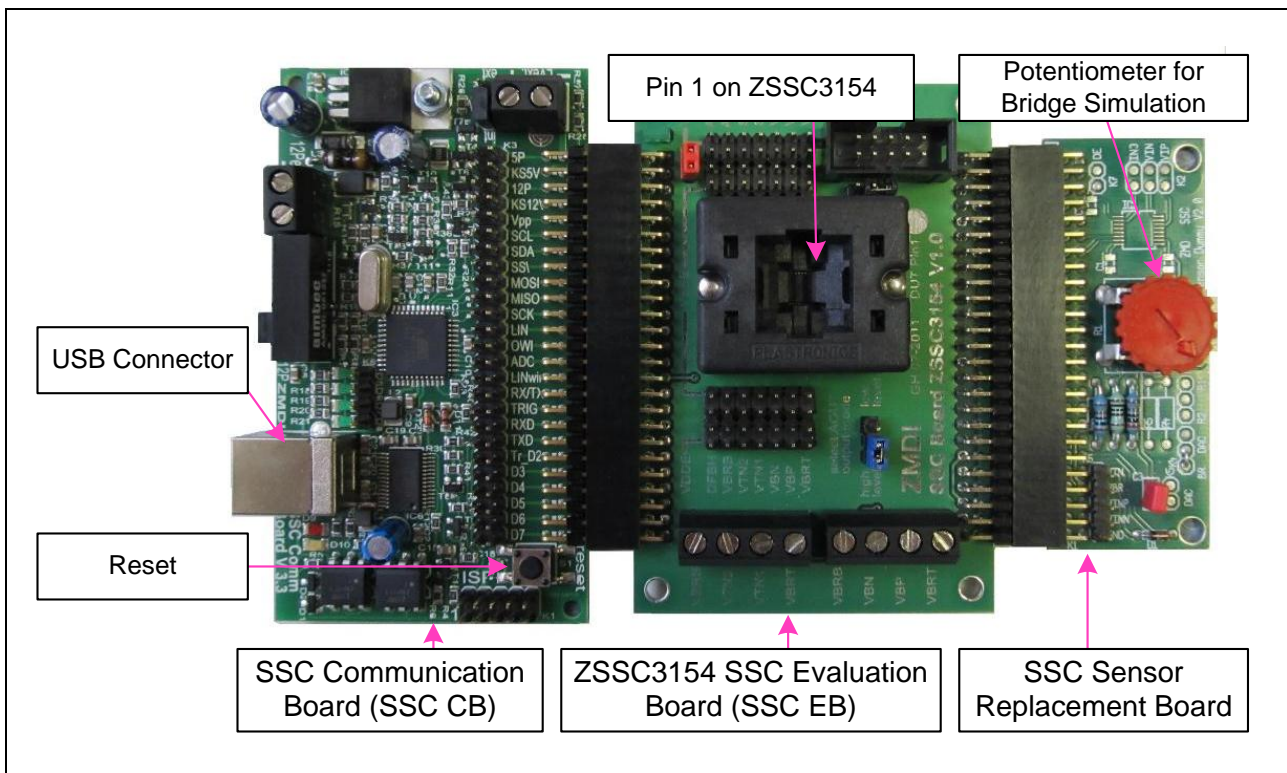


1 Kit Contents

The ZSSC3154 Evaluation Kit consists of the following parts:

- SSC Communication Board (SSC CB) V3.3 (including USB cable) *
- ZSSC3154 SSC Evaluation Board (SSC EB) V1.0
- SSC Sensor Replacement Board (SRB) V2.0
- SSC DVD, including the ZSSC3154 Software for evaluation and calibration
- 5 samples of the ZSSC3154xA2T (QFN32 5x5mm)
- SSC Evaluation Kit start up information

Figure 1.1 ZSSC3154 SSC Evaluation Kit



The SSC Evaluation Kit contains the software and hardware needed for communication and calibration of ZSSC3154 sensor signal conditioning ICs. A PC can communicate with the ZSSC3154 via the Communication Board (SSC CB) through a USB connection. The Sensor Replacement Board (SRB) provides a replacement for an actual sensor and can be used for the first step of calibration or a dry-run calibration as described in section 4. On the SRB, the sensor replacement signal is controlled by a potentiometer (see Figure 1.1).

The software will run under Windows® 98/ME/XP/NT/Vista/Windows® 7 operation systems after installation of a USB driver (refer to the *SSC_AN_CommunicationBoard_Driver_Installation_rev_X_xy*).

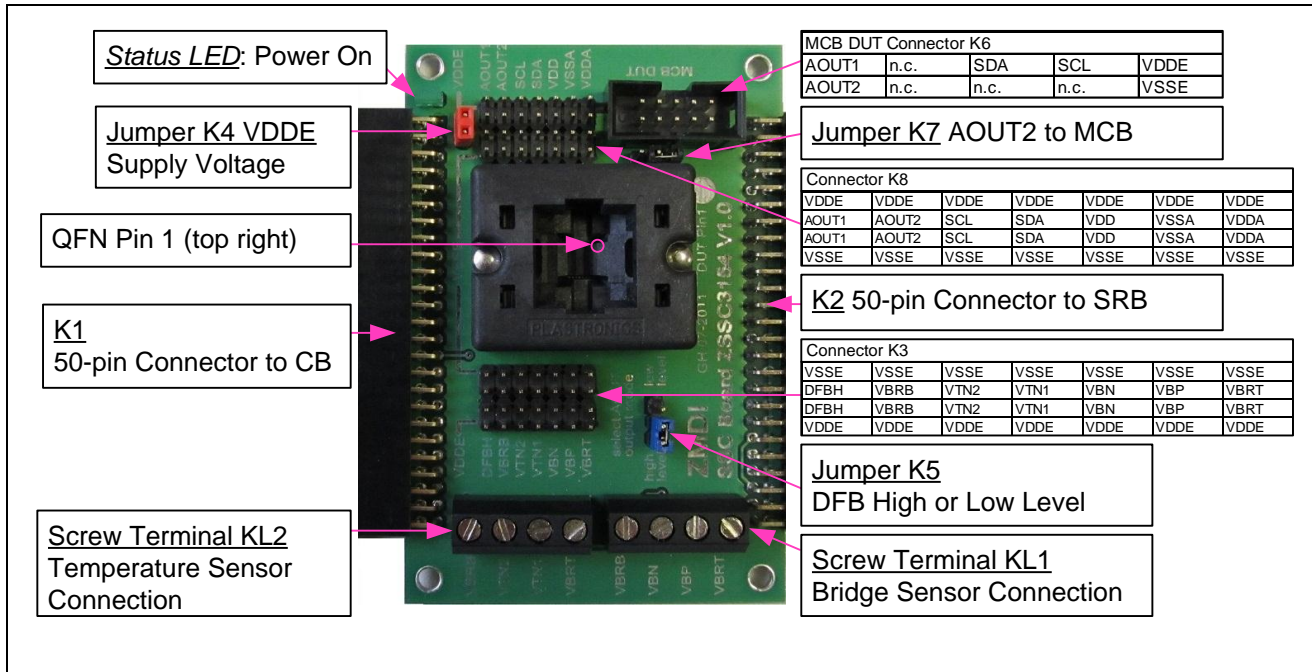
* For detailed information about the SSC Communication Board, please refer to the *SSC Communication Board Datasheet*.



2 ZSSC3154 Evaluation Board

2.1. Overview

Figure 2.1 ZSSC3154 SSC Evaluation Board – Overview



The main purpose of the SSC Evaluation Board is connection with the ZSSC3154 IC. The PC sends commands and data via its USB port (configured as a virtual COM port) to the SSC CB. The microcontroller (μC) on the SSC CB interprets these commands and relays them to the ZSSC3154 in the I²C™† or OWI communication mode. The μC will also forward any data bytes from the ZSSC3154 back to the PC via the USB connection. These bytes can be sensor and temperature readings to be displayed by the PC software, raw ADC data used during calibration, or EEPROM data. The SSC CB μC controls the power signals required for entering the Command Mode.

