

# **FCC Test Report**

Report No.: AGC00116190801FE03

FCC ID : 2AHYV-JAIRICON

**APPLICATION PURPOSE**: Original Equipment

**PRODUCT DESIGNATION**: TRUE WIRELESS SIGNATURE EARBUDS

**BRAND NAME** : JLAB

**MODEL NAME** : JBUDS AIR ICON

**APPLICANT**: PEAG, LLC dba JLab Audio

**DATE OF ISSUE** : Nov. 12, 2019

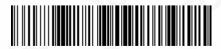
**STANDARD(S)** : FCC Part 15.247

**REPORT VERSION** : V1.0

### Attestation of Global Compliance (Shenzhen) Co., Ltd

#### **CAUTION:**

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



Page 2 of 72

#### REPORT REVISE RECORD

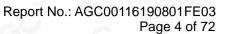
Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	® 1	Nov. 12, 2019	Valid	Initial Release



#### **TABLE OF CONTENTS**

1. VERIFICATION OF CONFORMITY	
2. GENERAL INFORMATION	
2.1. PRODUCT DESCRIPTION	
2.2. TABLE OF CARRIER FREQUENCYS	
2.3. RECEIVER INPUT BANDWIDTH	
2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE	
2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BE	HAVIOUR7
2.6. RELATED SUBMITTAL(S) / GRANT (S)	
2.7. TEST METHODOLOGY	
2.8. SPECIAL ACCESSORIES	
2.9. EQUIPMENT MODIFICATIONS	3
3. MEASUREMENT UNCERTAINTY	
4. DESCRIPTION OF TEST MODES	10
5. SYSTEM TEST CONFIGURATION	11
5.1. CONFIGURATION OF EUT SYSTEM	1
5.2 EQUIPMENT USED IN TESTED SYSTEM	1
5.3. SUMMARY OF TEST RESULTS	1
6. TEST FACILITY	12
7. PEAK OUTPUT POWER	13
7.1. MEASUREMENT PROCEDURE	G G
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION	
7.3. LIMITS AND MEASUREMENT RESULT	14
8. 20DB BANDWIDTH	20
8 1 MEASUREMENT PROCEDURE	20
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION	N) 20
8.3. LIMITS AND MEASUREMENT RESULTS	
9. CONDUCTED SPURIOUS EMISSION	27
9.1. MEASUREMENT PROCEDURE	
	L

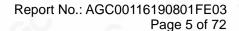






9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	27
9.3. MEASUREMENT EQUIPMENT USED	27
9.4. LIMITS AND MEASUREMENT RESULT	27
10. RADIATED EMISSION	
10.1. MEASUREMENT PROCEDURE	37
10.2. TEST SETUP	39
10.3. LIMITS AND MEASUREMENT RESULT	40
10.4. TEST RESULT	40
11. NUMBER OF HOPPING FREQUENCY	50
11.1. MEASUREMENT PROCEDURE	50
11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	50
11.3. MEASUREMENT EQUIPMENT USED	50
11.4. LIMITS AND MEASUREMENT RESULT	
12. TIME OF OCCUPANCY (DWELL TIME)	51
12.1. MEASUREMENT PROCEDURE	51
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	51
12.3. MEASUREMENT EQUIPMENT USED	51
12.4. LIMITS AND MEASUREMENT RESULT	51
13. FREQUENCY SEPARATION	55
13.1. MEASUREMENT PROCEDURE	55
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
13.3. MEASUREMENT EQUIPMENT USED	55
13.4. LIMITS AND MEASUREMENT RESULT	55
14. FCC LINE CONDUCTED EMISSION TEST	56
14.1. LIMITS OF LINE CONDUCTED EMISSION TEST	56
14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	56
14.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	57
14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	
14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	57
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	58
APPENDIX B: PHOTOGRAPHS OF EUT	60







