



FCC PART 27

TEST AND MEASUREMENT REPORT

For

Wireless Extenders, Inc.

One Meca Way,

Norcross, GA 30093, USA

FCC ID: SO4YX550-AWS-ALTE

Report Type: Original Report	Product Type: 4G Cellular Signal Amplifier
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1212121-27	Original Report	2013-02-08

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of Wireless Extender, Inc., and their product FCC ID: *SO4YX550-AWS-ALTE*, model: *YX550 ALTE-AWS*, which will henceforth be referred to as the “EUT” as referred to in this report, is a 4G cellular signal amplifier for both downlink (signals from the network to the subscriber’s equipment) and uplink (signals from subscriber’s equipment to the network). The 4G bands operate on the AWS band (2.1 GHz/1.7 GHz, band 4) and the 700 MHz LTE band (band 17). The YX550 ALTE-AWS is designed for small office and home office environments.

Technical Specification

Modulation	Frequency (MHz)	
	Downlink	Uplink
LTE	734-746	704-716
WCDMA/HSPA	2110-2155	1710-1755

1.2 Mechanical Description

The EUT dimension is approximately 17.8cm (L) x 9.2cm (W) x 1.0cm (H) and weighs approximately 230g

The test data gathered are from production sample provided by the manufacturer. Serial number: R1212121-1 assigned by BACL Sunnyvale.

1.3 Objective

This type approval report is prepared on behalf of Wi-Ex Inc. in accordance with Part 2, Subpart J, 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, band edge, and conducted and radiated margin.

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

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

Part 27 - Miscellaneous Wireless Communications Services
Applicable Standards: TIA/EIA-603-C, ANSI C63.4-2003.

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

1.6 Measurement Uncertainty

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

Based on CISPR16-4-2:2003, The Treatment of Uncertainty in EMC Measurements, the values ranging from ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

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

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

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

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

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

2 SYSTEM TEST CONFIGURATION

2.1 Justification

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

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

2.2 EUT Exercise Software

N/A, 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 Local Support Equipment and Software List and Details

Manufacturers	Descriptions	Models	Serial Numbers
HP	Signal Generator	8648C	MY45091309
Dell	Laptop	Latitude D600	CN-0X2034-48643-3A6-8307
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309
Agilent	Signal Studio for 3GPP LTE	N7624B	-
Agilent	Signal Studio for WCDMA/HSPA	N7600B	-

2.5 Internal Configurations of EUT

Manufacturer	Description	Model	Serial Number
Wireless Extenders, Inc.	Main PCB Board	YX550A	-

2.6 EUT Power Supply Information

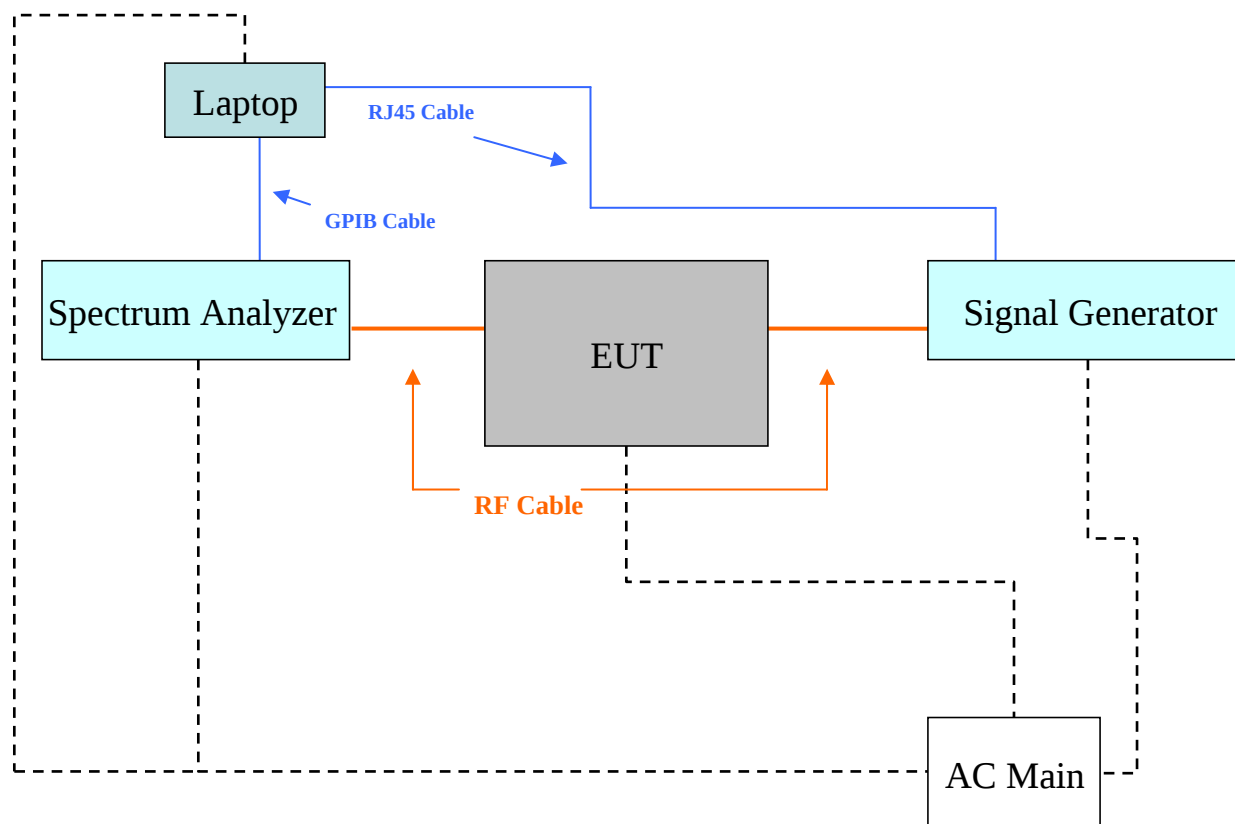
Manufacturer	Description	Model	Serial Number
I.T.E	AC/DC Power Adapter	FY0502000	-

2.7 Interface Ports and Cables

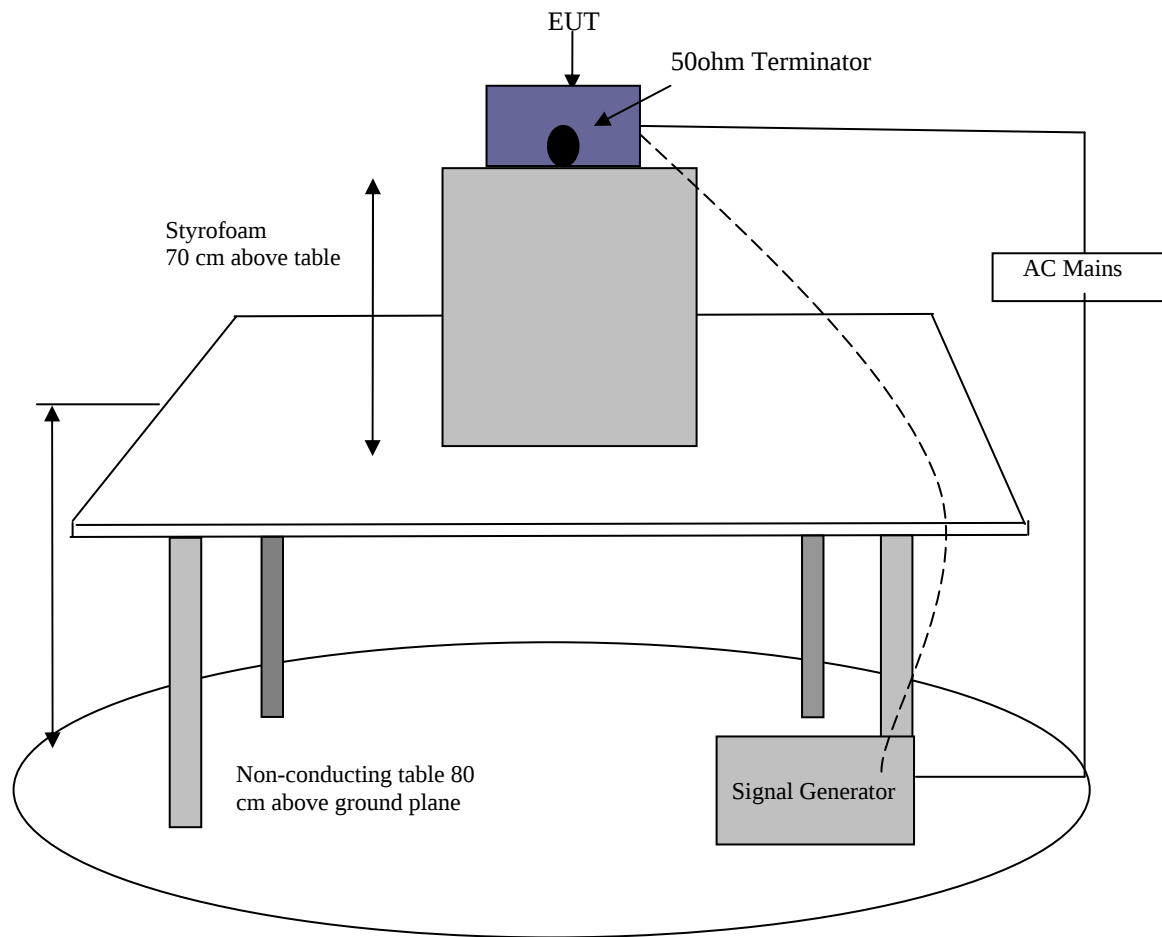
Cable Description	Length (m)	To	From
RF Cable	< 1	EUT	Spectrum Analyzer
RF Cable	< 1	EUT	Signal Generator

2.8 Test Setup Block Diagram

Antenna Port Conducted Testing



Radiated Emissions Testing



3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046, §27.50(b)	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A ¹
§2.1049, §27.53 (c)	Occupied Bandwidth	Compliant
§2.1053, §27.53 (c)	Spurious Radiated Emissions	Compliant
§2.1051, §27.53 (c)	Spurious Emissions at Antenna Terminals	Compliant
§27.53 (c)(g)	Band Edge	Compliant
§2.1055, §27.54	Frequency Stability	Note ¹
§2.1091, §27.52	RF Exposure Information	Compliant

1) Note: EUT is a signal booster.

4 FCC §2.1046 & §27.50 – RF OUTPUT POWER

4.1 Applicable Standard

According to FCC §27.50(c)(10), Portable stations (hand-held devices) are limited to 3 watts ERP.

According to FCC §27.50(d), fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

4.2 Test Procedure

Conducted:

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

4.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 Year
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03	1 Year

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

4.4 Test Environmental Conditions

Temperature:	21-22°C
Relative Humidity:	49-51 %
ATM Pressure:	101-102 kPa

The testing was performed by Wei Sun on 2012-12-18 at RF Site.

4.5 Test Results

AWS Band (Band 4)

Mode/Band		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
WCDMA/HSPA	1710-1755 MHz Uplink	Low	1712.4	-44.40	21.13
		Middle	1732.4	-44.40	22.16
		High	1752.6	-44.40	21.48
	2110-2155 MHz Downlink	Low	2112.4	-55.3	15.25
		Middle	2132.4	-52.3	15.16
		High	2152.6	-52.3	15.52

Mode/Band	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 2110-2155 MHz	QPSK (1.4 MHz)	2111	-55.5	15.41
	QPSK (1.4 MHz)	2132	-52	15.55
	QPSK (1.4 MHz)	2154	-52	15.55
	16QAM (1.4 MHz)	2111	-55.5	15.12
	16QAM (1.4 MHz)	2132	-52	15.32
	16QAM (1.4 MHz)	2154	-52	15.98
	64QAM (1.4 MHz)	2111	-55.5	15.02
	64QAM (1.4 MHz)	2132	-52	15.34
	64QAM (1.4 MHz)	2154	-52	15.52
	QPSK (3 MHz)	2112	-54.5	15.42
	QPSK (3 MHz)	2132	-51.5	15.55
	QPSK (3 MHz)	2153	-51.5	16.01
	16QAM (3 MHz)	2112	-54.5	15.55
	16QAM (3 MHz)	2132	-51.5	15.48
	16QAM (3 MHz)	2153	-51.5	15.94
	64QAM (3 MHz)	2112	-54.5	15.63
	64QAM (3 MHz)	2132	-51.5	15.47
	64QAM (3 MHz)	2153	-51.5	15.93
	QPSK (5 MHz)	2113	-55	15.02
	QPSK (5 MHz)	2132	-52	15.01
	QPSK (5 MHz)	2152	-52	15.53
	16QAM (5 MHz)	2113	-55	15.01
	16QAM (5 MHz)	2132	-52	15.01
	16QAM (5 MHz)	2152	-52	15.65
	64QAM (5 MHz)	2113	-55	15.13
	64QAM (5 MHz)	2132	-52	15.05
	64QAM (5 MHz)	2152	-52	15.49
	QPSK (10 MHz)	2115	-54.5	15.52
	QPSK (10 MHz)	2132	-52	15.30
	QPSK (10 MHz)	2150	-52	15.76
	16QAM (10 MHz)	2115	-54.5	15.43
	16QAM (10 MHz)	2132	-52	15.27
	16QAM (10 MHz)	2150	-52	15.77
	64QAM (10 MHz)	2115	-54.5	15.45
	64QAM (10 MHz)	2132	-52	15.32
	64QAM (10 MHz)	2150	-52	15.73

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Uplink 1710-1755 MHz	QPSK (1.4 MHz)	1711	-44	21.40
	QPSK (1.4 MHz)	1732	-45	21.67
	QPSK (1.4 MHz)	1754	-44	21.14
	16QAM (1.4 MHz)	1711	-44	21.33
	16QAM (1.4 MHz)	1732	-45	21.71
	16QAM (1.4 MHz)	1754	-44	21.11
	64QAM (1.4 MHz)	1711	-44	21.39
	64QAM (1.4 MHz)	1732	-45	21.53
	64QAM (1.4 MHz)	1754	-44	21.15
	QPSK (3 MHz)	1712	-44	21.12
	QPSK (3 MHz)	1732	-45	21.50
	QPSK (3 MHz)	1753	-44	21.09
	16QAM (3 MHz)	1712	-44	21.19
	16QAM (3 MHz)	1732	-45	21.48
	16QAM (3 MHz)	1753	-44	21.02
	64QAM (3 MHz)	1712	-44	21.14
	64QAM (3 MHz)	1732	-45	21.37
	64QAM (3 MHz)	1753	-44	21.04
	QPSK (5 MHz)	1713	-44	21.21
	QPSK (5 MHz)	1732	-45	21.55
	QPSK (5 MHz)	1752	-44	21.05
	16QAM (5 MHz)	1713	-44	21.34
	16QAM (5 MHz)	1732	-45	21.57
	16QAM (5 MHz)	1752	-44	21.02
	64QAM (5 MHz)	1713	-44	21.19
	64QAM (5 MHz)	1732	-45	21.54
	64QAM (5 MHz)	1752	-44	21
	QPSK (10 MHz)	1715	-45	21.33
	QPSK (10 MHz)	1732	-45	21.79
	QPSK (10 MHz)	1750	-43	21.80
	16QAM (10 MHz)	1715	-45	21.14
	16QAM (10 MHz)	1732	-45	21.71
	16QAM (10 MHz)	1750	-43	21.72
	64QAM (10 MHz)	1715	-45	21.42
	64QAM (10 MHz)	1732	-45	21.84
	64QAM (10 MHz)	1750	-43	21.81

LTE Band (Band 17)

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
734-746 MHz LTE Downlink	QPSK (1.4 MHz)	735	-56.5	15.78
	QPSK (1.4 MHz)	740	-55	15.28
	QPSK (1.4 MHz)	745	-55	15.11
	16QAM (1.4 MHz)	735	-56.5	15.82
	16QAM (1.4 MHz)	740	-55	15.21
	16QAM (1.4 MHz)	745	-55	15.14
	64QAM (1.4 MHz)	735	-56.5	15.80
	64QAM (1.4 MHz)	740	-55	15.27
	64QAM (1.4 MHz)	745	-55	15.17
	QPSK (3 MHz)	736	-56	15.91
	QPSK (3 MHz)	740	-55	15.15
	QPSK (3 MHz)	744	-55	15.67
	16QAM (3 MHz)	736	-56	15.91
	16QAM (3 MHz)	740	-55	15.07
	16QAM (3 MHz)	744	-55	15.46
	64QAM (3 MHz)	736	-56	15.45
	64QAM (3 MHz)	740	-55	15.15
	64QAM (3 MHz)	744	-55	15.71
	QPSK (5 MHz)	737	-55.5	15.04
	QPSK (5 MHz)	743	-55.5	15.40
	16QAM (5 MHz)	737	-55.5	15.95
	16QAM (5 MHz)	743	-55.5	15.41
	64QAM (5 MHz)	737	-55.5	15.92
	64QAM (5 MHz)	743	-55.5	15.40
	QPSK (10 MHz)	740	-55.5	15.48
	16QAM (10 MHz)	740	-55.5	15.47
	64QAM (10 MHz)	740	-55.5	15.54

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
704-716 MHz LTE Uplink	QPSK (1.4 MHz)	705	-51	21.37
	QPSK (1.4 MHz)	710	-52	21.92
	QPSK (1.4 MHz)	715	-50	21.23
	16QAM (1.4 MHz)	705	-51	21.59
	16QAM (1.4 MHz)	710	-52	22.12
	16QAM (1.4 MHz)	715	-50	21.50
	64QAM (1.4 MHz)	705	-51	21.49
	64QAM (1.4 MHz)	710	-52	22.07
	64QAM (1.4 MHz)	715	-50	21.44
	QPSK (3 MHz)	706	-50	22.15
	QPSK (3 MHz)	710	-52	21.97
	QPSK (3 MHz)	714	-51	21.46
	16QAM (3 MHz)	706	-50	22.08
	16QAM (3 MHz)	710	-52	21.93
	16QAM (3 MHz)	714	-51	21.31
	64QAM (3 MHz)	706	-50	22.11
	64QAM (3 MHz)	710	-52	21.99
	64QAM (3 MHz)	714	-51	21.24
	QPSK (5 MHz)	707	-50	22.07
	QPSK (5 MHz)	713	-52	21.51
	16QAM (5 MHz)	707	-50	22.14
	16QAM (5 MHz)	713	-52	21.36
	64QAM (5 MHz)	707	-50	22.10
	64QAM (5 MHz)	713	-52	21.27
	QPSK (10 MHz)	710	-52	21.29
	16QAM (10 MHz)	710	-52	21.31
	64QAM (10 MHz)	710	-52	21.33

5 FCC §2.1049 & §27.53 - OCCUPIED BANDWIDTH

5.1 Applicable Standard

Requirements: FCC §2.1049 and §27.53.

5.2 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.

5.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2012-05-04	1 year
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11	1 year

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

5.4 Test Environmental Conditions

Temperature:	21-23°C
Relative Humidity:	48-52 %
ATM Pressure:	101-102 kPa

The testing was performed by Wei Sun on 2012-12-19 at RF Site

5.5 Test Results

AWS Band (Band 4)

Frequency Band		Modulation	Frequency (MHz)	99% Emission Bandwidth	
				Input (MHz)	Output (MHz)
AWS	1700 MHz Uplink	WCDMA/HSPA	1732.4	4.1647	4.1912
	2110 MHz Downlink	WCDMA/HSPA	2132.4	4.1633	4.1513

Frequency Band		Modulation	Frequency (MHz)	99% Emission Bandwidth	
				Input (MHz)	Output (MHz)
AWS	1700 MHz Uplink	QPSK (1.4 MHz)	1732	1.0935	1.0804
		16 QAM (1.4 MHz)	1732	1.0968	1.0762
		64 QAM (1.4 MHz)	1732	1.0941	1.0790
		QPSK (3 MHz)	1732	2.6849	2.6833
		16 QAM (3 MHz)	1732	2.6973	2.6774
		64 QAM (3 MHz)	1732	2.6860	2.6821
		QPSK (5 MHz)	1732	4.4700	4.4610
		16 QAM (5 MHz)	1732	4.4697	4.4719
		64 QAM (5 MHz)	1732	4.4671	4.4732
		QPSK (10 MHz)	1732	8.9207	8.8899
		16 QAM (10 MHz)	1732	8.9079	8.9086
		64 QAM 10MHz)	1732	8.9067	8.9344
	2110 MHz Downlink	QPSK (1.4 MHz)	2132	1.0941	1.0772
		16 QAM (1.4 MHz)	2132	1.0937	1.0798
		64 QAM (1.4 MHz)	2132	1.0958	1.0765
		QPSK (3 MHz)	2132	2.7012	2.6788
		16 QAM (3 MHz)	2132	2.6985	2.6731
		64 QAM (3 MHz)	2132	2.7008	2.6765
		QPSK (5 MHz)	2132	4.4691	4.4404
		16 QAM (5 MHz)	2132	4.4770	4.4506
		64 QAM (5 MHz)	2132	4.4769	4.4656
		QPSK (10 MHz)	2132	8.9529	8.9158
		16 QAM (10 MHz)	2132	8.9437	8.9193
		64 QAM 10MHz)	2132	8.9429	8.9157

LTE Band (Band 17)

Frequency Band		Modulation	Frequency (MHz)	99% Emission Bandwidth	
				Input (MHz)	Output (MHz)
LTE	700 MHz Uplink	QPSK (1.4 MHz)	710	1.0948	1.0830
		16 QAM (1.4 MHz)	710	1.0964	1.0857
		64 QAM (1.4 MHz)	710	1.0956	1.0804
		QPSK (3 MHz)	710	2.6904	2.6748
		16 QAM (3 MHz)	710	2.6871	2.6729
		64 QAM (3 MHz)	710	2.6847	2.6752
		QPSK (5 MHz)	707	4.4726	4.4578
		16 QAM (5 MHz)	707	4.4696	4.4547
		64 QAM (5 MHz)	707	4.4767	4.4356
		QPSK (10 MHz)	710	8.9318	8.8643
		16 QAM (10 MHz)	710	8.9224	8.8943
		64 QAM 10MHz)	710	8.9445	8.8708
	700 MHz Downlink	QPSK (1.4 MHz)	740	1.0976	1.0783
		16 QAM (1.4 MHz)	740	1.0967	1.0780
		64 QAM (1.4 MHz)	740	1.0973	1.0802
		QPSK (3 MHz)	740	2.6965	2.6744
		16 QAM (3 MHz)	740	2.6996	2.6776
		64 QAM (3 MHz)	740	2.6896	2.6763
		QPSK (5 MHz)	737	4.4757	4.4705
		16 QAM (5 MHz)	737	4.4748	4.4431
		64 QAM (5 MHz)	737	4.4791	4.4488
		QPSK (10 MHz)	740	8.9671	8.9342
		16 QAM (10 MHz)	740	8.9587	8.9408
		64 QAM 10MHz)	740	8.9572	8.9019

Please refer to the following plots.

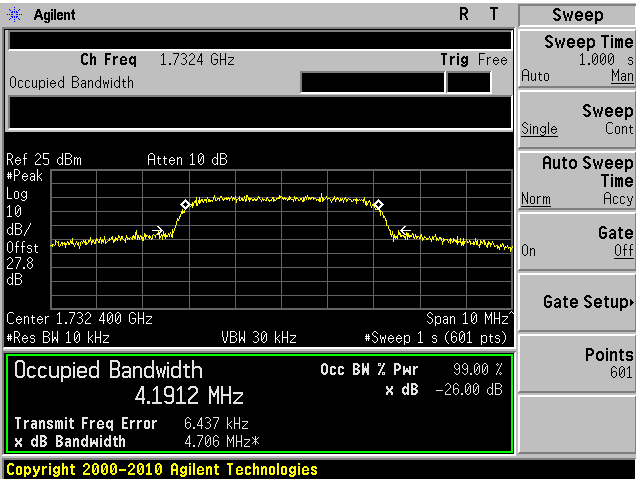
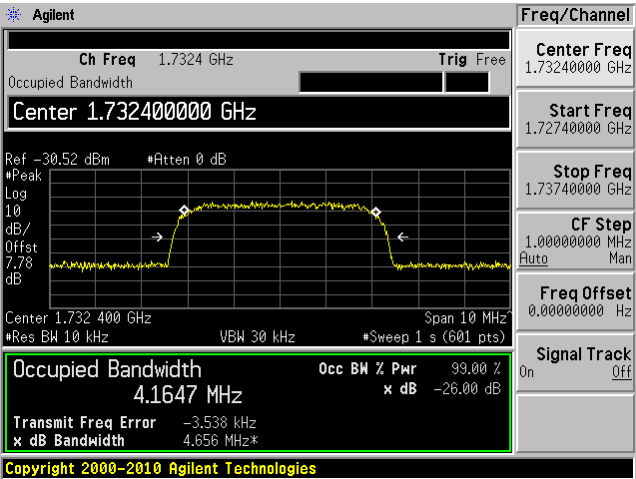
AWS Band (Band 4)

Uplink: 1710-1755 MHz

WCDMA/HSPA, Frequency: 1732.4 MHz

Input

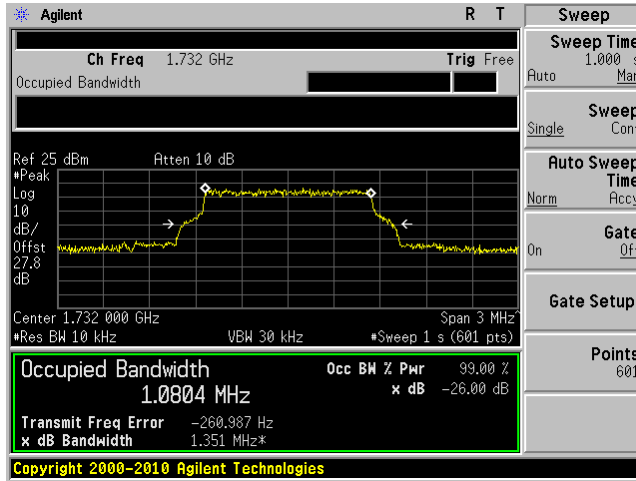
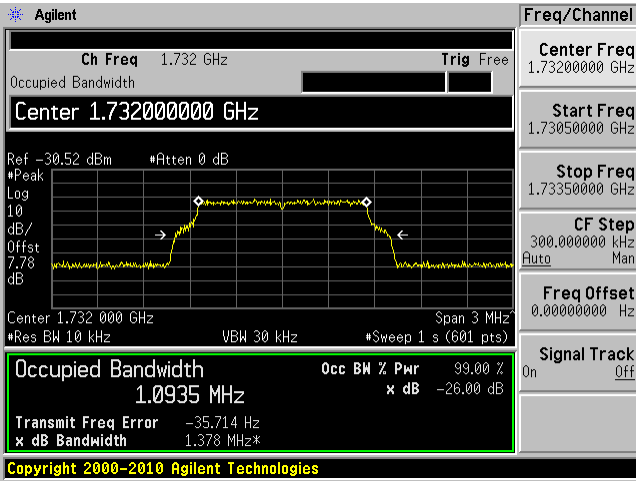
Output



