System Board 6158

MAXREFDES77#: DUAL-CHANNEL CURRENT SENSE PERIPHERAL MODULE

Details

SPI Interface

The MAXREFDES77# peripheral module can plug directly into a Pmod-compatible port (configured for SPI) through connector X1. For information on the SPI protocol, refer to the MAX11125 IC data sheet.

Connector X1 provides connection of the module to the Pmod host. See Table 1 for detailed description.

Connectors X3 and X4 provide connection to external power and the system loads.

Voltage Reference

The MAXREFDES77# peripheral module contains the MAX6126A30+ voltage reference to provide 3.0V reference to the ADC MAX11125.

Temperature Sensor

The MAXREFDES77# peripheral module also contains a temperature sensor, MAX6607IXK+, to measure the external temperature.

Software (GUI)

The Munich GUI is available for download and is provided to facilitate the evaluation of the MAXREFDES77#. Refer to the Munich GUI Quick Start Guide document for further details.

MAXREFDES77# System Board

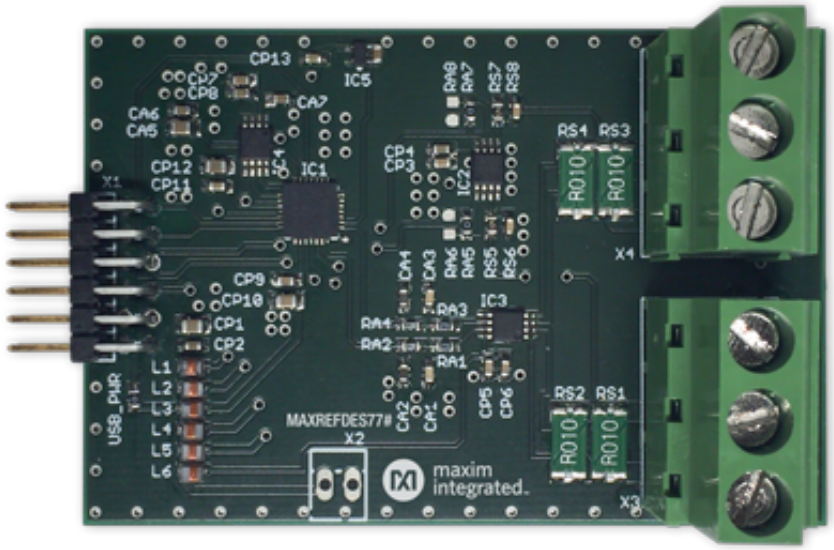

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Table 1. Connector X1 (SPI Communication)

Pin	Signal	Description
1	SPI_CS	Chip Select. Assert low to enable the SPI interface.
2	N.C.	No Connection
3	SPI_MOSI	MAX44285 Serial Data Input
4	Active-Low CONVST	ADC Conversion Control Input. Assert low to initiate an ADC conversion.
5	SPI_MISO	MAX44285 Serial Data Output
6	Active-Low EOC	End of Conversion Output. Data is valid after active-low EOC pulls low.
7	SPI_SCLK	MAX44285 Serial Clock Input
8	N.C.	No Connection
9	GND	Ground
10	GND	Ground
11, 12	+3.3V	+3.3V Power Supply

Step-by-Step Guide

The MAXREFDES77# allows measuring supply-voltage (up to 65V) and supply-current (up to 26A) for 2 different loads with independent supplies.

Procedure

1. Connect supply voltage between RS+ and GND.
2. Connect load resistor between RS- and GND.
3. Connect the MAXREFDES77# to the Munich via the Pmod connector.
4. Connect the Munich board to a PC via a USB cable as shown in **Figure 1**.
5. In the Munich GUI, select REFDES77 – Current Sense under the Device tab.
6. Click Scan Adapter.
7. Press Connect. Munich GUI will then allow you to start sampling from the MAXREFDES77# board.
8. Click Sample continuously. The Munich GUI will then plot the selected Physical Values and update static levels in real time. The Y-axis on the left shows the voltage. The second Y-axis on the right depicts the Current, and the third Y-axis on the far right displays the temperature. Scaling the Y-axes can be done manually in the calibration window, so the range of interest can be plotted.
9. Press the Calibrate button to perform linear calibration for accurate measurements. When in calibration mode, it is necessary to select ADC Counts in the Plot Configuration and keep Sample continuously running. See **Figure 2**.