#### 1. VERIFICATION OF CONFORMITY

Applicant	PEAG, LLC dba JLab Audio	
Address 2281 Las Palmas Drive, Suite 101 Carlsbad, CA 92011		
Manufacturer	PEAG, LLC dba JLab Audio	
Address	2281 Las Palmas Drive, Suite 101 Carlsbad, CA 92011	
Factory	PEAG, LLC dba JLab Audio	
Address	2281 Las Palmas Drive, Suite 101 Carlsbad, CA 92011	
Product Designation	TRUE WIRELESS SIGNATURE EARBUDS	
Brand Name	JLAB	
Test Model	JBUDS AIR ICON	
Date of test	Aug. 16, 2019 to Sep. 18, 2019 and Nov. 12, 2019	
Deviation	None	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BR/RF	

#### We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC PART 15.247.

Prepared By	Darsy Win	
) -C	Daisy Qin Project Engineer	Nov. 12, 2019
Reviewed By	Max Zhang	
PCC C	Max Zhang Reviewer	Nov. 12, 2019
Approved By	Forrest Wi	
	Forrest Lei Authorized Officer	Nov. 12, 2019

Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



Page 6 of 72

#### 2. GENERAL INFORMATION

#### 2.1. PRODUCT DESCRIPTION

The EUT is designed as "TRUE WIRELESS SIGNATURE EARBUDS". It is designed by way of utilizing the GFSK, Pi/4 DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

A major technical description	Tor Lot is described as following
Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	2.484dBm(Max)
Bluetooth Version	V5.0
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	VOD
Software Version	VOE
Antenna Designation	FPC Antenna(Comply with requirements of the FCC part 15.203)
Antenna Gain	-1.67dBi
Power Supply	DC 3.7V by battery
Note: 1.The EUT doesn't su 2.The BT function of	ipport BLE. EUT didn't work when charging.

Frequency Band	Channel Number	Frequency
20 2°	0	2402MHZ
NO O	G 2 1	2403MHZ
	(GO : C )	
30 20	38	2440 MHZ
2402~2480MHZ	39	2441 MHZ
	40	2442 MHZ
, GO	100	20 2 F. B
100	77	2479 MHZ
	78	2480 MHZ



Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,



Page 7 of 72

#### 2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHZ, In every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection(e.g. single of multislot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings.

Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

#### 2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a 79 hopping sequence in data mode: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01, 51, 03, 55, 05, 04

#### 2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

- 1. LAP/UAP of the master of the connection.
- 2. Internal master clock

The LAP(lower address part) are the 24 LSB's of the 48 BD ADDRESS. The BD ADDRESS is an unambiguous number of every Bluetooth unit. The UAP(upper address part) are the 24MSB's of the 48BD ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For ehavior zation with other units only offset are used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bit counter. For the deriving of the hopping sequence the entire. LAP(24 bits),4LSB's(4bits)(Input 1) and the 27MSB's of the clock(Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate te Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following ehavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the Bluetooth clock has a different value, because the period between the two transmission is longer(and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always Differ from the first one.



E-mail: agc@agc-cert.com Tel: +86-755 2523 4088 Service Hotline: 400 089 2118



Page 8 of 72

#### 2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AHYV-JAIRICON** filing to comply with the FCC PART 15.247 requirements.

#### 2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

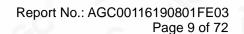
#### 2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

#### 2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.







#### 3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, Uc = ±0.8dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time: Uc = ±2 %
- Uncertainty of Frequency: Uc = ±2 %





#### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION				
1	Low channel GFSK				
2	Middle channel GFSK				
3	High channel GFSK				
4	Low channel π/4-DQPSK				
5	Middle channel π/4-DQPSK				
6	High channel π/4-DQPSK				
7	Low channel 8DPSK				
8	Middle channel 8DPSK				
9	High channel 8DPSK				
10	Hopping mode GFSK				
11	Hopping mode π/4-DQPSK				
12	Hopping mode 8DPSK				

Note: 1. Only the result of the worst case was recorded in the report, if no other cases.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.



Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,



Page 11 of 72

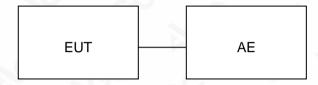
#### 5. SYSTEM TEST CONFIGURATION

#### **5.1. CONFIGURATION OF EUT SYSTEM**

Radiated Emission Configure:



Conducted Emission Configure:



#### **5.2 EQUIPMENT USED IN TESTED SYSTEM**

Item	Equipment	Model No.	ID or Specification	Remark
1	TRUE WIRELESS SIGNATURE EARBUDS	JBUDS AIR ICON	2AHYV-JAIRICON	EUT
2	USB Cable	N/A	1.0m unshielded	AE

#### **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT	
15.247 (b)(1)	Peak Output Power	Compliant	
15.247 (a)(1)	20 dB Bandwidth	Compliant	
15.247 (d)	Conducted Spurious Emission	Compliant	
15.209	Radiated Emission	Compliant	
15.247 (a)(1)(iii)	Number of Hopping Frequency	Compliant	
15.247 (a)(1)(iii)	Time of Occupancy	Compliant	
15.247 (a)(1)	Frequency Separation	Compliant	
15.207	Conducted Emission	N/A	

Note: The EUT can not use the BT function with charging.



Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,

Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Service Hotline:400 089 2118



Page 12 of 72

#### 6. TEST FACILITY

Test Site	Test Site Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location  1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping C Fuhai Street, Bao'an District, Shenzhen, Guangdong, China			
Designation Number	CN1259		
FCC Test Firm Registration Number	975832		
A2LA Cert. No.	5054.02		
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA		

#### **TEST EQUIPMENT OF RADIATED EMISSION TEST**

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2019	Jun. 11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 20, 2018	Dec. 19, 2019
2.4GHz Fliter	EM Electronics	2400-2500MHz	N/A	Feb. 27, 2019	Feb. 26, 2020
Attenuator	ZHINAN	E-002	N/A	Aug. 26, 2019	Aug. 25, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2017	Sep. 20, 2020
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 14, 2018	Jun. 13, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 26, 2018	May. 25, 2020
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 25, 2018	Oct. 24, 2019
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 21, 2019	Oct. 20, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep. 28, 2017	Sep. 27, 2019
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021





Page 13 of 72

#### 7. PEAK OUTPUT POWER

#### 7.1. MEASUREMENT PROCEDURE

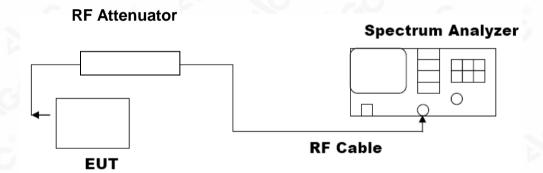
For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW ≥RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

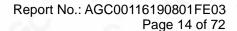
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

#### 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

#### **PEAK POWER TEST SETUP**









#### 7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT FOR GFSK MOUDULATION				
Frequency (GHz) Peak Power (dBm) Applicable Limits (dBm) Pass or Fail				
2.402	2.126	30	Pass	
2.441	1.916	30	Pass	
2.480	1.005	30	Pass	

#### CH<sub>0</sub>





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,

Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Service Hotline:400 089 2118



#### **CH39**



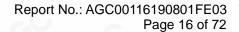
#### CH78





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China





	FOR II /4-DQPSK	MODULATION	
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	2.404	30	Pass
2.441	2.174	30	Pass
2.480	1.403	30	Pass

#### CH<sub>0</sub>



Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755 2523 4088 E-mail:agc@agc-cert.com Service Hotline:400 089 2118



#### **CH39**



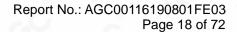
#### **CH78**





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China





PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION				
Frequency (GHz) Peak Power (dBm) Applicable Limits (dBm) Pass or Fail				
2.402	2.484	30	Pass	
2.441	2.275	30	Pass	
2.480	1.549	30	Pass	