Modulation: QPSK (1.4 MHz) Frequency: 1732 MHz

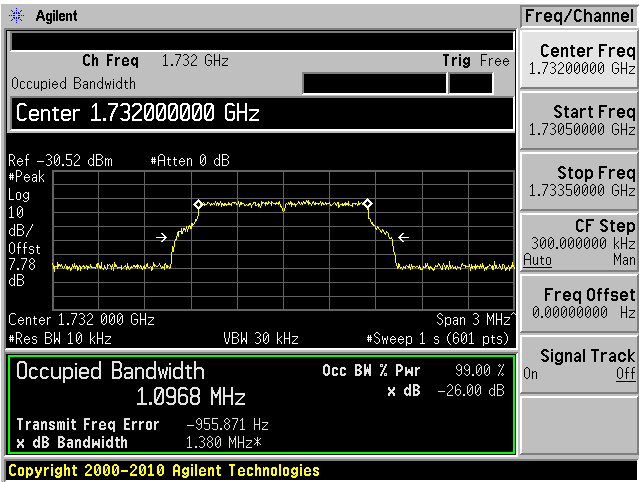
Input

Output

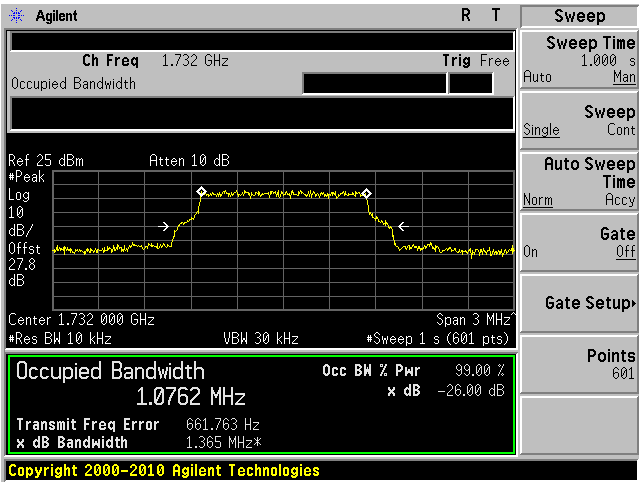


Modulation: 16QAM (1.4 MHz) Frequency: 1732 MHz

Input

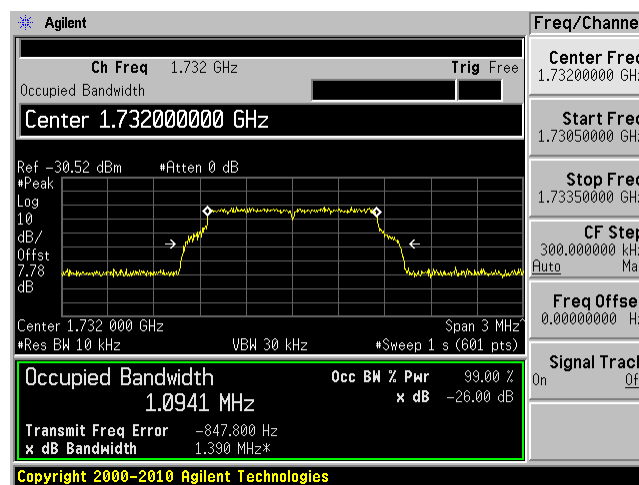


Output

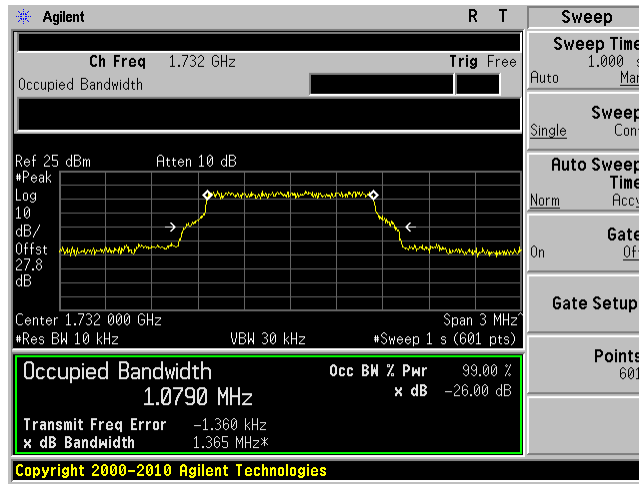


Modulation: 64QAM (1.4 MHz) Frequency: 1732 MHz

Input

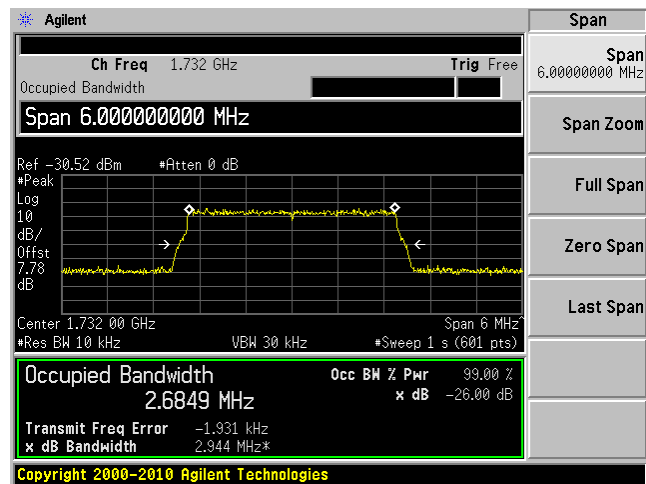


Output

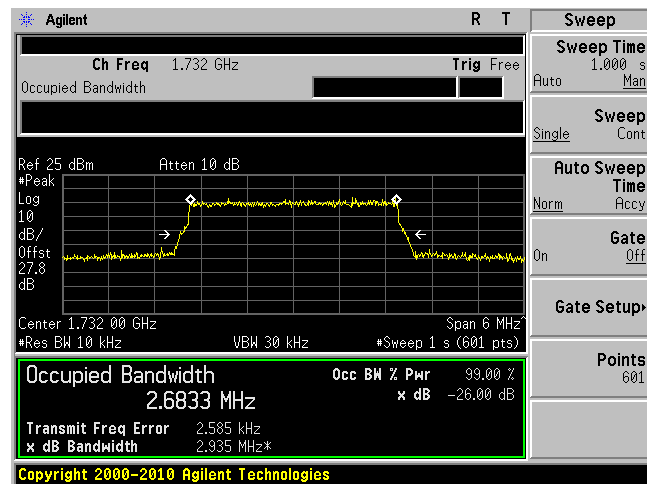


Modulation: QPSK (3 MHz) Frequency: 1732 MHz

Input

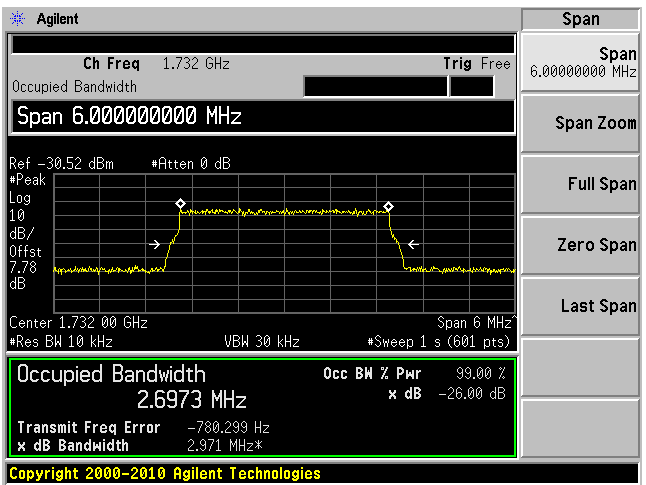


Output

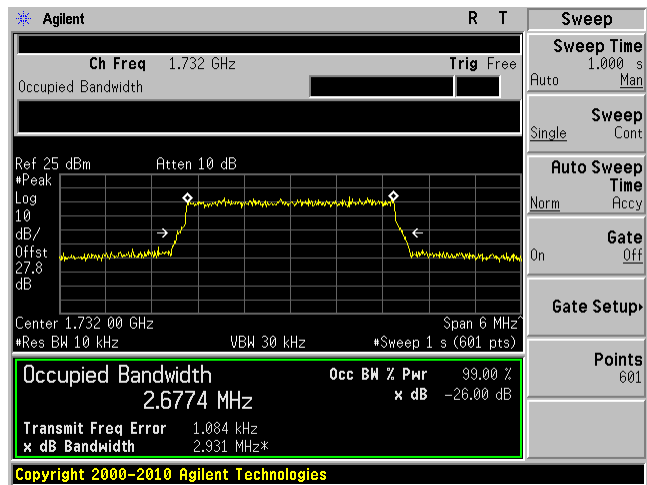


Modulation: 16QAM (3 MHz) Frequency: 1732 MHz

Input

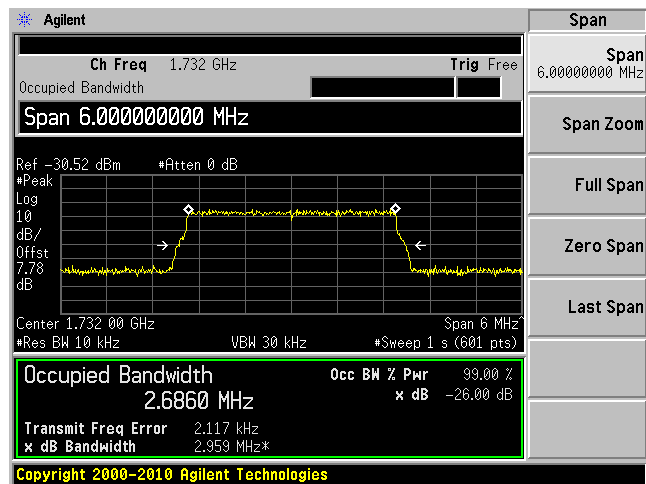


Output

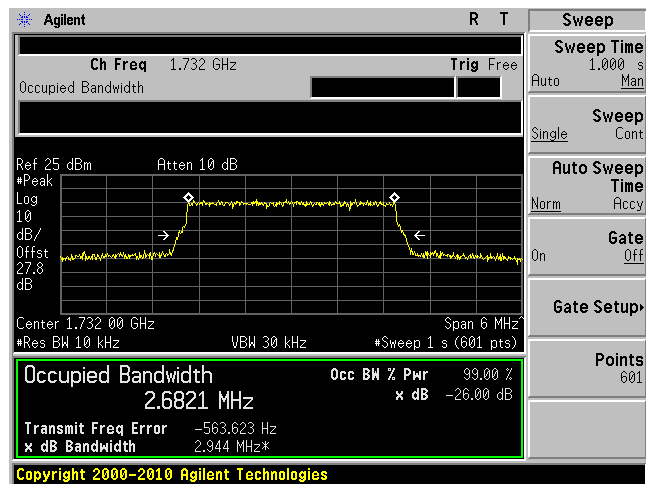


Modulation: 64QAM (3 MHz) Frequency: 1732 MHz

Input

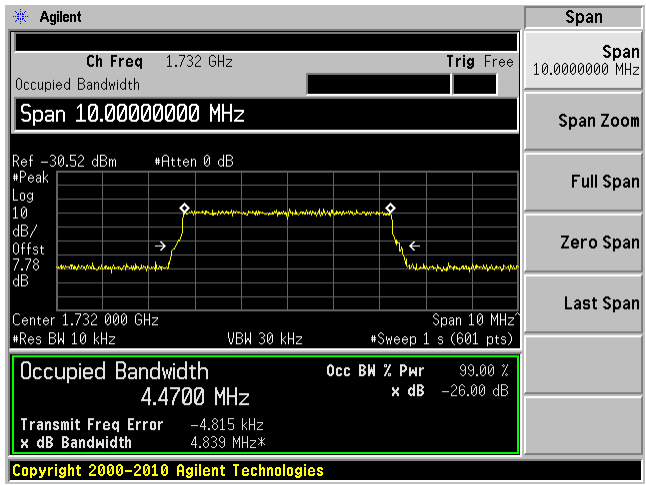


Output

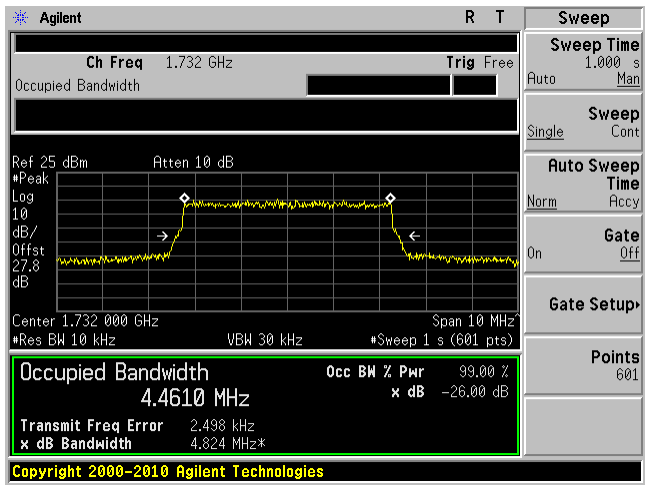


Modulation: QPSK (5 MHz) Frequency: 1732 MHz

Input

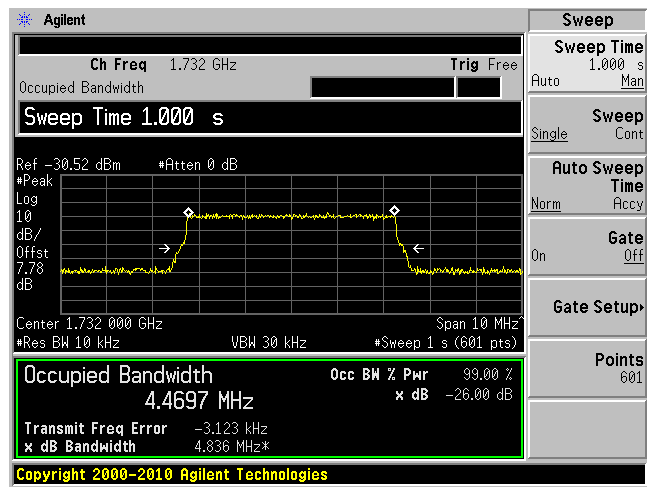


Output

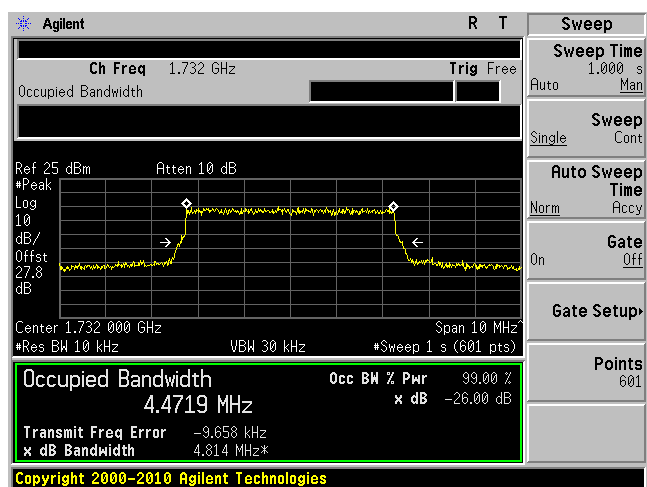


Modulation: 16QAM (5 MHz) Frequency: 1732 MHz

Input

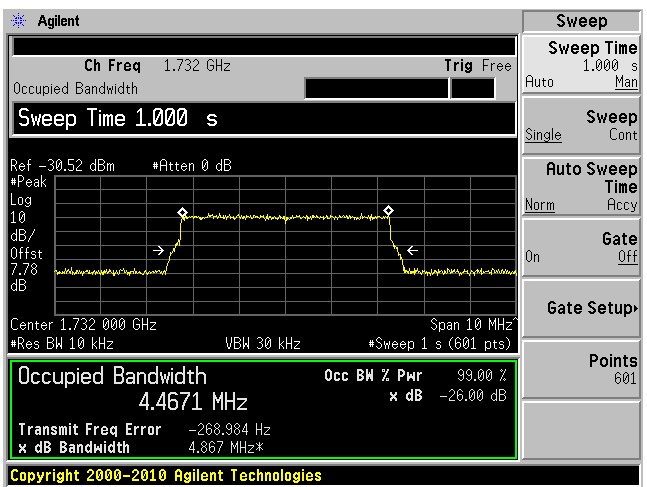


Output

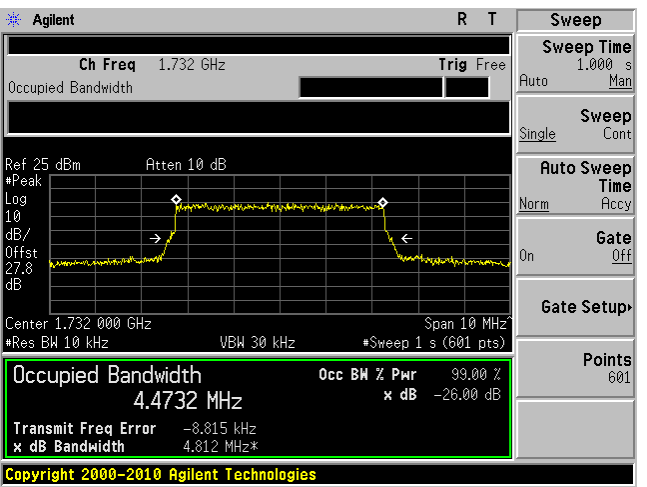


Modulation: 64QAM (5 MHz) Frequency: 1732 MHz

Input

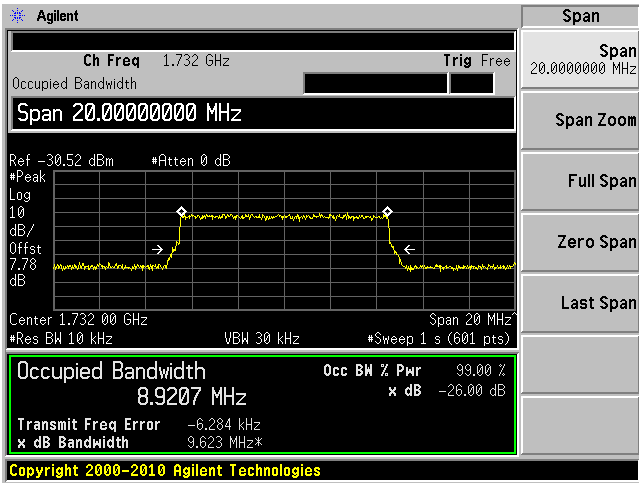


Output

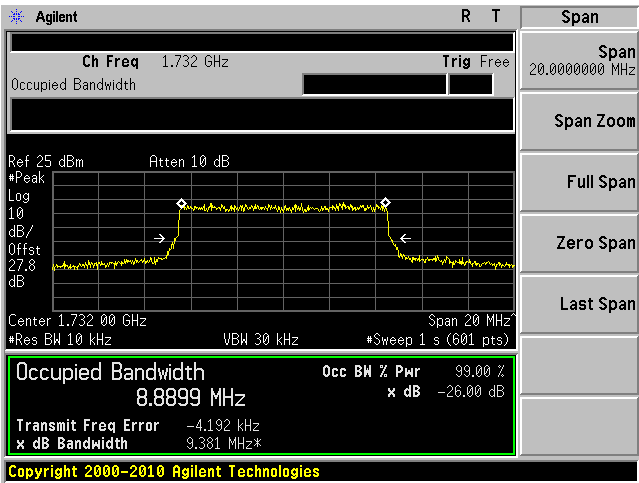


Modulation: QPSK (10 MHz) Frequency: 1732 MHz

Input

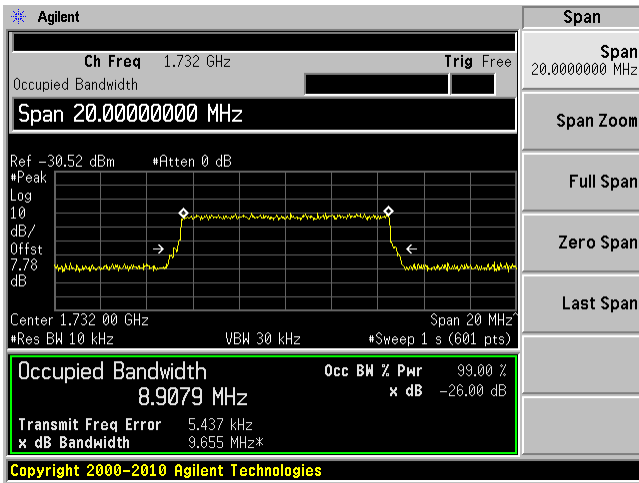


Output

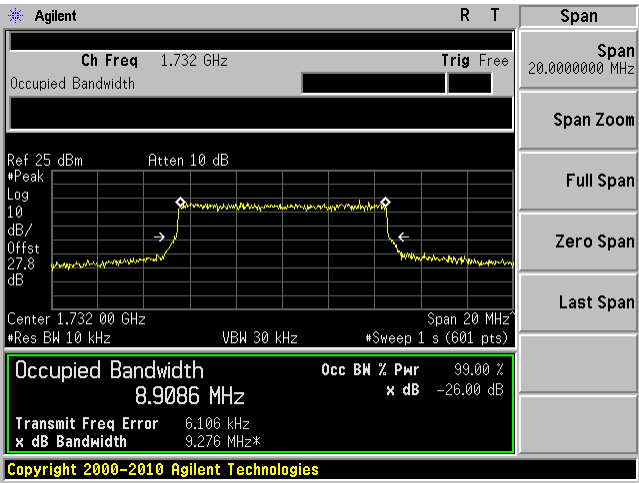


Modulation: 16QAM (10 MHz) Frequency: 1732 MHz

Input

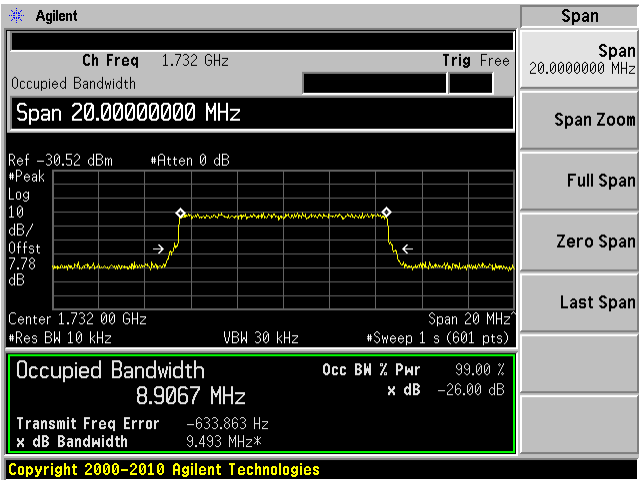


Output

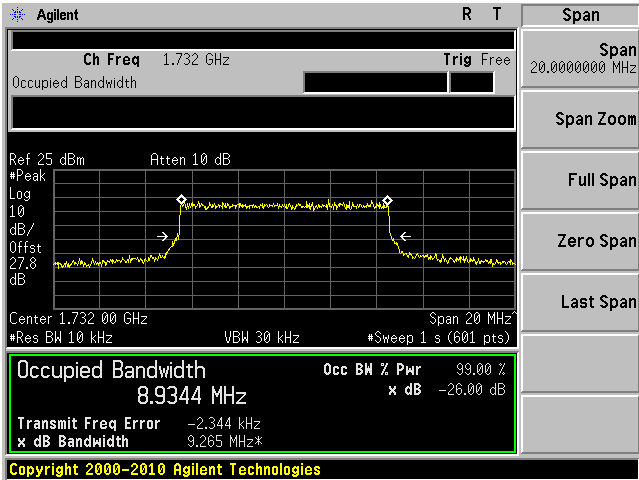


Modulation: 64QAM (10 MHz) Frequency: 1732 MHz

Input



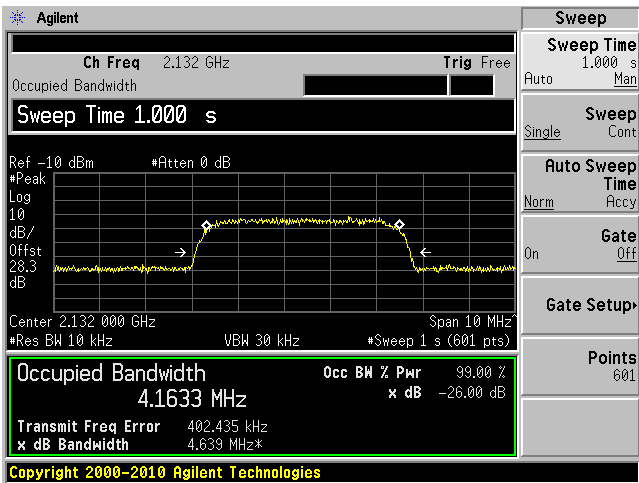
Output



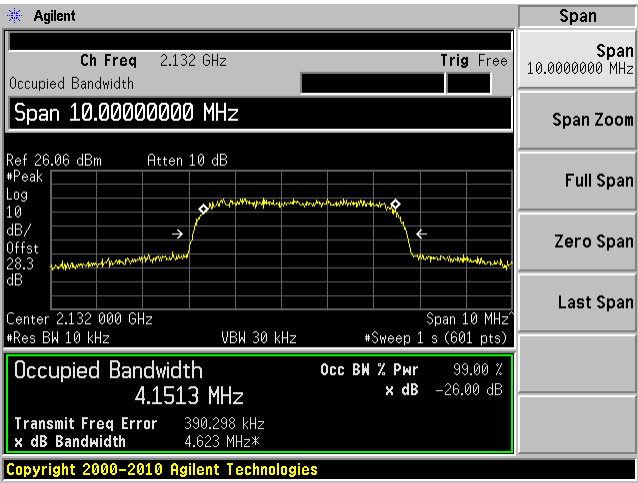
Downlink: 2110-2155 MHz

WCDMA/HSPA, Frequency: 2132.4 MHz

Input

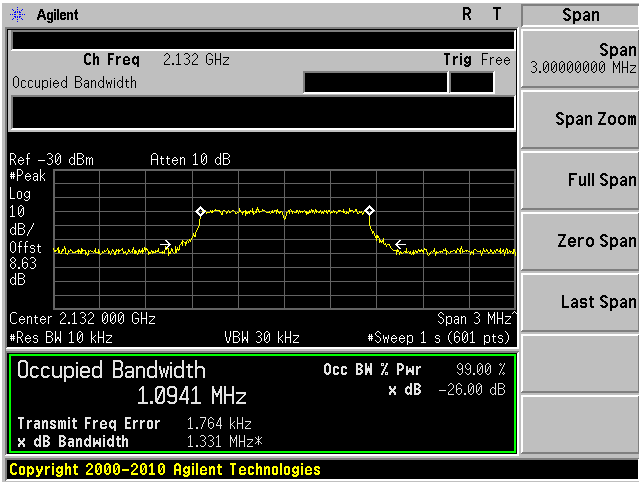


Output

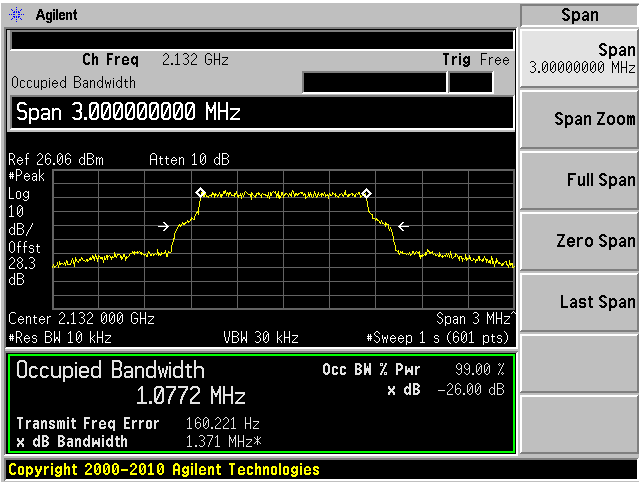


Modulation: QPSK (1.4 MHz), Frequency: 2132 MHz

Input

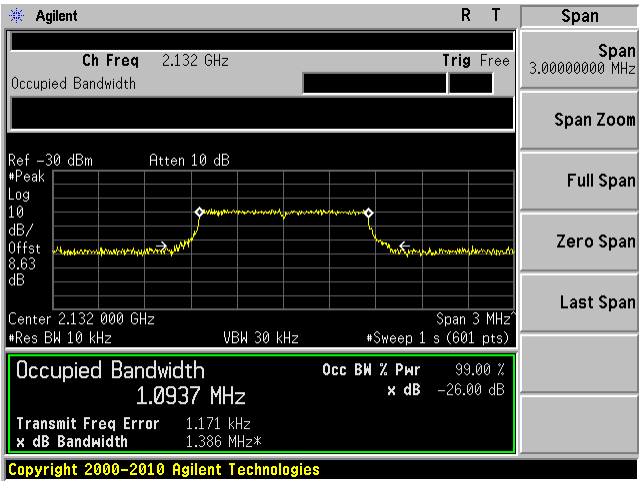


Output

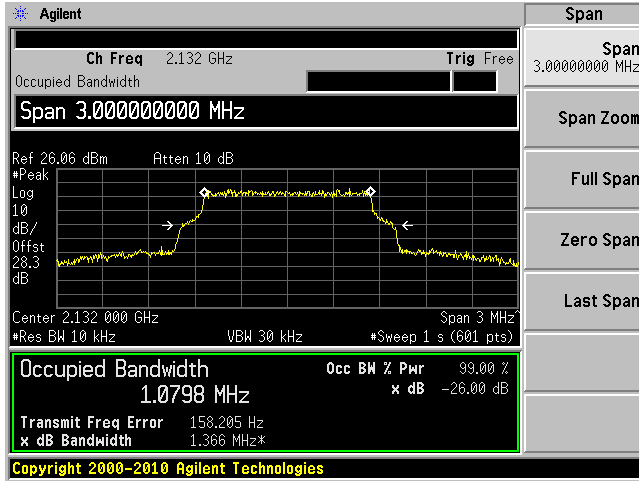


Modulation: 16QAM (1.4 MHz), Frequency: 2132 MHz

Input

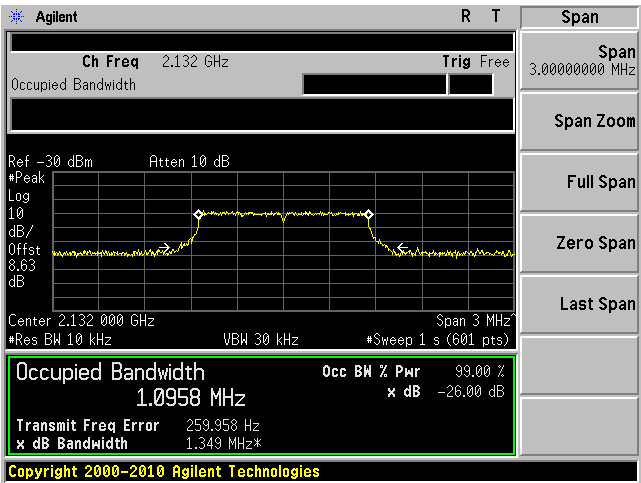


Output

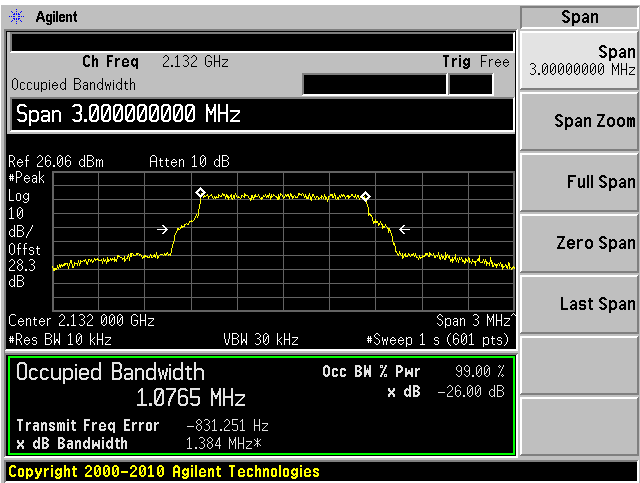


Modulation: 64QAM (1.4 MHz), Frequency: 2132 MHz

Input

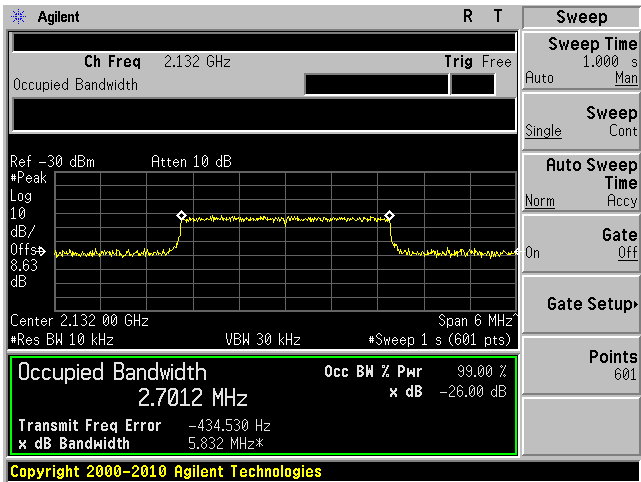


Output

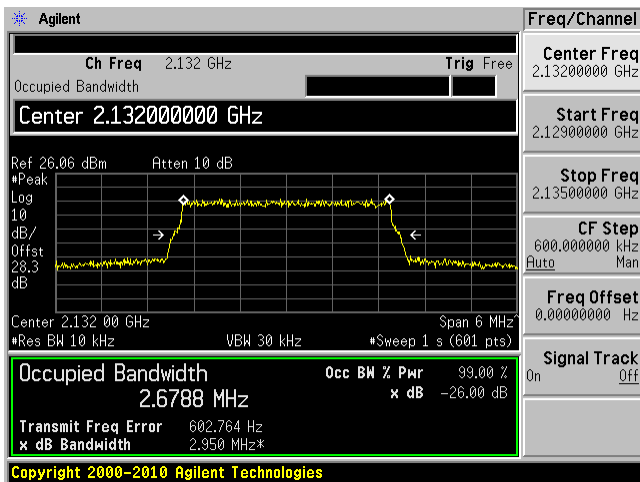


Modulation: QPSK (3 MHz), Frequency: 2132 MHz

Input

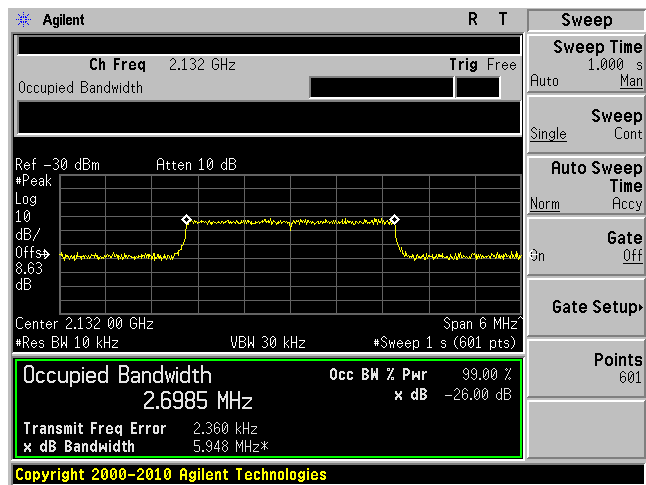


Output

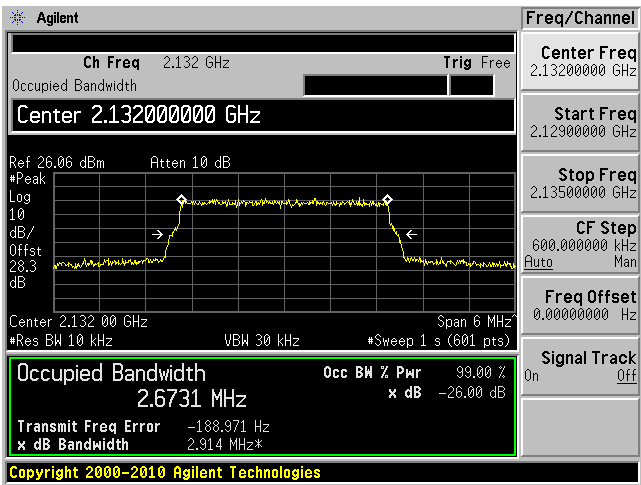


Modulation: 16QAM (3 MHz), Frequency: 2132 MHz

Input

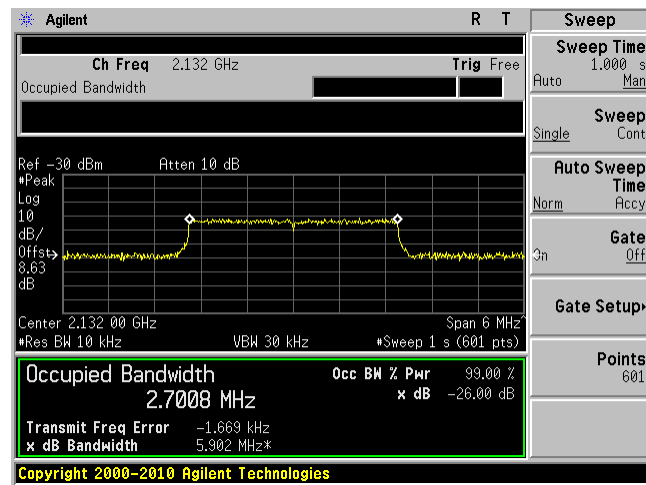


Output

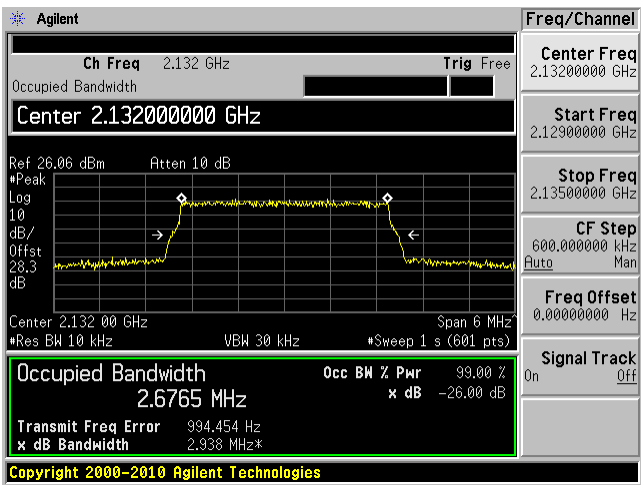


Modulation: 64QAM (3 MHz), Frequency: 2132 MHz

Input

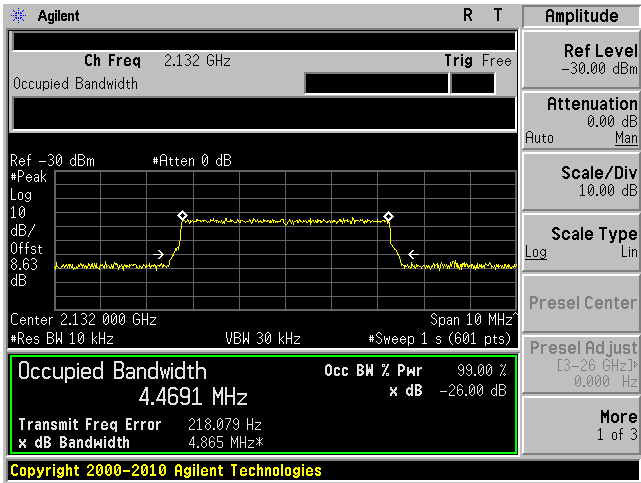


Output

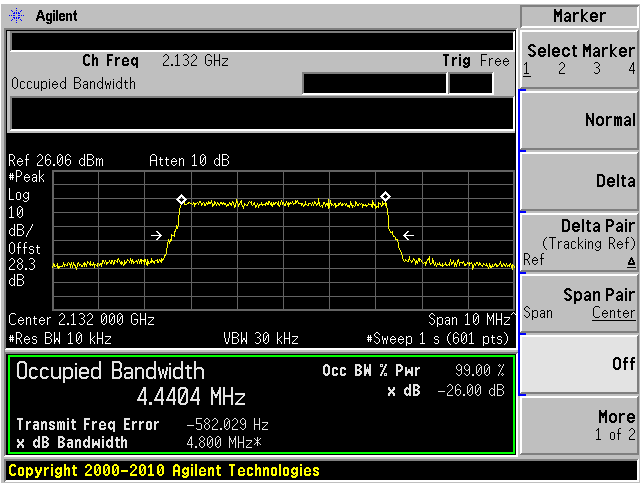


Modulation: QPSK (5 MHz), Frequency: 2132 MHz

Input

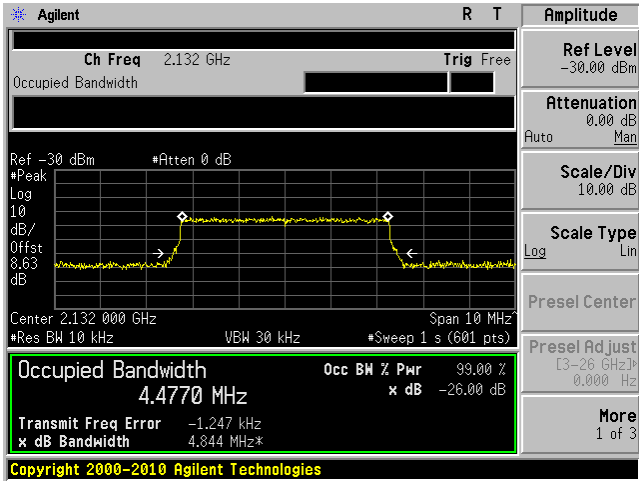


Output

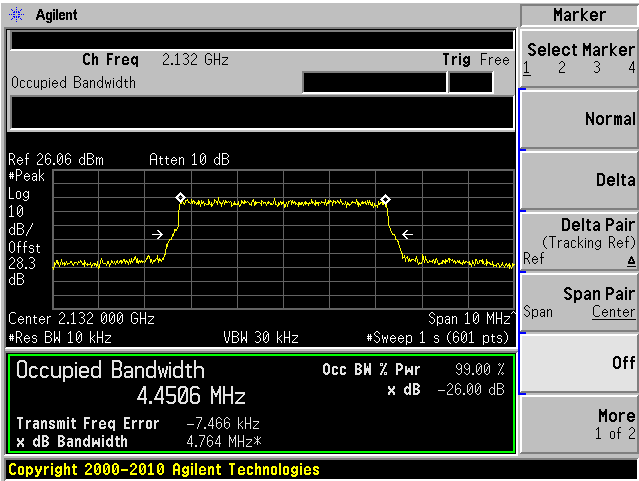


Modulation: 16QAM (5 MHz), Frequency: 2132 MHz

Input

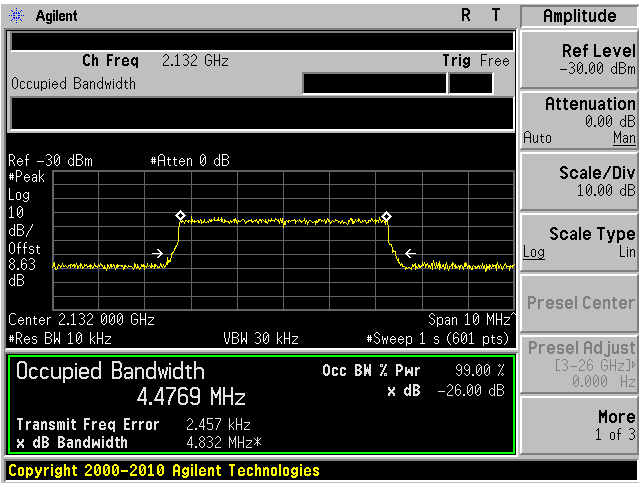


Output

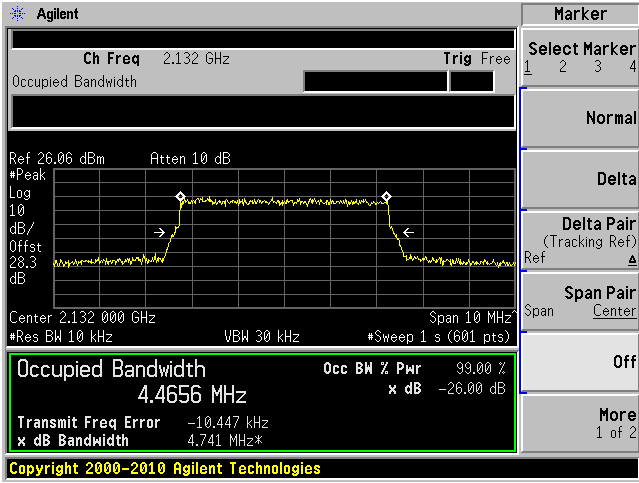


Modulation: 64QAM (5 MHz), Frequency: 2132 MHz

Input

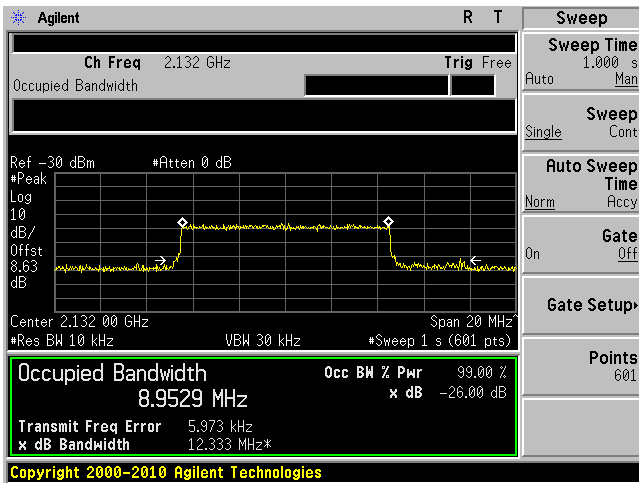


Output

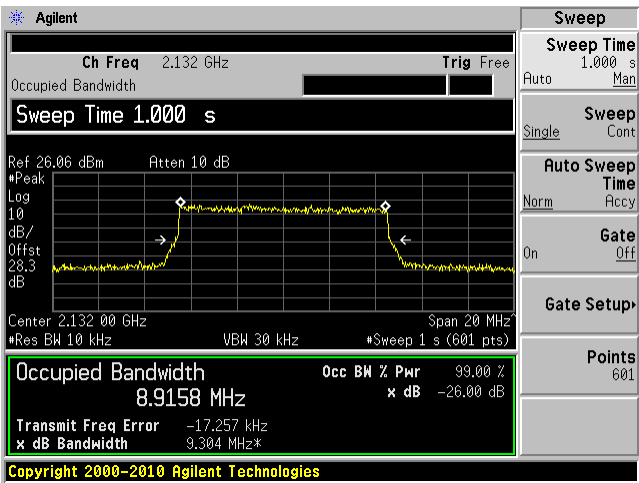


Modulation: QPSK (10 MHz), Frequency: 2132 MHz

Input

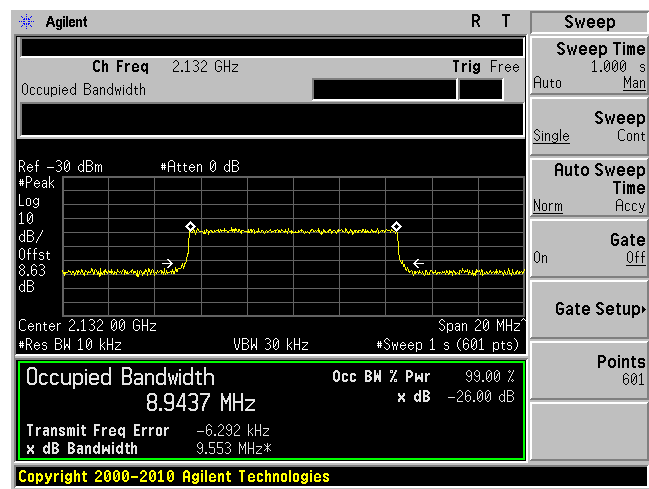


Output

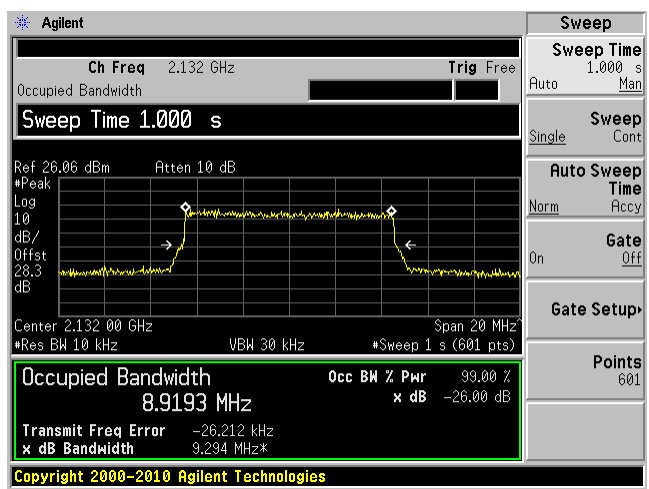


Modulation: 16QAM (10 MHz), Frequency: 2132 MHz

Input

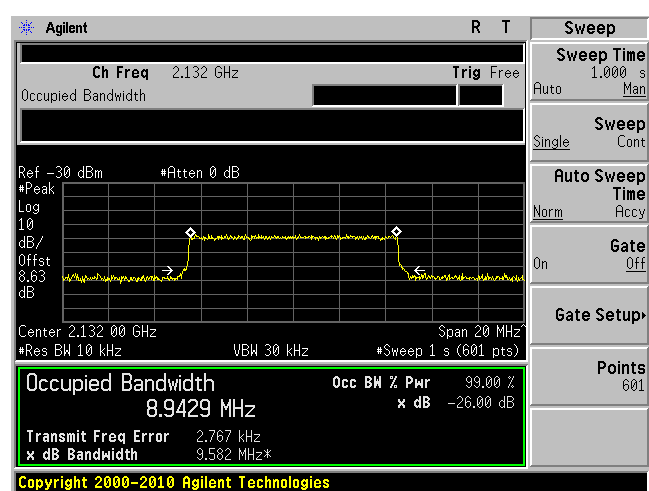


Output

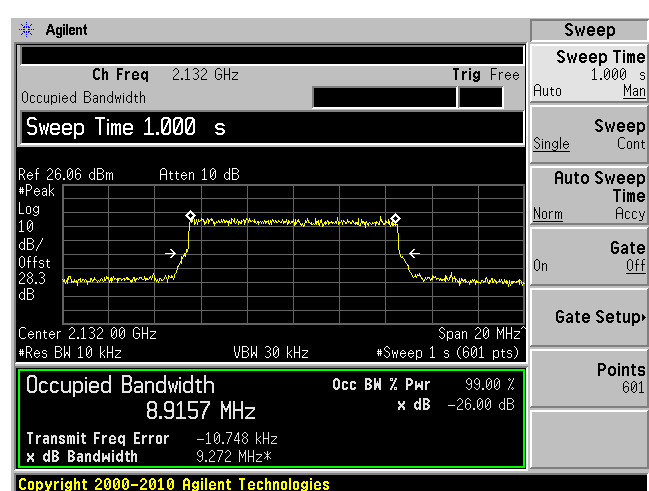


Modulation: 64QAM (10 MHz), Frequency: 2132 MHz

Input



Output

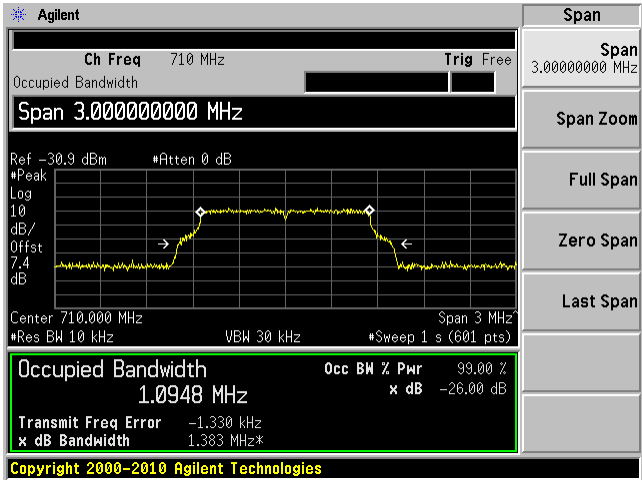


LTE Band (Band 17)

