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Approval Sheet

(產品承認書)

產品名稱 (Product): BT 4.2 / BT 5 Module (nRF52810)

產品型號 (Model No.): **MDBT42Q – 192K** (Chip Antenna)

MDBT42Q – P192K (PCB Antenna)

Advantage of MDBT42Q & MDBT42Q-P series:

1. *Long working distance:*
   ***MDBT42Q**: over 80 meters in open space.*
   ***MDBT42Q-P**: up to 60 meters in open space.*
2. *Declaration ID includes all Nordic applied profiles.*
3. *Granted main regional certification such as FCC (USA), CE(EU) TELEC (Japan), SRRC (China), IC (Canada), NCC (Taiwan), and KC (South Korea).*

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1. Overall Introduction

Raytac's MDBT42Q-192K & MDBT42Q-P192K is a BT 4.2 and BT 5 stack (Bluetooth low energy or BLE) module designed based on **Nordic nRF52810 SoC solution**, which incorporates: **GPIO**, **SPI**, **UART**, **I2C**, **PWM** and **ADC** interfaces for connecting peripherals and sensors.

Features of the module:

1. Dual Transmission mode of BLE & 2.4Ghz RF upon customer preference.
2. Compact size with **(L) 16 x (W) 10 x (H) 2.2 mm**.
3. Low power requirements, ultra-low peak, average and idle mode power consumption.
4. Be compatible with a large installed base of mobile phones, tablets and computers.
5. Fully coverage of BLE software stack. See *1.3 Profile & Service Information*
6. BLE & RF transmission switching helps products fit all operation system and most hardware.

1.1. Application

- IoT
  - Home automation
  - Sensor networks
  - Building automation
- Personal Area Networks
  - Health / fitness sensor and monitor device
  - Medical devices
  - Key-fobs and wrist watches
- Interactive entertainment devices
  - Remote control
  - Gaming controller
- Beacons
- A4WP wireless chargers and devices
- Remote control toys
- Computer peripherals and I/O devices
  - Mouse
  - Keyboard
  - Multi-touch trackpad

1.2. Features

- Multi-protocol 2.4GHz radio
- 32-bit ARM Cortex – M4 processor
- 192KB flash programmed memory and 24KB RAM
- Software stacks available as downloads
- Application development independent from protocol stack
- On-air compatible with nRF51, nRF24AP and nRF24L series
- Programmable output power from +4dBm to -20dBm
- RSSI
- RAM mapped FIFOs using EasyDMA
- Flexible and configurable 32 pin GPIO
- Programmable peripheral interface - PPI
- Simple ON / OFF global power mode
- Full set of digital interface all with Easy DMA including:
  - 1 x Hardware SPI master ; 1 x Hardware SPI slave
  - 1 x two-wire master ; 1 x two-wire slave
  - 1 x UART (CTS / RTS)
  - PDM for digital microphone
- Quadrature demodulator
- 12-bit / 200KSPS ADC
- 128-bit AES ECB / CCM / AAR co-processor
- Low cost external crystal 32MHz ± 40ppm for Bluetooth ; ± 50ppm for ANT Plus
- Low power 32MHz crystal and RC oscillators
- Wide supply voltage range 1.7V to 3.6V
- On-chip DC/DC buck converter
- Individual power management for all peripherals
- Timer counter
  - 3x 32-bit
  - 2 x 24-bit RTC
- 4-channel pulse width modulator (PWM) unit with EasyDMA

1.3. Profile & Service Information

Profile & Service are supported by MDBT42Q & MDBT42Q-P as below:

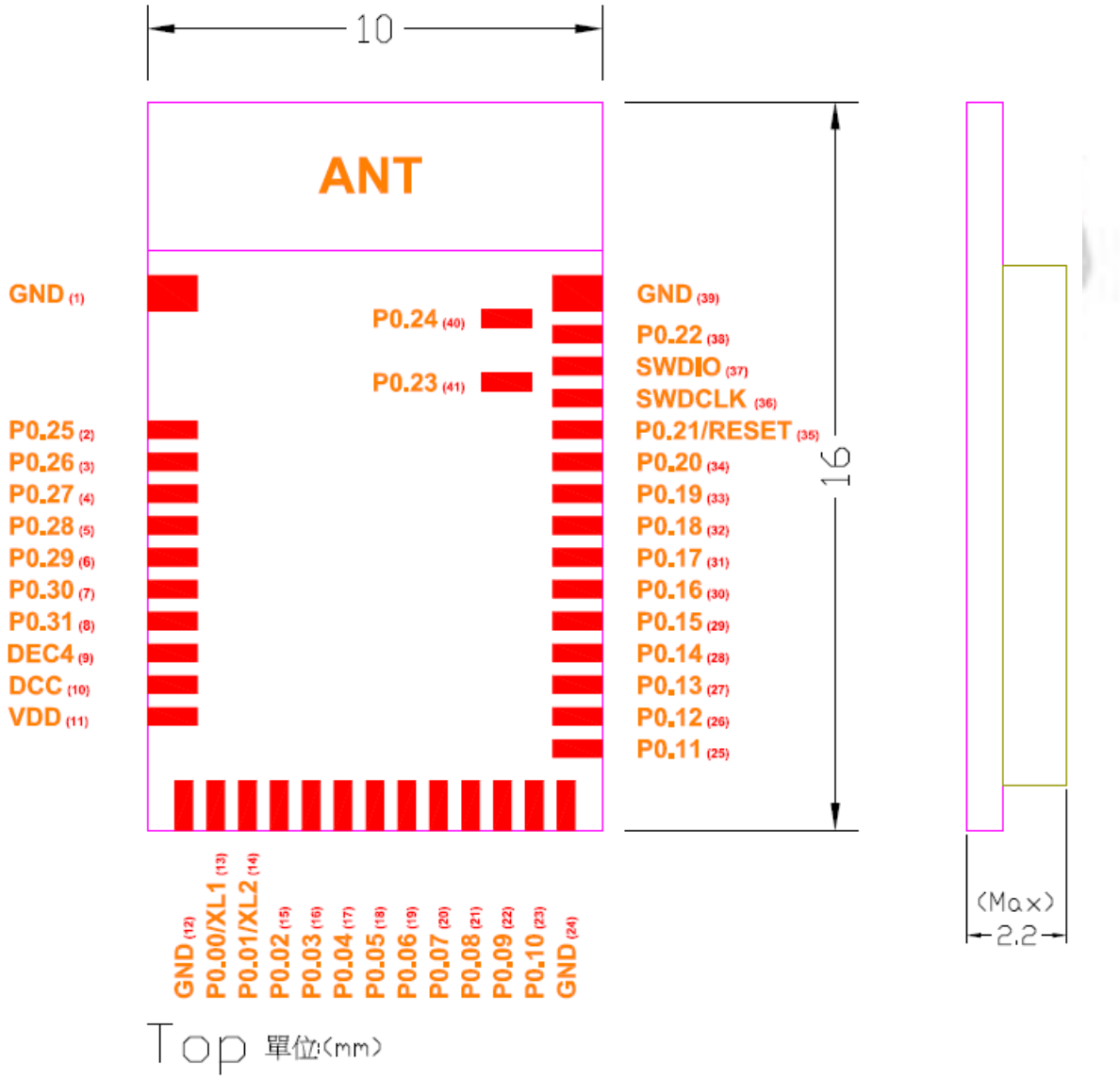
Profile Description	Service Description
Alert Notification Profile	Alert Notification Service
Blood Pressure Profile	Blood Pressure Service
	Device Information Service
Cycling Speed & Cadence Profile	Cycling Speed & Cadence Service
	Device Information Service
Glucose Profile	Glucose Service
	Device Information Service
Health Thermometer Profile	Health Thermometer Service
	Device Information Service
Heart Rate Profile	Heart Rate Service
	Device Information Service
HID over GATT Profile	HID Service
	Battery Service
Proximity Profile	Link Loss Service
	Immediate Alert Service
	TX Power Service
Running Speed & Cadence Profile	Running Speed & Cadence Service
	Device Information Service
Time Profile	Time Profile Service
Glucose Profile (Central)	

2. Product Dimension

2.1. PCB Dimensions & Pin Indication

- **MDBT42Q**

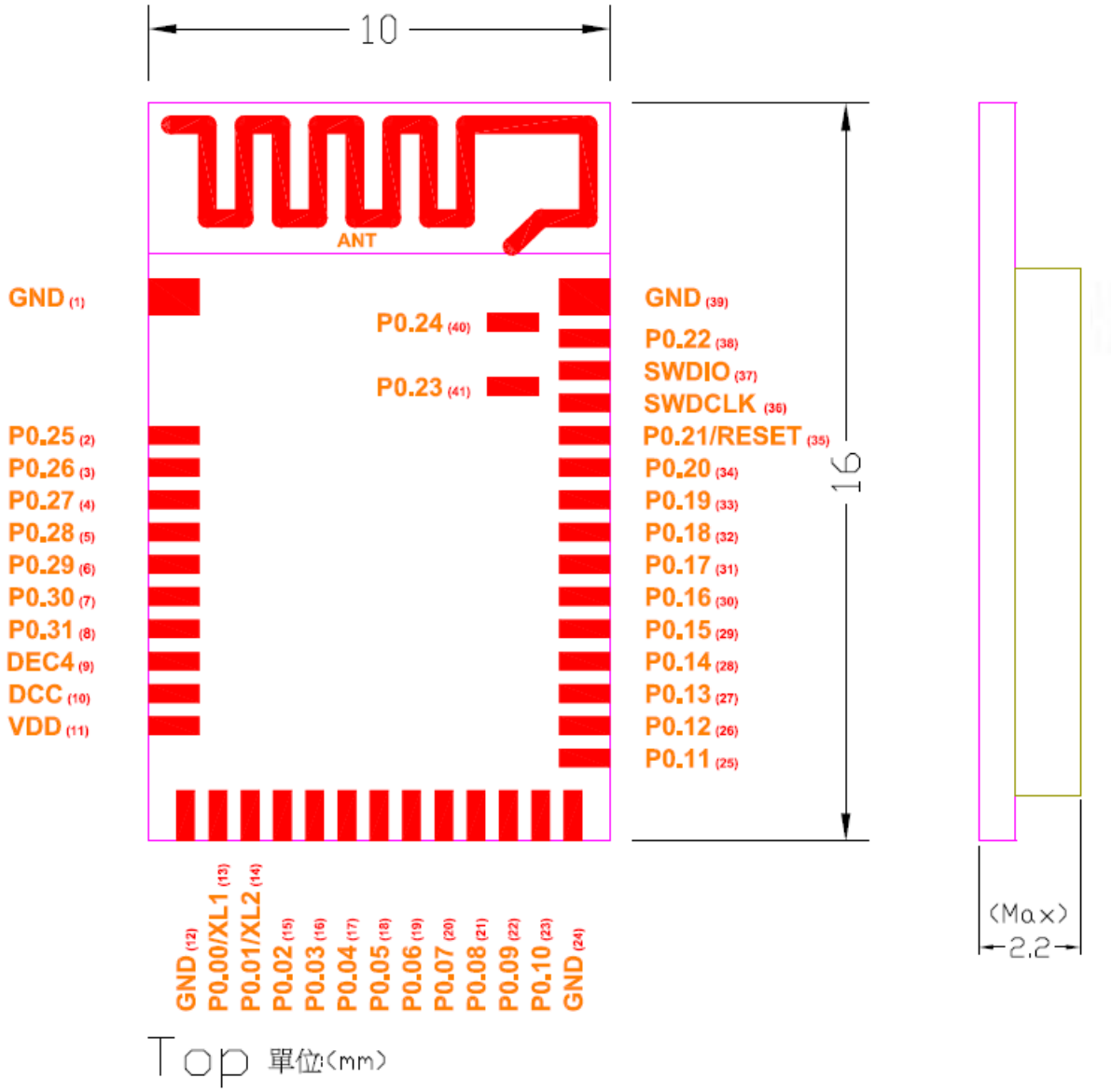
PCB SIZE: (L) 16 x (W) 10 x (H) 2.2 mm



**** Please be careful of the amount of solder paste for P0.23 & P0.24. The module may be lifted due to excess solder. Pads for P0.23 & P0.24 can be omitted when two GPIOs were not used.***

