



# nanoWiPOM Technical Manual

Document Revision: 1.05  
Document Date: 11 April 2016



### Overview

nanoWiPOM is a miniature wireless remote monitoring computer. Taking advantage of cellular networks, nanoWiPOM allow remote monitoring of voltages, currents, frequencies and many other physical parameters.



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### WARRANTY:

BiPOM Electronics warrants nanoWiPOM for a period of 2 years. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to nanoWiPOM. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.



## Specifications

- Based on the STM32F103VGT6 Cortex-M3 micro-controller
- 8-MByte SPI DATAFlash
- Micro-SD holder (up to 32 GB by inserting SDHC)
- One QUAD-BAND GSM modem (MTSMC-E.R3-SP) or CDMA modem
- One USB device port
- One RS485 serial port
- Two RS232 serial ports
- Analog input terminals (two 4-20mA or two 0-6VDC)
- Digital input terminals (4 x dry contacts)
- Digital output terminals (2 x 1A)
- LED's for status
- 3V battery holder for real-time clock
- 10-30 Volt input power range



Hardware Setup

Power

Apply power to nanoWiPOM as shown in Figure 1. Input voltage range is from 10 to 30 Volts regulated or unregulated DC:

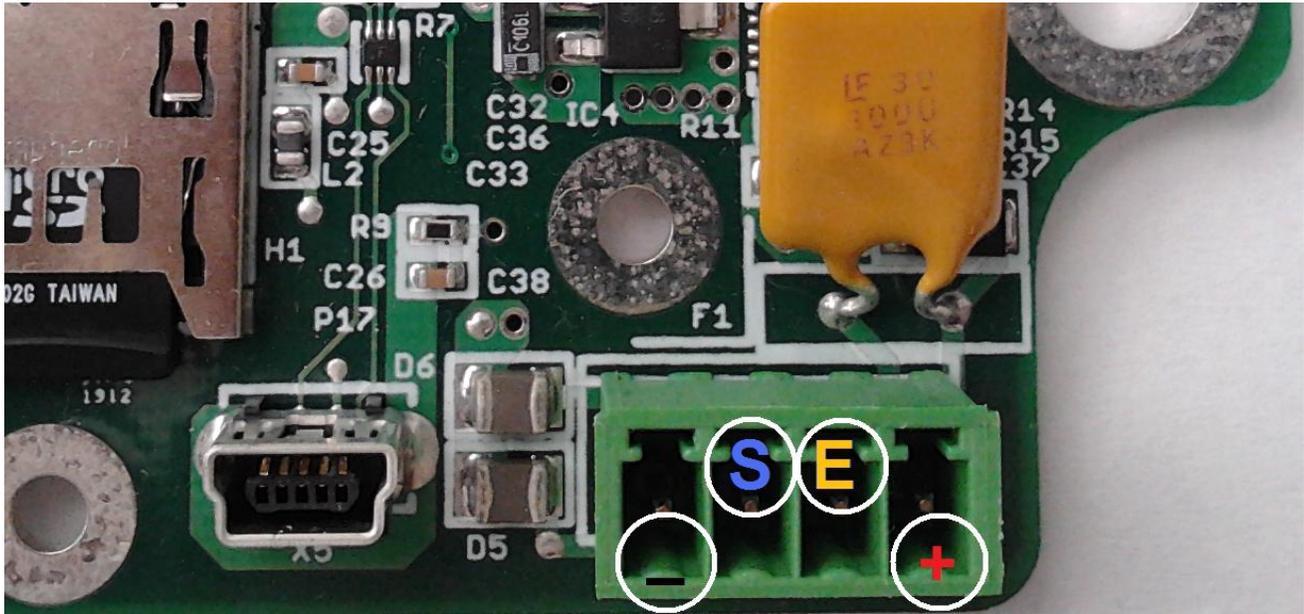


Figure 1

- “+” terminal is connected to the positive pin of the power supply.
- “S” terminal is connected to SHIELD ( optional ).
- “E” terminal is connected to EARTH ( optional ).
- “-” terminal is connected to power supply return.

When power is applied Green LED turns ON. Green LED shows power status. Solid green means power level is good and nanoWiPOM is ready for use.

Yellow LED shows communications. Blinking yellow LED indicates that nanoWiPOM is trying to establish communications. Solid yellow LED indicates that the communications is established.

Red LED shows a fault. If the red LED turns on or blinks, contact BiPOM Electronics for technical support.

If the power supply does not provide SHIELD and EARTH leave these terminals unconnected.

Power input is protected against reverse voltage.



### Analog inputs

nanoWipom provides 2 analog inputs to measure 4-20mA loop current. Sensors are loop-powered by nanoWiPOM. Loop current is electronically limited.

