FCC TEST REPORT

For

Guangzhou aVoice Electronic Technology Co., Ltd.

Headset microphone

Test Model: YS-M11

Prepared for	:	Guangzhou aVoice Electronic Technology Co., Ltd.
Address	:	Room 0293, Room 203, No. 1 Xinghua Road, Tianhe District, Guangzhou City
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	February 18, 2025
Number of tested samples	:	2
Sample No	:	A250217104-1, A250217104-2
Serial number	:	Prototype
Date of Test	:	February 18, 2025 ~ March 25, 2025
Date of Report	:	March 26, 2025

FCC TEST REPORT
FCC CFR 47 PART 15 C(15.236)

Report Reference No.	:	**LCSA01205121EA**
Date of Issue.....	:	March 26, 2025
Testing Laboratory Name.....	:	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address.....	:	101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China
Testing Location/ Procedure.....	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	:	**Guangzhou aVoice Electronic Technology Co., Ltd.**
Address.....	:	Room 0293, Room 203, No. 1 Xinghua Road, Tianhe District, Guangzhou City
Test Specification		
Standard.....	:	FCC CFR 47 PART 15 C(15.236)
Test Report Form No.....	:	TRF-4-E-165 A/0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

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EUT Description.....	:	Headset microphone
Trade Mark.....	:	N/A
Test Model	:	YS-M11
Ratings.....	:	Input: DC 5V Battery: 3.7V 450mAh
Result	:	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Diamond Lu/ Administrator	Jack Liu/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCSA01205121EA	March 26, 2025 Date of issue

Test Model.....	: YS-M11
EUT.....	: Headset microphone
Applicant.....	**: Guangzhou aVoice Electronic Technology Co., Ltd.**
Address.....	: Room 0293, Room 203, No. 1 Xinghua Road, Tianhe District, Guangzhou City
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Guangzhou aVoice Electronic Technology Co., Ltd.**
Address.....	: Room 0293, Room 203, No. 1 Xinghua Road, Tianhe District, Guangzhou City
Telephone.....	: /
Fax.....	: /
Factory.....	**: Guangzhou aVoice Electronic Technology Co., Ltd.**
Address.....	: Room 0293, Room 203, No. 1 Xinghua Road, Tianhe District, Guangzhou City
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revision Content	Revised By
000	March 26, 2025	Initial Issue	---

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1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Headset microphone
Test Model	:	YS-M11
Ratings	:	Input: DC 5V Battery: 3.7V 450mAh
Hardware Version	:	/
Software Version	:	/
UHF		
Operation frequency	:	657.50MHz~662.00MHz
Modulation Type	:	1/4πDQPSK
Antenna Type	:	Internal Antenna
Antenna Gain	:	-0.4dBi
Extreme temp. Tolerance	:	-30°C to +50°C

1.2. Support Equipment List

Manufacturer	Description	Model	Serial Number	Certificate
SHENZHEN TIANYIN ELE CTRONICS CO., LTD	Power Adapter	TPA-460502 00UU	--	FCC

Note: The adapter is supplied by lab and only use tested.

1.3. External I/O Cable

I/O Port Description	Quantity	Cable
Type-C 5V Port	1	N/A

1.4. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.
Test Firm Registration Number: 254912.

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.5. 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 LCS quality 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.

1.6. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	±3.10dB	(1)
		30MHz~200MHz	±2.96dB	(1)
		200MHz~1000MHz	±3.10dB	(1)
		1GHz~26.5GHz	±3.80dB	(1)
		26.5GHz~40GHz	±3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	±1.63dB	(1)
Power disturbance	:	30MHz~300MHz	±1.60dB	(1)
Output power	:	1GHz-40GHz	±0.57dB	(1)
Occupied Channel Bandwidth	:	1GHz-40GHz	±5%	(1)
Conducted RF Spurious Emission	:	9kHz-40GHz	±1.80dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

1.7. Description of Test Modes

The EUT has been tested under operating condition.

This test was performed with EUT in X, Y, Z position and the worst case was found when EUT in X position.

Worst-Case data rates were utilized from preliminary testing of the Chipset, worst-case data rates used during the testing are as follows:

Modulation Type	Test Frequency (MHz)
1/4πDQPSK	657.50
	659.50
	662.00

1.8. Frequency of Channels

Channel No. & Frequency:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	657.50	2	658.00
3	658.50	4	659.00
5	659.50	6	660.00
7	660.50	8	661.00
9	661.50	10	662.00

2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26-2015:American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.207, and 15.236 under the FCC Rules Part 15 Subpart C

2.3. General Test Procedures

2.3.1 Power Line Conducted Emissions(N/A)

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2.1 of ANSI C63.4-2014 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

2.3.2 Radiated Emissions

please refer to radated spurioes emission

3. SYSTEM TEST CONFIGURATION

3.1. Justification

The system was configured for testing in a continuous transmits condition.

3.2. EUT Exercise Software

The system was configured for testing in a continuous transmits condition;and transmission frequency by switch button control.

3.3. Special Accessories

N/A

3.4. Block Diagram/Schematics

Please refer to the related document

3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

3.6. Test Setup

Please refer to the test setup photo.

4. SUMMARY OF TEST RESULTS

Applied Standard: FCC Part 74		
FCC Rules	Description of Test	Result
FCC Part 15.236(d)(1)	Conducted Peak Output Power	PASS
FCC Part 15.236(f)(2)	Occupied Bandwidth Emission	PASS
FCC Part 15.236(f)(3)	Frequency Stability	PASS
FCC Part 15.236(g)(4)	Radiated Spurious Emission	PASS
FCC Part 15.236(g)(1)	Necessary bandwidth (BN)	PASS
§15.207	Conducted Emission	PASS
§15.203	Antenna Requirements	PASS

Note:Not Applicable because digital modulation.

5. TEST RESULT

5.1. Conducted Peak Output Power

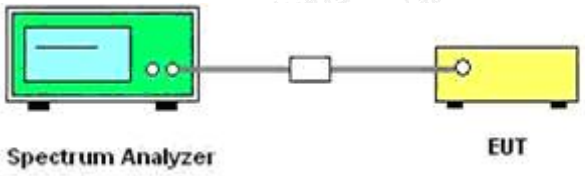
5.1.1. Limit

According to FCC 15.236(d)(1), The maximum radiated power shall not exceed the following values:

(1) In the bands allocated and assigned for broadcast television:

(i) Wireless microphones: 50 mW(17dBm) EIRP.

5.1.2. Test Configuration:



5.1.3. Test Procedure:

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

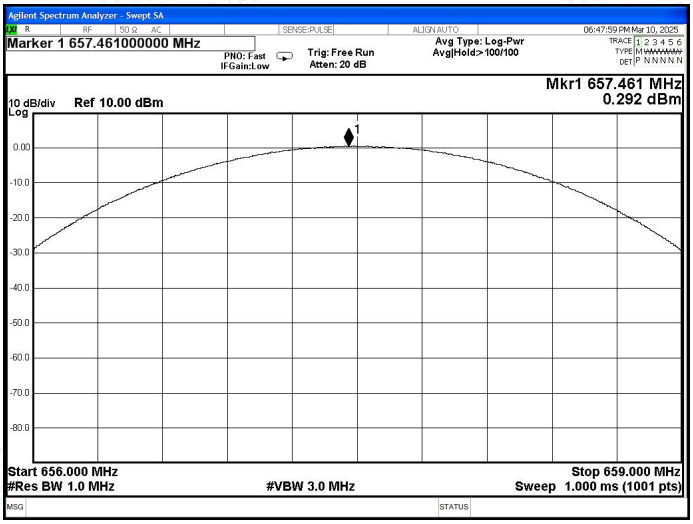
Measurement parameter	
Detector:	Peak (worst case) / Average (RMS)
Sweep time:	Auto / 20s
Resolution bandwidth:	> emission bandwidth
Video bandwidth:	> resolution bandwidth
Span:	> 2 times emissions bandwidth
Trace mode:	Max. hold
EUT configuration:	Peak: Unmodulated carrier RMS: Modulate the transmitter with a 2.5 kHz tone at a level 16 dB higher than that required to produce a frequency deviation of ± 75 kHz, or to produce 50% of the manufacturer's rated deviation, whichever is less.

5.1.4. Test result:

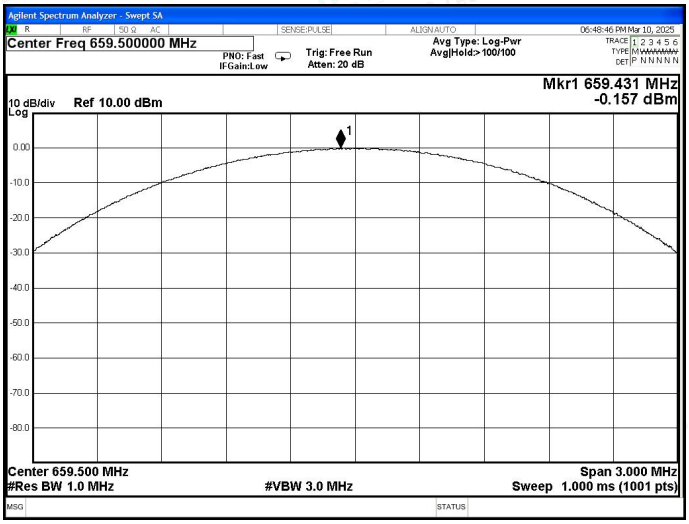
The EUT was programmed to be in continuously transmitting mode.

Test Mode	Frequency (MHz)	Measured Maximum Peak Power(dBm)	Antenna gain(dBi)	EIRP (dBm)	Limits (dBm)	Verdict
1/4πDQPSK	657.50	0.292	-0.4	-0.108	17	PASS
1/4πDQPSK	659.50	-0.157	-0.4	-0.557	17	PASS
1/4πDQPSK	662.00	-0.380	-0.4	-0.78	17	PASS

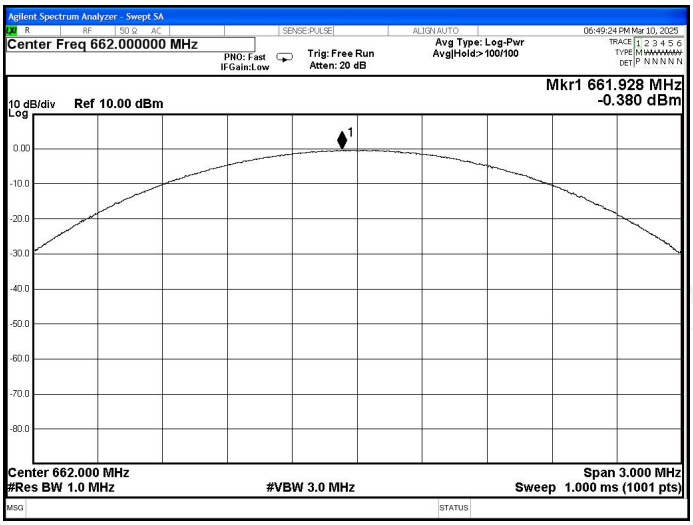
Maximum Peak Output Power



657.50MHz



659.50MHz



662.00MHz

5.2. Occupied bandwidth

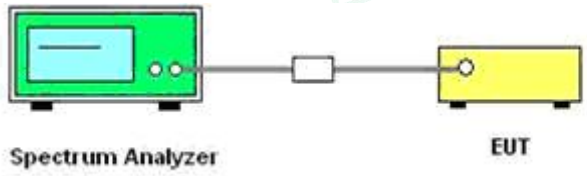
5.2.1. Limit:

According to §15.236(f) (1): The operating frequency within a permissible band of operation defined in paragraph (c) of this section must comply with the following requirements.

