



FCC PART 22H & 24E
TEST AND MEASUREMENT REPORT

For

AnyDATA Corporation

5 Oldfield, Irvine, CA 92618, USA

FCC ID: P4M-APT230

Report Type: Original Report	Product Type: CDMA Tracking Device
Prepared By: Bo Li 	
Report Number: R1310011-2224	
Report Date: 2013-11-20	
Victor Zhang 	
Reviewed By: EMC/RF Lead	
Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report **must not** be used by the customer to claim product certification, approval, or endorsement by A2LA* or any agency of the Federal Government.

* This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk “*” (Rev 1.0)

TABLE OF CONTENTS

1	GENERAL INFORMATION	5
1.1	PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	5
1.2	MECHANICAL DESCRIPTION	5
1.3	OBJECTIVE	5
1.4	RELATED SUBMITTAL(S)/GRANT(S).....	5
1.5	TEST METHODOLOGY	5
1.6	MEASUREMENT UNCERTAINTY.....	6
1.7	TEST FACILITY.....	6
2	SYSTEM TEST CONFIGURATION	7
2.1	JUSTIFICATION.....	7
2.2	EUT EXERCISE SOFTWARE.....	7
2.3	EQUIPMENT MODIFICATIONS	7
2.4	EUT INTERNAL CONFIGURATION	7
2.5	LOCAL SUPPORT EQUIPMENT LIST AND DETAILS	7
2.6	POWER SUPPLY AND LINE FILTERS.....	7
2.7	INTERFACE PORTS AND CABLING	7
3	SUMMARY OF TEST RESULTS.....	8
4	FCC §2.1046, §22.913 & §24.232 – RF OUTPUT POWER.....	9
4.1	APPLICABLE STANDARDS	9
4.2	TEST PROCEDURE	9
4.3	TEST EQUIPMENT LIST AND DETAILS	9
4.4	TEST ENVIRONMENTAL CONDITIONS	10
4.5	TEST RESULTS	10
5	FCC §2.1055, §22.355 & §24.235 – FREQUENCY STABILITY.....	12
5.1	APPLICABLE STANDARDS	12
5.2	TEST PROCEDURE	12
5.3	TEST EQUIPMENT LIST AND DETAILS	13
5.4	TEST ENVIRONMENTAL CONDITIONS.....	13
5.5	TEST RESULTS	13
6	FCC §2.1049, §22.917 & §24.238 - OCCUPIED BANDWIDTH.....	16
6.1	APPLICABLE STANDARDS	16
6.2	TEST PROCEDURE	16
6.3	TEST EQUIPMENT LIST AND DETAILS	16
6.4	TEST ENVIRONMENTAL CONDITIONS	16
6.5	TEST RESULTS	16
7	FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS.....	20
7.1	APPLICABLE STANDARDS	20
7.2	TEST PROCEDURE	20
7.3	TEST EQUIPMENT LIST AND DETAILS	20
7.4	TEST ENVIRONMENTAL CONDITIONS.....	21
7.5	TEST RESULTS	21
8	FCC §2.1051, §22.917 & §24.238 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	22
8.1	APPLICABLE STANDARDS	22
8.2	TEST PROCEDURE	22
8.3	TEST EQUIPMENT LIST AND DETAILS	22

8.4	TEST ENVIRONMENTAL CONDITIONS	22
8.5	TEST RESULTS	22
9	FCC §22.917 & §24.238 – BAND EDGE.....	27
9.1	APPLICABLE STANDARDS	27
9.2	TEST PROCEDURE	27
9.3	TEST EQUIPMENT LIST AND DETAILS	27
9.4	TEST ENVIRONMENTAL CONDITIONS.....	27
9.5	TEST RESULTS	27
10	FCC §1.1307(B) (1) & §2.1093 - RF EXPOSURE	29
10.1	TEST RESULTS	29
11	EXHIBIT A - FCC ID LABELING REQUIREMENTS	30
11.1	FCC ID LABEL REQUIREMENT	30
11.2	FCC ID LABEL CONTENTS AND LOCATION	30
12	EXHIBIT B - TEST SETUP PHOTOGRAPHS.....	31
12.1	RADIATED EMISSIONS - FRONT VIEW	31
12.2	RADIATED EMISSIONS – ABOVE 1 GHz REAR VIEW.....	31
12.3	RADIATED EMISSIONS – BELOW 1 GHz REAR VIEW.....	32
13	EXHIBIT C- EUT PHOTOGRAPHS	33
13.1	EUT TOP VIEW.....	33
13.2	EUT - BOTTOM VIEW	33
13.3	EUT - FRONT VIEW	34
13.4	EUT - REAR VIEW	34
13.5	EUT – SIDE VIEW (1).....	35
13.6	EUT – SIDE VIEW (2).....	35
13.7	EUT – OPEN CHASSIS VIEW	36
13.8	EUT – PCB TOP VIEW.....	36
13.9	EUT – PCB BOTTOM VIEW	37
13.10	EUT – CLIP VIEW.....	37
13.11	EUT – AC/DC ADAPTER	38

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1310011-2224	Original Report	2013-11-20

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *AnyDATA, Corp.* and their product *FCC ID: P4M-APT230*, model: APT230 which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a CDMA personal tracking device. The uplink frequency bands are: 824-849 MHz, and 1850-1910 MHz. The downlink frequency bands are 869-894 MHz, 1930-1990 MHz.

1.2 Mechanical Description

The EUT measures approximately 72 mm (L) x 43 mm (W) x 16.5 mm (H) and weighs 65 g.

The test data gathered are from typical production sample, serial number: R1310011-1 assigned by BACL.

1.3 Objective

This type approval report is prepared on behalf of *AnyDATA, Corp.* in accordance with Part 2, Subpart J, Part 22 Subpart H, Part 24 Subpart E of the Federal Communication Commissions rules.

