UG345: Si72xx Eval Kit User's Guide

The Si72xx-Eval-Kit is a simple and low cost demonstration of the six basic types of Si72xx Hall effect magnetic position sensors. A USB adapter provides power to the sensor boards and reads the output of the sensors. The data from the sensors is displayed on a PC GUI and can also be logged to a file. For the case of the Si7210 I2C sensor, the PC GUI also allows configuration of the sensor by I2C.

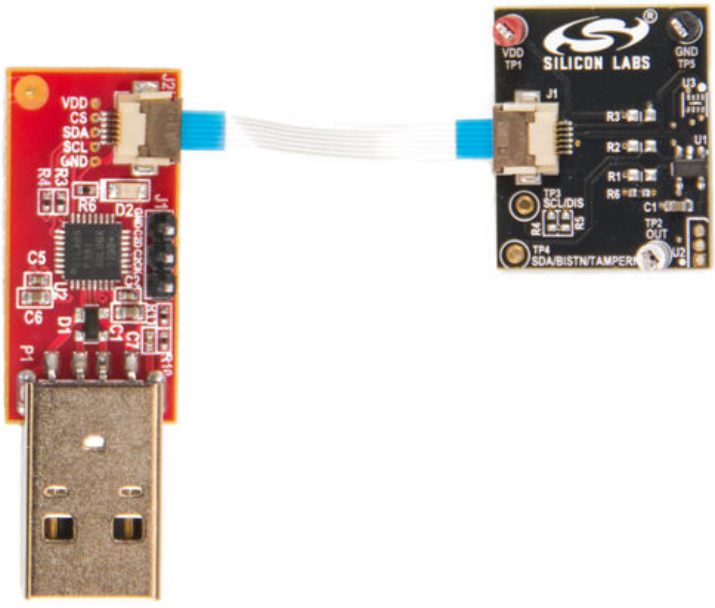
The six sensor types are supplied on small, postage-stamp-sized (PS) boards that connect to the USB dongle by a 6-pin flat cable.

The Si72xx-Eval-Kit includes:

- (1) USB adapter “SensorUSBDongle” that allows reading of the sensor data and I2C communications
- (1) Si7201-B01V-EB Switch PS board
- (1) Si7202-B01V-EB Latch PS board
- (1) Si7210-B00V-EB I2C PS board
- (1) Si7211-B00V-EB Analog PS board
- (1) Si7212-B00V-EB PWM PS board
- (1) Si7213-B00V-EB SENT PS Board
- (1) 8-inch, 6-pin cable
- (2) magnets

KEY POINTS

- Low cost evaluation of the 6 sensor types in the Si72xx family
  - Switch, Latch, PWM, Analog, SENT, and I2C
- USB adapter provides power and can read the data from the sensor
- PC GUI displays the data which can also be logged to a file
- I2C sensor configuration capability



Connection of the USB Adapter and Postage Stamp Board

1. Download the GUI

The GUI is available through Simplicity studio or from the web page: http://www.silabs.com/start-sensors.

When installing from Simplicity Studio, plug in the USB adapter first. Simplicity Studio will recognize the USB adapter and automatically offer the choice of downloading the GUI.

The GUI is distributed as an installer package which will install the PC GUI. With the USB adapter and desired PS evaluation board connected as shown in the figure on the front page, launch the GUI.

2. GUI Operation

If an I2C part is detected when the GUI is launched, the GUI will be automatically configured. For other part types that simply output the data, the part type for the PS board must be manually entered (device type selector and device scale selector boxes in upper left corner of the GUI).

The scale for all of the PS boards is 20mT. Once the “start” button is clicked the GUI will automatically read the data from the sensor in analog, PWM, or SENT format or simply the display the output pin status for switch and latch type parts.

