

# **FCC Test Report**

for

**Video Indoor Station**

**Trade Name** :   
**Model Number** : ID5101  
**FCC ID** : WUGARID5101  
**Report Number** : RF-C260-1009-187  
**Date of Receipt** : September 15, 2010  
**Date of Report** : December 6, 2011

Prepared for

**Amroad Technology Inc.**

18F-3, No.150, Jian 1st Rd., Zhonghe Dist., New Taipei City 235, Taiwan (R.O.C.)

Prepared by



**Central Research Technology Co.**

**EMC Test Laboratory**

No.11, Lane41, Fushuen St., Jungshan Chiu, Taipei, Taiwan, 104, R.O.C.



NVLAP LAB CODE 200575-0

**This report shall not be reproduced, except in full, without the written approval of Central Research Technology Co.. It may be duplicated completely in its entirety for legal use with the permission of the applicant. It should not be used to claim product endorsement by NVLAP or any U.S. government agency. The test result in the report applies only to the sample tested.**

# Certification

Equipment under Test : Video Indoor Station  
Model No. : ID5101  
FCC ID : WUGARID5101  
Applicant : Amroad Technology Inc.  
Address : 18F-3, No.150, Jian 1st Rd., Zhonghe Dist., New Taipei City  
235, Taiwan (R.O.C.)  
Manufacturer : AmRoad Technology Inc.  
Date of Testing : September 23, 2010 ~ April 26, 2011  
Applicable Standards : 47 CFR part 15, Subpart C  
Deviation : N/A  
Condition of Test Sample : Enigneering Sample

We, **Central Research Technology Co.**, hereby certify that one sample of the designated product was tested in our facility during the period mentioned above. The test records, data evaluation and Equipment Under Test (EUT) configurations shown in the present report are true and accurate representation of the measurements of the sample's RF characteristics under the conditions herein specified.

The test results show that the EUT as described in the present report is in compliance with the requirements set forth in the standards mentioned above and apply to the tested sample identified in the present report only. The test report shall not be reproduced, except in its entirety, without the written approval of Central Research Technology Co.

PREPARED BY : Rosa Hsieh , DATE : December 6, 2011  
(Rosa Hsieh/System Executive)

APPROVED BY : J. Y. Shih , DATE : Dec. 6, 2011  
(Tsun-Yu Shih/General Manager)

## Contents

<b>1</b>	<b>General Description .....</b>	<b>5</b>
1.1	GENERAL DESCRIPTION OF EUT .....	5
1.2	TEST METHODOLOGY .....	5
1.3	REQUIREMENT FOR COMPLIANCE.....	6
1.4	SUPPORT UNIT .....	8
1.5	LAYOUT OF THE SETUP .....	8
1.6	TEST CAPABILITY .....	9
1.7	MEASUREMENT UNCERTAINTY .....	10
<b>2</b>	<b>Field Strength of fundamental.....</b>	<b>11</b>
2.1	APPLIED STANDARD .....	11
2.2	TEST INSTRUMENTS .....	11
2.3	MEASUREMENT PROCEDURE .....	12
2.4	TEST CONFIGURATION .....	12
2.5	TEST DATA .....	13
<b>3</b>	<b>Radiated Emission .....</b>	<b>17</b>
3.1	APPLIED STANDARD .....	17
3.2	TEST INSTRUMENTS .....	18
3.3	MEASUREMENT PROCEDURE .....	19
3.4	TEST CONFIGURATION .....	20
3.5	TEST DATA .....	21
<b>4</b>	<b>Frequency Tolerance .....</b>	<b>23</b>
4.1	APPLIED STANDARD .....	23
4.2	TEST INSTRUMENTS .....	23
4.3	MEASUREMENT PROCEDURE .....	24
4.4	TEST CONFIGURATION .....	24
4.5	TEST DATA .....	25
<b>5</b>	<b>20dB Bandwidth .....</b>	<b>28</b>
5.1	APPLIED STANDARD .....	28
5.2	TEST INSTRUMENTS .....	28
5.3	MEASUREMENT PROCEDURE .....	29
5.4	TEST CONFIGURATION .....	29
5.5	TEST DATA .....	30
<b>6</b>	<b>Conducted Emission Measurement .....</b>	<b>31</b>

<b>6.1</b>	<b>LIMITS FOR EMISSION MEASUREMENT .....</b>	<b>31</b>
<b>6.2</b>	<b>TEST INSTRUMENTS .....</b>	<b>32</b>
<b>6.3</b>	<b>TEST PROCEDURES .....</b>	<b>33</b>
<b>6.4</b>	<b>TEST CONFIGURATIONS .....</b>	<b>34</b>
<b>6.5</b>	<b>TEST RESULTS .....</b>	<b>35</b>

**Attachment 1 – Photographs of the Test Configurations**

**Attachment 2 – External Photographs of EUT**

**Attachment 3 – Internal Photographs of EUT**

## **1 General Description**

### **1.1 General Description of EUT**

Equipment under Test: Video Indoor Station

Model No. : ID5101

Power in : 120Vac/ 60Hz

Test Voltage : 120Vac/ 60Hz

Channel Numbers : 1

Frequency Range : 13.56MHz

Function Modulation : FSK

Function Description :

The EUT is used to transmit and receive signal both. Please refer to the user's manual for the details.

### **1.2 Test Methodology**

For this E.U.T., the radiated emissions measurement performed according to the procedures illustrated in ANSI C63.4:2003 and other required were illustrated in separate sections of this test report for detail.

### 1.3 Requirement for Compliance

(1) Field strength of Fundametal

According to 15.225(a), the field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15848 microvolts/meter at 30 meters.

(2) Band Edge

According to 15.225(b), within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

According to 15.225(c), within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(3) Radiation emission

According to 15.225(d), the field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

(4) Frequency tolerance

According to 15.225(e), the frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

(5) Radiated emission limits, general requirements.

According to 15.209, except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

## (6) 20dB Bandwidth

According to 15.215(c) requires the device must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

According to 15.225, operation within the band 13.110 – 14.010 MHz.

## (7) Conduction Emission Requirement

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

\* Decreases with the logarithm of the frequency.

## (8) Restricted Band

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
<sup>2</sup> 1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)
13.36 - 13.41			

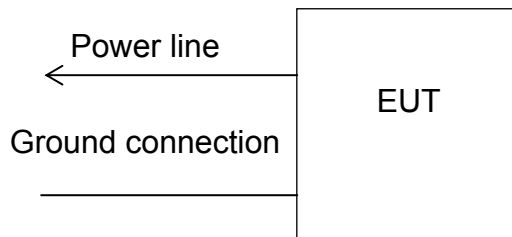
<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

## 1.4 Support Unit

No.	Equipment	Model No./ Serial No.	Brand	Power Line	Supported by lab.
N/A	*	*	*	*	*

## 1.5 Layout of the Setup



### Connecting Cables:

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
N/A	*	*	*	*	*	*	*



## 1.6 Test Capability

### Test Facility

The test facility used for evaluating the conformance of the EUT with each standard in the present report meets what required in CISPR16-1-4, CISPR16-2-3 and ANSI C63.4.

Test Room	Type of Test Room	Descriptions
TR1	10m semi-anechoic chamber (23m×14m×9m)	Complying with the NSA requirements in documents CISPR 22 and ANSI C63.4. For the radiated emission measurement.
TR11	3m semi-anechoic chamber (9m × 6m × 6m)	
TR13	Test Site	For the RF conducted emission measurement.
TR5	Shielding Room (8m×5m×4m)	For the conducted emission measurement.

**Test Laboratory Competence Information**

Central Research Technology Co. has been accredited/filed/authorized by the agencies listed in the following table.

Certificate	Nation	Agency	Code	Mark
Accreditation Certificate	USA	NVLAP	200575-0	ISO/IEC 17025
	R.O.C. (Taiwan)	TAF	0905	ISO/IEC 17025
	R.O.C. (Taiwan)	BSMI	SL2-IN-E-0033, SL2-IS-E-0033, SL2-R1/R2-E-0033, SL2-A1-E-0033 SL2-L1-E-0033	ISO/IEC 17025
Site Filing Document	USA	FCC	474046, TW1053	Test facility list & NSA/SVSWR Data
	Canada	IC	4699A-1, -3	Test facility list & NSA Data
	Japan	VCCI	R-1527,C-1609, T-1441, G-10	Test facility list & NSA/SVSWR Data
Authorization Certificate	Germany	TUV	10021687	ISO/IEC 17025
	Norway	Nemko	ELA212	ISO/IEC 17025

The copy of each certificate can be downloaded from our web site: [www.crc-lab.com](http://www.crc-lab.com)

**1.7 Measurement Uncertainty**

The assessed measurement uncertainty with a suitable coverage factor K to ensure 95% confidence level for the normal distribution are shown as below, the values are less than  $U_{cispr}$  in table 1 of CISPR 16-4-2.

Test Item	Measurement Uncertainty
Frequency error	4.2Hz
Radiated Emission (30MHz~200MHz)	Horizontal 2.8dB ; Vertical 3.5dB
Radiated Emission (200MHz~1GHz)	Horizontal 3.4dB ; Vertical 2.8dB

## 2 Field Strength of fundamental

Result: Pass

### 2.1 Applied Standard

According to 15.225(a), the field strength of any emissions within the band 13.553 - 13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

According to 15.225(b), within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

According to 15.225(c), within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

### 2.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ETSI/100019	2010/5/18	2011/5/18
Antenna	EMCO	6502/20558	2008/8/3	2011/8/3
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2011/4/17	2012/4/17

Note:

1. The calibrations are traceable to NML/ROC.
2. The calibration date of the semi-anechoic chamber listed above is the date of NSA measurement.

### Instrument Setting

RBW	VBW	Detector	Trace	Comment
9kHz	N/A	Quasi-Peak	Maxhold	

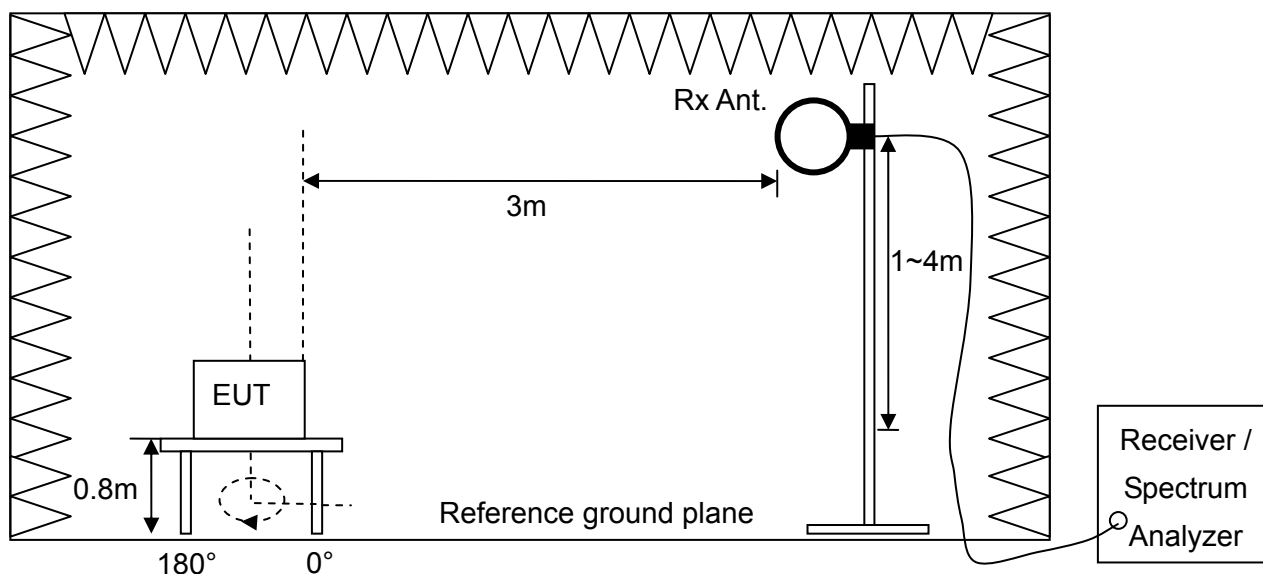
### Climatic Condition

Ambient Temperature : 24°C; Relative Humidity : 55%

## 2.3 Measurement Procedure

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.
- c. The EUT was set at 3m away from the interference receiving antenna.
- d. Rapidly sweep the signal in the test frequency range by using the spectrum through the Maximum-peak detector.
- e. Rotate the EUT from 0° to 360° and position the receiving loop antenna at 1~4 meters above the reference ground plane to determine the fundamental frequency and record them.
- f. Finely turn the turntable and the antenna to be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response and recorded position of fundamental frequency found from step e.
- g. Record and compare the maximum level with the required limit.
- h. Change the receiving antenna to another polarization to measure Field Strength of fundamental by following step e. to g. again.

