FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : Tour Guide System
FCC ID. : NTMWT-300T
Model No. : WT-300T
Working Frequency : 640-664 MHz

for

APPLICANT : E-J Electronics Co., Ltd.

ADDRESS : 4F., No.11, Lane. 125, Sec. 1, Guoguang Rd., Dali Dist., Taichung City 41262, Taiwan (R.O.C.)

Test Performed by

ELECTRONICS TESTING CENTER (ETC) , TAIWAN
NO. 34. LIN 5. DINGFU, 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 : 12-04-RBF-141-01

TEST REPORT CERTIFICATION

Applicant	:	E-J Electronics Co., Ltd. 4F., No.11, Lane. 125, Sec. 1, Guoguang Rd., Dali Dist., Taichung City 41262, Taiwan (R.O.C.)
Manufacturer	:	E-J Electronics Co., Ltd. 4F., No.11, Lane. 125, Sec. 1, Guoguang Rd., Dali Dist., Taichung City 41262, Taiwan (R.O.C.)
Description of EUT	:	
a) Type of EUT	:	Tour Guide System
b) Trade Name	:	OKAYO
c) Model No.	:	WT-300T
d) FCC ID	:	NTMWT-300T
e) Working Frequency	:	640~664 MHz
f) Power Supply	:	1.2V(Ni-MH) x 2 AA type rechargeable batteries / 1.5V x 2 AA Alkaline disposable

Regulation Applied: FCC Rules and Regulations Part 74 Subpart H

I HEREBY CERTIFY THAT; The data shown in th is report were m ade 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 22, 2012

Test Engineer : 
(Vincent Chang, Engineer)

Approve & Authorized Signer : 

S. S. Liou, Section Manager
EMC Dept. II of ELECTRONICS
TESTING CENTER, TAIWAN

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1. GENERAL INFORMATION

1.1 Product Description

a) Type of EUT	:	Tour Guide System
b) Trade Name	:	OKAYO
c) Model No.	:	WT-300T
d) FCC ID	:	NTMWT-300T
e) Working Frequency	:	640~664 MHz
f) Power Supply	:	1.2V(Ni-MH) x 2 AA type rechargeable batteries / 1.5V x 2 AA Alkaline disposable
g) Emission Designator	:	40K0F3E 2M+2DK=2x(9kHz)+2x(11kHz)x1=40 kHz

1.2 Test Methodology

Both conducted and radiated testing were perform ed according to the procedures in chapter 13 of ANSI C63.4 (2003). Test al so follow "TIA-603-C(2004)-Land Mobile FM or PM Com munications Equipment Measurement and Perform ance 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 m easurement facility used to collect the radiated data is located on the roof top of Building at NO.34, LIN 5, DINGFU TSUEN, LINKOU SHIANG TAIPEI COUNTY, TAIWAN, 24442, R.O.C.

This site has been fully described in a re port submitted to your office, and accepted in a letter dated Jun. 11, 2011.

2. REQUIREMENTS OF PROVISIONS

2.1 Definition

Intentional radiator:
A device that intentionally generates and em its 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 Com munication Equipm ent, a curve or equivalent data showing the frequency response of the a udio modulating circuit over a range of 100 to 5000 Hz shall be submitted.

(3) Occupied Bandwidth
For radiotelephone transm itter, other than single sideband or indenpent sideband transmitter, when m odulateed 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 gene rated within the equipm ent and appearing on a spurious frequency shall be checked at the equipm ent output term inal when properly loaded with a suitable artificial antenna.

(5) Field Strength of Spurious Emissions

Measurements shall be m ade to detect spurious em ission that m ay be radiated directly from the cabinet, control circuits , power leads, or interm ediate circuit elements under normal condition of installation and operation.

(6) Frequencies Tolerance

a) The frequency stability shall be m easured 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 identif ication plate or label pursuant to § 2.925 （ Identification of equipment） and §2.926（FCC identifier）.

