



SPP-03 BLE Module instructions

Version

V2023-0815

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Command format and default configuration description

1.1 Serial port default configuration

If there is no special instruction that the AT command serial port and the download serial port use the same serial port, the default UART configuration is 9600, 8N1

1.2 Start message

Company: PRL inc.

Ble mac:50524c345678

Firmware version: PRL V205

Remarks:

(1) Line break use \r\n

1.3 Instruction format

CMD[opt][param1,param2,...] command ends with carriage return line feed (\r\n) (the actual detection is \n end ASCII code 0 x0D, and the preceding \r will be ignored)

All line breaks are used uniformly \r\n

		Description	Example
CMD		Instruction name (case insensitive)	AT
opt	NA	Without any parameters, the specified instruction is executed directly.	AT
	?	Query status	AT?
	= param1,param2,...	with parameters, multiple parameters are separated by commas. if a parameter contains commas, it needs to be enclosed by double quotation marks (\n cannot appear in the parameter, and double quotation marks must be used when the first and last parameters are empty)	AT=1

1.4 Instruction response format

1.4.1 Command Execution Successful Response Format

\r\nOK\r\n // There cannot be any other messages in the middle (other messages can be

printed on the log port)

1.4.2 Instruction execution error response format

```
\r\n+<CMD>:<error_code>\r\nERROR\r\n
```

// The errorno indicates an error code (supported by some platforms). AT serial port cannot print any other error messages (other messages can be printed on log port)

1.4.3 Query function execution success response format

```
\r\nquery result (the response field of this specific instruction must be specified dead and cannot be modified)\r\nOK\r\n
```

1.4.4 Unknown instruction response format

There is no response when matching to the instruction

Unknown cmd:<all contents entered by serial port, including parameters>

Eg: For example, ATAA does not exist

Enter ATAA\r\n will back Unknown cmd:ATAA

Enter ATAA = 123\r\n will back Unknown cmd:ATAA = 123

1.5 URC active data

```
// Bluetooth data
```

```
+ EVENT:BLE_DISCONNECT // bluetooth disconnect status
```

```
+ EVENT:BLE_CONNECTED // bluetooth connection succeeded
```

```
+ DATA:<len>,<data> // received Bluetooth transparent data in host mode
```

1.6 errorno error code description

```
// System framework-related error codes
```

0: Success

1: This instruction is not supported (the combo framework contains this instruction but the current platform is not ported or is not supported by adaptation)

2: The instruction parameters contain unsupported operations (the current platform only supports some operations on the instruction)

3: Instruction format error (this refers to the error in the number of parameters, for example, two parameters are required, but only one parameter is entered)

4: Parameter error (the content of the parameter is wrong, for example, you need to enter a number of 0~9, and pass in 10 or xyz, which is the parameter error)

5: The length of the parameter is incorrect. The command length exceeds the maximum supported length.

32: Unknown error (or error type not handled)
 // Common common error codes
 33: malloc error
 34: Failed to read buf
 35: Failed to write buf
 36: Configuration error (configuration error loaded from memory, for example, we set port -1 for OTA upgrade, check port error when executing AT + OTA, and then report configuration error)
 37: Failed to create task
 38: Flash read and write failed
 39: Serial port configuration error, unsupported baud rate
 40: Serial port configuration error, unsupported data bits
 41: Serial port configuration error, unsupported stop bit
 42: Serial port configuration error, unsupported check bit
 43: Serial port configuration error, unsupported flow control
 44: Serial port configuration failed
 45: User name/password error
 46: Low power mode error or unsupported low power mode
 63: General error code (no other information)
 // BLE Bluetooth Related
 225: Bluetooth Startup or Shutdown Error
 226: Failed to set Bluetooth MAC (226: Set Bluetooth MAC;237: Failed to Get Bluetooth MAC)
 227: Modifying Bluetooth MAC is not supported
 228: Unsupported state or operation being performed is not allowed to be performed in the current state
 229: Bluetooth Disconnection Failed
 230: Bluetooth setting MTU failed (236 acquisition MTU failed)
 231: Bluetooth failed to send data
 232: Set Bluetooth Sender Broadcast Status
 233: Bluetooth Host Scan Failed
 234: No specified Bluetooth was scanned
 235: Bluetooth connection failed
 236: Failed to get MTU (failed to set MTU 230)
 237: Failed to get Bluetooth MAC (226: Set Bluetooth MAC;237: Failed to Get Bluetooth MAC)
 255: Unknown Bluetooth Error

2. Basic instruction

2.1 AT test instruction

Description	Instructions to test whether the AT framework is working properly
Response	OK //Some commands removed the response

Example	AT?
Description information in HELP	
Response	+AT:2 ERROR

2.2 AT+HELP

AT+HELP	
Description	Query AT instruction set list
Response	<instruction name>:<comment> ... <instruction name>:<comment> OK
Example	
Description information in HELP	
Response	Show cmd list //It does not work in some commands.

