FCC Part 74 Subpart H

EMI TEST REPORT

of

E.U.T. : Wireless Body-Pack Transmitter
FCC ID. : INGIN-264TB
Model No. : IN-264TB
Working Frequency: 502~607.875, 614.125~697.875 MHz

for

APPLICANT : JTS Professional Co., Ltd.
ADDRESS : No. 148, Industry 9th Road, Tali Dist., Taichung City 41280, 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 : 11-07-RBF-190

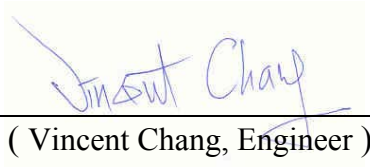
TEST REPORT CERTIFICATION

Applicant	:	JTS Professional Co., Ltd. No. 148, Industry 9th Road, Tali Dist., Taichung City 41280 Taiwan, R.O.C.
Manufacturer	:	JTS Professional Co., Ltd. No. 148, Industry 9th Road, Tali Dist., Taichung City 41280 Taiwan, R.O.C.
Description of EUT	:	
a) Type of EUT	:	Wireless Body-Pack Transmitter
b) Trade Name	:	JTS
c) Model No.	:	IN-264TB
d) FCC ID	:	INGIN-264TB
e) Working Frequency	:	502~607.875, 614.125~697.875 MHz
f) Power Supply	:	DC 1.5V Battery*2

Regulation Applied : FCC Rules and Regulations Part 74 Subpart H

I HEREBY CERTIFY THAT; The data shown in this report were made in accordance with the procedures given in ANSI C63.4 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 : Oct. 18, 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	:	Wireless Body-Pack Transmitter
b) Trade Name	:	JTS
c) Model No.	:	IN-264TB
d) FCC ID	:	INGIN-264TB
e) Working Frequency	:	502~607.875, 614.125~697.875 MHz
f) Power Supply	:	DC 1.5V Battery*2
g) Emission Designator	:	83K4F3E 2M+2DK=2x(5kHz)+2x(36.7kHz)x1=83.4kHz

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/ELA 603-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 TSUEN, LINKOU SHIANG TAIPEI COUNTY, 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

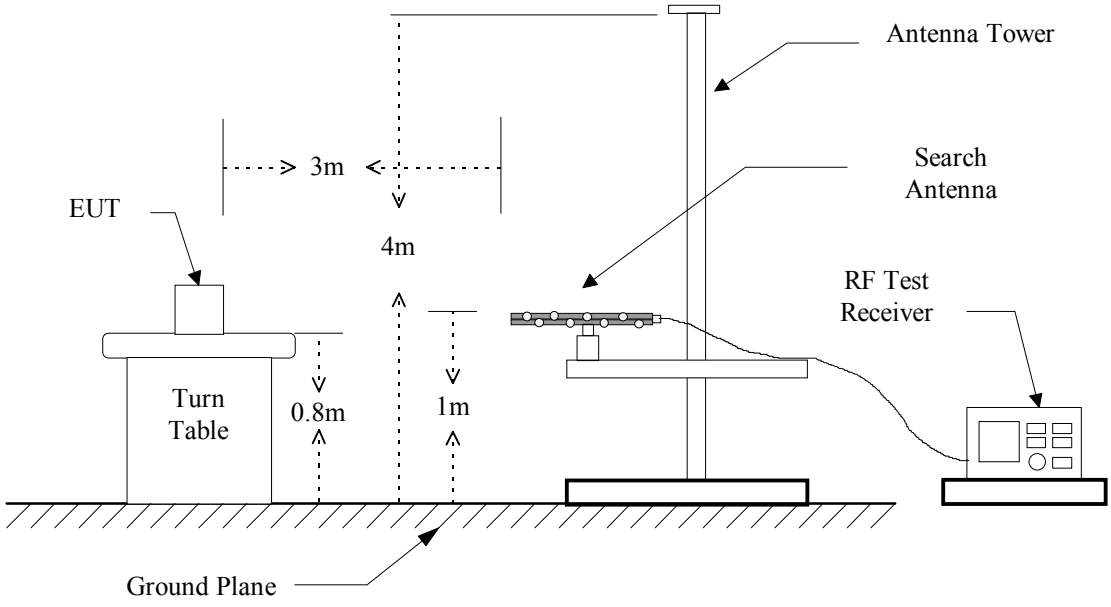
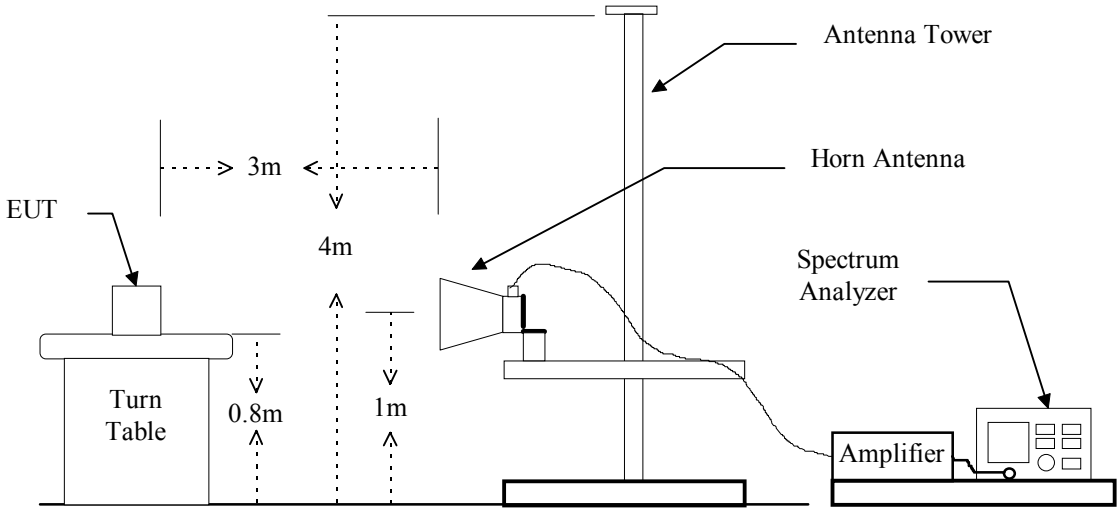


Figure 1 : Frequencies measured above 1 GHz configuration



3.3 Test Data

Band 502 – 687MHz

Operated mode : TX
Temperature : 28 °C
Test Date : Sep. 14, 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)
502.000	82.2	9.3	2	----	7.3	5.370	250

Frequency (MHz)	Meter Reading (dB μ V/m)	SG Reading (dBm)	Cable Loss (dB)	Antenna Gain	Result (dBm)	Output Power (mW)	Limit (mW)
526.000	82.4	9.6	2	----	7.6	5.754	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	81.5	11.3	2.2	----	9.1	8.128	250

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	81.2	11.3	2.3	----	9.0	7.943	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	81.3	11.7	2.3	----	9.4	8.710	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	2012/04/26	2013/04/26
Dipole Antenna	Schwarzbeck	897;898	2012/09/07	2013/09/07
Log-periodic Antenna	EMCO	3146	2011/11/04	2012/11/03
Amplifier	HP	8447D	2012/05/16	2013/05/16
Signal generator	HP	83732B	2012/09/06	2013/09/06

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.

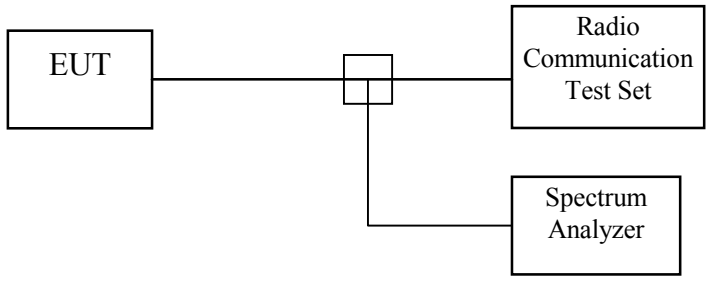
2. Repeat step 1 with changing the input frequency for 200, 500, 1000, 3000, and 5000 Hz in sequence.

