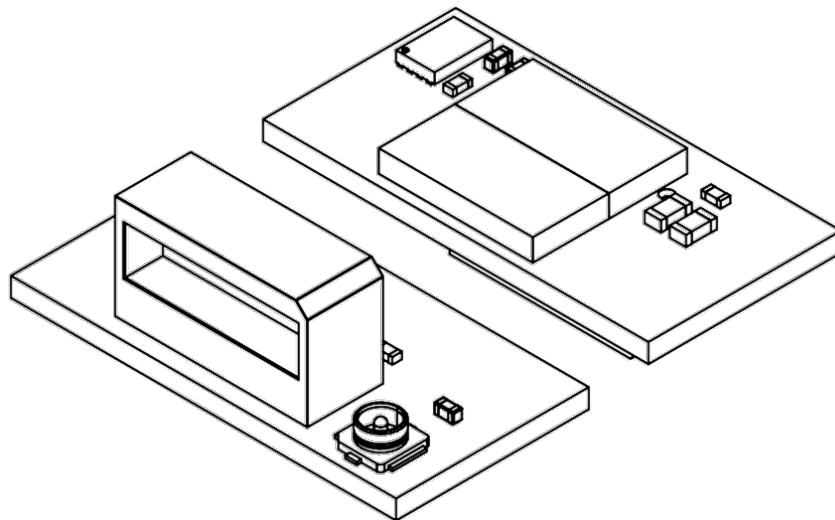


LOYBT-MODULE1

BLE 5.4 Module based on nRF52840



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1 Document Information

1.1 Revision History

Date	Version	Author	Description
2024-12-30	1.2	ND	Modifications for FCC filing
2024-12-17	1.1	ND	Added FCC Compliance Statement
2024-08-19	1.0	ND	Initial release V1.0

1.2 Contributors

Niko Delarich

1.3 Reviewers

Thomas Rauscher

2 Introduction

The LOYTEC LOYBT-MODULE1 is a BT 5.4 (BLE) stack module based on the Nordic nRF52840 SIP (System-in-Package) solution, which incorporates: GPIOs, SPI, UART, I2C, PWM, ADC, and NFC interfaces for connecting peripherals and sensors.

2.1 Features

- Embedded 2.4 GHz transceiver supports Bluetooth 5.4 (BLE)
- Compact size: (W) 20.0 x (H) 10.0 x (D) 7.6 mm
- Low power requirements
- Bluetooth © SIG Mesh compatible

2.2 Application

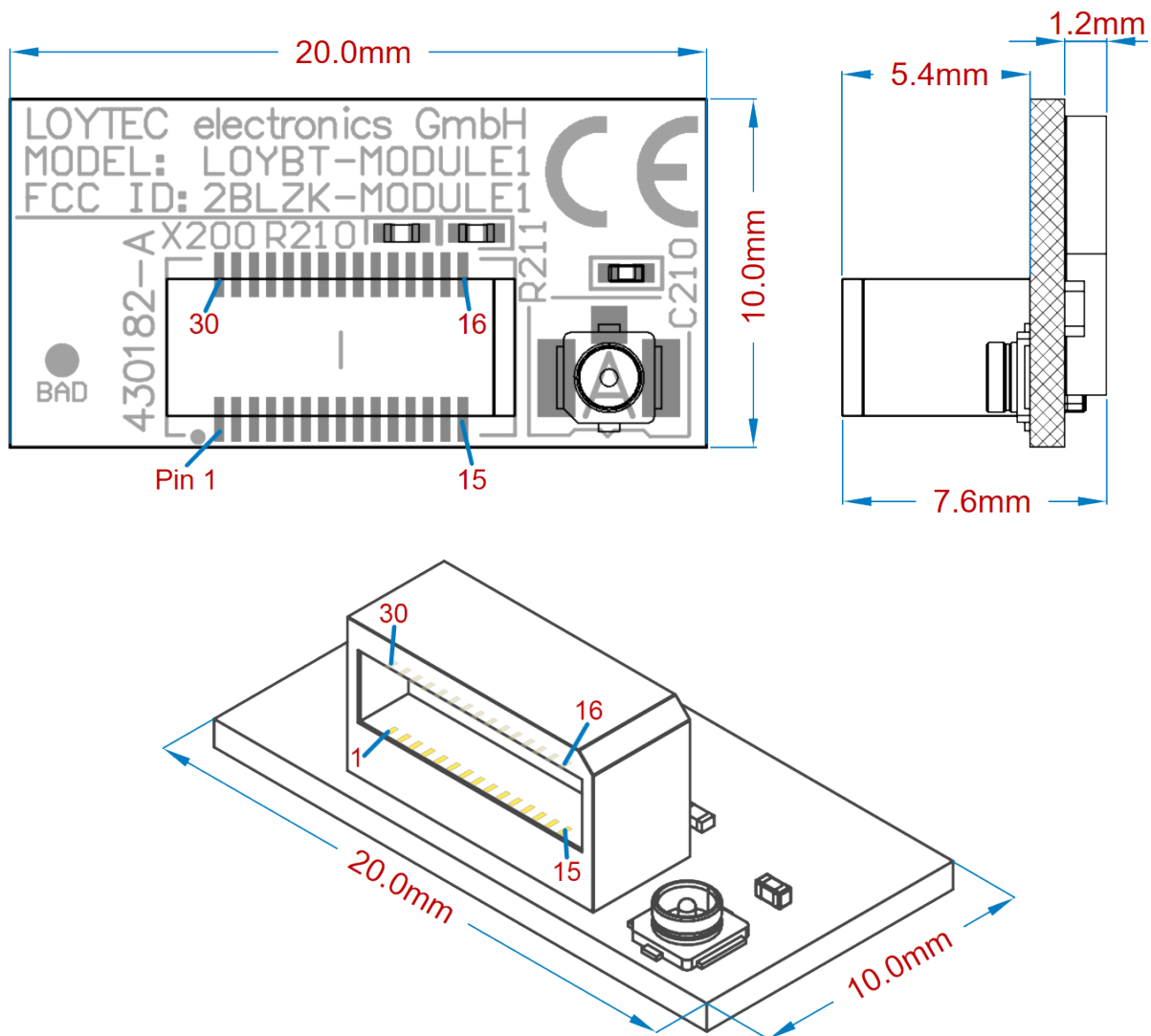
- Building control, Smart Home
- Industrial IoT
- BLE Beacons
- Bluetooth © SIG Mesh networks

