FCC TEST REPORT

Report No:STS2107030W01

Issued for

HANSEN ELECTRONICS CO., LTD.

Guihe Industrial Zone, Sandong Road, Huadu District,
Guangzhou City, Guangdong Province, China

Product Name:	Speaker with wireless microphone
Brand Name:	PYLE
Model Name:	PHP18DJT
Series Model:	PHP210DJT, PHP28DJT, PHPWA8TB, PHPWA10TB, PHPWA12TB,PHPWA15TB, PPHP101WMB, PPHP121WMB, PPHP86TBA, PPHP87BTA, PPHP822NSM, PPHP1022NSM, PPHP122NSM, PPHP152NSM, PNX6WPBK, PNX8WPBK, PHPD212A
FCC ID:	2AQ8HPHP18DJT
Test Standard:	FCC Part 74 Rules

Shenzhen STS Test Services Co., Ltd.
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TEST RESULT CERTIFICATION

Applicant's Name ..... :	HANSEN ELECTRONICS CO., LTD.
Address..... :	Guihe Industrial Zone, Sandong Road, Huadu District, Guangzhou City, Guangdong Province, China
Manufacturer's Name ..... :	HANSEN ELECTRONICS CO., LTD.
Address..... :	Guihe Industrial Zone, Sandong Road, Huadu District, Guangzhou City, Guangdong Province, China

Product Description

Product Name ..... :	Speaker with wireless microphone
Brand Name ..... :	PYLE
Model Name..... :	PHP18DJT
Series Model ..... :	PHP210DJT, PHP28DJT, PHPWA8TB, PHPWA10TB,PHPWA12TB, PHPWA15TB, PPHP101WMB,PPHP121WMB, PPHP86TBA, PPHP87BTA, PPHP822NSM, PPHP1022NSM, PPHP122NSM, PPHP152NSM, PNX6WPBK, PNX8WPBK, PHPD212A
Test Standards ..... :	FCC Part 74 Rules
Test Procedure..... :	ANSI C63.10-2013; C63.26-2015

This device described above has been tested by STS, 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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Date of Test ..... :	
Date of receipt of test item ..... :	06 July 2021
Date of performance of tests..... :	06 July 2021~ 22 Oct. 2021
Date of Issue ..... :	22 Oct. 2021
Test Result..... :	Pass

Testing Engineer : Chris Chen

(Chris Chen)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Vita Li

(Vita Li)

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Revision History

Rev.	Issue Date	Report NO.	Effect Page	Contents
00	22 Oct. 2021	STS2107030W01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
The EUT has been tested according to FCC CFR 47:
Part 2: Frequency Allocations and Radio Treaty Matters: General Rules and Regulations (10-1-05 Edition)
Part 74: Experimental Radio, Auxiliary, Special Broadcast and other program distributional services

Emission			
Standard	Item	Limit	Result
FCC 2.1053; 74.861(e)(6)	Radiated Spurious Emission	Refer to 74.861e(6)	PASS
FCC 2.1046 (a), 74.861(e)(1)	RF Output Power	250 mW	PASS
FCC 2.1047 (b), 74.861(e)(3)	Modulation Deviation	Refer to 74.861e(2)	PASS
FCC 2.1047 (a)	Audio Frequency Response	Refer to 2.1047(a)	PASS
FCC 74.861 (e)(5)	Occupied Bandwidth	< 200 KHz	PASS
FCC 74.861 (e)(6)(i) (ii); FCC 2.1049	Emission Mask	Refer to 74.861e(6)	PASS
2.1055(b); 74.861 e(4)	Frequency Stability vs. Temperature	Refer to 74.861e(4)	PASS
2.1055(a)(1); 74.861 e(4)	Frequency Stability vs. Voltage	Refer to 74.861e(4)	PASS
FCC 15.207	Line Conducted Emissions	Refer to 15.207	N/A

NOTE:
(1) “N/A” denotes test is not applicable in this Test Report.

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD
Add. : A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China
FCC test Firm Registration Number: 625569
IC test Firm Registration Number: 12108A
A2LA Certificate No.: 4338.01

1.2 MEASUREMENT UNCERTAINTY

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

No.	Item	Uncertainty
1	RF output power, conducted	±0.68dB
2	Unwanted Emissions, conducted	±2.988dB
3	All emissions, radiated 30-1GHz	±4.39dB
4	All emissions, radiated 1G-6GHz	±5.10dB
5	All emissions, radiated>6G	±5.48dB
6	Conducted Emission (9KHz-150KHz)	±2.79dB
7	Conducted Emission (150KHz-30MHz)	±2.80dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name:	Speaker with wireless microphone
Brand Name:	PYLE
Model Name:	PHP18DJT
Series Model :	PHP210DJT, PHP28DJT, PHPWA8TB, PHPWA10TB,PHPWA12TB,PHPWA15TB, PPHP101WMB,PPHP121WMB, PPHP86TBA, PPHP87BTA, PPHP822NSM, PPHP1022NSM, PPHP122NSM, PPHP152NSM, PNX6WPBK, PNX8WPBK, PHPD212A
Model Difference description:	Only different in model names.
Emission Bandwidth:	33.581KHz
Rating:	Input: DC 3V from AA Battery
Operation Frequency Range	470.5 MHz- 607.7 MHz
Maximum Transmitter Power:	0.951 mW(-0.22dBm)
Modulation mode / type:	Digital modulation
Frequency Tolerance	0.000954%
Temperature Range:	-30℃-50℃
Test frequency list:	See Note 3.
Software version number:	N/A
Hardware version number:	N/A

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2. Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	PYLE	PHP18DJT	monopole	NA	5	Antenna

Note: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.

3. Test frequency list

Test Channel List		
Test Channel	EUT Channel	Test Frequency (MHz)
lowest	CH01	470.5
middle	CH02	588.85
highest	CH03	607.7

Note:
In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test,please see the above listed frequency for testing.

2.2 DESCRIPTION OF THE TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Low Channel
Mode 2	Middle Channel
Mode 3	High Channel
Mode 4	Link Mode

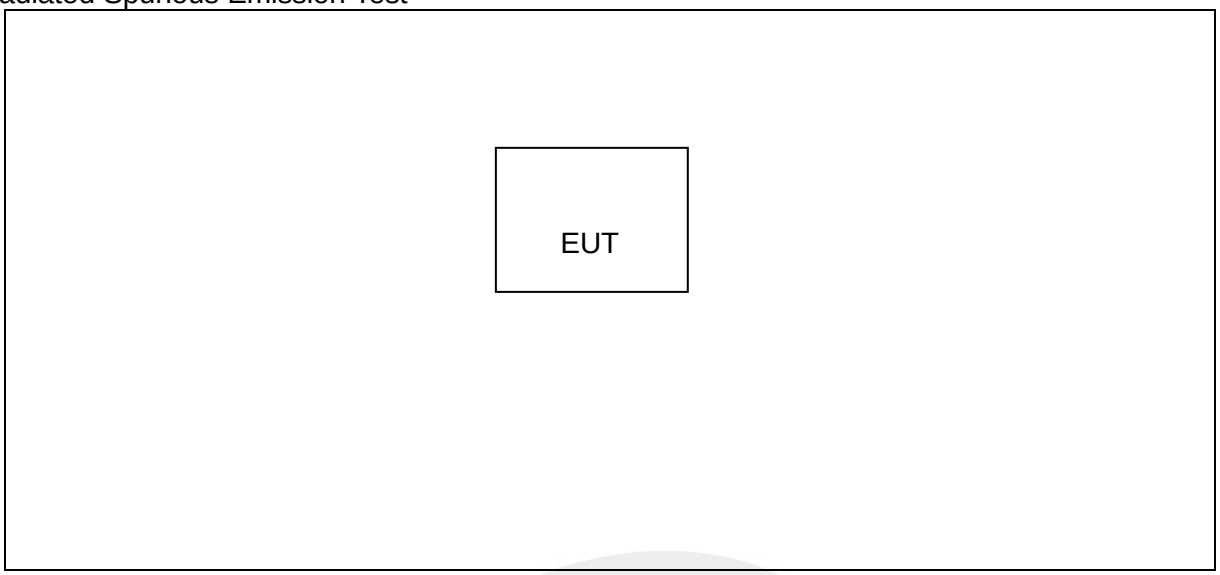
For Radiated Emission	
Final Test Mode	Description
Mode 1	Low Channel
Mode 2	Middle Channel
Mode 3	High Channel

Note:

(1) Due to the different configuration and test, in this list only some worse mode. The worst test data of the worse modeis reported by this report.

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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.

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
N/A	N/A	N/A	N/A	N/A	N/A

Note:

(1) For detachable type I/O cable should be specified the length in cm in『Length』column.

(2) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

2.5 TEST EQUIPMENT

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Bilog Antenna	TESEQ	CBL6111D	34678	2020.10.12	2022.10.11
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2021.10.11	2023.10.10
Pre-Amplifier (0.1M-3GHz)	EM	EM330	060665	2021.10.08	2022.10.07
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2021.09.30	2022.09.29
Signal Analyzer	R&S	FSV 40-N	101823	2021.09.30	2022.09.29
Temperature & Humidity	HH660	Mieo	N/A	2021.10.09	2022.10.08
Turn table	EM	SC100_1	60531	N/A	N/A
Antenna mast	EM	SC100	N/A	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Test SW	FARAD	EZ-EMC(Ver.STSLAB-03A1 RE)			

RF Connected Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Signal Generator	Agilent	N5182A	MY46240556	2021.09.30	2022.09.29
Signal Analyzer	Agilent	N9020A	MY51110105	2021.03.04	2022.03.03
Universal Radio communication tester	R&S	CMU200	111058	2021.09.29	2022.09.28
Audio analyzer	R&S	UPL	N/A	2021.03.04	2022.03.03
Temperature & Humidity	HH660	Mieo	N/A	2021.10.09	2022.10.08
Temperature& Humidity test chamber	Safety test	AG80L	171200018	2021.03.04	2022.03.03
Programmable power supply	Agilent	E3642A	MY40002025	2021.10.08	2022.10.07
Attenuator	HP	8494B	DC-18G	2021.04.28	2022.04.27
AC Power Source	APC	KDF-11010G	F214050035	N.C.R	N.C.R
Test SW	FARAD	LZ-RF /LzRf-3A3			

3. TEST METHODOLOGY

3.1 GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirement in Section 13.1.4.1 of ANSI C63.4:2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Not Applicable (Since the EUT is powered by battery)

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4:2003.

3.2 DESCRIPTION OF TEST MODES

The EUT has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.

3.3 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
[1]0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	([2])
13.36 - 13.41			

[1] Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

[2] Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

4. FCC PART 74 REQUIREMENTS

4.1 RADIATED SPURIOUS EMISSION

TEST LIMITS

According to CFR 47 section 74.861 e (6)(iii), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least 43 + 10 log (P) dB.
It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

= P(dBW) - [43 + 10log(P)] (dB)

= [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)

= -13dBm.

According to CFR 47 section 74.861 e (7), Beyond one megahertz below and above the carrier frequency, emissions shall comply with the limits specified in section 8.4 of ETSI EN 300 422-1 v1.4.2 (2011-08).

