

FCC Test Report

for

Remote Control

Mode Number : UTM-TV
Trade Name : Audiovox corporation
FCC ID : F4Z4K3CR20JA01
Report Number : RF-T013-0908-094
Date of Receipt : August 12, 2009
Date of Report : August 13, 2009

Prepared for

FORWARD ELECTRONIC CO., LTD.

393, Chung Cheng Rd., Sec. 1, Sanhsia Town, Taipei County, Taiwan, 237, R.O.C.

Prepared by



Central Research Technology Co.

EMC Test Laboratory

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NVLAP LAB CODE 200575-0

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Certification

Equipment under Test : Remote Control
Trade Name : Audiovox corporation
Mode Number : UTM-TV
FCC ID : F4Z4K3CR20JA01
Manufacturer : FORWARD ELECTRONIC CO., LTD.
Applicant : FORWARD ELECTRONIC CO., LTD.
Address : 393, Chung Cheng Rd., Sec. 1, Sanhsia Town, Taipei
County, Taiwan, 237, R.O.C.
Date of Testing : August 12, 2009
Applicable Standards : 47 CFR part 15, Subpart C
Deviation : NA
Condition of Test Sample : Engineering 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 : Cathy Chen , DATE : Aug. 13, 2009
(Cathy Chen/ Technical Manager)
APPROVED BY : J. Y. Shih , DATE : Aug. 13, 2009
(Tsun-Yu Shih/Laboratory Head)

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1 General Description

1.1 General Description of EUT

Equipment under Test : Remote Control
Mode Number : UTM-TV
Power in : 3Vdc
Test Voltage : 3Vdc (Batteryx2)
Manufacturer : FORWARD ELECTRONIC CO., LTD.
Channel Numbers : 1
Frequency Range : 27.045MHz
Modulation : FSK
Function Description :

The EUT is used to transmit control command. Please refer to the user's manual for the details.

1.2 Test Methodology

For this EUT, both conducted and radiated emissions were performed according to the procedures illustrated in ANSI C63.4:2003 and other required measurements were illustrated in separate sections of this test report for detail.

Since the EUT is considered a portable unit, it was pre-tested on the positioned of each 3 axis. There for only the test data of the worse case- z axiz was used for Radiated test.

1.3 Applied standards

(1) Field strength of fundamental

According to 15.227 (a), the field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

(2) Radiated Emission Requirement

According to 15.227 (b), The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209

According to 15.209, the general requirement of field strength of radiated emissions from intentional radiator at a distance of 3 meters shall not exceed the below table.

Frequency (MHz)	Measurement Distance (m)	Field Strength (uV/m)	Field Strength (dBuV/m)
30 – 88	3	100	40.0
88 – 216	3	150	43.5
216 – 960	3	200	46.0
960 – 1610	3	500	54.0
above 1610	3	500	54.0

Note 1- The lower limit shall apply at the transition frequency.

(3) Restricted Band

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (MHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
² 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			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

1.4 The Support Units

No.	Unit	Mode No./ Serial No.	Trade Name	Power Code	Supported by lab.
NA	-	-	-	-	-

1.5 Layout of Setup



Connecting Cables :

No.	Cable	Length	Shielded	Core	Shielded Backshell	Supported by lab.	Note
NA	-	-	-	-	-	-	

Justification :

For both conducted and radiated emission below 1GHz, the system was configured for typical fashion as a customer could normal use it. The peripherals other than EUT was connected in normally standing by situation.

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.
TR10	3m semi-anechoic chamber (9m × 6m × 6m)	
TR11	3m semi-anechoic chamber (9m × 6m × 6m)	
TR13	Chamber	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	ISO/IEC 17025
Site Filing Document	USA	FCC	474046, TW1053	Test facility list & NSA Data
	Canada	IC	4699A-1,-3	Test facility list & NSA Data
	Japan	VCCI	R-1527,C-1609,T-131,T-1441	Test facility list & NSA Data
Authorization Certificate	Germany	TUV	10021687-2007	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

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	
Radiated Emission: (30MHz~200MHz)	Horizontal 2.8dB ; Vertical 3.5 dB	
Radiated Emission: (200MHz~1GHz)	Horizontal 3.4dB ; Vertical 2.8dB	
Line Conducted Emission	ESH2-Z5	3.1dB
	ENV 4200	3.8dB

2 Field strength of Fundamental

Result: Pass

2.1 Applied standard

The field strength of any emission within this band shall not exceed 10,000 microvolts/meter at 3 meters. The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in Section 15.35 for limiting peak emissions apply.

