

5.2. Quickly verify bluetooth serial transmission

Our company has developed a special mobile phone Bluetooth transparent transmission test APP for this module for users to use. For APP introduction and instructions, please refer to *HLK-B40 Bluetooth Transparent Transmission Module Mobile APP Instructions*.

Use the module test bottom board and the mobile phone Bluetooth transparent transmission test APP to immediately start to test and verify the module's serial port-Bluetooth transparent transmission function.

The specific test procedures are as follows:

Connect the module to the test board correctly and connect the test board to the computer through a USB cable.

Open the corresponding serial port on your computer with the serial debugging tool.

Open the transparent transmission test APP on the mobile phone, the APP will automatically search for surrounding Bluetooth devices and display them in a list.

Click the Bluetooth device name corresponding to the module in the device list to connect. The default name of the B40 module is HLK_B40_**** and the suffix is the last four digits of the MAC address.

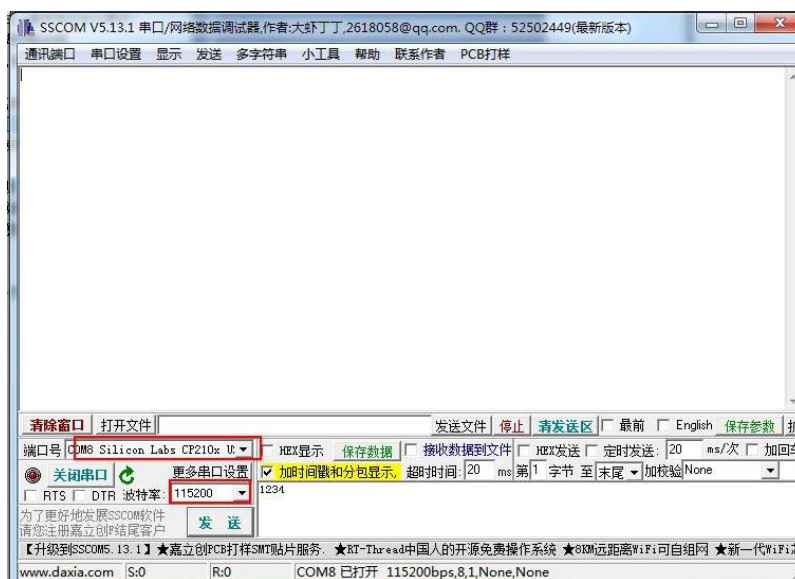


Figure 8 Figure of transmission test measurement tool

After the app is successfully connected to the module, the connection status LED on the test board will turn on, means the connected state.

At this time, the data can be sent to the serial port of the module in the serial port debugging tool on the computer and the sent content will be received and displayed as it is by the mobile phone app;

Send data from the transparent transmission test app on the mobile phone to the module, the sent content will be received by the module as it is and output to the serial port of the module. The received data can be seen in the serial port debugging tool on the computer. The effect is as follows:

Serial port of module

Mobile APP

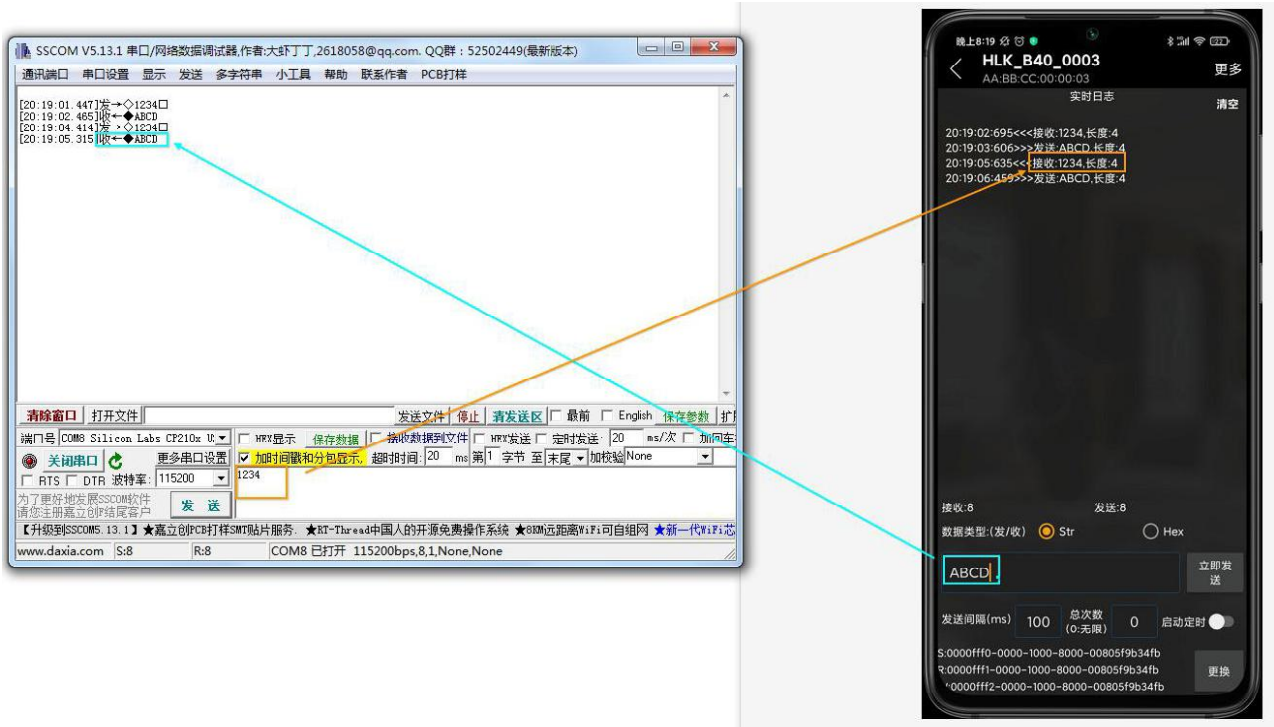


Figure 9 Data transmission through serial port and app

6. Low power sleep function

This module is developed based on BLE 5.1 supporting low power consumption and can be flexibly configured in many aspects to further reduce power consumption.

Configurable items	Description
Adjust transmit power	The lower the transmission power, the lower the power consumption but the shorter the transmission distance
Adjust the broadcast interval and connection interval	The larger the interval, the lower the power consumption but the greater the delay
Turn on auto sleep	6 μ A After the automatic sleep function is turned on, the module can be controlled by the input level of the external sleep control input pin. High level: the main chip will sleep automatically. Low level: wake up to work at full speed. The minimum operating current can be as low as 6 μ a during dormancy

Figure 5 A list of configuration items to reduce power consumption

All the above can be modified through the AT command, the user can be flexible according to the actual application scenario and requirements to achieve a balance between power consumption and performance.

When automatic sleep is turned on, the hibernate output outputs different levels to indicate whether the module is

currently dormant or wake-up:

High: wake-up, full-speed operation.

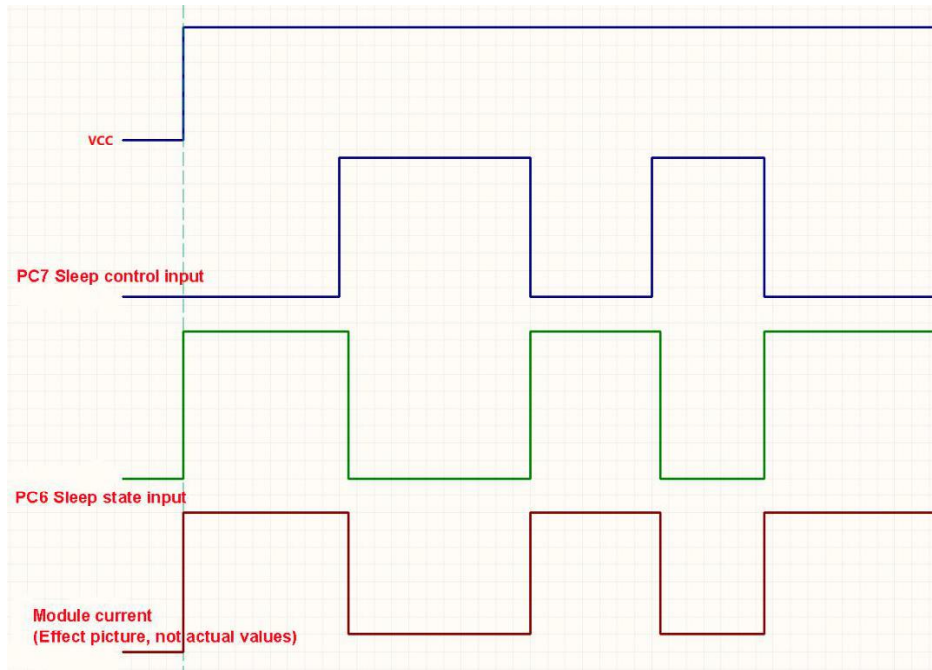


Figure 10 Control and state timing after low power function is turned on

7. AT command

7.1 AT instruction format description

All at instructions are in ascii string format and end with carriage return.

