FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : UHF Wireless Transmitter
FCC ID. : DLAS4LTX
Model No. : S4.16LTX; S4.4LTX
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.,
NEW TAIPEI CITY, TAIWAN, 24442, R.O.C.
TEL : (02)26023052 FAX : (02)26010910
http:// www.etc.org.tw ; e-mail:emc@etc.org.tw

Report Number : 14-04-RBF-023-01

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 Transmitter
b) Trade Name	:	TOA Corporation, TRANTEC
c) Model No.	:	S4.16LTX; S4.4LTX
d) FCC ID	:	DLAS4LTX
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
(Vincent Chang, 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	:	UHF Wireless Transmitter
b) Trade Name	:	TOA Corporation, TRANTEC
c) Model No.	:	S4.16LTX; S4.4LTX
d) FCC ID	:	DLAS4LTX
e) Working Frequency	:	606~608 MHz 614~698 MHz
f) Power Supply	:	DC 9V Battery
g) Emission Designator	:	119KF3E 2M+2DK=2x(3kHz)+2x(56.3kHz)x1=118.6kHz

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 Standsrds” 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 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

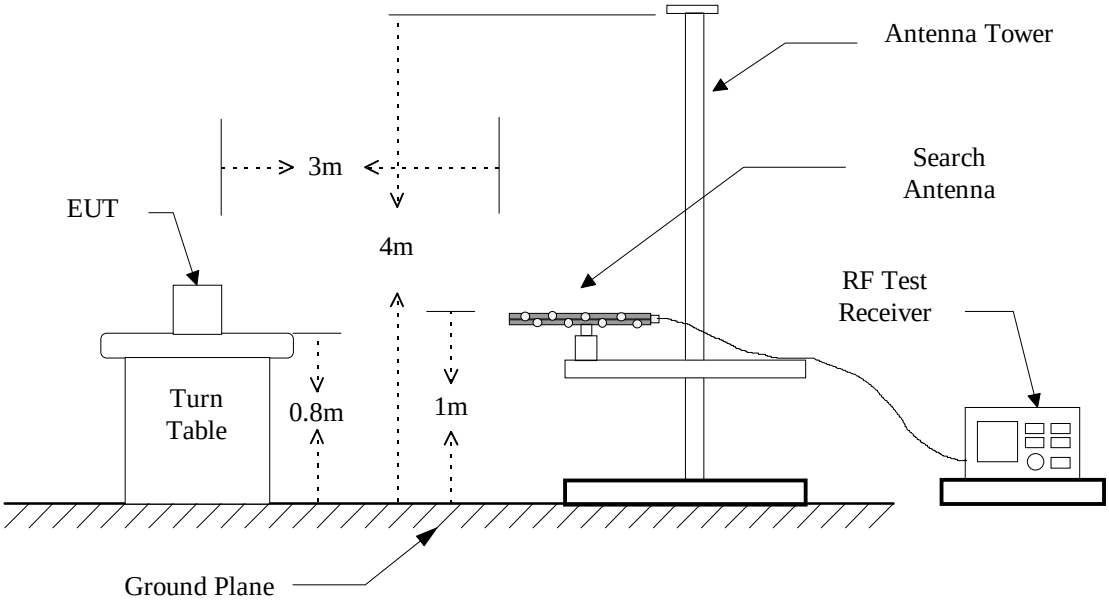
3.1 Provision Applicable

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

3.2 Measurement Procedure

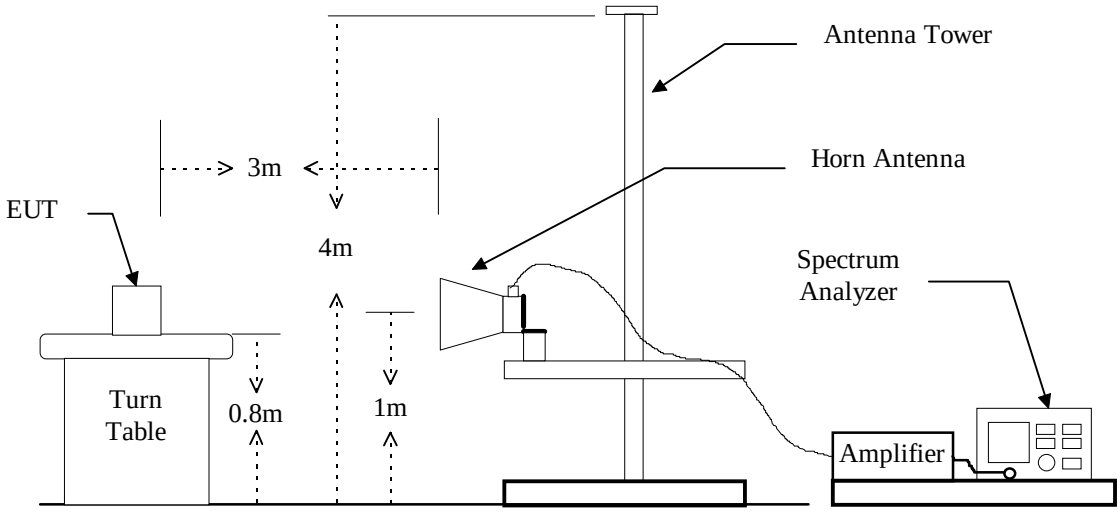
1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power.
2. Adjust the analyzer for each frequency measured in chapter 6 on a 1 MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna 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 : 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	81.10	10.90	2.2	----	8.70	7.413	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	81.30	11.10	2.20	----	8.90	7.762	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	81.40	11.00	2.30	----	8.70	7.413	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	81.60	11.50	2.30	----	9.20	8.318	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	81.70	12.10	2.30	----	9.80	9.550	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.

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

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.

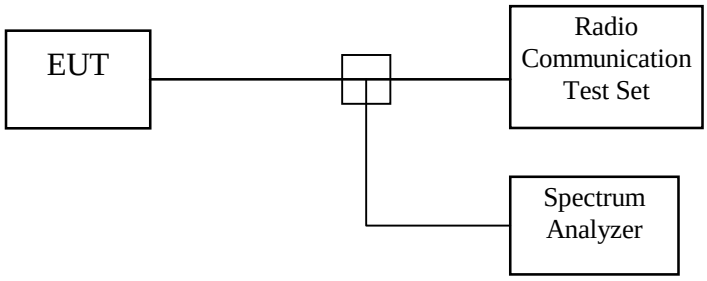
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

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

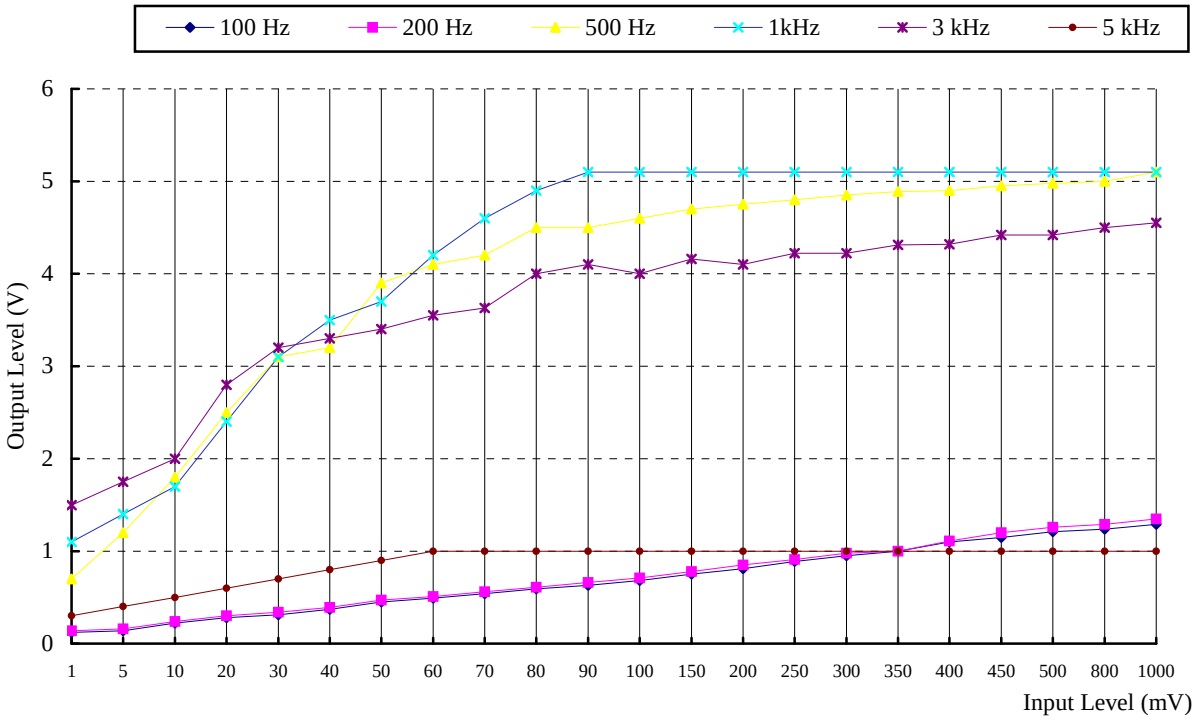
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2013/05/13	2014/05/12
Spectrum Analyzer	Rohde & Schwarz	FSP40	2014/01/21	2015/01/20

