

FCC PART 24E & 27
TEST AND MEASUREMENT REPORT

For

ADC Telecommunications Inc.

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

FCC ID: F8I-SP190AWSH
Model: FWU-28400000HU FlexWave
URH/Prism Host 1900/AWS Rx

Report Type: Original Report	Product Type: Wireless network system
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "*" (Rev 2)

TABLE OF CONTENTS

1	GENERAL INFORMATION	6
1.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	6
1.2	MECHANICAL DESCRIPTION	6
1.3	EUT PHOTO	6
1.4	OBJECTIVE.....	7
1.5	RELATED SUBMITTAL(S)/GRANT(S).....	7
1.6	TEST METHODOLOGY	7
1.7	MEASUREMENT UNCERTAINTY.....	7
1.8	TEST FACILITY.....	8
2	SYSTEM TEST CONFIGURATION	9
2.1	JUSTIFICATION	9
2.2	EUT EXERCISE SOFTWARE	9
2.3	EQUIPMENT MODIFICATIONS	9
2.4	SUPPORT EQUIPMENT LIST	9
2.5	LOCAL SUPPORT EQUIPMENT AND SOFTWARE LIST AND DETAILS	9
2.6	INTERNAL CONFIGURATIONS OF EUT.....	10
2.7	INTERFACE PORTS AND CABLES	10
3	SUMMARY OF TEST RESULTS.....	11
4	FCC §2.1046, §24.232 & §27.50 – RF OUTPUT POWER.....	12
4.1	APPLICABLE STANDARD	12
4.2	TEST PROCEDURE	12
4.3	TEST EQUIPMENT LIST AND DETAILS	12
4.4	TEST SETUP BLOCK DIAGRAM.....	12
4.5	TEST ENVIRONMENTAL CONDITIONS.....	13
4.6	SUMMARY OF TEST RESULTS.....	13
5	FCC §2.1047 - MODULATION CHARACTERISTIC.....	14
5.1	APPLICABLE STANDARD	14
5.2	TEST RESULT	14
6	FCC §2.1049, §24.238 & §27.53 - OCCUPIED BANDWIDTH.....	15
6.1	APPLICABLE STANDARD	15
6.2	TEST PROCEDURE	15
6.3	TEST EQUIPMENT LIST AND DETAILS	15
6.4	TEST ENVIRONMENTAL CONDITIONS.....	15
6.5	TEST RESULTS AND PLOTS.....	16
7	FCC §2.1053 & §27.53 - SPURIOUS RADIATED EMISSIONS.....	20
7.1	APPLICABLE STANDARD	20
7.2	TEST PROCEDURE	20
7.3	TEST EQUIPMENT LIST AND DETAILS	20
7.4	TEST SETUP BLOCK DIAGRAM.....	21
7.5	TEST ENVIRONMENTAL CONDITIONS.....	21
7.6	SUMMARY OF TEST RESULTS.....	22
7.7	TEST RESULTS	22
8	FCC §2.1051, §24.238 & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	25
8.1	APPLICABLE STANDARD	25
8.2	TEST PROCEDURE	25
8.3	TEST EQUIPMENT LIST AND DETAILS	25

8.4	TEST ENVIRONMENTAL CONDITIONS	25
8.5	TEST RESULTS	25
9	FCC §24.238 & §27.53– BAND EDGE.....	31
9.1	APPLICABLE STANDARD	31
9.2	TEST PROCEDURE	31
9.3	TEST ENVIRONMENTAL CONDITIONS	31
9.4	TEST EQUIPMENT LIST AND DETAILS	31
9.5	TEST RESULTS	31
10	FCC §2.1055 & §27.54 – FREQUENCY STABILITY.....	34
10.1	APPLICABLE STANDARD	34
10.2	TEST PROCEDURE	34
10.3	TEST EQUIPMENT LIST AND DETAILS	34
10.4	TEST ENVIRONMENTAL CONDITIONS	34
10.5	TEST RESULTS	35
11	FCC §1.1307(B)(1) & §2.1091 - RF EXPOSURE	36
11.1	APPLICABLE STANDARD	36
11.2	MPE PREDICTION	36
11.3	TEST RESULT	36
12	EXHIBIT A - FCC ID LABELING AND WARNING STATEMENT	38
12.1	FCC ID LABEL REQUIREMENT	38
12.2	FCC ID LABEL CONTENT	38
12.3	FCC LABEL LOCATION ON EUT	38
13	EXHIBIT B - TEST SETUP PHOTOGRAPHS.....	39
13.1	RADIATED EMISSIONS 30 MHz TO 1 GHz - FRONT VIEW	39
13.2	RADIATED EMISSIONS 30 MHz TO 1GHz- REAR VIEW	39
13.3	RADIATED EMISSIONS ABOVE 1 GHz - FRONT VIEW	40
13.4	RADIATED EMISSIONS ABOVE 1GHz- REAR VIEW.....	40
13.5	CONDUCTED MEASUREMENT.....	41
13.6	FREQUENCY STABILITY MEASUREMENT.....	41
14	EXHIBIT C- EUT PHOTOS.....	42
14.1	EUT TOP VIEW – URH HOST	42
14.2	EUT REAR VIEW – URH HOST.....	42
14.3	EUT TOP VIEW – DRU HOST	43
14.4	EUT REAR VIEW – DRU HOST.....	43
14.5	SUPPORT EQUIPMENT FRONT VIEW - MRAU	44
14.6	SUPPORT EQUIPMENT REAR VIEW – MRAU	44
14.7	SUPPORT EQUIPMENT FRONT VIEW – IFEU.....	45
14.8	SUPPORT EQUIPMENT REAR VIEW – IFEU.....	45
14.9	SUPPORT EQUIPMENT POWER SUPPLIES FRONT VIEW	46
14.10	SUPPORT EQUIPMENT POWER SUPPLIES REAR VIEW	46
14.11	EUT PCB ASSEMBLY PCS RF DART FRONT VIEW – URH HOST.....	47
14.12	EUT PCB ASSEMBLY PCS RF DART TOP VIEW – URH HOST	47
14.13	EUT PCB ASSEMBLY PCS RF DART BOTTOM VIEW – URH HOST.....	48
14.14	EUT PCB ASSEMBLY AWS RF DART FRONT VIEW – URH HOST	48
14.15	EUT PCB ASSEMBLY AWS RF DART TOP VIEW – URH HOST	49
14.16	EUT PCB ASSEMBLY AWS RF DART BOTTOM VIEW – URH HOST	49
14.17	EUT PCB ASSEMBLY SERF II TOP VIEW – URH HOST	50
14.18	EUT PCB ASSEMBLY SERF II BOTTOM VIEW – URH HOST	50
14.19	EUT PCB ASSEMBLY SYSTEM II TOP VIEW – URH HOST	51
14.20	EUT PCB ASSEMBLY SYSTEM II BOTTOM VIEW – URH HOST.....	51
14.21	EUT PCB ASSEMBLY DC POWER SUPPLY TOP VIEW – URH HOST.....	52
14.22	EUT PCB ASSEMBLY SYSTEM II BOTTOM VIEW – URH HOST.....	52