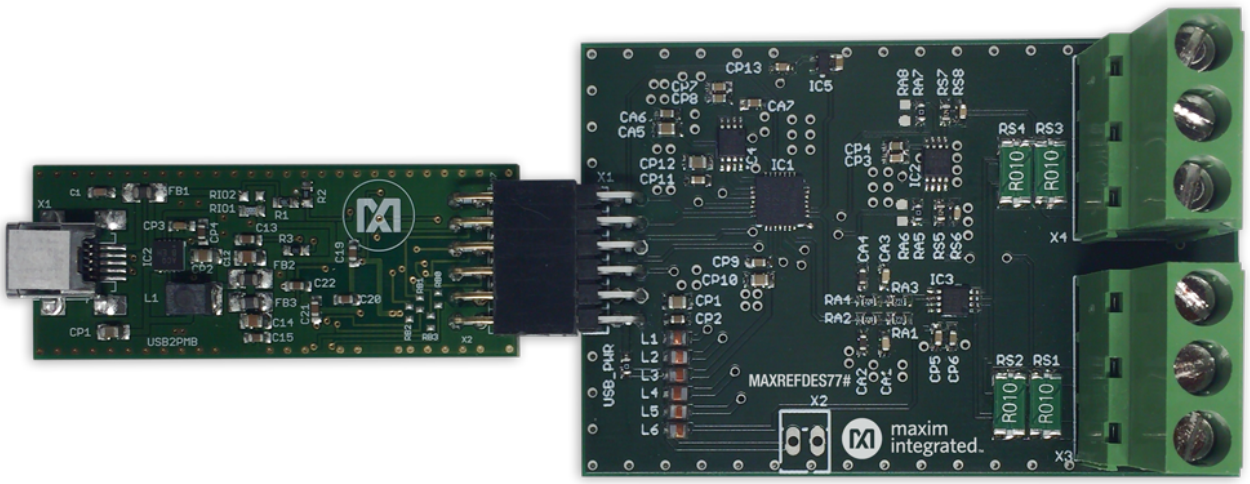

Figure 1. MAXREFDES77# connected to Munich board.

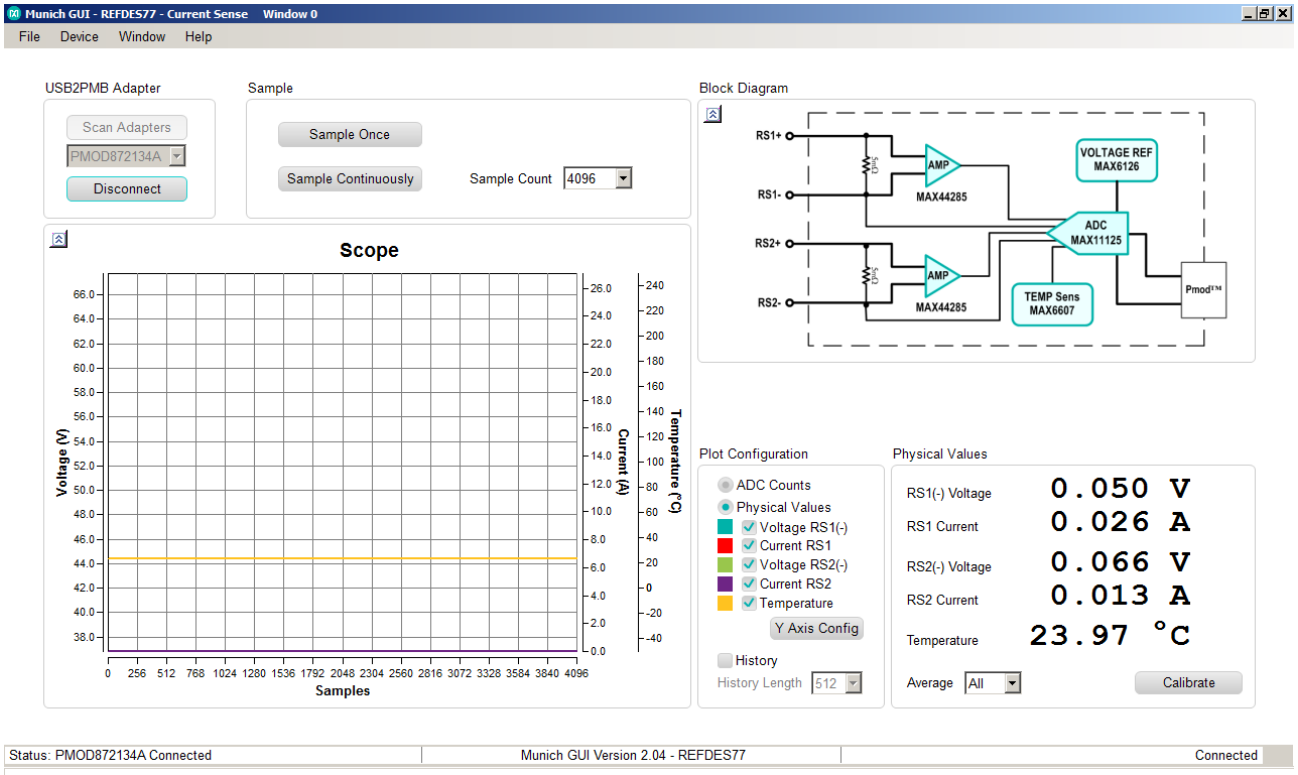

Figure 2. MAXREFDES77#/Munich GUI.

