

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

Telephone: +86-755-26648640 Fax: +86-755-26648637 Website: www.cga-cert.com

+86-755-26648637 Report Template Version: V05 www.cga-cert.com Report Template Revision Date: 2021-11-03

Test Report

Report No.: CQASZ20220300337E-01

Applicant: Avantronics Limited

Address of Applicant: The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen

Equipment Under Test (EUT):

Product: Audiplex

Model No.: WSTR-2403, WSTR-2403-S, WSTR-2403-RX, WSTR-2403-TX

Test Model No.: WSTR-2403

Brand Name: Avantree

FCC ID: WJ5-WSTR-2403

Standards: 47 CFR Part 15, Subpart C

Date of Receipt: 2022-03-08

Date of Test: 2022-03-08 to 2022-07-20

Date of Issue: 2022-07-28
Test Result: PASS*

*In the configuration tested, the EUT complied with the standards specified above.

Tested By: _____(Lewis Zhou)

Reviewed By:

(K Liao)

Approved By:

(Jack Ai)





Report No.: CQASZ20220300337E-01

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20220300337E-01	Rev.01	Initial report	2022-07-28





2 Test Summary

Test Item	Test Requirement	Test method	Result
Antenna Requirement	47 CFR Part 15, Subpart C Section 15.203/15.247 (c)	ANSI C63.10 2013	PASS
AC Power Line Conducted Emission	47 CFR Part 15, Subpart C Section 15.207	ANSI C63.10 2013	PASS
Conducted Peak Output Power	47 CFR Part 15, Subpart C Section 15.247 (b)(3)	ANSI C63.10 2013	PASS
6dB Occupied Bandwidth	47 CFR Part 15, Subpart C Section 15.247 (a)(2)	ANSI C63.10 2013	PASS
Power Spectral Density	47 CFR Part 15, Subpart C Section 15.247 (e)	ANSI C63.10 2013	PASS
Band-edge for RF Conducted Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
RF Conducted Spurious Emissions	47 CFR Part 15, Subpart C Section 15.247(d)	ANSI C63.10 2013	PASS
Radiated Spurious Emissions	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15, Subpart C Section 15.205/15.209	ANSI C63.10 2013	PASS



3 Contents

	Page
1 VERSION	2
2 TEST SUMMARY	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 CLIENT INFORMATION	5
4.2 GENERAL DESCRIPTION OF EUT	
4.3 ADDITIONAL INSTRUCTIONS	
4.4 TEST ENVIRONMENT	
4.5 DESCRIPTION OF SUPPORT UNITS	
4.6 STATEMENT OF THE MEASUREMENT UNCERTAINTY	
4.7 TEST LOCATION	
4.8 TEST FACILITY	
4.9 DEVIATION FROM STANDARDS	
4.10 OTHER INFORMATION REQUESTED BY THE CUSTOMER	
4.11 EQUIPMENT LIST	
5 TEST RESULTS AND MEASUREMENT DATA	
5.1 Antenna Requirement	12
5.2 CONDUCTED EMISSIONS	
5.3 CONDUCTED PEAK OUTPUT POWER	
5.4 6dB Occupy Bandwidth	
5.5 POWER SPECTRAL DENSITY	
5.6 BAND-EDGE FOR RF CONDUCTED EMISSIONS	
5.7 Spurious RF Conducted Emissions	
5.8 RADIATED SPURIOUS EMISSION & RESTRICTED BANDS	
5.8.1 Spurious Emissions	
6 PHOTOGRAPHS - EUT TEST SETUP	54
6.1 RADIATED SPURIOUS EMISSION	54
6.2 CONDUCTED EMISSIONS TEST SETUP	55
7 DUOTOCDADUS EUT CONSTDUCTIONAL DETAILS	5.0





4 General Information

4.1 Client Information

Applicant:	Avantronics Limited
Address of Applicant:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen
Manufacturer:	Avantronics Limited
Address of Manufacturer:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen
Factory:	Avantronics Limited
Address of Factory:	The 4th Floor, Yuepeng Building, No.1019 Jiabin Rd, Luohu District, Shenzhen

4.2 General Description of EUT

Draduat Name:	
Product Name:	Audiplex
Model No.:	WSTR-2403, WSTR-2403-S, WSTR-2403-RX, WSTR-2403-TX
Test Model No.:	WSTR-2403
Trade Mark:	Avantree
Software Version:	C05_TX_EPP_2021_9_2_V2.1 C05_2021_8_14RX_V1.3
Hardware Version:	MWAC05-TX-REVF MWAC05-RX-REVE
Operation Frequency:	2404MHz~2481MHz
Modulation Type:	GFSK
Transfer Rate:	1Mbps
Number of Channel:	3
Product Type:	☐ Mobile ☐ Portable ☐ Fix Location
Test Software of EUT:	BlueTest3
Antenna Type:	Chip antenna
Antenna Gain:	Ant1: 7.29dBi
	Ant2: 5.19dBi
	Mimo: 9.31dBi
EUT Power Supply:	Li-ion battery: DC 3.7V 600mAh, Charge by DC 5V for adapter

Mimo is the mode in which two antennas transmit simultaneously

When EUT works normally, it is transmitted simultaneously by two antennas



Report No.: CQASZ20220300337E-01

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2404MHz	1	2441MHz	2	2481MHz		

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency	
The lowest channel (CH0)	2404MHz	
The middle channel (CH1)	2441MHz	
The highest channel (CH2)	2481MHz	

