

# ***FCC Part 74 Subpart H***

## ***EMI TEST REPORT***

*of*

E.U.T. : Wireless Bodypack Transmitter  
Microphone

FCC ID. : Y4O-BPT

Model No. : BPT

Working Frequency : 520.05~607.9MHz; 614.1~697.9MHz

*for*

APPLICANT : inMusic Brands, Inc.

ADDRESS : 200 Scenic View Drive, Suite 201, Cumberland,  
Rhode Island, 02864, USA

Test Performed by

ELECTRONICS TESTING CENTER (ETC) , TAIWAN

NO. 34. LIN 5, DINGFU VIL., LINKOU DIST.,

NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.

TEL : (02)26023052 FAX : (02)26010910

[http:// www.etc.org.tw](http://www.etc.org.tw) ; e-mail:emc@etc.org.tw

Report Number : 15-06-RBF-019-02

## ***TEST REPORT CERTIFICATION***

Applicant : inMusic Brands, Inc.  
200 Scenic View Drive, Suite 201, Cumberland, Rhode  
Island, 02864, USA

Manufacturer : Mascot Electric Co., Ltd.  
No. 85 Chang Hsing First Street, Tai-tzu Village, Jen-Te Hsian,  
Tainan Hsien, Taiwan, R.O.C.

Description of EUT :

a) Type of EUT : Wireless Bodypack Transmitter Microphone

b) Trade Name : ALTO

c) Model No. : BPT

d) FCC ID : Y4O-BPT

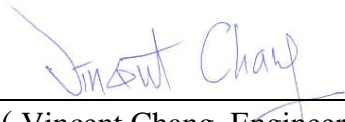
e) Working Frequency : 520.05~607.9MHz; 614.1~697.9MHz


f) Power Supply : DC 1.5V Battery\*2

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 C63.10-2009 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 : Aug. 05, 2015

Test Engineer :   
( Vincent Chang, Engineer )

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

# Table of Contents

# Page

<b>1. GENERAL INFORMATION .....</b>	<b>1</b>
1.1 PRODUCT DESCRIPTION.....	1
1.2 TEST METHODOLOGY.....	1
1.3 TEST FACILITY .....	1
<b>2. REQUIREMENTS OF PROVISIONS .....</b>	<b>2</b>
2.1 DEFINITION .....	2
2.2 FREQUENCIES AVAILABLE .....	2
2.3 REQUIREMENTS FOR RADIO EQUIPMENT ON CERTIFICATION .....	2
2.4 LABELING REQUIREMENT.....	3
<b>3. OUTPUT POWER MEASUREMENT .....</b>	<b>4</b>
3.1 PROVISION APPLICABLE .....	4
3.2 MEASUREMENT PROCEDURE .....	4
3.3 TEST DATA.....	6
3.4 RESULT CALCULATION.....	7
3.5 TEST EQUIPMENT .....	7
<b>4. MODULATION CHARACTERISTICS .....</b>	<b>8</b>
4.1 PROVISIONS APPLICABLE .....	8
4.2 MEASUREMENT METHOD.....	8
4.3 MEASUREMENT INSTRUMENT.....	9
4.4 MEASUREMENT RESULT .....	9
<b>5. OCCUPIED BANDWIDTH OF EMISSION .....</b>	<b>11</b>
5.1 PROVISIONS APPLICABLE .....	11
5.2 MEASUREMENT METHOD.....	11
5.3 OCCUPIED BANDWIDTH TEST EQUIPMENT .....	11
5.4 BANDWIDTH MEASURED .....	12
<b>6. FIELD STRENGTH OF EMISSION.....</b>	<b>18</b>
6.1 PROVISIONS APPLICABLE .....	18
6.2 MEASUREMENT PROCEDURE .....	18
6.3 MEASURING INSTRUMENT .....	19
6.4 MEASURING DATA .....	20
6.5 OTHER EMISSION .....	28
6.6 RADIATED MEASUREMENT PHOTOS.....	31
<b>7. FREQUENCY STABILITY MEASUREMENT.....</b>	<b>32</b>
7.1 PROVISIONS APPLICABLE .....	32
7.2 MEASUREMENT PROCEDURE .....	32
7.3 MEASUREMENT INSTRUMENT.....	33
7.4 MEASUREMENT DATA.....	34
<b>8 CONDUCTED EMISSION MEASUREMENT .....</b>	<b>36</b>
8.1 STANDARD APPLICABLE.....	36

## 1. GENERAL INFORMATION

### 1.1 Product Description

- a) Type of EUT : Wireless Bodypack Transmitter Microphone
- b) Trade Name : ALTO
- c) Model No. : BPT
- d) FCC ID : Y4O-BPT
- e) Working Frequency : 520.05~607.9MHz; 614.1~697.9MHz
- f) Power Supply : DC 1.5V Battery\*2
- g) Emission Designator : 107KF3E  
2M+2DK=2x(5kHz)+2x(51.6kHz)x1=107.2kHz
- h) Wireless Module : 2.4GHz RF Module TWMX (FCC ID:Y4O-TWMX)  
was installed inside.

### 1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10-2009. 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

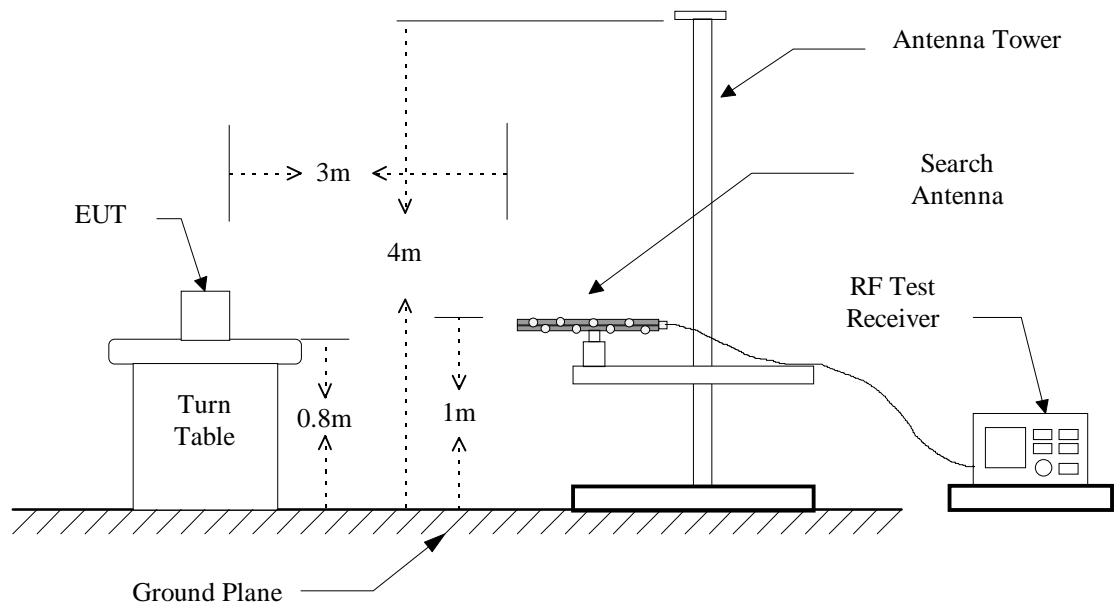
According to §74.861(e)(1)(ii), the output power shall not exceed 250 milliwatts.

