

FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : UHF Wireless Microphone
FCC ID. : DLAS4HDX
Model No. : S4.16HDX; S4.4HDX
Working Frequency : 606~608 MHz ; 614~698 MHz

for

APPLICANT : TOA Corporation
ADDRESS : 2-1 Takamatsu-cho, Takarazuka-shi, Hyogo-ken,
665-0043, Japan

Test Performed by

ELECTRONICS TESTING CENTER (ETC) , TAIWAN
NO. 34. LIN 5, DINGFU VIL., LINKOU DIST.,
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Report Number : 14-04-RBF-022-01

TEST REPORT CERTIFICATION

Applicant : TOA Corporation
2-1 Takamatsu-cho, Takarazuka-shi, Hyogo-ken, 665-0043, Japan

Manufacturer : Dynatron Industrial Co., Ltd.
No.89, Din Pin Rd., Ray Fong Industrial Area, Ray Fong Dist, New
Taipei City, Taiwan

Description of EUT :

a) Type of EUT : UHF Wireless Microphone

b) Trade Name : TOA Corporation, TRANTEC

c) Model No. : S4.16HDX; S4.4HDX

d) FCC ID : DLAS4HDX

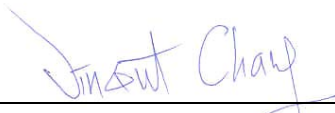
e) Working Frequency : 606~608 MHz
614~698 MHz

f) Power Supply : DC 9V Battery

Regulation Applied: FCC Rules and Regulations Part 74 Subpart H

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Issued Date : May 26, 2014

Test Engineer : 
(Vincent Chang, Engineer)

Approve & Authorized Signer : 
S. S. Liou, Section Manager
EMC Dept. II of ELECTRONICS
TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

- a) Type of EUT : UHF Wireless Microphone
- b) Trade Name : TOA Corporation, TRANTEC
- c) Model No. : S4.16HDX; S4.4HDX
- d) FCC ID : DLAS4HDX
- e) Working Frequency : 606~608 MHz
614~698 MHz
- f) Power Supply : DC 9V Battery
- g) Emission Designator : 118KF3E
 $2M+2DK=2x(0.6kHz)+2x(58.3kHz)x1=117.8kHz$
- h) Model Difference : Model: S4.4HDX and S4.16HDX are identical. They have the same design on the circuit and PCB layout. The only difference is the model name designation.

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in chapter 13 of ANSI C63.4 (2003). Test also follow "TIA-603-C(2004)-Land Mobile FM or PM Communications Equipment Measurement and Performance Standards" and section 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, and 2.1055 of Part 2 of CFR 47.

1.3 Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the roof top of Building at No.34, Lin 5, Dingfu Vil., Linkou Dist., New Taipei City, Taiwan 24442, R.O.C.

This site is FCC 2.948 listed and accepted in a letter dated Jan. 29, 2014.

Registration Number: 90589

2. REQUIREMENTS OF PROVISIONS

2.1 Definition

Intentional radiator:

A device that intentionally generates and emits radio frequency energy by radiation or induction.

2.2 Frequencies Available

According to sec. 74.802 of Part 74, the following frequencies are available for low power auxiliary station :

Frequencies (MHz)	
26.100-26.480	455.000-456.000
54.000-72.000	470.000-488.000
76.000-88.000	488.000-494.000
161.625-161.775	494.000-608.000
174.000-216.000	614.000-806.000
450.000-451.000	944.000-952.000

2.3 Requirements for Radio Equipment on Certification

(1) RF Output Power

For transmitters, the power output shall be measured at the RF output terminals.

(2) Modulation Characteristics

For Voice Modulated Communication Equipment, a curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted.

(3) Occupied Bandwidth

For radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

(4) Spurious Emissions at Antenna Terminals

The radio frequency voltage or power generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminal when properly loaded with a suitable artificial antenna.

(5) Field Strength of Spurious Emissions

Measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation.

(6) Frequencies Tolerance

- a) The frequency stability shall be measured with variation of ambient temperature.
- b) The frequency stability shall be measured with variation of primary supply voltage.

2.4 Labeling Requirement

Each equipment for which a type acceptance application is filed on or after May 1,1981, shall bear an identification plate or label pursuant to § 2.925 (Identification of equipment) and §2.926 (FCC identifier) .

3. OUTPUT POWER MEASUREMENT

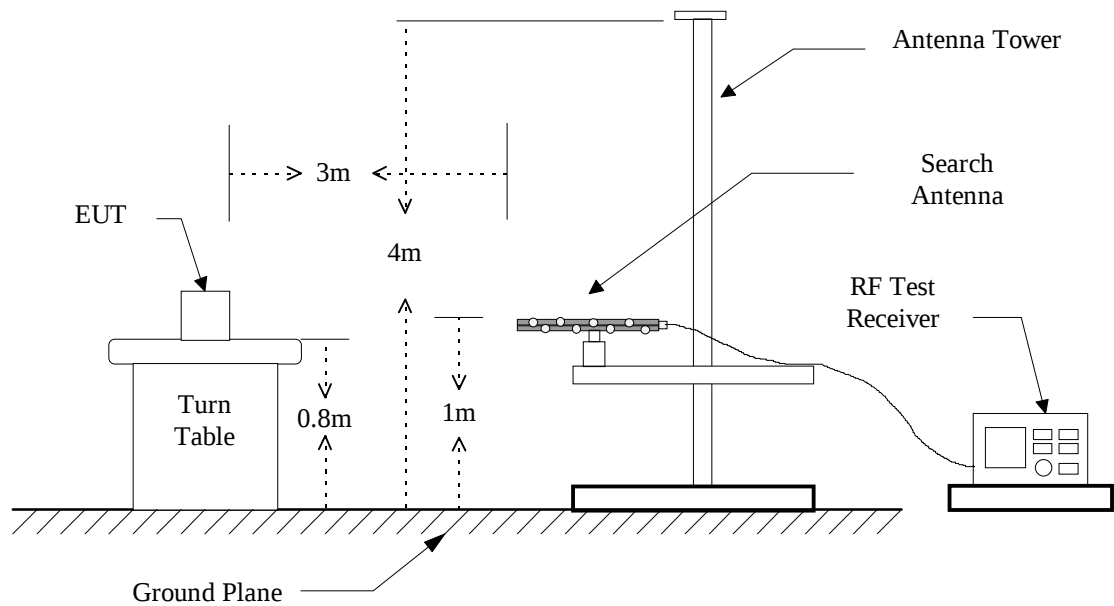
3.1 Provision Applicable

According to §74.861(e)(1)(ii), the output power shall not exceed 250 milliwatts.

3.2 Measurement Procedure

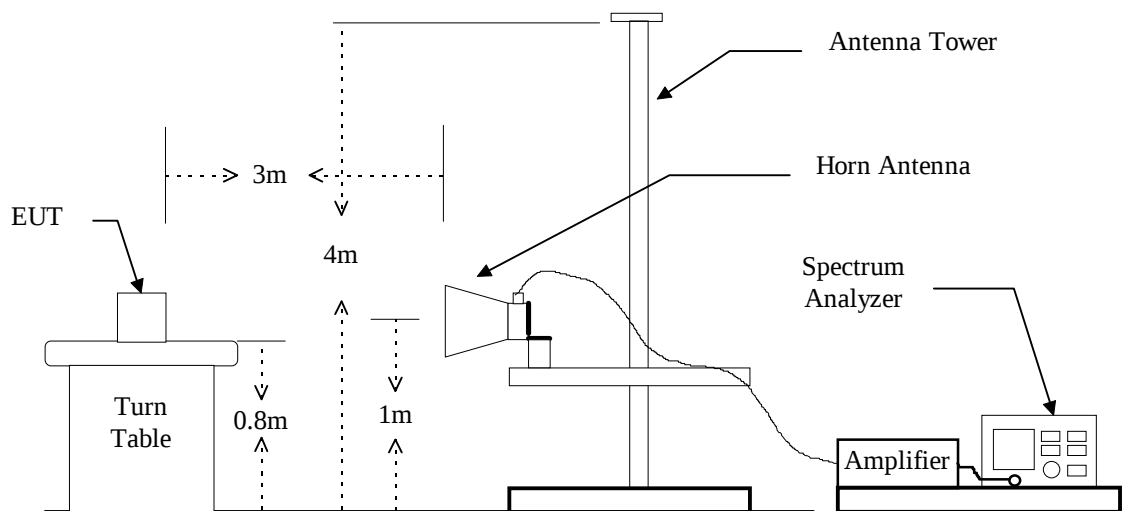
1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° , and record the highest value indicated on spectrum analyzer as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.
7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

Figure 1 : Frequencies measured below 1 GHz configuration



Note: For substitution method, replace the EUT with a tuned dipole antenna relative to each frequency and connect to a standard signal generator (SG) via a low loss cable.

Figure 2 : Frequencies measured above 1 GHz configuration



Note: For substitution method, replace the EUT with a horn antenna and connect to a standard signal generator (SG) via a low loss cable.

3.3 Test Data

Operated mode : TX
 Temperature : 25 °C

Test Date : Apr. 14, 2014
 Humidity : 65 %

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
606.125	81.20	11.00	2.2	----	8.80	7.586	250.0

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
607.925	81.40	11.20	2.20	----	9.00	7.943	250.0

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
614.125	81.30	10.90	2.30	----	8.60	7.244	250.0

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
671.000	81.50	11.40	2.30	----	9.10	8.128	250.0

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
697.925	81.60	12.00	2.30	----	9.70	9.333	250.0

Note: For measured frequency below 1GHz, a tuned dipole antenna is used.

