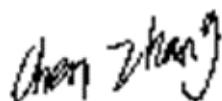


TEST REPORT

Product Name: Stalker Gaming Headset
FCC ID: 2A3UU-GS401
Trademark: SOMiC
Model Number: GS401 2.4G Version
Prepared For: Guangdong Shuoqiang Electronics Co., Ltd
Address: No. 9 Lianxin Road, Shangjiao Community Chang'an Town, Dongguan City Guangdong Province, China
Manufacturer: Guangdong Shuoqiang Electronics Co., Ltd.
Address: No. 9 Lianxin Road, Shangjiao Community Chang'an Town, Dongguan City Guangdong Province, China
Prepared By: Shenzhen CTB Testing Technology Co., Ltd.
Address: Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Community, Xinqiao Street, Baoan District, Shenzhen, Guangdong China
Sample Received Date: Apr. 7, 2022
Sample tested Date: Apr. 7, 2022 to Apr. 21, 2022
Issue Date: Apr. 21, 2022
Report No.: CTB220420036RF
Test Standards: FCC Part15.249
ANSI C63.10:2013
Test Results: PASS
Remark: This is 2.4GHz radio test report.

Compiled by:

Chen Zheng

Reviewed by:

Arron Liu

Approved by:

Bin Mei / Director

The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client.

TABLE OF CONTENT

Test Report Declaration		Page
1. VERSION	3	
2. TEST SUMMARY	4	
3. MEASUREMENT UNCERTAINTY	5	
4. PRODUCT INFORMATION AND TEST SETUP	6	
4.1 Product Information	6	
4.2 Test Setup Configuration	6	
4.3 Support Equipment	6	
4.4 Channel List	7	
4.5 Test Mode	7	
4.6 Test Environment	7	
5. TEST FACILITY AND TEST INSTRUMENT USED	8	
5.1 Test Facility	8	
5.2 Test Instrument Used	8	
6. AC POWER LINE CONDUCTED EMISSION	11	
6.1 Block Diagram Of Test Setup	11	
6.2 Limit	11	
6.3 Test procedure	11	
6.4 Test Result	13	
7. RADIATED SPURIOUS EMISSION	15	
7.1 Block Diagram Of Test Setup	15	
7.2 Limit	15	
7.3 Test procedure	16	
7.4 Test Result	17	
8. BAND EDGE AND RF COUNDUCTED SPURIOUS EMISSIONS	22	
8.1 Block Diagram Of Test Setup	22	
8.2 Limit	22	
8.3 Test procedure	23	
8.4 Test Result	24	
9. BANDWIDTH TEST	25	
9.1 Block Diagram Of Test Setup	25	
9.2 Limit	25	
9.3 Test procedure	25	
9.4 Test Result	25	
10. ANTENNA REQUIREMENT	27	
11. EUT TEST SETUP PHOTOGRAPHS	28	

(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB220420036RF	Apr. 21, 2022	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.215	20dB Bandwidth	PASS	
15.249	Fundamental & Radiated Spurious Emission Measurement	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

Remark:

Test according to ANSI C63.4-2014 & ANSI C63.10-2013.

3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m chamber Radiated spurious emission(9KHz-30MHz)	4.8dB
3m chamber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63°C
frequency	1×10-7
Conducted Emission (150KHz-30MHz)	3.2 dB
Radiated Emission(30MHz ~ 1000MHz)	4.8 dB
Radiated Emission(1GHz ~6GHz)	4.9 dB

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s): GS401 2.4G Version

Model Description: N/A

Hardware Version: V1.0

Software Version: V1.0

Operation Frequency: 2406-2478MHz

Type of Modulation: GFSK

Antenna installation: PCB antenna

Antenna Gain: 1dBi

Ratings: DC 5V charging from adapter

Battery DC 3.7V

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

Item	Equipment	Mfr/Brand	Model/Type	Series	Note
1	AC adapter	SHENZHEN ENGINE ELECTRONIC CO.,LTD	EE-050100 0E	N/A	AE

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Channel List

CH No.	Frequency (MHz)						
0	2406	1	2409	2	2412	3	2415
4	2418	5	2424	6	2427	7	2430
8	2433	9	2436	10	2439	11	2442
12	2445	13	2448	14	2451	15	2457
16	2460	17	2463	18	2466	19	2469
20	2472	21	2475	22	2478		

4.5 Test Mode

All test mode(s) and condition(s) mentioned were considered and evaluated respectively by performing full tests, the worst data were recorded and reported.

Test mode	Low channel	Middle channel	High channel
Transmitting GFSK	2406MHz	2439MHz	2478MHz

4.6 Test Environment

Humidity(%):	55
Atmospheric Pressure(kPa):	101.1
Normal Voltage(DC):	3.7V
Normal Temperature(°C)	25
Low Temperature(°C)	0
High Temperature(°C)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

