

# Approval Sheet

## (產品承認書)

產品名稱 (Product): BT 4.2 Module (nRF52832)

產品型號 (Model No.): **MDBT42 & MDBT42-P Series**

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# 1. Overall Introduction

Raytac's MDBT42 & MDBT42-P is a BT 4.0, BT 4.1 and BT 4.2 stack (Bluetooth low energy or BLE) module designed based on **Nordic nRF52832 SoC solution**, which incorporates: **GPIO, SPI, UART, I2C, I2S, PWM** and **ADC** interfaces for connecting peripherals and sensors.

Features of the module:

1. Dual Transmission mode of BLE & 2.4Ghz RF upon customer preference.
2. Compact size with **(L) 13.8 x (W) 8.8 x (H) 1.9 mm**.
3. Low power requirements, ultra-low peak, average and idle mode power consumption.
4. Be compatible with a large installed base of mobile phones, tablets and computers.
5. Fully coverage of BLE software stack. [See 1.3 Profile & Service Information.](#)
6. BLE & RF transmission switching helps products fit all operation system and most hardware.

## 1.1. Application

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

## 1.2. Features

- Multi-protocol 2.4GHz radio
- ARM® Cortex®-M4 32-bit processor with FPU, 64 MHz
- 512KB flash programmed memory and 64KB RAM
- Software stacks available as downloads
- Application development independent from protocol stack
- On-air compatible with nRF51, nRF24AP and nRF24L series
- Programmable TX output power from -20dBm to +4dBm in 4dB steps
- RSSI
- RAM mapped FIFOs using EasyDMA
- Dynamic on-air payload length up to 256 bytes
- Flexible and configurable 32 pin GPIO
- Programmable peripheral interface - PPI
- Simple ON / OFF global power mode
- Full set of digital interface all with Easy DMA including:
  - 3 x Hardware SPI master ; 3 x Hardware SPI slave
  - 2 x two-wire master ; 2 x two-wire slave
  - 1 x UART (CTS / RTS)
  - PDM for digital microphone
  - I2S for audio
- Quadrature demodulator
- 12-bit / 200KSPS ADC
- 128-bit AES ECB / CCM / AAR co-processor
- Low cost external crystal 32MHz  $\pm$  40ppm for Bluetooth ;  $\pm$  50ppm for ANT Plus
- Low power 32MHz crystal and RC oscillators
- Wide supply voltage range 1.7V to 3.6V
- On-chip DC/DC buck converter
- Individual power management for all peripherals
- Timer counter
  - 5 x 32-bit
  - 3 x 24-bit RTC
- NFC-A tag interface for OOB pairing
- 3x 4-channel pulse width modulator (PWM) units with EasyDMA

### 1.3. Profile & Service Information

Profile & Service are supported by MDBT42 & MDBT42-P as below:

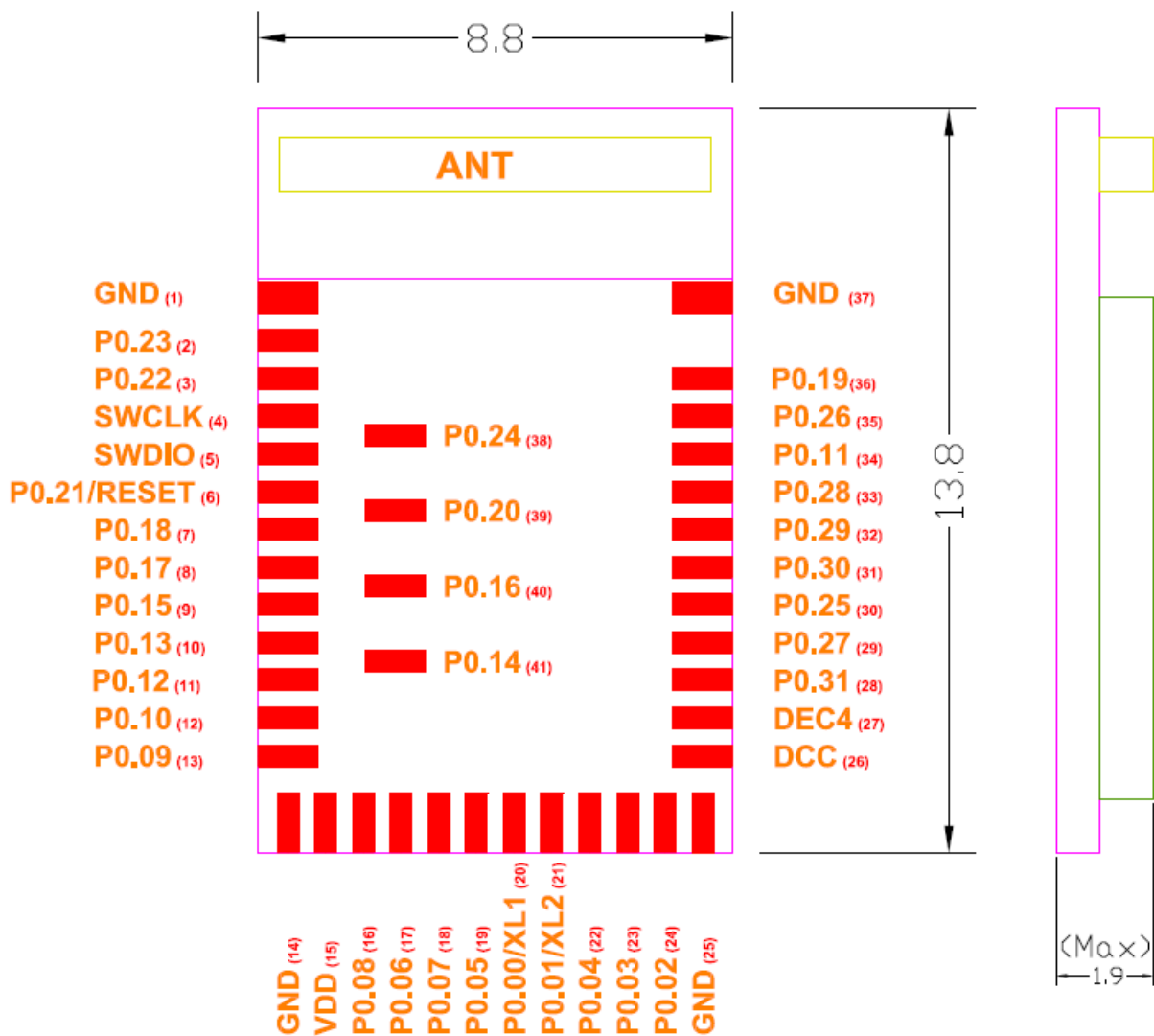
<b>Profile Description</b>	<b>Service Description</b>
Alert Notification Profile	Alert Notification Service
Blood Pressure Profile	Blood Pressure Service
	Device Information Service
Cycling Speed & Cadence Profile	Cycling Speed & Cadence Service
	Device Information Service
Glucose Profile	Glucose Service
	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

