FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : UHF PLL Mono In Ear Monitoring System (Transmitter)
FCC ID. : INGSIEM-2T
Model No. : SIEM-2T
Working Frequency : 502~607.875, 674~697.875 MHz

for

APPLICANT : JTS Professional Co., Ltd.
ADDRESS : NO. 148, 9th Industry Road, Ta-Li Industrial Park
Ta-Li City, 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 : 11-05-RBF-139-01

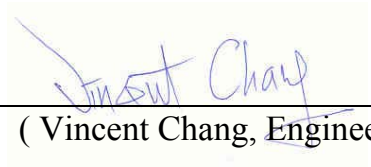
TEST REPORT CERTIFICATION

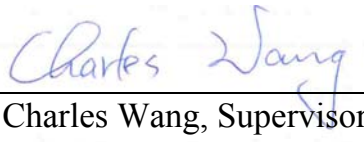
Applicant	:	JTS Professional Co., Ltd. NO. 148, 9th Industry Road, Ta-Li Industrial Park Ta-Li City, Taiwan, R.O.C.
Manufacturer	:	JTS Professional Co., Ltd. NO. 148, 9th Industry Road, Ta-Li Industrial Park Ta-Li City, Taiwan, R.O.C.
Description of EUT	:	
a) Type of EUT	:	UHF PLL Mono In Ear Monitoring System (Transmitter)
b) Trade Name	:	JTS
c) Model No.	:	SIEM-2T
d) FCC ID	:	INGSIEM-2T
e) Working Frequency	:	502~607.875, 674~697.875 MHz
f) Power Supply	:	I/P: 100-240Vac 50-60Hz 0.2A; O/P: 12Vdc 0.5A

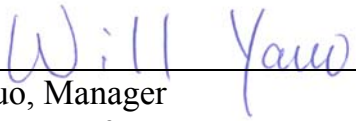
Regulation Applied : FCC Rules and Regulations Part 74 Subpart H

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 : Nov. 03, 2011

Test Engineer : 
(Vincent Chang, Engineer)

Check By : 
(Charles Wang, Supervisor)

Approve & Authorized : 
Will Yauo, 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 PLL Mono In Ear Monitoring System (Transmitter)
b) Trade Name	:	JTS
c) Model No.	:	SIEM-2T
d) FCC ID	:	INGSIEM-2T
e) Working Frequency	:	502~607.875, 674~697.875 MHz
f) Power Supply	:	I/P: 100-240Vac 50-60Hz 0.2A; O/P: 12Vdc 0.5A
g) Emission Designator	:	109KF3E 2M+2DK=2x(18kHz)+2x(36.6kHz)x1=109.2kHz

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

This site has been fully described in a report 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 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 2 : Frequencies measured below 1 GHz configuration

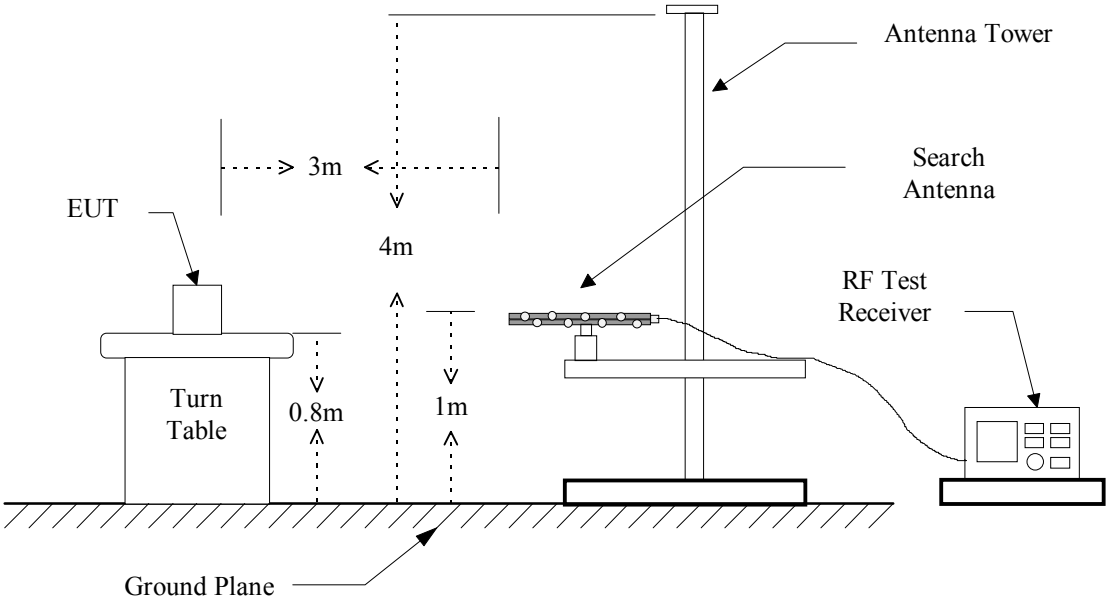
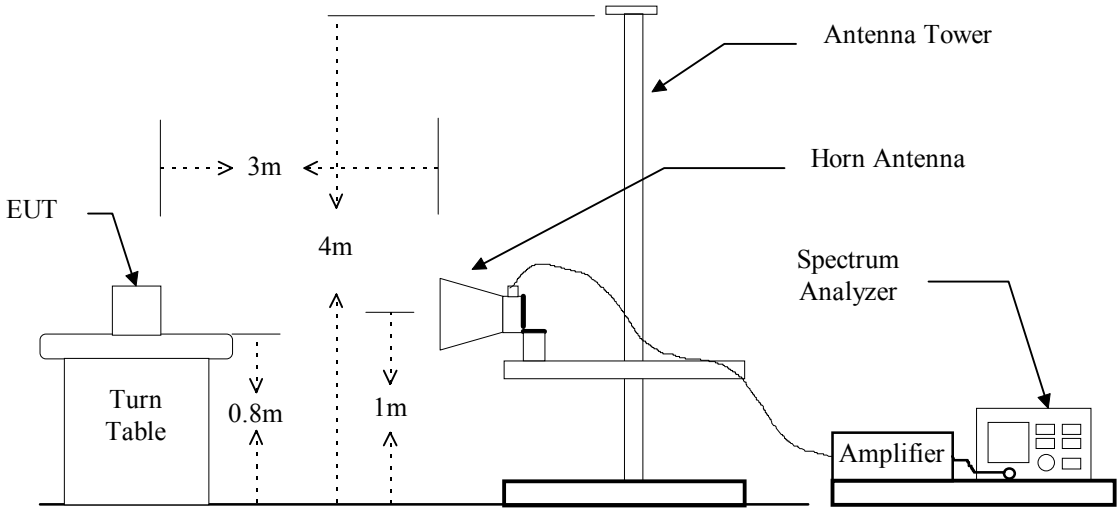


Figure 1 : Frequencies measured above 1 GHz configuration



3.3 Test Data

Band 502 – 697.875MHz

Operated mode : TX
Test Date : Jul. 08, 2011
Temperature : 28 °C
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)
502	80.2	7.3	2	----	5.3	3.388	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
526	79.5	6.7	2	----	4.7	2.951	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
607.875	78.8	8.5	2.2	----	6.3	4.266	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
674	77.2	7.3	2.3	----	5.0	3.162	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
697.875	76.8	7.2	2.3	----	4.9	3.090	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 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	2011/05/09	2012/05/07
Dipole Antenna	Schwarzbeck	897;898	2010/09/03	2011/09/02
Log-periodic Antenna	EMCO	3146	2010/10/11	2011/10/10
Amplifier	HP	8447D	2011/05/27	2012/05/25
Signal generator	HP	8656B	2010/12/09	2011/12/08

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.

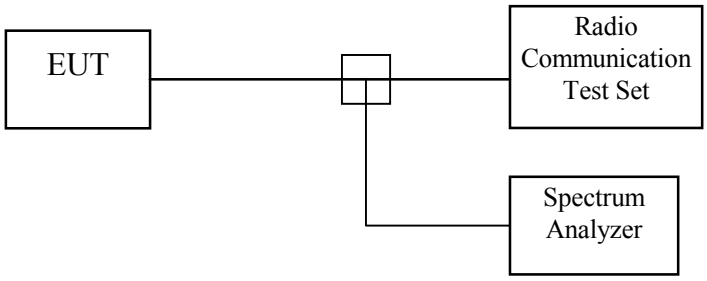
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