#### 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.

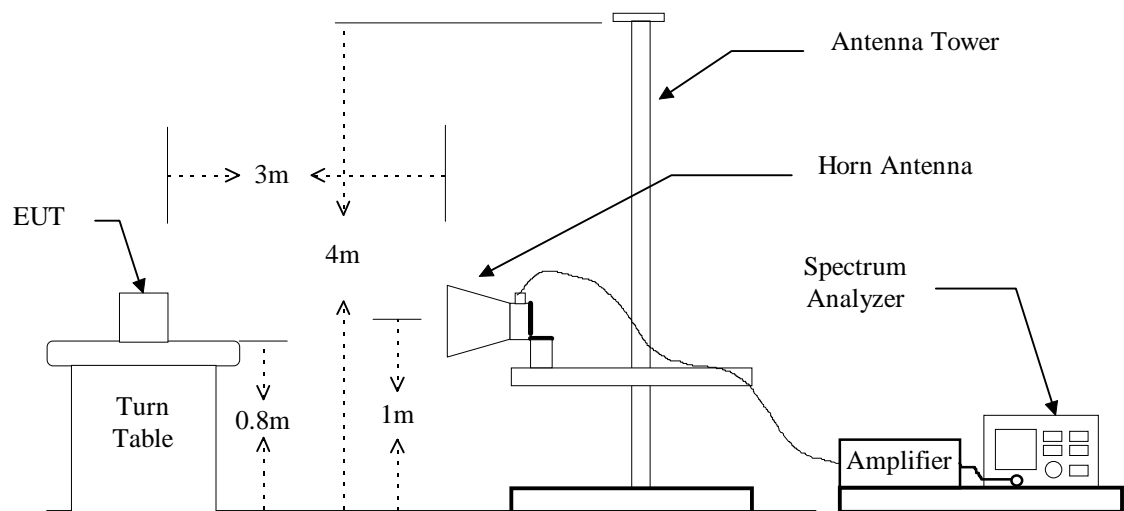


Figure 1 : Frequencies measured below 1 GHz configuration



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 : Aug. 03, 2015  
Humidity : 60 %

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
520.050	83.7	10.9	2.0	----	8.9	7.762	250.0

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
607.900	82.0	11.8	2.2	----	9.6	9.120	250.0

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
614.100	81.4	11.0	2.3	----	8.7	7.413	250.0

Frequency (MHz)	Meter Reading (dB $\mu$ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
697.900	81.6	12.0	2.3	----	9.7	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	ESL	2015/03/26	2016/03/25
Biconical Antenna	EMCO	3110	2014/11/04	2015/11/03
Log-periodic Antenna	EMCO	3146	2014/11/04	2015/11/03
Amplifier	HP	8447D	2014/10/28	2015/10/27
Signal generator	HP	83732B	2014/10/16	2015/10/15

## 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

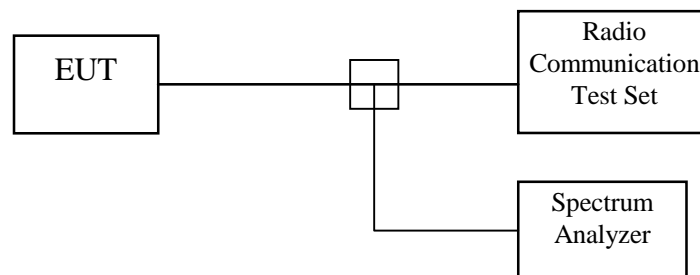
#### A) Modulation Limit

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	2014/08/12	2015/08/11
Spectrum Analyzer	Rohde & Schwarz	FSP40	2015/07/06	2016/07/05