3.4 Result Calculation

Result calculation is as following :

Result = SG Reading + Cable Loss + Antenna Gain Corrected

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

$$\text{mW} = \log^{-1} \left[\frac{\text{Result(dBm)}}{10} \right]$$

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2013/05/14	2014/05/13
Biconical Antenna	EMCO	3110	2013/10/25	2014/10/24
Log-periodic Antenna	EMCO	3146	2013/10/25	2014/10/24
Amplifier	HP	8447D	2013/05/03	2014/05/02
Signal generator	HP	83732B	2013/09/14	2014/09/13

4. MODULATION CHARACTERISTICS

4.1 Provisions Applicable

According to § 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be measured.

4.2 Measurement Method

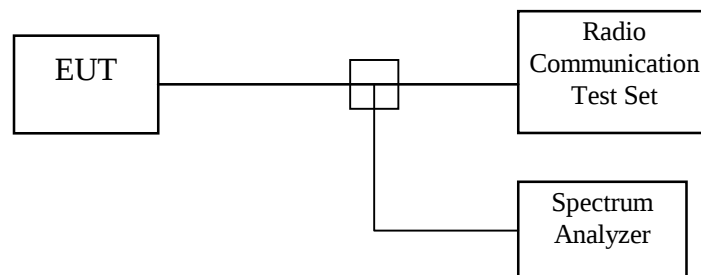
A) Modulation Limit

1. Position the EUT as shown in figure 3, adjust the audio input frequency to 100 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

B) Frequency response of all circuits

1. Position the EUT as shown in figure 3.
2. Vary the modulating frequency from 100 Hz to 15000 Hz with constant input voltage (derived from 5.4(a) of this test report), and observe the change in output.

Figure 3 : Modulation characteristic measurement configuration



4.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2013/05/13	2014/05/12
Spectrum Analyzer	Rohde & Schwarz	FSP40	2014/01/21	2015/01/20

4.4 Measurement Result

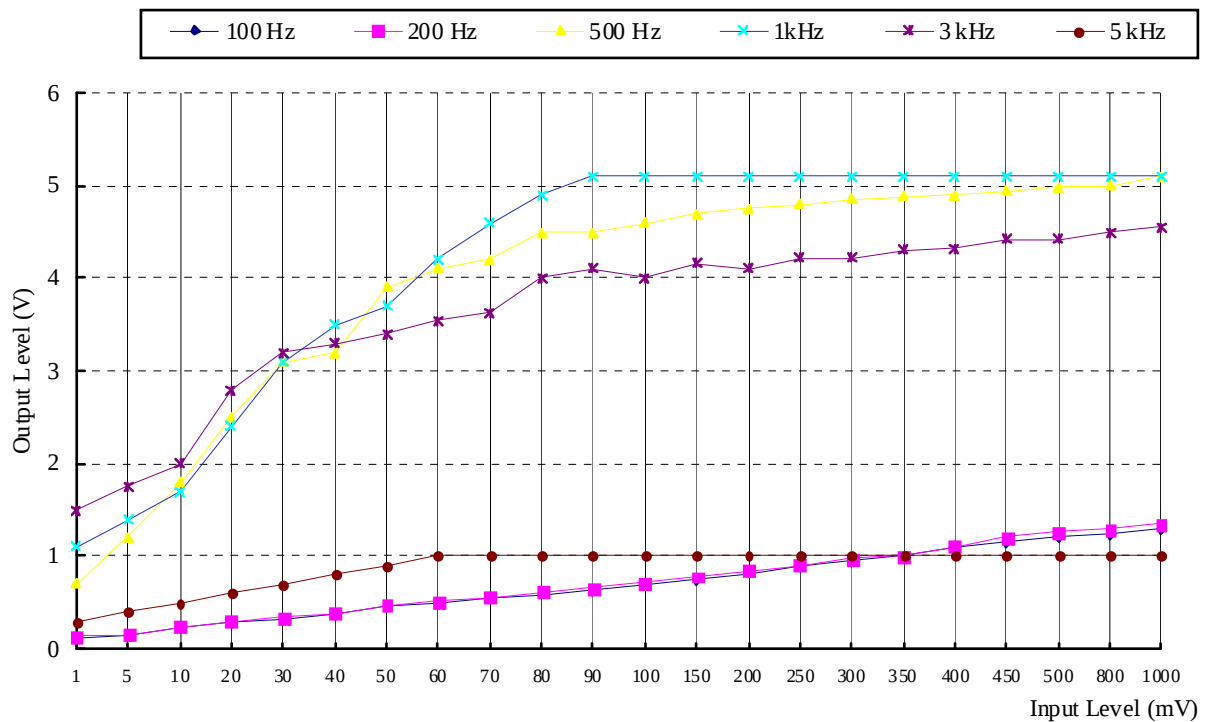
RF Frequency : 606.125MHz;

Test Date : Apr. 14, 2014

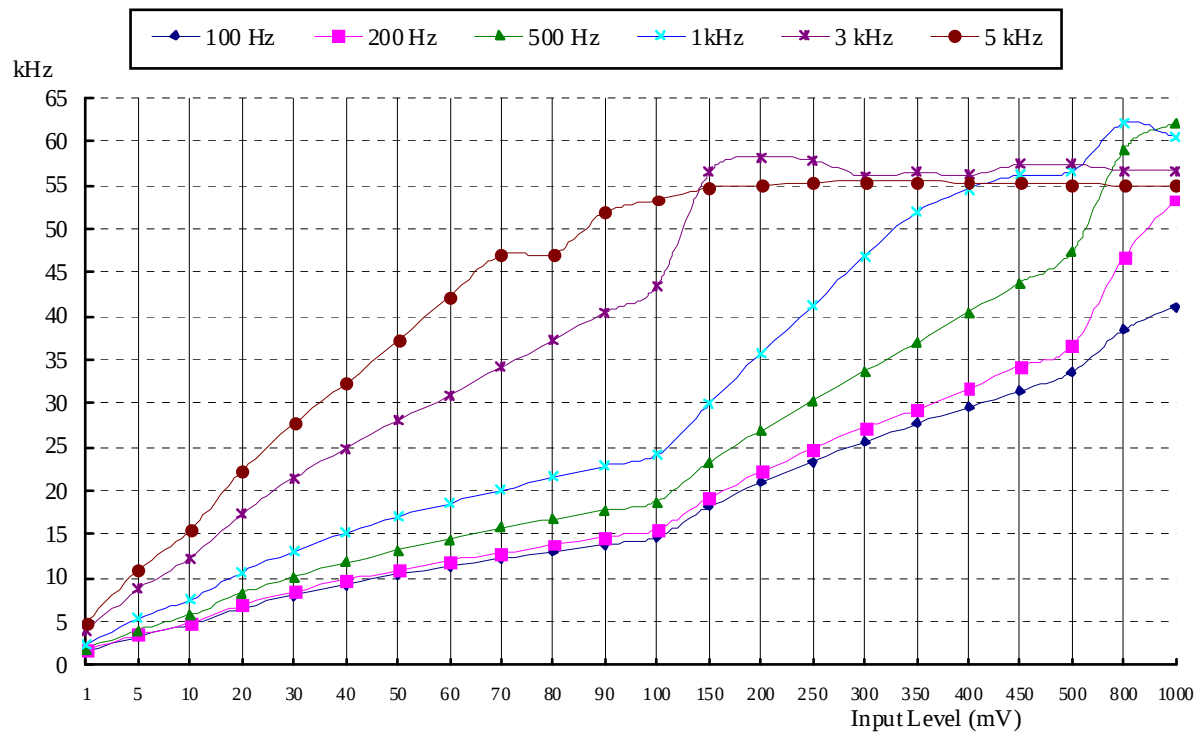
Temperature : 25 °C

Humidity : 65 %

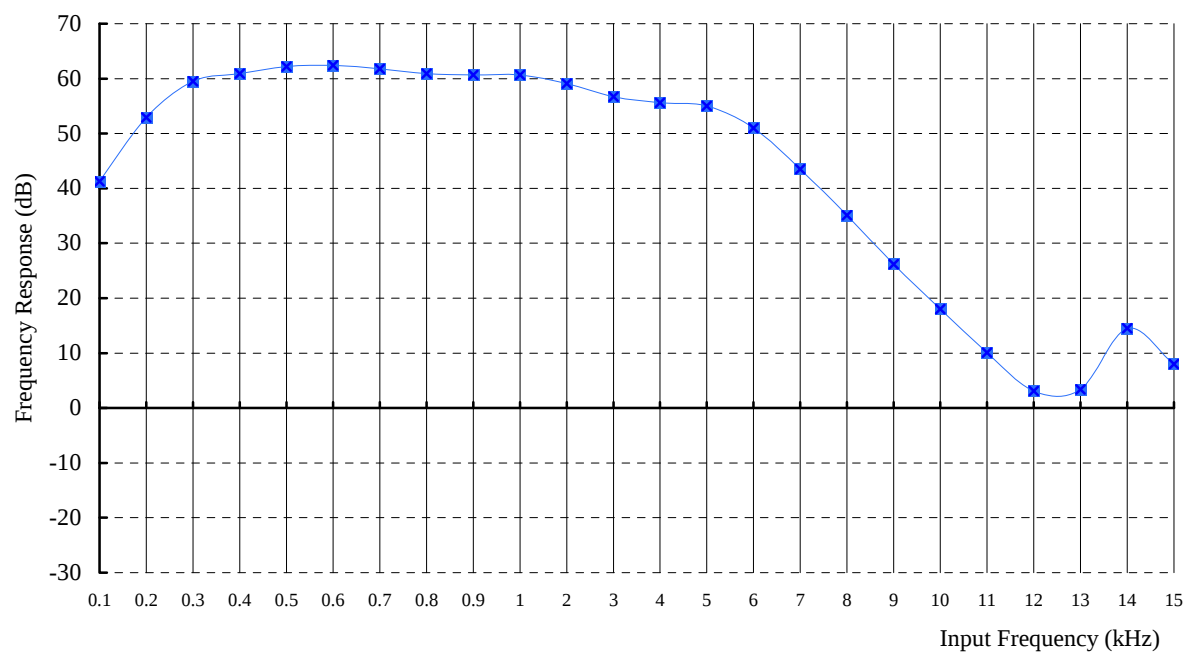
A). Frequency response



B). Modulation Limit



C). Frequency response of all circuits



5. OCCUPIED BANDWIDTH OF EMISSION

5.1 Provisions Applicable

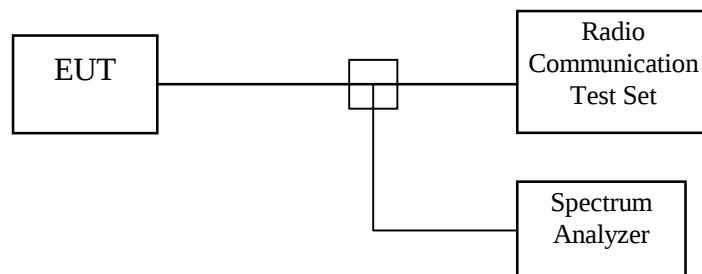
According to §2.1049 (c)(1), For radiotelephone transmitter, other than single sideband or indenpent sideband transmitter, when modulated by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

According to §74.861(e)(5), the frequency emission bandwidth shall not exceed 200 kHz.