3. OUTPUT POWER MEASUREMENT

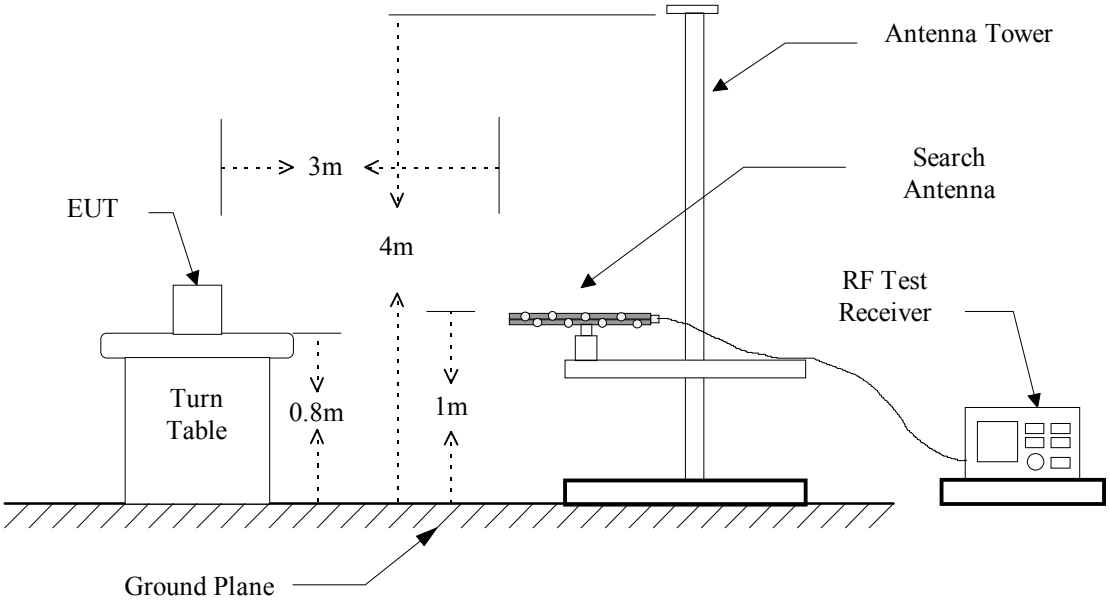
3.1 Provision Applicable

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

3.2 Measurement Procedure

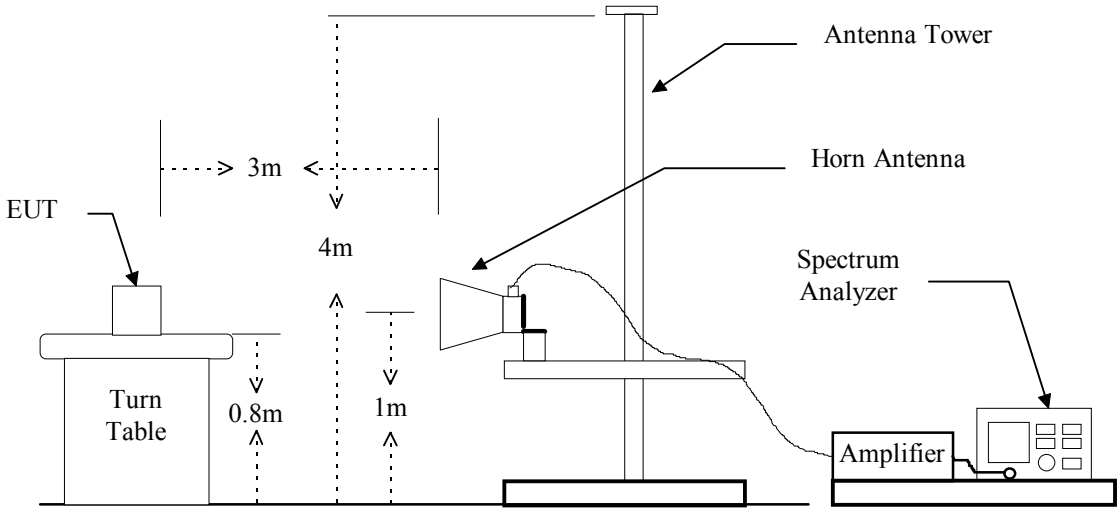
1. Setup the configuration per figure 1 and 2 for frequencies measured below and above 1 GHz respectively, adjusting the input voltage to produce the maximum power.
2. Adjust the analyzer for each frequency m easured in chapter 6 on a 1 MHz frequency span and 1MHz resolution bandwidth.
3. The search antenna is to be raised and lowered over a range from 1 to 4 m eters in horizontally polarized orientation. Positi on 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 sam e polarized orientation with search antenna. Connect th e 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 spect rum 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

Band 640 – 664MHz

Operated mode : TX
Temperature : 25 °C
Test Date : May 09, 2012
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)
640.1	83.2	12.1	2.4	----	9.7	9.333	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
652.4	83.0	11.6	2.4	----	9.2	8.318	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
663.9	82.5	11.9	2.3	----	9.6	9.120	250

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 ante nna 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	2012/04/26	2013/04/26
Dipole Antenna	Schwarzbeck	897;898	2011/09/08	2012/09/07
Log-periodic Antenna	EMCO	3146	2011/11/04	2012/11/03
Amplifier HP		8447D	2011/05/27	2012/05/26
Signal generator	HP	83732B	2011/12/09	2012/12/08

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.

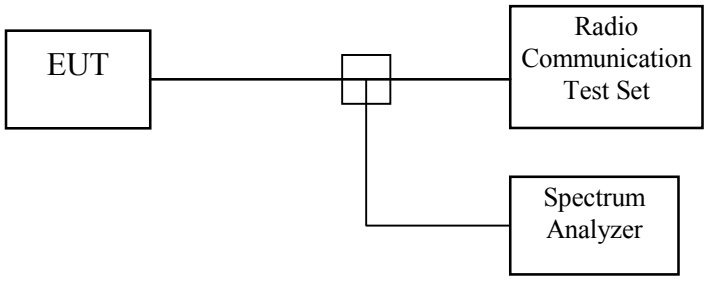
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

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

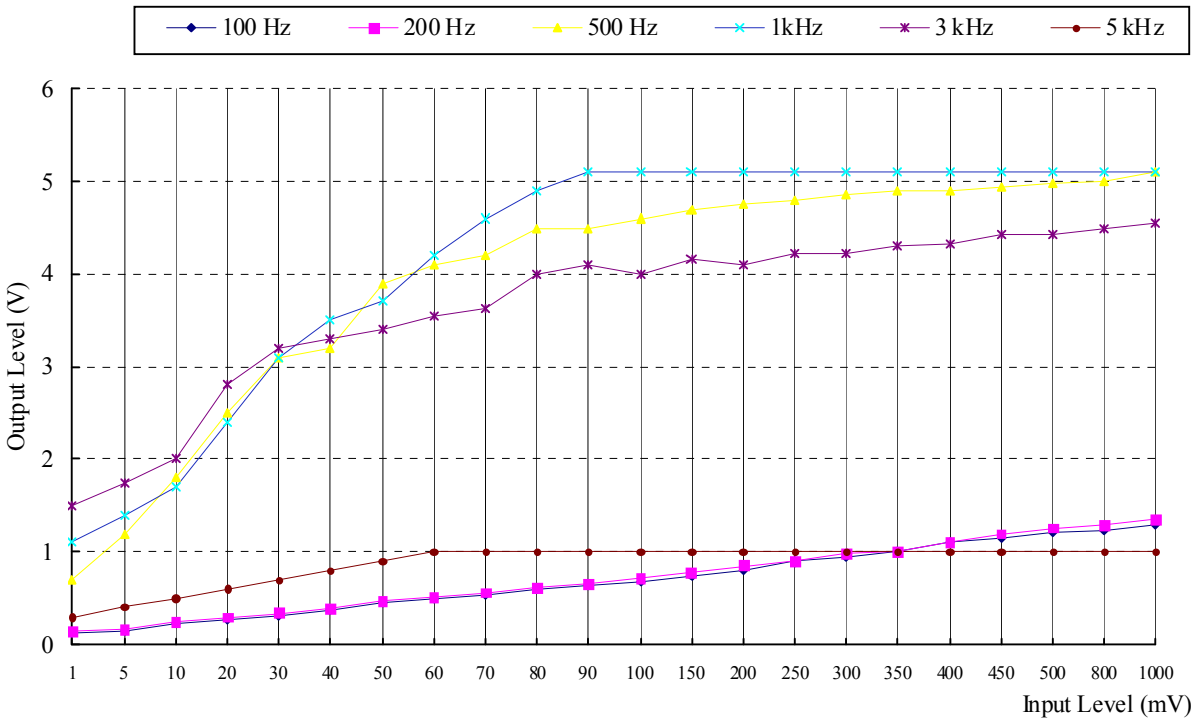
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX 2945B		2012/05/04	2013/05/07
Spectrum Analyzer	Rohde & Schwarz	FSP40	2011/09/21	2012/09/20