4.2 EMISSION MASK I

TEST LIMITS

- According to CFR 47 section 74.861 e (6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

a. (1) On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB;
(2) On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB;
(3) On any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth: at least 43+10log 10 *(mean output power in watts) dB;

4.3 EMISSION MASK II

TEST LIMITS

- According to ETSI EN 300 422-1 V1.5.1 Clause 8.3.1.2,

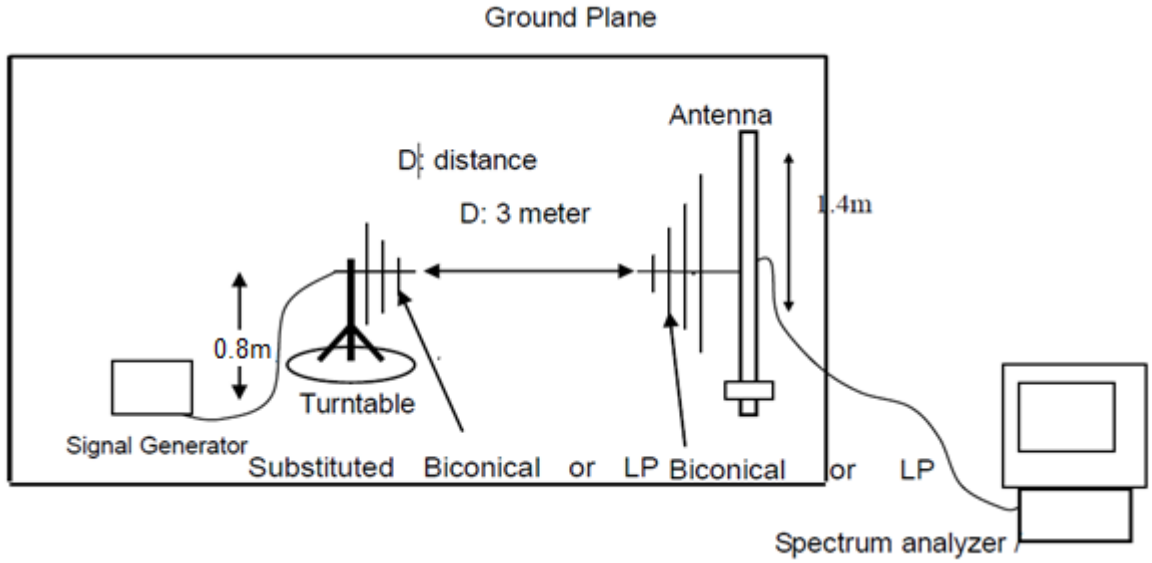
a. The transmitter output spectrum shall be within the mask defined in figure 3 where B is the declared channel bandwidth

TEST PROCEDURE

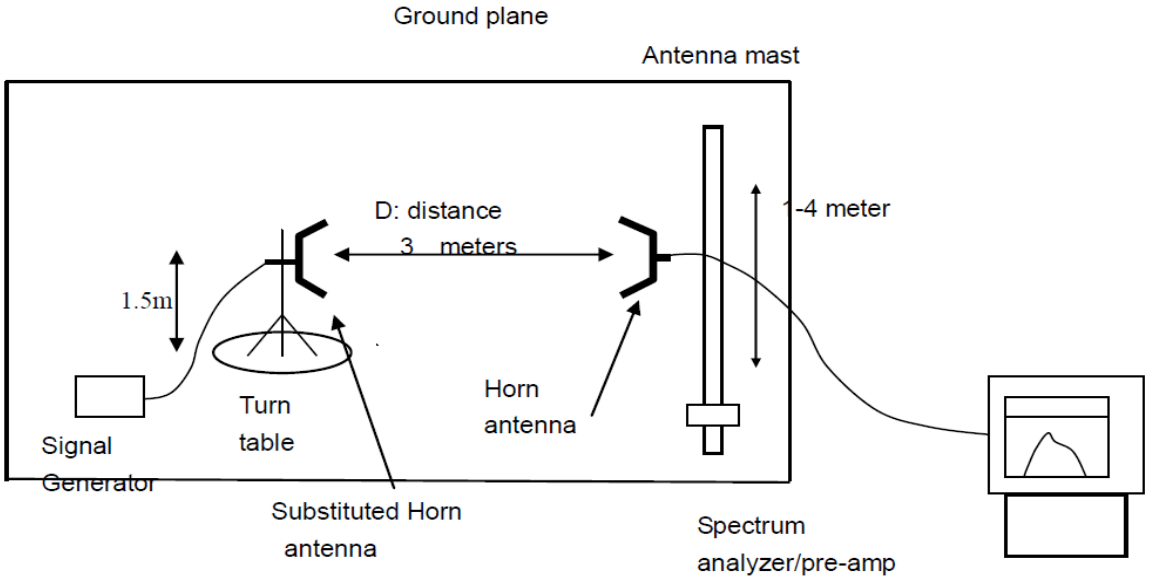
a. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
b. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
c. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
d. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
e. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
f. The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
h The maximum signal level detected by the measuring receiver shall be noted.
i The measurement shall be repeated with the test antenna set to horizontal polarization.
j Replace the antenna with a proper Antenna (substitution antenna).
k The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
l The substitution antenna shall be connected to a calibrated signal generator.
m If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
n The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
o The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
p The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
q The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

TEST CONFIGURATION

（A）Radiated Emission Test-Up Frequency Above 30MHz



（B）Radiated Emission Test-Up Frequency Above 1GHz



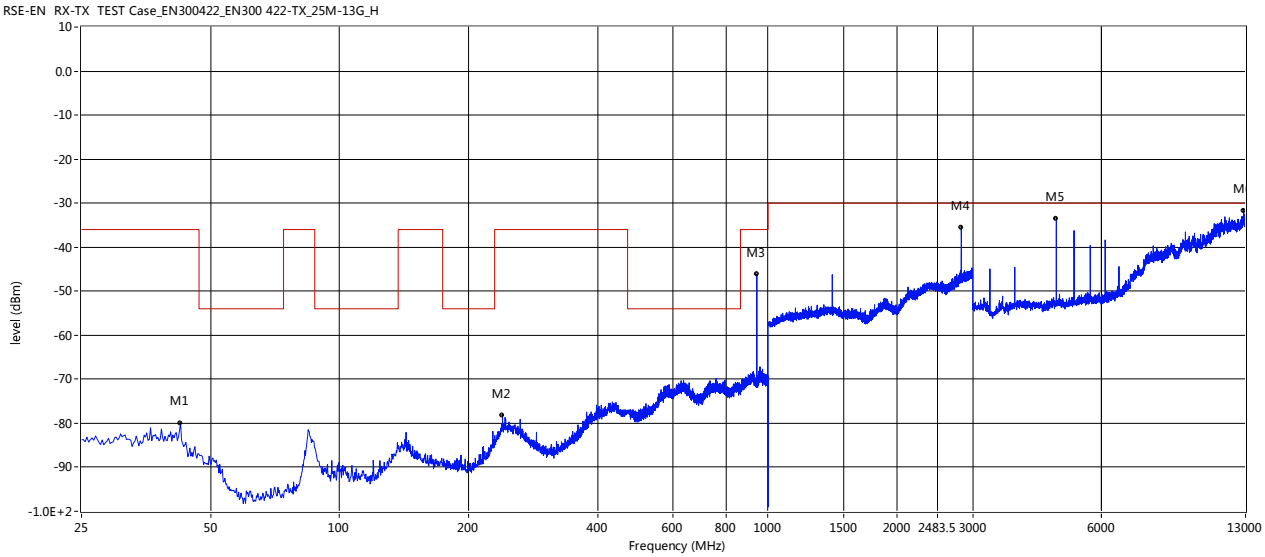
TEST RESULTS

(30-6000)MHz							
The Worst Test Results Low Channel 470.5 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
941.09	-39.70	6.88	4.72	-37.54	-13.00	-24.54	H
1411.59	-39.16	10.13	8.32	-37.35	-13.00	-24.35	H
1882.10	-30.35	9.65	11.72	-32.42	-13.00	-19.42	H
941.18	-42.85	6.88	4.72	-40.69	-13.00	-27.69	V
1411.32	-43.61	10.13	8.32	-41.80	-13.00	-28.80	V
1882.21	-42.36	9.65	11.72	-44.43	-13.00	-31.43	V
The Worst Test Results Mid Channel 588.85 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1176.88	-36.36	6.88	4.72	-34.20	-13.00	-21.20	H
1766.50	-42.53	10.13	8.32	-40.72	-13.00	-27.72	H
2354.97	-38.09	9.65	11.72	-40.16	-13.00	-27.16	H
1177.20	-37.29	6.88	4.72	-35.13	-13.00	-22.13	V
1766.76	-31.48	10.13	8.32	-29.67	-13.00	-16.67	V
2355.31	-36.26	9.65	11.72	-38.33	-13.00	-25.33	V
The Worst Test Results High Channel 607.7 MHz							
Frequency(MHz)	S G.Lev (dBm)	Ant(dBi)	Loss	PMea (dBm)	Limit （dBm）	Margin (dBm)	Polarity
1214.76	-35.96	6.88	4.72	-33.80	-13.00	-20.80	H
1823.34	-42.97	10.13	8.32	-41.16	-13.00	-28.16	H
2430.47	-37.78	9.65	11.72	-39.85	-13.00	-26.85	H
1214.81	-37.53	6.88	4.72	-35.37	-13.00	-22.37	V
1823.46	-31.50	10.13	8.32	-29.69	-13.00	-16.69	V
2430.61	-36.43	9.65	11.72	-38.50	-13.00	-25.50	V

ETSI EN 300 422-1 Clause 8.4 Spurious emissions:

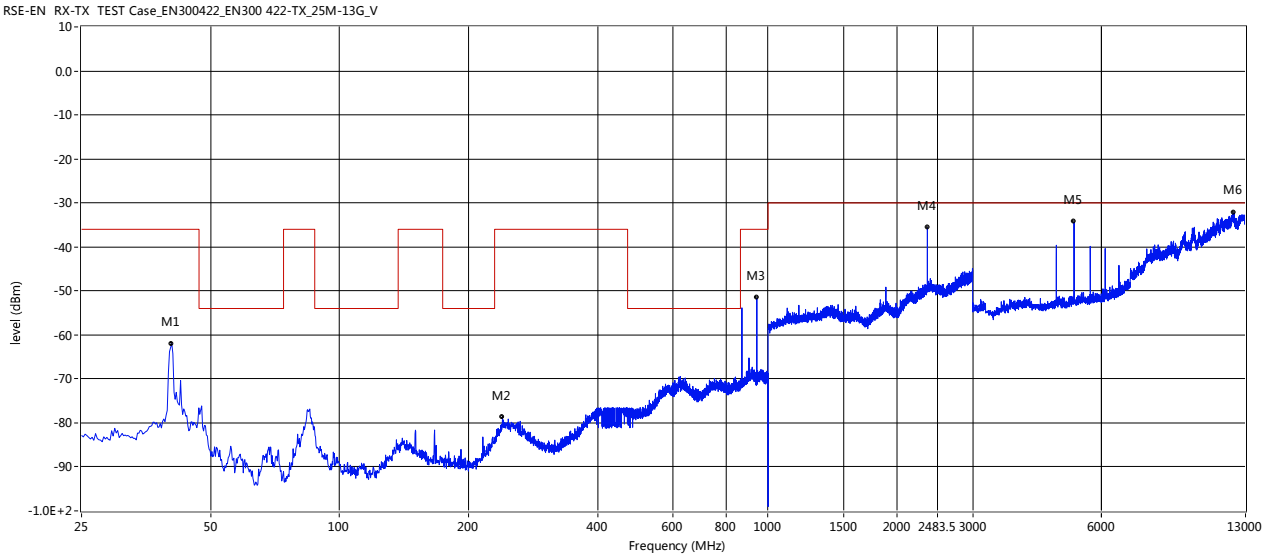
Low channel

Horizontal



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
42.550	-79.94	-6.15	-36.0	-43.94	350.00	Horizontal	Vertical	Pass
239.988	-78.26	-1.95	-36.0	-42.26	128.00	Horizontal	Vertical	Pass
941.013	-46.21	8.26	-36.0	-10.21	88.50	Horizontal	Vertical	Pass
2823.000	-35.64	20.54	-30.0	-5.64	359.00	Horizontal	Vertical	Pass
4705.000	-33.55	4.63	-30.0	-3.55	16.10	Horizontal	Vertical	Pass
12877.500	-31.69	23.83	-30.0	-1.69	0.00	Horizontal	Vertical	Pass

