

BCM-LZ100-AS

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CONFIDENTIAL INFORMATION

BnCOM Co.,Ltd.

BCM-LZ100-AS

AT Command Reference(English)

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■ HISTORY

Version	Release Data	Revision History
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1. Introduction

This document describes the "BCM-LZ100-AS Module" (hereinafter referred to as "BT") and the customer's MCU (hereinafter referred to as "HOST") connected by UART interface.

It defines the communication protocol through UART (serial port) between

1.1. Protocol Basic Rule

Data transmission/reception between HOST and BT is based on UART (serial port) interface.

- UART(serial port) Default setting

- Baud rate: 115200 bps
- Data bit: 8
- Parity bit: none
- Stop bit: 1
- Flow control: none

The above is the basic setting value, and if you want to change it, make a modification request when writing BT firmware or Change using command.

- Communication Direction

- REQUEST (HOST→BT): It is generated in HOST and transmitted to BT.
- NOTIFY(BT → HOST): A message generated by BT and delivered to HOST, which informs the basic status of BT.
- RESPONSE(BT → HOST): This is a message generated by BT and delivered to HOST. It is a response to REQUEST.

- Communication Rule

All protocols are composed of a combination of ASCII values, and protocol command commands notify the end of commands through Carriage Return (0x0D).

Ex) RESPONSE – REQUEST request success: "+OKWr"

Command	ERROR					
Command Set	+	O	K	Wr		
ASCII Set	0x2B	0x4F	0x4B	0x0D		



1.2. Protocol default operation

BT transmits the corresponding RESPONSE after receiving the REQUEST from the HOST.

The HOST can basically expect a RESPONSE of "+OK↵" or "+ERROR↵", and can receive a specific RESPONSE corresponding to the REQUEST.

2. Bluetooth Low Energy

When BT is operating, it operates as BLE Peripheral and provides the following functions

2.1. BLE Service UUID Classification

BT provides Data Service for data communication, and each UUID is shown in the table below.

Smartphones or other devices can access each service through the following UUID.

Division	UUID	Property
Data Service (Primary)	0x3B790000923E4F69B79474F07D000000	N/A
Notification (Characteristic)	0x3B790001923E4F69B79474F07D000000	Notification
Write No Response (Characteristic)	0x3B790002923E4F69B79474F07D000000	Write without Response



2.2. BLE Advertising Data

Advertising data transmitted by BT in factory default state during BLE operation is as shown in "Advertising Data Table" below..
 "Host" can set Advertiser manufacture/Service data information through AT Command command.

■ Advertising Data table

Total 31Byte	AD Structure 1	Length	0x02	Length of this data
		Type	0x01	Advertising type flag
		AD Data	0x06	LE Flag
	AD Structure 2	Length	0x02	Length of this data
		Type	0x0A	BLE TX Power
		AD Data	0x0A	10 dBm
	AD Structure 3	Length	0x13	Length of this data
		Type	0x09	Complete Local Name
		AD Data BLE Name	0x42	B
			0x43	C
			0x4D	M
			0x2D	-
			0x4C	L
			0x5A	Z
			0x31	1
			0x30	0
			0x30	0
			0x2D	-
			0x41	A
			0x53	S
	AD Structure 4	Length	NULL	
		Type	NULL	
		Manufacture Data (User settings Data)	NULL	



3. BT GPIO

A separate GPIO is assigned to inform the status information of BT or to control specific functions of BT in the HOST.

GPIO	Name	Direction	I/O	Description
PIO.14	Connected State	Output	Low	BLE Device Disconnected.
			High	BLE Device Connected.
PIO.34	Command Mode State	Input	Low	Command Mode (When the other device is connected)
			High	BLE Data Transfer Mode (When the other device is connected)
PIO.02	Sleep Wakeup	Input	Both (default : Low)	<ol style="list-style-type: none"> 1. When BT is operating in uart off sleep mode through AT command, Uart On. 2. When BT is in deep sleep mode operation through AT command, Device Reset wake up.

