

BLE152 Datasheet

Amp'ed RF Technology, Inc.

BLE152 Product Specification



32mm x 36.5mm x 0.87mm

Description

Amp'ed RF Technology presents the BLE152 sensor array Bluetooth module supporting v5.2 Bluetooth Low Energy. Integration multiple IoT sensors and an integrated internal antenna, the BLE152 provides a complete ready-to-use IoT platform.

The BLE152 is a PCB module, with pre-tested RF regulatory certifications improving time to market and reliability.

A ready to use AT command set enables instant BLE connectivity usage cases.

BLE152 features

Bluetooth features

- Bluetooth v5.2
- 2Mbps data throughput
- Long range Coded PHY
- 128-bit encryption security

Hardware configuration

- Cortex-M0+ microprocessor
- 256K bytes Flash memory
- 32K bytes RAM memory
- 1kB OTP memory
- 1x UART
- 1x I2C

Embedded software

- BLE protocol stack
- AT command set

Optional Sensor

- Gyroscope
- Magnetometer
- Pressure
- Temperature
- Digital Microphone
- Humidity
- Authentication

Additional documentation

- BLE Sensor Application Note

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1. Hardware Specifications

General Conditions (V_{IN} = 3.0V and 25°C)

1.1. Recommended Operating Conditions

Rating	Min	Typical	Max	Unit
Operating Temperature Range	-40	-	105	°C
Supply Voltage V_{IN}	1.7	3.3	3.6	Volts
Signal Pin Voltage	-	$0.7V_{DDIO} \sim V_{DDIO}$	-	Volts
RF Frequency	2400	-	2483.5	MHz

1.2. Absolute Maximum Ratings

Rating	Min	Typical	Max	Unit
Storage temperature range	-55	-	+125	°C
Supply voltage V_{IN}	-0.3	-	+3.9	Volts
I/O pin voltage V_{IO}	-0.3	-	+3.9	Volts
RF input power	-	-	8	dBm

1.3. Current Consumption

Modes (Typical Power Consumption)	Avg	Unit
RUN mode	2.2	mA
DEEPSTOP	15	uA
SHUTDOWN	1.5	uA

1.4. Selected RF Characteristics

Parameters	Conditions	Typical	Unit
Antenna load		40	ohm
Radio Receiver			
Sensitivity level	BER < .001 with DH5	-97	dBm
Maximum usable level	BER < .001 with DH1	0	dBm
Input VSWR		2.5:1	
Radio Transmitter			
Maximum output power	40 Ω load	+8	dBm
Initial Carrier Frequency Tolerance		0	kHz
20 dB Bandwidth for modulated carrier		935	kHz

1.5. I/O Operating Characteristics

Symbol	Parameter	Min	Max	Unit	Conditions
V _{IL}	Low-Level Input Voltage	-	0.3 × VCC	Volts	V _{IN} , 3.3V
V _{IH}	High-Level Input Voltage	0.7 × VCC	-	Volts	V _{IN} , 3.3V
V _{OL}	Low-Level Output Voltage	-	0.4	Volts	V _{IN} , 3.3V
V _{OH}	High-Level Output Voltage	VDD -0.4	-	Volts	V _{IN} , 3.3V

