User Manual

1.Scope

The GEBW2455A module is a Bluetooth / WiFi Communication Module which provides the highest level of integration for IoT applications handheld wireless systems ,with integrated IEEE 802.11b/g/n(HT20)/ac and Bluetooth 5.0 + EDR (Enhanced Data Rate).

The diamention of the module is 7.9mm * 7.3mm, 3.35~ 4.2Vdc power supply. The module uses stamp hold package so it is convienent for both hand soldering and surface mount machines.

GEBW2455A module can work when it is more than 20cm from the human body.

The datasheet as follow:

Product Name	Communication Module
Product Model	GEBW2455A
Manufacturer	Guangzhou Geoelectron Science & Technology Company Limited
Working Temperature	-20℃-75℃
Store Temperature	-40℃-80℃
Power Supply	3.35~4.2 Vdc
Diamention	7.9mm * 7.3mm

2.Standard

It supports the followingstandard:

Item	Standard	Frequency	Modulation
Bluetooth	Bluetooth 5.0	2402-2480MHz	GFSK, π /4 DQPSK, 8 - DPSK
WiFI	IEEE 802.11 b/g/n(HT20)/ac 2.4G and 5GHz	2412 to 2462MHz or 5000MHz 5180 to 5320MHz or 5500 to 5720MHz / 5745 to 5825MHz	802.11b: DSSS(CCK/QPSK/BPSK) 802.11g:OFDM(BPSK/QPSK/16QAM/64QAM) 802.11n(HT20): OFDM (BPSK/QPSK/16QAM/64QAM)

Note: The device is set through firmware, and the frequency band 5600-5650MHz detection is skipped during operation. This frequency band will not be connected and can not able to operate on Canada frequencies.

The GEBW2455A supportssupports the following standards:

- Bluetooth 2.1 + EDR
- Bluetooth 3.0
- Bluetooth 4.0 (Bluetooth Low Energy)
- Bluetooth 4.2 (Bluetooth Low Energy)
- Bluetooth 5.0 (BT5.0 is backwards compatible)
- IEEE 802.11ac single-stream mandatory and optional requirements for 20, 40, and 80 MHz channels
- IEEE 802.11n
- IEEE 802.11b
- IEEE 802.11g

3. Interface

The interface it provide for Bluetooth and WiFi is as below:

Bluetooth	UART
WiFI	SDIO

To use the module, the host system must be running LINUX operation system with kernel version 3.2.0 or above. The host system needs to provide power source for the module and a 32.768kHz slow clock for UART.

The module intergrates a Murata SP-HY1HK-B module. According the FCC module certification requirement, an oscillator is added to provide standalone operation.

4.FCC and IC compliance

FCC ID	2ABNA-2455A
IC	11648A-2455A

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: 2ABNA-2455A Or Contains FCC ID: 2ABNA-2455A”

When the module is installed inside another device, the user manual of this device must contain below warning statements:

1. 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.

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

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

The host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

The end user manual shall include all required regulatory information/warning as shown in this manual, include:

This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

IC WARNING
Cet appareil contient des émetteurs / récepteurs exemptés de licence conformes aux RSS (RSS) d'Innovation, Sciences et Développement économique Canada. Le fonctionnement est soumis aux deux conditions suivantes :
(1) Cet appareil ne doit pas causer d'interférences.
(2) Cet appareil doit accepter toutes les interférences, y compris celles susceptibles de provoquer un fonctionnement indésirable de l'appareil.
Cet équipement est conforme aux limites d'exposition au rayonnement ISED établies pour un environnement non contr?lé.
Cet équipement doit être installé et utilisé à une distance minimale de 20 cm entre le radiateur et votre corps.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
(1)This device may not cause interference.
(2)This device must accept any interference, including interference that may cause undesired operation of the device.
This device must be installed and operated with a minimum distance of 20 cm between the radiator and user body

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5.15-5.25 GHz band is restricted for indoor use only.
For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Module PIN Descriptions：

