

**CERTIFICATE OF COMPLIANCE (ERM EVALUATION)**

**Manufacture:** ADRF Korea, inc

5-5, Mojeon-Ri, Backsa-Myun, Icheon-City, Kyunggi-Do, Korea

**Date of Issue:**

May 16, 2014

**Location:**

HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

**Test Report No.:** HCTR1401F014-2

**FCC ID:**

**N52-ADX-R-C43M**

**APPLICANT:**

**ADRF Korea, inc**

**EUT Type:** High Power Remote Unite (Distribute Antenna System)

**Model:** ADX-R-C43M

**Frequency Ranges:**  
DL : 869 MHz ~ 894 MHz  
UL : 824 MHz ~ 849 MHz

**Conducted Output Power:**  
DL : 20 W(43 dBm)  
UL : 3.162 mW(5 dBm)

**FCC Rules Part(s):** CFR 47, Part 22

**Engineering Statement:**

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 22 of the FCC Rules under normal use and maintenance.



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Report prepared by  
:Yong Hyun Lee  
Test engineer of RF Team



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Approved by  
: Chang Seok Choi  
Manager of RF Team

## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1401FR014	January 22, 2014	- First Approval Report
HCTR1401FR014-1	February 17, 2014	- Added the measurement standards for "1. CLIENT INFORMATION"
HCTR1401FR014-2	May 16, 2014	- Added the uplink test result.

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## 1. CLIENT INFORMATION

The EUT has been tested by request of

Company	ADRF Korea, inc 5-5, Mojeon-Ri, Backsa-Myun, Icheon-City, Kyunggi-Do, Korea
Contact Point	Attention/ E-Mail: HK Song/ hk4464@adrftech.com Tel./ H.P. : +82-31-637-4435/ +82-10-3191-4773

■ FCC ID: **N52-ADX-R-C43M**

■ APPLICANT: **ADRF Korea, inc**

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■ Conducted Output Power:  
**DL : 20 W(43 dBm)**  
**UL : 3.162 mW(5 dBm)**

■ Antenna Gain(s): **2 dBi**

■ Date(s) of Tests: **2013. 12. 17. ~ 2014. 05. 16**

■ FCC Rules Part(s): **CFR Title 47 Part 22**

■ Measurement standard(s):  
**ANSI/TIA-603-C-2004, KDB 971168 D01 v02r01,**  
**KDB 935210 D02 v01r01**

■ Place of Tests: **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. (IC Recognition No. : 5944A-3)**

## 2. FACILITIES AND ACCREDITATIONS

### 2.1. FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 21, 2011 (Registration Number: 90661).

### 2.2. EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 3. TEST SPECIFICATIONS

Description	Reference	Results
Conducted RF Output Power	§2.1046; §22.913	Compliant
Occupied Bandwidth	§2.1049	Compliant
Spurious Emissions at Antenna Terminals	§2.1051, §22.917	Compliant
Out of Band Rejection	KDB 935210 D02 v01r01	Compliant
Radiated Spurious Emissions	§2.1053, §22.917	Compliant
Frequency Stability	§2.1055, §22.355	Compliant

#### 3.1. MODE OF OPERATION DURING THE TEST

The EUT was operated in a manner representative of the typical usage of the equipment.

During all testing, system components were manipulated within the confines of typical usage to maximize each emission.

The device does not supply antenna(s) with the system, so the dummy loads were connected to the RF output ports for radiated spurious emission testing.

QPSK was only selected and tested since it's the worst case configuration among all here modulations (QPSK, 16QAM, 64QAM).

#### 4. STANDARDS ENVIRONMENTAL TEST CONDITIONS

Temperature :	+ 15 to + 35
Relative humidity:	30 % to 60 %
Air pressure	860 mbar to 1 060 mbar

## 5. TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Due	Serial No.
Agilent	E4438C /Signal Generator	Annual	09/05/2014	MY42082646
Agilent	N5182A /Signal Generator	Annual	09/30/2014	MY50141649
Agilent	E4416A /Power Meter	Annual	10/16/2014	GB41291412
Agilent	E9327A/ Power Sensor	Annual	03/31/2015	MY4442009
NANGYEUL CO., LTD.	NY-THR18750/ Temperature and Humidity Chamber	Annual	10/30/2014	NY-2009012201A
Agilent	N9020A /Signal Analyzer	Annual	04/16/2015	US46220219
WEINSCHEL	67-30-33 / Fixed Attenuator	Annual	11/05/2014	BU5347
MCE / Weinschel	2-10 / Fixed Attenuator	Annual	10/28/2014	BR0554
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
MITEQ	AMF-6D-001180-35-20P/AMP	Annual	09/12/2014	1081666
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2015	1151
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	07/05/2015	1151
Schwarzbeck	VULB 9168/TRILOG Antenna	Biennial	07/02/2014	9168-255

## 6. RF OUTPUT POWER

### Test Requirements:

#### **§ 2.1046 Measurements required: RF power output:**

**§ 2.1046 (a)** For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

**§ 2.1046 (b)** For single sideband, independent sideband, and single channel, controlled carrier radiotelephone transmitters, the procedure specified in paragraph (a) of this section shall be employed and, in addition, the transmitter shall be modulated during the test as specified and as applicable in § 2.1046 (b) (1-5). In all tests, the input level of the modulating signal shall be such as to develop rated peak envelope power or carrier power, as appropriate, for the transmitter.

**§ 2.1046 (c)** For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

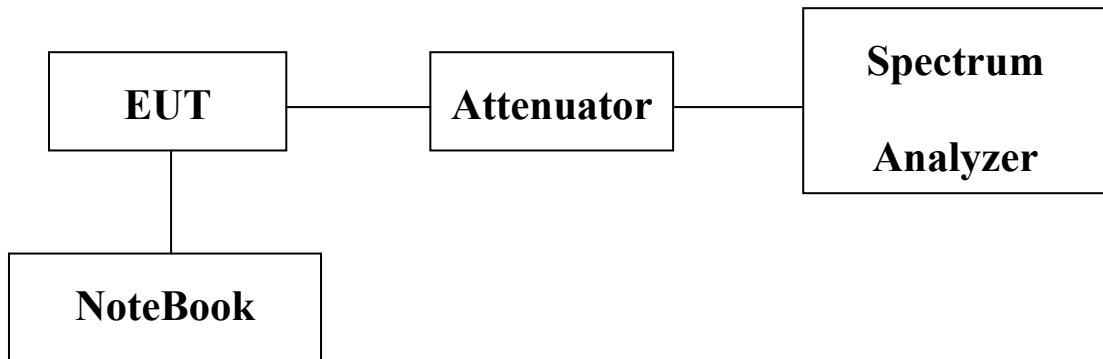
**§ 22.913 Effective radiated power limits.** The effective radiated power (ERP) of transmitters in the Cellular Radiotelephone Service must not exceed the limits in this section.

(a) Maximum ERP. In general, the effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. However, for those systems operating in areas more than 72 km (45 miles) from international borders that:

- (1) Are located in counties with population densities of 100 persons or fewer per square mile, based upon the most recently available population statistics from the Bureau of the Census; or,
- (2) Extend coverage on a secondary basis into cellular unserved areas, as those areas are defined in § 22.949, the ERP of base transmitters and cellular repeaters of such systems must not exceed 1000 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

**Test Procedures:**

As required by 47 CFR 2.1046, RF power output measurements were made at the RF output terminals using an attenuator and spectrum analyzer or power meter. This test was performed in all applicable modulations.

**Block Diagram 1. RF Power Output Test Setup****Test Results:**

Input Signal	Modulation	Level (dBm)
CDMA	DL/ UL :QPSK	DL : -17.0 UL: -45.0

**[Downlink]**

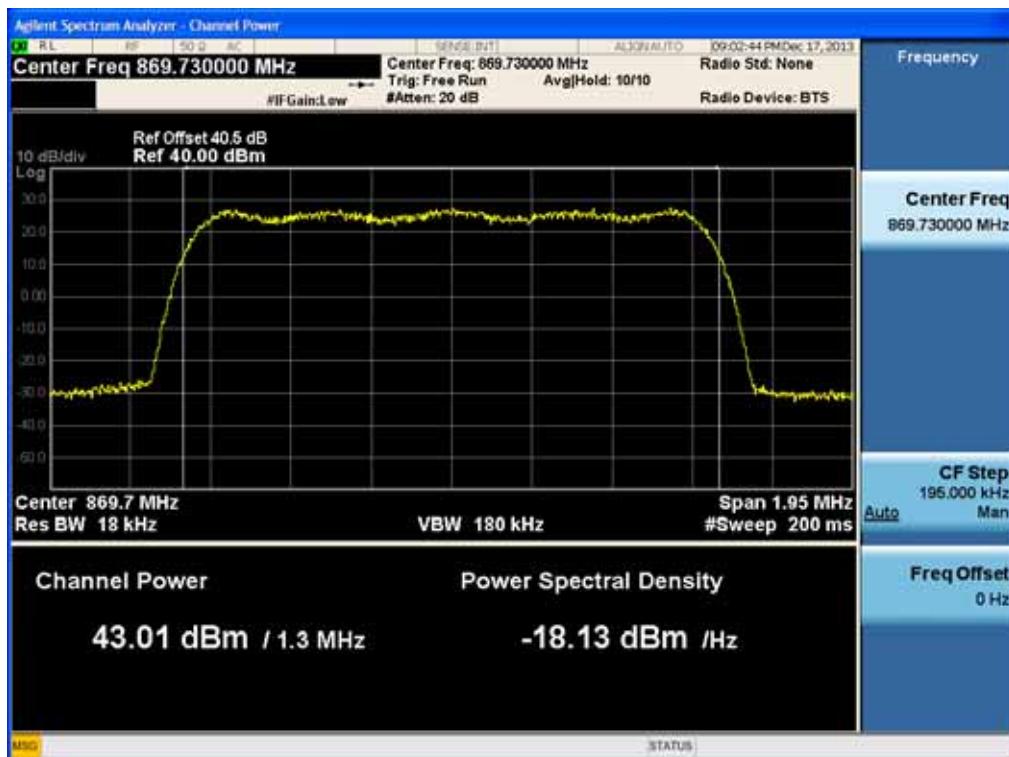
	Channel	Frequency (MHz)	Output Power	
			(dBm)	(W)
CDMA	Low	869.73	43.01	20.012
	Middle	881.52	43.10	20.431
	High	893.28	42.98	19.870

**[Uplink]**

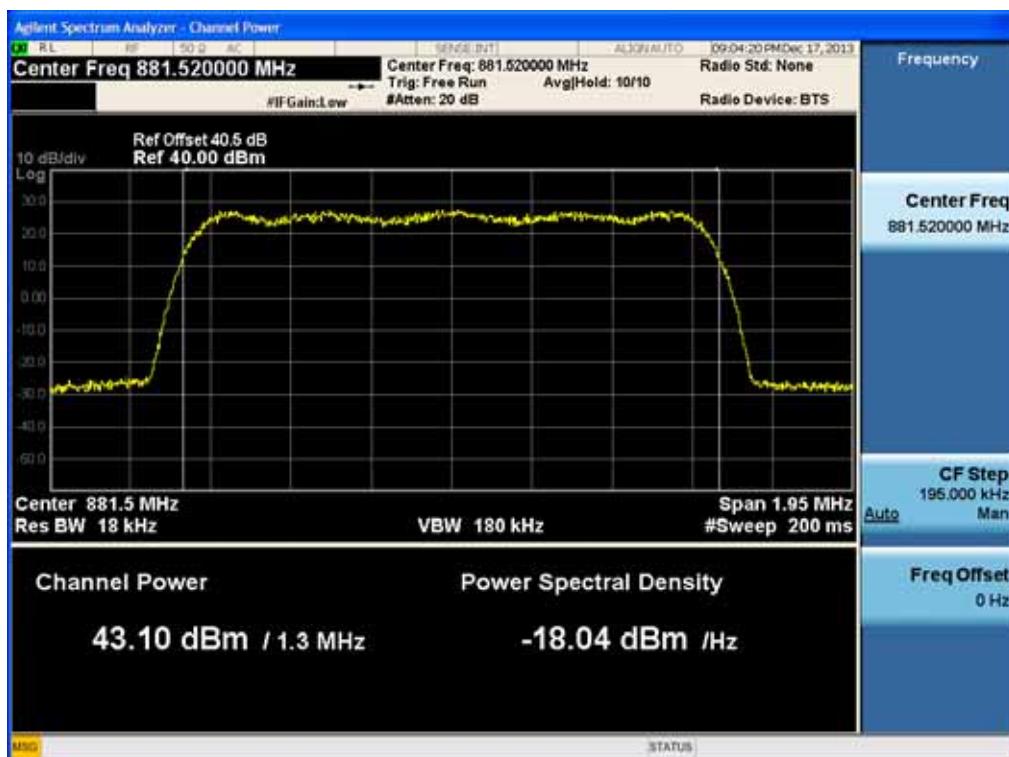
	Channel	Frequency (MHz)	Output Power	
			(dBm)	(mW)
CDMA	Low	824.73	4.67	2.932
	Middle	836.52	4.96	3.133
	High	848.28	4.27	2.674

## Plots of RF Output Power

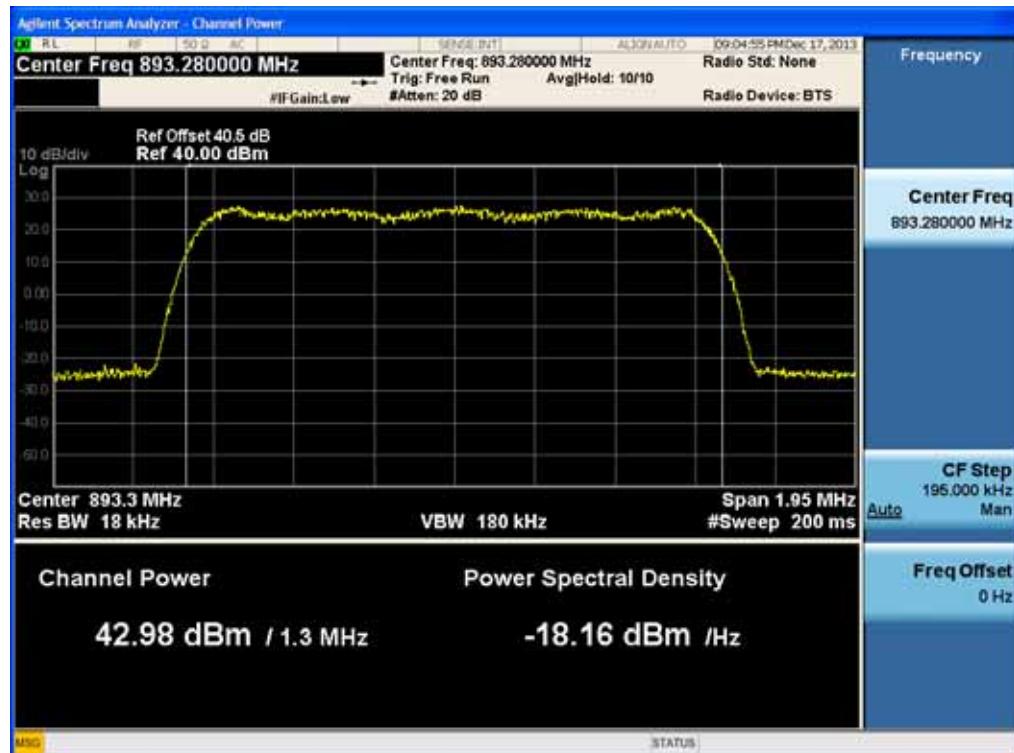
[CDMA Downlink Low]



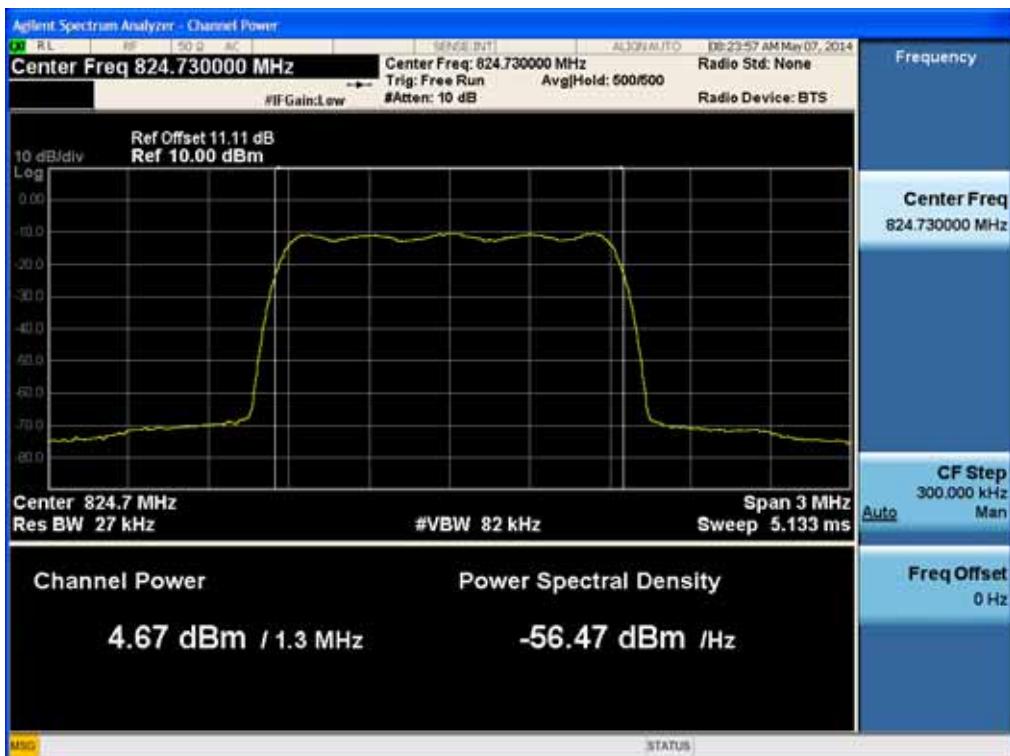
[CDMA Downlink Middle]



## [CDMA Downlink High]



## [CDMA Uplink Low]



### [CDMA Uplink Middle]



### [CDMA Uplink High]



## 7. OCCUPIED BANDWIDTH

### Test Requirement(s): § 2.1049 Measurements required: Occupied bandwidth:

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

**Test Procedures:** As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports for both Uplink and Downlink. The modulation characteristics of signal generator's carrier was measured first at a maximum RF level prescribed by the OEM. The signal generator was then connected to either the Uplink or Downlink input at the appropriate RF level. The resulting modulated signal through the EUT was measured and compared against the original signal.

