

PLE-52

DATA SHEET v1.5



BLE MODULE

PLE-52

PLE-52 module is a BLE module based on BT 5.0. It was developed using Nordic's nRF52832 chipset.

Revision History

No	Version	Date	Page	Description
1	0.1	2019-03-28	All	First release
2	0.2	2019-04-10	6	Add application
3	1.0	2019-04-30	All	Second release
4	1.1	2019-05-14	1	Edit introduction
5	1.2	2020-02-17	6	Add notice
6	1.3	2020-03-19	6	Edit Recommended PCB guide
7	1.4	2020-03-31	6	Edit Recommended PCB guide
8	1.5	2020-04-23	8	Edit Antenna Performance image

Table of Contents

1. Introduction

1.1 Applications

2. Specifications

2.1 Module Block Diagram

2.2 Chipset Specifications (nRF52832)

3. Layout

3.1 Dimensions

3.1.1 Pin Assignment

3.2 Recommended PCB guide

3.3 Schematic options

3.3.1 32.768 external crystal

3.3.2 DC/DC mode

4. Antenna

5. Certification

5.1 KC

5.2 FCC

1. Introduction



PLE-52

The PLE-52 module was developed using Nordic Semiconductor's [nRF52832 QFAA](#).

The [nRF52832](#) is the mid-range member of the nRF52 Series SoC family. It meets the challenges of a broad range of applications that need Bluetooth 5 feature sets, protocol concurrency and a rich and varied set of peripherals and features. In addition, it offers generous memory availability for both Flash and RAM.

The nRF52832 is fully multiprotocol capable with full protocol concurrency. It has protocol support for Bluetooth 5, Bluetooth mesh, ANT and 2.4 GHz proprietary stacks.

It is built around an ARM® Cortex™-M4 CPU with floating point unit running at 64 MHz. It has NFC-A Tag for use in simplified pairing and payment solutions. It has numerous digital peripherals and interfaces such as PDM and I2S for digital microphones and audio.

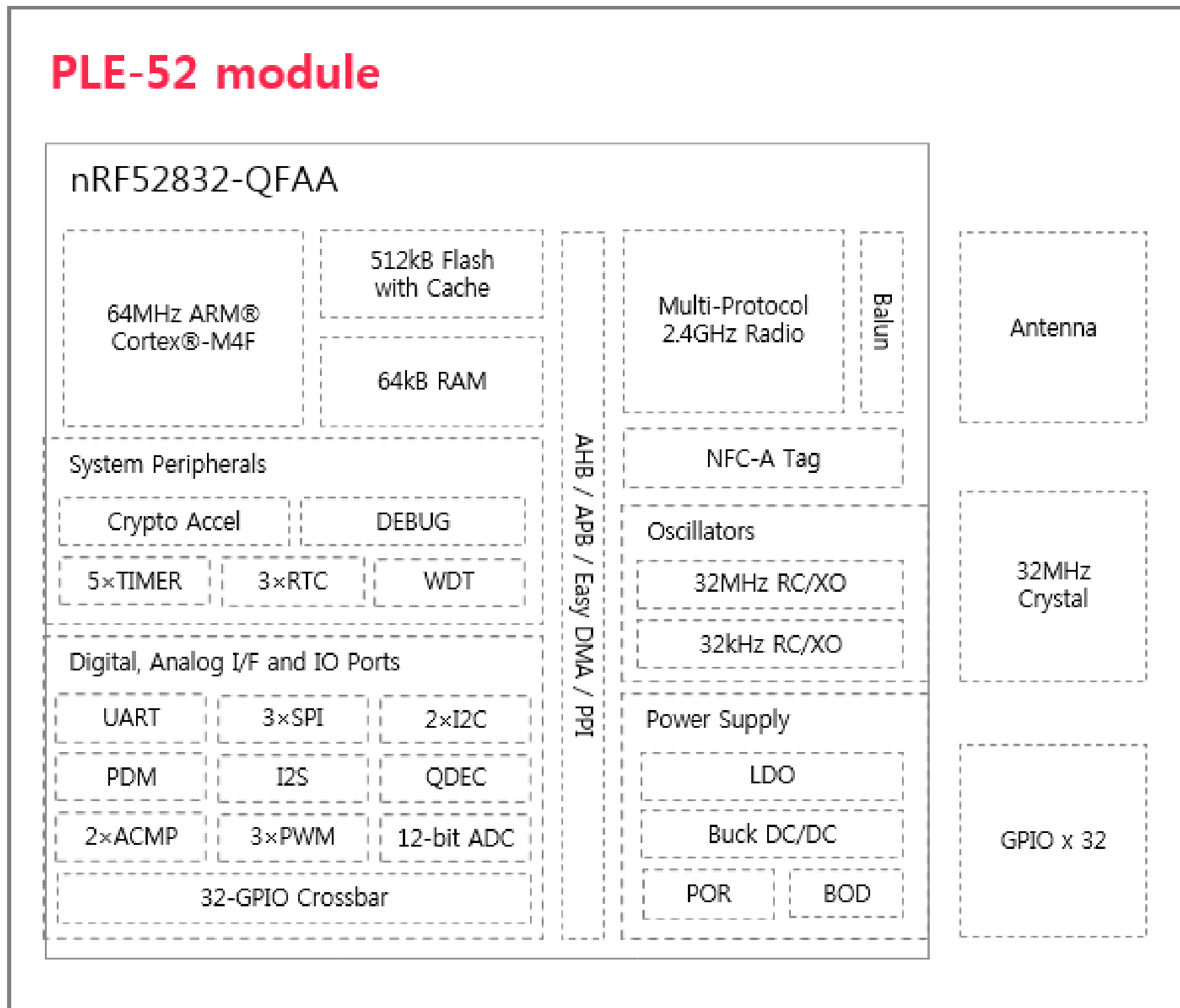
Exceptionally low energy consumption is achieved using a sophisticated on-chip adaptive power management system.