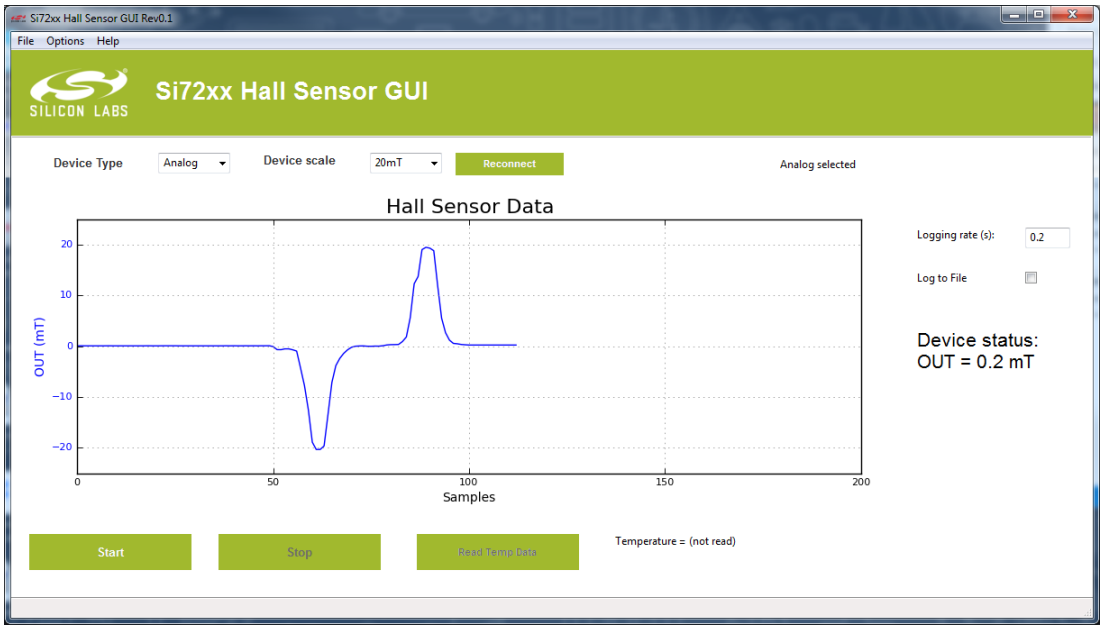


Figure 2.1. GUI Display of the Output of an Si7211 Analog Output Sensor

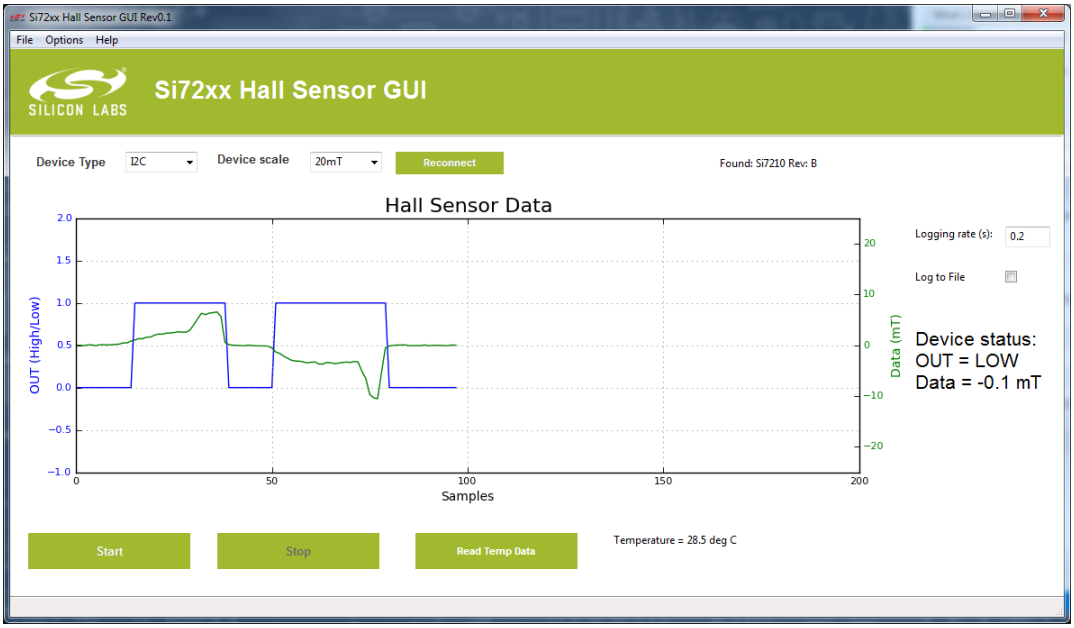


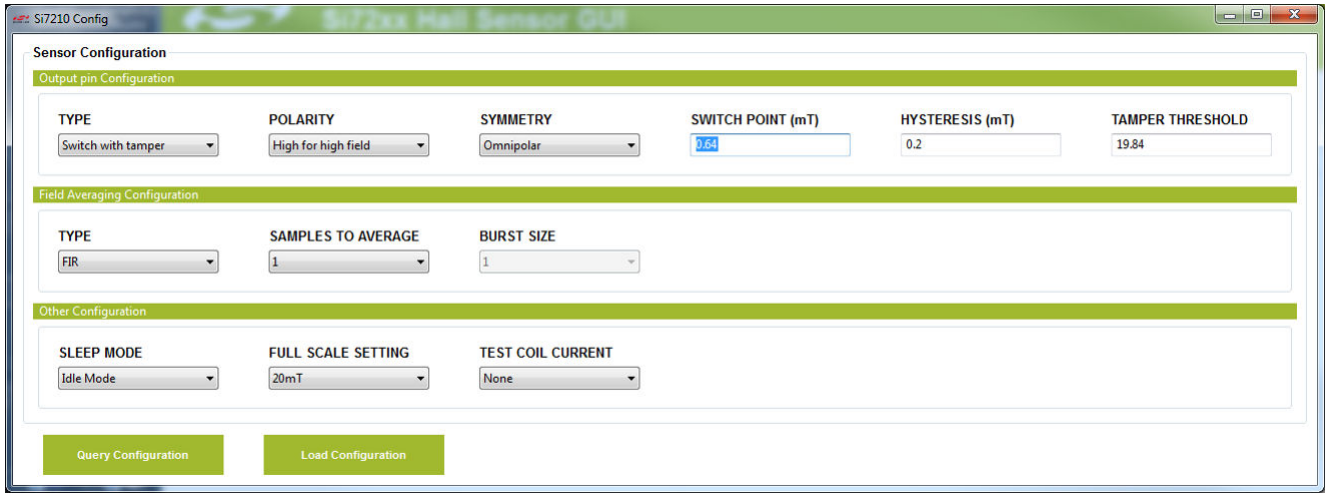
Figure 2.2. GUI Display of the Output of a Si7210-B00 I2C Sensor

The figure above shows the magnetic field and output pin status of the Si7210-B00 I2C Sensor. Note the tamper feature is enabled so the output pin goes back to the zero field level at high field. The data can optionally be logged to a file in standard csv format. The temperature of the Si7210 can also be read when the logging of magnetic field data is stopped.

3. Si7210 I2C Configuration

If the Si7210-B00-EB PS board is connected and an I2C device type is selected, then the I2C part can be further configured by clicking on the options menu and Si7210 configuration button. This will bring up a new window that allows configuration of the Si7210 type sensors.

Figure 3.1. Sensors Configuration GUI



The GUI is a graphical representation of the Si7210 register map.

ADDR	7	6	5	4	3	2	1	0
0xC0	chipid (RO)				revid (RO)			
0xC1	Dspsigm							
0xC2	Dspsigl							
0xC3						dspsigsel		
0xC4	meas(RO)				Usestore	oneburst	stop	sleep
0xC5								arautoinc
0xC6	sw_low4field	sw_op						
0xC7	sw_fieldpolsel		sw_hyst					
0xC8	Sltime							
0xC9	sw_tamper						Slfast	sltimeena
0xCA	a0							
0xCB	a1							
0xCC	a2							
0xCD	df_burstsize			df_bw				df_iir
0xCE	a3							
0xCF	a4							
0xD0	a5							
0xE1	otp_addr							
0xE2	otp_data							
0xE3							otp_read_en	otp_busy(RO)
0xE4							tm_fg	

As can be seen many of the bit fields are not aligned with register boundaries. When writing a particular bit field, it is best to use a read, modify, write procedure to ensure that other bit fields are not unintentionally changed. That is, read the register, modify the bit field of interest while keeping other bits the same, and then write the register back. Unspecified bits should not be changed from the factory configuration.

Several options are available from the configuration GUI:

1. Configure the device operate and release point with sleep timer settings.

   In sleep timer operation, only the fields corresponding to registers 0xC6 and 0xC7 can be configured:
   - Switch or latch
   - Output pin polarity (high or low for high field)
   - Symmetry
     - Omnipolar (responds to the field magnitude)
     - Unipolar (responds to positive or negative field)
   - Switch point
   - Hysteresis

   After these fields have been configured and loaded, and when the configuration window is closed, the data graph can be restarted and will only show the output pin status as the magnetic field data is not available by I2C in sleep timer operation. To wake the device out of sleep mode and try a different configuration, click options and Si7210 configuration again.