Power failure will not be lost after setting. All settings will take effect only after restart.

Query class instructions :

Send	Response
AT+<CMD>=?\r\n	Query success : AT+<CMD>=<val>\r\n OK\r\n Or query failed : AT+<CMD>=<val>\r\n ERROR\r\n

Set class instructions :

Send	Response
AT+<CMD>=<val>\r\n	Set sucessfully : AT+<CMD>=<val>\r\n OK\r\n Or set failure : AT+<CMD>=<val>\r\n ERROR\r\n

For ASCII code: 0x0D 0x0A

7.2 At instruction list and description

Item	command name	Description	Range parameters	Example								
1	VER	Software versions	Read only	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+MAC=?</td> <td>AT+VER=1.03(20092421) OK</td> </tr> </table>	send	response	AT+MAC=?	AT+VER=1.03(20092421) OK				
send	response											
AT+MAC=?	AT+VER=1.03(20092421) OK											
2	MAC	MAC address	Read only	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+MAC=?</td> <td>AT+MAC=112233445501 OK</td> </tr> </table>	send	response	AT+MAC=?	AT+MAC=112233445501 OK				
send	response											
AT+MAC=?	AT+MAC=112233445501 OK											
3	DEFAULT	Restore the default configuration	1	<table border="1"> <tr> <td>Send</td> <td>response</td> </tr> <tr> <td>AT+DEFAULT=1</td> <td>AT+DEFAULT=1 OK</td> </tr> </table>	Send	response	AT+DEFAULT=1	AT+DEFAULT=1 OK				
Send	response											
AT+DEFAULT=1	AT+DEFAULT=1 OK											
4	REBOOT	Restart the module	1	<table border="1"> <tr> <td>Send</td> <td>Response</td> </tr> <tr> <td>AT+REBOOT=1</td> <td>AT+REBOOT=1 OK</td> </tr> </table>	Send	Response	AT+REBOOT=1	AT+REBOOT=1 OK				
Send	Response											
AT+REBOOT=1	AT+REBOOT=1 OK											
5	TS	Restore transmission mode	1	<table border="1"> <tr> <td>Send</td> <td>response</td> </tr> <tr> <td>AT+TS=1</td> <td>AT+TS=1 OK</td> </tr> </table>	Send	response	AT+TS=1	AT+TS=1 OK				
Send	response											
AT+TS=1	AT+TS=1 OK											
6	NAME	Module. Bluetooth name	Up to 28 characters Default: HLK_B40_.	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+NAME=?</td> <td>AT+NAME=HLK_B40 OK</td> </tr> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+NAME=ble_1234</td> <td>AT+NAME=ble_1234 OK</td> </tr> </table>	send	response	AT+NAME=?	AT+NAME=HLK_B40 OK	send	response	AT+NAME=ble_1234	AT+NAME=ble_1234 OK
send	response											
AT+NAME=?	AT+NAME=HLK_B40 OK											
send	response											
AT+NAME=ble_1234	AT+NAME=ble_1234 OK											

