



## FCC 47 CFR PART 15 SUBPART B

Product Type : Wireless Mobile Hotspot  
Applicant : Sierra Wireless, Inc.  
Address : 13811 Wireless Way, Richmond, BC, Canada, V6V 3A4  
Trade Name : AirCard  
Model Number : AirCard 770S  
FCC ID : N7NAC770S  
Test Specification : FCC 47 CFR PART 15 SUBPART B: Oct., 2011  
ANSI C63.4: 2009  
CISPR 22: 1997  
Receive Date : Oct. 09, 2012  
Test Period : Oct. 09 ~ Oct. 11, 2012  
Issue Date : Nov. 22, 2012

### Issue by

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Taiwan Accreditation Foundation accreditation number: 1330



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**Revision History**


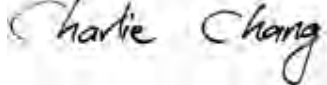
Rev.	Issue Date	Revisions	Revised By
00	Oct. 29, 2012	Initial Issue	
01	Nov. 20, 2012	Revised report information.	Joyce Liao
01	Nov. 22, 2012	Revised report format.	Joyce Liao

## Verification of Compliance

Issued Date: 11/22/2012

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Trade Name : AirCard  
Model Number : AirCard 770S  
FCC ID : N7NAC770S  
Applicable Standard : FCC 47 CFR PART 15 SUBPART B: Oct., 2011  
ANSI C63.4: 2009  
CISPR 22: 1997  
Test Result : Complied  
Performing Lab. : A Test Lab Techno Corp.  
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Taiwan Accreditation Foundation accreditation number: 1330  
<http://www.atl-lab.com.tw/e-index.htm>

The above equipment has been tested by A Test Lab Techno Corp., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Approved By :  Reviewed By :   
(Manager) (Murphy Wang) (Testing Engineer) (Charlie Chang)

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# 1 General Information

## 1.1 Summary of Test Result

Emission			
Standard	Item	Result	Remark
FCC 47 CFR PART 15 SUBPART B ANSI C63.4	Conducted Emission	PASS	Meet Class B limit
FCC 47 CFR PART 15 SUBPART B ANSI C63.4	Radiated Emission	PASS	Meet Class B limit

The test results of this report relate only to the tested sample(s) identified in this report. Manufacturer or whom it may concern should recognize the pass or fail of the test result.

## 1.2 Measurement Uncertainty

### Conducted Emission

The measurement uncertainty is evaluated as  $\pm 2.24$  dB.

### Conducted Emissions (Telecommunication Ports)

The measurement uncertainty is evaluated as  $\pm 2.24$  dB.

### Radiated Emission

The measurement uncertainty of 30 MHz - 1GHz is evaluated as  $\pm 3.072$ dB.

The measurement uncertainty of 1GHz - 40GHz is evaluated as  $\pm 3.072$ dB.

## 2 EUT Description

Product	Wireless Mobile Hotspot
Trade Name	AirCard
Model Number	AirCard 770S
FCC ID	N7NAC770S
Applicant	Sierra Wireless, Inc. 13811 Wireless Way, Richmond, BC, Canada, V6V 3A4
Manufacturer	Sierra Wireless, Inc. 13811 Wireless Way, Richmond, BC, Canada, V6V 3A4
Component	
Battery	SIERRA, W-5  3.7V, 2500mAh
Power Adapter	SIERRA, SSW-2458  I/P: 110-240VAC, 50/60Hz, 0.2A  O/P: 5.0VDC, 1.0A  Shielded, 1.0m

### I/O Port Description :

I/O Port Types	Q'TY	Test Description
1). USB Port	1	Connected to AC Adapter
2). Signal Port	2	For Manufacturer used
3). SIM Card Port	1	Connected to SIM Card

### 3 Test Methodology

#### 3.1. Decision of Test Mode

3.1.1. The following test mode(s) were scanned during the preliminary test:

Pre-Test Mode
Mode 1: GSM 850+Wi-Fi Link Mode
Mode 2: PCS 1900 + Wi-Fi Link Mode
Mode 3: WCDMA Band II + Wi-Fi Link Mode
Mode 4: WCDMA Band V + Wi-Fi Link Mode
Mode 5: LTE Band 4 + Wi-Fi Link Mode
Mode 6: LTE Band 17 + Wi-Fi Link Mode
Mode 7: LTE Band II + Wi-Fi Link Mode
Mode 8: LTE Band V + Wi-Fi Link Mode