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



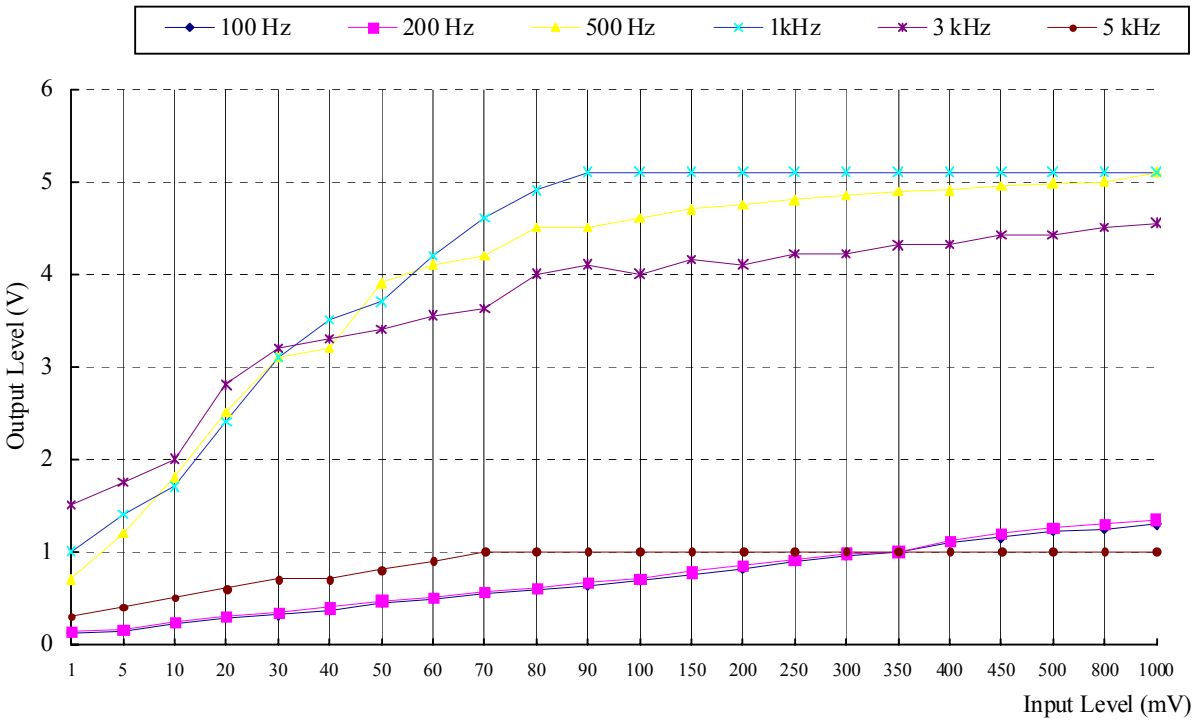
4.3 Measurement Instrument

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	2012/09/20	2013/09/20

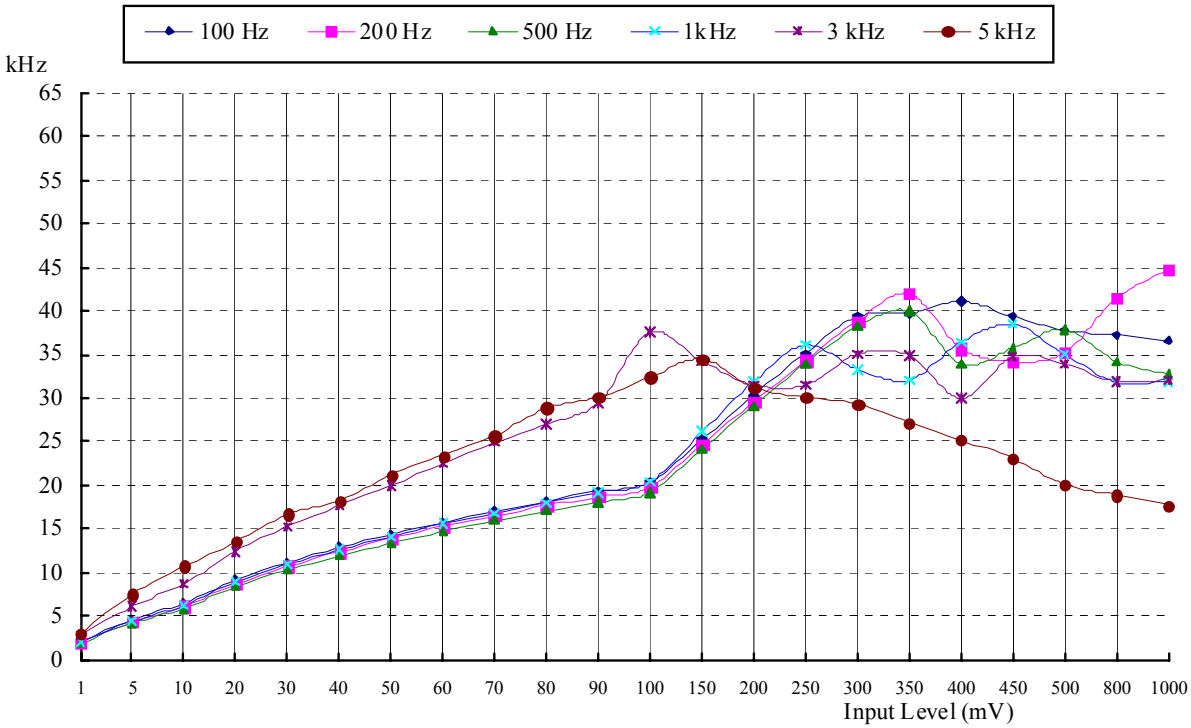
4.4 Measurement Result

1. RF Frequency : 502MHz;

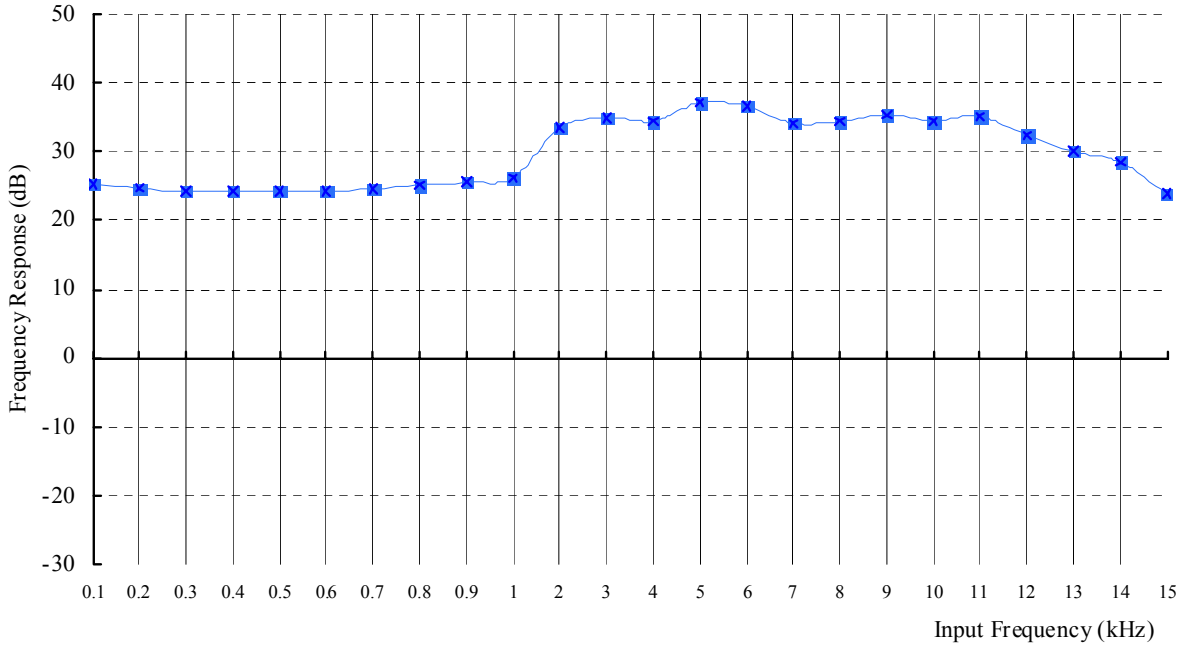
A). Frequency response



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.

