



BT-BR8051-A-MODULE

Bluetooth Module Datasheet

Version 2.0

1. INTRODUCTION

Overview

NIIMBOT BT-BR8051-A-MODULE it is a supports BR/EDR BLE Dual Mode.

Module operates with a widely IO power supply range from 1.8V to 3.3V and has very low power consumption inl both TX and RX modes

Features

- Qualified to Bluetooth® v5.2 specification
- 32-bit RISC processor up to 96MHz with on-chipROM(384Kbytes) and RAM(96Kbytes)Firmware Processor for system
- Operating temperature:-40°C to +85°C
- 1.8V to 3.3V IO power supply
- Wake up by UART/GPIO(sleep), and RTC(deep sleep)
- Package: QFN32 5*5
- High speed UART or USB port for BT HCI and AT commands
- Support up to 3 BLE links (links in slave mode).
- Single pin RF connection (50 ohm impedance in TX andRxmode)
- Integrated Power amplifier with maximum +6dbm transmit power output, support Bluetooth class 1.5 application without external PA
- -94dbm receive sensitivity for LE(1Mbps) mode and -92dbm for BR/EDR mode
- Up to +6dBm RF transmit power
- GFSK/ π /4-DQPSK/8DPSK modulator
- GFSK/ π /4-DQPSK/8DPSK demodulator
- RF/Analog Control(AGC,Ramp up/down timer,Low power)

Bluetooth subsystem

- Qualified to Bluetooth v5.2 specification including

1 Mbps Bluetooth low energy

- Single ended antenna connection with on-chip balun and Tx/Rx switch
- Class 2 support

Application

Standard HCI defined by SIG

- Printer
- Bluetooth HID



Figure 1: Module picture

2. General Specification

Table 1: General Specifications

Categories	Features	Implementation
Wireless Specification	Chip	BR8051AXX
	Bluetooth Version	V5.2 Dual-mode
	Frequency	2.402 - 2.480 GHz
	Receive Sensitivity	-96.0 dBm (typ.) $\pi/4$ DQPSK receiver sensitivity -89.0 dBm (typ.) 8DPSK receiver sensitivity -100 dBm (typ.) BLE 1 Ms/s receiver sensitivity
		Real-time digitised RSSI available to application
	Raw Data Rates (Air)	1 Mbps (Classic BT - BR/EDR)
Host Interface and Peripherals	UART Interface	TX, RX, CTS, RTS
		General Purpose I/O
		Default 115200,N,8,1
		Baudrate support from 1200 to 921600
	GPIO	Up to 16 GPIOs
	I ² C Interface	1 I ² C interface
	USB Interface	Support USB2.0 full speed mode
Profiles	BR/EDR	SPP (Serial Port Profile)
	Bluetooth Low Energy	GATT Client & Peripheral Simultaneous BR/EDR and BLE support
Maximum Connections	BR/EDR	up to 7 active slaves
	Bluetooth Low Energy	up to 3 active slaves
FW upgrade		Via UART(TBD)
		OTA
Supply Voltage	Supply	1.8 ~ 3.3V
Power Consumption		Max Peak Current(TX Power @ +6dBm TX): 40mA
		Sleep < 1mA (TBD)
		Deep Sleep < 20uA(TBD)
Physical	Dimensions	13mm(W) X 19.4mm(L) X 2.7mm(H); Pad Pitch 1mm
Environmental	Operating	-40°C to +85°C
	Storage	-40°C to +85°C
Miscellaneous	Lead Free	Lead-free and RoHS compliant
	Warranty	One Year
Humidity		10% ~ 90% non-condensing
MSL grade:		MSL 3
ESD grade:		Human Body Model: Class 2 2kV (all pins)
		Charged Device Model: Class III 500 V (all pins)