3.1.2. After the preliminary scan, the following test mode was found to produce the highest emission level.

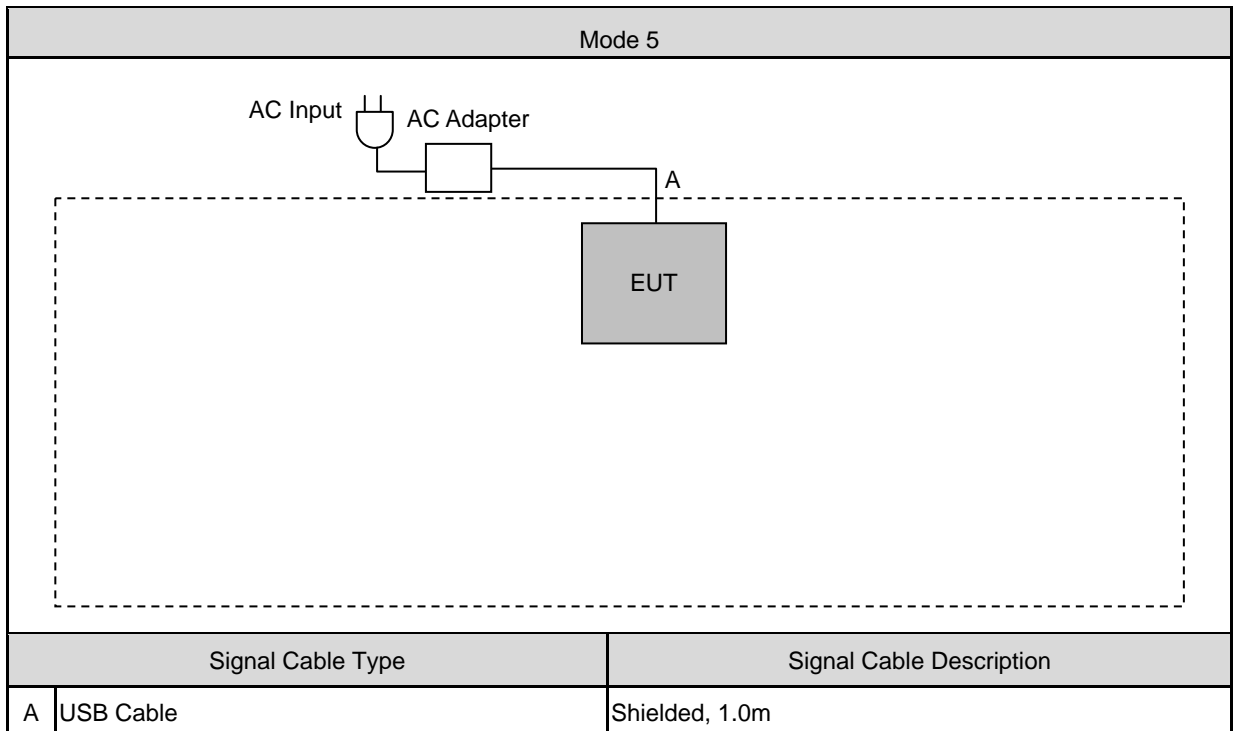
Final Test Mode			
Emission	Conducted Emission		Mode 5
	Radiated Emission	Below 1GHz	Mode 5
		Above 1GHz	Mode 5

Then, the above highest emission mode of the configuration of the EUT and cable was chosen for all final test items.

#### 3.2. EUT Exercise Software

1. Setup the EUT and simulators as shown on 3.3.
2. Turn on the power of all equipment.
3. EUT link to CMU200.
4. Turn on EUT's Wi-Fi function and Link AP.
5. The EUT will start to operate function.

### 3.3. Configuration of Test System Details



### 3.4. Test Site Environment

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC part 15: 15.107 Conducted Emission	15-35	26
Humidity (%RH)		25-75	60
Barometric pressure (mbar)		860-1060	950
Temperature (°C)	FCC part 15: 15.109 Radiated Emission	15-35	26
Humidity (%RH)		25-75	60
Barometric pressure (mbar)		860-1060	950



## 4 Emission Test

### 4.1. Conducted Emission Measurement

#### 4.1.1. Limit

A.C. Mains Conducted Interference Limit

Frequency (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	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 0.15 to 0.50 MHz.

#### 4.1.2. Test Instruments

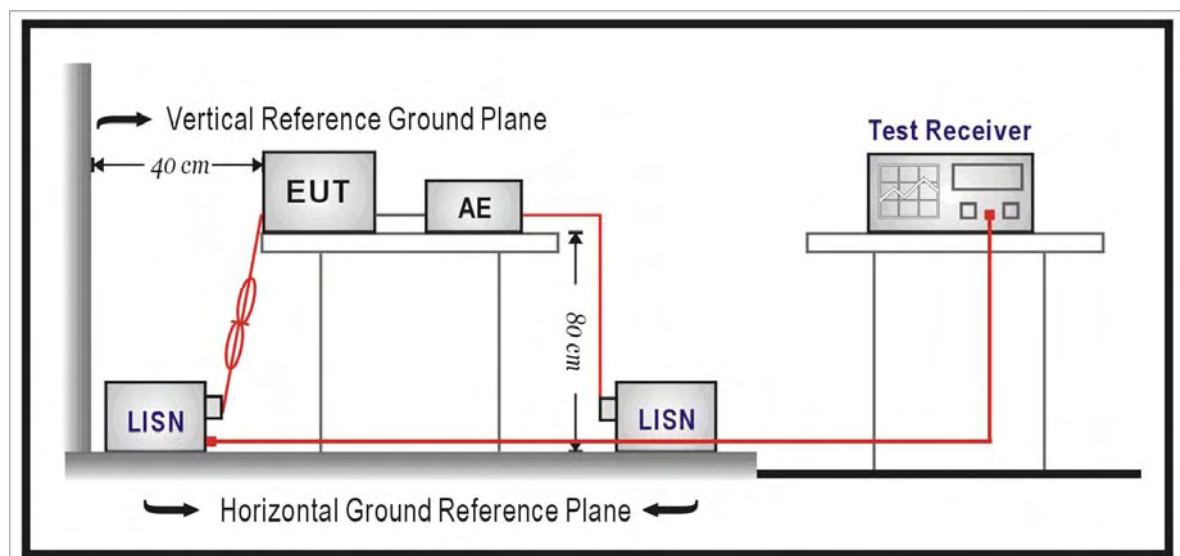
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Test Receiver	R&S	ESCI	100367	06/18/2012	(1)
LISN	R&S	ENV216	101040	03/07/2012	(1)
LISN	R&S	ENV216	101041	03/07/2012	(1)
Test Site	ATL	TE02	TE02	N.C.R.	-----

