

# BLE4.2 Bluetooth Module SPECIFICATION

Model No.: DL-32-BLE4.2

Version: V2.2



**Before using this module, please read this document carefully, and pay attention to the following important matters:**

This module is an electrostatic sensitive product. Please operate it on an anti-static workbench during installation and testing.

The module is integrated with all RF related devices and has PCB onboard antenna, so excellent RF performance can be obtained without additional antenna configuration. Please do not use metal case above the antenna, otherwise it will lead to serious attenuation of radio frequency signals, which will affect the effective use of distance.

Metal objects and wires should be kept away from the antenna as much as possible.

When installing the module, nearby objects should be kept at a sufficient safety distance from the module to prevent short circuit damage.

This module should be used in a dry environment. Please do not make any liquid substance come into this module.

Please use an independent voltage regulator circuit to supply power to this module, and avoid sharing with other circuits. The tolerance of the power supply should not be less than 5%.

**Disclaimer:**

This BLE module is intended to be embedded in your own products, and it does not provide a casing itself. All the charts and pictures shown in this specification here is just for your reference only. The actual test shall prevail for details. We do not assume any responsibility for personal injury or property loss caused by user's improper operation.

This specification is subject to change due to the continuous improvement and upgrading of the product version, and the latest version specification shall prevail. DREAMLNK reserves the right of final interpretation and modification of all contents in this specification.

Date	Version	Formulation / Revision of Contents	Approved by
2019-06-18	V1.0	Initial Version BLE Module	Fagan Xu
2021-04-05	V1.4	Configuration Instructions Updated	Fagan Xu
2023-07-10	V2.2	Add AT Command to Set the Manufacturer Data	Fagan Xu

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## 1. Module introduction

### 1.1 Brief introduction

DL-32-BLE4.2 is a low-power Bluetooth 4.2 module. The module integrates a high-performance 2.4GHz RF transceiver, a feature-rich baseband processor, ARM968E-S MCU, and a variety of peripheral interfaces. It has a built-in 160KBytes Flash and 20KBytes RAM, which support programmable protocols to meet your customized applications. It provides you a complete hardware and software solutions, which will greatly short your product development cycle and save your cost.

### 1.2 Features

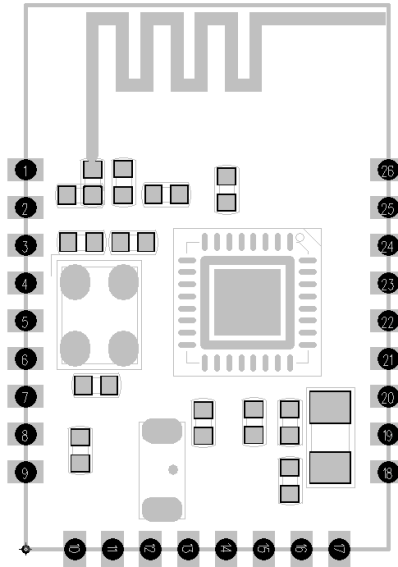
- Low-power Bluetooth 4.2 module with compact size
- Built-in 10bit high precision ADC
- Support UART/GPIO/I2C/PWM/ADC/SPI/JTAG and other interfaces
- Deep sleep current 3uA
- The serial port can be enabled with pins to switch the working state and sleep state.
- Support command switching between AT command mode and transparent transmission mode.
- Support AT command configuration parameters.
- Communication distance in open areas can reach 40m @ 0dBm transmit power
- Each frame of data packet supports up to 20 bytes.
- Power supply range: 1.55~3.3V, DC3.0V power supply is recommended.
- Dimensions: 18mm\*12mm\*1.7mm

### 1.3 Applications

- Industrial wireless control
- Wearable electronic products
- Health products
- Smart sockets and lights
- Bluetooth to UART products
- Wireless remote control

