



## FCC PART 24E & 27



# TEST AND MEASUREMENT REPORT

For

## ADC Telecommunications Inc.

P.O. Box 1101, Minneapolis, MN 55440, USA

**FCC ID: NOO-S2784-011**

<b>Report Type:</b> Original Report	<b>Product Type:</b> In Building Wireless Network System
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<b>Report Number:</b> R1003018-2427	
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\* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "\*" and

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**DOCUMENT REVISION HISTORY**

<b>Revision Number</b>	<b>Report Number</b>	<b>Description of Revision</b>	<b>Date of Revision</b>
0	R1003018-2427	Original Report	2010-04-09

## 1 GENERAL INFORMATION

### 1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *ADC Communications Inc.* and their product, FCC ID: *NOO-S2784-011*, Model: *SPT-M1-19AWS-1 1900/AWS Master RAU* which will henceforth be referred to as the "EUT". The EUT is a wireless network systems operate in PCS 1900 band with GSM, CDMA and WCDMA Modulations and AWS 2100 band with WCDMA Modulation, Downlink only. It is a flexible multi-operator/multi-protocol single platform system supporting up to 8 Radio Frequency (RF) bands. It consists of a Host Unit, an Expansion Unit (comprised of a DART Remote Module (DRU), IF Expansion Module (IFEU), and Power Supply), and Remote Amplifiers Units (RAUs). The Host, DRU and IFEU are intended for telecom closet indoor use. The RAU is intended to be installed above a false ceiling in an environmentally controlled office.

### 1.2 Mechanical Description

The EUT measures approximately 211 mm (L) x 272 mm (W) x 76 mm (H), and weighs approximately 3.4 kg.

*\*The test data gathered are from production sample, serial number: MR101Y8C / Unit #9 provided by the manufacturer.*

### 1.3 EUT Photo



*Please refer to Exhibit C for more EUT photographs.*

## 1.4 Objective

This type approval report is prepared on behalf of ADC Telecommunications, Inc. in accordance with Part 2, Subpart J, Part 24, Subpart E and Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation, frequency stability, band edge, and conducted and radiated margin.

## 1.5 Related Submittal(s)/Grant(s)

FCC ID: NOO-S2790-011, Report Number: R1001123-2224

## 1.6 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 24 Subpart E – PCS

Part 27 Subpart L - Miscellaneous Wireless Communications Services

Applicable Standards: TIA/EIA-603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## 1.7 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the values ranging from +2.0 dB for Conducted Emissions tests and +4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

## 1.8 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and

December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: R-2463 and C-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at <http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm>

## 2 SYSTEM TEST CONFIGURATION

### 2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

### 2.2 EUT Exercise Software

Signal was sent through EUT using a signal generator; device was set to normal operating mode.

### 2.3 Equipment Modifications

No modifications were made to the EUT.

### 2.4 Support Equipment List

Manufacturer	Description	Model	Serial Number
ADC Telecommunication	URH	-	MDF3O18A
ADC Telecommunication	DRH	-	7109A00S
Unipower Corporation	AC/DC Power Supply	TPCR1V3C-Z	24090T0019
ADC Telecommunication	IF Expansion Module	-	S/N7

### 2.5 Local Support Equipment and Software List and Details

Manufacturer	Description	Model	Serial Number
Agilent	MXG Vector Signal Generator	-	MY47420502

### 2.6 Internal Configurations of EUT

Manufacturer	Description	Model	Serial Number
ADC Telecommunication	AWS 2100 PCB Board	722766-0-A	#5
ADC Telecommunication	PCS 1900 PCB Board	712753-0 Rev A	MR101Y5F
ADC Telecommunication	Main PCB Board	712750-1 Rev A	R0948M0499NC



## 2.7 Interface Ports and Cables

Cable Description	Length (m)	To	From
Shielded Cable (Duplex Fiber Optic)	3	Host Unit	DRU (Dart Remote Unit)
75 Ohm Coax Cable	100	IF Expansion Unit (IFEU)	MRAU
50 ohm CATV cable	< 1	DRU	IF Expansion Unit
RF Cable	< 1	Main Hub/RAU	Spectrum Analyzer
RF Cable	< 1	Main Hub/RAU	Signal Generator

### 3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046, §24.232, §27.50 (i)	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A
§2.1049, §24.238, §27.53 (c)	Occupied Bandwidth / Out of Band Emissions	Compliant
§2.1053, §24.238, §27.53 (c)	Spurious Radiated Emissions	Compliant
§2.1051, §24.238, §27.53 (c)	Spurious Emissions at Antenna Terminals	Compliant
§24.238, §27.53 (c)	Band Edge	Compliant
§2.1055	Frequency Stability	Compliant
§2.1091	RF Exposure	Compliant

Note: \* For PCS Band, Only GSM Measurements were performed, for CDMA and WCDMA measurements please refer to: Report Number: R1001123-2224FCC ID: NOO-S2790-011

\*\* Please refer to the appendix I for the declaration of similarity.

## 4 FCC §2.1046, §24.232 & §27.50 – RF OUTPUT POWER

### 4.1 Applicable Standard

FCC §2.1046, §24.232 & §27.50.

### 4.2 Test Procedure

*Conducted:*

The RF output of the transmitter was connected to the signal generator and the spectrum analyzer through sufficient attenuation.

### 4.3 Test Environmental Conditions

<b>Temperature:</b>	21-24°C
<b>Relative Humidity:</b>	41-50 %
<b>ATM Pressure:</b>	99-102kPa

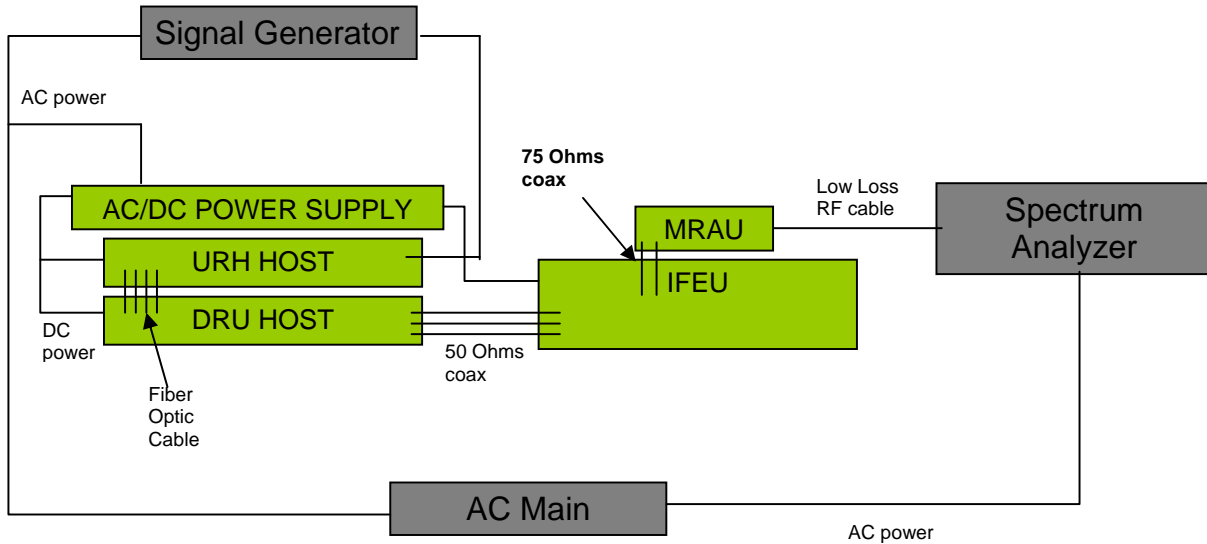
\* The testing was performed by Dennis Huang on 2010-3-9 at RF Site.

