

Approval Sheet

(產品承認書)

產品名稱 (Product):	BLE AT Command Module
	in Peripheral / Slave role
解決方案 (Solution):	Nordic nRF52805
產品型號 (Model No.):	MDBT42T – AT (Chip Antenna)
	MDBT42T – PAT (PCB Antenna)
韌體版本 (FW Revision):	1.0

Advantage of MDBT42T & MDBT42T-P series:

1. Long working distance under 1 Mbps:
MDBT42T: over 80 meters in open space.
MDBT42T-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 MDBT42T-AT & MDBT42T-PAT is a BT 5.1 stack (Bluetooth low energy or BLE) module designed based on **Nordic nRF52805 SoC solution**, which incorporates: **UART** interface in only peripheral/slave role for data bridge in compact size **(L) 11.2 x (W) 7.2 x (H) 2.05 / 1.8 mm**.

2. AT Command

2.1. List of supported commands

- Setting of device name
- Choose data rate of 1 Mbps or 2 Mbps on-air
- Set TX output power in 5 levels.
- Set advertising time
- Set connection interval under Mode 2
- Enable/disable advertising
- 7 sets of UART baud rates
- Enable/disable UART flow control
- Enable/disable interface of UART hardware
- Power-down mode for power saving and GPIO wake-up
- Support DC-to-DC and LDO power mode
- Use internal or external 32.768 KHz oscillator
- Recover-to-default setting with hardware and software method
- System reset of hardware and software
- Set serial number and retrieve
- Set or retrieve MAC Address
- Retrieve ADC value for battery detection, delivering the information through battery service.
- Support maximum MTU 247bytes / data payload up to maximum 244 bytes

2.2. AT Command Sets

2.2.1. "Write" Commands

No.	Command	Description
(1)	AT+NAME	Set device name,Max. length of 20 characters e.g. AT+NAME123 (device name 123, 3 characters)
(2)	AT+RESET	Set to reset system
(3)	AT+ADVSTART	Set to start advertising
(4)	AT+ADVSTOP	Set to stop advertising
(5)	AT+SLEEP	Set to get into deep sleep mode
(6)	AT+BAUDRATE9600	Set UART baud rate at 9600 bps,n,8,1
(7)	AT+BAUDRATE19200	Set UART baud rate at 19200 bps,n,8,1
(8)	AT+BAUDRATE38400	Set UART baud rate at 38400 bps,n,8,1
(9)	AT+BAUDRATE57600	Set UART baud rate at 57600 bps,n,8,1
(10)	AT+BAUDRATE115200	Set UART baud rate at 115200 bps,n,8,1
(11)	AT+BAUDRATE230400	Set UART baud rate at 230400 bps,n,8,1 (recommended enabling flow control)
(12)	AT+BAUDRATE460800	Set UART baud rate at 460800 bps,n,8,1 (recommended enabling flow control)
(13)	AT+FLOWCONTROLDIS	Disable UART flow control
(14)	AT+FLOWCONTROLEN	Enable UART flow control
(15)	AT+TXPOWER4DBM	Set RF TX power at + 4dBm
(16)	AT+TXPOWER0DBM	Set RF TX power at 0dBm
(17)	AT+TXPOWER-4DBM	Set RF TX power at - 4dBm
(18)	AT+TXPOWER-8DBM	Set RF TX power at - 8dBm
(19)	AT+TXPOWER-20DBM	Set RF TX power to - 20dBm
(20)	AT+XTALINTERNAL	Use internal RC 32.768KHZ low frequency oscillator
(21)	AT+XTALEXTERNAL	Use external crystal 32.768KHZ low frequency oscillator
(22)	AT+CONNECTINDICATORLOW	Set logic low output when connecting BT
(23)	AT+CONNECTINDICATORHIGH	Set logic high output when connecting BT
(24)	AT+PHYMODE1MBPS	Set PHY mode at 1Mbps

No.	Command	Description
(25)	AT+PHYMODE2MBPS	Set PHY mode at 2Mbps
(26)	AT+WAKEUPLow	Set logic low at wake-up when in deep sleep
(27)	AT+WAKEUPHigh	Set logic high at wake-up when in deep sleep
(28)	AT+ADVTIME<ttt>	Set advertising time (Hex) e.g. 0x001E (min. 30secs), 0x0E10 (Max. 3,600secs) 0x0000 (forever)
(29)	AT+DCDCDIS	Disable DC to DC converter
(30)	AT+DCDCEN	Enable DC to DC converter
(31)	AT+CONNECTINTERVALMODE0	Set connection interval mode for iOS/Android APP usage (min. 20ms / Max. 40ms),
(32)	AT+CONNECTINTERVALMODE1	Set connection interval mode for nRF52832 Central usage (min. 8ms / Max. 8ms)
(33)	AT+CONNECTINTERVALMODE2	Set connection interval mode for iOS/Android APP usage (programmable: min. / Max. range is 8ms ~ 1,000ms)
(34)	AT+CONNECTINTERVALTIME<ttttttt>	Set connection interval time (Hex), available when activating "AT+CONNECTINTERVALMODE2" e.g. 0x0008 (8ms), 0x03E8 (1,000ms), conditions to be met: "min. connection interval ≤ Max. connection interval"

No.	Command	Description
(35)	AT+SERIALNOnnnnnnnn	Set serial number e.g. AB000001, fixed 8-character length
(36)	AT+RESPONSEDIS	Disable response when sending "write" command
(37)	AT+RESPONSEEN	Enable response when sending "write" command
(38)	AT+DISCONNECT	Terminate the connection
(39)	AT+DEFAULT	Back to default
(40)	AT+MACADDRnnnnnnnnnnnn	Set IC MAC address, where n is Hex. Written order is from MSB byte to LSB byte.

***** Important *****

Flow control function cannot be activated when using external 32.768 Khz crystal oscillator. A "fail" response will return.

	Status of Flow Control	
	Disable	Enable
Internal RC oscillator	√	√
External crystal oscillator	√	fail

2.2.2. “Read” Commands

No.	Command	Description
(1)	AT?NAME	To retrieve device name
(2)	AT?VERSION	To retrieve firmware version
(3)	AT?MACADDR	To retrieve IC MAC address
(4)	AT?BAUDRATE	To retrieve current UART baud rate
(5)	AT?FLOWCONTROL	To retrieve UART status of flow control
(6)	AT?TXPOWER	To retrieve RF TX power
(7)	AT?XTAL	To retrieve status of oscillator
(8)	AT?CONNECTINDICATOR	To retrieve logic of pin for BT-connecting indicator
(9)	AT?PHYMODE	To retrieve status of PHY mode
(10)	AT?WAKEUP	To retrieve logic of wake-up pin
(11)	AT?ADVTIME	To retrieve advertising time (Hex)
(12)	AT?DCDC	To retrieve DC to DC converter status
(13)	AT?CONNECTINTERVALMODE	To retrieve status of connection interval mode
(14)	AT?SERIALNO	To retrieve serial number
(15)	AT?ADCVALUE	To retrieve 10bit ADC value
(16)	AT?RESPONSE	To retrieve status of response
(17)	AT?ALLPARAMETERS	To retrieve value of all parameters
(18)	AT?CONNECTINTERVALTIME	To retrieve value of connection interval time under Mode 2

2.2.3. Response (Default)

No.	Command	Response
(1)	AT?NAME	Raytac AT-UART (default)
(2)	AT?VERSION	e.g. version: 1.0
(3)	AT?MACADDR	e.g. D352BDE1E414
(4)	AT?BAUDRATE	0 baudrate9600 (default) (0 = 9600; 1 = 19200; 2 = 38400; 3 = 57600; 4 = 115200; 5 = 230400; 6 = 460800)
(5)	AT?FLOWCONTROL	0 flowcontrol disabled (default) (0 = disabled; 1 = enabled)
(6)	AT?TXPOWER	0 txpower 4dbm (default) (0 = 4dBm; 1 = 0dBm; 2 = -4dBm; 3 = -8dBm, 4 = -20dBm)
(7)	AT?XTAL	0 xtal internal (default) (0 = internal; 1 = external, and XTAL = 32.768KHz oscillator)
(8)	AT?CONNECTINDICATOR	0 connect indicator low (default) (0 = output low; 1 = output high)
(9)	AT?PHYMODE	0 PHY mode 1Mbps (default) (0 = 1Mbps; 1 = 2Mbps)
(10)	AT?WAKEUP	0 wakeup low (default) (0 = low active; 1 = high active)
(11)	AT?ADVTIME	0000 (default: Hex, forever advertising with no timeout, tttt: 0x0000)
(12)	AT?DCDC	0 dcdc dis (default) (0 = disabled; 1 = enabled)
(13)	AT?CONNECTINTERVALMODE	0 connect interval mode 0 (default) (0 = fixed connection interval for iOS/Android APP usage 1 = fixed connection interval, for nRF52832 Central usage 2 = programmable connection interval for iOS/Android APP usage)

No.	Command	Response
(14)	AT?SERIALNO	Display “ no data! ” string (default)
(15)	AT?ADCVALUE	Value varies from input voltage
(16)	AT?RESPONSE	1 response en (default) (0 = disable response; 1 = enable response)
(17)	AT?ALLPARAMETERS	Display value of all parameters, separated by "0x0d0x0a"
(18)	AT?CONNECTINTERVALTIME	006400C8 (default: Hex , 100ms min. connection interval / 200ms Max. connection interval, tttttt: 0x006400C8)

2.3. Default Info

No.	Description	Default
(1)	Device name	Raytac AT-UART
(2)	Base UUID	0x9E, 0xCA, 0xDC, 0x24, 0x0E, 0xE5, 0xA9, 0xE0 0x93, 0xF3, 0xA3, 0xB5, 0x00, 0x00, 0x40, 0x6E
(3)	Service UUID	0x0001 TX characteristic: 0x0003; RX characteristic: 0x0002
(4)	Baud rate	9600bps,n,8,1
(5)	Status of flow control	Disabled
(6)	RF TX power	+4dBm
(7)	32.768Khz oscillator	Using internal RC with 1000ms calibration time
(8)	Logic of BT connecting indicator	Output set as logic low when BT is connecting
(9)	PHY mode	1Mbps
(10)	Logic of wake-up pin	Set logic low to wake up in deep sleep
(11)	Advertising time	Forever advertising with no timeout
(12)	Status of DC-to-DC converter	Disabled
(13)	Connection interval mode	Set at min. 20ms and Max. 40ms for iOS/Android usage
(14)	Serial number	Display “ no data! ” string
(15)	ADC value	Value varies from input voltage between 0x0000 ~ 0x03FF (Hex).
(16)	State of response	Enabled

2.4. Pin Assignment

Pin No.	Name	Pin Function	Description
(1)	GND	Ground	The pad must be connected to a solid ground plane
(2)	NC	No function	Not connected
(3)	NC	No function	Not connected
(4)	RESET		Configurable as system RESET pin
(5)	Indicator	Output / Logic	Output logic is selective about the action of BT connection
(6)	Wakeup	Input / Logic	Input logic is selective about the action of wakeup from deep sleep
(7)	TX	Output	UART transmitter
(8)	RX	Input	UART receiver
(9)	UART PD	Input	Active-high with internal pull-high to disable hardware UART interface. The default is disabled.
(10)	GND	Ground	The pad must be connected to a solid ground plane
(11)	ADC	Analog input	10bit resolution ADC is always on and update every 200ms
(12)	Flashed Default	Input	Active-low with internal pull-high for $0.48\text{sec} \leq \text{logic low} \leq 1\text{sec}$ and return to logic high, then system will back to default.
(13)	RTS	Output	RTS, request to send. when using internal RC (LFXO)
	XL2	Analog input	Connecting to 32.768KHz crystal when using external LFXO
(14)	CTS	Input	CTS, clear to send. when using internal RC (LFXO)
	XL1	Analog input	Connecting to 32.768KHz crystal when using external LFXO
(15)	VDD	Power	Power-supply pin
(16)	GND	Ground	The pad must be connected to a solid ground plane
(17)	DCC	Power	DC/DC converter output pin
(18)	DEC4	Power	1V3 regulator supply decoupling. Input from DC/DC converter. Output from 1V3 LDO.
(19)	GND	Ground	The pad must be connected to a solid ground plane

3. How to Control via External MCU

3.1. How to Send AT Commands

- **When BT is NOT connected, for ALL commands**

1. Output low to [UART PD](#) pin to enable UART interface. Please keep it low during the whole time when sending AT commands.
2. Send any AT commands you want. *Please wait for at least 250 ms between sending each command.*

We recommend sending corresponding “Read” command ([section 2.2.2](#)) right after the delay to know whether the writing is successful before moving on to step 3 to save your settings.