## 2. Product Dimension

### 2.1. PCB Dimensions & Pin Indication

- **MDBT42**

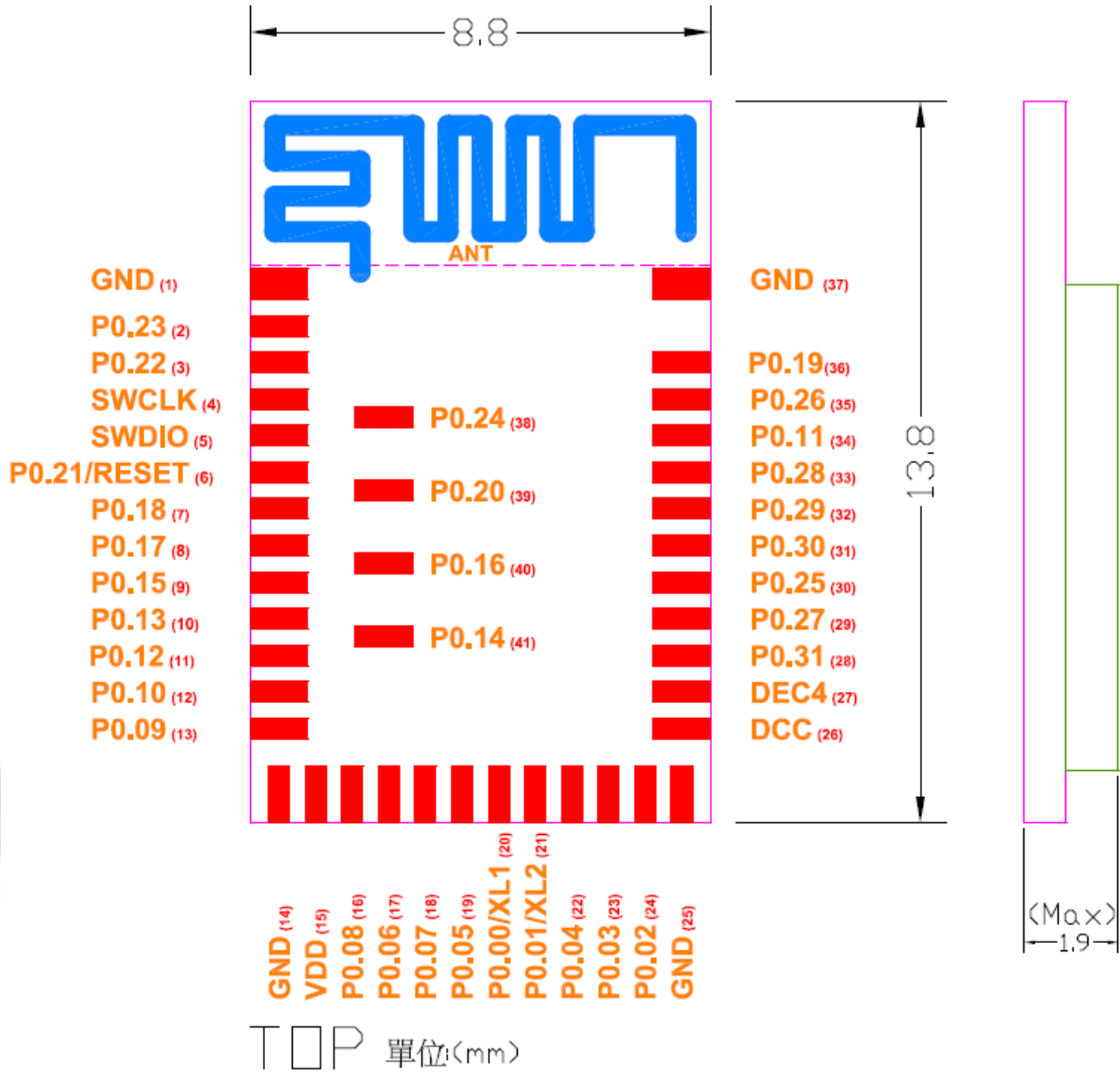
**PCB SIZE: (L) 13.8 x (W) 8.8 x (H) 1.9 mm**



TOP 單位:(mm)