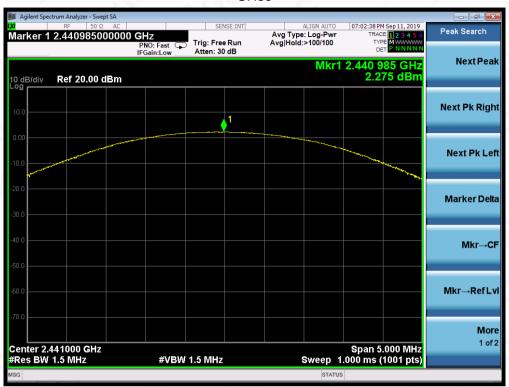
#### CH<sub>0</sub>



Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China
Tel: +86-755 2523 4088 E-mail:agc@agc-cert.com Service Hotline:400 089 2118



#### **CH39**



#### **CH78**





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



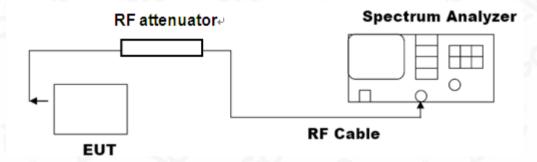
Page 20 of 72

#### 8. 20DB BANDWIDTH

#### **8.1. MEASUREMENT PROCEDURE**

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel
  The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video
  bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

#### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



#### 8.3. LIMITS AND MEASUREMENT RESULTS

MEASUREMENT RESULT FOR GFSK MOUDULATION				
Measurement Result				
Applicable Limits	Test Da	ata (MHz)	Criteria	
N/A	Low Channel	0.9582	PASS	
	Middle Channel	0.9539	PASS	
	High Channel	0.9595	PASS	



Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL





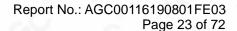
Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL







MEASUREMENT RESULT FOR ∏ /4-DQPSK MODULATION				
Measurement Result				
Applicable Limits	Test Data (MHz) Crite		Criteria	
N/A	Low Channel	1.347	PASS	
	Middle Channel	1.350	PASS	
C C	High Channel	1.315	PASS	

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL





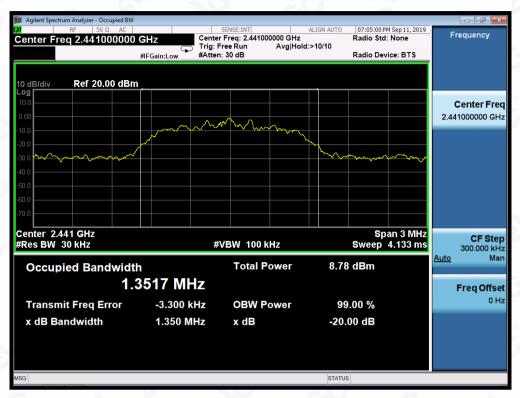
Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,

Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China Tel: +86-755 2523 4088 E-mail: agc@agc-cert.com Service Hotline:400 089 2118



#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



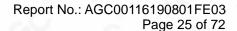
#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China





MEASUREMENT RESULT FOR 8-DPSK MODULATION				
Measurement Result				
Applicable Limits	Test Data (MHz) Criteria		Criteria	
N/A	Low Channel	1.324	PASS	
	Middle Channel	1.332	PASS	
C C	High Channel	1.309	PASS	

#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

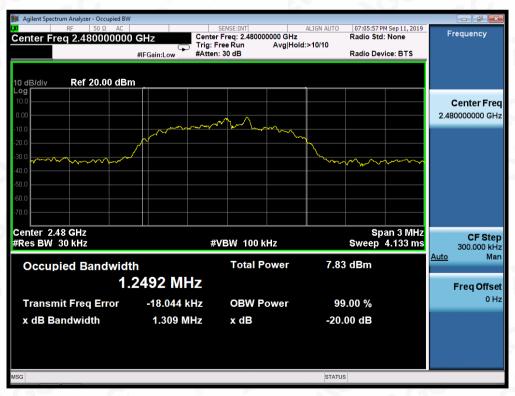
Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community,