**Test Results:** The EUT complies with the requirements of this section.

Input Signal	Modulation	Level (dBm)
CDMA	DL/ UL :QPSK	DL : -17.0 UL: -45.0

**[Downlink Output]**

	Channel	Frequency (MHz)	99% Bandwidth (MHz)
CDMA	Low	869.73	1.242
	Middle	881.52	1.240
	High	893.28	1.245

**[Downlink Input]**

	Channel	Frequency (MHz)	99% Bandwidth (MHz)
CDMA	Low	869.73	1.243
	Middle	881.52	1.237
	High	893.28	1.243

**[Uplink Output]**

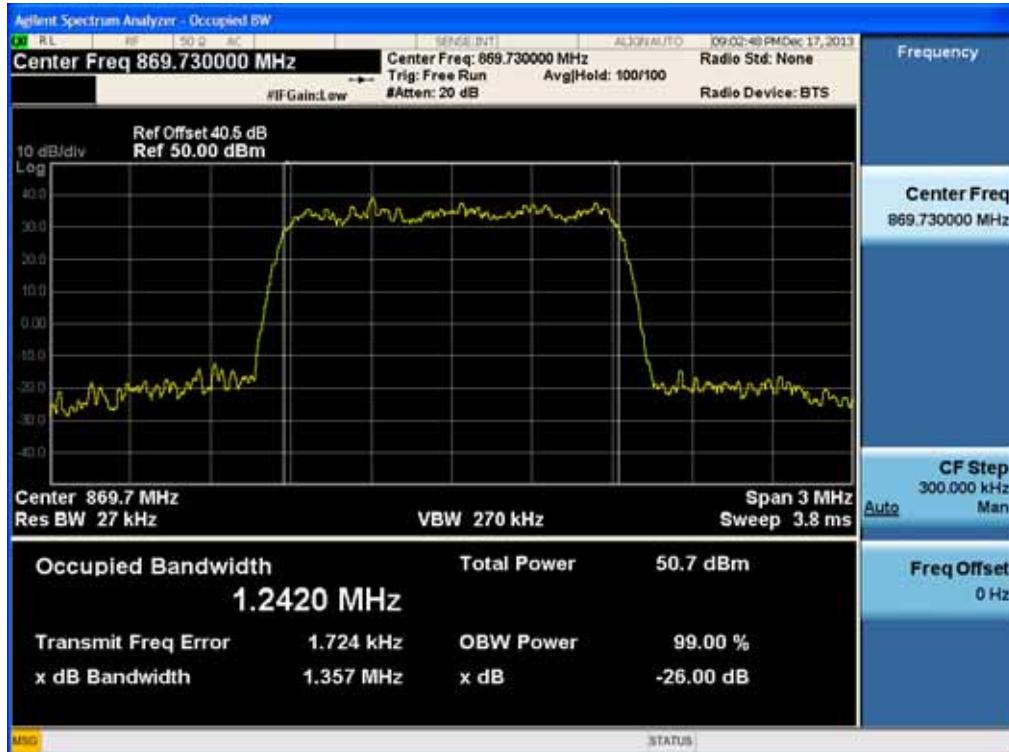
	Channel	Frequency (MHz)	99% Bandwidth (MHz)
CDMA	Low	824.73	1.245
	Middle	836.52	1.242
	High	848.28	1.245

**[Uplink Input]**

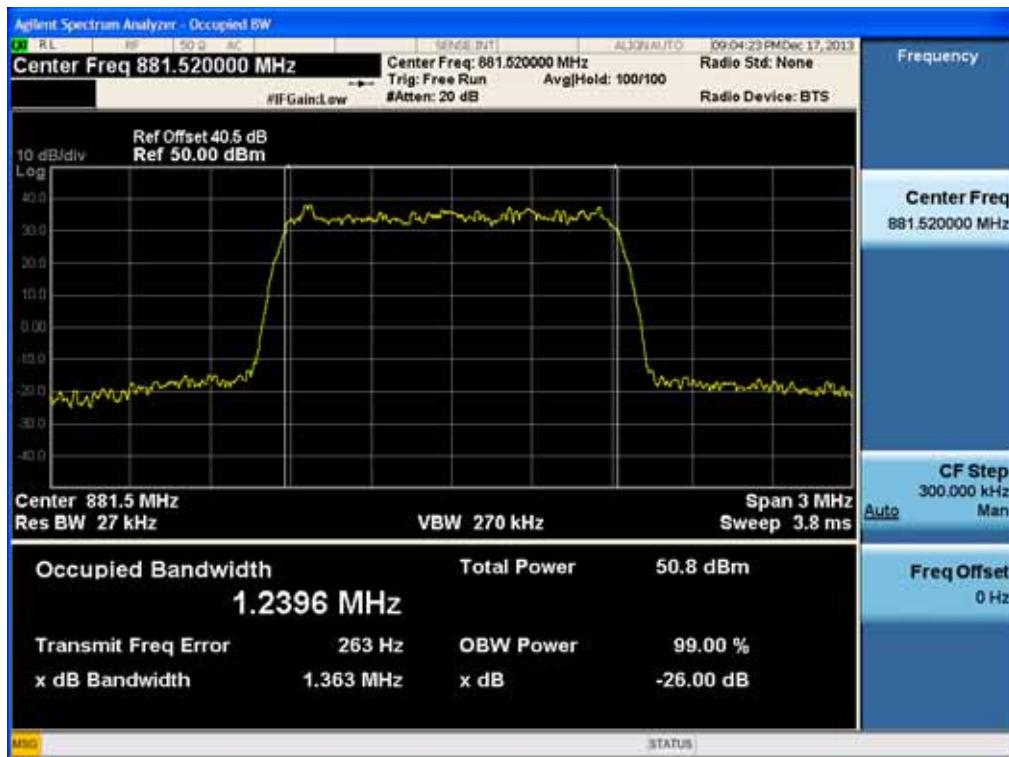
	Channel	Frequency (MHz)	99% Bandwidth (MHz)
CDMA	Low	824.73	1.240
	Middle	836.52	1.243
	High	848.28	1.241

## Plots of Occupied Bandwidth

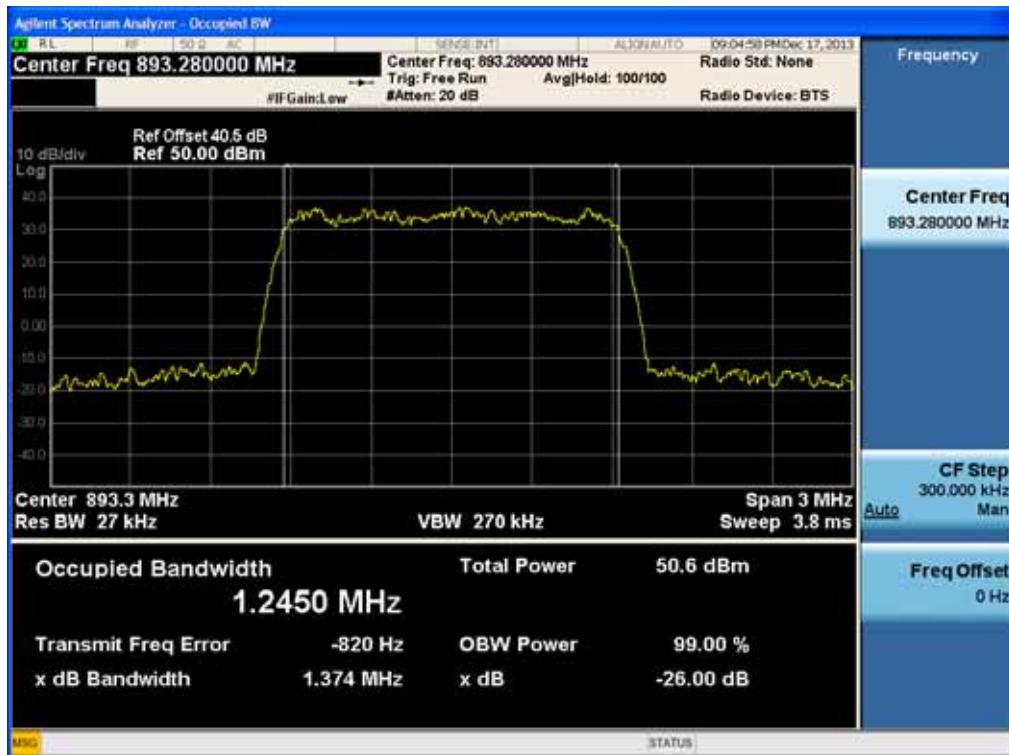
### [Output CDMA Downlink Low]



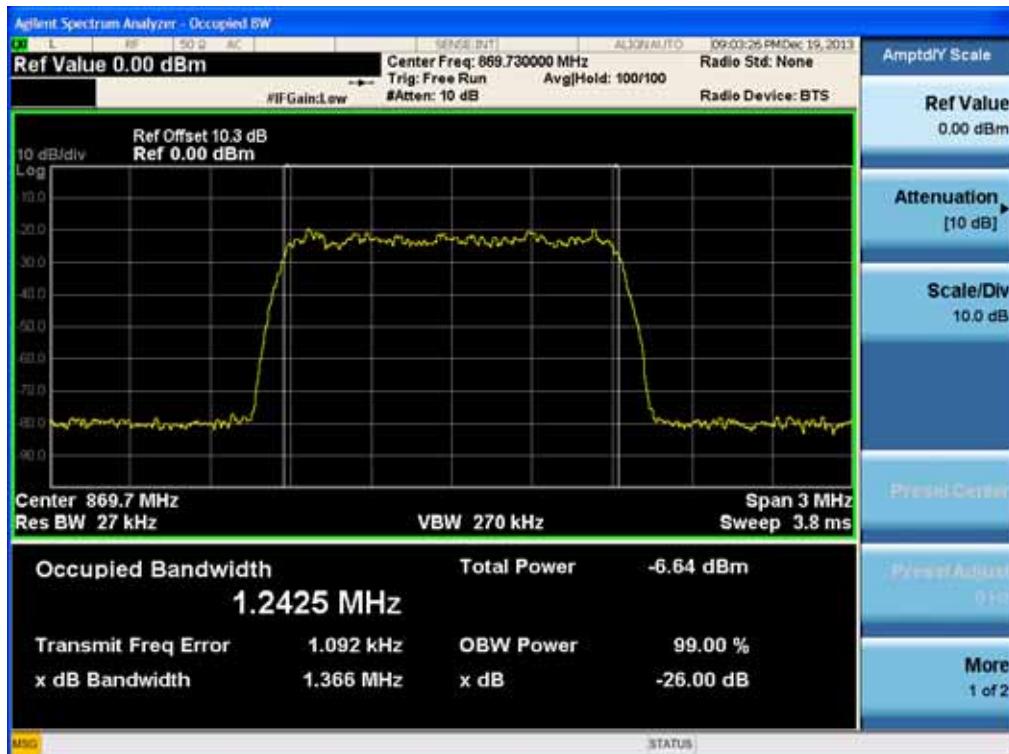
### [Output CDMA Downlink Middle]

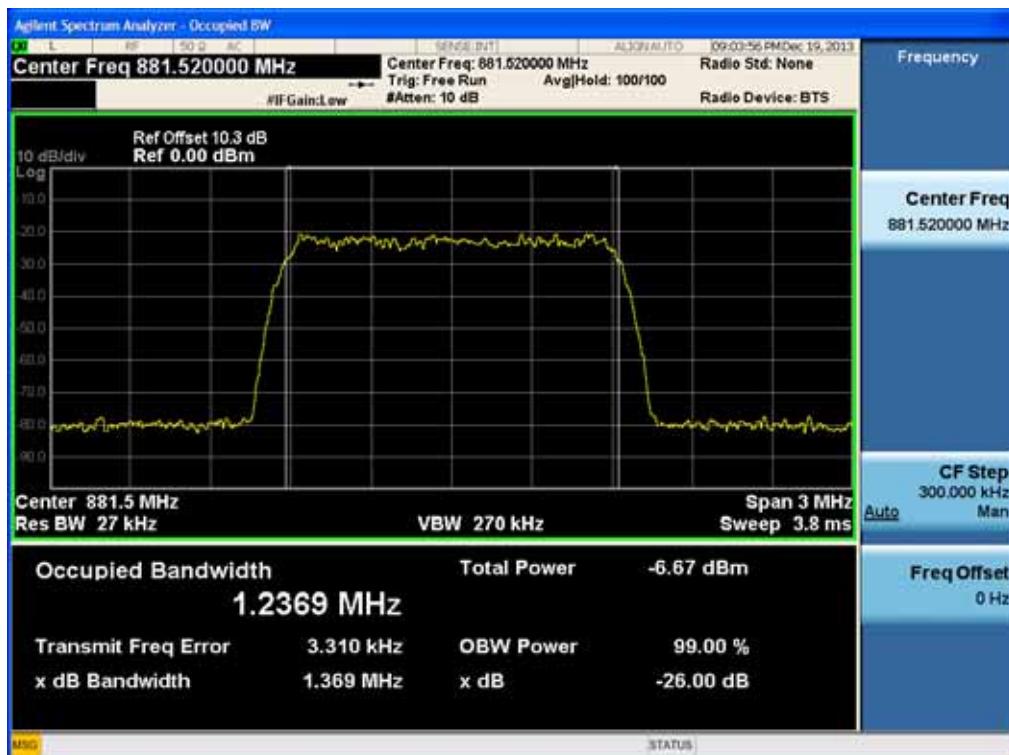
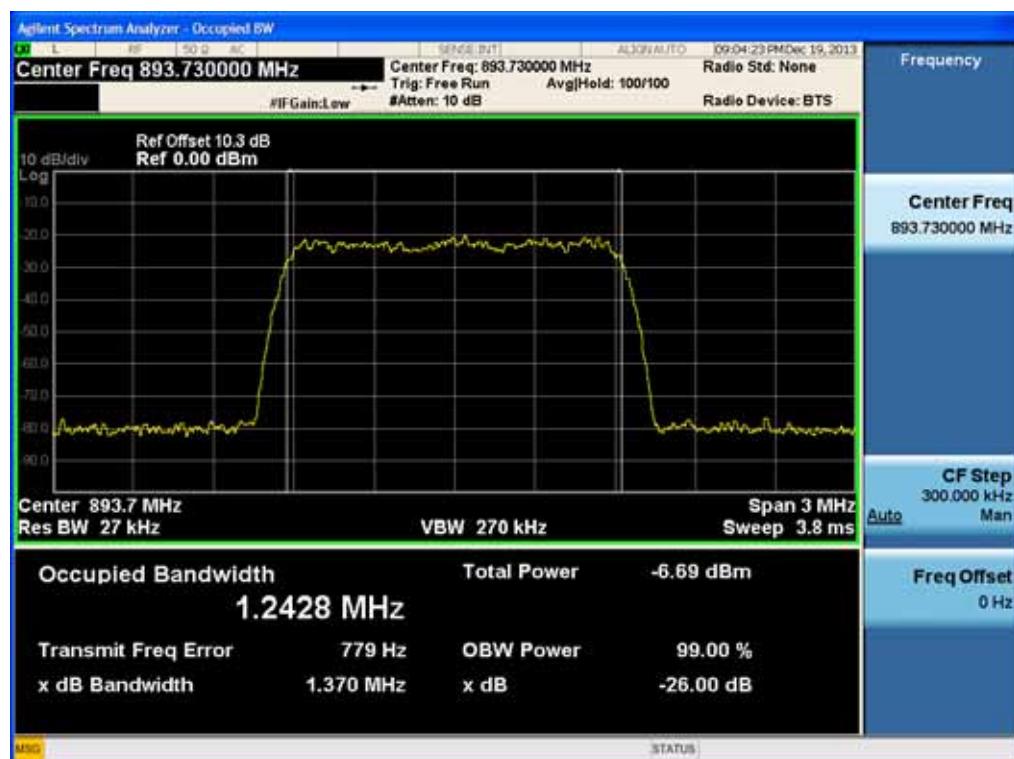


