

BCM-SQ400-AS

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BnCOM Co.,Ltd.



BnCOM

Audio Module User Manual

BCM-SQ400-AS

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Revision History

[illegible]

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1. INTRODUCTION

PURPOSE

This document presents the AT command set supported by BnCOM Bluetooth audio module and describes the protocol used to control and configure.

INTENDED AUDIENCE AND PERTINENT SECTIONS

This document is intended for BnCOM customers, especially system integrators, about to implement Bluetooth modules in their application.

Readers of this document should be familiar with BnCOM modules and their ease of controlling by means of AT commands.

This manual is intended for the developers who need to communicate with the devices using AT commands.

DOCUMENT CONVENTIONS

REFERENCES

The following documents contain provisions which, through reference in this text,

- [1] ITU-T Recommendation V.250: "Serial asynchronous automatic dialing and control".
- [2] Bluetooth Core specification v5.0
- [3] Bluetooth Profile Specification: "Hands-Free Profile 1.7".
- [4] Bluetooth Profile Specification: "Advanced Audio Distribution v1.3.2".
- [5] Bluetooth Profile Specification: "Audio/Video Remote Control v1.6.2".

2. Overview

DEFINITIONS AND ABBREVIATION

2.1.1 Definitions

For the purpose of the present document, the following syntactical definitions apply:

- <CR> Carriage return character, is the command line and result code terminator character.
- <LF> Linefeed character, is the character as line feed character.
- <...> Name enclosed in angle brackets is a parameter. The brackets themselves do not appear in the command line.
- [...] The square brackets represent the optional parameters of a command. Brackets do not appear in the command line. When a parameter is not given, the value will be set to the default value provided in the command description.
- Underline Underlined defined sub parameter value is the recommended default setting of this sub parameter.

2.1.2 Abbreviations

For the purpose of the present document, the following abbreviation apply:

- DCE Data Communication Controller
- DTE Data Terminal Equipment
- AG This is the device that is the gateway of the audio, both for input and output. Typical devices acting as AG are cellular phones.
- HF This is the device acting as the AG's remote audio input and output mechanism. It also provides some remote control means.

3. AT COMMAND

3.1 AT Command syntax

In this document, the following naming conventions are used:

- DCE (Data Communication Equipment): Bluetooth Audio module.
- DTE (Data Termination Equipment): The terminal that command to the module, e.g., PC or MCU.

Command Line

All command lines must start with “**AT**” and end with a carriage return character.

There are four types of AT command operations:

- Test command
Checks whether a certain AT command is supported. The syntax is:
+<name>=?
- Set command
Changes the settings used certain tasks
+<name>=<value>
+<name>=<compound value>
- Read command
Retrieves the current settings used for certain tasks
+<name>?
- Execution command
Perform an action or retrieve information/status
+<name>

The command line buffer can accept a maximum of **50** characters. If the characters entered exceeded this number, then “ERROR” will be returned.

Information Response and Result Codes

Information response and result codes (including both final codes and unsolicited codes) always start and end with a carriage return character and a linefeed character.

The AT commands will have the information response and result code in the below format:

- Information text responses: <CR><LF><text><CR><LF>
- Result codes: <CR><LF><verbose code><CR><LF>

There are three types of result codes: final, intermediate, and unsolicited.

The final result codes indicate that the execution of currently running AT commands is finished.

As an example, it can be any one of following types:

- <CR><LF>OK<CR><LF>
if the command is successful.
- <CR><LF>ERROR<CR><LF>
if the command has wrong format/command is invalid/command is not applicable, etc.

An intermediate result code or information text related to a command that comes before the final result code.

An intermediate result code (IRC) is a report of the progress of a DCE action.

Unsolicited result code is response that the modem issues independently of any running AT command as response to certain events (in the modem).

Unsolicited result codes (URC) indicate the occurrence of an event not directly associated with the issuance of a command from the DTE.

Range of values

For example, the following are some examples of value range indications:

- (0) Only the value 0 is supported
- (1,2,3) The values 1, 2, and 3 are supported
- (1-3) The values 1 through 3 are supported

Case Sensitivity of AT Commands

In this document, all AT commands are in uppercase letters.

For example

V1 – Extended syntax result codes			
Command	Syntax	Example	Response*NOTE
Test	+<name>=?	AT+UART=?<CR>	<CR><LF> +UART: (9600-1382400),(1,2),(N,O,E)<CR><LF> <CR><LF>OK<CR><LF>
Set	+<name>=[<value>]	AT+UART=115200,1,N<CR>	<CR><LF>OK<CR><LF> or <CR><LF>ERROR<CR><LF>
Read	+<name>?	AT+UART?<CR>	<CR><LF> +UART: 115200,1,N<CR><LF> <CR><LF>OK<CR><LF>
Execution	+<name>	AT+UART<CR>	<CR><LF>ERROR<CR><LF>

*NOTE Response format can be changed by ATV command.

3.2 Basic Commands

3.2.1 ATtention

Description

- Attention command determining the presence of a DCE, i.e., the Bluetooth audio module.

Syntax

Command	Possible Responses
AT	OK No response

Defined values

- None

3.2.2 Soft reset Z

Description

- This command can be used to force a reboot (warm reset) of the module

Syntax

Command	Possible Responses
ATZ[<value>]	OK

Defined values

- 0** Reset
 - 1** Reset and power on automatically
- If <n> is missing, the value "0" is assumed.

Examples

```
ATZ
OK
READY # Rebooted after one second.
```

3.2.3 Set to factory-defined configuration &F

Description

- This command can be used to reset all settings to their factory defaults as specified by the manufacturer

Syntax

Command	Possible Responses
AT&F	OK

Defined values

- None

Result codes

- OK If value is valid
- ERROR If value is not recognized or not supported

Examples

```
AT&F
OK
```

READY # Rebooted within a second

Notes

- The UART-related settings remain unchanged.

3.2.4 Verbose result codes V

Description

- This command determines the contents of header and trailer transmitted with AT command result codes and information response.

Syntax

Command	Possible Responses
ATV<value>	OK ERROR +CME ERROR: <err>

Defined values

- 0 Information responses: <text><CR><LF>, Result codes: <verbose code><CR>
1 Information responses: <CR><LF><text><CR><LF>, Result codes: <CR><LF><verbose code><CR><LF>
2 Information responses: <text><CR><LF>, Result codes: <verbose code><CR><LF>
3 Information responses: <text><CR>, Result codes: <verbose code><CR>
4 For backward compatibility

Examples

```

ATV0 # Set <value>=0
OK<CR> # Result codes: <verbose code><CR>
AT+UART?
+UART: 115200,1,N<CR><LF> # Information responses: <text><CR><LF>
OK<CR>

ATV1 # Set <value>=1
<CR><LF> # Result codes: <CR><LF><verbose code><CR><LF>
OK<CR><LF>
AT+UART?
+UART: 115200,1,N<CR><LF> # Information responses: <CR><LF><text><CR><LF>
<CR><LF>
OK<CR><LF>

```

Notes

Table 3.2.4.1 V0 parameter on response format

V0 – Extended syntax result codes			
Command	Syntax	Example	Response
Execution	+<name>	AT+UART<CR>	ERROR<CR>
Test	+<name>=?	AT+UART=?<CR>	+UART: (9600-1382400),(1,2),(N,O,E)<CR><LF> OK<CR>
Set	+<name>=<value>	AT+UART=115200,1,N<CR>	OK<CR>
Read	+<name>?	AT+UART?<CR>	+UART: 115200,1,N<CR><LF> OK<CR>

Table 3.2.4.2 V1 parameter on response format

V1 – Extended syntax result codes			
Command	Syntax	Example	Response
Execution	+<name>	AT+UART<CR>	<CR><LF>ERROR<CR><LF>
Test	+<name>=?	AT+UART=?<CR>	<CR><LF> +UART: (9600-1382400),(1,2),(N,O,E)<CR><LF> <CR><LF>OK<CR><LF>

Set	+<name>=<value>	AT+UART=115200,1,N<CR>	<CR><LF>OK<CR><LF> or <CR><LF>ERROR<CR><LF>
Read	+<name>?	AT+UART?<CR>	<CR><LF> +UART: 115200,1,N<CR><LF> <CR><LF>OK<CR><LF>

Table 3.2.4.3 V2 parameter on response format

V2 – Manufacturer specific			
Command	Syntax	Example	Response
Execution	+<name>	AT+UART<CR>	ERROR<CR><LF>
Test	+<name>=?	AT+UART=?<CR>	+UART: (9600-1382400),(1,2),(N,O,E)<CR><LF> OK<CR><LF>
Set	+<name>=<value>	AT+UART=115200,1,N<CR>	OK<CR><LF> or ERROR<CR><LF>
Read	+<name>?	AT+UART?<CR>	+UART: 115200,1,N<CR><LF> OK<CR><LF>

Table 3.2.4.4 V3 parameter on response format

V3 – Manufacturer specific			
Command	Syntax	Example	Response
Execution	+<name>	AT+UART<CR>	ERROR<CR>
Test	+<name>=?	AT+UART=?<CR>	+UART: (9600-1382400),(1,2),(N,O,E)<CR> OK<CR>
Set	+<name>=<value>	AT+UART=115200,1,N<CR>	OK<CR> or ERROR<CR>
Read	+<name>?	AT+UART?<CR>	+UART: 115200,1,N<CR> OK<CR>

Table 3.2.4.5 V4 parameter on response format

V4 – Manufacturer specific			
This supports for backward compatibility with old products. Information response and result codes always begin with the character "+".			
Command	Syntax	Example	Response
Execution	+<name>	AT+UART<CR>	+ERROR<CR>
Test	+<name>=?	AT+UART=?<CR>	+UART: (9600-1382400),(1,2),(N,O,E)<CR> +OK<CR>
Set	+<name>=<value>	AT+UART=115200,1,N<CR>	+OK<CR> or +ERROR<CR>
Read	+<name>?	AT+UART?<CR>	+UART: 115200,1,N<CR> +OK<CR>

3.2.5 Error message format +CMEE

Description

- This command disables or enables the use of the final result code + CME ERROR instead of ERROR.