2.2 Test Instruments

Test Site and Equipment	Manufacturer	Mode No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ETSI/100019	2008/11/26	2009/11/25
Antenna	EMCO	6502/20558	2008/8/4	2011/8/3
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2009/6/30	2010/6/29

Note:

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

Instrument Setting

RBW	VBW	Detector	Trace	Comment
100kHz	300kHz	Peak	Maxhold	Peak
100kHz	10Hz	Peak	Maxhold	Average

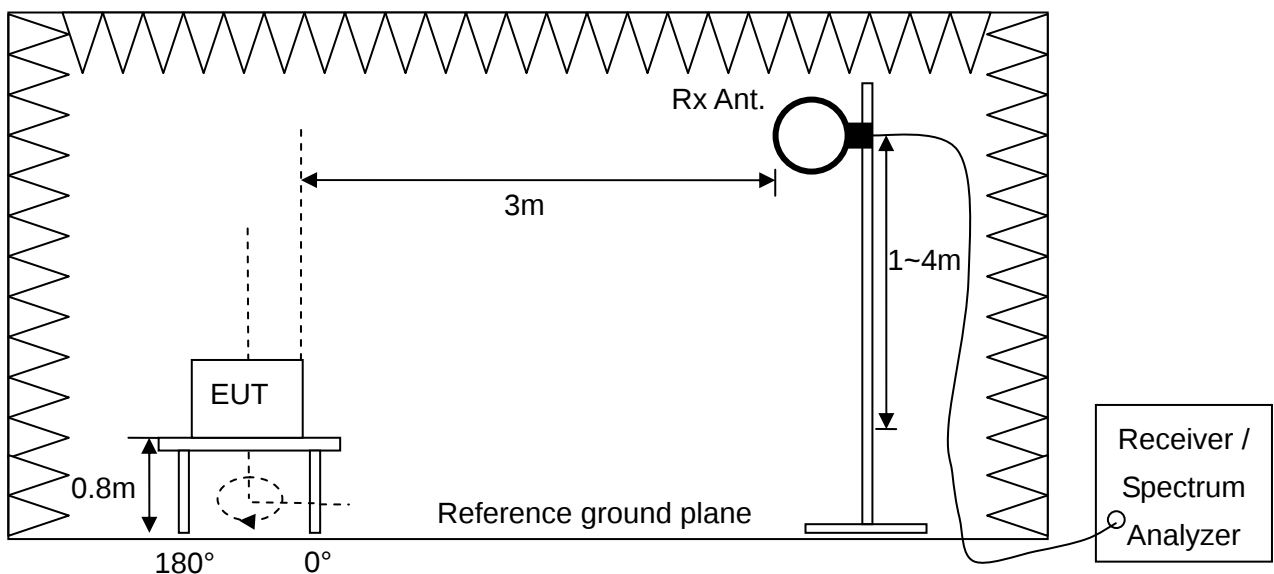
Climatic Condition

Ambient Temperature : 28°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 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 is 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

