Lab Code: 200167-0

FCC PART 27

TEST AND MEASUREMENT REPORT

For

Advanced RF Technologies, Inc.

3116 W Vanowen St.,

Burbank, CA 91505, USA

FCC ID: S2O-AXIOM
Model: AXIOM

Report Type:	**Product Type:**
Original Report	LTE, Cellular, PCS, AWS, Repeater

Test Engineer: Dennis Huang

Report Number: R1007282-27

Report Date: 2010-11-01

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1007282-27	Original Report	2010-11-01

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Advanced RF Technologies, Inc.* FCC ID: S2O-AXIOM, Model: AXIOM or the "EUT" as referred to in this report is a LTE, Cellular, PCS, and AWS Bi directional repeater. The LTE Band support three modulations: QPSK, 16QAM, 64QAM and the AWS band supports 1xEVDO.

. Repeater Specification

Parameters		LTE 700 MHz	Cellular (MHz)	PCS (MHz)	AWS (MHz)
Frequency	Downlink	Lower Band: 728-740	860-894	1930-1990	2110-2155
		Upper Band: 746-757			
	Uplink	Lower Band: 698-710	824-849	1850-1910	1710-1755
		Upper Band:776-787			
Output Power		25 dBm		30 dBm	
AC Power		110-220V, 60Hz			
Power Consumption		130 Watt			

1.2 Mechanical Description

The EUT measures 310 mm **(L)** x 508 mm **(W)** x 483 mm **(H)**, and weighs approximately 58 kg.

The test data gathered are from production sample, serial number: P-AXM100100001-A provided by the manufacturer.

1.3 Objective

This type approval report is prepared on behalf of *Advanced RF Technologies, 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)

FCC Part 22/24 report, BACL Report Number: R1007282-2224

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

1.6 Measurement Uncertainty

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

Based on 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.

1.7 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 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: C-2463 and R-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

NA, 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

Manufacturer	Description	Model	Serial Number
Agilent	Vector Signal Generator	E4438C	MY42083251
Agilent	Signal Studio for 3GPP LTE	N7624B	-

2.5 Internal Configurations of EUT

Manufacturer	Description	Model	Serial Number
Advanced RF Technologies, Inc	AWS PCB Board 1	ADRF-6410 REV1.2	A6410V1.2010040054
Advanced RF Technologies, Inc	AWS PCB Board 2	VZW Modular CH 20091021 VER.0.9	-
Advanced RF Technologies, Inc	AWS LED Board	-	091021
Advanced RF Technologies, Inc	AWS PCB Board 3	DSP-PCS Rev1.1	PCS091029020
Advanced RF Technologies	AWS FWD PCB Board 4	AION-9030-PCS Ver1.0 FWD	-
Advanced RF Technologies	AWS RVS PCB Board 5	AION-9030-PCS Ver1.0 RVS	-
Advanced RF Technologies, Inc	AWS FWD Module PCB Board 6	EMP-05-002 FWD	-
Advanced RF Technologies, Inc	AWS RVS Module PCB Board 7	EMP-05-002 RVS	-
Advanced RF Technologies, Inc	LTE PCB Board 1	ADRF-6410 REV1.2	-
Advanced RF Technologies, Inc	LTE PCB Board 2	VZW Modular20100518 VER1.0	AABAXSV1.001060065
Advanced RF Technologies, Inc	LTE LED Board	-	100506
Advanced RF Technologies, Inc	LTE PCB Board 3	LTE_DSP VER 1.0	PCS100526077
Advanced RF Technologies	LTE FWD PCB Board 4	LTE_UL_VER 1.0	-
Advanced RF Technologies	LTE RVS PCB Board 5	LTE_DL_VER 1.0	-
Advanced RF Technologies, Inc	LTE FWD Module PCB Board 6	EMP-07-001 REV 3.1 FWD	-
Advanced RF Technologies, Inc	LTE RVS Module PCB Board 7	EMP-07-001 REV 3.0 RVS	-
NEWTEC	Power Supply	-	-

2.6 Interface Ports and Cables

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

3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046, §27.50(i)	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A
§2.1049 (h), §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)	Band Edge	Compliant
§2.1055, §27.54	Frequency Stability	N/A[1]
§2.1091, §27.52	RF Exposure	Compliant

N/A: Not applicable.
Note[1]: EUT is a repeater.

4 FCC §2.1046 & §27.50 – RF OUTPUT POWER

4.1 Applicable Standard

According to FCC §27.50, the maximum effective radiated power (ERP) of fixed and base station must not exceed 1000 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:	21-24°C
Relative Humidity:	40-43 %
ATM Pressure:	101-103 kPa

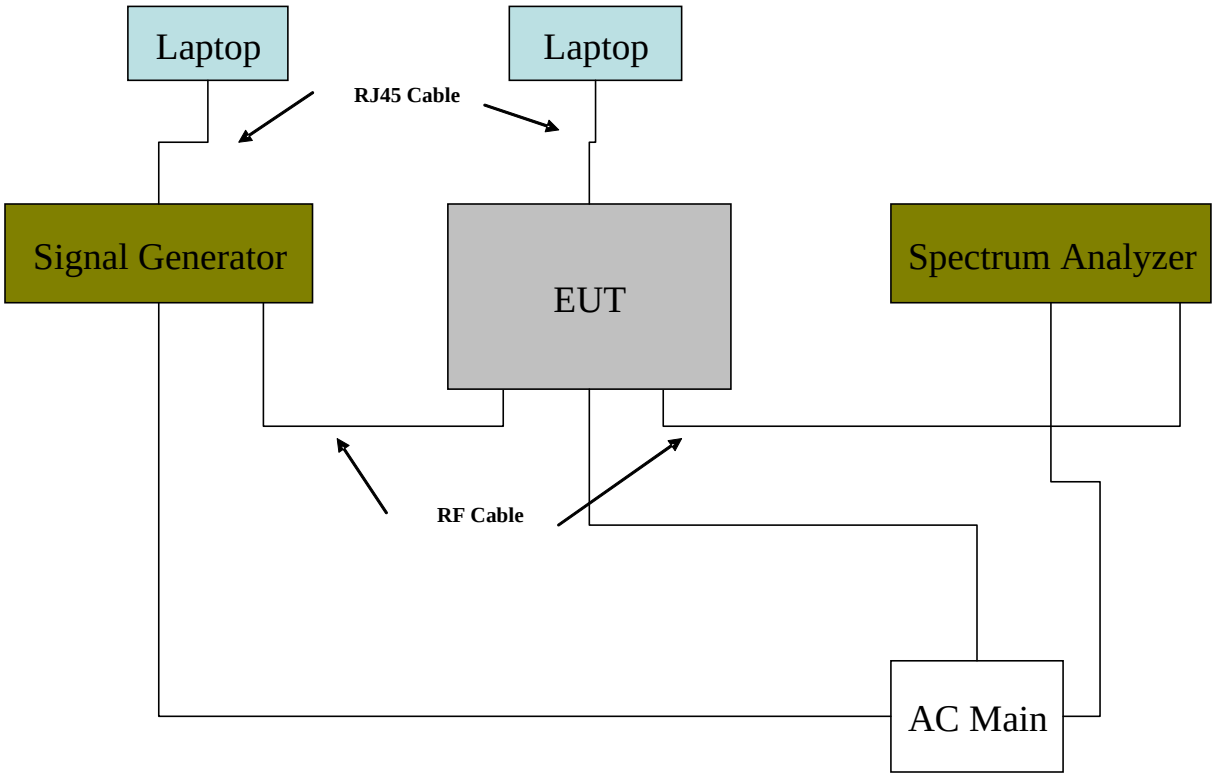
The testing was performed by Dennis Huang from 2010-08-24 to 2010-08-26 at RF Site.

4.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2010-05-09
Agilent	Signal Generator	E4438C	MY42083251	2009-12-08

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

4.5 Test Block Diagram



4.6 Summary of Test Results

746-757 MHz/776-787 MHz Band

Maximum Output Power (LTE) – Downlink

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 746-757 MHz	QPSK (1.4 MHz)	747	-66	25.19
	QPSK (1.4 MHz)	752	-66.1	25.1
	QPSK (1.4 MHz)	756	-65.8	25.02
	16QAM (1.4 MHz)	747	-66	25.1
	16QAM (1.4 MHz)	752	-65.7	25.03
	16QAM (1.4 MHz)	756	-65.7	25
	64QAM (1.4 MHz)	747	-66.5	25.04
	64QAM (1.4 MHz)	752	-66.2	25.03
	64QAM (1.4 MHz)	756	-66.1	25.13
	QPSK (3 MHz)	748	-64.3	25.11
	QPSK (3 MHz)	752	-64.3	25.06
	QPSK (3 MHz)	755	-64	25.02
	16QAM (3 MHz)	748	-66.2	25.16
	16QAM (3 MHz)	752	-66.2	25.13
	16QAM (3 MHz)	755	-66	25
	64QAM (3 MHz)	748	-66	25.25
	64QAM (3 MHz)	752	-66	25.2
	64QAM (3 MHz)	755	-66	25.04
	QPSK (5 MHz)	749	-66.1	25.09
	QPSK (5 MHz)	754	-65.9	25.1
	16QAM (5 MHz)	749	-64	25.29
	16QAM (5 MHz)	754	-64	25.06
	64QAM (5 MHz)	749	-66	25.32
	64QAM (5 MHz)	754	-65.8	25.09
	QPSK (10 MHz)	752	-66	25.08
	16QAM (10 MHz)	752	-64.6	25.03
	64QAM (10 MHz)	752	-66	25.13

Maximum Output Power (LTE) – Uplink

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Uplink 776-787 MHz	QPSK (1.4 MHz)	777	-69.5	25.07
	QPSK (1.4 MHz)	782	-69.5	25.2
	QPSK (1.4 MHz)	786	-69.5	25.18
	16QAM (1.4 MHz)	777	-69.3	25.18
	16QAM (1.4 MHz)	782	-69.3	25.36
	16QAM (1.4 MHz)	786	-69.3	25.32
	64QAM (1.4 MHz)	777	-69.5	25.14
	64QAM (1.4 MHz)	782	-69.5	25.29
	64QAM (1.4 MHz)	786	-69.5	25.23
	QPSK (3 MHz)	778	-69	25.29
	QPSK (3 MHz)	782	-69	25.28
	QPSK (3 MHz)	785	-69	25.3
	16QAM (3 MHz)	778	-69.3	25.01
	16QAM (3 MHz)	782	-69.2	25.05
	16QAM (3 MHz)	785	-69.2	25.02
	64QAM (3 MHz)	778	-69.4	25.08
	64QAM (3 MHz)	782	-69.4	25.07
	64QAM (3 MHz)	785	-69.4	25.07
	QPSK (5 MHz)	779	-69.2	25.24
	QPSK (5 MHz)	784	-69.2	25.07
	16QAM (5 MHz)	779	-69.4	25.01
	16QAM (5 MHz)	784	-69	25.23
	64QAM (5 MHz)	779	-69	25.11
	64QAM (5 MHz)	784	-69	25.03
	QPSK (10 MHz)	782	-69.2	25.06
	16QAM (10 MHz)	782	-69.4	25.13
	64QAM (10 MHz)	782	-69.4	25.09

728-740 MHz/698-710 MHz Band

Maximum Output Power (LTE) – Downlink

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 728-740 MHz	QPSK (1.4 MHz)	729	-65	25.5
	QPSK (1.4 MHz)	733	-66	25.01
	QPSK (1.4 MHz)	739	-68.9	25.04
	16QAM (1.4 MHz)	729	-66	25.21
	16QAM (1.4 MHz)	733	-66.7	25.18
	16QAM (1.4 MHz)	739	-66	25.02
	64QAM (1.4 MHz)	729	-64.5	25.05
	64QAM (1.4 MHz)	733	-65	25.15
	64QAM (1.4 MHz)	739	-66	25.19
	QPSK (3 MHz)	730	-66	25.33
	QPSK (3 MHz)	733	-67	25.03
	QPSK (3 MHz)	738	-68	25.28
	16QAM (3 MHz)	730	-66	25.12
	16QAM (3 MHz)	733	-66.5	25.02
	16QAM (3 MHz)	738	-66.8	25.18
	64QAM (3 MHz)	730	-65.9	25.06
	64QAM (3 MHz)	733	-65.8	25.08
	64QAM (3 MHz)	738	-65.1	25.03
	QPSK (5 MHz)	731	-66.16	25.16
	QPSK (5 MHz)	737	-67	25.41
	16QAM (5 MHz)	731	-66.2	25.17
	16QAM (5 MHz)	737	-66.8	25.14
	64QAM (5 MHz)	731	-64.8	25.02
	64QAM (5 MHz)	737	-65.5	25.04
	QPSK (10 MHz)	733	-66	25
	16QAM (10 MHz)	733	-64.8	25.04
	64QAM (10 MHz)	733	-66	25.26

Maximum Output Power (LTE) – Uplink

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Uplink 698-710 MHz	QPSK (1.4 MHz)	699	-68.5	25.17
	QPSK (1.4 MHz)	703	-69.5	25.09
	QPSK (1.4 MHz)	709	-69	25.02
	16QAM (1.4 MHz)	699	-68.5	25.11
	16QAM (1.4 MHz)	703	-69.3	25.22
	16QAM (1.4 MHz)	709	-68.9	25.05
	64QAM (1.4 MHz)	699	-68.7	25.07
	64QAM (1.4 MHz)	703	-69.5	25.16
	64QAM (1.4 MHz)	709	-69	25.09
	QPSK (3 MHz)	700	-68.5	25.1
	QPSK (3 MHz)	703	-69	25.23
	QPSK (3 MHz)	708	-69	25.1
	16QAM (3 MHz)	700	-68.5	25.13
	16QAM (3 MHz)	703	-69	25.26
	16QAM (3 MHz)	708	-69	25.13
	64QAM (3 MHz)	700	-68.5	25.03
	64QAM (3 MHz)	703	-69	25.33
	64QAM (3 MHz)	708	-69	25.18
	QPSK (5 MHz)	701	-68.8	25.05
	QPSK (5 MHz)	707	-69.2	25
	16QAM (5 MHz)	701	-68.5	25.22
	16QAM (5 MHz)	707	-69	25.31
	64QAM (5 MHz)	701	-68.5	25.14
	64QAM (5 MHz)	707	-68.5	25.38
	QPSK (10 MHz)	703	-69	25.02
	16QAM (10 MHz)	703	-69	25.12
	64QAM (10 MHz)	703	-69	25.35

2110-2155 MHz/1710-1755 MHz Band

Modulation: 1xEVDO

Maximum Output Power (AWS) – Downlink

Mode	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 2110-2155 MHz	2112.4	-62	29.92
	2132.4	-60.6	30.06
	2154.6	-60.4	30.15

Maximum Output Power (AWS) – Uplink

Mode	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 1710-1755 MHz	1712.4	-59.99	30.02
	1732.4	-60.6	30.08
	1754.6	-60.9	30.91

5 FCC §2.1047 - MODULATION CHARACTERISTIC

5.1 Applicable Standard

According to FCC §2.1047(d) and Part 27, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

5.2 Test Result

N/A

6 FCC §2.1049 & §27.53 - OCCUPIED BANDWIDTH

6.1 Applicable Standard

Requirements: FCC §2.1049 and §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:	21-24°C
Relative Humidity:	40-43 %
ATM Pressure:	101-103 kPa

The testing was performed by Dennis Huang from 2010-08-24 to 2010-08-26 at RF Site.

6.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2010-05-09
Agilent	Signal Generator	E4438C	MY42083251	2009-12-08

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

746-757 MHz / 776-787 MHz Band

Occupied Bandwidth (LTE) – Downlink

Mode	Modulation	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Downlink 746-757 MHz	QPSK (1.4 MHz)	747	1.1065	1.0961
	QPSK (1.4 MHz)	752	1.1057	1.1004
	QPSK (1.4 MHz)	756	1.1060	1.0964
	16QAM (1.4 MHz)	747	1.1061	1.0952
	16QAM (1.4 MHz)	752	1.1069	1.1002
	16QAM (1.4 MHz)	756	1.1046	1.0949
	64QAM (1.4 MHz)	747	1.1063	1.0972
	64QAM (1.4 MHz)	752	1.1063	1.1003
	64QAM (1.4 MHz)	756	1.1059	1.0964
	QPSK (3 MHz)	748	2.6954	2.6902
	QPSK (3 MHz)	752	2.6957	2.6923
	QPSK (3 MHz)	755	5.6954	2.6886
	16QAM (3 MHz)	748	2.6976	2.6922
	16QAM (3 MHz)	752	2.6976	2.6947
	16QAM (3 MHz)	755	2.6978	2.6913
	64QAM (3 MHz)	748	2.6962	2.6904
	64QAM (3 MHz)	752	2.6963	2.6938
	64QAM (3 MHz)	755	2.6958	2.6891
	QPSK (5 MHz)	749	4.5096	4.4911
	QPSK (5 MHz)	754	4.5092	4.4848
	16QAM (5 MHz)	749	4.5087	4.4899
	16QAM (5 MHz)	754	4.5085	4.4864
	64QAM (5 MHz)	749	4.5105	4.4888
	64QAM (5 MHz)	754	4.5092	4.4842
	QPSK (10 MHz)	752	8.9488	8.9113
	16QAM (10 MHz)	752	8.9498	8.9133
	64QAM (10 MHz)	752	8.9459	8.9120

Occupied Bandwidth (LTE) – Uplink

Mode	Modulation	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Uplink 776-787 MHz	QPSK (1.4 MHz)	777	1.1066	1.0964
	QPSK (1.4 MHz)	782	1.1060	1.0909
	QPSK (1.4 MHz)	786	1.1062	1.0962
	16QAM (1.4 MHz)	777	1.1049	1.0869
	16QAM (1.4 MHz)	782	1.1044	1.0902
	16QAM (1.4 MHz)	786	1.1054	1.0846
	64QAM (1.4 MHz)	777	1.1063	1.0870
	64QAM (1.4 MHz)	782	1.1058	1.0889
	64QAM (1.4 MHz)	786	1.1057	1.0859
	QPSK (3 MHz)	778	2.695	2.6772
	QPSK (3 MHz)	782	2.6956	2.677
	QPSK (3 MHz)	785	2.6938	2.6766
	16QAM (3 MHz)	778	2.6972	2.6745
	16QAM (3 MHz)	782	2.6972	2.6778
	16QAM (3 MHz)	785	2.6965	2.6768
	64QAM (3 MHz)	778	2.6956	2.6773
	64QAM (3 MHz)	782	2.6954	2.6774
	64QAM (3 MHz)	785	2.6956	2.6749
	QPSK (5 MHz)	779	4.5076	4.472
	QPSK (5 MHz)	784	4.5081	4.478
	16QAM (5 MHz)	779	4.5077	4.4733
	16QAM (5 MHz)	784	4.5066	4.4774
	64QAM (5 MHz)	779	4.5069	4.4773
	64QAM (5 MHz)	784	4.5058	4.4801
	QPSK (10 MHz)	782	8.9448	8.9037
	16QAM (10 MHz)	782	8.9447	8.9041
	64QAM (10 MHz)	782	8.9464	8.9070

728-740 MHz / 698-710 MHz Band

Occupied Bandwidth (LTE) – Downlink

Mode	Modulation	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Downlink 728-740 MHz	QPSK (1.4 MHz)	729	1.1060	1.0965
	QPSK (1.4 MHz)	733	1.1062	1.0998
	QPSK (1.4 MHz)	739	1.1063	1.0967
	16QAM (1.4 MHz)	729	1.1058	1.0967
	16QAM (1.4 MHz)	733	1.1070	1.0993
	16QAM (1.4 MHz)	739	1.1068	1.0959
	64QAM (1.4 MHz)	729	1.1051	1.0957
	64QAM (1.4 MHz)	733	1.1055	1.0997
	64QAM (1.4 MHz)	739	1.1064	1.0975
	QPSK (3 MHz)	730	2.6953	2.69
	QPSK (3 MHz)	733	2.6955	2.6903
	QPSK (3 MHz)	738	2.6955	2.6903
	16QAM (3 MHz)	730	2.6970	2.6924
	16QAM (3 MHz)	733	2.6977	2.6932
	16QAM (3 MHz)	738	2.6975	2.6911
	64QAM (3 MHz)	730	2.6958	2.69
	64QAM (3 MHz)	733	2.6952	2.6906
	64QAM (3 MHz)	738	2.6964	2.6912
	QPSK (5 MHz)	731	4.51	4.4877
	QPSK (5 MHz)	737	4.5095	4.487
	16QAM (5 MHz)	731	4.5095	4.4896
	16QAM (5 MHz)	737	4.5091	4.4847
	64QAM (5 MHz)	731	4.5087	4.4873
	64QAM (5 MHz)	737	4.5089	4.4858
	QPSK (10 MHz)	733	8.9451	8.9168
	16QAM (10 MHz)	733	8.9447	8.9169
	64QAM (10 MHz)	733	8.9472	8.9225

Occupied Bandwidth (LTE) – Uplink

Mode	Modulation	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Uplink 698-710 MHz	QPSK (1.4 MHz)	699	1.1052	1.0841
	QPSK (1.4 MHz)	703	1.1054	1.0873
	QPSK (1.4 MHz)	709	1.106	1.0828
	16QAM (1.4 MHz)	699	1.1044	1.0859
	16QAM (1.4 MHz)	703	1.1062	1.0906
	16QAM (1.4 MHz)	709	1.1065	1.0863
	64QAM (1.4 MHz)	699	1.1050	1.0862
	64QAM (1.4 MHz)	703	1.1056	1.0896
	64QAM (1.4 MHz)	709	1.1059	1.0846
	QPSK (3 MHz)	700	2.6945	2.6775
	QPSK (3 MHz)	703	2.694	2.6778
	QPSK (3 MHz)	708	2.6943	2.6734
	16QAM (3 MHz)	700	2.6965	2.6745
	16QAM (3 MHz)	703	2.698	2.6749
	16QAM (3 MHz)	708	2.6967	2.6744
	64QAM (3 MHz)	700	2.6948	2.6756
	64QAM (3 MHz)	703	2.695	2.6759
	64QAM (3 MHz)	708	2.6956	2.6757
	QPSK (5 MHz)	701	4.5055	4.4747
	QPSK (5 MHz)	707	4.5067	4.4758
	16QAM (5 MHz)	701	4.5057	4.4743
	16QAM (5 MHz)	707	4.5081	4.4707
	64QAM (5 MHz)	701	4.5054	4.4747
	64QAM (5 MHz)	707	4.5061	4.4758
	QPSK (10 MHz)	703	8.9414	8.8999
	16QAM (10 MHz)	703	8.9429	8.8958
	64QAM (10 MHz)	703	8.9451	8.8970

2110-2155 MHz/1710-1755 MHz Band

Modulation: 1xEVDO

Occupied Bandwidth (AWS) – Downlink

Mode	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Downlink 2110-2155 MHz	2112.4	1.2668	1.2636
	2132.4	1.2668	1.2638
	2154.6	1.2679	1.2654

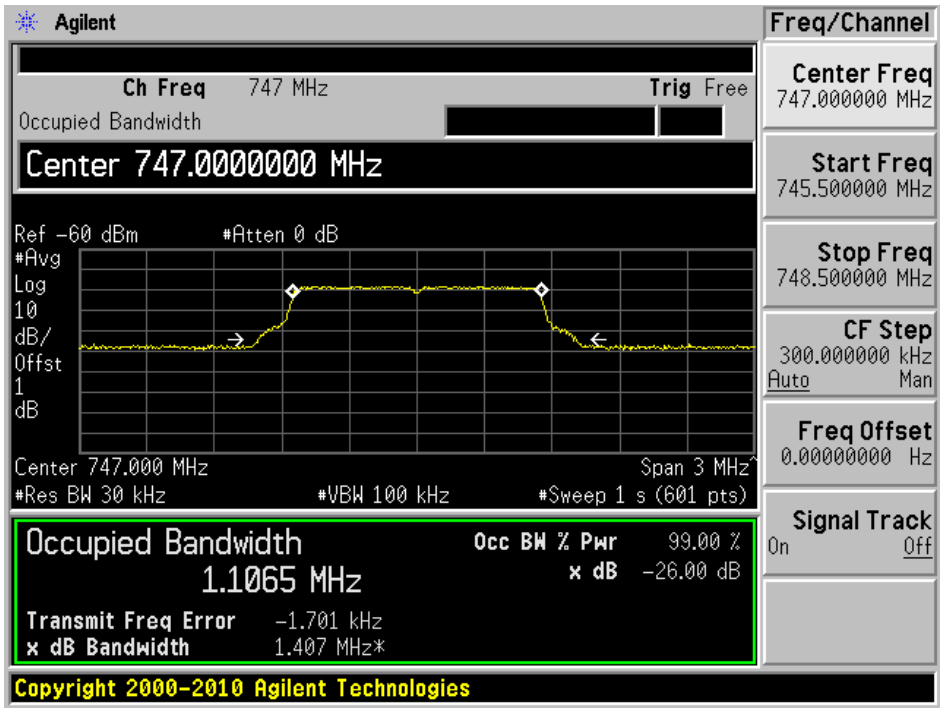
Occupied Bandwidth (AWS) – Uplink

Mode	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Downlink 1710-1755 MHz	1712.4	1.2665	1.2654
	1732.4	1.2663	1.2672
	1754.6	1.2649	1.2676