2.3 Specs

- Bluetooth 5, IEEE 802.15.4, 2.4 GHz transceiver
- 32-bit ARM Cortex-M4F CPU
- ARM CryptoCell 310
- 1MB Flash, 256 kB SRAM
- 23 GPIOs including 8 ADC
- Interfaces: UART, SPI, NFC
- Power supply: 1.7 V to 3.6 V
- Temperature: -40 to +85 °C
- ADC: 12 bit, 200ksps

3 Product Dimension

Size: (W) 20.0 x (H) 10.0 x (D) 7.6 mm



4 Pin Assignment

Pin #	Name	Function
1	GND	Ground
2	VDD	Power supply 1.7 – 3.6 V
3	P0.23	General-purpose digital I/O
4	P.028	General-purpose digital I/O (low frequency only)
	AIN4	Analog input
5	P0.29	General-purpose digital I/O (low frequency only)
	AIN5	Analog input
6	P0.11	General-purpose digital I/O
7	P0.30	General-purpose digital I/O (low frequency only)
	AIN6	Analog input
8	P0.25	General-purpose digital I/O
9	P0.31	General-purpose digital I/O (low frequency only)
	AIN7	Analog input
10	P0.27	General-purpose digital I/O
11	P0.02	General-purpose digital I/O (low frequency only)
	AIN0	Analog input
12	P0.15	General-purpose digital I/O
13	P0.03	General-purpose digital I/O (low frequency only)
	AIN1	Analog input
14	P0.04	General-purpose digital I/O
	AIN2	Analog input
15	P0.05	General-purpose digital I/O
	AIN3	Analog input
16	GND	Ground
17	VDD	Power supply 1.7 – 3.6 V
18	SWCLK	Debug interface
19	SWDIO	Debug interface
20	P0.24	General-purpose digital I/O
	MISO	SPI MISO
21	P0.22	General-purpose digital I/O
	SCK	SPI Clock
22	P0.20	General-purpose digital I/O
	MOSI	SPI MOSI
23	nRESET	Reset, active-low, integrated pull-up to VDD
24	P0.21	General-purpose digital I/O
25	P0.16	General-purpose digital I/O
26	P0.19	General-purpose digital I/O
27	P0.14	General-purpose digital I/O
	TXD	UART Transmit
28	P0.12	General-purpose digital I/O
	RXD	UART Receive
29	P0.09	General-purpose digital I/O (low frequency only)
	NFC1	NFC interface
30	P0.10	General-purpose digital I/O (low frequency only)
	NFC2	NFC interface

5 Specification

- RF IC: Nordic nRF52840, Crystal Frequency: 32 MHz & 32.768 kHz
- Serial flash: Renesas AT25XE161-MAHN-T, 16 MBit

Any technical spec shall refer to the official documents of Nordic/Renesas as final reference.

5.1 Absolute Maximum Ratings

	Min.	Max.	Unit
Supply voltage			
VDD	-0.3	+3.9	V
I/O pin voltage			
V _{I/O}	-0.3	VDD + 0.3 V (max 3.9 V)	V
NFC pin current			
I _{NFC1/2}		80	mA
Radio			
RF input level		10	dBm
Environmental			
Storage temperature	-40	+125	°C
Moisture sensitivity		Level 2	
ESD HBM		2	kV
ESD CDM _{QF}		750	V
Flash Memory			
Endurance (nRF52)	10 000 write/erase cycles		
Endurance (Renesas)	100 000 write/erase cycles		
Retention (nRF52)	10 years at 40 °C		
Retention (Renesas)	20 years		

5.2 Characteristics

	Min.	Typ.	Max.	Unit
Supply voltage				
VDD	1.7	3.3	3.6	V
Rise time to 1.7 V			60	ms
Environmental				
Operating temperature	-40	25	85	°C
Power consumption (@ 3V, 25 °C)				
Sleep current	1	1.5	2.5	µA
Max. current			50	mA
Clock frequencies				
Main clock		32		MHz
Real time clock		32 768		kHz

6 FCC Compliance Statement

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.

CAUTION: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B 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 radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.