

FCC Test Report

Report No.: AGC15130230302FE03

FCC ID : 2ABMR-EP-0E2

APPLICATION PURPOSE: Original Equipment

PRODUCT DESIGNATION: True Wireless Earphones

BRAND NAME : MEE audio

MODEL NAME : EP-0E2, EP-0E3, EP-0E4, EP-0E5

APPLICANT : S2E, Inc.

DATE OF ISSUE : May 04, 2023

STANDARD(S) : FCC Part 15.247

REPORT VERSION : V1.0

Attestation of Global Congliance (Shenzhen) Co., Ltd



Report No.: AGC15130230302FE03

Page 2 of 65

REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	May 04, 2023	Valid	Initial Release



TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	5
2. GENERAL INFORMATION	6
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCYS	6
2.3. RECEIVER INPUT BANDWIDTH	7
2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE	7
2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR	7
2.6. RELATED SUBMITTAL(S) / GRANT (S)	8
2.7. TEST METHODOLOGY	8
2.8. SPECIAL ACCESSORIES	8
2.9. EQUIPMENT MODIFICATIONS	8
2.10. ANTENNA REQUIREMENT	8
3. MEASUREMENT UNCERTAINTY	9
4. DESCRIPTION OF TEST MODES	10
5. SYSTEM TEST CONFIGURATION	11
5.1. CONFIGURATION OF EUT SYSTEM	11
5.2. EQUIPMENT USED IN TESTED SYSTEM	11
5.3. SUMMARY OF TEST RESULTS	11
6. TEST FACILITY	12
7. PEAK OUTPUT POWER	13
7.1. MEASUREMENT PROCEDURE	13
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
7.3. LIMITS AND MEASUREMENT RESULT	14
8. 20DB BANDWIDTH	19
8.1. MEASUREMENT PROCEDURE	19
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	19
8.3. LIMITS AND MEASUREMENT RESULTS	20
9. CONDUCTED SPURIOUS EMISSION	25
9.1. MEASUREMENT PROCEDURE	25 "Dedicated Testing/Inspection



9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	25
9.3. MEASUREMENT EQUIPMENT USED	25
9.4. LIMITS AND MEASUREMENT RESULT	25
10. RADIATED EMISSION	46
10.1. MEASUREMENT PROCEDURE	46
10.2. TEST SETUP	48
10.3. LIMITS AND MEASUREMENT RESULT	49
10.4. TEST RESULT	49
11. NUMBER OF HOPPING FREQUENCY	59
11.1. MEASUREMENT PROCEDURE	59
11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	59
11.3. MEASUREMENT EQUIPMENT USED	59
11.4. LIMITS AND MEASUREMENT RESULT	59
12. TIME OF OCCUPANCY (DWELL TIME)	60
12.1. MEASUREMENT PROCEDURE	60
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
12.3. MEASUREMENT EQUIPMENT USED	60
12.4. LIMITS AND MEASUREMENT RESULT	60
13. FREQUENCY SEPARATION	64
13.1. MEASUREMENT PROCEDURE	64
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	64
13.3. MEASUREMENT EQUIPMENT USED	64
13.4. LIMITS AND MEASUREMENT RESULT	64
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	65
APPENDIX B. PHOTOGRAPHS OF FUT	65



1. VERIFICATION OF CONFORMITY

Applicant	S2E, Inc.
Address	817 Lawson St., City of Industry, CA 91748 USA
Manufacturer	S2E, Inc.
Address	817 Lawson St., City of Industry, CA 91748 USA
Factory	S2E, Inc.
Address	817 Lawson St., City of Industry, CA 91748 USA
Product Designation	True Wireless Earphones
Brand Name	MEE audio
Test Model	EP-OE2
Series Model	EP-OE3, EP-OE4, EP-OE5
Declaration of Difference	All the same except for the model name and color.
Date of receipt of test item	Apr. 24, 2023
Date of test	Apr. 24, 2023 to May 04, 2023
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	Thea Huang	
	Thea Huang (Project Engineer)	May 04, 2023
Reviewed By	Calin Lin	
	Calvin Liu (Reviewer)	May 04, 2023
Approved By	Max Zhang	
	Max Zhang (Authorized Officer)	May 04, 2023



Report No.: AGC15130230302FE03 Page 6 of 65

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "True Wireless Earphones". It is designed by way of utilizing the GFSK, π /4-DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

, ,	U
Operation Frequency	2.402 GHz to 2.480 GHz
RF Output Power	5.754dBm (Max)
Bluetooth Version	V5.2
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps
Number of channels	79
Hardware Version	V1.1
Software Version	V1.1
Antenna Designation	FPC Antenna (Comply with requirements of the FCC part 15.203)
Antenna Gain	-0.78dBi
Power Supply	DC 3.7V by battery or DC 5V by adapter
Mata	

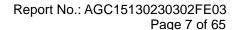
Note:

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
	1	2403 MHz
	:	•
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
	• •	•
	77	2479 MHz
	78	2480 MHz

^{1.} The EUT doesn't support BLE.

^{2.} The EUT comprises left and right channel headsets, both are the same, the left headset had been tested and recorded in this report as the worst case.





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:

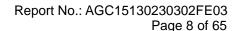
- 1. LAP/UAP of the master of the connection.
- 2. Internal master clock.

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.





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: 2ABMR-EP-OE2** 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.



Report No.: AGC15130230302FE03

Page 9 of 65

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%.

Item	Measurement Uncertainty	
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 3.1 \text{ dB}$	
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 4.0 \text{ dB}$	
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.8 \text{ dB}$	
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$	
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$	
Uncertainty of spurious emissions, conducted	U _c = ±2.7 %	
Uncertainty of Occupied Channel Bandwidth	U _c = ±2 %	



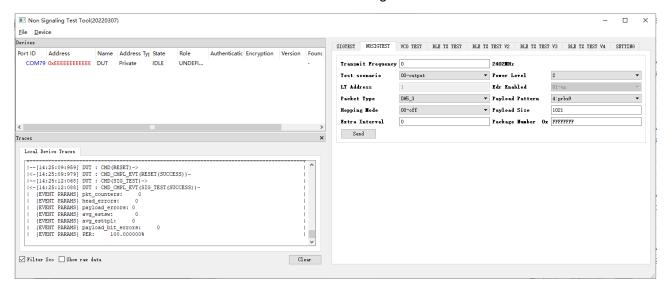
4. DESCRIPTION OF TEST MODES

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.

Software Setting





Report No.: AGC15130230302FE03

Page 11 of 65

5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

5.2. EQUIPMENT USED IN TESTED SYSTEM

Ite	em	Equipment	Model No.	ID or Specification	Remark
	1	True Wireless Earphones	EP-OE2	2ABMR-EP-OE2	EUT
	2	Control Box	USB-TTL	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 BT function cannot transmit when charging.