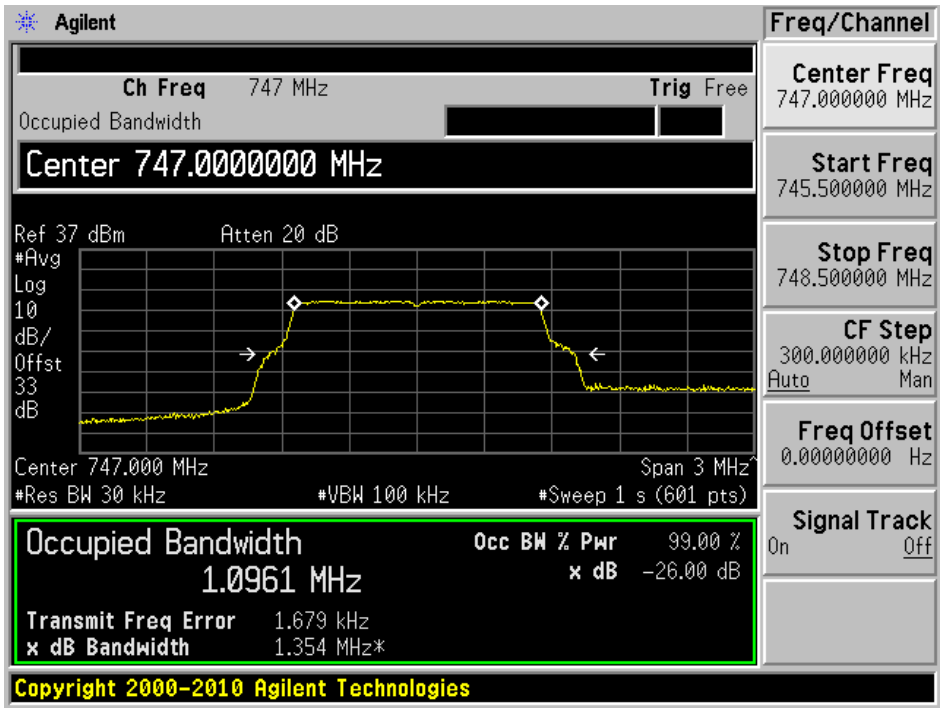
DL: 746-757 MHz

LTE-QPSK (1.4 MHz), Frequency: 747 MHz

Input

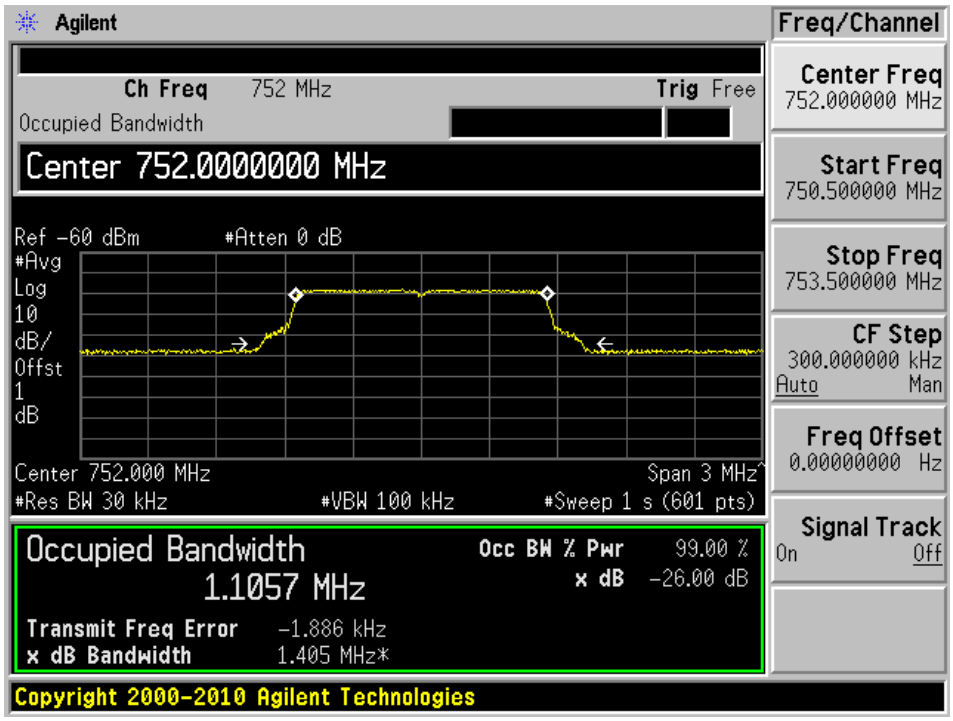


Output

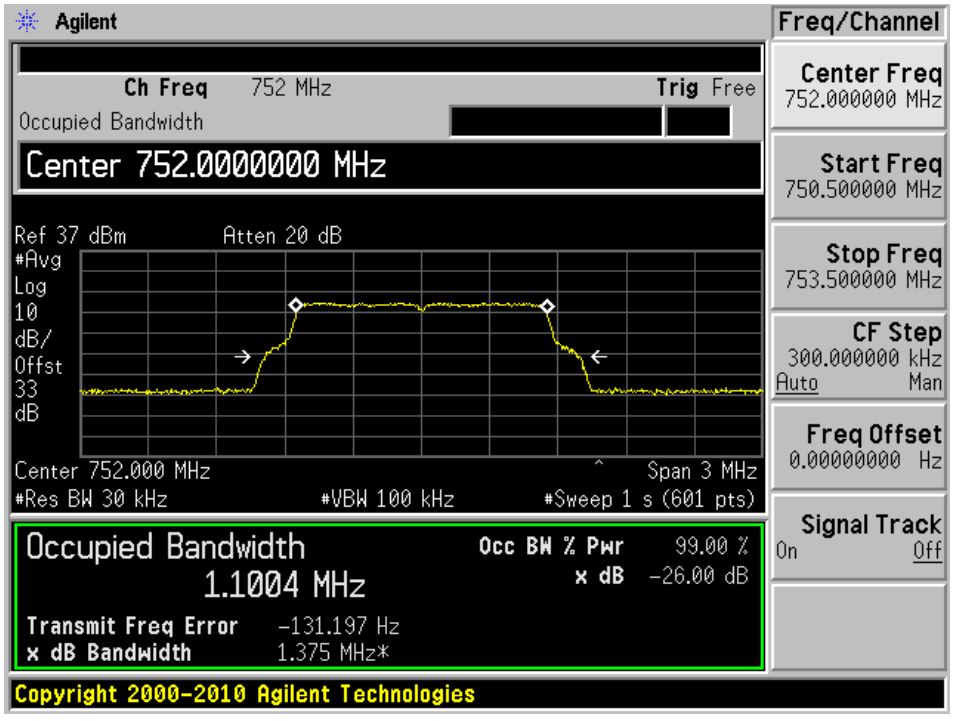


LTE-QPSK (1.4 MHz), Frequency: 752 MHz

Input

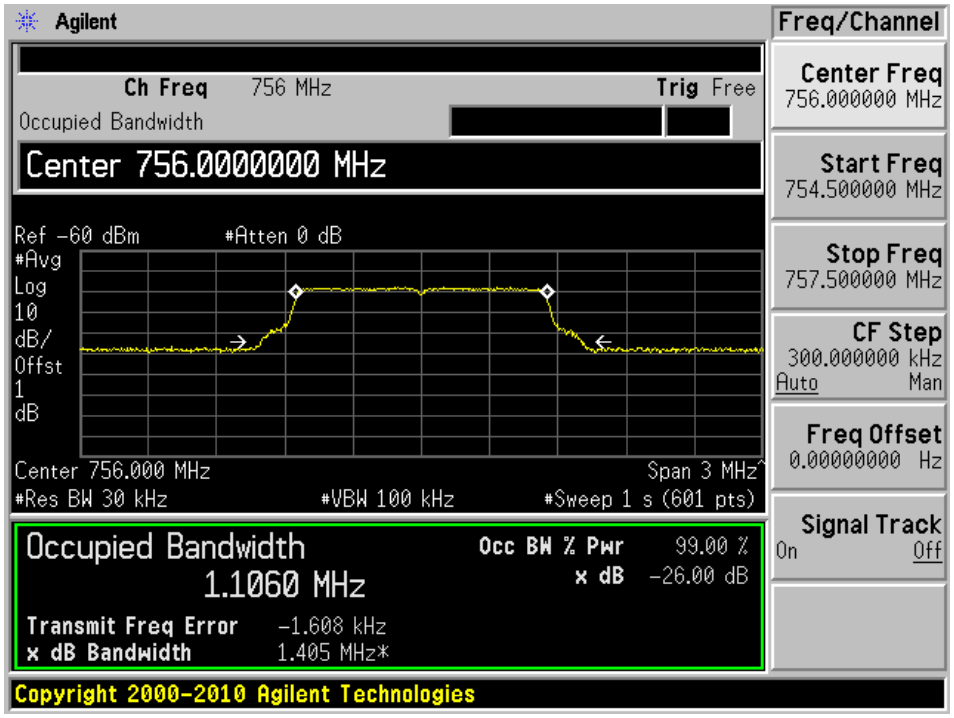


Output

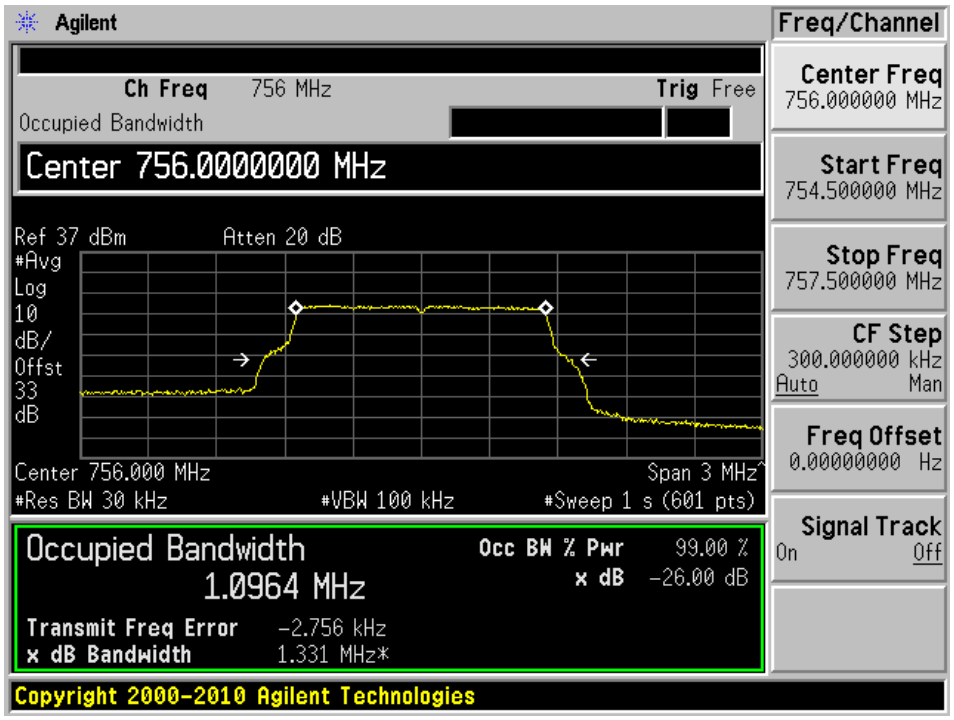


LTE-QPSK (1.4 MHz), Frequency: 756 MHz

Input

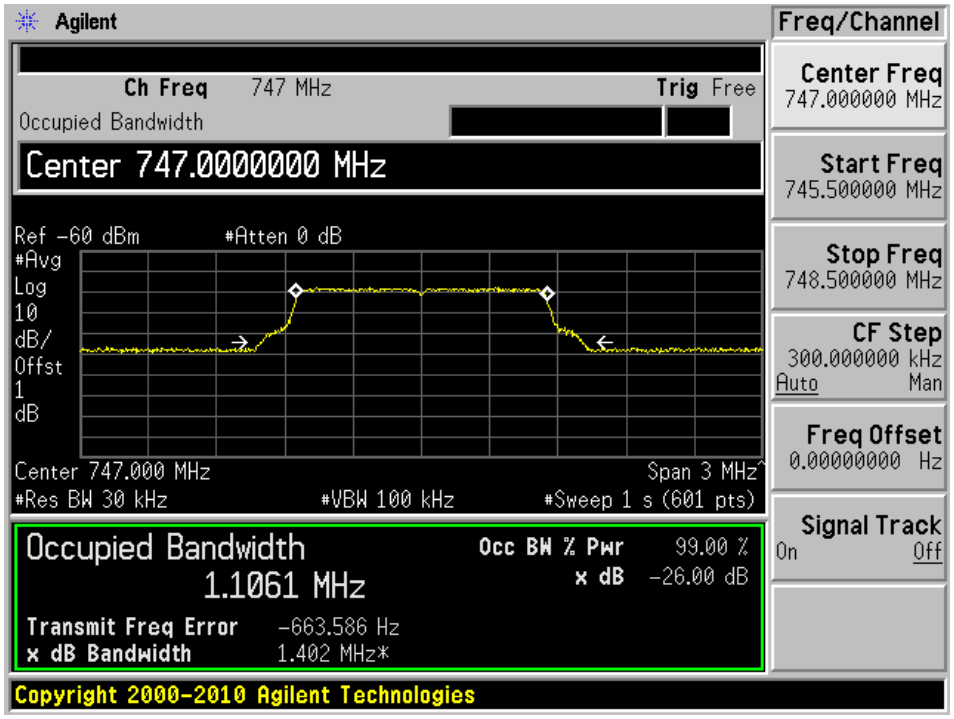


Output

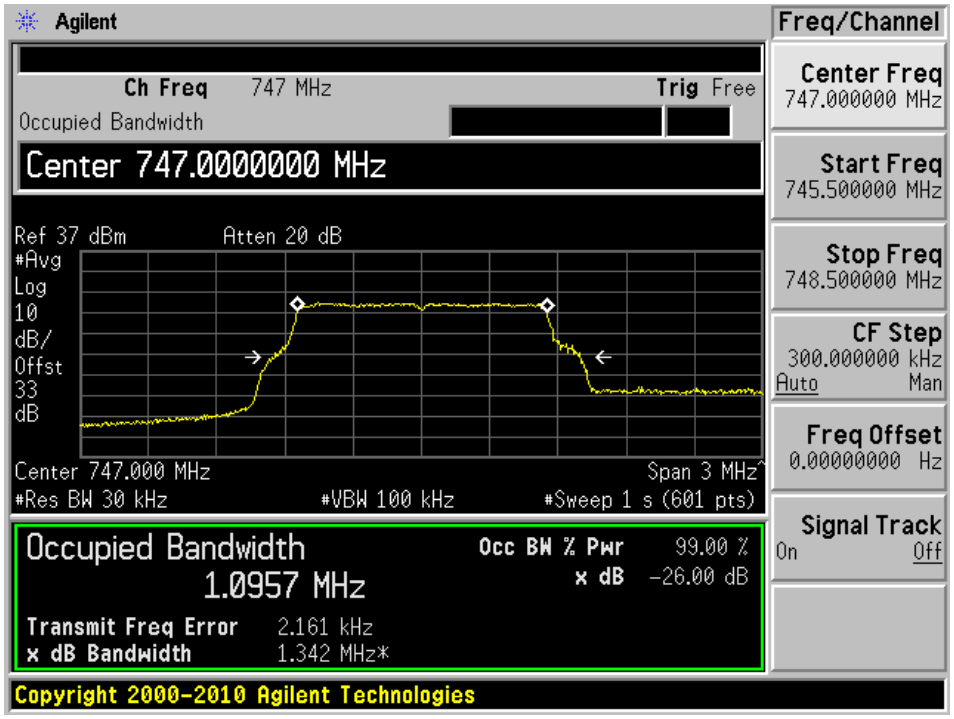


LTE-16QAM (1.4 MHz), Frequency: 747 MHz

Input

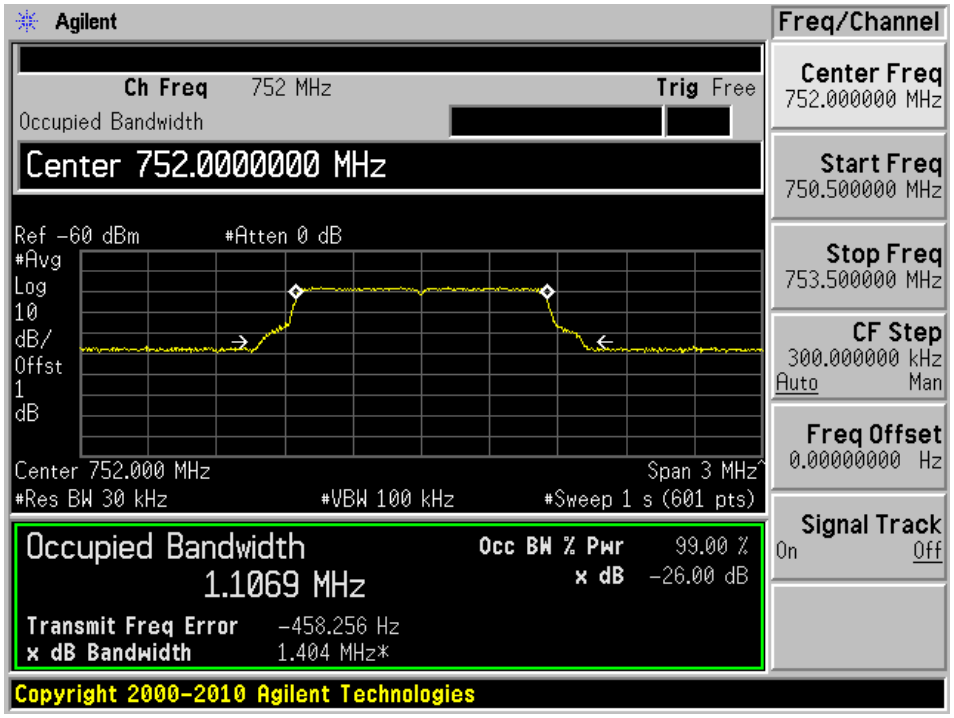


Output

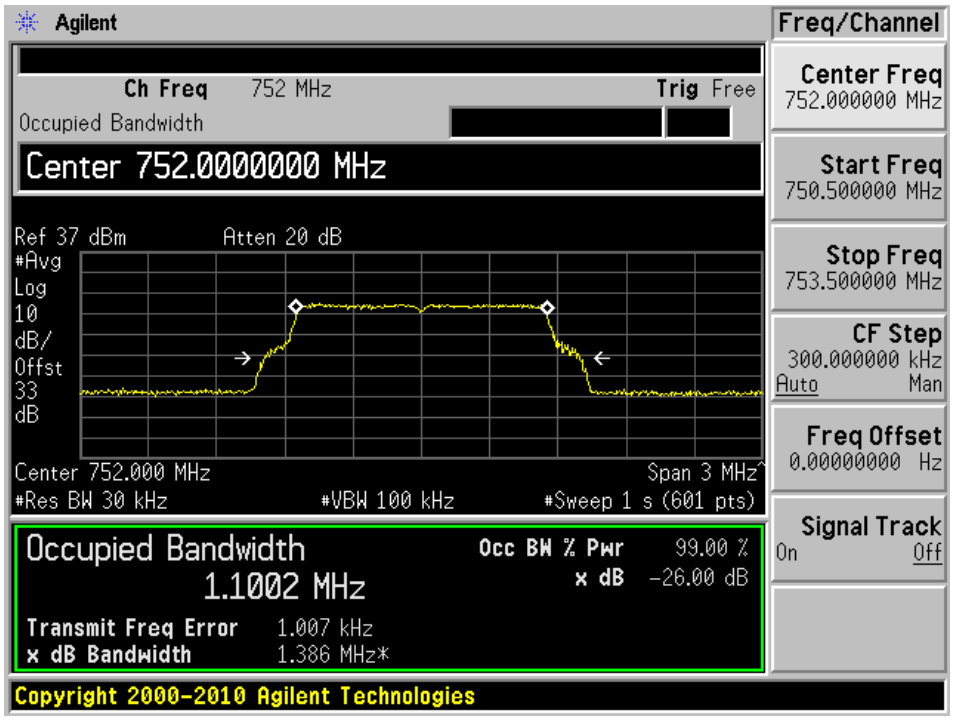


LTE-16QAM (1.4 MHz), Frequency: 752 MHz

Input

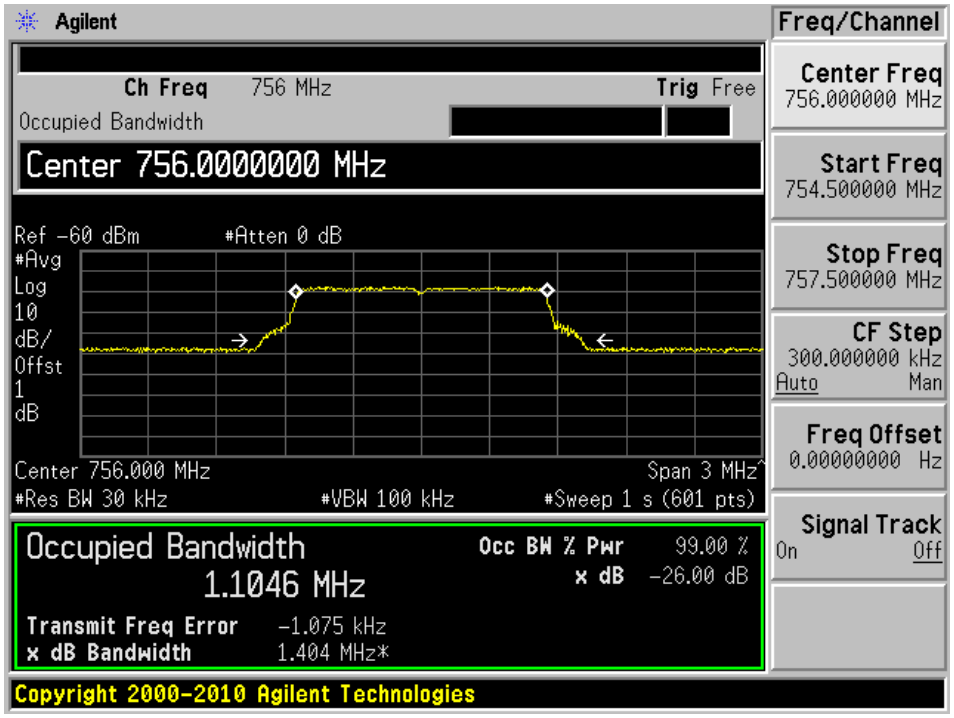


Output

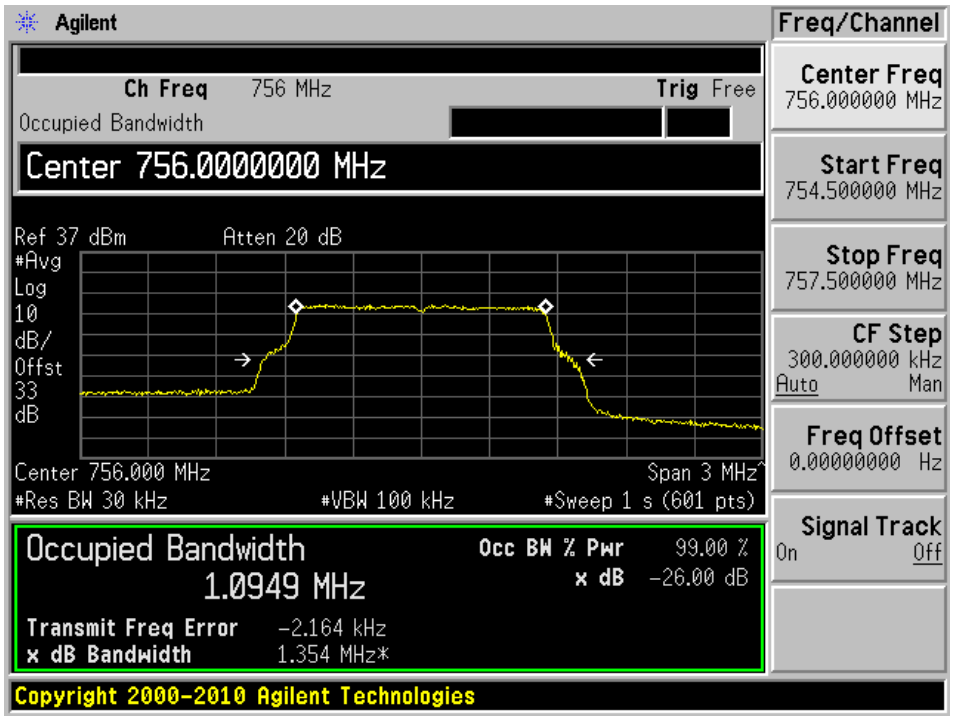


LTE-16QAM (1.4 MHz), Frequency: 756 MHz

Input

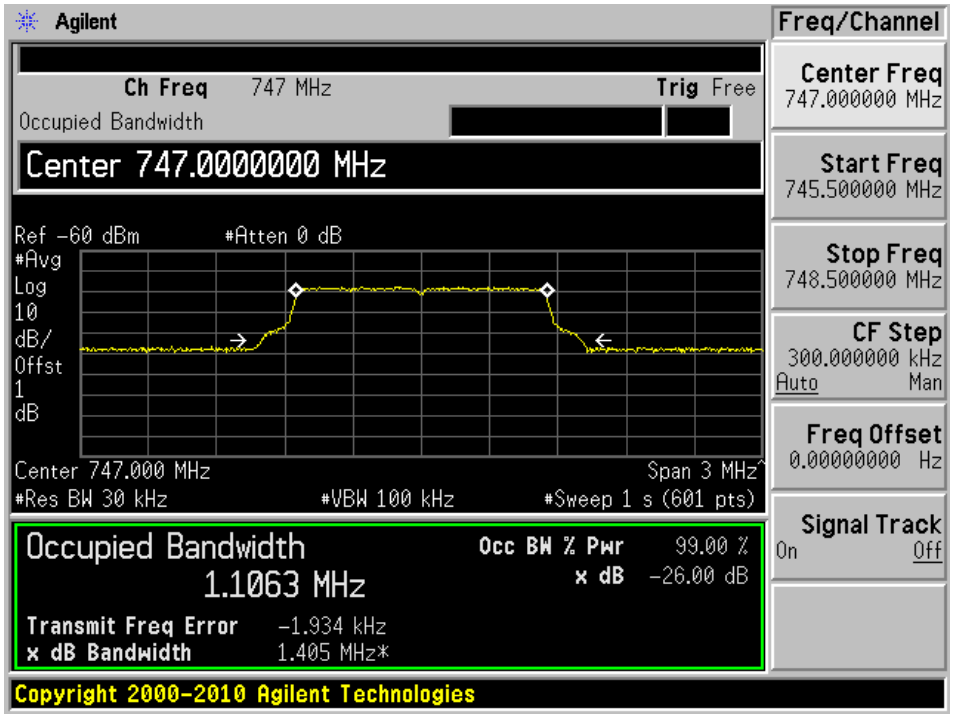


Output

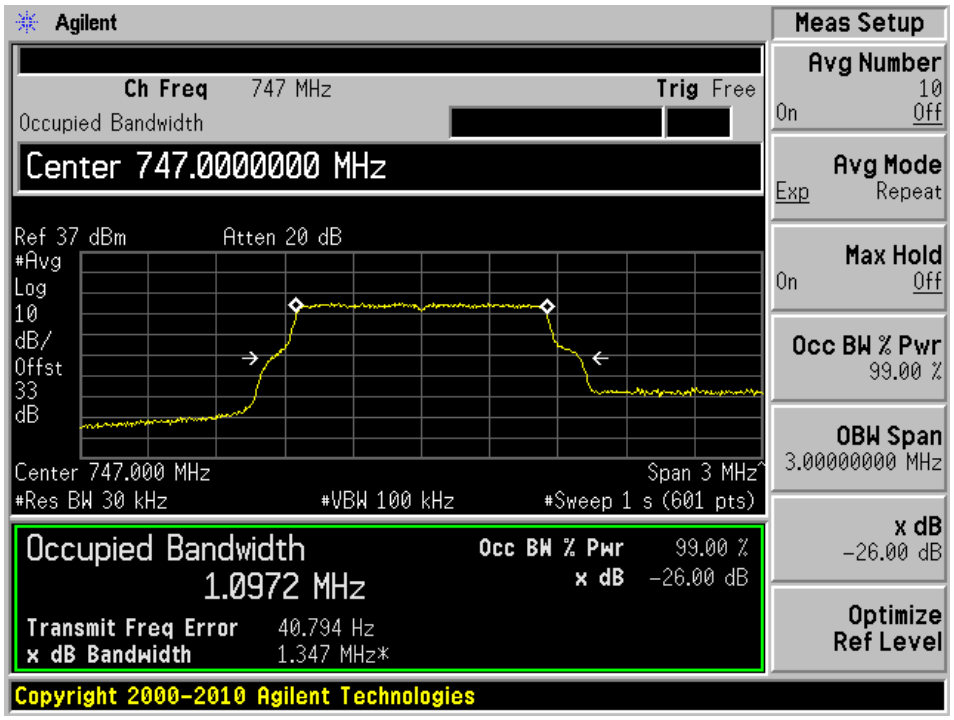


LTE-64QAM (1.4 MHz), Frequency: 747 MHz

Input

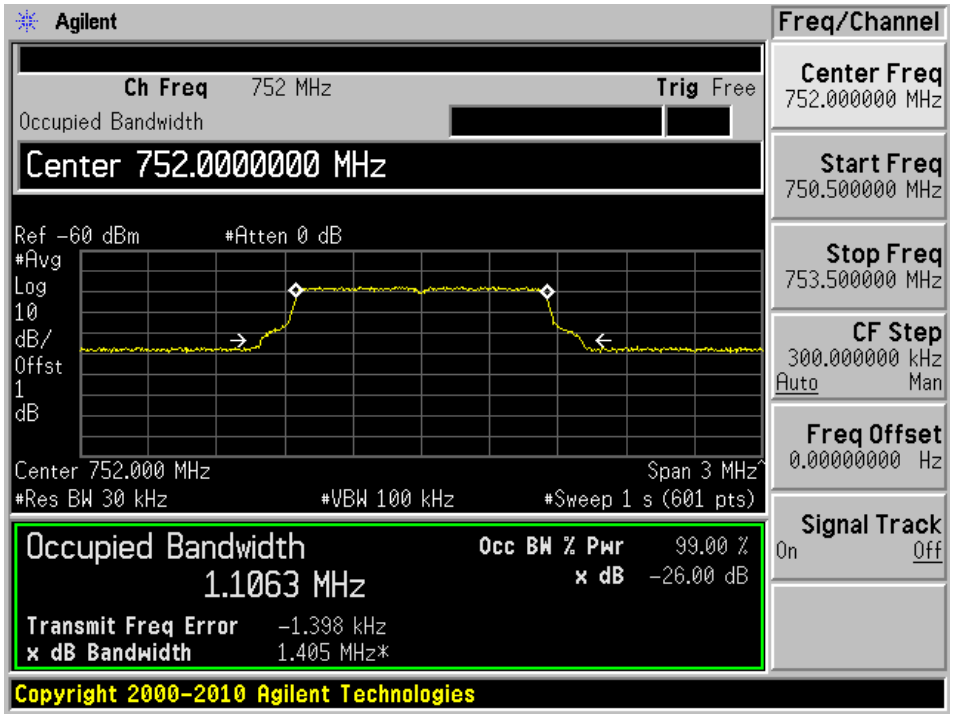


Output

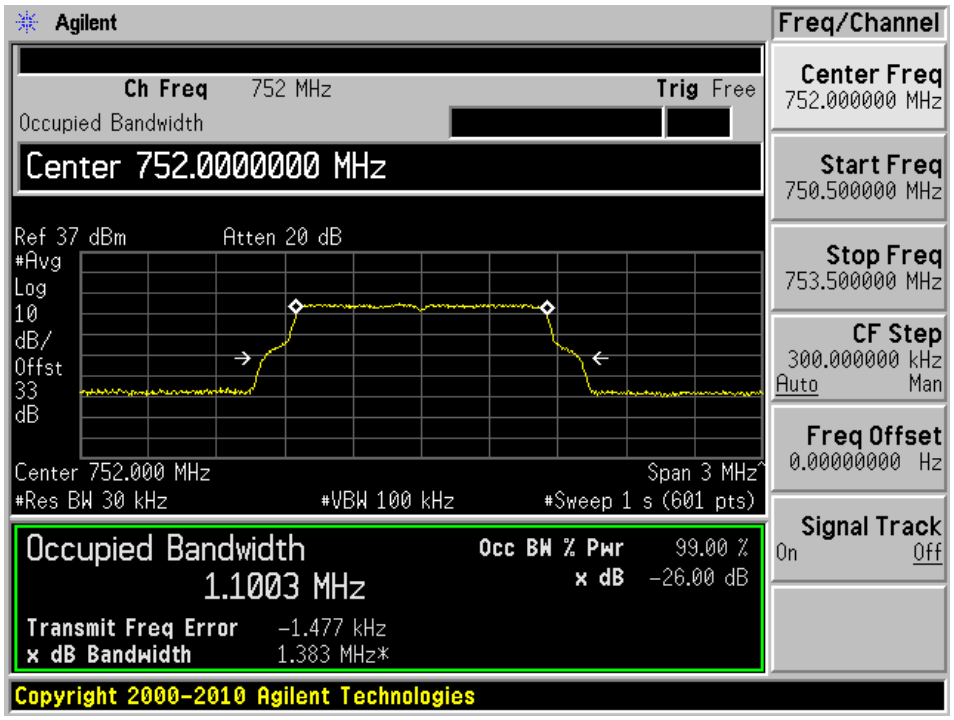


LTE-64QAM (1.4 MHz), Frequency: 752 MHz

Input

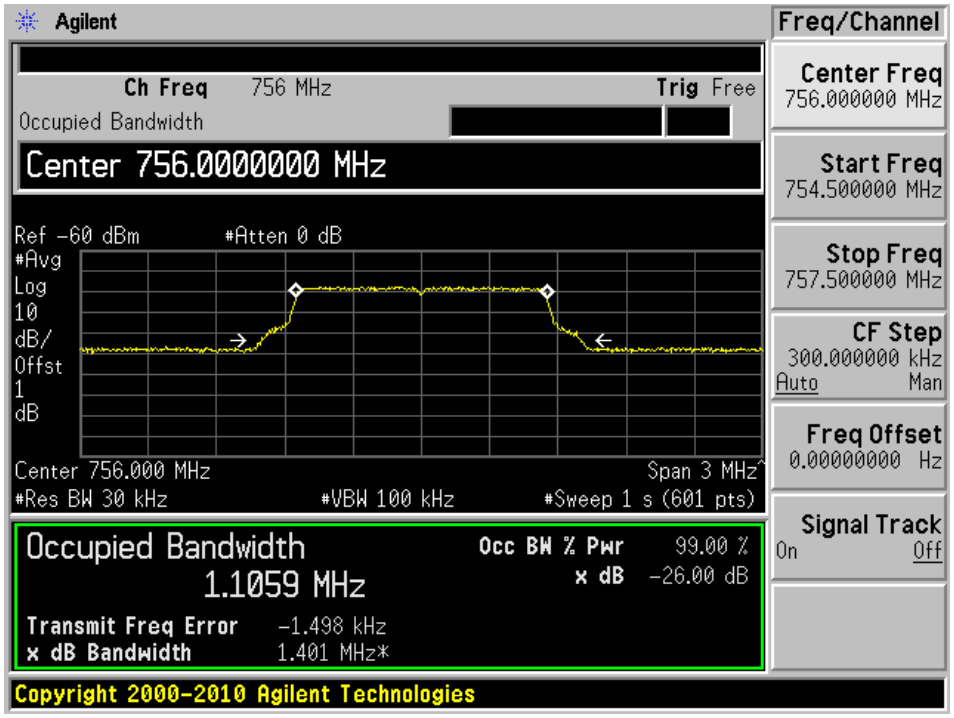


Output

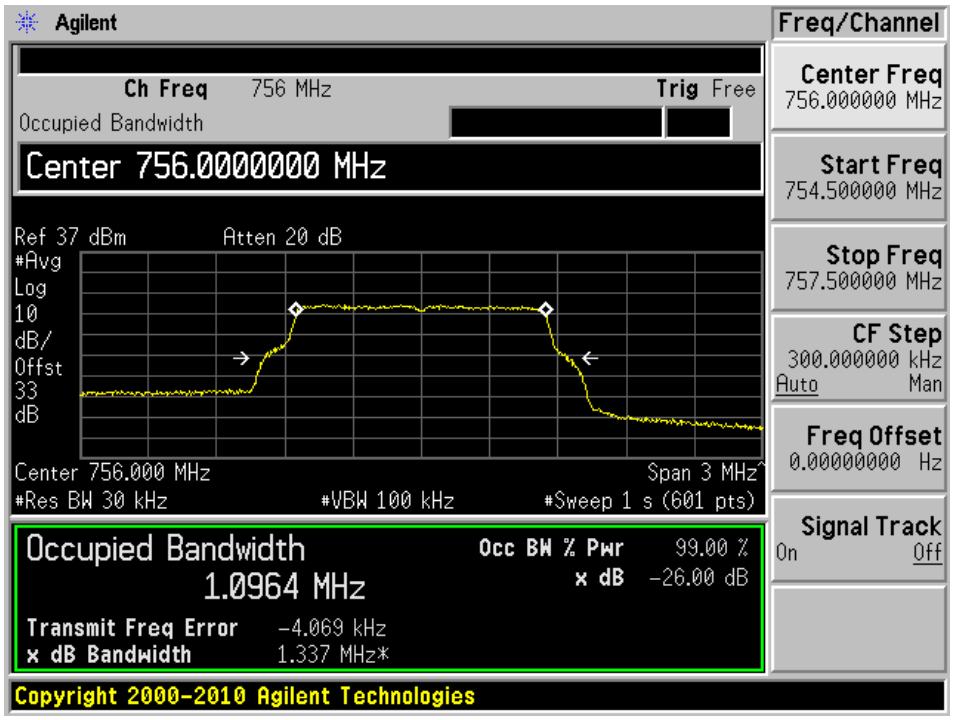


LTE-64QAM (1.4 MHz), Frequency: 756 MHz

Input

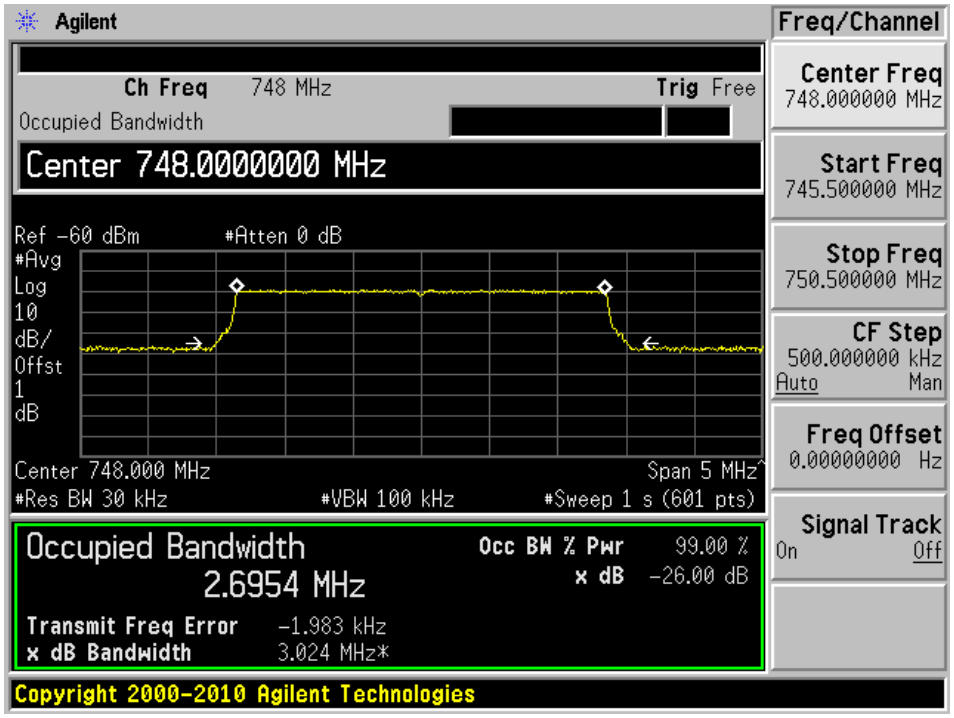


Output

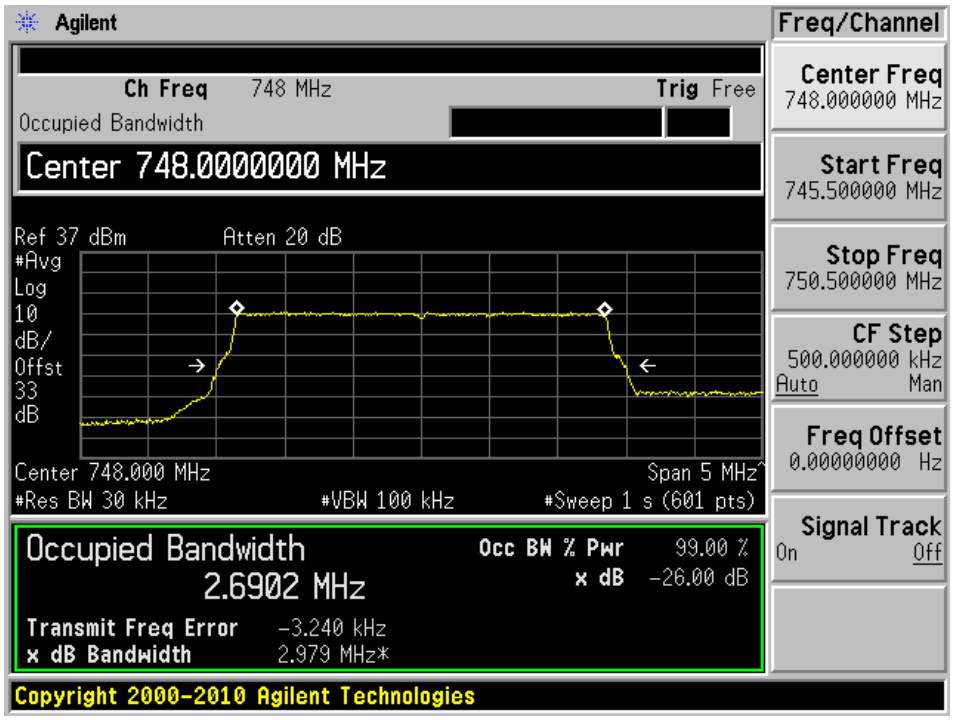