- **MDBT42Q-P**

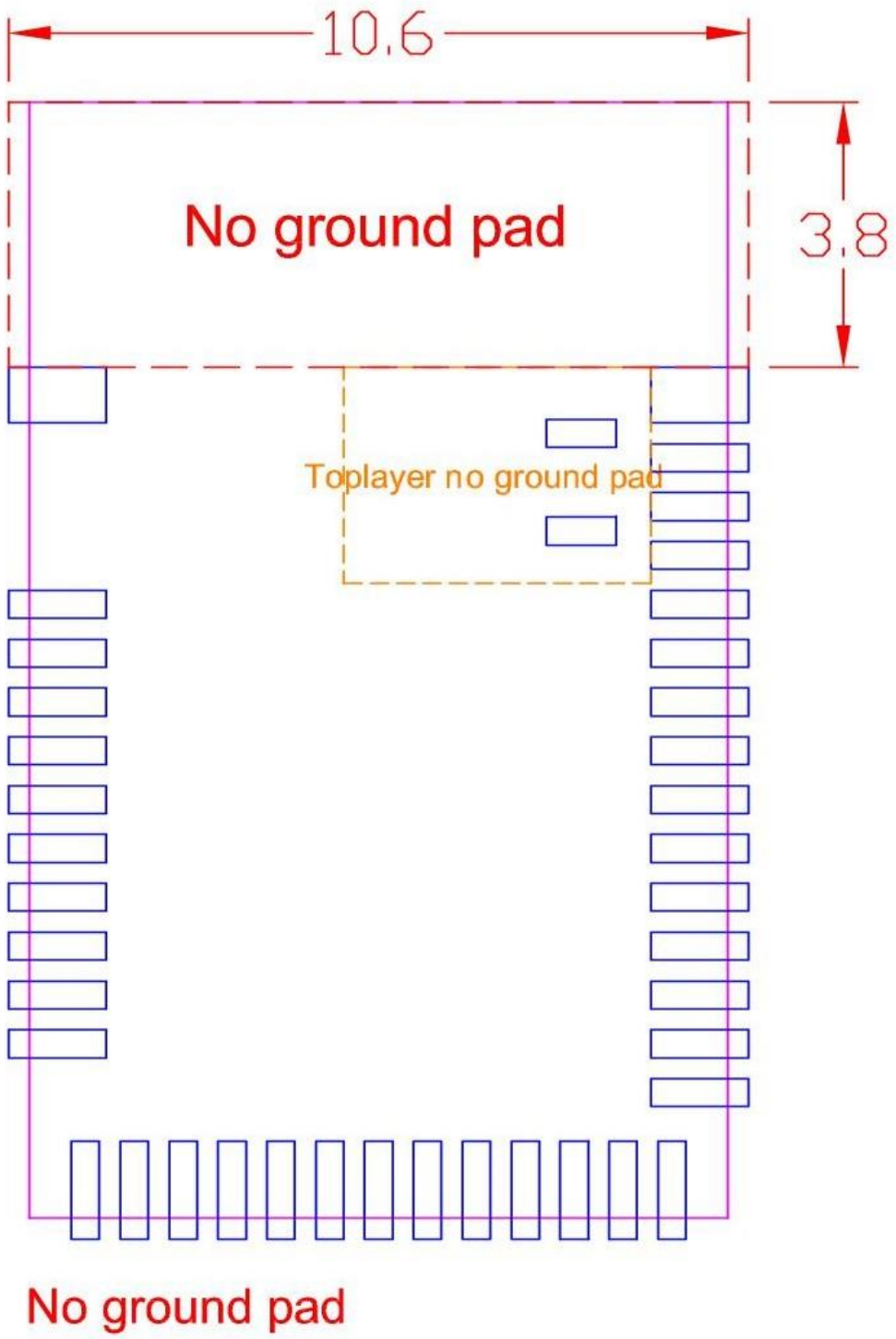
PCB SIZE: (L) 16 x (W) 10 x (H) 2.2 mm

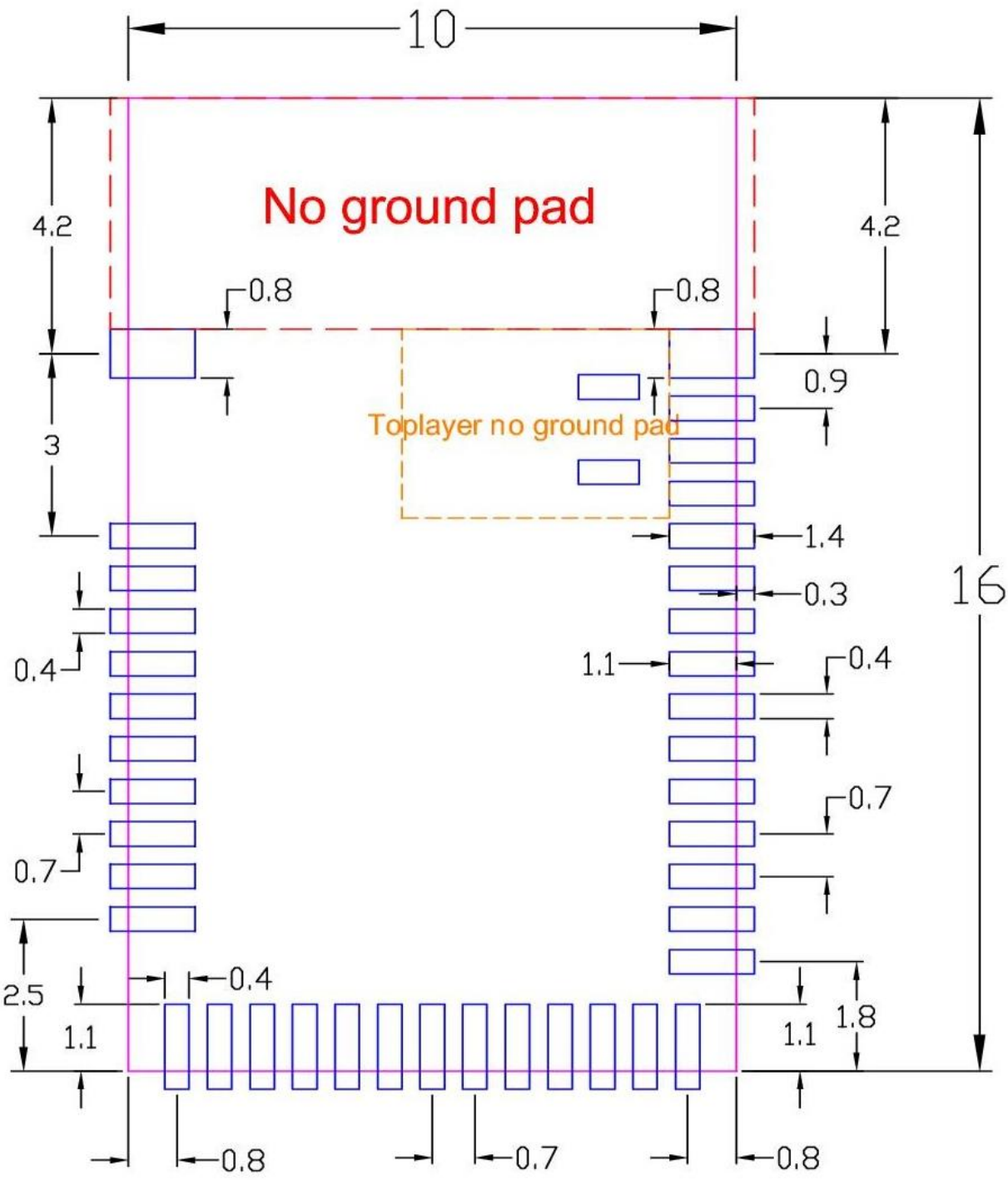


**** Please be careful of the amount of solder paste for P0.23 & P0.24. The module may be lifted due to excess solder. Pads for P0.23 & P0.24 can be omitted when two GPIOs were not used.***

2.2. Recommended Layout of Solder Pad

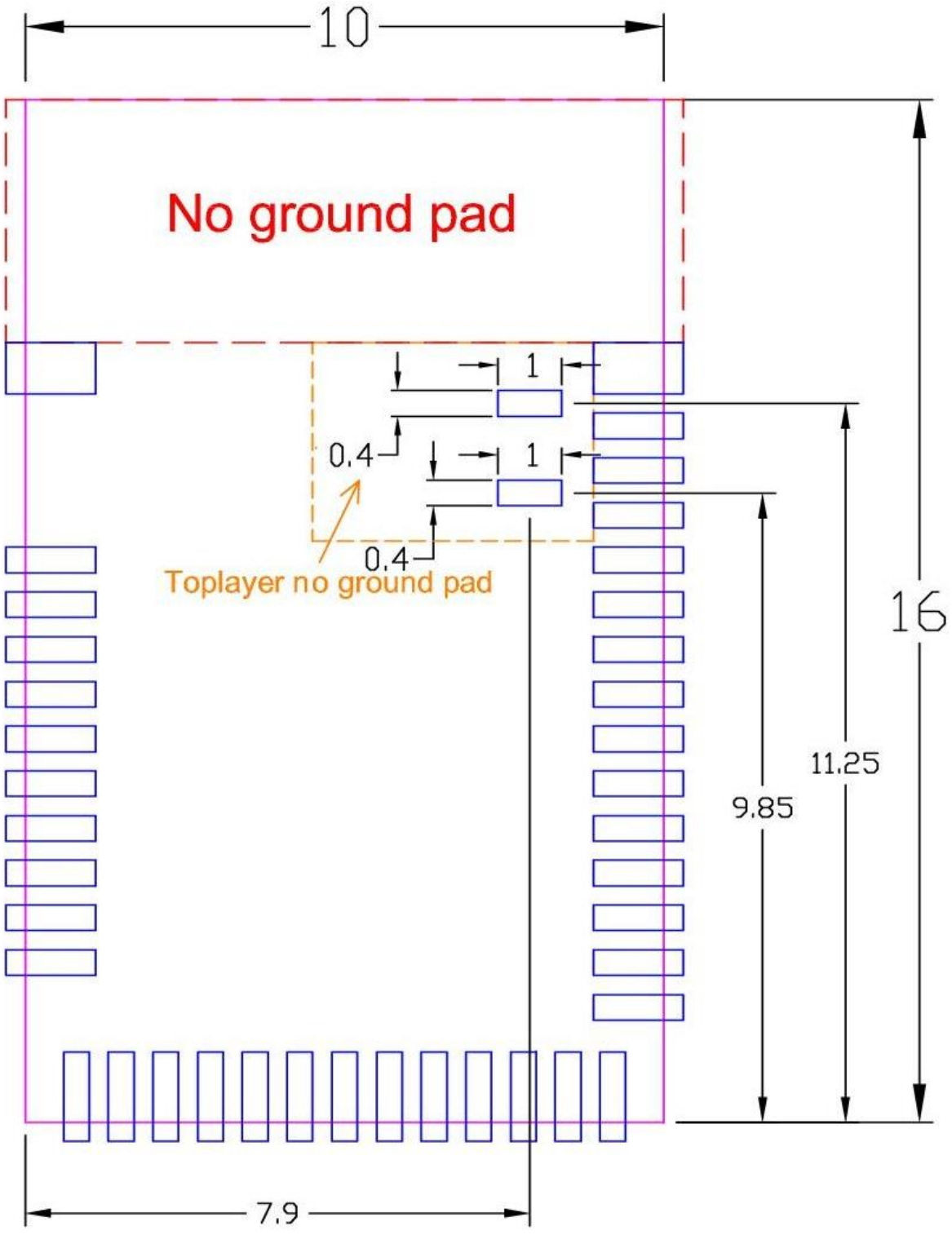
Graphs are all in Top View, Unit in mm.