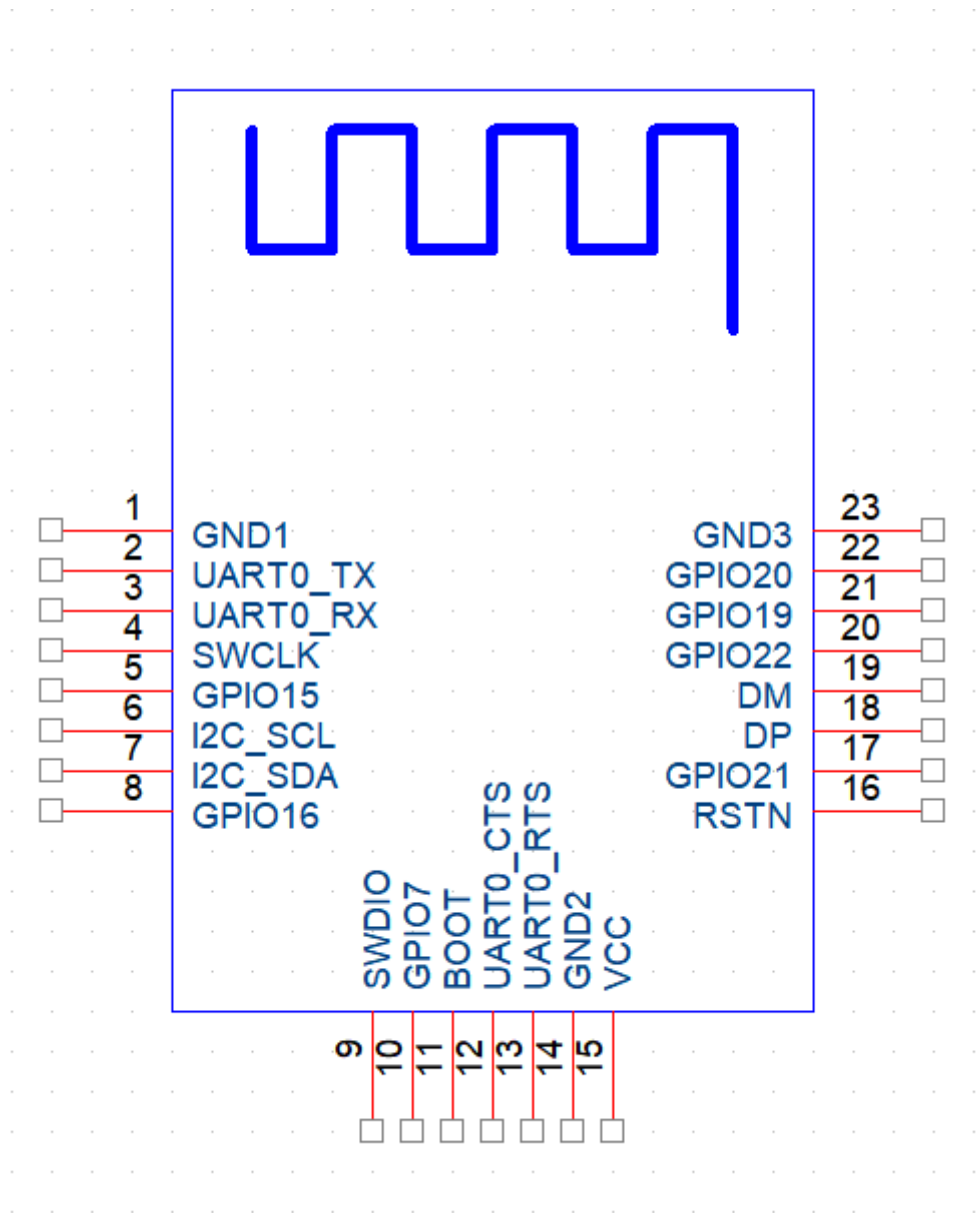


Figure 2: BT-BR8051-A-MODULE PIN Diagram(Top View)

3.0 PIN Definition Descriptions

Table 2:Pin definition

Pin	Pin Name	Type	Pin Descriptions	Notes
1	GND1	Vss	Power Ground	
2	UART0_TX	I/O	General purpose input/output,default is BT_TX	
3	UART0_RX	I/O	General purpose input/output,default is BT_RX	
4	SWCLK	I/O	General purpose input/output,default is SWCLK	
5	GPIO15	I/O	General purpose input/output,default is GPIO	
6	I2C_SCL	I/O	General purpose input/output,default is GPIO	
7	I2C_SDA	I/O	General purpose input/output,default is GPIO	