### [Output CDMA Downlink High]

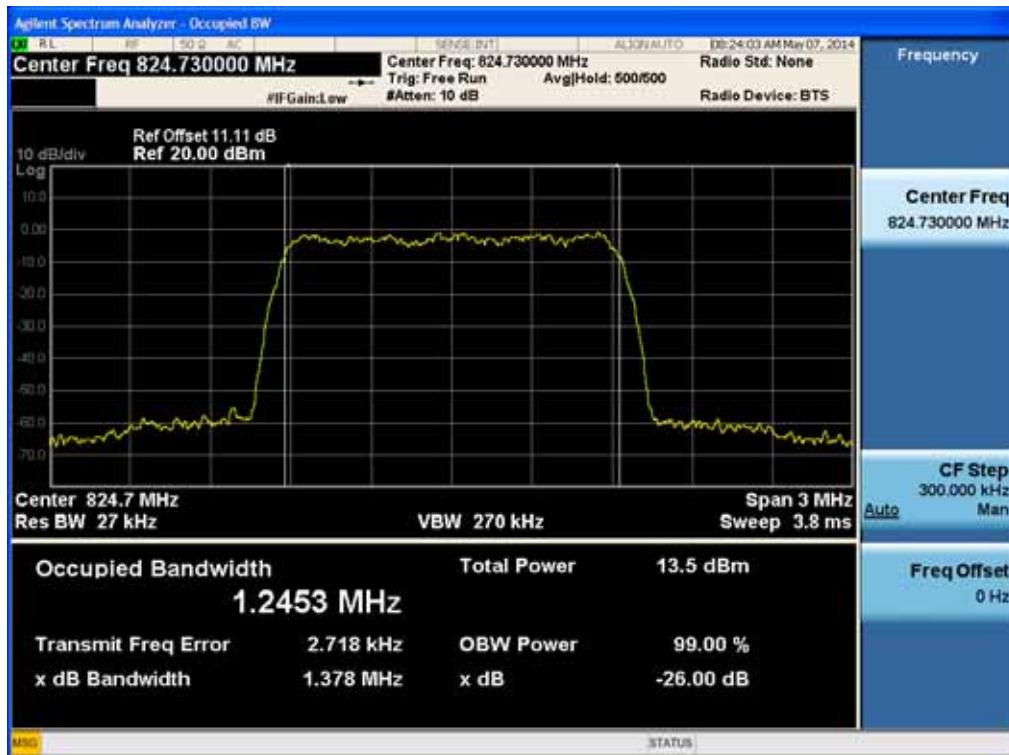


### [Input CDMA Downlink Low]

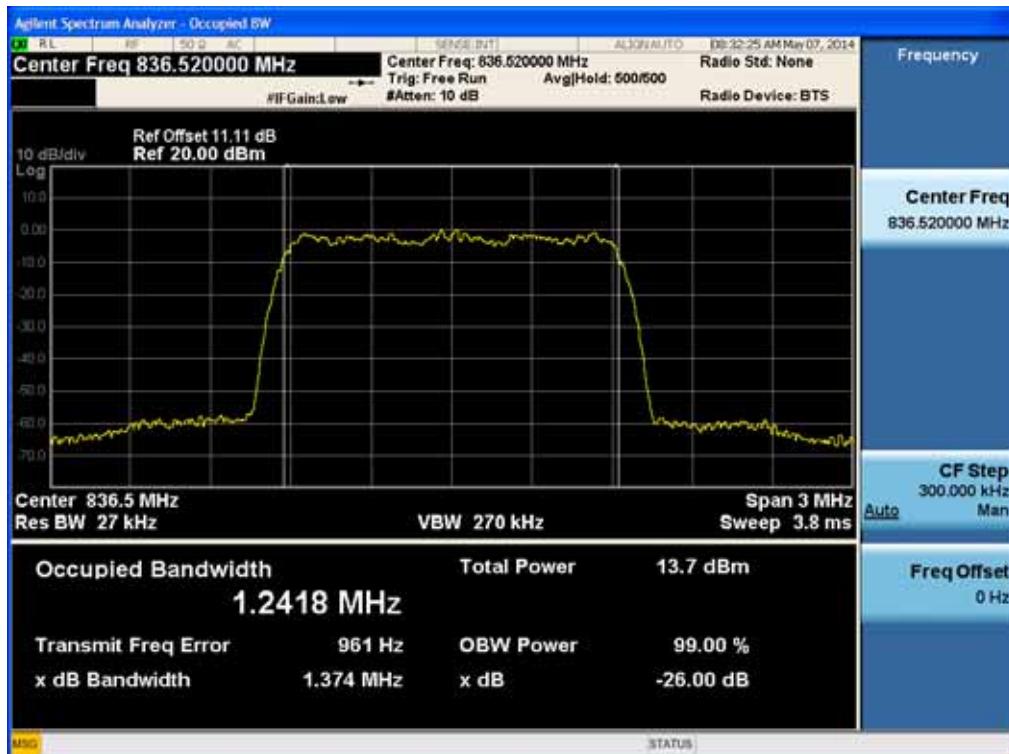


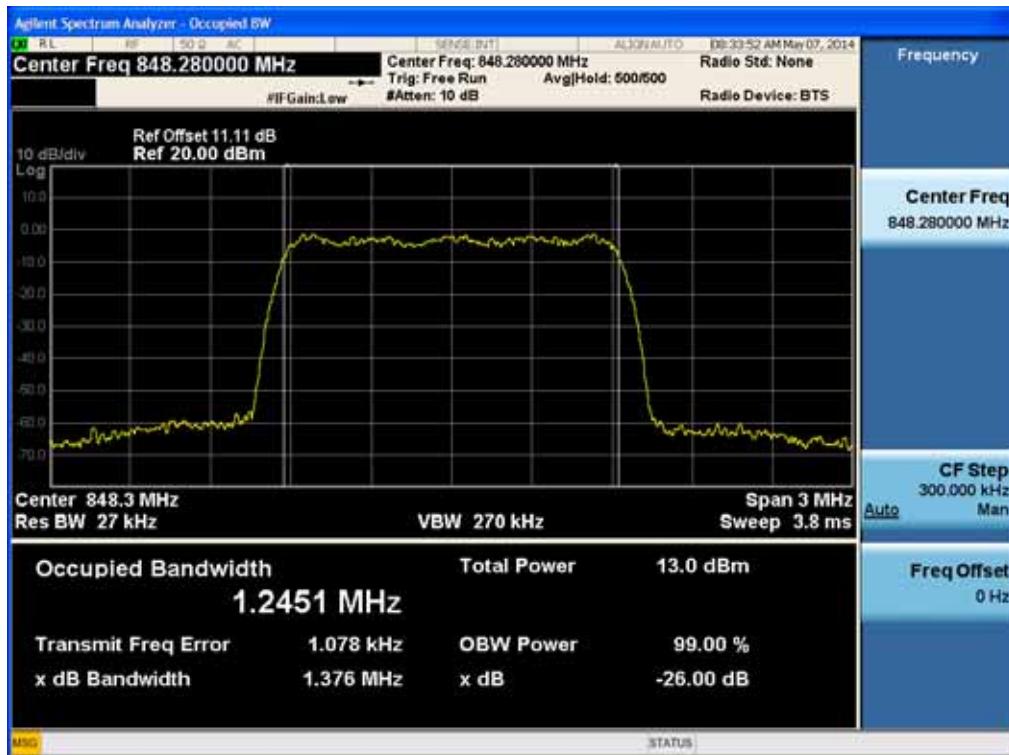
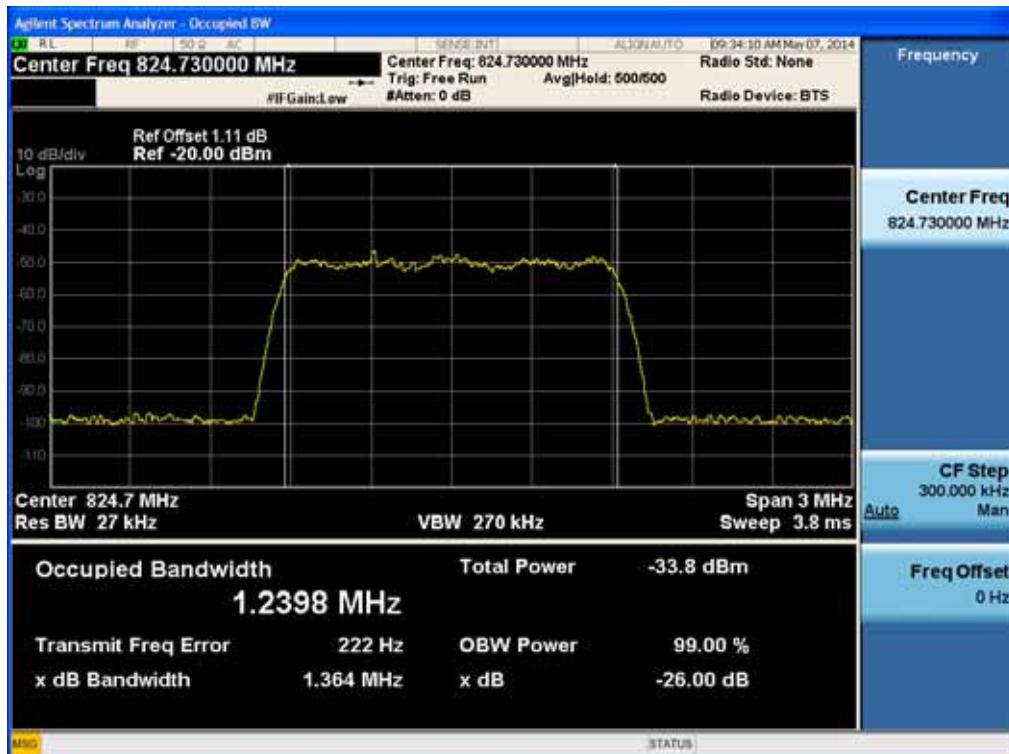
**[Input CDMA Downlink Middle]**

**[Input CDMA Downlink High]**


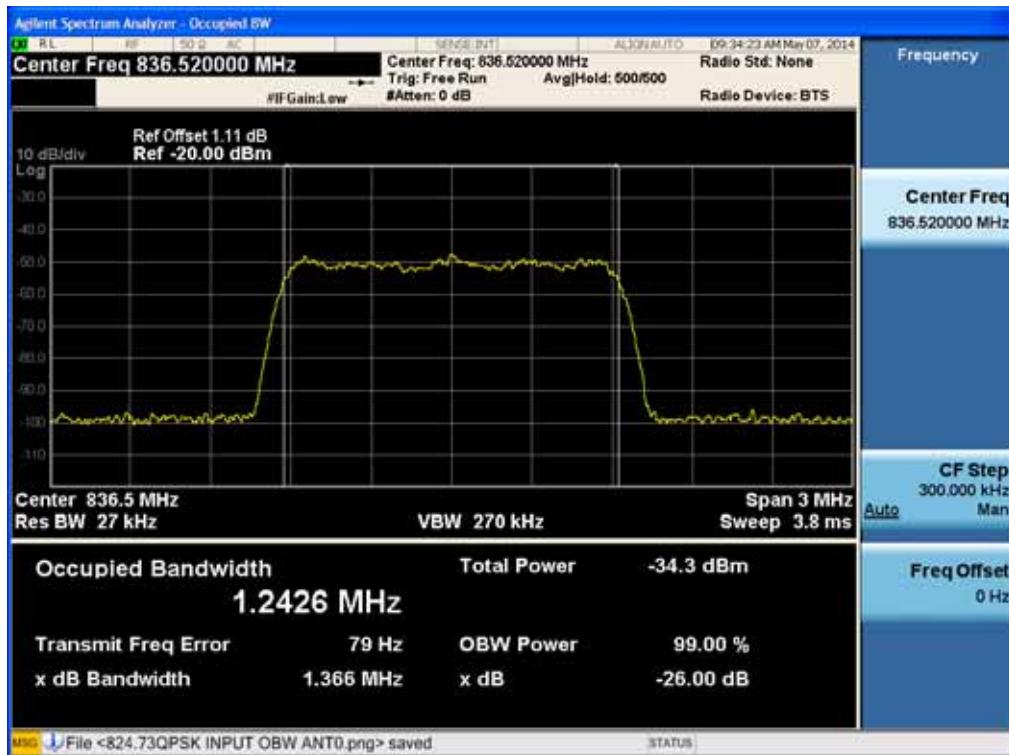
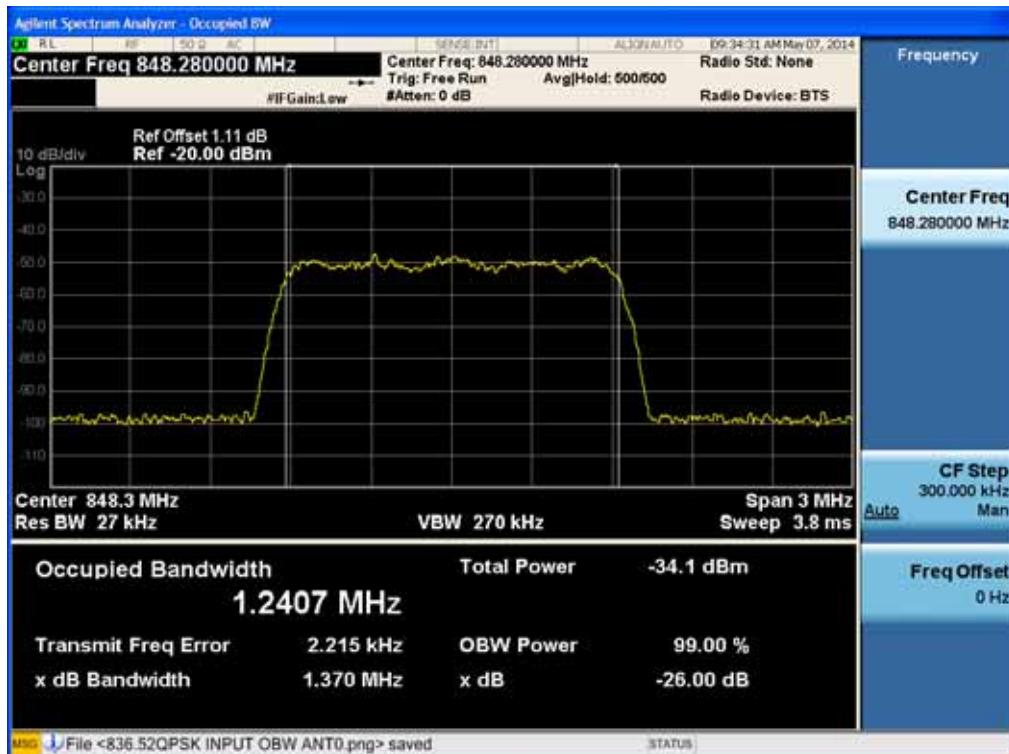
### [Output CDMA Uplink Low]



### [Output CDMA Uplink Middle]



**[Output CDMA Uplink High]**

**[Input CDMA Uplink Low]**


**[Input CDMA Uplink Middle]**

**[Input CDMA Uplink High]**


## 8. SPURIOUS AND HARMONIC EMISSION AT ANTENNA TERMINAL

### Test Requirement(s): § 2.1051 Measurements required: Spurious emissions at antenna terminals:

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

### § 22.917 Emission limitations for cellular equipment.

The rules in this section govern the spectral characteristics of emissions in the Cellular Radiotelephone Service.

