Class 1 Bluetooth® 2.1 Module

Features

- Fully qualified Bluetooth 2.1/2.0/1.2/1.1 module
- Bluetooth v2.0+EDR support
- Postage stamp sized module, 13.4mm x 25.8 mm x2mm
- UART (SPP or HCI) and USB (HCI only) data connection interfaces.
- Sustained SPP data rates - 240Kbps (slave), 300Kbps (master)
- HCI data rates - 1.5Mbps sustained, 3.0Mbps burst in HCI mode
- 8MB on board flash, HCI mode, or SPP/DUN software stacks available.
- Embedded Bluetooth stack profiles included *(requires no host stack)*: GAP, SDP, RFCOMM and L2CAP protocols, with SPP and DUN profile support.
- Bluetooth SIG Qualified, End Product Listing
- Castellated SMT pads for easy and reliable PCB mounting
- Class 1 high power amplifier with on board ceramic RF chip antenna.
  - Certifications: FCC, ICS, CE
  - Environmentally friendly, RoHS compliant

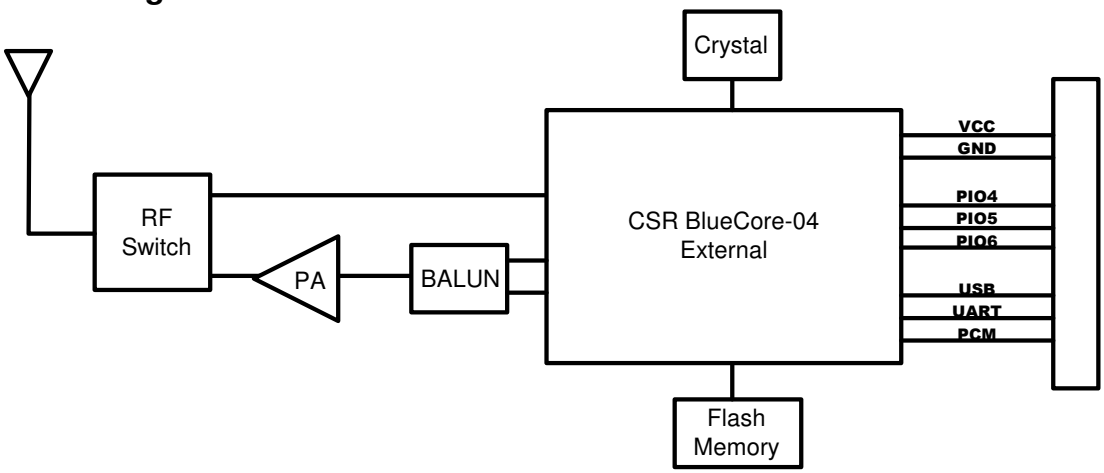
Applications

- Cable replacement
- Barcode scanners
- Measurement and monitoring systems
- Industrial sensors and controls
- Medical devices
- Asset tacking

Description

The RN41 provides a small form factor, low power, highly economic Bluetooth solution for OEM's adding wireless capability to their products. The RN41 supports multiple interface protocols, is simple to design in and fully certified, making it a complete embedded Bluetooth solution. By supporting the Enhanced Data Rate (EDR) Bluetooth® specification, the RN41 delivers three times the data rate than v1.2 Bluetooth devices. Designers can customize their application using the external interface to access up to 8Mbits of flash memory. The RN41 is the perfect product for developers who want to add wireless capability to their product but can not afford to spend significant time and money developing Bluetooth specific hardware and software.

