

FCC Test Report

Report No.: AGC01082210703FE03

FCC ID	: 2AIXN346GC
APPLICATION PURPOSE	: Original Equipment
PRODUCT DESIGNATION	: TWS Bluetooth Headset
BRAND NAME	: N/A
MODEL NAME	: BS346GC-1, BS346GC, BS346GL, BS346GL-1
APPLICANT	: GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED
DATE OF ISSUE	: Jul. 28, 2021
STANDARD(S)	: FCC Part 15.247
REPORT VERSION	: V1.0



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REPORT REVISE RECORD

	Report Version	Revise Time	Issued Date	Valid Version	Notes
ĺ	V1.0	. /	Jul. 28, 2021	Valid	Initial Release

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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	
	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)	
	2.7. TEST METHODOLOGY	8
	2.8. SPECIAL ACCESSORIES	8
	2.9. EQUIPMENT MODIFICATIONS	
	2.10. ANTENNA REQUIREMENT	
	3. MEASUREMENT UNCERTAINTY	9
	4. DESCRIPTION OF TEST MODES	
	5. SYSTEM TEST CONFIGURATION	11
	5.1. CONFIGURATION OF EUT SYSTEM	
	5.2. EQUIPMENT USED IN TESTED SYSTEM	11
	5.3. SUMMARY OF TEST RESULTS	11
	6. TEST FACILITY	
	7. PEAK OUTPUT POWER	
	7.1. MEASUREMENT PROCEDURE	
	7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
	7.3. LIMITS AND MEASUREMENT RESULT	
	8. 20DB BANDWIDTH	
	8.1. MEASUREMENT PROCEDURE	
	8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
	8.3. LIMITS AND MEASUREMENT RESULTS	
	9. CONDUCTED SPURIOUS EMISSION	
	9.1. MEASUREMENT PROCEDURE	
St pr	Any report having not been signed by authorized approver, or having been altered without authorization, or having not been stamped by the "bedicated" 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 a resented 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 issue further enquiry of validity or verification of the test report should be addressed to AGC by agc@agc-cert.com.	AGC. The test results



9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)	
9.3. MEASUREMENT EQUIPMENT USED	
9.4. LIMITS AND MEASUREMENT RESULT	
10. RADIATED EMISSION	
10.1. MEASUREMENT PROCEDURE	
10.2. TEST SETUP	
10.3. LIMITS AND MEASUREMENT RESULT	
10.4. TEST RESULT	
11. NUMBER OF HOPPING FREQUENCY	
11.1. MEASUREMENT PROCEDURE	
11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
11.3. MEASUREMENT EQUIPMENT USED	
11.4. LIMITS AND MEASUREMENT RESULT	
12. TIME OF OCCUPANCY (DWELL TIME)	
12.1. MEASUREMENT PROCEDURE	
12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
12.3. MEASUREMENT EQUIPMENT USED	
12.4. LIMITS AND MEASUREMENT RESULT	
13. FREQUENCY SEPARATION	
13.1. MEASUREMENT PROCEDURE	
13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)	
13.3. MEASUREMENT EQUIPMENT USED	
13.4. LIMITS AND MEASUREMENT RESULT	64
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	
	67

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1. VERIFICATION OF CONFORMITY

Applicant	GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED		
Address	4th Floor, 15th Building, Vtrek Innovation Industrial Park, No. 644, Shibei Road Panyu District, Guangzhou, China		
Manufacturer GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED			
Address	4th Floor, 15th Building, Vtrek Innovation Industrial Park, No. 644, Shibei Road, Panyu District, Guangzhou, China		
Factory	GUANGZHOU U&I TECHNOLOGY COMPANY LIMITED		
Address	4th Floor, 15th Building, Vtrek Innovation Industrial Park, No. 644, Shibei Road Panyu District, Guangzhou, China		
Product Designation	TWS Bluetooth Headset		
rand Name N/A			
Test Model	BS346GC-1		
Series Model BS346GC, BS346GL, BS346GL-1			
Declaration of Difference	All the same except for the model name. There are 2 types of charging boxes		
Date of test	Jul. 16, 2021 to Jul. 28, 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

