"WiFly GX" 802.11G Super Module



Features

- 802.11 b/g embedded module with data rates up to 54Mbps
- Wi-Fi Alliance certified for WPA2-PSK
- Ultra-low power - 4uA sleep, 40mA Rx, 210mA Tx (max)
- Multiple sleep modes, wake up timer or signal
- Small form factor 28mm x 40.8mm
- UART, RS-232 or RS-485 hardware interface
- On board ceramic chip antenna and U.FL connector for external antenna
- 10 General Purpose Digital IOs
- 8 analog sensor inputs
- Onboard ECOS-OS, TCP/IP stack
- Real-time clock for wakeup and time stamps
- Accepts wide voltage range input 3.3V – 12VDC (RN-121 and RN-123)
- Industrial voltage range input 6V – 48VDC (RN-125)
- Switched power supply for external sensors
- Supports Adhoc and infrastructure networking
- FCC / CE / ICS certified and RoHS compliant.

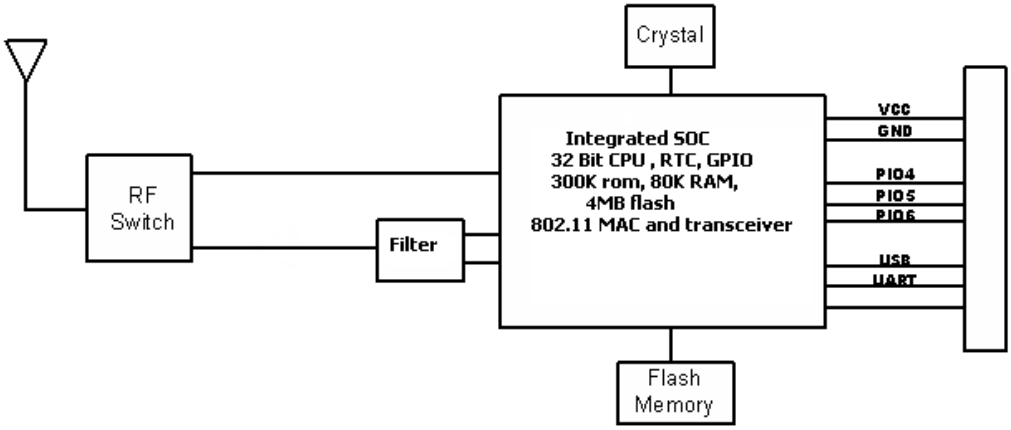
Applications

- Wireless thermostats
- RS232/RS485 cable replacement
- Remote equipment monitoring
- Scanners, GPS and measurement systems
- Industrial sensor and control
- Security
- Home Automation
- Medical devices

Description

The WiFly GX module is a stand alone, embedded wireless LAN/WAN access device. Because of its small form factor and extremely low power consumption, the RN-121G is perfect for mobile wireless applications such as asset monitoring, GPS tracking and portable devices. The WiFly GX simplifies the integration and development of your application by including an on board TCP/IP stack and networking application programs such as telnet and ftp. The hardware requires only four connections (PWR, TX, RX, GND) to create a simple wireless data connection. Additionally, continuously sampled analog inputs transmit audio, temperature, motion, or acceleration data without requiring additional hardware in your end application. The WiFly GX module uses a straight forward ASCII command set for configuration and programming. Once the WiFly GX is set up it can automatically associated and authenticate with a network, making your device accessible worldwide. The WiFly GX includes a high-speed UART and SPI interfaces that allow high-speed data transfer. The WiFly GX module is a complete wireless solution

Block Diagram



Overview

- Host Data Rate of up to 1Mbps for UART
- Low power - 110mA TX, 35mA idle, 4uA deep sleep
- Real time clock for time stamping, auto-sleep and auto-wakeup modes
- UART and wireless configuration using simple ASCII commands.
- Over the air firmware upgrade (FTP)
- Three on board LEDs for status.
- 32 pin Standard 2mm DIP socket pin spacing
- 802.11i: Open, WEP-64, WEP-128, WPA, WPA2
- Built in networking applications DHCP, UDP, DNS, ARP, ICMP, TCP, HTTP Client, FTP
- Supports 802.11 power save modes
- Commands for scanning networks roaming modes