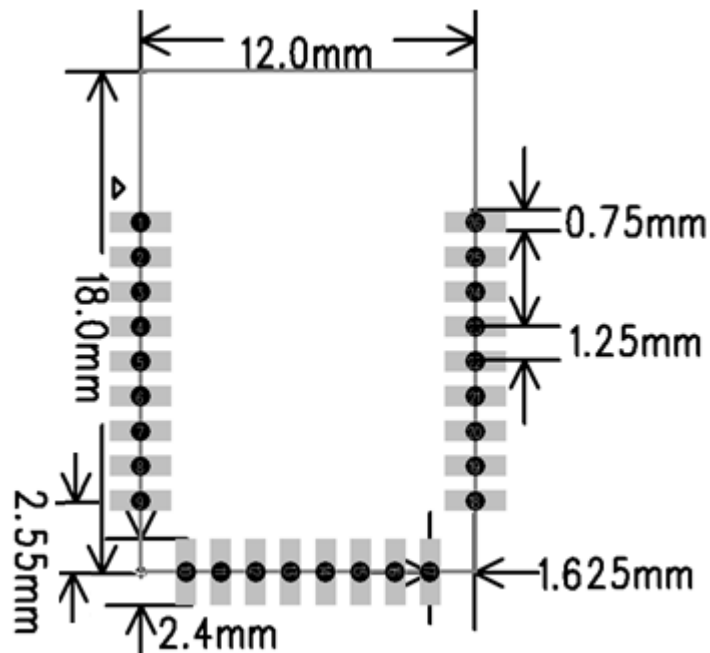
## 2. Product Details

### 2.1 Product outline drawing



Outline drawing

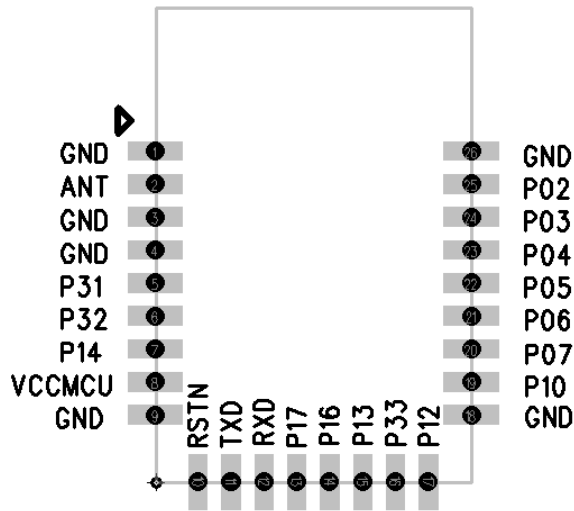
### 2.2 Product Size



Model No	L (mm)	W (mm)	H (mm)	PAD Size (mm)	Pin space (mm)	Thickness (mm)
DL-32-BLE4.2	18	12	1.7±0.2	-	1.25	0.8

2.3 Pins Definition

There are 26 interfaces of this BLE Module, and 17pins are GPIO.



DL-32-BLE4.2 Pins Definition

No.	Name	Function description
1、3、4、9、18、26	GND	Grounding
2	ANT	External antenna when needed
5	P31	General IO, ADC1
6	P32	General IO, ADC2
7	P14	General IO, PWM4
8	VCCBAT	3.0V VCC; the output current of the external power supply is recommended to be above 60mA
10	RSTN	Reset pin, active low
11	P00/TXD1	General IO, UART_TXD1 and MCU communication interface
12	P01/RXD1	General IO, UART_RXD1 and MCU communication interface
13	P17	General IO, UART_RXD2
14	P16	General IO, UART_TXD2
15	P13	General IO, PWM3
16	P33	General IO, ADC3
17	P12	General IO, PWM2
19	P10	General IO, PWM0
20	P07	General IO PWM5, SPI_NSS, JTAG_TMS
21	P06	General IO, SPI_MISO, PWM4, JTAG_TCK
22	P05	General IO, SPI_MOSI, JTAG_TDO
23	P04	General IO, SPI_SCK, JTAG_TDI
24	P03	General IO, I2C_SDA, JTAG_NTRST
25	P02	General IO, I2C_SCL

### 3. Function and test operation instructions

- Support Bluetooth 4.2 master mode and slave mode.
- Support WeChat AirSync protocol
- Default configuration:
  - Working mode: default transparent transmission mode, if using AT command, please switch to command mode;
  - UART parameters: 9600, 8bit data bit, no parity bit, 1 stop bit;
  - Bluetooth name: BleSerialPort;
  - Broadcast interval: "80, 80", namely max=50ms, min=50ms;
  - Connection interval: "36,24,2,100", namely max=36, min=24, latency=2, timeout=300 (max=45ms, min=30ms, latency=2, timeout=1000ms)

### 4. UUID

Slave port:      Service UUID: 0xFFB0

Eigenvalues:    UUID: 0xFFB1    Properties: Write Without Response

Eigenvalues:    UUID: 0xFFB2    Properties: Read Notify

### 5. Communication interface between BLE module and MCU

#### 5.1 Asynchronous serial communication

The BLE module communicates with the MCU through a serial port (UART). Default port characteristics: baud rate 9600, data bit 8, stop bit 1, parity bit None.