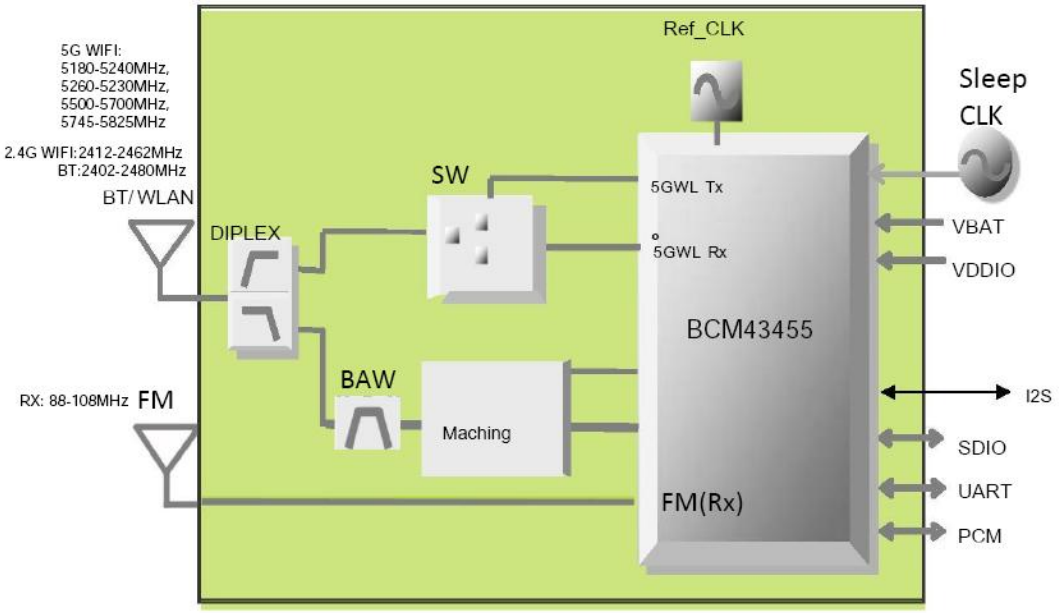
No.	Pin name	Type	System	Connection to IC pin name	Description
1	GPIO_6	I/O	WL	GPIO_6	Programmable GPIO Pin
2	GPIO_0	I/O	WL	GPIO_0	Programmable GPIO Pin
3	GPIO_3	I/O	WL	GPIO_3	Programmable GPIO Pin
4	GPIO_5	I/O	WL	GPIO_5	Programmable GPIO Pin
5	GPIO_1	I/O	WL	GPIO_1	Programmable GPIO Pin
6	GPIO_4	I/O	WL	GPIO_4	Programmable GPIO Pin
7	GPIO_2	I/O	WL	GPIO_2	Programmable GPIO Pin
8	BT_REG_ON	I	BT	BT_REG_ON	Used by PMU to power up or power down the internal BCM43455 regulators used by the BT/FM section. Also, when deasserted, this pin holds the BT/FM section in reset. This pin has an internal 200k ohm pull-down resistor that is enabled by default. It can be disabled through programming.
9	WL_REG_ON	I	WL	WL_REG_ON	Used by PMU to power up or power down the internal BCM43455 regulators used by the WLAN section. Also, when deasserted, this pin holds the WLAN section in reset. This pin has an internal 200k ohm pull-down resistor that is enabled by default. It can be disabled through programming.
10	GND	-	-	-	-
11	VIO	I	-	VDDIO, VDDIO_SD, BT_VDDO	Supply for PMU, BT, WLAN, SDIO.
12	GND	-	-	-	-
13	GND	-	-	-	-
14	SDIO_DATA0	I/O	WL	SDIO_DATA0	SDIO data line 0
15	SDIO_CMD	I/O	WL	SDIO_CMD	SDIO command line
16	SDIO_DATA1	I/O	WL	SDIO_DATA1	SDIO data line 1