Remark: (1) Calibration period 1 year. (2) Calibration period 2 years.

Note: N.C.R. = No Calibration Request.

#### 4.1.3. Test Setup

A.C. mains setup



#### 4.1.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

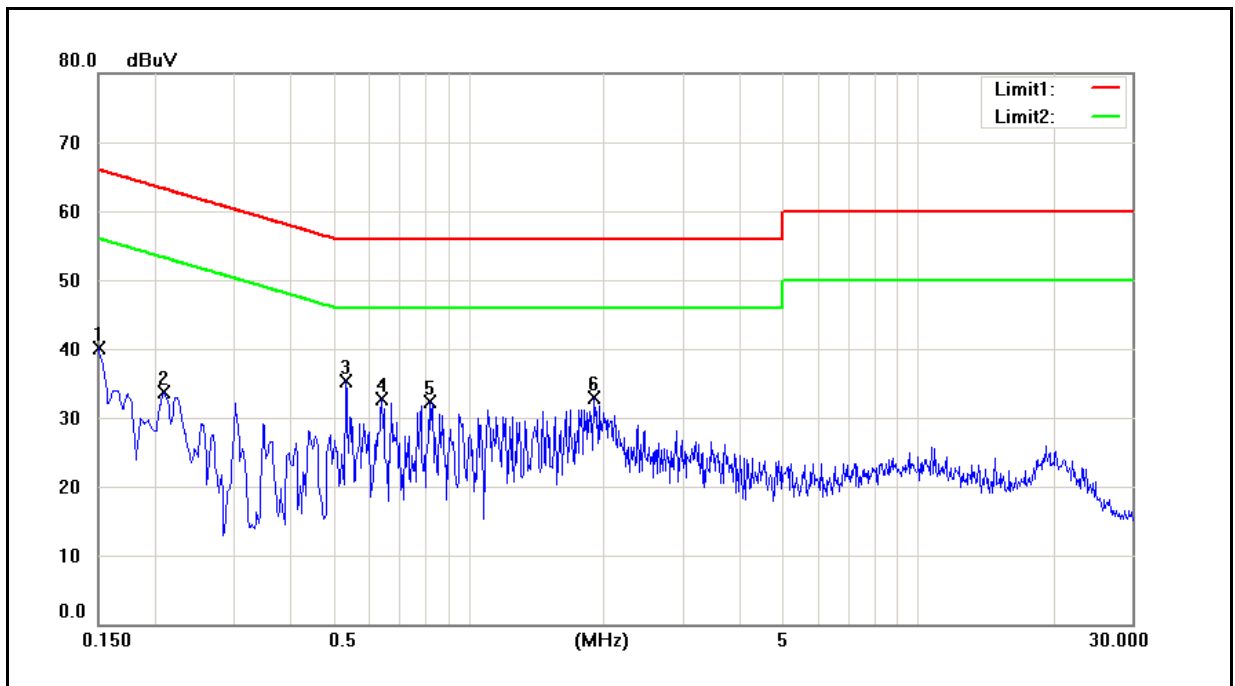
For A.C. mains conducted interference, measured both sides of A.C. lines and carried out using quasi-peak and average detector receivers of maximum conducted interference.

Conducted emissions were investigated over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz. The equipment under test (EUT) shall be meet the limits in section 4.1.1, as applicable, including the average limit and the quasi-peak limit when using respectively, an average detector and quasi-peak detector measured in accordance with the methods described of related standard. The voltage limits shall be met. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

If the reading of the measuring receiver shows fluctuations close to the limit, the reading shall be observed for at least 15 s at each measurement frequency; the higher reading shall be recorded with the exception of any brief isolated high reading which shall be ignored.

