

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT  
INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 15 SUBPART C REQUIREMENT**

*OF*

**ZuVo Water Filtration System**

**MODEL No.: Series 1xx, Series 3xx**

**FCC ID: ZBU-1XX3XXZXX001**

**REPORT NO: ES110226101F**

**ISSUE DATE: March 10, 2011**

*Prepared for*

**ZuVo Water LLC**

**Phil Houdek 404 Villa Street, Mountain View CA 94041**

*Prepared by*

**SHENZHEN EMTEK CO., LTD**

**Bldg 69, Majialong Industry Zone, Nanshan District,  
Shenzhen, Guangdong, China**

**TEL: 86-755-26954280**

**FAX: 86-755-26954282**

## VERIFICATION OF COMPLIANCE

Applicant:	ZuVo Water LLC Phil Houdek 404 Villa Street, Mountain View CA 94041
Product Description:	ZuVo Water Filtration System
Brand Name:	N/A
Model Number:	Series 1xx, Series 3xx (Note: The different between series 3xx and 1xx is 3xx has LED and 1xx does not have LED, All the PCBs in series 3xx and 1xx are same. Both Series 3xx and 1xx will have different color on the mechanical part. We take Series 3xx for test.)
Serial Number:	N/A
File Number:	ES110226101F
Date of Test:	February 26, 2011 to March 5, 2011

### We hereby certify that:

The above equipment was tested by SHENZHEN EMTEK CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of Part 15 Subpart C 15.225.

The test results of this report relate only to the tested sample identified in this report.

*Approved By*



**David Lee / Q.A. Manager  
SHENZHEN EMTEK CO., LTD.**

## Table of Contents

<b>1. GENERAL INFORMATION .....</b>	<b>4</b>
1.1 PRODUCT DESCRIPTION .....	4
1.2 RELATED SUBMITTAL(S) / GRANT (S) .....	4
1.3 TEST METHODOLOGY .....	4
1.4 SPECIAL ACCESSORIES .....	4
1.5 EQUIPMENT MODIFICATIONS .....	4
1.6 TEST FACILITY .....	5
<b>2. SYSTEM TEST CONFIGURATION .....</b>	<b>6</b>
2.1 EUT CONFIGURATION .....	6
2.2 EUT EXERCISE .....	6
2.3 TEST PROCEDURE .....	6
2.4 CONFIGURATION OF TESTED SYSTEM .....	7
<b>3. SUMMARY OF TEST RESULTS .....</b>	<b>8</b>
<b>4. DESCRIPTION OF TEST MODES .....</b>	<b>8</b>
<b>5. CONDUCTED EMISSIONS TEST .....</b>	<b>9</b>
5.1 MEASUREMENT PROCEDURE: .....	9
5.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	9
5.3 MEASUREMENT EQUIPMENT USED: .....	9
5.4 CONDUCTED EMISSION LIMIT .....	9
5.5 MEASUREMENT RESULT: .....	10
5.6 CONDUCTED EMISSION MEASUREMENT PHOTOS.....	11
<b>6. RADIATED EMISSION TEST .....</b>	<b>12</b>
6.1 MEASUREMENT PROCEDURE.....	12
6.2 RADIATED EMISSION LIMITATION .....	12
6.4 MEASUREMENT EQUIPMENT USED: .....	14
6.5 MEASUREMENT RESULT .....	14
6.6 RADIATION MEASUREMENT PHOTOS.....	16
<b>7. BANDWIDTH EMISSION TEST .....</b>	<b>17</b>
7.1 MEASUREMENT PROCEDURE.....	17
7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	17
7.3 MEASUREMENT EQUIPMENT USED: .....	17
7.4 MEASUREMENT RESULTS:.....	17
<b>8. FREQUENCY TOLERANCE TEST.....</b>	<b>19</b>
8.1 TEST CONDITION & SETUP:.....	19
8.2 TEST INSTRUMENTS SETUP: .....	19
8.3 TEST EQUIPMENT LIST:.....	19
8.4 TEST RESULT: .....	20

## **1. GENERAL INFORMATION**

### **1.1 Product Description**

The ZuVo Water LLC Model: Series 1xx (referred to as the EUT in this report). The EUT is a ZuVo Water Filtration System;

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 13.56MHz

B). Power Supply: AC 120V

### **1.2 Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for FCC ID: ZBU-1XX3XXZXX001 filing to comply with Section 15.225 of the FCC Part 15, Subpart C Rules.