#### 5.2 Data packet format

In the transparent transmission mode, the BLE module is responsible for forwarding the data sent from the MCU to the APP intact. The data sent by the APP to the BLE module is also directly forwarded to the MCU.

In command mode, the module can be set through AT commands, which can be set by sending AT commands on the APP side or sending AT commands on the serial port assistant on the computer side.

### 5.3 Working mode setting

#### 5.3.1 Switch between command mode and transparent transmission mode

Power-on default transparent transmission mode. In this mode, send "+++" and return to "AT+ok Mode=AT Mode\r\n" to enter the command mode. At this time, you can use AT commands to set and read.

In the command mode, input "AT+exit\r\n" and return to "AT+ok Mode=Normal\r\n" to enter the transparent transmission mode. At this time, any data sent will be directly and transparently transmitted.

**Note:** When sending "+++" to switch the mode, only 3 "+" are sent, no other characters, including "\r\n" are not allowed.

#### 5.3.2 Serial switch

24PIN (P03), pull high to enter the serial port transparent transmission mode; pull low to enter the low power consumption mode; N/C is the serial port transparent transmission mode. Level switching is necessary to enable conversion. (Note: Serial port transparent transmission is not possible in low power mode)

#### 5.3.3 Status Indicator

13PIN (P17), the unconnected state is high level, and the connected state is low level.

#### 5.3.4 MCU Interrupt Wake

14PIN (P16), the default is low level, high level when receiving data from APP, low level after receiving.

#### 5.3.5 Switch control

15PIN (P13), low level enters DEEP SLEEP mode, high level works normally, and N/C for normal working.

## 6. AT Command

Note: it enters the defaulted transparent transmission mode after power-on. In the transparent transmission mode, send "+++" to switch into the command mode. Sending AT commands in command mode should end with "\r\n". When using the serial port assistant to operate, you need to check the "Send new line" option.

Command	Explanation
"AT+setBR 9600\r\n"	Set baud rate
"AT+getManf\r\n "	Read manufacturer data
"AT+setManf=manf\r\n "	Set manufacturer data
"AT+getName\r\n"	Read Bluetooth name
"AT+setName=bleName\r\n"	Set Bluetooth name
"AT+getAddr\r\n"	Read Bluetooth MAC address
"AT+setAddr=112233445566\r\n"	Set Bluetooth MAC address
"AT+getStatus\r\n"	Read Bluetooth status
"AT+setAdvInt 80 100\r\n"	Set broadcast interval
"AT+setConnInt 36242300 \r\n"	Set connection interval
"AT+disConnect\r\n"	Disconnect
"AT+reStart\r\n"	Restart the module
"AT+getPara\r\n"	Get configuration parameters
"AT+exit\r\n"	Exit command mode (switch to transparent transmission mode); In the transparent transmission mode, send "+++" to switch into the AT command mode.
"AT+shutDown\r\n"	Shut Down the module
"AT+reStore\r\n"	Restore Factory Defaulted Setting
"AT+getInfo\r\n"	Query version information
"AT+help\r\n"	Instruction helps
"AT+setServer_uuid\r\n"	Change the Service UUID
"AT+setWrite_uuid\r\n"	Change the Write SERVER UUID
"AT+setNotify_uuid\r\n"	Change the Upload UUID
"AT+upmode\r\n"	Change whether the upload is "notify" or "indicate" (Default is "notify")



"AT+downmode\r\n"	Change whether data to be sent is "write" or "write_no_command" (Default value is "write_no_command")
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## 6.2 Baud rate modification

Command description: It takes effect after manual restart.

For example: "AT+setBR 9600\r\n" ("\r\n" is the end character, please do not enter it, but a newline character must be added after each instruction, the value is 0D 0A, the same below)

Hexadecimal: 41 54 2B 73 65 74 42 52 20 39 36 30 30 0D 0A (There is no space between each number, some software will automatically ignore the space, you can add space, the same below)

Reply: "AT+ok\r\n" (operation successful)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

<b>Baud rate setting range: (If the parameter does not match, it will prompt an error)</b>
2400, 4800, 9600, 19200, 38400, 57600, 115200

## 6.3 Read Bluetooth device name

Example: "AT+getName\r\n"

Hexadecimal: 41 54 2B 67 65 74 4E 61 6D 65 0D 0A

Reply: "AT+ok=bleName\r\n" (operation successful)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

## 6.4 Set Bluetooth device name

Command description: It takes effect after manual restart.

