FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : XS WIRELESS
FCC ID. : DMOSKXSW
Model No. : SK-XSW
Working Frequency : 548~638 MHz

for

APPLICANT : Sennheiser electronic GmbH & Co. KG
ADDRESS : Am Labor 1, 30900 Wedemark, Germany

Test Performed by

ELECTRONICS TESTING CENTER (ETC) , TAIWAN
NO. 34. LIN 5, DINGFU VIL., LINKOU DIST.,
NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.
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Report Number : 16-08-RBF-015-02

TEST REPORT CERTIFICATION

Applicant	:	Sennheiser Electric Corp. 1 Enterprise Drive, Old Lyme, CT 06371, USA
Manufacturer	:	MASCOT ELECTRIC CO., LTD NO. 85, CHANGXING 1ST ST., RENDE DIST., TAINAN CITY 717, TAIWAN
Description of EUT	:	
a) Type of EUT	:	XS WIRELESS
b) Trade Name	:	SENNHEISER
c) Model No.	:	SK-XSW
d) FCC ID	:	DMOSKXSW
e) Working Frequency	:	548~638 MHz
f) Power Supply	:	Battery DC 1.5V*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 C63.10-2013 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 : Sep. 22, 2016

Test Engineer : Brian Huang
(Brian Huang, Engineer)

Approve & Authorized Signer : S. S. Liou
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	:	XS WIRELESS
b) Trade Name	:	SENNHEISER
c) Model No.	:	SK-XSW
d) FCC ID	:	DMOSKXSW
e) Working Frequency	:	548~638 MHz
f) Power Supply	:	Battery DC 1.5V *2
g) Emission Designator	:	89K4F3E 2M+2DK=2x(2kHz)+2x(42.7kHz)x1=89.4kHz

1.2 Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10-2013. Test also follow "TIA-603-D(2010)-Land Mobile FM or PM Communications Equipment Measurement and Performance Standsrds" and section 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, and 2.1055 of Part 2 of CFR 47.

Measueement Software

Software	Version	Note
e3	Version 6.100618b	Radiated Emission Test
e3	Version 6.100421	Conducted Emission Test

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 indenpent sideband transmitter, when modulateed 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

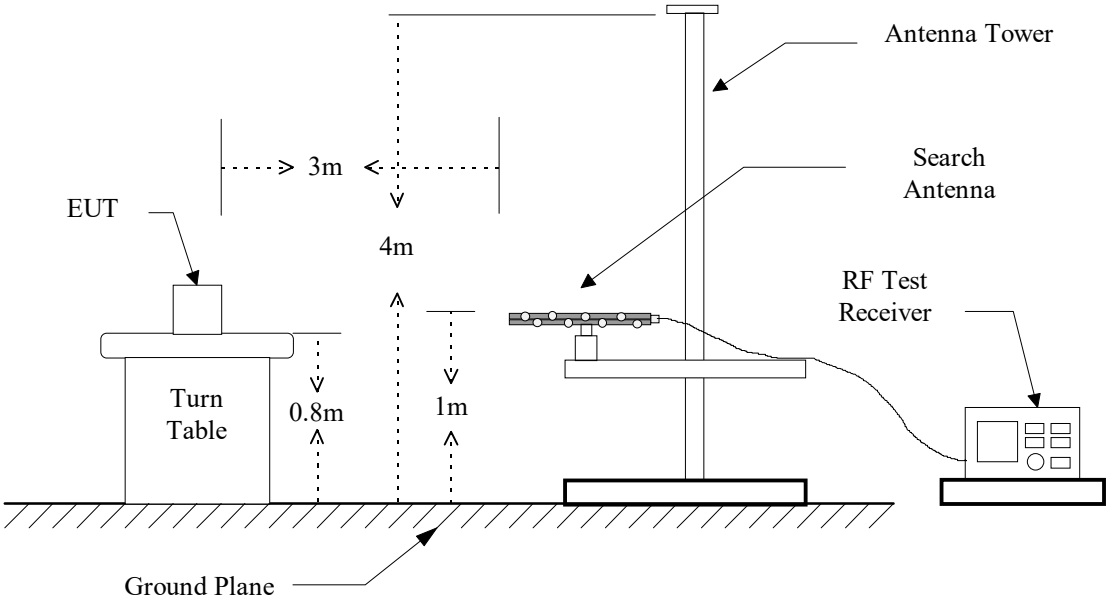
3.1 Provision Applicable

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

3.2 Measurement Procedure

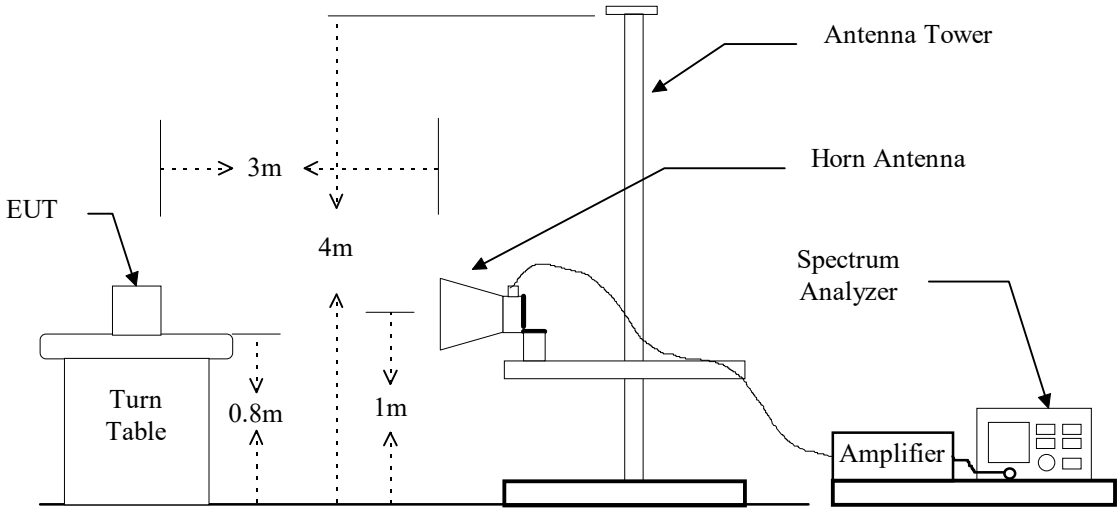
1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna 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 : 26 °C
Test Date : Aug. 16, 2016
Humidity : 68 %

Frequency (MHz)	Meter Reading (dBμV/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
548.250	86.74	12.24	2.0	----	10.24	10.568	250.0
607.900	85.76	12.71	2.2	----	10.51	11.246	250.0
614.150	86.20	12.50	2.3	----	10.20	10.471	250.0
637.800	85.74	12.34	2.3	----	10.04	10.093	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.

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

3.5 Test Equipment

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2015/12/05	2016/12/04
Biconical Antenna	EMCO	3110	2015/11/17	2016/11/16
Log-periodic Antenna	EMCO	3146	2015/11/17	2016/11/16
Amplifier	HP	8447D	2015/12/17	2016/12/16
Signal generator	HP	83732B	2015/11/24	2016/11/23

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.