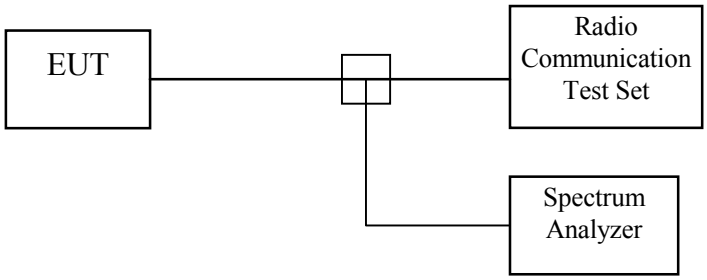
5.2 Measurement Method

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

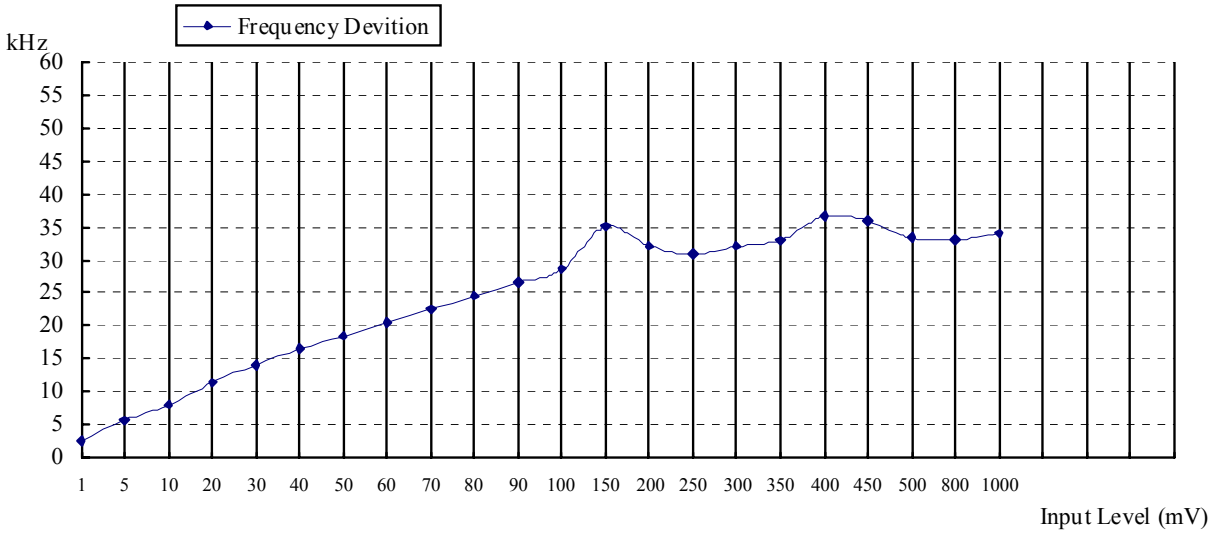
Equipment	Manufacturer	Model No.	Calibration Date	Next Cal. Date
Communications Service Monitor	AEROFLEX	2945B	2012/05/04	2013/05/07
Spectrum Analyzer	Rohde & Schwarz	FSP40	2012/09/20	2013/09/20

5.4 Bandwidth Measured

5.4.1 Input Level Derived

1. RF Frequency : 502MHz;

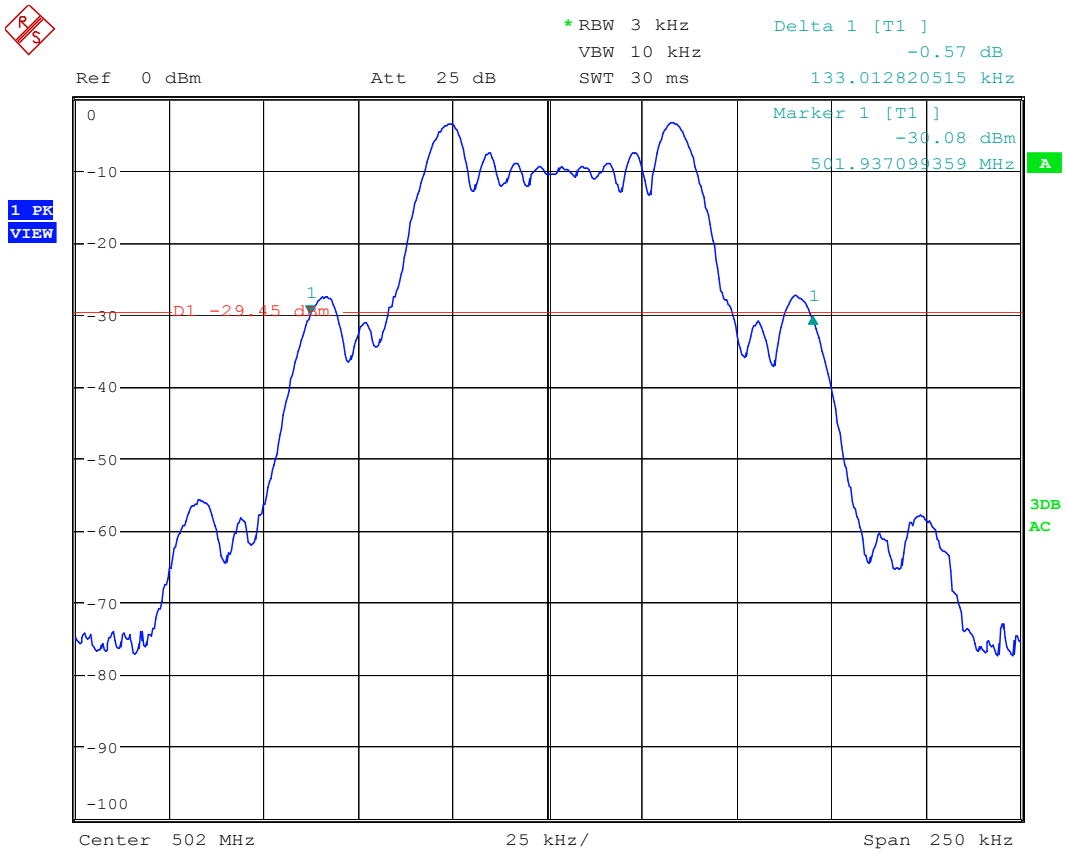
Input Audio Frequency : 2.5 kHz, Sine Wave

