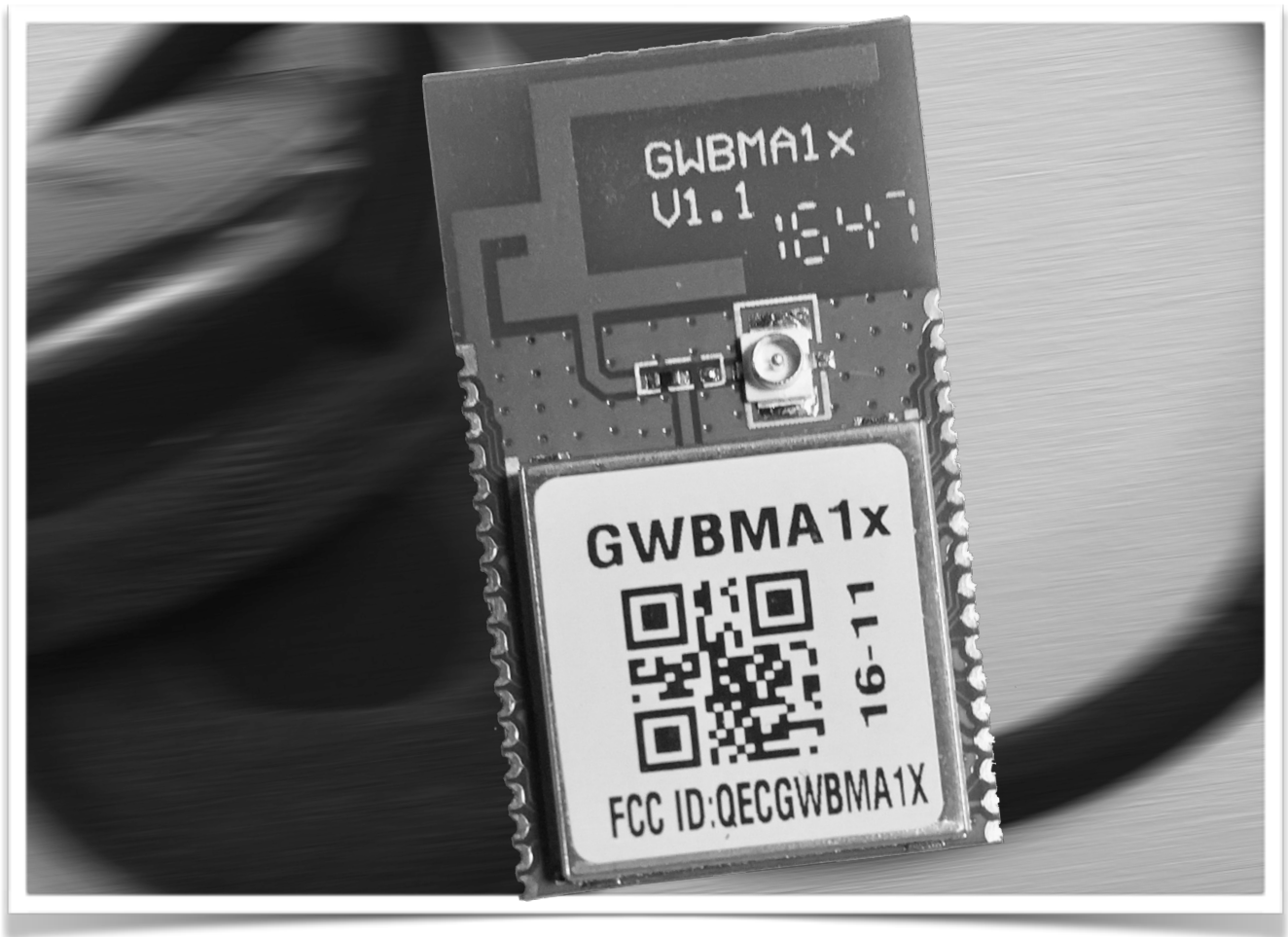Gigawit®

GWBMA0x Bluetooth Audio module

Data sheet version 1.0

Introduction

GWBMA1X is a high performance Bluetooth audio module, It provides various type of wireless audio connection, including Bluetooth, 2.4GHz., allows it to be adopted into different audio application, such as sound bar, Bluetooth speaker.

GWBMA1x embedded with comprehensive firmware, user needs not to spend any engineering effort on audio encode/decoding and RF connection.

GWBMA1x provides different interfaces, which allows it to be connect to different devices in future.

Applications

- Bluetooth speaker
- Bluetooth Sound-bar with wireless subwoofer
- True wireless stereo Bluetooth speaker
- Bluetooth Audio dongle
- Wireless TV headphone
- Wireless gaming headphone

Feature

- Bluetooth v4.2 specification compliant and support BR/EDR
- Programmable output RF power up to +8dBm
- -93dBm RF sensitivity
- Support A2DP 1.2, HFP 1.5 and AVRCP 1.5
- Support multiple Bluetooth/ proprietary link for wireless subwoofer, true wireless stereo, wireless surround speaker
- Multiple interfaces: UART, I2C, SPI, I2S, ADC, PWM, USB
- Analog and digital audio output
- On board 16bit stereo DAC and 16bit mono ADC
- Support MP3, SBC, WMA, ACC decoding
- Optional apex socket for external antenna
- FCC/CE certification