4.4 Measurement Result

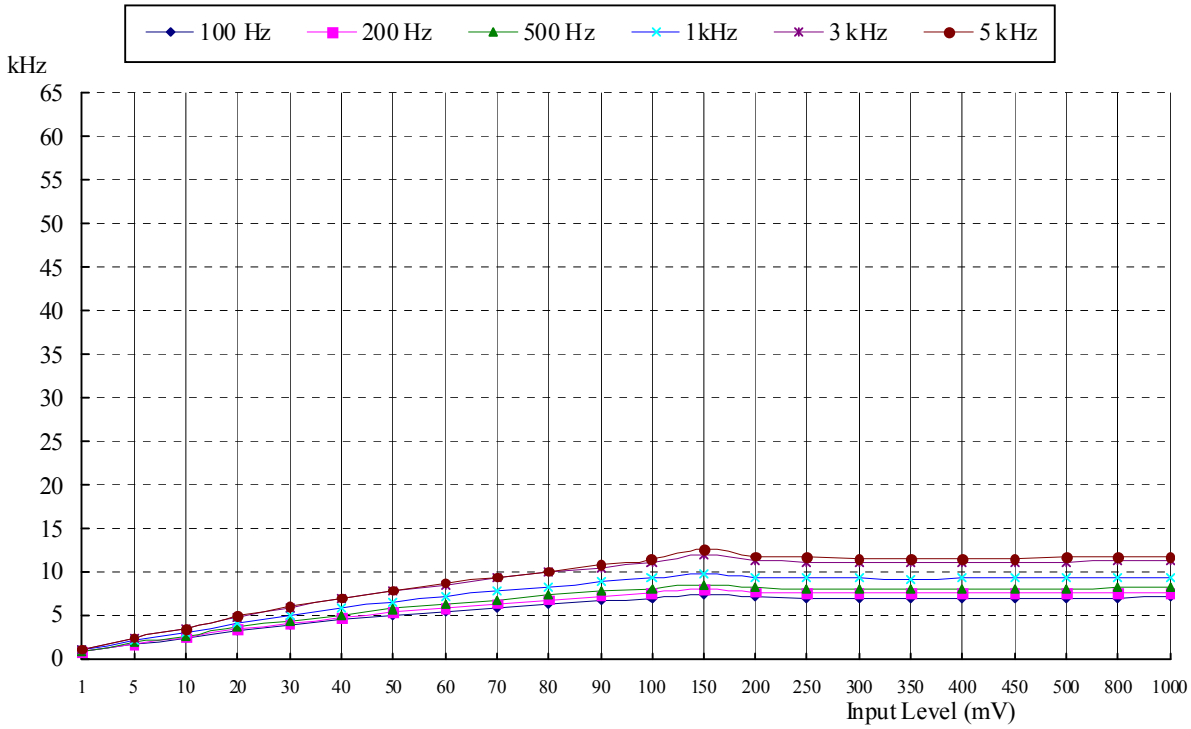
RF Frequency : 640.1MHz;

Test Date : May 09, 2012 Temperature : 25 °C Hum idity : 65 %

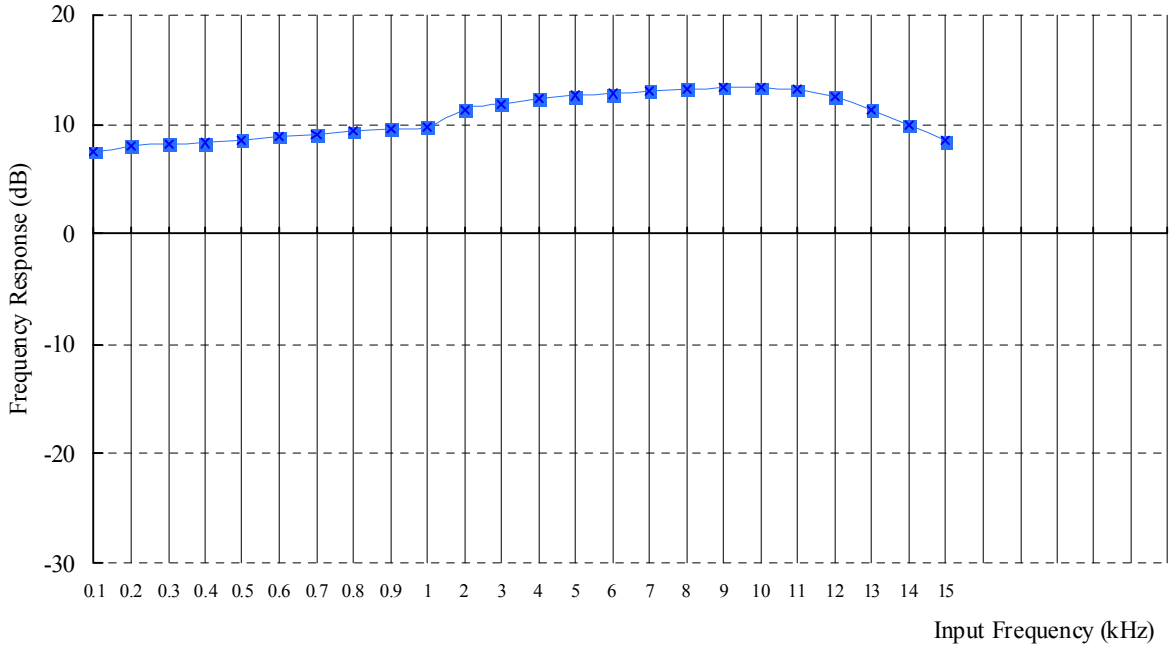
A). Frequency response



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 transm itter, other than single sideband or indenpent sideband transm itter, when m odulateed 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.

