

FCC Test Report

Report No.: AGC01082191102FE03

FCC ID : 2AO2PSB-WS61

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION: GLIDiC Sound Air TW-6000

BRAND NAME : GLIDiC

MODEL NAME : SB-WS61-MRTW, SB-WS61-MRTW/PK, SB-WS61-MRTW/GR

APPLICANT : SB C&S Corp

DATE OF ISSUE : Dec. 25, 2019

STANDARD(S) : FCC Part 15.247

REPORT VERSION: V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	1	Dec. 25, 2019	Valid	Initial Release

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Inspection



1. VERIFICATION OF CONFORMITY

SB C&S Corp	
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GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED	
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GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED	
4th Floor, 15th Building, Vtrek Innovation Industrial Park, No. 644, Shibei Road, Panyu District, Guangzhou, China 511430	
GLIDiC Sound Air TW-6000	
GLIDiC	
SB-WS61-MRTW	
Series Model SB-WS61-MRTW/PK, SB-WS61-MRTW/GR	
Difference description All the same except for the model name and color	
Dec. 09, 2019 to Dec. 19, 2019	
No any deviation from the test method	
Normal	
Pass	
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	John Zerry	
SGC V	John Zeng Project Engineer	Dec. 19, 2019
Reviewed By	Max Zhang	
	Max Zhang Reviewer	Dec. 25, 2019
Approved By	Formasticis	
	Forrest Lei Authorized Officer	Dec. 25, 2019

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "GLIDiC Sound Air TW-6000". It is designed by way of utilizing the GFSK, Pi/4 DQPSK and 8DPSK technology to achieve the system operation.

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A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	3.154dBm(Max)
Bluetooth Version	V5.0
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79 Channels
Hardware Version	BS286RK-BT-V08-L
Software Version	V1.2.3
Antenna Designation	Dielectric Chip Antenna(Comply with requirements of the FCC part 15.203)
Antenna Gain	3.4dBi
Power Supply	DC 3.7V by battery

Note: 1. The EUT comprises left and right channel headsets, both are the same in SCH but different in the PCB Layout. The RF output power of each headset had been tested and recorded in the report. For the other test items, the right headset had been tested and recorded in this report as the worst case because of the higher power.

2.The EUT doesn't support BLE.

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402MHZ
100 ac	1	2403MHZ
	\C -C .	10° 00°
-C	38	2440 MHZ
2402~2480MHZ	39	2441 MHZ
0	40	2442 MHZ
0 -6		C
	77	2479 MHZ
	78	2480 MHZ

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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, 04, 15, 66, 56, 19, 78, 07, 28, 69, 55,

36, 45, 05, 13, 43, 74, 57, 35, 67, 76, 02, 34, 54, 63,

42, 11, 30, 06, 64, 25, 75, 48, 17, 33, 58, 01, 29, 14,

51, 72, 03, 31, 50, 61, 77, 18, 10, 47, 12, 68, 08, 49,

20, 79, 73, 09, 16, 60, 71, 41, 24, 53, 38, 26, 46, 37,

65, 32, 70, 52, 27, 59, 22, 62, 39

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.

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

This submittal(s) (test report) is intended for **FCC ID**: **2AO2PSB-WS61** filling 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.

2.10. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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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 = ±3.1 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±4.0 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 %

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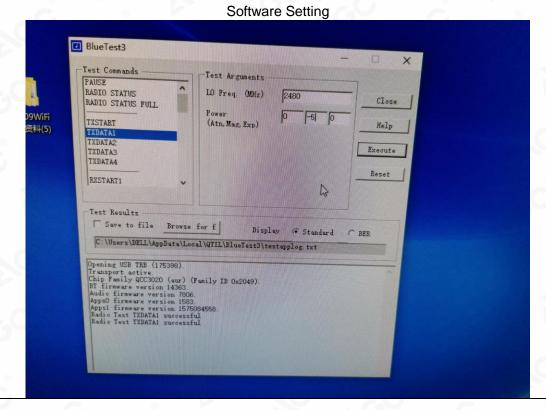


4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION	
100	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 Conducted Test method, a temporary antenna connector is provided by the manufacture.
- 3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.