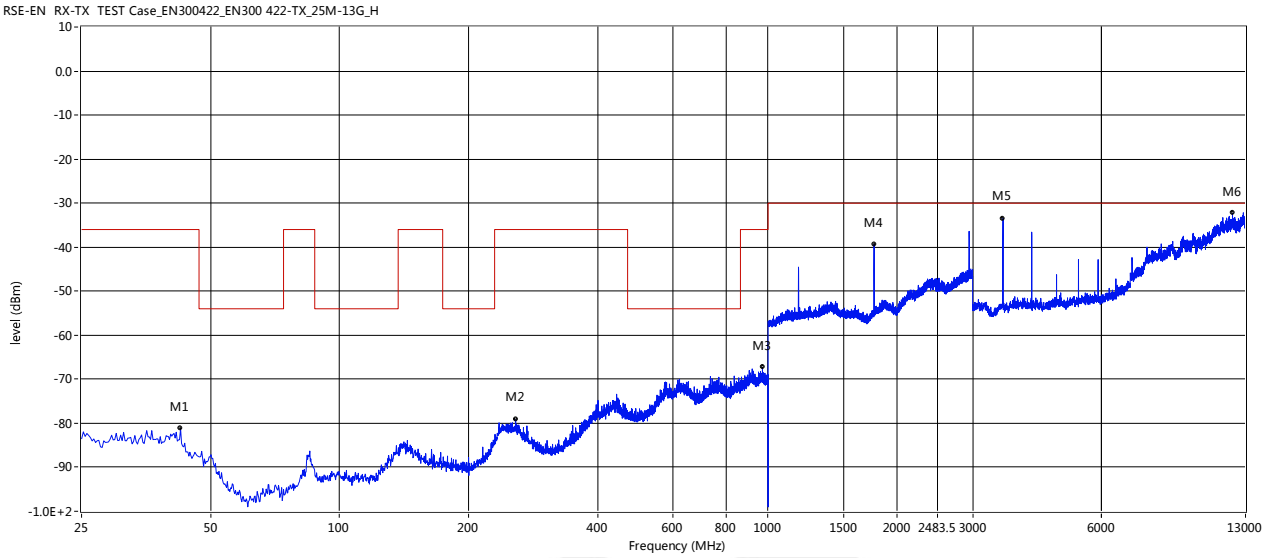
Vertical



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
40.600	-61.96	-4.69	-36.0	-25.96	225.90	Vertical	Vertical	Pass
239.988	-78.59	-1.95	-36.0	-42.59	228.70	Vertical	Vertical	Pass
941.256	-51.60	8.28	-36.0	-15.60	98.70	Vertical	Vertical	Pass
2353.000	-35.66	18.94	-30.0	-5.66	206.40	Vertical	Vertical	Pass
5175.000	-34.33	6.00	-30.0	-4.33	33.90	Vertical	Vertical	Pass
12177.500	-32.28	23.62	-30.0	-2.28	333.50	Vertical	Vertical	Pass

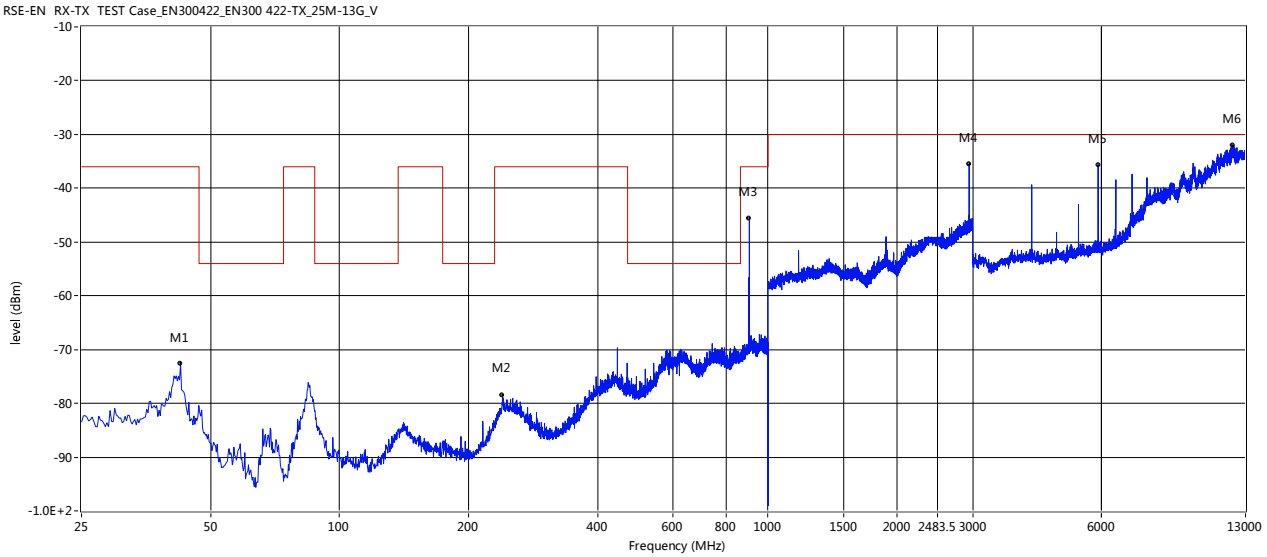
Mid channel

Horizontal



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
42.550	-81.24	-6.15	-36.0	-45.24	76.40	Horizontal	Vertical	Pass
257.538	-79.21	-2.56	-36.0	-43.21	37.20	Horizontal	Vertical	Pass
969.775	-67.26	9.34	-36.0	-31.26	270.70	Horizontal	Vertical	Pass
1766.500	-39.35	12.99	-30.0	-9.35	14.60	Horizontal	Vertical	Pass
3532.500	-33.44	3.54	-30.0	-3.44	359.60	Horizontal	Vertical	Pass
12122.500	-32.27	22.67	-30.0	-2.27	96.80	Horizontal	Vertical	Pass

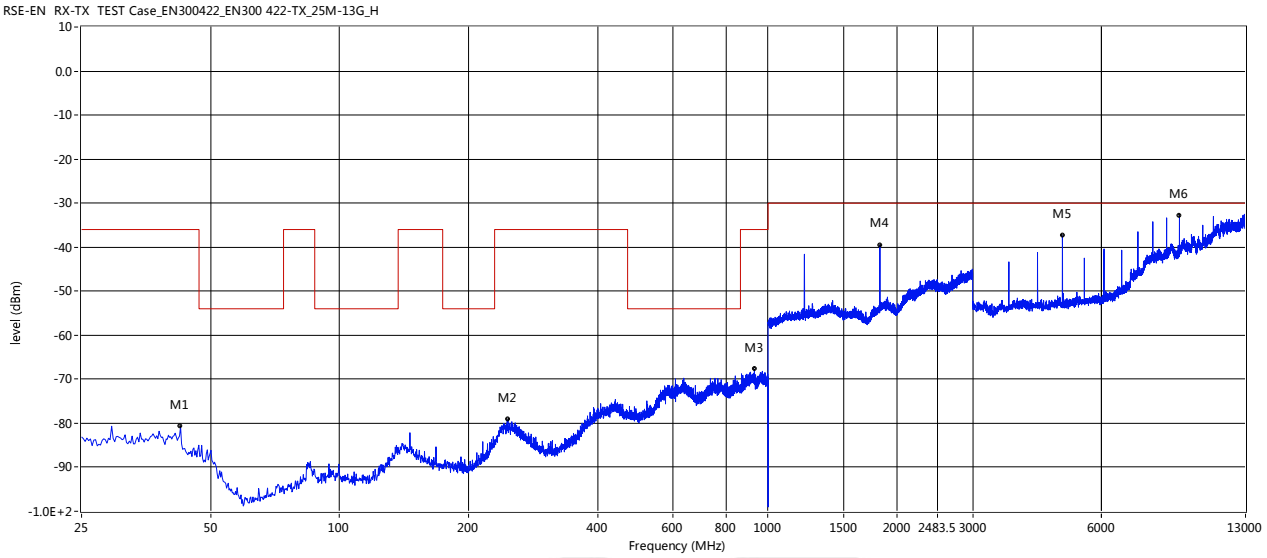
Vertical



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
42.550	-72.62	-6.15	-36.0	-36.62	0.80	Vertical	Vertical	Pass
239.988	-78.45	-1.95	-36.0	-42.45	26.00	Vertical	Vertical	Pass
903.962	-45.65	8.97	-36.0	-9.65	266.30	Vertical	Vertical	Pass
2944.500	-35.49	20.95	-30.0	-5.49	141.60	Vertical	Vertical	Pass
5887.500	-35.74	7.11	-30.0	-5.74	75.10	Vertical	Vertical	Pass
12110.000	-31.99	23.63	-30.0	-1.99	360.00	Vertical	Vertical	Pass

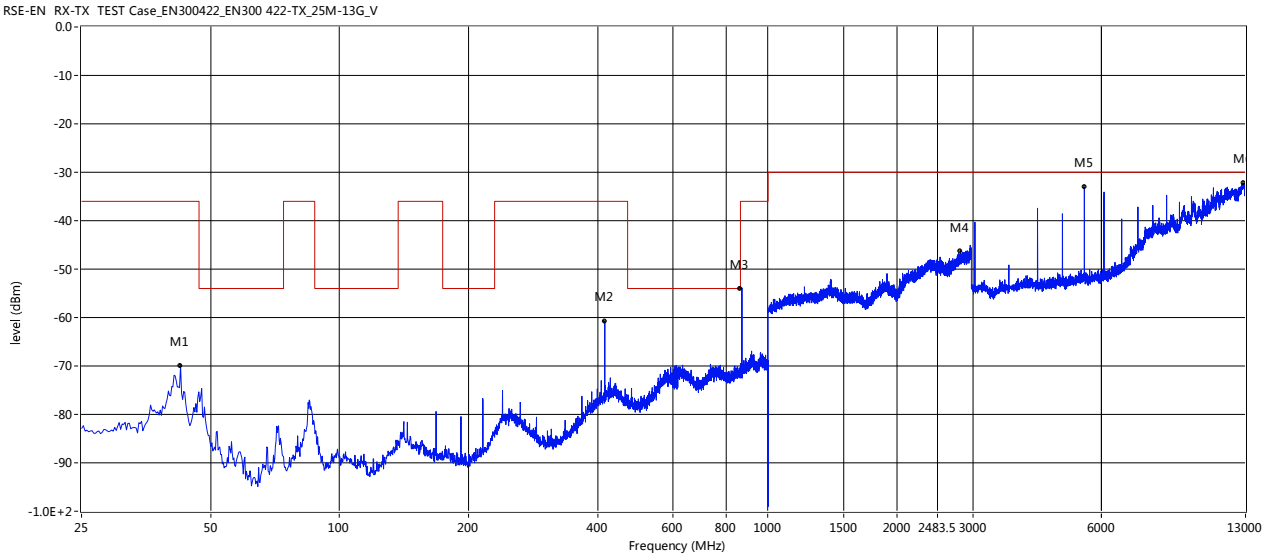
High channel

Horizontal



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
42.550	-80.78	-6.15	-36.0	-44.78	346.60	Horizontal	Vertical	Pass
247.056	-79.21	-2.19	-36.0	-43.21	271.00	Horizontal	Vertical	Pass
928.825	-67.71	8.98	-36.0	-31.71	127.40	Horizontal	Vertical	Pass
1823.000	-39.52	13.96	-30.0	-9.52	47.00	Horizontal	Vertical	Pass
4860.000	-37.44	4.78	-30.0	-7.44	216.30	Horizontal	Vertical	Pass
9115.000	-32.79	15.55	-30.0	-2.79	34.00	Horizontal	Vertical	Pass