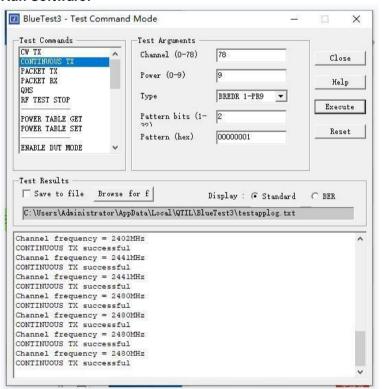


Report No.: CQASZ20220300337E-01

4.3 Additional Instructions

EUT Test Software Settings:						
Mode:	⊠ Special software is used.					
		☐ Through engineering command into the engineering mode. engineering command: *#*#3646633#*#*				
EUT Power level:	Class2 (Power level is built-in set para selected)	Class2 (Power level is built-in set parameters and cannot be changed and selected)				
Use test software to set the lo	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep					
transmitting of the EUT.						
Mode	Mode Channel Frequency(MHz)					
CH0 2404						
GFSK CH1 2441						
	CH2	2481				

Run Software:





Report No.: CQASZ20220300337E-01

4.4 Test Environment

Operating Environment:	Operating Environment:		
Temperature:	24.5°C		
Humidity:	59% RH		
Atmospheric Pressure:	1009mbar		
Test Mode:	Use test software to set the lowest frequency, the middle frequency and the highest frequency keep transmitting of the EUT.		

4.5 Description of Support Units

The EUT has been tested with associated equipment below.

1) Support equipment

Description	Manufacturer	Model No. Certification		Supplied by
1	/	/	, , , , , , , , , , , , , , , , , , , ,	
2) Cable				
Cable No.	Description	Manufacturer	Cable Type/Length	Supplied by
	,		1	,





4.6 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate.

The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities.

The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the **Shenzhen Huaxia Testing Technology Co., Ltd.** guality system acc. to DIN EN ISO/IEC 17025.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CQA laboratory is reported:

No.	Item	Uncertainty
1	Radiated Emission (Below 1GHz)	5.12dB
2	Radiated Emission (Above 1GHz)	4.60dB
3	Conducted Disturbance (0.15~30MHz)	3.34dB
4	Radio Frequency	3×10 ⁻⁸
5	Duty cycle	0.6 %
6	Occupied Bandwidth	1.1%
7	RF conducted power	0.86dB
8	RF power density	0.74
9	Conducted Spurious emissions	0.86dB
10	Temperature test	0.8℃
11	Humidity test	2.0%
12	Supply voltages	0.5 %
13	Frequency Error	5.5 Hz



Report No.: CQASZ20220300337E-01

4.7 Test Location

All tests were performed at:

Shenzhen Huaxia Testing Technology Co., Ltd.

1F., Block A of Tongsheng Technology Building, Huahui Road, Dalang Street, Longhua District, Shenzhen, China

4.8 Test Facility

• A2LA (Certificate No. 4742.01)

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4742.01.

• FCC Registration No.: 522263

Shenzhen Huaxia Testing Technology Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.:522263

4.9 Deviation from Standards

None.

4.10 Other Information Requested by the Customer

None.





4.11Equipment List

Tost Equipment	Manufacturer	Model No.	Instrument No.	Calibration Date	Calibration Due Date
Test Equipment			-		
EMI Test Receiver	R&S	ESR7	CQA-005	2021/9/10	2022/9/9
Spectrum analyzer	R&S	FSU26	CQA-038	2021/9/10	2022/9/9
		AFS4-00010300-18-10P-			
Preamplifier	MITEQ	4	CQA-035	2021/9/10	2022/9/9
		AMF-6D-02001800-29-			
Preamplifier	MITEQ	20P	CQA-036	2021/9/10	2022/9/9
Loop antenna	Schwarzbeck	FMZB1516	CQA-087	2021/9/16	2024/9/15
Bilog Antenna	R&S	HL562	CQA-011	2021/9/16	2024/9/15
Horn Antenna	R&S	HF906	CQA-012	2021/9/16	2024/9/15
Horn Antenna	Schwarzbeck	BBHA 9170	CQA-088	2021/9/16	2024/9/15
Coaxial Cable (Above 1GHz)	CQA	N/A	C019	2021/9/10	2022/9/9
Coaxial Cable (Below 1GHz)	CQA	N/A	C020	2021/9/10	2022/9/9
Antenna Connector	CQA	RFC-01	CQA-080	2021/9/10	2022/9/9
RF cable(9KHz~40GHz)	CQA	RF-01	CQA-079	2021/9/10	2022/9/9
Power divider	MIDWEST	PWD-2533-02-SMA-79	CQA-067	2021/9/10	2022/9/9
EMI Test Receiver	R&S	ESPI3	CQA-013	2021/9/10	2022/9/9
LISN	R&S	ENV216	CQA-003	2021/9/10	2022/9/9
Coaxial cable	CQA	N/A	CQA-C009	2021/9/10	2022/9/9

Note:

The temporary antenna connector is soldered on the pcb board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.