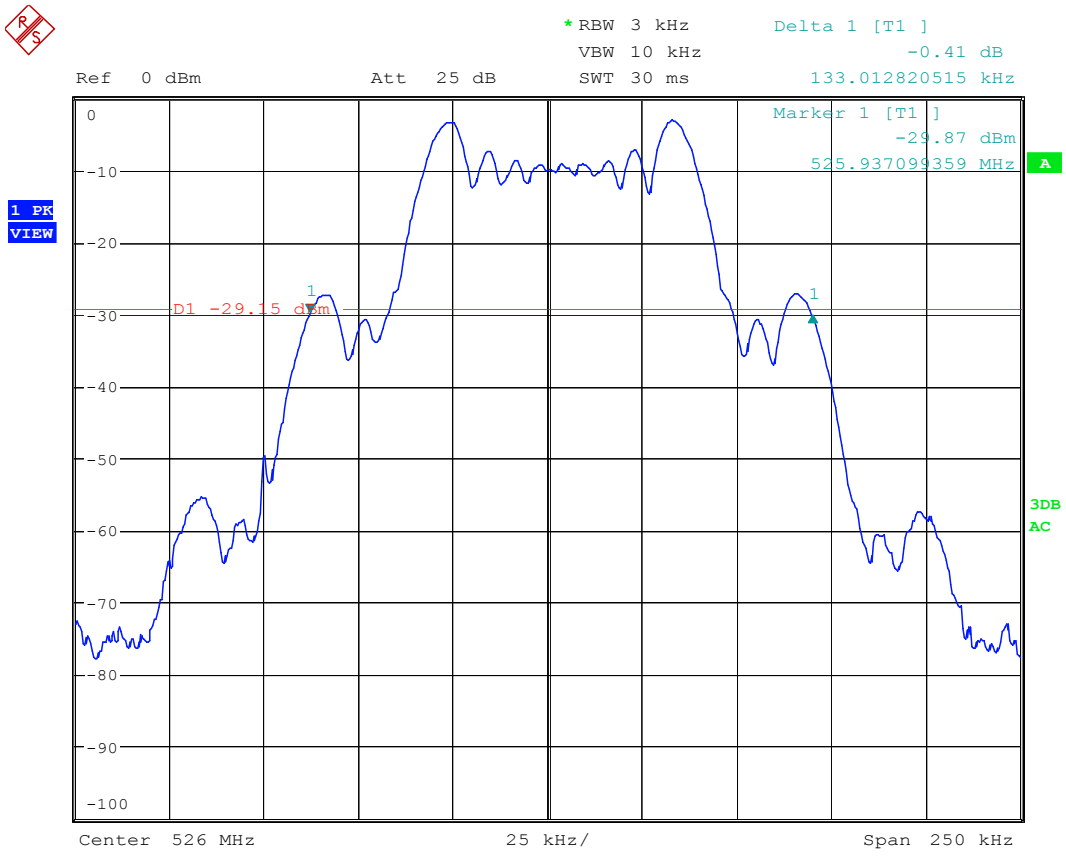


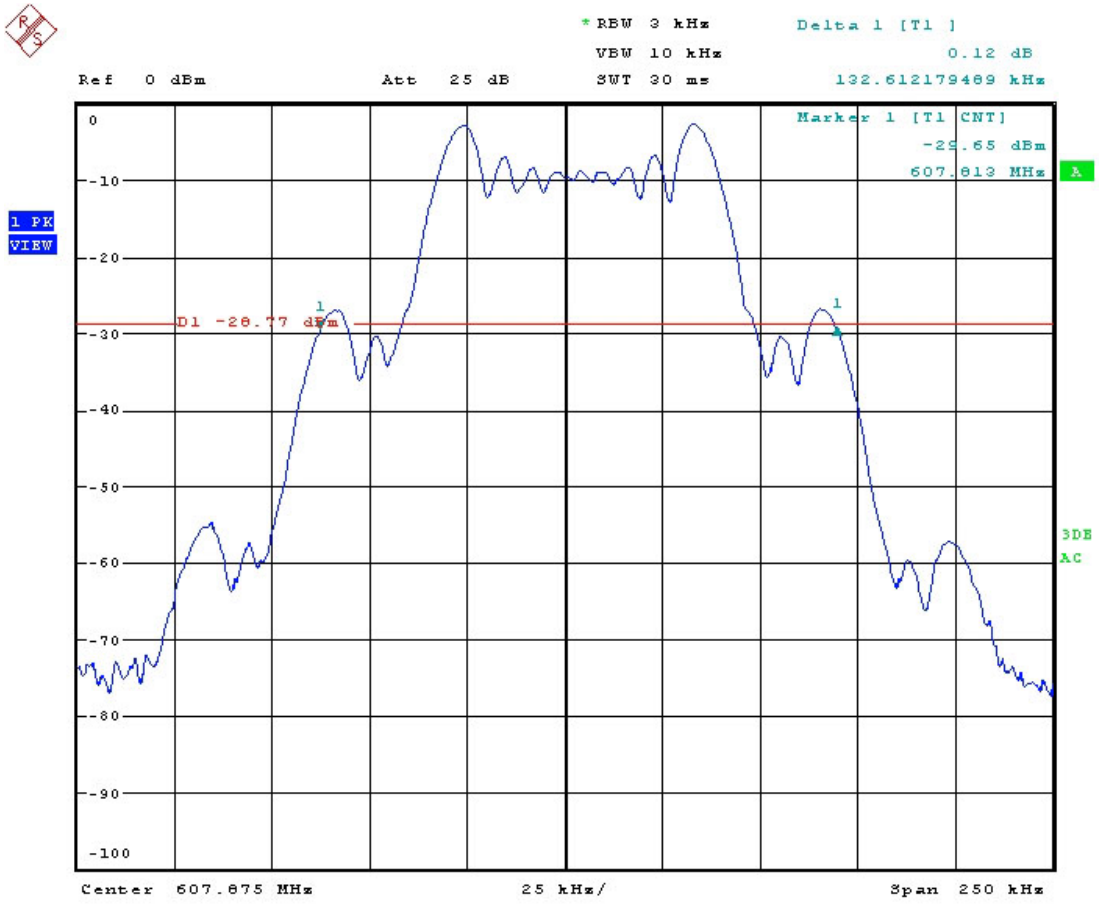
The Level input to produce 50% modulation is 50 mV, therefore the magnitude 16 dB greater than it is 315 mV.

