



## **FCC 47 CFR PART 15 SUBPART C**

### **TEST REPORT**

**For**

#### **RF WEATHER STATION & RC CLOCK**

**Model: ERF552W-2,ERF5XXXX-X (Where “X” can be taken place of “0-9”,  
“A”, “B”, “D”, “J”, “M”, “W”, “S”, or blank)**

**Trade Name: N/A**

*Prepared for*

**GUANGZHOU ESENS ELECTRONIC CO., LTD.  
MENGYONG VILLAGE, DASHI TOWN, PANYU, GUANGZHOU, CHINA**

*Prepared by*

**COMPLIANCE CERTIFICATION SERVICES (SHENZHEN) INC.  
NO. 5, JINAO INDUSTRIAL PARK, NO. 35 JUKENG ROAD,  
DASHUIKENG VILLAGE, GUANLAN TOWN, BAOAN  
DISTRICT, SHENZHEN, CHINA**

**TEL: 86-755-28055000**

**FAX: 86-755-28055221**



---

***Note:** This report shall not be reproduced except in full, without the written approval of Compliance Certification Services Inc. This document may be altered or revised by Compliance Certification Services Inc. personnel only, and shall be noted in the revision section of the document.*



## TABLE OF CONTENTS

<b>1. TEST RESULT CERTIFICATION.....</b>	<b>3</b>
<b>2. EUT DESCRIPTION .....</b>	<b>4</b>
<b>3. TEST METHODOLOGY .....</b>	<b>5</b>
3.1 EUT CONFIGURATION .....	5
3.2 EUT EXERCISE .....	5
3.3 GENERAL TEST PROCEDURES .....	5
3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS .....	6
3.5 DESCRIPTION OF TEST MODES .....	6
<b>4. INSTRUMENT CALIBRATION.....</b>	<b>7</b>
<b>5. FACILITIES AND ACCREDITATIONS .....</b>	<b>8</b>
5.1 FACILITIES .....	8
5.2 EQUIPMENT .....	8
5.3 LABORATORY ACCREDITATIONS AND LISTING .....	8
<b>6. SETUP OF EQUIPMENT UNDER TEST .....</b>	<b>9</b>
6.1 SETUP CONFIGURATION OF EUT .....	9
6.2 SUPPORT EQUIPMENT .....	9
<b>7. FCC PART 15.231 REQUIREMENTS.....</b>	<b>10</b>
7.1 20 DB BANDWIDTH.....	10
7.2 LIMIT OF TRANSMISSION TIME .....	12
7.3 DUTY CYCLE.....	14
7.4 RADIATED EMISSIONS .....	18
7.5 POWERLINE CONDUCTED EMISSIONS .....	23



## 1. TEST RESULT CERTIFICATION

**Applicant:** GUANGZHOU ESENS ELECTRONIC CO., LTD.  
MENGYONG VILLAGE, DASHI TOWN,  
PANYU, GUANGZHOU, CHINA

**Manufacturer:** GUANGZHOU ESENS ELECTRONIC CO., LTD.  
MENGYONG VILLAGE, DASHI TOWN,  
PANYU, GUANGZHOU, CHINA

**Equipment Under Test:** RF WEATHER STATION & RC CLOCK

**Trade Name:** N/A

**Model:** ERF552W-2, ERF5XXXX-X (Where "X" can be taken place of  
"0-9", "A", "B", "D", "J", "M", "W", "S", or blank)

**Model Tested:** ERF552W-2

**Date of Test:** November 11-28, 2007

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 15 Subpart C	No non-compliance noted

### We hereby certify that:

The above equipment was tested by Compliance Certification Services Inc. 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 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.207, 15.209 and Part 15.231.

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

**Approved by:**

**Tested By:** Tom Gan

Clinton Kao/ Manager  
COMPLIANCE CERTIFICATION  
SERVICES (SHENZHEN) INC.

**Reviewed By:**

Vincent Yao/ Assistant manager  
COMPLIANCE CERTIFICATION  
SERVICES (SHENZHEN) INC.