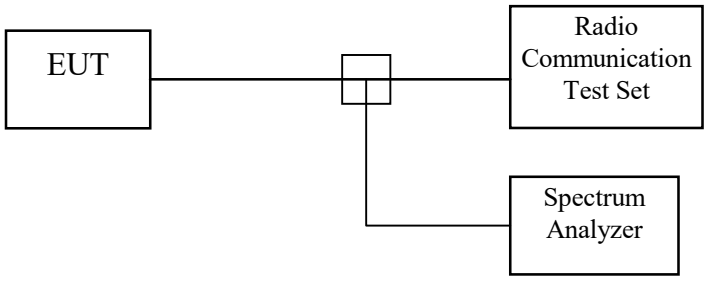
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

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

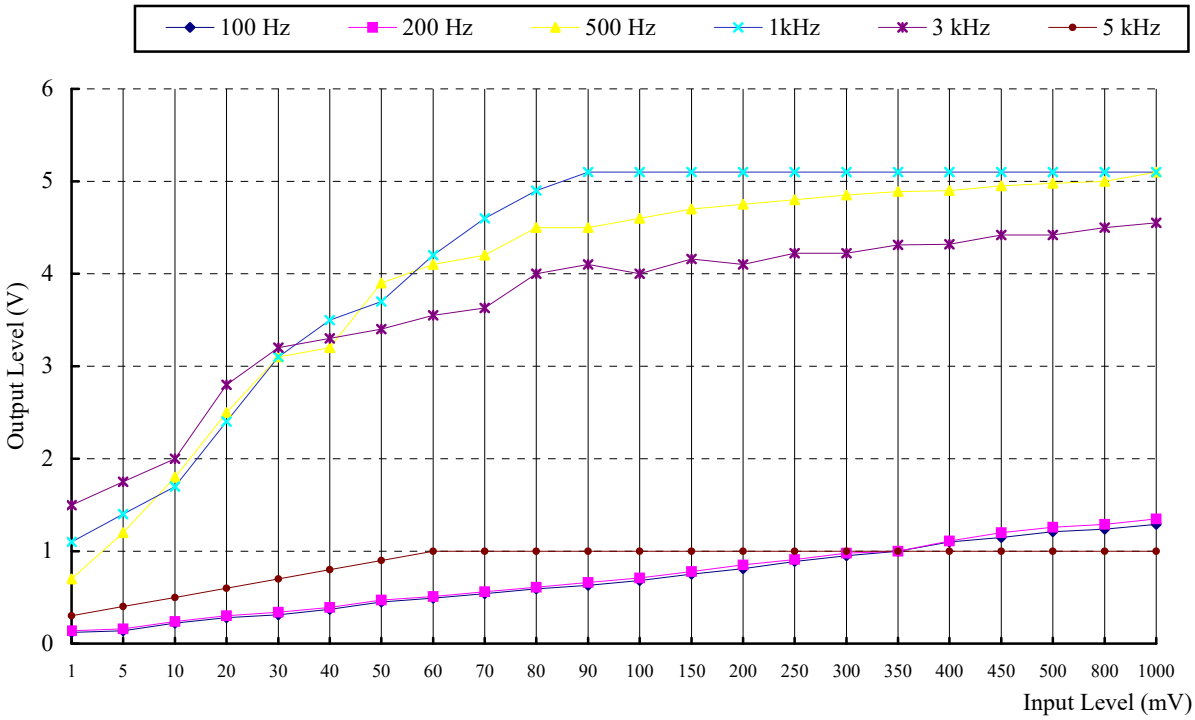
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2015/11/19	2016/11/18
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05

4.4 Measurement Result

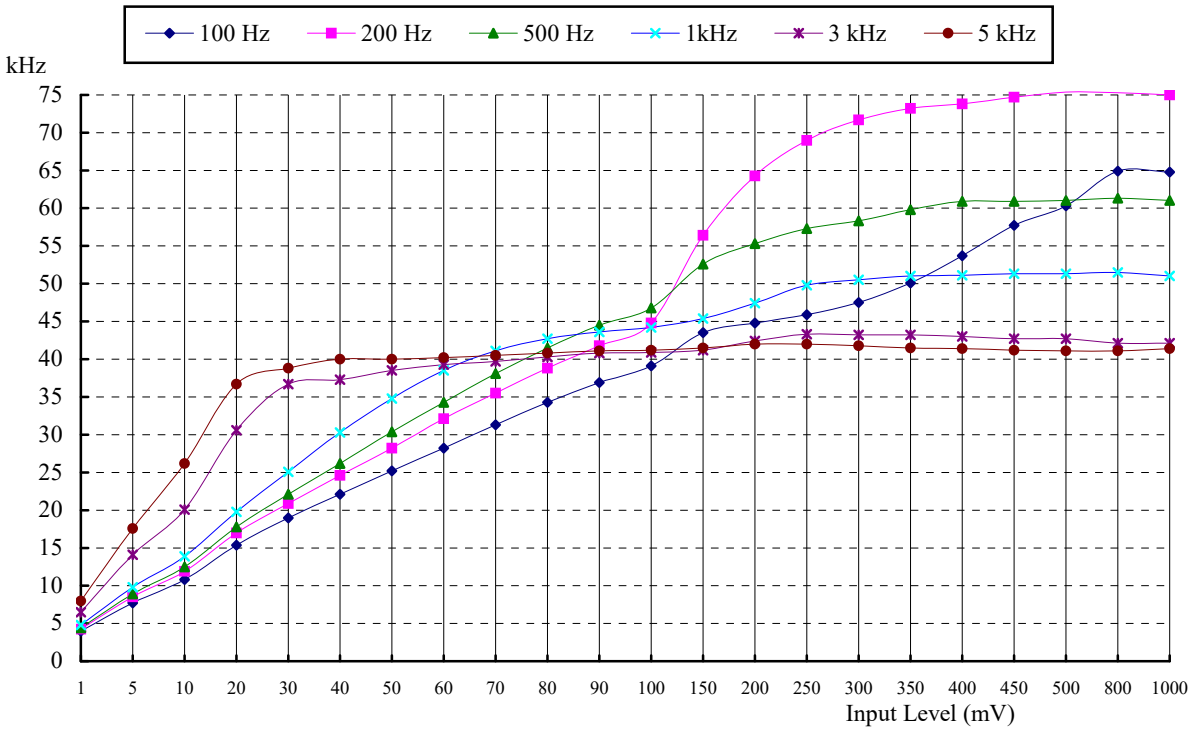
RF Frequency : 548.250MHz;

Test Date : Aug. 16, 2016 Temperature : 26 °C Humidity : 68 %

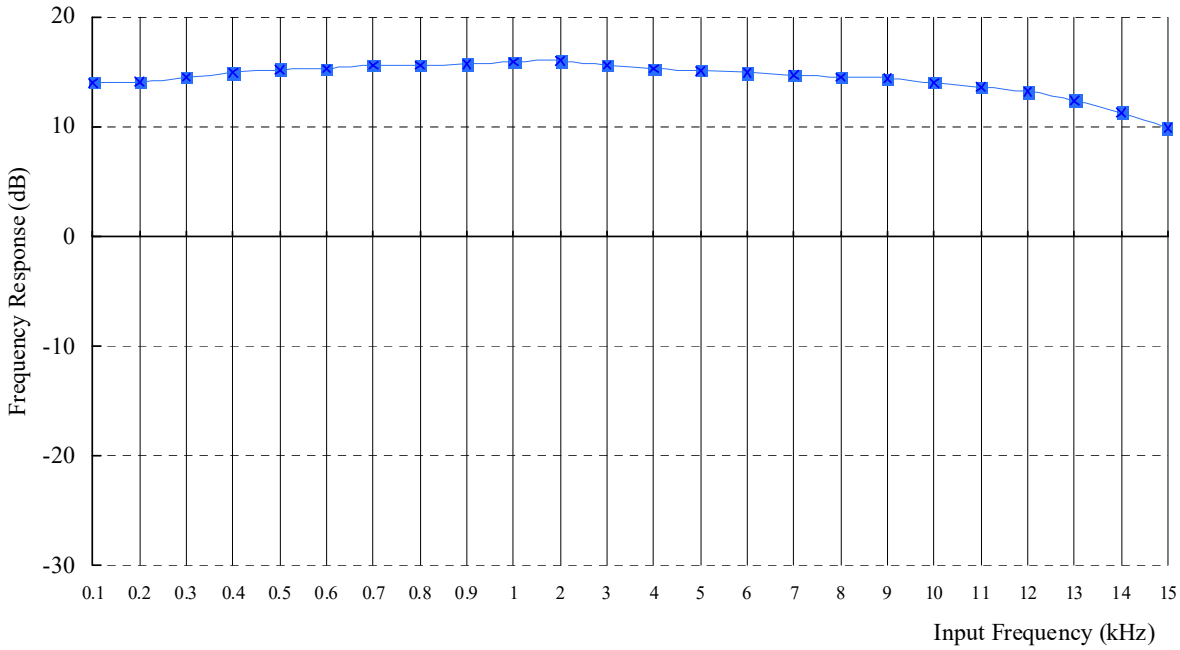
A). Frequency response



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 modulateed 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.

