

# **FCC Test Report**

Report No.: AGC08506210104FE03

FCC ID	: 2AN4C-1342
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: True Wireless Earphones
BRAND NAME	: 233621
MODEL NAME	: Pearl II Pro
APPLICANT	: Shenzhen Grandsun Electronic Co.,Ltd.
DATE OF ISSUE	: Feb. 26, 2021
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0

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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	· /	Feb. 26, 2021	Valid	Initial Release

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## **1. VERIFICATION OF CONFORMITY**

Applicant	Shenzhen Grandsun Electronic Co., Ltd.	
Address	Gaoqiao Industry Zone, Pingdi Town, Longgang District, Shenzhen, China	
Manufacturer	Shenzhen Grandsun Electronic Co., Ltd.	
Address	Gaoqiao Industry Zone, Pingdi Town, Longgang District, Shenzhen, China	
Factory	Shenzhen Grandsun Electronic Co., Ltd.	
Address	Gaoqiao Industry Zone, Pingdi Town, Longgang District, Shenzhen, China	
Product Designation	True Wireless Earphones	
Brand Name	233621	
Test Model	Pearl II Pro	
Date of test	Feb. 03, 2021 to Feb. 25, 2021	
Deviation	No any deviation from the test method	
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

we chang

Cool Cheng (Project Engineer)

Feb. 25, 2021

Reviewed By

Max Zham

Max Zhang (Reviewer)

Feb. 26, 2021

Approved By

owe

Forrest Lei (Authorized Officer)

Feb. 26, 2021

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# 2. GENERAL INFORMATION

# 2.1. PRODUCT DESCRIPTION

The EUT is designed as "True Wireless Earphones". It is designed by way of utilizing the GFSK, Pi/4 DQPSK and True Wireless Earphones technology to achieve the system operation.

A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.402 GHz to 2.480 GHz
RF Output Power	5.667dBm (Max)
Bluetooth Version	V5.2
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	V035
Software Version	V1.1.9
Antenna Designation	FPC Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	0.3dBi
Power Supply	DC 3.7V by battery
Note: The EUT comprises le	oft and right channel headsets, both are the same, the left headset had been teste

and recorded in this report as the worst case.

#### 2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
		2403 MHz
.C		
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
	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 multi slot 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 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, 00, 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 behavior action with other units only offset is 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 bits 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 the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

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.

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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.

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

This submittal(s) (test report) is intended for FCC ID: 2AN4C-1342 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.

# 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,  $Uc = \pm 0.8$ dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time:  $Uc = \pm 2\%$
- Uncertainty of Frequency:  $Uc = \pm 2 \%$

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# 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

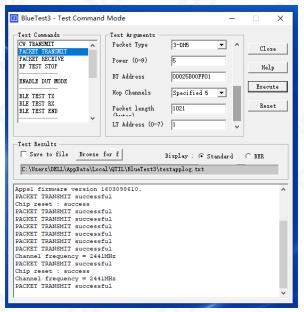
Note:

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.

Software Setting



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# **5. SYSTEM TEST CONFIGURATION**

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

EUT

Conducted Emission Configure:

	EUT -	S R	AE
--	-------	--------	----

#### 5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	True Wireless Earphones	Pearl II Pro	2AN4C-1342	EUT
2	Control Box	N/A	USB-TTL	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 BT function cannot transmit when charging.

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# 6. TEST FACILITY

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	May 15, 2020	May 14, 2021
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 07, 2020	Dec. 06, 2021
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 21, 2019	Sep. 20, 2021
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 03, 2020	Sep. 02, 2022
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 08, 2021	Jan. 07, 2023
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A

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# 7. PEAK OUTPUT POWER

# 7.1. MEASUREMENT PROCEDURE

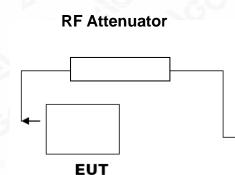
For peak power test:

- 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  $\geq$ RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

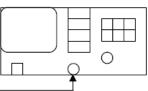
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

# PEAK POWER TEST SETUP







RF Cable

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#### 7.3. LIMITS AND MEASUREMENT RESULT

	PEAK OUTPUT POWER MEA FOR GFSK MOUI		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	5.493	21	Pass
2.441	5.595	21	Pass
2.480	5.667	21	Pass

#### CH0



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**CH39** NSE:INT Avg Type: Log-Pwr Avg|Hold: 100/100 Frequency Center Freq 2.441000000 GHz Trig: Free Run Atten: 30 dB PNO: Fast IFGain:Low Auto Tune Mkr1 2.441 040 GHz 5.595 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 2.441000000 GHz Start Freq 2.438500000 GHz Stop Freq 2.443500000 GHz CF Step 500.000 kHz <u>Auto</u> Ма **Freq Offset** 0 Hz Center 2.441000 GHz #Res BW 1.5 MHz Span 5.000 MHz Sweep 1.000 ms (1001 pts) #VBW 5.0 MHz STATUS

CH78

Keysight Spectrum Analyzer - Swept SA							
α RL   RF   50 Ω AC   Center Freq 2.480000000	CORREC GHZ PNO: Fast ↔→	SENSE:INT	Avg Type: I Avg Hold: 1		TRAC	4 Feb 04, 2021 E 1 2 3 4 5 6 PE M WWWWW	Frequency
10 dB/div Ref 20.00 dBm	IFGain:Low	Atten: 30 dB			DE 2.479 9	90 GHz 67 dBm	Auto Tur
og		1					<b>Center Fr</b> 2.480000000 Gi
0.00 10.0							<b>Start Fr</b> 2.477500000 G
20.0 UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU							<b>Stop Fr</b> 2.482500000 G
10.0							CF St 500.000 k <u>Auto</u> N
50.0							Freq Offs 0
Center 2.480000 GHz					Span 5	.000 MHz	
#Res BW 1.5 MHz	#VBW :	5.0 MHz	St	status	000 ms (	1001 pts)	

