



TEST REPORT

No. 2011TAR590

for

Sierra Wireless Inc.

USB Modem

Model Name: AirCard 330U

FCC ID: N7NAC330U

IC: 2417C-AC330U

with

Hardware Version: DV1.1

Software Version: SWI9200X_03.00.06.05AP

Issued Date: Nov 17, 2011

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

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

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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

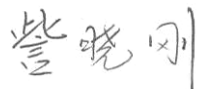
1.2. Testing Environment

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

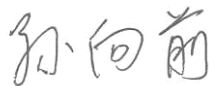
1.3. Project data

Testing Start Date: Oct 20, 2011
Testing End Date: Nov 17, 2011

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, BC, Canada, V6V 3A4
City: Richmond
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, BC, Canada, V6V 3A4
City: Richmond
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	USB Modem
Model Name	AirCard 330U
FCC ID	N7NAC330U
IC	2417C-AC330U
Frequency	GSM 850MHz; PCS 1900MHz; WCDMA Band II; WCDMA Band V; LTE Band 4; LTE Band 7;
Antenna	Internal
Output power	30.75 dBm maximum EIRP measured for PCS1900
Extreme temp. Tolerance	-30°C to +50°C

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*	SN or IMEI	HW Version	SW Version
N07	/	DV1.1	SWI9200X_03.00.06.05AP

*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 USB Modem 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 2, June 2007
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
RSS - Gen Issue 3	Spectrum Management and Telecommunications - Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment	2010-12

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.2 dB, 10 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Conducted chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

Fully-anechoic chamber (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

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	22.917, 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	24.238, 2.1051	6.5	A.2	P

Receiver Radiated Emission

Items	Test Name	Clause in FCC rules	Clause in IC rules		Section in this report	Verdict
			RSS-132	RSS-133		
1	Receiver Radiated Emissions	15.109 2.1053	4.6	6.6	A.2	P

7. Test Equipments Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL DUE DATE
1	Test Receiver	ESCI	100766	R&S	2011-12-06
2	Test Receiver	ESI40	831564/002	R&S	2011-12-12
3	BiLog Antenna	VULB9163	9163-175	Schwarzbeck	2011-12-05
4	BiLog Antenna	VULB9163	9163-302	Schwarzbeck	2011-12-10
5	Signal Generator	SMB100A	102063	R&S	2011-12-05
7	LISN	ESH2-Z5	829991/012	R&S	2011-12-20
8	Spectrum Analyzer	FSU26	200030	R&S	2011-12-18
9	Spectrum Analyzer	FSU46	100054	R&S	2011-12-14
10	Universal Radio Communication Tester	CMU200	100680	R&S	2011-12-23
11	Universal Radio Communication Tester	CMU200	109914	R&S	2011-12-21
12	Dual-Ridge Waveguide Horn Antenna	3117	00119024	ETS	2012-12-31
13	Dual-Ridge Waveguide Horn Antenna	3117	00119021	ETS	2013-12-09
14	Dual-Ridge Waveguide Horn Antenna	3116	2663	EMCO	2011-12-01
15	Dual-Ridge Waveguide Horn Antenna	3116	2661	EMCO	2011-12-01
16	Climatic chamber	PL-2G	343074	ESPEC	2011-12-15

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.

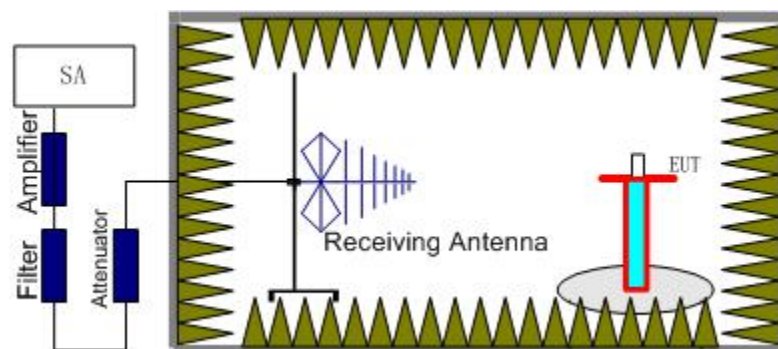
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