17	SDIO_DATA2	I/O	WL	SDIO_DATA2	SDIO data line 2
18	SDIO_DATA3	I/O	WL	SDIO_DATA3	SDIO data line 3
19	GND	-	-	-	-
20	SDIO_CLK	I	WL	SDIO_CLK	SDIO clock input
21	GND	-	-	-	-
22	VBAT_LDO	I	-	LDO_VDDBAT5V	Power supply
23	VBAT_SR	I	-	SR_VDDBAT5V	Power supply
24	SR_PVSS	-	-	-	Connect to GND
25	VIN_LDO	I	-	LDO_VDD1P5	LNLDO input
26	SR_PVSS	-	-	-	Connect to GND
27					
28	SR_VLX	O	-	SR_VLX	CBuck switching regulator output.
29	GND	-	-	-	-
30	LPO_IN	I	-	LPO_IN	External Sleep clock input(32.768kHz)
31	GND	-	-	-	-
32	BT_PCM_IN	I	BT	BT_PCM_IN	PCM data input or SLIMbus transport sensing.
33	BT_PCM_SYNC	I/O	BT	BT_PCM_SYNC	PCM sync; can be master(output) or slave(input), or SLIMbus data.
34	BT_PCM_OUT	O	BT	BT_PCM_OUT	PCM data output
35	BT_PCM_CLK	I/O	BT	BT_PCM_CLK	PCM or SLIMbus clock; can be master(output) or slave(input).
36	I2S_DO	I/O	FM	BT_I2S_DO	I2S data output

Items	Contents			
Specification	IEEE802.11a-5GHz			
Mode	OFDM			
Channel frequency (spacing)	5180 to 5320MHz (20MHz), 5500 to 5720MHz (20MHz), 5745 to 5825MHz (20MHz)			
Current Consumption	**min.**	**Typ.**	**Max.**	**Unit**
(a) Tx mode		-	260	mA
(b) Rx mode		-	100	mA
Transmitter	**min.**	**Typ.**	**Max.**	**Unit**
Power Levels (Power setting : 15dBm)	13	15	17	dBm
Spectrum Mask				
(a) at fc +/- 11MHz	-	-	-20	dBr
(b) at fc +/- 20MHz	-	-	-28	dBr
(c) at fc ≥ +/-30MHz	-	-	-40	dBr
Constellation Error	-	-	-25	dB
Spurious Emissions (BW=100kHz)				
(a) 30MHz -1GHz	-	-	-36	dBm
(b) 1GHz – 26.5GHz	-	-	-30	dBm
Receiver	**min.**	**Typ.**	**Max.**	**Unit**
Minimum Input Level (PER ≤ 10%)	-	-	-71.5	dBm
Adjacent Channel Rejection (PER≤ 10%)	-1	-	-	dB

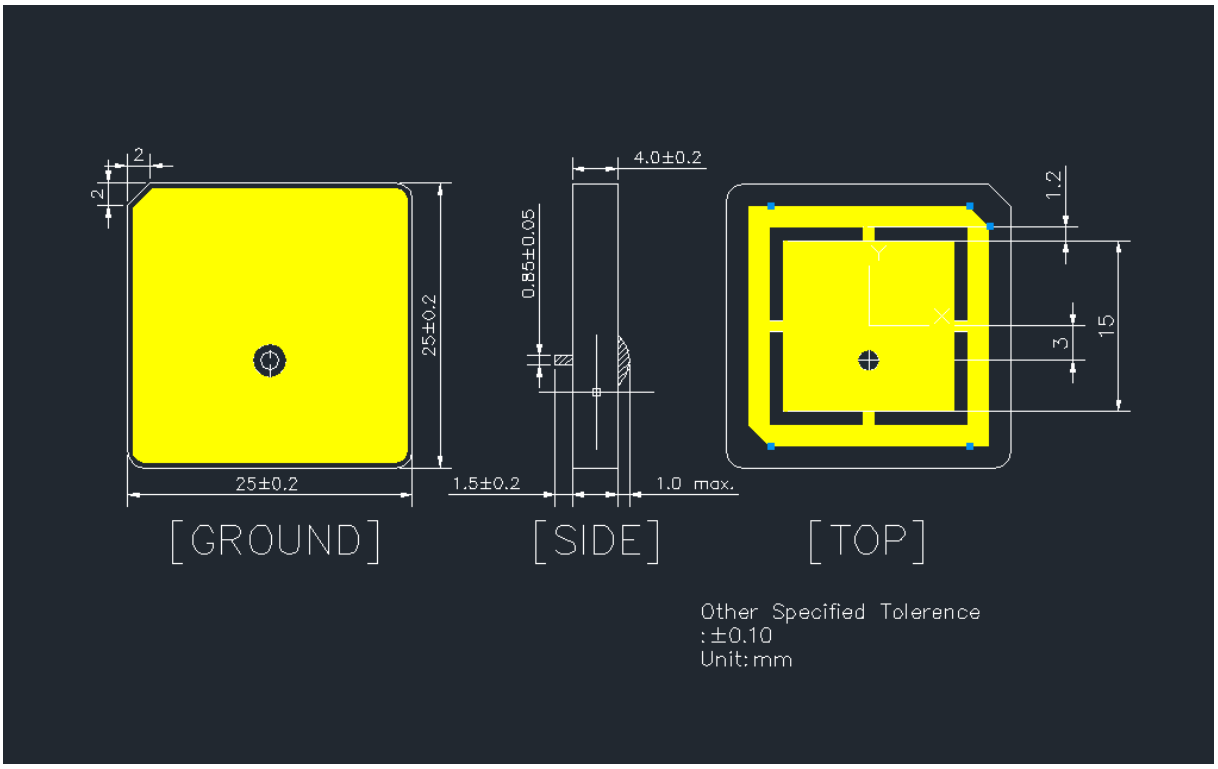
The data buffering is done inside the chipset BCM43455. The chip uses SDIO as the data interface of WiFi and serial port as the data interface of Bluetooth. Both SDIO and serial port IO are well defined by international standard. Such SDIO and serial are all serial(no parallel) data interface and they must be buffered to provide bytes data to be processed by BCM43455's microcontroller.