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	PEAK OUTPUT POWER MEASURE FOR Π/4-DQPSK MODUL		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	2.052	21	Pass
2.441	2.067	21	Pass
2.480	2.077	21	Pass



CH0

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#### Report No.: AGC08506210104FE03 Page 17 of 72



**CH39** NSE:INT Avg Type: Log-Pwr Avg|Hold: 100/100 Frequency Center Freq 2.441000000 GHz Trig: Free Run Atten: 30 dB PNO: Fast IFGain:Low Auto Tune Mkr1 2.441 110 GHz 2.067 dBm Ref 20.00 dBm 10 dB/div **Center Freq** 2.441000000 GHz **♦**<sup>1</sup> Start Freq 2.438500000 GHz Stop Freq 2.443500000 GHz CF Step 500.000 kHz <u>Auto</u> Ма **Freq Offset** 0 Hz Center 2.441000 GHz #Res BW 1.5 MHz Span 5.000 MHz Sweep 1.000 ms (1001 pts) #VBW 5.0 MHz STATUS

CH78

Keysight Spectrum Analyzer - Swept SA           RL         RF         50 Ω         AC	CORREC	SENSE:INT	ALIGN AUTO	08:35:32 PM Feb 04, 2021	Frequency
enter Freq 2.48000000	O GHz PNO: Fast ↔ IFGain:Low	→ Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr Avg Hold: 100/100	TRACE 1 2 3 4 5 6 TYPE MWWWW DET P NNNNN	
dB/div Ref 20.00 dBm			Mkr1	2.480 080 GHz 2.077 dBm	Auto Tu
0.0					Center F 2.480000000
00		∮ <sup>1</sup>			2.48000000
					<b>Start F</b> 2.477500000
).0					<b>Stop F</b> 2.482500000
.0					CF S
.0					500.000 <u>Auto</u>
.0					Freq Of
1.0					(
enter 2.480000 GHz Res BW 1.5 MHz	#VBW	/ 5.0 MHz	Sweep 1	Span 5.000 MHz .000 ms (1001 pts)	
G			STATUS		

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	PEAK OUTPUT POWER MEASURI FOR 8-DPSK MODULA		
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.402	2.797	21	Pass
2.441	2.811	21	Pass
2.480	2.836	21	Pass



CH0

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#### Report No.: AGC08506210104FE03 Page 19 of 72



CH39



CH78

J Keysight Spectrum Analyzer - Swept SA				
<sup>20</sup> RL RF 50 Ω AC Center Freq 2.480000000	CORREC SENSE:INT	ALIGN AUTO Avg Type: Log-Pwr	08:36:40 PM Feb 04, 2021 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast +++ Trig: Free Run IFGain:Low Atten: 30 dB	Avg Hold: 100/100	TYPE M WWWW DET P N N N N N	
10 dB/div Ref 20.00 dBm		Mkr1	2.479 940 GHz 2.836 dBm	Auto Tun
10.0				Center Fre 2.480000000 GH
10.0				2.48000000 GF
0.00				Start Fre
-10.0				2.477500000 GH
-10.0				
-20.0				Stop Fre
-30.0				2.482500000 GH
-30.0				
-40.0				CF Ste 500.000 kH
-50.0				<u>Auto</u> Ma
-30.0				
-60.0				Freq Offs 0 H
70.0				
-70.0				
Center 2.480000 GHz			Span 5.000 MHz	
#Res BW 1.5 MHz	#VBW 5.0 MHz	Sweep 1	.000 ms (1001 pts)	
MSG		STATUS		

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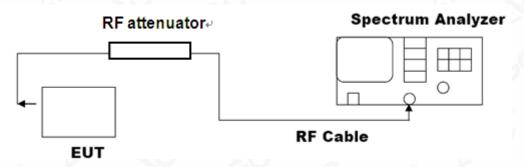


# 8. 20DB BANDWIDTH

#### **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)



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#### **8.3. LIMITS AND MEASUREMENT RESULTS**

MEASURE	MENT RESULT FOR GF	SK MOUDULATION	
Applicable Limite		Measurement Resu	lt
Applicable Limits	Test Data	ı (MHz)	Criteria
	Low Channel	0.962	PASS
N/A	Middle Channel	0.961	PASS
	High Channel	0.960	PASS

#### 08:32:50 PM Feb 04, 2021 SENSE:INT Center Freq: 2.402000000 GHz Trig: Free Run Avg|Hol #Atten: 30 dB Frequency 102000000 GHz Radio Std: None Avg|Hold: 100/100 #IFGain:Low Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.402000000 GHz Center 2.402 GHz #Res BW 30 kHz Span 3 MHz Sweep 3.2 ms CF Step 300.000 kHz #VBW 100 kHz <u>Auto</u> 12.9 dBm **Occupied Bandwidth Total Power** 874.06 kHz Freq Offset 0 Hz **Transmit Freq Error** -1.214 kHz 99.00 % **OBW Power** x dB Bandwidth 961.8 kHz x dB -20.00 dB

#### 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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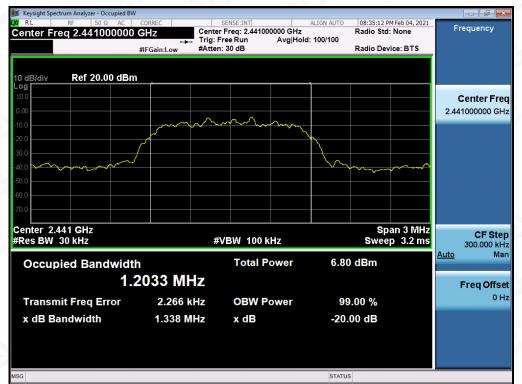