### 4.4 Measurement Result

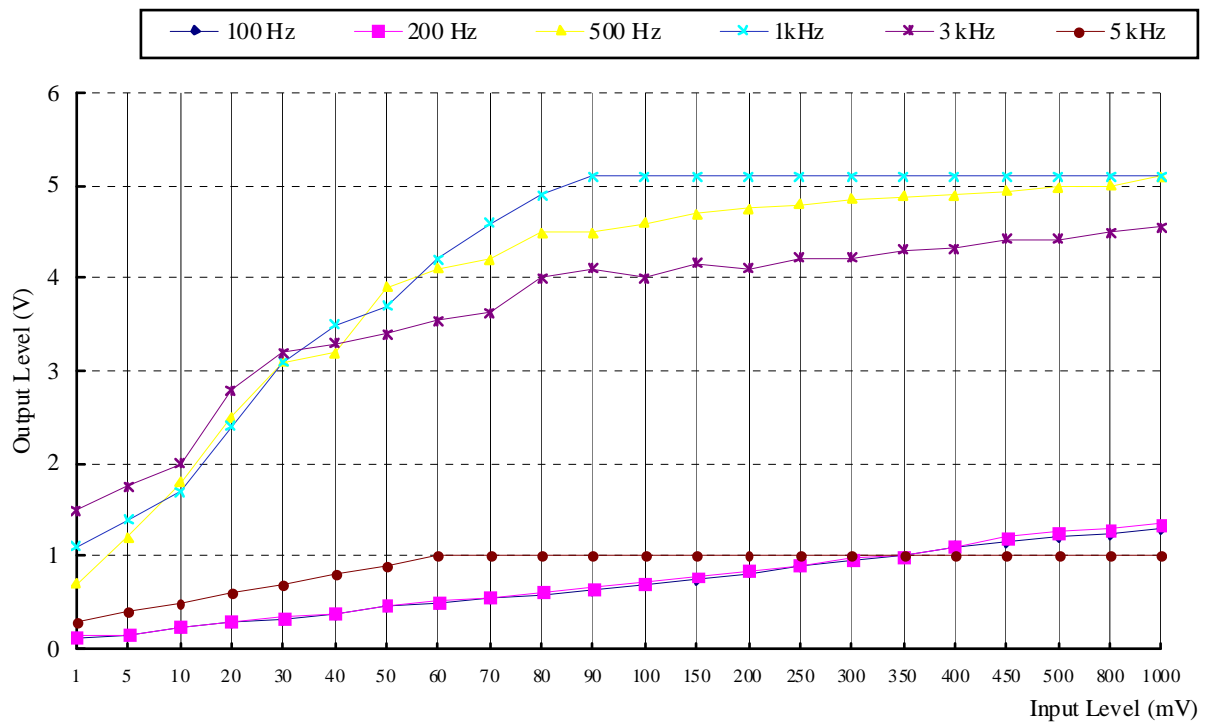
**RF Frequency : 607.900MHz;**

Test Date : Aug. 03, 2015

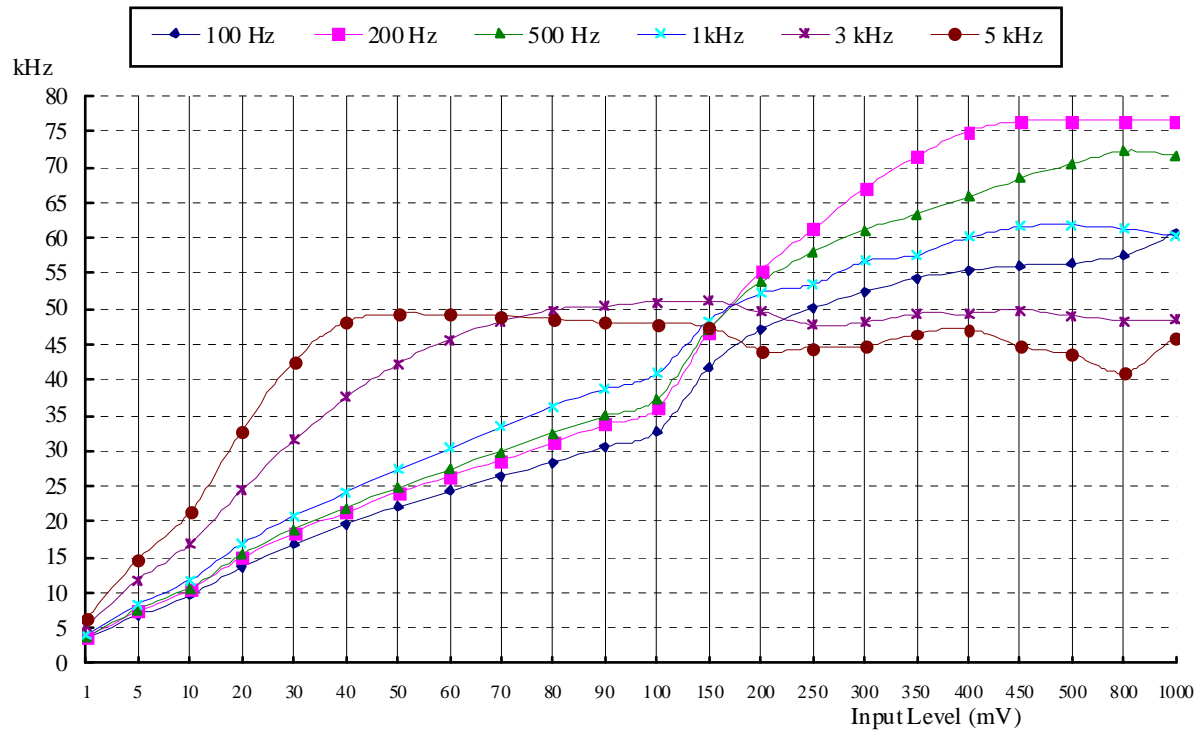
Temperature : 25 °C

Humidity : 60 %

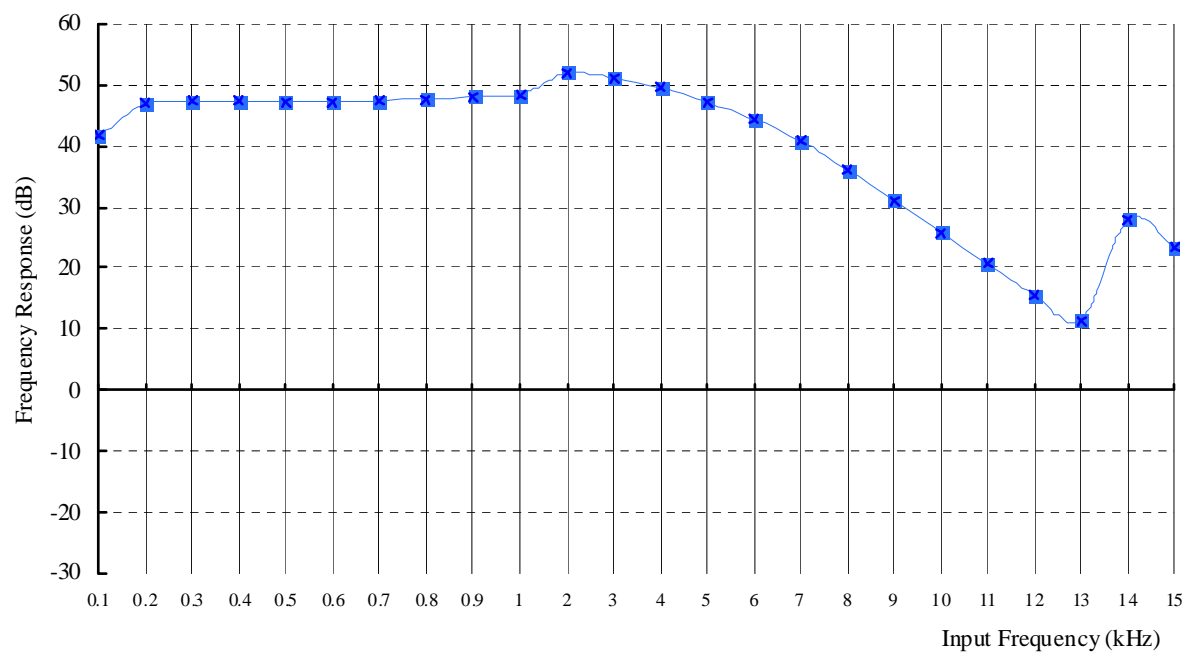
A). Frequency response



## B). Modulation Limit



## C). Frequency response of all circuits



## 5. OCCUPIED BANDWIDTH OF EMISSION

### 5.1 Provisions Applicable

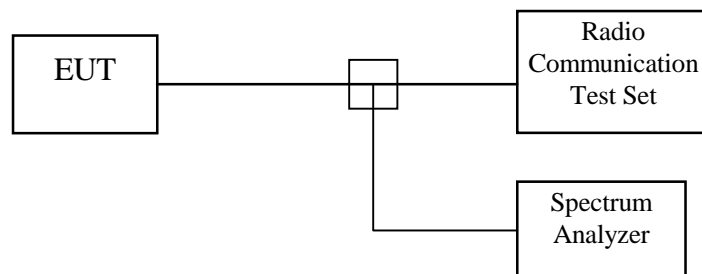
According to §2.1049 (c)(1), For radiotelephone transmitter, other than single sideband or indenpent sideband transmitter, when modulated by a 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

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	2014/08/12	2015/08/11
Spectrum Analyzer	Rohde & Schwarz	FSP40	2015/07/06	2016/07/05

## 5.4 Bandwidth Measured

### 5.4.1 Input Level Derived

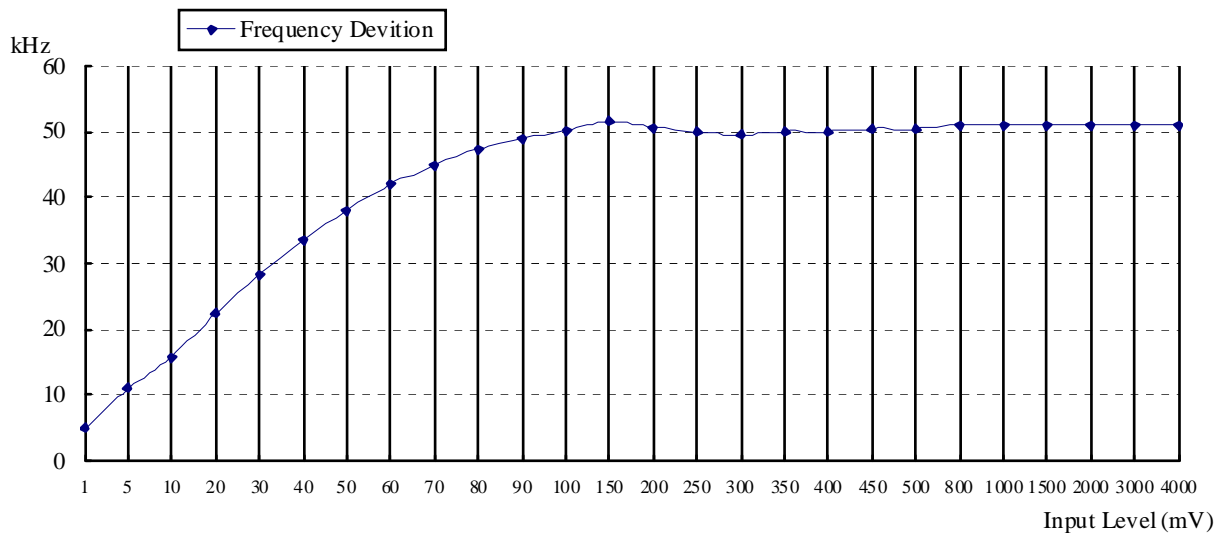
RF Frequency : 607.900MHz;