Report No.: AGC15130230302FE03

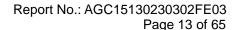
Page 12 of 65

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	Feb. 18, 2023	Feb. 17, 2024
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Aug. 04, 2022	Aug. 03, 2023
2.4GHz Filter	EM Electronics	2400-2500	N/A	Mar. 22, 2022	Mar. 21, 2024
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Oct. 31, 2021	Oct. 30, 2023
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	Apr. 23, 2023	Apr. 22, 2024
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Sep. 02, 2022	Sep. 01, 2024
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 05, 2023	Jan. 04, 2025
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A





7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

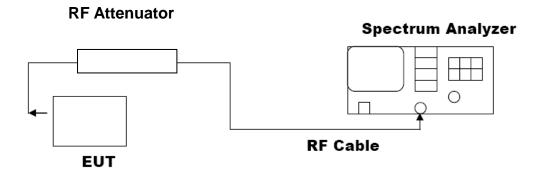
For peak power test:

- 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





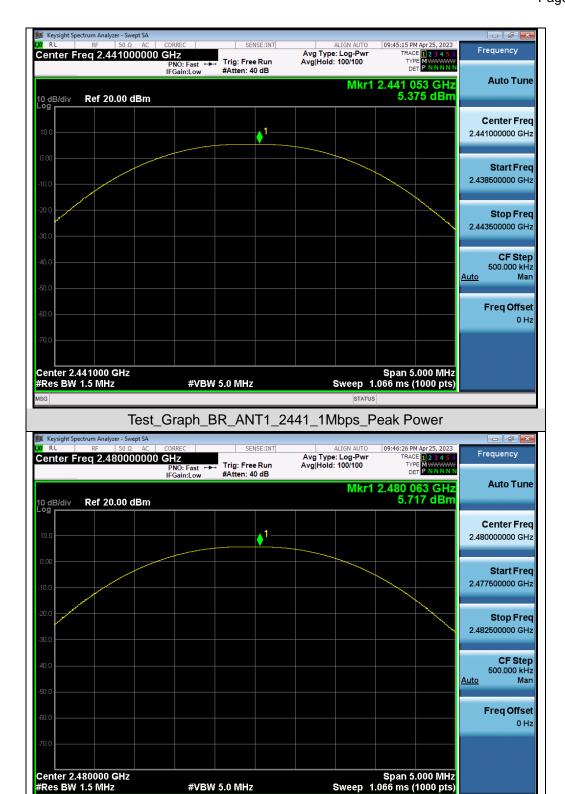
7.3. LIMITS AND MEASUREMENT RESULT

Test Data of Conducted Output Power				
Test Mode	Test Channel (MHz)	Peak Power (dBm)	Limits (dBm)	Pass or Fail
GFSK	2402	4.971	 \$21	Pass
	2441	5.375	 \$21	Pass
	2480	5.717	 21	Pass
π /4-DQPSK	2402	4.758	 \$21	Pass
	2441	5.044	 21	Pass
	2480	5.231	 21	Pass
8DPSK	2402	4.835	 \$21	Pass
	2441	5.392	 \$21	Pass
	2480	5.754	 21	Pass

Test Graphs of Conducted Output Power



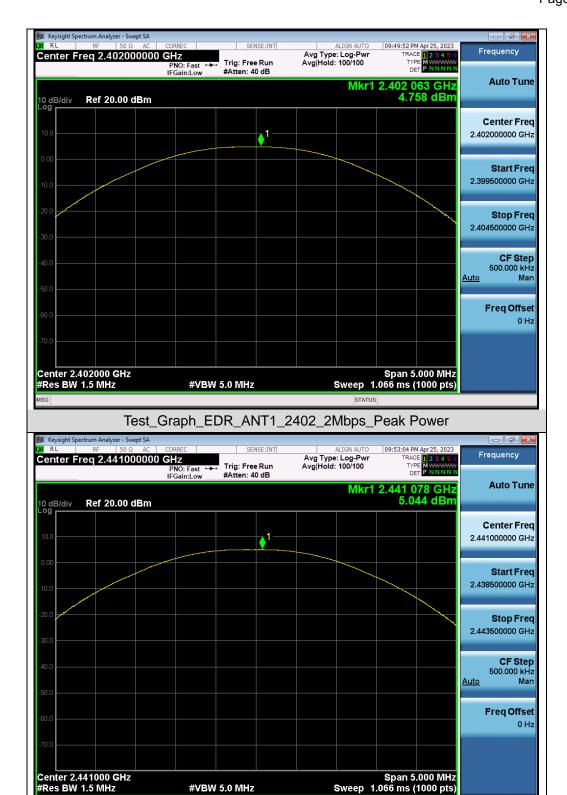




Test_Graph_BR_ANT1_2480_1Mbps_Peak Power

#VBW 5.0 MHz

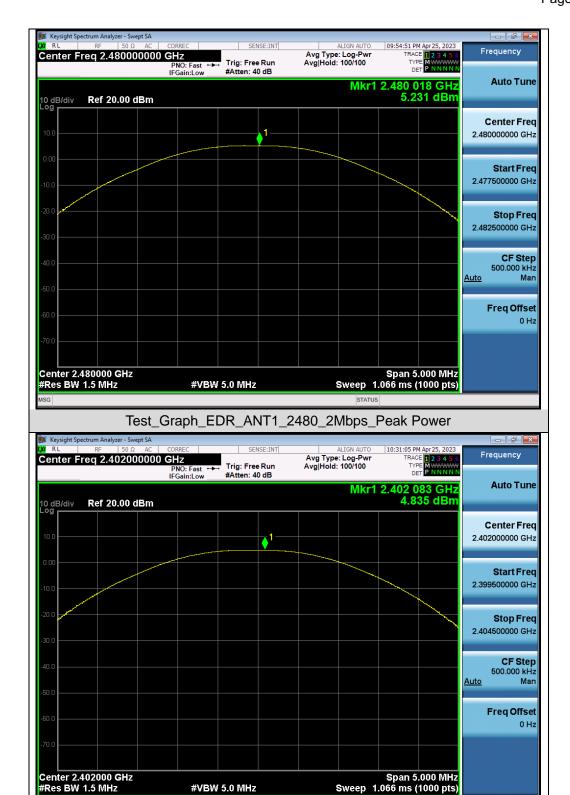




Test_Graph_EDR_ANT1_2441_2Mbps_Peak Power

#VBW 5.0 MHz

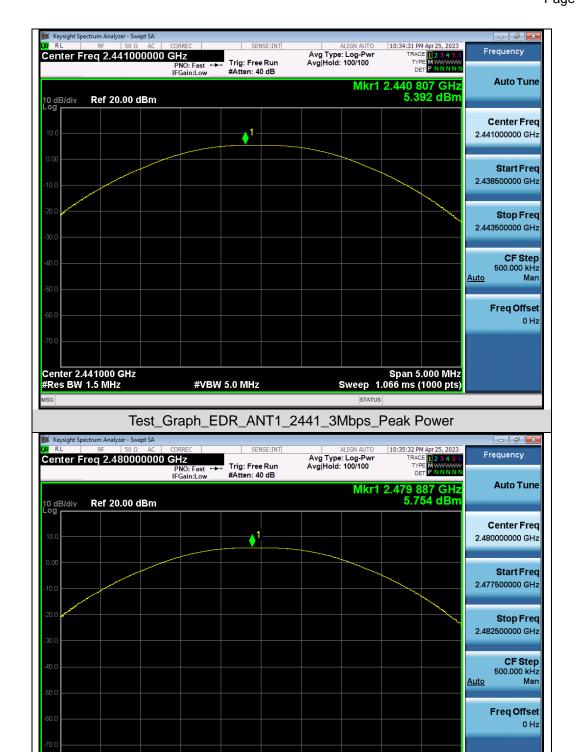




Test_Graph_EDR_ANT1_2402_3Mbps_Peak Power

#VBW 5.0 MHz



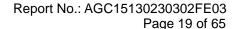


Test_Graph_EDR_ANT1_2480_3Mbps_Peak Power

#VBW 5.0 MHz

Span 5.000 MHz Sweep 1.066 ms (1000 pts)