MEASURE	MENT RESULT FOR II /4-D	OQPSK MODULATIO	N
Applicable Limite		Measurement Resu	lt
Applicable Limits	Test Data	(MHz)	Criteria
	Low Channel	1.338	PASS
N/A	Middle Channel	1.338	PASS
	High Channel	1.337	PASS

#### 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

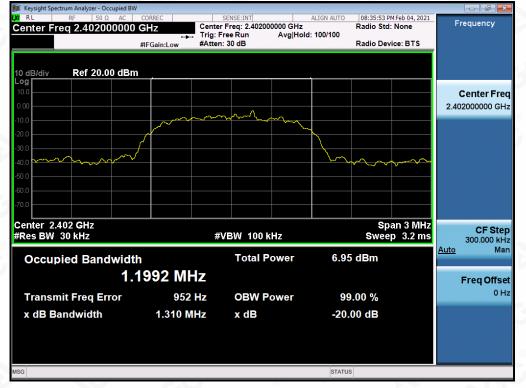


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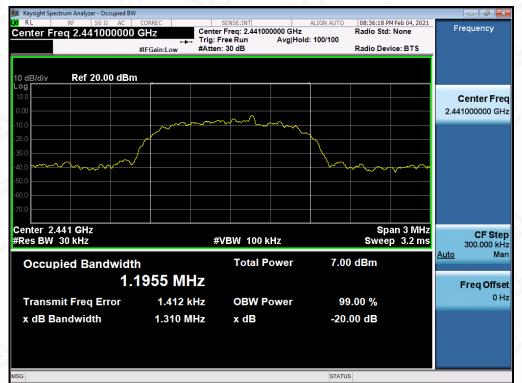
MEASU	REMENT RESULT FOR 8-	DPSK MODULATION	
Annicable Limite		Measurement Resu	lt
Applicable Limits	Test Dat	ta (MHz)	Criteria
	Low Channel	1.310	PASS
N/A	Middle Channel	1.310	PASS
-0	High Channel	1.310	PASS

#### 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.
- 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

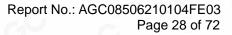
#### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

#### 9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEAS	SUREMENT RESULT			
Annlinghing Limite	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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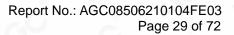




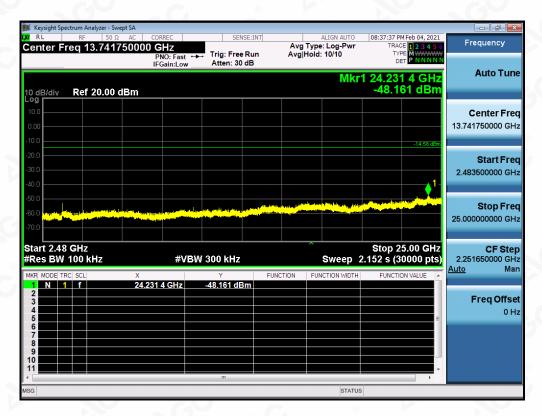
# TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF GFSK MODULATION IN LOW CHANNEL



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 Attestation of Global Compliance(Shenzhen)Co., Ltd