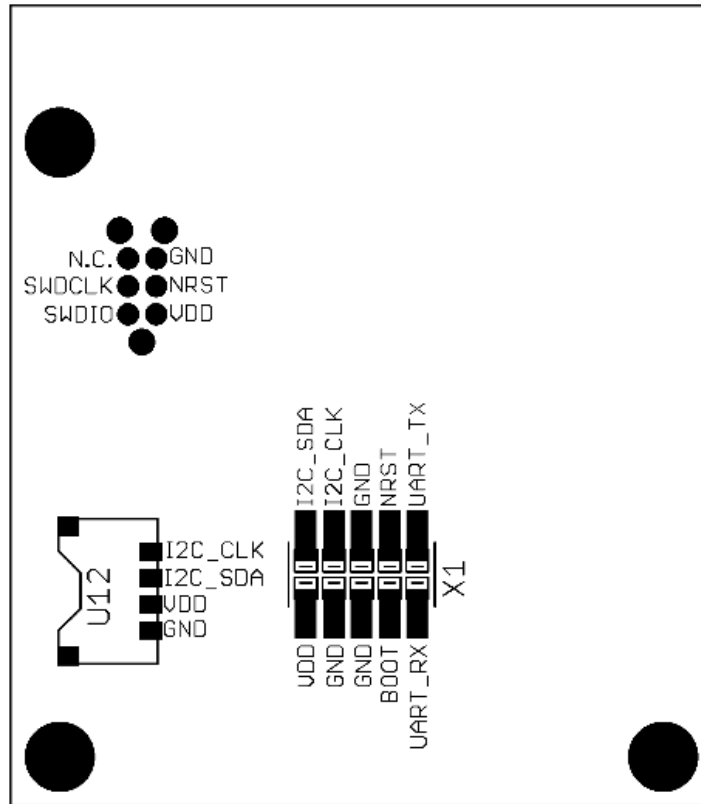
1.6. Pin Assignment

X1	Type	Pin #	Description
UART Interface			
UART_RX	I	9	Receive data
UART_TX	O	10	Transmit data
Power and Ground			
VDD		1	VDD
GND		3	GND
GND		5	GND
GND		6	GND
Reset			
NRST	I	8	Reset input
Fast boot			
BOOT	I	7	boot enable
UART Interface			
I2C_SDA	I/O	2	Data port
I2C_CLK	O	4	Clock

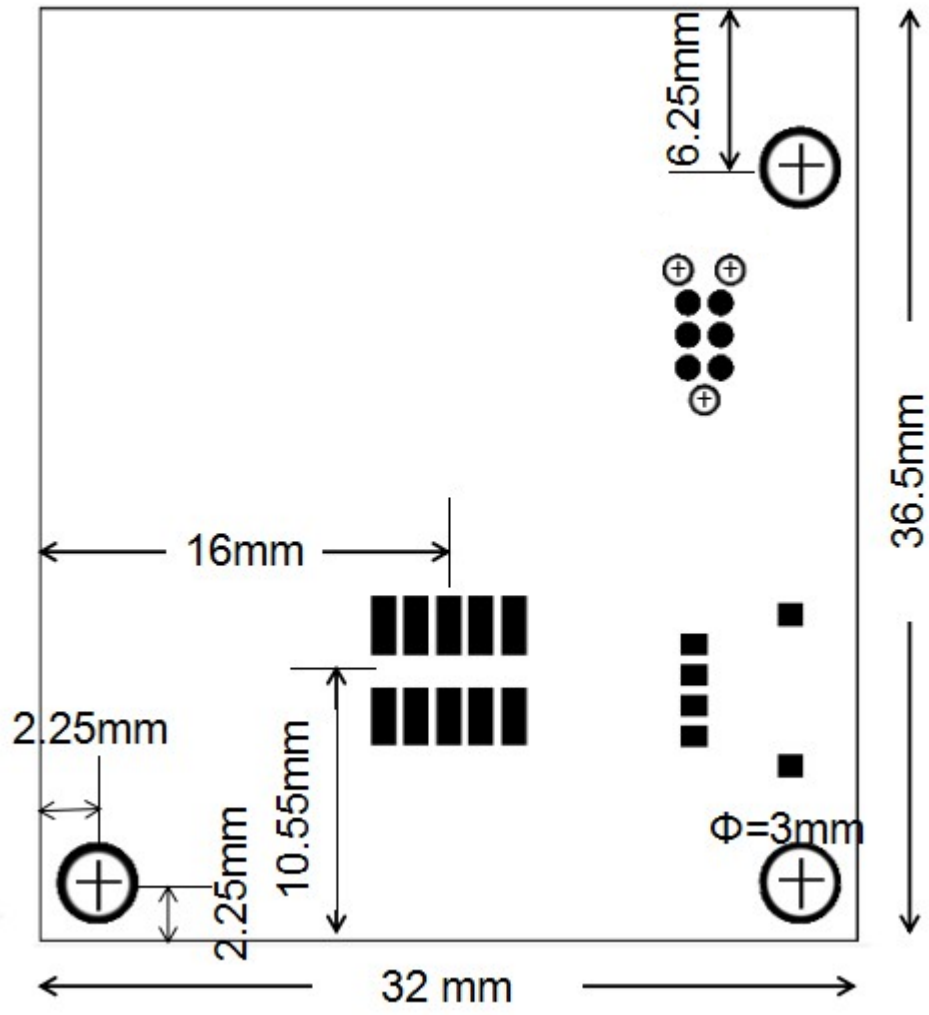
UCN	Type	Pin #	Description
VDD		1	VDD
NRST	I	3	Reset input
GND		5	GND
SWDIO	I/O	2	SWDIO
SWDCLK	I	4	SWDCLK
NC		6	