Test Mode : 27.045MHz

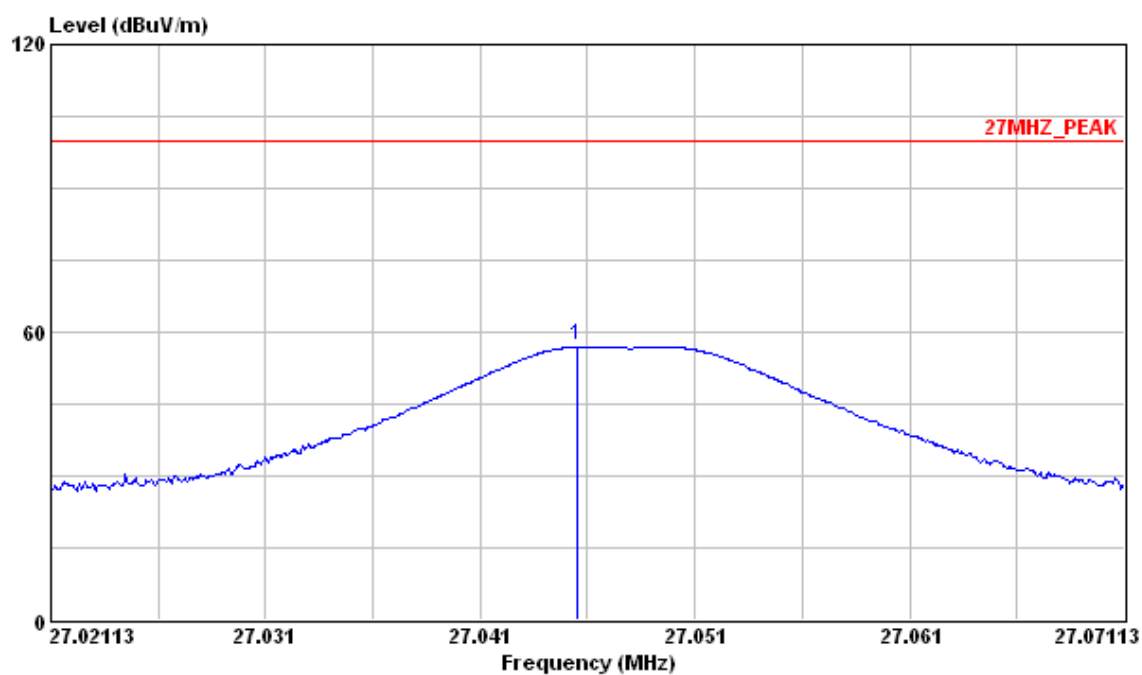
Tester : Jacky

Frequency (MHz)	Polarization	Reading Data (dBuV)		Correction Factor (dB/m)	Output Field Strength (dB μ V/m)		Limit (dB μ V/m)		Margin (dB)	
		PK	AV		PK	AV	PK	AV	PK	AV
27.046	V	44.58	43.89	12.66	57.24	56.55	100	80	42.76	23.45
	H	41.30	40.95	12.66	53.96	53.61	100	80	46.04	26.39

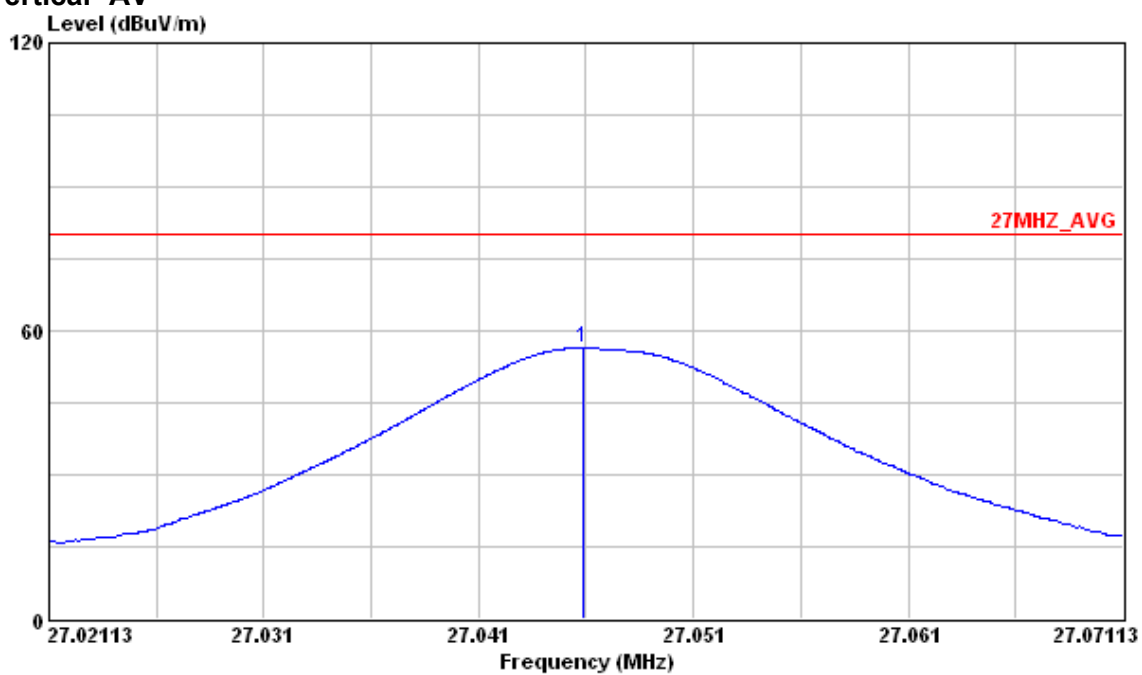
Note :