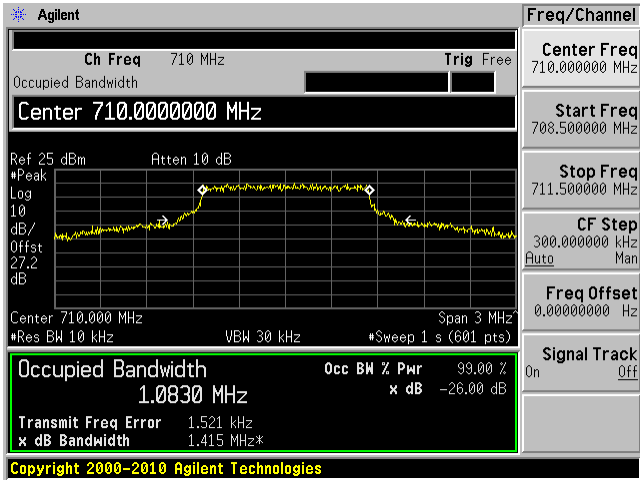
Uplink: 704-716 MHz

Modulation: QPSK (1.4 MHz), Frequency: 710 MHz

Input

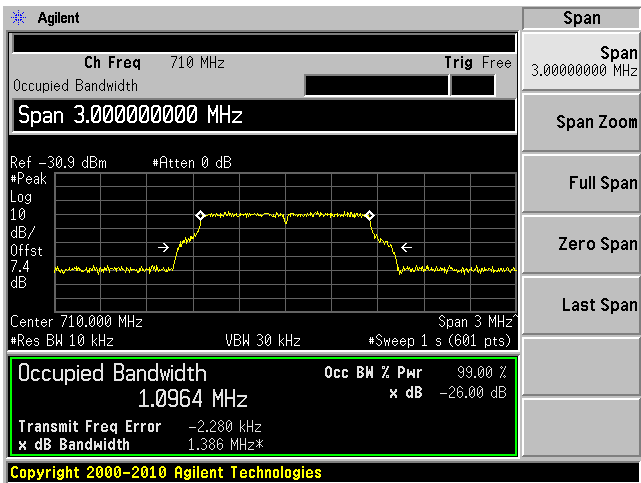


Output

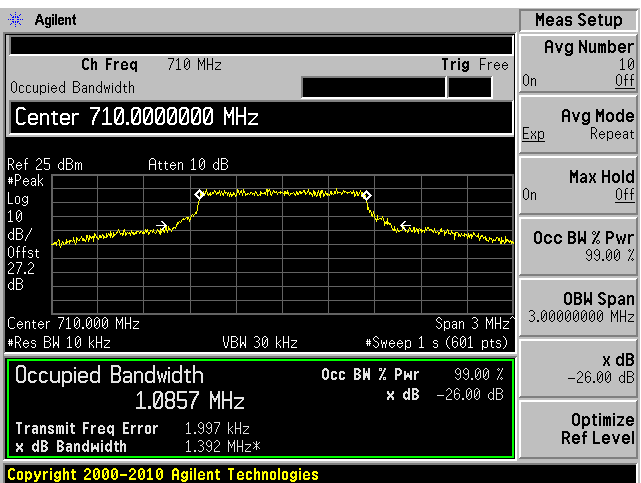


Modulation: 16QAM (1.4 MHz), Frequency: 782 MHz

Input

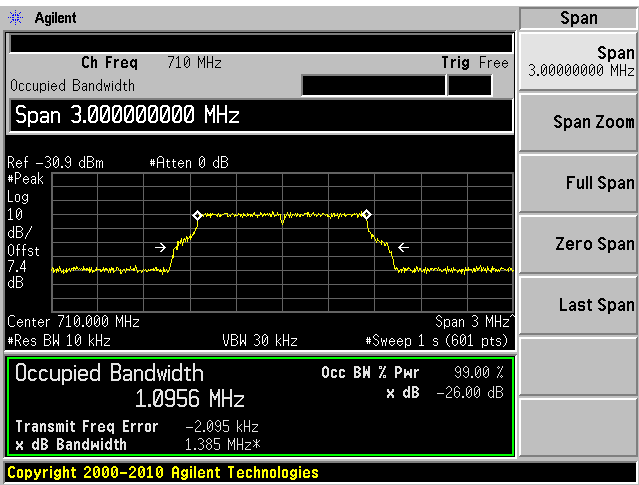


Output

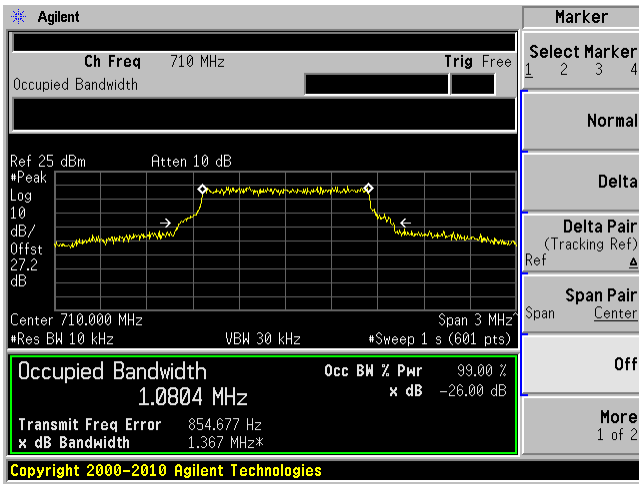


Modulation: 64QAM (1.4 MHz), Frequency: 710 MHz

Input

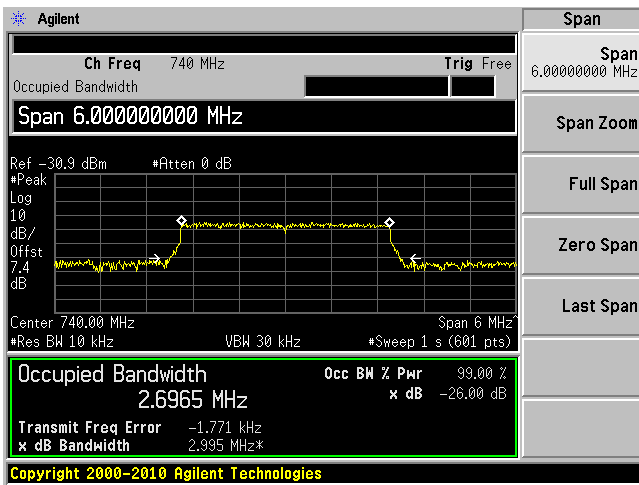


Output

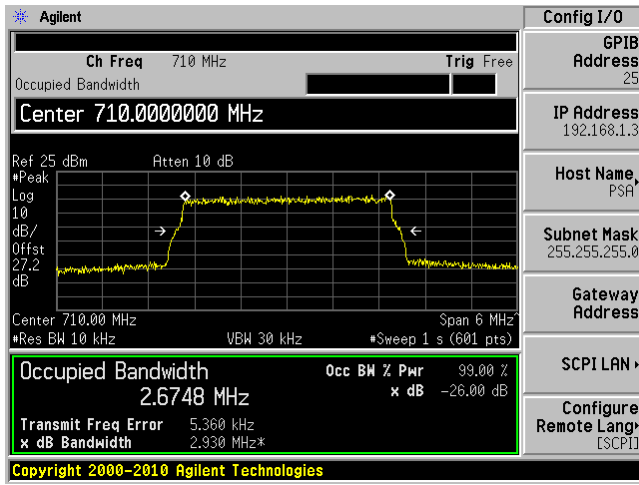


Modulation: QPSK (3 MHz), Frequency: 710 MHz

Input

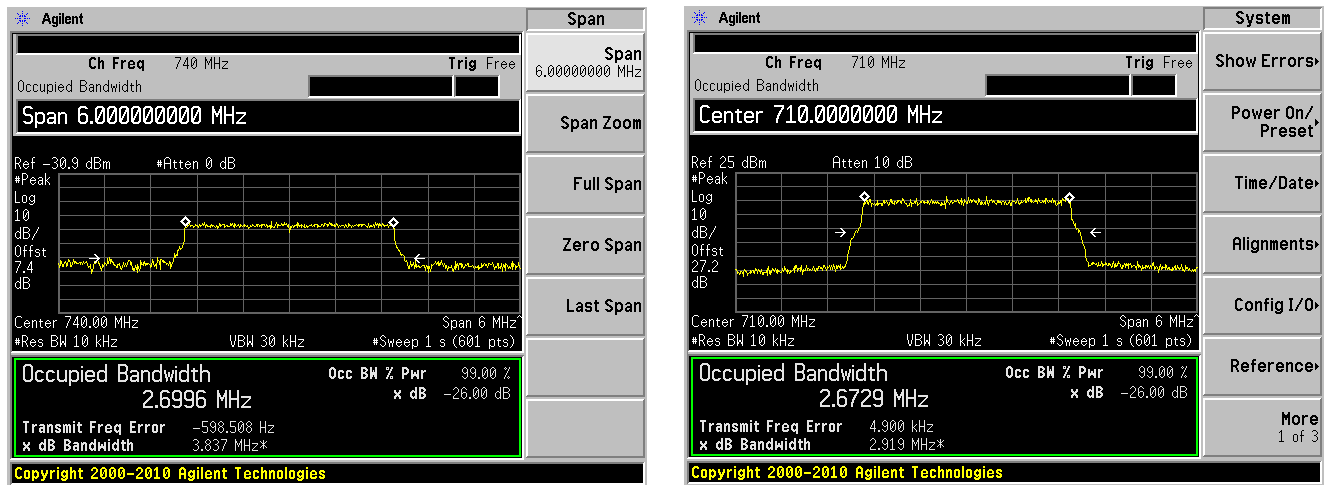


Output



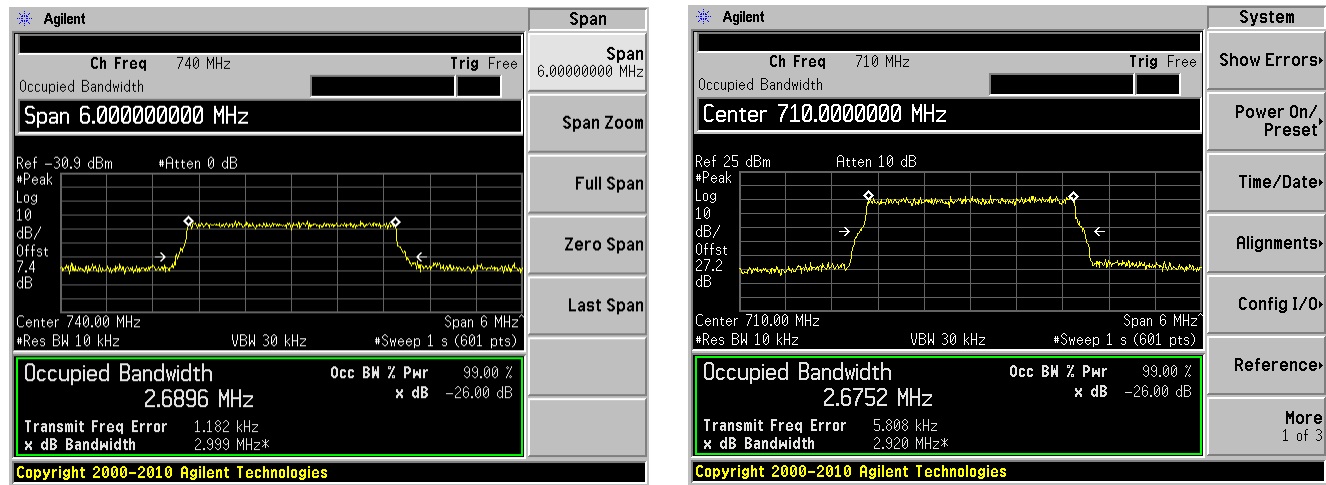
Modulation: 16QAM (3 MHz), Frequency: 710 MHz

InputOutput



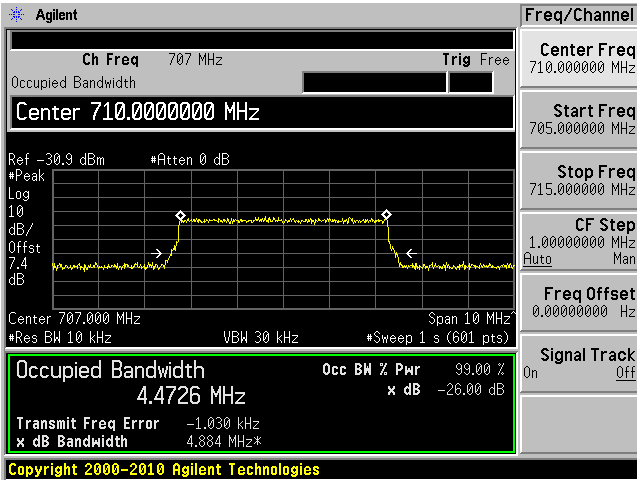
Modulation: 64QAM (3 MHz), Frequency: 10 MHz

InputOutput

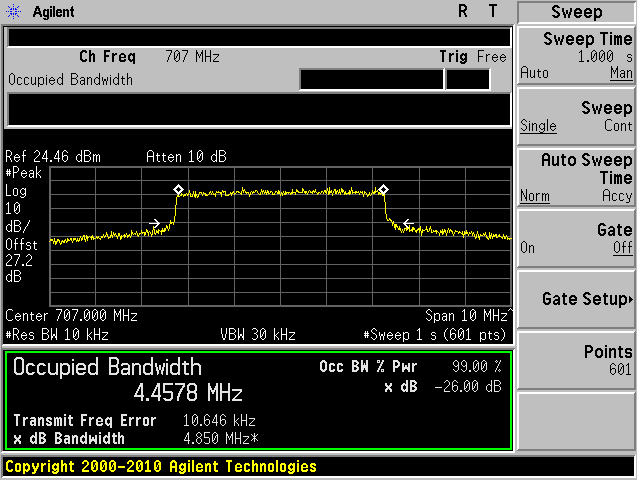


Modulation: QPSK (5 MHz), Frequency: 707 MHz

Input

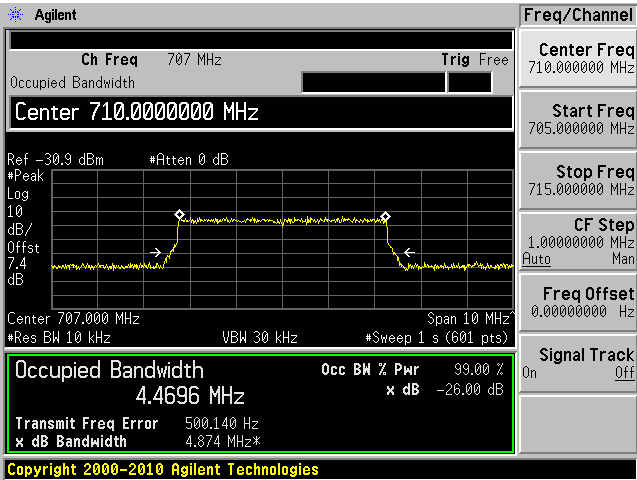


Output

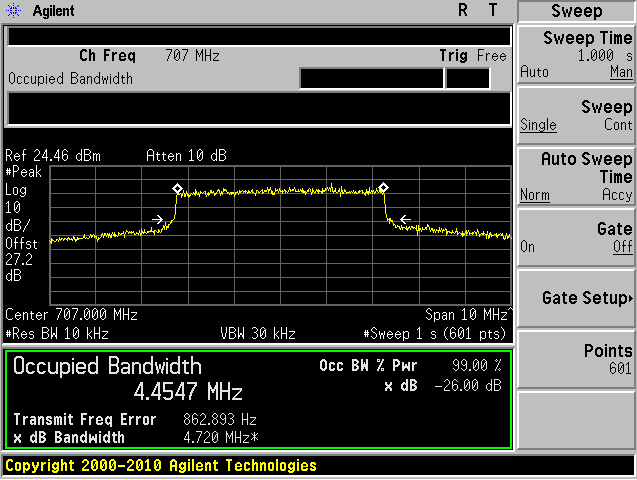


Modulation: 16QAM (5 MHz), Frequency: 707 MHz

Input

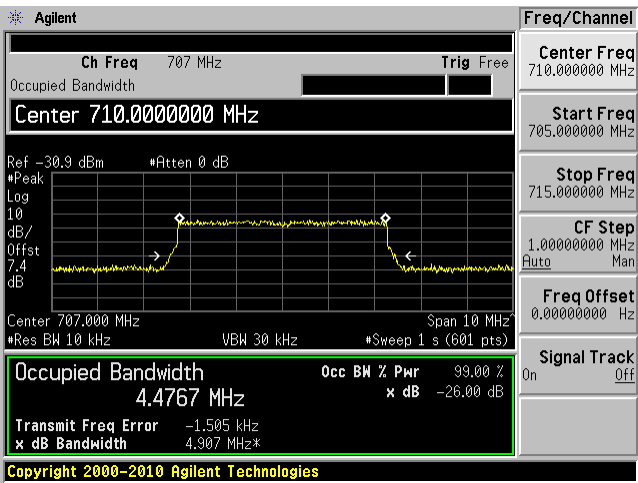


Output

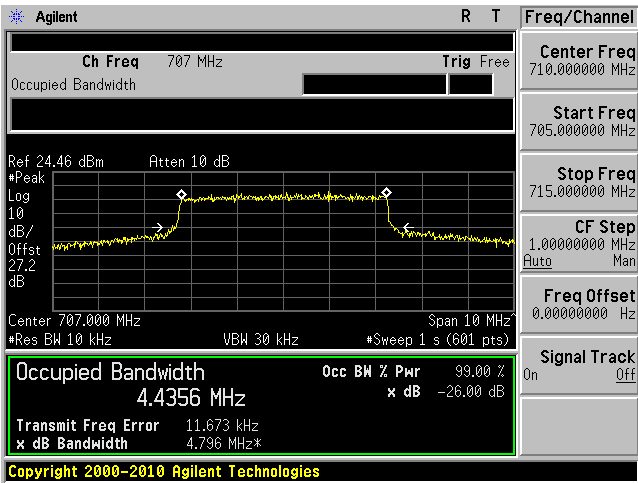


Modulation: 64QAM (5 MHz), Frequency: 707 MHz

Input

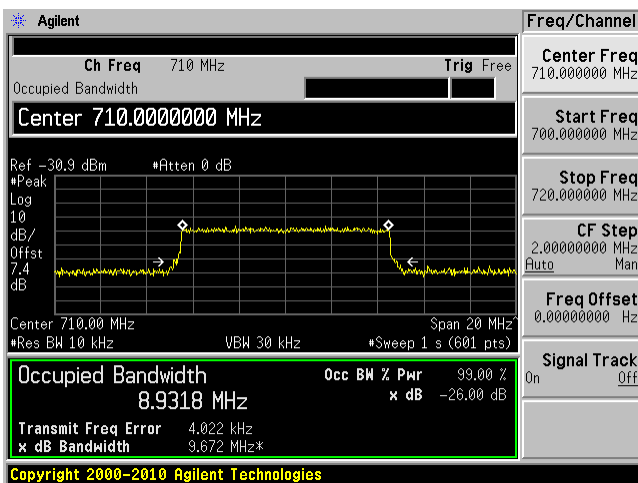


Output

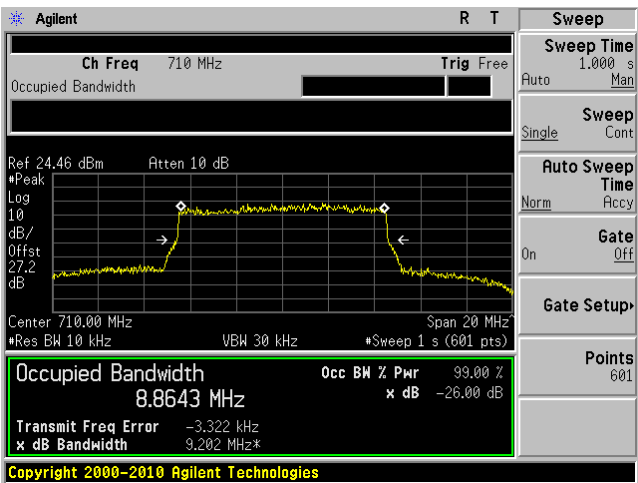


Modulation: QPSK (10 MHz), Frequency: 710 MHz

Input

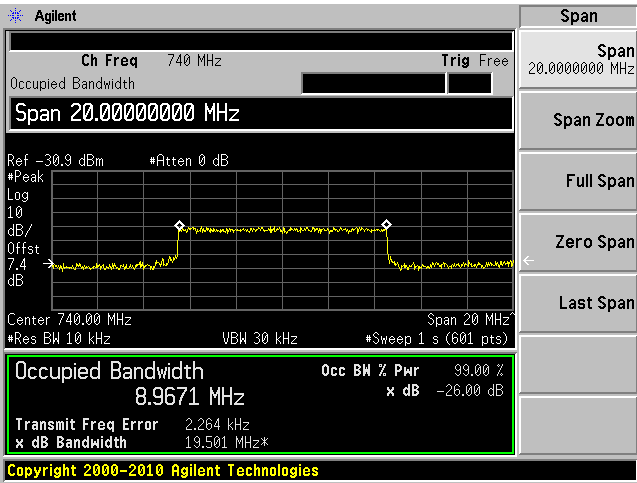


Output

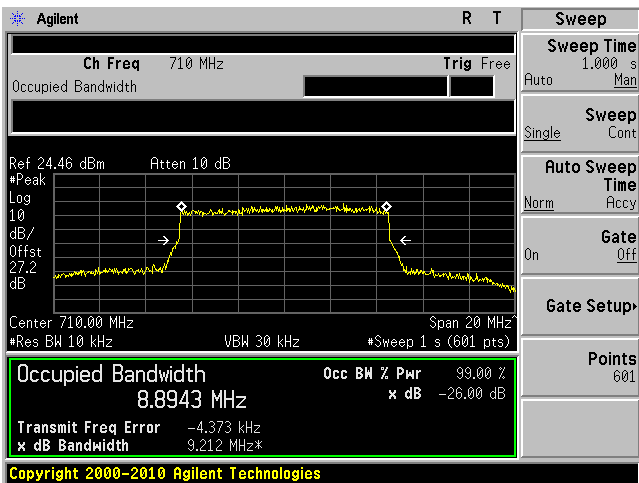


Modulation: 16QAM (10 MHz), Frequency: 710 MHz

Input

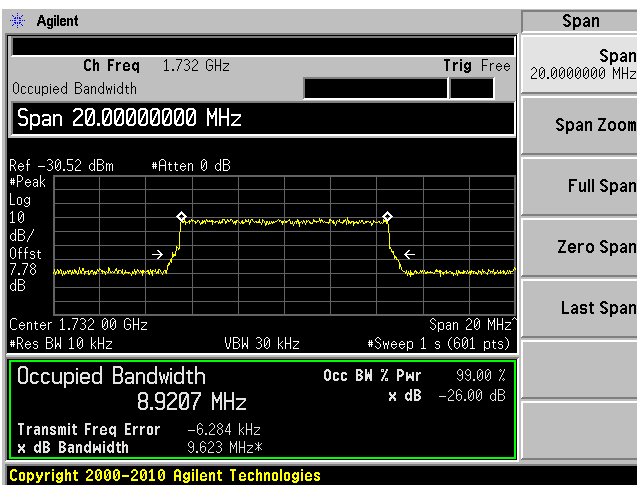


Output

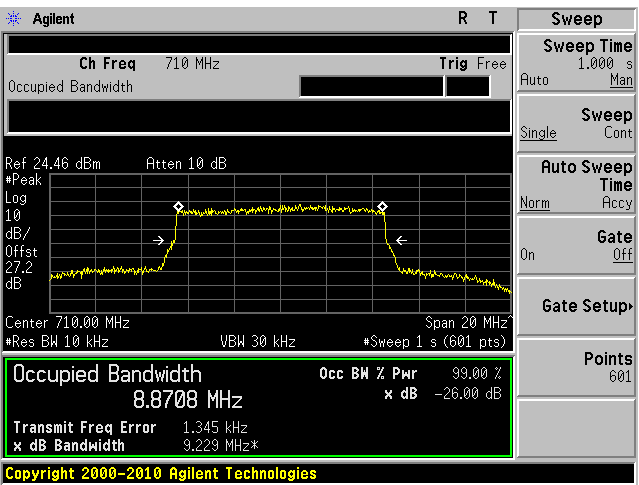


Modulation: 64QAM (10 MHz), Frequency: 710 MHz

Input



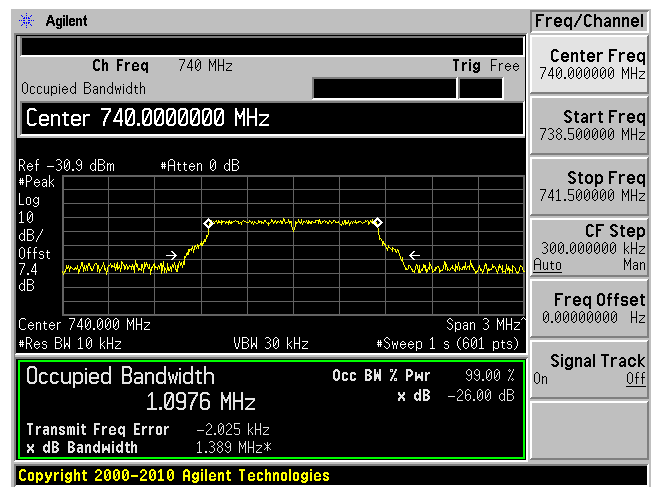
Output



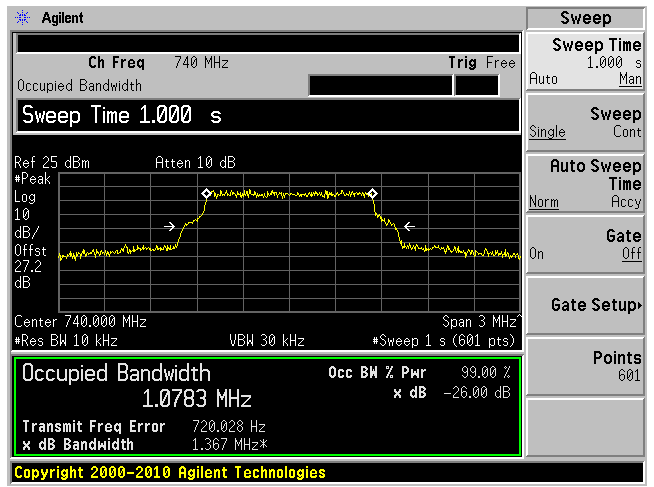
Downlink: 734-746 MHz

Modulation: QPSK (1.4 MHz), Frequency: 740 MHz

Input

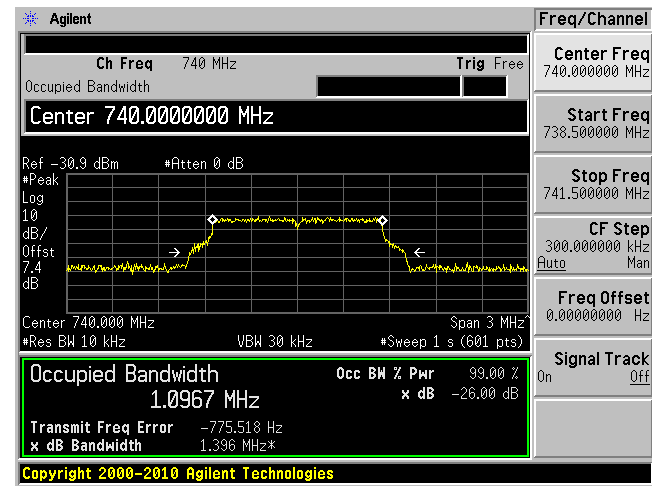


Output

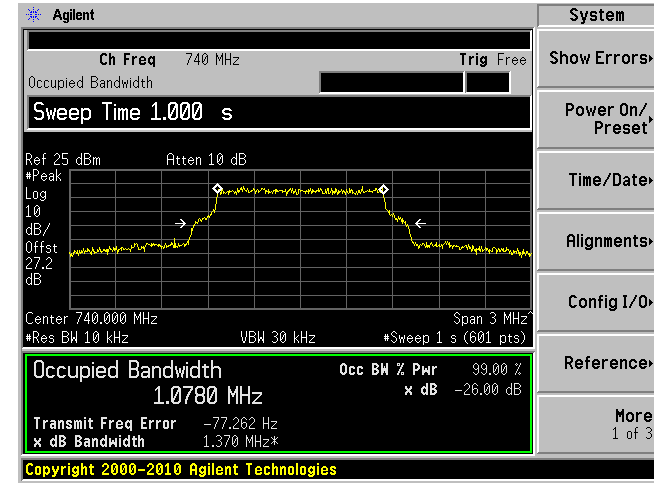


Modulation: 16QAM (1.4 MHz), Frequency: 740 MHz

Input

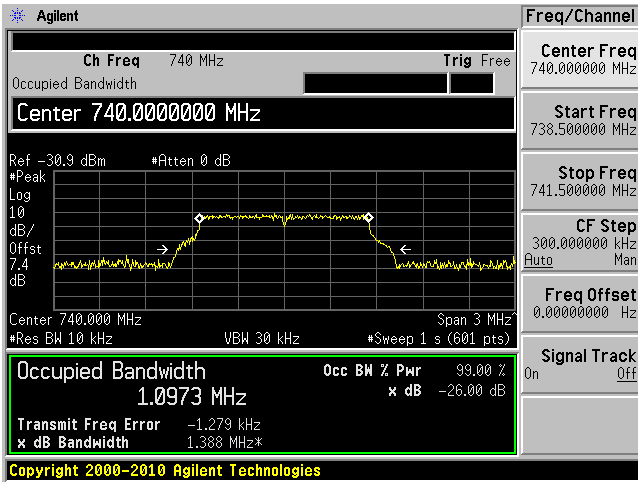


Output

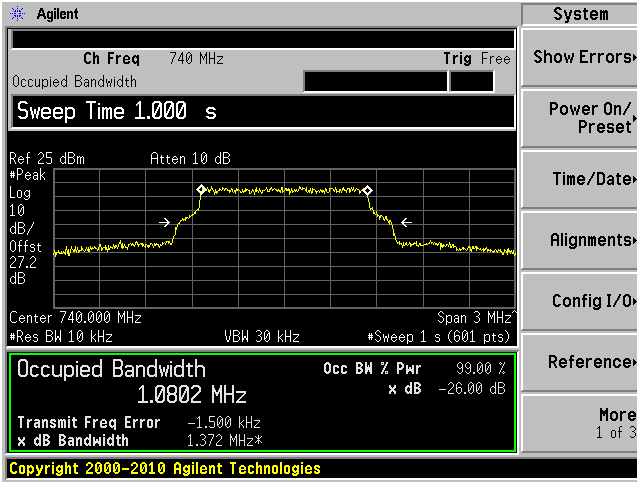


Modulation: 64QAM (1.4 MHz), Frequency: 740 MHz

Input

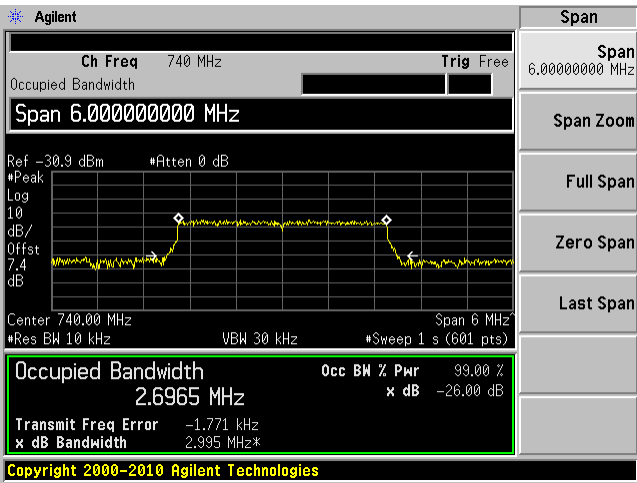


Output

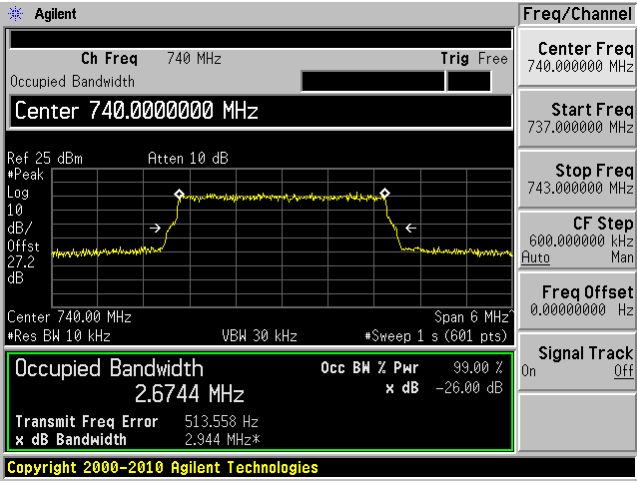


Modulation: QPSK (3 MHz), Frequency: 740 MHz

Input

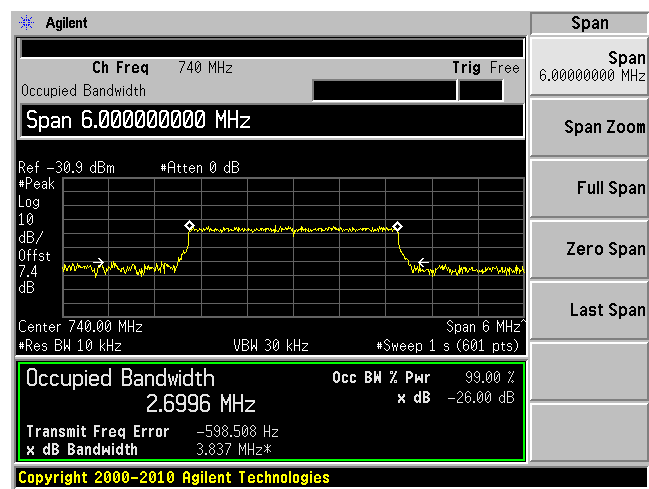


Output

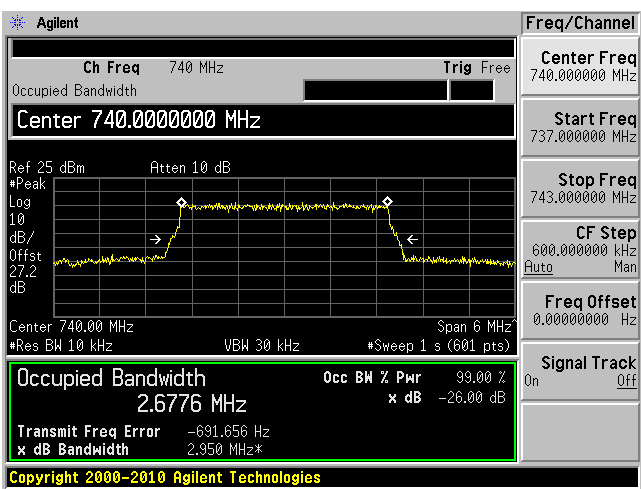


Modulation: 16QAM (3 MHz), Frequency: 740 MHz

Input

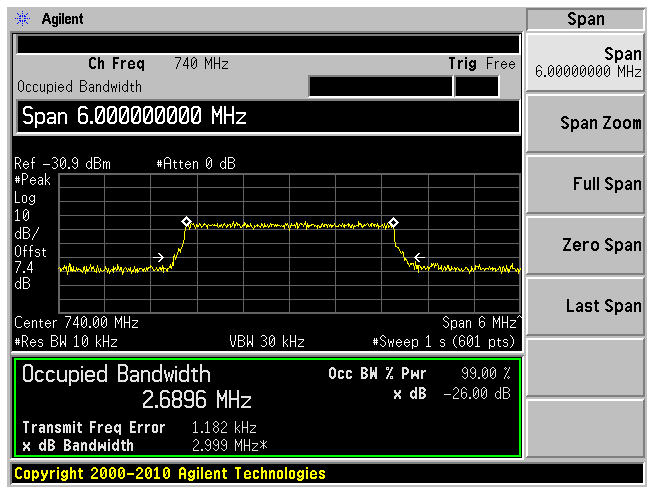


Output

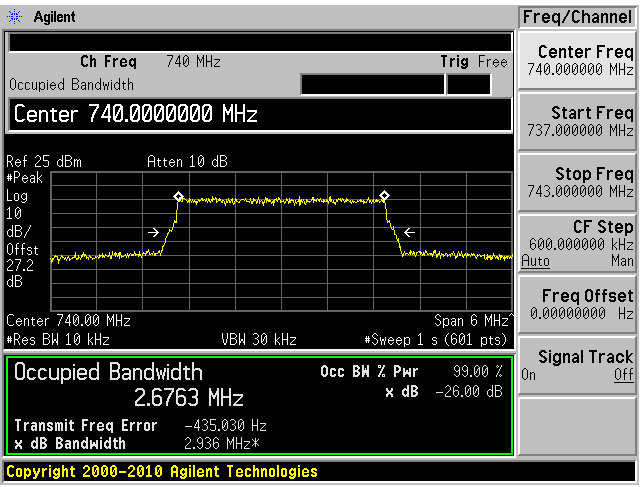


Modulation: 64QAM (3 MHz), Frequency: 752 MHz

Input



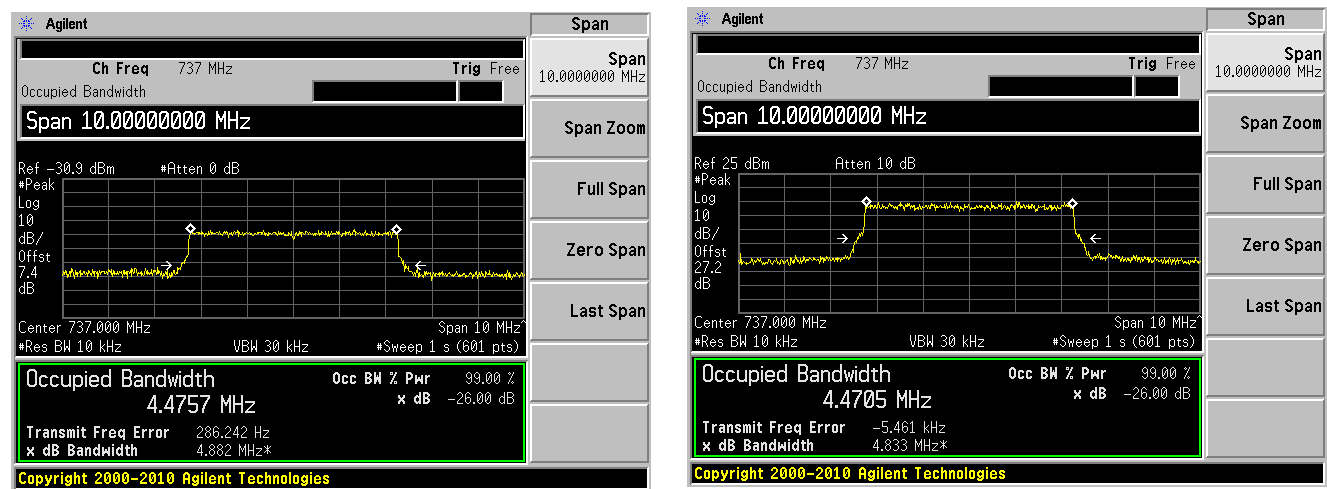
Output



Modulation: QPSK (5 MHz), Frequency: 737 MHz

Input

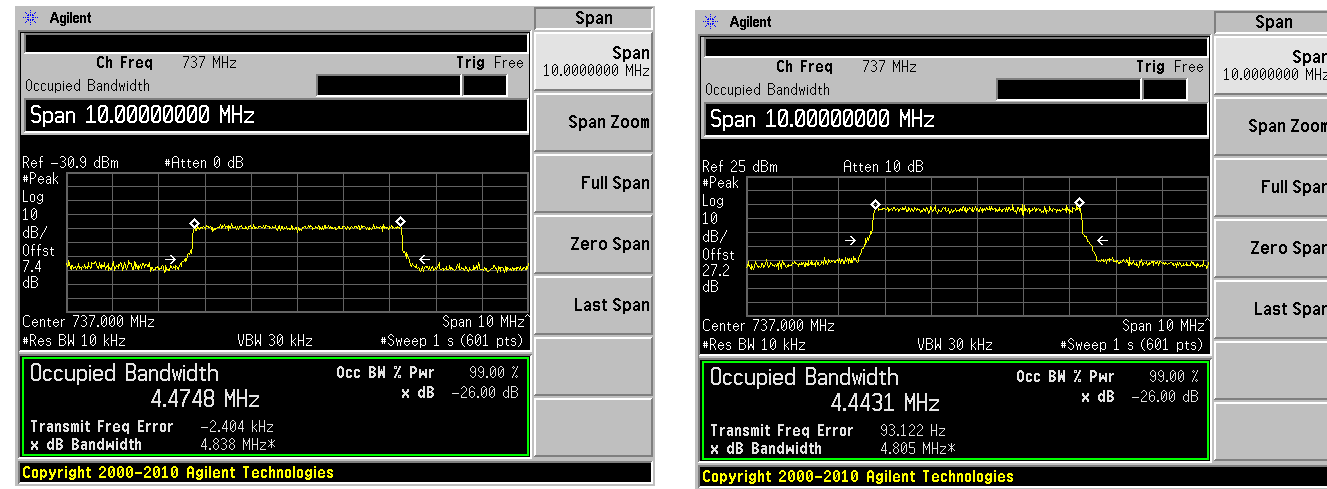
Output



Modulation: 16QAM (5 MHz), Frequency: 737 MHz

Input

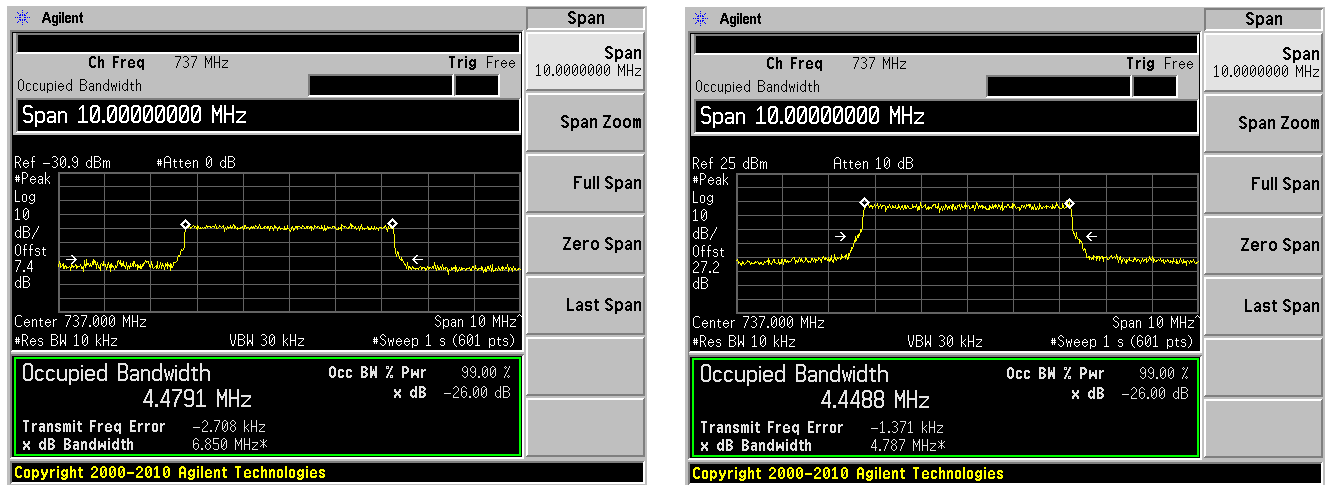
Output



Modulation: 64QAM (5 MHz), Frequency: 737 MHz

Input

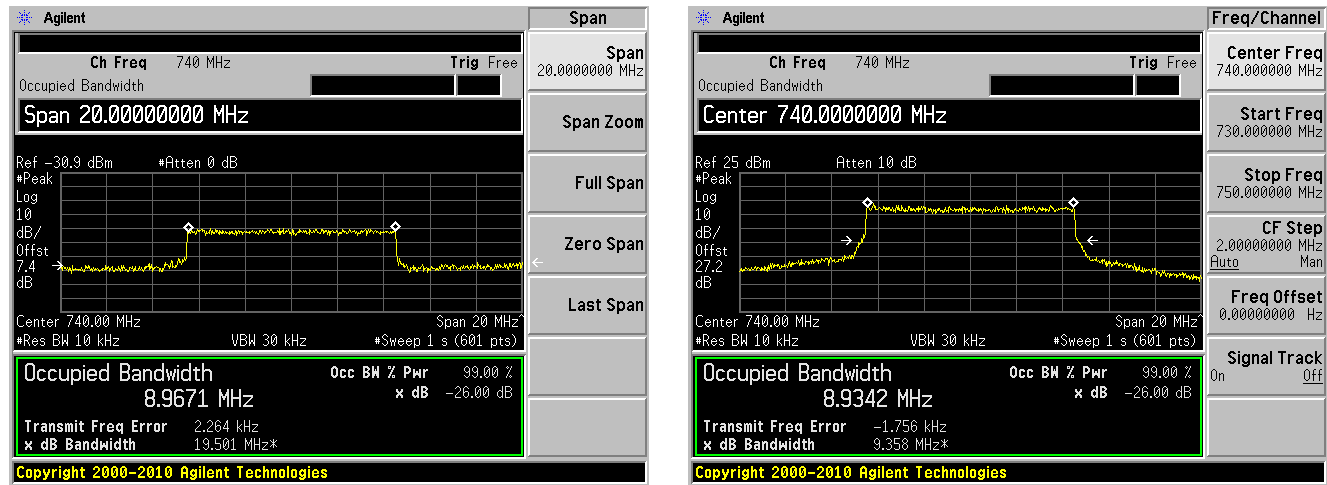
Output



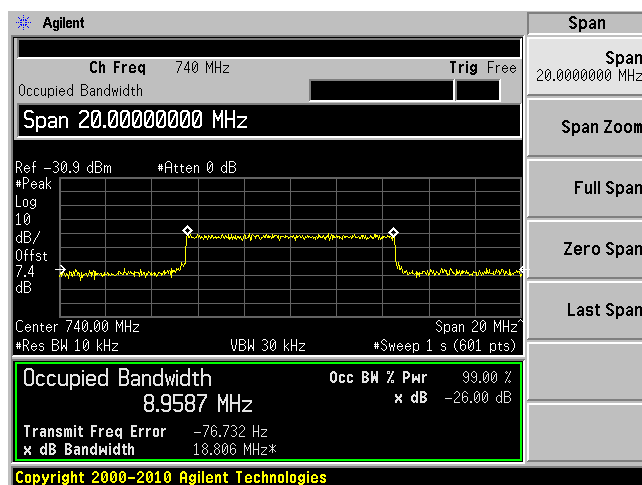
Modulation: QPSK (10 MHz), Frequency: 740 MHz

Input

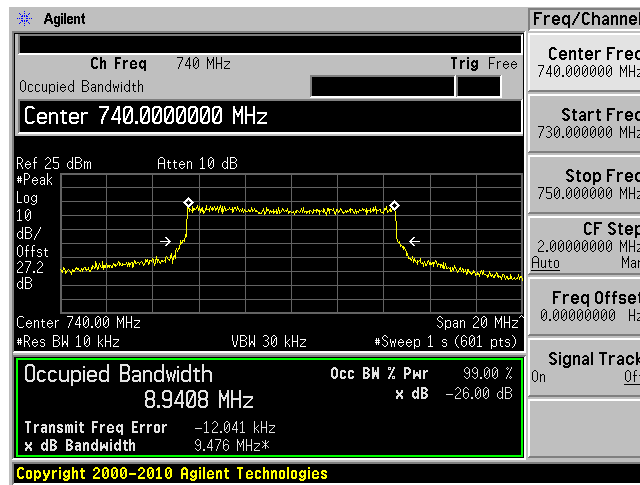
Output



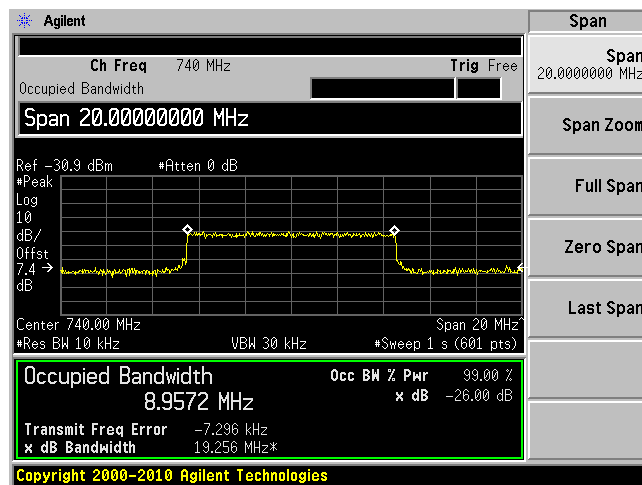
Input



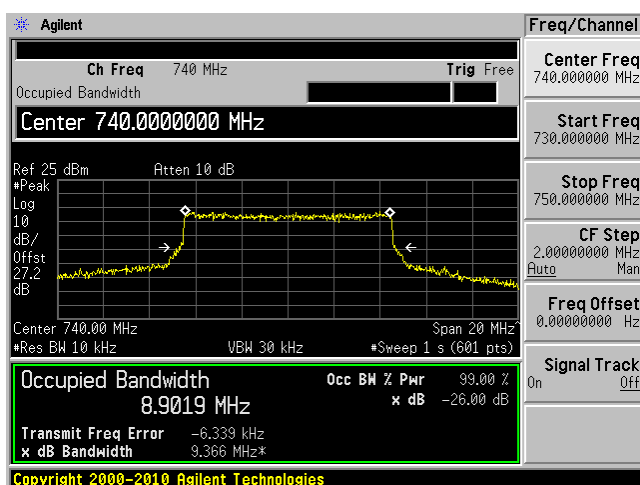
Output



Input



Output



6 FCC §2.1051 & §27.53 - SPURIOUS RADIATED EMISSIONS

6.1 Applicable Standard

Requirements: FCC §2.1051, §27.53.