## 2.4 Test Configuration



## 2.5 Test Data

### Field strength of fundamental

Test Mode : Continuous Transmitting

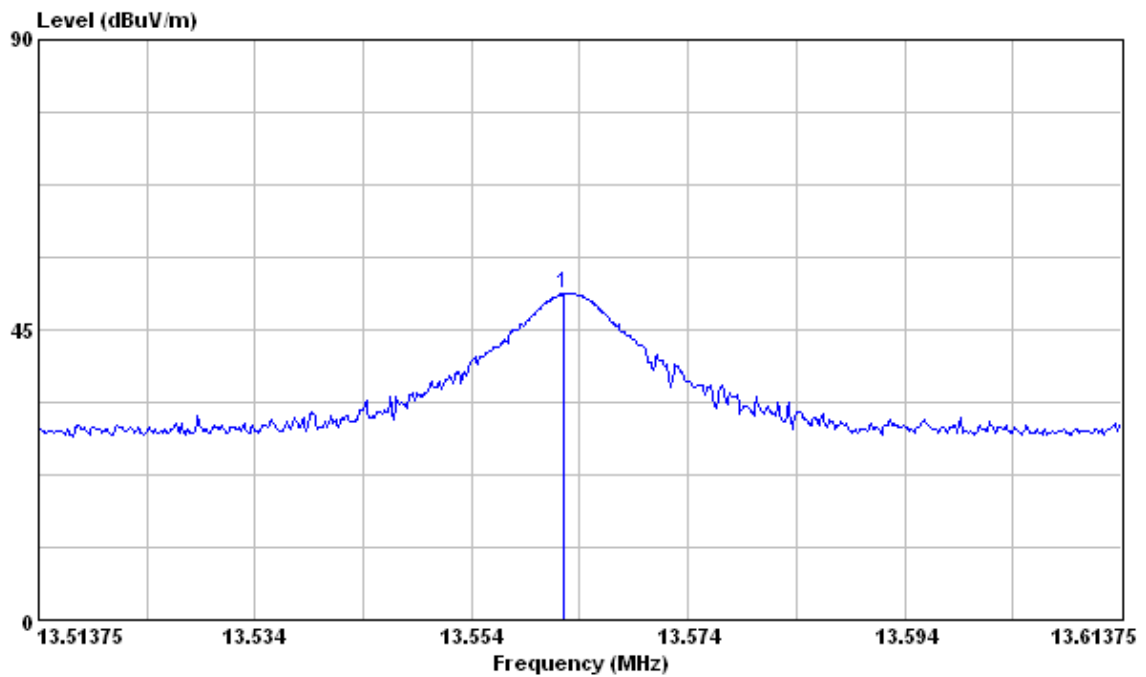
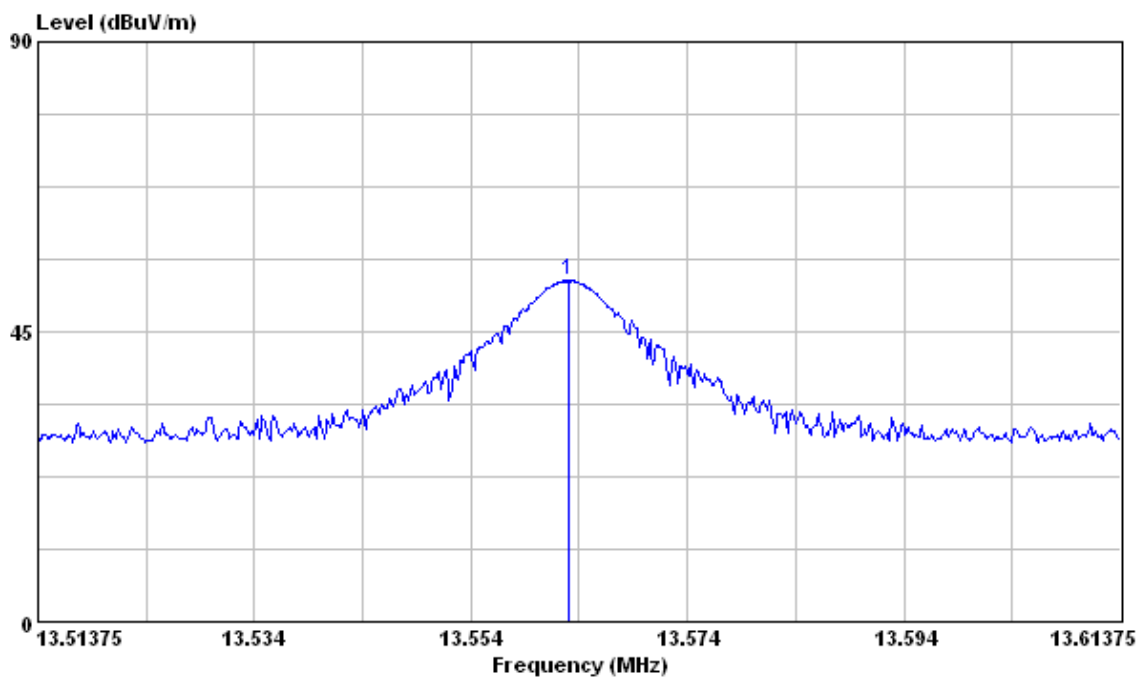
Test Distance : 3m

Tester : Jacky

Freq. (MHz)	Polarization	Reading Data (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.56	V	33.25	14.03	47.28	124	76.72
13.56	H	35.61	14.03	49.64	124	74.36

Note :

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor
2. Emission Level (dBuV/m) = Reading Data + Correction Factor
3. The formula transfers the limit at 30 m to 3m is  $L_3 = L_{30} \times (d_{30} / d_3)^2 = 15848 \times (30/3)^2 = 1584800(\mu\text{V/m}) = 124 \text{ (dBuV/m)}$
4. Margin (dB) = Limit –Emission Level

**V Polarization****H Polarization**

## Band Edge

Test Mode : Continuous Transmitting

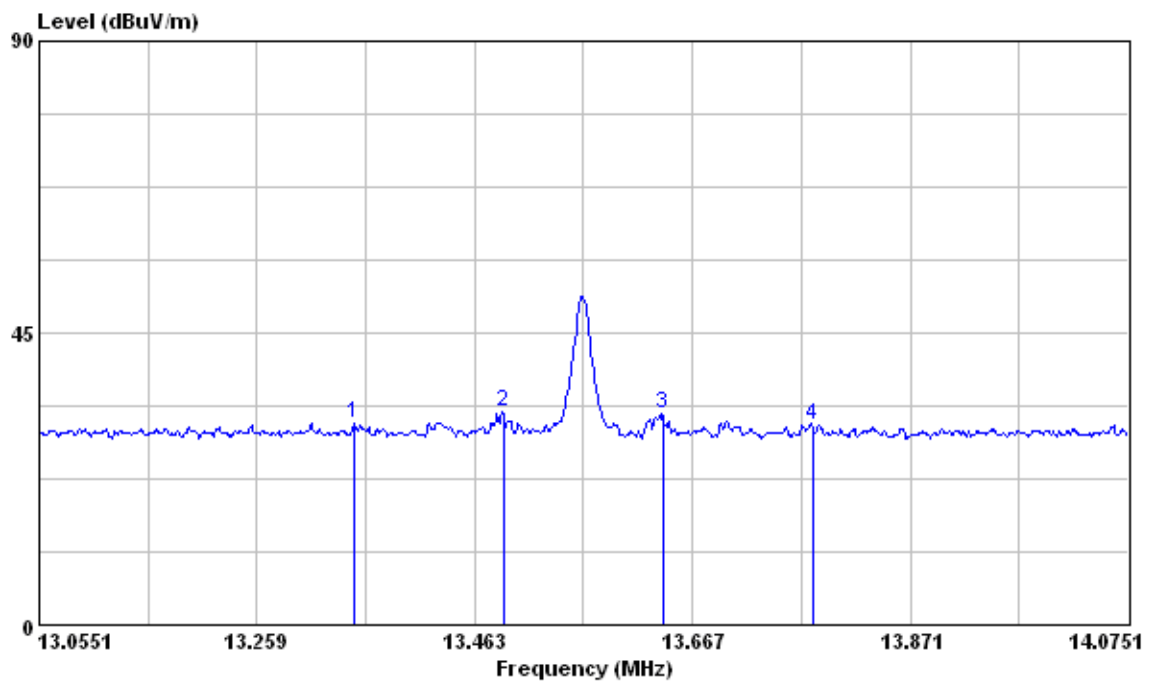
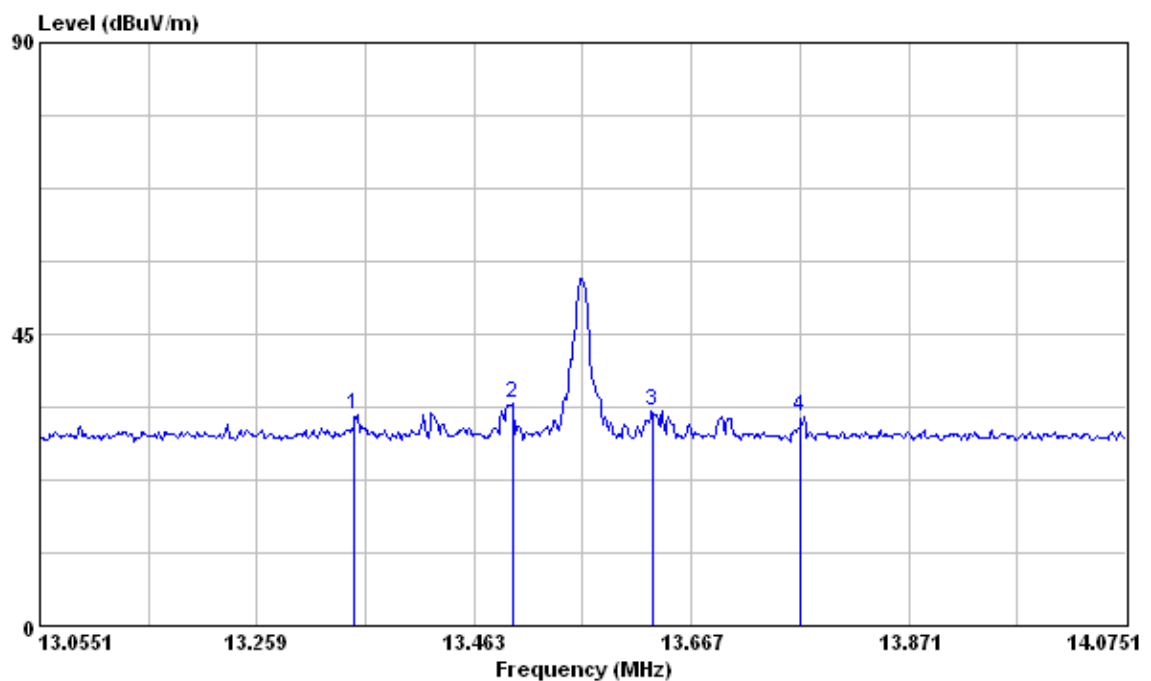
Test Distance : 3m