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Output Field Strength (dB μ V/m) = Reading Data + Correction Factor
3. Margin (dB) = Limit – Output Field Strength

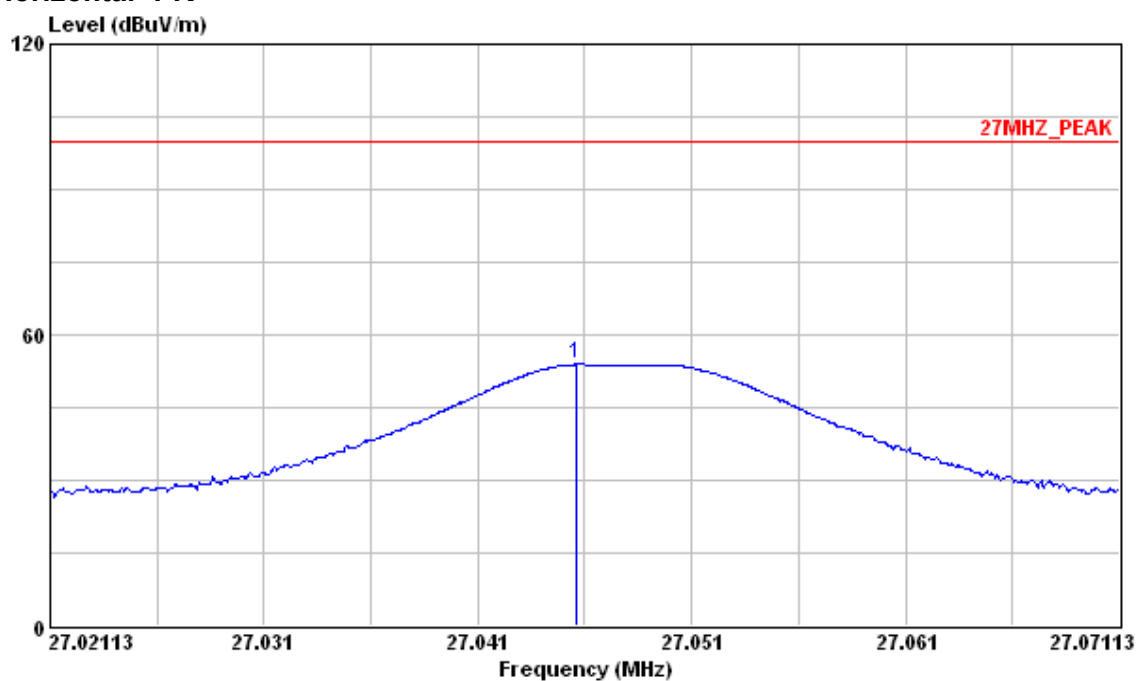
Vertical- PK



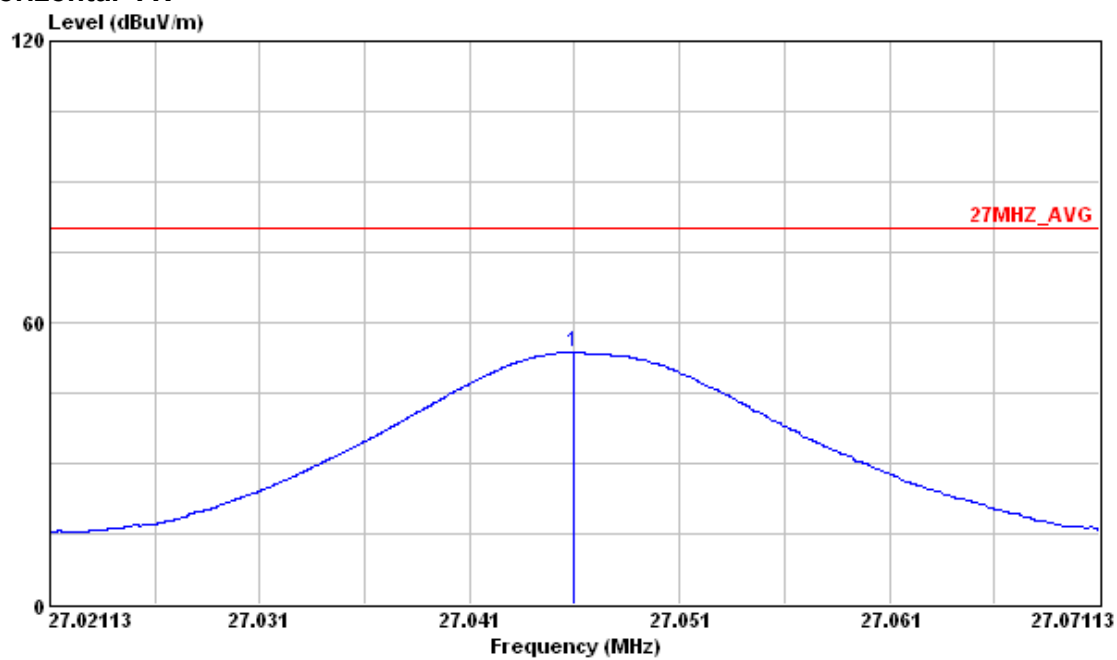
Vertical- AV



Horizontal- PK



Horizontal- AV



3 Radiated Emission Measurement

Result: Pass

3.1 Applied standard

The field strength of any emissions which appear outside of this band shall not exceed the general radiated emission limits in Section 15.209

Frequency (MHz)	Measurement Distance (m)	Field Strength (uV/m)	Field Strength (dBuV/m)
30 – 88	3	100	40.0
88 – 216	3	150	43.5
216 – 960	3	200	46.0
960 – 1610	3	500	54.0
above 1610	3	500	54.0

Note 1- The lower limit shall apply at the transition frequency.

3.2 Test Instruments

Test Site and Equipment	Manufacturer	Mode No./ Serial No.	Last Calibration Date	Calibration Due Date