Test Date : Aug. 03, 2015

Temperature : 25 °C

Humidity : 60 %

Input Audio Frequency : 2.5 kHz, Sine Wave

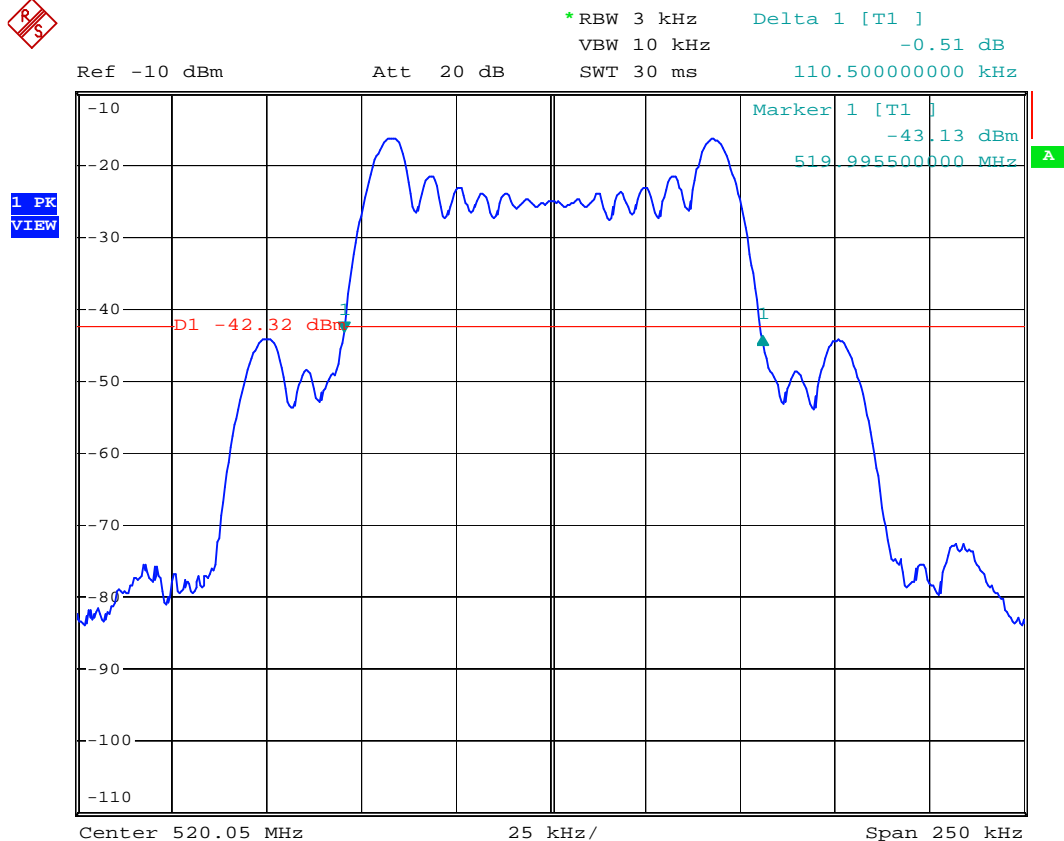


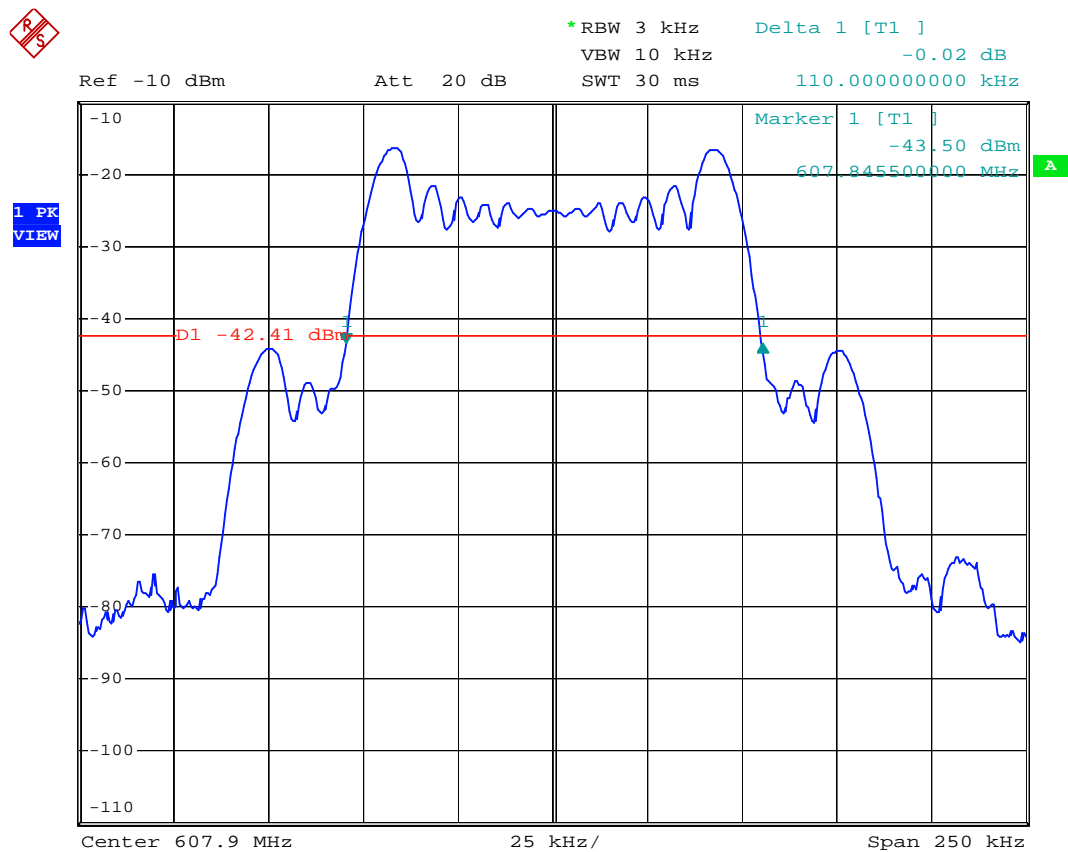
The Level input to produce 50% modulation is 30 mV, therefore the magnitude 16 dB greater than it is 189.2 mV.