(i) The frequency selection shall be offset from the upper or lower band limits by 25 kHz or an integral multiple thereof.

(ii) One or more adjacent 25 kHz segments within the assignable frequencies may be combined to form a channel whose maximum bandwidth shall not exceed 200 kHz. The operating bandwidth shall not exceed 200 kHz.

5.2.2. Test Configuration:



5.2.3. Test Procedure:

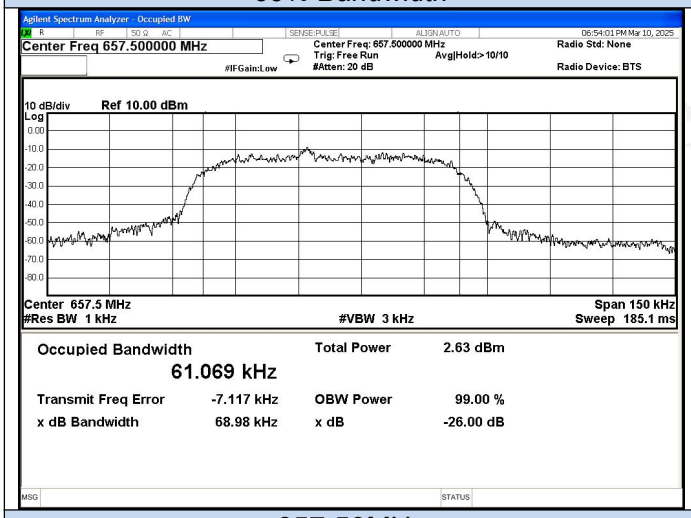
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

Measurement parameter	
Detector:	Peak
Sweep time:	Auto
Resolution bandwidth:	1 % to 5 % of the occupied bandwidth
Video bandwidth:	3 x resolution bandwidth
Span:	2 x emission bandwidth
Trace mode:	Max. hold
Analyzer function:	99% power occupied bandwidth function
EUT:	Modulated signal with max. frequency deviation

5.2.4. Result:

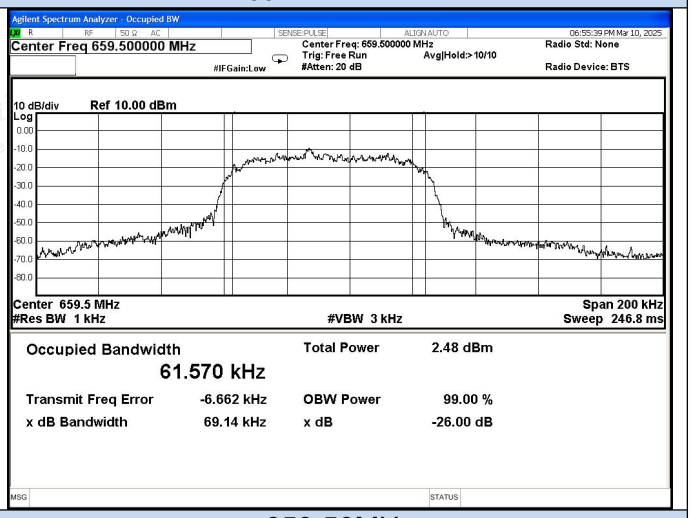
Test Mode	Frequency (MHz)	99% Bandwidth (KHz)	Limits (KHz)	Verdict
1/4πDQPSK	657.50	61.069	200	PASS
1/4πDQPSK	659.50	61.570	200	PASS
1/4πDQPSK	662.00	61.301	200	PASS

99% *Bandwidth*

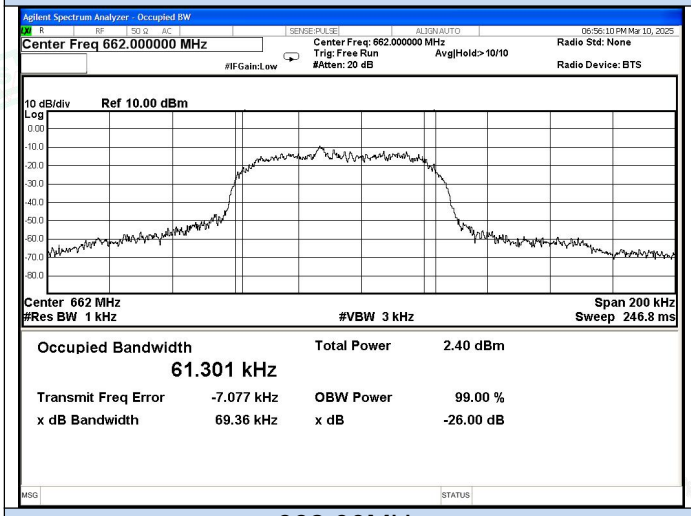


657.50MHz

99% Bandwidth



659.50MHz



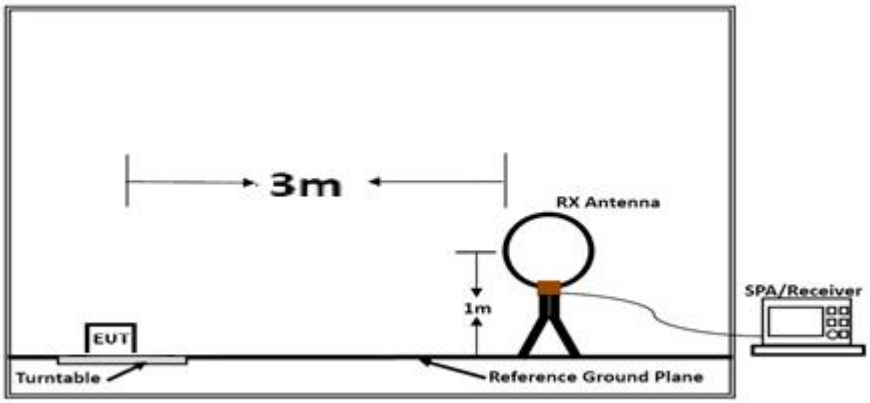
662.00MHz

5.3. Radiated Spurious Emission

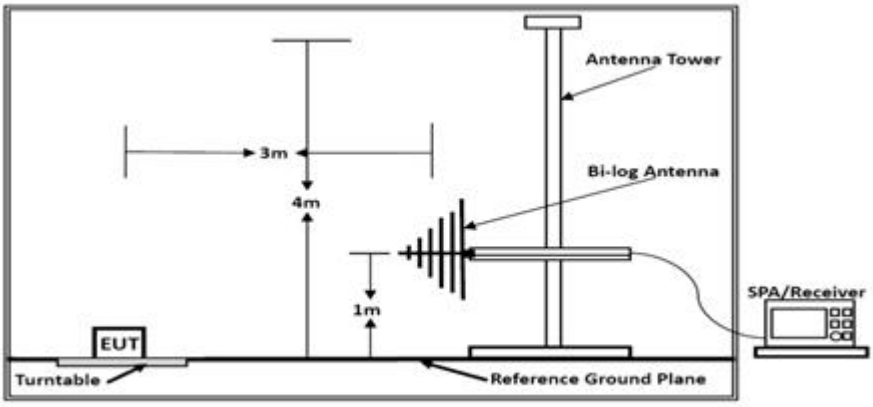
5.3.1. Limit:

According to §15.236(g)(4): Spurious emission limits. Emissions outside of the emission masks listed in paragraphs (g)(1) through (g)(3) shall comply with the limits specified in section 4.2.4.1.2 of ETSI EN 300 422-1 V2.2.1 (2021-11), (incorporated by reference, see § 15.38).

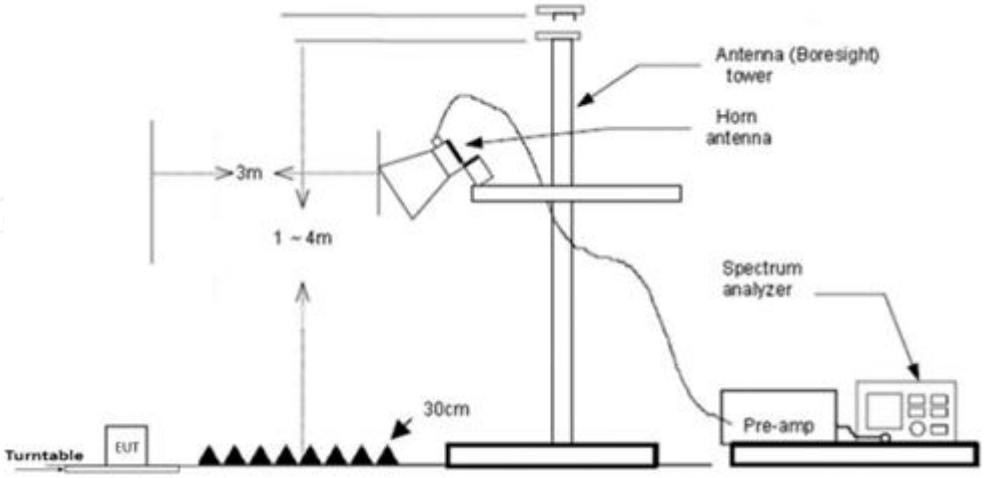
5.3.2. Test Configuration:



Below 30MHz



Below 1GHz



Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade form 3m to 1m.

5.3.3. Test Procedure:

1. The setup of EUT is according with per TIA/EIA Standard 603 and ANSI C63.4-2014 measurement procedure.

2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna heightand polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from theEUT. The test was performed by placing the EUT on 3-orthogonal axis.

