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Approval Sheet

MODEL : **BT40 module**

P/N : **nano51822-AA (RAM 16K)**

nano51822-AC (RAM 32K)

Approved	Checked	Designed

The Merit of nano51822 Module

1. Long Working Distance (Over 80M in open space)
2. Declaration ID already included all Nordic applied profiles.
3. Real-Time Operating System Supported.
4. Tickless Low Power Technology Ready.
5. Friendly developer environment.
6. FCC (USA) and Telec (Japan) certificate & CE(EU) granted.

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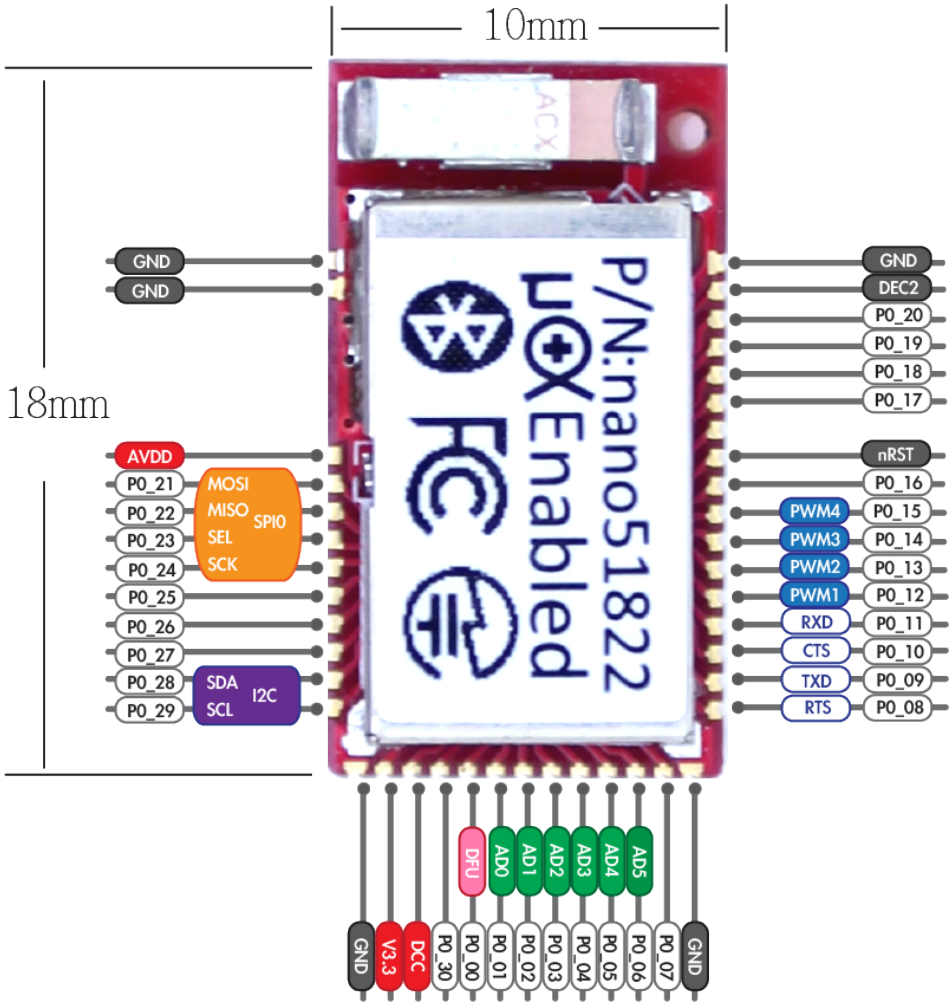
1. Overall Introduction



uCXpresso.NRF nano51822 is a BT4.0/4.1 (Bluetooth low energy or BLE) module designed based on Nordic nRF581822 solution. The feature of the module:

1. **Dual Transmission Mode of BLE & RF 2.4G upon customer preference.**
2. **Compact size with (L)18x(W)10x(H)3.2mm**
3. **Low power requirements, ultra-low peak, average and idle mode power consumption.**
4. **Compatible with a large installed based of mobiles phones, tablets and computers.**
5. **Fully coverage of wireless applications.**
6. **BLE & RF transmission switching may help products to fit all operation system**
7. **BLE & RF transmission switching may help products fit all kinds of hardware.**

1.1 Applications

SoT (Smart of Things) : Everything link to smart.

1.2 Features

. 2.4GHZ transceiver

. -93dbm sensitivity in Bluetooth low energy mode

. TX Power -20 to +4dbm

. RSSI (1db resolution)

. ARM Cortex – M0 32 bit processor

.Serial Wire Debug (SWD)

. RTOS 8.1.x and Tickless Technology ready

. S110 SoftDevice 7.x ready

. uCXpresso.NRF RTOS C/C++ Framework enabled.

. Friendly and free IDE supported. (for Windows, Linux and OS/X)

. Memory

. 152kb embedded flash memory for User's App.

. 6kb RAM memory for User's App. (nano51822-AA)

. 6+16kb RAM memory for User's App (nano51822-AC)

. Flexible Power Management

. Supply voltage range 1.8V to 3.6V

. 2.5us wake-up using 16MHz RCOSC

. 0.6uA @ 3V mode

. 1.2uA @ 3V in OFF mode + 1 region RAM retention

. 2.6uA @ 3V ON mode, all blocks IDLE

. 8/9/10 bit ADC- 6 configurable channels

. 30 General Purpose I/O Pins

. Two 16 bit timers with timer mode

. SPI Master

. Two-wire Master (I2C compatible)

. UART (CTS/RTS)