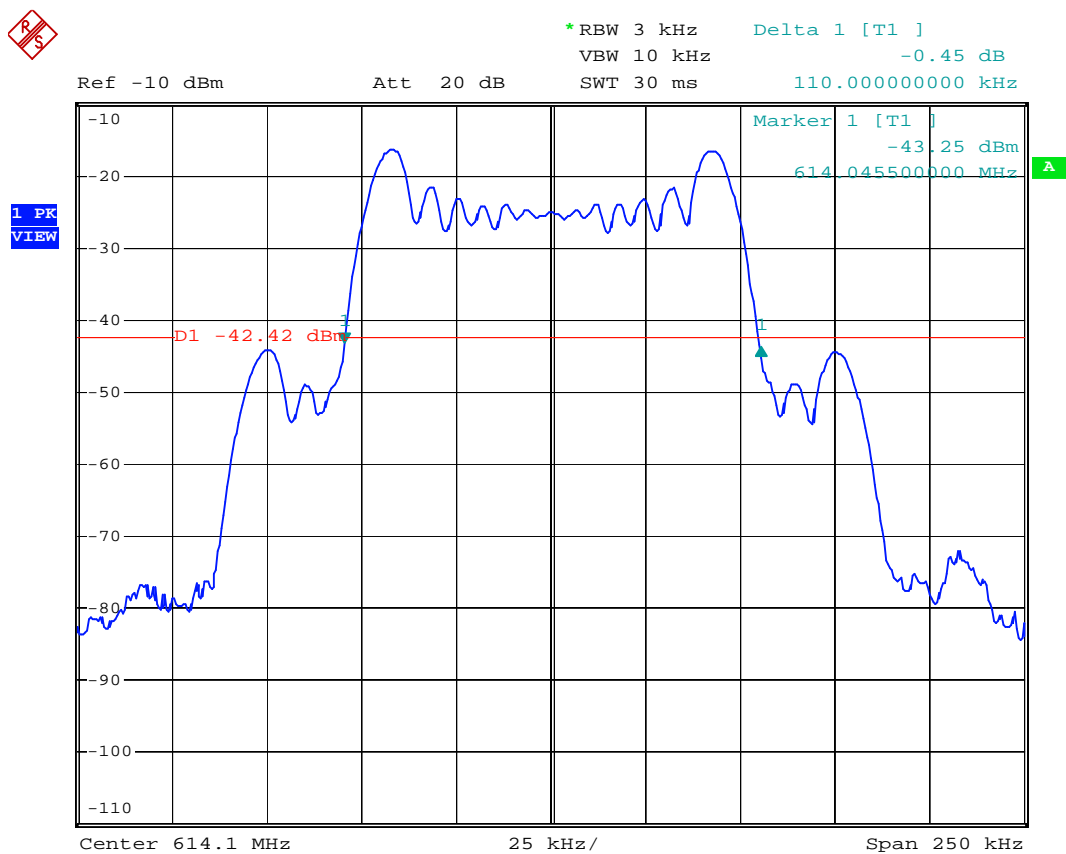


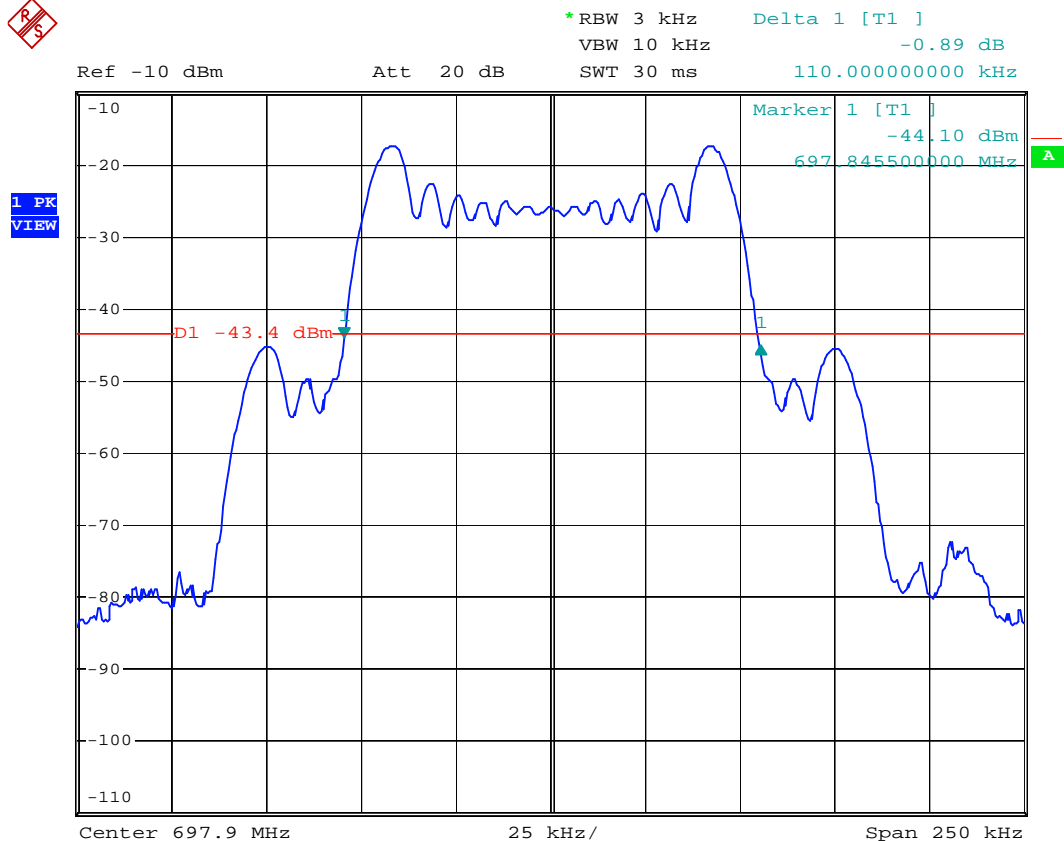
**5.4.2 Occupied Bandwidth Plotted**Test Date : Aug. 03, 2015Temperature : 25 °CHumidity : 60 %

<b>RF Frequency (MHz)</b>	<b>26 dB Bandwidth (kHz)</b>
520.050	110.5
607.900	110.0
614.100	110.0
697.900	110.0









## 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	2015/07/06	2016/07/05
Double Ridged Antenna	EMCO	3115	2014/10/22	2015/10/21
Double Ridged Antenna	EMCO	3115	2014/08/18	2015/08/17
Log-periodic Antenna	EMCO	3146	2014/11/04	2015/11/03
Biconical Antenna	EMCO	3110	2014/11/04	2015/11/03
Amplifier	HP	8449B	2014/08/12	2015/08/11
Amplifier	HP	8447D	2014/10/28	2015/10/27
Signal generator	HP	83732B	2014/10/16	2015/10/15

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: 520.050MHz

Operated mode : TX  
Temperature : 25°C

Test Date : Aug. 03, 2015  
Humidity : 60%

Unmodulated carrier output power is 8.9 dBm , or 7.762 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$8.9 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

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		
1040.100	50.1	53.4	-62.3	-59.0	5.9	-2.0	2.1	-60.5	-57.2	-13.0	-44.2
1560.150	---	---	---	---	7.8	-2.0	2.6	---	---	-13.0	---
2080.200	---	---	---	---	7.8	-2.0	3.1	---	---	-13.0	---
2600.250	---	---	---	---	9.2	-2.0	3.4	---	---	-13.0	---
3120.300	---	---	---	---	9.0	-2.0	3.8	---	---	-13.0	---
3640.350	---	---	---	---	9.3	-2.0	4.1	---	---	-13.0	---
4160.400	---	---	---	---	9.3	-2.0	4.4	---	---	-13.0	---
4680.450	---	---	---	---	9.9	-2.0	4.7	---	---	-13.0	---
5200.500	---	---	---	---	9.8	-2.0	5.0	---	---	-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: 607.900 MHz**

Operated mode : TX  
 Temperature : 25°C

Test Date : Aug. 03, 2015  
 Humidity : 60%

Unmodulated carrier output power is 9.6 dBm , or 9.120 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$9.6 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

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		
1215.800	50.8	53.9	-60.9	-57.7	6.6	-2.0	2.3	-58.6	-55.4	-13.0	-42.4
1823.700	---	---	---	---	7.6	-2.0	2.8	---	---	-13.0	---
2431.600	---	---	---	---	9.0	-2.0	3.3	---	---	-13.0	---
3039.500	---	---	---	---	8.9	-2.0	3.7	---	---	-13.0	---
3647.400	---	---	---	---	9.3	-2.0	4.1	---	---	-13.0	---
4255.300	---	---	---	---	9.5	-2.0	4.4	---	---	-13.0	---
4863.200	---	---	---	---	9.7	-2.0	4.8	---	---	-13.0	---
5471.100	---	---	---	---	10.0	-2.0	5.1	---	---	-13.0	---
6079.000	---	---	---	---	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: 614.100 MHz**

Operated mode : TX  
 Temperature : 25°C

Test Date : Aug. 03, 2015  
 Humidity : 60%

Unmodulated carrier output power is 8.7 dBm , or 7.413 mW (ERP).

The limit of spurious or harmonics is calculated as following :

$$8.7 - [43 + 10 \log(\text{carrier output power in W})], \text{ or } -13 \text{ dBm}$$

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		
1228.200	47.3	50.3	-64.3	-61.3	6.6	-2.0	2.3	-62.0	-59.0	-13.0	-46.0
1842.300	---	---	---	---	7.6	-2.0	2.9	---	---	-13.0	---
2456.400	---	---	---	---	9.1	-2.0	3.3	---	---	-13.0	---
3070.500	---	---	---	---	9.0	-2.0	3.8	---	---	-13.0	---
3684.600	---	---	---	---	9.2	-2.0	4.1	---	---	-13.0	---
4298.700	---	---	---	---	9.6	-2.0	4.5	---	---	-13.0	---
4912.800	---	---	---	---	9.7	-2.0	4.8	---	---	-13.0	---
5526.900	---	---	---	---	10.0	-2.0	5.1	---	---	-13.0	---
6141.000	---	---	---	---	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: 697.900 MHz**

