

RN-171-XV 802.11 b/g Wireless LAN Module

Features

- Drop-in Wi-Fi solution for existing systems that currently use 802.15.4 modules
- Based on Roving Networks' robust RN-171 Wi-Fi module
- Based on a pseudo-standard footprint
- On-board TCP/IP stack provides Internet access to every node
- No custom profiles needed
- Ultra-low power: 4-uA sleep, 40-mA Rx, 180-mA Tx at 10 dBm
- Configurable transmit power: 0 to +12 dBm
- Hardware interface: TTL UART
- Data rate: 464 Kbps using hardware flow control
- Through-hole board simplifies system integration
- 8 general purpose digital I/O pins
- 3 analog sensor interfaces
- Real-time clock for wakeup and time stamping
- Complete TCP/IP networking stack
- Wi-Fi Alliance certified for WEP, WPA, and WPA2-PSK
- WPS mode for easy configuration
- FCC/CE/ICS certified and RoHS compliant

Applications

- Industrial metering
- HVAC control
- Room temperature sensors
- Pump configuration and control
- Telemetry
- PV/solar controllers
- Robotics



Description

The RN-171-XV is a 802.11 b/g solution especially designed for designers who want to migrate their existing 802.15.4 architecture to a more standard TCP/IP-based platform without redesigning their existing hardware.

Based on a pseudo standard footprint often found in embedded applications, the Roving Networks' RN-171-XV module provides Wi-Fi connectivity using 802.11 b/g standards in legacy and existing designs that may have been based upon the 802.15.4 standard.

The RN-171-XV module is based on Roving Networks' robust RN-171 Wi-Fi module and incorporates an 802.11 b/g radio, a 32-bit SPARC processor, a TCP/IP stack, a real-time clock, a crypto accelerator, power management unit, and an analog sensor interface.

The module offers additional functionality through its on-board programmable GPIO pins (10) and ADCs (8). The ADCs provide 14-bit resolution while the GPIOs can be configured to provide standard functionality or status signaling to a host microcontroller, reducing the need for serial polling between the Wi-Fi module and host microcontroller.

The module is pre-loaded with firmware to simplify integration and minimize applications development time. In the simplest configuration, the hardware only requires four connections (PWR, TX, RX, and GND) to create a wireless data connection.

OVERVIEW

- Host data rates up to 460 Kbps over the UART
- Intelligent built-in power management with programmable wakeup events (timers and I/O)
- Real-time clock for time stamping, auto-sleep, and auto-wakeup modes
- Configuration over Wi-Fi or UART using simple ASCII commands
- Supports over the air firmware upgrade via FTP
- Secure Wi-Fi authentication via WEP, WPA-PSK (TKIP), and WPA2-PSK
- Built-in networking applications: DHCP, DNS, ARP, ICMP UDP, Telnet, FTP client, and HTML client
- Configurable transmit power of 0 to 12 dBm
- WPS mode for easy and secure wireless setup
- Built-in HTML web client to send GPIO, UART, and sensor data to remote web servers

The module's size is:

- *Size*—0.96" x 1.15"
- *Weight*—5.5 g

Tables 1 through 5 provide detailed specifications for the module.

Table 1. Environmental Conditions

Parameter	RN-171-XV
Temperature Range (Operating)	-40 °C ~ +85 °C
Temperature Range (Storage)	-40 °C ~ +85 °C
Relative Humidity (Operating)	≤90%
Relative Humidity (Storage)	≤90%

Table 2. Electrical Characteristics

Supply Voltage	Min	Typ.	Max.	Units
Input Power	3.0	3.3	3.7	V
Power Consumption				
Sleep		4		uA
Standby (doze)		15		mA
Connected (idle, RX)		40		mA
Connected (TX)		180 at 10 dBm		mA

Table 3. Analog Sensor Inputs

Parameter	Value
Sensor 0, 1, 2, 3 wakeup detect threshold	500 mV
A/D sensor 0 - 4 measurement range	0 - 400 mV
Precision	14 bits = 12 uV
Accuracy	5% un-calibrated, .01% calibrated
Minimum conversion time	35 uS (5 kHz over Wi-Fi)
Sensor power (pin 33) output resistance 3.3 V	10 ohms, maximum current = 50 mA

Table 4. Radio Characteristics

Parameter	Specifications
Frequency	2,402 ~ 2,480 MHz
Modulation	802.11b compatibility: DSSS (CCK-11, CCK-5.5, DQPSK-2, and DBPSK-1) 802.11g: OFDM (default)
Channel intervals	5 MHz
Channels	1 - 14
Transmission rate (over the air)	1 – 11 Mbps for 802.11b 6 – 54 Mbps for 802.11g
Receive sensitivity	-83 dBm typical
Output level (Class 1)	0 to +12 dBm (software configurable)

Table 5. Transmit Power

Output Power	802.11b (2 Mbps) Current in mA Note (1)	802.11g (24 Mbps) Current in mA Note (1)
0	120	135
2	130	150
4	170	190
6	175	200
8	180	210
10	185	225
12	190	240

Note:

1. Measured at 3.3-V DC VCC. The power consumption is the average power, active during actual power consumption.

Table 6 describes the LED indicators.