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



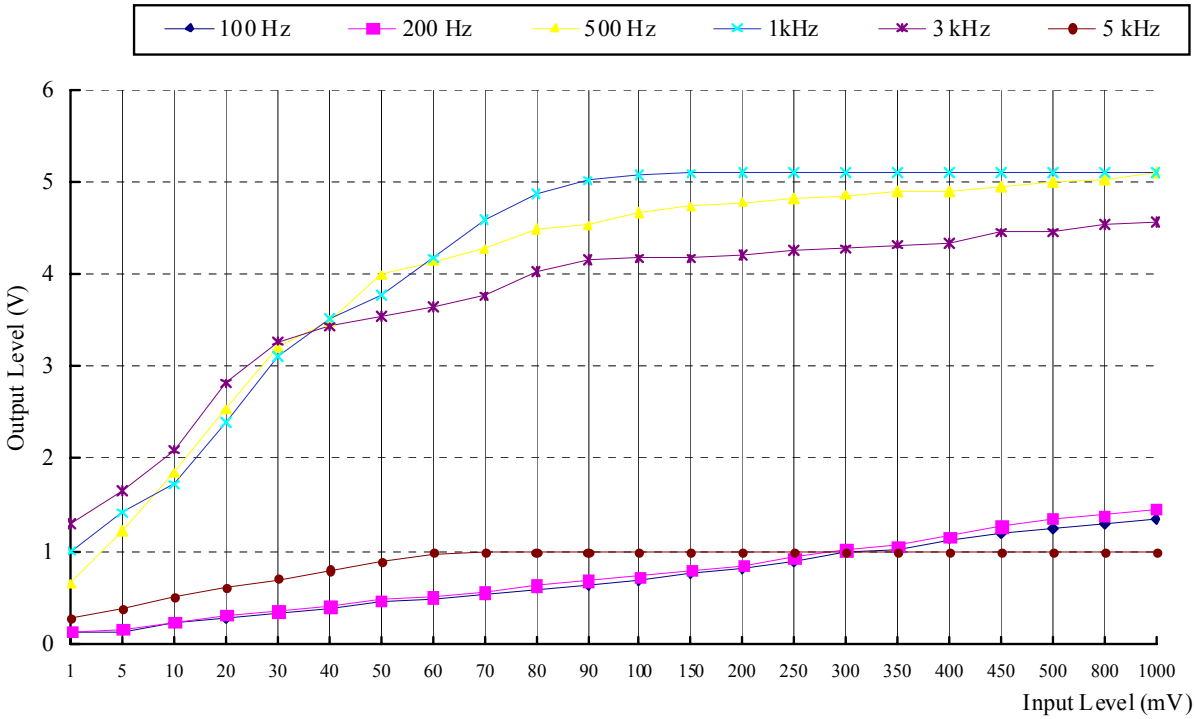
4.3 Measurement Instrument

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2010/12/10	2011/12/09
Spectrum Analyzer	Rohde & Schwarz	FSP40	2010/09/17	2011/09/16

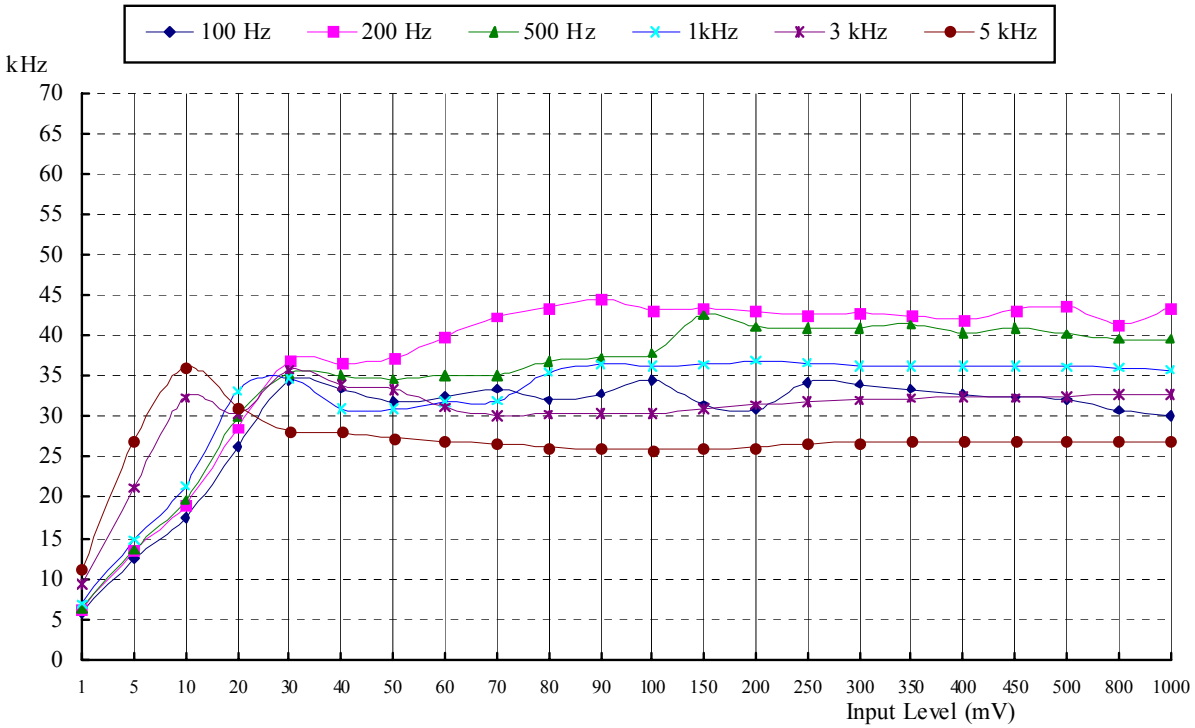
4.4 Measurement Result

1. RF Frequency : 502MHz;

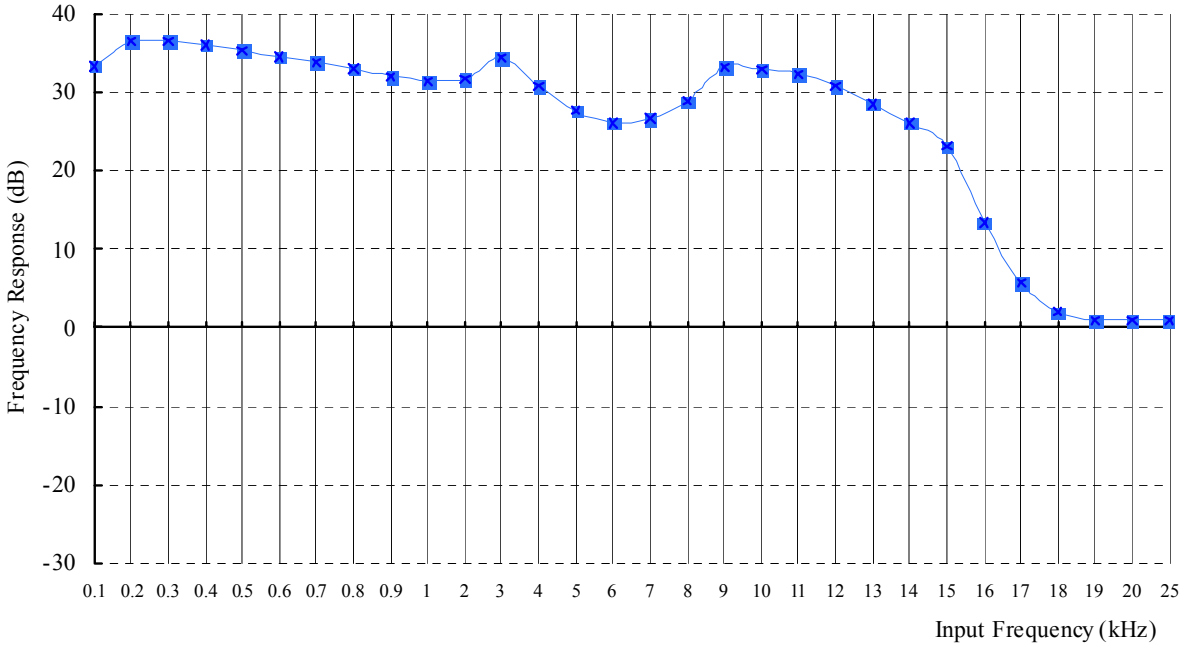
A). Frequency response



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.

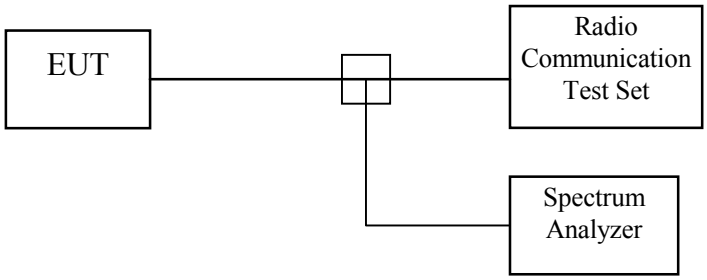
5.2 Measurement Method

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

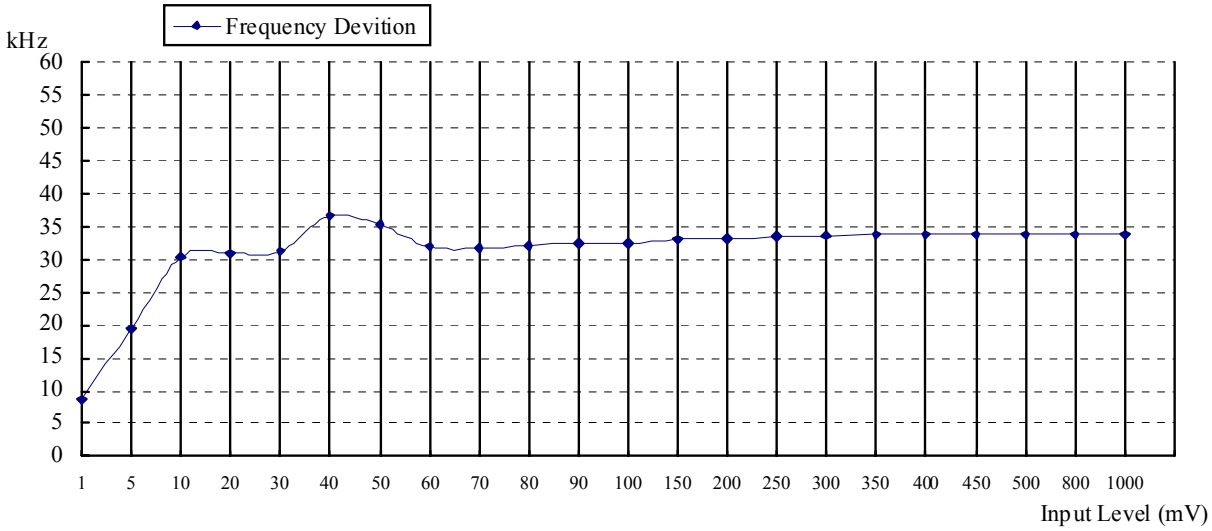
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2010/12/10	2011/12/09
Spectrum Analyzer	Rohde & Schwarz	FSP40	2010/09/17	2011/09/16