### **1.3 Test Methodology**

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

### **1.4 Special Accessories**

Not available for this EUT intended for grant.

### **1.5 Equipment Modifications**

Not available for this EUT intended for grant.

## 1.6 Test Facility

### Site Description

#### EMC Lab.

: Accredited by CNAS, 2010.10.29  
The certificate is valid until 2013.10.28  
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)  
The Certificate Registration Number is L2291

Accredited by TUV Rheinland Guangzhou, 2010.10.25  
The Laboratory has been assessed according to the requirements ISO/IEC 17025

Accredited by FCC, October 28, 2010  
The Certificate Registration Number is 406365.

Accredited by Industry Canada, May 24, 2008  
The Certificate Registration Number is 46405-4480

### Name of Firm

: SHENZHEN EMTEK CO., LTD

### Site Location

: Bldg 69, Majialong Industry Zone,  
Nanshan District, Shenzhen, Guangdong, China

## 2. System Test Configuration

### 2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

### 2.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The Tx frequency was 13.56MHz.

### 2.3 Test Procedure

#### 2.3.1 Conducted Emissions

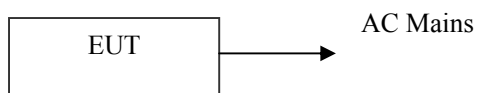
The EUT is placed on a turn table which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4-2003, conducted emissions from the EUT are measured in the **frequency range between 0.15 MHz and 30MHz** using **CISPR Quasi-Peak and average detector mode**.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) were rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4-2003.

## 2.4 Configuration of Tested System

**Fig. 2-1 Configuration of Tested System**



**Table 2-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note
1.	ZuVo Water Filtration System	N/A	Series 1xx	ZBU-1XX3XXZX X001	N/A	<i><b>EUT</b></i>

**Note:**

- (1) Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment.

### 3. Summary Of Test Results

<b>FCC Rules</b>	<b>Description Of Test</b>	<b>Result</b>
§15.207	Conducted Emission Requirements	Compliant
§15.205 , §15.209 §15.225(a)(b)(c)(d)	Radiated Emission	Compliant
§15.225(e)	Frequency Tolerance Requirements	Compliant
§15.215	Bandwidth Emission Requirements	Compliant

### 4. Description of test modes

The EUT (ZuVo Water Filtration System) has been tested under normal operating condition. In this report, all the measured datum of transmitter have been reported. No software used to control the EUT for staying in continuous transmitting mode for testing.

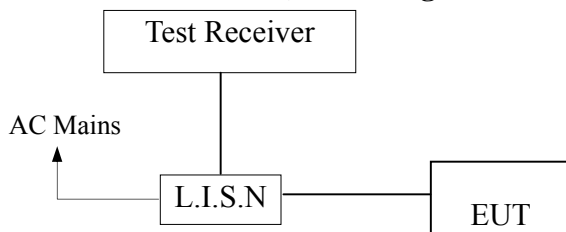


## 5. Conducted Emissions Test

### 5.1 Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

### 5.2 Test SET-UP (Block Diagram of Configuration)



### 5.3 Measurement Equipment Used:

Conducted Emission Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Test Receiver	Rohde & Schwarz	ESCS30	828985/018	05/29/2010	05/29/2011
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2010	05/29/2011
L.I.S.N	Rohde & Schwarz	ESH2-Z5	834549/005	05/29/2010	05/29/2011
50ΩCoaxial Switch	Anritsu	MP59B	M20531	005/29/2010	05/29/2011

### 5.4 Conducted Emission Limit

#### (7) Conducted Emission

##### Frequency(MHz)

0.15-0.5

0.5-5.0

5.0-30.0

##### Quasi-peak

66-56

56

60

##### Average

56-46

46

50

#### Note:

1. The lower limit shall apply at the transition frequencies
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

## 5.5 Measurement Result:

Date of Test:	02/28/2011	Temperature:	22
Frequency Detector:	0.15~30MHz	Humidity:	50%
Test Result:	PASS	Test Mode:	ON