### 4.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	MXG Vector Signal Generator	N5182A	MY47420502	2009-09-18

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### 4.5 Test Setup Block Diagram



### 4.6 Test Results

#### PCS Band:

GSM, Maximum Output Power – Modulated Signal

Channel	Frequency (MHz)	Output Power (dBm)
Low	1930.2	14.89
Middle	1960.0	14.98
High	1989.8	14.83

Note: \* For CDMA and WCDMA measurements please refer to: FCC ID: NOO-S2790-011, Report Number: R1001123-2224.

#### AWS Band:

WCDMA, Maximum Output Power – Modulated Signal

Channel	Frequency (MHz)	Output Power (dBm)
Low	2112.4	14.98
Middle	2132.4	14.91
High	2152.6	14.90

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## **5 FCC §2.1047 - MODULATION CHARACTERISTIC**

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### **5.1 Applicable Standard**

According to FCC §2.1047, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

### **5.2 Test Result**

N/A

## 6 FCC §2.1049, §24.238 & §27.53 - OCCUPIED BANDWIDTH

### 6.1 Applicable Standard

Requirements: FCC §2.1049, §24.238 and §27.53.

### 6.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 10 kHz and the 26 dB & 99% bandwidth was recorded.

### 6.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	MXG Vector Signal Generator	N5182A	MY47420502	2009-09-18

\* **Statement of Traceability: BA CL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### 6.4 Test Environmental Conditions

<b>Temperature:</b>	21-24°C
<b>Relative Humidity:</b>	41-50 %
<b>ATM Pressure:</b>	99-102kPa

\* *The testing was performed by Dennis Huang on 2010-3-9 at RF Site.*

## 6.5 Test Results and Plots

### PCS Band:

Mode		Channel	Frequency (MHz)	Emission Bandwidth (kHz)
GSM	Downlink	Low	1930.2	315.418
		Middle	1960.0	314.313
		High	1989.8	311.265

Note: \* For CDMA and WCDMA measurements please refer to: FCC ID: NOO-S2790-011, Report Number: R1001123-2224.

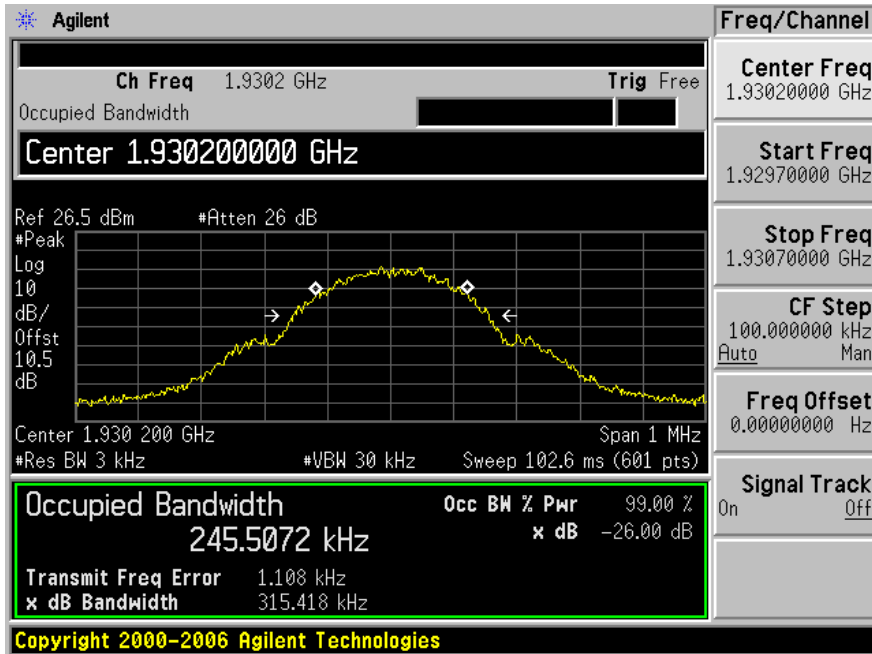
### AWS Band:

Mode		Channel	Frequency (MHz)	Emission Bandwidth (kHz)
WCDMA	Downlink	Low	2112.4	4706
		Middle	2132.4	4676
		High	2152.6	4708

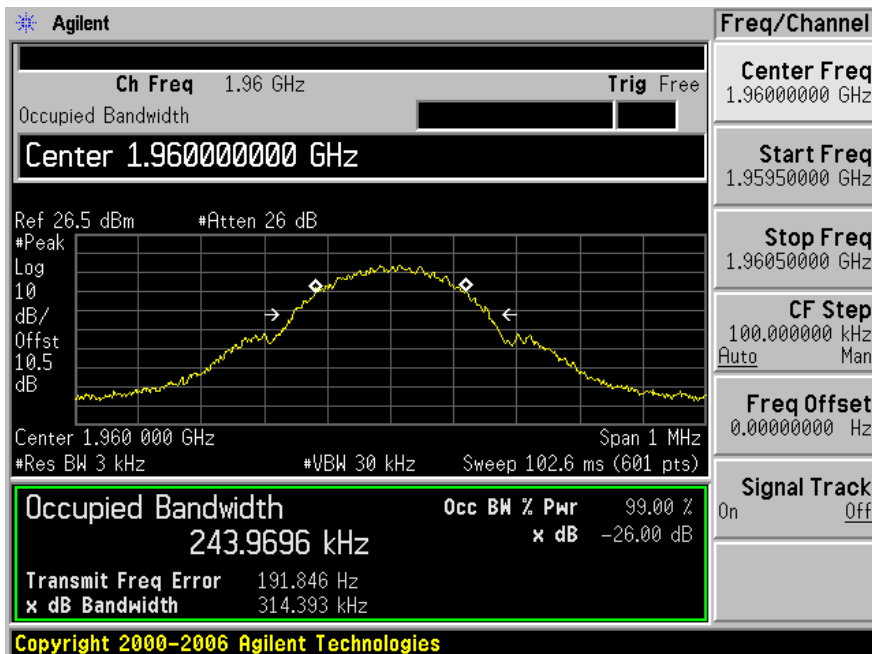
*Please refer to the following plots for details.*