5.4 Bandwidth Measured

5.4.1 Input Level Derived

1. RF Frequency : 502MHz;

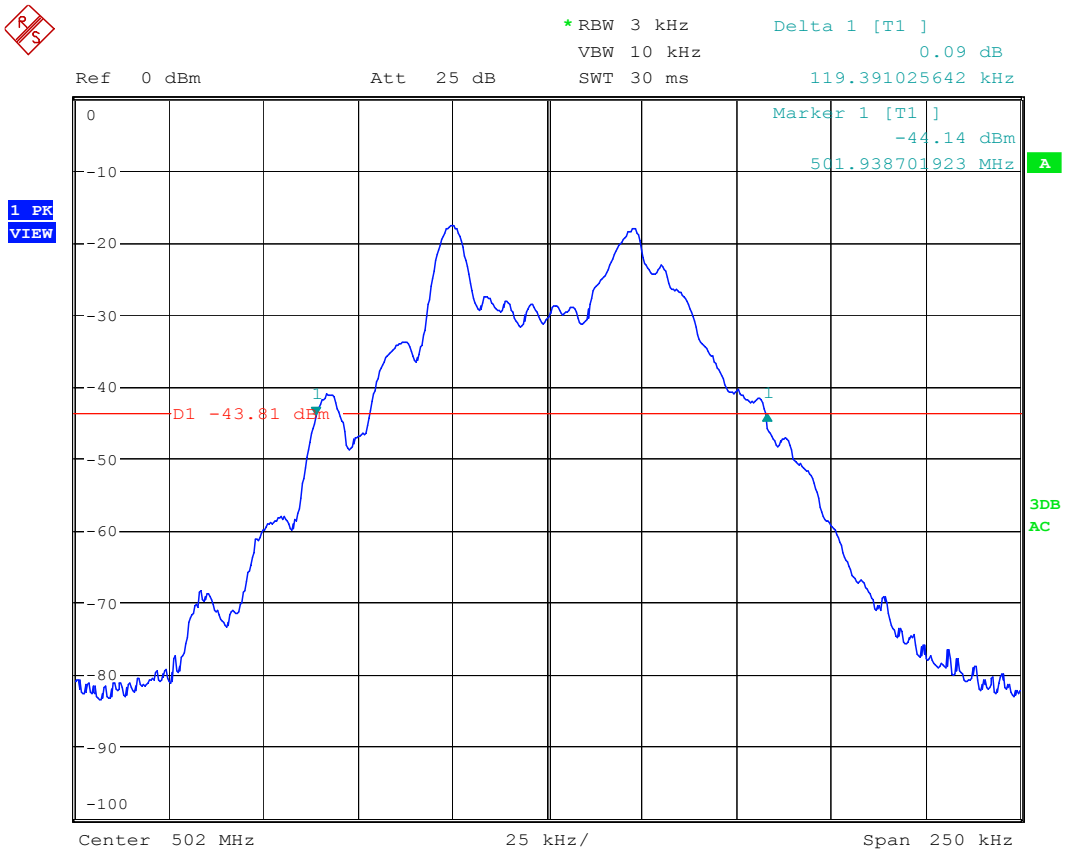
Input Audio Frequency : 2.5 kHz, Sine Wave

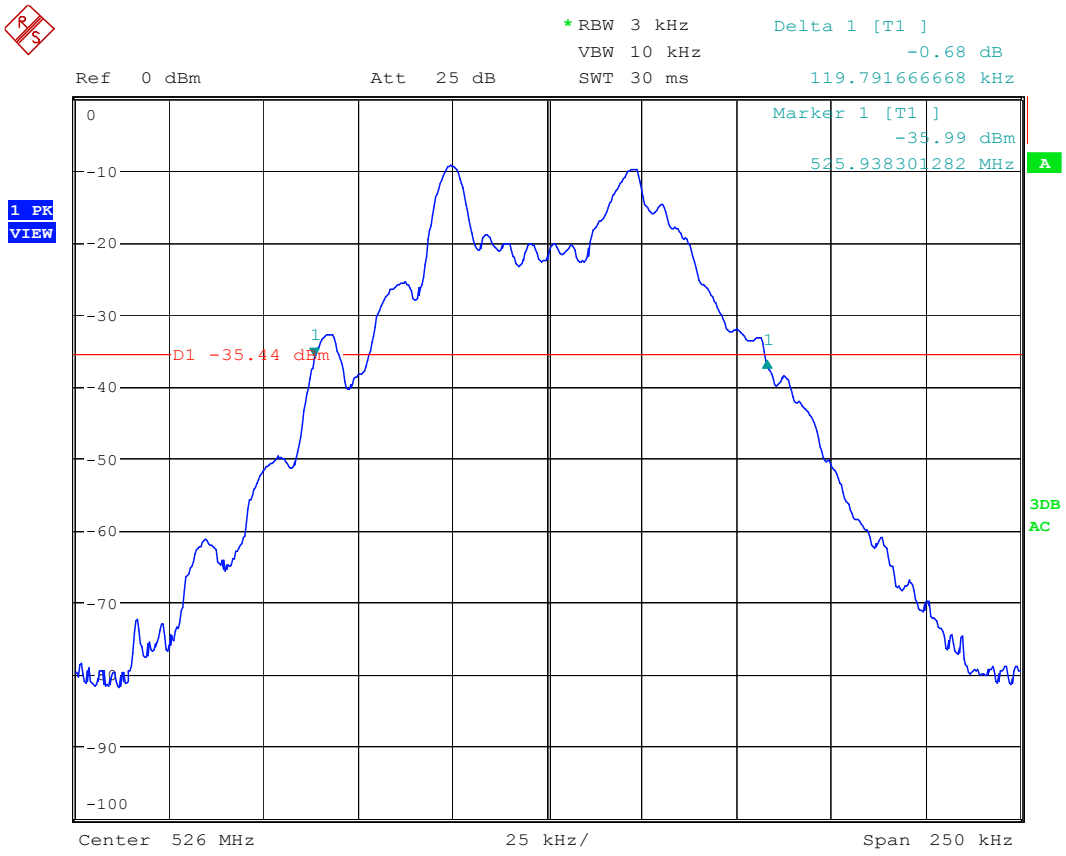


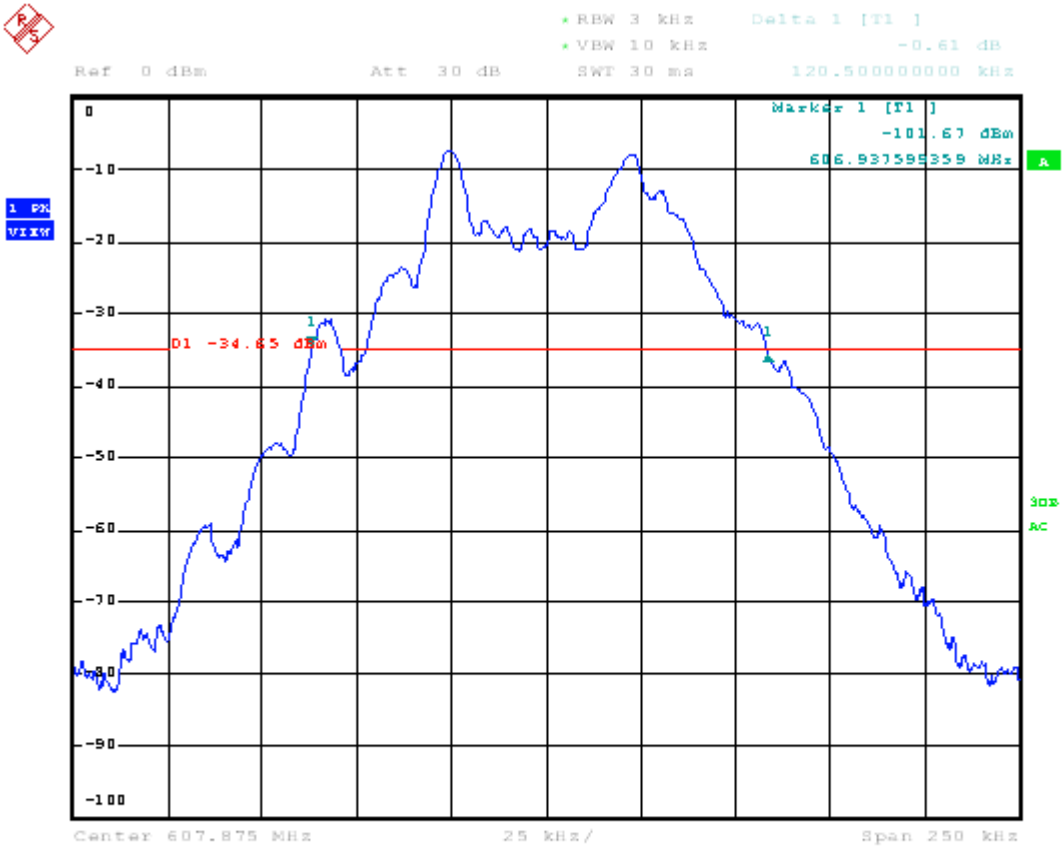
The Level input to produce 50% modulation is 5 mV, therefore the magnitude 16 dB greater than it is 31.5 mV.