LTE-QPSK (3 MHz), Frequency: 748 MHz

Input

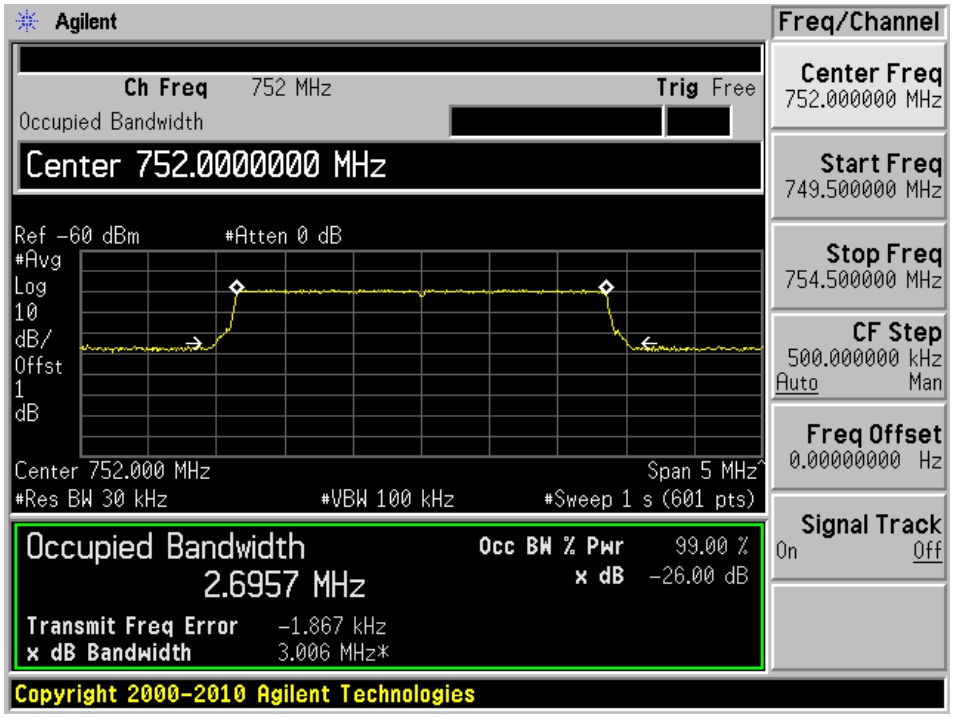


Output

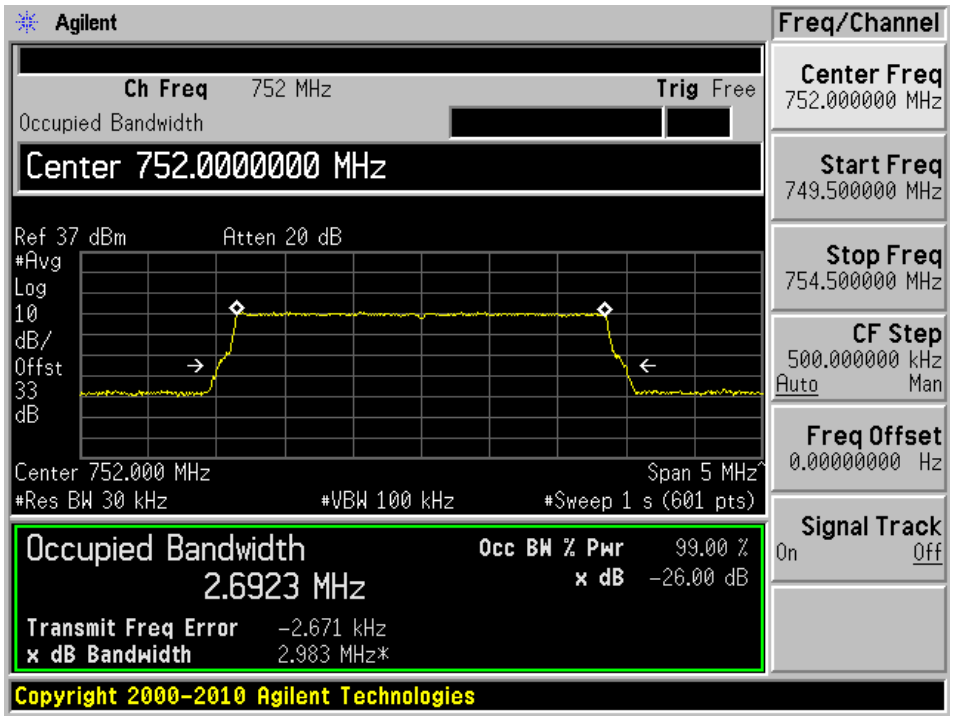


LTE-QPSK (3 MHz), Frequency: 752 MHz

Input

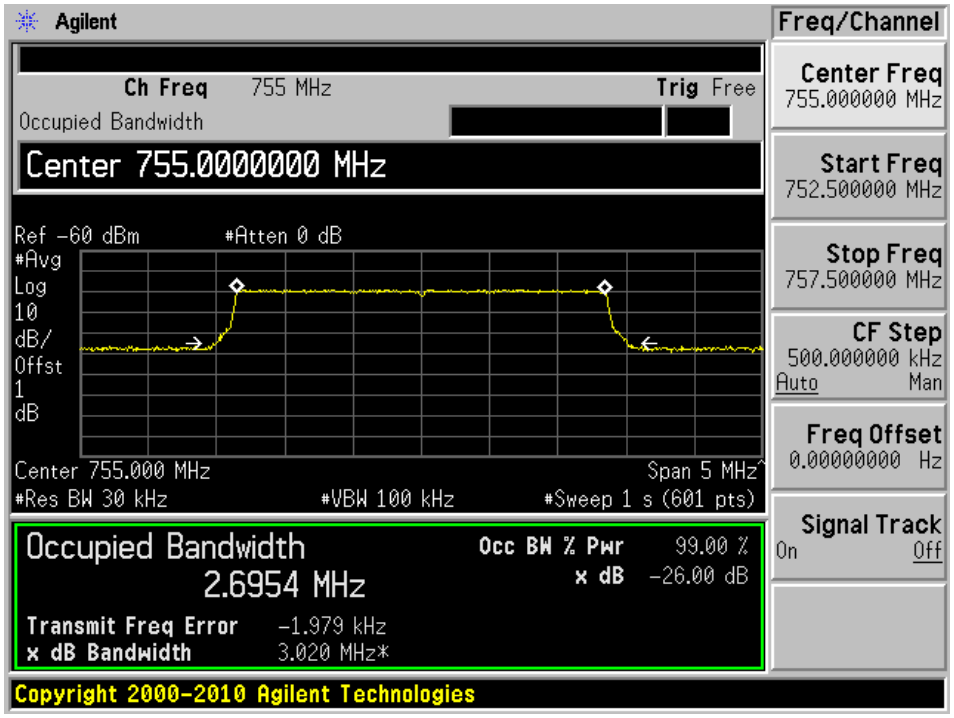


Output

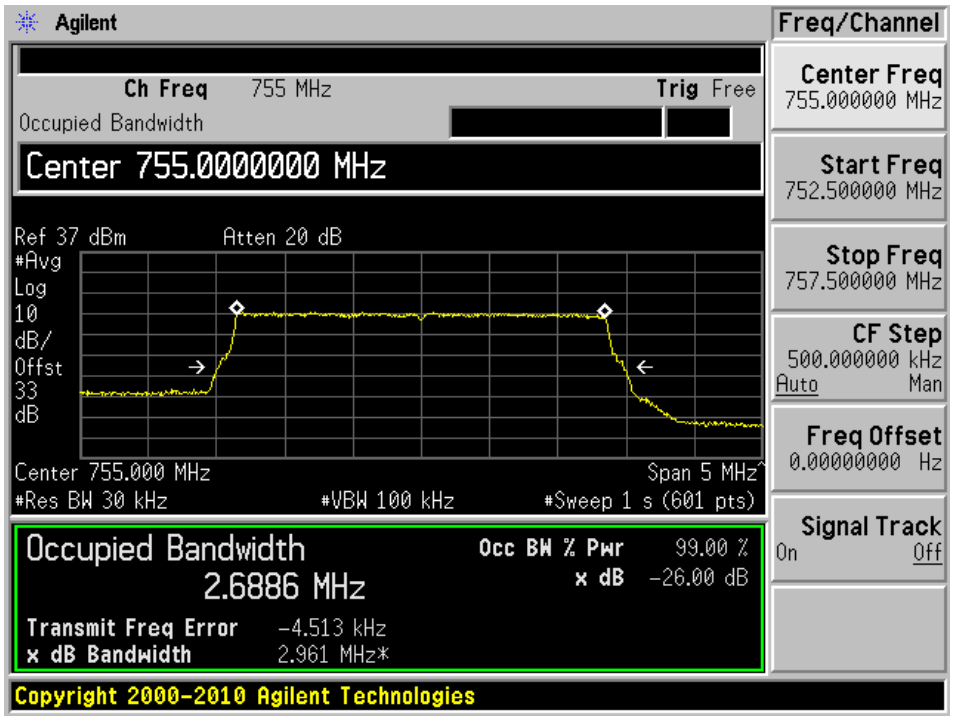


LTE-QPSK (3 MHz), Frequency: 755 MHz

Input

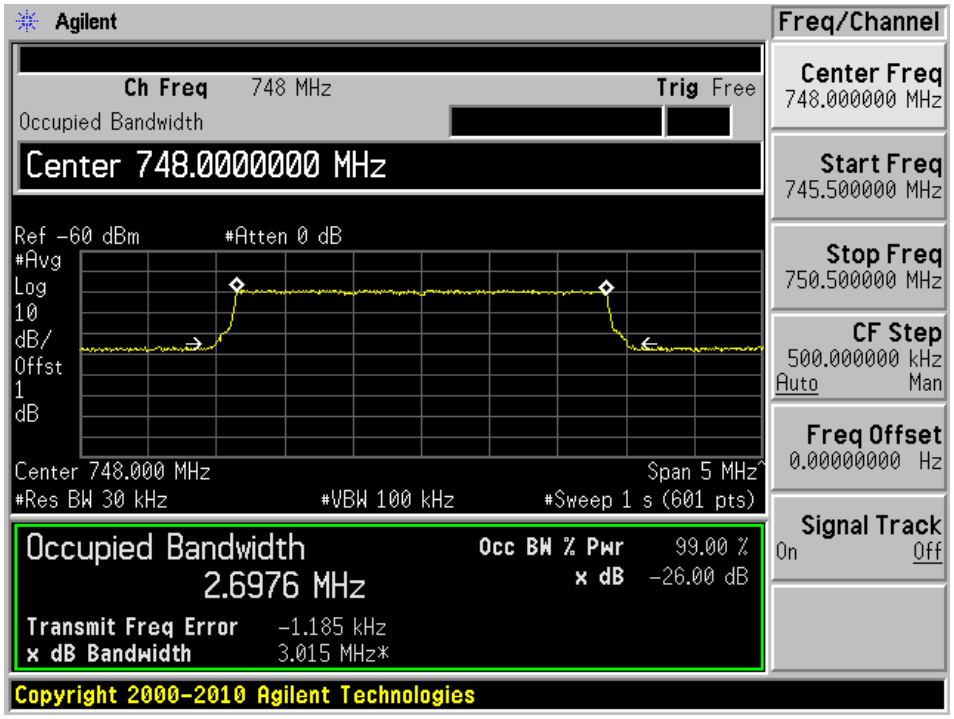


Output

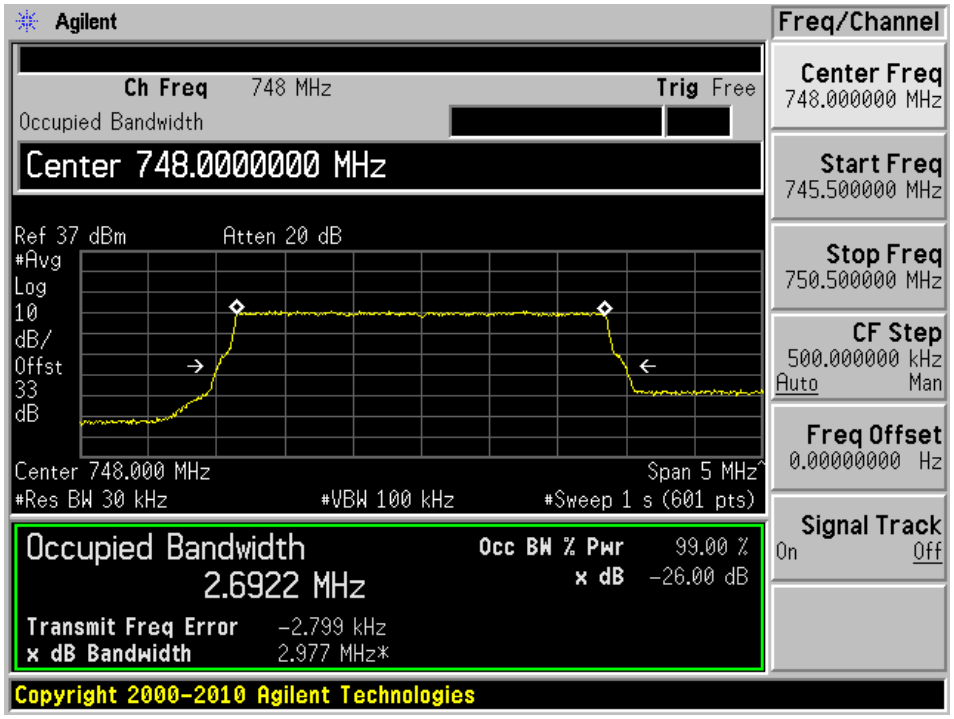


LTE-16QAM (3 MHz), Frequency: 748 MHz

Input

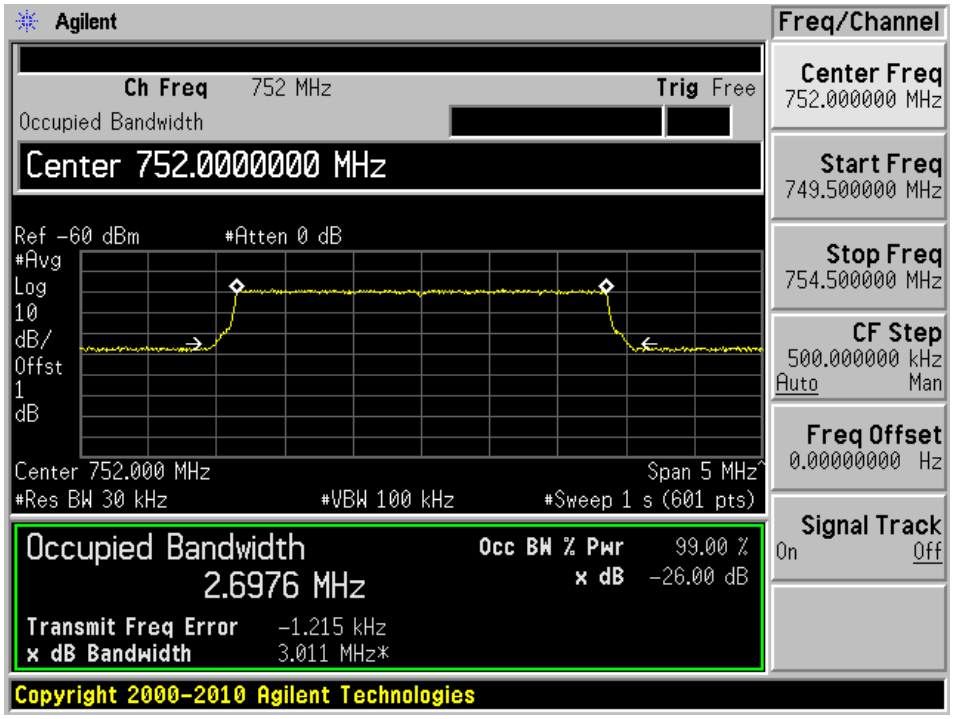


Output

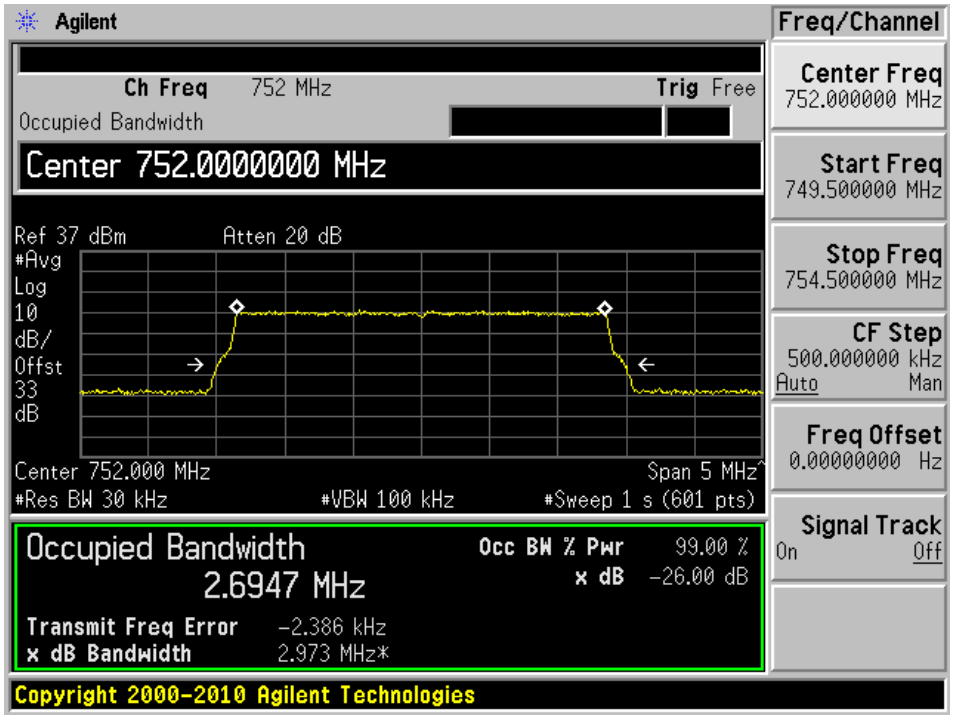


LTE-16QAM (3 MHz), Frequency: 752 MHz

Input

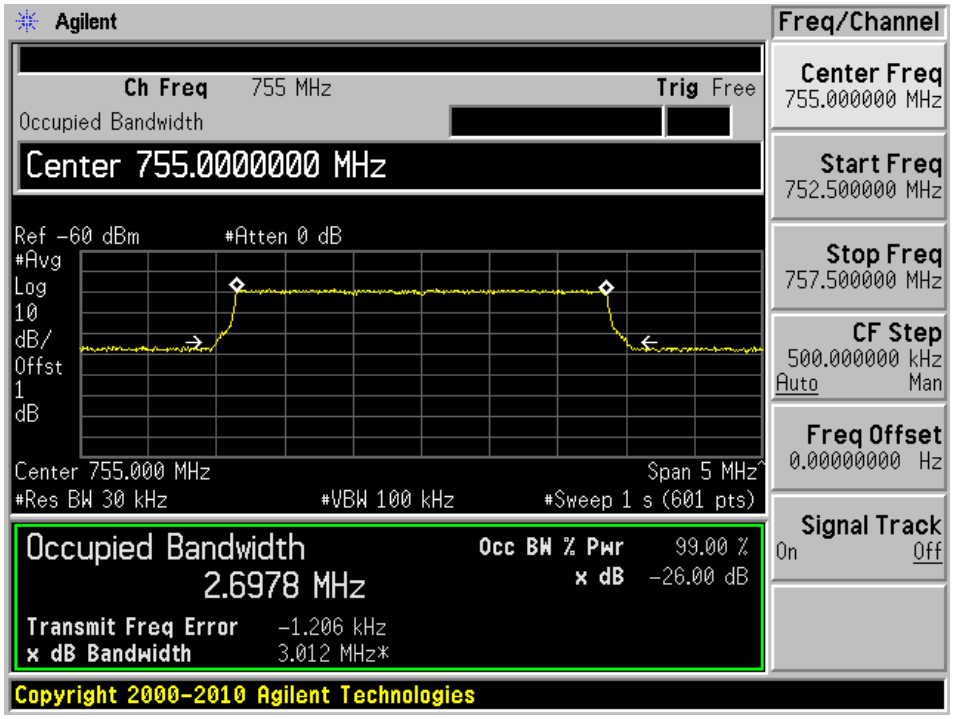


Output

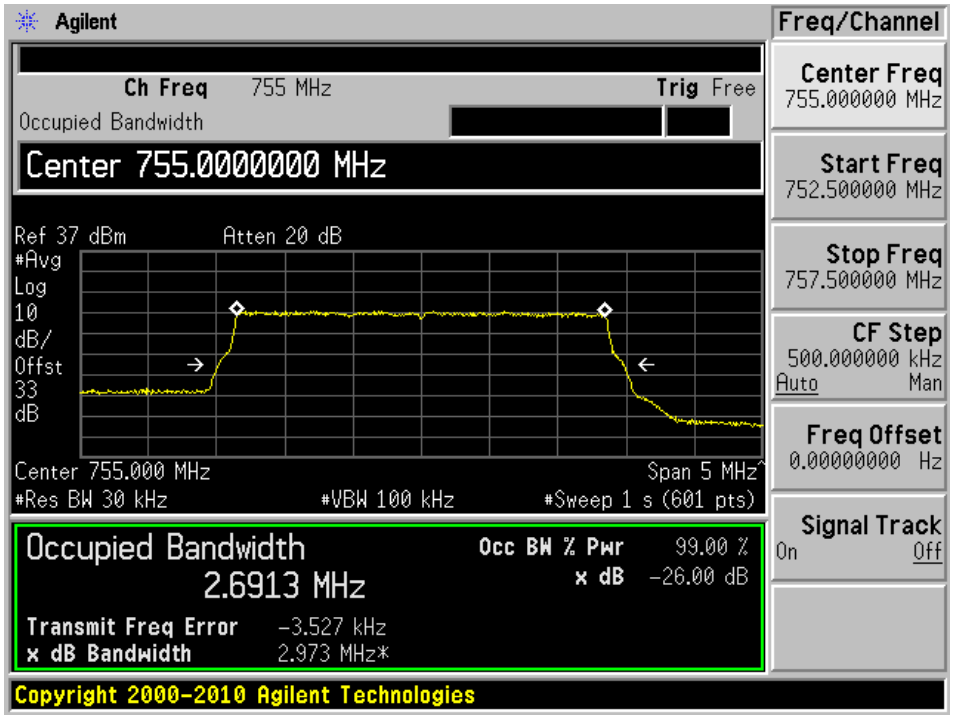


LTE-16QAM (3 MHz), Frequency: 755 MHz

Input

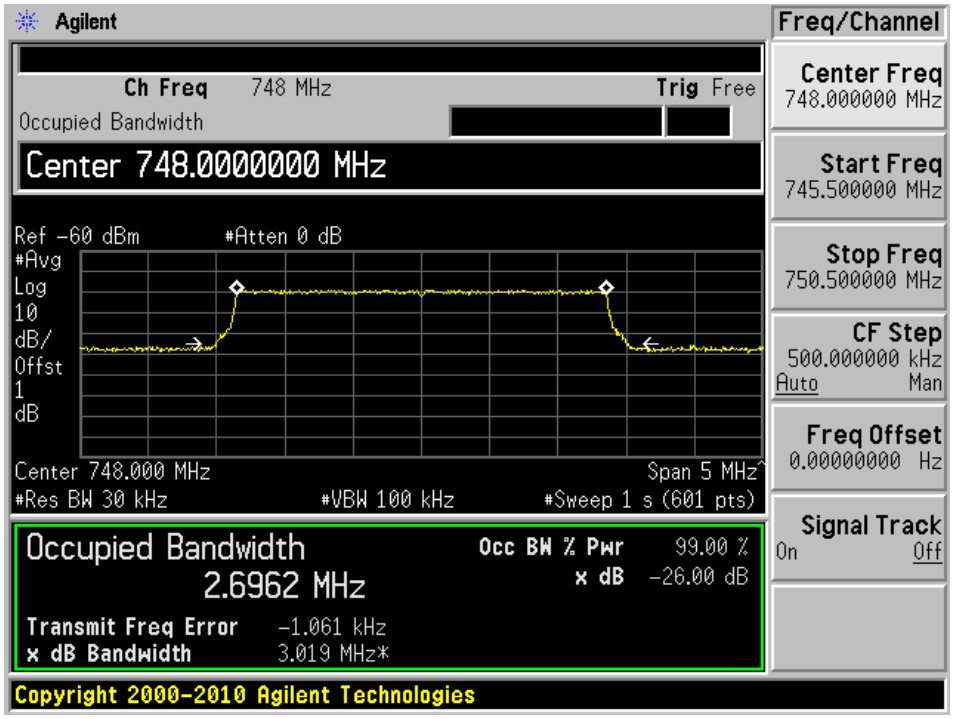


Output

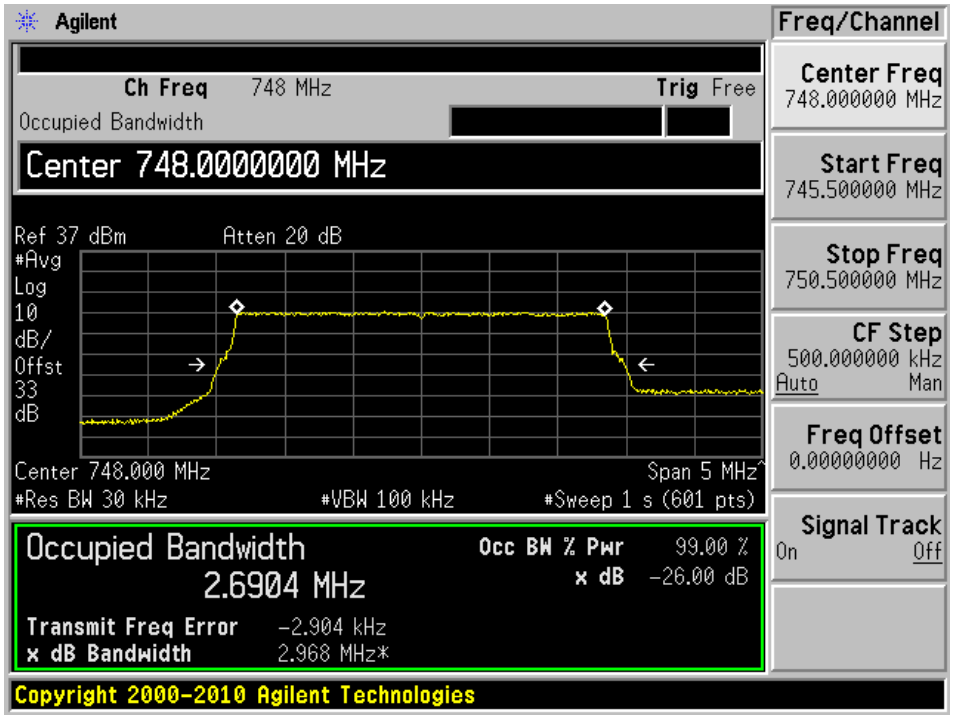


LTE-64QAM (3 MHz), Frequency: 748 MHz

Input

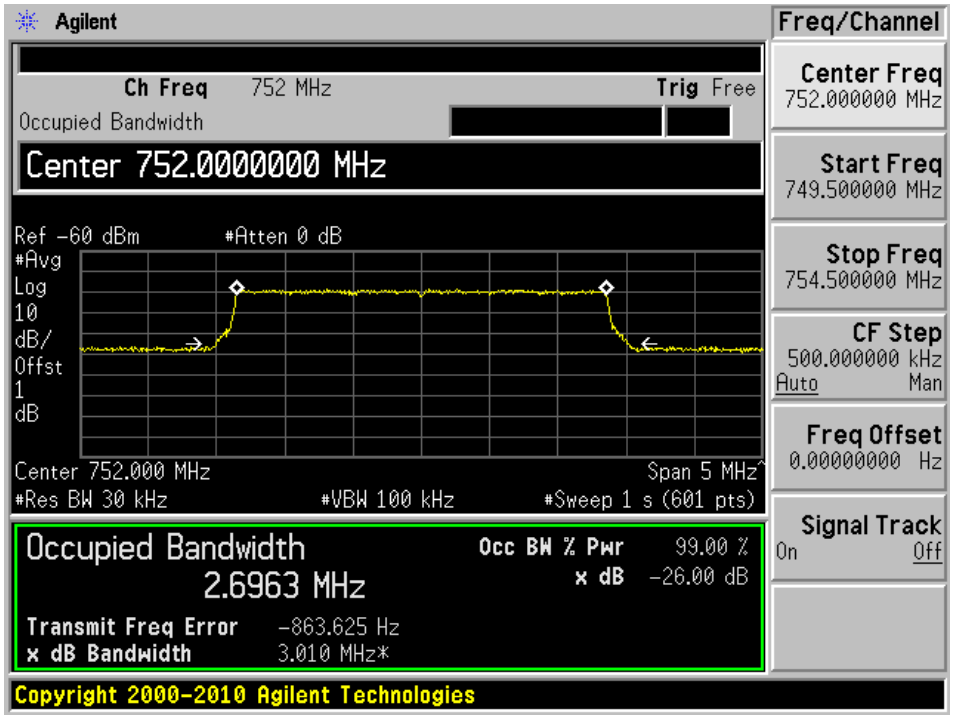


Output

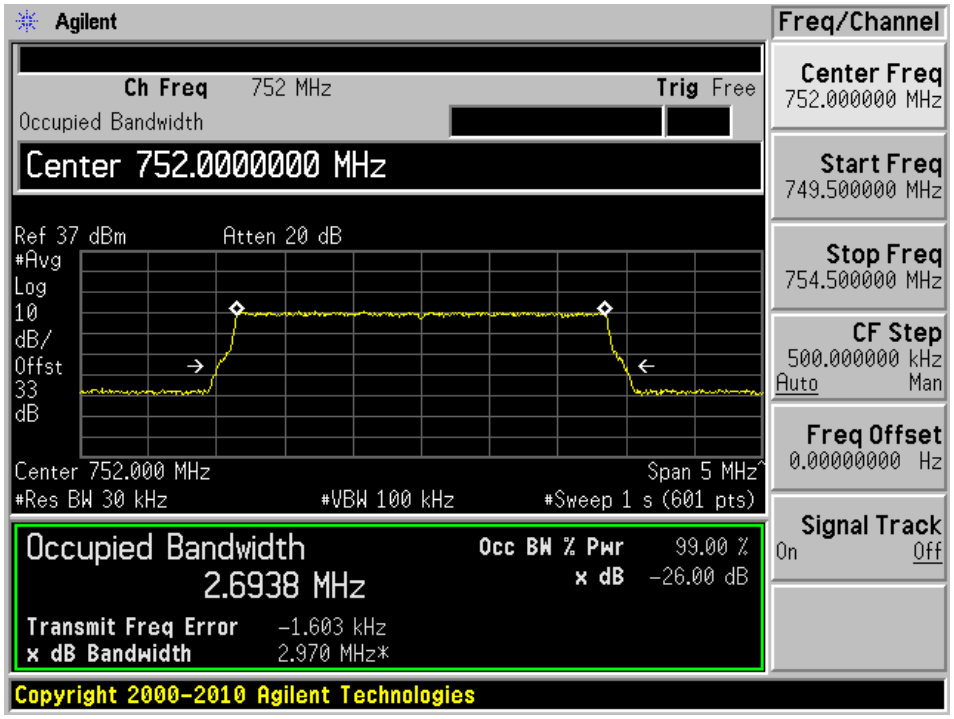


LTE-64QAM (3 MHz), Frequency: 752 MHz

Input

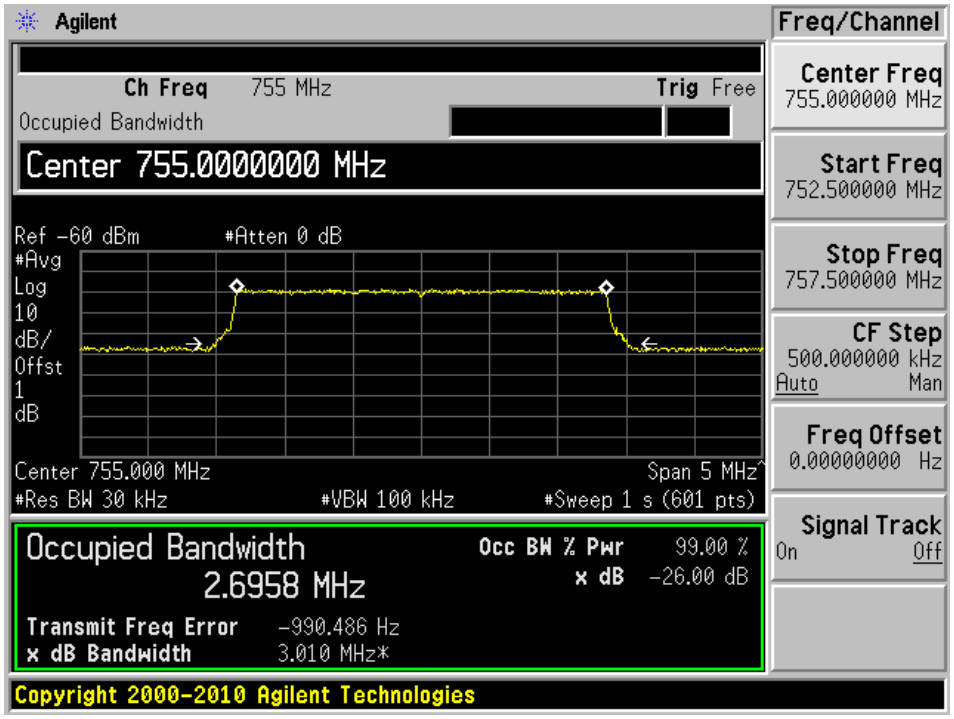


Output

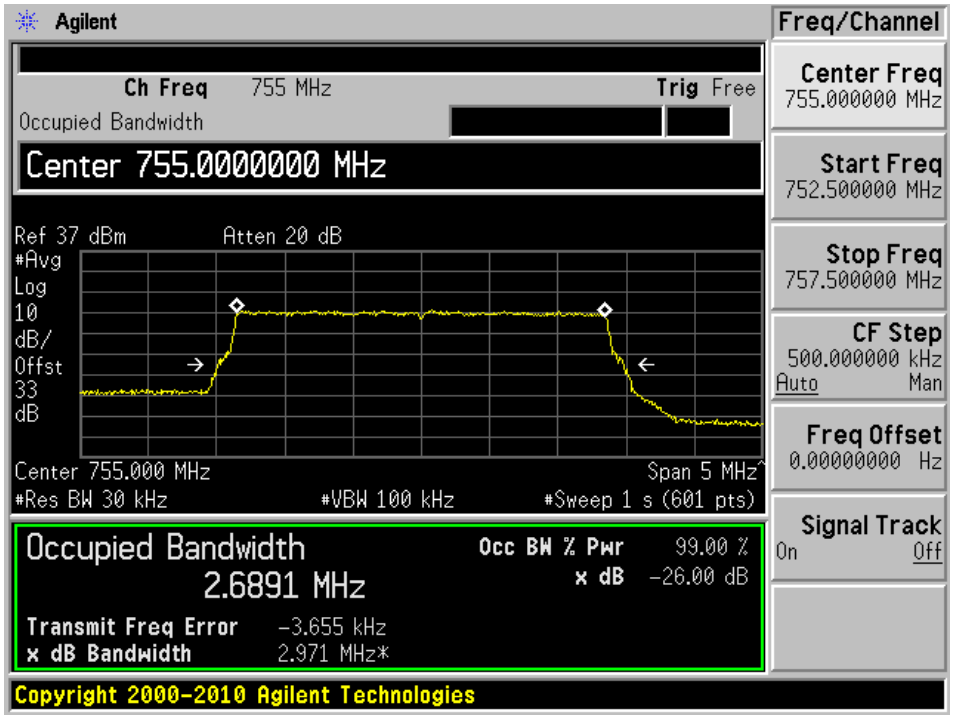


LTE-64QAM (3 MHz), Frequency: 755 MHz

Input

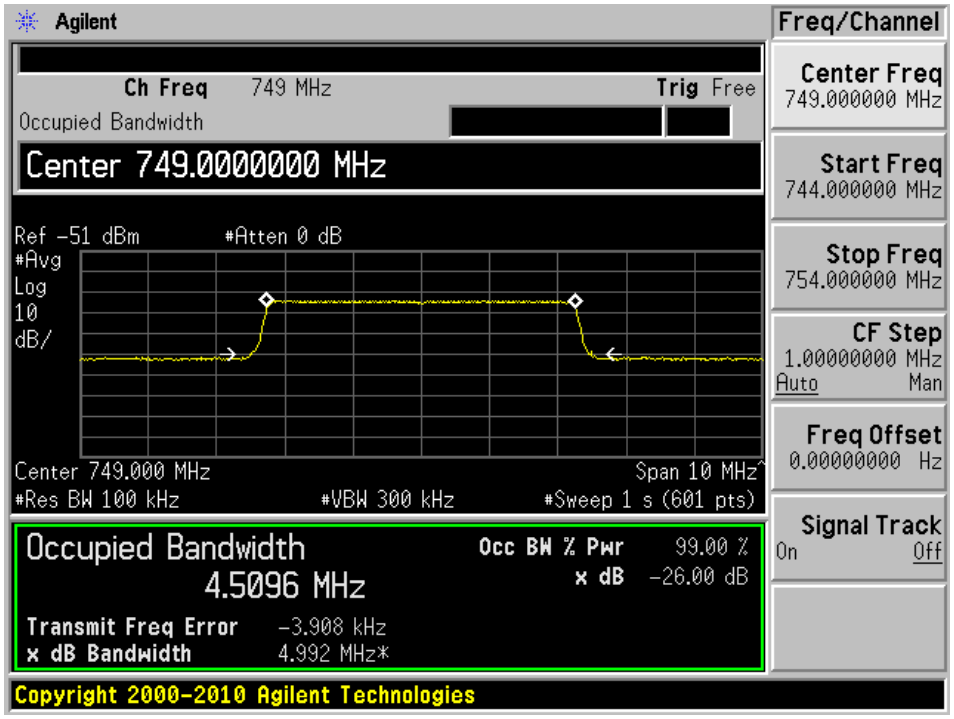


Output

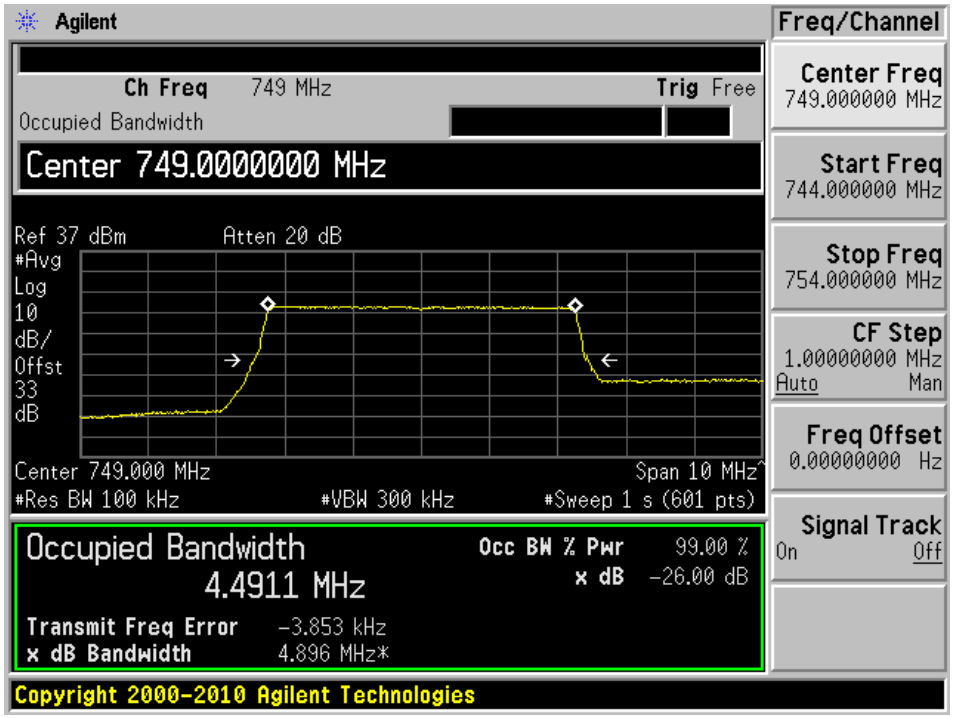


LTE-QPSK (5 MHz), Frequency: 749 MHz

Input

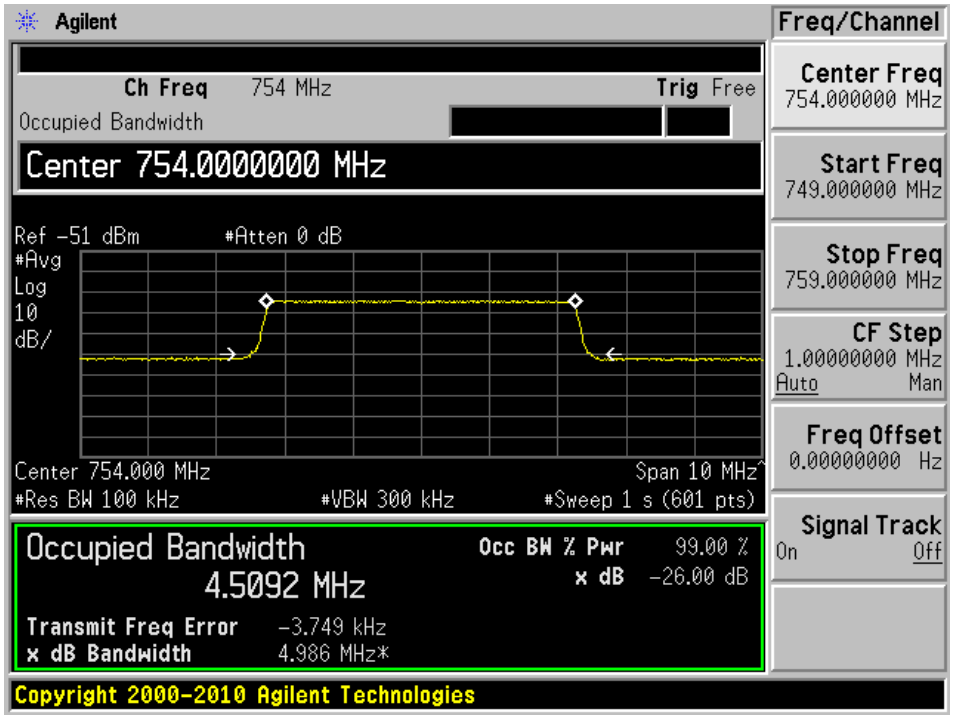


Output