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

1.4 Related Submittal(s)/Grant(s)

No Related Submittals

1.5 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 22 Subpart H - CELLULAR RADIOTELEPHONE SERVICE
Part 24 Subpart E – BROADBAND PCS

Applicable Standards: TIA/EIA603-C, ANSI C63.4-2009.

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.

1.6 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 CISPR16-4-2:2003, 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.

1.7 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 site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have 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 test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: A-0027. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is an American Association for Laboratory Accreditation (A2LA) accredited laboratory (Lab Code 3297-02). The current scope of accreditations can be found at

<http://www.a2la.org/scopepdf/3297-02.pdf?CFID=1132286&CFTOKEN=e42a3240dac3f6ba-6DE17DCB-1851-9E57-477422F667031258&jsessionid=8430d44f1f47cf2996124343c704b367816b>

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 wireless communications test set, device was set to normal operating mode.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 EUT Internal Configuration

Manufacturer	Description	Model	Serial Number
AnyDATA	MAIN board	APT230 MAIN v0.3	-

2.5 Local Support Equipment List and Details

N/A

2.6 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
HUONIU	Switching Adapter	HNA050100U	-

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	<1	Wireless communications test set	EUT
RF cable	<1	EUT	Spectrum Analyzer

3 Summary of Test Results

FCC Rules	Description of Tests	Results
§2.1046, §22.913, §24.232	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A
§2.1049, §22.917, §24.238	Occupied Bandwidth	Compliant
§2.1053, §22.917(a), §24.238(a)	Spurious Radiated Emissions	Compliant
§2.1051, §22.917, §24.238(a)	Spurious Emissions at Antenna Terminals	Compliant
§22.917, §24.238	Band Edge	Compliant
§2.1055, §22.355, §24.235	Frequency Stability	Compliant
§2.1093	RF Exposure	Compliant

N/A: EUT is digital modulation.

4 FCC §2.1046, §22.913 & §24.232 – RF Output Power

4.1 Applicable Standards

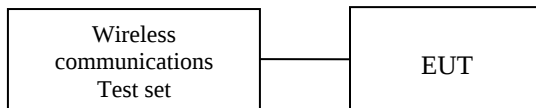
According to FCC §22.913 (a), the maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.

According to FCC §24.232 , Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

4.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the Wireless communications test set



Radiated method:

TIA 603-C section 2.2.17

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-2	2013-08-10	1 year
Hewlett Packard	Pre-amplifier	8447D	2944A10187	2013-03-08	1 year
A.H. Systems	Horn antenna	SAS-200/571	261	2013-01-18	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	667400960	2013-05-08	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-05-10	1 year
Agilent	Communication Tester	E5515C	GB44051221	2012-06-28	2 years

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

4.4 Test Environmental Conditions

Temperature:	20-21 °C
Relative Humidity:	42-45 %
ATM Pressure:	101.4-102kPa

The testing was performed by Bo Li on 2013-10-18 and 2013-10-23 in the RF Site and 5 meter chamber 3.

4.5 Test Results

Conducted:

Cellular Band, Part 22H

Mode	FED	REV	Low CH (824.7 MHz)	Middle CH (836.52 MHz)	High CH (848.31 MHz)	Limit (dBm)
CDMA2000 1xRTT	RC1	RC1 (S02)	23.62	23.65	23.47	38.45
	RC1	RC1 (S055)	23.59	23.56	23.51	38.45
	RC2	RC2 (S09)	23.65	23.66	23.49	38.45
	RC2	RC2 (S055)	23.67	23.65	23.56	38.45
	RC3	RC3 (S02)	23.66	23.68	23.45	38.45
	RC3	RC3 (S055)	23.8	23.75	23.51	38.45
	RC4	RC3 (S02)	23.73	23.67	23.48	38.45
	RC4	RC3 (S055)	23.61	23.69	23.47	38.45
	RC5	RC4 (S09)	23.65	23.63	23.44	38.45
	RC5	RC4 (S055)	23.71	23.74	23.45	38.45

PCS Band, Part 24E

Mode	FED	REV	Low CH (1851.25 MHz)	Middle CH (1880.0 MHz)	High CH (1908.75 MHz)	Limit (dBm)
CDMA2000 1xRTT	RC1	RC1 (S02)	23.44	23.44	23.29	33
	RC1	RC1 (S055)	23.43	23.49	23.29	33
	RC2	RC2 (S09)	23.4	23.48	23.29	33
	RC2	RC2 (S055)	23.42	23.53	23.26	33
	RC3	RC3 (S02)	23.46	23.47	23.28	33
	RC3	RC3 (S055)	23.48	23.55	23.38	33
	RC4	RC3 (S02)	23.44	23.48	23.29	33
	RC4	RC3 (S055)	23.45	23.47	23.23	33
	RC5	RC4 (S09)	23.44	23.48	23.25	33
	RC5	RC4 (S055)	23.45	23.48	23.29	33

ERP/EIRP:

Cellular Band, Part 22H

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dBd)	Cable Loss (dB)	Absolute Level (dBm)		
824.7	85.5	334	271	V	824.7	19.29	0	1.29	18	38.45	-20.45
824.7	92.33	58	195	H	824.7	23.43	0	1.29	23.14	38.45	-15.31
836.52	85.14	335	264	V	836.52	17.39	0	1.29	16.1	38.45	-22.35
836.52	93.04	66	200	H	836.52	24.16	0	1.29	22.87	38.45	-15.58
848.31	85.35	336	255	V	848.31	19.73	0	1.29	18.44	38.45	-20.01
848.31	93.63	63	188	H	848.31	23.56	0	1.29	22.27	38.45	-16.18

PCS Band, Part 24E

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dBi)	Cable Loss (dB)	Absolute Level (dBm)		
1851.25	89.04	99	146	V	1851.25	16.15	8.74	2.37	22.52	33	-10.48
1851.25	88.54	226	177	H	1851.25	15.75	8.74	2.37	22.12	33	-10.88
1880	88.04	195	170	V	1880	15.92	8.74	2.37	22.29	33	-10.71
1880	87.15	228	150	H	1880	14.87	8.74	2.37	21.24	33	-11.76
1908.75	87.07	132	147	V	1908.75	15.28	8.74	2.37	21.65	33	-11.35
1908.75	86.74	222	148	H	1908.75	14.93	8.74	2.37	21.3	33	-11.7

5 FCC §2.1055, §22.355 & §24.235 – Frequency Stability

5.1 Applicable Standards

Requirements: FCC §2.1055 (a), §2.1055 (d) & following:

According to FCC §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table C-1 of this section.