3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW	1MHz / 3MHz for Peak

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~30MHz / RBW/VBW 10kHz/30KHz for Peak
Start ~ Stop Frequency	30MHz~1000MHz / RBW/VBW 120kHz/300kHz for Peak

5.3.4. Results:

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS (dBuV/m) = RA (dBuV) + AF (dB/m) + CL (dB) – AG (dB)

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

Results of Radiated Emissions (9 KHz~30MHz)

Temperature	Temperature	23.9℃	Humidity
Test Engineer	Test Engineer	Jose Zhu	Configurations

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Over Limit (dBuV)	Remark
-	-	-	-	See Note

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

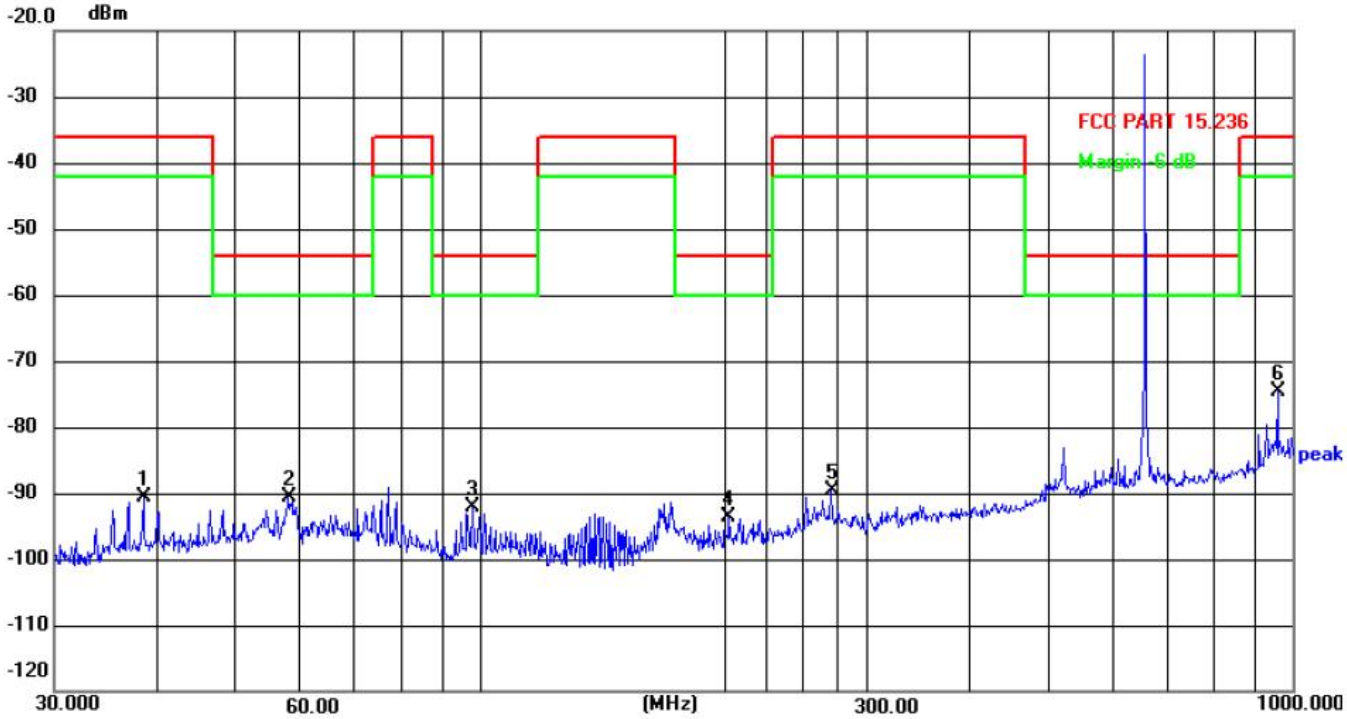
Results of Radiated Emissions (30MHz~10th carrier harmonic)

Temperature	23.9℃	Humidity	52.2%
Test Engineer	Jose Zhu	Configurations	1/4πDQPSK

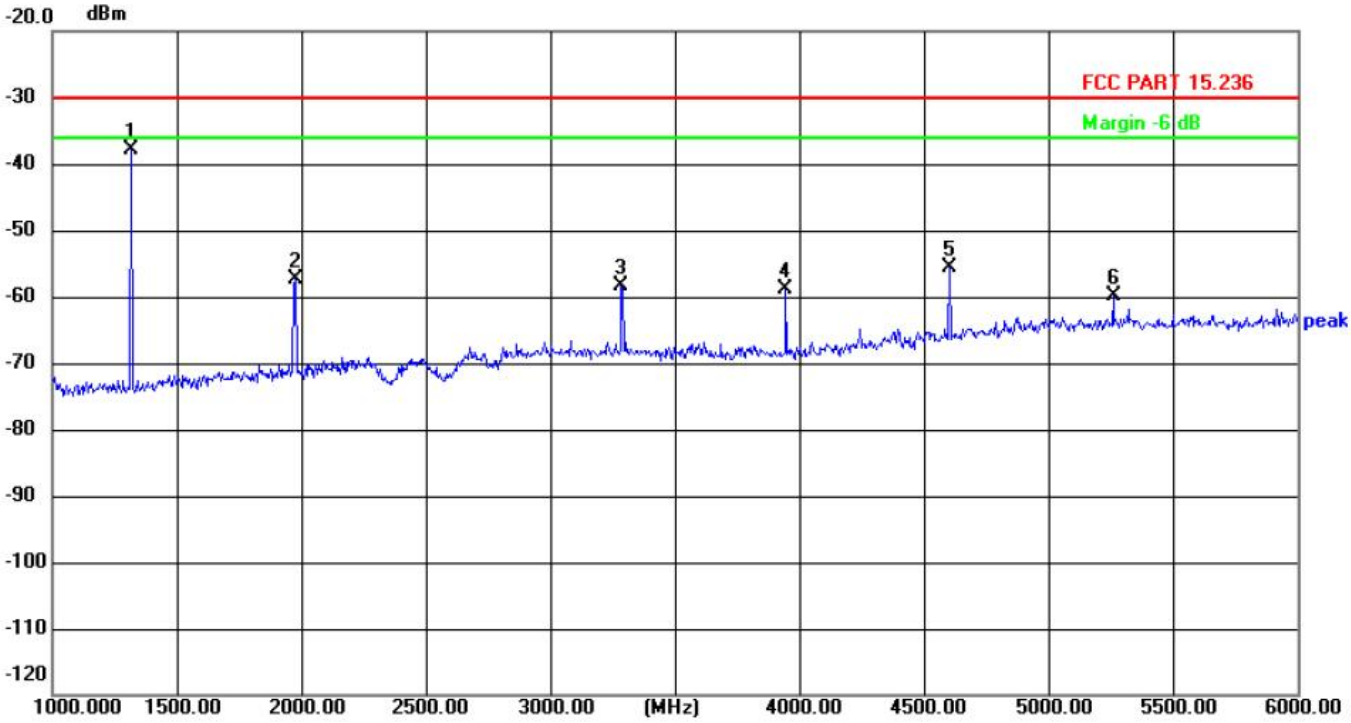
PASS.

The test data please refer to following page.

Horizontal_657.5MHz

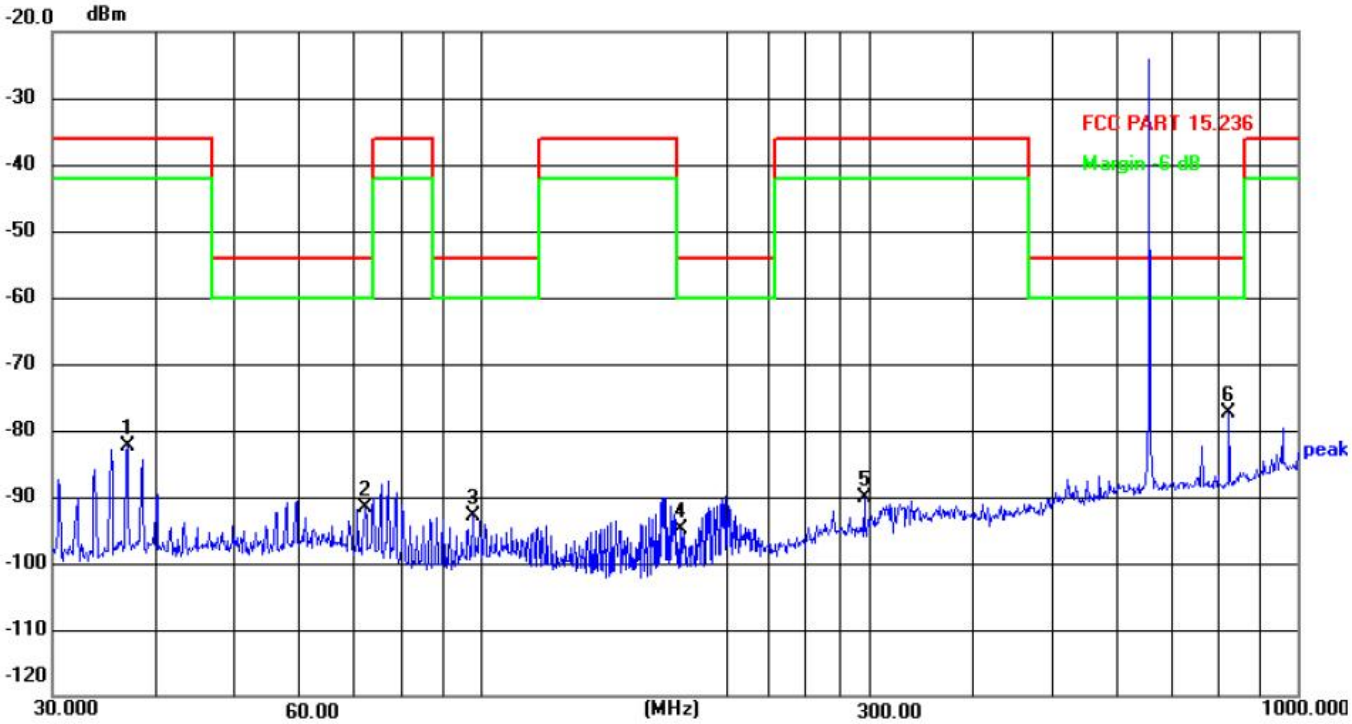


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	38.6160	-73.46	-17.11	-90.57	-36.00	-54.57	peak	P
2	58.2029	-74.22	-16.38	-90.60	-54.00	-36.60	peak	P
3	98.1418	-74.34	-17.87	-92.21	-54.00	-38.21	peak	P
4	202.8103	-75.11	-18.41	-93.52	-54.00	-39.52	peak	P
5	270.3748	-73.18	-16.49	-89.67	-36.00	-53.67	peak	P
6	958.7943	-67.91	-6.76	-74.67	-36.00	-38.67	peak	P