Center 2.480000 GHz #Res BW 1.5 MHz



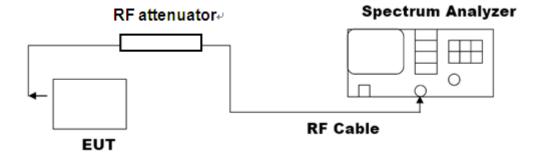


8. 20DB BANDWIDTH

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)

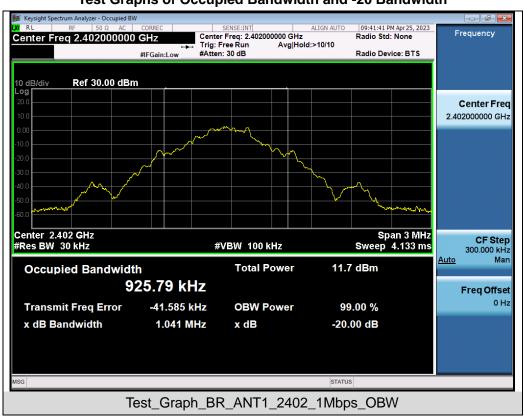




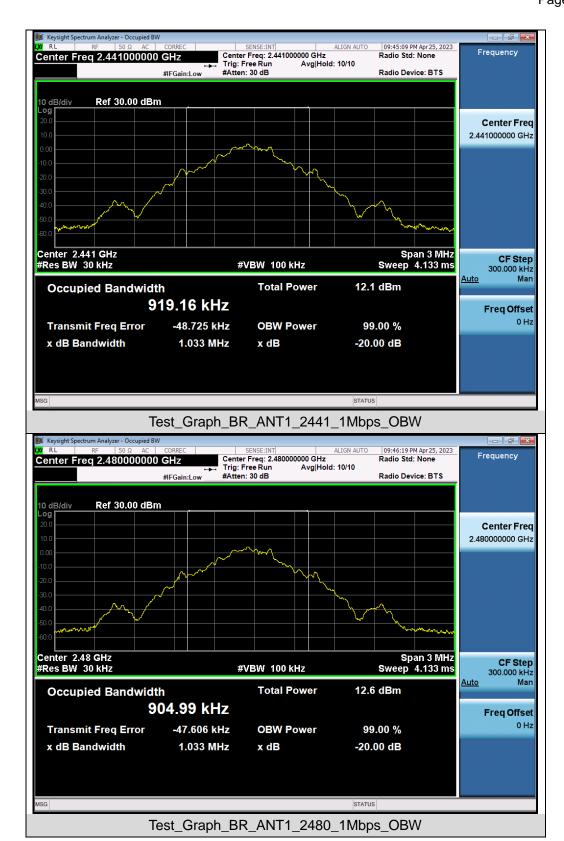
8.3. LIMITS AND MEASUREMENT RESULTS

Test Data of Occupied Bandwidth and -20dB Bandwidth					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-20dB Bandwidth (MHz)	Limits	Pass or Fail
GFSK	2402	0.926	1.041	N/A	Pass
	2441	0.919	1.033	N/A	Pass
	2480	0.905	1.033	N/A	Pass
π /4-DQPSK	2402	1.131	1.186	N/A	Pass
	2441	1.135	1.187	N/A	Pass
	2480	1.136	1.189	N/A	Pass
8DPSK	2402	1.139	1.197	N/A	Pass
	2441	1.138	1.233	N/A	Pass
	2480	1.142	1.234	N/A	Pass

Test Graphs of Occupied Bandwidth and -20 Bandwidth





















Report No.: AGC15130230302FE03

Page 25 of 65

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			
Amuliachia Limita	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 bandwidth			
within the band that contains the highest level of the			
desired power.	At least -20dBc than the limit	PASS	
In addition, radiation emissions which fall in the	Specified on the TOP Channel	PASS	
restricted bands, as defined in §15.205(a), must also			
comply with the radiated emission limits specified			
in§15.209(a))			



Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands



300.000 kHz

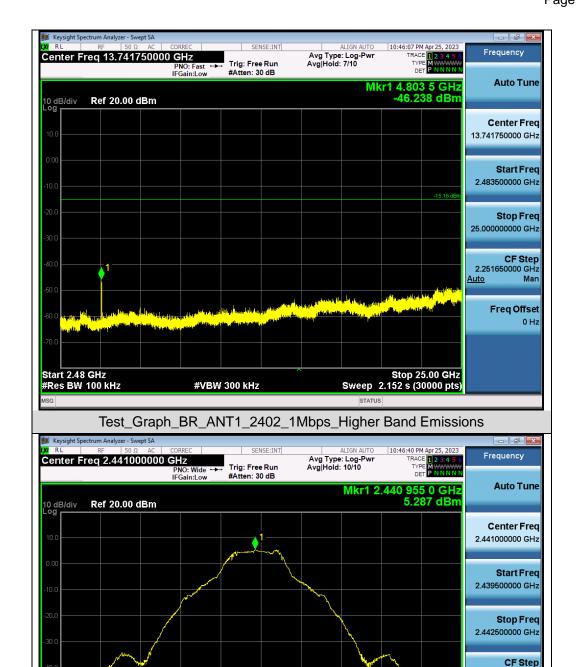
Freq Offset

Mar

<u>Auto</u>

Span 3.000 MHz Sweep 2.000 ms (30000 pts)





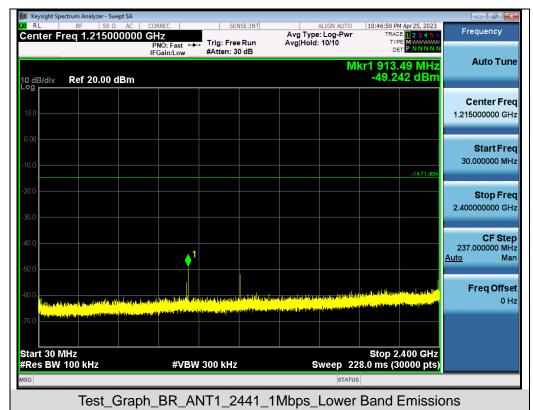
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

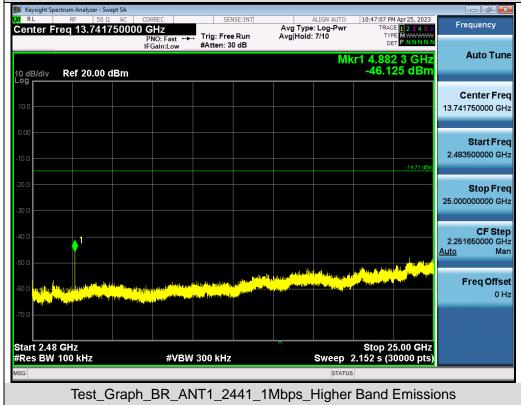
Test_Graph_BR_ANT1_2441_1Mbps_Reference Level