14.23 EUT PCB ASSEMBLY PCS IF DART FRONT VIEW – DRU HOST	53
14.24 EUT PCB ASSEMBLY PCS IF DART TOP VIEW – DRU HOST	53
14.25 EUT PCB ASSEMBLY PCS IF DART BOTTOM VIEW – DRU HOST	54
14.26 EUT PCB ASSEMBLY AWS IF DART FRONT VIEW – DRU HOST	54
14.27 EUT PCB ASSEMBLY AWS IF DART TOP VIEW – DRU HOST.....	55
14.28 EUT PCB ASSEMBLY AWS IF DART BOTTOM VIEW – DRU HOST	55
14.29 EUT PCB ASSEMBLY SERF II TOP VIEW – DRU HOST	56
14.30 EUT PCB ASSEMBLY SERF II BOTTOM VIEW – DRU HOST	56
14.31 EUT PCB ASSEMBLY SYSTEM II TOP VIEW – DRU HOST	57
14.32 EUT PCB ASSEMBLY SYSTEM II BOTTOM VIEW – DRU HOST	57
14.33 EUT PCB ASSEMBLY DC POWER SUPPLY TOP VIEW – DRU HOST.....	58
14.34 EUT PCB ASSEMBLY SYSTEM II BOTTOM VIEW – DRU HOST.....	58
15 APPENDIX I – DECLARATION OF SIMILARITY	59

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1003011-2427	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 Telecommunications, Inc.* and their product FCC ID: *F8I-SP190AWSH*, Model: *FWU-28400000HU FlexWave URH/Prism Host 1900/AWS Rx* which will henceforth be referred to as the "EUT". The EUT is a wireless network system which operates in PCS 1900 band with GSM, CDMA and WCDMA Modulations and AWS 2100 band with WCDMA Modulation, Uplink 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

(URH) measures approximately 228 mm (L) x 444 mm (W) x 133 mm (H), and weighs approximately 7.7 kg.
(DRH) measures approximately 228 mm (L) x 444 mm (W) x 133 mm (H), and weighs approximately 7.7 kg.

**The test data gathered are from production sample, serial number: MDF3O18A (URH), and 7109A00S (DRH) 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)

Report Number: R1001143

FCC ID: F8I-SP851970H

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	Master RAU	742784-0 Rev:1	MR101Y8C / Unit #9
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	URH Host PCS RF Dart PCB Board	MD03021	225509852
ADC Telecommunication	URH Host AWS RF Dart PCB Board	PRG1363	TR2207CE
ADC Telecommunication	URH Host SERF II (NETWORK) PCB Board	TR220J7	0020A723461718
ADC Telecommunication	URH Host System II PCB Board	DAC-146028G REV20	BTW180120013
ADC Telecommunication	URH Host DC Power Supply PCB Board	1432282G REV22	BTW16021059
ADC Telecommunication	DRU PCS IF Dart PCB Board	1466348G REV30	BTW183690002
ADC Telecommunication	DRU Host SERF II (NETWORK) PCB Board	ADC-1460280G	BTW180120005
ADC Telecommunication	DRU Host DC Power Supply PCB Board	1432282G REV22	BTW16021115

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: R1001143, FCC ID: F8I-SP851970H

** 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

According to §24.232 & §27.50, the maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 700 Watts.

4.2 Test Procedure

Conducted:

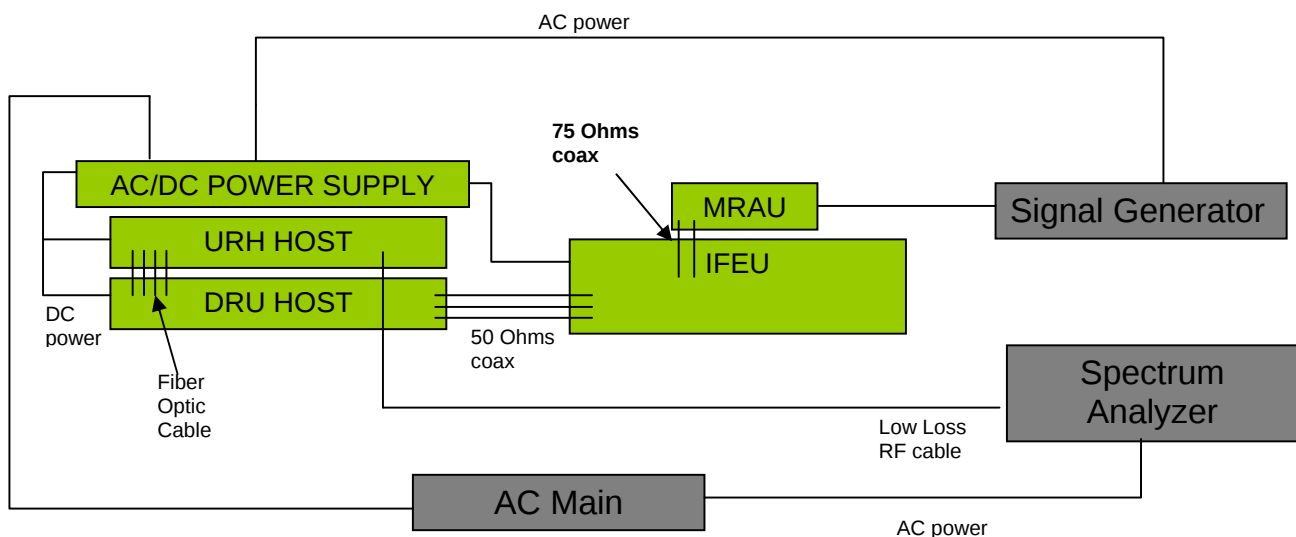
The RF output of the transmitter was connected to the signal generator and the spectrum analyzer through sufficient attenuation.

4.3 Test Equipment List and Details

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

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

4.4 Test Setup Block Diagram



4.5 Test Environmental Conditions

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

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

4.6 Summary of Test Results

PCS1900 Band:

GSM, Maximum Output Power – Modulated Signal

Reverse (Uplink)

Channel	Frequency (MHz)	Output Power (dBm)
Low	1850.2	-10.02
Middle	1880.0	-10.03
High	1909.8	-10.02

Note: For CDMA and WCDMA measurements please refer to Report Number: R1001143, FCC ID: F8I-SP851970H

AWS 2100 Band:

WCDMA, Maximum Output Power – Modulated Signal

Reverse (Uplink)

Channel	Frequency (MHz)	Output Power (dBm)
Low	1712.4	-10
Middle	1732.4	-10.01
High	1752.6	-10.05

5 FCC §2.1047 - MODULATION CHARACTERISTIC

5.1 Applicable Standard

According to FCC § 2.1047(d) and part 25, 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: CFR 47, Section 2.1049, Section 24.238 and Section 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	-	MY47420502	2009-09-18

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

6.4 Test Environmental Conditions

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

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

6.5 Test Results and Plots

PCS1900 Band:

Mode		Channel	Frequency (MHz)	Emission Bandwidth (kHz)
GSM (PCS)	Uplink	Low	1850.2	313.94
		Middle	1880.0	311.49
		High	1909.8	312.25

Note: For CDMA and WCDMA measurements please refer to Report Number: R1001143, FCC ID: F8I-SP851970H

AWS 2100 Band:

Mode		Channel	Frequency (MHz)	Emission Bandwidth (kHz)
WCDMA	Uplink	Low	1712.4	4705
		Middle	1732.4	4699
		High	1752.6	4715

Please refer to the following plots for details.