Please prolong the delay (over 250 ms) when writing or/and reading is not successful.

3. Send command “ **AT+RESET** ” (**not HW reset**) to save all your settings.
4. Output high or NC to [UART PD](#) pin to turn off UART interface.

- **When BT is connected for following commands ONLY**

Write: AT+DISCONNECT, AT+SLEEP

Read: AT?ADCVALUE

1. Output low to [UART PD](#) pin to enable UART interface. Please keep it low during the whole time when sending AT commands.
2. Output low to [flash default](#) pin to enable receiving AT commands when BT is connected. Please keep it low during the whole time when sending AT commands.
3. Send “AT?ADCVALUE” or “AT+DISCONNECT” or “AT+SLEEP”
4. Output high or NC to [UART PD](#) pin to turn off UART interface.
5. Output high or NC to [flash default](#) pin to disable the module to receive AT commands when BT is connected.

3.2. How to Transmit Data

*** Only when BT is connected ***

1. Output low to **UART PD** pin to enable UART interface. Please keep it low during the whole time when transmitting data.
2. Output high or NC to **UART PD** pin to turn off UART interface.

3.3. How to Return to Flashed Default Setting

*** Only when BT is NOT connected ***

*** Note that default baud rate is “9600bps,n,8,1”. For other default, please check [“2.3 Default Info”](#)**

● Use Hardware Method

1. Read **indicator** pin first to check if BT is *NOT* in connection.
2. Output a low pulse to **flash default** pin, then system will return to default setting.



● Use Software method

1. Output low to **UART PD** pin to enable UART interface. Please keep it low during the whole time when sending AT commands.
2. Send command “AT+DEFAULT”, then system will return to default setting.

4. Test Report

All testing is done under **PHY mode at 1M bps.**

4.1. Current Test

DC/DC	Logic of UART PD pin	Advertising Current	Connected Current
Disable	High	0.85 mA	0.3 mA
	Low	1.56 mA	1 mA
Enable	High	0.45 mA	0.16 mA
	Low	0.95 mA	0.68 mA

4.2. Throughput Test

Here **D.L.** means “Data Length” and **D.I.** means “Data Interval” in the table.

● MCU → Peripheral (MDBT42T-AT/MDBT42T-PAT) → Central → Console

Central Connection Interval	Peripheral Connection Interval	Baud Rate	Flow Control	MCU D.L. (bytes)	MCU D.I. (ms)	Total D.L. (bytes)	Total Trans. Time (sec)	Data Rate (k-bytes/sec)
min = 20ms Max = 75ms	min = 20ms Max = 40ms	9600	X	64	60	262152	273	0.96
			V	244	250	999432	1,042	
min = 20ms Max = 75ms	min = 20ms Max = 40ms	115200	X	64	8	262152	33	7.9
			V	244	30	999432	124	8
min = 20ms Max = 75ms	min = 20ms Max = 40ms	460800	X	244	25	999432	103	9.7
			V					
min = Max = 8ms	min = Max = 8ms	9600	X	64	60	262152	273	0.96
			V	244	250	999432	1,042	
min = Max = 8ms	min = Max = 8ms	115200	X	64	8	262152	33	7.9
			V	244	30	999432	124	8
min = Max = 8ms	min = Max = 8ms	460800	X	244	15	999432	62	16.1
			V					

● MCU → Central → Peripheral (MDBT42T-AT/MDBT42T-PAT) → Console

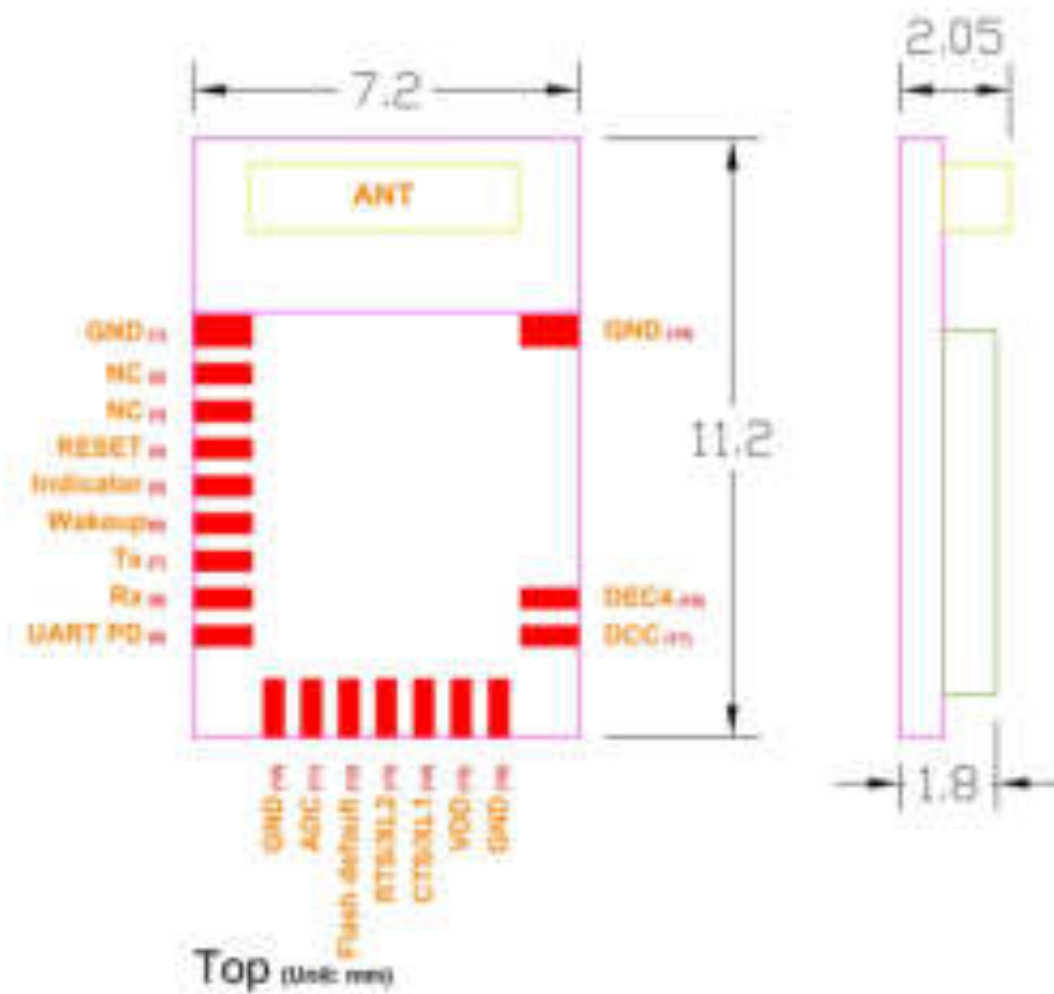
Central Connection Interval	Peripheral Connection Interval	Baud Rate	Flow Control	MCU D.L. (bytes)	MCU D.I. (ms)	Total D.L. (bytes)	Total Trans. Time (sec)	Data Rate (k-bytes/sec)
min = 20ms Max = 75ms	min = 20ms Max = 40ms	9600	X	64	60	262152	273	0.96
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			V	244	30	999432	124	8
			V	244	30	999432	124	8
min = 20ms Max = 75ms	min = 20ms Max = 40ms	460800	X	244	18	999432	74	13.5
			V					
min = Max = 8ms	min = Max = 8ms	9600	X	64	60	262152	273	0.96
			V	244	250	999432	1,042	
			V	244	250	999432	1,042	
min = Max = 8ms	min = Max = 8ms	115200	X	64	8	262152	33	7.9
			V	244	30	999432	124	8
			V	244	30	999432	124	8
min = Max = 8ms	min = Max = 8ms	460800	X	244	15	999432	61	16.3
			V					