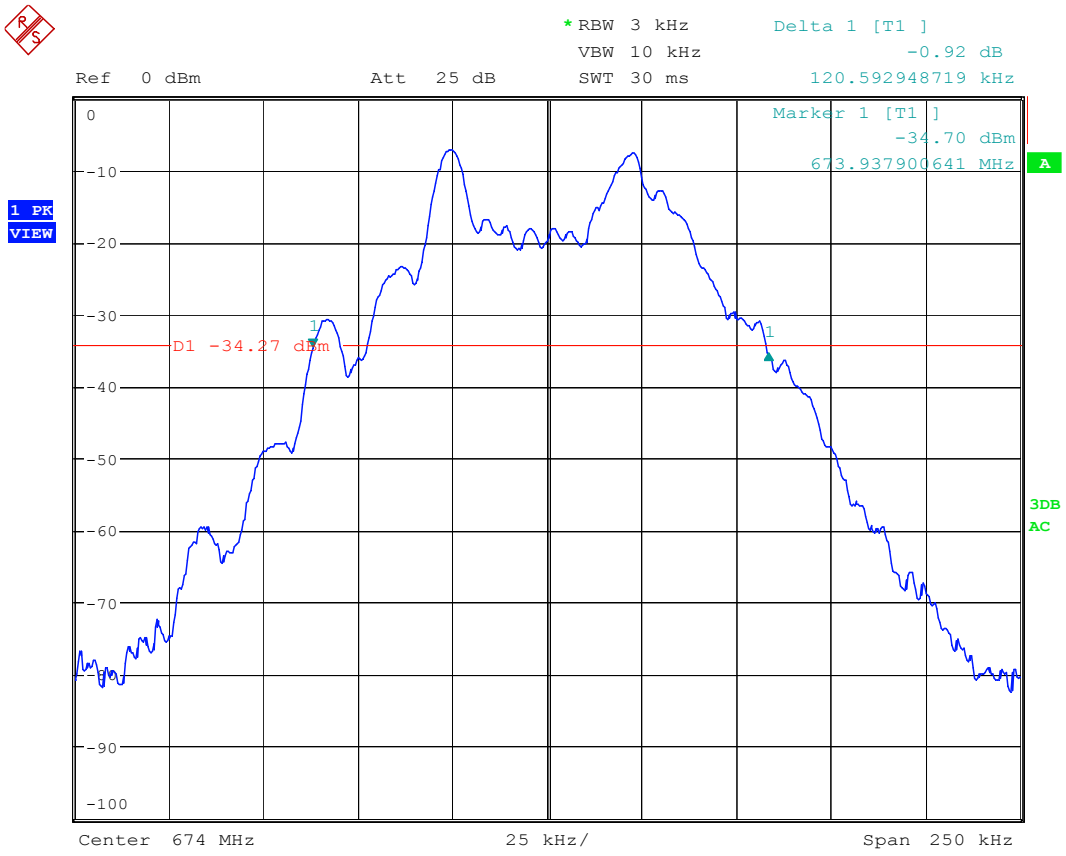
5.4.2 Occupied Bandwidth Plotted

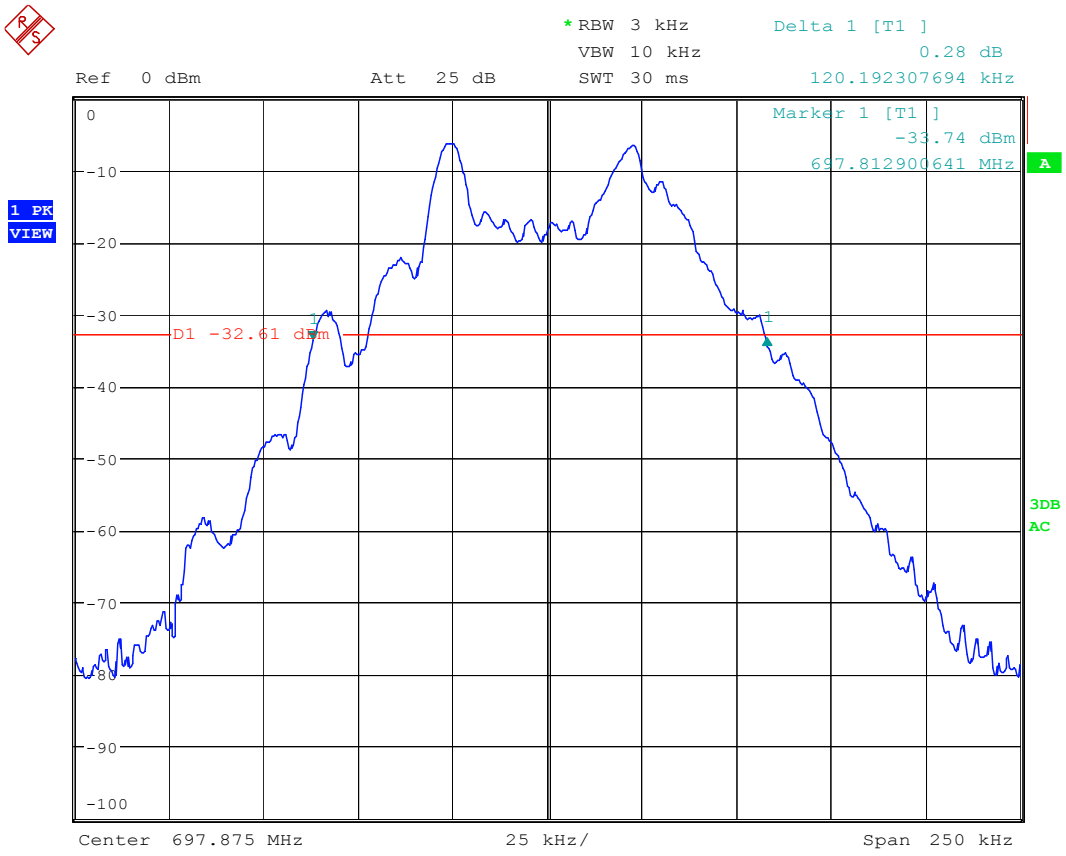
RF Frequency (MHz)	26 dB Bandwidth (kHz)
502	119.391
526	119.792
607.875	120.500
674	120.593
697.875	120.192


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
0.09 dB
119.391025642 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-44.14 dBm
501.938701923 MHz
A
1 PK
VIEW
D1 -43.81 dBm
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 502 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
-0.68 dB
119.791666668 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-35.99 dBm
525.938301282 MHz
A
1 PK
VIEW
D1 -35.44 dBm
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 526 MHz
25 kHz/
Span 250 kHz


RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
-0.61 dB
120.500000000 kHz
Ref 0 dBm
Att 30 dB
Marker 1 [T1]
-101.67 dBm
606.937595359 MHz
D1 -34.65 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 607.875 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
-0.92 dB
120.592948719 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-34.70 dBm
673.937900641 MHz
1 PK
VIEW
A
3DB
AC
D1 -34.27 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 674 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
0.28 dB
120.192307694 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-33.74 dBm
697.812900641 MHz
1 PK
VIEW
A
3DB
AC
D1 -32.61 dBm
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 697.875 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	2010/09/17	2011/09/16
Double Ridged Antenna	EMCO	3115	2011/05/30	2012/05/28
Double Ridged Antenna	EMCO	3115	2011/05/30	2012/05/28
Log-periodic Antenna	EMCO	3146	2010/10/11	2011/10/10
Biconical Antenna	EMCO	3110	2010/10/11	2011/10/10
Dipole Antenna	Schwarzbeck	897;898	2010/09/03	2011/09/02
Amplifier	HP	8449B	2010/12/29	2011/12/28
Amplifier	HP	8447D	2011/05/27	2012/05/25
Signal generator	HP	8656B	2010/12/09	2011/12/08

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: 502MHz

Operated mode : TX
Test Date : Jul. 08, 2011
Temperature : 28 °C
Humidity : 65 %

Unmodulated carrier output power is 5.3 dBm , or 3.388 mW (ERP).