6.2 Test Procedure

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

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

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

Spurious emissions in dB = 10 log (TX Power in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 Log₁₀ (power out in Watts)

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Sunol Science Corp	System Controller	SC99V	122303-1	N/R	N/R
Sunol Science Corp	Combination Antenna	JB3	A020106-3	2012-06-18	1 year
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03	1 year
Eaton	Horn antenna	96001		2012-10-17	1 year
A.H. Systems	Horn antenna	SAS-200/571	261	2012-01-18	1 year

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

6.4 Test Environmental Conditions

Temperature:	21-23°C
Relative Humidity:	47-49 %
ATM Pressure:	101-102 kPa

The testing was performed by Wei Sun on 2012-01-03 in Chamber #2.

6.5 Summary of Test Results

The worst case reading as follows:

Frequency Bands	Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Frequency Range
DL: 734-746 MHz	-35.85	1474	Horizontal	30 MHz – 8 GHz
UL: 704-716 MHz	-39.63	1412	Horizontal	30 MHz – 8 GHz
DL: 2110-2155 MHz	-37.67	4305.2	Horizontal	30 MHz – 22 GHz
UL: 1710-1755 MHz	-25.87	3464.8	Horizontal	30 MHz – 18 GHz

6.6 Test Results

AWS Band (Band 4)

Uplink (worst case Input frequency = 1732.4 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3464.8	47.9	243	190	V	3464.8	-48.54	10.08	3.75	-42.21	-13	-29.21
3464.8	51.33	352	155	H	3464.8	-45.2	10.08	3.75	-38.87	-13	-25.87

Downlink (worst case Input frequency = 2152.6 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
4305.2	35.11	36	155	V	4305.2	-60.06	10.61	4.67	-54.12	-13	-41.12
4305.2	38.85	242	155	H	4305.2	-56.61	10.61	4.67	-50.67	-13	-37.67

Uplink (worst case Input frequency = 1732 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3464	47.21	255	181	V	3464	-49.23	10.08	3.75	-42.9	-13	-29.9
3464	50.09	329	155	H	3464	-46.44	10.08	3.75	-40.11	-13	-27.11

Downlink (worst case Input frequency = 2153 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
4306	34.26	20	155	V	4306	-60.91	10.61	4.67	-54.97	-13	-41.97
4306	37.59	206	155	H	4306	-57.87	10.61	4.67	-51.93	-13	-38.93

Note: - All emissions are on/under noise floor level.

LTE Band (Band 17)

Uplink (worst Case Input frequency = 706 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1412	40.24	121	155	V	1412	-59.03	7.98	2.04	-53.09	-13	-40.09
1412	41.26	216	155	H	1412	-58.57	7.98	2.04	-52.63	-13	-39.63

Downlink (Input frequency = 737 MHz) – CW Signal

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (cm)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1474	39.24	397	155	V	1474	-60.26	8.43	2.09	-53.92	-13	-40.92
1474	44.48	69	168	H	1474	-55.19	8.43	2.09	-48.85	-13	-35.85

Note: - All emissions are on/under noise floor level.

7 FCC §2.1051 & §27.53 – SPURIOUS EMISSIONS AT ANTENNA TERMINALS

7.1 Applicable Standard

Requirements: FCC §2.1051 & §27.53.

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

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

7.2 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.

7.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03	1 year

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

7.4 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	47 %
ATM Pressure:	101.2 kPa

The testing was performed by Wei Sun on 2012-12-21 at RF Site.

7.5 Test Results

Please refer to the following plots.

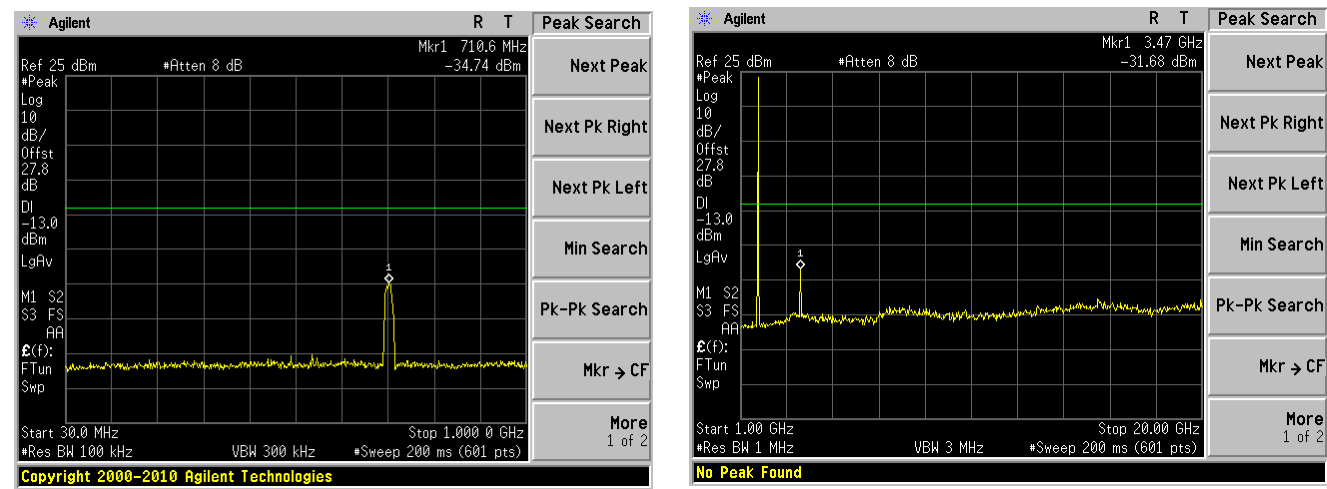
AWS Band (Band 4)

UL: 1710-1755 MHz

Modulation: CW Signal, Frequency: 1732.4 MHz

30 MHz to 1 GHz

above 1 GHz

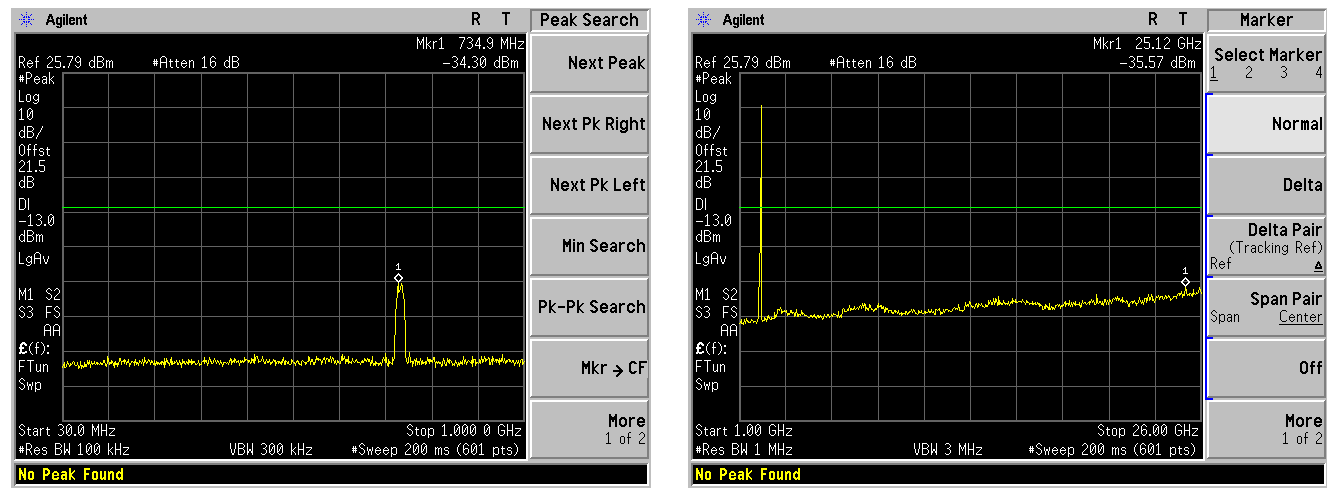


DL: 2110-2155 MHz

Modulation: CW Signal, Frequency: 2152.6 MHz

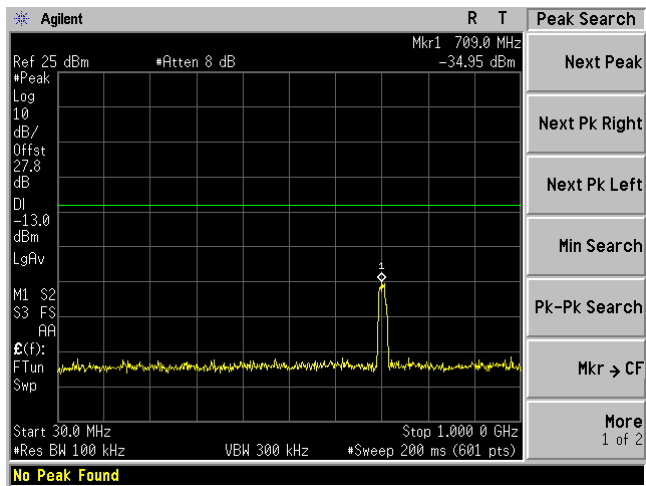
30 MHz to 1 GHz

above 1 GHz

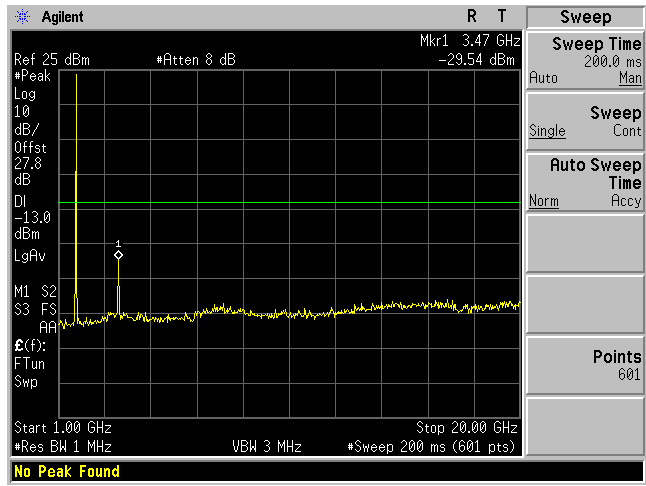


Modulation: CW Signal, Frequency: 1732 MHz

30 MHz to 1 GHz



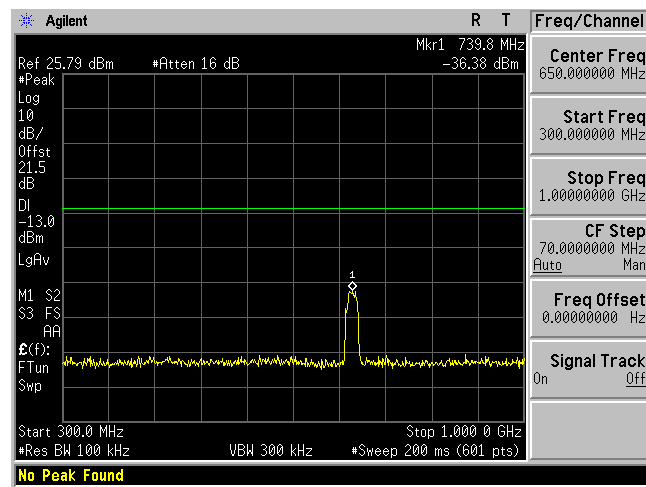
above 1 GHz



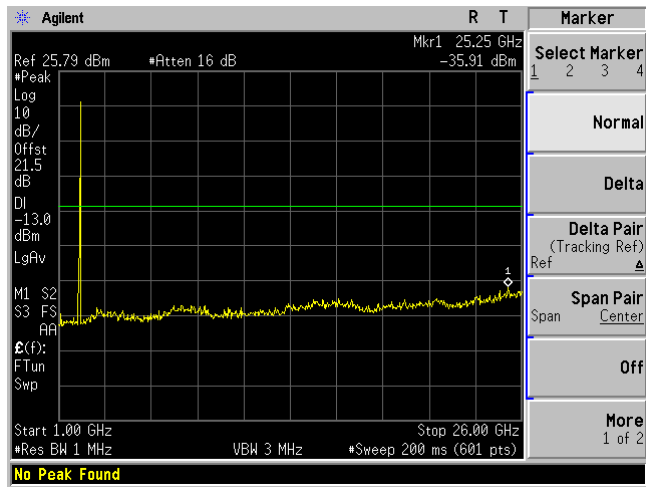
DL: 2110-2155 MHz

Modulation: CW Signal, Frequency: 2154 MHz

30 MHz to 1 GHz



above 1 GHz



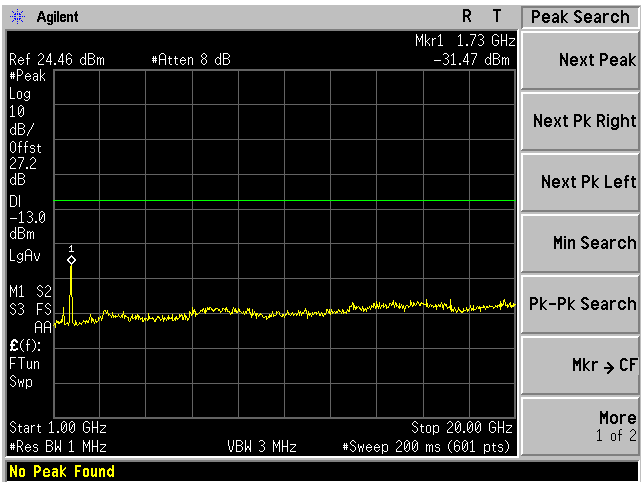
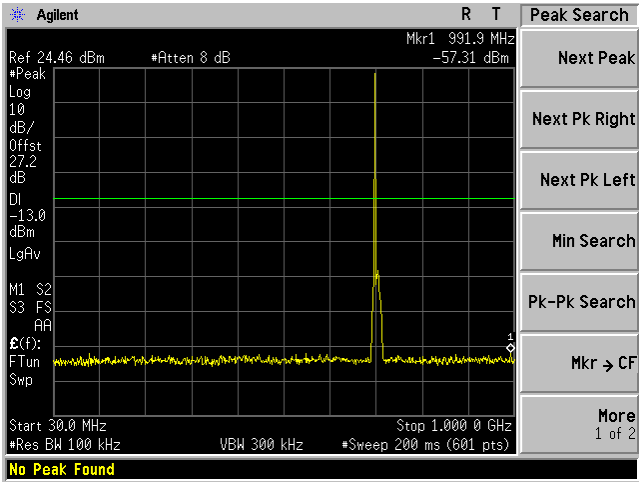
LTE Band (Band 17)

UL: 704-716 MHz

Modulation: CW Signal, Frequency: 706 MHz

30 MHz to 1 GHz

above 1 GHz

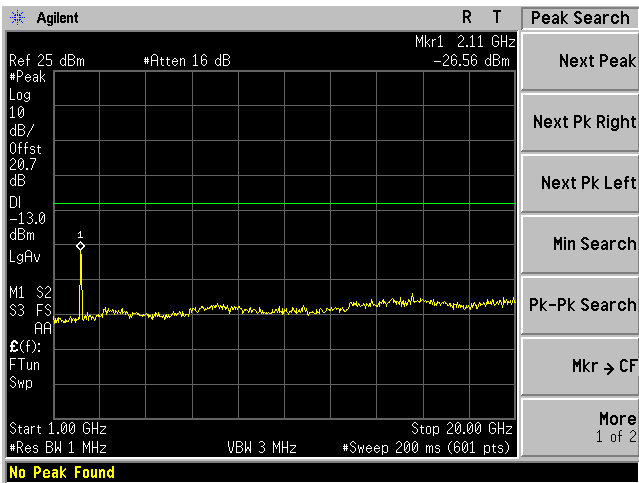
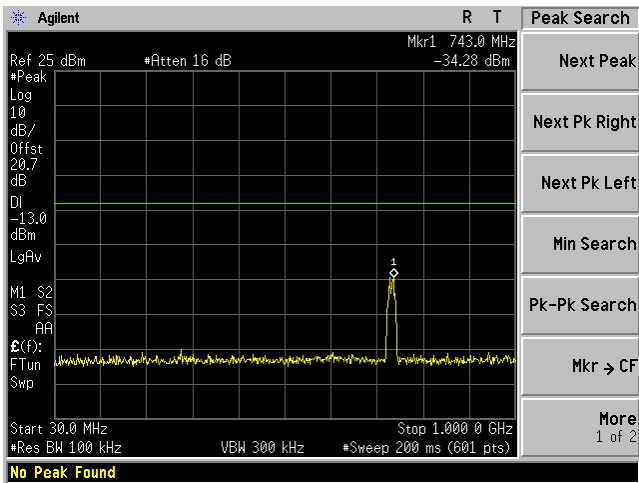


DL: 734-746 MHz

Modulation: CW Signal, Frequency: 737 MHz

30 MHz to 1 GHz

above 1 GHz



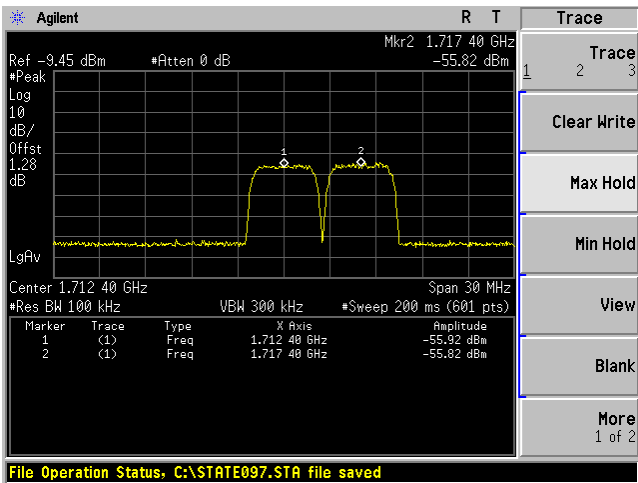
Inter-modulation

AWS Band (Band 4)

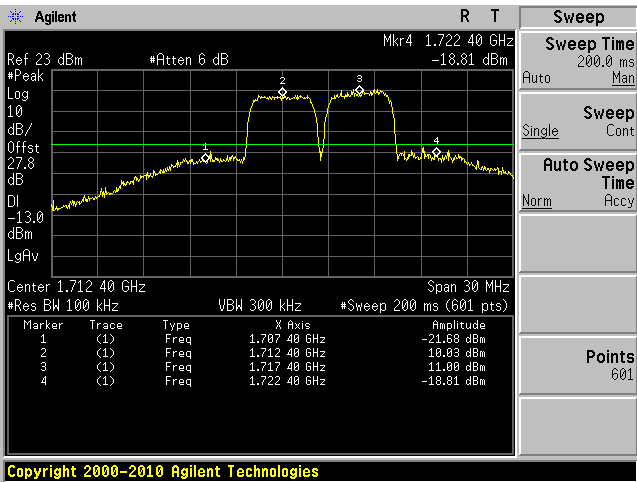
UL: 1710-1755 MHz

Modulation: WCDMA/HSPA

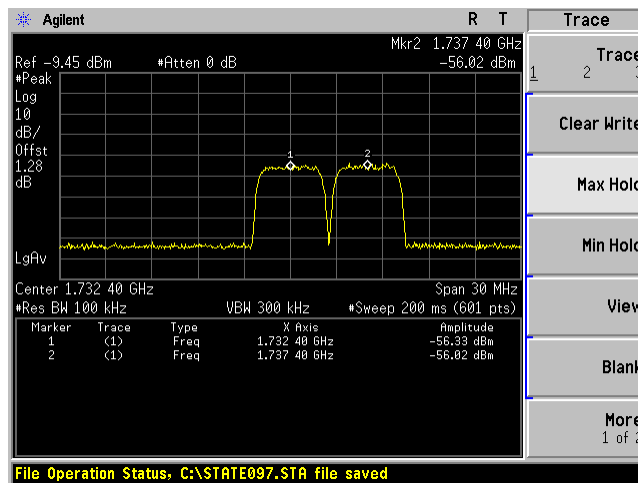
Low Channel Input



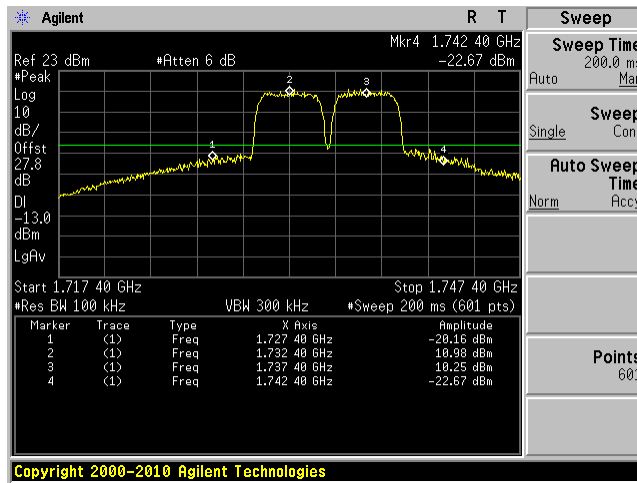
Low Channel Output



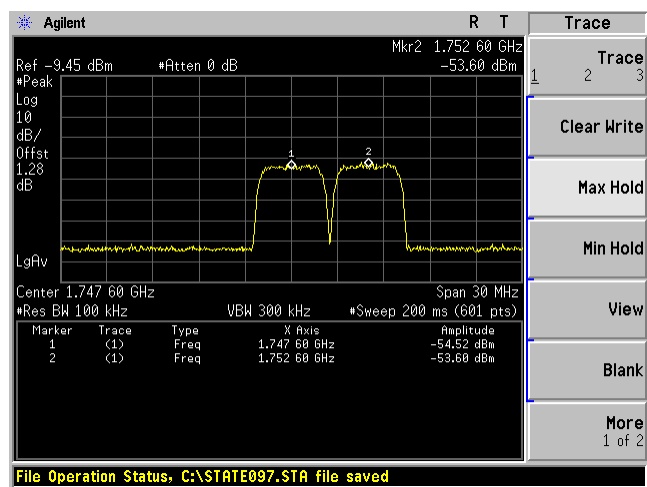
Middle Channel Input



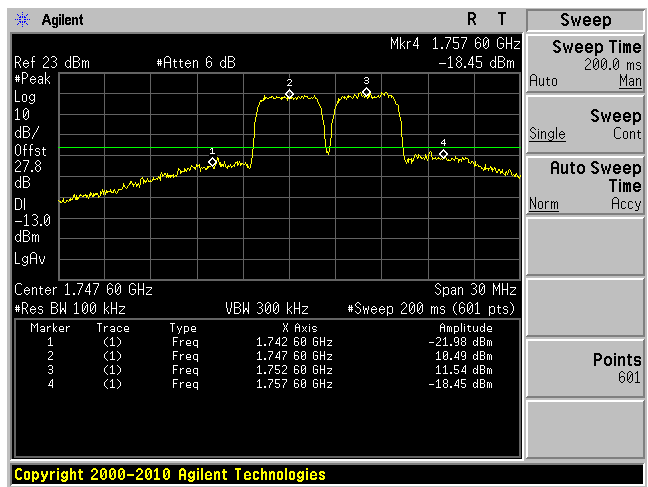
Middle Channel Output



High Channel Input

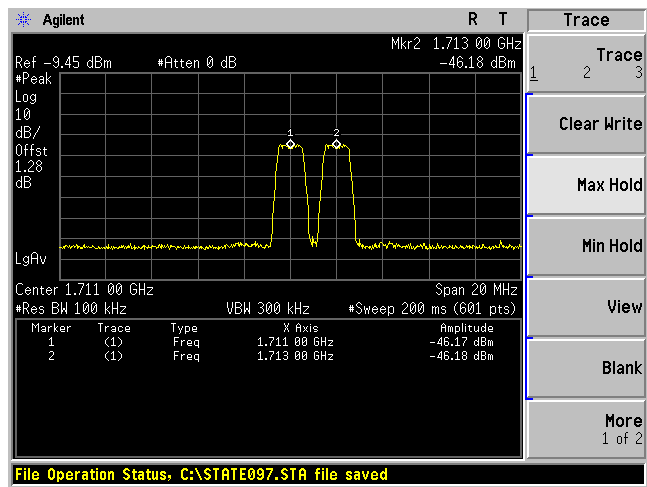


High Channel Output

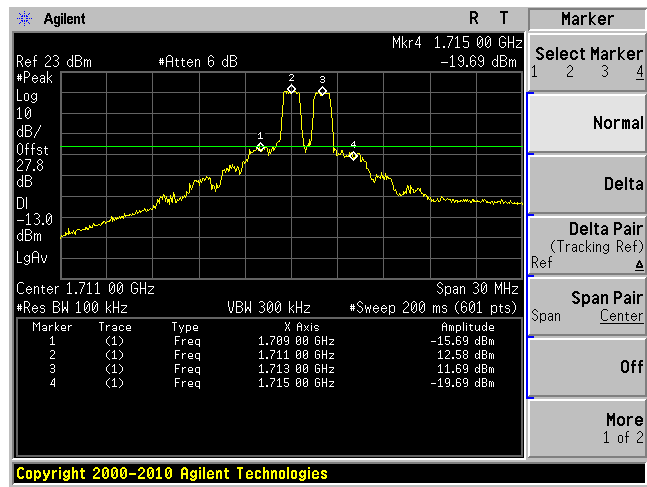


Modulation: LTE QPSK (1.4 MHz)

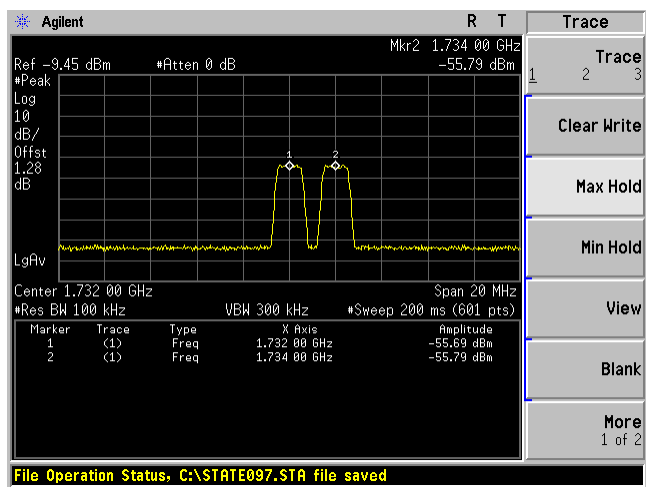
Low Channel Input



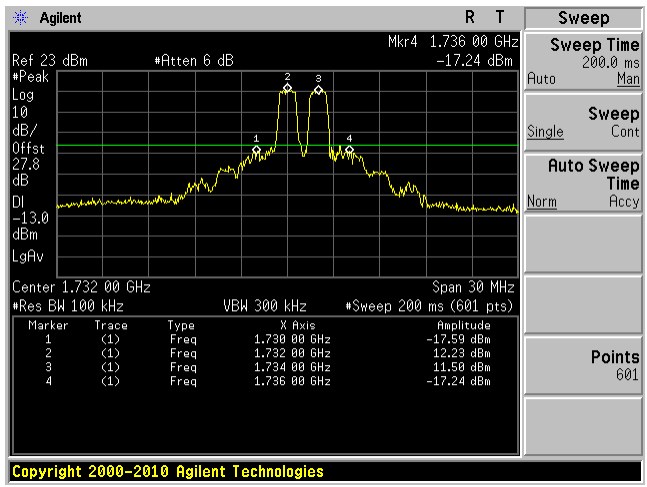
Low Channel Output



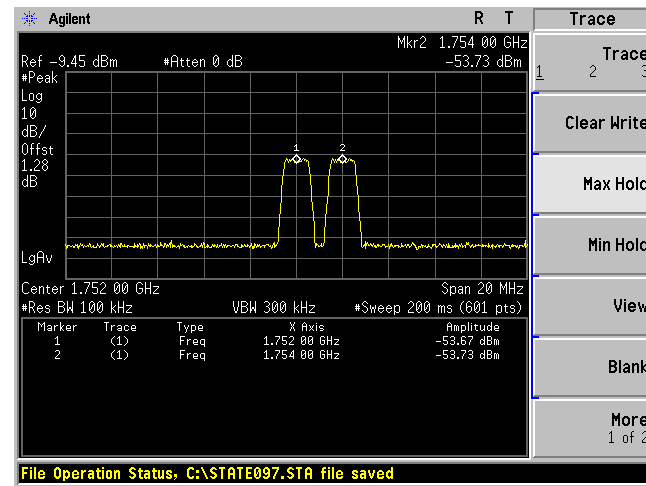
Middle Channel Input



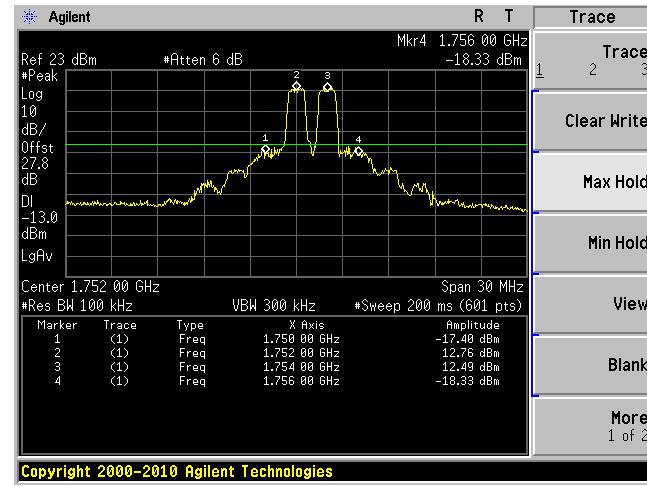
Middle Channel Output



High Channel Input

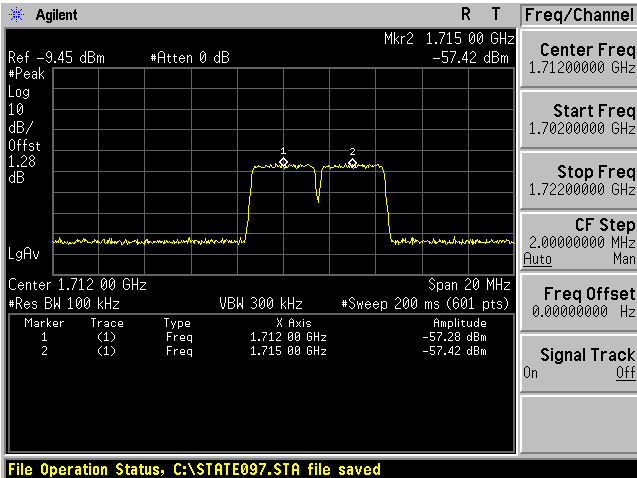


High Channel Output

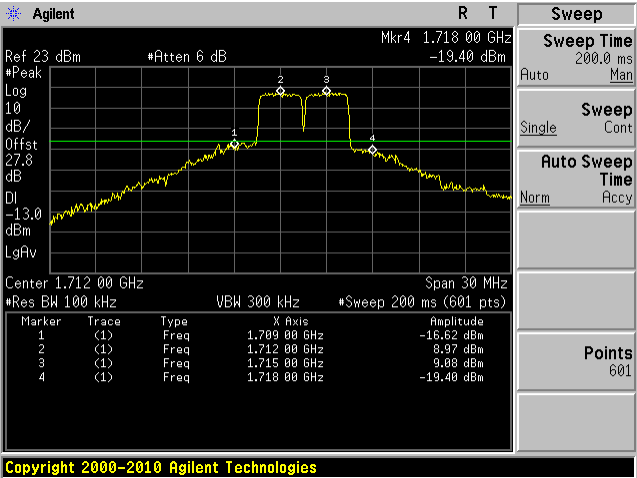


Modulation: LTE QPSK (3MHz)

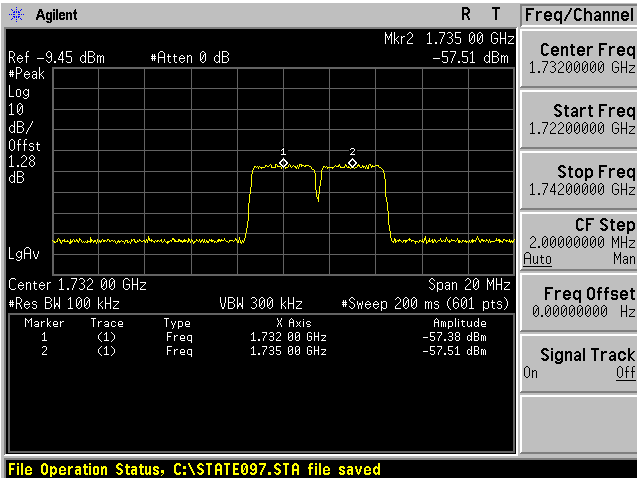
Low Channel Input



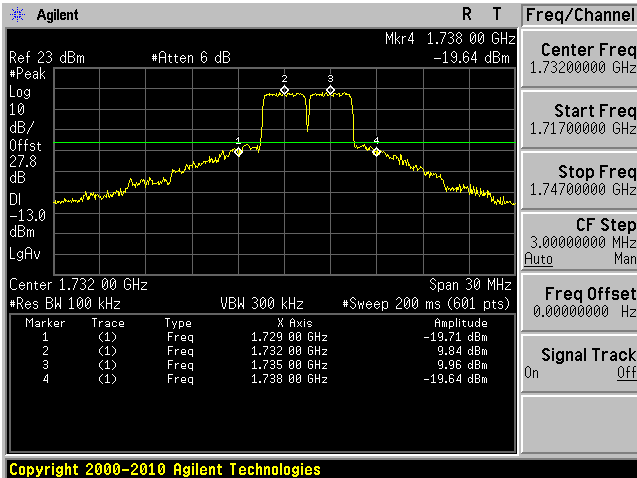
Low Channel Output



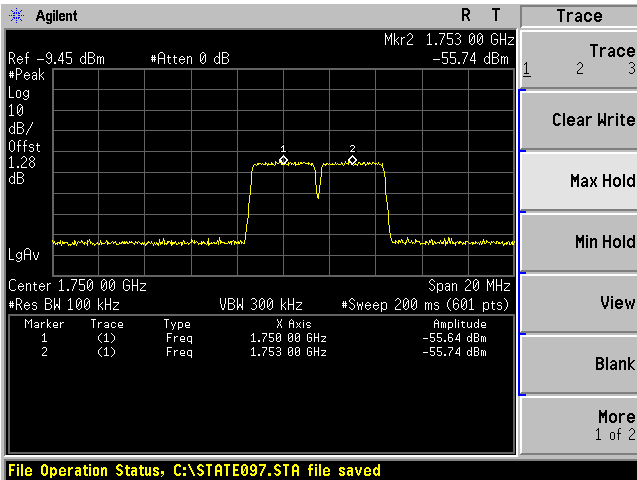
Middle Channel Input



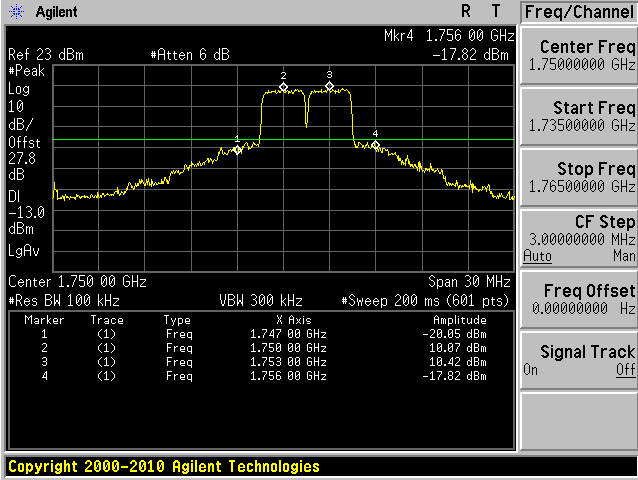
Middle Channel Output



High Channel Input

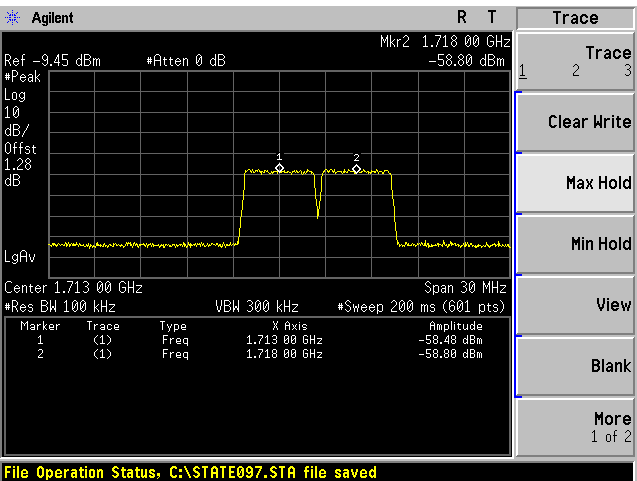


High Channel Output

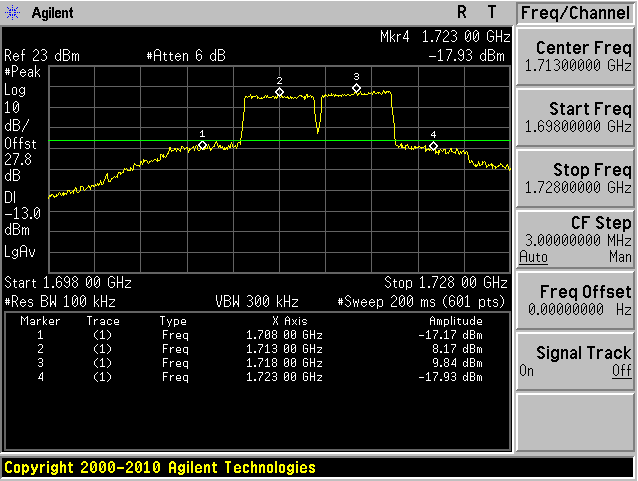


Modulation: LTE QPSK (5 MHz)