2.2. Schematic

Figure 2.2 shows the schematic of the ZSSC3154 SSC Evaluation Board (SSC EB). The SSC EB is powered by a 5V supply controlled by the μC on the SSC CB.

The green LED displays the status of this supply (maximum current that can be provided is 40mA).

The SSC EB board type is hard-coded by three resistors on **K1** connector pins D5 (low), D6 (low), and D7 (high). The SSC EB is connected to the SSC CB via the **K1** 50-pin female connector.

The SRB can be connected to the SSC EB via its **K2** 50-pin male connector. Alternatively, an external bridge sensor element and external temperature sensors can be connected using the on-board screw terminal **KL1/KL2**.

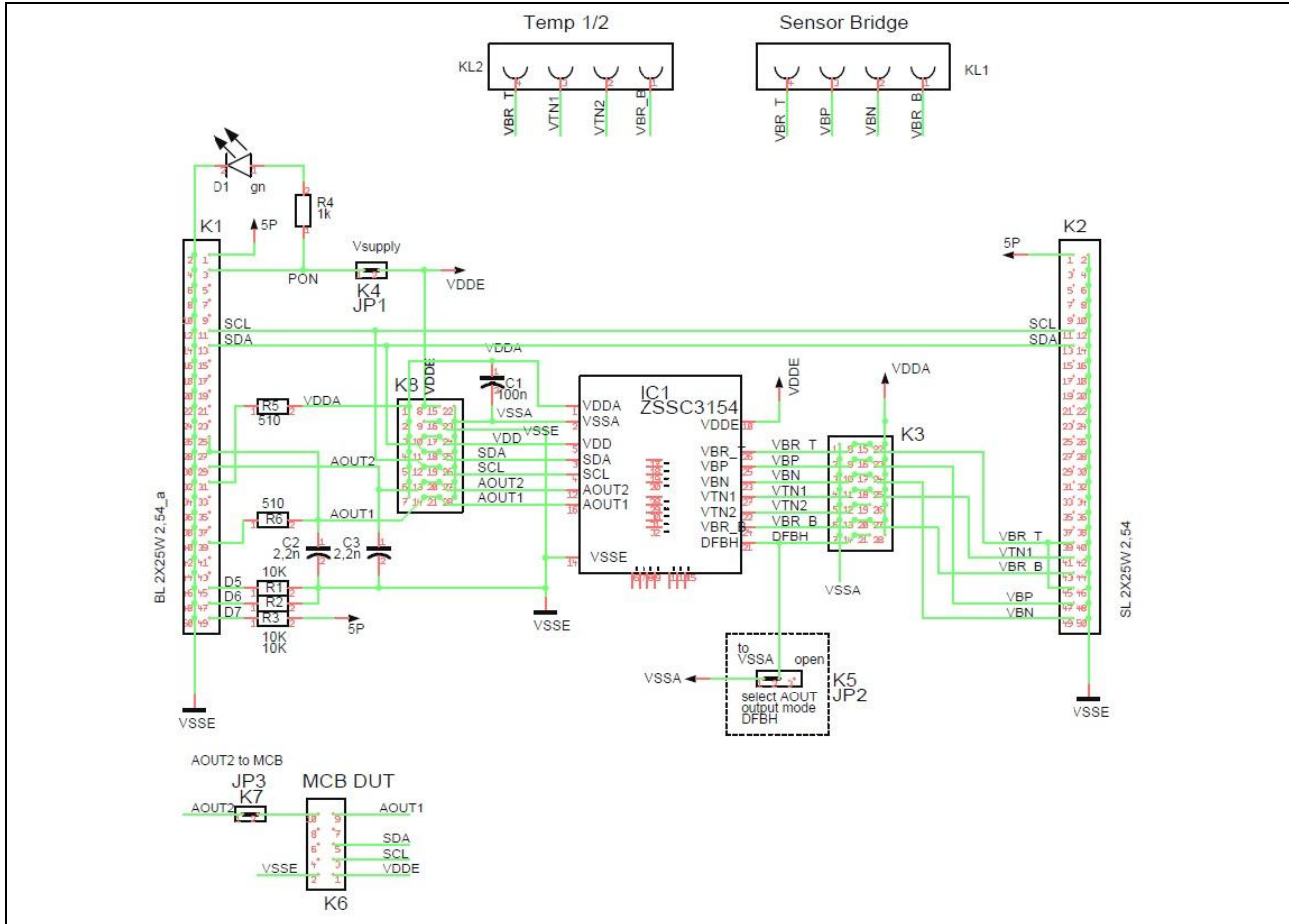
On-board there are several strips for simple access to all IC signals (connectors **K3** and **K8**).

Jumper **K4** can be used to remove the power supply for the ZSSC3154 manually or for a simple measurement of the supply current.

† I²C™ is a trademark of NXP.



Figure 2.2 SSC Evaluation Board Schematic



Jumper **K5** is used to determine the Diagnostic Fault Band Mode (DFB) for the AOUT voltage level. If left open, the level is low (DFBL); if shorted to ground, the level is high (DFBH).

Connection with a Mass Calibration Board (MCB) can be established via **K6** connector.

The output signal of AOUT2 can also be connected to pin10 on K6 if jumper **K7** is shorted.

2.3. Connections to the ZSSC3154

The SSC EB has a QFN-32 socket for inserting the QFN 5x5 ZSSC3154.

NOTE: Only one ZSSC3154 connection option can be used at a time (e.g., either through the SSC CB or via individual connections).

2.4. Reset Switch

Use the push button on the SSC CB to reset communications if needed.



3 ZSSC3154 Software

3.1. Overview

The ZMDI software provided with the ZSSC3154 SSC Evaluation Kit is intended for demonstration purposes and calibration of single units. This section gives a short overview of the variety of ways to use this evaluation software. For calibration examples using the complete SSC Evaluation Kit, refer to section 4.

The default software installation folder is `C:\program files\ZMDI\ZSSC3154`.

ZMDI can provide the user with algorithms and assistance in developing their full production calibration software. The software logs various data and commands into log files.

The software contains 5 menus that are intended for the following functions:

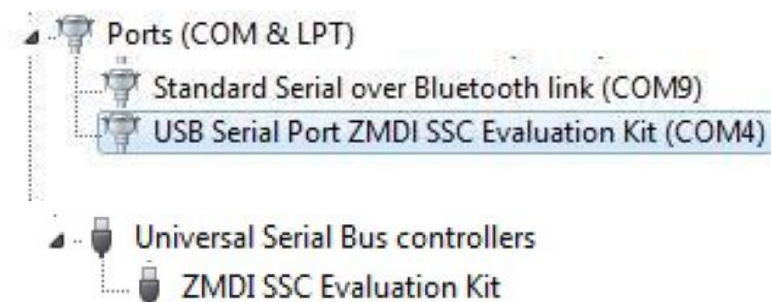
- Main Window: IC setup, configuration, and communication via check boxes, entry fields, and pull-down menus (see Figure 3.1)
- RAM/EEPROM Dialog: direct access to RAM/EEPROM registers (see Figure 3.12)
- Calibration Dialog: acquisition of raw data from sensor and calculation of coefficients (see Figure 3.11)
- Get Raw Values Dialog: special Dx commands for the ZSSC3154[‡] (see Figure 3.13)
- Send Command Dialog: low-level write/read communication with the SSC CB[§] (see Figure 3.14)

3.2. USB Driver Installation

The SSC Evaluation Kit requires installation of two USB drivers. To install the drivers, the user's system must meet these requirements and provide administrative rights if necessary:

- x86-compatible PC
- 64 MB RAM
- Hard drive with 20MB free space
- USB port
- Windows® 2000/XP/Vista/Windows®7

The two required driver files are in the *USB_Driver* folder on the Evaluation Kit DVD. These drivers will make the PC's USB port appear as a virtual COM port (typically COM3 or COM4 on most computers, as shown in the pictures below). The SSC Evaluation Kit software accesses the SSC Evaluation Board through the CB as if it were a COM (RS232) port. These drivers will not affect the operation of any other USB peripherals.