Block Diagram
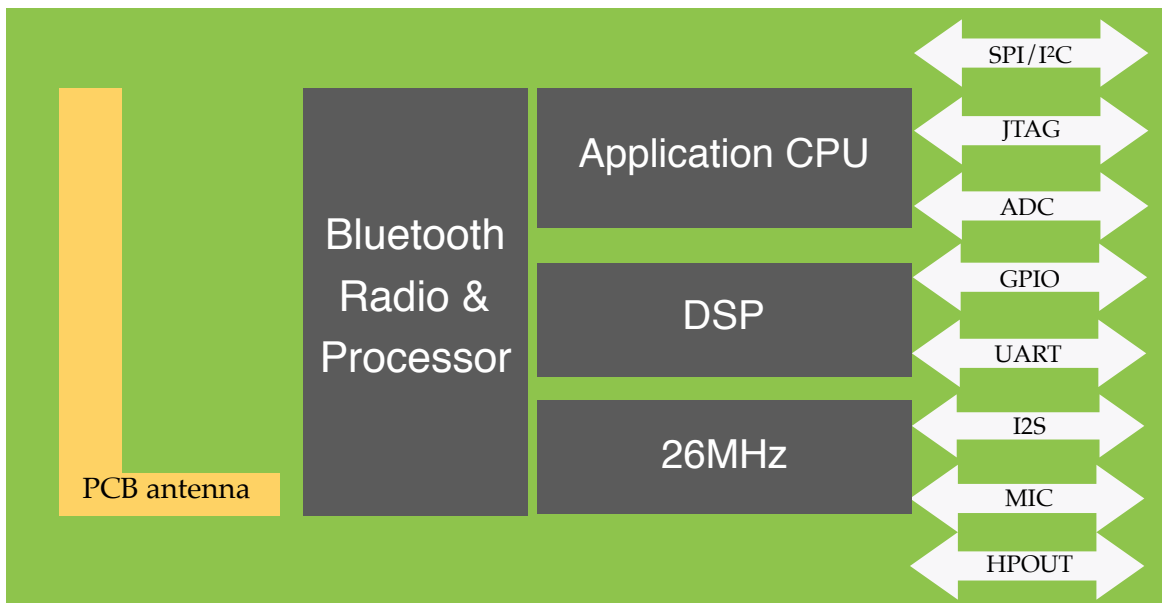
Electrical Specification

	Description	Typical
General	Operation voltage	3.3V to 4.2V DC
	Supply current	45mA @play; 20mA @ idle
	Antenna	PCB, (optional Ipex connector)
	Internal DAC	Stereo 16bit DAC with 94dB S/N
	I2S interface	48KHz, 16bit Stereo
	Digital I/O	UART, USB, SPI, I2C, GPIO, PWM
	Dimension	19 x 32 x 1 mm
	Operation temperature	-10 ~ +60°C
Bluetooth RF	Bluetooth version	Bluetooth v4.2 BR/EDR
	Frequency band	2.4GHz ISM (2.402 - 2.480GHz)
	Modulation Method	GFSK PI/4-DQPSK, 8 DPSK
	Max. Data Rate	3Mbps
	TX Power	+8dBm max, 3dB step control
	Rx Sensitivity	-92.5dBm
	RF Range (indoor)	10m

Table 1 Electrical Specification

Hardware information

Pin Assignment
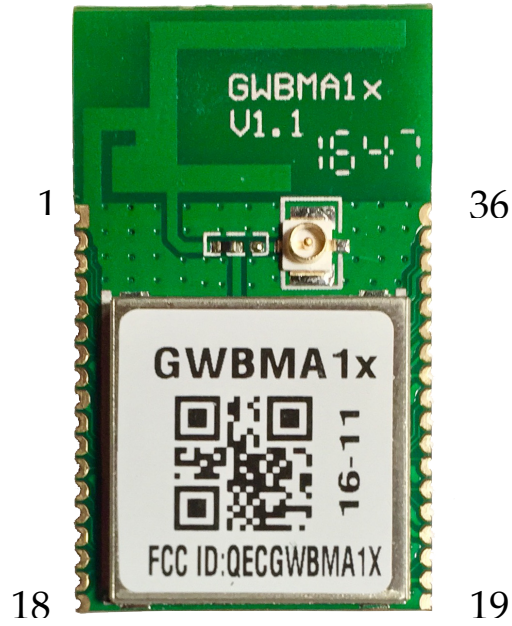
Pin	name	Type	Description
1	GND	GND	Ground
2	RXD	I/O	UART RX
3	TXD	I/O	UART TX
4	I2SDI	I/O	I2S Data Input
5	IS2DO	I/O	I2S Data Output
6	LRCK	I/O	I2S Left/Right clock
7	SCLK	I/O	I2S Bit Clock
8	MCLK	I/O	I2S Master Clock, typ 12.288MHz
9	GND	GND	Ground
10	GPIO3.7	I/O	IR input, Standby, GPIO [1]
11	SDDAT3	I/O	SD Card Data3, Mute output [2]
12	GPADC	Analog	12 bit ADC input
13	SDDAT2	I/O	SD Card Data2
14	SDDAT1	I/O	SD Card Data1
15	SDDAT0	I/O	SD Card Data0
16	SDCLK/HRX	I/O	SD Card Command/ Debug Rx
17	SDCMD/HTX	I/O	SD Card Command/ Debug Tx
18	GND	GND	Ground

| Pin	name	Type	Description
19	GND	GND	Ground
20	AVDD33	Power	3.3V LDO output
21	nRESET	I	Reset, Active Low
22	VIN	Power	Power input
23	USBDN	I/O	USB Data -
24	USBDP	I/O	USB Data +
25	SDA	I/O	I2C Data
26	SCL	I/O	I2C Clock
27	RLED	I/O	Red LED, GPIO
28	BLED	I/O	Blue LED, GPIO
29	LOUT	Analog	Stereo DAC Left Output
30	ROUT	Analog	Stereo DAC Right Output
31	MICP	Analog	Mic Input +
32	MICN	Analog	Mic Input -
33	MICBAS	Analog	Mic Bias voltage
34	AGND	GND	Analog Ground
35	GPIO2.0	I/O	General purpose I/O
36	GND	GND	Ground

Mounting GWBMA0x

GWBMA0x is RF sensitive; in order to obtain the best performance, it is recommended to mount the module at corner of mother board, and with some marginal space.