Eddy Lin

Eddy Liu Project Engineer

Max Zhans

Jul. 28, 2021

Reviewed By

Max Zhang

Jul. 28, 2021

Approved By

Reviewer

Forrest Lei Authorized Officer

Jul. 28, 2021

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "TWS Bluetooth Headset". 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

Operation Frequency	2.402 GHz to 2.480 GHz	
RF Output Power	2.892dBm (Max)	
Bluetooth Version	V5.1	
Modulation BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps		
Number of channels	79	
Hardware Version	V02	
Software Version	V01	
Antenna Designation	FPC Antenna (Comply with requirements of the FCC part 15.203)	
Antenna Gain	0.8dBi	
Power Supply	DC 3.7V by battery or DC 5V by adapter	
Note: 1. The EUT doesn't s	upport BLE.	

Note: 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.

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
	C1 C	2403 MHz
	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: 2AIXN346GC** 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 \pm 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	$U_{c} = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2 \%$

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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

COM UART Port B Baudrates	=115200 🔽 Open Close		(eu)
Channel 0 Packet Type DH1 Payload Type PRBS9 Tx Packet Count 0 Tx Level 7 PHY LE 1M PHY Whitening Enable Hit Target 0x000000c6967e Parameter 1 Parameter 2	Tx (for Certification) FW Mode Exec Stop Clear Report Item Value Tx bits 000000 Tx Pkt Count 000000 TX Report RX Report		HCI Reset Test Mode
lessage Load RtiBluetoothMP dll Success!!		×	

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

EUT

Conducted Emission Configure:

	5	
EUT		AE

5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	TWS Bluetooth Headset	BS346GC-1	2AIXN346GC	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)	(1)(iii) Time of Occupancy			
15.247 (a)(1)	15.247 (a)(1) Frequency Separation			
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 15,2021	May 14,2022
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	Apr. 23, 2021	Apr. 22, 2023
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

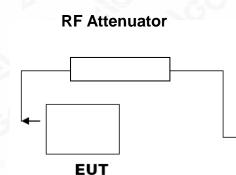
For peak power test:

- 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.

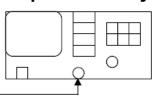
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

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

PEAK POWER TEST SETUP



Spectrum Analyzer



RF Cable

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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			
- 0	2402	-0.975	\$21	Pass			
GFSK	2441	-0.359	\$21	Pass			
	2480	0.070	\$21	Pass			
6	2402	1.032	\$21	Pass			
π /4-DQPSK	2441	1.839	\$21	Pass			
	2480	2.254	\$21	Pass			
6	2402	1.737	\$21	Pass			
8DPSK	2441	2.495	\$21	Pass			
	2480	2.892	\$21	Pass			

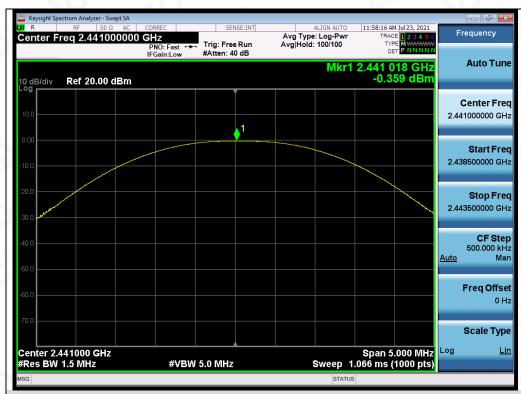
Test Graphs of Conducted Output Power



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Report No.: AGC01082210703FE03 Page 15 of 77





Test_Graph_BR_ANT1_2441_1Mbps_Peak Power



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Report No.: AGC01082210703FE03 Page 16 of 77

