



FCC TEST REPORT

FCC ID:2BRZL-MI104

Product : wireless microphone

Model Name : MI104, MI104A, MI104B,
MI104C, MI104D, MI104T

Brand : N/A

Report No. : NCT260051449E1-1

Prepared for

JUMBOAUDIO ELECTRONICS CO., LTD.

**NO. 15 YANGJIA , WANSHIXU VILLAGE, ZHUANGSHI STREET,
ZHENHAI DISTRICT, NINGBO,CHINA**

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name : JUMBOAUDIO ELECTRONICS CO., LTD.

Address : NO. 15 YANGJIA , WANSIXU VILLAGE, ZHUANGSHI STREET,
ZHENHAI DISTRICT, NINGBO,CHINA

Manufacture's name : JUMBOAUDIO ELECTRONICS CO., LTD.

Address : NO. 15 YANGJIA , WANSIXU VILLAGE, ZHUANGSHI STREET,
ZHENHAI DISTRICT, NINGBO,CHINA

Product name : wireless microphone

Model name : MI104, MI104A, MI104B, MI104C, MI104D, MI104T

Standards : FCC CFR47 Part 15 Section 15.236

Test procedure : ANSI C63.10-2020+Cor 1-2023

Date of test : Mar. 03, 2026-Apr. 07, 2026

Date of Issue : Apr. 07, 2026

This device described above has been tested by NCT, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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Test Engineer:

Keven Wu



Technical Manager:

Henry Wang / Manager



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1. VERSION

Report No.	Version	Description	Approved
NCT260051449E1-1	Rev.01	Initial issue of report	Apr. 07, 2026

2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.236) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.203	Antenna Requirement	N/A	
15.207	Conducted Emission	N/A	
15.236(d)(1)	Maximum Radiated Power(EIRP)	PASS	
15.236(g)	Radiated Spurious Emission Measurement	PASS	
15.236(g)	Spurious Emission at Antenna Port	PASS	
15.236(f)(2)	Occupied Bandwidth Emission	PASS	
15.236(f)(3)	Frequency Stability	PASS	

NOTE:

(1)" N/A" denotes test is not applicable in this Test Report

2.1 TEST FACILITY

Site Description

EMC Lab. : Accredited by CNAS, 2022-09-27
The certificate is valid until 2028.01.07
The Laboratory has been assessed and proved to be in compliance with
CNAS-CL01:2006 (identical to ISO/IEC 17025:2017)
The Certificate Registration Number is L8251
Designation Number: CN1347
Test Firm Registration Number: 894804
Accredited by A2LA, June 14, 2023
The Certificate Registration Number is 6837.01

Accredited by Industry Canada, November 09, 2018
The Conformity Assessment Body Identifier is CN0150
Company Number: 30806
Name of Firm : Shenzhen NCT Testing Technology Co., Ltd.
Site Location : A101&2F B2, Fuqiao 6th Area, Xintian Community, Fuhai Street, Baoan
District, Shenzhen, People's Republic of China

2.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Parameter	Uncertainty
RF output power, conducted	$\pm 1.0\text{dB}$
Power Spectral Density, conducted	$\pm 2.2\text{dB}$
Radio Frequency	$\pm 1 \times 10^{-6}$
Bandwidth	$\pm 1.5 \times 10^{-6}$
Time	$\pm 2\%$
Duty Cycle	$\pm 2\%$
Temperature	$\pm 1^\circ\text{C}$
Humidity	$\pm 5\%$
DC and low frequency voltages	$\pm 3\%$
Conducted Emissions (150kHz~30MHz)	$\pm 3.64\text{dB}$
Radiated Emission(9KHz~30MHz)	$\pm 4.51\text{dB}$
Radiated Emission(30MHz~1GHz)	$\pm 5.03\text{dB}$
Radiated Emission(1GHz~25GHz)	$\pm 4.74\text{dB}$
Remark: The coverage Factor ($k=2$), and measurement Uncertainty for a level of Confidence of 95%	

3.GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

Equipment	wireless microphone
Model Name	MI104
Serial Model	MI104A, MI104B, MI104C, MI104D, MI104T
Model Difference	All models are the same except for the model name and color.
Hardware version	N/A
Software version	N/A
Operation Frequency:	470.1-607.9MHz
Modulation Type:	DQPSK
Declared BW:	200KHz
Antenna Type:	Spring antenna
Antenna Gain:	-2.71 dBi
Ratings	DC 3V by 2*AA battery
Remark: the Antenna gain is provided by customer from Antenna spec. and the laboratory will not be responsible for the accumulated calculation results which covers the information provided by the applicant.	

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting. Only the worst case data were reported.

The EUT has been associated with peripherals pursuant to ANSIC63.10-2020+Cor 1-2023 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The details of test channels and bandwidth were for RF conductive measurement.

Operation Frequency each of channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	470.1	03	512.3	05	554.5	07	596.7
02	491.2	04	533.4	06	575.6	08	607.9

Note:

1. Test of channel was included the lowest, middle and highest frequency in highest data rate and to perform the test, then record on this report.

	Channel	Frequency(MHz)
Low Channel	01	470.1
Mid Channel	04	533.4
High Channel	08	607.9

3.2 DESCRIPTION OF TEST MODES

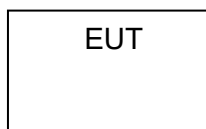
For All Emission	
Final Test Mode	Description
Transmitting mode	Keep the EUT in continuously transmitting mode

Note:

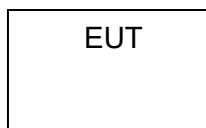
- (1) Fully-charged battery is used during the test

3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Spurious emissions

**3.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)**

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Adapter	OMIX	X2904	04A3650000024	Auxiliary

Item	Shielded Type	Ferrite Core	Length	Note

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

3.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiated emission & Radio Frequency Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
966 Shielded Room	966 Room	/	EMToni	2025/1/17	2028/1/16
EMI Test Receiver	ESCI	101178	Rohde & Schwarz	2025/6/10	2026/6/09
Amplifier (30MHz-1GHz)	BBV 9743 B	00374	SCHWARZBECK	2025/6/10	2026/6/09
Bilog Antenna (30MHz-1GHz)	VULB9162	00473	SCHWARZBECK	2026/3/07	2027/3/06
Horn antenna (1GHz-18GHz)	BBHA 9120 D	02622	SCHWARZBECK	2026/3/07	2027/3/06
Preamplifier (1GHz-18GHz)	BBV 9718D	0024	SCHWARZBECK	2025/6/10	2026/6/09
Spectrum Analyzer (10Hz-40GHz)	FSV 40	100952	Rohde & Schwarz	2025/6/10	2026/6/09
Preamplifier (18GHz-40GHz)	BBV 9721	0056	SCHWARZBECK	2025/6/10	2026/6/09
Double Ridge Guide Horn Antenna (18GHz-40GHz)	SAS-574	588	A.H.System	2026/3/07	2027/3/06
Loop Antenna (9KHz-30MHz)	FMZB1519B	014	SCHWARZBECK	2025/6/13	2026/6/12
Amplifier (9KHz-30MHz)	CVP 9222 C	00109	SCHWARZBECK	2025/6/10	2026/6/09
MXG Signal Analyzer	N9020A	MY50510202	Agilent	2025/6/10	2026/6/09
MXG Vector Signal Generator	N5182A	MY50140020	Agilent	2025/6/10	2026/6/09
MXG Analog Signal Generator	N5181A	MY47420919	Agilent	2025/6/10	2026/6/09
Power Sensor	TR1029-2	512364	Techoy	2025/6/10	2026/6/09
RF Switch	TR1029-1	512364	Techoy	2025/6/10	2026/6/09
Cable	DA800- 4000MM	NA	DA	2025/6/10	2026/6/09
Cable	DA800- 11000MM	NA	DA	2025/6/10	2026/6/09
Thermotank	OJN-9606	/	Zhongheng	2026/2/18	2027/2/17