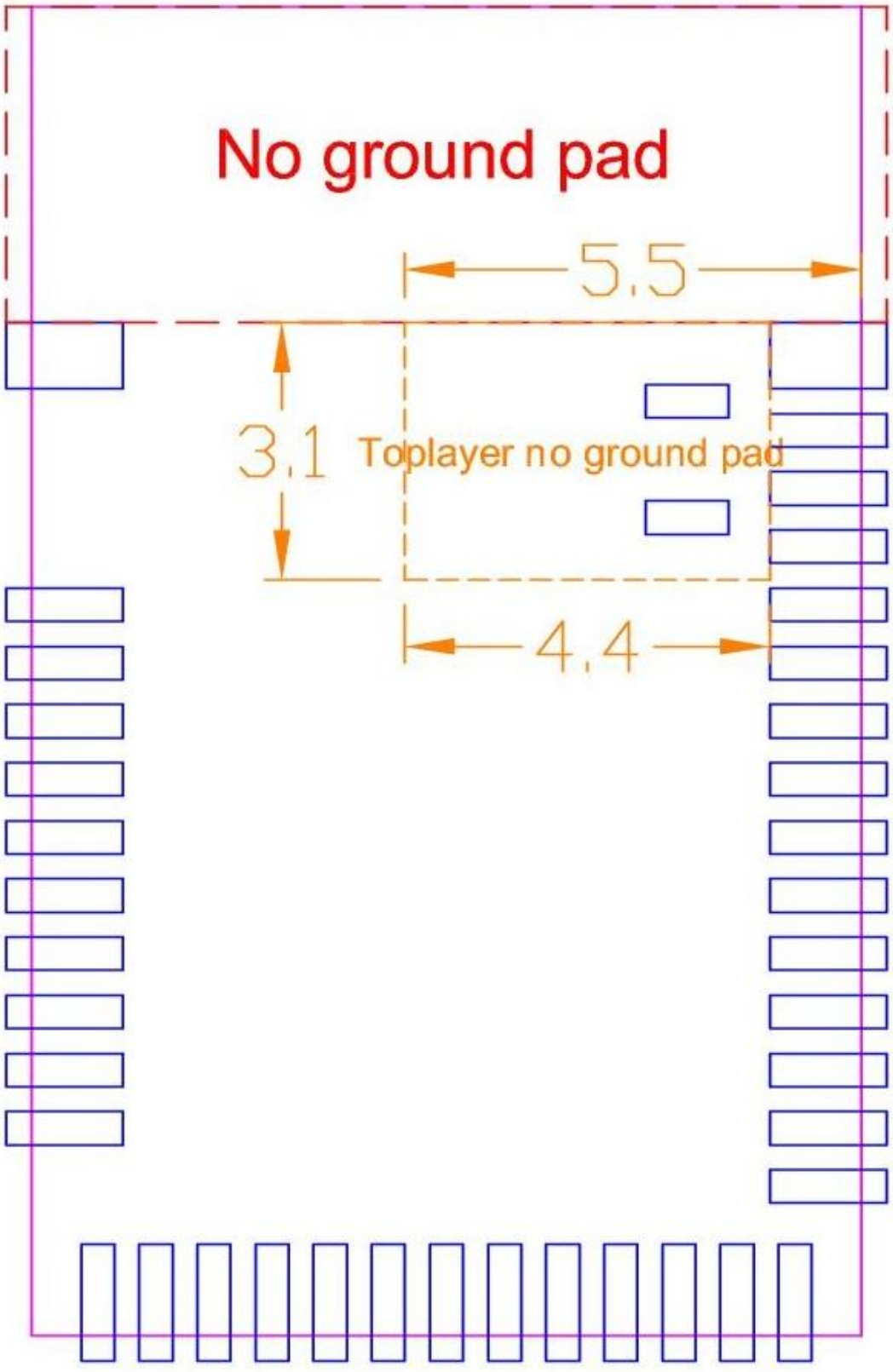




Top View（單位：mm）

recommended solder pad layout


10
No ground pad
1
0.4
1
0.4
Toplayer no ground pad
16
11.25
9.85
7.9

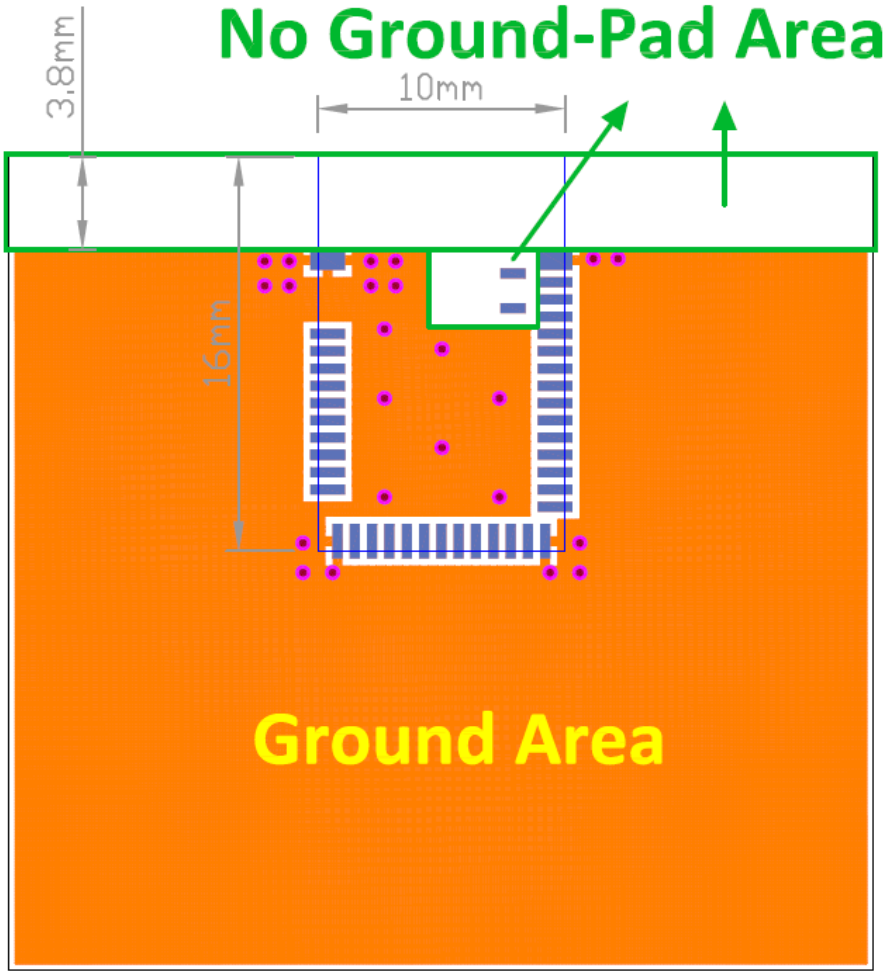


Toplayer no ground pad

2.3. RF Layout Suggestion (aka Keep-Out Area)

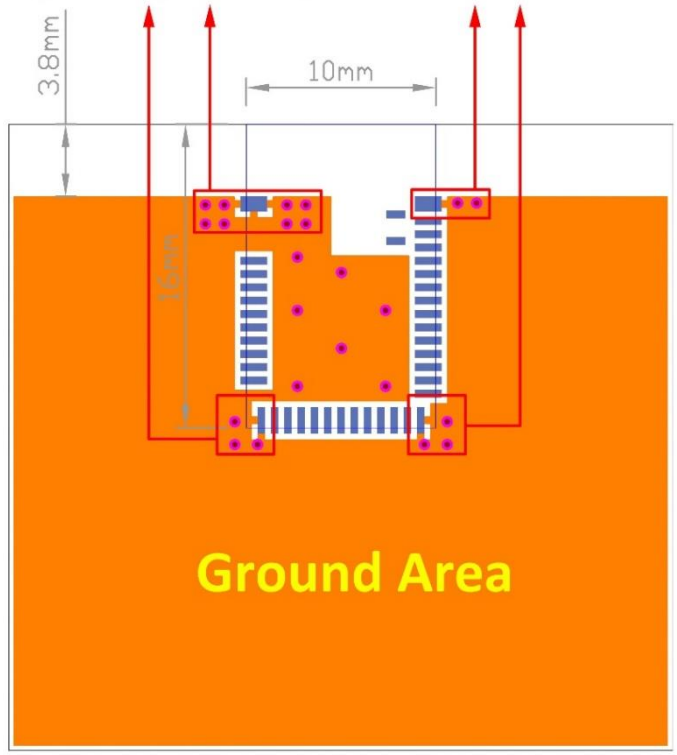
Please follow below instruction to have better wireless performance. Make sure to keep the "No-Ground-Pad" as wider as possible when there is no enough space in your design.

Welcome to send us your layout in PDF for review at service@raytac.com or your contact at Raytac with title "Layout reviewing –Raytac model no.–YOUR company's name".

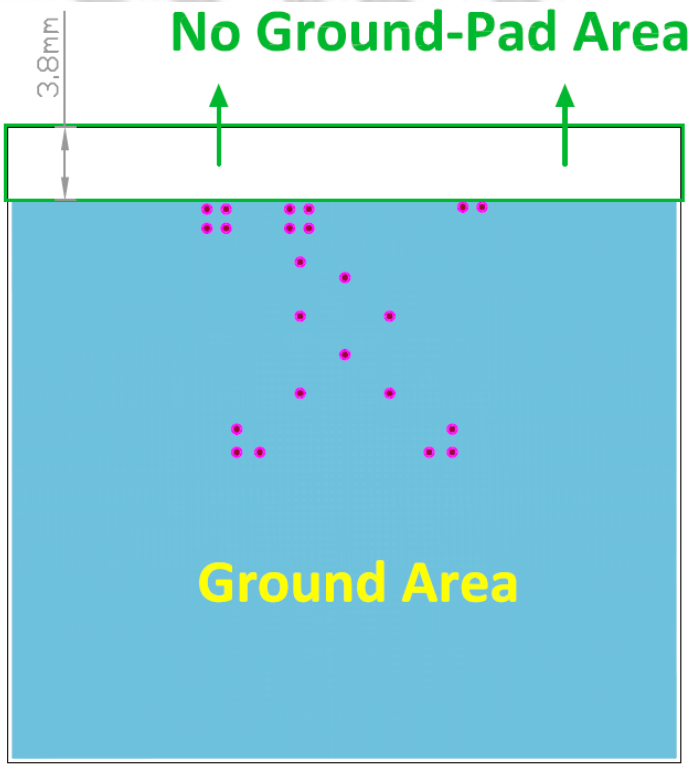


Top layer

Please add via holes in GROUND area as many as possible, especially around the four corners.

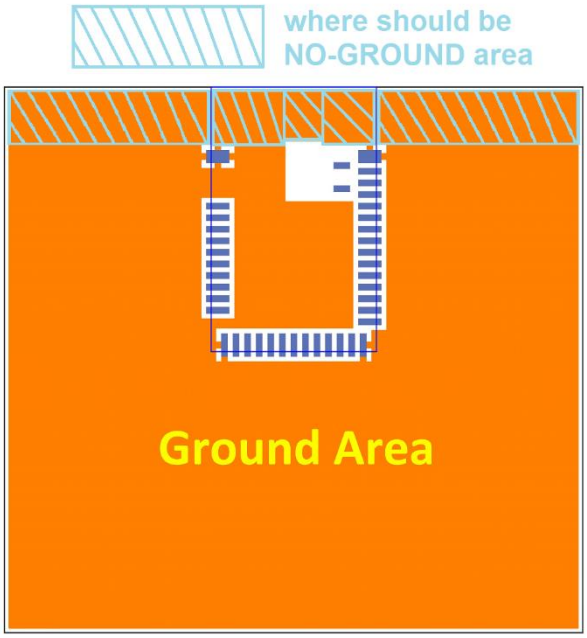


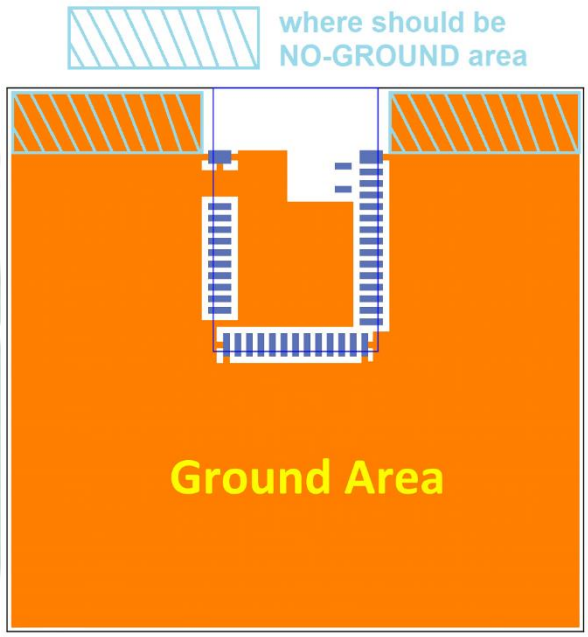
Top layer



Bottom layer

Examples of “**NOT RECOMMENDED**” layout





2.4. Footprint & Design Guide

Please visit “Support” page of our website to download. The package includes footprint, 2D/3D drawing, reflow graph and recommended spec for external 32.768khz.

2.5. Pin Assignment

Pin No.	Name	Pin function	Description
(1)	GND	Ground	The pad must be connected to a solid ground plane
(2)	P0.25	Digital I/O	General-purpose digital I/O
(3)	P0.26	Digital I/O	General-purpose digital I/O
(4)	P0.27	Digital I/O	General-purpose digital I/O
(5)	P0.28	Digital I/O	General-purpose digital I/O
	AIN4	Analog input	SAADC/COMP input
(6)	P0.29	Digital I/O	General-purpose digital I/O
	AIN5	Analog input	SAADC/COMP input
(7)	P0.30	Digital I/O	General-purpose digital I/O
	AIN6	Analog input	SAADC/COMP input
(8)	P0.31	Digital I/O	General-purpose digital I/O
	AIN7	Analog input	SAADC/COMP input
(9)	DEC4	Power	1V3 regulator supply decoupling. Input from DC/DC converter. Output from 1V3 LDO .
(10)	DCC	Power	DC/DC converter output pin
(11)	VDD	Power	Power-supply pin
(12)	GND	Ground	The pad must be connected to a solid ground plane
(13)	P0.00	Digital I/O	General-purpose digital I/O
	XL1	Analog input	Connection to 32.768khz crystal (LFXO)
(14)	P0.01	Digital I/O	General-purpose digital I/O
	XL2	Analog input	Connection to 32.768khz crystal (LFXO)
(15)	P0.02	Digital I/O	General-purpose digital I/O
	AIN0	Analog input	SAADC/COMP input
(16)	P0.03	Digital I/O	General-purpose digital I/O
	AIN1	Analog input	SAADC/COMP input
(17)	P0.04	Digital I/O	General-purpose digital I/O
	AIN2	Analog input	SAADC/COMP input
(18)	P0.05	Digital I/O	General-purpose digital I/O
	AIN3	Analog input	SAADC/COMP input
(19)	P0.06	Digital I/O	General-purpose digital I/O
(20)	P0.07	Digital I/O	General-purpose digital I/O
(21)	P0.08	Digital I/O	General-purpose digital I/O

Pin No.	Name	Pin function	Description
(22)	**P0.09**	Digital I/O	General-purpose digital I/O
(23)	**P0.10**	Digital I/O	General-purpose digital I/O
(24)	**GND**	Ground	The pad must be connected to a solid ground plane
(25)	**P0.11**	Digital I/O	General-purpose digital I/O
(26)	**P0.12**	Digital I/O	General-purpose digital I/O
(27)	**P0.13**	Digital I/O	General-purpose digital I/O
(28)	**P0.14**	Digital I/O	General-purpose digital I/O
(29)	**P0.15**	Digital I/O	General-purpose digital I/O
(30)	**P0.16**	Digital I/O	General-purpose digital I/O
(31)	**P0.17**	Digital I/O	General-purpose digital I/O
(32)	**P0.18**	Digital I/O	General-purpose digital I/O
(33)	**P0.19**	Digital I/O	General-purpose digital I/O
(34)	**P0.20**	Digital I/O	General-purpose digital I/O
(35)	**P0.21**	Digital I/O	General-purpose digital I/O
	RESET		Configurable as system RESET pin
(36)	**SWDCLK**	Digital input	Serial Wire debug clock input for debug and programming
(37)	**SWDIO**	Digital I/O	Serial Wire debug I/O for debug and programming
(38)	**P0.22**	Digital I/O	General-purpose digital I/O
(39)	**GND**	Ground	The pad must be connected to a solid ground plane
(40)	**P0.24**	Digital I/O	General-purpose digital I/O
(41)	**P0.23**	Digital I/O	General-purpose digital I/O

2.6. GPIO Located Near the Radio

The chart identifies some GPIO that have recommended usage. To maximize RF performance, these GPIO are only available to use under low drive, low frequency I/O only, wrong usage may lead to undesirable performance.

GPIO	QFN48 pin	Recommended usage
P0.25	37	Low drive, low frequency I/O only.
P0.26	38	
P0.27	39	
P0.28	40	
P0.29	41	

3. Main Chip Solution

RF IC	Crystal Frequency
Nordic NRF52810	**32MHZ**

32MHz crystal is already inside the module.

