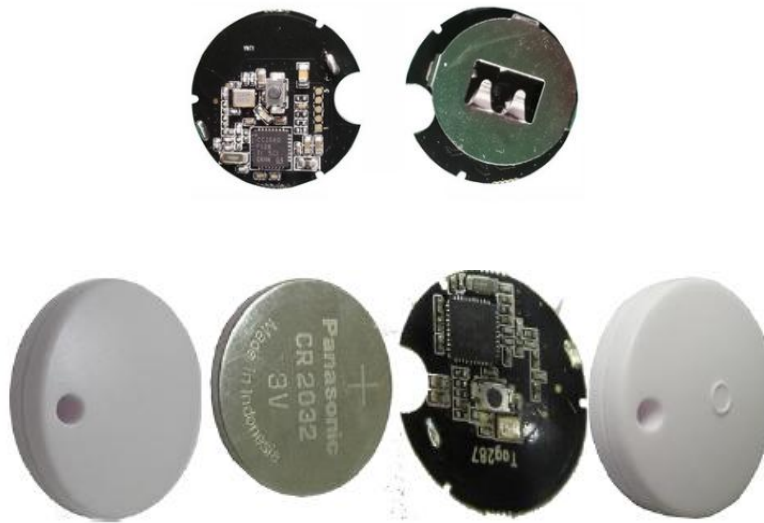


Radioland Beacon User's Guide



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1 product introduction

1.1 Description

Our company produces three kinds of Beacon modules, which is a complete low cost for Bluetooth low power applications. The CC2541-iBeacon wireless module is developed with TI high performance wireless SOC chip CC2541. And integrated low power 8051 microcontroller kernel. CC2640-iBeacon wireless module is developed using TI cost-effective ultra-low power chip cc2640. Special ARM Cortex integrated with RF Core in ARM Cortex M3 microcontroller M0 also improves the system performance. NRF51822-iBeacon wireless module is developed with Nordic high performance wireless SOC chip NRF51822. Integrated with high performance and low power CortexM0 microcontroller kernel. All modules support Bluetooth application BLE protocol stack and rich peripheral interfaces. Module configuration independent burning interface. Convenient for user programming debugging. Broadcast with battery data, equipped with keys, long press controllable module broadcast and sleep, mobile phone APP can modify module parameters.

1.2 Main Feature

- 2.4-GHz compliance with low power consumption specifications and proprietary RF on-chip system
- Programmable output power up to 0 ,4,5dBm
- Support IOS7.0, Android 4.3 or above
- Small diameter: 24.0mm, thickness: 4.5mm
- On-board PCB antenna
- Modulation mode GFSK

1.3 Applications

- Indoor navigation
- Mobile payment
- Store shopping guide
- Flow analysis

1.4 Electrical characteristics

Test Conditions: Ta=25°C, VCC=3.3V.

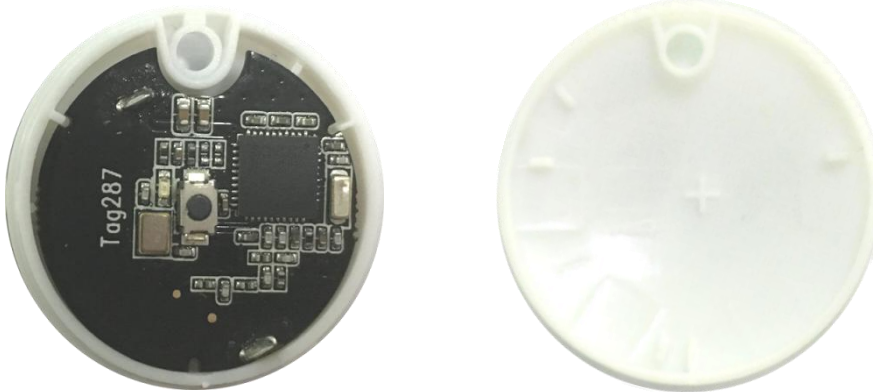
	CC2541-Beacon	CC2640-Beacon	nRF51822-Beacon
Frequency	2400 - 2483.5Mhz	2400 - 2483.5Mhz	2400 - 2483.5Mhz
Flash(KB)	256	256	256/128
Power supply	2.0 - 3.6V	1.8 - 3.6V	2.1 - 3.6V
Out Power	-26 - 0dBm	-21 - 5dBm	-30 - 4dBm
Sensitivitiy	-93dBm	-97dBm	-93dBm
TX Current	21.1mA	6.1mA at 0dBm	10.5mA
RX Current	19.6mA	5.9mA	9.7mA
Standby Current	0.4uA	1uA	2.6uA
Distance	30m	60m	50m
Antenna	PCB	PCB	PCB
Name	Radioland iBeacon	Radioland iBeacon	RDL51822
Interval	1S	1S	1S
Power	0dBm	0dBm	4dBm
Usage time	120 days	228 days	190 days
Size	25*4.6mm	25*4.6mm	25*4.6mm
Sensor	option	option	option/sht3x,kx022

