
FCC Test Report

Report No.: AGC13894230902FR01

FCC ID : 2BDWY-VM001

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : Vangoa wireless microphone

BRAND NAME : VANGOA

MODEL NAME : VM001, VM100, VM300, VM600, VM800

APPLICANT : Shenzhen LeYin Technology Co., Ltd

DATE OF ISSUE : Dec. 04, 2023

STANDARD(S) : FCC Part 15 Subpart C §15.249

REPORT VERSION : V1.0

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Report Revise Record

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

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen LeYin Technology Co., Ltd
Address	Floor 2, LongJun Industrial Zone 21 BuJiuWo, DaLang Street Shenzhen Guangdong 518000 China
Manufacturer	Shenzhen LeYin Technology Co., Ltd
Address	Floor 2, LongJun Industrial Zone 21 BuJiuWo, DaLang Street Shenzhen Guangdong 518000 China
Factory	Shenzhen LeYin Technology Co., Ltd
Address	Floor 2, LongJun Industrial Zone 21 BuJiuWo, DaLang Street Shenzhen Guangdong 518000 China
Product Designation	Vangoa wireless microphone
Brand Name	VANGO
Test Model	VM001
Series Model	VM100, VM300, VM600, VM800
Difference Description	Different model names
Date of receipt of test item	Sep. 12, 2023
Date of test	Sep. 12, 2023~Dec. 04, 2024
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-SRD/RF

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By



Alan Duan
(Project Engineer)

Dec. 04, 2024

Reviewed By



Calvin Liu
(Reviewer)

Dec. 04, 2024

Approved By



Max Zhang
Authorized Officer

Dec. 04, 2024

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	925.85MHz
Maximum field strength	33.43dB μ V/m(Peak)@3m
Modulation	GFSK
Number of channels	1 Channels
Antenna Gain	0dBi
Antenna Designation	PCB Antenna
Hardware Version	T7201-V2.0
Software Version	V1.0
Power Supply	DC 3V by battery(2*1.5V dry cell)

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2.2. TABLE OF CARRIER FREQUENCY

Channel Number	Frequency (MHz)
1	925.85

2.3. 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 uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 2.9$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.9$ dB
- Uncertainty of Occupied Channel Bandwidth: $U_c = \pm 2$ %

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4. DESCRIPTION OF TEST MODES

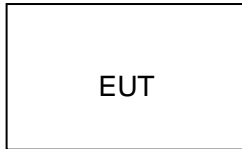
NO.	TEST MODE DESCRIPTION
1	920.85MHz channel TX_GFSK
<p>Note:</p> <ol style="list-style-type: none">1. All the test modes can be supply by battery, only the result of the worst case was recorded in the report, if no other cases.2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.3. Set the EUT into the individual test modes by pressing the EUT buttons.4. For battery operated equipment, the equipment tests are performed using a new battery.	

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



5.2 EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Vangoa wireless microphone	VM001	2BDWY-VM001	EUT

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249&15.209	Radiated Emission	Compliant
§15.249	Band Edges	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Not applicable

Note: The product is battery powered and does not need to consider conduction testing

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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	Feb. 18, 2023	Feb. 17, 2024
Signal Analyzer	Aglient	N9020A	MY52090123	Jun. 01, 2023	May 31, 2024
EXA Signal Analyzer	Agilent	N9010A	MY53470504	Jun. 01, 2023	May 31, 2024
2.4GHz Filter	EM Electronics	N/A	N/A	Mar. 18, 2022	Mar. 19, 2024
Attenuator	ZHINAN	E-002	N/A	Aug. 04, 2022	Aug. 03, 2024
Horn Antenna	SCHWARZBEC	BBHA9170	768	Sep. 24, 2023	Sep. 23, 2025
Active Loop Antenna (9K-30Mhz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 11, 2024
Double-Ridged Waveguide Horn	ETS	3117	00034609	Mar. 23, 2023	Mar. 22, 2024
Preamplifier	ETS	3117-PA	00246148	Aug. 04, 2022	Aug. 03, 2024
Wideband Antenna	SCHWARZBECK	VULB9168	VULB9168-494	Jan. 05, 2023	Jan. 04, 2024
Test Software	Tonscend	4.0.0.0	N/A	N/A	N/A