Tester : Jacky

Emission Freq. (MHz)	Polarizortal	Reading Data (dBuV)	Correction Factor (dB/m)	Maximum Emission within the band (dBuV/m)	Limit (dBuV/m)	Margin (dB)
13.35	V	17.16	14.04	31.20	80.51	49.31
13.35	H	18.50	14.04	32.54	80.51	47.97
13.49	V	18.95	14.03	32.98	90.47	57.49
13.50	H	20.31	14.03	34.34	90.47	56.13
13.64	V	18.57	14.02	32.59	90.47	57.88
13.63	H	19.14	14.02	33.16	90.47	57.31
13.78	V	16.66	14.02	30.68	80.51	49.83
13.77	H	18.31	14.02	32.33	80.51	48.18

Note :

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor
2. Maximum Emission within the band (dBuV/m) = Reading Data + Correction Factor
3. The formula transfers the limit at 30 m to 3m is  $L_3 = L_{30} \times (d_{30} / d_3)^2 = L_{30}(\text{dBuV/m}) + 40$
4. Margin (dB) = Limit –Maximum Emission within the band

**V Polarization****H Polarization**



### 3 Radiated Emission

Result: Pass

#### 3.1 Applied Standard

According to 15.225(d), The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

\*\* Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

**3.2 Test Instruments**

<b>Test Site and Equipment</b>	<b>Manufacturer</b>	<b>Model No./ Serial No.</b>	<b>Last Calibration Date</b>	<b>Calibration Due Date</b>
Test Receiver	R&S	ETSI/100019	2010/5/18	2011/5/18
Antenna	EMCO	6502/20558	2008/8/3	2011/8/3
Antenna	EMCO	3142C/52088	2010/5/16	2011/5/16
Pre-amplifier	Mini-circuit	ZKL-2/009	2011/2/7	2011/8/7
RF Cable	N/A	N/A/C0080	2011/2/7	2011/8/7
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2011/4/17	2012/4/17

Note:

1. The calibrations are traceable to NML/ROC.

**Instrument Setting**

<b>RBW</b>	<b>VBW</b>	<b>Detector</b>	<b>Trace</b>	<b>Comment</b>
9kHz	N/A	Quasi-Peak	Maxhold	Below 30MHz
120kHz	N/A	Quasi-Peak	Maxhold	Below 1GHz

**Climatic Condition**

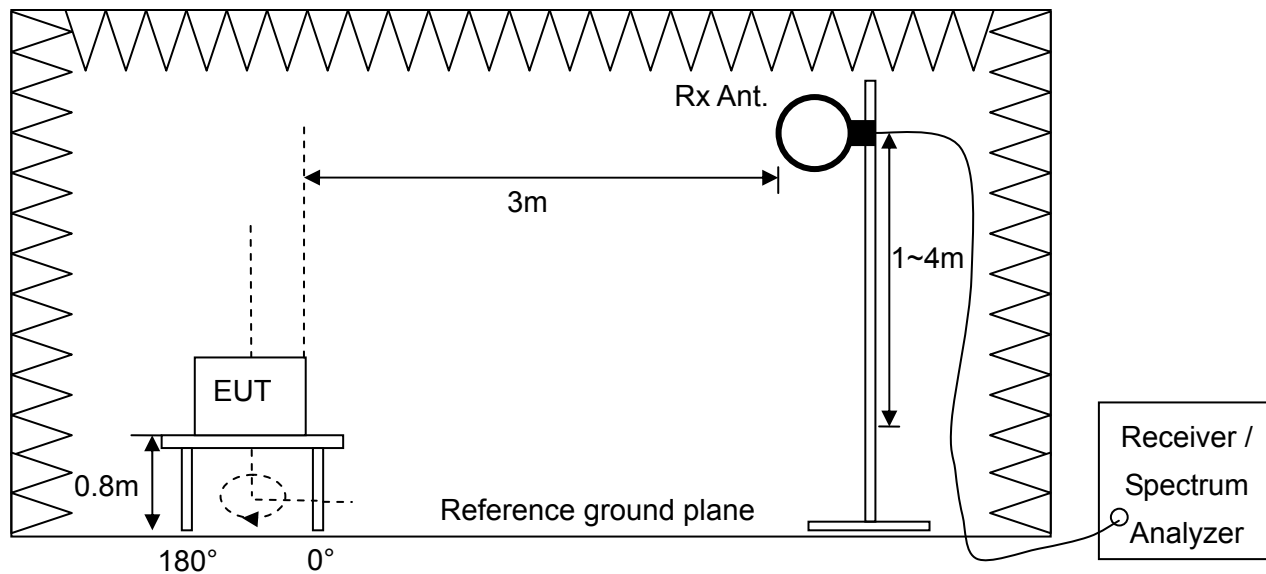
Ambient Temperature : 24°C; Relative Humidity : 55%

### **3.3 Measurement Procedure**

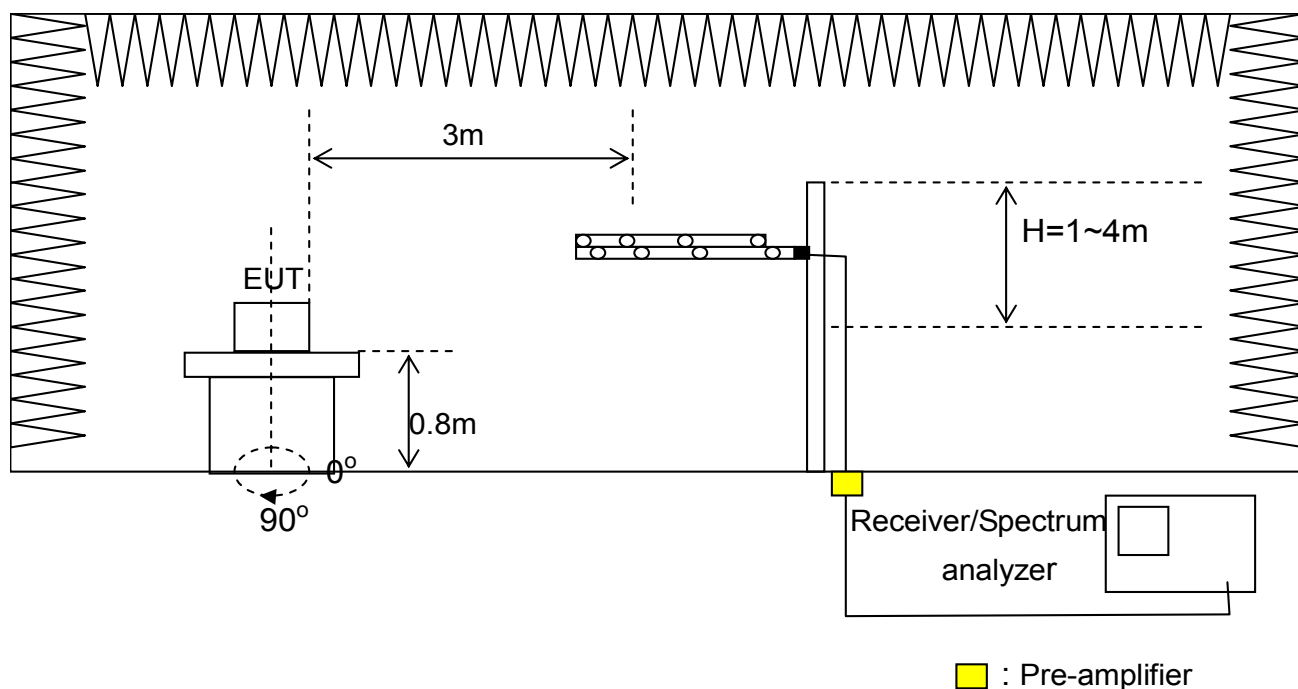
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. A software provided by client enabled the EUT to transmit and receive data at specified channel frequencies individually.
- c. If the EUT is tabletop equipment, it was placed on a wooden table with a height of 0.8 meters above the reference ground plane in the semi-anechoic chamber. If the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane in the semi-anechoic chamber.
- d. The EUT was set 3m away from the interference receiving antenna.
- e. Rapidly sweep the signal in the test frequency range by using the spectrum through the Maximum-peak detector.
- f. Rotate the EUT from 0° to 360° and position the receiving antenna at heights from 1 to 4 meters above the reference ground plane continuously to determine at least six frequencies associated with higher emission levels and record them.
- g. Then measure each frequency found from step f. by using the spectrum with rotating the EUT and positioning the receiving antenna height to determine the maximum level.
- h. For measurement of frequency above 1000MHz, the beamwidth of receiving horn antenna should keep covering EUT when the receiving horn antenna height varied.
- i. For measurement of frequency above 1000MHz, set the spectrum analyzer to find out the maximum peak or average level occurred, if any.
- j. Record frequency, azimuth angle of the turntable, height, and polarization of the receiving antenna and compare the maximum level with the required limit.
- k. Change the receiving antenna to another polarization to measure radiated emission by following step e. to j. again.
- l. If the peak emission level below 1000MHz measured from step f. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.
- m. If the peak emission level above 1000MHz measured from step f. is 20dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate A.V. value will be measured and presented.