Refer to *SSC CB AN - USB Driver Installation Rev_X_xy.pdf* for instructions on installing these two drivers and for determining the virtual COM port for the SSC Evaluation Kit, which is needed for setting up the kit.

[‡] For details of the Dx commands, refer to the *ZSSC3154 Functional Description*.

[§] For details about SSC CB command structure, refer to the *SSC Communication Board Data Sheet* and *SSC Command Syntax*.



3.3. User Files

User files are saved in `[My Documents]\ZMDI\ZSSC3154` and consist of log files and EEPROM files.

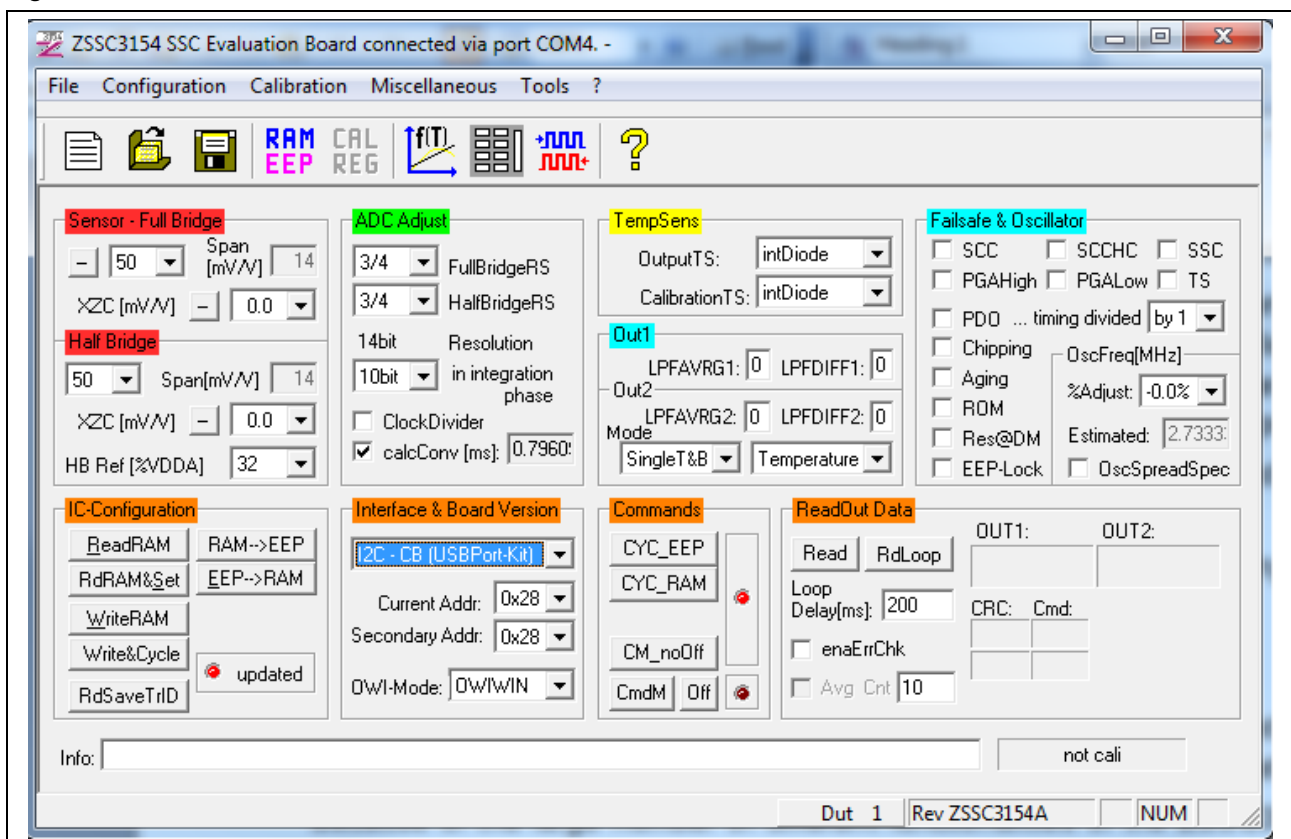
- `ZSSC3154_COMx.log`
A communication log file created when connection with the SSC CB and the ZSSC3154 is established (via OWI or I²C interface). This file is a log of the communication to the ZSSC3154 during the software session and can be saved after closing the software by renaming the file. Otherwise, it is overwritten the next time the software is opened or interface changed.
- `save_[date]_[time].3154`
A log file containing IC settings and acquired RAW data. This file can be used to load/save EEPROM contents.
- `save_[date]_[time].3154.txt`
A log file in text format containing IC settings and acquired RAW data. This file can be used to view the EEPROM contents.

3.4. General Setup of the Software

To install the ZSSC3154 software on the PC hard drive, locate the `setup.exe` file in the `\ZSSC3154\software` directory of the DVD-ROM and double click on it. The software completes the installation.

Because of the large number of different functionalities of the ZSSC3154, the user interface is divided into different segments. Within these segments, a number of associated functionalities are implemented. Several submenus allow access to sub-functionalities. After the ZSSC3154 Software is started, the main window is displayed as shown in Figure 3.1.

Figure 3.1 Main Window of the Evaluation Software





The main window includes all the settings for configuration of the ZSSC3154 in a clear structure, which hides the corresponding HEX commands behind buttons and pull-down menus. For a detailed description of the commands, refer to the *ZSSC3154 Functional Description*. An information box that explains functionality appears when the cursor is placed over most buttons, drop down menus, and check boxes.

3.4.1. Interface Selection

The ZSSC3154 supports two interfaces: OWI and I²C™ (see Figure 3.2). After starting the software, select the interface for the application in the “Interface Selection” section.

Adjacent to the drop down menu for the interface is a menu for selecting the I²C™ addresses to be used.

If I²C™ interface is selected, additional settings for the I²C™ interface are enabled in the “Send Command” menu.

For more details about the “Send Command” menu, see section 3.10.

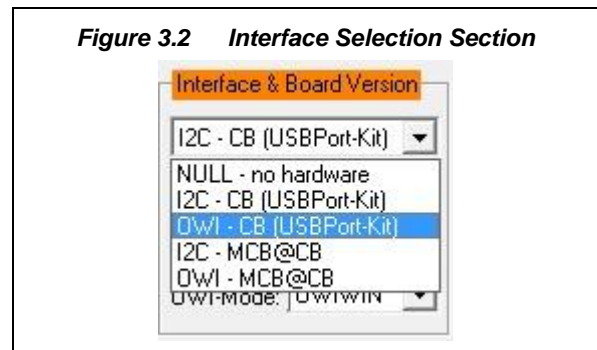


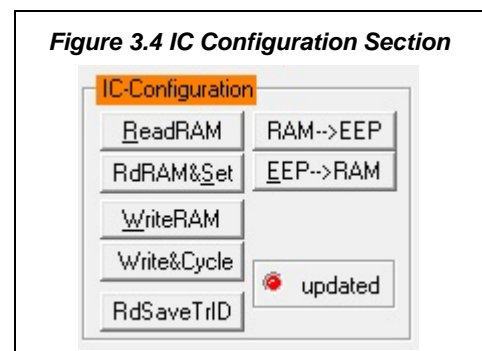
Figure 3.3 Additional I²C™ and OWI Interface Settings in the “Send Command” Menu



3.4.2. ZSSC3154 Configuration

The “IC Configuration” section includes the following buttons:

- **ReadRAM**: reads the complete RAM contents and updates only the “RAM_Register” menu.
- **RdRAM&Set**: reads the complete RAM contents and updates all of the ZSSC3154 software.
- **Write RAM**: copies the current software settings into the RAM of the ZSSC3154.
- **RAM-->EEP**: copies the RAM contents into EEPROM. The free-user-memory registers (1C_{HEX}, 1D_{HEX}, and 1E_{HEX}) will also be copied using the contents of the ZMDI software registers^{**}.
- **EEP-->RAM**: copies the EEPROM contents into RAM using the C0_{HEX} command.
- **Write&Cycle**: copies the current software settings into the RAM of the ZSSC3154 and starts the measurement cycle using the current RAM settings (command: 02_{HEX}^{††}).
- **RdSaveTrID**: Read and save traceability information (the contents of two free-user-memory registers 19_{HEX} and 1A_{HEX}).