#VBW 300 kHz

Center 2.441000 GHz #Res BW 100 kHz





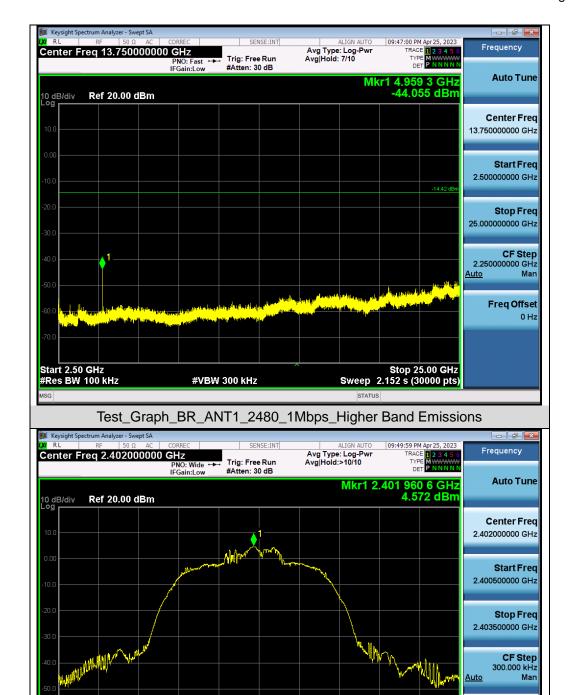






Freq Offset





Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_EDR_ANT1_2402_2Mbps_Reference Level

#VBW 300 kHz

Span 3.000 MHz Sweep 2.000 ms (30000 pts)

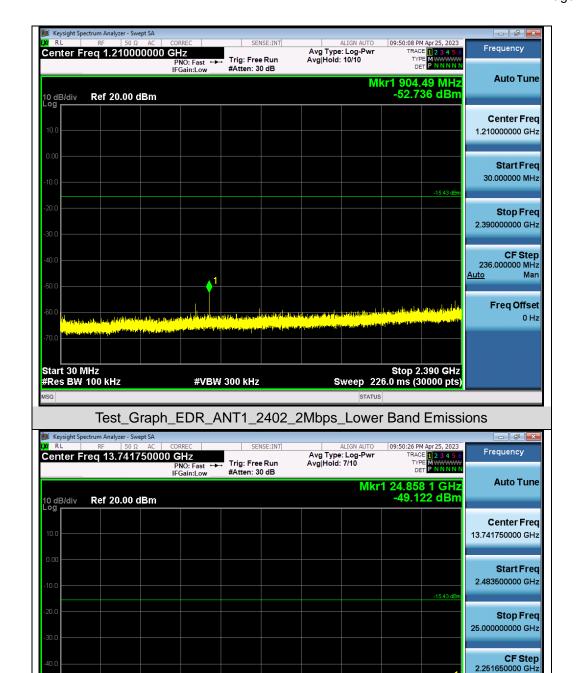
Center 2.402000 GHz #Res BW 100 kHz

<u>Auto</u>

Stop 25.00 GHz Sweep 2.152 s (30000 pts) Mar

Freq Offset 0 Hz





Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_EDR_ANT1_2402_2Mbps_Higher Band Emissions

#VBW 300 kHz

Start 2.48 GHz #Res BW 100 kHz

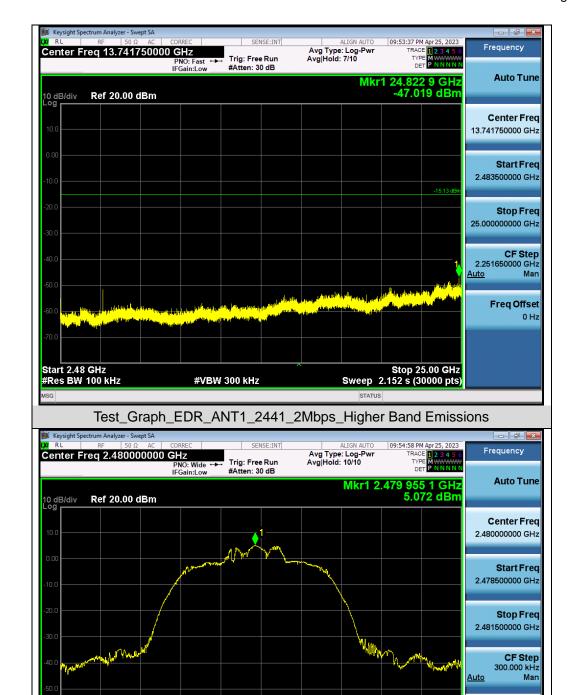




Freq Offset

Span 3.000 MHz Sweep 2.000 ms (30000 pts)





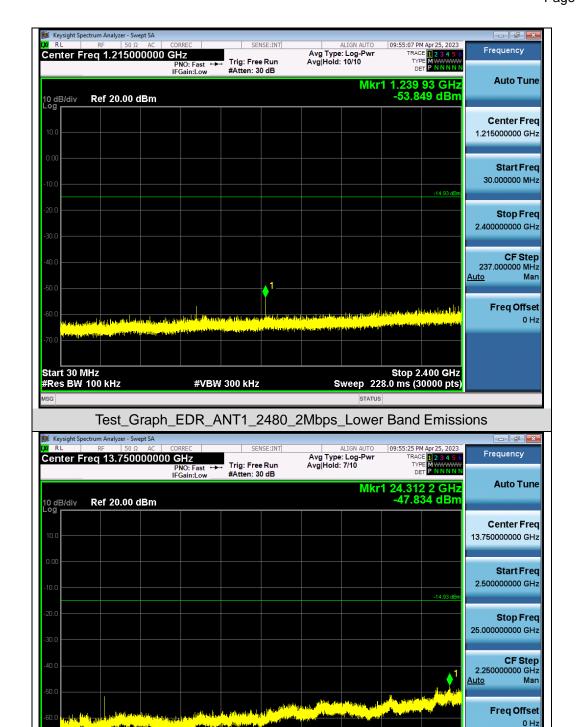
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_EDR_ANT1_2480_2Mbps_Reference Level

#VBW 300 kHz

Center 2.480000 GHz #Res BW 100 kHz





Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_EDR_ANT1_2480_2Mbps_Higher Band Emissions

#VBW 300 kHz

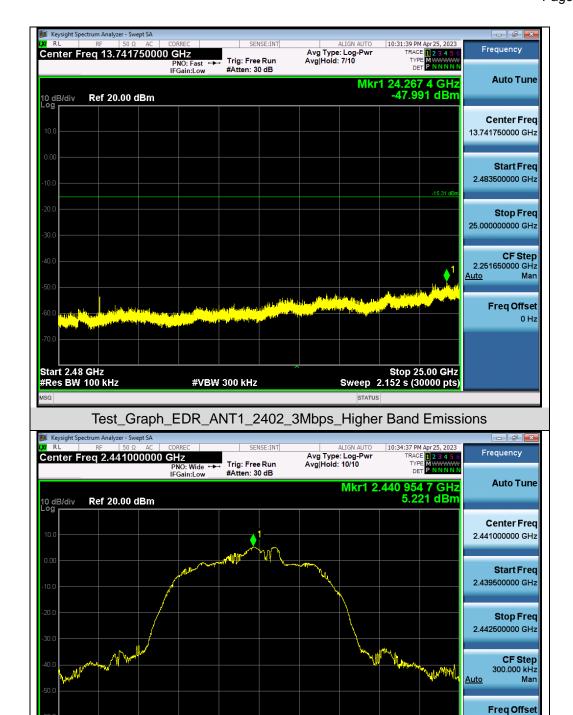
Stop 25.00 GHz Sweep 2.152 s (30000 pts)