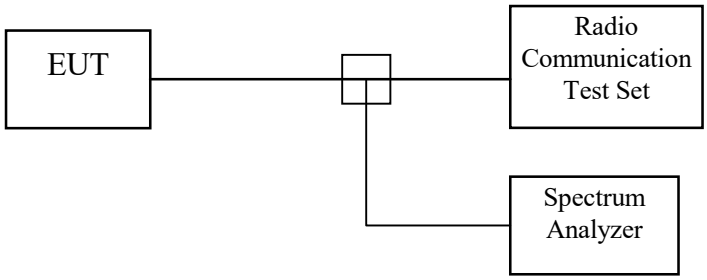
5.2 Measurement Method

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	2015/11/19	2016/11/18
Spectrum Analyzer	Rohde & Schwarz	FSP40	2016/07/06	2017/07/05

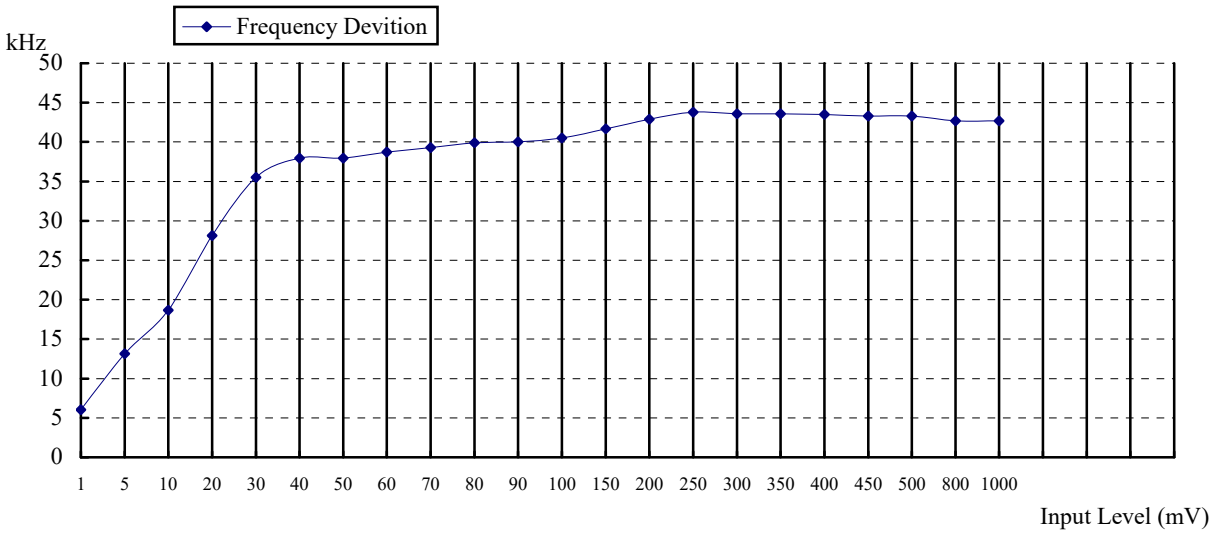
5.4 Bandwidth Measured

5.4.1 Input Level Derived

RF Frequency : 548.250MHz;

Test Date : Aug. 16, 2016 Temperature : 26 °C Humidity : 68 %

Input Audio Frequency : 2.5 kHz, Sine Wave

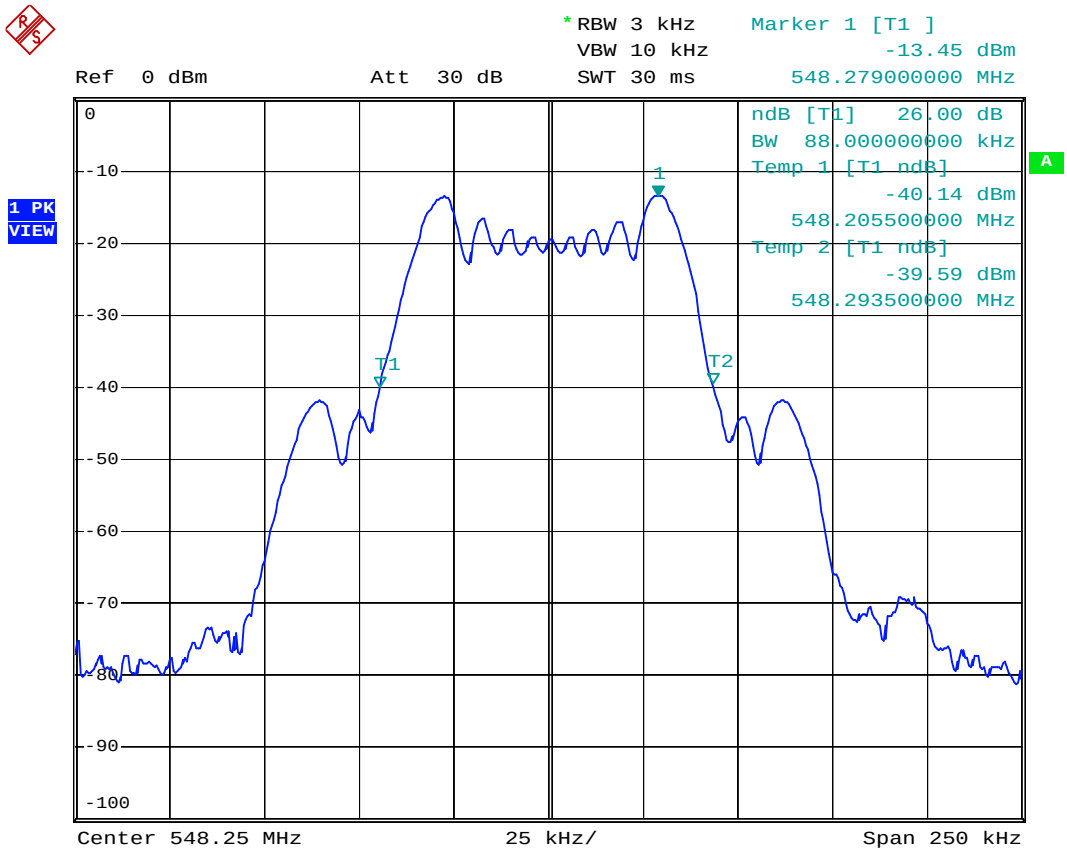


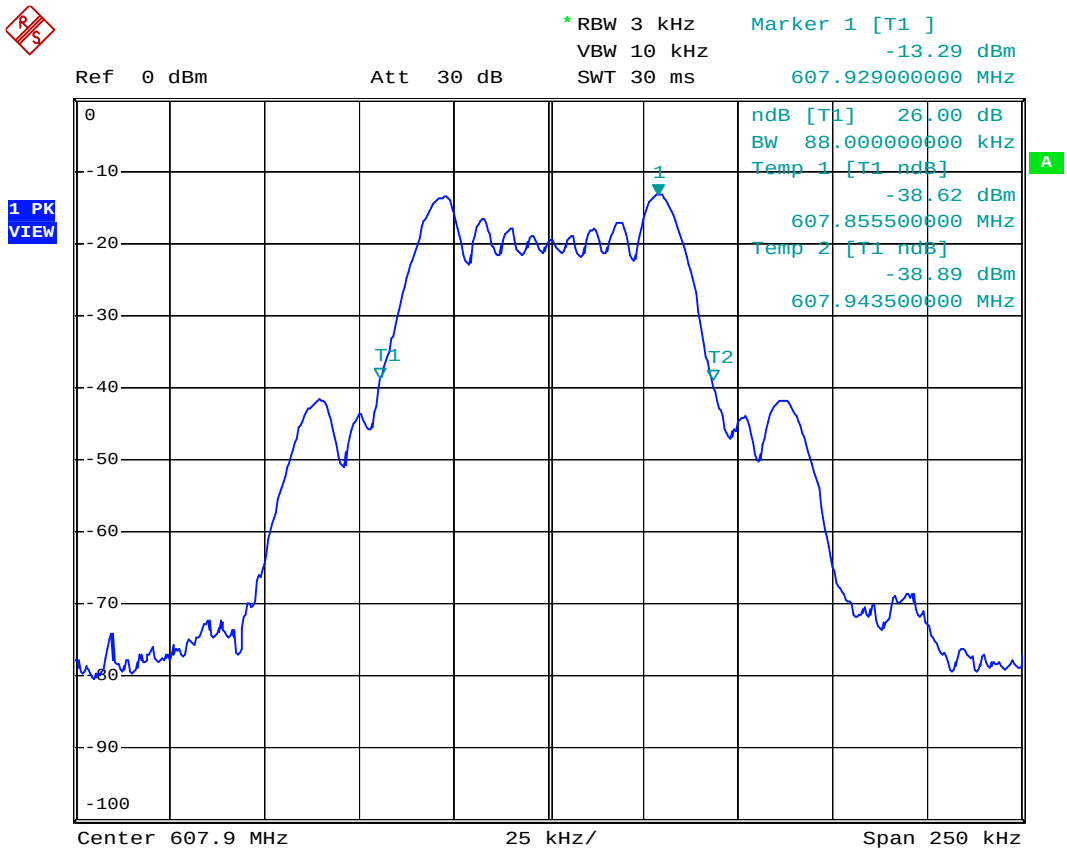
The Level input to produce 50% modulation is 13 mV, therefore the magnitude 16 dB greater than it is 82 mV.