PCS Band:

GSM, Uplink, Low Channel: 1850.2 MHz



GSM, Uplink, Middle Channel: 1880 MHz

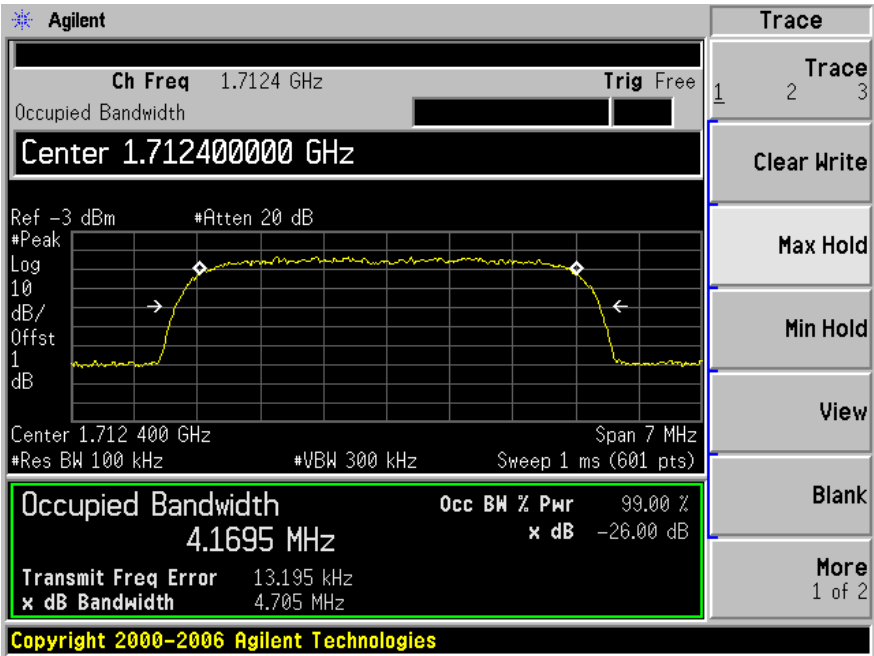


GSM, Uplink, High Channel: 1909.8 MHz

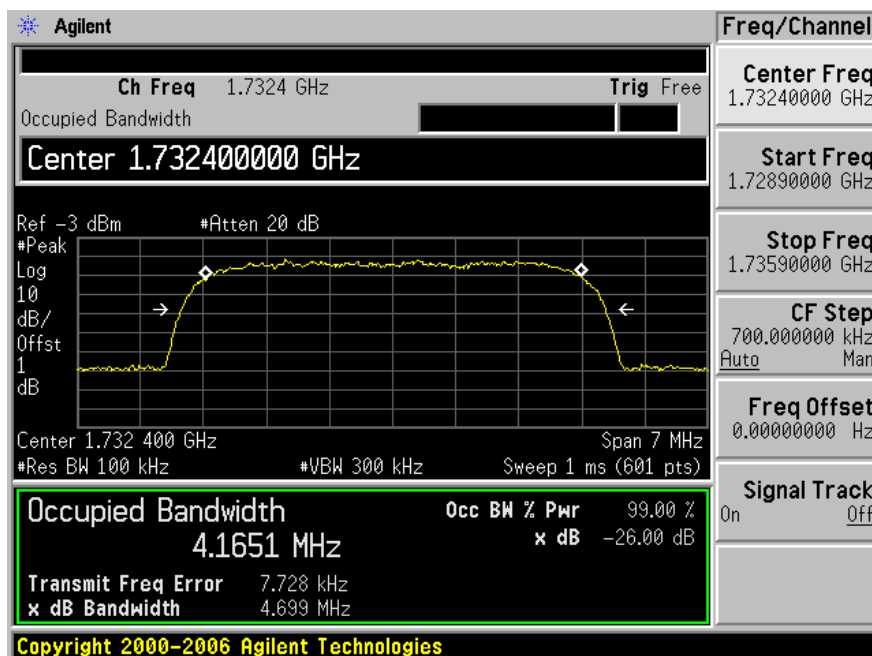


AWS Band:

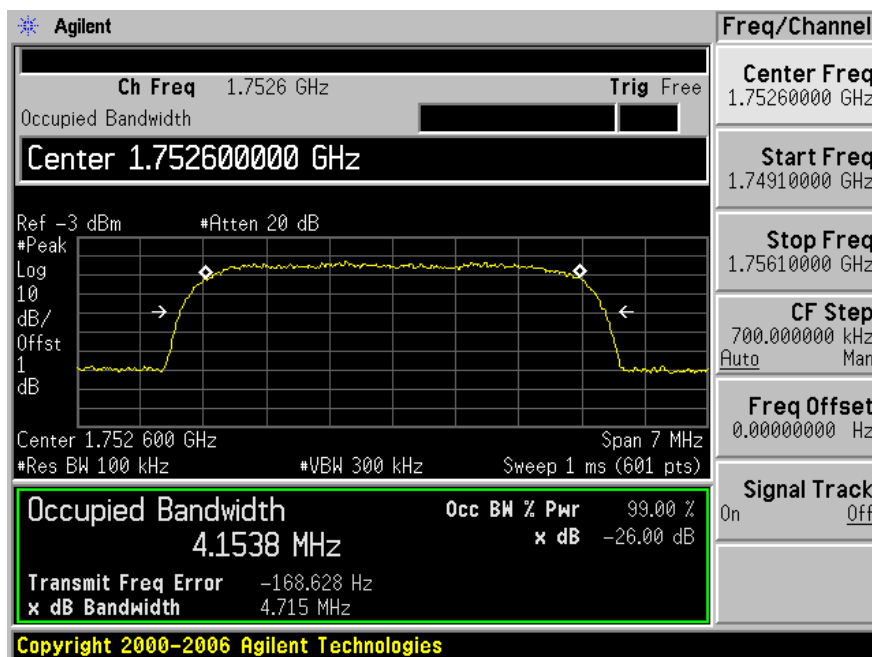
WCDMA, Uplink, Low Channel: 1712.4 MHz



WCDMA, Uplink, Middle Channel: 1732.4MHz



WCDMA, Uplink, High Channel: 1752.6 MHz



7 FCC §2.1053 & §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 = $10 \log (\text{TX Power in Watts}/0.001)$ – the absolute level

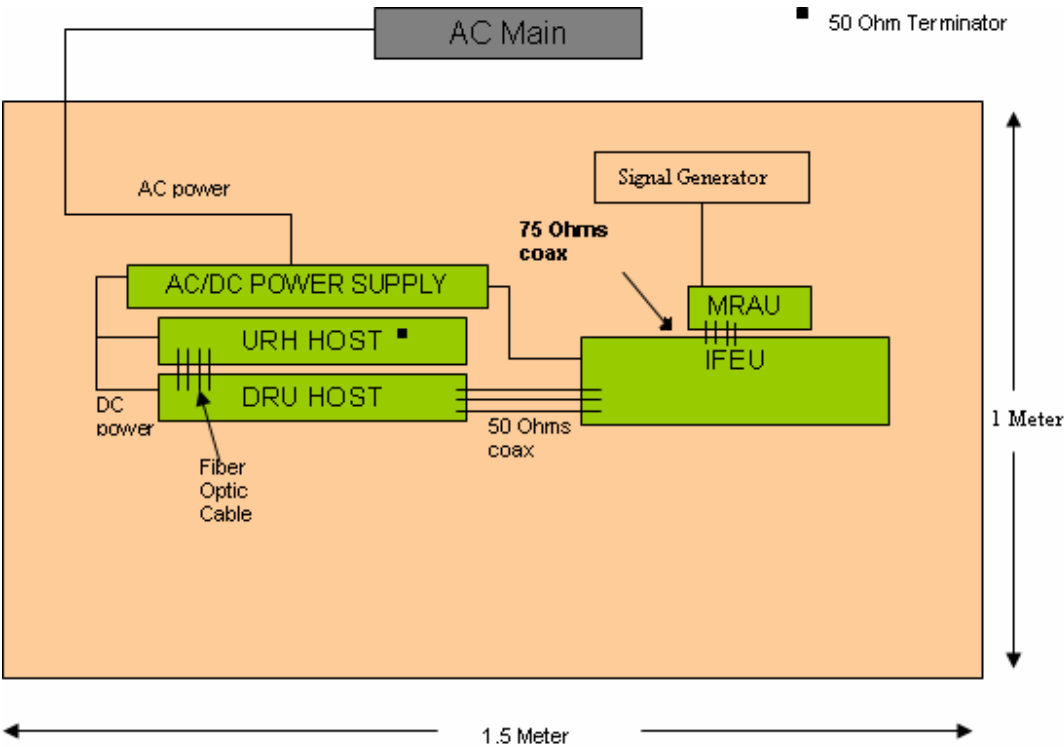
Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