High-speed UART features

- 64 bytes FIFO (transmitter and receiver)
- Fully compatible with industrial standard 16C450 and equivalent
- Auto hardware flow control using RTS/CTS
- Auto software flow control with programmable Xon/Xoff characters

RS-485 features (RN-125 only)

- Accepts 6Vdc to 48Vdc power
- RS-485 signaling with auto-direction control
- Onboard line termination resistors
- Hot-Swappable for Telecom Applications
- 1/4-Unit Load, Allowing Up to 128 Transceivers on the Bus

Environmental Conditions

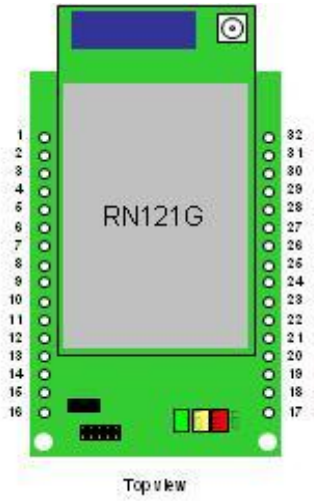
Parameter	Value
Temperature Range (Operating)	-30 °C ~ +85 °C
Temperature Range (Storage)	-40 °C ~ +85 °C
Relative Humidity (Operating)	≤90%
Relative Humidity (Storage)	≤90%

Radio Characteristics

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

Pin Description: RN-121 (TTL Uart interface)

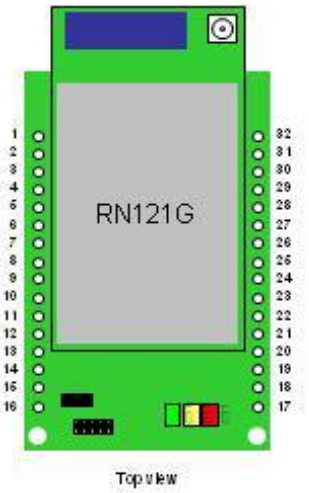
Note: Any unused pins should be left floating (No Connect)



Pin	Name	Description	Default
1	PIO7	General Purpose IO	No Connect
2	SPOWER	Switched sensor output power	No Connect
3	SENSE-4	Analog sensor input (1.2V)	
4	SENSE-5	Analog sensor input (1.2V)	
5	SENSE-6	Analog Sensor Input (1.2V)	
6	SENSE-7	Analog Sensor Input (1.2V)	
7	PIO6	Controls red LED	Input
8	PIO9	General purpose IO	Sets factory defaults
9	DEBUG_RX	2nd serial port	No Connect
10	DEBUG_TX	2nd serial port	No Connect
11	RESET	Active low with 10k built in pullup	
12	WAKE	Force the module to wake up, input to module, 31us min. pulse	No Connect
13	VIN	3.6-16VDC	
14	VREG	3.3V LDO output	
15	VBATT	Tie to VREG if USING VIN	Battery option
16	GND	Ground	
17	VDD	3.3V out-in	Power input
18	SPI_MOSI	Spi port MOSI line (WiFly GX is the master)	Output
19	SPI_CK	Spi port clock line (WiFly GX is the master)	Output
20	SPI_CS	Spi port chip-select line (WiFly GX is the master)	Output
21	SPI_MISO	Spi port MISO line (WiFly GX is the master)	Input
22	PIO5	Controls yellow LED	Connect/disconnect input
23	PIO4	Controls green LED	Connection status output
24	RTSB/PIO13	HW flow control output (Onboard UART) / General purpose IO	TTL output
25	CTSB/PIO12/ SENSE-1	HW flow control input (Onboard UART) / General purpose IO / Analog sensor input (3.3V)	TTL input
26	RXB / SENSE-0	TTL Data IN (Onboard UART) / Analog sensor input (3.3V)	Input
27	TXB	TTL Data Out (Onboard UART)	Output
28	NC		No Connect
29	SENSE-3	Analog sensor input (3.3V)	No Connect
30	SENSE-2	Analog sensor input (3.3V)	No Connect
31	NC		No Connect
32	GND	Ground	

Pin Description: RN-123 (RS-232 interface)

Note: Any unused pins should be left floating (No Connect)