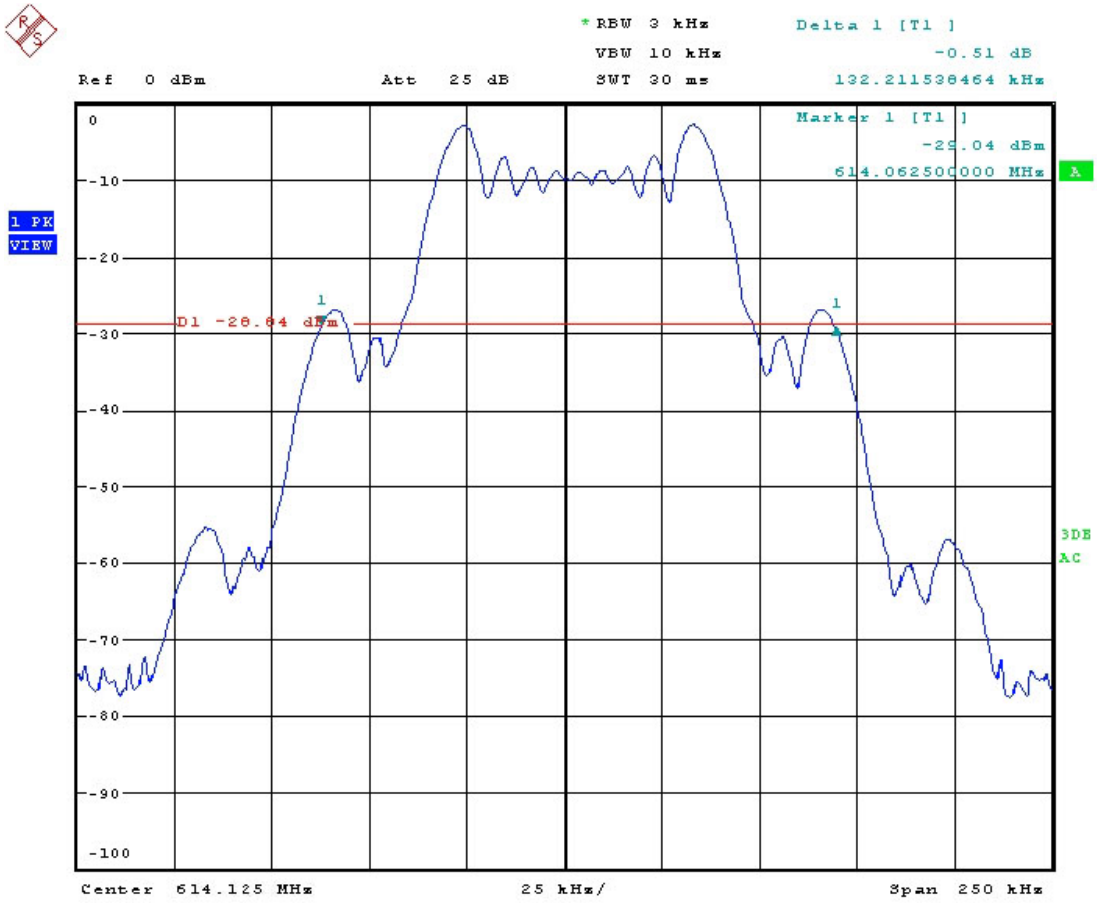
5.4.2 Occupied Bandwidth Plotted

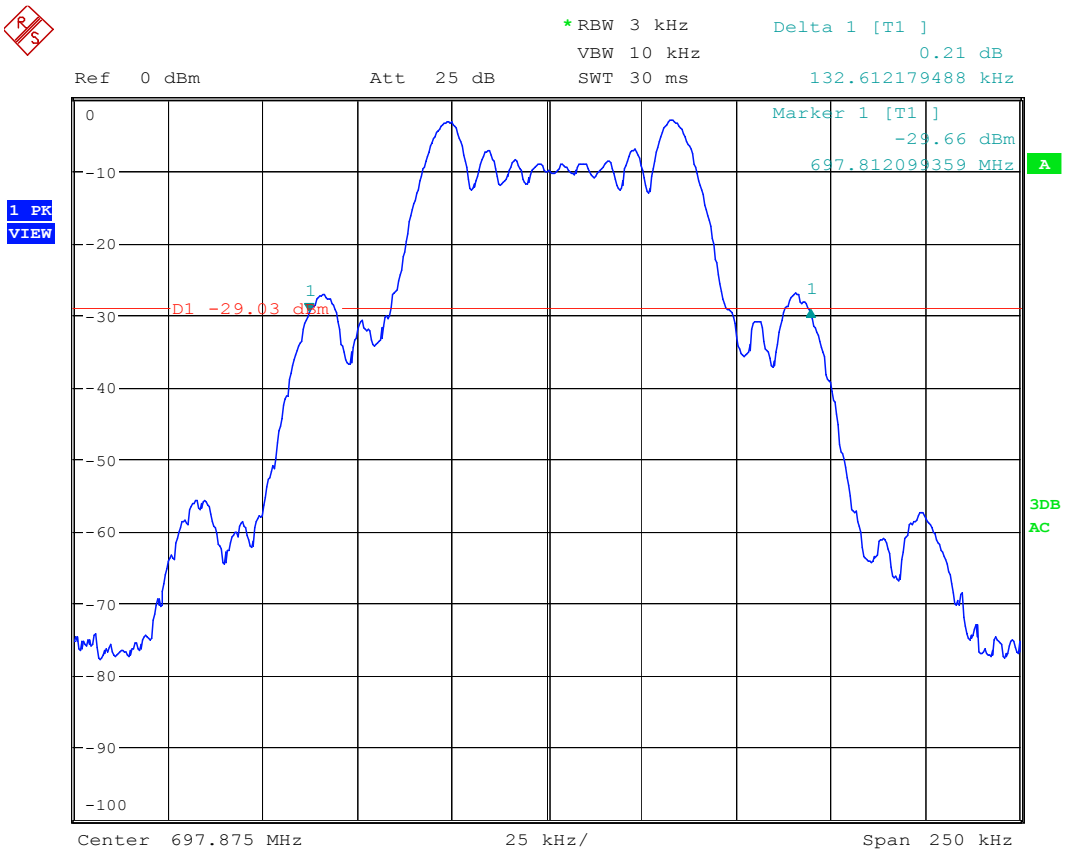
RF Frequency (MHz)	26 dB Bandwidth (kHz)
502.0	133.0
526.0	133.0
607.875	132.6
614.125	132.2
697.875	132.6


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
-0.57 dB
133.012820515 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-30.08 dBm
501.937099359 MHz
A
1 PK
VIEW
D1 -29.45 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]
-0.41 dB
133.012820515 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-29.87 dBm
525.937099359 MHz
1 PK
VIEW
A
3DB
AC
D1 -29.15 dBm
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]
0.12 dB
132.612179489 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1 CNT]
-29.65 dBm
607.813 MHz
A
1 PK
VIEW
D1 -28.77 dBm
3DB
AC
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]
-0.51 dB
132.211538464 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-29.04 dBm
614.062500000 MHz
A
1 PK
VIEW
D1 -28.64 dBm
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 614.125 MHz
25 kHz/
Span 250 kHz


* RBW 3 kHz
VBW 10 kHz
SWT 30 ms
Delta 1 [T1]
0.21 dB
132.612179488 kHz
Ref 0 dBm
Att 25 dB
Marker 1 [T1]
-29.66 dBm
697.812099359 MHz
A
1 PK
VIEW
D1 -29.03 dBm
3DB
AC
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	2012/09/20	2013/09/20
Double Ridged Antenna	EMCO	3115	2012/05/18	2013/05/18
Double Ridged Antenna	EMCO	3115	2012/05/18	2013/05/18
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	2012/09/07	2013/09/07
Amplifier	HP	8449B	2011/12/28	2012/12/27
Amplifier	HP	8447D	2012/05/16	2013/05/16
Signal generator	HP	83732B	2012/09/06	2013/09/06

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 : Sep. 14, 2012
Temperature : 28 °C
Humidity : 65 %

Unmodulated carrier output power is 7.3 dBm , or 5.370 mW (ERP).

The limit of spurious or harmonics is calculated as following :

7.3-[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	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
1506.000	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2008.000	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
2510.000	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
3012.000	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
3514.000	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
4016.000	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
4518.000	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
5020.000	---	---	---	---	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 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: 526MHz

Operated mode : TX Test Date : Sep. 14, 2012
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 7.6 dBm , or 5.754 mW (ERP).
The limit of spurious or harmonics is calculated as following :
7.6-[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)
1052.000	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
1578.000	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2104.000	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
2630.000	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
3156.000	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
3682.000	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
4208.000	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
4734.000	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
5260.000	---	---	---	---	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 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 : Sep. 14, 2012
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 9.1 dBm , or 8.128 mW (ERP).
The limit of spurious or harmonics is calculated as following :

9.1-[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	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
1823.625	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2431.500	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
3039.375	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
3647.250	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
4255.125	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
4863.000	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
5470.875	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
6078.750	---	---	---	---	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 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: 614.125MHz

Operated mode : TX Test Date : Sep. 14, 2012
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 9.0 dBm , or 7.943 mW (ERP).
The limit of spurious or harmonics is calculated as following :

9.0-[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)
1228.250	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
1842.375	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2456.500	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
3070.625	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
3684.750	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
4298.875	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
4913.000	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
5527.125	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
6141.250	---	---	---	---	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 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 : Sep. 14, 2012
Temperature : 28 °C Humidity : 65 %

Unmodulated carrier output power is 9.4 dBm , or 8.710 mW (ERP).
The limit of spurious or harmonics is calculated as following :

9.4-[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	---	---	---	---	6.4	-2.0	1.30	---	---	-13.0	---
2093.625	---	---	---	---	9.3	-2.0	1.75	---	---	-13.0	---
2791.500	---	---	---	---	9.2	-2.0	1.75	---	---	-13.0	---
3489.375	---	---	---	---	9.7	-2.0	1.75	---	---	-13.0	---
4187.250	---	---	---	---	9.6	-2.0	2.10	---	---	-13.0	---
4885.125	---	---	---	---	10.6	-2.0	2.10	---	---	-13.0	---
5583.000	---	---	---	---	10.9	-2.0	2.10	---	---	-13.0	---
6280.875	---	---	---	---	10.9	-2.0	2.60	---	---	-13.0	---
6978.750	---	---	---	---	12.1	-2.0	2.60	---	---	-13.0	---

