2G RF TEST REPORT

No. 2012TAR036

for

Sierra Wireless Inc.

Mobile Hotspot

Model Name: AirCard 763S

Marketing Name：/

FCC ID: N7NAC763S

IC: 2417C-AC763S

Issued Date: 2012-01-30

Test Laboratory:
DAR accreditation (DIN EN ISO/IEC 17025): No. DGA-PL-114/01-02
FCC 2.948 Listed: No.733176
IC O.A.T.S listed: No.6629A-1
TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology
3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China,100191.
Tel:+86(0)10-62304633-2604, Fax:+86(0)10-62304793, Email:welcome@emcite.com, web: www.emcite.com

CONTENTS

1. Test Laboratory

1.1. Testing Location

Company Name:	TMC Beijing, Telecommunication Metrology Center of MIIT
Address:	3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China
Postal Code:	100191
Telephone:	00861062304633
Fax:	00861062304793

1.2. Testing Environment

Normal Temperature:	15-35℃
Relative Humidity:	20-75%

1.3. Project data

Testing Start Date:	Dec. 23, 2011
Testing End Date:	Jan. 30, 2012

1.4. Signature

Zi Xiaogang

(Prepared this test report)

Sun Xiangqian

(Reviewed this test report)

Lu Bingsong

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	Sierra Wireless Inc.
Address /Post:	13811 Wireless Way Richmond, British Columbia, Canada, V6V 3A4.
City:	British Columbia
Country:	Canada
Telephone:	1 604 231 1100
Fax:	1 604 231 1109

2.2. Manufacturer Information

Company Name:	Sierra Wireless Inc.
Address /Post:	13811 Wireless Way Richmond, British Columbia, Canada, V6V 3A4.
City:	British Columbia
Country:	Canada
Telephone:	1 604 231 1100
Fax:	1 604 231 1109

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Mobile Hotspot
Model Name	AirCard 763S
Marketing Name	/
FCC ID	N7NAC763S
IC	2417C-AC763S
Frequency	GSM 850/900/1800/1900
	WCDMA Band I/II/V
	LTE Band 4/7

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	HW Version	SW Version	IMEI
No.1	DV1	SWI9200H2_00.00.02.02AP	001027009999999

*EUT ID: is used to identify the test sample in the lab internally.

3.3. General Description

The Equipment Under Test (EUT) is a model of mobile hotspot with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

4. Reference Documents

4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	V 10.1.06
FCC Part 22	PUBLIC MOBILE SERVICES	V 10.1.06
RSS-Gen	RSS-Gen — General Requirements and Information for the Certification of Radiocommunication Equipment	Issue 3, December 2010
RSS-132	Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz	Issue 2, September 2005
RSS-133	2 GHz Personal Communications Services	Issue 5, February 2009
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2004
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber (11.20 meters×6.10meters×5.60meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 70 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance, from 30 to 1000 MHz

Fully-anechoic chamber (11.20 meters×6.10meters×6.60meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 70 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz
Site voltage standing-wave ratio	**< 6** dB, 3 m distance, from 1000 to 18000 MHz

Control room and Conducted Chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. =35 %, Max. = 80 %
Shielding effectiveness	> 100 dB
Electrical insulation	> 2 MΩ
Ground system resistance	< 1 Ω

ESD test room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C, Max. = 30 ˚C
Relative humidity	Min. = 35 %, Max. = 60 %

6. SUMMARY OF TEST RESULTS

GSM 850

Items	Test Name	Clause in FCC rules	Clause in IC rules RSS-Gen and RSS-132	Section in this report	Verdict
1	Output Power	§2.1046(a), 22.913(a)	4.4	A.1	P
2	Emission Limit	24.238, 2.1051	4.5	A.2	P

PCS 1900

Items	Test Name	Clause in FCC rules	Clause in IC rules RSS-Gen and RSS- 133	Section in this report	Verdict
1	Output Power	24.232(b)	6.4	A.1	P
2	Emission Limit	22.917, 2.1051	6.5	A.2	P

Receiver Radiated Emission

Items	Test Name	Clause in IC rules		Section in this report	Verdict
		RSS-132	RSS-133		
1	Receiver Radiated Emissions	4.6	6.6	A.3	P