Syntax

Command	Possible Responses
AT+CMEE=<value>	OK ERROR +CME ERROR: <err>
AT+CMEE?	+CMEE: <value> OK
AT+CMEE=?	+CMEE: (list of supported <value>)

	OK
--	----

Defined values

- 0 Disable.
ERROR is used as the final result code in case of failure
- 1 Enable.
+CME ERROR: <err> result code and numeric <err> values are used

Notes

- For numeric error codes, see APPENDIX A.

Examples

```

AT+CME=0                # Disable CME ERROR result code
OK
AT+REMOTENAME?           # Query remote device name when not connected
ERROR                    # ERROR will be displayed
AT+CME=1                # Enable CME ERROR result code with numeric value
OK
AT+REMOTENAME?           # Query remote device name when not connected
+CME ERROR: 7            # CME ERROR will be displayed with error code

```

3.2.6 Display product identification information I

Description

- Display basic product identification information, which are version, local name and local address.

Syntax

Command	Possible Responses
ATI	<product information text> OK

Defined values

- None

Examples

```

ATI
00.00.01                # Version
BnCOM Audio Module      # Local name
74f0-7d-000000          # Local address
OK

```

3.2.7 Display version information +VERSION

Description

- Display firmware version

Command	Possible Responses
AT+VERSION	<major>.<minor>.<patch> OK
AT+VERSION?	+VERSION: <major>.<minor>.<patch> OK

Defined values

- None

Examples

AT+VERSION

01.02.26

OK

3.2.8 Change UART configuration +UART

Description

- Change UART configuration

Syntax

Command	Possible Responses
AT+UART=<baud>,<stop>,<parity>	OK ERROR +CME ERROR: <err>
AT+UART?	+UART: <baud>,<stop>,<parity> OK
AT+UART=?	+UART: (list of supported <baud>),(list of supported <stop>),(list of supported <parity>) OK

Defined values

<baud>	Description
9600	9600 bps
19200	19200 bps
38400	38400 bps
115200	115200 bps
230400	230400 bps
460800	460800 bps
921600	921600 bps
1382400	1382400 bps
<stop>	Description
1	1 Stop bit
2	2 Stop bits
<parity>	Description
N	None
O	Odd
E	Even

<baud>

9600 9600 bps
 19200 19200 bps
 38400 38400 bps
115200 115200 bps
 230400 230400 bps
 460800 460800 bps
 921600 921600 bps
 1382400 1382400 bps

- Number of stop bits

<stop>

1 One bit
 2 Two bits

- Parity to use

<parity>

N None
 O Odd
 E Even

Examples

```
AT+UART=115200,1,N
OK
AT+UART?
+UART: 115200,1,N
OK
```

3.3 General Commands

3.3.1 Configure the Bluetooth local name +LOCALNAME

Description

- Change Bluetooth local name

Syntax

Command	Possible Responses
AT+LOCALNAME=<name>	OK ERROR +CME ERROR: <err>
AT+LOCALNAME?	+LOCALNAME: <name> OK
AT+LOCALNAME=?	OK

Defined values

- Name string with double-quote character (")

<name>

1 to 26 characters in length

BCM-SQ400-AS Default

Examples

```
AT+LOCALNAME="BCM-SQ400-AS" # Set local name
OK
AT+LOCALNAME?                # Read current local name
+LOCALNAME: "BCM-SQ400-AS"
OK
```

3.3.2 Read the remote Bluetooth name +REMOTENAME

Description

- This command can be used to read of the remote device name.

Syntax

Command	Possible Responses
AT+REMOTENAME?	+REMOTENAME: <name> OK

Defined values

- None

Examples

```
CONNECTED: 02,112233445566 # Connected
AT+REMOTENAME?
+REMOTENAME: "My Phone"    # Read remote device name
OK
```

3.3.3 Read the local Bluetooth address +LOCALADDR

Description

- This command can be used to read the local Bluetooth address.

Syntax

Command	Possible Responses
AT+LOCALADDR?	+LOCALADDR: <address> OK

Defined values

- None

Examples

```
AT+LOCALADDR?           # Read address
+LOCALADDR: 74F07D000000
OK
```

3.3.4 Read the remote Bluetooth address +REMOTEADDR

Description

- This command can be used to read the Bluetooth address of remote device.

Syntax

Command	Possible Responses
AT+REMOTEADDR?	+REMOTEADDR: <address> OK

Defined values

- None

Examples

```
CONNECTED: 02,112233445566   # Connected
AT+REMOTEADDR?              # Read address
+REMOTEADDR: 112233445566
OK
```

3.3.5 Configure the Bluetooth pairing procedure +PAIRMODE

Description

- Change the Bluetooth pairing procedure

Syntax

Command	Possible Responses
+PAIRMODE=<value>	OK ERROR +CME ERROR: <err>
+PAIRMODE?	+PAIRMODE: <value> OK
+PAIRMODE=?	+PAIRMODE: (list of supported <value>) OK

Defined values

- 0 Legacy Pin code
- 1** SSP – Just Works
- 2 SSP – Passkey Entry
- 3 SSP – Numeric Comparison

Notes

- Bluetooth security is set at boot time. Therefore, if the security settings change, the module will reboot within 1 seconds automatically.

3.3.6 Change PIN code +PINCODE

Description

- Change Bluetooth legacy pairing pin code

Syntax

Command	Possible Responses
AT+PINCODE=<value>	OK ERROR +CME ERROR: <err>
AT+PINCODE?	+PINCODE: <value> OK
AT+PINOCDE=?	+PINCODE: (list of range <value>) OK

Defined values

0000...9999 4-digits pin code
0000 Default

Examples

AT+PINCODE=1234
 OK

3.3.7 Power on reconnection +PWRONCON

Description

- Set for automatic reconnection attempts in case of Bluetooth connection failure on power on

Syntax

Command	Possible Responses
AT+PWRONCON=<value>	OK ERROR +CME ERROR: <err>
AT+PWRONCON?	+PWRONCON: <value> OK
AT+PWRONCON=?	+PWRONCON: (range of supported <value>) OK

Defined values

0...5 Number of reconnection attempts
1 Default

3.3.8 Auto reconnection +AUTOCON

Description

- Set for automatic reconnection attempts in case of Bluetooth connection failure

Syntax

Command	Possible Responses
AT+AUTOCON=<enable>,<count>,<interval>	OK ERROR +CME ERROR: <err>
AT+AUTOCON?	+AUTOCON: <enable>,<count>,<interval> OK
AT+AUTOCON=?	+AUTOCON: (list of supported <enable>,<count>,<interval>) OK

Defined values

<enable>	Description
0	Disable
1	Enable
<count>	
1 to 50	Number of reconnection attempts
0	(0 – Endless retry)
<interval>	

0 to 65535 100 0	Delay between reconnection attempts in ms. 0 – No delay
------------------------	--

<enable>

0 Auto reconnection disable

1 Auto reconnection enable

<count>

1...50 Number of reconnection attempts

0 Endless retry

<interval>

0...65535 Delay between reconnection attempts in ms

100 Default

0 No delay

Examples

If AT+AUTOCON=1,5,30 is executed, Auto connection runs as follows:

① Bluetooth is not connected.

CONNECTABLE

② If user initiates to connect by command

AT+CONNECT

③ Attempt to connect.

CONNECT: 02,11:22:33:44:55:66

④ If the connection fails

CONNECT FAIL: 5

⑤ First, check whether auto reconnection is enabled, and if it is not enabled, proceed to step ⑫.