Ex> BT Uart wake up : PIO.02 (default : LOW) -> PIO.02 (High) -> PIO.02 (LOW) = BT Uart Init



4. Notify Protocol Summary

Through the Notify message notifying the state transition of BT, the HOST can detect the state change of BT in real time.

Command	Description	note
+READYWr	Power is applied and initialization is completed.	
+CONNECTEDWr	The BT device connects with the other device.	
+DISCONNECTEDWr	The BT device disconnected from the other device.	
+IDLE	BT device goes to standby.	
+ADVERTISINGWr	BT device starts BLE Advertising.	
+COMMANDWr	Operates in AT Command state while BT is connected to the other device.	
+TRANSFERWr	Operates in Data Transfer state while BT is connected to the other device.	

5. General Response Protocol Summary

The response message that informs the processing result of the command that controls various operations of BT is as follows.

Command	Description	note
+OKWr	Response to command received	
+ERROR,1Wr	No command received	
+ERROR,2Wr	Command passed parameter value error	
+ERROR,3Wr	Command passed parameter count error	
+ERROR,4Wr	Unable to process command	
+ERROR,5Wr	The command was executed, but the operation is not normal.	



6. AT Request Command Protocol Summary

Commands provided by BT may need to be reset after executing commands, so be sure to refer to the table below before using them

6.1. General Commands Summary

Command	Function	Factory Reset Setting Value	Reset Need	note
AT	Data RX/TX Test			
ATZ	Device Reset			
ATO	BLE Data transmission mode setting.			
AT&F	Factory reset device settings			
AT&S	Save device setting information.			
AT+DISCONNECT	Disconnect BLE device.			
AT+VER?	Device firmware version information.			
AT+REMOTEADDR?	Mac address information of the connected device.			
AT+NAME?	Device name information.	BCM-LZ100-AS		
AT+NAME=xxx	Set device name.			
AT+ADDR?	Device MAC Address Information			
AT+ADVINFO?	BLE Advertiser information.			
AT+ADVERTISING?	BLE Advertiser operation status information.	" +ADVERTISING"		
AT+ADVERTISING=x	BLE Advertiser operation status setting.			
AT+UART?	Device Uart communication setting information.	Baudrate : 115,200 Paritybit : None		
AT+UART=b,p	Device Uart communication settings.		O	
AT+MANUFDATA?	BLE Advertiser Manufacture information.			
AT+MANUFDATA=xxx	BLE Advertiser Manufacture settings.			
AT+ADVINTERVAL?	BLE Advertising Interval information.	160ms		
AT+ADVINTERVAL=ms	BLE Advertising Interval setting.			
AT+CONNINTERVAL?	BLE Connection Interval information.	Min : 6 (7.5ms) Max : 20 (25ms) Latency : 0 S_Timeout : 400 (4s)		
AT+CONNINTERVAL=m,m,l,s	BLE Connection Interval setting.			
AT+TXPWR?	BLE Tx power strength information.	0 (10dBm)		
AT+SLEEP=x	BT Sleep mode operation setting.			



6.2. General Commands

6.2.1. AT

■ Description

UART TX/RX Path test of BT module and host device.

■ Examples

```
(HOST→BT) : ATWr
(BT→HOST) : +OKWr
```

6.2.2. ATZ

■ Description

BT Device Software Reset.

■ Examples

```
(HOST→BT) : ATZWr
(BT→HOST) : +OKWr
--- Reboot ---
(BT→HOST) : +READYWr
--- When advertiser is enabled ---
(BT→HOST) : +ADVERTISINGWr
```

6.2.3. ATO

■ Description

After the BT module is connected to another BLE device, it changes to the status for transmitting data to the other device.

Error response when the connection with the other device is not established.

When BT connects with the other device, the basic operation is data transmission.

■ Examples

```
(HOST→BT) : ATOWr
(BT→HOST) : +OKWr
```



6.2.4. **AT&F**

■ **Description**

As a command to factory reset the setting values of BT, when the corresponding command is used BT module initializes device settings and executes Software Reset.

Error response when BT is connected to the other device.

Initialization List See General Commands Summary.

