

1 Overview

The USB Weather Board is fitted with a SCP1000 barometric pressure sensor, a SHT15 humidity sensor, and a TEMT6000 ambient light sensor. This allows the on-board ATmega8 to deliver pressure, humidity, temperature, and light level via USB. There is also the option of adding a BlueSMiRF to the unit which allows a Bluetooth compatible computer to remotely receive all readings.

Serial output is a single visible ASCII string at 9600bps, 8N1, at 1 reading per second.

2 Specifications

The electrical specifications are as follows:

- Powered by USB (5V)
- External 4-12V DC supply like a solar cell (Warning: Exceeding 12V may cause board damage)
- Approximately 35mA when active

3 Operation

The USB Weather Board is relatively straight forward in operation. The unit is powered by USB or a separate 4-12V supply with an on/off switch for easy power control.

Data transfer is available over two mediums - USB or Bluetooth. Bluetooth, however, is an add on (more on that below).

The FTDI USB to UART IC is used for communication through the USB port. The latest drivers for this IC can be found from the FTDI driver page.

Once the board is connected via USB, data can be acquired using any terminal program (i.e. HyperTerminal). Terminal configuration should be 9600bps 8-N-1.

The Weather Board shows an empty footprint, which can be utilized for Bluetooth communication. The footprint was designed specifically for the SparkFun BlueSMiRF device which allows for wireless communication to any Bluetooth enabled computer (for more information please see the BlueSMiRF link below). The footprint is labeled with GND and PWR pins so be sure to line the BlueSMiRF GND and PWR pins to match the footprint. A female header can be attached to allow the BlueSMiRF to be easily attached/detached from the board.

There is a separate switch that determines which communication is being used, USB or RF (Bluetooth). Please verify that the switch is in the appropriate position for your application. You may also want to review the schematic for a better understanding of the switch setup.

3.1 Sensors

The SHT15 Humidity Sensor, SCP1000 Pressure Sensor, and TEMT6000 Ambient Light Sensor have the following specifications:

- Absolute barometric pressure accurate within +/-150 Pascal
- Relative humidity accurate within +/-2%
- Temperature accurate within +/-0.3 degrees C
- Ambient light level as an analog reading
- Battery level as an analog reading
- Measurement rate of 1Hz

Ambient light level is an analog level relative to exposed visible light. It is a number from 1 to 1023 (10-bit ADC) where 1 is very bright and 1023 is very dark. In high daylight the number is 10-200. Indoors the level is 800-900. The sensor returns a reading greater than 1000 in low-light conditions.

Battery level is an analog reading from the power source attached to the external power connector. This could be a battery, solar cell, or DC supply. The battery level reading will normally be 0 when power is obtained via USB.

3.2 Output format

Once active, your terminal program should receive a serial output as a single visible ASCII string at 9600bps.

The following is an example output of the "Simple" text option from the Weather Board:

```
#21.81,081.28,026.5,079.7,083534,918,0,000001$  
#21.81,081.33,026.5,079.7,083527,919,0,000002$
```

Every second a new set of readings is displayed. There are 8 cells of data separated by commas.

- Cell 1 (21.81) = 21.81% Humidity
- Cell 2 (081.28) = 81.28F from the SHT15 sensor
- Cell 3 (026.5) = 26.5C from the SCP1000 sensor
- Cell 4 (79.70) = 79.7F from the SCP1000 sensor
- Cell 5 (083534) = 83854 Pascal from the SCP1000 sensor
- Cell 6 (918) = a relative reading from the TEMT6000 light sensor (pretty dark)
- Cell 7 (0) = battery level is 0 (no battery attached)
- Cell 8 (000001) is record number and will increment each second

3.3 Device Configuration

Press "ctrl+s" (control and the letter s at the same time) while the board is active to open the firmware configuration menu.

The firmware on the Weather Board v2 allows for user configuration of:

- Various readings, which can be turned on and off
- Output style, which can be switched from "Simple" to "Verbose"
- Temperature offset

All settings are retained in non-volatile memory and will be automatically restored when board is turned on.

If there is a reading that you do not need (battery level for instance) you can turn it off. This may be helpful when writing a parser or logging data.

The "Verbose" style of output is easier to read. The "Simple" style of output is easier for parsers and the creation of comma separated value (CSV) files for data analysis.

We have found that the digital sensors are temperature compensated and highly accurate, but because of local warming (from the PCB and local ICs), the displayed temperature from the

two sensors (SHT15 and SCP1000) will be slightly higher than the actual local temperature. We recommend taking a few local temperature readings and calibrating your Weather Board using the temperature offset setting.

4 Additional Resources

SHT15 Humidity Sensor Datasheet:

http://www.sensirion.com/en/pdf/product_information/Data_Sheet_humidity_sensor_SHT1x_SHT7x_E.pdf

SCP1000 Pressure Sensor Datasheet:

http://www.vti.fi/midcom-serveattachmentguid-30de88ec8eb89a476cb8c8e70b969dc3/scp1000_product_family_specification_rev_0.08.pdf

BlueSMiRF:

http://www.sparkfun.com/commerce/product_info.php?products_id=582

FTDI USB Driver Page:

<http://www.ftdichip.com/FTDrivers.htm>



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