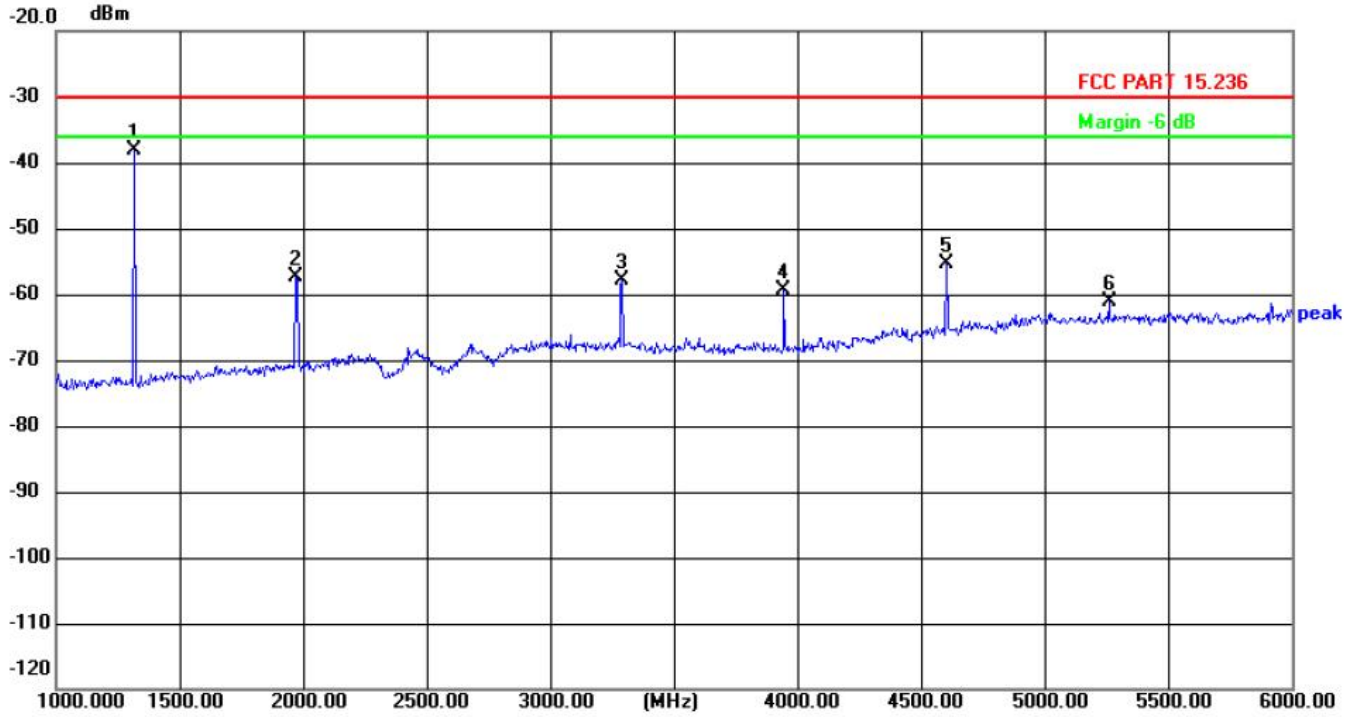


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	1315.000	-23.50	-14.49	-37.99	-30.00	-7.99	peak	P
2	1975.000	-44.02	-13.30	-57.32	-30.00	-27.32	peak	P
3	3285.000	-49.26	-9.14	-58.40	-30.00	-28.40	peak	P
4	3945.000	-51.61	-7.29	-58.90	-30.00	-28.90	peak	P
5	4600.000	-50.83	-4.83	-55.66	-30.00	-25.66	peak	P
6	5260.000	-57.63	-2.19	-59.82	-30.00	-29.82	peak	P

Vertical_657.5MHz

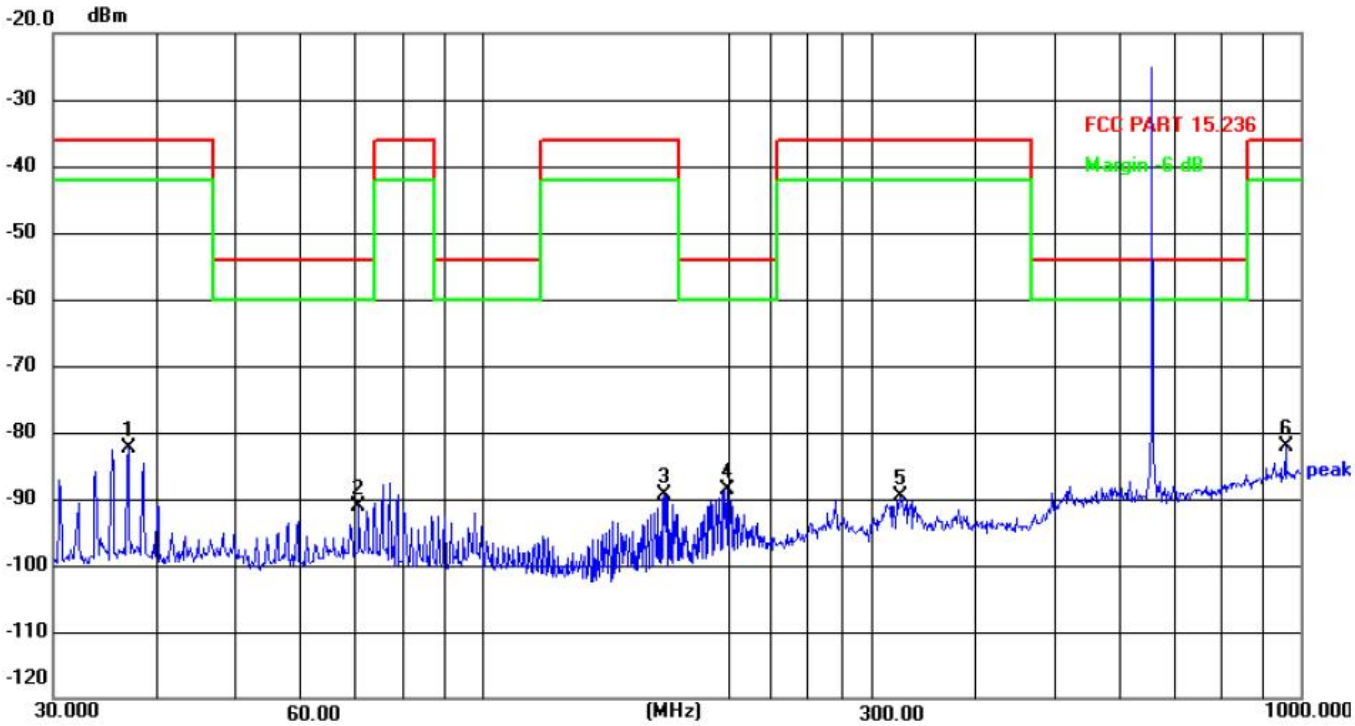


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	37.0248	-64.57	-17.69	-82.26	-36.00	-46.26	peak	P
2	72.3375	-72.18	-19.56	-91.74	-54.00	-37.74	peak	P
3	98.1418	-74.51	-18.31	-92.82	-54.00	-38.82	peak	P
4	175.6516	-75.78	-19.05	-94.83	-54.00	-40.83	peak	P
5	295.1468	-74.50	-15.57	-90.07	-36.00	-54.07	peak	P
6	824.5968	-68.31	-9.07	-77.38	-54.00	-23.38	peak	P

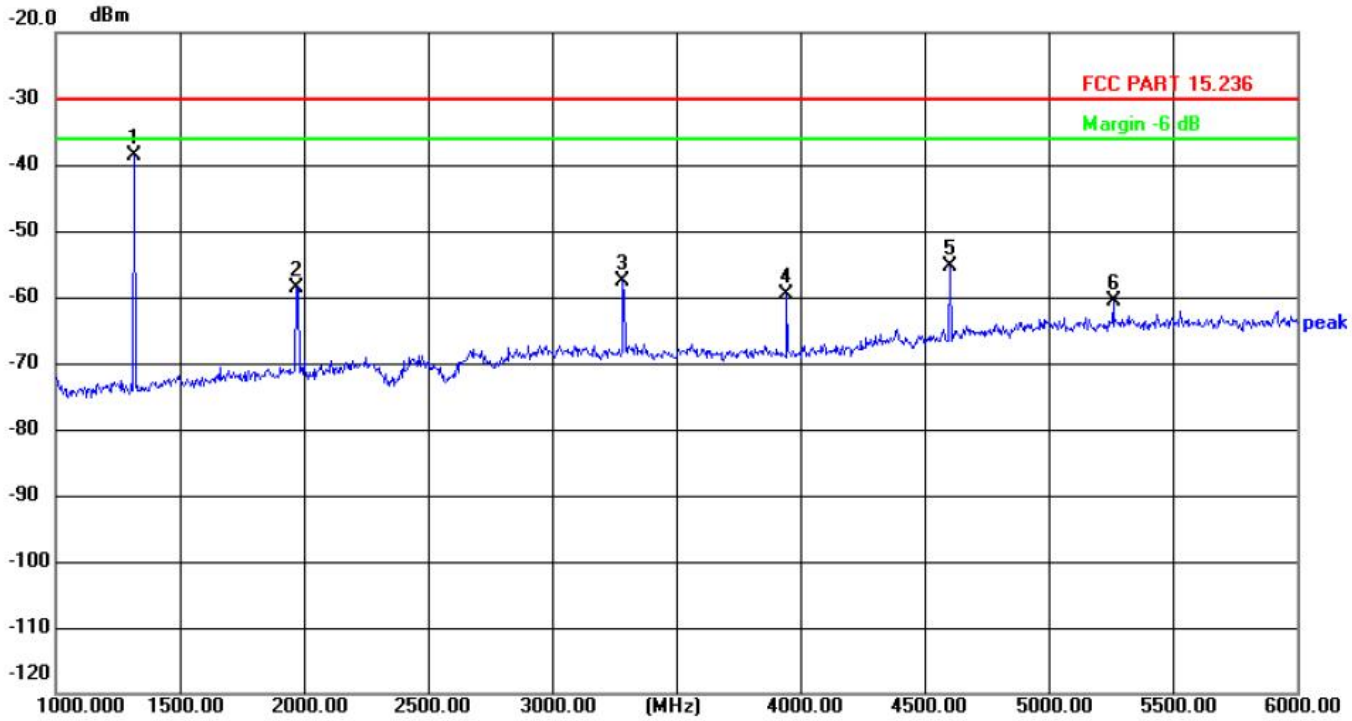


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	1315.000	-22.79	-15.24	-38.03	-30.00	-8.03	peak	P
2	1970.000	-44.13	-13.26	-57.39	-30.00	-27.39	peak	P
3	3290.000	-48.28	-9.48	-57.76	-30.00	-27.76	peak	P
4	3945.000	-50.83	-8.64	-59.47	-30.00	-29.47	peak	P
5	4605.000	-49.39	-6.07	-55.46	-30.00	-25.46	peak	P
6	5260.000	-57.47	-3.65	-61.12	-30.00	-31.12	peak	P