■ **Examples**

(HOST→BT) : AT&FWr

(BT→HOST) : +OKWr

--- Reboot ---

(BT→HOST) : +READYWr

(BT→HOST) : +ADVERTISINGWr

6.2.5. **AT&S**

■ **Description**

Command to save BT setting information to Flash Memory

■ **Info**

When the command is used, the entire information used for flash memory setting in BT is saved.

Data Storage List See General Commands Summary.

■ **Examples**

(HOST→BT) : AT&SWr

(BT→HOST) : +OKWr



6.2.6. AT+DISCONNECT

■ Description

Disconnect from the other device to which BT is connected.

Error response when BT is not connected to the other device.

■ Examples

```
(HOST→BT) : AT+DISCONNECT
(BT→HOST) : +OKWr
--- Device Disconnect Completed ---
(BT→HOST) : +DISCONNECTED
```

6.2.7. AT+VER?

■ Description

Firmware version information of BT module.

■ Examples

```
(HOST→BT) : AT+VER?
(BT→HOST) : +VER:1.0.0Wr
```

6.2.8. AT+REMOTEADDR?

■ Description

MAC Address information of the other device to which BT was last connected.

■ Info

Response "000000000000" when there is no connection information with the counterpart device

■ Info

Data format : ASCII code in Hex data format

■ Examples

```
(HOST→BT) : AT+REMOTEADDR?
(BT→HOST) : +REMOTEADDR:74F07DABCDEFWr
```



6.2.9. **AT+NAME?**

■ **Description**

BT device name information.

■ **Examples**

(HOST→BT) : AT+NAME?Wr

(BT→HOST) : +NAME:BCM-LZ100-ASWr

6.2.10. **AT+NAME=xxx**

■ **Description**

Set the name of the BT device. Use parameter data as ASCII data.

Error response when BT is connected to the other device.

Error response if the data exceeds the maximum length that can be set. (up to 23 bytes)

■ **Info**

Data format : ASCII code

■ **Info**

Name Lens = total(31byte) – (manufacture data lens+2) - flag(3byte) – tx power(3byte)

■ **Examples**

(HOST→BT) : AT+NAME=BCM-LZ100Wr

(BT→HOST) : +OKWr



6.2.11. AT+ADVINFO?

■ Description

BT Advertiser operation information. Outputs the current advertising data value.

■ Info

Data format : ASCII code in Hex data format

■ Examples

(HOST→BT) : AT+ADVINFO?Wr

(BT→HOST) : +ADVINFO: 020106020A0A0D0942434D2D4C5A3130302D4153Wr

6.2.12. AT+ADVERTISING?

■ Description

BT Advertiser operation information.

■ Examples

(HOST→BT) : AT+ADVERTISING?Wr

(BT→HOST) : +ADVERTISING=1Wr



6.2.13. AT+ADVERTISING=x

■ Description

BT Advertiser operation settings. Using parameter data as Decimal data.

Error response when BT is connected to the other device.

■ Info

Advertiser If the existing operation and command input are the same, +OKWr response.

■ Info

Data format : ASCII code in Decimal data format

■ Range

0 : Advertiser Disable.

1 : Advertiser Enable.

Other value error.

■ Examples

(HOST→BT) : AT+ADVERTISING=1Wr

(BT→HOST) : +OKWr

(BT→HOST) : +IDLEWr or +ADVERTISINGWr



6.2.14. AT+UART?

■ Description

BT Uart Settings Information.

■ Info

Response data : Baudrate, ParityBit

■ Info

Data format : ASCII code in Decimal data format

■ Examples

(HOST→BT) : AT+UART?Wr

(BT→HOST) : +UART:230400,0Wr



6.2.15. AT+UART=B,P

■ Description

BT Uart settings. Using parameter data as Deciaml data.

When applied after reset, data storage is required.

Error response when BT is connected to the other device.

■ Range

B = BaudRate	9600 ~ 1000000 Other value is error.
P = ParityBit	1 = Even Parity Bit 0 = None Parity Bit Other value error.