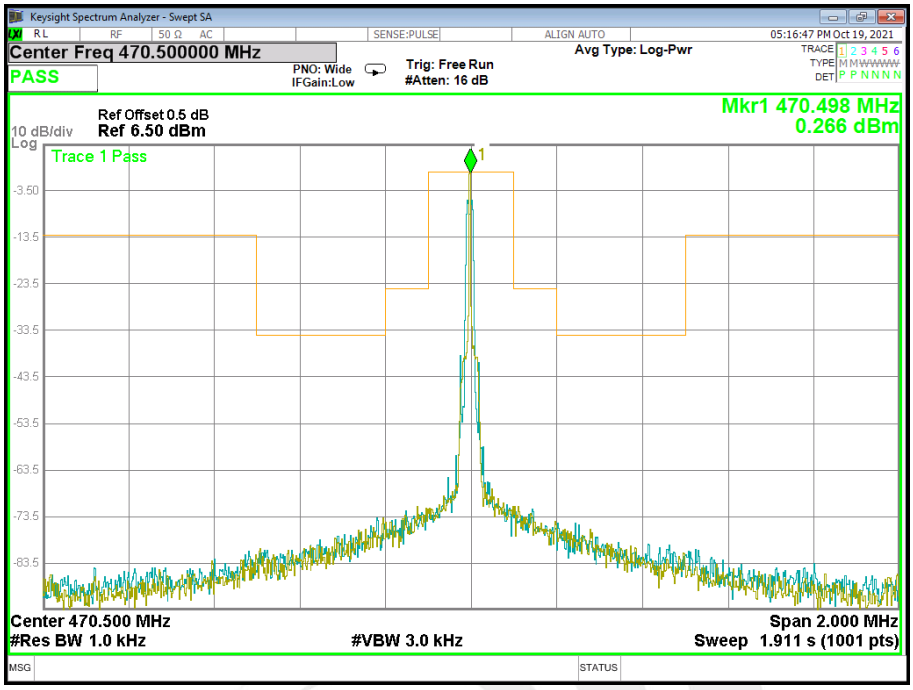
Vertical



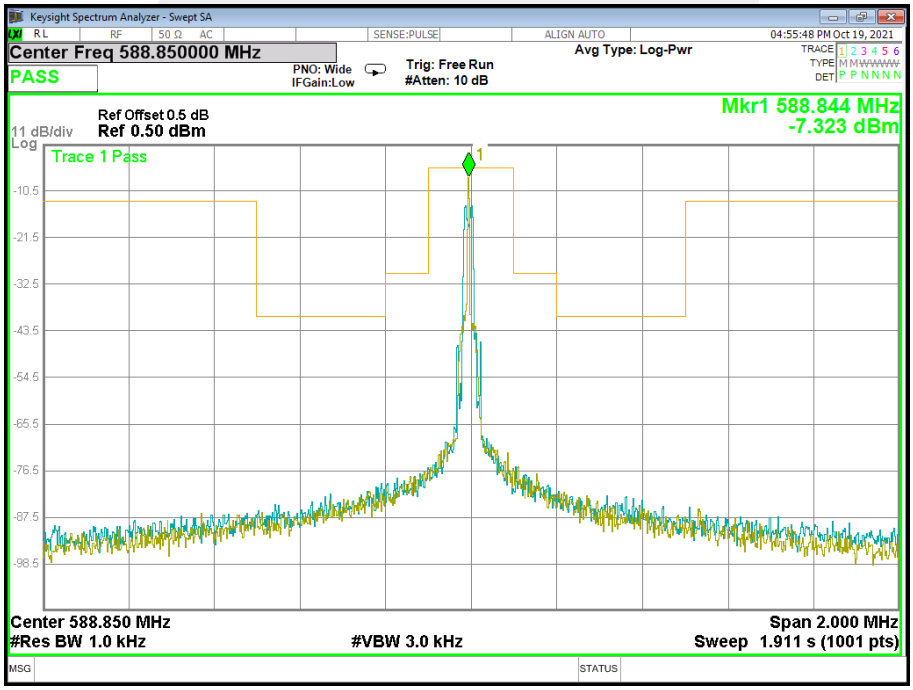
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
42.550	-69.97	-6.15	-36.0	-33.97	87.30	Vertical	Vertical	Pass
415.731	-60.80	2.00	-36.0	-24.80	360.00	Vertical	Vertical	Pass
868.862	-53.86	7.59	-36.0	-17.86	360.00	Vertical	Vertical	Pass
2813.000	-46.42	20.48	-30.0	-16.42	73.90	Vertical	Vertical	Pass
5467.500	-33.00	6.19	-30.0	-3.00	108.10	Vertical	Vertical	Pass
12877.500	-32.21	25.09	-30.0	-2.21	1.30	Vertical	Vertical	Pass

Emission Mask I

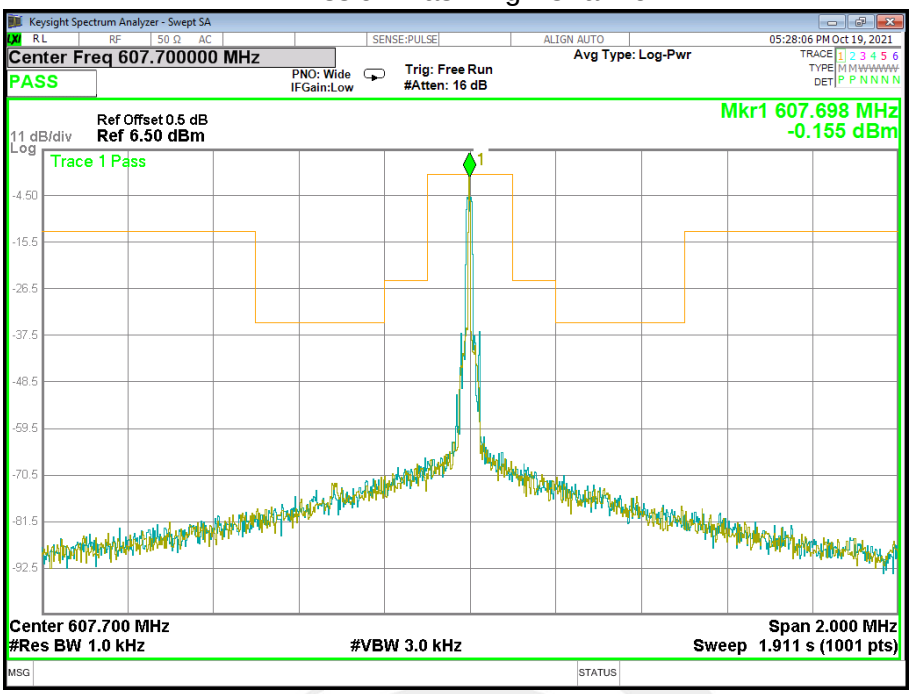
Emission Mask Low Channel



Emission Mask Mid Channel



Emission Mask High Channel



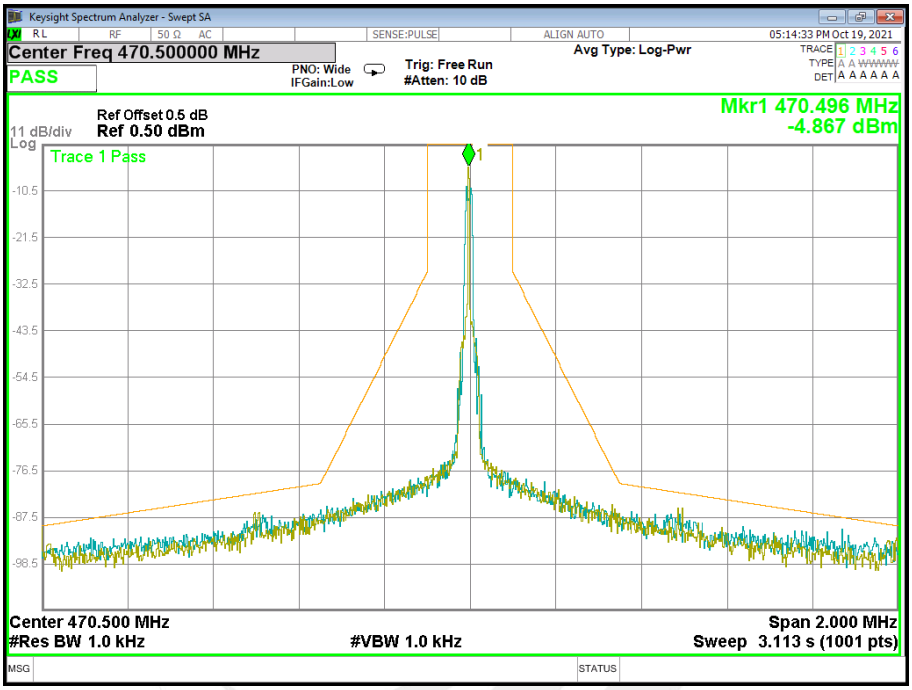
Emission Mask II

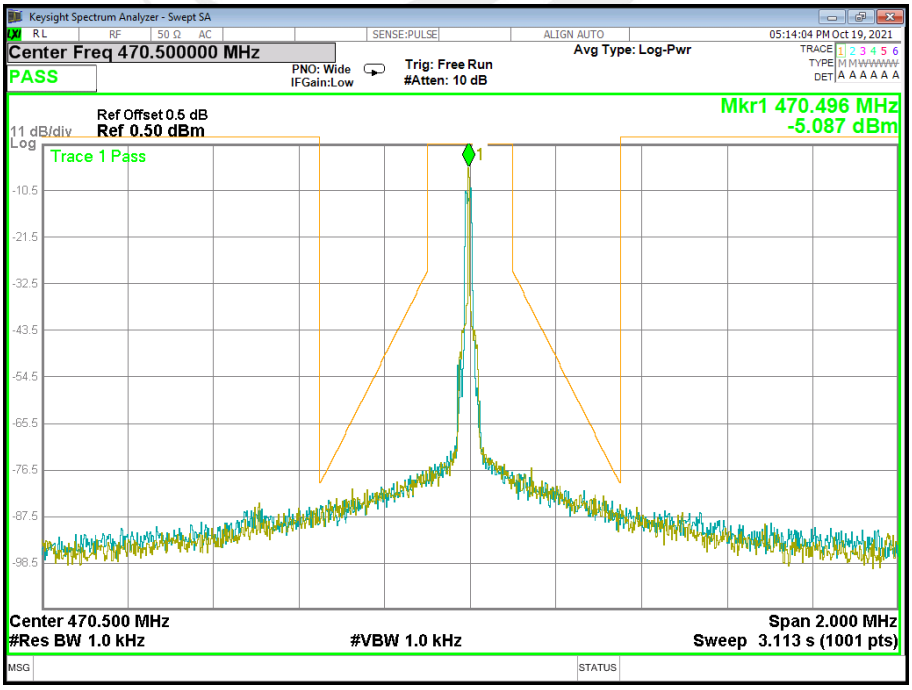
ETSI EN 300 422-1 V1.5.1 Clause 8.3.1.2 The Maximum Measurement of Necessary Bandwidth

Test Plot:

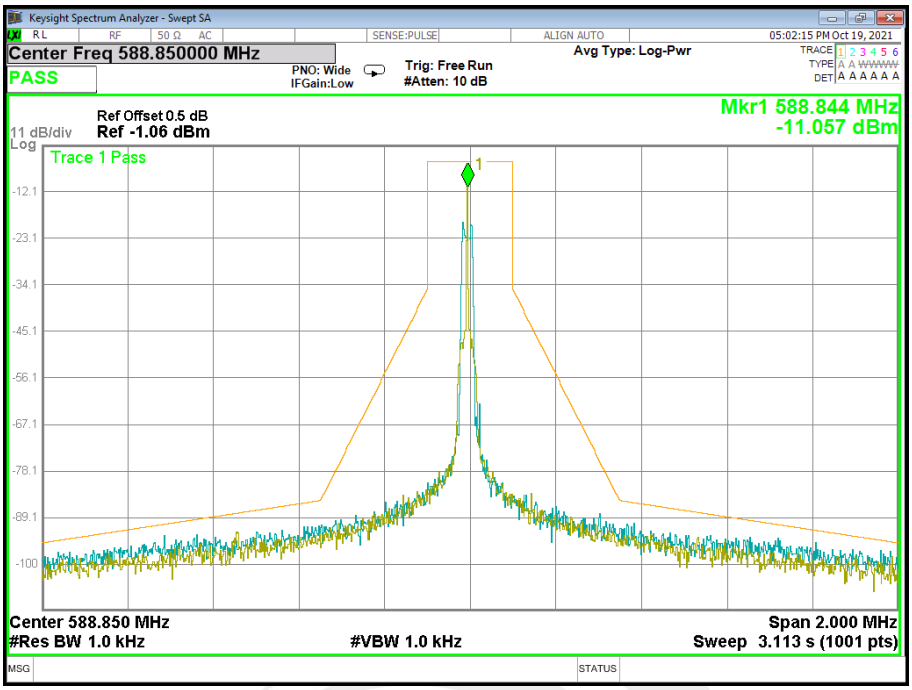
Frequency	Declared Bandwidth	B/2	0.35B
470.5 MHz	50K	25K	17.5K
588.85 MHz	50K	25K	17.5K
607.7 MHz	50K	25K	17.5K

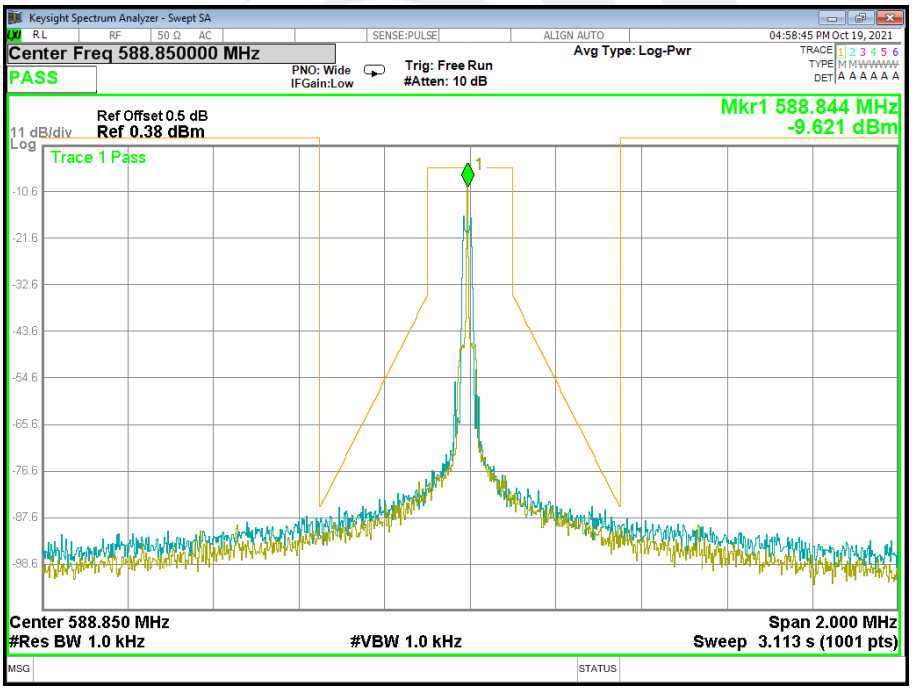
Low CH



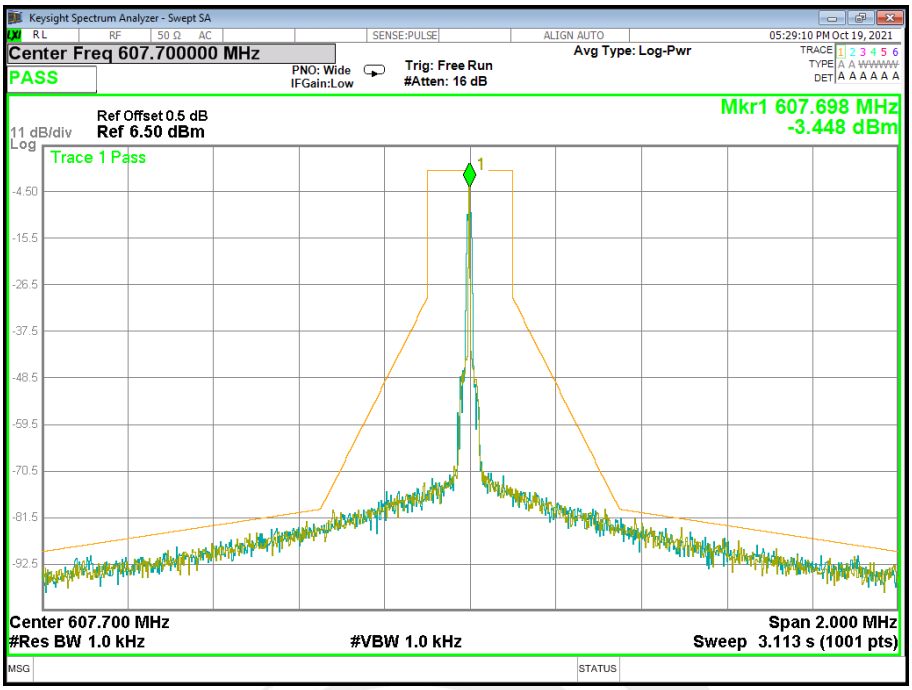


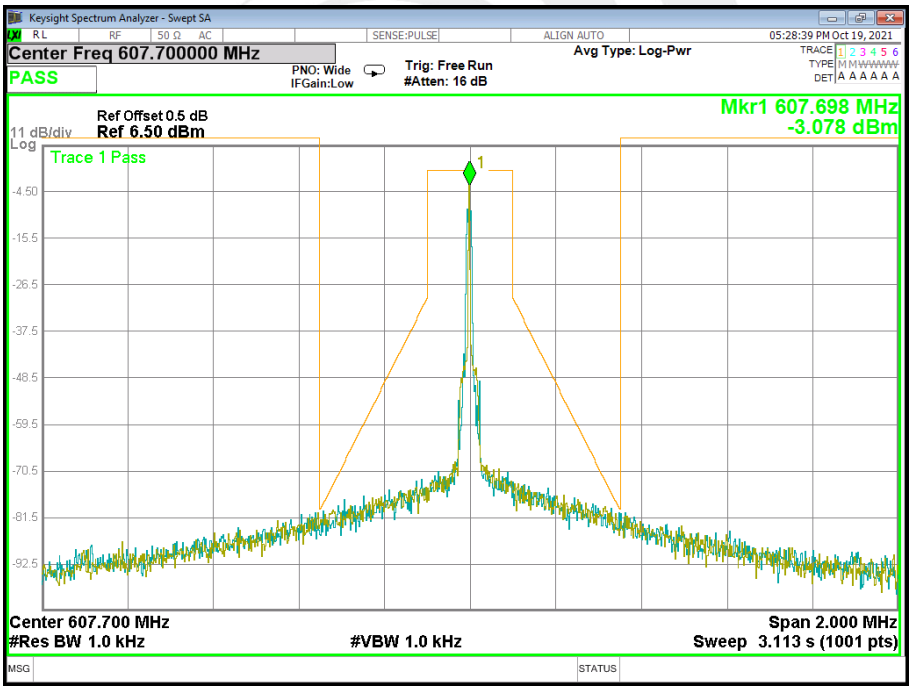
Mid CH


Keysight Spectrum Analyzer - Swept SA
Center Freq 588.850000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: Log-Pwr
05:02:15 PM Oct 19, 2021
Ref Offset 0.5 dB
11 dB/div
Ref -1.06 dBm
Log
Mkr1 588.844 MHz
-11.057 dBm
Trace 1 Pass
-12.1
-23.1
-34.1
-45.1
-56.1
-67.1
-78.1
-89.1
-100
Center 588.850 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 3.113 s (1001 pts)
MSG
STATUS


Keysight Spectrum Analyzer - Swept SA
Center Freq 588.850000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 10 dB
Avg Type: Log-Pwr
04:58:45 PM Oct 19, 2021
Ref Offset 0.5 dB
11 dB/div
Ref 0.38 dBm
Log
Mkr1 588.844 MHz
-9.621 dBm
Trace 1 Pass
-10.6
-21.6
-32.6
-43.6
-54.6
-65.6
-76.6
-87.6
-98.6
Center 588.850 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 3.113 s (1001 pts)
MSG
STATUS

High CH


Keysight Spectrum Analyzer - Swept SA
Center Freq 607.700000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: Log-Pwr
05:29:10 PM Oct 19, 2021
Ref Offset 0.5 dB
11 dB/div
Ref 6.50 dBm
Log
Mkr1 607.698 MHz
-3.448 dBm
Trace 1 Pass
-4.50
-15.5
-26.5
-37.5
-48.5
-59.5
-70.5
-81.5
-92.5
Center 607.700 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 3.113 s (1001 pts)
MSG
STATUS

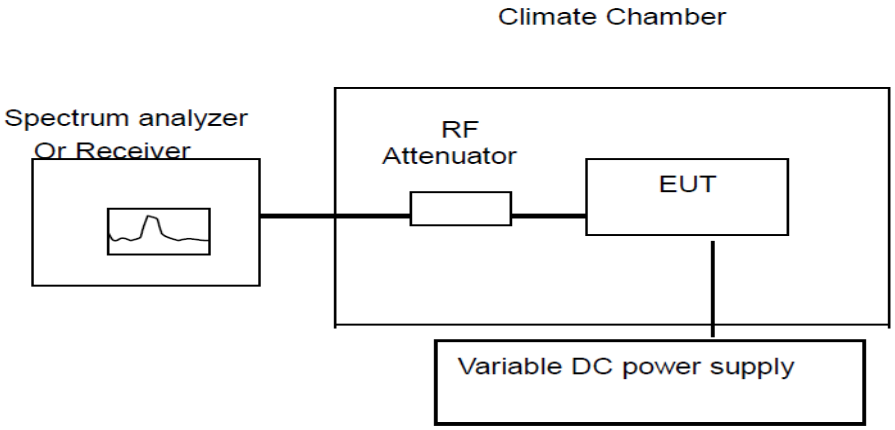

Keysight Spectrum Analyzer - Swept SA
Center Freq 607.700000 MHz
PASS
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 16 dB
Avg Type: Log-Pwr
05:28:39 PM Oct 19, 2021
Ref Offset 0.5 dB
11 dB/div
Ref 6.50 dBm
Log
Mkr1 607.698 MHz
-3.078 dBm
Trace 1 Pass
-4.50
-15.5
-26.5
-37.5
-48.5
-59.5
-70.5
-81.5
-92.5
Center 607.700 MHz
#Res BW 1.0 kHz
#VBW 1.0 kHz
Span 2.000 MHz
Sweep 3.113 s (1001 pts)
MSG
STATUS

4.4 FREQUENCY STABILITY VS. TEMPERATURE & VOLTAGE

TEST LIMIT

According to CFR 47 section 74.861 e (4), the frequency tolerance of the transmitter shall be 0.005 percent.

TEST CONFIGURATION



TEST PROCEDURE

a The EUT was connected to an external DC power supply and the RF output was connected to a frequency counter via feed through attenuators. The EUT was placed inside the temperature chamber. The DC leads and the RF output cable, exited the chamber through an opening made for that purpose.
After the temperature stabilized the frequency output was recorded form the counter.

b. An external variable DC power supply was connected to the battery terminals of the equipment under test.
For hand carried, battery powered equipment primary supply voltage was reduced to the battery operating end point as specified by the manufacturer. The output frequency was recorded for each battery voltage.