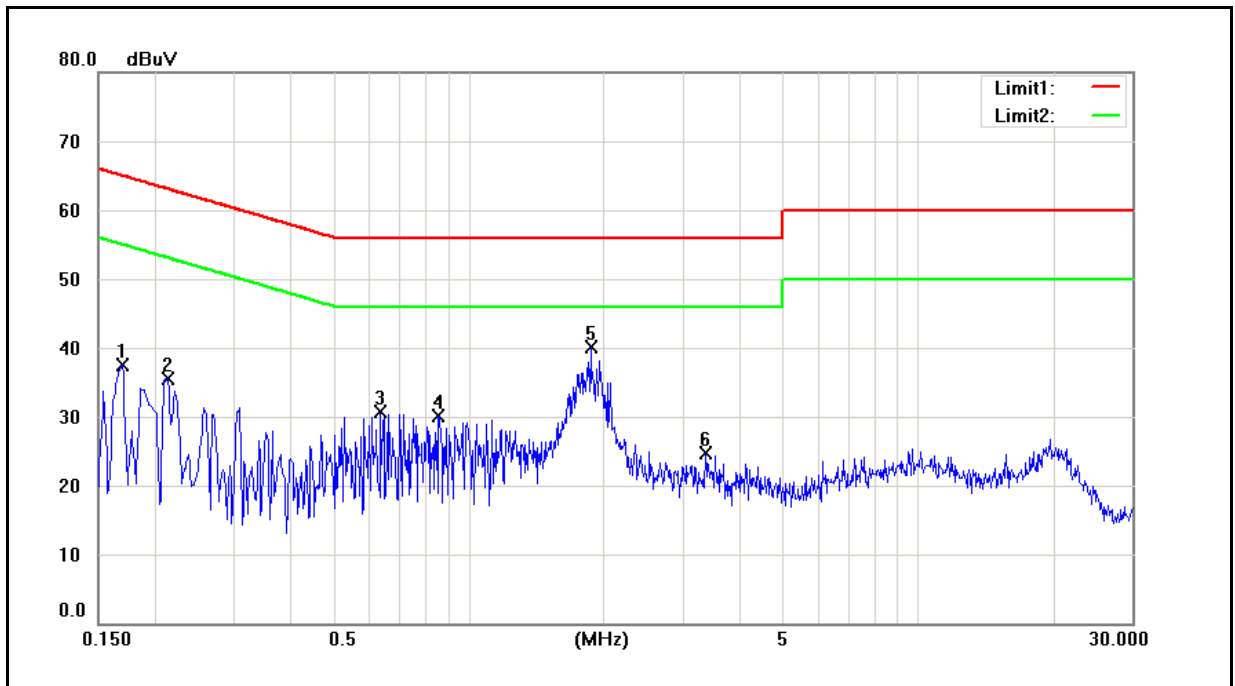
**4.1.5. Test Result**

Standard:	FCC Part 15B Class B	Line:	L1
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	AirCard 770S	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	10/09/2012
		Test By:	Charlie Chang
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1500	25.06	11.10	9.72	34.78	20.82	66.00	56.00	-31.22	-35.18	Pass
2	0.2100	21.93	7.55	9.72	31.65	17.27	63.21	53.21	-31.56	-35.94	Pass
3	0.5340	16.89	4.68	9.72	26.61	14.40	56.00	46.00	-29.39	-31.60	Pass
4	0.6420	16.77	5.67	9.72	26.49	15.39	56.00	46.00	-29.51	-30.61	Pass
5	0.8180	15.83	3.10	9.73	25.56	12.83	56.00	46.00	-30.44	-33.17	Pass
6	1.9060	24.27	11.61	9.80	34.07	21.41	56.00	46.00	-21.93	-24.59	Pass

Standard:	FCC Part 15B Class B	Line:	N
Test item:	Conducted Emission	Power:	AC 120V/60Hz
Model Number:	AirCard 770S	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	10/09/2012
		Test By:	Charlie Chang
Description:			



No.	Frequency (MHz)	QP reading (dBuV)	AVG reading (dBuV)	Correction factor (dB)	QP result (dBuV)	AVG result (dBuV)	QP limit (dBuV)	AVG limit (dBuV)	QP margin (dB)	AVG margin (dB)	Remark
1	0.1700	22.17	8.73	9.65	31.82	18.38	64.96	54.96	-33.14	-36.58	Pass
2	0.2140	19.08	8.70	9.64	28.72	18.34	63.05	53.05	-34.33	-34.71	Pass
3	0.6380	15.54	3.64	9.65	25.19	13.29	56.00	46.00	-30.81	-32.71	Pass
4	0.8580	13.48	3.97	9.67	23.15	13.64	56.00	46.00	-32.85	-32.36	Pass
5	1.8740	27.48	16.35	9.71	37.19	26.06	56.00	46.00	-18.81	-19.94	Pass
6	3.3780	6.78	-0.48	9.74	16.52	9.26	56.00	46.00	-39.48	-36.74	Pass

## 4.2. Radiated Interference Measurement

### 4.2.1. Limit

Under 1GHz test shall not exceed following value

FCC 47 CFR PART 15 SUBPART B				
Frequency range (MHz)	Class A		Class B	
	Distance (m)	dBuV/m	Distance (m)	dBuV/m
30 to 88	10	39	3	40
88 to 216	10	43.5	3	43.5
216 to 960	10	46.4	3	46
Above 960	10	49.5	3	54

CISPR 22				
Frequency range (MHz)	Class A		Class B	
	Distance (m)	dBuV/m	Distance (m)	dBuV/m
30 to 230	10	40	10	30
230 to 1000	10	47	10	37

Above 1GHz test shall not exceed following value

Frequency (MHz)	dBuV/m (Distance 3m)			
	Class A		Class B	
	Average	Peak	Average	Peak
1000 ~ 40000	60	80	54	74

- Remark:
1. The tighter limit shall apply at the edge between two frequency bands.
  2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.
  3. RF Voltage (dBuV/m) = 20 log RF Voltage (uV/m)
  4. Peak detector limit is corresponding to 20 dB above the maximum permitted average limit.