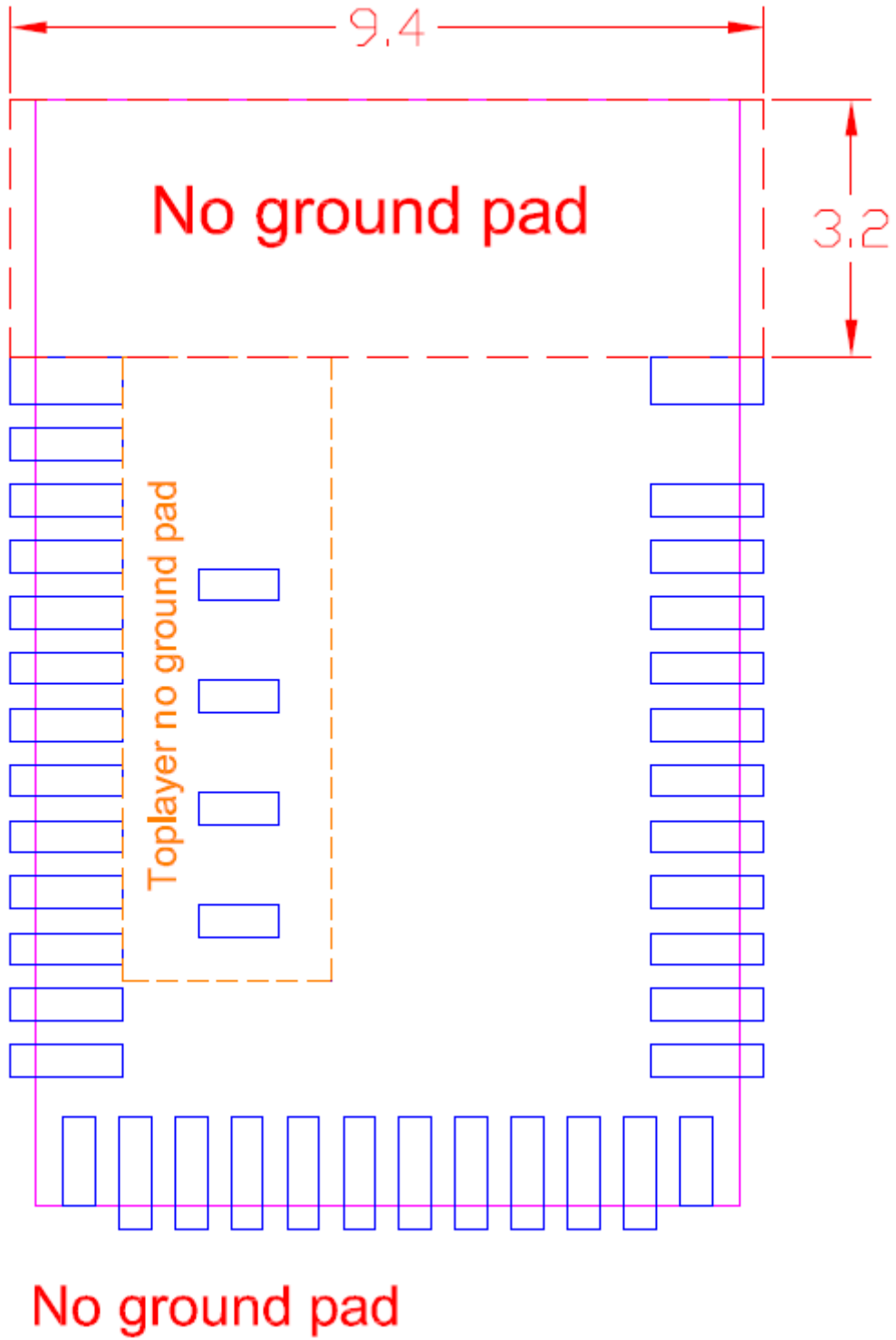
• **MDBT42-P**

**PCB SIZE: (L) 13.8 x (W) 8.8 x (H) 1.9 mm**

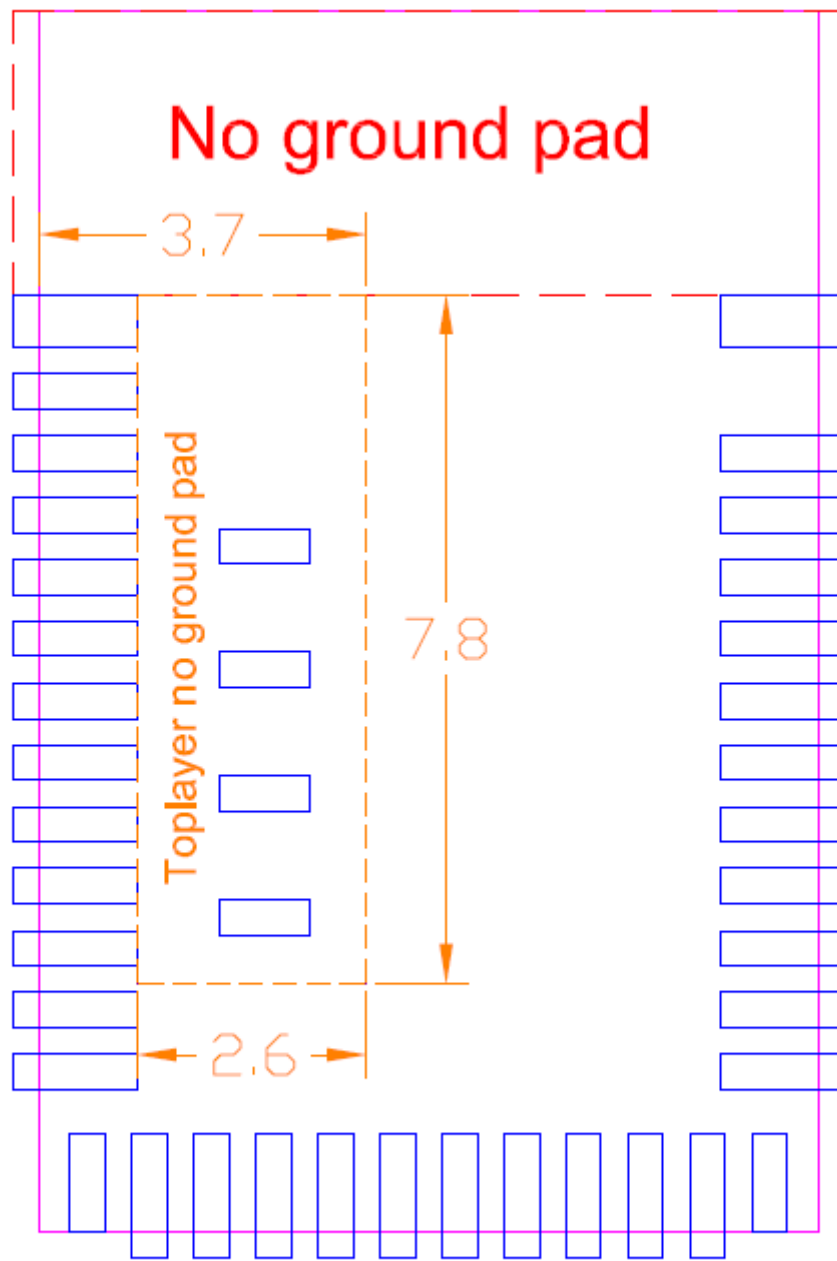