Start 2.50 GHz #Res BW 100 kHz









Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

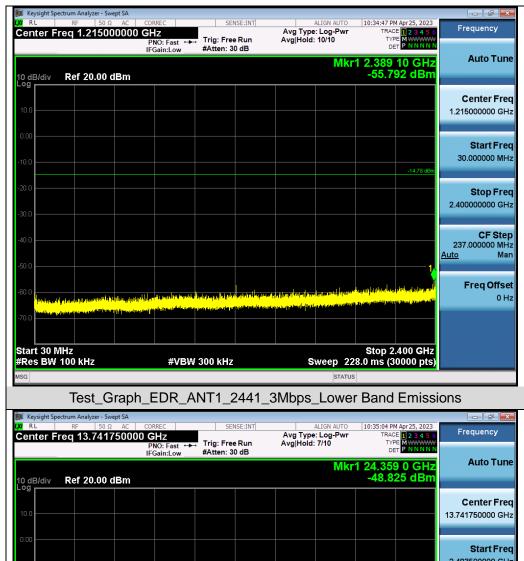
Test_Graph_EDR_ANT1_2441_3Mbps_Reference Level

#VBW 300 kHz

Span 3.000 MHz Sweep 2.000 ms (30000 pts)

Center 2.441000 GHz #Res BW 100 kHz





2.483500000 GHz -14.78 dl 25.000000000 GHz **CF Step** 2.251650000 GHz <u>Auto</u> Mar Freq Offset 0 Hz Start 2.48 GHz #Res BW 100 kHz Stop 25.00 GHz Sweep 2.152 s (30000 pts) #VBW 300 kHz Test_Graph_EDR_ANT1_2441_3Mbps_Higher Band Emissions

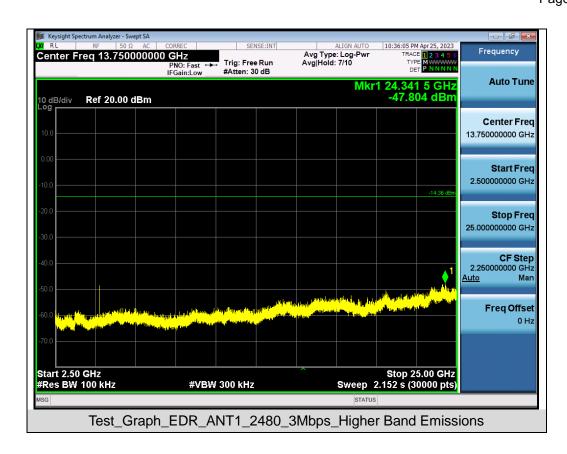
Web: http://www.agccert.com/





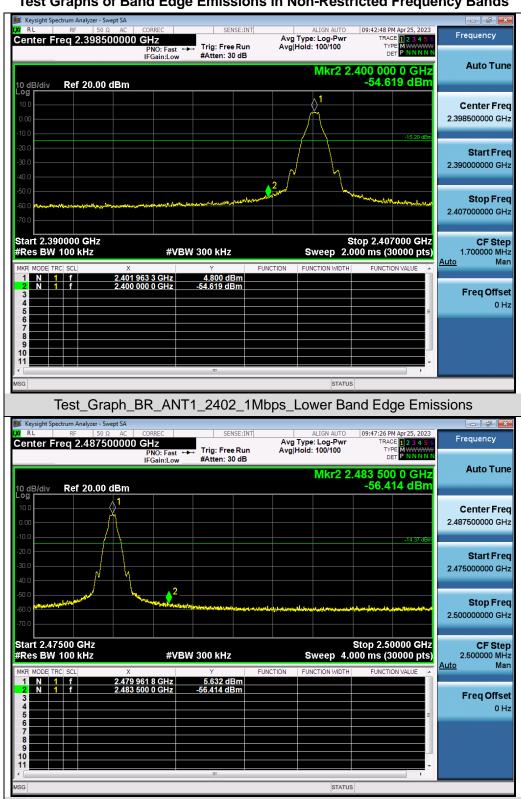
Test_Graph_EDR_ANT1_2480_3Mbps_Lower Band Emissions







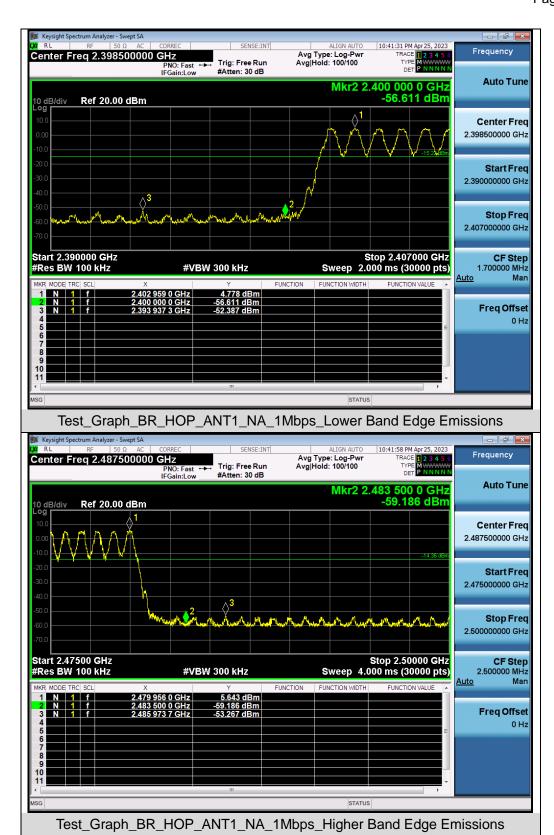
Test Graphs of Band Edge Emissions in Non-Restricted Frequency Bands



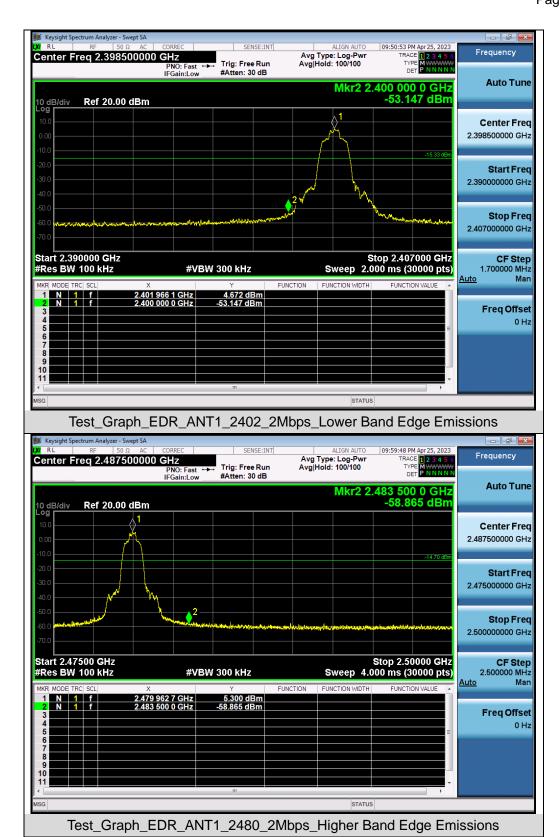
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_BR_ANT1_2480_1Mbps_Higher Band Edge Emissions