Connect the loop-powered sensors to analog terminals as shown in Figure 2:

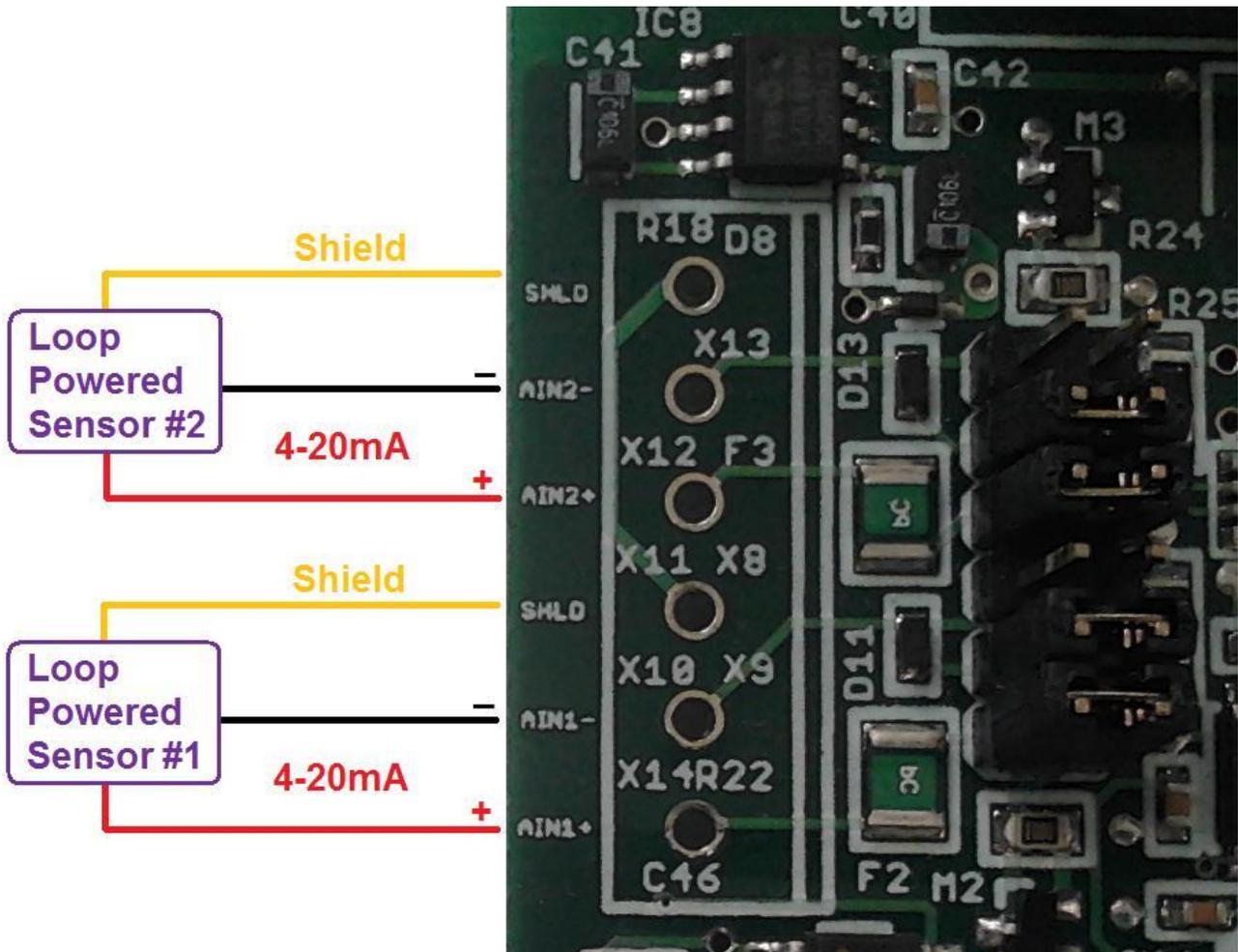
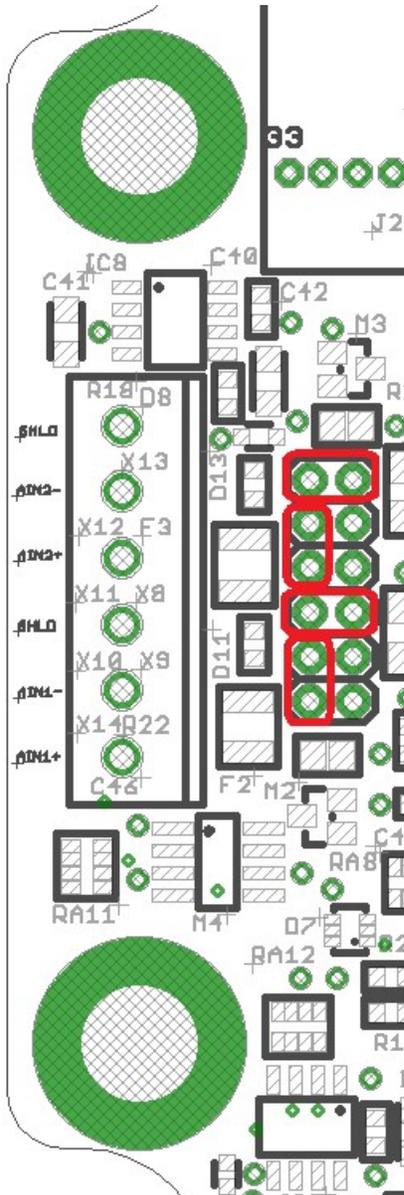


Figure 2

If the sensor cable does not provide SHIELD, leave these terminals unconnected.

