

QN9080

QN908x RF Certification Guide

Rev. 2 — 11 March 2019

Application note

Document information

Info	Content
Keywords	QN908x, BLE, Generic FSK, FCC/CE Certification
Abstract	This Application note describe FCC/CE certification test using the QN908X Evaluation boards for BLE module and Generic FSK module.



Revision history

Rev	Date	Description
1	20180524	Initial revision
2	20190311	Changed the Application Note name from QN908x Test Guide for RF Certification to QN908x RF Certification Guide

Contact information

For more information, please visit: <http://www.nxp.com>

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1. Introduction

QN908x is an ultra-low power BLE wireless MCU, based on which the product operated with the frequency within the ISM band. According to the regulatory of each region, certification is mandatory for these kinds of RF products. The test is FCC/CE certification in US and EU areas. There is similar certification requirement in other areas. The Generic FSK project inside of QN908x SDK is designed for the purpose.

2. Test Setup

2.1 GFSK project introduction

GFSK is a modulation method adopted by Bluetooth SIG for BLE, based on which the BLE link layer defines the packet format for devices to communicate with each other. For the devices not implemented, the BLE link layers communicate to each other with self-defined packet format. GFSK project is designed for such purpose.

The GFSK project supports burst/continuous and modulated/unmodulated modes for data transferring, which make it appropriate for RF certification.

2.1.1 Test Setup – Hardware

Requirements:

- NXP's QN9080 DK
- Micro USB cable
- Personal computer with a COM port terminal installed

As shown in Figure 1, connect the USB port (J2) of QN9080 DK with PC USB port by the USB cable.



Figure 1 Hardware Connection

Once QN9080 DK is plugged in, corresponding COM port can be seen in Device Manager as shown in Figure 2.

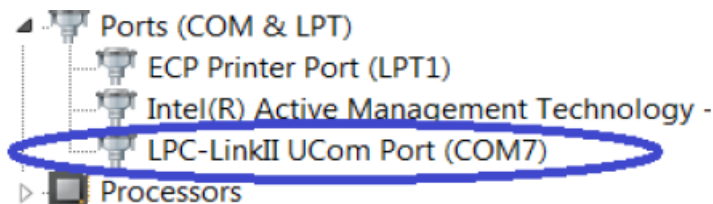


Figure 2 COM port in Device Manager

2.1.2 Test Setup – Software

Requirements:

- IDE: KEIL, IAR or MCUXpresso.
- Firmware project: connectivity_test project under QN9080 SDK folder (...\\SDK\\boards\\qn908xcdk\\wireless_examples\\genfsk\\connectivity_test).
- Test Tool: PuTTY or another terminal tool

2.1.3 Test Preparation

1. Test firmware downloading into QN9080 DK

Refer to the following the procedure below to compile and download firmware:

- a) Open the project connectivity_test from the following folder
...\\SDK\\boards\\qn908xcdk\\wireless_examples\\genfsk\\connectivity_test\\ by any of the three supported IDE
 - b) Compile the project by clicking the **Compiling** button
 - c) Download the firmware into the QN9080 DK
 - d) Press the **Reset** button(SW3) on QN9080 DK to run the firmware.
- #### 2. COM port terminal
- a) Open COM port terminal on your computer.
 - b) Select the correct setting for the COM port.

Taking Putty as an example, COM port setting is shown in Figure 2:

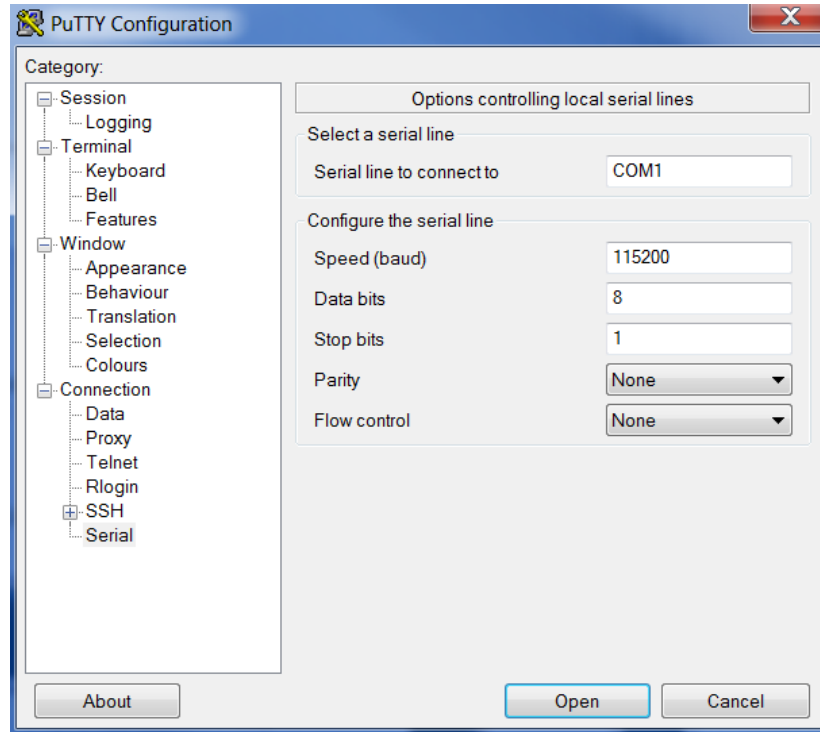


Figure 3. COM Port Setting

3. Test items and options

The GFSK project uses COM port terminal as commands console to control the operations of QN9080 DK.