8	GPIO16	I/O	General purpose input/output,default is GPIO
9	SWDIO	I/O	General purpose input/output,default is SWDIO
10	GPIO7	I/O	General purpose input/output,default is SWDIO
11	BOOT	I/O	BOOT Mode
12	UART0_CTS	I/O	General purpose input/output,default is UART0_CTS
13	UART0_RTS	I/O	General purpose input/output,default is UART0_RTS
14	GND2	Vss	Power Ground
15	VCC	Vdd	3.3V IO voltage input pin
16	RSTN	I	SOC RESET PIN
17	GPIO21	I/O	General purpose input/output,default is GPIO
18	DP	I/O	USB DP data
19	DM	I/O	USB DM data
20	GPIO22	I/O	General purpose input/output,default is GPIO
21	GPIO19	I/O	General purpose input/output,default is GPIO
22	GPIO20	I/O	General purpose input/output,default is GPIO
23	GND3	Vss	Power Ground

4. MECHANICAL DETAILS

4.1 Mechanical Details

- Dimension: 13mm(W) x 19.4mm(L) x 2.7mm(H) Tolerance: $\pm 0.1\text{mm}$
- Module size: 13mm X 19.4mm Tolerance: $\pm 0.2\text{mm}$
- Pad size: 2mmX0.9mm Tolerance: $\pm 0.2\text{mm}$
- Pad pitch: 1.5mm Tolerance: $\pm 0.1\text{mm}$