## 2.2. Recommended Layout of Solder Pad

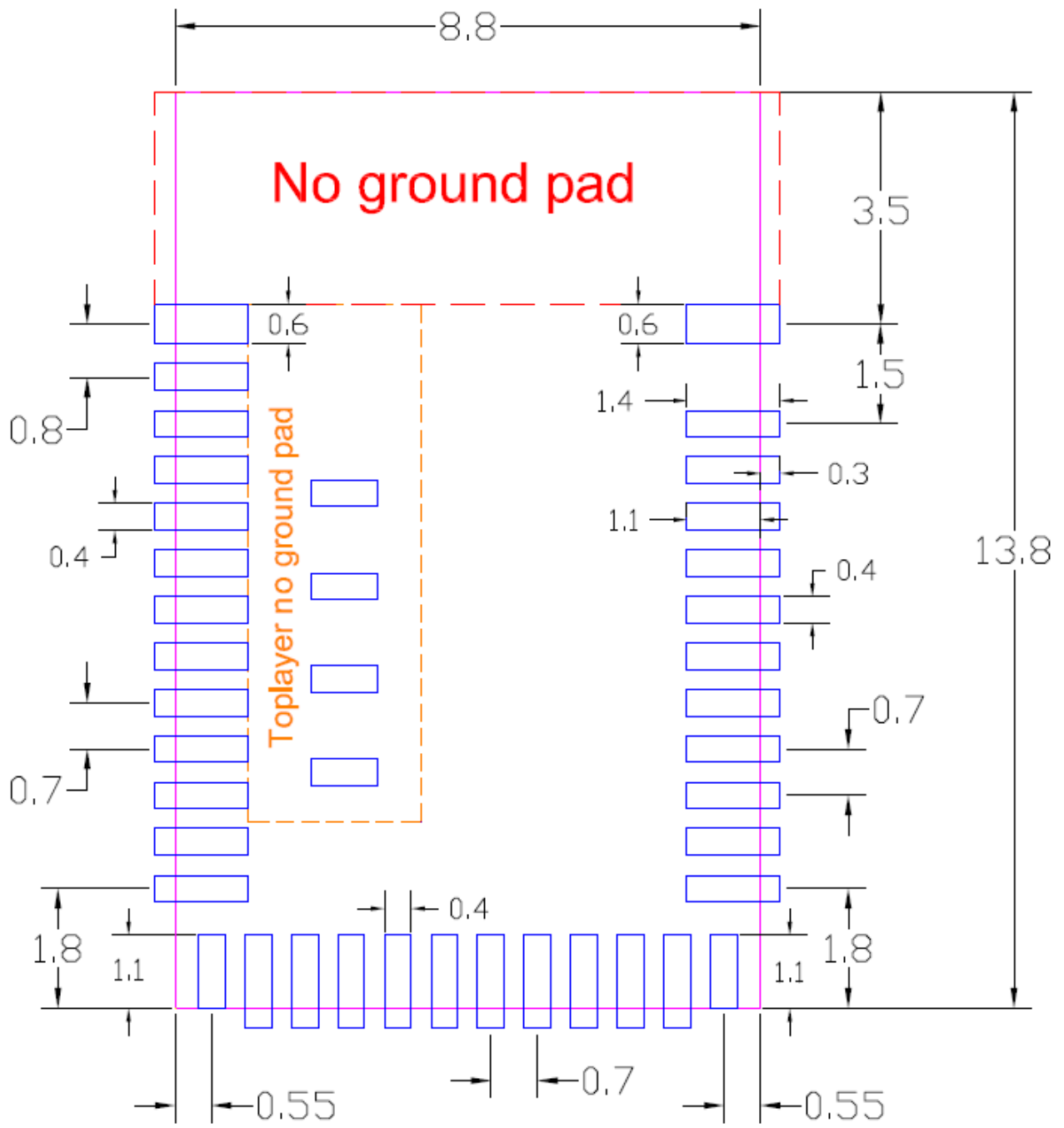
*Graphs are all in Top View, Unit in mm.*