4.4 Measurement Result

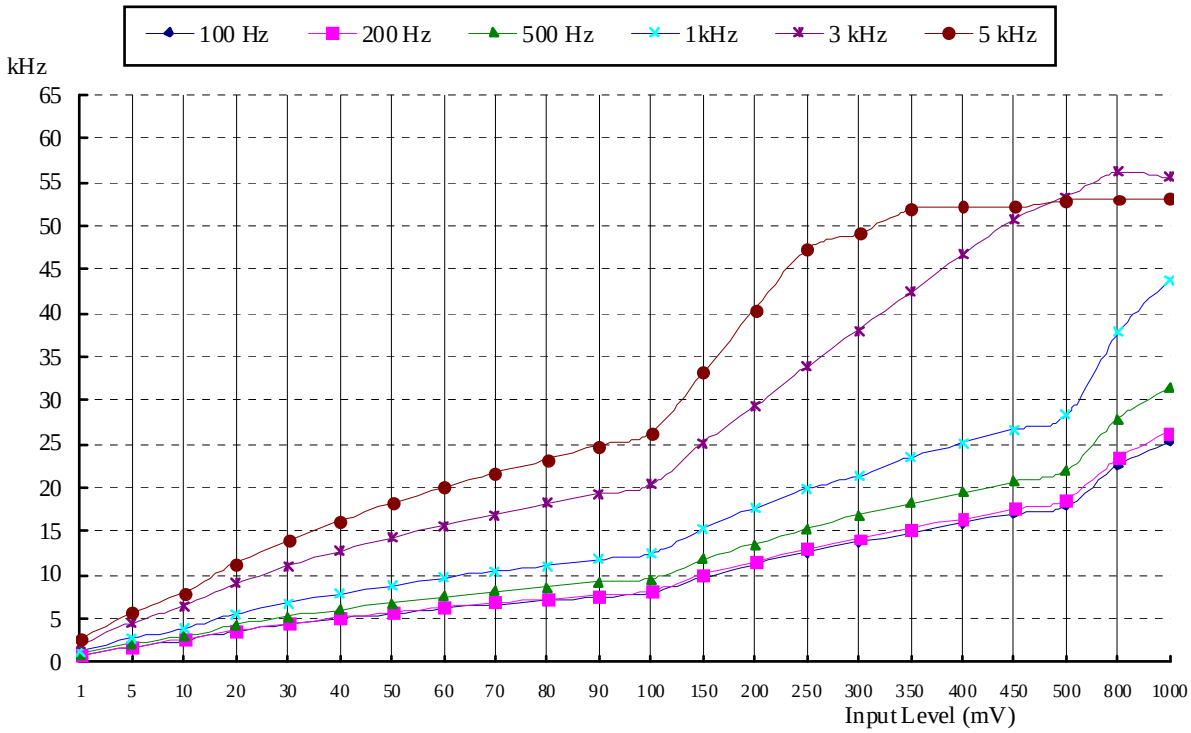
RF Frequency : 606.125MHz;

Test Date : Apr. 14, 2014 Temperature : 25 °C Humidity : 65 %

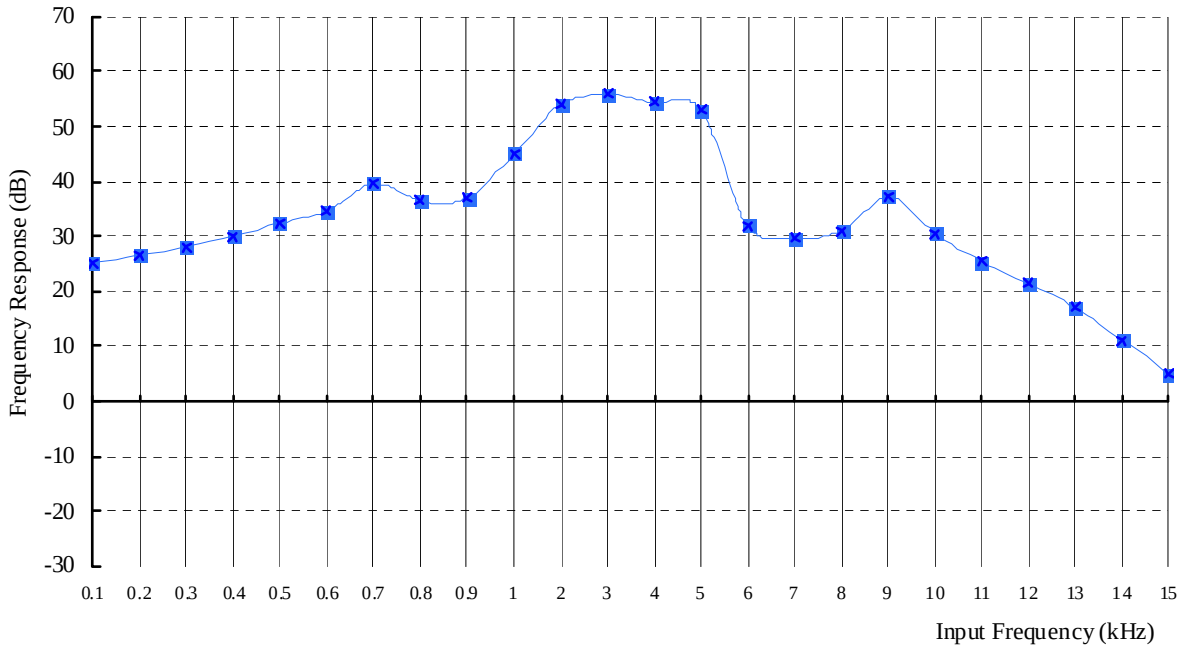
A). Frequency response



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 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.

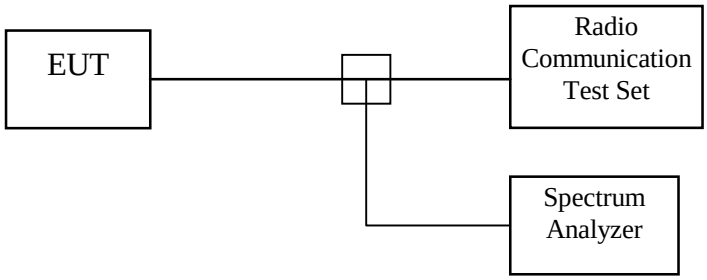
5.2 Measurement Method

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	2013/05/13	2014/05/12
Spectrum Analyzer	Rohde & Schwarz	FSP40	2014/01/201	2015/01/20