Conducted emission Test Equipment

Name	Model No.	Serial No.	Manufacturer	Date of Cal.	Due Date
944 Shielded Room	944 Room	/	EMToni	2025/1/17	2028/1/16
EMI Test Receiver	ESPI	101604	Rohde & Schwarz	2025/6/10	2026/6/09
LISN	ENV 216	102796	Rohde & Schwarz	2025/6/10	2026/6/09
LISN	VN1-13S	004023	CRANAGE	2025/6/10	2026/6/09
Cable	RG223-1500MM	NA	RG	2025/6/10	2026/6/09

Other

Item	Name	Manufacturer	Model	Software version
1	EMC Conduction Test System	FALA	EZ-EMC	Ver.EMC-CON 3A1.1+
2	EMC radiation test system	FALA	EZ-EMC	Ver.FA-03A2 RE+
3	RF test system	TACHOY	RFTest	V1.0.0
4	RF communication test system	TACHOY	RFTest	V1.0.0

4. EMC EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10-2020+Cor 1-2023
Test Frequency Range:	150KHz to 30MHz
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto

4.1.1 POWER LINE CONDUCTED EMISSION LIMITS

(Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Limit (dBuV)		Standard
	Quasi-peak	Average	
0.15 -0.5	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	56.00	46.00	FCC
5.0 -30.0	60.00	50.00	FCC

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

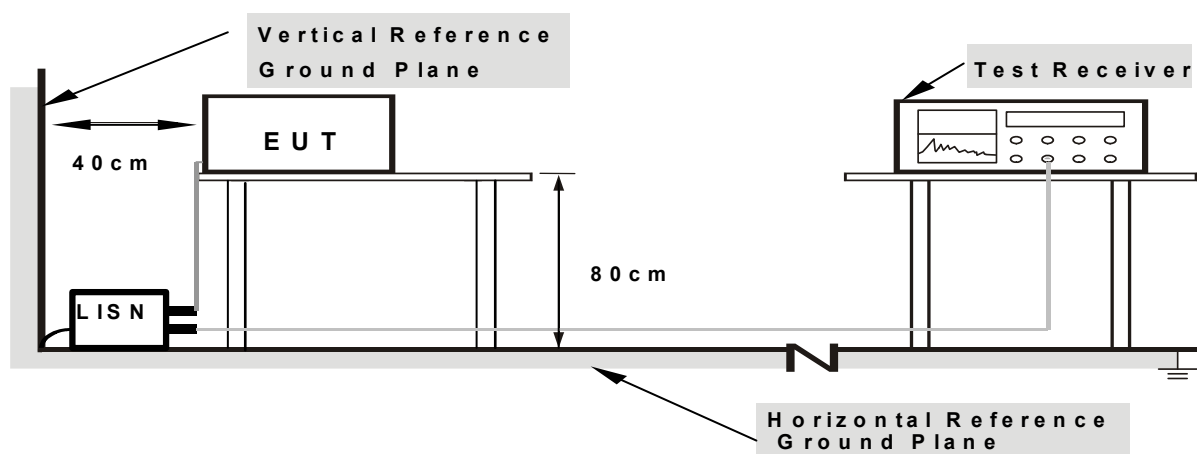
4.1.2 TEST PROCEDURE

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

4.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.1.6 TEST RESULTS

N/A , Because The power from Battery(2*AA)

4.2 RADIATED EMISSION MEASUREMENT

Test Requirement:	ETSI EN 300 422-1 V2.2.1 (2021-11)				
Test Method:	ANSI C63.10-2020+Cor 1-2023				
Test Frequency Range:	9kHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Value
	9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
	150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak
	Above 1GHz	Peak	1MHz	3MHz	Peak
		Peak	1MHz	10Hz	Average

4.2.1 RADIATED EMISSION LIMITS

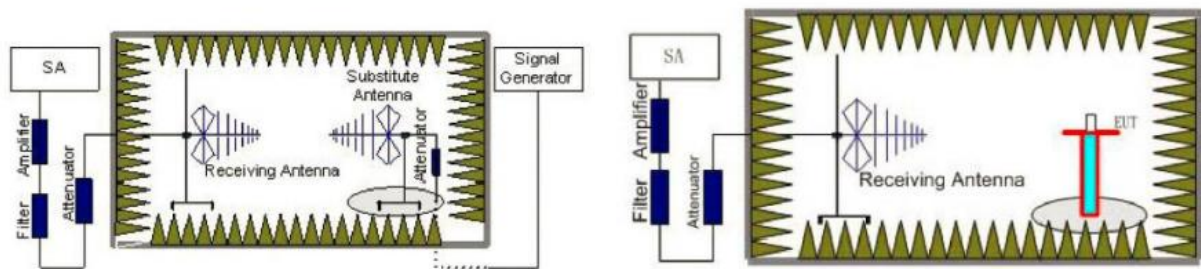
According to 15.236(g)

Frequency range	Maximum power	RBW
9 kHz - 150 kHz	-36 dBm	1 kHz
150 kHz - 30 MHz	-36 dBm	10 kHz
30 MHz - 1 GHz	-36 dBm	$F_c + 2,5 B \leq f \leq f_c + 4 B$: 1 kHz $F_c + 4 B < f \leq f_c + 10 B$: 10 kHz $f > f_c + 10 B$: 100 kHz $f < f_c - 10 B$: 100 kHz $f_c - 10 B \leq f < f_c - 4 B$: 10 kHz $f_c - 4 B \leq f \leq f_c - 2,5 B$: 1 kHz
except:		
47 MHz - 74 MHz	-54 dBm	100 kHz
87,5 MHz - 118 MHz		
174 MHz - 230 MHz	-54 dBm	$F_c + 2,5 B \leq f \leq f_c + 4 B$: 1 kHz $F_c + 4 B < f \leq f_c + 10 B$: 10 kHz $f > f_c + 10 B$: 100 kHz $f < f_c - 10 B$: 100 kHz $f_c - 10 B \leq f < f_c - 4 B$: 10 kHz $f_c - 4 B \leq f \leq f_c - 2,5 B$: 1 kHz
470 MHz - 862 MHz		
$1 \text{ GHz} < f \leq F_{\text{upper}}$	-30 dBm	$F_c + 2,5 B \leq f \leq f_c + 10 B$: 30 kHz $F_c + 10 B < f \leq f_c + 12 B$: 300 kHz $f > f_c + 12 B$: 1 MHz $f < f_c - 12 B$: 1 MHz $f_c - 12 B \leq f < f_c - 10 B$: 300 kHz $f_c - 10 B \leq f \leq f_c - 2,5 B$: 30 kHz