7. Test Equipments Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL DUE DATE
1	Test Receiver	ESCI	100701	R&S	2012.08.04
2	Test Receiver	ESCI	100702	R&S	2012.08.04
3	BiLog Antenna	VULB9163	9163-329	Schwarzbeck	2014.02.24
4	BiLog Antenna	VULB9163	9163-330	Schwarzbeck	2014.02.24
5	Signal Generator	SMR40	100541	R&S	2013.01.12
6	LISN	ESH2-Z5	100196	R&S	2013.01.26
7	Spectrum Analyzer	FSP40	100378	R&S	2012.11.22
8	Universal Radio Communication Tester	CMU200	114545	R&S	2012.03.24
9	Universal Radio Communication Tester	E5515C	GB47460389	Agilent	2012.09.20
10	Dual-Ridge Waveguide Horn Antenna	3117	00066577	ETS	2013.03.31
11	Dual-Ridge Waveguide Horn Antenna	3117	00066585	ETS	2013.03.31
12	Dual-Ridge Waveguide Horn Antenna	3160-09	LM4214/00118383	ETS	2012.07.21
13	Dual-Ridge Waveguide Horn Antenna	3160-09	LM4750/00118388	ETS	2012.07.21
14	Anechoic Chamber	FAC-T5-2.0	343074	ETS	2012.11.17

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER (§22.913(a)/§24.232(b))

A.1.1 Summary

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure max power transmission and proper modulation.
This result contains peak output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

A.1.2 Radiated

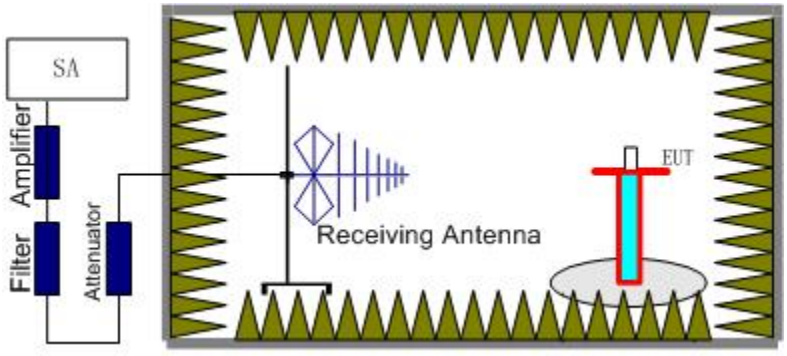
A.1.2.1 Description

This is the test for the maximum radiated power from the EUT.
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."
Rule Part 22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

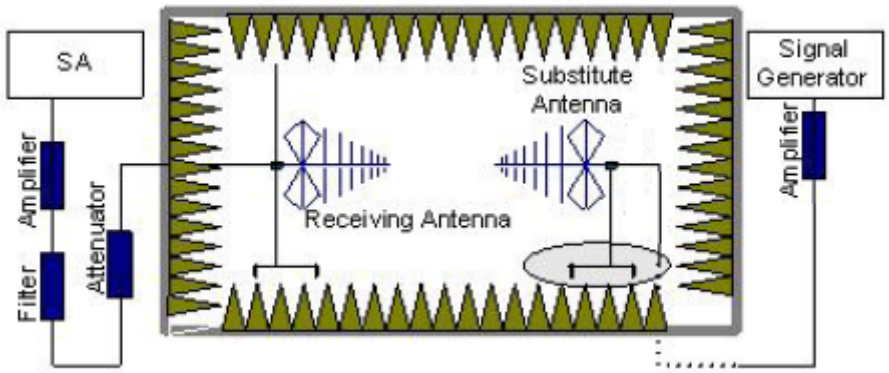
A.1.2.2 Method of Measurement

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.
   The cable loss (P_{cl}) ,the Substitution Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}+ P_{Ag} + P_{cl} + G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

GSM 850-ERP 22.913(a)

Limits

	Power Step	Burst Peak ERP (dBm)
GSM	5	≤38.45dBm (7W)
GPRS	3	≤38.45dBm (7W)
EGPRS	6	≤38.45dBm (7W)

Measurement result

GPRS

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dBm)	Peak ERP(dBm)	Polarization
824.2	-18.58	2.27	-53	0.84	2.15	29.16	V
836.6	-19.04	2.26	-53	0.9	2.15	28.65	V
848.8	-19.95	2.32	-53	0.95	2.15	27.63	V