Frequency Tolerance for Transmitters in the Public Mobile Services

<i>Frequency Range (MHz)</i>	<i>Base, fixed (ppm)</i>	<i>Mobile ≤ 3 watts (ppm)</i>	<i>Mobile ≤ 3 watts (ppm)</i>
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

According to FCC §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

5.2 Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC/AC power supply was connected to the battery terminals of the equipment under test. The voltage was set to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

5.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
BK Precision	DC Power Supply	1621A	D185052265	/	/
Fluke Corp	Multimeter, Digital	233	23840029	2013-05-20	1 year
BMI	AC Power Supply	3030A	35558	2013-08-26	1 year
Tenney	Temp/Humidity Chamber	TUJR	27445-06	2013-07-09	1 year
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-05-10	1 year
Agilent	Communication Tester	E5515C	GB44051221	2012-06-28	2 years

Statement of Traceability: **BACL Corp.** attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

5.4 Test Environmental Conditions

Temperature:	24 °C
Relative Humidity:	41%
ATM Pressure:	103.1kPa

The testing was performed by Bo Li on 2013-10-24 at RF Site.

5.5 Test Results

Please refer to the following tables.

Cellular Band, Part 22H*AC Main: 120V/60Hz- Adapter*

Reference Frequency: 836.52 MHz, Limit: 2.5 ppm				
Test Environment		Frequency Measure with Time Elapsed		
Temperature (°C)	Power Supplied (VAC)	Measured Error (Hz)	Frequency Error (ppm)	Limit (ppm)
Frequency Stability versus Temperature				
60	120	9.11	0.01089	2.5
50	120	9.34	0.011165	2.5
40	120	8.74	0.010448	2.5
30	120	9.2	0.010998	2.5
20	120	8.13	0.009719	2.5
10	120	9.25	0.011058	2.5
0	120	8.64	0.010329	2.5
-10	120	5.66	0.006766	2.5
-20	120	8.31	0.009934	2.5
Frequency Stability versus Voltage				
20	102	8.13	0.009719	2.5
20	138	8.15	0.009743	2.5

DC: 3.7V- Battery Power

Reference Frequency: 836.52 MHz, Limit: 2.5 ppm				
Test Environment		Frequency Measure with Time Elapsed		
Temperature (°C)	Power Supplied (VDC)	Measured Error (Hz)	Frequency Error (ppm)	Limit (ppm)
Frequency Stability versus Temperature				
60	3.7	4.69	0.005607	2.5
50	3.7	5.67	0.006778	2.5
40	3.7	4.56	0.005451	2.5
30	3.7	4.99	0.005965	2.5
20	3.7	5.78	0.00691	2.5
10	3.7	4.57	0.005463	2.5
0	3.7	4.39	0.005248	2.5
-10	3.7	4.08	0.004877	2.5
-20	3.7	3.11	0.003718	2.5
Frequency Stability versus Voltage				
20	3.4	5.8	0.006933	2.5
20	4.2	5.78	0.102	2.5

PCS Band, Part 24E*AC Main: 120V/60Hz- Adapter*

Reference Frequency: 1880 MHz				
Test Environment		Frequency Measure with Time Elapsed		
Temperature (°C)	Power Supplied (VAC)	Measured Error (Hz)	Frequency Error (ppm)	Result
Frequency Stability versus Temperature				
60	120	9.94	0.005287	Compliance
50	120	9.68	0.005149	Compliance
40	120	9.57	0.00509	Compliance
30	120	9.36	0.004979	Compliance
20	120	10.17	0.00541	Compliance
10	120	9.35	0.004973	Compliance
0	120	9.06	0.004819	Compliance
-10	120	15.73	0.008367	Compliance
-20	120	15.02	0.007989	Compliance
Frequency Stability versus Voltage				
20	102	10.15	0.005399	Compliance
20	138	10.17	0.00541	Compliance

DC: 3.7V – Battery Power

Reference Frequency: 1880 MHz				
Test Environment		Frequency Measure with Time Elapsed		
Temperature (°C)	Power Supplied (VDC)	Measured Error (Hz)	Frequency Error (ppm)	Result
Frequency Stability versus Temperature				
60	3.7	5.98	0.003181	Compliance
50	3.7	8.08	0.004298	Compliance
40	3.7	9.71	0.005165	Compliance
30	3.7	7.43	0.003952	Compliance
20	3.7	7.53	0.004005	Compliance
10	3.7	8.37	0.004452	Compliance
0	3.7	6.89	0.003665	Compliance
-10	3.7	10.53	0.005601	Compliance
-20	3.7	9.31	0.004952	Compliance
Frequency Stability versus Voltage				
20	3.4	7.55	0.004016	Compliance
20	4.2	7.62	0.004053	Compliance

6 FCC §2.1049, §22.917 & §24.238 - Occupied Bandwidth

6.1 Applicable Standards

Requirements: FCC §2.1049, §22.917, and §24.238

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 to at least 1% of the BW and the 26 dB & 99% bandwidth was recorded.