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5. SYSTEM TEST CONFIGURATION

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5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

EUT	

Conducted Emission Configure:

EUT AE		_	
	EUT	6	AE

5.2. EQUIPMENT USED IN TESTED SYSTEM

	Item	Equipment	Model No.	ID or Specification	Remark
N A W	1	GLIDiC Sound Air TW-6000	SB-WS61-MRTW	2AO2PSB-WS61	EUT
(80)	2	Control Box	TRBI200	N/A	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	Not applicable

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

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6. TEST FACILITY

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Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd		
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, 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	Sep. 09, 2019	Sep. 08, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Jun. 13, 2018	Jun. 12, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2018	May. 16, 2020
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020
ANTENNA	SCHWARZBECK	VULB9168	494	Sep. 20, 2019	Sep. 19, 2021
Test software	FARA	EZ-EMC (Ver RA-03A)	N/A	N/A	N/A

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7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

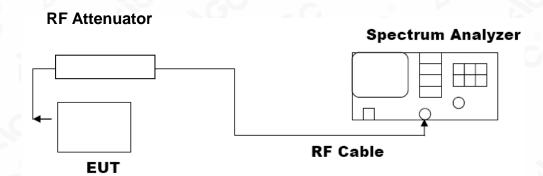
For peak power test:

- 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



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The test results
the test report.

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7.3. LIMITS AND MEASUREMENT RESULT

Right:

	FOR GFSK MOUL	DULATION	
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	1.828	21	Pass
2.441	0.860	21	Pass
2.480	-0.085	21	Pass

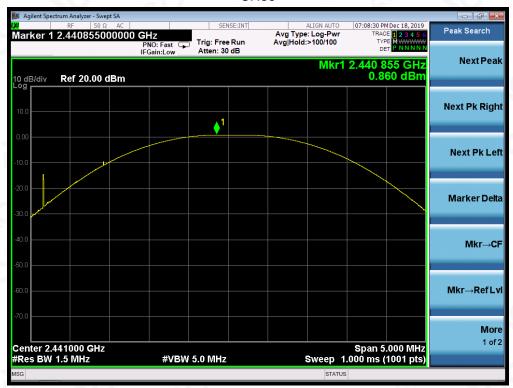
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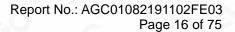
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g/Inspection The test results



	PEAK OUTPUT POWER MEASUREMENT RESULT FOR Π /4-DQPSK MODULATION				
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	2.403	21	Pass		
2.441	1.502	21	Pass		
2.480	2.162	21	Pass		

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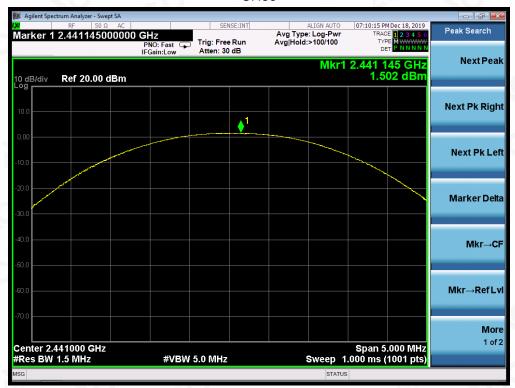


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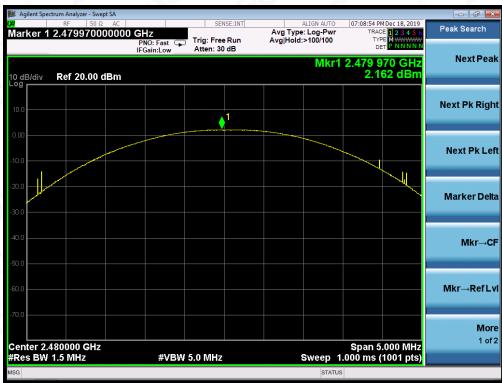




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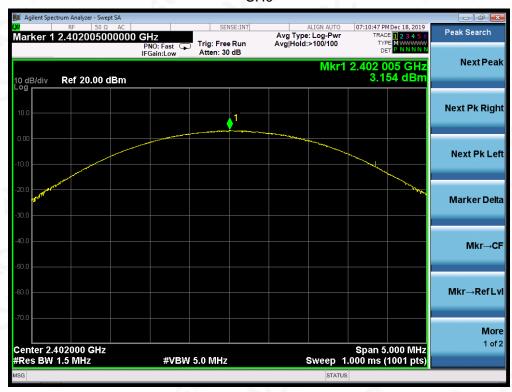


/Inspection The test results



	PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION				
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	3.154	21	Pass		
2.441	2.179	21	Pass		
2.480	1.067	21	Pass		

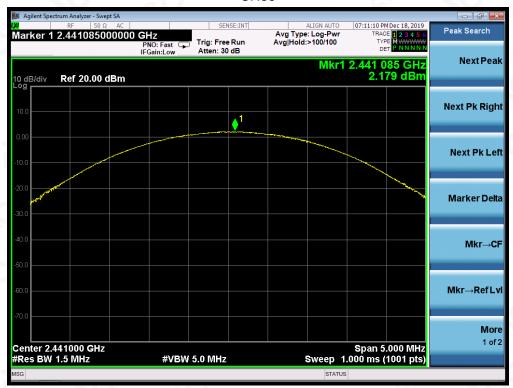
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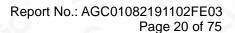
CH39



