National Semiconductor

Evaluation Board User's Guide

LMP92018 Analog System Monitor and Controller
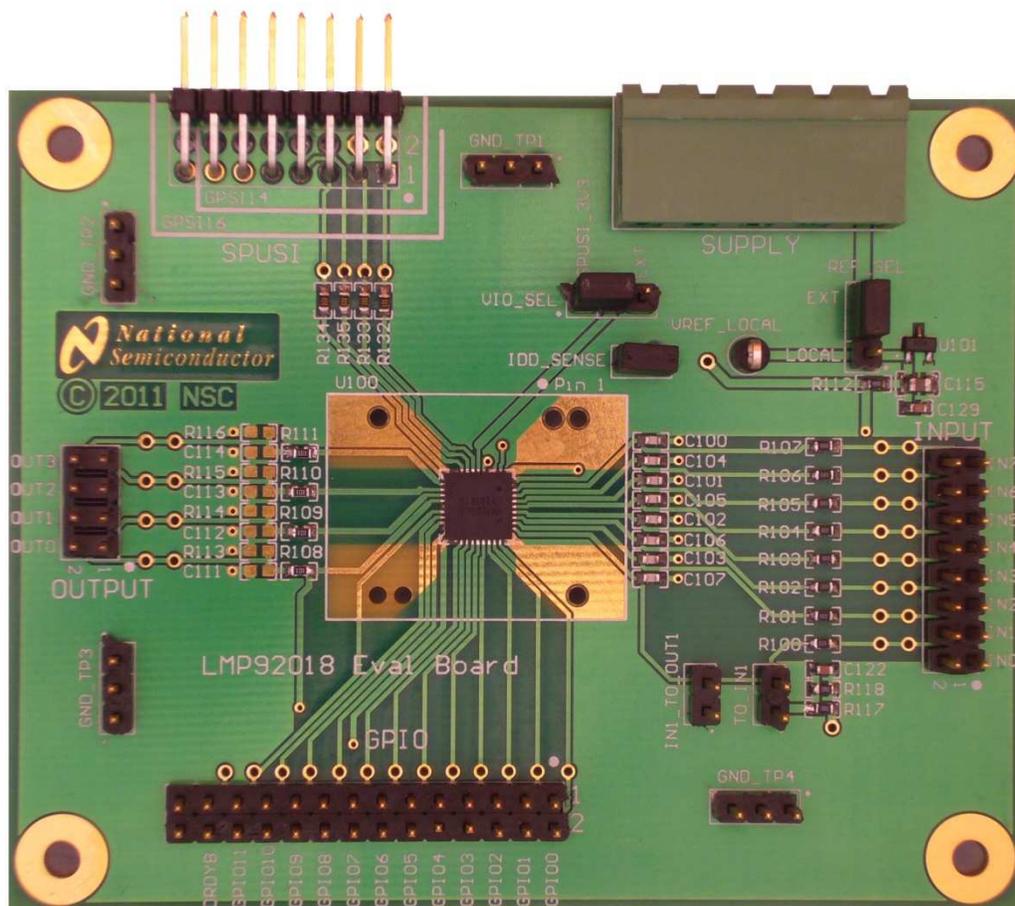
1. <u>Kit Components</u>

Item	Qty.	Description
LMP92018SQEVAL	1	LMP92018SQ Device evaluation board
SPUSI2	1	USB interface board purchased separately at: http://www.national.com/store/view_item/index.html?nsid=SPUSI2

2. <u>Software Installation</u>

TinyI2CSPI software, and LMP92018 specific Personality Files, can be obtained from the National Semiconductor Corp. website. Use the link below to download the self extracting archive and the installation manual.

http://www.national.com/analog/webench/sensors/spusi2

Follow the instructions and install the software in the Windows XP, or Windows 7 32bit environments. At present Windows 7 64bit is not supported.
When connecting SPUSI2 for the first time to your PC the operating system will attempt to install the appropriate drivers. Follow the instructions on the screen and allow the wizard to automatically search for required driver files.

