

## Wireless-Tag WT51822-S2

### Bluetooth Low Energy 4.1 Module

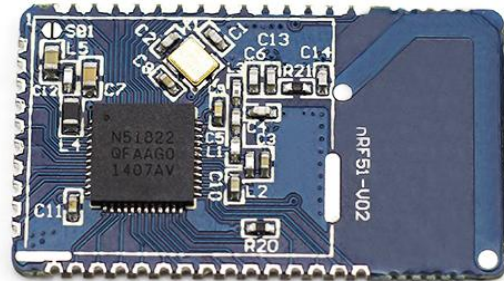
#### DATASHEET

#### Description

Bluetooth Low Energy® (BLE4.1 compatible with BLE4.0) module of WT51822-S2 is the next generation BLE module released by Wireless-Tag technology. The modules use nRF51822-QFAA from NORDIC as the controller chips. Given its small size, low power and competitive cost, WT51822-S2 can be easily used in your system and expedite your design.

nRF51822-QFAA is an ultra-low power 2.4 GHz wireless System on Chip (SoC) integrating the nRF51822 series 2.4 GHz transceiver, a 32 bit ARM® Cortex™-M0 CPU, flash memory, and analog and digital peripherals. nRF51822 can support Bluetooth® low energy and a range of proprietary 2.4 GHz protocols, such as Gazell from Nordic Semiconductor.

Fully qualified Bluetooth low energy stacks for nRF51822 are implemented in the S110 series of SoftDevices. The S110 series of SoftDevices are available for free and can be downloaded and installed on nRF51822 independent of your own application code.



#### Features

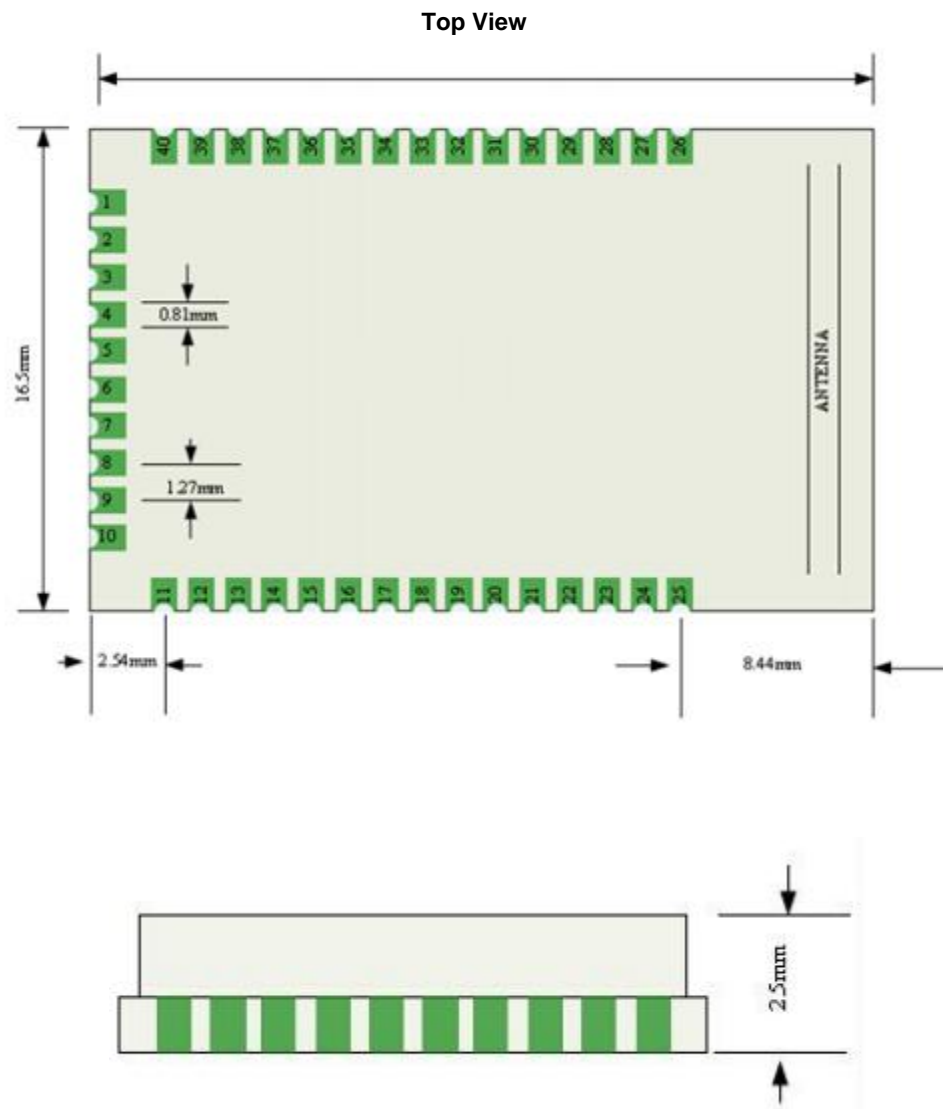
- Operating temperature: -25°C~75°C, typical 25°C
- 2.4 GHz transceiver
  - -93 dBm sensitivity in Bluetooth® low energy mode
  - 250 kbps, 1 Mbps, 2 Mbps supported data rates
  - TX Power -20 to +4 dBm in 4 dB steps
  - TX Power -30 dBm Whisper mode
  - 13 mA peak RX, 10.5 mA peak TX (0 dBm)
  - RSSI (1 dB resolution)
- ARM® Cortex™-M0 32 bit processor
  - 275  $\mu$ A/MHz running from flash memory
  - 150  $\mu$ A/MHz running from RAM
  - Serial Wire Debug (SWD)
- Memory
  - 256 KB embedded flash program memory
  - 16 KB RAM
- Flexible Power Management
  - Supply voltage range 2.0 V to 3.6 V
  - 2.5  $\mu$ s wake-up using 16 MHz RCOSC
  - 0.4  $\mu$ A @3V OFF mode
  - 0.5  $\mu$ A @3V in OFF mode + 1 region RAM retention

