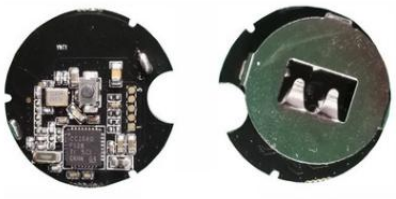
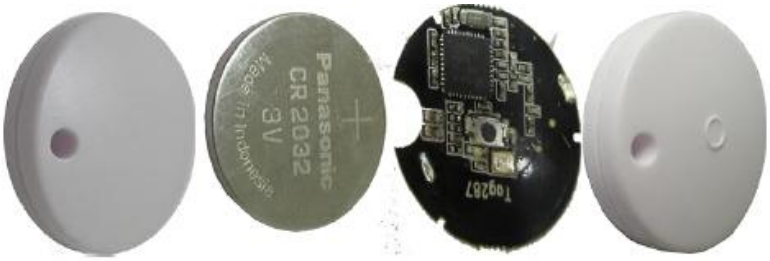
Radioland Beacon

FCC ID: 2AGUT-NRF52810

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. NRF52810-iBeacon wireless module is developed with Nordic high performance wireless SOC chip NRF52810. 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℃,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
Sensitivtiy	-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?

2.1 Module working state

(1) After the module is power on, the indicator lights flash 3 times, indicating that the module is in the broadcast state . At this time , the module is in a detectable state , and the mobile phone can search the module . At this time , the module can connect and modify the parameter through our APP.

(2) Press the button for three seconds, the module light flash once, and the module enters a low power state.

Press the button again for three seconds, the indicator flashes three times, and the module wakes back into the broadcast state.

You can modify the module parameters at this point.

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.

2.3APP operation

- **Modification intervals:**

Input 2-digit hexadecimal number 02 to C8U * 50 = broadcast interval (unit ms)

Note: using Apple's app RL Beaconn app operation here is similar

2541 is in an unconnectable state after modification. If you want to view specific parameters, please reboot

Example: modify broadcast interval to 500ms

1.Turn on your phone Bluetooth first and open RL Beacon (drop - down list of beacons)

2. Locate the beacon you want to modify and connect automatically when you click Connect as shown in the following figure

3.Find the broadcast interval item, enter the broadcast interval to be modified, click modify pop-up modification successful! You can

The broadcast interval set here is 500ms

The 0A parameter explains that: 0A is hexadecimal and converted to 10

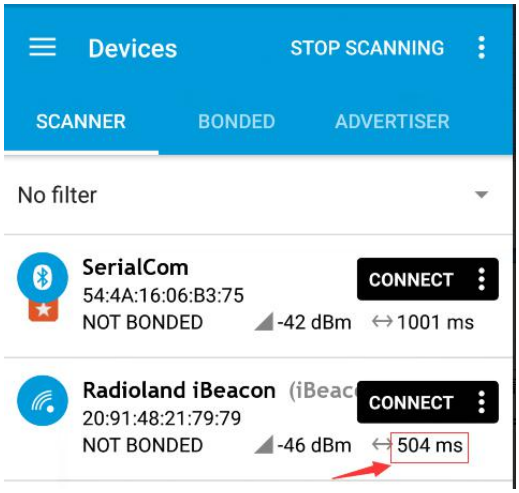
According to the formula: broadcast interval MST = input parameter 02-C8 / 50

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

4.When the modification is complete, you can view the app link via an oscilloscope or Android APP as follows

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

Note: the first step is to disconnect the Apple phone from the beacon before the beacon rebroadcasts.



- **Modification of transmit power:**

Parameters vary from chip to chip, see Appendix 2 Power comparison Table for specific modifications

Example:the modified CC2541-Beacon power is -6dBm

1.Modify 1 / 2 step with modified broadcast interval

2.To find the power item, enter 02. click on the modification. See Appendix 2 for specific power values.