## 2. EUT DESCRIPTION

<b>Product</b>	RF WEATHER STATION & RC CLOCK
<b>Trade Name</b>	N/A
<b>Model Number</b>	ERF552W-2,ERF5XXXX-X (Where “X” can be taken place of “0-9”, “A”, “B”, “D”, “J”, “M”, “W”, “S”, or blank)
<b>Model Difference</b>	The models are different because of the appearance color for marketing purpose only.
<b>Power Supply</b>	DC 3V powered by the battery
<b>Frequency Range</b>	433.83 MHz
<b>Antenna Designation</b>	Air Coil / +1dBi

**Remark:** This submittal(s) (test report) is intended for FCC ID: VT2ERF5XXX-X filing to comply with Section 15.207, 15.209 and 15.231 of the FCC Part 15, Subpart C Rules.



### **3. TEST METHODOLOGY**

The tests documented in this report were performed in accordance with ANSI C63.4 (2003) and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.231.

#### **3.1 EUT CONFIGURATION**

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

#### **3.2 EUT EXERCISE**

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

#### **3.3 GENERAL TEST PROCEDURES**

##### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable 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 maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4.

### 3.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

- (a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	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
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 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

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

<sup>2</sup> Above 38.6

- (b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 3.5 DESCRIPTION OF TEST MODES

The EUT has been tested under engineering test mode condition and the EUT staying in continuous transmitting mode.



## **4. INSTRUMENT CALIBRATION**

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.



## **5. FACILITIES AND ACCREDITATIONS**

### **5.1 FACILITIES**

All measurement facilities used to collect the measurement data are located at

No. 5, Jinao industrial park, No.35 Jukeng Road, Dashuikeng Village, Guanlan Town, Baoan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

### **5.2 EQUIPMENT**

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, biconical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### **5.3 LABORATORY ACCREDITATIONS AND LISTING**

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

<b>USA</b>	FCC
<b>Japan</b>	VCCI
<b>Canada</b>	INDUSTRY CANADA,
<b>Taiwan</b>	TAF, BSMI

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.ccsemc.com>.





## 6. SETUP OF EQUIPMENT UNDER TEST

### 6.1 SETUP CONFIGURATION OF EUT

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### 6.2 SUPPORT EQUIPMENT

Device Type	Brand	Model	FCC ID	Series No.	Data Cable	Power Cord
RF WEATHER STATION & RC CLOCK (receiver)	N/A	ERF552W-2	DoC	N/A	N/A	N/A

**Remark:**

- 1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.*
- 2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.*



## 7. FCC PART 15.231 REQUIREMENTS

### 7.1 20 dB BANDWIDTH

#### LIMIT

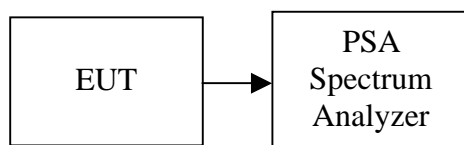
The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

#### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

#### Test Configuration



#### TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW is set to 10 kHz and VBW is set 30kHz.

#### TEST RESULTS

*No non-compliance noted.*

#### Test Data

Frequency (MHz)	20 dB Bandwidth (kHz)	Limit (MHz)	Result
433.83	56.70	1.0846	PASS



## Test Plot

Agilent 20:30:27 Nov 23, 2007

R T

Mkr1 56.7 kHz

0.02 dB

Ref 90 dB $\mu$ V

#Atten 10 dB

#Peak

Log

10

dB/

DI

50.2

dB $\mu$ V

LgAv

M1 S2

S3 FC

$\mathcal{E}(f)$ :