**PCS Band:**

GSM, Downlink, Low Channel: 1930.2 MHz



GSM, Downlink, Middle Channel: 1960 MHz



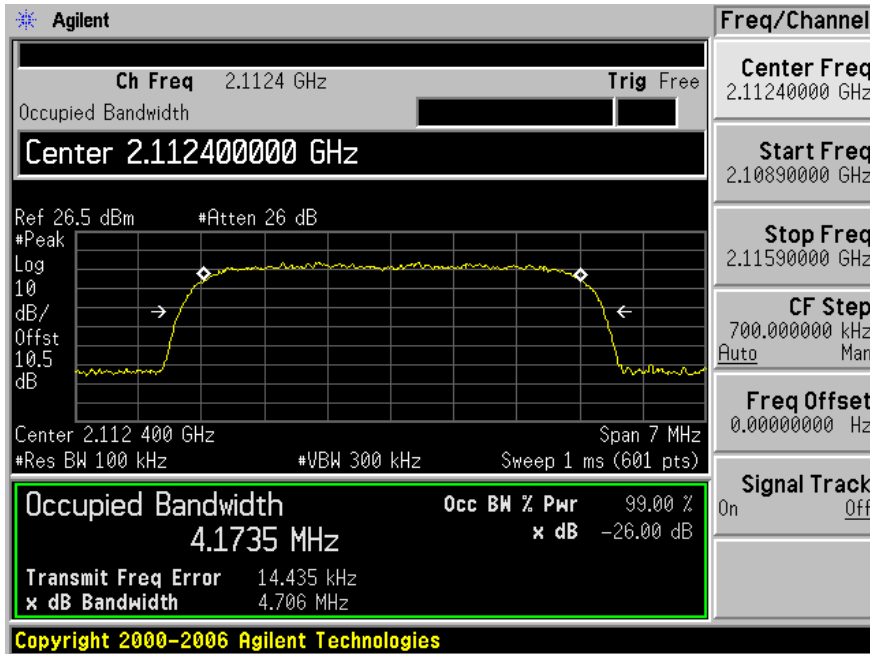


GSM, Downlink, High Channel: 1989.8 MHz

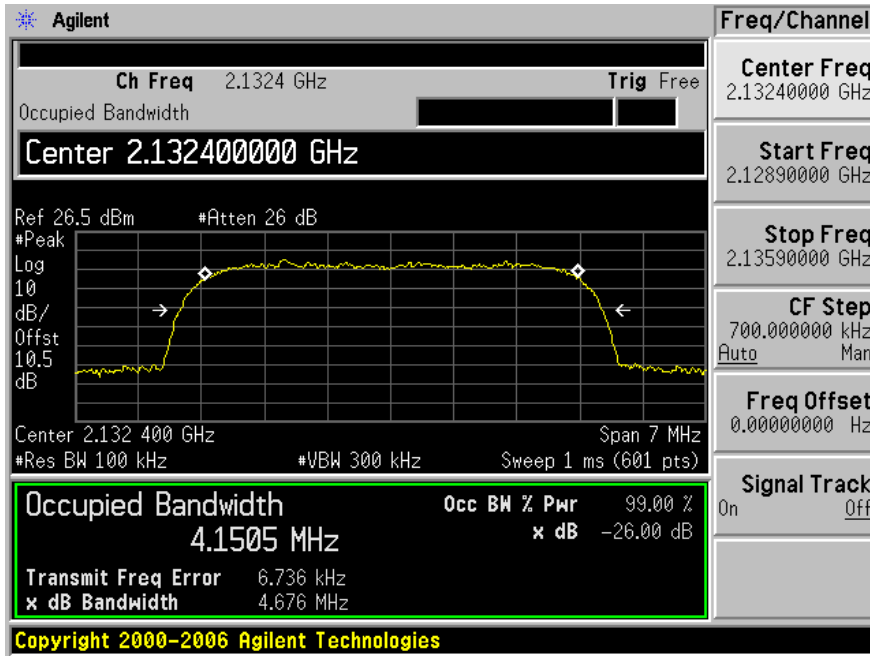


AWS Band:

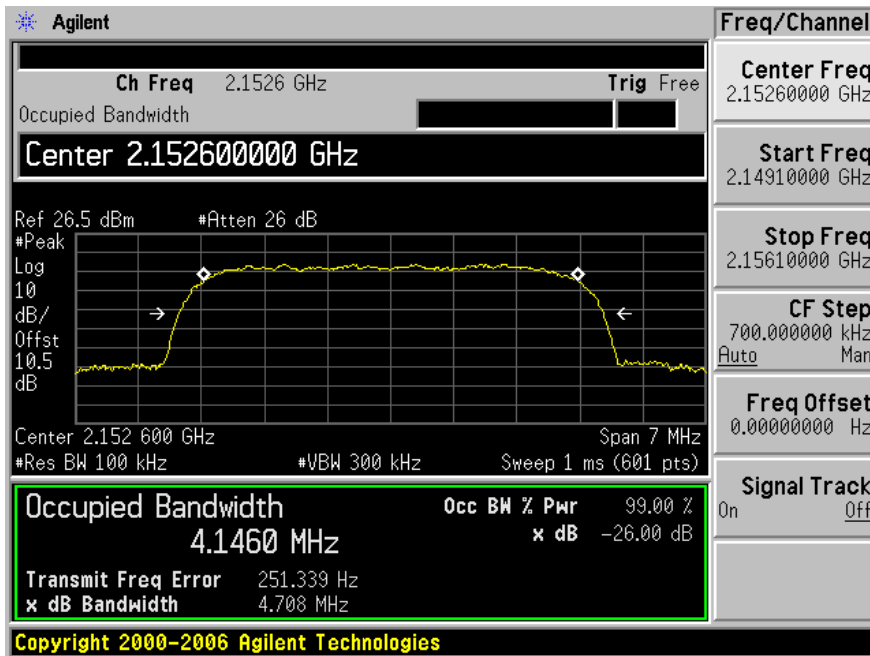
WCDMA, Downlink, Low Channel: 2112.4 MHz



WCDMA, Downlink, Middle Channel: 2132.4 MHz



WCDMA, Downlink, High Channel: 2152.6 MHz



## 7 FCC §2.1053, §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

### 7.1 Applicable Standard

Requirements: FCC §2.1053, §24.238 and §27.53.

### 7.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

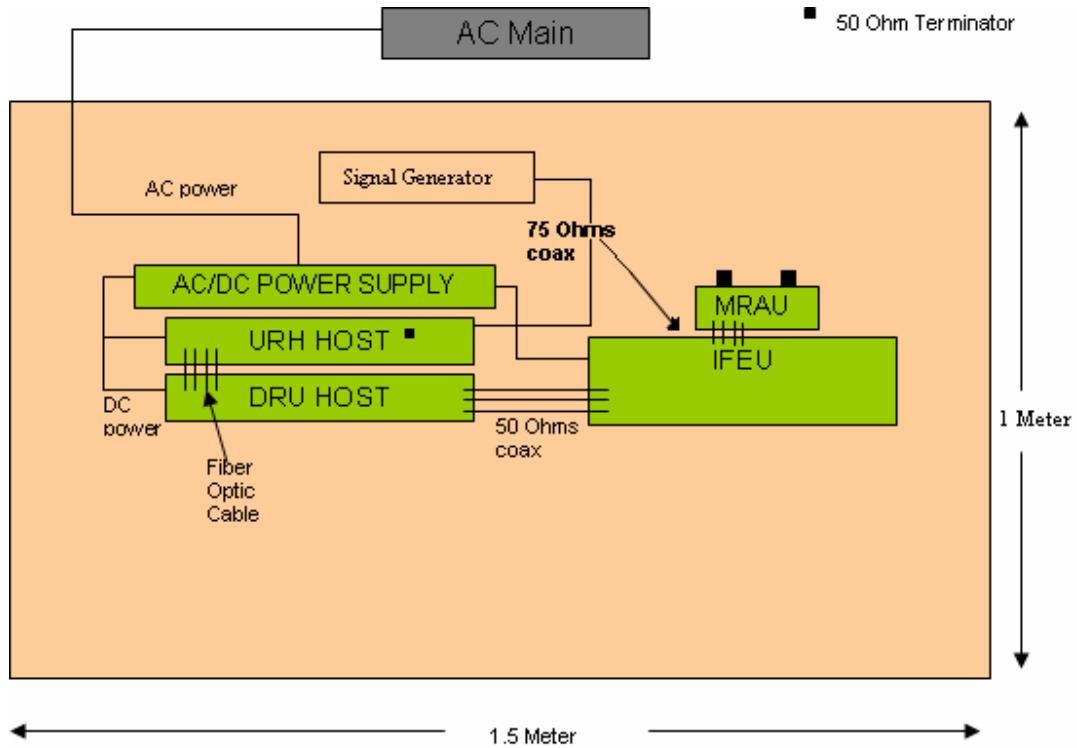
Spurious emissions in dB = 10 log (TX Power in Watts/0.001) – the absolute level  
Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts)

### 7.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Analyzer, Spectrum	E4446A	US44300386	2009-06-29
HP	Generator, Signal	83650B	3614A00276	2009-05-28
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2009-05-05
HP	Amplifier, Pre	1-26.5GHz	3147A00400	2010-1-29
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2009-09-23
A.R.A.	Antenna, Horn	DRG-118/A	1132	2009-07-28
Agilent	MXG Vector Signal Generator	N5182A	MY47420502	2009-09-18

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### 7.4 Test Setup Block Diagram



### 7.5 Test Environmental Conditions

<b>Temperature:</b>	21~23.5 °C
<b>Relative Humidity:</b>	43~59 %
<b>ATM Pressure:</b>	98~101.7kPa

*\*The testing was performed by Dennis Huang on 2010-03-02 in 5 Meter Chamber #3.*

## 7.6 Summary of Test Results

The worst case reading as follows:

### PCS Band:

Mode: GSM Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-20.18	5191.7	Horizontal	1960 MHz
Mode: CDMA Downlink			
-18.39	5191.7	Horizontal	1960 MHz
Mode: WCDMA Downlink			
-19.23	5191.7	Horizontal	1960 MHz

### AWS 2100 Band

Mode: WCDMA Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-19	72.9	Vertical	2132.4 MHz

Please refer to the following tables for detailed results.