Block Diagram



Overview

- Baud rate speeds: 1200bps up to 921Kbps, non-standard baud rates can be programmed.
- Class 1 radio, 330' (100m) distance, 12dBm output transmitter, -80dBm typical receive sensitivity
- Frequency 2402 ~ 2480MHz,
- FHSS/GFSK modulation, 79 channels at 1MHz intervals
- Secure communications, 128 bit encryption
- Error correction for guaranteed packet delivery
- UART local and over-the-air RF configuration
- Auto-discovery/pairing requires no software configuration (instant cable replacement).
- Auto-connect master, IO pin (DTR) and character based trigger modes

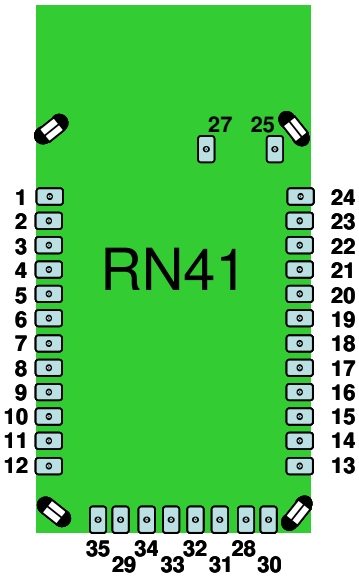
Environmental Conditions

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

Electrical Characteristics

Parameter	Min	Typ.	Max.	Unit
Supply Voltage (DC)	3.0	3.3	3.6	V
RX Supply Current		35	60	mA
TX Supply Current		65	100	mA
Average power consumption				
Standby/Idle (default settings)		25		mA
Connected (normal mode)		30		mA
Connected (low power Sniff)		8		mA
Standby/Idle (lowest power)	250uA	2.5		mA

