

PRODUCT BT829-2

N.E.T.

Bluetooth Low Energy 5.2 And 2.4G Wireless MCU IoT Module

high performance, high security, multi-protocol 2.4G and BLE

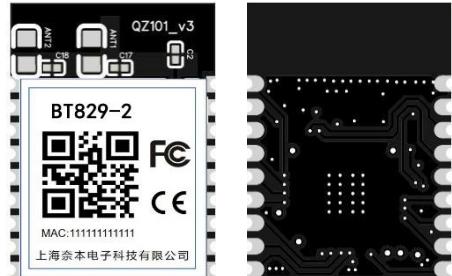
OVERVIEW

The BT829-2 is Bluetooth 5.2 low energy and 2.4GHz proprietary multi-application module. It is combine the excellent performance of a leading RF transceiver with a low-power ARM Cortex-M0+, power management unit, ADC, and smart I/O distribution controller.

In addition, BT829-2 supports an analog MIC interface that integrates a sigma-delta ADC, programmable gain amplifier, and microphone bias circuit for voice command application.

The embedded ARM Cortex-M0+ CPU enables developers to achieve 32-bit performance at an 8-bit price point, bypassing the step to 16-bit devices. By using a single-cycle multiply option and a 2-stage pipeline, the ARM Cortex-M0+ makes program execution simple and highly efficient.

The BT829-2 memory architecture includes 272kByte ROM, 104kByte RAM, and with 4M bit MCM Flash. Flash Address Space is a virtual space that is mapped to external Flash to extend the code space in XIP (execute In Place) mode.



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SPECIFICATION

| ITEM | SPECIFICATION | |
|-------------------|---|---|
| Microcontroller | <p>ARM Cortex- M0 + CPU (Maximum 40 MHz)</p> <ul style="list-style-type: none">• Serial flash controller with 8 kB 4 - way cache• 104kB SRAM, 272kB ROM• 64B EFuse for manufacturer use• 4M Flash | |
| Standards | <ul style="list-style-type: none">• Low Energy (BLE) compliant to Bluetooth SIG v5 . 2• 2 . 4 G proprietary features | |
| BLE Radio | <p>Tx Power</p> <ul style="list-style-type: none">• -20dB —7.5dB <p>Rx Sensitivity</p> <ul style="list-style-type: none">• 2Mbps:-94dbm• 1Mbps:-97dB | <p>Active Tx Power</p> <ul style="list-style-type: none">• RX mode: 5.3mA• Active TX mode:4.1mA@-20dB• Active TX mode:5.9mA@0dB• Active TX mode:6.8mA@4dB• Active TX mode:13.1mA@7.5dB• Advertising: 16.5uA (adv_interval:1s, payload: 23Bytes,0dBm) |
| Power Consumption | Power Down: 1.9uA | Deep LPS: 3.9uA |
| Peripherals | <p>11 x GPIO(mux' ed)</p> <p>1 x SPI(master or slave)</p> <p>2 x I2C(master)</p> <p>1 x I2S/PCM</p> <p>2 x UART</p> | <p>8 x Timers</p> <p>8 x PWM</p> |
| Voltage | Input voltage:1.8V~3.6V, 3.3V (typical) | |
| Environmental | <p>Temperature:</p> <ul style="list-style-type: none">• Operating: 0°C ~ 85°C• Storage: -55°C ~ 150°C | <p>Humidity</p> <ul style="list-style-type: none">• Relative: < 90 % Non- condensing• Storage: < 90 % Non- condensing |
| Physical | <p>Dimension:</p> <p>11.2*15.1*2.2 mm</p> <p>Weight: 1g</p> | <p>Pin: 18 - pin stamp</p> <p>Antenna: PCB</p> |
| Certification | | |

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1. Electrical Characteristics

1.1. Absolute Maximum Ratings

| Item | Min | Max | Unit |
|---|------|------|------|
| Storage Temperature | -55 | +125 | °C |
| Lead Temperature(Soldering, 10 sec) (T _{sld}) | | +260 | °C |
| Supply Voltage (VDD) | -0.3 | 3.65 | V |
| Input / Output Interface Voltage | 0 | VDD | V |