## 7.7 Test Results

**PCS Band**

GSM ~ Downlink (Input frequency = 1960 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
5191.7	55.66	27	1.76	H	5191.7	-40.94	10.1	2.34	-33.18	-13	-20.18
5191.7	55.17	64	1.92	V	5191.7	-41.43	10.1	2.34	-33.67	-13	-20.67
6144	51.03	339	1.11	V	6144	-47.32	10.9	2	-38.42	-13	-25.42
6144	50.56	326	1.32	H	6144	-47.79	10.9	2	-38.89	-13	-25.89
3072	53.23	328	1.15	V	3072	-47.84	9.5	1.68	-40.02	-13	-27.02
3072	52.78	34	1.19	H	3072	-48.29	9.5	1.68	-40.47	-13	-27.47
1250	63.85	356	1.0	V	1250	-48.62	7.1	1.34	-42.86	-13	-29.86
1250	61.07	305	1.0	H	1250	-51.4	7.1	1.34	-45.64	-13	-32.64
1500	57.2	342	1.0	V	1500	-55.04	8.8	1.34	-47.58	-13	-34.58
1500	52.5	305	1.0	H	1500	-59.74	8.8	1.34	-52.28	-13	-39.28

CDMA ~ Downlink (Input frequency = 1960 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
5191.7	57.45	26	1.77	H	5191.7	-39.15	10.1	2.34	-31.39	-13	-18.39
5191.7	55.04	62	2.03	V	5191.7	-41.56	10.1	2.34	-33.8	-13	-20.8
6144	52	326	1.32	H	6144	-46.35	10.9	2	-37.45	-13	-24.45
6144	51.04	339	1.11	V	6144	-47.31	10.9	2	-38.41	-13	-25.41
3072	52.64	328	1.15	V	3072	-48.43	9.5	1.68	-40.61	-13	-27.61
3072	51.38	33	1.19	H	3072	-49.69	9.5	1.68	-41.87	-13	-28.87
1250	64.15	356	1.0	V	1250	-48.32	7.1	1.34	-42.56	-13	-29.56
1500	60.15	333	1.0	V	1500	-52.09	8.8	1.34	-44.63	-13	-31.63
1250	61.82	307	1.0	H	1250	-50.65	7.1	1.34	-44.89	-13	-31.89
1500	56.74	305	1.0	H	1500	-55.5	8.8	1.34	-48.04	-13	-35.04

WCDMA ~ Downlink (Input frequency = 1960 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
5191.7	56.61	27	1.76	H	5191.7	-39.99	10.1	2.34	-32.23	-13	-19.23
5191.7	56.17	64	1.92	V	5191.7	-40.43	10.1	2.34	-32.67	-13	-19.67
6144	51.56	326	1.32	H	6144	-46.79	10.9	2	-37.89	-13	-24.89
6144	50.89	339	1.11	V	6144	-47.46	10.9	2	-38.56	-13	-25.56
3072	52.51	328	1.15	V	3072	-48.56	9.5	1.68	-40.74	-13	-27.74
3072	51.18	34	1.19	H	3072	-49.89	9.5	1.68	-42.07	-13	-29.07
1250	63.95	356	1.0	V	1250	-48.52	7.1	1.34	-42.76	-13	-29.76
1250	61.87	305	1.0	H	1250	-50.6	7.1	1.34	-44.84	-13	-31.84
1500	58.88	342	1.0	V	1500	-53.36	8.8	1.34	-45.9	-13	-32.9
1500	53.98	305	1.0	H	1500	-58.26	8.8	1.34	-50.8	-13	-37.8

**AWS Band:**

WCDMA ~ Downlink (Input frequency = 2132.4 MHz)

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Freq. (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Freq. (MHz)	Level (dBm)	Ant. Gain Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
72.9	71.5	170	1.0	V	72.9	-31.5	0	0.5	-32	-13	-19
5191.7	54.47	35	1.9	H	5191.7	-40.91	10.1	2.34	-33.15	-13	-20.15
266	64.24	152	1.0	H	266	-33.76	0	0.5	-34.26	-13	-21.26
72.9	69.12	192	2.56	H	72.9	-33.88	0	0.5	-34.38	-13	-21.38
5191.7	52.75	64	2.09	V	5191.7	-42.63	10.1	2.34	-34.87	-13	-21.87
266	63.51	174	1.25	V	266	-34.49	0	0.5	-34.99	-13	-21.99
3072	55.91	300	2.07	H	3072	-45.94	9.5	1.68	-38.12	-13	-25.12
6147	48.04	35	1.56	H	6147	-47.32	10.9	2	-38.42	-13	-25.42
6147	44.89	327	1.14	V	6147	-50.47	10.9	2	-41.57	-13	-28.57
3072	51.51	354	1.09	V	3072	-50.34	9.5	1.68	-42.52	-13	-29.52
1250	62.85	22	1.24	V	1250	-49.14	7.1	1.34	-43.38	-13	-30.38
1250	61.01	320	1.51	H	1250	-50.98	7.1	1.34	-45.22	-13	-32.22
1500	59.37	9	1.5	V	1500	-53.65	8.8	1.34	-46.19	-13	-33.19
1500	57.27	53	1.0	H	1500	-55.75	8.8	1.34	-48.29	-13	-35.29

## 8 FCC §2.1051, §24.238 & §22.917 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

### 8.1 Applicable Standard

Requirements: FCC §2.1051, §24.238, §27.53.

The spectrum shall be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

§24.238 and §27.53: 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

### 8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

### 8.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	MXG Vector Signal Generator	N5182A	MY47420502	2009-09-18

\* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### 8.4 Test Environmental Conditions

<b>Temperature:</b>	21-24°C
<b>Relative Humidity:</b>	41-50 %
<b>ATM Pressure:</b>	99-102kPa