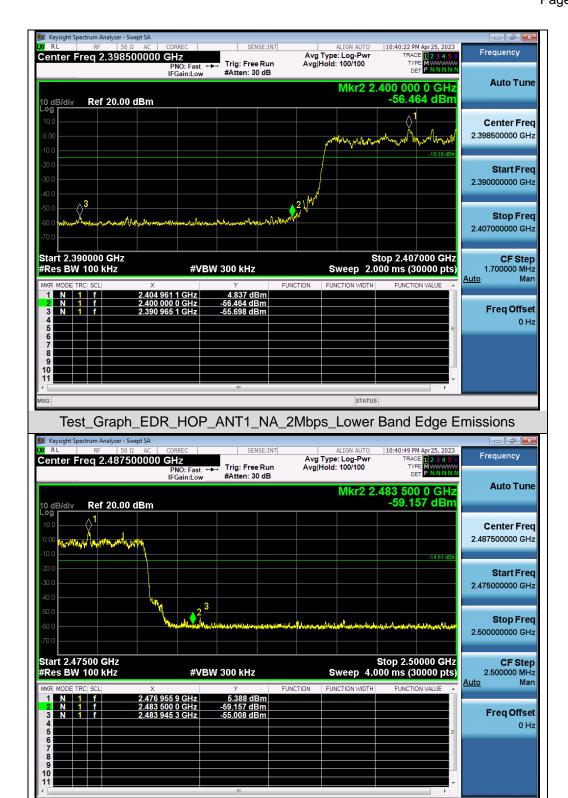








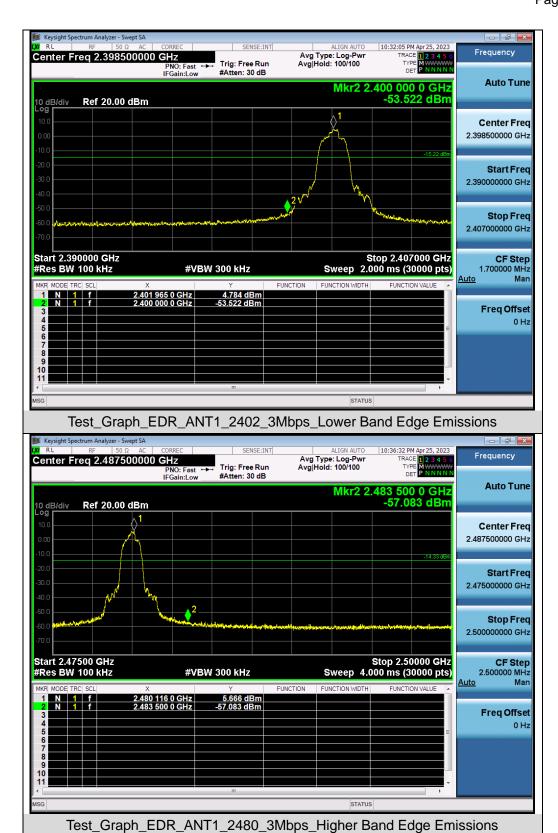




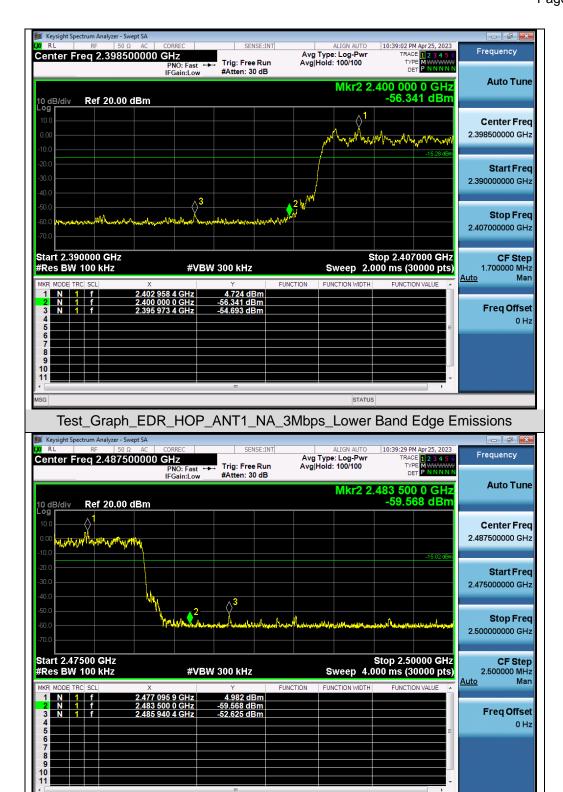
Test_Graph_EDR_HOP_ANT1_NA_2Mbps_Higher Band Edge Emissions

Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/









Test_Graph_EDR_HOP_ANT1_NA_3Mbps_Higher Band Edge Emissions



Report No.: AGC15130230302FE03

Page 46 of 65

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.



Report No.: AGC15130230302FE03

Page 47 of 65

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

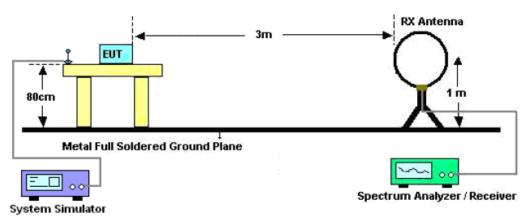
Spectrum Parameter	Setting		
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP		
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP		
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP		
Start Stan Fraguency	1GHz~26.5GHz		
Start ~Stop Frequency	1MHz/3MHz for Peak, 1MHz/3MHz for Average		

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

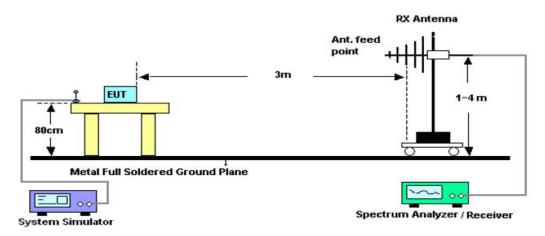


10.2. TEST SETUP

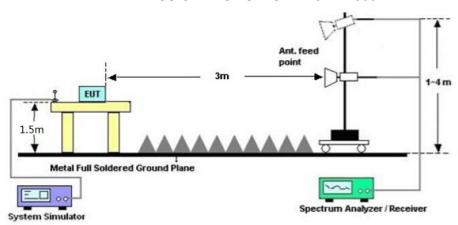
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/



Report No.: AGC15130230302FE03

Page 49 of 65

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

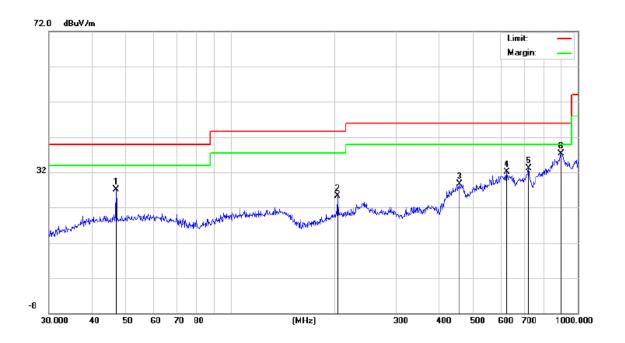
Radiated emission below 30MHz

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



Radiated emission from 30MHz to 1000MHz

EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Horizontal

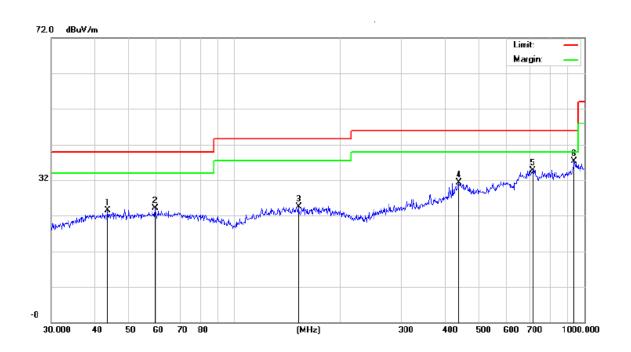


No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1	46.8303	13.06	14.10	27.16	40.00	-12.84	peak
2	203.5227	9.75	15.48	25.23	43.50	-18.27	peak
3	457.5072	5.52	23.24	28.76	46.00	-17.24	peak
4	625.0779	6.92	25.23	32.15	46.00	-13.85	peak
5	721.7259	6.62	26.46	33.08	46.00	-12.92	peak
6 *	896.9964	5.95	31.42	37.37	46.00	-8.63	peak