Also, keep it away from metal components, such like speakers, transformers, batteries, big aluminum capacitors, heat sinks and Metal Panels.
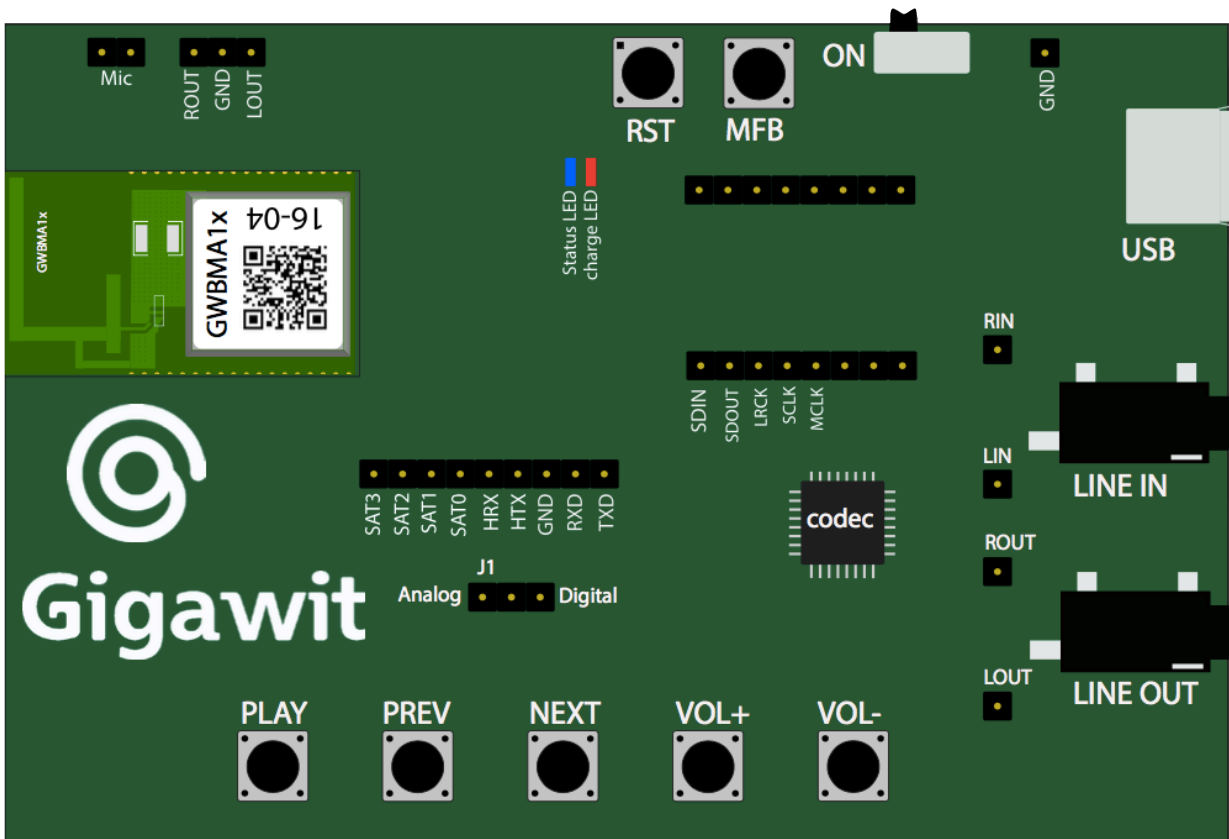
The figure below illustrates how to mount the GWBMA0x module. Improper mounting will decrease the RF performance dramatically.
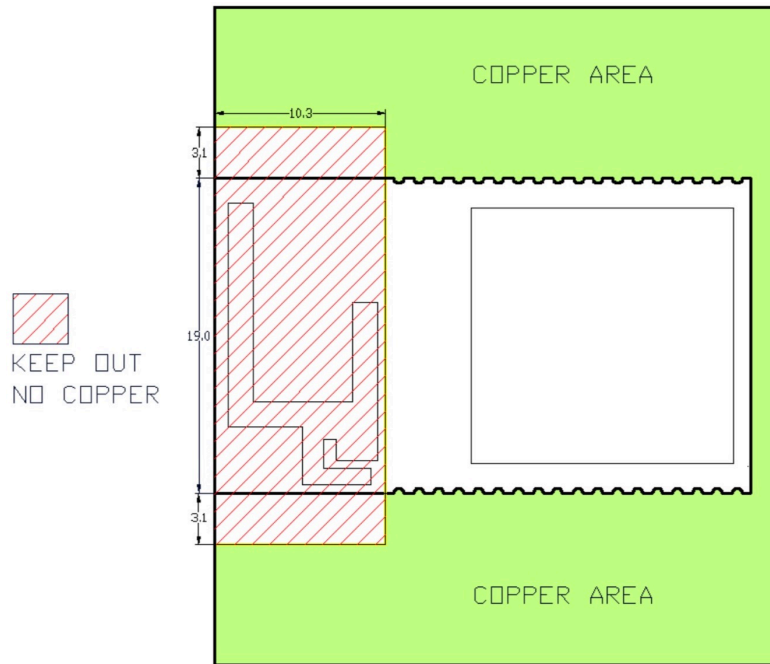
Dimension and layout
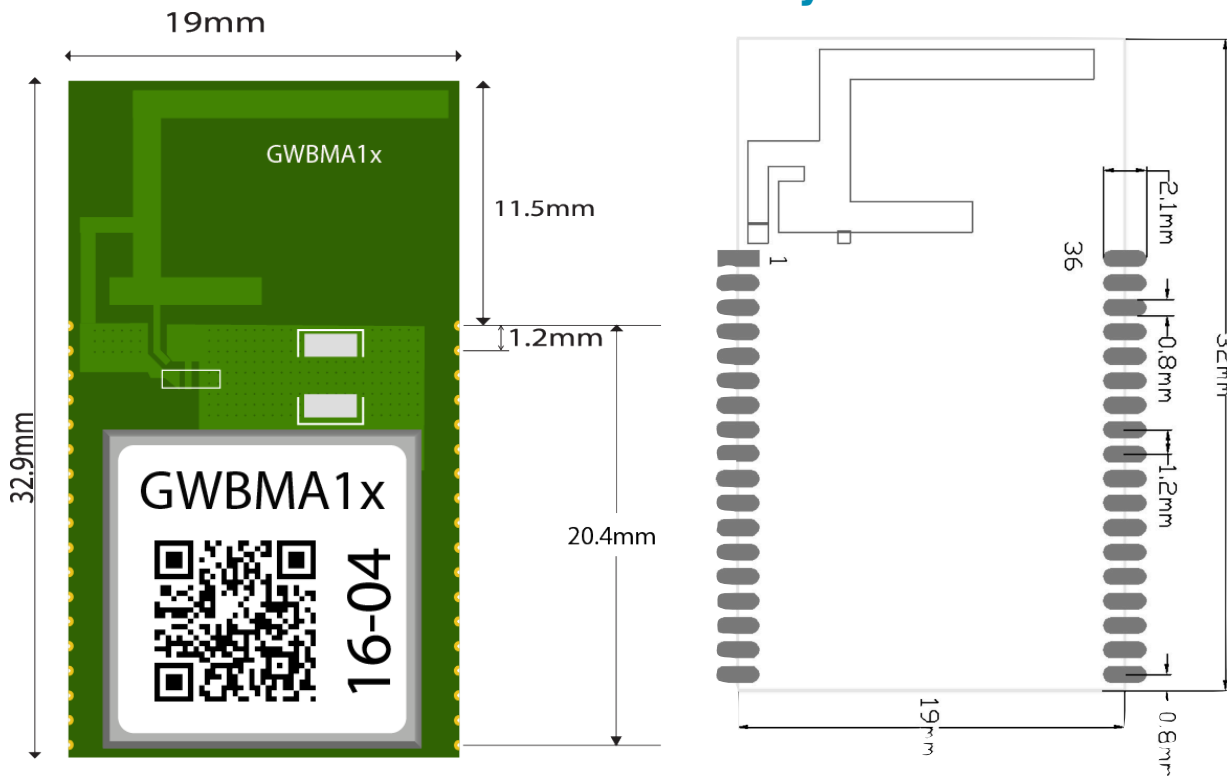
Evaluation Board

Description

The EVK contains complete external circuit for GWBMA1x, user can easily connect it to headphone or amplifier for evaluating the performance and feature of GWBMA1x. It is a very good reference for engineer designing the PCB for GWBMA1x.