4.2.2 DEVIATION FROM TEST STANDARD

No deviation

4.2.3 TEST SETUP



Frequency :9kHz-30MHz
RBW=10KHz,
VBW =30KHz
Sweep time= Auto
Trace = max hold
Detector function = peak

Frequency :30MHz-1GHz
RBW=120KHz,
VBW=300KHz
Sweep time= Auto
Trace = max hold
Detector function = peak

Frequency :Above 1GHz
RBW=1MHz,
VBW=3MHz(Peak), 10Hz(AV)
Sweep time= Auto
Trace = max hold
QP Detector function = peak, AV

4.2.4 TEST PROCEDURE

1. The EUT was placed on a turntable with 1.5m height
2. The test distance between the receiving antenna and the EUT is 3 meter, while the receiving (test)antenna is kept at 1.5 meter height.
3. Set EUT in continuous transmitting with maximum output power at test frequency.
4. The table was rotated from 0 to 360 degree to search the highest radiated emission.
5. Repeat step 3 to 4 for each polarization and test channel to find the worst emission level
6. The results obtained are compared to the limits in order to prove compliance with the requirement

4.2.5 TEST RESULTS

Radiated Spurious Emission (9KHz-30MHz)

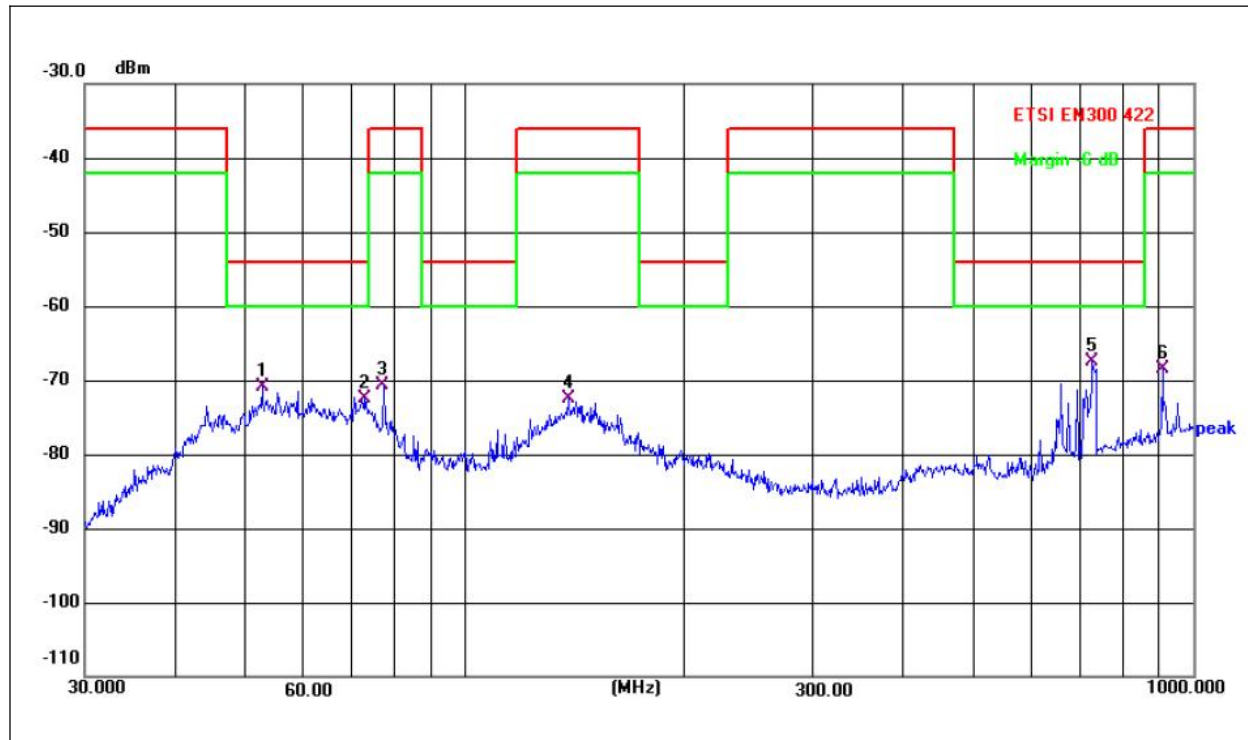
Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV/m)	Limit 3m (dBuV/m)	Over (dB)
--	--	--	--	>20

Note:

1. The amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.
2. Distance extrapolation factor = $40 \log(\text{Specific distance} / \text{test distance})$ (dB);
3. Limit line = Specific limits(dBuV) + distance extrapolation factor.

Radiated Spurious Emission (Between 30MHz – 1GHz)

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Horizontal
Test Voltage :	DC 3V		
Test Mode :	TX Mode (Low Channel)		