**4.2.2. Test Instruments**

10 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Pre Amplifier	Agilent	8447D	2944A11120	01/10/2012	(1)
Pre Amplifier	Agilent	8447D	2944A11119	01/10/2012	(1)
Test Receiver	R&S	ESCI	100722	10/18/2011	(1)
Test Receiver	R&S	ESCI	101000	12/26/2011	(1)
Broadband Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3268	06/06/2012	(1)
Broadband Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB 9160	9160-3273	12/27/2011	(1)
Test Site	ATL	TE06	TE06	08/13/2012	(1)

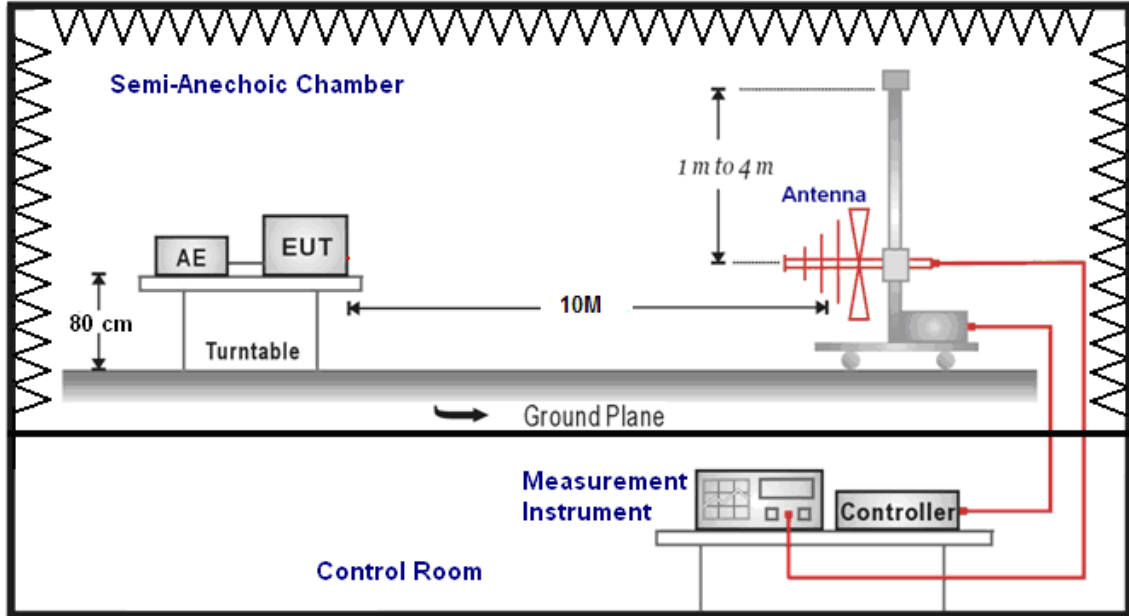
3 Meter Chamber					
Equipment	Manufacturer	Model Number	Serial Number	Cal. Date	Remark
Spectrum Analyzer	Agilent	E4445A	MY46181986	05/10/2012	(1)
Amplifier	Mini-Circuits	ZKL-1R5+	072010	05/29/2012	(1)
Amplifier	Mini-Circuits	ZVA-213-S+	467900926	05/29/2012	(1)
RF Pre-selector	Agilent	N9039A	MY46520255	05/10/2012	(1)
Horn Antenna (1~18GHz)	ETS-Lindgren	3117	00128055	08/09/2012	(1)
Horn Antenna (18~40GHz)	SCHWARZBECK MESS-ELEKTRONIK	BBHA9170	9170-320	06/21/2012	(1)
Test Site	ATL	TE09	TE09	05/11/2012	(1)

Remark: <sup>(1)</sup> Calibration period 1 year. <sup>(2)</sup> Calibration period 2 years.

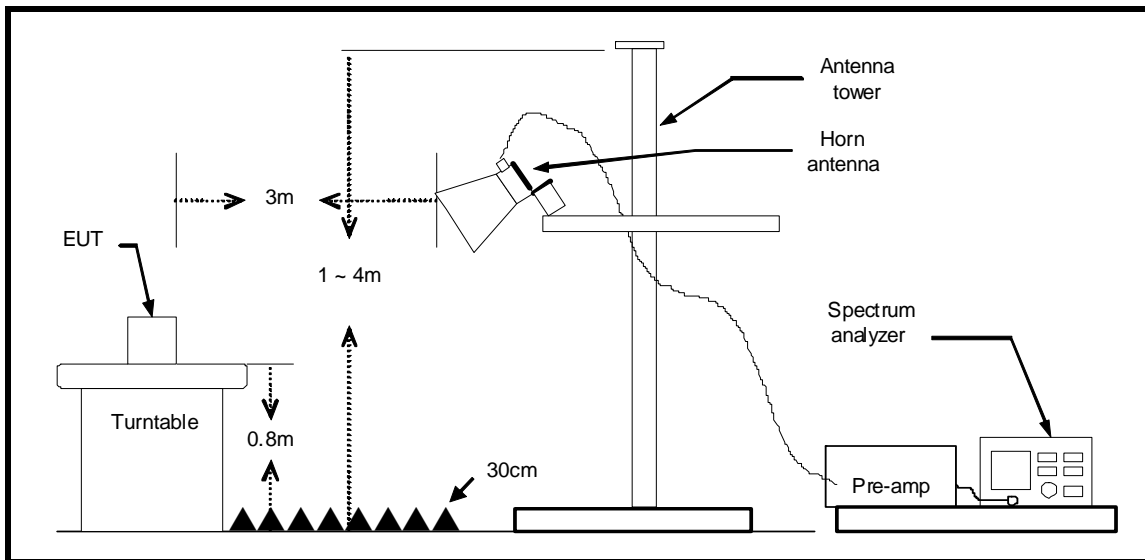
Note: N.C.R. = No Calibration Request.

