RN-42 User Manual

Type: **Release**

Document: **RN-42-001**

Version: **1.0**

Release Date: **Jan 08, 2010**

Release Record

Version Number	Release Date	Comments
Revision 1.0	2010-1-8	Initial Release

CONTENTS

1 Ordering Information

Module Name	Supply Voltage
RN-42	3.3V DC

2 Key Features

● Baud rate speeds: 1200bps up to 921Kbps, non-standard baud rates can be programmed.

● Class 2 radio, 33' (10m) distance, 6 dBm 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

4 Electrical Characteristic

4.1 Absolute Maximum ratings

Rating	Minimum	Maximum
Store temperature	-40℃	+120℃
Operation temperature	-40℃	+85℃
Power Supply	-0.4 Volt	DC 3.6Volt

4.2 Recommend operation conditions

Rating	Minimum	Type	Maximum
Store temperature	-40℃	+25℃	+85℃
Operation temperature	-20℃	+25℃	+70℃
Power Supply	-	DC 3.3Volt	DC 3.6Volt

4.3 Electrica 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 (Deep sleep enabled)	250uA	2.5		mA

4.4 Radio characteristics

Parameter	Freq. (GHz)	Min	Typ	Max	Bluetooth Specification	Units
Sensitivity @ 0.1%BER	2.402	–	–80	–86	<=–70	dBm
	2.442	–	–80	–86		dBm
	2.480	–	–80	–86		dBm
RF Transmit Power	2.402	5.0	6.0		<=6	dBm
	2.442	5.0	6.0			dBm
	2.480	5.0	6.0			dBm
Initial Carrier Frequency Tolerance	2.402	–	5	75	75	kHz
	2.442	–	5	75		kHz
	2.480	–	5	75		kHz
20dB bandwidth for modulated carrier		–	900	1000	<=1000	kHz
Drift (Five slots packet)		–	15	–	40	kHz
Drift Rate		–	13	–	20	kHz
△f1avg Max Modulation	2.402	140	165	175	>140	kHz
	2.442	140	165	175		kHz
	2.480	140	165	175		kHz
△f2avg Min Modulation	2.402	140	190	–	115	kHz
	2.442	140	190	–		kHz
	2.480	140	190	–		kHz

4.5 Digital I/O characteristics

2.7V<=VDD<=3.0V	Min	Typ.	Max.	Unit
Input logic level LOW	–0.4	–	+0.8	V
Input logic level HIGH	0.7VDD	–	VDD+0.4	V
Output logic level LOW	–	–	0.2	V
Output logic level HIGH	VDD–0.2	–	–	V
All I/O's (except reset) default to weak pull down	+0.2	+1.0	+5.0	uA