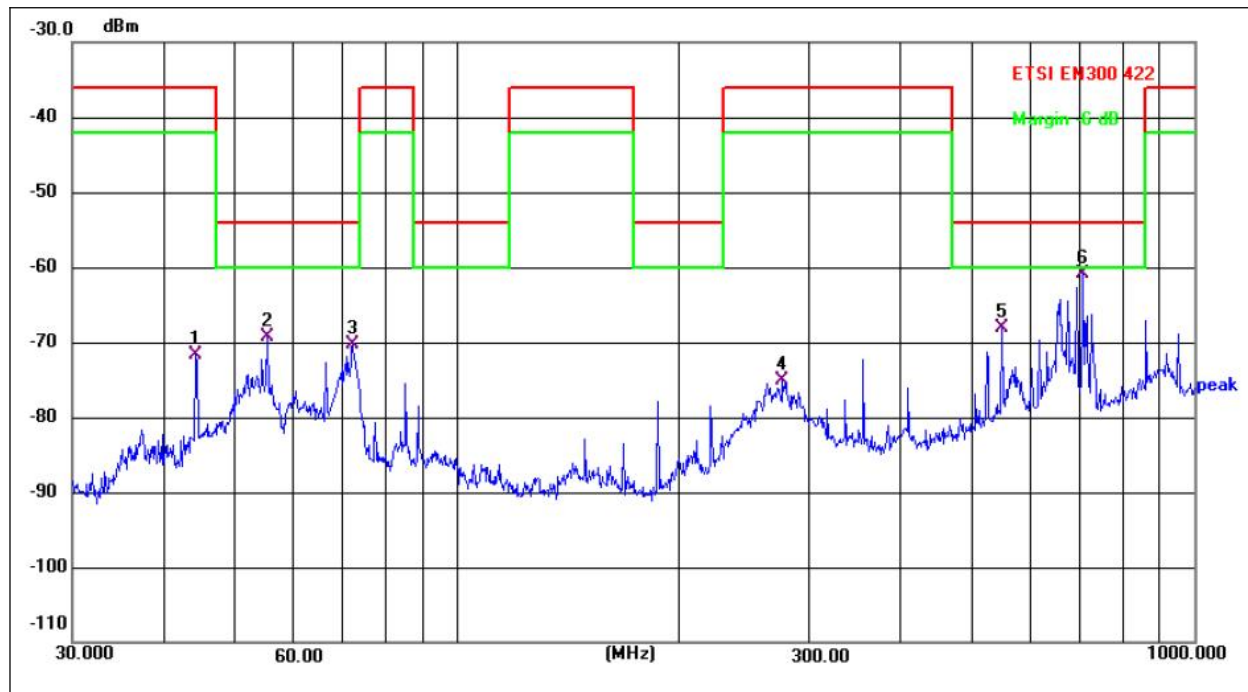


No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
1	52.5752	-59.49	-11.50	-70.99	-54.00	-16.99	QP
2	72.5915	-59.82	-12.68	-72.50	-54.00	-18.50	QP
3	77.3210	-56.85	-13.87	-70.72	-36.00	-34.72	QP
4	138.3873	-62.27	-10.31	-72.58	-36.00	-36.58	QP
5	726.8052	-69.10	1.56	-67.54	-54.00	-13.54	QP
6	906.4823	-72.88	4.42	-68.46	-36.00	-32.46	QP

Remarks:

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- 2.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3.All the modes have tested and record the worst mode(Low Channel) in the report.

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Vertical
Test Voltage :	DC 3V		
Test Mode :	TX Mode (Low Channel)		



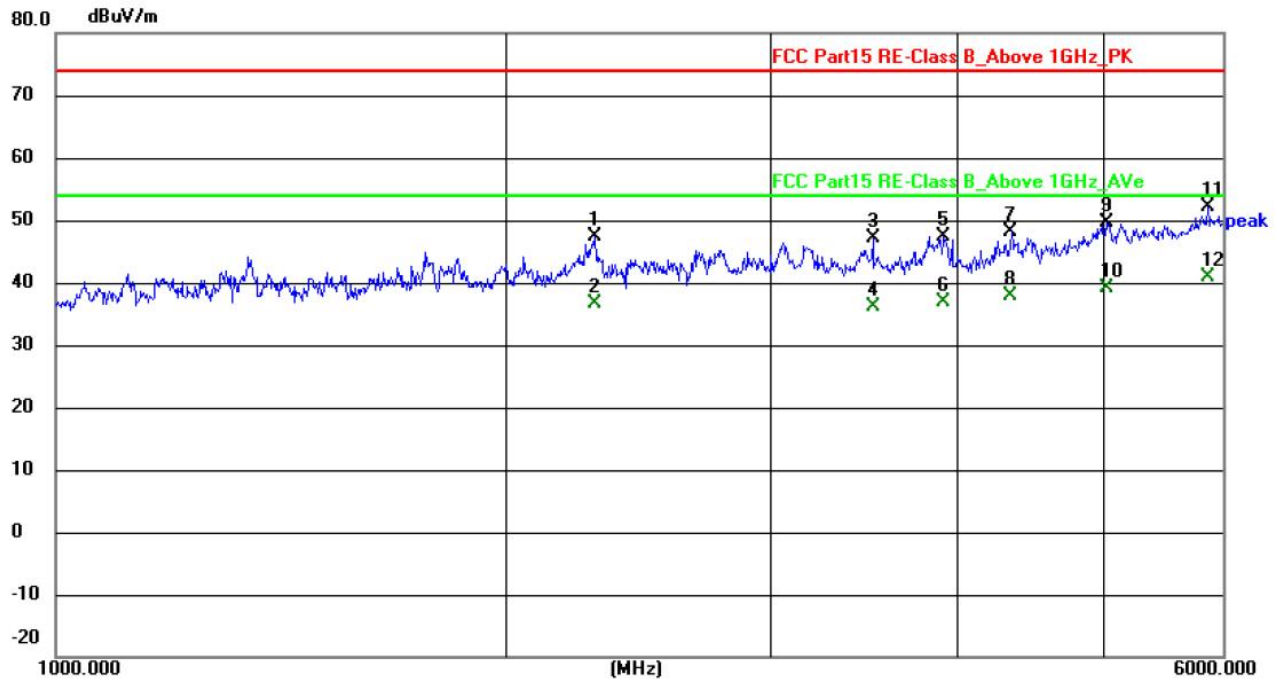
No.	Frequency (MHz)	Reading (dBm)	Factor (dB)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
1	44.1202	-60.70	-10.98	-71.68	-36.00	-35.68	QP
2	55.2207	-56.27	-12.95	-69.22	-54.00	-15.22	QP
3	72.0843	-54.89	-15.37	-70.26	-54.00	-16.26	QP
4	276.1235	-62.22	-12.82	-75.04	-36.00	-39.04	QP
5	547.0976	-64.31	-3.87	-68.18	-54.00	-14.18	QP
6	706.6998	-60.98	-0.01	-60.99	-54.00	-6.99	QP

Remarks:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.
3. All the modes have tested and record the worst mode (Low Channel) in the report.

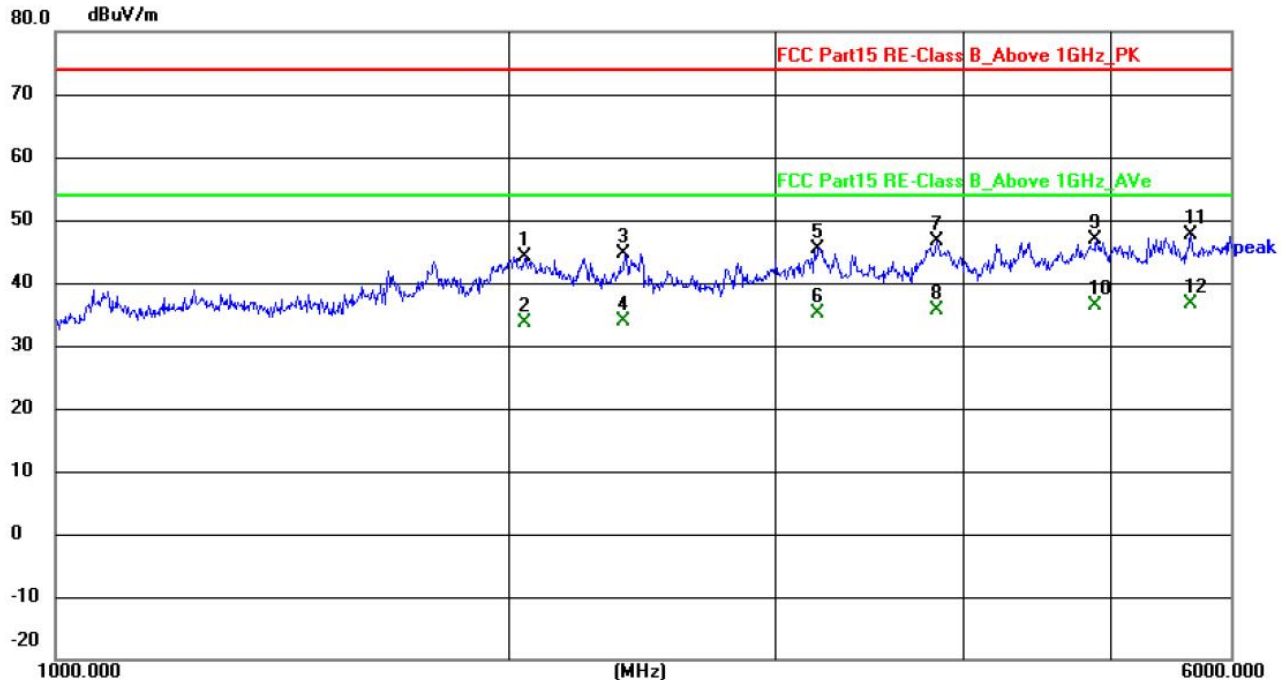
Radiated Spurious Emission (Above 1GHz)