**4.2.3. Setup**

Below 1GHz



Above 1GHz



#### 4.2.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. When the EUT is floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.

The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 10 meters for under 1GHz, and 3 meter for above 1GHz, the highest frequency performed according to internal source frequency of the EUT, the specification was below:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705 - 108	1000
108 - 500	2000
500 - 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

According to this standard paragraph 15.109, as an alternative to the radiated emission limits, digital devices may be shown to comply with the standards contained in Third Edition of the International Special Committee on Radio Interference (CISPR), Pub. 22, "Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement".

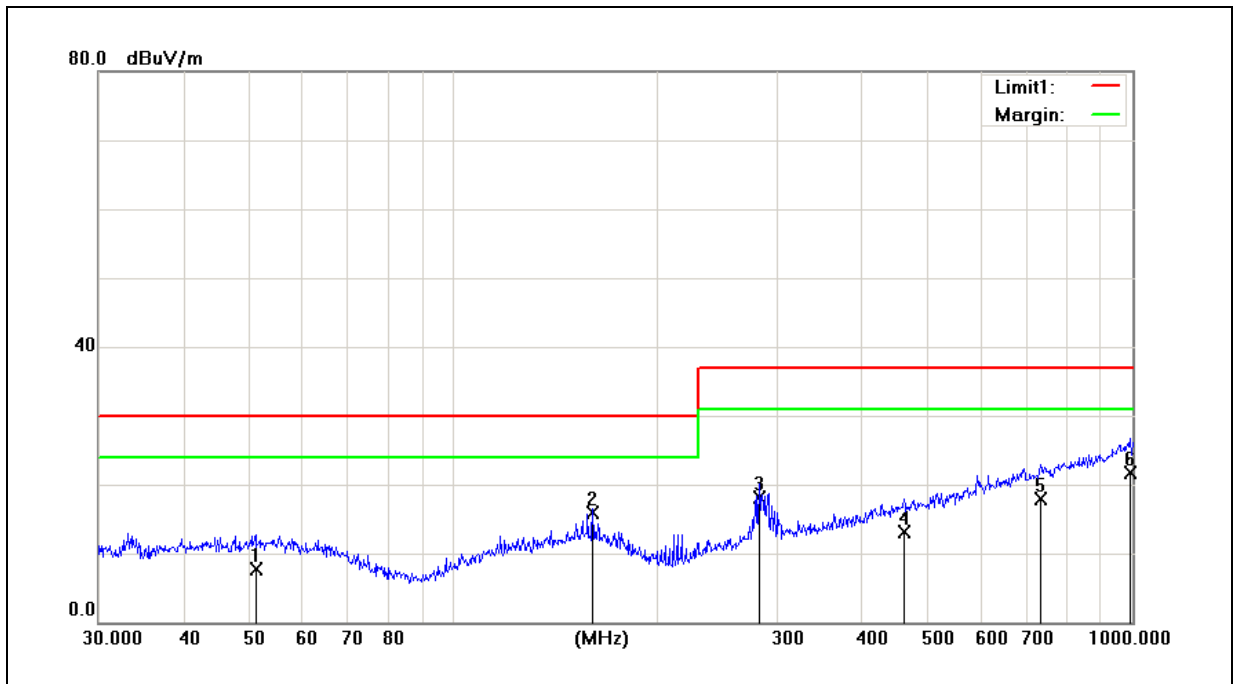
The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated on radiated measurement.

Radiated emissions were investigated over the frequency range from 30MHz to 1GHz using a receiver bandwidth of 120 kHz. Radiated was performed at an antenna to EUT distance of 10 meters.