CH78



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Left:

PEAK OUTPUT POWER MEASUREMENT RESULT				
	FOR GFSK MOUI	DULATION		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail	
2.402	-0.300	30	Pass	
2.441	0.017	30	Pass	
2.480	-0.020	30	Pass	

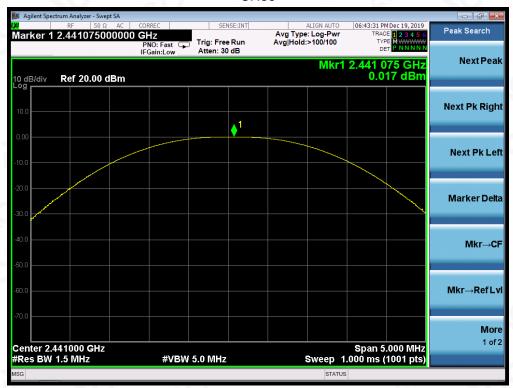
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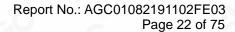
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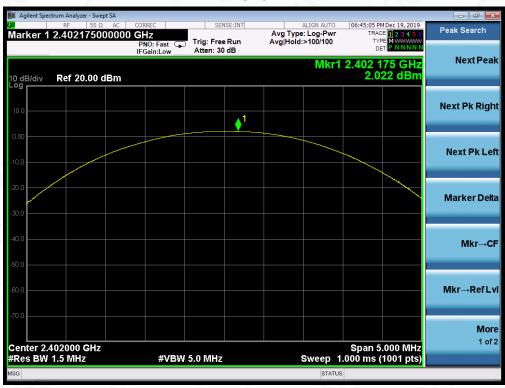


g/Inspection The test results



PEAK OUTPUT POWER MEASUREMENT RESULT				
	FOR II /4-DQPSK N	ODULATION		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail	
2.402	2.022	30	Pass	
2.441	2.369	30	Pass	
2.480	2.337	30	Pass	

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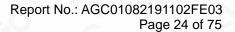
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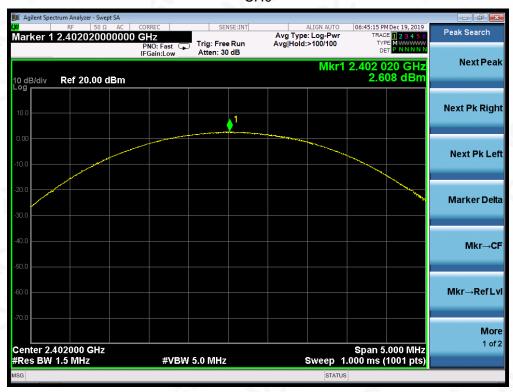


/Inspection The test results



	PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION				
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail		
2.402	2.608	30	Pass		
2.441	2.972	30	Pass		
2.480	2.880	30	Pass		

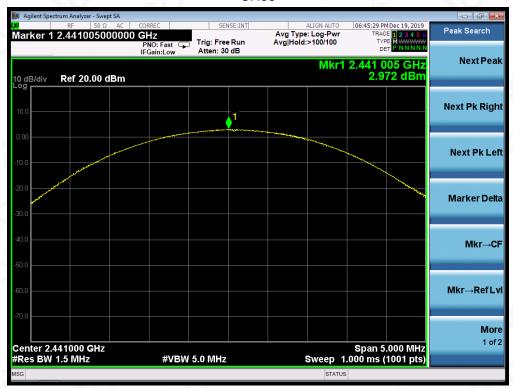
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8. 20DB BANDWIDTH

Report No.: AGC01082191102FE03 Page 26 of 75

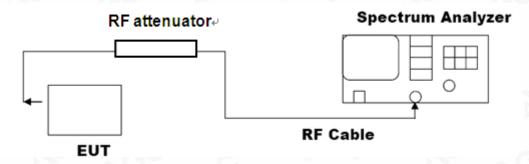
> /Inspection The test results

the test report.