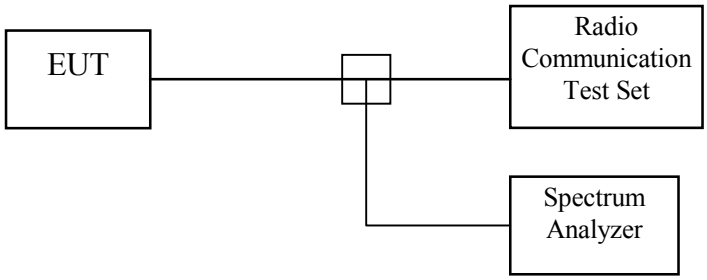
5.2 Measurement Method

1. Check the calibration of the m easuring 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 fr equency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

3. Apply a 2.5 kHz m odulation signal to EUT and m easure the frequencies of the modulated signal from the EUT where it is the specified num ber 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		2012/05/04	2013/05/07
Spectrum Analyzer	Rohde & Schwarz	FSP40	2011/09/21	2012/09/20

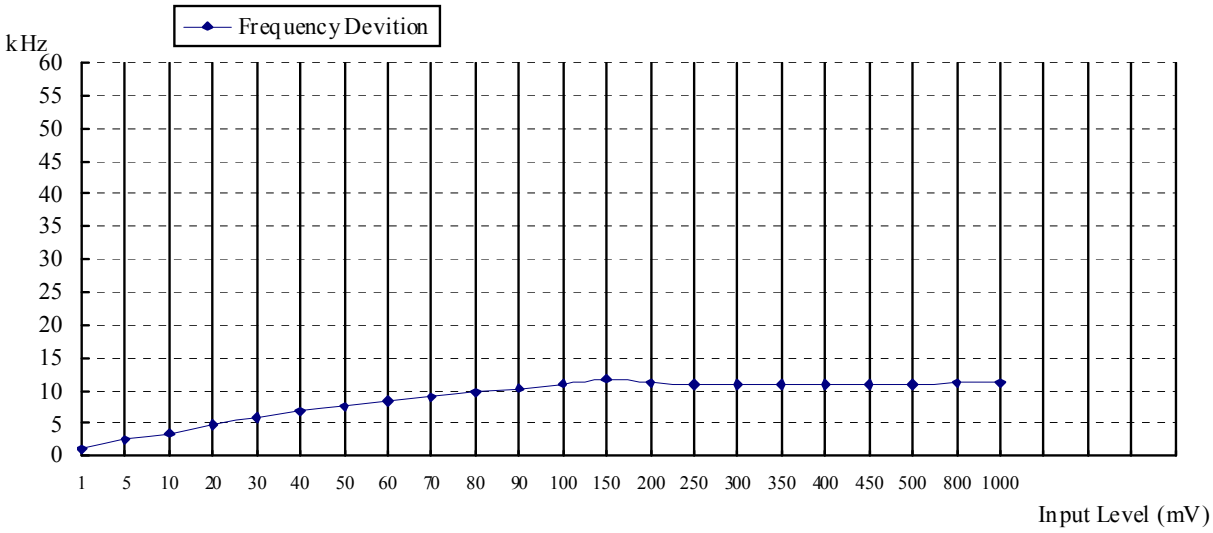
5.4 Bandwidth Measured

5.4.1 Input Level Derived

RF Frequency : 640-664MHz;