⑥ Wait for reconnection attempt interval time (in this case, 30 secs)

⑦ Timer expired

⑧ Attempt to connect

CONNECT: 02,11:22:33:44:55:66

⑨ If reconnection attempt fails, notify the user with URC

CONNECT FAIL: 5

⑩ If the number of attempts are reached auto connection count (in this case, 5 times), proceed to step ⑪.

Otherwise, repeat from step ⑥.

⑪ Stop the auto connection.

CONNECTABLE

3.3.9 Link loss recovery +LINKLOSS

Description

- Set for automatic reconnection when Bluetooth link loss occurs

Syntax

Command	Possible Responses
AT+LINKLOSS=<enable>,<timeout>,<interval>	OK ERROR +CME ERROR: <err>
AT+LINKLOSS?	+LINKLOSS: <enable>,<timeout>,<interval> OK
AT+LINKLOSS=?	+LINKLOSS: (list of supported <enable>,<timeout>,<interval>) OK

Defined values

<enable>	Description
0	Disable

1	Enable
<timeout>	Description
1 to 50 0	Time in minutes to attempt to reconnect for on link loss 0 – Endless retry
<interval>	
0 to 65535 0	Time in seconds between link loss reconnect attempts 0 – No delay

<enable>

- 0 Auto link loss recovery disable
- 1 Auto link loss recovery enable

<timeout>

- 1...60 Time in minutes to attempt to reconnect for on link loss
- 0 Endless retry

<interval>

- 1...180 Time in seconds between link loss reconnect attempts
- 0 No delay

Examples

if AT+LINKLOSS=1,5,30 is executed, Link loss recovery runs as follows:

- ① Bluetooth connected.
CONNECTED: 02,11:22:33:44:55:66
- ② If link loss occurred
DISCONNECTED: 02,11,11:22:33:44:55:66
First, check whether link loss reconnection is enabled, and if it is not enabled, proceed to step ⑫
- ③ Wait for interval time (in this case, 30 secs).
- ④ Attempt to connect.
CONNECT: 02,11:22:33:44:55:66
- ⑤ If the connection failed
CONNECT FAIL: 5
- ⑥ If the link loss timer expired (in this case, 5 mins), proceed to step ⑦.
Otherwise, repeat from step ③.
- ⑦ Stop link loss recovery.
CONNECTABLE

3.3.10Power On/Off +POWER

Description

- This command is used to power on or off the module

Syntax

Command	Possible Responses
AT+POWER=<value>	OK ERROR +CME ERROR: <err>
AT+POWER=?	+POWER: (list of supported <value>) OK

Defined values

- 0 Power off
- 1 Power on
- Other Reserved for manufacturer proprietary use.

Examples

```

READY                                     # Ready
AT+POWER=1
OK
POWER ON                                # Powered on

```

CONNECTABLE # Connectable

3.3.11 Start/Stop/Remove pair +PAIR

Description

- This command set the module to be connectable and discoverable – page and inquiry scanning or to be connectable not discoverable – page scanning.

Syntax

Command	Possible Responses
AT+PAIR=<value>	OK ERROR +CME ERROR: <err>
AT+PAIR=?	+PAIR: (list of supported <value>) OK

Defined values

- 0 Cancel pair
- 1 Start pair regardless of connection status
- 2 Start pair if not connected
- 3 Remove all paired device list then enters discoverable status

Examples

```
CONNECTABLE # Connectable
AT+PAIR=1 # Start pair
OK
PAIRING # Discoverable
AT+PAIR=0 # Cancel pair
OK
CONNECTABLE # Connectable
```

3.3.12 Pairing timeout +PAIRINT

Description

- This command is used to set the time in seconds that the module remains in the pairing mode

Syntax

Command	Possible Responses
AT+PAIRINT=<value>	OK ERROR +CME ERROR: <err>
AT+PAIRINT?	+PAIRINT: <value> OK
AT+PAIRINT=?	+PAIRINT: (range of supported <value>) OK

Defined values

- 1...10000 Pairing mode timeout in secs
- 60** Default
- 0 Always discoverable while not connected

Examples

```
AT+PAIRINT=120 # Set the pairing timeout to 120 secs
OK
```

Notes

- If the time out occurred the device enters connectable state

3.3.13 Bluetooth connect +CONNECT

Description

- This command is used to establish a connection

Syntax

Command	Possible Responses
AT+CONNECT	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
CONNECTABLE          # Connectable
AT+CONNECT           # Connect
OK
CONNECT 11:22:33:44:55:66  # Connecting to 11:22:33:44:55:66
CONNECTED: 02,11:22:33:44:55:66  # Connected
```

3.3.14 Bluetooth disconnect +DISCONNECT

Description

- This command used to disconnect active connection

Syntax

Command	Possible Responses
AT+DISCONNECT	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
CONNECTED: 02,11:22:22:33:44:55:66  # Connected
AT+DISCONNECT                       # Initiate to disconnect
OK
DISCONNECTED: 02,00,11:22:33:44:55:66  # Disconnected
CONNECTABLE                          # Connectable
```

3.3.15 Volume gain speaker +VGS

Description

- Adjust speaker volume level

Syntax

Command	Possible Responses
AT+VGS=<value>	OK ERROR +CME ERROR: <err>
AT+VGS?	+VGS: <gain> OK
AT+VGS=?	+VGS: (range of supported <value>) OK

Defined values

- 0...15 Decimal integer indicating the speaker gain (default: 10)
- + Volume up
- Volume down

Examples

```
AT+VGS=8              # Set the volume to 8 level
```

```
OK
AT+VGS=+          # Increase volume level
OK
AT+VGS?           # Read current volume level
+VGS: 9
OK
```

3.3.16 Mute control +MUTE

Description

- Mute On/Off

Syntax

Command	Possible Responses
AT+MUTE=<path>,<mute>	OK ERROR +CME ERROR: <err>
AT+MUTE?	+MUTE: <path>,<mute>,<path>,<mute> OK
AT+MUTE=?	+MUTE: (list of supported <path>),(list of supported <mute>) OK

Defined values

<path>	Description
0	Speaker
1	AUX (Currently not supported)
2	Microphone
3	All (speaker and microphone)
<mute>	Description
0	Mute
1	Unmute

```
<path>
0 Speaker
1 AUX (Currently not supported)
2 Microphone
3 All (speaker and microphone)
<mute>
0 Mute
1 Unmute
```

Examples

```
STREAMING          # Music is playing

AT+MUTE=0,1        # Mute SPK
OK
+MUTE: 0,0         # SPK is muted
AT+MUTE?           # Query mute state
+MUTE: 0,1,2,0     # SPK muted and MIC unmuted
OK
```

3.4 HFP Commands

3.4.1 Answering an incoming call A

Description

- Answering an incoming call
- An incoming call is indicated by a message "RING" which is repeated for every ring of the call

Syntax

Command	Possible Responses
ATA	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
INCOMING CALL      # Incoming call
RING               # Ringing
CID: 01012345678   # CID is optional
...
ATA                # Answer the incoming call
OK
ONGOING CALL       # Call active
```

3.4.2 Terminate or Reject a call +CHUP

Description

- Reject an incoming call or terminate an ongoing call

Syntax

Command	Possible Responses
AT+CHUP	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
ONGOING CALL       # Call active
...
AT+CHUP            # Terminate a call
OK
CALL ENDED         # Call terminated
```

3.4.3 Audio transfer +SCO

Description

- Toggle audio connection transfer towards the HF or AG

Syntax

Command	Possible Responses
AT+SCO	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
ONGOING CALL      # Call is active
SCO: 1            # Audio paths routed towards HF
AT+SCO
OK
SCO: 0            # Audio paths routed towards AG
AT+SCO
OK
SCO: 1            # Audio paths routed towards HF
```

3.4.4 Place a call with the phone number D

Description

- This command initiates outgoing voice calls by providing the destination phone number to the AG.

Syntax

Command	Possible Responses
ATD=<value>	OK ERROR +CME ERROR: <err>

Defined values

0...9, *, #, +, - Dialed digit

Examples

```
CONNECTED: 01,11:22:33:44:55:66 # Connected
ATD=+82-10-1234-5678           # Dialing to "082 010 1234 5678"
OK
OUTGOING CALL
```

3.4.5 Last number re-dial +BLDN

Description

- This command initiates outgoing voice calls by recalling the last number dialed by the AG.

Syntax

Command	Possible Responses
AT+BLDN	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
CONNECTED: 01,11:22:33:44:55:66 # Connected
AT+BLDN                       # Place call to the last number dialed
OK
OUTGOINGCALL          # Outgoing call
```

3.4.6 Calling line identification notification +CLIP

Description

- This command enables or disables caller id indications from the AG.