Pin	Name	Description	Default
1	PIO7	General Purpose IO	No Connect
2	SPOWER	Switched sensor output power	No Connect
3	SENSE-4	Analog sensor input (1.2V)	
4	SENSE-5	Analog sensor input (1.2V)	
5	SENSE-6	Analog Sensor Input (1.2V)	
6	SENSE-7	Analog Sensor Input (1.2V)	
7	PIO6	Controls red LED	Input
8	PIO9	General purpose IO	Sets factory defaults
9	DEBUG_RX	2nd serial port	No Connect
10	DEBUG_TX	2nd serial port	No Connect
11	RESET	Active low with 10k built in pullup	
12	WAKE	Force the module to wake up, input to module, 31us min. pulse	No Connect
13	NC		No Connect
14	VIN	6V to 9V DC	No Connect
15	NC		No Connect
16	GND	Ground	
17	P3.3V	3.3V out-in	No Connect
18	ENA_3.3V	Enable 3.3V regulator (pull low to disable)	No Connect
19	TXB-	RS485 line	
20	TXA+	RS485 line	
21	PIO8	General purpose IO	No Connect
22	PIO5	Controls yellow LED	Connect/disconnect input
23	PIO4	Controls green LED	Connection status output
24	RTSB	TTL HW flow control output	No Connect
25	CTSB	TTL HW flow control input	No Connect
26	RXDB	TTL Data IN	No Connect
27	TXDB	TTL Data Out	No Connect
28	RXDA	RS232 Data IN	RS232 input
29	TXDA	RS232 Data Out	RS232 output
30	RTSA	RS232 HW flow control output	RS232 output
31	CTSA	RS232 HW flow control input	RS232 input
32	GND	Ground	

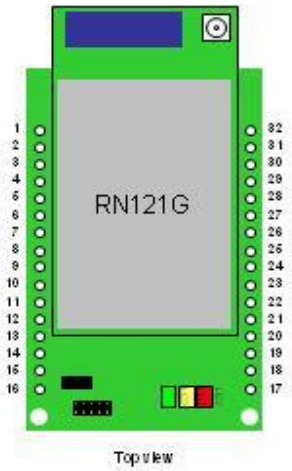
NOTE: Vin on RN-123 is on Pin 14 (6V to 9V DC)

Electrical Characteristics: RN-123 (RS-232 interface)

Parameter	Min	Typ.	Max.	Unit
Supply Voltage VIN	6.0	6V-9V	9	VDC
Supply Voltage P3.3V	3.0	3.3	3.6	VDC
Average power consumption				
Standby/Idle (default settings)	-	35	-	mA
Sleep	10	12	15	uA (micro)
Connected(idle, RX)		40		mA
Connected(TX)		110	180	mA

Pin Description: RN-125 (RS-485 interface)

Note: Any unused pins should be left floating (No Connect)



Pin	Name	Description	Default
1	PIO7	General Purpose IO	No Connect
2	SPOWER	Switched sensor output power	No Connect
3	SENSE-4	Analog sensor input (1.2V)	
4	SENSE-5	Analog sensor input (1.2V)	
5	SENSE-6	Analog Sensor Input (1.2V)	
6	SENSE-7	Analog Sensor Input (1.2V)	
7	PIO6	Controls red LED	
8	PIO9	General purpose IO	Sets factory defaults
9	DEBUG_RX	2nd serial port	No Connect
10	DEBUG_TX	2nd serial port	No Connect
11	RESET	Active low with 10k built in pullup	
12	WAKE	Force the module to wake up, input to module, 31us min. pulse	No Connect
13	VIN	6-48VDC	
14	P5V	5VDC input option	No Connect
15	T2	RS485 Terminator – Tie to P5V to terminate	No Connect
16	GND	Ground	
17	P3.3V	3.3V out-in	No Connect
18	ENA_3.3V	Enable 3.3V regulator (pull low to disable)	No Connect
19	TXB-	RS485 line	RS485
20	TXA+	RS485 line	RS485
21	PIO8	General purpose IO	No Connect
22	PIO5	Controls yellow LED	Connect/disconnect input
23	PIO4	Controls green LED	Connection status output
24	NC		No Connect
25	NC		No Connect
26	NC		No Connect
27	NC		No Connect
28	NC		No Connect
29	NC		No Connect
30	NC		No Connect
31	T1	RS485 Terminator – Tie to GND to terminate	No Connect
32	GND	Ground	