(a) Out of band emissions. 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.

(b) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Alternative out of band emission limit. Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas, in lieu of that set forth in this section, pursuant to a private contractual arrangement of all affected licensees and applicants. In this event, each party to such contract shall maintain a copy of the contract in their station files and disclose it to prospective assignees or transferees and, upon request, to the FCC.

(d) Interference caused by out of band emissions. If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC

may require a greater attenuation of that emission than specified in this section.

**Test Procedures:** A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured.

The spectrum was investigated from 9 kHz to the 12.75 GHz of the carrier.

**Test Results:** The EUT complies with the requirements of this section. There were no detectable Spurious emissions for this EUT.

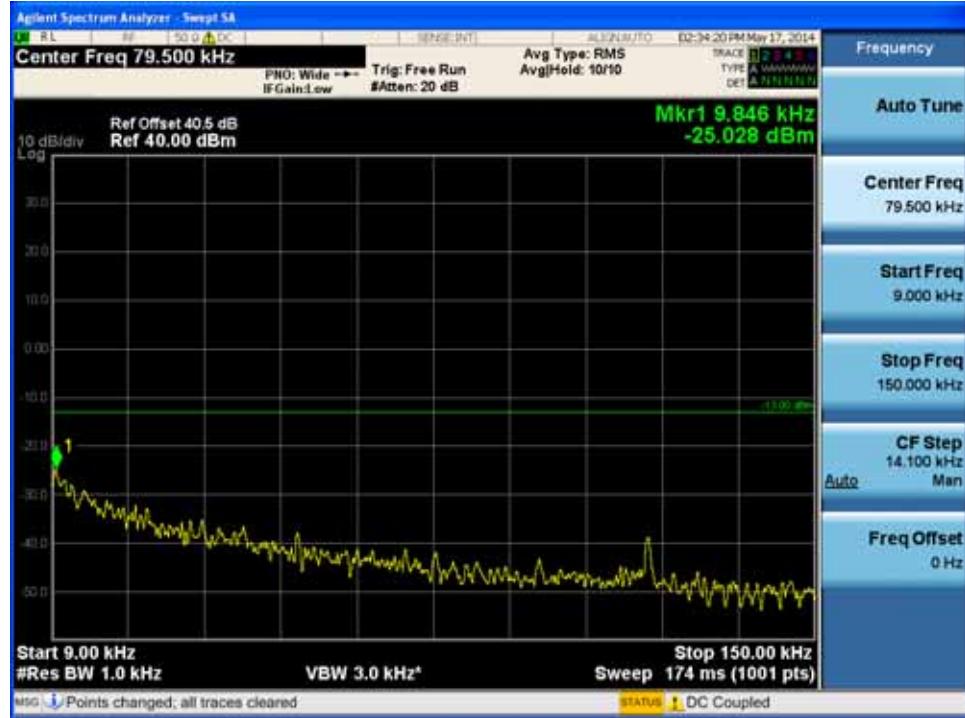
## Plots of Spurious Emission

### Conducted Spurious Emissions (9 kHz – 150 kHz)

[CDMA Downlink Low]



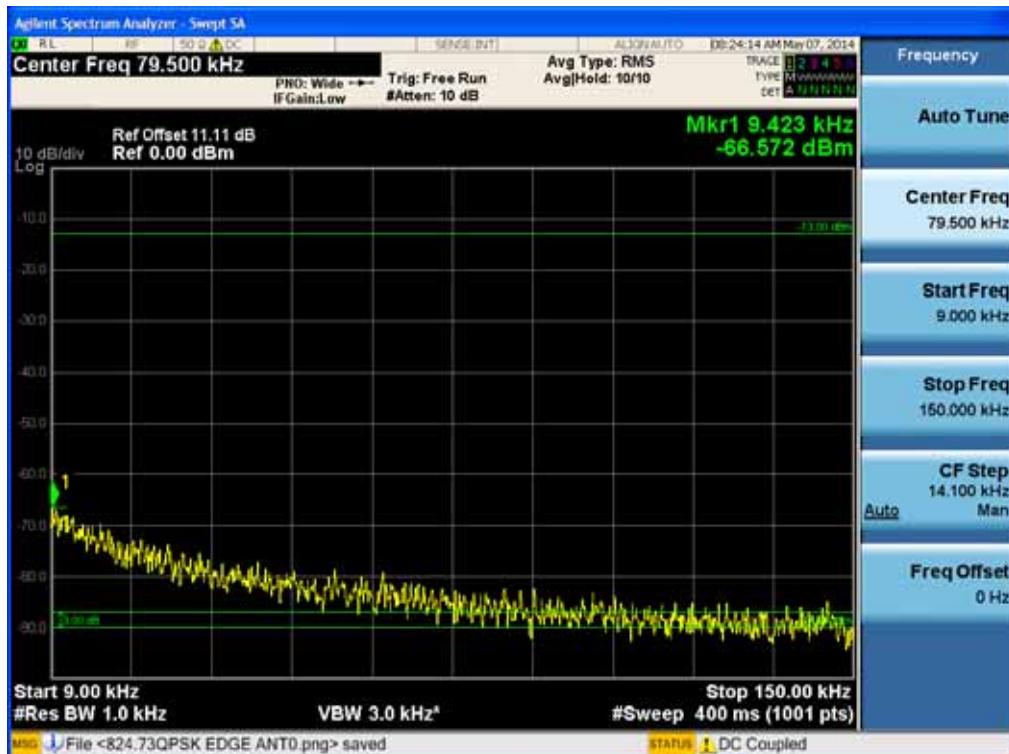
[CDMA Downlink Middle]



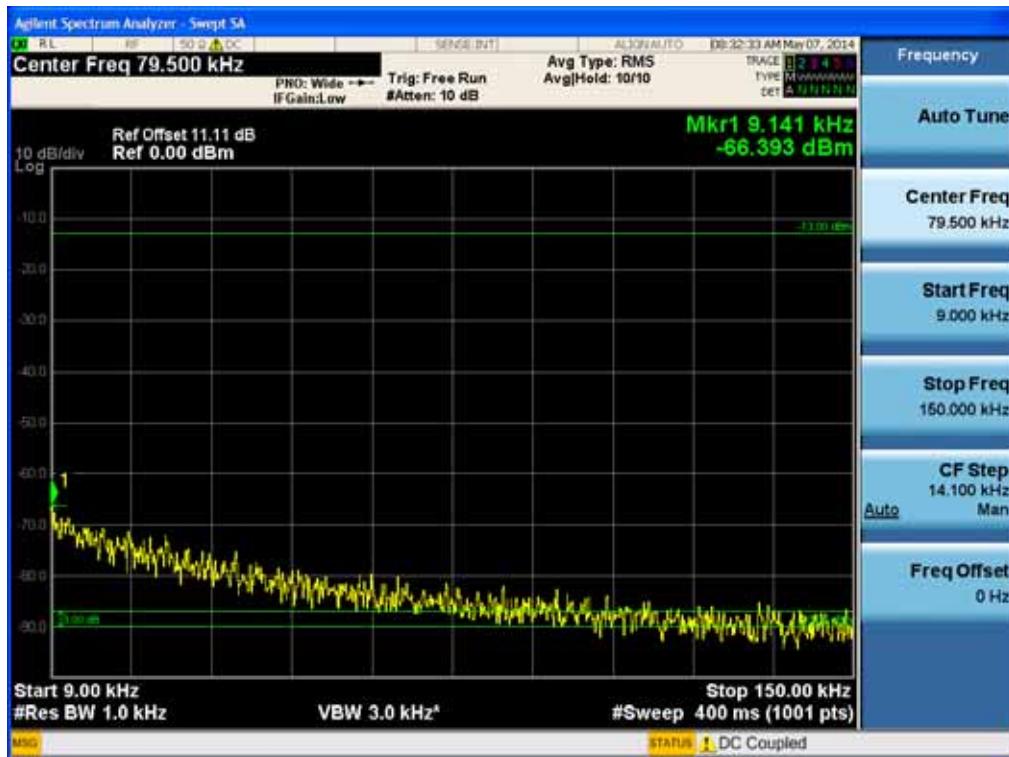
## [CDMA Downlink High]



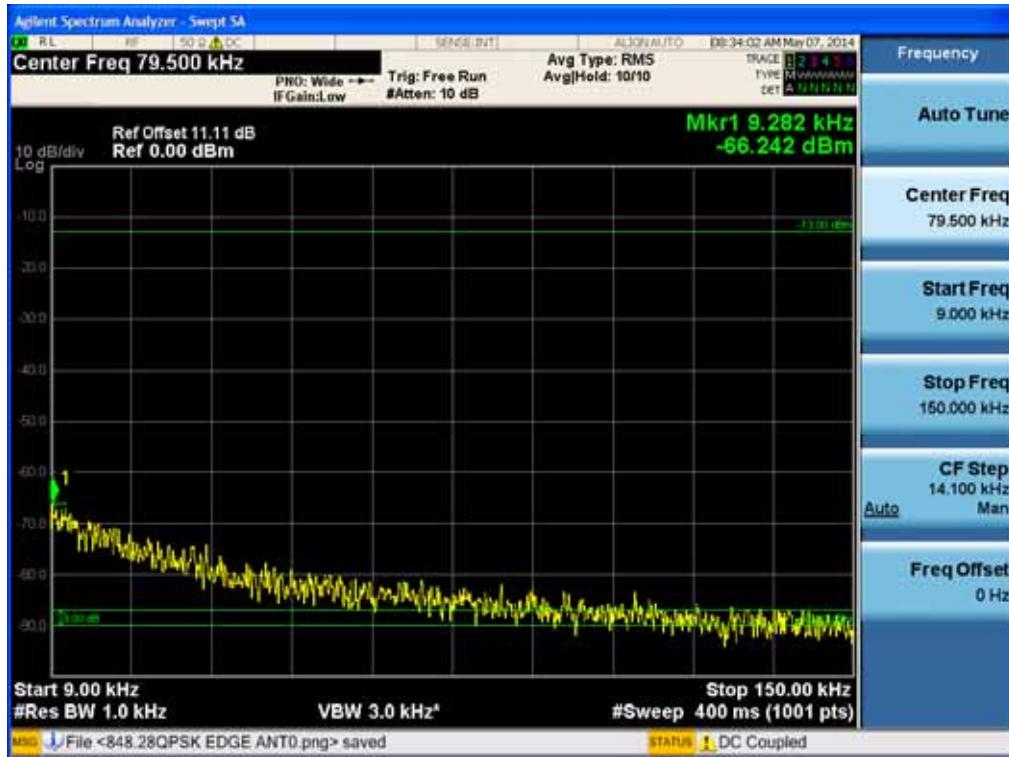
## [CDMA Uplink Low]



## [CDMA Uplink Middle]

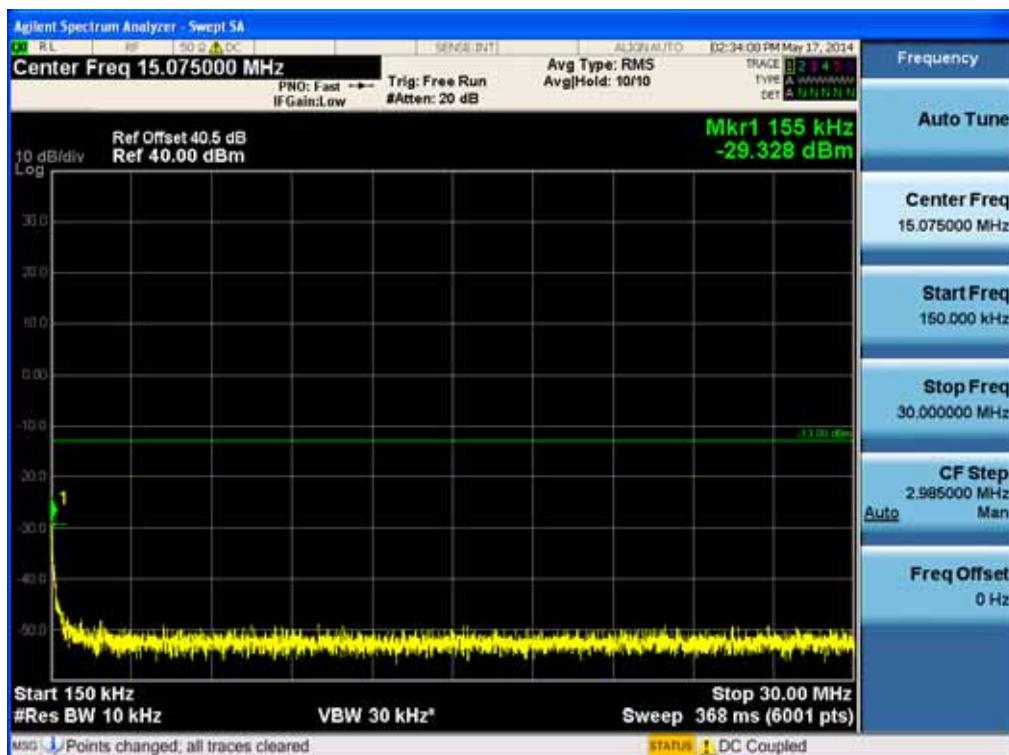


## [CDMA Uplink High]

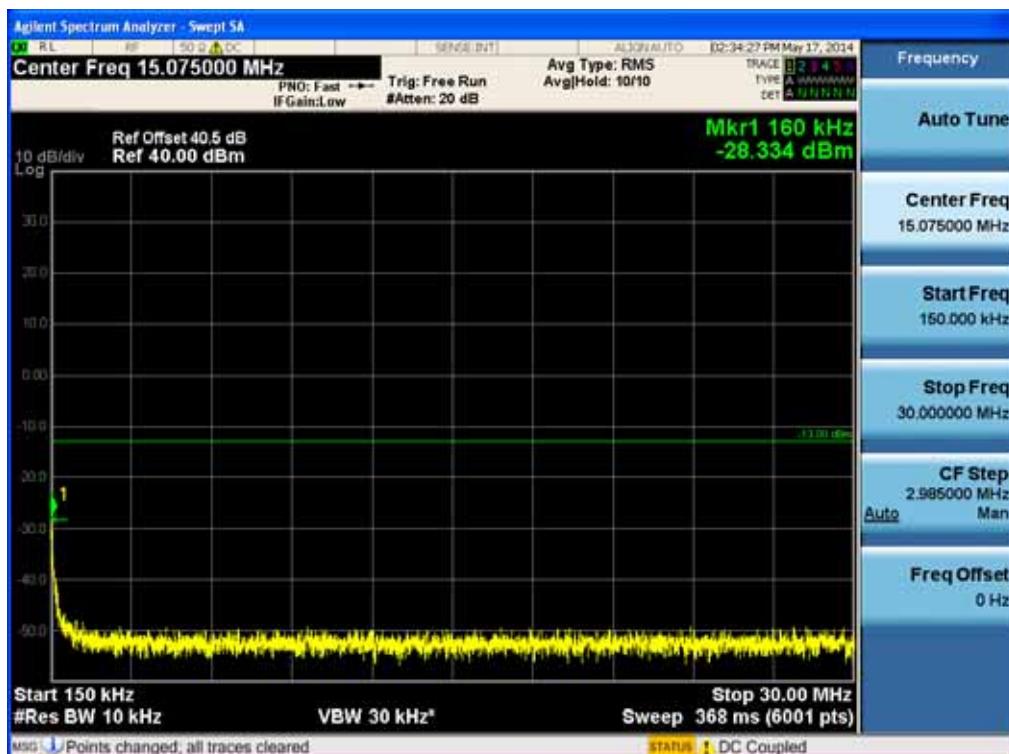


## Conducted Spurious Emissions (150 kHz – 30 MHz)

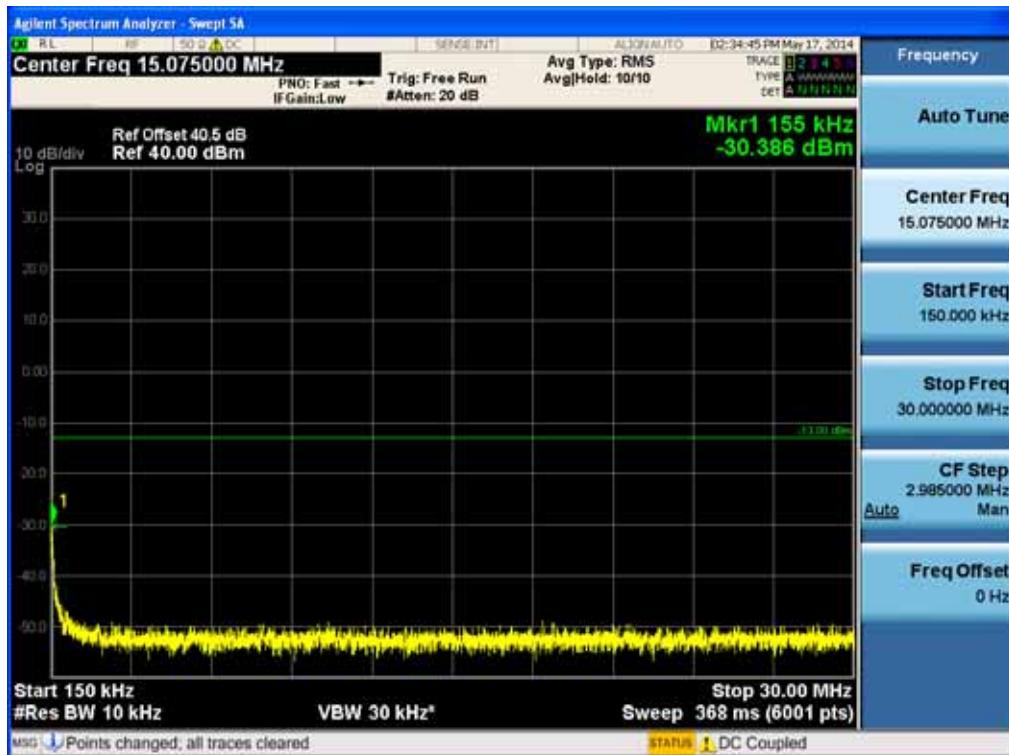
## [CDMA Downlink Low]