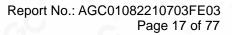




Test_Graph_EDR_ANT1_2402_2Mbps_Peak Power



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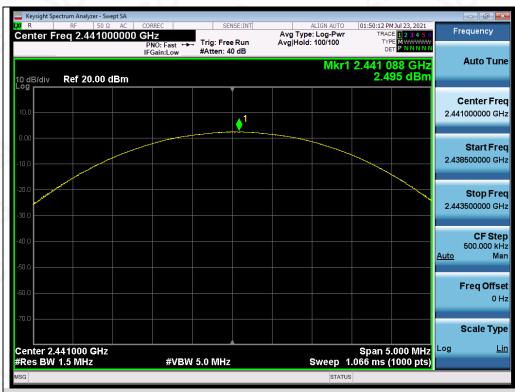




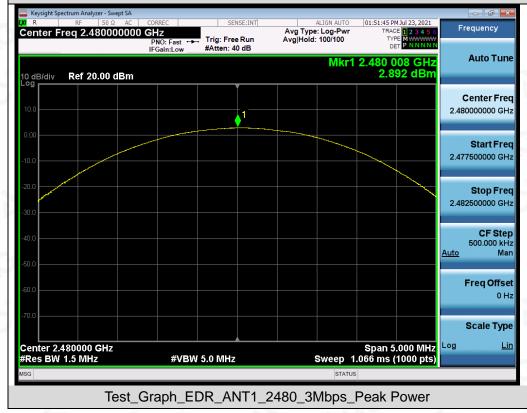
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Report No.: AGC01082210703FE03 Page 18 of 77





Test_Graph_EDR_ANT1_2441_3Mbps_Peak Power



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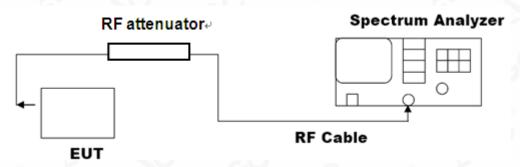


8. 20DB BANDWIDTH

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)



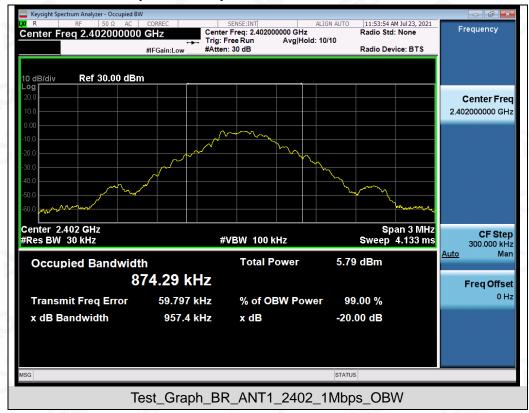
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Test Data of Occupied Bandwidth and -20dB Bandwidth								
Test Mode	Test Channel 99% Occupied (MHz) Bandwidth (MH		-20dB Bandwidth (MHz)	Limits	Pass or Fail			
-0	2402	0.874	0.957	N/A	Pass			
GFSK	2441	0.874	0.958	N/A	Pass			
	2480	0.874	0.957	N/A	Pass			
©	2402	1.161	1.279	N/A	Pass			
π/4-DQPSK	2441	1.162	1.280	N/A	Pass			
	2480	1.162	1.279	N/A	Pass			
6	2402	1.169	1.298	N/A	Pass			
8DPSK	2441	1.168	1.297	N/A	Pass			
	2480	1.169	1.298	N/A	Pass			

8.3. LIMITS AND MEASUREMENT RESULTS

Test Graphs of Occupied Bandwidth and -20 Bandwidth



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Report No.: AGC01082210703FE03 Page 21 of 77



Test_Graph_BR_ANT1_2441_1Mbps_OBW



Test_Graph_BR_ANT1_2480_1Mbps_OBW

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Report No.: AGC01082210703FE03 Page 22 of 77