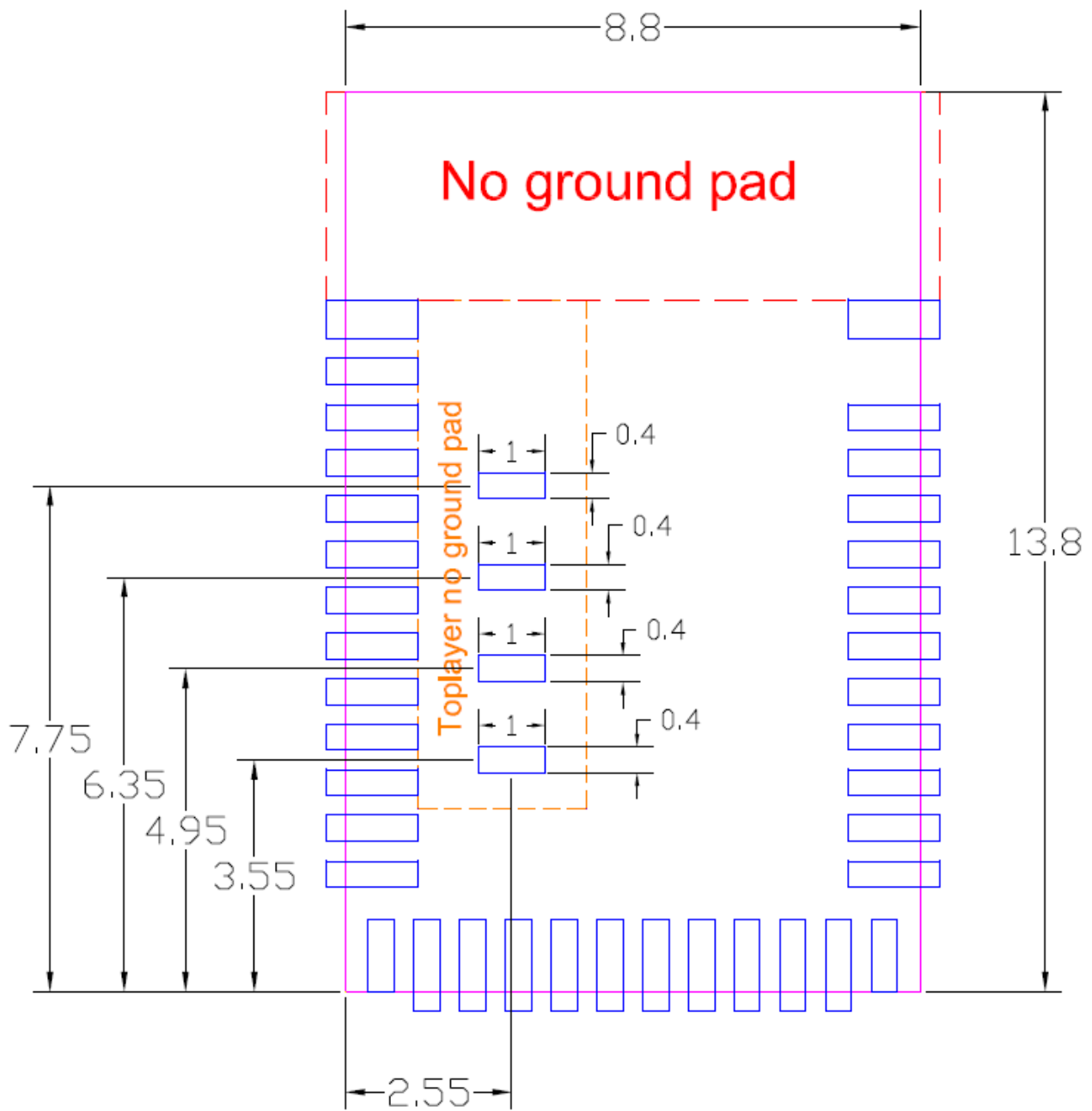






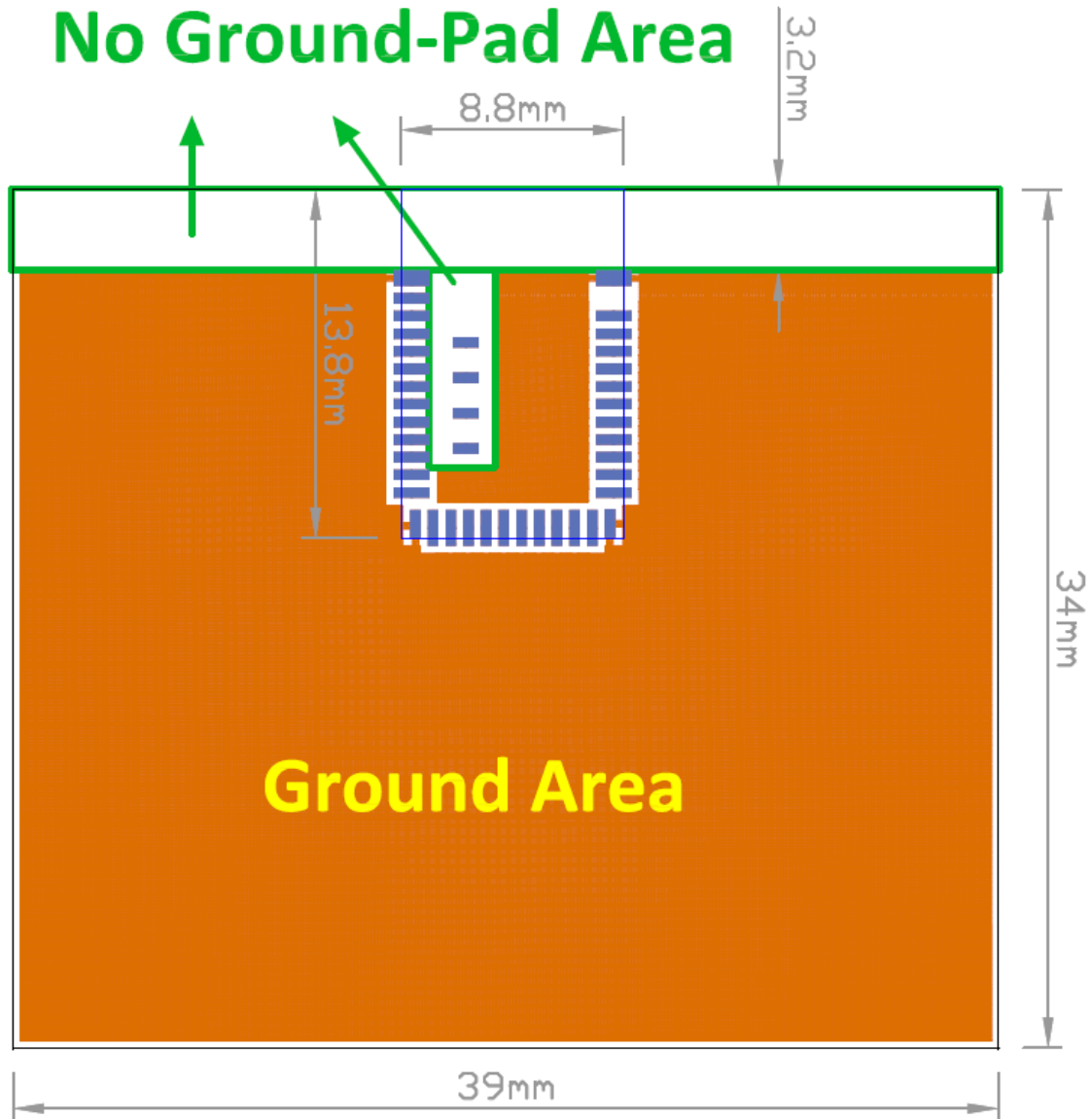
Toplayer no ground pad





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

Layout is suggested following below instruction to have better wireless performance. When design is not allowed to leave such space, please make sure to keep the “No-Ground-Pad” as wider as it can.



### 2.4. Footprint & Design Guide

[Click to download.](#)