5.2 Measurement Method

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT as shown in figure 4, and Install new batteries in the EUT. Turn on the EUT ant set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Apply a 2.5 kHz modulation signal to EUT and measure the frequencies of the modulated signal from the EUT where it is the specified number of dB below the reference level set in step 2. This is the occupied bandwidth specified.

Figure 4 : Occupied bandwidth measurement configuration



5.3 Occupied Bandwidth Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2013/05/13	2014/05/12
Spectrum Analyzer	Rohde & Schwarz	FSP40	2014/01/201	2015/01/20

5.4 Bandwidth Measured

5.4.1 Input Level Derived

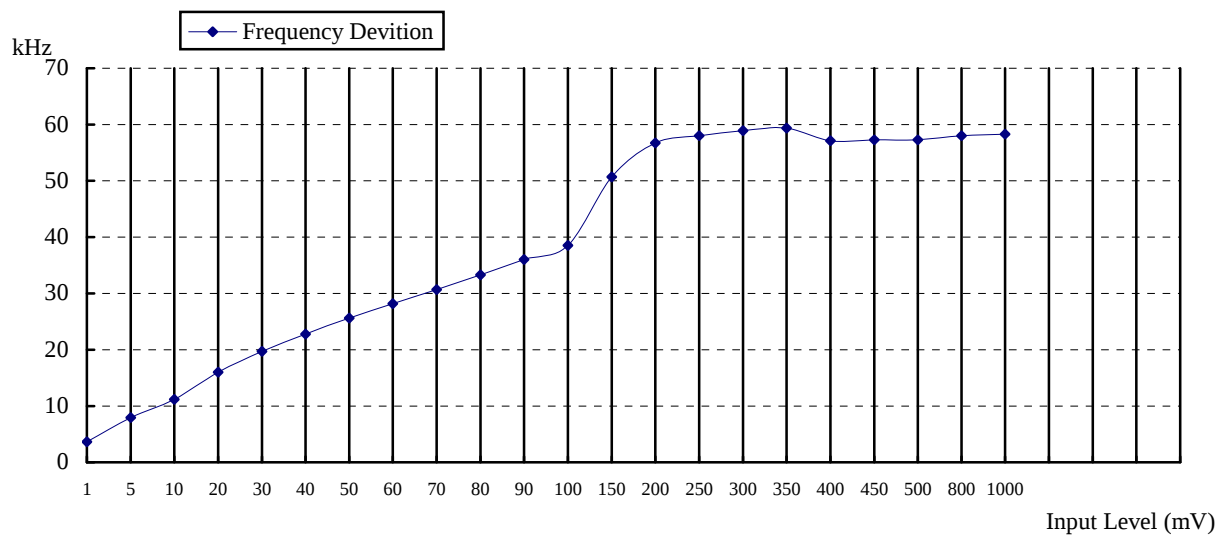
RF Frequency : 606.125MHz;

Test Date : Apr. 14, 2013

Temperature : 25 °C

Humidity : 65 %

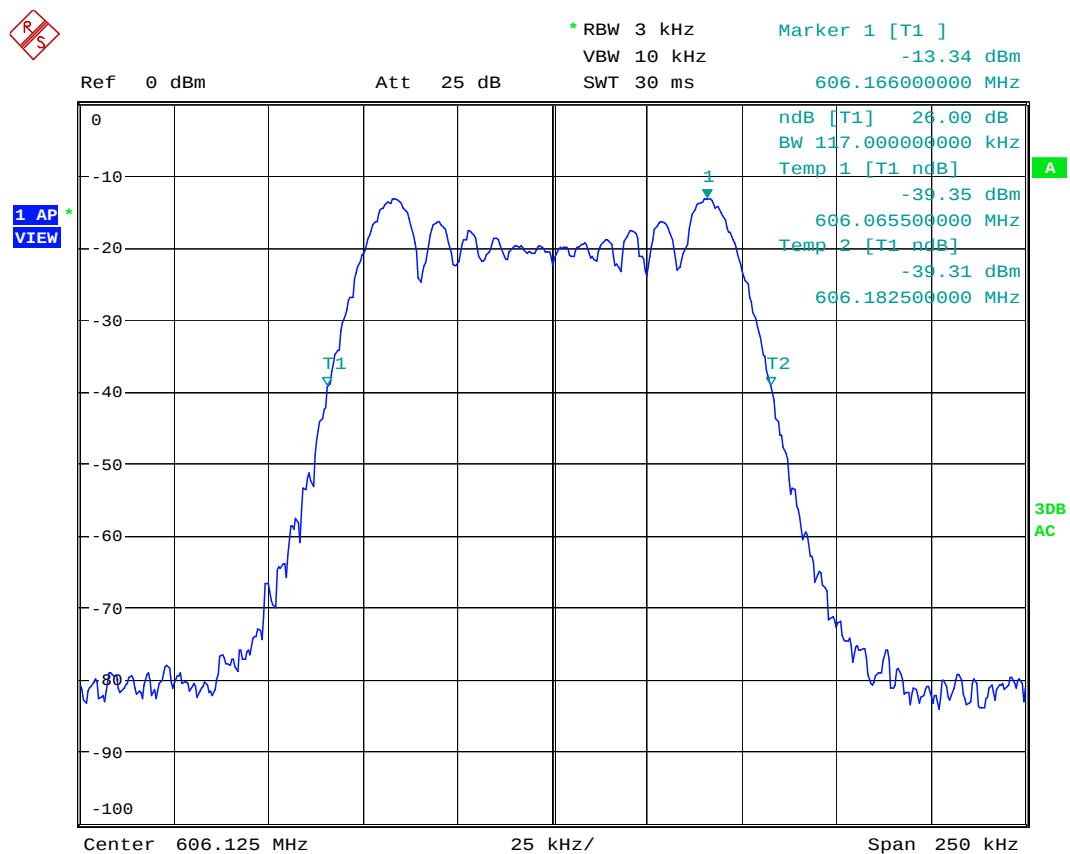
Input Audio Frequency : 2.5 kHz, Sine Wave