3. <u>Kit Assembly</u>

Equipment needed to conduct basic functionality tests:
- 5V power supply
- DC Voltmeter

Assemble the kit as follows:
- Connect 5V power supply (power off) to VDD and GND screw terminals
- Supply desired potential to the VREF and VGPIO screw terminals. For example, install jumper wires between VDD and VREF, and VDD and VGPIO screw terminal pairs.
- Connect the SPUSI2 dongle to the LMP92018SQEVAL board 14-pin header marked GPSI-14 (watch the alignment, the evaluation board connector is actually 16-pin, see picture below for correct alignment)
- Connect USB cable between host PC and the SPUSI2 dongle

Figure below shows the complete assembly:
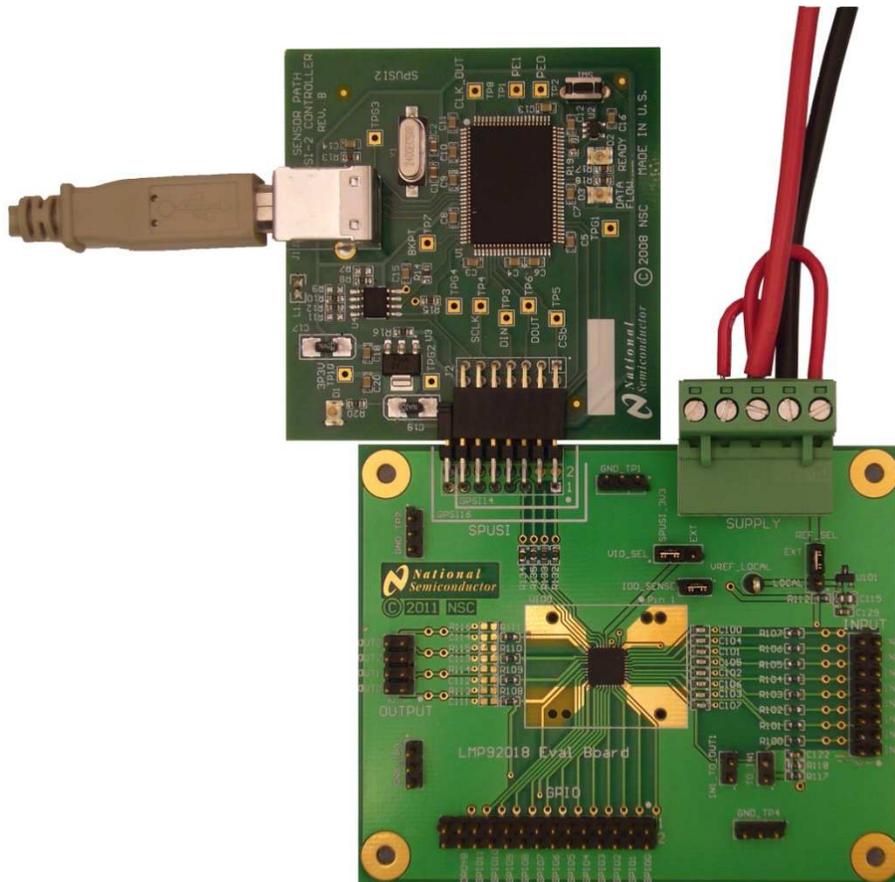
4. Default Set-Up and Power-Up

Verify the following default jumper settings on the Eval Board (these should already be factory set):

Jumper block	Default Shunt Position	Function
IDD_sense	in	This header allows for measurement of supply to the DUT (only to the DUT). This header should have a shunt installed
REF_SEL	EXT	Selects externally supplied voltage, via REF screw terminal, as the input to REF pin of LMP92018. To select locally generated 4.1V reference voltage move the shunt to LOCAL position. **NOTE: if LMP92018 is programmed to source the internally generated reference voltage, this shunt must be removed.**
VIO_SEL	SPUSI_3V3	Selects the 3.3V potential generated by the SPUSI2 dongle as the SPI interface rail. Use VIO screw terminal and move the shunt to EXT position to supply external voltage as the SPI rail reference.
IN1_TO_OUT1	not present	Shunt will connect the output OUT0 (DAC0) to the analog input IN0 (ADC0)
TO_IN1	not present	Shunt will connect VDD sense resistive divider output to analog input IN0 (ADC0)