## 2.5. Pin Assignment

Pin No.	Name	Pin function	Description
(1)	<b>GND</b>	Ground	The pad must be connected to a solid ground plane
(2)	<b>P0.23</b>	Digital I/O	General-purpose digital I/O
(3)	<b>P0.22</b>	Digital I/O	General-purpose digital I/O
(4)	<b>SWDCLK</b>	Digital input	Serial Wire debug clock input for debug and programming
(5)	<b>SWDIO</b>	Digital I/O	Serial Wire debug I/O for debug and programming
(6)	<b>P0.21</b>	Digital I/O	General-purpose digital I/O
	<b>RESET</b>		Configurable as system RESET pin
(7)	<b>P0.18</b>	Digital I/O	General-purpose digital I/O
	<b>TraceData(0)</b>		Trace port output
(8)	<b>P0.17</b>	Digital I/O	General-purpose digital I/O
(9)	<b>P0.15</b>	Digital I/O	General-purpose digital I/O
	<b>TraceData(2)</b>		Trace port output
(10)	<b>P0.13</b>	Digital I/O	General-purpose digital I/O
(11)	<b>P0.12</b>	Digital I/O	General-purpose digital I/O
(12)	<b>P0.10</b>	Digital I/O	General-purpose digital I/O
	<b>NFC2</b>	NFC input	NFC antenna connection
(13)	<b>P0.09</b>	Digital I/O	General-purpose digital I/O
	<b>NFC1</b>	NFC input	NFC antenna connection
(14)	<b>GND</b>	Ground	The pad must be connected to a solid ground plane
(15)	<b>VDD</b>	Power	Power-supply pin
(16)	<b>P0.08</b>	Digital I/O	General-purpose digital I/O
(17)	<b>P0.06</b>	Digital I/O	General-purpose digital I/O
(18)	<b>P0.07</b>	Digital I/O	General-purpose digital I/O
(19)	<b>P0.05</b>	Digital I/O	General-purpose digital I/O
	<b>AIN3</b>	Analog input	SAADC/COMP/LPCOMP input
(20)	<b>P0.00</b>	Digital I/O	General-purpose digital I/O
	<b>XL1</b>	Analog input	Connection to 32.768khz crystal (LFXO)
(21)	<b>P0.01</b>	Digital I/O	General-purpose digital I/O
	<b>XL2</b>	Analog input	Connection to 32.768khz crystal (LFXO)
(22)	<b>P0.04</b>	Digital I/O	General-purpose digital I/O
	<b>AIN2</b>	Analog input	SAADC/COMP/LPCOMP input
(23)	<b>P0.03</b>	Digital I/O	General-purpose digital I/O
	<b>AIN1</b>	Analog input	SAADC/COMP/LPCOMP input

Pin No.	Name	Pin function	Description
(24)	P0.02	Digital I/O	General-purpose digital I/O
	AIN0	Analog input	SAADC/COMP/LPCOMP input
(25)	GND	Ground	The pad must be connected to a solid ground plane
(26)	DCC	Power	DC/DC converter output pin
(27)	DEC4	Power	1V3 regulator supply decoupling. Input from DC/DC converter.
(28)	P0.31	Digital I/O	General-purpose digital I/O
	AIN7	Analog input	SAADC/COMP/LPCOMP input
(29)	P0.27	Digital I/O	General-purpose digital I/O
(30)	P0.25	Digital I/O	General-purpose digital I/O
(31)	P0.30	Digital I/O	General-purpose digital I/O
	AIN6	Analog input	SAADC/COMP/LPCOMP input
(32)	P0.29	Digital I/O	General-purpose digital I/O
	AIN5	Analog input	SAADC/COMP/LPCOMP input
(33)	P0.28	Digital I/O	General-purpose digital I/O
	AIN4	Analog input	SAADC/COMP/LPCOMP input
(34)	P0.11	Digital I/O	General-purpose digital I/O
(35)	P0.26	Digital I/O	General-purpose digital I/O
(36)	P0.19	Digital I/O	General-purpose digital I/O
(37)	GND	Ground	The pad must be connected to a solid ground plane
(38)	P0.24	Digital I/O	General-purpose digital I/O
(39)	P0.20	Digital I/O	General-purpose digital I/O
	TraceCLK		Trace port clock output
(40)	P0.16	Digital I/O	General-purpose digital I/O
	TraceData(1)		Trace port output
(41)	P0.14	Digital I/O	General-purpose digital I/O
	TraceData(3)		Trace port output

## 2.6. GPIO Located Near the Radio

Below remarks are extracted from Nordic's nRF52832 Spec. Any updates shall refer to Nordic's official release as final reference.

### 4.3.1 GPIO located near the radio

Radio performance parameters, such as sensitivity, may be affected by high frequency digital I/O with large sink/source current close to the Radio power supply and antenna pins.

**Table 5: GPIO recommended usage for WLCSP package**

Pin	GPIO	Recommended usage
F2	P0.22	Low drive, low frequency I/O only.
E2	P0.23	
E1	P0.24	
B3	P0.25	
D3	P0.26	
B4	P0.27	
A3	P0.28	
A4	P0.29	
A5	P0.30	
B5	P0.31	

## 3. Main Chip Solution

RF IC	Crystal Frequency
Nordic NRF52832	32MHZ

## 4. Specification

Any technical spec shall refer to Nordic's official documents as final reference.

### 4.1. Absolute Maximum Ratings

Note	Min.	Max.	Unit
<b>Supply voltages</b>			
VDD	-0.3	+3.9	V
VSS		0	V
<b>I/O pin voltage</b>			
$V_{I/O}, VDD \leq 3.6 \text{ V}$	-0.3	$VDD + 0.3 \text{ V}$	V
$V_{I/O}, VDD > 3.6 \text{ V}$	-0.3	3.9 V	V
<b>NFC antenna pin current</b>			
$I_{NFC1/2}$		80	mA
<b>Radio</b>			
RF input level		10	dBm
<b>Environmental (QFN package)</b>			
Storage temperature	-40	+125	°C
MSL	Moisture Sensitivity Level	2	
ESD HBM	Human Body Model	4	kV
ESD CDM <sub>QF</sub>	Charged Device Model	750	V
	(QFN48, 6x6 mm package)		
<b>Flash memory</b>			
Endurance	10 000		Write/erase cycles
Retention	10 years at 40°C		