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

 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com

Web: http://cn.agc-cert.com/



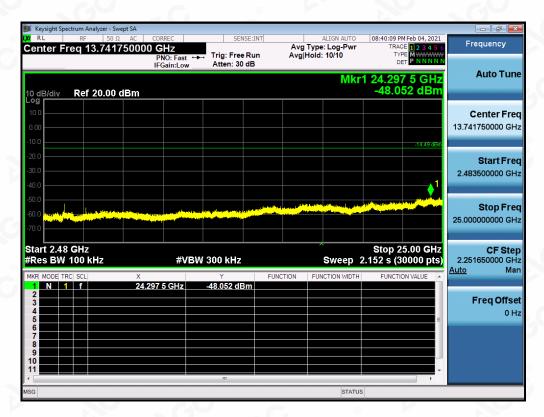
🔰 Keysight Spectrum Analyzer - Sv					
X/ RL RF 50 Ω	Ω AC CORREC	SENSE:INT	ALIGN AUTO	08:39:35 PM Feb 04, 2021	_ 6 ×
Center Freq 2.4410		► Trig: Free Run	Avg Type: Log-Pwr Avg Hold: 10/10	TRACE 1 2 3 4 5 6	Frequency
	PNO:Wide ← IFGain:Low	Atten: 30 dB	Avginola. Torro		
			Mkr1 2	.441 160 9 GHz	Auto Tune
10 dB/div Ref 20.00	dBm			5.506 dBm	
10.0			1		
		, mar	<u>_</u>		Center Free
0.00					2.441000000 GH
-10.0					
-20.0					Start Free
-30.0					2.439500000 GHz
-40.0 -50.0				ANN MAN	
				AL A ANALY	Stop Free
-60.0					2.442500000 GH
-70.0					
Center 2.441000 GHz	_     7			Span 3.000 MHz	CF Step
#Res BW 100 kHz		W 300 kHz	Sweep 2.0	000 ms (30000 pts)	300.000 kHz
MKR MODE TRC SCL	X	Y	FUNCTION FUNCTION WIDTH	FUNCTION VALUE	<u>Auto</u> Man
1 N 1 f	2.441 160 9 GHz	5.506 dBm			
2					Freq Offset
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6					
7 8					
9					
11				•	
< ISG					
130			STATUS		
			STATUS	3	
	wept SA Ω AC CORREC	SENSE:INT	ALIGN AUTO	08:39:44 PM Feb 04, 2021	
XI RL RF 50 Ω	Ω AC CORREC	Trin Frank	ALIGN AUTO Avg Type: Log-Pwr	08:39:44 PM Feb 04, 2021	Frequency
X/ RL RF 50 Ω	Ω AC CORREC	Trin Frank	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 2 2 3 4 5 6 TVPE MWWWWW DET PNNNN	Frequency
X/ RL RF 50 Ω	Ω AC   CORREC   000000 GHz PNO: Fast ←	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 2 3 4 5 6 TYPE DET PNNNNN 1 1.220 57 GHz	Frequency
Center Freq 1.2150	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 2 2 3 4 5 6 TVPE MWWWWW DET PNNNN	
x RL RF 50 € Center Freq 1.2150	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 2 3 4 5 6 TYPE DET PNNNNN 1 1.220 57 GHz	Frequency Auto Tune
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 dB/div         Ref 20.00	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 2 3 4 5 6 TYPE DET PNNNNN 1 1.220 57 GHz	Frequency Auto Tune Center Freq
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 dB/div         0.00	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Freq
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 0         0.00           .10.0	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 2 3 4 5 6 TYPE DET PNNNNN 1 1.220 57 GHz	Frequency Auto Tune Center Freq 1.215000000 GHz
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 0	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Freq 1.21500000 GHz Start Freq
RE         So g           Center Freq 1.2150           10 dB/div         Ref 20.00           00         0           00         0           00         0           00         0           00         0           00         0           00         0           00         0           00         0           00         0	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Freq 1.215000000 GHz
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 0	Ω AC CORREC 000000 GHZ PNO: Fast ← IFGain:Low	Trig: Free Run Atten: 30 dB	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Freq 1.21500000 GHz Start Freq
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           00         00           10.0         00           .000         000           .000         000           .000         000           .000         000           .000         000           .000         000           .000         000           .000         000           .000         000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000         .000           .000           .000 </td <td>Ω AC CORREC 00000 GHz PNO: Fast ← IFGain:Low</td> <td>Trig: Free Run Atten: 30 dB</td> <td>Align Auto Avg Type: Log-Pwr Avg Hold: 10/10</td> <td>08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm</td> <td>Frequency Auto Tune Center Freq 1.215000000 GHz Start Freq 30.000000 MHz Stop Freq</td>	Ω AC CORREC 00000 GHz PNO: Fast ← IFGain:Low	Trig: Free Run Atten: 30 dB	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Freq 1.215000000 GHz Start Freq 30.000000 MHz Stop Freq
RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 0         00      <	Ω AC CORREC 000000 GHz PNO: Fast → IFGain:Low dBm	Trig: Free Run Atten: 30 dB	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz Stop Frec
X         RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           10 0         0.00           .00         .00           .10.0         .00           .20.0         .00           .30.0	Ω AC CORREC 000000 GHz PNO: Fast → IFGain:Low dBm	Trig: Free Run Atten: 30 dB	Align Auto Avg Type: Log-Pwr Avg Hold: 10/10	08:39:44 PM Feb 04, 2021 TRACE 10.2 4.5 6 TYPE PWWWWW OET PNNINN 1 1.220 57 GHz -46.595 dBm	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz Stop Frec
X         RL         RF         50 cf           Center Freq 1.2150           10 dB/div         Ref 20.00           Log	Ω     AC     CORREC       00000 GHz     PNO: Fast       IFGain:Low	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 MIKr	09:39:44 PM Feb 04, 2021 TRACE [] 2 3 4 5 6 TYPE 0 CF P NUNN N 1 1.2220 57 CHz -46.595 dBm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz Stop Frec 2.400000000 GHz
X         RL         RF         50 cf           Center Freq 1.2150           10 dB/div         Ref 20.00           Log	Ω     AC     CORREC       00000 GHz     PNO: Fast       IFGain:Low	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 MIKr	09:39:44 PM Feb 04, 2021 TRACE 1.2 3 4 5 6 TYPE 1.1 1 2200 57 GHz -46.5955 dBm -14.49:659 -14.49:	Frequency           Auto Tune           Center Freq           1.215000000 GH2           Start Freq           30.000000 MH2           Stop Freq           2.40000000 GH2           CF Step           237.000000 MH2
X         RL         RF         50 cf           Center Freq 1.2150           10 dB/div         Ref 20.00           Log         10.0         10.0           10.0         10.0         10.0         10.0           10.0         10.0         10.0         10.0         10.0           10.0 <th1< td=""><td>Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 MIKr</td><td>09:39:44 PM Feb 04, 2021 TRACE [] 2 3 4 5 6 TYPE 0 CF P NUNN N 1 1.2220 57 CHz -46.595 dBm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm</td><td>Frequency           Auto Tune           Center Freq           1.215000000 GH2           Start Freq           30.000000 MH2           Stop Freq           2.40000000 GH2           CF Step           237.000000 MH2</td></t<></td></th1<>	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 MIKr</td><td>09:39:44 PM Feb 04, 2021 TRACE [] 2 3 4 5 6 TYPE 0 CF P NUNN N 1 1.2220 57 CHz -46.595 dBm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm</td><td>Frequency           Auto Tune           Center Freq           1.215000000 GH2           Start Freq           30.000000 MH2           Stop Freq           2.40000000 GH2           CF Step           237.000000 MH2</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 MIKr	09:39:44 PM Feb 04, 2021 TRACE [] 2 3 4 5 6 TYPE 0 CF P NUNN N 1 1.2220 57 CHz -46.595 dBm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm -14.9 dbm	Frequency           Auto Tune           Center Freq           1.215000000 GH2           Start Freq           30.000000 MH2           Stop Freq           2.40000000 GH2           CF Step           237.000000 MH2
X         RL         RF         50 f           Center Freq 1.2150         Center Freq 1.2150           10 dB/div         Ref 20.00           100         000           100         000           100         000           100         000           100         000           -200         000           -300         000           -40.0         000           -50.0         000           -60.0         000           -70.0         000           Start 30 MHz           #Res BW 100 kHz           MRR MODE TRC SCL         1           1         N         1           2         0	Ω     AC     CORREC       100000 GHz     PNO: Fast       PNO: Fast     Fast       IFGain:Low	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	09:39:44 PM Feb 04, 2021 TRACE 1.2 3 4 5 6 TYPE 1.1 1 2200 57 GHz -46.5955 dBm -14.49:659 -14.49:	Frequency           Auto Tune           Center Freq           1.215000000 GHz           Start Freq           30.000000 MHz           Stop Freq           2.40000000 GHz           CF Step           237.000000 MHz           Auto Mar
Center Freq 1.2150	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr</td><td>09:39:44 PM Feb 04, 2021 TRACE 1.2 3 4 5 6 TYPE 1.1 1 2200 57 GHz -46.5955 dBm -14.49:659 -14.49:</td><td>Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	09:39:44 PM Feb 04, 2021 TRACE 1.2 3 4 5 6 TYPE 1.1 1 2200 57 GHz -46.5955 dBm -14.49:659 -14.49:	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar
X         RL         RF         50 g           Center Freq 1.2150           10 dB/div         Ref 20.00           log	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr</td><td>09:39:44 PM Feb 04, 2021 TRACE 1.2 3 4 5 6 TYPE 1.1 1 2200 57 GHz -46.5955 dBm -14.49:659 -14.49:65</td><td>Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	09:39:44 PM Feb 04, 2021 TRACE 1.2 3 4 5 6 TYPE 1.1 1 2200 57 GHz -46.5955 dBm -14.49:659 -14.49:65	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar
X         RL         RE         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           -00 dB/div	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr</td><td>08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.</td><td>Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar
X         RL         RF         50 f           Center Freq 1.2150           10 dB/div         Ref 20.00           100	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr</td><td>08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.</td><td>Frequency Auto Tune Center Freq 1.215000000 GHz Start Freq 30.000000 MHz 2.400000000 GHz 2.400000000 GHz CF Step 237.000000 MHz Auto Man</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.	Frequency Auto Tune Center Freq 1.215000000 GHz Start Freq 30.000000 MHz 2.400000000 GHz 2.400000000 GHz CF Step 237.000000 MHz Auto Man
X         RL         RF         50 f           Center Freq 1.2150         Center Freq 1.2150           10 dB/div         Ref 20.00           10 d	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr</td><td>08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.</td><td>Frequency           Auto Tune           Center Freq           1.215000000 GHz           Start Freq           30.000000 MHz           Stop Freq           2.400000000 GHz           CF Step           237.000000 MHz</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.	Frequency           Auto Tune           Center Freq           1.215000000 GHz           Start Freq           30.000000 MHz           Stop Freq           2.400000000 GHz           CF Step           237.000000 MHz
X         RL         RF         50 g           Center Freq 1.2150           10 dB/div         Ref 20.00           10 0	Ω     AC     CORREC       100000 GHz     PNO: Fast ← IFGain:Low       dBm       dBm <t< td=""><td>Trig: Free Run Atten: 30 dB</td><td>ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr</td><td>08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.</td><td>Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar</td></t<>	Trig: Free Run Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10 Mkr	08:39:44 PM Feb 04, 2021 TRACE 12 24 5 6 TYPE P NN NN N 1 1.220 57 GHz -46.5955 dBm 214.49 dBm 214.	Frequency Auto Tune Center Frec 1.215000000 GHz Start Frec 30.000000 MHz 2.400000000 GHz CF Step 237.000000 MHz Auto Mar

#### TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN MIDDLE CHANNEL

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#### Report No.: AGC08506210104FE03 Page 31 of 72





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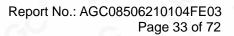
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#### TEST PLOT OF OUT OF BAND EMISSIONS OF GFSK MODULATION IN HIGH CHANNEL

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PR         SOR_AC         CORREC         SENSE:NT         Align Autor         Desite 25 PMreb 04.2021         Frequency           Center Freq 13.750000000 CH2 PRO: Fast IFGainLow         Trig: Free Run Atten: 30 dB         Avg Type: Log-Pwr AvglHoid: 10/10         Trace 12.20 Type: Log-Pwr 43.443 dBm         Autor Tune           10 dB/div         Ref 20.00 dBm	📕 Keysight Spectrum Analyzer - Swept SA 👘 👘																		
PNO: Fast IFGain:Low       Trig: Free Run Atten: 30 dB       Avg Hold: 10/10       Tree Num Det       Auto Tune         10 dE/div       Ref 20.00 dBm       -48.443 dBm       -48.443 dBm       -48.443 dBm       -48.443 dBm       Center Freq 13.750000000 GHz         10 dE/div       Ref 20.00 dBm       -48.443 dBm <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>SE</th> <th>NSE:INT</th> <th></th> <th>Ava</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>Frequency</th>										SE	NSE:INT		Ava						Frequency
MKr1 24./84/7 GHz       Center Freq         10 dB/div       Ref 20.00 dBm       -48.443 dBm         200       -48.443 dBm       -48.443 dBm	Cer	PNO: Fast											Avg Hold: 10/10			TYPE M WWWWW			
100	<u>1</u> 0 d	dB/div Ref 20.00 dBm -48.443 dBn														Auto Tune			
200       3	10.0 0.00																-14.40 dBe		•
60.0	-30.0																		
#Res BW 100 kHz     #VBW 300 kHz     Sweep 2.152 s (30000 pts)       MKR MODE TRC SCL     X     Y       1     N     1       2     3       3     -       4     -       5     -       6     -       7     -       8     -       9     -       10     -	-60.0												and the second		a standing street				
2       2	#Res BW 100 kHz							Y				FUNC				2.152 s (30000 pts)			2.250000000 GHz
	2 3 4 5 6 7 8 9 10 11	N		f			24.784	7 GHz			Bm								•

Note: The GFSK modulation is the worst case and only those data recorded in the report.