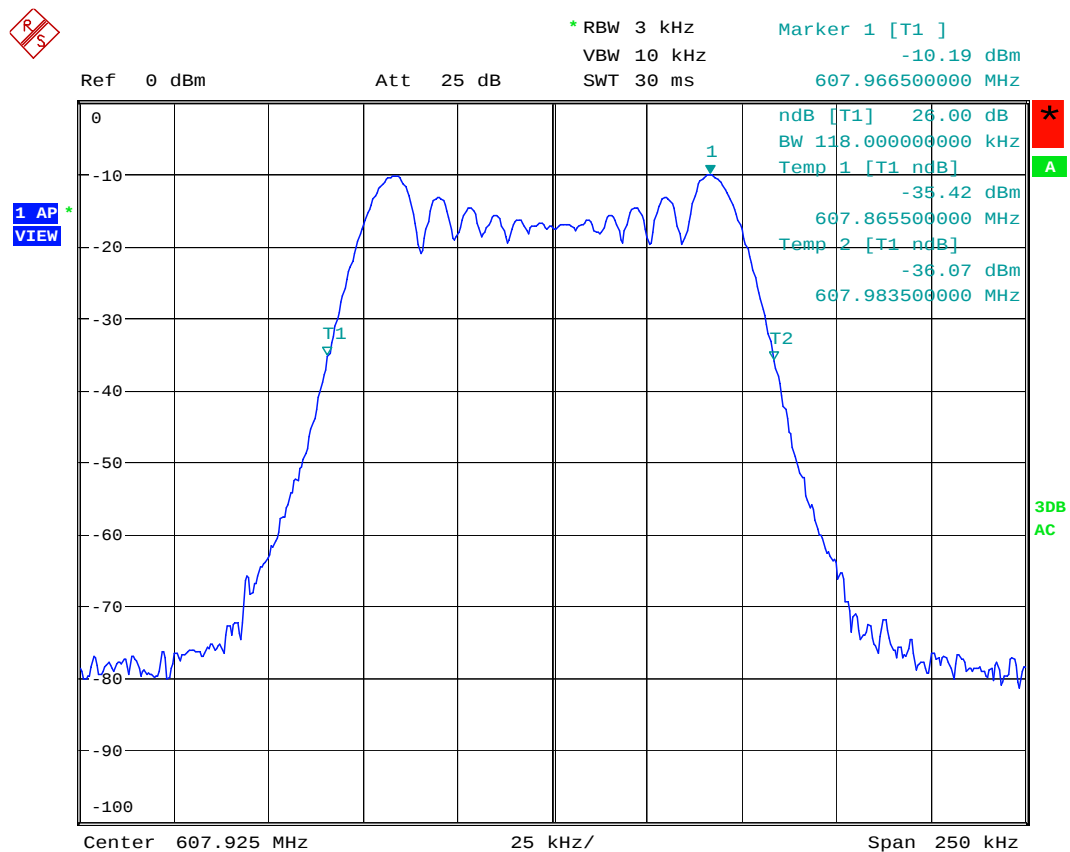


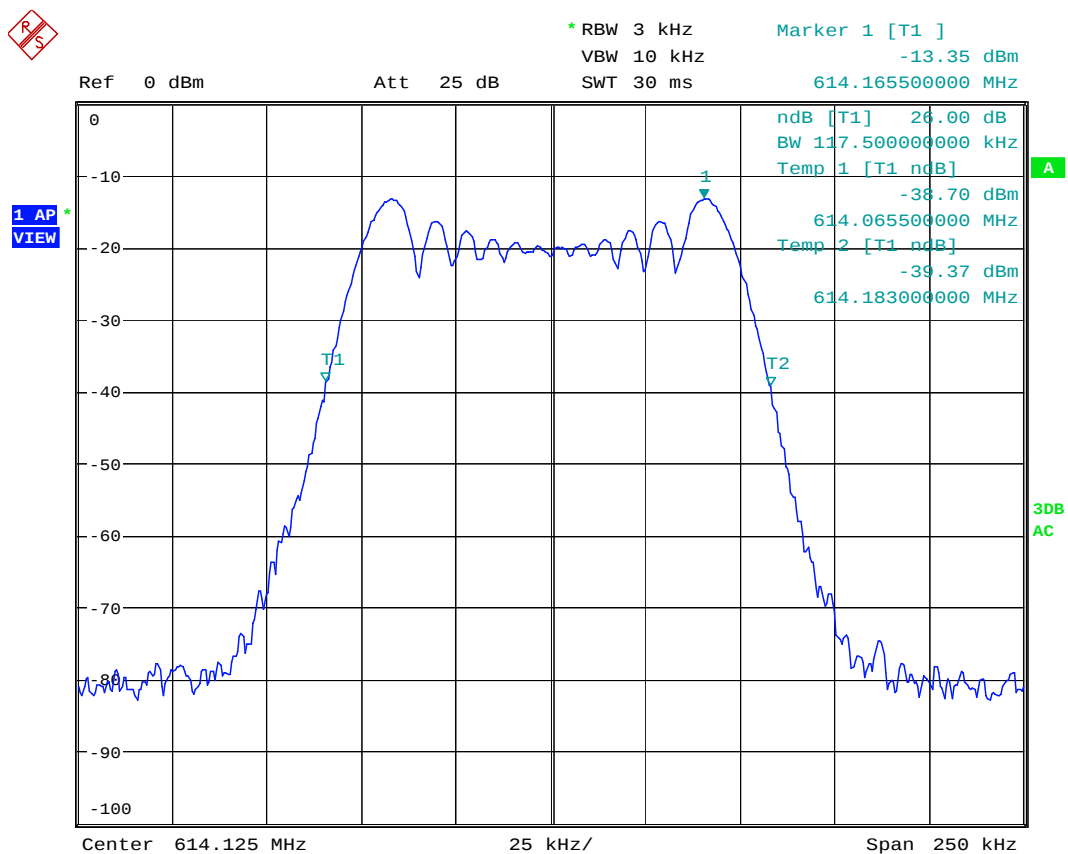
The Level input to produce 50% modulation is 60 mV, therefore the magnitude 16 dB greater than it is 378 mV.

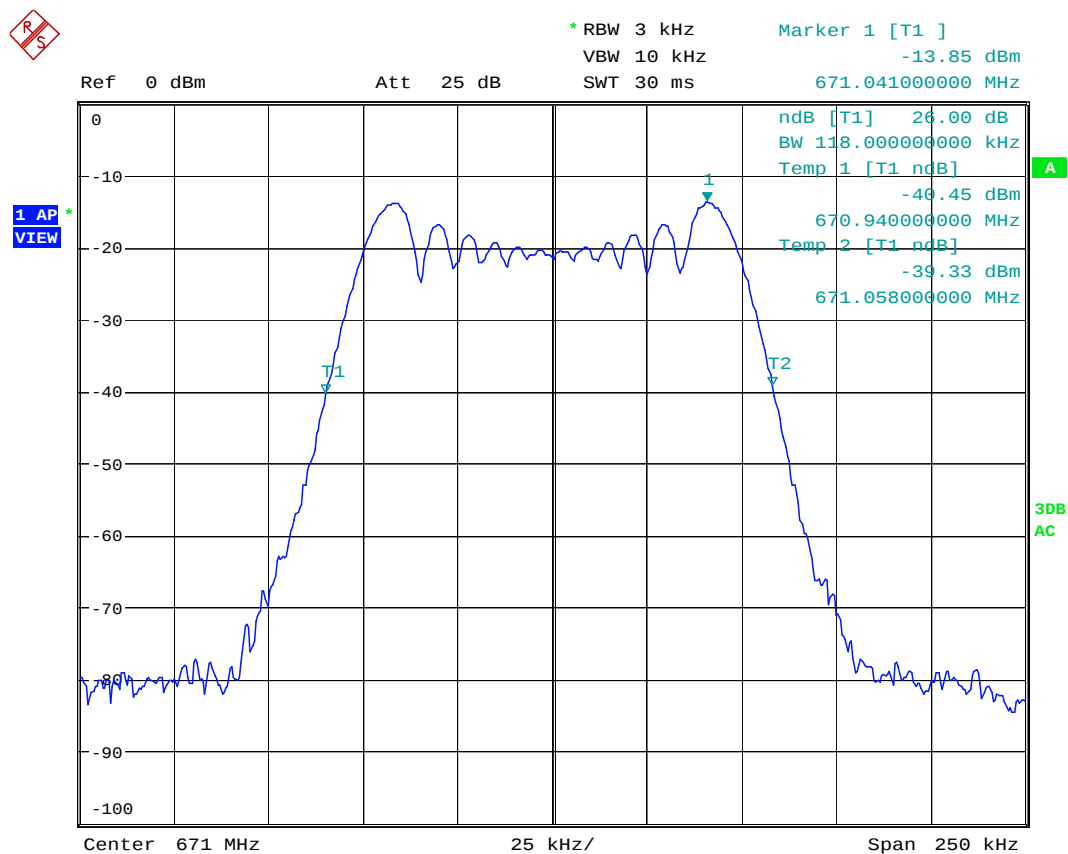
5.4.2 Occupied Bandwidth PlottedTest Date : Apr. 14, 2013Temperature : 25 °CHumidity : 65 %

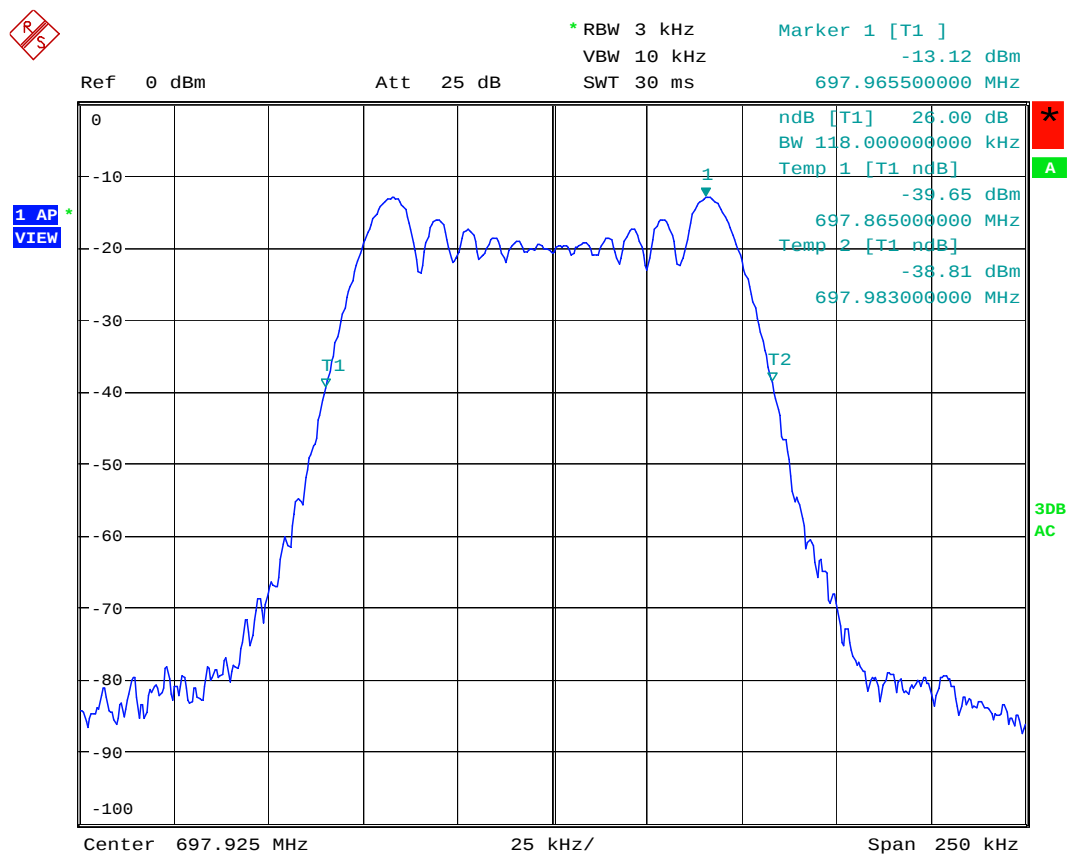
RF Frequency (MHz)	26 dB Bandwidth (kHz)
606.125	117.0
607.925	118.0
614.125	117.5
671.000	118.0
697.925	118.0











6. FIELD STRENGTH OF EMISSION

6.1 Provisions Applicable

According to §2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to §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:

- (i) 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.
- (ii) 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.
- (iii) on any frequency removed from the operating frequency by more than 250 percent of the authorized bandwidth shall be attenuated below the unmodulated carrier by at least 43 plus 10 Log(output power in watts) dB.