TEST RESULTS

(1) Frequency stability versus input voltage (Supply Nominal voltage is DC 3V)

(2) Frequency stability versus input voltage (Supply battery operating end point which shall be specified by the manufacturer DC 3.3V)

Reference Frequency: 470.500MHz			
Power Supply	Environment Temperature (ºC)	Frequency Error (Hz)	Frequency Error (%)
2.7V，DC	20	3684	0.000783
3.0V，DC	20	3682	0.000783
3.3V，DC	20	3693	0.000785
BEP	20	3693	0.000785

Reference Frequency: 470.500MHz				
Environment Temperature(ºC)	Frequency Deviation measured with time Elapse(30 minutes)			
	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Results
50	3693	0.000785	0.00500	PASS
40	3692	0.000785		
30	3691	0.000784		
20	3695	0.000785		
10	3699	0.000786		
0	3699	0.000786		
-10	3694	0.000785		
-20	3697	0.000786		
-30	3689	0.000784		

Reference Frequency: 588.850MHz			
Power Supply	Environment Temperature (ºC)	Frequency Error (Hz)	Frequency Error (%)
2.7V，DC	20	5617	0.000954
3.0V，DC	20	5621	0.000955
3.3V，DC	20	5615	0.000954
BEP	20	5620	0.000954

Reference Frequency: 588.850MHz				
Environment Temperature(ºC)	Frequency Deviation measured with time Elapse(30 minutes)			
	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Results
50	5611	0.000953	0.00500	PASS
40	5616	0.000954		
30	5617	0.000954		
20	5617	0.000954		
10	5615	0.000954		
0	5613	0.000953		
-10	5620	0.000954		
-20	5621	0.000955		
-30	5620	0.000954		

Reference Frequency: 607.700MHz			
Power Supply	Environment Temperature (ºC)	Frequency Error (Hz)	Frequency Error (%)
2.7V，DC	20	1868	0.000307
3.0V，DC	20	1861	0.000306
3.3V，DC	20	1872	0.000308
BEP	20	1862	0.000306

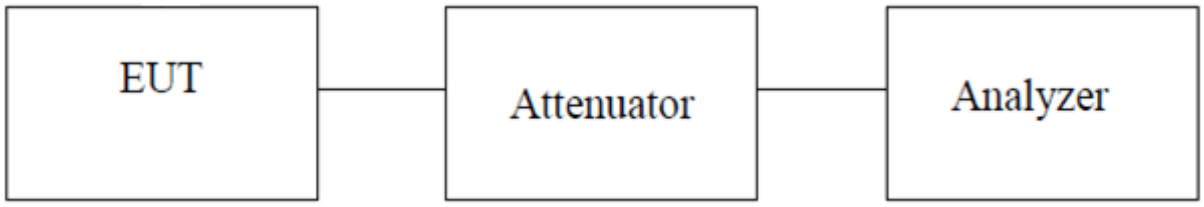
Reference Frequency: 607.700MHz				
Environment Temperature(ºC)	Frequency Deviation measured with time Elapse(30 minutes)			
	Frequency Error (Hz)	Frequency Error (%)	Limit (%)	Results
50	1861	0.000306	0.00500	PASS
40	1860	0.000306		
30	1863	0.000307		
20	1854	0.000305		
10	1864	0.000307		
0	1854	0.000305		
-10	1857	0.000306		
-20	1860	0.000306		
-30	1868	0.000307		

4.5 OCCUPIED BANDWIDTH

TEST LIMIT

According to CFR 47 section 74.861 e (5), the operating bandwidth shall no exceed 200 KHz. Near the carrier an emission mask is defined by the standard.

TEST CONFIGURATION



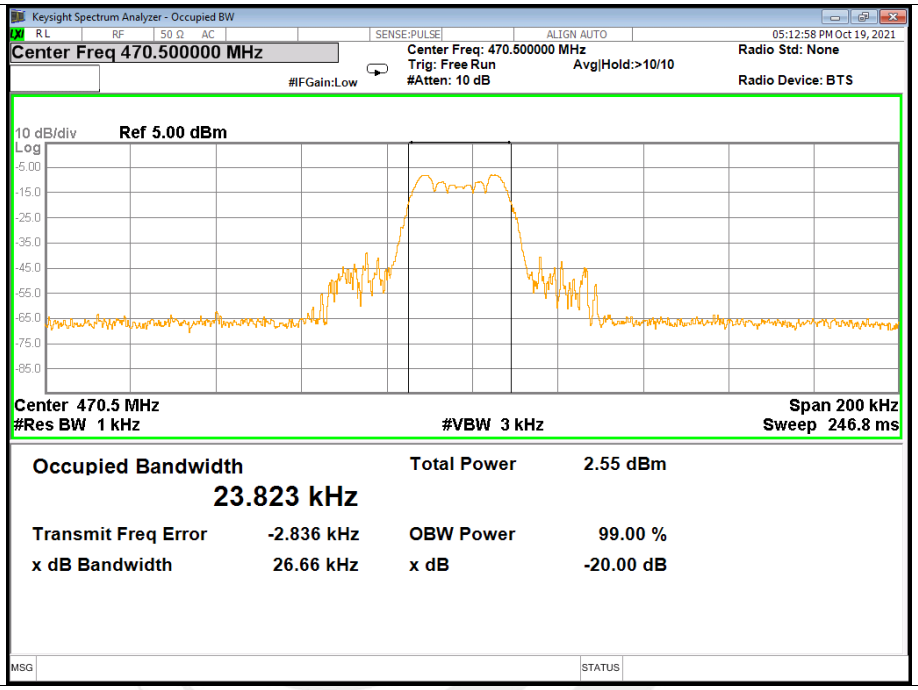
TEST PROCEDURE

a. The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation.
   Set Occupied Bandwidth was measured with a occupied bandwidth function of the analyzer.
b. The near the carrier emissions are measured by normal power measurement function of the analyzer.
c. Set SPA Max hold. Mark peak, 99%.

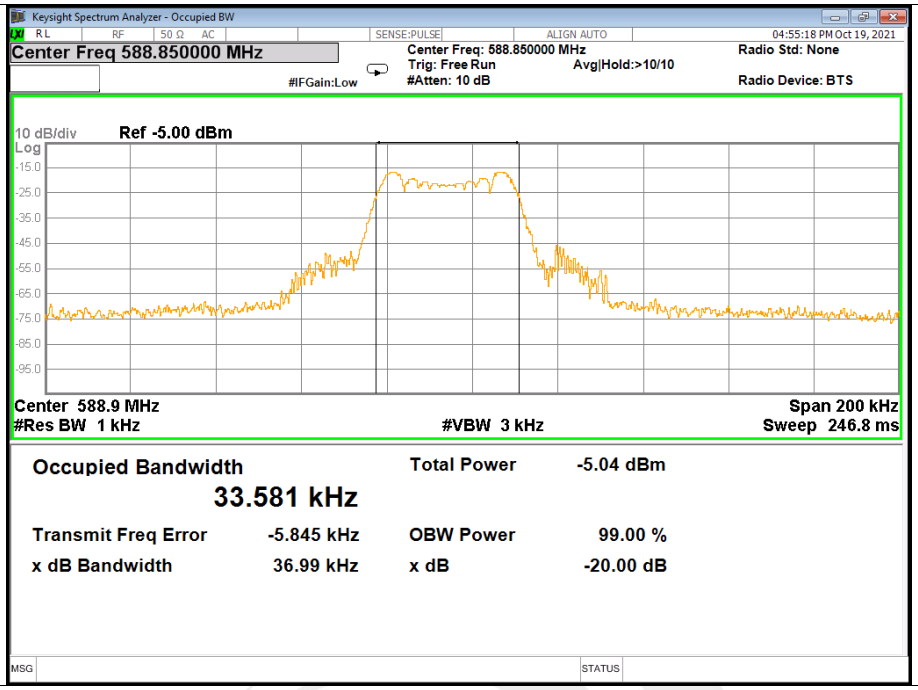
TEST RESULT

Frequency(MHz)	Occupied Bandwidth(KHz)	Limit(KHz)
470.5	23.823	200
588.85	33.581	200
607.7	14.176	200

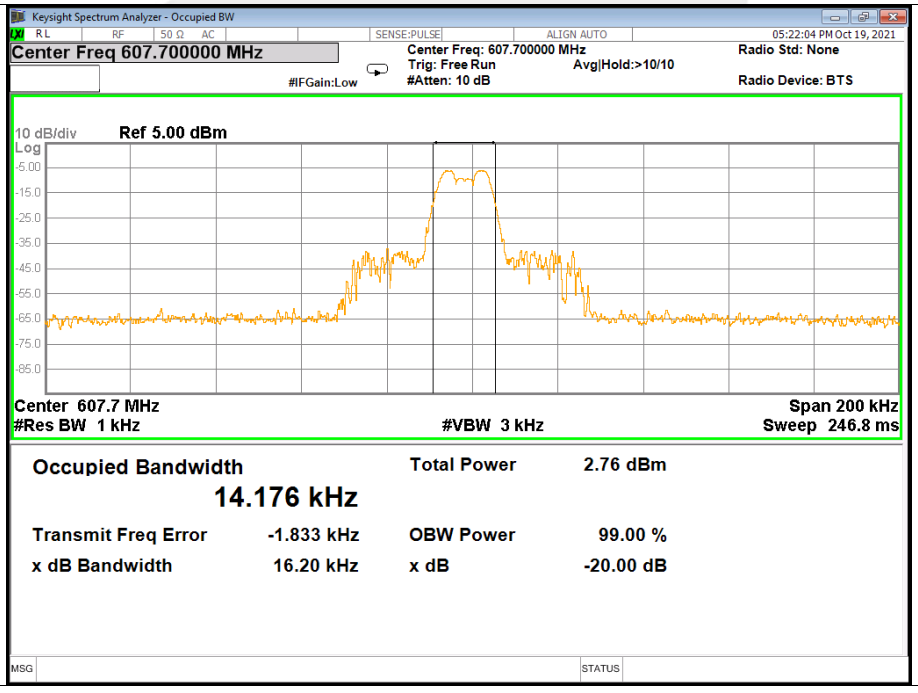
Occupied bandwidth of Low Channel (Maximum)



Occupied bandwidth of Mid Channel (Maximum)



Occupied bandwidth of High Channel (Maximum)



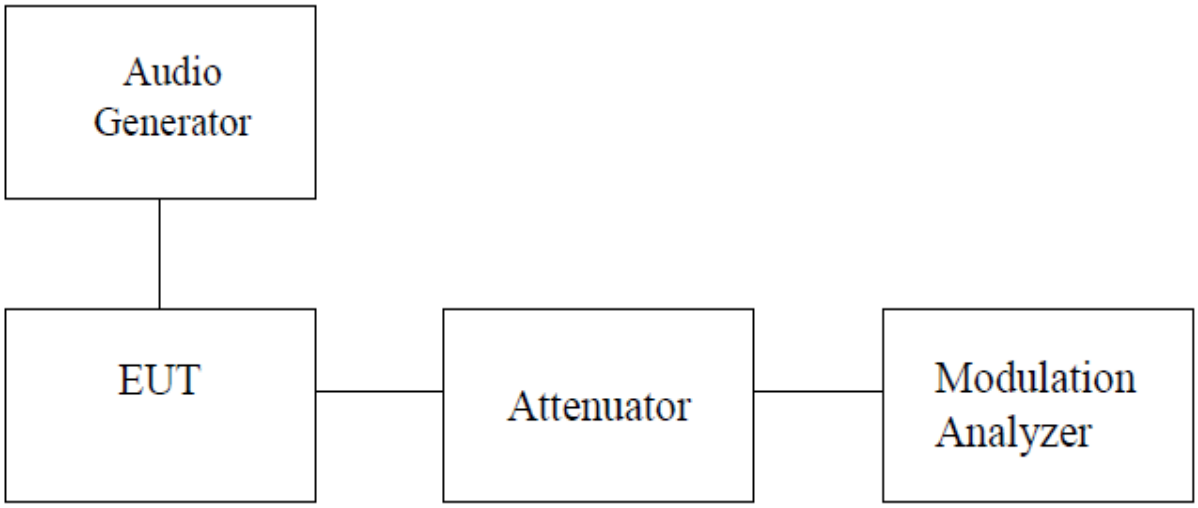
4.6 AUDIO FREQUENCY RESPONSE

TEST LIMIT

The audio frequency response is the degree of closeness to which the frequency deviation of the transmitter follows a prescribed characteristic.The frequency response of the audio modulation part is measured over a frequency range of 100 Hz to 5000 Hz.