\* *The testing was performed by Dennis Huang on 2010-3-9 at RF Site.*

### 8.5 Test Results

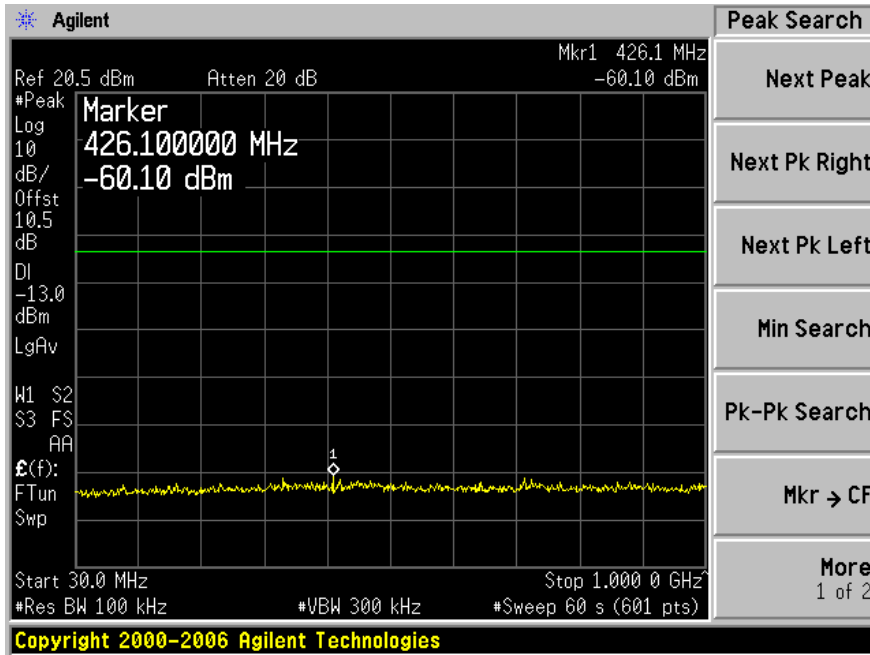
Note: \* For CDMA and WCDMA measurements please refer to: FCC ID: NOO-S2790-011, Report Number: R1001123-2224.



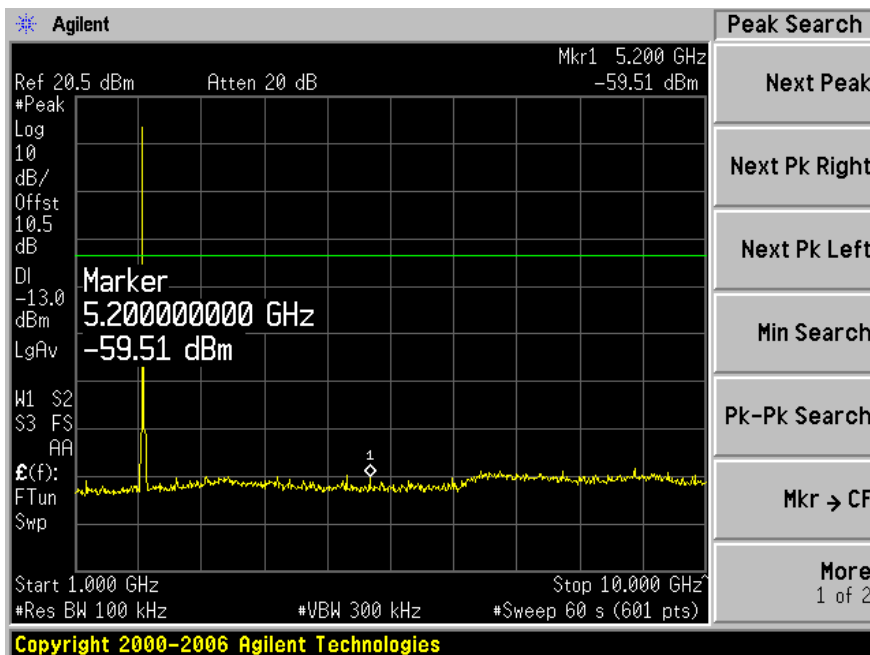
**PCS Band:**

GSM, Downlink, Middle Channel: 1960 MHz:

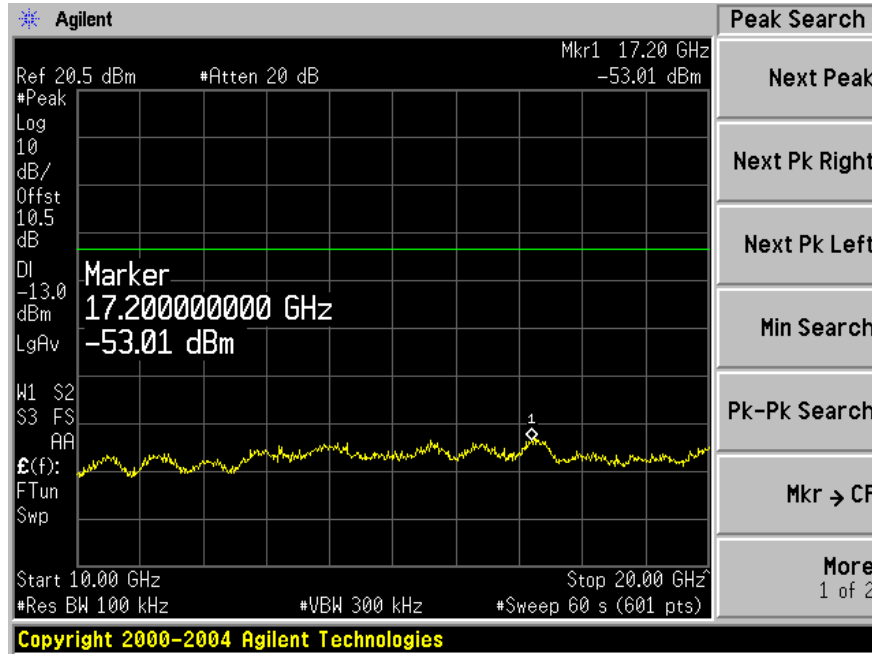
Plot 1: 30 MHz to 1 GHz



Plot 2: 1-10 GHz

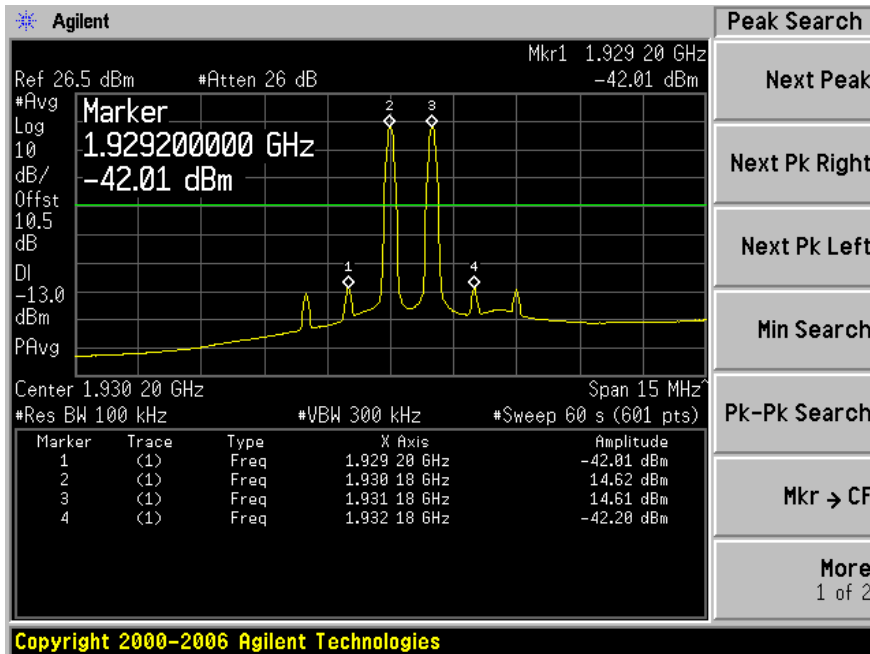


Plot 3: 10-20 GHz

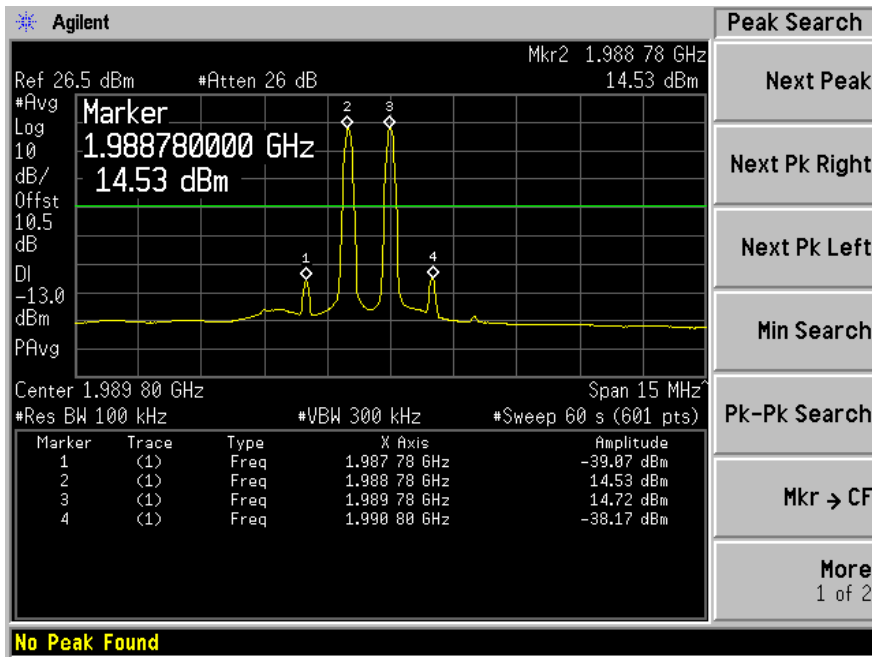


**Inter-modulation:**

GSM, Downlink, Low Channel: 1930.2 MHz:



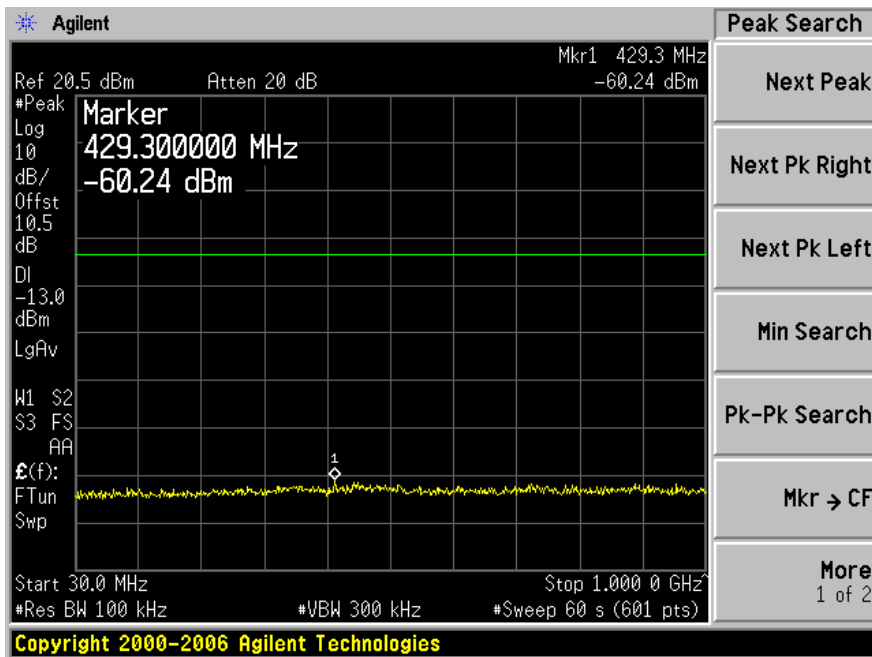
GSM, Downlink, High Channel: 1989.8 MHz:



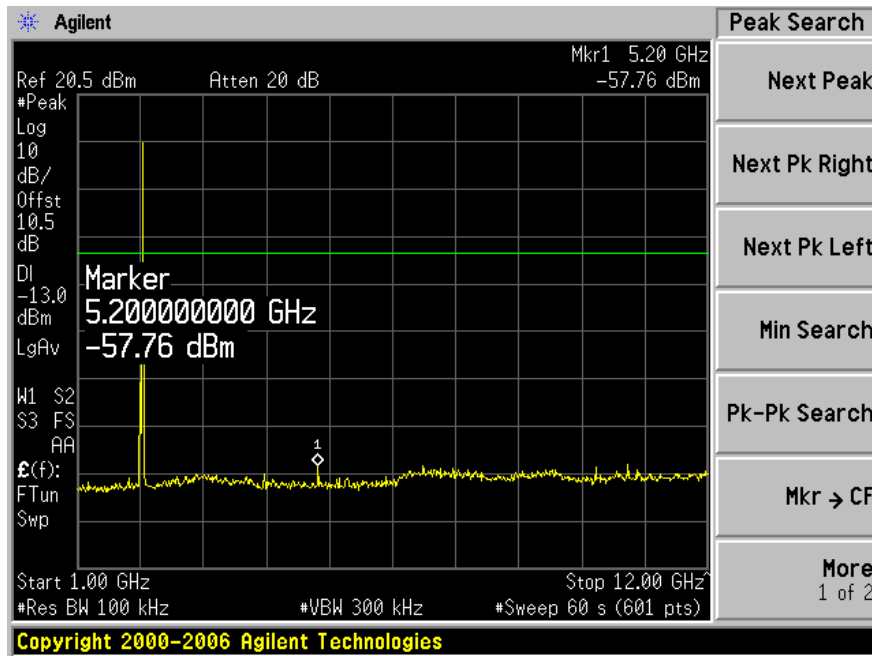
AWS Band:

WCDMA, Downlink, Middle Channel: 2112.4 MHz:

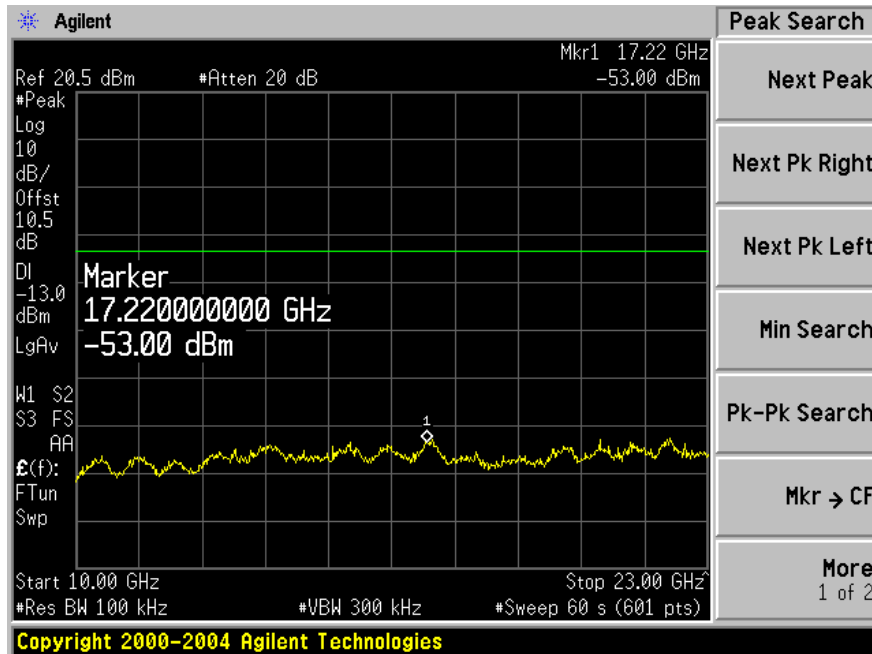
Plot 1: 30 MHz to 1 GHz



Plot 2: 1-12 GHz

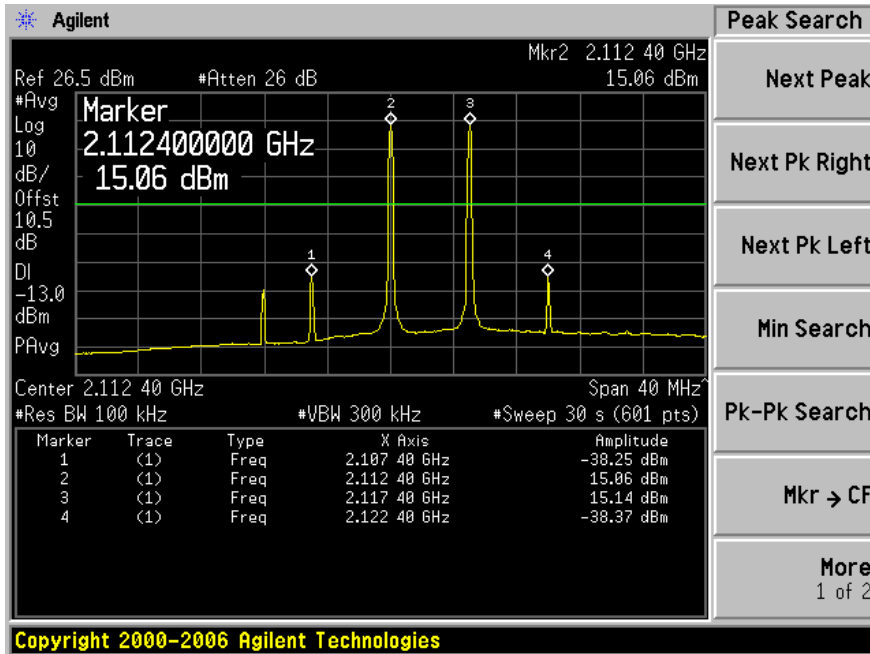


Plot 3: 12-20 GHz

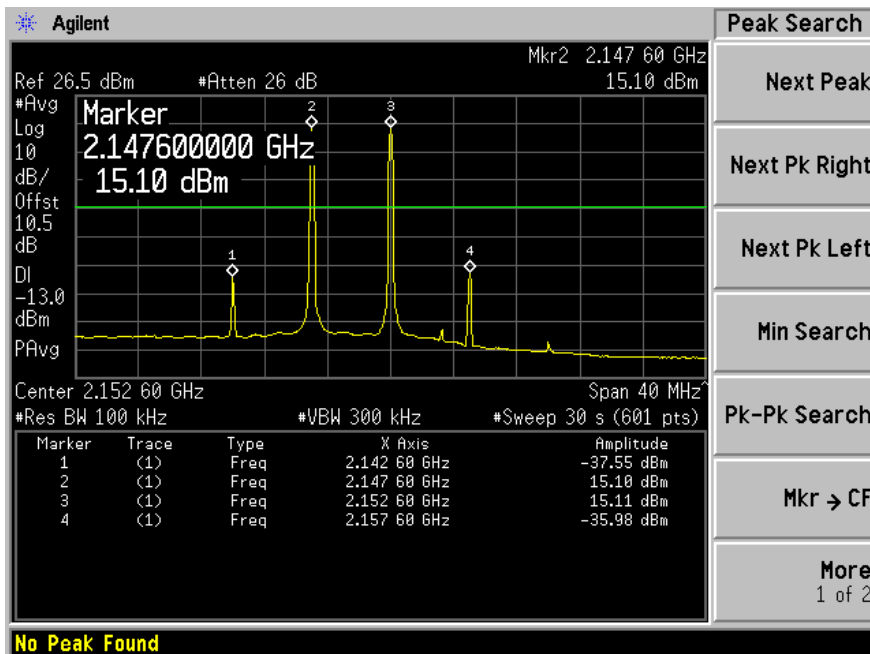


**Inter-modulation:**

WCDMA, Downlink, Low Channel: 2112.4 MHz:



WCDMA, Downlink, High Channel: 2152.6 MHz:



## 9 FCC §24.238 & §27.53– BAND EDGE

### 9.1 Applicable Standard

According to FCC §24.238 and §27.53, the power of any emissions 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.

### 9.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

### 9.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	MXG Vector Signal Generator	N5182A	MY47420502	2009-09-18

\* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

### 9.4 Test Environmental Conditions

<b>Temperature:</b>	21-24°C
<b>Relative Humidity:</b>	41-50 %
<b>ATM Pressure:</b>	99-102kPa

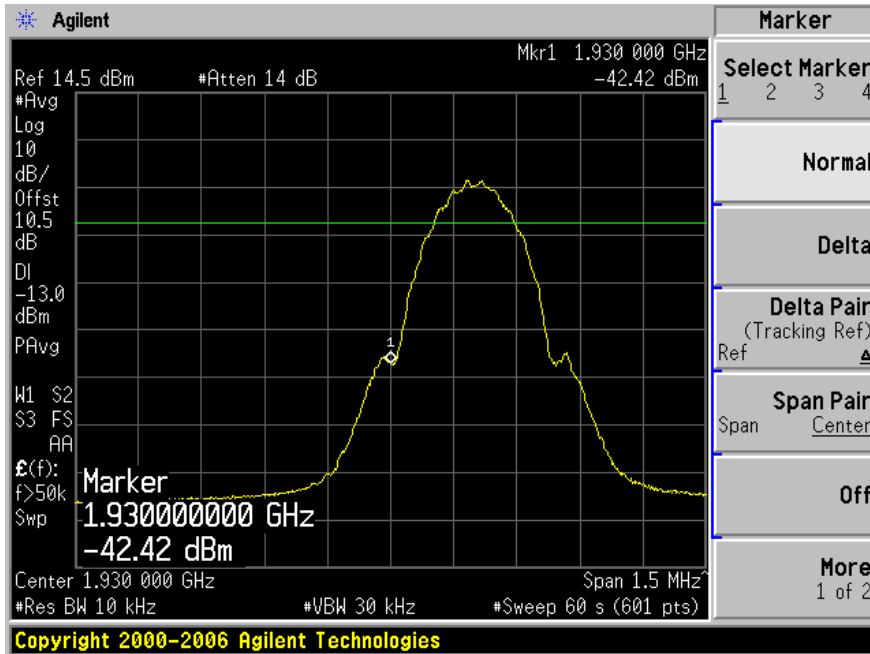
\* The testing was performed by Dennis Huang on 2010-3-9 at RF Site.

### 9.5 Test Results

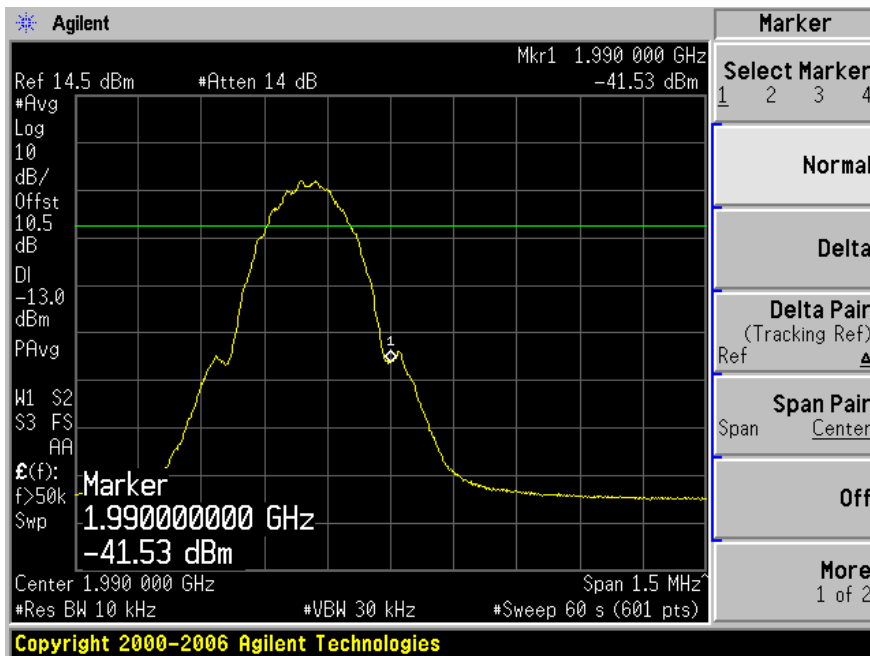
Note: \* For CDMA and WCDMA measurements please refer to: FCC ID: NOO-S2790-011, Report Number: R1001123-2224.