2.3 AT+RST

AT+RST	
Description	Restart module
Response	OK
Example	
Description information in HELP	
Response	Soft restart

2.4 AT+RESTORE

AT+RESTORE	
Description	Restore factory mode and erase configuration information (except MAC address and triplet)
Response	
Remarks	Automatically restart after success Default parameters:
Example	
Description information in HELP	
Response	Restore setting

2.5 ATE1

ATE1	
Description	Open echo
Response	
Example	ATE1
Description information in HELP	
Response	Enable echo

2.6 ATE0

ATE0	
Description	Turn off echo
Response	
Example	ATE0
ATE1 =?	
Response	Disable echo

2.7 AT+GMR

AT+GMR	
Description	Query version information
Response	<at version:>:AT version information (combo version) <sdk version:>:SDK version information <firmware version:>: firmware version
Example	AT+GMR at version:release/v2.0.0 sdk version:amebaD-6.2c firmware version:release/v1.2.3
Description information in HELP	
Response	Show version info

2.8 AT+SLEEP

AT+SLEEP=<mode>	
Description	Set sleep mode
Parameters	Mode: 0: Enter light sleep, power-on does not automatically enter light sleep state

	1: Enter light sleep, and automatically enter light sleep when powered on 2: Enter a deep sleep state
Response	
Remarks	Wake up the module by sending any data to the serial port
Example	
Description information in HELP	
Response	Set low power mode

2.9 AT+UARTCFG

AT+UARTCFG?	
Description	Query AT serial port configuration
Response	+UARTCFG:<baudrate>
Example	
AT+UARTCFG=<baudrate>	
Description	Set AT serial port configuration instructions, 6212,6252 and 8258 only support baudrate
Parameters	baudrate: serial port baud rate, support: 2400, 4800, 9600, 19200, 38400, 57600, 115200, 921600

3. BLE proprietary instruction

3.1 Basic instruction

3.1.1 AT+BLEMAC

AT+BLEMAC?	
Description	Query Bluetooth MAC address
Response	+BLEMAC:<MAC>
Example	
AT+BLEMAC=<MAC>	
Description	Set Bluetooth MAC Address (Effective after Restart)
Parameters	MAC: Bluetooth MAC address to be set, format uppercase without separation eg:AB5F8D9EBB01
Response	

Example	
Description information in HELP	
Response	Query and set BLE MAC

3.1.2 AT+BLEMODE

AT+BLEMODE?	
Description	Query working mode
Response	+BLEMODE :<mode>
Example	
AT+BLEMODE=<mode>	
Description	Set Bluetooth working mode Note: It will be executed immediately after setting the Bluetooth mode. If it is to start Bluetooth, you need to set the Bluetooth parameters before starting Bluetooth.
Parameters	mode: 0: slave mode 1: Host Mode 2:iBeacon mode 9: Bluetooth Off
Response	OK
Example	
Attention	Ruiyu Series (BW16/BW15) If multiple wireless types are turned on, they need to be turned on in the specified order. If AP + STA + Bluetooth triple mode or AP + STA hybrid mode is turned on, AP needs to be turned on first, and then STA and Bluetooth need to be connected (Bluetooth and STA sequence is not required, but AP must be turned on first)
Description information in HELP	
Response	Query and set BLE mode

3.1.3 AT+BLERFPWR

AT+BLERFPWR?	
Description	Query Bluetooth transmit power
Response	+BLERFPWR:MAX:<max_power> MIN:<min_power> CURRENT:<cur_power> // Parameter description max_power: Bluetooth maximum transmit power supported by the current module min_power: Bluetooth minimum transmit power supported by current module cur_power: Bluetooth transmit power set by the current module
Example	
AT+BLERFPWR=<power>	
Description	Set the Bluetooth transmit power (need to be set in the Bluetooth off state)

Parameters	power: Bluetooth transmit power, the values are integer, MAX (maximum transmit power), MIN (minimum transmit power)
Response	OK
Example	
Description information in HELP	
Response	Query and set BLE RF power

3.1.4 AT+BLESTATE

AT+BLESTATE?	
Description	Query Bluetooth connection status
Response	+ BLESTATE:<status>
Parameters	status: 0: Not connected 1: Connected
Example	
Description information in HELP	
Response	Query BLE connect status