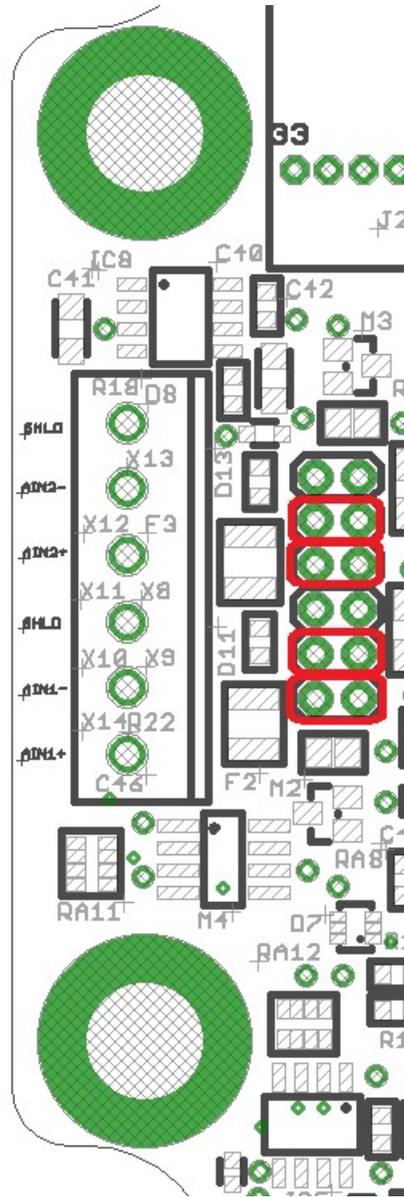
If an analog input is not used, leave its terminals unconnected.



Jumpers for AIN2

Jumpers for AIN1

Analog Input jumpers configured for 0-6V range



Jumpers for AIN2

Jumpers for AIN1

Analog Input jumpers configured for 4-20mA range



### Digital inputs

nanoWipom has 4 digital inputs that can be configured either as dry-contact inputs or voltage inputs.

For dry-contact configuration, connect external switches to digital input terminals as shown in Figure 3 and install all the jumpers:

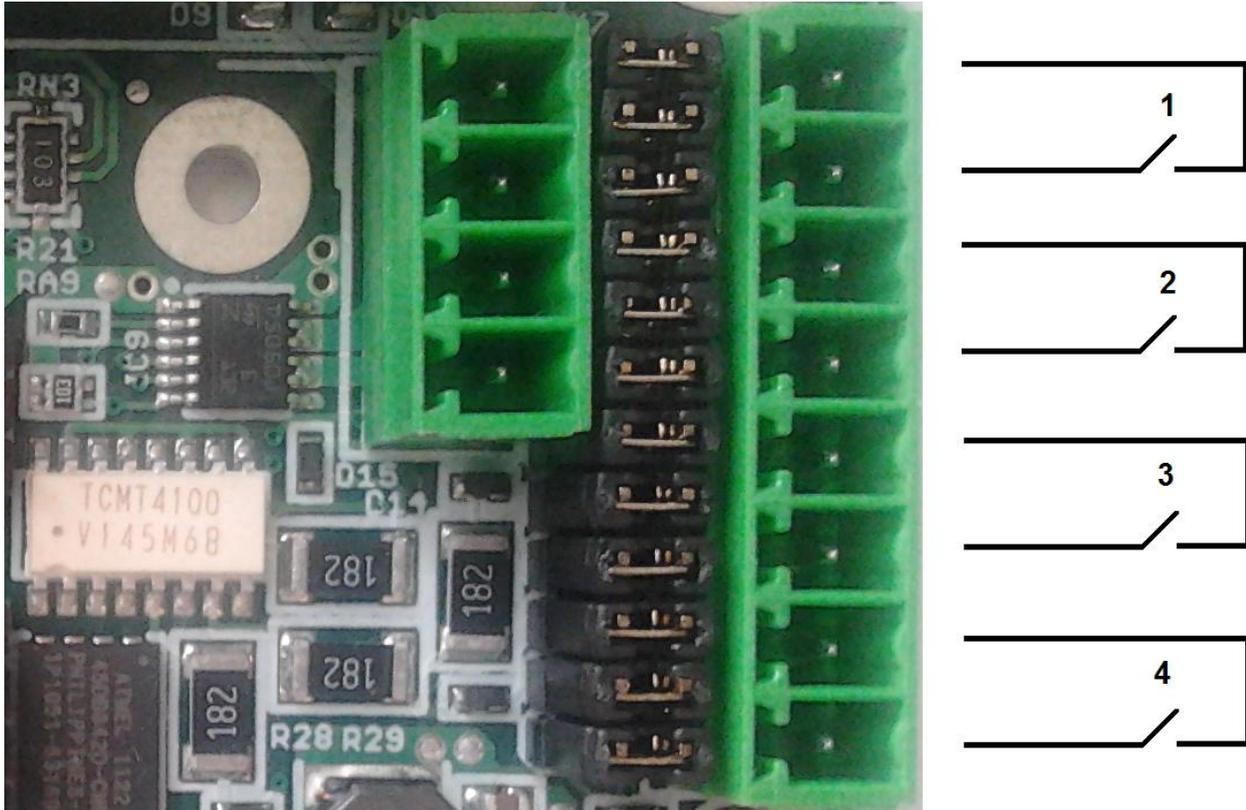


Figure 3

If a digital input is not used leave its terminals unconnected.

nanoWipom has an internal series resistor (1800 Ohms ) on digital inputs.

