Lab Code: 200167-0

FCC PART 22H, 24E & 27

TEST AND MEASUREMENT REPORT

For

ADC Telecommunications Inc.

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

FCC ID: F8I-SP851970H

Report Type:	**Product Type:**
Original Report	FlexWave™ URH Host

Test Engineer:	Dennis Huang
Report Number:	R1001143
Report Date:	2010-01-19
Reviewed By:	Boni Baniqued EMC/RF Supervisor
Prepared By: **(84)**	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Ave Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

TABLE OF CONTENTS

DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1001143	Original Report	2010-01-19

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *ADC Telecommunications, Inc.* FCC ID: *F8I-SP851970H*, Model: *FWU-28400000HU FlexWave URH/Prism Host* or the "EUT" as referred to in this report is the Flexwave Universal Radio Head (URH) host, in its most basic configuration, serves as a transport between a FCC approved base station. The "host" is co-located with the base station, performs wide band digitization, fiber optic transport, and reconstruction of the RF signal. The host unit contains RF interfaces for all connected base stations, SFP fiber connectivity for all connected remotes.

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 22, Subpart H, 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)

No Related Submittals

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 22 Subpart H - Public Mobile Services
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
MRAU	Master RAU	-	RAU 13
Unipower Corporation	AC/DC Power Supply	RPXP48122-Z	26097N0062
SRAU	Slave RAU	-	DL B2
IFEU	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
Agilent	Signal Generator	8648C	4108A05591

2.6 Internal Configurations of EUT

Manufacturer	Description	Model	Serial Number
ADC Telecommunication	URH Host PCS RF Dart PCB Board	MD0302L	225509852
ADC Telecommunication	URH Host Cell RF Dart PCB Board	1425438-33	225509760
ADC Telecommunication	URH Host 700UC1 RF Dart PCB Board	1661026G REV10	BTW182100002
ADC Telecommunication	URH Host 700ABC1 RF Dart PCB Board	1472952G REV20	BTW184120002
ADC Telecommunication	URH Host 700UC2 RF Dart PCB Board	1472953G REV30	BTW184090003
ADC Telecommunication	URH Host 700ABC2 RF Dart PCB Board	1472952G REV20	BTW184120001
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 Cell IF Dart PCB Board	1466349G REV20	BTW181700003
ADC Telecommunication	DRU 700UC1 IF Dart PCB Board	1474385G REV20	BTW183660001
ADC Telecommunication	DRU 700ABC1 IF Dart PCB Board	1474387G REV10	BTW183670001
ADC Telecommunication	DRU 700UC2 IF Dart PCB Board	1474388G REV10	BTW182680001
ADC Telecommunication	DRU 700ABC2 IF Dart PCB Board	TR2200HV	0020A7234613/4
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	3	IF Expansion Unit (IFEU)	SRAU
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, §22.913, §24.232, §27.50 (i)	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A
§2.1049, §22.917, §24.238, §27.53 (c)	Occupied Bandwidth / Out of Band Emissions	Compliant
§2.1053, §22.917, §24.238, §27.53 (c)	Spurious Radiated Emissions	Compliant
§2.1051, §22.917, §24.238, §27.53 (c)	Spurious Emissions at Antenna Terminals	Compliant
§22.917, §24.238, §27.53 (c)	Band Edge	Compliant
§2.1055	Frequency Stability	Compliant
§2.1091	RF Exposure	Compliant

4 FCC §2.1046, §22.913, §24.232 & §27.50 – RF OUTPUT POWER

4.1 Applicable Standard

According to §22.913, §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 Environmental Conditions

Temperature:	22-24°C
Relative Humidity:	41-43 %
ATM Pressure:	101-102kPa

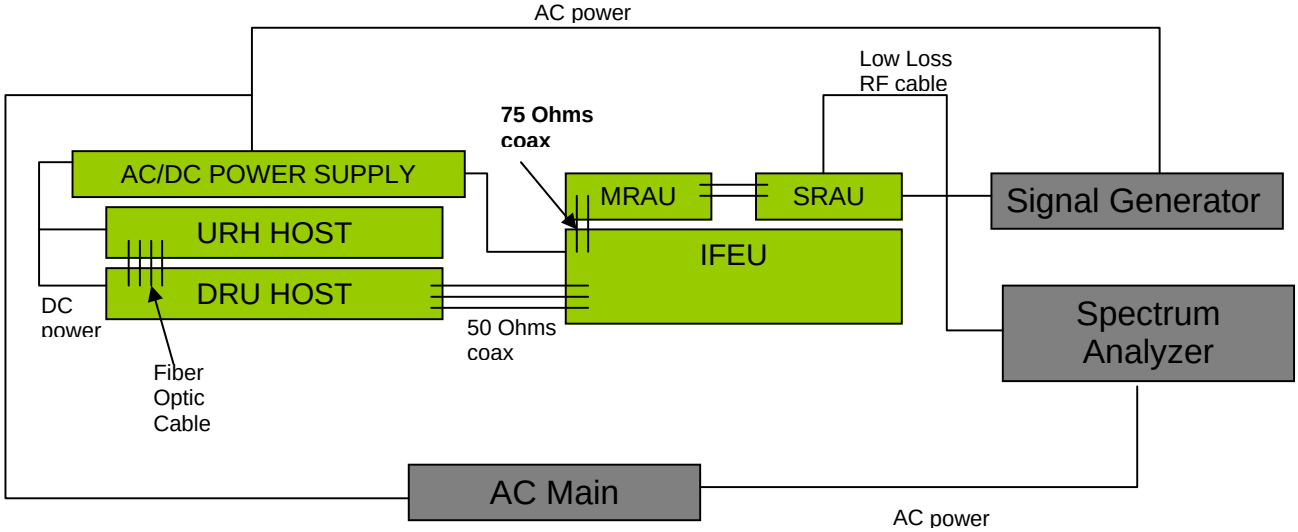
** The testing was performed by Dennis Huang from 2009-12-11 to 2009-12-15 in RF Site.*

4.4 Test Equipment List and Details

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

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

4.5 Test Setup Block Diagram (Bench Testing)



4.6 Summary of Test Results

Maximum Output Power – Modulated Signal

Cellular 850 MHz & PCS 1900 MHz Band

Radio Mode	Band	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)
CDMA	Cellular 850 MHz	Low	824.80	-10.21	0.0953
		Middle	836.52	-9.98	0.1005
		High	848.20	-10.02	0.0995
	PCS 1900 MHz	Low	1850.8	-10.33	0.0927
		Middle	1880.0	-10.05	0.0989
		High	1909.2	-10.49	0.0893
WCDMA	Cellular 850 MHz	Low	826.4	-10.26	0.0942
		Middle	836.4	-10.13	0.0971
		High	846.6	-10.65	0.0861
	PCS 1900 MHz	Low	1852.4	-10.01	0.0998
		Middle	1880.0	-10.26	0.0942
		High	1907.6	-10.39	0.0914

700 MHz LTE Band

Band	Antenna Port	Modulation	Frequency (MHz)	Output Power (dBm)	Output Power (mW)	CCDF (dB)
776-787 MHz	# 1	QPSK	782	-10.82	0.0828	11.39
		16 QAM	782	-11.08	0.0780	11.63
		64 QAM	782	-11.33	0.0736	11.18
	# 2	QPSK	782	-11.29	0.0743	11.75
		16 QAM	782	-11.47	0.0713	11.45
		64 QAM	782	-11.35	0.0733	11.24
698-716 MHz	# 1	QPSK	703	-11.63	0.0687	11.20
		QPSK	711	-11.17	0.0764	11.75
		16 QAM	703	-11.35	0.0733	11.59
		16 QAM	711	-11.45	0.0716	11.66
		64 QAM	703	-11.60	0.0692	11.40
		64 QAM	711	-11.46	0.0714	11.60
	# 2	QPSK	703	-11.69	0.0677	11.69
		QPSK	711	-10.81	0.0830	11.51
		16 QAM	703	-10.81	0.0830	11.41
		16 QAM	711	-10.82	0.0828	11.50
		64 QAM	703	-11.34	0.0735	11.24
		64 QAM	711	-11.52	0.0705	11.32

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, §22.917, §24.238 & §27.53 - OCCUPIED BANDWIDTH

6.1 Applicable Standard

Requirements: CFR 47, Section 2.1049, Section 22.917, 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 100 kHz and the 26 dB & 99% bandwidth was recorded.

6.3 Test Environmental Conditions

Temperature:	22-24°C
Relative Humidity:	41-43 %
ATM Pressure:	101-102kPa

** The testing was performed by Dennis Huang from 2009-12-11 to 2009-12-15 in RF Site.*

6.4 Test Equipment List and Details

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

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

6.5 Summary of Test Results

Cellular 850 MHz & PCS 1900 MHz Band

Radio Mode	Band	Channel	Frequency (MHz)	Emission Bandwidth (MHz)
CDMA	Cellular 850 MHz	Low	824.80	1.485
		Middle	836.52	1.480
		High	848.20	1.483
	PCS 1900 MHz	Low	1850.80	1.481
		Middle	1880.00	1.487
		High	1909.20	1.488
WCDMA	Cellular 850 MHz	Low	826.4	4.716
		Middle	836.4	4.722
		High	846.6	4.719
	PCS 1900 MHz	Low	1852.4	4.718
		Middle	1880.0	4.727
		High	1907.6	4.720

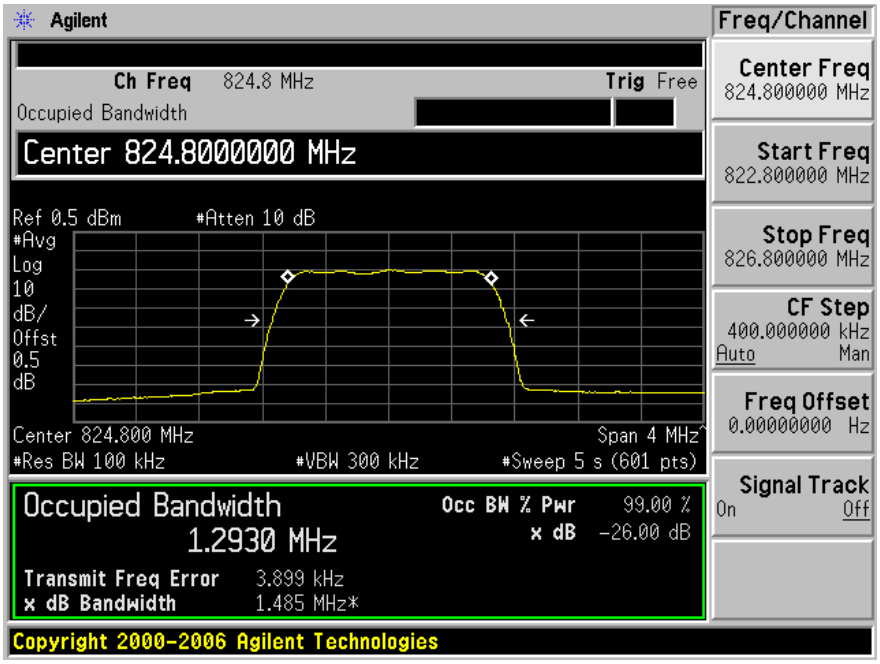
700 MHz LTE Band

Band	Antenna Port	Modulation	Frequency (MHz)	Emission Bandwidth (MHz)
776-787 MHz	# 1	QPSK	782	9.341
		16 QAM	782	9.359
		64 QAM	782	9.436
	# 2	QPSK	782	9.3
		16 QAM	782	9.328
		64 QAM	782	9.410
698-716 MHz	# 1	QPSK	703	9.32
		QPSK	711	9.304
		16 QAM	703	9.347
		16 QAM	711	9.345
		64 QAM	703	9.413
		64 QAM	711	9.449
	# 2	QPSK	703	9.312
		QPSK	711	9.329
		16 QAM	703	9.344
		16 QAM	711	9.388
		64 QAM	703	9.451
		64 QAM	711	9.483

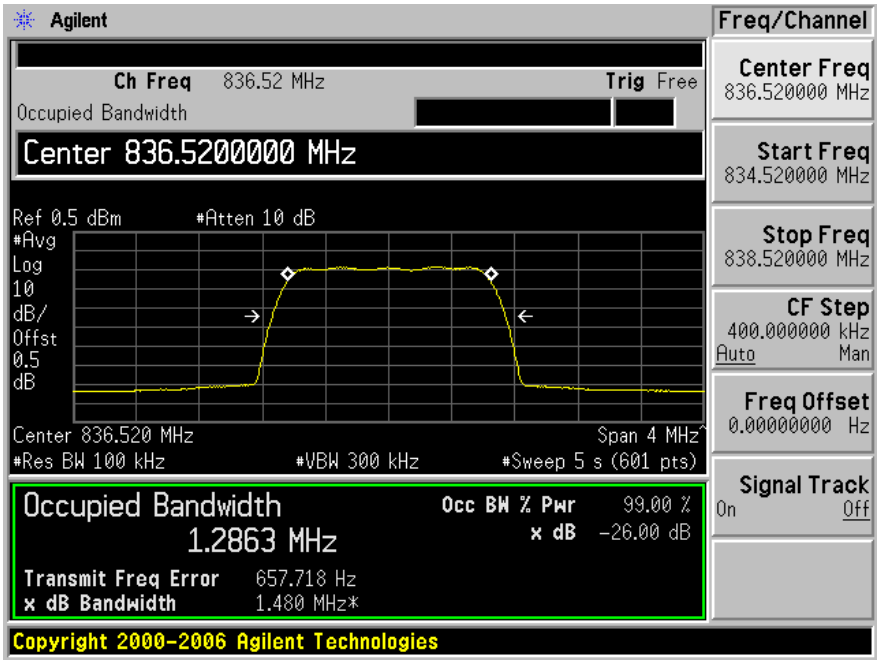
Please refer to the following plots for details.