Horizontal_659.5MHz

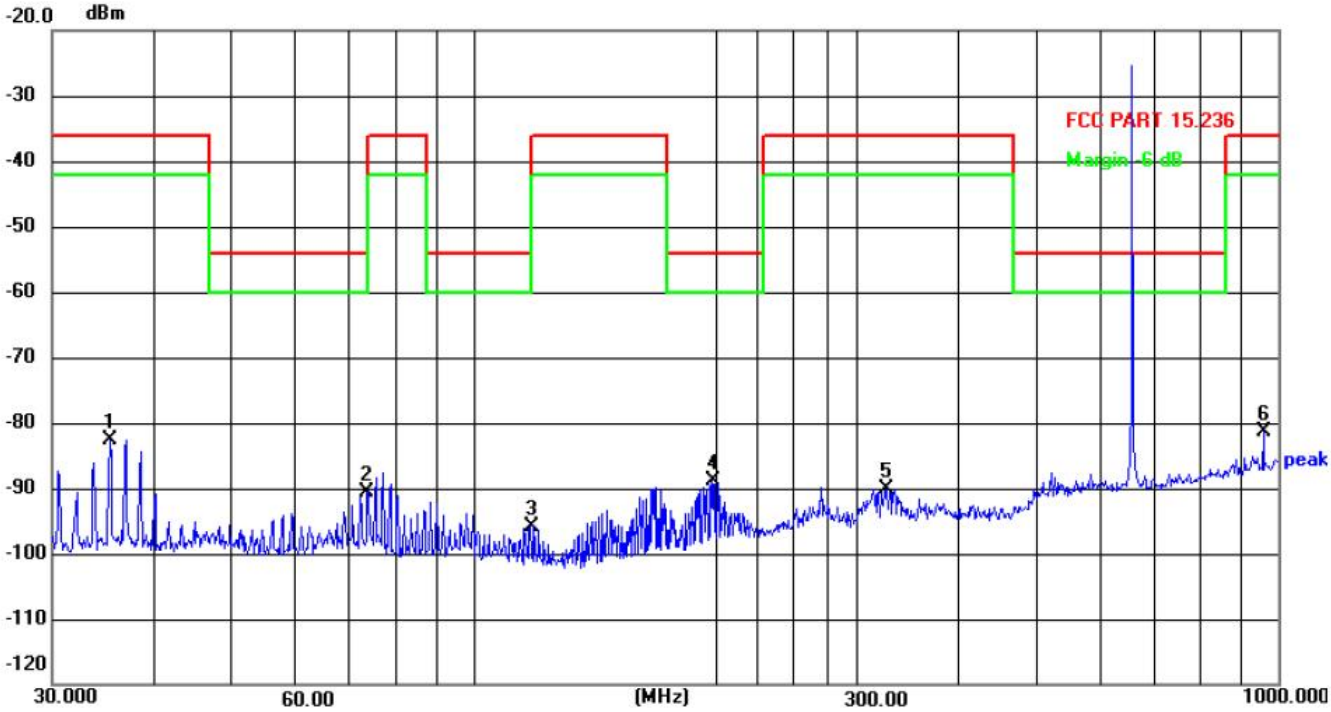


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	37.0248	-64.67	-17.69	-82.36	-36.00	-46.36	peak	P
2	70.8315	-71.61	-19.50	-91.11	-54.00	-37.11	peak	P
3	167.2366	-69.73	-19.57	-89.30	-36.00	-53.30	peak	P
4	199.9855	-71.19	-17.39	-88.58	-54.00	-34.58	peak	P
5	324.4560	-75.51	-14.22	-89.73	-36.00	-53.73	peak	P
6	958.7943	-74.14	-8.03	-82.17	-36.00	-46.17	peak	P

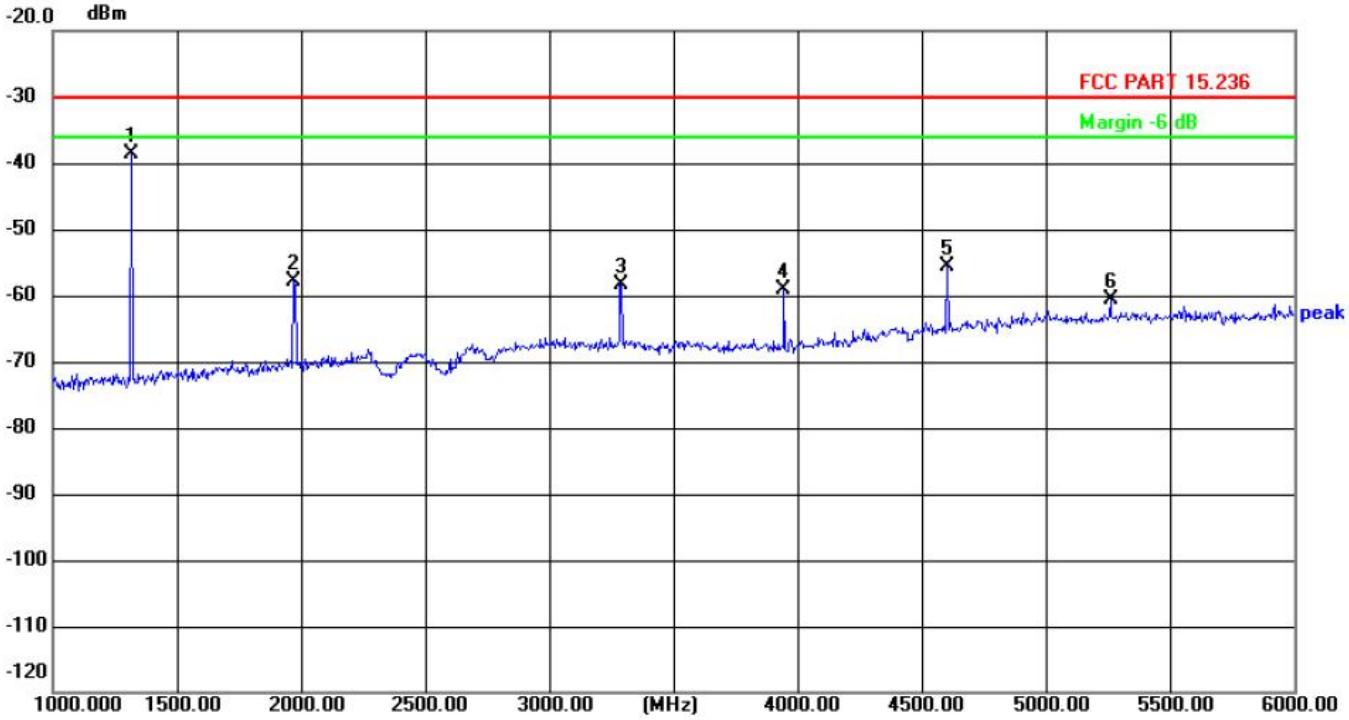


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	1315.000	-24.02	-14.49	-38.51	-30.00	-8.51	peak	P
2	1970.000	-45.20	-13.31	-58.51	-30.00	-28.51	peak	P
3	3285.000	-48.56	-9.14	-57.70	-30.00	-27.70	peak	P
4	3945.000	-52.37	-7.29	-59.66	-30.00	-29.66	peak	P
5	4600.000	-50.62	-4.83	-55.45	-30.00	-25.45	peak	P
6	5260.000	-58.43	-2.19	-60.62	-30.00	-30.62	peak	P

Vertical_659.5MHz

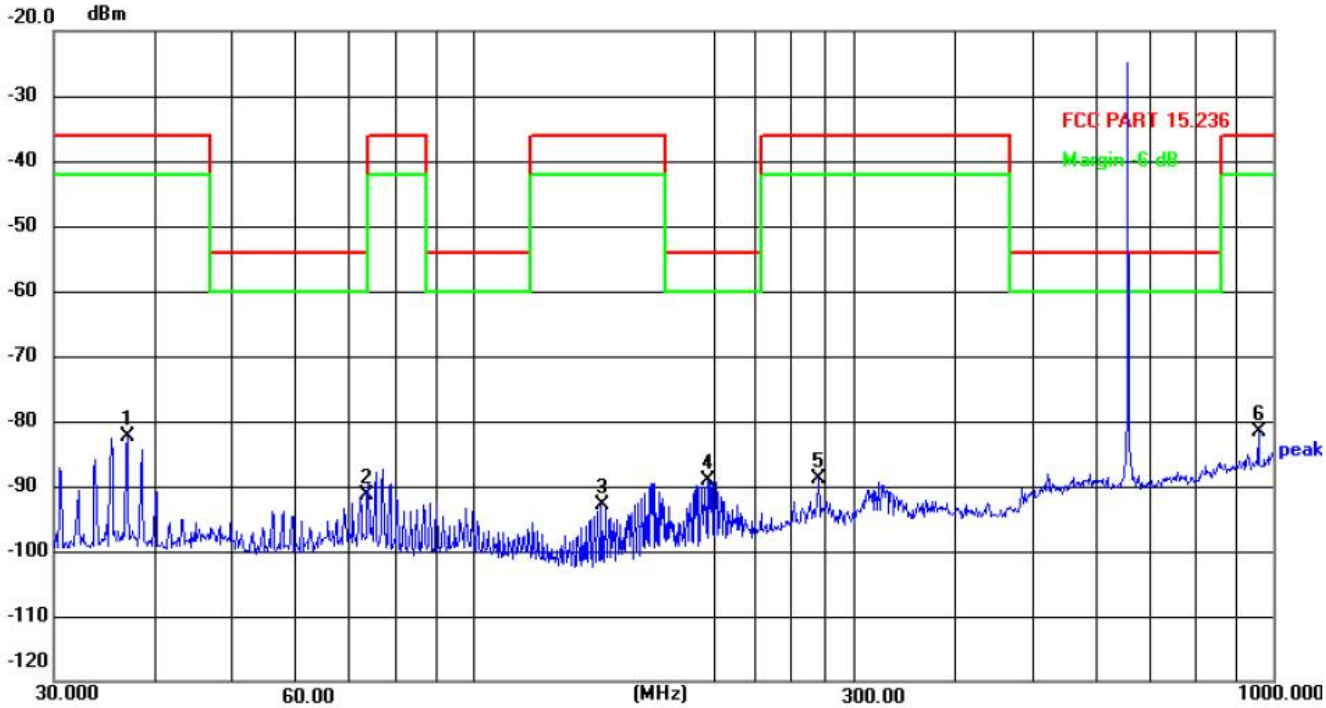


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	35.3750	-64.80	-17.79	-82.59	-36.00	-46.59	peak	P
2	73.8756	-71.04	-19.63	-90.67	-54.00	-36.67	peak	P
3	117.7725	-76.07	-19.75	-95.82	-54.00	-41.82	peak	P
4	197.8928	-71.29	-17.59	-88.88	-54.00	-34.88	peak	P
5	326.7395	-75.76	-14.24	-90.00	-36.00	-54.00	peak	P
6	958.7943	-73.39	-8.03	-81.42	-36.00	-45.42	peak	P

