



BM20 BLE Single Mode Module Product Specification

Model Name	BM20
Project code	
Description	BLE Single Mode Module
Revision	1.0
Issue Date	2018/05/29

Approved by	Reviewed by	Issued by
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Revision History

Revision	Released Date	Comments/Remark	Author
0.1	2018/01/30	Initial release	Iestyn Chen
0.2	2018/02/02	Update Block diagram, pin map and ME drawing	Iestyn Chen
0.3	2018/02/23	Add reference circuit and Module Layout Guide	Iestyn Chen
0.4	2018/03/31	Update Pin define and IO mapping table	JH
0.5	2018/04/12	Modify the introduction 、 Block diagram and Mechanical information	JH
1.0	2018/05/31	Modify specification	JH

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1. INTRODUCTION

The Innocomm's BM20 module based on Nordic's outstanding nRF52832 BLE. It features a powerful CPU (ARM Cortex-M4) and completes a lineup of Nordic's Bluetooth 5 ready devices that together offer the full spectrum of possibilities when designing *Bluetooth*® 5 into your products.

The BM20 supports key Bluetooth 5 features of high throughput (2Mbps) and increased broadcast capacity with advertising extensions (x 8), as an optimized solution that makes it attractive in a very wide range of applications from a performance.

2. General Information

2.1 Key Features

RF

- 2.4 GHz transceiver
 - -96 dBm sensitivity in *Bluetooth*® low energy mode
 - Supported data rates: 1 Mbps, 2 Mbps *Bluetooth*® low energy mode
 - -20 to +5 dBm TX power, configurable in 4 dB steps
 - RSSI (1 dB resolution)
- ARM® Cortex®-M4 32-bit processor, 64 MHz
 - 144 EEMBC CoreMark® score running from flash memory
 - 34.4 µA/MHz running from flash memory
 - 32.8 µA/MHz running from RAM
 - Serial wire debug (SWD)
- Flexible power management
 - 1.7 V-3.6 V supply voltage range
 - Fast wake-up using 64 MHz internal oscillator
- 512 kB flash and 64 kB RAM
- Nordic SoftDevice ready
- Support for concurrent multi-protocol
- 12-bit, 200 ksps ADC - 8 configurable channels with programmable gain
- Temperature sensor
- 4-channel pulse width modulator (PWM) unit with EasyDMA
- Digital microphone interface (PDM)
- 3x 32-bit timer with counter mode
- SPI master/slave with EasyDMA
- I2C compatible 2-wire master/slave
- UART (CTS/RTS) with EasyDMA
- Programmable peripheral interconnect (PPI)
- Quadrature decoder (QDEC)
- AES HW encryption with EasyDMA

Outline

- 15.0 mm(L) × 10.0 mm(W) × 2.6 mm(H),
- 32 pin LGA Package

Application

- Computer peripherals and I/O devices
- Mouse
- Keyboard
- Mobile HID
- CE remote controls
- Network processor
- Wearable
- Virtual reality headsets
- Health and medical
- Enterprise lighting
- Industrial
- Commercial
- Retail
- Beacons
- Connectivity device in multi-chip solutions

3. PIN Map and Signal Description

Pin #	Pin Name	Description
1	GPIO1	Analog/Digital, SAADC/COMP/LPCOMP input
2	GPIO2	Analog/Digital, SAADC/COMP/LPCOMP input
3	GPIO3	Analog/Digital, SAADC/COMP/LPCOMP input
4	GPIO4	Analog/Digital, SAADC/COMP/LPCOMP input
5	GPIO5	Digital
6	GPIO6	Digital
7	GND	Ground
8	GPIO7	Digital
9	GPIO8	NFC/Digital
10	GPIO9	NFC/Digital
11	GPIO10	Digital
12	GPIO11	Digital
13	GPIO12	Digital
14	GPIO13	Digital
15	GPIO14	Digital
16	GPIO15	Digital
17	n_RESET	Reset, active Low, with internal pull-up
18	SWCLK	BLE Debug/download
19	SWDIO	BLE Debug/download
20	GND	Ground
21	BLE_ANT	BLE Antenna
22	GND	Ground
23	GND	Ground
24	VDD	Module Power in
25	GPIO16	Digital
26	GPIO17	Analog/Digital, SAADC/COMP/LPCOMP input
27	GPIO18	Analog/Digital, SAADC/COMP/LPCOMP input
28	GND	Ground
29	GND	Ground
30	GND	Ground
31	XL1	Connection for 32.768 kHz crystal
32	XL2	Connection for 32.768 kHz crystal

4. ELECTRICAL CHARACTERISTICS

4.1 Recommended Operating Range

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
Operating ambient temperature range, TA		-40	25	85	C
Supply rise time	(0 V to 1.7 V)			60	ms
Operating supply voltage, VDD		1.7	3.0	3.6	V

Important: Power-on reset circuitry may not function properly for rise times longer than the specified maximum.