1. 1 Applications

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

2. Specifications

2.1 Module Block Diagram



PLE-52 MODULE BLOCK DIAGRAM

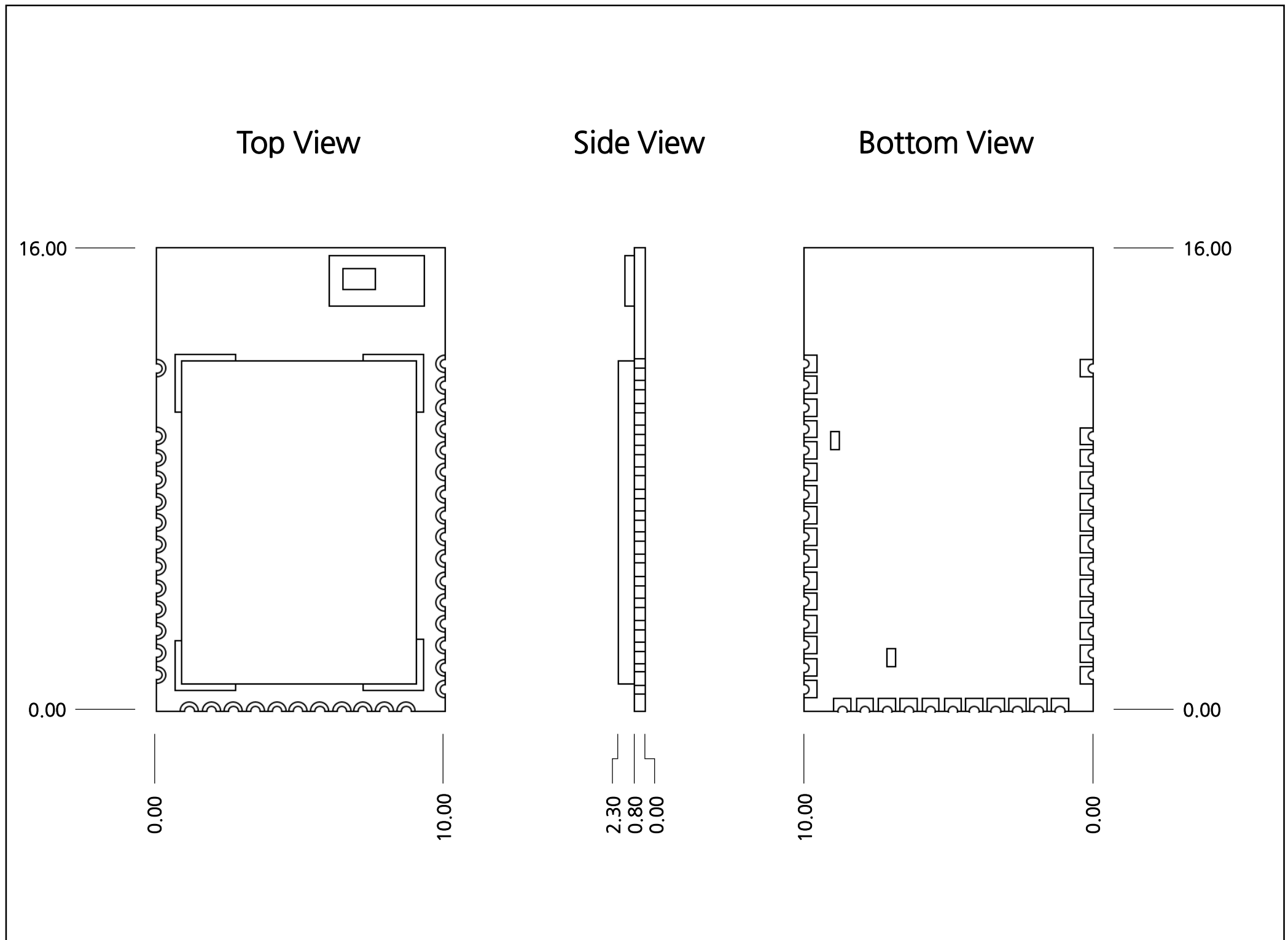
2. 2 Chipset Specifications (nRF52832)