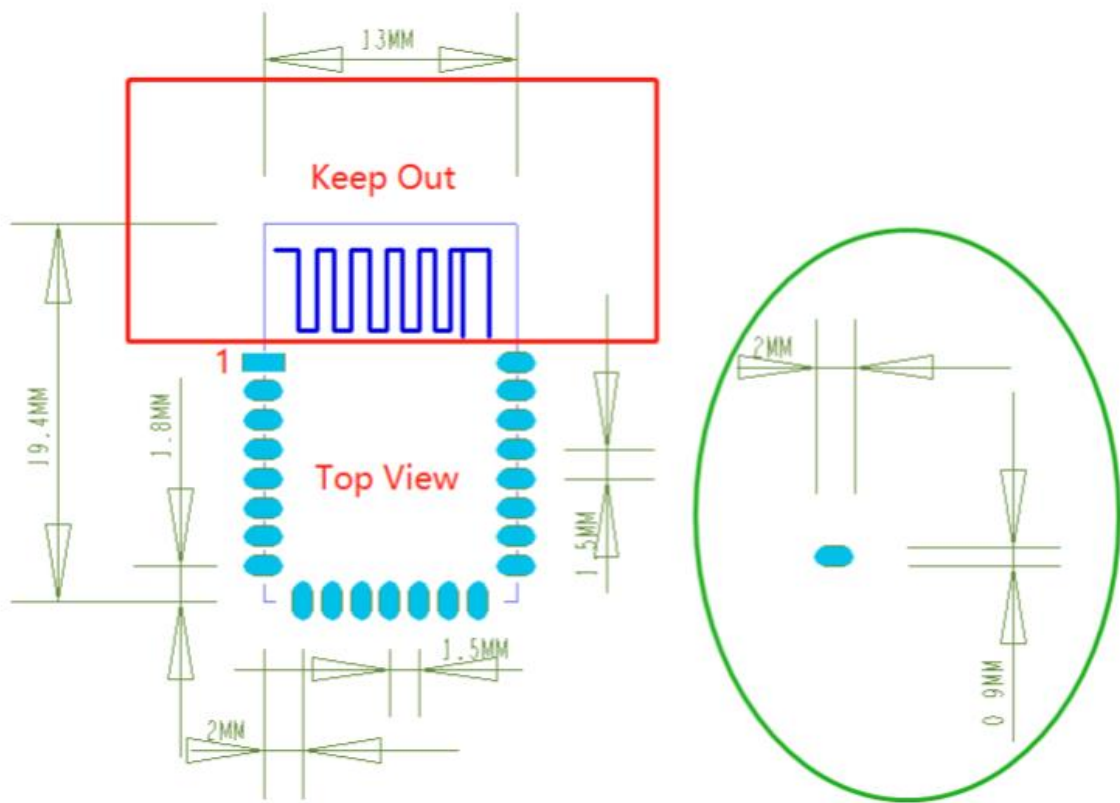


Figure 3: BT-BR8051-A-MODULE footprint

5. FCC Warning

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01

5.1 List of applicable FCC rules

FCC Part 15.247

5.2 Specific operational use conditions

This transmitter/module and its antenna(s) must not be co-located or operating in conjunction with any transmitter. This information also extends to the host manufacturer's instruction manual.

5.3 Limited module procedures

Not applicable

5.4 Trace antenna designs

It is "not applicable" as trace antenna which is not used on the module.

5.5 RF exposure considerations

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment can be used in portable exposure conditions.

The host product manufacturer would provide the above information to end users in their end-product manuals.

5.6 Antennas

PCB antenna; -1.028dBi; 2.402 GHz~2.480GHz

5.7 Label and compliance information

The end product must carry a physical label or shall use e-labeling followed KDB784748D01 and KDB 784748 stating "Contains Transmitter Module FCC ID: 2ARXB-051A".

5.8 Information on test modes and additional testing requirements

For more information on testing, please contact the manufacturer.

5.9 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (FCC Part 15.247) listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed when contains digital circuitry.

FCC Statements

(OEM) Integrator has to assure compliance of the entire end-product incl. the integrated RF Module. For 15 B (§15.107 and if applicable §15.109) compliance, the host manufacturer is required to show compliance with 15 while the module is installed and operating.

Furthermore the module should be transmitting and the evaluation should confirm that the module's intentional emissions (15C) are compliant (fundamental / out-of-band). Finally the integrator has to apply the appropriate equipment authorization (e.g. Verification) for the new host device per definition in §15.101.

Integrator is reminded to assure that these installation instructions will not be made available to the end-user of the final host device.

The final host device, into which this RF Module is integrated has to be labeled with an auxiliary label stating the FCC ID of the RF Module, such as "Contains FCC ID: 2ARXB-051A".

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.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could

void the user's authority to operate the equipment.

The Integrator will be responsible to satisfy SAR/ RF Exposure requirements, when the module integrated into the host device.

Module statement

The single-modular transmitter is a self-contained, physically delineated, component for which compliance can be demonstrated independent of the host operating conditions, and which complies with all eight requirements of § 15.212(a)(1) as summarized below.

- 1) The radio elements have the radio frequency circuitry shielded.
- 2) The module has buffered modulation/data inputs to ensure that the device will comply with Part 15 requirements with any type of input signal.
- 3) The module contains power supply regulation on the module.
- 4) The module contains a permanently attached antenna.
- 5) The module demonstrates compliance in a stand-alone configuration.
- 6) The module is labeled with its permanently affixed FCC ID label.
- 7) The module complies with all specific rules applicable to the transmitter, including all the conditions provided in the integration instructions by the grantee.
- 8) The module complies with RF exposure requirements.

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

IC Statements

The final host device, into which this RF Module is integrated" has to be labeled with an auxiliary label stating the IC of the RF Module, such as" Contains transmitter module IC: 28978-051A".

Le périphérique hôte final, dans lequel ce module RF est intégré, doit être étiqueté avec une étiquette auxiliaire indiquant le CI du module RF, telle que "Contient le module émetteur IC: 28978-051A".

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) L' appareil ne doit pas produire de brouillage;
- (2) L' appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d' en compromettre le fonctionnement.

Radio Frequency Exposure Statement for IC:

This equipment complies with IC exposure limits set forth for an uncontrolled environment. This equipment can be used in portable exposure conditions.

Déclaration d'exposition aux radiofréquences pour IC:

Cet équipement est conforme aux limites d'exposition IC établies pour un environnement non contrôlé. Cet équipement peut être utilisé dans des conditions d'exposition portables.