5. Product Dimension

5.1. PCB Dimensions & Pin Indication

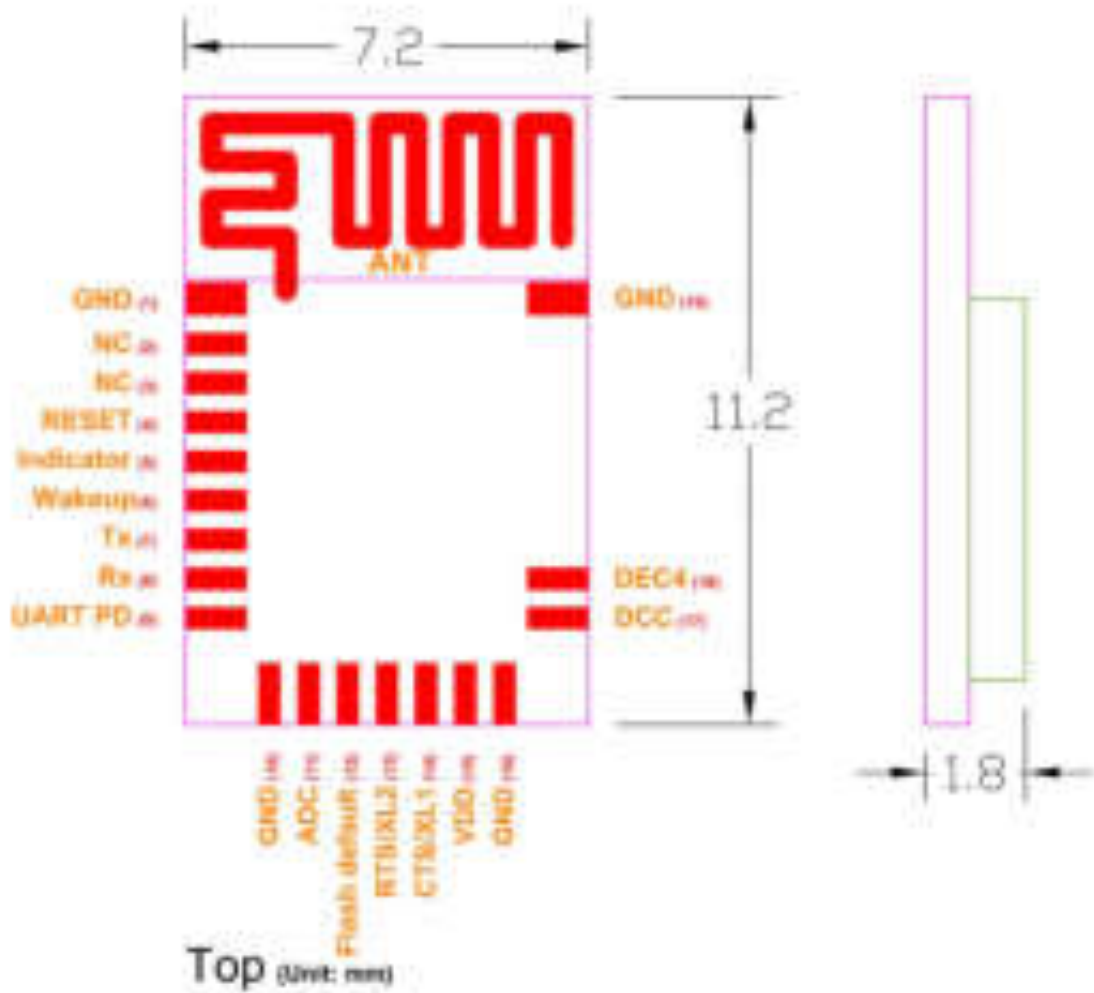
- **MDBT42T**

PCB Size (in mm)			
	Min.	Norm	MAX.
L		11.2	
W	- 0.15	7.2	+ 0.2
H		2.05	



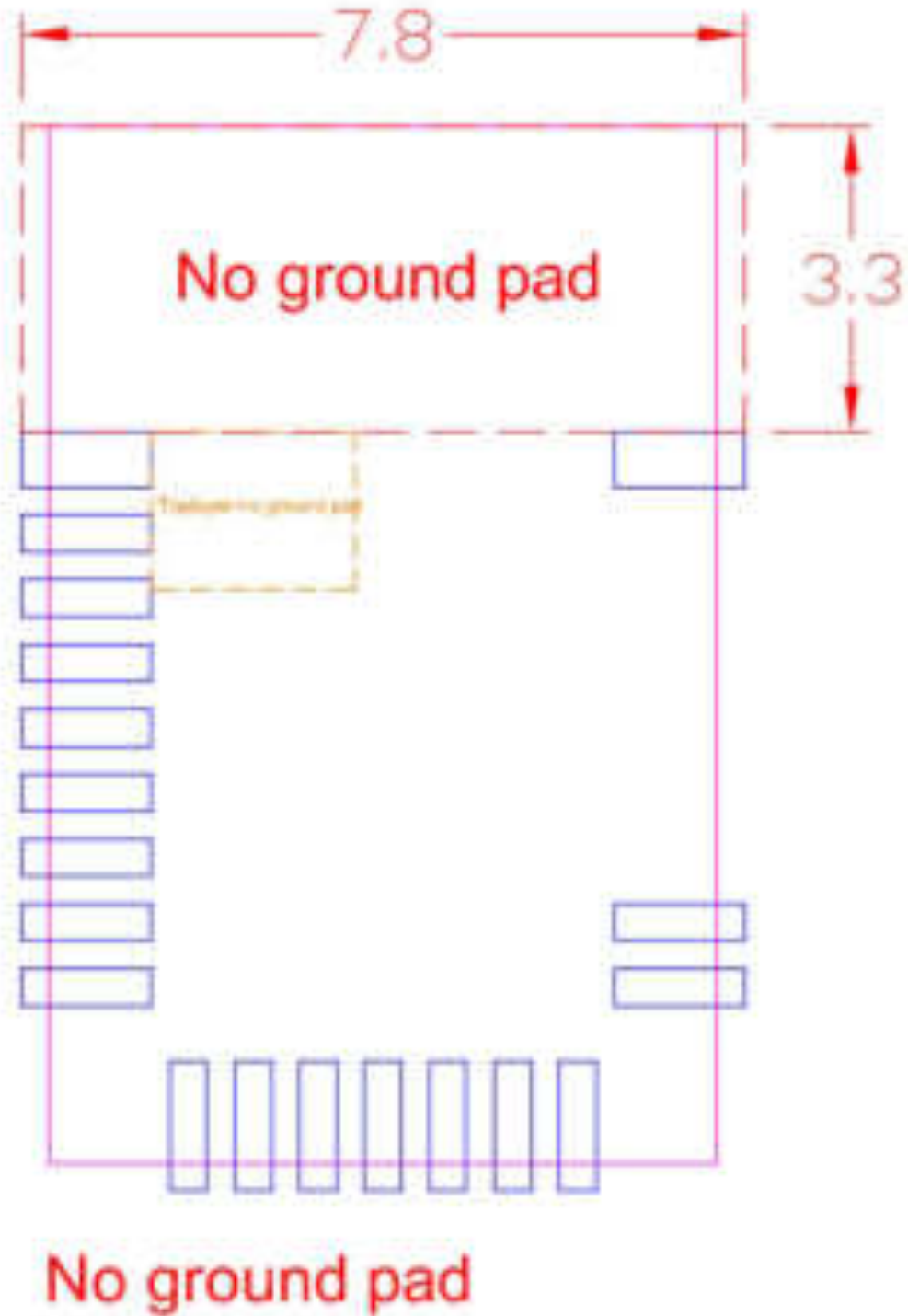
• MDBT42T-P

PCB Size (in mm)			
	Min.	Norm	MAX.
L		11.2	
W	- 0.15	7.2	+ 0.2
H		1.8	



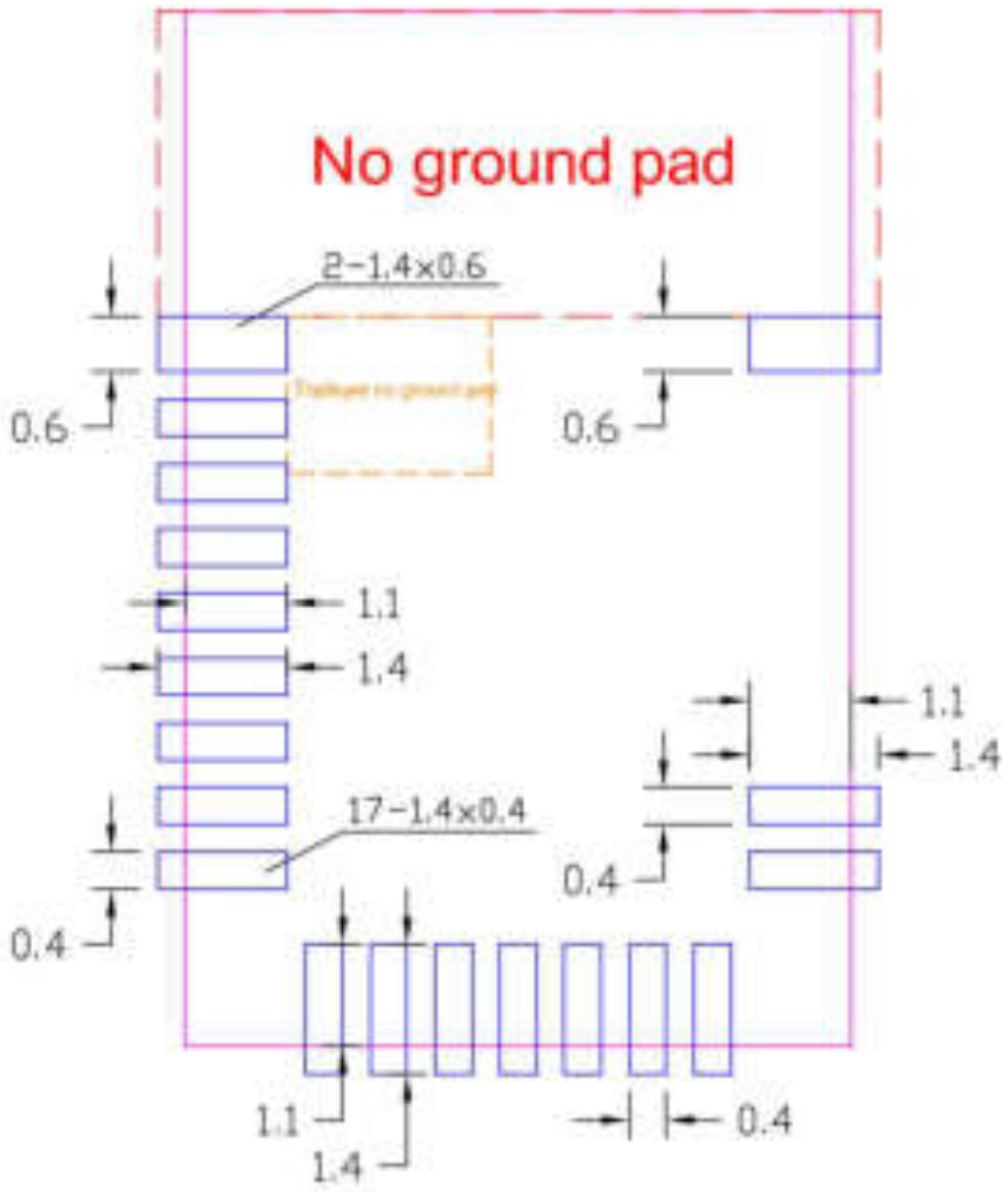
5.2. Recommended Layout of Solder Pad

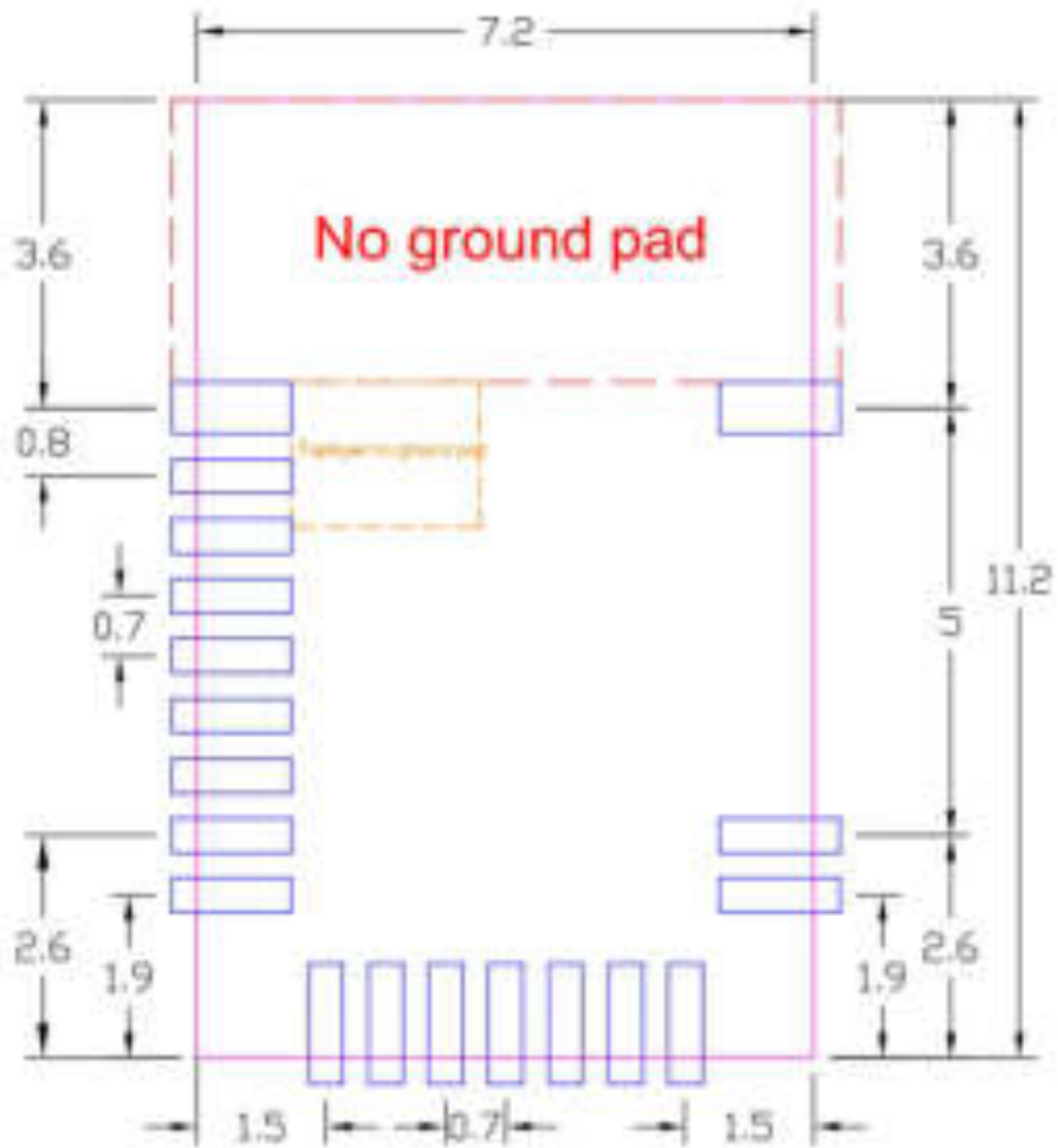
Graphs are all in Top View, Unit in mm





Toplayer no ground pad





Top View (Unit: mm)
recommended solder pad layout

5.3. 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 not enough space in your design.

No Ground Pad should be included in the corresponding position of the antenna in **EACH LAYER**.

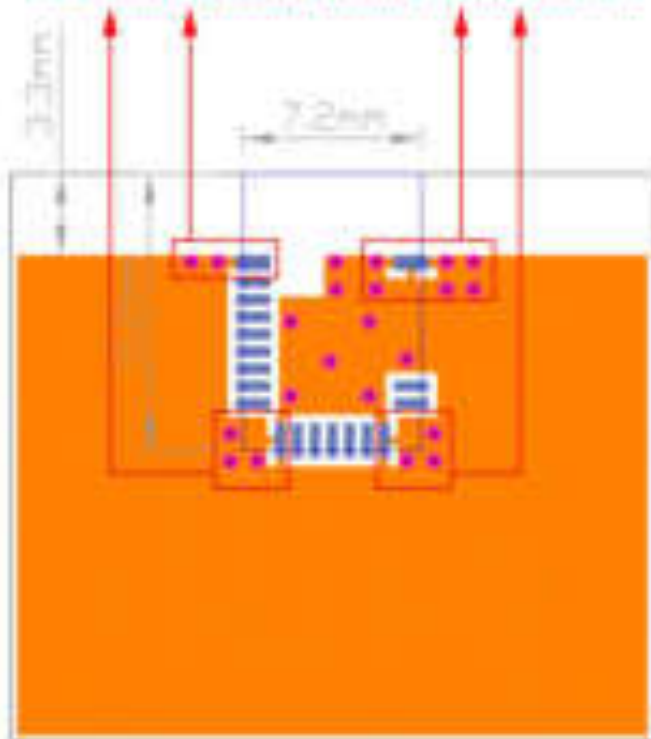
Place the module towards the edge of PCB to have better performance than placing it on the center.

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”.

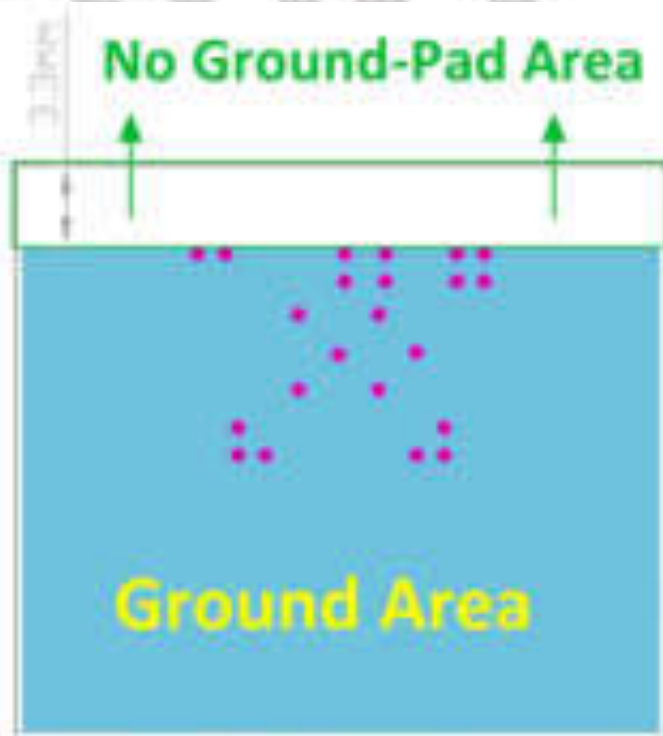


Top layer

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

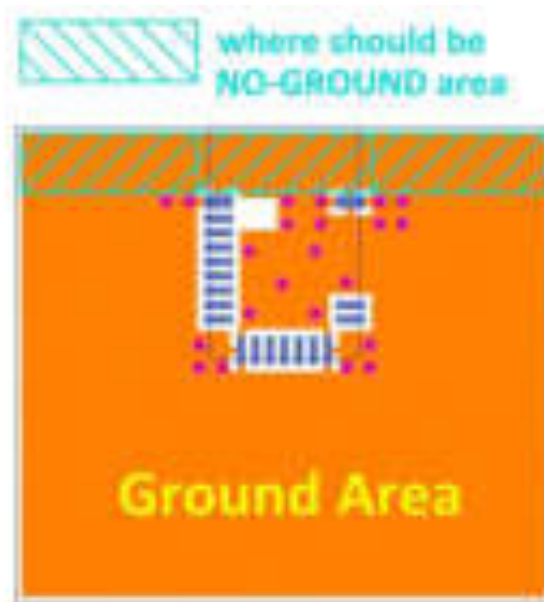


Top layer

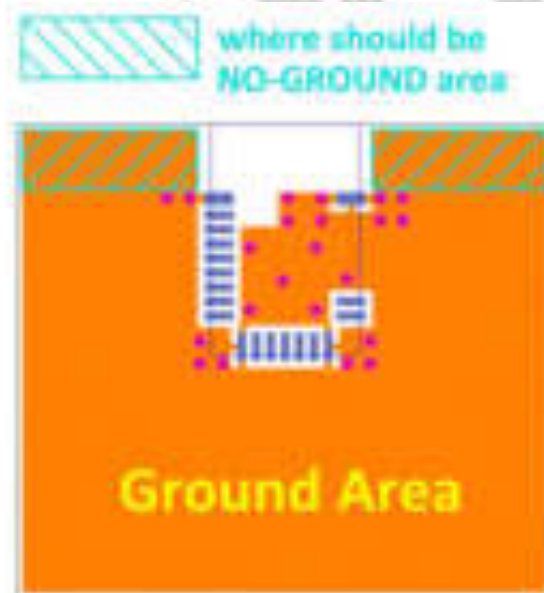