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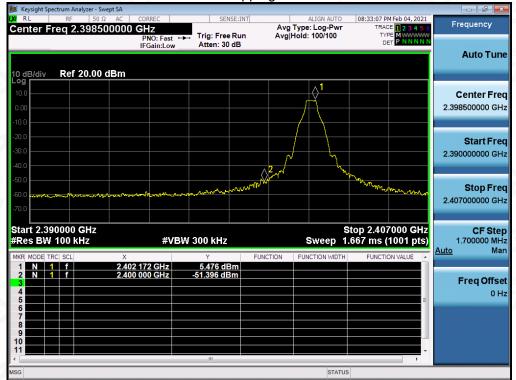
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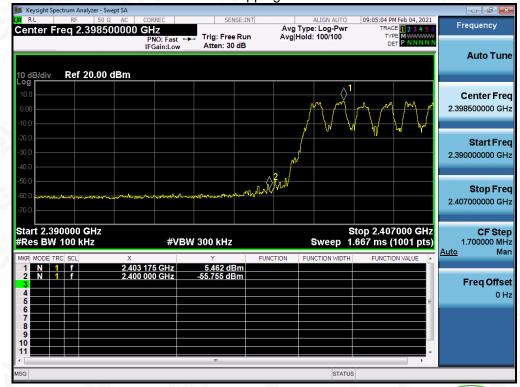
#### TEST RESULT FOR BAND EDGE

#### GFSK MODULATION IN LOW CHANNEL

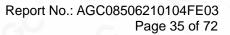
Hopping off



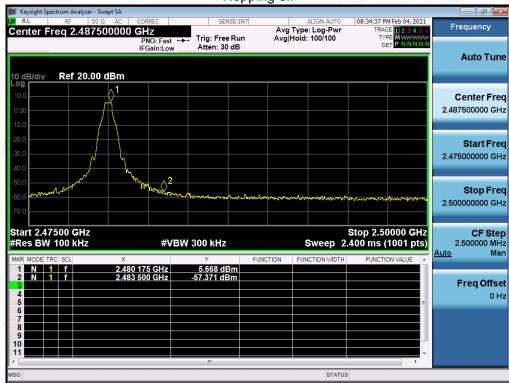
Hopping on



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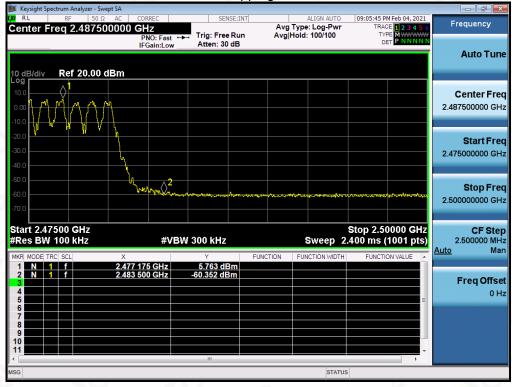




# GFSK MODULATION IN HIGH CHANNEL

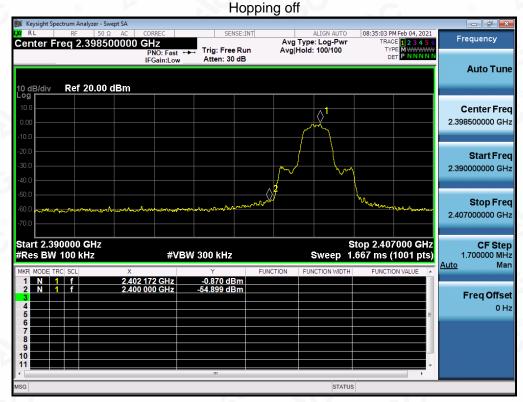
Hopping off

Hopping on



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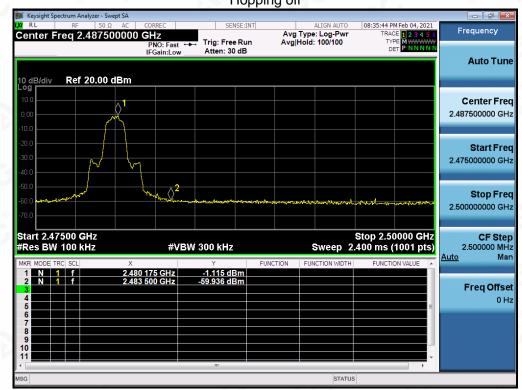
# $\pi$ /4-DQPSK MODULATION IN LOW CHANNEL

Hopping on



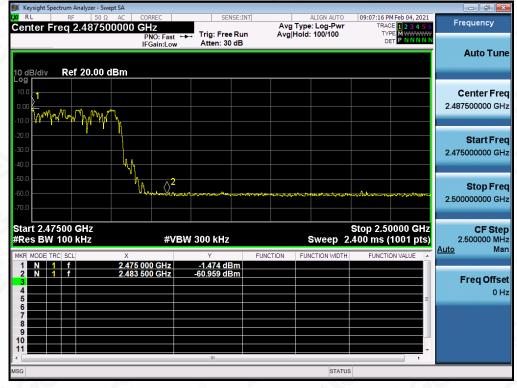
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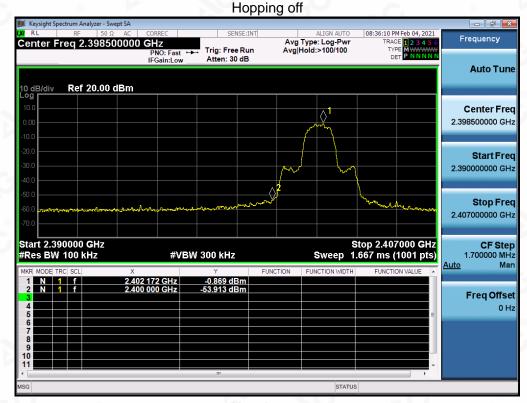
# $\pi$ /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off