3.Power reduction can be seen through Android APP

Change name:

The name that is written can not be greater than 8 bytes (letters, numbers, or underlines)

Example : the modification of the 2541-beacon broadcast name is 12345678

1. Modify 1 / 2 step with modified broadcast interval
2. Find the name item, enter the name you want to modify, 12345678, click on the change

3. See name change success through Android app

- **Modify broadcast UUID:**

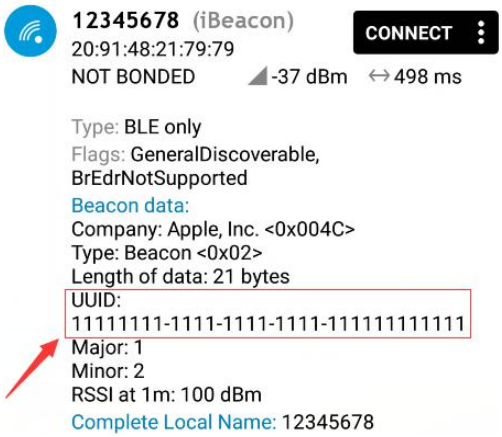
Write at random 32 bytes (here UUID refers to broadcast UUIDs, not service UUIDs)

Example : Modify 2541-beacon broadcast UUID to full 1

1.Modify 1 / 2 step with modified broadcast interval

2.To find the UUID entry, enter the 32 UUIDs that you want to modify, here 32 1s, click on the changes

3.After modification, you can view the changes through Android APP



- **Modify Major Minor and RSS:**

Major two bytes hexadecimal / minor two bytes hexadecimal / RSSI 1 byte hexadecimal

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

Example:Modified Major to 100, modified Minor to 65535, recommended write 50

Note: if the write value of the Android's APP write is changed

Major : 0064（100）

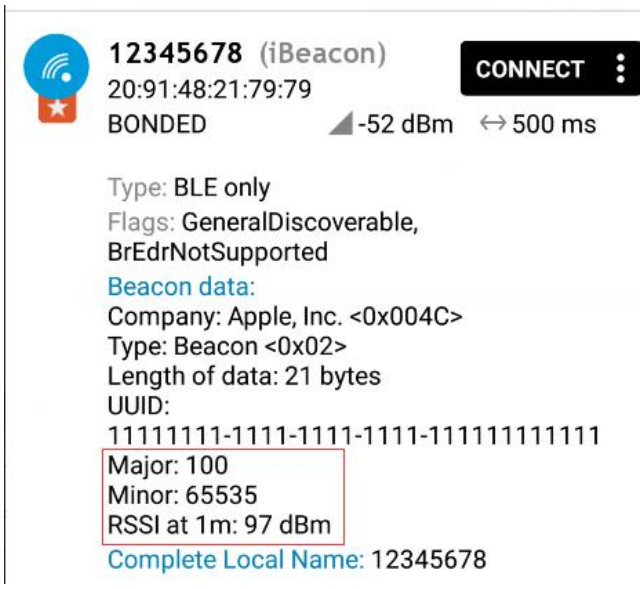
Minor : FFFF（65535）

RSSI（Power Batter）: 34(50)

1. Modify 1 / 2 step with modified broadcast interval

2. Apple app writes (left) and android app writes (right) as shown in the following figure

3. After modification, you can view the write status through android app



3.CC254x/nRF52810 /CC2640iBeacon Interface

CC254x / nRF52810/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

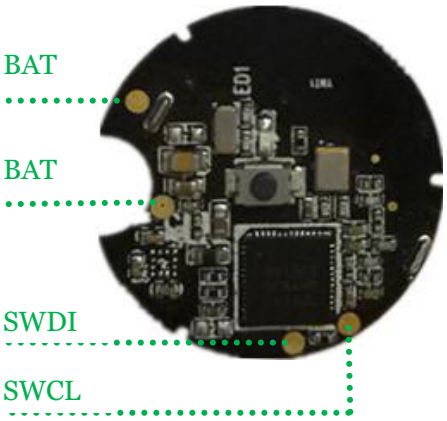
APP Command

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

4. Module Introduction

4.1 cc2541-Beacon

4.3 nRF52810-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

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

To assure continued compliance, any changes or modifications not expressly approved by the party.

Responsible for compliance could void the user's authority to operate this equipment. (Example- use only shielded interface cables when connecting to computer or peripheral devices).

This equipment 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.

RF warning statement:

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.