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	-	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

Temperature:	21~23.5 °C
Relative Humidity:	43~59 %
ATM Pressure:	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 Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-18.05	5191.7	Horizontal	1880 MHz
Mode: CDMA Uplink			
-18.35	5191.7	Horizontal	1880 MHz
Mode: WCDMA Uplink			
-17.39	5191.7	Horizontal	1880 MHz

AWS Band:

Mode: WCDMA Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-17.93	72.9	Vertical	1732.4 MHz

Please refer to the following tables for detailed results.

7.7 Test Results

PCS Band

GSM ~ Uplink (Input frequency = 1880 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	57.79	26	1.81	H	5191.7	-38.81	10.1	2.34	-31.05	-13	-18.05
5191.7	52.31	61	1.0	V	5191.7	-44.29	10.1	2.34	-36.53	-13	-23.53
6147	51.29	323	1.3	H	6147	-47.06	10.9	2	-38.16	-13	-25.16
6147	50.49	332	1.15	V	6147	-47.86	10.9	2	-38.96	-13	-25.96
3072	52.38	336	1.14	V	3072	-48.69	9.5	1.68	-40.87	-13	-27.87
1250	64.55	356	1.0	V	1250	-47.92	7.1	1.34	-42.16	-13	-29.16
3072	50.88	30	1.28	H	3072	-50.19	9.5	1.68	-42.37	-13	-29.37
1500	57.31	360	1.21	V	1500	-54.93	8.8	1.34	-47.47	-13	-34.47
1250	58.97	310	1.0	H	1250	-53.5	7.1	1.34	-47.74	-13	-34.74
1500	54.45	319	1.0	H	1500	-57.79	8.8	1.34	-50.33	-13	-37.33

CDMA ~ Uplink (Input frequency = 1880 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	57.49	26	1.81	H	5191.7	-39.11	10.1	2.34	-31.35	-13	-18.35
5191.7	52.24	61	1.0	V	5191.7	-44.36	10.1	2.34	-36.6	-13	-23.6
6147	51.88	323	1.3	H	6147	-46.47	10.9	2	-37.57	-13	-24.57
6147	50.26	332	1.15	V	6147	-48.09	10.9	2	-39.19	-13	-26.19
3072	53	336	1.14	V	3072	-48.07	9.5	1.68	-40.25	-13	-27.25
1250	64.91	356	1.0	V	1250	-47.56	7.1	1.34	-41.8	-13	-28.8
3072	50.68	30	1.28	H	3072	-50.39	9.5	1.68	-42.57	-13	-29.57
1500	57.2	360	1.21	V	1500	-55.04	8.8	1.34	-47.58	-13	-34.58
1250	58.59	310	1.0	H	1250	-53.88	7.1	1.34	-48.12	-13	-35.12
1500	54.49	319	1.0	H	1500	-57.75	8.8	1.34	-50.29	-13	-37.29

WCDMA ~ Uplink (Input frequency = 1880 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	58.45	25	1.81	H	5191.7	-38.15	10.1	2.34	-30.39	-13	-17.39
5191.7	53.59	61	1	V	5191.7	-43.01	10.1	2.34	-35.25	-13	-22.25
6147	50.44	321	1.28	H	6147	-47.91	10.9	2	-39.01	-13	-26.01
6147	50.39	332	1.15	V	6147	-47.96	10.9	2	-39.06	-13	-26.06
3072	53.15	324	1.16	V	3072	-47.92	9.5	1.68	-40.1	-13	-27.1
1250	63.22	356	1	V	1250	-49.25	7.1	1.34	-43.49	-13	-30.49
3072	49.55	30	1.28	H	3072	-51.52	9.5	1.68	-43.7	-13	-30.7
1500	58.24	360	1.21	V	1500	-54	8.8	1.34	-46.54	-13	-33.54
1250	57.55	310	1	H	1250	-54.92	7.1	1.34	-49.16	-13	-36.16
1500	53.44	320	1	H	1500	-58.8	8.8	1.34	-51.34	-13	-38.34

AWS 2100 Band

WCDMA ~ Uplink (Input frequency = 1732.4 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	72.57	172	1.00	V	72.9	-30.43	0.0	0.50	-30.93	-13	-17.93
5191.7	54.90	11	1.74	H	5191.7	-40.48	10.1	2.34	-32.72	-13	-19.72
72.9	69.95	194	2.56	H	72.9	-33.05	0.0	0.50	-33.55	-13	-20.55
266.0	64.64	152	1.00	H	266.0	-33.36	0.0	0.50	-33.86	-13	-20.86
5191.7	52.92	63	2.37	V	5191.7	-42.46	10.1	2.34	-34.7	-13	-21.70
266.0	63.21	173	1.25	V	266.0	-34.79	0.0	0.50	-35.29	-13	-22.29
3072.0	55.81	305	1.97	H	3072.0	-46.04	9.5	1.68	-38.22	-13	-25.22
6144.0	47.48	335	1.69	H	6144.0	-47.88	10.9	2.00	-38.98	-13	-25.98
6144.0	45.41	324	1.00	V	6144.0	-49.95	10.9	2.00	-41.05	-13	-28.05
3072.0	52.25	334	1.25	V	3072.0	-49.60	9.5	1.68	-41.78	-13	-28.78
1250.0	62.71	24	1.16	V	1250.0	-49.28	7.1	1.34	-43.52	-13	-30.52
1250.0	60.78	305	1.00	H	1250.0	-51.21	7.1	1.34	-45.45	-13	-32.45
1500.0	58.22	8	1.53	V	1500.0	-54.80	8.8	1.34	-47.34	-13	-34.34
1500.0	58.17	55	1.00	H	1500.0	-54.85	8.8	1.34	-47.39	-13	-34.39

8 FCC §2.1051, §24.238 & §27.53 - 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 10th 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	-	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