Hopping on



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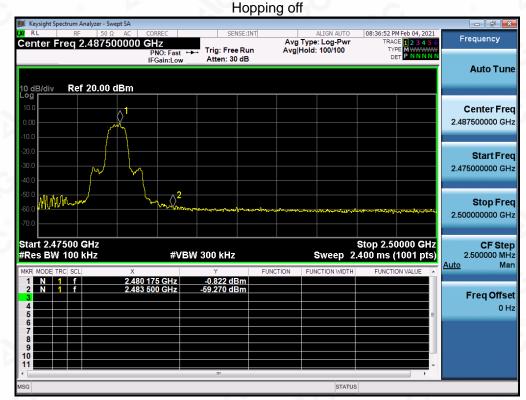
# 8-DPSK MODULATION IN LOW CHANNEL

Hopping on



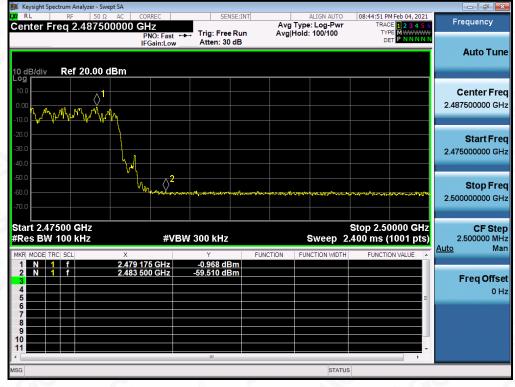
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# 8-DPSK MODULATION IN HIGH CHANNEL

Hopping on



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# **10. RADIATED EMISSION**

#### **10.1. MEASUREMENT PROCEDURE**

- 1. 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 emission, 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.

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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

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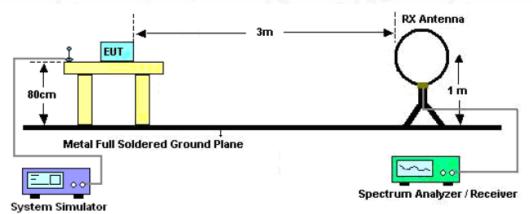
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 E-mail: agc@agc-cert.com
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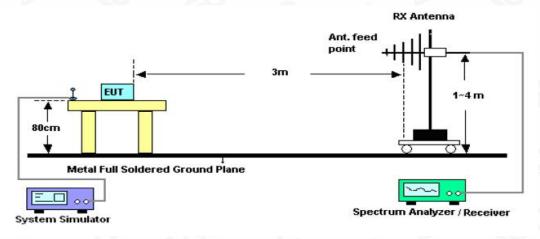


### 10.2. TEST SETUP

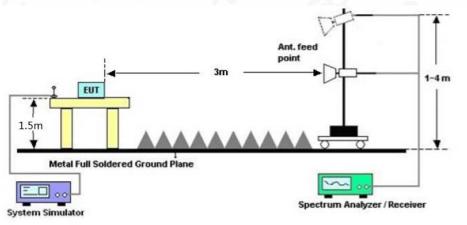
Radiated Emission Test-Setup Frequency Below 30MHz



# RADIATED EMISSION TEST SETUP 30MHz-1000MHz



# RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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#### **10.3. LIMITS AND MEASUREMENT RESULT**

#### 15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/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**

The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

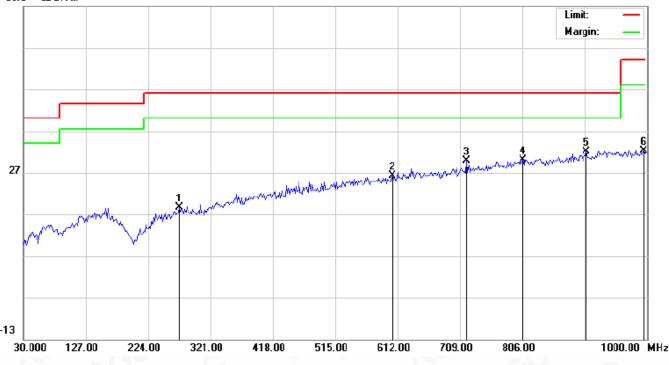
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#### **RADIATED EMISSION BELOW 1GHz**

EUT	True Wireless Earphones	Model Name	Pearl II Pro	
Temperature	25°C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 3	Antenna	Horizontal	

#### 66.9 dBuV/m



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	2	272.5000	-0.82	19.33	18.51	46.00	-27.49	peak
2	6	603.9167	-0.85	27.00	26.15	46.00	-19.85	peak
3	7	18.7000	1.20	28.57	29.77	46.00	-16.23	peak
4	8	306.0000	-0.51	30.49	29.98	46.00	-16.02	peak
5	* 9	04.6167	0.29	31.74	32.03	46.00	-13.97	peak
6	9	93.5333	-0.25	32.50	32.25	54.00	-21.75	peak

#### **RESULT: PASS**

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 Attestation of Global Compliance(Shenzhen)Co., Ltd

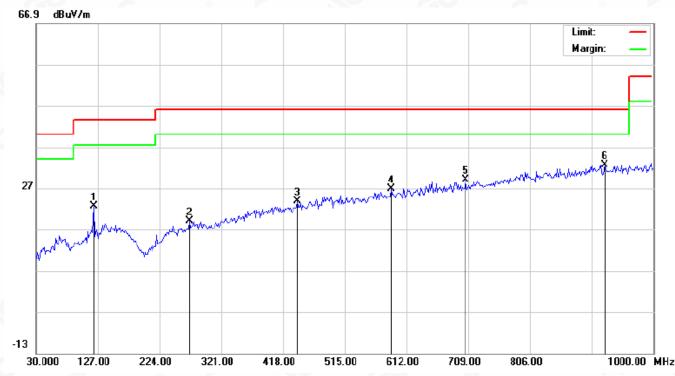
 Attestation of Global Compliance(Shenzhen)Std & Tech Co., Ltd