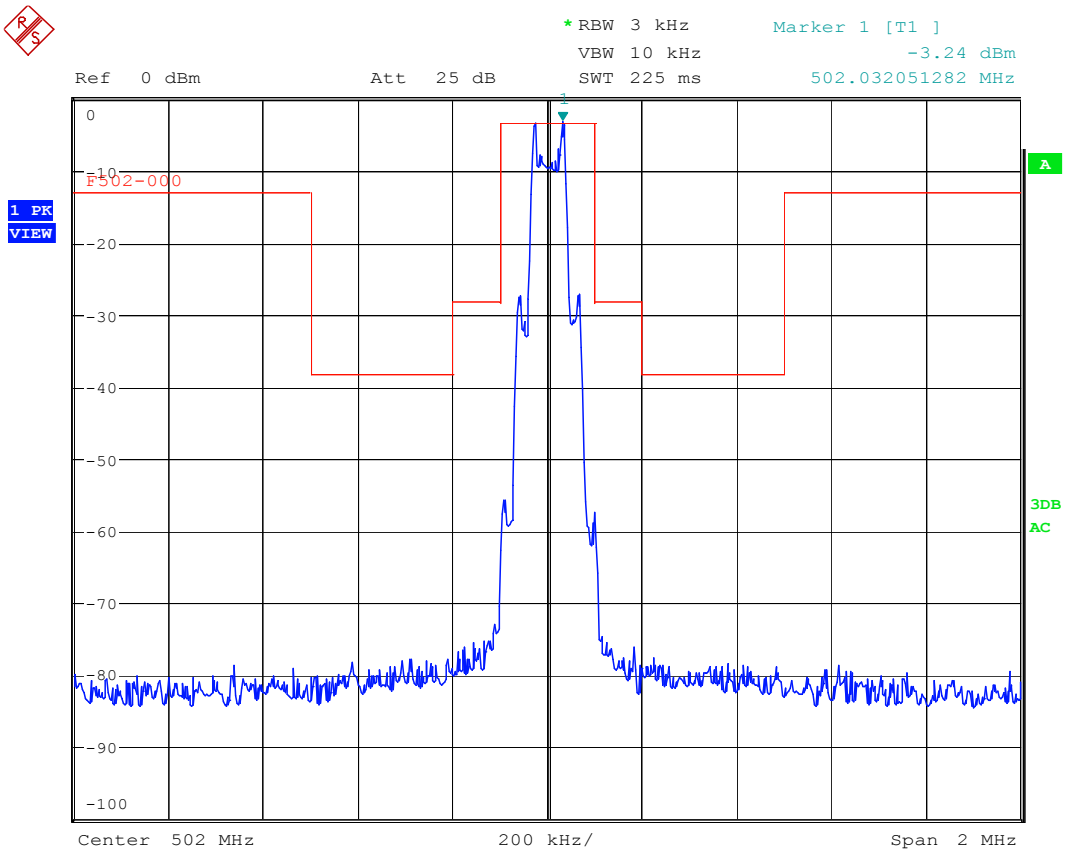
Note :

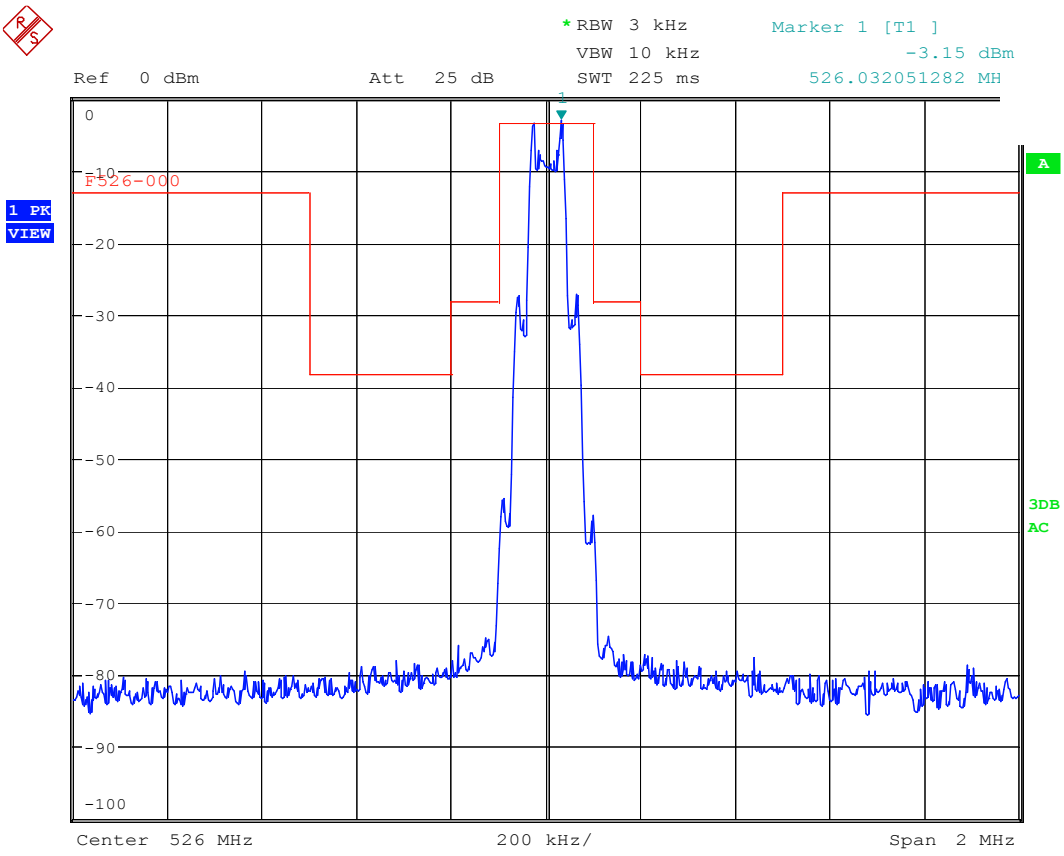
1. Remark "---" means that the emission level is too weak to be detected.
2. For measured frequency below 1GHz, a tuned dipole antenna is used.
3. Result calculation is as following :

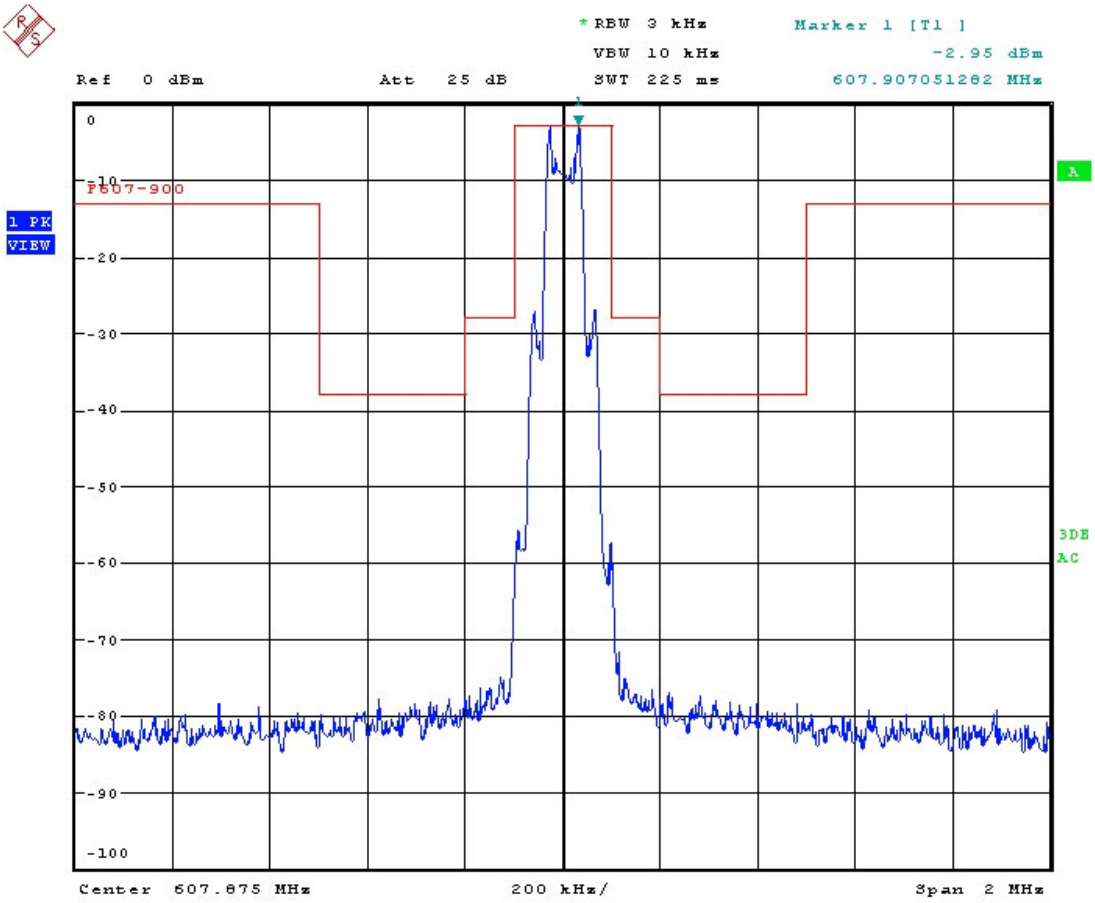
   Result = SG Reading +Cable Loss +Antenna Gain +Antenna Gain Corrected