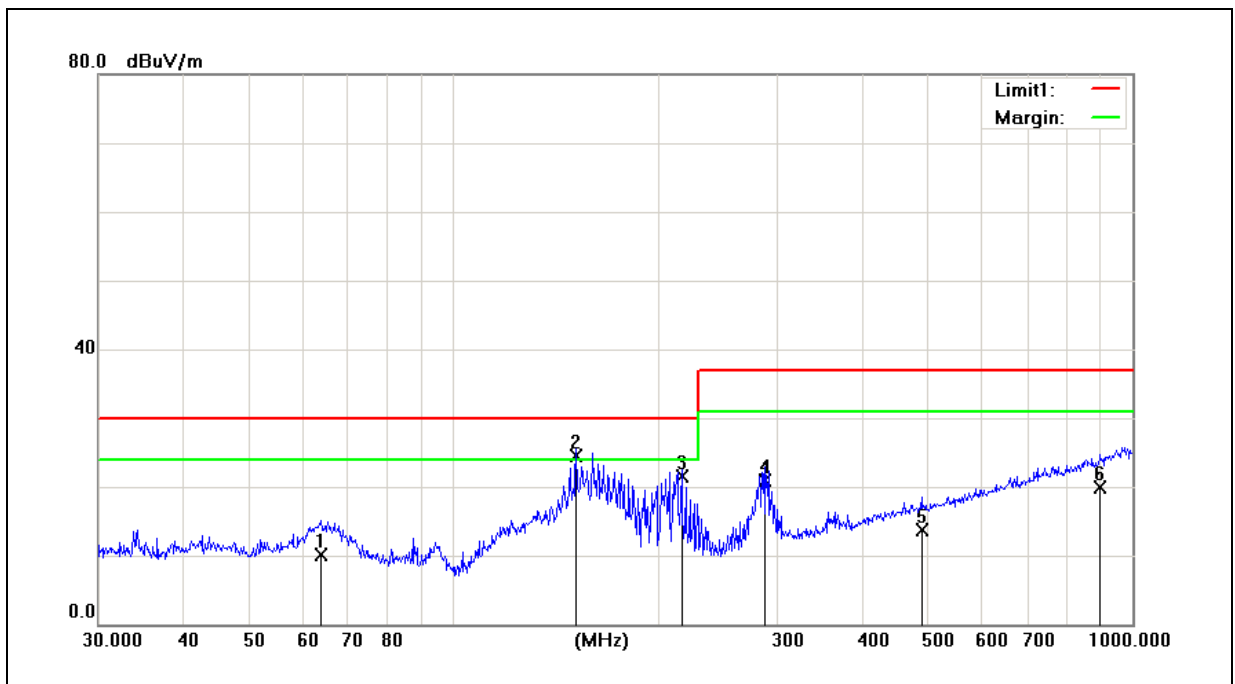
**4.2.5. Test Result**

Standard:	CISPR 22 Class B	Test Distance:	10m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	AirCard 770S	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	10/11/2012
Ant.Polar.:	Horizontal	Test By:	Charlie Chang



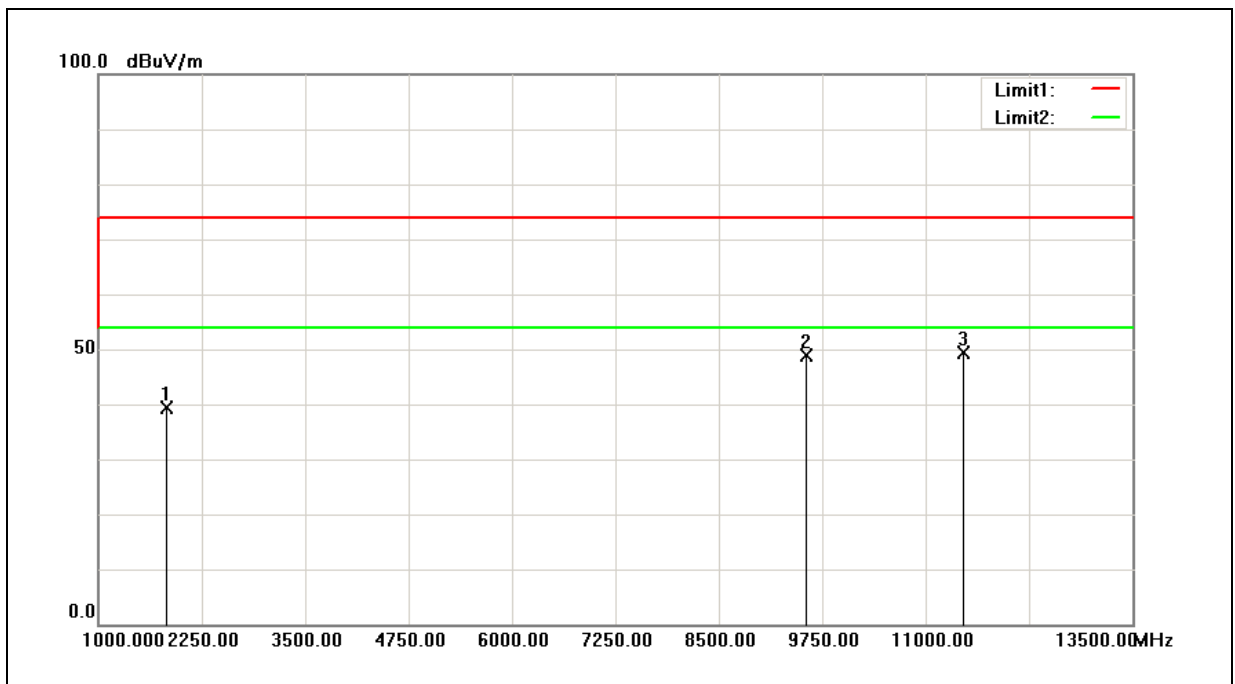
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	51.1210	22.06	-14.36	7.70	30.00	-22.30	200	109	QP
2	160.3456	28.75	-12.75	16.00	30.00	-14.00	400	210	QP
3	281.9946	30.09	-11.99	18.10	37.00	-18.90	400	349	QP
4	460.7271	21.37	-8.27	13.10	37.00	-23.90	376	360	QP
5	731.9203	21.27	-3.37	17.90	37.00	-19.10	400	181	QP
6	993.0114	20.75	1.05	21.80	37.00	-15.20	300	206	QP