Test_Graph_EDR_ANT1_2402_2Mbps_OBW



Test_Graph_EDR_ANT1_2441_2Mbps_OBW

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Report No.: AGC01082210703FE03 Page 23 of 77



Test_Graph_EDR_ANT1_2480_2Mbps_OBW



Test_Graph_EDR_ANT1_2402_3Mbps_OBW

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Report No.: AGC01082210703FE03 Page 24 of 77



Test_Graph_EDR_ANT1_2441_3Mbps_OBW



Test_Graph_EDR_ANT1_2480_3Mbps_OBW

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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 MEASUREMENT RESULT							
Angliaghta Limita	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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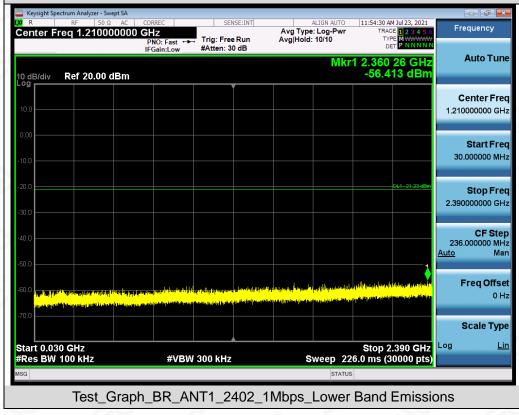


Test Graphs of Spurious Emissions in Non-Restricted Frequency Bands

R

AGC

Test_Graph_BR_ANT1_2402_1Mbps_Reference Level



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Report No.: AGC01082210703FE03 Page 27 of 77







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Report No.: AGC01082210703FE03 Page 28 of 77