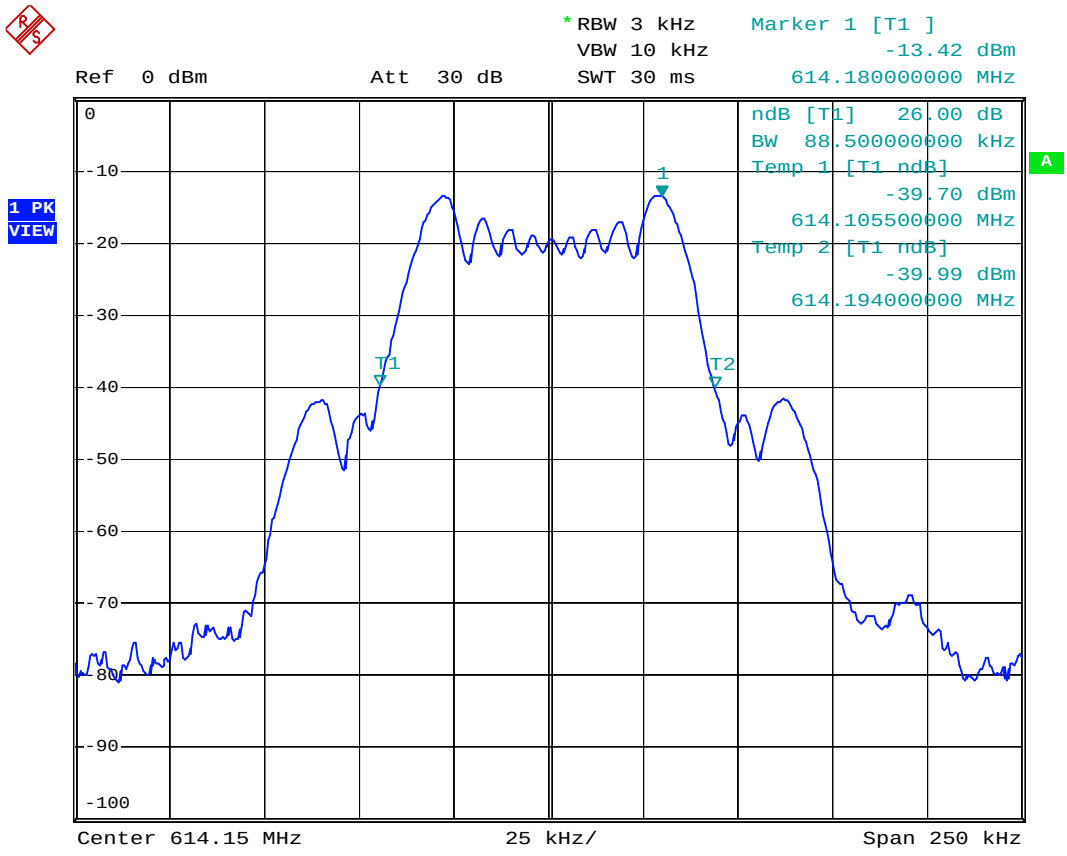
5.4.2 Occupied Bandwidth Plotted

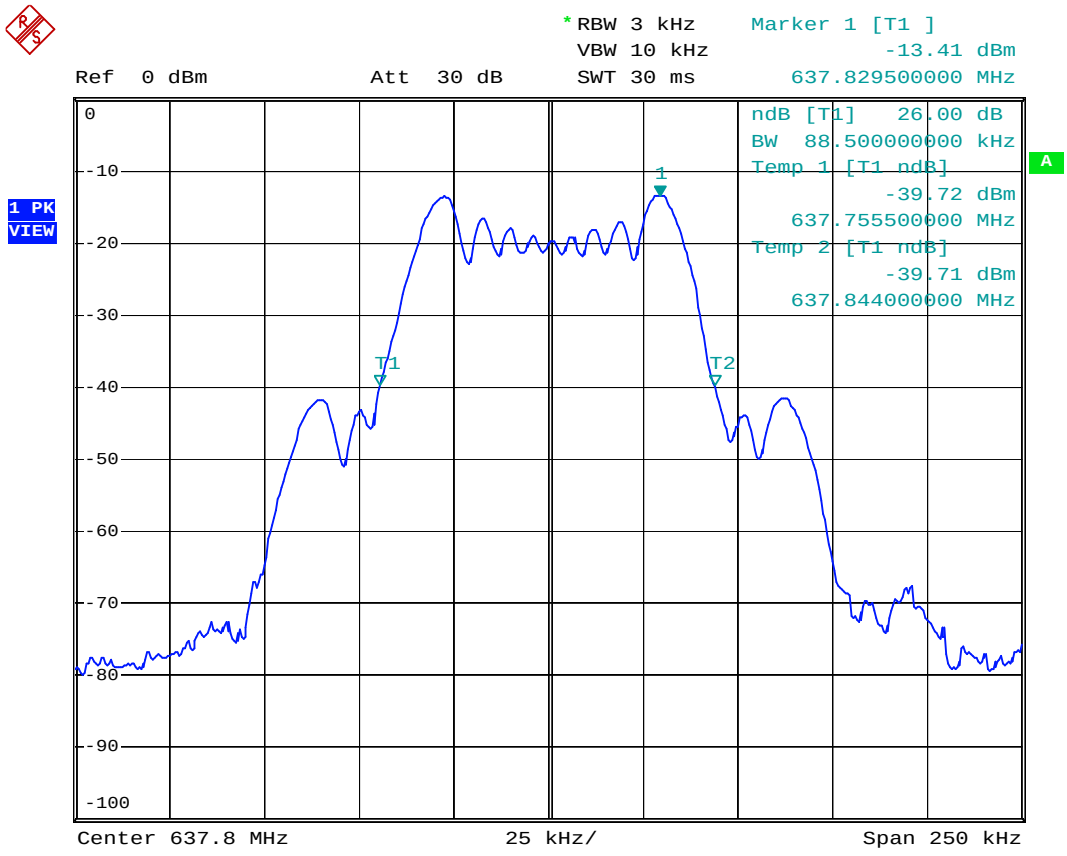
Test Date : Aug. 17, 2016 Temperature : 27 °C Humidity : 68 %

RF Frequency (MHz)	26 dB Bandwidth (kHz)
548.250	88.0
607.900	88.0
614.150	88.5
637.800	88.5


*RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-13.45 dBm
548.279000000 MHz
Ref 0 dBm
Att 30 dB
ndB [T1] 26.00 dB
BW 88.000000000 kHz
Temp 1 [T1 ndB]
-40.14 dBm
548.205500000 MHz
Temp 2 [T1 ndB]
-39.59 dBm
548.293500000 MHz
1 PK
VIEW
A
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
T1
T2
1
Center 548.25 MHz
25 kHz/
Span 250 kHz


*RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-13.29 dBm
607.929000000 MHz
Ref 0 dBm
Att 30 dB
ndB [T1] 26.00 dB
BW 88.000000000 kHz
Temp 1 [T1 ndB]
-38.62 dBm
607.855500000 MHz
Temp 2 [T1 ndB]
-38.89 dBm
607.943500000 MHz
1 PK
VIEW
A
T1
T2
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 607.9 MHz
25 kHz/
Span 250 kHz


*RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-13.42 dBm
614.180000000 MHz
Ref 0 dBm
Att 30 dB
ndB [T1] 26.00 dB
BW 88.500000000 kHz
Temp 1 [T1 ndB]
-39.70 dBm
614.105500000 MHz
Temp 2 [T1 ndB]
-39.99 dBm
614.194000000 MHz
1 PK
VIEW
A
T1
T2
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 614.15 MHz
25 kHz/
Span 250 kHz


*RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-13.41 dBm
637.829500000 MHz
Ref 0 dBm
Att 30 dB
ndB [T1] 26.00 dB
BW 88.500000000 kHz
Temp 1 [T1 ndB]
-39.72 dBm
637.755500000 MHz
Temp 2 [T1 ndB]
-39.71 dBm
637.844000000 MHz
1 PK
VIEW
A
T1
T2
1
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 637.8 MHz
25 kHz/
Span 250 kHz

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 follwing sceedule:

(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	2016/07/06	2017/07/05
Double Ridged Antenna	EMCO	3115	2015/10/08	2016/10/07
Log-periodic Antenna	EMCO	3146	2015/11/17	2016/11/16
Biconical Antenna	EMCO	3110	2015/11/17	2016/11/16
Amplifier	HP	8449B	2015/10/06	2016/10/05
Amplifier	HP	8447D	2015/12/17	2016/12/16
Signal generator	HP	83732B	2015/11/24	2016/11/23

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: 548.250MHz

Operated mode : TX
Test Date :Aug. 16, 2016
Temperature : 26°C
Humidity : 68%

Unmodulated carrier output power is 10.24 dBm , or 10.568 mW (ERP).
The limit of spurious or harmonics is calculated as following :

10.24-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1096.500	63.1	59.6	-49.1	-52.6	6.9	-2.0	2.2	-44.4	-47.9	-13.0	-31.4
1644.750	---	---	---	---	8.3	-2.0	2.7	---	---	-13.0	---
2193.000	---	---	---	---	9.0	-2.0	3.1	---	---	-13.0	---
2741.250	---	---	---	---	9.8	-2.0	3.5	---	---	-13.0	---
3289.500	---	---	---	---	9.8	-2.0	3.8	---	---	-13.0	---
3837.750	---	---	---	---	9.9	-2.0	4.1	---	---	-13.0	---
4386.000	---	---	---	---	10.8	-2.0	4.4	---	---	-13.0	---
4934.250	---	---	---	---	10.8	-2.0	4.7	---	---	-13.0	---
5482.500	---	---	---	---	10.9	-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 :

   Result = SG Reading - Cable Loss + Antenna Gain + 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 Test Date :Aug. 16, 2016
Temperature : 26°C Humidity : 68%

Unmodulated carrier output power is 10.51 dBm , or 11.246 mW (ERP).
The limit of spurious or harmonics is calculated as following :

10.51-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1215.800	67.6	65.4	-44.1	-46.2	7.3	-2.0	2.3	-39.1	-41.2	-13.0	-26.1
1823.700	---	---	---	---	8.3	-2.0	2.8	---	---	-13.0	---
2431.600	---	---	---	---	9.7	-2.0	3.3	---	---	-13.0	---
3039.500	---	---	---	---	9.6	-2.0	3.7	---	---	-13.0	---
3647.400	---	---	---	---	9.9	-2.0	4.0	---	---	-13.0	---
4255.300	---	---	---	---	10.5	-2.0	4.4	---	---	-13.0	---
4863.200	---	---	---	---	10.9	-2.0	4.7	---	---	-13.0	---
5471.100	---	---	---	---	10.9	-2.0	4.9	---	---	-13.0	---
6079.000	---	---	---	---	11.8	-2.0	5.2	---	---	-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 :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

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

c. Tx Frequency: 614.150 MHz

Operated mode : TX Test Date :Aug. 16, 2016
Temperature : 26°C Humidity : 68%

Unmodulated carrier output power is 10.20 dBm , or 10.471 mW (ERP).
The limit of spurious or harmonics is calculated as following :

10.20-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1228.300	67.5	69.0	-44.1	-42.6	7.3	-2.0	2.3	-39.1	-37.6	-13.0	-24.6
1842.450	---	---	---	---	8.3	-2.0	2.8	---	---	-13.0	---
2456.600	---	---	---	---	9.8	-2.0	3.3	---	---	-13.0	---
3070.750	---	---	---	---	9.7	-2.0	3.7	---	---	-13.0	---
3684.900	---	---	---	---	9.9	-2.0	4.0	---	---	-13.0	---
4299.050	---	---	---	---	10.6	-2.0	4.4	---	---	-13.0	---
4913.200	---	---	---	---	10.9	-2.0	4.7	---	---	-13.0	---
5527.350	---	---	---	---	10.9	-2.0	5.0	---	---	-13.0	---
6141.500	---	---	---	---	11.8	-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 :

   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

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

d. Tx Frequency: 637.800 MHz

Operated mode : TX Test Date :Aug. 16, 2016
Temperature : 26°C Humidity : 68%

Unmodulated carrier output power is 10.04 dBm , or 10.093 mW (ERP).
The limit of spurious or harmonics is calculated as following :

10.04-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBμV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1275.600	59.9	58.0	-51.5	-53.4	7.5	-2.0	2.3	-46.3	-48.2	-13.0	-33.3
1913.400	---	---	---	---	8.4	-2.0	2.9	---	---	-13.0	---
2551.200	---	---	---	---	9.9	-2.0	3.4	---	---	-13.0	---
3189.000	---	---	---	---	9.7	-2.0	3.8	---	---	-13.0	---
3826.800	---	---	---	---	9.9	-2.0	4.1	---	---	-13.0	---
4464.600	---	---	---	---	11.0	-2.0	4.5	---	---	-13.0	---
5102.400	---	---	---	---	10.8	-2.0	4.8	---	---	-13.0	---
5740.200	---	---	---	---	11.3	-2.0	5.1	---	---	-13.0	---
6378.000	---	---	---	---	12.1	-2.0	5.4	---	---	-13.0	---

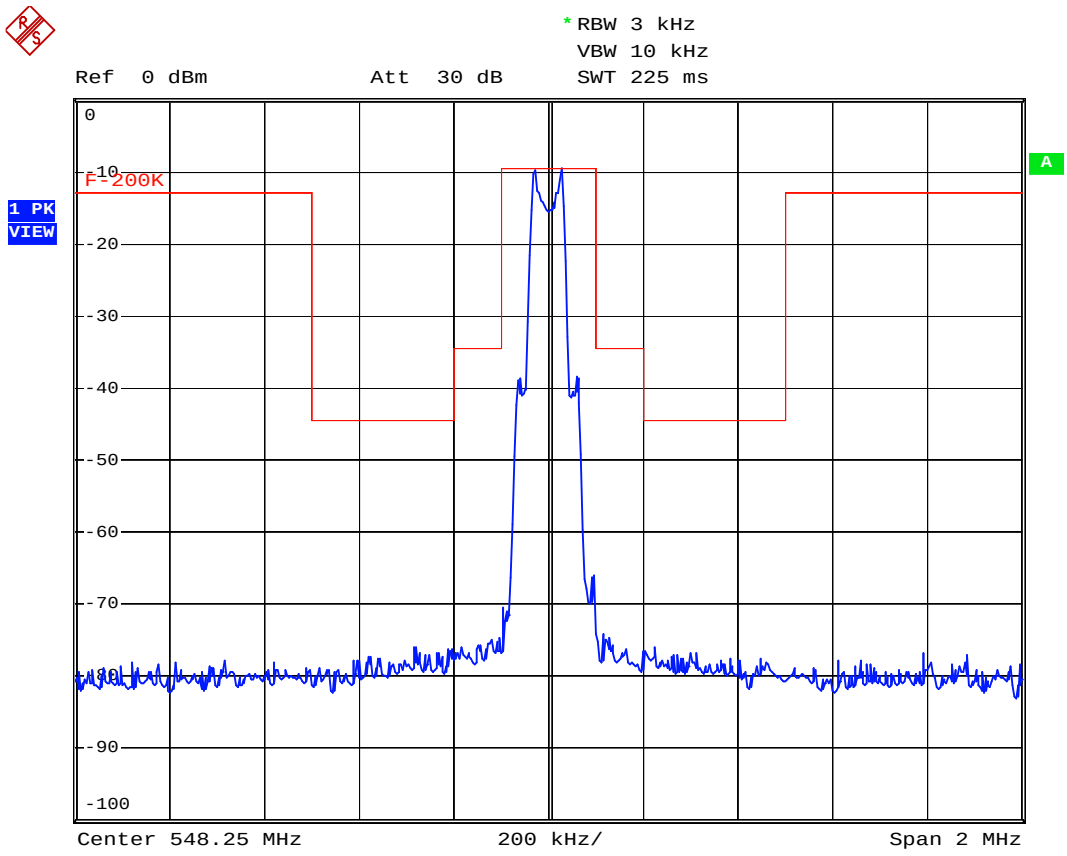
Note :