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Horizontal
Test Voltage :	DC 3V		
Test Mode :	TX Mode (Low Channel)		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2288.263	50.58	-3.29	47.29	74.00	-26.71	peak
2	2288.263	39.81	-3.29	36.52	54.00	-17.48	AVG
3	3505.144	45.99	1.02	47.01	74.00	-26.99	peak
4	3505.144	35.09	1.02	36.11	54.00	-17.89	AVG
5	3909.967	45.44	1.99	47.43	74.00	-26.57	peak
6	3909.967	34.80	1.99	36.79	54.00	-17.21	AVG
7	4338.163	44.80	3.39	48.19	74.00	-25.81	peak
8	4338.163	34.39	3.39	37.78	54.00	-16.22	AVG
9	5015.753	44.35	5.25	49.60	74.00	-24.40	peak
10	5015.753	33.80	5.25	39.05	54.00	-14.95	AVG
11	5861.858	44.33	7.79	52.12	74.00	-21.88	peak
12	5861.858	33.09	7.79	40.88	54.00	-13.12	AVG

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101 kPa	Polarization :	Vertical
Test Voltage :	DC 3V		
Test Mode :	TX Mode (Low Channel)		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	2047.672	48.32	-4.27	44.05	74.00	-29.95	peak
2	2047.672	37.83	-4.27	33.56	54.00	-20.44	AVG
3	2380.264	47.77	-3.10	44.67	74.00	-29.33	peak
4	2380.264	37.00	-3.10	33.90	54.00	-20.10	AVG
5	3199.044	45.20	0.25	45.45	74.00	-28.55	peak
6	3199.044	34.77	0.25	35.02	54.00	-18.98	AVG
7	3833.659	44.85	1.77	46.62	74.00	-27.38	peak
8	3833.659	33.93	1.77	35.70	54.00	-18.30	AVG
9	4891.499	41.91	4.90	46.81	74.00	-27.19	peak
10	4891.499	31.57	4.90	36.47	54.00	-17.53	AVG
11	5645.392	40.30	7.22	47.52	74.00	-26.48	peak
12	5645.392	29.41	7.22	36.63	54.00	-17.37	AVG

Remarks:

- 1.Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
- 2.The emission levels of other frequencies are very lower than the limit and not show in test report.
- 3.All the modes have tested and record the worst mode(Low Channel) in the report.

5. MAXIMUM RADIATED POWER(EIRP)**5.1 APPLIED PROCEDURES / LIMIT**

ACCORDING TO FCC 15.236(D)(1), FOR LOW POWER AUXILIARY STATION OPERATING IN THE 470-608, AND 614-698 MHZ BANDS, IN THE BANDS ALLOCATED AND ASSIGNED FOR BROADCAST TELEVISION AND IN THE 600 MHZ SERVICE BAND: 50 MW EIRP

5.2 TEST PROCEDURE

1. THE MAXIMUM PEAK OUTPUT POWER WAS MEASURED WITH A SPECTRUM ANALYZER CONNECTED TO THE ANTENNA TERMINAL WHILE EUT WAS OPERATING IN UNMODULATED SITUATION.
2. POWER WAS SUPPLIED TO THE BATTERY INPUT CONNECTOR A POWER SUPPLY. THE POWER SUPPLY WAS SET FOR +3.0VDC. THE SPECTRUM ANALYZER WAS CONNECTED AT ANTENNA TERMINAL TO MEASURE RF POWER OF THE CARRIER.
3. A MULTIMETER WAS CONNECTED IN SERIES WITH FINAL RF STAGE TO MEASURE THE CURRENT; A MULTIMETER WAS USED TO MEASURE FINAL RF STAGE SUPPLY VOLTAGE. THEN THE VOLTAGE V.S. CURRENT OF THE FINAL RF STAGE CAN BE SHOWN.

5.3 DEVIATION FROM STANDARD

No deviation.