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7. RADIATED EMISSION

7.1. TEST LIMIT

Standard FCC15.249

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	

Remark:

- (1) Emission level dB μ V = 20 log Emission level μ V/m.
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use minimum resolution bandwidth of 1 MHz. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz RBW 2.4MHz/ VBW 8MHz for Peak, RBW 2.4MHz/3MHz for Average

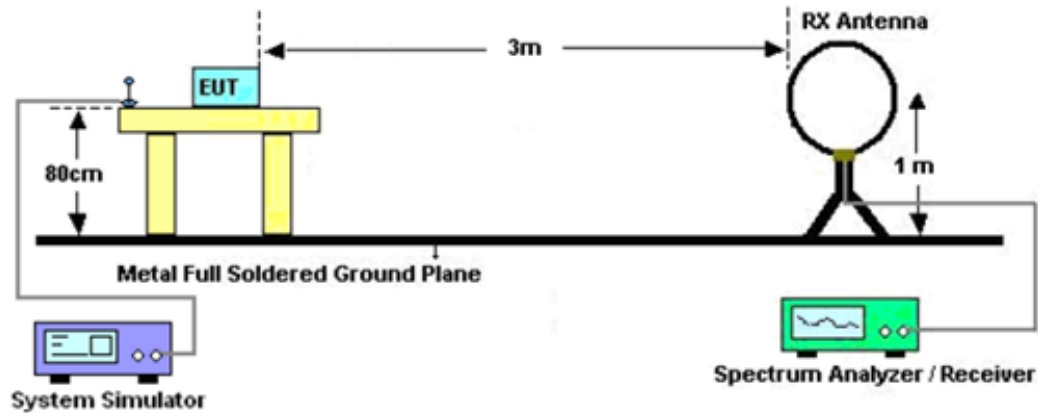
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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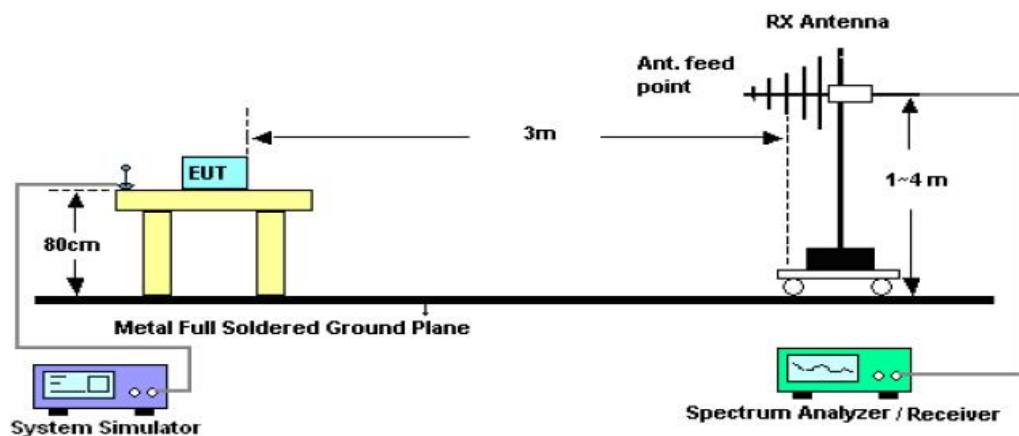
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7.3. TEST SETUP