Syntax

Command	Possible Responses
---------	--------------------

AT+CLIP=<value>	OK ERROR +CME ERROR: <err>
AT+CLIP=?	+CLIP: (list of supported <value>) OK

Defined values

- 0 Disable CLI notification
- 1 Enable CLI notification

Examples

```
CONNECTED: 01,11:22:33:44:55:66      # Connected

AT+CLIP=1                             # Enable caller id indications
OK
```

3.4.7 Toggle voice recognition +BVRA

Description

- This can be used to activate/deactivate the voice recognition function resident in the AG.

Syntax

Command	Possible Responses
AT+BVRA	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
CONNECTED: 01,11:22:33:44:55:66      # Connected

AT+BVRA                               # Enable voice recognition
OK
SCO: 2,2                               # Enabled
AT+BVRA                               # Disable voice recognition
OK
SCO: 0,0                               # Disabled
```

3.4.8 Transmit DTMF code +VTS

Description

- During an ongoing call, this command instructs the AG to transmit a specific DTMF code to its network connection.

Syntax

Command	Possible Responses
AT+VTS=<value>	OK ERROR +CME ERROR: <err>
AT+VTS=?	+VTS: (list of supported <value>) OK

Defined values

- 0...9, #, *, A, B, C, D DTMF codes

Examples

```
ONGOING CALL                           # Active call
AT+VTS=#                               # Transmit DTMF '#'
OK
```

AT+VTS=2 # Transmit DTMF '2'
OK

3.4.9 Subscriber number information +CNUM

Description

- This command can be used to query the AG subscriber number.

Syntax

Command	Possible Responses
AT+CNUM	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
CONNECTED: 01,11:22:33:44:55:66 ; Connected
AT+CNUM ; Query subscriber number
OK
CNUM: 821012345678
```

3.4.10 Retrieve supported features +BRSF

Description

- This command is used by Bluetooth hands-free (HF) device to report the features that are supported by hands-free unit, and request the phone's audio gateway (AG) feature set

Syntax

Command	Possible Responses
AT+BRSF=<value>	+BRSF: <supported features bitmap> OK or ERROR +CME ERROR: <err>
AT+BRSF=?	+BRSF: (list of supported <value>) OK

Defined values

- 0 HF
- 1 AG

Examples

```
CONNECTED: 01,11:22:33:44:55:66 # Connected
AT+BRSF=0 # Request the HF supported features bitmap
+BRSF: 02BF # HF supported features are as Notes
OK
AT+BRSF=1 # Request the AG supported features bitmap
+BRSF: 0F6F # AG supported features are as Notes
OK
```

Notes

- Supported features bitmap in the HF
 - Bit 0 EC and/or NR function
 - Bit 1 Three-way calling
 - Bit 2 CLI presentation capability

- Bit 3 Voice recognition activation
- Bit 4 Remote volume control
- Bit 5 Enhanced call status
- Bit 6 Enhanced call control
- Bit 7 Codec negotiation
- Bit 8 HF indicators
- Bit 9 eSCO S4 settings

- Supported features bitmap in the AG
 - Bit 0 Three-way calling
 - Bit 1 EC and/or NR function
 - Bit 2 Voice recognition function
 - Bit 3 In-band ring tone capability
 - Bit 4 Attach a number to a voice tag
 - Bit 5 Ability to reject a call
 - Bit 6 Enhanced call status
 - Bit 7 Enhanced call control
 - Bit 8 Extended Error Result Codes
 - Bit 9 Codec negotiation
 - Bit 10 HF Indicators
 - Bit 11 eSCO S4 settings

3.4.11 Headset button press +CKPD

Description

- This command issues the AG to indicate that the button has been pressed.

Syntax

Command	Possible Responses
AT+CKPD	OK ERROR +CME ERROR: <err>

Defined values

- None

Notes

- This command is available only when HSP is connected

3.4.12 Change the internal HFP settings +SETHFP

Description

- Change the internal settings related to HFP.

Syntax

Command	Possible Responses
AT+SETHFP=<cmd>,<value>	OK ERROR +CME ERROR: <err>
AT+SETHFP=?	OK

Defined values

<cmd>

- 1 Set hands-free profile version

<value>

- Bit 0 HSP
- Bit 1 HFP 1.5
- Bit 2 HFP 1.7 (default)

* Where <value> is 0, HFP will be disabled

<cmd>
 12 Auto answer on connect
 <value>
0 Disable (default)
 1 Enable

<cmd>
 13 Enable mic mute synchronization
 <value>
0 Disable (default)
 1 Enable

<cmd>
 14 When set cancels a voice dial if a last number redial is initiated
 <value>
0 Disable (default)
 1 Enable

<cmd>
 20 Configures the PIO to drive when a call is active
 <value>
 0...31 PIO number
255 Disable (default)

<cmd>
 21 Configures the PIO to drive when an incoming call is ringing
 <value>
 0...31 PIO number
255 Disable (default)

<cmd>
 22 Configures the PIO to drive when an outgoing call is ringing
 <value>
 0...31 PIO number
255 Disable (default)

Examples

```

AT+SETHFP=12,1      # Enable auto answer on connect
OK
AT+SETHFP=1,0      # Disable HFP (if you want to use only A2DP)
OK                    # Rebooted
+READY
  
```

3.4.13 Get the internal HFP settings +GETHFP

Description

- Get the current HFP settings value

Syntax

Command	Possible Responses
AT+GETHFP=<value>	+HFP: <value> OK ERROR +CME ERROR: <err>

Defined values

- See +SETHFP

Examples

```

AT+GETHFP=12                    ; Read auto answer on connect function
+HFP: 1
OK
AT+GETHFP=1                    # Read hands-free profile version
+HFP: 4                        # HFP 1.7 supported
OK
  
```


3.5 A2DP and AVRCP Commands

3.5.1 Toggle music playback +PLAYNPAUSE

Description

- Toggle music play

Syntax

Command	Possible Responses
AT+PLAYNPAUSE	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```

CONNECTED: 02,11:22:33:44:55:66      # A2DP connected
AT+PLAYNPAUSE
OK
STREAMING                             # Music is playing
AT+PLAYNPAUSE
OK
SUSPENDED                             # Music paused

```

3.5.2 Play the music +PLAY

Description

- Play music

Syntax

Command	Possible Responses
AT+PLAY	OK ERROR +CME ERROR: <err>

Defined values

- None

3.5.3 Pause the music +PAUSE

Description

- Pause music

Syntax

Command	Possible Responses
AT+PAUSE	OK ERROR +CME ERROR: <err>

Defined values

- None

3.5.4 Play the next song +FORWARD

Description

- Play the next song

Syntax

Command	Possible Responses
AT+FORWARD	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
STREAMING
AT+FORWARD
OK
```

3.5.5 Play the previous song +BACKWARD

Description

- Play the previous song

Syntax

Command	Possible Responses
AT+BACKWARD	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
STREAMING
AT+BACKWARD
OK
```

3.5.6 Change player's repeat mode +REPEAT

Description

- Change the player's repeat mode

Syntax

Command	Possible Responses
AT+REPEAT=<value>	OK ERROR +CME ERROR: <err>

Defined values

- Player application setting
 - 1 OFF
 - 2 Single track repeats
 - 3 All tracks repeat
 - 4 Group repeats

Notes

3.5.7 Change player's shuffle mode +SHUFFLE

Description

- Change player's shuffle mode

Syntax

Command	Possible Responses
AT+SHUFFLE=<value>	OK ERROR +CME ERROR: <err>

Defined values

- Player application setting
- 1 OFF
- 2 All tracks shuffle
- 3 Group shuffles

3.5.8 Change the internal A2DP settings +SETA2DP

Description

- Change internal settings related to A2DP

Syntax

Command	Possible Responses
AT+SETA2DP=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

<cmd>

- 1 Enable A2DP streaming

<value>

- 0 Disable

- 1** Enable (default)

<cmd>

- 8 A2DP open media on connect

<value>

- 0 Disable

- 1 Enable (default)

<cmd>

- 9 Default A2DP volume level

<value>

- 9 Default A2DP volume level

0...15 (default: 10)

Examples

```
AT+SETA2DP: 9,12          # Set A2DP default volume to 12
OK
```

3.5.9 Get the internal A2DP settings +GETA2DP

Description

- Get the current A2DP settings value

Syntax

Command	Possible Responses
AT+GETA2DP=<value>	+A2DP: <value> OK or ERROR +CME ERROR: <err>

Defined values

- See +SETA2DP

Examples

```
AT+GETA2DP=9              ; Read A2DP default volume level
+A2DP: 12
OK
```

3.5.10 Change the internal AVRCP settings +SETAVRCP

Description

- Change internal settings related to AVRCP

Syntax

Command	Possible Responses
AT+SETAVRCP=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

<cmd>

1 Enable AVRCP control

<value>

0 Disable

1 Enable (default)

* Should be rebooted to take effect.

<cmd>

2 Enable AVRCP absolute volume control

<value>

0 Disable

1 Enable (default)

* Should be rebooted to take effect

Examples