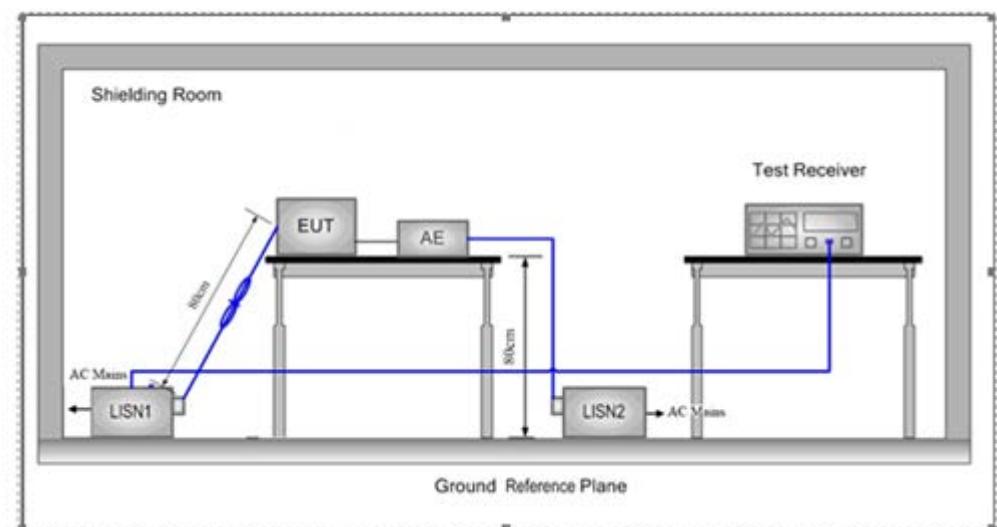
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated date	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2021.09.27	2022.08.05
2	Power Sensor	Agilent	U2021XA	MY56120032	2021.09.27	2022.08.05
3	Power Sensor	Agilent	U2021XA	MY56120034	2021.09.27	2022.08.05
4	Communication test set	R&S	CMW500	108058	2021.09.27	2022.08.05
5	Spectrum Analyzer	R&S	FSP40	100550	2021.09.27	2022.08.05
6	Signal Generator	Agilent	N5181A	MY49060920	2021.09.27	2022.08.16
7	Signal Generator	Agilent	N5182A	MY47420195	2021.09.27	2022.08.05
8	Communication test set	Agilent	E5515C	MY50102567	2021.09.27	2022.08.16
9	band rejection filter	Shenxiang	MSF2400-248 3.5MS-1154	20181015001	2021.09.27	2022.08.05
10	band rejection filter	Shenxiang	MSF5150-585 0MS-1155	20181015001	2021.09.27	2022.08.05
11	band rejection filter	Xingbo	XBLBQ-DZA1 20	190821-1-1	2021.09.27	2022.08.05
12	BT&WI-FI Automatic test software	Microwave	MTS8310	Ver. 2.0.0.0	2021.09.27	2022.08.05
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2021.09.27	2022.08.05
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2021.09.27	2022.08.05
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	2021.09.27	2022.08.05
16	966 chamber	C.R.T.	966 Room	966	2021.09.27	2024.08.11
17	Receiver	R&S	ESPI	100362	2021.09.27	2022.08.05
18	Amplifier	HP	8447E	2945A02747	2021.09.27	2022.08.05

19	Amplifier	Agilent	8449B	3008A01838	2021.09.27	2022.08.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	869	2021.09.27	2022.08.07
21	Horn Antenna	Schwarzbeck	BBHA9120D	1911	2021.09.27	2022.08.08
22	Software	Fala	EZ-EMC	FA-03A2 RE	2021.09.27	2022.08.05
23	3-Loop Antenna	Daze	ZN30401	17014	2021.09.27	2022.08.05
24	loop antenna	ZHINAN	ZN30900A	/	2021.09.27	2022.08.05
25	Horn antenna	A/H/System	SAS-574	588	2021.09.27	2022.08.05
26	Amplifier	AEROFLEX	/	S/N/ 097	2021.09.27	2022.08.05

Radiated emission						
No.	Equipment	Manufacturer	Model No.	Serial No.	Calibrated date	Calibrated until
1	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	1911	2021.09.27	2022.08.08
2	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	869	2021.09.27	2022.08.05
3	Amplifier	Agilent	8449B	3008A01838	2021.09.27	2022.08.05
4	Amplifier	HP	8447E	2945A02747	2021.09.27	2022.08.05
5	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESPI7	100362	2021.09.27	2022.08.05
6	Coaxial cable	ETS	RFC-SNS-100-NMS-80 NI	/	2021.09.27	2022.08.05
7	Coaxial cable	ETS	RFC-SNS-100-NMS-20 NI	/	2021.09.27	2022.08.05
8	Coaxial cable	ETS	RFC-SNS-100-SMS-20 NI	/	2021.09.27	2022.08.05
9	Coaxial cable	ETS	RFC-NNS-100-NMS-300 NI	/	2021.09.27	2022.08.05
10	Communication test set	Agilent	E5515C	MY50102567	2021.09.27	2022.08.16
11	Communication test set	R&S	CMW500	108058	2021.09.27	2022.08.05
12	EZ-EMC	Frad	EMC-con3A1.1	/	/	/

6. AC POWER LINE CONDUCTED EMISSION

6.1 Block Diagram Of Test Setup



6.2 Limit

Table 4 – AC power-line conducted emissions limits

Frequency (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 ^{Note 1}	56 to 46 ^{Note 1}
0.5 - 5	56	46
5 - 30	60	50

Note 1: The level decreases linearly with the logarithm of the frequency.