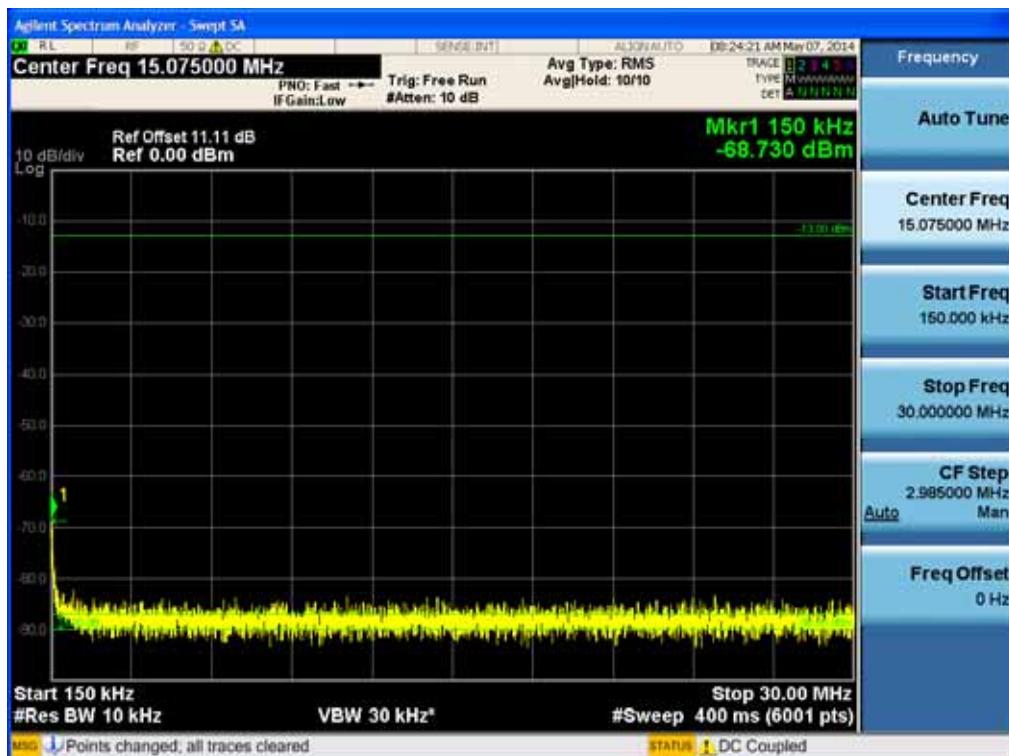
## [CDMA Downlink Middle]



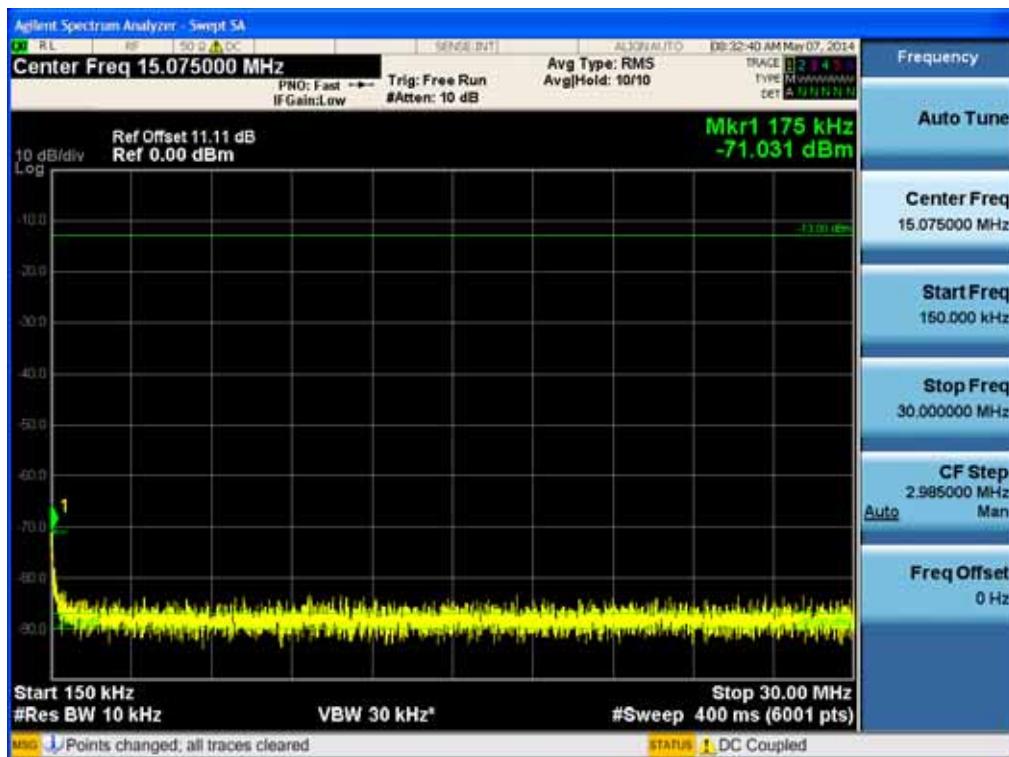
## [CDMA Downlink High]



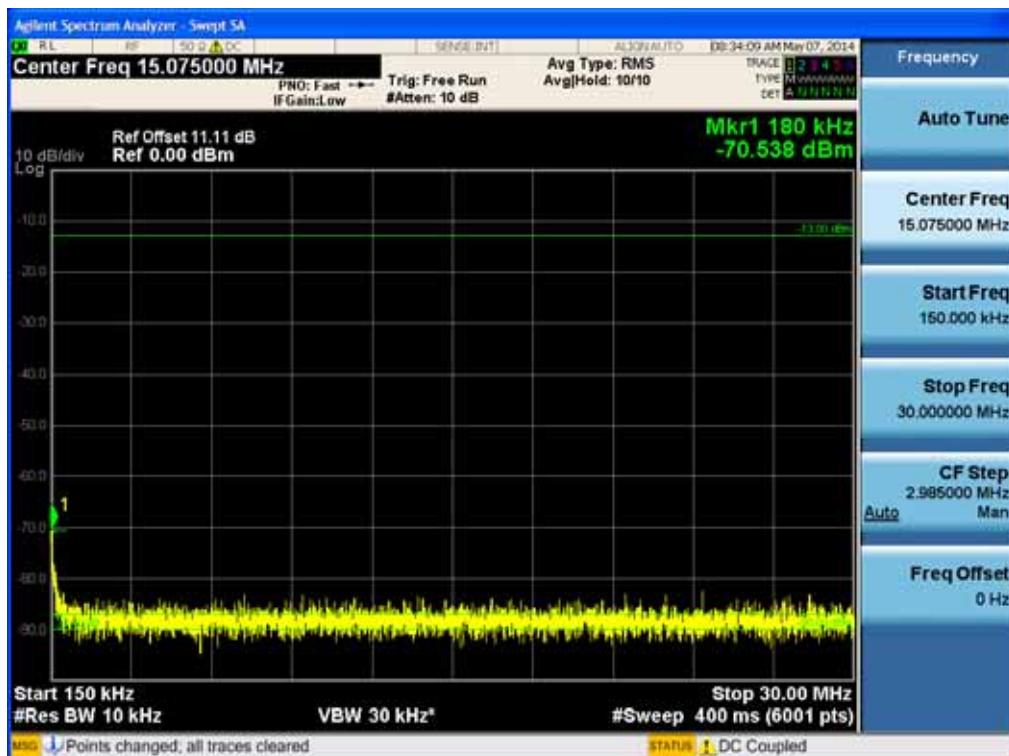
## [CDMA Uplink Low]



## [CDMA Uplink Middle]

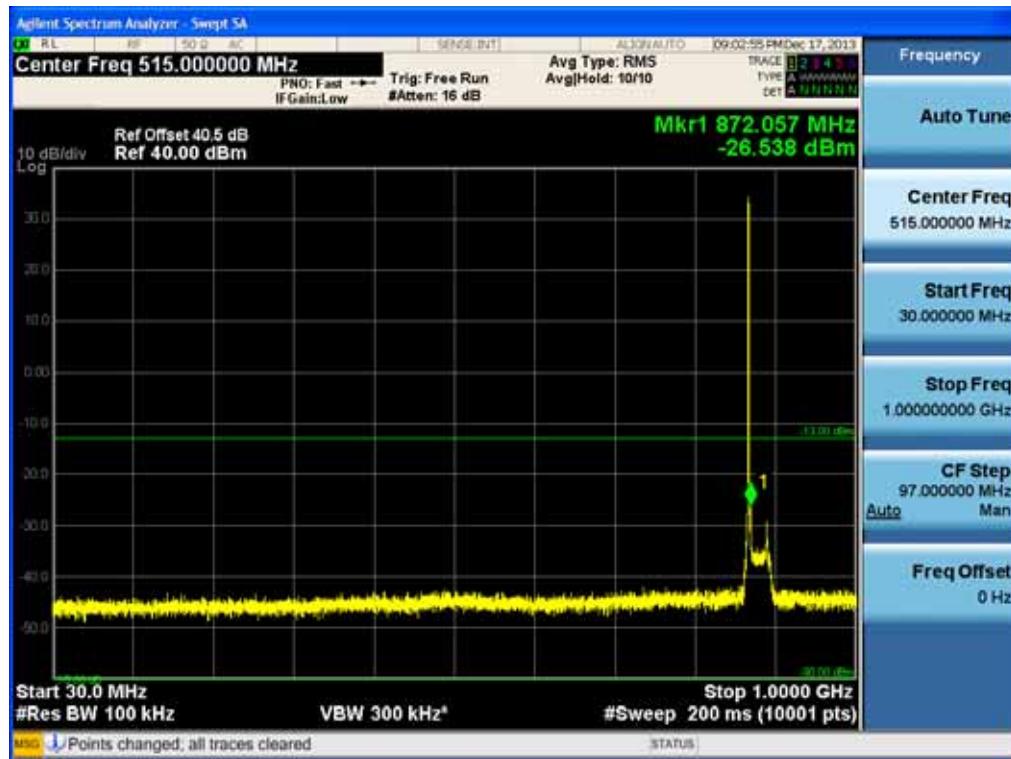


## [CDMA Uplink High]

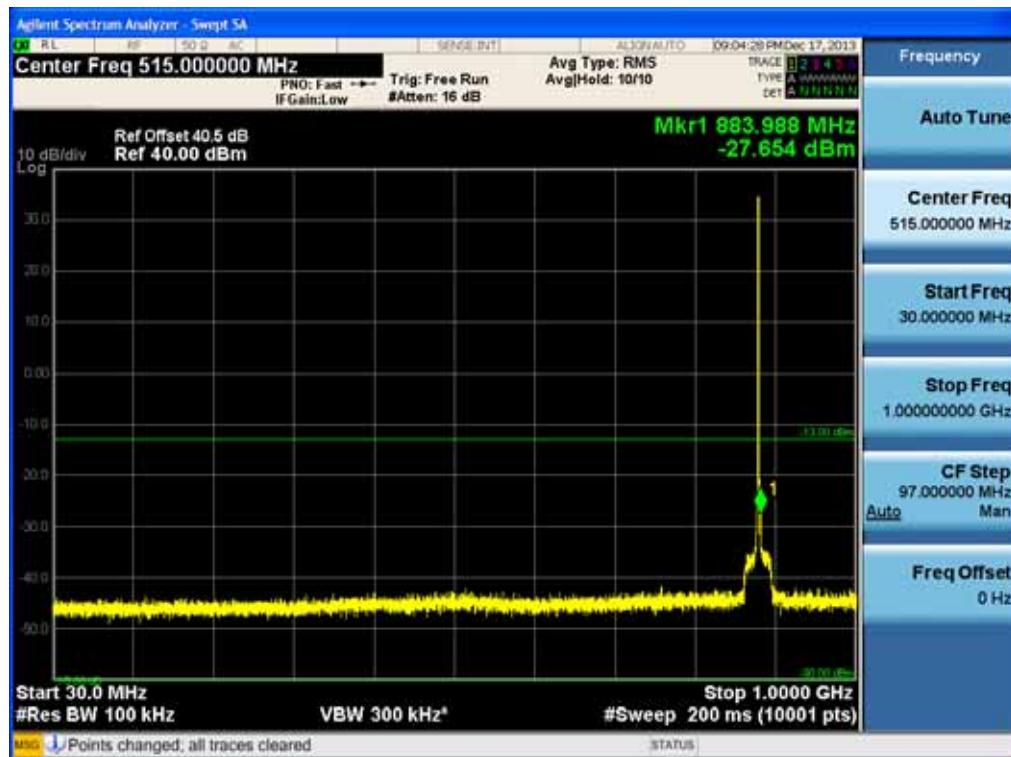


## Conducted Spurious Emissions (30 MHz – 1 GHz)

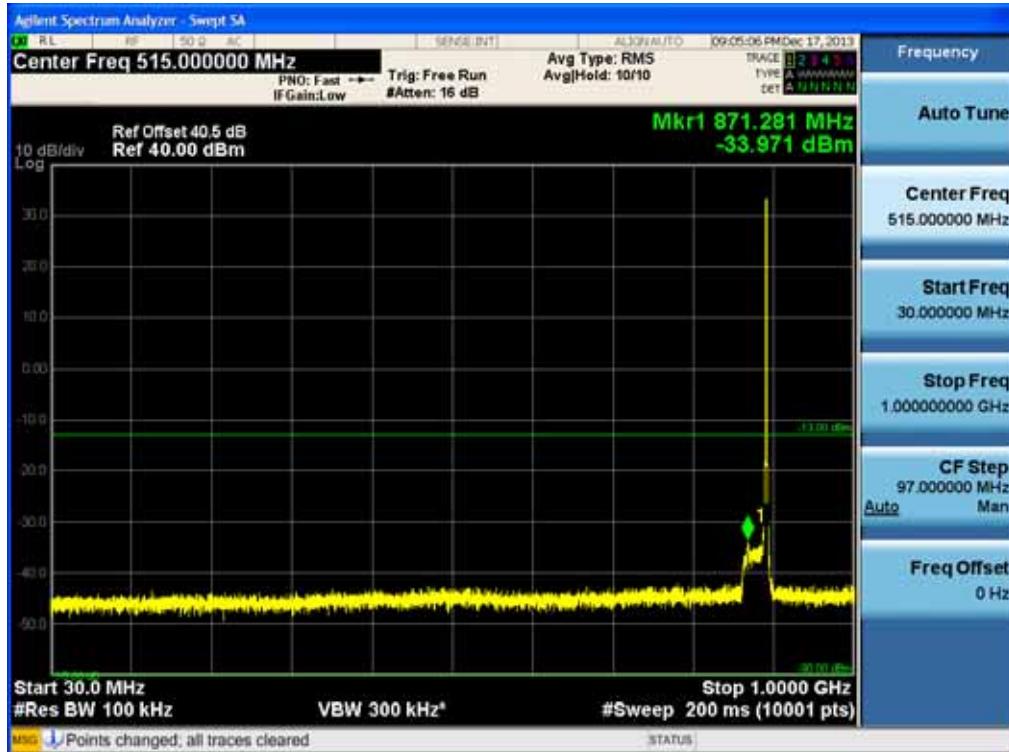
## [CDMA Downlink Low]