■ Info

Data format : ASCII code in Decimal data format

■ Examples

(HOST→BT) : AT+UART=230400,0Wr

(BT→HOST) : +OKWr



6.2.16. AT+MANUFDATA?

- **Description**

BT Advertiser Manufacture data information.

- **Info**

Response data : Manufacture Data

- **Info**

Data format : ASCII code in Decimal data format

- **Examples**

(HOST→BT) : AT+MANUFDATA?Wr

(BT→HOST) : +MANUFDATA:12345Wr



6.2.17. AT+MANUFDATA=MD

■ Description

BT Advertiser Manufacture data setup. Using parameter data as Decimal data.

Parameter data is 0x2C (", " : comma), 0x00 (NULL) data is not used.

Error response when BT is connected to the other device.

■ Info

MD = Manufacture data.

■ Info

Data format : ASCII code in Decimal data format

■ Info

Error response if it exceeds the maximum length that can be set.

Manufacture Lens = total(31byte) – (Device Name Lnes+2) – flag(3byte) – tx power(3byte)

■ Examples

(HOST→BT) : AT+MANUFDATA=12345Wr

(BT→HOST) : +OKWr



6.2.18. AT+ADVINTERVAL?

■ Description

About BT Advertising Interval.

■ Info

Data format : ASCII code in Decimal data format
Unit : 1 ms

■ Range

Min : 20 ms
Max : 10240 ms
Other value error.

■ Examples

(HOST→BT) : AT+ADVINTERVAL?Wr
(BT→HOST) : +ADVINTERVAL:160Wr

6.2.19. AT+ADVINTERVAL=ms

■ Description

BT Advertising Interval information. Using parameter data as Decimal data.
Error response when BT is connected to the other device.

■ Info

Data format : ASCII code in Decimal data format
Unit : 1 ms

■ Range

20ms(min) ~ 10240ms(max)
Other value error.

■ Examples

(HOST→BT) : AT+ADVINTERVAL=160Wr
(BT→HOST) : +OKWr



6.2.20. AT+CONNINTERVAL?

■ Description

BT Connection Interval Information.

■ Info

Data format : ASCII code in Decimal data format

■ Range

Min (Unit : 1.25ms) : 0x0006 (6 * 1.25ms = 7.5ms) ~ 0x0C80 (3200 * 1.25ms = 4s)

Max (Unit : 1.25ms) : 0x0006 (6 * 1.25ms = 7.5ms) ~ 0x0C80 (3200 * 1.25ms = 4s)

Latency : 0~ 499 (0x01F3)

S_timeout (Unit : 10ms) : 0x000A (10 * 10ms = 100ms) ~ 0x0C80 (3200 * 10ms = 32s)

Other value error.

■ Examples

(HOST→BT) : AT+CONNINTERVAL?Wr

(BT→HOST) : +CONNINTERVLA:6,12,0,400Wr



6.2.21. AT+CONNINTERVAL=min,max,latency,s_timeout

■ Description

BT Connection Interval setting. Use parameter data as Decimal data.

Error response when BT is connected to the other device.

■ Info

Data format : ASCII code in Decimal data format.

S_timeout = Supervision time out.

Supervision time out setting value must be greater than the value of $((\text{latency}+1)*\text{MAX})*2$.

■ Range

Min (Unit : 1.25ms) : 0x0006 (6 * 1.25ms = 7.5ms) ~ 0x0C80 (3200 * 1.25ms = 4s)

Max (Unit : 1.25ms) : 0x0006 (6 * 1.25ms = 7.5ms) ~ 0x0C80 (3200 * 1.25ms = 4s)

Latency : 0~ 499 (0x01F3)

S_timeout (Unit : 10ms) : 0x000A (10 * 10ms = 100ms) ~ 0x0C80 (3200 * 10ms = 32s)

Other value error.

■ Examples

(HOST→BT) : AT+CONNINTERVAL=6,20,0,400Wr

(BT→HOST) : +OKWr



6.2.22. AT+TXPWR?

■ Description

About BT Advertiser TX Power.