The limit of spurious or harmonics is calculated as following :

5.3-[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)
1004.000	---	---	---	---	5.6	-2.0	1.8	---	---	-13.0	---
1506.000	---	---	---	---	8.2	-2.0	2.3	---	---	-13.0	---
2008.000	---	---	---	---	8.5	-2.0	2.7	---	---	-13.0	---
2510.000	---	---	---	---	9.5	-2.0	3.0	---	---	-13.0	---
3012.000	---	---	---	---	9.2	-2.0	3.3	---	---	-13.0	---
3514.000	---	---	---	---	9.5	-2.0	3.6	---	---	-13.0	---
4016.000	---	---	---	---	9.5	-2.0	3.8	---	---	-13.0	---
4518.000	---	---	---	---	10.5	-2.0	4.1	---	---	-13.0	---
5020.000	---	---	---	---	10.2	-2.0	4.3	---	---	-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.
4. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

b. Tx Frequency: 526MH

Operated mode : TX Test Date : Jul. 08, 2011
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 4.7 dBm , or 2.951 mW (ERP).
The limit of spurious or harmonics is calculated as following :
4.7-[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)
1052.000	---	---	---	---	5.9	-2.0	1.9	---	---	-13.0	---
1578.000	---	---	---	---	8.2	-2.0	2.3	---	---	-13.0	---
2104.000	---	---	---	---	8.7	-2.0	2.7	---	---	-13.0	---
2630.000	---	---	---	---	9.4	-2.0	3.1	---	---	-13.0	---
3156.000	---	---	---	---	9.3	-2.0	3.4	---	---	-13.0	---
3682.000	---	---	---	---	9.5	-2.0	3.8	---	---	-13.0	---
4208.000	---	---	---	---	9.9	-2.0	3.9	---	---	-13.0	---
4734.000	---	---	---	---	10.4	-2.0	4.2	---	---	-13.0	---
5260.000	---	---	---	---	10.3	-2.0	4.4	---	---	-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.
4. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

c. Tx Frequency: 607.875MHz

Operated mode : TX Test Date : Jul. 08, 2011
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 6.3 dBm , or 4.266 mW (ERP).
The limit of spurious or harmonics is calculated as following :

6.3-[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)
1215.750	---	---	---	---	6.6	-2.0	2.0	---	---	-13.0	---
1823.625	---	---	---	---	8.4	-2.0	2.5	---	---	-13.0	---
2431.500	---	---	---	---	9.2	-2.0	2.9	---	---	-13.0	---
3039.375	---	---	---	---	9.2	-2.0	3.3	---	---	-13.0	---
3647.250	---	---	---	---	9.5	-2.0	3.7	---	---	-13.0	---
4255.125	---	---	---	---	10.0	-2.0	3.9	---	---	-13.0	---
4863.000	---	---	---	---	10.3	-2.0	4.2	---	---	-13.0	---
5470.875	---	---	---	---	10.3	-2.0	4.5	---	---	-13.0	---
6078.750	---	---	---	---	10.9	-2.0	4.8	---	---	-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.
4. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

d. Tx Frequency: 674MHz

Operated mode : TX
Test Date : Jul. 08, 2011
Temperature : 28 °C
Humidity : 65 %

Unmodulated carrier output power is 5.0 dBm , or 3.162 mW (ERP).

The limit of spurious or harmonics is calculated as following :

5.0-[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)
1348.000	---	---	---	---	7.4	-2.0	2.1	---	---	-13.0	---
2022.000	---	---	---	---	8.5	-2.0	2.7	---	---	-13.0	---
2696.000	---	---	---	---	9.3	-2.0	3.1	---	---	-13.0	---
3370.000	---	---	---	---	9.4	-2.0	3.5	---	---	-13.0	---
4044.000	---	---	---	---	9.5	-2.0	3.8	---	---	-13.0	---
4718.000	---	---	---	---	10.3	-2.0	4.2	---	---	-13.0	---
5392.000	---	---	---	---	10.3	-2.0	4.5	---	---	-13.0	---
6066.000	---	---	---	---	10.9	-2.0	4.8	---	---	-13.0	---
6740.000	---	---	---	---	11.2	-2.0	5.1	---	---	-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.
4. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

e. Tx Frequency: 697.875MHz

Operated mode : TX Test Date : Jul. 08, 2011
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 4.9 dBm , or 3.090 mW (ERP).
The limit of spurious or harmonics is calculated as following :

4.9-[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)
1395.750	---	---	---	---	7.7	-2.0	2.2	---	---	-13.0	---
2093.625	---	---	---	---	8.7	-2.0	2.7	---	---	-13.0	---
2791.500	---	---	---	---	9.3	-2.0	3.2	---	---	-13.0	---
3489.375	---	---	---	---	9.5	-2.0	3.6	---	---	-13.0	---
4187.250	---	---	---	---	9.9	-2.0	3.9	---	---	-13.0	---
4885.125	---	---	---	---	10.3	-2.0	4.3	---	---	-13.0	---
5583.000	---	---	---	---	10.4	-2.0	4.6	---	---	-13.0	---
6280.875	---	---	---	---	11.2	-2.0	4.9	---	---	-13.0	---
6978.750	---	---	---	---	11.0	-2.0	5.2	---	---	-13.0	---

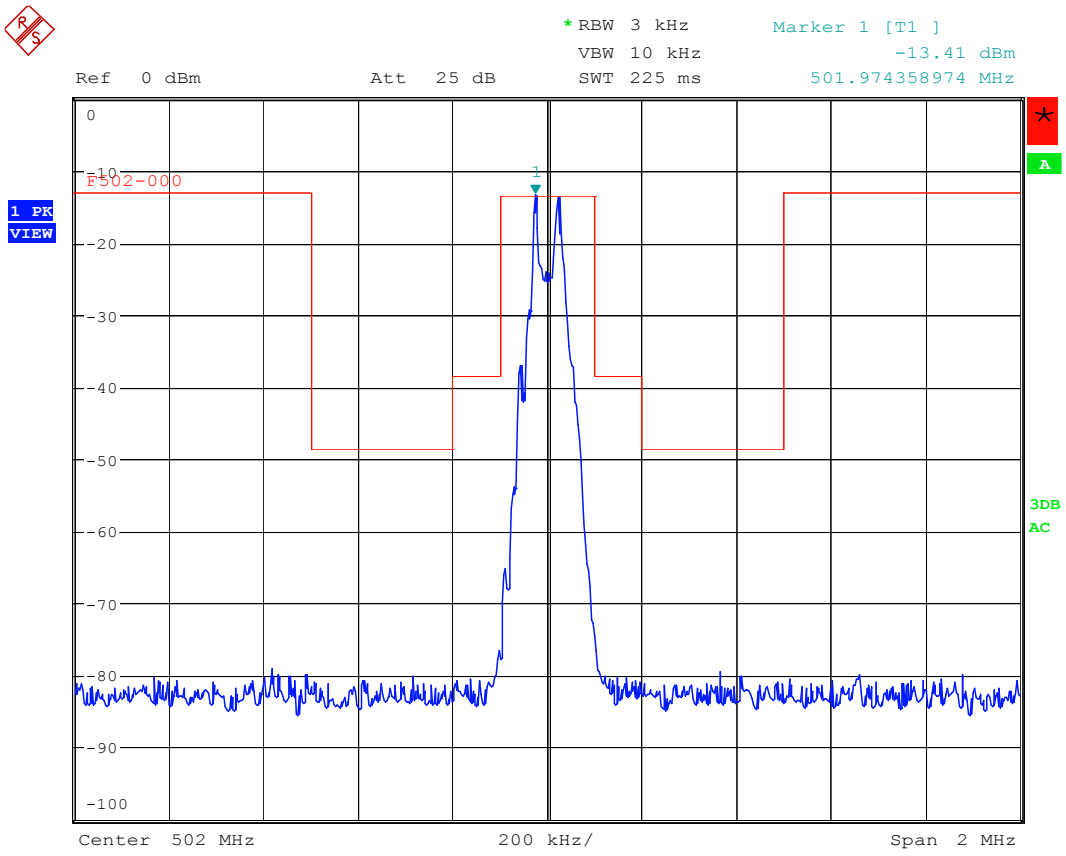
Note :