U12	Type	Pin #	Description
I2C_CLK	O	1	Data port
I2C_SDA	I/O	2	Clock
VDD		3	VDD
GND		4	GND

1.7. Pin Placement Diagram (Bottom View)

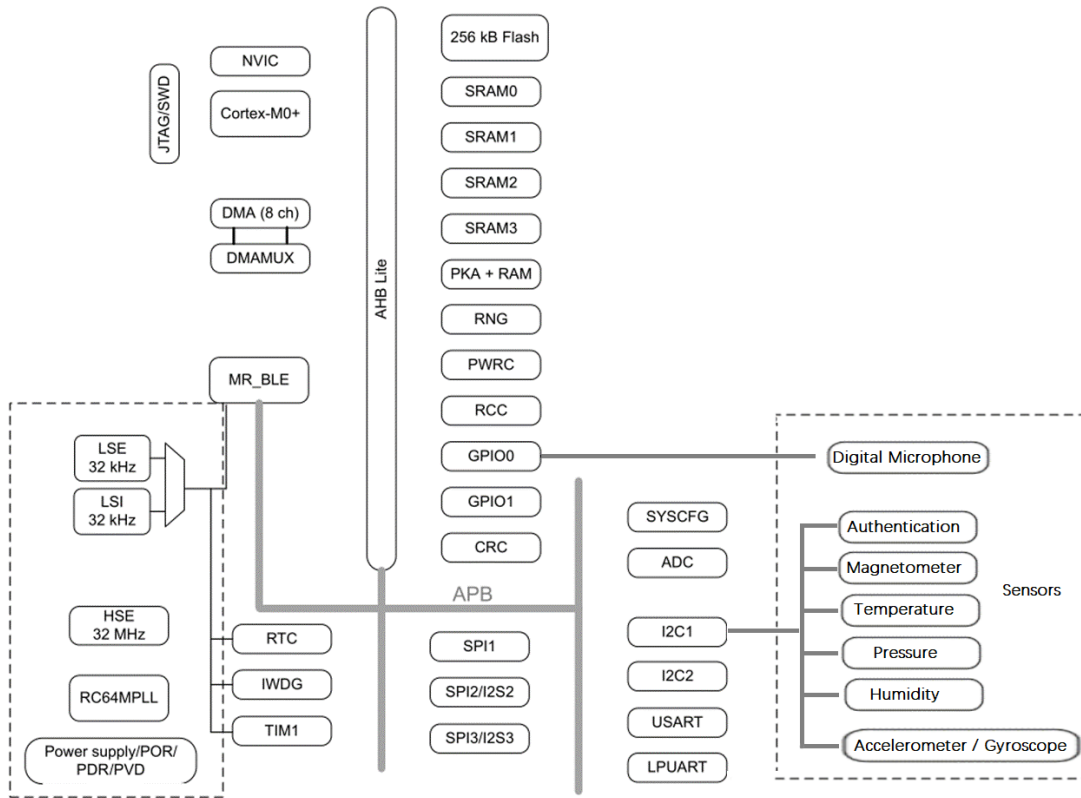


1.8. PCB Drawing



32 mm x 36.5 mm x 0.87 mm (+/- 0.05mm, height tolerance)