6.2 Measurement Procedure

1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power as measured in chapter 3.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0 ° to 360 ° , and record the highest value indicated on spectrum analyzer as reference value.
4. Repeat step 3 until all frequencies need to be measured were complete.
5. Repeat step 4 with search antenna in vertical polarized orientations.
6. Replace the EUT with a tuned dipole antenna (horn antenna for above 1 GHz) relative to each frequency in horizontally polarized orientation and as the same polarized orientation with search antenna. Connect the tuned dipole antenna to a standard signal generator (SG) via a low loss cable. Power on the SG and tune the right frequency in measuring as well as set SG at a appreciated output level. Rise and lower the search antenna to get the highest value on spectrum analyzer, and then hold this position. Adjust the SG output to get a identical value derived from step 3 on spectrum analyzer. Record this value for result calculated.

7. Repeat step 6 until all frequencies need to be measured were complete.
8. Repeat step 7 with both dipole antenna (horn antenna for above 1 GHz) and search antenna in vertical polarized orientations.

6.3 Measuring Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2014/01/21	2015/01/20
Double Ridged Antenna	EMCO	3115	2013/04/29	2014/04/28
Double Ridged Antenna	EMCO	3115	2013/04/29	2014/04/28
Log-periodic Antenna	EMCO	3146	2013/10/25	2014/10/24
Biconical Antenna	EMCO	3110	2013/10/25	2014/10/24
Amplifier	HP	8449B	2014/01/15	2015/01/14
Amplifier	HP	8447D	2013/05/03	2014/05/02
Signal generator	HP	83732B	2013/09/14	2014/09/13

Measuring instrument setup in frequency band measured is as following :

Frequency Band (MHz)	Instrument	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	Spectrum Analyzer	Peak	100 kHz	100 kHz
Above 1000	Spectrum Analyzer	Peak	1 MHz	1 MHz

6.4 Measuring Data

6.4.1. Emission Test Data

a. Tx Frequency: 606.125MHz

Operated mode : TX
Temperature : 25°C

Test Date : Apr. 14, 2014
Humidity : 65%

Unmodulated carrier output power is 8.8 dBm , or 7.586 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$8.8 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency (MHz)	Meter Reading (dBUV)		SG Reading (dBm)		Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V				H	V		
1212.250	62.2	64.4	-49.5	-47.2	6.6	-2.0	2.3	-45.2	-42.9	-13.0	-29.9
1818.375	---	---	---	---	7.6	-2.0	2.8	---	---	-13.0	---
2424.500	---	---	---	---	9.0	-2.0	3.3	---	---	-13.0	---
3030.625	---	---	---	---	8.9	-2.0	3.7	---	---	-13.0	---
3636.750	---	---	---	---	9.3	-2.0	4.1	---	---	-13.0	---
4242.875	---	---	---	---	9.5	-2.0	4.4	---	---	-13.0	---
4849.000	---	---	---	---	9.8	-2.0	4.8	---	---	-13.0	---
5455.125	---	---	---	---	10.0	-2.0	5.1	---	---	-13.0	---
6061.250	---	---	---	---	10.8	-2.0	5.3	---	---	-13.0	---

Note :

1. Remark “---” means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain} + \text{Antenna Gain Corrected}$$

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

b. Tx Frequency: 607.925 MHz

Operated mode : TX
 Temperature : 25°C

Test Date : Apr. 14, 2014
 Humidity : 65%

Unmodulated carrier output power is 9.0 dBm , or 7.943 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$9.0 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V				H	V		
1215.850	62.6	64.7	-49.1	-46.9	6.6	-2.0	2.3	-44.8	-42.6	-13.0	-29.6
1823.775	---	---	---	---	7.6	-2.0	2.8	---	---	-13.0	---
2431.700	---	---	---	---	9.0	-2.0	3.3	---	---	-13.0	---
3039.625	---	---	---	---	8.9	-2.0	3.7	---	---	-13.0	---
3647.550	---	---	---	---	9.3	-2.0	4.1	---	---	-13.0	---
4255.475	---	---	---	---	9.5	-2.0	4.4	---	---	-13.0	---
4863.400	---	---	---	---	9.7	-2.0	4.8	---	---	-13.0	---
5471.325	---	---	---	---	10.0	-2.0	5.1	---	---	-13.0	---
6079.250	---	---	---	---	10.8	-2.0	5.3	---	---	-13.0	---

Note :

1. Remark “---” means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain} + \text{Antenna Gain Corrected}$$

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

c. Tx Frequency: 614.125 MHz

Operated mode : TX
 Temperature : 25°C

Test Date : Apr. 14, 2014
 Humidity : 65%

Unmodulated carrier output power is 8.6 dBm , or 7.244 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$8.6 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V				H	V		
1228.250	62.3	64.5	-49.3	-47.1	6.6	-2.0	2.3	-45.0	-42.8	-13.0	-29.8
1842.375	---	---	---	---	7.6	-2.0	2.9	---	---	-13.0	---
2456.500	---	---	---	---	9.1	-2.0	3.3	---	---	-13.0	---
3070.625	---	---	---	---	9.0	-2.0	3.8	---	---	-13.0	---
3684.750	---	---	---	---	9.2	-2.0	4.1	---	---	-13.0	---
4298.875	---	---	---	---	9.6	-2.0	4.5	---	---	-13.0	---
4913.000	---	---	---	---	9.7	-2.0	4.8	---	---	-13.0	---
5527.125	---	---	---	---	10.0	-2.0	5.1	---	---	-13.0	---
6141.250	---	---	---	---	10.8	-2.0	5.4	---	---	-13.0	---

Note :

1. Remark “---” means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain} + \text{Antenna Gain Corrected}$$

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

d. Tx Frequency: 671.000 MHz

Operated mode : TX
 Temperature : 25°C

Test Date : Apr. 14, 2014
 Humidity : 65%

Unmodulated carrier output power is 9.1 dBm , or 8.128 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$9.1 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V				H	V		
1342.000	64.3	66.4	-46.8	-44.6	7.1	-2.0	2.4	-42.1	-39.9	-13.0	-26.9
2013.000	---	---	---	---	7.5	-2.0	3.0	---	---	-13.0	---
2684.000	---	---	---	---	9.2	-2.0	3.5	---	---	-13.0	---
3355.000	---	---	---	---	9.3	-2.0	3.9	---	---	-13.0	---
4026.000	---	---	---	---	8.9	-2.0	4.3	---	---	-13.0	---
4697.000	---	---	---	---	9.9	-2.0	4.7	---	---	-13.0	---
5368.000	---	---	---	---	9.9	-2.0	5.0	---	---	-13.0	---
6039.000	---	---	---	---	10.8	-2.0	5.3	---	---	-13.0	---
6710.000	---	---	---	---	10.7	-2.0	5.6	---	---	-13.0	---

Note :

1. Remark “---” means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain} + \text{Antenna Gain Corrected}$$

Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

e. Tx Frequency: 697.925 MHz

Operated mode : TX
 Temperature : 25°C

Test Date : Apr. 14, 2014
 Humidity : 65%

Unmodulated carrier output power is 9.7 dBm , or 9.333 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$9.7 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

Frequency (MHz)	Meter Reading (dBuV)		SG Reading (dBm)		Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm)		Limit (dBm)	Margin (dB)
	H	V	H	V				H	V		
1395.850	64.5	66.5	-46.4	-44.3	7.3	-2.0	2.5	-41.6	-39.5	-13.0	-26.5
2093.775	---	---	---	---	7.8	-2.0	3.1	---	---	-13.0	---
2791.700	---	---	---	---	9.1	-2.0	3.6	---	---	-13.0	---
3489.625	---	---	---	---	9.4	-2.0	4.0	---	---	-13.0	---
4187.550	---	---	---	---	9.3	-2.0	4.4	---	---	-13.0	---
4885.475	---	---	---	---	9.7	-2.0	4.8	---	---	-13.0	---
5583.400	---	---	---	---	10.1	-2.0	5.1	---	---	-13.0	---
6281.325	---	---	---	---	10.9	-2.0	5.4	---	---	-13.0	---
6979.250	---	---	---	---	10.5	-2.0	5.8	---	---	-13.0	---

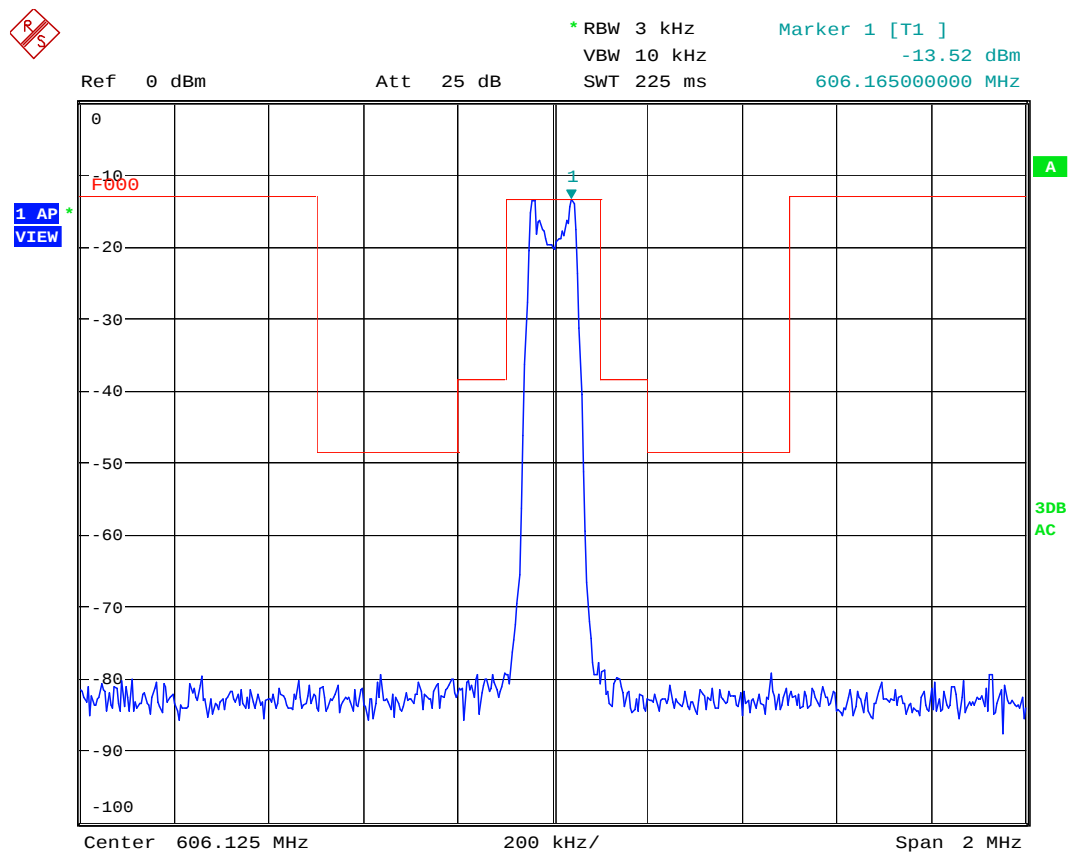
Note :