Once the above jumpers are in place, turn on the 5V power supply

5. TinyI2CSPI User Interface Software

Start TinyI2CSPI User Interface software (START->TinyI2CSPI->RunTinyI2CSPI)

> **NOTE:** Currently on some systems the software does not start properly using method described above: a command window flashes on the screen momentarily, but GUI never starts. If this occurs in your system start the software by START->TinyI2CSPI-> TinyI2CSPI Environment. This will open a command window. At the prompt:
> C:\...\TinyI2CSPI> **cd dist**
> C:\...\TinyI2CSPI \dist\> **tinyi2cspi.exe**
> This will launch the GUI

The initial screen will look as below:
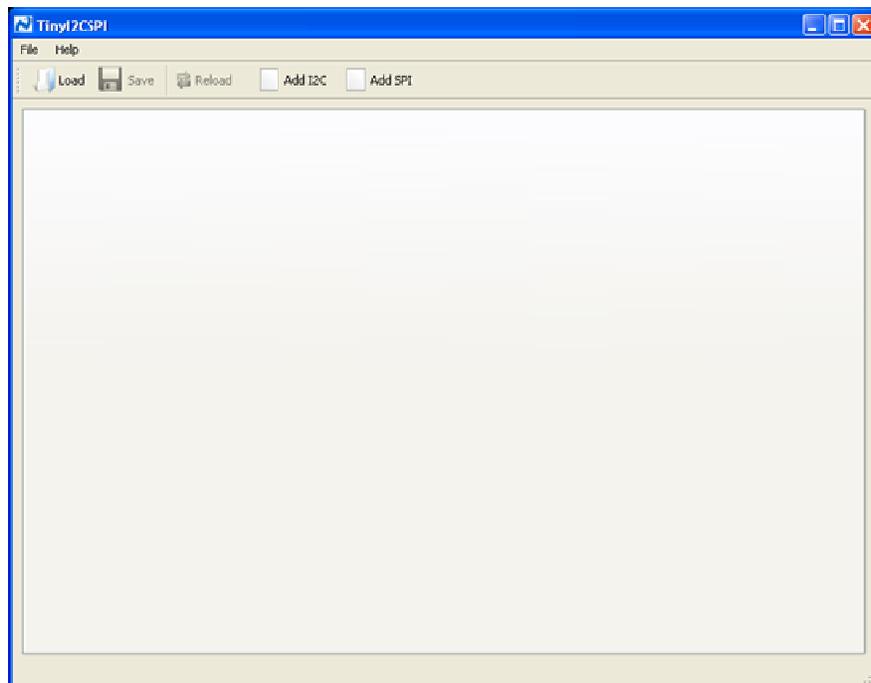
Use the **Load** button to select and load personality files. Or use **Add SPI** to open new SPI interface command window and enter your own sequences.
NOTE: Personality files are text files containing SPI bus sequences. The files are either available for download from the TinyI2CSPI Software web page, or are provided in the archive containing this document.

6. Quick Example

Insert shunt in the IN1_TO_OUT1 header prior to executing the instructions below.