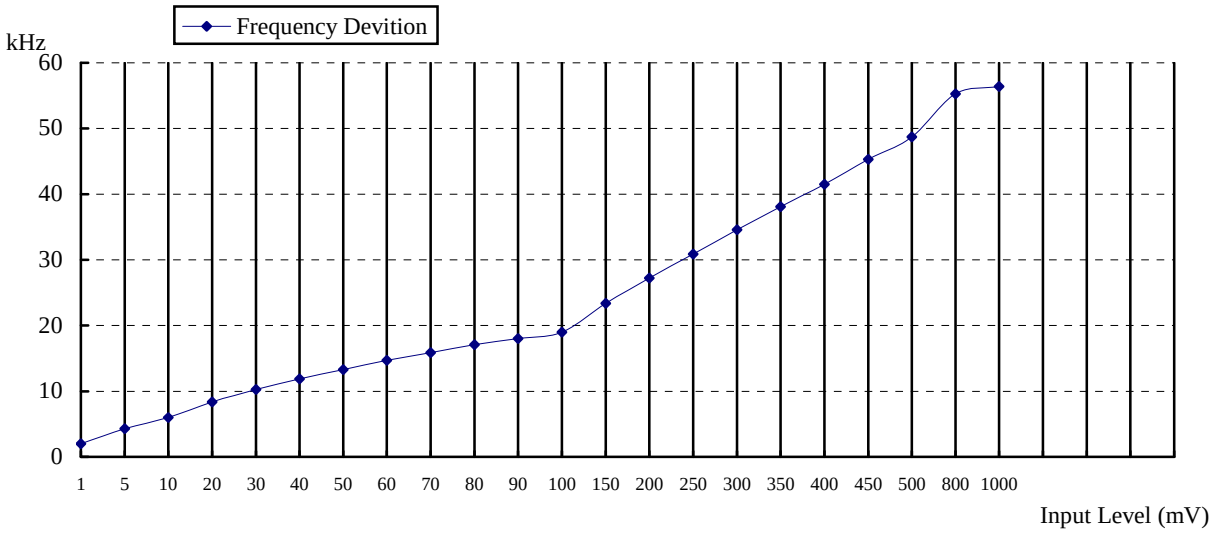
5.4 Bandwidth Measured

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

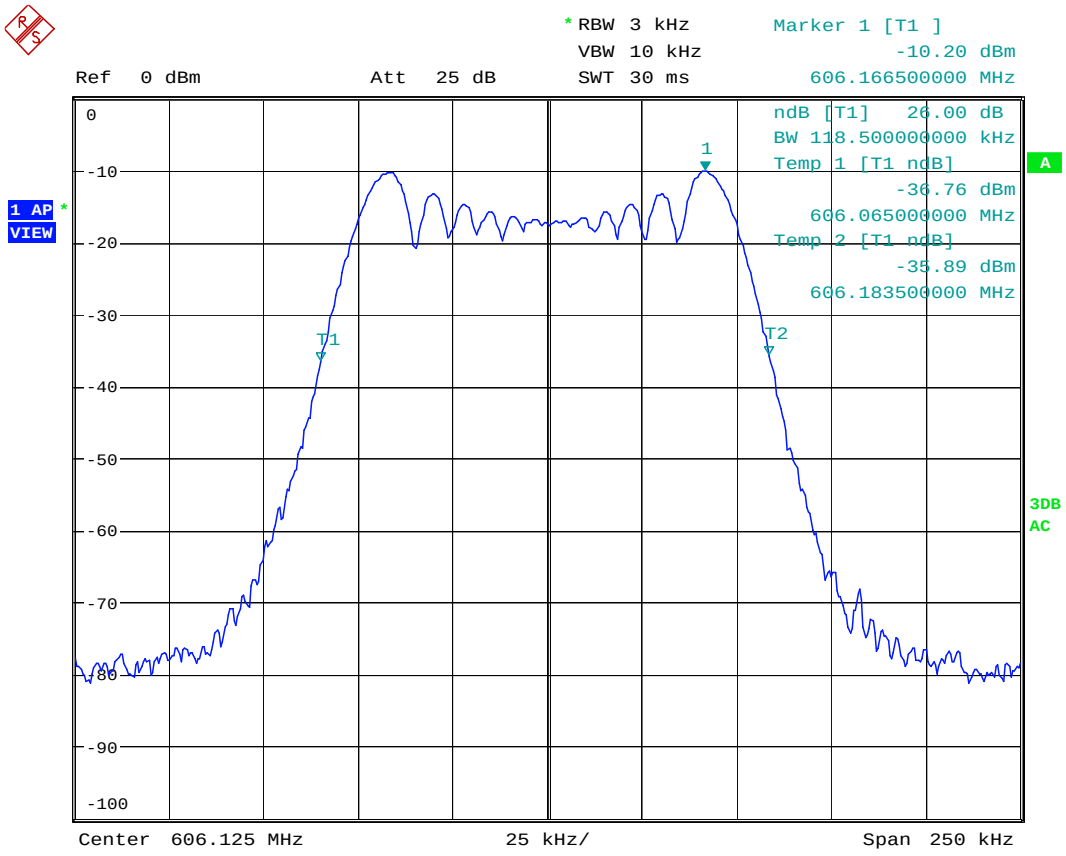


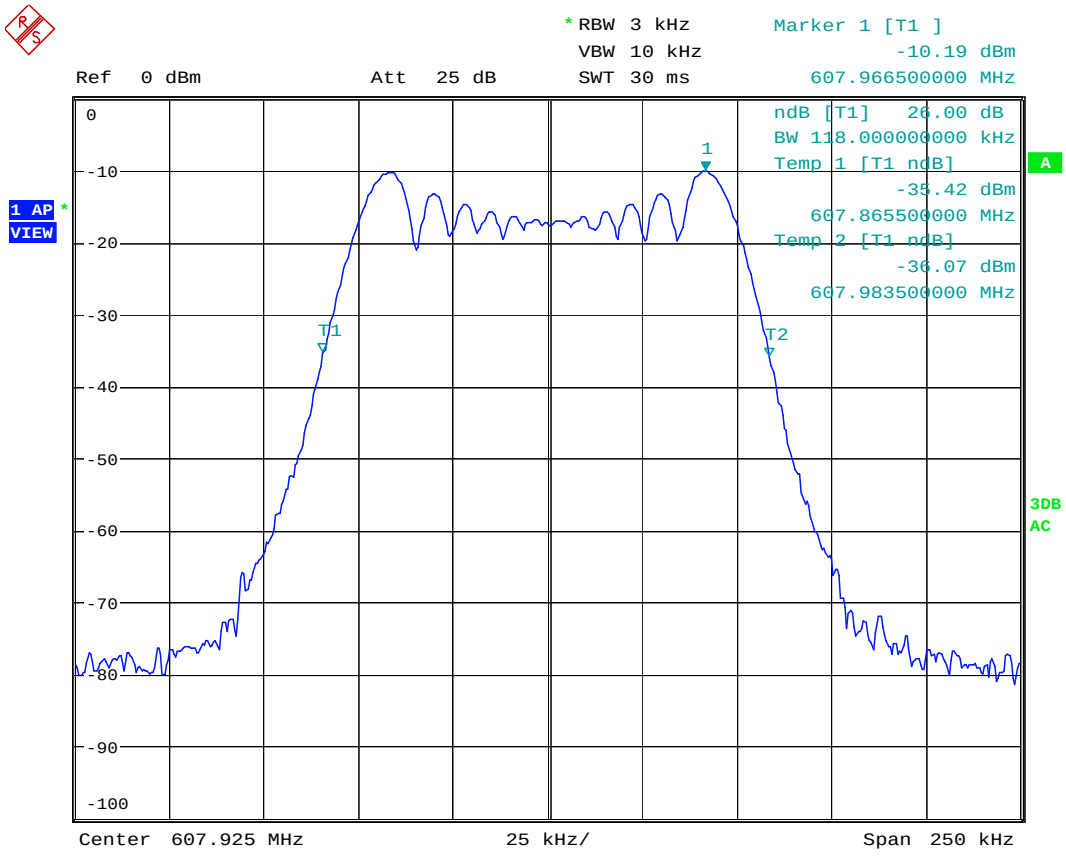
The Level input to produce 50% modulation is 150 mV, therefore the magnitude 16 dB greater than it is 946 mV.

