WiFly GSX Super Module “SuRF Board”

Features

- UART interface with RS232 and TTL signaling
- Through hole board simplifies system integration
- Accepts 3-12VDC
- Status LEDs to show network status and data transfer
- Ultra-low power - 4uA sleep, 50mA Rx, 210mA Tx (max)
- High throughput, 1Mbps sustained data rate with TCP/IP and WPA2
- Through hole design with mounting posts
- Jumpers for setting adhoc mode
- On board ceramic chip antenna and U.FL connector for external antenna
- 10 general purpose digital I/O
- 8 analog sensor interfaces
- Real-time clock for wakeup and time stamping
- On board ECOS-OS, TCP/IP stacks
- Wi-Fi Alliance certified for WPA2-PSK
- FCC / CE / ICS certified and RoHS compliant.

Applications

- Wireless serial connections
- Remote sensors
- Telemetry
- Security
- Industrial sensors and controls
- Home Automation

Description

The RN-134 “SuRF” board is field ready, WiFi certified 802.11 b/g solution. The SuRF board has the flexibility to connect directly to a standard RS232 interface or through the TTL UART interface to embedded systems. The status LEDs and jumpers enable rapid prototyping and integrating into existing systems.

The RN-134 is built upon Roving Networks RN-131 WiFly-GSX module. The WiFly GSX module incorporates a 2.4GHz radio, processor, Full TCP/IP stack, real-time clock, FTP, DHCP, DNS and web server. The RN-131G is the smallest, lowest power 802.11 b/g module available. The module supports adhoc and enterprise networking.

In the simplest configuration the hardware only requires four connections (PWR, TX, RX, GND). In cases where power is available on the RS232 DB9 connector of your application, the RN134 can be directly wired to create an instant serial to WiFi network link.

Additionally, the analog sensor interface provides direct connections to send temperature, acceleration and other analog data without requiring additional hardware. The WiFly GSX module is programmed and controlled with a simple ASCII command language. Once the WiFly GSX is setup it can scan to find an access point, associate, authenticate and connect over any WiFi network.
Overview

- Host Data Rate up to 1 Mbps for UART interface, 230400 for RS232 interface.
- Intelligent, built-in power management with programmable wakeup
- Powered from regulated 3.3-3.7V source or 2.0-3.0V batteries
- Real time clock for time stamping, auto-sleep and auto-wakeup modes
- Configuration over WiFi or UART using simple ASCII commands
- Over the air firmware upgrade via FTP
- Secure WiFi authentication WEP-128, WPA-PSK (TKIP), WPA2-PSK, EAP-TLS for mixed mode Enterprise
- Built in networking applications DHCP, DNS, ARP, ICMP UDP, Telnet, FTP
- 802.11 power save and roaming functions

Environmental Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range (Operating)</td>
<td>-30°C ~ 85°C</td>
</tr>
<tr>
<td>Temperature Range (Storage)</td>
<td>-30°C ~ 85°C</td>
</tr>
<tr>
<td>Relative Humidity (Operating)</td>
<td>≤90%</td>
</tr>
<tr>
<td>Relative Humidity (Storage)</td>
<td>≤90%</td>
</tr>
</tbody>
</table>

Electrical Characteristics

<table>
<thead>
<tr>
<th>Supply Voltage</th>
<th>Min</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage VDD</td>
<td>3.0</td>
<td>3.3</td>
<td>12</td>
<td>V</td>
</tr>
<tr>
<td>UART interface</td>
<td>3.0</td>
<td>3.3</td>
<td>3.3</td>
<td>V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power consumption</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep</td>
<td>4</td>
<td></td>
<td></td>
<td>uA</td>
</tr>
<tr>
<td>Standby (doze)</td>
<td>-</td>
<td>15</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Connected (idle, RX)</td>
<td>40</td>
<td></td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Connected (TX)</td>
<td>140</td>
<td>212</td>
<td></td>
<td>mA</td>
</tr>
</tbody>
</table>

Analog Sensor Inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sense 0,1,2,3 wakeup detect threshold</td>
<td>500mV</td>
</tr>
<tr>
<td>AD sense 0-7 measurement range</td>
<td>0-400mV</td>
</tr>
<tr>
<td>Precision</td>
<td>14 bits = 12uV</td>
</tr>
<tr>
<td>Accuracy</td>
<td>5% un-calibrated, .01% calibrated</td>
</tr>
<tr>
<td>Minimum conversion time</td>
<td>35uS (5kHz over wifi)</td>
</tr>
<tr>
<td>Sensor Power (pin 33) output resistance 3.3V</td>
<td>10 ohms, max current = 50mA</td>
</tr>
</tbody>
</table>
## Radio Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2402 ~ 2480MHz</td>
</tr>
<tr>
<td>Modulation</td>
<td>802.11b compatibility: DSSS(CCK-11, CCK-5.5, DQPSK-2, DBPSK-1) 802.11g: OFDM (default)</td>
</tr>
<tr>
<td>Channel intervals</td>
<td>5MHz</td>
</tr>
<tr>
<td>Channels</td>
<td>1 - 14</td>
</tr>
<tr>
<td>Transmission rate (over the air)</td>
<td>1 – 11Mbps for 802.11b / 6 – 54Mbps for 802.11g</td>
</tr>
<tr>
<td>Receive sensitivity</td>
<td>-85dBm typ.</td>
</tr>
<tr>
<td>Output level (Class1)</td>
<td>+18dBm</td>
</tr>
<tr>
<td>Maximum RF input to U.FL connector</td>
<td>10 dBm</td>
</tr>
</tbody>
</table>
Board Description