Test Receiver	R&S	ETSI/100019	2008/11/26	2009/11/25
Antenna	EMCO	3142C/52088	2009/7/22	2010/7/21
PRE-AMPLIFIER	MITEQ	AMF-4D-005180-24 -10P/1072961	2008/12/19	2009/12/18
Semi - anechoic Chamber	ETS. LINDGREN	TR11/ 906-A	2009/6/30	2010/6/29

Note:

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

Instrument Setting

RBW	VBW	Detector	Trace	Comment
120kHz	N/A	Quasi-Peak	Maxhold	

Climatic Condition

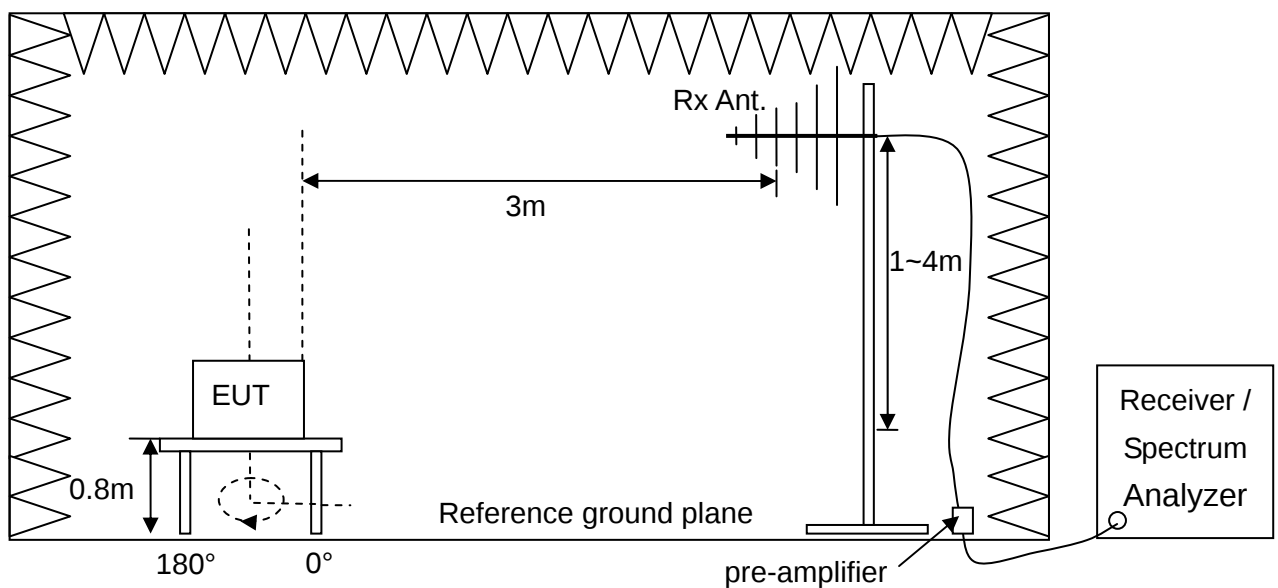
Ambient Temperature : 28°C; Relative Humidity : 55%

3.3 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. 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 below 1000MHz, set the receiver detector to be Quasi-Peak per CISPR 16-1 to find out the maximum level occurred.
- i. For measurement of frequency above 1000MHz, set the spectrum detector to be Peak or Average to find out the maximum 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.