The block diagram of the module is as below:



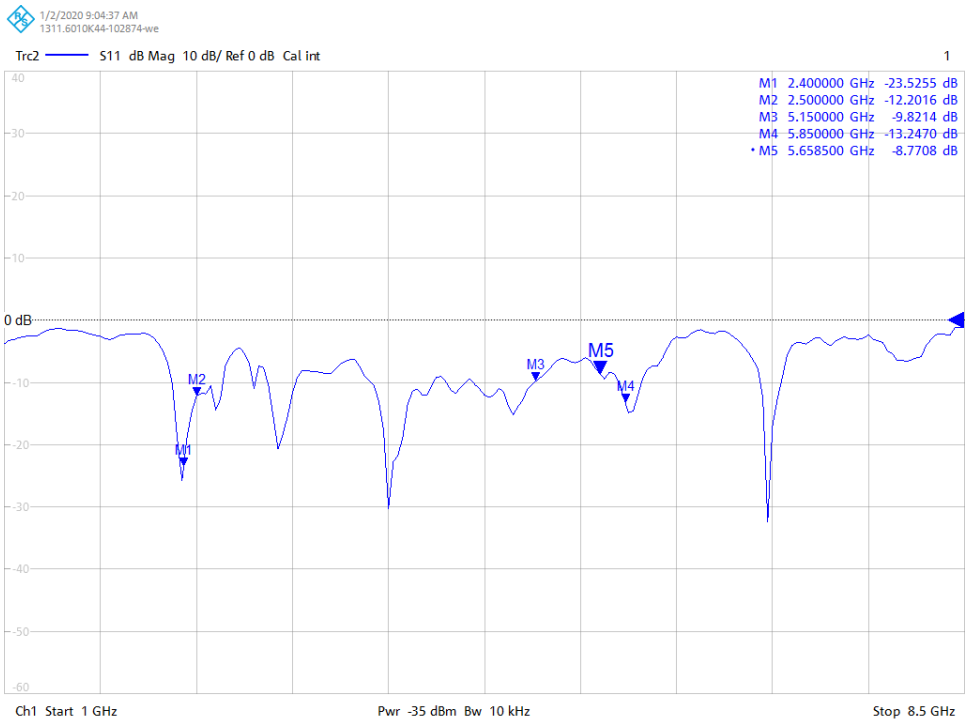
Antenna Specification

Part No.	HG-01		
Customer	Geoelectron	DATE: 2020/1/2	
Ant type	Integrated antenna		
ELECTRICAL SPECIFICATIONS			
ITEM		**SPEC**	**Unit**
1	Frequency Range	2400-2500&5150-5850 (MHz)	MHz
2	Impedance	50	Ω
3	Polarization	R.H.C.P	
4	Gain at Zenith	(2400MHz-2500MHz) +4.5 &(5150MHz-5850MHz) +3 typ	3dBi
5	Axial Ratio	3.0 Max.	dB
6	Operation Temperature Range	-40℃ to +85℃	℃
7	Ground plane	70 x 70 D=3.0mm	
DIMENSIONS			