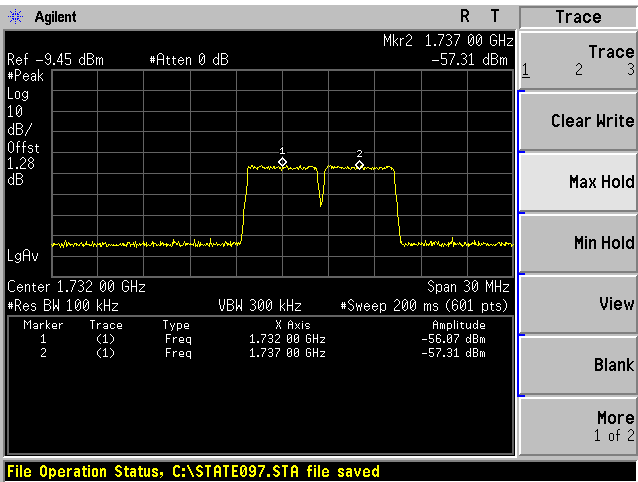
Low Channel Input



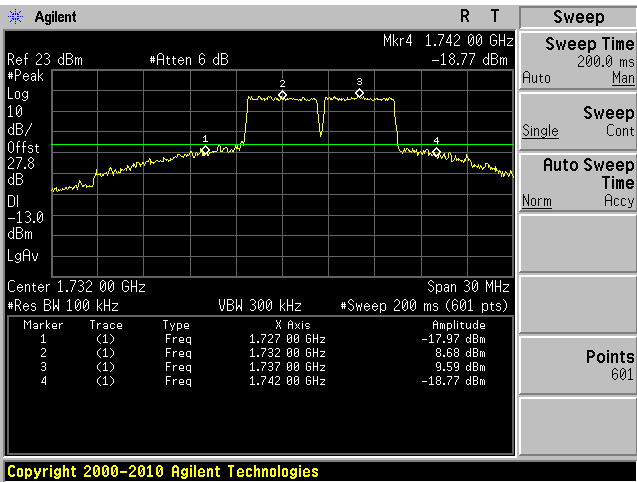
Low Channel Output



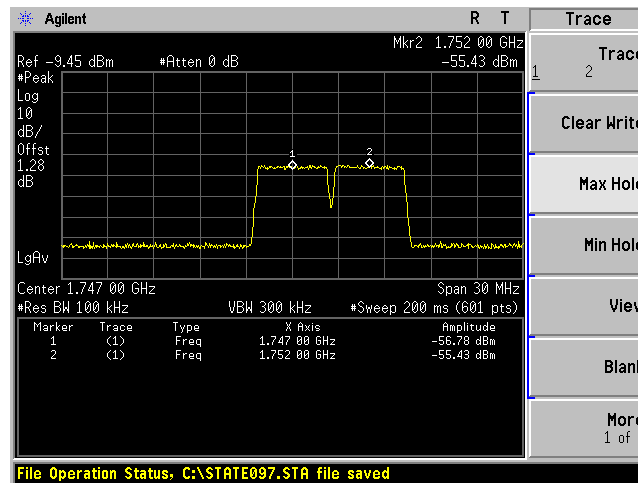
Middle Channel Input



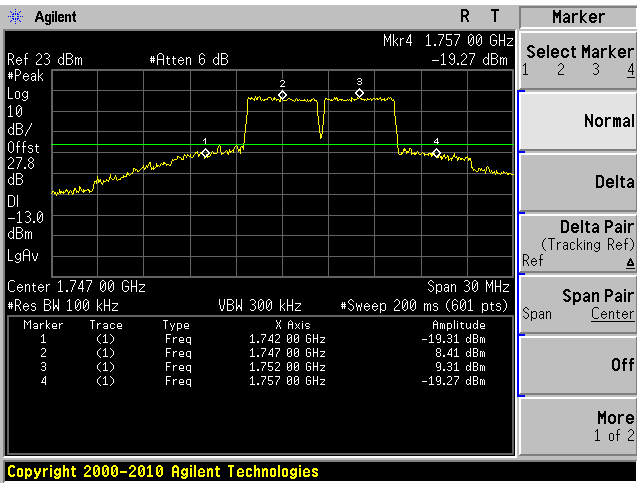
Middle Channel Output



High Channel Input

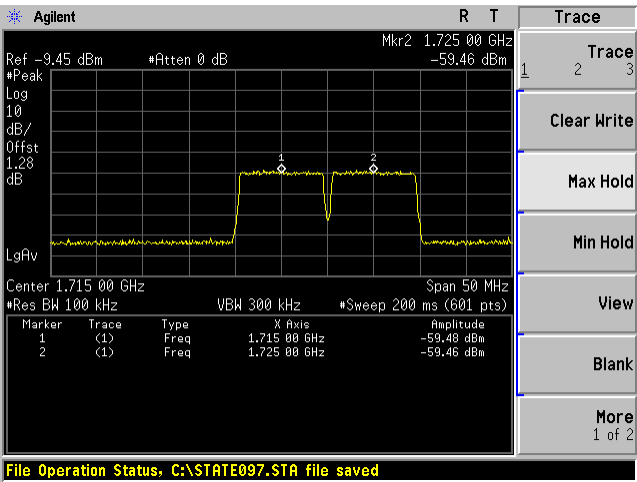


High Channel Output

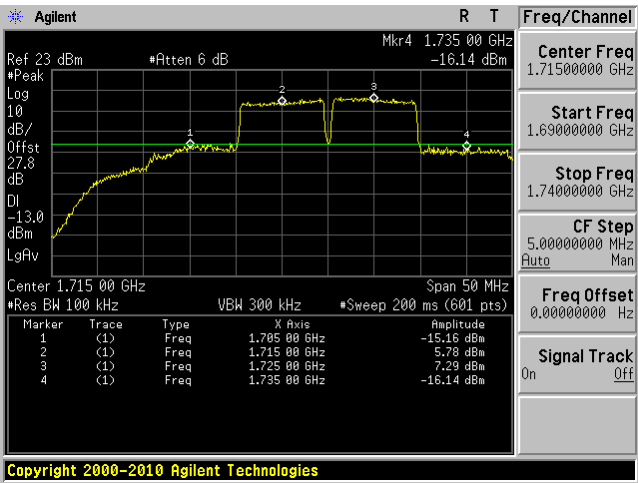


Modulation: LTE QPSK (10 MHz)

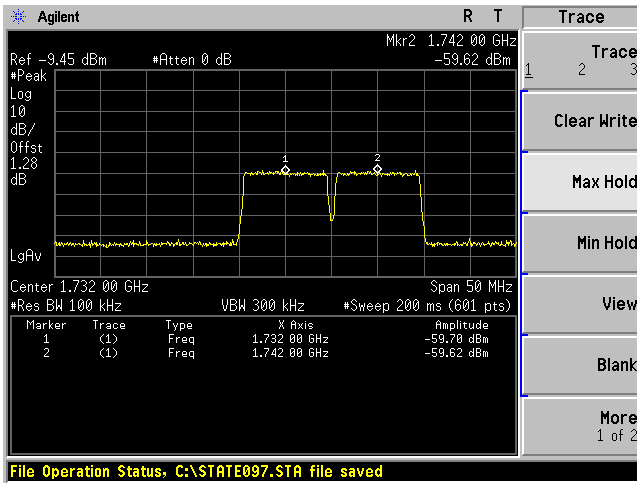
Low Channel Input



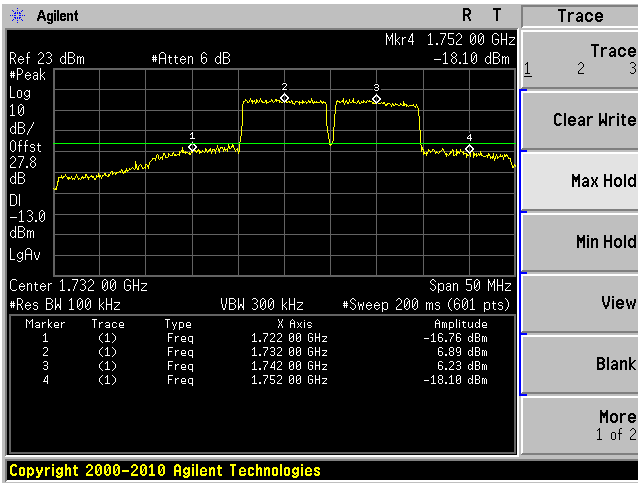
Low Channel Output



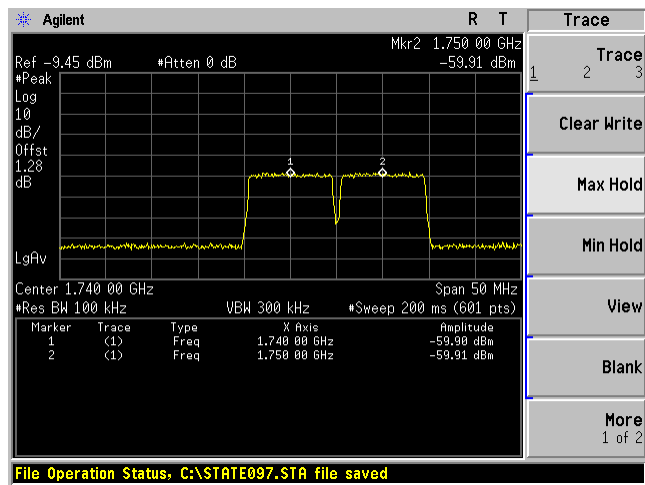
Middle Channel Input



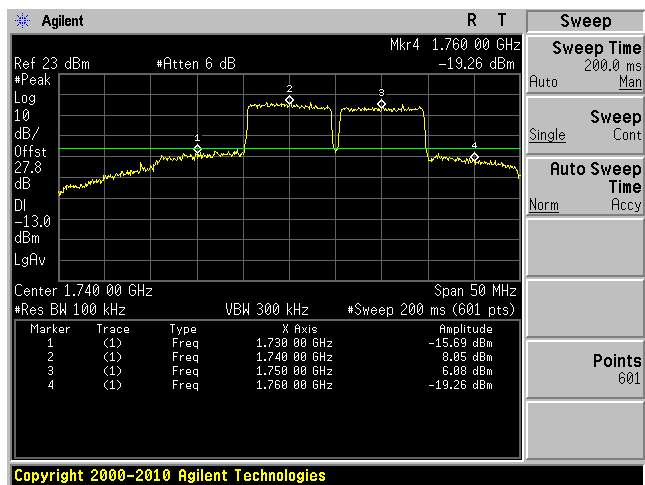
Middle Channel Output



High Channel Input



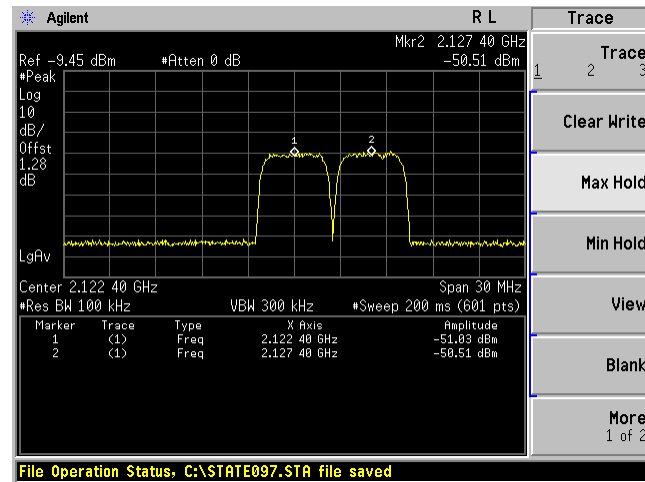
High Channel Output



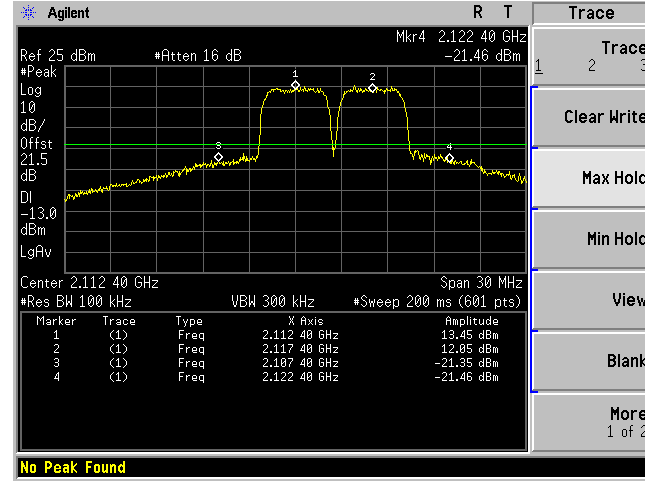
DL: 2110-2155 MHz

Modulation: WCDMA/HSPA

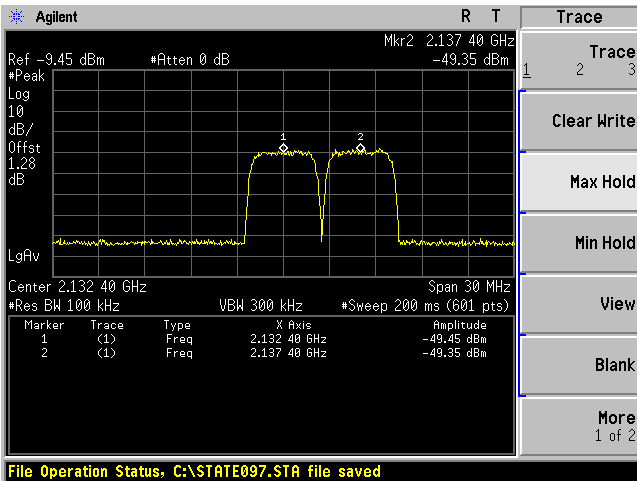
Low Channel Input



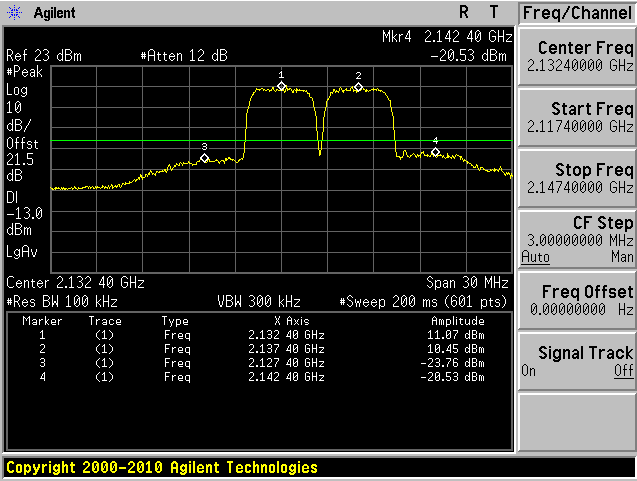
Low Channel Output



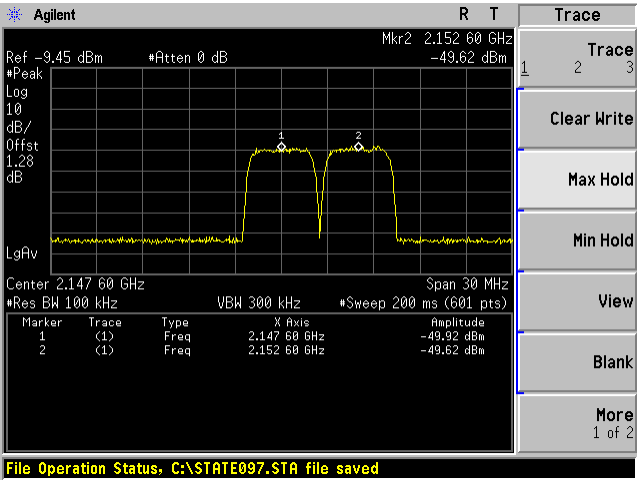
Middle Channel Input



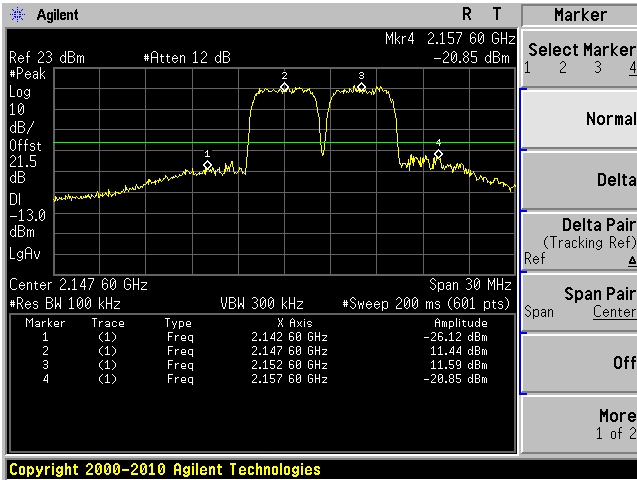
Middle Channel Output



High Channel Input

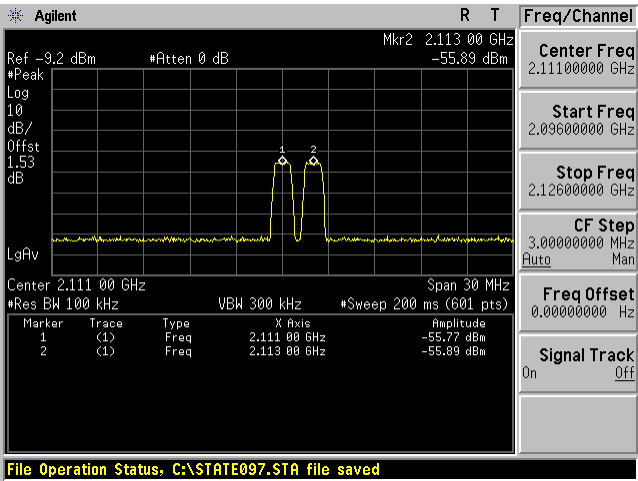


High Channel Output

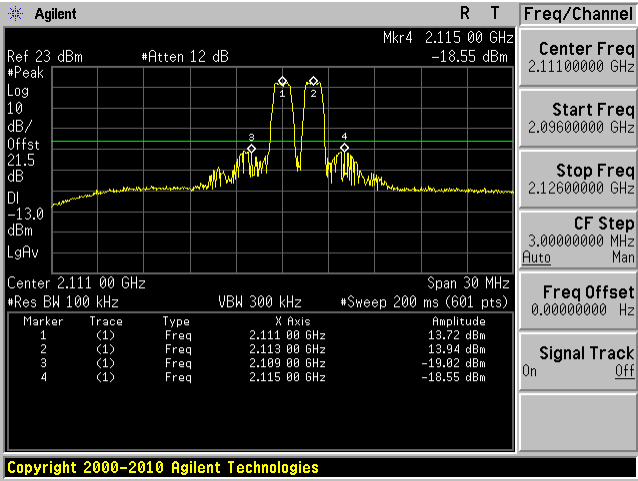


Modulation: LTE QPSK (1.4 MHz)

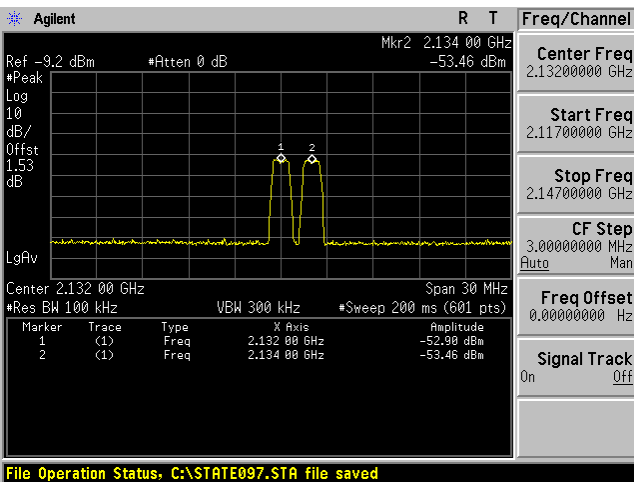
Low Channel Input



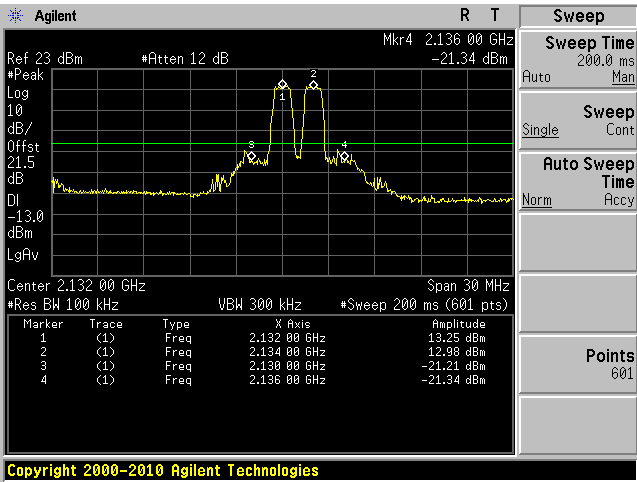
Low Channel Output



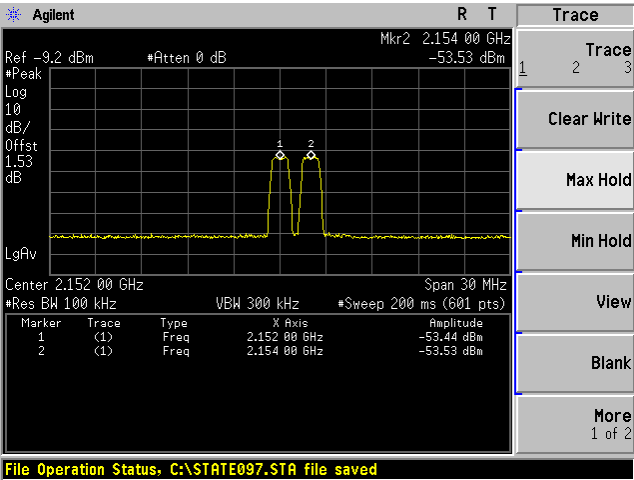
Middle Channel Input



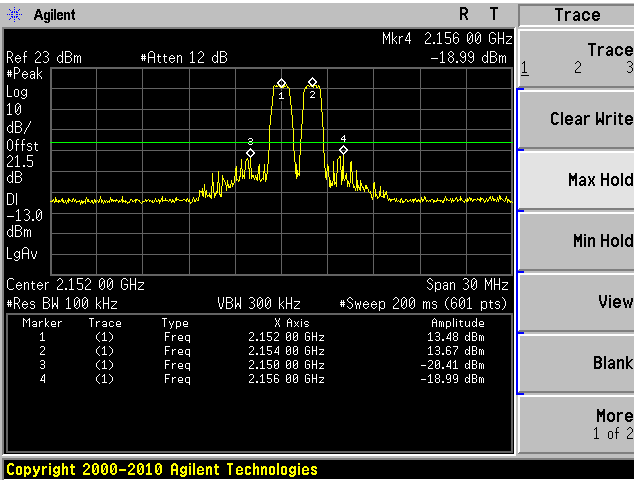
Middle Channel Output



High Channel Input

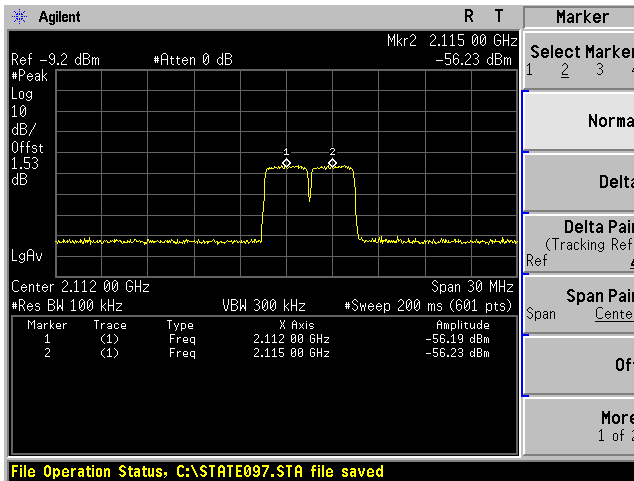


High Channel Output

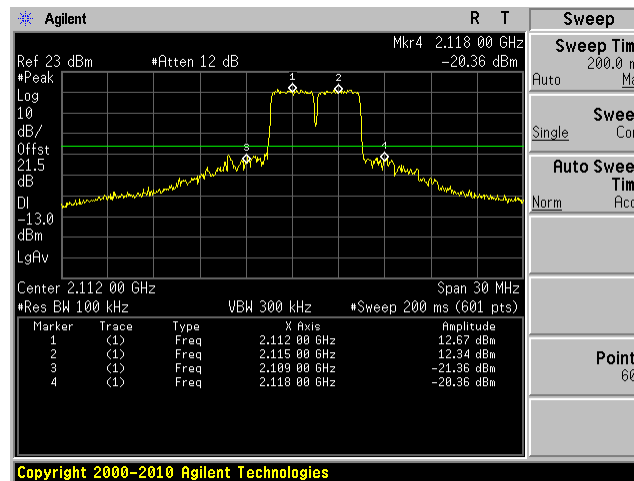


Modulation: LTE QPSK (3MHz)

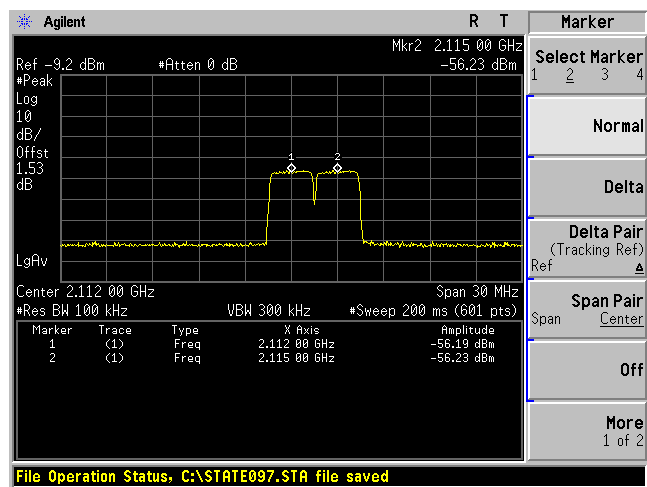
Low Channel Input



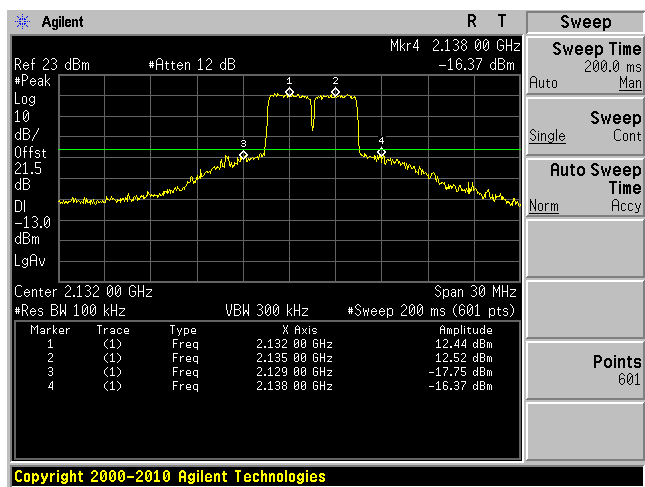
Low Channel Output



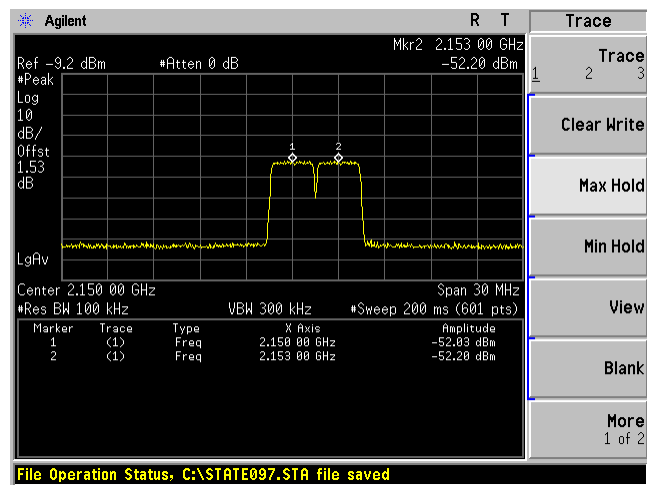
Middle Channel Input



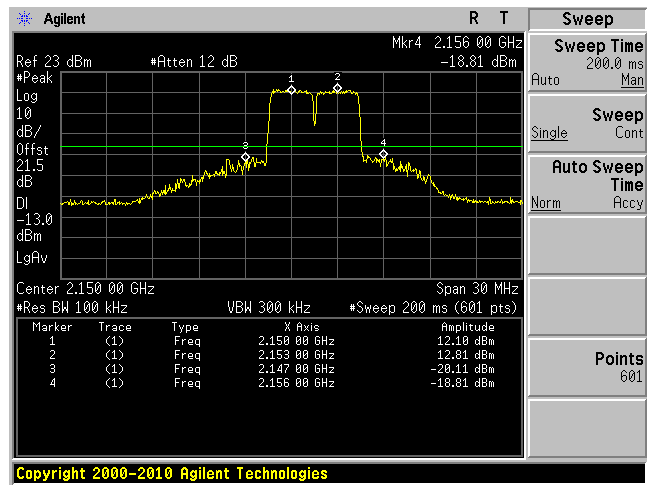
Middle Channel Output



High Channel Input

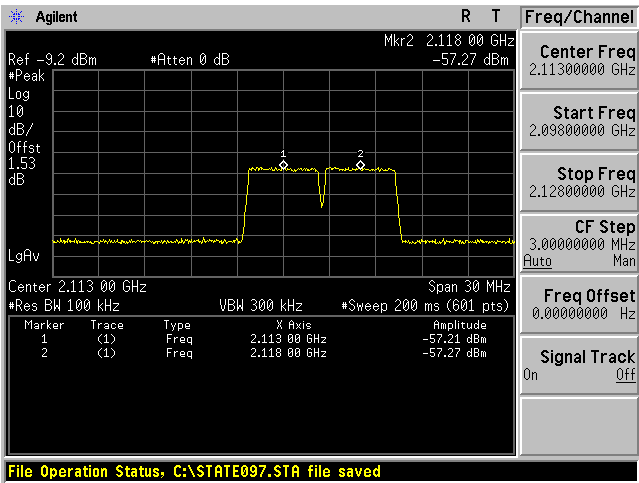


High Channel Output

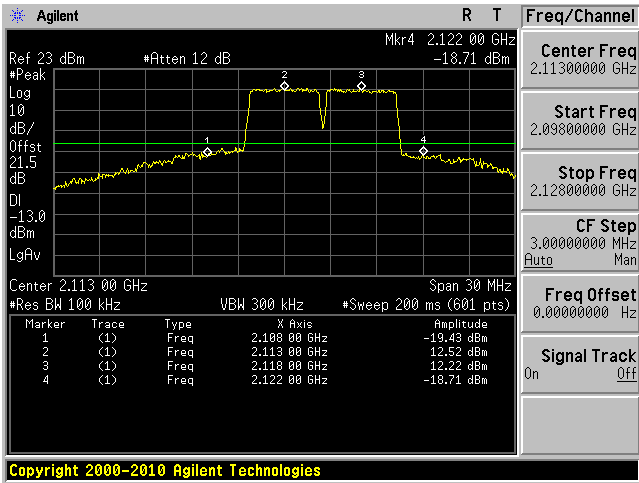


Modulation: LTE QPSK (5 MHz)

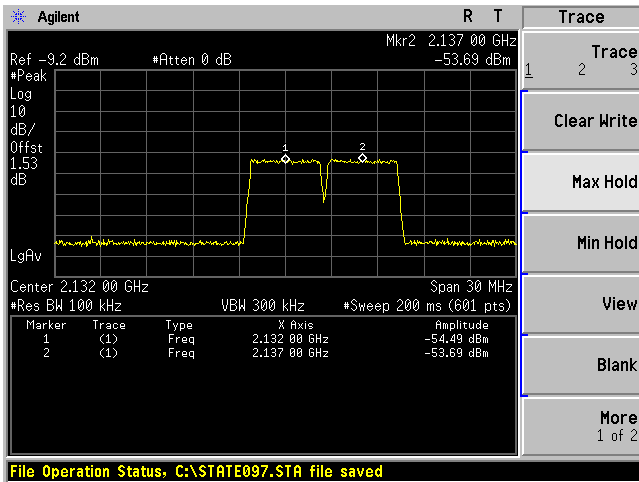
Low Channel Input



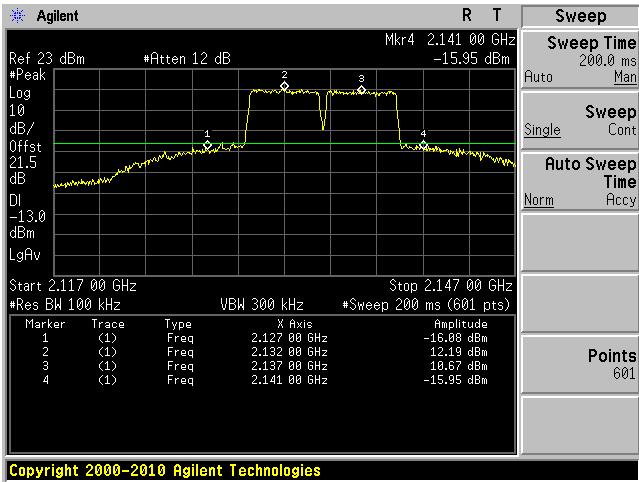
Low Channel Output



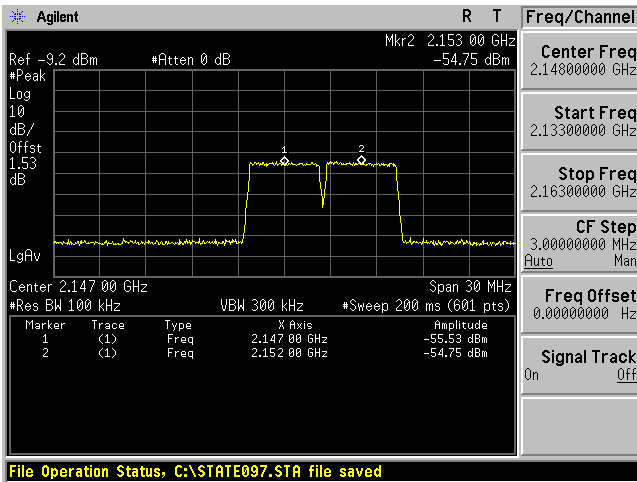
Middle Channel Input



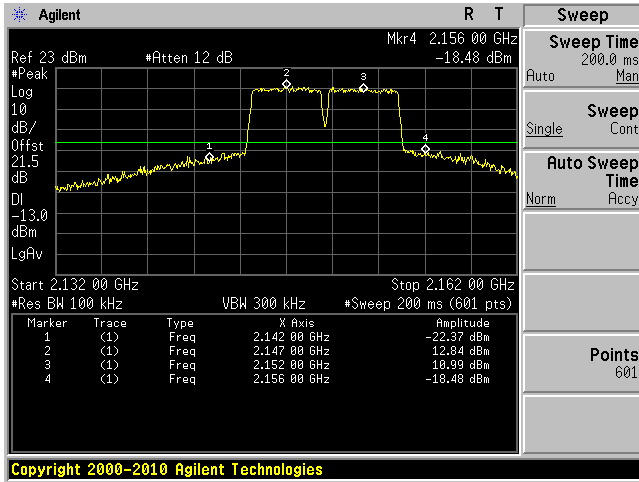
Middle Channel Output



High Channel Input

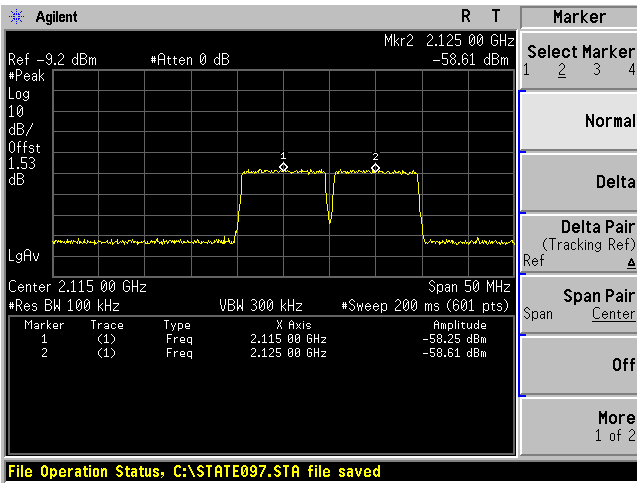


High Channel Output

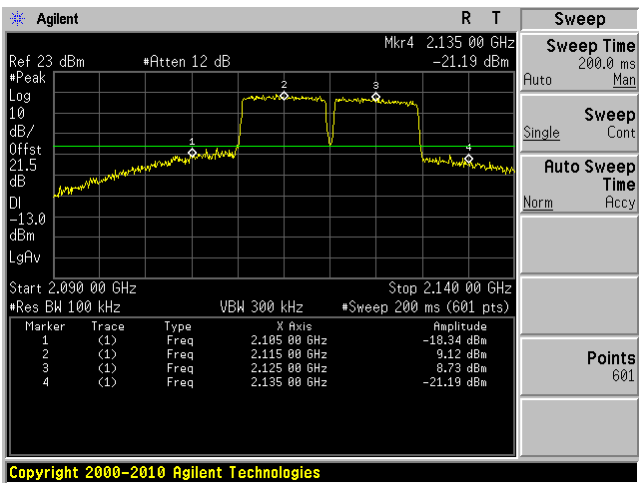


Modulation: LTE QPSK (10 MHz)

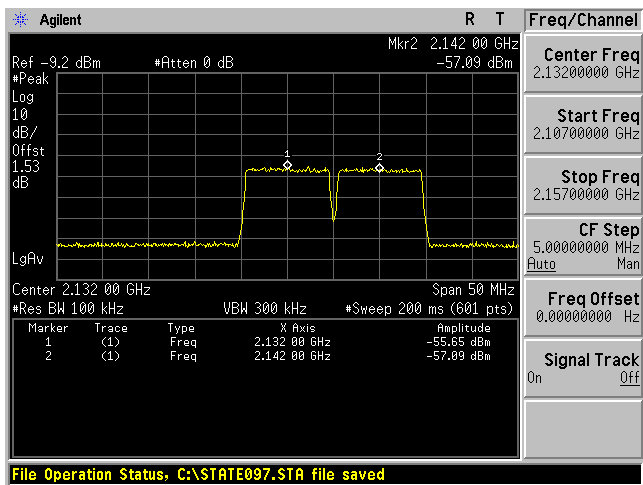
Low Channel Input



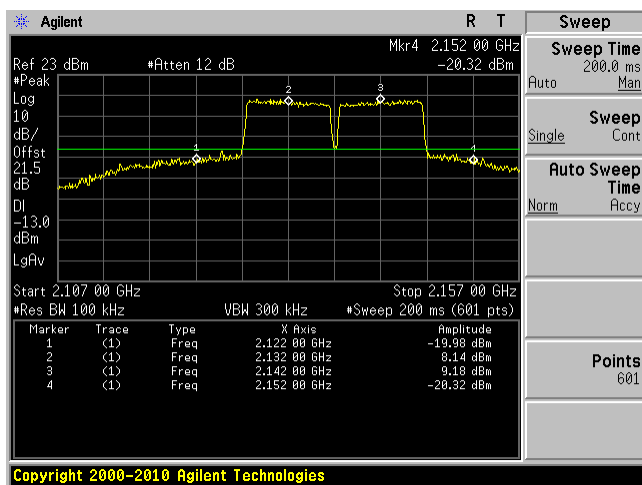
Low Channel Output



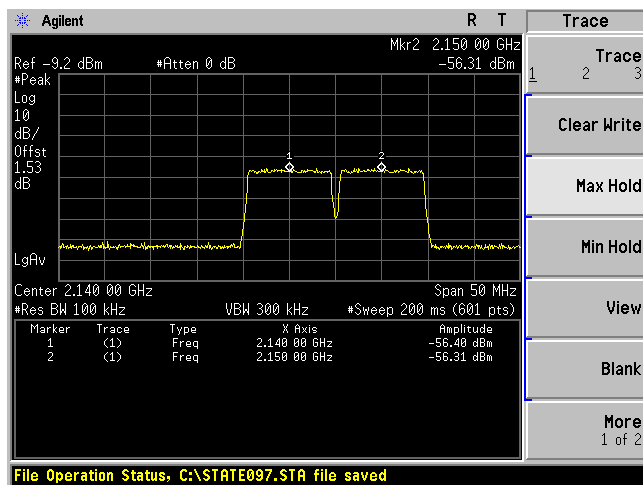
Middle Channel Input



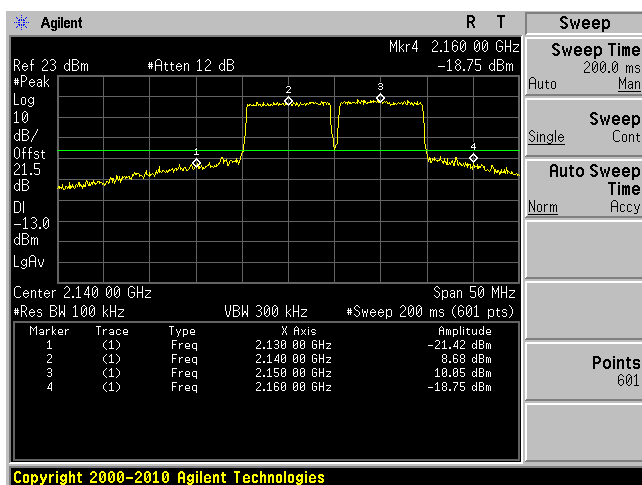
Middle Channel Output



High Channel Input



High Channel Output

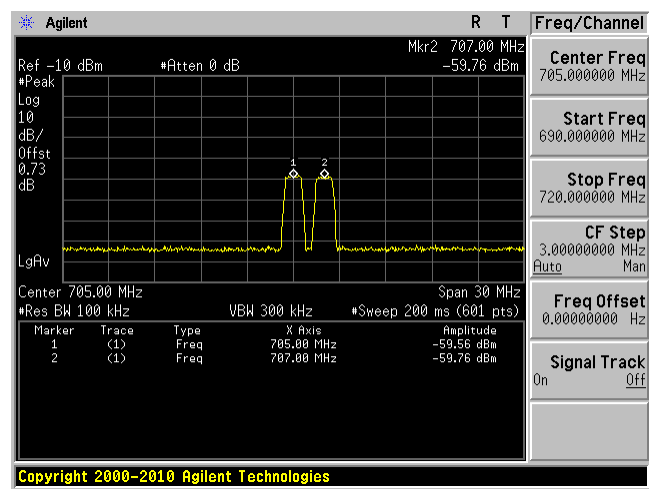


LTE Band (Band 17)