6.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year
Agilent	Communication Tester	E5515C	GB44051221	2012-06-28	2 years

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

6.4 Test Environmental Conditions

Temperature:	20°C
Relative Humidity:	41%
ATM Pressure:	101kPa

The testing was performed by Bo Li on 2013-10-21 in the RF Site.

6.5 Test Results

Please refer to the following tables and plots.

Cellular Band, Part 22H

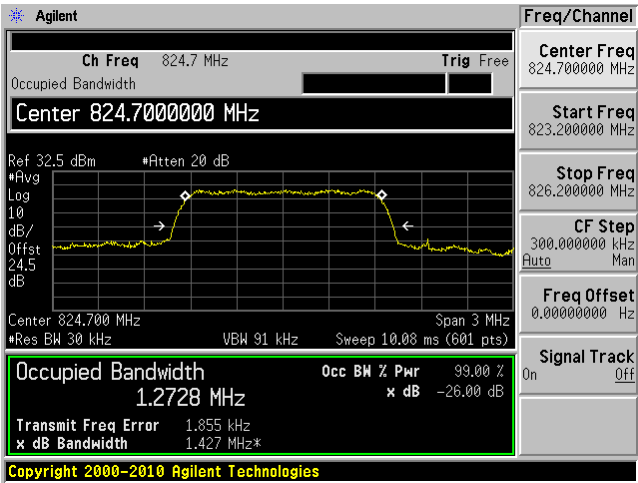
Channel	Frequency (MHz)	26 dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
CDMA 1xRTT			
Low	824.7	1.427	1.2728
Middle	836.52	1.422	1.2726
High	848.31	1.414	1.2717

PCS Band, Part 24E

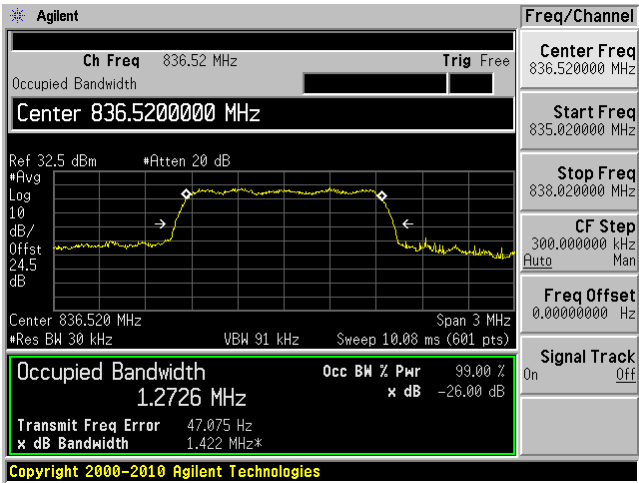
Channel	Frequency (MHz)	26 dB Occupied Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
CDMA 1xRTT			
Low	1851.25	1.421	1.2747
Middle	1880.00	1.427	1.2774
High	1908.75	1.425	1.2775