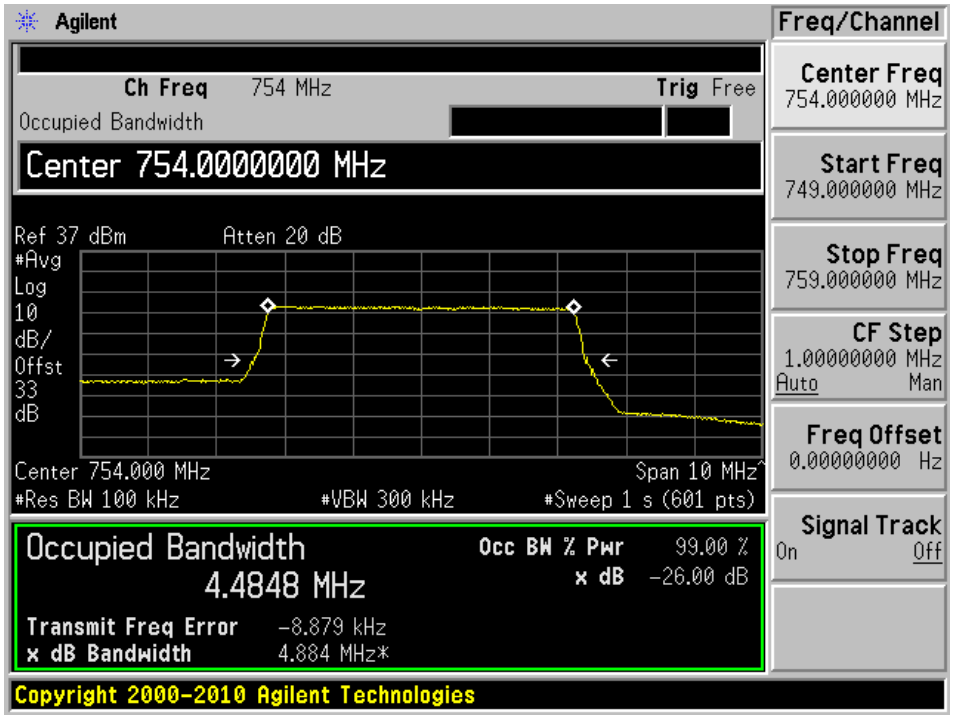


LTE-QPSK (5 MHz), Frequency: 754 MHz

Input

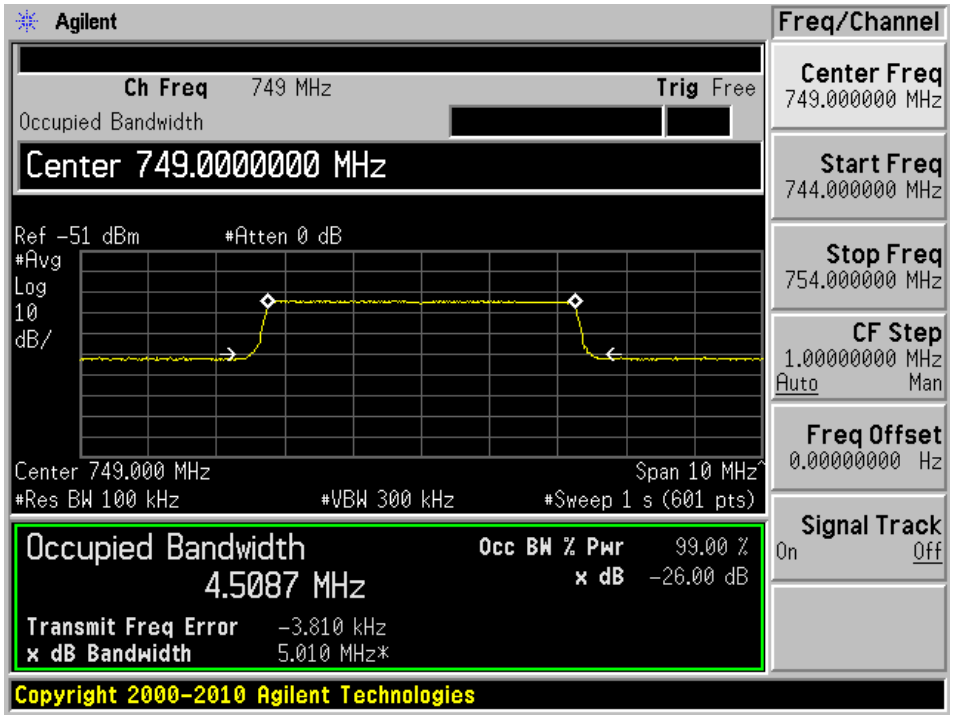


Output

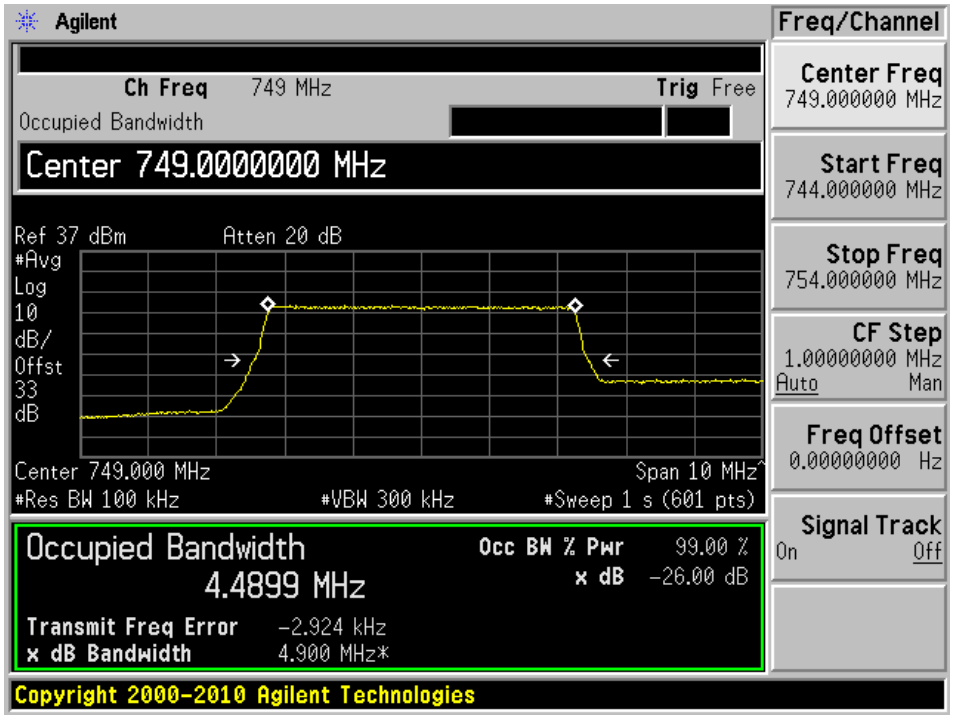


LTE-16QAM (5 MHz), Frequency: 749 MHz

Input

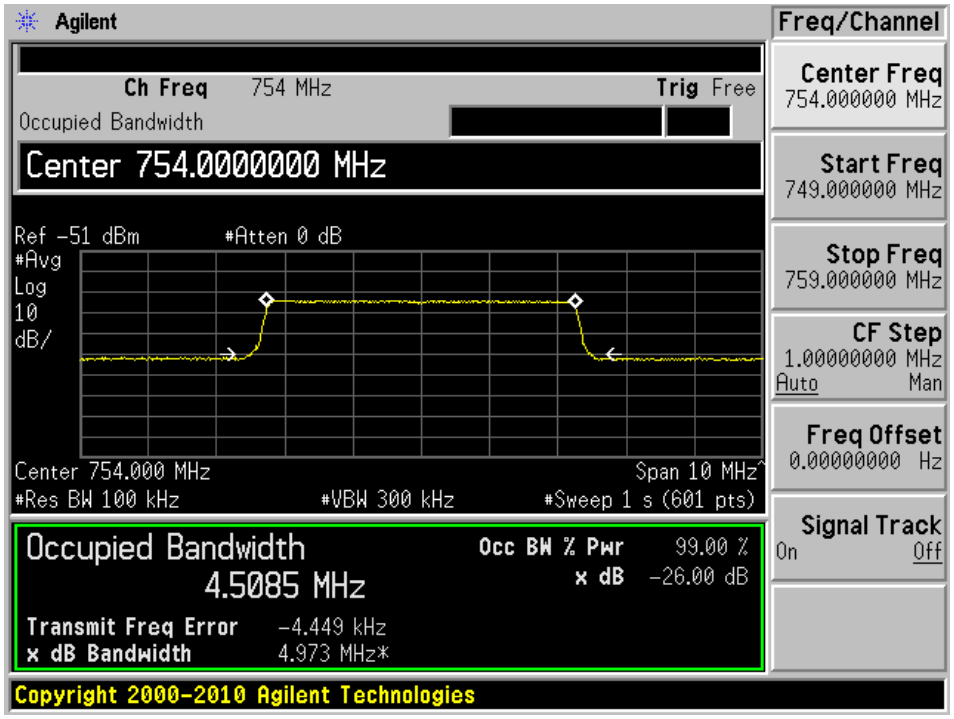


Output

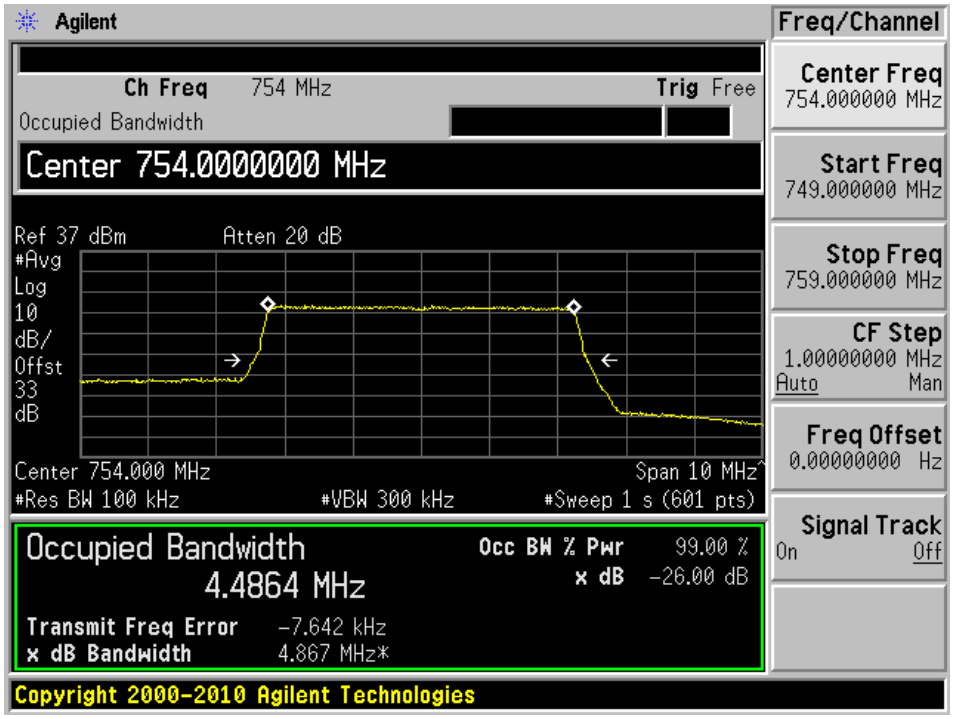


LTE-16QAM (5 MHz), Frequency: 754 MHz

Input

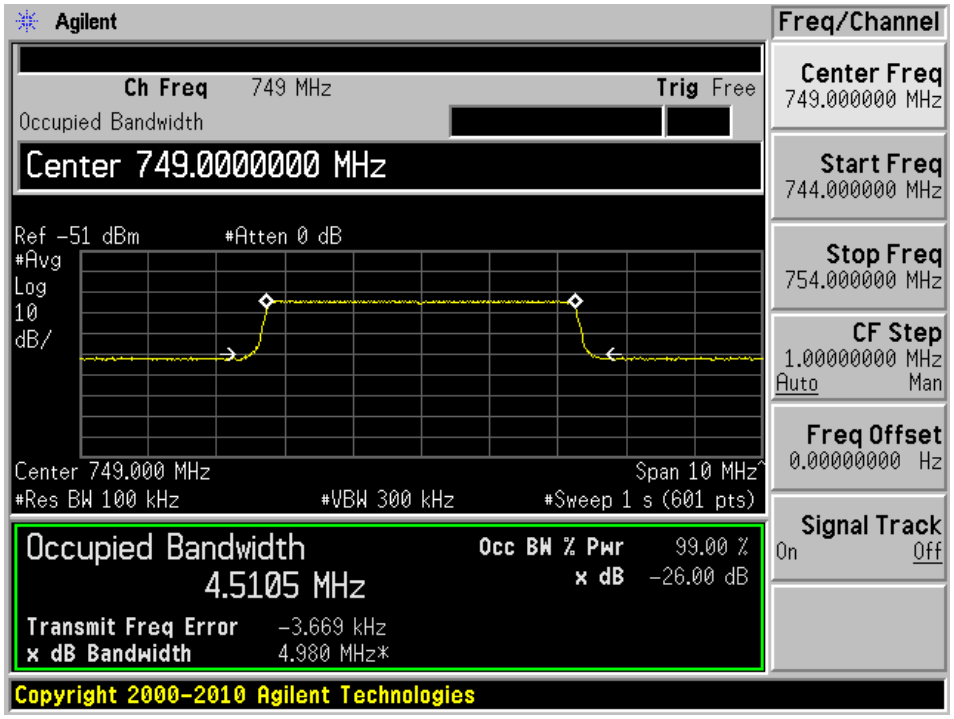


Output

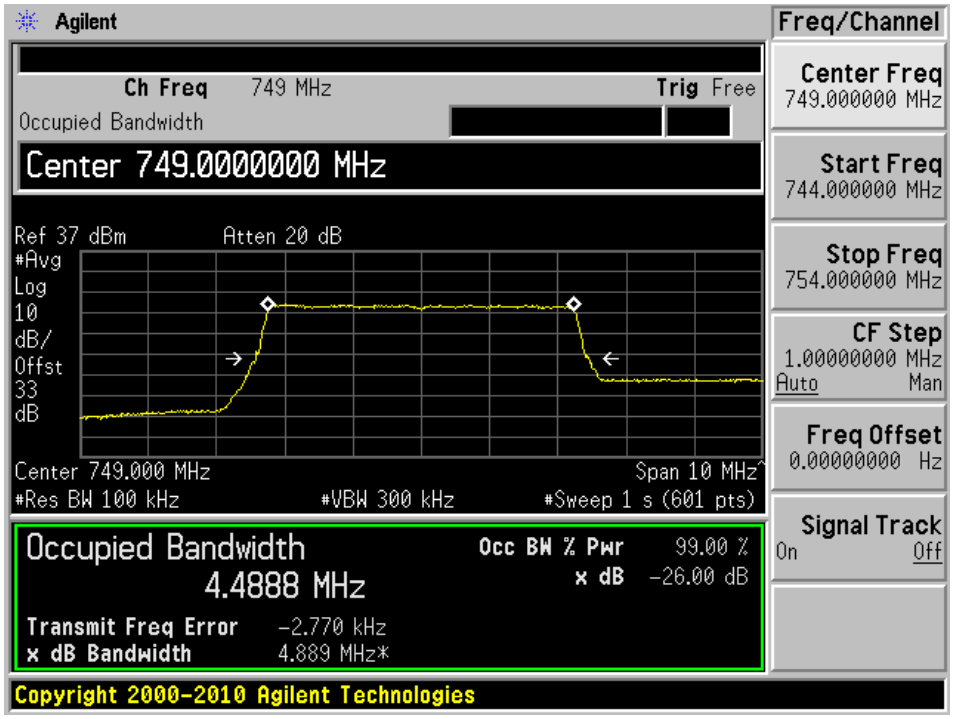


LTE-64QAM (5 MHz), Frequency: 749 MHz

Input

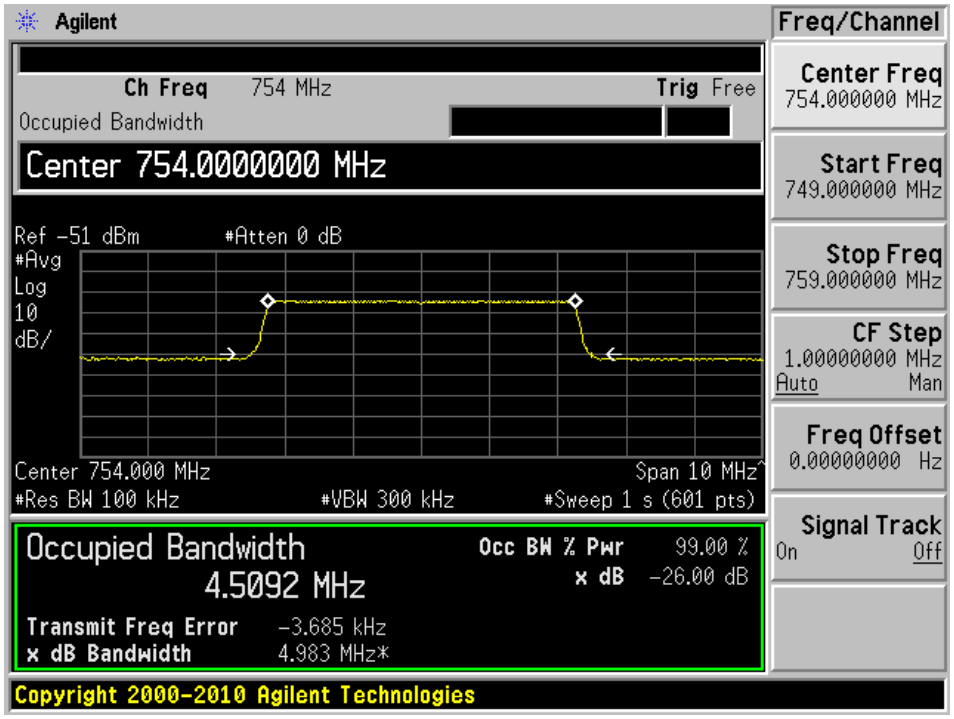


Output

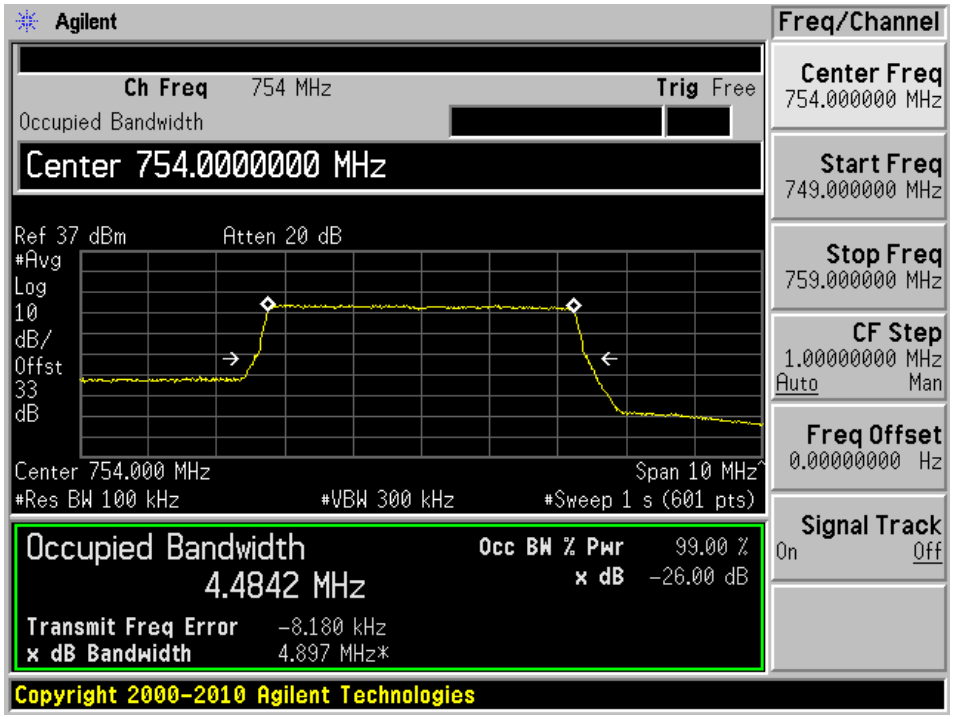


LTE-64QAM (5 MHz), Frequency: 754 MHz

Input

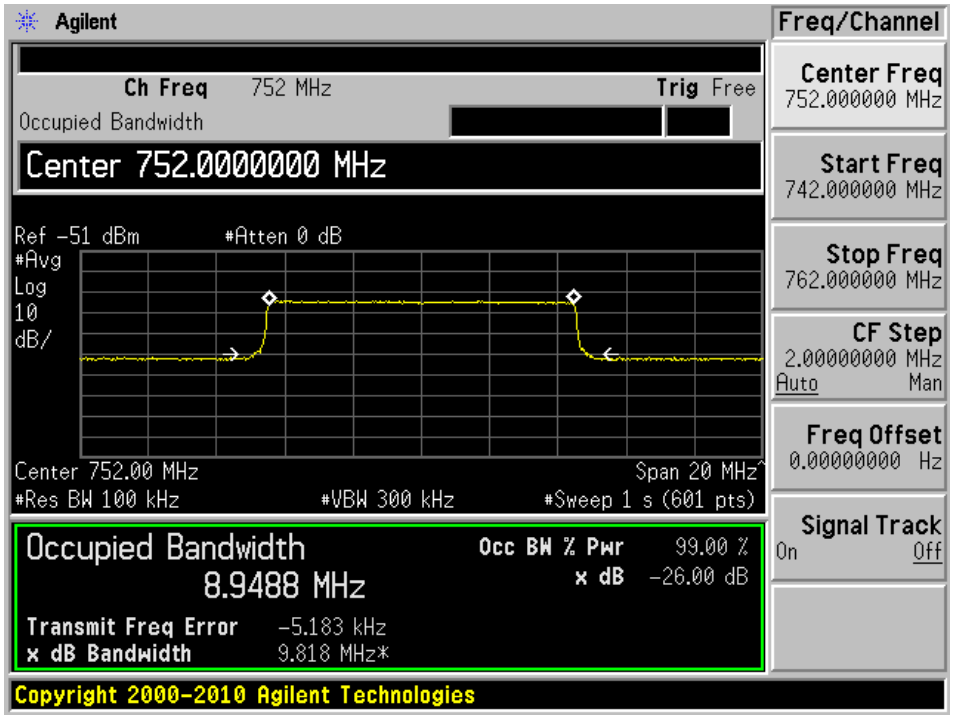


Output

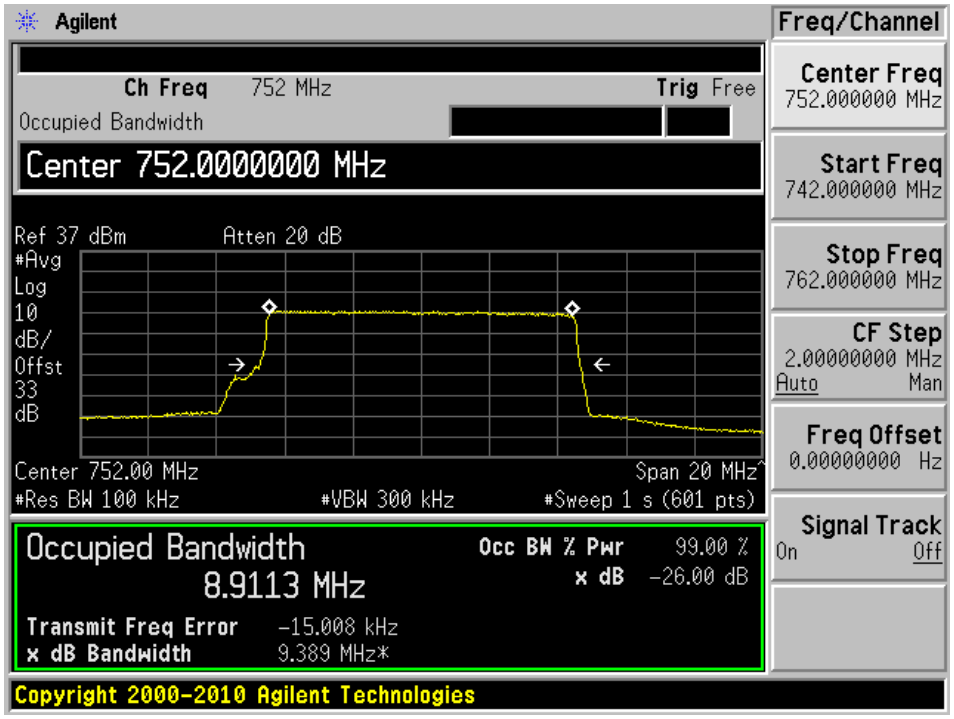


LTE-QPSK (10 MHz), Frequency: 752 MHz

Input

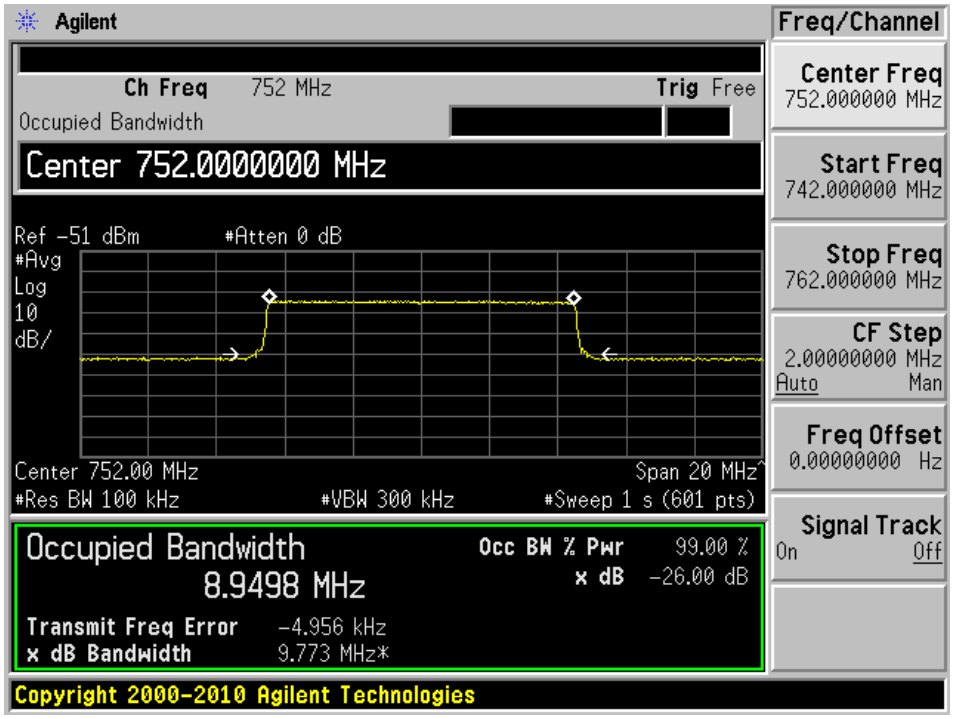


Output

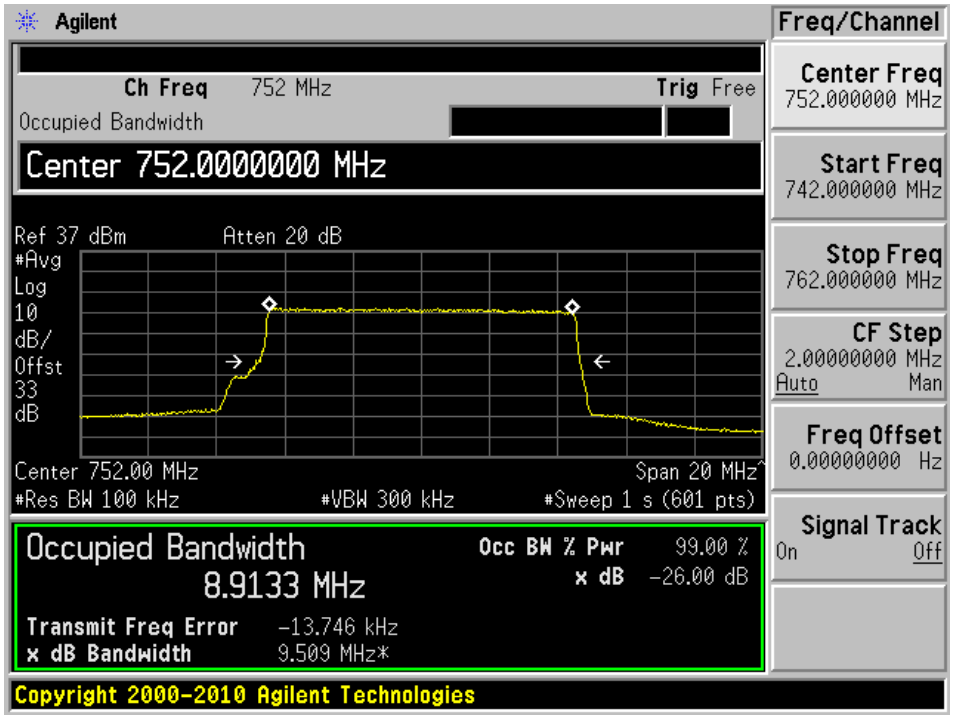


LTE-16QAM (10 MHz), Frequency: 752 MHz

Input

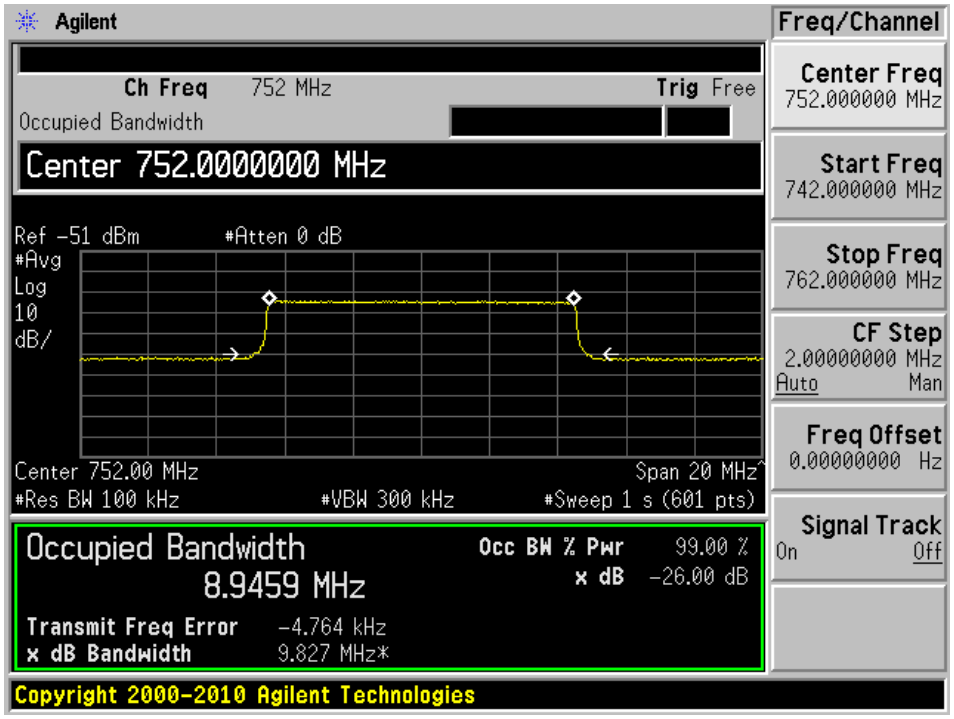


Output

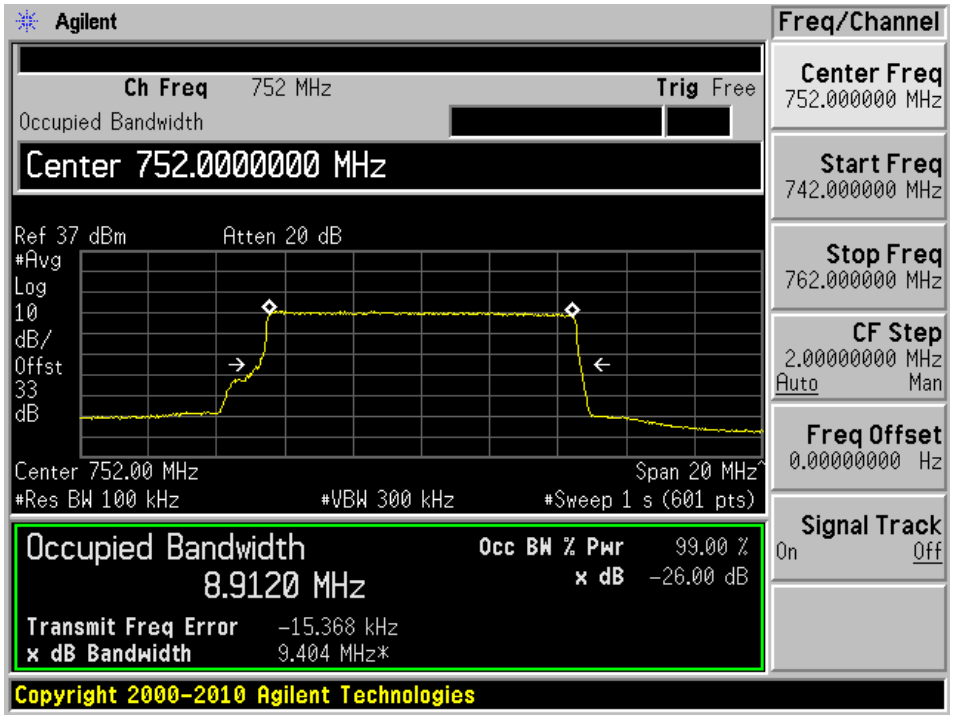


LTE-64QAM (10 MHz), Frequency: 752 MHz

Input



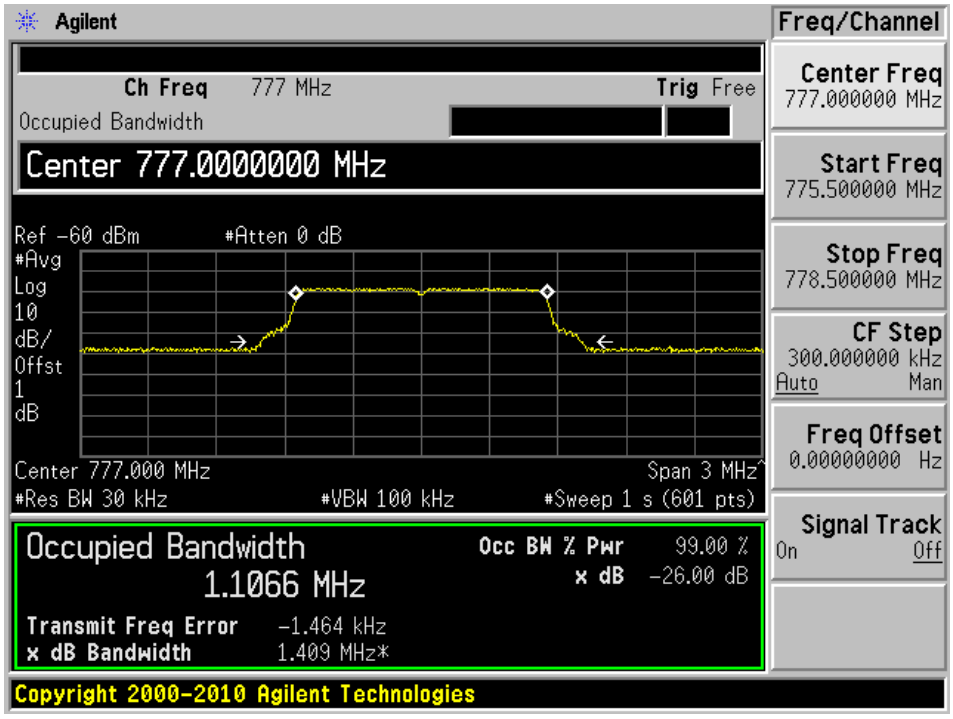
Output



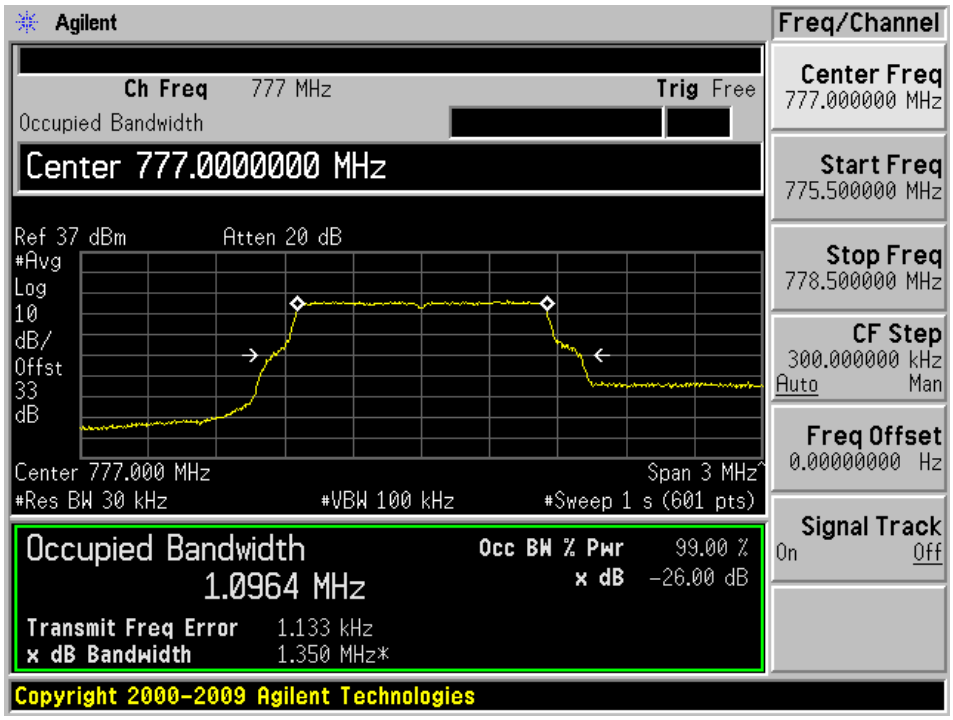
UL: 776-787 MHz

LTE-QPSK (1.4 MHz), Frequency: 777 MHz

Input

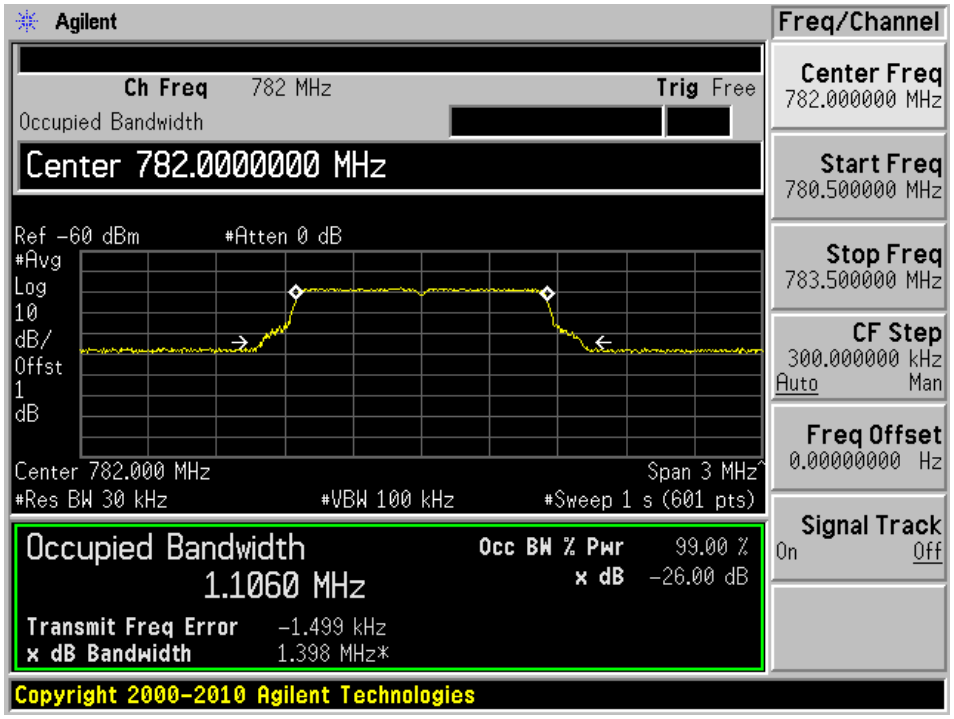


Output

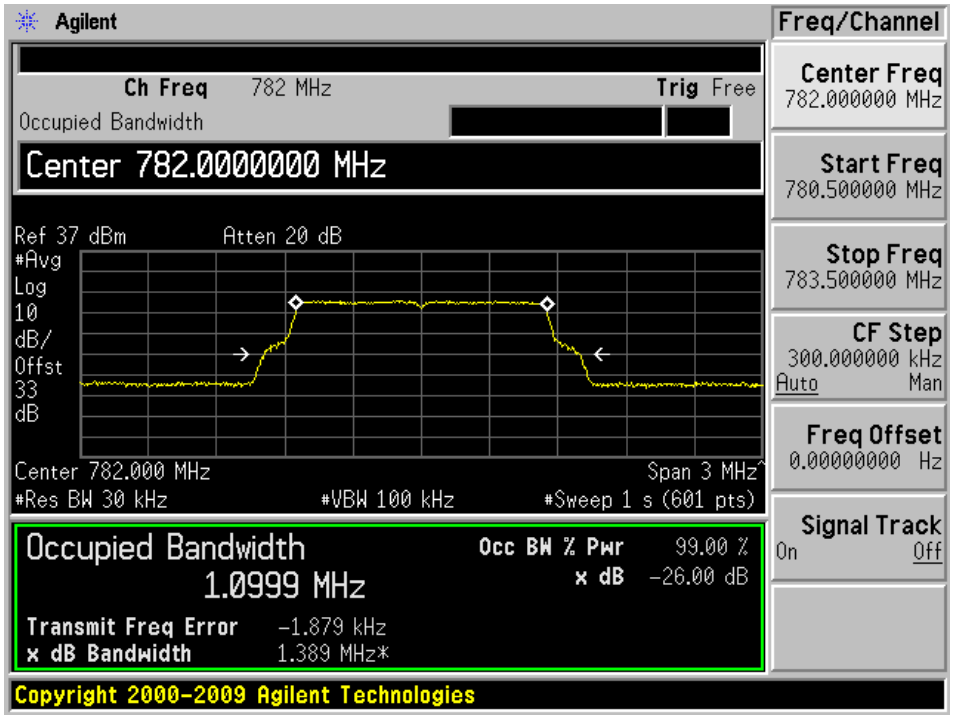


LTE-QPSK (1.4 MHz), Frequency: 782 MHz