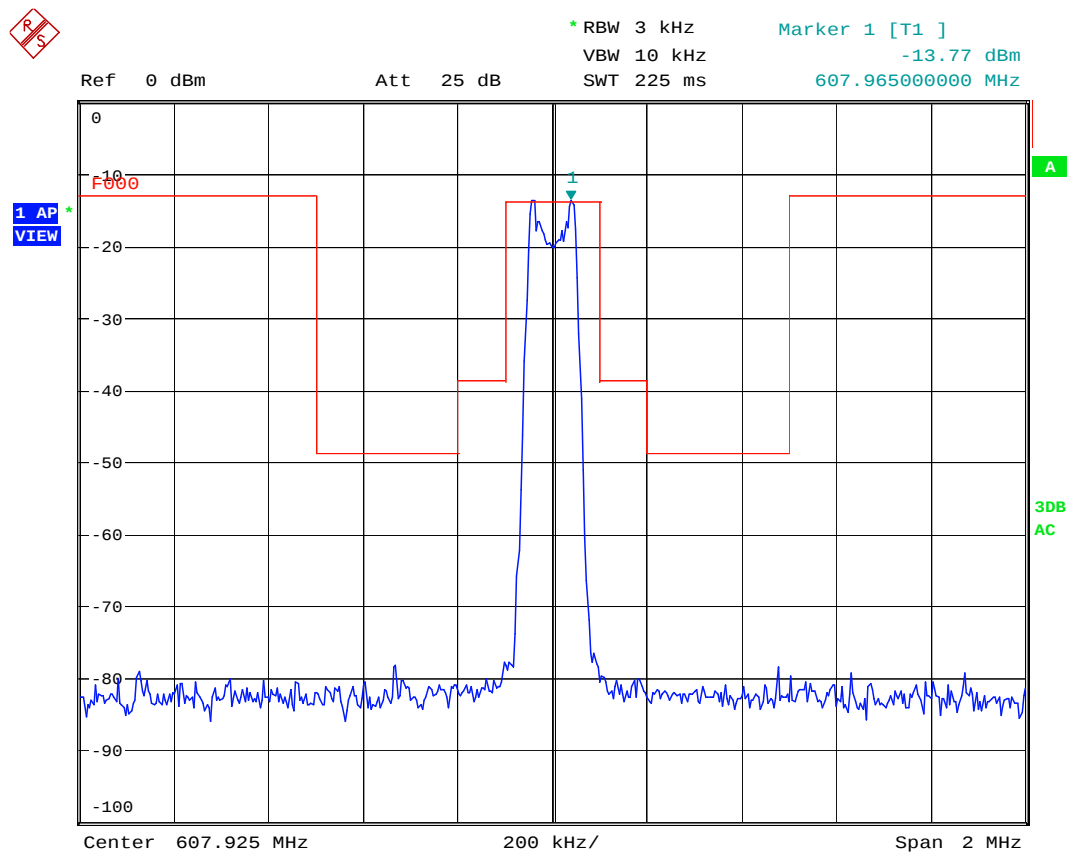
1. Remark “---” means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

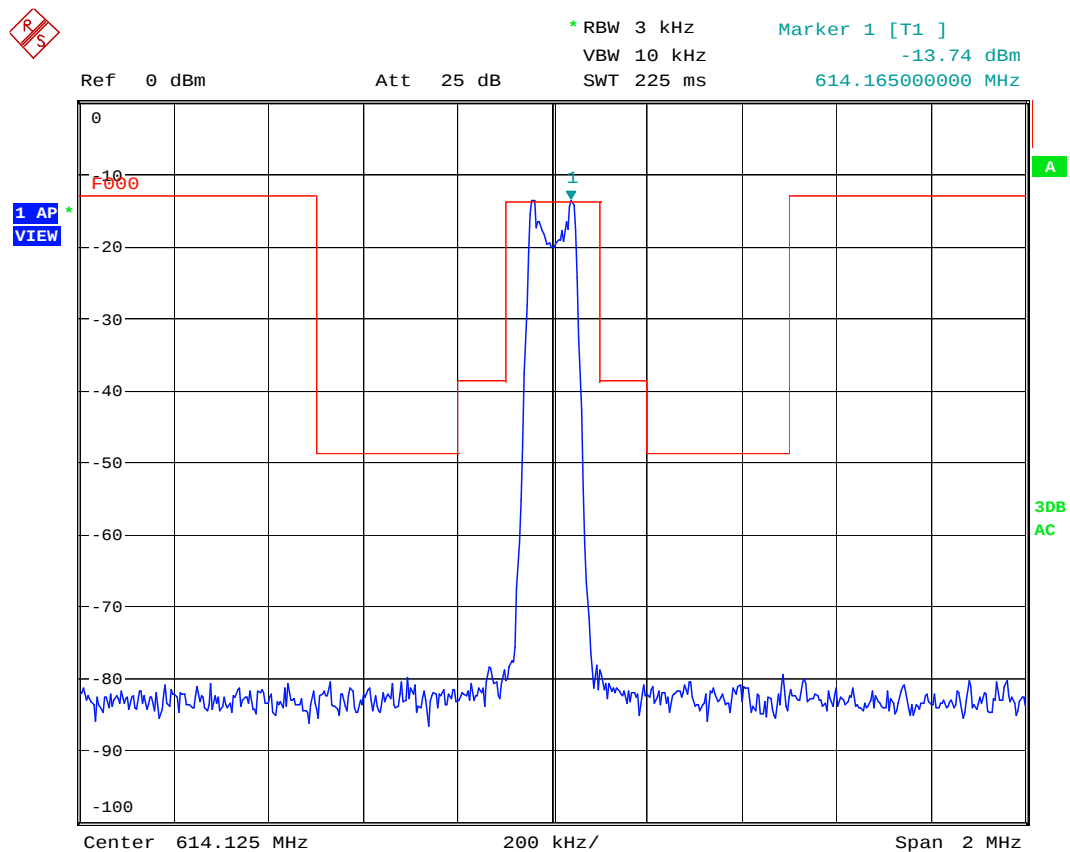
$$\text{Result} = \text{SG Reading} + \text{Cable Loss} + \text{Antenna Gain} + \text{Antenna Gain Corrected}$$

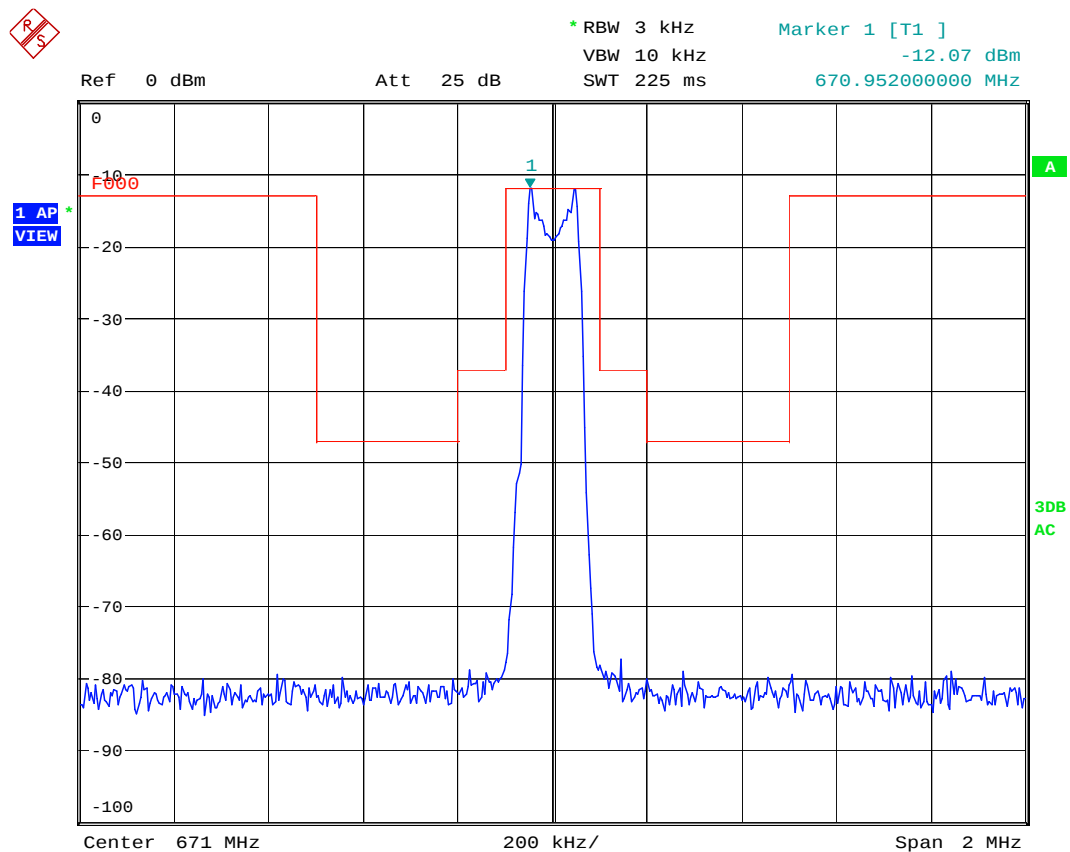
Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