**PCS Band:**

GSM, Downlink: Lowest Channel

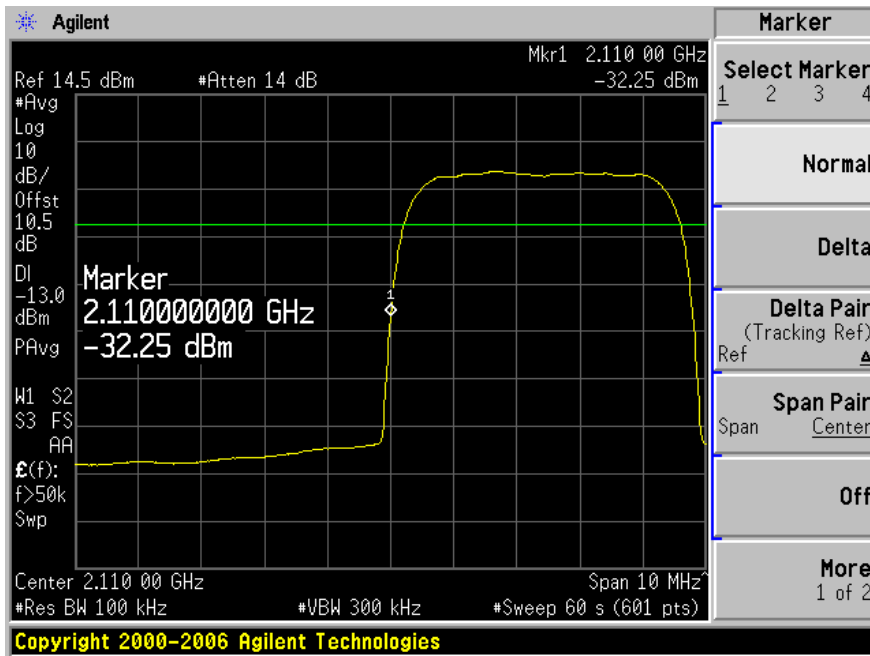


GSM, Band Downlink: Highest Channel

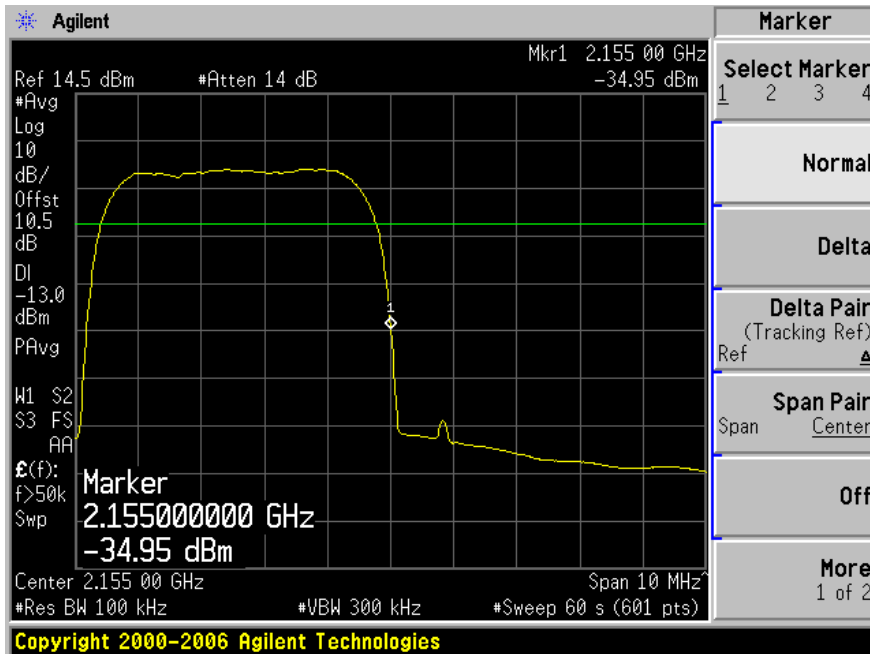


**AWS Band:**

WCDMA, Downlink: Lowest Channel



WCDMA, Downlink: Highest Channel





## 10 FCC §2.1055, §24.235 & §27.54 – Frequency Stability

### 10.1 Applicable Standard

According to FCC §2.1055, §24.235 and §27.54 the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 10.2 Test Procedure

The frequency stability of the transmitter is measured by:

- a.) Temperature: The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.
- b.) Primary Supply Voltage: The primary supply voltage is varied from battery end point to 115 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025$  % ( $\pm 2.5$  ppm) of the center frequency.

CW was tested as worst case.

### 10.3 Test Environmental Conditions

<b>Temperature:</b>	21-24°C
<b>Relative Humidity:</b>	41-50 %
<b>ATM Pressure:</b>	99-102kPa

\* The testing was performed by Dennis Huang on 2010-3-9 at RF Site.

### 10.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	MXG Vector Signal Generator	N5182A	MY47420502	2009-09-18
Tenney	Temperature Oven	Versa Tenn	12.431-8	N/A

\* **Statement of Traceability: BAACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

## 10.5 Test Results

Note: \* For CDMA and WCDMA measurements please refer to: FCC ID: NOO-S2790-011, Report Number: R1001123-2224.

### PCS Band:

The EUT is tested at 1960 MHz with CW

#### (Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-80	-0.04082
120	-75	-0.03827
138	-75	-0.03827

#### (Frequency Drift with Supply Temperature Variation)

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
50	-15	-0.00765
-20	-12.3	-0.00628

### AWS Band:

The EUT is tested at 2132.4 MHz with CW

#### (Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-80	-0.03752
120	-105	-0.04924
138	-75	-0.03517

#### (Frequency Drift with Supply Temperature Variation)

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
50	-125	-0.05862
-20	-90	-0.04221

## 11 FCC §1.1307(b)(1) & §2.1091 - RF EXPOSURE

### 11.1 Applicable Standard

According to §1.1310 and §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
<b>Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

### 11.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

### 11.3 Test Result

#### PCS Band:

Maximum peak output power at antenna input terminal (dBm):	<u>14.98</u>
Maximum peak output power at antenna input terminal (mW):	<u>31.477</u>
Prediction distance (cm):	<u>20</u>
Prediction frequency (MHz):	<u>1960</u>
Antenna Gain, typical (dBi):	<u>8</u>
Maximum Antenna Gain (numeric):	<u>6.310</u>
Power density at predication frequency and distance (mW/cm <sup>2</sup> ):	<u>0.04322</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm <sup>2</sup> ):	<u>1.0</u>

**AWS Band:**

Maximum peak output power at antenna input terminal (dBm): 14.98  
Maximum peak output power at antenna input terminal (mW): 31.477  
Prediction distance (cm): 20  
Prediction frequency (MHz): 2112.4  
Antenna Gain, typical (dBi): 8  
Maximum Antenna Gain (numeric): 6.310  
Power density at predication frequency and distance (mW/cm<sup>2</sup>): 0.04322  
MPE limit for uncontrolled exposure at predication frequency (mW/cm<sup>2</sup>): 1.0