Test Line	Frequency MHz	Emission Level QP dB(μV)	Emission Level AV dB(μV)	Limits QP dB(μV)	Limits AV dB(μV)	Margin QP dB(μV)	Margin AV dB(μV)
Line	0.155	54.58	23.39	65.73	55.73	-11.15	-32.34
	0.275	40.84	22.37	60.97	50.97	-20.13	-28.6
	1.22	24.18	18.3	56	46	-31.82	-27.7
	2.83	31.13	26.01	56	46	-24.87	-19.99
	4.55	27.71	22.98	56	46	-28.29	-23.02
	21.5	24.62	19.67	60	50	-35.38	-30.33
Neutral	0.155	55.15	23.47	65.73	55.73	-10.58	-32.26
	0.285	42.73	21.96	60.67	50.67	-17.94	-28.71
	1.345	24.88	19.49	56	46	-31.12	-26.51
	2.85	31.26	26.66	56	46	-24.74	-19.34
	6.1	25.49	19.44	60	50	-34.51	-30.56
	21.5	23.75	19.75	60	50	-36.25	-30.25

### Conducted emission Measurement Photos



## 6. Radiated Emission Test

### 6.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. For measurements from 30 MHz to 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.
3. For frequency range below 30MHz the Loop antenna was used at 3 m measurement distance with antenna heights of 1 m to 4 m and antenna loop front and side faced to the EUT. The axis of the antenna was rotated to maximize the emission. A CISPR quasi-peak detector is used for measurements below 30MHz and RBW/VBW is 9kHz/30kHz.
4. The limit 1.75MHz to 30MHz in 15.225(a)(b)(c)(d) are specified at 30 meters, and measurements were made at 3 meters, the limit is translated to 3 meters by using a formula as follows:  $\text{Limit}_{3m} = \text{Limit}_{30m} + (40\log(30m/3) = 40\text{dB})$
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured was complete.

### 6.2 Radiated Emission Limitation

#### 47 CFR Part 15 Subpart C ( 1.705MHz to 30MHz Emission Limit )

Frequency (MHz)	Field Strength 30m(uV/30m)	Distance (m)	Field Strength 3m (dBuV/m)
1.705 to 13.110	30	3	69.5
13.110 to 13.410	106	3	80.5
13.410 to 13.553	334	3	90.5
13.553 to 13.567	15848	3	124.0
13.567 to 13.710	334	3	90.5
13.710 to 14.010	106	3	80.5
14.010 to 30.000	30	3	69.5

Note: Use Quasi-peak meter.

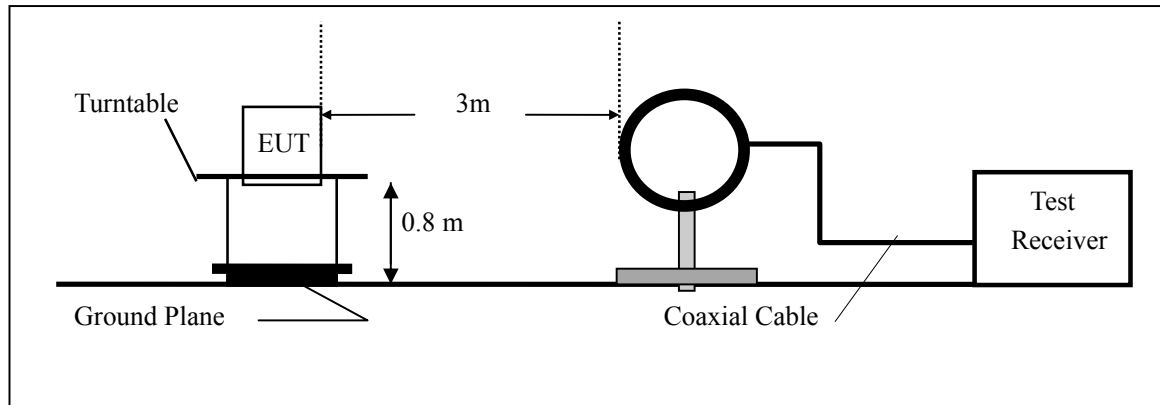
Distance Factor  $\text{limit}_{(3m)} = \text{Limit}_{30m} + 40\log(30m/3)$