2. Module Block Diagram



3. Hardware Design

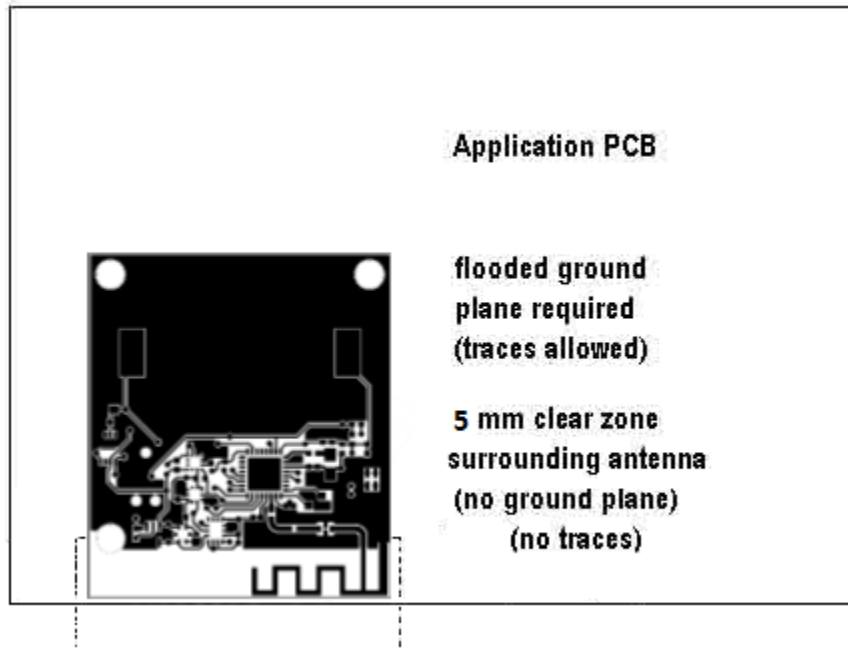
Notes

- All unused pins should be left floating; do not ground.
- All GND pins must be well grounded.
- The area around the antenna should be free of any ground planes, power planes, trace routings, or metal for at least 5 mm in all directions.
- Traces should not be routed underneath the module.
- The BLE152 must be reprogrammed via UART.

3.1. GPIO Interface

All GPIOs are capable of sinking and sourcing 6mA of I/O current.

3.2. PCB Layout Guidelines



3.3 Low power circuit requirements

Module part number	Low power usage	External LPO circuit required
BLE152	Yes	Not required

4. Regulatory Compliance

Federal Communications Commission statement:

This module has been tested and found to comply with the FCC Part15.

These limits are designed to provide reasonable protection against harmful interference in approved installations. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

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.

Modifications or changes to this equipment not expressly approved by Amp'ed RF Technology may void the user's authority to operate this equipment.

The modular transmitter must be equipped with either a permanently affixed label or must be capable of electronically displaying its FCC identification number

(A) If using a permanently affixed label, the modular transmitter must be labeled with its own FCC identification number, and, if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains Transmitter Module FCC ID: TBD" or "Contains FCC ID: TBD."

(B) If the modular transmitter uses an electronic display of the FCC identification number, the information must be readily accessible and visible on the modular transmitter or on the device in which it is installed. If the module is installed inside another device, then the outside of the device into which the module is installed must display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC certified transmitter module(s)."

To satisfy FCC RF Exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Industry Canada statement:

Label of the end product:

The final product must be labeled in a visible area with the following "Contains transmitter module IC: TBD"

This Class B digital apparatus complies with Canadian ICES-003.

Cetappareilnumérique de la classe B estconforme à la norme NMB-003 du Canada.

This device complies with RSS-210 of the Industry Canada 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.

Ce dispositif est conforme à la norme CNR-210 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

4.1. Modular Approval, FCC and IC

FCC ID: TBD

IC: TBD

In accordance with FCC Part 15, the BLE152 is listed above as a Modular Transmitter device.

4.2. FCC Label Instructions

The outside of final products that contain a BLE152 device must display a label referring to the enclosed module. This exterior label can use wording such as the following:

Contains Transmitter Module

FCC ID: TBD

IC: TBD

Any similar wording that expresses the same meaning may be used.

4.3. CE Label Instructions

TBD

4.4. Bluetooth Certification

Bluetooth QDID: TBD

5. Ordering Information

Part Name	Description
BLE152	BLE module

6. Revision History

Date	Revision	Description
15 June, 2021	1.0	Initial version