Example: "AT+setName=bleName\r\n" (if set to SENSUN FAT)

Hexadecimal: 41 54 2B 73 65 74 4E 61 6D 65 3D 62 6C 65 4E 61 6D 65 0D 0A

Reply: "AT+okrestart effect!\r\n" (Operation is successful, need to send restart command, it will take effect after restart)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.5 Read Bluetooth MAC address

Example: "AT+getAddr\r\n"

Hexadecimal: 41 54 2B 67 65 74 41 64 64 72 0D 0A

Reply: "AT+okFF:11:22:33:66:FF\r\n" (operation successful)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.6 Set Bluetooth MAC address

Example: "AT+setAddr=112233445566\r\n"

Hexadecimal: 41 54 2B 73 65 74 41 64 64 72 3D 31 31 32 32 33 33 34 34 35 35 36 36 0D 0A

Reply: "AT+okrestart effect!\r\n" (Operation is successful, need to send restart command, it will take effect after restart)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.7 Read the status of the Bluetooth module: broadcast/connected

Example: "AT+getStatus\r\n"

Hexadecimal: 41 54 2B 67 65 74 53 74 61 74 75 73 0D 0A

Reply: "AT+ok status\_code\r\n" (operation successful), the status\_code is as follows:

00	Module is in idle state
01	The module is in the broadcast state
02	Module is connected
03	Scan with response
04	Scan without response

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.8 Change the Bluetooth broadcast interval

Command description: It takes effect after manual restart.

Example: "AT+setAdvInt 80 100\r\n" (minimum interval  $80 \times 0.625\text{ms}$ , maximum interval  $100 \times 0.625\text{ms}$ )

Hexadecimal: 41 54 2B 73 65 74 41 64 76 49 6E 74 20 38 30 20 31 30 30 0D 0A

(Maximum and minimum broadcast interval, "min<=max", 80-16000 is 50ms-10000ms)

Reply: "AT+okrestart effect!\r\n" (Operation is successful, need to send restart command, it will take effect after restart)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.9 Change the Bluetooth connection interval

Command description: Take effect immediately, do not set frequently, otherwise the connection may be dropped.

Example: "AT+setConnInt 36 24 23 00\r\n" (parameters are max, min, latency, timeout)

Hexadecimal: 41 54 2B 73 65 74 43 6F 6E 6E 49 6E 74 20 33 36 32 34 32 33 30 30 0D 0A

In the example, the maximum interval is  $36 \times 1.25\text{ms}$ , the minimum interval is  $24 \times 1.25\text{ms}$ , the latency is 2, and the connection timeout is  $300 \times 10\text{ms}$ .

Minimum connection interval and maximum connection interval: The range of values is 0x0006-0x0C80 (7.5ms~4000ms), min<=max.

Latency: The value range is: 0x0000-0x01F3 (0~499).

Connection timeout: The value range is: 0x000A-0x0C80. The connection interval must be less than the connection timeout time, namely:  $[\text{max} \times 1.25 * (1 + \text{latency})] < 10 * \text{timeout}$ .

Reply: "AT+ok\r\n" (Operation is successful, no need to restart, take effect immediately)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.10 Disconnect the Bluetooth module

Example: "AT+disConnect\r\n"

Hexadecimal: 41 54 2B 64 69 73 43 6F 6E 6E 65 63 74 0D 0A

Reply: "AT+ok\r\n" (operation successful)

"AT+err\_code\r\n" (Operation failed, please refer to "Command error return parameter description" for err\_code)

### 6.11 Reset/Restart

Example: "AT+reStart\r\n"

Hexadecimal: 41 54 2B 64 69 73 43 6F 6E 6E 65 63 74 0D 0A

Reply: "AT+ok restart now \r\n" (If the operation is successful, it will automatically restart immediately)

### 6.12 Get configuration parameters

Example: "AT+getPara\r\n"

Hexadecimal: 41 54 2B 67 65 74 50 61 72 61 0D 0A

Reply: "AT+ok uart 9600,8,N,1; adv 120 160; con 36,24,2,300.\r\n" (operation successful), the return parameters include serial port, broadcast interval, connection interval.