CDMA Cellular Band Uplink

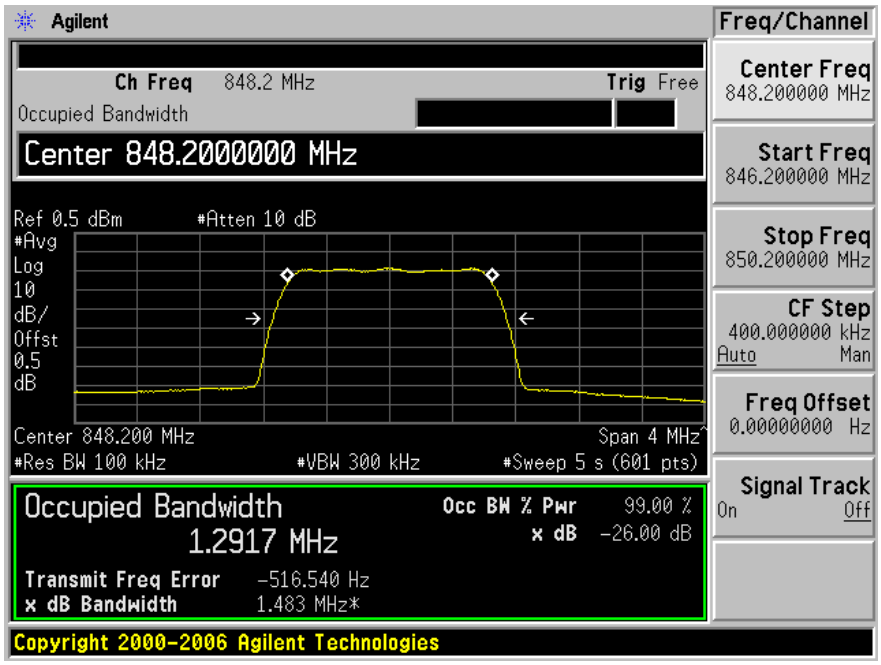
Low Channel: 824.8 MHz



Middle Channel: 836.52 MHz

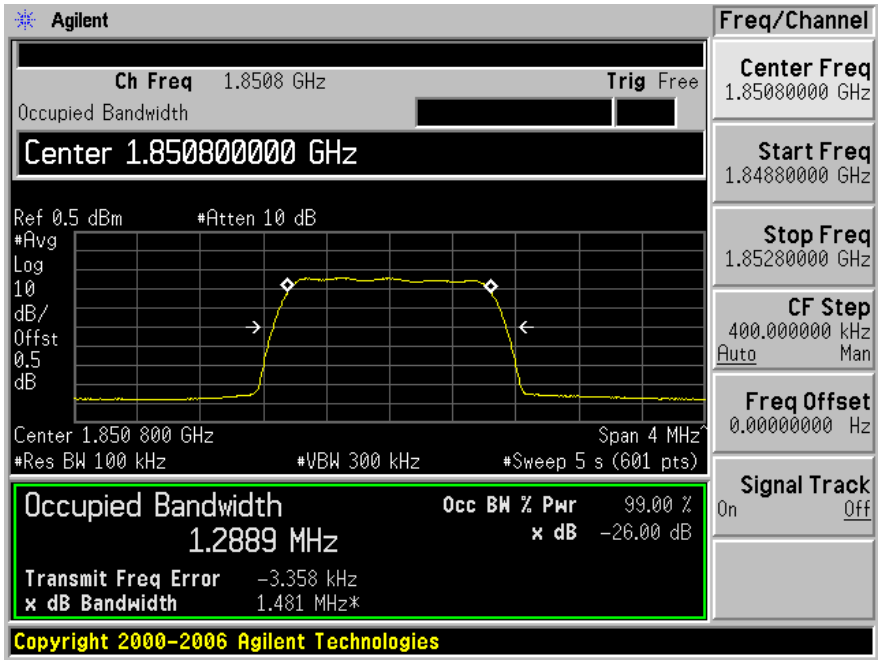


High Channel: 848.2 MHz

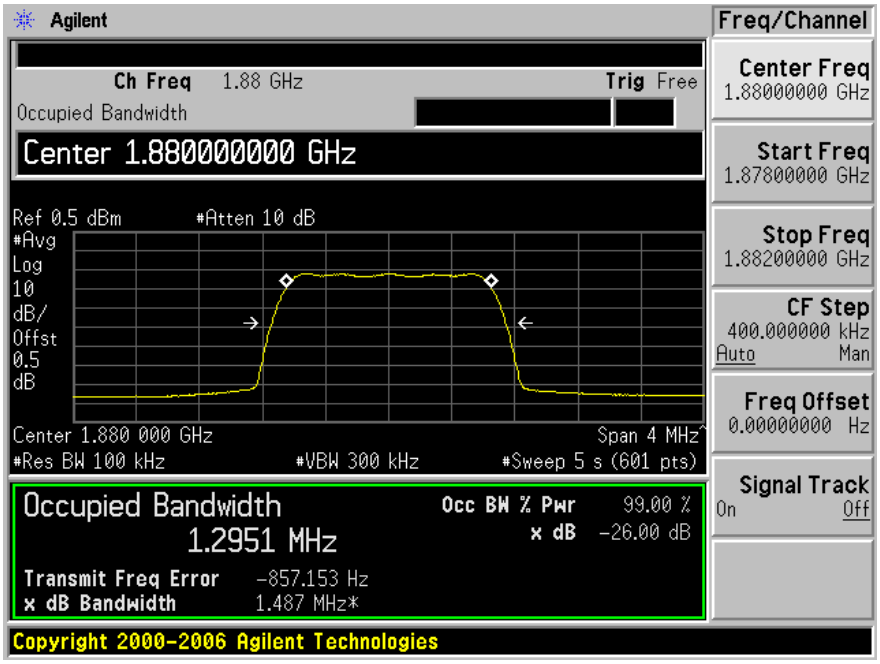


CDMA PCS Band Uplink

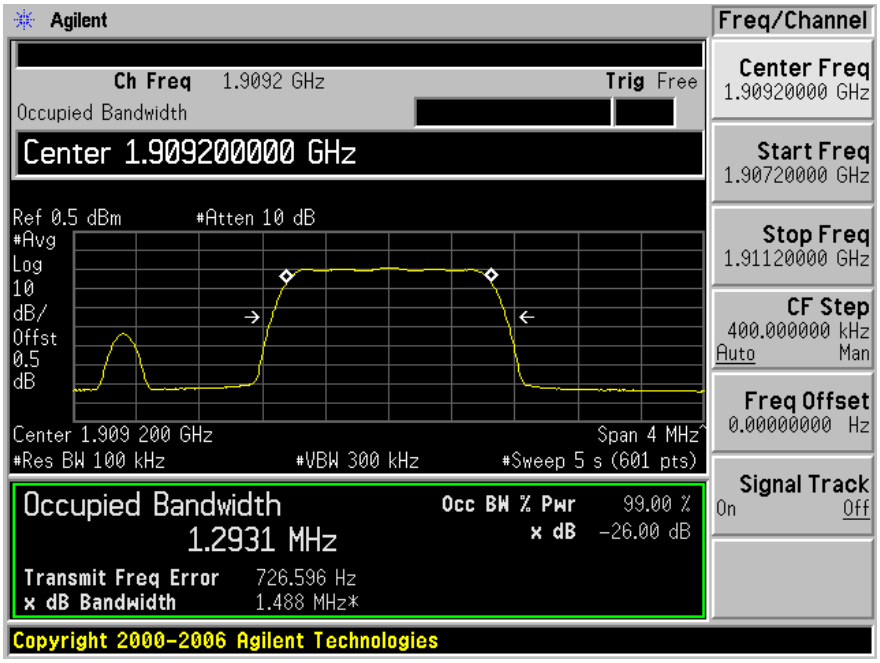
Low Channel: 1850.8 MHz



Middle Channel: 1880 MHz

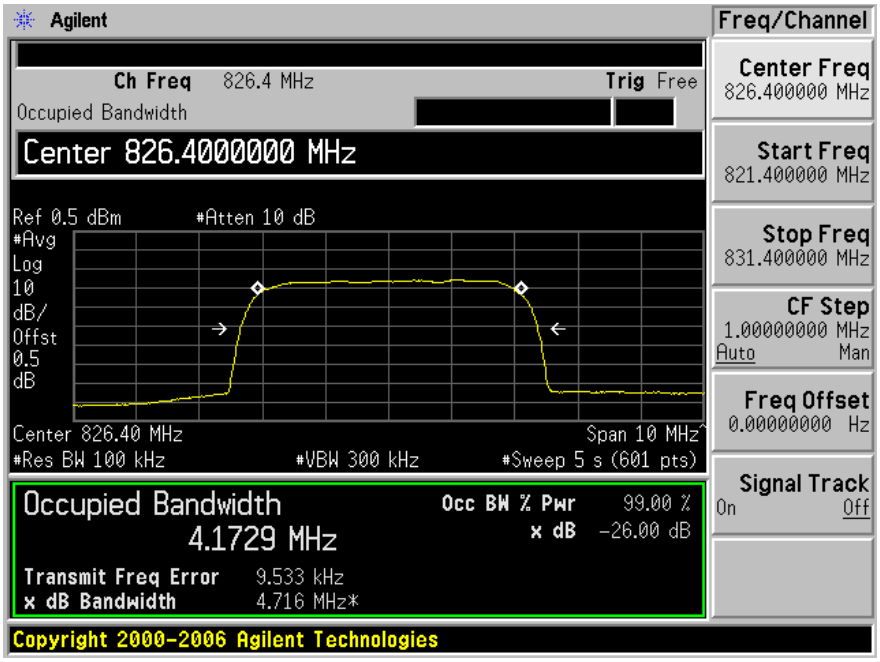


High Channel: 1909.2 MHz

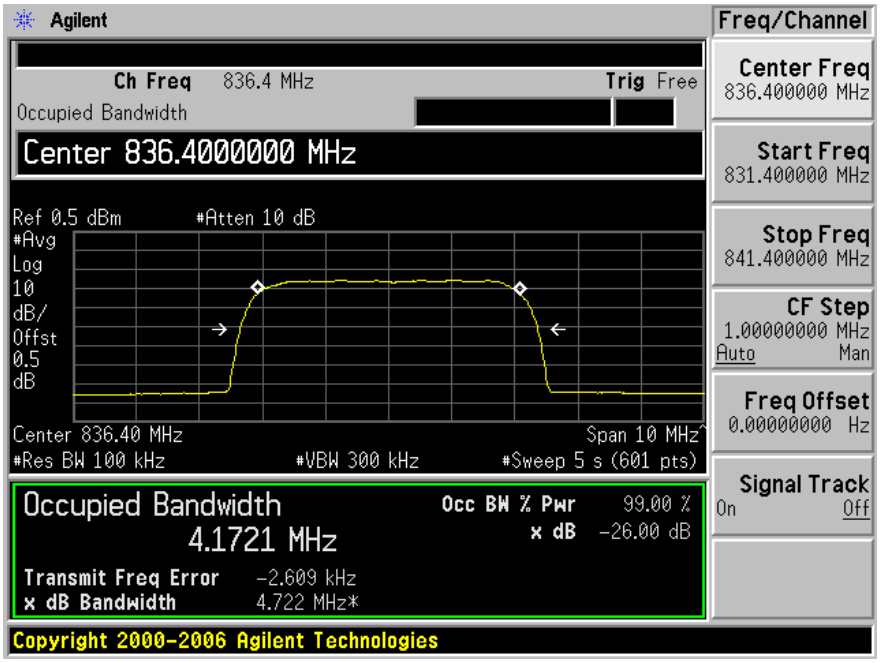


WCDMA Cellular Band Uplink

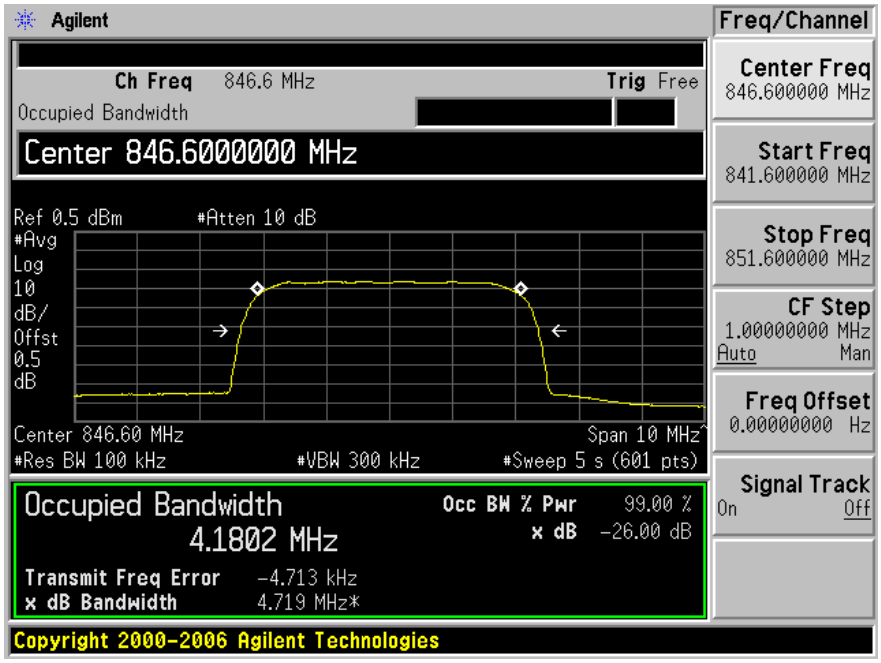
Low Channel: 826.4 MHz



Middle Channel: 836.4 MHz

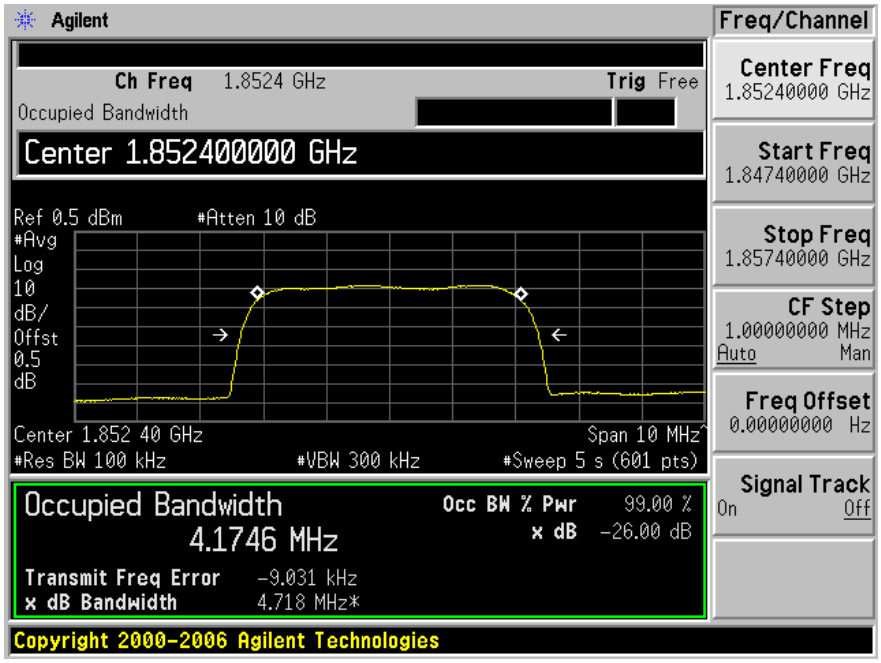


High Channel: 846.6 MHz

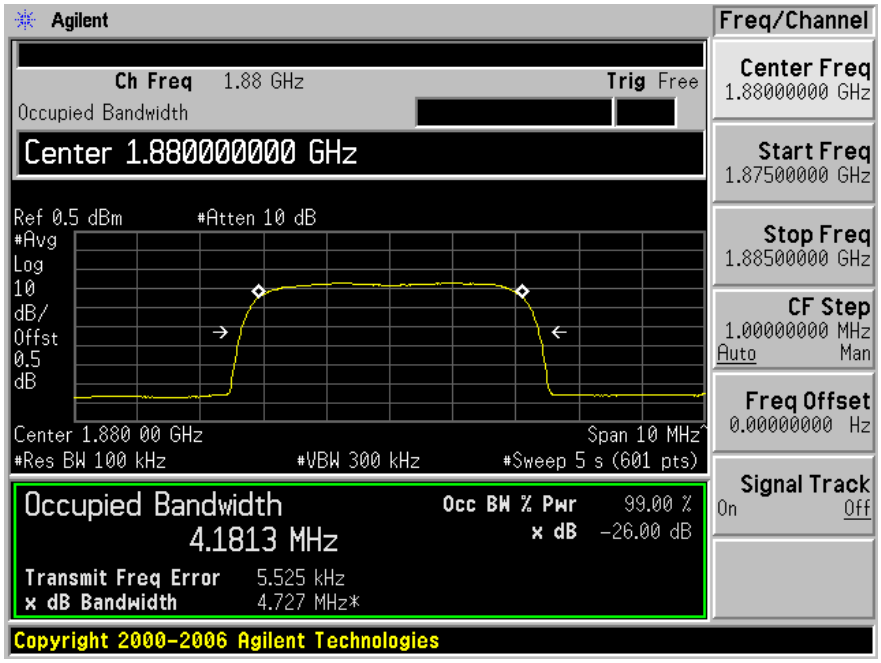


WCDMA PCS Band Uplink

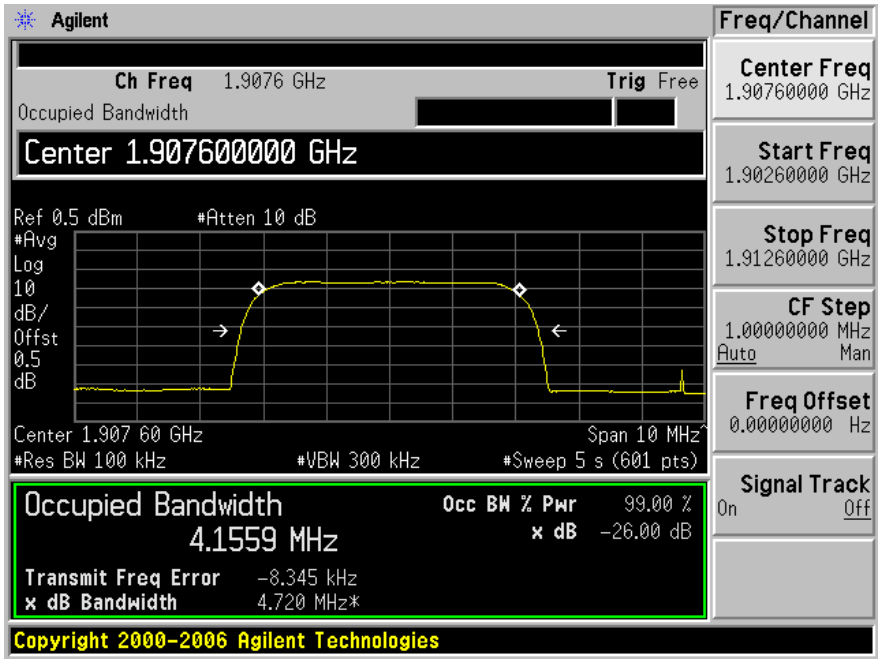
Low Channel: 1852.4 MHz



Middle Channel: 1880 MHz

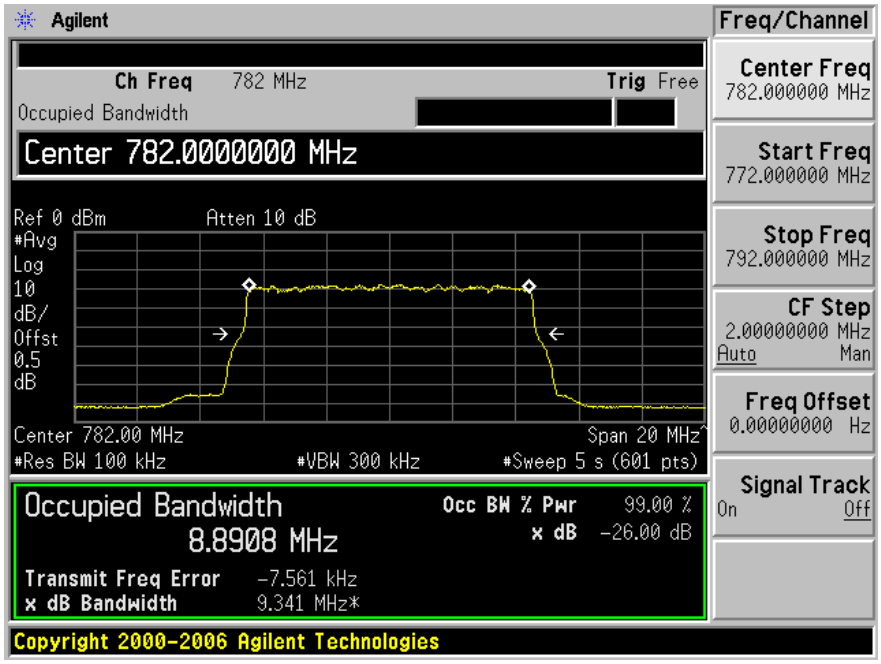


High Channel: 1907.6 MHz

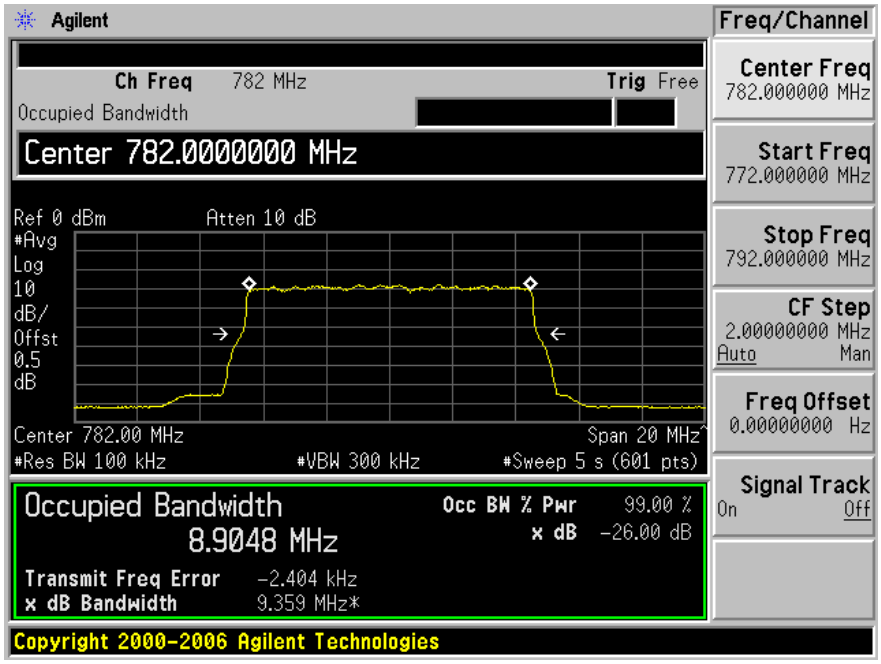


776-787 MHz LTE Band Uplink, Antenna Port # 1

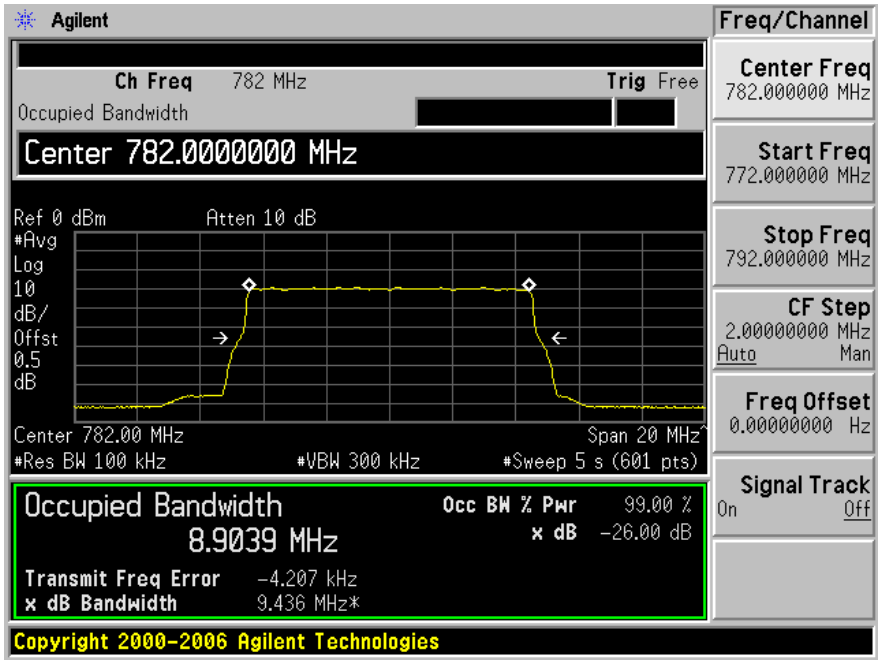
Modulation: QPSK, Frequency: 782 MHz



Modulation: 16QAM, Frequency: 782 MHz

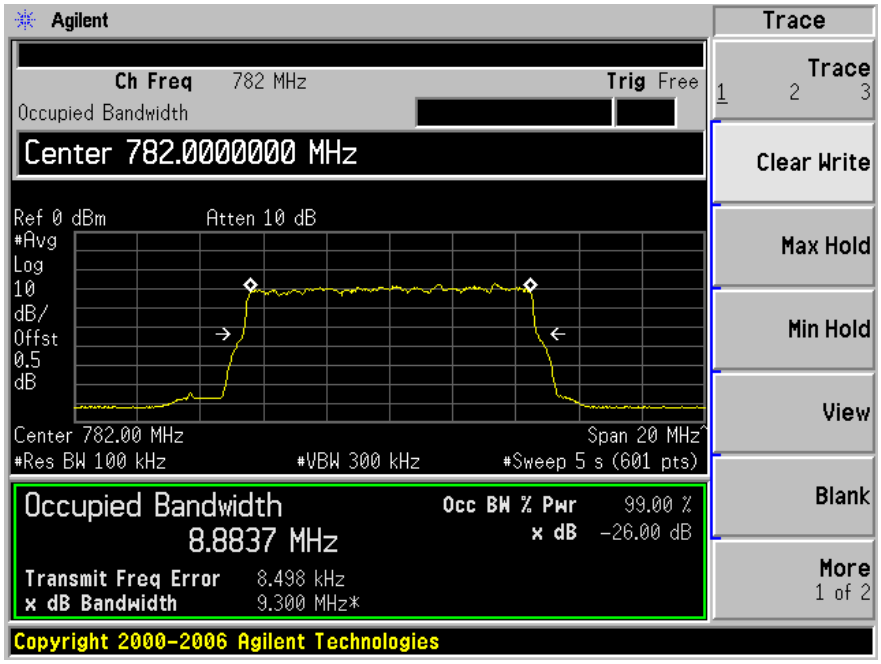


Modulation: 64QAM, Frequency: 782 MHz

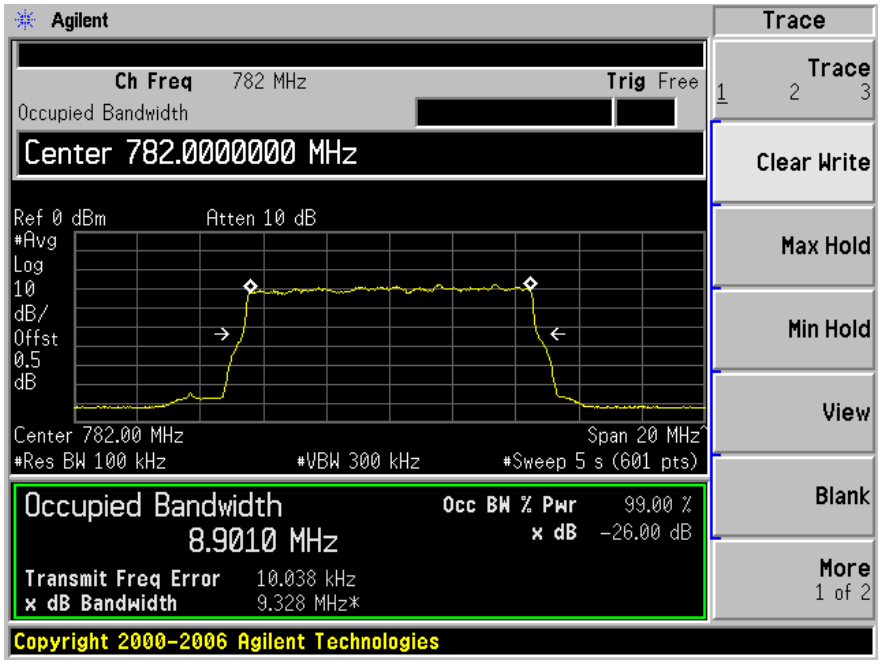


776-787 MHz LTE Band Uplink, Antenna Port # 2

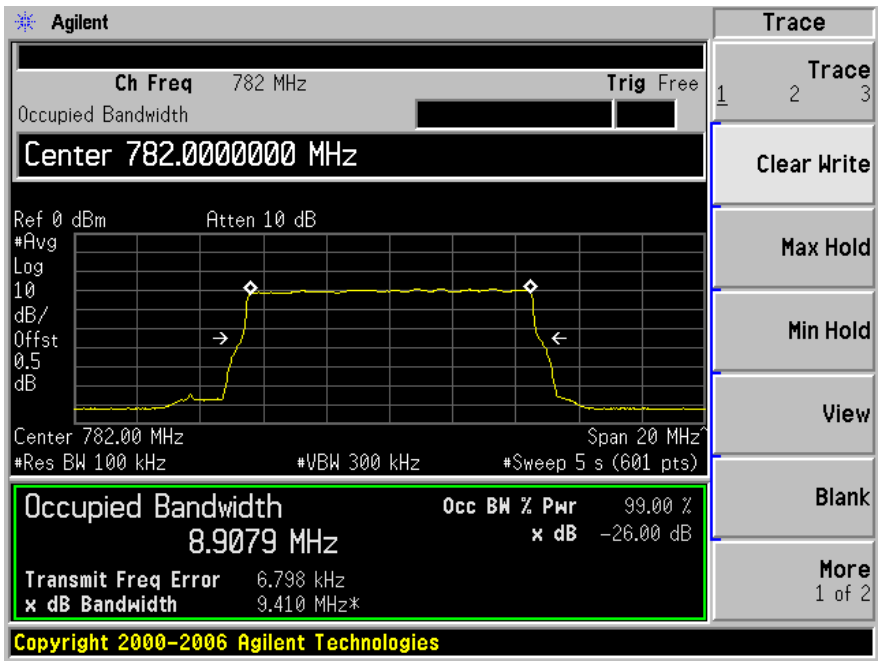
Modulation: QPSK, Frequency: 782 MHz



Modulation: 16QAM, Frequency: 782 MHz

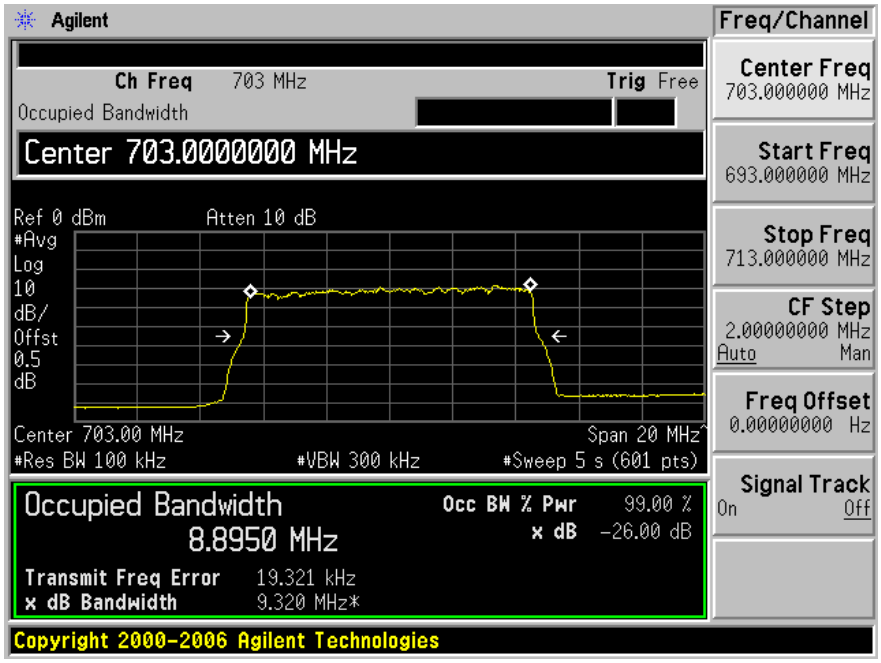


Modulation: 64QAM, Frequency: 782 MHz

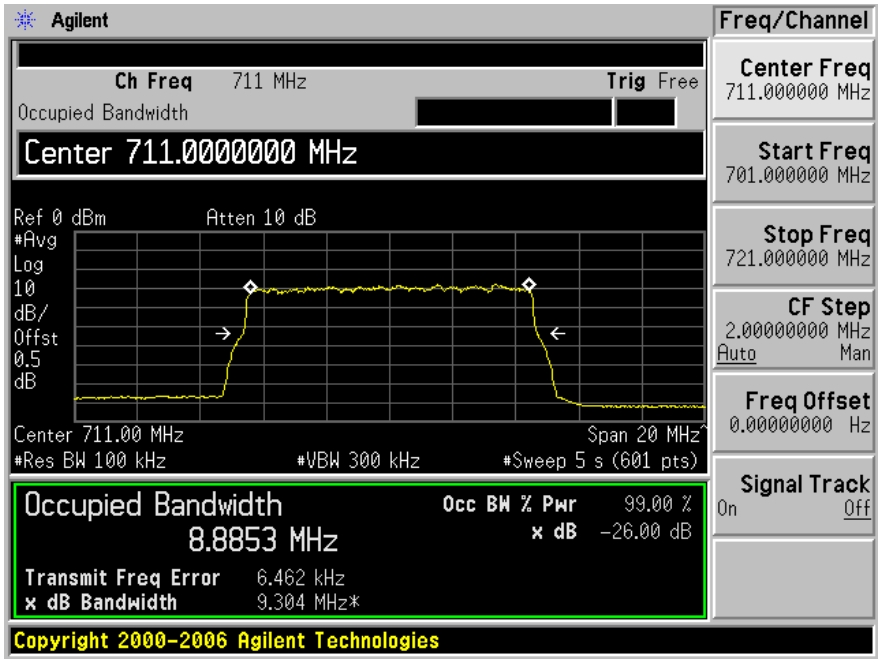


698-716 MHz LTE Band Uplink, Antenna Port # 1

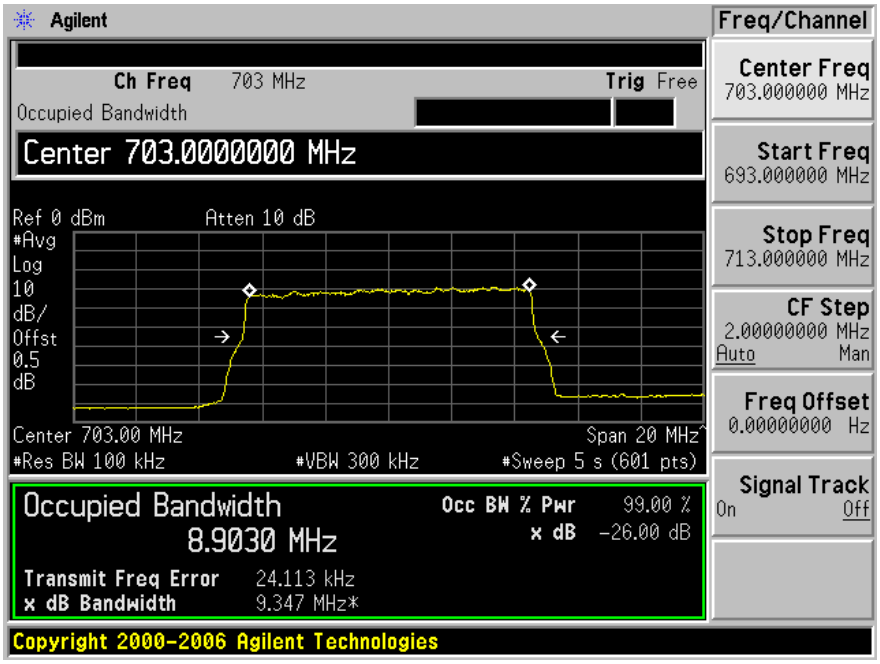
Modulation: QPSK, Frequency: 703 MHz



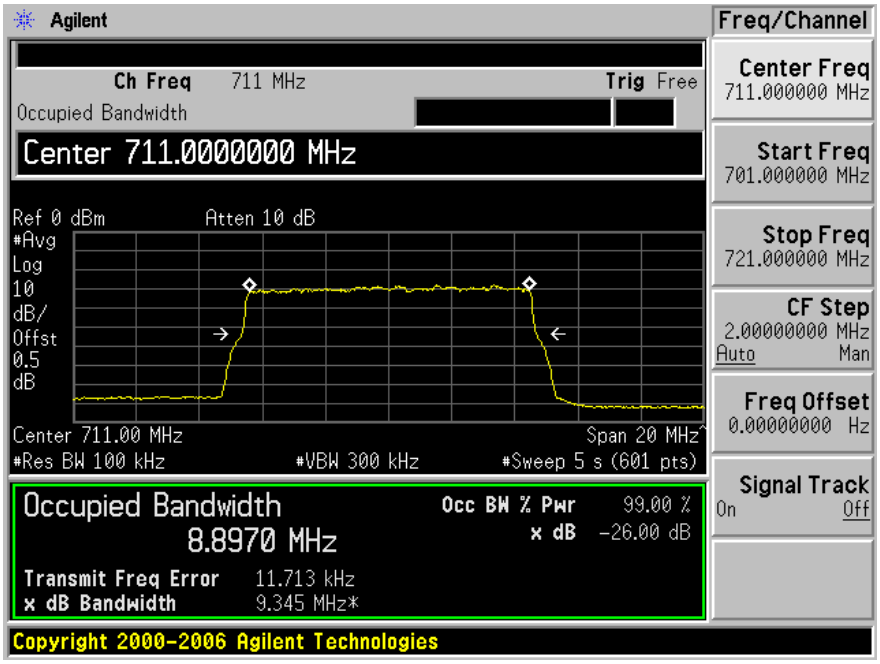
Modulation: QPSK, Frequency: 711 MHz



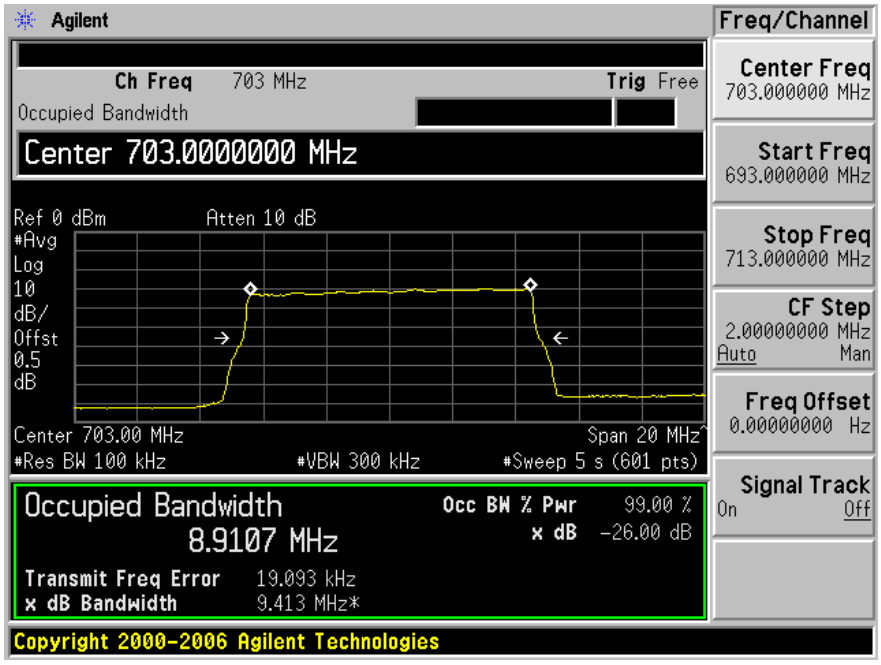
Modulation: 16QAM, Frequency: 703 MHz



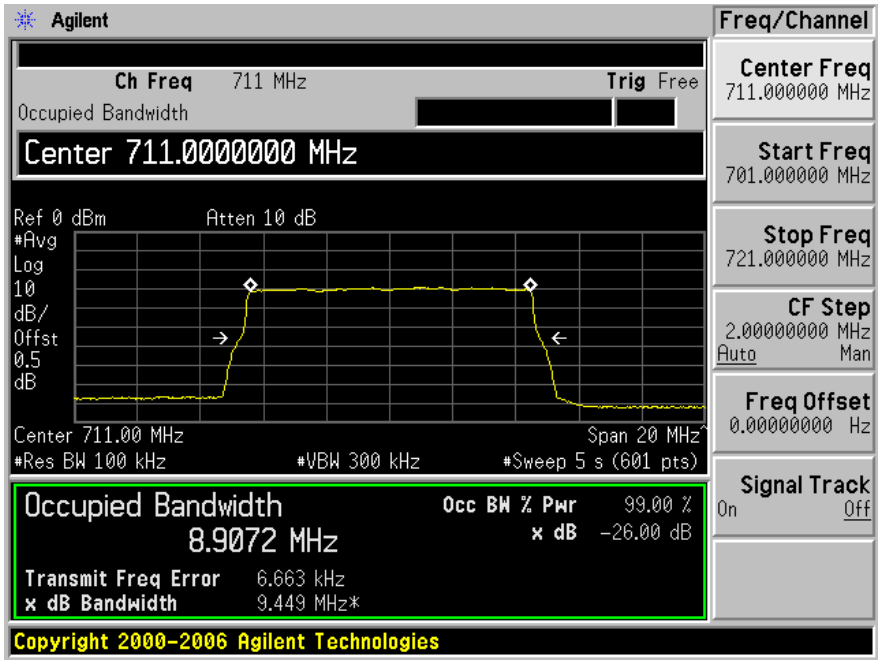
Modulation: 16QAM, Frequency: 711 MHz



Modulation: 64QAM, Frequency: 703 MHz

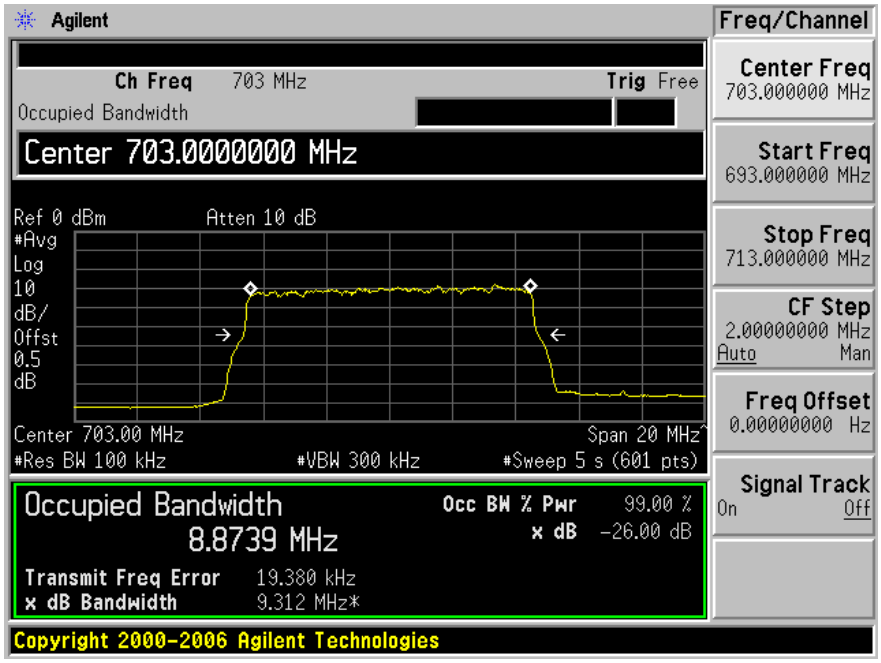


Modulation: 64QAM, Frequency: 711 MHz

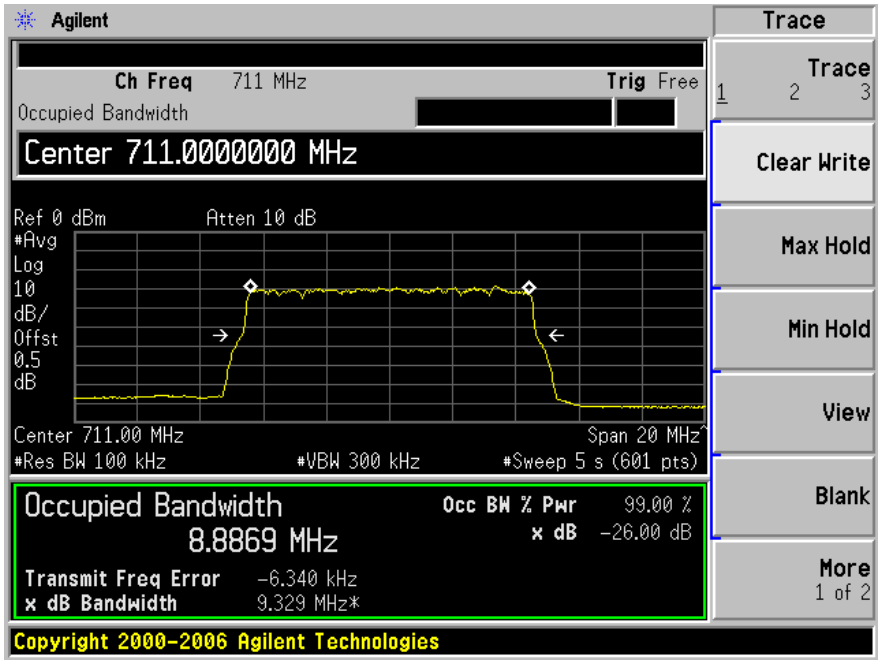


698-716 MHz LTE Band Uplink, Antenna Port # 2

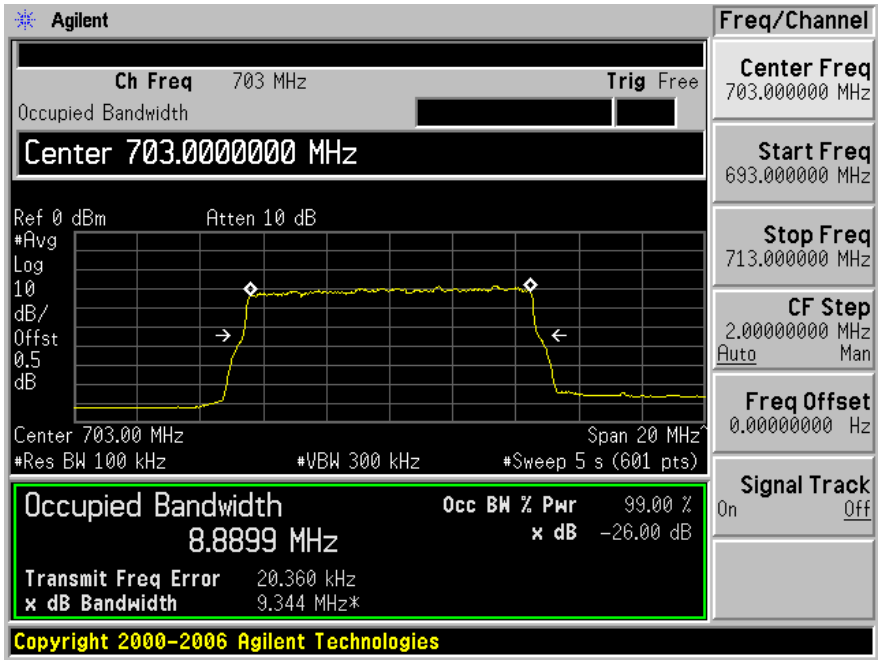
Modulation: QPSK, Frequency: 703 MHz



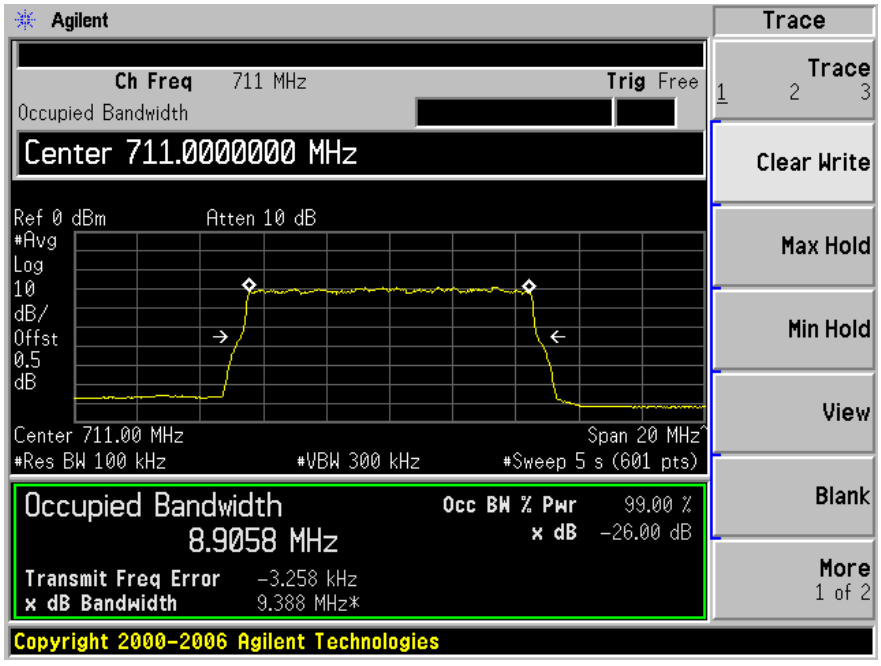
Modulation: QPSK, Frequency: 711 MHz



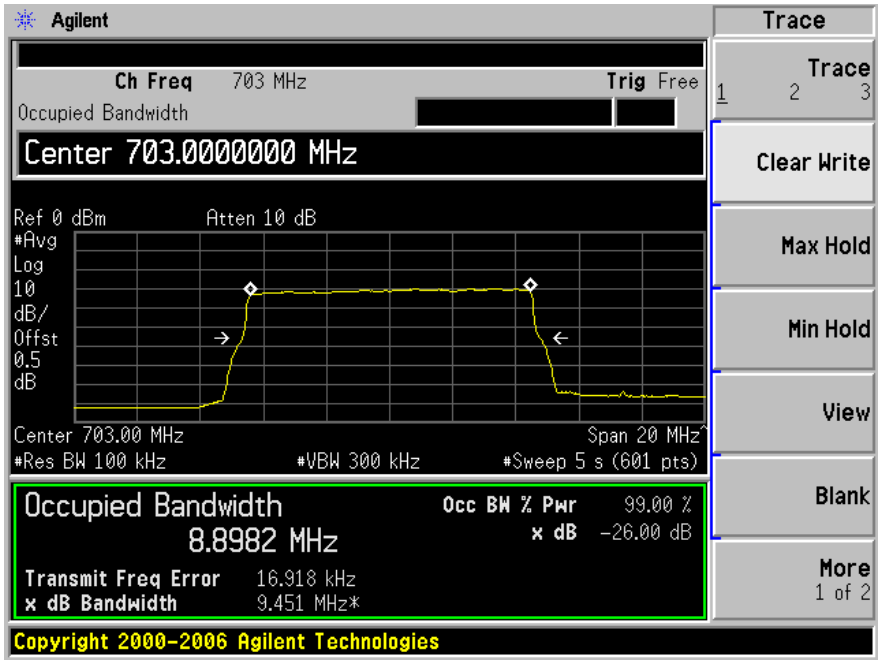
Modulation: 16QAM, Frequency: 703 MHz



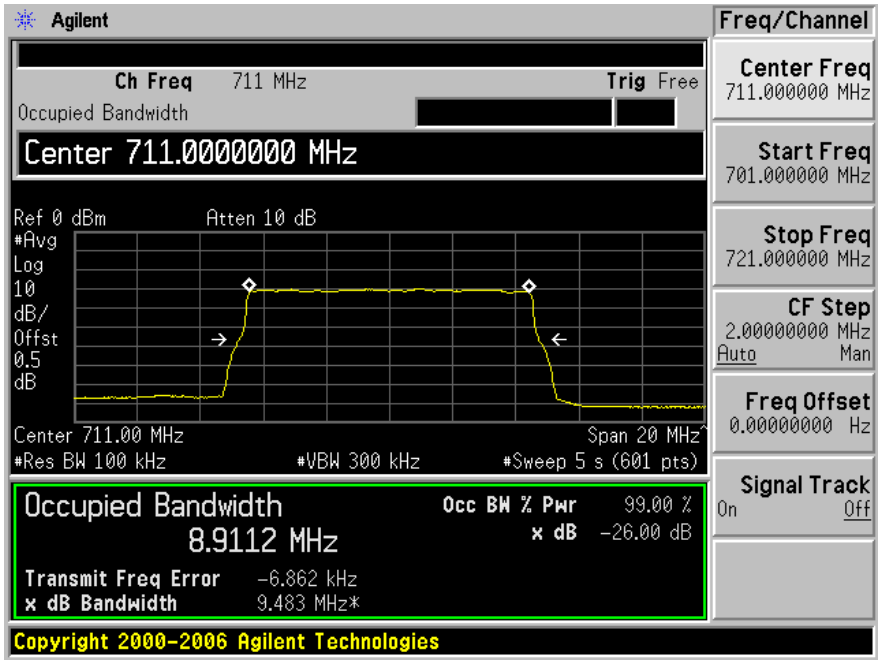
Modulation: 16QAM, Frequency: 711 MHz



Modulation: 64QAM, Frequency: 703 MHz



Modulation: 64QAM, Frequency: 711 MHz



7 FCC §2.1053, §22.917, §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

7.1 Applicable Standard

Requirements: CFR 47, §2.1053, §22.917, §24.238 and §27.53.

7.2 Test Procedure

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

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

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

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

7.3 Test Environmental Conditions

Temperature:	22-24°C
Relative Humidity:	41-43 %
ATM Pressure:	101-102kPa

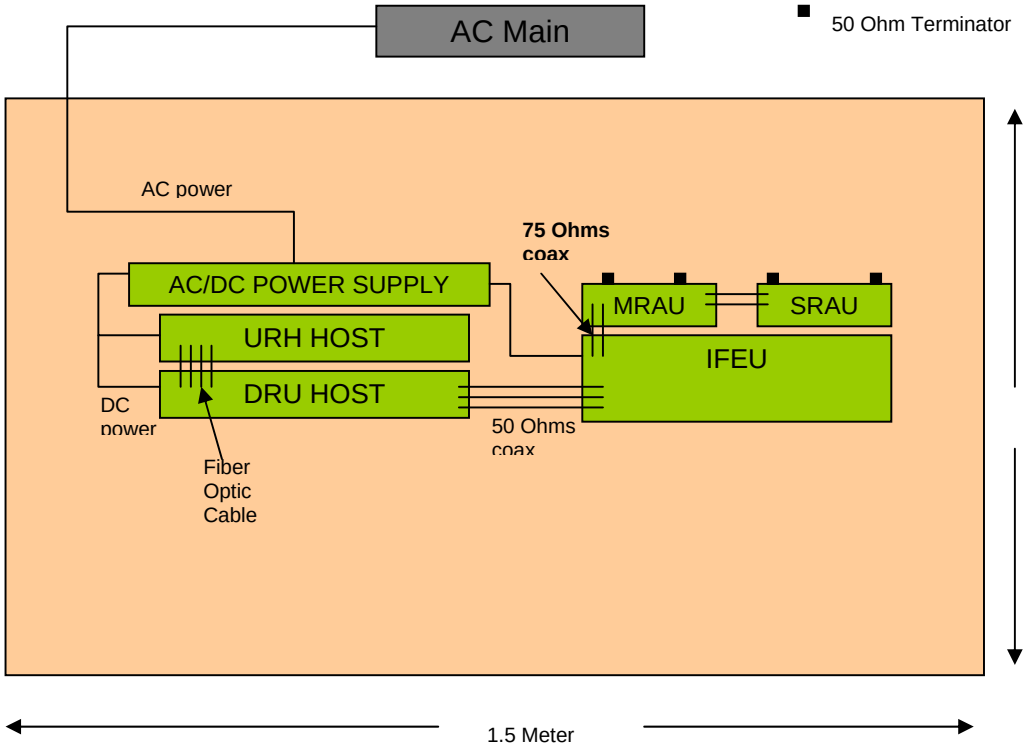
** The testing was performed by Dennis Huang from 2009-12-11 to 2009-12-15 in 5 meter chamber#3.*

7.4 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
Ducommun Technologies	Amplifier, Pre	1-18 GHz	9909297-01R	2009-03-04
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
Rohde & Schwarz	Signal Generator	SMIQ03	849192/0085	2009-12-03

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

7.5 Test Setup Block Diagram



7.6 Summary of Test Results

Cellular 850 MHz and PCS 1900 MHz band worst case Configuration:

CDMA

Band	Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
Cellular 850 MHz	-19.04	7545.85	Vertical	836.52 MHz
PCS 1900 MHz	-18.03	7545.85	Vertical	1880 MHz

WCDMA:

Band	Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
Cellular 850 MHz	-18.22	7545.85	Vertical	836.4 MHz
PCS 1900 MHz	-18.03	7545.85	Vertical	1880 MHz

700 MHz LTE Band worst case Configuration:

776-787 MHz Band

Uplink - Middle Channel (782 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-14.05	7542	Horizontal	782 MHz

698-716 MHz Band

Uplink - Middle Channel (703 MHz)			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-12.22	7542	Horizontal	703 MHz
Uplink - Middle Channel (711 MHz)			
-13.35	7542	Horizontal	711 MHz

Please refer to the following tables for detailed results.

7.7 Test Results

Cellular 850 MHz and PCS 1900 MHz Band

CDMA:

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