- **Offset calibration**
  To perform offset calibration, connect both RS1- and RS2- to GND. Then observe and enter the numbers printed in Physical Values box to the appropriate Offset Textboxes (voltage and current).
- **Volt per LSB calibration**
  To perform Volt per LSB calibration, apply a known voltage to both RS1- and RS2-. Note that the measurement range is up to 65V, but for good calibration the applied voltage should be < 75% of the allowed range. Use an accurate multimeter that has 1mV or better accuracy. See **Figure 3**. Divide the applied voltage level (i.e. 60V) by the number shown in **Physical Value** box. Then subtract the 0V Offset. The result yields the weight of 1 LSB, which should be about 0.0165V.

  $$\text{Volt per LSB} = 60V/(ADC_{counts} \text{ at } 60V - ADC_{counts} \text{ at } 0V)$$

- **Ampere per LSB calibration**
  To perform ampere per LSB calibration, apply a known voltage to RS+ and connect a load from RS- to GND. Then, measure the current through the load with an ampmeter. There are two available gain options: 20x (MAX44285T) and 100x (MAX44285H). If the gain is 20, then the current-range is up to ~27A. If the gain is 100, then the current range is up to ~5.4A.
  For accurate calibration, use load with current at ~75% of the range.

$$A\ per\ LSB = 20A/(ADC_{counts}\ at\ 20A - ADC_{counts}\ at\ 0A)$$

The Munich GUI automatically saves these calibration settings once the calibration menu is closed. Therefore, if the same hardware is used, it is not neccesarry to re-calibrate.