USB port

 Besides USB feature (future firmware), the USB port is the major power source for the board. There is a simple charging circuit on board, where a 3.7V Li-ion can be charged up (if connect to the board) once the USB port is connected.
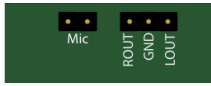
Control keys

 The board contains basic control key, which allows user to Play/Pause a track, go to Previous or Next track, and control the volume up and down.

Audio output
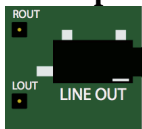
 A codec is on board, which connects to module's I2S output. The output of the codec is connected to the LINE OUT socket. User can also connect the I2S output to their own codec directly.
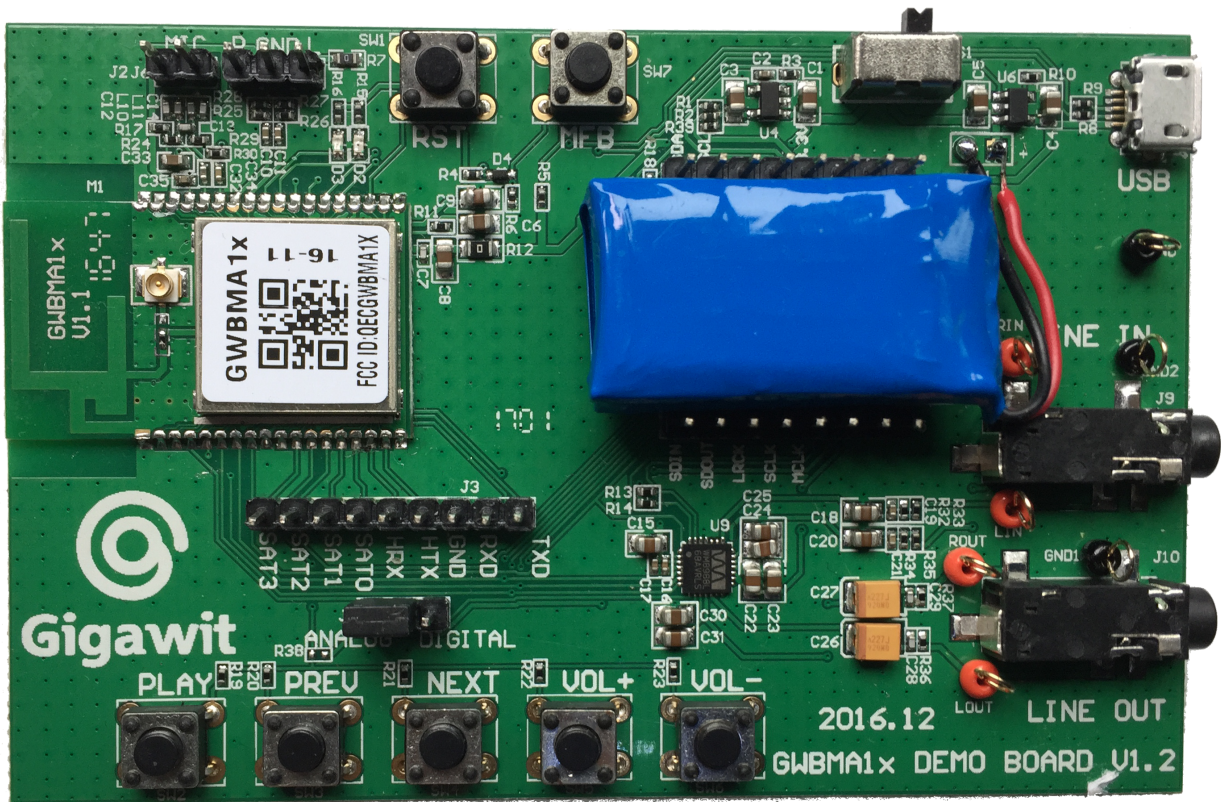
 The module's analog audio output are routed to the ROUT, LOUT pins, user can connect it to audio amplifier circuit or ear phone.
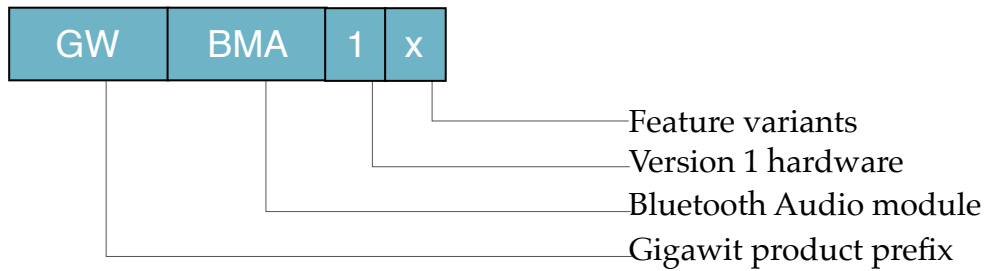
Power and reset

 The RST button will reset the module, where the MFB button will put the module into firmware update mode (update later).

Part number

GWBMA1x naming rule is as following:

Part number	Description
GWBMA10	Standard Bluetooth Audio
GWBMA1A	Bluetooth Audio with low latency codec *
GWBMA1W	Bluetooth Audio with Wireless Subwoofer *
GWBMA1S	Bluetooth Audio with True Wireless Stereo *
GWBMA1D	Bluetooth Audio with Wireless Surround and Subwoofer *
GWBMA1Q	Bluetooth Audio with low latency codec and voice chat for gaming headphone *
GWBMAH	Proprietary 2.4G wireless low latency mono module*

* future release

All part numbers are base on same hardware with different firmware loaded. Therefore, same PCB can fit with all the part number above.