7	BAND	Serial. Porter rate	1200,2400,4800,9600,14400, 19200,38400,57600,115200, 230400,460800,921600 Default : 115200	<table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+BAND=?</td><td>AT+BAND=115200 OK</td></tr> </table> <table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+BAND=230400</td><td>AT+BAND=230400 OK</td></tr> </table>	send	response	AT+BAND=?	AT+BAND=115200 OK	send	response	AT+BAND=230400	AT+BAND=230400 OK	
send	response												
AT+BAND=?	AT+BAND=115200 OK												
send	response												
AT+BAND=230400	AT+BAND=230400 OK												
8	RFPOWER	Bluetooth. Transmit power	1-18, 18 grades Default: 8 The smaller the transmission distance, the lower the power consumption; the larger the transmission distance, the greater the power consumption	<table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+RFPOWER=?</td><td>AT+RFPOWER=8 OK</td></tr> </table> <table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+RFPOWER=10</td><td>AT+RFPOWER=10 OK</td></tr> </table>	send	response	AT+RFPOWER=?	AT+RFPOWER=8 OK	send	response	AT+RFPOWER=10	AT+RFPOWER=10 OK	
send	response												
AT+RFPOWER=?	AT+RFPOWER=8 OK												
send	response												
AT+RFPOWER=10	AT+RFPOWER=10 OK												
9	SLEEPEN	auto sleep Enable	0 disable sleep 1 enable sleep Default value: 0 After enabling, the module will automatically enter the sleep state according to the control of the level of the SLEEPEN input pin	<table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+SLEEPEN=?</td><td>AT+SLEEPEN=0 OK</td></tr> </table> <table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+SLEEPEN=1</td><td>AT+SLEEPEN=1 OK</td></tr> </table>	send	response	AT+SLEEPEN=?	AT+SLEEPEN=0 OK	send	response	AT+SLEEPEN=1	AT+SLEEPEN=1 OK	
send	response												
AT+SLEEPEN=?	AT+SLEEPEN=0 OK												
send	response												
AT+SLEEPEN=1	AT+SLEEPEN=1 OK												
10	CONNI	Bluetooth Connection interval	6 ~ 3200 , The unit is 1.25ms, i.e. 7.5-4000ms. The default value is 24 The smaller the tranceiver, the faster the power	<table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+CONNI=?</td><td>AT+CONNI=24 OK</td></tr> </table> <table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+CONNI=8</td><td>AT+CONNI=8 OK</td></tr> </table>	send	response	AT+CONNI=?	AT+CONNI=24 OK	send	response	AT+CONNI=8	AT+CONNI=8 OK	
send	response												
AT+CONNI=?	AT+CONNI=24 OK												
send	response												
AT+CONNI=8	AT+CONNI=8 OK												
11	ADVI	Bluetooth Broadcast interval	Unit: 625us Recommended value: 80,160,320,800, 1600,3200 Default value: 800	<table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+ADVI=?</td><td>AT+ADVI=800 OK</td></tr> </table> <table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+ADVI=1600</td><td>AT+ADVI=1600 OK</td></tr> </table>	send	response	AT+ADVI=?	AT+ADVI=800 OK	send	response	AT+ADVI=1600	AT+ADVI=1600 OK	
send	response												
AT+ADVI=?	AT+ADVI=800 OK												
send	response												
AT+ADVI=1600	AT+ADVI=1600 OK												
12	ADVDATA	Self-define Broadcast data	Hexadecimal number, the number of characters is a multiple of 2, up to 40 hexadecimal numbers Default: none	<table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+ADVDATA=?</td><td>AT+ADVDATA=03FF1A1B OK</td></tr> </table> <table border="1"> <tr><td>send</td><td>response</td></tr> <tr><td>AT+ADVDATA=68696C696E6B</td><td>AT+ADVDATA=68696C696E6B OK</td></tr> </table>	send	response	AT+ADVDATA=?	AT+ADVDATA=03FF1A1B OK	send	response	AT+ADVDATA=68696C696E6B	AT+ADVDATA=68696C696E6B OK	
send	response												
AT+ADVDATA=?	AT+ADVDATA=03FF1A1B OK												
send	response												
AT+ADVDATA=68696C696E6B	AT+ADVDATA=68696C696E6B OK												