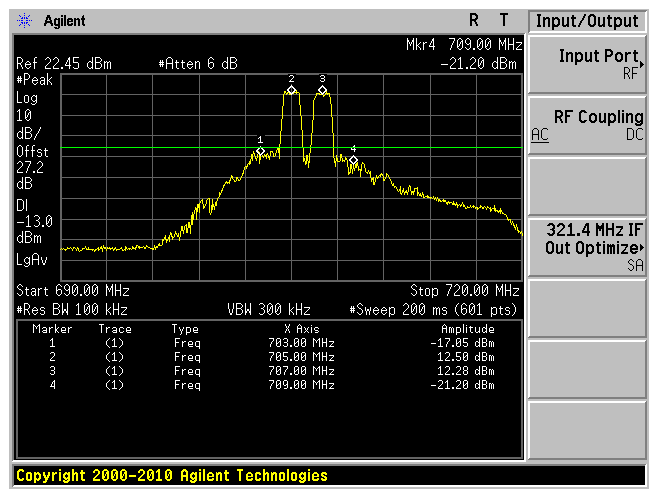
UL: 706-716 MHz

Modulation: QPSK (1.4 MHz)

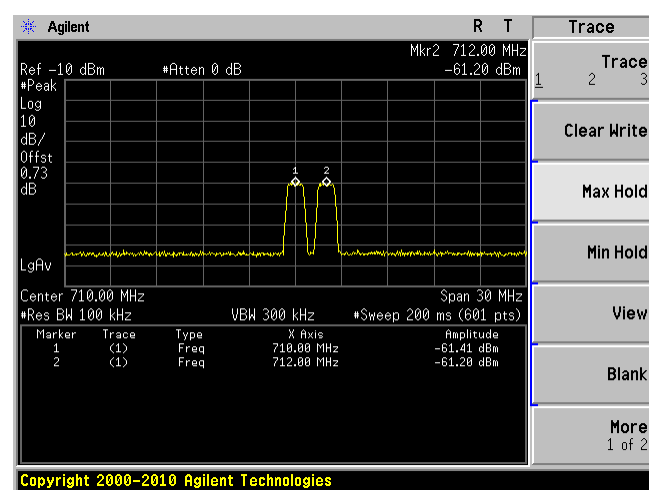
Low Channel Input



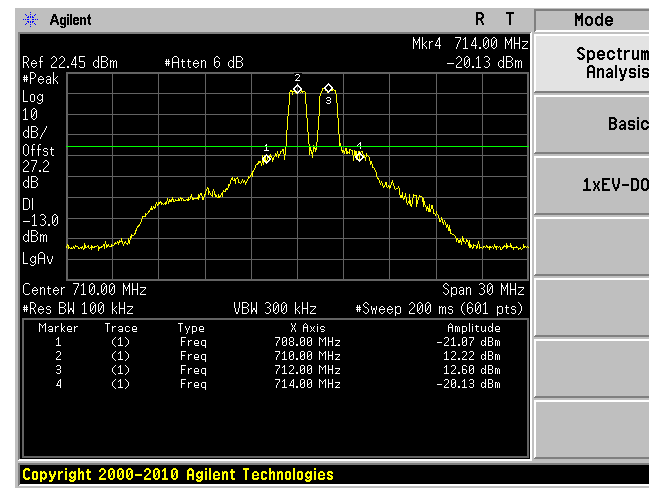
Low Channel Output



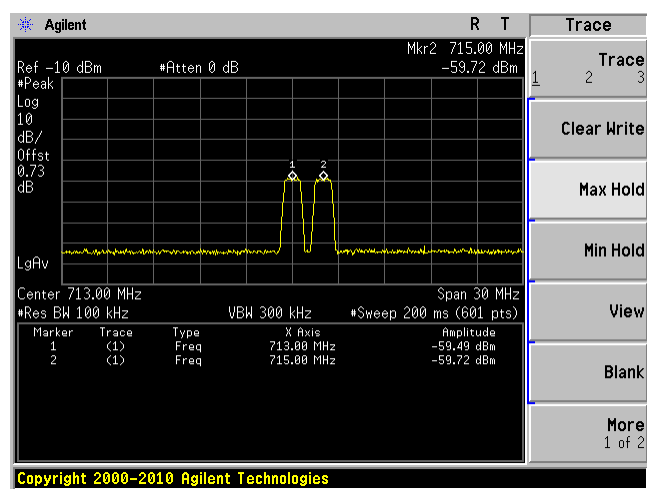
Middle Channel Input



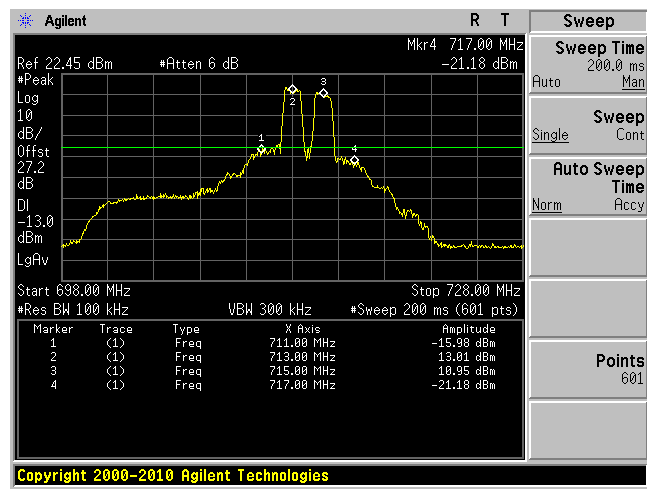
Middle Channel Output



High Channel Input

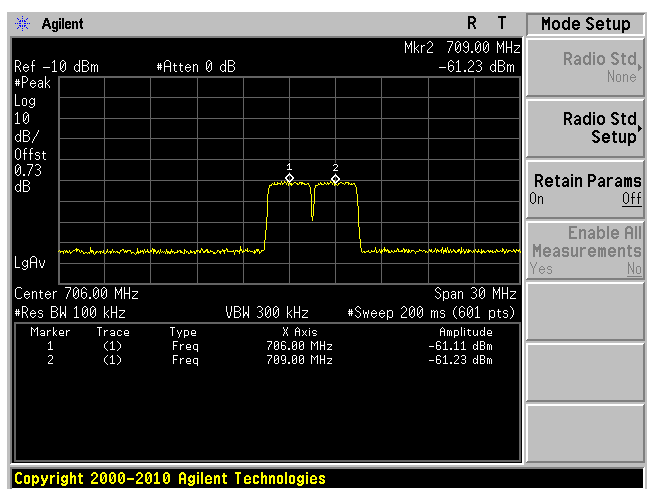


High Channel Output

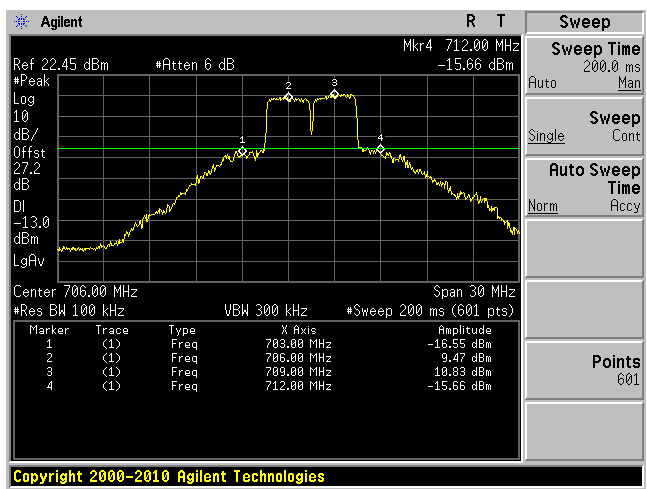


Modulation: QPSK (3 MHz)

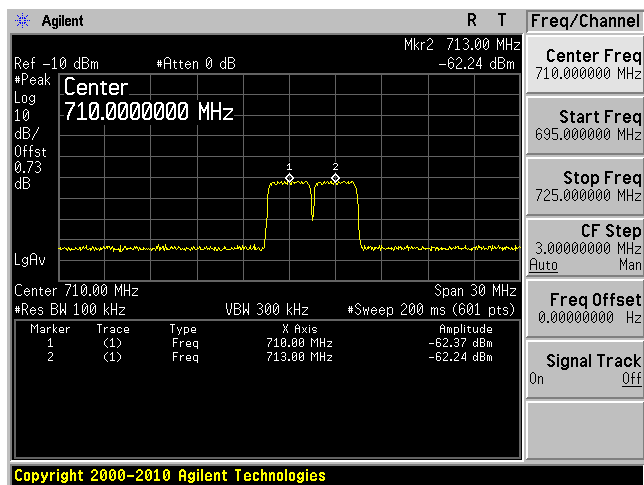
Low Channel Input



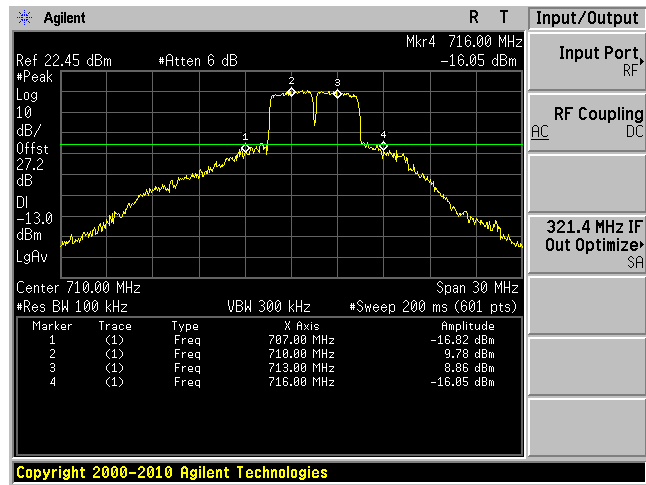
Low Channel Output



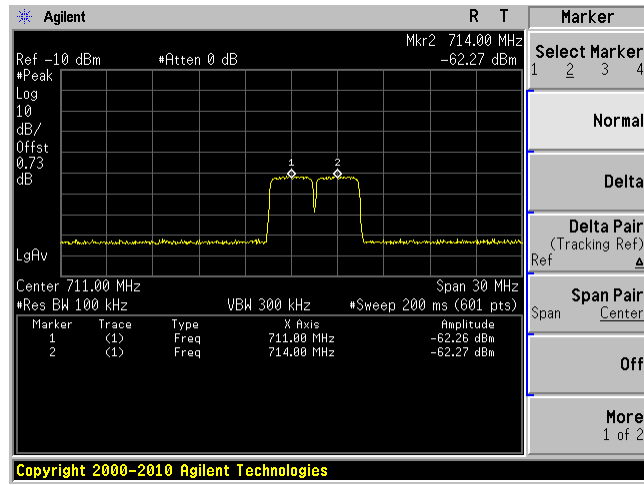
Middle Channel Input



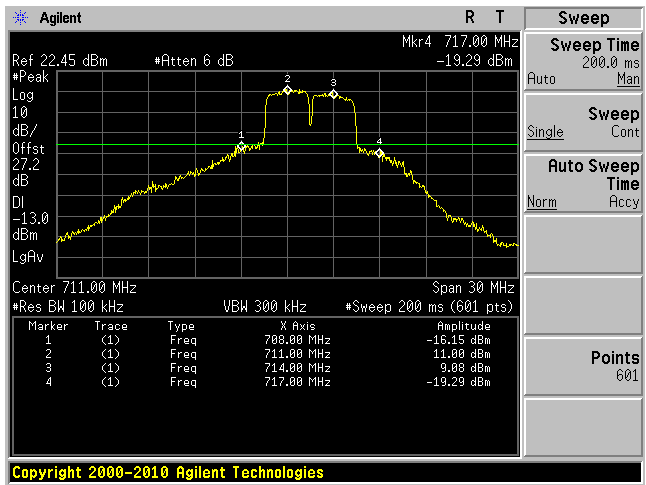
Middle Channel Output



High Channel Input



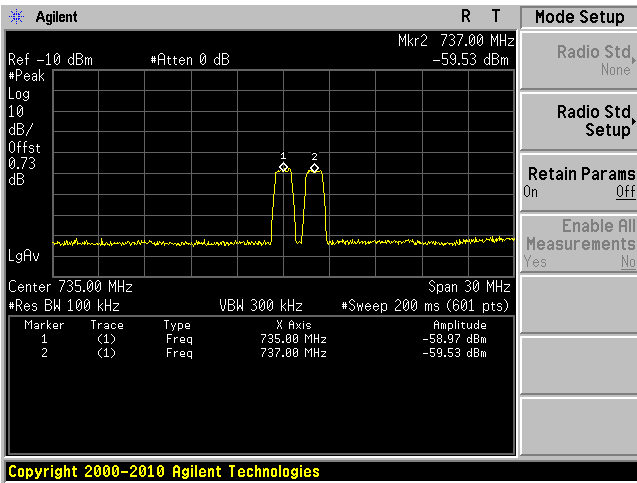
High Channel Output



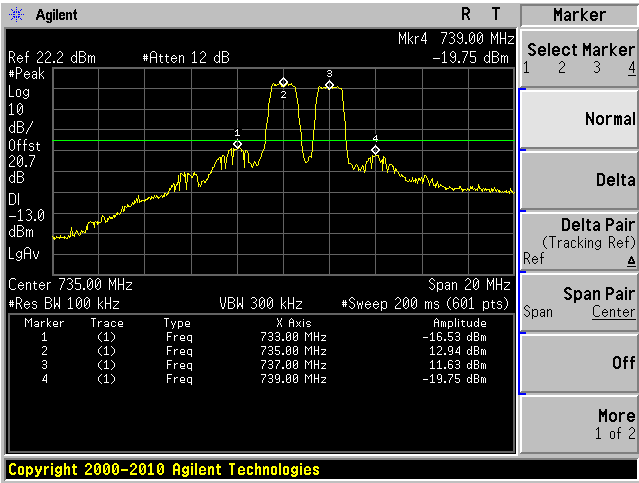
DL: 734-746 MHz

Modulation: QPSK (1.4 MHz)

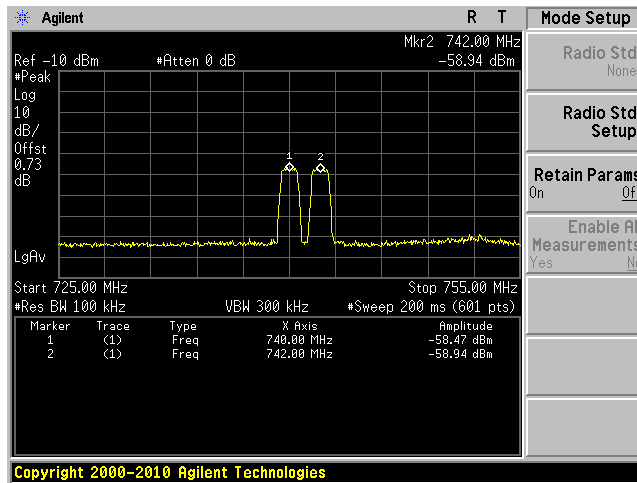
Low Channel Input



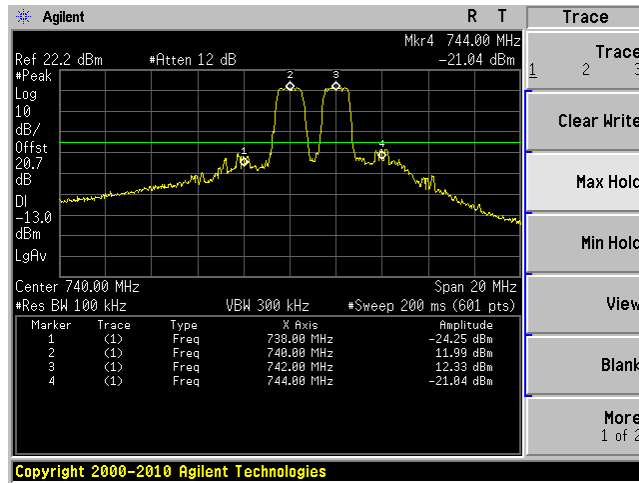
Low Channel Output



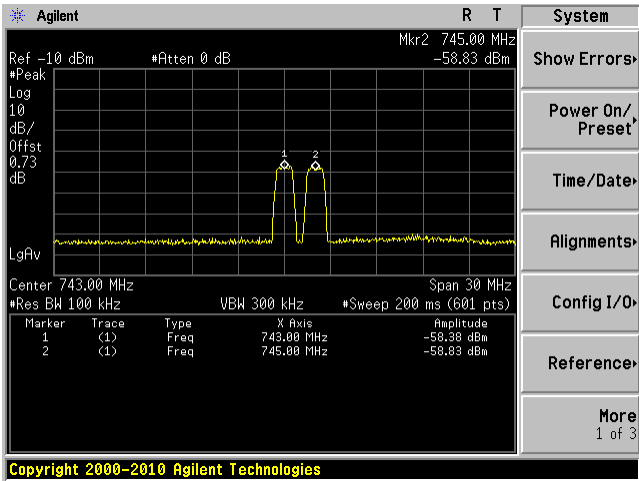
Middle Channel Input



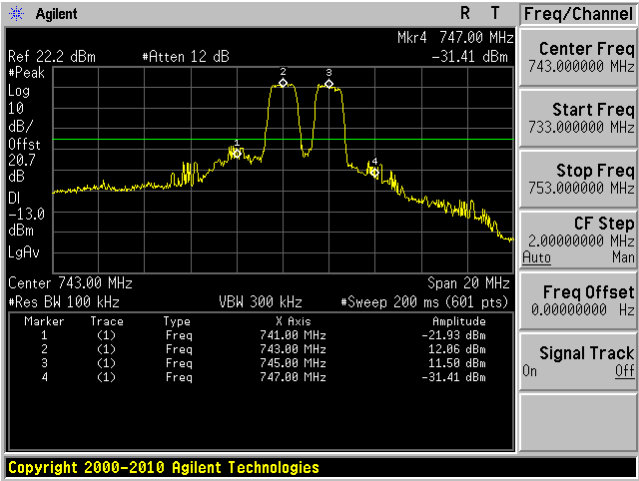
Middle Channel Output



High Channel Input

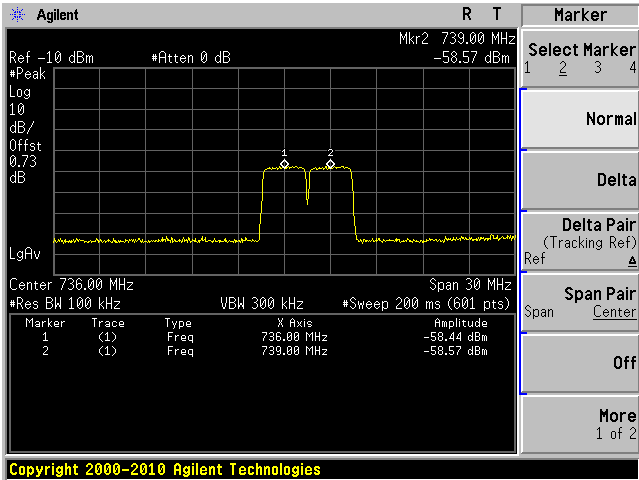


High Channel Output

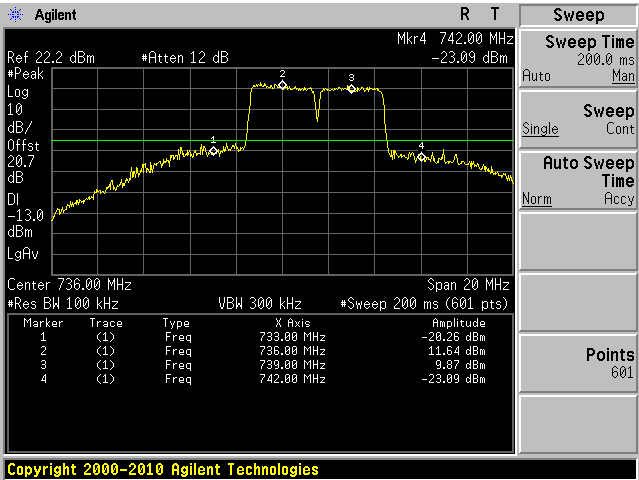


Modulation: QPSK (3 MHz)

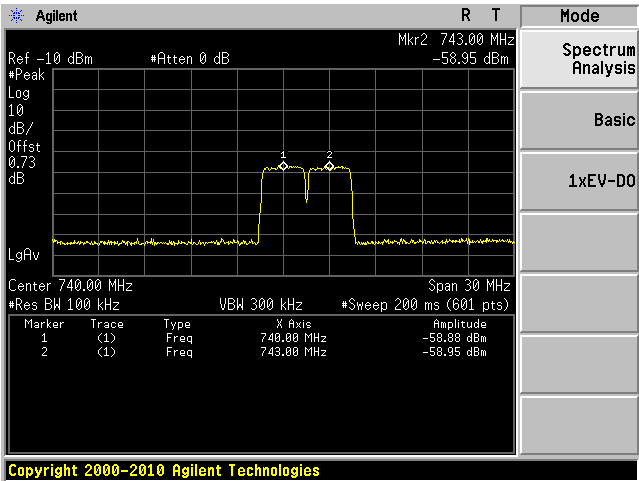
Low Channel Input



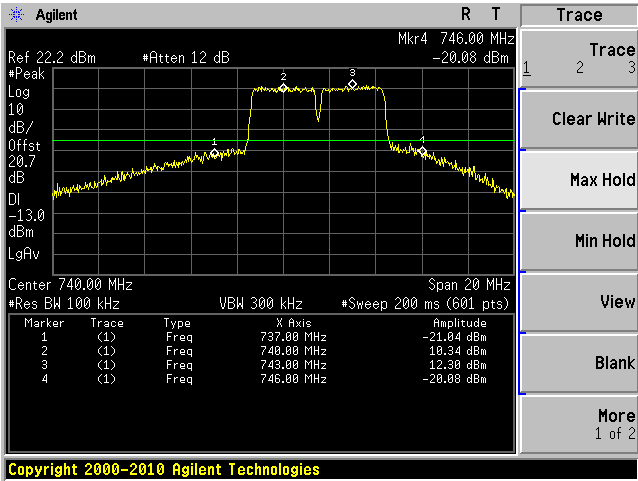
Low Channel Output



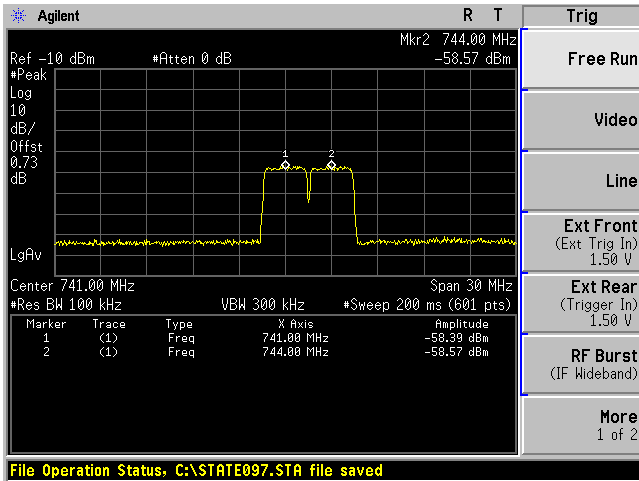
Middle Channel Input



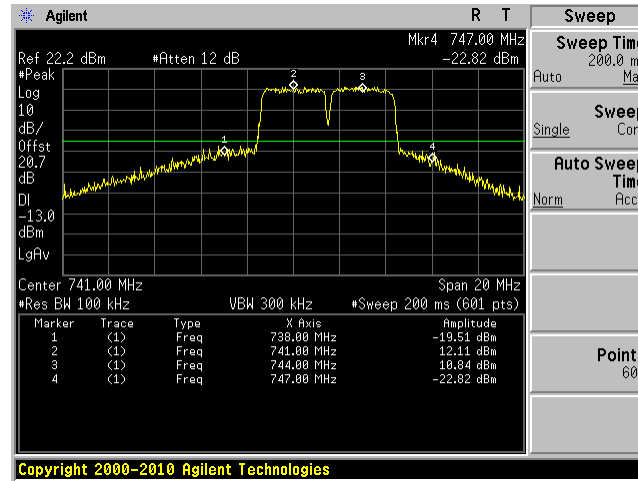
Middle Channel Output



High Channel Input



High Channel Output



8 FCC §27.53 – BAND EDGE

8.1 Applicable Standard

According to FCC §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.

8.2 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.

8.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2012-05-10	1 year
Agilent	Signal Generator	E4438C	MY45091309	2012-05-03	1 year

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

8.4 Test Environmental Conditions

Temperature:	23°C
Relative Humidity:	49 %
ATM Pressure:	101.2 kPa

The testing was performed by Wei Sun on 2012-12-20 at RF Site.

8.5 Test Results

Please refer to the following plots.

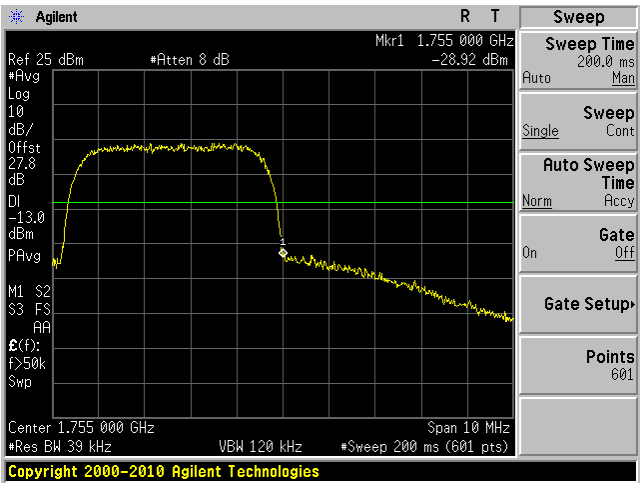
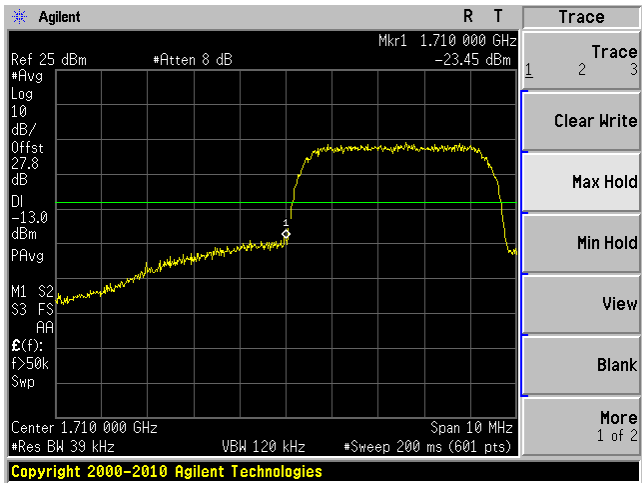
AWS Band (Band 4)

UL: 1710-1755 MHz

WCDMA/HSPA

Lowest Edge

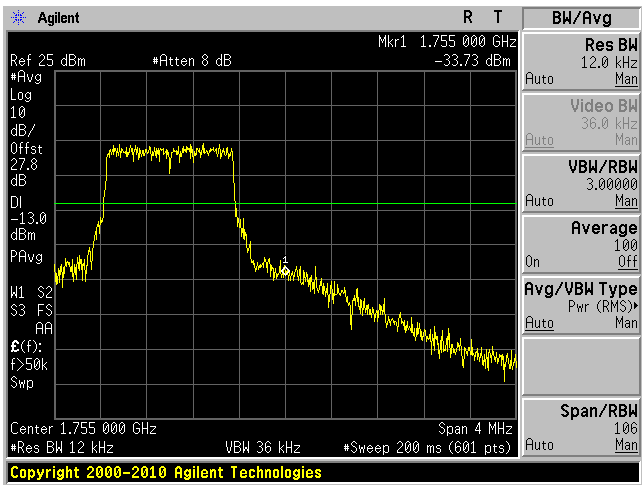
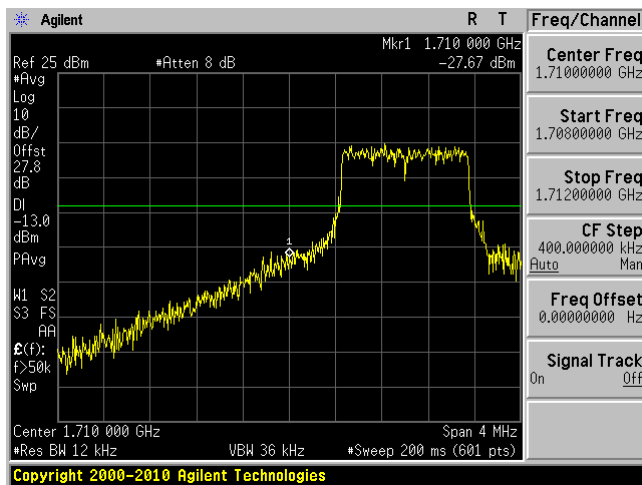
Highest Edge



Modulation: QPSK (1.4 MHz)

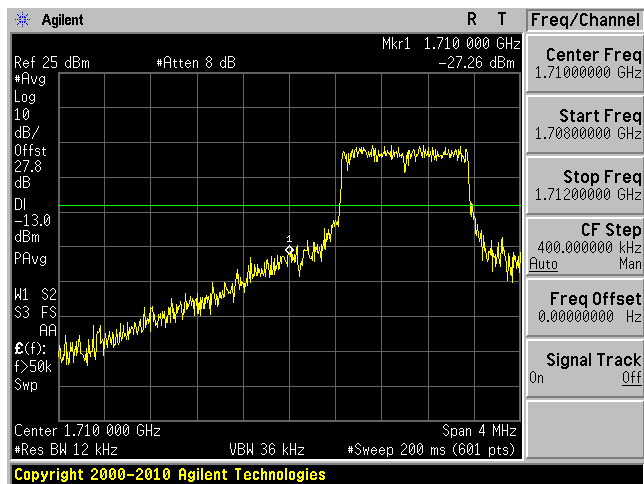
Lowest Edge

Highest Edge

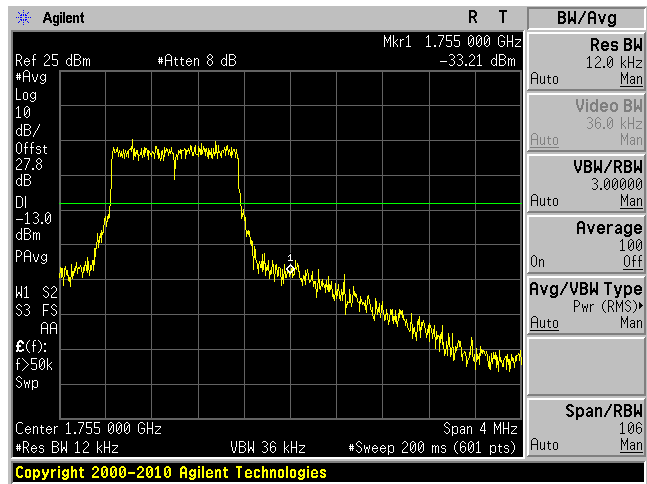


Modulation: 16QAM (1.4 MHz)

Lowest Edge

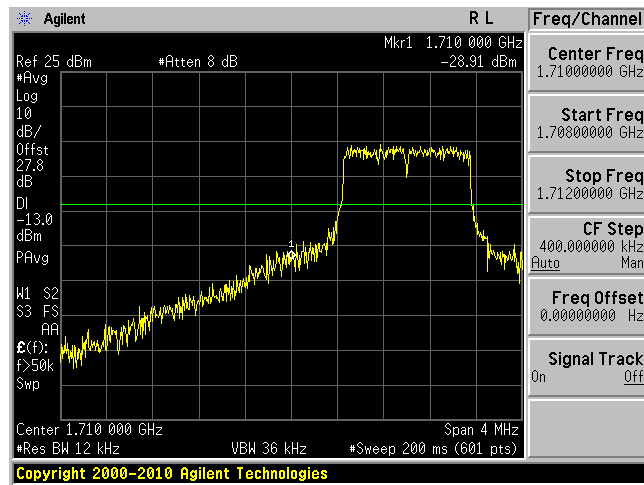


Highest Edge

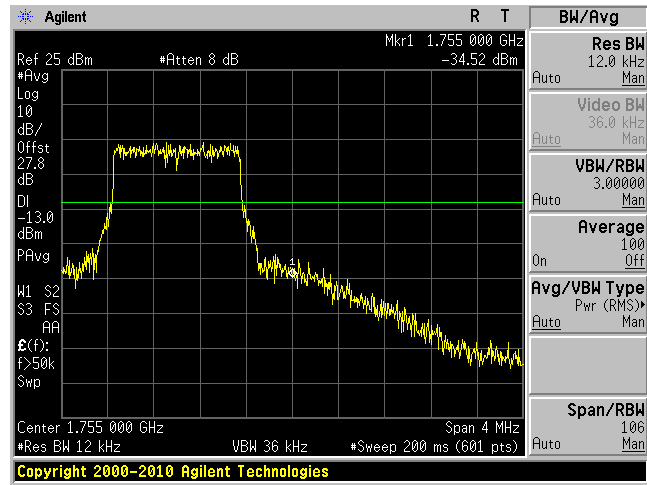


Modulation: 64QAM (1.4 MHz)

Lowest Edge



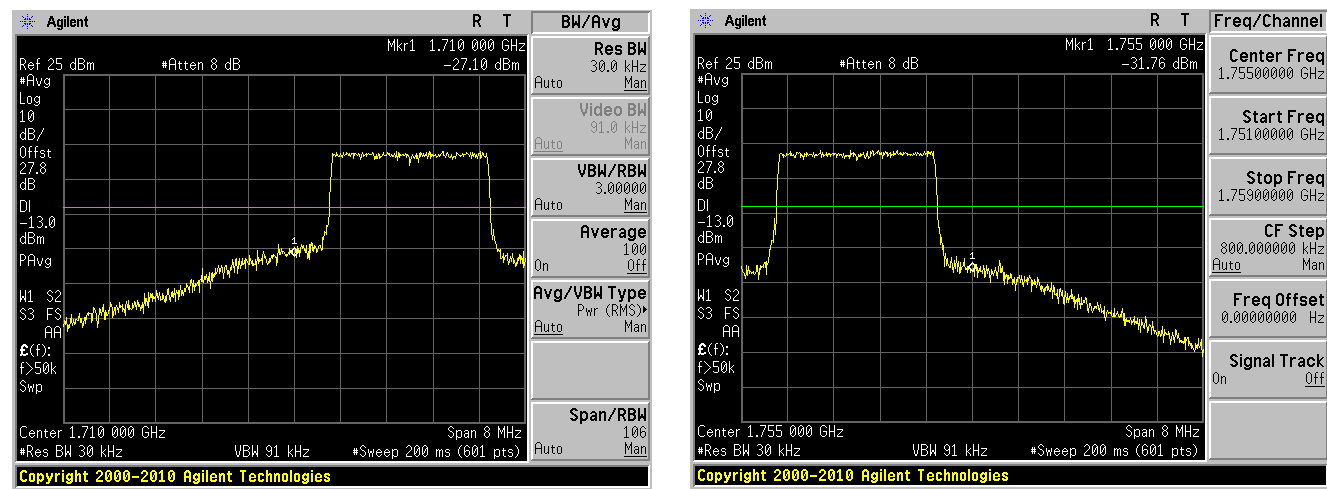
Highest Edge



Modulation: QPSK (3 MHz)

Lowest Edge

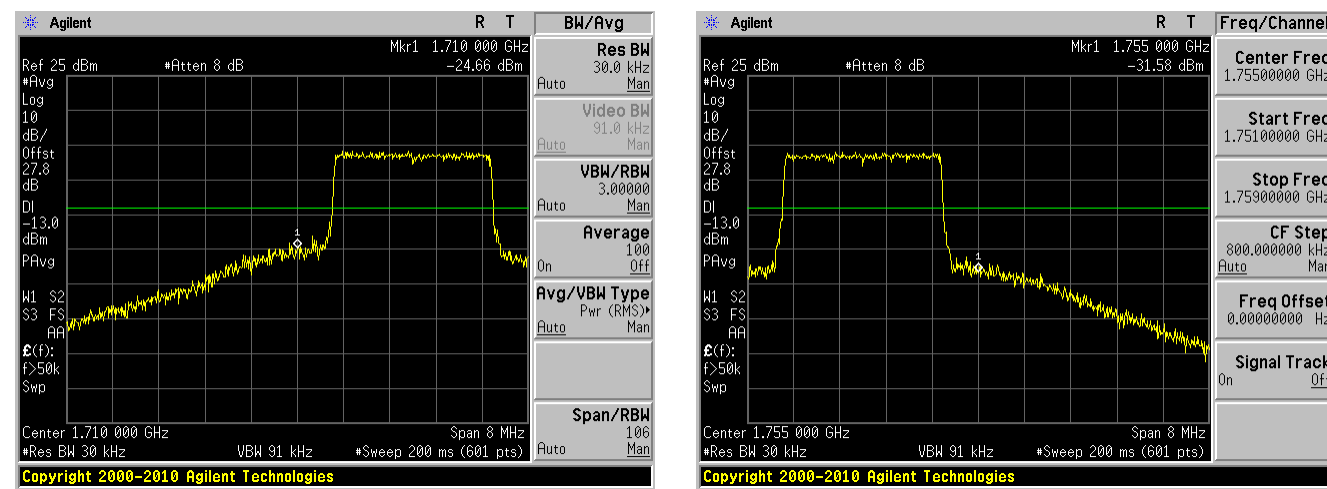
Highest Edge



Modulation: 16QAM (3 MHz)

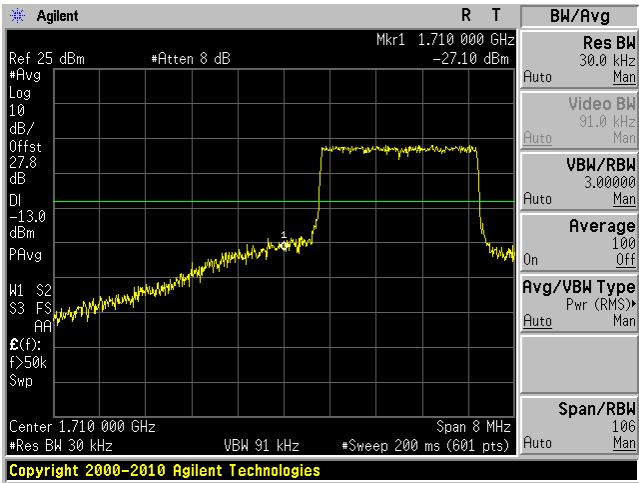
Lowest Edge

Highest Edge

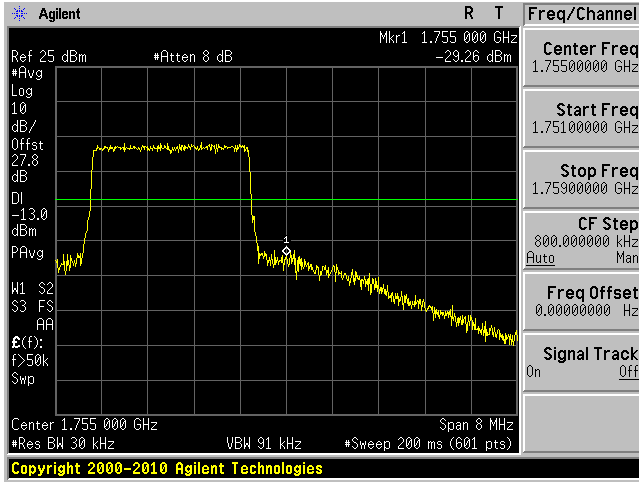


Modulation: 64QAM (3 MHz)

Lowest Edge

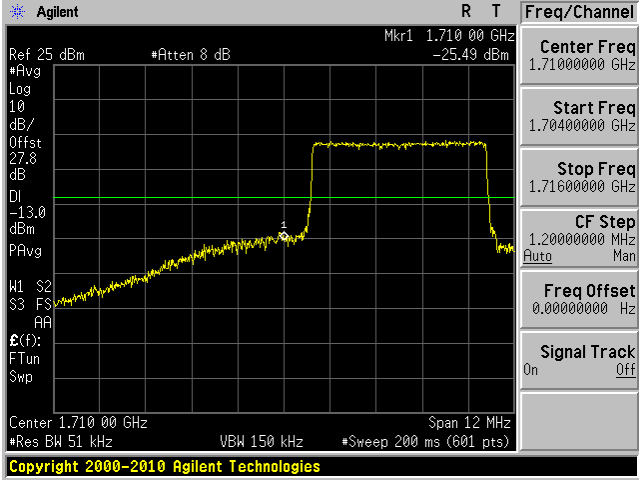


Highest Edge

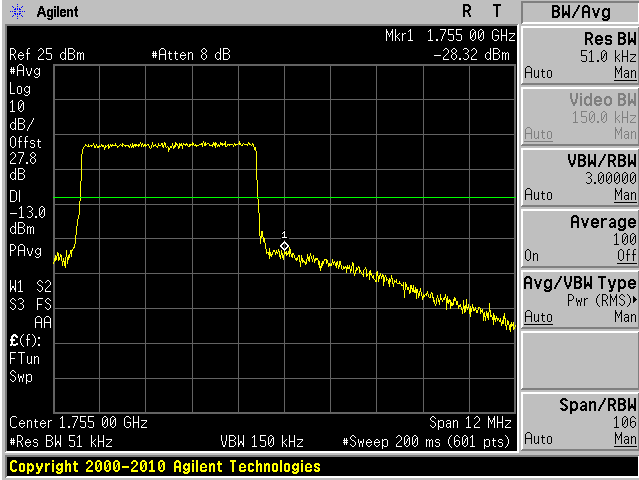


Modulation: QPSK (5 MHz)