f>50k

Swp

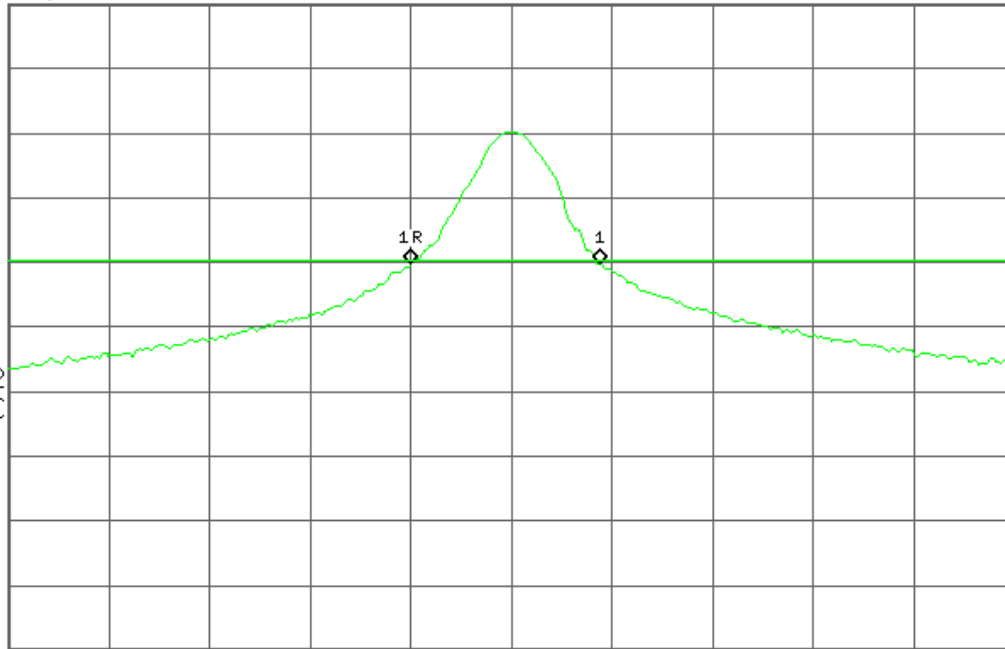
Center 433.829 6 MHz

#Res BW 10 kHz

#VBW 30 kHz

Span 300 kHz

Sweep 2.88 ms (601 pts)





## 7.2 LIMIT OF TRANSMISSION TIME

### LIMIT

According to 15.231 (e) limit for transmission time:

The devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

### **Or**

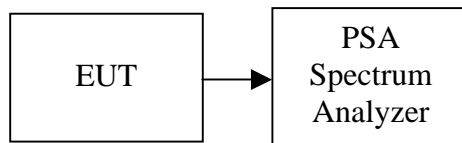
According to 15.231 (a)(1), a manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration



### TEST PROCEDURE

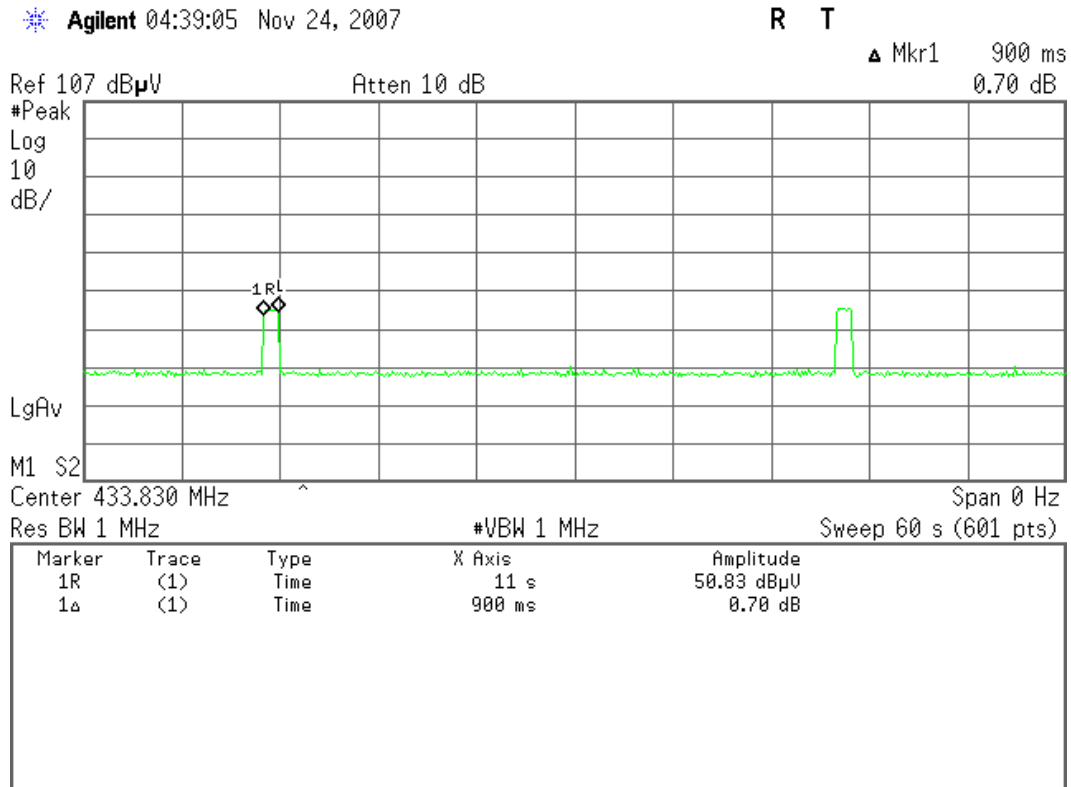
The transmitter output is connected to the spectrum analyzer. The spectrum analyzer center frequency is set to the transmitter frequency. The RBW and VBW are set to 1MHz.



## TEST RESULTS

No non-compliance noted

### Test Plot



Note: From above test plot we can know that:

The duration of each transmission=900ms =0.9s <1second .

900ms \* 30=27000ms=27s > 10second



## 7.3 DUTY CYCLE

### LIMIT

#### **According to 15.35 (c) limit for duty cycle:**

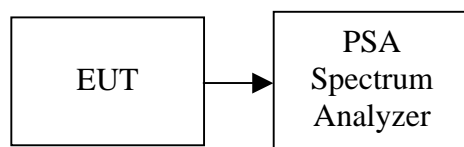
As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.

### MEASUREMENT EQUIPMENT USED

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2008

*Remark: Each piece of equipment is scheduled for calibration once a year.*

### Test Configuration



### TEST PROCEDURE

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set center frequency of spectrum analyzer = operating frequency.
4. Set the spectrum analyzer as RBW, VBW=1MHz, Span = 0Hz, Adjust Sweep = 300ms
5. Repeat above procedures until all frequency measured were complete.

### TEST RESULTS

*No non-compliance noted*

#### Test Data

Ton+off = 125ms (which exceeds 0.1 seconds, and use the formula Ton/100ms to calculate the duty-cycle correction factor)

$$T_{on} = 0.450\text{ms} \times 22 + 0.450\text{ms} \times 14 + 0.433\text{ms} \times 1 = 16.633\text{ms}$$

$$\text{Duty Cycle Correction Factor} = 20 \times \log (T_{on} / T_{on+off}) = 20 \times \log (16.633/100) = -15.58 \text{ dB}$$



## Test Plot

Agilent 04:43:51 Nov 24, 2007

R T

Mkr1 125 ms  
-0.07 dB

Ref 107 dBμV

Atten 10 dB

#Peak  
Log  
10  
dB/

LgAv

W1 S2  
S3 FS

£(f):  
FTun

Center 433.830 MHz

Res BW 1 MHz

#VBW 1 MHz

Span 0 Hz  
Sweep 300 ms (601 pts)

Agilent 04:42:21 Nov 24, 2007

R T

Mkr1 116 ms  
0.08 dB

Ref 107 dBμV

Atten 10 dB

#Peak  
Log  
10  
dB/

LgAv

W1 S2  
S3 FS

£(f):  
FTun

Center 433.830 MHz

Res BW 1 MHz

#VBW 1 MHz

Span 0 Hz  
Sweep 300 ms (601 pts)



Agilent 04:45:53 Nov 24, 2007

R T

Δ Mkr1 450 μs  
0.13 dB

Ref 107 dBμV

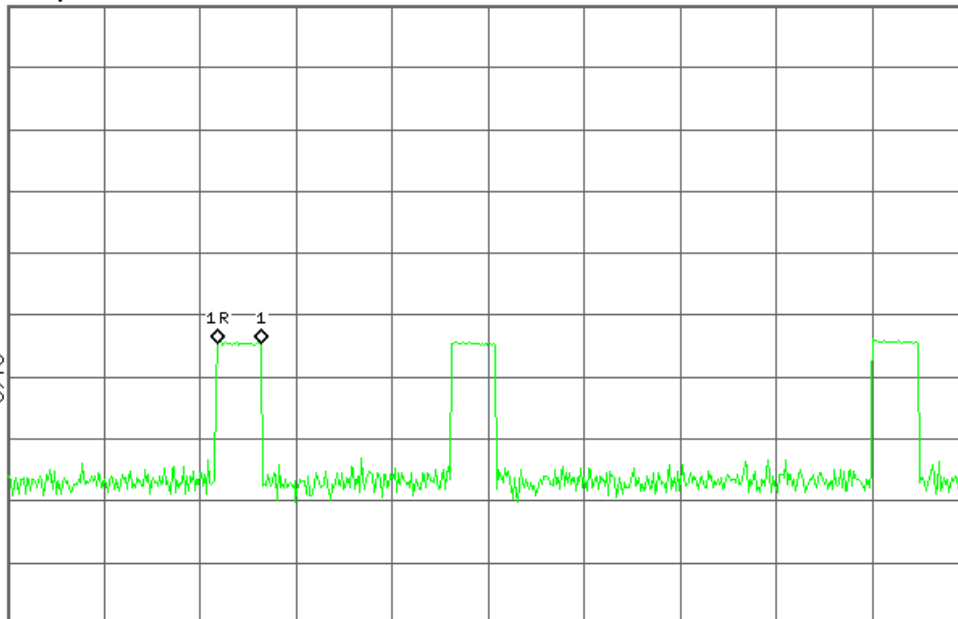
Atten 10 dB

#Peak  
Log  
10  
dB/

LgAv

W1 S2  
S3 FS

£(f):  
FTun



Center 433.830 MHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 10 ms (601 pts)

Agilent 04:47:16 Nov 24, 2007

R T

Δ Mkr1 450 μs  
-0.51 dB

Ref 107 dBμV

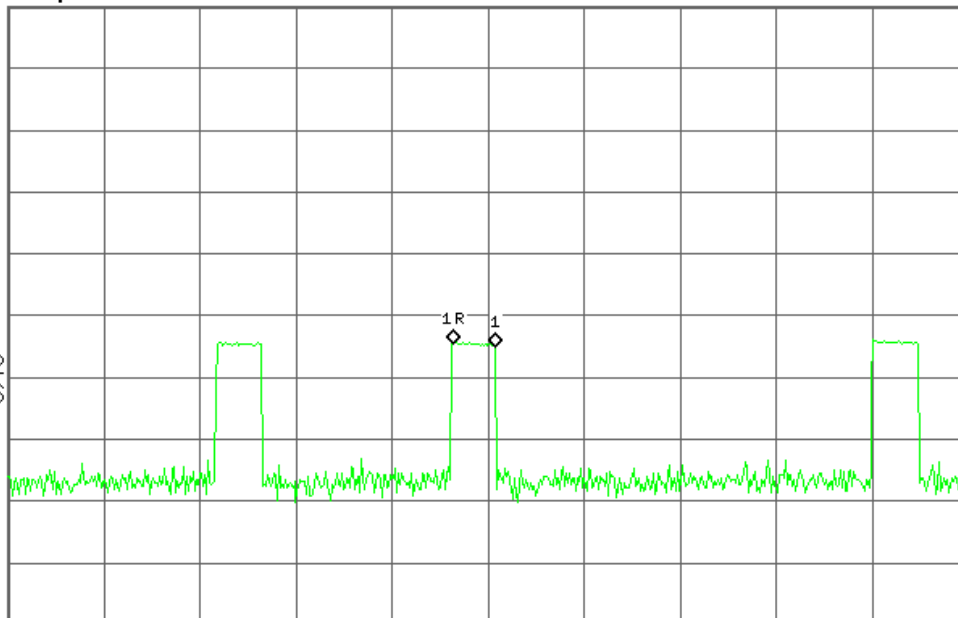
Atten 10 dB

#Peak  
Log  
10  
dB/

LgAv

W1 S2  
S3 FS

£(f):  
FTun



Center 433.830 MHz

Span 0 Hz

Res BW 1 MHz

#VBW 1 MHz

Sweep 10 ms (601 pts)





Agilent 09:35:52 Nov 24, 2007

R

Mkr1 433.3  $\mu$ s  
0.03 dB

Ref 107 dB $\mu$ V

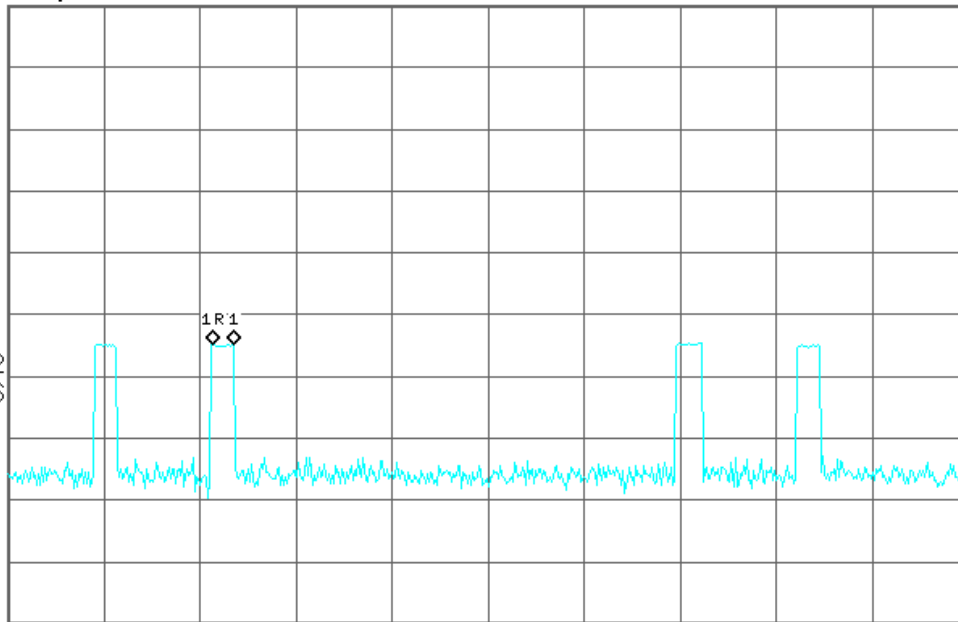
#Atten 10 dB

#Peak  
Log  
10  
dB/

LgAv

W1 W2  
S3 FS

(f):  
FTun



Center 433.830 MHz

Res BW 1 MHz

#VBW 1 MHz

Span 0 Hz

Sweep 20 ms (601 pts)



## 7.4 RADIATED EMISSIONS

### LIMIT

- According to §15.231(b), In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:  

Fundamental Field Strength (microvolts/meter)	Field Strength of Frequency Fundamental Spurious Emissions (MHz)

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 – 40.70	2,250	225
70 – 130	1,250	125
130 – 174	1,250 to 3,750 **	125 to 375 **
174 – 260	3,750	375
260 – 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

\*\* linear interpolations

[Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz,  $\mu\text{V/m}$  at 3 meters =  $56.81818(F) - 6136.3636$ ; for the band 260-470 MHz,  $\mu\text{V/m}$  at 3 meters =  $41.6667(F) - 7083.3333$ . The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.]

- 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 (mV/m)	Measurement Distance (m)
30-88	100*	3
88-216	150*	3
216-960	200*	3
Above 960	500	3

**Remark:** 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.

- In the above emission table, the tighter limit applies at the band edges.

Frequency (Hz)	Field Strength ( $\mu\text{V/m}$ at 3-meter)	Field Strength (dB $\mu\text{V/m}$ at 3-meter)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

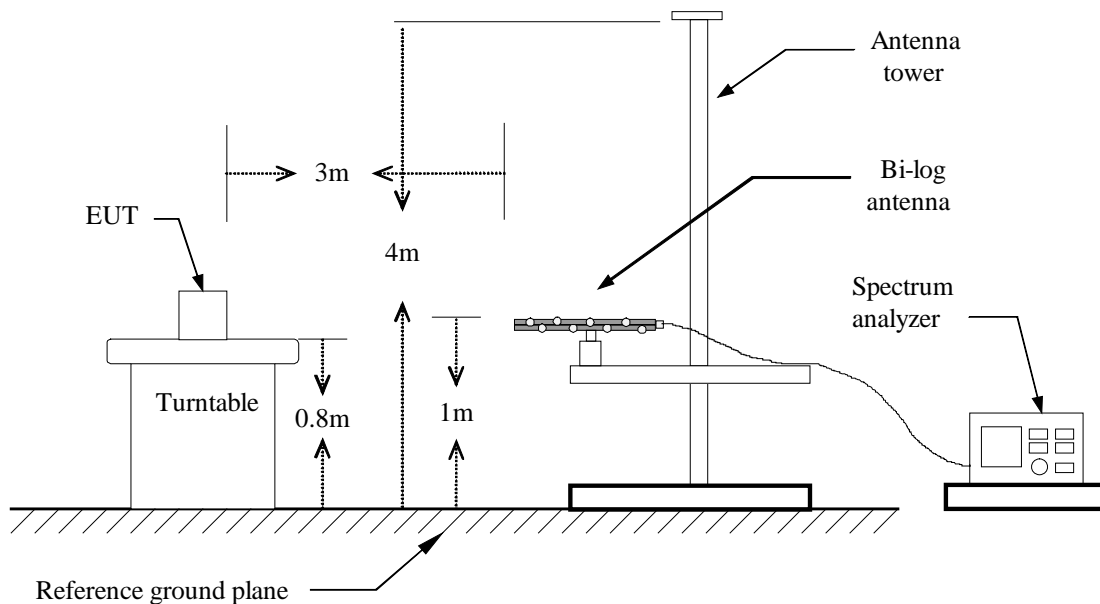
## MEASUREMENT EQUIPMENT USED

966 RF CHAMBER 2				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
PSA Spectrum Analyzer	Agilent	E4446A	US44300399	02/05/2008
EMI Test Receiver	R&S	ESCI	1166.5950 03	01/13/2008
Pre-Amplifier	MITEQ	N/A	AFS42-00102650-42-10P-42	02/14/2008
Bilog Antenna	SCHWAZBECK	CBL6143	5082	06/09/2008
Turn Table	EMCO	2081-1.21	N/A	N.C.R
Antenna Tower	CT	N/A	N/A	N.C.R
Controller	CT	N/A	N/A	N.C.R
RF Comm. Test set	HP	8920B	US36142090	N.C.R
Site NSA	C&C	N/A	N/A	06/09/2008
Horn Antenna	TRC	N/A	N/A	03/04/2008

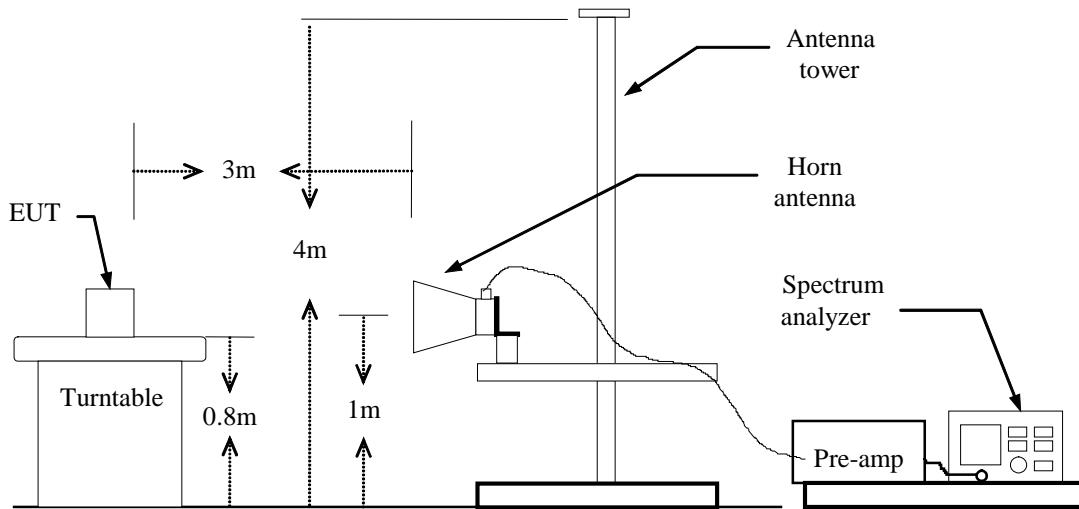
**Remark:** Each piece of equipment is scheduled for calibration once a year.

### Test Configuration

Below 1 GHz



## Above 1 GHz



## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Set the spectrum analyzer in the following setting as:

Below 1GHz:

RBW=100kHz / VBW=300kHz / Sweep=AUTO

Above 1GHz:

(a) PEAK: RBW=VBW=1MHz / Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

7. Repeat above procedures until the measurements for all frequencies are complete.

**TEST RESULTS****Operation Mode:** TX**Test Date:** November 24, 2007**Temperature:** 20°C**Tested by:** Tom Gan**Humidity:** 70 % RH**Polarity:** Ver. / Hor.**Fundamental:**

Freq. (MHz)	Ant. Pol (H/V)	Reading (Peak) (dBuV)	Correction Factor (dB/m)	Result (Peak) (dBuV/m)	Duty Cycle Correction Factor (dB)	Result (Average/Quasi-peak) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
433.83	V	70.41	-8.31	62.10	---	---	92.86	-30.76	Peak
433.83	V	70.41	-8.31	62.10	-15.58	46.52	72.86	-26.34	Average
433.83	H	75.62	-8.31	67.31	---	---	92.86	-25.55	Peak
433.83	H	75.62	-8.31	67.31	-15.58	51.73	72.86	-21.13	Average

**Remark:**

1. Average Result = Peak result + Duty cycle correction factor
2. Peak Result = peak reading + Correction Factor
3. Correction Factor = Cable Loss + Antenna Gain - Amplifier Gain

Freq. (MHz)	Ant. Pol. H/V	Detector Mode (PK/QP)	Reading (dBuV)	Factor (dB)	Actual FS (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)
35.40	V	Peak	32.60	-8.84	23.76	40.00	-16.24
141.60	V	Peak	35.02	-16.41	18.61	43.50	-24.89
170.40	V	Peak	35.08	-14.89	20.19	43.50	-23.31
637.17	V	Peak	32.18	-5.15	27.03	46.00	-18.97
787.67	V	Peak	32.11	-3.96	28.15	46.00	-17.85
868.17	V	Peak	37.89	-3.64	34.25	52.86	-18.61
35.85	H	Peak	32.28	-9.12	23.16	40.00	-16.84
84.90	H	Peak	35.01	-16.36	18.65	40.00	-21.35
99.75	H	Peak	38.22	-15.43	22.79	43.50	-20.71
528.67	H	Peak	31.43	-6.93	24.50	46.00	-21.50
727.00	H	Peak	31.17	-4.24	26.93	46.00	-19.07
868.17	H	Peak	38.66	-3.64	35.02	52.86	-17.84

**Remark:**

1. Measuring frequencies from 30 MHz to the 1GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak detector mode.
3. Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. The IF bandwidth of SPA between 30MHz to 1GHz was 100kHz.
5. Actual Fs = Peak reading + Ant. CF, Margin = Actual Fs - Limit  
Correction Factor = Cable Loss + Antenna Gain - Amplifier Gain

**Above 1 GHz****Operation Mode:** TX**Test Date:** November 24, 2007**Temperature:** 20°C**Humidity:** 70 % RH**Tested by:** Tom Gan

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
1906.67	V	49.94	---	-7.83	42.11	---	74.00	54.00	-11.89	Peak
2163.33	V	49.18	---	-6.81	42.37	---	74.00	54.00	-11.63	Peak
2396.67	V	48.64	---	-5.89	42.75	---	74.00	54.00	-11.25	Peak
N/A										
2150.00	H	26.35	---	-6.87	19.48	---	74.00	54.00	-34.52	Peak
2466.67	H	26.03	---	-5.61	20.42	---	74.00	54.00	-33.58	Peak
2753.33	H	28.96	---	-4.78	24.18	---	74.00	54.00	-29.82	Peak
N/A										

**Remark:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin>20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Spectrum Peak Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 1MHz, Sweep time = 200 ms.
  - b. Spectrum AV Setting 1GHz - 26GHz, RBW = 1MHz, VBW = 10Hz, Sweep time = 200 ms.
5. Actual Fs=Peak reading + Ant.CF. , Margin= Actual Fs-Limit  
Correction Factor= Cable Loss + Antenna Gain -Amplifier Gain

## 7.5 POWERLINE CONDUCTED EMISSIONS

### LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### MEASUREMENT EQUIPMENT USED

Conducted Emission Test Site G				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESCI EMI TEST RECEIV.ESCI	ROHDE&SCHWARZ	1166.5950 03	100088	02/05/2008
LISN	EMCO	3825/2	1371	02/05/2008
LISN	EMCO	3825/2	8901-1459	02/05/2008

**Remark:** Each piece of equipment is scheduled for calibration once a year.

### TEST CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST 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.

### TEST RESULTS

*Not applicable (Since the EUT is powered by battery)*

## **APPENDIX 1 PHOTOGRAPHS OF TEST SETUP**

### **Radiated Emission Set up Photos**