Occupied Bandwidth, Part 22H

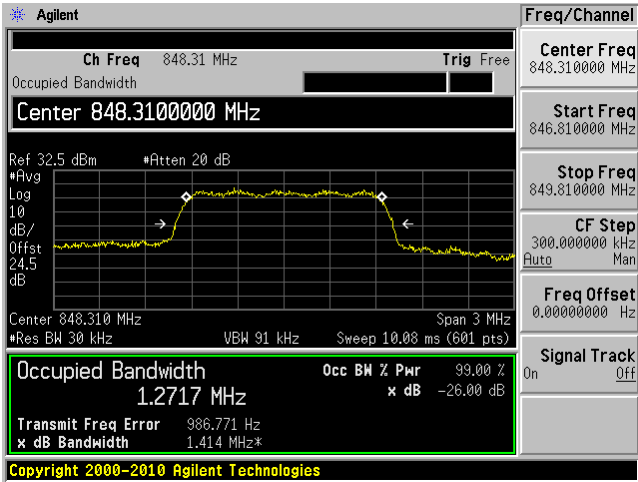
Low Channel



Middle Channel

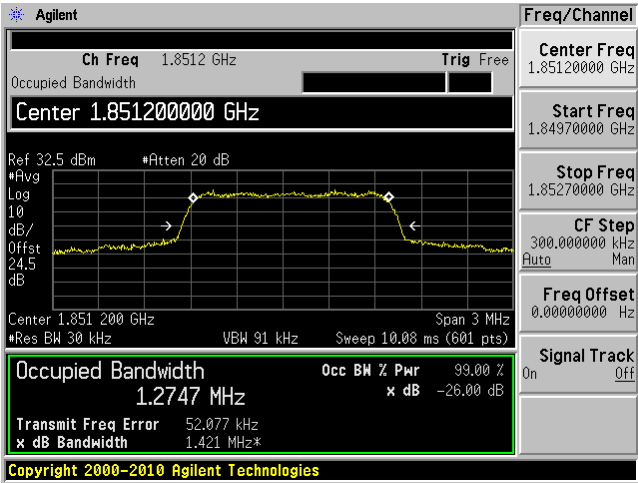


High Channel

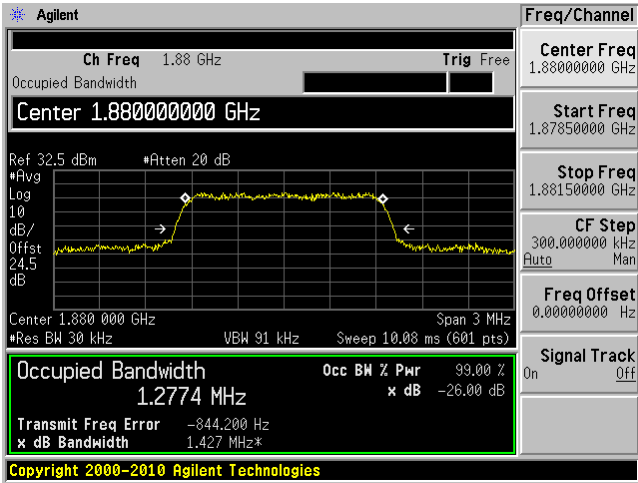


Occupied Bandwidth, Part 24E

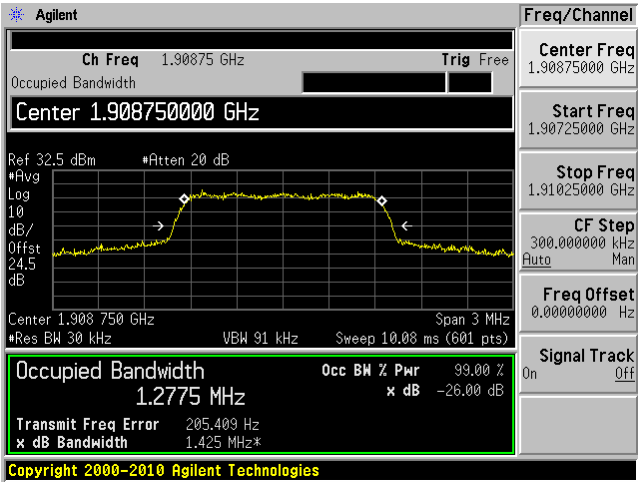
Low Channel



Middle Channel



High Channel



7 FCC §2.1053, §22.917 & §24.238 - Spurious Radiated Emissions

7.1 Applicable Standards

According to FCC §22.917, §24.238, 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.

7.2 Test Procedure

The transmitter was placed on the 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	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2013-06-18	1 year
EMCO	Horn Antenna	3115	9511-4627	2013-10-17	1 year
Sunol Science Corp	Horn Antenna	DHR-118	A052704	2013-02-24	1 year
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2013-05-09	1 year
Agilent	Communication Tester	E5515C	GB44051221	2012-06-28	2 years

Statement of Traceability: *BACL Corp.* attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

7.4 Test Environmental Conditions

Temperature:	20-21 °C
Relative Humidity:	41-46 %
ATM Pressure:	101.4-101.6kPa

The testing was performed by Bo Li on 2013-10-21 and 2013-10-29 in 5 Meter Chamber 3.

7.5 Test Results

Cellular Band, Part 22H

30 MHz -10 GHz Radiated Emission at 3-meter (Middle Channel, 836.52 MHz)

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted				Absolute Level (dBm)	FCC	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
1673.04	49.28	340	150	V	1673.04	-58.72	9.07	2.21	-51.86	-13	-38.86
1673.04	54.1	98	100	H	1673.04	-53.9	9.07	2.21	-47.04	-13	-34.04
2509.56	34.96	0	100	V	2509.56	-69.04	9.89	3.04	-62.19	-13	-49.19
2509.56	35.26	0	100	H	2509.56	-68.74	9.89	3.04	-61.89	-13	-48.89
3346.08	34.12	0	100	V	3346.08	-65.88	10.17	3.5	-59.21	-13	-46.21
3346.08	34.09	0	100	H	3346.08	-65.91	10.17	3.5	-59.24	-13	-46.24

PCS Band, Part 24E

30 MHz -20 GHz Radiated Emission at 3-meter (Middle Channel, 1880 MHz)

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted				Absolute Level (dBm)	FCC	
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polar (H/V)	Frequency (MHz)	S.G. Level (dBm)	Antenna Gain (dBi)	Cable Loss (dB)		Limit (dBm)	Margin (dB)
3760	41.79	331	150	V	3760	-33.36	9.96	4	-27.4	-13	-14.4
3760	44.09	95	150	H	3760	-30.02	9.96	4	-24.06	-13	-11.06
5640	35.69	159	150	V	5640	-39.38	11.33	5.63	-33.68	-13	-20.68
5640	35.25	270	150	H	5640	-38.97	11.33	5.63	-33.27	-13	-20.27
7520	33.36	0	100	V	7520	-41.83	11.68	6.54	-36.69	-13	-23.69
7520	32.9	0	100	H	7520	-41.73	11.68	6.54	-36.59	-13	-23.59

8 FCC §2.1051, §22.917 & §24.238 - Spurious Emissions at Antenna Terminals

8.1 Applicable Standards

According to FCC §22.917, §24.238 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.

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	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year
Agilent	Communication Tester	E5515C	GB44051221	2012-06-28	2 years

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

8.4 Test Environmental Conditions

Temperature:	20°C
Relative Humidity:	41%
ATM Pressure:	101kPa

The testing was performed by Bo Li on 2013-10-21 in the RF Site.

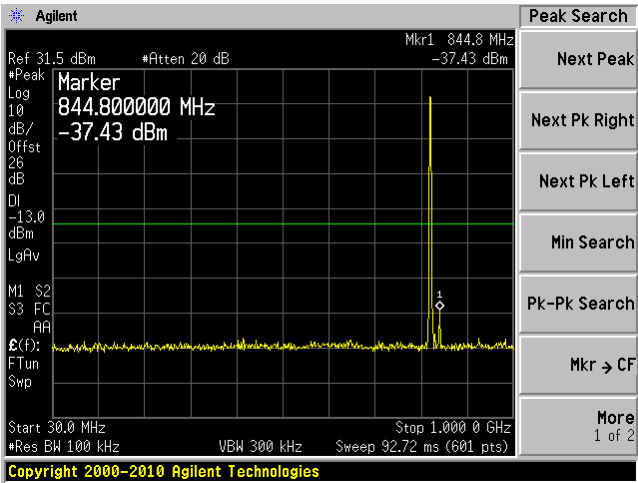
8.5 Test Results

Please refer to the following plots.

