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Approval Sheet

(產品承認書)

產品名稱 (Product): BT 5.0 Dongle (nRF52840)

deployed MDBT50Q-P1M module

產品型號 (Model No.): **MDBT50Q – RX**

產品料號 (Part No.): **MD - 240A4 - 003** (Raytac Logo)

MD - 240A4 - 004 (No Logo)

Working distance of MDBT50Q-RX

- ***1Mbps:*** up to 250 meters in open space.
- ***2Mbps:*** up to 120 meters in open space.

Index

1. Overall Introduction

Raytac's MDBT50Q-RX is a BT 5.0 stack (Bluetooth low energy or BLE) dongle designed based on **Nordic nRF52840 SoC solution**, which incorporates: **GPIO**, **PWM** and **USB** interfaces for connecting peripherals and sensors.

Features:

1. Embedded 2.4GHz transceiver supports Bluetooth 5 (Bluetooth), IEEE 802.15.4 (THREAD & Zigbee) & 2.4Ghz RF & ANT+ upon customer's preference.
2. Compact size with **(L) 43.1 x (W) 18 x (H) 9.3 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.
6. BLE & RF transmission switching helps products fit all operation systems and most hardware.

1.1. Applications

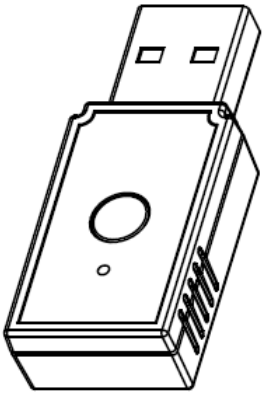
- IoT Networks
  - Smart home (such as door locks, lighting) sensors and controllers
  - Smart city sensor networks
  - Industrial IoT sensors and controllers
  - Connected white goods
- Personal Area Networks
  - Health / fitness sensor and monitor device
  - Medical device
- Advanced wearables
  - Gateway for smart watches or connected health
  - Advanced personal fitness devices
  - Virtual/Augmented Reality applications
- High performance HID Controllers
- Mesh Network

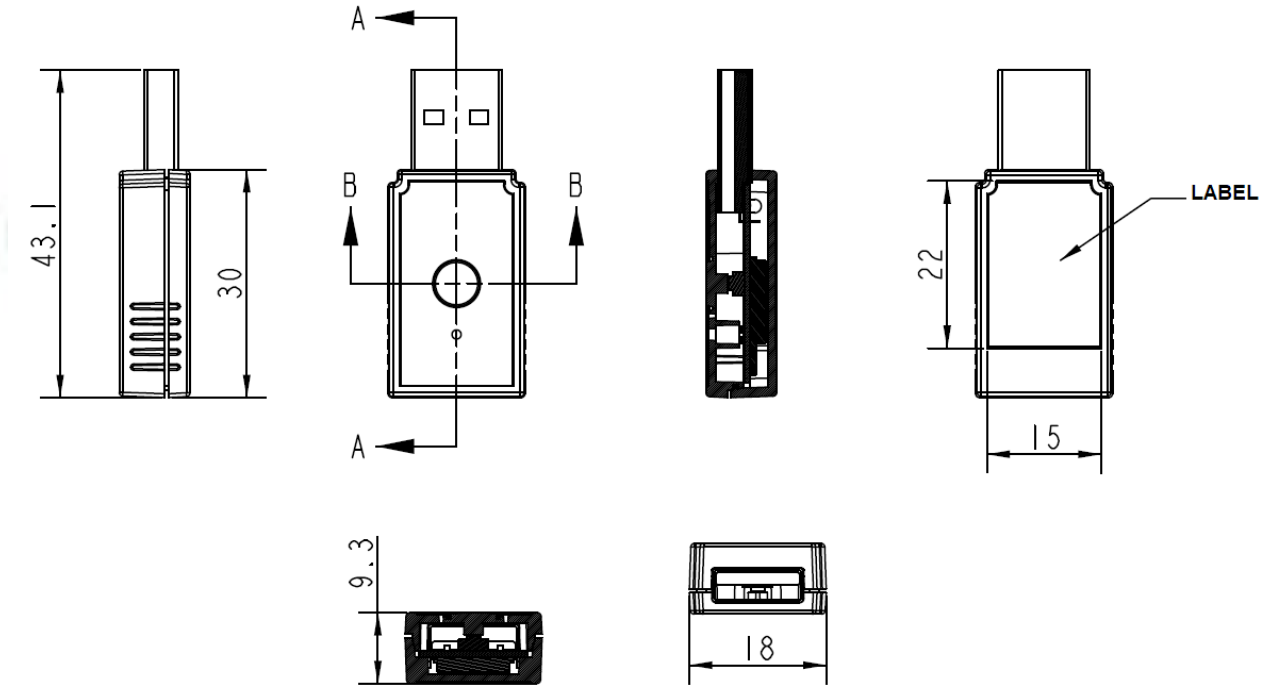
1.2. Features

- Bluetooth 5, IEEE 802.15.4, 2.4 GHz transceiver
    - -95dBm sensitivity in 1Mbps Bluetooth low energy (BLE) mode
    - -103dBm sensitivity in 125Kbps BLE mode (long range)
    - +8 dBm TX power (down to -20 dBm in 4 dB steps)
    - On-air compatible with nRF52, nRF51, nRF24L and nRF24AP Series
    - Programmable output power from +8dBm to -20dB
    - RSSI (1dB resolution)
    - Supported data rates:
        - Bluetooth 5: 2 Mbps, 1 Mbps, 500 kbps, 125 kbps
        - IEEE 802.15.4-2006: 250 kbps
        - Proprietary 2.4 GHz: 2 Mbps, 1 Mbps
- ARM Cortex –M4 32-bit processor with FPU, 64 MHz
- Memory: 1MB flash / 256KB RAM
- HW accelerated security
    - ARM TrustZone Cryptocell 310 security subsystem
    - 128 bit AES / ECB / CCM / AAR co-processor (on-the-fly packet encryption)
- Interfaces on device
    - USB 2.0 full speed (12Mbps) controller
    - Programmable peripheral interconnect (PPI)
    - 1 x Switch and max. 2 x LED
    - EasyDMA automated data transfer between memory and peripherals.
- 4 x 4 channel pulse width modulator (PWM) units with EasyDMA
- 5 X 32-bit timers with counter mode
- 3 x 24-bit real-time counters (RTC)
- Flexible power management
    - On-chip DC/DC and LDO regulators with automated low current modes
    - Automated peripheral power management
    - Fast wake-up using 64MHz internal oscillator
    - 0.4uA at 3V in System OFF mode, no RAM retention
    - 1.5uA at 3V in System ON mode, no RAM retention, wake on RTC
- Nordic SoftDevice ready and with support for concurrent multi-protocol

2. Product Dimension

DONGLE SIZE: (L) 43.1 x (W) 18 x (H) 9.3 mm





3. Main Chip Solution

RF IC	Module	Crystal Frequency
Nordic nRF52840	**MDBT50Q-P1M (PCB/Printed Antenna)**	**32MHZ**

4. Shipment Packaging Information

Order Code	Logo
MD-240A4-003	Raytac Logo
	
MD-240A4-004	No Logo
	

- Unit Weight (with casing): 5.8 g (± 0.2 g)

- Packaging Type: Anti-static Tray only

- Minimum Package Quantity (MPQ): 40 pcs per Tray

- Carton Contents: 600 pcs per carton (15 Full Trays + 1 Empty Tray)

- Dimension of Carton: (L) 31 x (W) 25 x (H) 22 cm

- Gross Weight: approx. 4.70 kgs per full carton (contains 600 pcs)

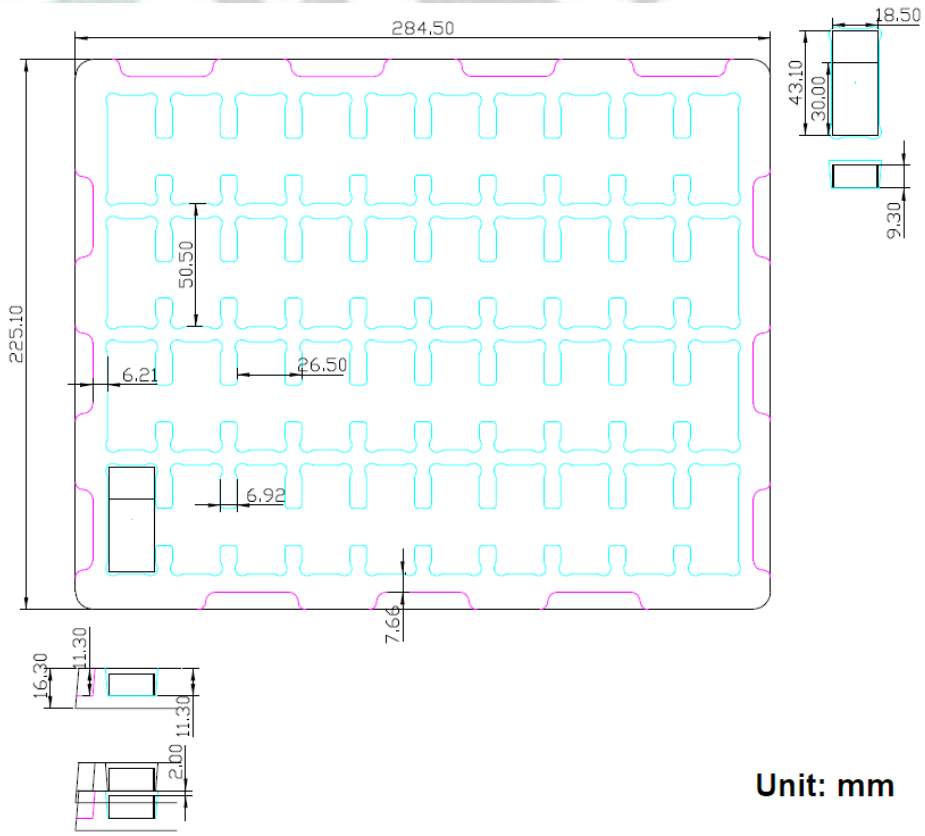
4.1. Label

A label is attached to the casing of the dongle. The standard label is:

For previous version “MD-240A4-001” & “MD-240A4-002”, the label is the following one:

4.2. Tray Specifications

Dongles are packed in trays for volume order. Specifications are as follows:



5. Specification

5.1. Operating Conditions

Symbol	Parameter	Min.	Nom.	Max.	Units
VDD	VDD supply voltage, independent of DCDC enable		3.3		V
VDD_{POR}	VDD supply voltage needed during power-on reset	1.75			V
VDDH	VDDH supply voltage, independent of DCDC enable		3.3		V
VBUS	VBUS USB supply voltage	4.35	5	5.5	V
t_{R_VDD}	Supply rise time (0 V to 1.7 V)			60	ms
t_{R_VDDH}	Supply rise time (0 V to 3.7 V)			100	ms
TA	Operating temperature	-40	25	75	°C

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

Contents below are from "nRF52840 Product Specification v1.1", please refer to Nordic's release as final reference.