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

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

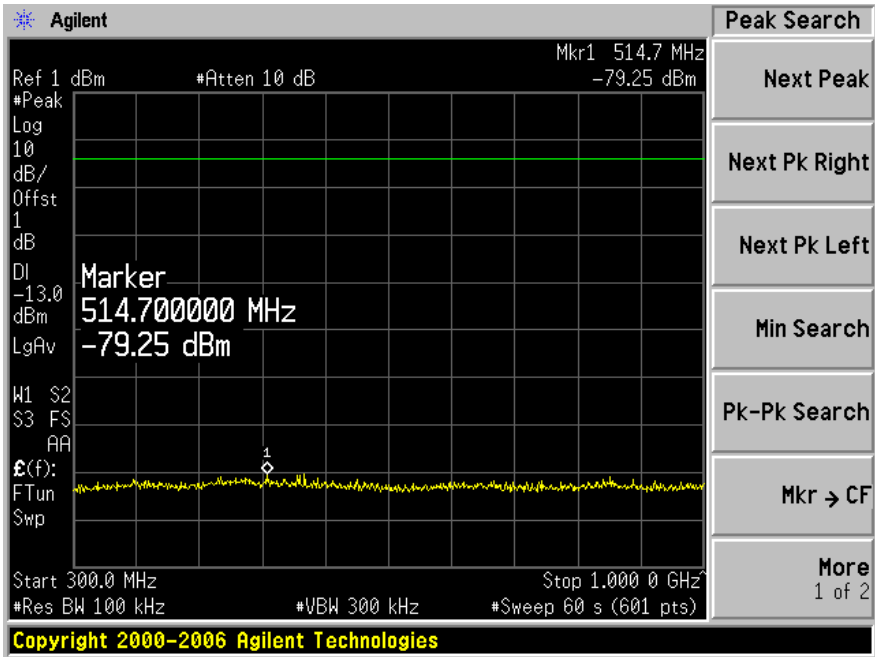
8.5 Test Results

Note: For PCS band, CDMA and WCDMA measurements please refer to: Report Number: R1001143,
FCC ID: F8I- SP851970H

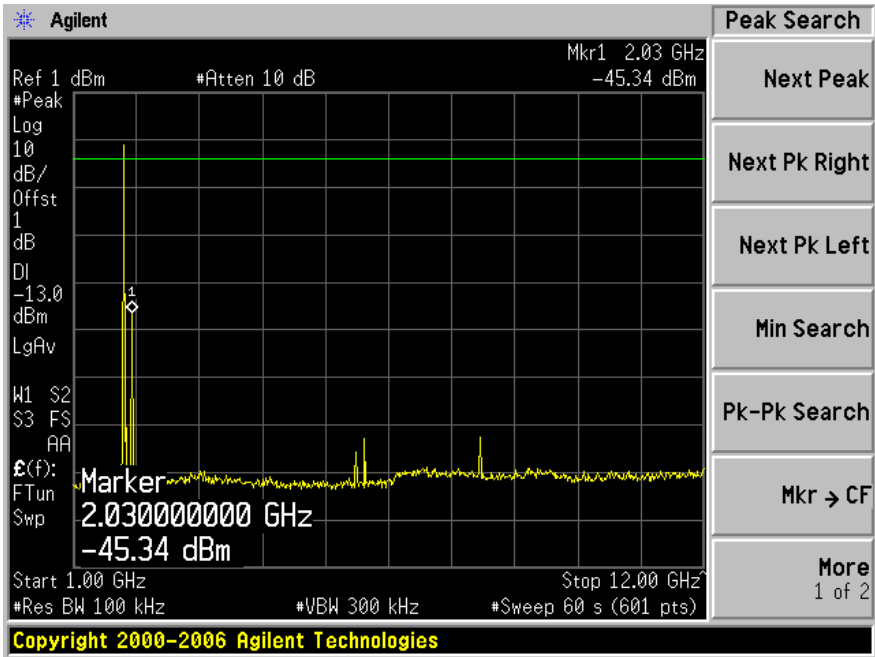
PCS Band:

GSM, Uplink, Middle Channel: 1880 MHz:

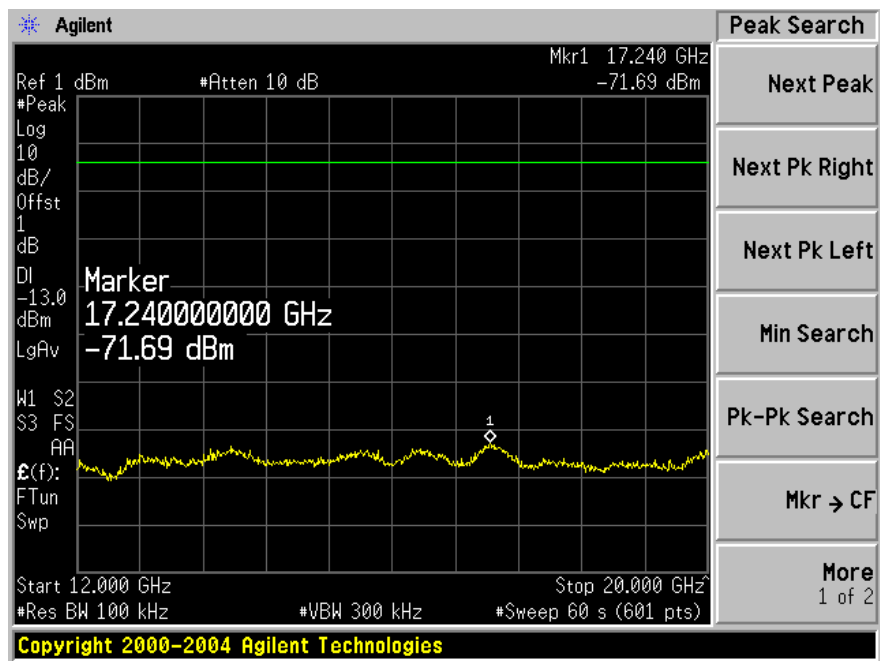
Plot 1: 30 MHz to 1 GHz



Plot 2: 1-12 GHz

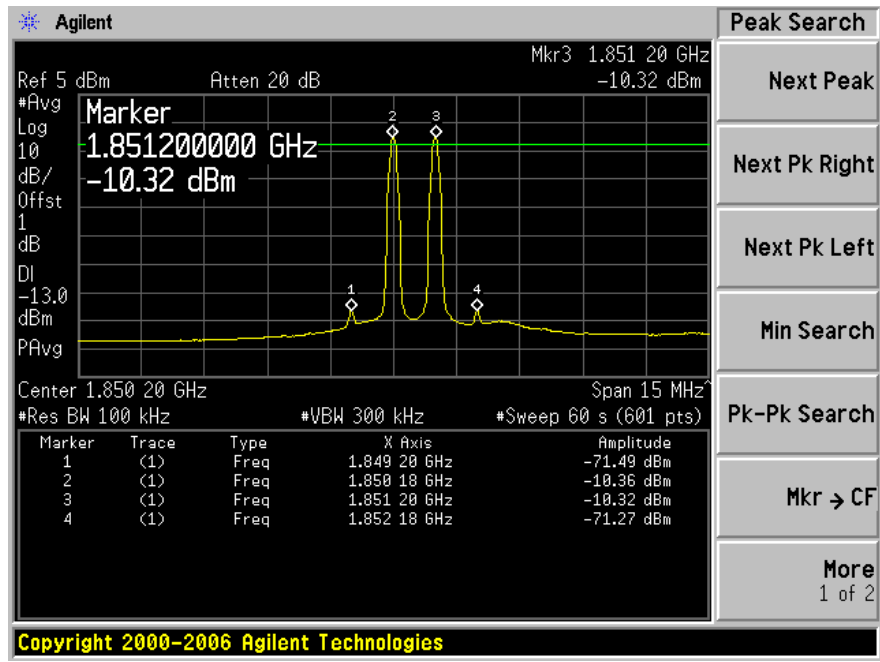


Plot 3: 12-20 GHz

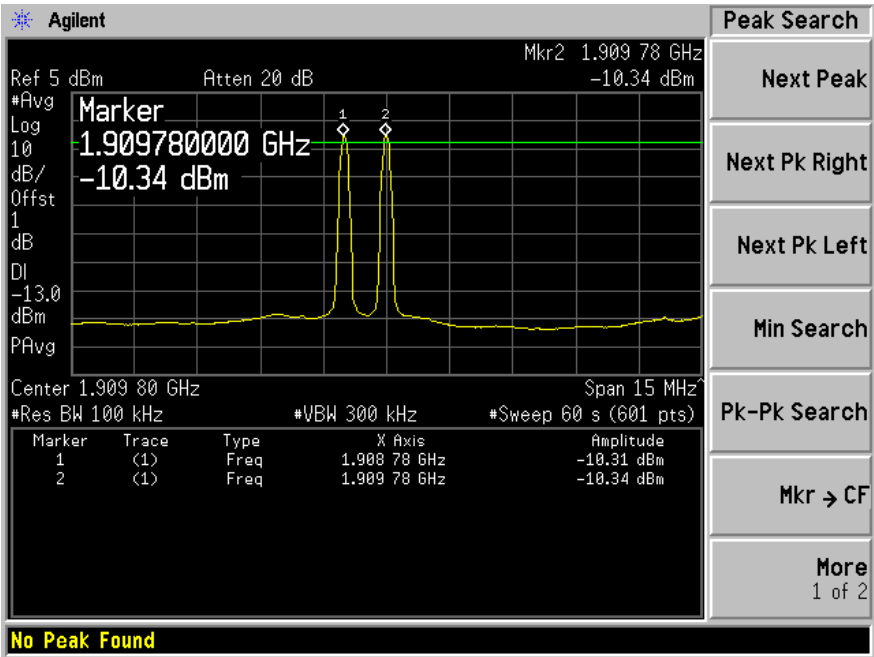


Inter-modulation:

GSM, Uplink, Low Channel: 1850.2 MHz:



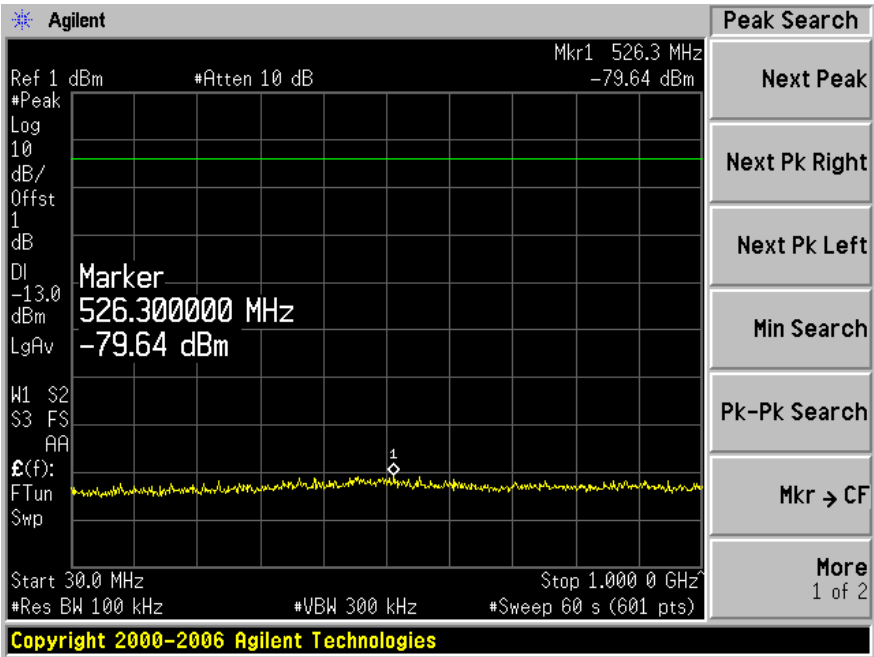
GSM, Uplink, High Channel: 1909.8 MHz:



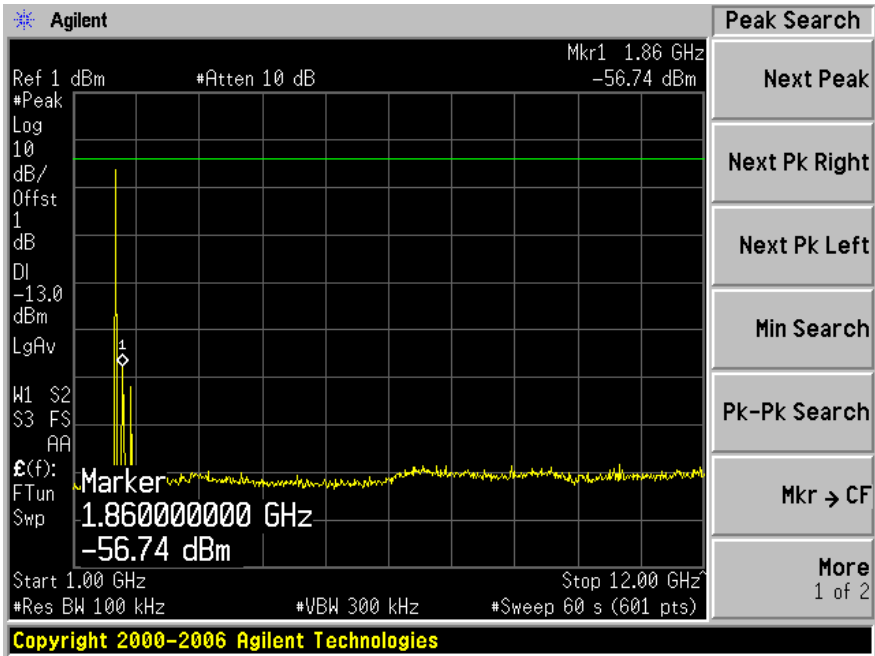
AWS Band:

WCDMA, Uplink, Middle Channel: 1732.4 MHz:

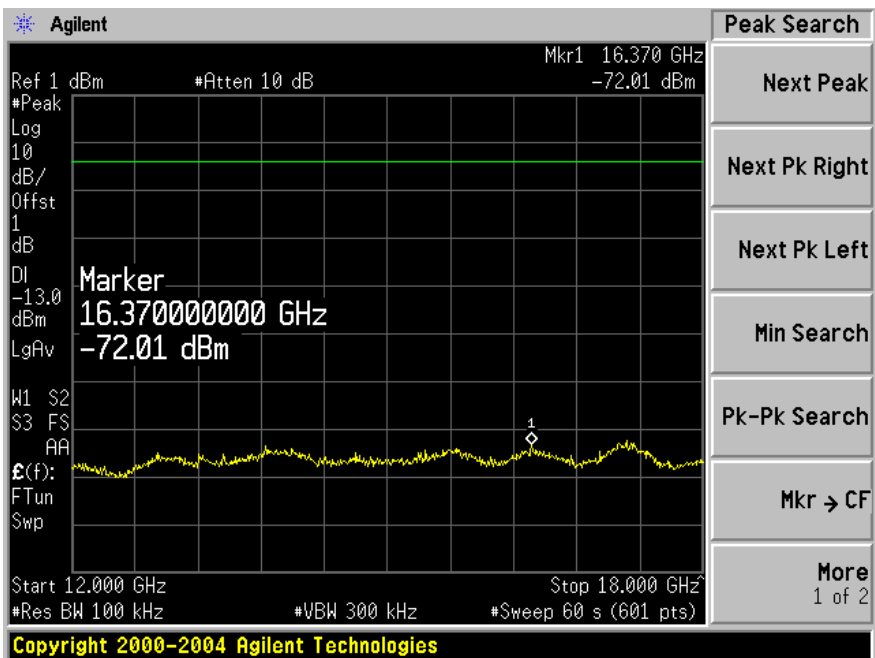
Plot 1: 30 MHz to 1 GHz



Plot 2: 1-12 GHz

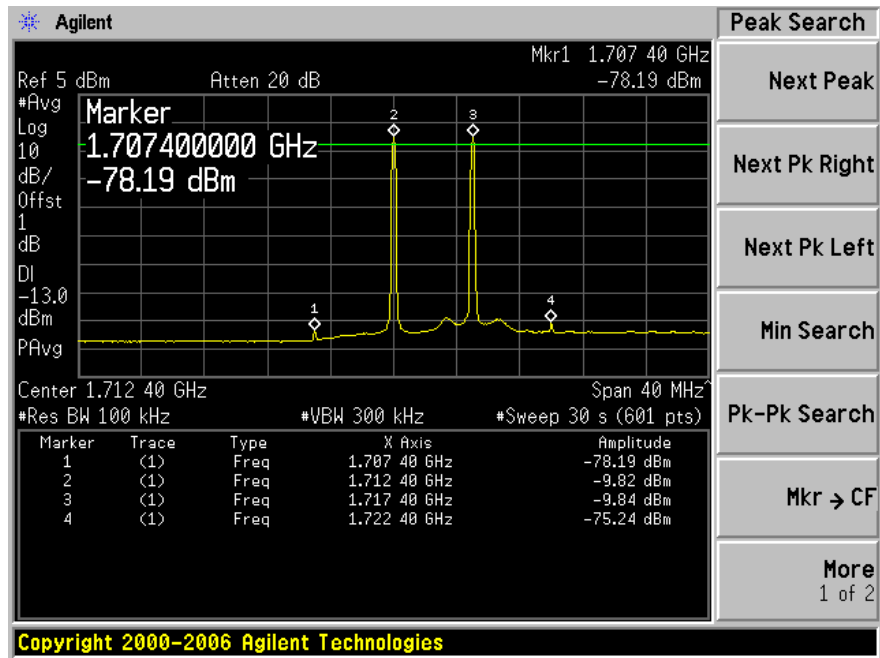


Plot 3: 12-18 GHz

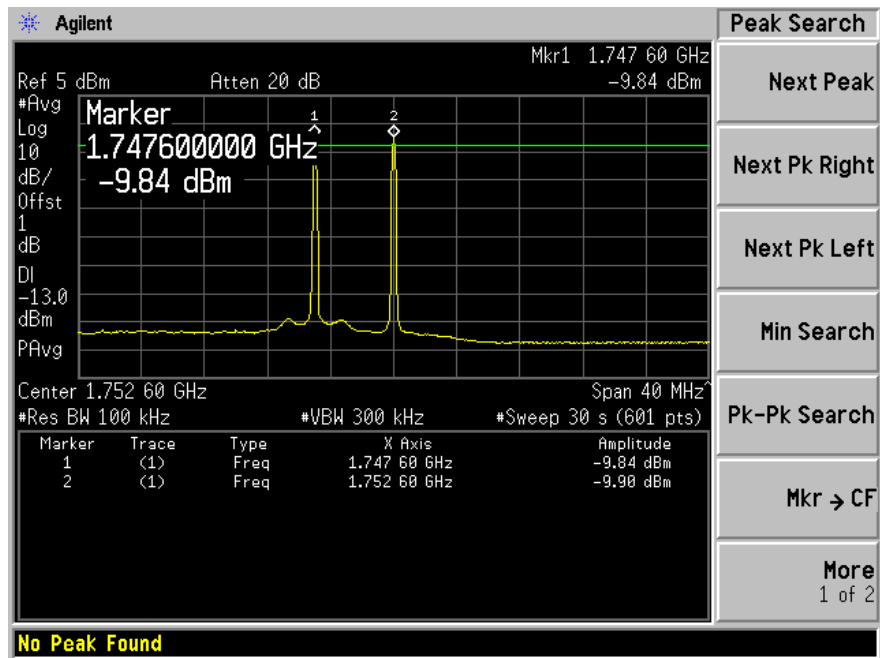


Inter-modulation:

WCDMA, Uplink, Low Channel: 1712.4 MHz:



WCDMA, Uplink, High Channel: 1752.6 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 Environmental Conditions

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

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

9.4 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	-	MY47420502	2009-09-18

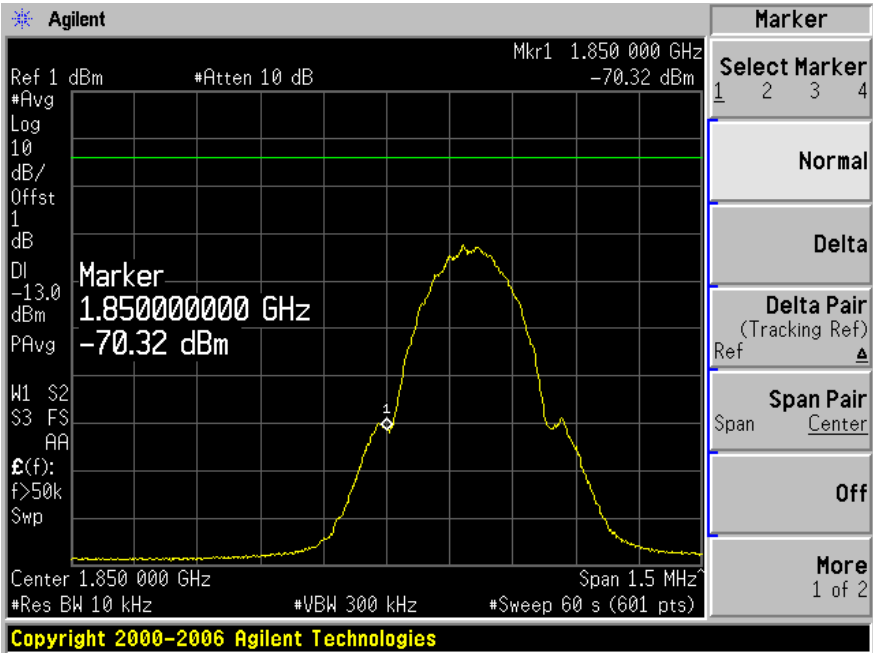
* **Statement of Traceability:** BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