- 2.3 ^A @3V ON mode, all blocks IDLE
- 8/9/10 bit ADC - 8 configurable channels
- 31 General Purpose I/O Pins
- One 32 bit and two 16 bit timers with counter mode
- SPI Master
- UART (CTS/RTS)
- Two-wire Master (I2C compatible)
- Quadrature Decoder (QDEC)
- AES HW encryption
- Real Timer Counter (RTC)
- 16 MHz crystal
- Balun
- AES HW encryption
- Package variants
- Operating distance: 0~45m, class II level
- Support System: IOS & Android
- WT51822-S2, 16.5 x 28.8 mm, with PCB antenna.

## Applications

- Computer peripherals and I/O devices
- Mouse
- Keyboard
- Multi-touch track pad
- Interactive entertainment devices
- Remote control
- 3D Glasses
- Gaming controller
- Personal Area Networks
- Health/fitness sensor and monitor devices
- Medical devices
- Key-fobs + wrist watch
- Remote control toys

## 1. Mechanical Data



## 2. Pin Functions

No.	Name	Function description	No.	Name	Function description
1	VCC	DC2.0 V~3.6V	21	SWDIO RST	System reset (active low). Also HW debug and flash programming I/O
2	P0.30	General purpose I/O pin	22	SWDCLK	HW debug and flash programming I/O
3	P0.00	General purpose I/O pin	23	P0.17	General purpose I/O pin

	AREF0	ADC Reference voltage			
4	P0.01 AIN2	General purpose I/O pin ADC input 2	24	P0.18	General purpose I/O pin
5	P0.02 AIN3	General purpose I/O pin ADC input 3	25	P0.19	General purpose I/O pin
6	P0.03 AIN4	General purpose I/O pin ADC input 4	26	P0.20	General purpose I/O pin
7	P0.04 AIN5	General purpose I/O pin ADC input 5	27	GND	Ground (0 V)
8	P0.05 AIN6	General purpose I/O pin ADC input 6	28	ANTEN (GND)	2.4G antenna (Ground (0 V))*
9	P0.06 AIN7 AREF1	General purpose I/O pin ADC input 7 ADC Reference voltage	29	GND	Ground (0 V)
10	P0.07	General purpose I/O pin	30	GND	Ground (0 V)
11	GND	Ground (0 V)	31	GND	Ground (0 V)
12	P0.08	General purpose I/O pin	32	P0.21	General purpose I/O pin
13	P0.09	General purpose I/O pin	33	P0.22	General purpose I/O pin
14	P0.10	General purpose I/O pin	34	P0.23	General purpose I/O pin
15	P0.11	General purpose I/O pin	35	P0.24	General purpose I/O pin
16	P0.12	General purpose I/O pin	36	P0.25	General purpose I/O pin
17	P0.13	General purpose I/O pin	37	P0.26 AIN0 XL2	General purpose I/O pin ADC input 0 Connection for 32.768 kHz crystal
18	P0.14	General purpose I/O pin	38	P0.27 AIN1 XL1	General purpose I/O pin ADC input 1 Connection for 32.768 kHz crystal or external 32.768 kHz clock reference
19	P0.15	General purpose I/O pin	39	P0.28	General purpose I/O pin
20	P0.16	General purpose I/O pin	40	P0.29	General purpose I/O pin