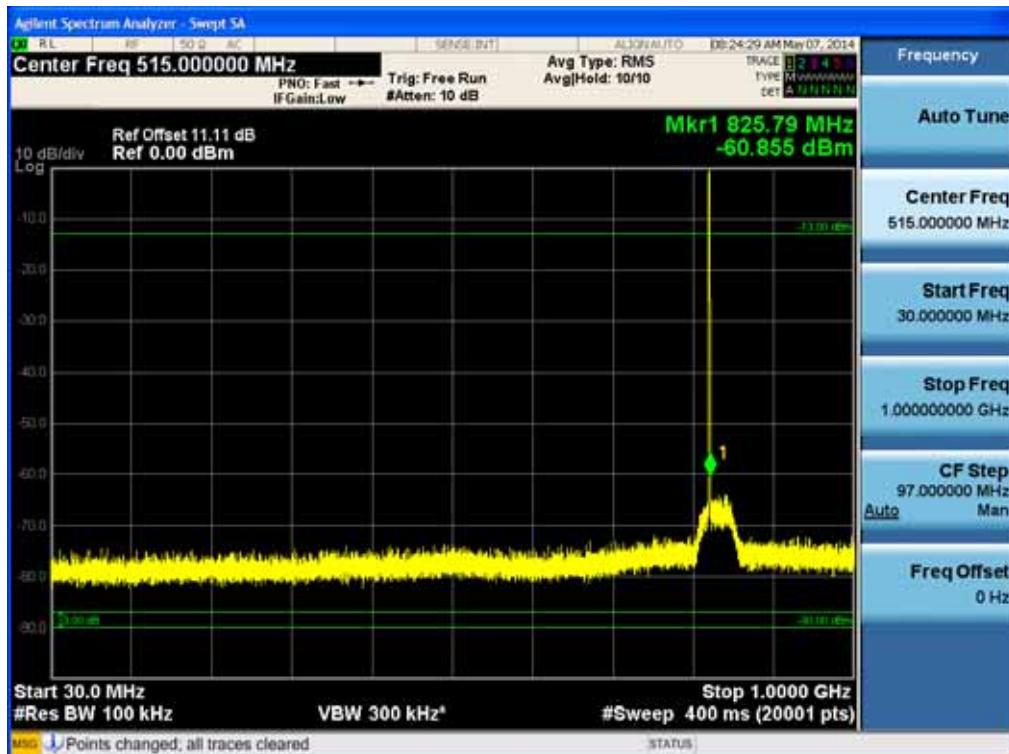
## [CDMA Downlink Middle]



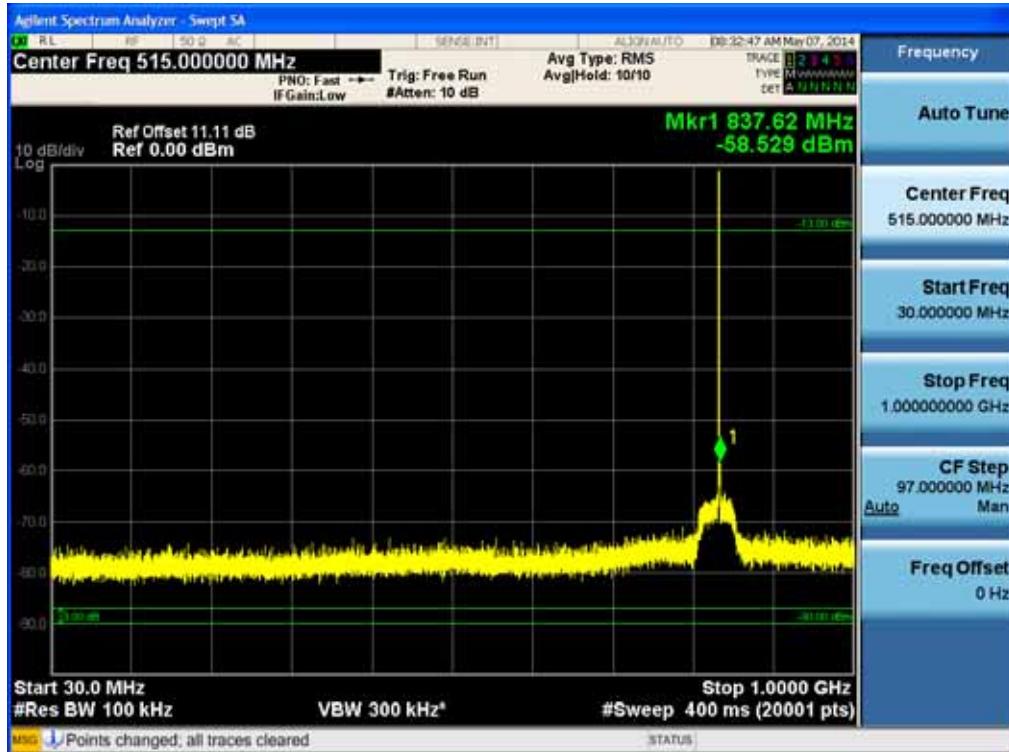
## [CDMA Downlink High]



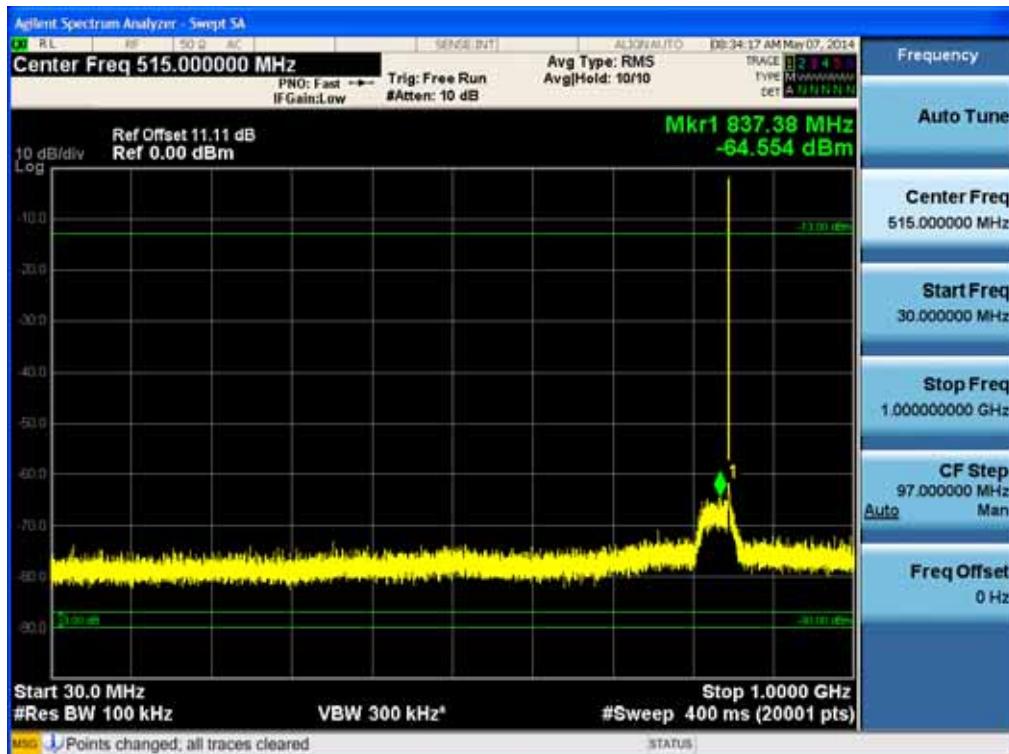
## [CDMA Uplink Low]



## [CDMA Uplink Middle]



## [CDMA Uplink High]



## Conducted Spurious Emissions (1 GHz – 12.75 GHz)

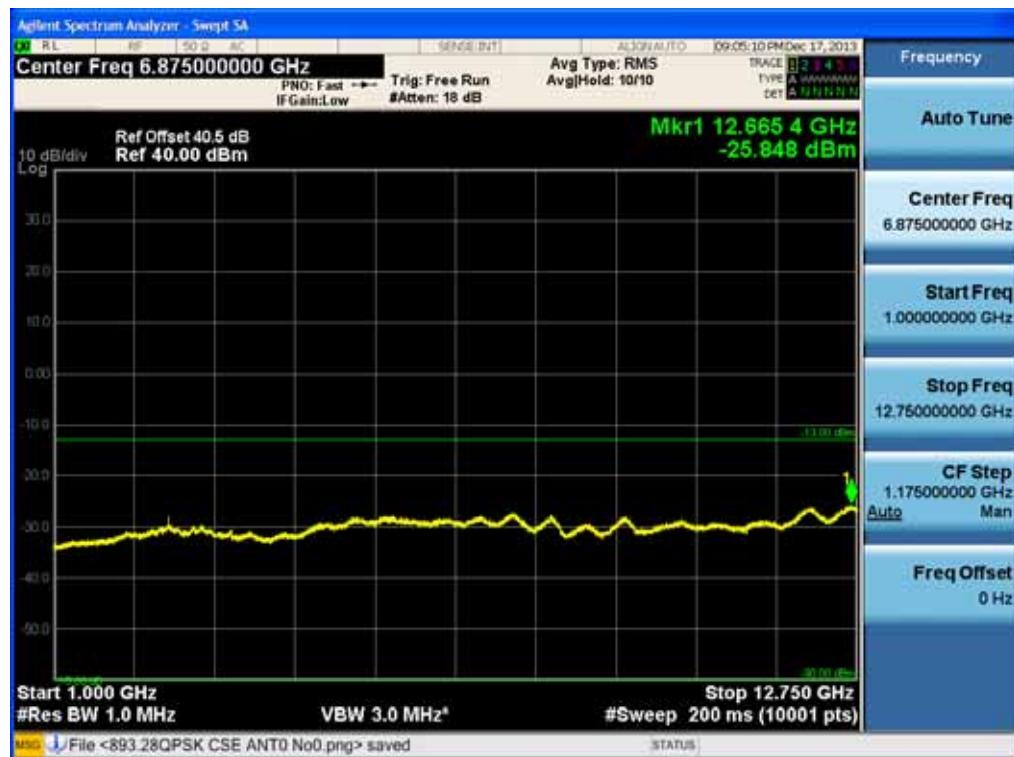
## [CDMA Downlink Low]



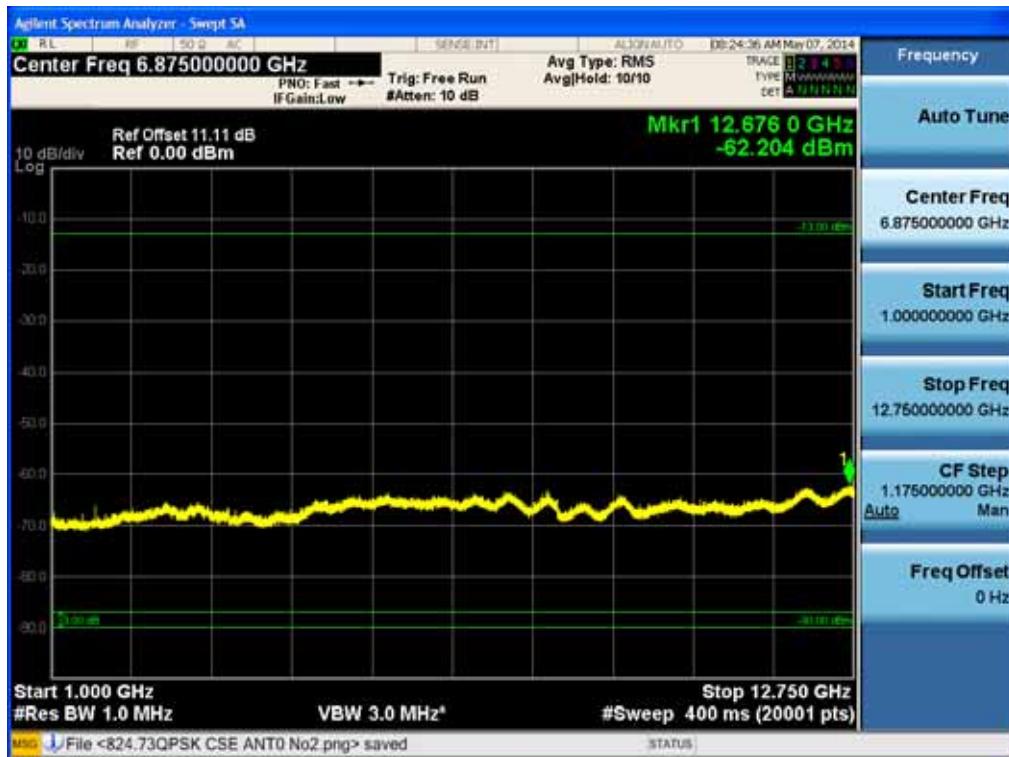
## [CDMA Downlink Middle]



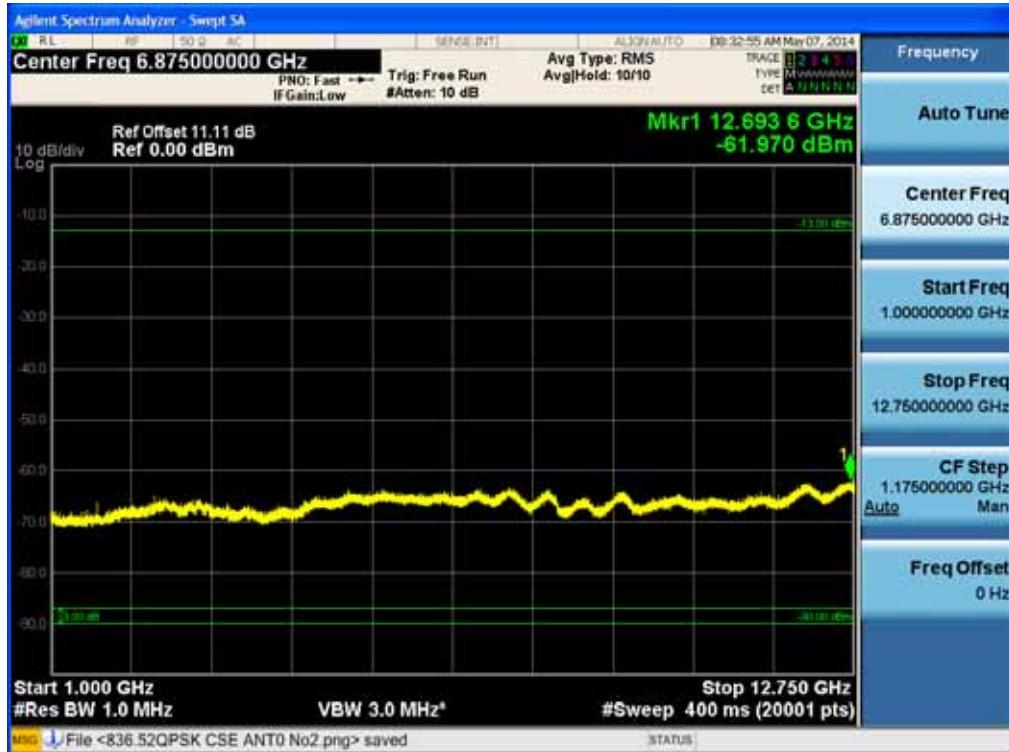
## [CDMA Downlink High]