^{**} The contents of the “RAM-Register” dialog will be used for free-user-memory registers.

^{††} For details about ZSSC3154 commands, refer to the *ZSSC3154 Functional Description*.



The “updated” LED displays the software configuration status compared with the attached ZSSC3154’s register content. If the content is identical, the LED is green (on).

3.4.3. Analog Front End (AFE) Adjustment

The ZSSC3154 has different options to adapt the analog front end (AFE) to the specific sensing element. The “Sensor - Full Bridge” and “Half Bridge” sections (shown in Figure 3.5) influence the programmable gain amplifier (PGA) and extended zero compensation.

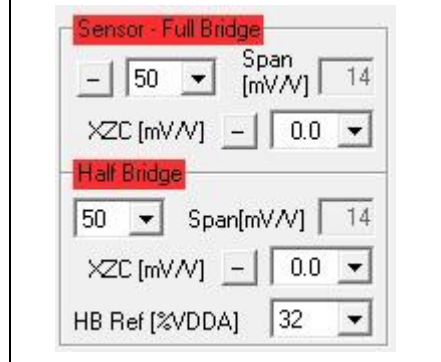
The sensor’s span or sensitivity is defined by mV/V and is referenced to the bridge supply voltage.

Different reference voltages can be selected for the Half Bridge, which are entered as a percentage of the positive analog supply voltage (VDDA).

Refer to the *ZSSC3154 Data Sheet* for details about AFE and XZC settings.

The polarity of the sensor signal can be selected by the button and can be changed if the PCB layout requires swapped input pins.

Figure 3.5 Bridge Sensor Adaptation



3.4.4. Temperature Sensor Selection

The next stage in the AFE is the multiplexer that selects the input signal for measuring temperature (see Figure 3.6). The ZSSC3154 can use three different temperature channels: one internal and two external. Each input can be used for calibration calculation. External temperature sensors can be used as an optional additional output signal during Normal Operating Mode (NOM).

3.4.5. ADC Settings

The last stage of the AFE is the analog-to-digital converter (ADC). The signal path within the AFE is designed in fully differential switched capacitor technology with a selectable resolution of 13 or 14 bits. It is necessary to provide an ADC input within 10% to 90% of the ADC range of the application.

Refer to the *ZSSC3154 Data Sheet* for details about ADC settings.

If the analog input voltage does not fit the ADC range and an underflow or overflow occurs, the “Range Shift” option can be used for fine-tuning. A lower “Span” setting in the “Sensor Adaptation” section can also be useful for fitting the ADC range.

The ADC resolution first step of the conversion integration phase can be adjusted, which influences the integration time. Select a conversion time that is as long as possible to secure a high degree of noise suppression.

If enabled, the clock divider makes the ADC operate with half of the clock frequency. This increases accuracy and linearity.

Figure 3.6 Temperature Sensor

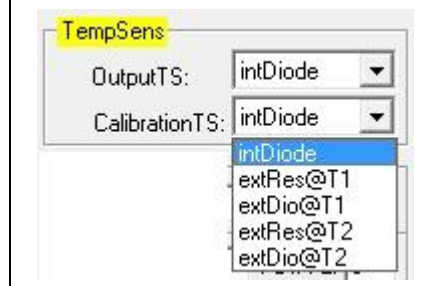
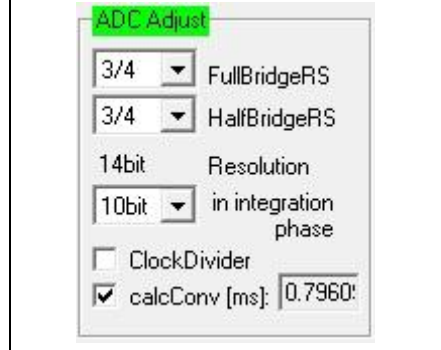


Figure 3.7 ADC Adjust

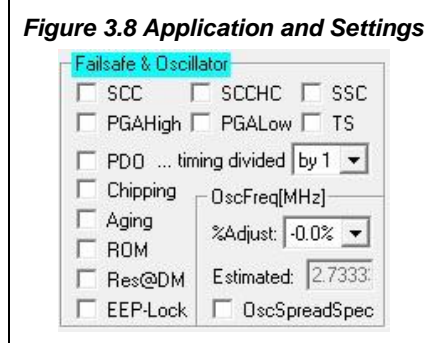




3.4.6. Application Settings

The internal microcontroller of the ZSSC3154 can detect various errors and perform different types of measurement cycles. It controls multiple protection options that can be configured by the ZSSC3154 Software.

Figure 3.8 illustrates all the application options for the ZSSC3154, which can be enabled/disabled via the checkboxes. The example in Figure 3.8 shows the ZSSC3154 settings with no options enabled. For more details about the related options, refer to the *ZSSC3154 Functional Description*.



SCC : Enables Sensor Connection Check.

SSCH : Enables Sensor Connection Check (SCC) high-capacity mode.

SSC : Enables Sensor Short Check.

PGAHigh : Main sensor channel data validation upper limit check.

PGALow : Main sensor channel data validation lower limit check.

TS : Temperature sensor channel data validation check.

PDO : Power-on Diagnostic Mode. A sequence of upper limit, lower limit, and diagnostic range is output at startup.

Chipping : Broken chip check.

Aging : Enables Sensor Aging Check.

ROM : Enables ROM check after power-on. If enabled, the start-up time will be increased approximately 10ms.

Res@DM : If enabled, the ZSSC3154 is reset if the ZSSC3154 enters the Steady Diagnostic Mode.

EEP-Lock : Enables EEPROM lock for OWI communication. If enabled, the EEPROM cannot be changed via the OWI interface and must be reset via the I²C™ interface.

Oscillator Frequency (OscFreq[MHz] section):

%Adjust : Clock frequency adjustment. An estimate of the clock frequency is displayed in MHz.

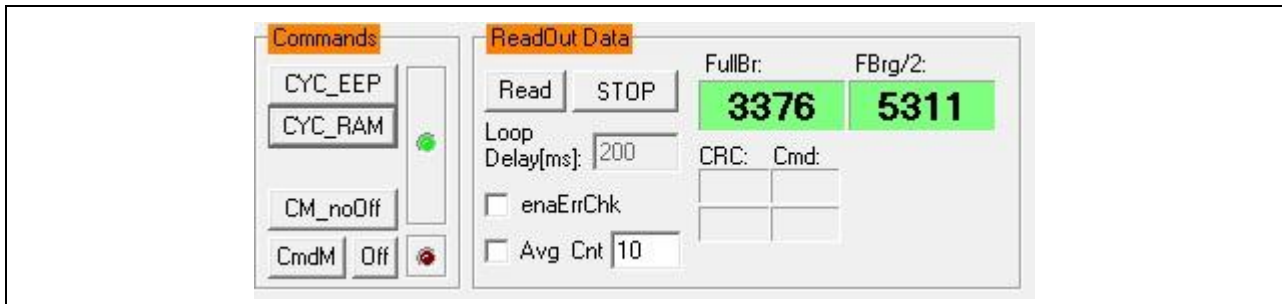
OscSpreadSpec : Oscillator spread spectrum mode.