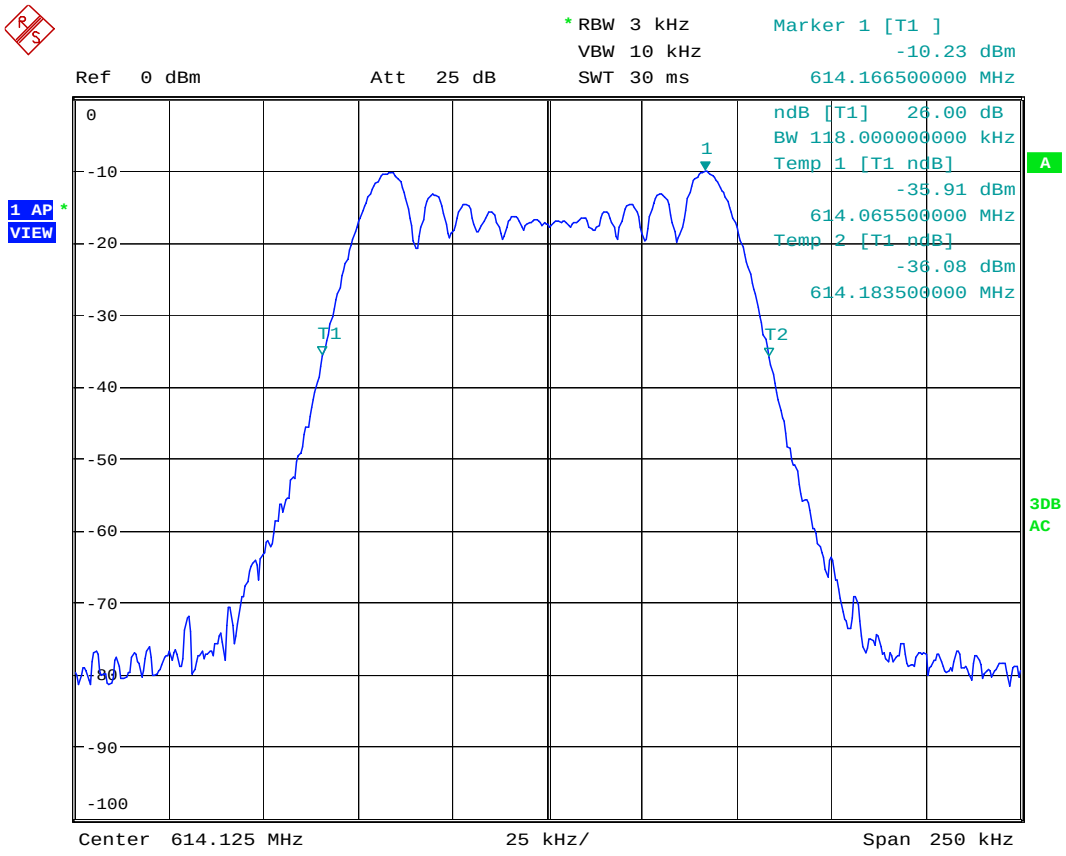
5.4.2 Occupied Bandwidth Plotted

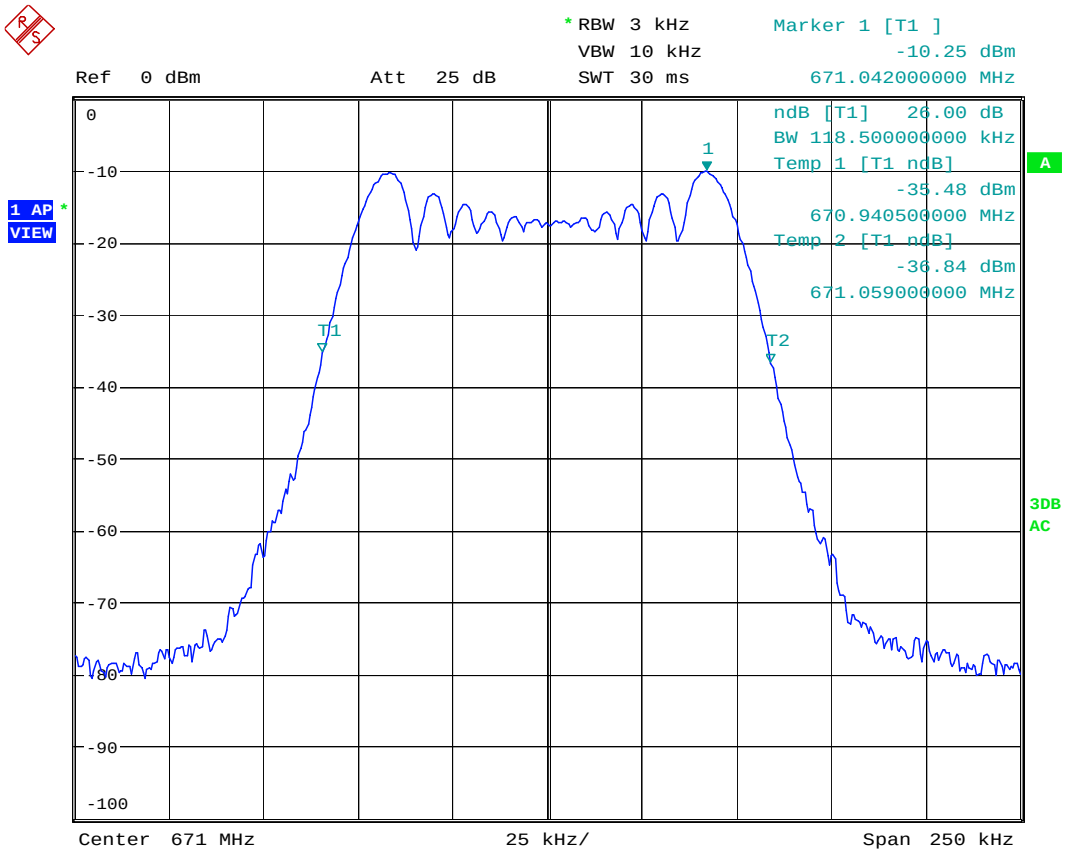
Test Date : Apr. 14, 2013 Temperature : 25 °C Humidity : 65 %

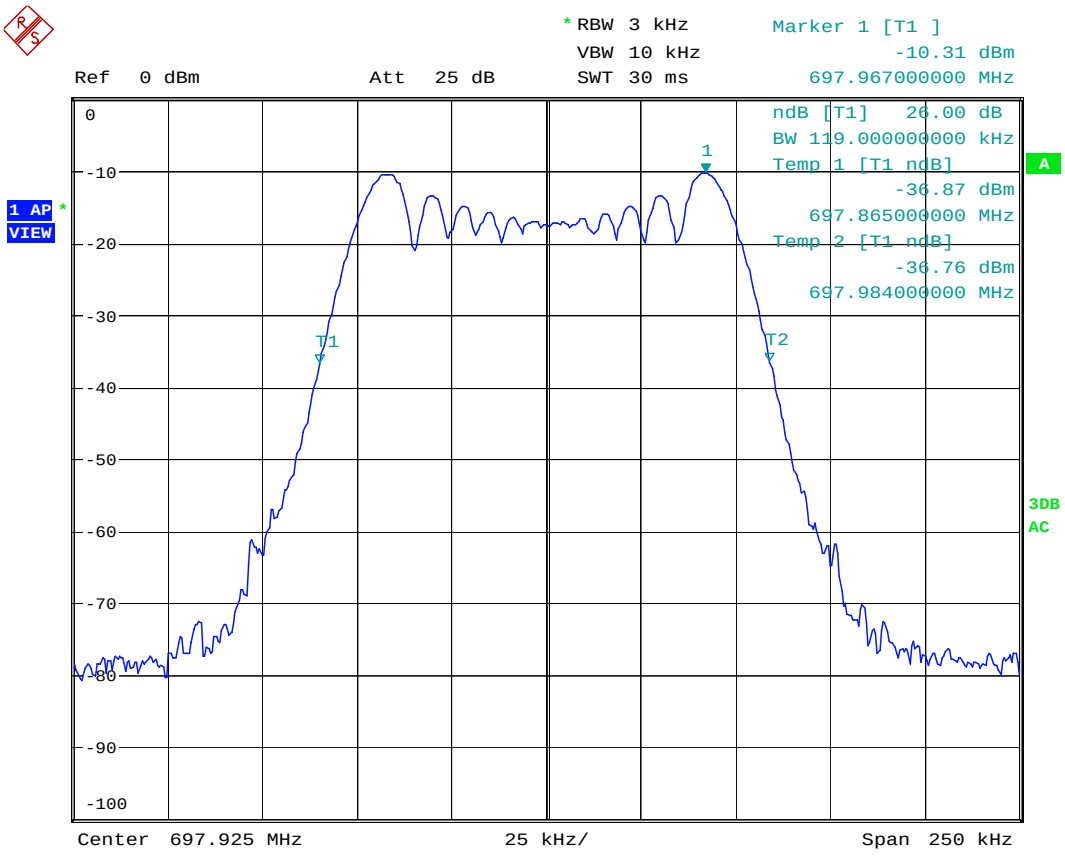
RF Frequency (MHz)	26 dB Bandwidth (kHz)
606.125	118.5
607.925	118.0
614.125	118.0
671.000	118.5
697.925	119.0