Input

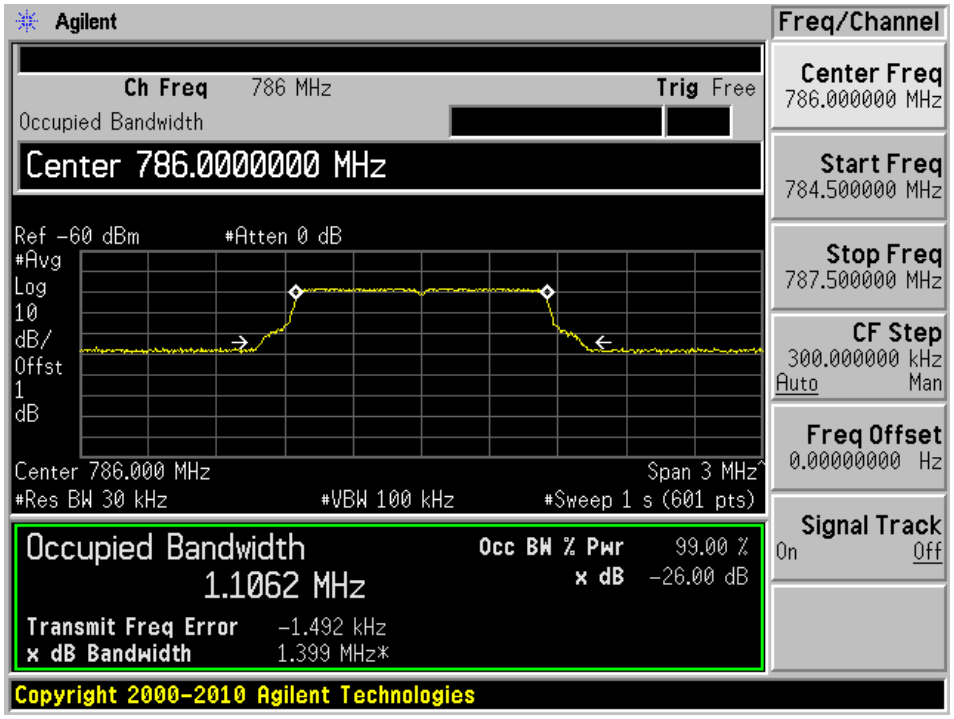


Output

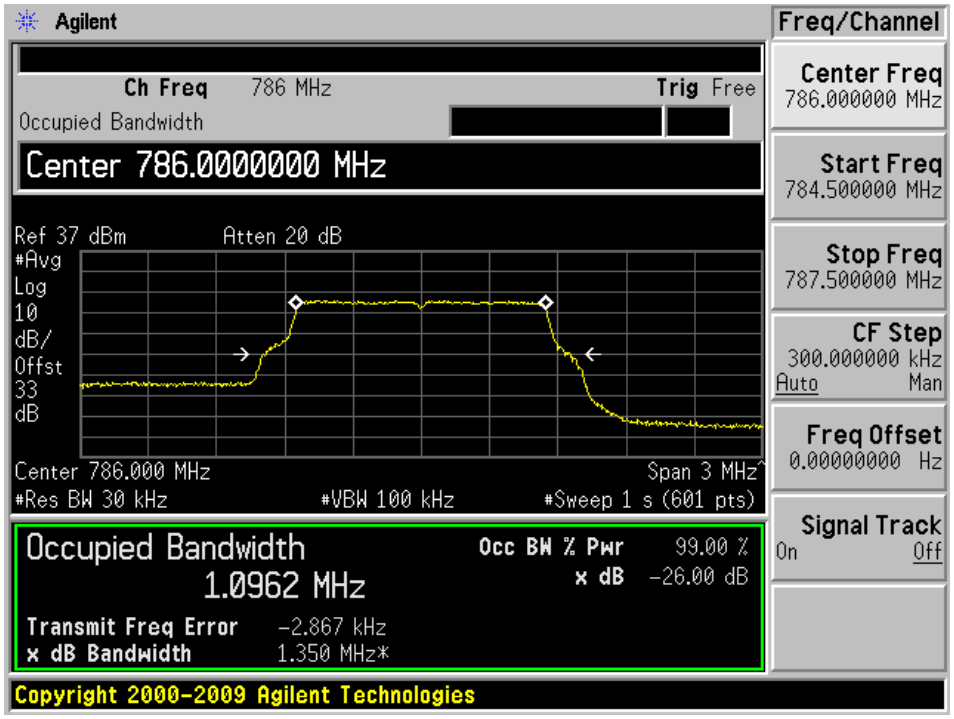


LTE-QPSK (1.4 MHz), Frequency: 786 MHz

Input

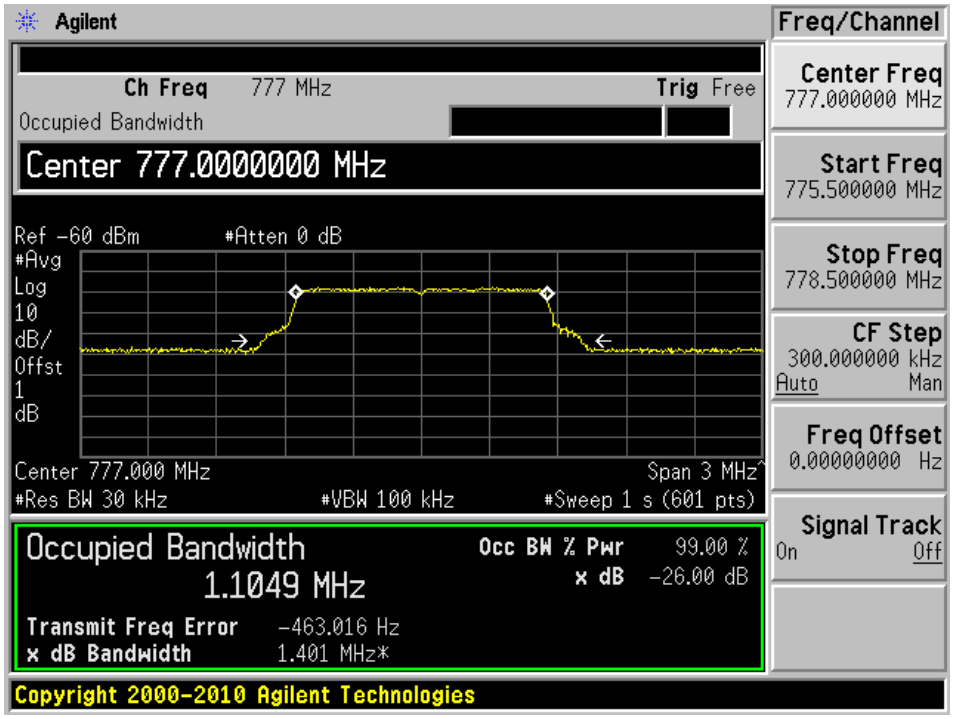


Output

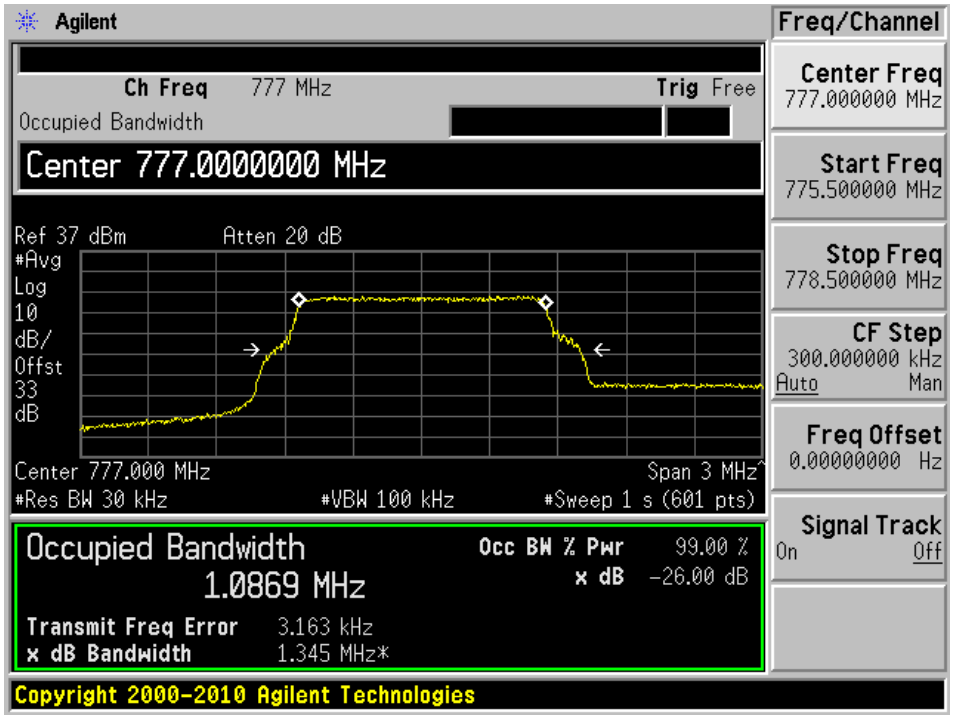


LTE-16QAM (1.4 MHz), Frequency: 777 MHz

Input

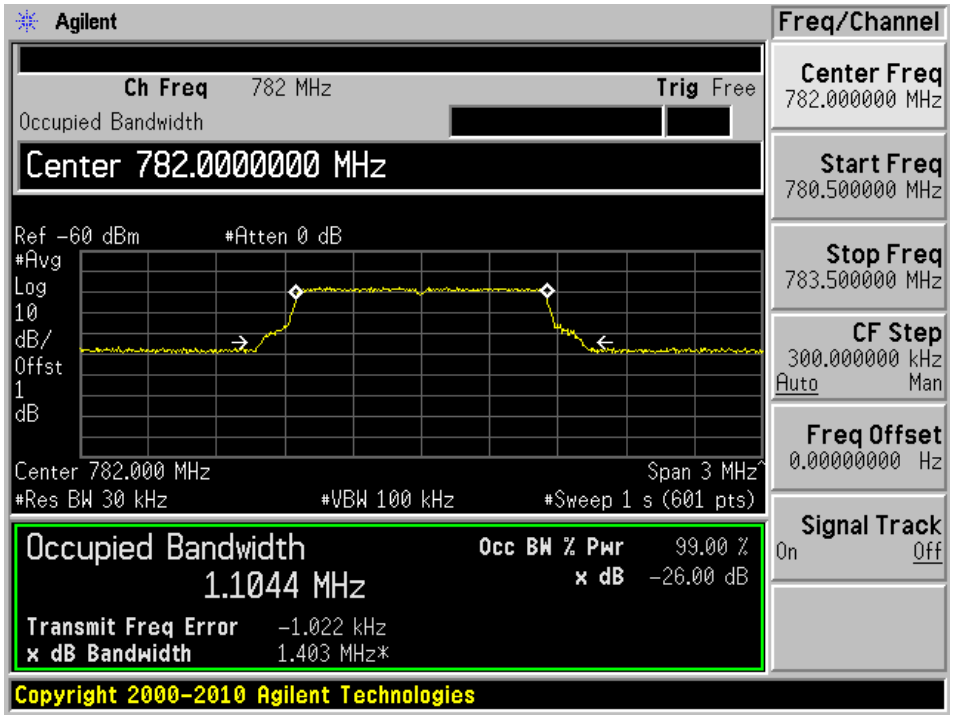


Output

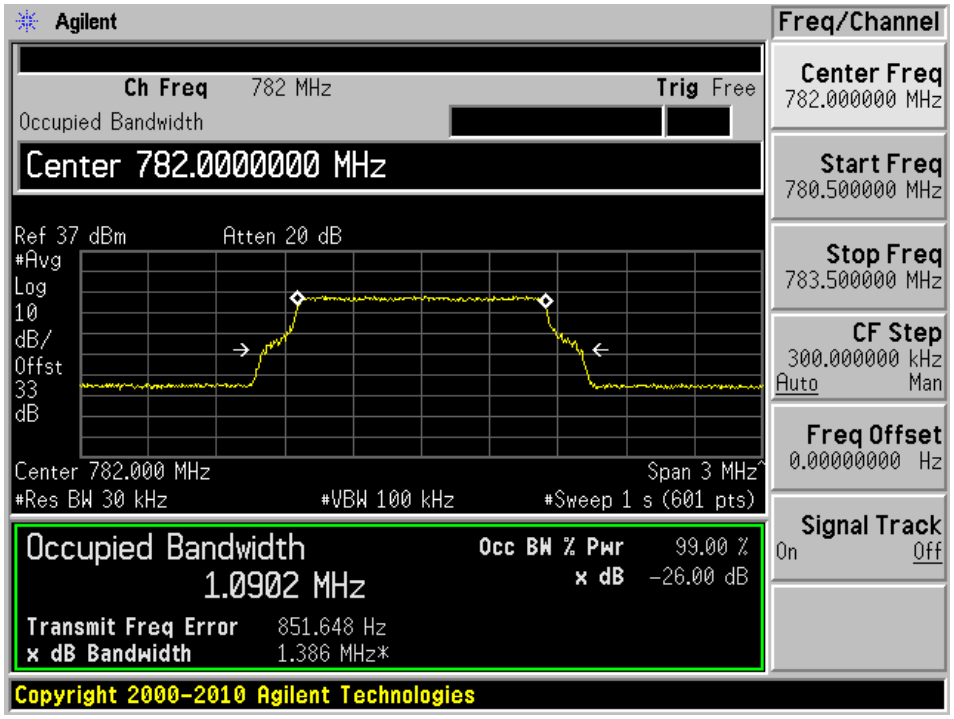


LTE-16QAM (1.4 MHz), Frequency: 782 MHz

Input

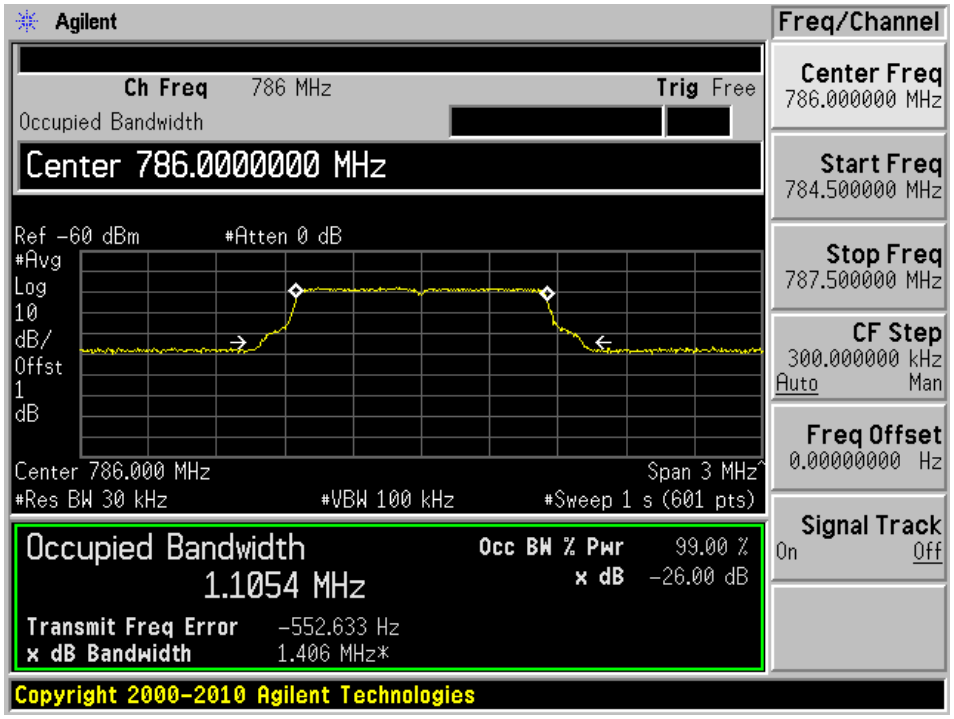


Output

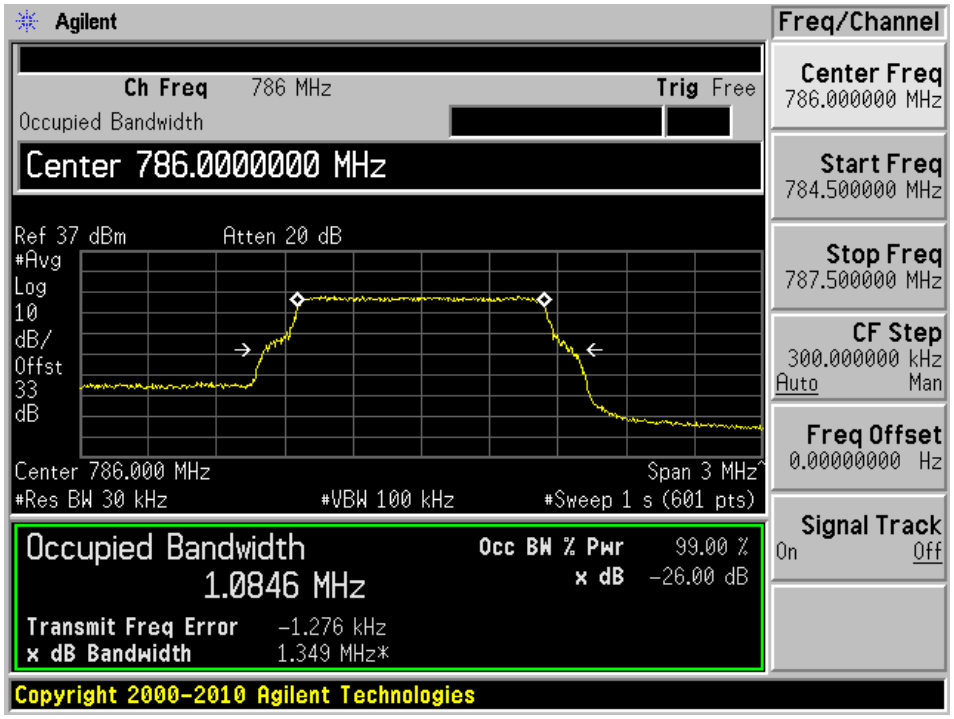


LTE-16QAM (1.4 MHz), Frequency: 786 MHz

Input

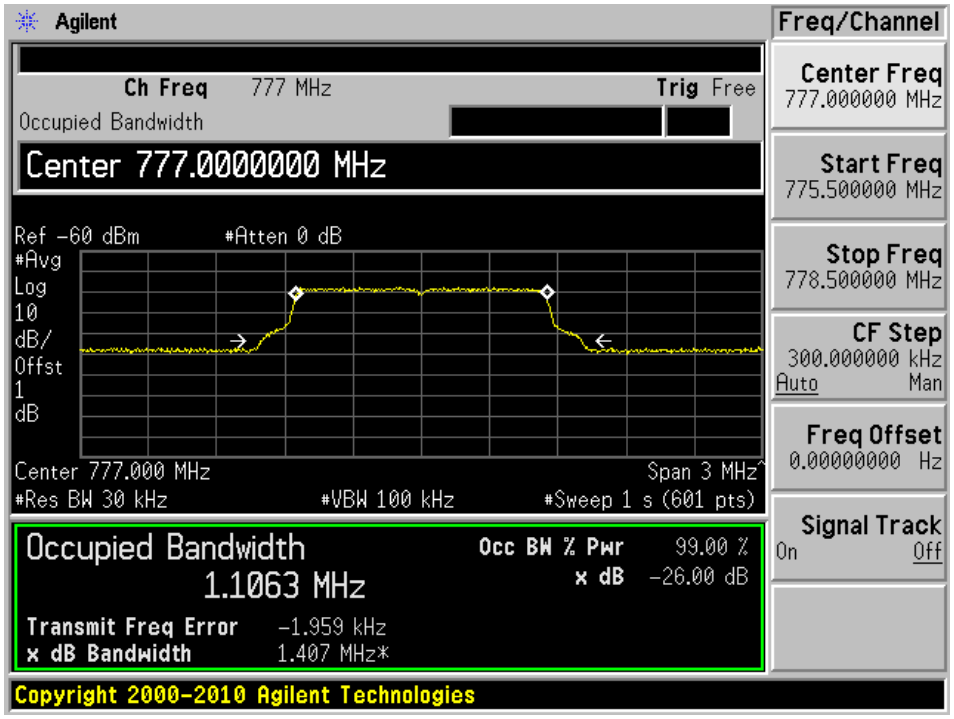


Output

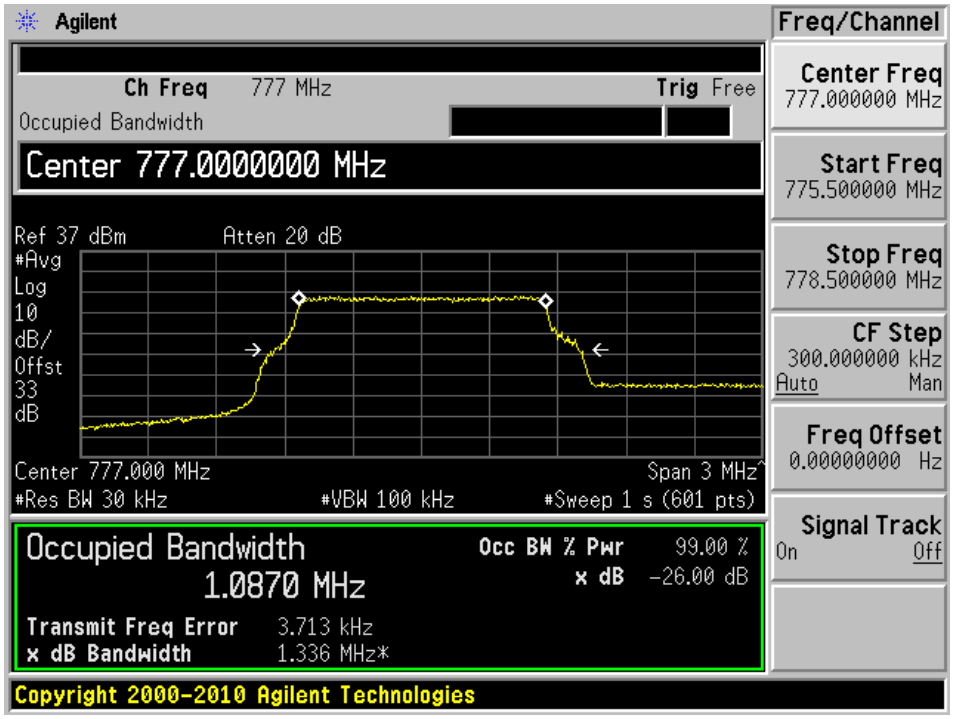


LTE-64QAM (1.4 MHz), Frequency: 777 MHz

Input

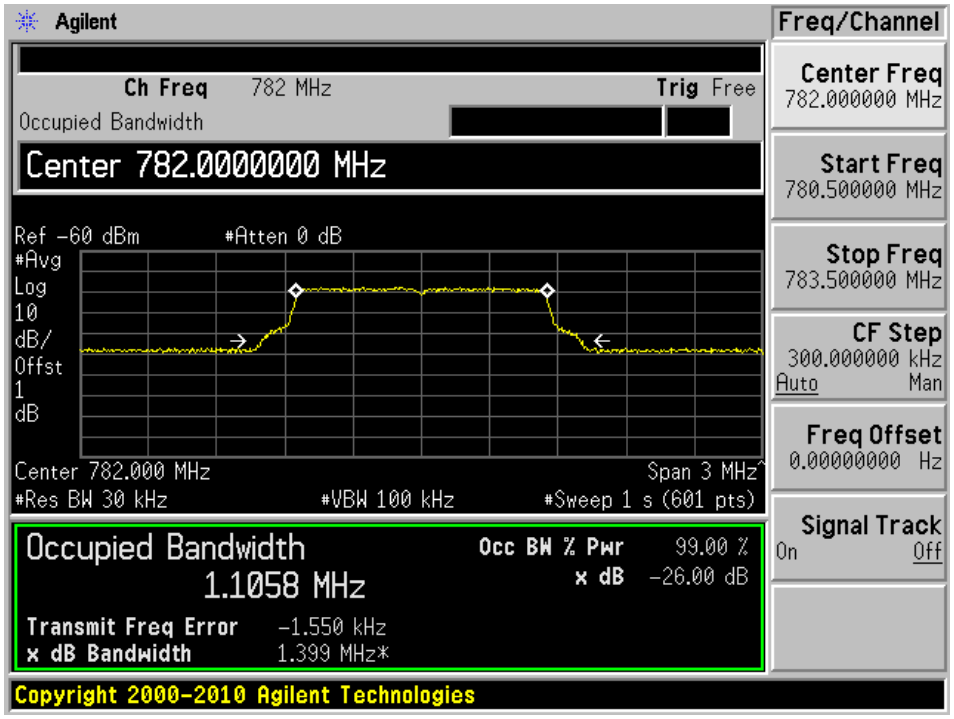


Output

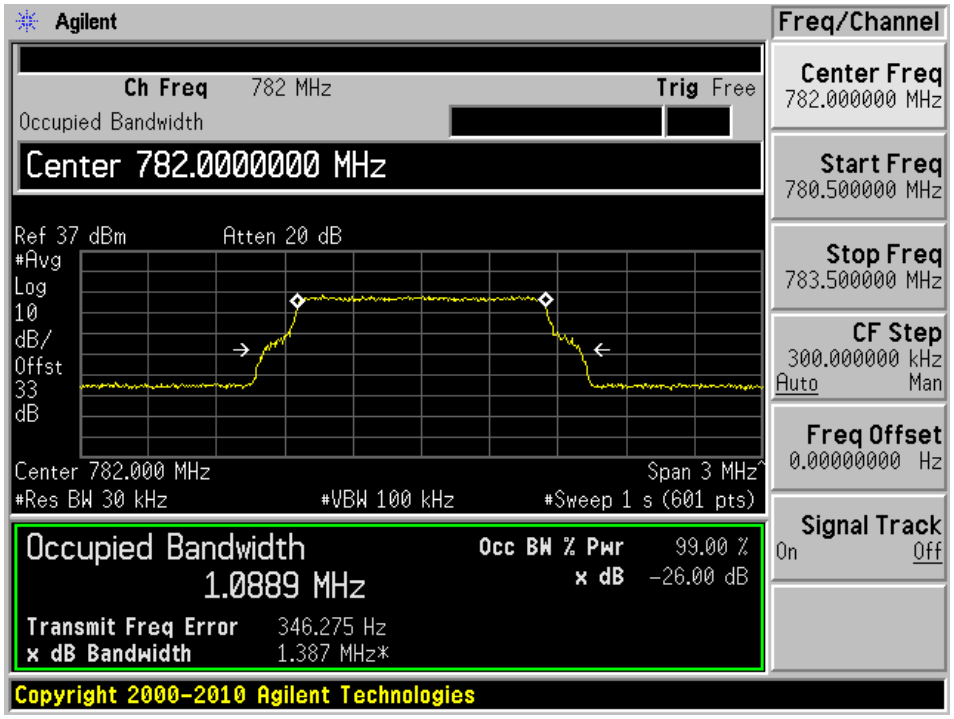


LTE-64QAM (1.4 MHz), Frequency: 782 MHz

Input

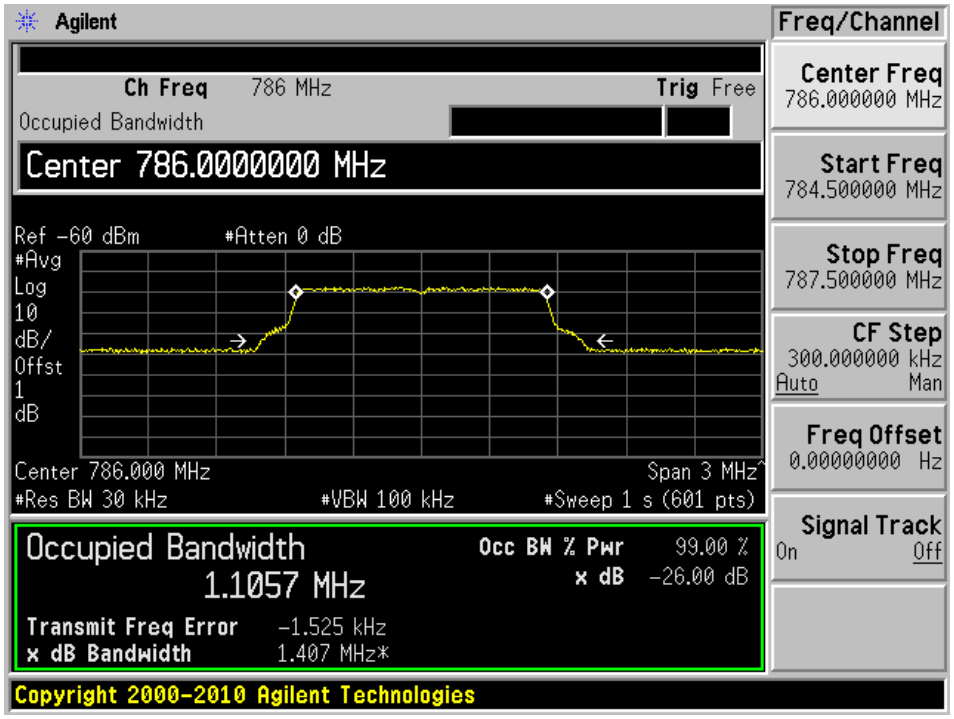


Output

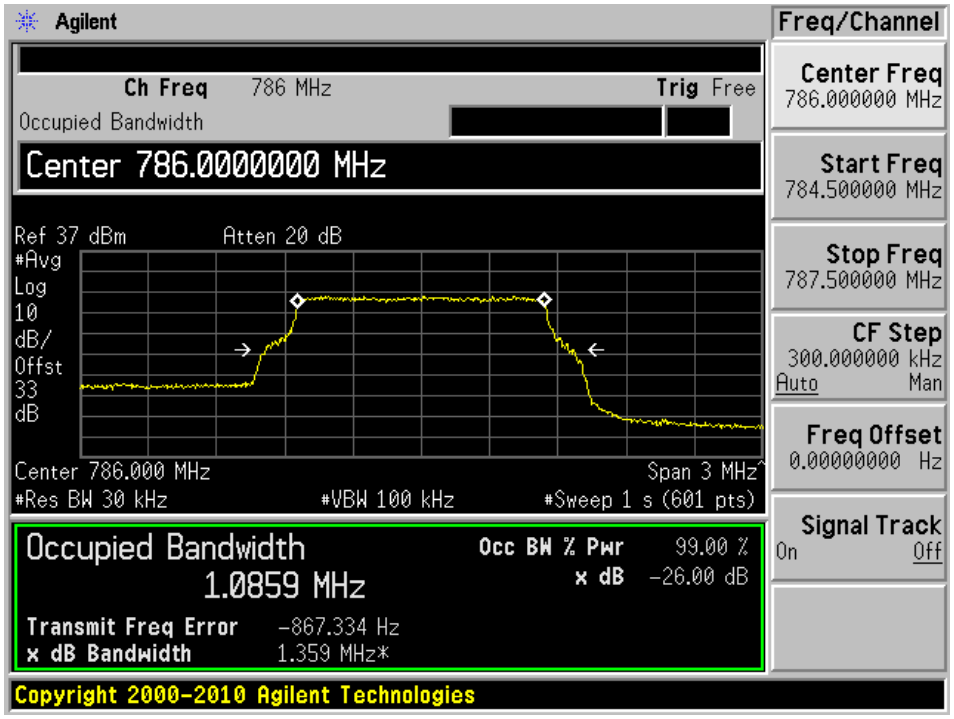


LTE-64QAM (1.4 MHz), Frequency: 786 MHz

Input

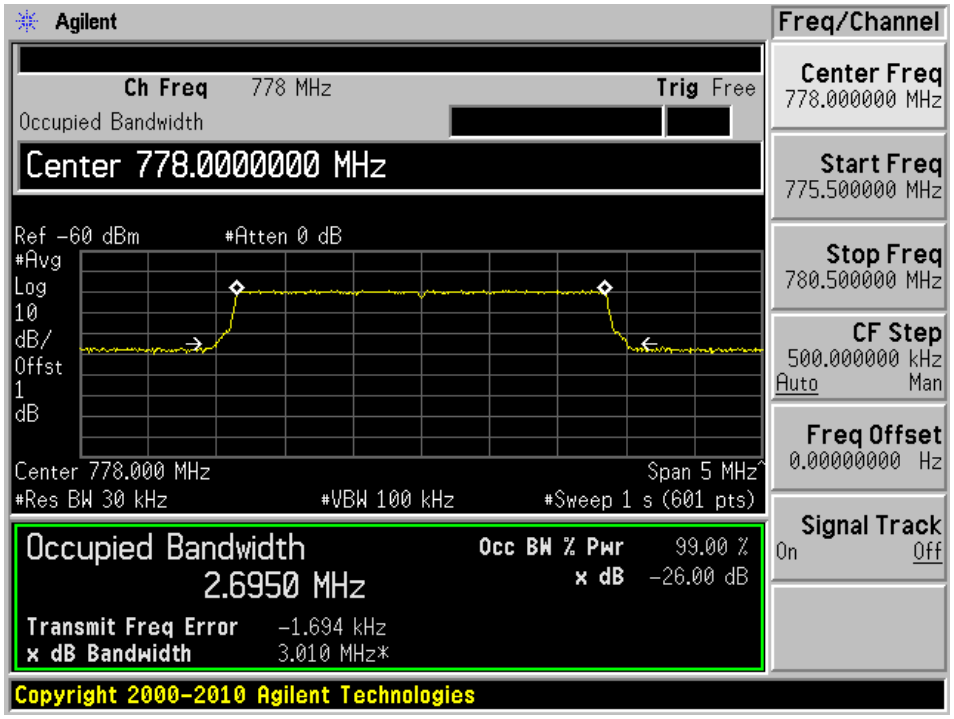


Output

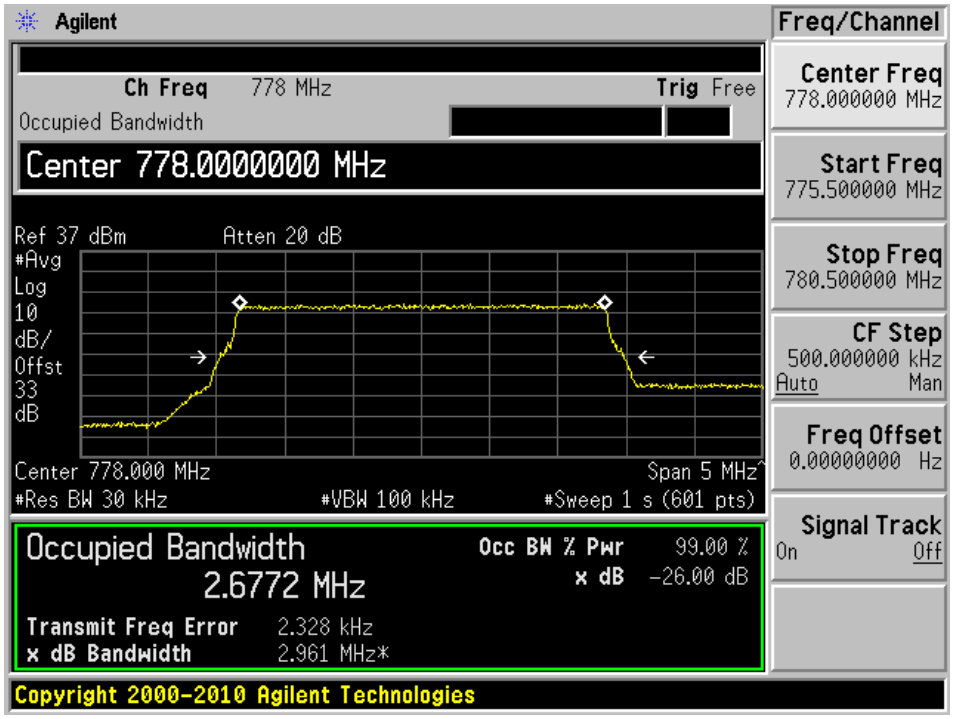


LTE-QPSK (3 MHz), Frequency: 778 MHz

Input

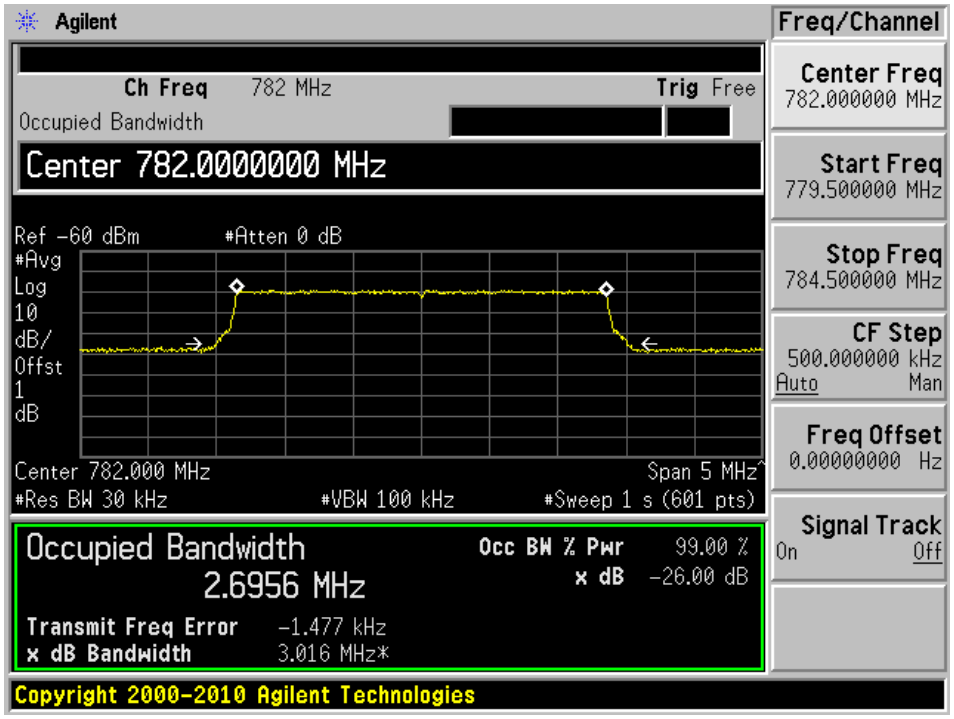


Output

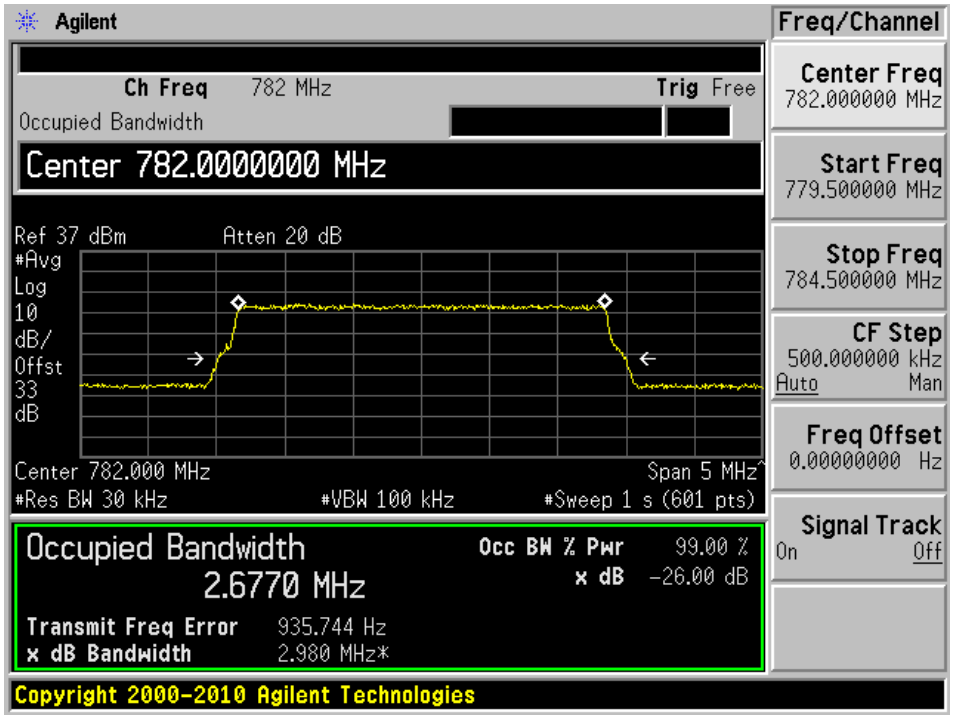


LTE-QPSK (3 MHz), Frequency: 782 MHz

Input

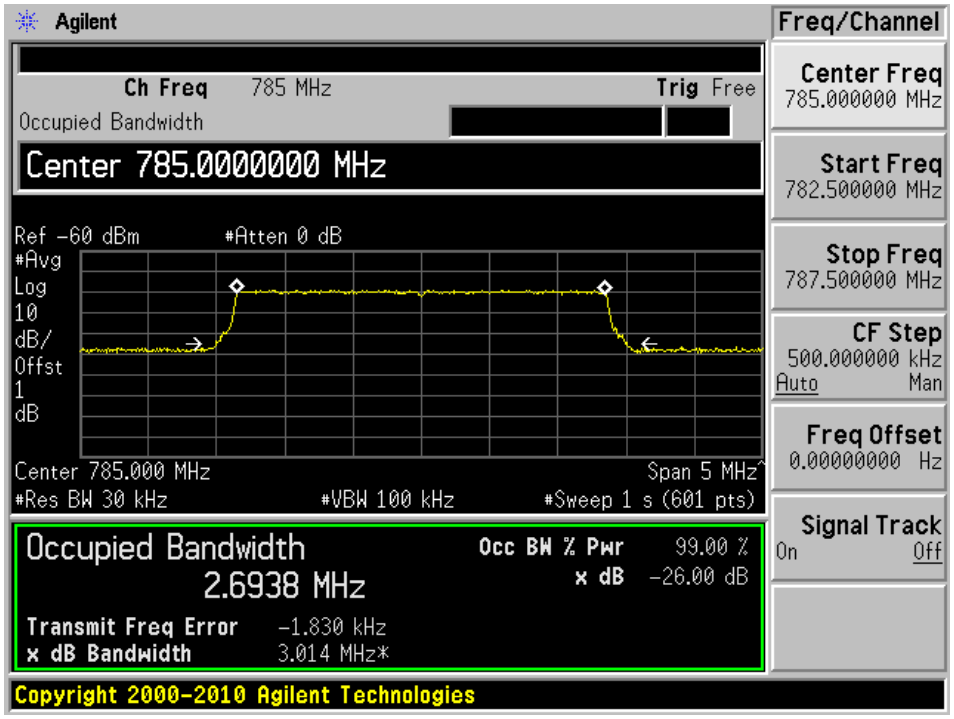


Output