CHARACTERISTICS

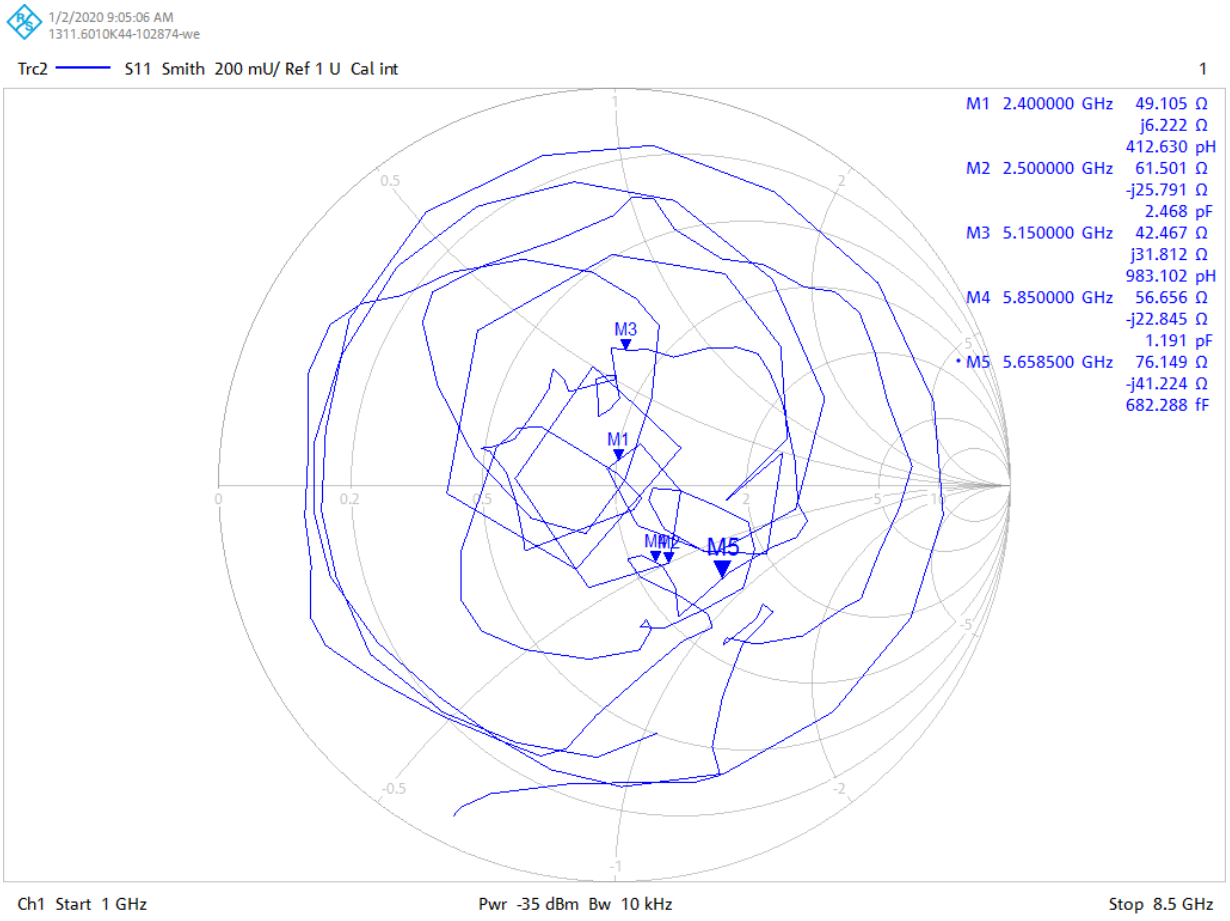
测试夹具：70x70 m



S11 Graph

CHARACTERISTICS

Test Fixture：40.4x25x0.6 mm



Smith Circle diagram