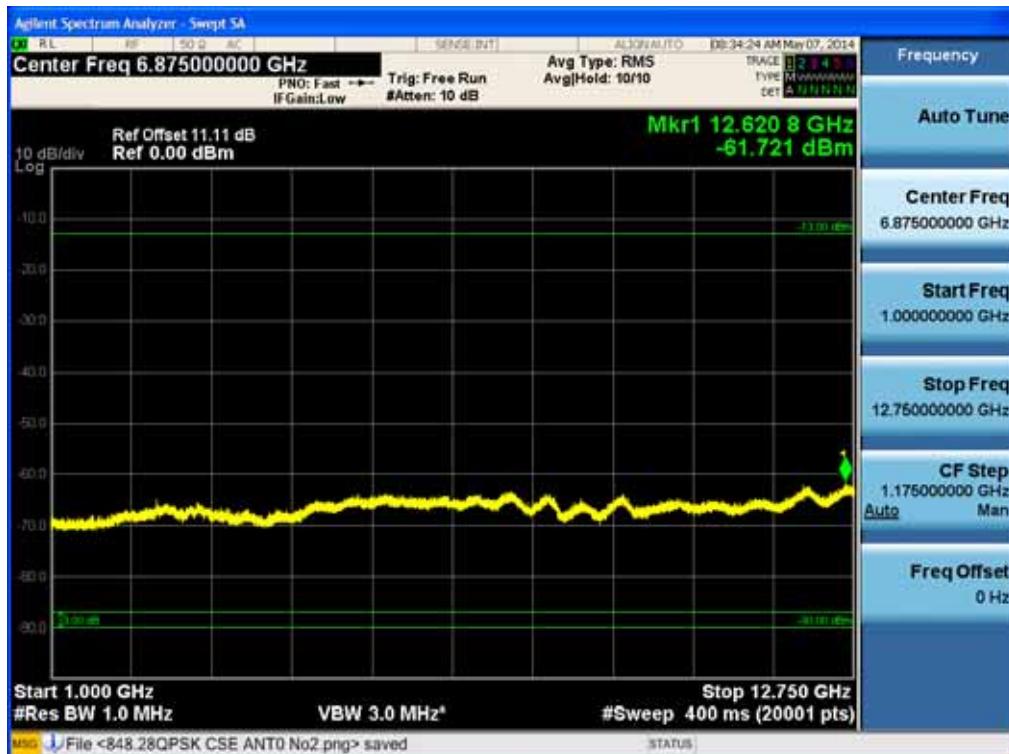
## [CDMA Uplink Low]



## [CDMA Uplink Middle]

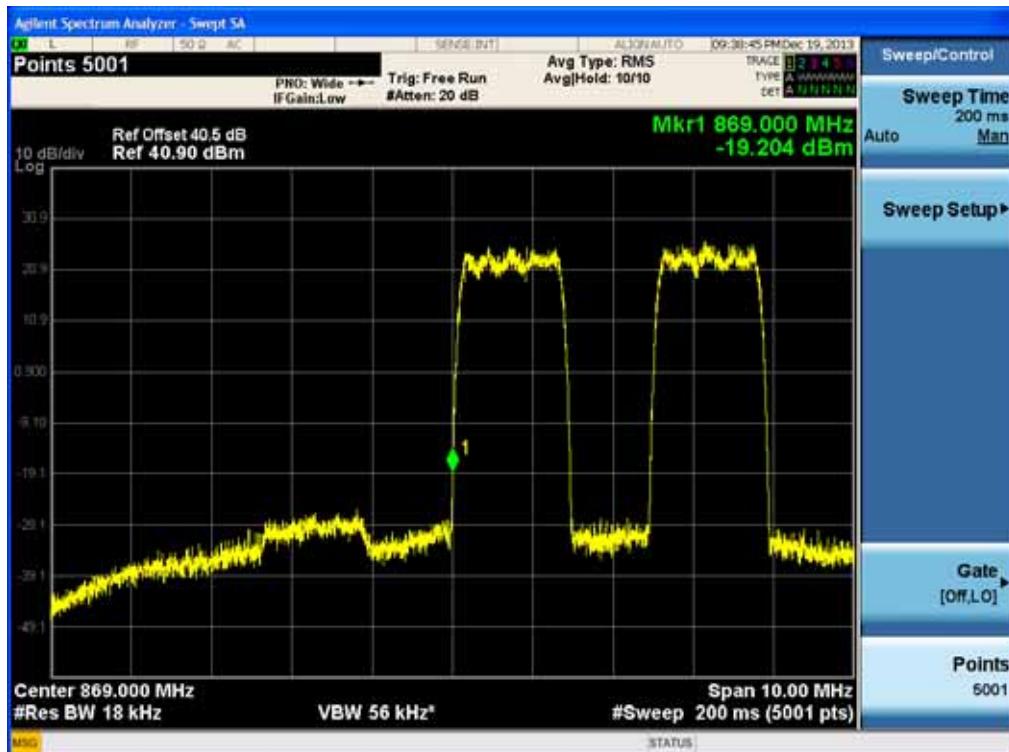


## [CDMA Uplink High]

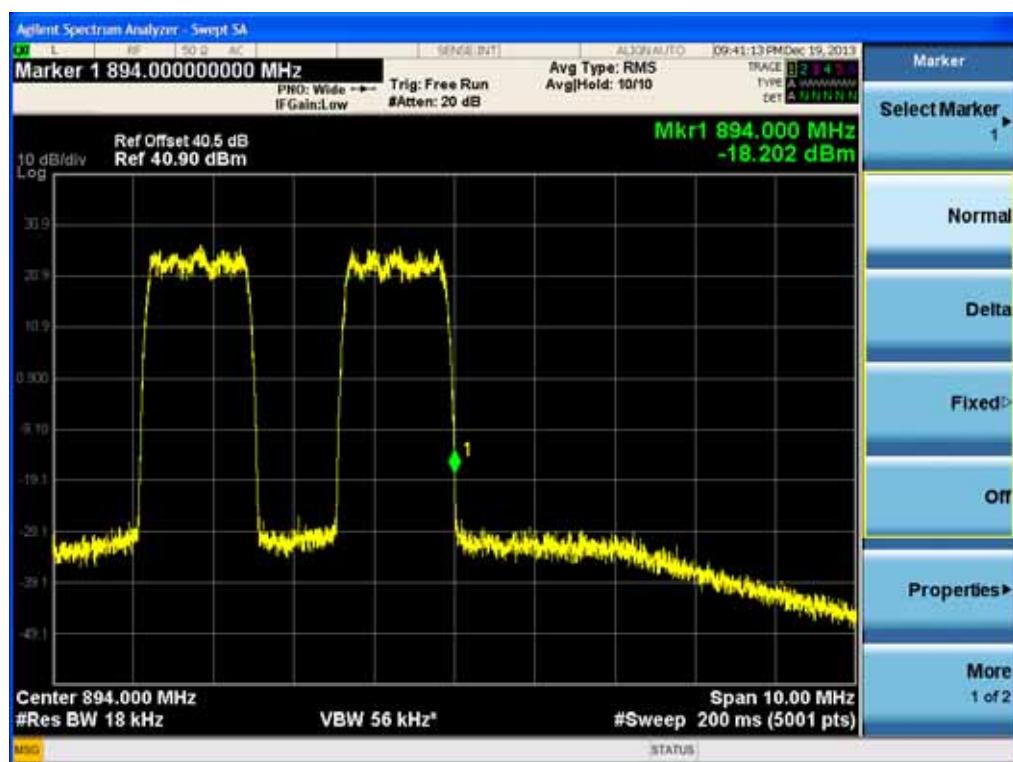


### Intermodulation Spurious Emissions

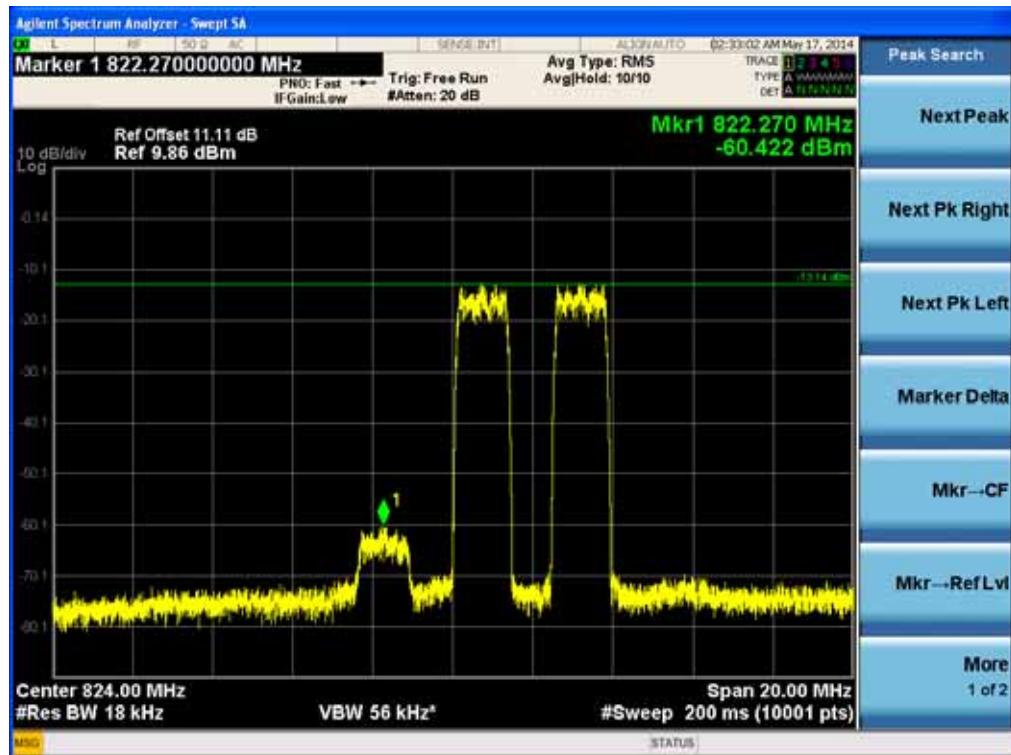
#### [CDMA Downlink Low]



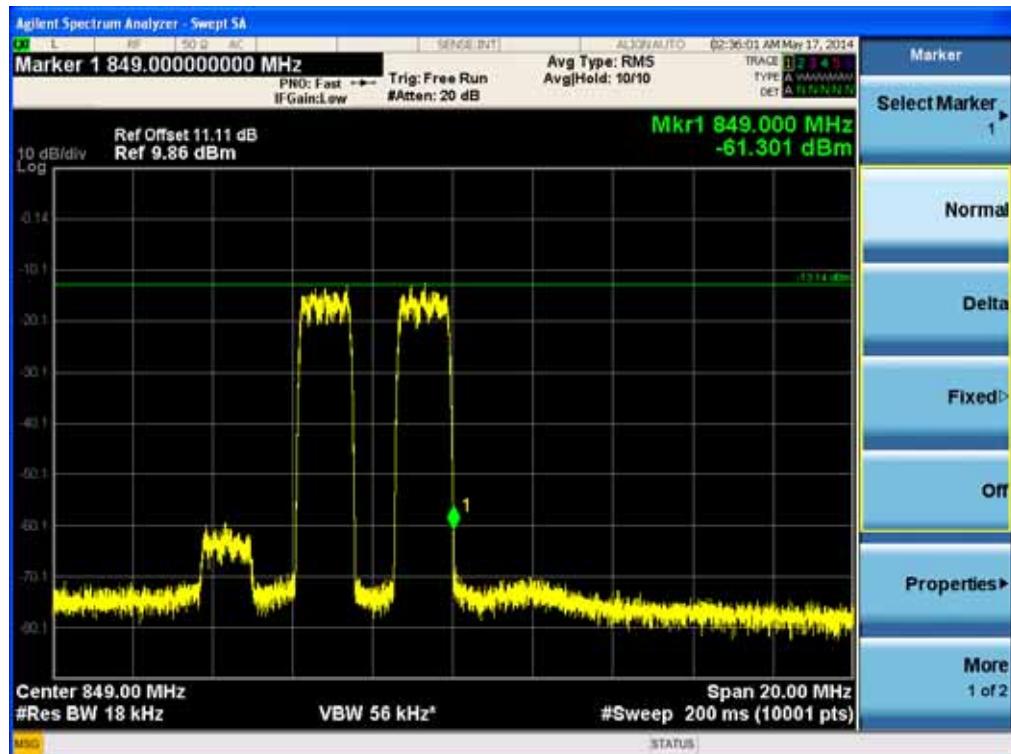
#### [CDMA Downlink High]