5 Mechanical Dimensions

PCB LAYOUT
PAD SIZE = 0.8 X 1.30 mm

MODULE DIMENSIONS

RN-42

RN-42

3.2 mm
2.0 mm
3.3 mm

13.4 mm
5.8 mm
25.8 mm

27   25

24
23
22
21
20
19
18
17
16
15
14
13

15.4 mm

1
2
3
4
5
6
7
8
9
10
11
12

13.2 mm

1.2 mm

2.8 mm

35 29 34 33 32 31 28 30

2.5 mm
3.5 mm
4.8 mm
6.0 mm
7.2 mm
8.4 mm
9.7 mm
10.7 mm
13.2 mm

Antenna

RF Shield

2.0 mm
25.8 mm
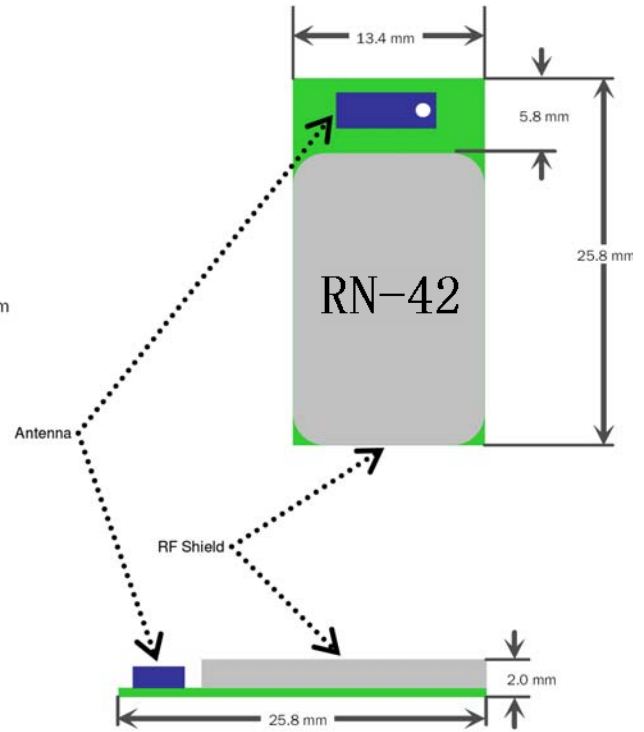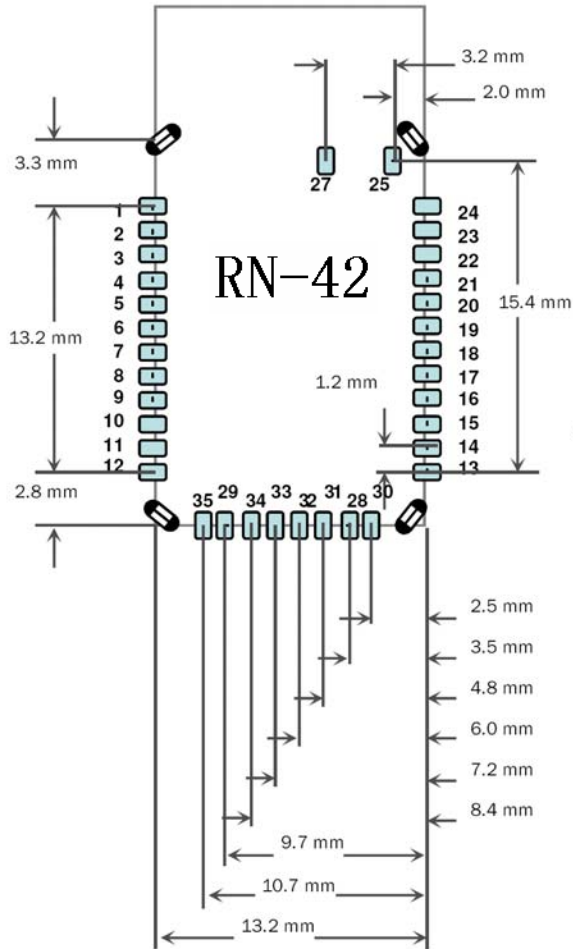
6 Pin Definition Descriptions
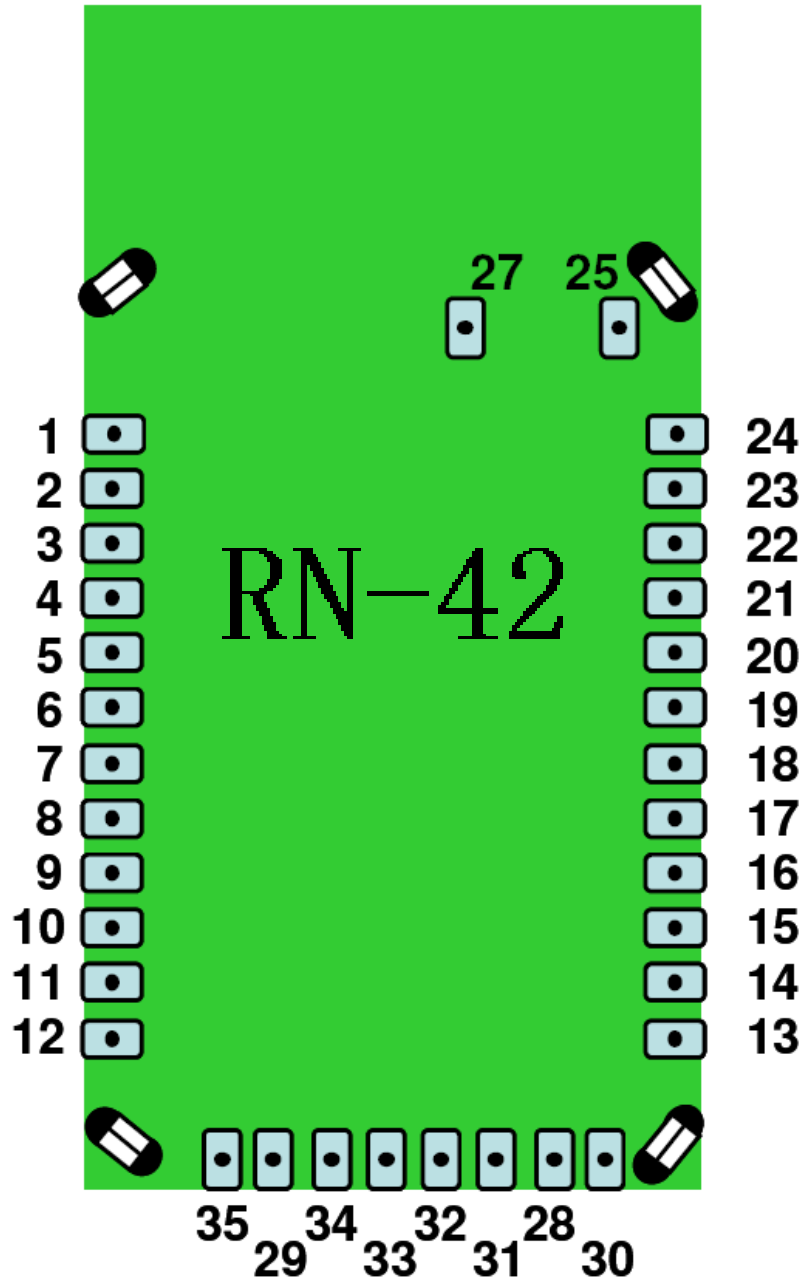
Top view