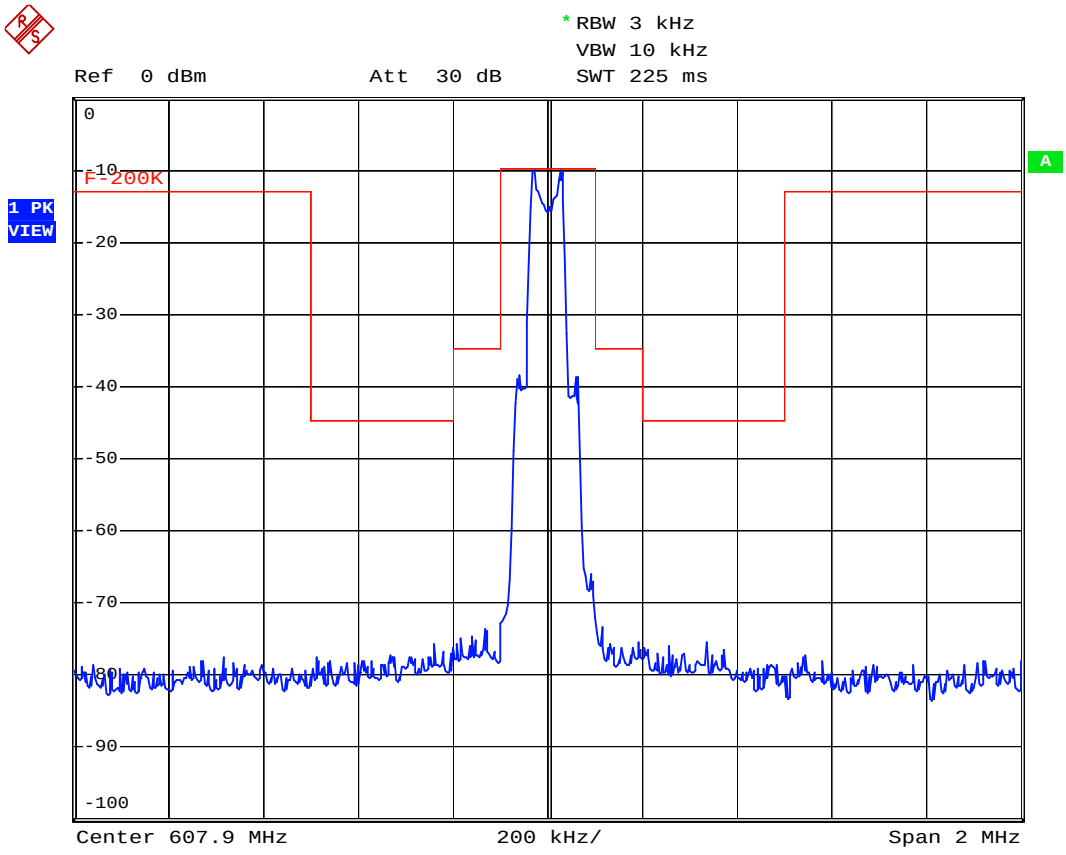
1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

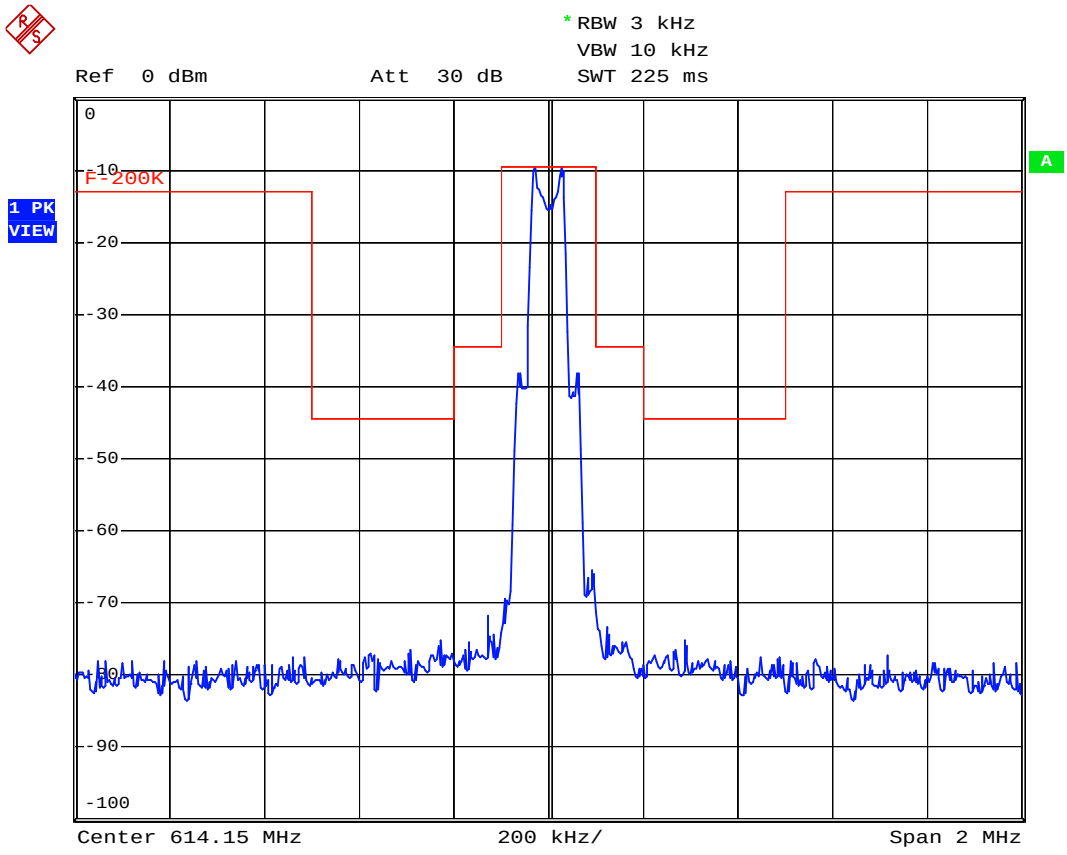
   Result = SG Reading - Cable Loss + Antenna Gain + Antenna Gain Corrected