5.2. Absolute Maximum Ratings

	Note	Min.	Max.	Unit
Radio				
RF input level			10	dBm
I/O pin voltage				
$V_{I/O}$, VDD ≤ 3.6 V		-0.3	VDD + 0.3	V
$V_{I/O}$, VDD > 3.6 V		-0.3	3.9	V
Environmental aQFN™ package				
ESD CDM	Charged Device Model		750	V
MSL	Moisture Sensitivity Level		2	
ESD HBM	Human Body Model		2	kV
ESD HBM Class	Human Body Model Class		2	
Flash memory				
Endurance		10 000		Write/erase cycles
Retention		10 years at 40°C		

5.3. Electrical Specifications

5.3.1. General Radio Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
f_{OP}	Operating frequencies	2360		2500	MHz
$f_{PLL,CH,SP}$	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_{BPS}	On the air data rate	125		2000	kbps
$f_{chip,\ IEEE\ 802.15.4}$	Chip rate in IEEE 802.15.4 mode		2000		kchips

5.3.2. Radio Current Consumption (Transmitter)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{TX,PLUS8dBM,DCDC}$	TX only run current (DC/DC, 3 V) P_{RF} = +8 dBm	..	14.8	..	mA
$I_{TX,PLUS8dBM}$	TX only run current P_{RF} = +8 dBm	..	32.7	..	mA
$I_{TX,PLUS4dBM,DCDC}$	TX only run current (DC/DC, 3 V) P_{RF} = +4 dBm	..	9.6	..	mA
$I_{TX,PLUS4dBM}$	TX only run current P_{RF} = +4 dBm	..	21.4	..	mA
$I_{TX,0dBM,DCDC,5V,REG0HIGH}$	TX only run current (DC/DC, 5 V, REG0 out = 3.3 V)P_{RF} = 0 dBm		3.0		mA
$I_{TX,0dBM,DCDC,5V,REG0L}$	TX only run current (DC/DC, 5 V, REG0 out = 1.8 V)P_{RF} = 0 dBm		3.0		mA
$I_{TX,0dBM,DCDC}$	TX only run current (DC/DC, 3 V)P_{RF} = 0 dBm	..	4.8		mA
$I_{TX,0dBM}$	TX only run current P_{RF} = 0 dBm	..	10.6	..	mA
$I_{TX,MINUS4dBM,DCDC}$	TX only run current DC/DC, 3 V P_{RF} = -4 dBm	..	3.1	..	mA
$I_{TX,MINUS4dBM}$	TX only run current P_{RF} = -4 dBm	..	8.1	..	mA
$I_{TX,MINUS8dBM,DCDC}$	TX only run current DC/DC, 3 V P_{RF} = -8 dBm		3.3		mA
$I_{TX,MINUS8dBM}$	TX only run current P_{RF} = -8 dBm	..	7.2		mA
$I_{TX,MINUS12dBM,DCDC}$	TX only run current DC/DC, 3 V P_{RF} = -12 dBm		3.0		mA
$I_{TX,MINUS12dBM}$	TX only run current P_{RF} = -12 dBm	..	6.4	..	mA
$I_{TX,MINUS16dBM,DCDC}$	TX only run current DC/DC, 3 V P_{RF} = -16 dBm		2.8		mA
$I_{TX,MINUS16dBM}$	TX only run current P_{RF} = -16 dBm	..	6.0	..	mA
$I_{TX,MINUS20dBM,DCDC}$	TX only run current DC/DC, 3 V P_{RF} = -20 dBm		2.7		mA
$I_{TX,MINUS20dBM}$	TX only run current P_{RF} = -20 dBm	..	5.6	..	mA

5.3.3. Radio Current Consumption (Receiver)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{RX,1M,DCDC}$	RX only run current (DC/DC, 3 V) 1 Mbps / 1 Mbps BLE	..	4.6	..	mA
$I_{RX,1M}$	RX only run current (LDO, 3 V) 1 Mbps / 1 Mbps BLE	..	9.9	..	mA
$I_{RX,2M,DCDC}$	RX only run current (DC/DC, 3 V) 2 Mbps / 2 Mbps BLE	..	5.2	..	mA
$I_{RX,2M}$	RX only run current (LDO, 3 V) 2 Mbps / 2 Mbps BLE	..	11.1	..	mA
$I_{START,RX,1M,DCDC}$	RX start-up current (DC/DC, 3 V) 1 Mbps / 1 Mbps BLE		3.7		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	..	8.0	..	dBm
P_{RFC}	RF power control range		28.0		dB
P_{RFCR}	RF power accuracy			±4	dB
$P_{RF1,1}$	1st Adjacent Channel Transmit Power 1 MHz (1 Mbps)	..	-24.8	..	dBc
$P_{RF2,1}$	2nd Adjacent Channel Transmit Power 2 MHz (1 Mbps)	..	-54.0	..	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)	..	-54.0	..	dBc
E_{vm}	Error vector magnitude IEEE 802.15.4	..	8	..	%rms
$P_{harm2nd,\ IEEE\ 802.15.4}$	2nd harmonics in IEEE 802.15.4 mode	..	-51.0	..	dBm
$P_{harm3rd,\ IEEE\ 802.15.4}$	3rd harmonics in IEEE 802.15.4		-48.0	..	dBm

5.3.5. 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
$RSSI_{PERIOD}$	RSSI sampling time from RSSI_START task		0.25		µs
$RSSI_{SETTLE}$	RSSI settling time after signal level change		15		µs

5.3.6. Receiver Operation

Symbol	Description	Min.	Typ.	Max.	Units
$P_{RX,MAX}$	Maximum received signal strength at < 0.1% PER		0		dBm
$P_{SENS,IT,1M}$	Sensitivity, 1 Mbps nRF mode ideal transmitter[1]		-93		dBm
$P_{SENS,IT,2M}$	Sensitivity, 2 Mbps nRF mode ideal transmitter[2]		-89		dBm
$P_{SENS,IT,SP,1M,BLE}$	Sensitivity, 1 Mbps BLE ideal transmitter, packet length ≤ 37 bytes BER=1E-3[3]		-95		dBm
$P_{SENS,IT,LP,1M,BLE}$	Sensitivity, 1 Mbps BLE ideal transmitter, packet length ≥ 128 bytes BER=1E-4[4]		-94		dBm
$P_{SENS,IT,SP,2M,BLE}$	Sensitivity, 2 Mbps BLE ideal transmitter, packet length ≤ 37 bytes		-92		dBm
$P_{SENS,IT,BLE\ LE125k}$	Sensitivity, 125 kbps BLE mode		-103		dBm
$P_{SENS,IT,BLE\ LE500k}$	Sensitivity, 500 kbps BLE mode		-99		dBm
$P_{SENS,IEEE\ 802.15.4}$	Sensitivity in IEEE 802.15.4 mode		-100		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 3 dB.
2. Same as above.
3. As defined in the Bluetooth Core Specification v4.0 Volume 6: Core System Package (Low Energy Controller Volume)
4. Equivalent BER limit < 10E-04

5.3.7. RX Selectivity

Symbol	Description	Min.	Typ.	Max.	Units
$C/I_{1M,co\text{-}channel}$	1Mbps 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

Symbol	Description	Min.	Typ.	Max.	Units
$C/I_{2M,-2MHz}$	2 Mbps mode, Adjacent (-2 MHz) interference		6		dB
$C/I_{2M,+2MHz}$	2 Mbps mode, Adjacent (+2 MHz) interference		-19		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		-42		dB
$C/I_{2M,\geq12MHz}$	2 Mbps mode, Adjacent (≥12 MHz) interference		-52		dB
$C/I_{2MBLE,co\text{-}channel}$	2 Mbps BLE mode, Co-Channel interference		6.8		dB
$C/I_{2MBLE,\pm2MHz}$	2 Mbps BLE mode, Adjacent (±2 MHz) interference		-10		dB
$C/I_{2MBLE,\pm4MHz}$	2 Mbps BLE mode, Adjacent (±4 MHz) interference		-45		dB
$C/I_{2MBLE,\geq6MHz}$	2 Mbps BLE mode, Adjacent (≥6 MHz) interference		-48		dB
$C/I_{2MBLE,image}$	Image frequency interference		-24		dB
$C/I_{2MBLE,image,\ 2MHz}$	Adjacent (2 MHz) interference to in-band image frequency		-35		dB
$C/I_{125k\ BLE\ LR,\ co\text{-}channel}$	125 kbps BLE LR mode, Co-Channel interference		4.4		dB
$C/I_{125k\ BLE\ LR,-1MHz}$	125 kbps BLE LR mode, Adjacent (-1 MHz) interference		-4.0		dB
$C/I_{125k\ BLE\ LR,+1MHz}$	125 kbps BLE LR mode, Adjacent (+1 MHz) interference		-12		dB
$C/I_{125k\ BLE\ LR,-2MHz}$	125 kbps BLE LR mode, Adjacent (-2 MHz) interference		-28		dB
$C/I_{125k\ BLE\ LR,+2MHz}$	125 kbps BLE LR mode, Adjacent (+2 MHz) interference		-50		dB
$C/I_{125k\ BLE\ LR,>3MHz}$	125 kbps BLE LR mode, Adjacent (≥3 MHz) interference		-55		dB
$C/I_{125k\ BLE\ LR,image}$	Image frequency interference		-29		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.