5.4 TEST SETUP**5.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

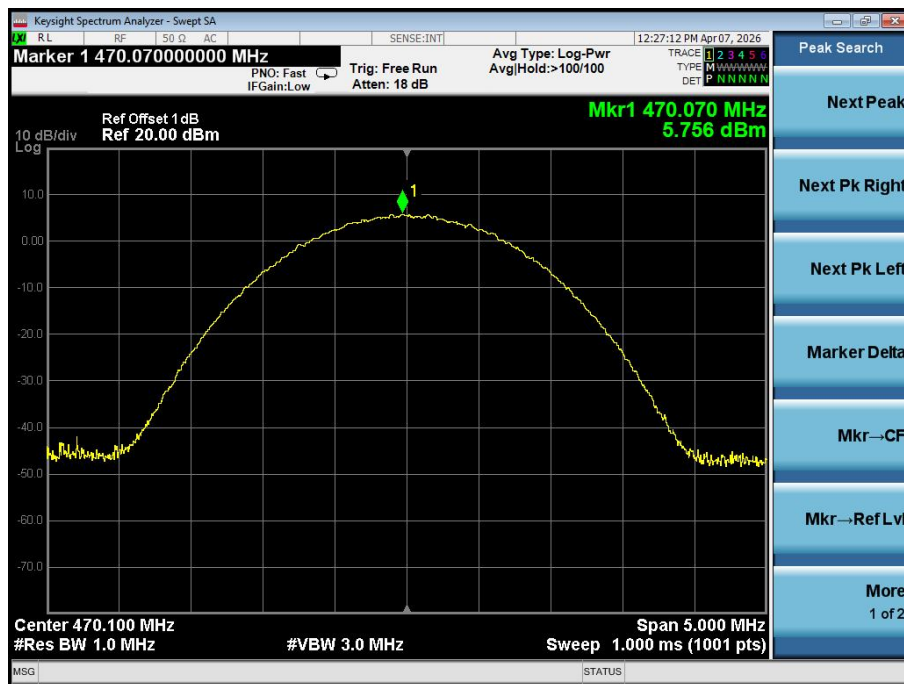
5.6 TEST RESULTS

Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 3V

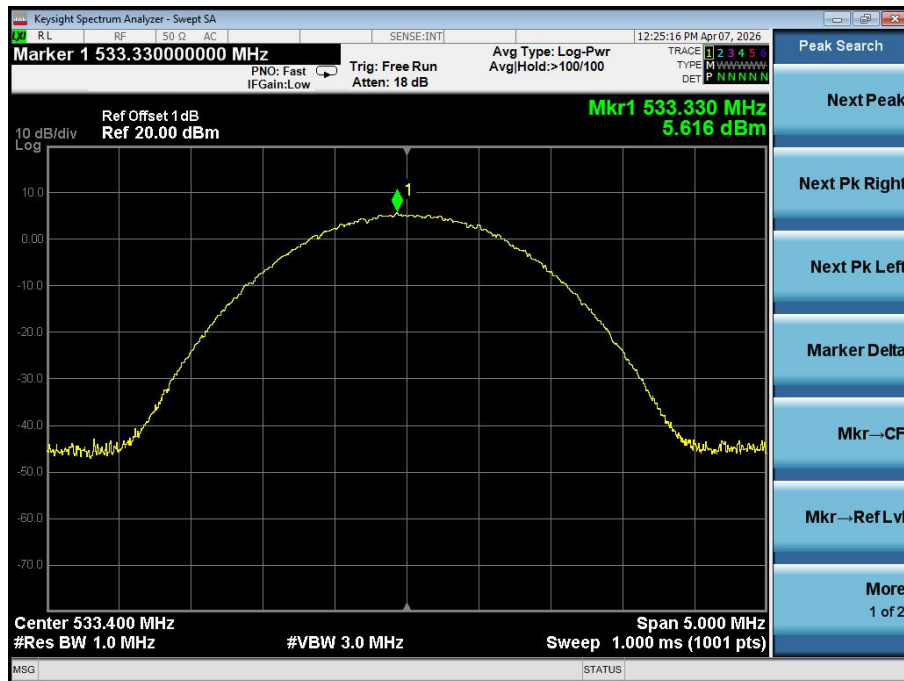
Channel	CONDUCTED OUTPUT POWER (dBm)	ANT GAIN (dBi)	EIRP (dBm)	Limit (dBm)	Result
Low	5.756	-2.71	3.046	17	PASS
Mid	5.616	-2.71	2.906	17	PASS
High	3.283	-2.71	0.573	17	PASS

Remark: cable loss is 1dBm, It has been compensated in the test diagram.

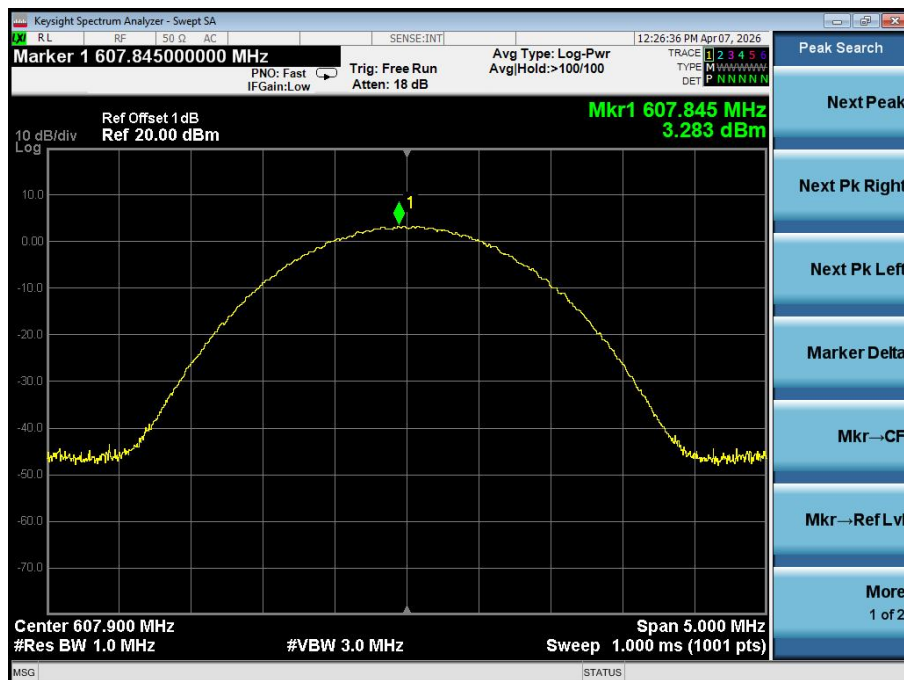
Low Channel



Mid Channel



High Channel



6. CHANNEL BANDWIDTH**6.1 APPLIED PROCEDURES / LIMIT**

According to FCC 15.236(f)(1), The operating frequency within a permissible band of operation 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.

6.2 TEST PROCEDURE

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;
2. Set the spectrum analyzer: RBW = 1%-5% OBW, VBW $\geq$ 3 RBW
3. Mark the -20dB&99% BANDWIDTH

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP**6.5 EUT OPERATION CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

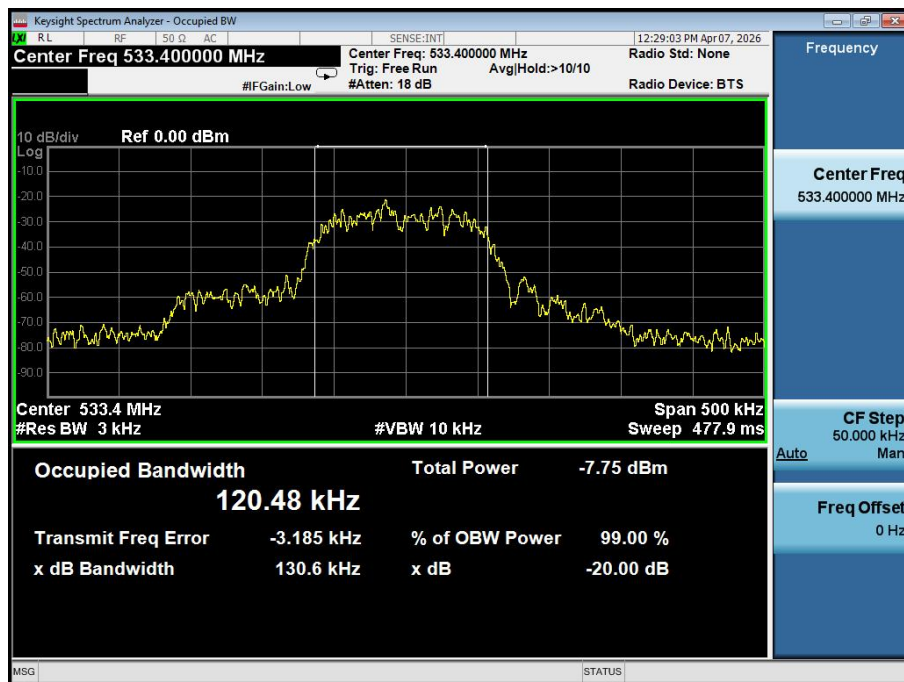
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	101kPa	Test Voltage :	DC 3V

Channel	99% bandwidth (KHz)	-20 bandwidth (KHz)	Limit (KHz)	Result
Low	122.31	134.8	200	Pass
Mid	120.48	130.6	200	Pass
High	122.33	130.9	200	Pass

Low Channel



Mid Channel



High Channel



7. NECESSARY BANDWIDTH

7.1 LIMIT

The following limits are applicable, where B is the Declared Channel Bandwidth.