```
AT+SETAVRCP:2,0          # Set AVRCP absolute volume control to disable
OK
```

3.5.11 Get the internal AVRCP settings +GETAVRCP

Description

- Get the current AVRCP settings value

Syntax

Command	Possible Responses
AT+GETAVRCP=<value>	+AVRCP: <value> OK or ERROR +CME ERROR: <err>

Defined values

- See +SETAVRCP

Examples

```
AT+GETAVRCP=2          # Read AVRCP absolute volume control
+AVRCP: 0
OK
```

3.6 LE Commands

3.6.1 Advertising interval +LEADVINT

Description

- Set LE advertising interval

Syntax

Command	Possible Responses
AT+LEADVINT=<min>,<max>	OK ERROR +CME ERROR: <err>
AT+LEADVINT?	+LEADVINT: <min>,<max> OK
AT+LEADVINT=?	+LEADVINT: (range of supported <min>),(range of supported <max>) OK

Defined values

- Minimum value for the advertising event interval
<min>
32...16384 (default: 32)
- Maximum value for the advertising event interval
<max>
32...16384 (default: 42)

Examples

```
AT+LEADVINT:32,42          # Set the advertising interval to 32 (20ms) and 42(26.2ms)
OK
```

Notes

- The advertising interval shall be an integer multiple of 0.625ms in the range of 20ms to 10.24sec.
 - Time = N * 0.625ms
- The advertising interval min must always be less than or equal to advertising interval max.

3.6.2 Advertisement data +LEADVDATA

Description

- Set the custom advertisement data

Syntax

Command	Possible Responses
AT+LEADVDATA=<value>	OK ERROR +CME ERROR: <err>
AT+LEADVDATA?	+LEADVDATA: <data> OK
AT+LEADVDATA=?	OK

Defined values

- Minimum value for the advertising event interval
32...16384 (default: 32)

Examples

```
AT+LEADVDATA=BnCOM
OK
```

Notes

3.6.3 Scan response data +LESCANDAT

- TBD

3.6.4 Connection interval +LECONINT

Description

- Set LE connection interval

Syntax

Command	Possible Responses
AT+LECONINT=<min>,<max>	OK ERROR +CME ERROR: <err>
AT+LECONINT?	+LECONINT: <min>,<max>
AT+LECONINT=?	+LECONINT: (range of supported <min>),(range of supported <max>)

Defined values

- Minimum value for the connection interval
<min>
6...32000 (default: 24)
- Maximum value for the connection interval
<max>
6...32000 (default: 39)

Examples

```
AT+LECONINT:24,39      # Set the connection interval to 24 (30ms) and 39(48.75ms)
OK
```

Notes

- The connection interval shall be an integer multiple of 1.25ms in the range of 7.5ms to 4.5sec.
 - Time = N * 1.25ms
- The connection interval min must always be less than or equal to connection interval max.

3.6.5 Start Advertising +LEADVS

Description

- Start LE advertising

Syntax

Command	Possible Responses
AT+LEADVS	OK ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
CONNECTABLE      # Connectable
AT+LEADVS        # Start advertising
OK
LEADVERTISING    # Advertising
```

3.6.6 Stop Advertising +LEADVE

Description

- Stop LE advertising

Syntax

Command	Possible Responses
AT+LEADVE	OK LEOFF or ERROR +CME ERROR: <err>

Defined values

- None

Examples

```
LEADVERTISING      # Advertising
AT+LEADVE           # Stop advertising
OK
LEOFF               # Stopped
```

3.6.7 Change the internal LE settings +SETLE

Description

- Change internally used LE setting

Syntax

Command	Possible Responses
AT+SETLE=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

<cmd>

1 Active LE when powered off

<value>

0 Disable (default)

1 Enable

Examples

```
AT+SETLE=2,1      # Enable active LE when powered off
OK
```

3.6.8 Read the internal LE settings +GETLE

Description

- Read current LE setting

Syntax

Command	Possible Responses
AT+GETLE=<value>	+LE: <value> OK or ERROR +CME ERROR: <err>

Defined values

- See +SETLE

Examples

```
AT+GETLE=1        # Read active LE when powered off
```

+LE: 1
OK

3.7 SPP Commands

- TBD

3.8 Audio Prompt Commands

3.8.1 Set the audio prompts +SETPROMPT

Description

- This command can be used to configure internal PROMPT settings for the special function.

Syntax

Command	Possible Responses
AT+SETPROMPT=<cmd>,<value>	OK ERROR

Defined values

<cmd>

0...N Prompt ID

N means total number of audio prompts

<value>

0 Stop the prompt from currently playing

1 Stop the current playing and start to play new prompt immediately

2 Cancel all queued prompts and enqueue new prompt

3 Push the new prompt into the queue

After playing current prompt then play a prompt in order from the queue

<cmd>

8000 Audio prompt features is enabled or not

<value>

0 Disable

1 Enable (default)

<cmd>

8002 Disable audio prompt terminate

<value>

0 Disable (default)

1 Enable

Examples

```
AT+SETPROMPT=1,1      # Play the audio prompt No.1
OK
AT+SETPROMPT=1,0      # Stop the audio prompt No.1
OK
AT+SETPROMPT=8000,0   # Disable the audio prompt function
OK
```

3.9 Tone Commands

3.9.1 Set the tone +SETTONE

Description

- This command can be used to configure internal TONE settings for the special function.

Syntax

Command	Possible Responses
AT+SETTONE=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

- Play the specified tone

<cmd>

1...N Tone ID (N means total number of supported tones)

☞ where <cmd> is hexadecimal digit

<value>

0 Stop the tone from currently playing

1 Stop the current playing tone and start to play new tone immediately

2 Cancel all queued tones and enqueue new tone

After playing current tone then play a tone immediately

3 Push the new tone into the queue

After playing current tone then play a tone in order from the queue

- Play the specified event tone

<cmd>

4000...5000 Event mask (For event, see the APPENDIX B)

☞ where <cmd> is hexadecimal digit

☞ No <value> is required

<cmd>

8000 Specifies whether tone playing is enabled

<value>

0 Disable

1 Enable (default)

<cmd>

8002 Play the tone at fixed volume selected

<value>

0 Disable

1 Enable (default)

<cmd>

8003 Fixed tone volume level

<value>

0...15

10 (default)

<cmd>

8004 Play local volume

<value>

0 Disable (default)

1 Enable

Examples

```
AT+SETTONE=0C,1      # Play the tone of 0x0C
OK
AT+SETTONE =4001      # Play the tone of event 0x4001
OK
AT+SETTONE =4001,0D    # Change the tone of event 0x4001 to 0x0D
OK
```

Table 1.3.8.1.1

Event	Tone* ¹	Description
Power On	4 Note Rising Scale	Audio prompt supported* ²
Power Off	4 Note Falling Scale	Audio prompt supported
Enter Pairing	2 Note Rising Scale	Audio prompt supported
Initiate Voice Dial	Short 1	
Last Number Redial	Short 1	
Answer	Short 1	
Reject	Short 1	
Cancel End	Short 1	
Transfer Toggle	Short 1	
Microphone Mute On	2 Note Falling Scale	
Microphone Mute Off	2 Note Rising Scale	
Reset Paired Device List	Long Double Low	
Pairing Fail	Long Low	Audio prompt supported
Pairing Successful	Short 1	Audio prompt supported
Battery Low	Battery Low Tone	
Link Loss	Short Double Low	
Mute Reminder	Long Double Low	
Volume Max	Middle 9	
Volume Min	Middle 0	
Ringtone 1	Ring Valkyries	
Ringtone 2	Phone Ring	
Primary Device Connected	Short High	Audio prompt supported
Secondary Device Connected	Short Middle – GS7	

*1: See APPENDIX for the types of tones supported.

*2: If event has audio prompt attached to it, audio prompt will be played instead of tone.

3.10 LED Commands

3.10.1 Set the LED +SETLED

Description

- This command can be used to configure internal LED settings for the special function.