5 Test results and Measurement Data

5.1 Antenna Requirement

Standard requirement: 47 CFR Part 15C Section 15.203 /247(c)

15.203 requirement:

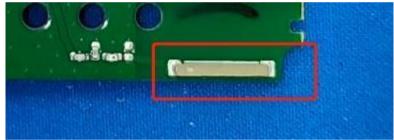
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

15.247(b) (4) requirement:

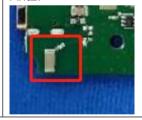
The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

EUT Antenna:





Ant2:



The antenna is Chip antenna. Ant 1: 7.29dBl Ant 2: 5.19dBi Mimo:9.31dBi

Ant1 and Ant2 differ in length

Mimo Antenna Gain: $10 \log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}]$ dBi = 9.31dBi

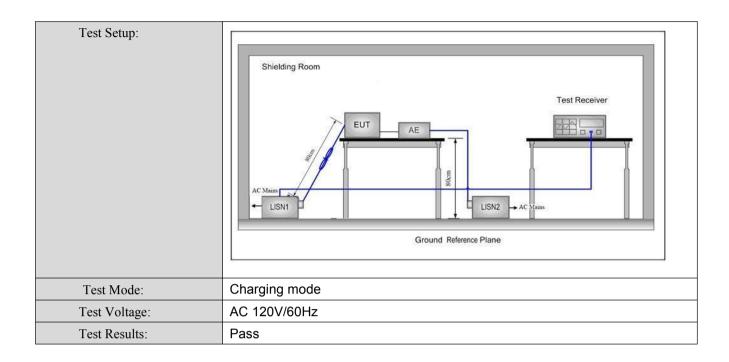


Report No.: CQASZ20220300337E-01

5.2 Conducted Emissions

Test Requirement:	47 CFR Part 15C Section 15.207				
Test Method:	ANSI C63.10: 2013				
Test Frequency Range:	150kHz to 30MHz				
Limit:		Limit (d	Limit (dBuV)		
	Frequency range (MHz)	Quasi-peak	Average		
	0.15-0.5	66 to 56*	56 to 46*		
	0.5-5	56	46		
	5-30	60	50		
	* Decreases with the logarithm o	f the frequency.			
Test Procedure:	The mains terminal disturble room.	bance voltage test was	s conducted in a shielde	ed	
	 The EUT was connected to Impedance Stabilization N impedance. The power cal connected to a second LIS reference plane in the sam measured. A multiple sock power cables to a single L exceeded. The tabletop EUT was place ground reference plane. A placed on the horizontal ground reference plane. A vertical ground reference preference plane. The LISN unit under test and bonded mounted on top of the ground the EUT and associated en the EUT and associated en the EUT and all of the in ANSI C63.10: 2013 on cor 	etwork) which provides oles of all other units of N 2, which was bonder the way as the LISN 1 for et outlet strip was used ISN provided the rating open an anon-metallic and for floor-standing are cound reference plane, the a vertical ground reference plane was bonded to the 1 was placed 0.8 m from the vertical ground reference und reference plane. The fof the LISN 1 and the quipment was at least 0 the country of the LISN 1 and the quipment was at least 0 the country of the country	a 50Ω/50μH + 5Ω linear in the EUT were do to the ground for the unit being do to connect multiple of the LISN was not do table 0.8m above the rangement, the EUT was derence plane. The rear do reference plane. The endizontal ground form the boundary of the plane for LISNs his distance was EUT. All other units of 0.8 m from the LISN 2. The positions of	as	

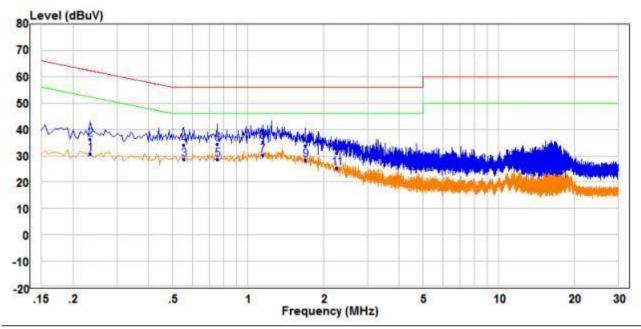






Measurement Data

Live line:



	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark	Pol/Phase
-	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.235	21.23	9.56	30.79	52.27	-21.48	Average	Line
2	0.235	26.62	9.56	36.18	62.27	-26.09	QP	Line
3	0.555	19.01	9.76	28.77	46.00	-17.23	Average	Line
3 4 5	0.555	24.29	9.76	34.05	56.00	-21.95	QP	Line
5	0.755	18.81	9.86	28.67	46.00	-17.33	Average	Line
6	0.755	24.45	9.86	34.31	56.00	-21.69	QP	Line
7 PP	1.145	19.96	10.08	30.04	46.00	-15.96	Average	Line
8 QP	1.145	25.39	10.08	35.47	56.00	-20.53	QP	Line
9	1.695	17.18	11.18	28.36	46.00	-17.64	Average	Line
10	1.695	22.60	11.18	33.78	56.00	-22.22	QP	Line
11	2.265	13.99	11.38	25.37	46.00	-20.63	Average	Line
12	2.265	19.70	11.38	31.08	56.00	-24.92	QP	Line