RESULT: PASS



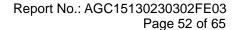
EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Vertical



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		43.5057	6.61	16.93	23.54	40.00	-16.46	peak
2		59.4405	7.01	17.09	24.10	40.00	-15.90	peak
3	1	152.6641	6.23	18.20	24.43	43.50	-19.07	peak
4	4	138.6554	5.36	25.88	31.24	46.00	-14.76	peak
5	7	711.6734	6.25	28.51	34.76	46.00	-11.24	peak
6	* (35.5463	6.88	30.40	37.28	46.00	-8.72	peak

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

2. All test modes had been pre-tested. The mode 9 is the worst case and recorded in the report.





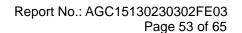
Radiated emission above 1GHz

EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.69	0.08	44.77	74	-29.23	peak
4804.000	37.47	0.08	37.55	54	-16.45	AVG
7206.000	40.71	2.21	42.92	74	-31.08	peak
7206.000	32.58	2.21	34.79	54	-19.21	AVG
Remark:						
actor = Anter	Factor = Antenna Factor + Cable Loss – Pre-amplifier.					

EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	43.83	0.08	43.91	74	-30.09	peak
4804.000	36.41	0.08	36.49	54	-17.51	AVG
7206.000	40.29	2.21	42.5	74	-31.5	peak
7206.000	31.36	2.21	33.57	54	-20.43	AVG
Remark:						
actor = Anter	nna Factor + Cable	Loss - Pre-	amplifier.			





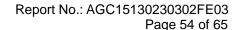
EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 8	Antenna	Horizontal

(dBµV)	(dB)	(dDu\//m)	/ ID . I// .		Value Type
	. ,	(dBµV/m)	(dBµV/m)	(dB)	12.30 1)00
45.82	0.14	45.96	74	-28.04	peak
38.51	0.14	38.65	54	-15.35	AVG
41.39	2.36	43.75	74	-30.25	peak
34.67	2.36	37.03	54	-16.97	AVG
	38.51 41.39 34.67	38.51 0.14 41.39 2.36 34.67 2.36	38.51 0.14 38.65 41.39 2.36 43.75	38.51 0.14 38.65 54 41.39 2.36 43.75 74 34.67 2.36 37.03 54	38.51 0.14 38.65 54 -15.35 41.39 2.36 43.75 74 -30.25 34.67 2.36 37.03 54 -16.97

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

EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 8	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4882.000	45.77	0.14	45.91	74	-28.09	peak
4882.000	37.49	0.14	37.63	54	-16.37	AVG
7323.000	40.52	2.36	42.88	74	-31.12	peak
7323.000	33.48	2.36	35.84	54	-18.16	AVG
emark:						





EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4960.000	46.53	0.22	46.75	74	-27.25	peak
4960.000	38.52	0.22	38.74	54	-15.26	AVG
7440.000	41.48	2.64	44.12	74	-29.88	peak
7440.000	32.37	2.64	35.01	54	-18.99	AVG

Remark

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

EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type	
4960.000	46.44	0.22	46.66	74	-27.34	peak	
4960.000	38.53	0.22	38.75	54	-15.25	AVG	
7440.000	40.82	2.64	43.46	74	-30.54	peak	
7440.000	31.57	2.64	34.21	54	-19.79	AVG	
Remark:							
Factor = Anter	na Factor + Cabl	e Loss – Pre-a	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, Margin=Level-Limit.

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

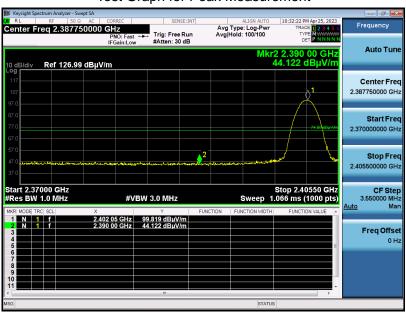
All test modes had been tested. The 8DPSK modulation is the worst case and recorded in the report.



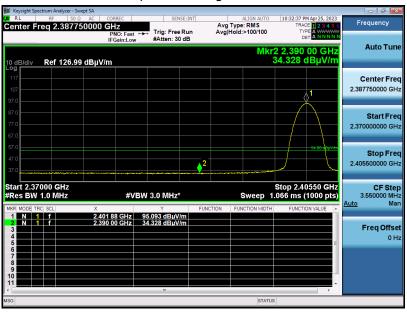
Test result for band edge emission at restricted bands

EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Horizontal

Test Graph for Peak Measurement



Test Graph for Average Measurement

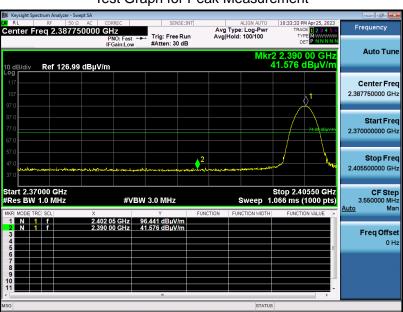


RESULT: PASS

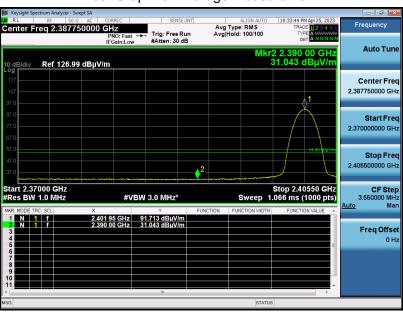


EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 7	Antenna	Vertical

Test Graph for Peak Measurement



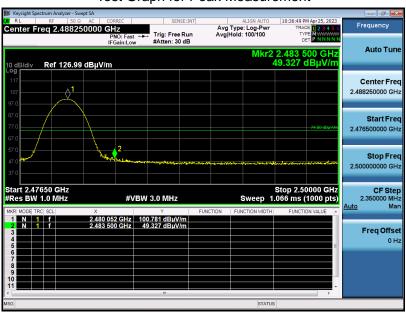
Test Graph for Average Measurement



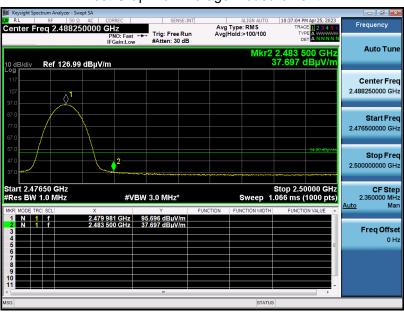


EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Horizontal

Test Graph for Peak Measurement



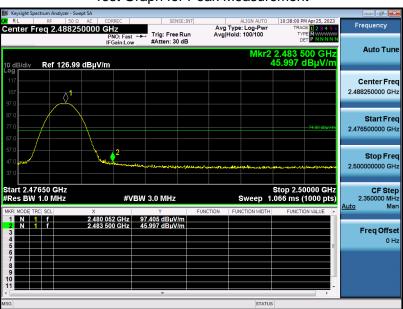
Test Graph for Average Measurement



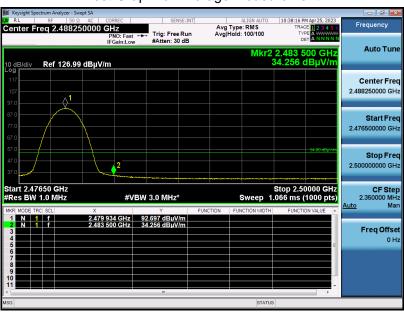


EUT	True Wireless Earphones	Model Name	EP-OE2
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 9	Antenna	Vertical

Test Graph for Peak Measurement



Test Graph for Average Measurement



Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. The 8DPSK modulation is the worst case and recorded in the report.