According to CFR 47 section 74.861 e (1), any form of modulation may be used. A maximum deviation of ±75 KHz is permitted when frequency modulation is employed.

TEST CONFIGURATION



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TEST PROCEDURE

a. The audio frequency response is the degree of the closeness to which the frequency deviation of the transmitter follows prescribed characteristics.

b. The frequency response of the audio modulation part is measured over a frequency range of 100Hz to 5000 Hz.

c. For 1000 Hz tone reference signal the audio generator level is adjusted to get 20% of the rated system deviation.

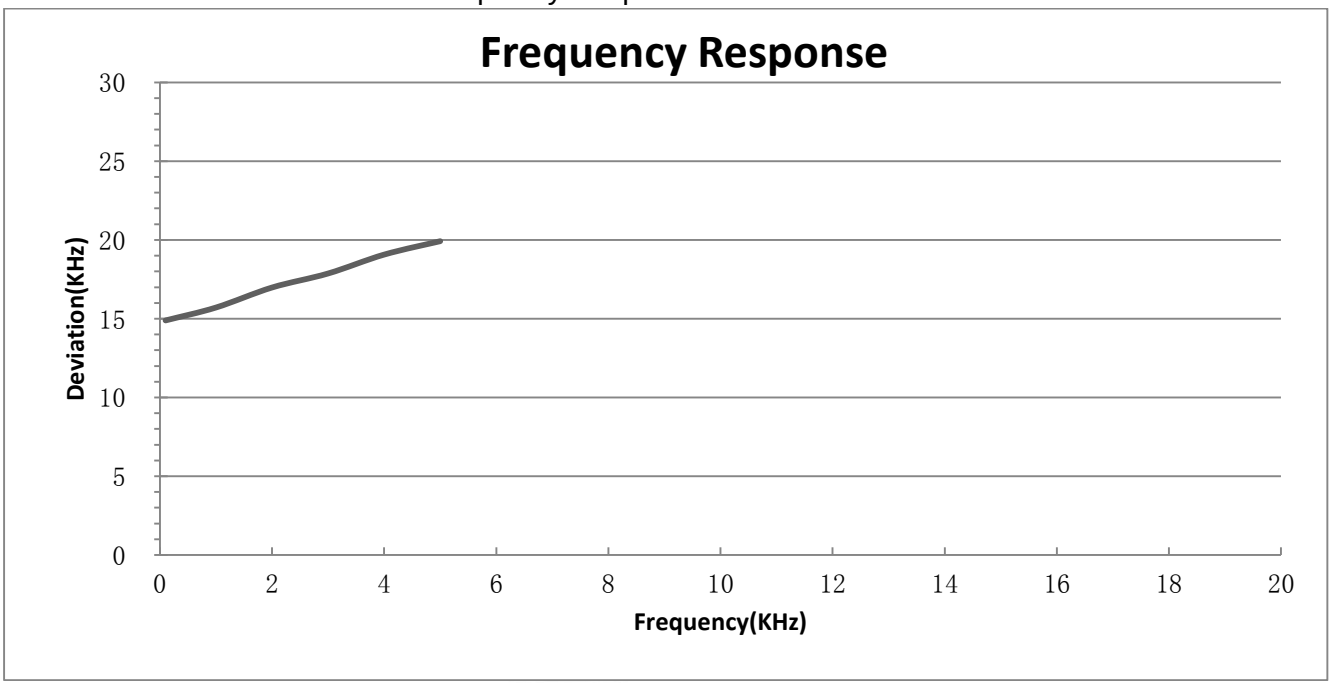
d. The deviations obtained over the frequency range from 100 HZ to 5000 Hz are recorded and compared with the reference deviation as follows:
Audio Frequency Response= 20 log (DEV freq/ Dev ref)

TEST RESULT

Audio Frequency Response:

Frequency(KHz)	Deviation(KHz)
0.01	14.89
1	15.71
2	16.98
3	17.87
4	19.07
5	19.92

Frequency Response of Mid Channel



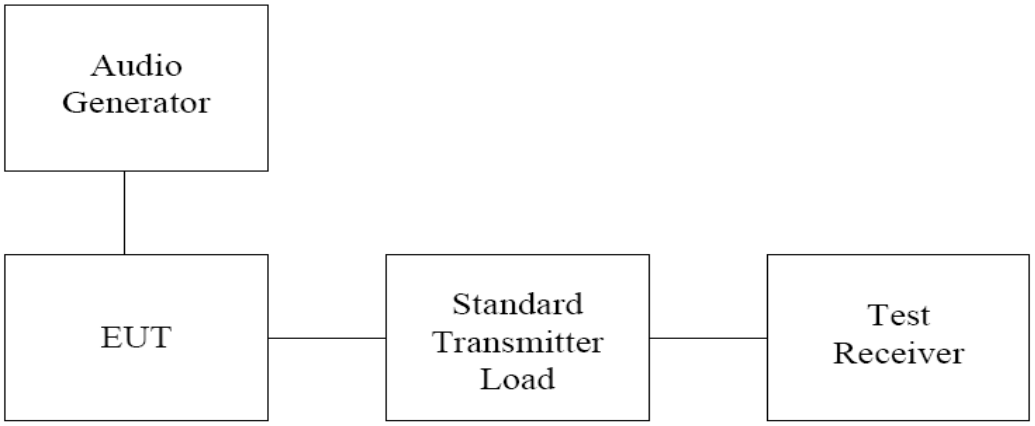
4.7 MODULATION DEVIATION

TEST LIMIT

According to CFR 47 section 2.1047 a, for Voice modulation communication equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000 Hz shall be measured.

According to CFR 47 section 74.861 e (3), any form of modulation may be used. A maximum deviation of ±75 KHz is permitted when frequency modulation is employed.

TEST CONFIGURATION



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TEST PROCEDURE

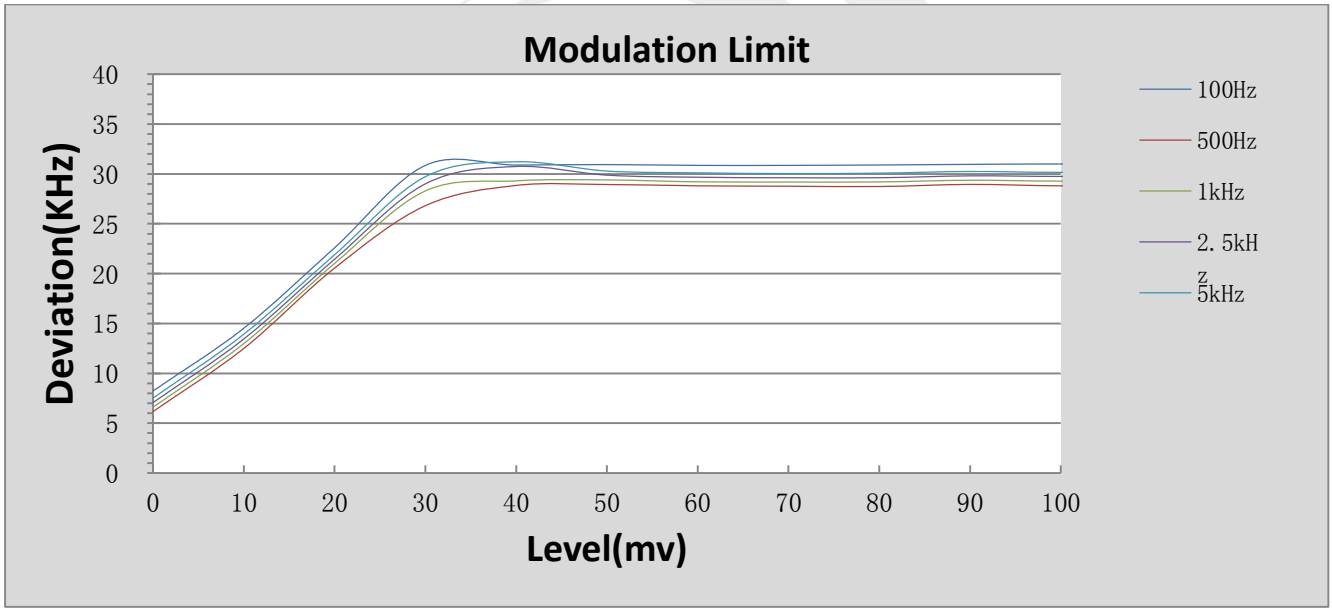
a. Modulation limits is the transmitter circuit's ability to limit the transmitter form producing deviations in excess of rated system deviation.
b. The audio signal generator is connected to the audio input of the EUT with its full rating.
c. The modulation response is measured at certain modulation frequencies, related to 1000 Hz reference signal.
d. Tests are performed for positive and negative modulation.

TEST RESULT

Modulation Deviation

Level(mv)	100Hz	500Hz	1kHz	2.5kHz	5kHz
0	8.23	6.17	6.61	7.07	7.52
10	14.53	12.50	12.99	13.45	13.93
20	22.60	20.56	21.03	21.45	21.90
30	30.86	26.82	28.30	29.01	29.73
40	30.89	28.85	29.31	30.75	31.22
50	30.94	28.94	29.40	29.88	30.29
60	30.86	28.81	29.21	29.67	30.11
70	30.86	28.77	29.19	29.62	30.04
80	30.90	28.74	29.20	29.62	30.08
90	30.96	28.95	29.37	29.81	30.25
100	31.00	28.81	29.28	29.75	30.16
110	30.94	28.89	29.38	29.82	30.31