. AES HW encryption

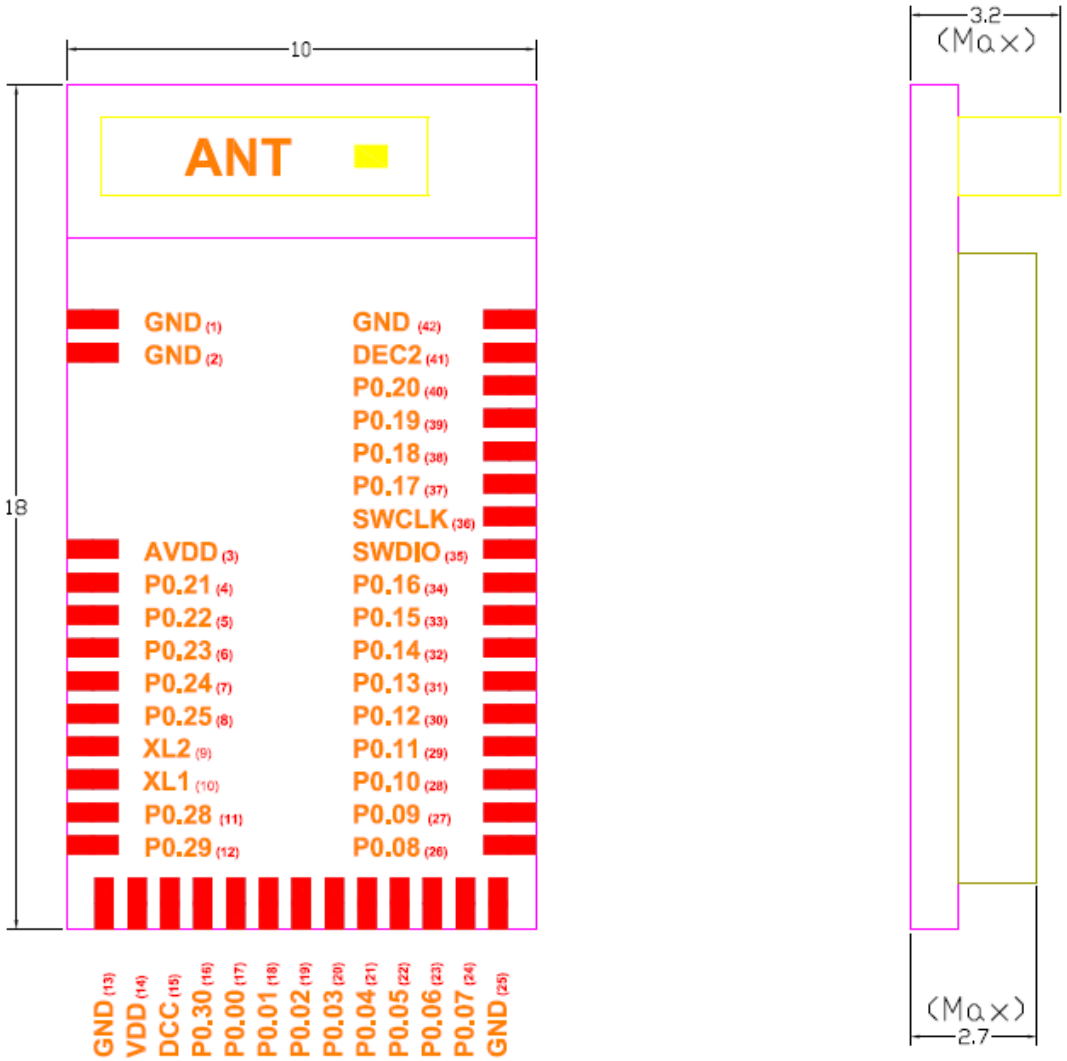
1.3 Profile and Service Information

Adopted Profile	Adopted Services	Supported
HID over GATT	HID Battery Device Information	YES
Heart Rate Monitor	Heart Rate Device Information	YES
Proximity	Link Loss Immediate Alert TX Power	YES
Blood Pressure	Blood pressure	YES
Health Thermometer	Health Thermometer	YES
Glucose	Glucose	YES
Phone Alert Status	Phone Alert Status	YES
Alert Notification	Alert Notification	YES
Time	Current Time Next DST Change Reference Time Update	YES
Find Me	Immediate Alert	YES
Cycling speed and cadence	Cycling speed and cadence Device information	YES
Running speed and cadence	Running speed and cadence Device information	YES

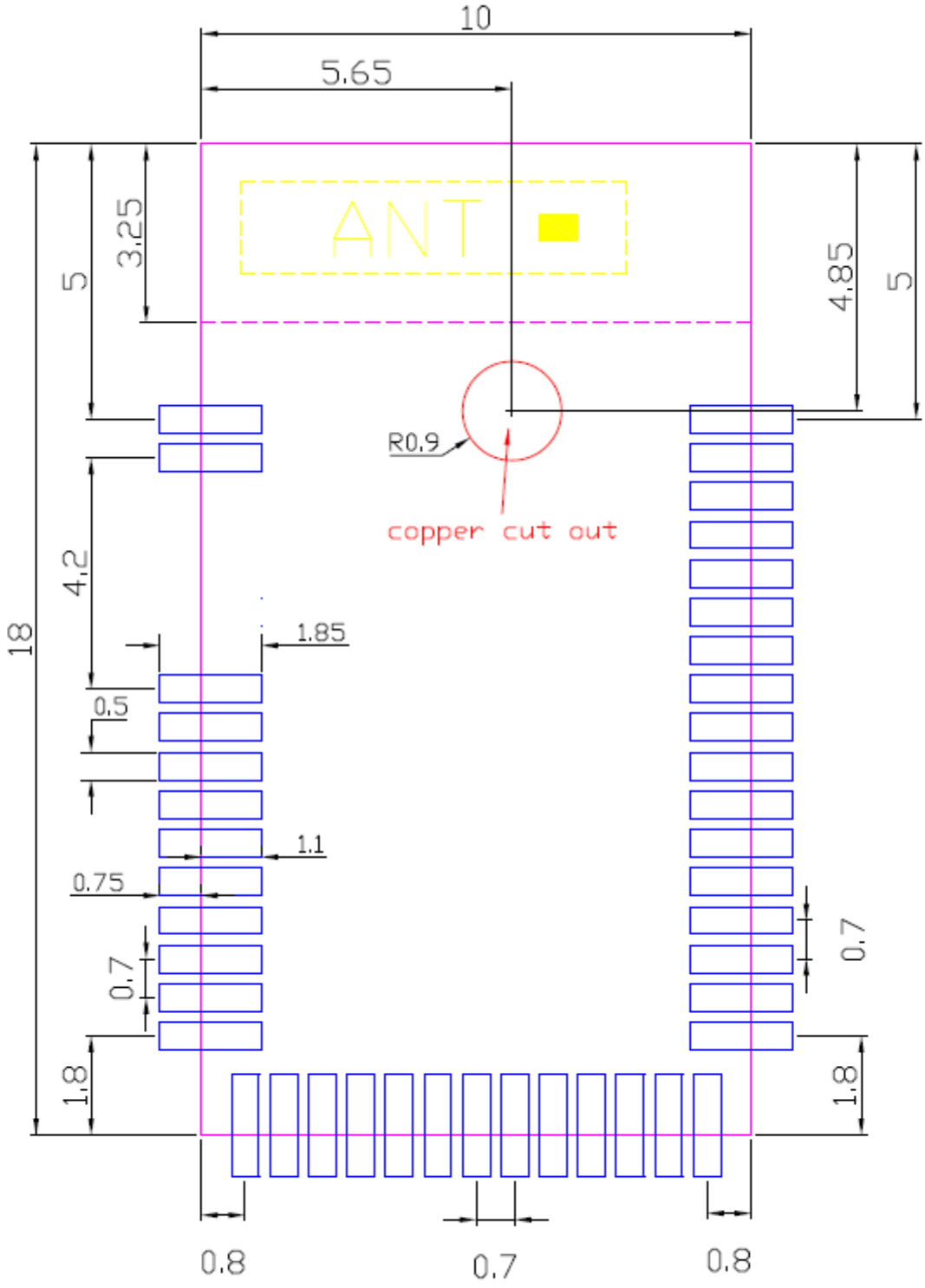
2. Product Dimension

2.1 PCB Dimensions, & Pin Indication & Layout Guide

PCB SIZE：10 x18 (mm)



TOP 單位:(mm)



Top View（單位：mm）

recommended solder pad layout

2.2 Pin Assignment

Pin No.	Name	Pin function	Description
(1)(2)	GND	Ground	The pad must be connected to a solid ground plane
(3)	AVDD	Power	Analog power supply
(4)	P0.21	Digital I/O	General-purpose digital I/O
(5)	P0.22	Digital I/O	General-purpose digital I/O
(6)	P0.23	Digital I/O	General-purpose digital I/O
(7)	P0.24	Digital I/O	General-purpose digital I/O
(8)	P0.25	Digital I/O	General-purpose digital I/O
(9)	P0.26	Digital I/O	General-purpose digital I/O
	AIN0	Analog input	ADC input 0
	XL2	Analog output	Connector for 32.768KHz crystal
(10)	P0.27	Digital I/O	General-purpose digital I/O
	AIN1	Analog input	ADC input 1
	XL1	Analog input	Connector for 32.768KHz crystal or external 32.768KHz clock reference
(11)	P0.28	Digital I/O	General-purpose digital I/O
(12)	P0.29	Digital I/O	General-purpose digital I/O
(13)	GND	Ground	The pad must be connected to a solid ground plane
(14)	VDD	Power	Power supply
(15)	DCC	Power	DC/DC output voltage to external LC filter
(16)	P0.30	Digital I/O	General-purpose digital I/O
(17)	P0.00	DFU	Enter to bootloader (DFU) mode, Active Low Level
	AREF0	Analog input	ADC Reference voltage
(18)	P0.01	Digital I/O	General-purpose digital I/O
	AIN2	Analog input	ADC input 2
(19)	P0.02	Digital I/O	General-purpose digital I/O
	AIN3	Analog input	ADC input 3
(20)	P0.03	Digital I/O	General-purpose digital I/O
	AIN4	Analog input	ADC input 4
(21)	P0.04	Digital Input	General-purpose digital I/O
	AIN5	Analog input	ADC input 5
(22)	P0.05	Digital I/O	General-purpose digital I/O
	AIN6	Analog input	ADC input 6

Pin No.	Name	Pin function	Description
(23)	**P0.06**	Digital I/O	General-purpose digital I/O
	AIN7	Analog input	ADC input 7
	AREF1	Analog input	ADC Reference voltage
(24)	**P0.07**	Digital I/O	General-purpose digital I/O
(25)	**GND**	Ground	The pad must be connected to a solid ground plane
(26)	**P0.08**	Digital I/O	General-purpose digital I/O
(27)	**P0.09**	Digital I/O	General-purpose digital I/O
(28)	**P0.10**	Digital I/O	General-purpose digital I/O
(29)	**P0.11**	Digital I/O	General-purpose digital I/O
(30)	**P0.12**	Digital I/O	General-purpose digital I/O
(31)	**P0.13**	Digital I/O	General-purpose digital I/O
(32)	**P0.14**	Digital I/O	General-purpose digital I/O
(33)	**P0.15**	Digital I/O	General-purpose digital I/O
(34)	**P0.16**	Digital I/O	General-purpose digital I/O
(35)	**SWDIO/RESET**	Digital I/O	System reset(active low).Also HW debug and flash Programming
(36)	**SWDCLK**	Digital input	HW debug and flash programming. Connect a 12K ohm resister to GND for flash programming .
(37)	**P0.17**	Digital I/O	General-purpose digital I/O
(38)	**P0.18**	Digital I/O	General-purpose digital I/O
(39)	**P0.19**	Digital I/O	General-purpose digital I/O
(40)	**P0.20**	Digital I/O	General-purpose digital I/O
(41)	**DEC2**	Power	Power supply decoupling. Low voltage mode VCC
(42)	**GND**	Ground	The pad must be connected to a solid ground plane

[1] Digital I/O pad with 5mA source/sink capability.