### 3. Serial AT commands Description:

Module will automatically recognize and distinguish serial data, the data packet began with AT character will be defaulted as AT commands and parsing, and will return the process results, so the data under transparent transmission mode cannot begin with AT character.

#### 4-1. The test command

Command format: AT\r Syntax: AT \r

Returning value: OK\r Return value: OK \r

Content: send AT test commands, returning value OK indicates module AT commands tested successfully.

#### 4-2. MAC address Operation Command

Command Format: AT + ADDR \r?

Return Value: xxxxxxxxxxxx \r

Content: Return the module's current MAC address: xxxxxxxxxxxx

Command Format: AT + ADDR = 123456789ABC \r

Return value: OK \r

Content: modify the module MAC address again: 123456789ABC, return value OK indicates the success of reset MAC address.

**Note: If the Bluetooth module modified the module MAC address successfully under being connected state, but the module will not switch immediately to the new address , it needs to disconnect the module , then the module will be broadcast with a new MAC address.**

#### 4-3. Operation command of Serial Port Communication Baud-rate

Command format: AT + BAUD = 19200 \r

Return value: OK \r

ERROR \r

Content: Re-edit module communication baud rate to 19200bps, Return OK indicates the success of modification, Return ERROR indicates that the new baud rate modification fails, the reason is set point value is not common serial port baud rate value.

Command Format: AT + BAUD \r?

Return Value: 19200 \r

Content: Check the current module serial communication baud rate, the module returns the current setting of the baud rate 19200bps.

**NOTE: The module default baud rate is 9600bps, because if the serial port baud rate is too high, it need to increase RTS / CTS data flow control, otherwise there will be errors, it is recommended that the baud rate is no more than 57600bps. The serial port baud rates that current module supports :**

**1200/2400/4800/9600/14400/19200/28800/38400/57600/76800/115200/230400.**

#### 4-4. Operation Command of the Device Name

Command Format: AT + NAME = Wireless-tag01 \r

Return value: OK \r  
ERROR \r

Content: Rename the module: Wireless-tag01, the length of a name must be no more than 20 bytes, the return value OK indicates the success of the rename, the return ERROR represents the renamed fails, you may have exceeded the limit length .

Command Format: AT + NAME \r?

Return Value: Wireless-tag01 \r

Content: Check the module's current device name, serial port return to the module's current device name: Wireless-tag01.

**NOTE: Modify the device name under the state of the Bluetooth being connected, the module will not modify immediately .It needs to disconnect the Bluetooth connection, and then the module will broadcast with a new device name.**

#### 4-5. Read Command of Module Parameter

Command: AT + RX \r

Return Value: NAME: Wireless-tag01 \r

BAUD: 19200 \r

MAC: 123456789ABC \r

Contents: Check the module's current parameter, return to the module's current device name, serial port baud rate and device MAC address.

#### 4-6. Set Command of Module Transmit Power

Command Format: AT + RFPM = 3 \r

Return value: OK \r

ERROR \r

Content: Reset the modules transmit power, for example ,set the module transmission power to level 4 ,the transmit power is -8dbm, return OK indicates power reset successes, return ERROR indicates power reset fails, the reason may the set power level is not in the level list.

Command Format: AT + RFPM \r?

Return Value: -8dbm \r

Content: Check the transmit power configuration of the currentBluetooth module, return to the current setting of the transmission power value: -8dbm.

**NOTE: Bluetooth module currently supports setting transmit power level in the following table:**

Power Level	Power Value
0	+4dbm
1	0dbm
2	-4dbm
3	-8dbm
4	-12dbm
5	-16dbm
6	-20dbm

7	-30dbm
8	-40dbm

#### 4-7. Reset Module Command

Command Format: AT + RESET \r

Return value: OK \r

Content: Module reset command, returns OK, the module reset successes.