Bottom layer

Examples of “**NOT RECOMMENDED**” layout



Top layer



Top layer

5.4. 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.

6. Main Chip Solution

RF IC	Crystal Frequency
Nordic NRF52805	32MHZ

32MHz crystal is already inside the module.

7. Shipment Packaging Information

Model	Antenna	Photo
MDBT42T-AT	Chip/Ceramic	
MDBT42T-PAT	PCB/Printed	

- Unit Weight of Module:

MDBT42T-AT: 0.28 g (± 0.02 g) ; MDBT42T-PAT: 0.26 g (± 0.02 g)

- Packaging Type: Anti-Static tray only

- Minimum Package Quantity (MPQ): 120 pcs per Tray

- Carton Contents: 2,400 pcs per carton (20 Full Trays + 1 Empty Tray)

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

- Gross Weight: approx. 2.20 kgs per full carton with 2,400 pcs

7.1. Marking on Metal Shield

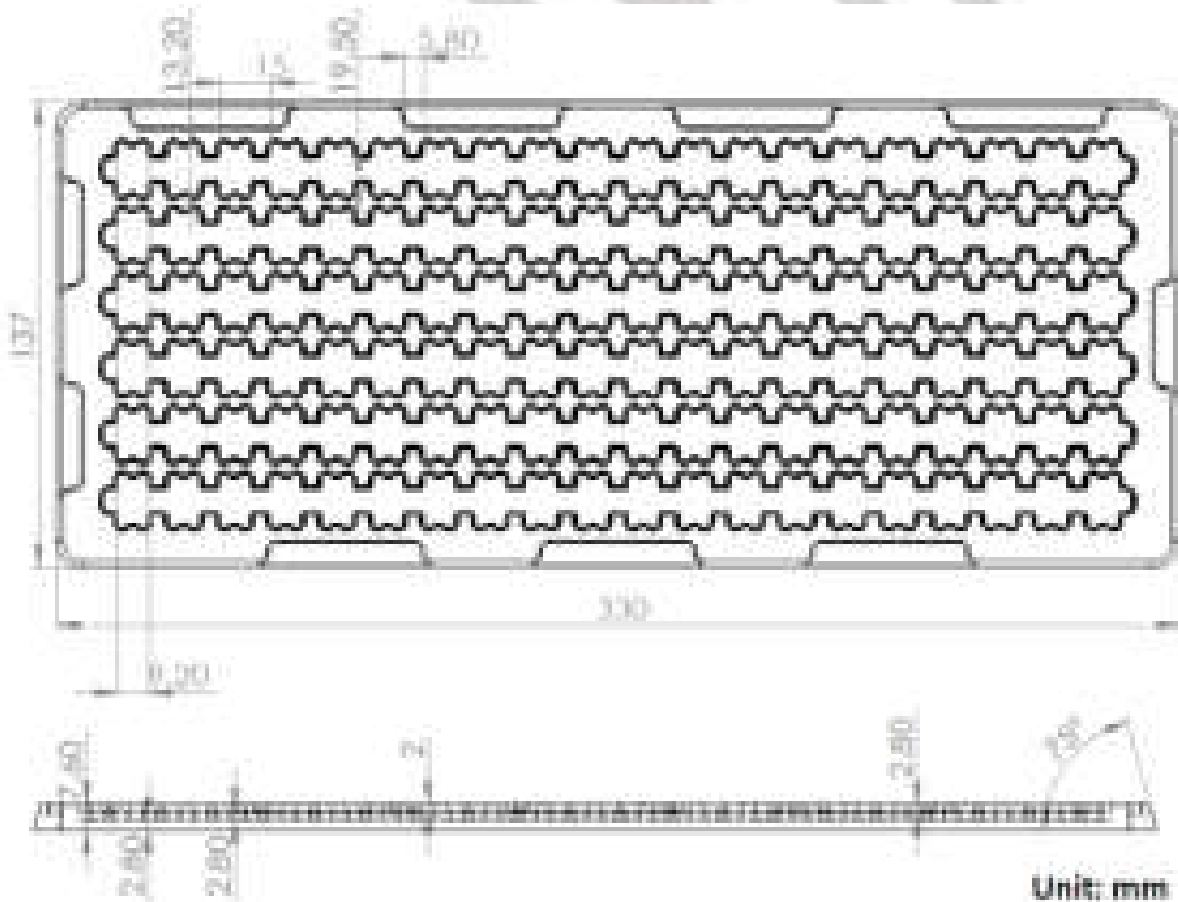
Label context on metal shield is as below:



7.2. Packaging Info

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

7.2.1. Tray Packaging



8. Specification

Any technical spec shall refer to Nordic's official documents as final reference. Contents below are from "[nRF52805 Product Specification v1.2](#)", please click to download full spec.