5.3.8. 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 closet 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.

5.3.9. Radio Timing Parameters

Symbol	Description	Min.	Typ.	Max.	Units
$t_{TXEN,BLE,1M}$	Time between TXEN task and READY event after channel FREQUENCY configured (1 Mbps BLE and 150 µs TIFS)	140		140	µs
$t_{TXEN,FAST,BLE,1M}$	Time between TXEN task and READY event after channel FREQUENCY configured (1 Mbps BLE with fast ramp-up and 150 µs TIFS)	40		40	µs
$t_{TXDIS,BLE,1M}$	When in TX, delay between DISABLE task and DISABLED event for MODE = Nrf_1Mbit and MODE = Ble_1Mbit	6		6	µs
$t_{RXEN,BLE,1M}$	Time between the RXEN task and READY event after channel FREQUENCY configured (1 Mbps BLE)	140		140	µs
$t_{RXEN,FAST,BLE,1M}$	Time between the RXEN task and READY event after channel FREQUENCY configured (1 Mbps BLE with fast ramp-up)	40		40	µs
$t_{RXDIS,BLE,1M}$	When in RX, delay between DISABLE task and DISABLED event for MODE = Nrf_1Mbit and MODE = Ble_1Mbit	0		0	µs
$t_{TXDIS,BLE,2M}$	When in TX, delay between DISABLE task and DISABLED event for MODE = Nrf_2Mbit and MODE = Ble_2Mbit	4		4	µs
$t_{RXDIS,BLE,2M}$	When in RX, delay between DISABLE task and DISABLED event for MODE = Nrf_2Mbit and MODE = Ble_2Mbit	0		0	µs
$t_{TXEN,IEEE\ 802.15.4}$	Time between TXEN task and READY event after channel FREQUENCY configured (IEEE 802.15.4)	130		130	µs
$t_{TXEN,FAST,IEEE\ 802.15.4}$	Time between TXEN task and READY event after channel FREQUENCY configured (IEEE 802.15.4 with fast ramp-up)	40		40	µs
$t_{TXDIS,IEEE\ 802.15.4}$	When in TX, delay between DISABLE task and DISABLED event (IEEE 802.15.4)	21		21	µs
$t_{RXEN,IEEE\ 802.15.4}$	Time between the RXEN task and READY event after channel FREQUENCY configured (IEEE 802.15.4)	130		130	µs
$t_{RXEN,FAST,IEEE\ 802.15.4}$	Time between the RXEN task and READY event after channel FREQUENCY configured (IEEE 802.15.4 with fast ramp-up)	40		40	µs
$t_{RXDIS,IEEE\ 802.15.4}$	When in RX, delay between DISABLE task and DISABLED event (IEEE 802.15.4)	0.5		0.5	µs
$t_{RX\text{-}to\text{-}TX\ turnaround}$	Maximum TX-to-RX or RX-to-TX turnaround time in IEEE 802.15.4 mode		40		µs

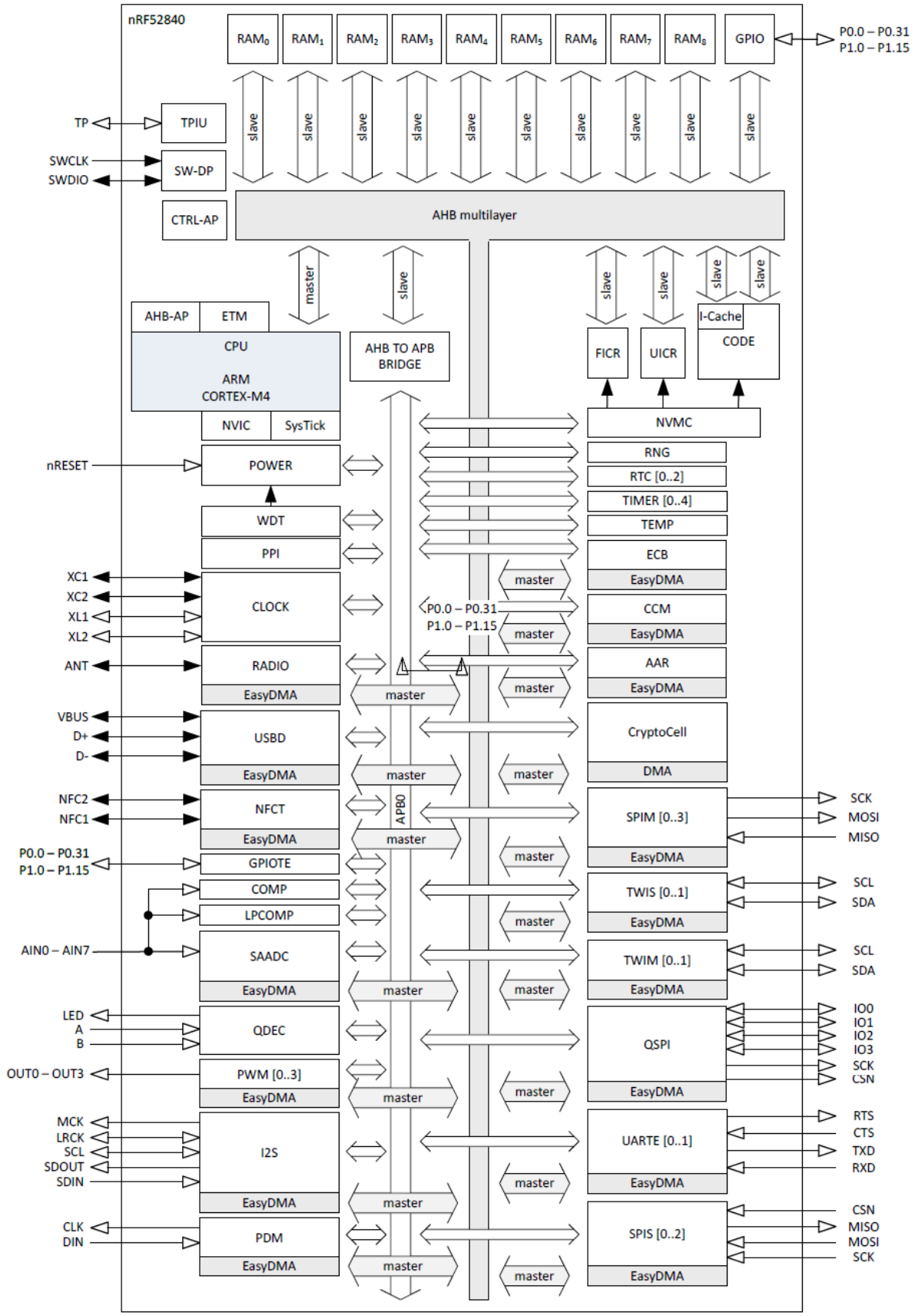
5.3.10. CPU

Symbol	Description	Min.	Typ.	Max.	Units
W_{FLASH}	CPU wait states, running CoreMark from flash, cache disabled			2	
$W_{FLASHCACHE}$	CPU wait states, running CoreMark from flash, cache enabled			3	
W_{RAM}	CPU wait states, running CoreMark from RAM			0	
CM_{FLASH}	CoreMark, running CoreMark from flash, cache enabled		212		CoreM
$CM_{FLASH/MHz}$	CoreMark per MHz, running CoreMark from flash, cache enabled		3.3		CoreMark/MHz
$CM_{FLASH/mA}$	CoreMark per mA, running CoreMark from flash, cache enabled, DCDC 3V		59		CoreM/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		0.97		µA
$I_{ON\_RAMON\_EVENT}$	System ON, full 256 kB RAM retention, wake on any event		2.35		µA
$I_{ON\_RAMON\_POF}$	System ON, full 256 kB RAM retention, wake on any event, power-fail comparator enabled		2.35		µA
$I_{ON\_RAMON\_GPIOTE}$	System ON, full 256 kB RAM retention, wake on GPIOTE input (event mode)		17.37		µA
$I_{ON\_RAMON\_GPIOTEPORT}$	System ON, full 256 kB RAM retention, wake on GPIOTE PORT event		2.36		µA
$I_{ON\_RAMOFF\_RTC}$	System ON, no RAM retention, wake on RTC (running from LFRC clock)		1.5		µA
$I_{ON\_RAMON\_RTC}$	System ON, full 256 kB RAM retention, wake on RTC (running from LFRC clock)		3.16		µA
$I_{OFF\_RAMOFF\_RESET}$	System OFF, no RAM retention, wake on reset		0.40		µA
$I_{OFF\_RAMOFF\_LPCOMP}$	System OFF, no RAM retention, wake on LPCOMP		0.86		µA
$I_{OFF\_RAMON\_RESET}$	System OFF, full 256 kB RAM retention, wake on reset		1.86		µA
$I_{ON\_RAMOFF\_EVENT\_5V}$	System ON, no RAM retention, wake on any event, 5 V supply on VDDH, REG0 output = 3.3 V		1.29		µA
$I_{OFF\_RAMOFF\_RESET\_5V}$	System OFF, no RAM retention, wake on reset, 5 V supply on VDDH, REG0 output = 3.3 V		0.95		µA