**15.209 Radiated Emission Limits; General Requirements.**

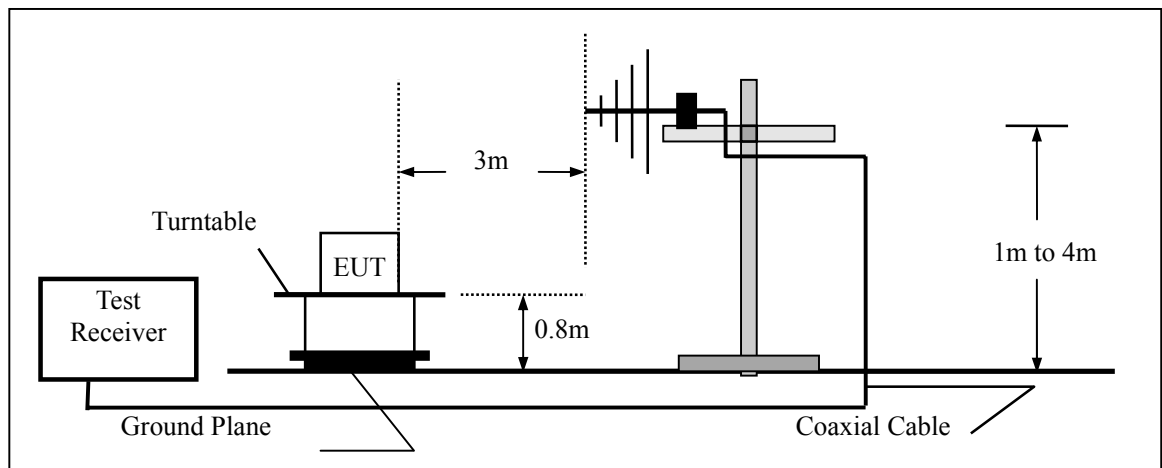
Frequency (MHz)	Field Strength (uV/ m)	dBuV/m	Distance (m)
0.009 – 0.490	2400/F(kHz)		300
0.490 – 1.705	24000/F(kHz)		30
1.705 – 30.0	30	29.5	30
30 - 88	100**	40.0	3
88 - 216	150**	43.5	3
216 - 960	200**	46.0	3
Above 960	500	54.0	3

**6.3 Test SET-UP (Block Diagram of Configuration)**

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



**6.4 Measurement Equipment Used:**

Test Site # 1					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	Rohde & Schwarz	ESU	1302.6005.26	05/29/2010	05/29/2011
Pre-Amplifier	HP	8447D	2944A07999	05/29/2010	05/29/2011
Bilog Antenna	Schwarzbeck	VULB9163	142	05/29/2010	05/29/2011
Loop Antenna	Schwarzbeck	FMZB1519	1519-012	05/29/2010	05/29/2011

**6.5 Measurement Result**

## Below 30MHz Radiated Emission Data

Operation Mode: Transmitting Mode  
Humidity : 65 %  
Test Result: PASS

Test Date : 02/28/2011  
Temperature : 28  
Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
13.2163	V	77.29	80.5	-3.21	Peak
13.3044	V	78.61	80.5	-1.89	Peak
13.4118	V	81.93	90.5	-8.57	Peak
13.561	V	92.45	124	-31.55	Peak
13.5945	V	88.36	90.5	-2.14	Peak
13.7051	V	77.24	90.5	-13.26	Peak
13.4696	H	85.6	90.5	-4.9	Peak
13.4968	H	87.96	90.5	-2.54	Peak
13.524	H	90.33	90.5	-0.17	Peak
13.5593	H	92.13	124	-31.87	Peak
13.5913	H	91.16	90.5	0.66	Peak
13.6394	H	85.42	90.5	-5.08	Peak
13.2163	V	77.29	80.5	-3.21	Peak

**Note:** (1) All Readings are Peak Value.

(2) The average measurement was not performed when the peak measured data under the limit of average detection.