8.1. Absolute Maximum Ratings

Item	Min.	Max.	Unit
Supply voltages			
VDD	-0.3	+1.8	V
VDD		0	V
LDO pin voltage			
V _{DD} VDD +0.3 V	-0.3	0.00 ± 0.1	V
V _{DD} VDD +1.0 V	-0.3	0.0	V
Environmental WLCSP package			
Storage temperature	-80	+125	°C
EM	Maximum Sensitivity Level	0	
EM HBM	Human Body Model	0	kV
EM ESD Class	Human Body Model Class	0	
EM CDM	Charged Device Model	0	kV
Flash memory			
Endurance	10 000		write/erase cycles
Retention at 85 °C	10		years

8.2. 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)			40	ns
T _A	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.

8.3. Electrical Specifications

8.3.1. General Radio Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
f_{op}	Operating frequencies	2360		2500	MHz
$f_{PLL,CRSF}$	PLL channel spacing		1		MHz
$f_{DEV,1M}$	Frequency deviation @ 1 Mbps		±170		kHz
$f_{DEV,BLE,1M}$	Frequency deviation @ BLE 1 Mbps		±250		kHz
$f_{DEV,2M}$	Frequency deviation @ 2 Mbps		±120		kHz
$f_{DEV,BLE,2M}$	Frequency deviation @ BLE 2 Mbps		±500		kHz
f_{data}	On-the-air data rate	1000		2000	kbps

8.3.2. Radio Current Consumption (Transmitter)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{DCDC,3V,4dBm}$	TX only run current (DCDC, 3V) $P_{EIR} = +4$ dBm		7.0		mA
$I_{DCDC,4dBm}$	TX only run current $P_{EIR} = +4$ dBm		15.4		mA
$I_{DCDC,0dBm}$	TX only run current (DCDC, 3V) $P_{EIR} = 0$ dBm		4.6		mA
$I_{DCDC,0dBm}$	TX only run current $P_{EIR} = 0$ dBm		10.1		mA
$I_{DCDC,3V,-4dBm}$	TX only run current DCDC, 3V $P_{EIR} = -4$ dBm		3.4		mA
$I_{DCDC,-4dBm}$	TX only run current $P_{EIR} = -4$ dBm		7.8		mA
$I_{DCDC,3V,-8dBm}$	TX only run current DCDC, 3V $P_{EIR} = -8$ dBm		3.2		mA
$I_{DCDC,-8dBm}$	TX only run current $P_{EIR} = -8$ dBm		6.8		mA
$I_{DCDC,3V,-12dBm}$	TX only run current DCDC, 3V $P_{EIR} = -12$ dBm		2.9		mA
$I_{DCDC,-12dBm}$	TX only run current $P_{EIR} = -12$ dBm		6.2		mA
$I_{DCDC,3V,-16dBm}$	TX only run current DCDC, 3V $P_{EIR} = -16$ dBm		2.7		mA
$I_{DCDC,-16dBm}$	TX only run current $P_{EIR} = -16$ dBm		5.7		mA
$I_{DCDC,3V,-20dBm}$	TX only run current DCDC, 3V $P_{EIR} = -20$ dBm		2.5		mA
$I_{DCDC,-20dBm}$	TX only run current $P_{EIR} = -20$ dBm		5.4		mA
$I_{DCDC,3V,-40dBm}$	TX only run current DCDC, 3V $P_{EIR} = -40$ dBm		2.1		mA
$I_{DCDC,-40dBm}$	TX only run current $P_{EIR} = -40$ dBm		4.3		mA

8.3.3. Radio Current Consumption (Receiver)

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

8.3.4. Transmitter Specification

Symbol	Description	Min.	Typ.	Max.	Units
P_{EIR}	Maximum output power		4		dBm
P_{ACC}	RF power control range		24		dB
P_{ACC}	RF power accuracy			±4	dB
P_{ACLR1}	1st Adjacent Channel Transmit Power 1 MHz (1 Mbps)		-25		dBc
P_{ACLR2}	2nd Adjacent Channel Transmit Power 1 MHz (1 Mbps)		-50		dBc
P_{ACLR1}	1st Adjacent Channel Transmit Power 2 MHz (2 Mbps)		-25		dBc
P_{ACLR2}	2nd Adjacent Channel Transmit Power 2 MHz (2 Mbps)		-50		dBc

8.3.5. Receiver Operation

Symbol	Description	Min.	Typ.	Max.	Units
P_{RX_MAX}	Maximum received signal strength at < 0.1% FER		0		dBm
P_{RX_TYP1}	Sensitivity, 1 Mbps with mode ideal transmitter ¹		-94		dBm
P_{RX_TYP2}	Sensitivity, 2 Mbps with mode ideal transmitter ¹		-91		dBm
$P_{RX_TYP_BLE1}$	Sensitivity, 1 Mbps BLE ideal transmitter; packet length ≥ 12 bytes BCR=1E-3 ²		-93		dBm
$P_{RX_TYP_BLE2}$	Sensitivity, 1 Mbps BLE ideal transmitter; packet length ≥ 12B bytes BCR=1E-4 ³		-96		dBm
$P_{RX_TYP_BLE3}$	Sensitivity, 2 Mbps BLE ideal transmitter; packet length ≥ 12 bytes		-94		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 BCR limit = 10E-04.

8.3.6. RX Selectivity

Symbol	Description	Min.	Typ.	Max.	Units
$C_{1M,co-channel}$	1Mbps mode, co-channel interference		0		dB
$C_{1M,-1MHz}$	1 Mbps mode, Adjacent (-1 MHz) interference		-2		dB
$C_{1M,+1MHz}$	1 Mbps mode, Adjacent (+1 MHz) interference		-10		dB
$C_{1M,-2MHz}$	1 Mbps mode, Adjacent (-2 MHz) interference		-19		dB
$C_{1M,+2MHz}$	1 Mbps mode, Adjacent (+2 MHz) interference		-42		dB
$C_{1M,-3MHz}$	1 Mbps mode, Adjacent (-3 MHz) interference		-38		dB
$C_{1M,+3MHz}$	1 Mbps mode, Adjacent (+3 MHz) interference		-48		dB
$C_{1M,+5MHz}$	1 Mbps mode, Adjacent (+5 MHz) interference		-50		dB
$C_{1MbpsLL,co-channel}$	1 Mbps BLE mode, co-channel interference		0		dB
$C_{1MbpsLL,-1MHz}$	1 Mbps BLE mode, Adjacent (-1 MHz) interference		-2		dB
$C_{1MbpsLL,+1MHz}$	1 Mbps BLE mode, Adjacent (+1 MHz) interference		-8		dB
$C_{1MbpsLL,-2MHz}$	1 Mbps BLE mode, Adjacent (-2 MHz) interference		-22		dB
$C_{1MbpsLL,+2MHz}$	1 Mbps BLE mode, Adjacent (+2 MHz) interference		-40		dB
$C_{1MbpsLL,+3MHz}$	1 Mbps BLE mode, Adjacent (+3 MHz) interference		-50		dB
$C_{1MbpsLL,imag}$	Image frequency interference		-22		dB
$C_{1MbpsLL,imag,2MHz}$	Adjacent (1 MHz) interference to in-band image frequency		-35		dB
$C_{2M,co-channel}$	2 Mbps mode, co-channel interference		10		dB
$C_{2M,-2MHz}$	2 Mbps mode, Adjacent (-2 MHz) interference		0		dB
$C_{2M,+2MHz}$	2 Mbps mode, Adjacent (+2 MHz) interference		-14		dB
$C_{2M,-4MHz}$	2 Mbps mode, Adjacent (-4 MHz) interference		-20		dB
$C_{2M,+4MHz}$	2 Mbps mode, Adjacent (+4 MHz) interference		-48		dB
$C_{2M,-6MHz}$	2 Mbps mode, Adjacent (-6 MHz) interference		-42		dB
$C_{2M,+6MHz}$	2 Mbps mode, Adjacent (+6 MHz) interference		-47		dB
$C_{2M,+12MHz}$	2 Mbps mode, Adjacent (12 MHz) interference		-52		dB
$C_{2MbpsLL,co-channel}$	2 Mbps BLE mode, co-channel interference		0		dB
$C_{2MbpsLL,-2MHz}$	2 Mbps BLE mode, Adjacent (-2 MHz) interference		-2		dB
$C_{2MbpsLL,+2MHz}$	2 Mbps BLE mode, Adjacent (+2 MHz) interference		-12		dB
$C_{2MbpsLL,-4MHz}$	2 Mbps BLE mode, Adjacent (-4 MHz) interference		-22		dB
$C_{2MbpsLL,+4MHz}$	2 Mbps BLE mode, Adjacent (+4 MHz) interference		-46		dB
$C_{2MbpsLL,+6MHz}$	2 Mbps BLE mode, Adjacent (+6 MHz) interference		-50		dB
$C_{2MbpsLL,imag}$	Image frequency interference		-29		dB
$C_{2MbpsLL,imag,2MHz}$	Adjacent (0 MHz) interference to in-band image frequency		-44		dB

Remark: Wanted signal level at PIN = -87 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.

8.3.7. RX Intermodulation

Symbol	Description	Min.	Typ.	Max.	Units
F _{IMD3,1M}	IMD performance, 1 Mbps, 50% offset channel, Packet length <= 37 bytes		-31		dBm
F _{IMD3,1M,RL}	IMD performance, RL 1 Mbps, 50% offset channel, Packet length <= 37 bytes		-33		dBm
F _{IMD3,2M}	IMD performance, 2 Mbps, 50% offset channel, Packet length <= 37 bytes		-31		dBm
F _{IMD3,2M,RL}	IMD performance, RL 2 Mbps, 50% offset channel, Packet length <= 37 bytes		-33		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.