Radio	
Band	2.4 GHz ISM
On-air datarate	2 Mbps and 1 Mbps Bluetooth LE 1 Mbps ANT 2 Mbps and 1 Mbps 2.4 GHz proprietary
Output power	Programmable: +4 to -20 dBm in 4 dB steps
Sensitivity	-96 dBm Bluetooth LE 1 Mbps -89 dBm Bluetooth LE 2 Mbps -93 dBm 1 Mbps ANT -30 dBm whisper mode
RSSI	1 dB resolution
Radio current consumption with DC/DC at 3V	7.5 mA – TX at +4 dBm output power 5.3 mA – TX at 0 dBm output power 5.4 mA – RX at 1 Mbps
Microcontroller	
CPU	ARM Cortex M4
Floating Point Unit	Yes
Memory	Flash 512 KB (+ cache) + 64 KB RAM
GPIO	32 configurable
Peripherals	
NFC	NFC-A Tag
ADC	12-bit 200 ksps
Comparators	General purpose, low-power
Interfaces	SPI/2-wire/I ² S/UART/PDM/QDEC
Security	AES-128/ECB/CCM/AAR
Timers/Counters	32-bit
System	
System peripheral bus	20-channel PPI
Power supply	Automatic system power DC/DC (1.7 V to 3.6 V), LDO (1.7 V to 3.6 V)
System current consumption DC/DC at 3V	0.3 μ A – No RAM retention 1.2 μ A – All peripherals in IDLE mode 1.6 μ A – All peripherals IDLE mode (32 kHz + RTC) 20 nA per 4 KB - RAM retention
Performance	
Coremark	215 EEMBC CoreMark [®] (3.36 CoreMark/MHz) 58 CoreMark [®] /mA (Flash)
Package options	
QFN	6×6 48-pin