Syntax

Command	Possible Responses
AT+SETLED=<cmd>[,<arg1>[,<arg2>[,...]]]	OK ERROR +CME ERROR: <err>

Defined values

Value	Description
<cmd>	■ Turn on/off LED
<arg1>	0...N LED id (N is total number of supported LED) ⓘ <arg1> is only required 0 Turn off 1 Turn on
<cmd>	■ Display the specified event LED pattern
	4000...5000 Event mask (For event, see the APPENDIX B) ⓘ No arguments are required
<cmd>	■ Display the specified state LED pattern
	5000...5000+N State mask (For state, see the APPENDIX A) ⓘ No arguments are required
<cmd>	■ Configure LED pattern for the specified event
	4000...5000 Event mask ⓘ <arg1> to <arg8> are required in format as below: <on>,<off>,<repeat>,<num flashes>,<LED A>,<LED B>,<color>,<save>
<arg1>	0...2550 On time in msec
<arg2>	0...2550 Off time in msec
<arg3>	0...10000 Repeat delay in msec
<arg4>	0...15 Number of flashes in the pattern
<arg5>	0...31 Specifies the PIO as LED A
<arg6>	0...31 Specifies the PIO as LED B
<arg7>	0...4 Defines the LED(s) that the sequence will display
<arg8>	0 Display the pattern 1 Display the pattern & Save
<cmd>	■ Configure LED pattern for the specified state
	0...N State mask ⓘ <arg1>,...,<arg8> are required in format as below: <on>,<off>,<repeat>,<num flashes>,<LED A>,<LED B>,<color>,<save>
<arg1>	0...2550 On time in msec
<arg2>	0...2550 Off time in msec
<arg3>	0...10000 Repeat delay in msec
<arg4>	0...15 Number of flashes in the pattern
<arg5>	0...31 Specifies the PIO as LED A
<arg6>	0...31 Specifies the PIO as LED B
<arg7>	0...4 Defines the LED(s) that the sequence will display
<arg8>	0 Display the pattern 1 Display the pattern & Save

<cmd>	F000	LED function enabled or not
<arg1>	0	Disable
	1	Enable (default)
<cmd>	F002	Set a PIO as a LED enable pin
<arg1>	0...31	PIO
	255	N/A (default)

Notes

- See application example for the detailed usage

3.11 PIO Commands

3.11.1 Set the PIO +SETPIO

Description

- Set to the specified PIO to low or high

Syntax

Command	Possible Responses
AT+SETPIO=<pio>,<value>	OK ERROR +CME ERROR: <err>

Defined values

<pio>
0...N N is number of supported PIO
<value>
0 Low
1 High

Examples

```
AT+SETPIO=16,1                      # Set PIO 16 to high
OK
```

3.11.2 AT+GETPIO

Description

- Read current PIO level

Syntax

Command	Possible Responses
AT+GETPIO=<pio>	+PIO: <value> OK or ERROR +CME ERROR: <err>

Defined values

- Get the value for the specified PIO
- <pio>
0...N number of supported PIO

Examples

```
AT+GETPIO=16                      # Get value of PIO 16
+PIO: 1                            # PIO 16 is High
OK
```

3.12 I2S Commands

3.12.1 Set the I2S +SETI2S

Description

- Change internally used I2S setting

Syntax

Command	Possible Responses
AT+SETI2S=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

Parameter	Description
<cmd>	4 Specifies whether to resample music rates for i2s output (in HZ)
<value>	0 No resampling 44100 44.1kHz 48000 48.0kHz
<cmd>	5 Specifies whether to resample voice rates for i2s output (in HZ)
<value>	0 No resampling 44100 44.1kHz 48000 48.0kHz
<cmd>	6 Specifies the I2S bit clock rate (BCLK) as a multiple of the sample rate, output when running is in I2S master mode
<value>	0...64
<cmd>	7 Specifies the I2S master clock rate (MCLK) as a multiple of the sample rate
<value>	0 Disable 1...61
<cmd>	8 Plug-in type
<value>	0...3 Don't use 4 Customer developed plug-in (default)
<cmd>	9 Master or slave operation
<value>	0 Slave 1 Master (default)
<cmd>	10 Specifies the number of bits in each audio sample
<value>	0 16 bits 1 24 bits 2 32 bits
<cmd>	11 Select between left justified and right justified
<value>	0 Left justified (default) 1 Right justified
<cmd>	12 Justified delay by 1 bit
<value>	0 No delay 1 1-bit delay (default)
<cmd>	13 Specifies the I2S input audio bit resolution
<value>	0 16 bits (default) 1 24 bits

Examples

```
AT+SETI2S=4,48000      # Set resampling music rates for i2s output to 48000
OK
```

3.12.2 Get the I2S +GETI2S

Description

- Read internally used I2S setting

Syntax

Command	Possible Responses
AT+GETI2S=<cmd>	+I2S: <value> OK or ERROR +CME ERROR: <err>

Defined values

☞ See AT+SETCONFIG

Examples

```
AT+GETI2S=4      # Get resampling music rates for i2s output
+I2S: 48000      # Sample rate is 48000
OK
```

3.13 I2C Commands

- TBD

3.14 Miscellaneous Commands

3.14.1 Set the configuration +SETCONFIG

Description

- Change internally used configuration setting

Syntax

Command	Possible Responses
AT+SETCONFIG=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

Parameter	Description
<cmd>	8 Specifies the action taken on a pairing mode timeout to be defined
<value>	0 Return to the connectable mode (default) 1 Power off 2 Power off if PDL is empty
<cmd>	13 If this is set the module will power off when the paired devices are reset
<value>	0 Disable (default) 1 Enable
<cmd>	14 If this is set the module remains discoverable at all times
<value>	0 Disable (default) 1 Enable
<cmd>	15 Ignores the power off button press immediately after power on
<value>	0 Disable 1 Enable (default)
<cmd>	16 Power off only if Vreg enable low
<value>	0 Disable (default) 1 Enable
<cmd>	17 Allow automatic power off when charging and battery level is critical
<value>	0 Disable (default) 1 Enable
<cmd>	18 Enter discoverable mode when connectable
<value>	0 Disable (default) 1 Enable
<cmd>	19 Automatically reconnect at power on
<value>	0 Disable (default) 1 Enable
<cmd>	20 Enter pairing mode on failure to connect
<value>	0 Disable (default) 1 Enable
<cmd>	21 Do not go discoverable during link loss
<value>	0 Disable (default) 1 Enable
<cmd>	22 BT2.1 Man in the middle
<value>	0 Disable (default)

	1	Enable
<cmd>	24	Secure pairing mode enable
<value>	0	Disable
	1	Enable (default)
<cmd>	25	Reset chip after power off is complete
<value>	0	Disable (default)
	1	Enable
<cmd>	26	Auto power on after initialization enable
<value>	0	Disable (default)
	1	Enable
<cmd>	27	Disable role switching
<value>	0	Disable (default)
	1	Enable
<cmd>	29	When set, this feature prevents the device from physically powering off after the device is made logically off
<value>	0	Disable (default)
	1	Enable
<cmd>	30	This forces Encryption on SLC establishment
<value>	0	Disable
	1	Enable (default)

Examples

```
AT+SETCONFIG=26,1      # Enable auto power on after initialization
OK
AT+SETCONFIG=19,1      # Enable automatically reconnect at power on
OK
```

3.14.2 AT+GETCONFIG

Description

- Read internally used configuration setting

Syntax

Command	Possible Responses
AT+GETCONFIG=<cmd>	+CONFIG: <value> OK or ERROR +CME ERROR: <err>

Defined values

☞ See AT+SETCONFIG

Examples

```
AT+GETCONFIG=26      # Get auto power on after initialization enable
+CONFIG: 1
OK
AT+GETCONFIG=19      # Get automatically reconnect at power on enable
+CONFIG: 1
OK
```

3.14.3 Set the timer +SETTIMER

Description

- Change internally used timer setting

Syntax

Command	Possible Responses
AT+SETTIMER=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

Parameter	Description
<cmd>	1 Automatic switch off time (in secs)
<value>	1...21600 0 Disable (default)
<cmd>	2 Disable power off after power on time (in secs)
<value>	0...60 (default: 3)
<cmd>	3 Pairing mode timeouts (in secs)
<value>	0...65535 (default: 300)
<cmd>	4 Connectable mode timeouts (in secs)
<value>	0...65535 (default: 60)
<cmd>	5 Pairing mode timeouts if PDL is empty
<value>	0...65535 (default: 0)
<cmd>	11 Limbo timeouts (in secs)
<value>	0...60 (default: 30)

Examples

```
AT+SETTIMER=1,60      # Set Automatic switch off time to 60 secs
OK
```

3.14.4 AT+GETTIMER

Description

- Read internally used timer setting

Syntax

Command	Possible Responses
AT+GETTIMER=<cmd>	+TIMER: <value> OK or ERROR +CME ERROR: <err>

Defined values

☞ See AT+SETTIMER

Examples

```
AT+GETTIMER=1          # Get the automatic switch off time
+TIMER: 60
OK
```

3.14.5 Set the audio +SETAUDIO

Description

- Change internally used audio setting

Syntax

Command	Possible Responses
AT+SETAUDIO=<cmd>,<value>	OK ERROR +CME ERROR: <err>

Defined values

Parameter	Description
<cmd>	4 Specifies whether incoming audio comes from
<value>	1 Internal (default) 2 I2S 3 SPDIF (Don't use)
<cmd>	31 Mute duration on power up (in msec)
<value>	0...65535 (default: 10)
<cmd>	32 Mute duration on power down (in msec)
<value>	0...65535 (default: 10)
<cmd>	35 Configure PIO to drive when audio is active
<value>	0...32 Supported PIO number 255 Disable (default)
<cmd>	37 Configure PIO to drive when the device power up
<value>	0...32 Supported PIO number 255 Disable (default)
<cmd>	38 Configure PIO to drive for the audio mute line used
<value>	0...32 Supported PIO number 255 Disable (default)

Examples

```
AT+SETAUDIO=35,21      # Set PIO 21 to High when audio is active
OK
```

3.14.6 AT+GETAUDIO

Description

- Read internally used audio setting

Syntax

Command	Possible Responses
AT+GETAUDIO=<cmd>	+AUDIO: <value> OK or ERROR +CME ERROR: <err>

Defined values

☞ See AT+SETAUDIO

Examples

```
AT+SETAUDIO=35          # Get the audio active PIO
+AUDIO: 21
OK
```

3.14 Unsolicited result codes

An unsolicited code (URC) is a string message provided by the module that is not a response to a previous AT command. It can be output at any time to inform the HOST of a specific event or status change. The URC can have the same name as the command that enables it or can be enabled by another command.