6. Block Diagram



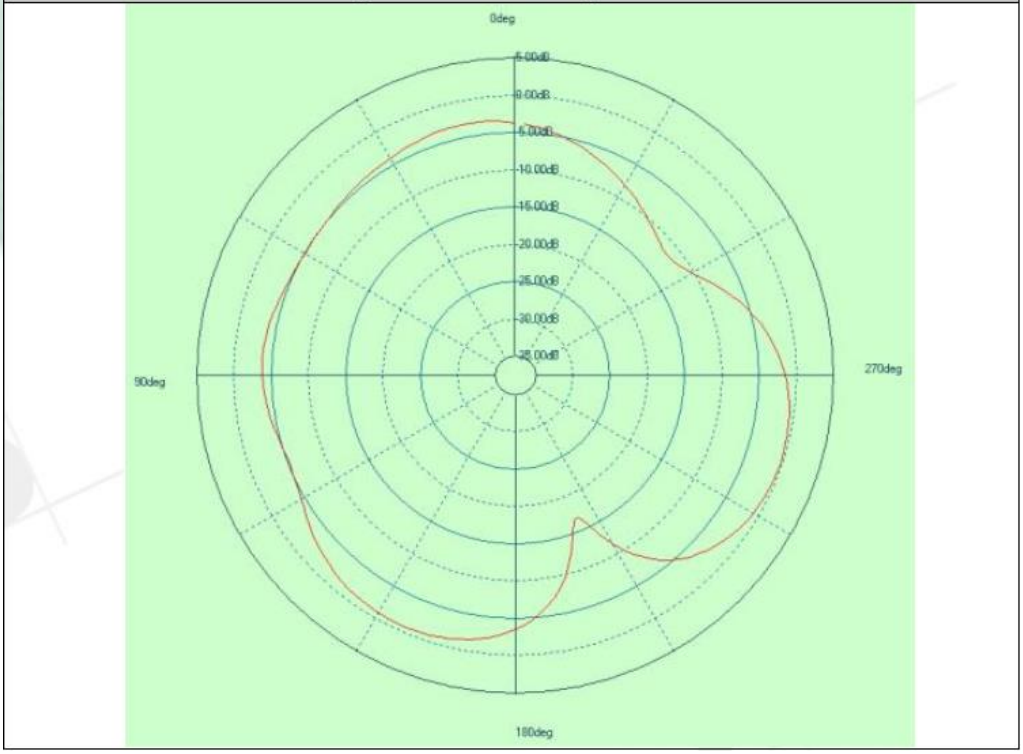
7. Antenna

7.1. MDBT50Q-P1M

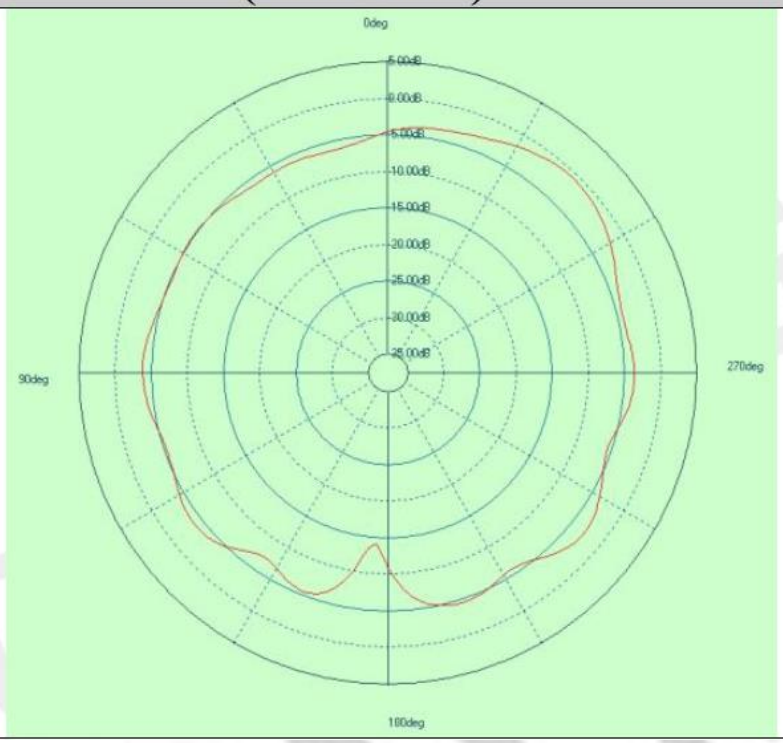
Antenna Gain and Efficiency

MDBT50Q (PCB antenna)			
Freq(MHz)	Peak. dBi	Efficiency	Average . dBi
2400.00	-0.72	29.40%	-5.32
2410.00	-0.62	31.02%	-5.08
2420.00	-0.44	32.89%	-4.83
2430.00	-0.44	35.00%	-4.56
2440.00	0.08	36.98%	-4.32
2450.00	0.05	37.76%	-4.23
2460.00	0.24	37.40%	-4.27
2470.00	0.26	37.43%	-4.27
2480.00	0.41	36.96%	-4.32
2490.00	0.37	35.03%	-4.56
2500.00	-0.15	31.71%	-4.99