Table 6. RN-171-XV Evaluation Board LED Indicators

Condition	Red LED	Yellow LED	Green LED
On solid	-	-	Connected over TCP
Fast blink	Not associated	Rx/Tx data transfer	No IP address
Slow blink	Associated, no Internet	-	IP address OK
Off	Associated, Internet OK	-	-

TYPICAL APPLICATION SCHEMATIC

Figure 1 shows a typical application schematic. RN-171-XV connector pins 13, 15, 18, and 19 can be configured as GPIO pins or sensor inputs, depending on the installed resistors. When configured as GPIO pins, you should **ONLY** install column 1 resistors. When configured as sensor inputs, **ONLY** stuff column 2 and column 3 resistors. The default configuration is:

- *Sensor inputs*—Pins 19 and 20
- *GPIO*—Pins 13, 15, and 18

Figure 1. Application Schematic

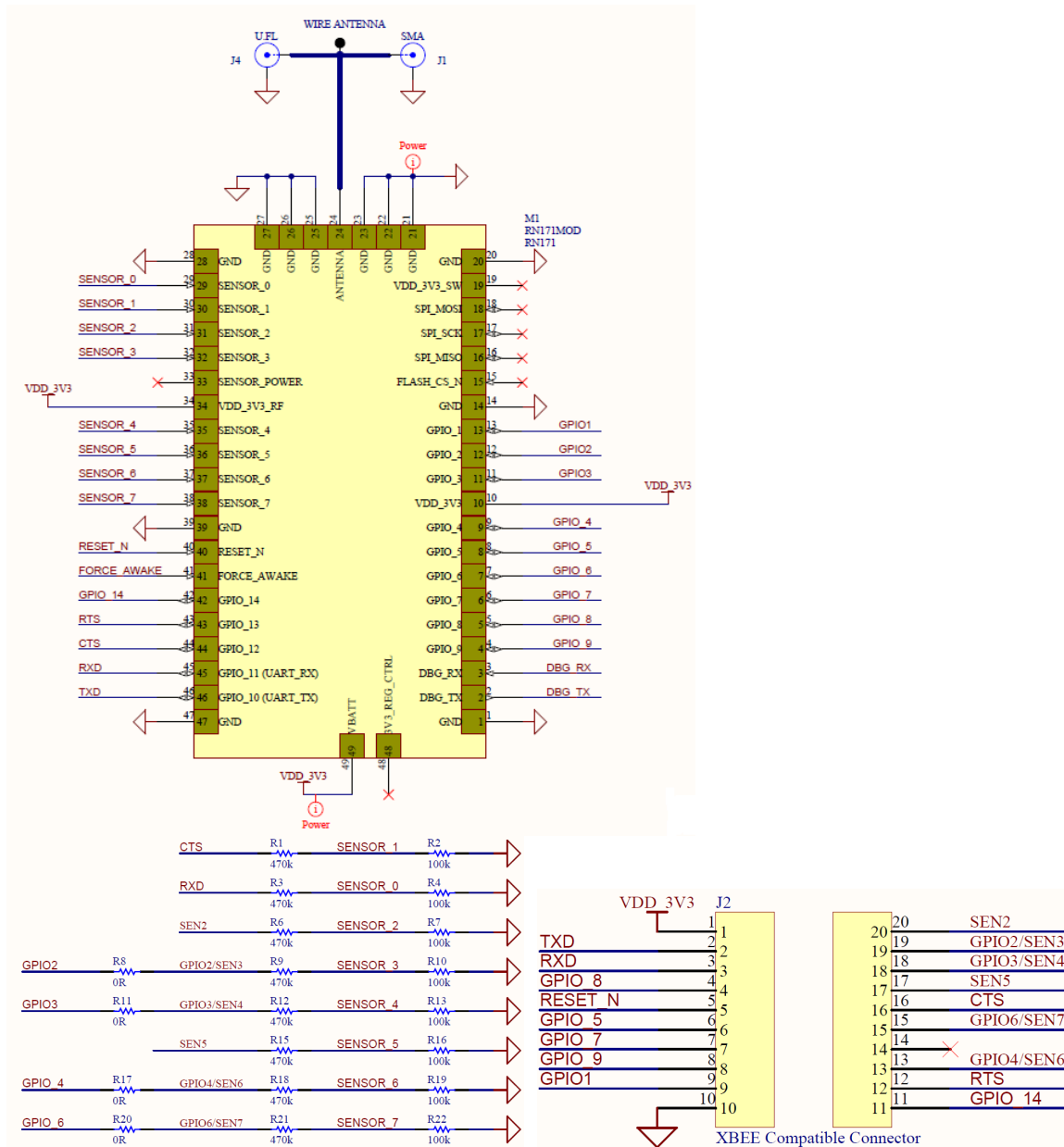
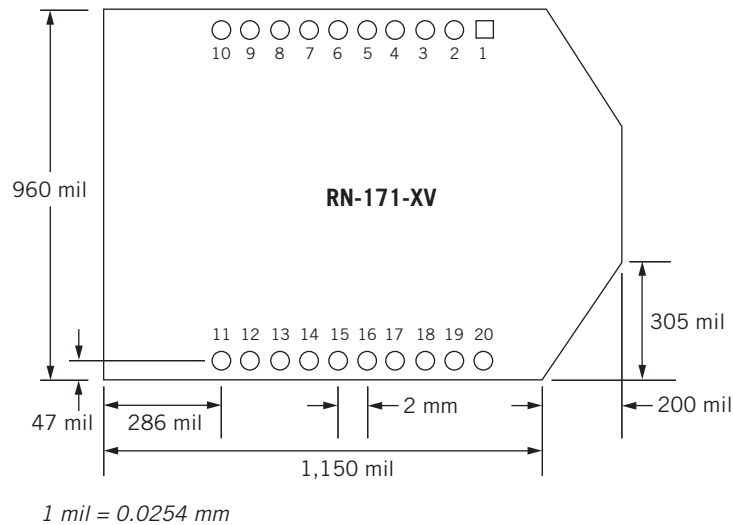