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-10.20 dBm
606.166500000 MHz
Ref 0 dBm
Att 25 dB
ndB [T1] 26.00 dB
BW 118.500000000 kHz
Temp 1 [T1 ndB]
-36.76 dBm
606.065000000 MHz
Temp 2 [T1 ndB]
-35.89 dBm
606.183500000 MHz
1 AP *
VIEW
A
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
T1
T2
1
Center 606.125 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-10.19 dBm
607.966500000 MHz
Ref 0 dBm
Att 25 dB
ndB [T1] 26.00 dB
BW 118.000000000 kHz
Temp 1 [T1 ndB]
-35.42 dBm
607.865500000 MHz
Temp 2 [T1 ndB]
-36.07 dBm
607.983500000 MHz
1 AP
VIEW
A
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
T1
T2
1
Center 607.925 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-10.23 dBm
614.166500000 MHz
Ref 0 dBm
Att 25 dB
ndB [T1] 26.00 dB
BW 118.000000000 kHz
Temp 1 [T1 ndB]
-35.91 dBm
614.065500000 MHz
Temp 2 [T1 ndB]
-36.08 dBm
614.183500000 MHz
1 AP *
VIEW
A
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
T1
T2
1
Center 614.125 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-10.25 dBm
671.042000000 MHz
Ref 0 dBm
Att 25 dB
ndB [T1] 26.00 dB
BW 118.500000000 kHz
Temp 1 [T1 ndB]
-35.48 dBm
670.940500000 MHz
Temp 2 [T1 ndB]
-36.84 dBm
671.059000000 MHz
1 AP *
VIEW
A
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
T1
T2
1
Center 671 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-10.31 dBm
697.967000000 MHz
Ref 0 dBm
Att 25 dB
ndB [T1] 26.00 dB
BW 119.000000000 kHz
Temp 1 [T1 ndB]
-36.87 dBm
697.865000000 MHz
Temp 2 [T1 ndB]
-36.76 dBm
697.984000000 MHz
1 AP
VIEW
A
3DB
AC
T1
T2
1
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 697.925 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	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 Test Date :Apr. 14, 2014
Temperature : 25°C Humidity : 65%

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

Frequency (MHz)	Meter Reading (dBuV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1212.250	61.1	64.8	-50.6	-46.8	6.6	-2.0	2.3	-46.3	-42.5	-13.0	-29.5
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 :

   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: 607.925 MHz

Operated mode : TX Test Date :Apr. 14, 2014
Temperature : 25°C Humidity : 65%

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

Frequency (MHz)	Meter Reading (dBuV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1215.850	61.3	64.9	-50.4	-46.7	6.6	-2.0	2.3	-46.1	-42.4	-13.0	-29.4
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 :
   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: 614.125 MHz

Operated mode : TX Test Date :Apr. 14, 2014
Temperature : 25°C Humidity : 65%

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

Frequency (MHz)	Meter Reading (dBuV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1228.250	61.4	64.8	-50.2	-46.8	6.6	-2.0	2.3	-45.9	-42.5	-13.0	-29.5
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 :

   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: 671.000 MHz

Operated mode : TX Test Date :Apr. 14, 2014
Temperature : 25°C Humidity : 65%

Unmodulated carrier output power is 9.2 dBm , or 8.318 mW (ERP).
The limit of spurious or harmonics is calculated as following :

9.2-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBuV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1342.000	61.6	64.9	-49.5	-46.1	7.1	-2.0	2.4	-44.8	-41.4	-13.0	-28.4
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 :

   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.

e. Tx Frequency: 697.925 MHz

Operated mode : TX Test Date :Apr. 14, 2014
Temperature : 25°C Humidity : 65%

Unmodulated carrier output power is 9.8 dBm , or 9.550 mW (ERP).
The limit of spurious or harmonics is calculated as following :

9.8-[43+10log(carrier output power in W)], or -13dBm

Frequency (MHz)	Meter Reading (dBuV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1395.850	63.1	66.9	-47.8	-43.9	7.3	-2.0	2.5	-43.0	-39.1	-13.0	-26.1
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	---

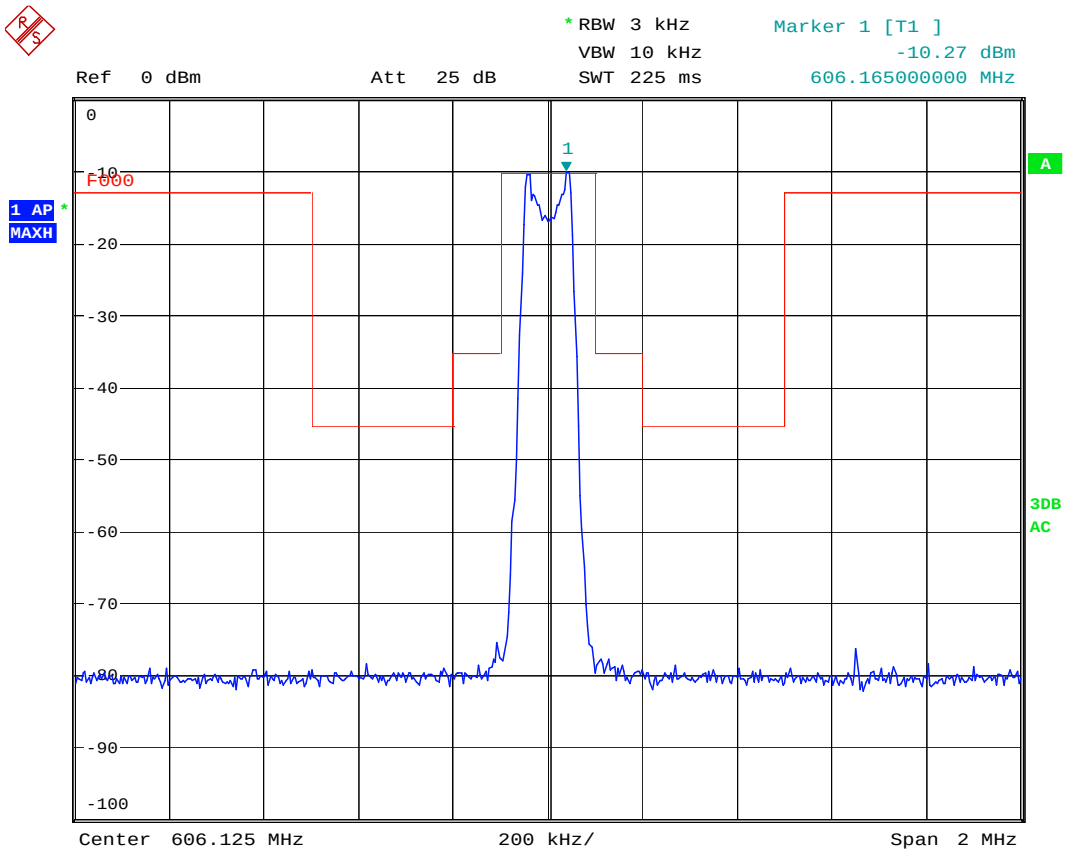
Note :