3.5. Operation Section

The “Commands” and “Read Out Data” sections control the collection of data and configuration of the ZSSC3154.

Figure 3.9 Normal Operation Section



3.5.1. Normal Operation Mode (NOM)

In the “Commands” section, use the **CYC_EEP** or **CYC_RAM** button to exit Command Mode (CM) and start NOM using either the EEPROM or RAM registers settings, respectively. The ZSSC3154 can now continually perform a measurement cycle. The status LED “NOM running” is updated accordingly.

3.5.2. Command Mode (CM)

In the “Commands” section, use the **CmdM** button to start the Command Mode of the ZSSC3154 by sending the Start_CM command (0x7274) to the ZSSC3154.

3.5.3. Power IC OFF

The **Off** button in the “Commands” section can be used to power off the ZSSC3154. If the **Off** button is clicked, all communication interfaces are disabled, so no further communication is possible until the **CmdM** button is pressed (entering the Command Mode) or an interface is selected. In both cases, the ZSSC3154 will be powered on and communication established. The simulated LEDs indicate whether the ZSSC3154 is in Command Mode (CM) or running in Normal Operation Mode (NOM).

3.5.4. Data Read-Out

The **Read** and **RdLoop** buttons in the “ReadOut Data” section start a read-out of sensor data. When a loop measurement is started, the button text will change to “Stop.” Clicking again on the button stops the loop. The “Loop Delay” field sets the rate in milliseconds of the readouts in loop mode.

3.5.5. Enable Error Check

The **enaErrChk** checkbox in the “Read Out Data” section turns on the error checks selected in the “Application & Settings” section (section 3.4.6). An error message is processed if any of the errors selected occur.

3.5.6. Average Count and Statistics

The **Avg Cnt** checkbox in the “ReadOut Data” section starts the averaging and statistics calculations. It is only enabled if the measurement is in a loop mode. The resulting data is displayed in the adjacent fields after the specified cycles in the field are passed.



3.6. Operational Modes

ZSSC3154 provides several AOUT2 output behaviors based on the EEPROM settings. The AOUT2 output is selected by the “Mode” fields under “Out2” (see Figure 3.10 and Table 3.1). The AOUT1 output always represents the calibrated sensor signal. Digital filter settings can also be adjusted in this section with the LPFAVRG and LPFDIFF fields for each output in the range of 0 to 7. For more details refer to the *ZSSC3154 Functional Description*.

Note: It is recommended that both outputs have the same filter settings for LPFAVRG and LPFDIFF.

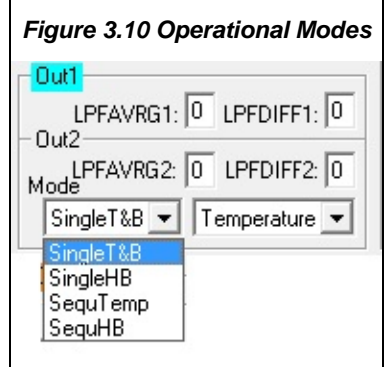


Table 3.1 Operational Modes for the AOUT2 Output

AOUT2 Mode	Mode Setting	AOUT2 Sensor Output Options
Single Temperature and Bridge Signal	SingleT&B	Temperature
		1-Bridge
		Bridge/2
		(1-Bridge)/2
Single Half Bridge	SingleHB	Half Bridge
Sequential Temperature	SequTemp	Temperature & Bridge Sensor
		Temperature & 1-Bridge Sensor
		Temperature & (Bridge Sensor)/2
		Temperature & (1-Bridge Sensor)/2
Sequential Half Bridge	SequHB	Half Bridge & Bridge Sensor
		Half Bridge & 1-Bridge Sensor
		Half Bridge & (Bridge Sensor)/2
		Half Bridge & (1-Bridge Sensor)/2

3.7. Calibration Window

The “Sensor – Calibration” dialog is used to perform a calibration of the ZSSC3154 with either the SRB or the user’s sensor module.

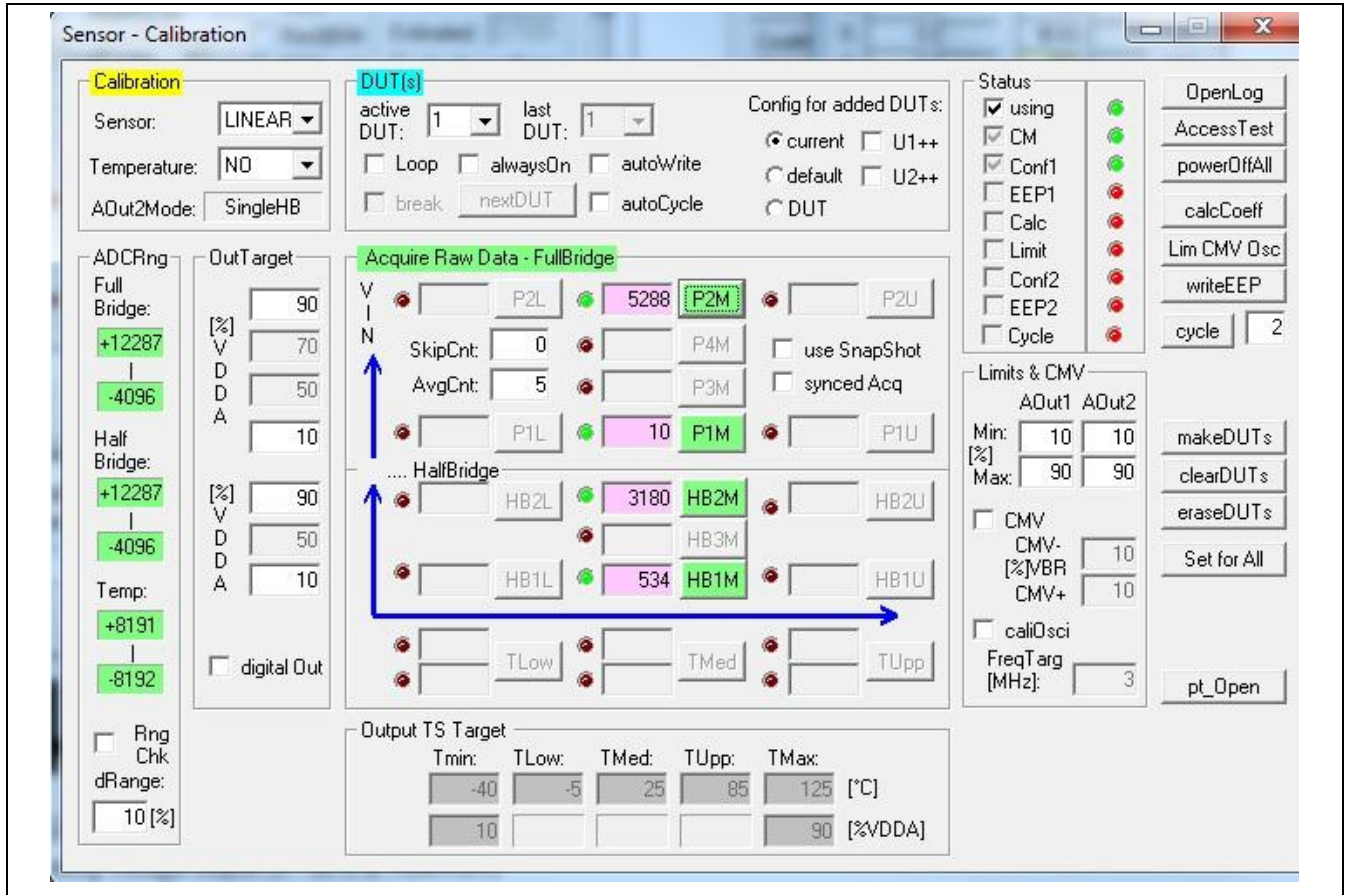
This screen can be accessed by either clicking on the icon or selecting “Calibration” on the top menu. Section 4 gives an example calibration using the commands on this screen:

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Figure 3.11 "Sensor – Calibration" Dialog





3.8. RAM/EEPROM Register Dialog Window

This dialog window is used to read and write register contents into the ZSSC3154 memories and has the same functionality as the “DUT Configuration” section in the main window.