Customisation

No SDK will be provided for GWBMA1x. However, firmware customisation service will be provided (requires NRE). Customised firmware will be pre-programmed in the GWBMA1x module and delivery to customer.
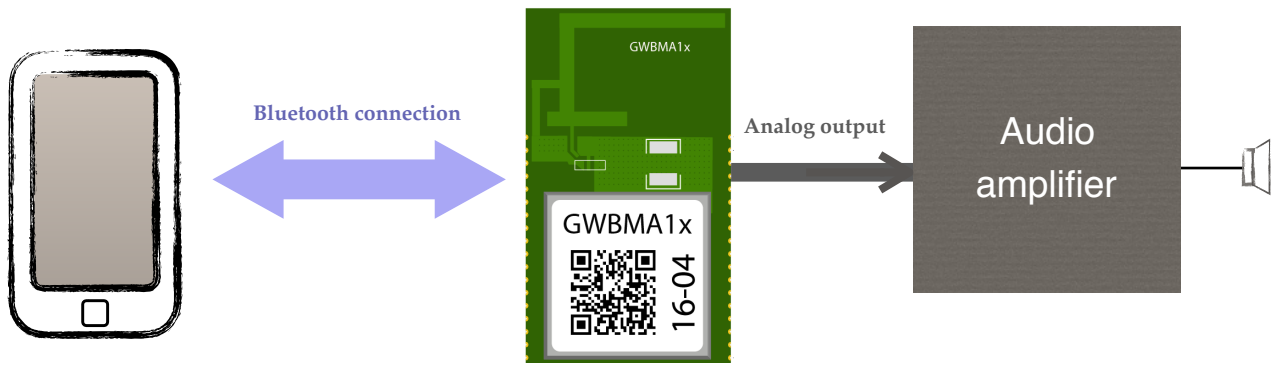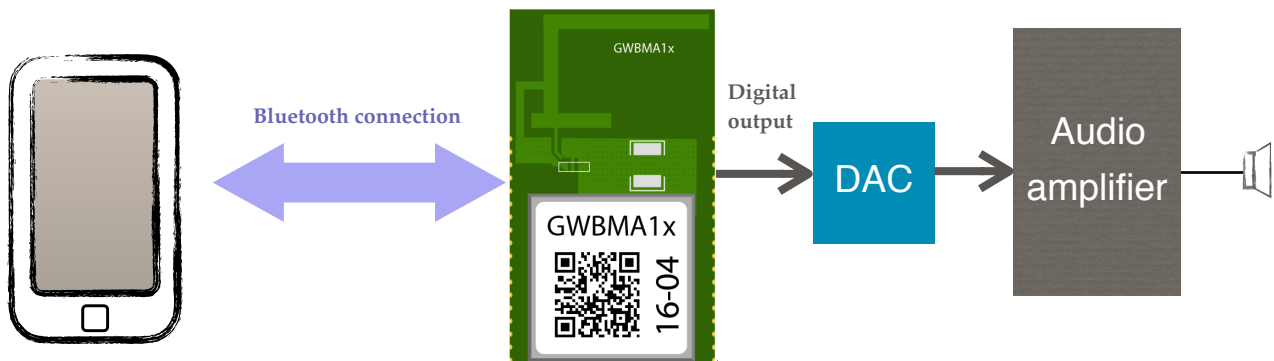
Firmware information

GWBMA10

This section will describe the firmware feature of GWBMA10.

Bluetooth Audio

The basic feature of GWBMA10 is to connect smart phone or tablet through Bluetooth, and output music from them. The basic architecture are as following:


Using internal DAC, analog audio output

Using external DAC, I2S audio output

Internal and External DAC

GWBMA10 provide the simplest and flexible Bluetooth audio connections. Internal DAC can be either enabled or disabled. With internal DAC enabled, audio signal from wireless side will be decoded inside the module and output as analog audio signal, user can connect it to amplifier for audio playback; if the internal DAC is disabled, audio signal will be output as digital format to the I2S bus, where user can connect it to any DAC chip to achieve higher audio quality. Such flexibility allows GWBMA10 suitable for application from low cost portable speaker to high quality audio system.

Control buttons

In order to provide more IO pins and reduce the module dimension, GWBMA10 use one single pin for five control buttons. The connection is as following:
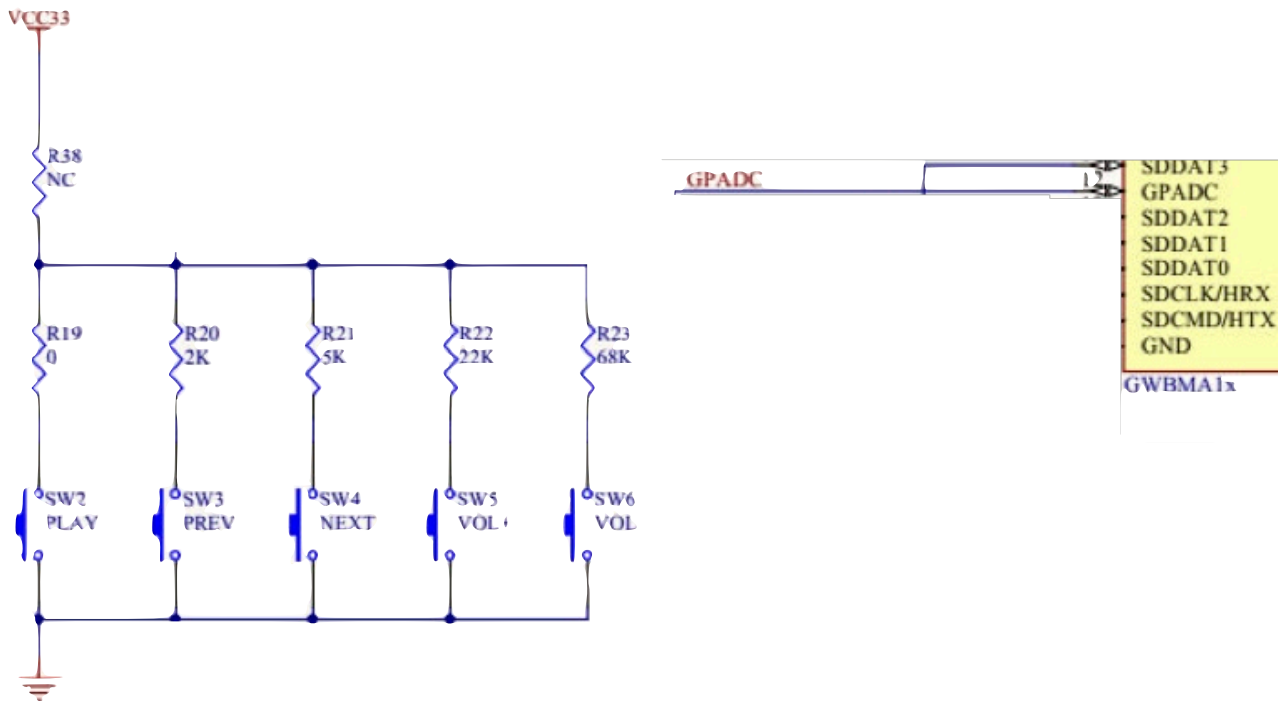
An ADC pin (GPADC) is used for the connecting five push buttons (PLAY, PREV, NEXT, VOL+, VOL-), therefore user MUST follows the circuit and resister value as stated on the above diagram. **Improper resistors value will cause the push buttons malfunction.** The advantage of such design allows only one pin is used for multiple push button, and the most important is it maintains a flexibility for adding more push buttons in future.

Button	Description
PLAY	Audio playback and pause
PREV	Play the previous track
NEXT	Play the next track
VOL+	Increase sound volume
VOL-	Decrease sound volume

The feature of each buttons is described as the table below:

Button debouncing is already handled by the firmware, however, it is still suggested to use push button with lesser debouncing in order to avoid any denouncing situation which is outside the range which firmware can handle.