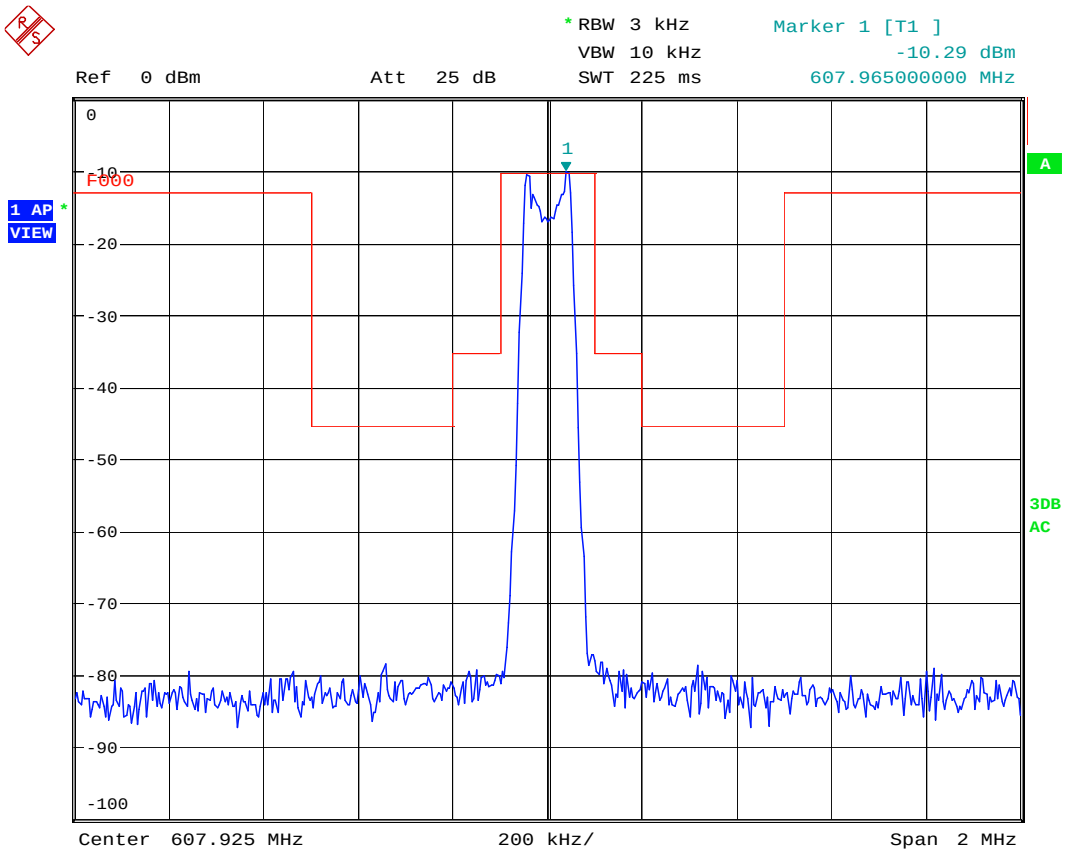
1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

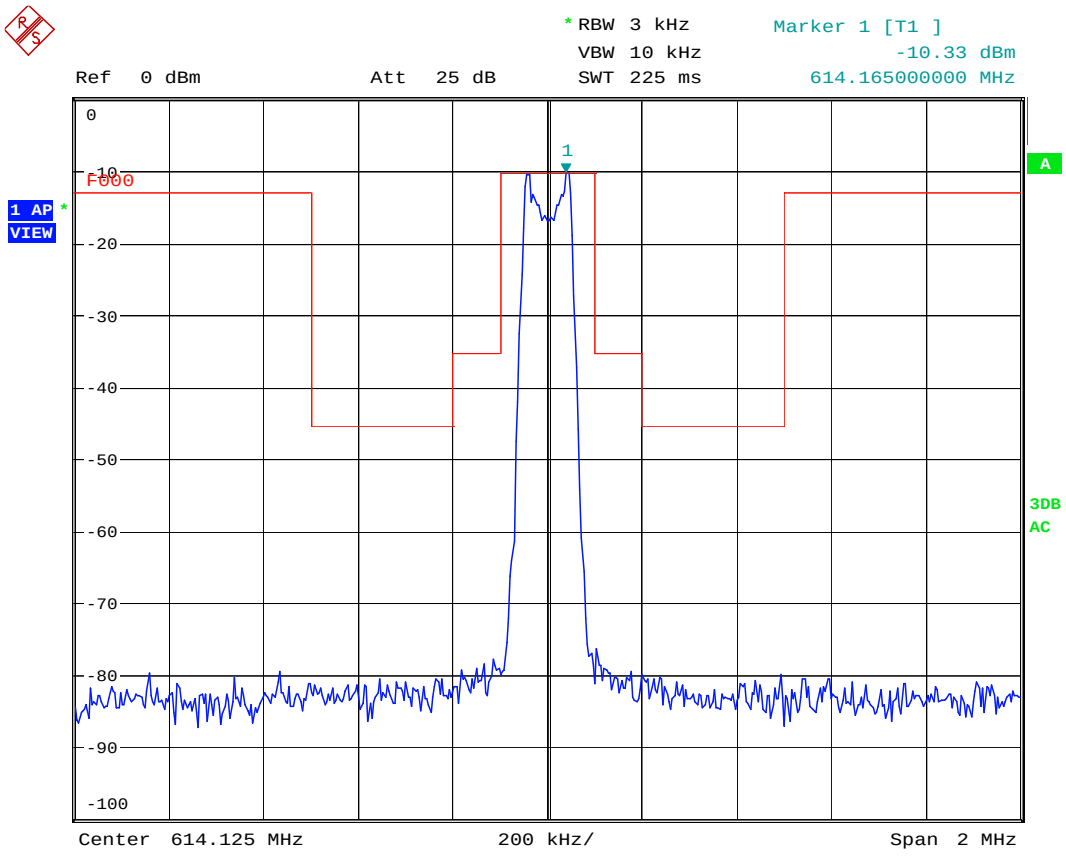
   Result = SG Reading +Cable Loss +Antenna Gain +Antenna Gain Corrected

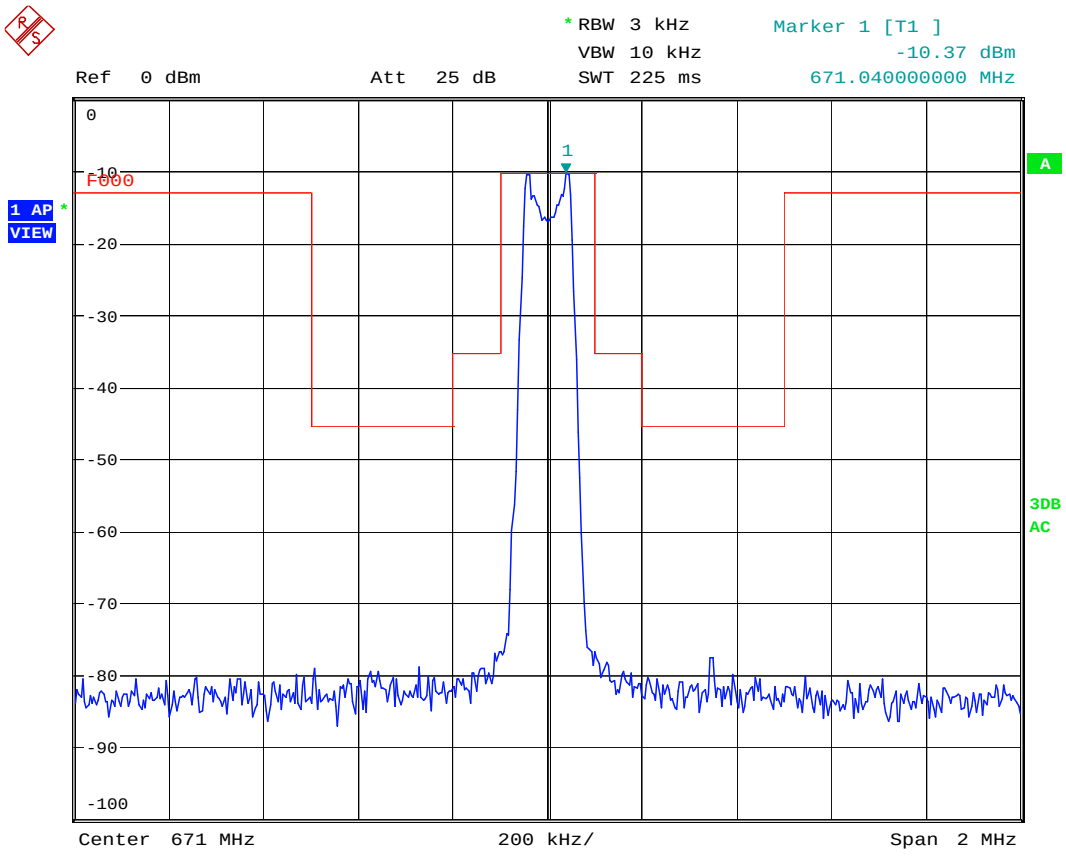
   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.