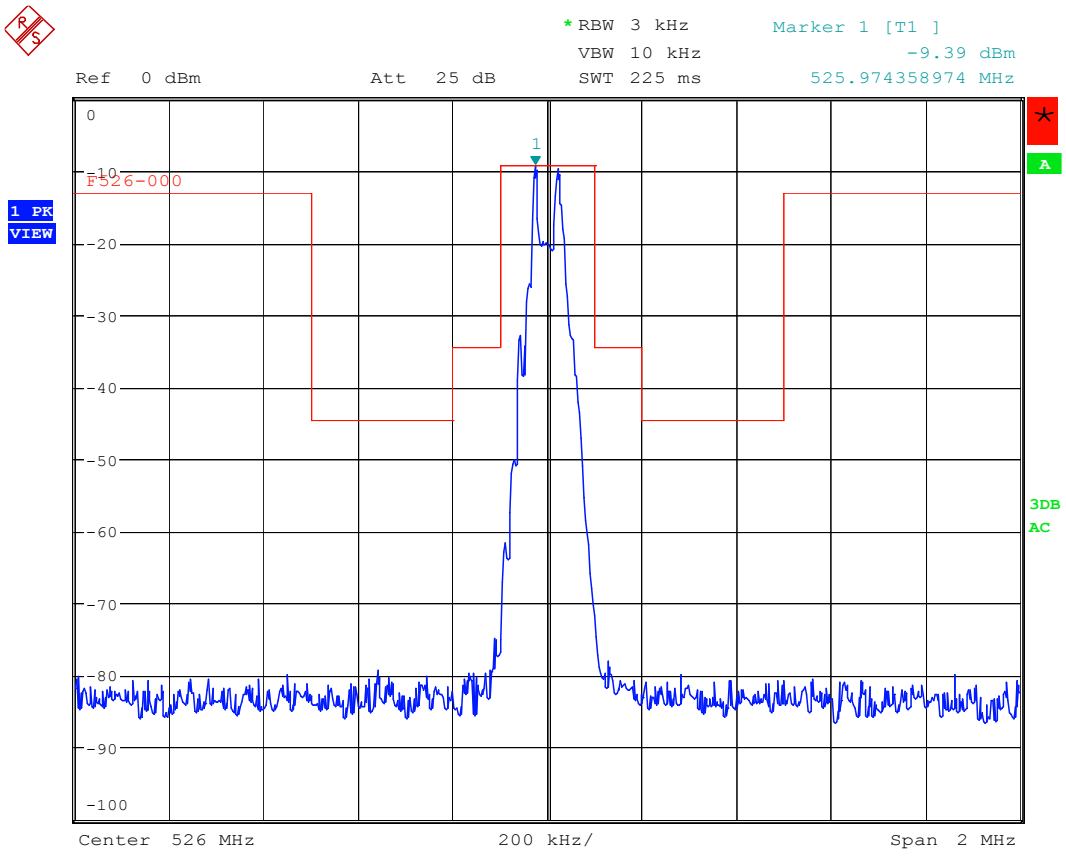
1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

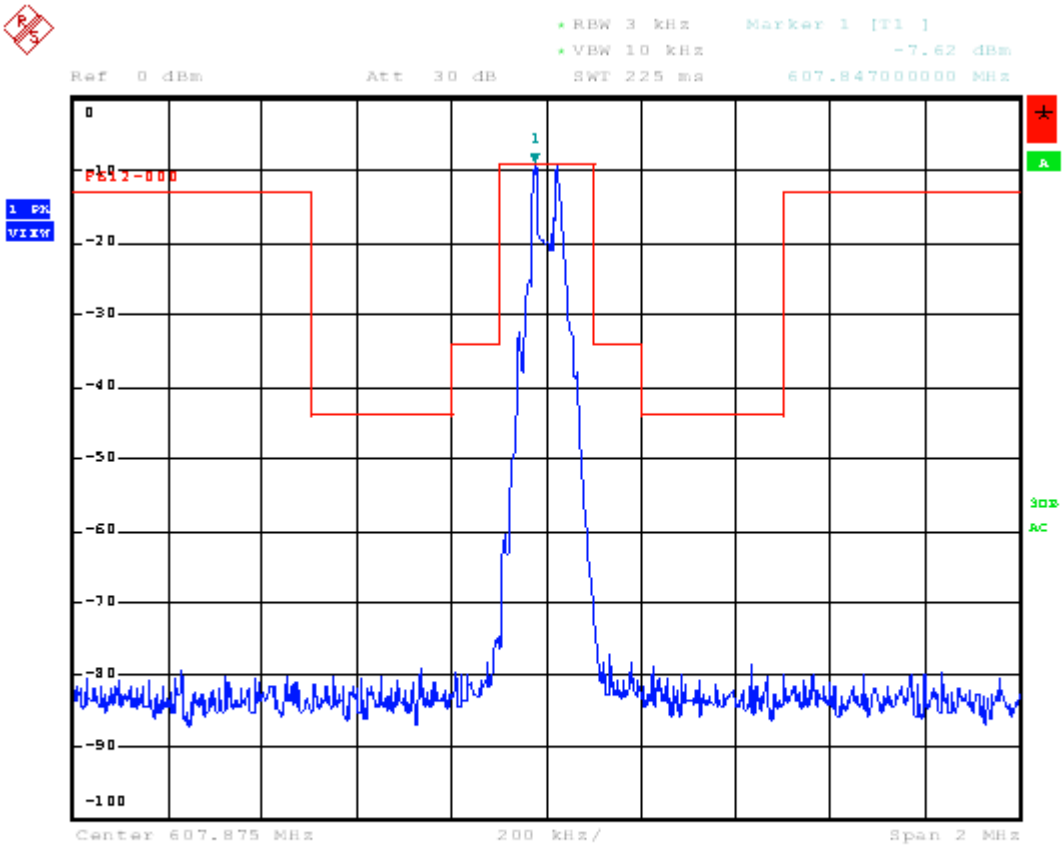
   Result = SG Reading +Cable Loss +Antenna Gain +Antenna Gain Corrected

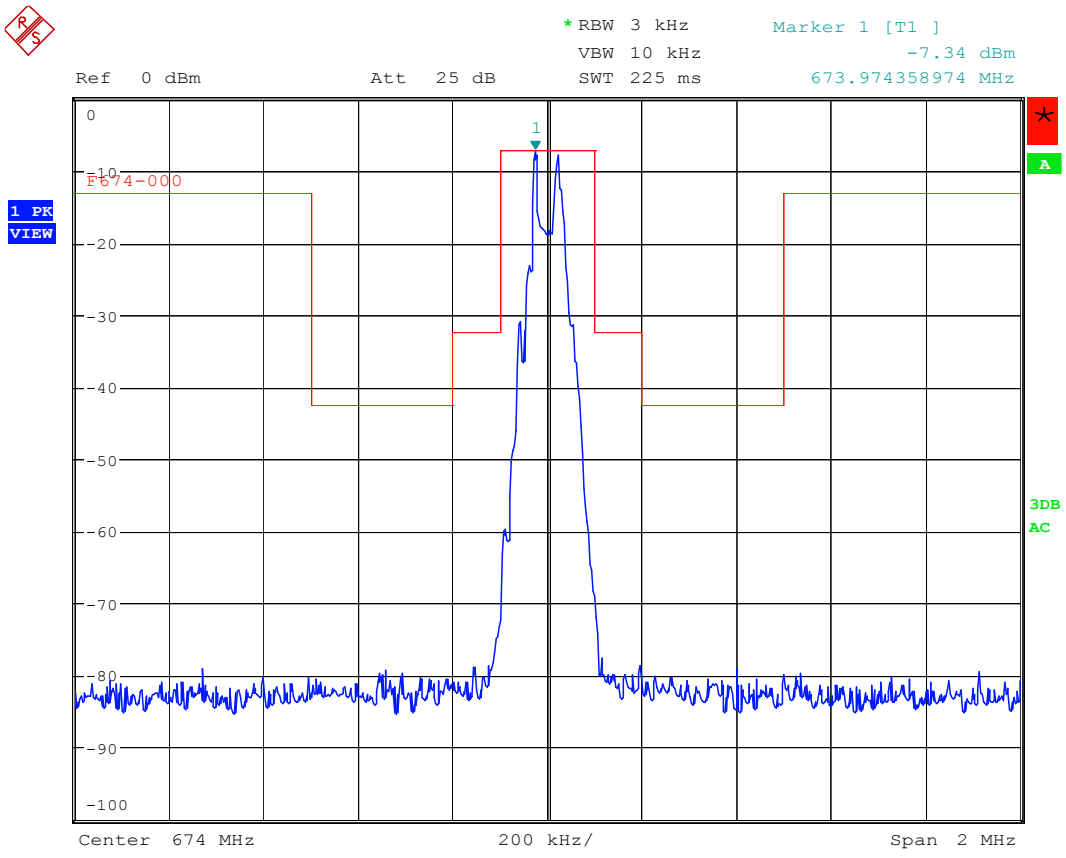
   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.
4. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