Operated mode : TX  
 Temperature : 25°C

Test Date : Aug. 03, 2015  
 Humidity : 60%

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		
1395.800	47.9	51.3	-63.0	-59.5	7.3	-2.0	2.5	-60.2	-56.7	-13.0	-43.7
2093.700	---	---	---	---	7.8	-2.0	3.1	---	---	-13.0	---
2791.600	---	---	---	---	9.1	-2.0	3.6	---	---	-13.0	---
3489.500	---	---	---	---	9.4	-2.0	4.0	---	---	-13.0	---
4187.400	---	---	---	---	9.3	-2.0	4.4	---	---	-13.0	---
4885.300	---	---	---	---	9.7	-2.0	4.8	---	---	-13.0	---
5583.200	---	---	---	---	10.1	-2.0	5.1	---	---	-13.0	---
6281.100	---	---	---	---	10.9	-2.0	5.4	---	---	-13.0	---
6979.000	---	---	---	---	10.5	-2.0	5.8	---	---	-13.0	---

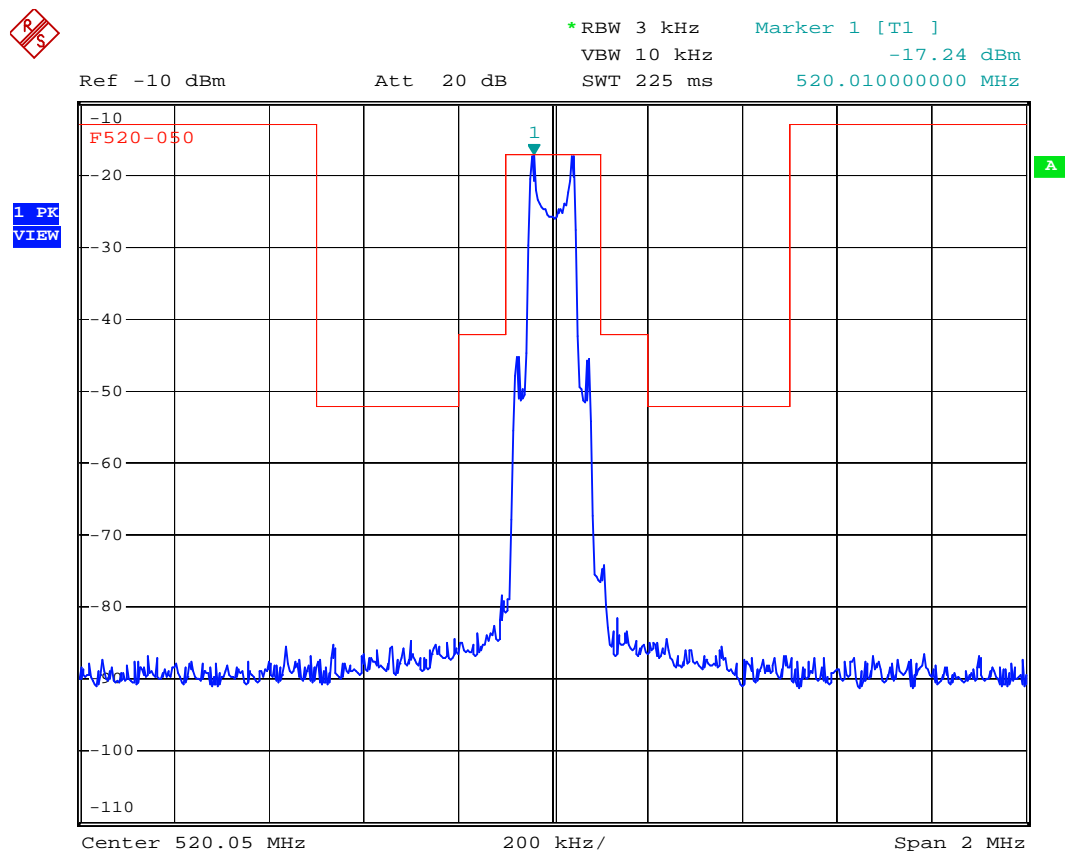
Note :

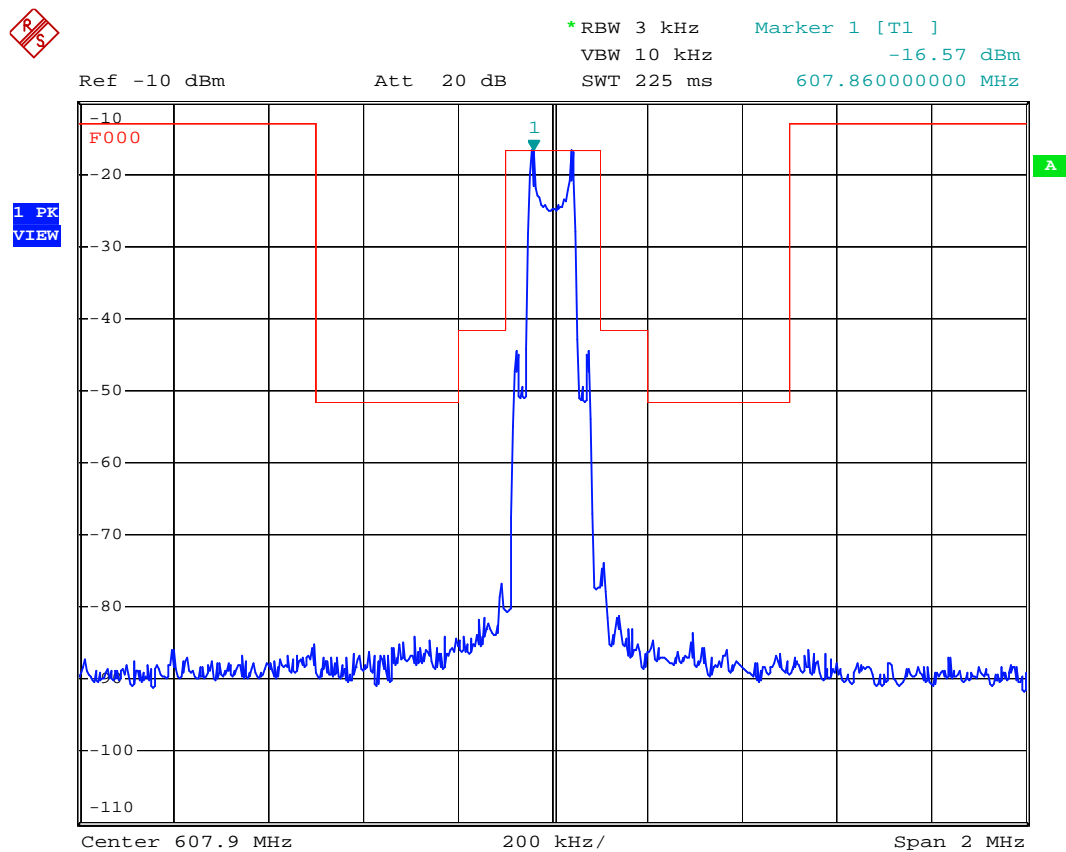
1. Remark “---” means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