3. SoB (System on Board) Solution

RF Module	Crystal Frequency
nano51822 SoB Module	16MHZ

4. Shipment Packing Information

88 pcs/ Tray

10 Trays / Export Carton (880pcs per carton)

N.W: 2.1Kg (may subject to be changed upon contents)

5. Specification

5.1 Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit
Supply voltages				
VDD		-0.3	+3.6	V
DEC2[1]			2	V
VSS			0	V
I/O pin voltage				
VIO		-0.3	VDD + 0.3	V
Environmental QFN48 package				
Storage temperature		-40	+125	°C
MSL	Moisture Sensitivity Level		2	
ESD HBM	Human Body Model		4	kV
ESD CDM	Charged Device Model		750	V

Flash memory			
Endurance	20 000		write/erase cycles
Retention	10 years at 40 °C		
Number of times an address can be written between erase cycles		2	times

5.2 Operation Conditions

Symbol	Parameter	Notes	Min.	Typ.	Max.	Units
VDD	Supply voltage, normal mode		1.8	3.0	3.6	V
VDD	Supply voltage, normal mode, DC/DC converter output voltage 1.9 V		2.1	3.0	3.6	V
VDD	Supply voltage, low voltage mode	1	1.75	1.8	1.95	V
t_{R_VDD}	Supply rise time (0 V to 1.8 V)	2			60	ms
T_A	Operating temperature		-25	25	75	°C

5.3 Electrical Specifications

5.3.1 Radio Transceiver

. General Radio Characteristics

Symbol	Description	Note	Min.	Typ.	Max.	Units	Test level
f_{OP}	Operating frequencies	1 MHz channel spacing	2400		2483	MHz	N/A
PLL_{res}	PLL programming resolution			1		MHz	N/A
Δf250	Frequency deviation @ 250 kbps			±170		kHz	2
Δf_{1M}	Frequency deviation @ 1 Mbps			±170		kHz	2
Δf_{2M}	Frequency deviation @ 2 Mbps			±320		kHz	2
Δf_{BLE}	Frequency deviation @ BLE		±225	±250	±275	kHz	4
bps_{FSK}	On-air data rate		250		2000	kbps	N/A

. Radio Current Consumption

Symbol	Description	Note	Min.	Typ.	Max.	Units	Test level
$I_{TX,+4dBm}$	TX only run current @ P_{OUT} = +4 dBm	1		16		mA	4
$I_{TX,0dBm}$	TX only run current @ P_{OUT} = 0 dBm	1		10.5		mA	4
$I_{TX,-4dBm}$	TX only run current @ P_{OUT} = -4 dBm	1		8		mA	2
$I_{TX,-8dBm}$	TX only run current @ P_{OUT} = -8 dBm	1		7		mA	2
$I_{TX,-12dBm}$	TX only run current @ P_{OUT} = -12 dBm	1		6.5		mA	2
$I_{TX,-16dBm}$	TX only run current @ P_{OUT} = -16 dBm	1		6		mA	2
$I_{TX,-20dBm}$	TX only run current @ P_{OUT} = -20 dBm	1		5.5		mA	2
$I_{TX,-30dBm}$	TX only run current @ P_{OUT} = -30 dBm	1		5.5		mA	2
$I_{START,TX}$	TX startup current	2		7		mA	1
$I_{RX,250}$	RX only run current @ 250 kbps			12.6		mA	1
$I_{RX,1M}$	RX only run current @ 1 Mbps			13		mA	4
$I_{RX,2M}$	RX only run current @ 2 Mbps			13.4		mA	1
$I_{START,RX}$	RX startup current	3		8.7		mA	1

1. Valid for data rates 250 kbps, 1 Mbps, and 2 Mbps
2. Average current consumption (at 0 dBm TX output power) for TX startup (130 µs), and when changing mode from RX to TX (130 µs).
3. Average current consumption for RX startup (130 µs), and when changing mode from TX to RX (130 µs).

5.3.2 Transmitter Specifications

Symbol	Description	Min.	Typ.	Max.	Units	Test level
P_{RF}	Maximum output power		4		dBm	4
P_{RFC}	RF power control range	20	24		dB	2
PRFCR	RF power accuracy			±4	dB	1
P_{WHISP}	RF power whisper mode		-30		dBm	2
P_{BW2}	20 dB bandwidth for modulated carrier (2 Mbps)		1800	2000	kHz	2
P_{BW1}	20 dB bandwidth for modulated carrier (1 Mbps)		950	1100	kHz	2
P_{BW250}	20 dB bandwidth for modulated carrier (250 kbps)		700	800	kHz	2
$P_{RF1.2}$	1st Adjacent Channel Transmit Power 2 MHz (2 Mbps)			-20	dBc	2
$P_{RF2.2}$	2nd Adjacent Channel Transmit Power 4 MHz (2 Mbps)			-45	dBc	2
$P_{RF1.1}$	1st Adjacent Channel Transmit Power 1 MHz (1 Mbps)			-20	dBc	2
$P_{RF2.1}$	2nd Adjacent Channel Transmit Power 2 MHz (1 Mbps)			-40	dBc	2
$P_{RF1.250}$	1st Adjacent Channel Transmit Power 1 MHz (250 kbps)			-25	dBc	2
$P_{RF2.250}$	2nd Adjacent Channel Transmit Power 2 MHz (250 kbps)			-40	dBc	2
$t_{TX,30}$	Maximum consecutive transmission time, f_{TOL} < ±30 ppm			16	ms	1
$t_{TX,60}$	Maximum consecutive transmission time, f_{TOL} < ±60 ppm			4	ms	1

5.3.3 Receiver Specifications

Symbol	Description	Min.	Typ.	Max.	Units	Test level
Receiver operation						
PRX_{MAX}	Maximum received signal strength at < 0.1% PER		0		dBm	1
$PRX_{SENS,2M}$	Sensitivity (0.1% BER) @ 2 Mbps		-85		dBm	2
$PRX_{SENS,1M}$	Sensitivity (0.1% BER) @ 1 Mbps		-90		dBm	2
$PRX_{SENS,250k}$	Sensitivity (0.1% BER) @ 250 kbps		-96		dBm	2
P_{SENS} IT 1 Mbps BLE	Receiver sensitivity: Ideal transmitter		-93		dBm	2
P_{SENS} DT 1 Mbps BLE	Receiver sensitivity: Dirty transmitter		-91		dBm	2
RX selectivity - modulated interfering signal[1]						
	2 Mbps					
C/I_{CO}	C/I co-channel		12		dB	2
C/I_{1ST}	1^{st} ACS, C/I 2 MHz		-4		dB	2
C/I_{2ND}	2^{nd} ACS, C/I 4 MHz		-24		dB	2
C/I_{3RD}	3^{rd} ACS, C/I 6 MHz		-28		dB	2
C/I_{6th}	6^{th} ACS, C/I 12 MHz		-44		dB	2
C/I_{Nth}	N^{th} ACS, C/I f_i > 25 MHz		-50		dB	2
	1 Mbps					
C/I_{CO}	C/I co-channel (1 Mbps)		12		dB	2
C/I_{1ST}	1^{st} ACS, C/I 1 MHz		4		dB	2
C/I_{2ND}	2^{nd} ACS, C/I 2 MHz		-24		dB	2
C/I_{3RD}	3^{rd} ACS, C/I 3 MHz		-30		dB	2
C/I_{6th}	6^{th} ACS, C/I 6 MHz		-40		dB	2
C/I_{12th}	12^{th} ACS, C/I 12 MHz		-50		dB	2
C/I_{Nth}	N^{th} ACS, C/I f_i > 25 MHz		-53		dB	2