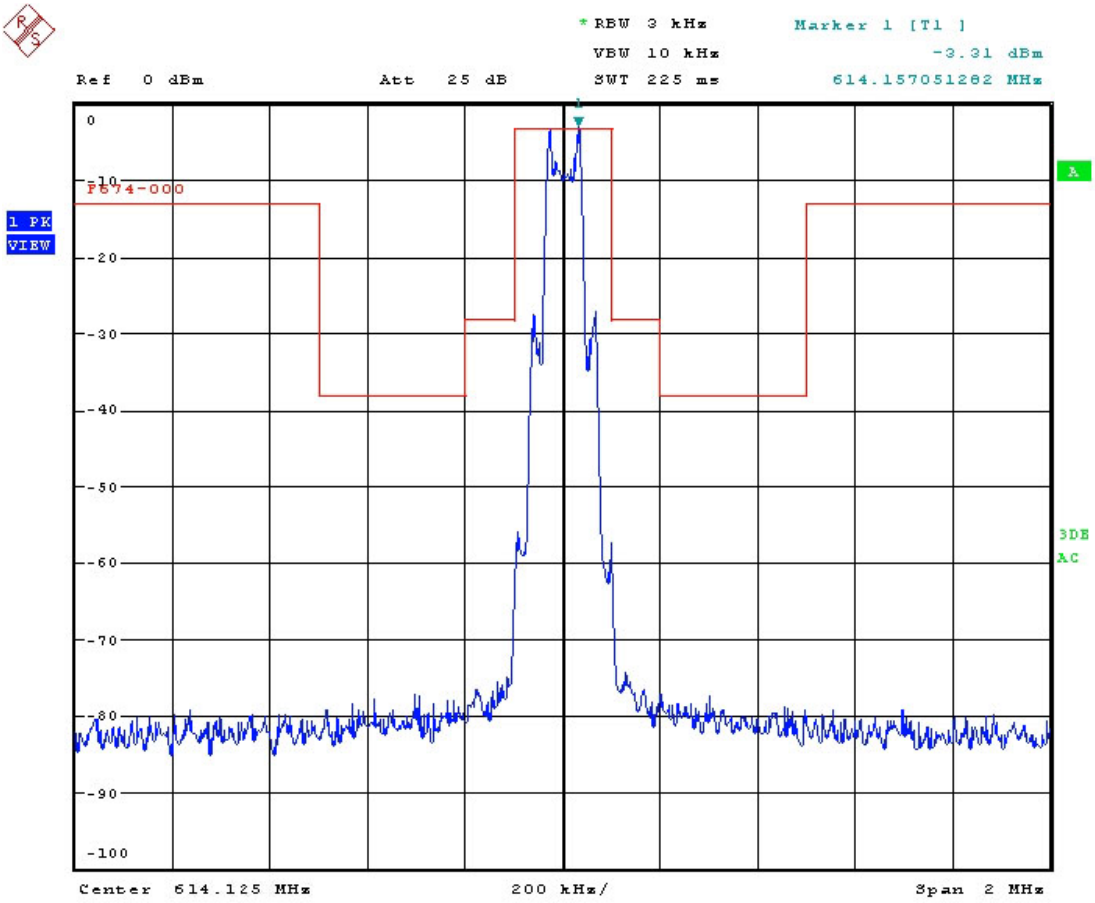
   Antenna Gain Corrected : is used for antenna other than dipole to convert radiated power to ERP.
4. Spurious or harmonics above 1 GHz is too low to be detected or attenuated more than 60 dB from limit value.

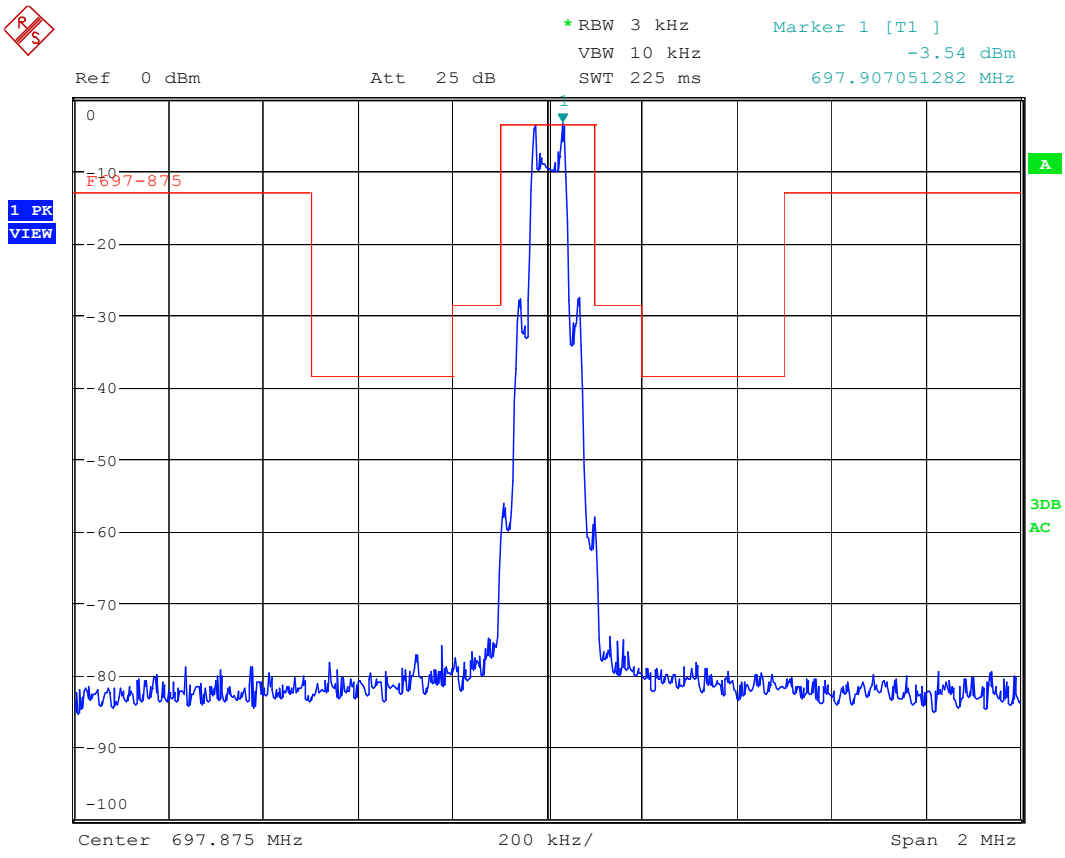
6.4.2 Emission mask plots




*RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-3.15 dBm
526.032051282 MH
Ref 0 dBm
Att 25 dB
1
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
F526-000
1 PK
VIEW
A
3DB
AC
Center 526 MHz
200 kHz/
Span 2 MHz


* RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-2.95 dBm
607.907051282 MHz
Ref 0 dBm
Att 25 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
F607-900
1 PK
VIEW
A
3DB
AC
Center 607.875 MHz
200 kHz/
Span 2 MHz


*RBW 3 kHz
VBW 10 kHz
SWT 225 ms
Marker 1 [T1]
-3.31 dBm
614.157051282 MHz
Ref 0 dBm
Att 25 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
FS74-000
1 PK
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]
-3.54 dBm
697.907051282 MHz
Ref 0 dBm
Att 25 dB
F697-875
1 PK
VIEW
A
3DB
AC
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 697.875 MHz
200 kHz/
Span 2 MHz

6.5 Other Emission

a) Emission frequencies below 1 GHz

Test Date : Sep. 14, 2012 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)
38.14	V	5.1	13.1	18.2	40.0	-21.8	178	1.0
133.62	V	5.3	13.7	19.0	43.5	-24.5	192	1.0
175.82	V	5.2	15.9	21.1	43.5	-22.4	188	1.0
199.71	V	3.3	18.5	21.8	43.5	-21.7	194	1.0
228.19	V	4.8	19.0	23.8	46.0	-22.2	185	1.0
245.18	V	6.8	20.0	26.8	46.0	-19.2	196	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.