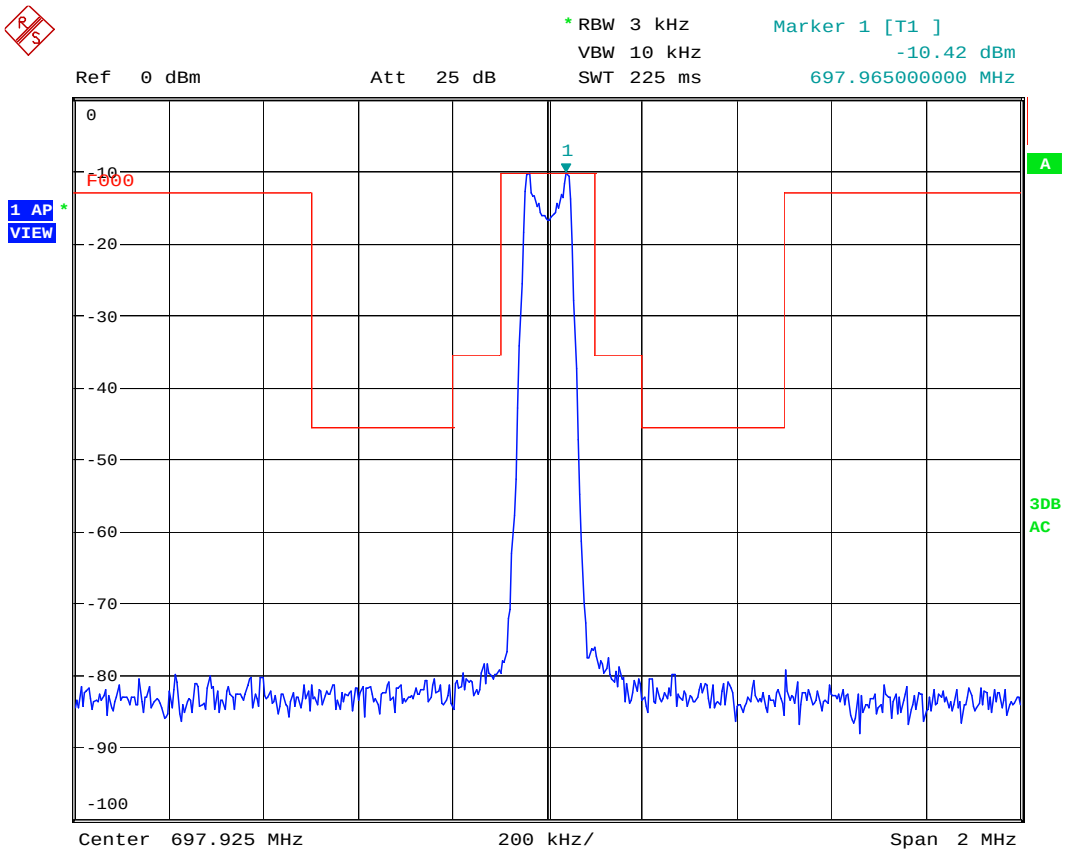
6.4.2 Emission mask plots




*RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-10.29 dBm
607.965000000 MHz
Ref 0 dBm
Att 25 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
F000
1
1 AP
VIEW
A
3DB
AC
Center 607.925 MHz
200 kHz/
Span 2 MHz


*RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-10.33 dBm
614.165000000 MHz
Ref 0 dBm
Att 25 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
F000
1
1 AP
VIEW
A
3DB
AC
Center 614.125 MHz
200 kHz/
Span 2 MHz

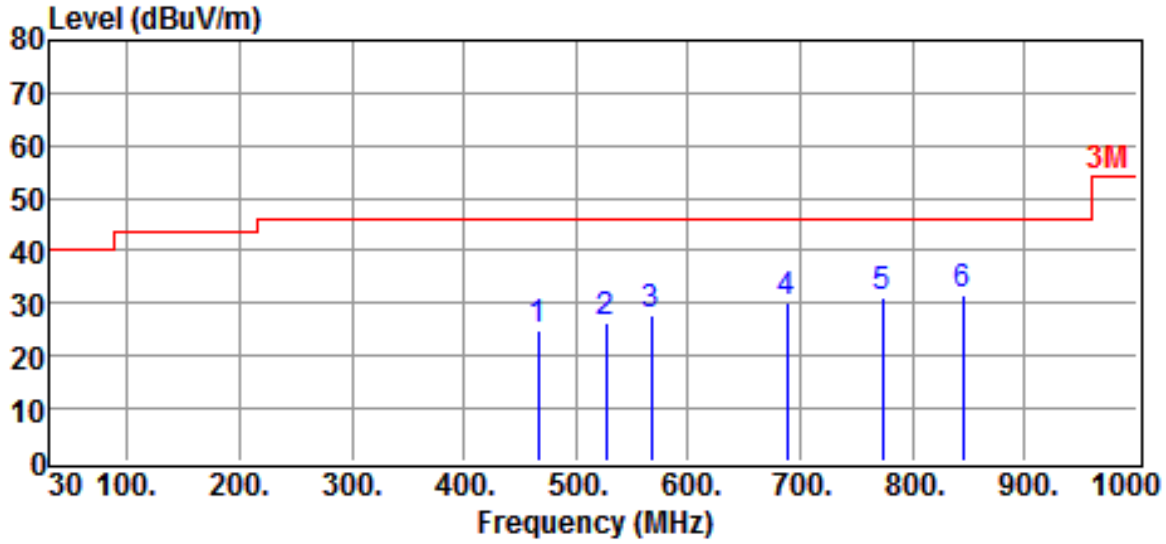

*RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-10.37 dBm
671.040000000 MHz
Ref 0 dBm
Att 25 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
F000
1
1 AP *
VIEW
A
3DB
AC
Center 671 MHz
200 kHz/
Span 2 MHz


* RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-10.42 dBm
697.965000000 MHz
Ref 0 dBm
Att 25 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
F000
1
1 AP
VIEW
A
3DB
AC
Center 697.925 MHz
200 kHz/
Span 2 MHz

6.5 Other Emission

a) Emission frequencies below 1 GHz

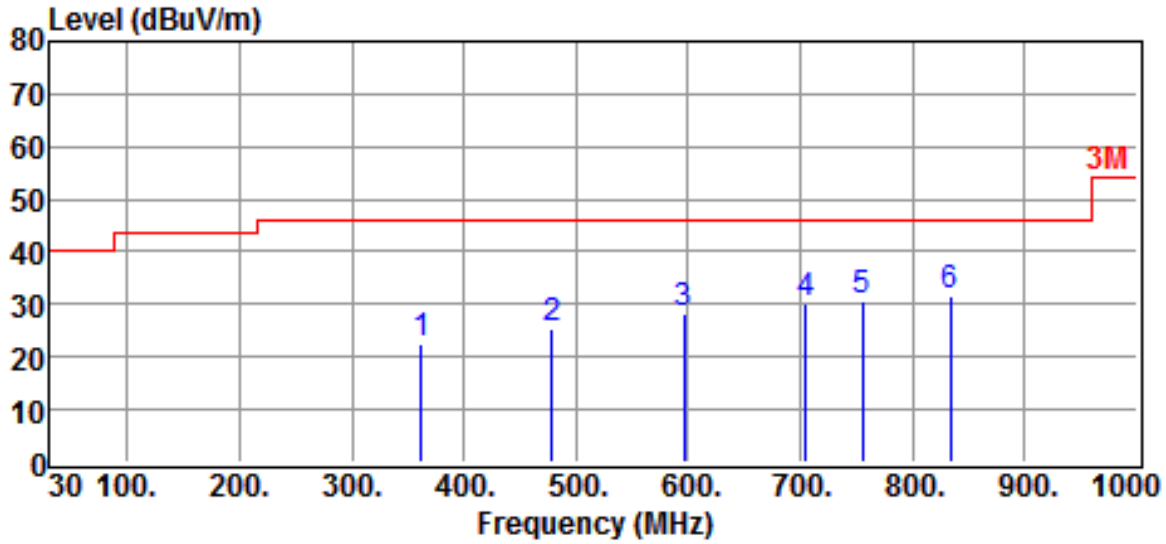
Test Date : Apr. 14, 2014 Temperature : 25°C Humidity : 65 %



Site	:OPEN SITE	Date	:2014-04-14
EUT	:UHF Wireless Transmitter	Ant. Pol.	:HORIZONTAL
Model	:S4.16LTX	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
466.5000	4.4	20.7	25.1	46.0	-20.9	Peak
526.6400	4.4	22.0	26.4	46.0	-19.6	Peak
567.3800	5.1	22.5	27.6	46.0	-18.4	Peak
687.6600	5.2	24.8	30.0	46.0	-16.0	Peak
773.0200	5.2	26.0	31.2	46.0	-14.8	Peak
844.8000	4.7	27.1	31.8	46.0	-14.2	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 Transmitter	Ant. Pol.	:VERTICAL
Model	:S4.16LTX	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
361.7400	4.3	18.1	22.4	46.0	-23.6	Peak
478.1400	4.3	21.1	25.4	46.0	-20.6	Peak
596.4800	5.2	22.9	28.1	46.0	-17.9	Peak
705.1200	4.8	25.2	30.0	46.0	-16.0	Peak
755.5600	4.9	25.7	30.6	46.0	-15.4	Peak
833.1600	4.4	27.0	31.4	46.0	-14.6	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℃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.