### 3.4 Test Configuration

#### Below 30MHz



#### Above 30MHz



## 3.5 Test Data

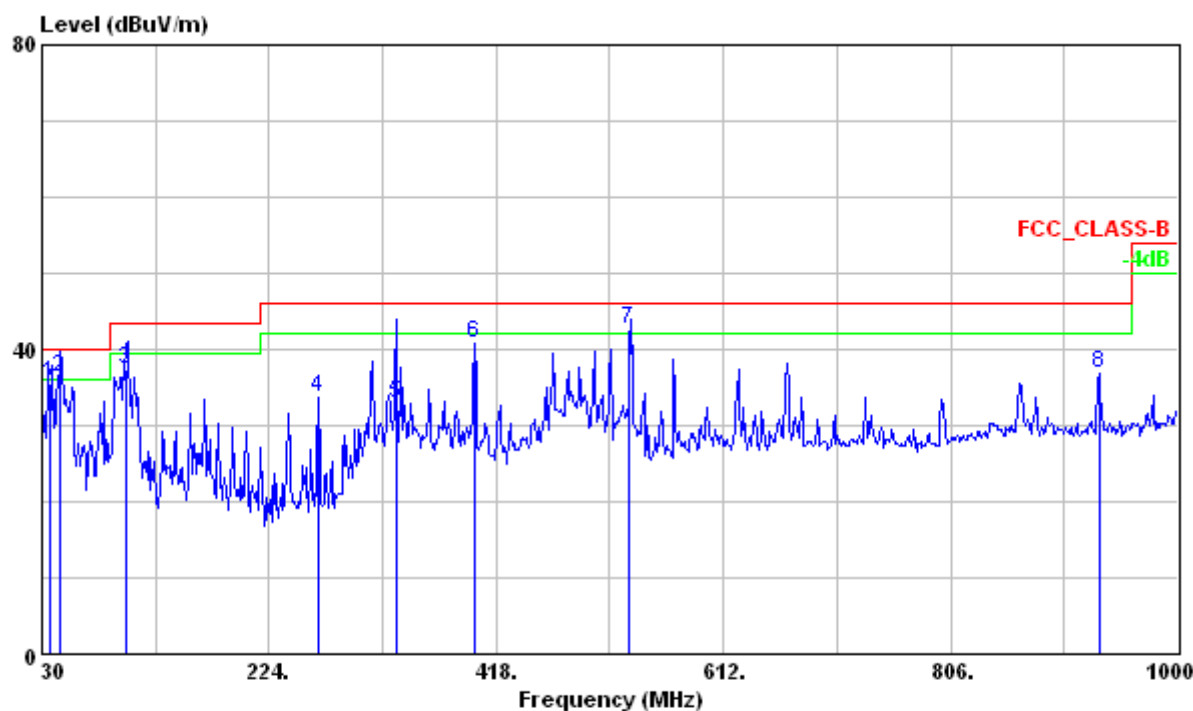
Test Mode : Contuious transmitting

Test Distance : 3m

Tester : Jacky

Polarization : Vertical

Frequency Range : 9KHz~1GHz



	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dB/m	dBuV	dBuV/m	dB	cm	deg		
1	37.365	35.66	-12.77	48.43	40.00	-4.34	100	29	VERTICAL	QP
2 !	45.745	36.36	-16.45	52.81	40.00	-3.64	100	300	VERTICAL	QP
3	101.915	37.45	-18.64	56.09	43.50	-6.05	100	337	VERTICAL	QP
4	266.520	33.56	-13.30	46.86	46.00	-12.44	---	---	VERTICAL	Peak
5	332.625	32.77	-11.13	43.90	46.00	-13.23	135	165	VERTICAL	QP
6	399.400	40.80	-9.11	49.91	46.00	-5.20	---	---	VERTICAL	Peak
7 !	531.998	42.53	-6.12	48.65	46.00	-3.47	100	160	VERTICAL	QP
8	932.800	36.84	-0.74	37.58	46.00	-9.16	---	---	VERTICAL	Peak

Note:

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor
2. Emission Level (dBuV/m) = Reading Data + Correction Factor
3. Margin (dB) = Limit – Emission Level

No signal can be detected from 9kHz to 30MHz, so the graphs are omitted below 30MHz.

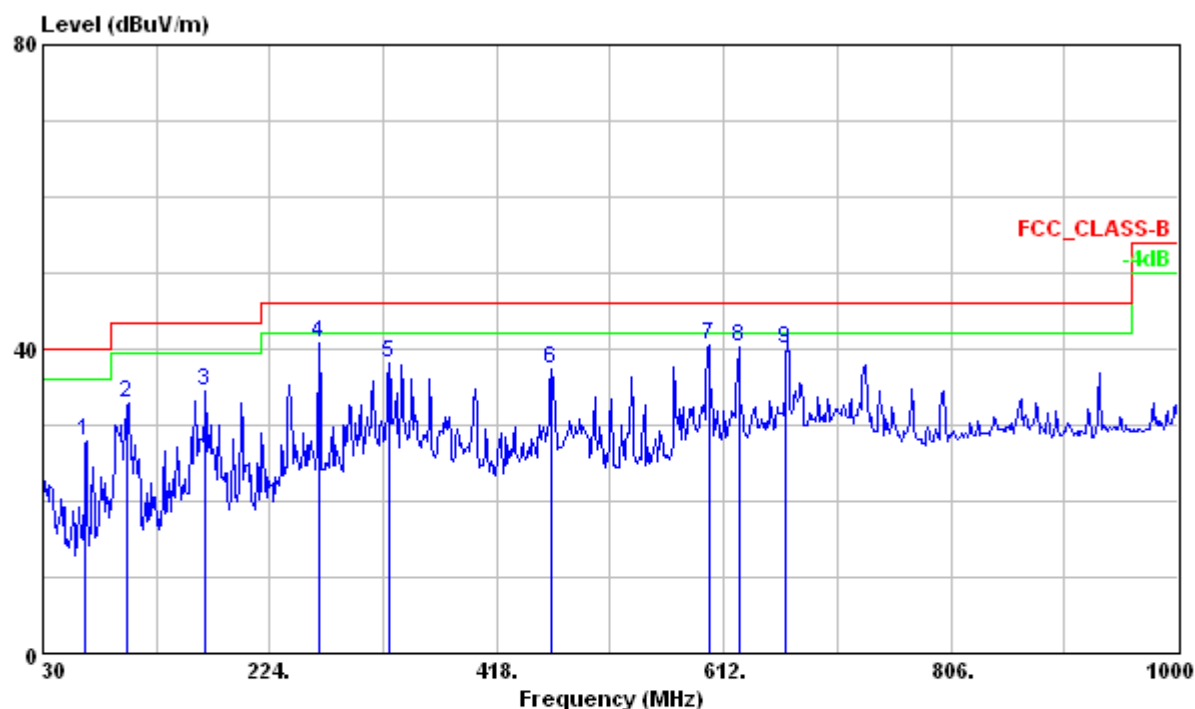
Test Mode : Contuious transmitting

Test Distance :3m

Tester : Jacky

Polarization : Horizontal

Frequency Range : 9kHz~1GHz



	Frequency (MHz)						Ant Pos	Table Pos	Pol/Phase	Remark
	Freq	Level	Factor	Read	Limit	Over				
	MHz	dBuV/m	dB/m	dBuV	dBuV/m	dB	cm	deg		
1	66.450	27.94	-19.58	47.52	40.00	-12.06	---	---	HORIZONTAL	Peak
2	102.090	32.94	-18.65	51.59	43.50	-10.56	---	---	HORIZONTAL	Peak
3	167.970	34.36	-16.80	51.16	43.50	-9.14	---	---	HORIZONTAL	Peak
4	266.520	40.86	-13.30	54.16	46.00	-5.14	---	---	HORIZONTAL	Peak
5	325.900	38.12	-11.37	49.49	46.00	-7.88	---	---	HORIZONTAL	Peak
6	464.500	37.44	-7.69	45.13	46.00	-8.56	---	---	HORIZONTAL	Peak
7	599.600	40.45	-4.70	45.15	46.00	-5.55	---	---	HORIZONTAL	Peak
8	624.610	40.27	-4.51	44.78	46.00	-5.73	---	---	HORIZONTAL	Peak
9	664.975	40.09	-3.91	44.00	46.00	-5.91	100	178	HORIZONTAL	QP

Note:

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor
2. Emission Level (dBuV/m) = Reading Data + Correction Factor
3. Margin (dB) = Limit – Emission Level

No signal can be detected from 9kHz to 30MHz, so the graphs are omitted below 30MHz.

## 4 Frequency Tolerance

Result: Pass

### 4.1 Applied Standard

According to 15.225(e), the frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over a temperature variation of  $-20$  degrees to  $+50$  degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 4.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Data
Spectrum Analyzer	Agilent	E4405B/ MY45106706	2011/3/29	2012/3/29
Temperature Chamber	Terchy	MHG-800LF/ 920224	2010/8/7	2011/8/7
Adjustable AC Power Supply	EXTECH	6110/1102108	NCR	NCR
Test Site	N.A.	TR13	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

### Instrument Setting

RBW	VBW	Detector	Trace	Comment
300Hz	1kHz	Peak	Maxhold	

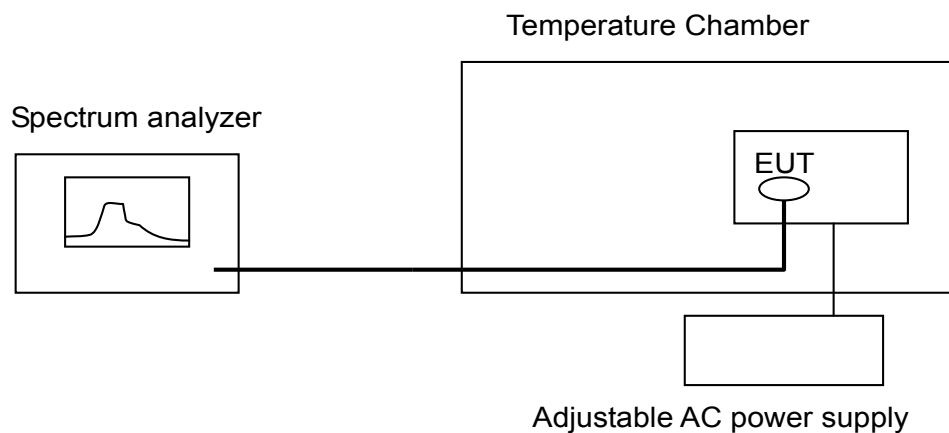
### Climatic Condition

Ambient Temperature : 23°C; Relative Humidity : 65%

### 4.3 Measurement Procedure

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage described in the user's manual supported by the manufacturer in test site TR13.
- b. Measure the frequency tolerance by using the spectrum analyzer and following the test conditions described in FCC 15.225(e) to perform the normal and extreme test conditions tests.
- c. Record the level and compare with the required limit.

### 4.4 Test Configuration





## 4.5 Test Data

Test Mode : Continuous transmitting

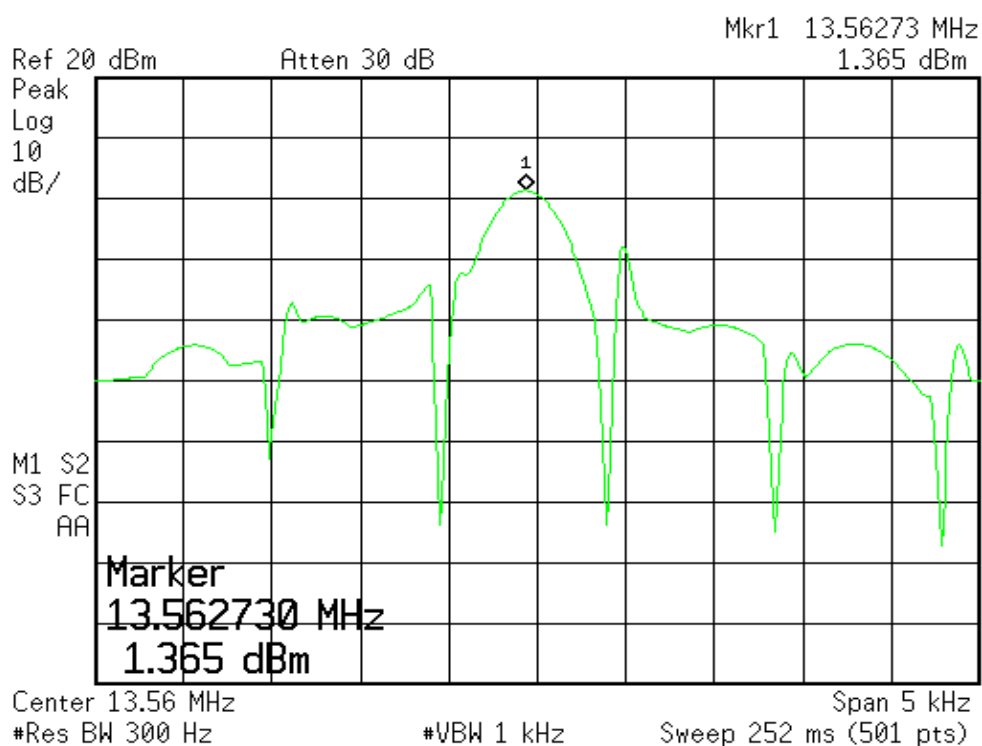
Tester : Jun Kong

Temperature (°C)	AC Voltage (Volt)	Meas. Frequency (MHz)	Deviation (%)	Limit (%)	Margin (%)
20°C	120	13.56273	NA	NA	NA
	138	13.56273	0.000	0.01	0.010
	102	13.56273	0.000	0.01	0.010
-20°C	120	13.56284	0.0008	0.01	0.0092
50°C	120	13.56277	0.0003	0.01	0.0097