Electrical Characteristics: RN-125 (RS485 interface)

Parameter	Min	Typ.	Max.	Unit
Supply Voltage VIN	6.0	24	48	VDC
Supply Voltage P5V	4.0	5.0	6.0	VDC
Average power consumption				
Standby/Idle (default settings)	-	35	-	mA
Sleep	10	12	15	uA (micro)
Connected(idle, RX)		40		mA
Connected(TX)		110	180	mA

**Note: The 3.3V Power input should not be used to power the RN-125 since the RS-485 driver requires a higher input voltage.

Design Concerns

1. ***Reset circuit***. Reset is active LOW, is optional and does not need to be connected. There is a built in voltage monitor that will pull Reset LOW (open drain FET) if the input voltage drops below 2.7VDC. If external reset is desired, use an OPEN DRAIN driver and do not drive the Reset pin to any voltage > 1.0 Vdc.

2. ***Powering the WiFly Module***. There are 3 options to power the RN-121.
   - Supply 3.6 to 16VDC power to VIN (pin 13). Tie VREG (pin 14) to VBATT (pin 15).
   - Apply 3.3VDC regulated power to VDD (pin 17).
   - Apply battery = 2.0 to 3.0VDC to VBATT (pin 15).

   If VIN is powered, VREG will supply 3.3VDC output and can be used for other circuits, with a current limitation of 50 ma.

   Warning: Placing 5VDC or any voltage above 3.3Vdc into the VDD pins of the module will permanently damage the radio module. Be sure to use the VIN = pin 13 power pin for any power supplied that is > 3.3VDC.

3. ***Factory reset PIO9 (pin 8).*** It is a good idea to connect this pin to a switch, or jumper, or resistor, so it can be accessed. This pin can be used to reset the module to FACTORY DEFAULTS and is often critical in situations where the module has been mis-configured.

4. ***GPIO connections:*** Placing 3.3Vdc into the PIO's while they are set as outputs will permanently damage the radio modules. The failure mode is a short across GND and VCC. Use a 10KΩ resistor in series or a 10KΩ pull up resistor for input and output PIO's respectively.

5. ***Sensor connections.*** The Sensor inputs SENS1-8 are extremely sensitive to over voltage. Under no conditions should these pins be pulled high above 1.2VDC. Placing any voltage above this will permanently damage the radio module.

6. ***Connection status.*** PIO5 is available to drive an LED, and blinks at various speeds to indicate status. PIO2 is an output which directly reflects the connection state, it goes HIGH when connected, and LOW otherwise.

7. ***Minimizing Radio interference.*** When integrating the WiFly module with on board chip antenna be sure the area around the chip antenna end the module protrudes at least 5mm from the PCB and any metal enclosure. If this is not possible use the external antenna option with the U.FL to reverse polarity SMA connector.

8. ***Connecting to the GPIO.*** Placing 3.3Vdc into the PIO's while they are set as outputs will permanently damage the radio. The failure mode is short across GND and VCC. Use a 10KO resistor is series or a 10KO pull up resistor for input and output PIO's respectively.
   - Make sure to connect a common ground when using the external TX, RX inputs on the 0 – 3.3Vdc
   - For a 3 wire DB-9 interface (tx, rx, gnd only) connect/short CTS to RTS, Factory default is hardware flow control enabled CTS and RTS connected.
   - When using a 5.0Vdc Input, PIO's require a 10K ohm series resistor. PIO's are 0-3.3Vdc not 5 volt tolerant.

9. ***Headers.*** The P/N for 8-pin header 2mm Male and female headers from Digikey:

   Male header: P/N: 3M9327-ND
   Female header: P/N: 3M9403-ND

   Two of each are required to make a 16 pin header.

Compliance Information

- FCC Certified
- Environmentally friendly RoHS compliant

Ordering Information

Part Number	Description
RN-121	UART and SPI interfaces, pin compatible with RN-111B
RN-121-TEMP	With onboard temperature and humidity sensors
RN-122	With two UARTS, one high-speed, pin compatible with RN-111B
RN-123	With RS-232 interface
RN-125	With RS-485 interface
For other configurations, contact Roving Networks directly.	

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