Access the RAM/EEPROM dialog window by clicking on the  icon or by selecting “Configuration” and then RAM/EEPROM on the top menu.

There is also a **WriteEEP** button to store all register contents into the EEPROM of the ZSSC3154. Register indexing corresponds to the ZSSC3154 memory addresses.

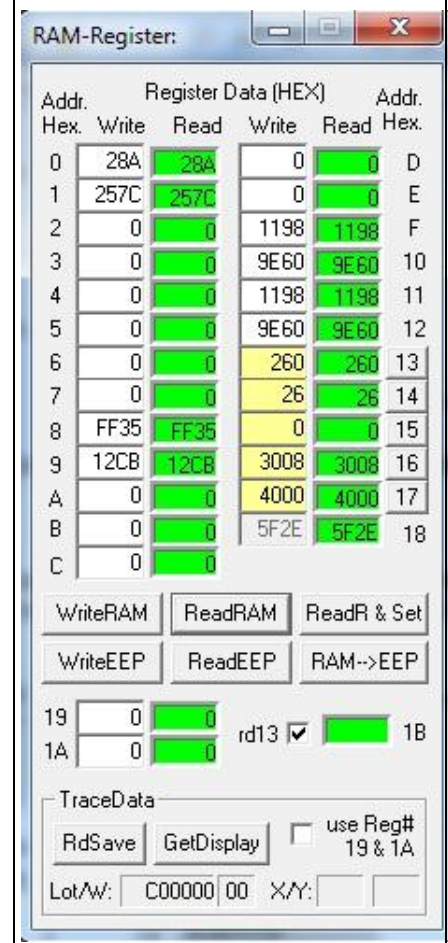
The configuration of the ZSSC3154 is stored in 28 EEPROM 16-bit words.

- Calibration coefficients for conditioning the sensor signal via conditioning calculations and output limits are stored in 19 registers (registers 0_{HEX} to 12_{HEX}).
- There are 5 words for setting the configuration of the ZSSC3154 (registers 13_{HEX} to 17_{HEX}).
- One register is used for storing the EEPROM signature (register 18_{HEX}), which is used in NOM to check the validity of the EEPROM contents after power-on.
- Two additional 16-bit registers are available for optional user data (registers 19_{HEX} and 1A_{HEX}).

For more information regarding the registers, refer to the *ZSSC3154 Functional Description*.

Note: If current settings differ from the memory contents, registers that do not correspond to memory will have a **red** background after the “Read” operation; otherwise, the background will be green.

Figure 3.12 *Displaying RAM-EEP Register Contents*



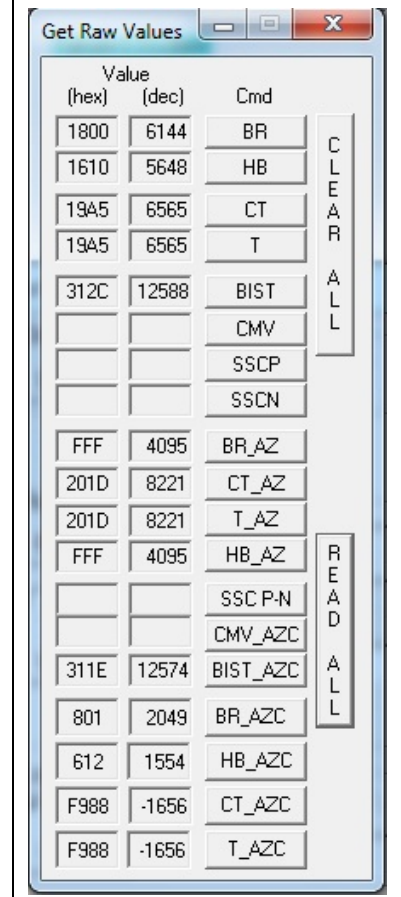


3.9. Get Raw Values Dialog

The “Get Raw Values” dialog is used to acquire the RAW values of the measurements for the following values:


BR	Bridge Signal Raw Data (main channel)
HB	Half-Bridge Signal Raw Data (main channel)
CT	Main Calibration Temperature Raw Data
T	Calibration Temperature Raw Data
BIST	Built In Self-Test Raw Data
CMV	Common Mode Voltage
SSCP	Positive-Biased Sensor Short Check Raw Data
SSCN	Negative-Biased Sensor Short Check Raw Data
BR_AZ	Sensor Signal Auto-Zero Raw Data
CT_AZ	Calibration Temperature Auto-Zero Raw Data
T_AZ	Temperature Auto-Zero Raw Data
HB_AZ	Half-Bridge Sensor Signal Auto-Zero Raw Data
SSCP-N	Positive-Negative Biased Sensor Short Check Raw Data
CMV_AZC	Common Mode Voltage, Auto-Zero Compensated
BIST_AZC	Built In Self-Test Raw Data, Auto-Zero Compensated
BR_AZC	Sensor Signal Main Channel Raw Data including Auto-Zero Compensation
HB_AZC	Half-Bridge Sensor Signal Main Channel Raw Data including Auto-Zero Compensation
CT_AZC	Calibration Temperature Raw Data including Auto-Zero Compensation
T_AZC	Temperature Raw Data including Auto-Zero Compensation

Figure 3.13 “Get Raw Values” Dialog





3.10. Send Command

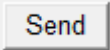
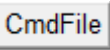


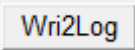
Access the “Send Command” menu by clicking the  icon or by selecting “Calibration” and then “Send Command” in the top menu. This dialog is used for transferring commands from the PC to the microcontroller on the SSC CB and reading the result of the commands.

A full summary and detailed command description of the applicable controller commands are given in the *ZSSC3154 Functional Description*.

For more functionality, the *ZMDI SSC Terminal software* can be used. This is the lowest level of communication for transferring commands from the PC to the microcontroller on the SSC CB. A full summary and detailed command description of the applicable controller commands are given in *SSC Command Syntax*.

SSC TermV202.exe can be installed from the SSC DVD, which will create a *ZMDI SSC Terminal* icon on the PC desktop. Click on this icon to activate the terminal program. For the ZSSC3154 communication mode, use the setting explained for I²C and OWI.

The “Send Command” dialog includes the following buttons:

-  Sends a command to the SSC CB. Alternatively, a *.3154_cmd command file can be loaded.
-  Loads a ZSSC3154 command file.
-  Reads the output data buffer of the ZSSC3154. A loop delay can also be added between the readings.
-  Performs the same function as the “Send” command except that the command field and the data field are separated. The ZSSC3154 software generates the actual instruction to be sent to the SSC CB.
-  Writes text entered in the adjacent field to the log file. The checkboxes can be used to write various data into the log file, such as status, commands, messages, etc.

For the communication between the SSC CB and the ZSSC3154, the ZSSC3154’s slave address and the communication frequency can be selected from the drop-down menus on the right.