3. Layout

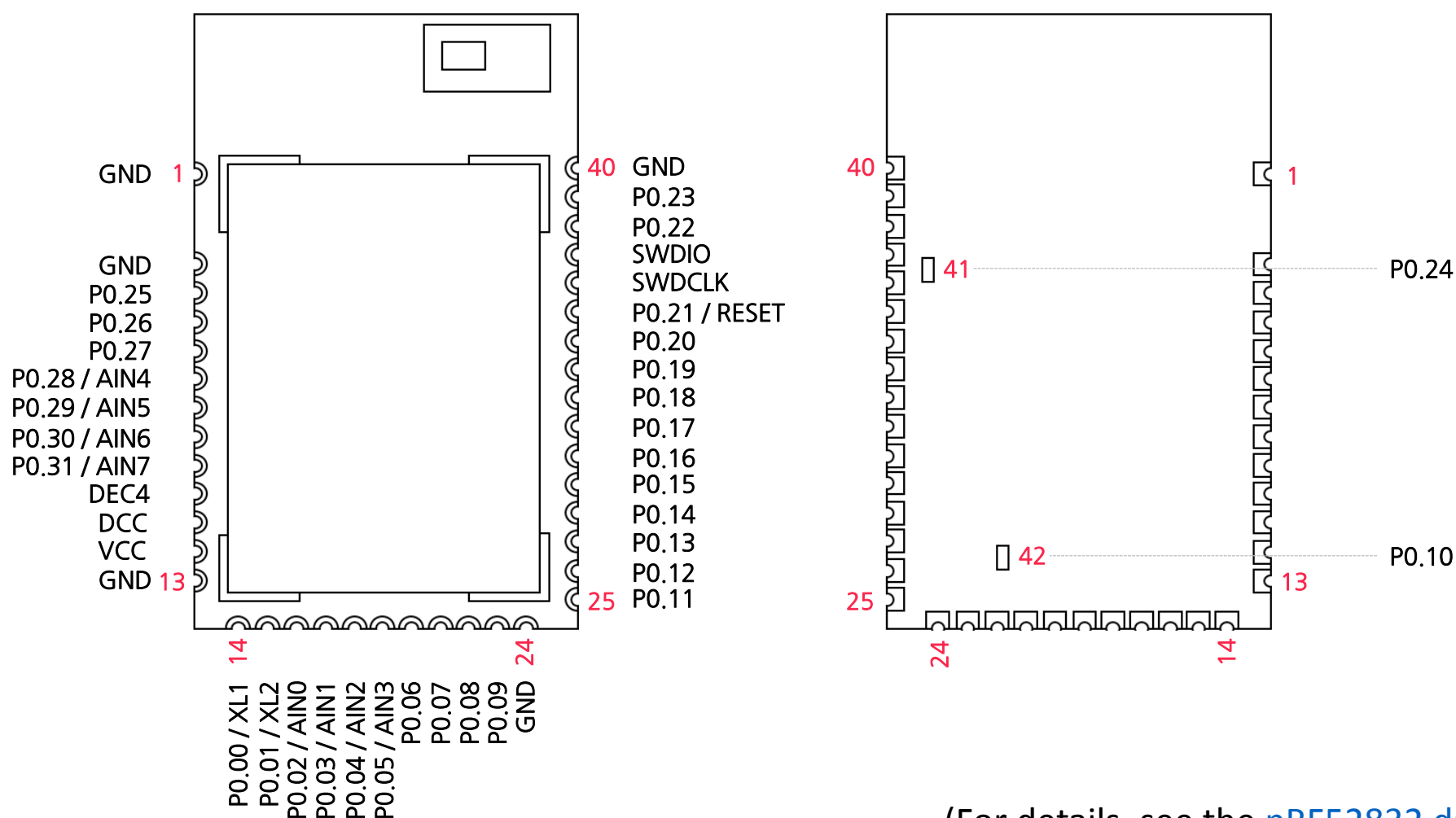
3.1 Dimensions

[unit : mm]



PLE-52 MODULE DIMENSIONS

3. 1. 1 Pin assignment



(For details, see the [nRF52832 datasheet](#).)