EGPRS

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Correction (dBm)	Peak ERP(dBm)	Polarization
824.2	-20.42	2.27	-53	0.84	2.15	27.32	H
836.6	-20.18	2.26	-53	0.9	2.15	27.51	V
848.8	-20.31	2.32	-53	0.95	2.15	27.27	V

Frequency**:** MHz

Peak ERP(dBm)= P_{Mea}(dBm)- P_{cl}(dB) - P_{Ag}(dB) - G_a (dB)-2.15dBm=dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

PCS1900-EIRP 24.232(b)

Limits

	Power Step	Burst Peak EIRP (dBm)
GSM	0	≤33dBm (2W)
GPRS	3	≤33dBm (2W)
EGPRS	5	≤33dBm (2W)

Measurement result

GPRS

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Peak EIRP(dBm)	Polarization
1850.2	-24.66	3.92	-50	-4.56	25.98	H
1880.0	-22.64	3.64	-50	-4.43	28.15	V
1909.8	-22.52	3.61	-50	-4.30	28.17	V

EGPRS

Frequency(MHz)	P_{Mea}(dBm)	P_{cl}(dB)	P_{Ag}(dB)	G_a Antenna Gain(dB)	Peak EIRP(dBm)	Polarization
1850.2	-26.64	3.92	-50	-4.56	24.00	V
1880.0	-26.36	3.64	-50	-4.43	24.43	V
1909.8	-26.23	3.61	-50	-4.30	24.46	V

Frequency**:** MHz

Peak EIRP(dBm)= P_{Mea}(dBm) - P_{cl}(dB) - P_{Ag}(dB) - G_a (dB) =dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

A.2 EMISSION LIMIT (§2.1051/§22.917§24.238)

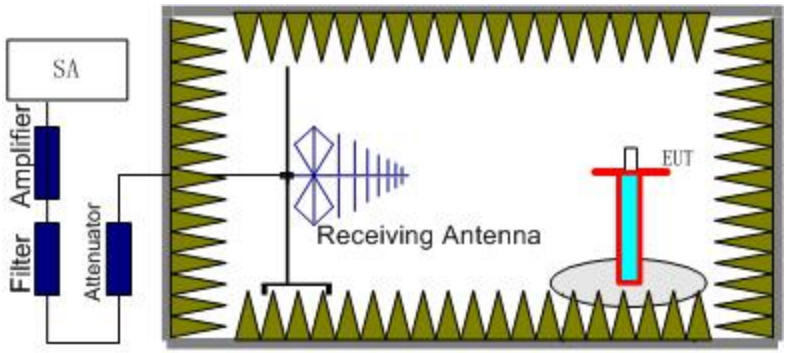
A.2.1 Measurement Method

The measurement procedures in TIA-603C-2004 are used.

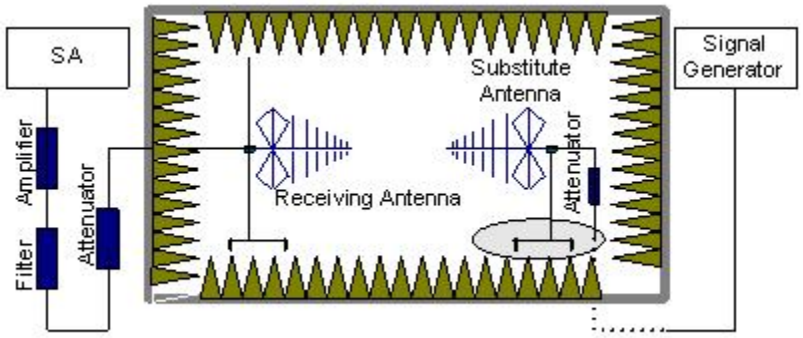
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the

substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.
   A amplifier should be connected in for the test.
   The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}+ P_{pl} + G_a
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.