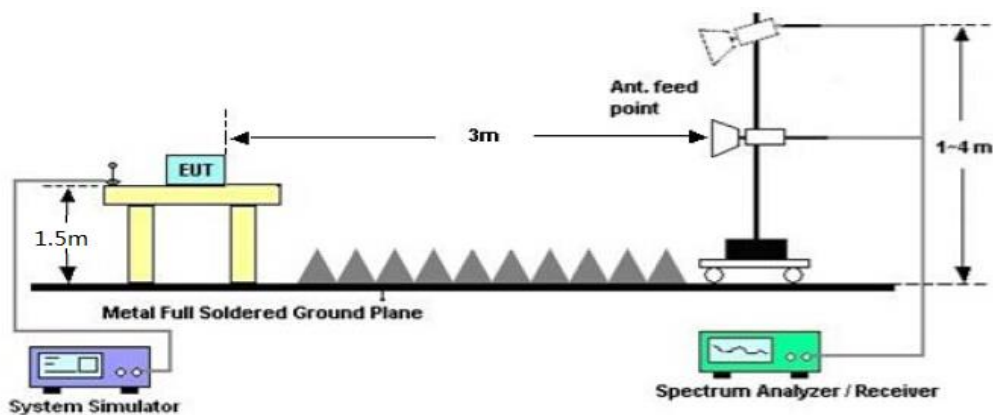
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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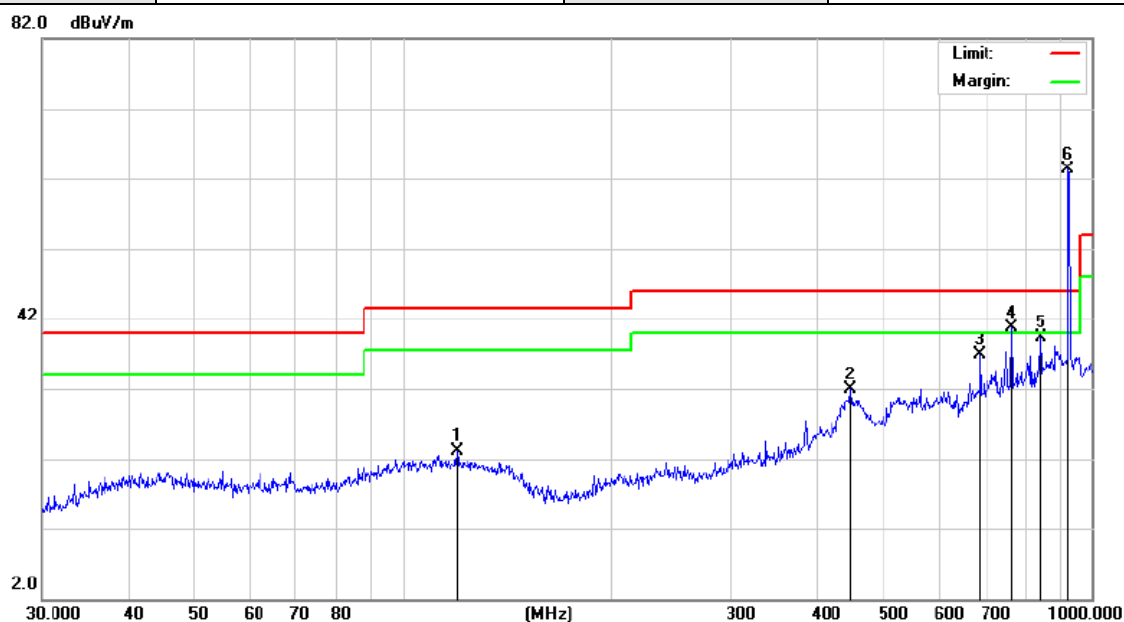
7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

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

RADIATED EMISSION 30MHz- 1GHZ

EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	24.6° C	Relative Humidity	61.7%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Mode	Mode 1	Polarization	Horizontal



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		119.8555	6.62	16.40	23.02	43.50	-20.48	peak
2		446.4141	6.96	24.88	31.84	46.00	-14.16	peak
3		687.1507	12.39	24.49	36.88	46.00	-9.12	peak
4	!	763.3757	15.43	25.23	40.66	46.00	-5.34	peak
5		842.1295	11.33	28.03	39.36	46.00	-6.64	peak
6	*	925.5157	34.34	29.00	63.34	46.00	17.34	peak