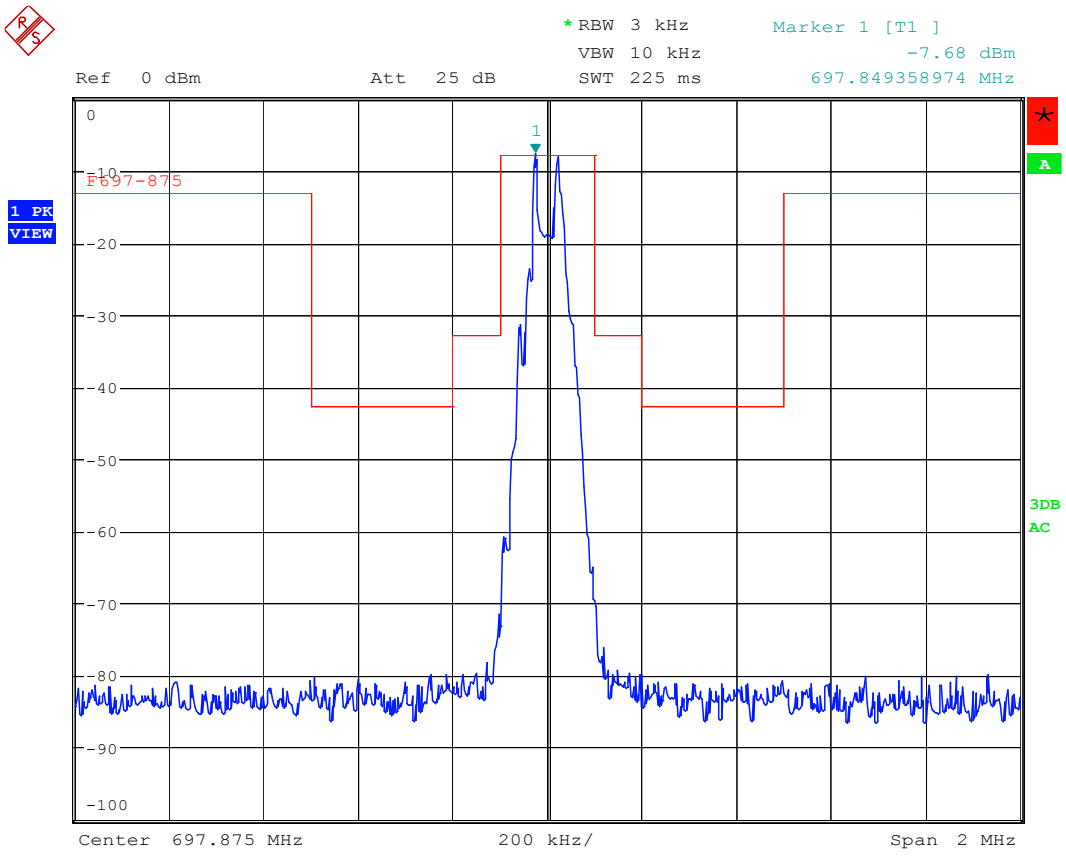
6.4.2 Emission mask plots




* RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-9.39 dBm
525.974358974 MHz
Ref 0 dBm
Att 25 dB
F526-000
1 PK
VIEW
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 526 MHz
200 kHz/
Span 2 MHz


RBW 3 kHz
VBW 10 kHz
Marker 1 [T1]
-7.62 dBm
607.847000000 MHz
Ref 0 dBm
Att 30 dB
SWT 225 ms
PB12-000
1 PK
VIEW
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 607.875 MHz
200 kHz/
Span 2 MHz


* RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-7.34 dBm
673.974358974 MHz
Ref 0 dBm
Att 25 dB
1 PK
VIEW
F674-000
3DB
AC
Center 674 MHz
200 kHz/
Span 2 MHz


* RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-7.68 dBm
697.849358974 MHz
Ref 0 dBm
Att 25 dB
1 PK
VIEW
F697-875
3DB
AC
Center 697.875 MHz
200 kHz/
Span 2 MHz

6.5 Other Emission

a) Emission frequencies below 1 GHz

Test Date : Jul. 08, 2011 Temperature : 28 °C Humidity : 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)
41.61	V	18.1	12.3	30.4	40.0	-9.6	175	1.0
125.85	V	13.6	13.3	26.9	43.5	-16.6	189	1.0
163.11	V	10.6	14.7	25.3	43.5	-18.2	194	1.0
188.72	V	8.7	17.5	26.2	43.5	-17.3	188	1.0
229.18	V	7.7	19.1	26.8	46.0	-19.2	192	1.0
284.57	V	3.6	23.8	27.4	46.0	-18.6	170	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.

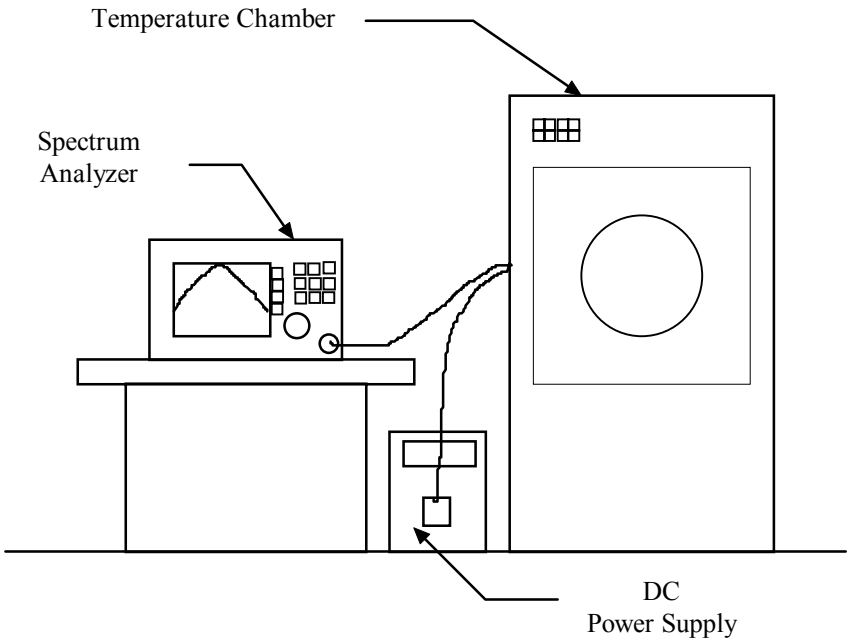
B) Frequency stability versus input voltage

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 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	2010/09/17	2011/09/16
Temperature Chamber	MALLIER	MCT-2X-M	2010/12/28	2011/12/27

7.4 Measurement Data

A. Tx Frequency 502MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :502 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	1.5Vdc (New Batt.)	502.0123	0.00246	501.9894	-0.00212	501.9937	-0.00126
40		502.0172	0.00342	502.0010	0.00019	502.0059	0.00117
30		502.0075	0.00149	501.9882	-0.00234	501.9949	-0.00102
20		502.0161	0.00321	501.9931	-0.00136	502.0040	0.00079
10		501.9889	-0.00220	501.9812	-0.00374	502.0108	0.00214
0		501.9981	-0.00038	501.9869	-0.00261	501.9837	-0.00326
-10		502.0076	0.00151	502.0015	0.00031	501.9853	-0.00292
-20		502.0009	0.00019	501.9835	-0.00329	502.0013	0.00027
-30		502.0070	0.00139	502.0088	0.00176	501.9951	-0.00098

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

Reference Frequency : 502 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vac)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	1.275	502.0040	0.00080	502.0037	0.00073	501.9979	-0.00041
25	1.725	501.9872	-0.00255	502.0148	0.00295	501.9948	-0.00104

B. Tx Frequency 697.875MHz

B1. Frequency stability versus enviroment tempture

Reference Frequency : 697.875 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	1.5Vdc (New Batt.)	697.8614	-0.00195	697.8839	0.00127	697.8879	0.00185
40		697.8886	0.00196	697.8875	0.00179	697.8731	-0.00027
30		697.8527	-0.00320	697.8759	0.00013	697.8692	-0.00083
20		697.8964	0.00306	697.8612	-0.00198	697.8692	-0.00083
10		697.9010	0.00372	697.8844	0.00135	697.8816	0.00095
0		697.8763	0.00019	697.8910	0.00230	697.8910	0.00229
-10		697.8660	-0.00129	697.8823	0.00104	697.8488	-0.00375
-20		697.8953	0.00290	697.8737	-0.00019	697.8670	-0.00115
-30		697.8604	-0.00210	697.8530	-0.00316	697.8496	-0.00364

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

Reference Frequency : 697.875 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	1.275	697.8874	0.00178	697.8801	0.00073	697.8625	-0.00179
25	1.725	697.8882	0.00189	697.8962	0.00304	697.8662	-0.00125

8 CONDUCTED EMISSION MEASUREMENT

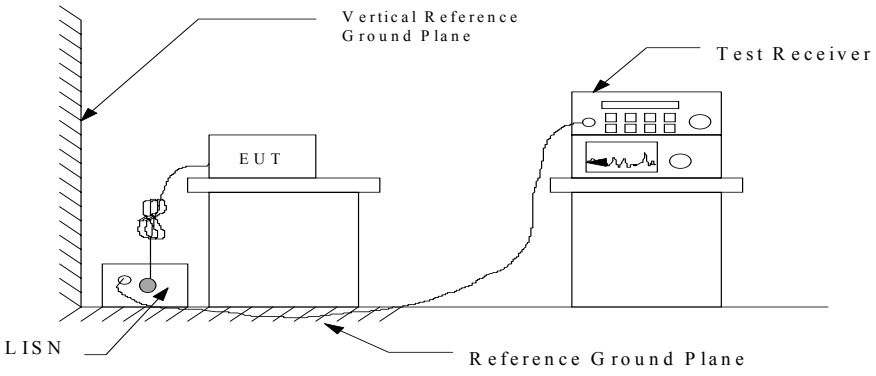
8.1 Standard Applicable

For unintentional and intentional device, Line Conducted Emission Limits are in accordance to §15.107(a) and §15.207(a) respectively .