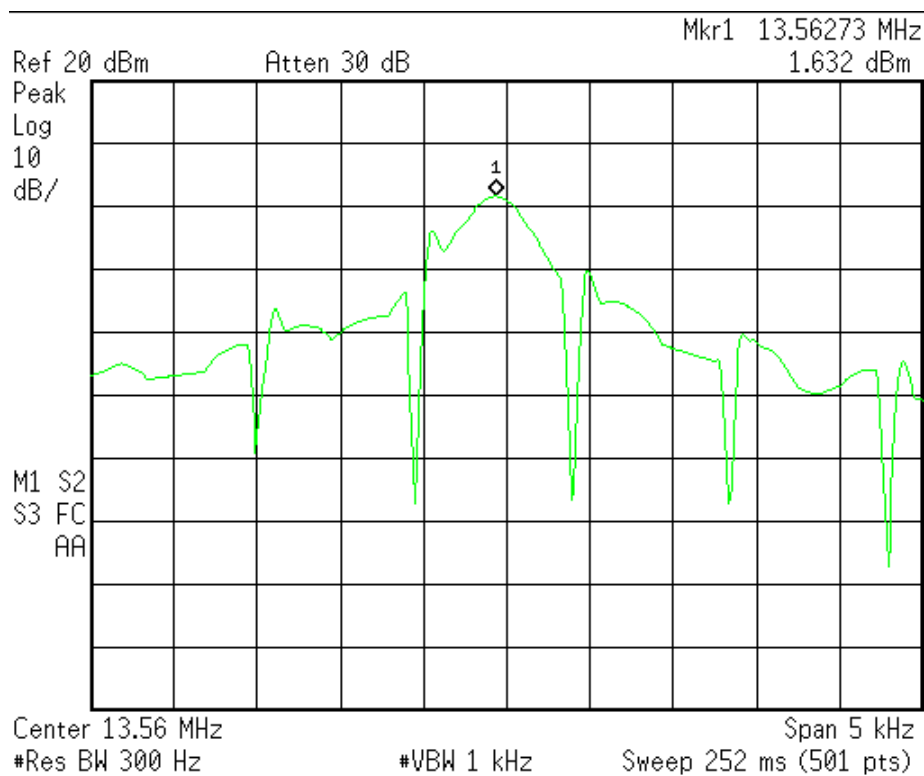
Note:

1. Meas. Frequency @20°C/120Vac : Operated Frequency
2. Deviation(%) = ( | Meas. Frequency – Operated Frequency | / Operated Frequency ) × 100%
3. Margin (%) = Limit – Deviation

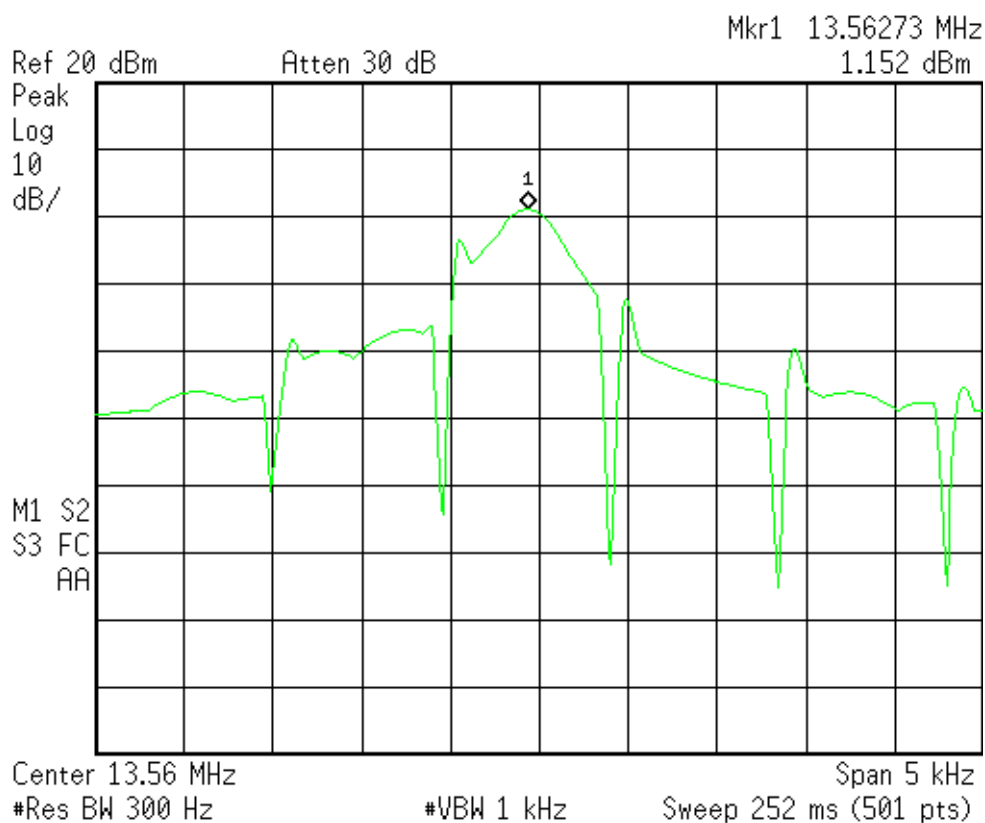
## 20°C, 120Vac

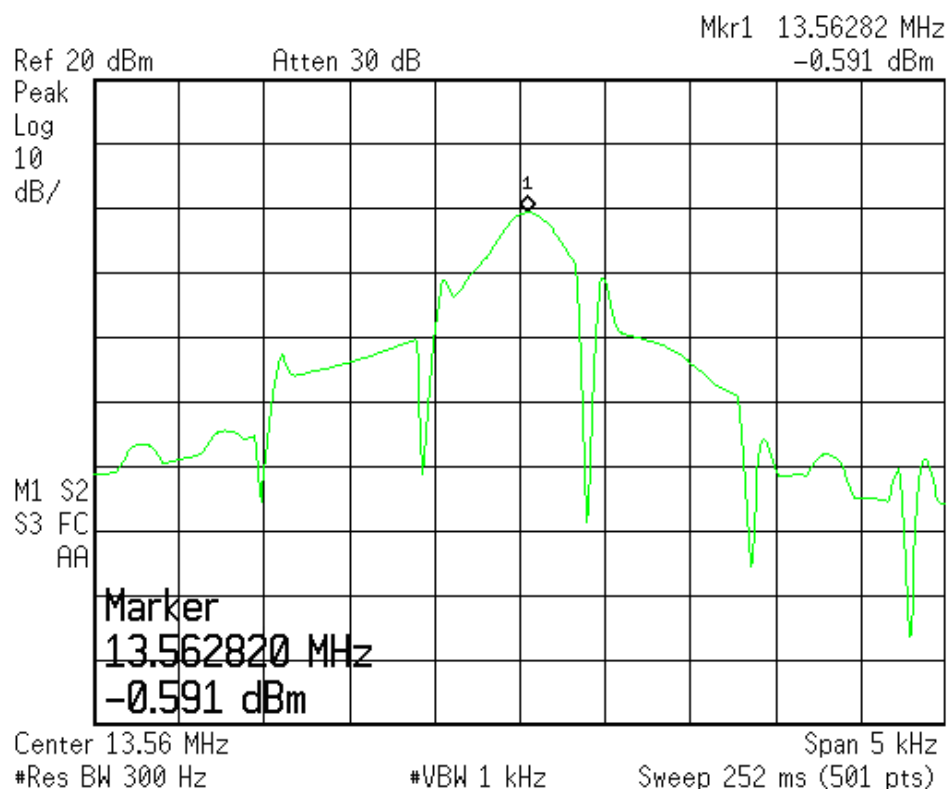
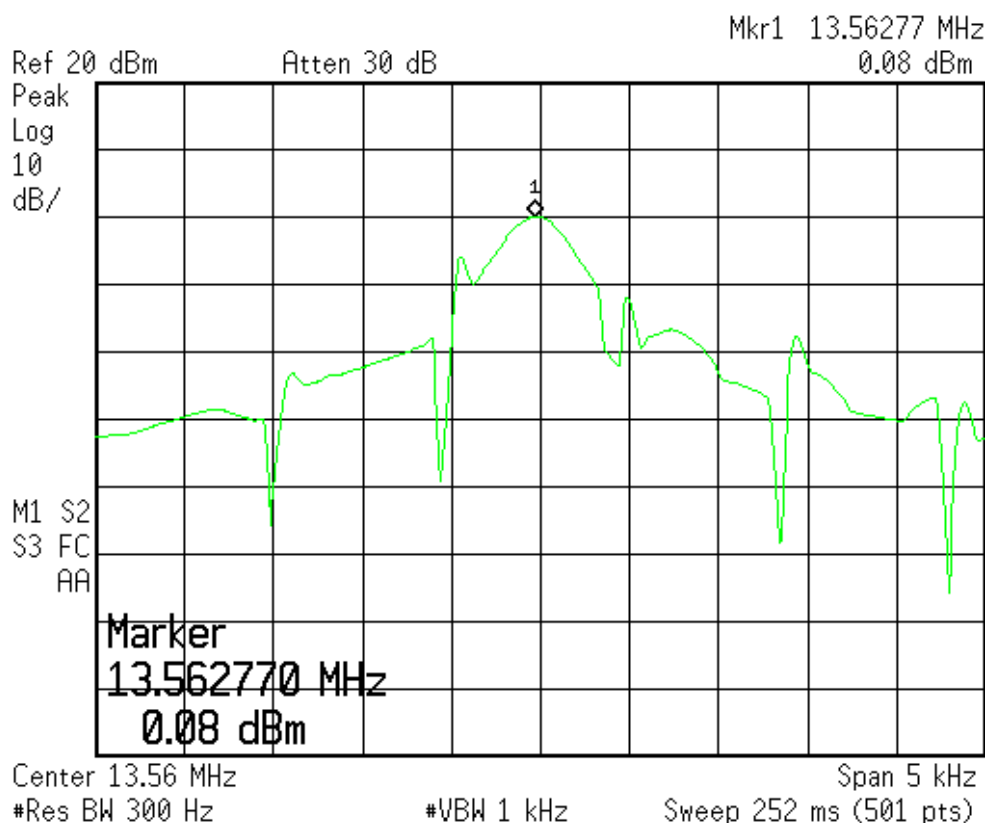


20°C, 138Vac



20°C, 102Vac



**-20°C, 120Vac****50°C, 120Vac**

**5 20dB Bandwidth****Result: Pass****5.1 Applied Standard**

According to 15.215(c) requires the device must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

According to 15.225, Operation within the band 13.110 – 14.010 MHz.

**5.2 Test Instruments**

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Data
Spectrum Analyzer	Agilent	E4405B/ MY45106706	2011/3/29	2012/3/29
Test Site	N.A.	TR13	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

**Instrument Setting**

RBW	VBW	Detector	Trace	Comment
9kHz	30kHz	Peak	Maxhold	

**Climatic Condition**

Ambient Temperature : 23°C; Relative Humidity : 65%

### 5.3 Measurement Procedure

- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage described in the user's manual supported by the manufacturer in the test site TR13.
- b. Measure the 20dB bandwidth by using the spectrum analyzer and following the test conditions described in FCC 15.215.
- c. Record the frequencies and compare with the required limit.