RESULT: PASS

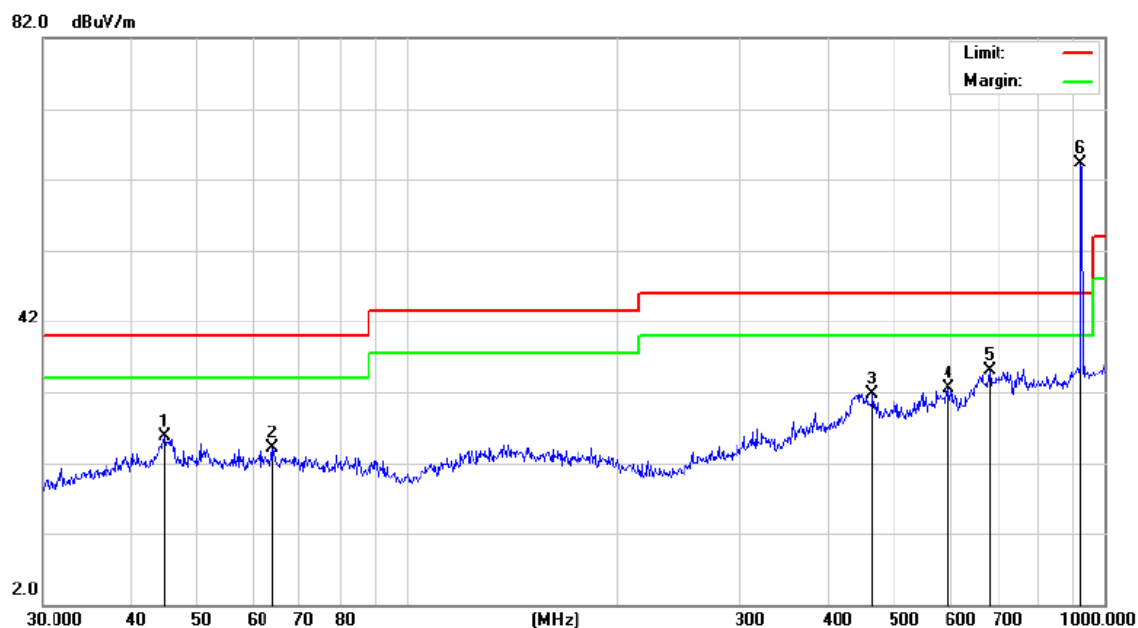
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EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	24.6° C	Relative Humidity	61.7%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Mode	Mode 1	Polarization	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		44.9004	8.75	16.95	25.70	40.00	-14.30	peak
2		63.9827	7.11	17.06	24.17	40.00	-15.83	peak
3		463.9696	6.88	24.92	31.80	46.00	-14.20	peak
4		597.2232	6.46	26.03	32.49	46.00	-13.51	peak
5		682.3483	7.33	27.75	35.08	46.00	-10.92	peak
6	*	925.5157	35.20	29.04	64.24	46.00	18.24	peak

RESULT: PASS

Note: Factor=Antenna Factor + Cable loss, Margin= Level-Limit.

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

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FIELD STRENGTH OF FUNDAMENTAL

EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	24.6° C	Relative Humidity	58.9%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Modulation	GFSK	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
925.85	-15.62	49.05	33.43	114.00	-80.57	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	24.6° C	Relative Humidity	58.9%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Modulation	GFSK	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
925.85	-15.70	49.05	33.35	114.00	-80.65	peak
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

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RADIATED EMISSION ABOVE 1GHZ

EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	24.6° C	Relative Humidity	58.9%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Mode	Mode 1	Polarization	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1830.2	49.85	3.76	53.61	74.00	-20.39	peak
1830.2	39.51	3.76	43.27	54.00	-10.73	AVG
2745.3	47.18	8.17	55.35	74.00	-18.65	peak
2745.3	34.15	8.17	42.32	54.00	-11.68	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	24.6° C	Relative Humidity	58.9%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Mode	Mode 1	Polarization	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1830.2	48.69	3.76	52.45	74.00	-21.55	peak
1830.2	36.41	3.76	40.17	54.00	-13.83	AVG
2745.3	45.85	8.17	54.02	74.00	-19.98	peak
2745.3	34.51	8.17	42.68	54.00	-11.32	AVG
Remark:						
Factor = Antenna Factor + Cable Loss – Pre-amplifier.						

RESULT: PASS

Note: The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Emission Level-Limit.

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

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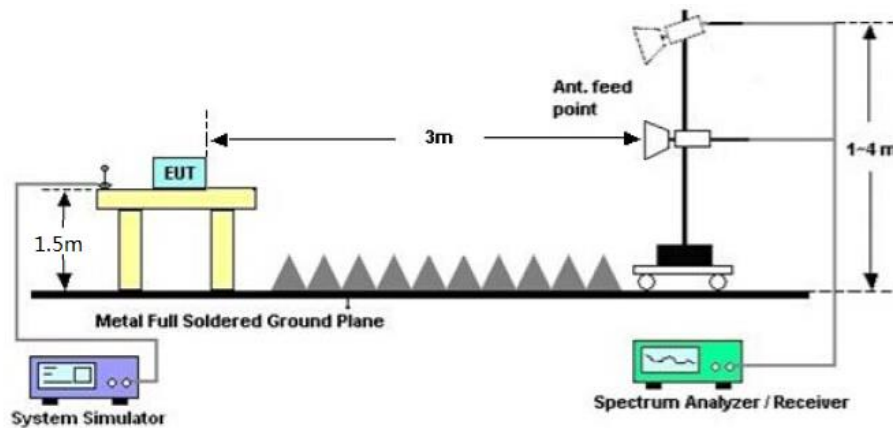
8. BAND EDGE EMISSION