3.1.5 AT+BLEDISCON

AT+BLEDISCON	
Description	Disconnect the Bluetooth connection // Removed
Response	
Example	
Description information in HELP	
Response	Disconnect BLE

3.1.6 AT+BLEMENTU

AT+BLEMENTU?	
Description	Query Bluetooth MTU
Response	+BLEMENTU:<MTU>
Example	
AT+BLEMENTU=<mtu>	
Description	Set up bluetooth MTU
Parameters	mtu: Set the MTU of Bluetooth, with a value of 23~250
Response	
Example	
Description information in HELP	

Response	Query and set BLE MTU
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3.1.7 AT+BLESEND

AT+BLESEND=<len>,<data>	
Description	Send data to Bluetooth transparent UUID channel
Parameters	len: The length of the data to be sent, in bytes. data: The content of the data to be sent should be the same length as len.
Response	
Example	
Description information in HELP	
Response	Send by BLE transparent transmission

3.1.8 AT+BLESERUUID

AT+BLESERUUID?	
Description	Query the UUID of the Bluetooth Transparent Service
Response	+BLESERUUID:<UUID>
Example	
AT+BLESERUUID=<UUID>	
Description	Set Bluetooth Transparent Service UUID (Bluetooth name is only allowed when Bluetooth is off)
Parameters	UUID:16-byte service ID, string length 32-bit eg:00112233445566778899aabbccddeeff
Response	
Example	
Description information in HELP	
Response	Query and set BLE TT server UUID

3.1.9 AT+BLETXUUID

AT+BLETXUUID?	
Description	Query the UUID of the TX feature of the Bluetooth Transparent Service.
Response	+BLETXUUID:<UUID>
Example	
AT+BLETXUUID=<UUID>	
Description	Set the TX feature UUID of Bluetooth transparent service (only Bluetooth name is allowed when Bluetooth is off)
Parameters	UUID:16-byte service ID, string length 32-bit

	eg:00112233445566778899aabbccddeeff
Response	
Example	
Description information in HELP	
Response	Query and set BLE TX UUID

3.1.10 AT+BLERXUUID

AT+BLERXUUID?	
Description	Query Bluetooth Transparent Service RX Feature UUID
Response	+BLERXUUID:<UUID>
Example	
AT+BLERXUUID=<UUID>	
Description	Set Bluetooth Transparent Service RX Feature UUID (Bluetooth name is only allowed to be set when Bluetooth is off)
Parameters	UUID:16-byte service ID, string length 32-bit eg:00112233445566778899aabbccddeeff
Response	
Example	
Description information in HELP	
Response	Query and set BLE RX UUID

3.1.11 AT+TRANSENER

AT+TRANSENER	
Description	Enter Bluetooth transparent mode
Response	
Remarks	After entering +++, you can exit the transparent transmission mode and enter the AT command mode.
Example	
AT+TRANSENER	
Description	Start BLE transparent transmission

3.2 Sender command

3.2.1 AT + NAME

AT+NAME?	
Description	Query Bluetooth name
Response	+BLENAME :<ble name>

Example	
AT+NAME	<ble name>
Description	Set Bluetooth device name (only set Bluetooth name when Bluetooth is off)
Parameters	Bble name: bluetooth name (UTF-8 format, Chinese supported)
Response	
Example	AT + NAMEmySPP - 03
Description information in HELP	
Response	Query and set BLE name

3.2.2 AT+BLECONINTV

AT+BLECONINTV?	
Description	Query Bluetooth Connection Interval
Response	+BLECONINTV:<min_interval>,< max_interval>,<latency>,< timeout>
Example	
AT+BLECONINTV=<min_interval>,< max_interval>,<latency>,< timeout>	
Description	Set Bluetooth connection interval (only allowed when Bluetooth is off)
Parameters	min_interval: minimum connection interval, value 6~3200 (actual time is minInterval * 1.25ms, required to be 7.5ms ~ 4S) max_interval: maximum connection interval, value 6~3200 (actual time is minInterval * 1.25ms, required to be 7.5ms ~ 4S) Latency: delay (can skip several connections), required between 0 and 499 Timeout: timeout period, the value is 10~3200, the actual time is Timeout * 10ms, that is, 100ms ~ 32*1000ms and the Timeout is * 10>(1 + Latency)* max_interval * 1.25
Response	
Example	
Description information in HELP	
Response	Query and set BLE connect interval