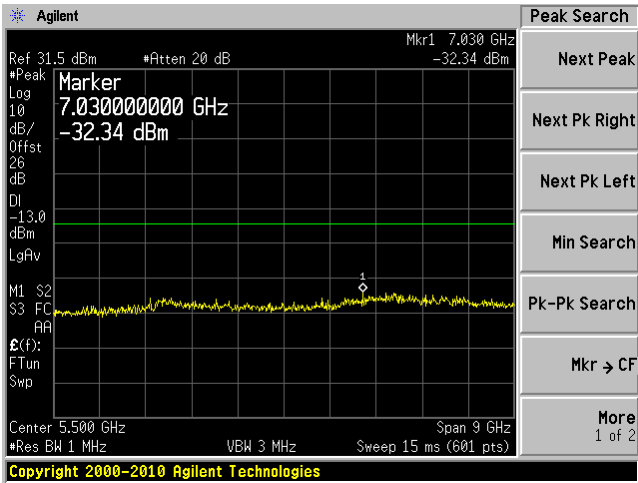
Spurious Emission at Antenna Port, Part 22H

Low Channel

30 MHz – 1 GHz

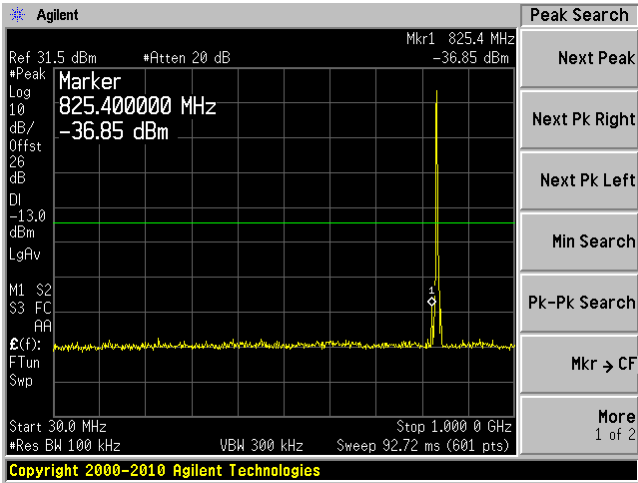


1 GHz – 10 GHz

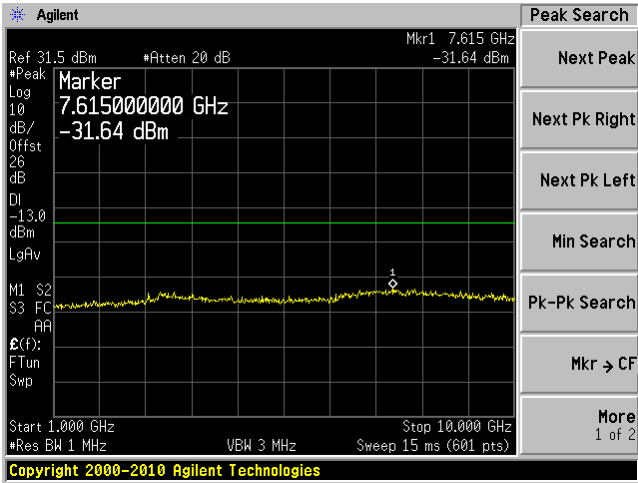


Middle Channel

30 MHz – 1 GHz

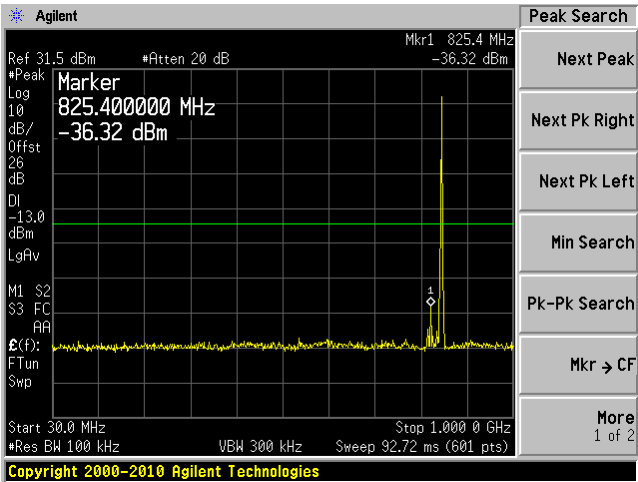


1 GHz – 10 GHz

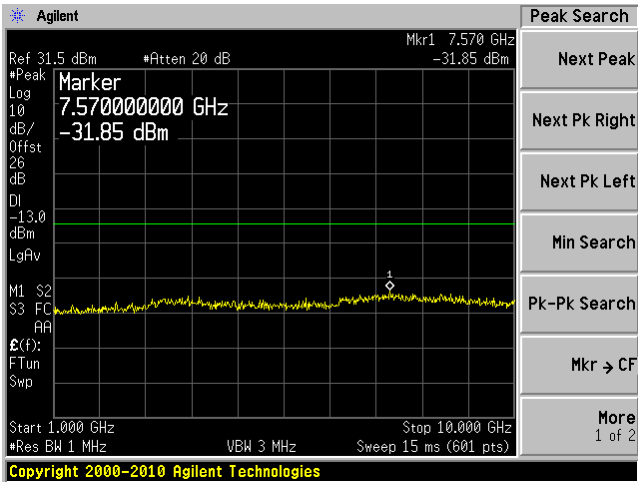


High Channel

30 MHz – 1 GHz

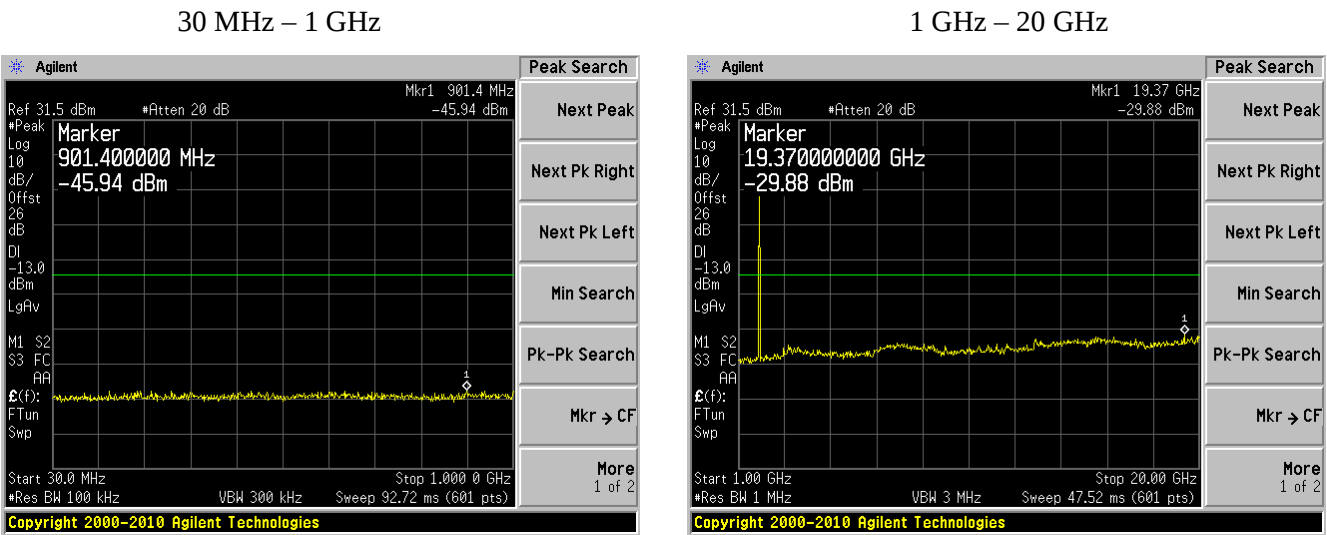


1 GHz – 10 GHz

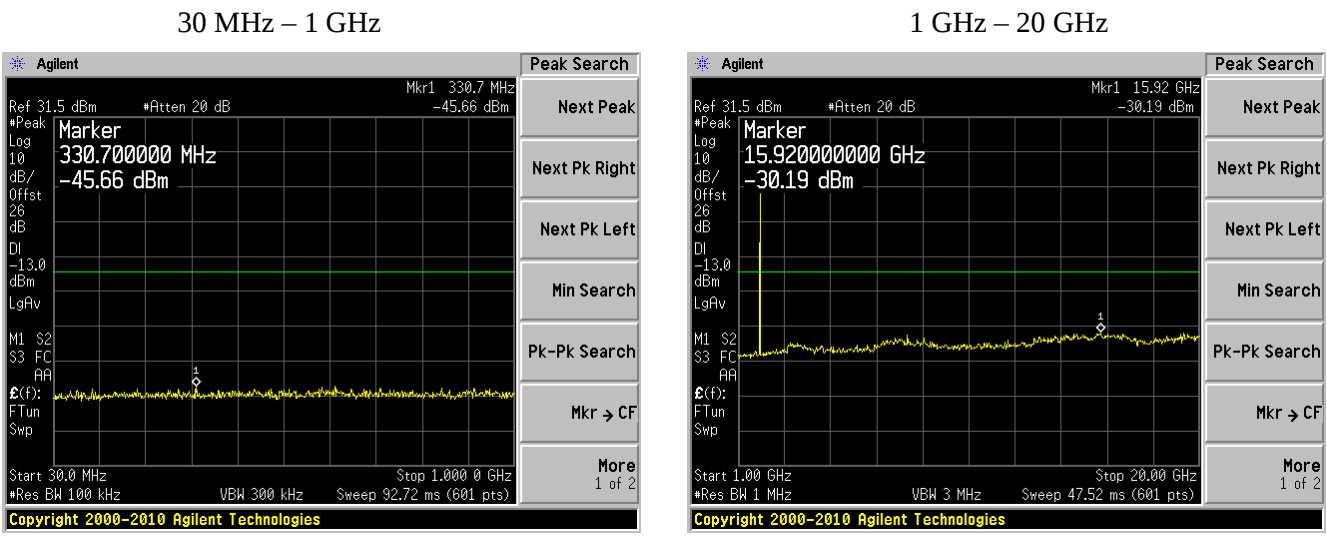


Spurious Emission at Antenna Port, Part 24E

Low Channel

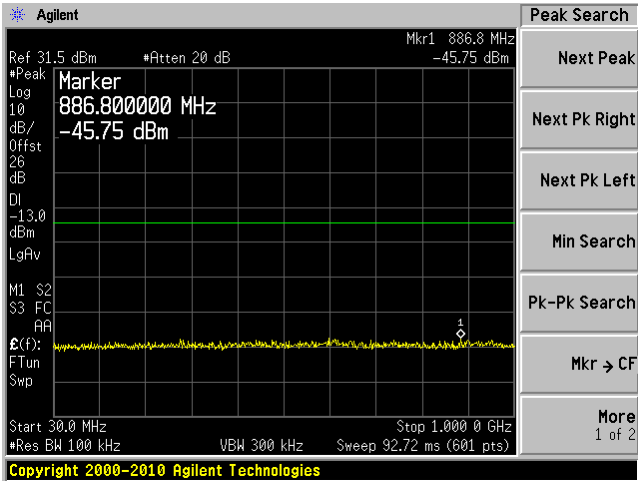