**B. Frequency 30MHz to 1000MHz Radiated Emission Data**

Operation Mode: Transmitting Mode

Test Date : 02/28/2011

Humidity : 65 %

Temperature : 28

Test Result: PASS

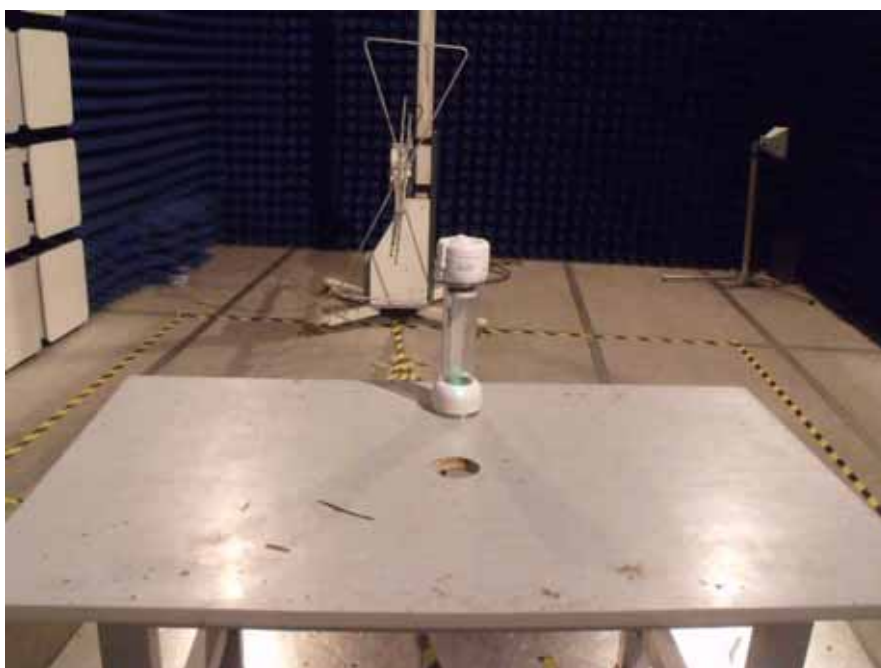
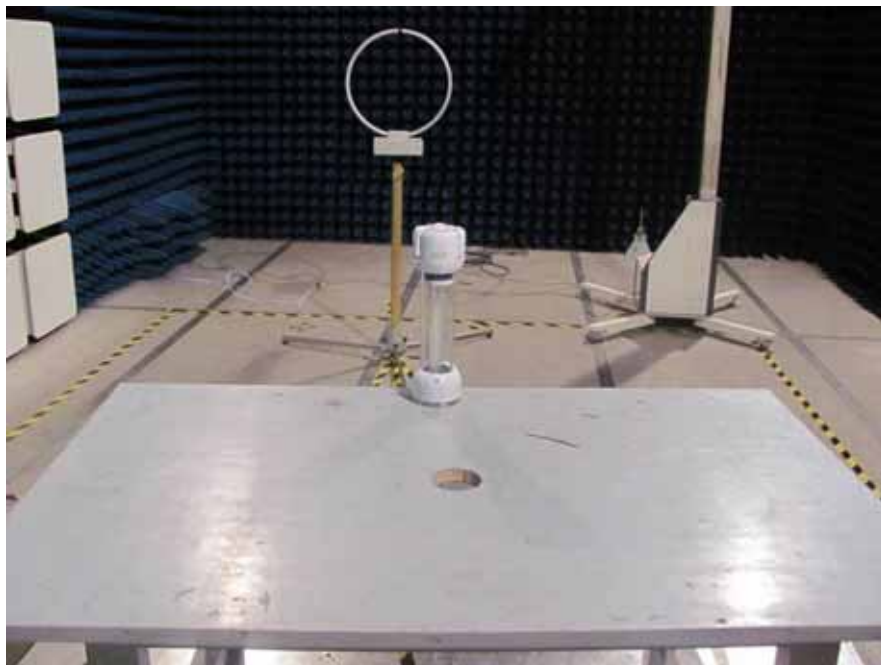
Test By: Andy