After setup completes successfully, open Putty with the correct settings, and press the **Reset** Button (SW3) The output is shown as the Figure 4.



Figure 4 Initialization Output

Press the Enter key, the main menu is shown as in Figure 5 with all the options and test items. There are eight options and four test items totally.

1. Test items

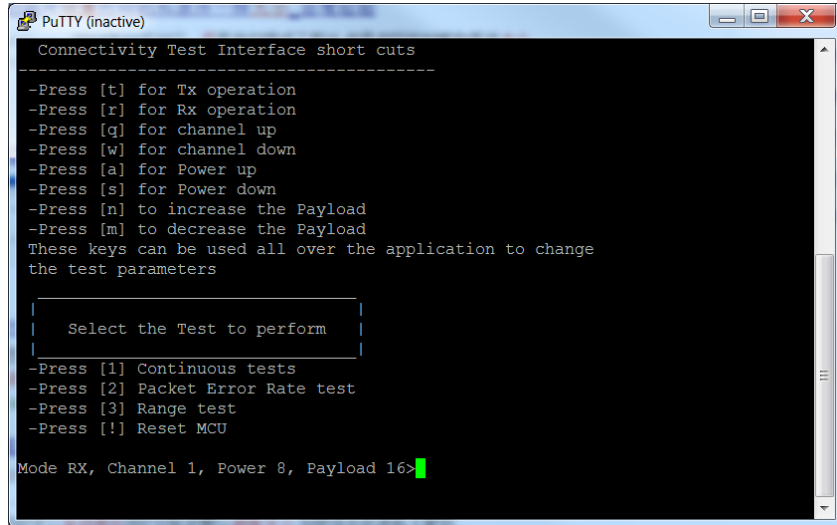


Figure 5 Main menu

Among the four test items, the first one is often used for RF certification test. There are seven sub items supported by the GFSK project for first test item, which is shown as Figure 7.

2. Test options:

a) **TX/RX**

- [t]: used to choose TX test
- [r]: used to choose RX test

This option allows you to select the appropriate operation for the test. The default mode is RX test.

b) **Channel change**

- [q]: used for channel up
- [w]: used for channel down

The QN908x can be configured to use any channel frequency between 2.400 and 2.480GHz with each channel frequency interval 2MHz.

c) **TX power**

- [a]: used for power up
- [s]: used for power down

This parameter is used to adjust the TX power when QN908x is in TX operation. The default TX power is 'power 8'.

Table 2 TX Power

Number	TX Power(dBm)	Number	TX Power(dBm)
--------	---------------	--------	---------------

0	<-30	11	-7
1	-30	12	-6
2	-25	13	-5
3	-20	14	-4
4	-18	15	-3
5	-16	16	-2
6	-14	17	-1
7	-12	18	0
8	-10	19	1
9	-9	20	2
10	-8		

d) Payload length

[n]: used to increase payload

[m]: used to decrease payload

This parameter specifies the payload length in one packet of QN9080. The default payload length is 16, the max payload length supported is 35.

4. Test Cases

4.1 TX with modulation

The case is used when the test requirement required the signal over the air is with data modulated.

The TX with modulation can be implemented according to the following steps:

- a) Press [t] to choose TX test.
- b) Select TX channel by option [q] or [w]. (channel 1 for 2402MHz test, channel 39 for 2440MHz test, channel 79 for 2480MHz test).
- c) Select TX power by option [a] or [s]. The default TX power is 0dBm.
- d) Select test cases shown in Figure 7, per requirement on data pattern and the continuous/burst mode. [5] is chosen, for example.
- e) The test is started.
- f) Press [1] to end the test.

```

COM7 - PuTTY
-----
[t] Tx   [q] Ch+ [a] Pw+ [n] Pyld+
[r] Rx   [w] Ch- [s] Pw- [m] Pyld-
-----

Continuous Test Menu

-Press [1] Idle
-Press [2] Burst Transmission using random-payload packets
-Press [3] Continuous Modulated Transmission 1's
-Press [4] Continuous Modulated Transmission 0's
-Press [5] Continuous Modulated Transmission pseudo-random
-Press [6] Continuous Unmodulated Transmission
-Press [7] Continuous Packet Mode Reception
-Press [8] Continuous Energy Detect
-Press [p] Previous Menu

Mode TX, Channel 1, Power 18, Payload 16>

```

Figure 7 Test Menu

4.2 TX with no modulation

The case is used when the test requirement required the signal over the air is with no data modulated.

The TX with modulation can be implemented according to the following steps:

- g) Press [t] to choose TX test.
- h) Select TX channel by option [q] or [w]. (channel 1 for 2402 MHz test, channel 39 for 2440 MHz test, channel 79 for 2480 MHz test).
- i) Select TX power by option [a] or [s]. The default TX power is 0dBm.
- j) Select test cases shown in Figure 7, per requirement on data pattern and the continuous/burst mode. [6] is chosen, for example.
- k) The test is started.
- l) Press [1] to end the test.

Note: The two cases above illustrate how to choose test items and set options. Generate your test cases with the test items and options per the RF certification requirements.

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