Figure 2 shows the pin pads and dimensions. Table 7 describes the pins.

Figure 2. Pin Pads & Dimensions

Table 7. Pin Description

Pad Number	Signal Name	Description	Optional Function	Direction
1	VDD_3V3	3.3-V regulated power input to the module.		Power
2	UART_TX	UART TX, 8-mA drive, 3.3-V tolerant.		OUT →
3	UART_RX	UART RX, 3.3-V tolerant.		IN ←
4	GPIO8	GPIO, 24-mA drive, 3.3-V tolerant. The RN-171-XV drives GPIO8 HIGH on powerup, which overrides software configured powerup values, such as set sys value 0x0000 on GPIO8.		I/O
5	RESET	<i>Optional</i> module reset signal (active low), 100-k pull up, apply pulse of at least 160 us, 3.3-V tolerant.		Input
6	GPIO5	GPIO, 24-mA drive, 3.3-V tolerant.	Data TX/RX	OUT →
7	GPIO7	GPIO, 24-mA drive, 3.3-V tolerant.		I/O
8	GPIO9	Enable ad-hoc mode, restore factory defaults, 8 mA drive, 3.3-V tolerant.		I/O
9	GPIO1	GPIO, 8-mA drive, 3.3-V tolerant.		I/O
10	GND	Ground.		Ground
11	GPIO14	GPIO, 8-mA drive, 3.3-V tolerant.		I/O
12	UART_RTS	UART RTS flow control, 8-mA drive, 3.3-V tolerant.		OUT →
13	GPIO4/sensor 6	GPIO, 24-mA drive, 3.3-V tolerant/ADC input, (3.3-V tolerant) . Defaults to GPIO4. <i>Note (1)</i>		I/O
14	Not Used			No Connect
15	GPIO6/ sensor 7	GPIO, 24-mA drive, 3.3-V tolerant/ADC input, (3.3-V tolerant) . Defaults to GPIO6. <i>Note (1)</i>		Power
16	UART_CTS	UART CTS flow control, 3.3-V tolerant.		IN ←
17	Sensor 5	Sensor interface, analog input to module, (3.3-V tolerant) .		Input
18	GPIO3/ sensor 4	GPIO, 8-mA drive, 3.3-V tolerant/ADC input (3.3-V tolerant) . Defaults to GPIO3.		I/O
19	GPIO2/ sensor 3	GPIO, 8-mA drive, 3.3-V tolerant/ADC input (3.3-V tolerant) . Defaults to sensor 3.		I/O
20	Sensor 2	Sensor interface, analog input to module, 3.3-V tolerant .		Input

Note:

- For information on alternate I/O functions, refer to the WiFly advanced user manual.

DESIGN CONCERNS

The following sections provide information on designing with the RN-171-XV module.

Powering the Module

Apply ONLY 3.3 V $\pm 10\%$ regulated power to pin 1 (VDD) and pin 10 (ground). The module does not have an on-board voltage regulator and MUST be powered from a regulated 3.3-V power supply.

Antenna

The RN-171-XV ships with a wire antenna. Custom antenna configurations such as chip, U.FL., and reverse polarity SMA connectors are available with extended lead times.

ORDERING INFORMATION

Table 7 provides ordering information. Table 8 provides information on related products.

Table 7. Ordering Information

Part Number	Description
RN-171-XV-W	Standard configuration, industrial temperature (-40 °C to +85 °C) 802.15.4 replacement solution with ¼ inch wire antenna.
RN-171-XV-U	Custom configuration, industrial temperature (-40 °C to +85 °C) 802.15.4 replacement solution with U.FL. connector.
RN-171-XV-S	Custom configuration, industrial temperature (-40 °C to +85 °C) 802.15.4 replacement solution with a reverse polarity SMA connector.

Table 8. Related Products

Part Number	Description
RN-XV-RD2	Two-relay evaluation board for the RN-171-XV.
RN-XV-RD1	One-relay evaluation board for the RN-171-XV.

Go to <http://www.rovingnetworks.com> for current pricing and a list of distributors carrying Roving Networks products.

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