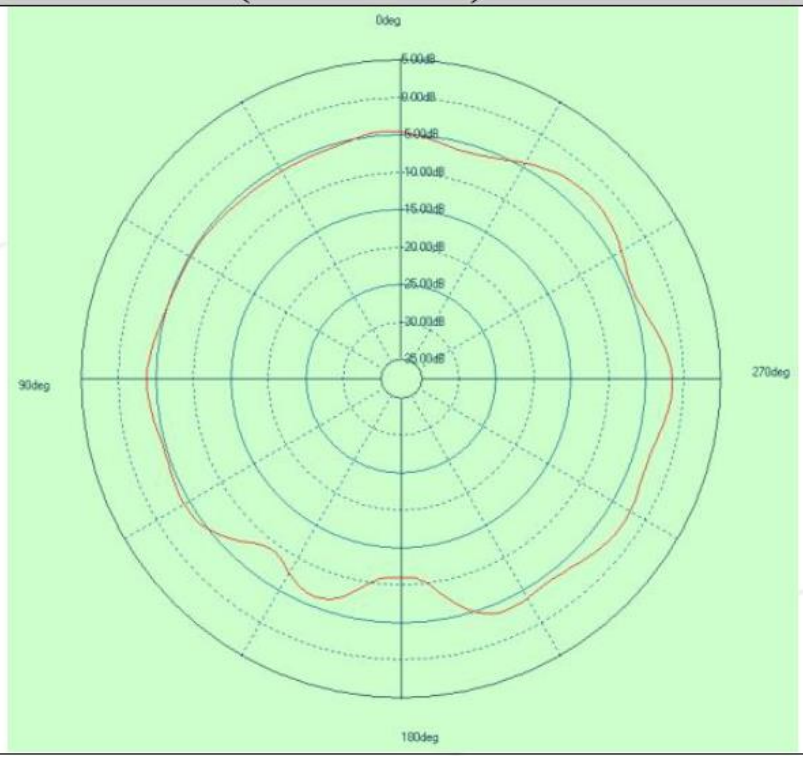
Free Space
EIRP (2450 MHz) – XY cut



Free Space
EIRP (2450 MHz) – XZ cut



Free Space
EIRP (2450 MHz) – YZ cut

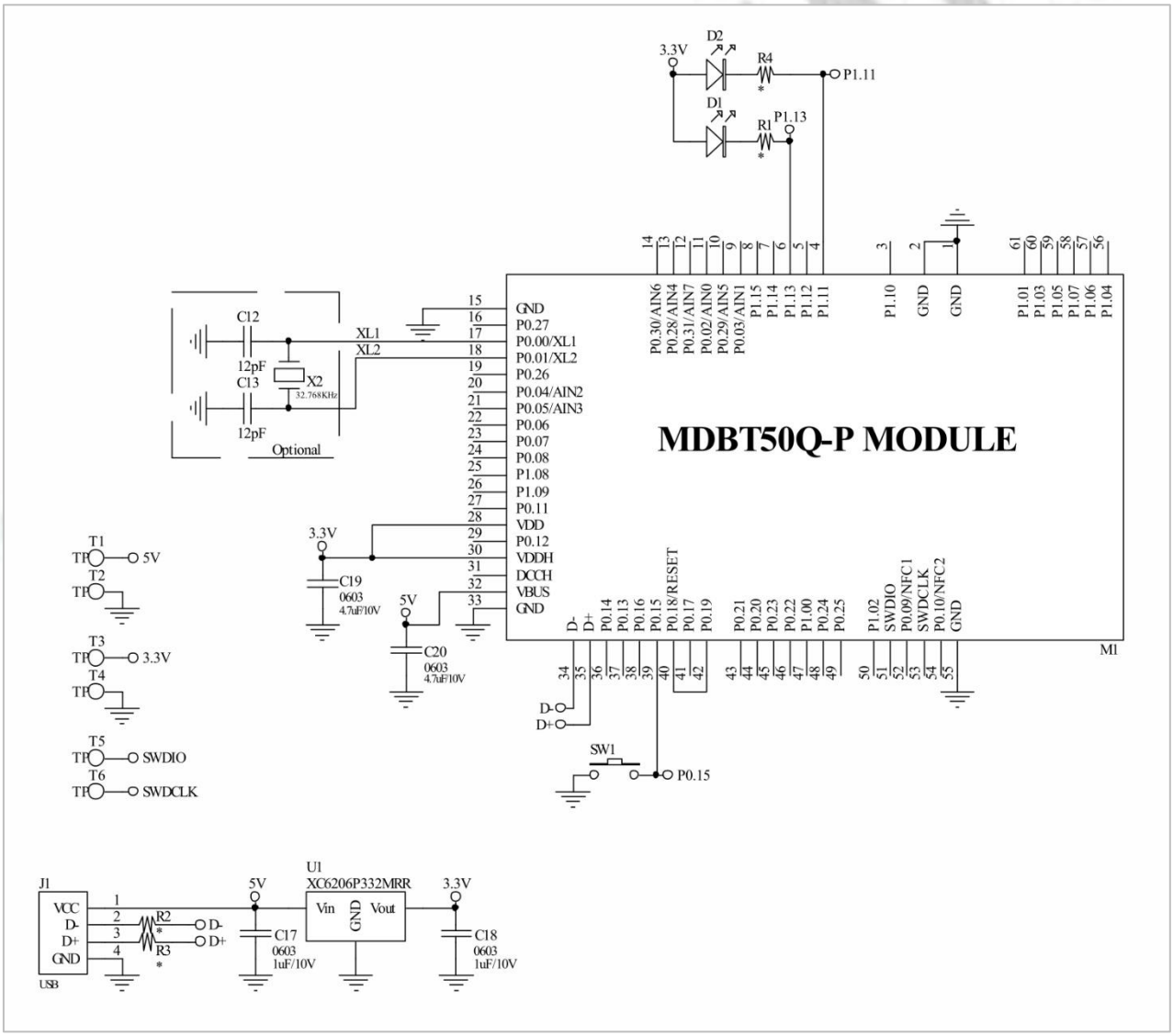


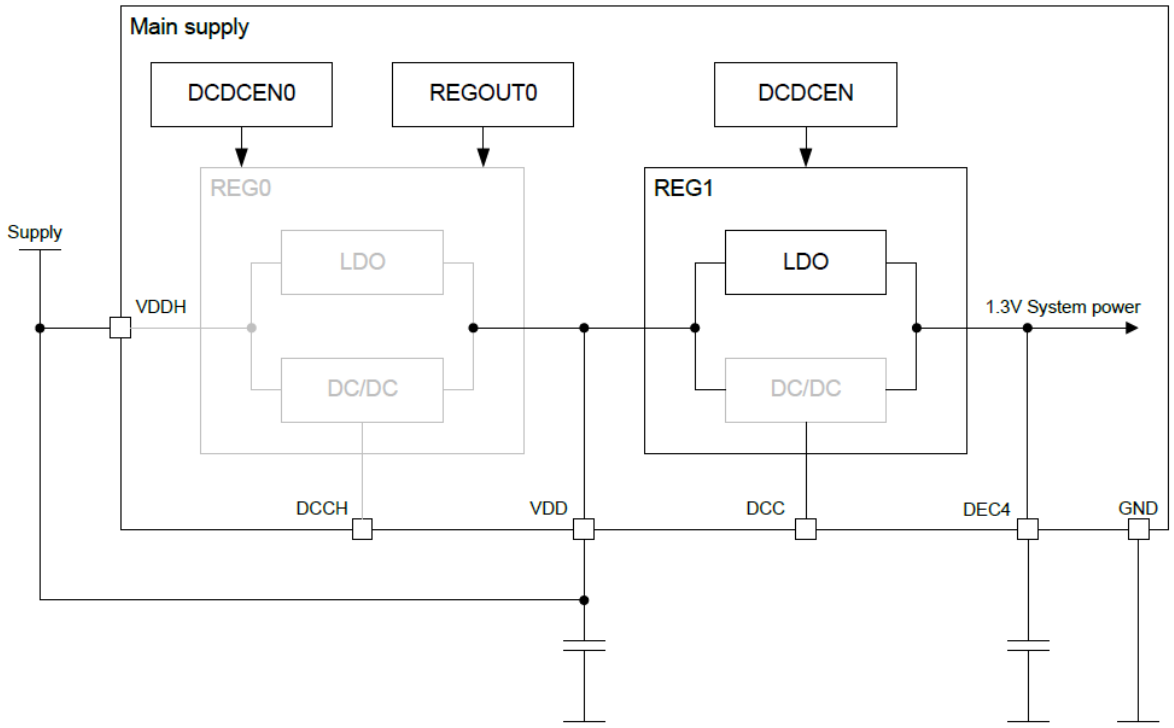
8. Reference Circuit

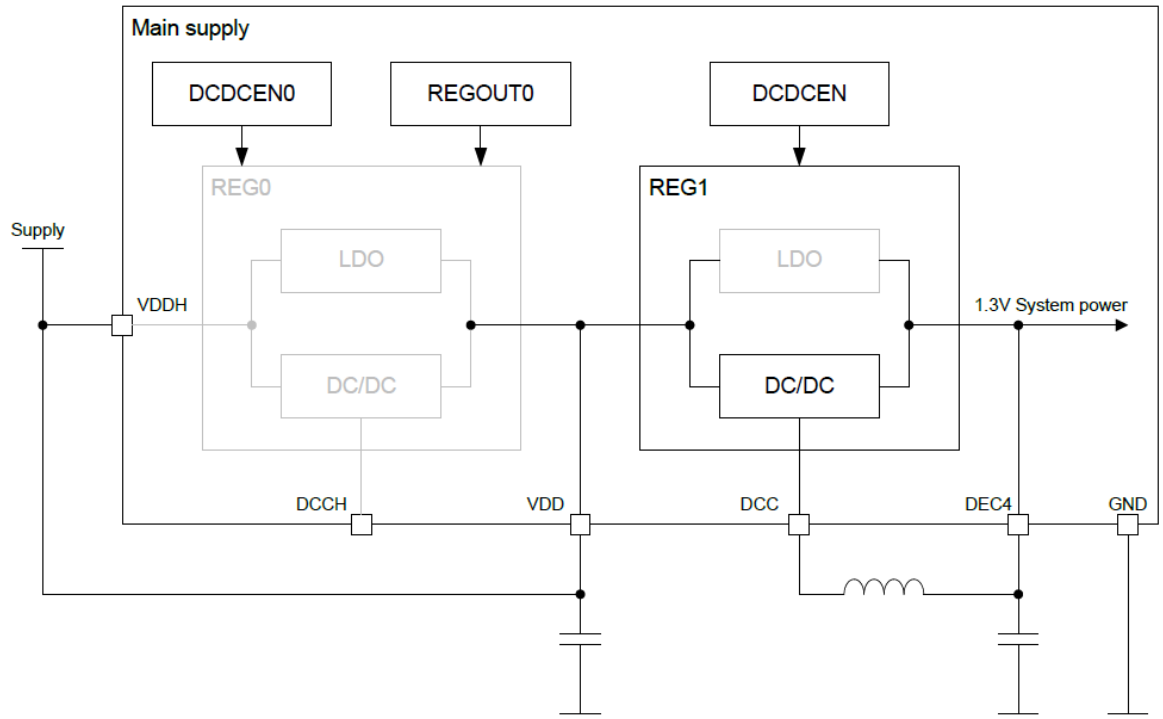
Default is Reg0 DC/DC and LDO Mode Disabled.

*Dongle is pre-programmed with Raytac's test code. Please **re-program** it with your own firmware onto the dongle for further testing. See 9 Programming GPIO for more info.*

- External 32.768khz is already inside the dongle.
- Standard dongle only has one LED (D1). Please discuss with us directly if you need two LEDs (D1+D2).

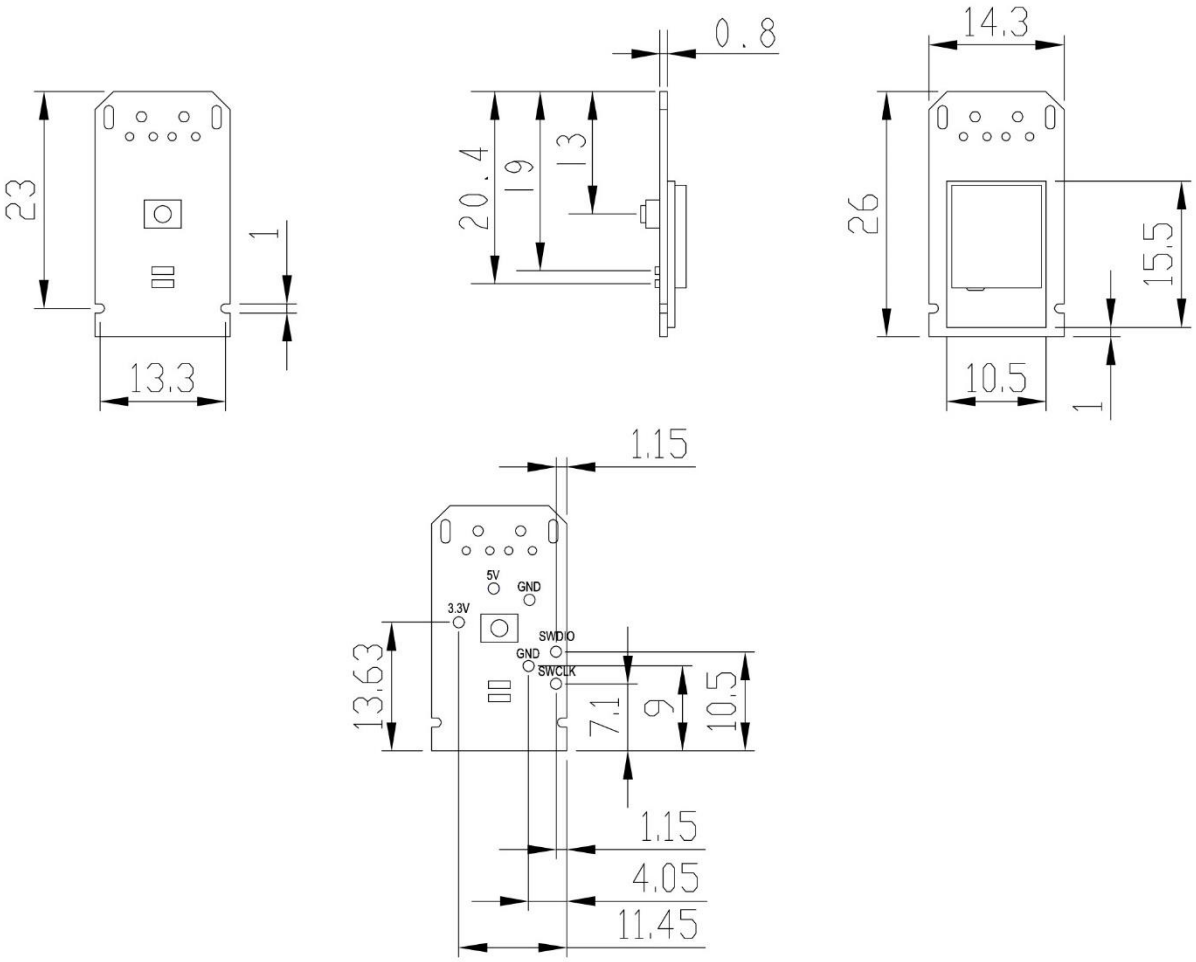



Main supply
DCDCEN0
REGOUT0
DCDCEN
REG0
REG1
Supply
LDO
LDO
VDDH
1.3V System power
DC/DC
DC/DC
DCCH
VDD
DCC
DEC4
GND


Main supply
DCDCEN0
REGOUT0
DCDCEN
REG0
REG1
Supply
LDO
LDO
VDDH
1.3V System power
DC/DC
DC/DC
DCCH
VDD
DCC
DEC4
GND

9. Programming GPIO

Below drawing shows the position of programming GPIO.