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 Data (MHz) Criteria			
100 GC	Low Channel	0.9602	PASS	
N/A	Middle Channel	0.9570	PASS	
	High Channel	0.9576	PASS	

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TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



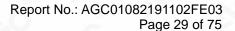
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TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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WEASURE	MENT RESULT FOR II /4-		
Applicable Limits		Measurement Result Test Data (MHz) Criteria	
Applicable Ellinic	Test Data		
N/A	Low Channel	1.331	PASS
	Middle Channel	1.332	PASS
	High Channel	1.334	PASS

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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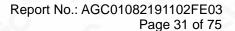
TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASU	REMENT RESULT FOR 8-D	PSK MODULATION	l	
	Measurement Result			
Applicable Limits	Test Data	(MHz)	Criteria	
N/A	Low Channel	1.304	PASS	
	Middle Channel	1.301	PASS	
	High Channel	1.297	PASS	

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL



TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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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

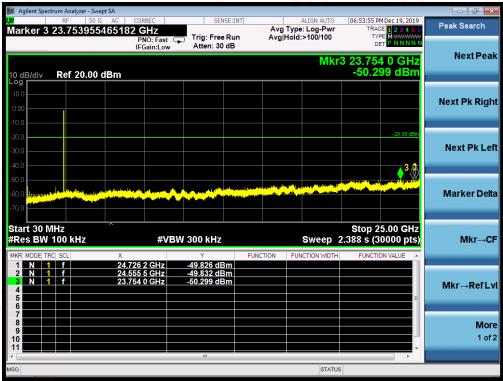
LIMITS AND MEASUREMENT RESULT				
Annelina I. India	Measurement Result			
Applicable Limits	Test Data	Criteria		
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit Specified on the BOTTOM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

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TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 8DPSK MODULATION IN LOW CHANNEL

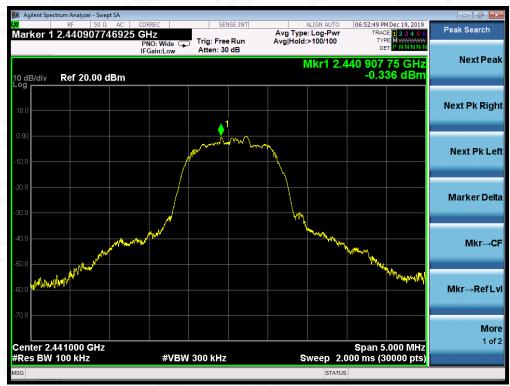


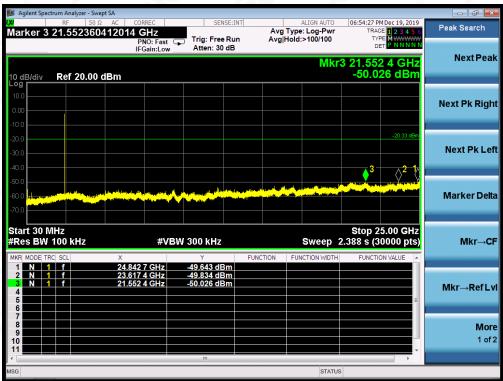


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TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN MIDDLE CHANNEL





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a/Inspection

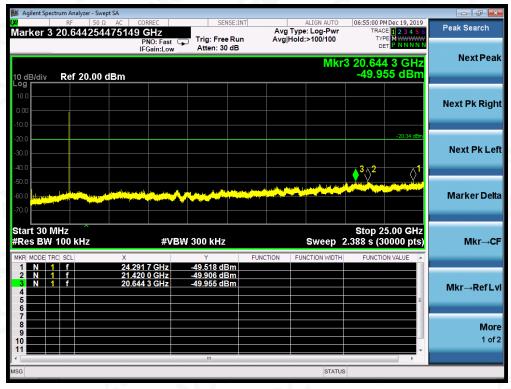
suance of the test report.

The test results



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.

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Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

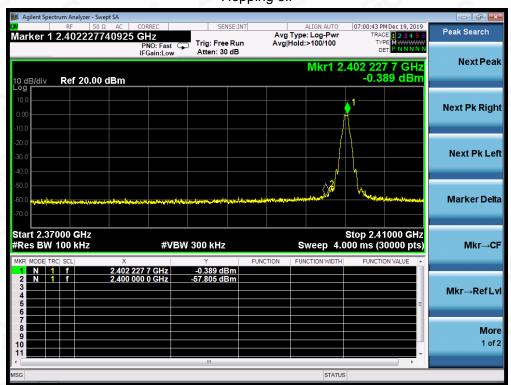
Fel: +86-755 2523 4088 E-mail: agc@agc-cert.com Web: http://cn.agc-cert.com/