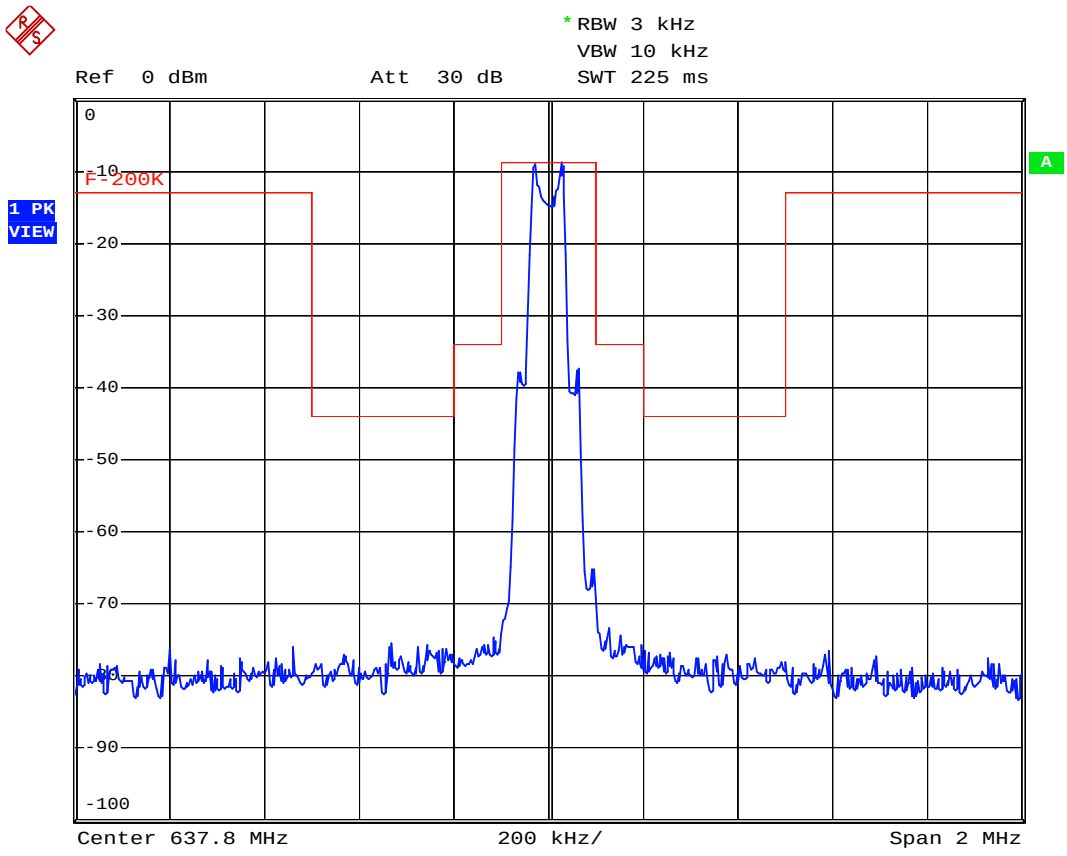
   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

6.4.2 Emission mask plots



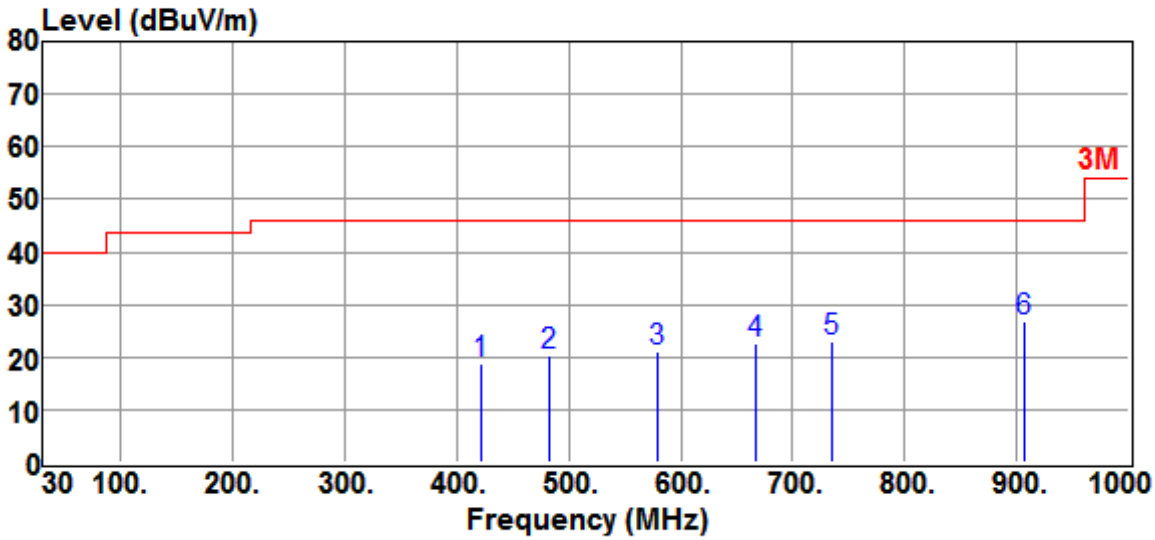

RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Ref 0 dBm
Att 30 dB
1 PK
VIEW
F-200K
A
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 607.9 MHz
200 kHz/
Span 2 MHz


*RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Ref 0 dBm
Att 30 dB
1 PK
VIEW
A
F-200K
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 614.15 MHz
200 kHz/
Span 2 MHz


RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Ref 0 dBm
Att 30 dB
1 PK
VIEW
A
F-200K
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 637.8 MHz
200 kHz/
Span 2 MHz

6.5 Other Emission

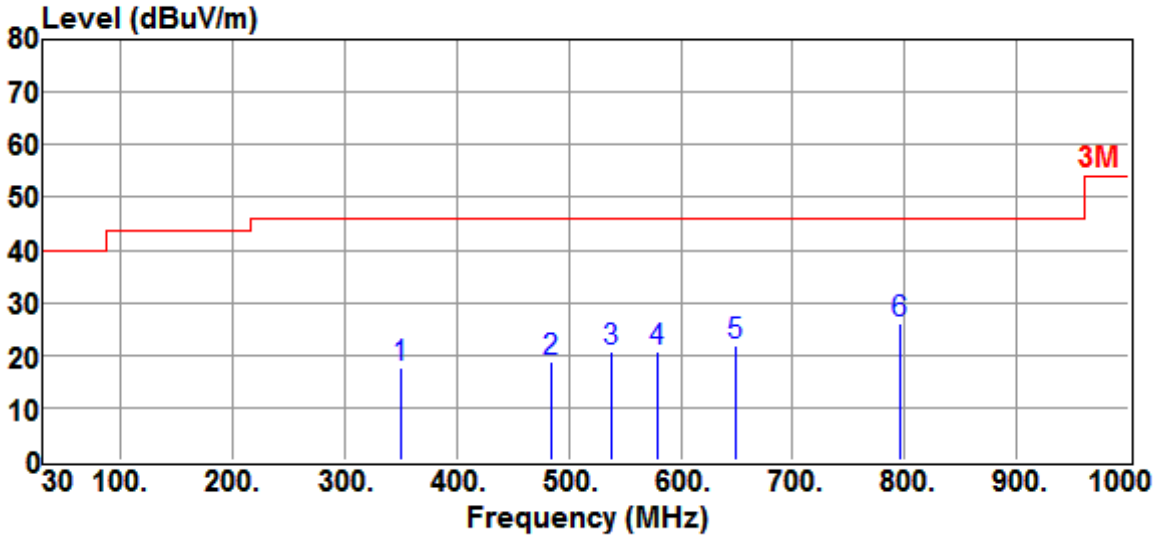
a) Emission frequencies below 1 GHz



Site	:CHAMBER#2	Date	:2016-08-25
Limit	:3M	Ant. Pol.	:HORIZONTAL
EUT	:XS WIRELESS	Model	:SK-XSW
Power Rating	:DC 3V	Temp.	:25 ˚C
Engineer	:Brian Huang	Humi.	:53 %
Test Mode	:TX Mode (Beltpack device)		

Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
421.8800	26.4	-7.4	19.0	46.0	-27.0	QP
482.0200	27.2	-6.9	20.3	46.0	-25.7	QP
579.9900	26.6	-5.6	21.0	46.0	-25.0	QP
667.2900	26.7	-4.0	22.7	46.0	-23.3	QP
734.2200	26.4	-3.5	22.9	46.0	-23.1	QP
906.8800	27.2	-0.4	26.8	46.0	-19.2	QP