Symbol	Description	Min.	Typ.	Max.	Units	Test level
	250 kbps					
C/I_{CO}	C/I co-channel		4		dB	2
C/I_{1ST}	1^{st} ACS, C/I 1 MHz		-10		dB	2
C/I_{2ND}	2^{nd} ACS, C/I 2 MHz		-34		dB	2
C/I_{3RD}	3^{rd} ACS, C/I 3 MHz		-39		dB	2
C/I_{6th}	6^{th} ACS, C/I f_i > 6 MHz		-50		dB	2
C/I_{12th}	12^{th} ACS, C/I 12 MHz		-55		dB	2
C/I_{Nth}	N^{th} ACS, C/I f_i > 25 MHz		-60		dB	2
	***Bluetooth* Low Energy RX selectivity**					
C/I_{CO}	C/I co-channel		10		dB	2
C/I_{1ST}	1^{st} ACS, C/I 1 MHz		1		dB	2
C/I_{2ND}	2^{nd} ACS, C/I 2 MHz		-25		dB	2
C/I_{3+N}	ACS, C/I (3+n) MHz offset [n = 0, 1, 2, . . .]		-51		dB	2
C/I_{Image}	Image blocking level		-30		dB	2
$C/I_{Image\pm1MHz}$	Adjacent channel to image blocking level (±1 MHz)		-31		dB	2
RX intermodulation[2]						
P_IMD_{2Mbps}	IMD performance, 2 Mbps, 3rd, 4th and 5th offset channel		-41		dBm	2
P_IMD_{1Mbps}	IMD performance, 1 Mbps, 3rd, 4th and 5th offset channel		-40		dBm	2
$P\_IMD_{250kbps}$	IMD performance, 250 kbps, 3rd, 4th and 5th offset channel		-36		dBm	2
P_IMD_{BLE}	IMD performance, 1 Mbps BLE, 3rd, 4th and 5th offset channel		-39		dBm	2

1. Wanted signal level at P_{IN} = -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.
2. Wanted signal level at P_{IN} = -64 dBm. Two interferers with equal input power are used. The interferer closest in frequency is unmodulated, the other interferer is modulated equal with the wanted signal. The input power of interferers where the sensitivity equals BER = 0.1% is presented.

5.3.4 Radio Timing Parameters

Symbol	Description	250 k	1 M	2 M	BLE	Jitter	Units
t_{TXEN}	Time between TXEN task and READY event	132	132	132	140	0	µs
$t_{TXDISABLE}$	Time between DISABLE task and DISABLED event when the radio was in TX	10	4	3	4	1	µs
t_{RXEN}	Time between the RXEN task and READY event	130	130	130	138	0	µs
$t_{RXDISABLE}$	Time between DISABLE task and DISABLED event when the radio was in RX	0	0	0	0	1	µs
$t_{TXCHAIN}$	TX chain delay	5	1	0.5	1	0	µs
$t_{RXCHAIN}$	RX chain delay	12	2	2.5	3	0	µs

5.3.5 RSSI Specifications

Symbol	Description	Note	Min.	Typ.	Max.	Units	Test level
$RSSI_{ACC}$	RSSI accuracy	Valid between: -50 dBm and -80 dBm			±6	dB	2
$RSSI_{RESOLUTION}$	RSSI resolution			1		dB	1
$RSSI_{PERIOD}$	Sample period		8.8			µs	1
$RSSI_{CURRENT}$	Current consumption in addition to I_{RX}			250		µA	1

5.3.6 CPU

Symbol	Description	Min.	Typ.	Max.	Units	Test level
$I_{CPU, Flash}$	Run current at 16 MHz, Executing code from flash memory		4.4[1]		mA	2
$I_{CPU, RAM}$	Run current at 16 MHz, Executing code from RAM		2.4[2]		mA	1
$I_{START, CPU}$	CPU startup current		600		µA	1
$t_{START, CPU}$	IDLE to CPU execute	0	[3]		µs	1

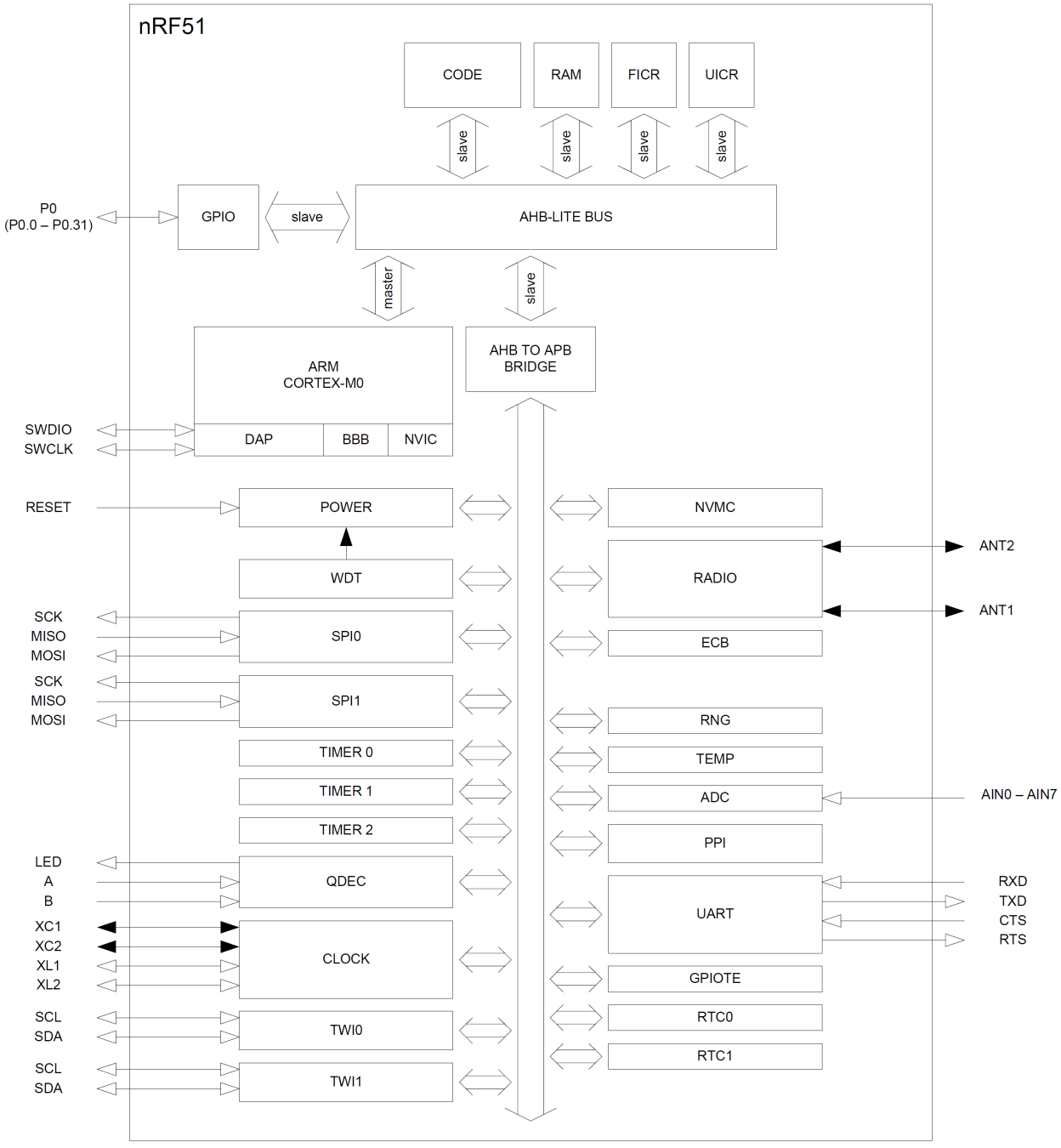
5.3.7 Power Management

Symbol	Description	Note	Min.	Typ.	Max.	Units	Test level
$t_{POR, 1\mu s}$	Time Reset is active from VDD reaches 1.7 V with 1 µs rise time		0.2	2.7		ms	1
$t_{POR, 50\ ms}$	Time Reset is active from VDD reaches 1.7 V with 50 ms rise time		6.5	29		ms	1
I_{OFF}	Current in SYSTEM-OFF, no RAM retention			0.4		µA	1
$I_{OFF, 8\ k}$	Current in SYSTEM-OFF mode 8 kB SRAM retention			0.6		µA	1
$I_{OFF, 16\ k}$	Current in SYSTEM-OFF mode 16 kB SRAM retention			0.8		µA	1
I_{OFF2ON}	OFF to CPU execute transition current			400		µA	1
t_{OFF2ON}	OFF to CPU execute			9.6	10.6	µs	1
I_{ON}	SYSTEM-ON base current			2.3		µA	2
I_{1V2}	Current drawn by 1V2 regulator			290		µA	2
t_{1V2}	Startup time for 1V2 regulator			2.3		µs	1
I_{1V7}	Current drawn by 1V7 regulator			90		µA	2
t_{1V7}	Startup time for 1V7 regulator			2	3.6	µs	1
$I_{1V2RC16}$	Current drawn by 1V2 regulator and 16 MHz RCOSC when both are on at the	See ***Table 24***		830[1]		µA	1