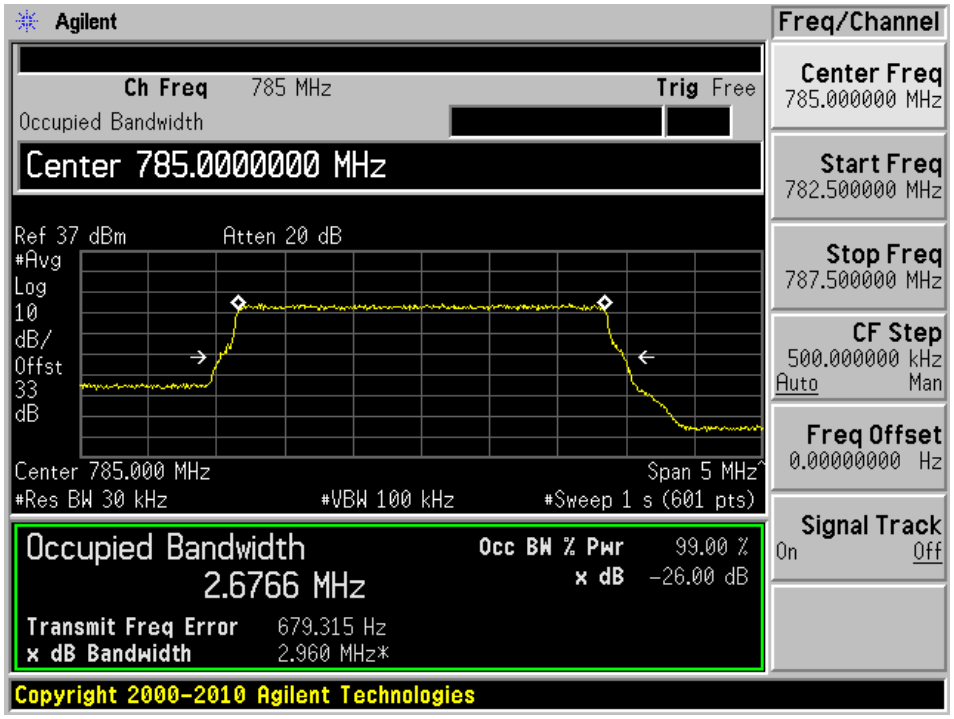


LTE-QPSK (3 MHz), Frequency: 785 MHz

Input

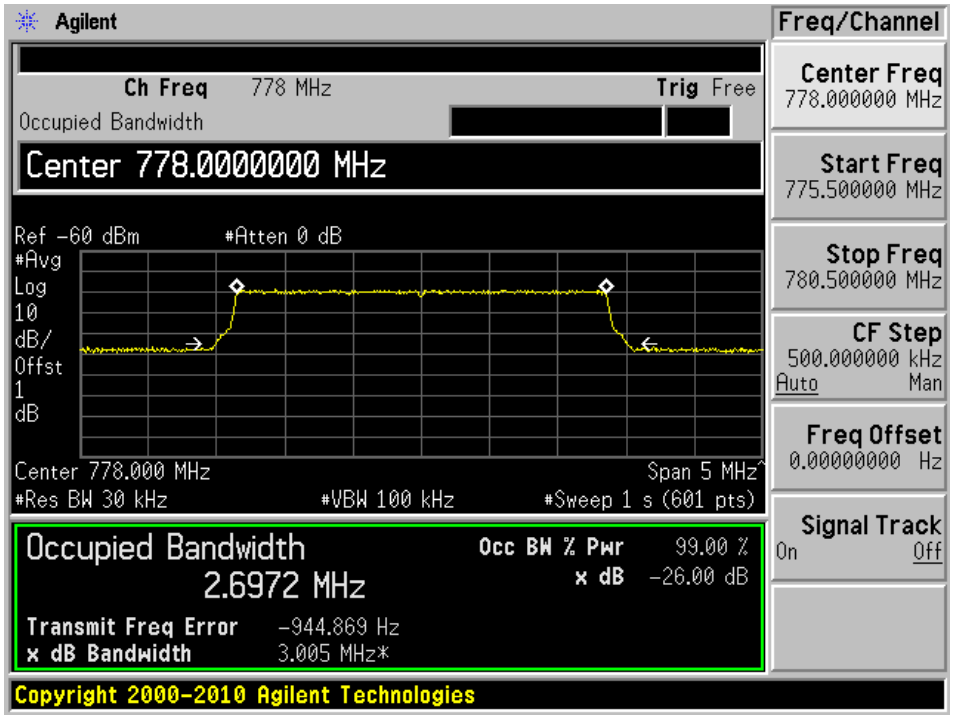


Output

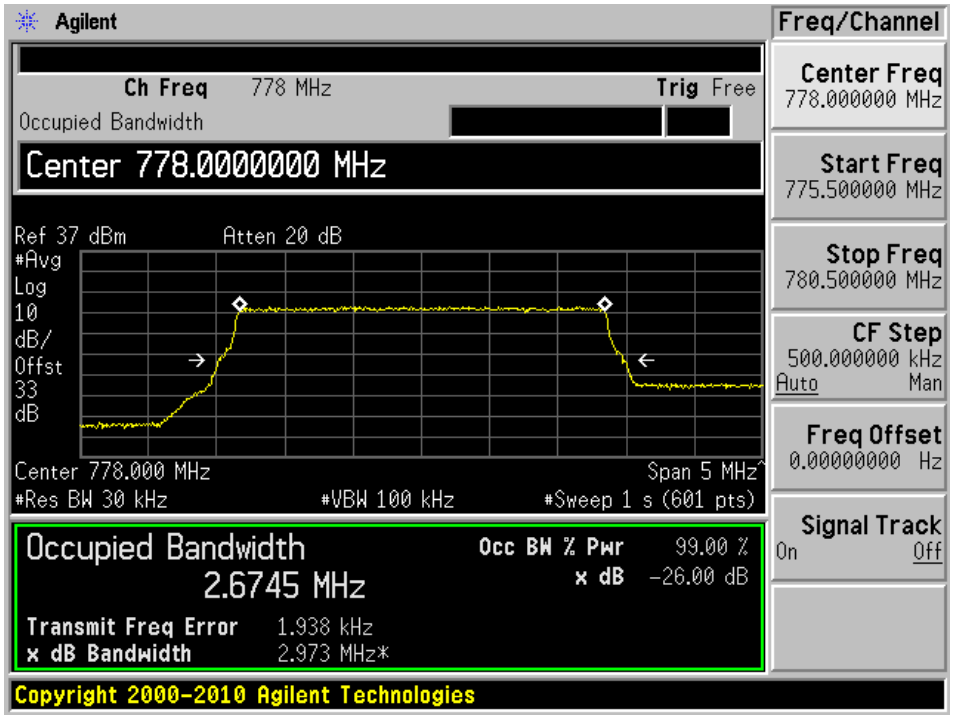


LTE-16QAM (3 MHz), Frequency: 778 MHz

Input

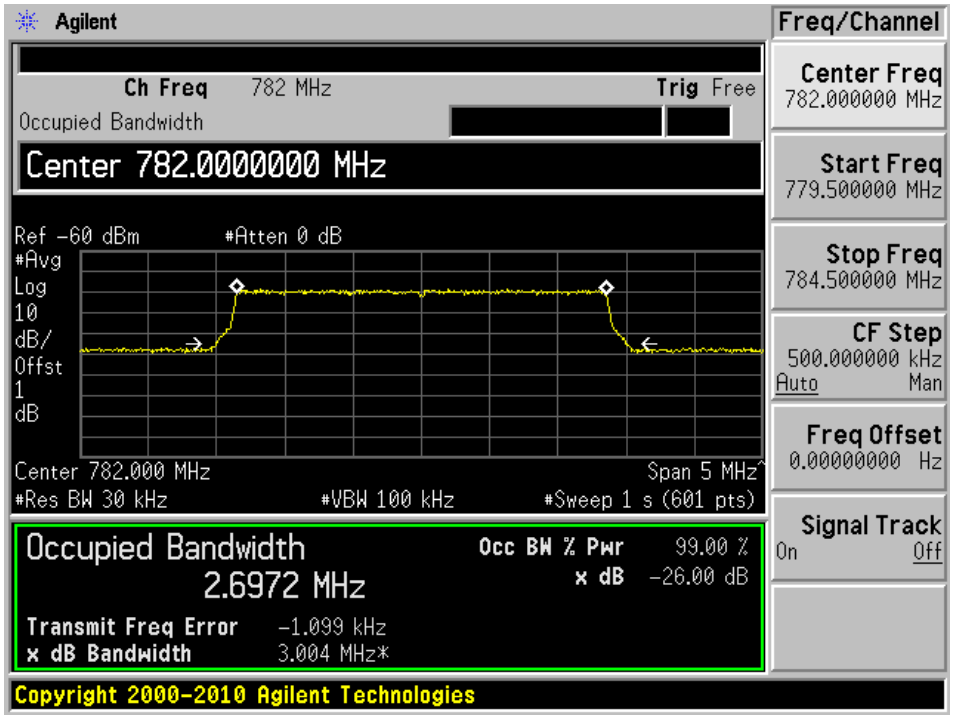


Output

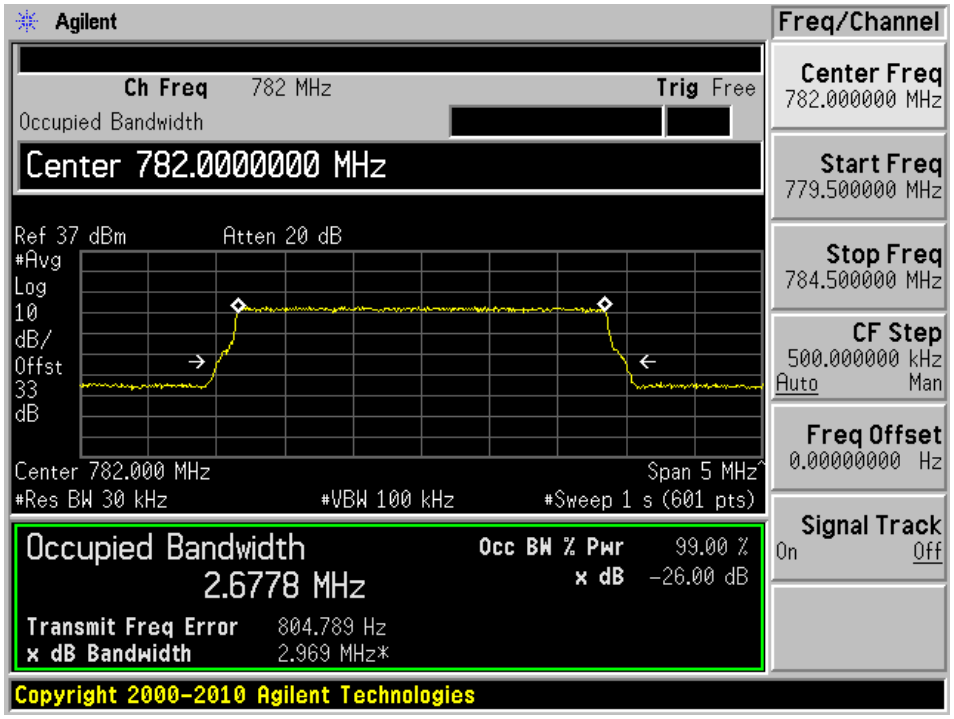


LTE-16QAM (3 MHz), Frequency: 782 MHz

Input

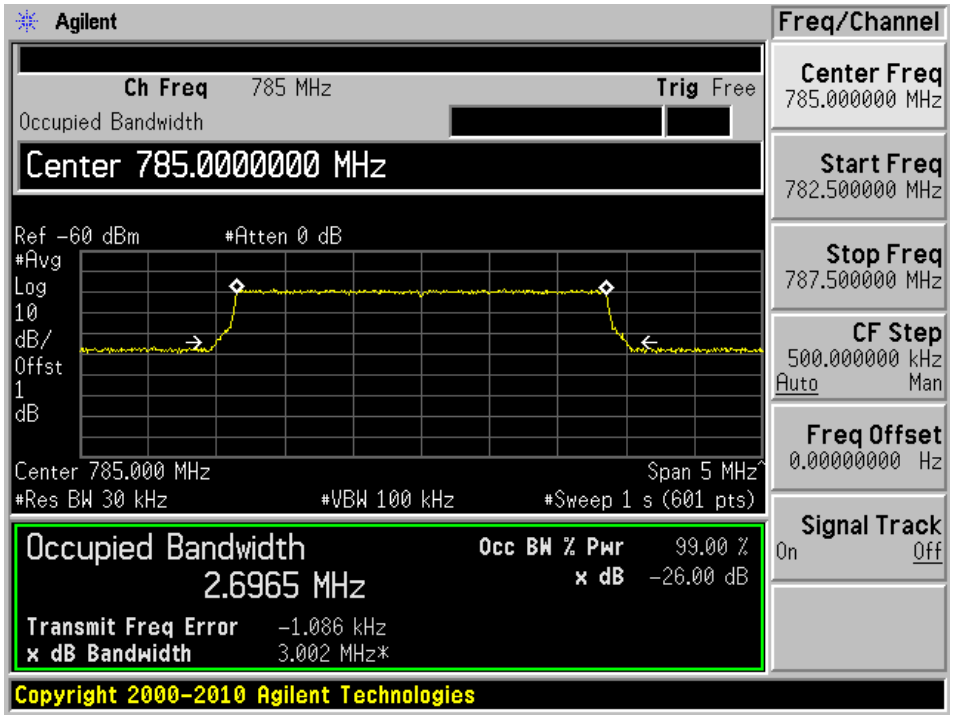


Output

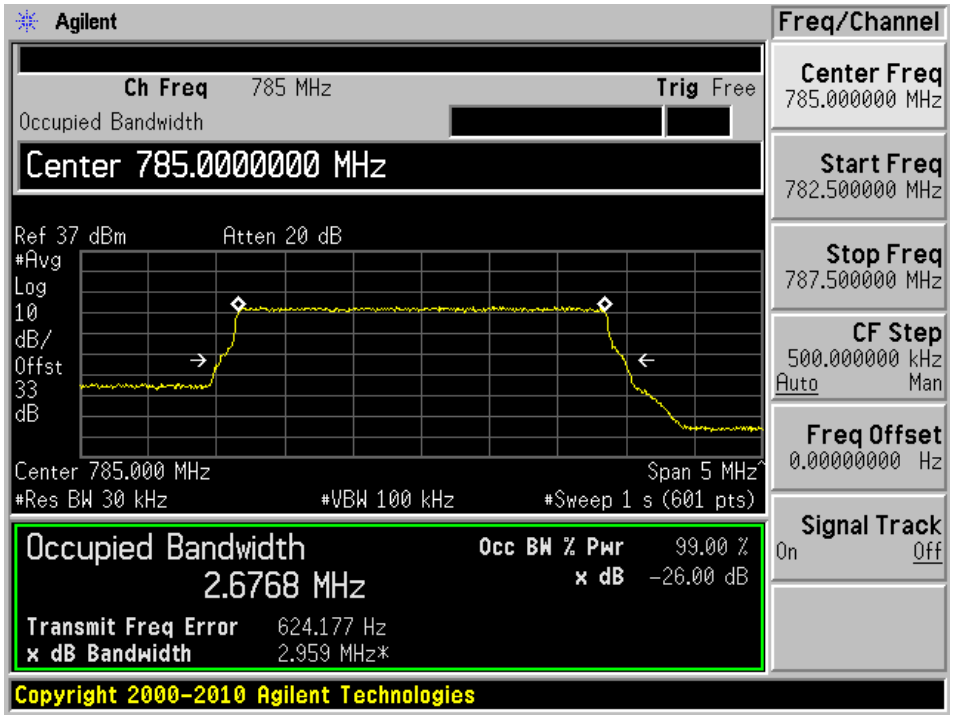


LTE-16QAM (3 MHz), Frequency: 785 MHz

Input

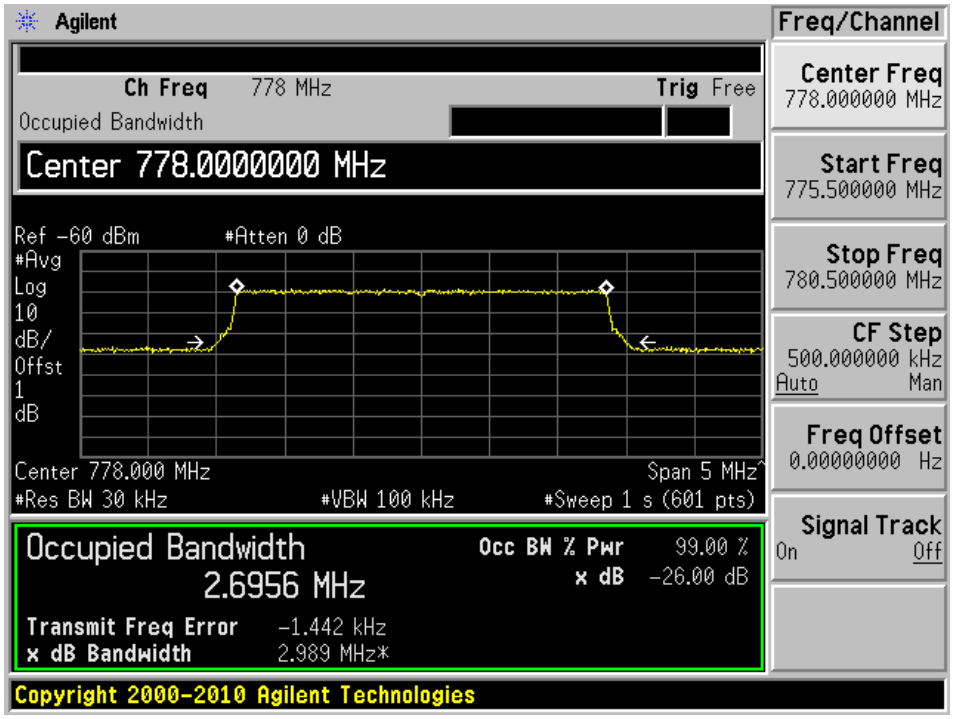


Output

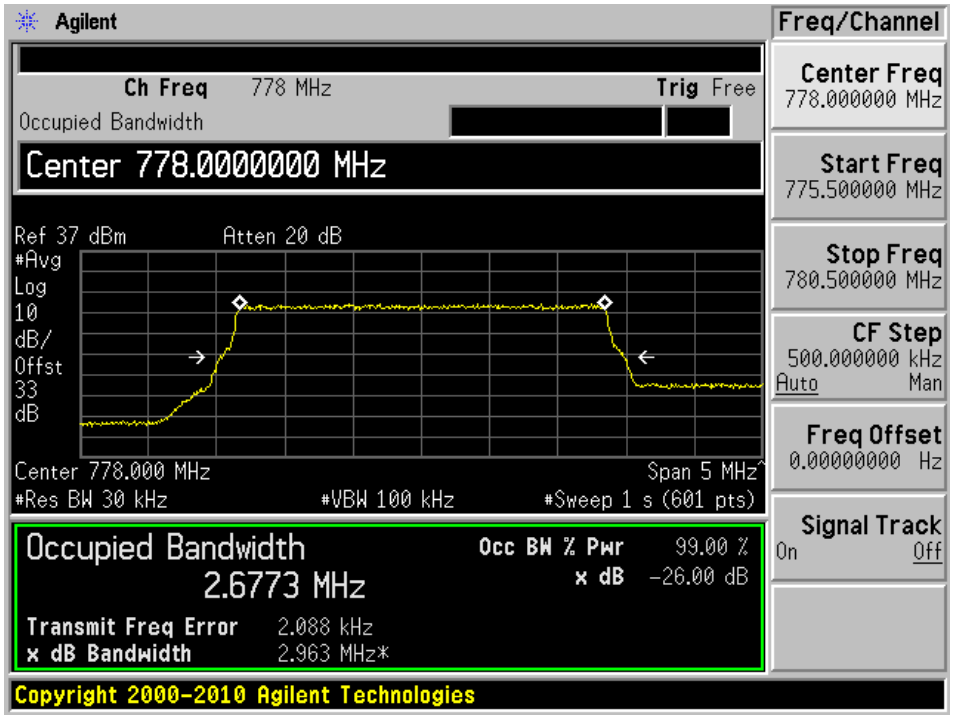


LTE-64QAM (3 MHz), Frequency: 778 MHz

Input

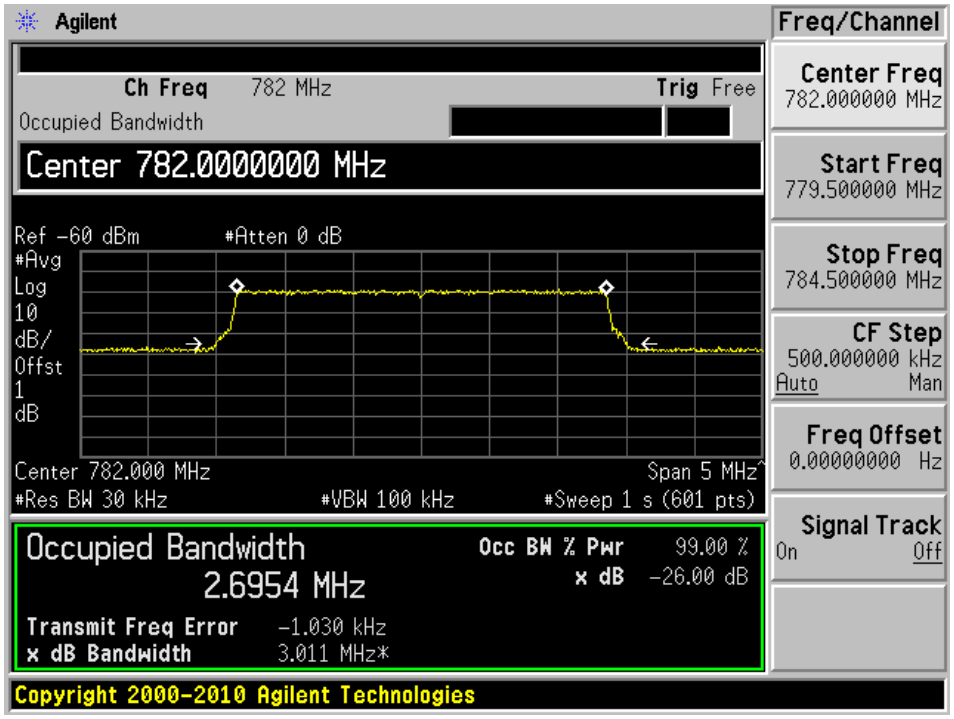


Output

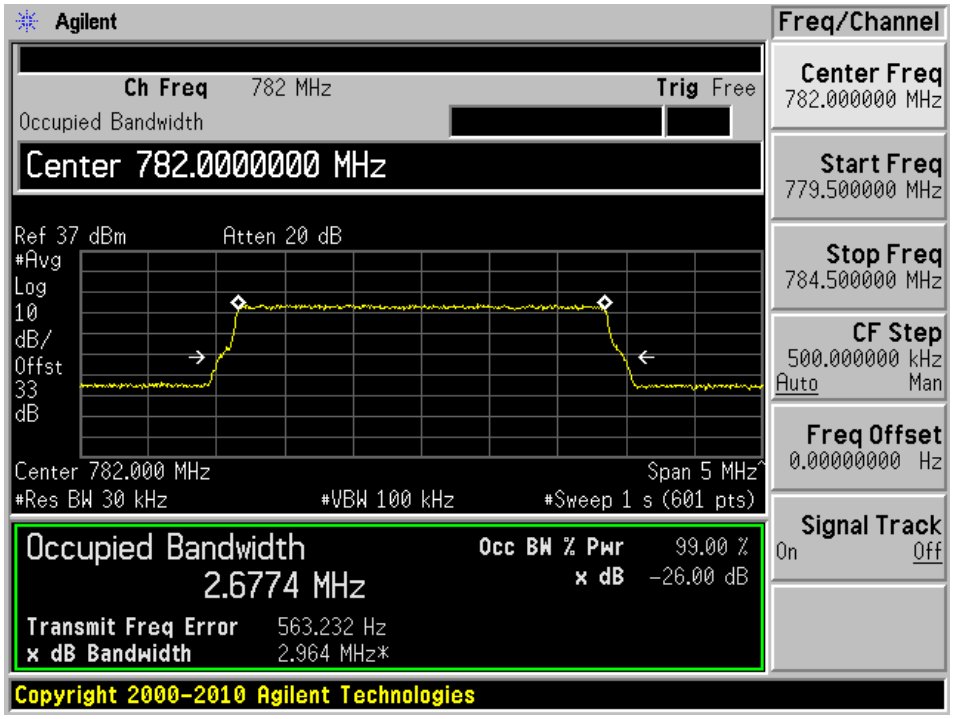


LTE-64QAM (3 MHz), Frequency: 782 MHz

Input

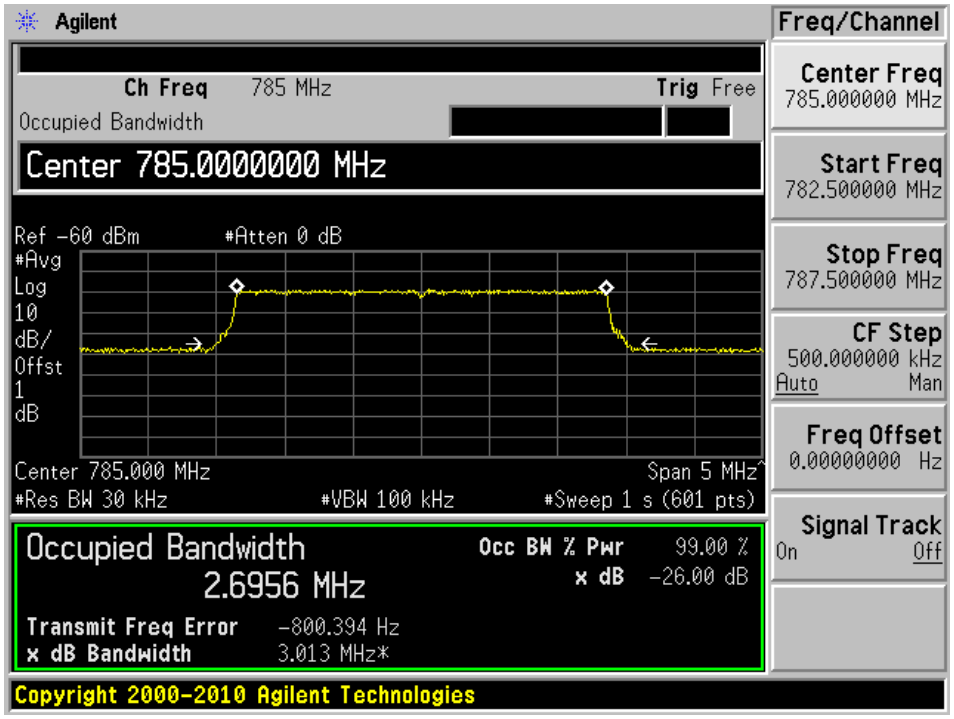


Output

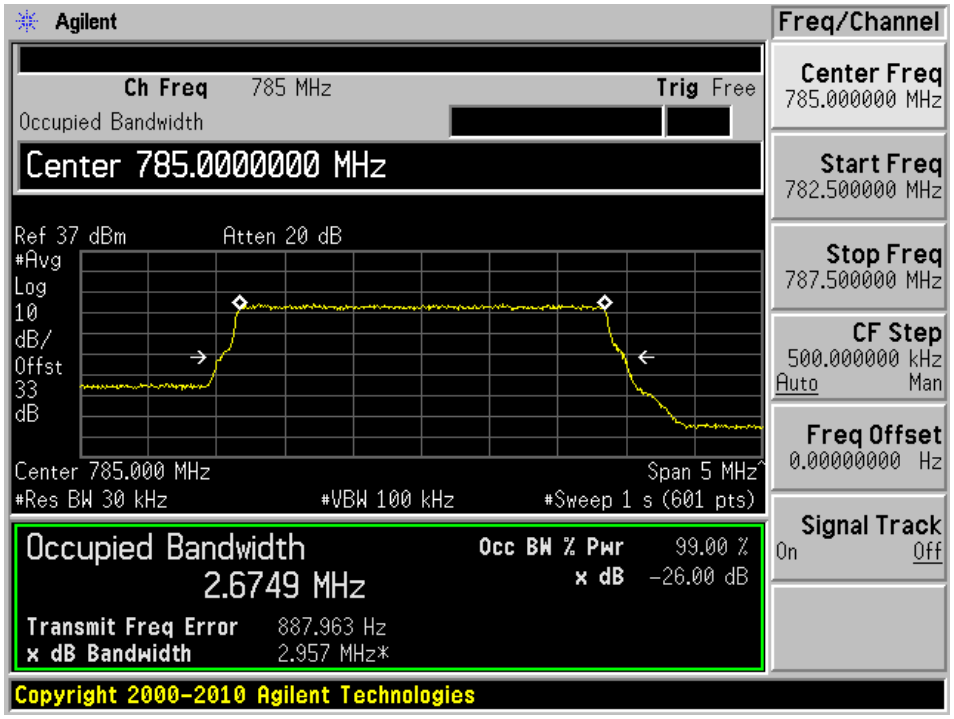


LTE-64QAM (3 MHz), Frequency: 785 MHz

Input

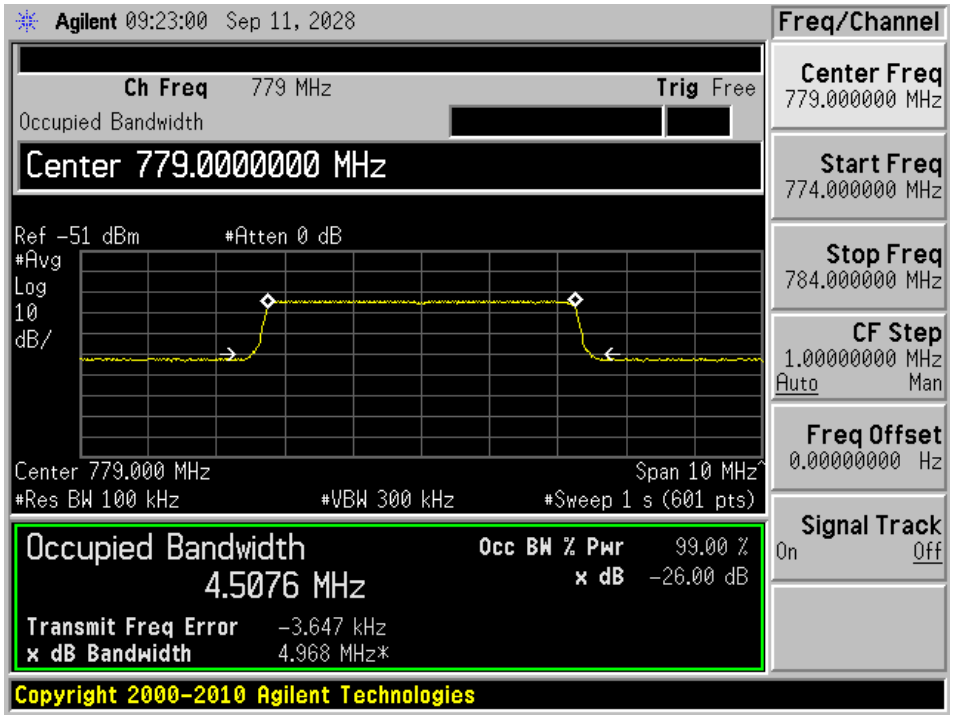


Output

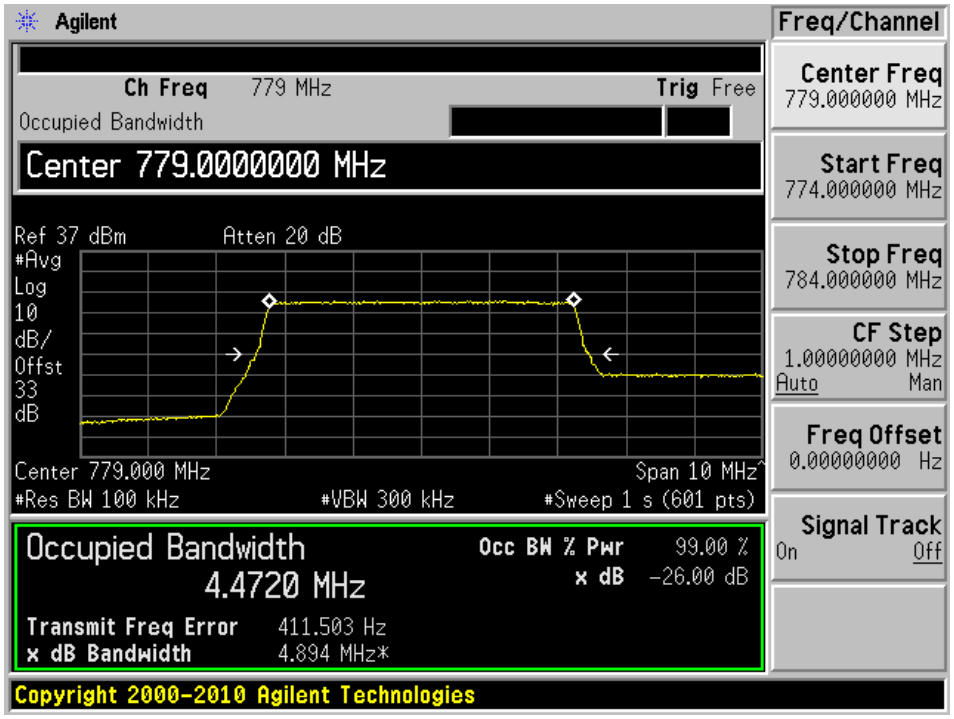


LTE-QPSK (5 MHz), Frequency: 779 MHz

Input

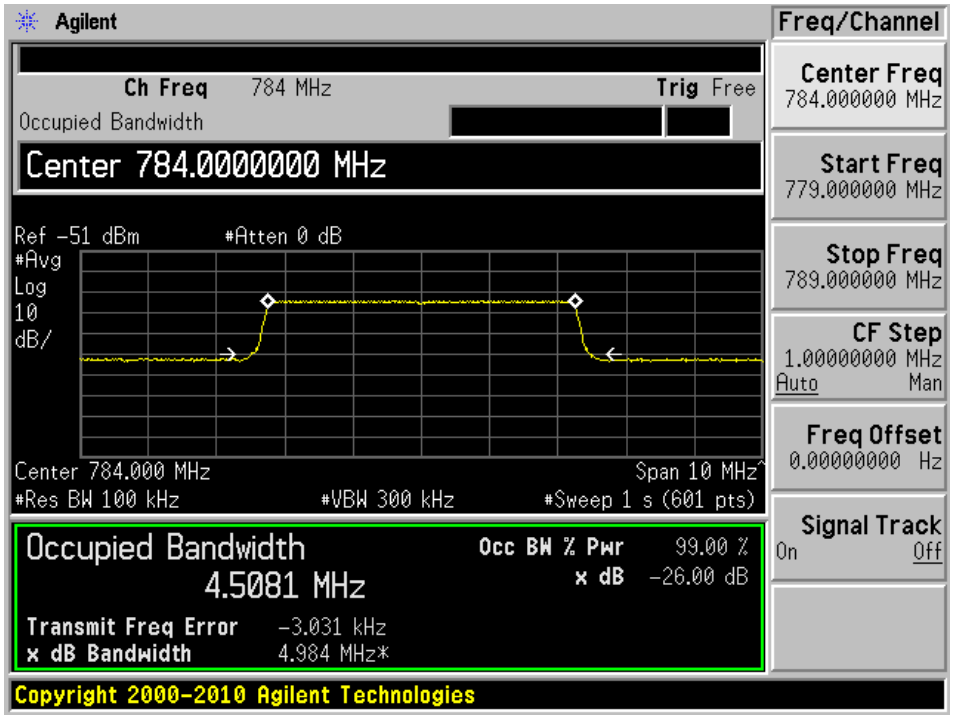


Output

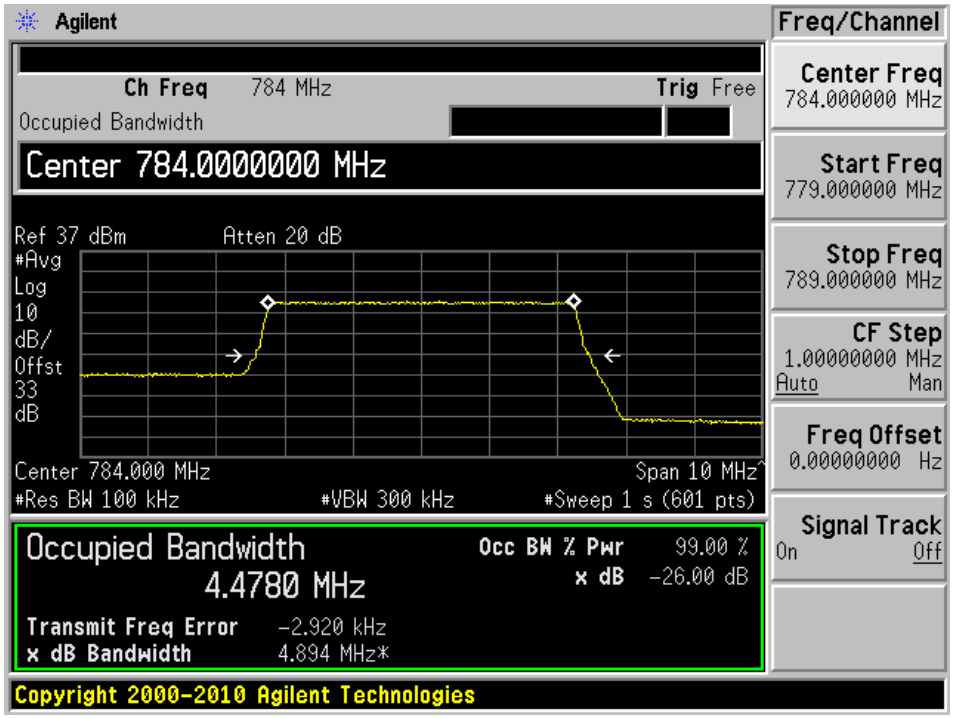


LTE-QPSK (5 MHz), Frequency: 784 MHz

Input

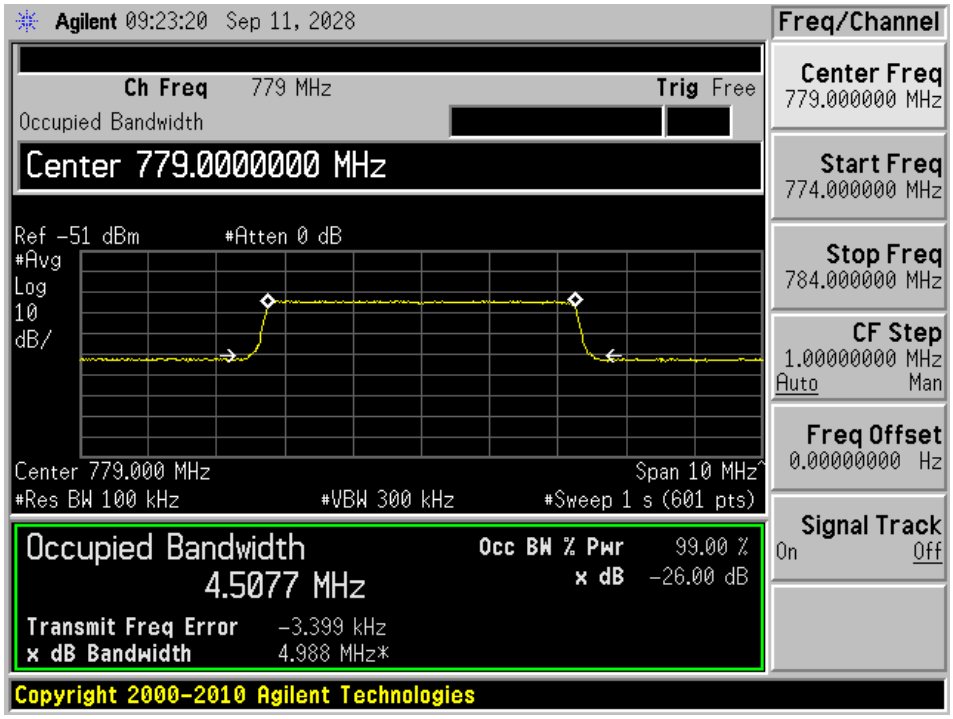


Output

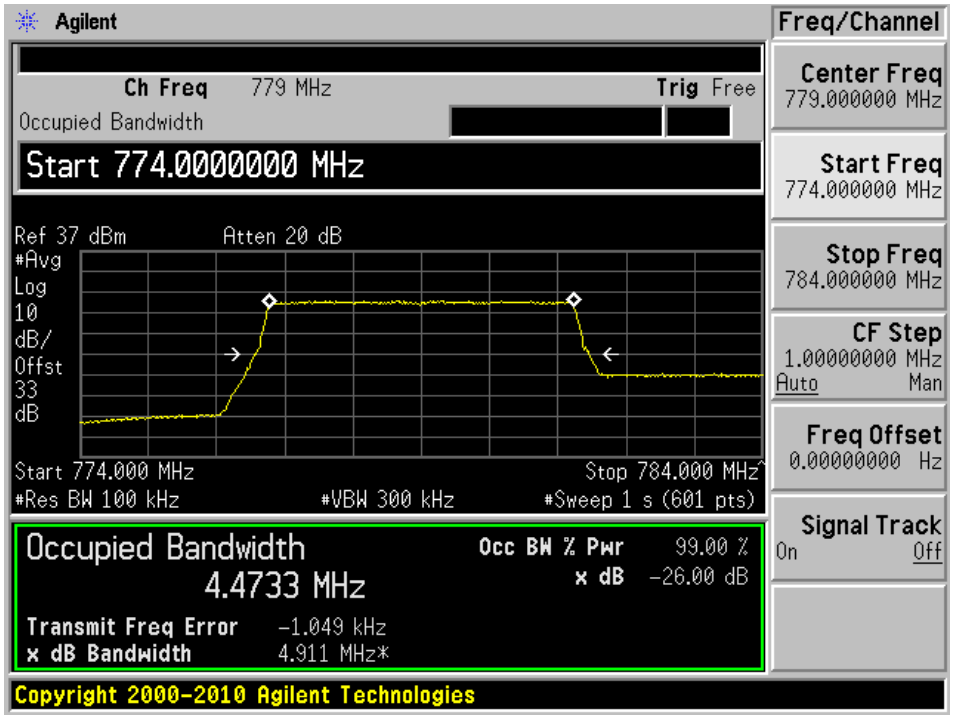


LTE-16QAM (5 MHz), Frequency: 779 MHz

Input