Lowest Edge

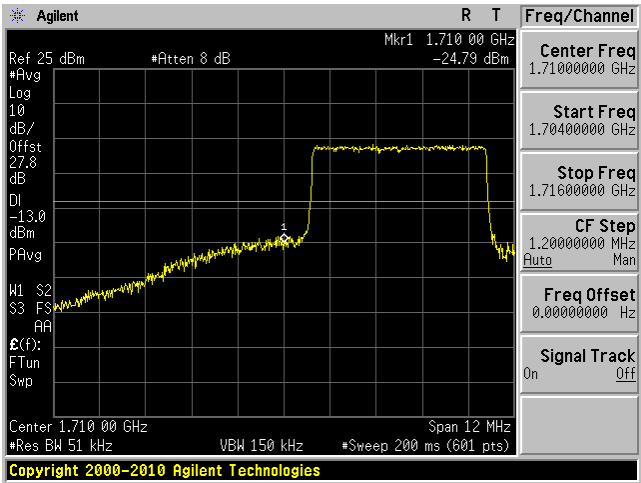


Highest Edge

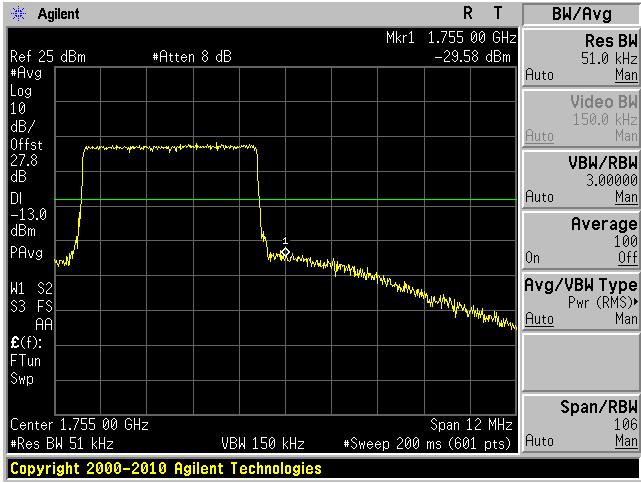


Modulation: 16QAM (5 MHz)

Lowest Edge

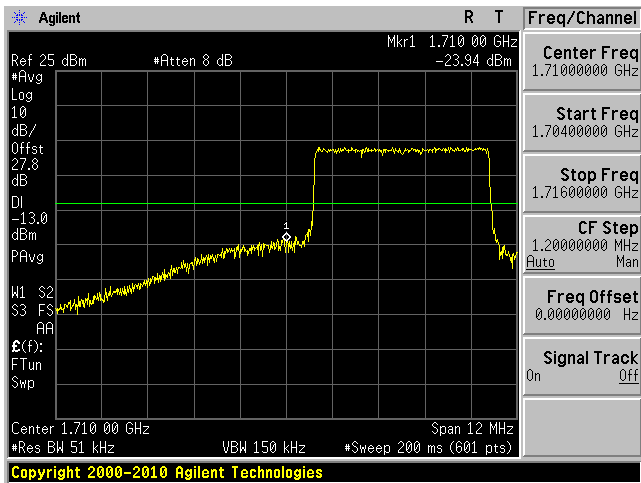


Highest Edge

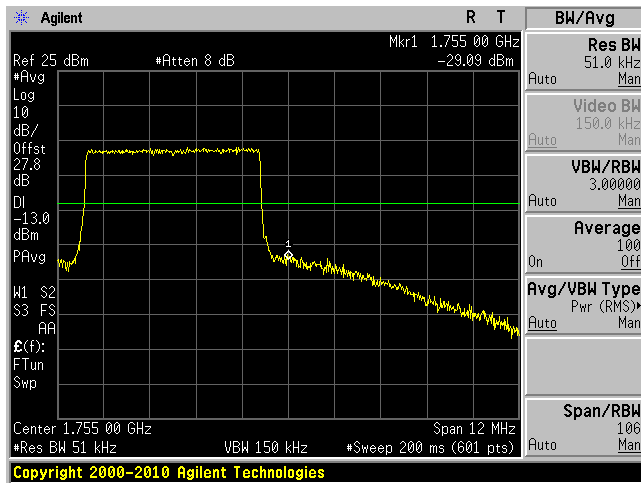


Modulation: 64QAM (5 MHz)

Lowest Edge



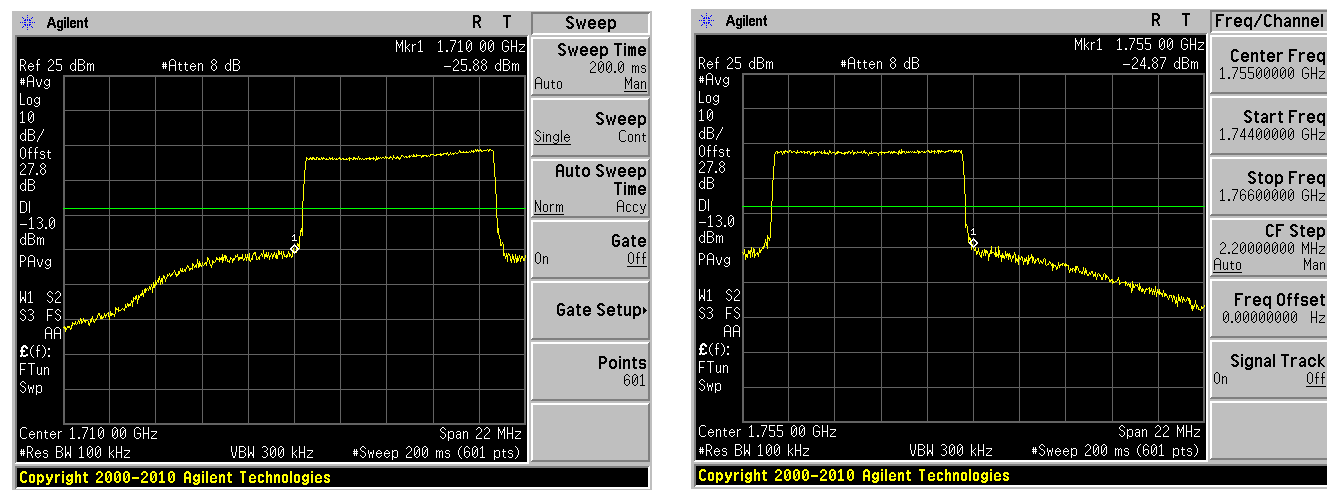
Highest Edge



Modulation: QPSK (10 MHz)

Lowest Edge

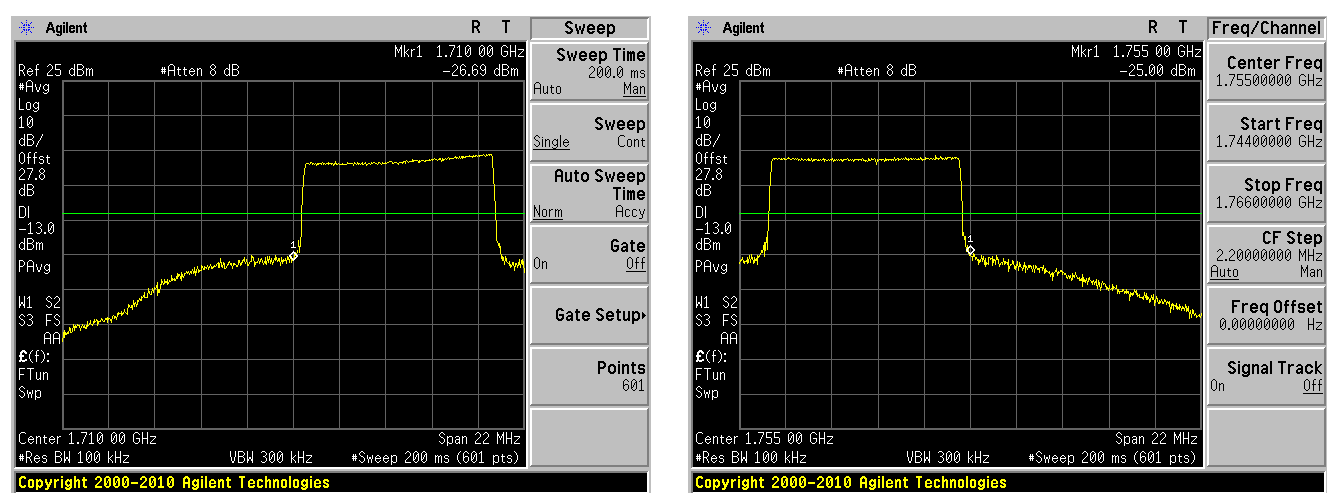
Highest Edge



Modulation: 16QAM (10 MHz)

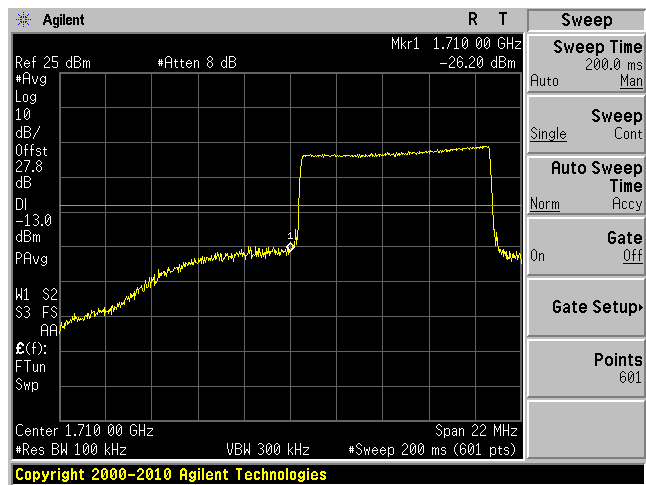
Lowest Edge

Highest Edge

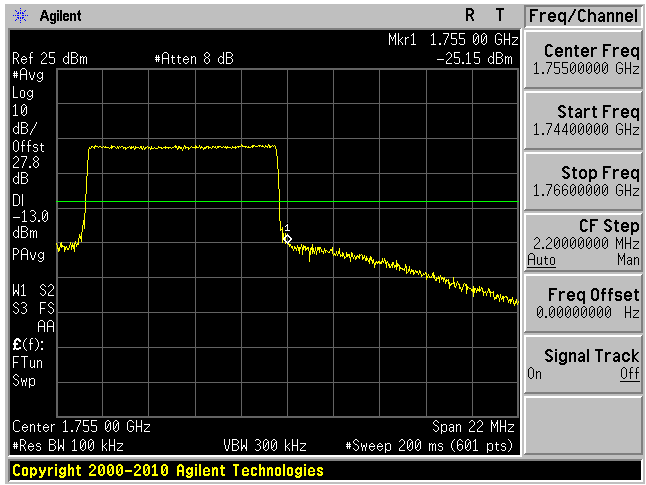


Modulation: 16QAM (10 MHz)

Lowest Edge



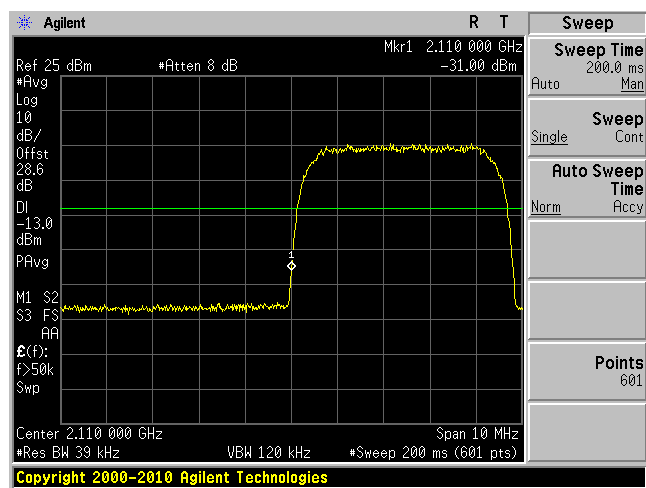
Highest Edge



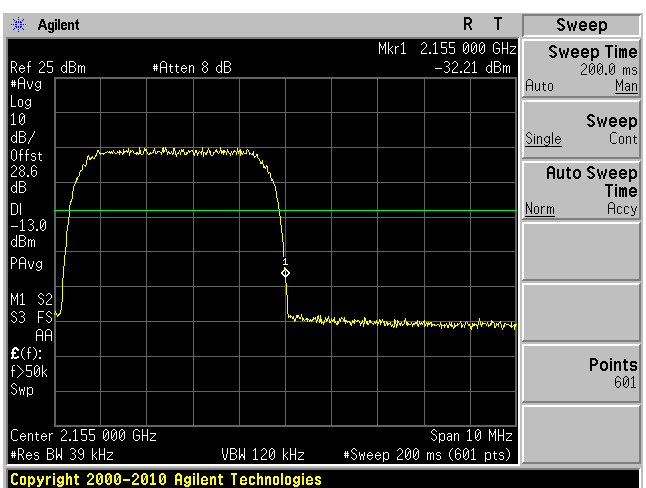
DL: 2110-2155 MHz

WCDMA/HSPA

Lowest Edge

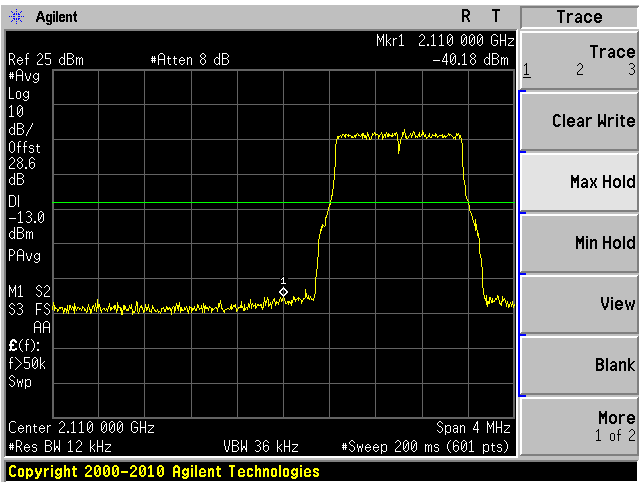


Highest Edge

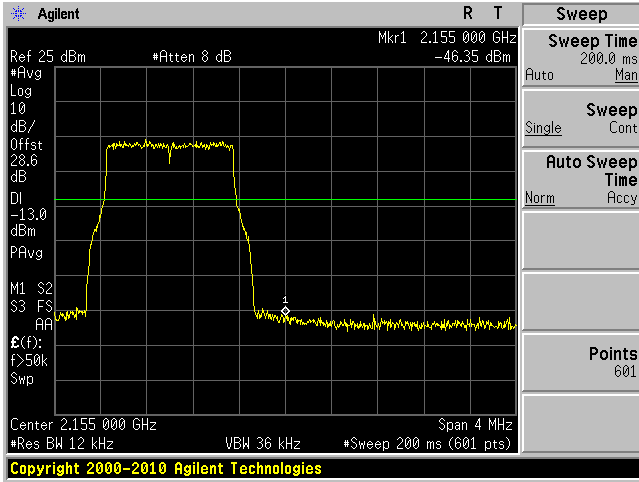


Modulation: QPSK (1.4 MHz)

Lowest Edge

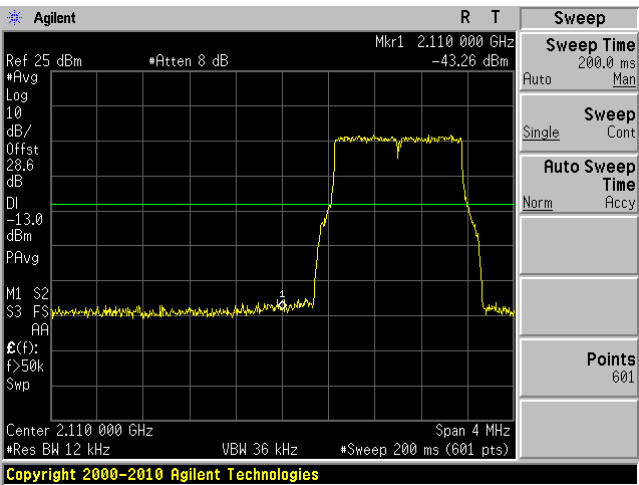


Highest Edge

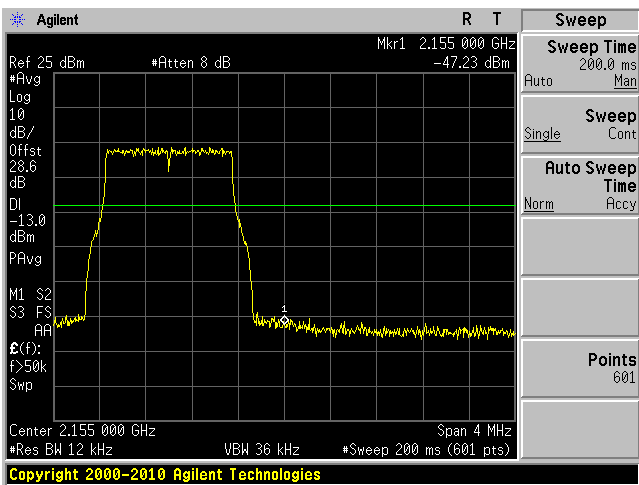


Modulation: 16QAM (1.4MHz)

Lowest Edge

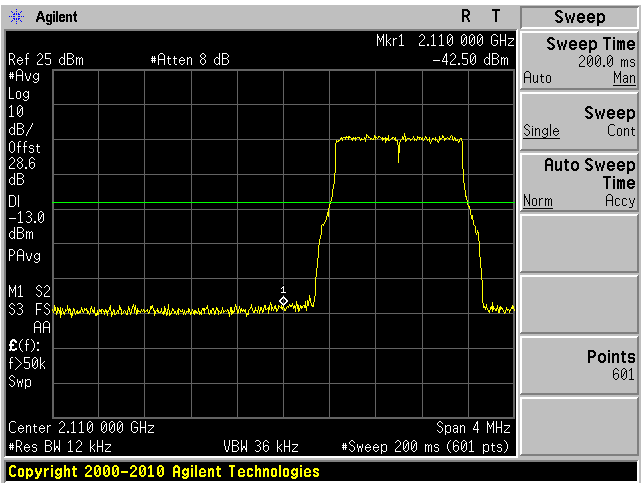


Highest Edge

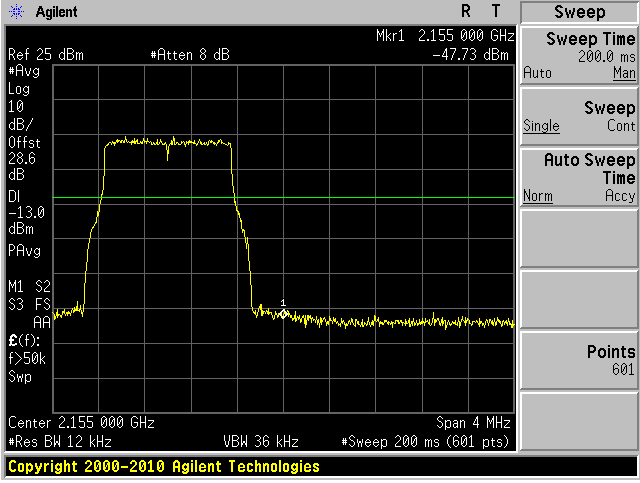


Modulation: 64QAM (1.4MHz)

Lowest Edge

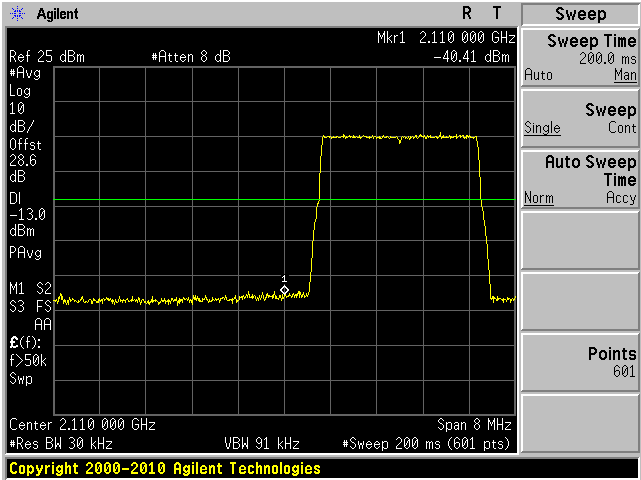


Highest Edge

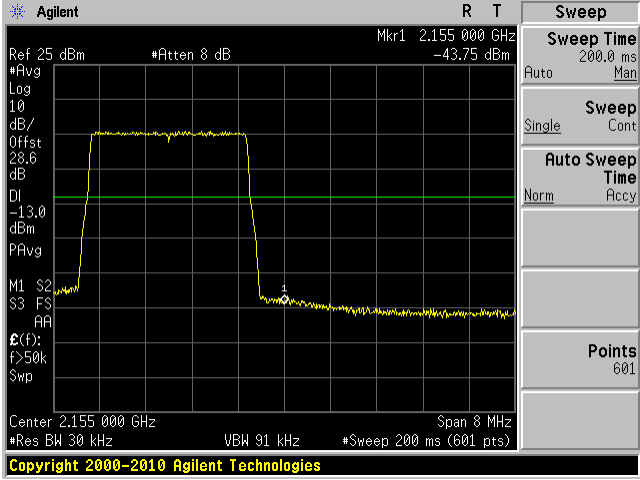


Modulation: QPSK (3 MHz)

Lowest Edge

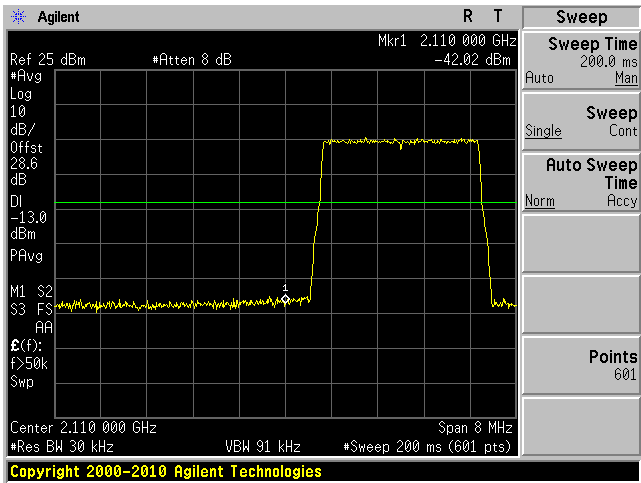


Highest Edge

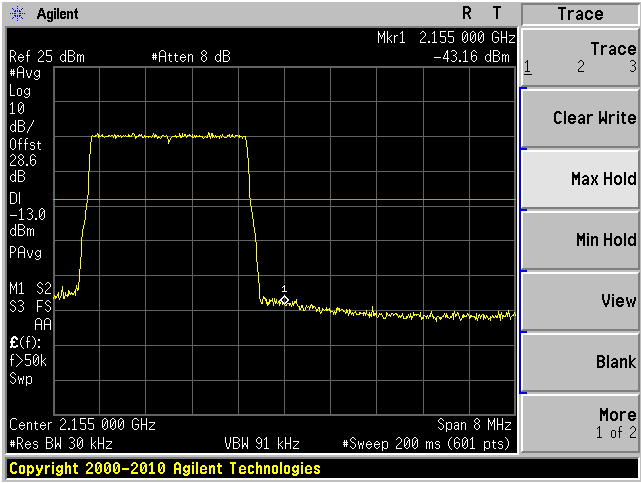


Modulation: 16QAM (3 MHz)

Lowest Edge

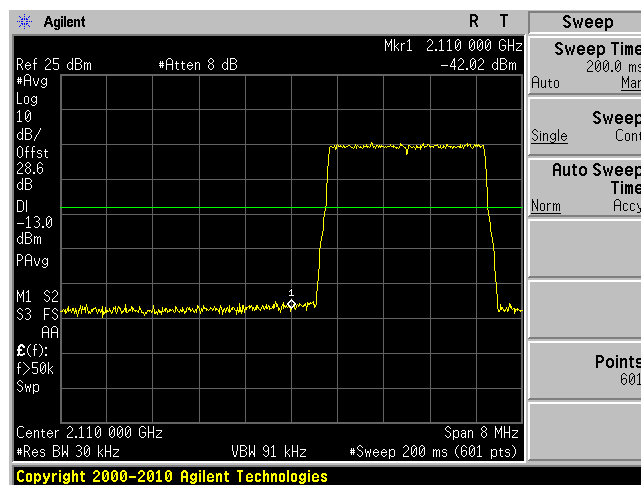


Highest Edge

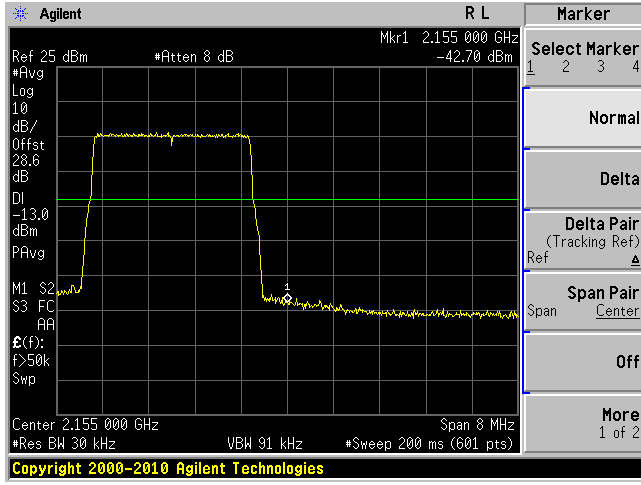


Modulation: 64QAM (3 MHz)

Lowest Edge

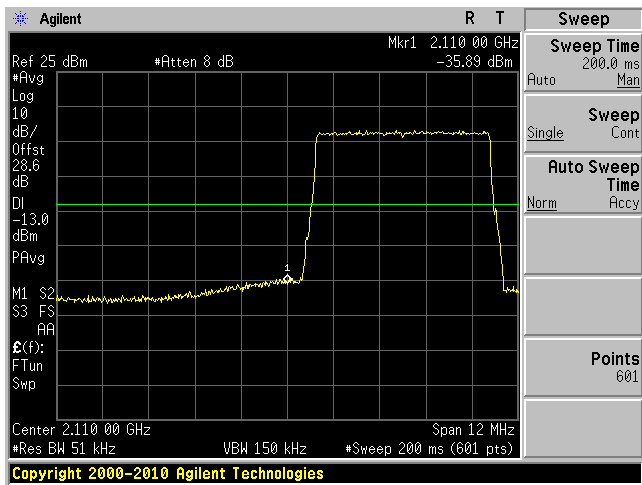


Highest Edge

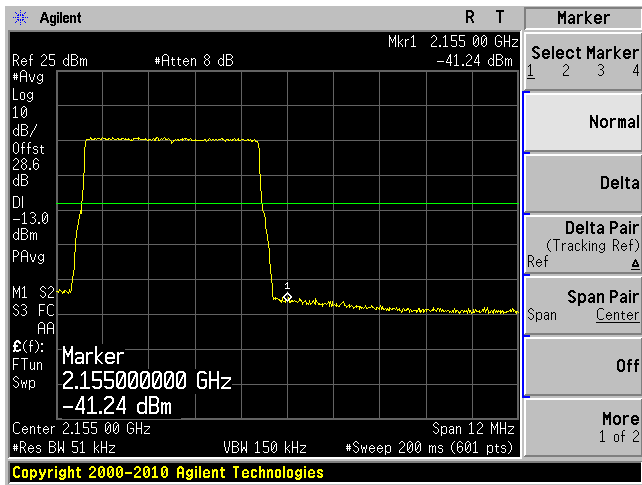


Modulation: QPSK (5 MHz)

Lowest Edge

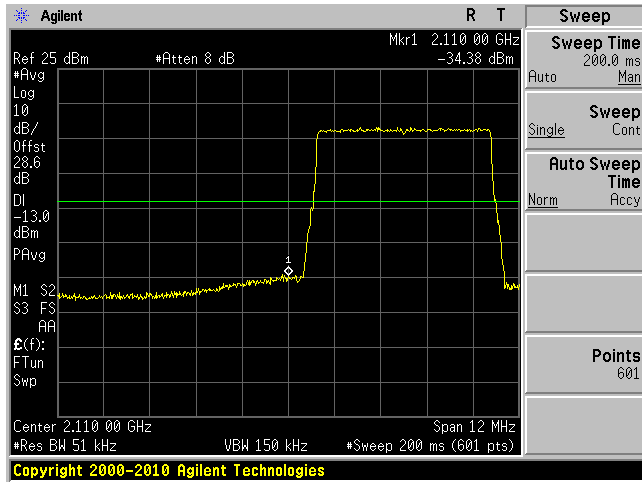


Highest Edge

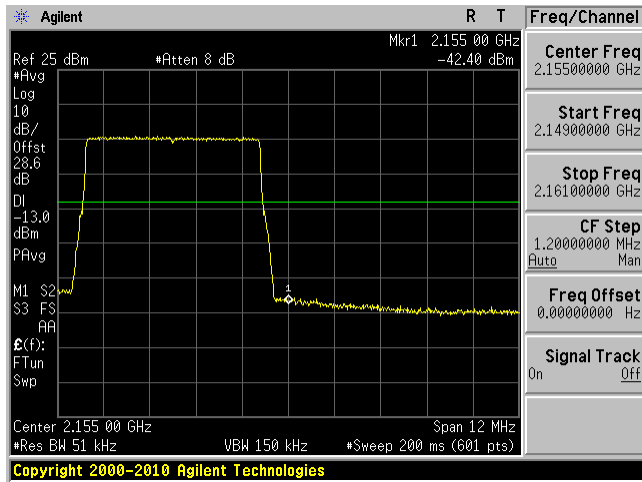


Modulation: 16QAM (5 MHz)

Lowest Edge



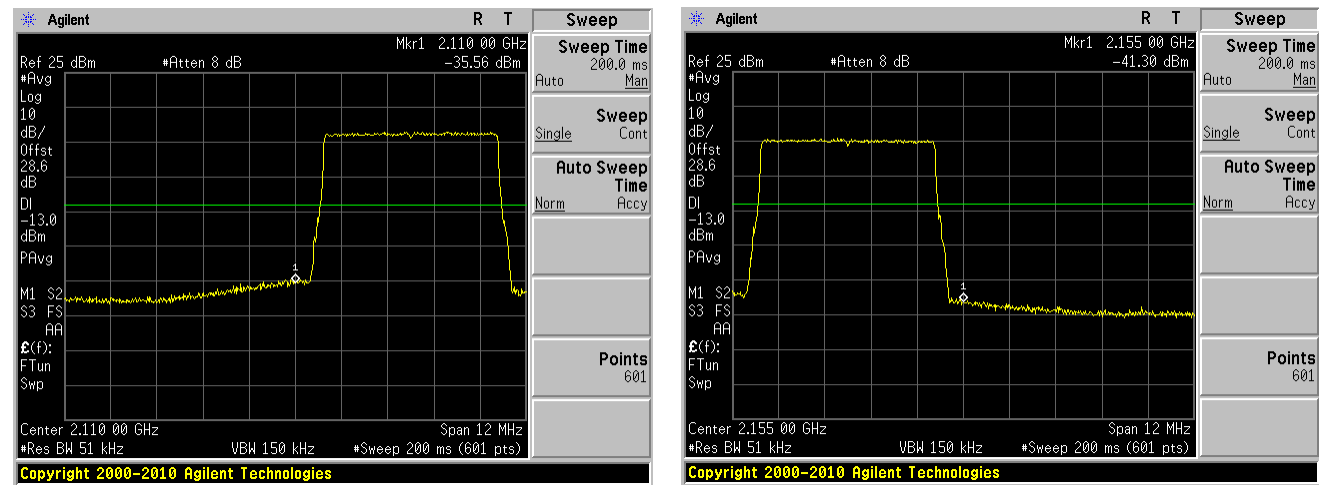
Highest Edge



Modulation: 64QAM (5 MHz)

Lowest Edge

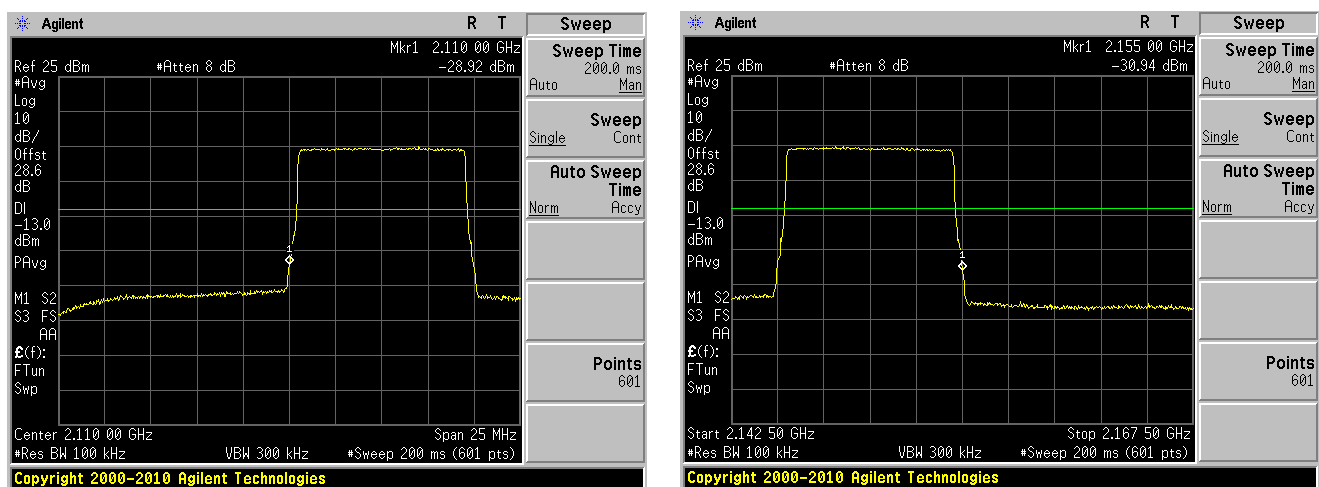
Highest Edge



Modulation: QPSK (10 MHz)

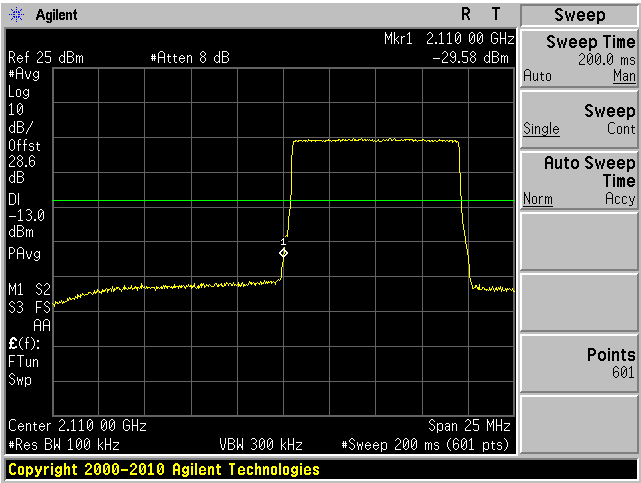
Lowest Edge

Highest Edge

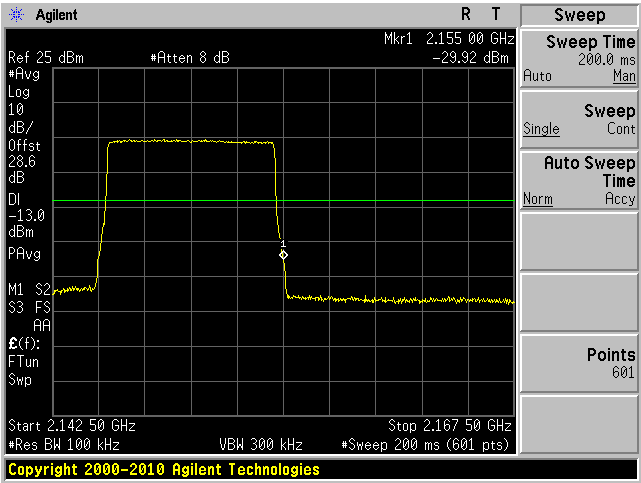


Modulation: 16QAM (10 MHz)

Lowest Edge

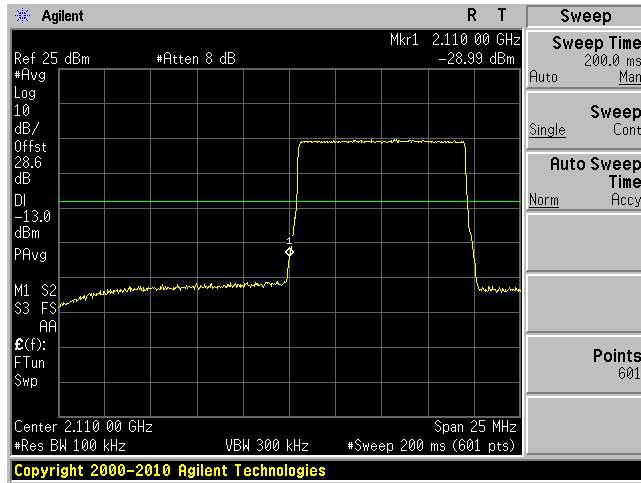


Highest Edge

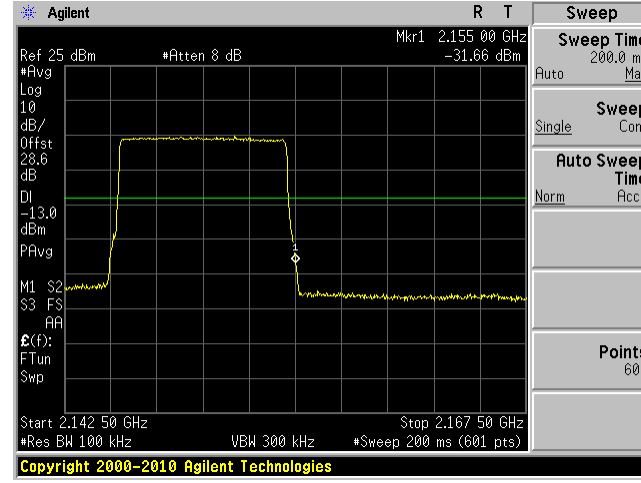


Modulation: 64QAM (10 MHz)

Lowest Edge



Highest Edge



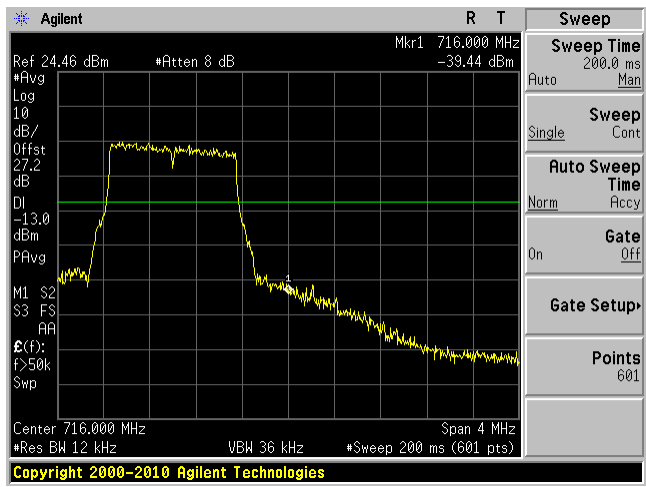
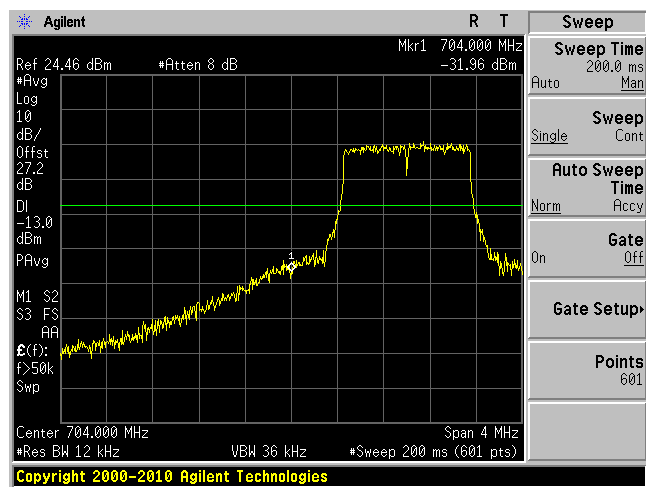
LTE Band (Band 17)

UL: 704-716 MHz

Modulation: QPSK (1.4 MHz)

Lowest Edge

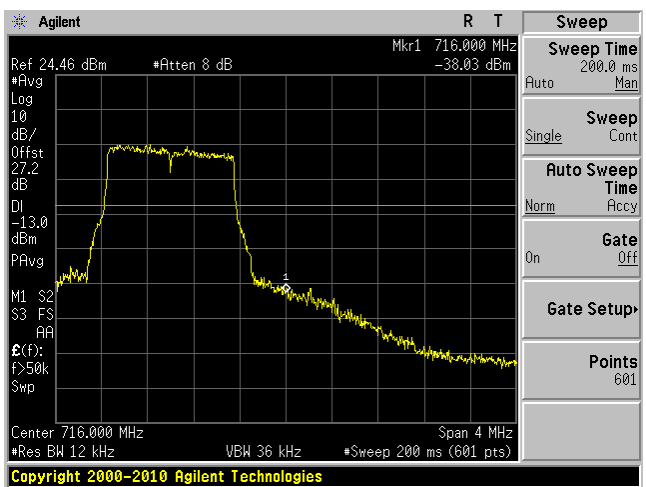
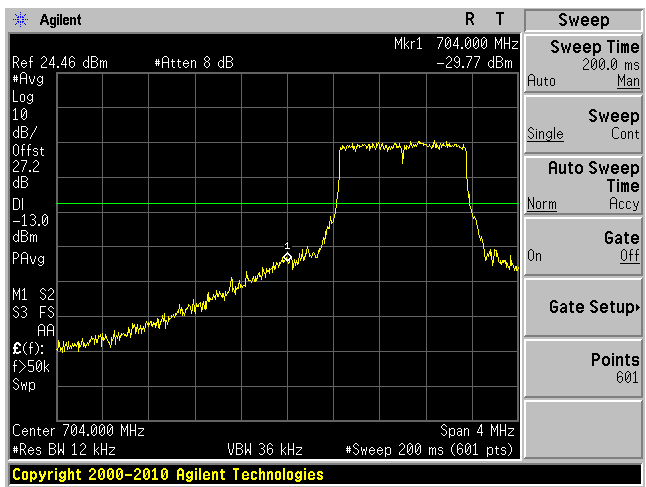
Highest Edge