### 5.4 Test Configuration

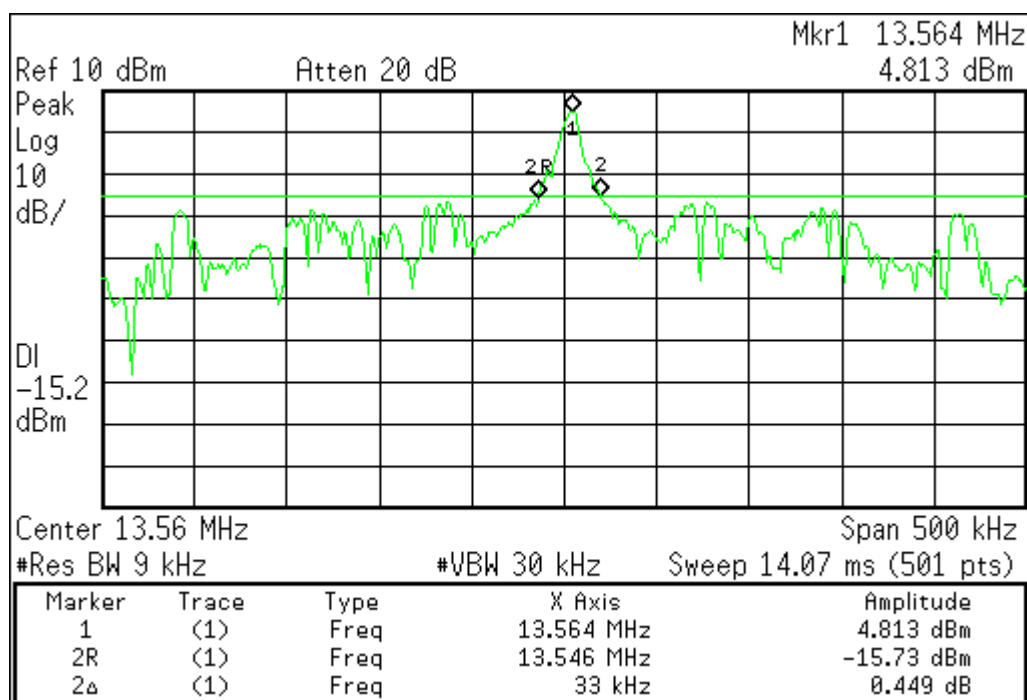


## 5.5 Test Data

Test Mode : Continuous transmitting

Tester : Jun Kong

Operating Frequency (MHz)	The lowest frequency (MHz)	The highest frequency (MHz)	Limit (MHz)
13.56	13.546	13.579	13.110~14.01



## 6 Conducted Emission Measurement

Test Result: Pass

### 6.1 Limits for Emission Measurement

For intentional device, according to §15.207(a) line conduction emission limit is as below table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

\* Decreases with the logarithm of the frequency.

Note:

For a device with a permanent antenna operating at or below 30 MHz, the FCC will accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

## 6.2 Test Instruments

Test Site and Equipment	Manufacturer	Model No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ESCS 30/ 836858/021	2011/1/14	2012/1/14
LISN	R&S	ESH2-Z5/ 836613/001	2010/5/26	2011/5/26
2 <sup>nd</sup> LISN	R&S	ENV4200/ 833209/010	2011/1/14	2012/1/14
50Ω terminator	N/A	N/A/001	2010/8/26	2011/8/26
RF Switch	N/A	RSU28/ 338965/002	2010/8/23	2011/8/23
RF Cable	N/A	N/A/ C0052 ~ 56	2010/8/23	2011/8/23
Test Software	Audix	e3/ Ver. 5.2004-2-19k	NCR	NCR
shielded room	ETS LINDGREN	TR5/15353-F	NCR	NCR

Note:

1. The calibrations are traceable to NML/ROC.
2. NCR : No Calibration Required.

## Instrument Setting

IF BW	Measurement Time	Detector	Trace	Comment
9kHz	1 second	Quasi-Peak / Average	Maxhold	

## Climatic Condition

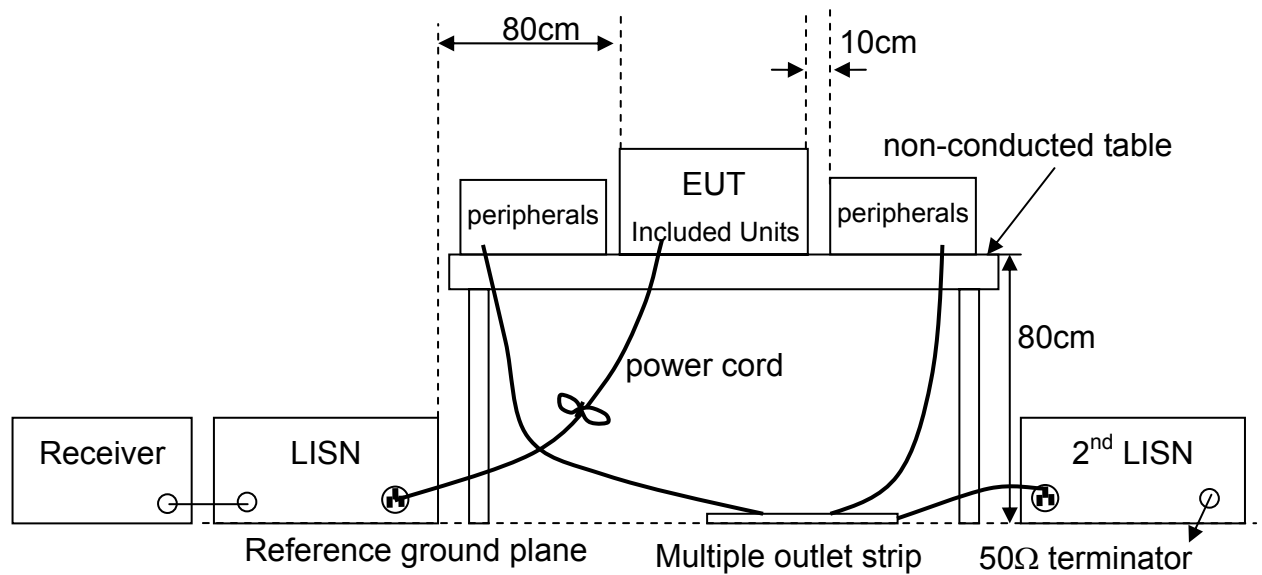
Ambient Temperature : 27°C;      Relative Humidity : 65%



### **6.3 Test Procedures**

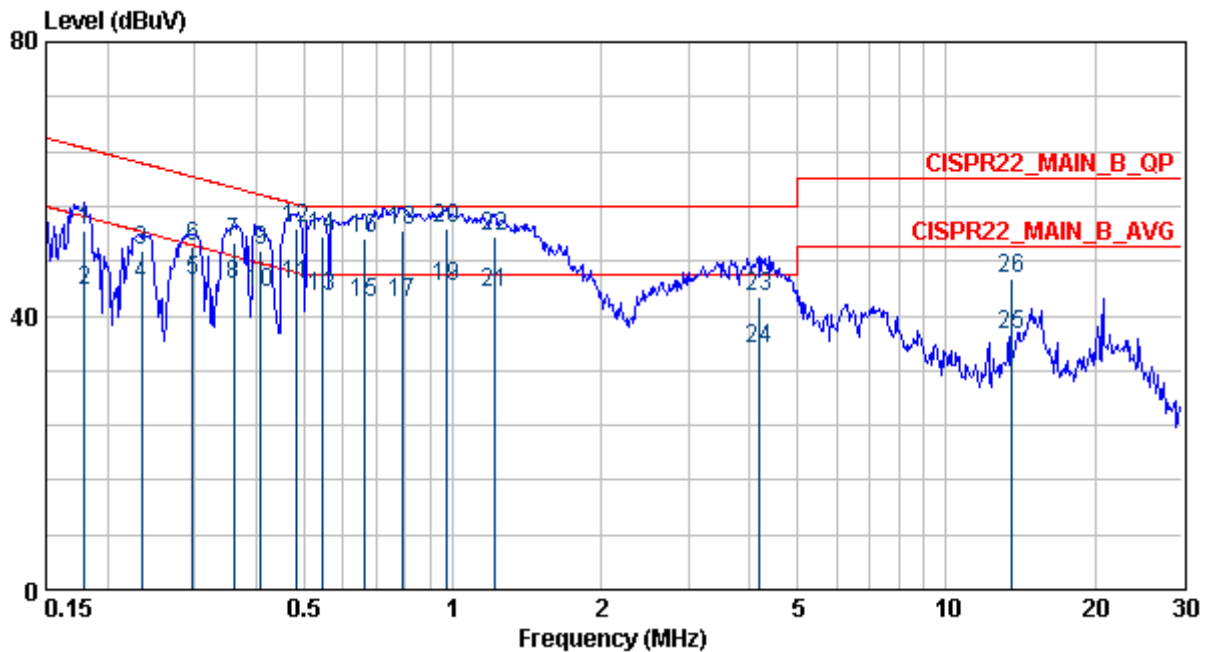
- a. The EUT was set up per the test configuration figured in the next section of this chapter to simulate the typical usage per the user's manual.
- b. If the EUT is tabletop equipment, it was placed on a non-conducted table with a height of 0.8 meters above the reference ground plane and 0.4 meters from the conducting wall of the shielded room. Also if the EUT is floor-standing equipment, it was placed on a non-conducted support with a height of 12 millimeters above the reference ground plane.
- c. Connect the EUT's power source to the appropriate power mains through the LISN.
- d. All the other peripherals are connected to the 2<sup>nd</sup> LISN, if any.
- e. The LISN was placed 0.8 meters from the EUT and at least 0.8 meters from other units and other metal planes.
- f. Measure the conducted emissions on each power line (Neutral Line and Line 1 – Hot side) of the EUT's power source by using the test receiver connected to the coupling RF output port of LISN.
- g. Rapidly scan the signal from 150kHz to 30MHz by using the receiver through the Maximum-Peak detector to determine those frequencies associated with higher emission levels for each measured line.
- h. Then measure the maximum level of conducted disturbance for each frequency found from step g. by using the receiver through the Quasi-Peak and Average detectors per CISPR 16-1.
- i. Record the level for each frequency and compare with the required limit.