Figure 3.14 “Send-Command” Dialog





4 Calibration Example

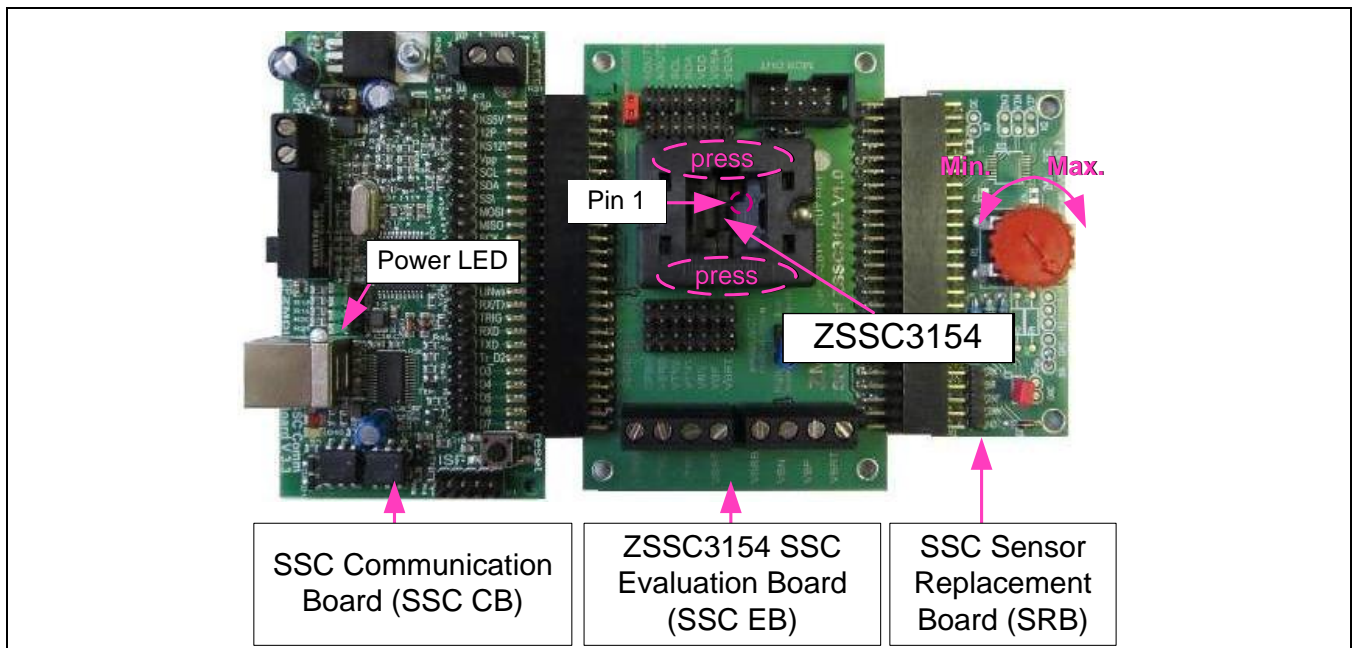


The following directions perform an example of a simple calibration using the sensor replacement board (SRB). The calibrated output will be displayed as a calibration result.

4.1. Hardware Setup

- Connect the SSC CB, SSC EB, and SRB as shown in Figure 4.1.
- Press down on top of the socket on the SSC EB to open it and insert a ZSSC3154 (see Figure 4.1; note pin 1 orientation).
- Connect a USB cable from the USB connector on the SSC CB to an available USB port on the PC. Verify that the green PWR LED is lit on the SSC CB.

Figure 4.1 Hardware Setup for Calibration Example

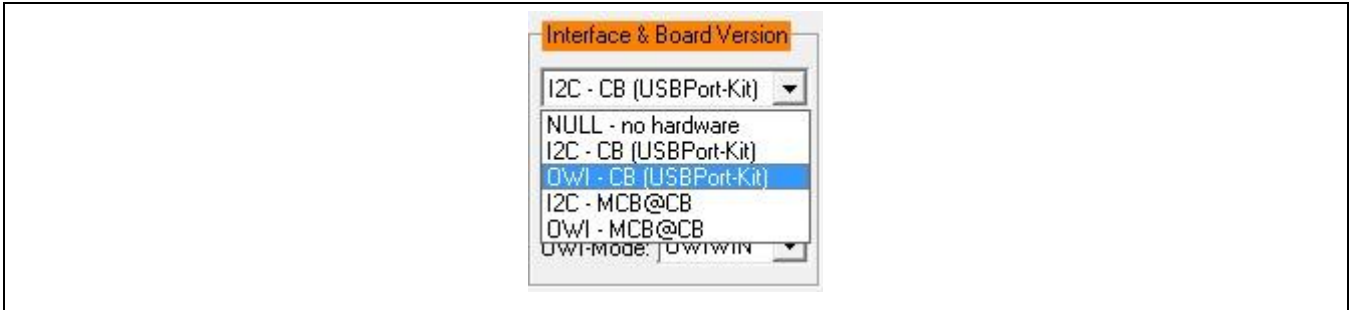


4.2. Software Startup

- Start the ZSSC3154 Software by clicking on the desktop icon or activate it from the Windows Start Menu folder: #Start_Menu#ZMDI\ZSSC3154\ZSSC3154.
- Select the "I2C – CB – USB" or "OWI – CB – USB" interface from the drop down menu in the "Interface Selection" section of the main window as shown in Figure 4.2.



Figure 4.2 Select Interface

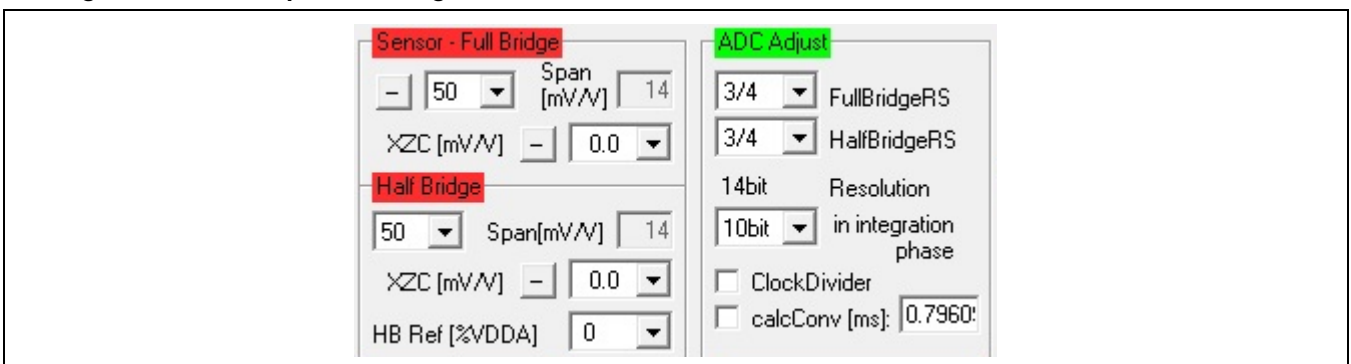


c) Select the following settings as shown in Figure 4.3:

- In the “Sensor – Full Bridge” and “Half Bridge” sections, set the “Span [mV/V]” (sensor sensitivity) menu to **50mV/V**, which is the typical span when using the SRB. With the 5V supply, this equals a total span of 250mV.
- In the “ADC Adjust” section, set the resolution integration phase to **10bits**. ADC resolution is set to **14bits**.
- In the “ADC Adjust” section, set the “FullBridgeRS” and “HalfBridgeRS” (range shift) menus to $\frac{3}{4}$, which fits the input signal range to the ADC output value (“analog zero”). For example for a range shift of $\frac{3}{4}$ and 14 bits resolution, the read-out values would be between -4096 and +12287.
- Operational mode: for this example, set the “Out2” section mode to “Single HB” (single half bridge).

Note: Write the configuration into the RAM by pressing on the **WriteRAM** button in the “IC Configuration” section.

Figure 4.3 Select Span and Range Shift



4.3. Calibration Data Acquisition

a) Click on the icon or select “Calibration” on the top menu and then “Calibration” from the drop-down menu. The “Sensor – Calibration” window appears as shown in Figure 4.4. Select the calibration mode from the drop down menu.

For this example, the recommended mode is

- ✓ **LINEAR** (two points only) for the sensor
- ✓ **NO** calibration for the temperature (temperature calibration requires a chamber with a controlled environment)



- b) Type the desired sensor target corresponding in percent to the VDD supply. It is recommended that the output targets for the sensor points be in between 10% and 90%.
- c) Next start data collection. Normally this would be done with a real sensor attached on a remote board in a controlled chamber. Instead, this calibration example run uses the SRB as the input as follows:
 - ✓ **Minimum** [10%] Sensor Signal: turn the SRB counter-clockwise (CCW) to the end and press the **P1M** button and **HB1M** button.
 - ✓ **Maximum** [90%] Sensor Signal: turn the SRB clockwise (CW) to the end and press the **P2M** button and **HB2M** button.