CF Step 2.251650000 GHz

> Freq Offset 0 Hz

Scale Type

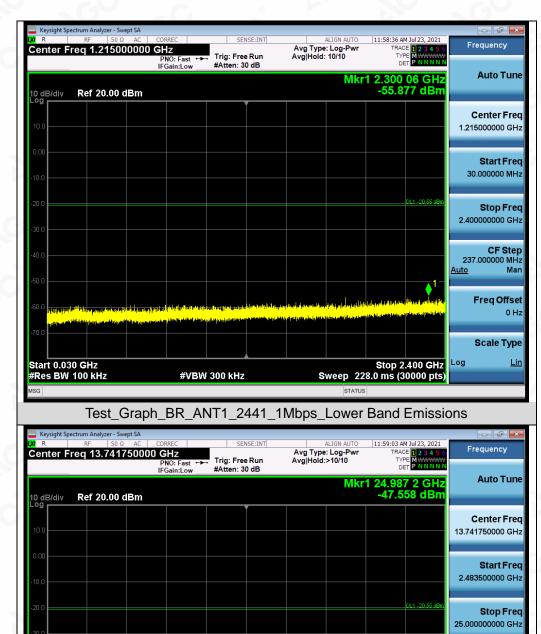
Lin

Auto

Log

Stop 25.00 GHz Sweep 2.152 s (30000 pts) Man





Test_Graph_BR_ANT1_2441_1Mbps_Higher Band Emissions

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#VBW 300 kHz

Start 2.48 GHz #Res BW 100 kHz

Report No.: AGC01082210703FE03 Page 29 of 77



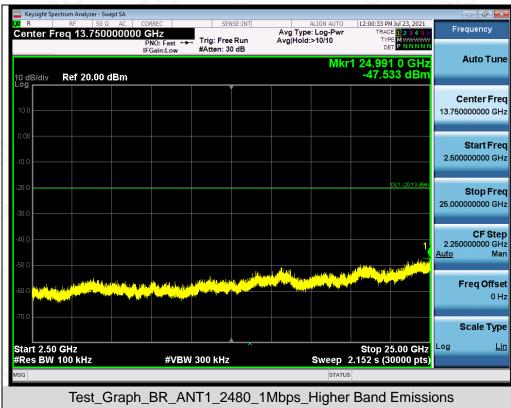


Keysight Spectrum Analyzer - Swept SA					
x RF 50 Ω AC Center Freq 1.21500000	00 GHz PNO: Fast ↔	Trig: Free Run #Atten: 30 dB	ALIGN AUTO Avg Type: Log-Pwr Avg Hold: 10/10	12:00:07 PM Jul 23, 2021 TRACE 1 2 3 4 5 6 TYPE M WWWWW DET P NNNNN	Frequency
10 dB/div Ref 20.00 dBm	IFGain:Low	#Atten: 30 dB	Mkr	1 2.262 61 GHz -56.018 dBm	Auto Tune
10.0					Center Freq 1.215000000 GHz
-10.0					Start Freq 30.000000 MHz
-20.0				DL1 -20,13 dBm	Stop Freq 2.400000000 GHz
-40.0					CF Step 237.000000 MH; <u>Auto</u> Mar
-60.0 How and the state of the	nergepter bei generation and the second s	a an filmen an a than an tao an	n de glinnet myneret et de fentref hyddellinte de Myneren yn gyneret hydd Angol, Pelynaeth eng		Freq Offset 0 Hz
-70.0					Scale Type
Start 0.030 GHz #Res BW 100 kHz	#VBW	/ 300 kHz	Sweep 22	8.0 ms (30000 pts)	Log <u>Lin</u>

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Report No.: AGC01082210703FE03 Page 30 of 77







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Report No.: AGC01082210703FE03 Page 31 of 77







Test_Graph_EDR_ANT1_2402_2Mbps_Lower Band Emissions

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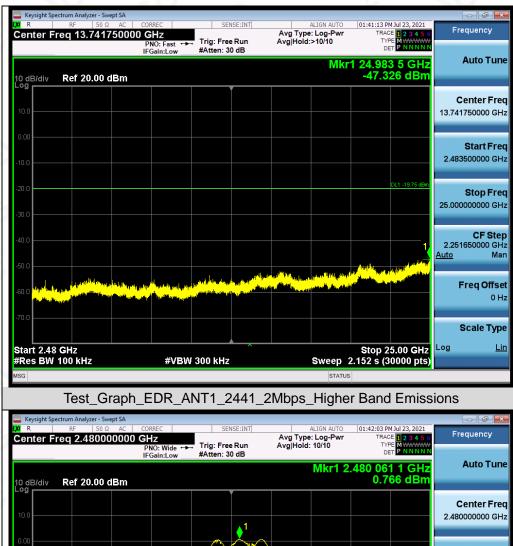
	ctrum Analyzer - S										n X
x R Center Fr	eq 1.2150	00000 G	ORREC HZ PNO: Fast ↔	. Trig: Fre			ALIGN AUTO : Log-Pwr : 10/10	TRAC	M Jul 23, 2021 CE 1 2 3 4 5 6 PE M	Freque	ncy
10 dB/div Log	Ref 20.00		FGain:Low	#Atten: 3	0 dB		Mkr	1 2.266	72 GHz 43 dBm	Aut	o Tune
10.0										Cent 1.2150000	e r Frec 000 GH:
-10.0										Sta 30.0000	rt Free 000 MH
-20.0									DL1 -19.75 dBm	Sto 2.4000000	p Free 000 GH:
-40.0										237.0000 <u>Auto</u>	F Ster 000 MH Mai
discon all the	an na san ƙasar ƙasar ƙasar Ingan Manazar ƙasar ƙasar ƙasar ƙasar ƙasar ƙasar	an a	, a point in the second se	an han ban ban an tangan da ta	a ay a tha to state the state	la samual ta <mark>el da sa</mark> na _s amén ne kampady	la last ber tid by tadi Produktion and all stat	en en der stellen die Staar Gebeure en stellen die Staar	n tanki pika sika nterpenyeria (ni)	Freq	I Offse 0 H
-70.0										Scal	е Туре
Start 0.03 #Res BW			#VBW	/ 300 kHz		s		28.0 ms (3	2.400 GHz 30000 pts)	Log	Lir
MSG							STATUS	8			