URC	Description
READY	The module is ready to communicate with the host
POWER ON	The module is powered on
POWER OFF	The module is powered off
CONNECATBLE	The module is connectable – page scanning
PAIRING	The module is connectable and discoverable – page and inquiry scanning
PAIRED	Pairing is successful
CONNECT <MAC>	Connection in progress
CONNECT FAIL	Connection is failed
CONNECTED: <num>,<profiles>,<MAC>	Connected - Parameters <num> Number of connected devices <profile> Mask of all connected profiles - Example CONNECTED: 01, 05,AA:BB:CC:DD:EE:FF
DISCONNECTED: <num><profiles>	Disconnected - Parameters <num> Number of connected devices <profile> Mask of all connected profiles - Example DISCONNECTED: 00, 00
LINKLOSS	Link loss
VGS: <level>	Speaker volume level - Parameters <level> 0...15 - Example VOL: 10
RING	Incoming call signal from network
NO CARRIER	No carrier signal was detected
CID: <number>	Calling line identification - Parameters <number> Caller ID - Example CID: 010-1234-5678
INCOMING CALL	Incoming call-in progress
OUTGOING CALL	Outgoing call-in progress
ONGOING CALL	Active call-in progress and audio is present
CALL ENDED	Call ended

WBS: <n>	WB-Speech codec bit masks ■ Parameters <n> 0 No Codec 1 CVSD Codec 2 SBC Codec ■ Example WBS: 1
SCO: <n>	Synchronous connection link type ■ Parameters <n> 0 Unknown 1 SCO 2 ESCO ■ Example SCO: 2
STREAMING	A2DP audio is streaming
SUSPENDED	A2DP audio is suspended
SBC	SBC codec is in use
AAC	AAC codec is in use
ADVERTISING	LE advertising
LEOFF	LE service stopped
LEMTU: <n>	LE maximum transmit unit ■ Parameters <n> ■ Example +LEMTU: 23
LECONINT: <min><max>	LE connection interval ■ Parameters <min> Minimum connection interval <max> Maximum connection interval ■ Example LECONINT: 16,24
LECONNECTED	LE connected
LEDISCONNECTED	LE disconnected

REQUIREMENTS OF EXTERNAL INTERFACE

USER INTERFACES

Button	Event	State*1	Action	AT Command
VREGENABLE*2	Long	0	Power on	AT+POWER=1
		1-13	Power off	AT+POWER=0
MFB	Short	1,3,13	Initiate Voice Dial	AT+BVRA
		5	Call Answer	ATA
		4,6,12	Call Cancel or Call End	AT+CHUP
		8,9,10		
		11		
	Long	1,3,13	Last Number Redial	AT+BLDN
		5	Call Reject	AT+CHUP
		6,8,9,10,11,12	Audio Transfer Toggle	AT+TRANSFER
	Very Very Long	1,3,13	Enter Pairing	AT+PAIR=1
		2	Cancel Pairing	AT+PAIR=0
Play/Pause	Short	1,3,13	Play/Pause	AT+PLAYNPAUSE
	Long			
Volume Up	Short	4-13	Volume Up	AT+VGS=+
	Long			
	Double	13	Next song	AT+FORWARD
Volume Down	Short	4-13	Volume Down	AT+VGS=-
	Long			
	Double		Previous song	AT+BACKWARD
MFB+Volume Up+Volume Down	Very Very Long	0-13	Reset paired device list	AT+PAIRREMOVE
Play/Pause+Volume Up+Volume Down		0		

*1: Regulator enable and multifunction input. A high input enables the on-chip regulators, which can then be latched on internally and the button used as a multifunction input.

*2: See APPENDIX A.

HARDWARE INTERFACES

Programmable I/O ports (PIO)

BCM-SQ300-AS provides up to 14 lines of programmable bidirectional I/O, PIO[21,18:16,9:0].

PIO	Function	Pad type	Description
PIO [0]	UART_RX	Bidirectional with strong pull-up	
PIO [1]	UART_TX	Bidirectional with strong pull-up	
PIO [2]	SPI_MOSI / I2S_SD_IN	Bidirectional with weak pull-down	
PIO [3]	SPI_MISO / I2S_SD_OUT	Bidirectional with weak pull-down	
PIO [4]	SPI_CS# / I2S_WS	Bidirectional with weak pull-down	
PIO [5]	SPI_CLK / I2S_SCK	Bidirectional with weak pull-down	
PIO [6]	Button	Bidirectional with strong pull-down	MFB

PIO [7]	Button	Bidirectional with strong pull-down	Pair
PIO [8]	UART_RTS	Bidirectional with strong pull-up	Not used (default)
PIO [9]	UART_CTS	Bidirectional with strong pull-down	Not used (default)
PIO [16]	Button	Bidirectional with strong pull-up	Volume Up
PIO [17]	Button	Bidirectional with strong pull-down	Volume Down
PIO [18]	Button	Bidirectional with weak pull-down	Play/Pause
PIO [21]	AMP_ENABLE	Bidirectional with weak pull-down	Audio amp drive

LED

The BCM-SQ300-AS includes a 3-pad PWM LED driver for driving RGB LEDs for producing a wide range of colors. All LEDs are controlled by application.

The terminals are open-drain outputs, so the LED must be connected from a positive supply rail to the pad in series with a current-limiting register.

LED	Function	Description
LED [2]	Red	Charging or Error, etc.
LED [4]	Blue	Display state
LED [1]	Green	Optional, Currently not used

SOFTWARE INTERFACES

GATT UUID

Type	UUID	Attribute
Primary Service	0xFFFD	N/A
Characteristic	0xFFE1	Notification
	0xFFE2	Write without response

COMMUNICATION INTERFACES

UART

Setting	Default Value
Baud rate	115200
Data bits	8bit
Parity	None
Stop bit	1 bit
Flow control	None

ADDITIONAL NONFUNCTIONAL REQUIREMENTS

UPGRADE

- Contact to BnCOM

APPENDICES

APPENDIX A: The supported device states

Define all terms and unique acronyms employed throughout document and specific to project.