 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com



#### Report No.: AGC08506210104FE03 Page 46 of 72

EUT	True Wireless Earphones	Model Name	Pearl II Pro
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical



No.	Mk	. Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		120.5333	4.53	18.00	22.53	43.50	-20.97	peak
2		270.8833	-0.11	19.20	19.09	46.00	-26.91	peak
3		440.6333	-0.09	23.80	23.71	46.00	-22.29	peak
4		587.7500	0.09	26.71	26.80	46.00	-19.20	peak
5		704.1500	0.84	28.24	29.08	46.00	-16.92	peak
6	*	922.4000	0.74	31.89	32.63	46.00	-13.37	peak

# **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. All test modes had been pre-tested. The mode 3 is the worst case and recorded in the report.

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# **RADIATED EMISSION ABOVE 1GHz**

EUT	True Wireless Earphones	Model Name	Pearl II Pro
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Frequency	Meter Reading	Meter Reading Factor Emission Level		Limits	Margin	Malas Tar
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	44.37	0.08	44.45	74	-29.55	peak 💿
4804.000	37.61	0.08	37.69	54	-16.31	AVG
7206.000	40.58	2.21	42.79	74	-31.21	peak
7206.000	32.94	2.21	35.15	54	-18.85	AVG
	0				60	
emark:			0			2
actor = Anter	na Factor + Cable	Loss – Pre-	amplifier.	8		

EUTTrue Wireless EarphonesModel NamePearl II ProTemperature25°CRelative Humidity55.4%Pressure960hPaTest VoltageNormal Voltage

Test	est Mode Mode 1			6	Antenna			Vertical	
Γ	Frequency	Meter F	Reading	Factor	Emission Level	Limits	Margin	Value Type	
	(MHz)	(df	3μV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
	4804.000	43	8.95	0.08	44.03	74	-29.97	peak	
	4804.000	36	6.54	0.08	36.62	54	-17.38	AVG	
	7206.000	39	9.67	2.21	41.88	74	-32.12	peak	
	7206.000	31	.83	2.21	34.04	54	-19.96	AVG	

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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#### Report No.: AGC08506210104FE03 Page 48 of 72

EUT	True Wireless Earphones	Model Name	Pearl II Pro
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Meter Reading Factor Emi		Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	45.39	0.14	45.53	74	-28.47	peak
4882.000	38.17	0.14	38.31	54	-15.69	AVG
7323.000	41.52	2.36	43.88	74	-30.12	peak
7323.000	34.65	2.36	37.01	54	-16.99	AVG
0	6		9	0	8	
emark:	- 6	8		<u> </u>	- 6	0
ctor = Anter	na Factor + Cable	Loss – Pre-	amplifier.			

EUT	True Wireless Earphones Mod		Pearl II Pro
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	44.81	0.14	44.95	74	-29.05	peak
4882.000	37.92	0.14	38.06	54	-15.94	O AVG
7323.000	40.75	2.36	43.11	74	-30.89	peak
7323.000	33.08	2.36	35.44	54	-18.56	AVG
	8					

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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#### Report No.: AGC08506210104FE03 Page 49 of 72

EUT	True Wireless Earphones	Model Name	Pearl II Pro
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	46.74	0.22	46.96	74	-27.04	peak
4960.000	38.97	0.22	39.19	54	-14.81	AVG
7440.000	40.58	2.64	43.22	74	-30.78	peak
7440.000	31.61	2.64	34.25	54	-19.75	AVG
0				0	8	
emark:	- 61	8		~ G	- 61	8
ctor = Anter	na Factor + Cable	Loss – Pre-	amplifier.			- 6

EUT True Wireless Earphones		Model Name	Pearl II Pro	
Temperature	25°C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 3	Antenna	Vertical	

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4960.000	46.05	0.22	46.27	74	-27.73	peak
4960.000	38.26	0.22	38.48	54	-15.52	AVG
7440.000	40.11	2.64	42.75	74	-31.25	peak
7440.000	30.79	2.64	33.43	54	-20.57	AVG
		e.C	(3)		(	
				8		

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

# **RESULT: PASS**

Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

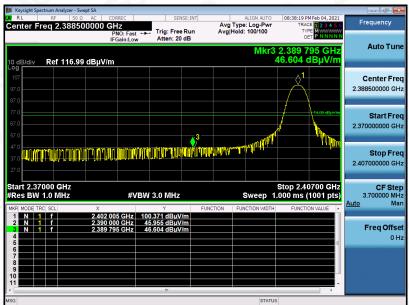
All test modes had been tested. The GFSK modulation is the worst case and recorded in the report.

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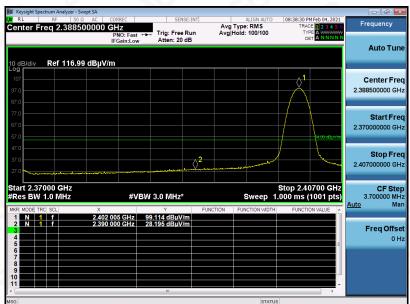


TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS						
EUT	True Wireless Earphones	Model Name	Pearl II Pro			
Temperature	25°C	Relative Humidity	55.4%			
Pressure	960hPa	Test Voltage	Normal Voltage			
Test Mode	Mode 1	Antenna	Horizontal			

ΡK



AV



#### **RESULT: PASS**

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