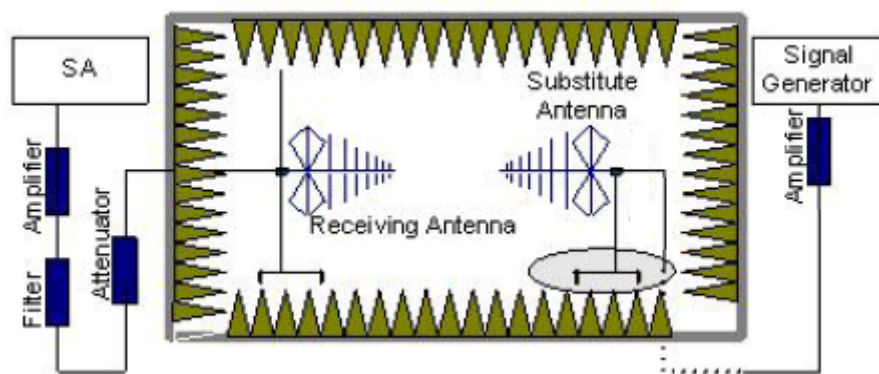
A.1.2.2 Method of Measurement

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 Substitute Antenna.
The cable loss (P_{cl}) ,the Substitute Antenna Gain (G_a) and the Amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{Ag} + P_{cl} + G_a$$

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, $ERP = EIRP - 2.15\text{dBi}$.

GSM 850-ERP 22.913(a)

Limits

	Power Step	Burst Peak ERP (dBm)
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
824.20	-18.36	2.27	-53.00	0.84	2.15	29.38	H
836.60	-17.48	2.26	-53.00	0.90	2.15	30.21	H
848.80	-18.32	2.32	-53.00	0.95	2.15	29.26	H

EGPRS

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dB)	Correction (dBm)	Peak ERP(dBm)	Polarization
824.20	-21.40	2.27	-53.00	0.84	2.15	26.34	H
836.60	-19.98	2.26	-53.00	0.90	2.15	27.71	H
848.80	-21.09	2.32	-53.00	0.95	2.15	26.49	H

Frequency: 836.60MHz

Peak ERP(dBm)= P_{Mea}(-17.48dBm)- P_{cl}(2.26dB)- P_{Ag}(-53.00dB)-G_a (0.90dB)-2.15dBm=30.21dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

PCS1900-EIRP 24.232(b)

Limits

	Power Step	Burst Peak EIRP (dBm)
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
1850.20	-20.67	3.92	-50.00	-4.56	29.97	H
1880.00	-20.04	3.64	-50.00	-4.43	30.75	H
1909.80	-20.17	3.61	-50.00	-4.30	30.52	H

EGPRS

Frequency(MHz)	P _{Mea} (dBm)	P _{cl} (dB)	P _{Ag} (dB)	G _a Antenna Gain(dB)	Peak EIRP(dBm)	Polarization
1850.20	-21.11	3.92	-50.00	-4.56	29.53	H
1880.00	-20.58	3.64	-50.00	-4.43	30.21	H
1909.80	-21.07	3.61	-50.00	-4.30	29.62	H

Frequency: 1880.00MHz

Peak EIRP(dBm)= P_{Mea}(-20.04dBm)- P_{cl}(3.64dB)- P_{Ag}(-50.00dB)-G_a (-4.43dB) =30.75dBm

ANALYZER SETTINGS: RBW = VBW = 3MHz

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

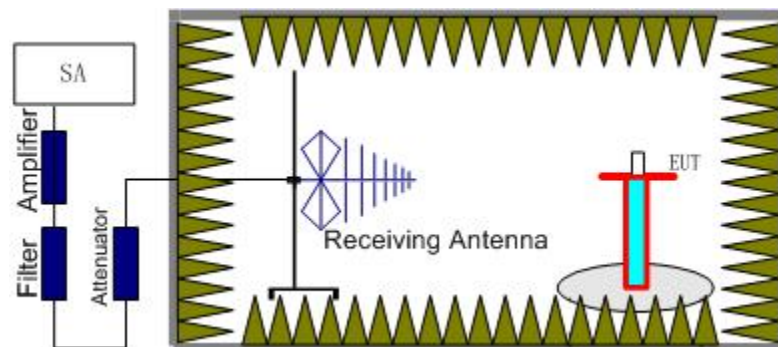
A.2.1 Measurement Method

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

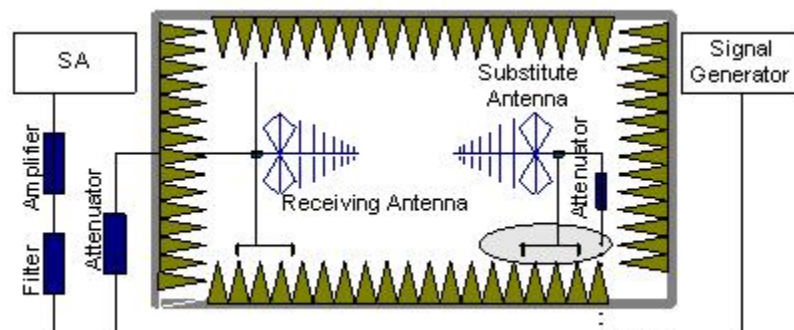
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station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

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:

$$\text{Power(EIRP)} = P_{Mea} + P_{pl} + G_a$$

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, $ERP = EIRP - 2.15\text{dBi}$.