13	ROLE	module BLE role	1 slave 2 host Default value: 1	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+ROLE=?</td> <td>AT+ROLE=1 OK</td> </tr> </table> <table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+ROLE=2</td> <td>AT+ROLE=2 OK</td> </tr> </table>	send	response	AT+ROLE=?	AT+ROLE=1 OK	send	response	AT+ROLE=2	AT+ROLE=2 OK	
send	response												
AT+ROLE=?	AT+ROLE=1 OK												
send	response												
AT+ROLE=2	AT+ROLE=2 OK												
14	ENCRYPT	Pairing binding Enable	0 does not require pairing binding 1 requires pairing and binding Default value: 0	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+ENCRYPT=?</td> <td>AT+ENCRYPT=0 OK</td> </tr> </table> <table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+ENCRYPT=1</td> <td>AT+ENCRYPT=1 OK</td> </tr> </table>	send	response	AT+ENCRYPT=?	AT+ENCRYPT=0 OK	send	response	AT+ENCRYPT=1	AT+ENCRYPT=1 OK	
send	response												
AT+ENCRYPT=?	AT+ENCRYPT=0 OK												
send	response												
AT+ENCRYPT=1	AT+ENCRYPT=1 OK												
15	PINCODE	Pairing code	6-bit integer Default value: 000000	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+PINCODE=?</td> <td>AT+PINCODE=000000 OK</td> </tr> </table> <table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+PINCODE=123456</td> <td>AT+PINCODE=123456 OK</td> </tr> </table>	send	response	AT+PINCODE=?	AT+PINCODE=000000 OK	send	response	AT+PINCODE=123456	AT+PINCODE=123456 OK	
send	response												
AT+PINCODE=?	AT+PINCODE=000000 OK												
send	response												
AT+PINCODE=123456	AT+PINCODE=123456 OK												
16	PEERMAC	When the module is the master, it automatically goes to the MAC address of the slave	MAC address, 12 hexadecimal numbers	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+PEERMAC=?</td> <td>AT+PEERMAC=AABBCC000001 OK</td> </tr> </table> <table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+PEERMAC=AABBCC000001</td> <td>AT+PEERMAC=AABBCC000001 OK</td> </tr> </table>	send	response	AT+PEERMAC=?	AT+PEERMAC=AABBCC000001 OK	send	response	AT+PEERMAC=AABBCC000001	AT+PEERMAC=AABBCC000001 OK	
send	response												
AT+PEERMAC=?	AT+PEERMAC=AABBCC000001 OK												
send	response												
AT+PEERMAC=AABBCC000001	AT+PEERMAC=AABBCC000001 OK												
17	AUTHPWG	OTA and air-configured access passwords	Up to 8 characters Default: Hi- Link	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+AUTHPWG=?</td> <td>AT+AUTHPWG=HiLink OK</td> </tr> </table> <table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+AUTHPWG=68686868</td> <td>AT+AUTHPWG=68686868 OK</td> </tr> </table>	send	response	AT+AUTHPWG=?	AT+AUTHPWG=HiLink OK	send	response	AT+AUTHPWG=68686868	AT+AUTHPWG=68686868 OK	
send	response												
AT+AUTHPWG=?	AT+AUTHPWG=HiLink OK												
send	response												
AT+AUTHPWG=68686868	AT+AUTHPWG=68686868 OK												
18	CONNSTATE	Query the device information for the current Bluetooth connection	Read-only Responses includes: Number of devices currently connected Each device's Role, MAC	<table border="1"> <tr> <td>send</td> <td>respnse</td> </tr> <tr> <td>AT+CONNSTATE=?</td> <td>AT+CONNSTATE=2 M,4E21FB831492 M,539FD7108A6D OK</td> </tr> </table>	send	respnse	AT+CONNSTATE=?	AT+CONNSTATE=2 M,4E21FB831492 M,539FD7108A6D OK					
send	respnse												
AT+CONNSTATE=?	AT+CONNSTATE=2 M,4E21FB831492 M,539FD7108A6D OK												

19	RECONNI	Bluetooth automatically re-connects when the module is the host	Integer, unit s 0: Represents only one attempt to connect at startup, not a reconnect 1 to 60: The connection is automatically reconnected after a specified number of	<table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+RECONNI=?</td> <td>AT+RECONNI=0 OK</td> </tr> </table> <table border="1"> <tr> <td>send</td> <td>response</td> </tr> <tr> <td>AT+RECONNI=10</td> <td>AT+RECONNI=10 OK</td> </tr> </table>	send	response	AT+RECONNI=?	AT+RECONNI=0 OK	send	response	AT+RECONNI=10	AT+RECONNI=10 OK
send	response											
AT+RECONNI=?	AT+RECONNI=0 OK											
send	response											
AT+RECONNI=10	AT+RECONNI=10 OK											
20	UIDS	Bluetooth transmission service UUID	32 hexadecimal Default : 0000fff00000100080000080 5f9b34fb									
21	UIDR	Read feature UUID in transmission service (module transmits, APP receives)	32 hexadecimal Default : 0000fff10000100080000080 5f9b34fb									
22	UIDW	White feature UUID in APP transmission (APP receives module transmits)	32 hexadecimal Default : 0000fff20000100080000080 5f9b34fb									

Table 6 AT command list and description

8. Wireless settings and queries via Bluetooth

In the mobile phone APP, the module can be queried and set up by Bluetooth wireless, please refer to the *HLK-B40 Bluetooth transmission mode phone APP usage instructions*.

9. OTA functionality

In the mobile phone APP, through Bluetooth wireless upgrade module firmware, the specific operation please refer to the *HLK-B40 Bluetooth transmission module mobile phone APP Instructions* for use.

10. Contact info

Shenzhen Hi-Link Electronic CO.,Ltd

Address : 3F,Caiyue Mansion West gate,Liuxian Blvd,MinZhi

Street,LongHua District,Shenzhen,China

Phone : 0755-23152658/83575155

Email: sales@hlktech.com

FCC Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: This product has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This product 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 product 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.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1: This module certified that complies with RF exposure requirement under 5mm RF distance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Note 2: Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3: The module may be operated only with the antenna with which it is authorized. Any antenna that is of the same type and of equal or less directional gain as an antenna that is authorized with the intentional radiator may be marketed with, and used with, that intentional radiator.

Note 4: FCC ID label on the final system must be labeled with "Contains FCC ID: 2AD56HLK-B40" or "Contains transmitter module FCC ID: 2AD56HLK-B40" .