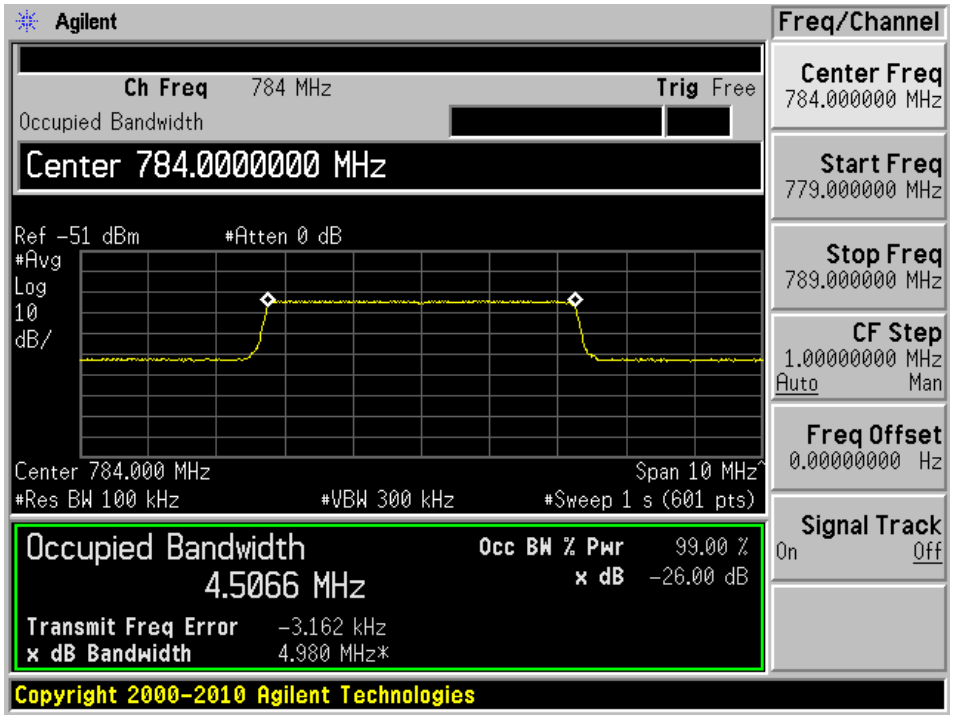


Output

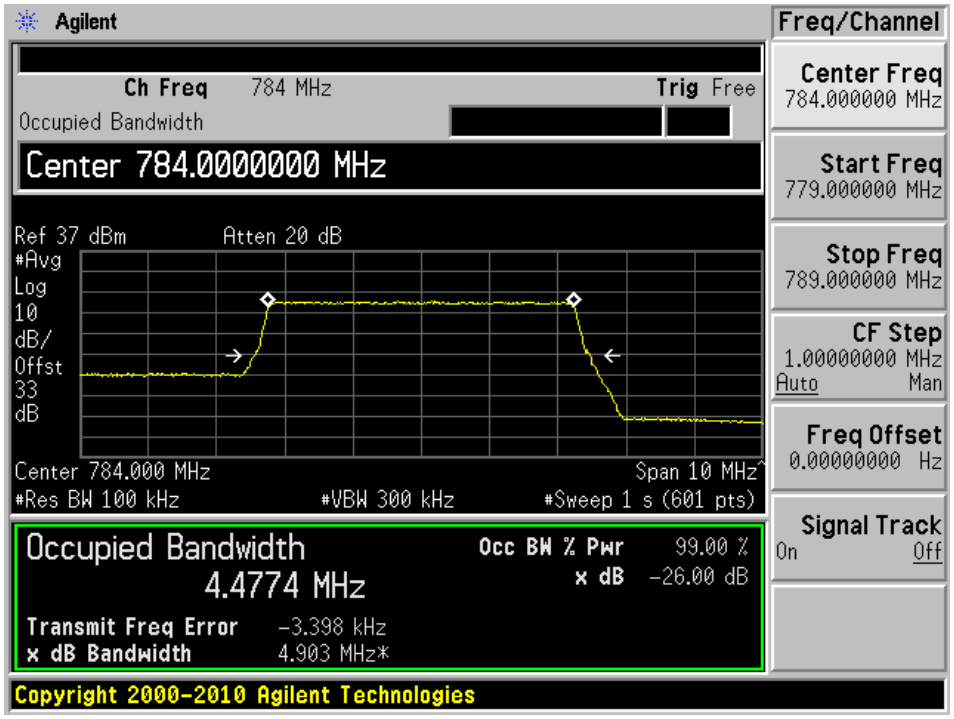


LTE-16QAM (5 MHz), Frequency: 784 MHz

Input

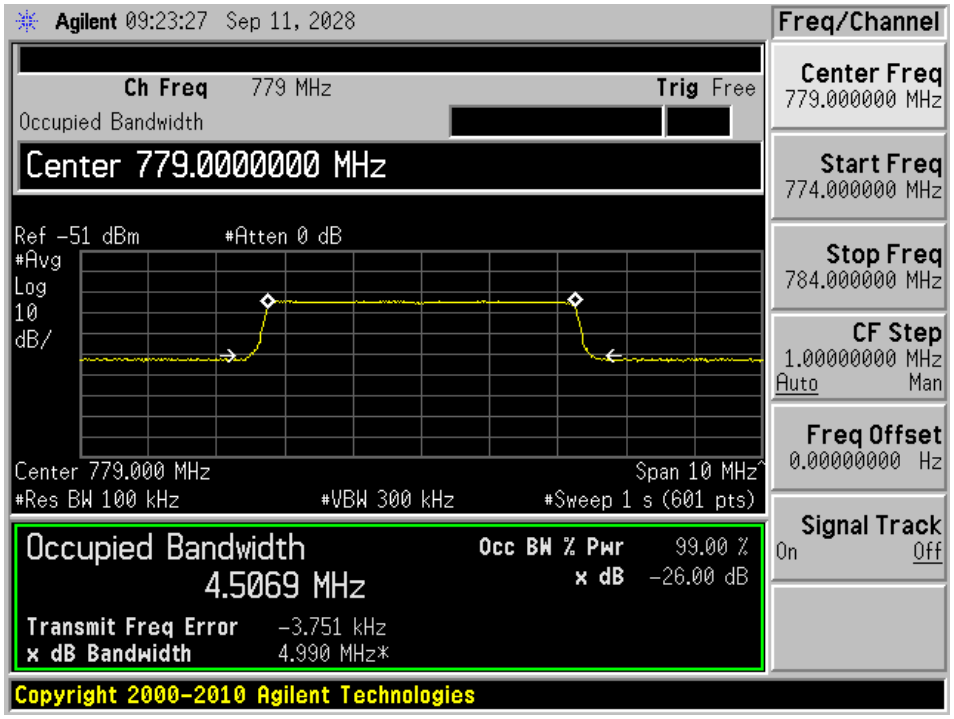


Output

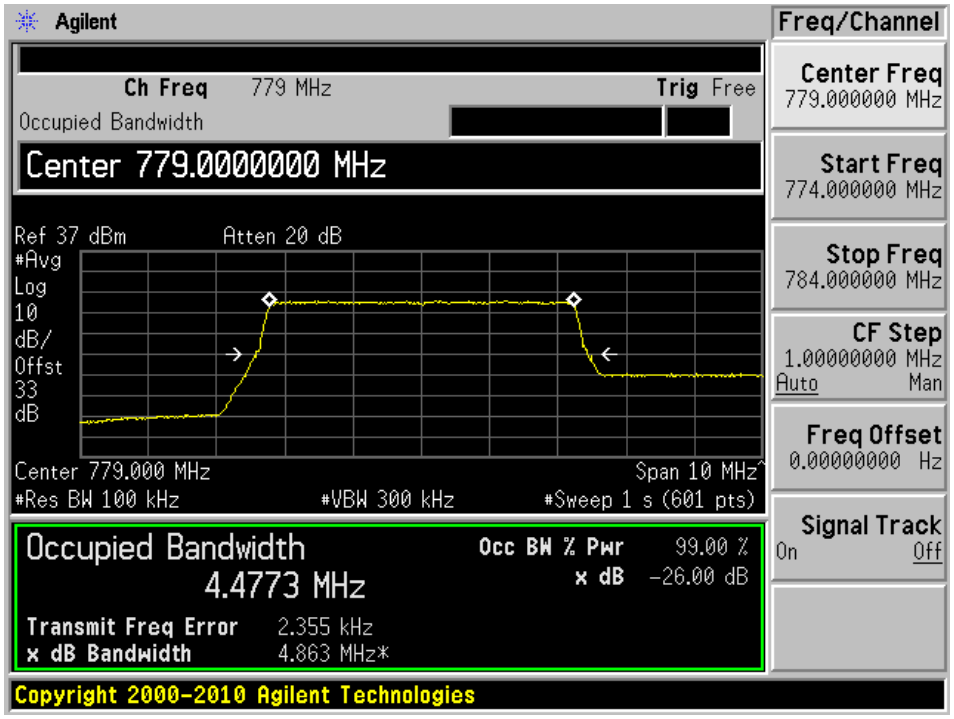


LTE-64QAM (5 MHz), Frequency: 779 MHz

Input

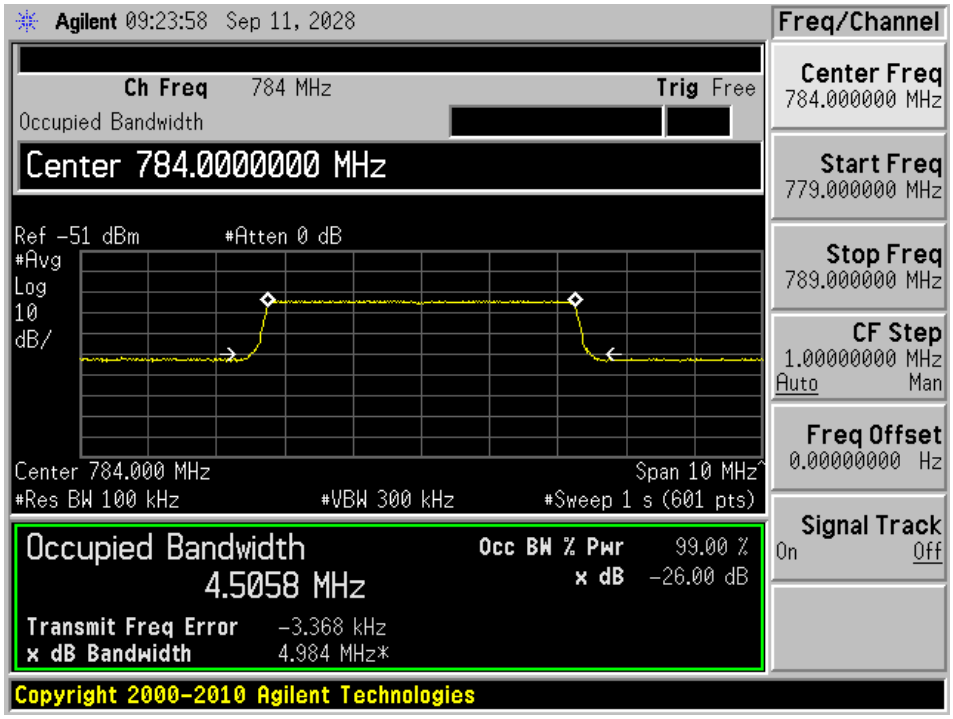


Output

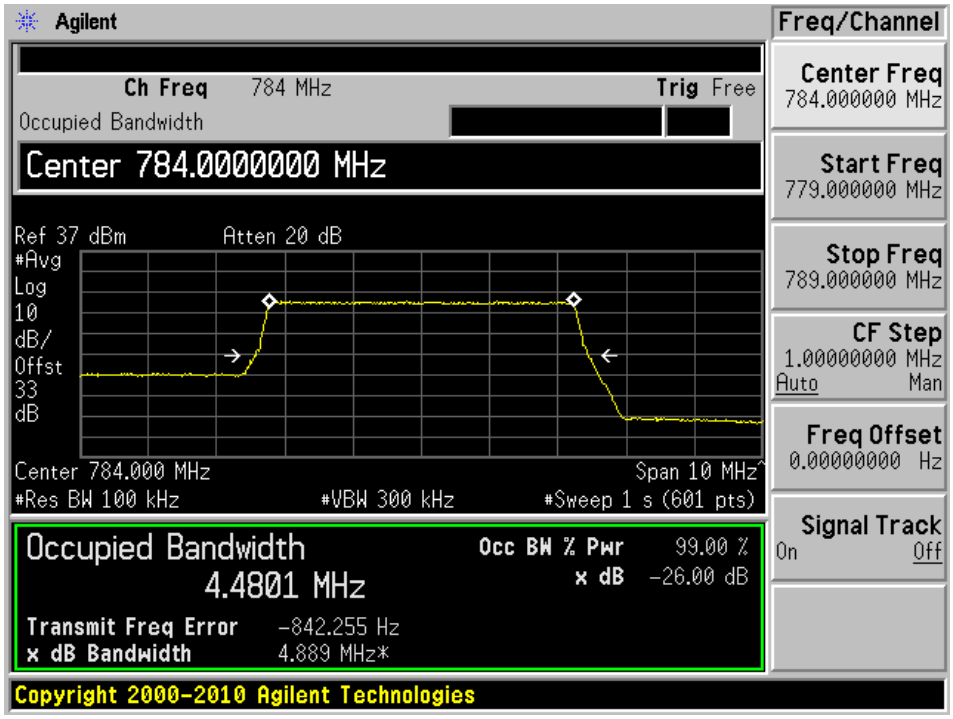


LTE-64QAM (5 MHz), Frequency: 784 MHz

Input

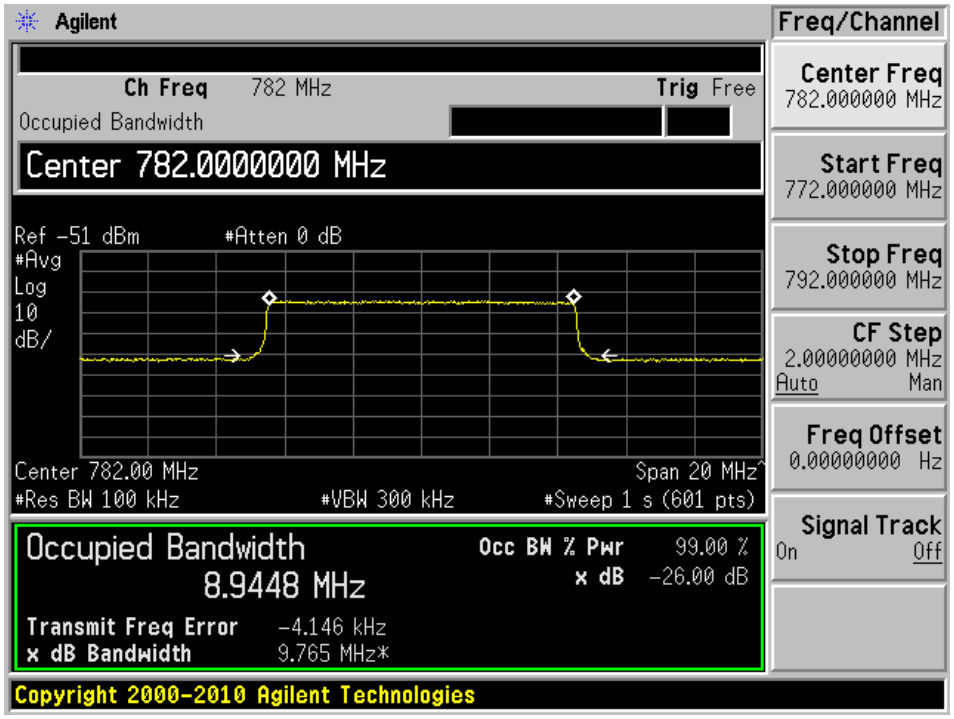


Output

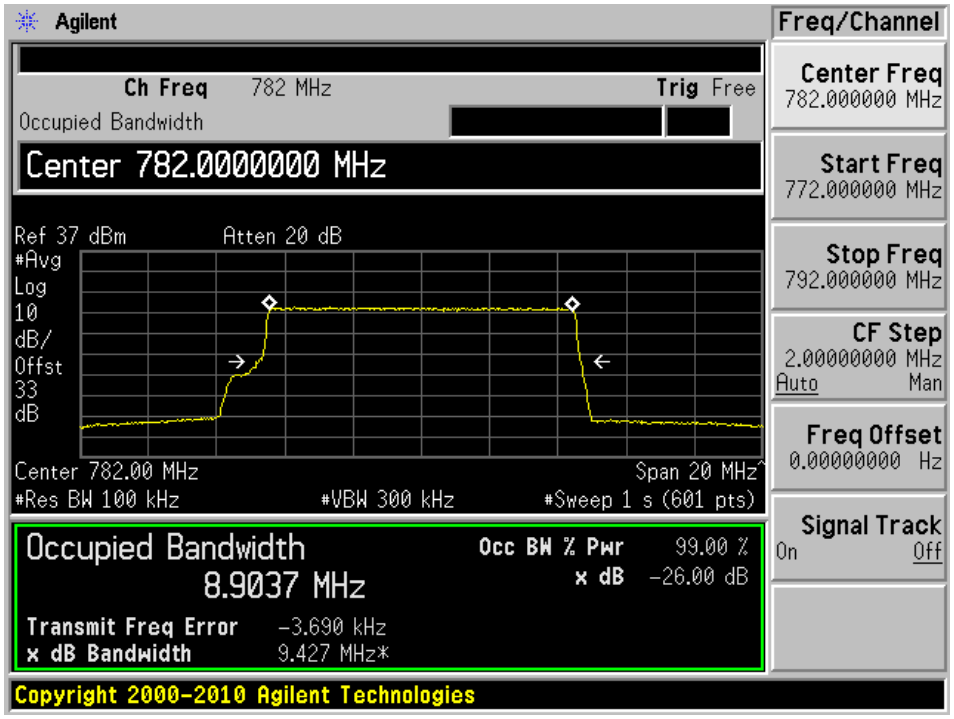


LTE-QPSK (10 MHz), Frequency: 782 MHz

Input

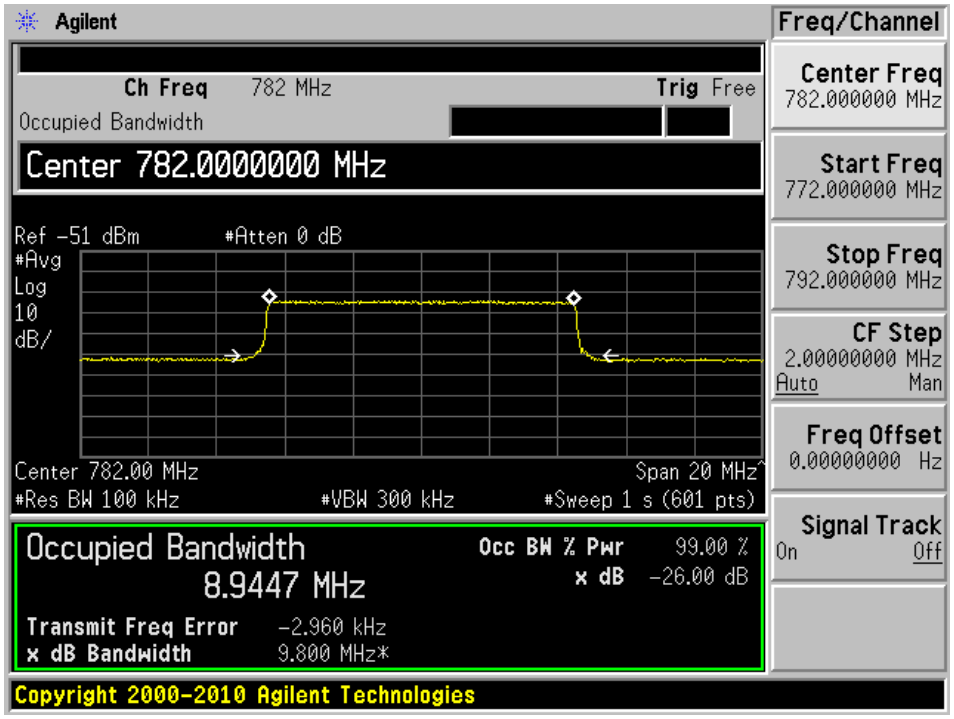


Output

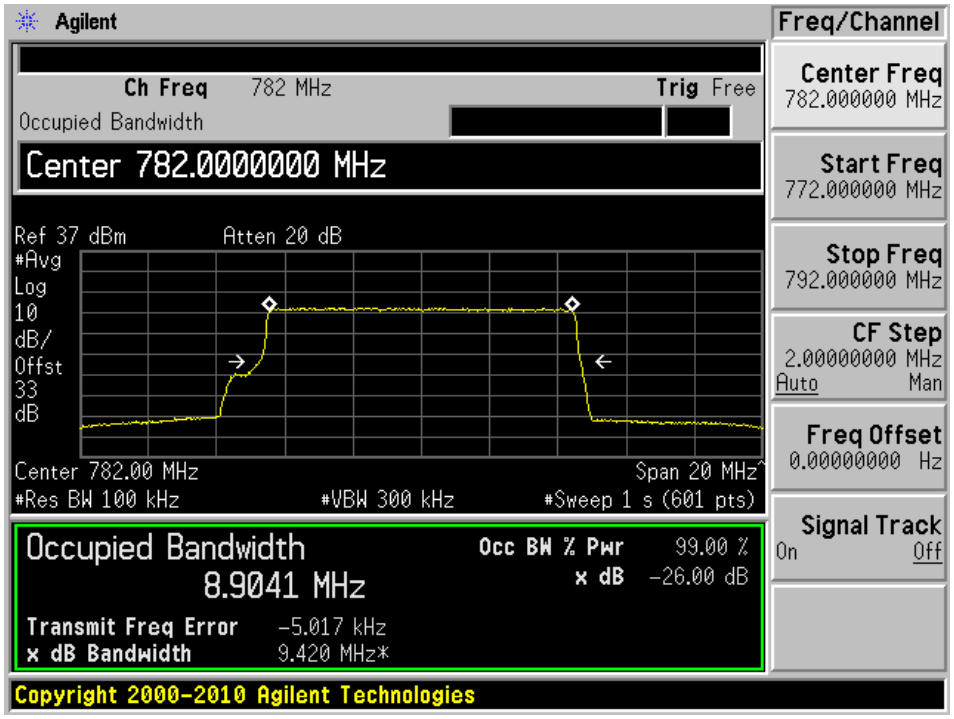


LTE-16QAM (10 MHz), Frequency: 782 MHz

Input

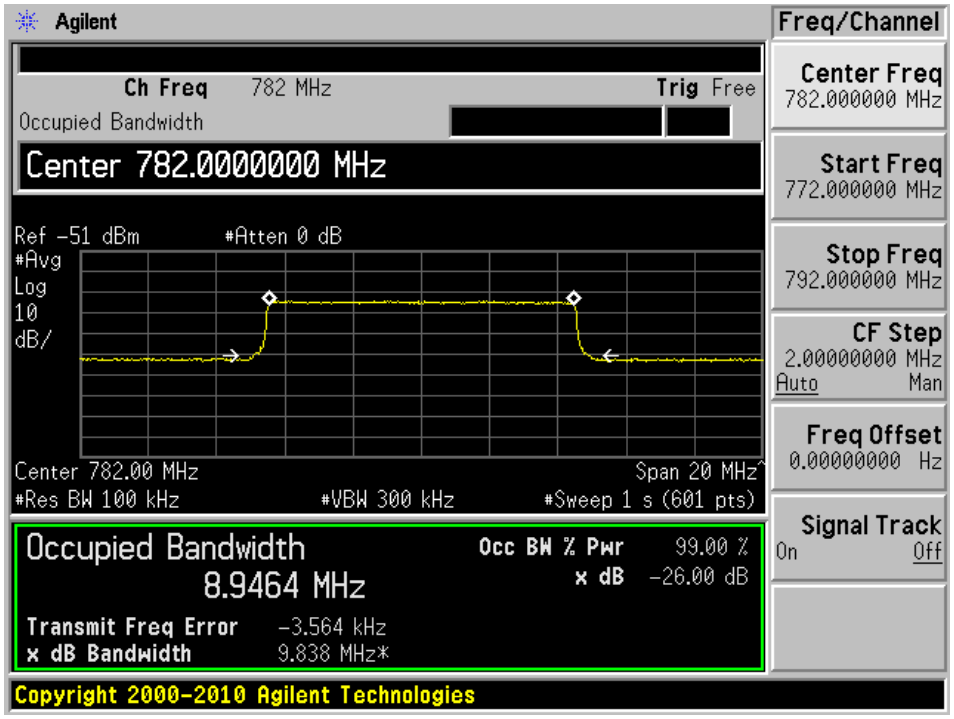


Output

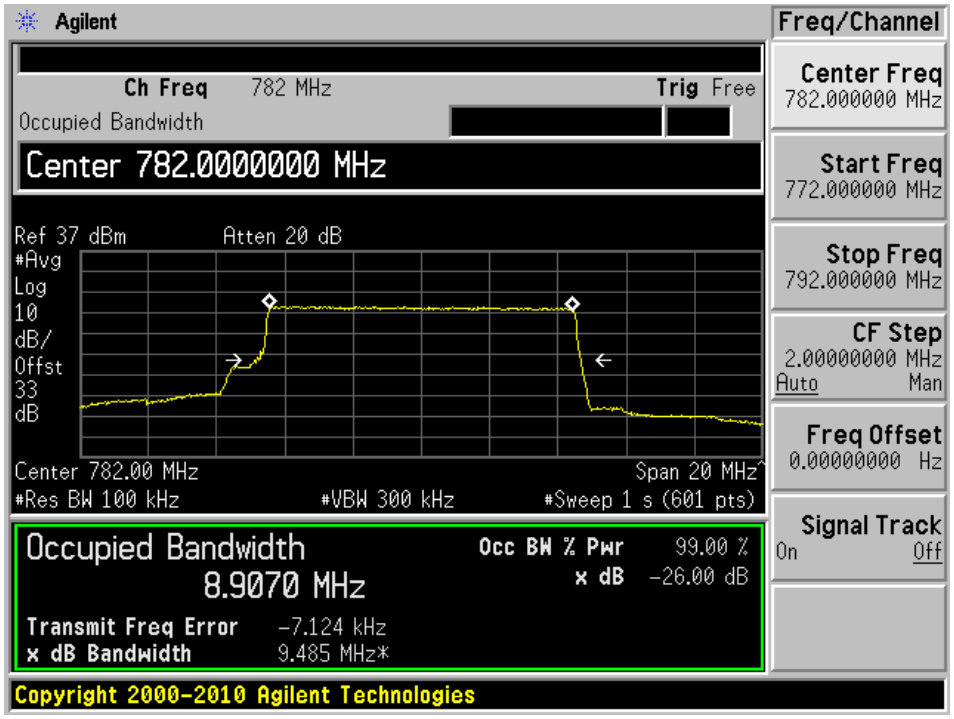


LTE-64QAM (10 MHz), Frequency: 782 MHz

Input



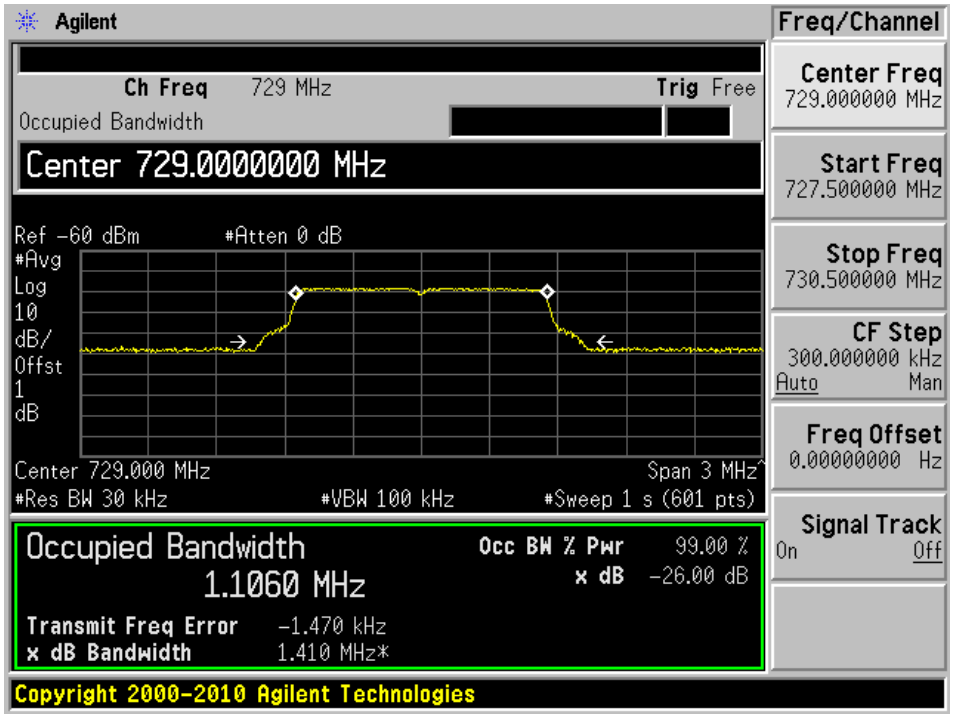
Output



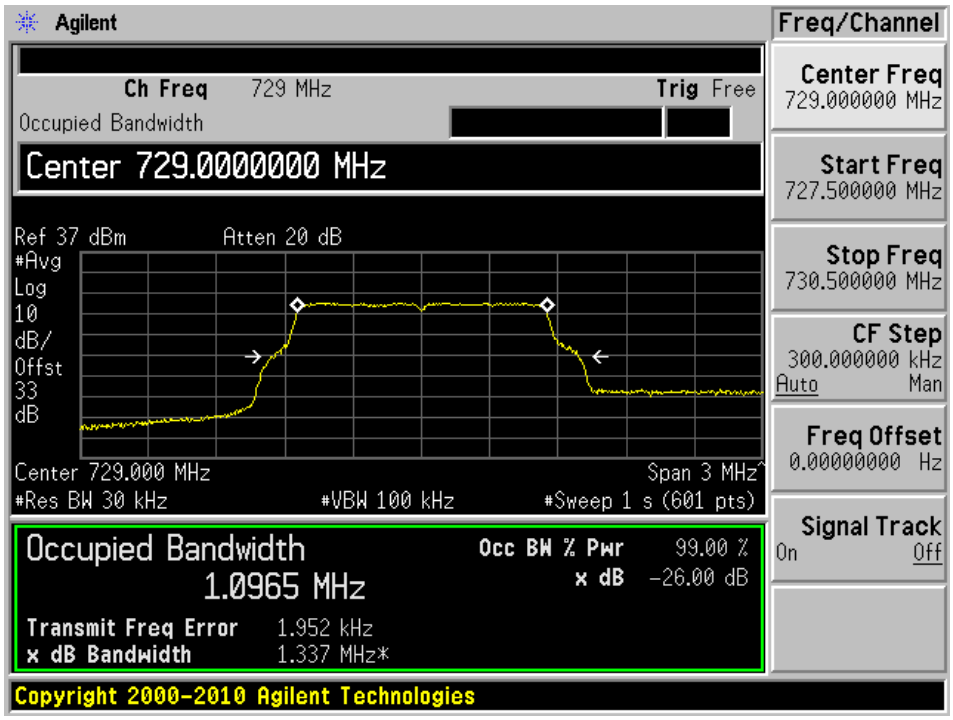
DL: 728-740 MHz

LTE-QPSK (1.4 MHz), Frequency: 729 MHz

Input

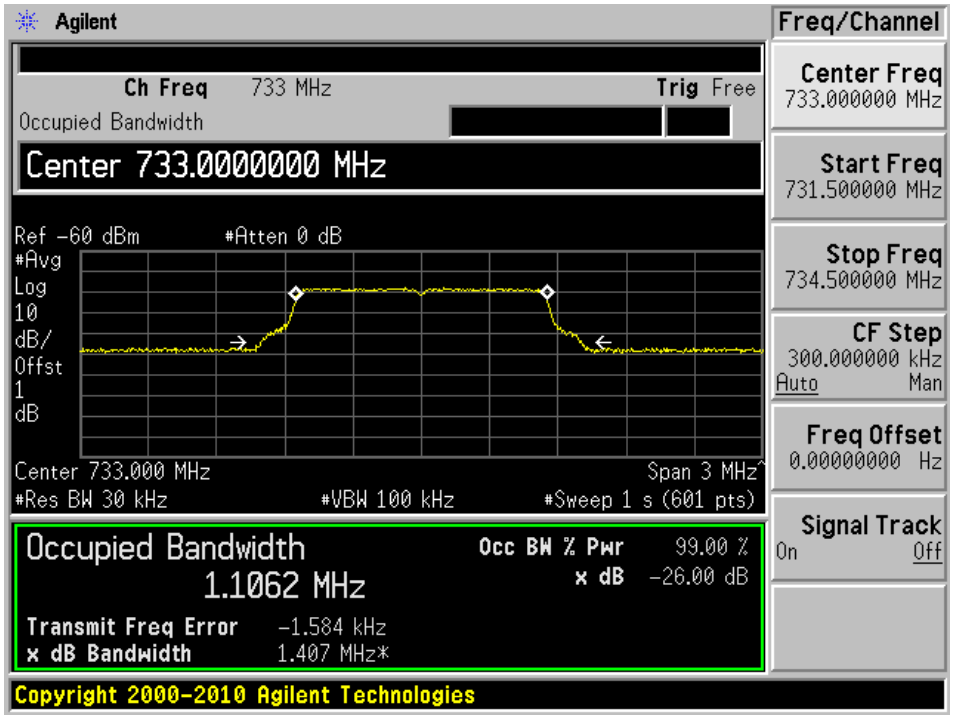


Output

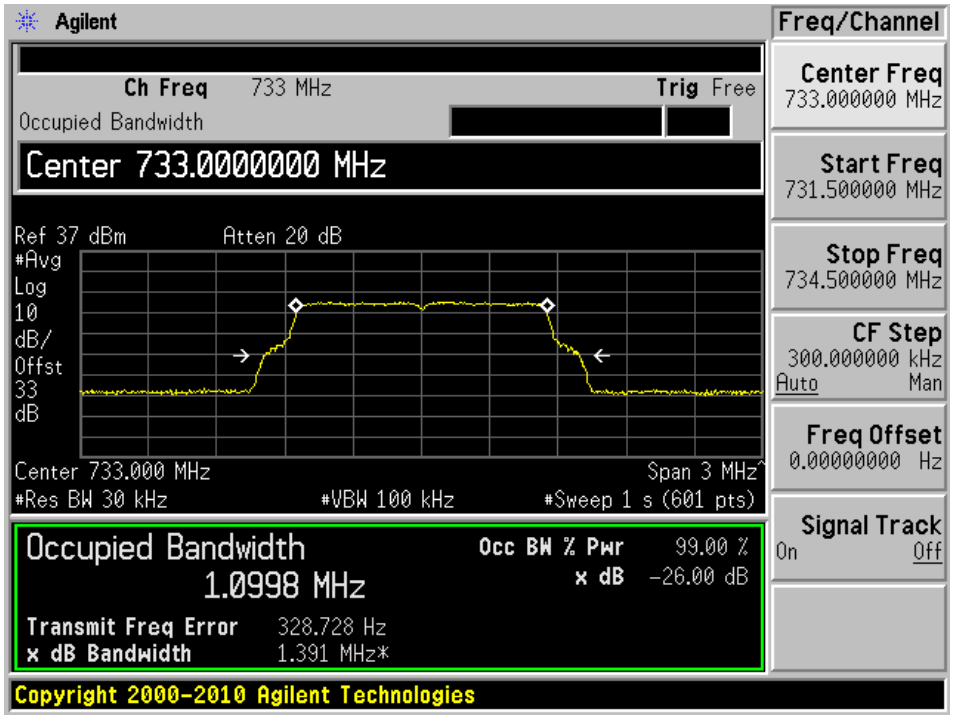


LTE-QPSK (1.4 MHz), Frequency: 733 MHz

Input

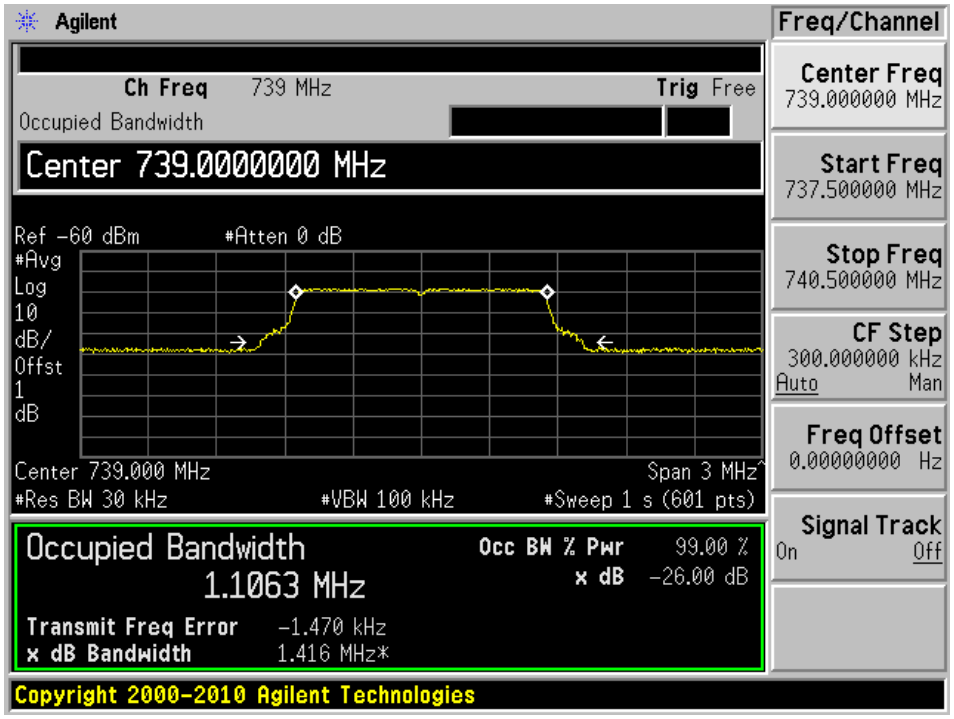


Output

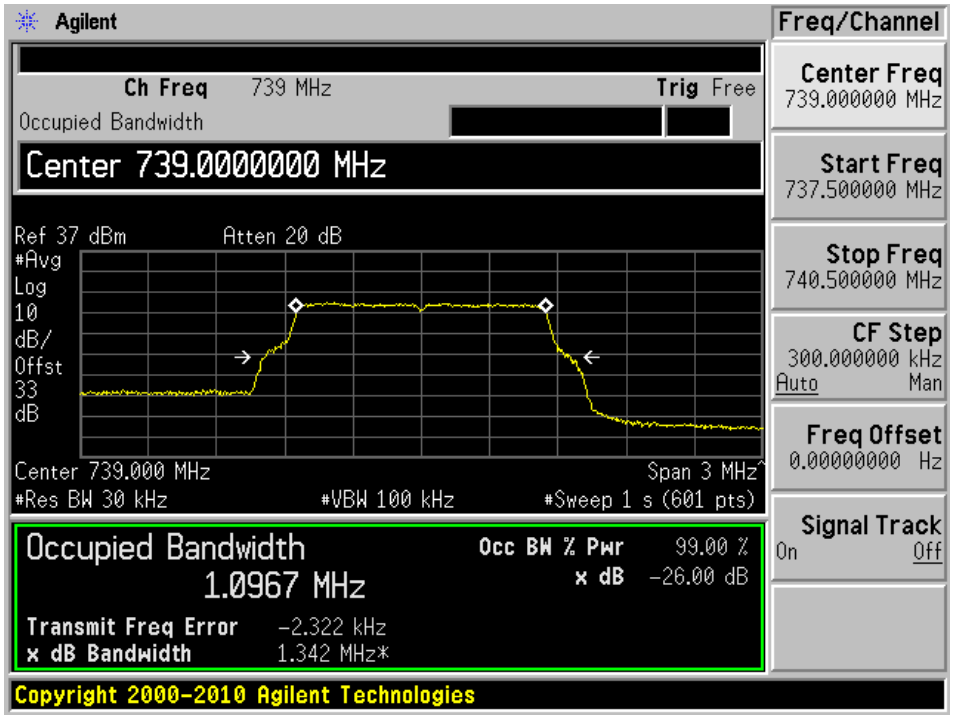


LTE-QPSK (1.4 MHz), Frequency: 739 MHz

Input

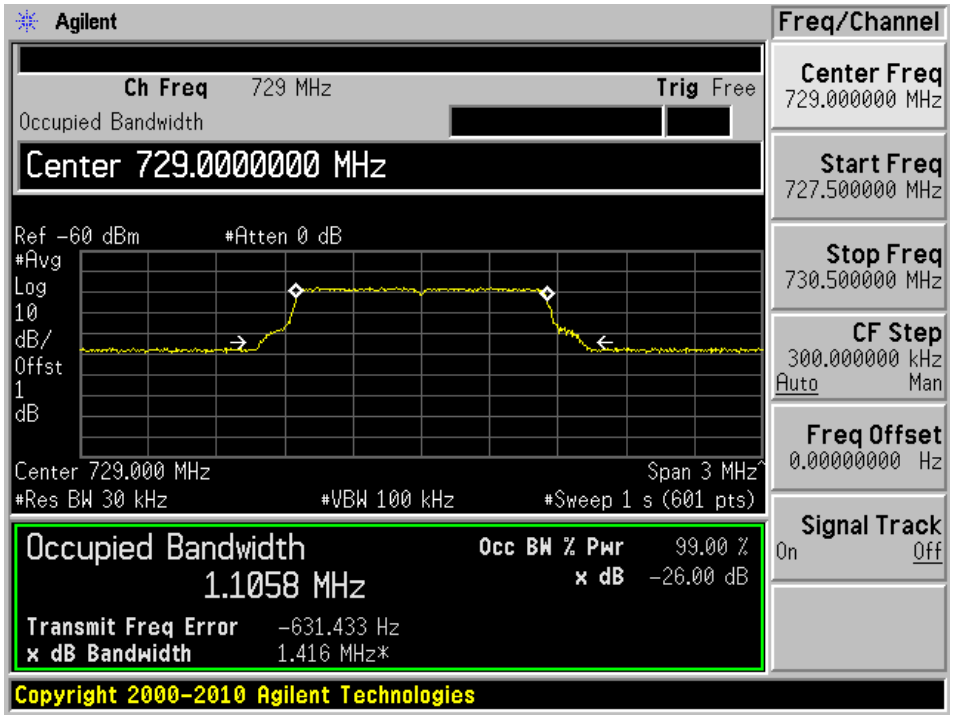


Output