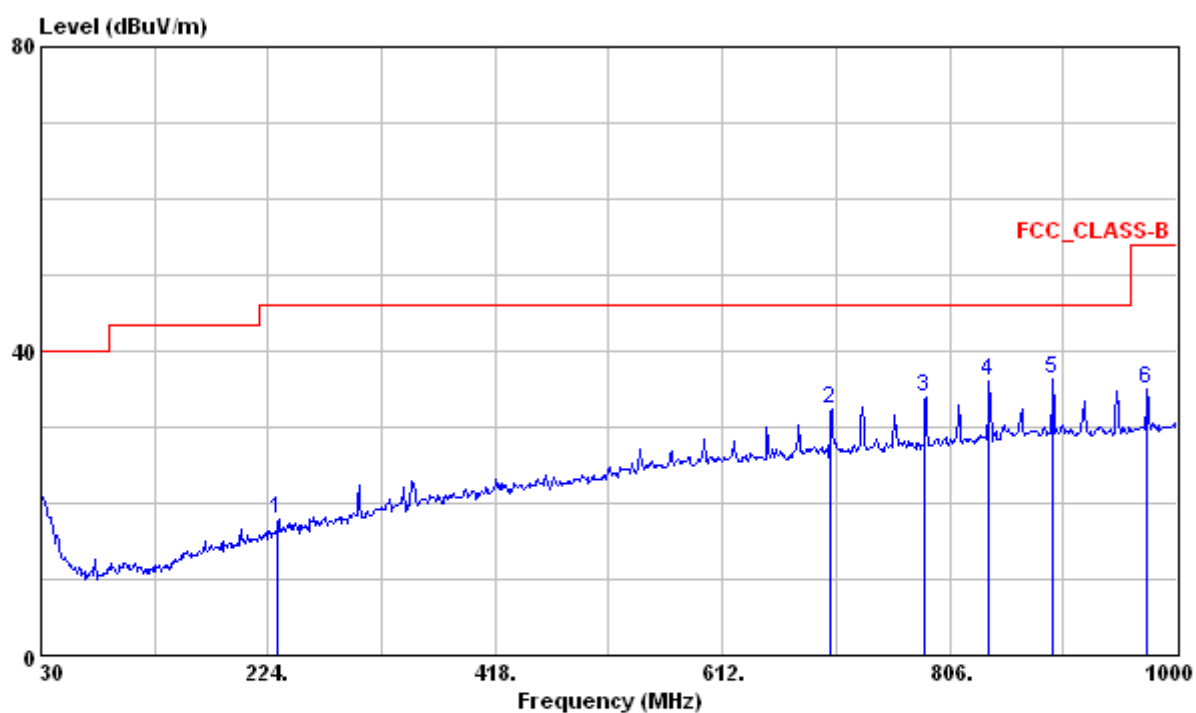
- l. If the peak emission level below 1000MHz measured from step f. is 4dB lower than the limit specified, then the emission values presented will be the peak value only. Otherwise, accurate Q.P. value will be measured and presented.
- m. If the peak emission level above 1000MHz measured from step f. 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



3.5 Test Data

Test Mode : Continuous Transmitting
Test Distance : 3m **Tester** : Jacky
Polarization : Vertical **Frequency Range** : 30MHz~1GHz



	Freq	Level	Read	Limit	Over	Ant	Table		
	MHz	dBuV/m	Level	Line	Limit	Pos	Pos	Pol/Phase	Remark
			dBuV	dB/m	dBuV/m	dB	cm	deg	
1	232.230	17.86	32.37	-14.51	46.00	-28.14	---	---	VERTICAL Peak
2	704.600	32.39	35.28	-2.89	46.00	-13.61	---	---	VERTICAL Peak
3	785.100	33.87	36.18	-2.31	46.00	-12.13	---	---	VERTICAL Peak
4	839.700	36.09	37.56	-1.47	46.00	-9.91	---	---	VERTICAL Peak
5	894.300	36.20	36.73	-0.53	46.00	-9.80	---	---	VERTICAL Peak
6	974.800	35.11	35.12	-0.01	54.00	-18.89	---	---	VERTICAL Peak