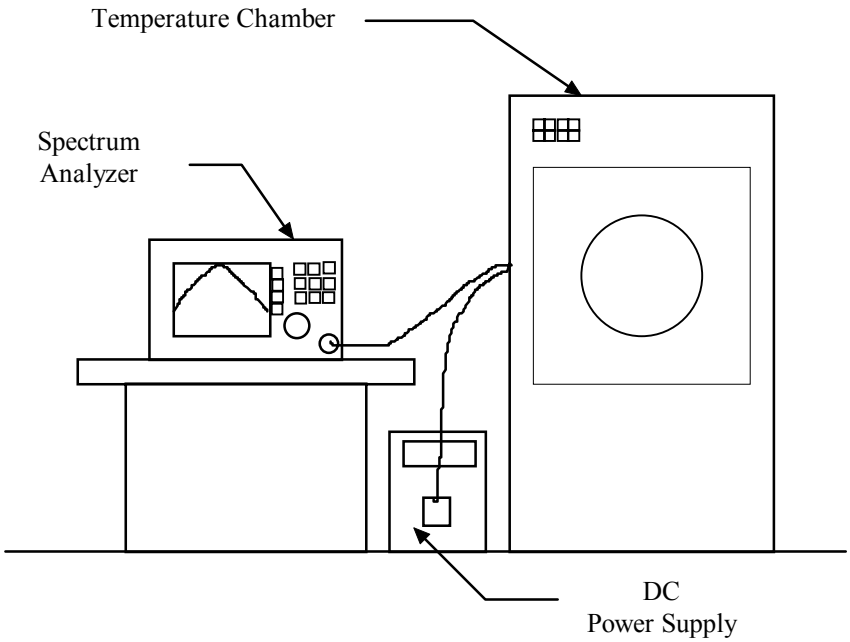
B) Frequency stability versus input voltage

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	2012/09/20	2013/09/20
Temperature Chamber	MALLIER	MCT-2X-M	2012/05/03	2013/05/03

7.4 Measurement Data

A. Tx Frequency 502MHz

A1. Frequency stability versus enviroment tempture

Reference Frequency :502 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
50	3.0Vdc	501.9865	-0.00269	502.0164	0.00326	501.9960	-0.00080
40		501.9972	-0.00056	501.9990	-0.00020	502.0149	0.00297
30		502.0079	0.00157	502.0015	0.00029	502.0060	0.00119
20		502.0040	0.00080	501.9833	-0.00332	502.0122	0.00243
10		502.0181	0.00360	501.9966	-0.00069	502.0159	0.00316
0		501.9973	-0.00053	501.9919	-0.00160	501.9976	-0.00049
-10		501.9893	-0.00213	502.0011	0.00022	502.0002	0.00005
-20		501.9972	-0.00055	502.0029	0.00058	502.0134	0.00266
-30		502.0157	0.00313	501.9848	-0.00302	502.0042	0.00084

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

Reference Frequency : 502 MHz		Limit：0.005%					
Enviroment	Power	Frequency measured with time elapsed					
Tempture	Supplied	2 minute		5 minute		10 minute	
(℃)	(Vdc)	(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.25	501.9927	-0.00146	502.0009	0.00018	502.0131	0.00262
25	3.45	502.0144	0.00287	501.9907	-0.00186	502.0173	0.00346

B. Tx Frequency 526MHz

B1. Frequency stability versus enviroment tempture

Reference Frequency : 526 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	525.9830	-0.00323	525.9912	-0.00167	526.0074	0.00140
40		526.0027	0.00051	525.9877	-0.00235	526.0090	0.00171
30		526.0122	0.00231	526.0177	0.00336	525.9900	-0.00190
20		526.0009	0.00016	525.9984	-0.00031	526.0109	0.00207
10		526.0160	0.00305	526.0019	0.00037	526.0148	0.00282
0		526.0120	0.00228	526.0172	0.00327	526.0134	0.00255
-10		525.9940	-0.00113	525.9875	-0.00237	526.0102	0.00194
-20		526.0062	0.00117	525.9849	-0.00286	526.0077	0.00146
-30		525.9822	-0.00338	525.9981	-0.00035	525.9858	-0.00270

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

Reference Frequency : 526 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.25	526.0137	0.00261	526.0184	0.00349	525.9931	-0.00131
25	3.45	526.0169	0.00320	525.9891	-0.00208	526.0013	0.00024

C. Tx Frequency 607.875MHz

C1. Frequency stability versus enviroment tempture

Reference Frequency : 607.9 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	607.8884	0.00221	607.8618	-0.00218	607.8824	0.00122
40		607.8938	0.00309	607.8673	-0.00126	607.8619	-0.00216
30		607.8849	0.00162	607.8673	-0.00127	607.8677	-0.00120
20		607.8653	-0.00159	607.8670	-0.00132	607.8647	-0.00170
10		607.8666	-0.00139	607.8635	-0.00189	607.8614	-0.00224
0		607.8682	-0.00112	607.8518	-0.00382	607.8806	0.00093
-10		607.8894	0.00237	607.8848	0.00161	607.8760	0.00017
-20		607.8942	0.00315	607.8857	0.00176	607.8844	0.00155
-30		607.8906	0.00257	607.8559	-0.00314	607.8754	0.00006

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

Reference Frequency : 607.9 MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.25	607.8775	0.00041	607.8896	0.00240	607.8783	0.00054
25	3.45	607.8921	0.00281	607.8920	0.00280	607.8555	-0.00321

D. Tx Frequency 614.125MHz

D1. Frequency stability versus enviroment tempture

Reference Frequency : 674 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	614.1047	-0.00331	614.1346	0.00157	614.1272	0.00036
40		614.1415	0.00269	614.1436	0.00302	614.1446	0.00319
30		614.1158	-0.00149	614.1420	0.00277	614.1165	-0.00139
20		614.1280	0.00049	614.1042	-0.00339	614.1148	-0.00166
10		614.1309	0.00096	614.1121	-0.00210	614.1357	0.00175
0		614.1421	0.00279	614.1030	-0.00358	614.1039	-0.00344
-10		614.1302	0.00085	614.1146	-0.00169	614.1406	0.00254
-20		614.1472	0.00361	614.1026	-0.00364	614.1146	-0.00170
-30		614.1302	0.00084	614.1473	0.00363	614.1163	-0.00141

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

Reference Frequency : 674MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.25	614.1370	0.00195	614.1114	-0.00221	614.1187	-0.00103
25	3.45	614.1374	0.00202	614.1391	0.00230	614.1378	0.00209

E. Tx Frequency 697.875MHz

E1. 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	3.0Vdc	697.8694	-0.00080	697.8691	-0.00085	697.8628	-0.00175
40		697.8639	-0.00159	697.8568	-0.00260	697.8614	-0.00196
30		697.8775	0.00035	697.9016	0.00382	697.8758	0.00012
20		697.8623	-0.00181	697.8727	-0.00033	697.8668	-0.00118
10		697.8650	-0.00143	697.8705	-0.00064	697.8657	-0.00134
0		697.8769	0.00028	697.8548	-0.00290	697.8890	0.00200
-10		697.8916	0.00237	697.8654	-0.00137	697.8570	-0.00258
-20		697.8511	-0.00343	697.8812	0.00089	697.8769	0.00027
-30		697.8909	0.00228	697.8724	-0.00038	697.8678	-0.00103

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

Reference Frequency : 697.875MHz		Limit：0.005%					
Enviroment Tempture (℃)	Power Supplied (Vdc)	Frequency measured with time elapsed					
		2 minute		5 minute		10 minute	
		(MHz)	(%)	(MHz)	(%)	(MHz)	(%)
25	2.25	697.8786	0.00052	697.8974	0.00322	697.8573	-0.00253
25	3.45	697.8511	-0.00343	697.8948	0.00284	697.8894	0.00206

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.