11. NUMBER OF HOPPING FREQUENCY

11.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- 1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- 2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- 3. VBW > RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.
- 4. Allow the trace to stabilize.

11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

11.4. LIMITS AND MEASUREMENT RESULT

Test Data of Number of Hopping Frequency					
Test Mode Number of Hopping Frequency Limits Pass or Fa					
GFSK Hopping	79	>=15	Pass		

Test Graphs of Number of Hopping Frequency



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



Report No.: AGC15130230302FE03

Page 60 of 65

12. TIME OF OCCUPANCY (DWELL TIME)

12.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- 1. Span: Zero span, centered on a hopping channel.
- 2. RBW shall be ≤channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.
- 3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.
- 4. Detector function: Peak. Trace: Max hold.
- 5. Use the marker-delta function to determine the transmit time per hop.
- 6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

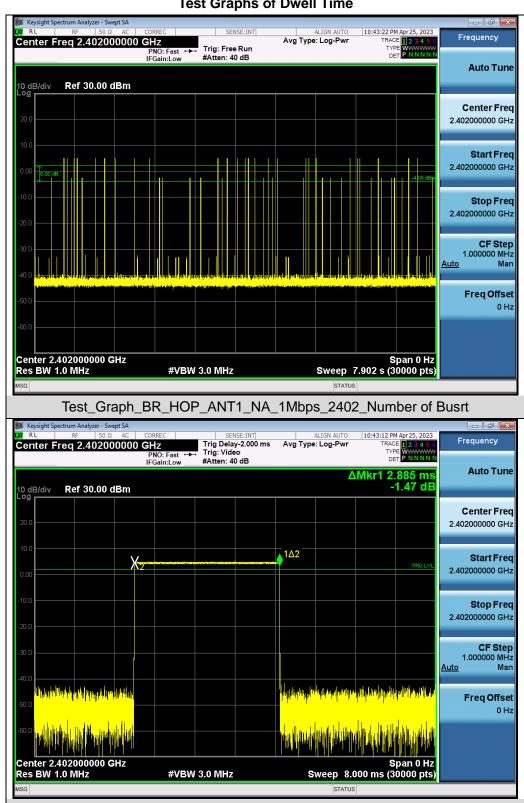
12.4. LIMITS AND MEASUREMENT RESULT

Test Data of Dwell Time						
Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Sweep Time (ms)	Limit (ms)	Pass or Fail	
2402	2.885	26.0*4	300.040	400	Pass	
2441	2.885	26.0*4	300.040	400	Pass	
2480	2.885	27.0*4	311.580	400	Pass	

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



Test Graphs of Dwell Time



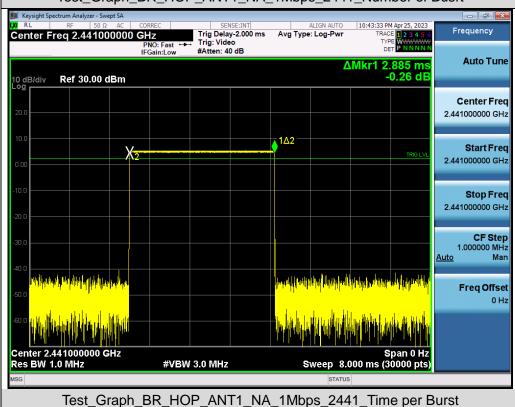
Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "Dedicated Testing/Inspection Stamp" is deemed to be invalid. Copying or excerpting portion of, or altering the content of the report is not permitted without the written authorization of AGC. The test results presented in the report apply only to the tested sample. Any objections to report issued by AGC should be submitted to AGC within 15days after the issuance of the test report. Further enquiry of validity or verification of the test report should be addressed to AGC by agc01@agccert.com.

Test_Graph_BR_HOP_ANT1_NA_1Mbps_2402_Time per Burst

Web: http://www.agccert.com/

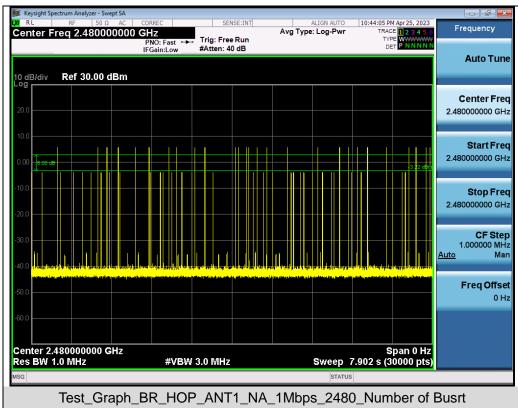


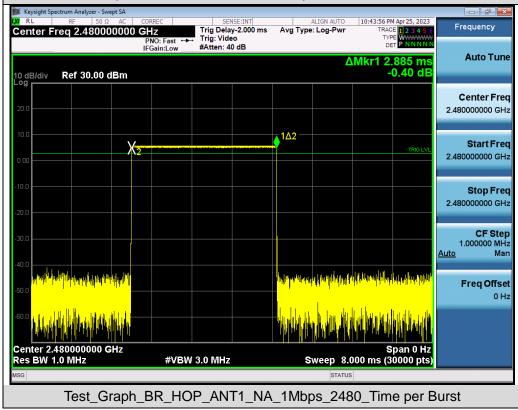




Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/







Tel: +86-755 2523 4088 E-mail: agc@agccert.com Web: http://www.agccert.com/



13. FREQUENCY SEPARATION

13.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

- 1. Span: Wide enough to capture the peaks of two adjacent channels.
- 2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- 3. Video (or average) bandwidth (VBW) ≥ RBW.
- 4. Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

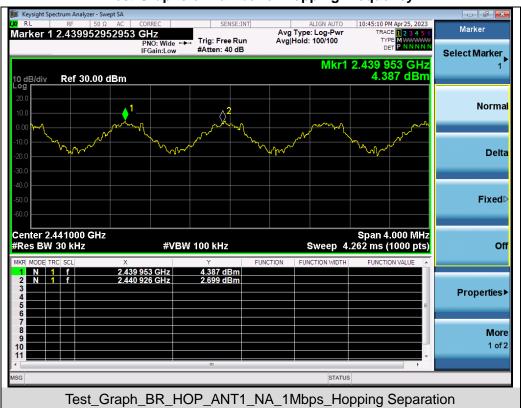
13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

13.4. LIMITS AND MEASUREMENT RESULT

Test Data of Frequency Separation						
Test Mode	Channel Separation (MHz)	Limits	Pass or Fail			
GFSK Hopping	0.973	>= 2/3 -20dB BW	Pass			

Test Graphs of Number of Hopping Frequency



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



Report No.: AGC15130230302FE03

Page 65 of 65

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC15130230302AP02

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC15130230302AP03

----END OF REPORT----



Conditions of Issuance of Test Reports

- 1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").
- 2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.
- 3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.
- 4. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.
- 5. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.
- 6. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.
- 7.Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.
- 8. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.
- 9. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.