4.2 Power Consumption

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNIT
TX supply current at maximum output power(+4dBm)				25	mA
RX				16	mA
System Off mode				0.7	uA

4.3 I/O Characteristics

PARAMETER	MIN	TYP	MAX	UNIT
Voltage at digital I/O pins	-0.3		VDD + 0.3	V
Input Low voltage level(VIL)			0.3xVDD	V
Input High voltage level(VIH)	0.7xVDD		VDD	V
Output Low Voltage level(VOL)			0.4	V
Output Low Voltage level(VOH)	VDD-0.4		VDD	V

5. RF CHARACTERISTICS

TX:

Following characteristics are valid for conditions as follows (unless otherwise specified) $T_{amb} = -20\text{ }^{\circ}\text{C}$ to $85\text{ }^{\circ}\text{C}$, $VCC = 3.3\text{ V}$ Bursts: 10, Payload: PRBS 9, Length: 37 Bytes				
	MIN	TYP	MAX	UNIT
Maximum TX Power			3.3	dBm
1st Adjacent Channel Transmit Power 1 MHz (1 Msps)		-25		dBc
2nd Adjacent Channel Transmit Power 2 MHz (1 Msps)		-50		dBc
1st Adjacent Channel Transmit Power 2 MHz (2 Msps)		-25		dBc
2nd Adjacent Channel Transmit Power 4 MHz (2 Msps)		-50		dBc

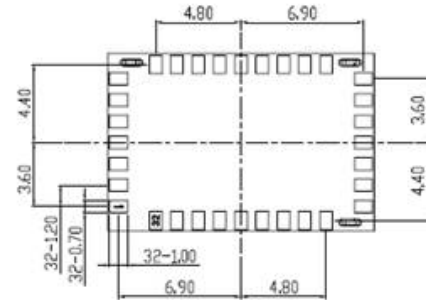
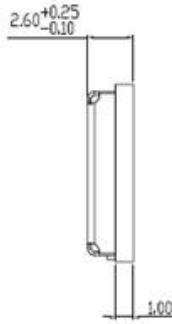
RX:

Following characteristics are valid for conditions as follows (unless otherwise specified) $T_{amb} = -20\text{ }^{\circ}\text{C}$ to $85\text{ }^{\circ}\text{C}$, $VCC = 3.3\text{ V}$				
PARAMETER	MIN	TYP	MAX	UNIT
Receiver Sensitivity		-95		dBm