8.3.8. Radio Timing Parameters

Symbol	Description	Min.	Typ.	Max.	Units
T _{RDWAKEUP}	Time between TXEN task and READY event after channel FREQUENCY configured (1 Mbps RL and 150 µs TRF)		140		µs
T _{RDWAKEUP,RL}	Time between TXEN task and READY event after channel FREQUENCY configured (1 Mbps RL with fast ramp-up and 150 µs TRF)		40		µs
T _{RDWAKEUP}	When in TX, delay between DISABLE task and DISABLED event for MODE = RL_1Mbit and MODE = RL_2Mbit		4		µs
T _{RDWAKEUP}	Time between the RXEN task and READY event after channel FREQUENCY configured (1 Mbps RL)		140		µs
T _{RDWAKEUP,RL}	Time between the RXEN task and READY event after channel FREQUENCY configured (1 Mbps RL) with fast ramp-up)		40		µs
T _{RDWAKEUP}	When in RX, delay between DISABLE task and DISABLED event for MODE = RL_1Mbit and MODE = RL_2Mbit		0		µs
T _{RDWAKEUP}	When in TX, delay between DISABLE task and DISABLED event for MODE = RL_1Mbit and MODE = RL_2Mbit		4		µs
T _{RDWAKEUP}	When in RX, delay between DISABLE task and DISABLED event for MODE = RL_1Mbit and MODE = RL_2Mbit		0		µs

8.3.9. RSSI Specifications

Symbol	Description	Min.	Typ.	Max.	Units
RSSI _{acc}	RSSI accuracy ¹⁸		±2		dB
RSSI _{resolution}	RSSI resolution		1		dB
RSSI _{start}	RSSI sampling time from RSSI_START task		0.25		µs
RSSI _{sett}	RSSI settling time after signal level change		15		µs

8.3.10. CPU

Symbol	Description	Min.	Typ.	Max.	Units
W _{flash}	CPU wait states, running from flash	8		8	
W _{ram}	CPU wait states, running from RAM			0	
CM _{flash}	CoresMark ¹ , running from flash		144		CoresMark
CM _{flash/mHz}	CoresMark per MHz, running from flash		2.25		CoresMark/MHz
CM _{flash/mA}	CoresMark per mA, running from flash, DCDC 1W		88		CoresMark/mA

8.3.11. Power Management

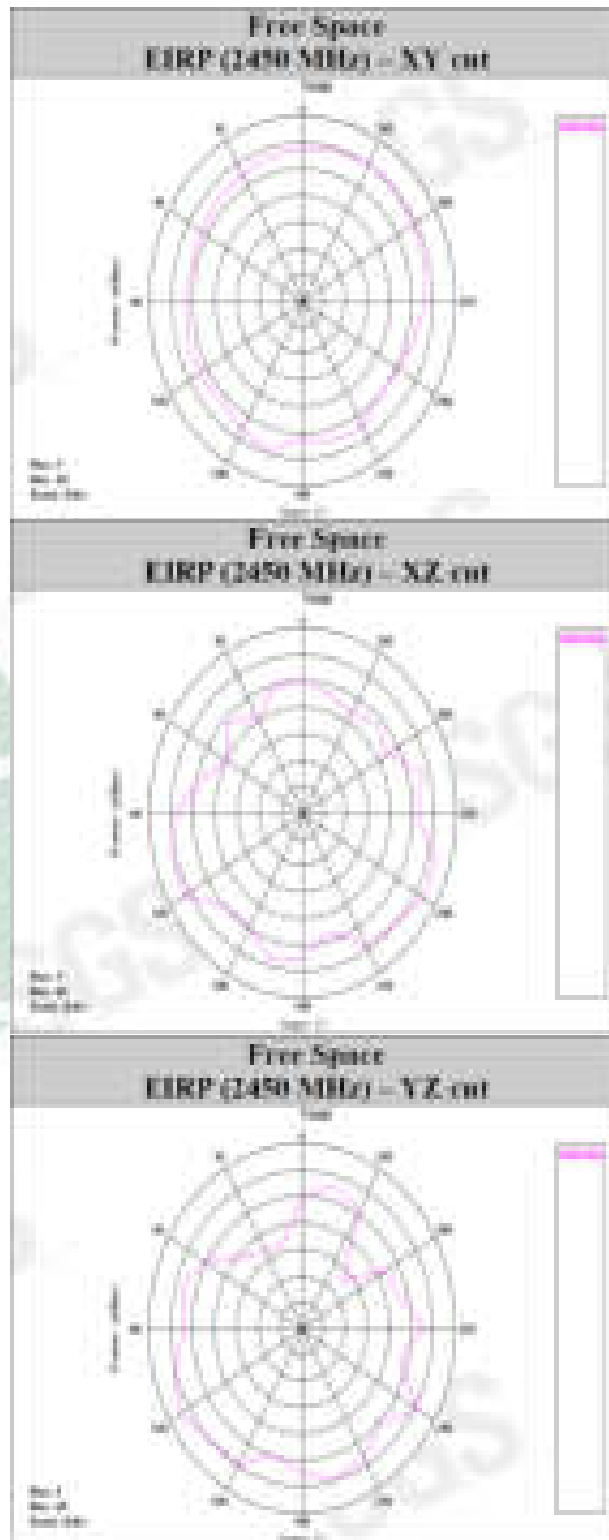
Symbol	Description	Min.	Typ.	Max.	Units
I _{sw_wakeup_32bit}	System ON, no RAM retention, wake on any event		0.6		µA
I _{sw_wakeup_32bit}	System ON, full 24 kB RAM retention, wake on any event		0.8		µA
I _{sw_wakeup_32bit}	System ON, full 24 kB RAM retention, wake on any event, power-fail-comparator enabled		0.8		µA
I _{sw_wakeup_32bit}	System ON, full 24 kB RAM retention, wake on GPIOE input (event mode)		0.3		µA
I _{sw_wakeup_32bit}	System ON, full 24 kB RAM retention, wake on GPIOE PCRT event		0.8		µA
I _{sw_wakeup_32bit}	System ON, no RAM retention, wake on RTC (running from LPRC clock)		1.4		µA
I _{sw_wakeup_32bit}	System ON, full 24 kB RAM retention, wake on RTC (running from LPRC clock)		1.5		µA
I _{sw_wakeup_32bit}	System OFF, no RAM retention, wake on reset		0.3		µA
I _{sw_wakeup_32bit}	System OFF, full 24 kB RAM retention, wake on reset		0.5		µA
I _{sw_wakeup_32bit}	System ON, full 24 kB RAM retention, wake on RTC (running from LPRC clock)		1.5		µA
I _{sw_wakeup_32bit}	System ON, no RAM retention, wake on RTC (running from LPRC clock)		1.8		µA

9. Antenna

9.1. MDBT42T Series

Test Result

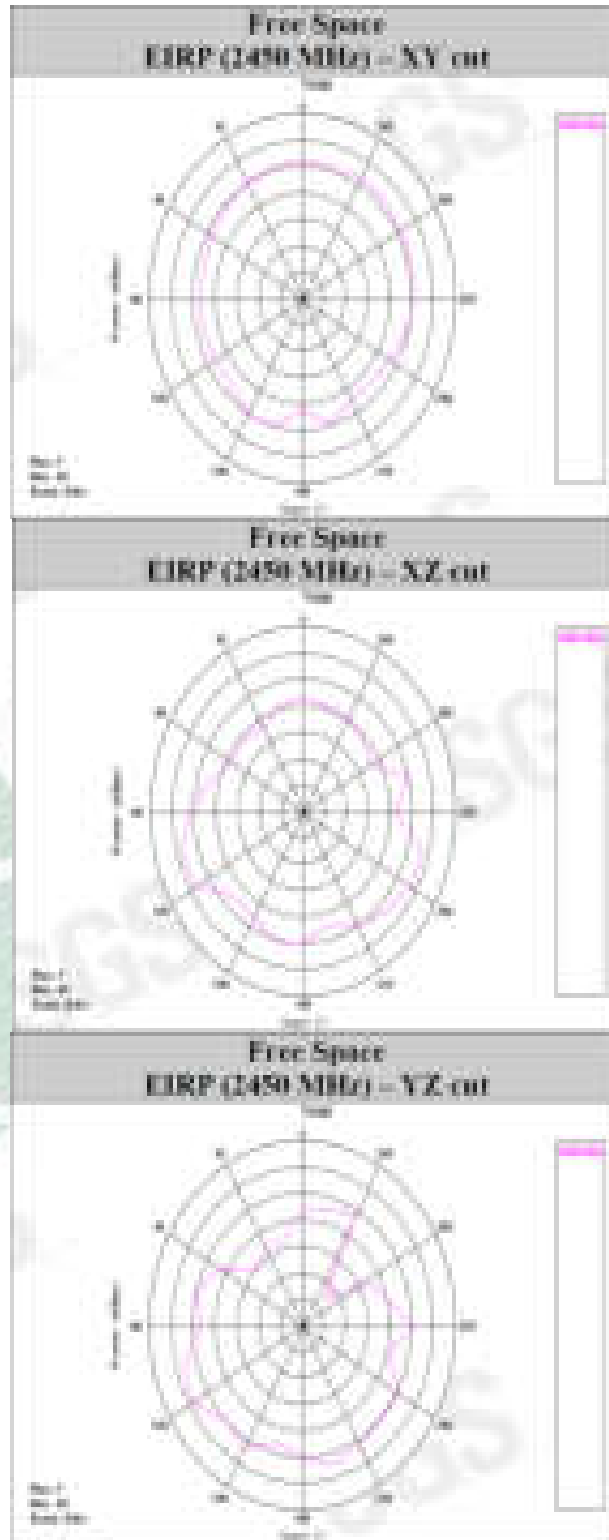
Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Gain (dBi)	2.00	1.75	1.52	1.40	1.32	1.30	1.31	1.30	1.42	1.51	1.47
Directivity (dB)	5.20	5.29	5.23	5.20	5.28	5.22	5.13	5.20	5.30	5.31	5.35
Efficiency (dB)	-2.20	-3.54	-3.71	-3.80	-3.68	-3.70	-3.58	-3.59	-3.88	-3.80	-3.92



9.2. MDBT42T-P Series

Test Result

Frequency (MHz)	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Gain (dB)	-4.70	-4.67	-4.70	-5.03	-5.21	-5.40	-5.77	-6.24	-6.72	-7.19	-7.77
Directivity (dBi)	5.25	5.23	5.29	5.13	5.08	4.95	4.82	4.65	4.45	4.25	4.23
Efficiency (dB)	-8.94	-8.89	-8.89	-10.16	-10.29	-10.38	-10.68	-10.84	-11.24	-11.48	-11.60