Phone call feature
GWBMA10 contains phone call feature, which allows user to answer phone call directly.
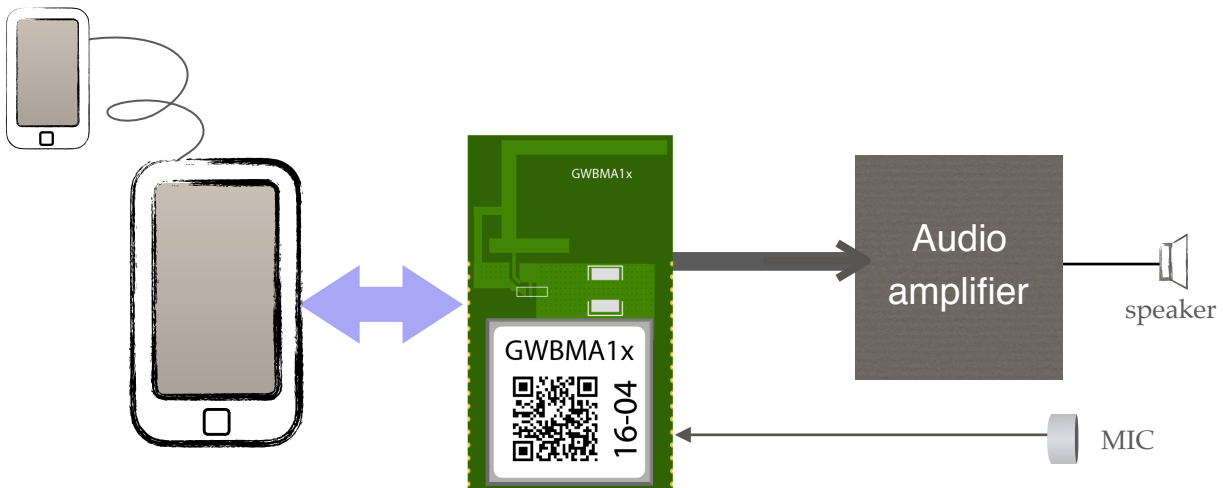
When a phone call in, music will be paused (if it is playing) and GWBMA10 will alert user by speaking out the in-coming phone number (as long as caller ID is available). User can then accept the call by pushing the PLAY button.
Such caller ID speak out feature is enabled with English language by default, it can be disabled or changed to other language by our engineer. Customer can also provides us their own MP3 files to import to GWBMA10.

GPIO1.3, 1.4
On GWBMA1x EVK, GWBMA10's GPIO 1.3 and GPIO 1.4 (pin 27, 28) are connected two LEDs for indication of pairing and operation. User can simply ignore these two pin if no LEDs display is needed. It is also possible to change the function of this two pins base on customer request.

AT-command (to be released in later firmware version)

GWBMA10 accepts AT-command for configuration, allowing the module to be controlled by micro-controller, so that feature of GWBMA10 can be embedded into system's software
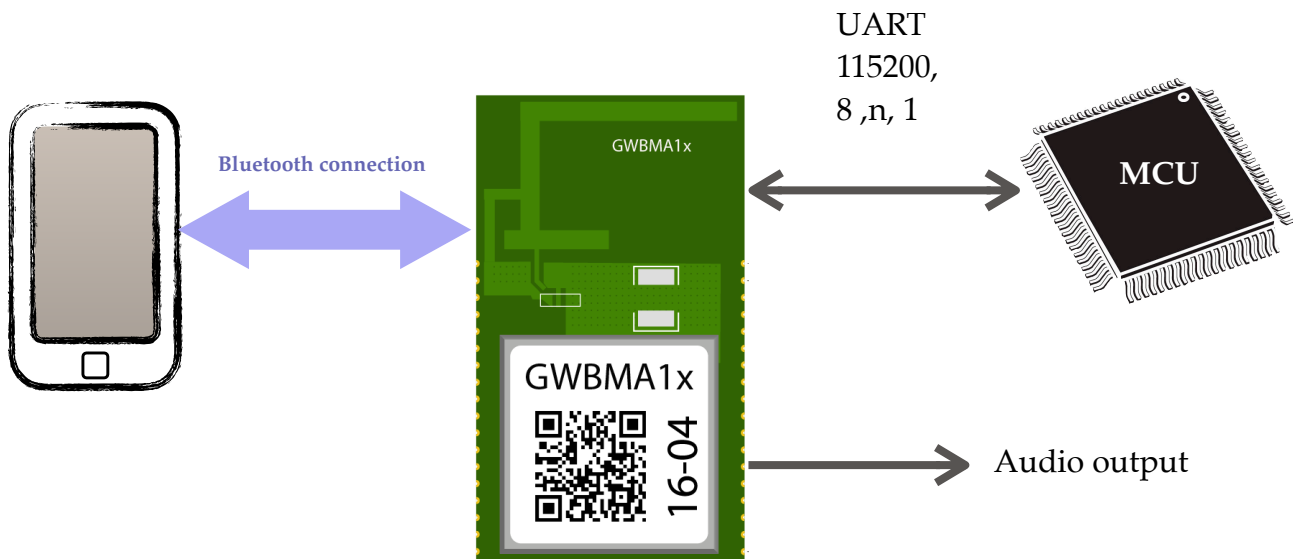
The AT-command syntax is as following:

    Enquiry:

     AT+command?\r\n

    Setting:

     AT+command= new value\r\n

GWBMA10 AT-command are listed as following:

GABMD10 AT-command table

Aspect	Topic	Enquiry	Response	Set	Response	Note
Bluetooth	Bluetooth name	AT+BTNAME?	Current Bluetooth name	AT+BTNAME={new name}	OK	
	Bluetooth Address	AT+BTADDR?	Current Bluetooth address	AT+BTADDR={new address}	OK	the address is 6-byte data
	Bluetooth PIN	AT+PINCODE?	Current PIN code	AT+PINCODE={new pin code}	OK	PIN code is 4-byte data
Audio operation	Playback	N/A	N/A	AT+PLAY	OK	
	Previous track	N/A	N/A	AT+PREV	OK	
	Next track	N/A	N/A	AT+NEXT	OK	
	Volume up	N/A	N/A	AT+VOLUP	OK	
	Volume down	N/A	N/A	AT+VOLDN	OK	
RF testing mode (for FCC)	Testing parameter	N/A	N/A	AT+FCC={parameter}	OK	parameter format: aabbccddeeff aa: frequency method. Condition: effective only when ff is 01 - 00: fix frequency - 01: frequency hopping bb: RF data rate. Condition: effective only when ff is 01 - 00: basic rate - 02: Enhanced data rate (2M) - 03: Enhance data rate (3M) cc: Package type. Condition: effective only when ff is 01 - 01: DM1 - 02: DM3 - 03: DM5 dd: Channel,0 to 78. Condition: effective only when either ff is 00, or ff is 01 and aa is 00. ee: Tx power level: 00, 01 or 02. Condition: effective only when ff is 01 or 02 ff: Testing mode - 00: Rx - 01: Tx modulated - 02: Tx carrier
	Stop testing	N/A	N/A	AT+FCCSTOP	OK	

GWBMA1A

GWBMA1A embeds with no latency feature, allows audio signal to be transmitted with very low latency (~40ms). It will be suitable for applications like video playback which requires video and audio synchronisation.