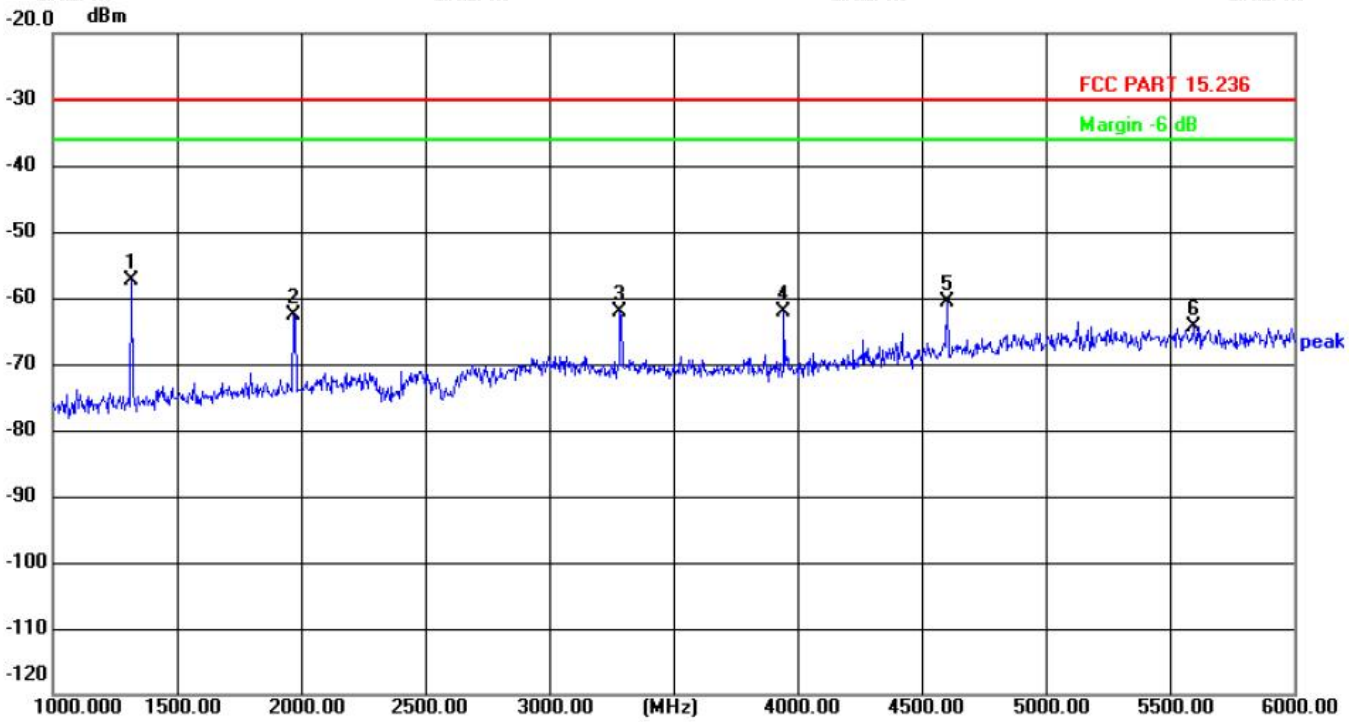


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	1315.000	-23.27	-15.24	-38.51	-30.00	-8.51	peak	P
2	1970.000	-44.66	-13.26	-57.92	-30.00	-27.92	peak	P
3	3290.000	-48.78	-9.48	-58.26	-30.00	-28.26	peak	P
4	3945.000	-50.40	-8.64	-59.04	-30.00	-29.04	peak	P
5	4600.000	-49.41	-6.09	-55.50	-30.00	-25.50	peak	P
6	5260.000	-56.99	-3.65	-60.64	-30.00	-30.64	peak	P

Horizontal_622.0MHz

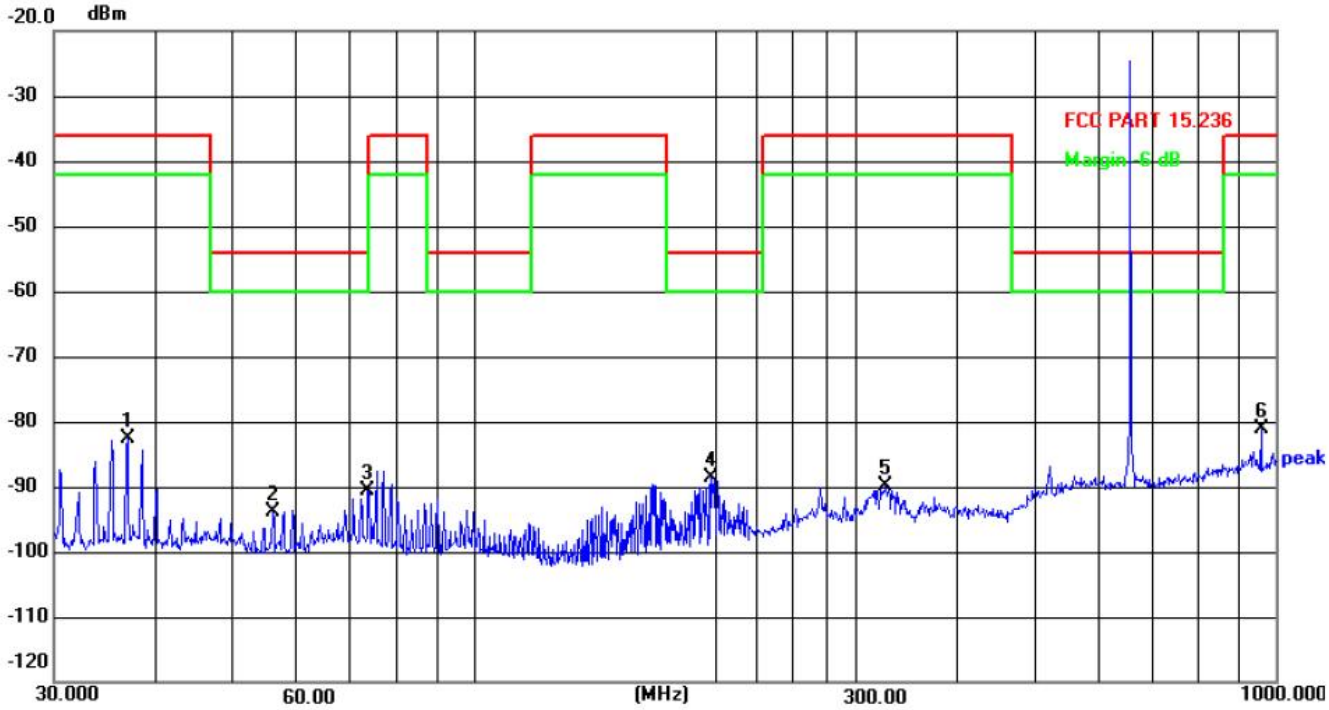


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	37.0248	-64.80	-17.69	-82.49	-36.00	-46.49	peak	P
2	73.8756	-71.84	-19.63	-91.47	-54.00	-37.47	peak	P
3	144.8418	-72.52	-20.38	-92.90	-36.00	-56.90	peak	P
4	196.5098	-71.49	-17.71	-89.20	-54.00	-35.20	peak	P
5	270.3748	-73.51	-15.41	-88.92	-36.00	-52.92	peak	P
6	958.7943	-73.47	-8.03	-81.50	-36.00	-45.50	peak	P

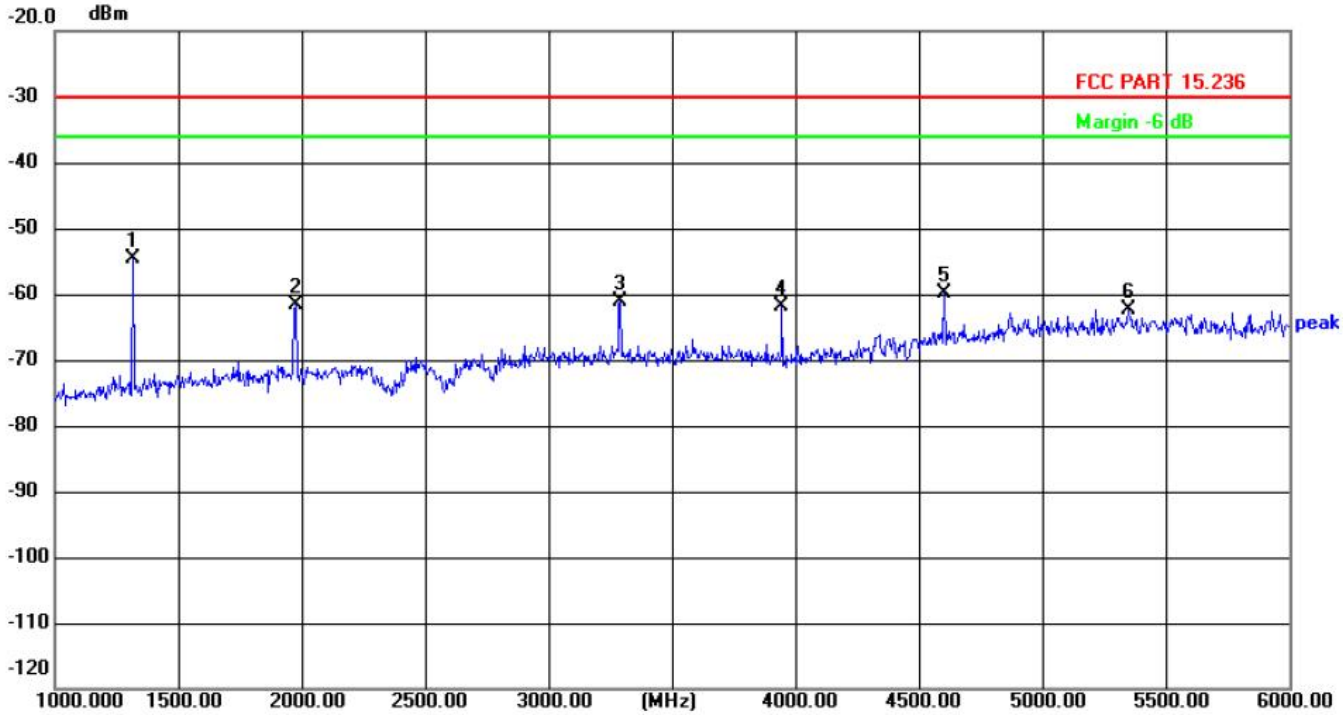


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	1315.000	-42.10	-15.24	-57.34	-30.00	-27.34	peak	P
2	1970.000	-49.38	-13.26	-62.64	-30.00	-32.64	peak	P
3	3285.000	-52.70	-9.49	-62.19	-30.00	-32.19	peak	P
4	3945.000	-53.43	-8.64	-62.07	-30.00	-32.07	peak	P
5	4605.000	-54.63	-6.07	-60.70	-30.00	-30.70	peak	P
6	5595.000	-60.99	-3.30	-64.29	-30.00	-34.29	peak	P