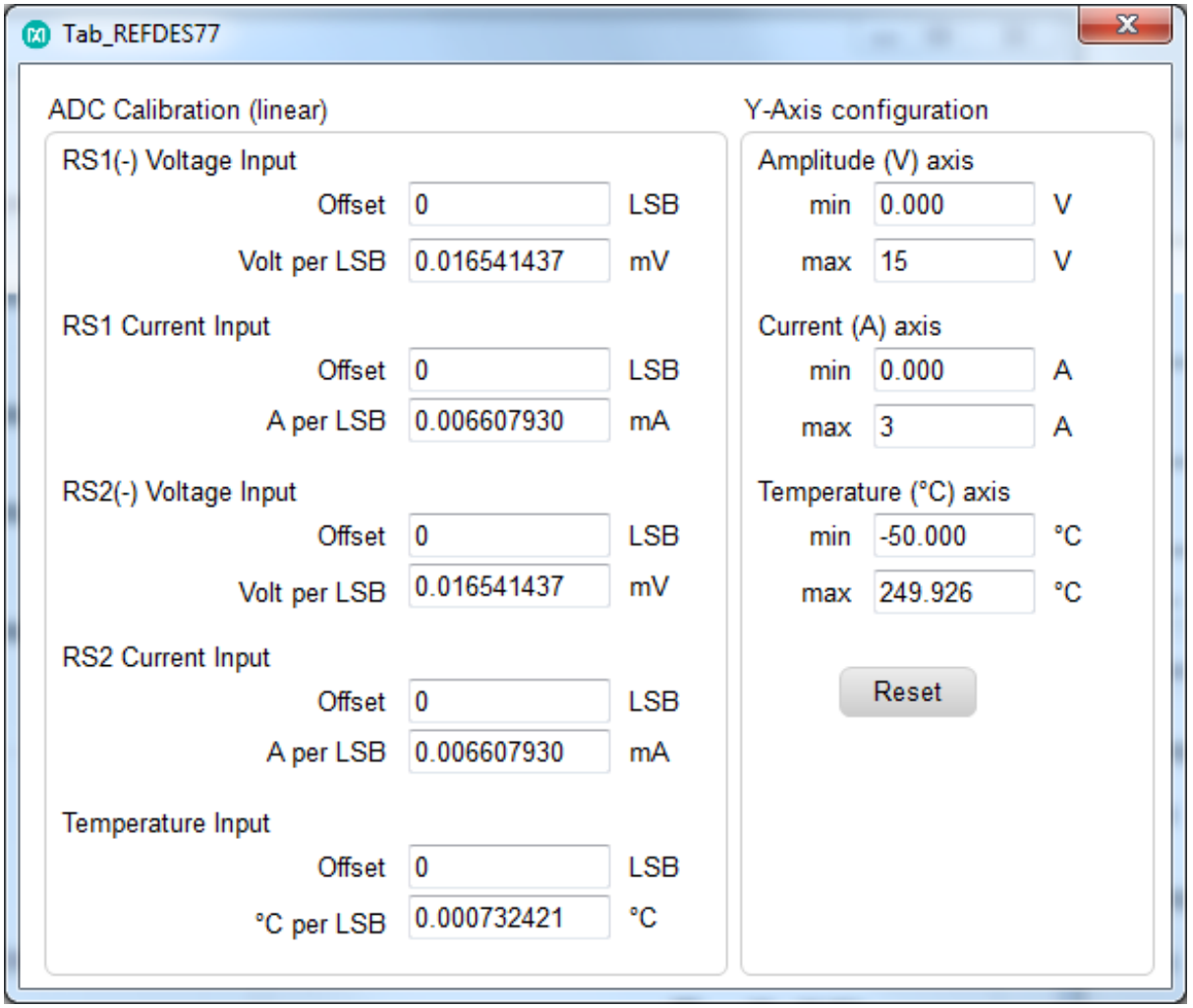

Figure 3. Calibration menu.

Lab Measurements

The MAXREFDES77# reference design was verified and tested under full input range and different output load conditions, and the results were captured by Munich GUI as shown in **Figure 4**.

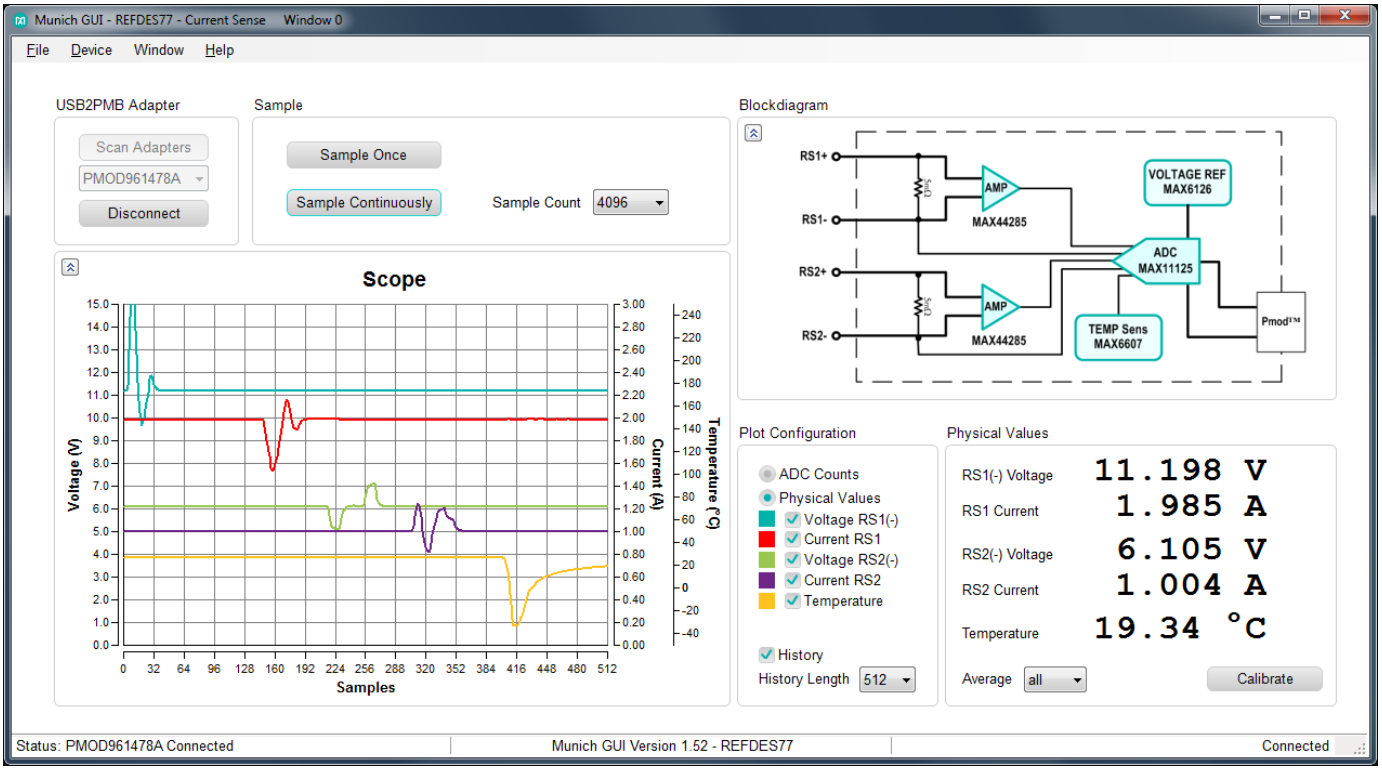

Figure 4. MAXREFDES77# lab measurements.

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