10. Certification

10.1. Declaration ID

Declaration ID	QDID(s)	Company	Specification Name
D041673	118335 - End Product 91659 - Profile Subsystem 111537 - Profile Subsystem	Raytac Corporation	5.0

Supported profile and service:

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)	
Mesh Profile	Mesh Provisioning Service
	Mesh Proxy Service

10.2. FCC Certificate (USA)

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: 07/26/2018

Application
Dated: 07/25/2018

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:	SH6MDBT50Q
Name of Grantee:	Raytac Corp.
Equipment Class:	**Digital Transmission System**
Notes:	**Bluetooth Low Energy & IEEE 802.15.4 Combo Module**
Modular Type:	**Single Modular**

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	**2402.0 - 2480.0**	**0.0066**		
	15C	**2405.0 - 2480.0**	**0.0066**		

Modular Approval. This is a portable device. Power Output 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. 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.: 182180940/AA/00	Ramy Nabod Product Assessor	

No. 134, Wu Kung Road,
New Taipei Industrial Park,
Wuku District, New Taipei City,
Taiwan 24803
Tel: +886-2-2299-3279
Fax: +886-2-2298-2698

No: MH/2018/C0096C

FCC SDoC REPORT

This certifies that the following designated product

Product Name: Bluetooth Low Energy & IEEE 802.15.4 Combo Dongle
Brand Name: Raytac
Model No. : MDBT50Q-RX
Added Model(s): N/A

(Product Identification)

It is herewith confirmed and found to comply with the requirements set up by ANSI C63.4:2014 & 47 CFR Part 15, Subpart B, Class B regulations for the evaluation of electromagnetic compatibility.
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 and,
(2) This device must accept any interference received, including interference that may cause undesired operation.

(Identification of regulations / standards)
This declaration is the responsibility of the manufacturer / importer

Applicant : Raytac Corporation
Address : 5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan
Manufacturer : Raytac Corporation
Address : 5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan

This is the result of test, **Based on SGS EMC Test Report Number(s) : MH/2018/C0096**, that was carried out from the submitted type-samples of a product in conformity with the specification of the respective standards. The certificate holder has the right to fix the FCC-mark for EMI on the product complying with the inspection sample.

Eddy Cheng

(Mr. Eddy Cheng)

..... Dec. 28, 2018.....
(Date)

Any unauthorized alteration, forgery or falsification of the content or appearance of this report is unlawful and offenders may be prosecuted to the fullest extent of the law.

10.3. TELEC Certificate (Japan)

Certificate Technical Support Center Co.,Ltd:
RAB ID No. 018

Construction Type Certification

Registration No.	CSRT180280
Certificate Holder	Raytac Corporation 5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City, 235, Taiwan
Product Category	Article 2, Paragraph 1, Item 19
Model Type or Name	MDBT50Q, MDBT50Q-1M, MDBT50Q-P1M, MDBT50Q-U1M
Type of Emission, Frequency and Antenna Power	F1D 2402MHz - 2480MHz (2MHz separation, 40 channels) 5.9704mW, 5.0816mW
Manufacturer	Raytac Corporation 5F, No.3, Jiankang Rd., Zhonghe Dist., New Taipei City, 235, Taiwan
Factory	Tech-Lin's Electronics Corp. 5F/11F, No. 778, Zhongzheng Rd., Zhonghe Dist., New Taipei City 23586, Taiwan R.O.C
Remarks	The scope of evaluation relates to the submitted documents and product only. It is only valid in conjunction with the Annex.

When the product is placed on the Japanese market, the Specified Radio Equipment marking as shown on the right must be attached on visible part of the product.

R 018-180280

Witnesses that the certification is on Construction Type Certification under Article 38-24 of the Radio Law.

Date of Certificate
2018/7/30

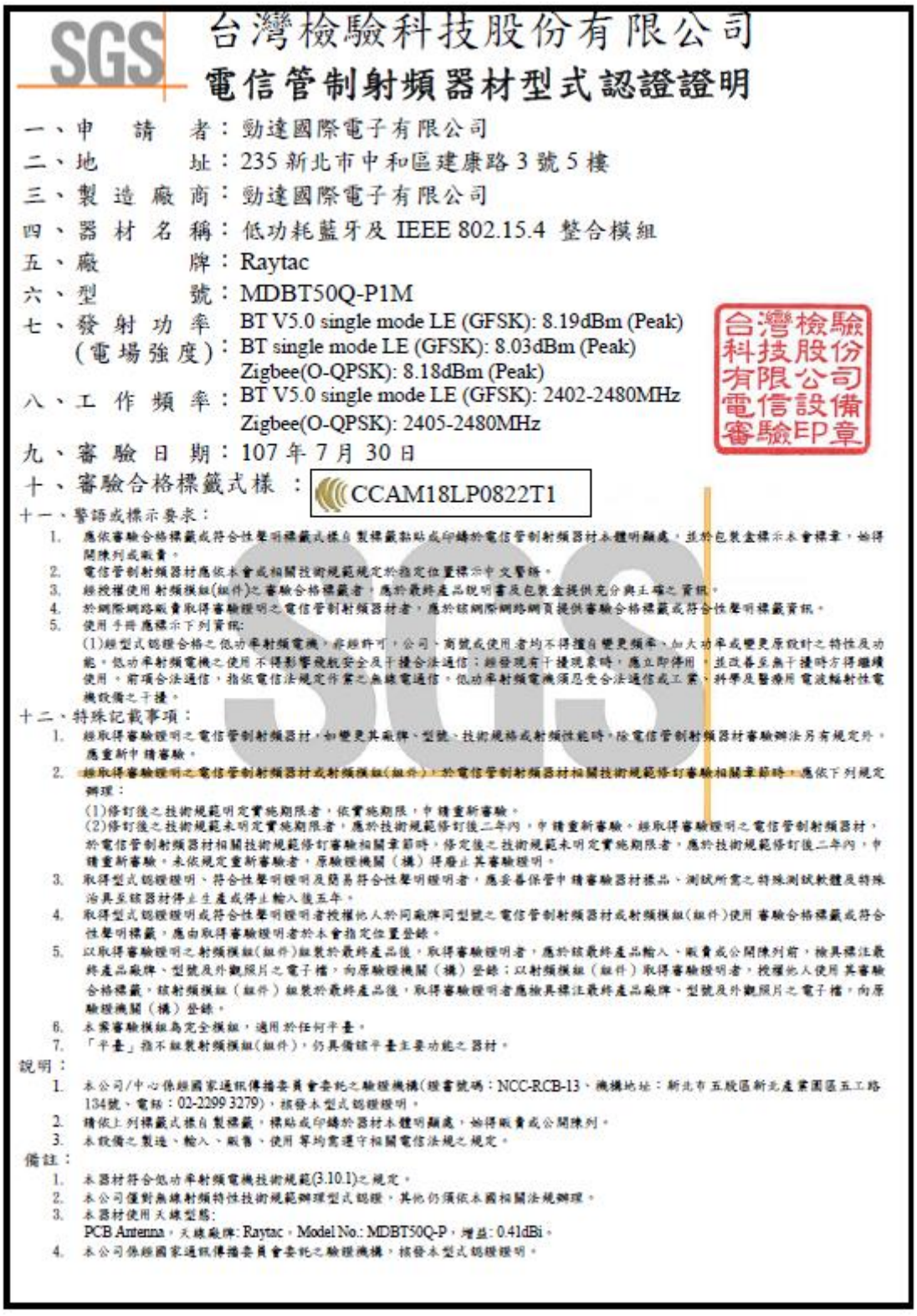
Takuji Nakano

Certification Examiner : Takuji Nakano
C&S Certificate Technical Support Center Co., Ltd.

Address: Shinyokohama First Bldg.B1, 1-2-1 Shinyokohama, Kohoku-ku, Yokohama-City, 222-0033 Japan
Tel.: +81 45 478 3365 • Fax: +81 45 478 3382 • E-mail: cert@cns-web.co.jp

10.4. NCC Certificate (Taiwan)

MDBT50Q-P1M



台灣檢驗科技股份有限公司

電信管制射頻器材型式認證證明

一、申　請　者：勁達國際電子有限公司
二、地　　址：235 新北市中和區建康路 3 號 5 樓
三、製 造 廠 商：勁達國際電子有限公司
四、器 材 名 稱：低功耗藍牙及 IEEE 802.15.4 整合模組
五、廠　　牌：Raytac
六、型　　號：MDBT50Q-P1M
七、發 射 功 率（電場強度）：BT V5.0 single mode LE (GFSK): 8.19dBm (Peak)
BT single mode LE (GFSK): 8.03dBm (Peak)
Zigbee(O-QPSK): 8.18dBm (Peak)
八、工 作 頻 率：BT V5.0 single mode LE (GFSK): 2402-2480MHz
Zigbee(O-QPSK): 2405-2480MHz
九、審 驗 日 期：107 年 7 月 30 日
十、審驗合格標籤式樣：CCAM18LP0822T1