6. Mechanical Information

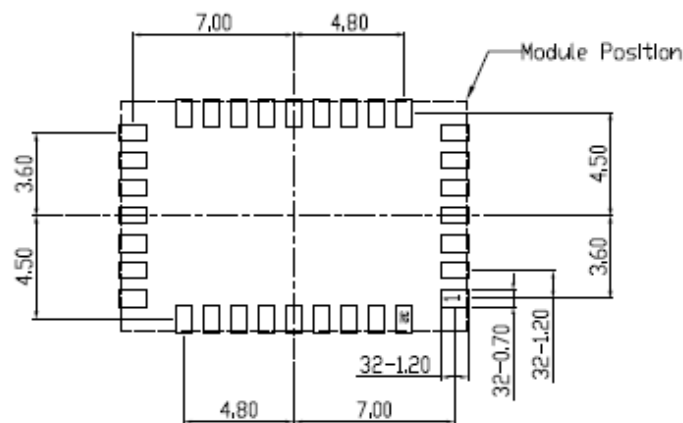


TOP SIDE

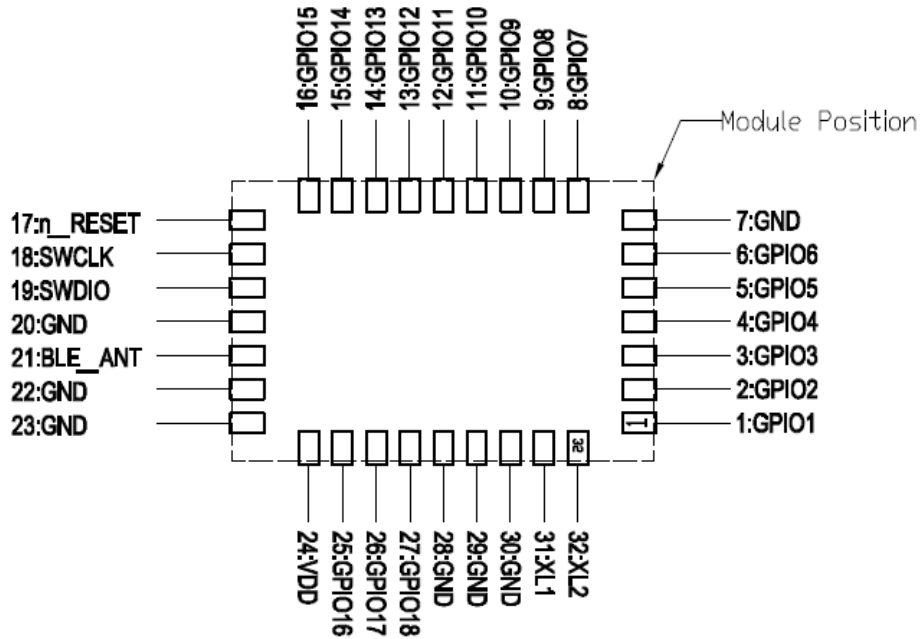


BOTTOM SIDE

7. PCB Layout Recommendation



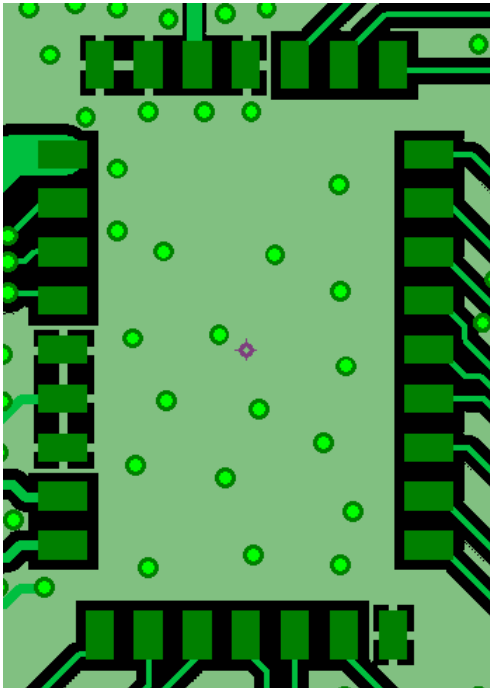
TOP VIEW



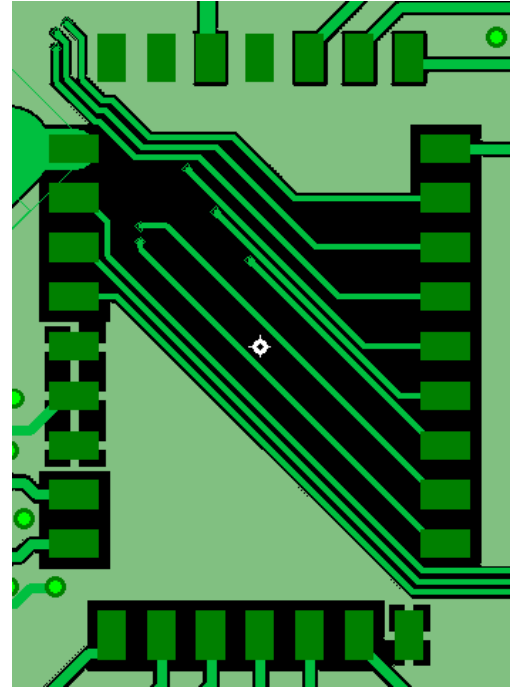
TOP VIEW

8. Module Layout Guide

1. Do not route traces under module to minimize on interference.

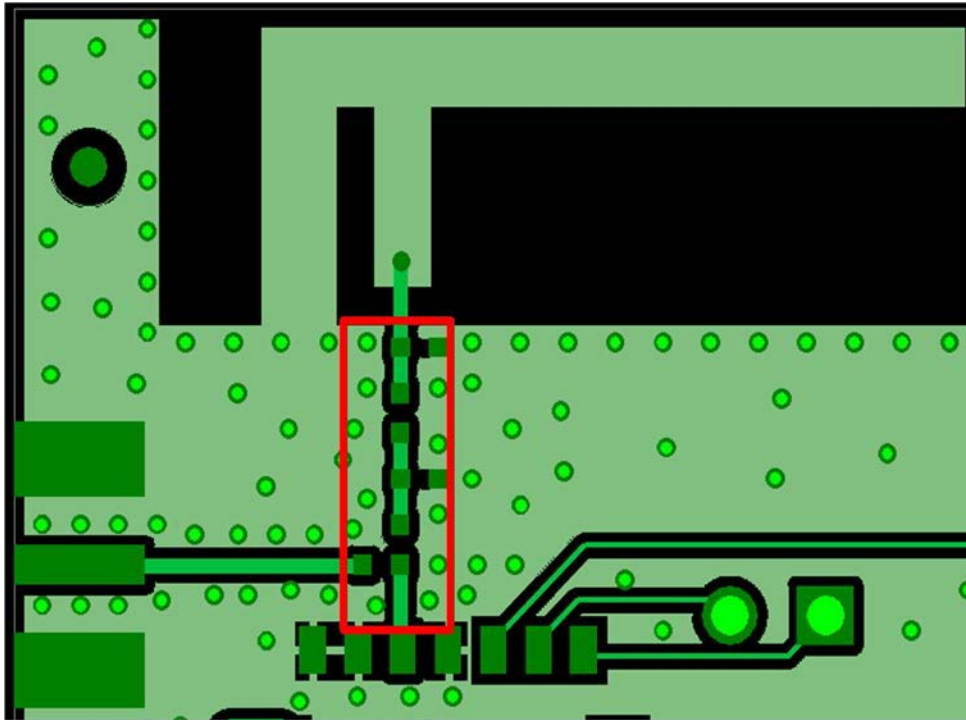