■ Info

Data format : ASCII code in Decimal data format

■ Range

0 : 10 dBm
 1 : 5 dBm
 2 : 4 dBm
 3 : 3 dBm
 4 : 0 dBm
 5 : -2 dBm
 6 : -5 dBm
 7 : -6 dBm
 8 : -10 dBm
 9 : -15 dBm
 10 : -20 dBm
 Other value error.

■ Examples

(HOST→BT) : AT+TXPWR?Wr
 (BT→HOST) : +TXPWR:0Wr



6.2.23. AT+SLEEP=x

■ Description

Sleep mode operation setting of BT module. Default idle sleep mode operation (Uart ON sleep mode) if sleep mode operation is not set through command

■ Info

Data format : ASCII code in Decimal data format

■ Range

0 : BT Uart module off sleep mode.
1 : BT Deep sleep mode.
Other value error.

■ Wakeup

0 : BT Uart off sleep mode
→ PIO.00 both edge. (default low -> high -> low) -> Uart module init.
→ Wakeup Delay (500ms)
1 : BT Deep sleep mode.
→ PIO.00 both edge. (default low -> high -> low) -> BT Device reset wake up.
→ Wakeup Delay (500mS)

■ Examples

(HOST→BT) : AT+SLEEP=0Wr
(BT→HOST) : +OKWr



6.2.24. **AT+INFO?**

- **Description**

BT device name, address, version information

- **Examples**

(HOST→BT) : AT+INFO?Wr

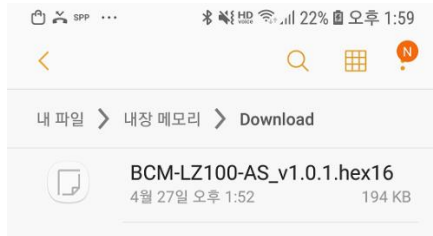
(BT→HOST) : +INFO:BCM-LZ100-AS,74F07D000000,1.0.0Wr



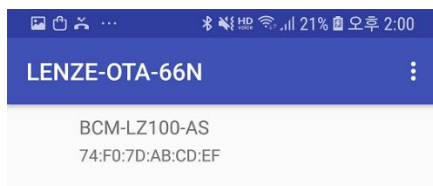
7. Over The Air Device Firmware Update Guide

- Guide for using LENZE Tech Application "LENZE-OTA-66N". Provide Download APK

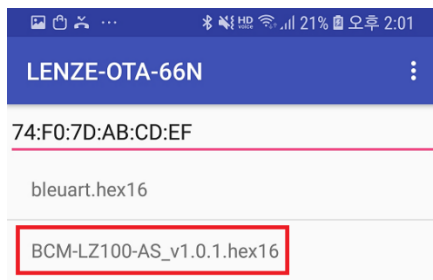
7.1. Move the Download file to the Download root.



7.2. BLE Device Scan.



7.3. Download File Select.



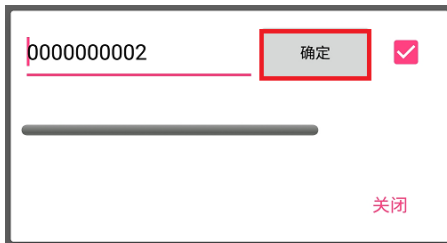
7.4. Enter OTA Key.

- OTA Key: Delivered when OTA F/W is delivered



7.5. OTA Update Start.

确定 click



7.6. OTA Update Complet.



FCC MODULAR APPROVAL INFORMATION

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.

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

NOTE:

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 equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

OEM INTEGRATION INSTRUCTIONS:

This device is intended only for OEM integrators under the following conditions:

The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 3 conditions above are met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

Upgrade Firmware:

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

End product labeling:

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2APDI-BCM-LZ100-AS".

Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

RSS-GEN Section

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RSS-102 RF Exposure

L'antenne (ou les antennes) doit être installée de façon à maintenir à tout instant une distance minimum de au moins 20 cm entre la source de radiation (l'antenne) et toute personne physique. Cet appareil ne doit pas être installé ou utilisé en conjonction avec une autre antenne ou émetteur.