GWBMA1A consists of Gigawit no latency protocol, therefore it requires GWBMA1A to be used in pair as the following diagram, in order to implement such feature.
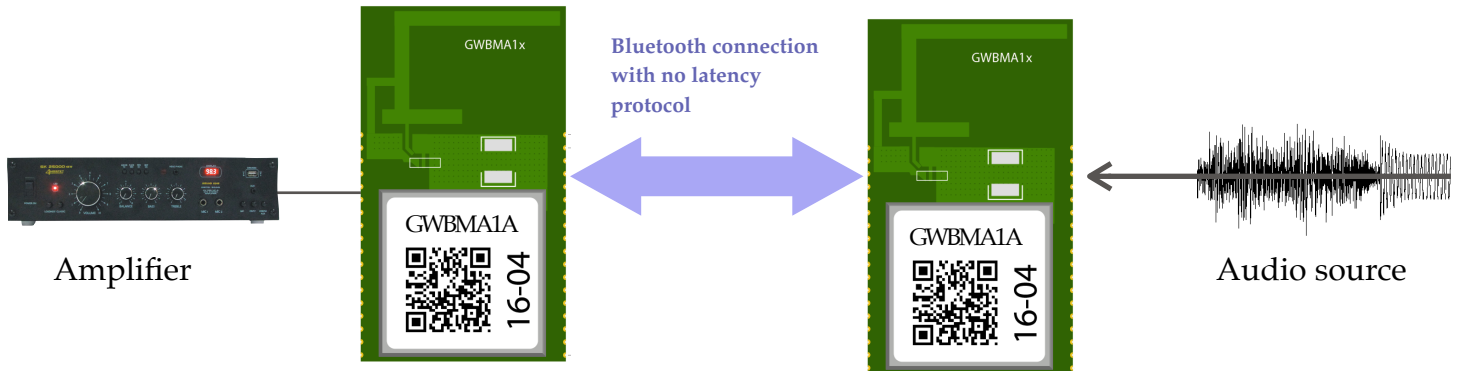
(Detail information will be release later)

GWBMA1W

GWBMA1W provides both Bluetooth and proprietary 2.4GHz connection simultaneously, where the 2.4GHz feature provides a wireless connection for sub-woofer. GWBMA1W will be suitable for the 2.1 audio application, such as sound bar.
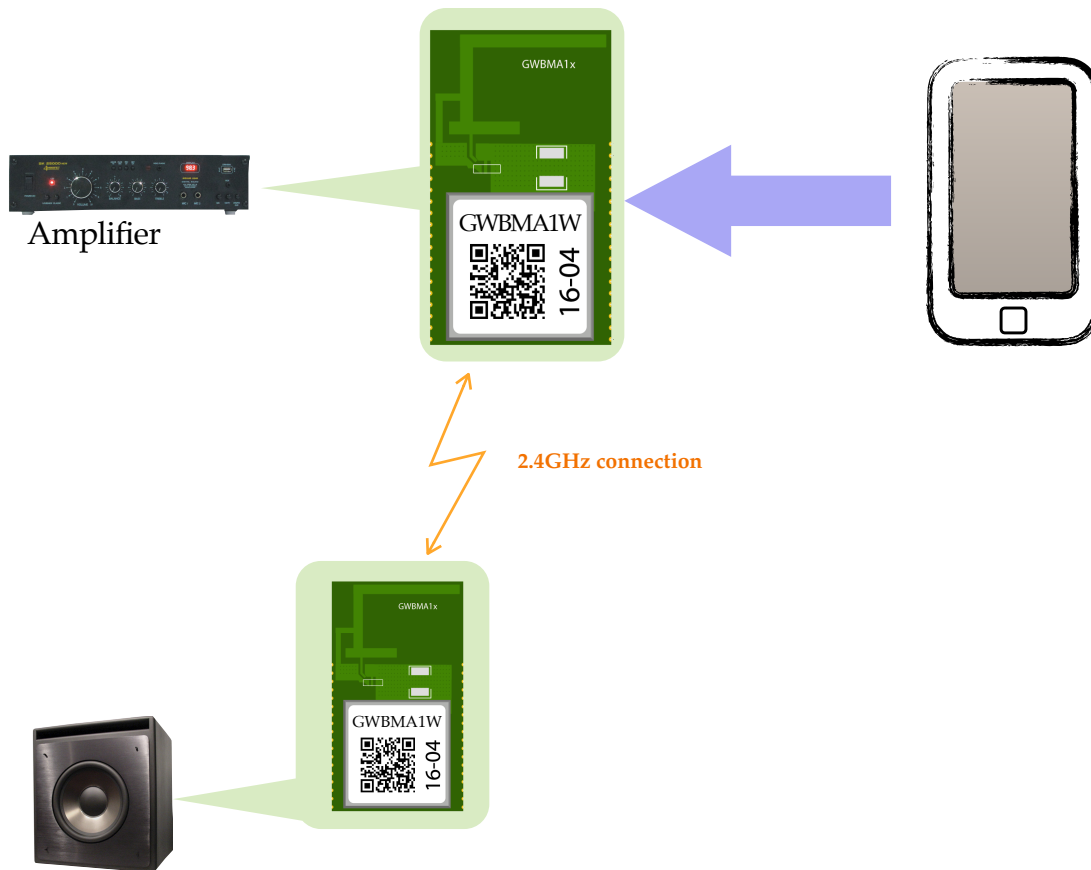
(Detail information will be release later)