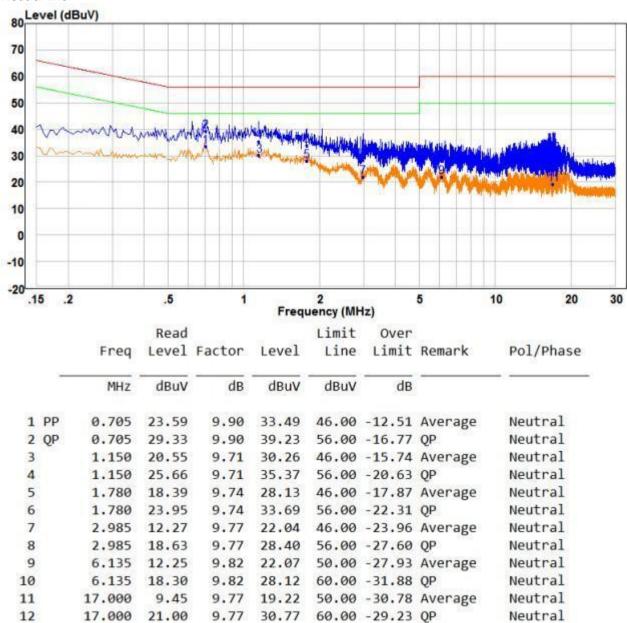
Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level =Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.









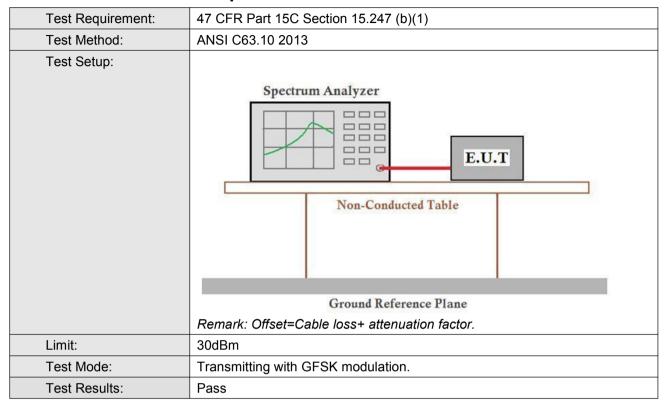
Remark:

- 1. The following Quasi-Peak and Average measurements were performed on the EUT:
- 2. Final Test Level = Receiver Reading + LISN Factor + Cable Loss.
- 3. If the Peak value under Average limit, the Average value is not recorded in the report.





5.3 Conducted Peak Output Power



Measurement Data

Ant1

GFSK mode (1Mbps)					
Test channel Peak Outp		AV Power (dBm)	Limit (dBm)	Result	
Lowest	9.07	6.32	28.71	Pass	
Middle	8.93	5.89	28.71	Pass	
Highest	5.35	3.42	28.71	Pass	

Ant2:

GFSK mode (1Mbps)						
Test channel	Peak Output Power (dBm)	·		Result		
Lowest	-29.64	-26.61	30.00	Pass		
Middle	-29.67	-29.67 -26	-26.63	30.00	Pass	
Highest	-30.65	-27.52	30.00	Pass		

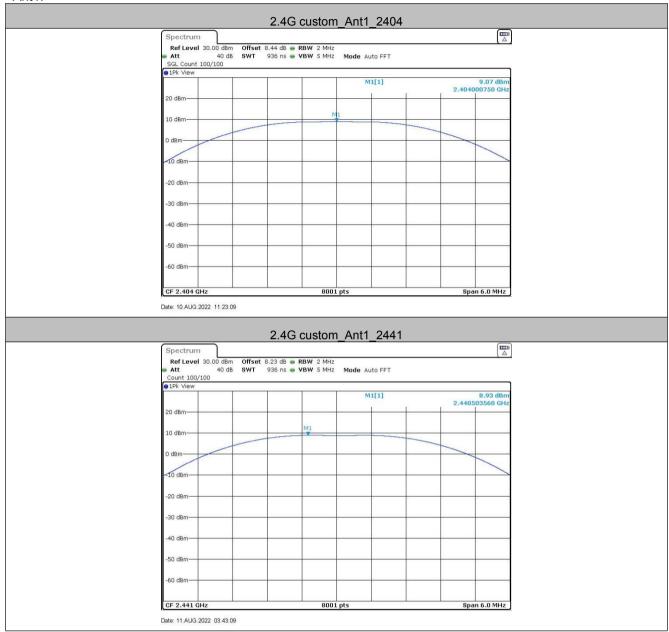
Mimo:

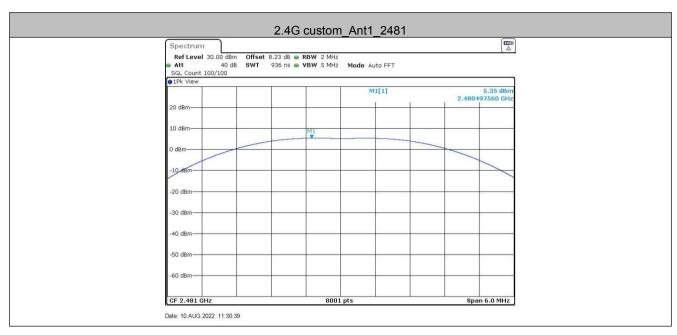
GFSK mode (1Mbps)						
Test channel	Peak Output Power (dBm)	AV Power (dBm)	Limit (dBm)	Result		
Lowest	9.07	6.32	26.69	Pass		
Middle	8.93	5.89	26.69	Pass		
Highest	5.35	3.42	26.69	Pass		

Mimo power calculation formula:10*LOG[10^(ANT1/10)+10^(ANT2/10)]