* Decreasing linearly with the logarithm of the frequency

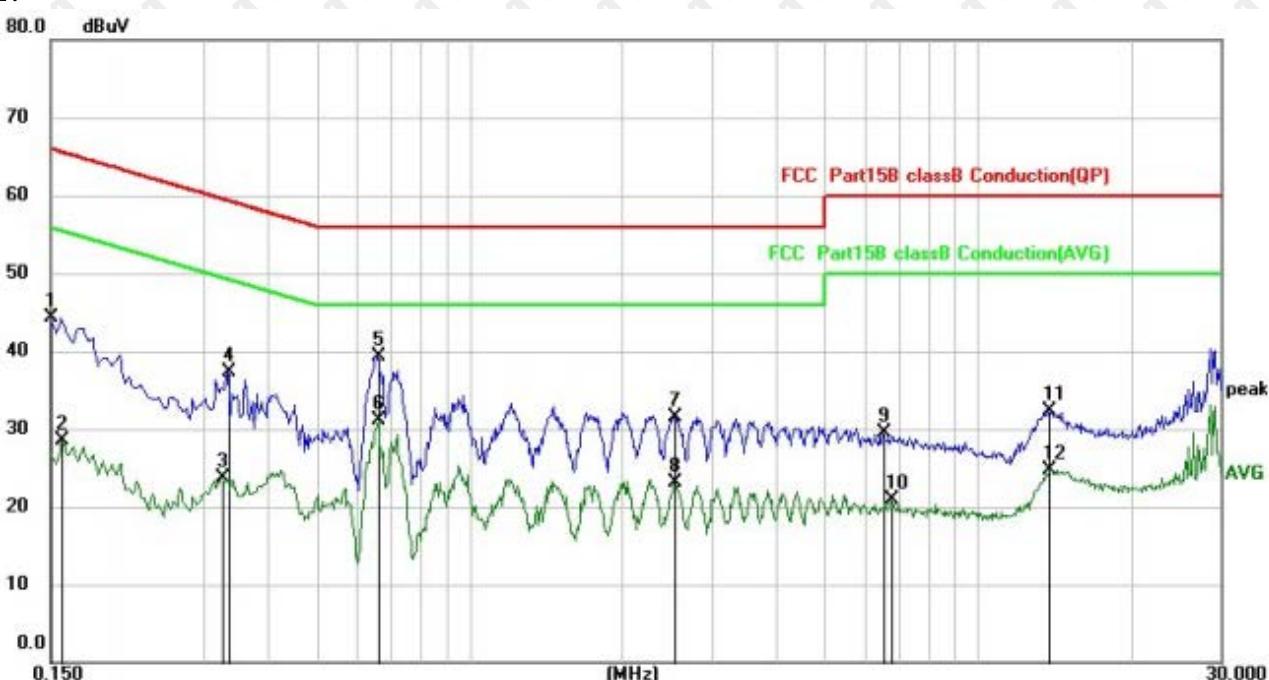
6.3 Test procedure

- 1) The mains terminal disturbance voltage test was conducted in a shielded room.
- 2) The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
- 3) The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane,

- 4) The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.
- 5) In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10 on conducted measurement.
- 6) All modes were tested at AC 120V and 240V, only the worst result of AC 120V 60Hz was reported.
- 7) If a EUT received DC power from the USB Port of Notebook PC, the PC's adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.

6.4 Test Result

L:

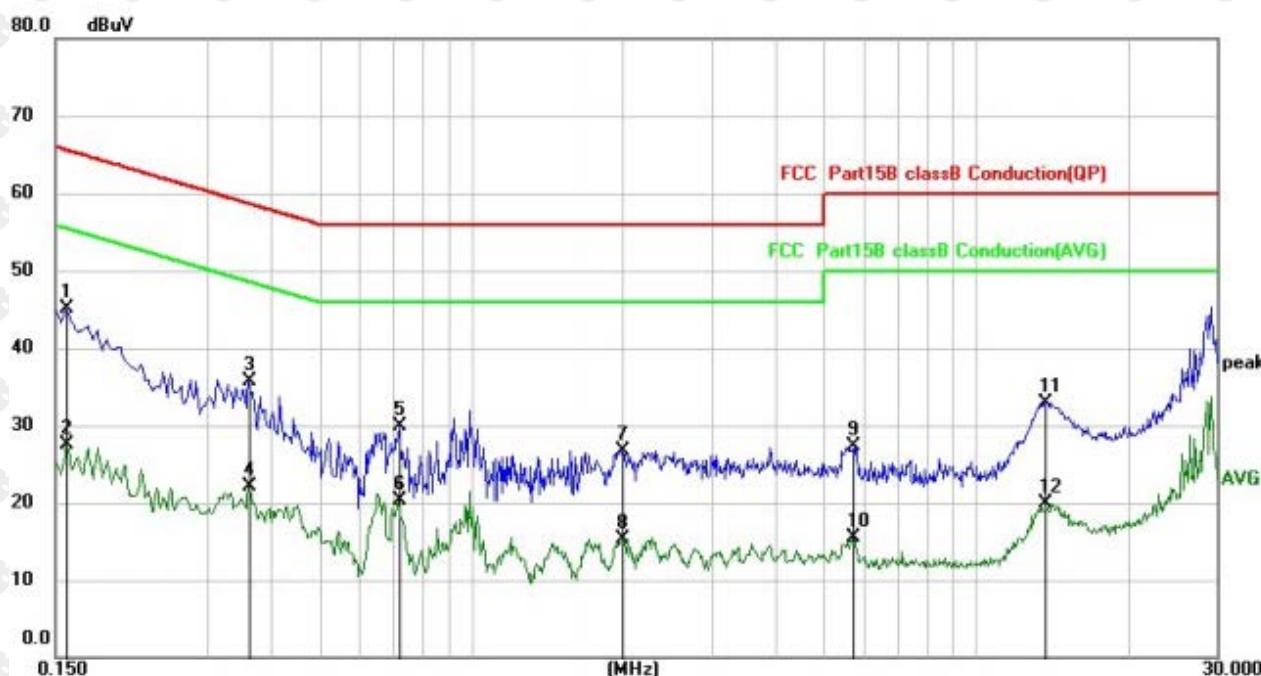


No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1	0.1500	33.54	10.72	44.26	66.00	-21.74	QP	
2	0.1580	17.81	10.72	28.53	55.57	-27.04	AVG	
3	0.3260	12.99	10.62	23.61	49.55	-25.94	AVG	
4	0.3339	26.72	10.61	37.33	59.35	-22.02	QP	
5	0.6580	28.77	10.55	39.32	56.00	-16.68	QP	
6 *	0.6620	20.48	10.55	31.03	46.00	-14.97	AVG	
7	2.5340	20.84	10.63	31.47	56.00	-24.53	QP	
8	2.5340	12.48	10.63	23.11	46.00	-22.89	AVG	
9	6.5020	18.72	10.70	29.42	60.00	-30.58	QP	
10	6.7380	10.25	10.71	20.96	50.00	-29.04	AVG	
11	13.8340	21.42	10.89	32.31	60.00	-27.69	QP	
12	13.8340	13.79	10.89	24.68	50.00	-25.32	AVG	

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

N:



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Detector
			Level	Factor	ment			
		MHz	dBuV	dB	dBuV	dBuV	dB	
1	*	0.1580	34.46	10.72	45.18	65.57	-20.39	QP
2		0.1580	16.88	10.72	27.60	55.57	-27.97	AVG
3		0.3620	25.08	10.60	35.68	58.68	-23.00	QP
4		0.3620	11.50	10.60	22.10	48.68	-26.58	AVG
5		0.7180	19.41	10.56	29.97	56.00	-26.03	QP
6		0.7180	9.74	10.56	20.30	46.00	-25.70	AVG
7		1.9860	16.07	10.63	26.70	56.00	-29.30	QP
8		1.9860	4.62	10.63	15.25	46.00	-30.75	AVG
9		5.6940	16.72	10.67	27.39	60.00	-32.61	QP
10		5.6940	4.81	10.67	15.48	50.00	-34.52	AVG
11		13.6620	21.99	10.88	32.87	60.00	-27.13	QP
12		13.6620	9.03	10.88	19.91	50.00	-30.09	AVG

Remark:

Factor = Cable loss + LISN factor, Margin = Measurement – Limit

7. RADIATED SPURIOUS EMISSION

7.1 Block Diagram Of Test Setup

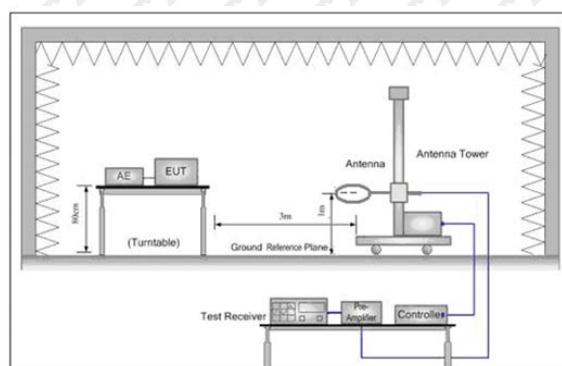


Figure 1. Below 30MHz

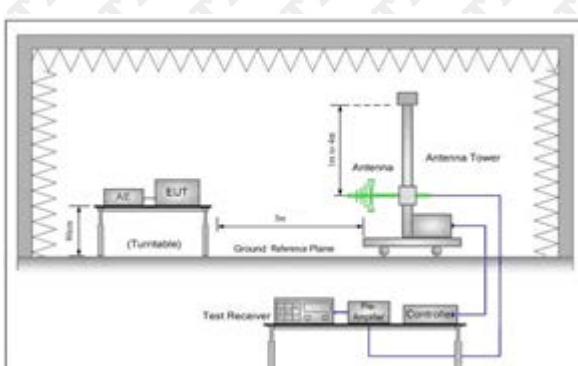
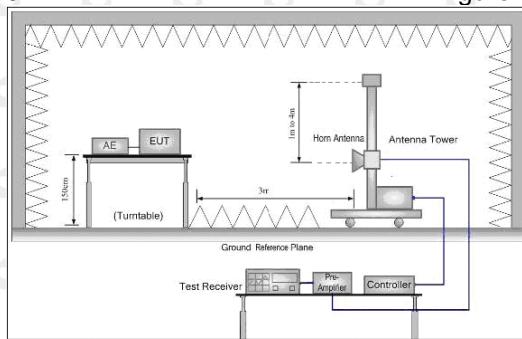


Figure 2. 30MHz to 1GHz



7.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	-	300
0.490MHz-1.705MHz	24000/F (kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

7.3 Test procedure

Below 1GHz test procedure as below:

- a.The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b.The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c.The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d.For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e.The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f.If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Above 1GHz test procedure as below:

- g.Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 meter to 1.5 meter(Above 18GHz the distance is 1 meter and table is 1.5 meter).
- h.Test the EUT in the lowest channel ,the middle channel ,the Highest channel
- j.Repeat above procedures until all frequencies measured was complete.
- j. Full battery is used during test