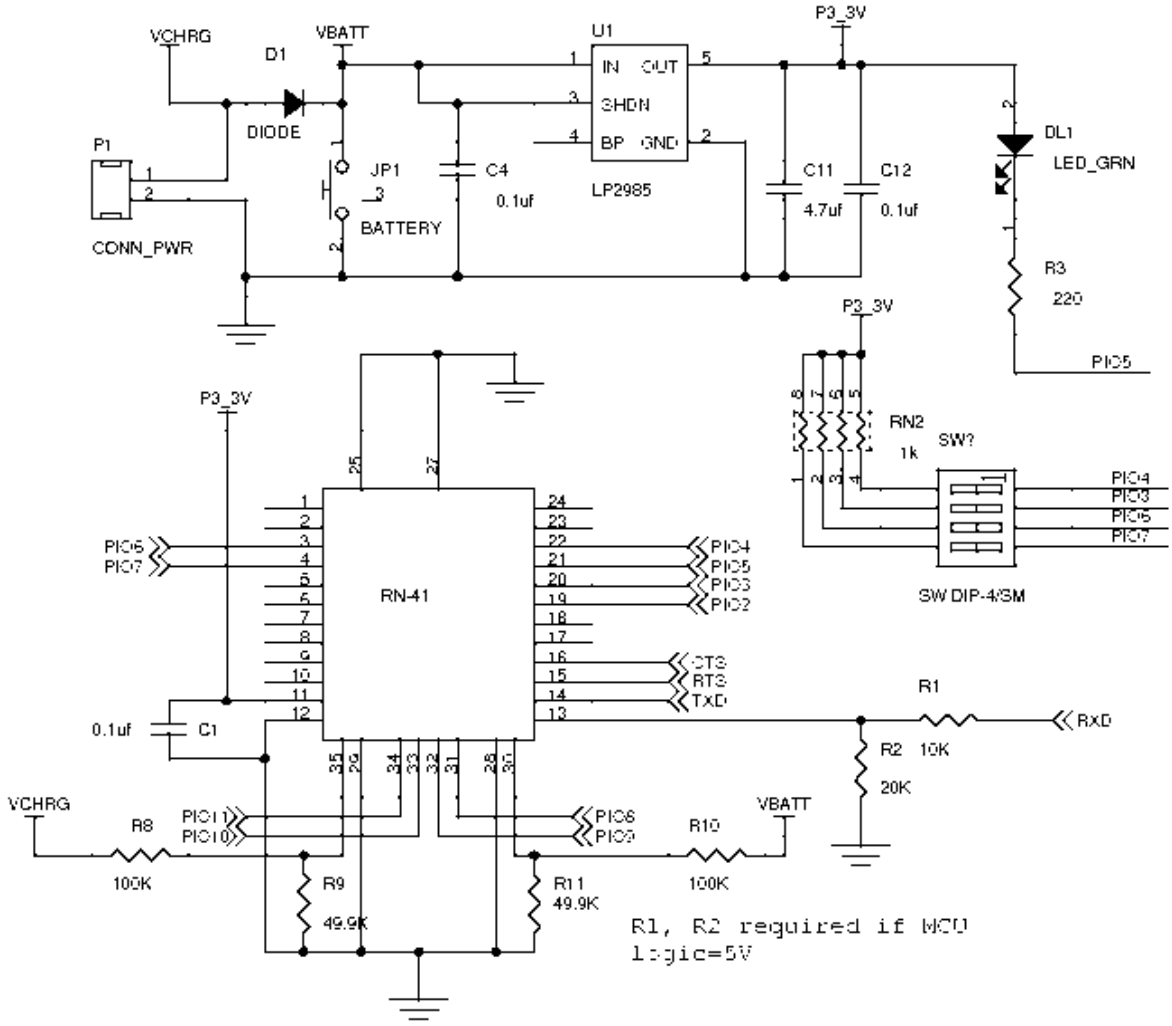
Pin Description



Top view

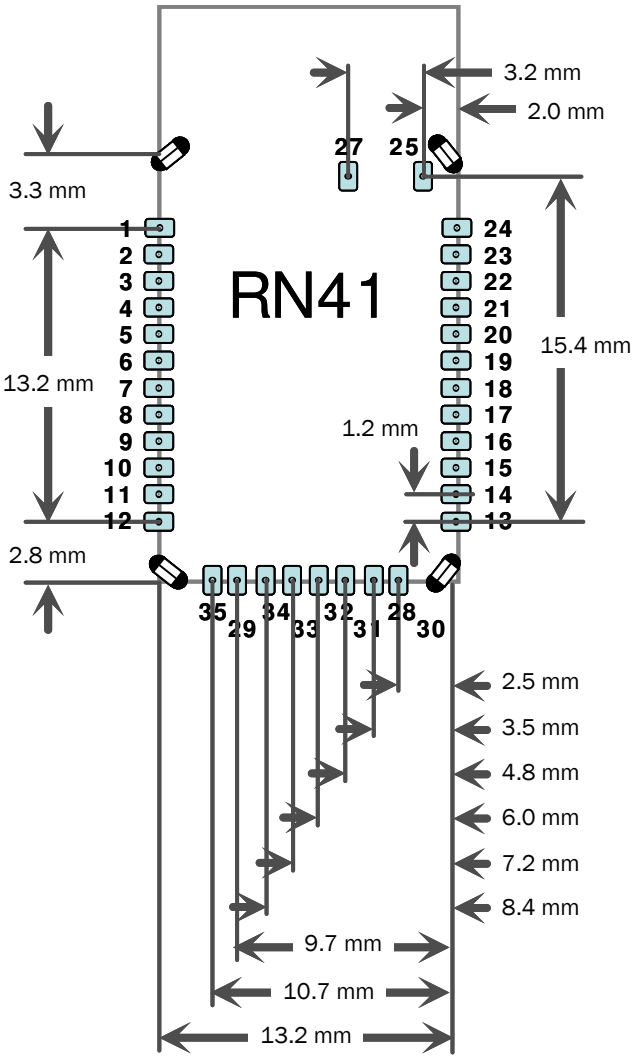
Pin	Name	Description	Default
1	GND		
2	SPI MOSI	Programming only	No Connect
3	PIO6	IO (HIGH=AUTO MASTER)	Input to RN41with weak pulldown
4	PIO7	IO (HIGH= force 9600 baud), low = 115K baud	Input to RN41 with weak pulldown
5	RESET	Active LOW reset optional	Input to RN41 with 1K pullup
6	SPI_CLK	Programming only	No Connect
7	PCM_CLK	PCM interface	No Connect
8	PCM_SYNC	PCM interface	No Connect
9	PCM_IN	PCM interface	No Connect
10	PCM_OUT	PCM interface	No Connect
11	VDD	3.3V regulated Power In	
12	GND		
13	UART_RX	UART Receive Input	Input to RN41 with pullup
14	UART_TX	UART Transmit output	High level output from RN41
15	UART_RTS	UART RTS out , goes HIGH to disable host transmitter	Low level output from RN41
16	UART_CTS	UART CTS input, if set HIGH, disables transmitter	Low level input to RN41
17	USB_D+	USB port	Pull up 1.5K when active
18	USB_D-	USB port	
19	PIO2	High when connected, Low otherwise	Output from RN41
20	PIO3	Auto discovery = HIGH	Input to RN41 with weak pulldown
21	PIO5	Status: toggles based on state, LOW on connect	Output from RN41
22	PIO4	To set Factory defaults start HIGH, then toggle 3x	Input to RN41 with weak pulldown
23	SPI_CSB	Programming only	No Connect
24	SPI_MISO	Programming only	No Connect
25	GND		
26	NC	RF pad keep all traces and planes clear.	
27-29	GND		
30	AIO1	Analog AD input, 0-1.8VDC 8 bit.	Charger monitor
31	PIO8	IO (RF data/config LED option)	Output from RN41
32	PIO9	IO	Input to RN41 with weak pulldown
33	PIO10	IO (remote DTR signal)	Input to RN41 with weak pulldown
34	PIO11	IO (remote RTS signal)	Input to RN41 with weak pulldown
35	AIO1	Analog AD input, 0-1.8VDC 8 bit.	Battery monitor