2 How to use?

1) Insert the battery positive side up into the battery compartment



2) Put the module in the case



3) After the assembly is completed, you can press the switch button firmly. If the light flashes once, it means that it is closed. And if you need to turn on, please press and hold it until the LED light flashes 3 times.



Beacon

Note: CC2541-Beacon can only modify the parameter for the first time, the module will reject the connection on the second connection, and the forced connection will timeout. Because the connection can only be connected once, the user is advised. Modify all parameters once and then use them. Otherwise, if you can't connect the second time, you will have to press two buttons once for three seconds, or reboot the module, which will be very inconvenient. It is therefore recommended that all parameters be modified at one time.

2.2APP download

Android APP download address: <https://pan.baidu.com/s/1gfKUoOb> access password: **hil4**.

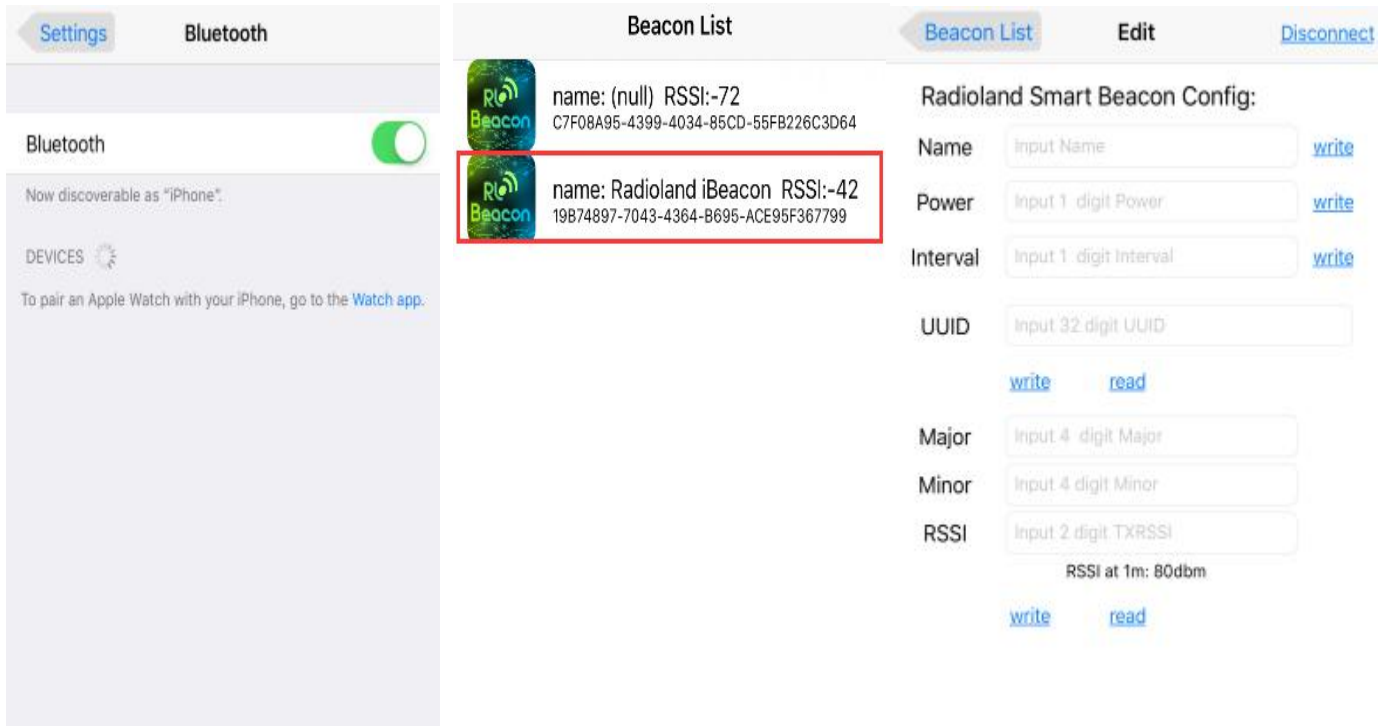
Apple APP can search APP Store for” **RL beacon**” downloads.