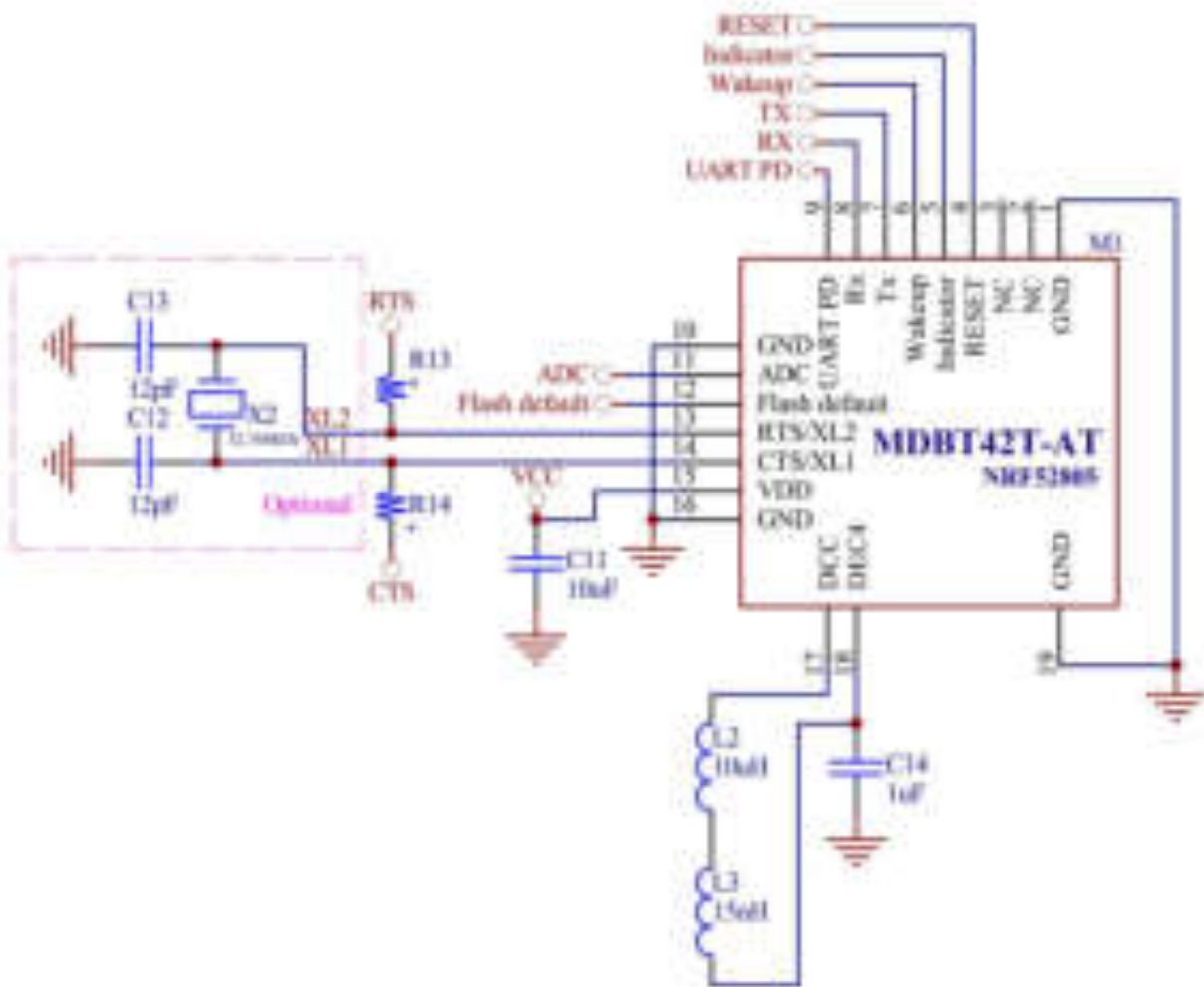
10. Reference Circuit

Module is pre-programmed with Raytac's AT command firmware. Default is NOT using "DC-DC mode" and is using internal 32.768kHz RC oscillator.

REMARK:

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

**** When NOT using internal 32.768kHz RC oscillator, please add X2 / C12 / C13. ****



11. Certification


11.1. Declaration ID

Declaration ID	GD(ies)	Company	Specification Name
0047708	12001 - ERM Product	Raytac Corporation	5.1

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

11.2. FCC Certificate (USA)

BLE 1 Mbps & 2 Mbps

TCB	<p>GRANT OF EQUIPMENT AUTHORIZATION</p> <p>Certification</p> <p>Issued Under the Authority of the Federal Communications Commission</p> <p>By:</p>	TCB			
	<p>3125 North America, Inc.</p> <p>430 Old Peachtree Road NW Suite 100</p> <p>Buckeye, GA 30606</p>	<p>Date of Grant: 11/10/2020</p> <p>Application Date: 11/10/2020</p>			
<p>Raytek Corp.</p> <p>51, No.1, Jiansang Rd, Zhonghe Dist.,</p> <p>New Taipei City, 20666</p> <p>Taiwan</p> <p>Attention: Yemeng Liou, R&D Manager</p>					
NOT TRANSFERABLE					
<p>EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified herein for use under the Commission's Rules and Regulations listed below.</p>					
<p>FCC IDENTIFIER: 2EWA1127-2T</p> <p>Name of Grantee: Raytek Corp.</p> <p>Equipment Class: Digital Transmission System</p> <p>Notes: BLE Module</p> <p>Modular Type: Single Modular</p>					
Grant Notes	FCC Rule Part	Frequency Range MHz	Output Power	Frequency Tolerance	Emitted Disturbance
	15C	2400.0 - 2484.0	5 dBm		
<p>Single Modular Approval: Output power level is contingent on configuration of the device in all final test configurations to the responsibility of the licensee. OEM integrators and subassemblies must be provided with safe operating instructions to satisfy RF exposure compliance. OEM integrators are required to ensure that end user has no manual instructions to remove or disable the device. The licensee must not be associated or operating in conjunction with any other equipment/technology unless in accordance with FCC rules governing such devices.</p>					
					

11.3. TELEC Certificate (Japan)

BLE 1 Mbps & 2 Mbps

Information for
the certificate
Number of Conformity
patches
www.telecom.gov

 **telecommunication**

Certificate
of
Radio Equipment in JAPAN

No. 2011-200780 / 00

Telecommunication, operating as Conformity Assessment Body (CAB) ID Number: 2011 with respect to Japan, declares that
the listed product complies with the Technical Regulations: Conformity Certification of Specified Radio equipment
(enactment of MIT 47 27, 1981)

Product description: BLE Module
Trademark: Raytek Corporation
Type designation: M00T42T
Hardware / Software version: 1.0 / 1.0
Remarks: See Annex 3

Manufacturer: Raytek Corp.
Address: 8F., No. 3, Jenkung Road, Zhonghe District,
City: 23566 New Taipei City
Country: Taiwan

This certificate is granted to:

Name: Raytek Corp.
Address: 8F., No. 3, Jenkung Road, Zhonghe District,
City: 23566 New Taipei City
Country: Taiwan

This certificate has THREE Annexes.

Dated on: 21 October 2011

CAB



David Chen
Product Assessor


RMA PRODUCTS
RVA C-774

11.4. NCC Certificate (Taiwan)

BLE 1 Mbps & 2 Mbps


MDBT42T



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

證明字號：電管字第 400 號

- 一、申請人：聯發國際電子有限公司
- 二、地址：臺北市大直區中直路 1 段 143 號 3 樓之 1
- 三、製造廠商：聯發國際電子有限公司
- 四、器材名稱：藍牙模組
- 五、廠牌：Raytar Corporation
- 六、型號：MDBT42T
- 七、器材功率(電傳強度)：射頻傳輸規格如後列
- 八、工作頻率：射頻傳輸規格如後列
- 九、審驗日期：109年11月12日
- 十、審驗合格標識式樣：

十一、審驗合格標識式樣(註：器材名稱、使用時間、功率及電壓等應填寫下列標識式樣)

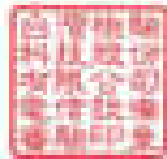
1. 應於主體明顯處標註審驗合格標識式樣於器材標識式樣背面，其內容應包含：審驗標識、器材名稱及功率、器材名稱及功率、審驗合格標識式樣(如左)：審驗合格標識式樣背面標識式樣，並印於主體標識式樣背面。
2. 應於主體明顯處標註器材名稱及功率、電壓及電流等資訊。
3. 應於主體明顯處標註器材名稱及功率、電壓及電流等資訊。
4. 應於主體明顯處標註器材名稱及功率、電壓及電流等資訊。

十二、審驗合格標識式樣(註：器材名稱、使用時間、功率及電壓等應填寫下列標識式樣)

1. 應於主體明顯處標註審驗合格標識式樣於器材標識式樣背面，其內容應包含：審驗標識、器材名稱及功率、器材名稱及功率、審驗合格標識式樣(如左)：審驗合格標識式樣背面標識式樣，並印於主體標識式樣背面。
2. 應於主體明顯處標註器材名稱及功率、電壓及電流等資訊。

十三、審驗合格標識式樣(註：器材名稱、使用時間、功率及電壓等應填寫下列標識式樣)

1. 應於主體明顯處標註審驗合格標識式樣於器材標識式樣背面，其內容應包含：審驗標識、器材名稱及功率、器材名稱及功率、審驗合格標識式樣(如左)：審驗合格標識式樣背面標識式樣，並印於主體標識式樣背面。
2. 應於主體明顯處標註器材名稱及功率、電壓及電流等資訊。



BLE 1 Mbps & 2 Mbps

MDBT42T-P



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

證號字號：信字第 AM 號

- 一、申請人：聯建國際電子有限公司
- 二、統一編號：臺北市民安路和平里路3段143號3樓之1
- 三、製造廠商：聯建國際電子有限公司
- 四、器材名稱：藍牙模組
- 五、廠牌：Raytac Corporation
- 六、型號：MDBT42T-P
- 七、使用頻率(電磁強度)：無線射頻技術認證依據
- 八、工廠編號：無線射頻技術認證依據
- 九、審驗日期：109年11月12日

十、審驗合格標識號碼：



- 十一、審驗合格之要求：(註：以下所列之內容係本局進行之認證要求)
 - 1. 應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋，其中凡屬臺灣之無線電設備，應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼及器材名稱標識，其中凡屬臺灣之無線電設備，如無線電。
 - 2. 應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼。
 - 3. 應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼。
 - 4. 本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼及器材名稱標識，其中凡屬臺灣之無線電設備，應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼。
 - 5. 應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼。
- (註：應將審驗合格之器材名稱標識、廠牌、公司、型號及器材名稱等資訊，與本證明書所列之審驗合格標識號碼及器材名稱標識，加蓋於器材名稱標識上加蓋(附件)之審驗合格標識號碼及器材名稱標識，並應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼及器材名稱標識，並應於本證明書所列之審驗合格標識號碼及器材名稱標識上加蓋(附件)之審驗合格標識號碼及器材名稱標識。

11.5. CE (EU) & RCM (Australia & New Zealand) Test Report

BLE 1 Mbps & 2 Mbps

		Page: 4 / 88 Rev: 00
Report No.: T200004W09-RT		
1. TEST RESULT CERTIFICATION		
Applicant:	Rayfac Corp SF No.3, Jankang Road, Zhonghe District, New Taipei City 23566, Taiwan	
Manufacturer:	Rayfac Corp SF No.3, Jankang Road, Zhonghe District, New Taipei City 23566, Taiwan	
Equipment Under Test:	BLE Module	
Trade Name:	Rayfac Corporation	
Model Number:	MDBT42T, MDBT42T-F	
Date of Test:	August 26 - September 2, 2000	
APPLICABLE STANDARDS		
STANDARD	TEST RESULT	
ETSI EN 300 328 V2 3.2: 2019 & AS/NZS 4268:2017	No non-compliance noted	
Statements of Conformity		
Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrument/labor uncertainty.		
The above equipment was tested by Compliance Certification Services Inc. for compliance with the requirements set forth in ETSI EN 300 328. The results of testing in this report apply only to the product/system which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.		
Approved by:		
		
<hr/>		
Kevin Tsai Deputy Manager		

VERIFICATION OF COMPLIANCE

Issue Date: Sep. 11, 2020
Applicant: Rayfac Corporation
Address: SF, No. 3, Jinkang Road, Zhonghe District, New Taipei City, Taiwan
Manufacturer: Rayfac Corporation
Address: SF, No. 3, Jinkang Road, Zhonghe District, New Taipei City 23586, Taiwan
Contact Information: Web: www.rayfac.com
 TEL# +886-2-3234-0230
 E-mail# service@rayfac.com
Product: BLE Module
Brand Name/Trade Mark: Rayfac Corporation
Model/Type: MD8T42T
Added Model(s): MD8T42T-P
Applicable Standards: EN 301 489 -1 v2.2.3 : 2019-11
 EN 301 489 -17 v3.2.2 : 2019-12 (Draft)
 EN 55032 : 2015+AC:2016-07
 EN 61000-4-2 : 2009
 EN 61000-4-3 : 2006+A1:2009+A2:2010
Test Laboratory: SGS Taiwan Ltd.
 Electromagnetic Compatibility Laboratory
 No.2, Kaji 1st Rd., Gueishan District, Taoyuan City, Taiwan
Test Report No.: VMH2020/80031, dated on Sep. 11, 2020

Conclusion: Based upon a review of the Test Report(s), the tested sample of the product mentioned above is deemed to comply with the requirements of the above standards.