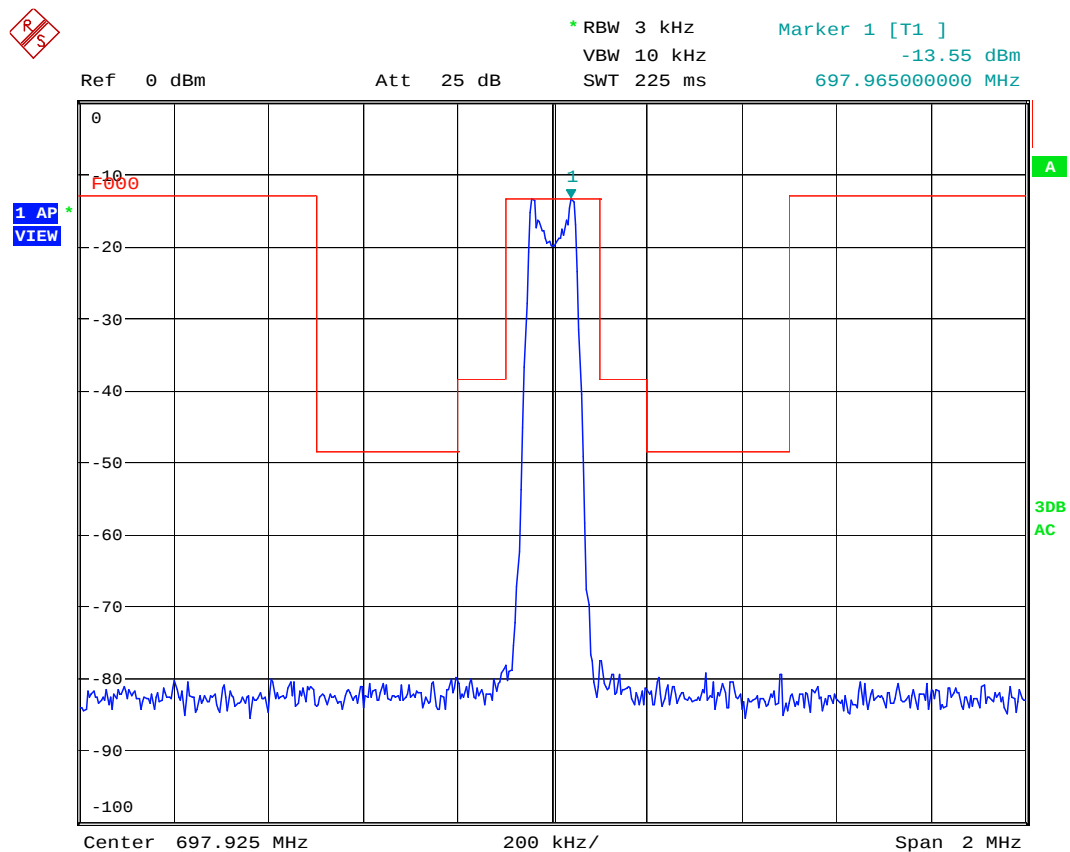
6.4.2 Emission mask plots











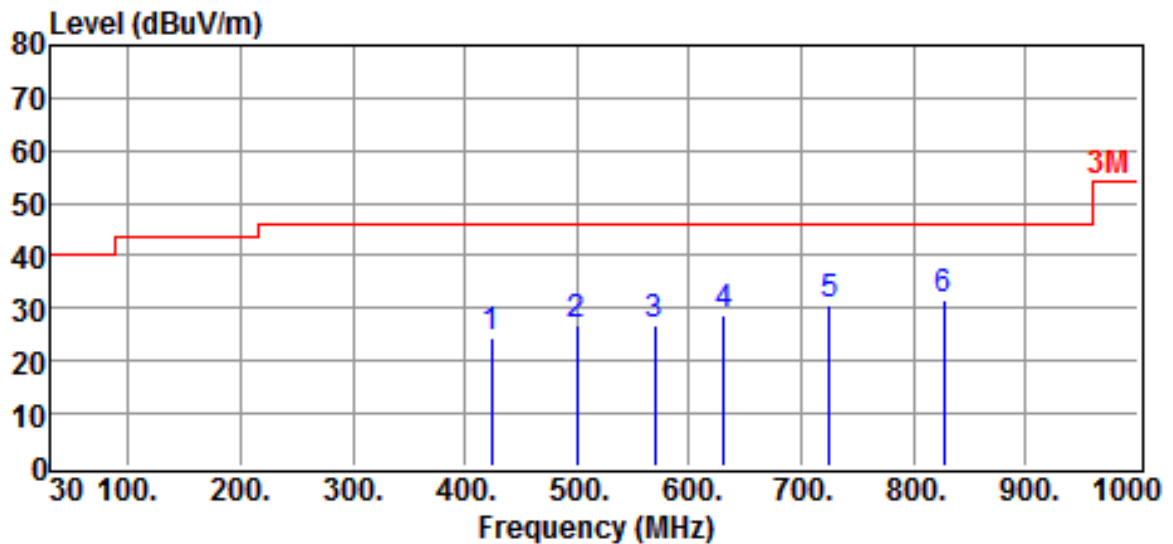
6.5 Other Emission

a) Emission frequencies below 1 GHz

Test Date : Apr. 14, 2014

Temperature : 25°C

Humidity : 65 %



Site : OPEN SITE

Date : 2014-04-14

EUT : UHF Wireless Microphone

Ant. Pol. : HORIZONTAL

Model : S4.16HDX

Detector :

Power Rating : DC 9V

Engineer : VC

Limit : 3M

Temp. : 25 °C

Memo : TX MODE

Humi. : 65 %

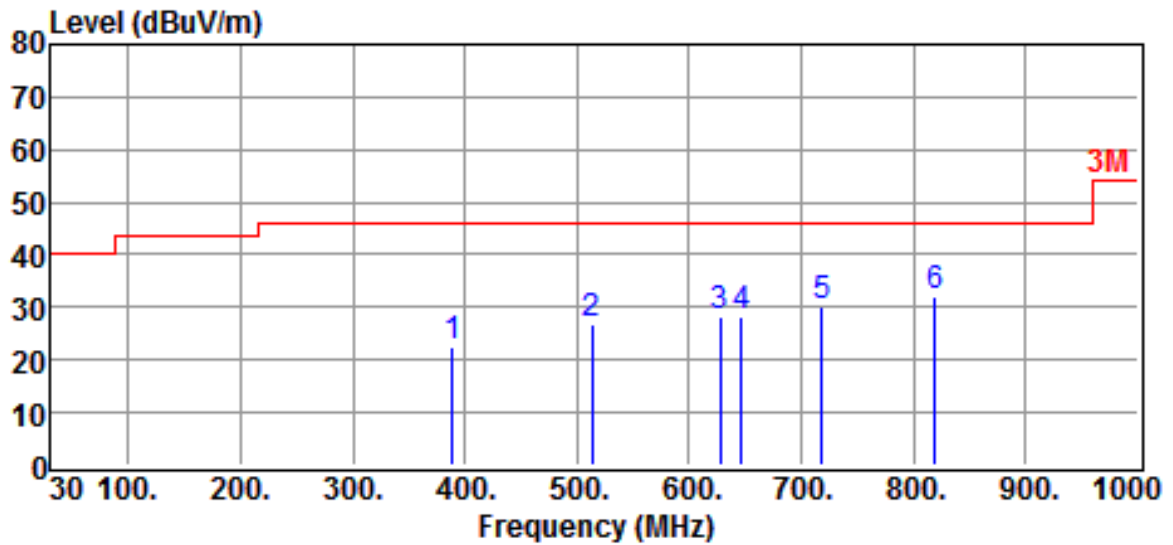
Freq MHz	Reading dBUV	Correction Factor dB	Result dBUV/m	Limits dBUV/m	Over limit dB	Detector
423.8200	4.7	19.7	24.4	46.0	-21.6	Peak
499.4800	5.3	21.5	26.8	46.0	-19.2	Peak
569.3200	4.4	22.5	26.9	46.0	-19.1	Peak
631.4000	5.4	23.6	29.0	46.0	-17.0	Peak
724.5200	5.2	25.3	30.5	46.0	-15.5	Peak
827.3400	4.7	26.9	31.6	46.0	-14.4	Peak

Note :

1. Result = Reading + Corrected Factor

2. Corrected Factor = Antenna Factor + Cable Loss

3. The margin value=Limit - Result



Site	:OPEN SITE	Date	:2014-04-14
EUT	:UHF Wireless Microphone	Ant. Pol.	:VERTICAL
Model	:S4.16HDX	Detector	:
Power Rating	:DC 9V	Engineer	:VC
Limit	:3M	Temp.	:25 °C
Memo	:TX MODE	Humi.	:65 %

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
388.9000	3.7	18.9	22.6	46.0	-23.4	Peak
513.0600	4.9	21.7	26.6	46.0	-19.4	Peak
627.5200	4.9	23.5	28.4	46.0	-17.6	Peak
646.9200	4.6	23.9	28.5	46.0	-17.5	Peak
718.7000	4.9	25.3	30.2	46.0	-15.8	Peak
819.5800	5.5	26.8	32.3	46.0	-13.7	Peak

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit - Result

b) Emission frequencies above 1 GHz

Radiated emission frequencies above 1 GHz to 25 GHz were too low to be measured with a pre-amplifier of 35 dB.