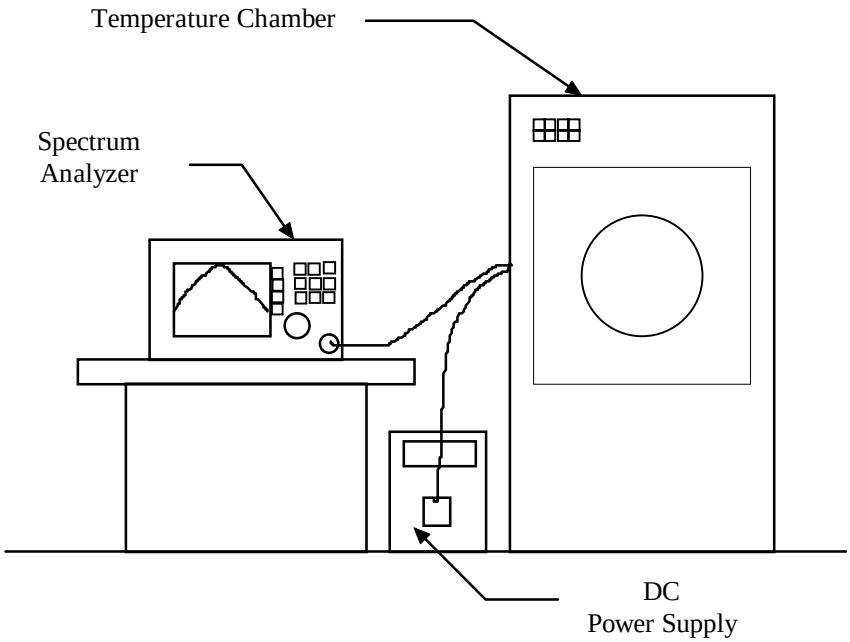
B) Frequency stability versus input voltage

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	2014/01/21	2015/01/20
Temperature Chamber	MALLIER	MCT-2X-M	2013/05/03	2014/05/02

7.4 Measurement Data

Test Date : Apr. 15, 2014 Temperature : 25 °C Humidity : 65 %

A. Tx Frequency 606.125MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :606.125 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9	606.1029	-0.00365	606.1372	0.00202	606.1155	-0.00156
40		606.1044	-0.00340	606.1422	0.00283	606.1299	0.00081
30		606.1194	-0.00092	606.1165	-0.00140	606.1202	-0.00078
20		606.1267	0.00027	606.1201	-0.00081	606.1330	0.00132
10		606.1312	0.00102	606.1423	0.00285	606.1084	-0.00274
0		606.1177	-0.00121	606.1421	0.00283	606.1464	0.00354
-10		606.1234	-0.00026	606.1172	-0.00129	606.1346	0.00159
-20		606.1161	-0.00147	606.1353	0.00171	606.1187	-0.00104
-30		606.1304	0.00089	606.1164	-0.00141	606.1022	-0.00376

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

Reference Frequency : 606.125 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vac)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	606.1475	0.00371	606.1425	0.00289	606.1410	0.00264
25	10.35	606.1356	0.00175	606.1359	0.00180	606.1330	0.00132

Test Date : Apr. 15, 2014 Temperature : 25 °C Humidity : 65 %

B. Tx Frequency 607.925MHz

B1. Frequency stability versus enviroment tempture

Reference Frequency : 607.925MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9	607.9288	0.00062	607.9182	-0.00112	607.9044	-0.00339
40		607.9132	-0.00194	607.9409	0.00262	607.9254	0.00006
30		607.9125	-0.00205	607.9176	-0.00122	607.9037	-0.00350
20		607.9350	0.00165	607.9224	-0.00042	607.9028	-0.00365
10		607.9336	0.00142	607.9251	0.00001	607.9481	0.00381
0		607.9118	-0.00217	607.9038	-0.00349	607.9312	0.00102
-10		607.9421	0.00281	607.9191	-0.00097	607.9454	0.00335
-20		607.9304	0.00090	607.9417	0.00275	607.9464	0.00352
-30		607.9241	-0.00016	607.9458	0.00342	607.9320	0.00116

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

Reference Frequency : 607.925MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vac)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	607.9131	-0.00196	607.9288	0.00062	607.9082	-0.00276
25	10.35	607.9099	-0.00248	607.9477	0.00373	607.9096	-0.00253

Test Date : Apr. 15, 2014 Temperature : 25 °C Humidity : 65 %

C. Tx Frequency 614.125MHz

C1. Frequency stability versus enviroment tempture

Reference Frequency : 614.125 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9	614.1019	-0.00376	614.1226	-0.00039	614.1153	-0.00158
40		614.1414	0.00268	614.1354	0.00169	614.1199	-0.00083
30		614.1415	0.00269	614.1165	-0.00138	614.1037	-0.00347
20		614.1225	-0.00041	614.1472	0.00361	614.1323	0.00119
10		614.1220	-0.00049	614.1112	-0.00225	614.1478	0.00371
0		614.1332	0.00134	614.1201	-0.00080	614.1176	-0.00120
-10		614.1046	-0.00332	614.1230	-0.00032	614.1177	-0.00119
-20		614.1343	0.00152	614.1424	0.00284	614.1394	0.00234
-30		614.1192	-0.00094	614.1294	0.00071	614.1164	-0.00141

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

Reference Frequency : 614.125 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	614.1318	0.00111	614.1226	-0.00038	614.1214	-0.00058
25	10.35	614.1087	-0.00265	614.1201	-0.00080	614.1410	0.00260

Test Date : Apr. 15, 2014 Temperature : 25 °C Humidity : 65 %

D. Tx Frequency 671.000MHz

D1. Frequency stability versus enviroment tempture

Reference Frequency : 671.000 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9	670.9892	-0.00161	671.0122	0.00182	671.0127	0.00189
40		671.0209	0.00311	670.9988	-0.00018	670.9824	-0.00262
30		671.0239	0.00356	670.9872	-0.00190	671.0127	0.00189
20		670.9962	-0.00057	670.9866	-0.00199	670.9955	-0.00066
10		670.9967	-0.00049	670.9767	-0.00348	671.0221	0.00330
0		670.9771	-0.00342	670.9954	-0.00068	670.9913	-0.00130
-10		671.0077	0.00115	671.0004	0.00006	671.0011	0.00016
-20		671.0192	0.00286	671.0233	0.00348	671.0206	0.00306
-30		671.0077	0.00115	671.0035	0.00053	670.9963	-0.00055

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

Reference Frequency : 671.000 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vac)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	671.0039	0.00057	671.0079	0.00117	671.0136	0.00202
25	10.35	670.9866	-0.00200	670.9804	-0.00293	670.9764	-0.00351

Test Date : Apr. 15, 2014 Temperature : 25 °C Humidity : 65 %

E. Tx Frequency 697.925MHz

E1. Frequency stability versus enviroment tempture

Reference Frequency : 697.925 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	9	697.9133	-0.00167	697.9198	-0.00075	697.9030	-0.00315
40		697.9325	0.00107	697.9381	0.00187	697.9386	0.00195
30		697.9234	-0.00022	697.9397	0.00211	697.9057	-0.00276
20		697.9313	0.00091	697.9024	-0.00324	697.8997	-0.00363
10		697.9090	-0.00229	697.9204	-0.00066	697.9399	0.00213
0		697.9479	0.00328	697.8988	-0.00376	697.9497	0.00353
-10		697.9411	0.00231	697.9252	0.00003	697.9013	-0.00339
-20		697.9396	0.00209	697.9465	0.00309	697.9297	0.00068
-30		697.9422	0.00247	697.9435	0.00264	697.9238	-0.00017

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

Reference Frequency : 697.925 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vac)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	7.65	697.9228	-0.00031	697.9499	0.00357	697.9032	-0.00312
25	10.35	697.9144	-0.00152	697.9016	-0.00335	697.9480	0.00329

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.