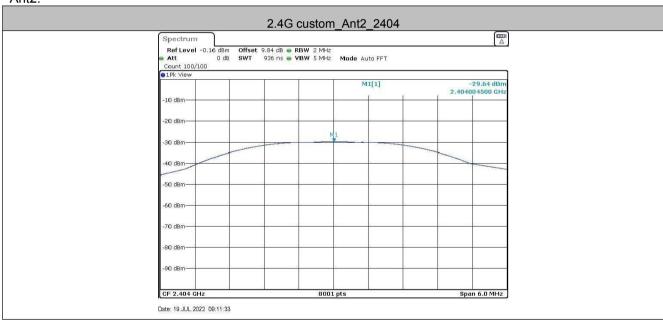










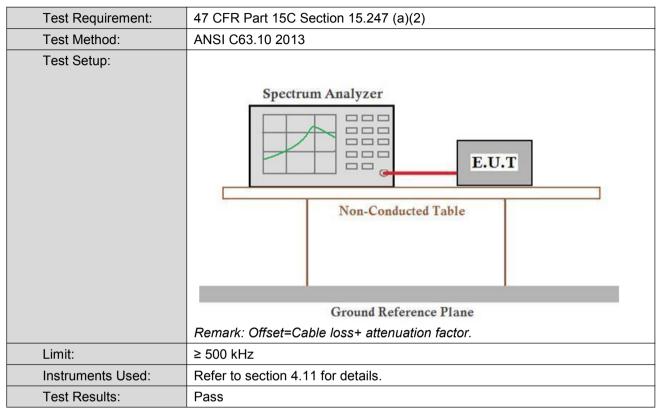








5.4 6dB Occupy Bandwidth



Measurement Data

Ant1:

GFSK mode (1Mbps)						
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result			
Lowest	1.240	≥500	Pass			
Middle	0.892	≥500	Pass			
Highest	1.120	≥500	Pass			

Ant2:

GFSK mode (1Mbps)						
Test channel	6dB Occupy Bandwidth (MHz)	Limit (kHz)	Result			
Lowest	1.212	≥500	Pass			
Middle	1.180	≥500	Pass			
Highest	1.144	≥500	Pass			



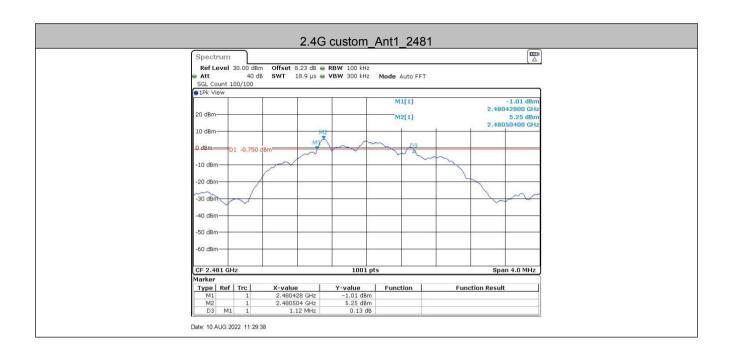
Report No.: CQASZ20220300337E-01

Ant1:

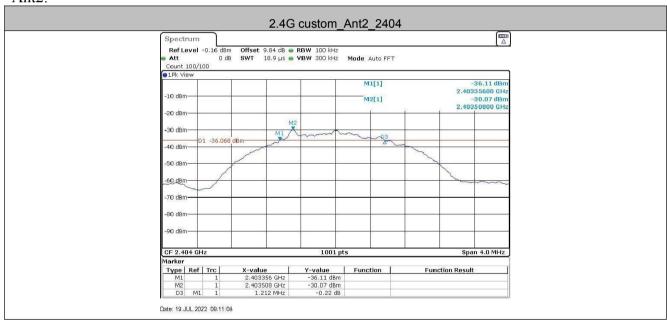




Report No.: CQASZ20220300337E-01



Ant2:

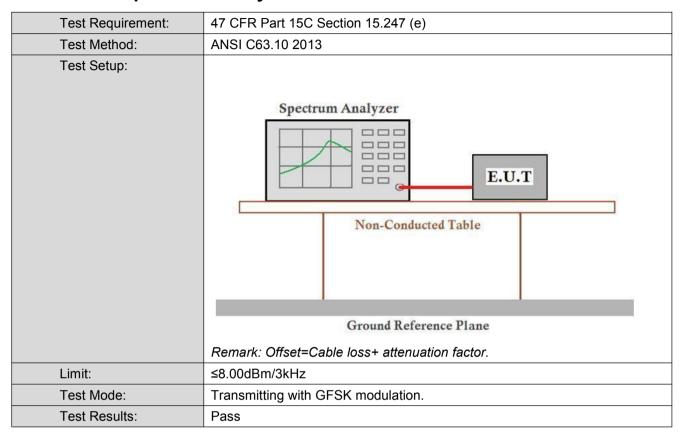








5.5 Power Spectral Density



Measurement Data

Ant1:

GFSK mode (1Mbps)						
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result			
Lowest	3.95	≤6.71	Pass			
Middle	3.04	≤6.71	Pass			
Highest	2.18	≤6.71	Pass			

Ant2:

GFSK mode (1Mbps)						
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result			
Lowest	-35.96	≤8.00	Pass			
Middle	-33.69	≤8.00	Pass			
Highest	-36.25	≤8.00	Pass			

Mimo:

GFSK mode (1Mbps)						
Test channel	Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)	Result			
Lowest	3.95	≤4.69	Pass			
Middle	3.04	≤4.69	Pass			
Highest	2.18	≤4.69	Pass			