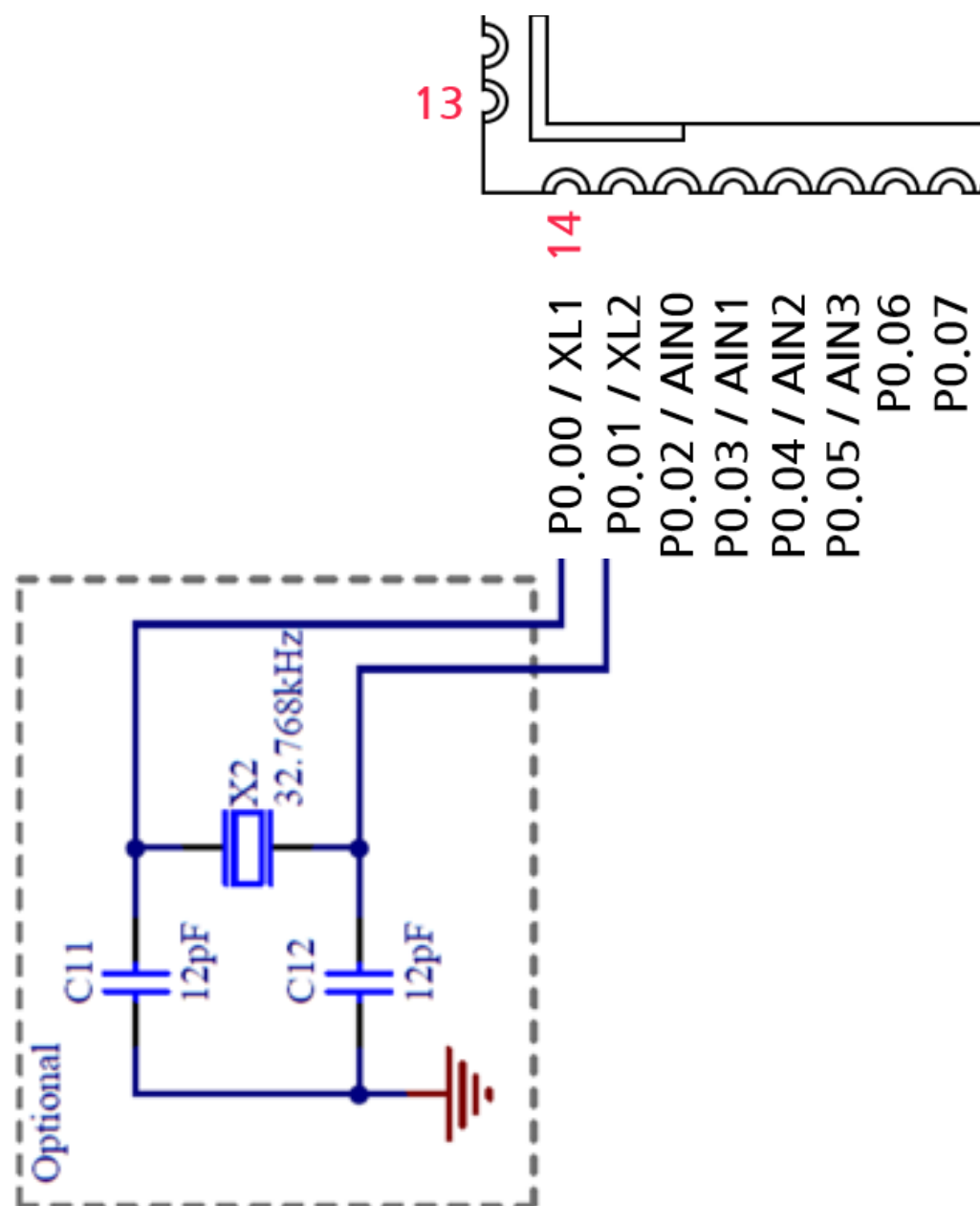
Pin	Name	Description
1	GND	
2	GND	
3	P0.25	Low drive, low frequency I/O only.
4	P0.26	Low drive, low frequency I/O only.
5	P0.27	Low drive, low frequency I/O only.
6	P0.28 / AIN4	Low drive, low frequency I/O only.
7	P0.29 / AIN5	Low drive, low frequency I/O only.
8	P0.30 / AIN6	Low drive, low frequency I/O only.
9	P0.31 / AIN7	Low drive, low frequency I/O only.
10	DEC4	
11	DCC	
12	VCC	
13	GND	
14	P0.00 / XL1	GPIO
15	P0.01 / XL2	GPIO
16	P0.02 / AIN0	GPIO
17	P0.03 / AIN1	GPIO
18	P0.04 / AIN2	GPIO
19	P0.05 / AIN3	GPIO
20	P0.06	GPIO
21	P0.07	GPIO

Pin	Name	Description
22	P0.08	GPIO
23	P0.09	NFC Pin / GPIO
24	GND	
25	P0.11	GPIO
26	P0.12	GPIO
27	P0.13	GPIO
28	P0.14	GPIO
29	P0.15	GPIO
30	P0.16	GPIO
31	P0.17	GPIO
32	P0.18	GPIO
33	P0.19	GPIO
34	P0.20	GPIO
35	P0.21 / RESET	RESET
36	SWDCLK	Serial wire debug clock input
37	SWDIO	Serial wire debug I/O
38	P0.22	Low drive, low frequency I/O only.
39	P0.23	Low drive, low frequency I/O only.
40	GND	
41	P0.24	Low drive, low frequency I/O only.
42	P0.10	NFC Pin / GPIO

3. 3 Schematic options

3. 3. 1 32.768kHz external crystal (optional)

Internal or external crystal can be set in F / W.