CDMA, Cellular Band, Input Frequency = 836.52 MHz											
1250	68.86	337	2.29	V	1250	-44.43	5.8	0.94	-39.57	-13	-26.57
1250	66.45	69	1.2	H	1250	-46.84	5.8	0.94	-41.98	-13	-28.98
3071.99	61.25	19	1.44	V	3071.99	-42.62	8.9	1.51	-35.23	-13	-22.23
3071.99	60.17	354	1.0	H	3071.99	-43.70	8.9	1.51	-36.31	-13	-23.31
7545.85	52.47	324	1.0	V	7545.85	-37.81	8.7	2.93	-32.04	-13	-19.04
7545.85	51.69	309	1.36	H	7545.85	-38.59	8.7	2.93	-32.82	-13	-19.82
CDMA, PCS Band, Input Frequency = 1880 MHz											
1250	67.91	25	1.68	V	1250	-45.38	5.8	0.94	-40.52	-13	-27.52
1250	66.08	67	1.18	H	1250	-47.21	5.8	0.94	-42.35	-13	-29.35
3071.99	60.59	16	1.31	V	3071.99	-43.28	8.9	1.51	-35.89	-13	-22.89
3071.99	61.65	320	1.3	H	3071.99	-42.22	8.9	1.51	-34.83	-13	-21.83
7545.85	53.48	324	1.0	V	7545.85	-36.80	8.7	2.93	-31.03	-13	-18.03
7545.85	51.21	32	1.35	H	7545.85	-39.07	8.7	2.93	-33.30	-13	-20.30

WCDMA:

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
WCDMA, Cellular Band, Input Frequency = 836.4 MHz											
1250	69.09	337	2.29	V	1250	-44.2	5.8	0.94	-39.34	-13	-26.34
1250	66.71	69	1.2	H	1250	-46.58	5.8	0.94	-41.72	-13	-28.72
3071.99	61.65	19	1.44	V	3071.99	-42.22	8.9	1.51	-34.83	-13	-21.83
3071.99	59.97	354	1	H	3071.99	-43.9	8.9	1.51	-36.51	-13	-23.51
7545.85	53.29	324	1	V	7545.85	-36.99	8.7	2.93	-31.22	-13	-18.22
7545.85	52.2	309	1.36	H	7545.85	-38.08	8.7	2.93	-32.31	-13	-19.31
WCDMA, PCS Band, Input Frequency = 1880 MHz											
1250	67.91	25	1.68	V	1250	-45.38	5.8	0.94	-40.52	-13	-27.52
1250	66.08	67	1.18	H	1250	-47.21	5.8	0.94	-42.35	-13	-29.35
3071.99	60.59	16	1.31	V	3071.99	-43.28	8.9	1.51	-35.89	-13	-22.89
3071.99	61.65	320	1.3	H	3071.99	-42.22	8.9	1.51	-34.83	-13	-21.83
7545.85	53.48	324	1	V	7545.85	-36.8	8.7	2.93	-31.03	-13	-18.03
7545.85	51.21	32	1.35	H	7545.85	-39.07	8.7	2.93	-33.3	-13	-20.3

700 MHz LTE Band

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
Uplink (Input frequency = 782 MHz)											
1250	68.53	20	1.15	V	1250	-44.76	5.8	0.94	-39.90	-13	-26.90
1250	68.03	63	1.00	H	1250	-45.26	5.8	0.94	-40.40	-13	-27.40
3072	60.52	18	1.00	V	3072	-43.35	8.9	1.51	-35.96	-13	-22.96
3072	61.41	334	1.44	H	3072	-42.46	8.9	1.51	-35.07	-13	-22.07
7542	56.13	333	1.00	V	7542	-34.15	8.7	2.93	-28.38	-13	-15.38
7542	57.46	46	1.22	H	7542	-32.82	8.7	2.93	-27.05	-13	-14.05
Uplink (Input frequency = 703 MHz)											
1250	67.78	18	1.16	V	1250	-45.51	5.8	0.94	-40.65	-13	-27.65
1250	68.31	64	1.00	H	1250	-44.98	5.8	0.94	-40.12	-13	-27.12
3072	61.00	17	1.00	V	3072	-42.87	8.9	1.51	-35.48	-13	-22.48
3072	61.70	334	1.11	H	3072	-42.17	8.9	1.51	-34.78	-13	-21.78
7542	56.48	324	1.47	V	7542	-33.80	8.7	2.93	-28.03	-13	-15.03
7542	59.29	46	1.25	H	7542	-30.99	8.7	2.93	-25.22	-13	-12.22
Uplink (Input frequency = 711 MHz)											
1250	69.00	21	1.14	V	1250	-44.29	5.8	0.94	-39.43	-13	-26.43
1250	68.37	68	1.00	H	1250	-44.92	5.8	0.94	-40.06	-13	-27.06
3072	60.75	20	1.37	V	3072	-43.12	8.9	1.51	-35.73	-13	-22.73
3072	61.79	334	1.57	H	3072	-42.08	8.9	1.51	-34.69	-13	-21.69
7542	54.64	324	1.08	V	7542	-35.64	8.7	2.93	-29.87	-13	-16.87
7542	58.16	46	1.25	H	7542	-32.12	8.7	2.93	-26.35	-13	-13.35

8 FCC §2.1051, §22.917, §24.238 & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

8.1 Applicable Standard

Requirements: CFR 47, § 21051. §22.917, §24.238, §27.53.

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

§ 22.917, § 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 Environmental Conditions

Temperature:	22-24°C
Relative Humidity:	41-43 %
ATM Pressure:	101-102kPa

** The testing was performed by Dennis Huang from 2009-12-11 to 2009-12-15 in RF Site.*

8.4 Test Equipment List and Details

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

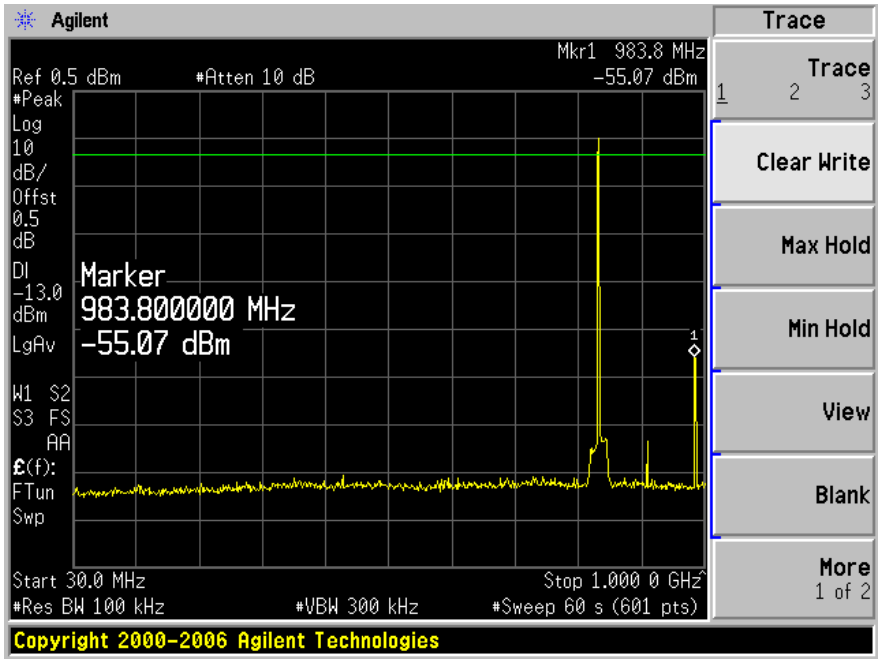
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

8.5 Test Results

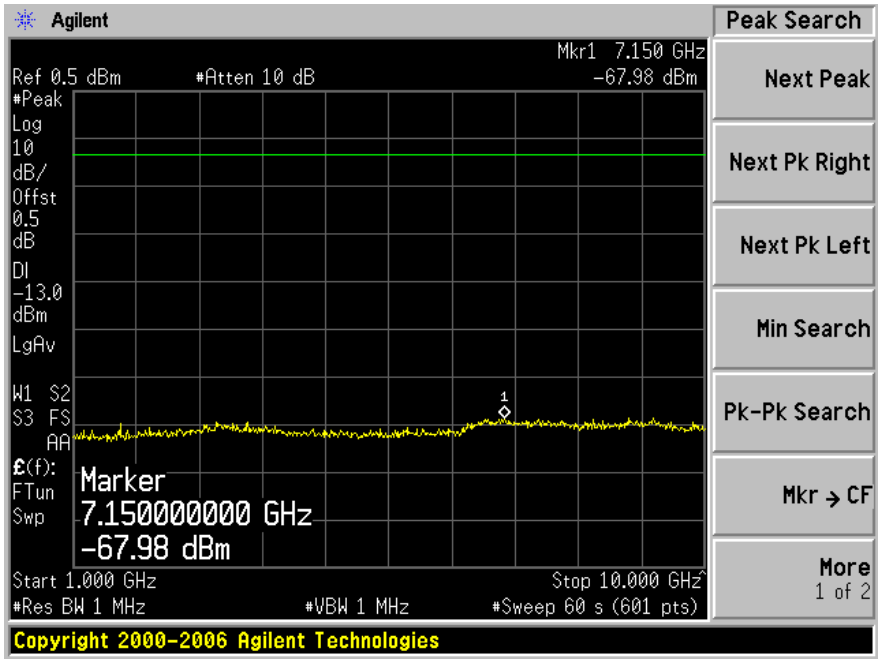
Please refer to the following plots.

CDMA Cellular Band Uplink, Middle Channel: 836.52 MHz:

Plot 1: 30 MHz to 1 GHz

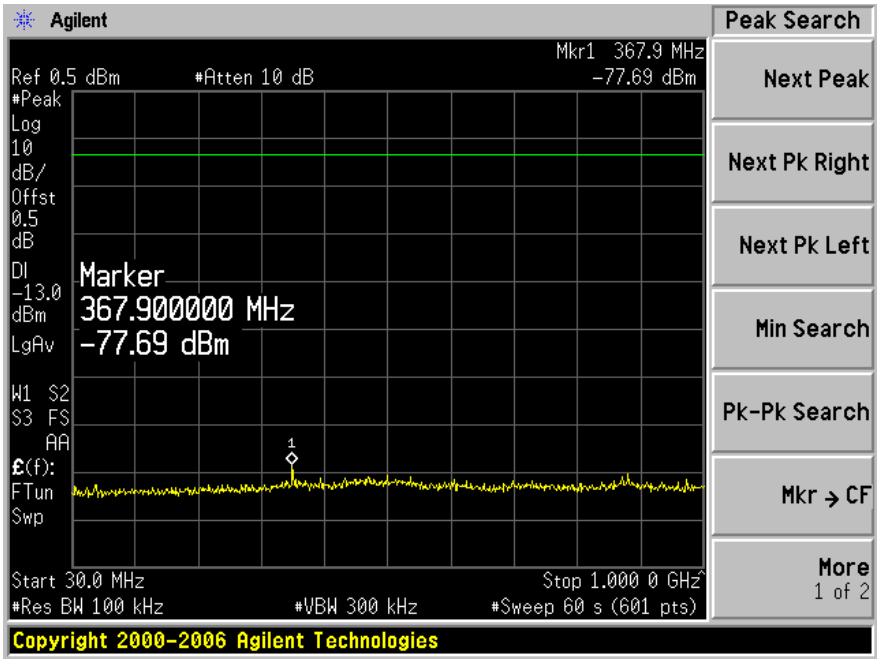


Plot 2: Above 1 GHz

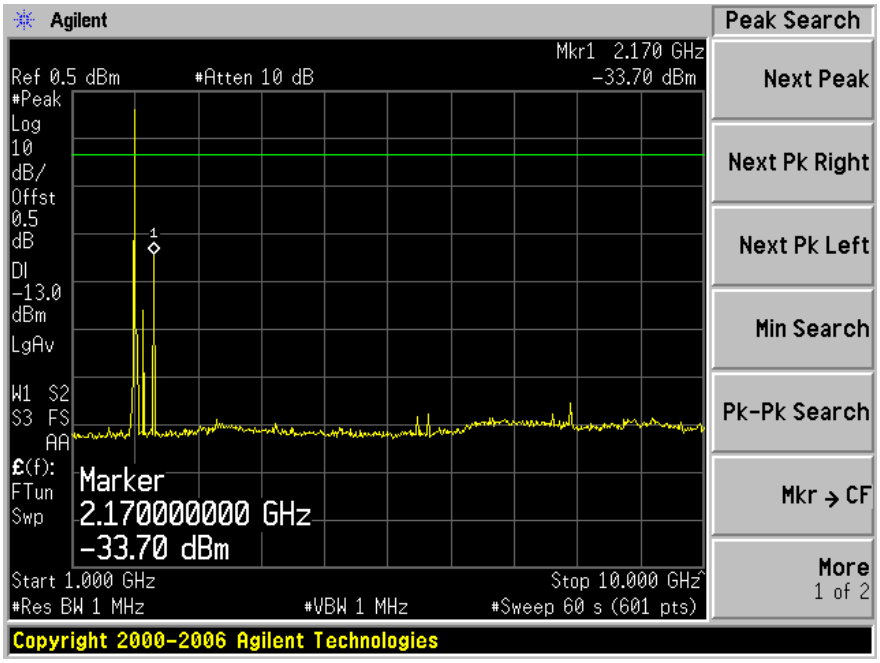


CDMA PCS Band Uplink, Middle Channel: 1880 MHz:

Plot 1: 30 MHz to 1 GHz

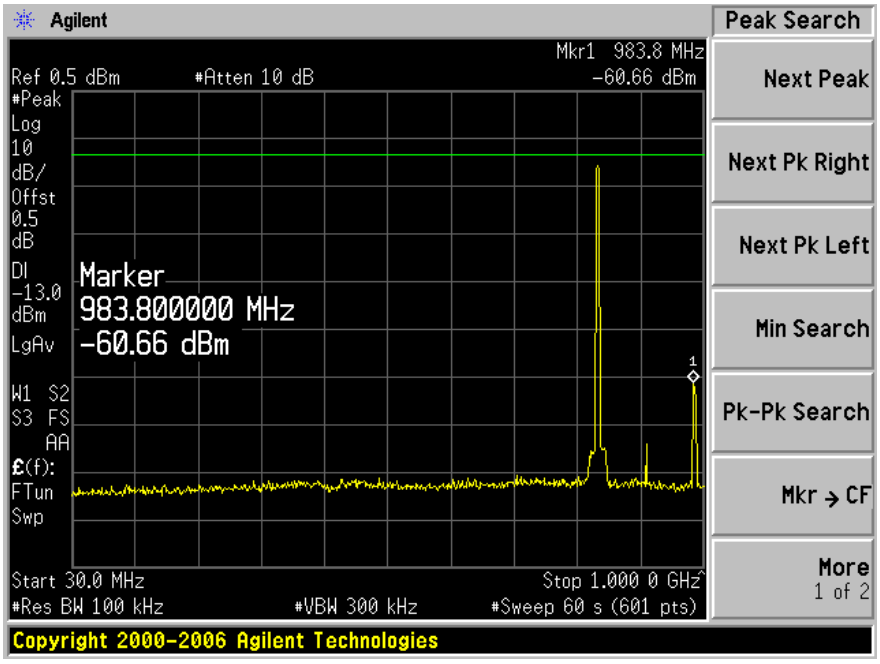


Plot 2: Above 1 GHz

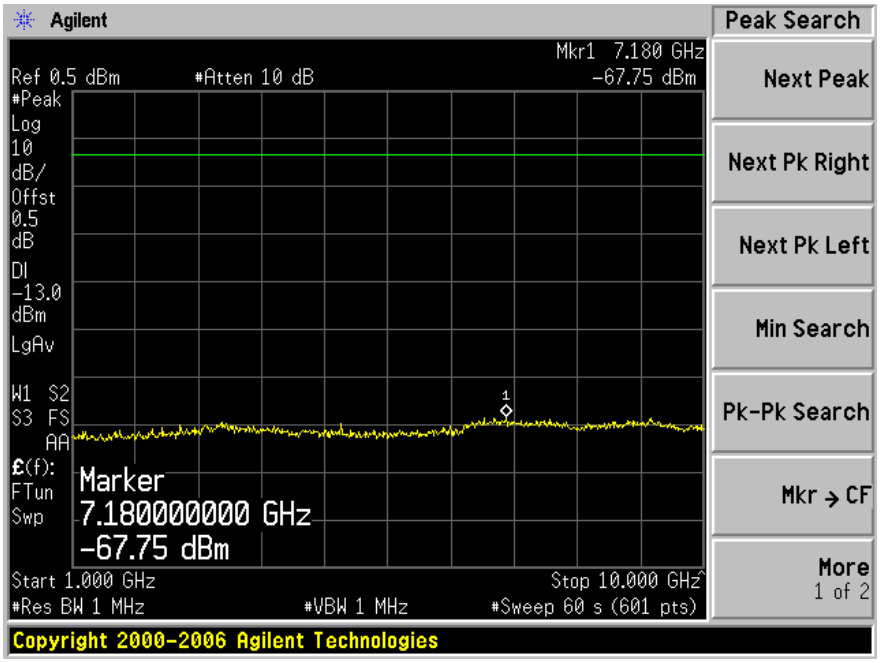


WCDMA Cellular Band Uplink, Middle Channel: 836.42 MHz:

Plot 1: 30 MHz to 1 GHz

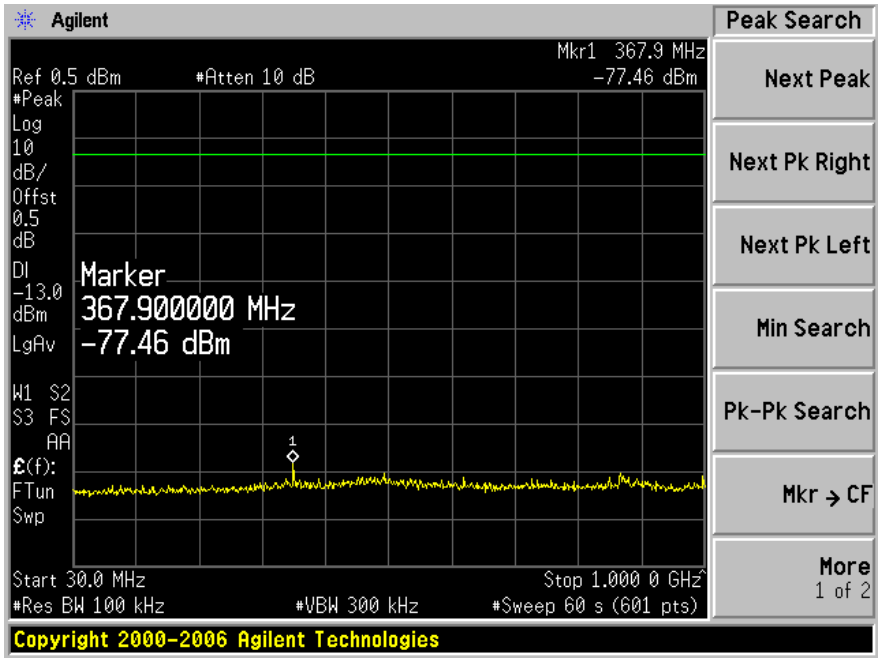


Plot 2: Above 1 GHz

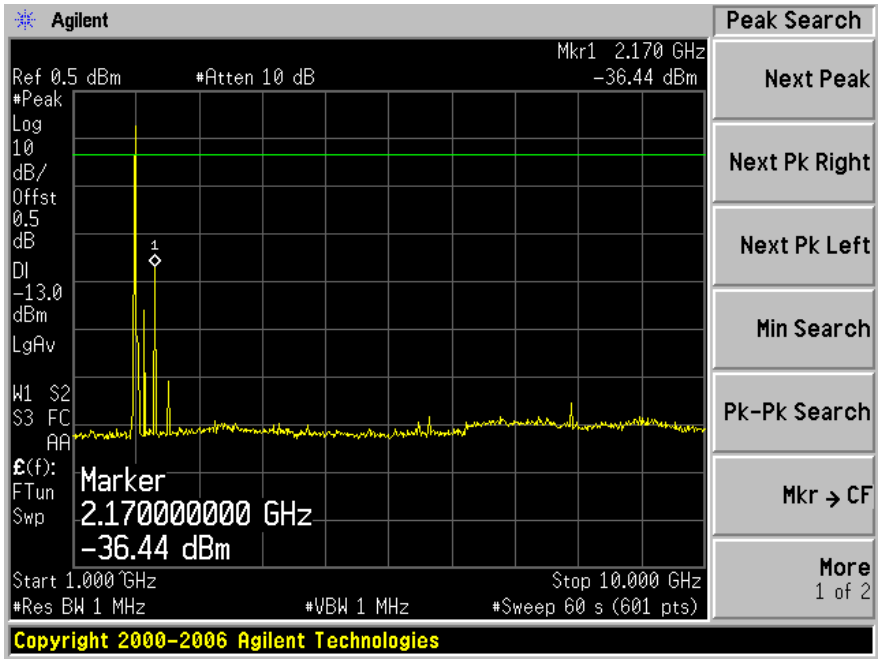


WCDMA PCS Band Uplink, Middle Channel: 1880 MHz:

Plot 1: 30 MHz to 1 GHz

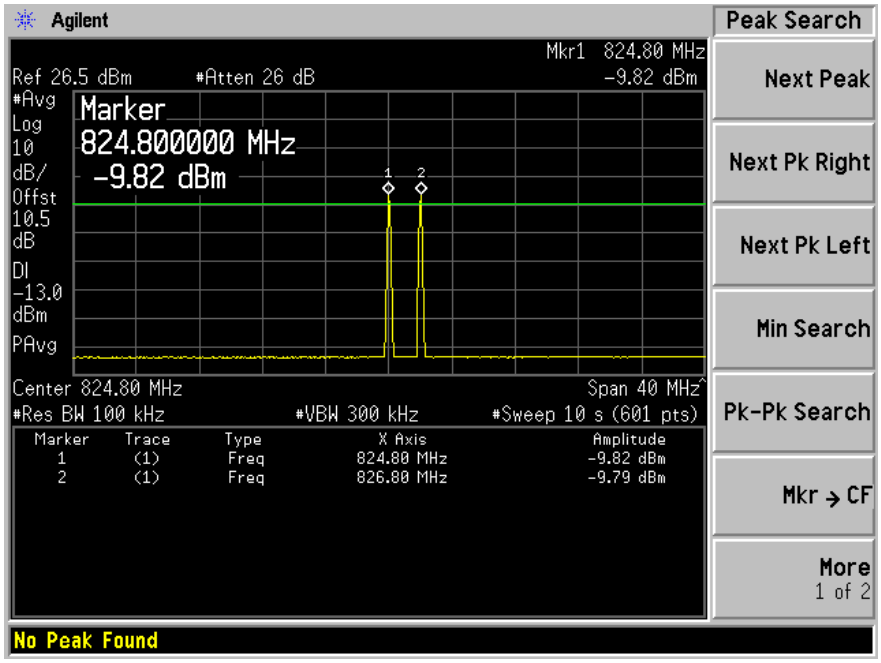


Plot 2: Above 1 GHz

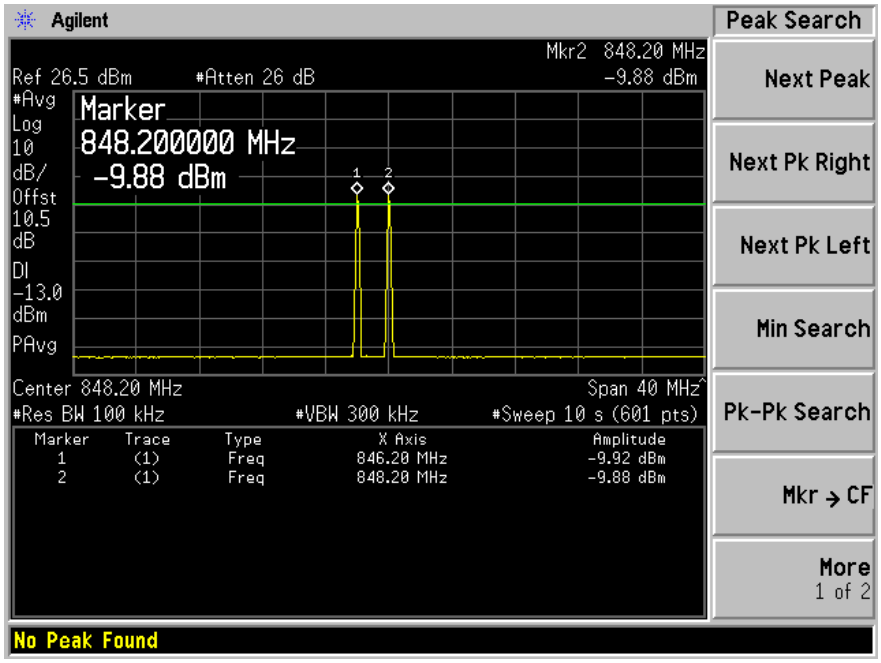


Inter-modulation:

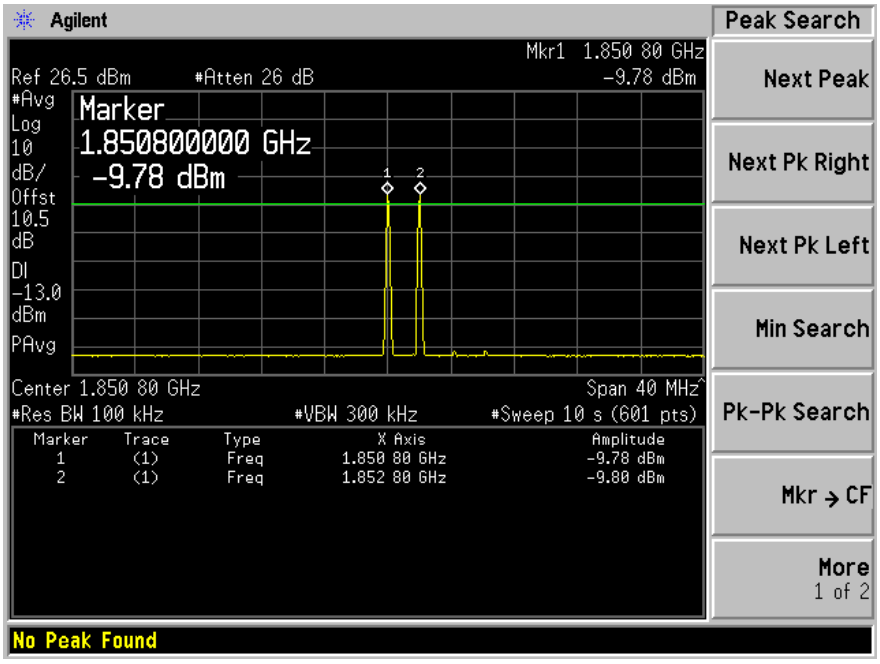
CDMA Cellular Band Uplink, Low Channel: 824.8 MHz:



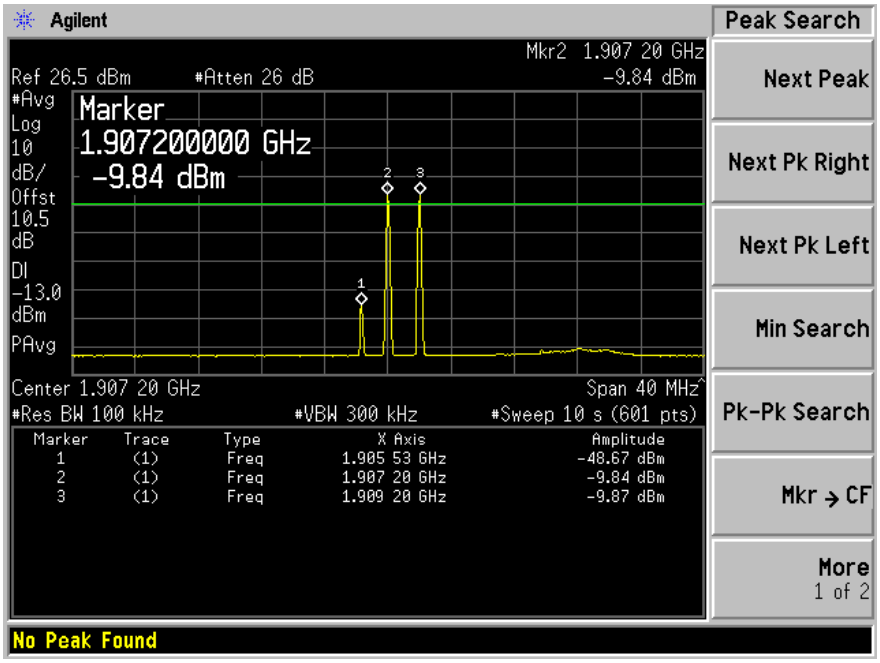
CDMA Cellular Band Uplink, High Channel: 848.2 MHz:



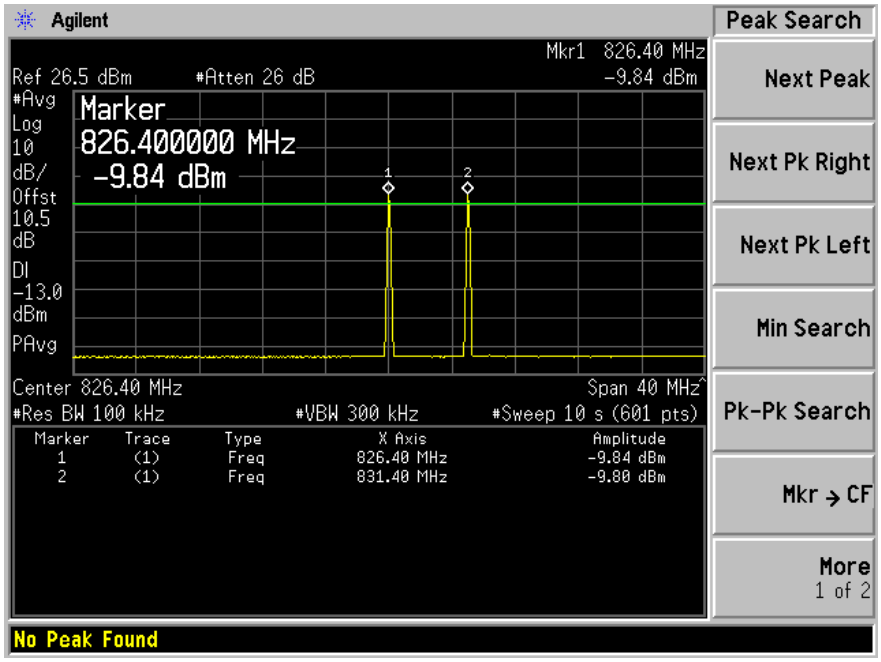
CDMA/EVDO PCS Band Uplink, Low Channel: 1850.8 MHz:



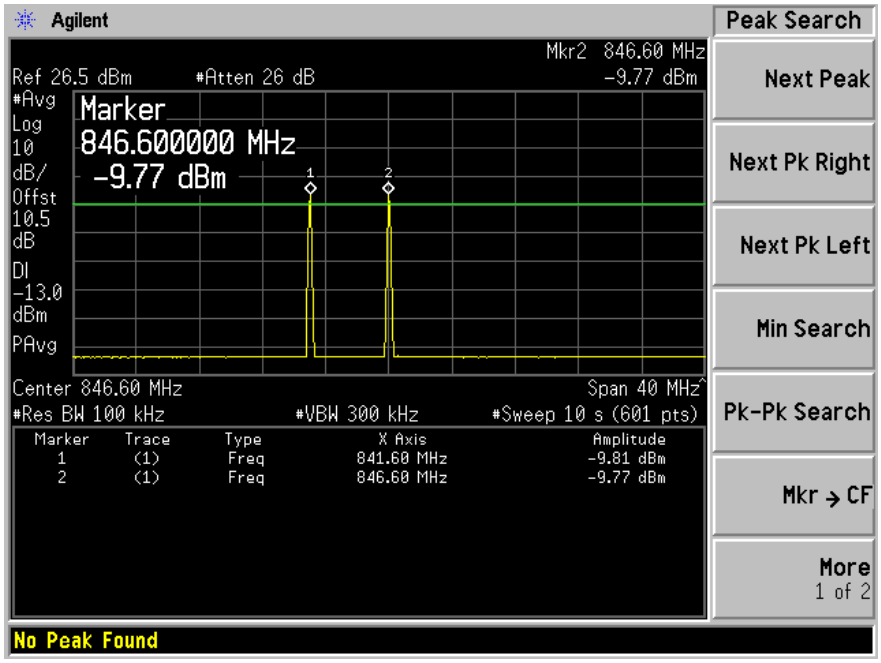
CDMA/EVDO PCS Band Uplink, High Channel: 1909.2 MHz:



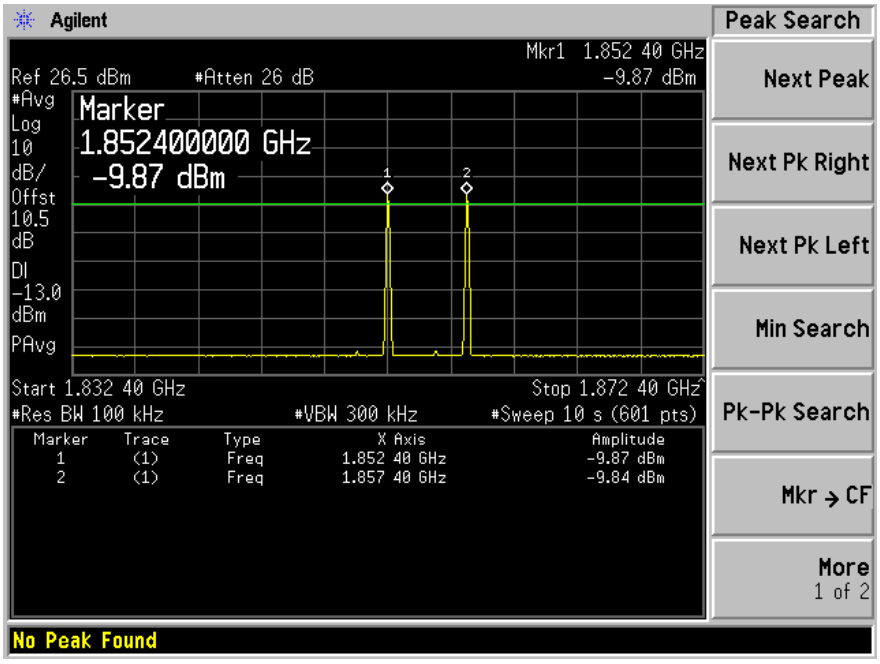
WCDMA Cellular Band Uplink, Low Channel: 826.4 MHz:



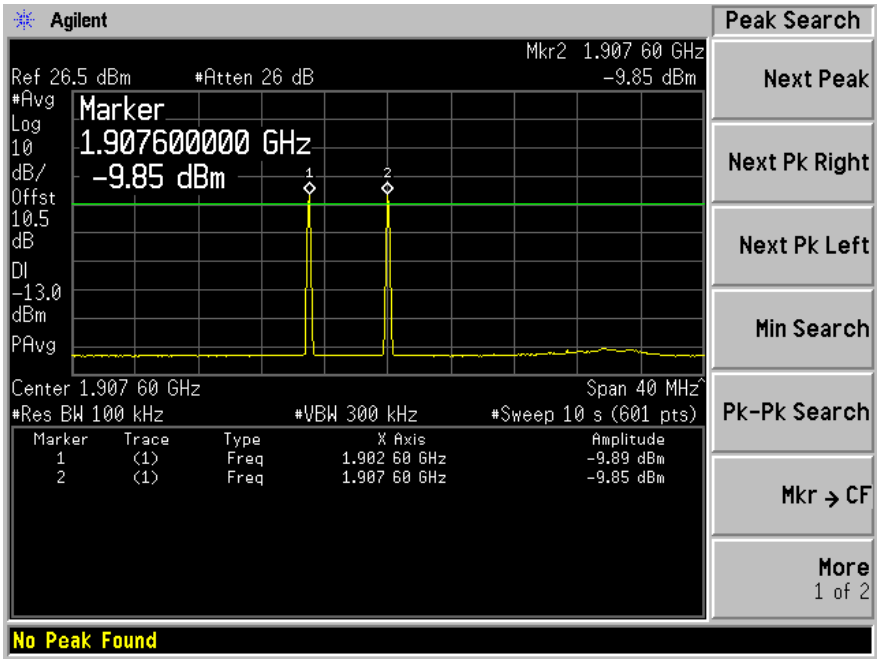
WCDMA Cellular Band Uplink, High Channel: 846.6 MHz:



WCDMA PCS Band Uplink, Low Channel: 1852.4 MHz:



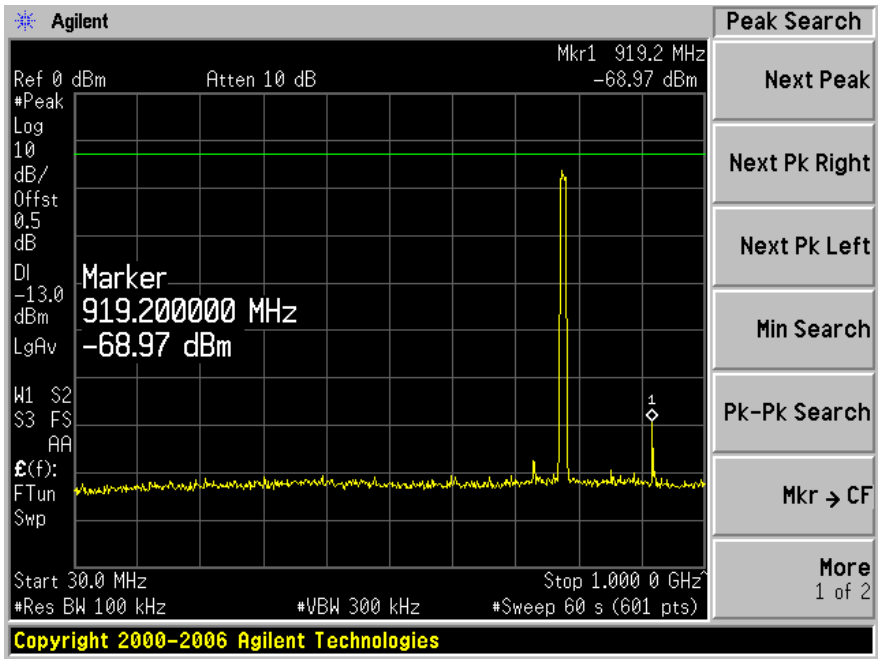
WCDMA PCS Band Uplink, High Channel: 1907.6 MHz:



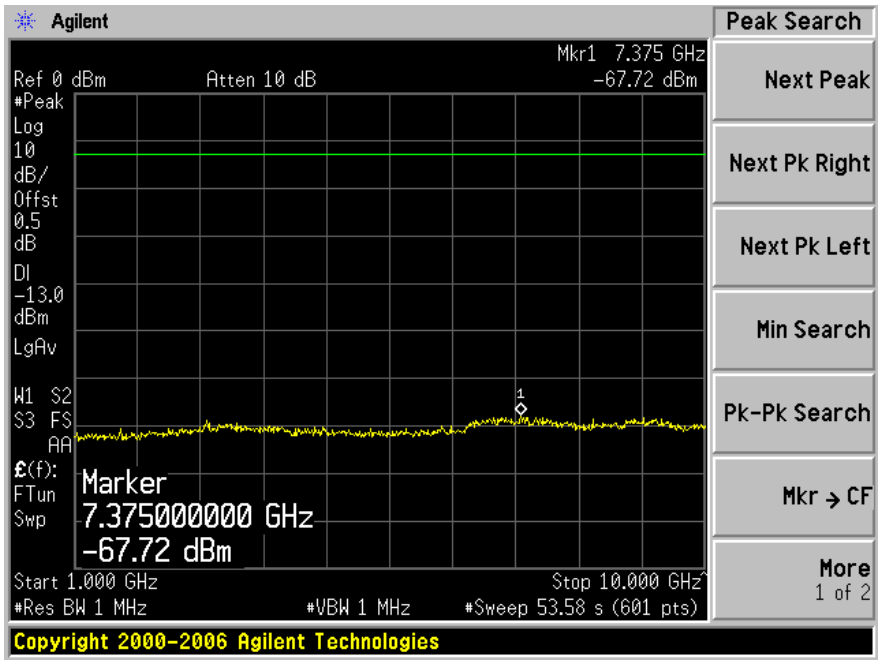
776-787 MHz LTE Band, Uplink: Antenna Port # 1:

Modulation: QPSK, Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz

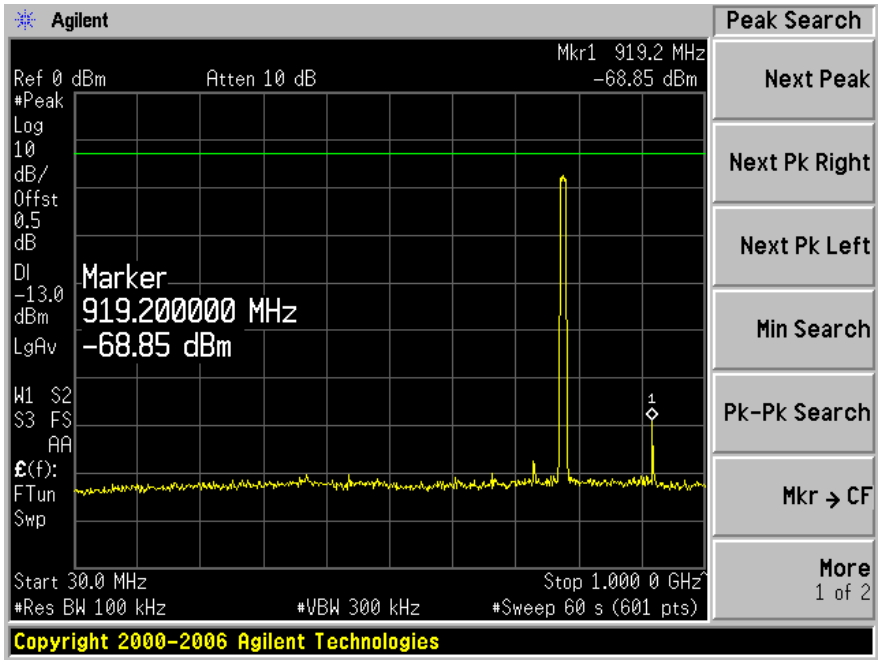


Plot 2: Above 1 GHz

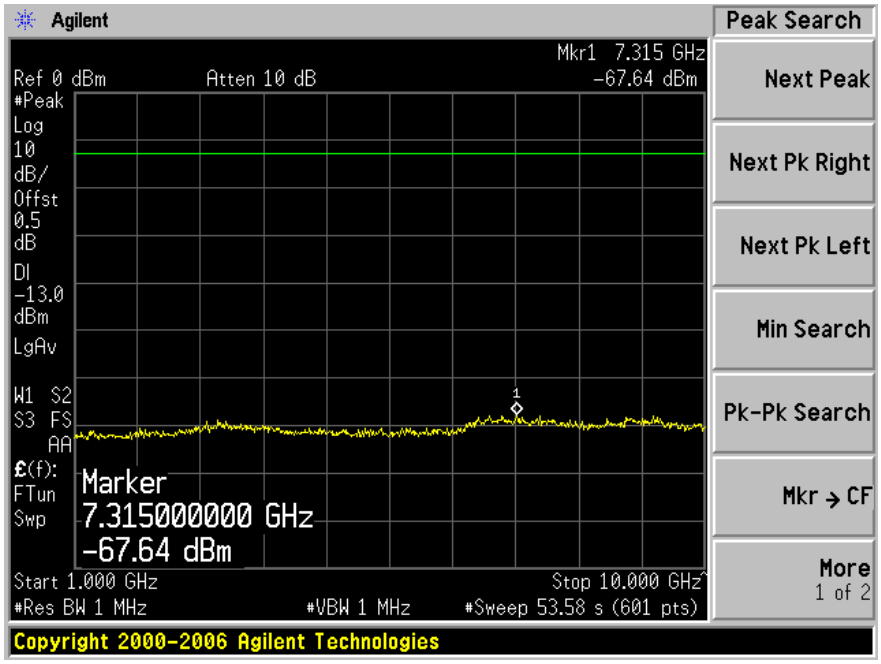


Modulation: 16QAM, Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz

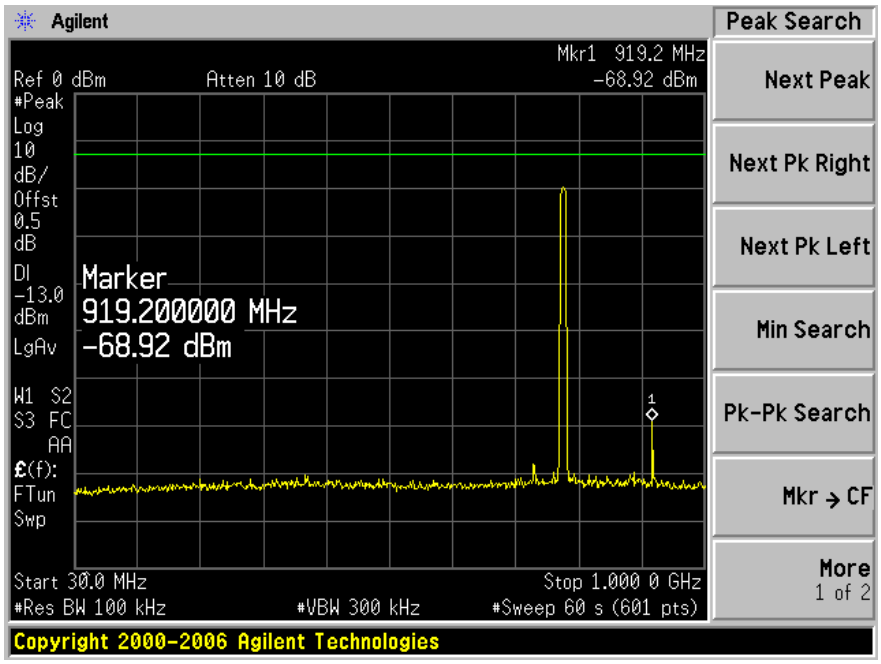


Plot 2: Above 1 GHz

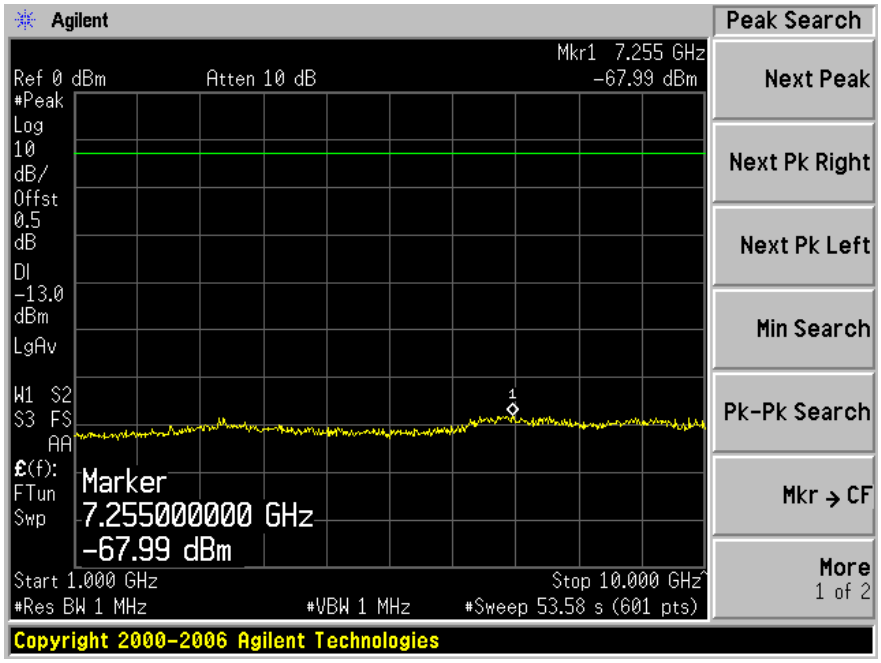


Modulation: 64QAM, Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz



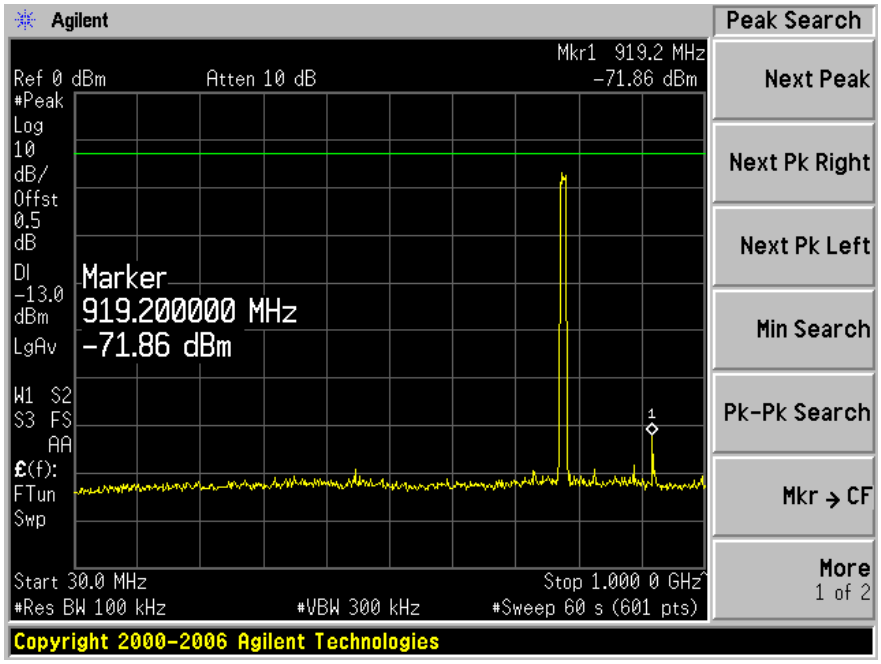
Plot 2: Above 1 GHz



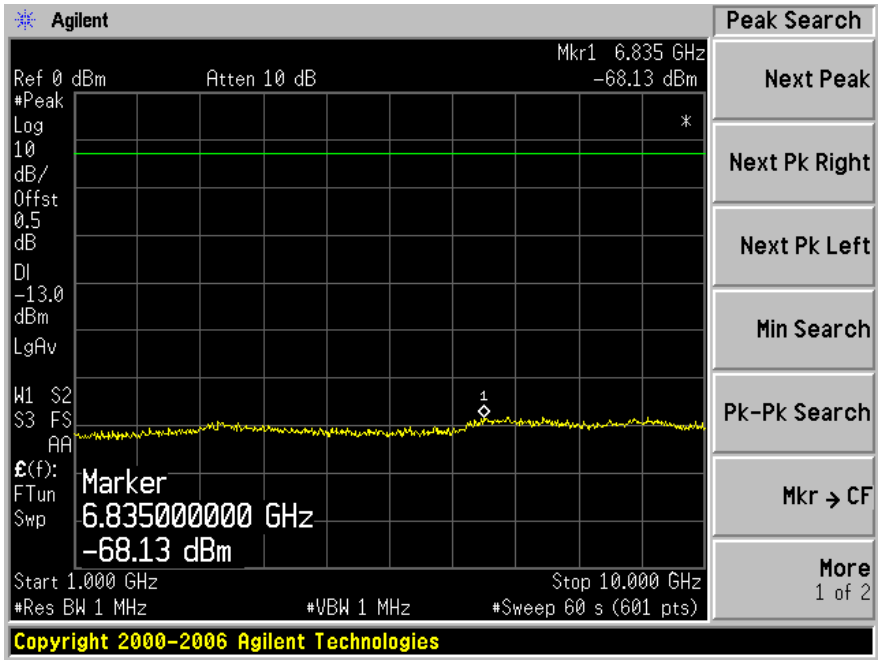
776-787 MHz LTE Band, Uplink: Antenna Port # 2:

Modulation: QPSK, Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz

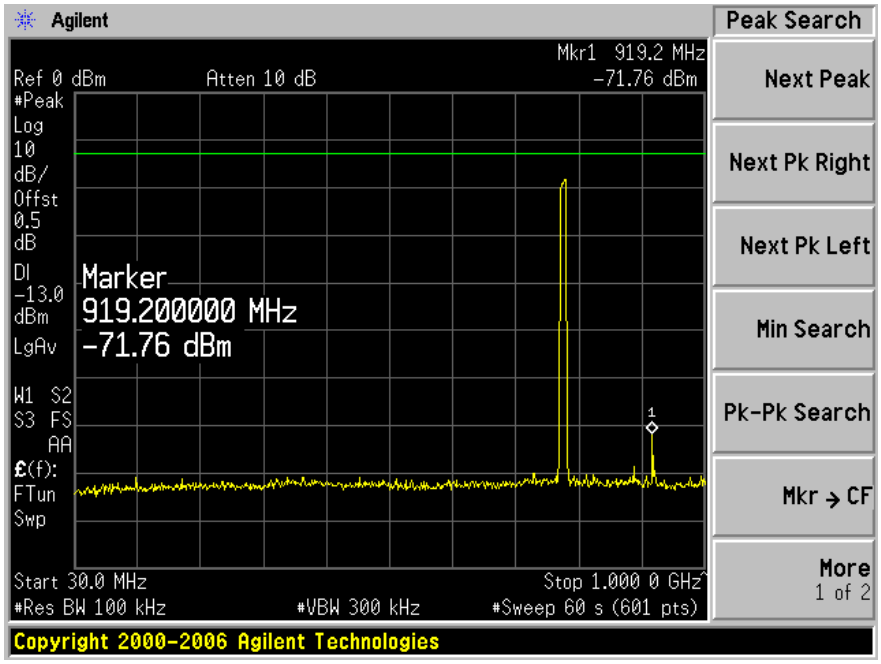


Plot 2: Above 1 GHz

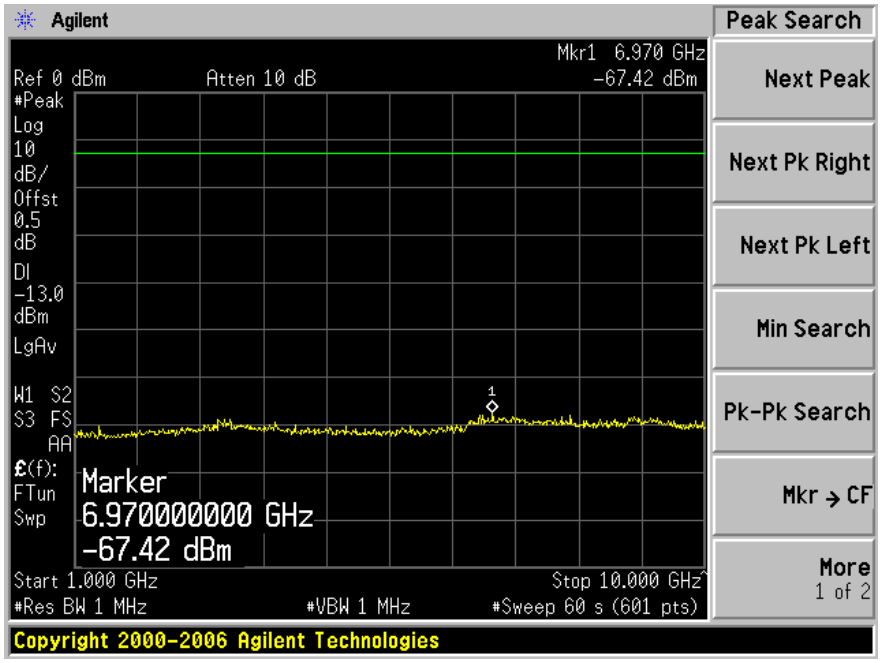


Modulation: 16QAM, Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz

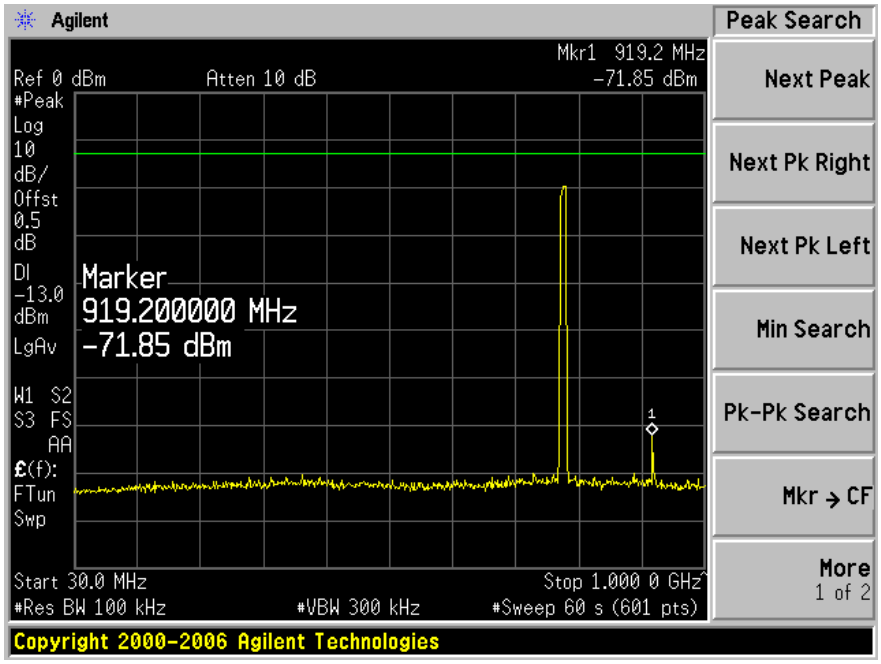


Plot 2: Above 1 GHz

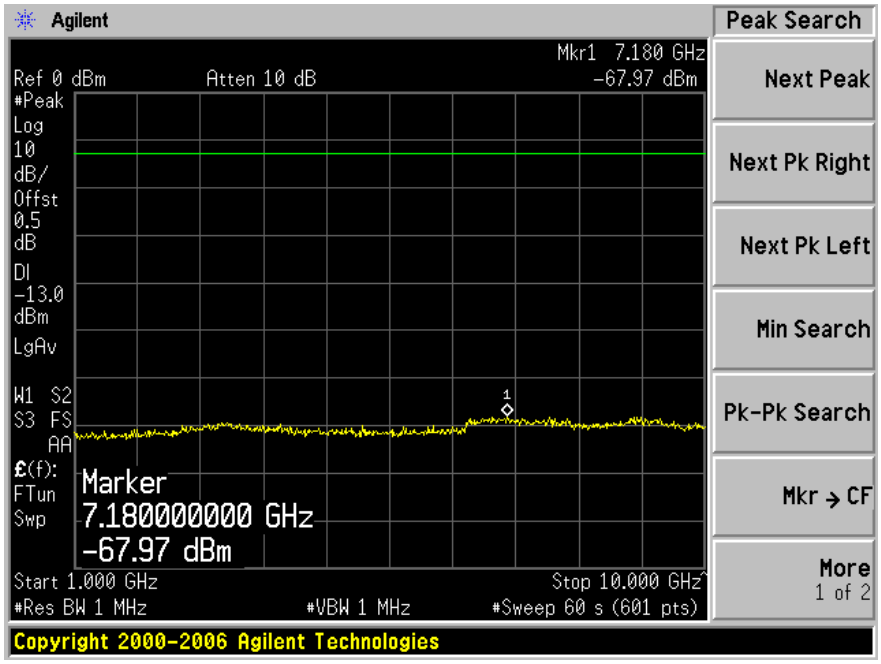


Modulation: 64QAM, Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz



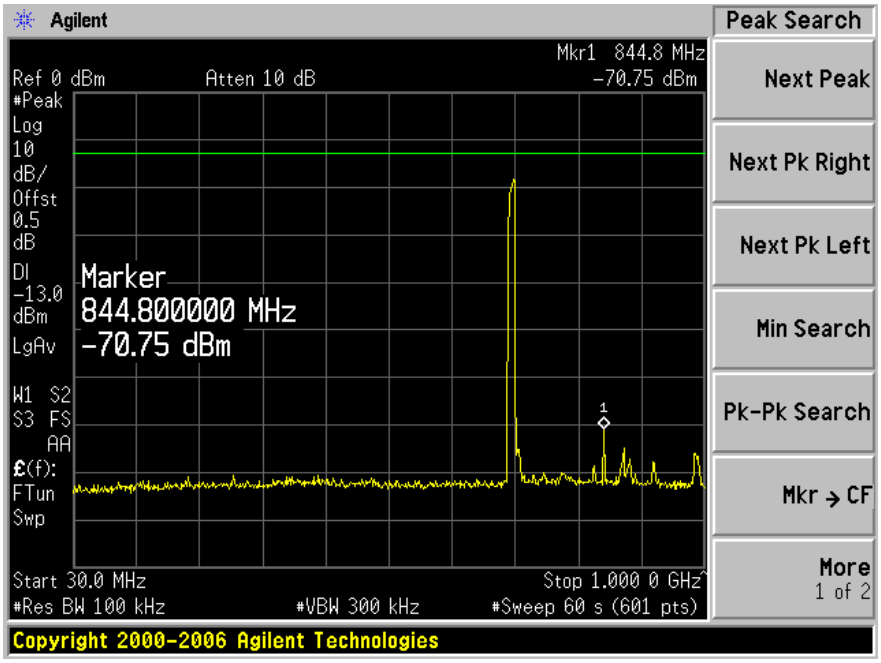
Plot 2: Above 1 GHz



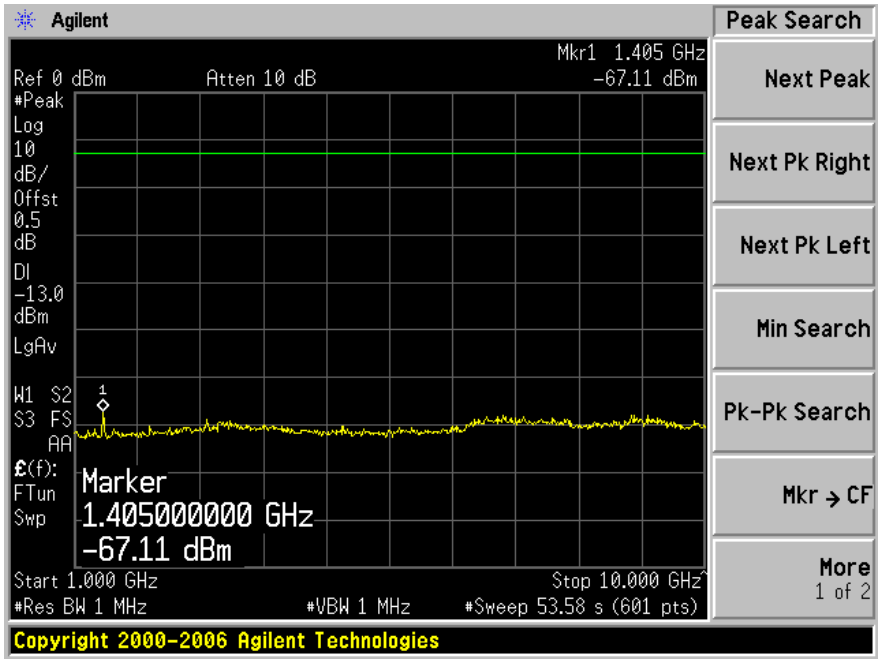
698-716 MHz LTE Band, Uplink: Antenna Port #1:

Modulation: QPSK, Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

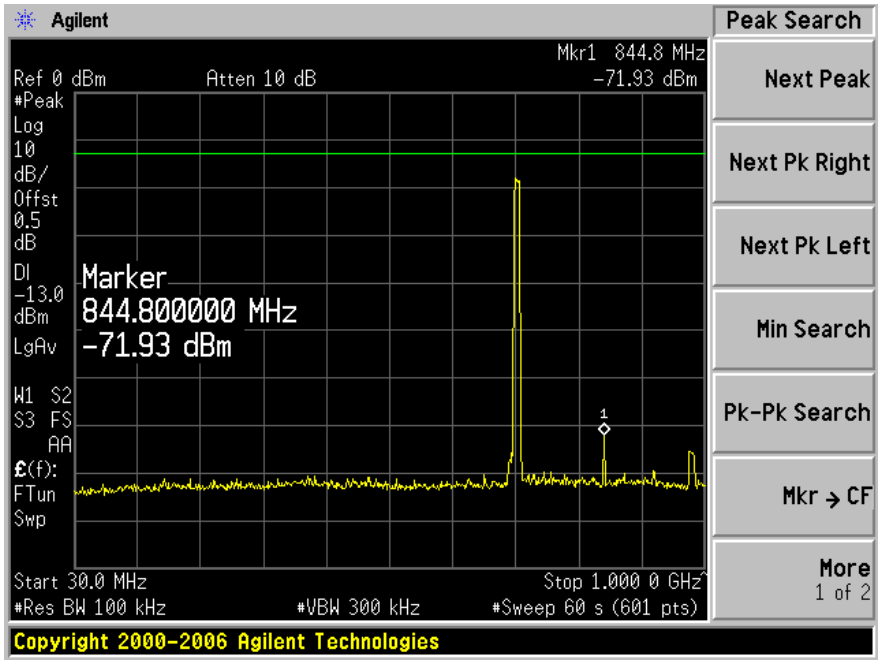


Plot 2: Above 1 GHz

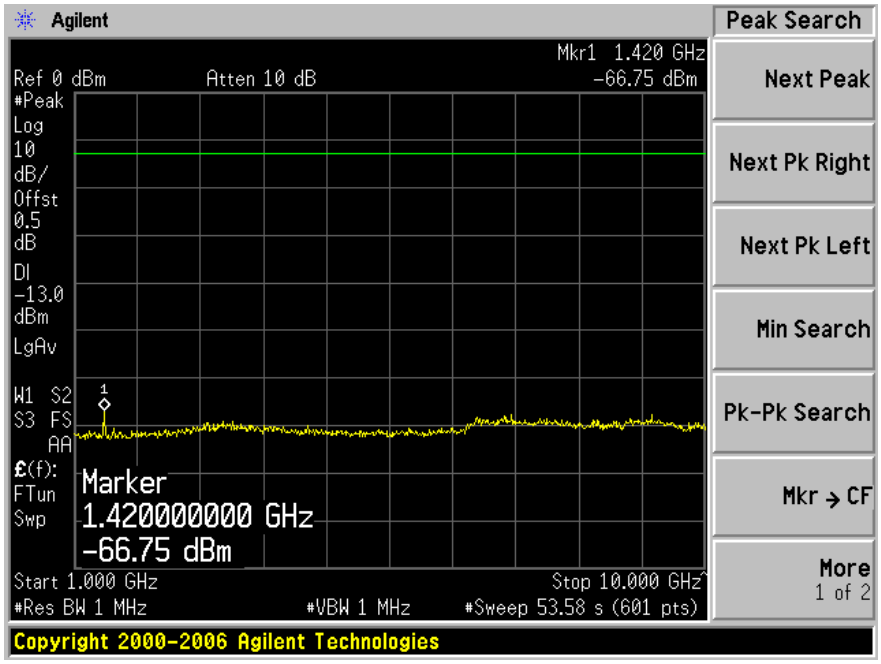


Modulation: QPSK, Frequency: 711 MHz

Plot 1: 30 MHz to 1 GHz

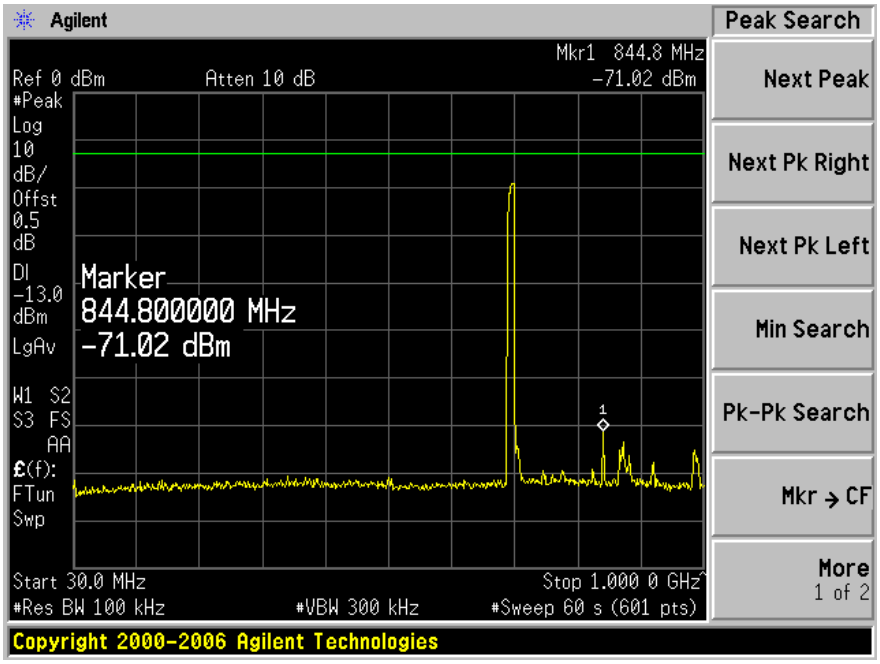


Plot 2: Above 1 GHz

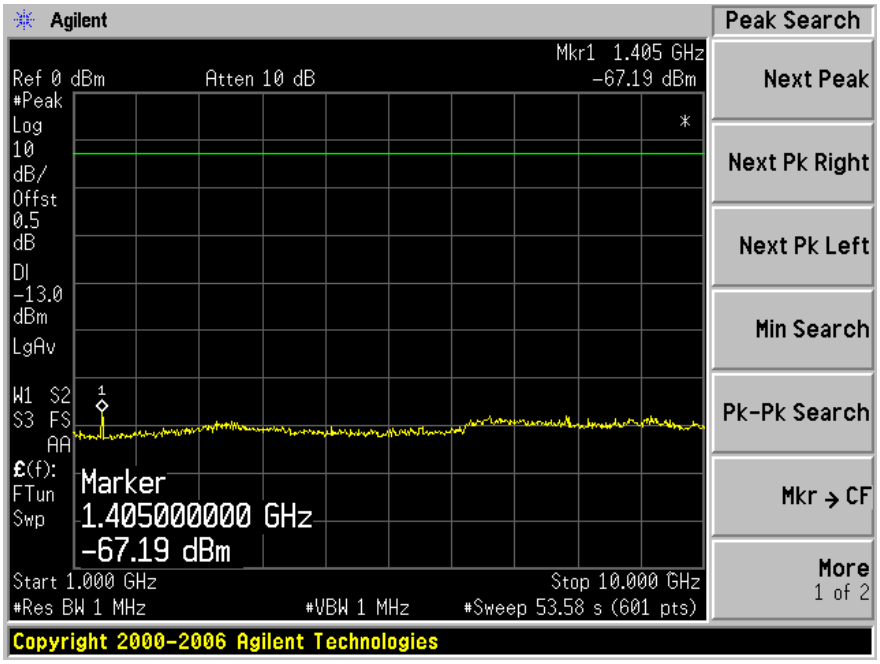


Modulation: 16QAM, Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

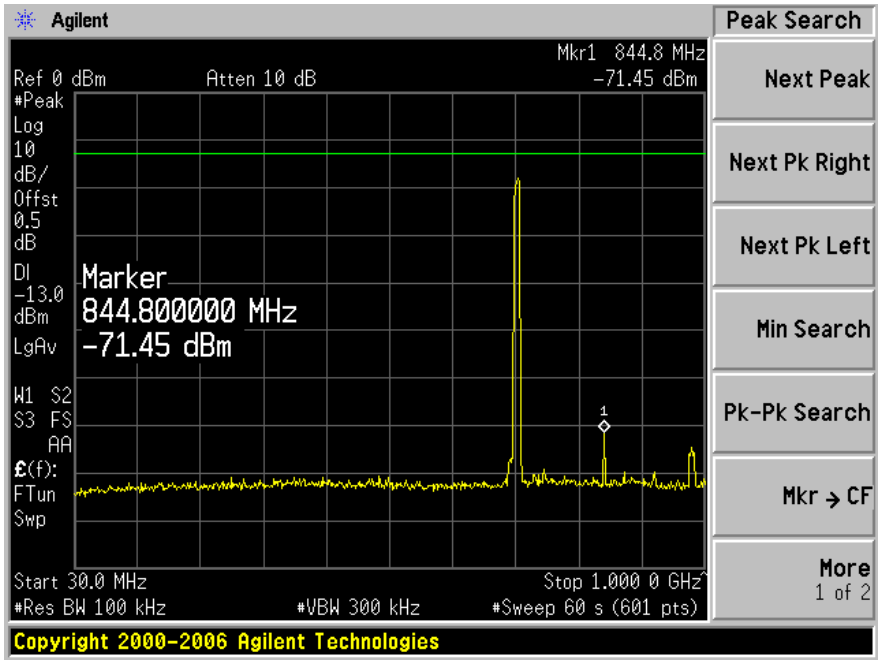


Plot 2: Above 1 GHz

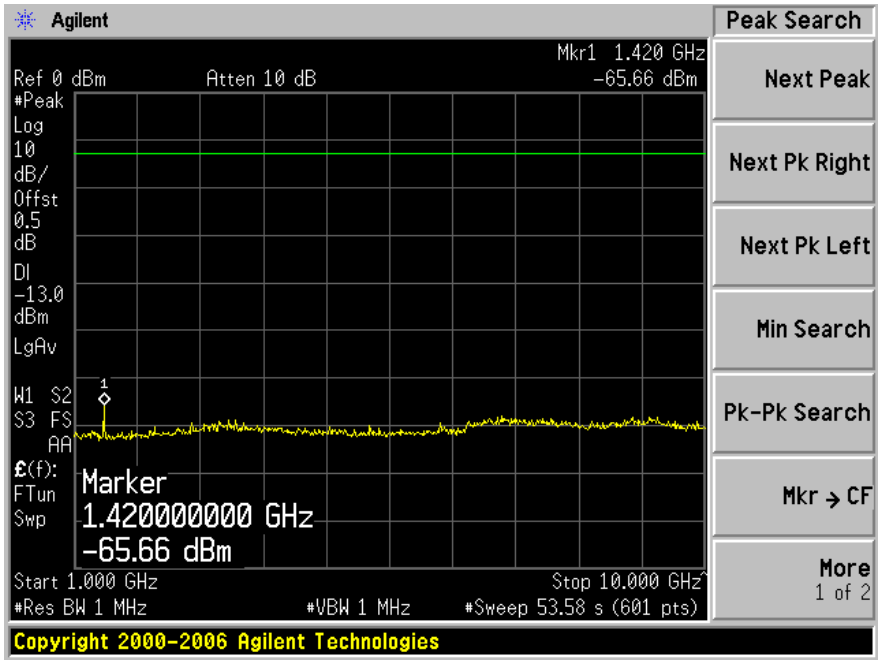


Modulation: 16QAM, Frequency: 711 MHz

Plot 1: 30 MHz to 1 GHz

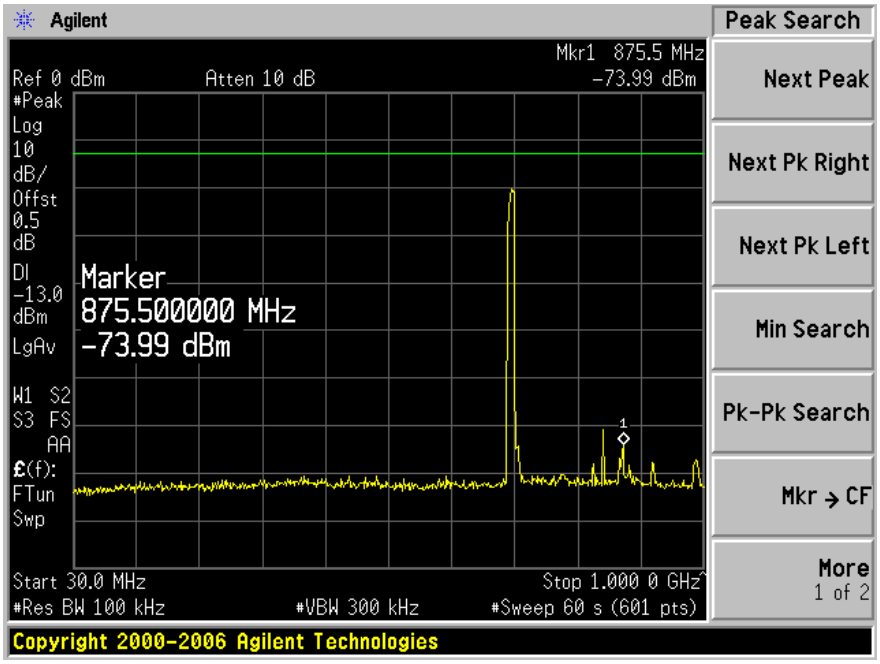


Plot 2: Above 1 GHz

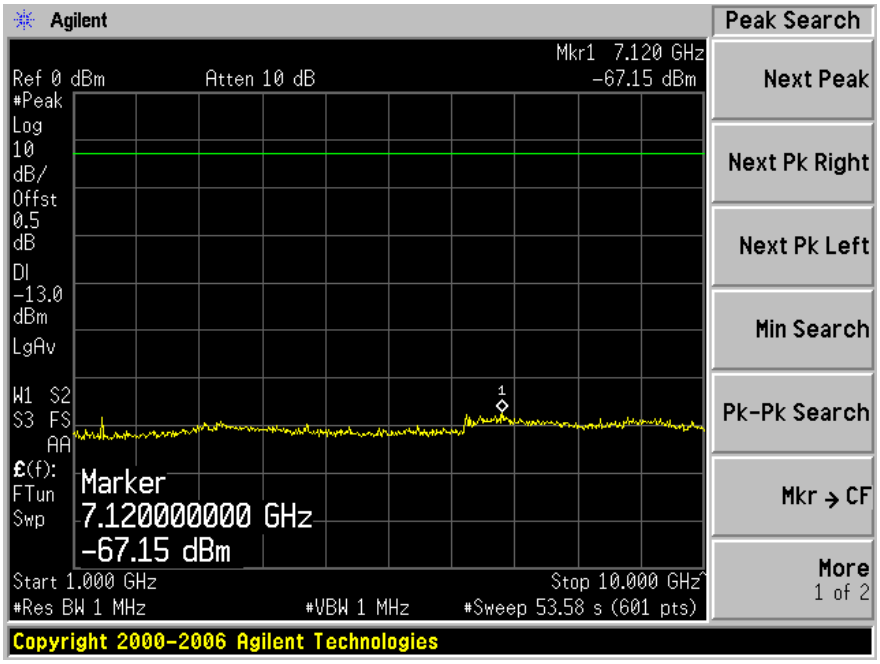


Modulation: 64QAM, Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

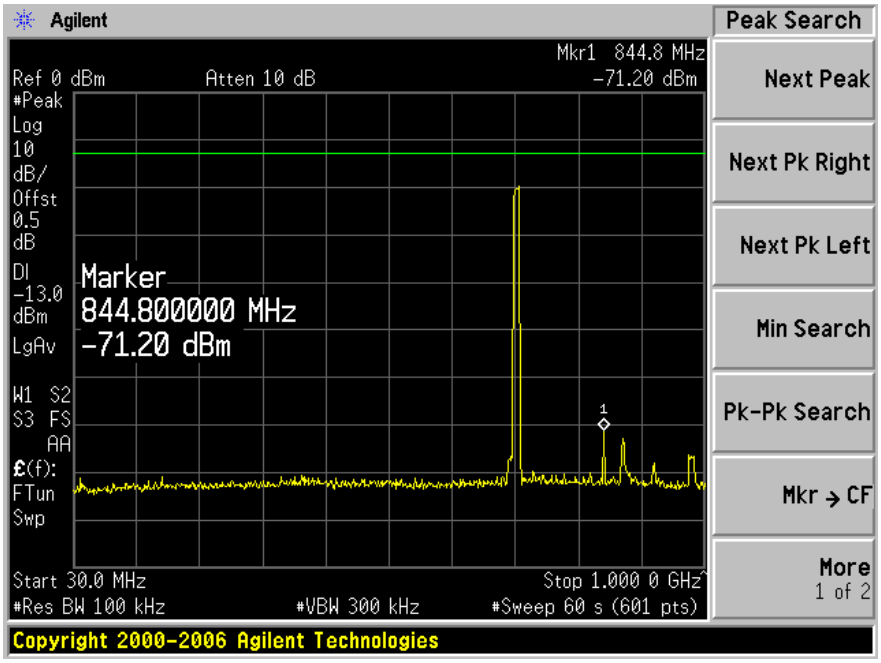


Plot 2: Above 1 GHz

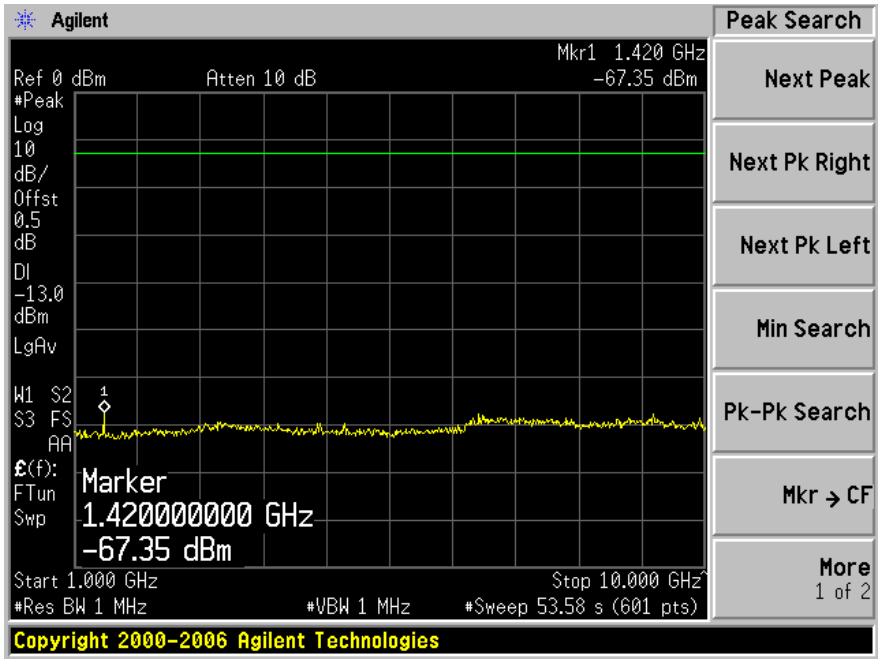


Modulation: 64QAM, Frequency: 711 MHz

Plot 1: 30 MHz to 1 GHz

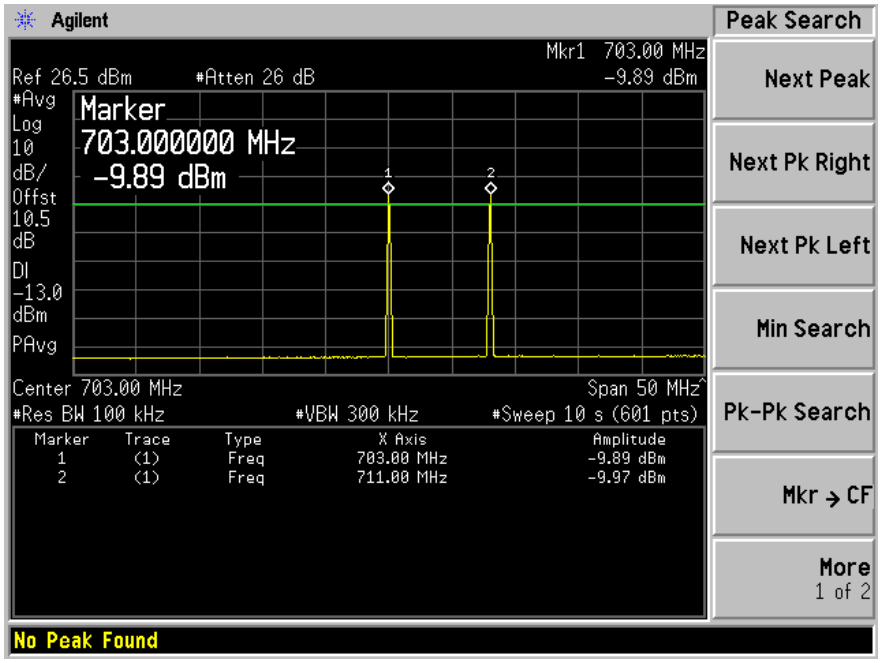


Plot 2: Above 1 GHz

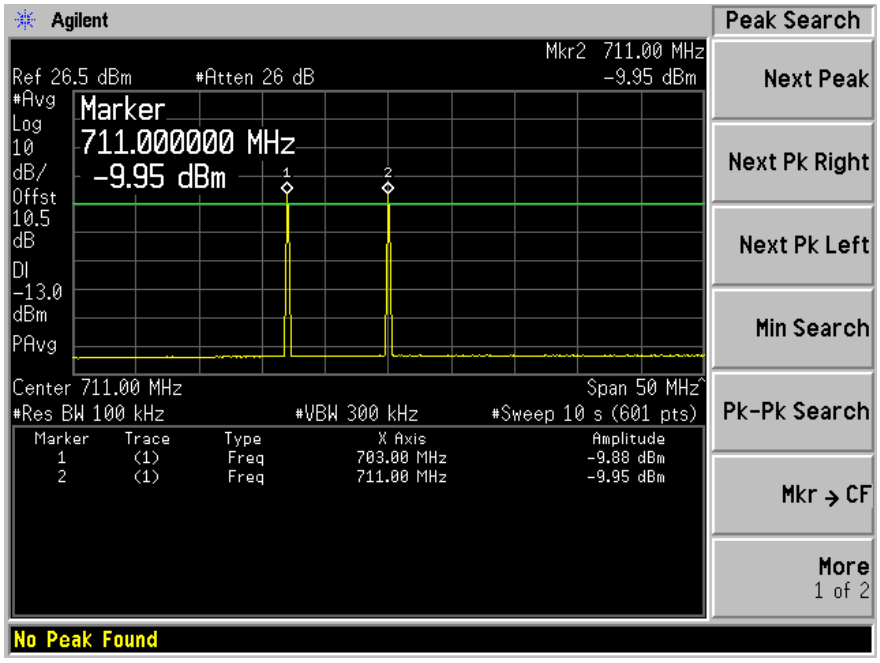


698-716 MHz LTE Band, Uplink CW Inter-Modulation Antenna Port # 1

Inter-Modulation Lowest Frequency



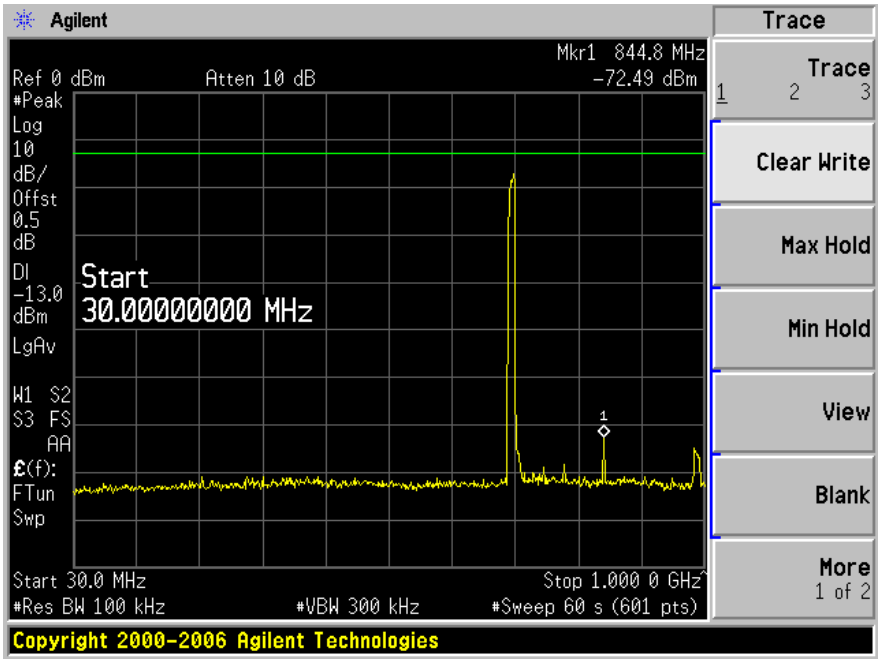
Inter-Modulation Highest Frequency



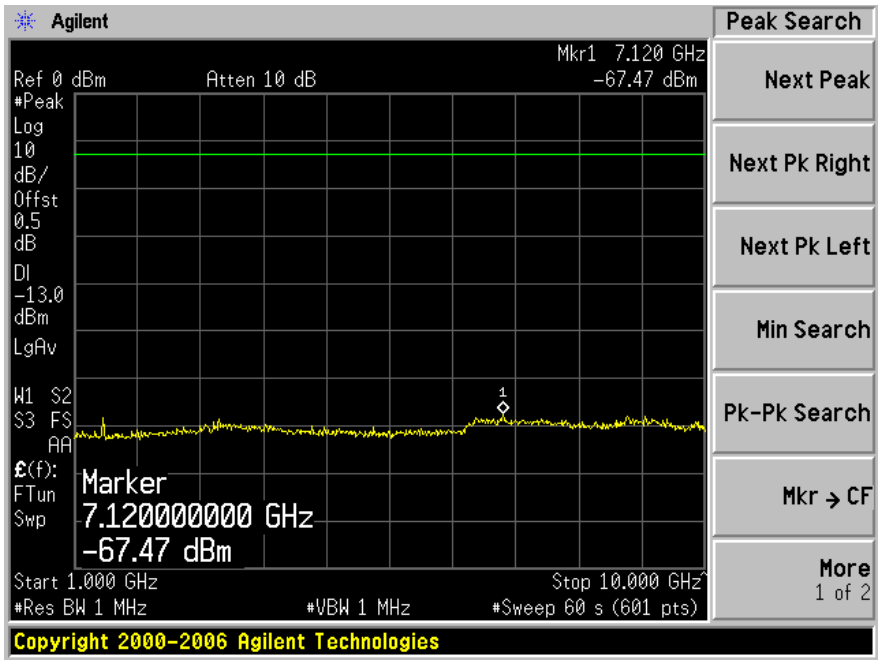
698-716 MHz LTE Band, Uplink Antenna Port # 2

Modulation: QPSK, Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

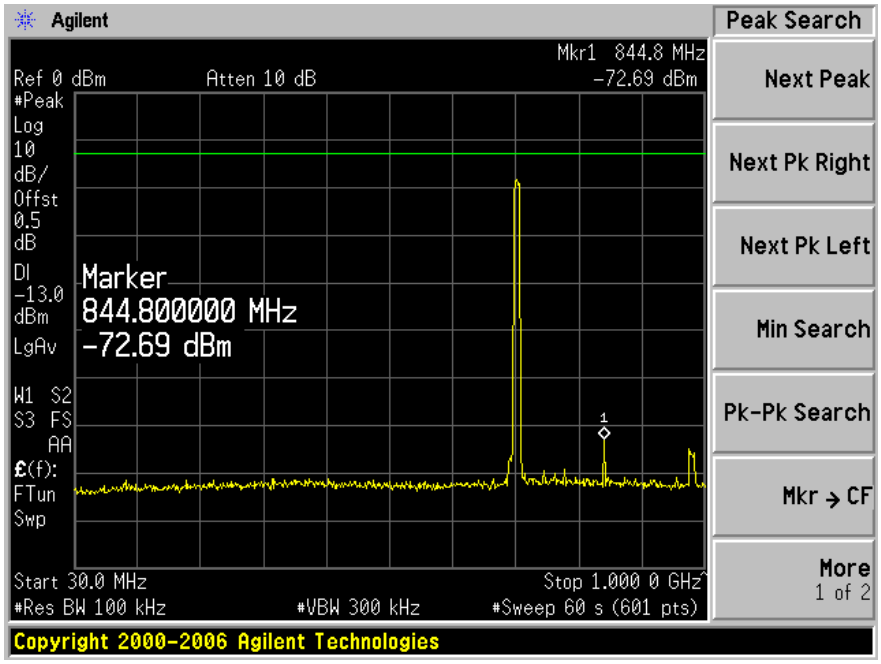


Plot 2: Above 1 GHz

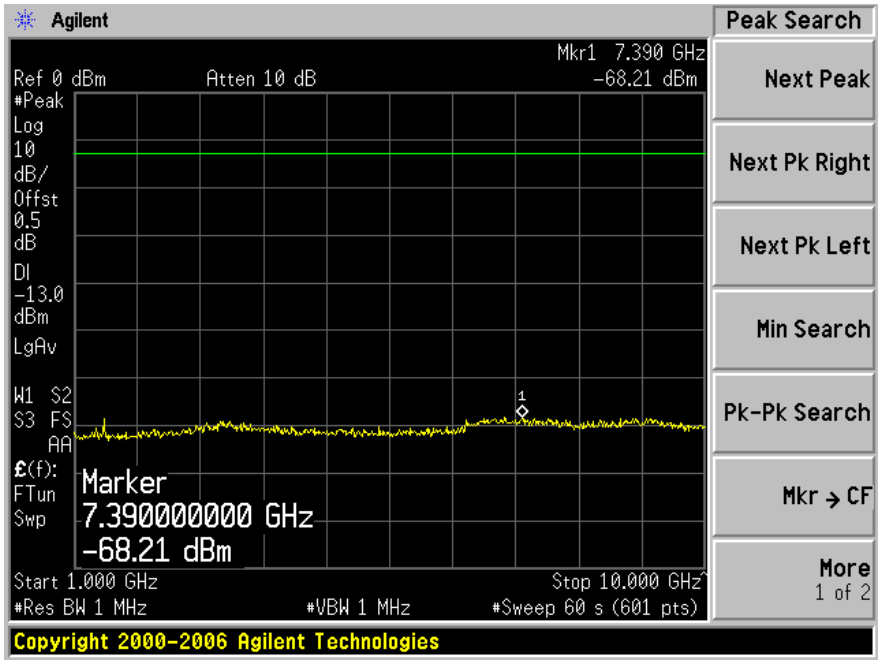


Modulation: QPSK, Frequency: 711 MHz

Plot 1: 30 MHz to 1 GHz

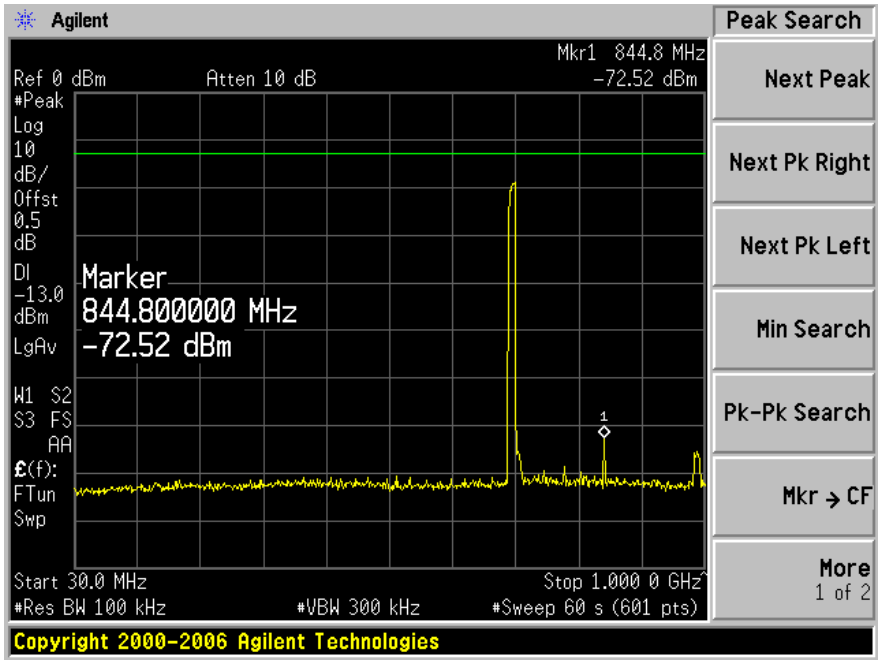


Plot 2: Above 1 GHz

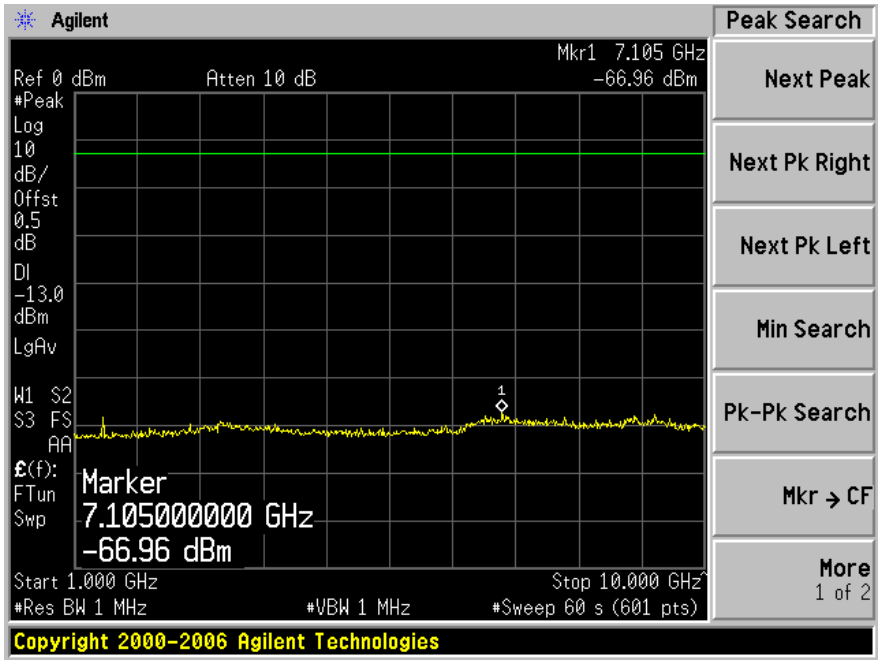


Modulation: 16QAM, Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

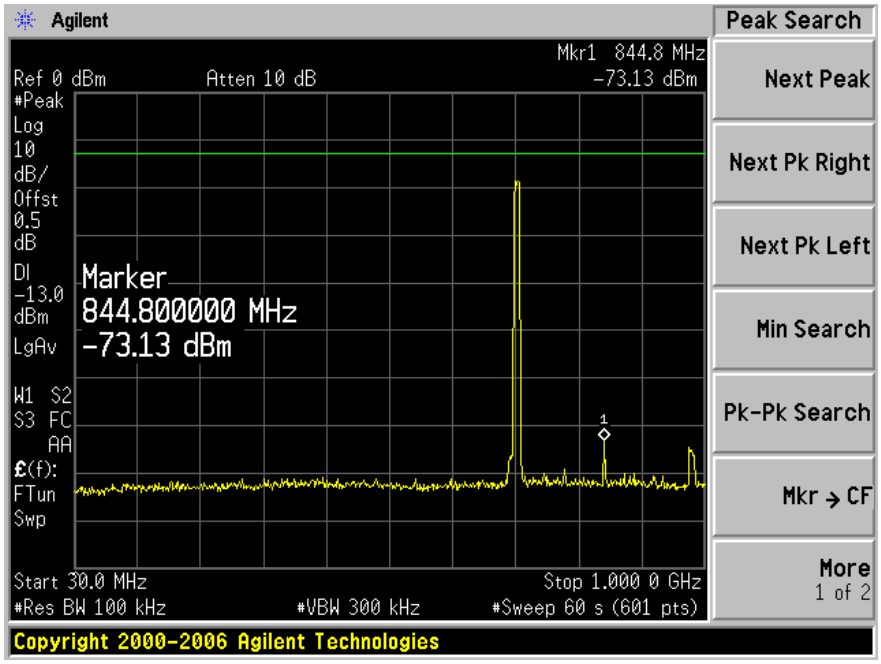


Plot 2: Above 1 GHz

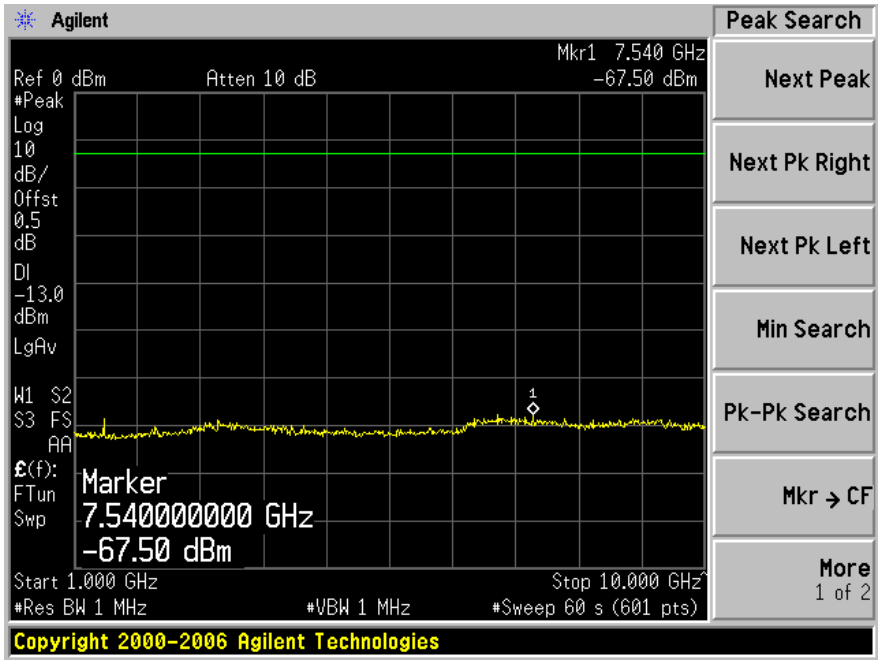


Modulation: 16QAM, Frequency: 711 MHz

Plot 1: 30 MHz to 1 GHz

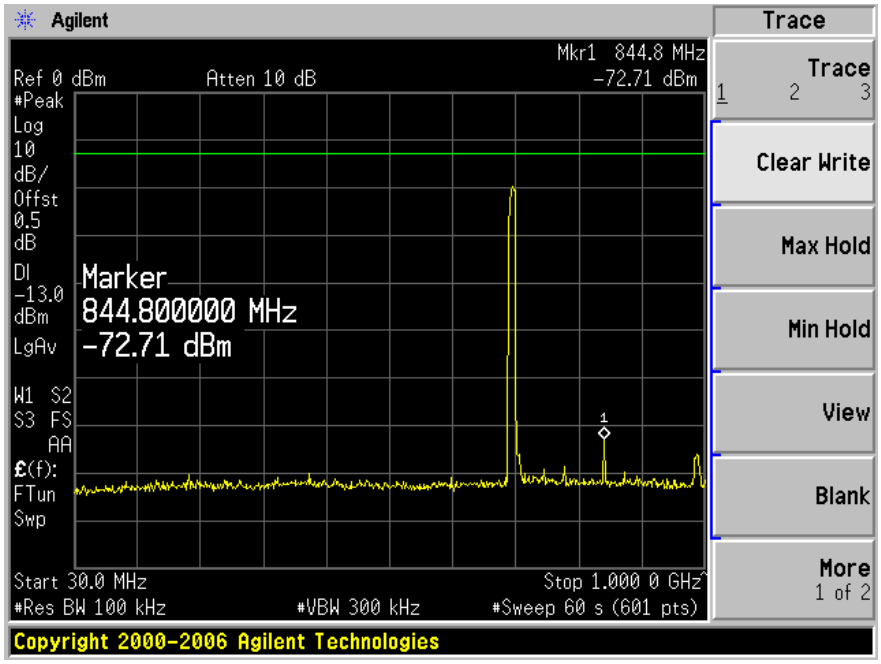


Plot 2: Above 1 GHz

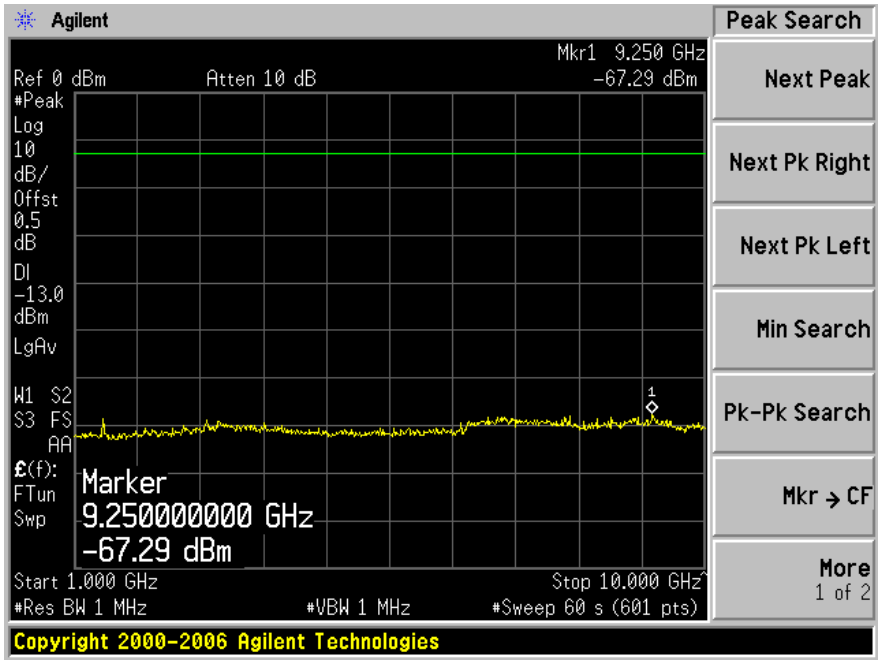


Modulation: 64QAM, Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

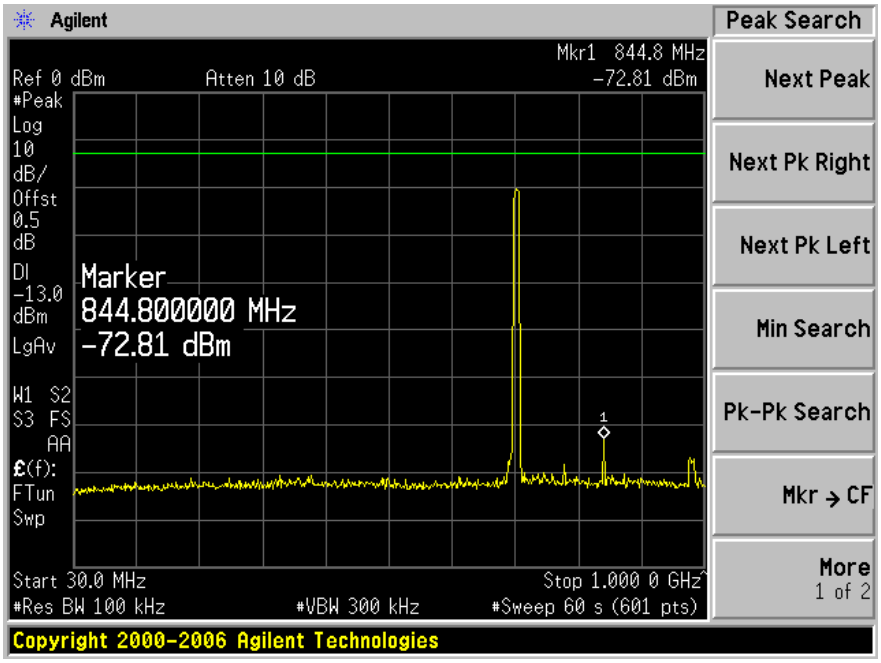


Plot 2: Above 1 GHz

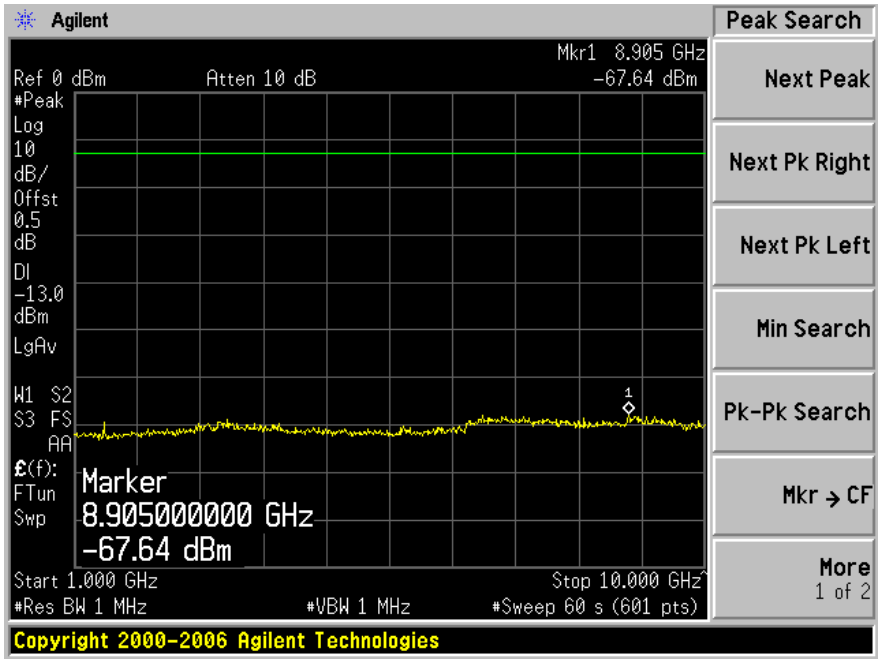


Modulation: 64QAM, Frequency: 711 MHz

Plot 1: 30 MHz to 1 GHz

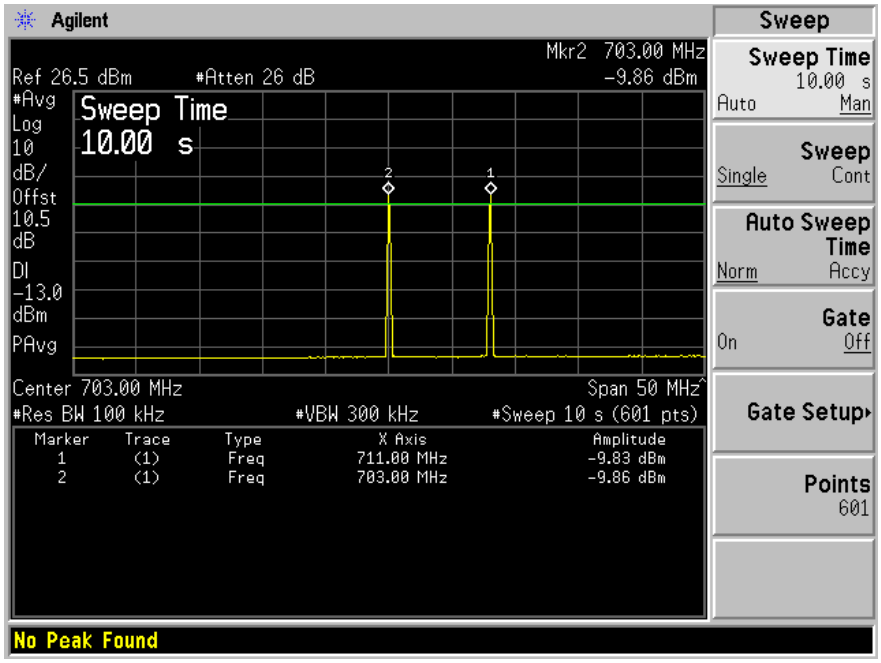


Plot 2: Above 1 GHz

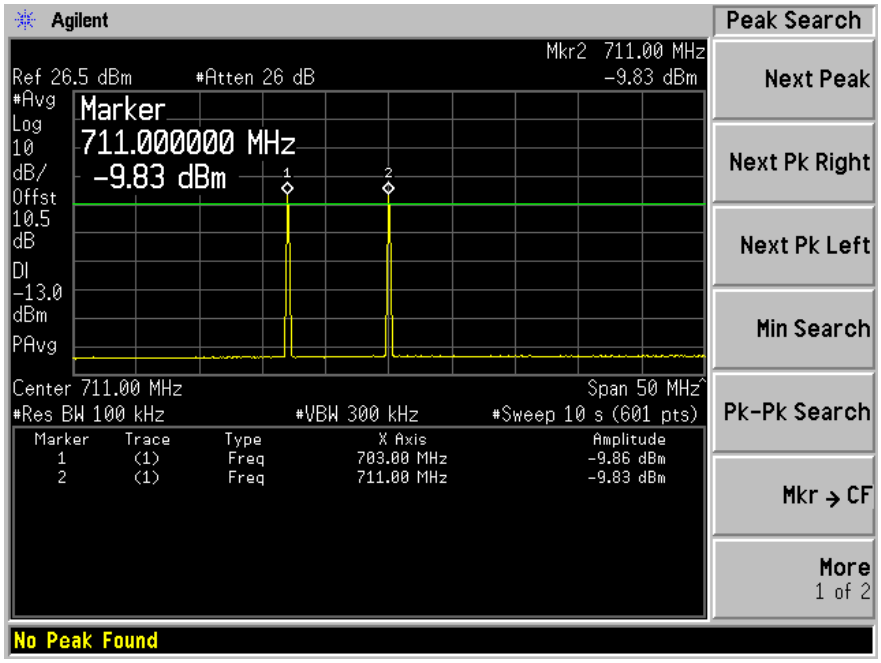


698-716 MHz LTE Band, Uplink CW Inter-Modulation Antenna Port # 2

Inter-Modulation Lowest Frequency



Inter-Modulation Highest Frequency



9 FCC §22.917, §24.238 & §27.53– BAND EDGE

9.1 Applicable Standard

According to §22.917, §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:	22-24°C
Relative Humidity:	41-43 %
ATM Pressure:	101-102kPa

** The testing was performed by Dennis Huang from 2009-12-11 to 2009-12-15 in 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	N5182A	MY47420502	2009-09-18

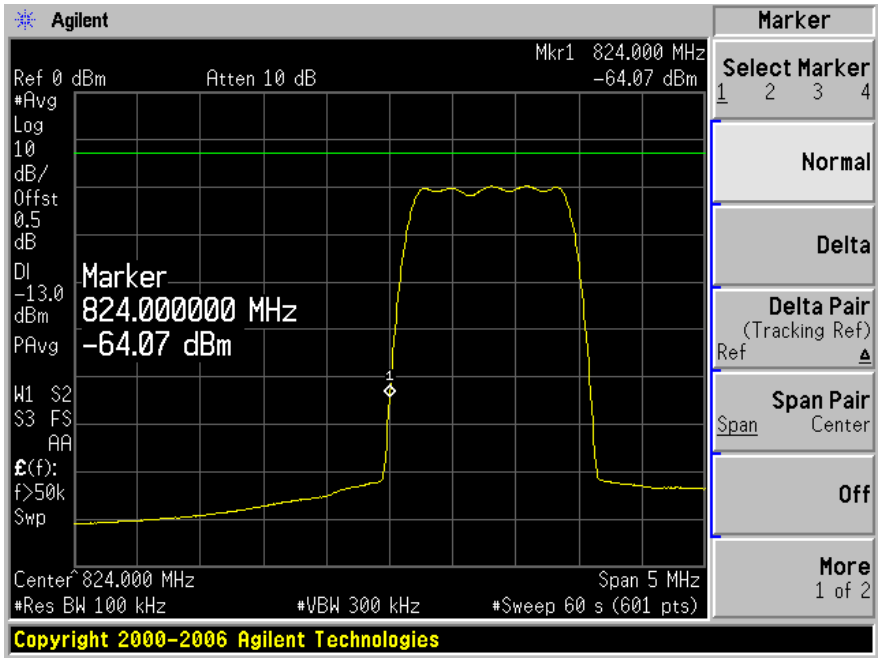
*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

9.5 Test Results

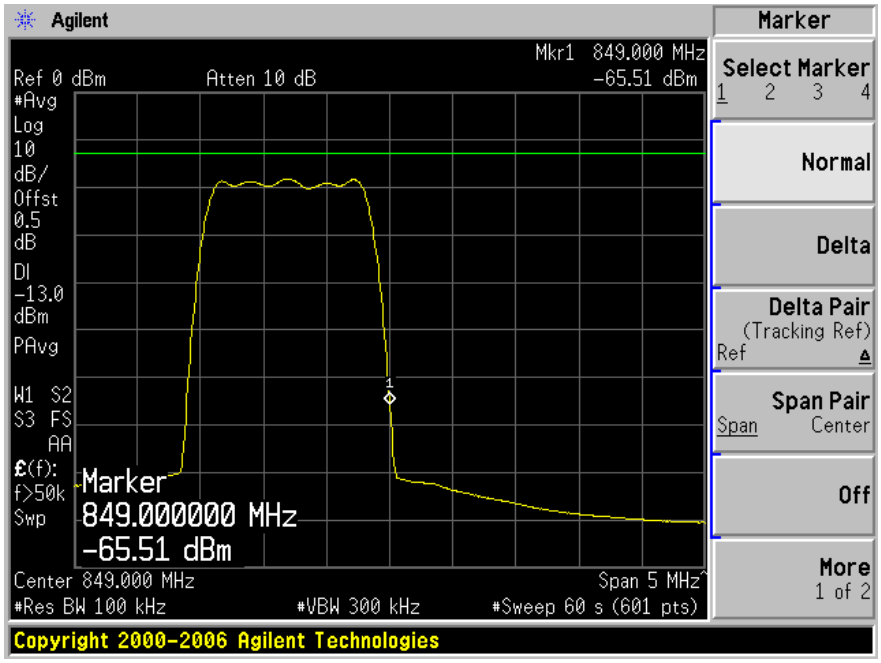
Please refer to the following plots.