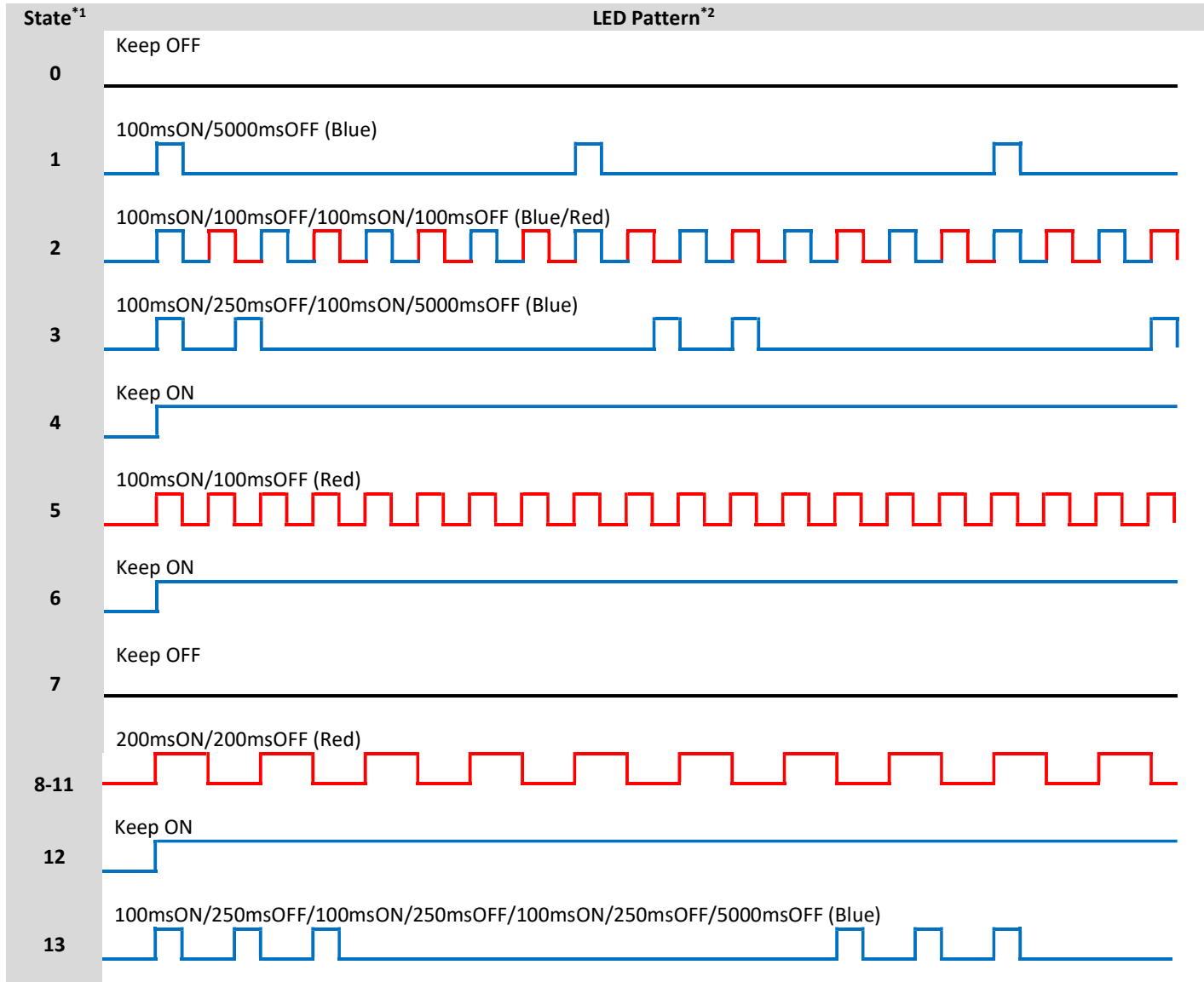
State	Description	URC
0	Logically off but physically on - limbo	READY
1	Connectable – page scanning	CONNECTABLE
2	Connectable and discoverable – page and inquiry scanning	PAIRING
3	Connected	CONNECTED
4	Outgoing calling in progress	OUTGOING CALL
5	Incoming calling in progress	INCOMING CALL
6	Active call and the audio is present	ONGOING CALL
7	Test mode	-
8	Active call and a second incoming call	-
9	Active call and a second call on hold	-
10	More than one active call	-
11	Incoming call on hold	-
12	Active call and the audio is not present	ONGOING CALL
13	Streaming A2DP audio	STREAMING

APPENDIX B: The supported event

Event	Description	AT Command / URC
4001	Power On	AT+POWER=1
4002	Power Off	AT+POWER=0
4003	Enter Pairing	AT+PAIR=1
4004	Initiate Voice Dial	AT+BVRA
4006	Last Number Redial	AT+BLDN
4008	Answer	ATA
4009	Reject	AT+CHUP
400A	Cancel End	AT+CHUP
400B	Transfer Toggle	AT+TRANSFER
400C	Microphone Mute Toggle	AT+MUTE=2,1
400D	Main Output Volume Up	AT+VGS=+
400E	Main Output Volume Down	AT+VGS=-
4010	Three Way Release All Held	AT+CHLD=0
4011	Three Way Accept Waiting Release Active	AT+CHLD=1
4012	Three Way Accept Waiting Hold Active	AT+CHLD=2
4013	Three Way Add Held To 3 Way	AT+CHLD=3
4014	Three Way Connect 2 Disconnect	AT+CHLD=4
4018	Establish SLC	AT+CONNECT
4019	Microphone Mute On	AT+MUTE=2,1
401A	Microphone Mute Off	AT+MUTE=2,0
401E	Place Incoming Call On Hold	AT+BTRH=0
401F	Accept Held Incoming Call	AT+BTRH=1
4020	Reject Held Incoming Call	AT+BTRH=2
4045	AVRCP Play Pause	AT+PLAYNPAUSE
4045	AVRCP Stop	AT+STOP
408F	Reset Paired Device List	AT+PAIRREMOVE
40FE	Cancel Pairing	AT+PAIR=0
4700	Pairing Fail	-
4701	Pairing Successful	PAIRED
4704	Battery Low	BATT: 0
4717	Link Loss	LINKLOSS
471B	Mute Reminder	-
4724	Reconnect Failed	CONNECT FAIL
4736	Multipoint Call Waiting	-
4744	Volume Max	VOLMAX
4745	Volume Min	VOLMIN
4751	Ringtone 1	RING
4752	Ringtone 2	-
4753	Primary Device Connected	CONNECTED
4754	Secondary Device Connected	CONNECTED
477C	Primary Device Disconnected	DISCONNECTED
477D	Secondary Device Disconnected	DISCONNECTED

APPENDIX C: LED Pattern

List file / document names / provided links to all diagrams, models, additional findings pertinent to technical specification development.



*1 – See APPENDIX A

*2 – LED pattern can change by the AT+SETLED command.

APPENDIX D: Tones

ID*1	Description	Event*2	ID	Description	Event
00	No tone	N/A	30	5 Rapid High	
01	Middle 0	Volume Min	31	Long Low to High	
02	Short 1	Initiate Voice Dial, Last Number Redial, Answer, Reject, Cancel End, Transfer Toggle Pairing Successful	32	Long High to Low	
03	Short 2	-	33	Short V High	
04	Short 3	-	34	12 High/Higher Beeps	
05	Short 4	-	35	Short Middle – DS8	
06	Short 5	-	36	5 High Beeps	
07	Short 6	-	37	Medium Low to High	
08	Short 7	-	38	Medium High to Low	
09	Short 8		39	Short Middle – D6	
0A	Middle 9	Volume Max	3A	4 Low to High Long at Top	
0B	4 Note Rising Scale	Power On	3B	4 High to Low Long at Bottom	
0C	4 Note Falling Scale	Power Off	3C	3 Note Descending	
0D	2 Note Rising Scale	Enter Pairing Microphone Mute Off	3D	5th Down Medium-Long	
0E	2 Note Falling Scale	Microphone Mute On	3E	5th Down Short-Short	
0F	Long High Short Low	-	3F	5th Up Short-Short	
10	Short Middle – GS7	Secondary Device Connected	40	2 Half Second Low Tones	
11	Long Middle	-	41	Short High Tone	
12	Long Low	Pairing Fail	42	Long Low Tone	
13	Short High	Primary Device Connected	43	Double Low Tones	
14	V Long High	-	44	G Major Arp Up	
15	Long High	-	45	G Major Arp Down	
16	Short Double Low	Link Loss	46	Fairly Short High Tone	
17	Short Double High	-	47	Fairly Short Low Tone	
18	Battery Low	Battery Low	48	Medium Length Low Tone	
19	Low 500ms	-	49	Short Low-High	
1A	Long Double Low	Reset Paired Device List Mute Reminder	4A	Double Octave Toggle Ring Tone	
1B	Ring Twilight	-	4B	Low Low High	
1C	Ring	-	4C	Double Low Tones (long)	
1D	Ring Valkyries	Ring tone 1	4D	Connected 3 Beep Rising Tone	
1E	Ring Green Sleeves	-	4E	Disconnected 3 Beep Falling Tone	
1F	Ring Two Beep	-	4F	Confirmation Rising Tone	
20	Ring Fair Ground	-	50	Double Beep Error Tone	
21	Ring Counter Point	-	51	Low Batt Double Beep	
22	Ring Major Arp	-	52	Mute Off Double Beep	
23	Ring Major Scale	-	53	Mute On Double Beep	
24	Ring Minor Arp	-	54	Single Tone	
25	Ring Harmonic Minor Scale	-	55	Shutdown Tone Double Beep	
26	Ring More Than A Feeling	-	56	Phone Ring	Ring tone 2
27	Ring Eight Beeps	-	57	Power Up Tone	
28	Ring Four Beeps	-	58	Vol Level 7/0	
29	Ring Bumblebee	-	59	Vol Level 6	
2A	Ring Aug Scale	-	5A	Vol Level 5	
2B	Ring Dim Scale	-	5B	Vol Level 4	
2B	Ring Custom	-	5C	Vol Level 3	
2D	4 Note Low to High	-	5D	Vol Level 2	

2E	4 Note High to Low	-	5E	Vol Level 1	
2F	Short High to Low	-			

*1: All values are represented in HEX decimal

*2: See APPENDIX B

APPENDIX E: Error codes

Error code (Decimal)	Description
0	No error
1	
2	
3	Not supported
4	Timed-out
5	
6	Invalid argument
7	Invalid state
8	Invalid size
9	Invalid response
10	CRC mismatch
11	

APPENDIX F: Examples

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-SQ400-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.