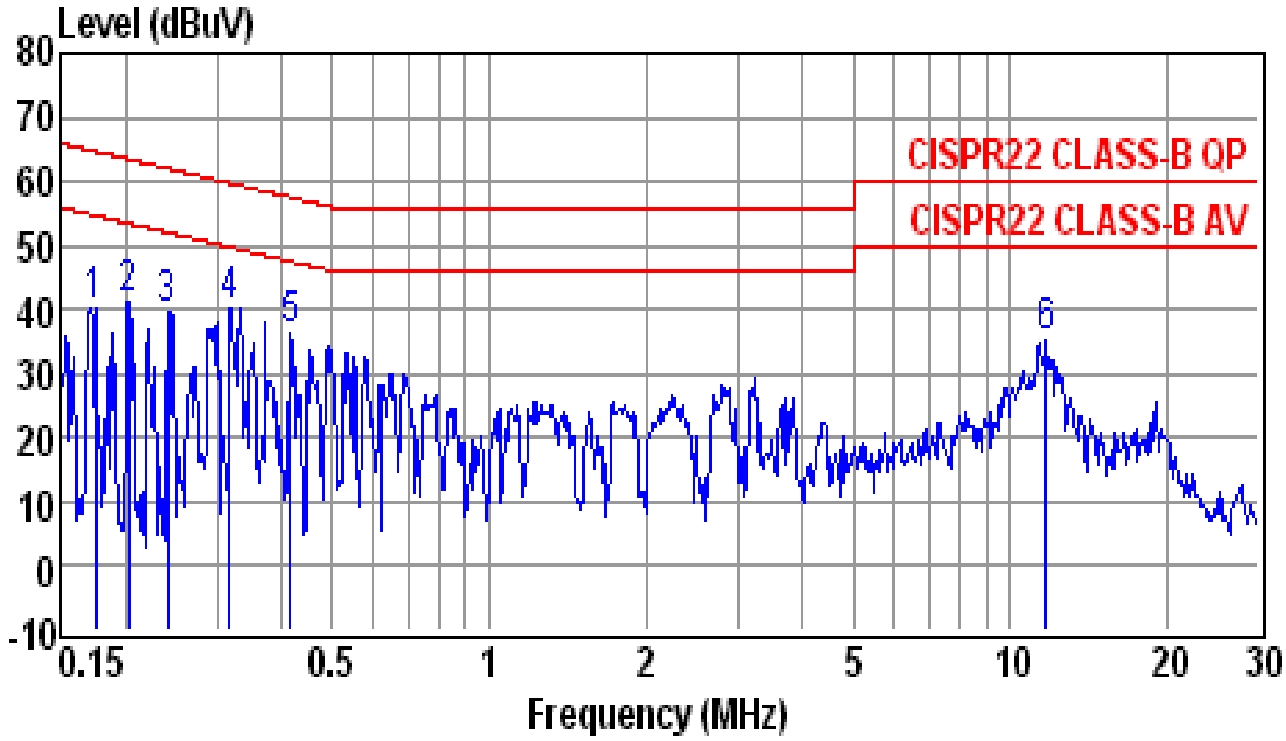
8.2 Measurement Procedure

1. Setup the configuration per figure 6.
2. A preliminary scan with a spectrum monitor is performed to identify the frequency of emission that has the highest amplitude relative to the limit by operating the EUT in selected modes of operation, typical cable positions, and with a typical system configuration.
3. Record the 6 or 8 highest emissions relative to the limit.
4. Measure each frequency obtained from step 3 by a test receiver set on quasi peak detector function, and then records the accuracy frequency and emission level. If all emissions measured in the specified band are attenuated more than 20 dB from the limit, this step would be ignored, and the peak detector function would be used.
5. Confirm the highest three emissions with variation of the EUT cable configuration and record the final data.
6. Repeat all above procedures on measuring each operation mode of EUT.

Figure 6 : Conducted emissions measurement configuration



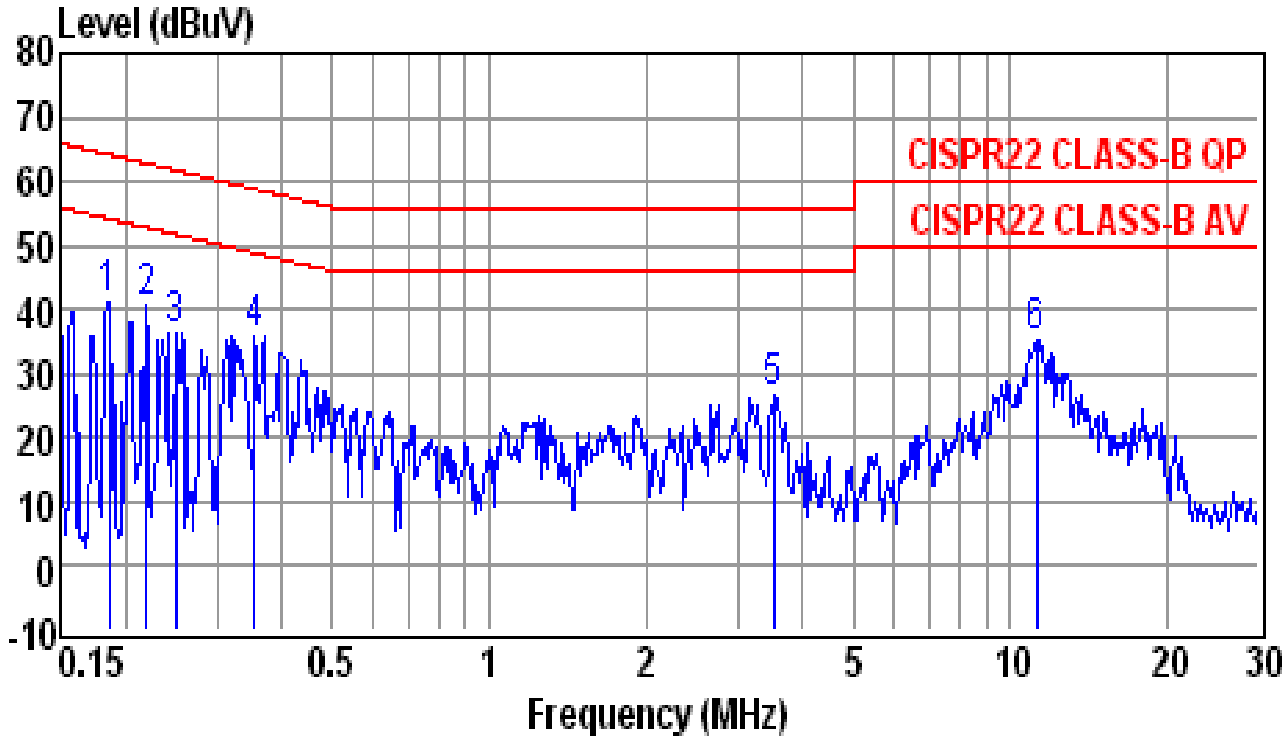
8.3 Conducted Emission Data



Site	: conducted #1	Date	: 06-13-2011
Condition	: CISPR22 CLASS-B QP	LISN	: NEUTRAL
Tem / Hum	: 26 ℃ / 65%	Test Mode	: TX & MICMODE
EUT	: SIEM-2T	Power Rating	: 120V 60Hz
Memo	:	Memo	:

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.1758	40.01	0.37	40.38	64.68	-24.30	QP
0.2029	40.92	0.37	41.29	63.49	-22.20	QP
0.2404	39.24	0.37	39.61	62.08	-22.47	QP
0.3166	39.82	0.39	40.21	59.80	-19.59	QP
0.4149	36.05	0.39	36.44	57.55	-21.11	QP
11.7450	34.27	0.81	35.08	60.00	-24.92	QP

Note :
1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss



Site	: conducted #1	Date	: 06-13-2011
Condition	: CISPR22 CLASS-B QP	LISN	: LINE
Tem / Hum	: 26 ℃ / 65%	Test Mode	: TX & MICMODE
EUT	: SIEM-2T	Power Rating	: 120V 60Hz
Memo	:	Memo	:

Freq (MHz)	Reading (dBuV)	Factor (dB)	Emission Level (dBuV)	Limit Line (dBuV)	Over Limit (dB)	Remark
0.1864	40.88	0.37	41.25	64.20	-22.95	QP
0.2197	40.14	0.37	40.51	62.83	-22.32	QP
0.2495	36.12	0.37	36.49	61.78	-25.29	QP
0.3539	35.46	0.39	35.85	58.87	-23.02	QP
3.5090	26.34	0.55	26.89	56.00	-29.11	QP
11.2570	34.52	0.80	35.32	60.00	-24.68	QP

Note :
1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss

8.4 Result Data Calculation

The result data is calculated by adding the LISN Factor to the measured reading. The basic equation with a sample calculation is as follows:

RESULT = READING + LISN FACTOR

Assume a receiver reading of 22.5 dB μ V is obtained, and LISN Factor is 0.1 dB, then the total of disturbance voltage is 22.6 dB μ V.

RESULT = 22.5 + 0.1 = 22.6 dB μ V
Level in μ V = Common Antilogarithm[(22.6 dB μ V)/20]
= 13.48 μ V

8.5 Conducted Measurement Equipment

The following test equipment are used during the conducted test .

Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
EMI Test Receiver	Rohde & Schwarz	ESCI	2011/05/09	2012/05/07
LISN	EMCO	3625/2	2011/03/01	2012/02/28
LISN	Rohde & Schwarz	ESH2-Z5	2010/08/10	2011/08/09

8.6 Photos of Conduction Measuring Setup