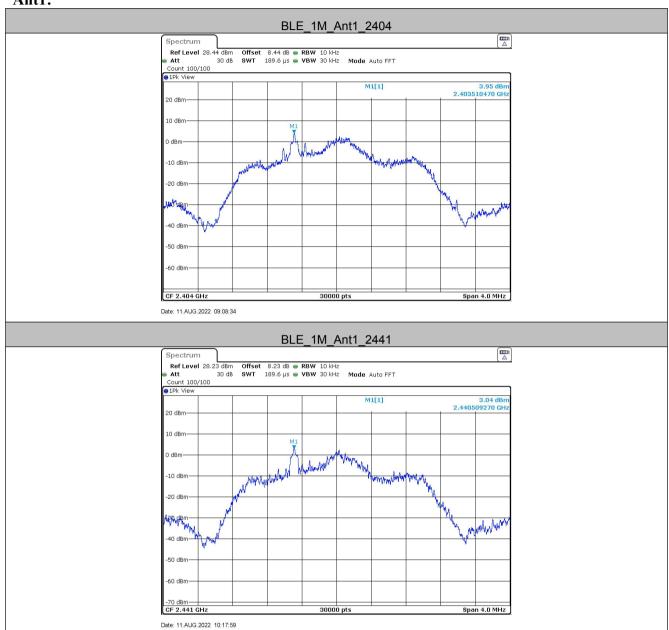
Mimo power calculation formula:10*LOG[10^(ANT1/10)+10^(ANT2/10)]



Report No.: CQASZ20220300337E-01

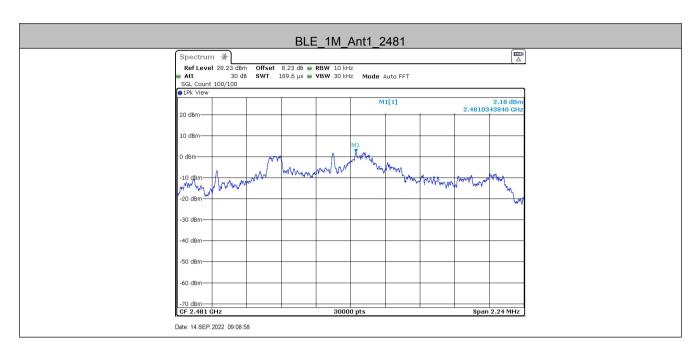
Test plot as follows:

Ant1:

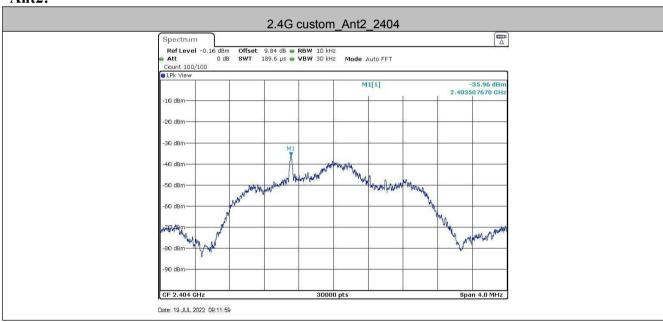




Report No.: CQASZ20220300337E-01



Ant2:



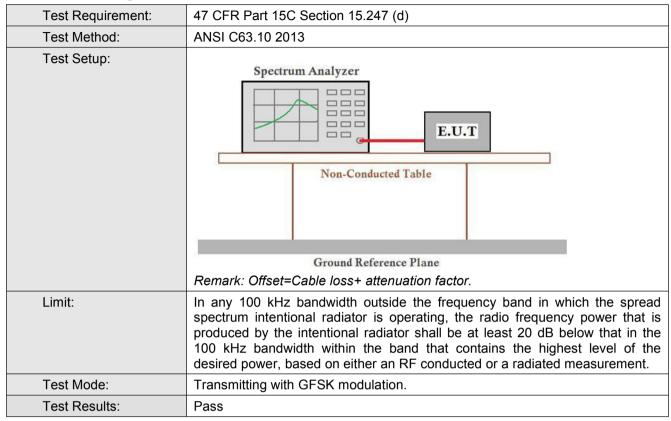






Report No.: CQASZ20220300337E-01

5.6 Band-edge for RF Conducted Emissions



TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
2.4G	Ant1	Low	2404	8.88	-36.29	≤-11.12	PASS
custom		High	2481	8.95	-29.98	≤-11.05	PASS

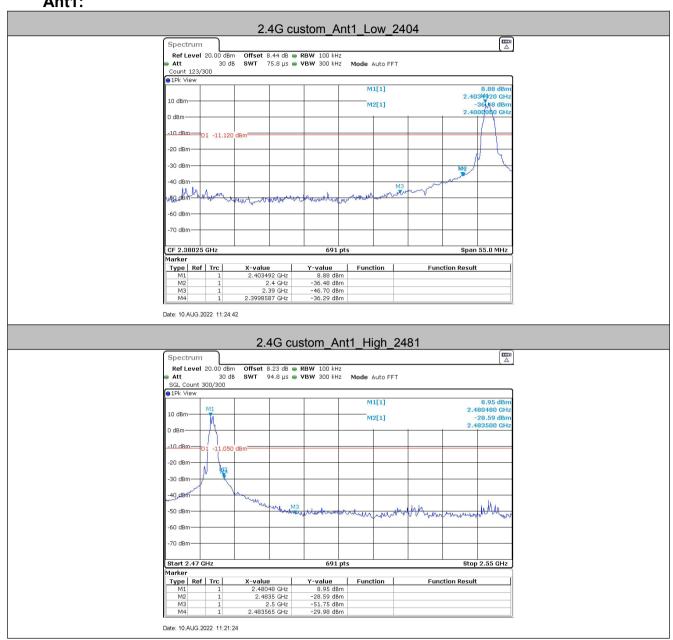
TestMode	Antenna	ChName	Channel	RefLevel[dBm]	Result[dBm]	Limit[dBm]	Verdict
2.4G		Low	2404	-29.98	-72.95	≤-49.98	PASS
custom	Ant2	High	2481	-31.03	-69.94	≤-51.03	PASS