台灣檢驗科技股份有限公司 電信設備審驗印章

十一、警語或標示要求：

1. 應依審驗合格標籤或符合性聲明標籤式樣自製標籤黏貼或印鑄於電信管制射頻器材本體明顯處，並於包裝盒標示本會標章，始得開賣或販賣。
2. 電信管制射頻器材應依本會或相關技術規範規定於指定位置標示中文警語。
3. 經授權使用射頻模組(組件)之審驗合格標籤者，應於最終產品說明書及包裝盒提供充分與正確之資訊。
4. 於網際網路販賣取得審驗證明之電信管制射頻器材者，應於該網際網路網頁提供審驗合格標籤或符合性聲明標籤資訊。
5. 使用手冊應標示下列資訊:
(1)經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

十二、特殊記載事項：

1. 經取得審驗證明之電信管制射頻器材，如變更其廠牌、型號、技術規格或射頻性能時，除電信管制射頻器材審驗辦法另有規定外，應重新申請審驗。
2. 經取得審驗證明之電信管制射頻器材或射頻模組(組件)，於電信管制射頻器材相關技術規範修訂審驗相關章節時，應依下列規定辦理：
(1)修訂後之技術規範明定實施期限者，依實施期限，申請重新審驗。
(2)修訂後之技術規範未明定實施期限者，應於技術規範修訂後二年內，申請重新審驗。經取得審驗證明之電信管制射頻器材，於電信管制射頻器材相關技術規範修訂審驗相關章節時，修定後之技術規範未明定實施期限者，應於技術規範修訂後二年內，申請重新審驗。未依規定重新審驗者，原驗證機關（構）得廢止其審驗證明。
3. 取得型式認證證明、符合性聲明證明及簡易符合性聲明證明者，應妥善保管申請審驗器材樣品、測試所需之特殊測試軟體及特殊治具至該器材停止生產或停止輸入後五年。
4. 取得型式認證證明或符合性聲明證明者授權他人於同廠牌同型號之電信管制射頻器材或射頻模組(組件)使用審驗合格標籤或符合性聲明標籤，應由取得審驗證明者於本會指定位置登錄。
5. 以取得審驗證明之射頻模組(組件)組裝於最終產品後，取得審驗證明者，應於該最終產品輸入、販賣或公開陳列前，檢具標注最終產品廠牌、型號及外觀照片之電子檔，向原驗證機關（構）登錄；以射頻模組（組件）取得審驗證明者，授權他人使用其審驗合格標籤，該射頻模組（組件）組裝於最終產品後，取得審驗證明者應檢具標注最終產品廠牌、型號及外觀照片之電子檔，向原驗證機關（構）登錄。
6. 本案審驗模組為完全模組，適用於任何平臺。
7. 「平臺」指不組裝射頻模組(組件)，仍具備該平臺主要功能之器材。

說明：

1. 本公司/中心係經國家通訊傳播委員會委託之驗證機構(證書號碼：NCC-RCB-13、機構地址：新北市五股區新北產業園區五工路134號、電話：02-2299 3279)，核發本型式認證證明。
2. 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。
3. 本設備之製造、輸入、販售、使用等均需遵守相關電信法規之規定。

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，Model No.: MDBT50Q-P，增益: 0.41dBi。
4. 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。

10.5. CE (EU) Test Report

CE

RED (2014/53/EU)
ETSI EN 300 328 V2.1.1: 2016
TEST REPORT

FOR

Applicant:	Raytac Corporation 5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan
Product Name:	Bluetooth Low Energy & IEEE 802.15.4 Combo Dongle
Brand Name:	Raytac
Model No.:	MDBT50Q-RX
Model Difference:	N/A
Report Number:	E2/2018/C0012
Issue Date:	Jan. 21, 2019
Date of Test:	Dec. 21, 2018 ~ Dec. 27, 2018
Date of EUT Received:	Dec. 17, 2018

We hereby certify that:
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. 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.

Tested By: Vito Pei
Vito Pei / Sr. Engineer

Approved By: Jazz Huang
Jazz Huang / Asst. Supervisor

SGS Reference No: MH/2018/C0095C

VERIFICATION OF EMC COMPLIANCE

Verification No.	:	MH/2018/C0095C
Representative Model No.	:	MDBT50Q-RX
Added Model(s)	:	N/A
Product Name	:	Bluetooth Low Energy & IEEE 802.15.4 Combo Dongle
Brand Name	:	Raytac
Applicant	:	Raytac Corporation
Address of Applicant	:	5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan
Test Report Number	:	MH/2018/C0095
Date of Issue	:	Dec. 28, 2018
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

10.6. RCM (Australia & New Zealand) Test Report

Australian/New Zealand Standard
AS/NZS 4268:2017
TEST REPORT

FOR

Applicant:	Raytac Corporation 5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan
Product Name:	Bluetooth Low Energy & IEEE 802.15.4 Combo Dongle
Brand Name:	Raytac
Model No.:	MDBT50Q-RX
Model Difference:	N/A
Report Number:	E2/2019/20021
Issue Date:	Feb. 20, 2018
Date of Test:	Dec. 21, 2018 ~ Dec. 27, 2018
Date of EUT Received:	Dec. 17, 2018

We hereby certify that:
The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory for compliance with the requirements set forth in the Australian/New Zealand Standard AS/NZS 4268:2017. Test report to determine compliance with AS/NZS 4268 requirements. 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.

Tested By: Vito Pei
Vito Pei / Sr. Engineer

Approved By: CHUN-CHIEH, CHEN
Chun Chieh Chen / Asst. Supervisor

EMC TEST REPORT

Based on SGS EMC Test Report No.: MH/2018/C0095

Applicant	**: Raytac Corporation**
Address	**: 5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan**
Manufacturer	**: Raytac Corporation**
Address	**: 5F., No.3, Jiankang Road, Zhonghe District, New Taipei City 23586, Taiwan**

Equipment Under Test (EUT) :

Name	**: Bluetooth Low Energy & IEEE 802.15.4 Combo Dongle**
Brand Name	**: Raytac**
Model No.	**: MDBT50Q-RX**
Added Model(s)	**: N/A**

Standard : AS/NZS CISPR 32 : 2015

Date of Receipt : Feb. 15, 2019
Date of Test : Dec. 17 ~ 26, 2018
Date of Issue : Feb. 19, 2019

Test Result :	**PASS**

In the configuration tested, the EUT complied with the standards specified above.

Remarks :

This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS Taiwan Electronics & Communication Laboratory or testing done by SGS Taiwan Electronics & Communication Laboratory in connection with distribution or use of the product described in this report must be approved by SGS Taiwan Electronics & Communication Laboratory in writing.

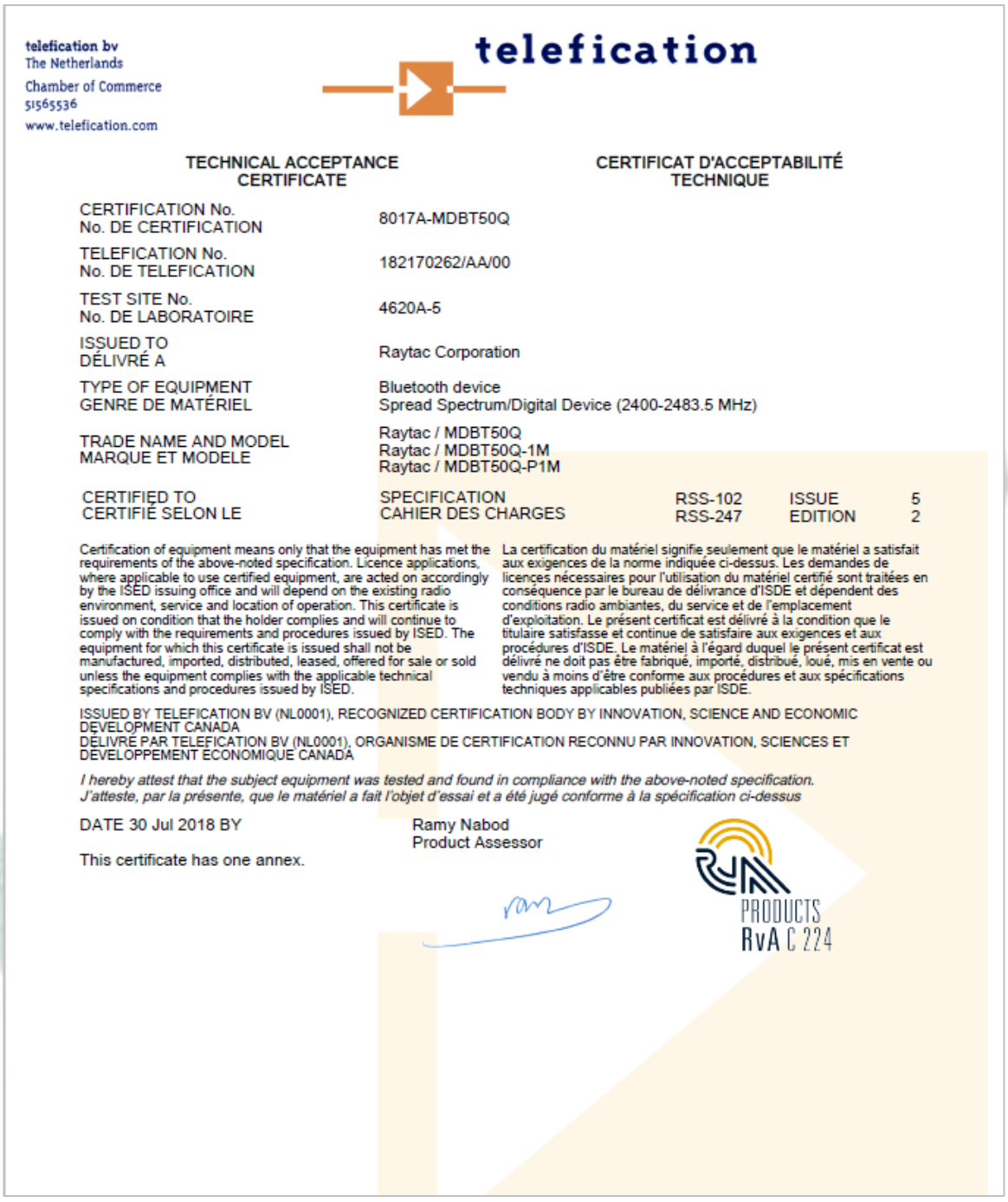
Tested By: Lowka Chen ***Date*** **Feb. 19, 2019**

Lowca Chen (Engineer)

Approved By Eddy Cheng ***Date*** **Feb. 19, 2019**

Eddy Cheng (Asst.Supervisor)

10.7. IC Certificate (Canada)



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Chamber of Commerce
51565536
www.telefication.com

telefication

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

CERTIFICATION No. No. DE CERTIFICATION	8017A-MDBT50Q
TELEFICATION No. No. DE TELEFICATION	182170262/AA/00
TEST SITE No. No. DE LABORATOIRE	4620A-5
ISSUED TO DÉLIVRÉ A	Raytac Corporation
TYPE OF EQUIPMENT GENRE DE MATÉRIEL	Bluetooth device Spread Spectrum/Digital Device (2400-2483.5 MHz)
TRADE NAME AND MODEL MARQUE ET MODELE	Raytac / MDBT50Q Raytac / MDBT50Q-1M Raytac / MDBT50Q-P1M
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 30 Jul 2018 BY

Ramy Nabod
Product Assessor

This certificate has one annex.