### 6.13 Exit command mode

Example: "AT+exit\r\n"

Hexadecimal: 41 54 2B 65 78 69 74 0D 0A

Reply: "AT+ok Mode=Normal\r\n" (operation is successful, switch to transparent transmission mode)

### 6.14 Restore Factory Defaults

Example: "AT+reStore\r\n"

Hexadecimal: 41 54 2B 72 65 53 74 6F 72 65 0D 0A

Reply: "AT+ ok restart now\r\n" (operation successful)

### 6.15 Query Version Information

Example: "AT+getInfo\r\n"

Hexadecimal: 41 54 2B 67 65 74 49 6E 66 6f 0D 0A

Reply: "AT+ok HW=288-BLE-JXKJ,SW=V0.2"

### 6.16 Change the Service UUID

Example: "AT+setServer\_uuid=ff50\r\n" (Change SERVER UUID =FF50)

Hexadecimal: 41 54 2B 73 65 74 53 65 72 76 65 72 5F 75 75 69 64 3D 66 66 35 30 0D 0A

Reply: "AT+ok"

Characteristic value UUID: 0xFFB1 Properties: Write Without Response

### 6.17 Change the Write Service UUID

Example: "AT+setWrite\_uuid=ff60\r\n" (Modify Write SERVER UUID =FF60)

Hexadecimal: 41 54 2B 73 65 74 57 72 69 74 65 5F 75 75 69 64 3D 66 66 36 30 0D 0A

Reply: "AT+ok"

The modification takes effect only after the re-start command is executed

### 6.18 Change the Notify Service UUID

Example: AT+setNotify\_uuid=ff70\r\n (Change the Notify SERVER UUID =FF70)

Hexadecimal: 41 54 2B 73 65 74 4E 6F 74 69 66 79 5F 75 75 69 64 3D 66 66 37 30 0D 0A

Reply: "AT+ok"

The modification takes effect only after you run the restart command or power it on again

### 6.19 Change whether the upload is "notify" or "indicate" (Default is "notify")

Example: "AT+upmode=indicate\r\n" (change the uploaded data to "indicate")

For example, AT+upmode= notify\r\n (Change the mode of uploading data to "notify")

The modification takes effect only after you run the restart command or power it on again

### 6.20 Change whether data to be sent is "write" or "write\_no\_command" (The default value is "write\_no\_command" after Power-on)

Example: AT+downmode=write\_req\r\n (Change the value to "write" mode)

Example: AT+downmode=write\_command\r\n (Change the value to "write\_no\_command" mode)

The modification takes effect only after you run the restart command or power it on again

## 6.21 Help instruction

Example: "AT+help\r\n"

Hexadecimal: 41 54 2B 68 65 6C 70 0D 0A

Reply to AT+ok Help:

shutdown

setBR

getManf

setManf

getName

setName

getAddr

setAddr

getStatus

setAdvInt

setConnInt

disConnect

reStore

reStart

getPara

getInfo

setServer\_uuid

setWrite\_uuid

setNotify\_uuid

upmode

downmode

exit

Help

### 6.22 Read the Bluetooth Manufacturer DData

Example: "AT+getManf \r\n"

Hexadecimal: 41 54 2b 67 65 74 4d 61 6e 66 0D 0A

Reply: "AT+ok F0:05: \r\n" (operation successful); The default value is AT+ok F0:05:

"AT+err\_code\r\n" (The operation fails. For details about err\_code, see "Command Error Return Parameter Description")

### 6.23 Set the Bluetooth MManufacturer Data

Command description: The command takes effect only after manual restart.

Example: "AT+setManf=535008002209130200dc\r\n" (e.g.: set to 535008002209130200dc)

Hexadecimal: 41 54 2b 73 65 74 4d 61 6e 66 3d 35 33 35 30 30 38 30 30 32 32 30 30 31 33 30 32 30 30 64 63 0D 0A

Re: "AT+okrestart effect! \r\n "(operation is successful, need to send a restart command, restart after the effect)

"AT+err\_code\r\n" (The operation fails. For details about err\_code, see "Command Error Return Parameter Description")

### 6.24 Command Error Return Parameter Description

err_code	Meaning
"06"	The last operation is not finished
"07"	The command parameter is invalid
"08"	Module is not connected
"09"	Module is connected
"10"	Module is broadcasting
"11"	Operation failed

## 7. Power consumption

Broadcast interval 100ms: 220 uA

Broadcast interval 500ms: 70 uA

Broadcast interval 1000ms: 40 uA

Deep sleep current (no broadcast): 7 uA

## 8. Appendix: Reference specification

《BLUETOOTH SPECIFICATION Version 4.2》

《IEEE 802.15.1》

## 9. Contact us

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