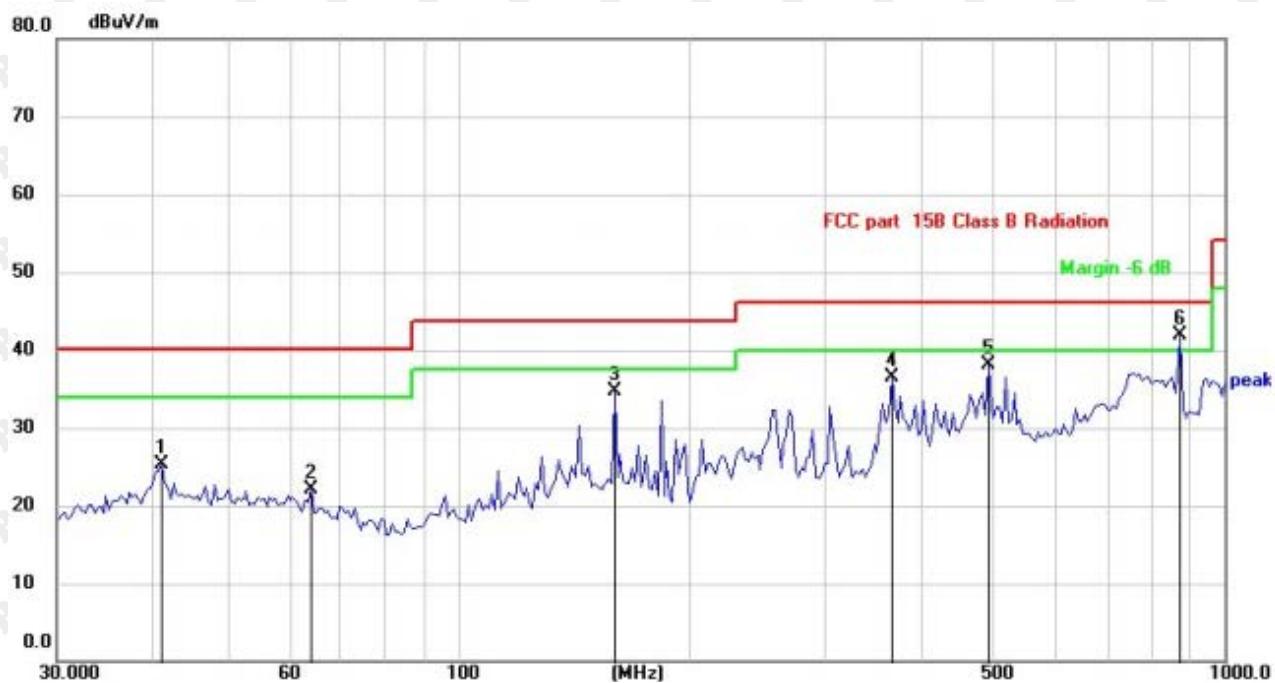
Receiver set:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-0.090MHz	Peak	10kHz	30KHz	Peak
0.009MHz-0.090MHz	Average	10kHz	30KHz	Average
0.090MHz-0.110MHz	Quasi-peak	10kHz	30KHz	Quasi-peak
0.110MHz-0.490MHz	Peak	10kHz	30KHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30KHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120 kHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

7.4 Test Result

Below 1GHz Test Results:

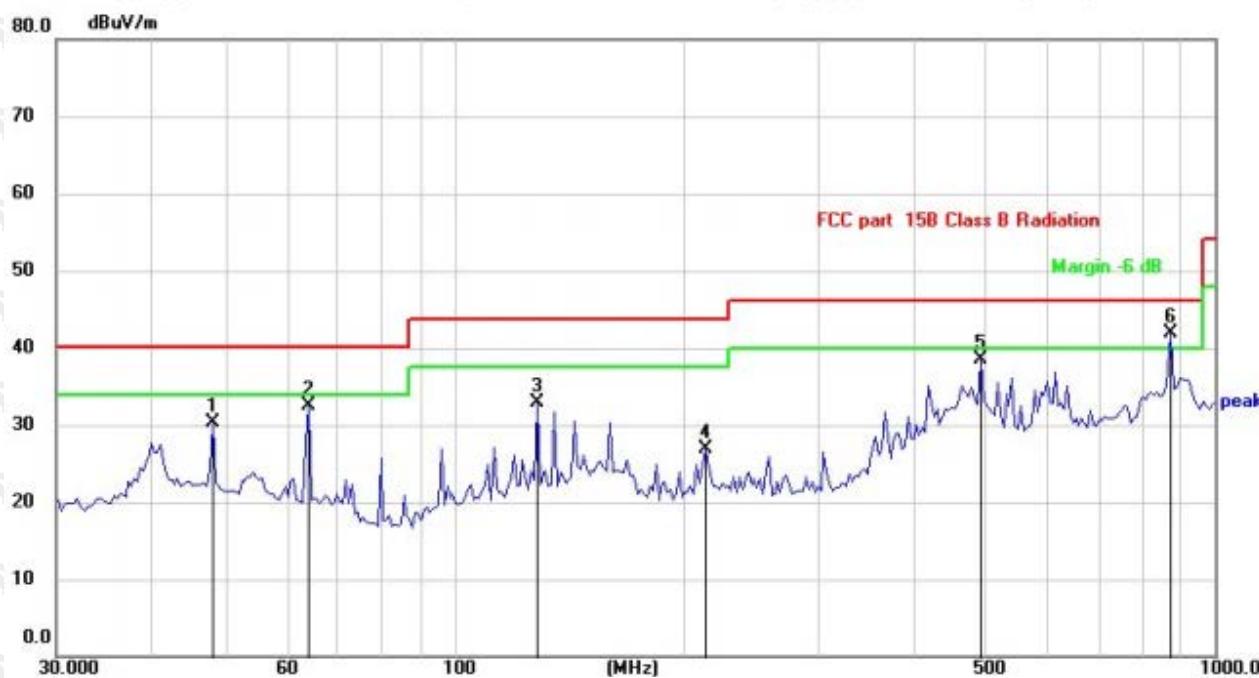
Antenna polarity: H



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Over	
			Level					
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		41.1319	30.64	-5.31	25.33	40.00	-14.67	QP
2		64.3200	28.97	-6.93	22.04	40.00	-17.96	QP
3		160.0646	40.25	-5.57	34.68	43.50	-8.82	QP
4		368.1116	39.38	-2.81	36.57	46.00	-9.43	QP
5		491.6057	37.50	0.51	38.01	46.00	-7.99	QP
6	*	876.7827	35.66	6.17	41.83	46.00	-4.17	QP

Remark: Factor = Cable loss + Antenna factor - Pre-amplifier; Margin = Measurement – Limit

Antenna polarity: V



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dB/m	dB	Detector
1		48.1625	35.82	-5.57	30.25	40.00	-9.75	QP
2		64.3200	39.38	-6.93	32.45	40.00	-7.55	QP
3		128.5629	39.25	-6.26	32.99	43.50	-10.51	QP
4		213.7633	34.06	-7.18	26.88	43.50	-16.62	QP
5		491.6057	38.08	0.51	38.59	46.00	-7.41	QP
6	*	876.7827	35.68	6.17	41.85	46.00	-4.15	QP

Remark: Factor = Cable lose + Antenna factor - Pre-amplifier; Margin = Measurement – Limit

CH Low (2406MHz)
Horizontal:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2406	108.31	-5.84	102.47	114	-11.53	peak
2406	93.28	-5.84	87.44	94	-6.56	AVG
4812	59.07	-3.64	55.43	74	-18.57	peak
4812	49.89	-3.64	46.25	54	-7.75	AVG
7218	59.92	-0.95	58.97	74	-15.03	peak
7218	48.55	-0.95	47.60	54	-6.40	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2406	108.88	-5.84	103.04	114	-10.96	peak
2406	94.84	-5.84	89.00	94	-5.00	AVG
4812	57.23	-3.64	53.59	74	-20.41	peak
4812	48.95	-3.64	45.31	54	-8.69	AVG
7218	58.74	-0.95	57.79	74	-16.21	peak
7218	48.06	-0.95	47.11	54	-6.89	AVG

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

CH Middle (2439MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2439	106.95	-5.71	101.24	114	-12.76	
2439	92.16	-5.71	86.45	94	-7.55	AVG
4878	55.46	-3.51	51.95	74	-22.05	peak
4878	45.19	-3.51	41.68	54	-12.32	AVG
7317	56.74	-0.82	55.92	74	-18.08	peak
7317	46.77	-0.82	45.95	54	-8.05	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2439	106.23	-5.71	100.52	114	-13.48	
2439	91.30	-5.71	85.59	94	-8.41	AVG
4878	54.47	-3.51	50.96	74	-23.04	peak
4878	45.88	-3.51	42.37	54	-11.63	AVG
7317	56.33	-0.82	55.51	74	-18.49	peak
7317	46.78	-0.82	45.96	54	-8.04	AVG

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

CH High (2478MHz)

Horizontal:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2478	106.34	-5.65	100.69	114	-13.31	peak
2478	93.16	-5.65	87.51	94	-6.49	AVG
4956	54.60	-3.43	51.17	74	-22.83	peak
4956	45.59	-3.43	42.16	54	-11.84	AVG
7434	55.43	-0.75	54.68	74	-19.32	peak
7434	47.41	-0.75	46.66	54	-7.34	AVG

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

Vertical:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type
2478	107.08	-5.65	101.43	114	-12.57	peak
2478	91.54	-5.65	85.89	94	-8.11	AVG
4956	54.99	-3.43	51.56	74	-22.44	peak
4956	46.87	-3.43	43.44	54	-10.56	AVG
7434	56.62	-0.75	55.87	74	-18.13	peak
7434	47.21	-0.75	46.46	54	-7.54	AVG

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

Remark:

- (1) Measuring frequencies from 9KHz to the 25 GHz.
- (2). All modes of GFSK were test at Low, Middle, and High channel, only the worst result of GFSK Low Channel was reported for below 1GHz test.
- (3). For BT above 1GHz test all modes of GFSK were test at Low, Middle, and High channel, only the worst result of GFSK Low Channel was reported.
- (4). By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that "Z axis" position was the worst, and test data recorded in this report.
- (5). Radiated emission test from 9kHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9kHz to 30MHz and not recorded in this report.