### 4.2. Operation Conditions

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

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



## 4.3. Electrical Specifications

### 4.3.1. General Radio Characteristics

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

### 4.3.2. Radio Current Consumption (Transmitter)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{TX,PLUS4dBm,DCDC}$	TX only run current (DCDC, 3V) $P_{RF} = +4$ dBm		7.5		mA
$I_{TX,PLUS4dBm}$	TX only run current $P_{RF} = +4$ dBm		16.6		mA
$I_{TX,0dBm,DCDC}$	TX only run current (DCDC, 3V) $P_{RF} = 0$ dBm		5.3		mA
$I_{TX,0dBm}$	TX only run current $P_{RF} = 0$ dBm		11.6		mA
$I_{TX,MINUS4dBm,DCDC}$	TX only run current DCDC, 3V $P_{RF} = -4$ dBm		4.2		mA
$I_{TX,MINUS4dBm}$	TX only run current $P_{RF} = -4$ dBm		9.3		mA
$I_{TX,MINUS8dBm,DCDC}$	TX only run current DCDC, 3V $P_{RF} = -8$ dBm		3.8		mA
$I_{TX,MINUS8dBm}$	TX only run current $P_{RF} = -8$ dBm		8.4		mA
$I_{TX,MINUS12dBm,DCDC}$	TX only run current DCDC, 3V $P_{RF} = -12$ dBm		3.5		mA
$I_{TX,MINUS12dBm}$	TX only run current $P_{RF} = -12$ dBm		7.7		mA
$I_{TX,MINUS16dBm,DCDC}$	TX only run current DCDC, 3V $P_{RF} = -16$ dBm		3.3		mA
$I_{TX,MINUS16dBm}$	TX only run current $P_{RF} = -16$ dBm		7.3		mA
$I_{TX,MINUS20dBm,DCDC}$	TX only run current DCDC, 3V $P_{RF} = -20$ dBm		3.2		mA
$I_{TX,MINUS20dBm}$	TX only run current $P_{RF} = -20$ dBm		7.0		mA
$I_{TX,MINUS40dBm,DCDC}$	TX only run current DCDC, 3V $P_{RF} = -40$ dBm		2.7		mA
Symbol	Description	Min.	Typ.	Max.	Units
$I_{TX,MINUS40dBm}$	TX only run current $P_{RF} = -40$ dBm		5.9		mA
$I_{START,TX,DCDC}$	TX start-up current DCDC, 3V, $P_{RF} = 4$ dBm		4.0		mA
$I_{START,TX}$	TX start-up current, $P_{RF} = 4$ dBm		8.8		mA

### 4.3.3. Radio Current Consumption (Receiver)

Symbol	Description	Min.	Typ.	Max.	Units
$I_{RX,1M,DCDC}$	RX only run current (DCDC, 3V) 1MSPS / 1MSPS BLE		5.4		mA
$I_{RX,1M}$	RX only run current 1MSPS / 1MSPS BLE		11.7		mA
$I_{RX,2M,DCDC}$	RX only run current (DCDC, 3V) 2MSPS		5.8		mA
$I_{RX,2M}$	RX only run current 2MSPS		12.9		mA
$I_{START,RX,1M,DCDC}$	RX start-up current (DCDC 3V) 1MSPS / 1MSPS BLE		3.5		mA
$I_{START,RX,1M}$	RX start-up current 1MSPS / 1MSPS BLE		7.5		mA

### 4.3.4. Transmitter Specification

Symbol	Description	Min.	Typ.	Max.	Units
$P_{RF}$	Maximum output power		4	6	dBm
$P_{RFC}$	RF power control range		24		dB
$P_{RFCR}$	RF power accuracy			±4	dB
$P_{RF1,1}$	1st Adjacent Channel Transmit Power 1 MHz (1 MspS)		-25		dBc
$P_{RF2,1}$	2nd Adjacent Channel Transmit Power 2 MHz (1 MspS)		-50		dBc
$P_{RF1,2}$	1st Adjacent Channel Transmit Power 2 MHz (2 MspS)		-25		dBc
$P_{RF2,2}$	2nd Adjacent Channel Transmit Power 4 MHz (2 MspS)		-50		dBc

### 4.3.5. 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, 1MSPS nRF mode <sup>15</sup>		-93		dBm
$P_{SENS,IT,SP,1M,BLE}$	Sensitivity, 1MSPS BLE ideal transmitter, <=37 bytes BER=1E-3 <sup>16</sup>		-96		dBm
$P_{SENS,IT,LP,1M,BLE}$	Sensitivity, 1MSPS BLE ideal transmitter >=128 bytes BER=1E-4 <sup>17</sup>		-95		dBm
$P_{SENS,IT,2M}$	Sensitivity, 2MSPS nRF mode <sup>18</sup>		-89		dBm

## 4.3.6. RX Selectivity

Symbol	Description	Min.	Typ.	Max.	Units
$C/I_{1M,co-channel}$	1 Msps mode, Co-Channel interference		9		dB
$C/I_{1M,-1MHz}$	1 Msps mode, Adjacent (-1 MHz) interference		-2		dB
$C/I_{1M,+1MHz}$	1 Msps mode, Adjacent (+1 MHz) interference		-10		dB
$C/I_{1M,-2MHz}$	1 Msps mode, Adjacent (-2 MHz) interference		-19		dB
$C/I_{1M,+2MHz}$	1 Msps mode, Adjacent (+2 MHz) interference		-42		dB
$C/I_{1M,-3MHz}$	1 Msps mode, Adjacent (-3 MHz) interference		-38		dB
$C/I_{1M,+3MHz}$	1 Msps mode, Adjacent (+3 MHz) interference		-48		dB
$C/I_{1M,\pm 6MHz}$	1 Msps mode, Adjacent ( $\geq 6$ MHz) interference		-50		dB
$C/I_{1MBLE,co-channel}$	1 Msps BLE mode, Co-Channel interference		6		dB
Symbol	Description	Min.	Typ.	Max.	Units
$C/I_{1MBLE,-1MHz}$	1 Msps BLE mode, Adjacent (-1 MHz) interference		-2		dB
$C/I_{1MBLE,+1MHz}$	1 Msps BLE mode, Adjacent (+1 MHz) interference		-9		dB
$C/I_{1MBLE,-2MHz}$	1 Msps BLE mode, Adjacent (-2 MHz) interference		-22		dB
$C/I_{1MBLE,+2MHz}$	1 Msps BLE mode, Adjacent (+2 MHz) interference		-46		dB
$C/I_{1MBLE,>3MHz}$	1 Msps BLE mode, Adjacent ( $\geq 3$ 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
$C/I_{2M,co-channel}$	2 Msps mode, Co-Channel interference		10		dB
$C/I_{2M,-2MHz}$	2 Msps mode, Adjacent (-2 MHz) interference		6		dB
$C/I_{2M,+2MHz}$	2 Msps mode, Adjacent (+2 MHz) interference		-14		dB
$C/I_{2M,-4MHz}$	2 Msps mode, Adjacent (-4 MHz) interference		-20		dB
$C/I_{2M,+4MHz}$	2 Msps mode, Adjacent (+4 MHz) interference		-44		dB
$C/I_{2M,-6MHz}$	2 Msps mode, Adjacent (-6 MHz) interference		-42		dB
$C/I_{2M,+6MHz}$	2 Msps mode, Adjacent (+6 MHz) interference		-47		dB
$C/I_{2M,\geq 12MHz}$	2 Msps mode, Adjacent ( $\geq 12$ MHz) interference		-52		dB