The mean Power Density, measured with 1 kHz measurement bandwidth and RMS detector, of the transmitter unwanted emissions shall not exceed the limits of the masks provided in figure 1 for equipment employing analogue modulation and figure 2 for equipment employing digital modulation, but excluding WMAS.

The limits in figures 1 and 2 are relative to the transmitter RF output power according to clauses 4.2.1 and 5.4.1.

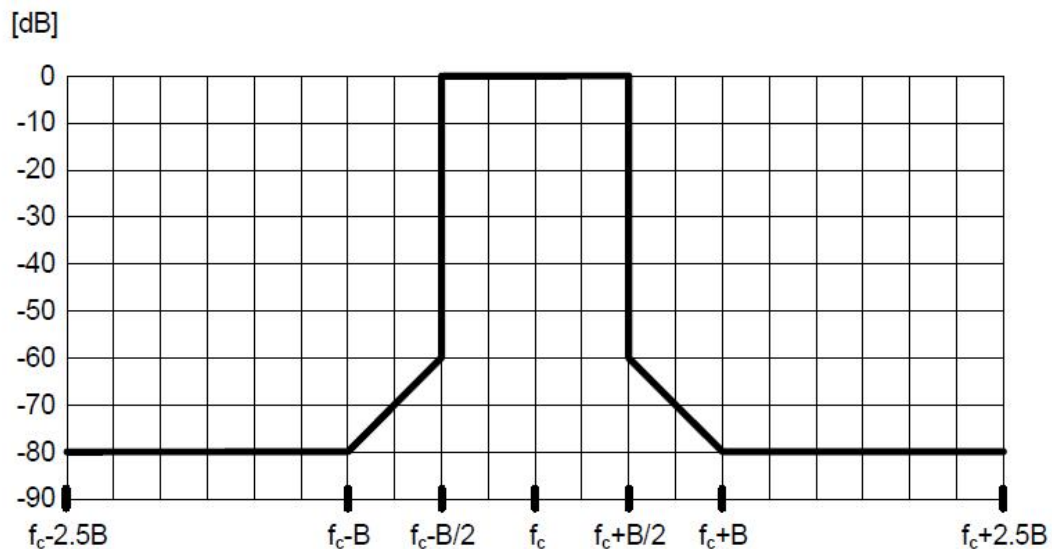


Figure 1: Transmit spectral power mask for equipment employing analogue modulation, RBW = 1 kHz

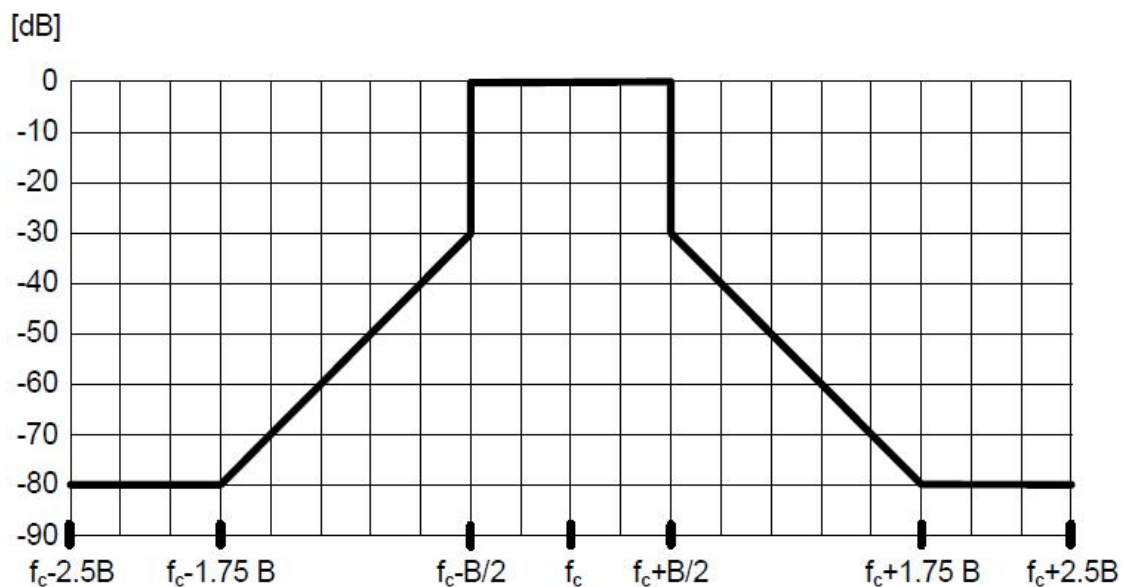


Figure 2: Transmit spectral power mask for equipment employing digital modulation, except WMAS, RBW = 1 kHz

The limits in figure 3 are applicable for WMAS, where B is the Declared Channel Bandwidth. The mean Power Density, measured with 100 kHz measurement bandwidth and PEAK detector, of the transmitter unwanted emissions shall not exceed the limits of the mask provided in figure 3. The limits in figure 3 are relative to transmitter RF output power according to clauses 4.2.1 and 5.4.1.