Pin	Name	Description	Default
1	GND		
2	SPI MOSI	Programming only	No Connect
3	PIO6	Set BT master (HIGH=auto-master mode)	Input to RN42with weak pull down
4	PIO7	Set Baud rate (HIGH = force 9600, LOW = 115K or firmware setting)	Input to RN42 with weak pull down
5	RESET	Active LOW reset	Input to RN42 with 1K pull up
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 input	
12	GND		
13	UART_RX	UART receive Input	Input to RN42
14	UART_TX	UART transmit output	High level output from RN42
15	UART_RTS	UART RTS, goes HIGH to disable host transmitter	Low level output from RN42
16	UART_CTS	UART CTS, if set HIGH, disables transmitter	Low level input to RN42
17	USB_D+	USB port	Pull up 1.5K when active
18	USB_D-	USB port	
19	PIO2	Status, HIGH when connected, LOW otherwise	Output from RN42
20	PIO3	Auto discovery = HIGH	Input to RN42 with weak pull down
21	PIO5	Status, toggles based on state, LOW on connect	Output from RN42
22	PIO4	Set factory defaults	Input to RN42 with weak pull down
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	GND		
28	GND		
29	GND		
30	AIO0	Optional analog input	Not Used
31	PIO8	Status (RF data rx/tx)	Output from RN42

32	PIO9	IO	Input to RN42 with weak pull down
33	PIO10	IO (remote DTR signal)	Input to RN42 with weak pull down
34	PIO11	IO (remote RTS signal)	Input to RN42 with weak pull down
35	AIO1	Optional analog input	Not Used

7 Design Concerns

7.1 Reset circuit

RN-42 contains a 1k pull up to VCC, the polarity of reset on the RN42 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.

7.2 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. To set Factory
defaults start HIGH, then toggle times.

7.3 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.

7.4 HCI mode

The RN42 module must be loaded with special firmware to run in HCI mode. When in
HCI mode the standard SPP/DUN applications are disabled.

7.5 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.