If the supply voltage is 30 Volts, the input current is approximately 16 mA through the dry contact.

If the supply voltage is 12 Volts, the input current is approximately 6 mA through the dry contact.



Figure 4 shows the connections and jumpers when the digital inputs are configured as voltage inputs.

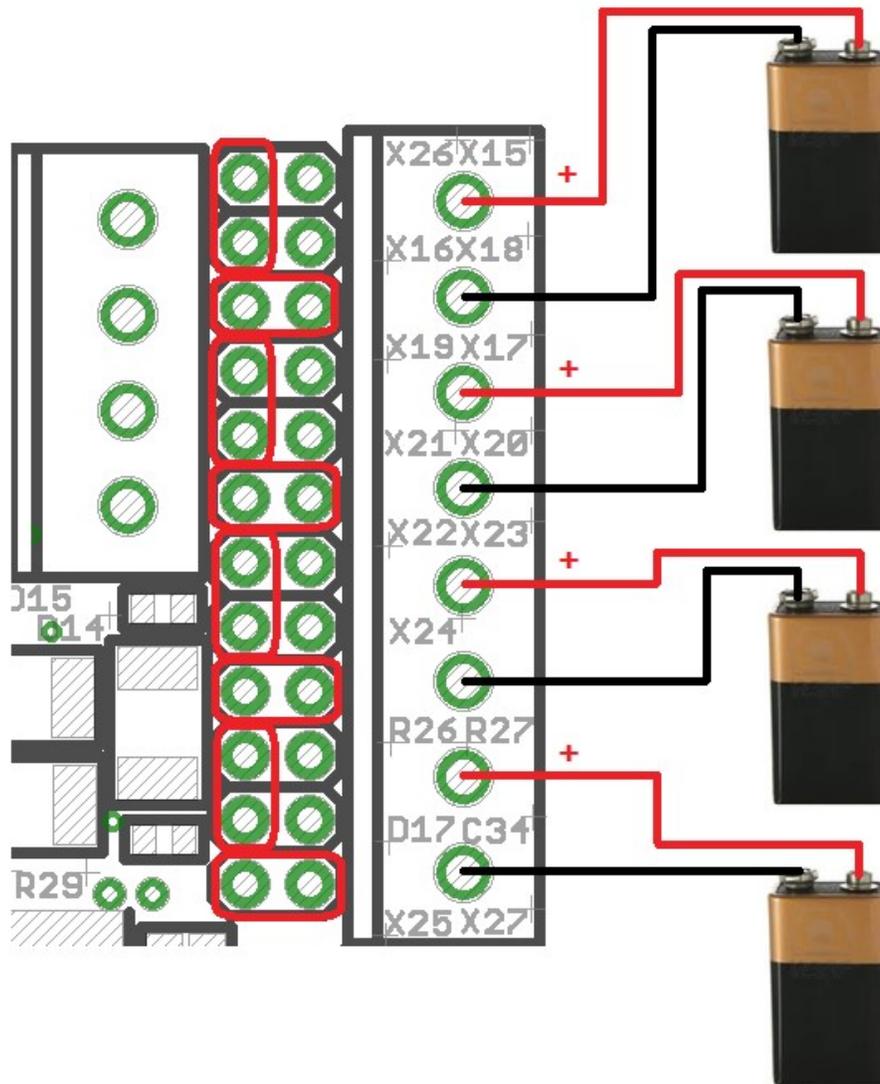


Figure 4

In voltage input mode, a channel can detect a voltage range from 4 Volts to 30 Volts as active.

It is also possible to have some digital inputs as dry-contact and others as voltage inputs by properly configuring the jumpers for each individual channel.



### Digital Outputs

nanoWipom provides 2 high-current, high-voltage outputs. Each output can drive up to 1 Ampere. If an output is activated, the supply voltage will appear on output terminals.

Connect external loads to digital output terminals as shown in Figure 5:

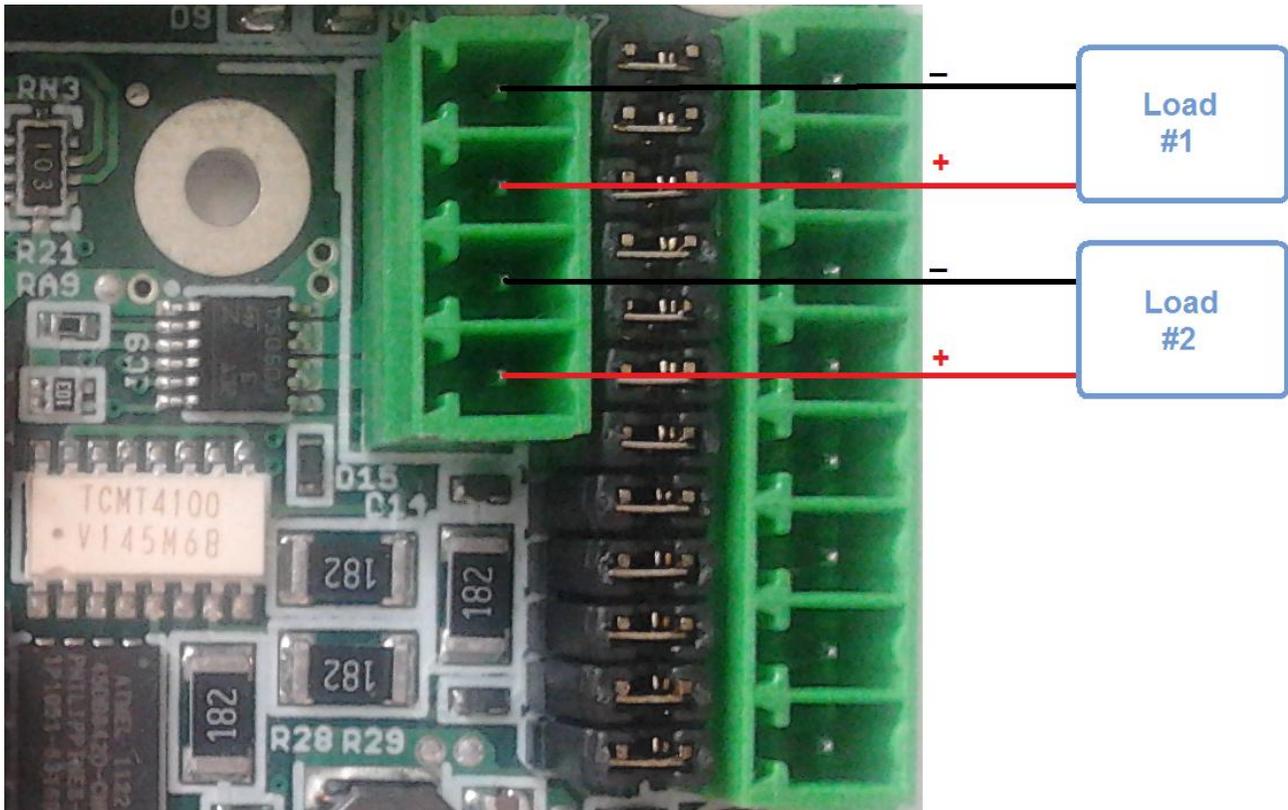


Figure 5

Digital outputs are NOT CMOS/TTL level. They are power supply level. Do NOT connect the digital outputs to TTL/CMOS level circuitry !!!



### RS232 Serial Ports

nanoWipom has two RS232 ports. **RS232 COM0** interface is provided on the X2 connector to communicate to external RS232 devices. This interface is used to download the firmware as well using CTS\_0 and DSR\_0 signals to put the board into BOOT mode. The MINI-MAX/STM32 Loader in the [STM Development System](#) software package can be used to upgrade the on-board firmware.