## 6.4 Test Configurations



## 6.5 Test Results

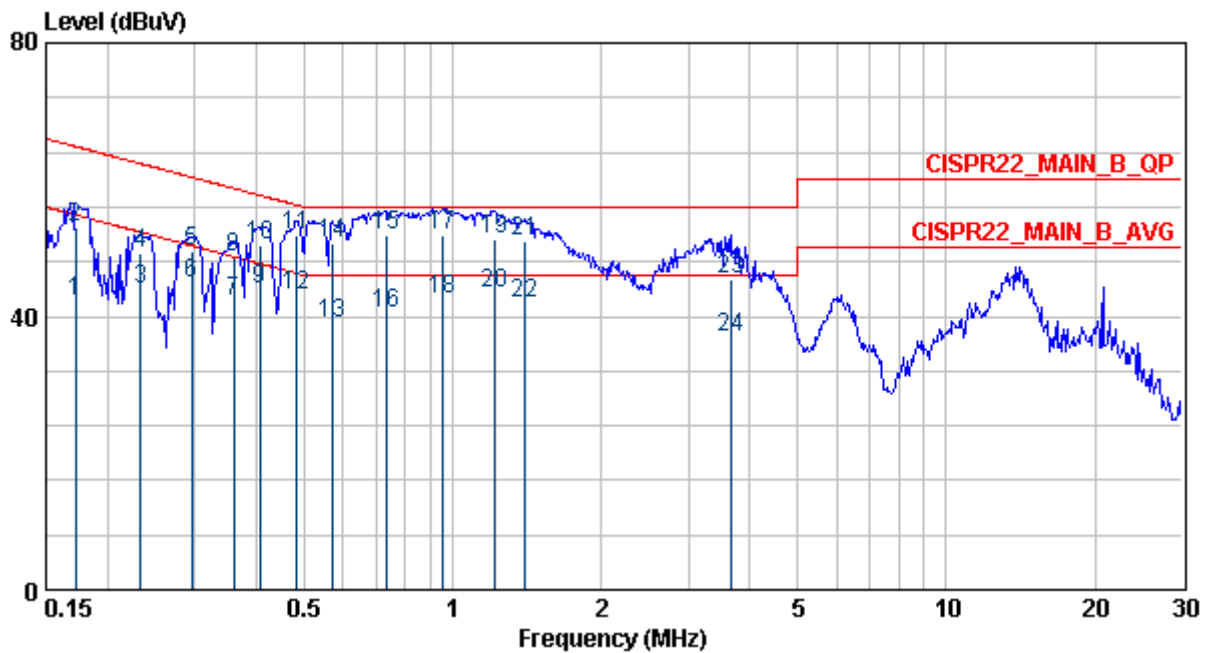
Test Mode : Transmitting with antenna  
Tester : CDC Frequency Range : 150kHz~30MHz  
Phase : Line



Note:

Tx Fundamental, for reference only. Please refer to next page.

Test Mode : Transmitting with dummy load  
Tester : CDC Frequency Range : 150kHz~30MHz  
Phase : Line

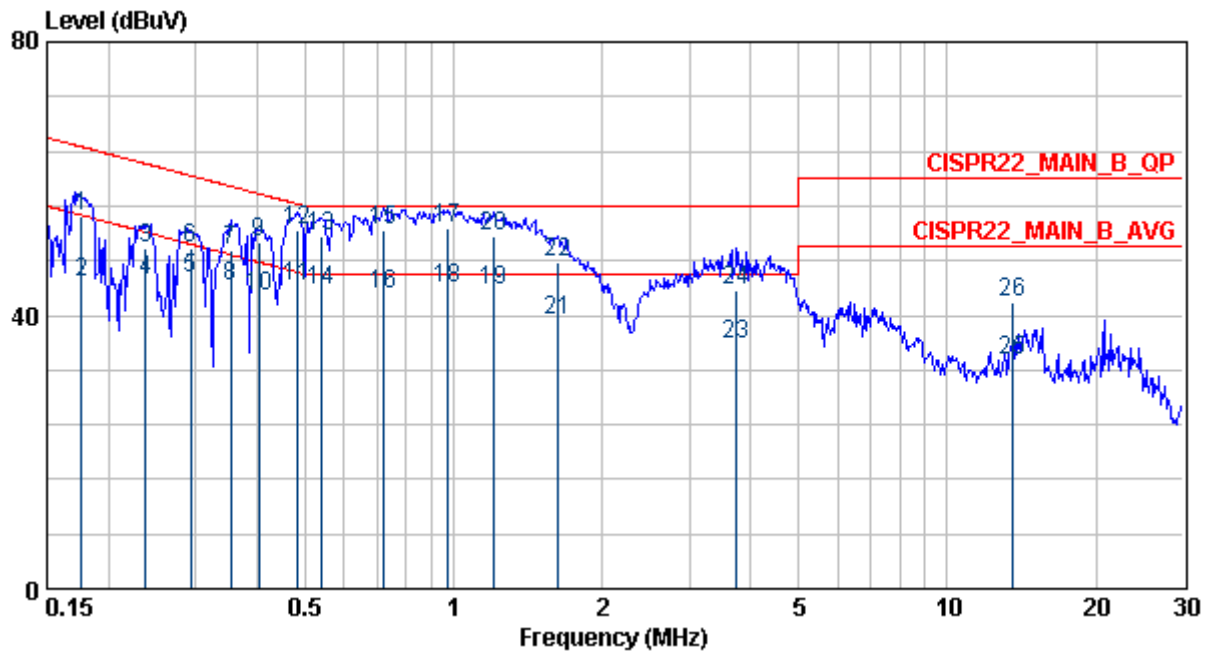


	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Ant Pos	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	cm		
1	0.172	42.29	0.24	42.05	54.85	-12.56	---	LINE	AVERAGE
2	0.172	53.04	0.24	52.80	64.85	-11.81	---	LINE	QP
3	0.234	44.09	0.25	43.84	52.31	-8.22	---	LINE	AVERAGE
4	0.234	49.19	0.25	48.94	62.31	-13.12	---	LINE	QP
5	0.296	49.50	0.26	49.24	60.37	-10.87	---	LINE	QP
6	0.296	44.83	0.26	44.57	50.37	-5.54	---	LINE	AVERAGE
7	0.359	42.24	0.27	41.97	48.74	-6.50	---	LINE	AVERAGE
8	0.359	48.66	0.27	48.39	58.74	-10.08	---	LINE	QP
9	0.406	44.10	0.28	43.82	47.73	-3.63	---	LINE	AVERAGE
10	0.406	50.50	0.28	50.22	57.73	-7.23	---	LINE	QP
11	0.484	51.79	0.29	51.50	56.27	-4.49	---	LINE	QP
12	0.484	43.07	0.29	42.78	46.27	-3.21	---	LINE	AVERAGE
13	0.570	38.88	0.28	38.60	46.00	-7.12	---	LINE	AVERAGE
14	0.570	50.72	0.28	50.44	56.00	-5.28	---	LINE	QP
15	0.731	51.93	0.32	51.61	56.00	-4.07	---	LINE	QP
16	0.731	40.39	0.32	40.07	46.00	-5.61	---	LINE	AVERAGE
17	0.958	51.84	0.31	51.53	56.00	-4.16	---	LINE	QP
18	0.958	42.47	0.31	42.16	46.00	-3.53	---	LINE	AVERAGE
19	1.216	51.39	0.33	51.06	56.00	-4.61	---	LINE	QP
20	1.216	43.36	0.33	43.03	46.00	-2.64	---	LINE	AVERAGE
21	1.403	50.87	0.34	50.53	56.00	-5.13	---	LINE	QP
22	1.403	41.79	0.34	41.45	46.00	-4.21	---	LINE	AVERAGE
23	3.661	45.48	0.44	45.04	56.00	-10.52	---	LINE	QP
24	3.661	36.89	0.44	36.45	46.00	-9.11	---	LINE	AVERAGE

Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

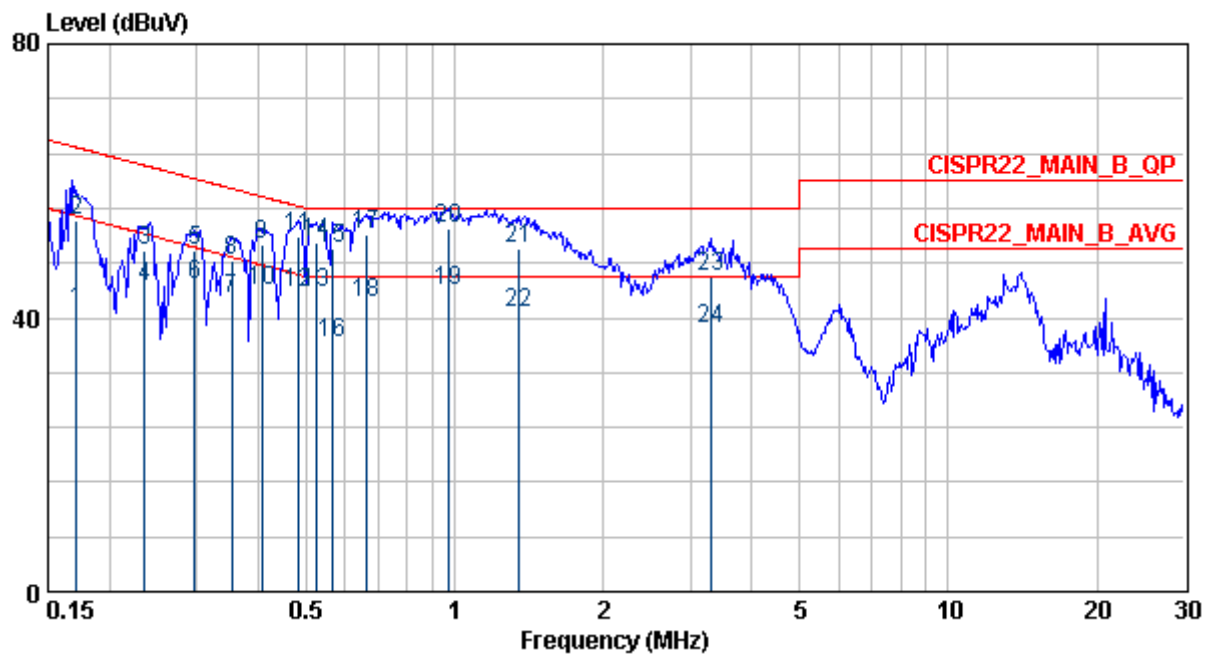
Test Mode : Transmitting with antenna  
Tester : CDC Temperature : 24°C  
Humidity : 75%RH Frequency Range : 150kHz~30MHz  
IF Bandwidth : 9kHz Phase : Neutral



Note:

Tx Fundamental, for reference only. Please refer to next page.

Test Mode : Transmitting with dummy load  
Tester : CDC Frequency Range : 150kHz~30MHz  
Phase : Neutral



	Freq	Level	Factor	Read Level	Limit Line	Over Limit	Ant Pos	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	cm		
1	0.172	40.92	0.29	40.63	54.89	-13.96	---	NEUTRAL	AVERAGE
2	0.172	54.33	0.29	54.04	64.89	-10.55	---	NEUTRAL	QP
3	0.236	49.87	0.30	49.57	62.25	-12.37	---	NEUTRAL	QP
4	0.236	44.52	0.30	44.22	52.25	-7.72	---	NEUTRAL	AVERAGE
5	0.297	49.77	0.31	49.46	60.32	-10.55	---	NEUTRAL	QP
6	0.297	44.92	0.31	44.61	50.32	-5.40	---	NEUTRAL	AVERAGE
7	0.354	42.70	0.33	42.37	48.87	-6.17	---	NEUTRAL	AVERAGE
8	0.354	48.29	0.33	47.96	58.87	-10.58	---	NEUTRAL	QP
9	0.406	50.64	0.34	50.30	57.73	-7.09	---	NEUTRAL	QP
10	0.406	44.09	0.34	43.75	47.73	-3.64	---	NEUTRAL	AVERAGE
11	0.484	51.82	0.35	51.47	56.27	-4.46	---	NEUTRAL	QP
12	0.484	43.60	0.35	43.25	46.27	-2.68	---	NEUTRAL	AVERAGE
13	0.524	43.63	0.35	43.28	46.00	-2.37	---	NEUTRAL	AVERAGE
14	0.524	51.04	0.35	50.69	56.00	-4.96	---	NEUTRAL	QP
15	0.567	50.07	0.34	49.73	56.00	-5.93	---	NEUTRAL	QP
16	0.567	36.22	0.34	35.88	46.00	-9.78	---	NEUTRAL	AVERAGE
17	0.665	52.18	0.37	51.81	56.00	-3.82	---	NEUTRAL	QP
18	0.665	42.10	0.37	41.73	46.00	-3.90	---	NEUTRAL	AVERAGE
19	0.968	44.04	0.37	43.67	46.00	-1.96	---	NEUTRAL	AVERAGE
20	0.968	52.99	0.37	52.62	56.00	-3.01	---	NEUTRAL	QP
21	1.352	50.04	0.39	49.65	56.00	-5.96	---	NEUTRAL	QP
22	1.352	40.67	0.39	40.28	46.00	-5.33	---	NEUTRAL	AVERAGE
23	3.293	45.96	0.47	45.49	56.00	-10.04	---	NEUTRAL	QP
24	3.293	38.38	0.47	37.91	46.00	-7.62	---	NEUTRAL	AVERAGE

## Note:

1. Emission Level = reading value + correction factor.
2. Correction factor = cable loss + insertion loss of LISN.
3. Q.P. is abbreviation of quasi-peak.