1.2. Recommended Operating Conditions

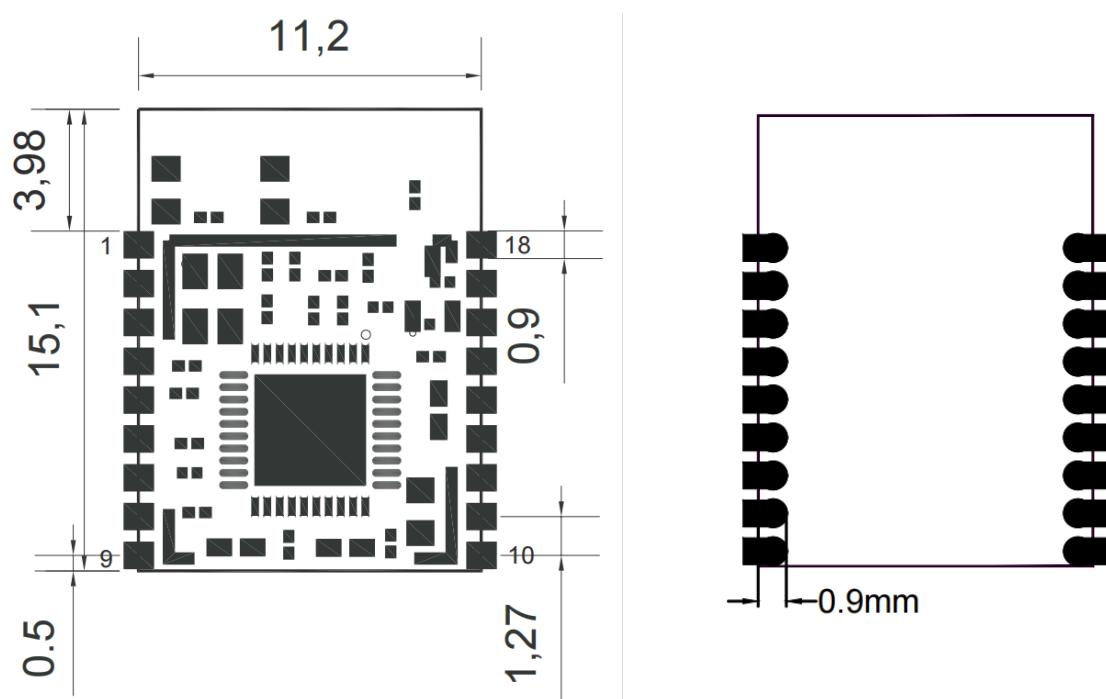
| Item | Min | Typ | Max | Unit |
|-----------------------|-----|-----|-----|------|
| Operating Temperature | 0 | | +85 | °C |
| Supply Voltage (VDD) | 1.8 | 3.0 | 3.6 | V |

1.3. Electrical performance characteristics

| Item | Min | Typ | Max | Unit | Test Conditions |
|-----------------------------|---------|-----|--------|------|------------------------|
| Transmit power consumption | | 5.9 | | mA | 0dBm continuous launch |
| Receiving power consumption | | 5.3 | | mA | Continuous reception |
| standby power | | 1.9 | | µA | |
| Input IO high level | 0.7VDD | | VDD | V | |
| Input IO low level | 0 | | 0.3VDD | V | |
| Input IO high level | VDD-0.3 | | VDD | V | |
| Input IO low level | 0 | | 0.3 | V | |

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2. Mechanical Dimensions



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3. Pin Function

| Pin Number | Pin Name | Pin Descriptions |
|------------|----------|---|
| 1 | GND | Ground |
| 2 | VCC | Power supply |
| 3 | P2_4 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 4 | P2_5 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 5 | P0_3 | LOG_UART TX. Power on trap: Pull-up for normal operation Pull-down to bypass executing program code in flash (PAD internal pull-up by default). |
| 6 | P4_1 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 7 | P4_0 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 8 | P0_6 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 9 | NRST | Hardware reset pin, low active. |
| 10 | P0_1 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 11 | RX_LOG | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. HCl_UART_RX (default). |
| 12 | TX_LOG | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. HCl_UART_TX (default). |
| 13 | P5_1 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |
| 14 | NC | Not connect |
| 15 | P5_2 | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. |