8.1. MEASUREMENT PROCEDURE

1. The EUT operates at transmitting mode. The operate channel is tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
2. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: (a) PEAK: RBW=1MHz, VBW=3MHz / Sweep=AUTO
(b) AVERAGE: RBW=1MHz; VBW=3MHz / Sweep=AUTO
3. Other procedures refer to clause 7.2.

8.2. TEST SETUP

RADIATED EMISSION TEST SETUP



8.3 RADIATED TEST RESULT

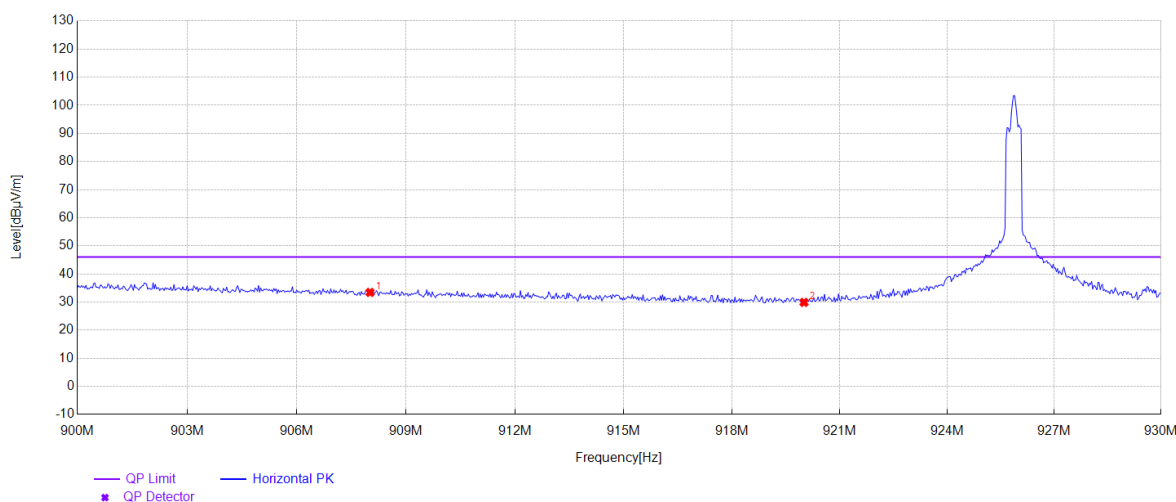
Note:

1. Factor=Antenna Factor + Cable loss - Amplifier gain. Field Strength=Factor + Reading level
2. The factor had been edited in the "Input Correction" of the Spectrum Analyzer. So the Amplitude of test plots is equal to Reading level plus the Factor in dB. Use the A dB(μ V) to represent the Amplitude. Use the F dB(μ V/m) to represent the Field Strength. So A=F.

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EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	22.9° C	Relative Humidity	58.5%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Mode	Mode 1	Polarization	Horizontal