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



Site	:CHAMBER#2	Date	:2016-08-25
Limit	:3M	Ant. Pol.	:VERTICAL
EUT	:XS WIRELESS	Model	:SK-XSW
Power Rating	:DC 3V	Temp.	:25˚C
Engineer	:Brian Huang	Humi.	:53 %
Test Mode	:TX Mode (Beltpack device)		

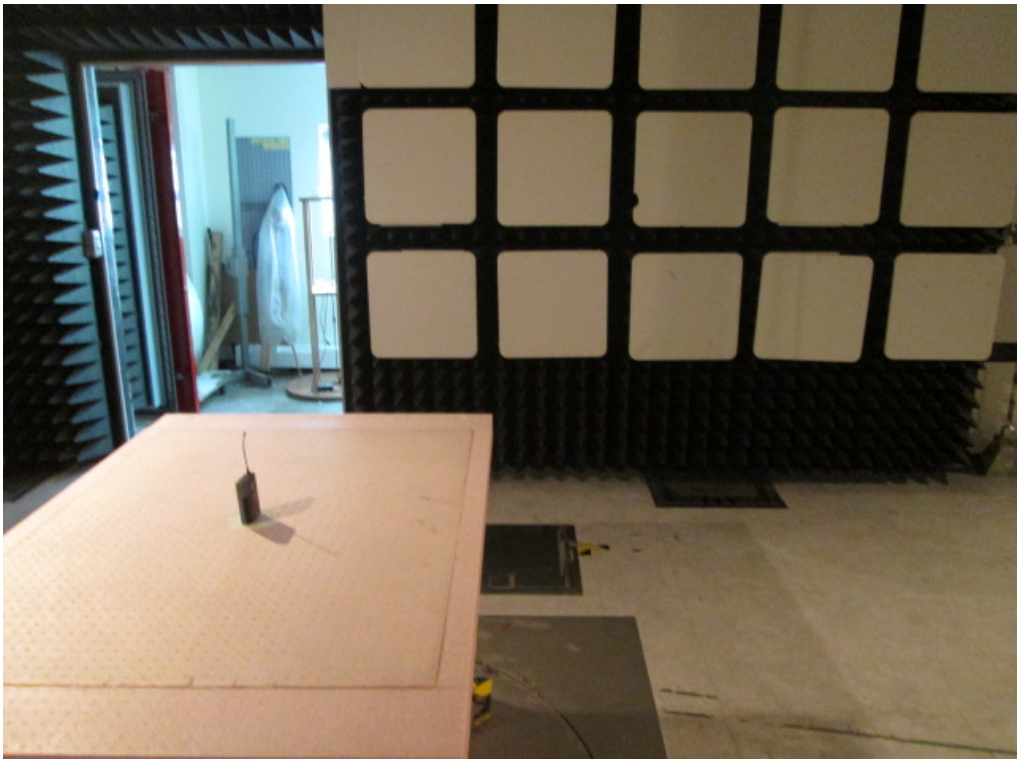
Freq MHz	Reading dBµV	Correction Factor dB	Result dBµV/m	Limits dBµV/m	Over limit dB	Detector
350.1000	25.6	-7.8	17.8	46.0	-28.2	QP
483.9600	25.8	-6.9	18.9	46.0	-27.1	QP
538.2800	26.9	-6.1	20.8	46.0	-25.2	QP
579.9900	26.2	-5.6	20.6	46.0	-25.4	QP
649.8300	26.3	-4.3	22.0	46.0	-24.0	QP
796.3000	28.3	-2.1	26.2	46.0	-19.8	QP

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℃to +50℃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℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃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℃. 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℃decreased per stage until the lowest temperature -30℃is measured, record all measurement frequencies.

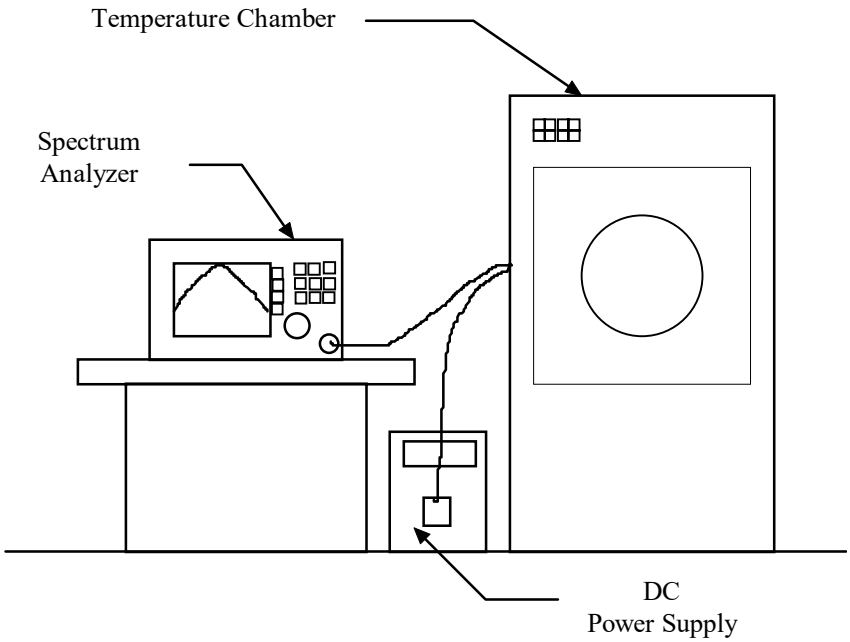
B) Frequency stability versus input voltage

1. Setup the configuration per figure 7 for frequencies measured at ambient temperature if it is within 15℃to 25℃. Otherwise, an environmental chamber set for a temperature of 20℃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	2016/07/06	2017/07/05
Temperature Chamber	MALLIER	MCT-2X-M	2015/12/15	2016/12/14

7.4 Measurement Data

Test Date : Aug. 17, 2016 Temperature : 27 °C Humidity : 68 %

A. Tx Frequency 548.250MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :548.250 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0	548.2478	-0.00040	548.2478	-0.00040	548.2478	-0.00040
40		548.2488	-0.00022	548.2488	-0.00022	548.2487	-0.00024
30		548.2491	-0.00016	548.2490	-0.00018	548.2490	-0.00018
20		548.2499	-0.00002	548.2499	-0.00002	548.2499	-0.00002
10		548.2506	0.00011	548.2506	0.00011	548.2506	0.00011
0		548.2515	0.00027	548.2514	0.00026	548.2514	0.00026
-10		548.2527	0.00049	548.2526	0.00047	548.2526	0.00047
-20		548.2534	0.00062	548.2533	0.00060	548.2533	0.00060
-30		548.2544	0.00080	548.2544	0.00080	548.2543	0.00078

A2. Frequency stability versus supplied voltage

Reference Frequency : 548.250 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.5	548.2508	0.00015	548.2508	0.00015	548.2508	0.00015
25	3.5	548.2509	0.00016	548.2509	0.00016	548.2508	0.00015

Test Date : Aug. 17, 2016 Temperature : 27 °C Humidity : 68 %

B. Tx Frequency 637.800MHz

B1. Frequency stability versus enviroment tempture

Reference Frequency : 637.800 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0	637.8013	0.00020	637.8013	0.00020	637.8013	0.00020
40		637.8010	0.00016	637.8011	0.00017	637.8011	0.00017
30		637.8008	0.00013	637.8008	0.00013	637.8008	0.00013
20		637.8004	0.00006	637.8004	0.00006	637.8004	0.00006
10		637.7998	-0.00003	637.7998	-0.00003	637.7998	-0.00003
0		637.8002	0.00003	637.8002	0.00003	637.8002	0.00003
-10		637.8010	0.00016	637.8010	0.00016	637.8010	0.00016
-20		637.8019	0.00030	637.8018	0.00028	637.8018	0.00028
-30		637.8021	0.00033	637.8021	0.00033	637.8021	0.00033

B2. Frequency stability versus supplied voltage

Reference Frequency : 637.800 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.5	637.8008	0.00013	637.8008	0.00013	637.8008	0.00013
25	3.5	637.8008	0.00013	637.8007	0.00011	637.8007	0.00011

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.