Middle Channel

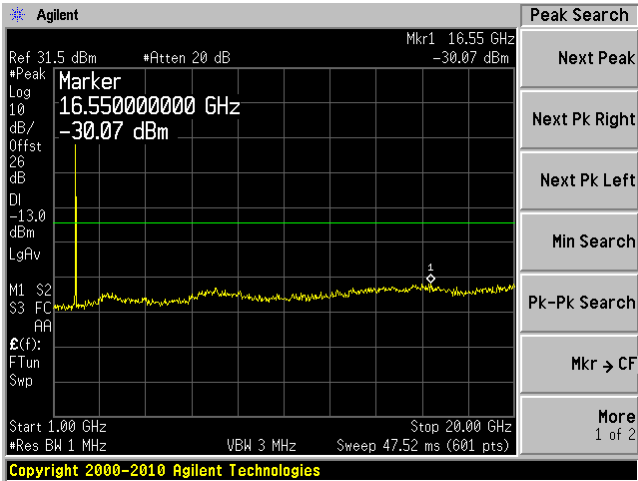


High Channel

30 MHz – 1 GHz



1 GHz – 20 GHz



9 FCC §22.917 & §24.238 – Band Edge

9.1 Applicable Standards

According to FCC §22.917, §24.238, 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	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2013-10-16	1 year
Agilent	Communication Tester	E5515C	GB44051221	2012-06-28	2 years

Statement of Traceability: BACL Corp. attests that all calibrations have been performed per the A2LA requirements, traceable to the NIST.

9.4 Test Environmental Conditions

Temperature:	20 °C