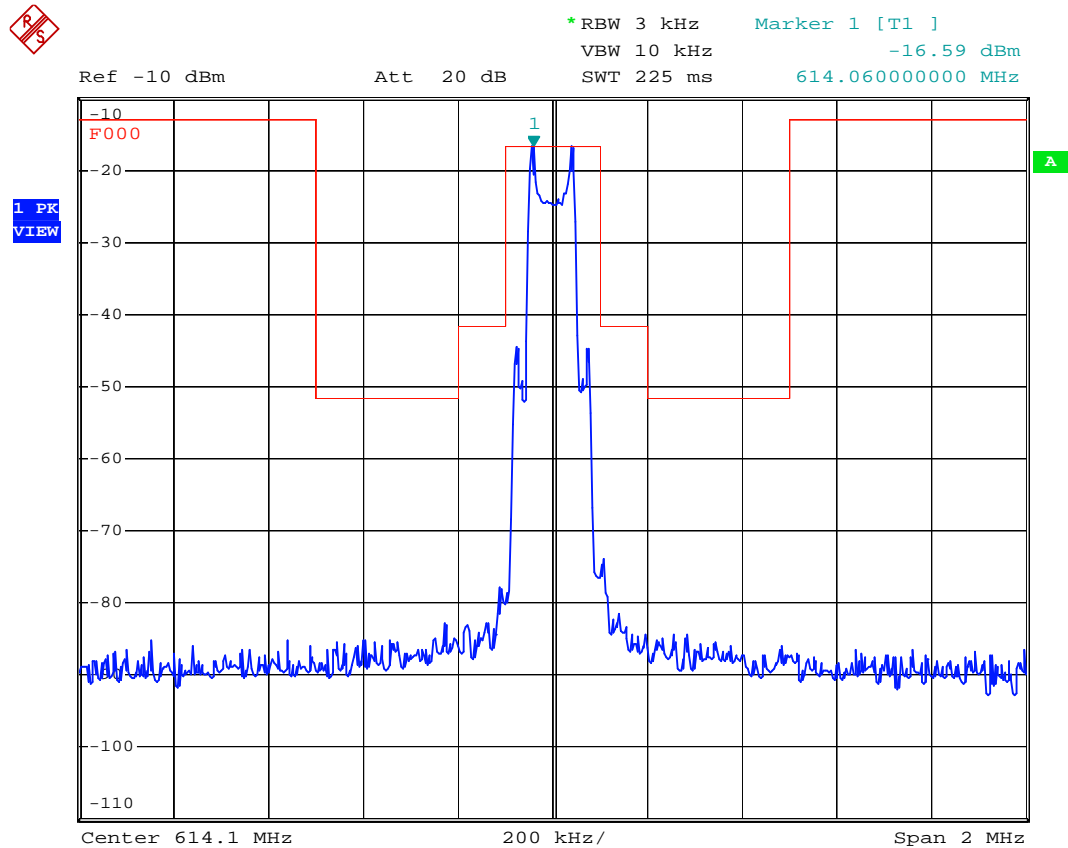
$$\text{Result} = \text{SG Reading} - \text{Cable Loss} + \text{Antenna Gain} + \text{Antenna Gain Corrected}$$

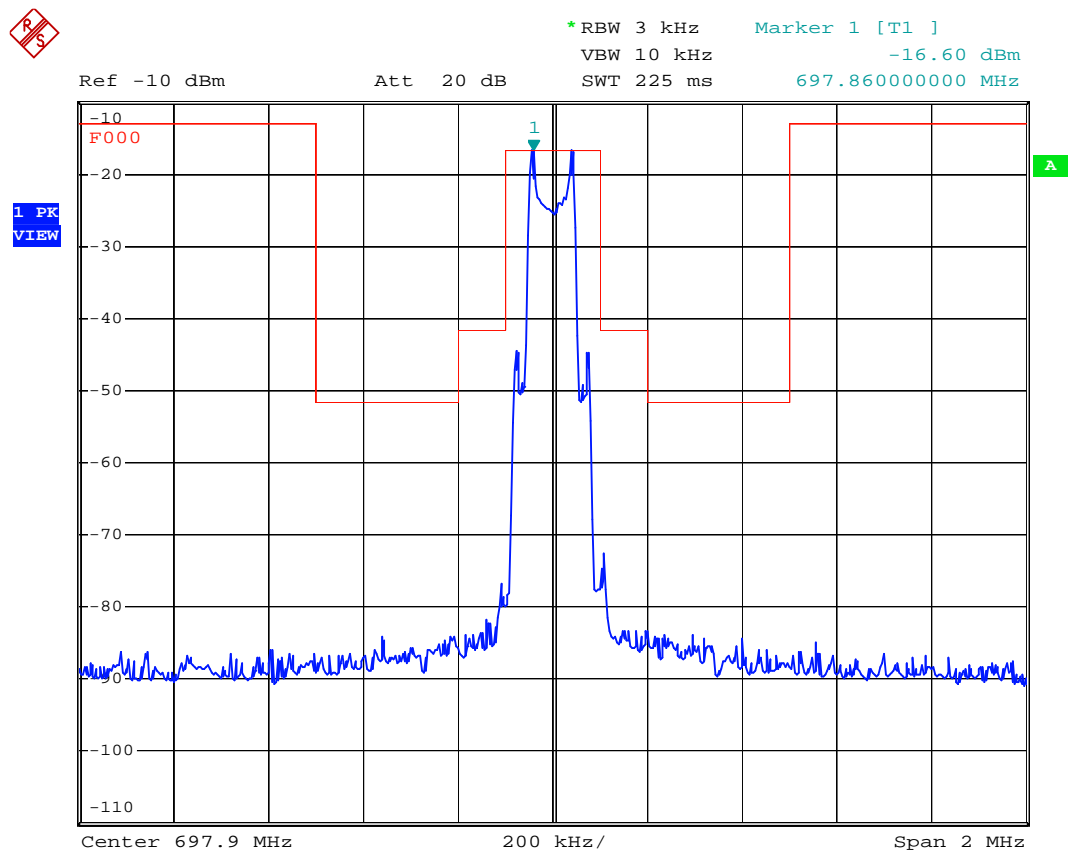
Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

## 6.4.2 Emission mask plots









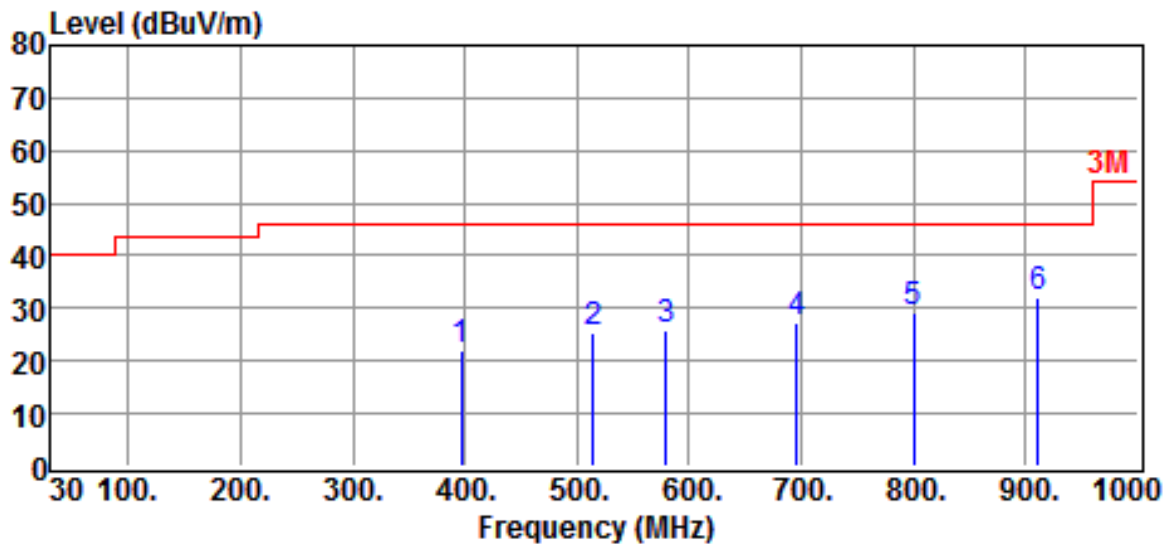
## 6.5 Other Emission

a) Emission frequencies below 1 GHz

Test Date : Aug. 03, 2015

Temperature : 25°C

Humidity : 60 %



Site : OPEN SITE

Date : 2015-08-03

EUT : UHF Wireless Microphone

Ant. Pol. : HORIZONTAL

Model : BPT

Detector :