Test Date : May. 09, 2012 Temperature : 25 °C Hum idity : 65 %

Input Audio Frequency : 2.5 kHz, Sine Wave

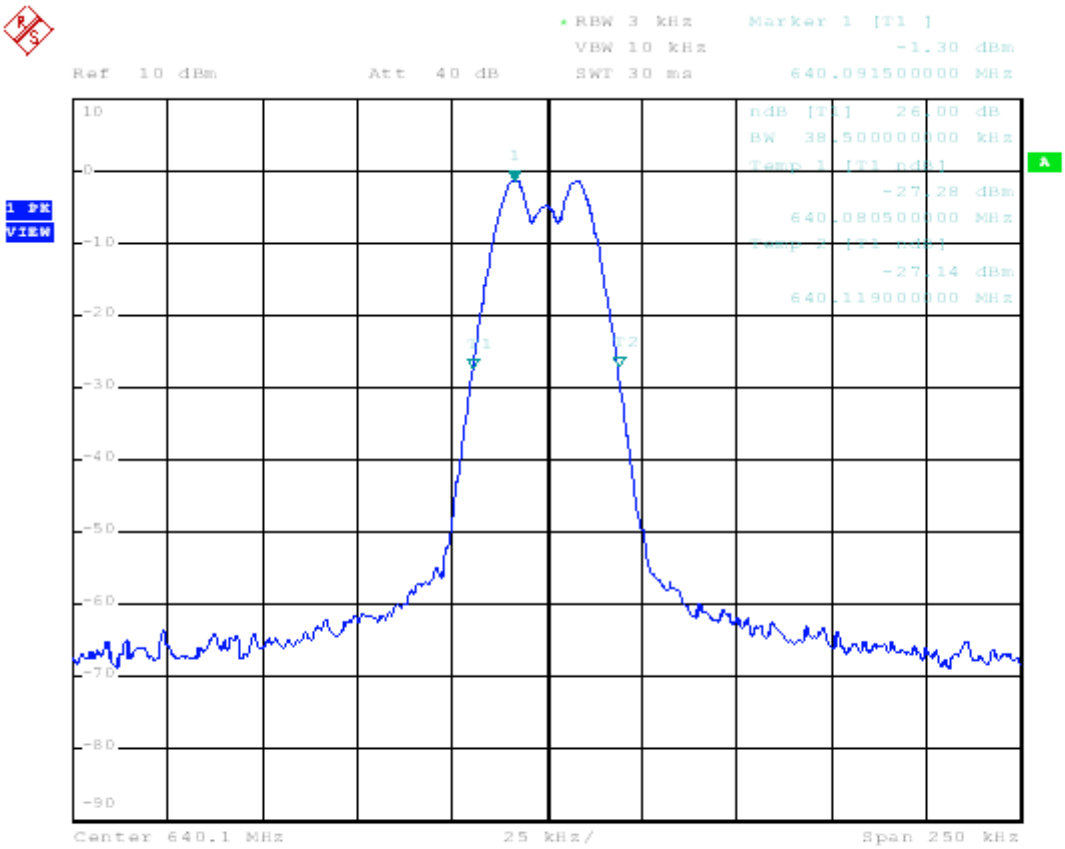


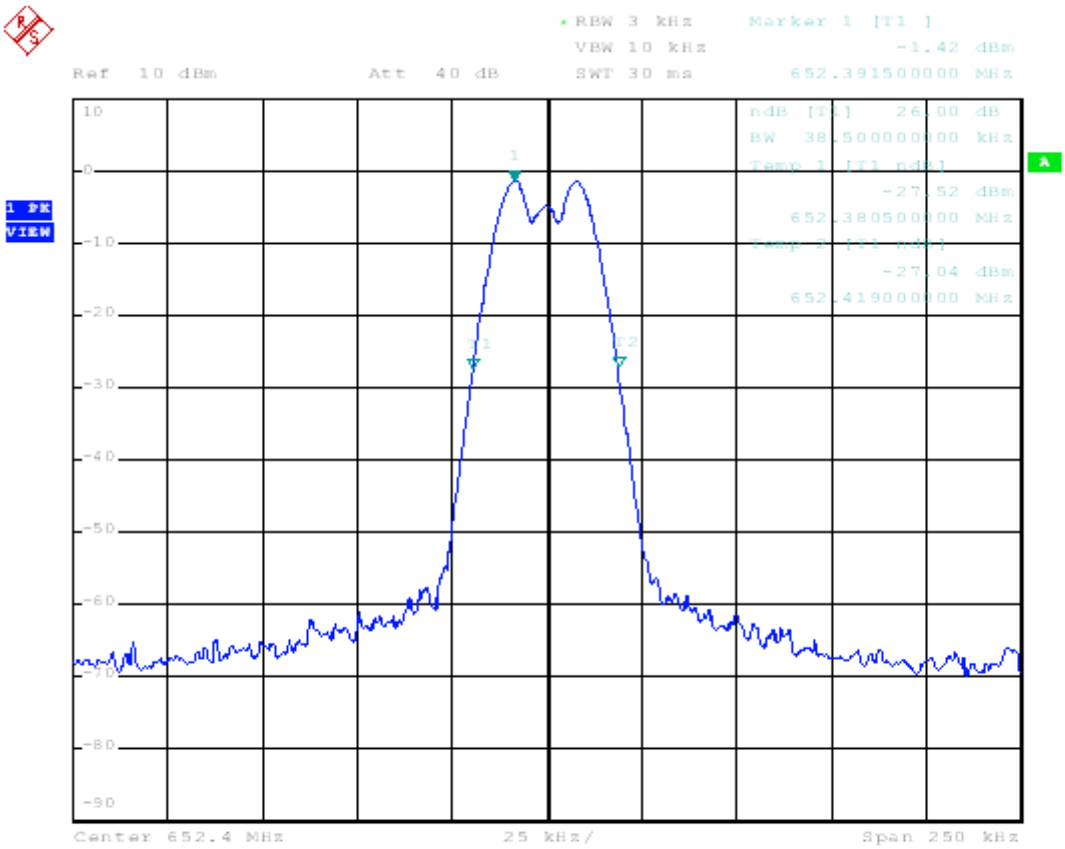
The Level input to produce 50% modulation is 60 mV, therefore the magnitude 16 dB greater than it is 378 mV.

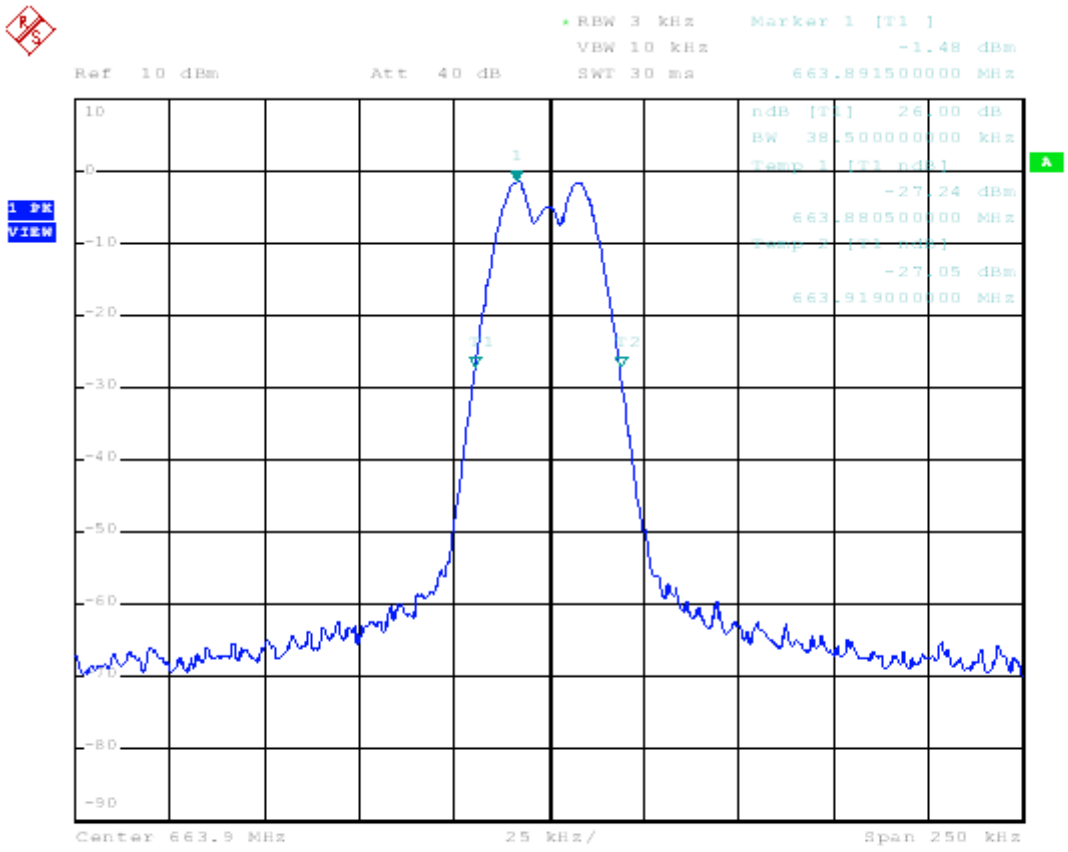
5.4.2 Occupied Bandwidth Plotted

Test Date : May 09, 2012 Temperature : 25 °C Hum idity : 65 %

RF Frequency (MHz)	26 dB Bandwidth (kHz)
640.1 38.5	
652.4 38.5	
663.9 38.5	


RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-1.30 dBm
640.091500000 MHz
Ref 10 dBm
Att 40 dB
ndB [T1] 26.00 dB
BW 38.500000000 kHz
-27.28 dBm
640.080500000 MHz
-27.14 dBm
640.119000000 MHz
1 PK
VIEW
A
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 640.1 MHz
25 kHz/
Span 250 kHz


RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-1.42 dBm
652.391500000 MHz
Ref 10 dBm
Att 40 dB
ndB [T1] 26.00 dB
BW 38.500000000 kHz
Temp 1 [T1 ndB]
-27.52 dBm
652.380500000 MHz
Temp 2 [T1 ndB]
-27.04 dBm
652.419000000 MHz
1 PK VIEW
A
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 652.4 MHz
25 kHz/
Span 250 kHz


RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Marker 1 [T1]
-1.48 dBm
663.891500000 MHz
Ref 10 dBm
Att 40 dB
ndB [T1] 26.00 dB
BW 38.500000000 kHz
-27.24 dBm
663.880500000 MHz
-27.05 dBm
663.919000000 MHz
1 PK
VIEW
A
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 663.9 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 half wave 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	2011/09/21	2012/09/20
Double Ridged Antenna	EMCO	3115	2011/05/30	2012/05/29
Double Ridged Antenna	EMCO	3115	2011/05/30	2012/05/29
Log-periodic Antenna	EMCO	3146	2011/11/04	2012/11/03
Biconical Antenna	EMCO	3110	2011/11/04	2012/11/03
Dipole Antenna	Schwarzbeck	897;898	2011/08/24	2012/08/23
Amplifier HP		8449B	2011/12/28	2012/12/27
Amplifier HP		8447D	2011/05/27	2012/05/26
Signal generator	HP	83732B	2011/08/22	2012/08/21

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: 640.1MHz

Operated mode : TX Test Date :May 09, 2012
Temperature : 25 °C Humidity : 65 %

Unmodulated carrier output power is 9.7 dBm , or 9.333 mW (ERP).
The limit of spurious or harmonics is calculated as following :

9.7-[43+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)
1280.200	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
1920.300	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2560.400	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
3200.500	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
3840.600	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
4480.700	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
5120.800	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
5760.900	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
6401.000	---	---	---	---	12.1	-2.0	2.60	---	---	-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 ante nna other than dipole to convert radiated power to ERP.
4. Spurious or harm onics above 1 GHz is too lo w to be detected or attenuated m ore than 60 dB from limit value.

b. Tx Frequency: 652.4 MHz

Operated mode : TX Test Date :May 09, 2012
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 :

9.3-[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)
1304.800	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
1957.200	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2609.600	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
3262.000	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
3914.400	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
4566.800	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
5219.200	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
5871.600	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
6524.000	---	---	---	---	12.1	-2.0	2.60	---	---	-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 ante nna other than dipole to convert radiated power to ERP.
4. Spurious or harm onics above 1 GHz is too lo w to be detected or attenuated m ore than 60 dB from limit value.

c. Tx Frequency: 663.9MHz

Operated mode : TX Test Date :May 09, 2012
Temperature : 25 °C Humidity : 65 %

Unmodulated carrier output power is 9.6 dBm , or 9.120 mW (ERP).
The limit of spurious or harmonics is calculated as following :

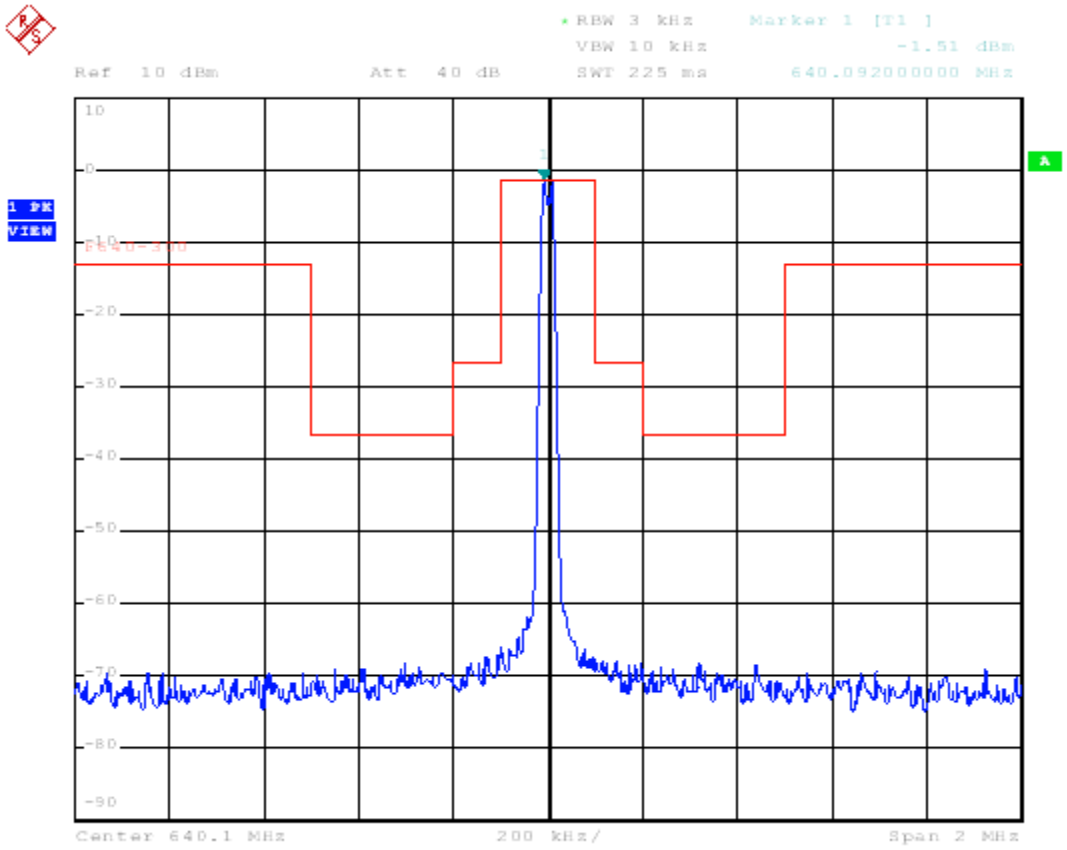
9.6-[43+10log(carrier output power in W)], or -13dBm