Beacon

2.3 APP operation

Open Bluetooth and APP to find the device click connect

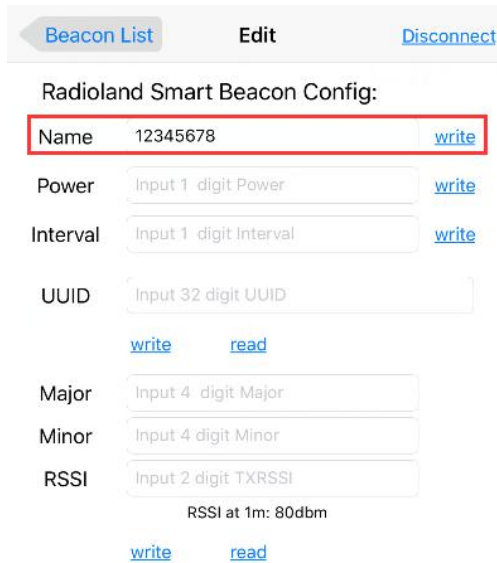


- **Modify name**

Write the name can't more than the 8 byte (Letter, number or underline)

Example: Modify 2541-Beacon broadcast name is 12345678

- 1) Find the name item, enter you want to modify the name (12345678), click modify



- 2)View modify name in the Android app

Link: <https://pan.baidu.com/s/1smm4ahJ> password: 19a1

Beacon

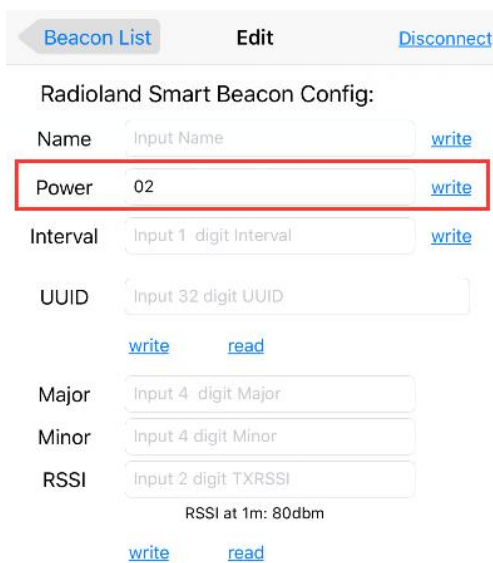


- **Modify tx power:**

Different chips modify the parameters are not the same, Please refer to Appendix 2 for details