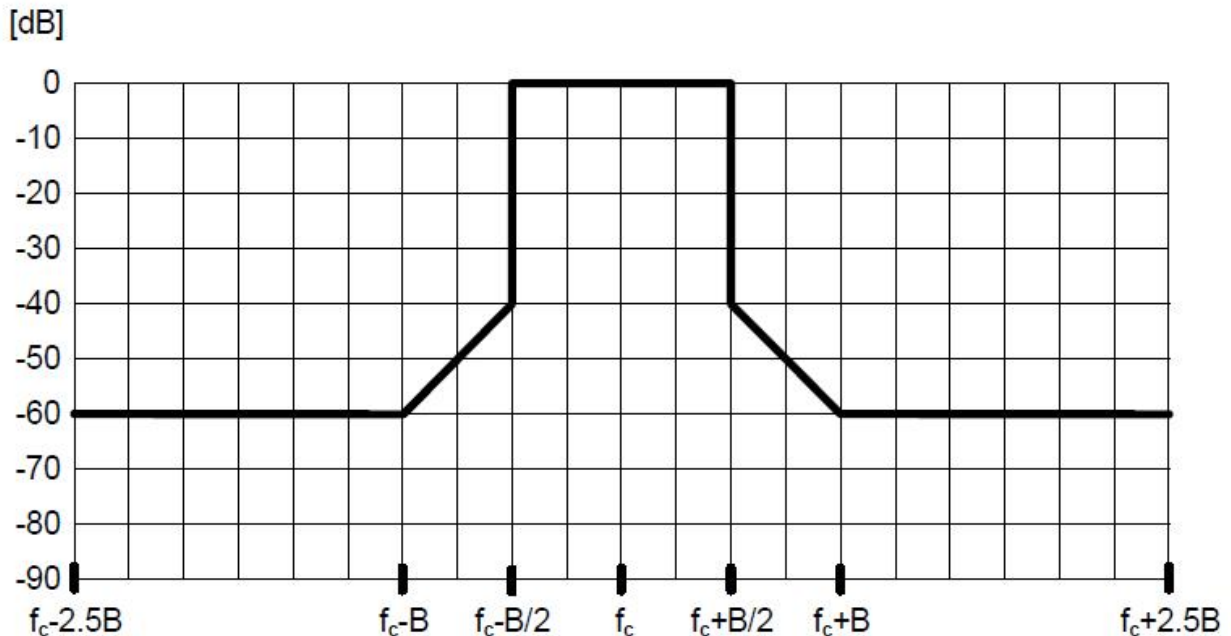


Figure 3: Transmit spectral power mask for WMAS, RBW = 100 kHz

The limits in figure 3 are provided with RBW = 100 kHz. The relevant measurements can also be performed with other RBW for certain ranges of B as given in table 3, accounting that the relevant limit given under RBW= 100 kHz needs to be converted appropriately by adding $c = 10 \times \log_{10}(\text{RBW}/100 \text{ kHz})$ for correction.

Table 6: Correction factor for different B and applicable RBW

B	RBW, VBW	c = correction factor
$B < 2 \text{ MHz}$	10 kHz	-10 dB
$2 \text{ MHz} \leq B < 5 \text{ MHz}$	25 kHz	-7 dB
$5 \text{ MHz} \leq B \leq 20 \text{ MHz}$	100 kHz	0 dB

Standard Applicable

According to §15.236 (g)(4):

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).

7.2 TEST SETUP



7.3 TEST PROCEDURE

For equipment with continuous transmission

The settings of the spectrum analyser shall be:

Centre Frequency = f_{cm} (actual centre frequency)

Span = $5 \times B$

RBW = 1 kHz

VBW=1kHz

Sweep Points > Span/RBW

Detector = RMS

Trace Mode = Clear Write

Measurement Time > 20 s

Sweep Time = Measurement Time

Sweep Mode = Single sweep

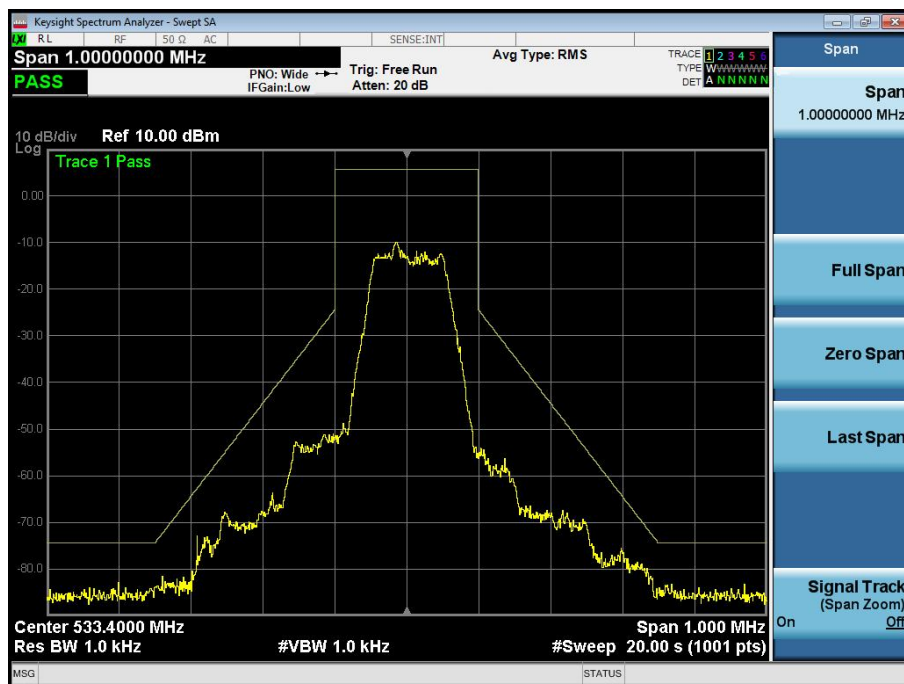
NOTE: If the DUT does not provide an unmodulated carrier to measure the actual centre frequency f_{cm} according to clause 5.4.2, the declared centre frequency f_c can be used

7.4 TEST RESULTS

Low Channel



Mid Channel



High Channel



8. FREQUENCY STABILITY

8.1 Limit

$$\pm 0.005\% \times 470.1\text{MHz} = 23.51\text{ KHz}$$

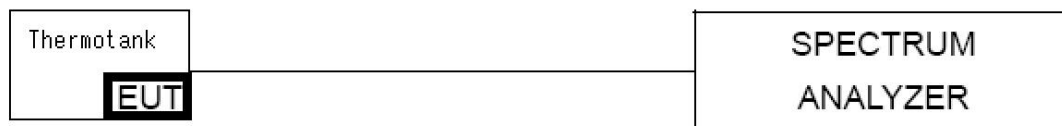
$$\pm 0.005\% \times 579.1\text{MHz} = 26.67\text{KHz}$$

$$\pm 0.005\% \times 578.25\text{MHz} = 30.40\text{KHz}$$

8.2 Standard Applicable

According to FCC 15.236(f)(1)(iii), The frequency tolerance of the carrier signal shall be maintained within $\pm 0.005\%$ 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

8.3 TEST SETUP



8.4 Test Procedure

1. Setup the configuration of the ambient temperature from -20°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.

8.5 Test Result

Test frequency	Test Conditions		Measure Frequency	Frequency Error	Limit	Result
(MHz)	Voltage (V)	Temperature(°C)	(MHz)	(KHz)	(KHz)	
470.1	N	N	470.102	2	±28.16	Pass
		L	470.108	8		Pass
		H	470.105	5		Pass
	L	N	470.111	11		Pass
		L	470.109	9		Pass
		H	470.104	4		Pass
	H	N	470.103	3		Pass
		L	470.110	10		Pass
		H	470.106	6		Pass
Test frequency	Test Conditions		Measure Frequency	Frequency Error	Limit	Result
(MHz)	Voltage (V)	Temperature(°C)	(MHz)	(KHz)	(KHz)	
533.4	N	N	533.406	6	±28.96	Pass
		L	533.412	12		Pass
		H	533.409	9		Pass
	L	N	533.411	11		Pass
		L	533.407	7		Pass
		H	533.408	8		Pass
	H	N	533.409	9		Pass
		L	533.410	10		Pass
		H	533.412	12		Pass
Test frequency	Test Conditions		Measure Frequency	Frequency Error	Limit	Result
(MHz)	Voltage (V)	Temperature(°C)	(MHz)	(KHz)	(KHz)	
607.9	N	N	607.909	9	±29.71	Pass
		L	607.905	5		Pass
		H	607.912	12		Pass
	L	N	607.912	12		Pass
		L	607.906	6		Pass
		H	607.907	7		Pass
	H	N	607.908	8		Pass
		L	607.911	11		Pass
		H	607.910	10		Pass

9. TEST PHOTO & EUT PHOTO

Reference to the appendix for details.

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