6.6 Radiated Measurement Photos



7. FREQUENCY STABILITY MEASUREMENT

7.1 Provisions Applicable

According to §2.1055 (a)(1), the frequency stability shall be measured with variation of ambient temperature from -30°C to +50°C centigrade, and according to §2.1055 (d)(2), the frequency stability shall be measured with variation of primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

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

7.2 Measurement Procedure

A) Frequency stability versus environmental temperature

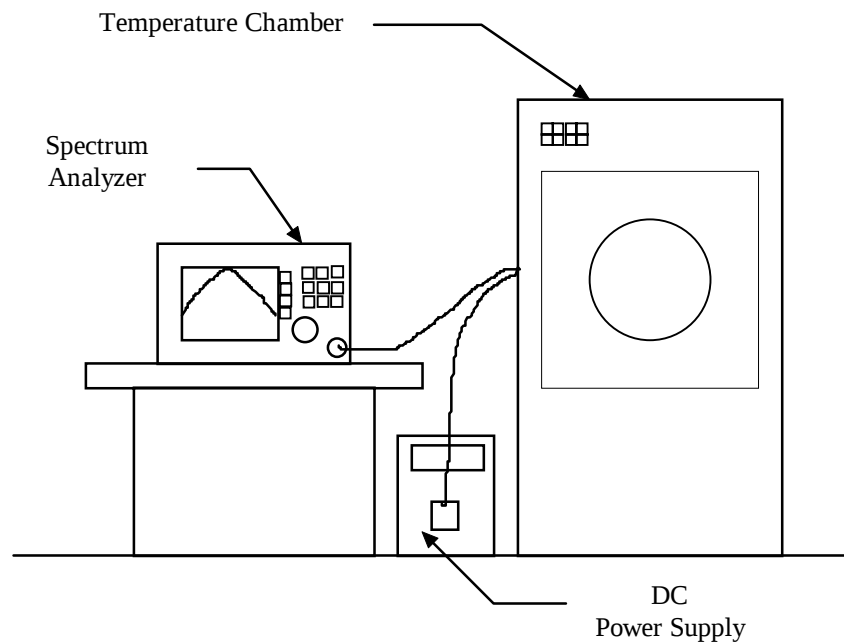
1. Setup the configuration per figure 5 for frequencies measured at ambient temperature if it is within 15°C to 25°C. Otherwise, an environmental chamber set for a temperature of 20°C shall be used.
2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. Set the temperature of chamber to 50°C. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.
4. Repeat step 2 with a 10°C decreased per stage until the lowest temperature -30°C is measured, record all measurement frequencies.

B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15°C to 25°C. Otherwise, an environmental chamber set for a temperature of 20°C shall be used. Install new batteries in the EUT.

2. Set SA center frequency to the right frequency needs to be measured. Then set SA RBW to 30 kHz, VBW to 100kHz and frequency span to 500 kHz. Record this frequency to be a reference.
3. For non hand carried, battery operated device, supply the EUT primary voltage with 85 and 115 percent of the nominal value and record the frequency.

Figure 5 : Frequency stability measurement configuration



7.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Spectrum Analyzer	Rohde & Schwarz	FSP40	2014/01/21	2015/01/20
Temperature Chamber	MALLIER	MCT-2X-M	2013/05/03	2014/05/02

7.4 Measurement DataTest Date : Apr. 14, 2014Temperature : 25 °CHumidity : 65 %**A. Tx Frequency 606.125MHz****A1. Frequency stability versus enviroment tempture**

Reference Frequency :606.125 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9.0	606.1109	-0.00232	606.1197	-0.00087	606.1425	0.00289
40		606.1086	-0.00270	606.1407	0.00259	606.1284	0.00057
30		606.1283	0.00054	606.1063	-0.00309	606.1173	-0.00127
20		606.1126	-0.00204	606.1103	-0.00242	606.1178	-0.00119
10		606.1390	0.00231	606.1457	0.00341	606.1110	-0.00231
0		606.1296	0.00076	606.1424	0.00287	606.1063	-0.00308
-10		606.1103	-0.00243	606.1412	0.00267	606.1252	0.00004
-20		606.1130	-0.00198	606.1226	-0.00039	606.1300	0.00083
-30		606.1019	-0.00381	606.1082	-0.00277	606.1211	-0.00065

A2. Frequency stability versus supplied voltage (85% - 115%)

Reference Frequency : 606.125 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	606.1200	-0.00083	606.1067	-0.00302	606.1394	0.00238
25	10.35	606.1058	-0.00317	606.1077	-0.00285	606.1131	-0.00197

Test Date : Apr. 14, 2014Temperature : 25 °CHumidity : 65 %**B. Tx Frequency 607.925MHz****B1. Frequency stability versus environment temperature**

Reference Frequency : 607.925MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9.0	607.9372	0.00200	607.9033	-0.00357	607.9387	0.00226
40		607.9061	-0.00310	607.9270	0.00034	607.9302	0.00085
30		607.9376	0.00207	607.9442	0.00316	607.9412	0.00266
20		607.9272	0.00036	607.9320	0.00115	607.9356	0.00175
10		607.9103	-0.00242	607.9365	0.00189	607.9227	-0.00037
0		607.9440	0.00312	607.9193	-0.00094	607.9161	-0.00146
-10		607.9126	-0.00203	607.9315	0.00107	607.9016	-0.00385
-20		607.9167	-0.00136	607.9458	0.00343	607.9440	0.00312
-30		607.9134	-0.00192	607.9134	-0.00191	607.9466	0.00355

B2. Frequency stability versus supplied voltage (85% - 115%)

Reference Frequency : 607.925MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	607.9443	0.00318	607.9323	0.00120	607.9472	0.00366
25	10.35	607.9347	0.00159	607.9381	0.00215	607.9181	-0.00114

Test Date : Apr. 14, 2014Temperature : 25 °CHumidity : 65 %**C. Tx Frequency 614.125MHz****C1. Frequency stability versus enviroment tempture**

Reference Frequency : 614.125 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9.0	614.1185	-0.00106	614.1351	0.00164	614.1394	0.00235
40		614.1022	-0.00371	614.1282	0.00052	614.1289	0.00064
30		614.1098	-0.00248	614.1473	0.00363	614.1403	0.00249
20		614.1348	0.00160	614.1484	0.00381	614.1252	0.00004
10		614.1301	0.00084	614.1032	-0.00355	614.1162	-0.00144
0		614.1187	-0.00103	614.1092	-0.00257	614.1142	-0.00176
-10		614.1278	0.00046	614.1077	-0.00281	614.1169	-0.00132
-20		614.1141	-0.00177	614.1113	-0.00223	614.1142	-0.00176
-30		614.1050	-0.00326	614.1111	-0.00226	614.1091	-0.00259

C2. Frequency stability versus supplied voltage (85% - 115%)

Reference Frequency : 614.125 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	614.1098	-0.00248	614.1409	0.00258	614.1426	0.00286
25	10.35	614.1282	0.00051	614.1300	0.00081	614.1094	-0.00254

Test Date : Apr. 14, 2014Temperature : 25 °CHumidity : 65 %**D. Tx Frequency 671.000MHz****D1. Frequency stability versus enviroment tempture**

Reference Frequency : 671.000 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9.0	670.9973	-0.00040	670.9852	-0.00221	670.9843	-0.00234
40		670.9940	-0.00089	671.0112	0.00167	671.0212	0.00316
30		670.9858	-0.00212	670.9818	-0.00271	670.9926	-0.00111
20		671.0000	0.00000	670.9745	-0.00380	670.9987	-0.00019
10		671.0065	0.00097	671.0090	0.00134	670.9884	-0.00172
0		671.0071	0.00105	670.9806	-0.00290	670.9939	-0.00091
-10		670.9882	-0.00175	670.9835	-0.00246	670.9755	-0.00365
-20		670.9922	-0.00116	670.9853	-0.00219	670.9819	-0.00269
-30		670.9849	-0.00224	671.0182	0.00271	670.9854	-0.00217

D2. Frequency stability versus supplied voltage (85% - 115%)

Reference Frequency : 671.000 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	671.0037	0.00056	670.9818	-0.00271	670.9779	-0.00329
25	10.35	670.9904	-0.00143	670.9934	-0.00098	670.9779	-0.00330

Test Date : Apr. 14, 2014Temperature : 25 °CHumidity : 65 %**E. Tx Frequency 697.925MHz****E1. Frequency stability versus enviroment tempture**

Reference Frequency : 697.925 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9.0	697.9384	0.00192	697.9079	-0.00245	697.9391	0.00202
40		697.9001	-0.00357	697.9200	-0.00071	697.9333	0.00119
30		697.9132	-0.00169	697.9165	-0.00121	697.9384	0.00192
20		697.9324	0.00106	697.9488	0.00341	697.9499	0.00356
10		697.9271	0.00030	697.9244	-0.00009	697.9294	0.00063
0		697.8985	-0.00379	697.9026	-0.00321	697.9039	-0.00302
-10		697.9233	-0.00024	697.9388	0.00198	697.9077	-0.00248
-20		697.9288	0.00054	697.9417	0.00239	697.8991	-0.00372
-30		697.9156	-0.00134	697.9289	0.00056	697.9439	0.00271

E2. Frequency stability versus supplied voltage (85% - 115%)

Reference Frequency : 697.925 MHz		Limit : 0.005%					
Enviroment Tempture (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	697.9149	-0.00145	697.9314	0.00091	697.9044	-0.00295
25	10.35	697.9070	-0.00257	697.9481	0.00331	697.9425	0.00251

8 CONDUCTED EMISSION MEASUREMENT

8.1 Standard Applicable

This EUT is excused from investigation of conducted emission, for it is powered by DC battery only. According to §15.207 (d), measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.