Note: This verification is only valid for the product and configuration described and in conjunction with the test report as detailed above.

Authorized Signatory:



SGS Taiwan Ltd.
Emily Cheng
Assistant Supervisor

11.6. IC Certificate (Canada)

BLE 1 Mbps & 2 Mbps

SGS

Certificate
SGS Reference: **US0186.2020.000406**
CCS-CERT20100039-02

Certified Product
ISED ID Number: **BLE Mobile**
Type of Equipment: **MOBILECT, MOBT42T-P**
Bluetooth device

Certificate Holder
Address: **Raytac Corp.**
RF, No. 5, Jiansheng Road,
New Taipei City 22566, Taiwan

US0186

Certificate of equipment means only that the equipment has met the requirements of the above cited specification. License applications, where applicable to use certified equipment, are acted on accordingly by the Industry Canada issuing office and will depend on the working with equipment, nature and location of operation. The 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 used unless the equipment complies with the applicable technical specifications and procedures issued by Industry Canada.

I hereby attest that the subject equipment was tested and found to comply with the above cited specifications.

La certification d'équipement signifie seulement que le matériel a satisfait aux exigences de la norme indiquée ci-dessus. Les demandes de licences nécessaires pour l'utilisation de matériel certifié sont traitées en conséquence par le bureau de délivrance d'Industrie Canada et dépendent des conditions d'utilisation, de la nature et de la localisation d'opération. La présente certification est émise en condition que le titulaire s'acquiesce et continuera de s'acquiescer des exigences et procédures émise par Industrie Canada. L'équipement à lequel s'applique la présente certification ne doit pas être fabriqué, importé, distribué, loué, offert en vente ou utilisé à moins qu'il ne conforme aux procédures et aux spécifications techniques applicables prévues par Industrie Canada.

Je certifie par la présente que le matériel a été trouvé conforme à la certification citée ci-dessus.

Authorized By: *Sauki*
Said U.
Carter

Code Issued: 11122020

US0186

This Certificate is valid only with documentation being with Industry Canada Radio Licensing (IREL)

555 North Annapolis, Inc.
600 Old Peachtree Road, Suite 100, Suwanee, GA 30088 USA
t +1 770 270 1880 f +1 770 271 0240 www.sgs.com
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EQUIPMENT DETAIL				
Frequency Range (MHz)	RF Power (Watts)	Antenna Type	Necessary Bandwidth (kHz)	Emission Classification
2402.0-2483.0	0.004	NOM 1	2014.4	F1D
<small>Note: 1) Chip antenna: -1.52dBi, PCB Antenna: -4.57dBi</small>				
SPECIFICATION				
Standard/Specification		Issue	Issue Date	
ICES-247		Issue 2	February 2017	

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11.7. SRRC Certificate (China)

BLE 1 Mbps & 2 Mbps



11.8. KC Certificate (South Korea)

BLE 1 Mbps & 2 Mbps

방송통신기자재등의 적합인증서 Certificate of Broadcasting and Communication Equipments	
상호 또는 상품명 <small>Supplier's Name</small>	Skyns Corporation
기자재명칭(모델명) <small>Equipment Name</small>	특정주파력 무선기기(무선랜에러통신시스템용 무선기기)
기본모델명 <small>Base Model Name</small>	MDBT420
유형모델명 <small>Sub-Model Name</small>	MDBT420-F
인증번호 <small>Certificate No.</small>	K-C-100-MDBT420
제조사(제조국가) <small>Manufacturer Country of Origin</small>	Skyns Corporation - 한국
인증연월일 <small>Date of Issuance</small>	2020-09-14
기타 <small>Other</small>	
이 기어는 「전자법」 제48조의2 제2항에 따라 인증되었음을 증명합니다. It is verified that foregoing equipment has been certified under the Class 2, Article 48-2 of Radio Waves Act.	
2020년(Year) 09월(Month) 14일(Day)	
국립전파연구원장 Director General of National Radio Research Agency	
	
<small>이 인증번호 유효기간은 2020년 9월 14일부터 2025년 9월 14일까지입니다. 이 인증번호의 유효기간은 2020년 9월 14일부터 2025년 9월 14일까지입니다.</small>	

11.9. RoHS & REACH Report

Please visit "[Support](#)" page of our website to download.

11.10. 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.

11.10.1. FCC (USA)

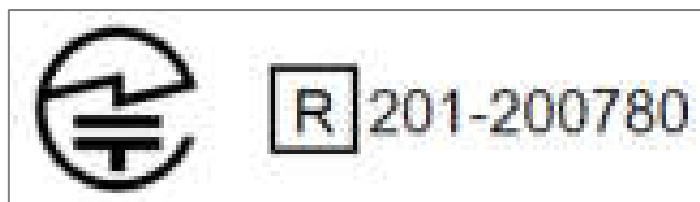
The FCC statement should be included in the user manual when there is no enough space on label. Otherwise, it should be included on the label.

“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: SH6MDBT42T”.

11.10.2. TELEC (Japan)

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



11.10.3. 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。

MDBT42T Series



MDBT42T-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 CCAM20LP2810T1」或「本產品內含射頻模組：ID 編號 CCAM20LP2811T0」。

「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。

11.10.4. 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-MDBT42T”.

12. 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°C to $+125^{\circ}\text{C}$ 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.

13. Basic Facts for nRF52 Chip

Below chart shows basic spec for Nordic nRF52 family, which is helpful to understand the differences between each SoC. Any discrepancy shall refer to Nordic's technical document as final reference.

See [Full List of Raytac's BLE Modules](#) for complete model no. of each item.

Nordic Architecture	nRF 52810	nRF 52811	nRF 52812	nRF 52813	nRF 52818	nRF 52811	nRF 52832
RAYTAC Model No. (REF ID)	520 series	521 series 52 series	52 series	420 series 42 series 520 series	420 series	420 series	421 series 421 series
Bluetooth Direction Finding		Y	Y			Y	
Bluetooth 5 Long Range (1278kpa)	Y	Y	Y			Y	
Bluetooth 5 High Speed	Y	Y	Y	Y	Y	Y	Y
Bluetooth 5 Ad. Extension (AE)	Y	Y	Y	Y	Y	Y	Y
Flash (kB)	1024	512	256	512	1024	1024	1024
RAM (kB)	256	128	64	64	256	256	256
ANT Plus	Y	Y	Y	Y	Y	Y	
BLE 4.2 LE	Y	Y	Y			Y	
ARM TrustZone Cryptos	Y						
USB	Y	Y	Y				
QSPI	Y						
NFC	Y	Y		Y			
DS	Y	Y		Y			
SPI, I2C, UART, PWM	Y	Y	Y	Y	Y	Y	without PWM
PPM	Y	Y		Y	Y	Y	
ADC, Temperature	Y	Y	without ADC	Y	Y	Y	without contactless
Supply Range (V)	1.7 to 3.3	1.7 to 3.3	1.7 to 3.3	1.7 to 3.3	1.7 to 3.3	1.7 to 3.3	1.7 to 3.3

14. 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 Developer Zone: <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 nRF52805 : <https://www.nordicsemi.com/Products/Low-power-short-range-wireless/nRF52805>
A brief introduction to nRF52805 and download links for Nordic's developing software and SoftDevices.

History of Firmware Revision

FW Ver.	Compatible HW Build	Release Date	Description of Revision	Note
1.0		2020/09/24	1 st release.	99-52805-03A

Full List of Raytac's BLE Modules

● MDBT40 Series

Series	Nordic Solution	Raytac No.	IC Ver.	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

● MDBT42Q Series (QFN Package IC)

Series	Nordic Solution	Raytac No.	IC Ver.	Antenna	RAM	Flash Memory
MDBT42Q	nRF52832	MDBT42Q-512KV2	2	Chip Antenna	64 kb	512 K
	nRF52810	MDBT42Q-192KV2	2		24 kb	192 K
	nRF52811	MDBT42Q-192KL	1			
MDBT42Q-P	nRF52832	MDBT42Q-P512KV2	2	PCB Antenna	64 kb	512 K
	nRF52810	MDBT42Q-P192KV2	2		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 Ver.	Antenna	RAM	Flash Memory
MDBT42	nRF52832	MDBT42-512KV2	2	Chip Antenna	64 kb	512 K
MDBT42-P		MDBT42-P512KV2		PCB Antenna		

● MDBT42V Series (WLCSP Package IC)

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

● MDBT42T Series (WLCSP Package IC)

Series	Nordic Solution	Raytac No.	IC Ver.	Antenna	RAM	Flash Memory
MDBT42T	nRF52805	MDBT42T-192K	1	Chip Antenna	24 kb	192 K
MDBT42T-P		MDBT42T-P192K		PCB Antenna		

● MDBT42TV Series (WLCSP Package IC)

Series	Nordic Solution	Raytac No.	IC Ver.	Antenna	RAM	Flash Memory
MDBT42TV	nRF52805	MDBT42TV-192K	1	Chip Antenna	24 kb	192 K
MDBT42TV-P		MDBT42TV-P192K		PCB Antenna		

● MDBT50Q Series (aQFN Package IC)

Series	Nordic Solution	Raytac No.	IC Ver.	Antenna	RAM	Flash Memory
MDBT50Q	nRF52840	MDBT50Q-1MV2	2	Chip Antenna	256 kb	1 MB
	nRF52833	MDBT50Q-512K	1		128 kb	512 kb
MDBT50Q-P	nRF52840	MDBT50Q-P1MV2	2	PCB Antenna	256 kb	1 MB
	nRF52833	MDBT50Q-P512K	1		128 kb	512 kb
MDBT50Q-U	nRF52840	MDBT50Q-U1MV2	2	u.FL Connector	256 kb	1 MB
	nRF52833	MDBT50Q-U512K	1		128 kb	512 kb
Dongle	nRF52840	MDBT50Q-RX	1, 2	PCB Antenna	256 kb	1 MB

● MDBT50 Series (QFN Package IC)

Series	Nordic Solution	Raytac No.	IC Ver.	Antenna	RAM	Flash Memory
MDBT50	nRF52820	MDBT50-256R	1	Chip Antenna	256 kb	32 K
MDBT50-P	nRF52820	MDBT50-P256R	1	PCB Antenna	256 kb	32 K

Release Note

- 2020/11/20 Version A: 1st release