**RS232 COM1** interface is provided on the X4 connector:

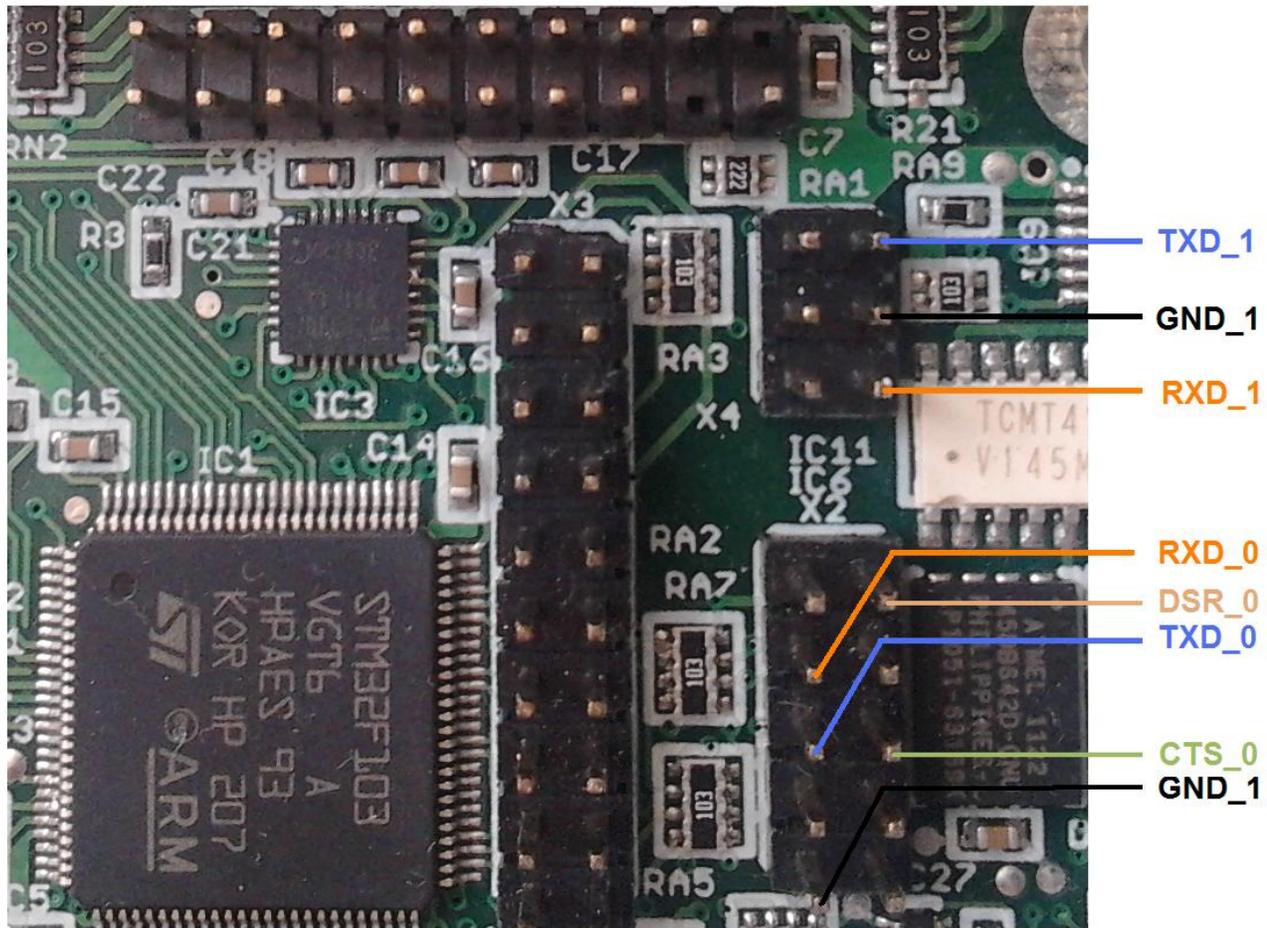


Figure 6



BiPOM provides a special cable to convert to a standard 9-pin DSUB male connector on RS232 COM0 interface:

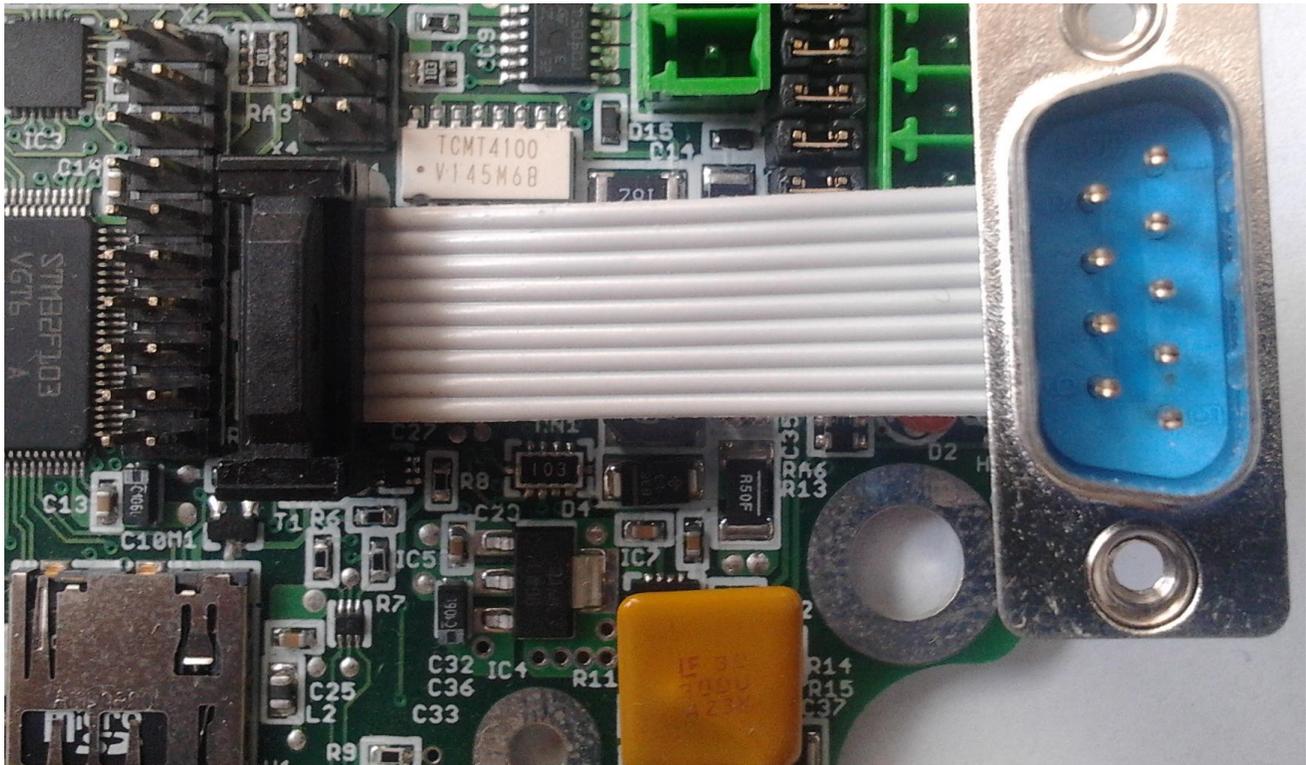


Figure 7



RS232 Ports Pinout:

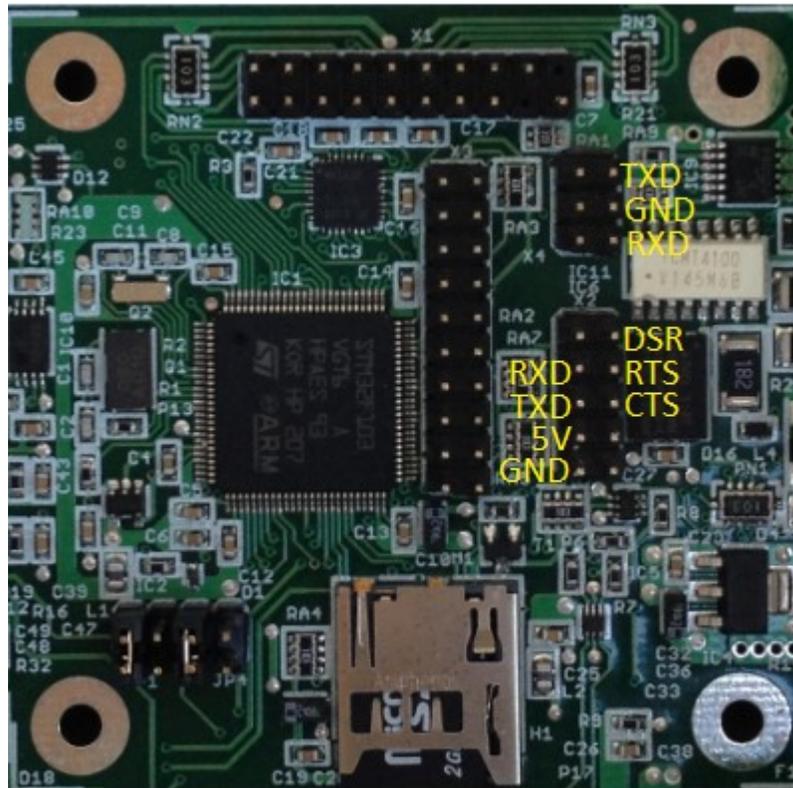


Figure 7



5V supply can be connected to COM0 RS232 port by installing jumper JP7 as shown. This way, external devices connected to the RS232 port can be powered from 5V line of nanoWiPOM:

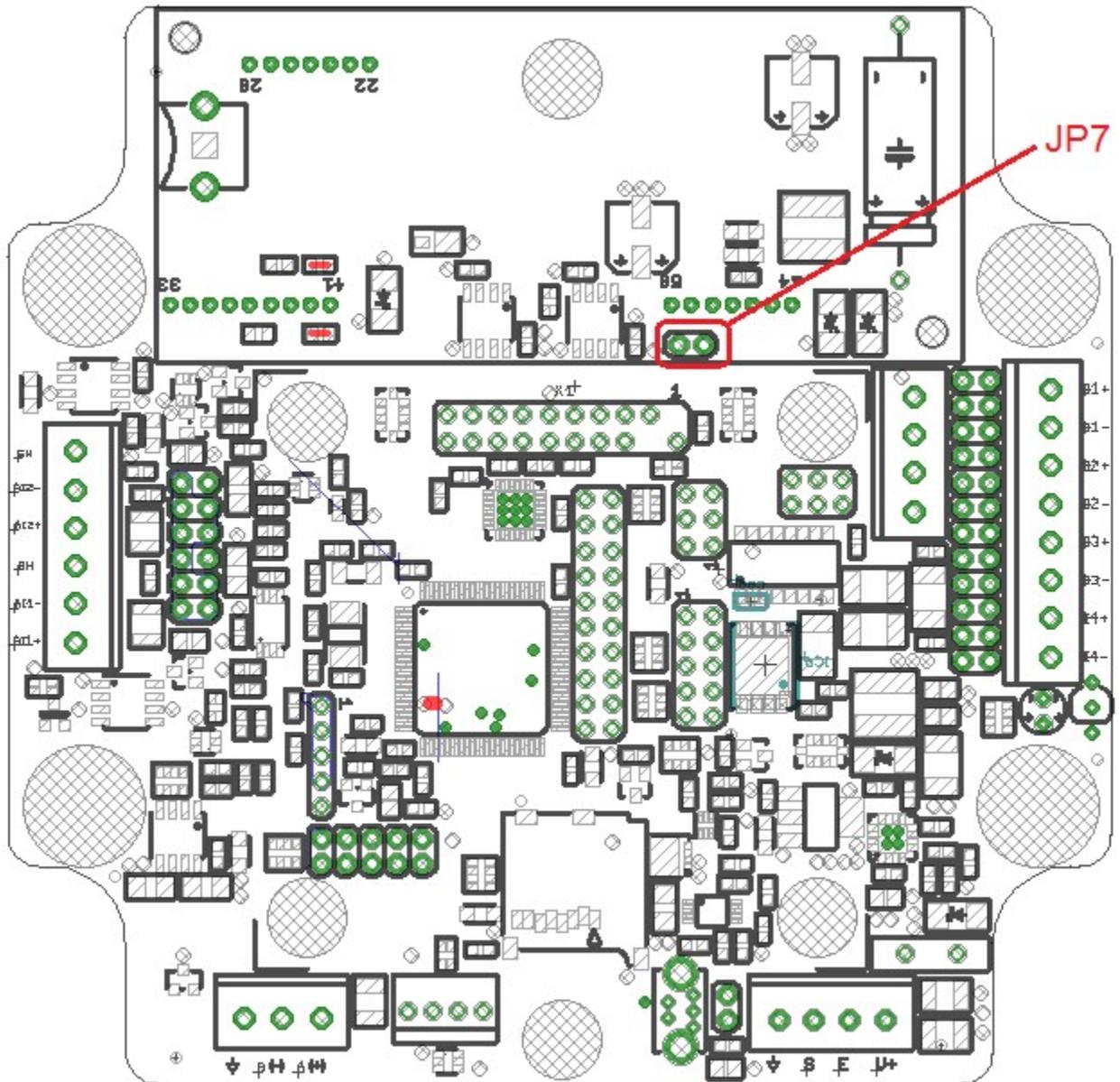


Figure 8



### RS485 Serial Port

nanoWipom provides one RS485 serial port to communicate with external devices using standard protocols such as MODBUS:

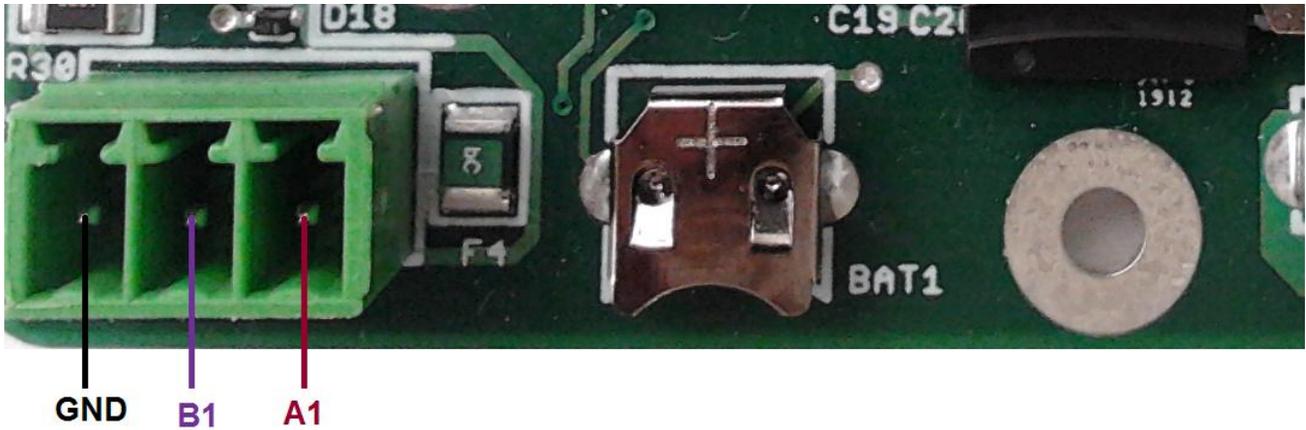


Figure 9



**microSD interface**

nanoWipom has a microSD Card slot to install microSD or microSDHC cards. The firmware supports both types of cards:

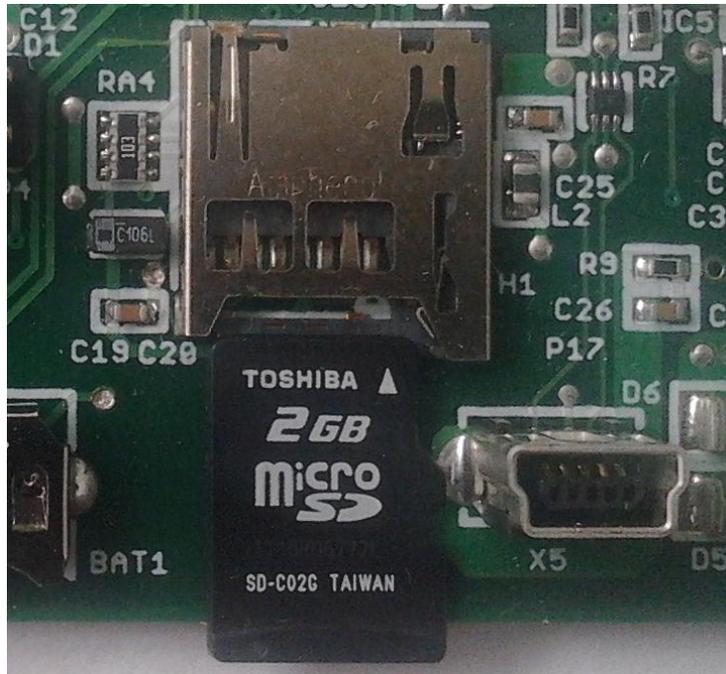


Figure 10



Figure 11



## Software Setup

nanoWipom is shipped with a pre-programmed WRTU firmware. WRTU firmware has the following features:

- Reading the Analog inputs
- Reading the Digital inputs
- Controlling the Digital Outputs
- Tag management
- Logging data to DataFlash and/or microSD card
- MODBUS RTU through RS485, RS232 and USB ports
- MODBUS Master through RS485 port
- LCD display update through I2C port
- Event and alarm management
- USB device port support
- Wireless data transmission using the cell modem

WRTU can be used over the cell phone network using BiPOM's Web Portal or locally through the USB cable using BiPOM WRTU Client.

Please see WRTU Client User Manual and WRTU Web Portal User Manual for more details.



## Collecting Data

For wireless monitoring, a SIM card with a monthly data plan is required. SIM card can be obtained from BiPOM Electronics by opening an account. When the account is established, a membership is created on WiPOM Web Portal. You can access your account as well as your nanoWiPOM devices through the WiPOM Web Portal. The portal will show the minute usage, number of minutes left, overage as well as the data from nanoWiPOM.

Data can be collected in real-time by the web portal and recorded to a database. Alternatively, data can be logged on nanoWiPOM and accessed as historical data as a later date through the web portal.