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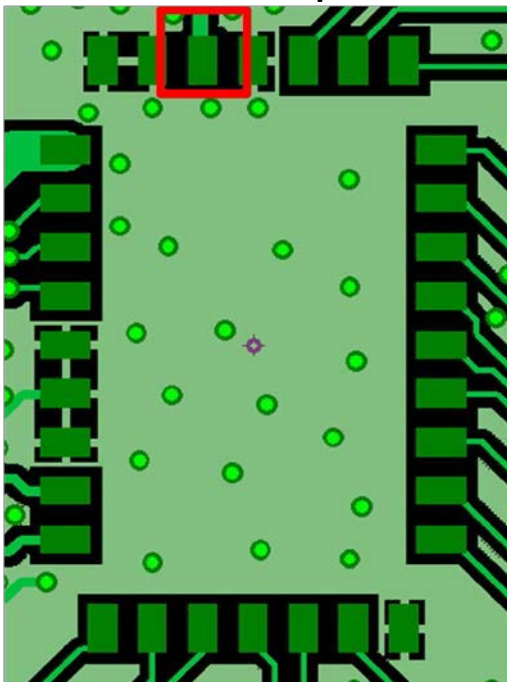


(X)

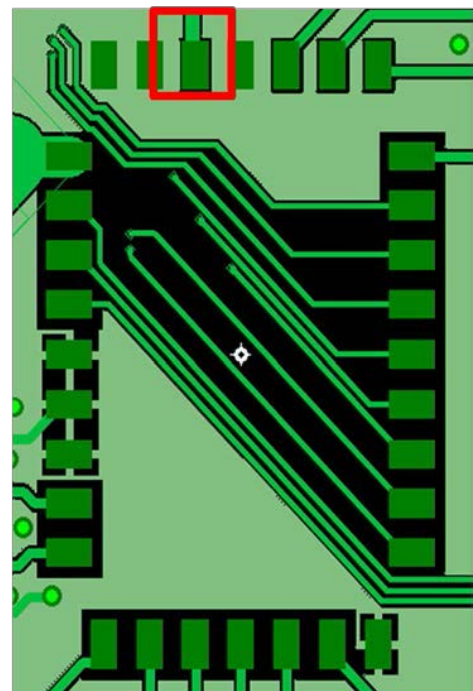
- The trace Impedance of the antenna port (Pin 21) is $50\ \Omega$. In order to minimize the return loss, it is recommended to use short traces.



- Keep enough clearance between the antenna port (Pin 21) and surrounding GND to minimize the power loss.