A.2.2 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of PCS1900 (1850.2 MHz, 1880 MHz and 1909.8 MHz) and GSM850 (824.2MHz, 836.6MHz, 848.8MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 and GSM850 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

A.2.4 Measurement Results Table

Frequency	Channel	Frequency Range	Result
GSM 850MHz	Low	30MHz-10GHz	Pass
	Middle	30MHz-10GHz	Pass
	High	30MHz-10GHz	Pass
GSM 1900MHz	Low	30MHz-20GHz	Pass
	Middle	30MHz-20GHz	Pass
	High	30MHz-20GHz	Pass

A.2.5 Sweep Table

Working Frequency	Subrange (GHz)	RBW	VBW	Sweep time (s)
850MHz	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~10	1 MHz	3 MHz	3
1900MHz	0.03~1	100KHz	300KHz	10
	1-2	1 MHz	3 MHz	2
	2~5	1 MHz	3 MHz	3
	5~8	1 MHz	3 MHz	3
	8~11	1 MHz	3 MHz	3
	11~14	1 MHz	3 MHz	3
	14~18	1 MHz	3 MHz	3
	18~20	1 MHz	3 MHz	2

GPRS Mode Channel 128/824.2MHz

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dBm)	Peak ERP(dBm)	Limit （dBm）	Polarization
1648.23	-53.84	3.89	-5.45	2.15	-54.43	-13.00	V
2472.25	-47.75	5.06	-5.34	2.15	-49.62	-13.00	V
2958.53	-48.40	5.55	-6.99	2.15	-49.11	-13.00	H
3942.33	-53.16	6.24	-8.22	2.15	-53.33	-13.00	V
4948.35	-59.51	7.02	-9.66	2.15	-59.02	-13.00	V
6593.21	-56.94	7.99	-10.63	2.15	-56.45	-13.00	H

GPRS Mode Channel 190/836.6MHz

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dBm)	Peak ERP(dBm)	Limit （dBm）	Polarization
1673.82	-52.35	3.91	-5.52	2.15	-52.89	-13.00	H
2486.48	-48.19	5.06	-5.34	2.15	-50.06	-13.00	V
2885.37	-47.71	5.52	-6.83	2.15	-48.55	-13.00	V
4013.32	-53.67	6.25	-8.29	2.15	-53.78	-13.00	V
6609.28	-55.7	7.99	-10.61	2.15	-55.23	-13.00	V
8337.84	-53.85	8.43	-12.32	2.15	-52.11	-13.00	V

GPRS Mode Channel 251/848.8MHz

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Correction (dBm)	Peak ERP(dBm)	Limit （dBm）	Polarization
2546.36	-47.83	5.07	-5.37	2.15	-49.68	-13.00	V
2894.56	-48.34	5.56	-6.81	2.15	-49.24	-13.00	H
3552.05	-46.14	6.07	-7.33	2.15	-47.03	-13.00	V
4128.46	-52.34	6.31	-8.36	2.15	-52.44	-13.00	V
6293.42	-52.4	8.04	-10.22	2.15	-52.37	-13.00	V
7065.64	-55.94	8.26	-11.46	2.15	-54.89	-13.00	V

GPRS Mode Channel 512/1850.2MHz

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
3699.68	-45.96	5.96	-8.17	-43.75	-13.00	H
5649.35	-43.86	7.48	-10.01	-41.33	-13.00	V
7296.27	-41.32	8.18	-11.34	-38.16	-13.00	H
9250.54	-40.39	8.74	-12.63	-36.5	-13.00	V
13725.52	-43.89	9.91	-13.12	-40.68	-13.00	V
15652.33	-41.72	11.27	-12.73	-40.26	-13.00	H

GPRS Mode Channel 661/1880.0MHz

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
3759.87	-43.23	5.94	-8.21	-40.96	-13.00	H
5639.74	-50.09	7.44	-10.06	-47.47	-13.00	V
9401.52	-43.65	8.89	-12.60	-39.94	-13.00	V
11276.84	-49.99	9.55	-12.40	-47.14	-13.00	H
13084.51	-61.19	9.80	-13.38	-57.61	-13.00	V
16919.82	-50.60	11.17	-12.40	-49.37	-13.00	V

GPRS Mode Channel 810/1909.8MHz

Frequency(MHz)	P_{Mea}(dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit （dBm）	Polarization
3816.81	-44.14	6.10	-8.28	-41.92	-13.00	H
5732.42	-48.61	7.59	-10.09	-46.11	-13.00	V
9549.19	-49.90	8.91	-12.58	-46.23	-13.00	V
11973.82	-55.49	9.56	-12.50	-52.55	-13.00	H
14870.11	-56.13	10.46	-13.53	-52.06	-13.00	H
17763.28	-57.85	11.35	-13.46	-55.74	-13.00	V