#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



Page 27 of 72

#### 9. CONDUCTED SPURIOUS EMISSION

#### 9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- 3. Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
  RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

#### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT			
	Measurement Result		
Applicable Limits	Test Data	Criteria	
In any 100 KHz Bandwidth Outside the	At least -20dBc than the limit		
frequency band in which the spread spectrum	Specified on the BOTTOM	PASS	
intentional radiator is operating, the radio frequency	Channel		
power that is produce by the intentional radiator			
shall be at least 20 dB below that in 100KHz	0		
pandwidth within the band that contains the highest	2.C 0 P		
evel of the desired power.	At least -20dBc than the limit	DACC	
n addition, radiation emissions which fall in the	Specified on the TOP Channel	PASS	
restricted bands, as defined in §15.205(a), must also	0		
comply with the radiated emission limits specified	C		
n§15.209(a))			



Attestation of Global Compliance(Shenzhen)Co.,Ltd.

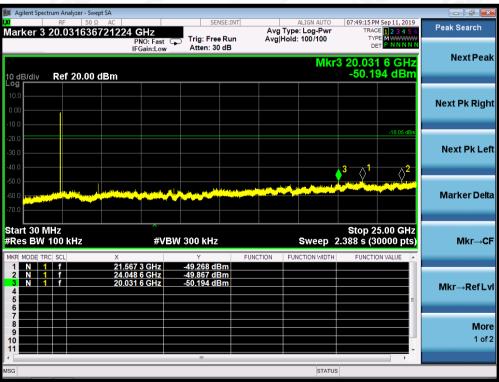
Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



#### TEST RESULT FOR ENTIRE FREQUENCY RANGE

TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 8DPSK MODULATION IN LOW CHANNEL







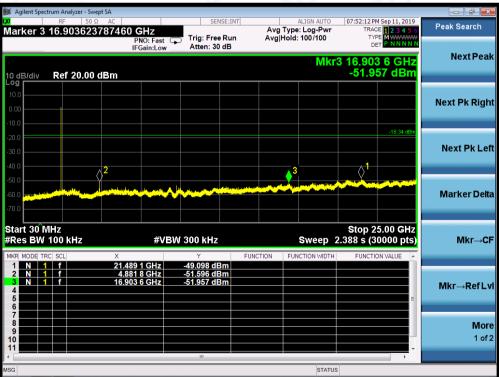
Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



### TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN MIDDLE CHANNEL







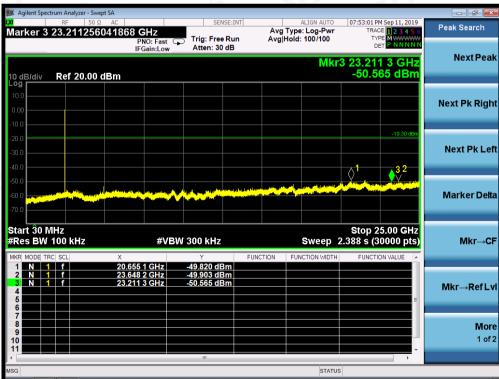
Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



### TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN HIGH CHANNEL





Note: The peak emissions without marker on the above plots are fundamental wave and need not to compare with the limit. The 8DPSK modulation is the worst case and only those data recorded in the report.



Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2, Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China