Symbol	Description	Note	Min.	Typ.	Max.	Units	Test level
$I_{1V2XO16}$	Current drawn by 1V2 regulator and 16 MHz XOSC when both are on at the same time	See ***Table 24***		740[1]		µA	1
I_{DCDC}	Current drawn by DC/DC converter			300		µA	1
F_{DCDC}	DC/DC converter current conversion factor		0.65[2]		1.2[2]		1
$t_{START,DCDC}$	DC/DC converter startup time		10[2]		425[2]	µs	1

1. This number includes the current used by the automated power and clock management system.
2. F_{DCDC} and $t_{START,DCDC}$ will vary depending on VDD and device internal current consumption (I_{DD}). The range of values stated in this specification is for VDD between 2.1 V and 3.6 V, and I_{DD} between 4 mA and 20 mA. Please refer to the *nRF51 Series Reference Manual*, v1.1 or later, for a method to calculate these numbers based on VDD and I_{DD}.

6. Block Diagram



nano51822 block diagram

7. Antenna

ACX
Advanced Ceramic X

AT7020 Series
Multilayer Chip Antenna

Features

❖ Monolithic SMD with small, low-profile and light-weight type.

❖ Wide bandwidth

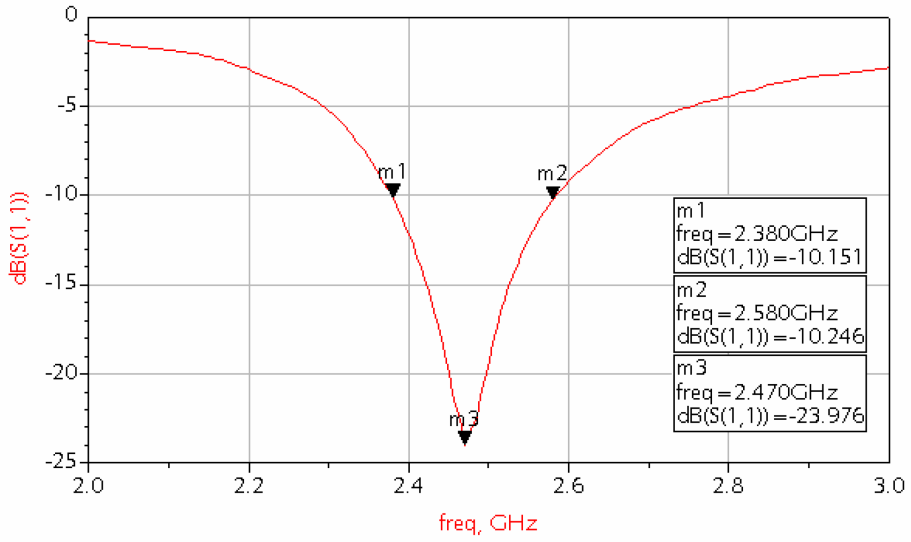
Applications

❖2.4GHz WLAN, Home RF, Bluetooth Modules, etc.

Specifications

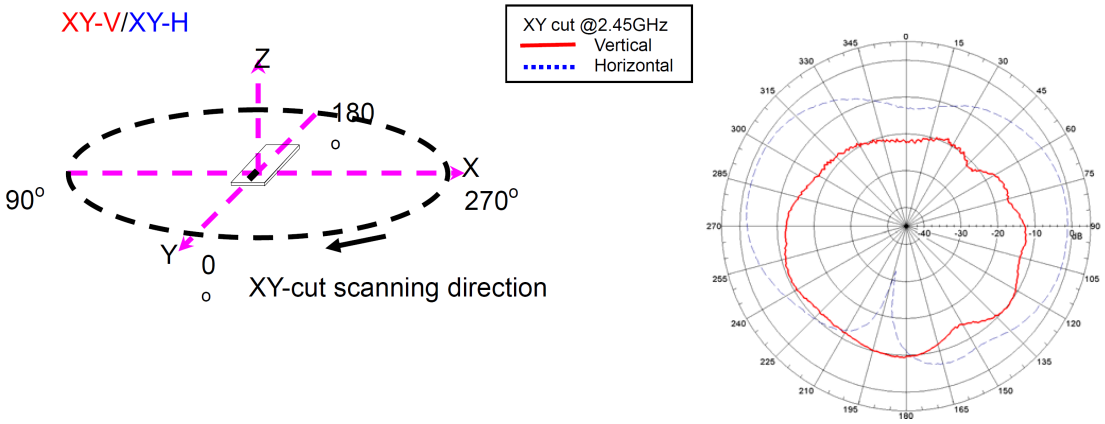
Part Number	Frequency Range (MHz)	Peak Gain (dBi typ.)	Average Gain (dBi typ.)	VSWR	Impedance
AT7020 -E3R0HBA_	2400~2500	1.3dBi (XZ-V)	-0.5dBi (XZ-V)	2 max.	50 Ω