8. BAND EDGE AND RF CONDUCTED SPURIOUS EMISSIONS

8.1 Block Diagram Of Test Setup

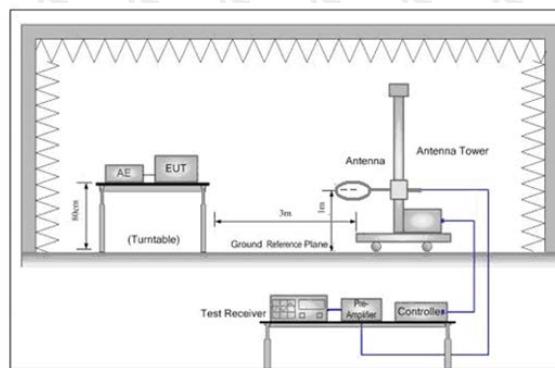


Figure 1. Below 30MHz

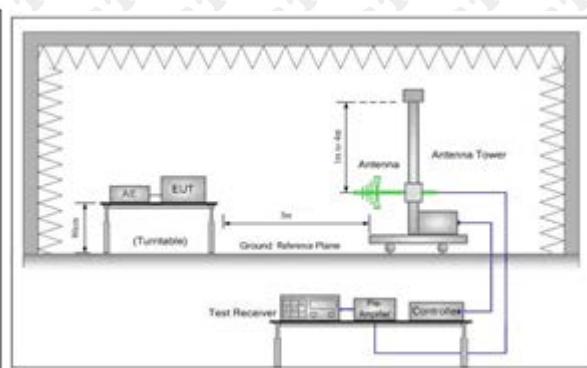
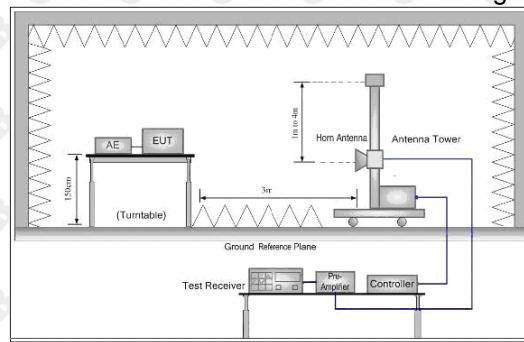


Figure 2. 30MHz to 1GHz



8.2 Limit

Spurious Emissions:

Frequency	Field strength (microvolt/meter)	Limit (dB μ V/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F (kHz)	-	-	300
0.490MHz-1.705MHz	24000/F (kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

8.3 Test procedure

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Frequency	Detector	RBW	VBW	Remark
2310MHz-2400MHz	peak	1MHz	3MHz	peak
2483.5MHz-2500MHz	peak	1MHz	3MHz	peak

8.4 Test Result

CH Low:

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2309.75	27.01	-4.34	22.67	54	-31.33	peak
2	2343.77	27.53	-4.51	23.02	54	-30.98	peak
3	2377.67	26.44	-4.28	22.16	54	-31.84	peak
4	2389.52	27.36	-4.18	23.18	54	-30.82	peak
5	2400.00	27.08	-3.92	23.16	54	-30.84	peak

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2310.06	28.41	-4.09	24.32	54	-29.68	peak
2	2344.29	27.97	-4.49	23.49	54	-30.51	peak
3	2378.31	28.50	-4.77	23.73	54	-30.27	peak
4	2390.48	27.76	-4.91	22.85	54	-31.15	peak
5	2400.00	27.86	-3.69	31.55	54	-22.45	peak

CH High:

Horizontal:

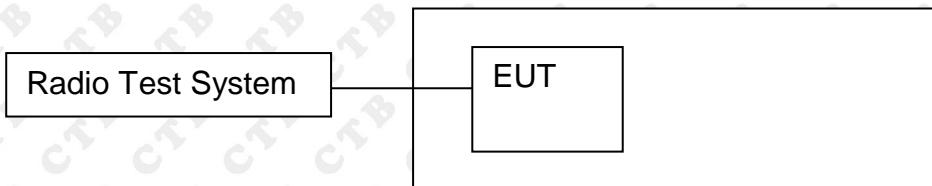
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.53	28.48	-4.16	24.32	54	-29.68	peak
2	2488.53	29.01	-4.27	24.74	54	-29.26	peak
3	2490.09	29.75	-4.07	25.68	54	-28.32	peak
4	2495.56	29.32	-3.99	25.34	54	-28.66	peak

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.67	28.74	-4.22	24.52	54	-29.48	peak
2	2488.80	28.95	-4.17	24.77	54	-29.23	peak
3	2490.05	29.32	-4.16	25.17	54	-28.83	peak
4	2495.65	29.00	-4.04	24.96	54	-29.04	peak

9. BANDWIDTH TEST

9.1 Block Diagram Of Test Setup



9.2 Limit

FCC Part15 (15.249) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.215	Bandwidth	2402-2483.5	PASS