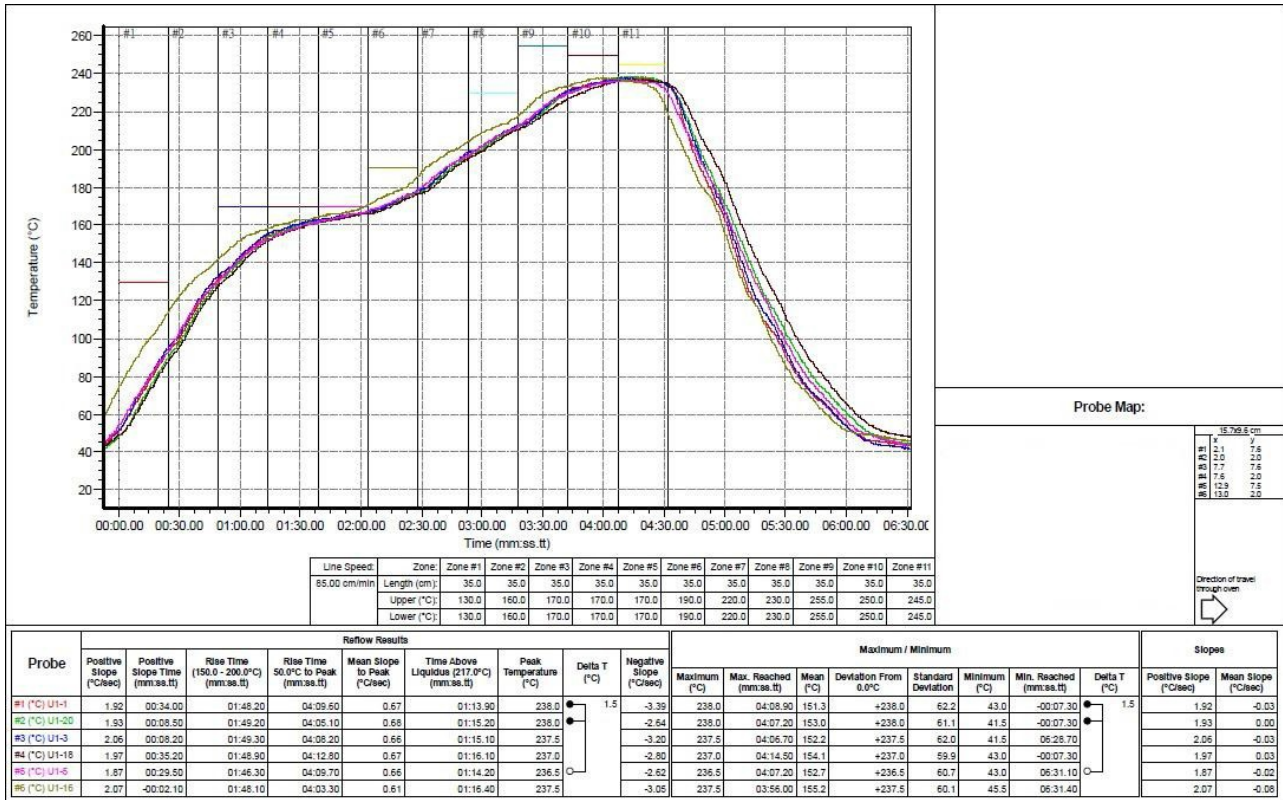


(O)



(X)

9. SMT Solder Reflow Recommendation



Note: Allowable reflow soldering times: 2 times base on recommended reflow profile.

10. Appendix

BM20		nRF52832_QFN48		
Pin Number	Pin Name	Pin Number	Pin Name	Type
1	GPIO1	4	P0.02	Analog/Digital
2	GPIO2	5	P0.03	Analog/Digital
3	GPIO3	6	P0.04	Analog/Digital
4	GPIO4	7	P0.05	Analog/Digital
5	GPIO5	8	P0.06	Digital
6	GPIO6	9	P0.07	Digital
8	GPIO7	10	P0.08	Digital
9	GPIO8	11	P0.09	NFC/Digital
10	GPIO9	12	P0.10	NFC/Digital
11	GPIO10	14	P0.11	Digital
12	GPIO11	15	P0.12	Digital
13	GPIO12	18	P0.15	Digital/Trace port
14	GPIO13	21	P0.18	Digital/Trace port
15	GPIO14	22	P0.19	Digital
16	GPIO15	23	P0.20	Digital/Trace port CLK
17	nReset	24	P0.21	Digital/Reset
25	GPIO16	37	P0.25	Digital
26	GPIO17	41	P0.29	Analog/Digital
27	GPIO18	43	P0.31	Analog/Digital

IO Mapping table

Federal Communications Commission Statement

This device complies with FCC Rules Part 15. Operation is subject to the following two conditions:

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

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the Federal Communications Commission (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 causes 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 doing 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.

FCC Caution

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

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance. To maintain compliance with FCC exposure compliance requirement, please follow operation instruction as documented in this manual.

FCC Label Instructions:

The outside of final products that contains this module device must display a label

referring to the enclosed module. This exterior label can use wording such as: "Contains

Transmitter Module FCC ID:YAIBM20",or "Contains FCC ID: YAIBM20", Any similar wording that expresses the same meaning may be used.