Peak Value



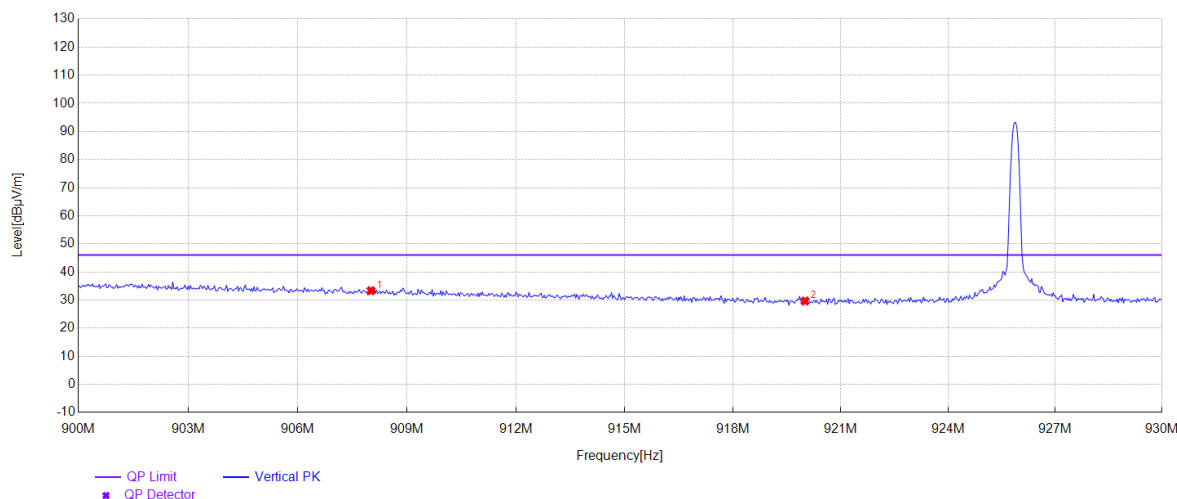
NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	908.01	33.43	28.01	46.00	12.57	100	359	Horizontal
2	920.01	29.90	24.58	46.00	16.10	100	126	Horizontal

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EUT	Vangoa wireless microphone	Model Name	VM001
Temperature	22.9° C	Relative Humidity	58.5%
Pressure	985kPa	Test Voltage	DC 3.0V by battery
Test Mode	Mode 1	Polarization	Vertical

Peak Value



NO.	Freq. [MHz]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	908.01	33.35	28.01	46.00	12.65	100	86	Vertical
2	920.01	29.65	24.58	46.00	16.35	100	225	Vertical

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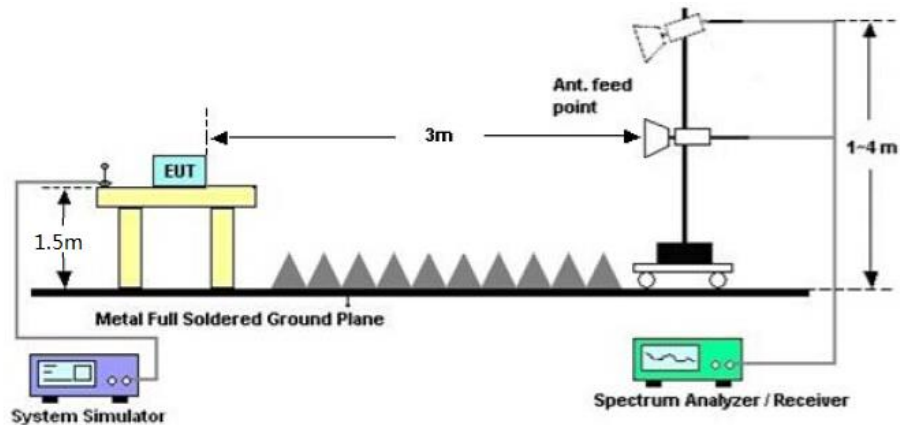
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9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
2. Set SPA Centre Frequency = Operation Frequency, RBW= 5.1kHz, VBW \geq 1 \times RBW.
3. Set SPA Trace 1 Max hold, then View.