Standard:	CISPR 22 Class B	Test Distance:	10m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	AirCard 770S	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5	Date:	10/11/2012
Ant.Polar.:	Vertical	Test By:	Charlie Chang



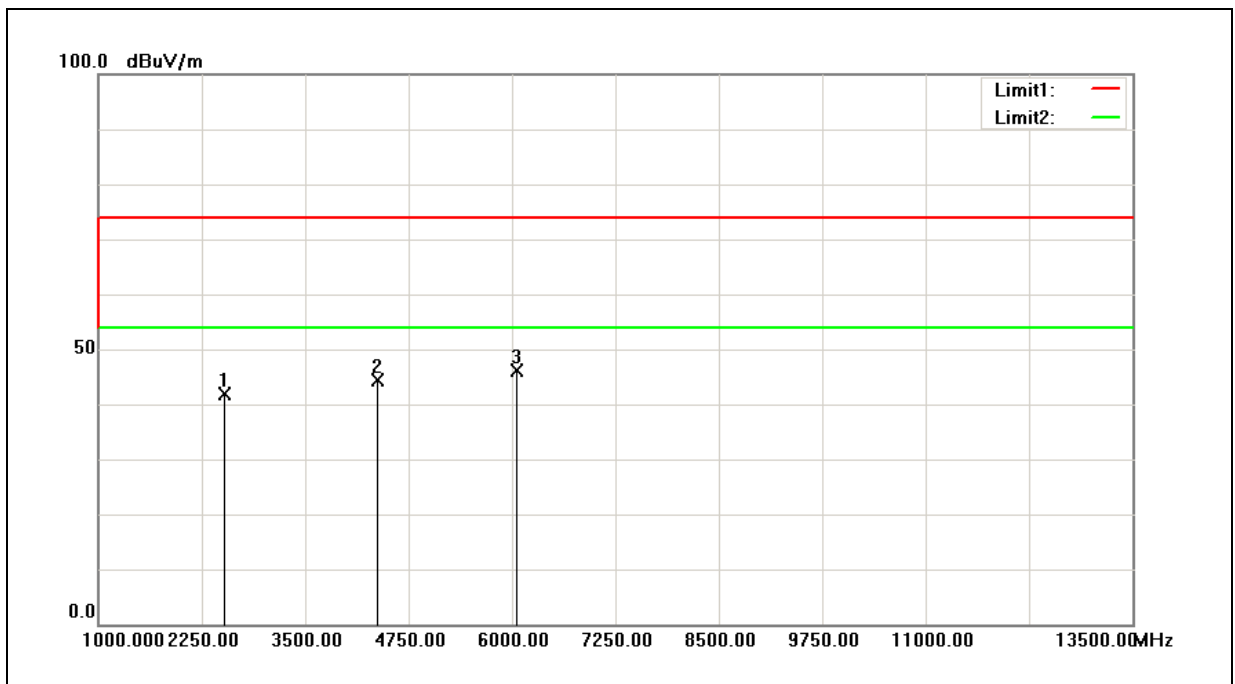
No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)	Remark
1	63.7588	25.42	-15.22	10.20	30.00	-19.80	300	124	QP
2	151.5972	37.14	-12.64	24.50	30.00	-5.50	100	283	QP
3	216.7828	36.66	-15.06	21.60	30.00	-8.40	100	231	QP
4	287.9904	31.90	-11.00	20.90	37.00	-16.10	100	326	QP
5	489.0270	20.58	-6.88	13.70	37.00	-23.30	200	73	QP
6	896.9965	18.72	1.18	19.90	37.00	-17.10	100	257	QP

Standard:	FCC Part 15B Class B	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	AirCard 770S	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5 (1GHz~13.5GHz)	Date:	10/11/2012
Ant.Polar.:	Horizontal	Test By:	Charlie Chang



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	1825.000	60.12	-20.68	39.44	74.00	-34.56	peak
2	9550.000	54.13	-5.20	48.93	74.00	-25.07	peak
3	11462.500	51.21	-1.73	49.48	74.00	-24.52	peak

Standard:	FCC Part 15B Class B	Test Distance:	3m
Test item:	Radiated Emission	Power:	AC 120V/60Hz
Model Number:	AirCard 770S	Temp.(°C)/Hum.(%RH):	26(°C)/60%RH
Mode:	5 (1GHz~13.5GHz)	Date:	10/11/2012
Ant.Polar.:	Vertical	Test By:	Charlie Chang



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2525.000	59.98	-18.06	41.92	74.00	-32.08	peak
2	4375.000	57.90	-13.49	44.41	74.00	-29.59	peak
3	6062.500	56.04	-9.90	46.14	74.00	-27.86	peak