7.6   Minimizing radio interface

When laying out the carrier board for the RN42 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 RN42 module should protrude 5mm past any metal enclosure.
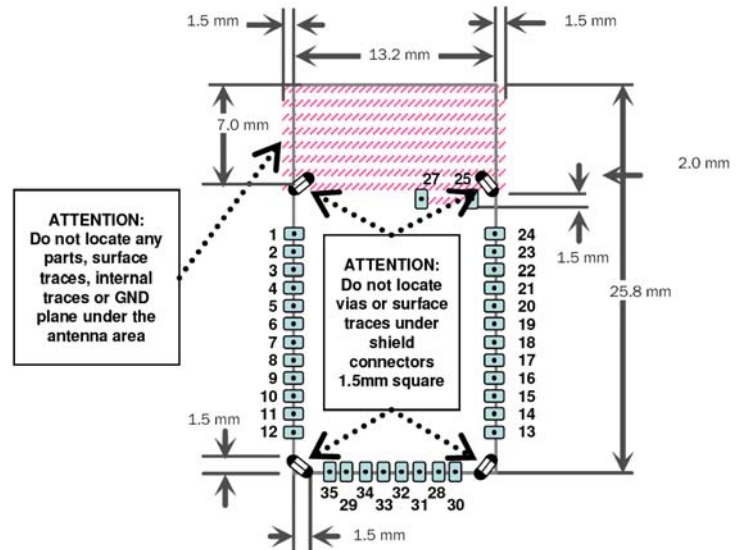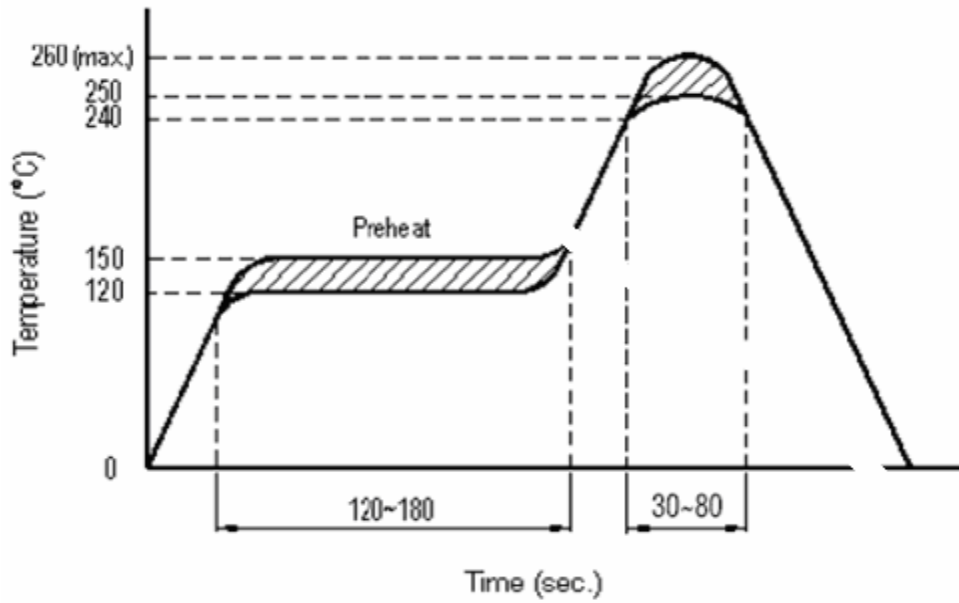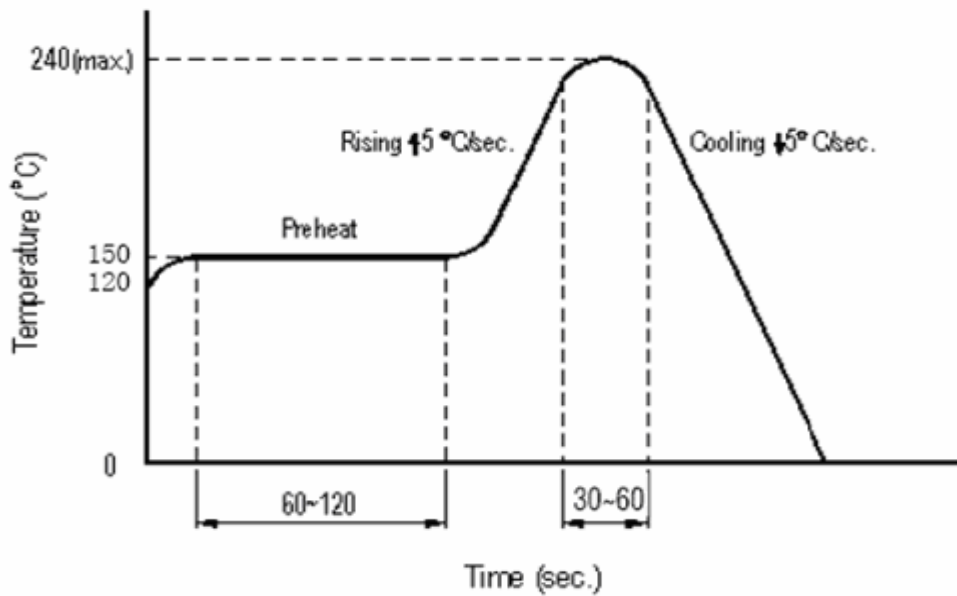
7.7   Soldering reflow profile

● 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

9 SMT Reflow Profile
9.1 Reliability solder temperature chart:

9.2 Reflow temperature chart:

Compliance Information

FCC Compliance Statement:

This device complies with Part 15 of the FCC Rules . Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and

2. This device must accept any interference received, including interference that may cause undesired operation. This device must accept any interference received, including interference that may cause undesired operation. Product that is a radio transmitter is labeled with FCC ID.

FCC Caution*:*

(1) Exposure to Radio Frequency Radiation. This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be collocated or operating in conjunction with any other antenna or transmitter.

End-users and installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

(2) Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

(3) This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

(4) Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

(5) Outdoor Operations in the 5.15~5.25GHz band is prohibited.

NOTE:

(1) This device is approved for OEM installation with specified antennas as listed in this Manual. It is the responsibility of the Installer to comply with the separation distance for satisfying RF exposure compliance.

(2) This device only could work when being installed into "client devices" which could not transmit automatically, such as Notebook P.C. , with the software driver limit.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

IC Radiation Exposure Statement for Canada
This equipment complies with IC radiation exposure limits set forth for an uncontrolled enviroment. To maintain compliance with IC RF exposure compliance requirements, Please avoid direct contact to the transmitting. End users must follow the specific operating instructions for satisfying RF Exposure compliance.

Caution: The device is incapable of transmitting in the band 5600-5650 MHz band in Canada.