9.5 Test Results

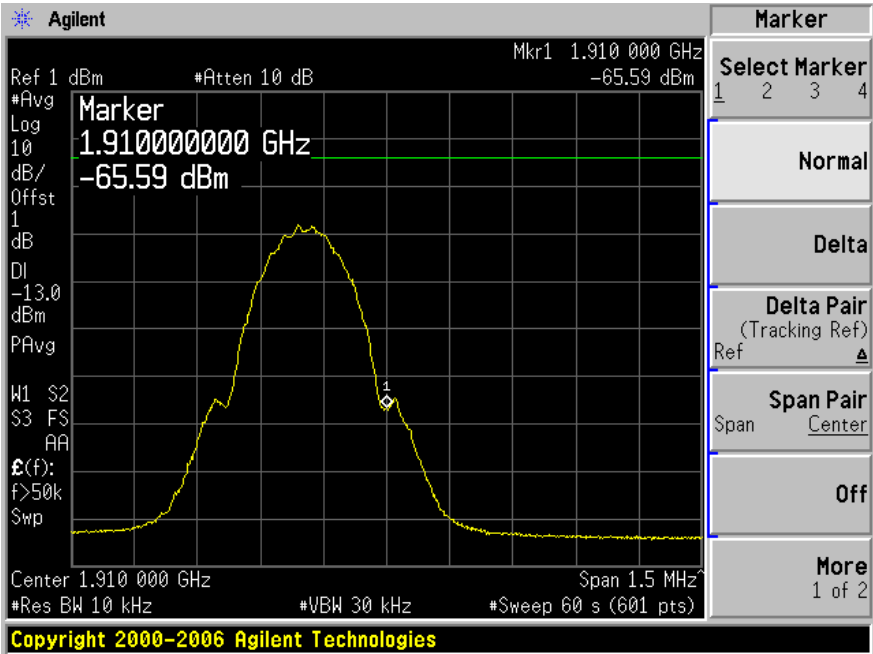
Note: For CDMA and WCDMA measurements please refer to: Report Number: R1001143, FCC ID: F8I-SP851970H

PCS Band:

GSM, Uplink: Lowest Channel

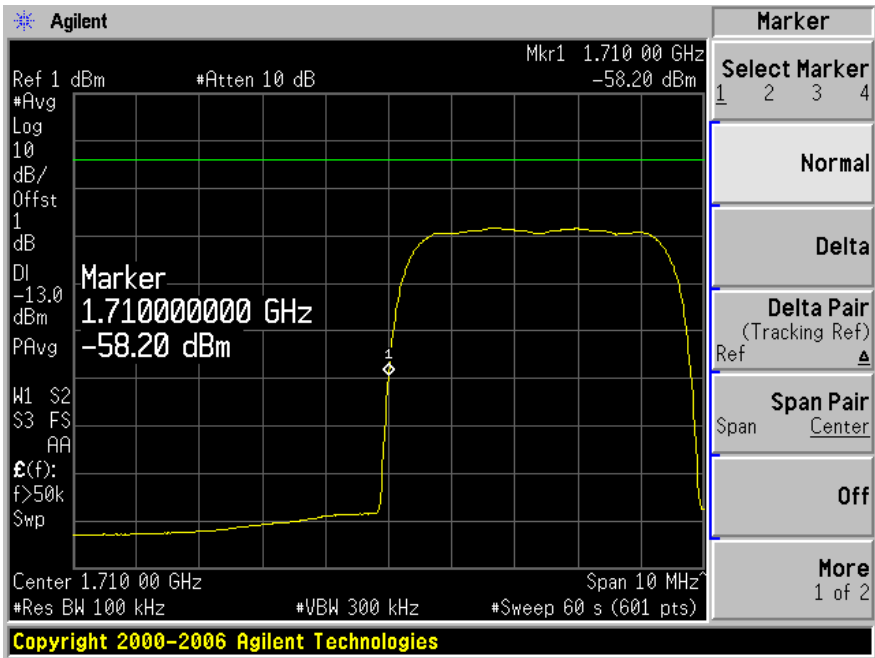


GSM, Uplink: Highest Channel

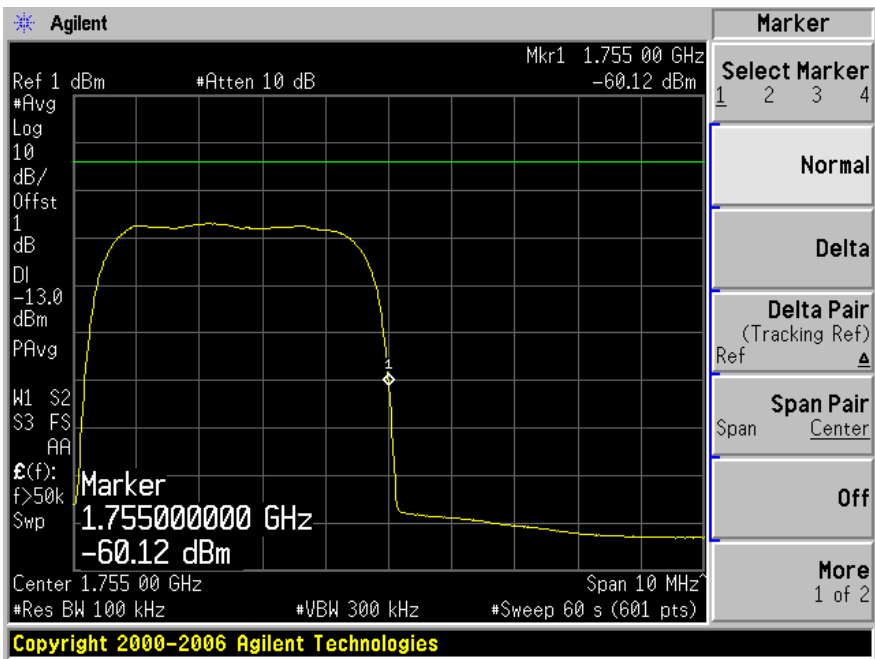


AWS Band:

WCDMA, Uplink: Lowest Channel



WCDMA, Uplink: Highest Channel



10 FCC §2.1055 & §27.54 – Frequency Stability

10.1 Applicable Standard

According to FCC §2.1055 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 $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency.

CW was tested as worst case.

10.3 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	-	MY47420502	2009-09-18
Tenney	Temperature Oven	Versa Tenn	12.431-8	N/A

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

10.4 Test Environmental Conditions

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

* The testing was performed by Dennis Huang on 2010-03-09 at RF Site.

10.5 Test Results

Note: For CDMA and WCDMA measurements please refer to: Report Number: R1001143FCC ID: F8I-SP851970H

PCS Band:

Uplink, The EUT is tested at 1880 MHz with CW

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-95	-0.05053191
120	-65	-0.03457446
138	-55	-0.02925531

(Frequency Drift with Supply Temperature Variation)

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
50	-12	-0.0063829
-20	-115	-0.0611702

AWS 2100 Band:

Uplink, The EUT is tested at 1732.4 MHz with CW

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-70	-0.04041
120	-85	-0.04906
138	-80	-0.04618

(Frequency Drift with Supply Temperature Variation)

Temperature (°C)	Frequency Error (Hz)	Frequency Error (ppm)
50	-100	-0.05772
-20	-110	-0.0635

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 ²)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	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): -10.02

Maximum peak output power at antenna input terminal (mW): 0.09954

Prediction distance (cm): 20

Prediction frequency (MHz): 1850.2

Antenna Gain, typical (dBi): 8.0

Maximum Antenna Gain (numeric): 6.310

Power density at predication frequency and distance (mW/cm²): 0.000012

MPE limit for uncontrolled exposure at predication frequency (mW/cm²): 1.0

AWS Band:

Maximum peak output power at antenna input terminal (dBm):	<u>-10</u>
Maximum peak output power at antenna input terminal (mW):	<u>0.1</u>
Prediction distance (cm):	<u>20</u>
Prediction frequency (MHz):	<u>1712.4</u>
Antenna Gain, typical (dBi):	<u>8.0</u>
Maximum Antenna Gain (numeric):	<u>6.310</u>
Power density at predication frequency and distance (mW/cm ²):	<u>0.000013</u>
MPE limit for uncontrolled exposure at predication frequency (mW/cm ²):	<u>1.0</u>