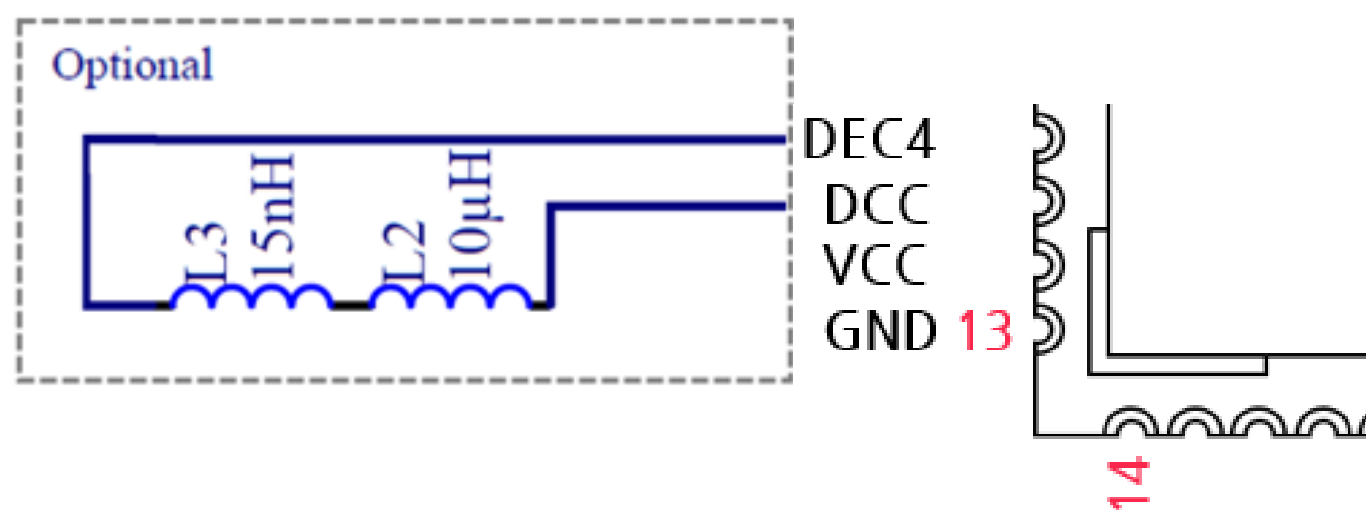


3. 3. 2 DC/DC mode (optional)

This module is configured in LDO mode.

DC / DC mode setup : add 10uH, 15nH to DCC and DEC4 as shown below.

(For details, see the [nRF52832 datasheet](#).)

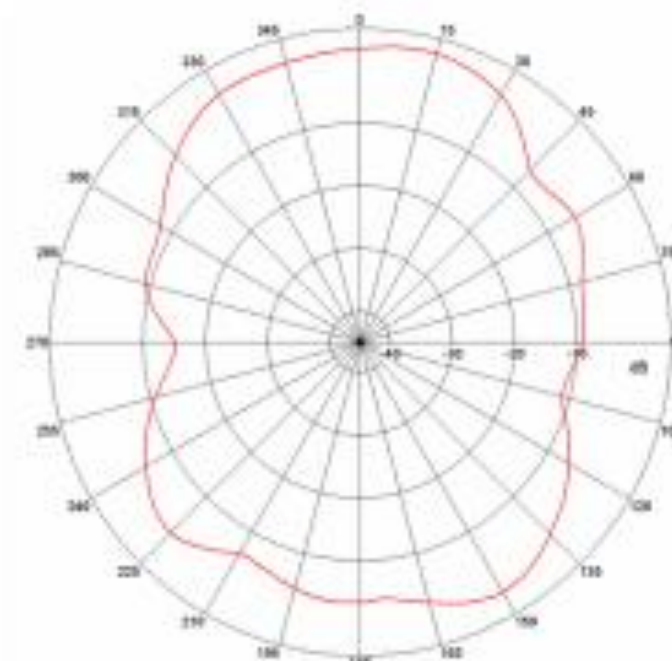
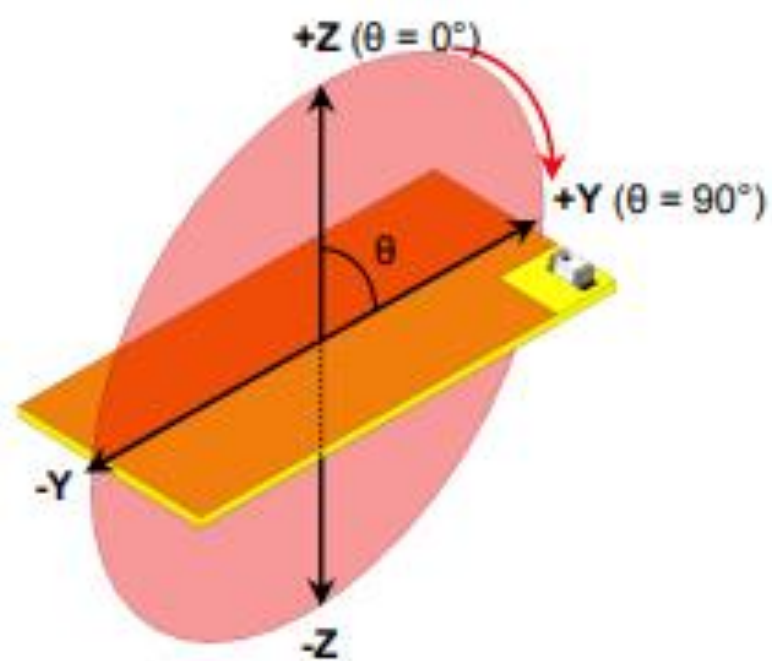