4. Shipment Packaging Information

Antenna	Model
Chip/Ceramic Antenna	MDBT42Q-192K
	
PCB/Printed Antenna	MDBT42Q-P192K
	

- Unit Weight of Module:

  MDBT42Q-192K: 0.64g / pc (±0.02g) ; MDBT42Q-P192K: 0.62g / pc (±0.02g)

- Packaging Type: Anti-Static tray only

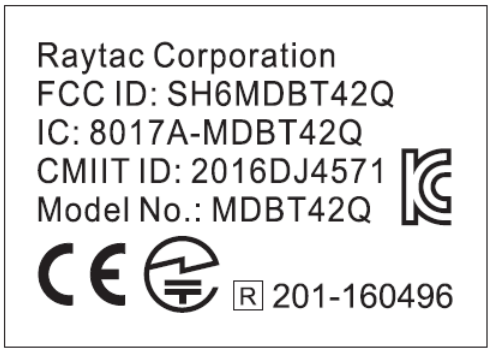
- Minimum Package Quantity (MPQ): 88 pcs per Tray

- Carton Contents: 1,760 pcs per carton (20 Full Tray + 1 Empty Tray)

- Dimension of Carton: (L) 37 x (W) 21 x (H) 13 cm

- Gross Weight: approx. 2.80 kgs per full carton (contains 1,760 pcs)

4.1. Marking on Metal Shielding

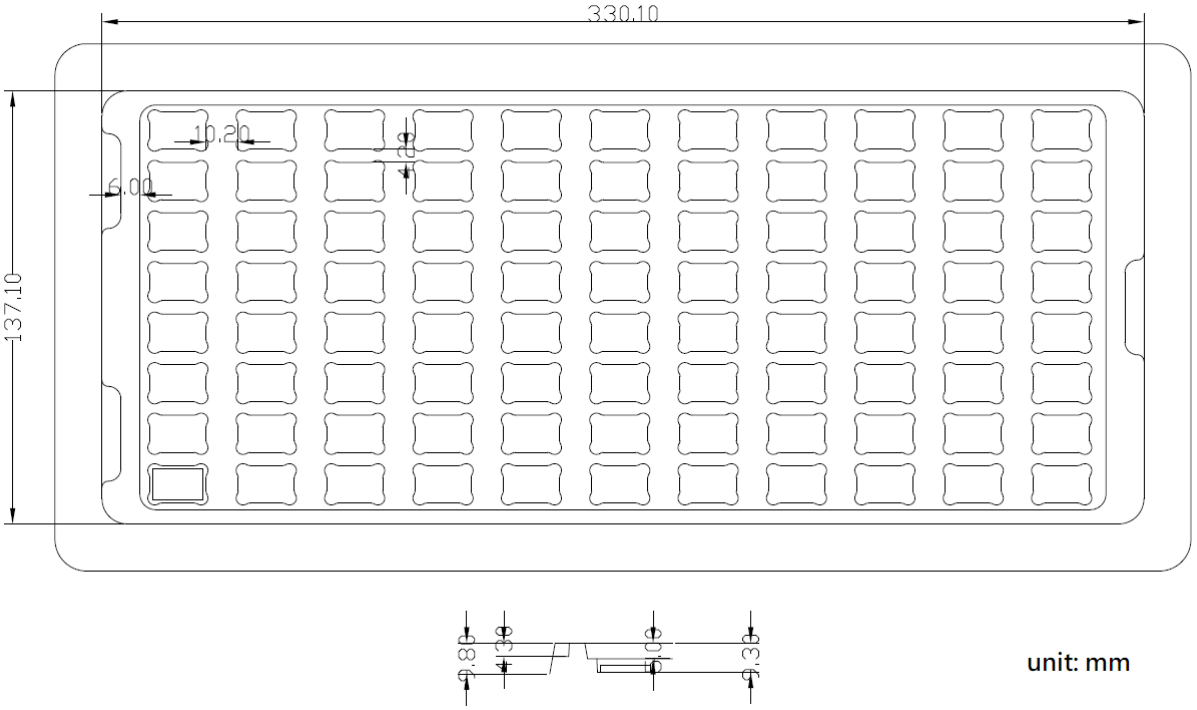


4.2. Color of Solder Mask and Dot Marking

Module(s) with date code “738” would have solder mask (PCB color) in BLUE with one black dot on the lower right corner of the shielding. Batches with other date code are all in GREEN solder mask with no dot marking.

4.3. Tray Info

Anti-static tray is specifically designed for mass production. It can be used directly on SMT automatic machine.



5. Specification

Any technical spec shall refer to Nordic's official documents as final reference. Contents below are from "nRF52810 Product Specification v1.3", please click to download full spec.

5.1. Absolute Maximum Ratings

	Note	Min.	Max.	Unit
Supply voltages				
VDD		-0.3	+3.9	V
VSS			0	V
I/O pin voltage				
$V_{I/O}$, VDD ≤ 3.6 V		-0.3	VDD + 0.3 V	V
$V_{I/O}$, VDD > 3.6 V		-0.3	3.9 V	V
Radio				
RF input level			10	dBm
Environmental QFN package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		2	
ESD HBM	Human Body Model		4	kV
ESD HBM Class	Human Body Model Class		3A	
ESD CDM	Charged Device Model		1	kV
Flash memory				
Endurance		10 000		Write/erase cycles
Retention		10 years at 40°C		

5.2. Operation Conditions

Symbol	Parameter	Min.	Nom.	Max.	Units
VDD	Supply voltage, independent of DCDC enable	1.7	3.0	3.6	V
t_{R_VDD}	Supply rise time (0 V to 1.7 V)			60	ms
TA	Operating temperature	-40	25	85	°C

Important: The on-chip power-on reset circuitry may not function properly for rise times longer than the specified maximum.

5.3. Electrical Specifications

5.3.1. General Radio Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
f_{OP}	Operating frequencies	2360		2500	MHz
$f_{PLL,PROG,RES}$	PLL programming resolution		2		kHz
$f_{PLL,CH,SP}$	PLL channel spacing		1		MHz
$f_{DELTA,1M}$	Frequency deviation @ 1 Mbps		±170		kHz
$f_{DELTA,BLE,1M}$	Frequency deviation @ BLE 1 Mbps		±250		kHz
$f_{DELTA,2M}$	Frequency deviation @ 2 Mbps		±320		kHz
$f_{DELTA,BLE,2M}$	Frequency deviation @ BLE 2 Mbps		±500		kHz
fsk_{SPS}	On-the-air data rate	1		2	Mbps

5.3.2. Radio Current Consumption (Transmitter)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{TX,PLUS4dBM,DCDC}$	TX only run current (DCDC, 3V) P_{RF} =+4 dBm		7.0		mA
$I_{TX,PLUS4dBM}$	TX only run current P_{RF} = +4 dBm		15.4		mA
$I_{TX,0dBM,DCDC}$	TX only run current (DCDC, 3V)P_{RF} = 0dBm		4.6		mA
$I_{TX,0dBM}$	TX only run current P_{RF} = 0dBm		10.1		mA
$I_{TX,MINUS4dBM,DCDC}$	TX only run current DCDC, 3V P_{RF} = -4dBm		3.6		mA
$I_{TX,MINUS4dBM}$	TX only run current P_{RF} = -4 dBm		7.8		mA
$I_{TX,MINUS8dBM,DCDC}$	TX only run current DCDC, 3V P_{RF} = -8 dBm		3.2		mA
$I_{TX,MINUS8dBM}$	TX only run current P_{RF} = -8 dBm		6.8		mA
$I_{TX,MINUS12dBM,DCDC}$	TX only run current DCDC, 3V P_{RF} = -12 dBm		2.9		mA
$I_{TX,MINUS12dBM}$	TX only run current P_{RF} = -12 dBm		6.2		mA
$I_{TX,MINUS16dBM,DCDC}$	TX only run current DCDC, 3V P_{RF} = -16 dBm		2.7		mA
$I_{TX,MINUS16dBM}$	TX only run current P_{RF} = -16 dBm		5.7		mA
$I_{TX,MINUS20dBM,DCDC}$	TX only run current DCDC, 3V P_{RF} = -20 dBm		2.5		mA
$I_{TX,MINUS20dBM}$	TX only run current P_{RF} = -20 dBm		5.4		mA
$I_{TX,MINUS40dBM,DCDC}$	TX only run current DCDC, 3V P_{RF} = -40 dBm		2.1		mA
$I_{TX,MINUS40dBM}$	TX only run current P_{RF} = -40 dBm		4.3		mA

5.3.3. Radio Current Consumption (Receiver)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{RX,1M,DCDC}$	RX only run current (DCDC, 3V) 1 Mbps / 1 Mbps BLE		4.6		mA
$I_{RX,1M}$	RX only run current 1 Mbps / 1 Mbps BLE		10.0		mA
$I_{RX,2M,DCDC}$	RX only run current (DCDC, 3V) 2 Mbps / 2 Mbps BLE		5.2		mA
$I_{RX,2M}$	RX only run current 2 Mbps / 2 Mbps BLE		11.2		mA
$I_{START,RX,1M,DCDC}$	RX start-up current (DCDC, 3 V) 1 Mbps / 1 Mbps BLE		3.5		mA
$I_{START,RX,1M}$	RX start-up current 1 Mbps / 1 Mbps BLE		6.7		mA

5.3.4. Transmitter Specification

Symbol	Description	Min.	Typ.	Max.	Units
P_{RF}	Maximum output power		4	8	dBm
P_{RFC}	RF power control range		24		dB
P_{RFCR}	RF power accuracy			±4	dB
$P_{RF1,1}$	1st Adjacent Channel Transmit Power 1 MHz (1 Mbps)		-25		dBc
$P_{RF2,1}$	2nd Adjacent Channel Transmit Power 2 MHz (1 Mbps)		-50		dBc
$P_{RF1,2}$	1st Adjacent Channel Transmit Power 2 MHz (2 Mbps)		-25		dBc
$P_{RF2,2}$	2nd Adjacent Channel Transmit Power 4 MHz (2 Mbps)		-50		dBc

5.3.5. Receiver Operation

Symbol	Description	Min.	Typ.	Max.	Units
$P_{RX,MAX}$	Maximum received signal strength at < 0.1% BER		0		dBm
$P_{SENS,IT,1M}$	Sensitivity, 1 Mbps nRF mode[1]		-93		dBm
$P_{SENS,IT,SP,1M,BLE}$	Sensitivity, 1 Mbps BLE ideal transmitter, <=37 bytes BER=1E-3[2]		-96		dBm
$P_{SENS,IT,LP,1M,BLE}$	Sensitivity, 1 Mbps BLE ideal transmitter >=128 bytes BER=1E-4[3]		-95		dBm
$P_{SENS,IT,2M}$	Sensitivity, 2 Mbps nRF mode[4]		-89		dBm
$P_{SENS,IT,SP,2M,BLE}$	Sensitivity, 2 Mbps BLE ideal transmitter, Packet length <=37bytes		-93		dBm

1. Typical sensitivity applies when ADDR0 is used for receiver address correlation. When ADDR [1...7] are used for receiver address correlation, the typical sensitivity for this mode is degraded by 3dB.
2. As defined in the Bluetooth Core Specification v4.0 Volume 6: Core System Package (Low Energy Controller Volume).
3. Equivalent BER limit < 10E-04.
4. Same as remark 1.

5.3.6. RX Selectivity

Symbol	Description	Min.	Typ.	Max.	Units
$C/I_{1M,co\text{-}channel}$	1 Mbps mode, Co-Channel interference		9		dB
$C/I_{1M,-1MHz}$	1 Mbps mode, Adjacent (-1 MHz) interference		-2		dB
$C/I_{1M,+1MHz}$	1 Mbps mode, Adjacent (+1 MHz) interference		-10		dB
$C/I_{1M,-2MHz}$	1 Mbps mode, Adjacent (-2 MHz) interference		-19		dB
$C/I_{1M,+2MHz}$	1 Mbps mode, Adjacent (+2 MHz) interference		-42		dB
$C/I_{1M,-3MHz}$	1 Mbps mode, Adjacent (-3 MHz) interference		-38		dB
$C/I_{1M,+3MHz}$	1 Mbps mode, Adjacent (+3 MHz) interference		-48		dB
$C/I_{1M,\pm6MHz}$	1 Mbps mode, Adjacent (≥6 MHz) interference		-50		dB
$C/I_{1MBLE,co\text{-}channel}$	1 Mbps BLE mode, Co-Channel interference		6		dB
$C/I_{1MBLE,-1MHz}$	1 Mbps BLE mode, Adjacent (-1 MHz) interference		-2		dB
$C/I_{1MBLE,+1MHz}$	1 Mbps BLE mode, Adjacent (+1 MHz) interference		-9		dB
$C/I_{1MBLE,-2MHz}$	1 Mbps BLE mode, Adjacent (-2 MHz) interference		-22		dB
$C/I_{1MBLE,+2MHz}$	1 Mbps BLE mode, Adjacent (+2 MHz) interference		-46		dB
$C/I_{1MBLE,>3MHz}$	1 Mbps BLE mode, Adjacent (≥3 MHz) interference		-50		dB
$C/I_{1MBLE,image}$	Image frequency Interference		-22		dB
$C/I_{1MBLE,image,1MHz}$	Adjacent (1 MHz) interference to in-band image frequency		-35		dB
$C/I_{2M,co\text{-}channel}$	2 Mbps mode, Co-Channel interference		10		dB
$C/I_{2M,-2MHz}$	2 Mbps mode, Adjacent (-2 MHz) interference		6		dB
$C/I_{2M,+2MHz}$	2 Mbps mode, Adjacent (+2 MHz) interference		-14		dB
$C/I_{2M,-4MHz}$	2 Mbps mode, Adjacent (-4 MHz) interference		-20		dB
$C/I_{2M,+4MHz}$	2 Mbps mode, Adjacent (+4 MHz) interference		-44		dB
$C/I_{2M,-6MHz}$	2 Mbps mode, Adjacent (-6 MHz) interference		-42		dB
$C/I_{2M,+6MHz}$	2 Mbps mode, Adjacent (+6 MHz) interference		-47		dB
$C/I_{2M,\geq12MHz}$	2 Mbps mode, Adjacent (≥12 MHz) interference		-52		dB

Remark: Wanted signal level at PIN = -67 dBm. One interferer is used, having equal modulation as the wanted signal. The input power of the interferer where the sensitivity equals BER = 0.1% is presented.