Vertical_622.0MHz



No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	37.0248	-64.91	-17.69	-82.60	-36.00	-46.60	peak	P
2	56.1974	-75.65	-18.17	-93.82	-54.00	-39.82	peak	P
3	73.8756	-70.90	-19.63	-90.53	-54.00	-36.53	peak	P
4	197.8928	-71.15	-17.59	-88.74	-54.00	-34.74	peak	P
5	326.7395	-75.53	-14.24	-89.77	-36.00	-53.77	peak	P
6	958.7943	-73.18	-8.03	-81.21	-36.00	-45.21	peak	P



No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector	P/F
1	1315.000	-39.50	-15.24	-54.74	-30.00	-24.74	peak	P
2	1975.000	-48.50	-13.23	-61.73	-30.00	-31.73	peak	P
3	3290.000	-51.66	-9.48	-61.14	-30.00	-31.14	peak	P
4	3945.000	-53.19	-8.64	-61.83	-30.00	-31.83	peak	P
5	4600.000	-53.67	-6.09	-59.76	-30.00	-29.76	peak	P
6	5350.000	-58.82	-3.48	-62.30	-30.00	-32.30	peak	P

Note:

1). Emission level (dBuV/m) = 20 log Emission level (uV/m).
2). Level = Reading + Factor, Margin = Level – Limit, Factor = Antenna Factor + Cable Loss - Preamp Factor

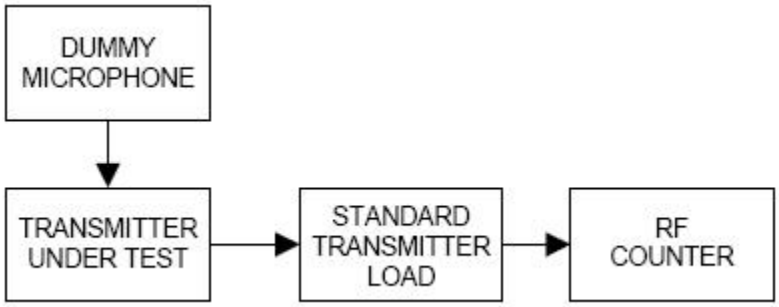
5.4.Frequency Stability

5.4.1. Limit

According to §15.236(f) (3): The frequency tolerance of the carrier signal shall be maintained within ± 0.005% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. Battery operated equipment shall be tested using a new battery.

Requirements:+/-50 ppm

5.4.2. Test Configuration:



5.4.3. Test Procedure

1. Setup the configuration of the ambient temperature form-30°C to 50°C with sufficient time.

And measure the different power of the EUT with an artificial power from highest to end point voltage.

2. Set frequency counter center frequency to the right frequency needs to be measured band.

5.4.5. Test Result:

Assigned Frequency: 657.50MHz		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 28.025 kHz
50	3.7	+2.79
40	3.7	+2.50
30	3.7	+2.35
20	3.7	+1.80
10	3.7	-1.06
0	3.7	-1.49
-10	3.7	-1.87
-20	3.7	-2.35
-30	3.7	-2.33
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 28.025 kHz
25	3.3	+2.41
25	3.7	-1.86
25	4.2	-2.16

Assigned Frequency:659.50MHz		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 28.025 kHz
50	3.7	+2.70
40	3.7	+2.38
30	3.7	+2.30
20	3.7	+1.81
10	3.7	-1.26
0	3.7	-1.43
-10	3.7	-1.73
-20	3.7	-2.25
-30	3.7	-2.46
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 28.025 kHz
25	3.3	+2.25
25	3.7	-1.88
25	4.2	-2.15

Assigned Frequency: 662.00MHz		
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within +/- 28.025 kHz
50	3.7	+2.63
40	3.7	+2.42
30	3.7	+2.26
20	3.7	+1.76
10	3.7	-1.17
0	3.7	-1.47
-10	3.7	-1.82
-20	3.7	-2.15
-30	3.7	-2.11
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency Measure with Time Elapsed Total emission within Max +/- 28.025 kHz
25	3.3	+2.18
25	3.7	-1.61
25	4.2	-2.17

Battery end point: 3.7Vdc

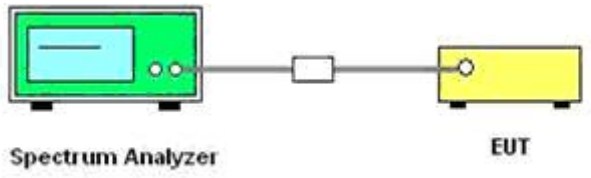
The results: The unit does meet the FCC requirements.

5.5.Necessary bandwidth (BN) for Digital Systems

5.5.1.Limits:

According to §15.236(g) (2): Emissions within the band from 2.5 × B below to 2.5 × B above the carrier frequency, where B is the channel bandwidth, shall comply with the emission mask in Figure 2 of section 4.2.4.2.2 of ETSI EN 300 422-1 V2.2.1 (2021-11) (incorporated by reference, see § 15.38)

5.5.2. Test Configuration:



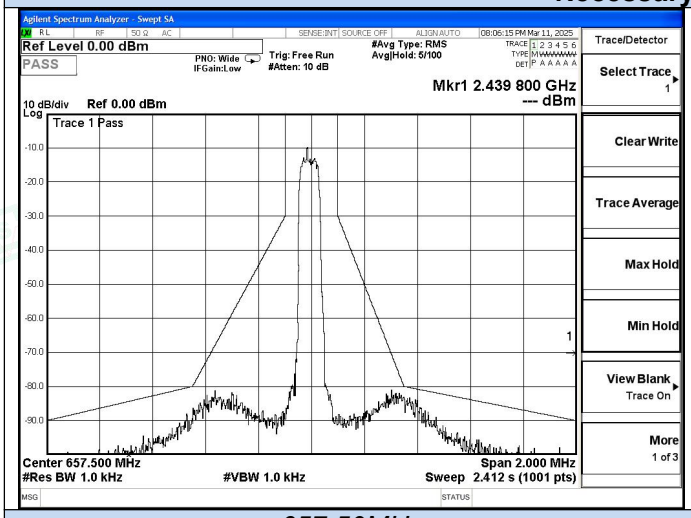
5.5.3. Test Procedure:

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.

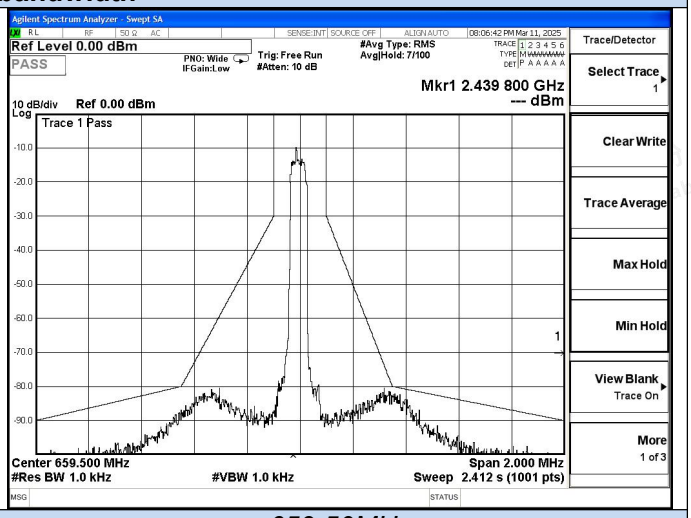
Measurement parameter	
Detector:	Peak - Quasi Peak / Average
Sweep time:	Auto
Resolution bandwidth:	1 kHz
Video bandwidth:	1 kHz
Span:	Fc-1MHz to fc+1MHz(2MHz)
Trace mode:	Max Hold

5.5.4. Results:

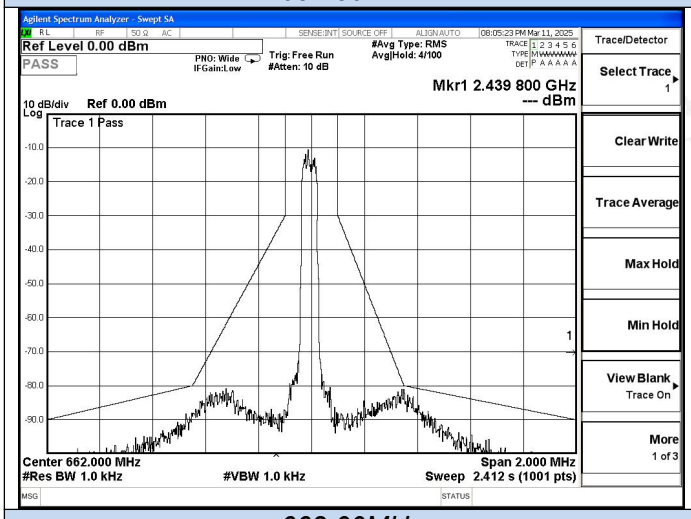
Necessary bandwidth



657.50MHz



659.50MHz



662.00MHz

5.6. AC Power line conducted emissions

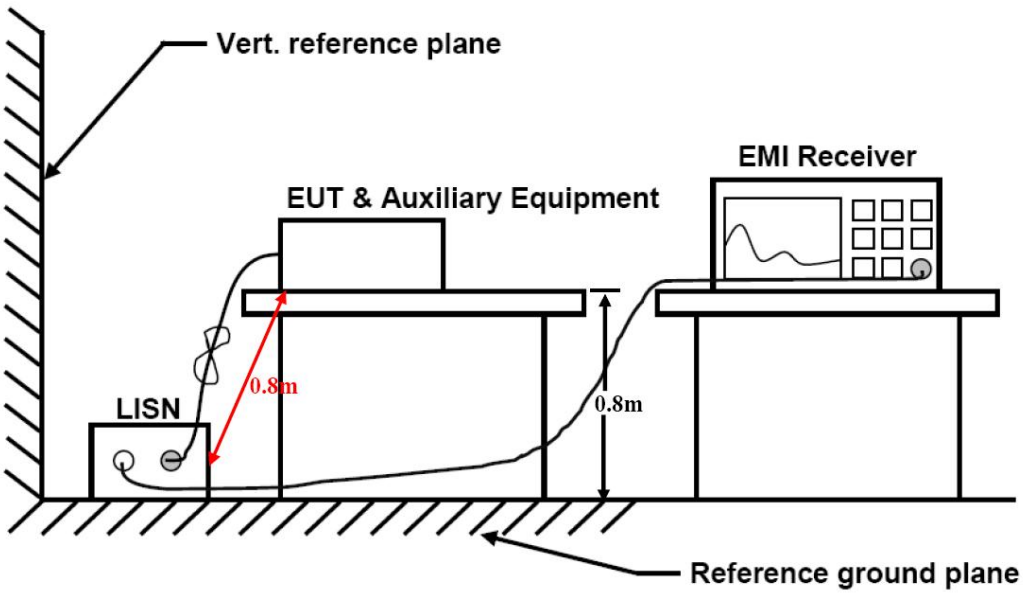
5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