Note :

- Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
- Emission Level (dBuV/m) = Reading Data + Correction Factor

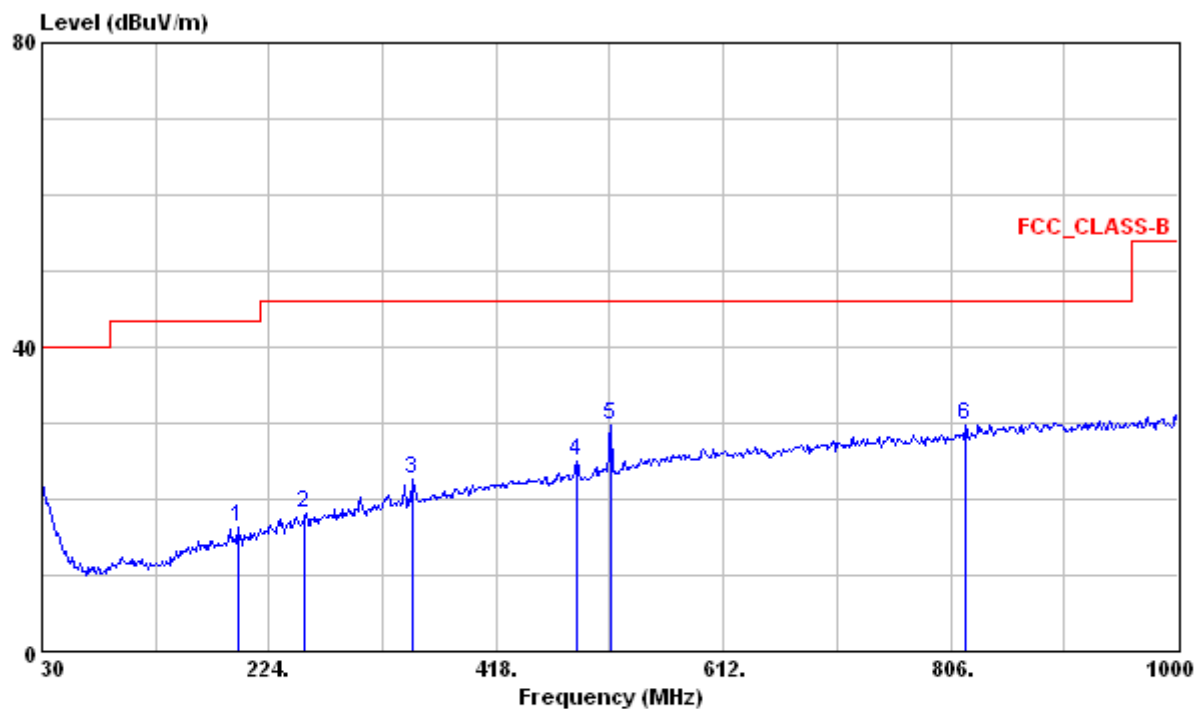
Test Mode : Continuous Transmitting

Test Distance : 3m

Tester : Jacky

Polarization :Horizontal

Frequency Range : 30MHz~1GHz



	Freq	Level	Read Level	Factor	Limit Line	Over Limit	Ant Pos	Table Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV	dB/m	dBuV/m	dB	cm	deg		
1	196.860	16.27	32.25	-15.98	43.50	-27.23	---	---	HORIZONTAL	Peak
2	254.370	18.09	31.82	-13.73	46.00	-27.91	---	---	HORIZONTAL	Peak
3	346.900	22.66	33.14	-10.48	46.00	-23.34	---	---	HORIZONTAL	Peak
4	486.900	24.97	32.26	-7.29	46.00	-21.03	---	---	HORIZONTAL	Peak
5	515.600	29.76	36.33	-6.57	46.00	-16.24	---	---	HORIZONTAL	Peak
6	818.700	29.81	31.64	-1.83	46.00	-16.19	---	---	HORIZONTAL	Peak

Note :

1. Correction Factor (dB/m) = Cable Loss + Antenna Factor – Gain of Preamplifier
2. Emission Level (dBuV/m) = Reading Data + Correction Factor