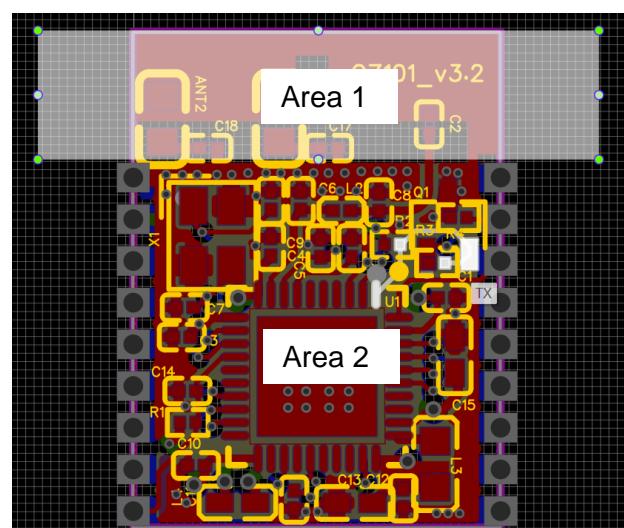
| | | |
|----|----|--|
| 16 | TX | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. AUXADC input 0. Capacitive sensor input 0. |
| 17 | RX | General purpose IO. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-down. AUXADC input 1. Capacitive sensor input 1. |
| 18 | NC | Not connect |

4. Part No. Description

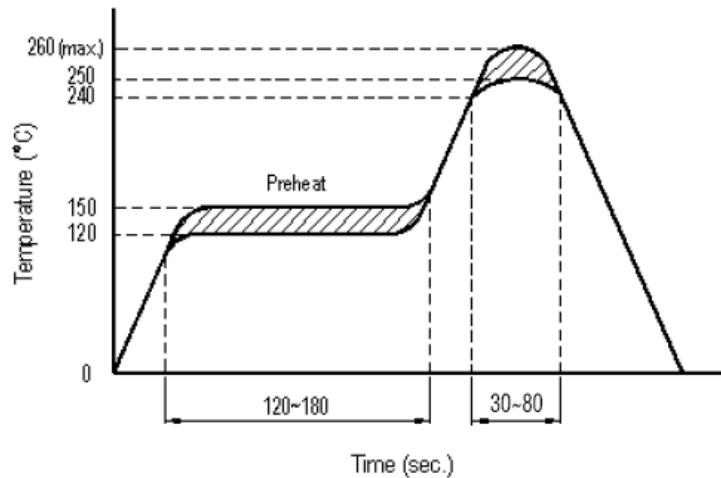
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5. PCB Design Considerations

- 5.1. PCB directly below the module antenna (area 1 in the red frame as below picture) shall be cleared, and the larger the clearance area, the better.
- 5.2. The module layout shall be as close to the board edge as possible (the antenna faces outside the board) and away from metal and high-frequency components.
- 5.3. Try not to route the bottom of the module (area 2 in the yellow frame as below picture).
- 5.4. The minimum clearance area of the antenna is within 20mm in front of the module antenna and 15mm on the left and right.
- 5.5. The module antenna and the surrounding clearance area shall not connect to the ground in a large area



6. Reflow Patch Reference



7. Package Information

Packing method: Real

Minimum package quantity: 800pcs/pack

FCC Statement

FCC standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Chip antenna with antenna gain -0.6dBi

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.

Any Changes or modifications not expressly approved by the party responsible for compliance 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.

FCC Radiation Exposure Statement

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

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: 2BAMT-BT829-2 Or Contains FCC ID: 2BAMT-BT829-2"

When the module is installed inside another device, the user manual of the host must contain below warning statements;

1. 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.

(2) This device must accept any interference received, including interference that may cause undesired operation.

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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

Any company of the host device which install this modular with modular approval should perform the test of radiated & conducted emission and spurious emission,etc. according to FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, Only if the test result comply with FCC part 15C : 15.247 and 15.209 & 15.207 ,15B Class B requirement, then the host can be sold legally.