GWBMA1S

GWBMA1S module embeds True Wireless feature, allowing modules cascade connected. It provides a flexible and longer audio routing. The maximum number of modules in a connection will be limited communication latency and CPU processing power.
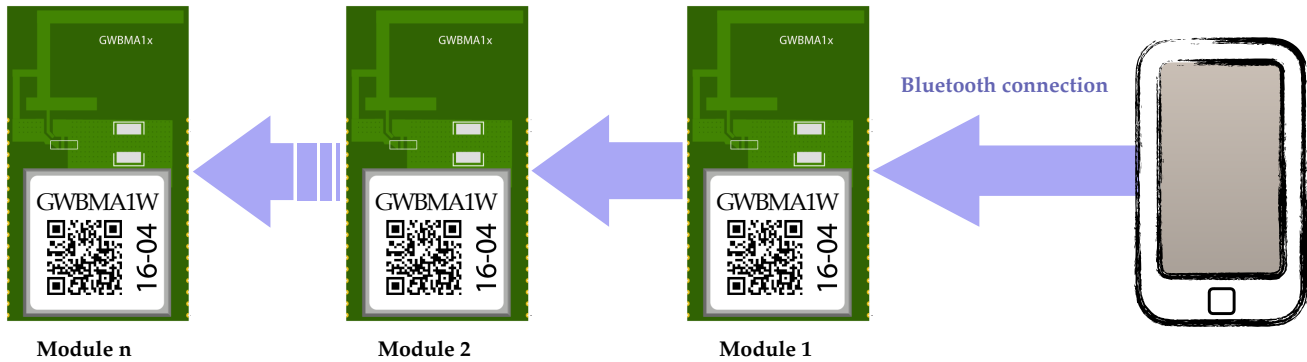
(Detail information will be release later)

FCC and CE Certification

TCB

GRANT OF EQUIPMENT
AUTHORIZATION

TCB

Certification
Issued Under the Authority of the
Federal Communications Commission
By:

PHOENIX TESTLAB GmbH
Koenigswinkel 10
32825 Blomberg,
Germany

Date of Grant: 11/15/2016

Application Dated: 11/15/2016

Gigawit Electronics Limited
308 Building 25-2, Keyuanxi Induestry Park
High-tech Park, Nanshan District Shenzhen 518057
Shenzhen, 518057
China

Attention: Charlie Pan , Purchasing Manager

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is
VALID ONLY for the equipment identified hereon for use under the Commission's
Rules and Regulations listed below.
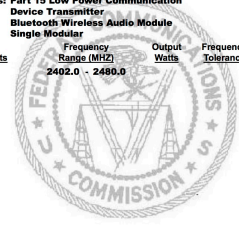
FCC IDENTIFIER: QECGWBMA1X
Name of Grantee: Gigawit Electronics Limited
Equipment Class: Part 15 Low Power Communication Device Transmitter
Notes: Bluetooth Wireless Audio Module
Modular Type: Single Modular

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15C	2402.0 - 2480.0			

FCC certification

AGC
Attestation of Global Compliance

T: 0086-755-2908 1955
F: 0086-755-2600 8484
E-mail: agc@agc-cert.com
Web: Http://www.agc-cert.com

Recognized by China National Accreditation Service for
Conformity Assessment & Taiwan Accreditation
Foundation

2F., Building 2, No.1-No.4, Chaxi Sanwei
Technical Industrial Park, Gushu, Xixiang Street
Baoan District, Shenzhen, P. R. China (518000)

EC-R&TTE Certification of Conformance

Registration No. AGC03817160902E0

Certificate Holder Gigawit Electronics Limited
308 Building 25-2, Keyuanxi Industry Park High-tech Park,
Nanshan District Shenzhen 518057

Product Designation GWBMA1x Bluetooth Wireless Audio Module

Brand Name N/A

Model / Series Models GWBMA1x

Manufacturer Gigawit Electronics Limited
308 Building 25-2, Keyuanxi Industry Park High-tech Park,
Nanshan District Shenzhen 518057

Requirement	Applied Standards	Document Evidence	Result
Art.3.1(a) Health	EN 62479:2010	Test Report: AGC03817160902EH02	Conform
Art.3.1(a) Safety	EN 60950-1:2006+A11:2009 +A1:2010+A12:2011+A2:2013	Test Report: AGC03817160902ES01	Conform
Art.3.1(b) EMC	EN 301 489-1 V1.9.2 EN 301 489-17 V2.2.1	Test Report: AGC03817160902EE01	Conform
Art.3.2 Radio	EN 300 328 V1.9.1	Test Report: AGC03817160902EE04	Conform

CE R&TTE tested

Signed by Quality Manager
Issue Date: Oct. 18, 2016

Recognized by Attestation of Global Compliance (Shenzhen) Co., Ltd., in accordance with the R&TTE Directive 1999/5/EC. The
certificate doesn't imply assessment of the production. The Applicant of the certificate is authorized to use this certificate in
connection with EC declaration of conformity to the Directive. The certificate is only applicable to the equipments described above.
This certificate shall not be re-produced except in full without the written approval of Attestation of Global Compliance (Shenzhen)
Co., Ltd.
Note: This certificate is part of the full test report(s) and should be used in conjunction with it.

CE certification

방송통신기자재등의 적합인증서
Certificate of Broadcasting and Communication Equipments

상호 또는 성명 *Trade Name or Applicant*	오스턴 일렉트릭(Austin electric)
기자재 명칭 *Equipment Name*	특정소출력 무선기기(무선데이터통신시스템용 무선기기)
기본모델명 *Basic Model Number*	GWBMA10
파생모델명 *Series Model Number*	
인증번호 *Certification No.*	MSIP-CRI-5AE-GWBMA10
제조자/제조국가 *Manufacturer/ Country of Origin*	Gigawit Electronics Limited / 중국
인증연월일 *Date of Certification*	2017-06-22
기타 *Others*	

위 기자재는 『전파법』 제58조의2 제2항에 따라 인증되었음을 증명합니다.

It is verified that foregoing equipment has been certificated under the Clause 2, Article 58-2 of Radio Waves Act.

2017년(Year) 06월(Month) 22일(Date)

국립전파연구원장
Director General of National Radio Research Agency

※ 인증 받은 방송통신기자재는 반드시 "적합성평가표시" 를 부착하여 유통하여야 합니다.
위반시 과태료 처분 및 인증이 취소될 수 있습니다.

KCC certification

QDL Bluetooth® qualified design listing

The Bluetooth SIG Hereby Recognizes

K-SOLUTION CONSULTING CO., LIMITED
Member Company

Bluetooth Module(GWBMA1x)
Qualified Design Name

Declaration ID: D037124
Qualified Design ID: 101280
Specification Name: 4.2
Project Type: End Product
Model Number: GWBMA1x
Listing Date: 22 September 2017   Assessment Date: 21 September 2017
Hardware Version Number: V1.1   Software Version Number: V1.1

This certificate acknowledges the *Bluetooth®* Specifications declared by the member are achieved in accordance with
the Bluetooth Qualification Process as specified within the Bluetooth Specifications and as required within the current PRD

Bluetooth®

BQB certification

I.   Contact information

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Revision update

1.0

- update pin assignment

- update suggest PCB design

- BQQ certification added

- UART speed corrected to 115200