❖ Return Loss/With Matching Circuits

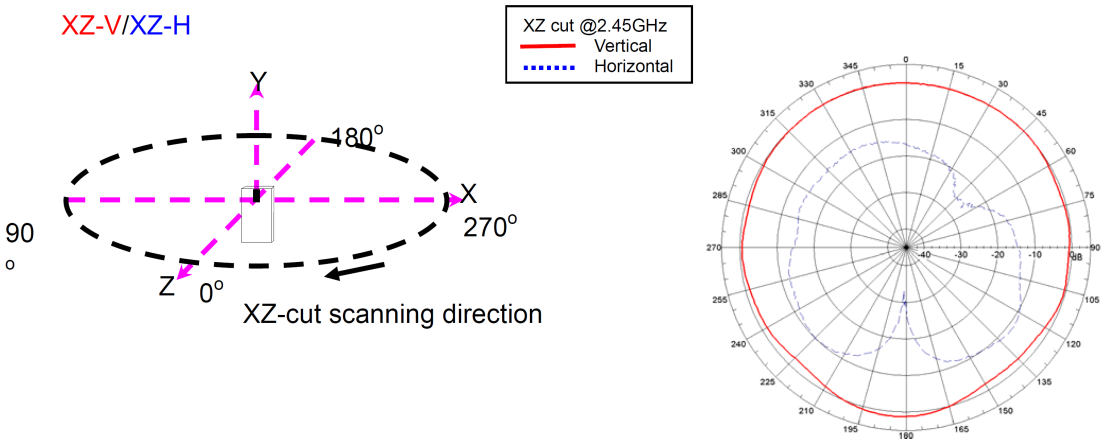


❖ Radiation Patterns

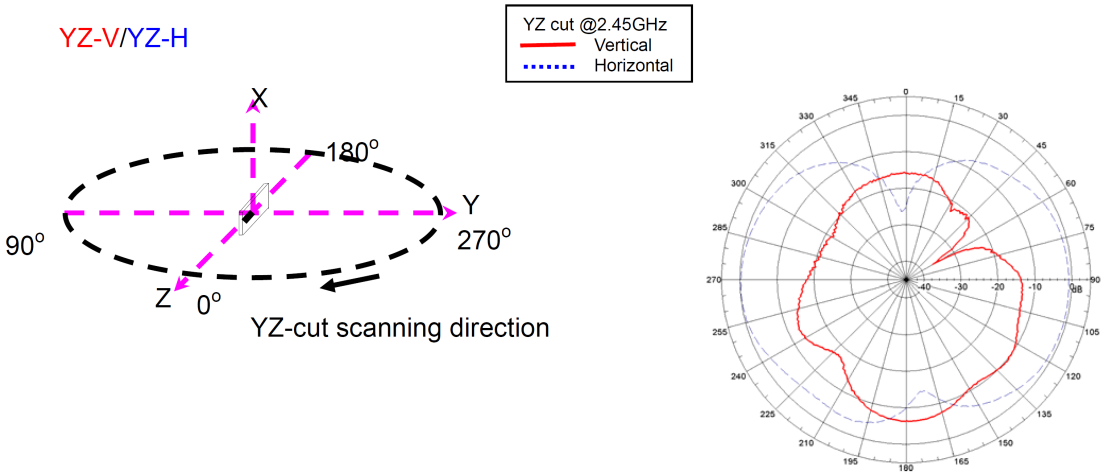
XY-V/XY-H



XZ-V/XZ-H

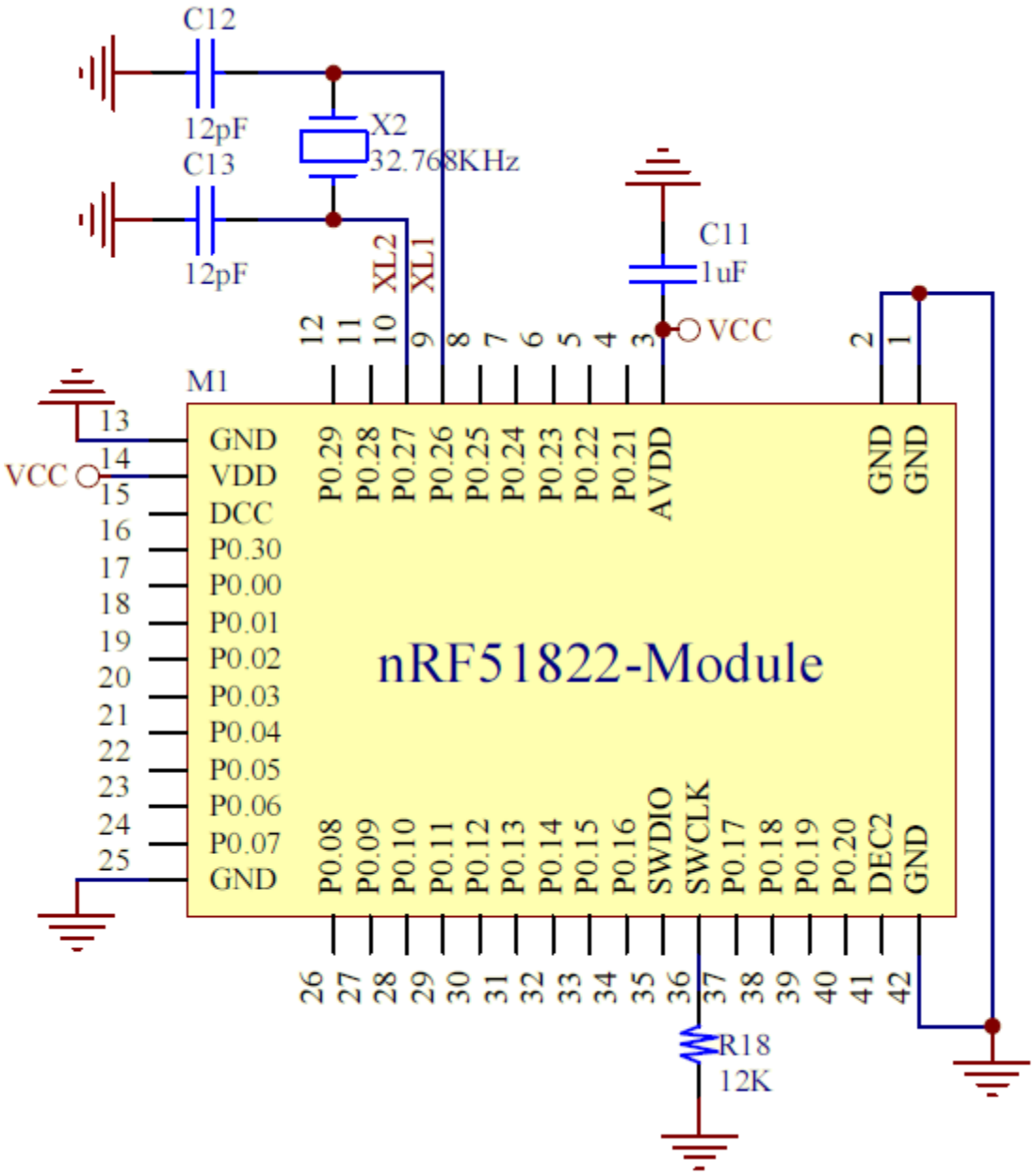


YZ-V/YZ-H

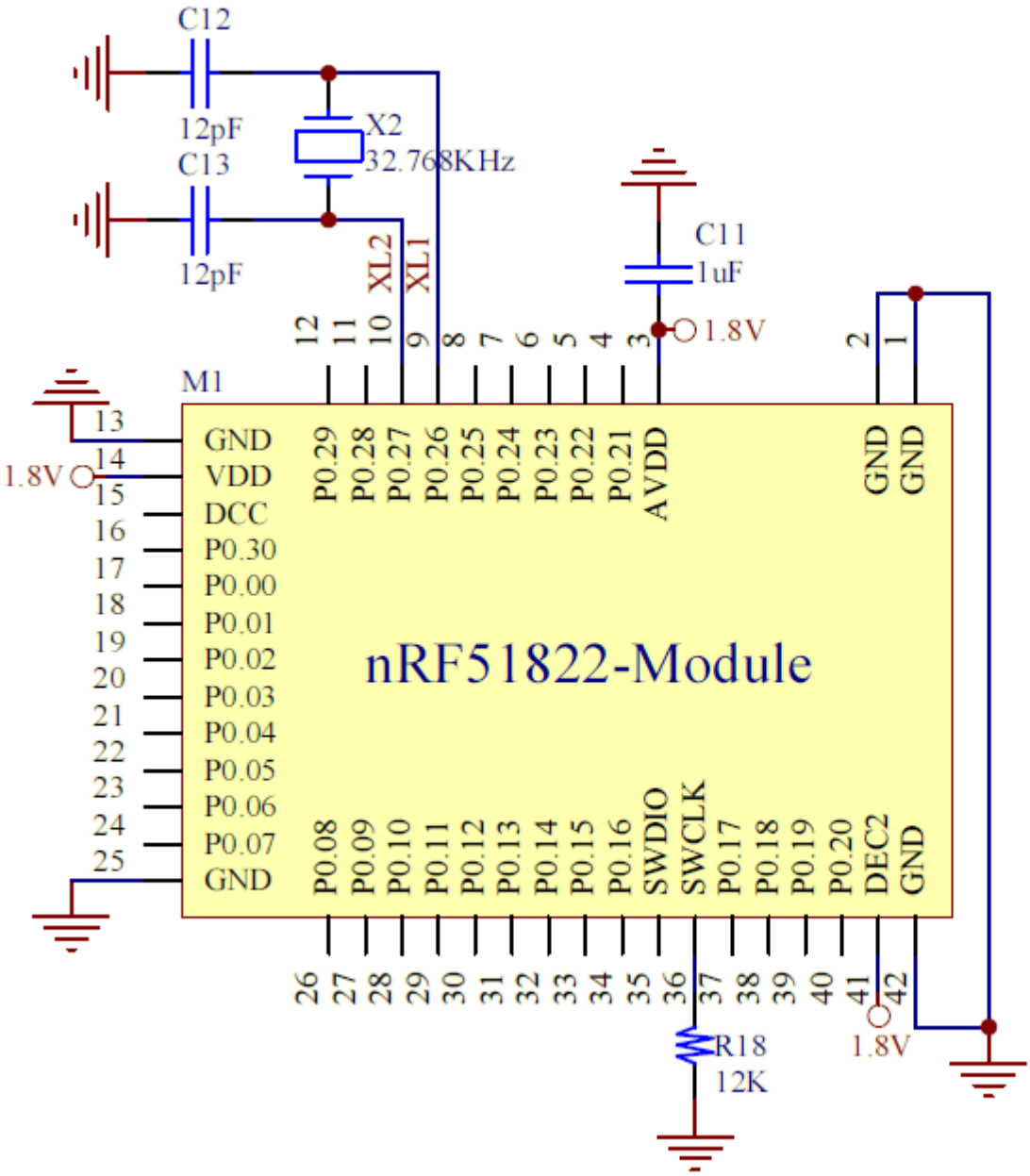


8. Reference Circuit

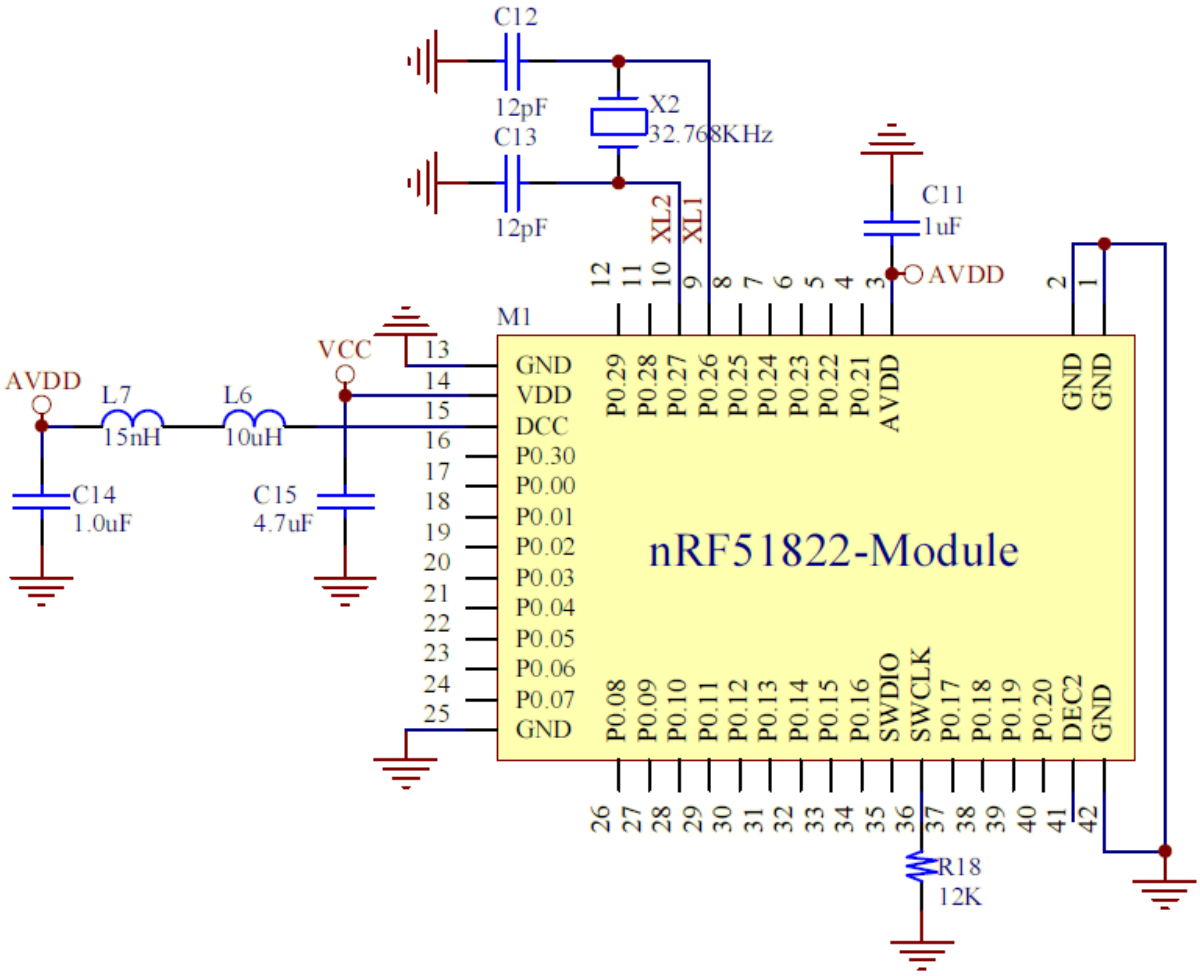
8.1 nano51822 Schematic with external LDO



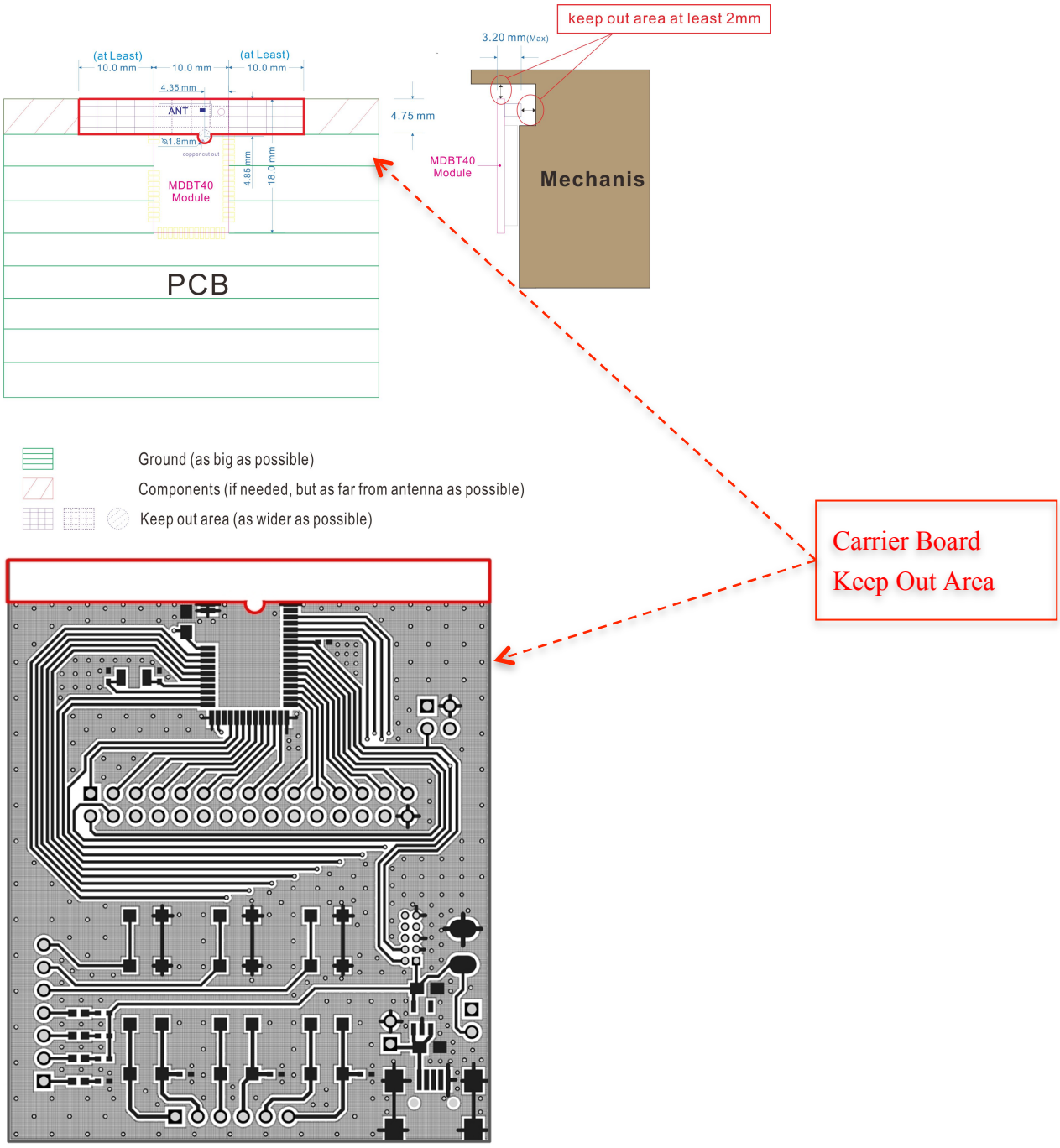
8.2 nano51822 Schematic with 1.8V Low Voltage Mode



8.3 nano51822 Schematic with Internal DC/DC Converter



9. Carrier Keep-Out Area



10. Current Consumption Reference Data (BT3.0 VS BT4.0)

Mouse Power Consumption			
	BT4.0 (Based on nano51822)		**BT3.0**
	BT4.0 Mode	RF2.4GHz	
2 x AAA	9.5 Months	10 Months	2.9 Months
2 x AA	21 Months	22 Months	6.2 Months
Including Sensor	**BT4.0 (Based on nano51822)**		**BT3.0 @3V**
	BT4.0 Mode @ 1.5V	RF2.4GHz @1.5V	
Active-Mouse moving (4.3%) (7.5ms report rate)	5.4 mA 8.1 mW	5.8 mA 8.7 mW	8.7 mA 26.1 mW
Rest 1>1s (4.1%) Link maintained Sensor latency: 20ms	900 uA 1.35 mW	350 uA No link 1.05 mW	1.24 mA 3.72 mW
Rest 2>10 sec (4.9%) Link maintained Sensor latency: 100ms	680 uA 1.02 mW	120 uA 198 uW	900 uA 2.7 mW
Rest 2d>60 sec Link maintained Sensor latency: 100ms	120 uA 180 uW	120 uA 198 uW	900 uA 2.7 mW
Rest 3>600s (86.3) Link disconnected Sensor latency: 500ms	90 uA 135 uW	90 uA 135 uW	797 uA 2.3 mW

Keyboard Power Consumption			
	BT4.0 (Based on nano51822)		**BT3.0 @3V**
	BT4.0 Mode @3V	RF2.4GHz @3V	
Active 6 letters/s	200 uA	5.8 mA 8.7 mW	8.7 mA 26.1 mW
Rest 1 Maintain link	20 - 40 uA	NA	20 - 40 uA
Rest 2 after>1min, disconnected	0.8 uA	0.8 uA	2 uA Only when PC is off

11. BT 4.0 Product Certification Cost Comparison Chart

BT 4.0 Product Safty & Certificaiotn Cost Comparison List

(First Certification Application)		
	Chip On Board To Build Up Finished Product	Apply Raytac Module MDBT40 To Build Up Finished Product
Declaration ID	US$8,000	US$8,000
BQB Test	US$7,000	US$0
USA FCC Test for BT4.0	US$3,600	US$0
***USA FCC Test for RF**	US$600	
Japan Telec Test for BT4.0	US$5,500	US$0
***Japan Telec Test for RF**	US$5,500	
CE Certification	US$4,500	US$0
Total	US$34,700	US$8,000
Note:	1. BQB lab handling charge is not included 2. Declaration ID cost based on normal application 3. * Test for RF refer to 2.4GHz RF(nRF51822) or ANT(nRF51422), can be waived if no need such application. 4. Above cost list provided for reference, it may be varied according to different testing lab	1. BQB lab handling charge is not included 2. Declaration ID cost based on normal application 3. Above cost list provided for reference, it may be varied according to different testing lab

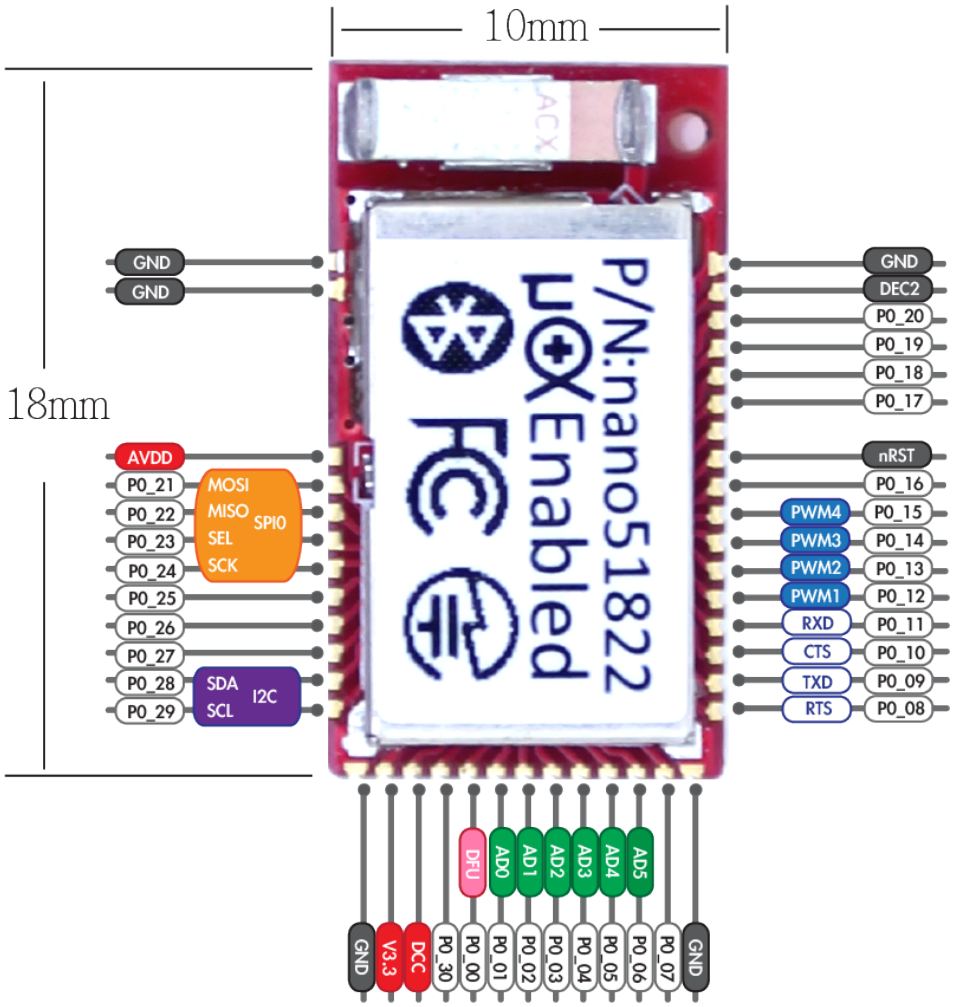
(Later Series Product Certification Application)		
	Chip On Board To Build Up Finished Product	Apply Raytac Module MDBT40 To Build Up Finished Product
Declaration ID or Product List	US$8,000	US$0
BQB Test	US$7,000	US$0
USA FCC Test for BT4.0	US$3,600	US$0
USA FCC Test for RF	US$600	
Japan Telec Test for BT4.0	US$5,500	US$0
Japan Telec Test for RF	US$5,500	
CE Certification	US$4,500	US$0
Total	US$34,700	US$0
Note:	1. BQB lab handling charge is not included 2. Declaration ID cost based on normal application 3. * Test for RF refer to 2.4GHz RF(nRF51822) or ANT(nRF51422), can be waived if no need such application. 4. Above cost list provided for reference, it may be varied according to different testing lab	1. BQB lab handling charge is not included 2. Declaration ID cost based on normal application 3. Above cost list provided for reference, it may be varied according to different testing lab

12. uCXpresso.NRF RTOS C/C++ Framework

13.1 Specifications

- **Kernel: FreeRTOS v8.1.2 and later**
- **Driver: S110 SoftDevice 7.0**
- **OTA DFU support Dropbox and Google Driver**
- **Rich BLE Class Library**
- **Rich Peripherals Class Library**
- **RTOS Class Library**

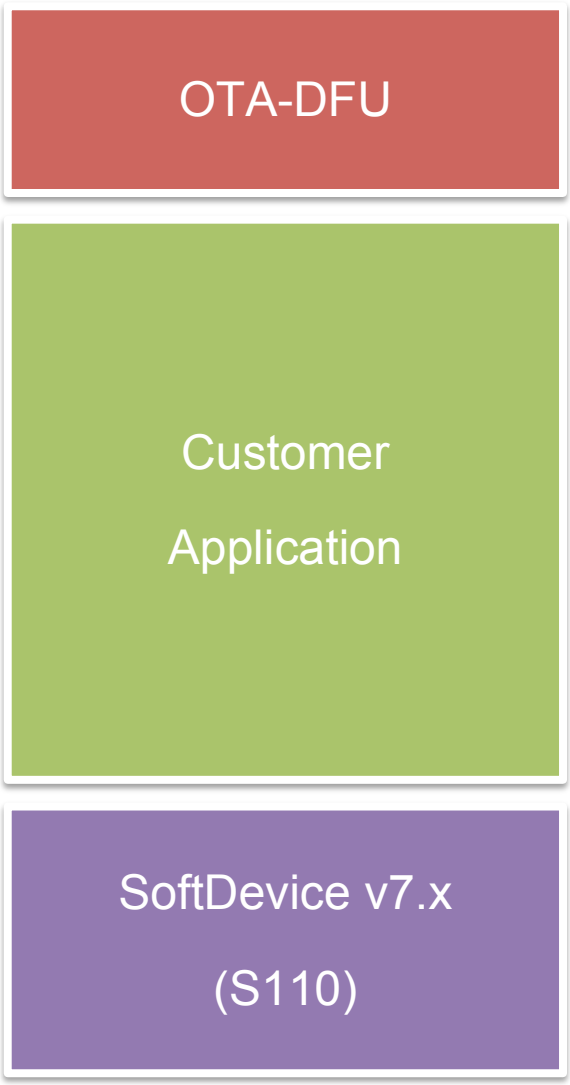
13.2 uCXpresso.NRF defined pin assignment



GPIO Example Code:

```
CPin led(17); // Set a LED pin on P0.17
led.output(); // Set led as an output pin
```

13.2 Flash Memory Block



13.3 GitHub Location

https://github.com/ucxpresso/nano51822