Load in the ADC.tpf personality file. The screen will look as follows:
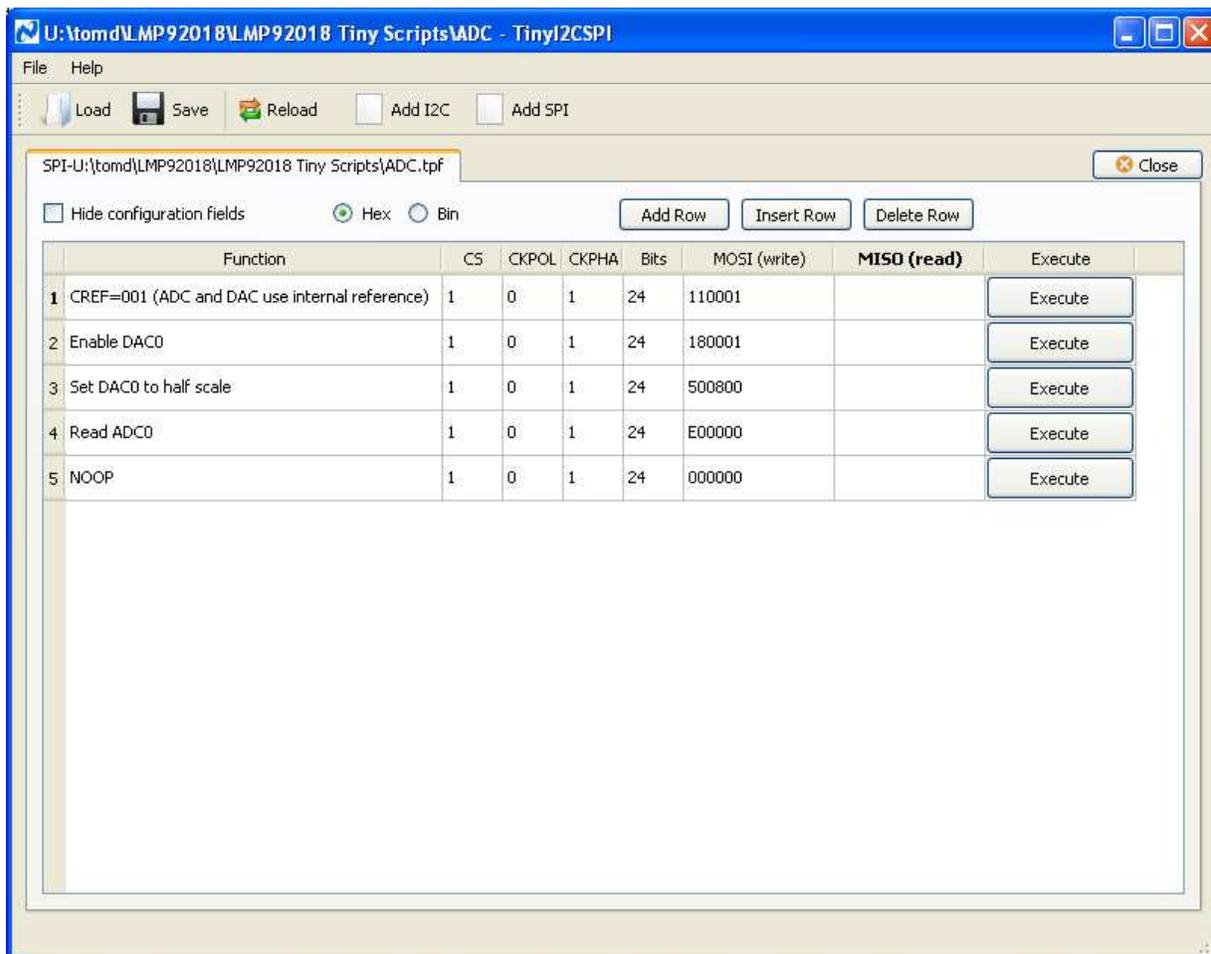
NOTE: CKPOL and CKPHA values determine the phase and polarity relationship between the SPI data (DOUT/DIN) and serial clock (SCLK). Values as shown above are required for proper operation of the LMP92018 SPI bus.

In the figure above each line represents a single SPI bus transaction. MOSI is the 24 bit value that will be shifted into the LMP92018. MISO will contain data returned from LMP92018 during the same frame.

To execute a transaction, press "Execute" button at the end of the corresponding line. At the beginning it is advisable to execute transactions in order listed.

The example above will program LMP92018 to use internal reference block as the reference source to both ADC and the DACs. The DAC0 will source out ½FS (Full Scale) via the on-board shunt to the ADC0 input. As the result the "Read ADC0" transaction will result ½FS value returned from the

LMP92018. The value returned from the LMP92018 will be shown in MOSI column of line 5 (NOOP)

NOTE: Read operations from LMP92018 require 2 SPI transactions: one to issue READ command, and one to shift out the requested content. NOOP in line 6 is used to complete the data shift operation out of the LMP92018

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