5.3.7. RX Intermodulation

Symbol	Description	Min.	Typ.	Max.	Units
$P_{IMD,5TH,1M}$	IMD performance, 1 Msps, 5th offset channel, Packet length <= 37 bytes		-33		dBm
$P_{IMD,5TH,1M,BLE}$	IMD performance, BLE 1 Msps, 5th offset channel, Packet length <= 37 bytes		-30		dBm
$P_{IMD,5TH,2M}$	IMD performance, 2 Msps, 5th offset channel, Packet length <= 37 bytes		-33		dBm
$P_{IMD,5TH,2M,BLE}$	IMD performance, BLE 2 Msps, 5th offset channel, Packet length <= 37 bytes		-31		dBm

Remark: Wanted signal level at PIN = -64dBm. Two interferers with equal input power are used. The interferer closest in frequency is not modulated, the other interferer is modulated equal with the wanted signal. The input power of the interferers where the sensitivity equals BER = 0.1% is presented.

5.3.8. Radio Timing Parameters

Symbol	Description	Min.	Typ.	Max.	Units
t_{TXEN}	Time between TXEN task and READY event after channel FREQUENCY configured. Compatible with old devices.	140		140	µs
$t_{TXEN,FAST}$	Time between TXEN task and READY event after channel FREQUENCY configured (Fast Mode)	40		40	µs
$t_{TXDISABLE,1M}$	Time between DISABLE task and DISABLED event when the radio was in TX for MODE = Nrf_1Mbit and MODE = Ble_1Mbit	6		6	µs
$t_{TXDISABLE,2M}$	Time between DISABLE task and DISABLED event when the radio was in TX and mode is set to 2 Mbps	4		4	µs
t_{RXEN}	Time between the RXEN task and READY event after channel FREQUENCY configured in default mode. Compatible with old devices.	140		140	µs
$t_{RXEN,FAST}$	Time between the RXEN task and READY event after channel FREQUENCY configured in fast mode	40		40	µs
t_{SWITCH}	The minimum time taken to switch from RX to TX or TX to RX when channel FREQUENCY unchanged		20		µs
$t_{RXDISABLE}$	Time between DISABLE task and DISABLED event when the radio was in RX	0		0	µs
$t_{TXCHAIN}$	Digital propagation delay (in radio only) when transmitting. Does not include EasyDMA access time.		0.6		µs
$t_{RXCHAIN}$	Digital propagation delay (in radio only) when receiving. Does not include EasyDMA access time.		9.4		µs
$t_{RXCHAIN,2M}$	Digital propagation delay in 2 Mbps mode (radio only) when receiving. Does not include EasyDMA access time.		5		µs

5.3.9. RSSI Specifications

Symbol	Description	Min.	Typ.	Max.	Units
$RSSI_{ACC}$	RSSI Accuracy Valid range -90 to -20 dBm		±2		dB
$RSSI_{RESOLUTION}$	RSSI resolution		1		dB
$RSSI_{PERIOD}$	Sample period		0.25		us

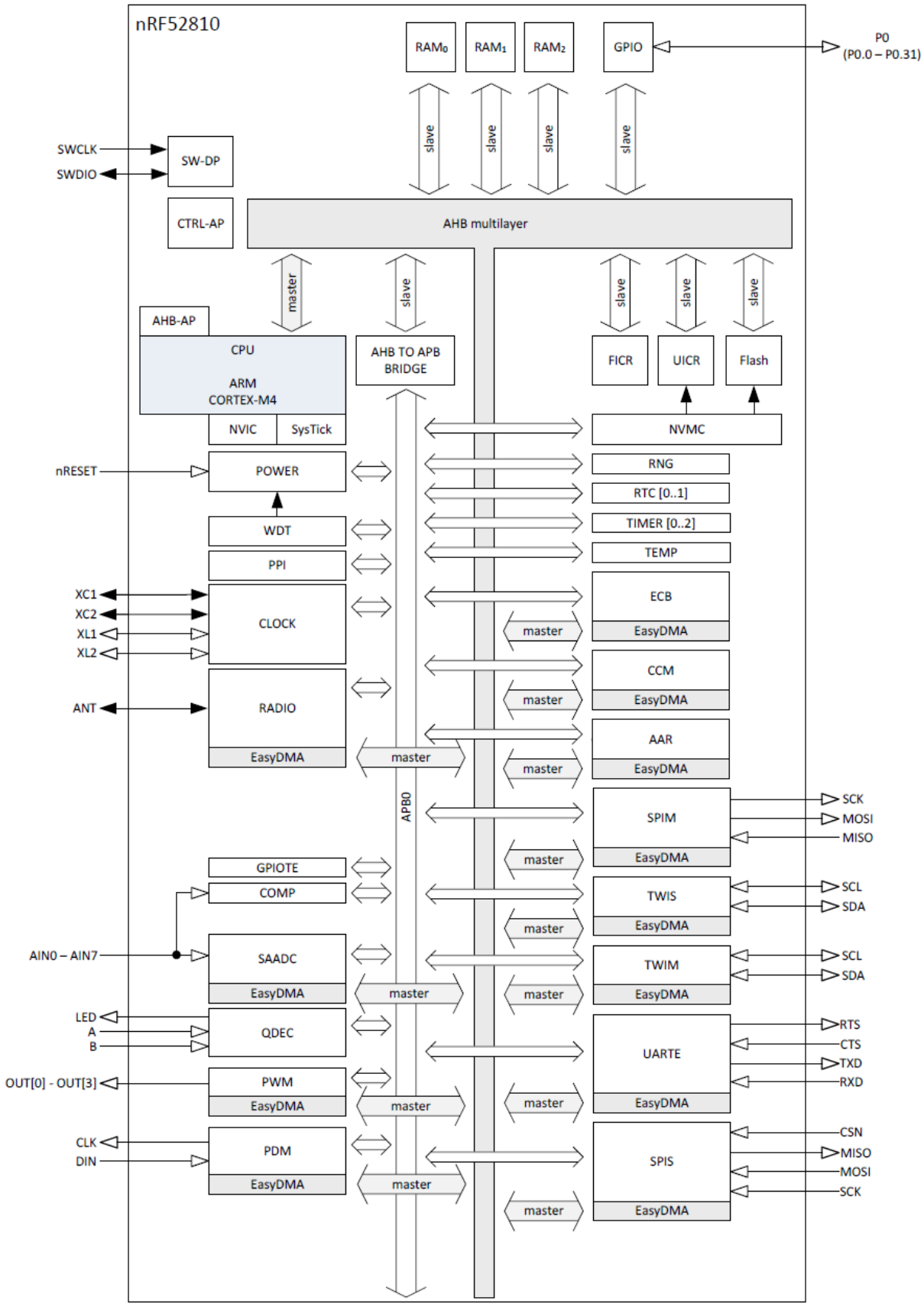
5.3.10. CPU

Symbol	Description	Min.	Typ.	Max.	Units
W_{FLASH}	CPU wait states, running from flash	0		2	
W_{RAM}	CPU wait states, running from RAM			0	
CM_{FLASH}	CoreMark[1], running from flash		144		CoreMark
$CM_{FLASH/MHz}$	CoreMark per MHz, running from flash		2.25		CoreMark/MHz
$CM_{FLASH/mA}$	CoreMark per mA, running from flash, DCDC 3V		65		CoreMark/mA

5.3.11. Power Management

Symbol	Description	Min.	Typ.	Max.	Units
$I_{ON\_RAMOFF\_EVENT}$	System ON, No RAM retention, Wake on any event		0.6		µA
$I_{ON\_RAMON\_EVENT}$	System ON, Full 24 kB RAM retention, Wake on any event		0.8		µA
$I_{ON\_RAMON\_POF}$	System ON, Full 24 kB RAM retention, Wake on any event, Power fail comparator enabled		0.8		µA
$I_{ON\_RAMON\_GPIOTE}$	System ON, Full 24 kB RAM retention, Wake on GPIOTE input (Event mode)		3.3		µA
$I_{ON\_RAMON\_GPIOTEPORT}$	System ON, Full 24 kB RAM retention, Wake on GPIOTE PORT event		0.8		µA
$I_{ON\_RAMON\_RTC}$	System ON, Full 24 kB RAM retention, Wake on RTC (running from LFRC clock)		1.5		µA
$I_{ON\_RAMOFF\_RTC}$	System ON, No RAM retention, Wake on RTC (running from LFRC clock)		1.4		µA
$I_{ON\_RAMON\_RTC\_LFXO}$	System ON, Full 24 kB RAM retention, Wake on RTC (running from LFXO clock)		1.1		µA
$I_{ON\_RAMOFF\_RTC\_LFXO}$	System ON, No RAM retention, Wake on RTC (running from LFXO clock)		1.0		µA
$I_{OFF\_RAMOFF\_RESET}$	System OFF, No RAM retention, Wake on reset		0.3		µA
$I_{OFF\_RAMON\_RESET}$	System OFF, Full 24 kB RAM retention, Wake on reset		0.5		µA

6. Block Diagram



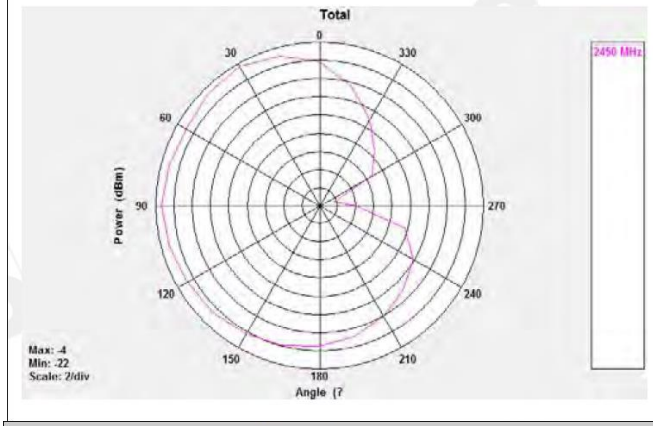
7. Antenna

7.1. MDBT42Q Series

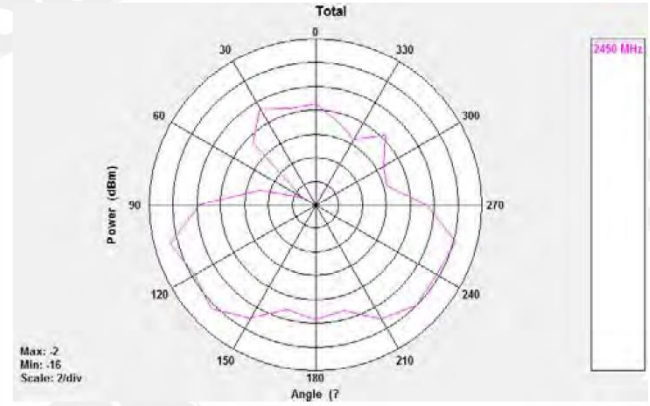
Test Result

Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Gain (dBi)	-3.68	-2.91	-2.34	-1.98	-1.66	-1.60	-1.77	-2.09	-2.60	-3.35	-4.10
Peak EIRP (dBm)	-3.68	-2.91	-2.34	-1.98	-1.66	-1.60	-1.77	-2.09	-2.60	-3.35	-4.10
Directivity (dBi)	4.98	5.11	5.12	5.02	4.93	4.76	4.58	4.38	4.11	3.77	3.42