2. Configure the idle mode parameters.

   In idle mode, all of the registers are configurable. This adds the capability of programming:

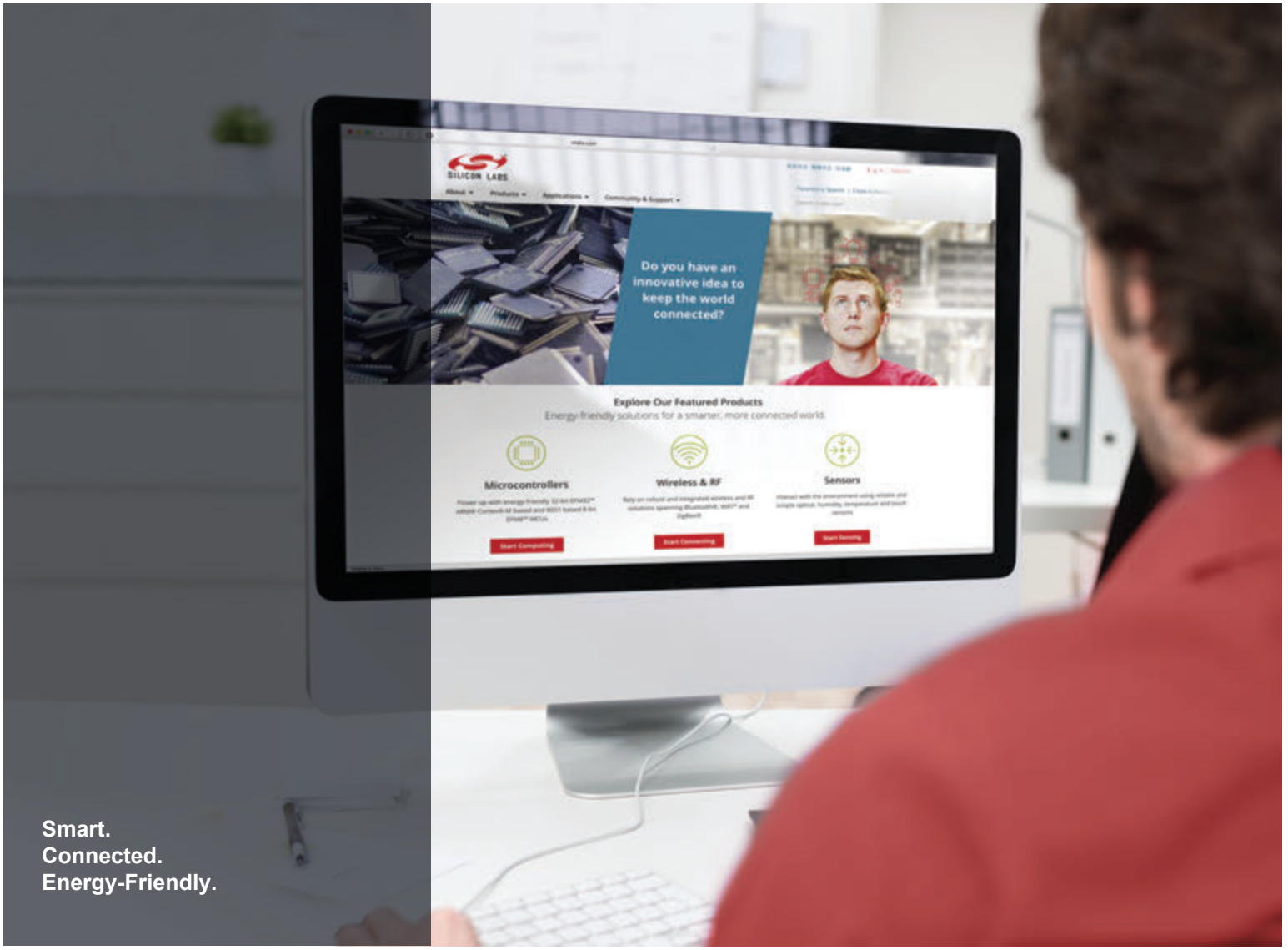
   - Tamper threshold (the output pin will return to the zero field value once the tamper threshold is crossed)

- Field averaging
- Full scale
- Turn off or on the test coil with positive or negative current (VDD = 3.3 V).

After these fields have been configured and loaded, and when the configuration window is closed, the data graph can be restarted and will show both the output pin status and the magnetic field data. In this mode of operation, the device will initiate a conversion of a given number of samples in FIR mode or burst size in IIR mode and then get the conversion result (after the IIR filter in IIR mode). The Si7210 will set the output pin according to the programmed values for output pin configuration after each conversion. The output pin status is also graphed.

If the test coil has been turned on, the magnetic field reading will increase or decrease depending on the selected polarity of the coil current.

Although the Si7210 is also capable of working in idle timer mode (where the sampling is determined by a timer rather than I2C transactions), this mode of operation is not supported in the GUI.



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