Modulation: 16QAM (1.4 MHz)

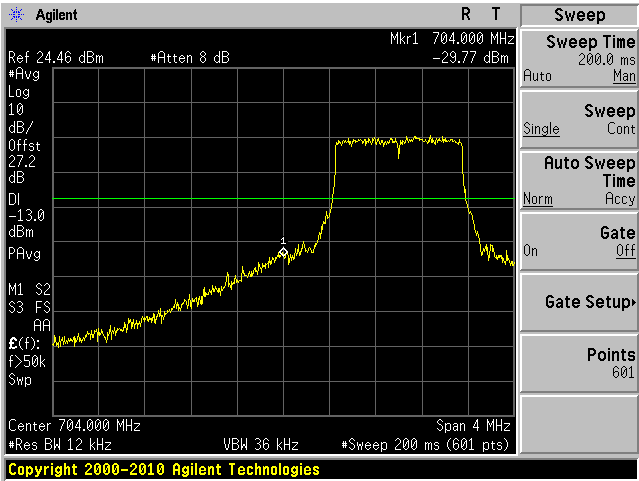
Lowest Edge

Highest Edge

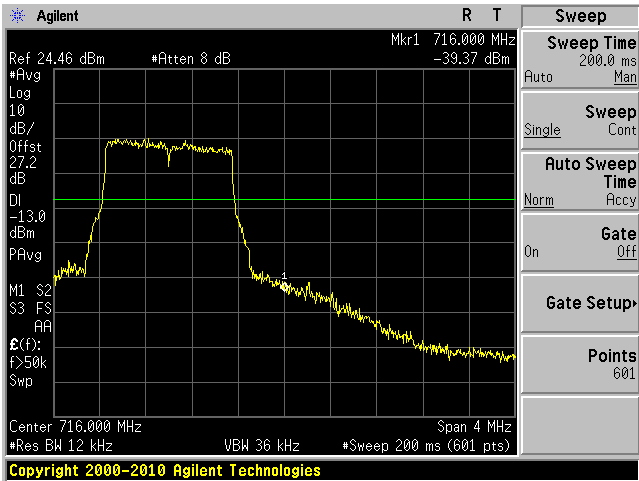


Modulation: 64QAM (1.4 MHz)

Lowest Edge

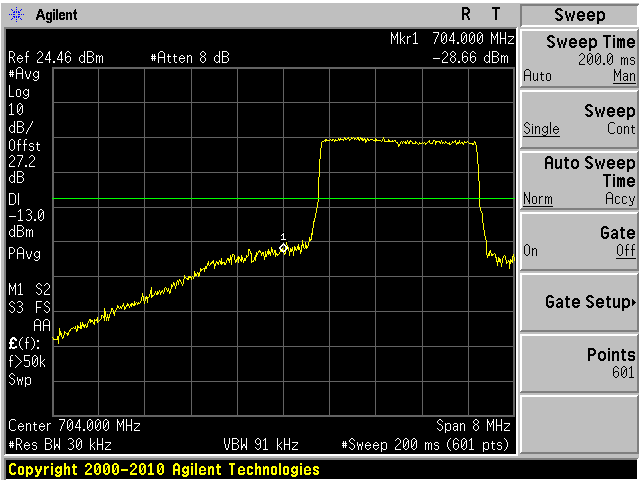


Highest Edge

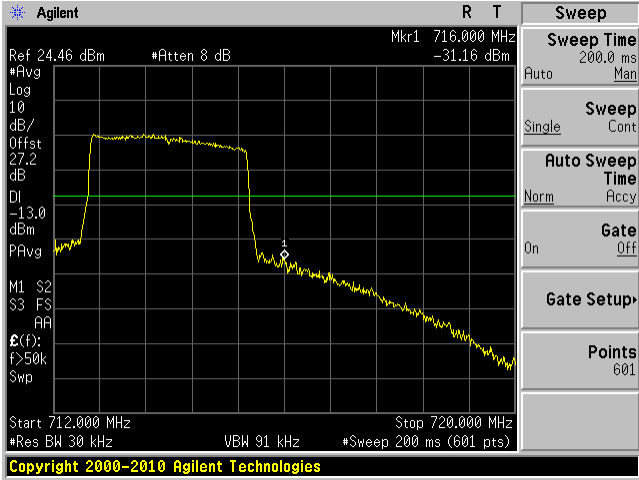


Modulation: QPSK (3 MHz)

Lowest Edge



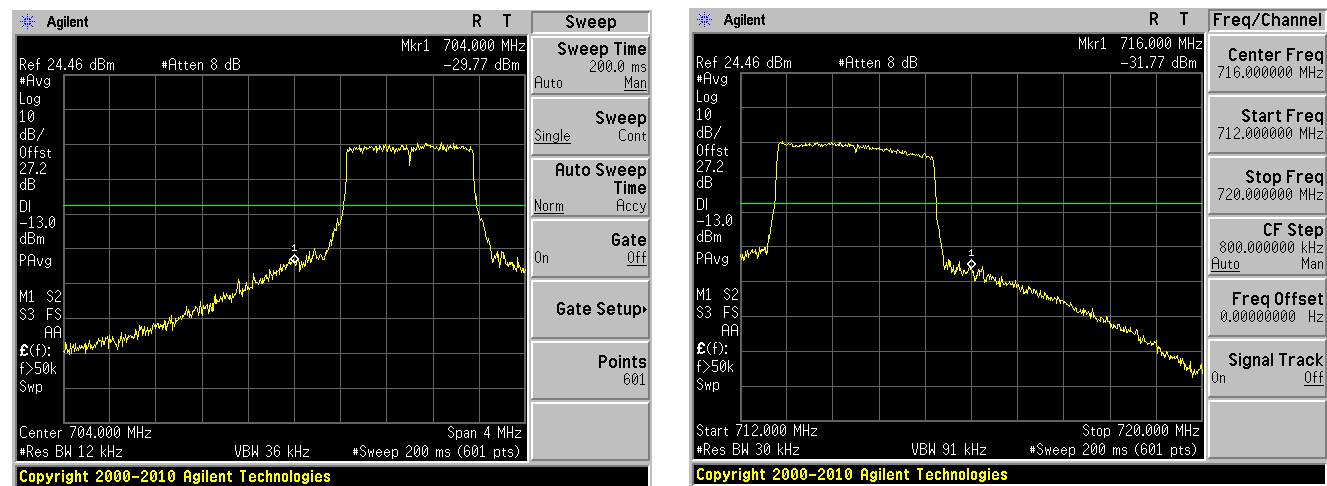
Highest Edge



Modulation: 16QAM (3 MHz)

Lowest Edge

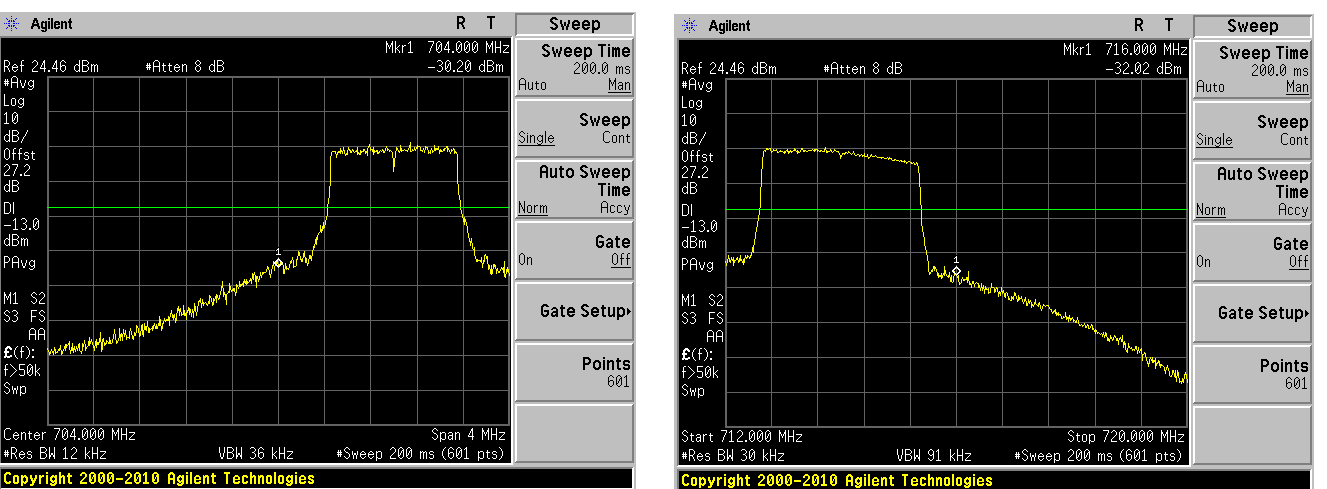
Highest Edge



Modulation: 64QAM (3 MHz)

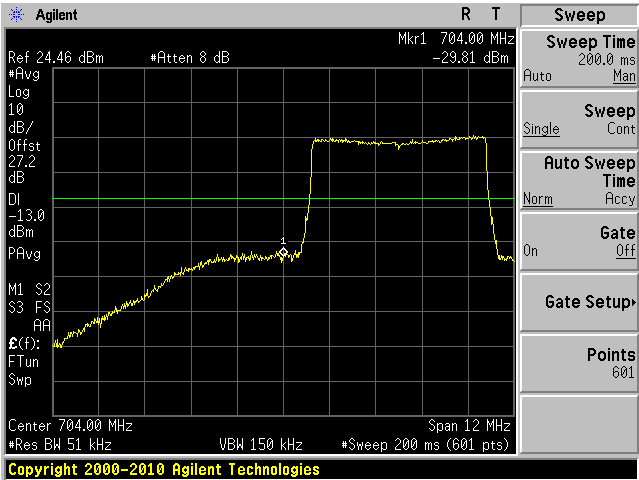
Lowest Edge

Highest Edge

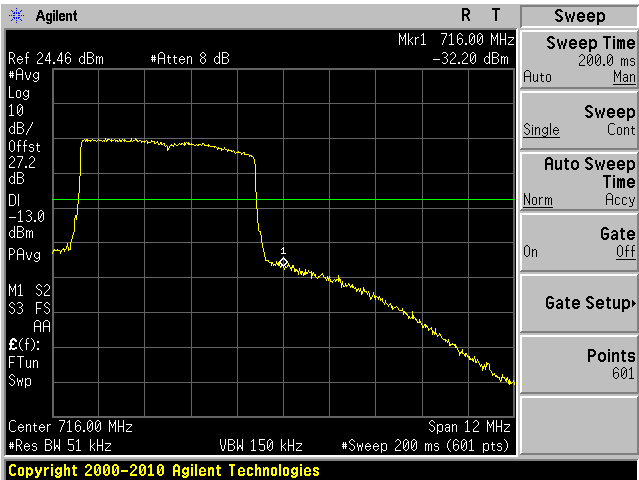


Modulation: QPSK (5 MHz)

Lowest Edge

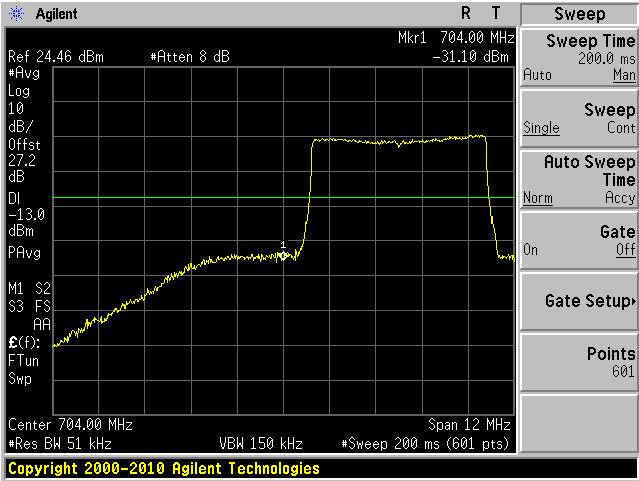


Highest Edge



Modulation: 16QAM (5MHz)

Lowest Edge

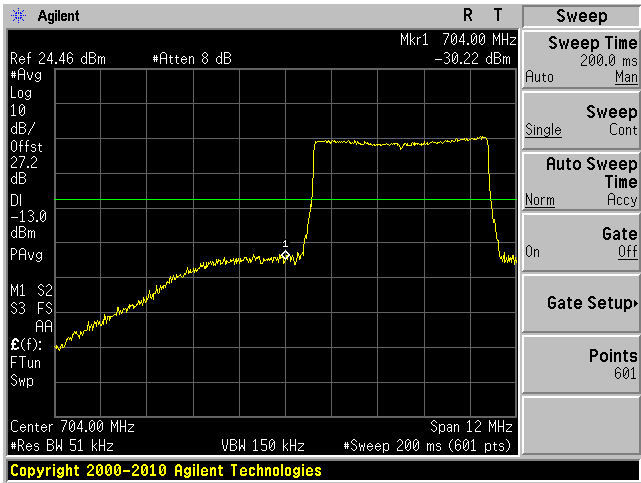


Highest Edge

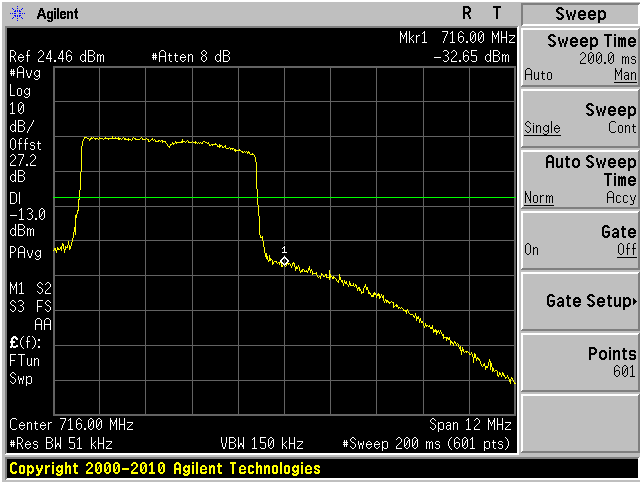


Modulation: 64QAM (5 MHz)

Lowest Edge

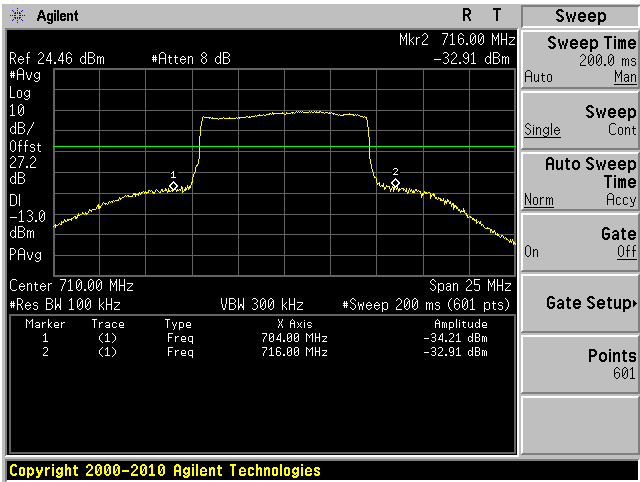


Highest Edge



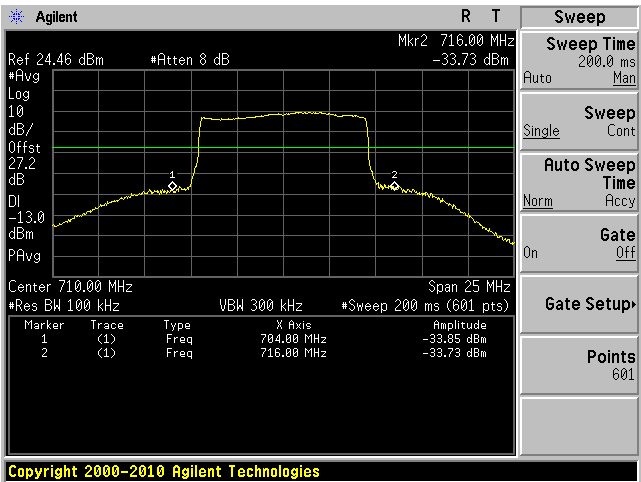
Modulation: QPSK (10 MHz)

Lowest Edge and Highest Edge



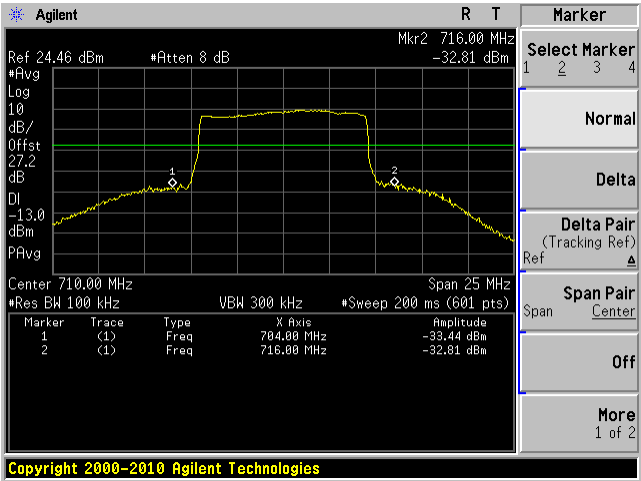
Modulation: 16QAM (10 MHz)

Lowest Edge and Highest Edge



Modulation: 64QAM (10 MHz)

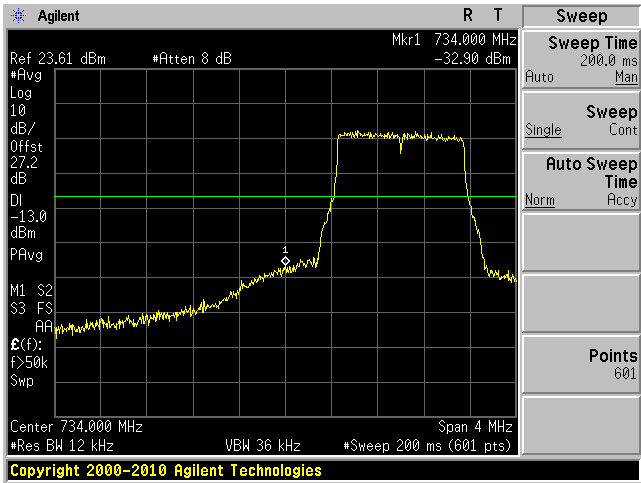
Lowest Edge and Highest Edge



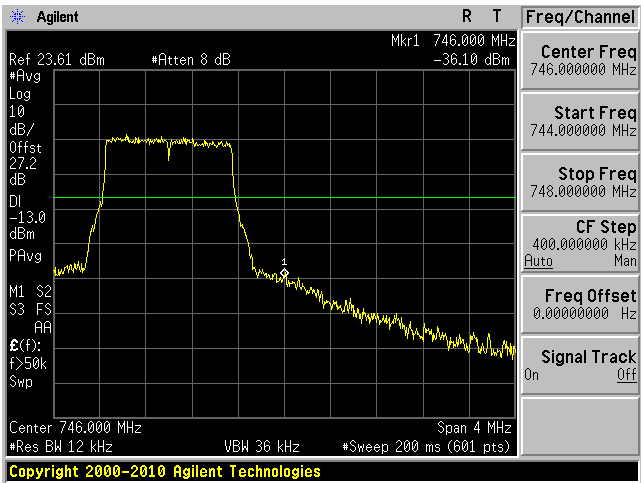
DL: 734-746 MHz

Modulation: QPSK (1.4 MHz)

Lowest Edge

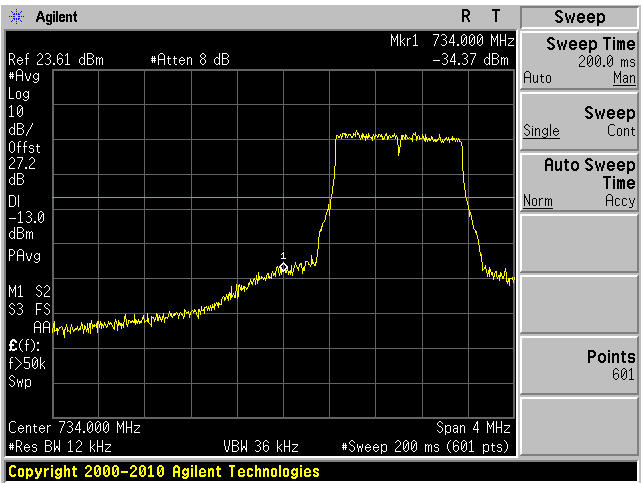


Highest Edge

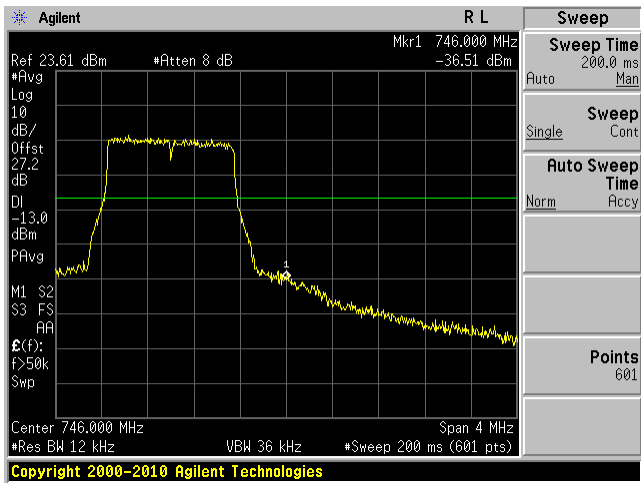


Modulation: 16QAM (1.4 MHz)

Lowest Edge

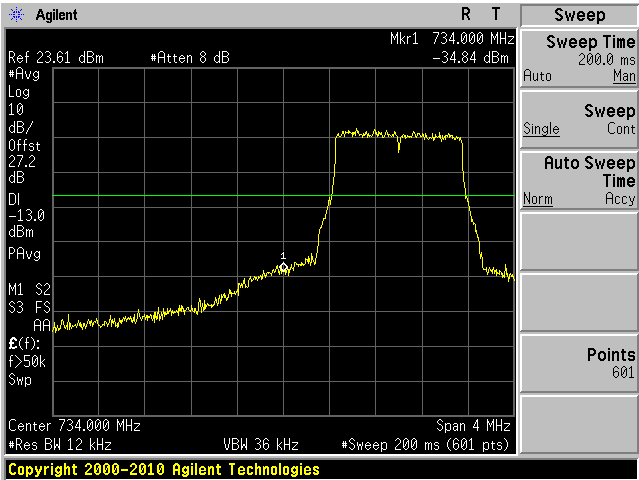


Highest Edge

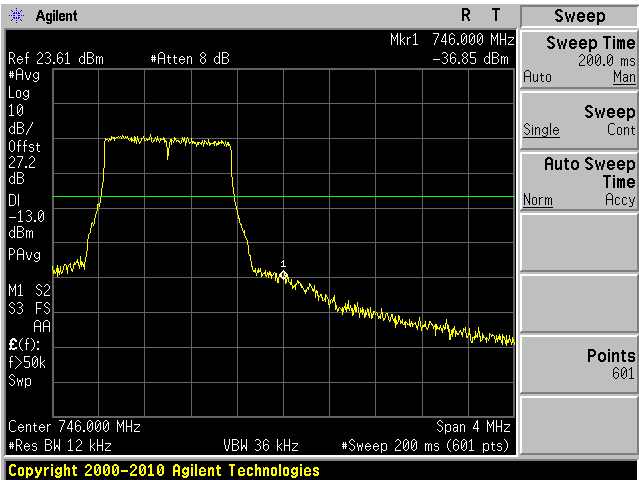


Modulation: 64QAM (1.4 MHz)

Lowest Edge

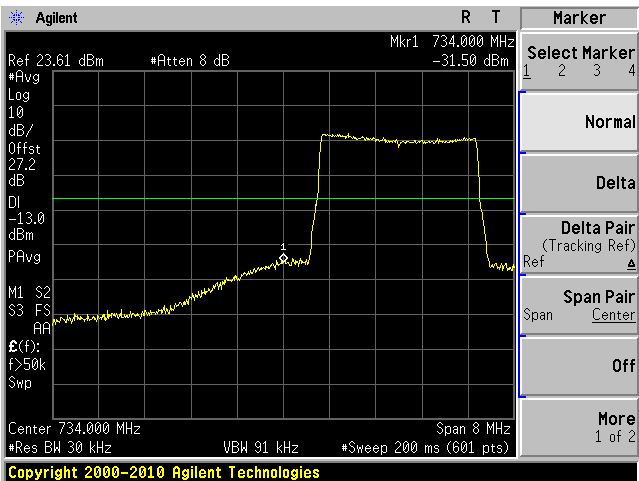


Highest Edge

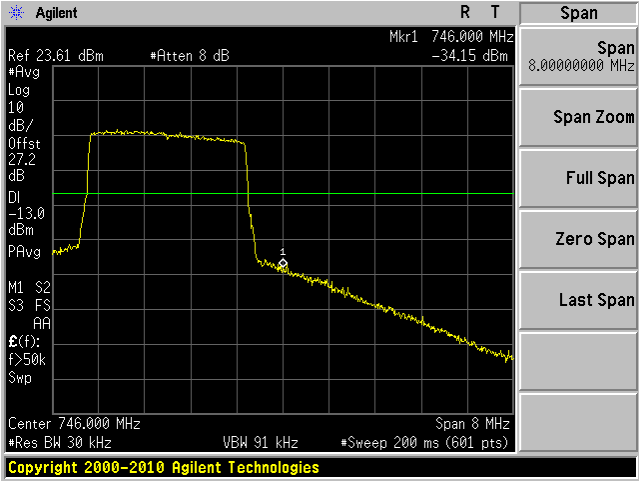


Modulation: QPSK (3 MHz)

Lowest Edge

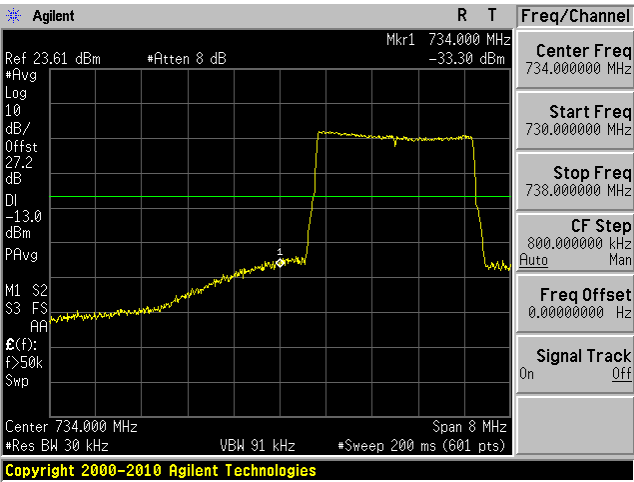


Highest Edge

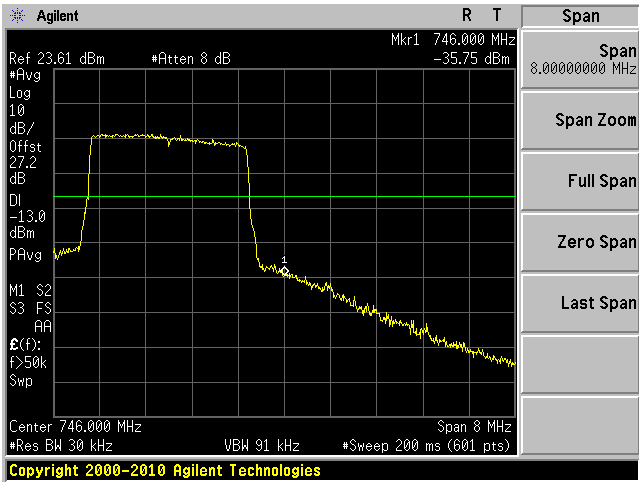


Modulation: 16QAM (3 MHz)

Lowest Edge

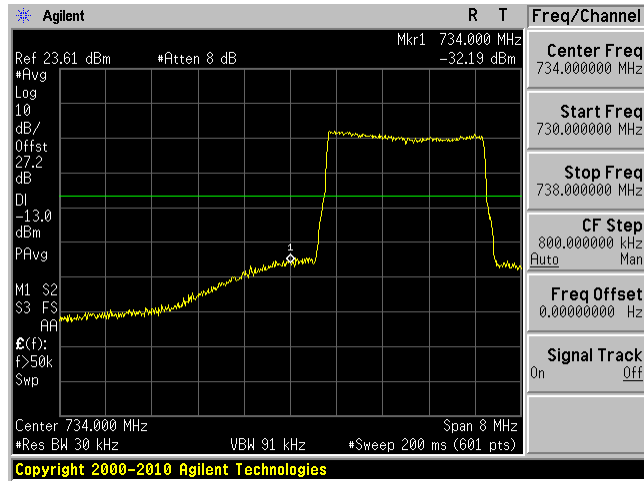


Highest Edge

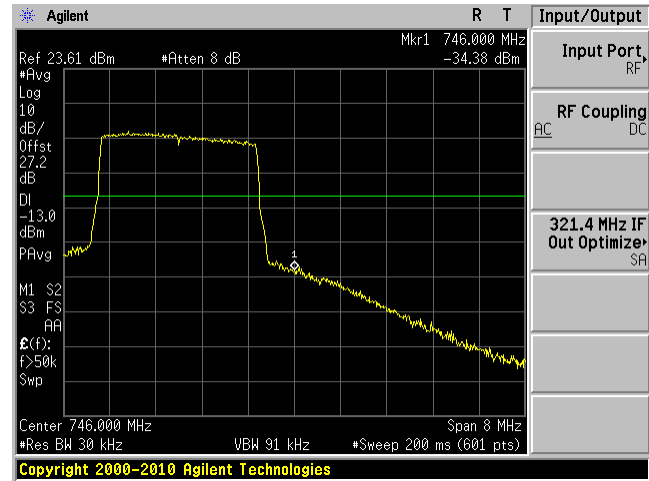


Modulation: 64QAM (3 MHz)

Lowest Edge

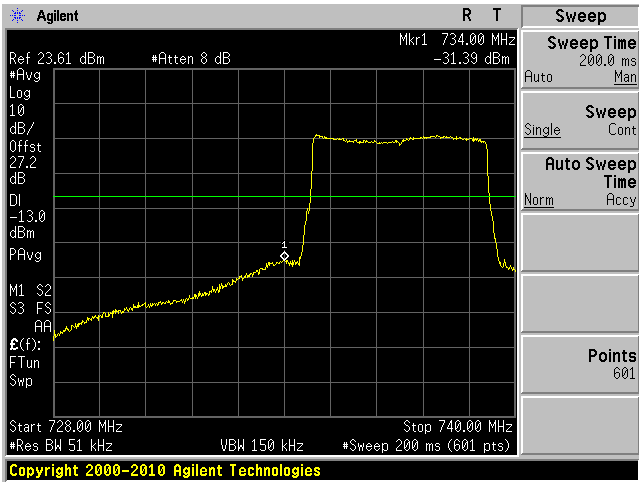


Highest Edge

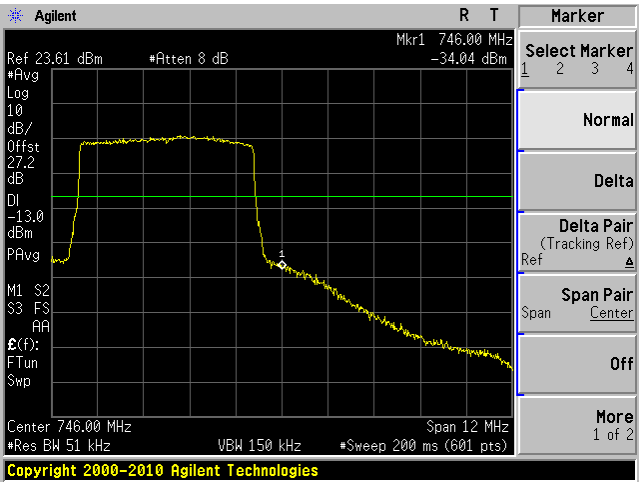


Modulation: QPSK (5 MHz)

Lowest Edge

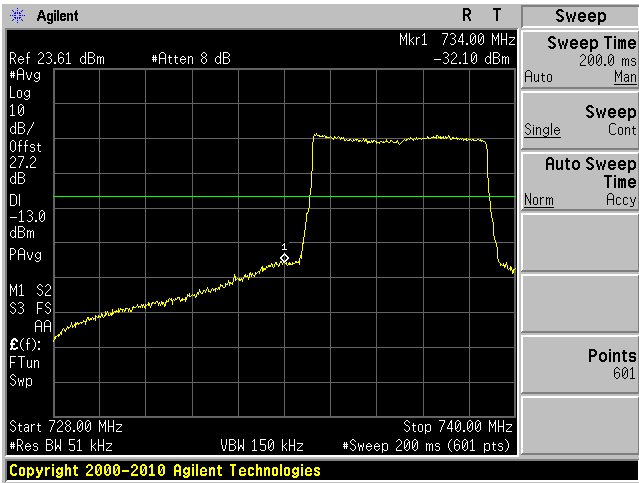


Highest Edge

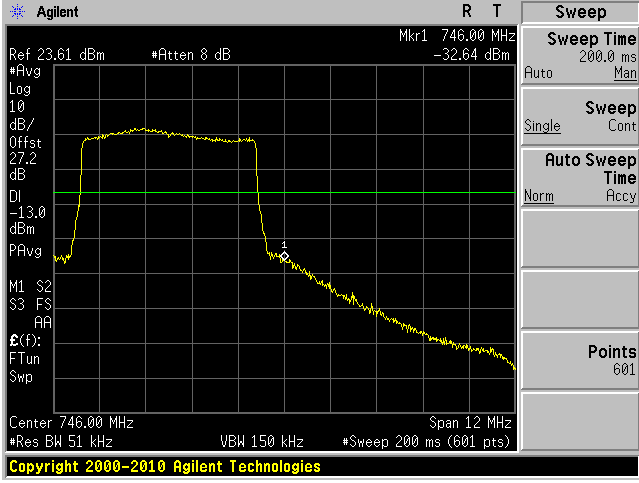


Modulation: 16QAM (5MHz)

Lowest Edge

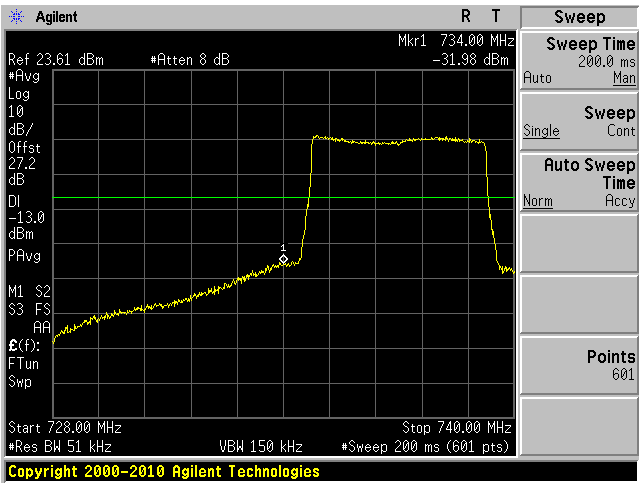


Highest Edge

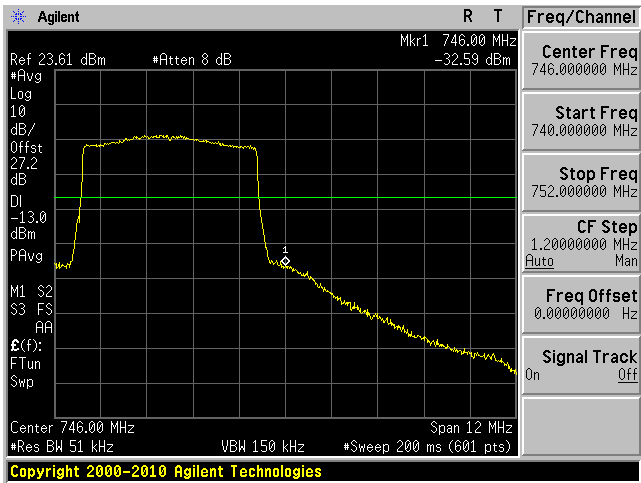


Modulation: 64QAM (5 MHz)

Lowest Edge

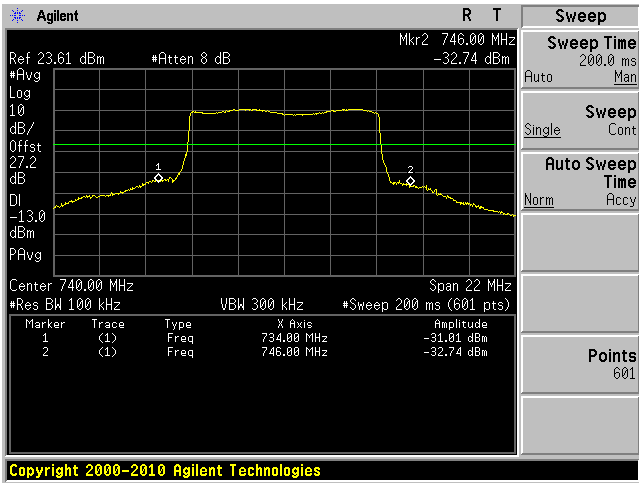


Highest Edge



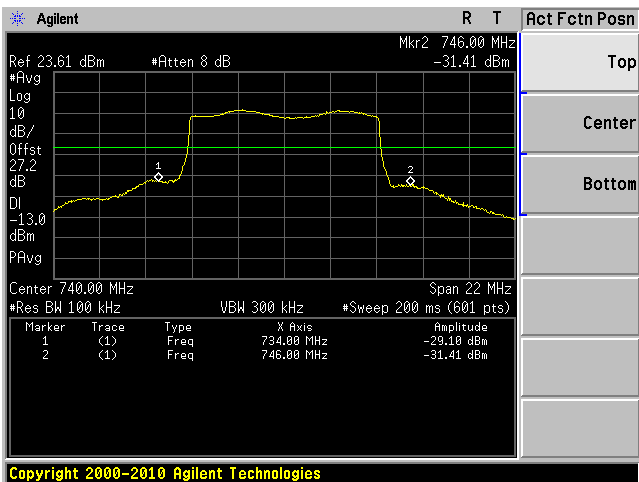
Modulation: QPSK (10 MHz)

Lowest Edge and Highest Edge



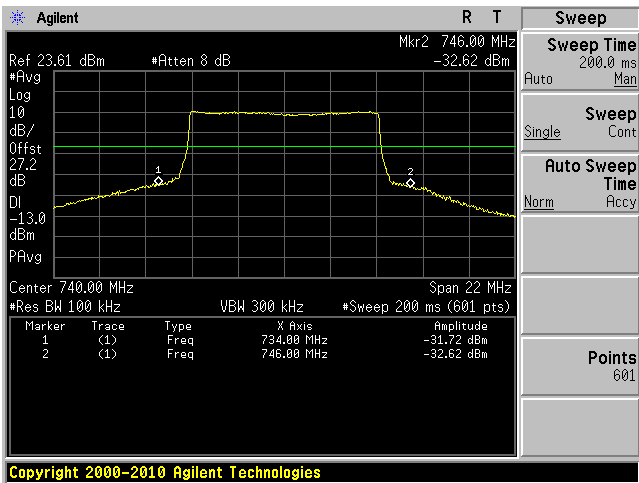
Modulation: 16QAM (10 MHz)

Lowest Edge and Highest Edge



Modulation: 64QAM (10 MHz)

Lowest Edge and Highest Edge



9 FCC §2.1055 & §27.54 – FREQUENCY STABILITY

9.1 Applicable Standard

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

9.2 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.

9.3 Test Results

Not applicable, EUT is a signal booster; the signal source is from the signal generator, no frequency stability applied.

10 FCC §2.1091 & §27.52 - RF EXPOSURE INFORMATION

10.1 Applicable Standard

According to FCC §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	¹ (100)	30
1.34-30	824/f	2.19/f	¹ (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

¹ = Plane-wave equivalent power density

10.2 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

Test Results:

WCDMA/HSPA Band (Band 4), Uplink

Maximum peak output power at antenna input terminal (dBm): 22.16

Maximum peak output power at antenna input terminal (mW): 164.43

Prediction distance (cm): 20.00

Prediction frequency (MHz): 1732.4

Antenna Gain, typical (dBi): 5.0

Antenna Gain, typical (numeric): 3.16

Power density at predication frequency and distance (mW/cm²): 0.103

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

WCDMA/HSPA Band (Band 4), Downlink

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>16.01</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>39.90</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2153</u>
<u>Antenna Gain, typical (dBi):</u>	<u>3.00</u>
<u>Antenna Gain, typical (numeric):</u>	<u>2.00</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.016</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>1.0</u>

LTE Band (Band 17), Uplink

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>22.12</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>162.93</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>710</u>
<u>Antenna Gain, typical (dBi):</u>	<u>3.0</u>
<u>Antenna Gain, typical (numeric):</u>	<u>2.0</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.0648</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>0.473</u>

LTE Band (Band 17), Downlink

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>15.95</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>39.36</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>737</u>
<u>Antenna Gain, typical (dBi):</u>	<u>3.0</u>
<u>Antenna Gain, typical (numeric):</u>	<u>2.0</u>
<u>Power density at predication frequency and distance (mW/cm²):</u>	<u>0.0157</u>
<u>MPE limit for uncontrolled exposure at predication frequency (mW/cm²):</u>	<u>0.491</u>

Results

For uplink and downlink, the highest power density levels at 20 cm are below the MPE uncontrolled exposure limit.