Acquired data will be displayed in the text boxes next to the buttons.

Note: only active buttons corresponding to the calibration mode are green.

4.4. Calculation of the Coefficients and Limits

- a) The **calcCoeff** button at the right of the “Sensor – Calibration” screen calculates the calibration coefficients. The result of the calculation (if successful) is displayed on the screen (see Figure 4.4). The CMC removes the offset and temperature dependency so that the measuring output result is within the target values (%VDDA or in this case, between 10% and 90%).
Note: The number of calibration points is equal to the number of coefficients to be calculated.
- b) The **Limits CMV Osc** button calculates sensor aging (CMV) and output limits.
- c) Click on **writeEEP** to make these calculations effective and written in the EEPROM. Option: starting a measuring cycle can be triggered by pressing the **cycle** button.

Close the calibration window and trigger a measurement in the main window (see Figure 3.1) by clicking on either the **Read** or **Read Loop** button in the “ReadOut Data” section. The ZSSC3154 is already running in Normal Operation Mode (NOM) because the **cycle** button was pressed in the calibration window.

Measurement results can also be displayed in % by opening the “Tools -> Measure Output” window and selecting the output format in the checkbox.

ZSSC3154

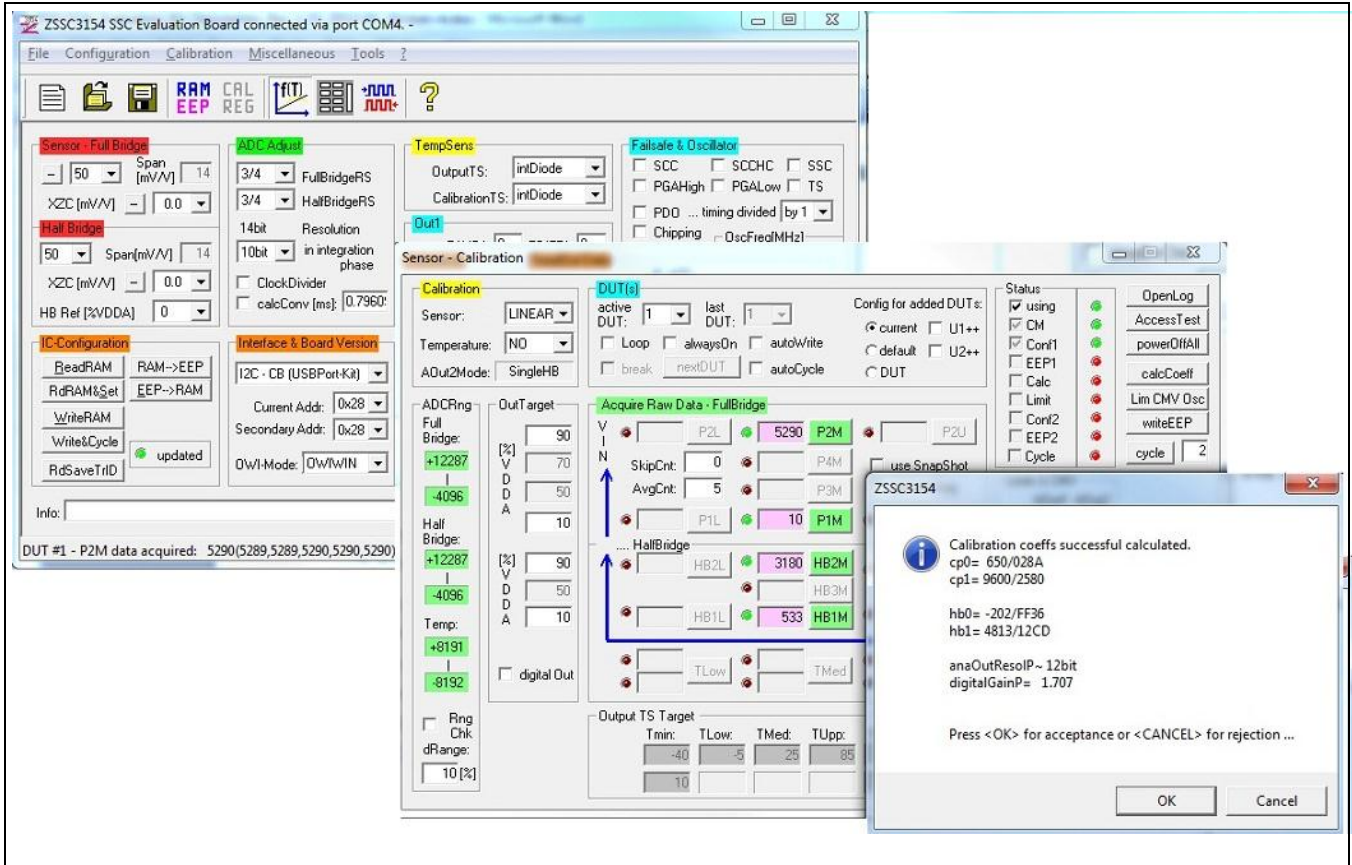
Automotive Sensor Signal Conditioner with Dual Analog Output



The Analog Mixed Signal Company



Figure 4.4 Displaying the Result of the Coefficient Calculation



Note: all active buttons corresponding to the calibration method selected are green.



5 Ordering Information

Item	Product Sales Code	Description
1	ZSSC3154-KIT	ZSSC3154 Evaluation Kit V1.0 (includes items. 2, 3, 4, 5, 6)
2 *	SSC Comm. Board V3.3	SSC Communication Board V3.3 (incl. USB cable)
3 *	SSC Board ZSSC3154 V1.0	ZSSC3154 SSC Evaluation Board (SSC EB) V1.0 (includes 5 ZSSC3154 samples)
4 *	SSC Sensor Replacement Board V2.0	SSC Sensor Replacement Board V2.0
5 *	SSC Test Board V1.0	SSC Test Board V1.0
6 *	SSC-C SSC DVD V2.10	SSC DVD, including the ZSSC3154 Software for evaluation and calibration

* Items 2 to 6 can be ordered separately after ordering position 1.

6 Related Documents

Document	File Name
ZSSC3154 Data Sheet	ZSSC3154_DataSheet_Rev_x_yy.pdf
ZSSC3154 Functional Description	ZSSC3154_FunctionalDescription_Rev_x_yy.pdf
SSC Communication Board Data Sheet	SSC_CommunicationBoard_DataSheet_Rev_x_yy.pdf
SSC Sensor Replacement Board Data Sheet	SSC_SensorReplacementBoard_DataSheet_Rev_x_yy.pdf
SSC Command Syntax	SSC_CommandSyntax_Rev_x_yy.xls, where y_xx have to be replaced by the actual firmware version
SSC Mass Calibration Board Data Sheet	SSC_MassCalibrationBoard_DataSheet_Rev_x_yy.pdf
SSC AN – Change CB's Product ID	SSC_AN_CommunicationBoard_PID_change_Rev_x_yy.pdf

Visit ZMDI's website www.zmdi.com or contact your nearest sales office for the latest version of these documents.

7 Glossary

Term	Description
ADC	Analog-to-Digital Converter
AFE	Analog Front End
CB	Communication Board
CMC	Calibration Microcontroller
CMV	Common Mode Voltage
OWI	One-Wire Interface
PCB	Printed Circuit Board
PGA	Programmable Gain Amplifier
SRB	Sensor Replacement Board
SSC	Sensor Signal Conditioner
µC	Microcontroller
DFB[L/H]	Diagnostic Fault Band [Mode]

ZSSC3154

Automotive Sensor Signal Conditioner with Dual Analog Output

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8 Document Revision History

Revision	Date	Description
1.00	March 13, 2012	First release.

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