PRODUCTS
RvA C 224

10.8. SRRC Certificate (China)

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: 2018DJ5128
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

2018 年 8 月 29 日
Year Month Date

10.9. KC Certificate (South Korea)

2CC6-E6D4-B6AA-9E64

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*	MDBT50Q-U
파생모델명 *Series Model Number*	MDBT50Q, MDBT50Q-P
인증번호 *Certification No.*	R-C-ryt-MDBT50Q
제조자/제조국가 *Manufacturer/ Country of Origin*	Raytac Corporation / 대만
인증연월일 *Date of Certification*	2018-08-17
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.

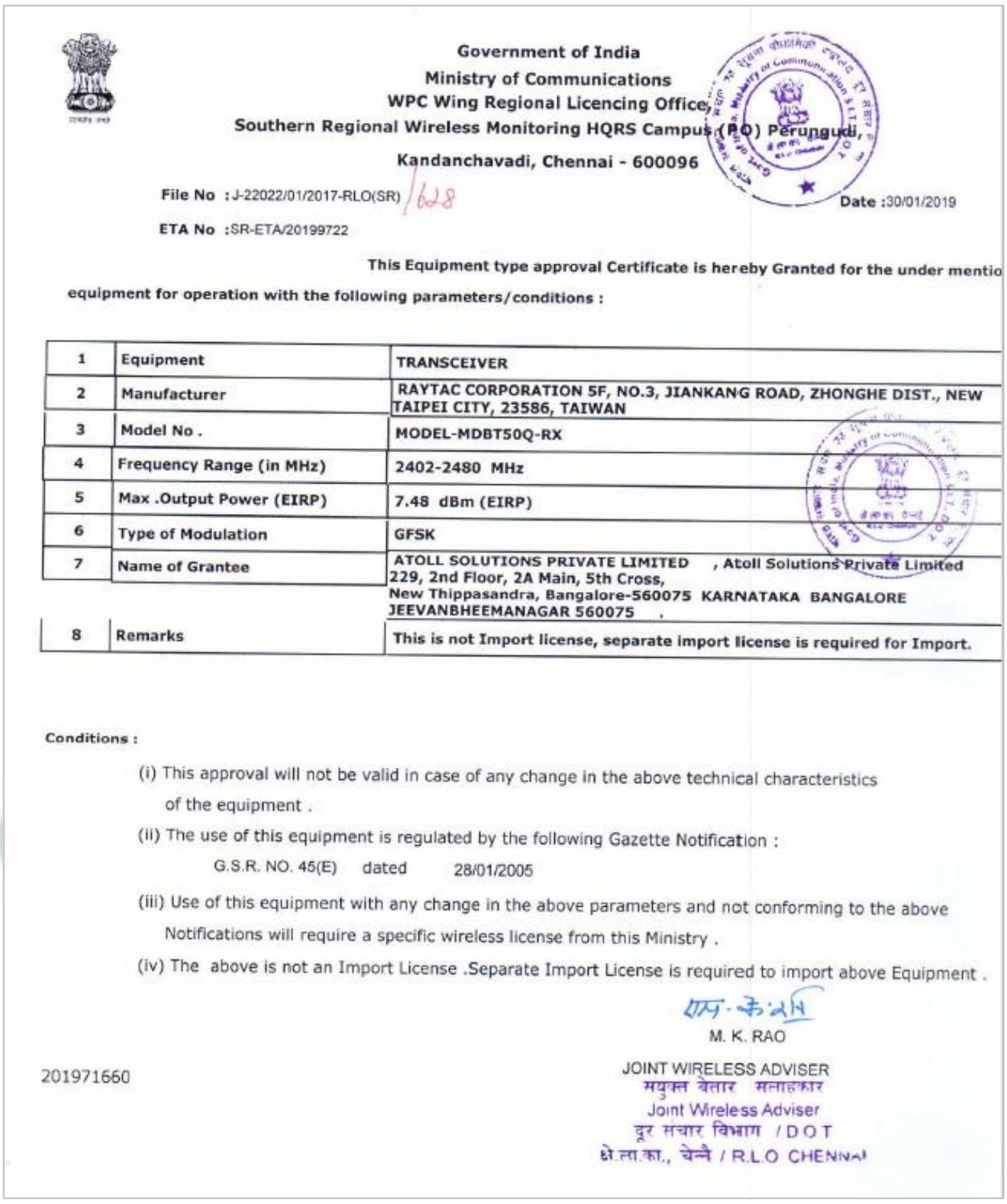
2018년(Year) 08월(Month) 17일(Day)

국립전파연구원장 국립전파연구원장인

Director General of National Radio Research Agency

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

10.10. WPC (India) Certificate



Government of India
Ministry of Communications
WPC Wing Regional Licencing Office,
Southern Regional Wireless Monitoring HQRS Campus (PO) Perungudi,
Kandanchavadi, Chennai - 600096

File No : J-22022/01/2017-RLO(SR) /628 Date :30/01/2019

ETA No :SR-ETA/20199722

This Equipment type approval Certificate is hereby Granted for the under mentio equipment for operation with the following parameters/conditions :

1	Equipment	TRANSCEIVER
2	Manufacturer	RAYTAC CORPORATION 5F, NO.3, JIANKANG ROAD, ZHONGHE DIST., NEW TAIPEI CITY, 23586, TAIWAN
3	Model No .	MODEL-MDBT50Q-RX
4	Frequency Range (in MHz)	2402-2480 MHz
5	Max .Output Power (EIRP)	7.48 dBm (EIRP)
6	Type of Modulation	GFSK
7	Name of Grantee	ATOLL SOLUTIONS PRIVATE LIMITED , Atoll Solutions Private Limited 229, 2nd Floor, 2A Main, 5th Cross, New Thippasandra, Bangalore-560075 KARNATAKA BANGALORE JEEVANBHEEMANAGAR 560075 .
8	Remarks	This is not Import license, separate import license is required for Import.

Conditions :

(i) This approval will not be valid in case of any change in the above technical characteristics of the equipment .

(ii) The use of this equipment is regulated by the following Gazette Notification :

G.S.R. NO. 45(E) dated 28/01/2005

(iii) Use of this equipment with any change in the above parameters and not conforming to the above Notifications will require a specific wireless license from this Ministry .

(iv) The above is not an Import License .Separate Import License is required to import above Equipment .

M. K. RAO

JOINT WIRELESS ADVISER
संयुक्त बेतार सलाहकार
Joint Wireless Adviser
दूर संचार विभाग / D O T
क्षे.ला.का., चेन्नै / R.L.O CHENNAI

201971660

10.11. RoHS & REACH Report

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

11. Notes and Cautions

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

- Follow the guidelines of this document while working with the product. Any discrepancy of core Bluetooth technology and technical specification of IC should refer to the 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 dongle without casing as it may cause damage to the PCBA. It is highly recommended using anti-ESD measurements when working with the dongle without casing or during assembly to prevent damage from real-life ESD events.

- Do not expose modules under direct sunlight for longer periods of time. Dongles should be kept away from humid and salty air conditions, and any corrosive gasses or substances. Store it within -40℃ to +75℃ before and after installation.

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

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

The dongle is not suitable for life support devices or systems and is not allowed to be used in destructive devices or systems in any direct or indirect ways. The customer agrees to indemnify Raytac for any losses when using dongle(s) in applications such as the ones described above.

12. Basic Facts for nRF52 Chip

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

	Nordic Solution			
	nRF52840	nRF52832	nRF52810	nRF52811
RAYTAC Model No.	MDBT50Q-1M MDBT50Q-P1M MDBT50Q-U1M	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

13. Useful Links

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

  Nordic Infocenter is no longer being updated from 2018/11/30. Please visit Documentation Library (https://www.nordicsemi.com/DocLib) for latest updates.

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

- Official Page of nRF52840 : https://www.nordicsemi.com/eng/Products/nRF52840
  A brief introduction to nRF52840 and download links for Nordic's developing software and SoftDevices.

14. USB Driver for Windows

Please check "Support" page of our website to download.

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-1M	1	Chip Antenna	256 kb	1MB
MDBT50Q-P		MDBT50Q-P1M		PCB Antenna		
MDBT50Q-U		MDBT50Q-U1M		u.FL Connector		

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

Release Note

- 2018/12/14: 1ST release.
- 2019/03/19: Version B

  (1) Updated part no./order code and schematic due to design of product changed.

  (2) Updated FCC, CE, RCM and WPC regulation info in Chapter 10: Certifications.

  (3) Updated Chapter 5: Specifications and Chapter 11: Notes & Cautions.

  (4) Added nRF52811 info in Chapter 12: Basic Facts for nRF52 Chip and Full List of Raytac BLE Modules.

  (5) Added new MDBT42Q-U module in Full List of Raytac BLE Modules.

  (6) Added download link for USB driver.