Cellular 850 MHz and PCS 1900 MHz Band:

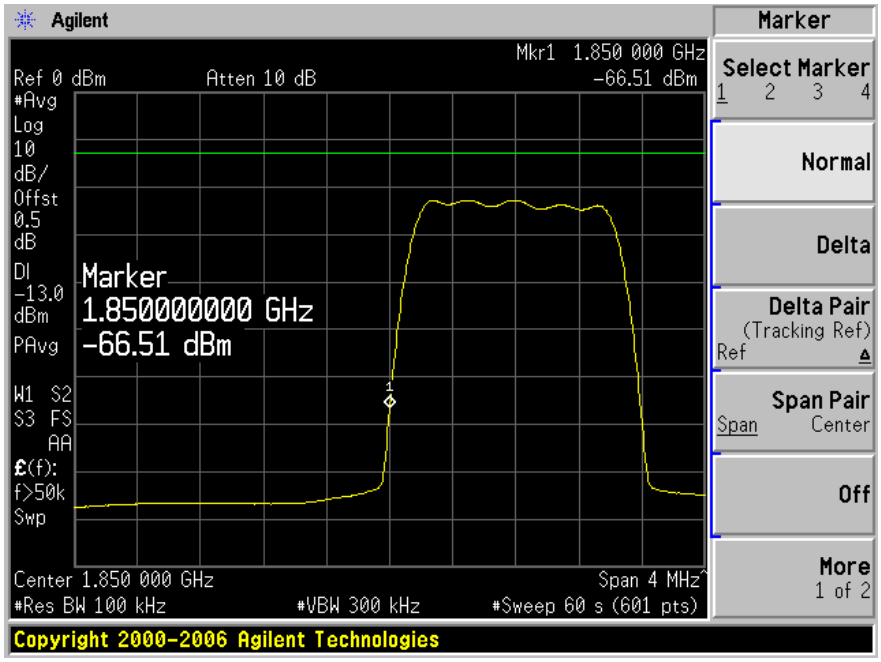
CDMA Cellular Band Uplink: Lowest Channel



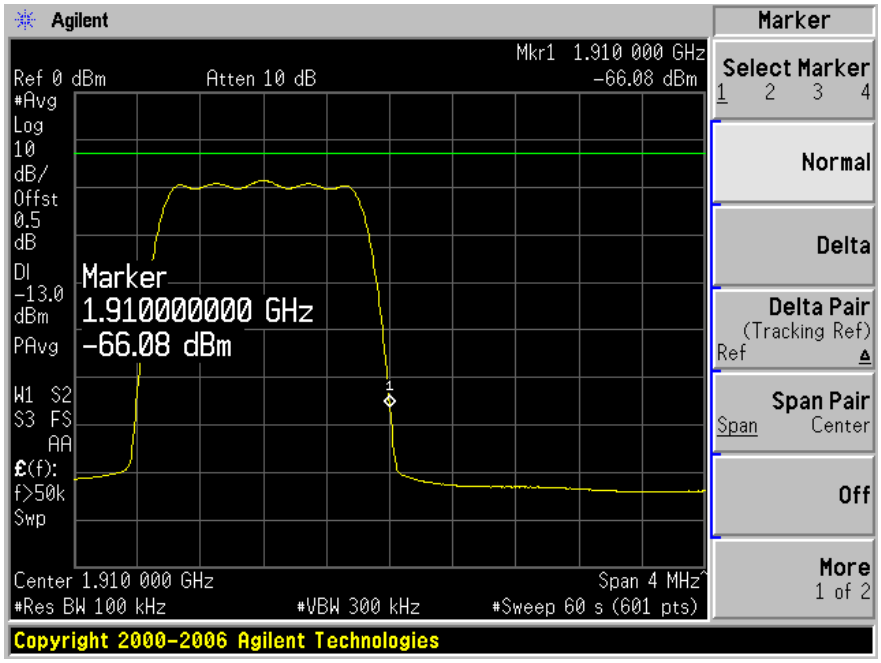
CDMA Cellular Band Uplink: Highest Channel



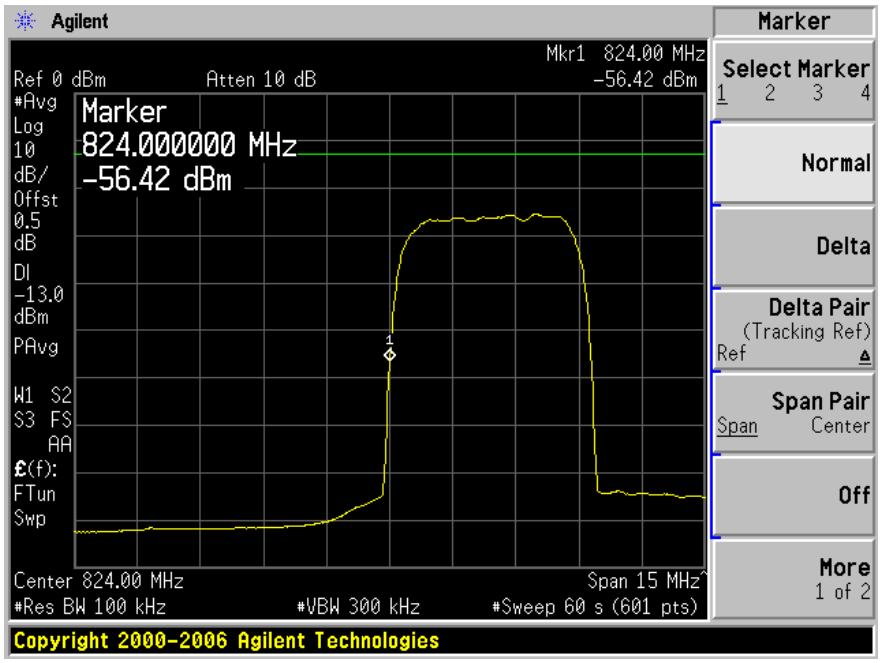
CDMA PCS Band Uplink: Lowest Channel



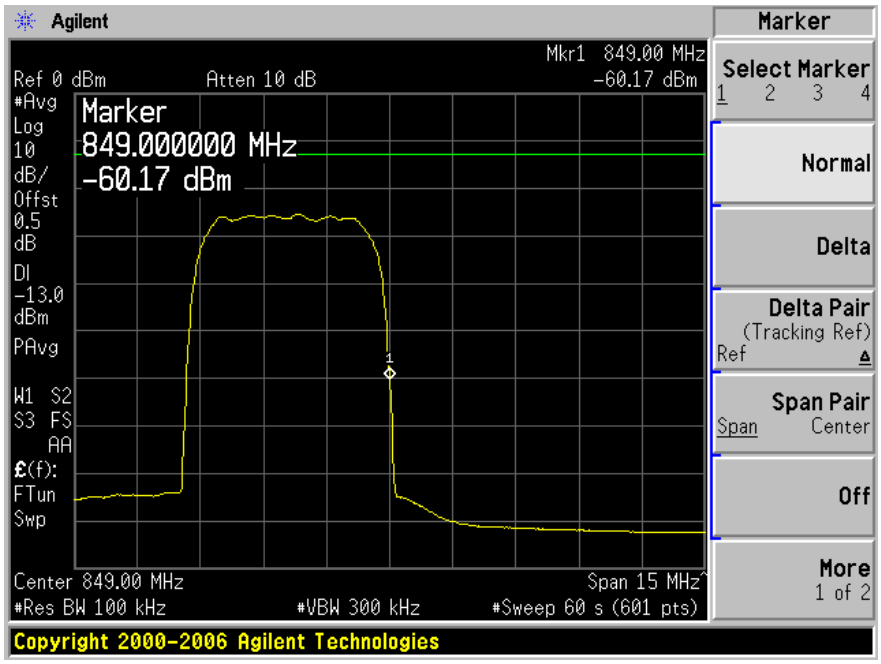
CDMA PCS Band Uplink: Highest Channel



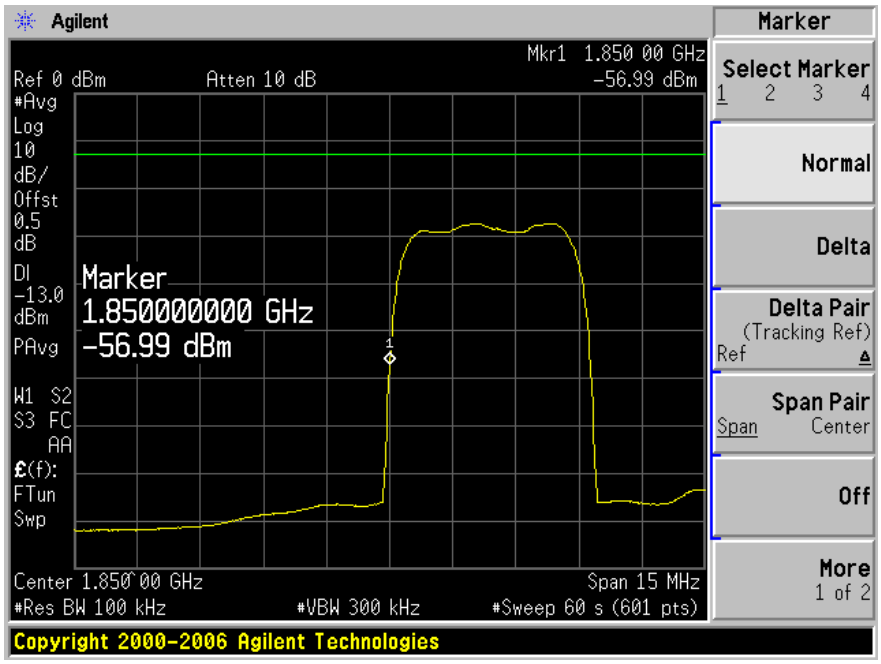
WCDMA Cellular Band Uplink: Lowest Channel



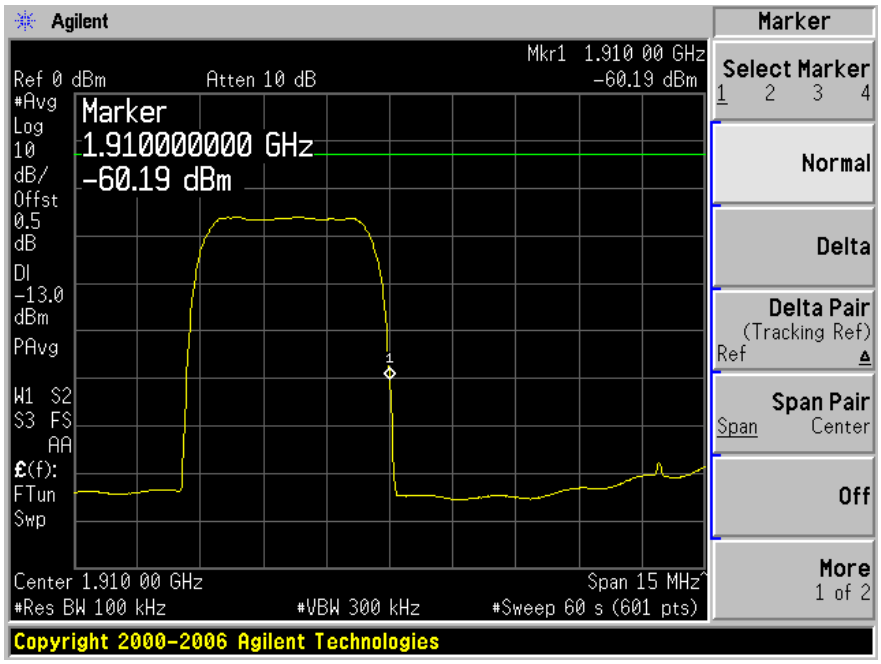
WCDMA Cellular Band Uplink: Highest Channel



WCDMA PCS Band Uplink: Lowest Channel



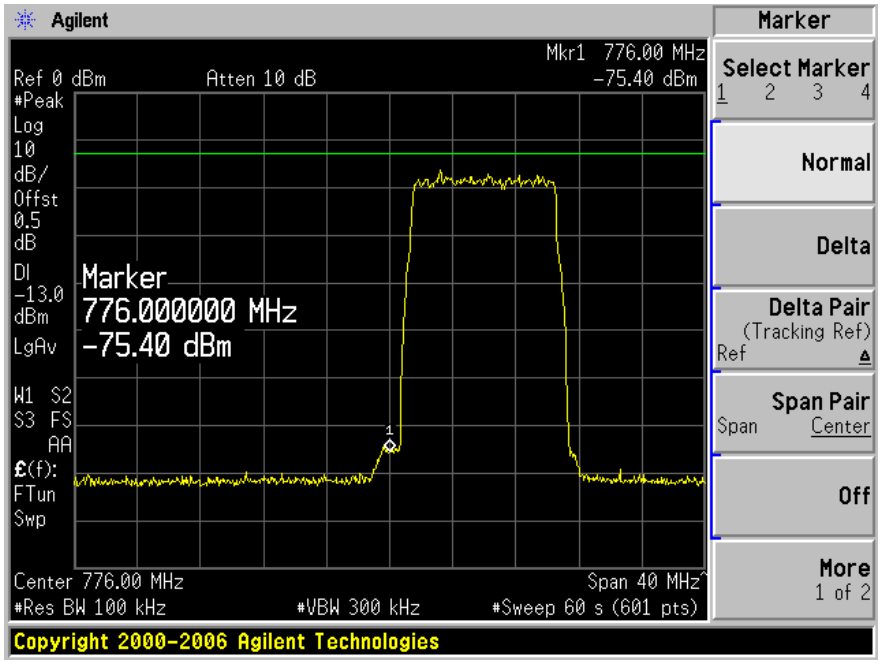
WCDMA PCS Band Uplink: Highest Channel



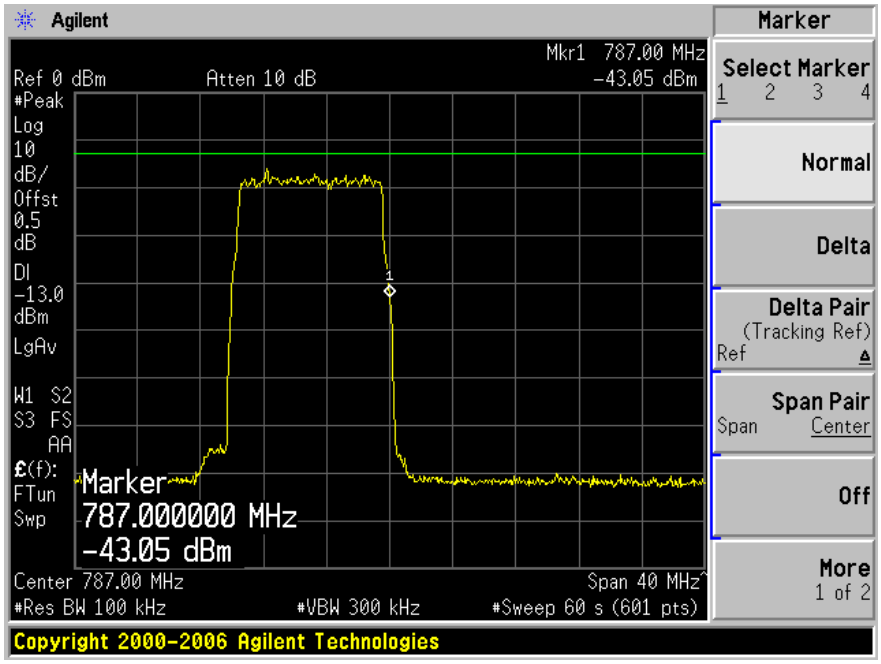
776-787 MHz LTE Band, Uplink, Antenna # 1:

Modulation: QPSK

Plot 1: Lowest Edge

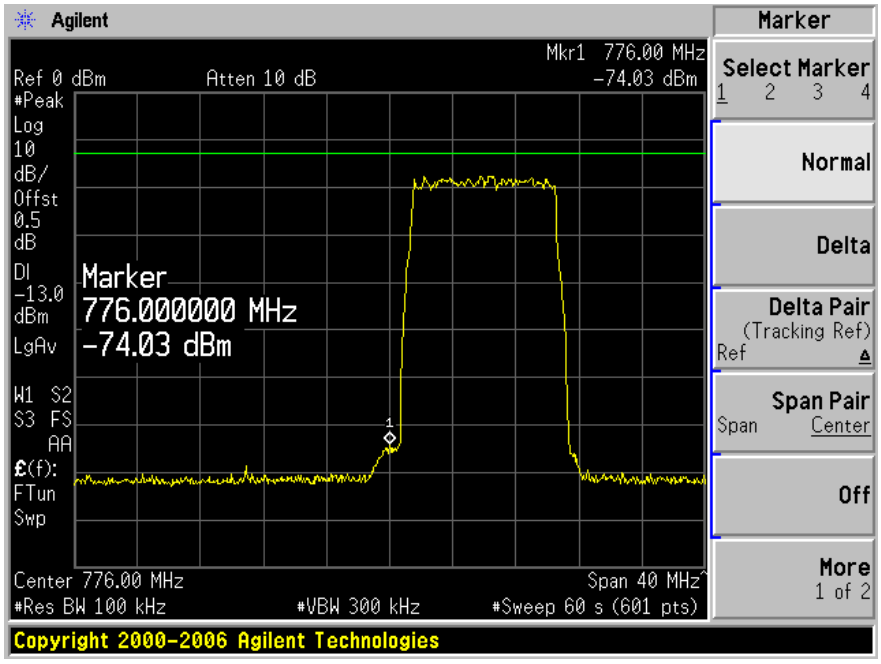


Plot 2: Highest Edge

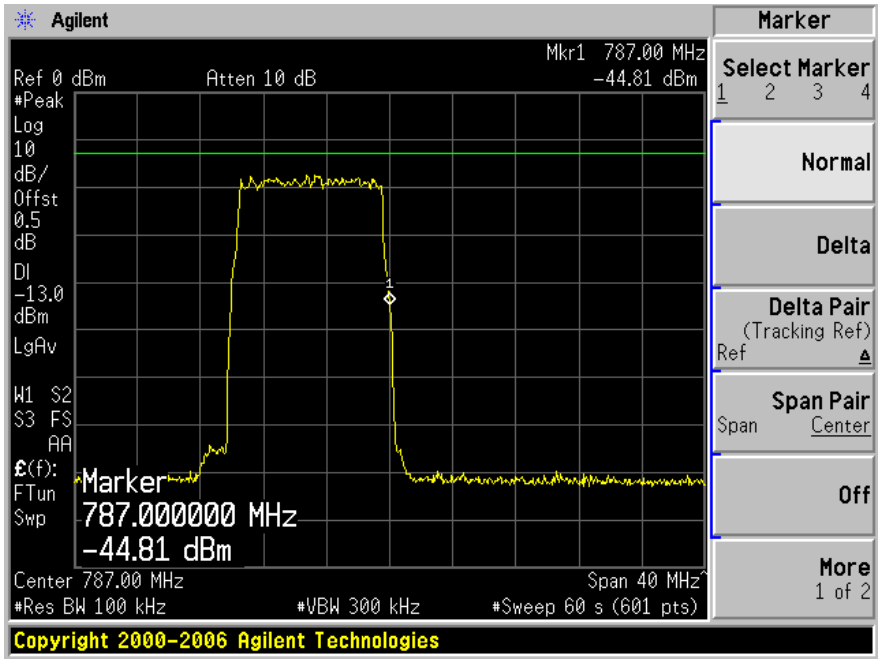


Modulation: 16QAM

Plot 1: Lowest Edge

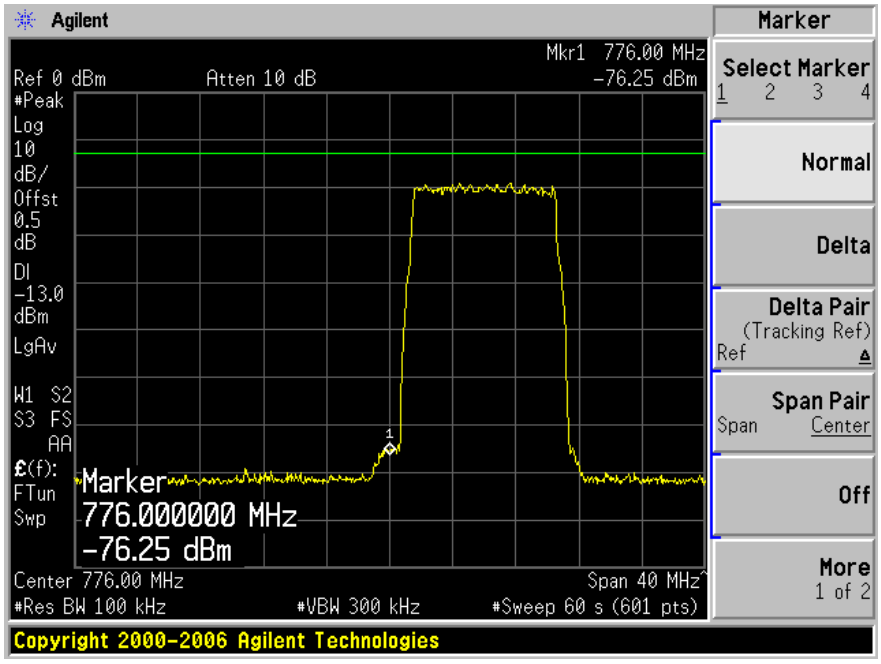


Plot 2: Highest Edge

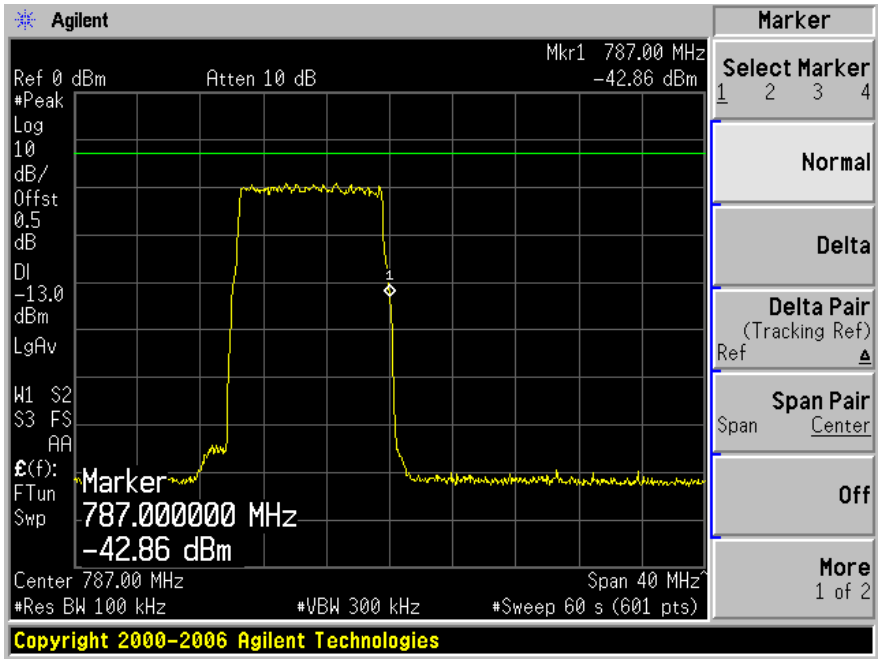


Modulation: 64QAM

Plot 1: Lowest Edge



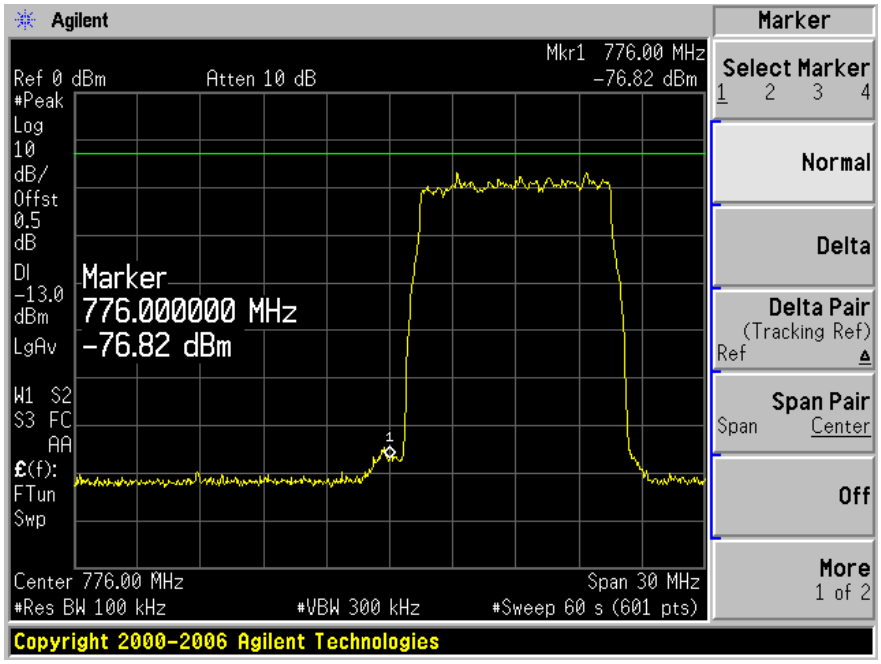
Plot 2: Highest Edge



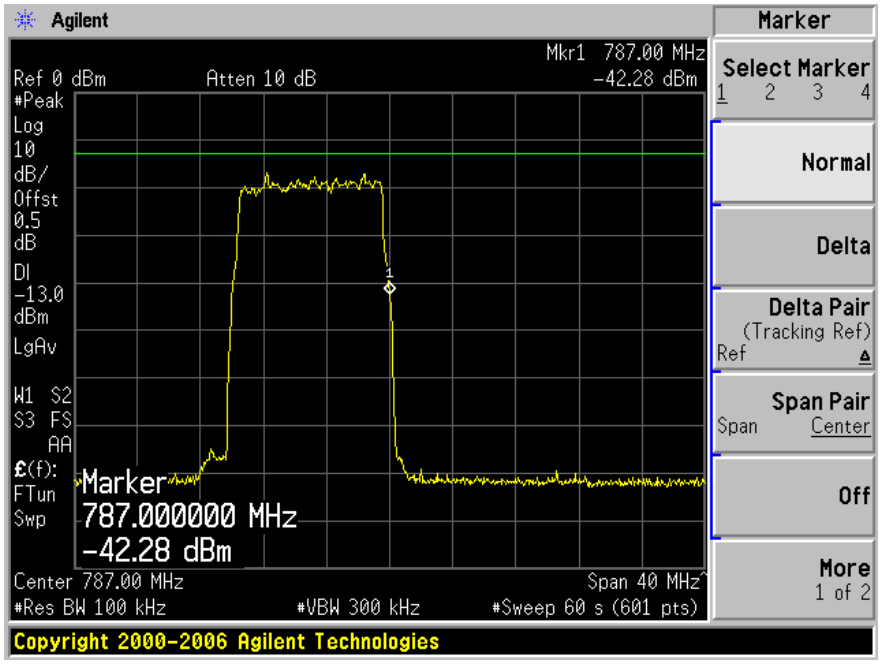
776-787 MHz LTE Band, Uplink, Antenna # 2:

Modulation: QPSK

Plot 1: Lowest Edge

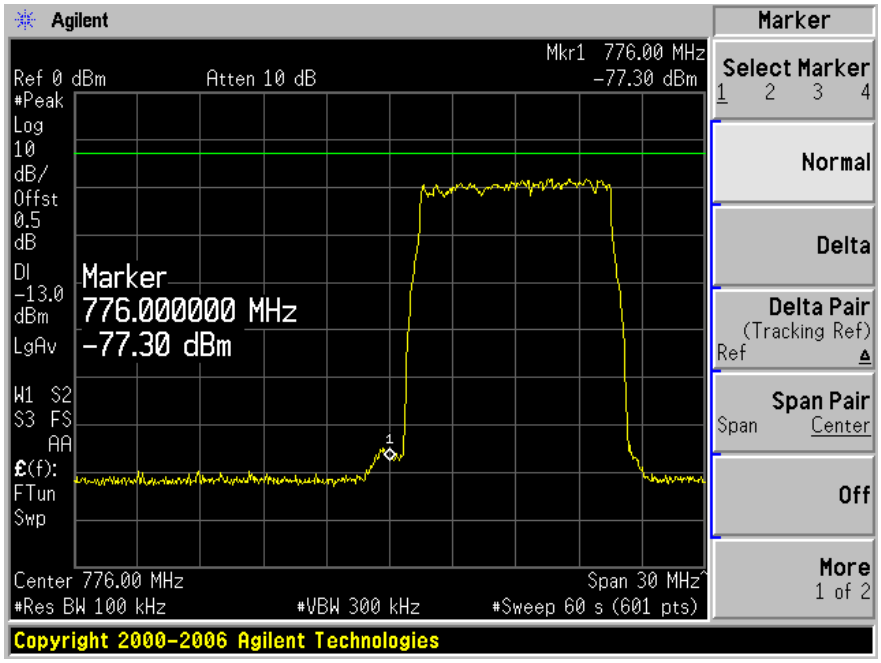


Plot 2: Highest Edge

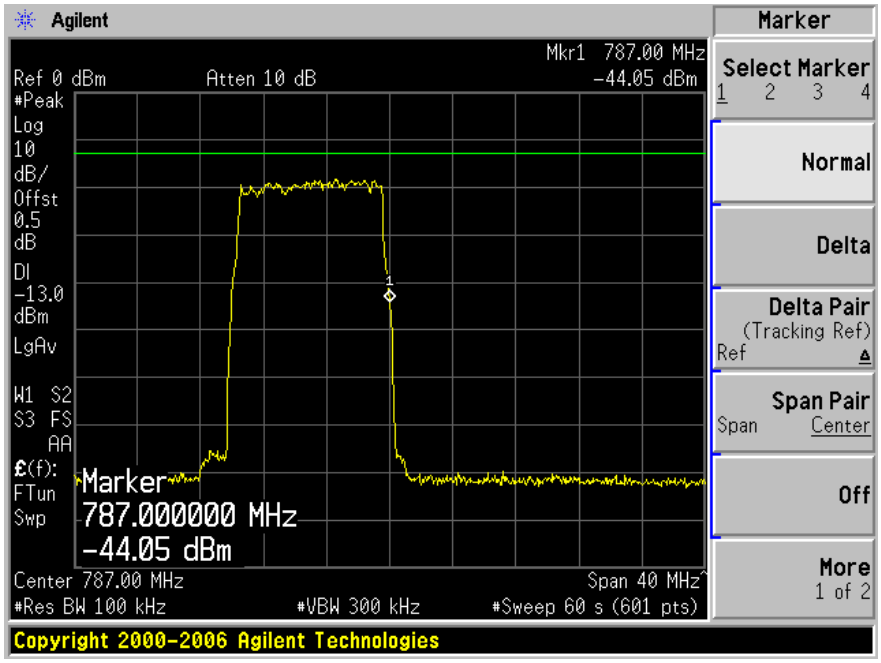


Modulation: 16QAM

Plot 1: Lowest Edge

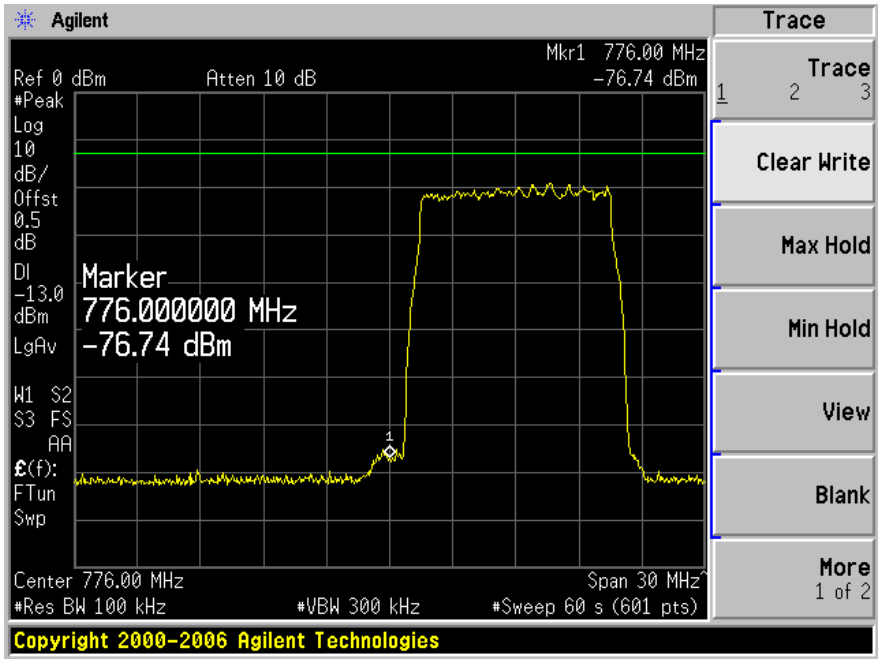


Plot 2: Highest Edge

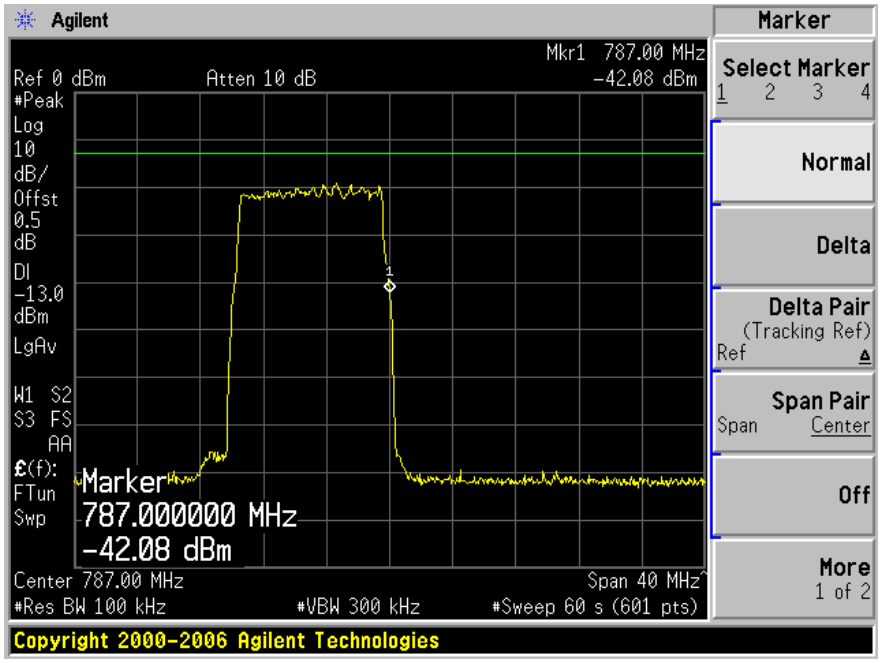


Modulation: 64QAM

Plot 1: Lowest Edge



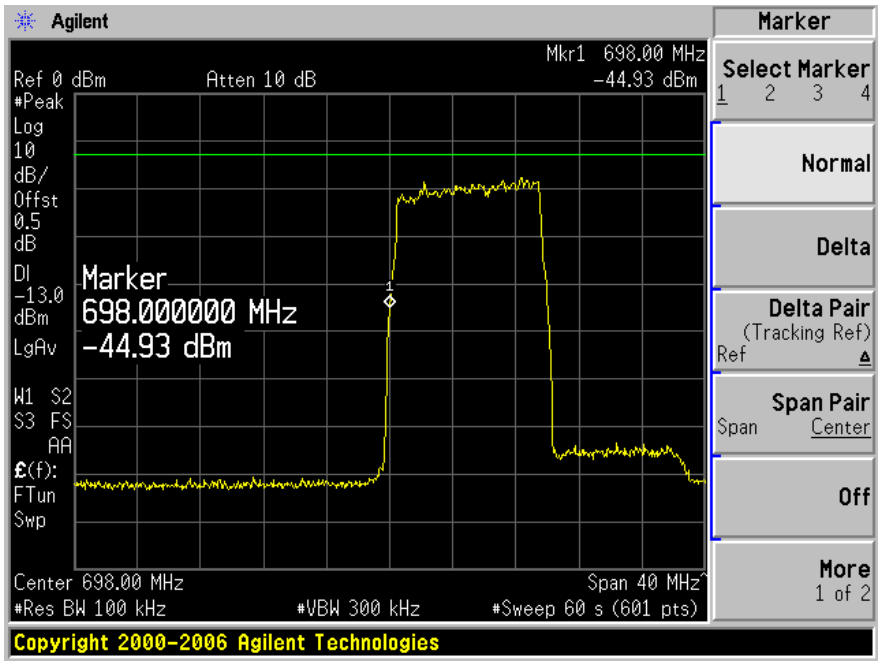
Plot 2: Highest Edge



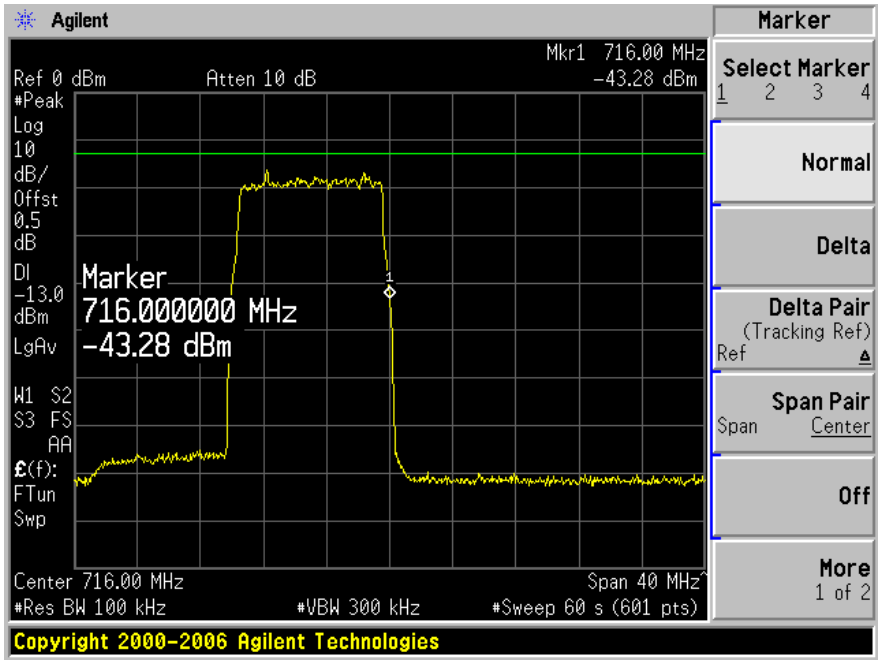
698-716 MHz LTE Band, Uplink, Antenna # 1:

Modulation: QPSK

Plot 1: Lowest Edge

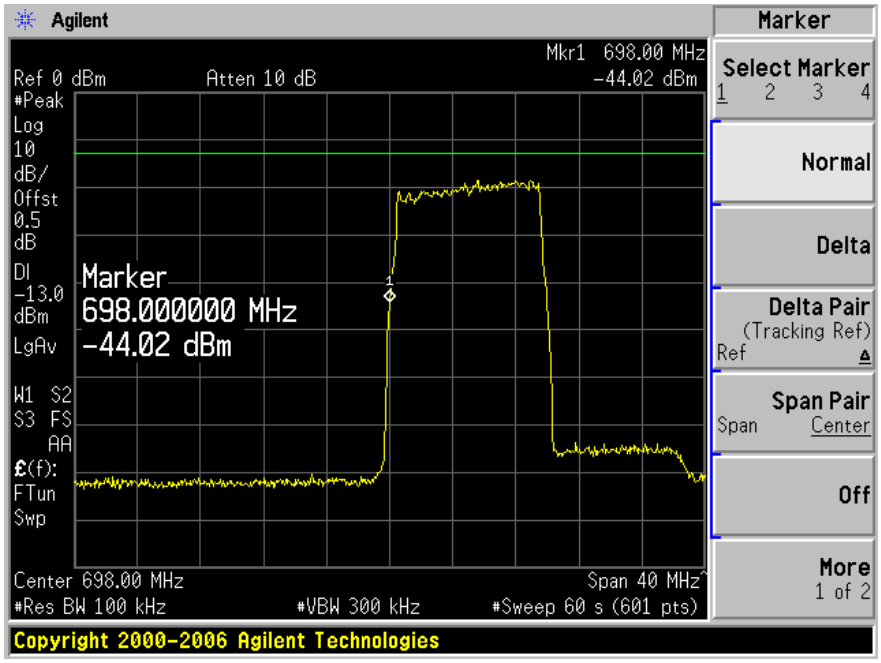


Plot 2: Highest Edge

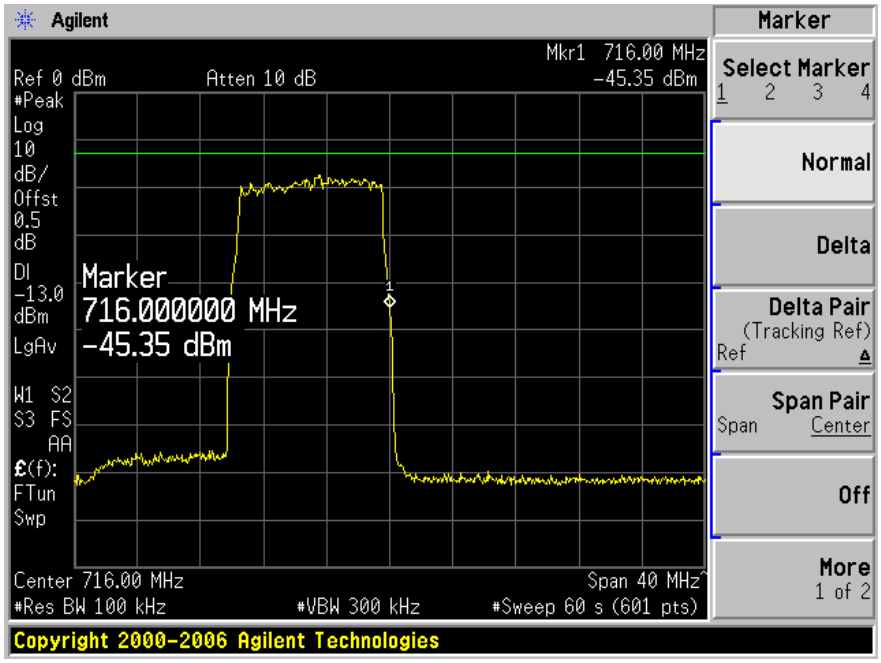


Modulation: 16QAM

Plot 1: Lowest Edge

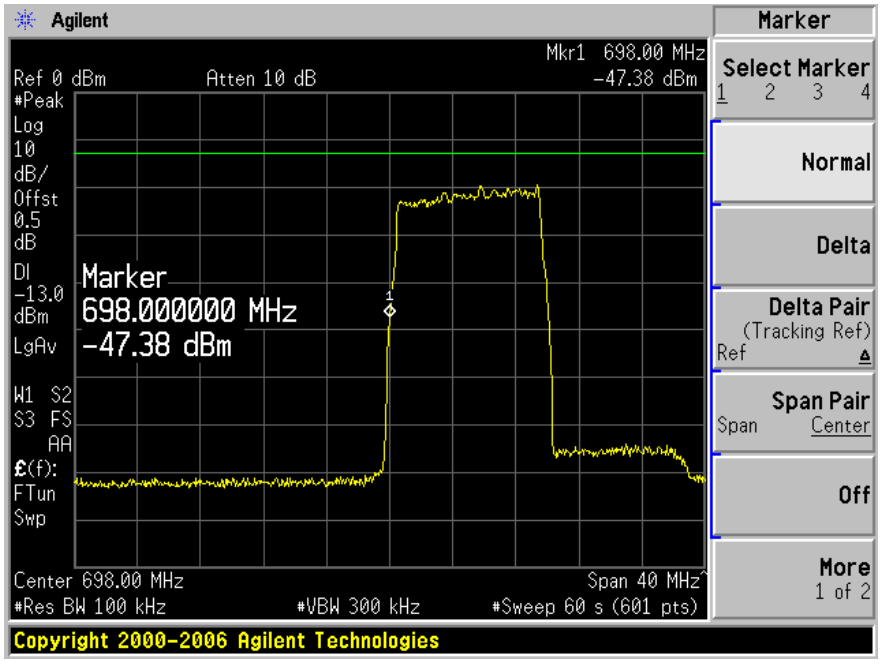


Plot 2: Highest Edge

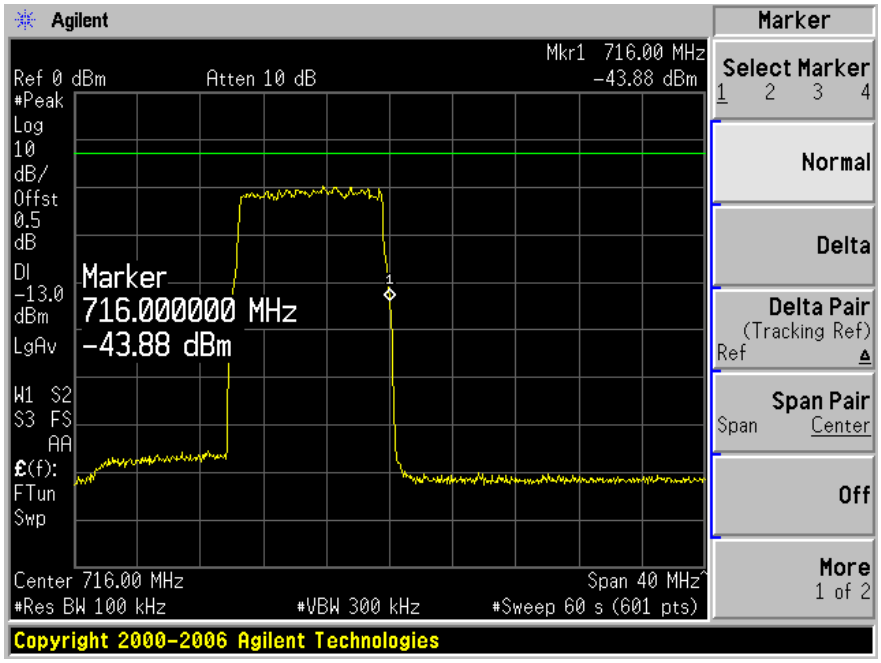


Modulation: 64QAM

Plot 1: Lowest Edge



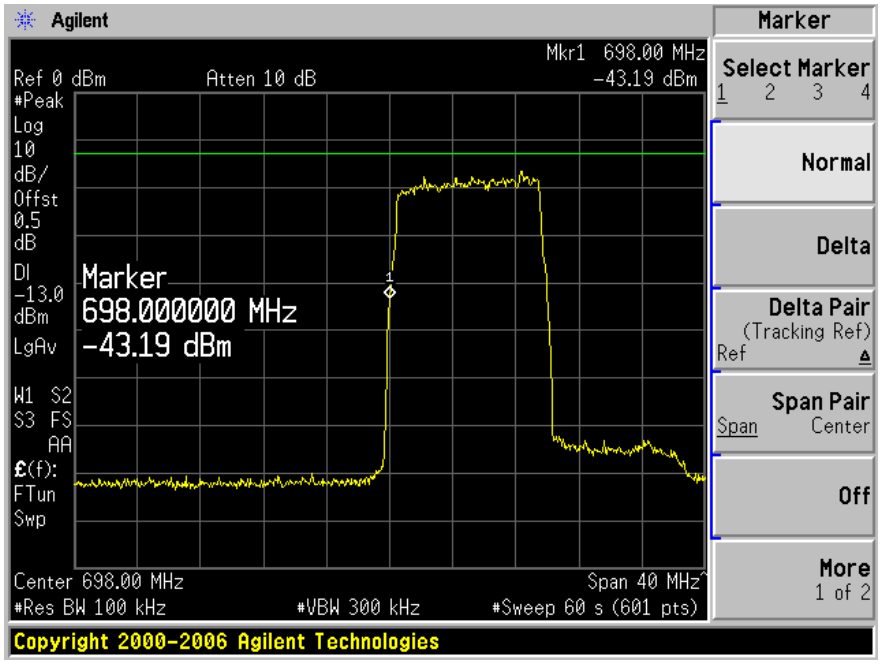
Plot 2: Highest Edge



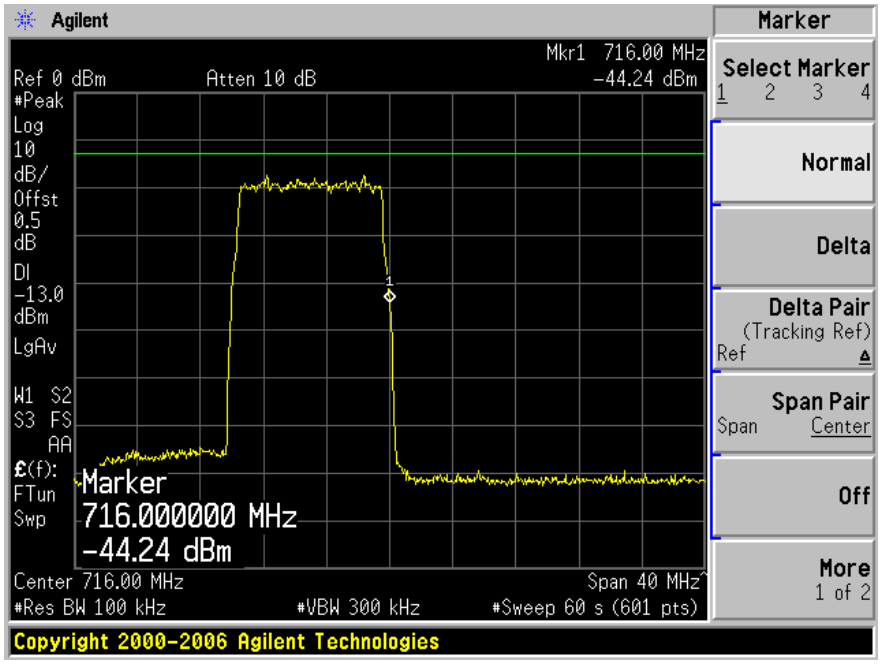
698-716 MHz LTE Band, Uplink, Antenna # 2:

Modulation: QPSK

Plot 1: Lowest Edge

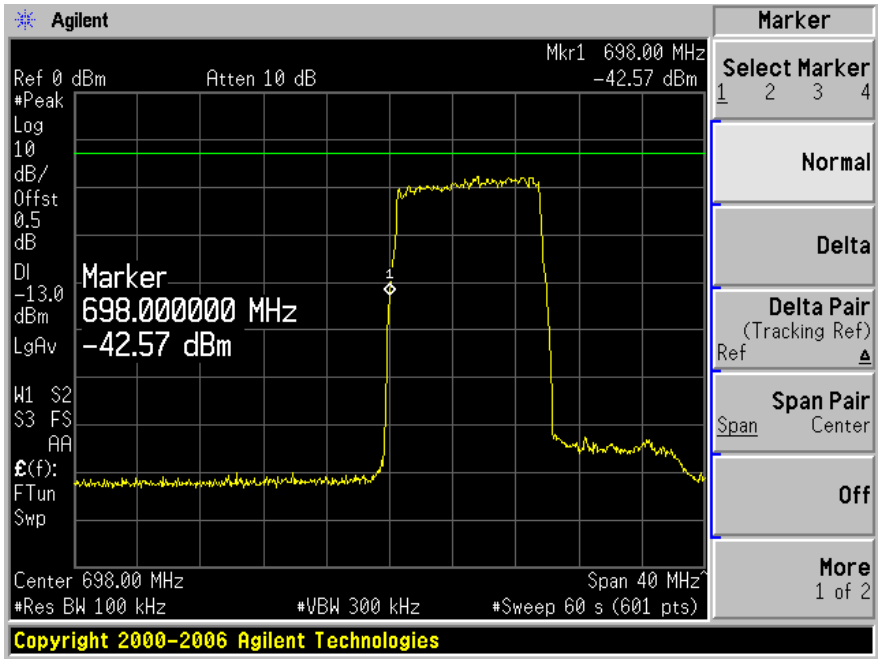


Plot 2: Highest Edge

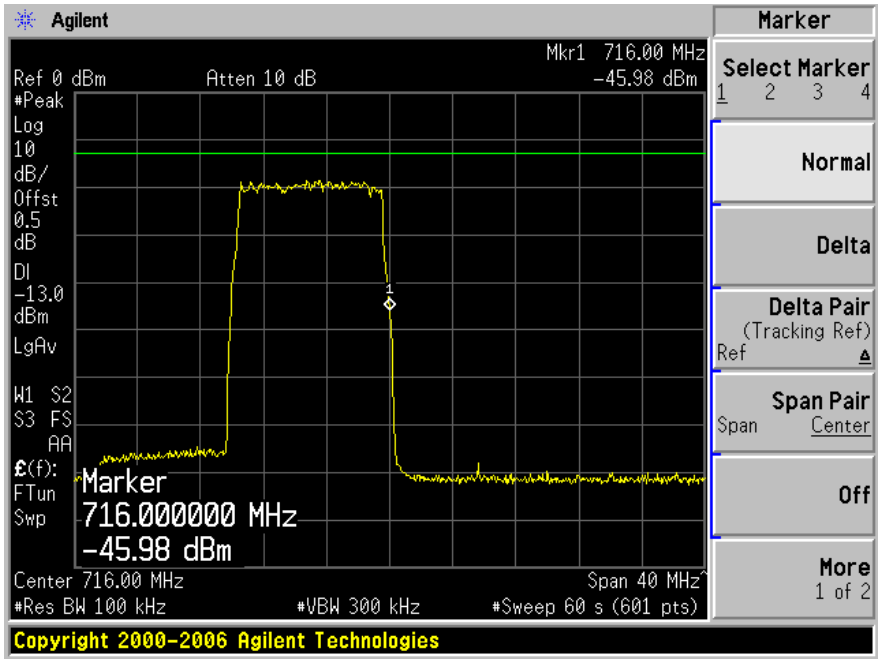


Modulation: 16QAM

Plot 1: Lowest Edge

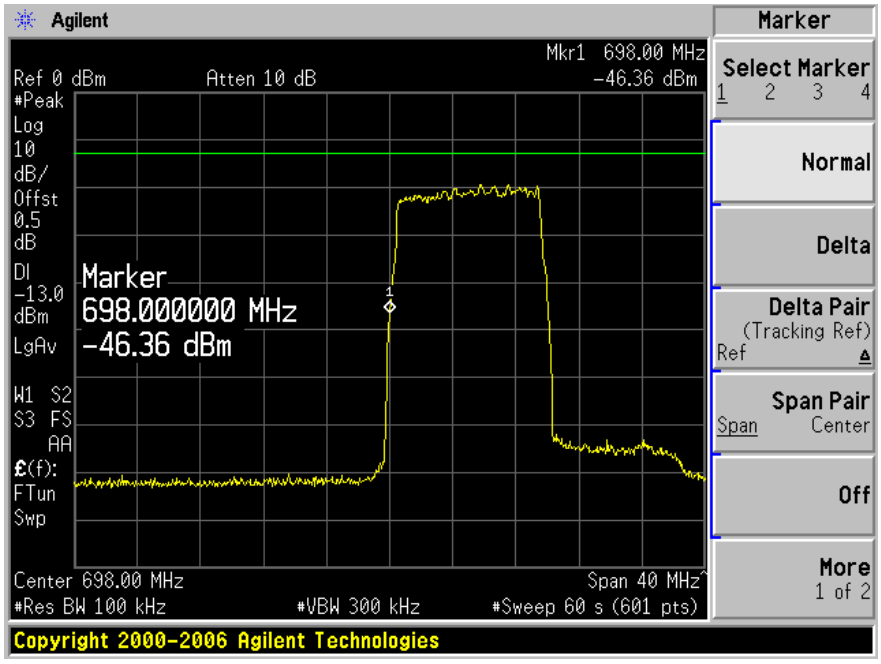


Plot 2: Highest Edge

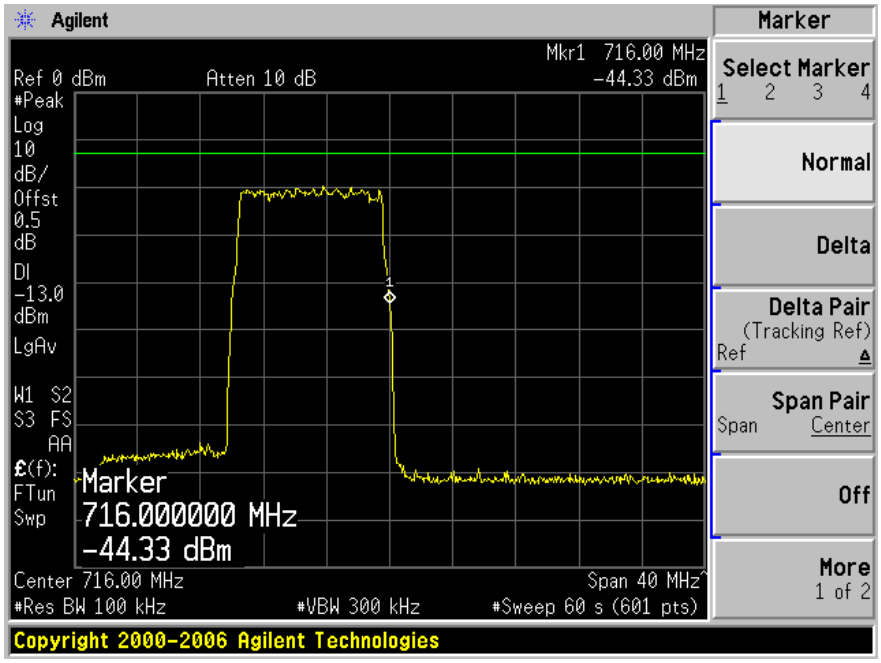


Modulation: 64QAM

Plot 1: Lowest Edge



Plot 2: Highest Edge



10 FCC §2.1055, FCC §27.54 – FREQUENCY STABILITY

10.1 Applicable Standard

According to § 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 ± 0.000 25 %(± 2.5 ppm) of the center frequency.

CW was tested as worst case.

10.3 Test Environmental Conditions

Temperature:	22-24°C
Relative Humidity:	41-43 %
ATM Pressure:	101-102kPa

** The testing was performed by Dennis Huang on 2009-12-05 in RF Site.*

10.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2009-04-27
Agilent	Signal Generator	E4438C	MY47271125	2009-04-13
Tenney	Temperature Oven	Versa Tenn	12.431-8	2008-12-20

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

10.5 Test Results

Cellular 850 MHz and PCS 1900 MHz Band

The EUT is tested at 836.52 MHz with CW

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-95	-0.113565725
120	-100	-0.119542868
138	-100	-0.119542868

(Frequency Drift with Supply Temperature Variation)

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
50	-100	-0.119542868
-20	-100	-0.119542868

The EUT is tested at 1880 MHz with CW

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-185	-0.098404255
120	-205	-0.109042553
138	-200	-0.106382979

(Frequency Drift with Supply Temperature Variation)

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
50	-240	-0.127659574
-20	-200	-0.106382979

776-787 MHz LTE Band

The EUT is tested at 782 MHz with CW, Antenna Port #1

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-95	-0.121483376
120	-90	-0.115089514
138	-100	-0.127877238

(Frequency Drift with Supply Temperature Variation)

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
50	-110	-0.140664962
-20	-95	-0.121483376

The EUT is tested at 782 MHz with CW, Antenna Port #2

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-100	-0.127877238
120	-90	-0.115089514
138	-100	-0.127877238

(Frequency Drift with Supply Temperature Variation)

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
50	-110	-0.140664962
-20	-100	-0.127877238

698-716 MHz LTE Band

The EUT is tested at 703 MHz with CW, Antenna Port #1

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-95	-0.135135135
120	-95	-0.135135135
138	-100	-0.142247511

(Frequency Drift with Supply Temperature Variation)

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
50	-95	-0.135135135
-20	-90	-0.12802276

The EUT is tested at 703 MHz with CW, Antenna Port #2

(Frequency Drift with Supply Voltage Variation)

Voltage (Vac)	Frequency Error (Hz)	Frequency Error (ppm)
102	-100	-0.142247511
120	-95	-0.135135135
138	-100	-0.142247511

(Frequency Drift with Supply Temperature Variation)

Temperature (ºC)	Frequency Error (Hz)	Frequency Error (ppm)
50	-100	-0.142247511
-20	-90	-0.12802276

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

Please see the following MPE calculation for details.

Cellular 850 MHz and PCS 1900 MHz Band:

Uplink: 850 MHz Cellular

CDMA:

Maximum peak output power at antenna input terminal (dBm):	-9.98
Maximum peak output power at antenna input terminal (mW):	0.1005
Prediction distance (cm):	20
Prediction frequency (MHz):	836.52
Antenna Gain, typical (dBi):	8.0
Maximum Antenna Gain (numeric):	6.310
Power density at predication frequency and distance (mW/cm^2):	0.0000126
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5577

WCDMA:

Maximum peak output power at antenna input terminal (dBm):	-10.13
Maximum peak output power at antenna input terminal (mW):	0.0971
Prediction distance (cm):	20
Prediction frequency (MHz):	836.4
Antenna Gain, typical (dBi):	8.0
Maximum Antenna Gain (numeric):	6.310
Power density at predication frequency and distance (mW/cm^2):	0.00001218
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5577

Uplink: 1900 MHz PCS

CDMA:

Maximum peak output power at antenna input terminal (dBm):	-10.05
Maximum peak output power at antenna input terminal (mW):	0.0988
Prediction distance (cm):	20
Prediction frequency (MHz):	1880
Antenna Gain, typical (dBi):	8.0
Maximum Antenna Gain (numeric):	6.310
Power density at predication frequency and distance (mW/cm^2):	0.00001241
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1

WCDMA:

Maximum peak output power at antenna input terminal (dBm):	-10.01
Maximum peak output power at antenna input terminal (mW):	0.0998
Prediction distance (cm):	20
Prediction frequency (MHz):	1880
Antenna Gain, typical (dBi):	8.0
Maximum Antenna Gain (numeric):	6.310
Power density at predication frequency and distance (mW/cm^2):	0.00001252
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1

LTE 700 MHz Band

Uplink:

Maximum peak output power at antenna input terminal (dBm):	-10.81
Maximum peak output power at antenna input terminal (mW):	0.0829
Prediction distance (cm):	20
Prediction frequency (MHz):	782
Antenna Gain, typical (dBi):	8.0
Maximum Antenna Gain (numeric):	6.310
Power density at predication frequency and distance (mW/cm^2):	0.0000104
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5213