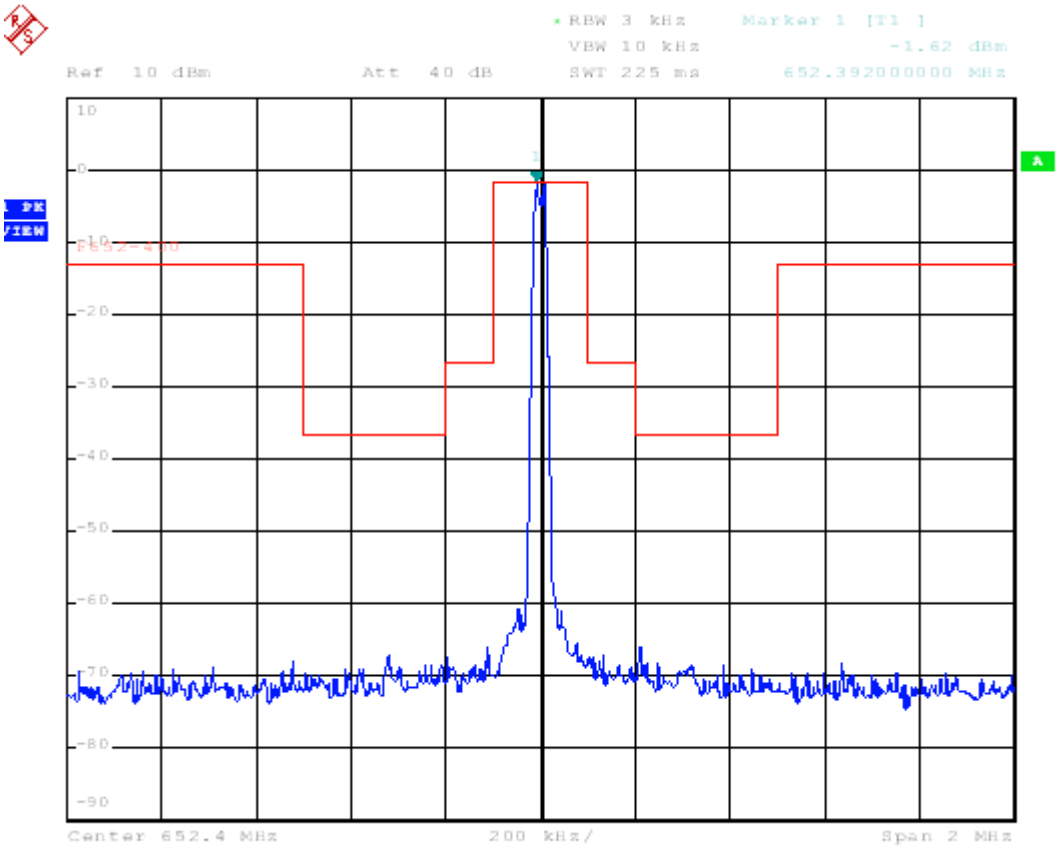
Frequency (MHz)	Meter Reading (dBuV) H	V	SG Reading (dBm) H	V	Antenna Gain	Antenna Gain Corr'	Cable Loss (dB)	Result (dBm) H	V	Limit (dBm)	Margin (dB)
1327.800	---	--- --- ---			6.4	-2.0	1.30	---	---	-13.0	---
1991.700	---	--- --- ---			9.3	-2.0	1.75	---	---	-13.0	---
2655.600	---	--- --- ---			9.2	-2.0	1.75	---	---	-13.0	---
3319.500	---	--- --- ---			9.7	-2.0	1.75	---	---	-13.0	---
3983.400	---	--- --- ---			9.6	-2.0	2.10	---	---	-13.0	---
4647.300	---	--- --- ---			10.6	-2.0	2.10	---	---	-13.0	---
5311.200	---	--- --- ---			10.9	-2.0	2.10	---	---	-13.0	---
5975.100	---	--- --- ---			10.9	-2.0	2.60	---	---	-13.0	---
6639.000	---	--- --- ---			12.1	-2.0	2.60	---	---	-13.0	---

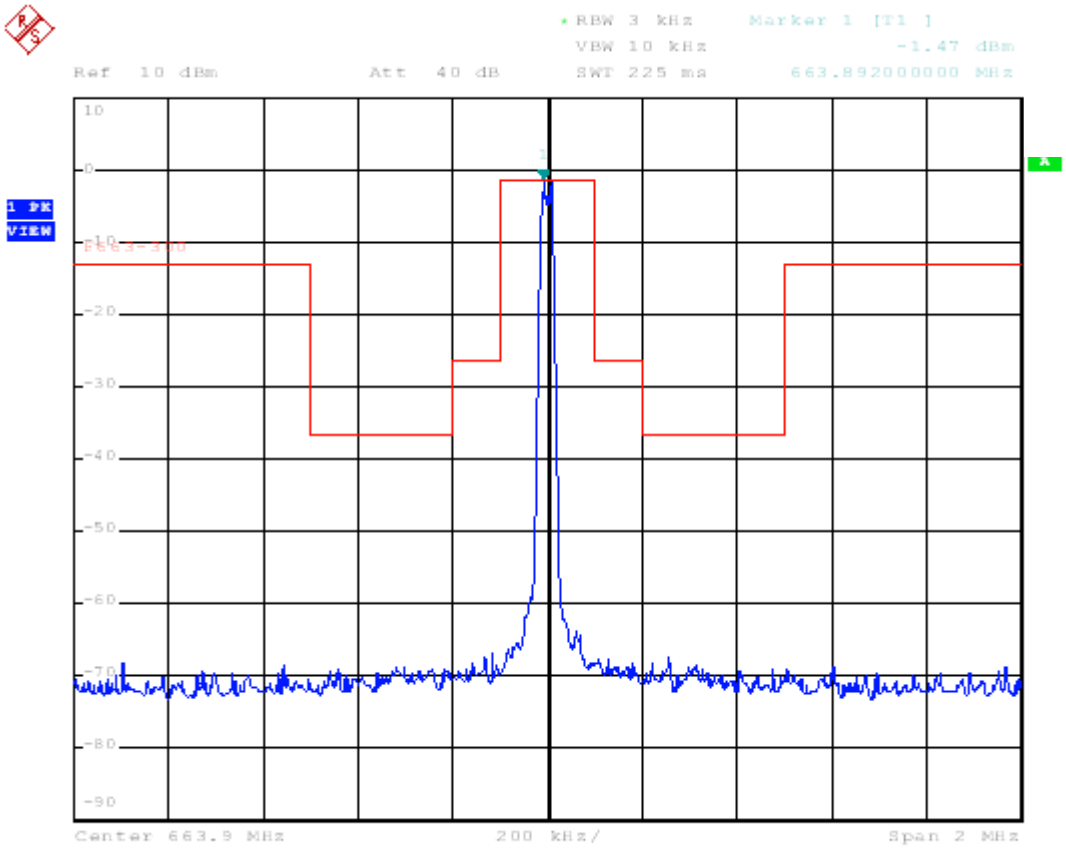
Note :

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 ante nna other than dipole to convert radiated power to ERP.
4. Spurious or harm onics above 1 GHz is too lo w to be detected or attenuated m ore than 60 dB from limit value.