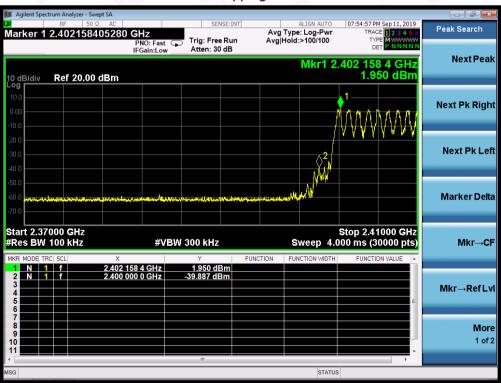


#### **TEST RESULT FOR BAND EDGE**

### GFSK MODULATION IN LOW CHANNEL Hopping off



#### Hopping on





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

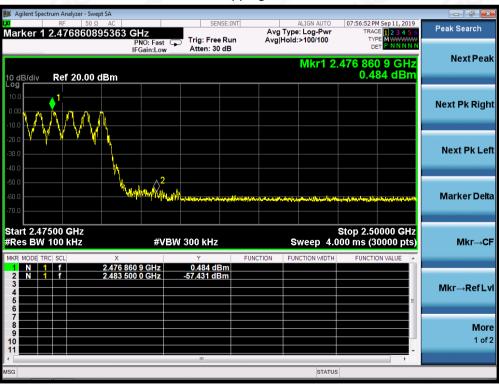
Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



### GFSK MODULATION IN HIGH CHANNEL Hopping off



#### Hopping on





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



## $\pi$ /4-DQPSK MODULATION IN LOW CHANNEL Hopping off



#### Hopping on





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



### $\pi$ /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off



#### Hopping on



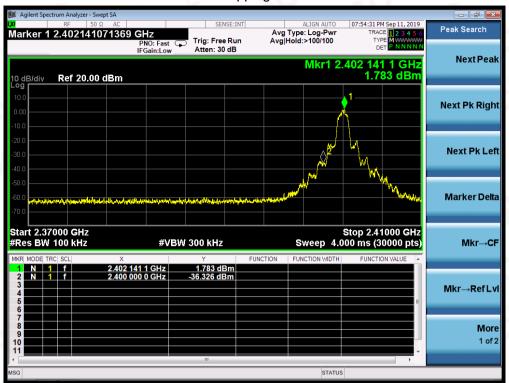


Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



### 8DPSK MODULATION IN LOW CHANNEL Hopping off



#### Hopping on





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



### 8DPSK MODULATION IN HIGH CHANNEL Hopping off



#### Hopping on





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



Page 37 of 72

#### 10. RADIATED EMISSION

#### 10.1. MEASUREMENT PROCEDURE

- The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8.If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.





Page 38 of 72

#### The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

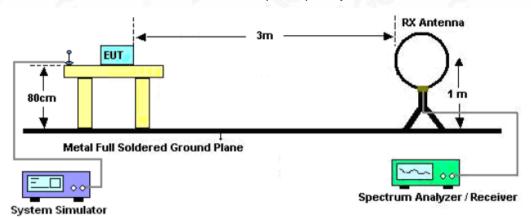
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP



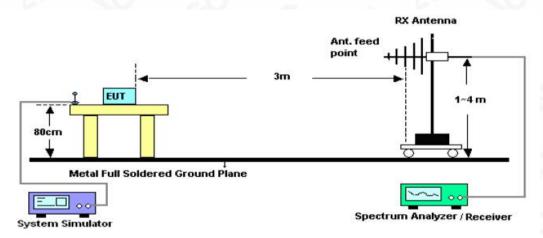


#### 10.2. TEST SETUP

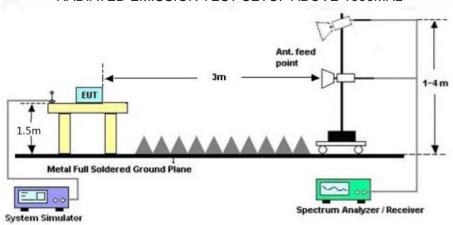
#### Radiated Emission Test-Setup Frequency Below 30MHz



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz



#### RADIATED EMISSION TEST SETUP ABOVE 1000MHz





Attestation of Global Compliance(Shenzhen)Co.,Ltd.

Add: 2/F., Building 2,Sanwei Chaxi Industrial Park, Sanwei Community, Hangcheng Street, Bao'an District, Shenzhen, Guangdong, China



Page 40 of 72

#### 10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested For restricted band radiated emission, the test records reported below are the worst result compared to other modes.

#### 10.4. TEST RESULT

#### **RADIATED EMISSION BELOW 30MHZ**

No emission found between lowest internal used/generated frequencies to 30MHz.