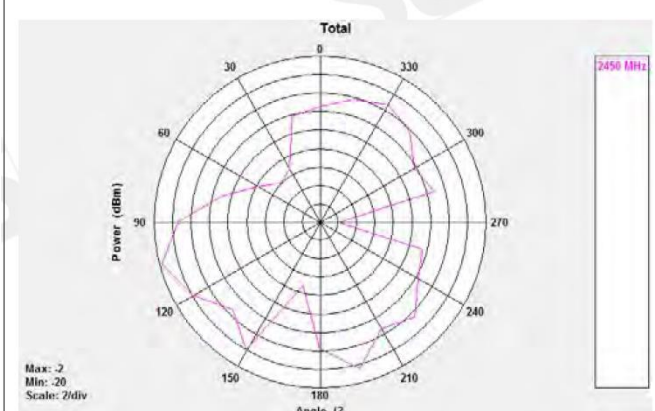
Free Space
EIRP (2450 MHz) – XY cut



Free Space
EIRP (2450 MHz) – XZ cut



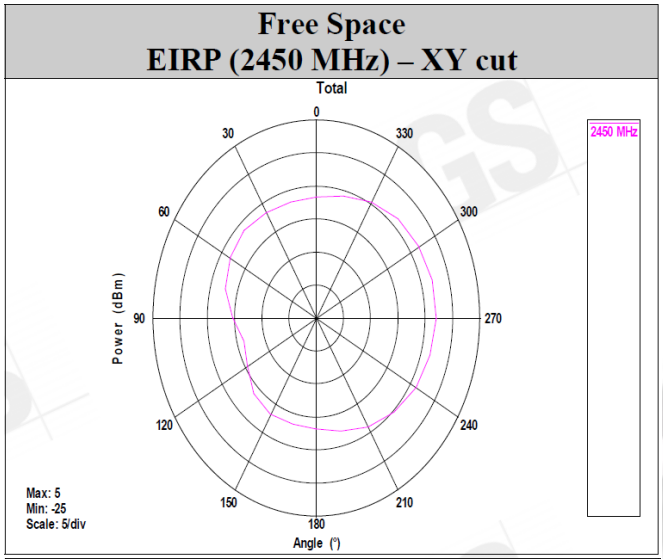
Free Space
EIRP (2450 MHz) – YZ cut

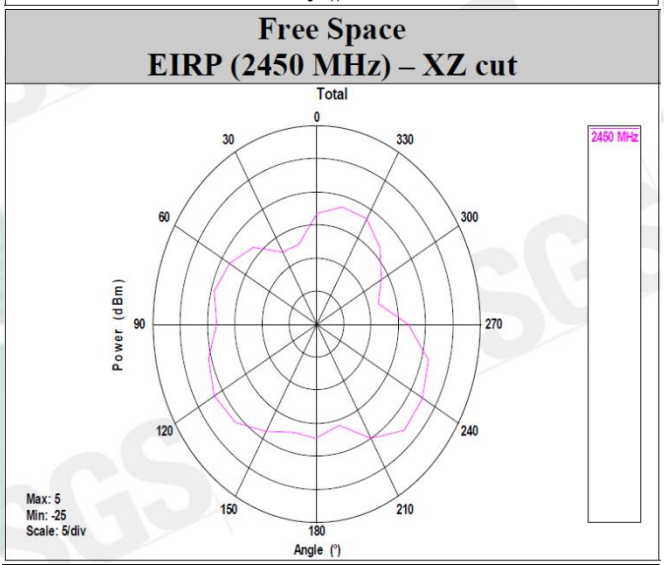


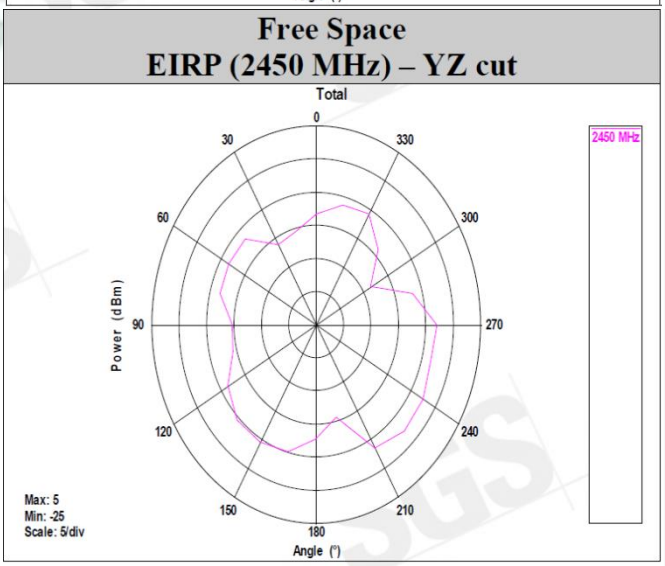
7.2. MDBT42Q-P Series

Test Result

Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Gain (dBi)	-3.87	-3.06	-2.31	-2.01	-2.04	-2.31	-2.24	-1.96	-1.61	-1.71	-1.97
Peak EIRP (dBm)	-3.87	-3.06	-2.31	-2.01	-2.04	-2.31	-2.24	-1.96	-1.61	-1.71	-1.97
Directivity (dBi)	3.79	4.00	4.25	4.17	3.86	3.51	3.54	3.91	4.39	4.44	4.49







8. Reference Circuit

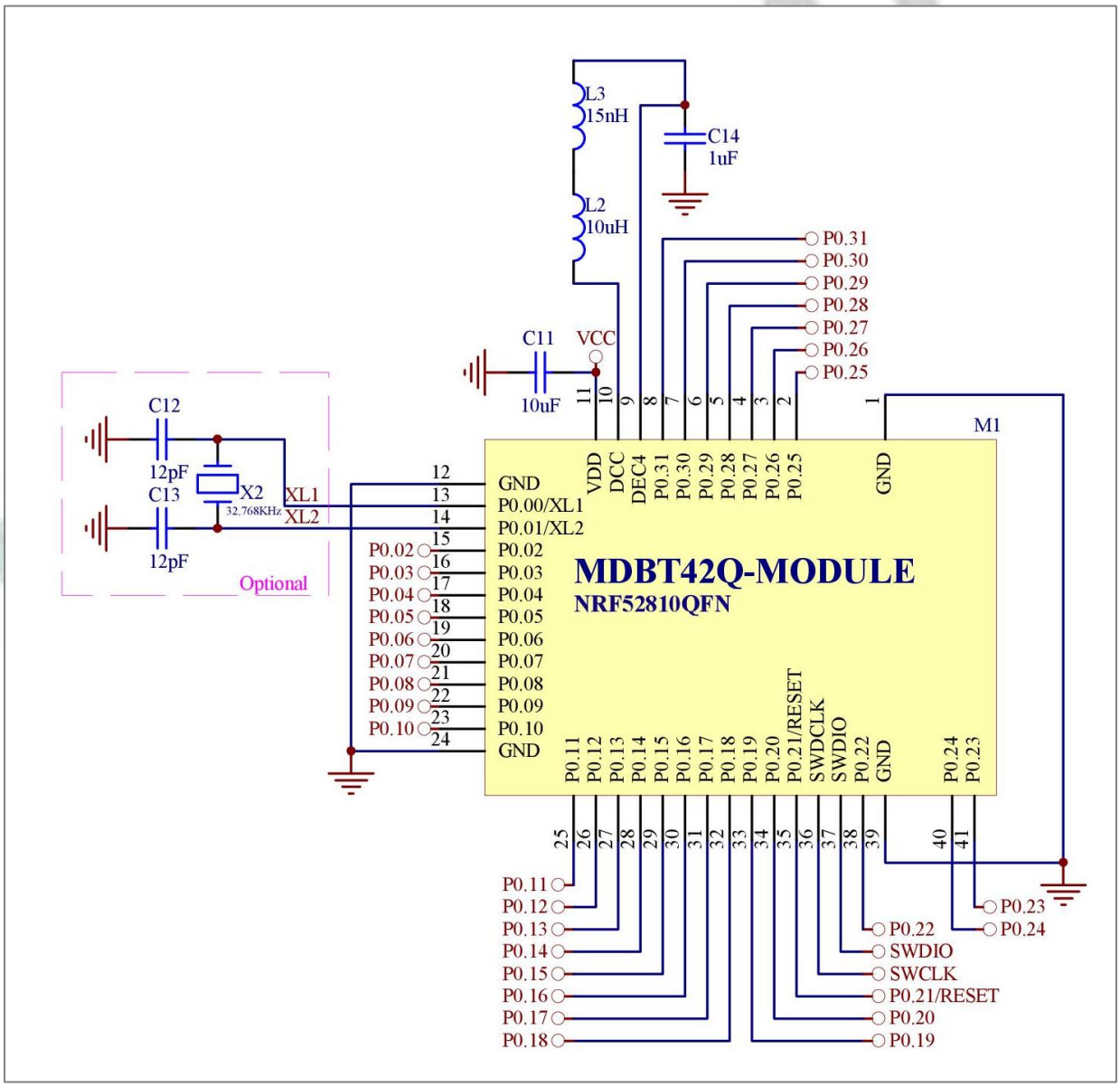
Module is pre-programmed with Raytac's testing code. Default is using "LDO mode" and needs external 32.768khz to work.

REMARK:

***** DEC4 decoupling capacitor (1μF) is already inside the module. *****

***** When using DC-DC mode, please remove L2 / L3 / C14. *****

***** When using internal 32.768khz RC oscillator, please remove X2 / C12 / C13. *****



9. Certification

9.1. Declaration ID

QDL Bluetooth® qualified design listing

The Bluetooth SIG Hereby Recognizes

Raytac Corporation
Member Company

MDBT42 Series nRF52 Bluetooth Low Energy Module
Qualified Design Name

Declaration ID: D033661
Qualified Design ID: 91882
Specification Name: 4.2
Project Type: End Product
Model Number: MDBT42/MDBT42-P/MDBT42Q/MDBT42Q-P/MDBT42V/MDBT42V-P
Listing Date: 29 December 2016
Assessment Date: 29 December 2016
Hardware Version Number: V1
Software Version Number:

This certificate acknowledges the *Bluetooth*® Specifications declared by the member are achieved in accordance with the Bluetooth Qualification Process as specified within the Bluetooth Specifications and as required within the current PRD

Bluetooth®

QDL Bluetooth® qualified design listing

The Bluetooth SIG Hereby Recognizes

Raytac Corporation
Member Company

Multiprofile Subsystem for MDBTXX series module
Qualified Design Name

Declaration ID: D033622
Qualified Design ID: 91659
Specification Name: 4.2
Project Type: Profile Subsystem
Model Number: Multiprofile Subsystem for MDBTXX series module
Listing Date: 19 December 2016
Assessment Date: 19 December 2016
Hardware Version Number: NA
Software Version Number: 1

This certificate acknowledges the *Bluetooth*® Specifications declared by the member are achieved in accordance with the Bluetooth Qualification Process as specified within the Bluetooth Specifications and as required within the current PRD

Bluetooth®

QDL Bluetooth® qualified design listing

The Bluetooth SIG Hereby Recognizes

Raytac Corporation
Member Company

nRF52xxx Bluetooth Module
Qualified Design Name

Declaration ID: D036781
Qualified Design ID: 100551
Specification Name: 5.0
Project Type: End Product
Model Number: MDBT42/MDBT42-P/MDBT42Q/MDBT42Q-P/MDBT42V/MDBT42V-P
Listing Date: 30 August 2017
Assessment Date: 30 August 2017
Hardware Version Number: 1
Software Version Number: 2

This certificate acknowledges the *Bluetooth*® Specifications declared by the member are achieved in accordance with the Bluetooth Qualification Process as specified within the Bluetooth Specifications and as required within the current PRD

Bluetooth®

9.2. FCC Certificate (USA)

BLE 4.2

telefication

TCB

GRANT OF EQUIPMENT AUTHORIZATION
Certification
Issued Under the Authority of the
Federal Communications Commission
By:

TCB

Telefication B.V.
Edisonstraat 12a
Zevenaar, NL-6902 PK
Netherlands

Date of Grant: 02/21/2017

Application
Dated: 02/21/2017

Raytac Corp.
5F., No.3, Jiankang Rd., Zhonghe Dist.,
New Taipei City,, 23586
Taiwan

Attention: Venson Liao , R&D Manager

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER:	SH6MDBT42Q
Name of Grantee:	Raytac Corp.
Equipment Class:	**Digital Transmission System**
Notes:	**BT 4.2 Module**
Modular Type:	**Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	**2402.0 - 2480.0**	**0.0023**		

C2PC: To change module to be certified under portable device.
Power output listed is conducted. This grant is valid only when the module is sold to OEM integrators and must be installed by the OEM or OEM integrators. The antenna's as listed in this application must not be co-located or operating in conjunction with any other antenna or transmitter. End-users may not be provided with the module installation instructions. OEM integrators and end-users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

Certificate No.: 162181172/AA/01	Mohammad Elhaj Product Assessor	

BLE 5.0

telefication

TCB

GRANT OF EQUIPMENT AUTHORIZATION

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

TCB

Telefication B.V.
Edisonstraat 12a
Zevenaar, NL-6902 PK
Netherlands

Date of Grant: 01/02/2018

Application
Dated: 12/18/2017

Raytac Corp.
5F., No.3, Jiankang Rd., Zhonghe Dist.,
New Taipei City,. 23586
Taiwan

Attention: Venson Liao , R&D Manager

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER:	SH6MDBT42Q
Name of Grantee:	Raytac Corp.
Equipment Class:	**Digital Transmission System**
Notes:	**BLE Module**
Modular Type:	**Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Emission Tolerance Designator
	15C	**2402.0 - 2480.0**	**0.0023**	

C2PC: add BT5.0 by Firmware and change product name to BLE module from BT 4.2 module. To change module to be certified under portable device.
Power output listed is conducted. This grant is valid only when the module is sold to OEM integrators and must be installed by the OEM or OEM integrators. The antenna's as listed in this application must not be co-located or operating in conjunction with any other antenna or transmitter. End-users may not be provided with the module installation instructions. OEM integrators and end-users must be provided with transmitter operating conditions for satisfying RF exposure compliance.

Certificate No.: 162181172/AA/02	George Lo Product Assessor	George Lo

9.3. TELEC Certificate (Japan)

BLE 4.2

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The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

Certificate

of

Radio Equipment in JAPAN

No: 201-160496 / 00

Telefication, operating as Conformity Assessment Body (CAB ID Number: 201) with respect to Japan, declares that the listed product complies with the Technical Regulations Conformity Certification of Terminal equipment (ordinance of MPT N° 31,1984)

Product description: **BT 4.2 Module**
Trademark: **Raytac**
Type designation: **MDBT42Q**
Hardware / Software version: **1 / 1**
Variants: **See Annex 3**

Manufacturer: **Raytac Corporation**
Address: **5F, No.3, Jiankang Rd., Zhonghe Dist.,**
City: **New Taipei 23586**
Country: **Taiwan**

This statement is granted to:

Name: **Raytac Corporation**
Address: **5F, No.3, Jiankang Rd., Zhonghe Dist.,**
City: **New Taipei 23586**
Country: **Taiwan**

This statement has THREE Annexes.

Zevenaar, 19 August 2016

CAB

Ramy Nabod
Product Assessor

PRODUCTS
RvA C 224

BLE 5.0

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The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

Certificate

of

Radio Equipment in JAPAN

No: 201-160496 / 02

Telefication, operating as Conformity Assessment Body (CAB ID Number: 201) with respect to Japan, declares that the listed product complies with the Technical Regulations Conformity Certification of Specified Radio equipment (ordinance of MPT N° 37,1981)

Product description: **BLE Module**
Trademark: **Raytac**
Type designation: **MDBT42Q**
Hardware / Software version: **1 / 1**
Variants: **See Annex 3**

Manufacturer: **Raytac Corporation**
Address: **5F, No. 3, Jiankang Rd., Zhonghe Dist.**
City: **23586 New Taipei City**
Country: **Taiwan**

This certificate is granted to:

Name: **Raytac Corporation**
Address: **5F, No. 3, Jiankang Rd., Zhonghe Dist.**
City: **23586 New Taipei City**
Country: **Taiwan**

This certificate has THREE Annexes.