3.2.3 AT+BLEAUTH

AT+BLEAUTH?	
Description	Query Bluetooth Pairing Code
Response	+BLEAUTH:<pind>
Example	
AT+BLEAUTH=<pind>	
Description	Set Bluetooth pairing code (only allow setting when Bluetooth is off)
Parameters	Pind: Enable pairing code, set 6-digit eg:123456 Disable pairing code DISENABLE

Response	
Example	
Description information in HELP	
Response	Query and set BLE PIN code

3.2.4 AT+BLEADVINTV

AT+BLEADVINTV?	
Description	Query Bluetooth Broadcast Interval
Response	+BLEADVINTV:<intv>
Example	
AT+BLEADVINTV=<intv>	
Description	Set Bluetooth broadcast interval (only allow setting when Bluetooth is off)
Parameters	<intv>: broadcast interval, the unit value is 160~16384, and the broadcast interval is $iNtv * 0.625ms$
Response	
Example	
Description information in HELP	
Response	Query and set BLE broadcast time

3.3 Host instruction

3.3.1 AT+BLESCAN

AT+BLESCAN	
Description	Initiate scanning in Bluetooth host mode
Response	Devices Found:<id/total> // index/total indicates the serial number of the currently scanned bluetooth device and the total number of scans Name:<name> // bluetooth name, if not, N/A will be displayed MAC:<MAC> // uppercase + colon separation rssi:<rssi> Devices Found:<id/total> name:<name>N/A MAC:<MAC> rssi:<rssi>
Example	
Description information in HELP	

Response	Start BLE scan
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3.3.2 AT+ BLECONNECT

AT+BLECONNECT=<MAC>	
Description	Connect to specify Bluetooth (only allow connection in Bluetooth host state) Note: This is only a single connection. It will not automatically reconnect after the connection fails, and it will not automatically reconnect after the connection is successful.
Parameters	MAC: connection destination mac address (eg:A4C13812505C)
Response	+EVENT:BLE_ <u>C</u> ONNECTED *Transmission direction: Host -> Slave only
Example	
Description information in HELP	
Response	Set BLE connect

3.3.3 AT+BLEAUTOCON

AT+BLEAUTOCON=<MAC>,<UUID>,<save_flash>	
Description	Connect to specify Bluetooth (only allow connection in Bluetooth host state)
Parameters	MAC: connection destination mac address (eg:A4C13812505C) UUID: If you need to connect to the specified UUID, set it to the last two digits of the target UUID (eg:E455) Note: The connection can be realized by either input of MAC and UUID (both can be set). If there is no restriction, it is set to FALSE. If both MAC and UUID are set to FALSE, the automatic connection is closed. save_flash: whether to save to flash and set up automatic connection when starting up, 0 means not to save, only this connection, 1 means to save to flash, and the next time to start up automatic connection
Response	+ EVENT:BLE_ <u>C</u> ONNECTED // This message is displayed if the connection is successful + BLEAUTOCON:Wait connect // If the specified Bluetooth is not currently scanned, the message will be displayed (the background will also automatically scan, and will automatically connect when the specified connection is scanned)
Example	
Description information in HELP	
Response	Set BLE auto connect

3.3.4 AT+BLEDISAUTOCON

AT+BLEDISAUTOCON	
Description	Cancel starting automatic scanning connection Bluetooth
Response	
Example	
Description information in HELP	
Response	Turn off BLE auto connect

3.4 BLE iBeacon command

3.4.1 AT+BLEIBCNUUID

AT+BLEIBCNUUID?	
Description	Query the iBeacon UUID of the current Bluetooth setting
Response	+BLEIBCNUUID:<iBeacon>
Example	
AT+BLEIBCNUUID=<iBeacon>	
Description	Set the iBeacon UUID of Bluetooth (only allow setting when Bluetooth is off)
Parameters	iBeacon: UUID to set (length 16 bytes, string length 32 bits eg:00112233445566778899aabbccddeeff)
Response	
Example	
Description information in HELP	
Response	Query and set BLE iBeacon UUID

3.4.2 AT+BLEIBCNDATA

AT+BLEIBCNDATA=<company ID>,<MAJOR>,<MINOR>,<POWER>	
Description	Set Bluetooth iBeacon data (only allow setting when Bluetooth is off)
Parameters	companyID(2 bytes 16-byte data, eg:11aa) MAJOR (2 bytes of 16-byte data, eg:11aa), MINOR (2 bytes of 16-byte data, eg:11aa), POWER (1 byte of 16-byte data, eg:aa)
Response	
Example	
Description information in HELP	
Response	Set BLE iBeacon data