Typical Application Circuit

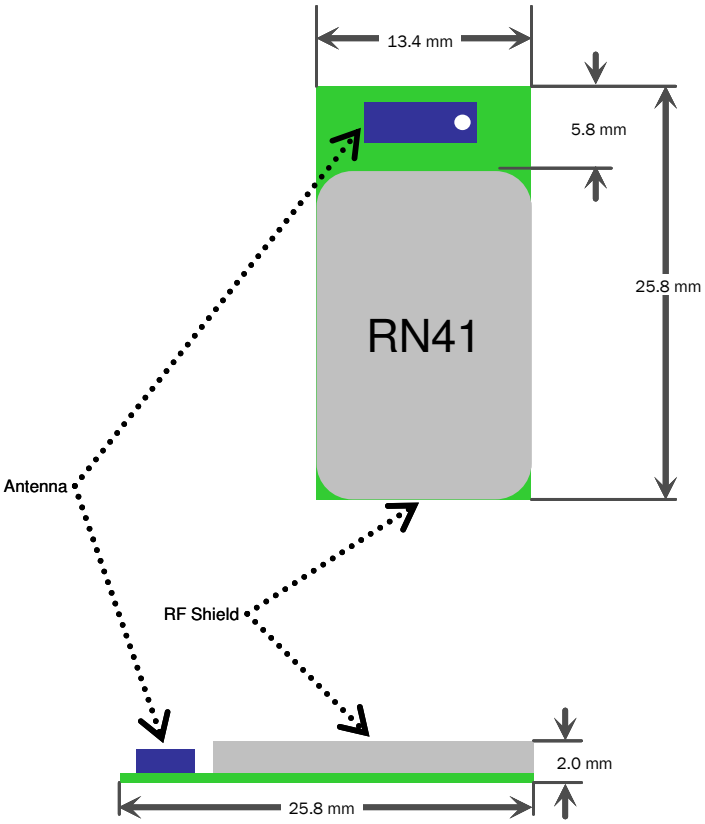


Module Dimensions

PCB LAYOUT
PAD SIZE = 0.8 X 1.30 mm



MODULE DIMENSIONS



Design Concerns

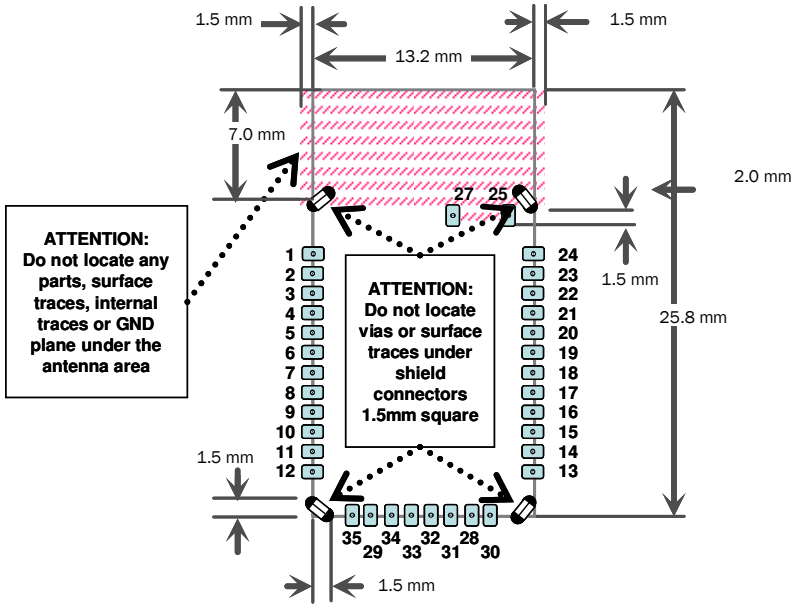
1. ***Reset circuit***. RN-41 contains a 1k pullup to VCC, the polarity of reset on the RN41 is ACTIVE LOW. A power on reset circuit with delay is OPTIONAL on the reset pin of the module. It should only be required if the input power supply has a very slow ramp, or tends to bounce or have instability on power up. Often a microcontroller or embedded CPU IO is available to generate reset once power is stable. If not, there are many low cost power supervisor chips available, such as MCP809, MCP102/121, and Torex XC61F.

2. ***Factory reset PIO4.*** 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.

3. ***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.

4. ***Using SPI bus for flash upgrade.*** While not required, this bus is very useful for configuring advanced parameters of the Bluetooth modules, and is required for upgrading the firmware on modules. The suggested ref-design shows a 6pin header which can be implemented to gain access to this bus. A minimum-mode version could just use the SPI signals (4pins) and pickup ground and VCC from elsewhere on the design.

5. ***Minimizing Radio interference.*** When laying out the carrier board for the RN41 module the areas under the antenna and shielding connections should not have surface traces, GND planes, or exposed vias. (See diagram to right) For optimal radio performance the antenna end of RN41 module should protrude 5mm past any metal encloser.



6. ***Soldering Reflow Profile.***
   - Lead-Free Solder Reflow
   - Temp: 230 degree C , 30-40 seconds, Peak 250 degree C maximum.
   - Preheat temp: 165 +- 15 degree C, 90 to 120 seconds.
   - Time: Single Pass, One Time

Compliance Information

Category	Country	Standard
Radio	**USA**	FCC CFR47 Part 15 C, para 15.247
	FCC ID:	T9J-R41-1
	EUROPE	EN 300 328-1
		EN 300 328-2 2.4GHz
	CANADA	IC RSS-210 low power comm. device
	IC Canada ID:	6514A-RN411
EMC	**USA**	FCC CFR47 Part 15 subclass B
	EUROPE	EN 55022 Class B radiated
		EN61000-4-2 ESD immunity
		EN61000-4-3 radiated field
		EN61000-4-6 RF immunity
		EN61000-4-8 power magnetic immunity
Bluetooth	**LISTED**	B013180
Environmental	**RoHS**	RoHS compliant

ORDERING INFORMATION

Part Number	Description
RN-41	Standard Application firmware Enabled (SPP/DUN Master and Slave)
RN-41-H	HCI over H4 UART at 115K Bps (Application firmware disabled)
RN-41-U	HCI over USB port (USB slave device at 12Mbps rate).
For other configurations, contact Roving Networks directly.	

Visit http://www.rovingnetworks.com/buynow.php for current pricing and a list of distributors carrying our products.