#### 4-8. Restore the Default Configuration Commands

Command Format: AT + DEFAULT \r

Return value: OK \r

Content: Recover the module configuration parameters to the default parameters, MAC address will also restore to the factory default address, return OK indicates the module successful recovery.

#### 4-9. Query Command of Module Version Number

Command Format: AT + VERSION \r

Return Value: V1.0 \r

Content: Query module current version, return to module current version V1.0.

## 4. BLE Protocol Description(app port)

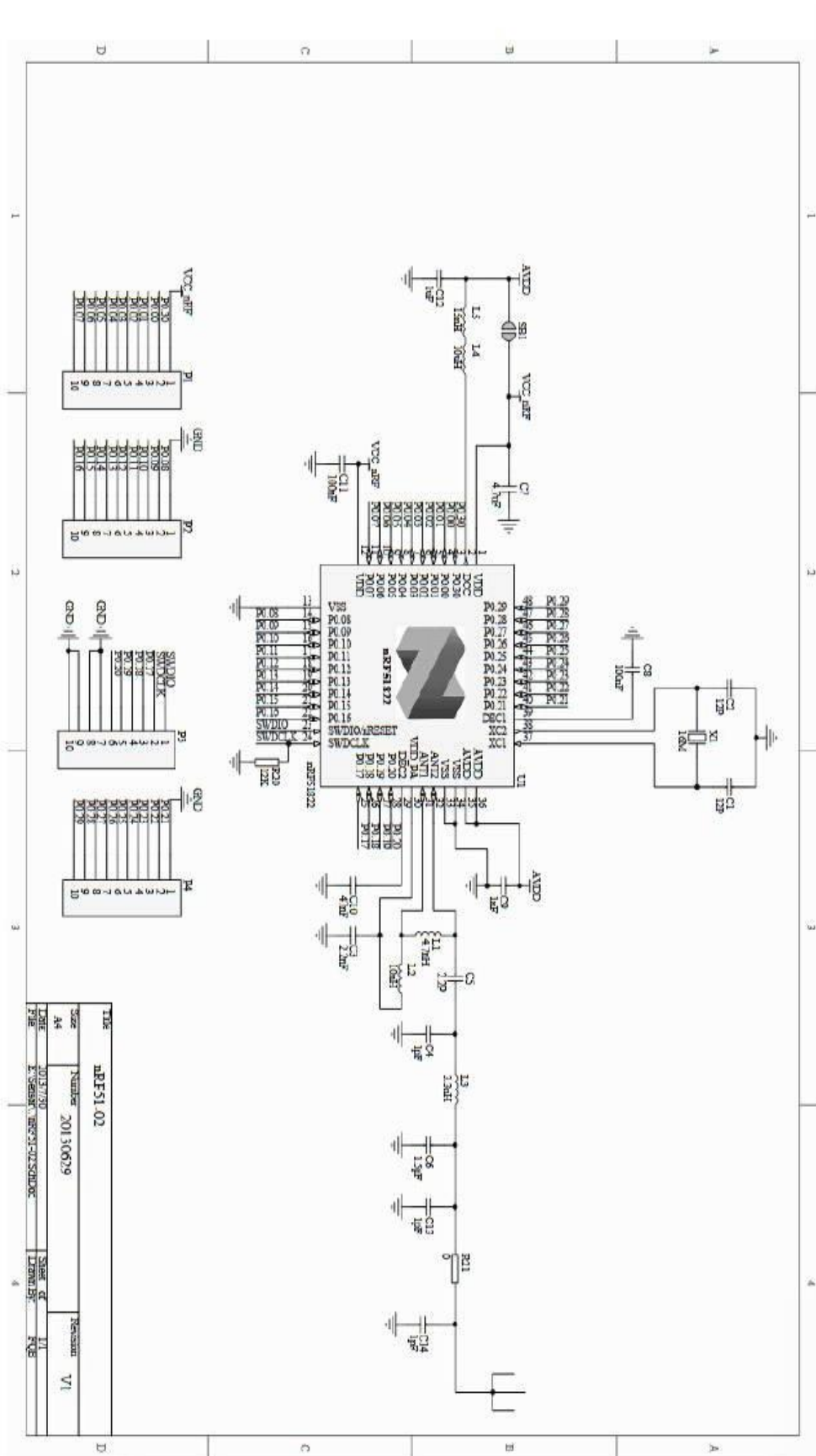
[Service UUID: 0x1234 ]

Eigen values	characteristic	
0x1235	Write Without Response	

[Service UUID: 0x1234]