Modulation Deviation of Mid Channel



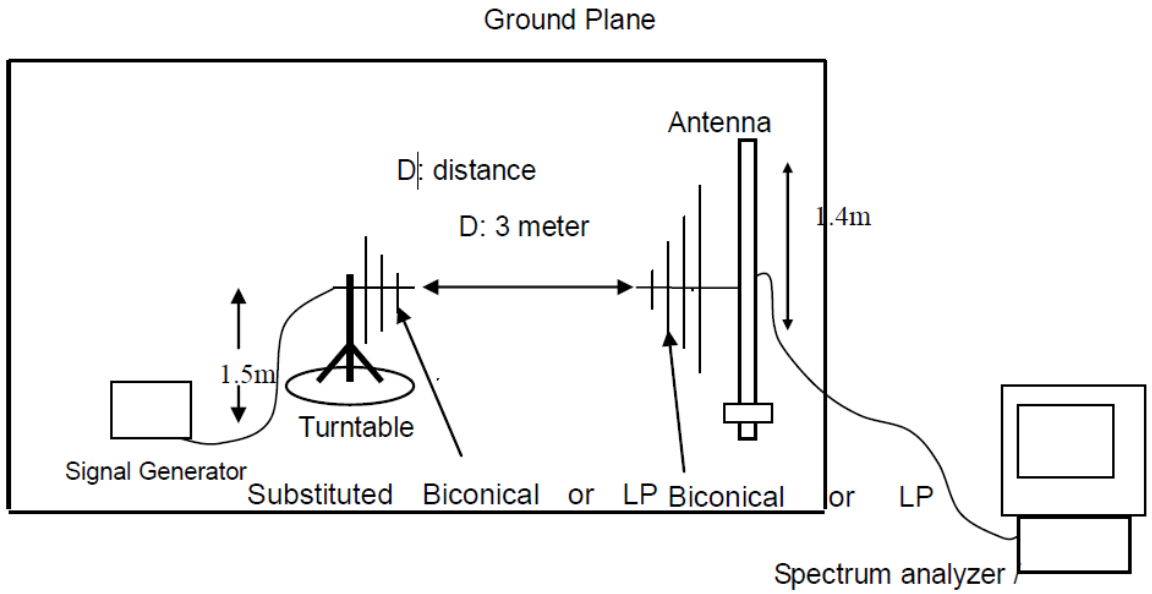
4.8 RF OUTPUT POWER

TEST LIMIT

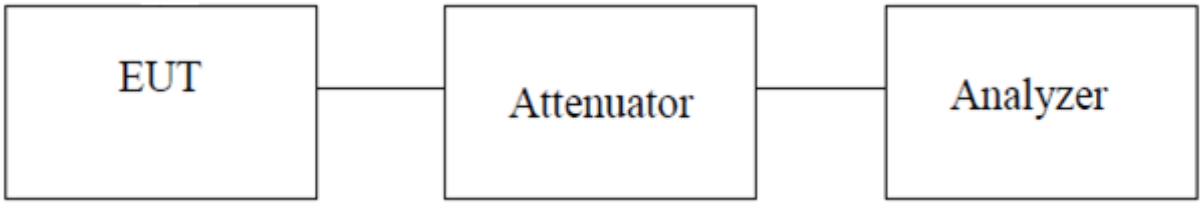
According to CFR 47 section 74.861 e (1), the power of the measured unmodulated carrier power at the output of the transmitter power amplifier (antenna input power) may not exceed the following:
(i) 54-72, 76-88, and 174-216 MHz bands: 50 mW EIRP
(ii) 470-608 and 614-698: 250 mW conducted power
(iii) 600 MHz duplex gap: 20 mW EIRP

TEST CONFIGURATION

Radiation



Conduction



TEST PROCEDURE(Radiation)

a. On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
b. The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
c. The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
d. The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
e. The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
f. The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

h The maximum signal level detected by the measuring receiver shall be noted.

i The measurement shall be repeated with the test antenna set to horizontal polarization.

j Replace the antenna with a proper Antenna (substitution antenna).

k The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

l The substitution antenna shall be connected to a calibrated signal generator.

m If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

n The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

o The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

p The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

q The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

TEST PROCEDURE (Conduction)

a. The RF output of the transceiver was connected to the input of the spectrum analyzer through sufficient attenuation.

b. Set the RBW >20BW,VBW>3xRBW.

c. Detector = peak.

d Sweep time = auto couple.

e Trace mode = max hold.

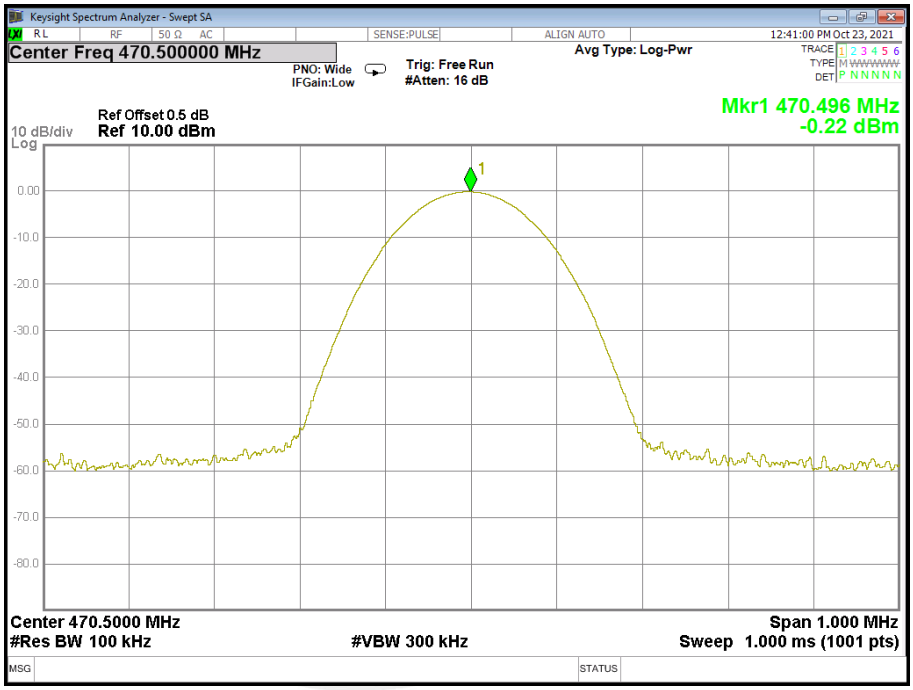
f Allow trace to fully stabilize.

g Use the peak marker function to determine the maximum amplitude level.

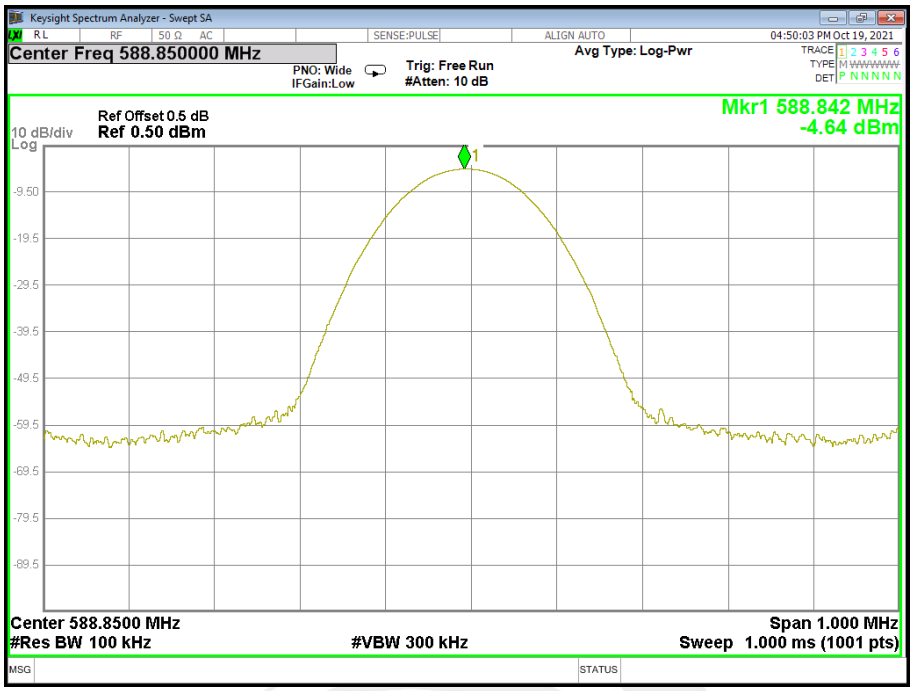
TEST RESULT

Frequency Channel (MHz)	Peak Output Power (dBm)	Transmitter Power (mW)	Limits (mW)
470.5	-0.22	0.951	250
588.85	-4.64	0.344	250
607.7	-0.77	0.838	250

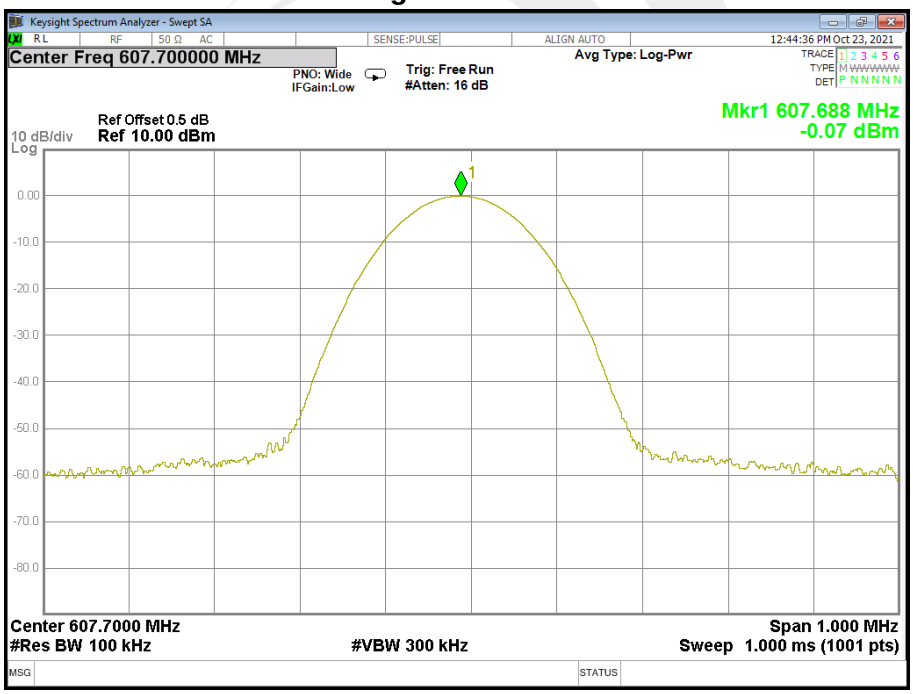
Low Channel



Mid Channel



High Channel



4.9 CONDUCTED EMISSION MEASUREMENT

POWER LINE CONDUCTED EMISSION LIMITS

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 the limits in the following table.

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

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.

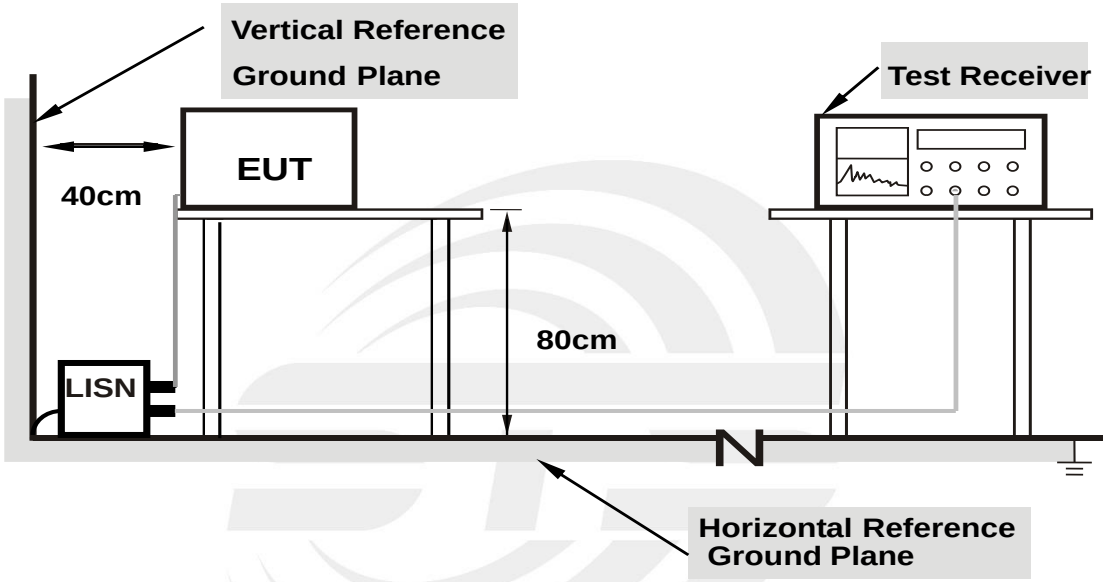
The following table is the setting of the receiver

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

TEST PROCEDURE

a. The EUT is 0.8 m from the horizontal ground plane and 0.4 m from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments are powered from additional LISN(s). The LISN provides 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. 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.
c. 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.
d. LISN is at least 80 cm from the nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

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 support units.

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.

TEST RESULT

Temperature:	N/A	Relative Humidity:	N/A
Test Voltage:	N/A	Phase:	L/N
Test Mode:	N/A		

Note: The EUT only power by battery, not applicable.

PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※