UART Interface
TTL signals
RX - input to SuRF board
TX - output from SuRF board

Power
5-12 VDC
GND

Evaluation Board Connector

Sensors
WARNING: Sensors must not be driven with more than 1.2 VDC or permanent damage will occur

RS232 Interface
RX - input to SuRF board
TX - output from SuRF board

Jumper Block 1 - 4
1) Adhoc mode & Factory Reset
2) Config 1
3) Config 2
4) Config 3

LED Indicators

<table>
<thead>
<tr>
<th>Condition</th>
<th>Blue LED</th>
<th>Red LED</th>
<th>Yellow LED</th>
<th>Green LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON solid</td>
<td>Power On</td>
<td>Not Associated</td>
<td>Rx/Tx data transfer</td>
<td>Connected over TCP</td>
</tr>
<tr>
<td>Fast blink</td>
<td></td>
<td></td>
<td></td>
<td>No IP address</td>
</tr>
<tr>
<td>Slow blink</td>
<td></td>
<td>Associated, No Internet</td>
<td></td>
<td>IP address OK</td>
</tr>
<tr>
<td>OFF</td>
<td>No Power</td>
<td>Associated, Internet</td>
<td>OK</td>
<td></td>
</tr>
</tbody>
</table>

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Physical Dimensions

Top view

- Width: 26.6 mm
- Height: 51.2 mm
- Thickness: 12.8 mm
- Height of the top section: 4.9 mm
Design Concerns

1. **Minimizing Radio interference.** When integrating the RN-134 into your system, make sure the area around the chip antenna that overhangs the PCB is away from any metal enclosure. If this is not possible use the on board U.FL jack with a U.FL to SMA cable to connect an external antenna. To switch between the chip and external antenna use the `set wlan antenna <num>` command where 0 = chip and 1 = U.FL.

2. **U.FL connector.** Use Hirose U.FL connector **U.FL-R-SMT** to for connecting external antennas. See Roving Networks U.FL to SMA cable. Part number: RN-UFL-SMA6

![U.FL-R-SMT-1](image)

3. **Powering the module.** The RN-134 can be powered from the RS232 header, the UART interface or the power connector. You should only provide power on one of the three interfaces.

   - If powered from the RS232 header, apply 3 to 12 VDC on pin 9 and ground to pin 5 of the RS232 header.
   - If powered from the UART interface, apply 3.3 VDC on pin 1 and ground on pin 2 of the UART interface.
   - If powered from the power connector, apply 3 to 12 VDC

4. **Sensor Interfaces.** Inputs must not exceed 1.2V. Sensitivity saturates at 400 mV. It is recommended that you use the Sensor power output to drive any analog devices that are attached to the sensor pins.

   Note the exception to this is Sensor pins 2 and 3. These have a resistor network in front of sensors 4 and 5 respectfully so they can be drive with up to 5 VDC.

5. **Adhoc and Restoring Factory Settings.** Jumper 1 on the jumper header is connected to PIO9. When this jumper is in place the module will power up in adhoc mode. If the jump is then toggled 5 times, the initial factory default configuration will be RESTORED. This is useful for cases where the module is mis-configured and is no long responding.
6.

Having this jumper on at power up also arms the restore factory reset function. After power up, if jumper 1 is
toggled on and off five times while the module the configuration will be RESTORED to the initial settings. This is
very useful in cases where the module is mis-configured and no is long responding to commands.

Compliance Information

| FCC | ID            | U3O-G2M5477 Part 15.247 |
| IC  | (canada) RSS-210 |
| CE  | EU ID # 0681   |
| REG | U9M20901-1000-C |
| RADIO | EN 300328 V1.7.1 (10/2006) |
| EMC | EN 301489-1 V1.8.1 (04/2008), EN 301489-17 V1.3.2 (04/2008) |
| SAFETY | EN 60950-1:2001+A11:2004 |
| RoHs | Compliant |

Ordering Information

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN-134</td>
<td>With chip antenna and U.FL jack. Standard firmware version</td>
</tr>
<tr>
<td>RN-131G</td>
<td>WiFly-GSX 802.11 b/g surface mount module</td>
</tr>
<tr>
<td>RN-131G-EVAL</td>
<td>Development Kit (Includes the RN-134 module)</td>
</tr>
<tr>
<td>RN-UFL-SMA6</td>
<td>6 inch cable with U.FL connector on one end and SMA on the other</td>
</tr>
<tr>
<td>RN-SMA4-RP</td>
<td>4” external antenna with reverse polarity SMA connector. Used with RN-UFL-SMA6</td>
</tr>
</tbody>
</table>

For other configurations, contact Roving Networks directly.

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