Power Rating : DC 1.5V \*2

Engineer : VC

Limit : 3M

Temp. : 25°C

Memo : TX MODE

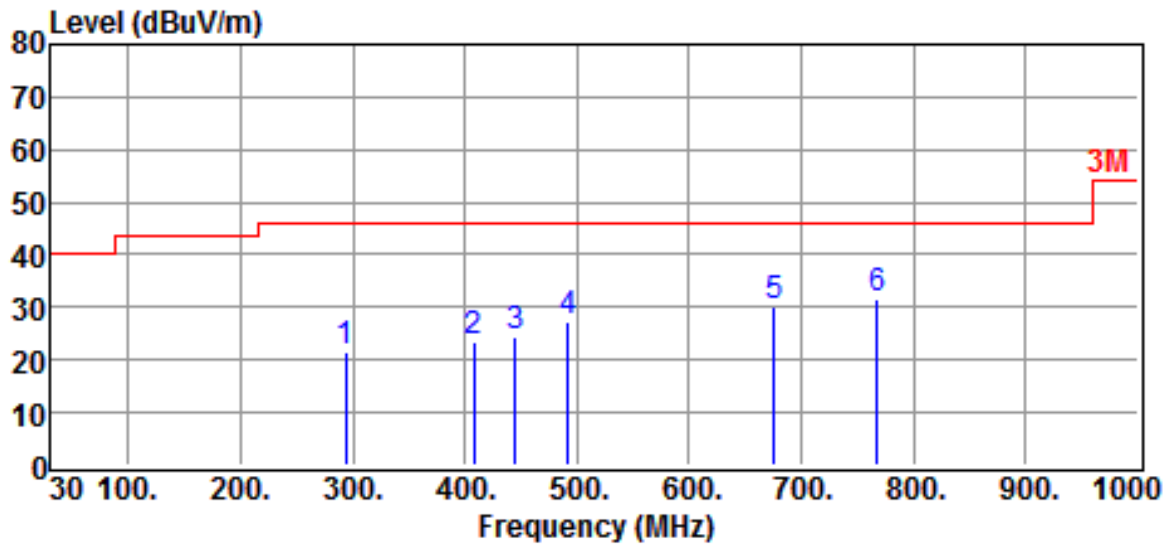
Humi. : 60 %

Freq MHz	Reading dBUV	Correction Factor dB	Result dBUV/m	Limits dBUV/m	Over limit dB	Detector
396.6600	2.8	19.0	21.8	46.0	-24.2	Peak
515.0000	3.5	21.7	25.2	46.0	-20.8	Peak
579.0200	3.1	22.7	25.8	46.0	-20.2	Peak
695.4200	2.4	25.0	27.4	46.0	-18.6	Peak
800.1800	2.9	26.4	29.3	46.0	-16.7	Peak
910.7600	3.7	28.2	31.9	46.0	-14.1	Peak

Note :

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





Site	:OPEN SITE	Date	:2015-08-03
EUT	:UHF Wireless Microphone	Ant. Pol.	:VERTICAL
Model	:BPT	Detector	:
Power Rating	:DC 1.5V *2	Engineer	:VC
Limit	:3M	Temp.	:25 °C
Memo	:TX MODE	Humi.	:60 %

Freq MHz	Reading dBuV	Correction Factor dB	Result dBuV/m	Limits dBuV/m	Over limit dB	Detector
293.8400	4.4	17.0	21.4	46.0	-24.6	Peak
408.3000	4.2	19.4	23.6	46.0	-22.4	Peak
445.1600	4.4	20.2	24.6	46.0	-21.4	Peak
491.7200	6.1	21.3	27.4	46.0	-18.6	Peak
676.0200	5.4	24.5	29.9	46.0	-16.1	Peak
767.2000	5.7	25.9	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

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

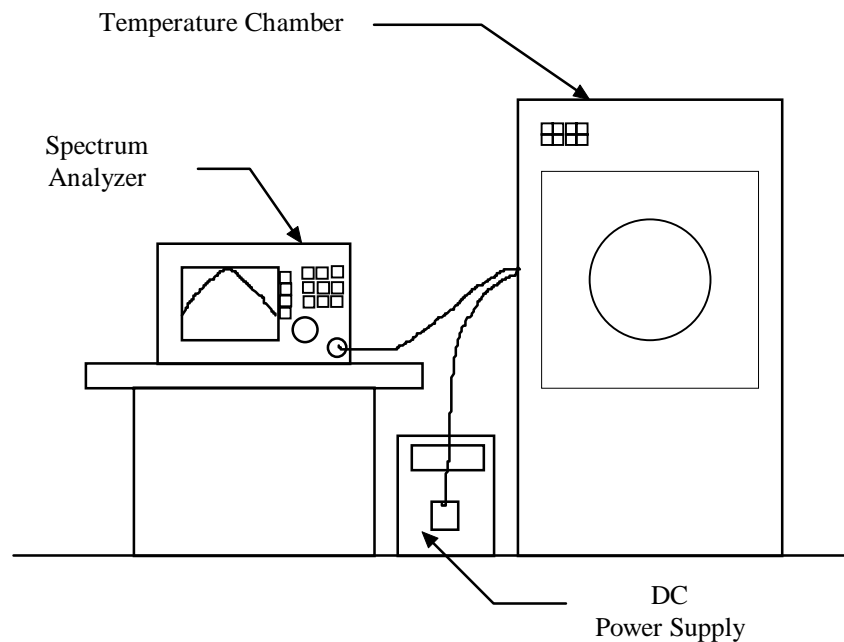
1. Setup the configuration per figure 5 for frequencies measured at ambient temperature if it is within 15°C to 25°C. Otherwise, an environmental chamber set for a temperature of 20°C shall be used.
2. Turn on EUT and set SA center frequency to the right frequency needs to be measured. Then set SA RBW 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	2015/07/06	2016/07/05
Temperature Chamber	MALLIER	MCT-2X-M	2014/10/27	2015/10/26

**7.4 Measurement Data**Test Date : Aug. 05, 2015Temperature : 25 °CHumidity : 60 %**A. Tx Frequency 520.050MHz****A1. Frequency stability versus environment temperature**

Reference Frequency : 520.050 MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0	520.0699	0.00383	520.0694	0.00373	520.0663	0.00313
40		520.0655	0.00298	520.0635	0.00260	520.0619	0.00228
30		520.0617	0.00225	520.0612	0.00215	520.0612	0.00215
20		520.0602	0.00196	520.0582	0.00158	520.0576	0.00146
10		520.0549	0.00094	520.0545	0.00087	520.0513	0.00024
0		520.0499	-0.00002	520.0500	-0.00001	520.0494	-0.00012
-10		520.0485	-0.00029	520.0469	-0.00060	520.0467	-0.00063
-20		520.0368	-0.00254	520.0389	-0.00213	520.0375	-0.00240
-30		520.0317	-0.00352	520.0316	-0.00354	520.0311	-0.00363

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

Reference Frequency : 520.050 MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.55	520.0566	0.00127	520.0597	0.00187	520.0618	0.00227
25	3.45	520.0586	0.00165	520.0610	0.00212	520.0602	0.00196

Test Date : Aug. 05, 2015Temperature : 25 °CHumidity : 60 %**B. Tx Frequency 697.900MHz****B1. Frequency stability versus environment temperature**

Reference Frequency : 697.900MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0	697.9262	0.00375	697.9231	0.00331	697.9224	0.00321
40		697.9180	0.00258	697.9178	0.00255	697.9162	0.00232
30		697.9122	0.00175	697.9081	0.00116	697.9079	0.00113
20		697.9037	0.00053	697.9034	0.00049	697.9027	0.00039
10		697.9010	0.00014	697.8999	-0.00001	697.8982	-0.00026
0		697.8984	-0.00023	697.8976	-0.00035	697.8973	-0.00039
-10		697.8894	-0.00152	697.8911	-0.00128	697.8884	-0.00166
-20		697.8835	-0.00236	697.8859	-0.00202	697.8824	-0.00252
-30		697.8776	-0.00321	697.8764	-0.00338	697.8748	-0.00361

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

Reference Frequency : 697.900MHz		Limit : 0.005%					
Environment Temperature (°C)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.55	697.9086	0.00123	697.9091	0.00130	697.9122	0.00175
25	3.45	697.9103	0.00148	697.9098	0.00140	697.9111	0.00159

## **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.