6.4.2 Emission mask plots




RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-1.62 dBm
652.392000000 MHz
Ref 10 dBm
Att 40 dB
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
A
Center 652.4 MHz
200 kHz/
Span 2 MHz


RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-1.47 dBm
663.892000000 MHz
Ref 10 dBm
Att 40 dB
1 PK
VIEW
A
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
Center 663.9 MHz
200 kHz/
Span 2 MHz

6.5 Other Emission

a) Emission frequencies below 1 GHz

Test Date : May 09, 2012 Temperature : 25 °C Hum idity : 65 %

Frequency (MHz)	Ant-Pol H/V	Meter Reading (dBuV)	Corrected Factor (dB)	Result @3m (dBuV/m)	Limit @3m (dBuV/m)	Margin (dB)	Table Degree (Deg.)	Ant. High (m)
41.15	V	6.5	13.3	19.8	40.0	-20.2	165	1.0
125.14	V	8.0	12.8	20.8	43.5	-22.7	178	1.0
149.28	V	7.2	14.1	21.3	43.5	-22.2	182	1.0
175.83	V	7.9	14.8	22.7	43.5	-20.8	174	1.0
238.14	V	6.1	19.4	25.5	46.0	-20.5	175	1.0
245.24	V	6.4	20.0	26.4	46.0	-19.6	192	1.0

Note :

1. Remark "---" means that the emissions level is too low to be measured.
2. The expanded uncertainty of the radiated emission tests is 3.53 dB.

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.

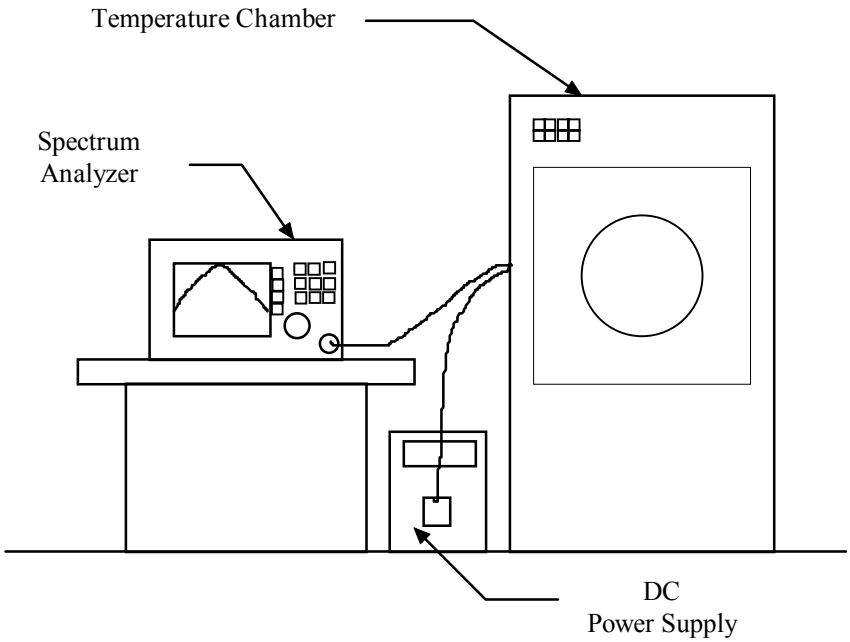
B) Frequency stability versus input voltage

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 fre quency needs to be m easured. Then set SA RBW to 30 kHz, VBW to 100kHz and freque ncy 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	2011/09/21	2012/09/20
Temperature Chamber	MALLIER	MCT-2X-M	2012/05/03	2013/05/03

7.4 Measurement Data

Test Date : May 09, 2012 Temperature : 25 °C Hum idity : 65 %

A. Tx Frequency 640.1MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :640.1 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0Vdc	640.1218	0.00340	640.0928	-0.00113	640.1102	0.00160
40		640.1035	0.00055	640.0778	-0.00347	640.1145	0.00227
30		640.0866	-0.00209	640.0763	-0.00370	640.0987	-0.00020
20		640.0766	-0.00366	640.0939	-0.00095	640.0907	-0.00145
10		640.0876	-0.00194	640.0915	-0.00133	640.0963	-0.00058
0		640.1033	0.00051	640.1192	0.00301	640.0856	-0.00225
-10		640.1188	0.00294	640.1065	0.00101	640.1098	0.00153
-20		640.0860	-0.00219	640.0796	-0.00319	640.1200	0.00313
-30		640.0803	-0.00307	640.1041	0.00064	640.0857	-0.00223

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

Reference Frequency : 640.1 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.55	640.1129	0.00202	640.0919	-0.00127	640.0800	-0.00313
25	3.45	640.0820	-0.00281	640.0864	-0.00212	640.0970	-0.00047

Test Date : May 09, 2012 Temperature : 25 °C Hum idity : 65 %

B. Tx Frequency 652.4MHz

B1. Frequency stability versus enviroment tempture

Reference Frequency : 652.4MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0Vdc	652.4093	0.00143	652.3801	-0.00306	652.4210	0.00322
40		652.3990	-0.00016	652.4248	0.00381	652.4169	0.00259
30		652.4251	0.00384	652.3952	-0.00074	652.4180	0.00276
20		652.3797	-0.00311	652.3769	-0.00354	652.3970	-0.00046
10		652.4206	0.00316	652.3818	-0.00279	652.3944	-0.00085
0		652.4105	0.00160	652.3888	-0.00171	652.3784	-0.00331
-10		652.4110	0.00169	652.4063	0.00097	652.4215	0.00329
-20		652.4147	0.00225	652.3849	-0.00231	652.3805	-0.00299
-30		652.4199	0.00305	652.3863	-0.00210	652.3982	-0.00028

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

Reference Frequency : 652.4MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.55	652.4239	0.00366	652.3854	-0.00224	652.3917	-0.00127
25	3.45	652.4004	0.00006	652.3904	-0.00148	652.4084	0.00129

Test Date : May 09, 2012 Temperature : 25 °C Hum idity : 65 %

C. Tx Frequency 663.9MHz

C1. Frequency stability versus enviroment tempture

Reference Frequency : 663.9 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0Vdc	663.8814	-0.00281	663.9013	0.00020	663.9022	0.00033
40		663.9198	0.00298	663.9191	0.00288	663.9190	0.00287
30		663.8912	-0.00133	663.8949	-0.00076	663.8973	-0.00041
20		663.9033	0.00050	663.8995	-0.00008	663.9186	0.00280
10		663.9099	0.00149	663.9252	0.00379	663.8867	-0.00200
0		663.9131	0.00198	663.9233	0.00351	663.9120	0.00181
-10		663.8932	-0.00102	663.8870	-0.00195	663.8855	-0.00219
-20		663.9051	0.00077	663.8886	-0.00172	663.9098	0.00148
-30		663.8746	-0.00383	663.9100	0.00151	663.8844	-0.00234

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

Reference Frequency : 663.9 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.55	663.8882	-0.00177	663.9055	0.00083	663.9040	0.00061
25	3.45	663.9236	0.00356	663.8839	-0.00243	663.8934	-0.00099

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.