## 4.3.7. RX Intermodulation

Symbol	Description	Min.	Typ.	Max.	Units
$P_{IMD,1M}$	IMD performance, 1 Msps, 3rd, 4th, and 5th offset channel		-33		dBm
$P_{IMD,1M,BLE}$	IMD performance, BLE 1 Msps, 3rd, 4th, and 5th offset channel		-30		dBm
$P_{IMD,2M}$	IMD performance, 2 Msps, 3rd, 4th, and 5th offset channel		-33		dBm

## 4.3.8. Radio Timing Parameters

Symbol	Description	Min.	Typ.	Max.	Units
$t_{TXEN}$	Time between TXEN task and READY event after channel FREQUENCY configured		140		us
$t_{TXEN,FAST}$	Time between TXEN task and READY event after channel FREQUENCY configured (Fast Mode)		40		us
$t_{TXDISABLE}$	Time between DISABLE task and DISABLED event when the radio was in TX and mode is set to 1Msps		6		us
$t_{TXDISABLE,2M}$	Time between DISABLE task and DISABLED event when the radio was in TX and mode is set to 2Msps		4		us
$t_{RXEN}$	Time between the RXEN task and READY event after channel FREQUENCY configured in default mode		140		us
$t_{RXEN,FAST}$	Time between the RXEN task and READY event after channel FREQUENCY configured in fast mode		40		us
$t_{SWITCH}$	The minimum time taken to switch from RX to TX or TX to RX (channel FREQUENCY unchanged)		20		us
$t_{RXDISABLE}$	Time between DISABLE task and DISABLED event when the radio was in RX		0		us
$t_{TXCHAIN}$	TX chain delay		0.6		us
$t_{RXCHAIN}$	RX chain delay		9.4		us
$t_{RXCHAIN,2M}$	RX chain delay in 2Msps mode		5		us

## 4.3.9. RSSI Specifications

Symbol	Description	Min.	Typ.	Max.	Units
$RSSI_{ACC}$	RSSI Accuracy Valid range -90 to -20 dBm		±2		dB
$RSSI_{RESOLUTION}$	RSSI resolution		1		dB
$RSSI_{PERIOD}$	Sample period		8		us

## 4.3.10. CPU

Symbol	Description	Min.	Typ.	Max.	Units
$W_{FLASH}$	CPU wait states, running from flash, cache disabled	0		2	
$W_{FLASHCACHE}$	CPU wait states, running from flash, cache enabled	0		3	
$W_{RAM}$	CPU wait states, running from RAM			0	
$I_{DDFLASHCACHE}$	CPU current, running from flash, cache enabled, LDO		7.4		mA
$I_{DDFLASHCACHEDCDC}$	CPU current, running from flash, cache enabled, DCDC 3V		3.7		mA
$I_{DDFLASH}$	CPU current, running from flash, cache disabled, LDO		8.0		mA
$I_{DDFLASHDCDC}$	CPU current, running from flash, cache disabled, DCDC 3V		3.9		mA
$I_{DDRAM}$	CPU current, running from RAM, LDO		6.7		mA
$I_{DDRAMDCDC}$	CPU current, running from RAM, DCDC 3V		3.3		mA
$I_{DDFLASH/MHz}$	CPU efficiency, running from flash, cache enabled, LDO		125		$\mu A /$ MHz
$I_{DDFLASHDCDC/MHz}$	CPU efficiency, running from flash, cache enabled, DCDC 3V		58		$\mu A /$ MHz

Symbol	Description	Min.	Typ.	Max.	Units
$CM_{FLASH}$	CoreMark <sup>3</sup> , running from flash, cache enabled		215		CoreM
$CM_{FLASH/MHz}$	CoreMark per MHz, running from flash, cache enabled		3.36		CoreM MHz
$CM_{FLASH/mA}$	CoreMark per mA, running from flash, cache enabled, DCDC 3V		58		CoreM mA

## 4.3.11. Power Management

Symbol	Description	Min.	Typ.	Max.	Units
$I_{ON\_RAMOFF\_EVENT}$	System ON, No RAM retention, Wake on any event		1.2		$\mu A$
$I_{ON\_RAMON\_EVENT}$	System ON, Full RAM retention, Wake on any event		1.5		$\mu A$
$I_{ON\_RAMOFF\_RTC}$	System ON, No RAM retention, Wake on RTC		1.9		$\mu A$
$I_{OFF\_RAMOFF\_RESET}$	System OFF, No RAM retention, Wake on reset		0.7		$\mu A$
$I_{OFF\_RAMOFF\_GPIO}$	System OFF, No RAM retention, Wake on GPIO		1.2		$\mu A$
$I_{OFF\_RAMOFF\_LPCOMP}$	System OFF, No RAM retention, Wake on LPCOMP		1.9		$\mu A$
$I_{OFF\_RAMOFF\_NFC}$	System OFF, No RAM retention, Wake on NFC field		0.7		$\mu A$
$I_{OFF\_RAMON\_RESET}$	System OFF, Full RAM retention, Wake on reset		1.0		$\mu A$

## 5. FCC Compliance

This equipment has been tested and found to comply with the limits for a Class digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to the radio communications. However, there are no guarantees that interference will not occur in a particular installation.

### Troubleshooting

If this equipment does cause harmful interference to radio reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following instructions.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Consult dealer or an experienced radio technician.

### Conditions

Operation is subject to the following conditions

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

### FCC Caution

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.

Any changes or modifications not expressly approved by the party responsible for compliance could void the authority to operate equipment.

### RF Exposure

For body worn operation, this device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions the handset a minimum of 5mm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

### End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 5mm may be maintained between the antenna and users. The final end

product must be labeled in a visible area with the following:

Contains FCC ID: SH6MDBT42

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.



## 6. IC Caution

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- This device may not cause interference
- This device must accept any interference, including interference that may cause undesired operation of the device

### RF exposure

To comply with the FCC RF exposure compliance requirements, this device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

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:

- l'appareil ne doit pas produire de brouillage, et
- l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Pour se conformer aux exigences de conformité RF canadienne l'exposition, cet appareil et son antenne ne doivent pas être co-localisés ou fonctionnant en conjonction avec une autre antenne ou transmetteur.

### End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 5mm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following:

Contains IC ID: 8017A-MDBT42



## 7. NCC 警語

根據 NCC 低功率電波輻射性電機管理辦法規定

第十二條：

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。

第十四條：

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。

此模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示。

「本產品內含射頻模組：ID 編號 XXXXX」字樣