Freq. (MHz)	Ant.Pol. H/V	Emission Level (dBuV)	Limit 3m (dBuV/m)	Margin (dB)	Note
30.00	V	28.84	40	-11.16	Peak
37.77	V	26.72	40	-13.28	Peak
42.44	V	26.99	40	-13.01	Peak
45.55	V	24.61	40	-15.39	Peak
99.95	V	19.04	43.5	-24.46	Peak
118.61	V	20.16	43.5	-23.34	Peak
30.00	H	19.27	40	-20.73	Peak
37.77	H	17.77	40	-22.23	Peak
50.21	H	17.92	40	-22.08	Peak
54.87	H	15.67	40	-24.33	Peak
99.95	H	15.47	43.5	-28.03	Peak
109.28	H	15.04	43.5	-28.46	Peak

**Note:** (1) All Readings are Peak Value.

(2) The average measurement was not performed when the peak measured data under the limit of average detection.

## 6.6 Radiation Measurement Photos



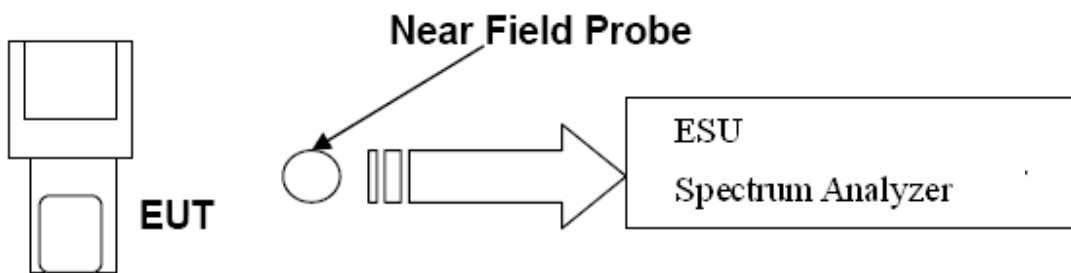


## 7. Bandwidth Emission Test

### 7.1 Measurement Procedure

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Set EUT as normal operation
3. Set SPA Center Frequency = fundamental frequency, the resolution bandwidth of the spectrum analyzer was set to 1kHz..
4. The maximum permitted bandwidth at 13.553MHz to 13.567MHz with respect to the reference level specified of the center frequency of the EUT.

### 7.2 Test SET-UP (Block Diagram of Configuration)



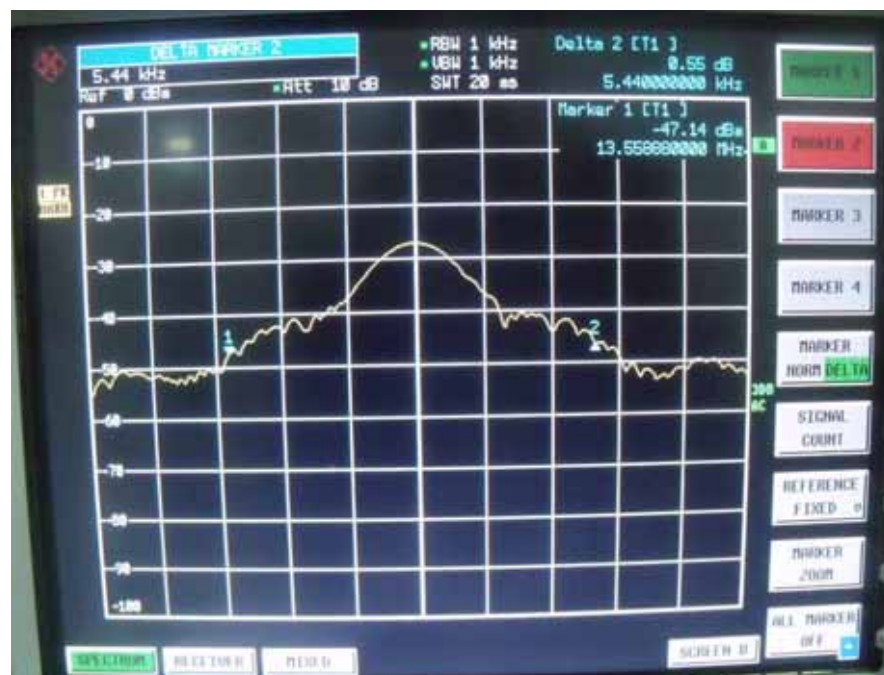
### 7.3 Measurement Equipment Used:

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Rohde & Schwarz	ESU	1302.6005.26	05/29/2011
Probe	EM	EM-6992	107328	05/29/2011

### 7.4 Measurement Results:

Operation frequency	13.56068MHz
20dB Bandwidth measurement	5.44KHz

Refer to attached data chart.



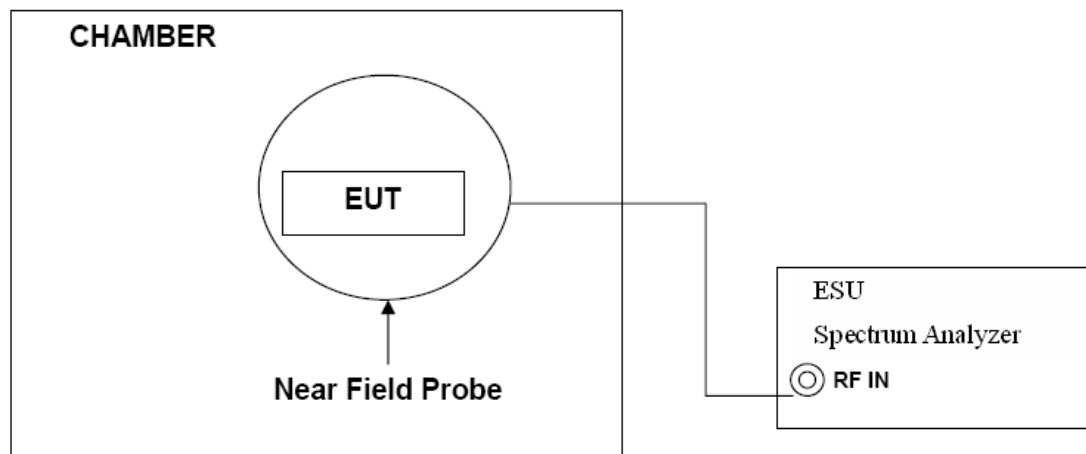
## 8. Frequency Tolerance Test

### 8.1 Test Condition & Setup:

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 and with every 10C degree to test 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.

The resolution bandwidth of the spectrum analyzer was set to 10Hz., SPAN set to 2kHz. The detector function was set to peak and hold mode read frequency.

### 8.2 Test Instruments Setup:



### 8.3 Test Equipment List:

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Rohde& Schwarz	ESU	1302.6005.26	05/29/2011
Probe	EM	EM-6992	107328	05/29/2011
Temp. / Humidity Chamber	Kingson	THS-M1	242	05/29/2011

#### 8.4 Test Result:

Frequency: 13.560680 MHz at -20°C and +50°C

Temperature (°C)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
50	13.56059	90	<0.01	Pass
40	13.56063	50	<0.01	Pass
30	13.56062	60	<0.01	Pass
20	Reference (13.560680 MHz)			
10	13.56067	10	<0.01	Pass
0	13.56065	30	<0.01	Pass
-10	13.56063	50	<0.01	Pass
-20	13.56061	70	<0.01	Pass

#### Frequency Stability versus Input Voltage:

The Frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$ , the frequency of the transmitter was measured at 85% and at 115% of the rated power supply voltage at 20°C environmental temperature.

Carrier Frequency: 13.560410 MHz at 20°C at 120VAC

Measured Voltage $\pm 15\%$ of nominal (DC)	Measured Freq. (MHz)	Freq. Drift (Hz)	Freq. Deviation (Limit: 0.01%)	Pass/Fail
102	13.56067	10	<0.01	Pass
138	13.56064	40	<0.01	Pass