* Decreasing linearly with the logarithm of the frequency

5.6.2 Block Diagram of Test Setup



5.6.3 Disturbance Calculation

The AC mains conducted disturbance is calculated by adding the 10dB Pulse Limiter and Cable Factor and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

CD (dBuV) = RA (dBuV) + PL (dB) + CL (dB)

Where CD = Conducted Disturbance	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	PL = 10 dB Pulse Limiter Factor

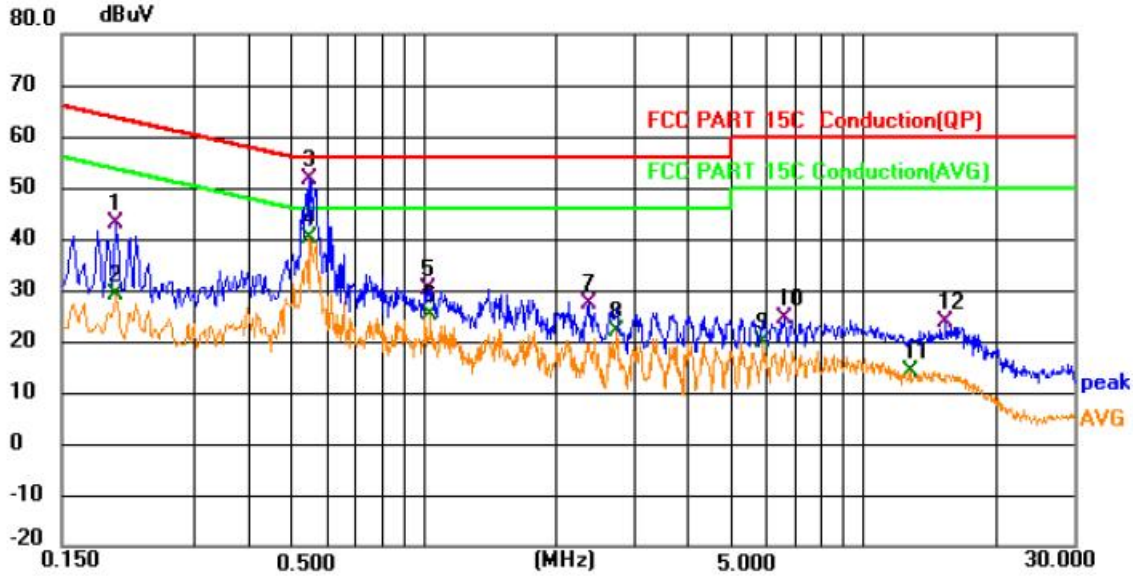
5.6.4 Test Results

Temperature	22.5℃	Humidity	53.7%
Test Engineer	Jose Zhu	Configurations	1/4πDQPSK

PASS.

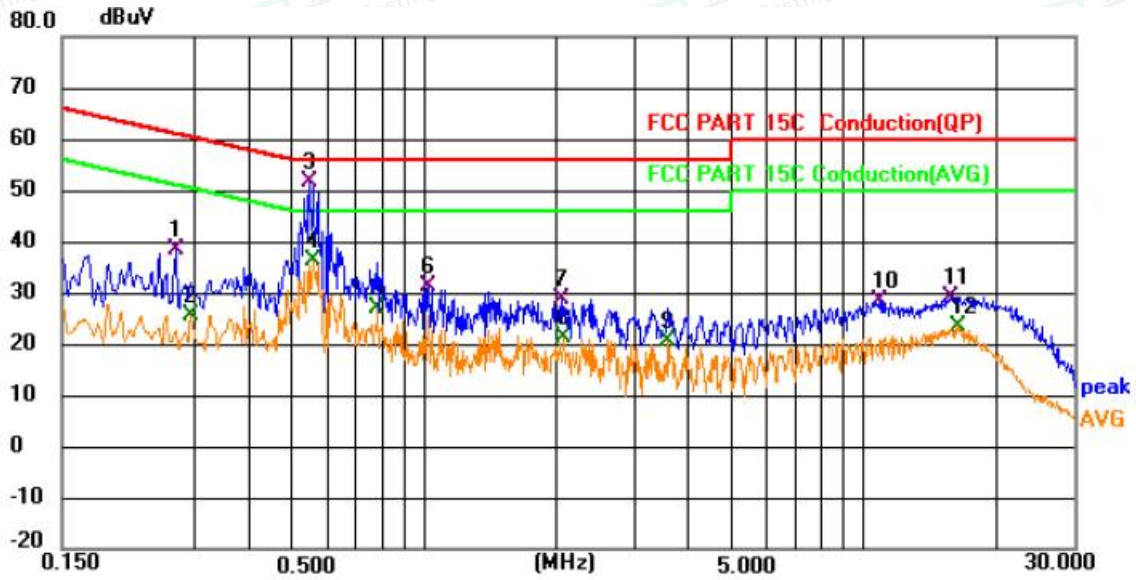
The test data please refer to following page.

Line



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.200	23.26	19.65	42.91	63.61	-20.70	QP
2		0.200	9.30	19.65	28.95	53.61	-24.66	AVG
3	*	0.550	32.06	19.68	51.74	56.00	-4.26	QP
4		0.550	20.42	19.68	40.10	46.00	-5.90	AVG
5		1.023	11.17	19.14	30.31	56.00	-25.69	QP
6		1.032	5.91	19.14	25.05	46.00	-20.95	AVG
7		2.369	8.42	19.05	27.47	56.00	-28.53	QP
8		2.747	2.80	19.17	21.97	46.00	-24.03	AVG
9		5.923	0.91	18.89	19.80	50.00	-30.20	AVG
10		6.558	5.40	19.13	24.53	60.00	-35.47	QP
11		12.759	-5.56	19.72	14.16	50.00	-35.84	AVG
12		15.310	3.80	19.90	23.70	60.00	-36.30	QP

Neutral



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Margin	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.272	18.52	19.78	38.30	61.06	-22.76	QP
2		0.294	5.81	19.78	25.59	50.41	-24.82	AVG
3	*	0.546	32.18	19.41	51.59	56.00	-4.41	QP
4		0.559	16.77	19.42	36.19	46.00	-9.81	AVG
5		0.784	7.67	19.23	26.90	46.00	-19.10	AVG
6		1.023	12.43	18.80	31.23	56.00	-24.77	QP
7		2.045	9.63	19.14	28.77	56.00	-27.23	QP
8		2.085	1.98	19.13	21.11	46.00	-24.89	AVG
9		3.592	1.56	18.99	20.55	46.00	-25.45	AVG
10		10.851	8.91	19.56	28.47	60.00	-31.53	QP
11		15.819	9.64	19.63	29.27	60.00	-30.73	QP
12		16.404	4.02	19.55	23.57	50.00	-26.43	AVG

****Note:*

Measurement = Reading + Correct Factor, Margin = Measurement – Limit,

Correct Factor=Lisn Factor+Cable Factor+Insertion loss of Pulse Limiter.

5.7. Antenna Requirements

5.7.1 Standard Applicable

According to antenna requirement of §15.203.

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 shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

5.7.2. Standard Applicable

According to § 15.203, 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.

5.7.3. Antenna Connector Construction

The gains of antenna used for transmitting is -0.4dBi(Max.), and the antenna is monopole antenna and no consideration of replacement. Please see EUT photo for details.

5.7.4. Results: Compliance.

6. LIST OF MEASURING EQUIPMENTS

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	MXA Signal Analyzer	Agilent	N9020A	MY49100060	2024-10-08	2025-10-07
2	DC Power Supply	Agilent	E3642A	N/A	2024-10-08	2025-10-07
3	Temperature & Humidity Chamber	Baro	/	/	2024-06-12	2025-06-11
4	EMI Test Software	AUDIX	E3	/	N/A	N/A
5	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2024-06-06	2025-06-05
6	Positioning Controller	Max-Full	MF7802BS	MF780208586	N/A	N/A
7	Active Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2024-07-13	2027-07-12
8	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2024-08-03	2027-08-02
9	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2024-07-13	2027-07-12
10	EMI Test Receiver	R&S	ESR 7	101181	2024-06-06	2025-06-05
11	RS SPECTRUM ANALYZER	R&S	FSP40	100503	2024-06-06	2025-06-05
12	Low-frequency amplifier	SchwarzZBECK	BBV9745	00253	2024-10-08	2025-10-07
13	High-frequency amplifier	JS Denki Pte	PA0118-43	JSPA21009	2024-10-08	2025-10-07
14	EMI Test Receiver	R&S	ESPI	101940	2024-06-06	2025-06-05
15	Artificial Mains	R&S	ENV216	101288	2024-06-06	2025-06-05
16	10dB Attenuator	SCHWARZBECK	MTS-IMP-136	261115-001-0032	2024-06-06	2025-06-05
17	EMI Test Software	Farad	EZ	/	N/A	N/A
18	Antenna Mast	Max-Full	MFA-515BSN	1308572	N/A	N/A
19	Pulse Limiter	R&S	ESH3-Z2	102750-NB	2024-06-06	2025-06-05
20	Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	791	2024-07-13	2027-07-12
21	Broadband Preamplifier	SCHWARZBECK	BBV9719	9719-025	2024-07-30	2025-07-29

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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