A.3 RECEIVER RADIATION EMISSION

Reference

IC: RSS 132, Issue 2, Section 4.6. RSS 133, Issue 5, Section 6.6

A.3.1 Method of Measurement

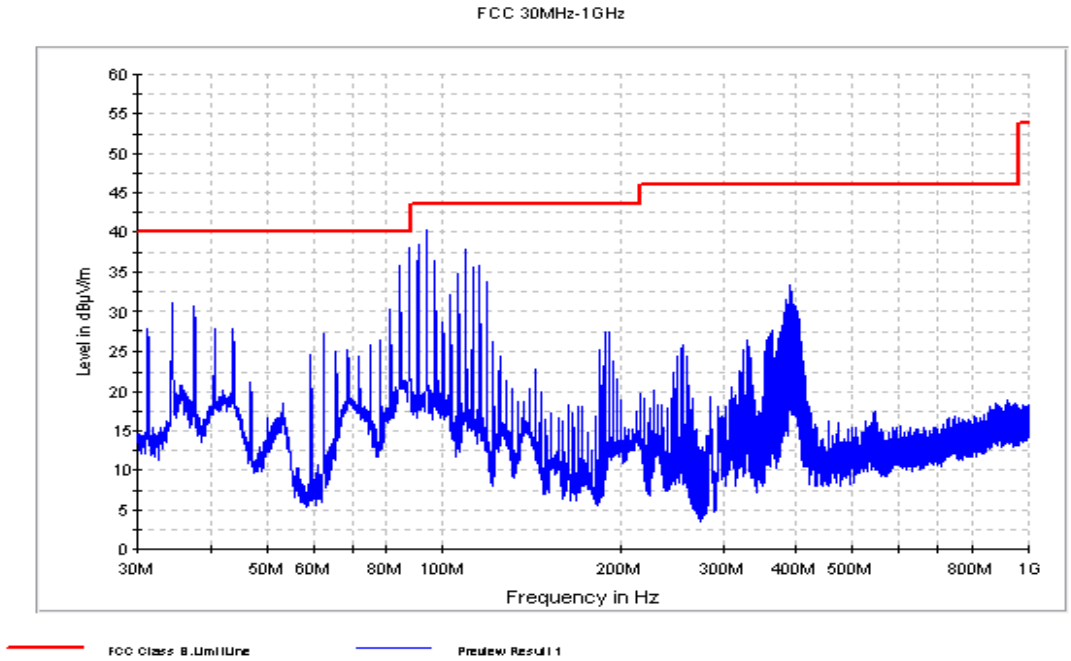
The measurement procedure in ANSI C64.4-2003 is used. The EUT is placed on a 80cm height non-conductive table locating on the center of turntable. From 30MHz-1GHz, the measurement distance is 10m. For frequency range above 1GHz, the measurement distance is 3m.

The EUT is measured with travel charger and the operating mode is idle without CMU200's signaling.