4. Antenna

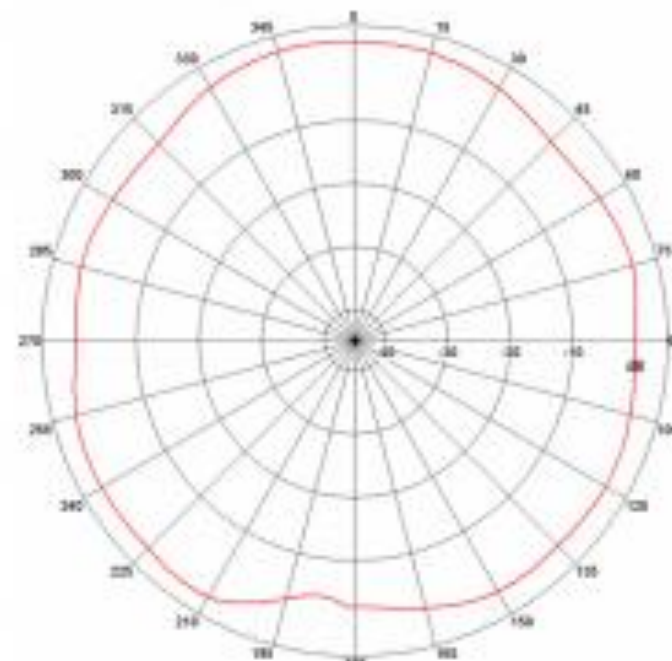
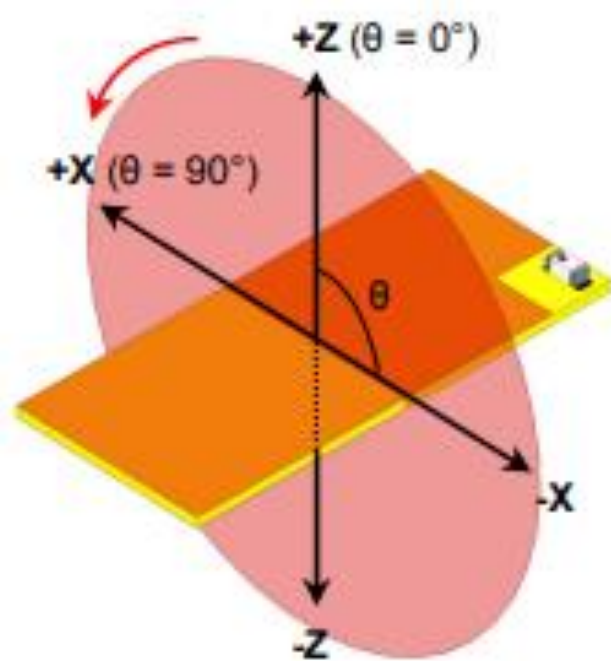
Mounting Considerations 1: Antenna Performance