Example: Modify CC2541-Beacon power to -6dBm

1) Find the power item, enter 02, click modify



2) Weak power is seen in Android app



- **Modify broadcast interval:**

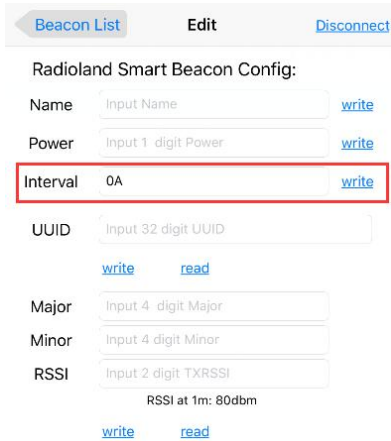
Enter two hexadecimal digits (02 to C8) * 50 = Broadcast interval (ms)

broadcast interval	para
100ms	02
500ms	0A
1s	14
5s	32
10s	C8

Beacon

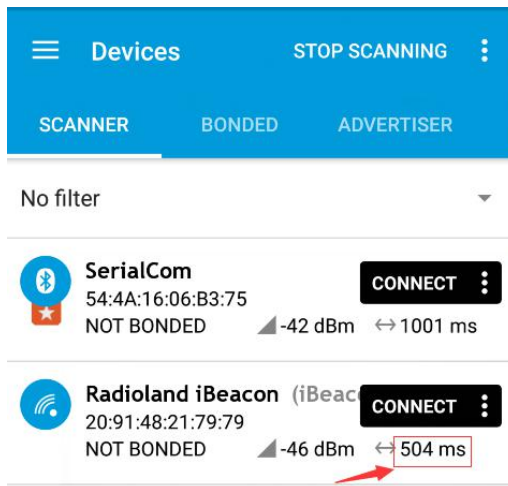
Example: Modify cc2541-Beacon broadcast interval to 500ms

1) Find the broadcast interval item, enter 0A, click modify



The screenshot shows the 'Radioland Smart Beacon Config' interface. It includes fields for Name, Power, Interval, UUID, Major, Minor, and RSSI. The 'Interval' field is highlighted with a red box and contains the value '0A'. A 'write' button is visible next to the Interval field.

3) available atin in Android app and Oscilloscope



0A Parameter explanation: 0A is hexadecimal, convert to 10 decimal

According to the formula: Broadcast Interval (ms) = Input Parameter (02-C8) * 50

So here broadcast interval is 0A-> 10 * 50 = 500ms

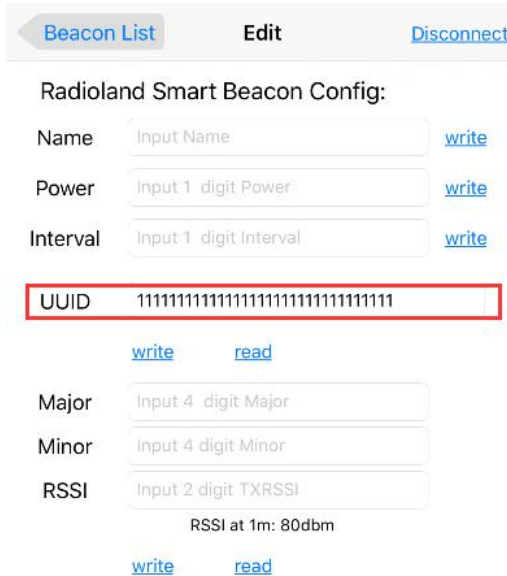
Beacon

- **Modify broadcast UUID:**

Write at random 32 bytes (here UUID refers to broadcast UUID, not service UUID)

Example: Modify CC2541-Beacon broadcast UUID

1) Find the UUID item, enter 32byte, click modify



Beacon List Edit Disconnect

Radioland Smart Beacon Config:

Name write

Power write

Interval write

UUID write read

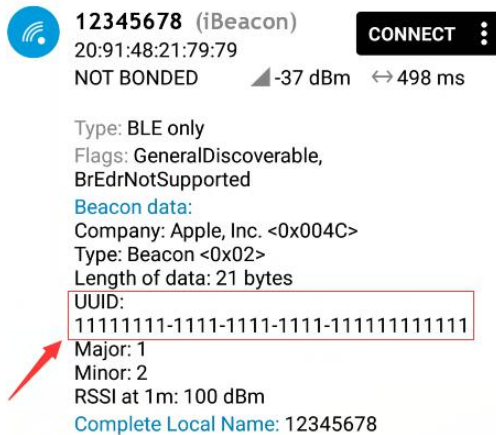
Major

Minor

RSSI write read

RSSI at 1m: 80dbm

2) Modify to view in Android APP



12345678 (iBeacon) CONNECT

20:91:48:21:79:79

NOT BONDED -37 dBm ↔ 498 ms

Type: BLE only

Flags: GeneralDiscoverable, BrEdrNotSupported

Beacon data:

Company: Apple, Inc. <0x004C>

Type: Beacon <0x02>

Length of data: 21 bytes

UUID: 11111111-1111-1111-1111-111111111111

Major: 1

Minor: 2

RSSI at 1m: 100 dBm

Complete Local Name: 12345678

- **Modify Major Minor and RSSI:**

Major two byte hexadecimal, Minor two byte hexadecimal, RSSI one byte hexadecimal

All three values need to be input RSSI, where the default is that the battery power varies with the actual value.

Example: Modify Major to 100, modify Minor to 65535, modify RSSI to 50

Beacon

Note: if is Android app,

Major : 0064 (100)

Minor : FFFF (65535)

RSSI (Battery power) : 34 (50)

1)APPLE app write to(left)and android app write to (right)

Beacon List **Edit** [Disconnect](#)

Radioland Smart Beacon Config:

Name [write](#)

Power [write](#)

Interval [write](#)

UUID [write](#) [read](#)

Major 100

Minor 65535

RSSI 50

RSSI at 1m: 80dbm

[write](#) [read](#)

Device address: 20:91:48:21:79:79

State: Connected

Data: No data

修改间隔 [write](#)

发射功率 [write](#)

修改名字 [write](#)


UUID [write](#) [Read](#)

Major 0064

Minor FFFF

RSSI 34

[write](#) [Read](#)



12345678 (iBeacon)

20:91:48:21:79:79

BONDED ▲ -52 dBm ↔ 500 ms

CONNECT ⋮

Type: BLE only

Flags: GeneralDiscoverable, BrEdrNotSupported

Beacon data:

Company: Apple, Inc. <0x004C>

Type: Beacon <0x02>

Length of data: 21 bytes

UUID: 11111111-1111-1111-1111-111111111111

Major: 100

Minor: 65535

RSSI at 1m: 97 dBm

[Complete Local Name: 12345678](#)

3.CC254x/nRF51822 /CC2640iBeacon Interface

CC254x / nRF51822/CC2640iBeacon use 128bitUUID, through the definition of GATT Service planning a simple communication protocol, users can quickly modify the App parameter to the iBeacon, iBeacon notify the way through the modified feedback to the App.

Service UUID: 00001803-494c-4f47-4943-544543480000

Description	UUID	Attribute	Length
mobile->ibeacon	00001805-494c-4f47-4943-544543480000	notify/read+notify	20(Max)
ibeacon->mobile	00001804-494c-4f47-4943-544543480000	write	20(Max)

Broadcast content :

BattPower is the battery power displayed in the broadcast, the user can read through the radio iBeacon battery charge written in the app does not have specific meaning but must be written, when the power is updated after the data. Broadcast data as shown below, the maximum 31 (unit: byte)

0	1	2	3	4	5 - 8	9 - 24
The first group of data length 0x02	Broadcast flag 0x01	Broadcast mode selection 0x02 0x04	The second set of data length 0x1A	Vendor flag	Vendor specific data	16byte UUID

25 - 26	27 - 28	29
Major	Minor	BattPower

APP Command

Num	APP Command	Return	Description
1	Change name: 0x11+name(length<=8)	0x11	The first connectable version reboot takes effect other versions take effect immediately all versions are saved
2	Change UUID: 0x12+16byte UUID	0x12+16byte UUID	Immediate effect, save power Eg: 0x12 0x11 0x11... 0x99 0x99 <-- totle16 -->
3	Read UUID: 0x13	0x13+16byte UUID	
4	Change Major,Minor battPower: 0x14+Major+Minor+BattPower	0x14+Major+Minor +BattPower	Immediate effect, save power Major: 2byte(eg:0x00 0x0a is10) Minor: 2byte(eg:0x00 0x0b is 11) BattPower: This position is the battery power, see note 1 for details 1byte(eg:0x01)
5	Find Major,Minor,BattPowe: 0x15	0x15+Major+Minor +BattPower	
6	Modify the broadcast interval: 0x16+1byte(0x00-0xC8)	0x16+4byte	Immediate effect (eg:0x02 is 100ms)
7	Modify the transmit power: 0x17+1byte	2byte	Immediate effect 2541 can write : 0x01,0x02,0x03 51822 can write: 0x00,0x04,0xD8, 0xEC,0xF0,0xF4,0xF8,0xFC See note 2 for details