A.3.2 Method of Measurement

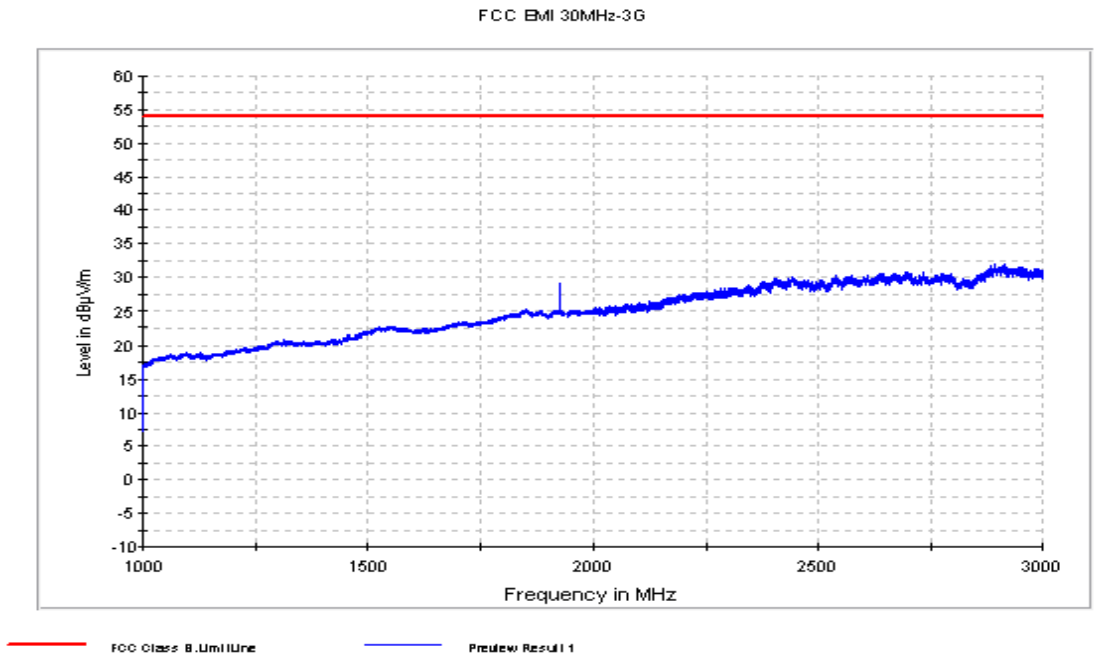
Frequency of Emission (MHz)	Limit (dBμV/m)	Measurement Distance (m)
30-88	30	10
88-216	33.5	10
216-960	36	10
960-1000	44	10
>1000	54	3

A. 3.3 Measurement results



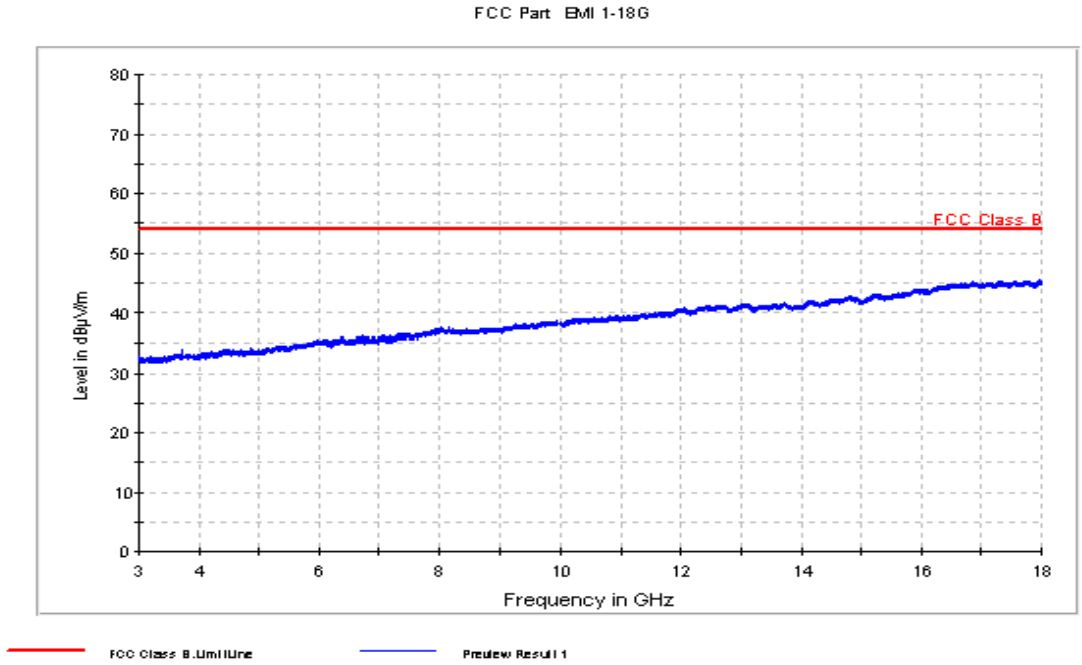
IF bandwidth: 120 kHz

Idle Mode: 30MHz-1GHz



RBW / VBW 1 MHz

Idle Mode: 1GHz-3GHz



RBW / VBW 1 MHz

Idle Mode: 3GHz-18GHz

*****END OF REPORT*****