Relative Humidity:	41 %
ATM Pressure:	101 kPa

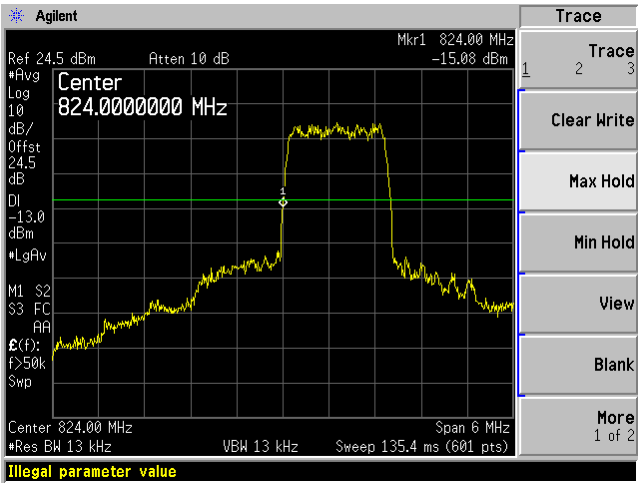
The testing was performed by Bo Li on 2013-10-21 in the RF Site.

9.5 Test Results

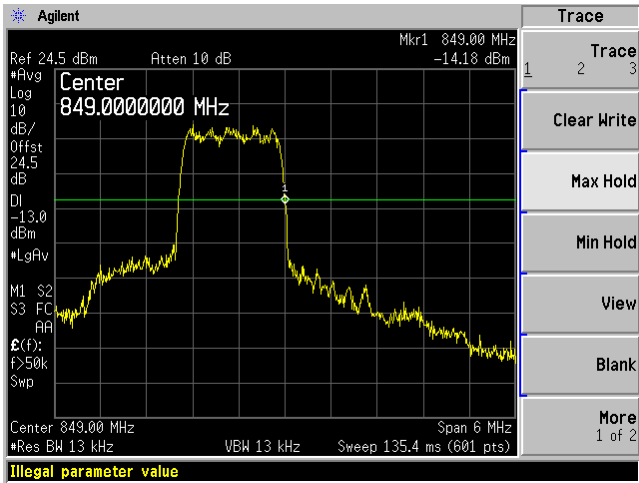
Please refer to the following plots.

Band Edge, Part 22H

Lowest Channel

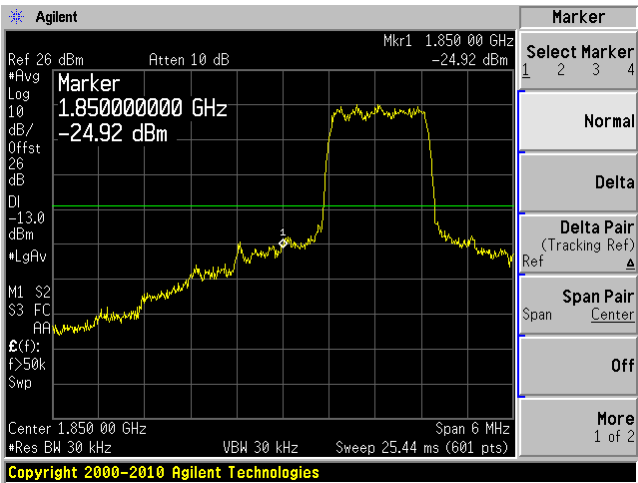


Highest Channel

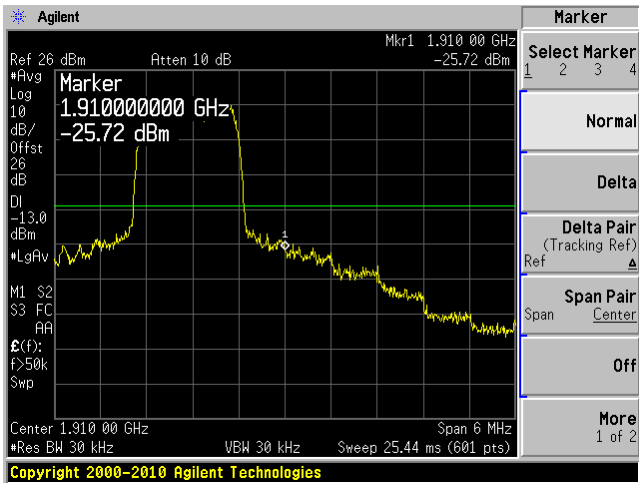


Band Edge, Part 24E

Lowest Channel



Highest Channel



10 FCC §1.1307(B) (1) & §2.1093 - RF Exposure

10.1 Test Results

Please refer to SAR report, report number: R1310011-FCC-SAR.