9.3 Test procedure

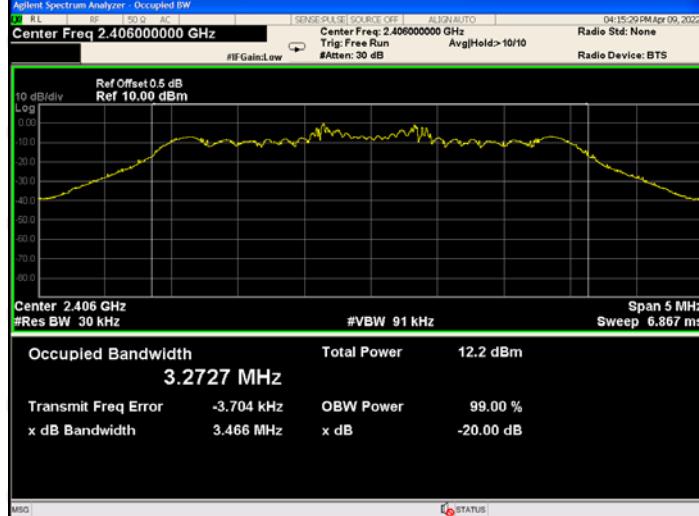
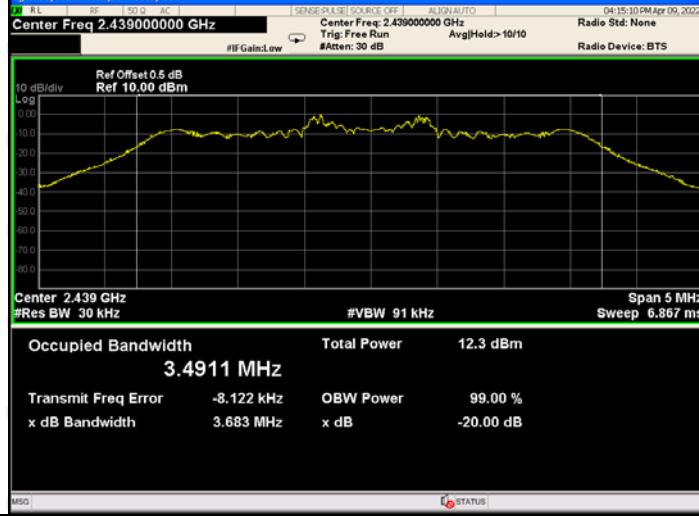
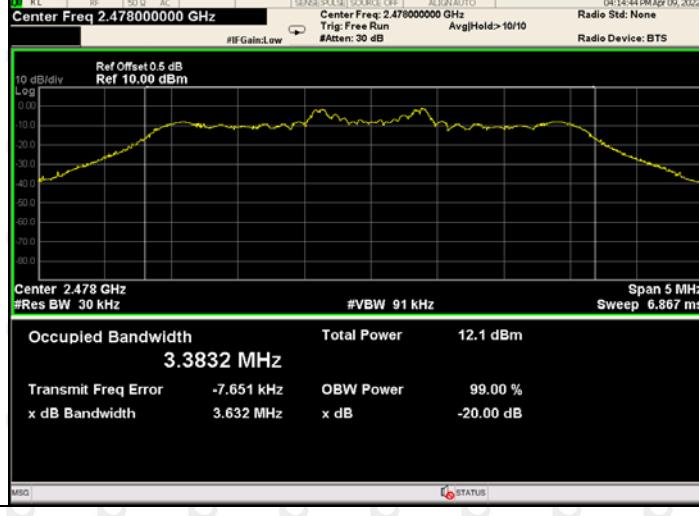
1. Set resolution bandwidth (RBW) = 1-5% or DTS BW, not to exceed 100 kHz.
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

9.4 Test Result

Test Mode	Frequency (MHz)	20dB Bandwidth (MHz)	Result
GFSK	Low channel	3.466	PASS
	Mid channel	3.683	PASS
	High channel	3.632	PASS

Note: All modes of operation were Pre-scan and the worst-case emissions are reported.

Test Graph:

GFSK Low channel	
GFSK Mid channel	
GFSK High channel	

10. ANTENNA REQUIREMENT

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.

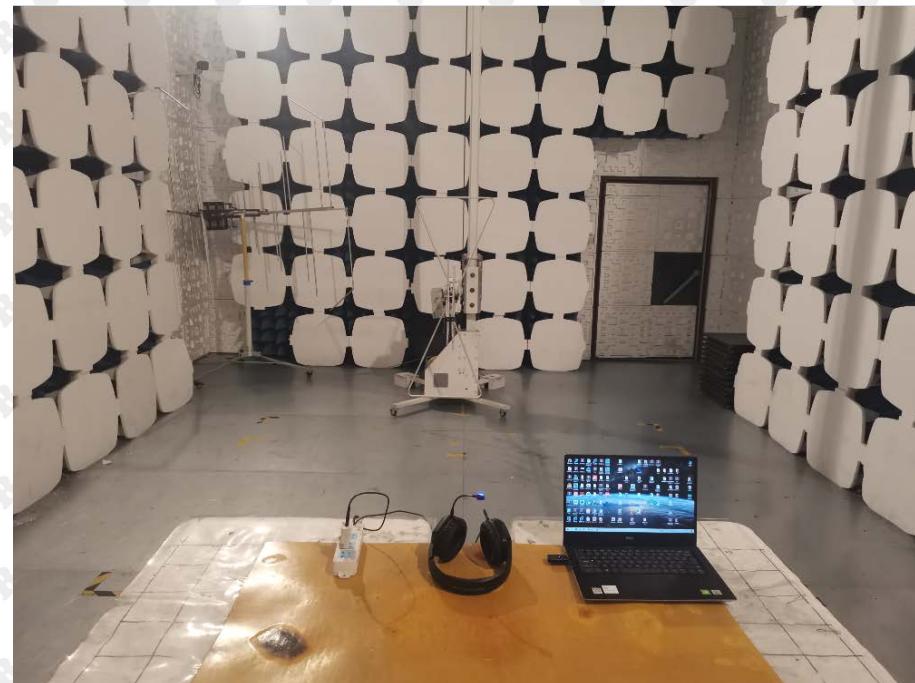
EUT Antenna:

The antenna is PCB antenna. The best case gain of the antenna is 1dBi.

11. EUT TEST SETUP PHOTOGRAPHS

Radiated Emissions

Below 1G



Above 1G



Conducted emission



***** END OF REPORT *****