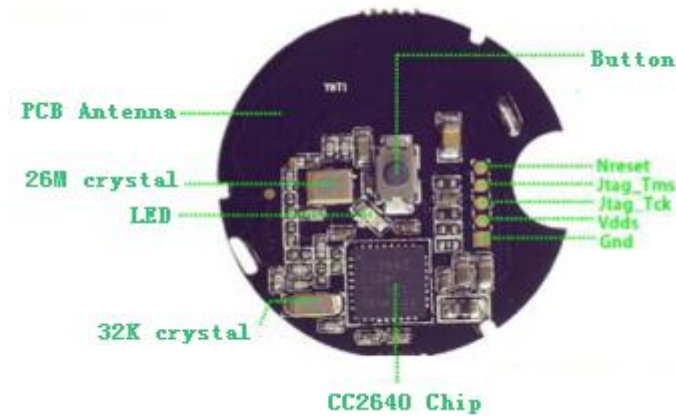
Beacon

4. Module Introduction

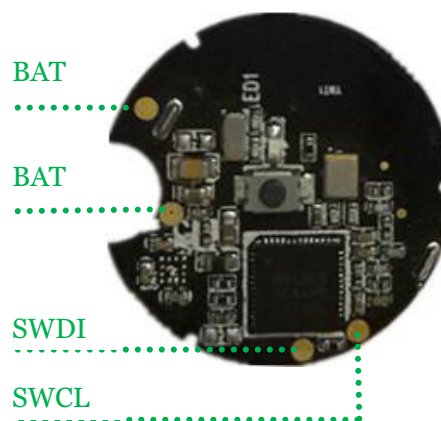
4.1 cc2541-Beacon



4.2 cc2640-Beacon



4.3 nRF51822-Beacon



Appendix 1

Attributes	Factory settings
Name	2541: Radioland iBeacon
Master-slave mode	Slave mode
Way of working	By default, the system enters the broadcast mode
Pass word Authentication Type	NO
Default broadcast interval	1000ms
Default power setting	0dBm

Attributes	Factory settings
Name	2640: Radioland iBeacon
Master-slave mode	Slave mode
Way of working	By default, the system enters the broadcast mode
Pass word Authentication Type	NO
Default broadcast interval	1000ms
Default power setting	0dBm

Attributes	Factory settings
Name	51822: RDL51822
Master-slave mode	Slave mode
Way of working	By default, the system enters the broadcast mode
Pass word Authentication Type	NO
Default broadcast interval	1000ms
Default power setting	4dBm

Appendix 2

CC2541 Power Comparison Table		
Power	Parament	1m RSSI reference value
-23dBm	0x01	-73
-6dBm	0x02	-56
0dBm	0x03	-50
51822 Power Comparison Table		
0dBm	0x00	-54
4dBm	0x04	-50
-30dBm	0xD8	-89
-20dBm	0xEC	-77
-16dBm	0xF0	-72
-12dBm	0xF4	-65
-8dBm	0xF8	-62
-4dBm	0xFC	-58
CC2640 Power Comparison Table		
-21dBm	0x01	-75
-18dBm	0x02	-77
-15dBm	0x03	-72
-12dBm	0x04	-73
-9dBm	0x05	-70
-6dBm	0x06	-66
-3dBm	0x07	-68
0dBm	0x08	-65
1dBm	0x09	-63
2dBm	0x10	-57
3dBm	0x11	-59
4dBm	0x12	-54
5dBm	0x13	-55