Report No.: CQASZ20220300337E-01

Test plot as follows:

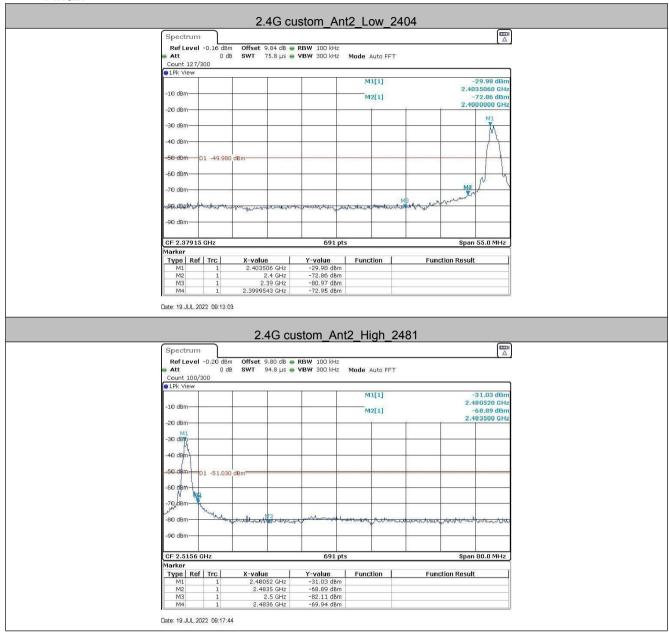
Ant1:





Report No.: CQASZ20220300337E-01

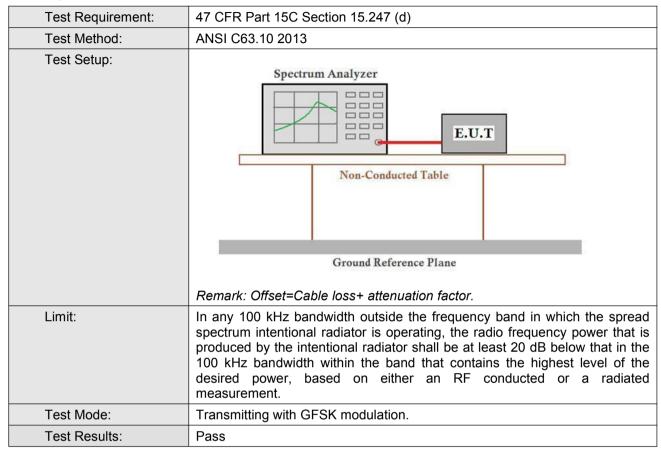
Ant2:







5.7 Spurious RF Conducted Emissions

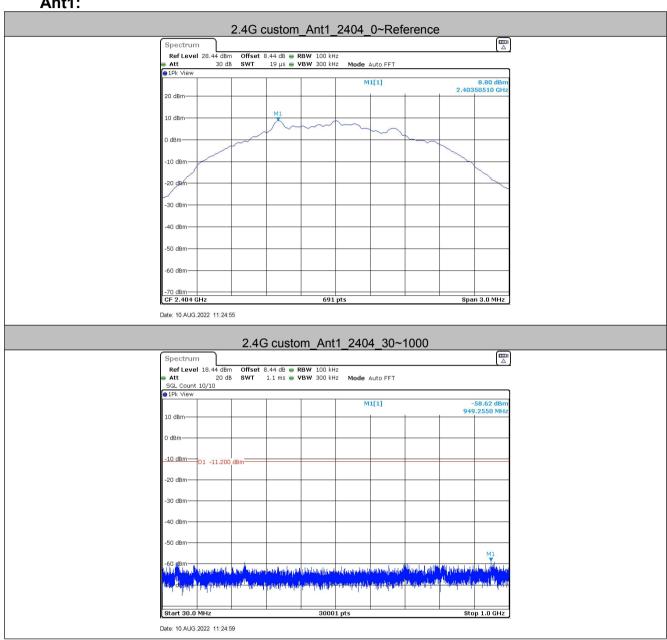




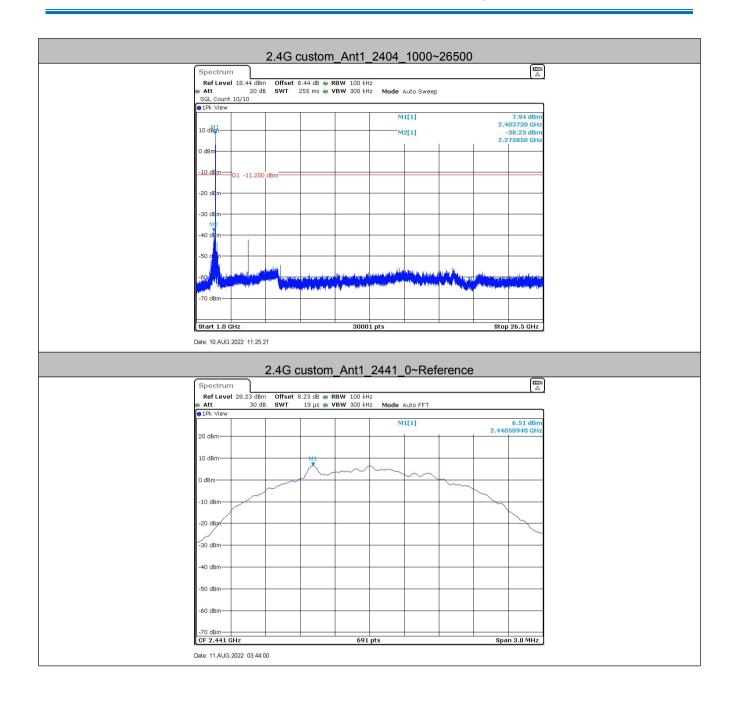
Report No.: CQASZ20220300337E-01

Test plot as follows:

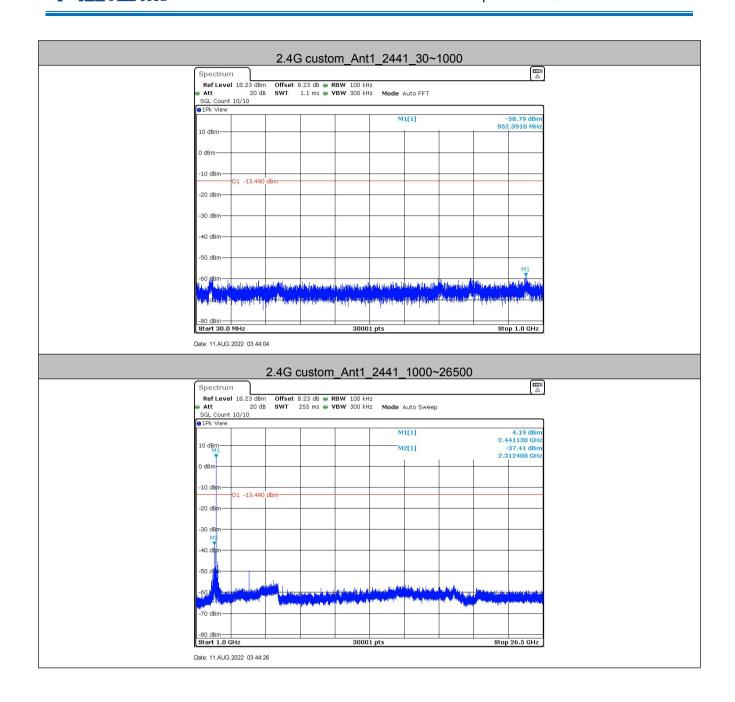
Ant1:



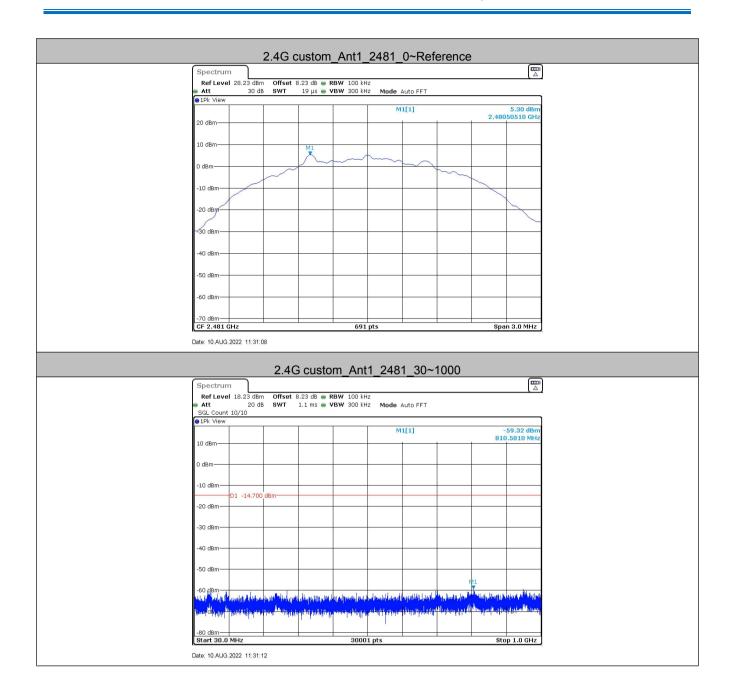






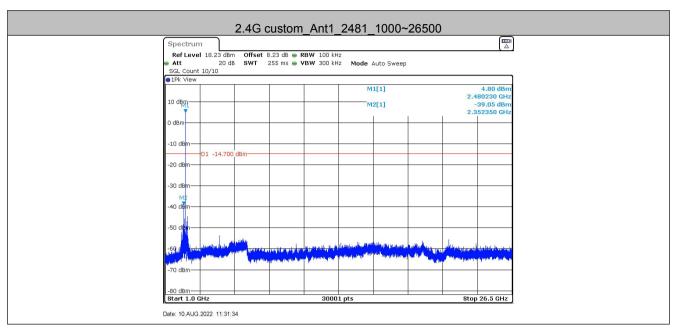








Report No.: CQASZ20220300337E-01



Ant2:

