

Application for FCC Certification
On behalf of

Hisense Electric Co., Ltd.

Product Name: Sero 7 Pro

Model No.: M470BSA

FCC ID: W9HPADP0001

Prepared For : Hisense Electric Co., Ltd.
No.218 Qianwangang Road, Economy & Technology
Development Zone, Qingdao, China

Prepared By : Audix Technology (Shanghai) Co., Ltd.
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Report No. : ACI-F13048
Date of Test : Mar. 29 – 30, 2013
Date of Report : Apr. 01, 2013

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TEST REPORT FOR FCC CERTIFICATE

Applicant : Hisense Electric Co., Ltd.
 Manufacturer : Hisense Electric Co., Ltd.
 EUT Description : Sero 7 Pro
 (A) Model No. : M470BSA
 (B) Test Voltage : AC 120V/60Hz,
 DC 5V (USB Power)

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C OCTOBER 2012
 AND ANSI C63.4-2003*

The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: M470BSA), which was tested on Mar. 29 – 30, 2013 is technically compliance with the FCC limits.

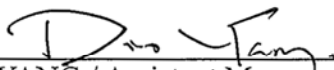
This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.


This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

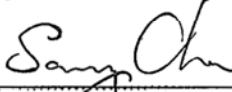
The test results for EUT's other function are contained in No. EM-F1020201, a FCC Doc report; for EUT's Bluetooth function are contained in No. F12035, a Certification report; for EUT's DTS function are contained in No. F12036, a Certification report; for EUT's UNII function are contained in No. F12037, a Certification report.

Date of Test : Mar. 29 – 30, 2013 Date of Report : Apr. 01, 2013

Producer : 
 KATHY WANG / Assistant

Review : 
 DIO YANG / Assistant Manager

 For and on behalf of
 Audix Technology (Shanghai) Co., Ltd.

Signatory : 
 Authorized Signature EMC SAMMY CHEN/ Deputy Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2012 AND ANSI C63.4:2003	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2012 AND ANSI C63.4:2003	Pass	15.209(a) 15.225(a)(b)(c) (d)
Frequency Tolerance Measurement	FCC RULES AND REGULATIONS PART 15 SUBPART C October 2012 AND ANSI C63.4:2003	Pass	15.225(e)

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : Sero 7 Pro

Type of EUT : Production Pre-product Pro-type

Model Number : M470BSA

Freq. Range : 13.56MHz (1 Channel)

Tested Freq. : 13.56MHz

Modulation : ASK

Antenna Type : Loop Antenna

Adapter : Manufacturer : Meic
Model Number : MN-A110-L120
Input : 100-240V~, 50/60Hz 0.3A max
Output : 5V $\overline{\text{---}}$ 2A

USB cable : Shielded, Detachable, 1.2m

Applicant : Hisense Electric Co., Ltd.
No.218 Qianwangang Road, Economy & Technology
Development Zone, Qingdao, China

Manufacturer : Hisense Electric Co., Ltd.
No.218 Qianwangang Road, Economy & Technology
Development Zone, Qingdao, China

2.2 Description of Test Facility

Site Description (Semi-Anechoic Chamber) : Sept. 17, 1998 file on
Mar 16, 2012 Renewed
Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046, USA

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3 F 34 Bldg 680 Guiping Rd.,
Caohejing Hi-Tech Park,
Shanghai 200233, China

FCC registration Number : 91789

Accredited by NVLAP, Lab Code : 200371-0

2.3 Measurement Uncertainty

Conducted Emission Expanded Uncertainty : U = 3.42 dB

Radiated Emission Expanded Uncertainty (30-200MHz):
U = 4.14dB (Horizontal)
U = 4.28dB (Vertical)

Radiated Emission Expanded Uncertainty (200M-1GHz):
U = 4.18dB (Horizontal)
U = 4.26dB (Vertical)

Frequency Tolerance Expanded Uncertainty : U = 0.05 kHz

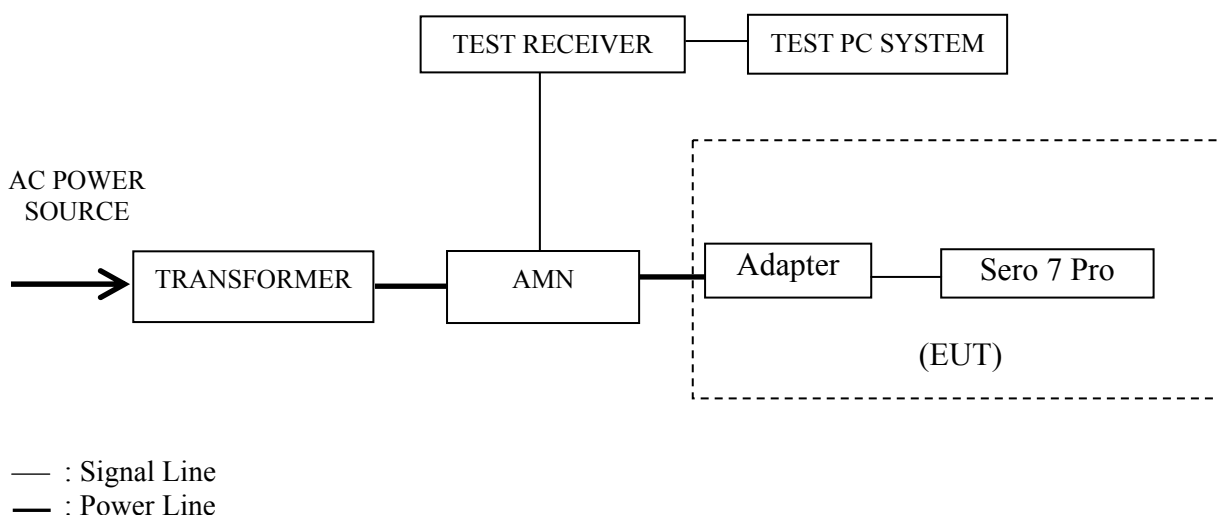
3 CONDUCTED EMISSION TEST

3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	100841	Mar 22, 2012	Mar 22, 2013
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	Feb 25, 2013	Feb 25, 2014
3.	50Ω Coaxial Switch	Anritsu	MP59B	6200426389	Sep 18, 2012	Mar 18, 2013
4.	Software	Audix	E3	SET00200 9804M592	--	--

3.2 Block Diagram of Test Setup



3.3 Conducted Emission Limits [FCC Part 15 Subpart C 15.207]

Frequency Range (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56*	56~46*
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE – *Decreases with the logarithm of the frequency.

3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner that tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

- 3.5.1 Setup the EUT as shown in Sec. 3.2.
- 3.5.2 Turn on the power of all equipments and the EUT.
- 3.5.3 Set the EUT on the test mode (Transmitting), and then test.

3.6 Test Procedures

The EUT was connected to the power mains through an Artificial Mains Network (AMN). This provided a 50 ohm coupling impedance for the measuring equipment.

Both sides of AC line (Line & Neutral) were checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables were changed or manipulated according to ANSI C63.4:2003 during conducted emission test.

The bandwidth of R&S Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7.

3.7 Test Results

< PASS >

The frequency and amplitude of the highest conducted emission relative to the limit is reported. All emissions not reported below are too low against the prescribed limits.

NOTE 1 – Factor = Cable Loss + AMN Factor.

NOTE 2 – Emission Level = Meter Reading + Factor.

NOTE 3 – “QP” means “Quasi-Peak” values, “AV” means “Average” values.

EUT : Sero 7 Pro Temperature : 25°C

Model No. : M470BSA Humidity : 44%RH

Test Mode : Transmitting Date of Test : Mar. 29, 2013

Test Line	Frequency (MHz)	Meter Reading dB(μ V)	Factor (dB)	Emission Level dB(μ V)	Limits dB(μ V)	Margin (dB)	Remark
Line	0.151	30.05	0.23	30.28	65.96	35.68	QP
	0.329	35.48	0.30	35.78	59.49	23.71	
	0.751	30.42	0.21	30.63	56.00	25.37	
	2.237	28.96	0.39	29.35	56.00	26.65	
	5.653	22.92	0.54	23.46	60.00	36.54	
	16.486	20.22	0.86	21.08	60.00	38.92	
	0.151	20.10	0.23	20.33	55.96	35.63	AV
	0.329	25.90	0.30	26.20	49.49	23.29	
	0.751	20.10	0.21	20.31	46.00	25.69	
	2.237	18.51	0.39	18.90	46.00	27.10	
	5.653	12.80	0.54	13.34	50.00	36.66	
	16.486	11.52	0.86	12.38	50.00	37.62	
Neutral	0.151	30.85	0.13	30.98	65.96	34.98	QP
	0.325	36.56	0.14	36.70	59.57	22.87	
	1.269	31.91	0.22	32.13	56.00	23.87	
	2.448	28.40	0.19	28.59	56.00	27.41	
	5.476	23.37	0.44	23.81	60.00	36.19	
	20.377	27.87	0.82	28.69	60.00	31.31	
	0.151	20.10	0.13	20.23	55.96	35.73	AV
	0.325	26.50	0.14	26.64	49.57	22.93	
	1.269	21.50	0.22	21.72	46.00	24.28	
	2.448	18.50	0.19	18.69	46.00	27.31	
	5.476	13.21	0.44	13.65	50.00	36.35	
	20.377	17.51	0.82	18.33	50.00	31.67	

TEST ENGINEER: JOE YE

4 RADIATED EMISSION TEST

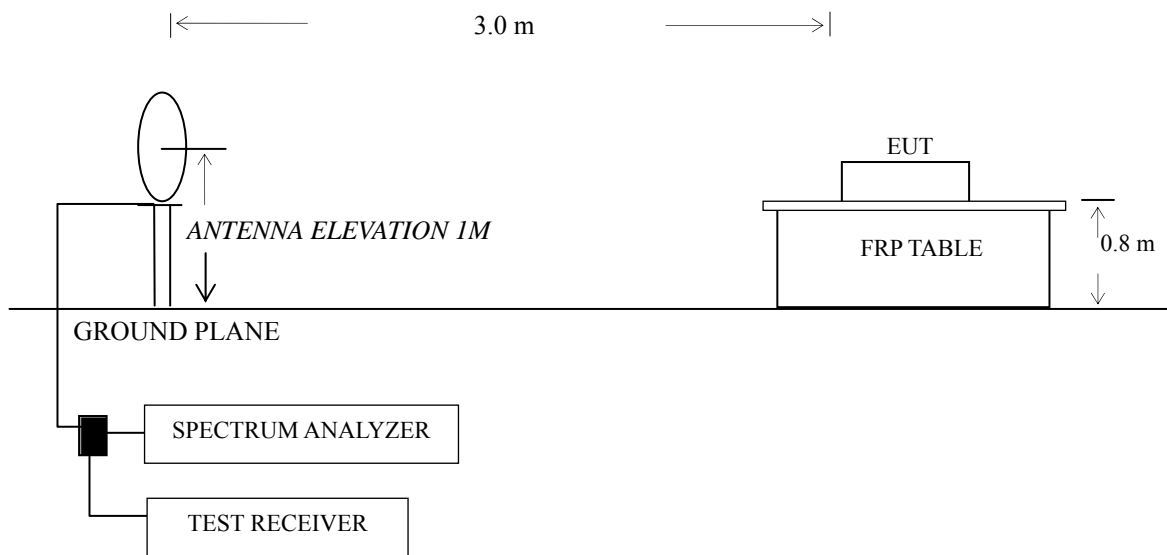
4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Preamplifier	Agilent	8447D	2944A10548	Mar 18, 2013	Sep 18, 2013
2.	Spectrum Analyzer	Agilent	E7405A	MY45106600	Mar 22, 2013	Mar 22, 2014
3.	Test Receiver	R&S	ESVS10	844594/001	Mar 22, 2013	Mar 22, 2014
4.	Loop Antenna	Schaffner	HLA6120	23193	May 03, 2012	May 03, 2013
5.	Bi-log Antenna	TESEQ	CBL6112D	1193	May 03, 2012	May 03, 2013
6.	50Ω Coaxial Switch	Anritsu	MP59B	6200426390	Mar 18, 2013	Sep 18, 2013
7.	Software	Audix	E3	SET00200 9912M295-2	--	--

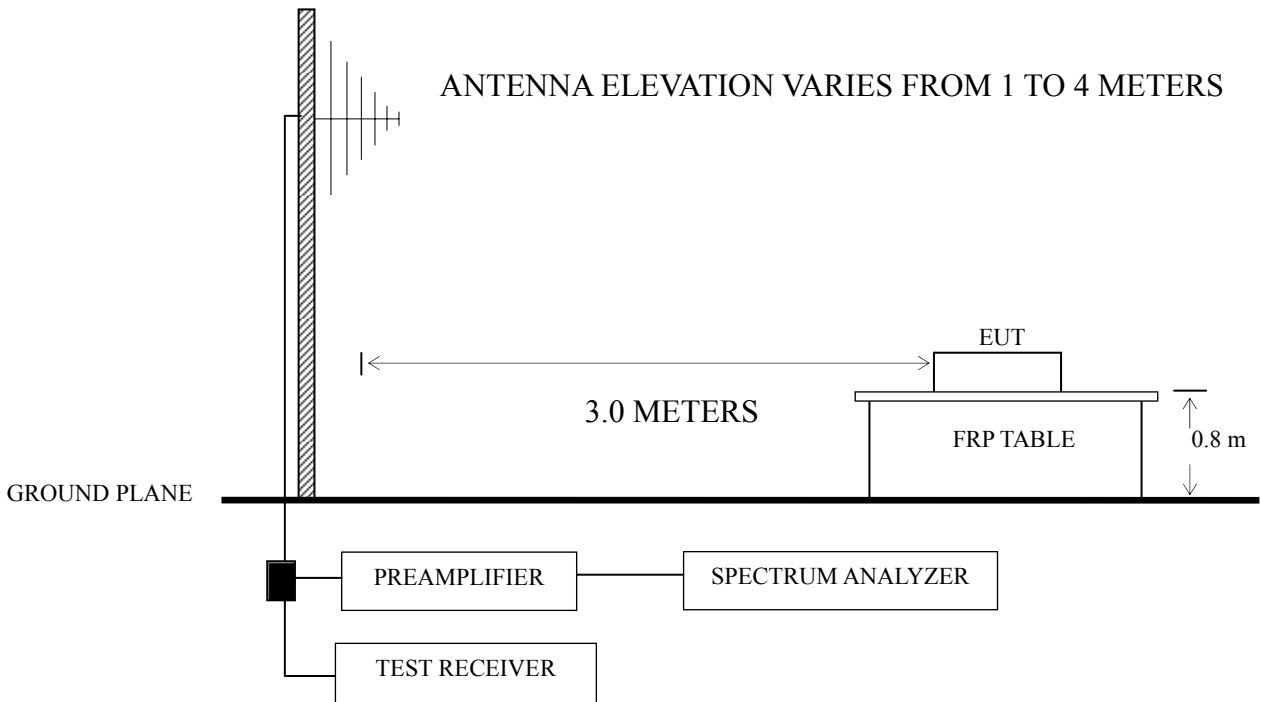
4.2 Block Diagram of Test Setup

For 9kHz to 30MHz



■ : 50 ohm Coaxial Switch

For 30MHz to 1GHz



■ : 50 ohm Coaxial Switch

4.3 Radiated Emission Limit

FCC Part 15 Subpart C 15.225

Frequency (MHz)	Field strength of fundamental			
	($\mu\text{V/m}$)	Distance (meter)	$\text{dB}(\mu\text{V/m})$	Distance (meter)
13.553 – 13.567	15848	30	124	3
13.410 – 13.553 and 13.567 – 13.710	334	30	90.50	3
13.110 – 13.410 and 13.710 – 14.010	106	30	80.50	3
Outside of the 13.110 – 14.010	See 15.209 Limits			
NOTE 1 - Emission Level $\text{dB}(\mu\text{V/m}) = 20 \log \text{Emission Level}(\mu\text{V/m})$ NOTE 2 - The tighter limit applies at the band edges. NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.				

FCC Part 15 Subpart C 15.209

Frequency (MHz)	Distance (m)	Field strength limits ($\mu\text{V/m}$)	
		($\mu\text{V/m}$)	dB($\mu\text{V/m}$)
0.009 ~ 0.490	300	2400/F(kHz)	See NOTE 1
0.490 ~ 1.705	30	24000/F(kHz)	See NOTE 1
1.705 ~ 30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0

NOTE 1 - Emission Level dB ($\mu\text{V/m}$) = 20 log Emission Level ($\mu\text{V/m}$)
NOTE 2 - The tighter limit applies at the band edges.
NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

4.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 3.2.

4.5.2 Turn on the power of all equipment.

4.5.3 Turn the EUT on the test mode, and then test.

4.6 Test Procedures

For 9kHz to 30MHz test, the EUT is placed on a turn table which is 1 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum electric field strength. The EUT was positioned such that the distance from antenna to the EUT was 3 meters. The center of the loop antenna is 1 m above the ground. All vertical axis and horizontal axis of the antenna are set on measurement.

For 30MHz to 1000MHz test, the EUT is placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4 on radiated measurement.

The bandwidth of Test Receiver R&S ESCI was set at 9kHz below 30MHz and 120 kHz above 30MHz.

The frequency range from 9 kHz to 30 MHz was checked.

All the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

No.	Frequency	Data Page
1.	Fundamental Radiated Emission and inside of the 13.110-14.010 MHz band	P14
2.	Radiated Emission < 30 MHz	P15
3.	Radiated Emission > 30 MHz	P16

NOTE 1 – For 9kHz to 30MHz test, due to the emission signal is low, we performed the test at 1m distance, and then convert the readings to 3m readings.

NOTE 2 – Level = Read Level + Antenna Factor + Cable Loss - Distance Conversion Factor (for 9kHz to 30MHz)
 Level = Read Level + Antenna Factor + Cable Loss
 (for 30MHz to 1000MHz)

Distance Conversion Factor = $40\log(3/1) = 19.00$ dB

NOTE 3 – EUT configured in Lying, Side & Stand direction were all evaluated. For 9kHz to 30MHz, the emission levels recorded below is data of EUT configured in **Stand** direction, for Stand direction was the maximum emission direction during the test; For 30MHz to 1000MHz, the emission levels recorded below is data of EUT configured in **Lying** direction, for Lying direction was the maximum emission direction during the test.

NOTE 4 – All reading are Quasi-Peak values.

NOTE 5 – The emission levels not reported are too low against the limit.

Fundamental Radiated Emission and inside of the 13.110-14.010 MHz band

EUT : Sero 7 Pro Temperature : 25°C

Model No. : M470BSA Humidity : 45%RH

Test Mode : Transmitting Date of Test : Mar 29, 2013

Polarization	Frequency (MHz)	Meter Reading dB (μ V)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Conversion Factor (dB)	Emission Level dB (μ V/m)	Limits dB (μ V/m)	Margin (dB)
Horizontal	13.348	31.22	24.56	0.47	19.00	37.25	80.5	43.25
	13.553	40.99	24.55	0.47	19.00	47.01	90.5	43.49
	13.560	48.73	24.55	0.47	19.00	54.75	124	69.25
	13.567	36.81	24.55	0.47	19.00	42.83	90.5	47.67
	13.772	32.83	24.54	0.48	19.00	38.85	80.5	41.65
Vertical	13.344	20.64	24.56	0.47	19.00	26.67	80.5	53.83
	13.553	30.27	24.55	0.47	19.00	36.29	90.5	54.21
	13.560	43.32	24.55	0.47	19.00	49.34	124	74.66
	13.567	31.86	24.55	0.47	19.00	37.88	90.5	52.62
	13.718	16.75	24.54	0.48	19.00	22.77	80.5	57.73

TEST ENGINEER: RAVEN JIN

Radiated Emission < 30 MHz

EUT : Sero 7 Pro Temperature : 25°C
 Model No. : M470BSA Humidity : 45%RH
 Test Mode : Transmitting Date of Test : Mar 29, 2013

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Distance Conversion Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	0.75	16.86	20.70	0.31	19.00	18.87	80.50	61.63
	11.58	28.07	24.63	0.45	19.00	34.15	90.50	56.35
	11.94	24.71	24.62	0.45	19.00	30.78	124.00	93.22
	28.60	15.69	26.58	0.64	19.00	23.91	90.50	66.59
Vertical	0.72	25.28	20.69	0.28	19.00	27.25	80.50	53.25
	2.36	22.12	20.88	0.50	19.00	24.50	80.50	56.00
	0.75	16.86	20.70	0.31	19.00	18.87	80.50	61.63
	11.58	28.07	24.63	0.45	19.00	34.15	90.50	56.35

TEST ENGINEER: RAVEN JIN

Radiated Emission > 30 MHz

EUT : Sero 7 Pro Temperature : 25°C
 Model No. : M470BSA Humidity : 45%RH
 Test Mode : Transmitting Date of Test : Mar 29, 2013

Polarization	Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)
Horizontal	203.63	10.06	7.93	1.97	19.96	43.50	23.54
	272.50	22.79	12.60	2.35	37.74	46.00	8.26
	386.96	12.12	15.33	2.67	30.12	46.00	15.88
	460.68	10.94	17.30	2.86	31.10	46.00	14.90
	816.67	8.09	20.53	3.80	32.42	46.00	13.58
Vertical	884.57	11.98	19.65	4.32	35.95	46.00	10.05
	203.63	13.20	7.93	1.97	23.10	43.50	20.40
	272.50	12.33	12.60	2.35	27.28	46.00	18.72
	460.68	14.90	17.30	2.86	35.06	46.00	10.94
	476.20	10.42	17.80	2.92	31.14	46.00	14.86
	527.61	10.35	18.38	3.05	31.78	46.00	14.22
	859.35	9.78	20.70	4.08	34.56	46.00	11.44

TEST ENGINEER: RAVEN JIN

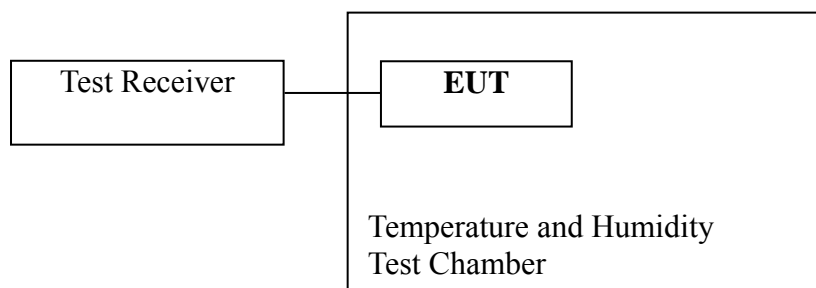
5 FREQUENCY TOLERANCE MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1.	Test Receiver	R&S	ESCI	101303	Sep 11, 2012	Sep 11, 2013
2.	Temperature and Humidity Test Chamber	TECRCHY	MHU-150L	850811	Mar. 11, 2013	Mar. 11, 2014

5.2 Block Diagram of Test Setup



5.3 Specification Limits (§15.225(e))

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency.

5.4 Operating Condition of EUT

The test program "NFC Tester" was used to enable the EUT to transmit data continuously.

5.5 Test Procedure

The over 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.

5.6 Test Results

PASSED.

(Test Date: Mar. 31, 2013 Temperature: 24°C Humidity: 45 %)

Temperature (°C)	Voltage (V)	Operating Frequency (MHz)	Measured Frequency (MHz)	Tolerance (%)	Limit (%)
20	120	13.56	13.5604	0.0029	0.01
20	102	13.56	13.5604	0.0029	
20	138	13.56	13.5604	0.0029	
50	120	13.56	13.5611	0.0081	
40	120	13.56	13.5610	0.0074	
30	120	13.56	13.5605	0.0037	
10	120	13.56	13.5607	0.0052	
0	120	13.56	13.5606	0.0044	
-10	120	13.56	13.5609	0.0066	
-20	120	13.56	13.5610	0.0074	

6 DEVIATION TO TEST SPECIFICATIONS

None.