Typical 2D radiation patterns @ 2.44GHz

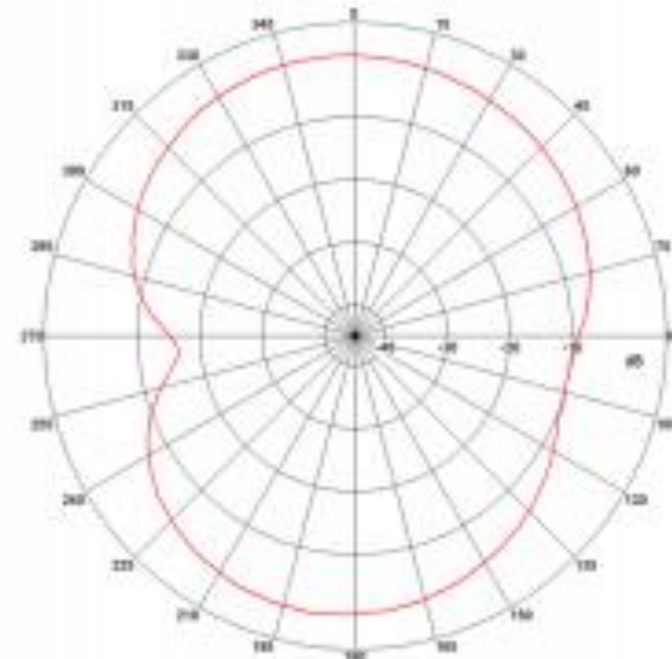
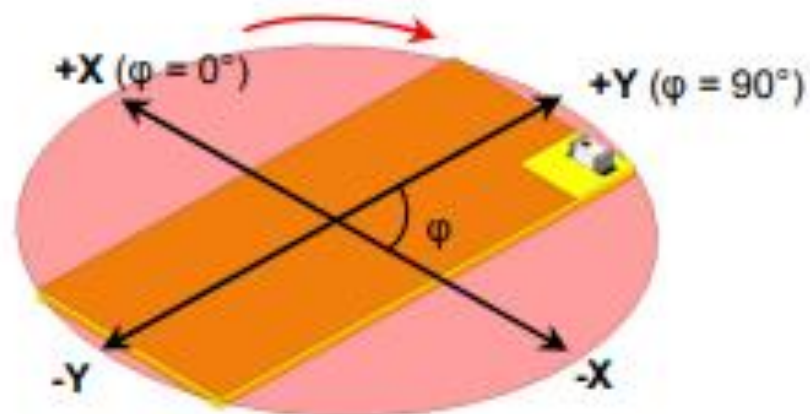
YZ-plane



XZ-plane



XY-plane



5. Certification

5.1 KC

D887-6297-768D-241D

방송통신기자재등의 적합인증서 Certificate of Broadcasting and Communication Equipments	
상호 또는 성명 <i>Trade Name or Applicant</i>	주식회사 엘테크
기자재명칭(명칭) <i>Equipment Name</i>	특정소출력 무선기기(무선데이터통신시스템용 무선기기)
기본모델명 <i>Basic Model Number</i>	PLE-52
파생모델명 <i>Series Model Number</i>	PLE-52M, PLE-52ML
인증번호 <i>Certification No.</i>	R-C-pro-B01
제조사/제조국가 <i>Manufacturer/ Country of Origin</i>	주식회사 엘테크 / 한국
인증연월일 <i>Date of Certification</i>	2019-04-26
기타 <i>Others</i>	
위 기자재는 「전파법」 제58조의2 제2항에 따라 인증되었음을 증명합니다. It is verified that foregoing equipment has been certificated under the Clause 2, Article 58-2 of Radio Waves Act.	
2020년(Year) 08월(Month) 13일(Day)	
국립전파연구원장 	
Director General of National Radio Research Agency	
※ 인증 받은 방송통신기자재는 반드시 "적합성평가표시" 를 부착하여 유통하여야 합니다. 위반시 과태료 처분 및 인증이 취소될 수 있습니다.	

5.2 FCC

TCB

**GRANT OF EQUIPMENT
AUTHORIZATION**

TCB

Certification

Issued Under the Authority of the
Federal Communications Commission

By:

Timco Engineering, Inc.
849 NW State Road 45
Newberry, FL 32669

Date of Grant: 02/02/2023
Application Dated: 02/02/2023

Ltech Inc.
RM.528.5FL, 229, Yangji-ro, Bucheon-si
Gyeonggi-do, 14786
South Korea

Attention: Seungmun Lee

NOT TRANSFERABLE

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

FCC IDENTIFIER: 2A88K-PLE52
Name of Grantee: Ltech Inc.
Equipment Class: Digital Transmission System
Notes: BLE Module
Modular Type: Single Modular

<u>Grant Notes</u>	<u>FCC Rule Parts</u>	<u>Frequency Range (MHZ)</u>	<u>Output Watts</u>	<u>Frequency Tolerance</u>	<u>Emission Designator</u>
	15C	2402.0 - 2480.0	0.000275		

Output power listed is conducted. Single Modular Approval for mobile RF Exposure condition. The module antenna(s) must be installed to meet the RF exposure compliance separation distance of 20 cm and any additional testing and authorization process as required. Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the FCC multi-transmitter procedures. Approved for OEM integration only. The grantee must provide OEM integrators, or end-users if marketed directly to end-users, with installation and operating instructions for satisfying FCC multi-transmitter product guidelines. This grant is valid only when the device is sold to OEM integrators and the OEM integrators are instructed to ensure that the end-user has no manual instructions to remove or install the device.