Zevenaar, 23 May 2019

CAB

David Chen

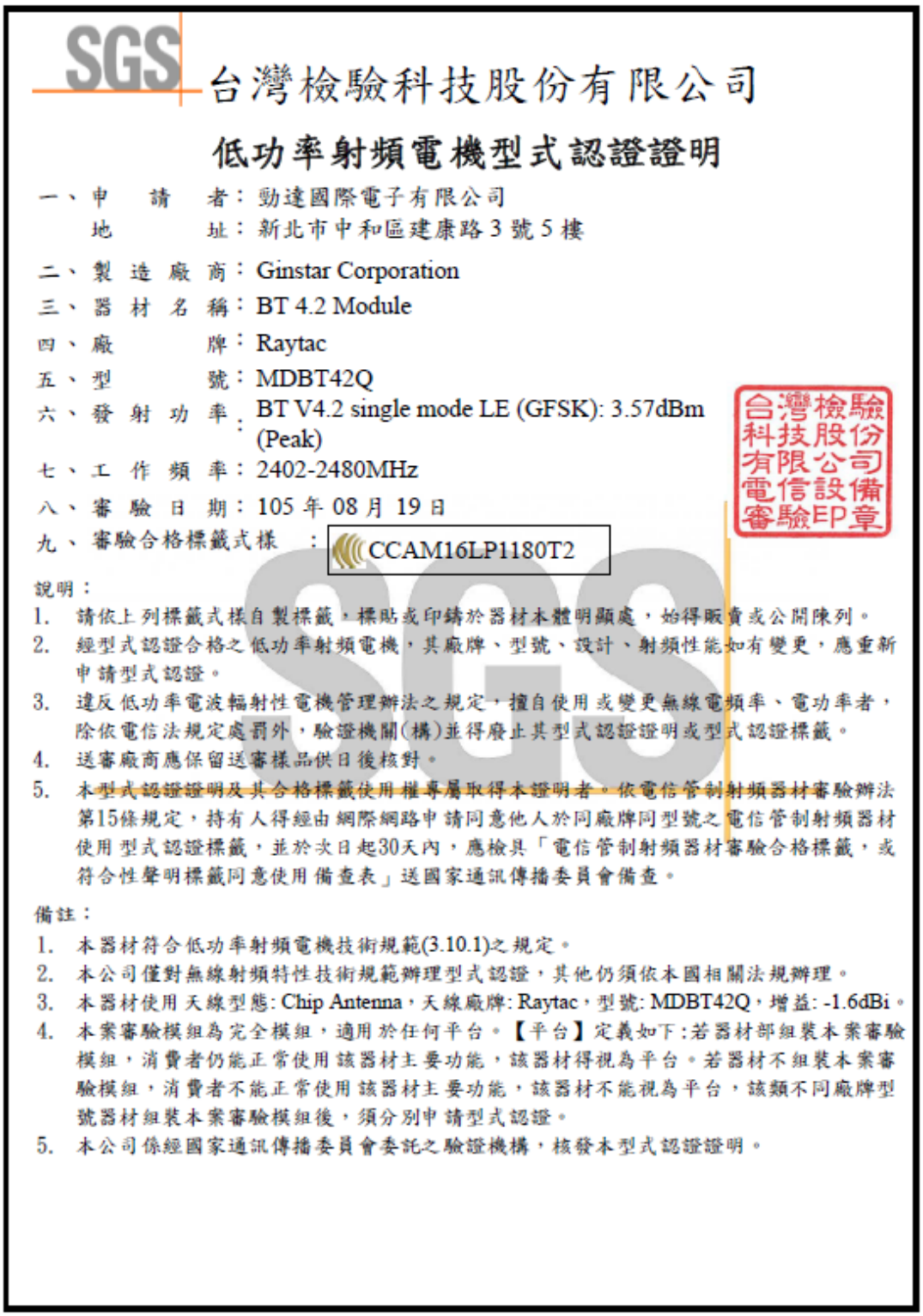
David Chen
Product Assessor

PRODUCTS
RvA C 224

9.4. NCC Certificate (Taiwan)

MDBT42Q Series

BLE 4.2



SGS 台灣檢驗科技股份有限公司

低功率射頻電機型式認證證明

一、申請者地址：勁達國際電子有限公司 新北市中和區建康路 3 號 5 樓

二、製造廠商：Ginstar Corporation

三、器材名稱：BT 4.2 Module

四、廠牌：Raytac

五、型號：MDBT42Q

六、發射功率：BT V4.2 single mode LE (GFSK): 3.57dBm (Peak)

七、工作頻率：2402-2480MHz

八、審驗日期：105 年 08 月 19 日

九、審驗合格標籤式樣：CCAM16LP1180T2

台灣檢驗科技股份有限公司 電信設備審驗印章

說明：

1. 請依上列標籤式樣自製標籤，標貼或印鑄於器材本體明顯處，始得販賣或公開陳列。
2. 經型式認證合格之低功率射頻電機，其廠牌、型號、設計、射頻性能如有變更，應重新申請型式認證。
3. 違反低功率電波輻射性電機管理辦法之規定，擅自使用或變更無線電頻率、電功率者，除依電信法規定處罰外，驗證機關(構)並得廢止其型式認證證明或型式認證標籤。
4. 送審廠商應保留送審樣品供日後核對。
5. 本型式認證證明及其合格標籤使用權專屬取得本證明者。依電信管制射頻器材審驗辦法第15條規定，持有人得經由網際網路申請同意他人於同廠牌同型號之電信管制射頻器材使用型式認證標籤，並於次日起30天內，應檢具「電信管制射頻器材審驗合格標籤，或符合性聲明標籤同意使用備查表」送國家通訊傳播委員會備查。

備註：

1. 本器材符合低功率射頻電機技術規範(3.10.1)之規定。
2. 本公司僅對無線射頻特性技術規範辦理型式認證，其他仍須依本國相關法規辦理。
3. 本器材使用天線型態: Chip Antenna，天線廠牌: Raytac，型號: MDBT42Q，增益: -1.6dBi。
4. 本案審驗模組為完全模組，適用於任何平台。【平台】定義如下：若器材部組裝本案審驗模組，消費者仍能正常使用該器材主要功能，該器材得視為平台。若器材不組裝本案審驗模組，消費者不能正常使用該器材主要功能，該器材不能視為平台，該類不同廠牌型號器材組裝本案審驗模組後，須分別申請型式認證。
5. 本公司係經國家通訊傳播委員會委託之驗證機構，核發本型式認證證明。

BLE 4.2

SGS 台灣檢驗科技股份有限公司

低功率射頻電機型式認證證明

一、申　請　者：勁達國際電子有限公司
　　地　　址：新北市中和區建康路 3 號 5 樓
二、製 造 廠 商：Ginstar Corporation
三、器 材 名 稱：BT 4.2 Module
四、廠　　牌：Raytac
五、型　　號：MDBT42Q-P
六、發 射 功 率：BT V4.2 single mode LE (GFSK): 3.57dBm (Peak)
七、工 作 頻 率：2402-2480MHz
八、審 驗 日 期：105 年 08 月 19 日
九、審驗合格標籤式樣　：CCAM16LP1181T1

台灣檢驗科技股份有限公司 電信設備審驗印章

說明：

1. 請依上列標籤式樣自製標籤，標貼或印鑄於器材本體明顯處，始得販賣或公開陳列。
2. 經型式認證合格之低功率射頻電機，其廠牌、型號、設計、射頻性能如有變更，應重新申請型式認證。
3. 違反低功率電波輻射性電機管理辦法之規定，擅自使用或變更無線電頻率、電功率者，除依電信法規定處罰外，驗證機關(構)並得廢止其型式認證證明或型式認證標籤。
4. 送審廠商應保留送審樣品供日後核對。
5. 本型式認證證明及其合格標籤使用權專屬取得本證明者。依電信管制射頻器材審驗辦法第15條規定，持有人得經由網際網路申請同意他人於同廠牌同型號之電信管制射頻器材使用型式認證標籤，並於次日起30天內，應檢具「電信管制射頻器材審驗合格標籤，或符合性聲明標籤同意使用備查表」送國家通訊傳播委員會備查。

備註：

1. 本器材符合低功率射頻電機技術規範(3.10.1)之規定。
2. 本公司僅對無線射頻特性技術規範辦理型式認證，其他仍須依本國相關法規辦理。
3. 本器材使用天線型態: PCB Antenna，天線廠牌: Raytac，型號: MDBT42Q-P，增益: -1.61dBi。
4. 本案審驗模組為完全模組，適用於任何平台。【平台】定義如下:若器材部組裝本案審驗模組，消費者仍能正常使用該器材主要功能，該器材得視為平台。若器材不組裝本案審驗模組，消費者不能正常使用該器材主要功能，該器材不能視為平台，該類不同廠牌型號器材組裝本案審驗模組後，須分別申請型式認證。
5. 本公司係經國家通訊傳播委員會委託之驗證機構，核發本型式認證證明。

9.5. CE Test Report (EU)

BLE 4.2 &5.0

SGS Reference No: MH/2019/40103C

VERIFICATION OF EMC COMPLIANCE

Verification No.	:	MH/2019/40103C
Representative Model No.	:	MDBT42Q
Added Model(s)	:	MDBT42Q-P, MDBT42Q-U
Product Name	:	BLE Module
Brand Name	:	Raytac
Applicant	:	Raytac Corporation
Address of Applicant	:	5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City , 23586, Taiwan
Test Report Number	:	MH/2019/40103
Date of Issue	:	May 13, 2019
Applicable Standards	:	EN 301 489 –1 $_{v2.2.0}$: 2017-03 (Draft) EN 301 489 –17 $_{v3.2.0}$: 2017-03 (Draft) EN 55032 : 2015+AC:2016-07 EN 61000-4-2 : 2009, EN 61000-4-3 : 2006+A1:2008+A2:2010

Conclusion

The apparatus meets the requirements of the above standards and hence compliance the essential requirements under article 3.1b of the RED (2014/53/EU) Directive.

*This verification is only valid for the equipment and configuration described, and in conjunction with the test report as detailed above.

Authorized Signatory:

Eddy Cheng

SGS TAIWAN LTD.
Eddy Cheng
Technical Asst. Supervisor

VERIFICATION OF COMPLIANCE

Applicant:	Raytac Corporation 5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City , 23586, Taiwan
Product Name:	BLE Module
Brand Name:	Raytac
Model No.:	MDBT42Q, MDBT42Q-P
Model Difference:	MDBT42Q with Chip antenna, MDBT42Q-P with PCB antenna
File Number:	ER/2017/70008-01
Date of test:	Nov. 09, 2017~ Nov. 28, 2017
Date of EUT Received:	Nov. 09, 2017

APPLICABLE STANDARDS	
STANDARD	**TEST RESULT**
ETSI EN 300 328 V2.1.1: 2016	Complied

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory for compliance with the requirements set forth in the European Standard ETSI EN 300 328 V2.1.1: 2016 under RED 2014/53/EU Class II. The results of testing in this report apply to the product system that was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Test By:	Marcus Tseng	***Date:***	Dec. 05, 2017
	Marcus Tsen / Engineer		
Prepared By:	Yuri Tsai	***Date:***	Dec. 05, 2017
	Yuri Tsai/ Clerk		
Approved By:	Jim Chang	***Date:***	Dec. 05, 2017
	Jim Chang / Asst. Manager		

9.6. IC Certificate (Canada)

BLE 4.2

telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

TECHNICAL ACCEPTANCE CERTIFICATE / **CERTIFICAT D'ACCEPTABILITÉ TECHNIQUE**

CERTIFICATION No. No. DE CERTIFICATION	8017A-MDBT42Q
TELEFICATION No. No. DE TELEFICATION	162170280/AA/01
TEST SITE No. No. DE LABORATOIRE	4620A-5
ISSUED TO DÉLIVRÉ A	Raytac Corporation
TYPE OF EQUIPMENT GENRE DE MATÉRIEL	Bluetooth device
TRADE NAME AND MODEL MARQUE ET MODELE	Raytac / MDBT42Q Raytac / MDBT42Q-P

CERTIFIED TO CERTIFIÉ SELON LE	SPECIFICATION CAHIER DES CHARGES	RSS-102 RSS-247	ISSUE EDITION	5 1

Certification of equipment means only that the equipment has met the requirements of the above-noted specification. Licence applications, where applicable to use certified equipment, are acted on accordingly by the Industry Canada issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements and procedures issued by Industry Canada. The equipment for which this certificate is issued shall not be manufactured, imported, distributed, leased, offered for sale or sold unless the equipment complies with the applicable technical specifications and procedures issued by Industry Canada.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance d'Industrie Canada et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'Industrie Canada. Le matériel à l'égard duquel le présent certificat est délivré ne doit pas être fabriqué, importé, distribué, loué, mis en vente ou vendu à moins d'être conforme aux procédures et aux spécifications techniques applicables publiées par Industrie Canada.

ISSUED BY TELEFICATION BV, RECOGNIZED CERTIFICATION BODY BY INDUSTRY CANADA
DÉLIVRÉ PAR TELEFICATION BV, ORGANISME DE CERTIFICATION RECONNU PAR INDUSTRIE CANADA

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specification.
J'atteste, par la présente, que le matériel a fait l'objet d'essai et a été jugé conforme à la spécification ci-dessus

DATE 21 Feb 2017 BY

Mohammad Elhaj
Product Assessor

This certificate has one annex.