The test results

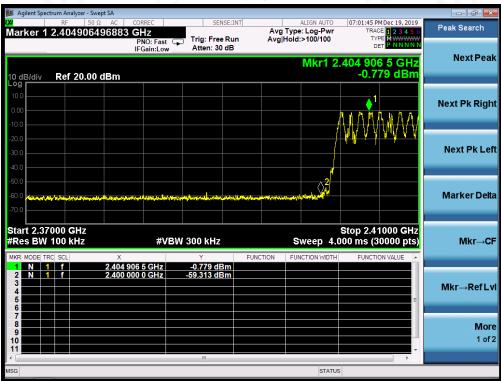


TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL Hopping off



Hopping on

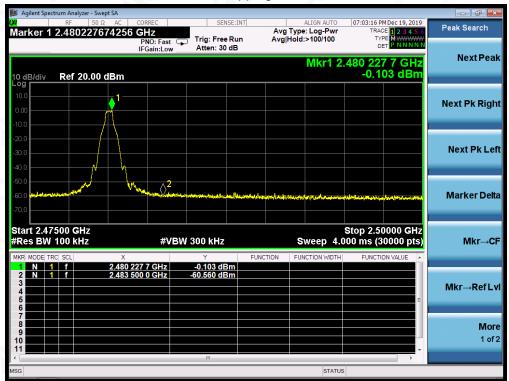


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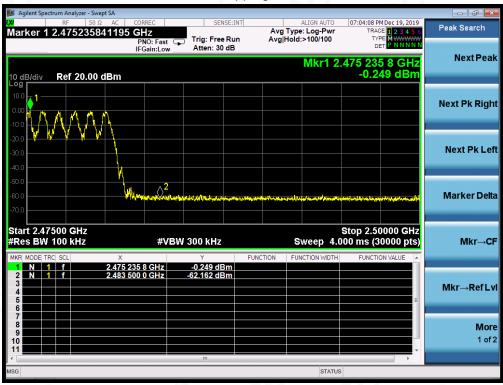
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GFSK MODULATION IN HIGH CHANNEL Hopping off



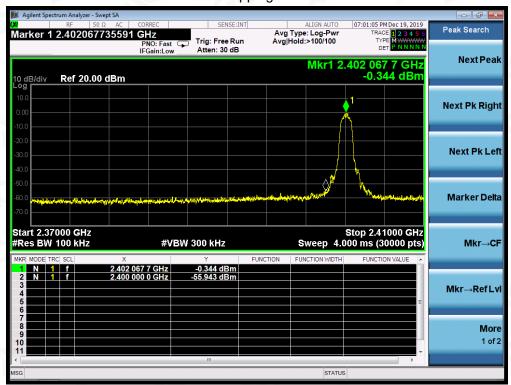
Hopping on



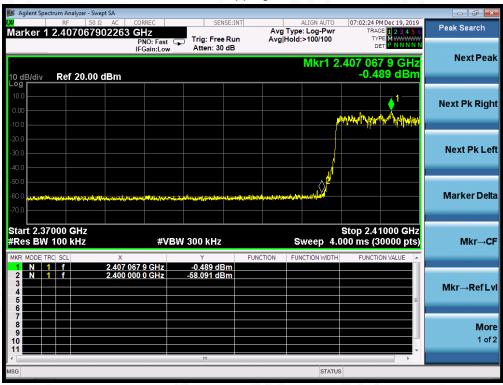
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π /4-DQPSK MODULATION IN LOW CHANNEL Hopping off



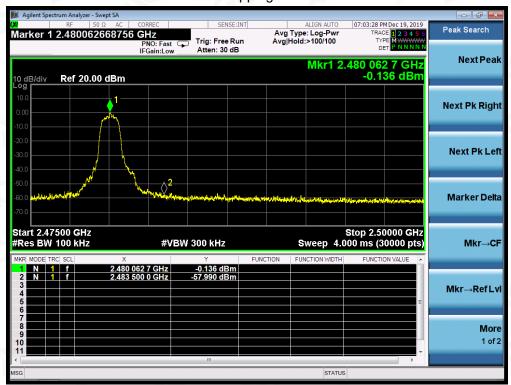
Hopping on



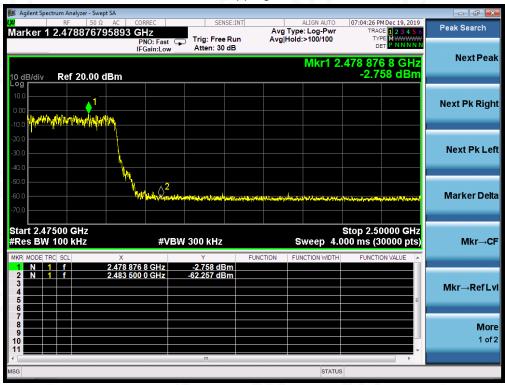
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π /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off



Hopping on



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