## [CDMA Uplink Low]

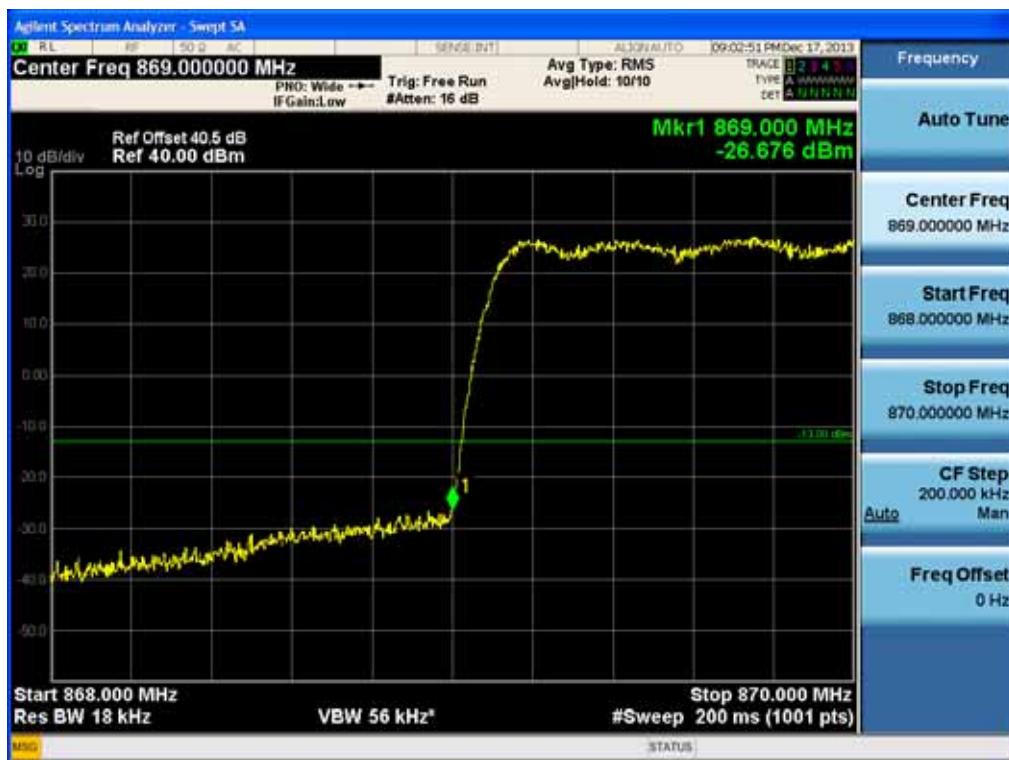


## [CDMA Uplink High]

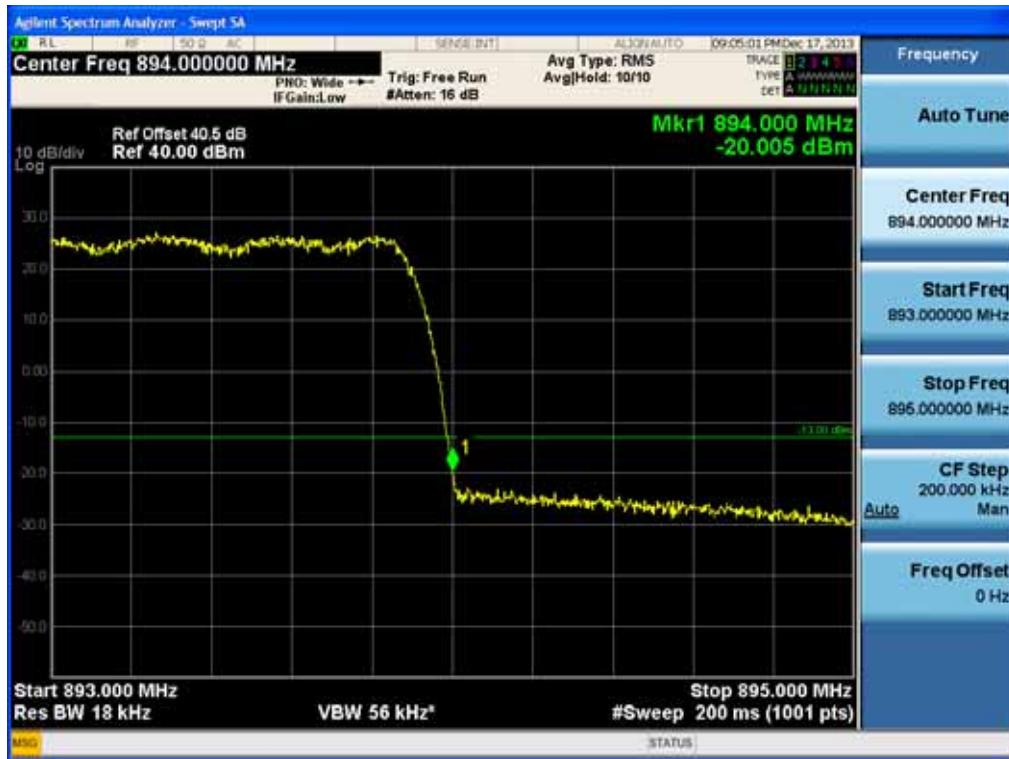


### Band Edge

#### [CDMA Downlink Low]



#### [CDMA Downlink High]



## [CDMA Uplink Low]



## [CDMA Uplink High]



## 9. OUT OF BAND REJECTION

### Test Requirement(s): **KDB 935210 D02 v01r01**

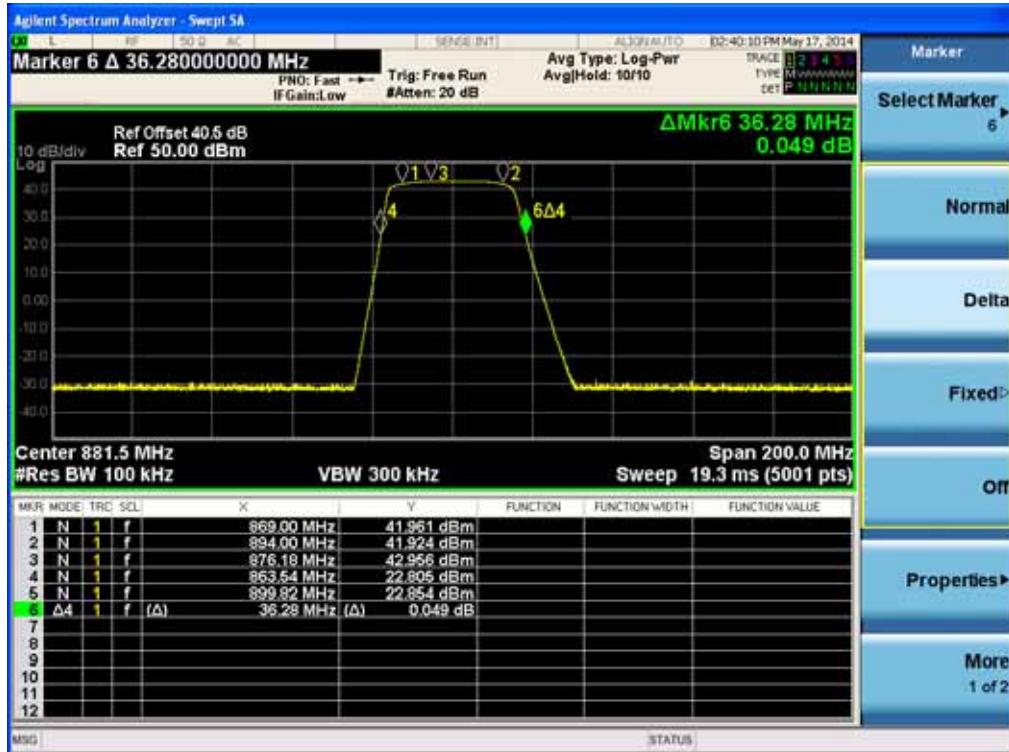
Out of Band Rejection – Test for rejection of out of band signals. Filter freq. response plots are acceptable.

**Test Procedures:** A modulated carrier generated by the signal generator carrier was connected to either the Uplink or Downlink RF port at a maximum level as determined by the spectrum analyzer was connected to either the Uplink or Downlink port depending on the circuitry being measured. Signal generator sweep from the frequency more lower than the operating frequency to the frequency more higher than it, find the product band filter characteristic

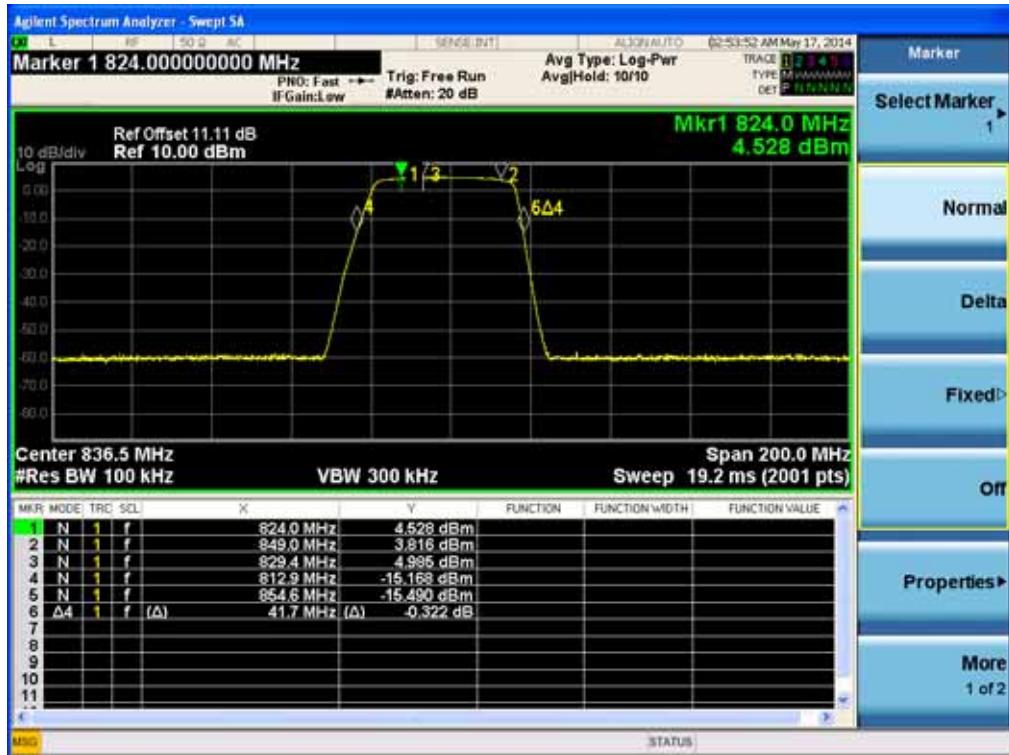
**Test Results:** The EUT complies with the requirements of this section.

## Out of Band Rejection

## [CDMA Downlink]



## [CDMA Uplink]



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## 10. FIELD STRENGTH OF SPURIOUS RADIATION

**Test Requirement(s): § 2.1053 Measurements required: Field strength of spurious radiation.**

**§ 2.1053 (a)** Measurements shall be made to detect spurious emissions that may be Radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

**§ 2.1053 (b):** The measurements specified in paragraph (a) of this section shall be made for the following equipment:

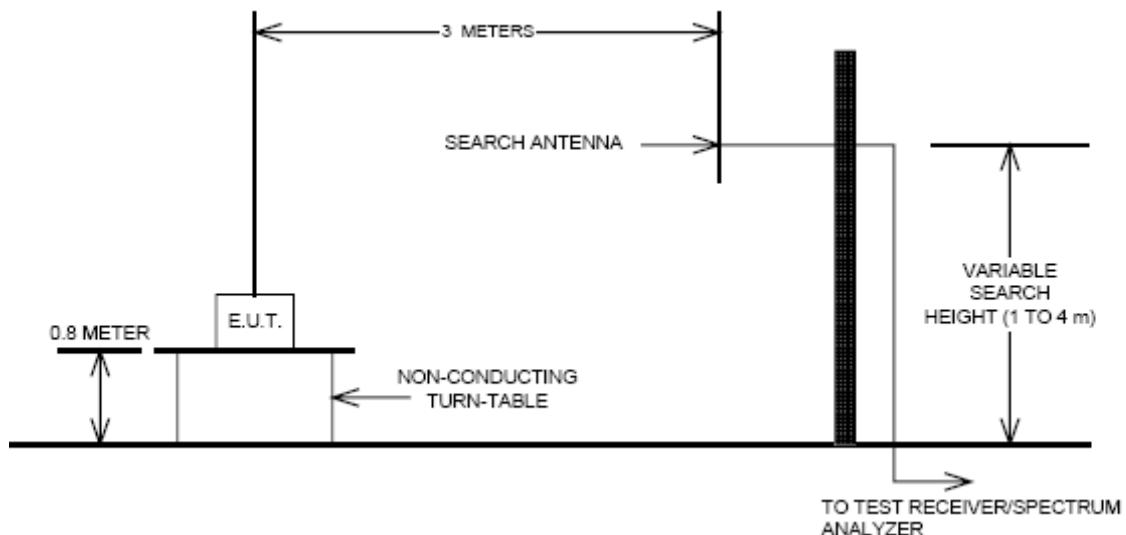
- (1)** Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.
- (2)** All equipment operating on frequencies higher than 25 MHz.
- (3)** All equipment where the antenna is an integral part of, and attached directly to The transmitter.
- (4)** Other types of equipment as required, when deemed necessary by the Commission.

**Test Procedures:** As required by 47 CFR 2.1053, *field strength of radiated spurious measurements* were made in accordance with the procedures of ANSI/TIA-603-C-2004 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards". Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports

were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360 and the receiving antenna scanned from 1-3m in order to capture the maximum emission. A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated. The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40 GHz, whichever was the lesser, were investigated.

## Radiated Spurious Emissions Test Setup



**Test Result:**

**[Downlink]**

Mode	Frequency	Freq.(MHz)	<u>Substitute</u> <u>Level</u> [dBm]	Ant. Gain (dBD)	C.L	Pol.	ERP (dBm)	Margin (dB)
CDMA	881.52	1763	-49.53	7.21	5.21	H	-45.53	32.53
		2645	-47.44	8.41	6.67	V	-47.70	34.70
		3092	-46.09	8.93	7.23	V	-46.04	33.40

**[Uplink]**

Mode	Frequency	Freq.(MHz)	<u>Substitute</u> <u>Level</u> [dBm]	Ant. Gain (dBi)	C.L	Pol.	EIRP (dBm)	Margin (dB)
CDMA	836.52	1673	-51.46	7.51	5.02	H	-48.97	35.97
		2510	-50.99	8.42	6.48	H	-49.05	36.05
		3346	-51.47	9.80	7.44	V	-49.10	36.10

## 11. FREQUENCY STABILITY OVER TEMPERATURE AND VOLTAGE VARIATIONS

**Test Requirement(s):** §2.1055(a)(1) , §22.355

**Test Procedures:**

As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Spectrum Analyzer.

The EUT was placed in the Environmental Chamber.

A CW signal was injected into the EUT at the appropriate RF level. The frequency counter option on the Spectrum Analyzer was used to measure frequency deviations. The frequency drift was investigated for every 10 °C increment until the unit is stabilized then recorded the reading in tabular format with the temperature range of -30 to 50 °C.

Voltage supplied to EUT is 110 Vac reference temperature was done at 20°C.

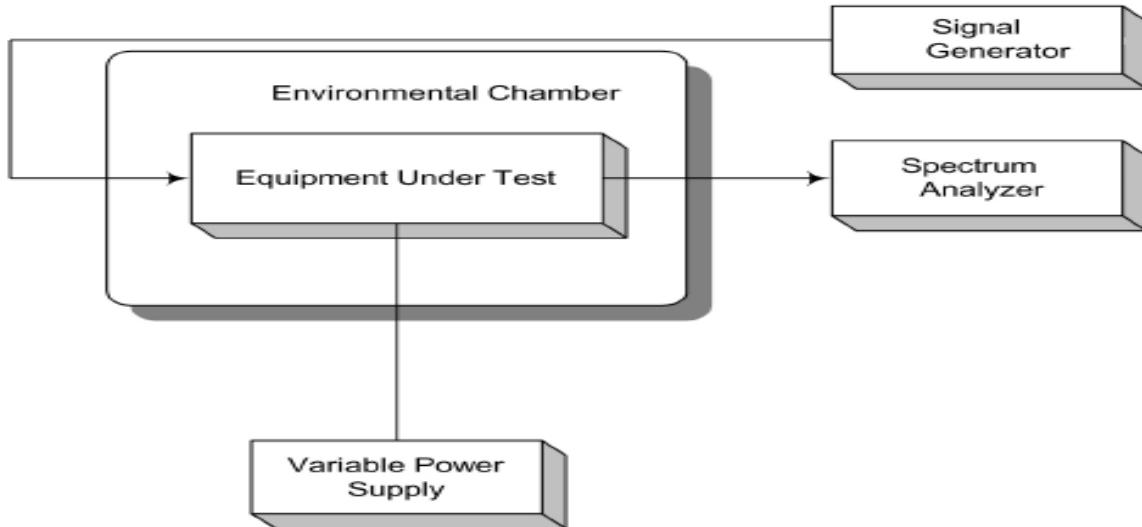
The voltage was varied by ± 15 % of nominal

**§ 22.355 Frequency tolerance.** Except as otherwise provided in this part, 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.

Table C-1—Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤3 watts (ppm)
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

**Test Setup:**



**Test Results:**

The E.U.T was found in compliance for Frequency Stability and Voltage Test

**Frequency Stability and Voltage Test Results**

[Downlink]

Reference: 110 Vac at 20°C    Freq. = 881.5 MHz

Voltage (%)	Temp. ( )	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	881 500 000	0.0	0.0	0.0000
	-30	881 500 000	0.0	0.0	0.0000
	-20	881 500 000	0.0	0.0	0.0000
	-10	881 500 000	0.0	0.0	0.0000
	0	881 500 000	0.0	0.0	0.0000
	+10	881 500 000	0.0	0.0	0.0000
	+30	881 500 000	0.1	0.1	0.0001
	+40	881 500 000	0.0	0.0	0.0000
	+50	881 500 000	0.0	0.0	0.0000
	115%	881 500 000	0.0	0.0	0.0000
85%	+20	881 500 000	0.0	0.0	0.0000

[Uplink]

**Reference:** 110 Vac at 20°C    **Freq.** = 836.52 MHz

Voltage (%)	Temp. ( )	Frequency (Hz)	Frequency Error (Hz)	Deviation (Hz)	ppm
100%	+20(Ref)	836 520 000	0.0	0.0	0.0
	-30	836 520 000	0.0	0.0	0.0
	-20	836 520 000	0.0	0.0	0.0
	-10	836 520 000	0.0	0.0	0.0
	0	836 520 000	0.0	0.0	0.0
	+10	836 520 000	0.0	0.0	0.0
	+30	836 520 000	0.0	0.0	0.0
	+40	836 520 000	0.0	0.0	0.0
	+50	836 520 000	0.0	0.0	0.0
115%	+20	836 520 000	0.0	0.0	0.0
85%	+20	836 520 000	0.0	0.0	0.0

## 12. RF EXPOSURE STATEMENT

### 1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

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(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
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	-	.....	1.0	30
100.000.....	.....	.....	.....	.....

F = frequency in MHz

\* = Plane-wave equivalent power density

### 2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

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

**2-1 Limit (Down Link)**

Max Peak output Power at antenna input terminal	43.100	dBm
Max Peak output Power at antenna input terminal	20417.379	mW
Prediction distance	100.000	cm
Prediction frequency	881.520	MHz
Antenna Gain(typical)	2.000	dBi
Antenna Gain(numeric)	1.585	-
Power density at prediction frequency( S)	0.25751	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	0.588	mW/cm <sup>2</sup>

**2-2 Limit (Up Link)**

Max Peak output Power at antenna input terminal	4.960	dBm
Max Peak output Power at antenna input terminal	3.133	mW
Prediction distance	100.000	cm
Prediction frequency	836.520	MHz
Antenna Gain(typical)	2.000	dBi
Antenna Gain(numeric)	1.585	-
Power density at prediction frequency( S)	0.00004	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	0.558	mW/cm <sup>2</sup>

**3. RESULTS**

The power density level at 100 cm is 0.25751 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 0.588 mW/cm<sup>2</sup> at Down Link

The power density level at 100 cm is 0.00004 mW/cm<sup>2</sup>, which is below the uncontrolled exposure limit of 0.558 mW/cm<sup>2</sup> at Up Link

Simultaneous MPE at 100 cm is  $(0.25751/10) + (0.00004/10) = 0.025755 < 1.0$

Warning: In order to avoid the possibility of exceeding the FCC radio frequency exposure limits, it must also have a minimum distance of 100 cm from the body during normal operation.