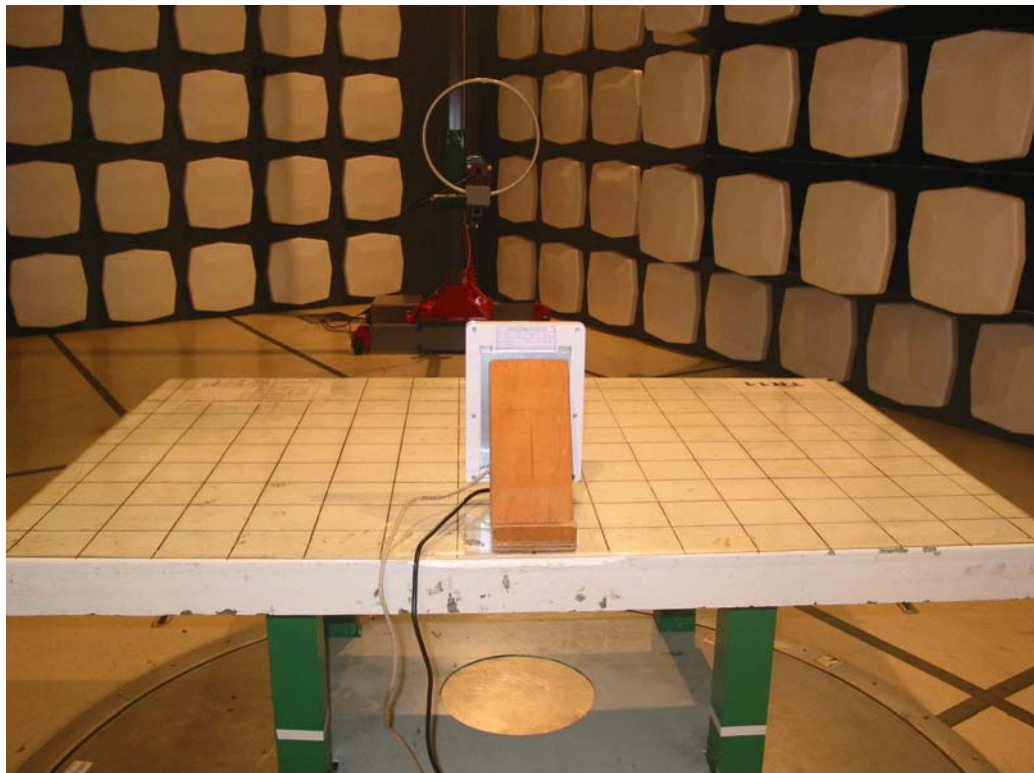
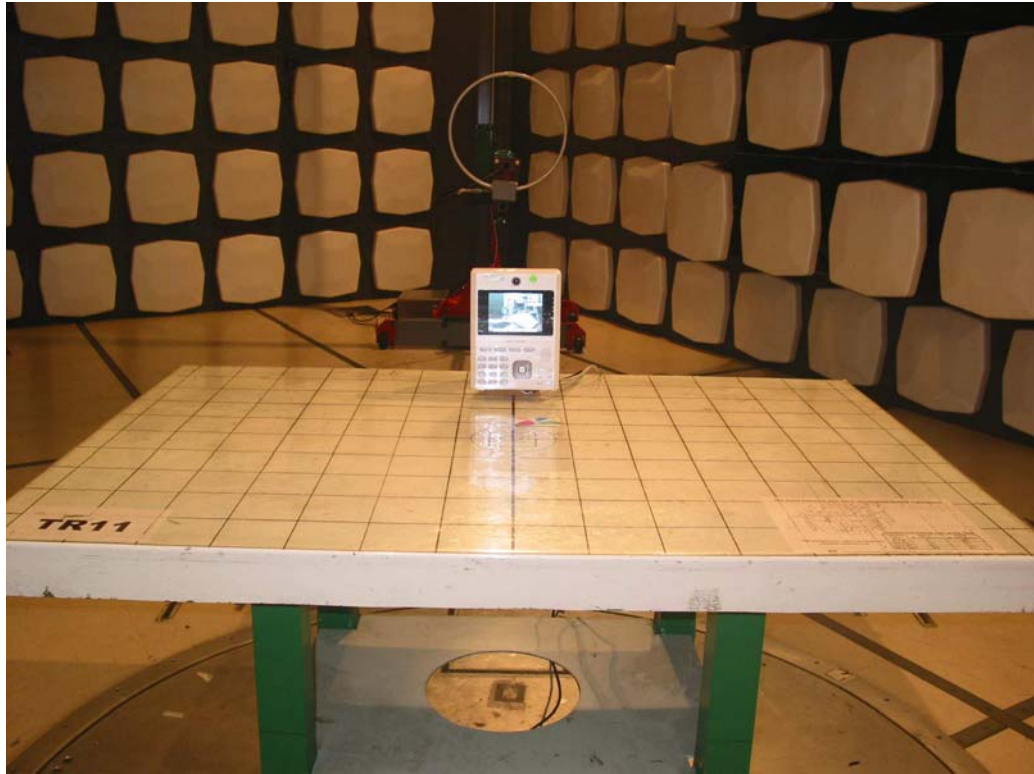


# **Attachment 1**

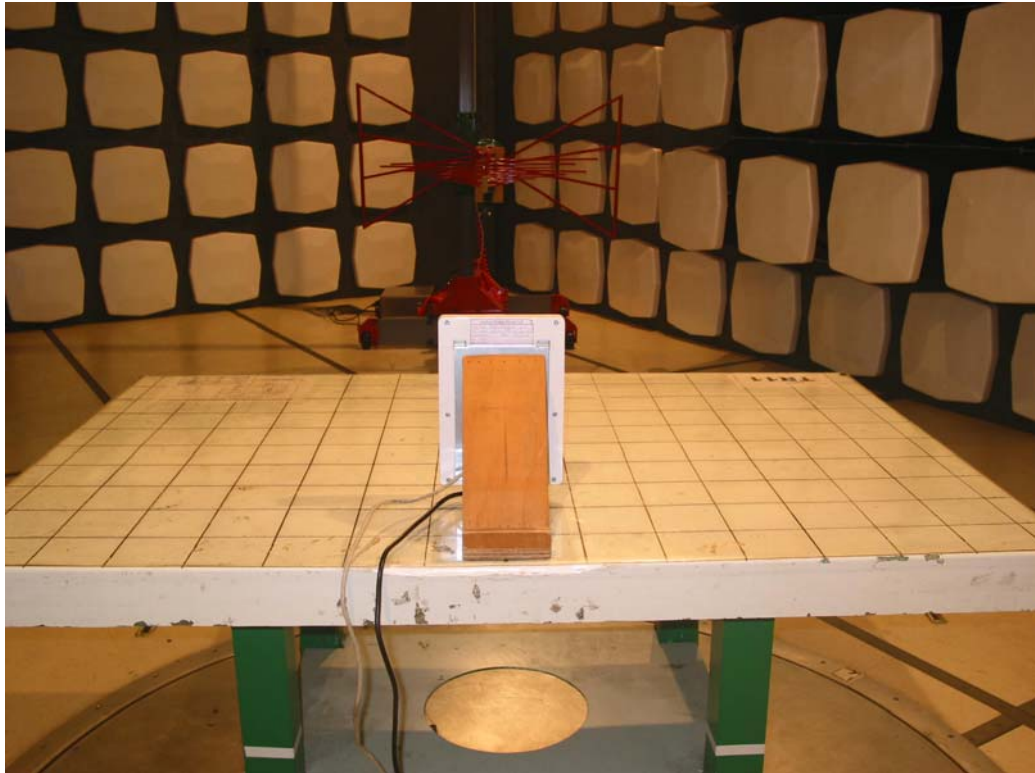
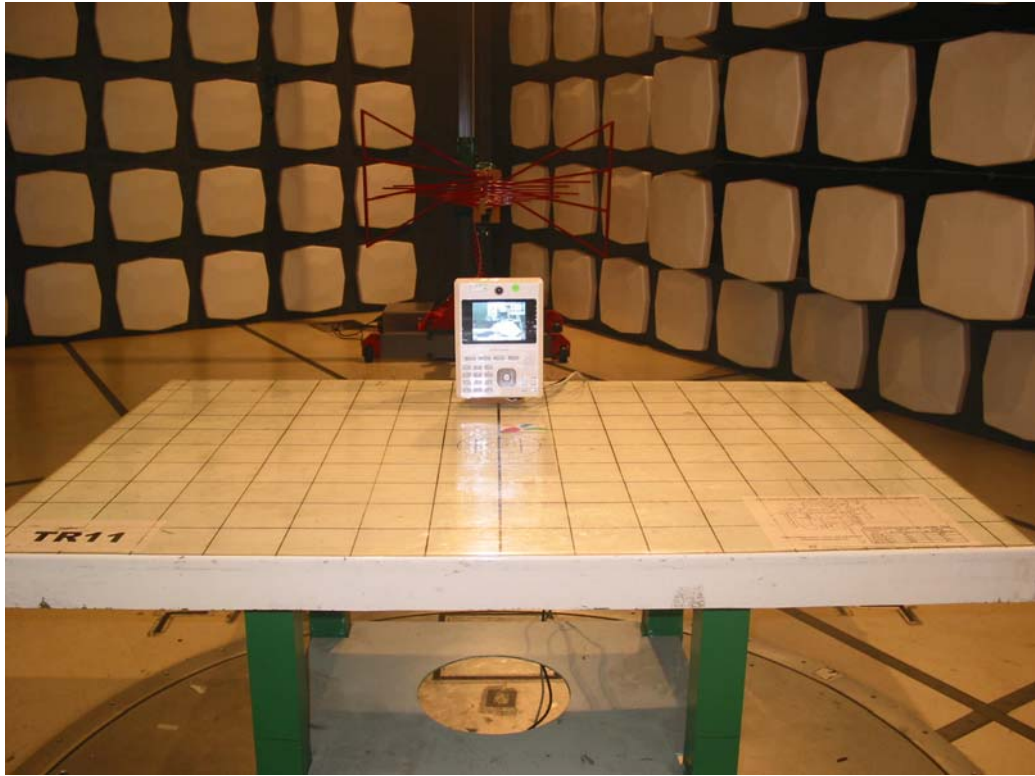
## **Photographs of the Test Configurations**

## **Radiated Emission Measurement**

**9kHz~30MHz**



**Above 30MHz**



## **Attachment 2**

### **External Photographs of EUT**









## **Attachment 3**

### **Internal Photographs of EUT**