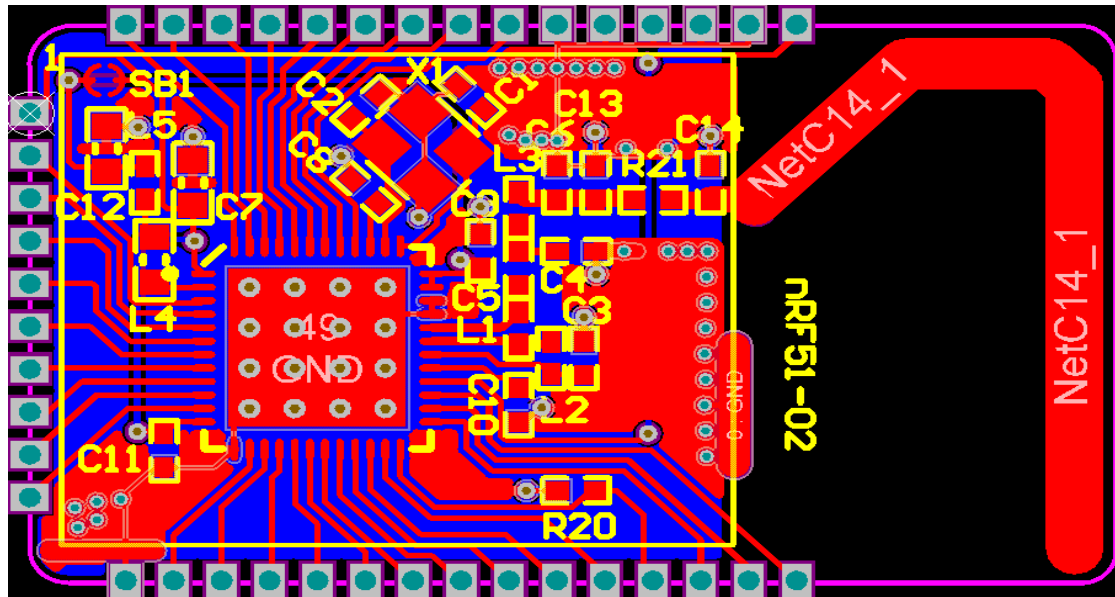
Eigen values	characteristic	
0x1236	Notify	

## 5. Schematics

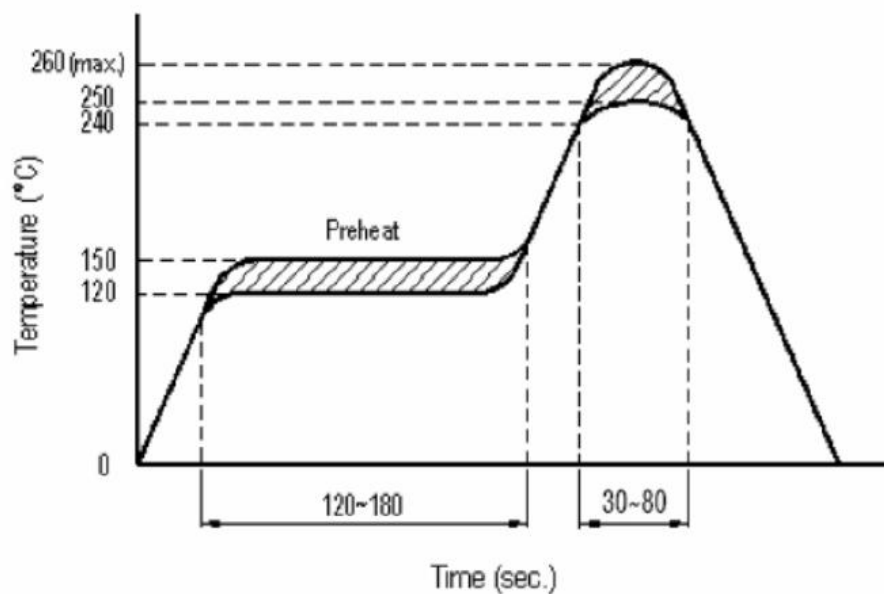


## 6. Physical drawings





## 7. Reflow soldering reference



## 8. Technical Support

For technical support, please send e-mail to: [technical@wireless-tag.com](mailto:technical@wireless-tag.com)

Disclaimer: We reserve the final interpretation and modification rights to update the product manuals without notice at any time!