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



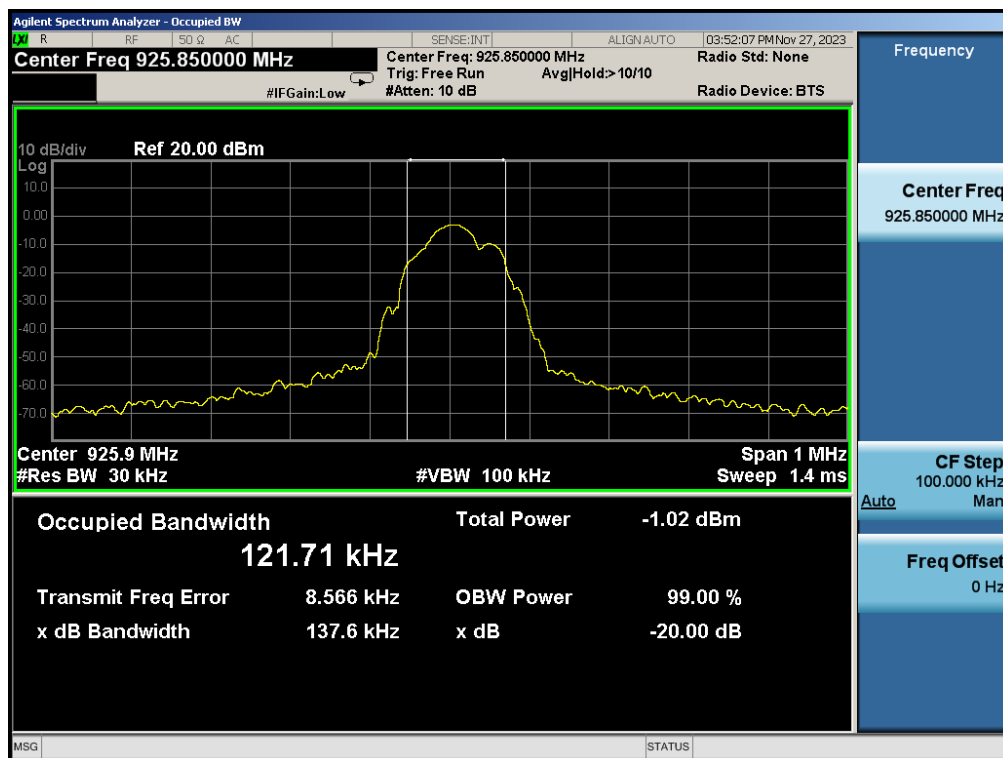
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9.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	GFSK

Test Channel (MHz)	20DB BANDWIDTH (kHz)	99% BANDWIDTH (kHz)	Criteria
925.85	137.60	121.71	PASS

TEST PLOT OF BANDWIDTH FOR 925.85MHz CHANNEL



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10. FCC LINE CONDUCTED EMISSION TEST

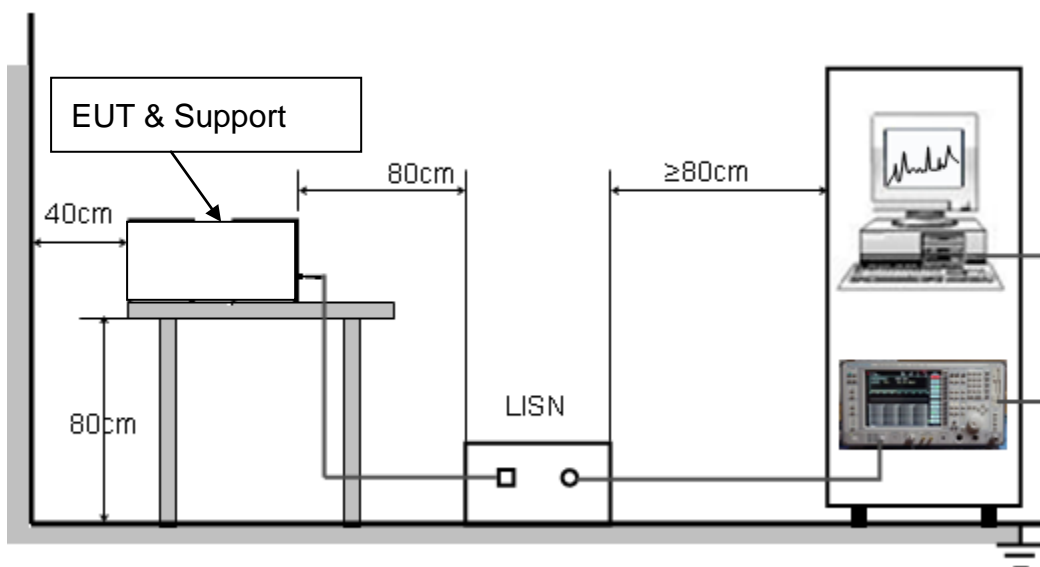
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note: 1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

10.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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10.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipment received AC120V/60Hz power from a LISN, if any.
5. The EUT received AC120V/60Hz power from a LISN.
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

10.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Note: Not applicable

APPENDIX I: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC13894230902AP01

APPENDIX II: PHOTOGRAPHS OF THE EUT

Refer to the Report No.: AGC13894230902AP02

----END OF REPORT----

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