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 the PCS1900 band (1850.2 MHz, 1880 MHz and 1909.8 MHz) and GSM850 band (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 ,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

GSM Mode Channel 128/824.2MHz

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dBm)	Peak ERP(dBm)	Limit (dBm)	Polarization
1648.52	-43.39	3.57	-5.45	2.15	-43.66	-13.00	V
3590.92	-68.21	5.25	-8.01	2.15	-67.60	-13.00	V
4552.75	-62.82	6.50	-8.89	2.15	-62.58	-13.00	V
5535.32	-65.55	8.78	-10.01	2.15	-66.47	-13.00	V
7119.47	-65.56	8.55	-11.17	2.15	-65.09	-13.00	H
8647.20	-64.86	7.74	-12.32	2.15	-62.43	-13.00	H

GSM Mode Channel 190/836.6MHz

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dBm)	Peak ERP(dBm)	Limit (dBm)	Polarization
1673.35	-53.75	3.47	-5.34	2.15	-54.03	-13.00	V
2510.04	-46.66	4.33	-5.43	2.15	-47.71	-13.00	H
3111.57	-68.00	4.91	-6.97	2.15	-68.09	-13.00	H
4318.53	-66.68	6.11	-8.69	2.15	-66.25	-13.00	H
5672.89	-66.56	10.19	-10.07	2.15	-68.83	-13.00	V
8077.63	-64.97	7.64	-11.95	2.15	-62.81	-13.00	V

GSM Mode Channel 251/848.8MHz

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Correction (dBm)	Peak ERP(dBm)	Limit (dBm)	Polarization
1697.49	-49.59	3.62	-5.23	2.15	-50.13	-13.00	H
2422.15	-51.35	4.20	-5.17	2.15	-52.53	-13.00	H
3844.51	-66.21	5.90	-8.31	2.15	-65.95	-13.00	V
5070.89	-70.44	7.40	-9.74	2.15	-70.25	-13.00	V
7151.77	-67.32	8.83	-11.19	2.15	-67.11	-13.00	V
8485.67	-62.93	7.81	-12.19	2.15	-60.70	-13.00	H

GSM Mode Channel 512/1850.2MHz

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
3700.25	-48.91	5.31	-8.14	-46.08	-13.00	V
5550.46	-55.88	8.71	-10.02	-54.57	-13.00	H
8515.44	-68.76	7.79	-12.21	-64.34	-13.00	V
10134.81	-63.88	8.49	-12.43	-59.94	-13.00	V
13823.14	-64.56	11.47	-13.93	-62.10	-13.00	V
17772.56	-57.26	11.89	-13.46	-55.69	-13.00	H

GSM Mode Channel 661/1880.0MHz

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
3760.04	-48.76	5.97	-8.21	-46.52	-13.00	H
5640.15	-55.88	9.59	-10.06	-55.41	-13.00	V
9029.77	-65.71	8.27	-12.60	-61.38	-13.00	H
10207.09	-64.48	8.59	-12.44	-60.63	-13.00	H
13177.51	-63.29	10.27	-13.48	-60.08	-13.00	H
17693.61	-57.71	11.87	-13.42	-56.16	-13.00	V

GSM Mode Channel 810/1909.8MHz

Frequency(MHz)	P _{Mea} (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
3819.72	-47.36	5.56	-8.28	-44.64	-13.00	V
5729.25	-56.85	10.05	-10.09	-56.81	-13.00	H
7789.14	-67.99	7.63	-11.69	-63.93	-13.00	V
10232.12	-62.45	8.60	-12.45	-58.60	-13.00	H
13820.89	-59.71	11.47	-13.93	-57.25	-13.00	V
17542.40	-58.24	11.88	-13.33	-56.79	-13.00	V

Receiver Mode

Frequency(MHz)	Result(dBuV/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dBuV)	Polarity
17995.000	45.943	-30.0	46.3	29.6	H
17980.500	44.735	-31.5	46.3	29.9	H
17974.900	44.631	-30.9	46.3	29.2	V
17946.700	44.779	-32.5	46.3	31.0	H
17963.400	44.771	-30.5	46.3	29.0	V
18000.000	44.761	-30.4	46.3	28.9	H

END OF REPORT