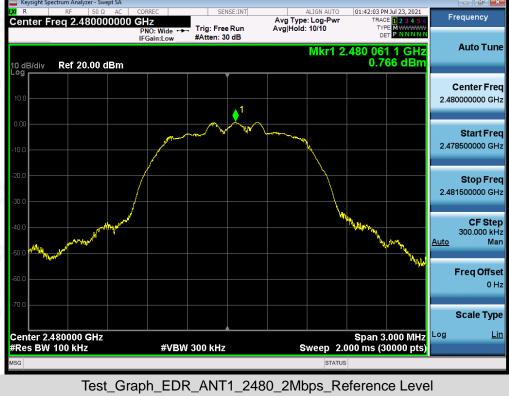
Test_Graph_EDR_ANT1_2441_2Mbps_Reference Level

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Report No.: AGC01082210703FE03 Page 33 of 77







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Report No.: AGC01082210703FE03 Page 34 of 77

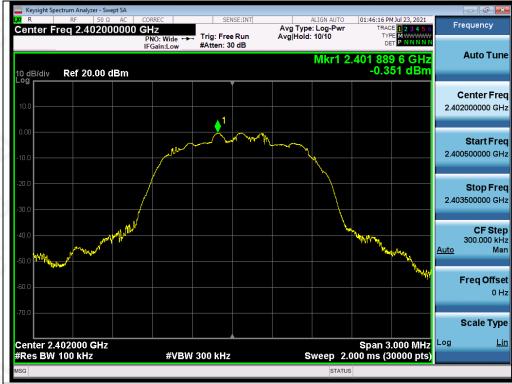






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Keysight Spectrum Analyzer - Swept SA		1				_	- # -
R RF 50Ω AC enter Freq 1.210000000	PNO: Fast 🔸	SENSE:INT → Trig: Free Run #Atten: 30 dB	Avg Typ Avg Hold	ALIGN AUTO De: Log-Pwr d: 10/10	TYPE	ul 23, 2021 1 2 3 4 5 6 M W N N N N N	Frequency
0 dB/div Ref 20.00 dBm	IFGain:Low	#Atten: 30 dB		Mkr	1 2.205 9 -56.44	1 GHz	Auto Tun
10.0							Center Fre 1.210000000 GH
0.0							Start Fre 30.000000 MH
0.0					DI	<u>.1 -20.35 dBm</u>	Stop Fre 2.390000000 GF
							CF Ste 236.000000 Mi <u>Auto</u> Mi
0.0 		electronic sector and the field of	ugila a linga Napitikhi na ani payaanina asia	ing ang telahan sa	a gott na stadiji ta kara Mara Radi je poslova stada stalje posl	1 Addagationali anti-pipeterine	Freq Offs 0 H
	·						Scale Typ
tart 0.030 GHz Res BW 100 kHz	#VBW	/ 300 kHz		Sweep 22	Stop 2.3 6.0 ms (30	SV GHZ	Log <u>L</u>

Test_Graph_EDR_ANT1_2402_3Mbps_Reference Level

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Report No.: AGC01082210703FE03 Page 36 of 77



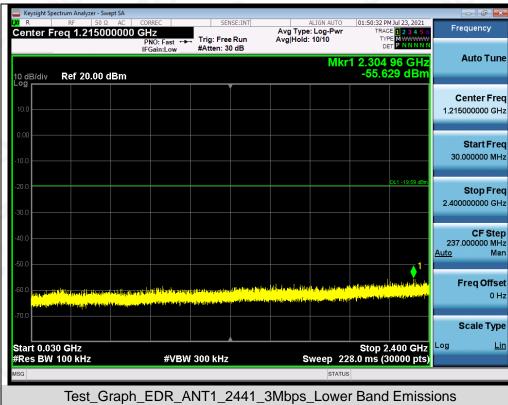




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