PRODUCTS
RvA C 224

BLE 5.0

telefication bv
The Netherlands
Chamber of Commerce
51565536
www.telefication.com

telefication

TECHNICAL ACCEPTANCE CERTIFICATE | **CERTIFICAT D'ACCEPTABILITÉ TECHNIQUE**

CERTIFICATION No. No. DE CERTIFICATION	8017A-MDBT42Q
TELEFICATION No. No. DE TELEFICATION	162170280/AA/02
TEST SITE No. No. DE LABORATOIRE	4620A-5
ISSUED TO DÉLIVRÉ A	Raytac Corporation
TYPE OF EQUIPMENT GENRE DE MATÉRIEL	Bluetooth device
TRADE NAME AND MODEL MARQUE ET MODELE	Raytac / MDBT42Q Raytac / MDBT42Q-P

CERTIFIED TO / CERTIFIÉ SELON LE — SPECIFICATION / CAHIER DES CHARGES: RSS-102 ISSUE 5; RSS-247 EDITION 2

Certification of equipment means only that the equipment has met the requirements of the above-noted specification. Licence applications, where applicable to use certified equipment, are acted on accordingly by the ISED issuing office and will depend on the existing radio environment, service and location of operation. This certificate is issued on condition that the holder complies and will continue to comply with the requirements and procedures issued by ISED. The equipment for which this certificate is issued shall not be manufactured, imported, distributed, leased, offered for sale or sold unless the equipment complies with the applicable technical specifications and procedures issued by ISED.

La certification du matériel signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation du matériel certifié sont traitées en conséquence par le bureau de délivrance d'ISDE et dépendent des conditions radio ambiantes, du service et de l'emplacement d'exploitation. Le présent certificat est délivré à la condition que le titulaire satisfasse et continue de satisfaire aux exigences et aux procédures d'ISDE. Le matériel à l'égard duquel le présent certificat est délivré ne doit pas être fabriqué, importé, distribué, loué, mis en vente ou vendu à moins d'être conforme aux procédures et aux spécifications techniques applicables publiées par ISDE.

ISSUED BY TELEFICATION BV (NL0001), RECOGNIZED CERTIFICATION BODY BY INNOVATION, SCIENCE AND ECONOMIC DEVELOPMENT CANADA
DÉLIVRÉ PAR TELEFICATION BV (NL0001), ORGANISME DE CERTIFICATION RECONNU PAR INNOVATION, SCIENCES ET DÉVELOPPEMENT ÉCONOMIQUE CANADA

I hereby attest that the subject equipment was tested and found in compliance with the above-noted specification.
J'atteste, par la présente, que le matériel a fait l'objet d'essai et a été jugé conforme à la spécification ci-dessus

DATE 02 Jan 2018 BY — George Lo, Product Assessor

This certificate has one annex.

George Lo

PRODUCTS RvA C 224

9.7. SRRC Certificate (China)

BLE 4.2 &5.0

无线电发射设备
Radio Transmission Equipment
型号核准证
Type Approval Certificate

劲达国际电子有限公司（台湾）：

根据《中华人民共和国无线电管理
In accordance with the provisions on the Radio

条例》，经审查，下列无线电发射设备
Regulations of the People's Republic of China , the following

符合中华人民共和国无线电管理规定和
radio transmission equipment , after examination , conforms

技术标准，其核准代码为：CMIIT ID: 2016DJ4571
to the provisions with its CMIIT ID:

中华人民共和国工业和信息化部
（发证机关）
Sealed by issuing authority

有效期：五年
Validity

2016 年 8 月 12 日
Year Month Date

9.8. KC Certificate (South Korea)

BLE 4.2 &5.0

B58D-F9C0-417D-C63A

방송통신기자재등의 적합인증서

Certificate of Broadcasting and Communication Equipments

상호 또는 성명 *Trade Name or Applicant*	Raytac Corporation
기자재명칭(명칭) *Equipment Name*	특정소출력 무선기기(무선데이터통신시스템용 무선기기)
기본모델명 *Basic Model Number*	MDBT42Q
파생모델명 *Series Model Number*	MDBT42Q-P, MDBT42Q-U
인증번호 *Certification No.*	MSIP-CRM-ryt-MDBT42Q
제조자/제조국가 *Manufacturer/ Country of Origin*	Raytac Corporation / 대만
인증연월일 *Date of Certification*	2016-10-06
기타 *Others*	

위 기자재는 「전파법」 제58조의2 제2항에 따라 인증되었음을 증명합니다.

It is verified that foregoing equipment has been certificated under the Clause 2, Article 58-2 of Radio Waves Act.

2019년(Year) 05월(Month) 14일(Day)

국립전파연구원장 국립전파연구원 전파인증

Director General of National Radio Research Agency

※ 인증 받은 방송통신기자재는 반드시 "적합성평가표시" 를 부착하여 유통하여야 합니다.
위반시 과태료 처분 및 인증이 취소될 수 있습니다.

9.9. RoHS & REACH Report

Please visit “Support” page of our website to download.

9.10. End-Product Label

It is suggested using following content adding to package or user manual or label to obey the regulation. Any rules of end-product label shall refer to each certification for final reference.

9.10.1. FCC (USA)

The FCC statement should be included in the user manual when there is no enough space on label. Otherwise, it should be included on the label.

“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. (2) This device must accept any interference received, including interference that may cause undesired operation.”

The final end product must be labeled in a visible area with the following: “Contain FCC ID: SH6MDBT42Q”.

9.10.2. TELEC (Japan)

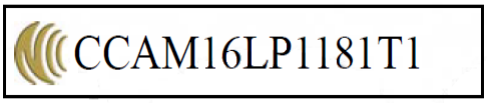
When manufacturer is placing the product on the Japanese market, the product must be affixed with the following Specified Radio Equipment marking:

9.10.3. NCC (Taiwan)

請依下列標籤式樣自製標籤，標貼或印鑄於器材本體明顯處，始得販賣或公開陳列。

MDBT42Q Series

MDBT42Q-P Series



平台廠商必須於平台上標示字樣「本產品內含射頻模組：ID 編號 CCAM16LP1180T2」或「本產品內含射頻模組：ID 編號 CCAM16LP1181T1」。

「平台」定義如下：若器材組裝本案模組，消費者仍能正常使用該器材主要功能，該器材得視為平台。若器材不組裝本案模組，消費者不能正常使用該器材主要功能，該器材不能視為平台。該類不同廠牌型號器材組裝本案審驗模組後，須分別申請型式認證。

9.10.4. IC (Canada)

The IC statement should be included in the user manual when there is no enough space on label. Otherwise, it should be included on the label.

“This device complies with Industry Canada license-exempt RSS Standard(s). Operation is subject to the following two conditions. (1) This device may not cause harmful interference. (2) This device must accept any interference received, including interference that may cause undesired operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence.L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.”

The final end product must be labeled in a visible area with the following: “Contain IC ID: 8017A-MDBT42Q”.

10. Notes and Cautions

Module is not designed to last for a lifetime. Like general products, it is expected to be worn out after continuous usage through the years. To assure that product will perform better and last longer, please make sure you:

- Follow the guidelines of this document while designing circuit/end-product. Any discrepancy of core Bluetooth technology and technical specification of IC should refer to definition of Bluetooth Organization and Nordic Semiconductor as final reference.

- Do not supply voltage that is not within range of specification.

- Eliminate static electricity at any cost when working with the module as it may cause damage. It is highly recommended adding anti-ESD components to circuit design to prevent damage from real-life ESD events. Anti-ESD methods can be also applied in mechanical design.

- Do not expose modules under direct sunlight for long duration. Modules should be kept away from humid and salty air conditions, and any corrosive gasses or substances. Store it within -40℃ to +125℃ before and after installation.

- Avoid any physical shock, intense stress to the module or its surface.

- Do not wash the module. No-Clean Paste is used in production. Washing it will oxidize the metal shield and have chemistry reaction with No-Clean Paste. Functions of the module are not guaranteed if it has been washed.

The module is not suitable for life support device or system and not allowed to be used in destructive device or systems in any direct or indirect ways. The customer agrees to indemnify Raytac for any losses when applying modules in applications such as the ones described above.

11. Basic Facts for nRF52 Chip

Below is the comparison chart between nRF52840, nRF52832, nRF52810 & nRF52811. Any discrepancy shall refer to Nordic's technical document as final reference.

	nRF52840	nRF52832	nRF52810	nRF52811
RAYTAC Model No.	MDBT50Q Series	MDBT42Q-512KV2 MDBT42Q-P512KV2 MDBT42 series MDBT42V series	MDBT42Q-192K MDBT42Q-P192K	MDBT42Q-192KL MDBT42Q-P192KL
Bluetooth 5 Long Range (125kbps)	V			V
Bluetooth 5 High Speed	V	V	V	V
Bluetooth 5 Ad. Extention (x8)	V	V	V	V
Flash (kBytes)	1024	512	192	192
RAM (kBytes)	256	64	24	24
ANT Plus	V	V	V	V
IEEE 802.15.4	V			V
ARM® TrustZone® Cryptocell	V			
USB	V			
QSPI	V			
NFC	V	V		
I2S	V	V		
SPI, TWI, UART, PWM	V	V	V	V
PDM	V	V	V	V
ADC, Comparators	V	V	V	V
Supply Range (V)	1.7 to 5.5	1.7 to 3.6	1.7 to 3.6	1.7 to 3.6

12. Useful Links

- Nordic Infocenter: https://infocenter.nordicsemi.com/index.jsp
  All the necessary technical files of Nordic's chip are on this website.

- Nordic DevZone: https://devzone.nordicsemi.com/questions/
  A highly recommended website for firmware developer. Interact with other developers and Nordic's employees will help with your questions. The site also includes tutorials in detail to help you get started.

- Official Page of nRF52810 : https://www.nordicsemi.com/eng/Products/nRF52810
  A brief introduction to nRF52810 and download links for Nordic's developing software and SoftDevices.

Full List of Raytac's BLE Modules

MDBT40 & MDBT40-P Series

Series	Nordic Solution	Raytac No.	IC Version	Antenna	RAM	Flash Memory
MDBT40	nRF51822	MDBT40-256V3	3	Chip Antenna	16 kb	256 K
		MDBT40-256RV3			32 kb	256 K
MDBT40-P	nRF51822	MDBT40-P256V3	3	PCB Antenna	16 kb	256 K
		MDBT40-P256RV3			32 kb	256 K
MDBT40 - ANT	nRF51422	MDBT40-ANT -256V3	3	Chip Antenna	16 kb	256 K
		MDBT40-ANT -256RV3			32 kb	
MDBT40 - ANT-P	nRF51422	MDBT40-ANT -P256V3	3	PCB Antenna	16 kb	256 K
		MDBT40-ANT -P256RV3			32 kb	
MDBT40 Nano	nRF51822	MDBT40-n256V3	3	N/A	16 kb	256 K
MDBT40 - ANT-Nano	nRF51422	MDBT40-ANT -n256V3	3	N/A	16 kb	256 K

MDBT42Q Series (QFN Package IC)

Series	Nordic Solution	Raytac No.	IC Version	Antenna	RAM	Flash Memory
MDBT42Q	nRF52832	MDBT42Q-512KV2	2	Chip Antenna	64 kb	512 K
	nRF52810	MDBT42Q-192K	1		24 kb	192 K
	nRF52811	MDBT42Q-192KL	1			
MDBT42Q-P	nRF52832	MDBT42Q-P512KV2	2	PCB Antenna	64 kb	512 K
	nRF52810	MDBT42Q-P192K	1		24 kb	192 K
	nRF52811	MDBT42Q-P192KL	1			
MDBT42Q-U	nRF52832	MDBT42Q-U512KV2	2	u.FL Connector	64 kb	512 K

MDBT42 Series (WLCSP Package IC)

Series	Nordic Solution	Raytac No.	IC Version	Antenna	RAM	Flash Memory
MDBT42	nRF52832	MDBT42-512KV2	2	Chip Antenna	64 kb	512 K
MDBT42-P		MDBT42-P512KV2		PCB Antenna		

Series	Nordic Solution	Raytac No.	IC Version	Antenna	RAM	Flash Memory
MDBT42V	nRF52832	MDBT42V-512KV2	2	Chip Antenna	64 kb	512 K
MDBT42V-P		MDBT42V-P512KV2		PCB Antenna		

MDBT50Q Series (aQFN Package IC)

Series	Nordic Solution	Raytac No.	IC Version	Antenna	RAM	Flash Memory
MDBT50Q	nRF52840	MDBT50Q-1MV2	2	Chip Antenna	256 kb	1MB
MDBT50Q-P		MDBT50Q-P1MV2		PCB Antenna		
MDBT50Q-U		MDBT50Q-U1MV2		u.FL Connector		

Dongle	nRF52840	MDBT50Q-RX	1, 2	PCB Antenna	256 kb	1MB

Release Note

- 2017/08/02 Version A: 1st release
- 2017/11/10 Version B:

  (1) Updated Chapter 2 (2.2, 2.3, 2.4 & 2.6), Chapter 4 (adding description of changing color of solder mask), Chapter 5 (updating technical spec based on Nordic nRF52810 PS V1.0), Chapter 9.1 (adding BT 5.0 certificate), and full list of model no..

  (2) Added Chapter 10: Basic Facts for nRF52 Chip and Chapter 11: Useful Links.
- 2017/12/26 Version C:

  (1) Updated Chapter 4 (removing marking info), Chapter 8 (revising typo of two C13).
- 2018/08/03 Version D:

  (1) Added remarks of P0.23/P0.24 and updated link of design guide in Chapter 2.

  (2) Updated technical spec in Chapter 5 and list of model no.

  (3) Added CE EN300 328 (RED) compliant proof and updated link for RoHS & REACH report in Chapter 9.

  (4) Added Chapter 10: Notes and Cautions.
- 2019/06/14 Version E:

  (1) Updated technical spec in Chapter 5: Specification.

  (2) Updated description of test code in Chapter 8: Reference Circuit.

  (3) Added BT 5.0 Certificates in Chapter 9: Certification.

  (4) Added nRF52811 information in Chapter 11: Basic Facts for nRF52 Chip.

  (5) Added MDBT42Q-U in Full List of Raytac's BLE Modules.