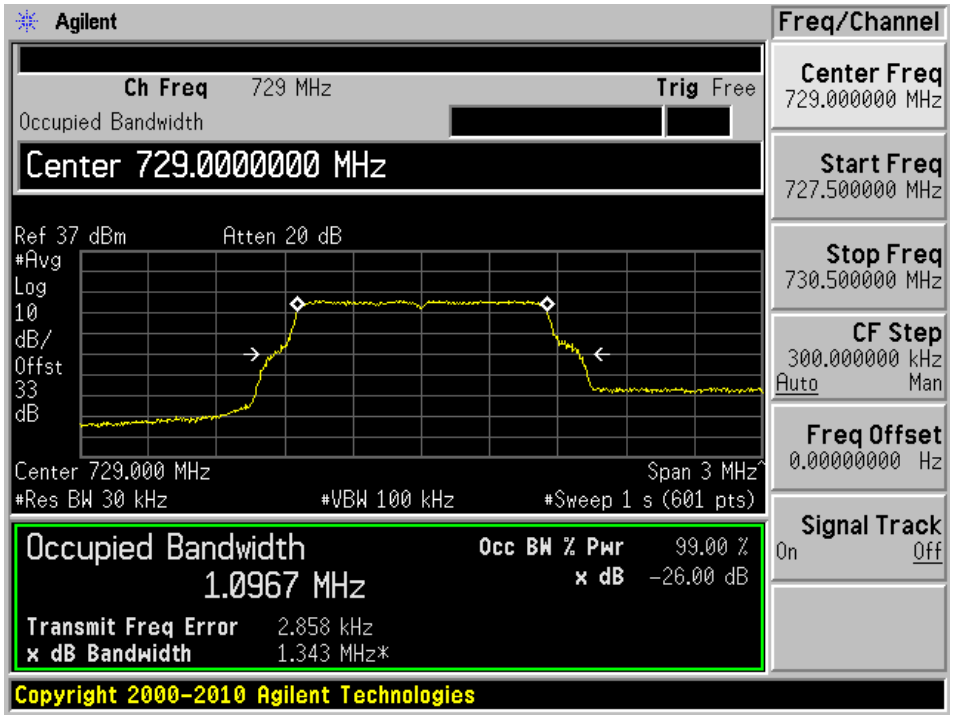


LTE-16QAM (1.4 MHz), Frequency: 729 MHz

Input

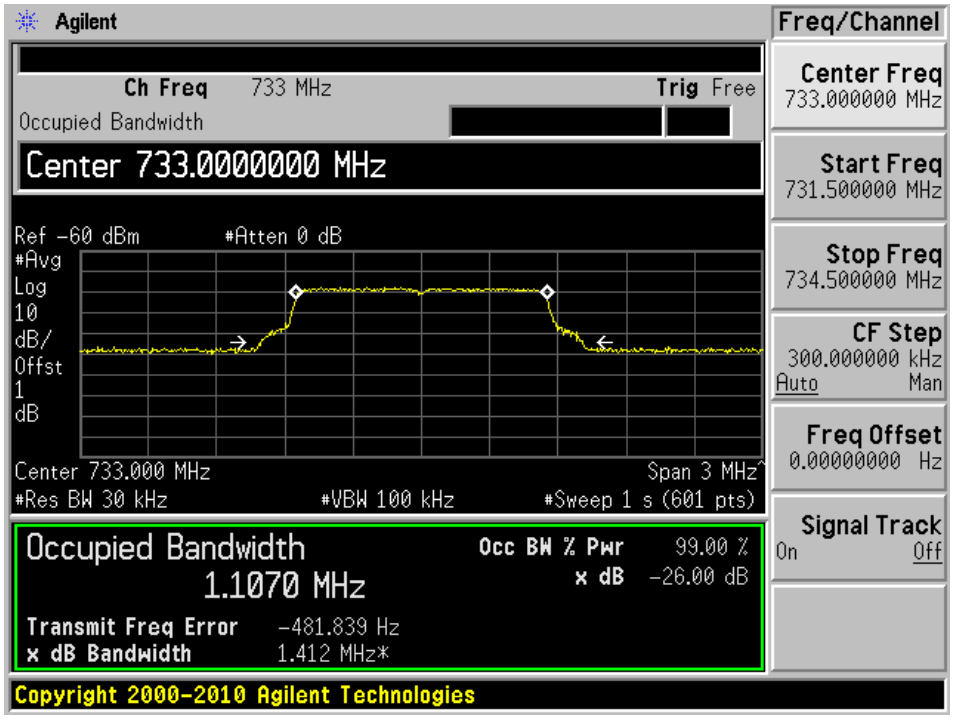


Output

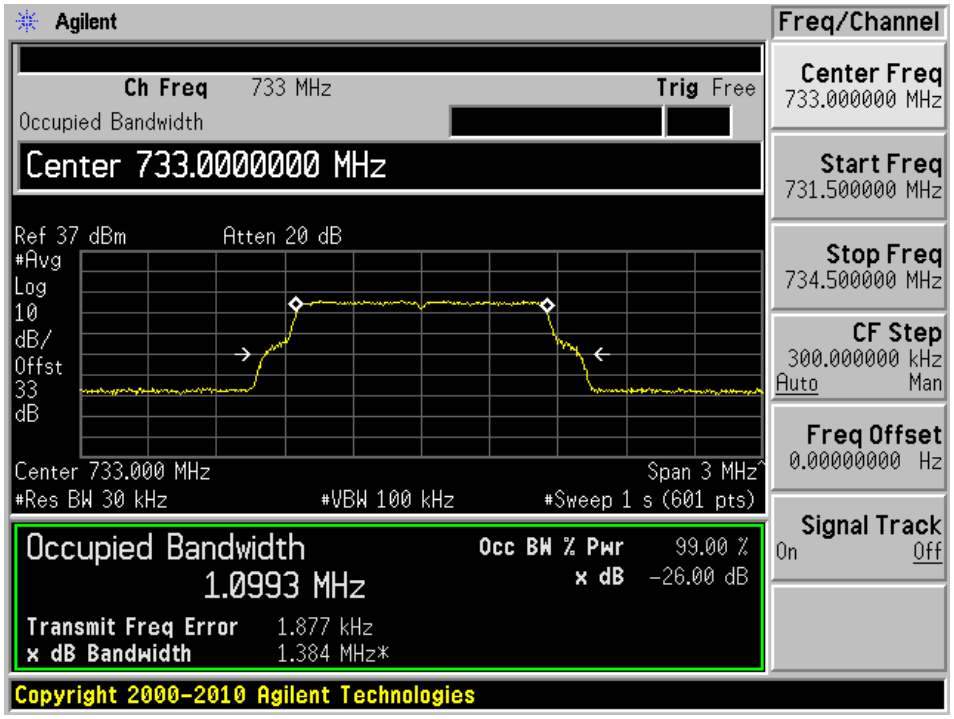


LTE-16QAM (1.4 MHz), Frequency: 733 MHz

Input

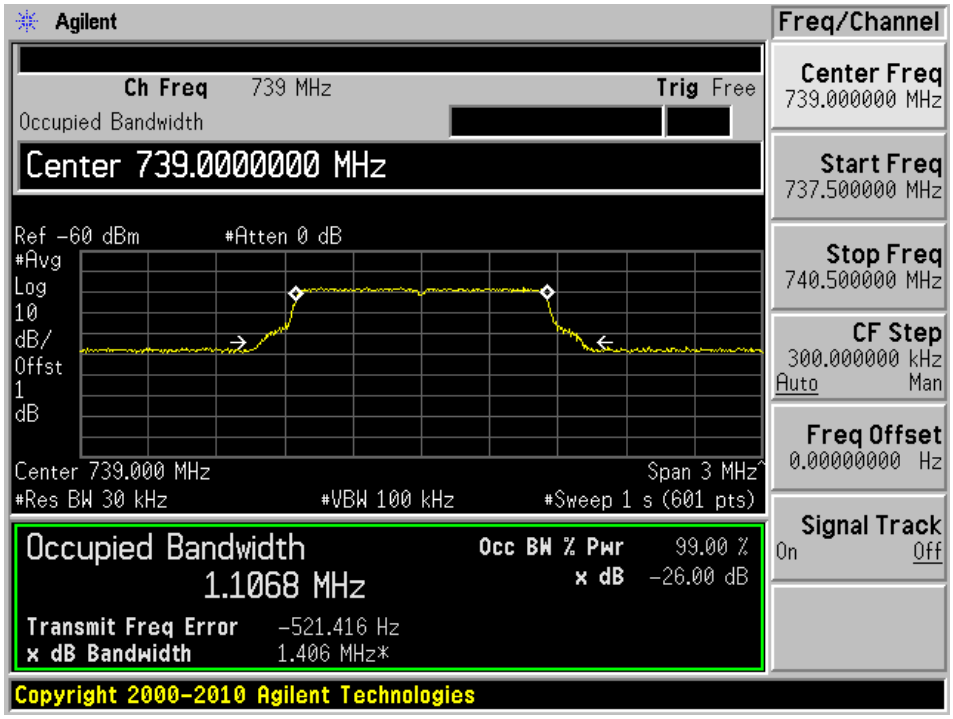


Output

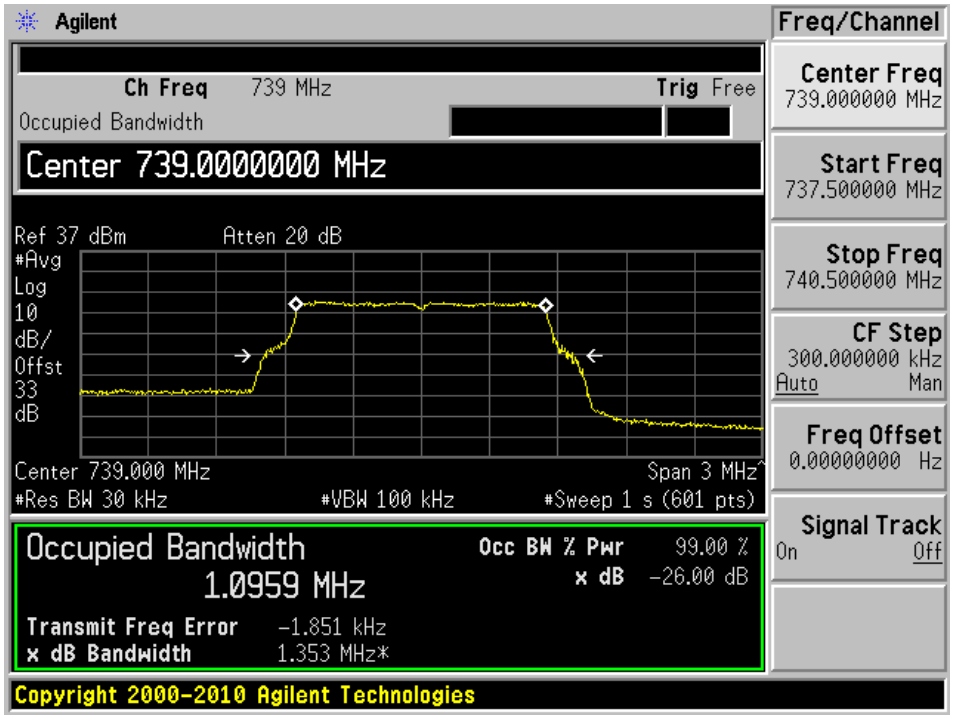


LTE-16QAM (1.4 MHz), Frequency: 739 MHz

Input

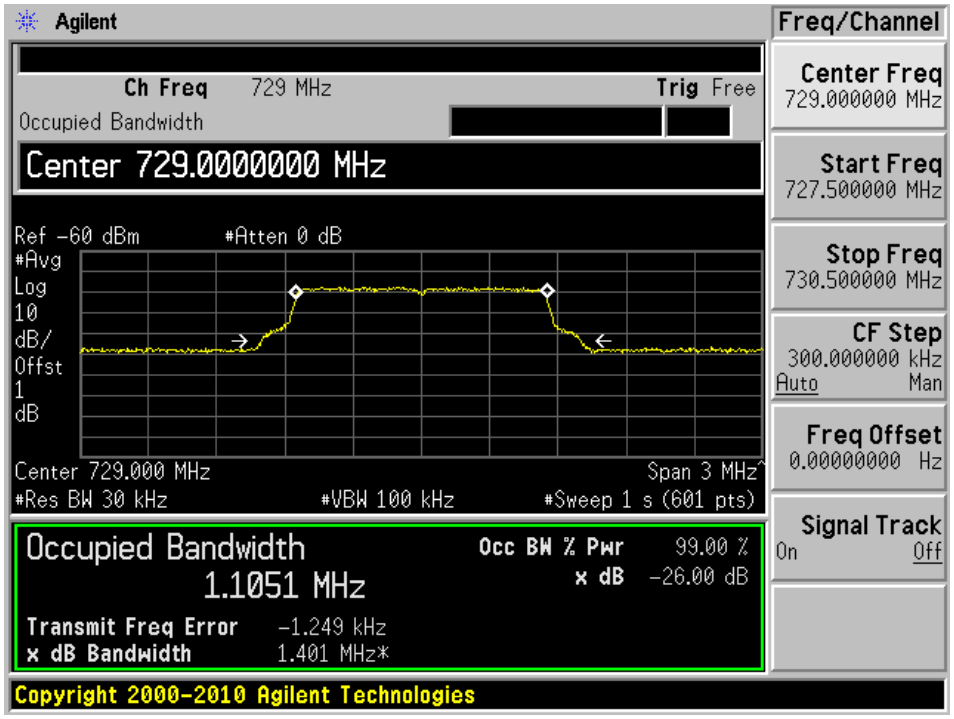


Output

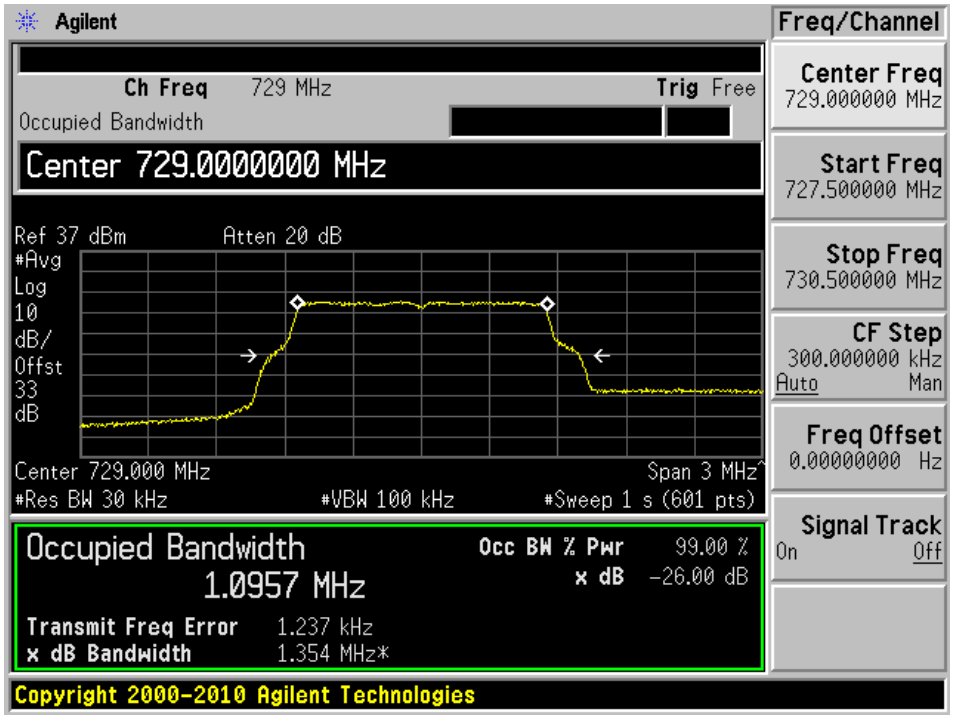


LTE-64QAM (1.4 MHz), Frequency: 729 MHz

Input

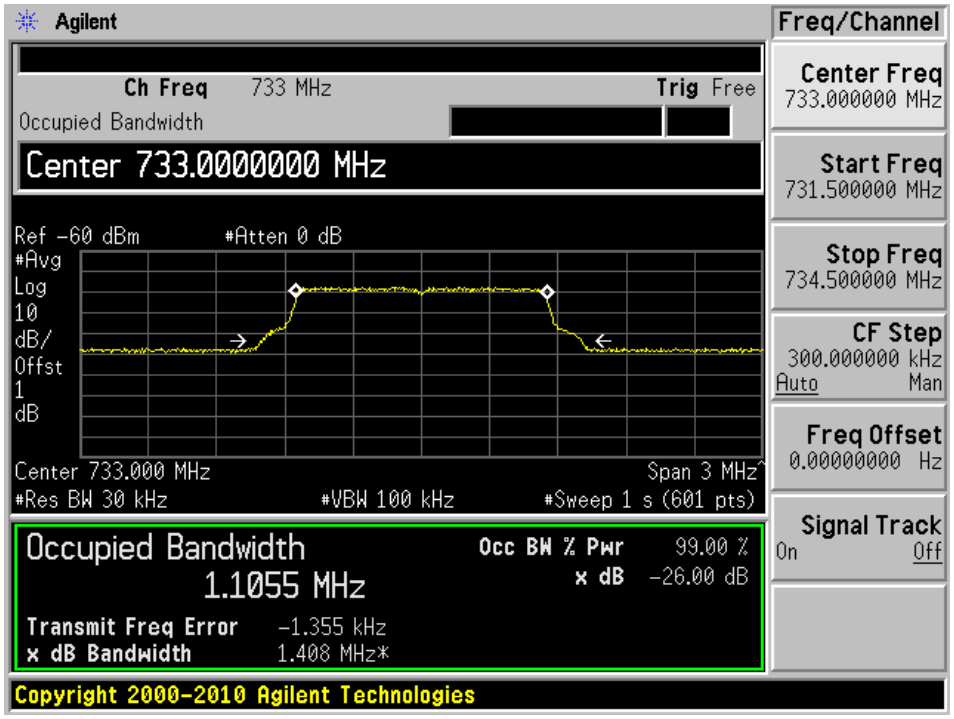


Output

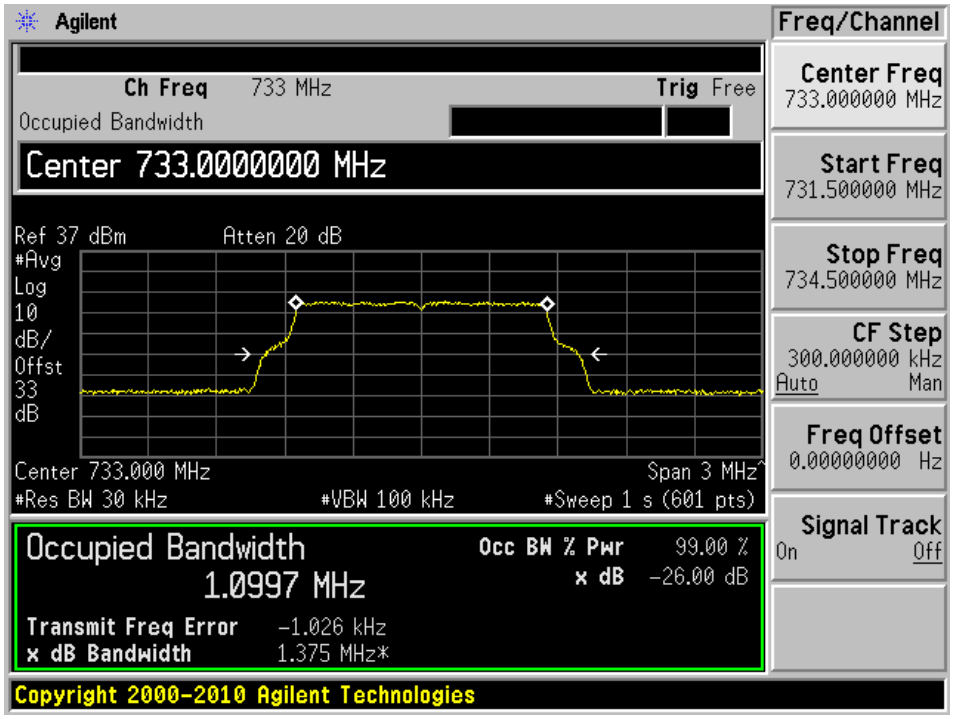


LTE-64QAM (1.4 MHz), Frequency: 733 MHz

Input

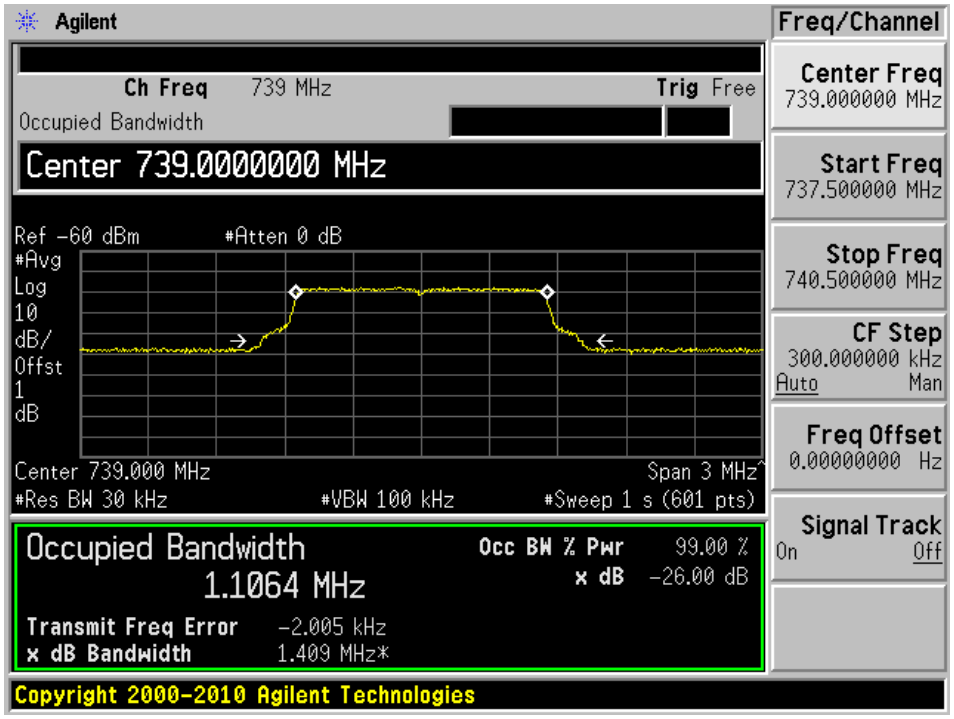


Output

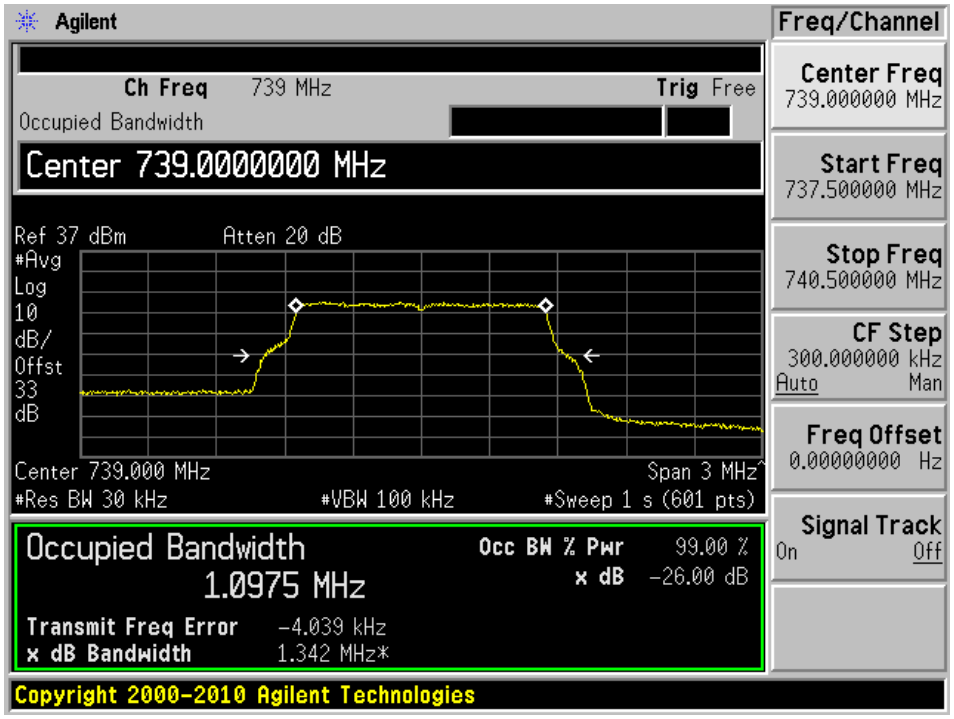


LTE-64QAM (1.4 MHz), Frequency: 739 MHz

Input

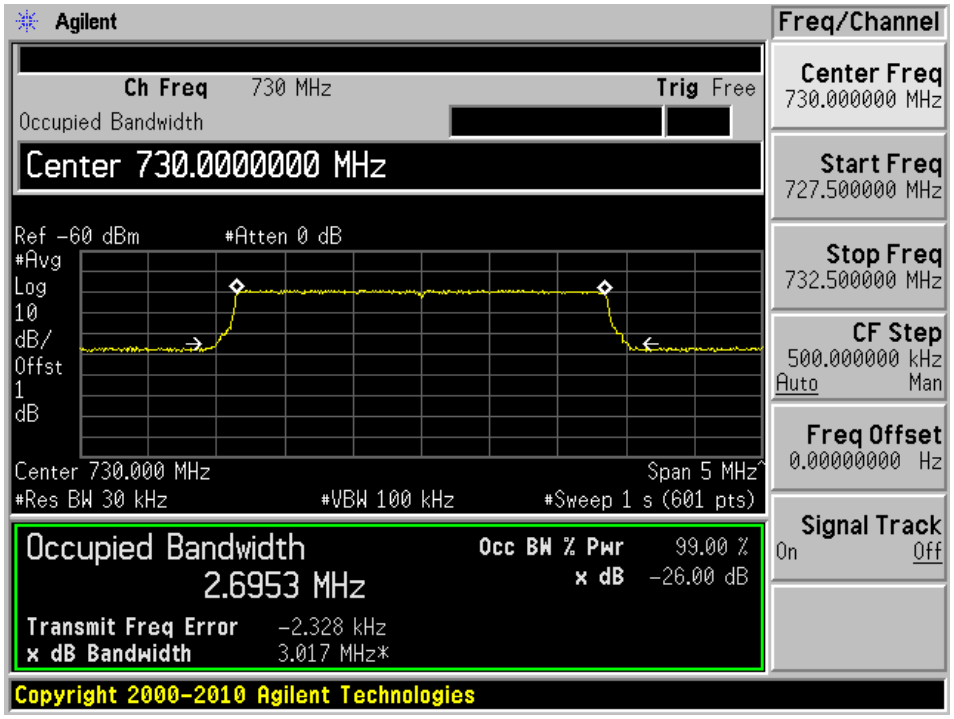


Output

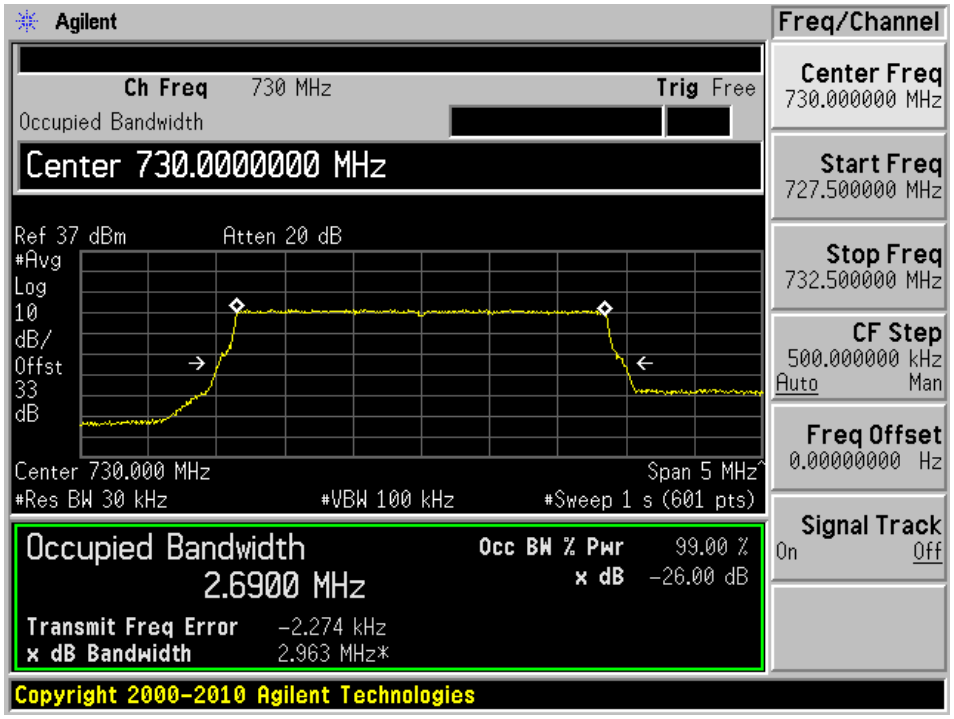


LTE-QPSK (3 MHz), Frequency: 730 MHz

Input

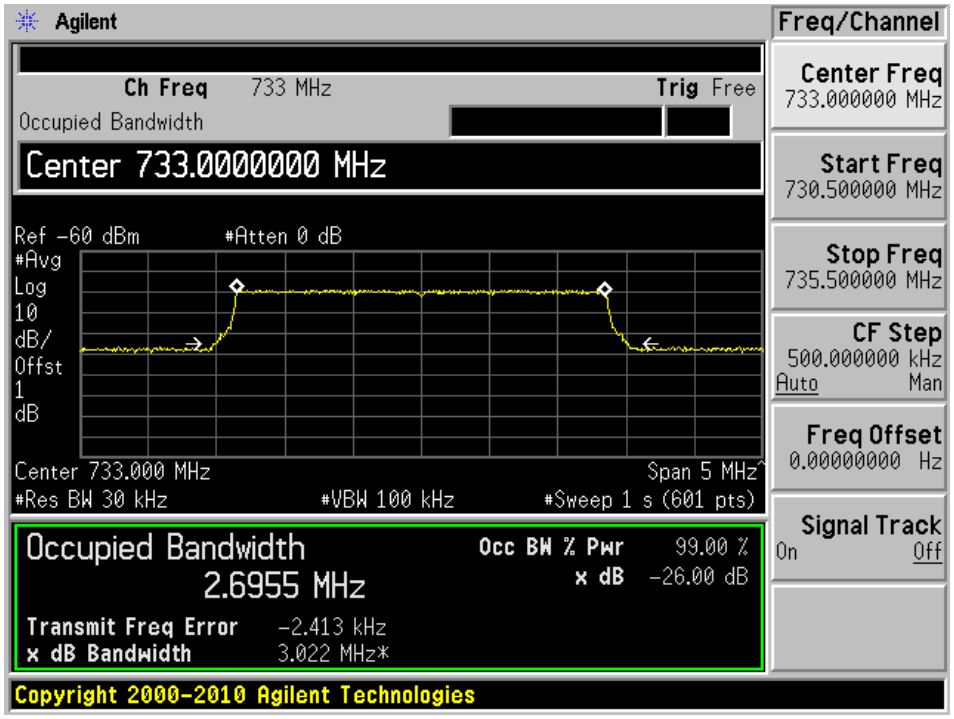


Output

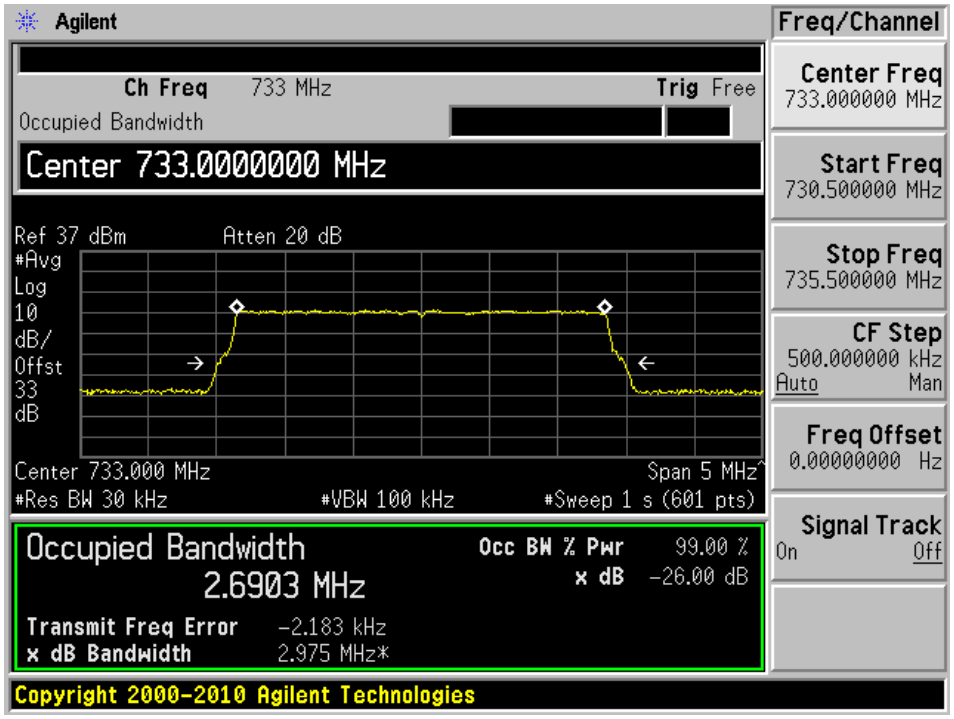


LTE-QPSK (3 MHz), Frequency: 733 MHz

Input

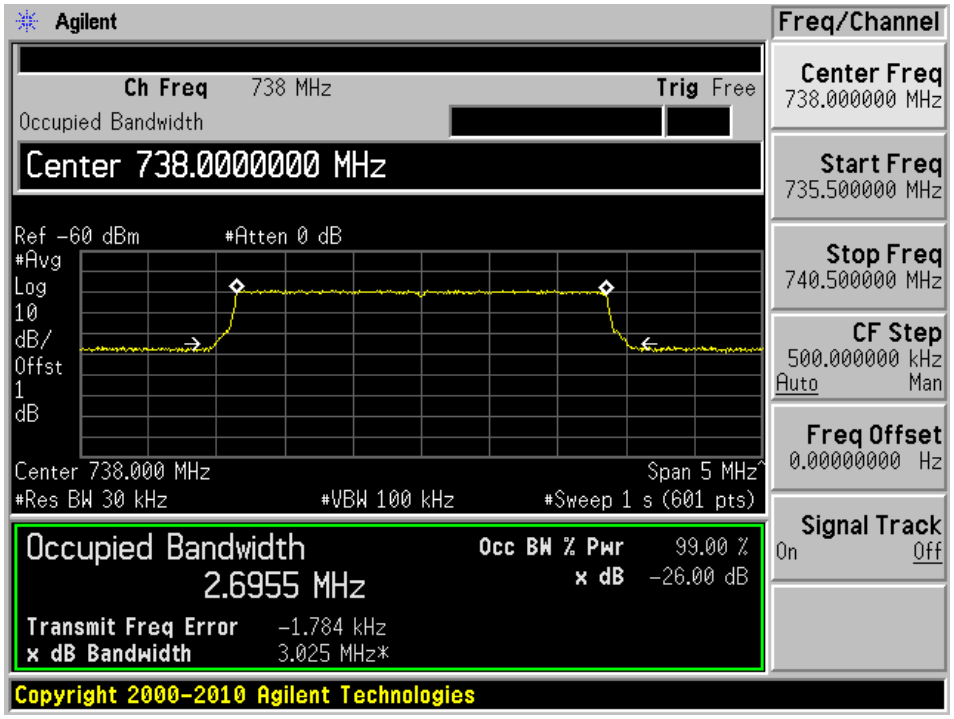


Output

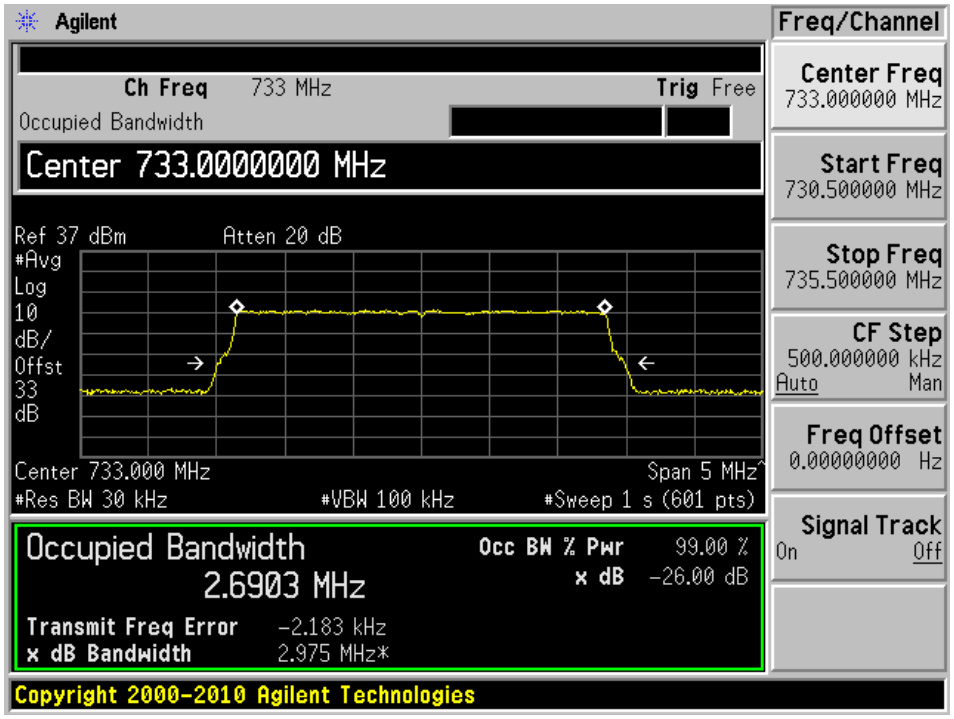


LTE-QPSK (3 MHz), Frequency: 738 MHz

Input

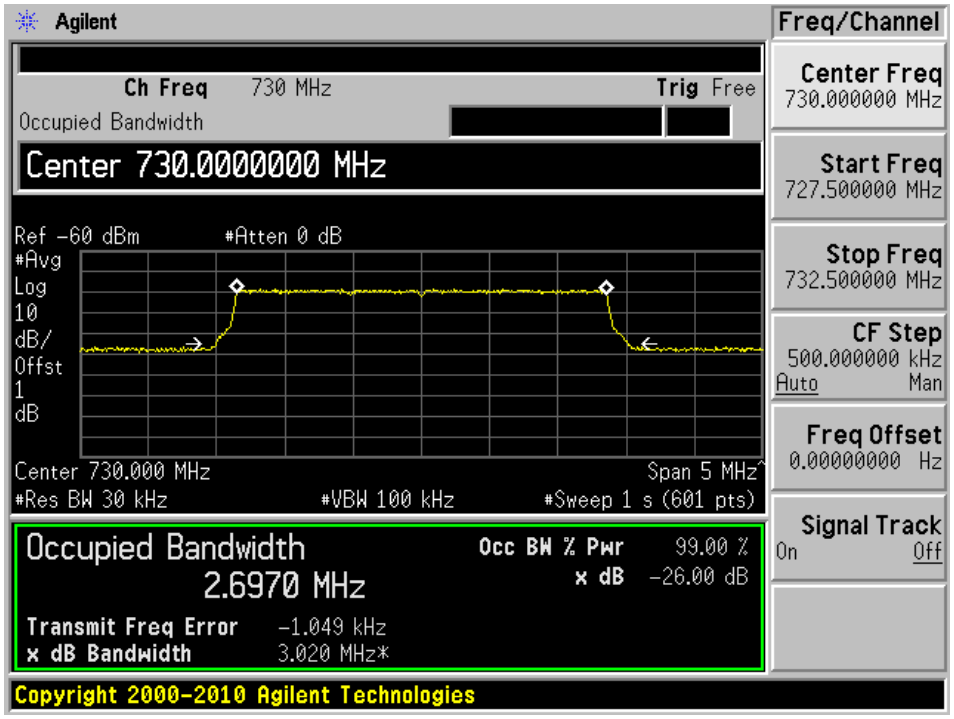


Output

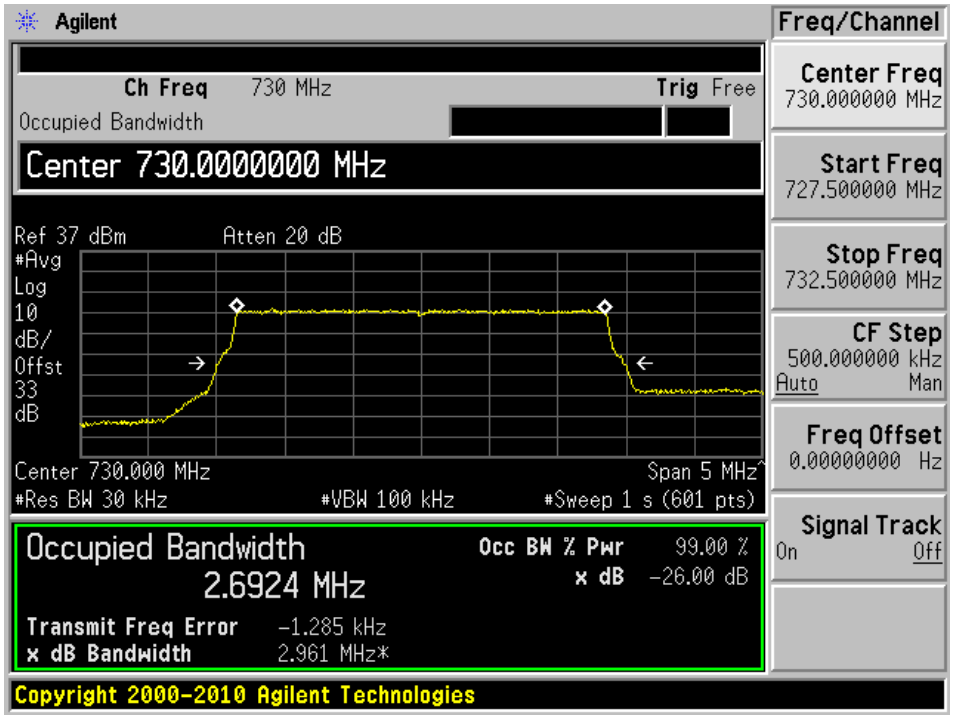


LTE-16QAM (3 MHz), Frequency: 730 MHz

Input

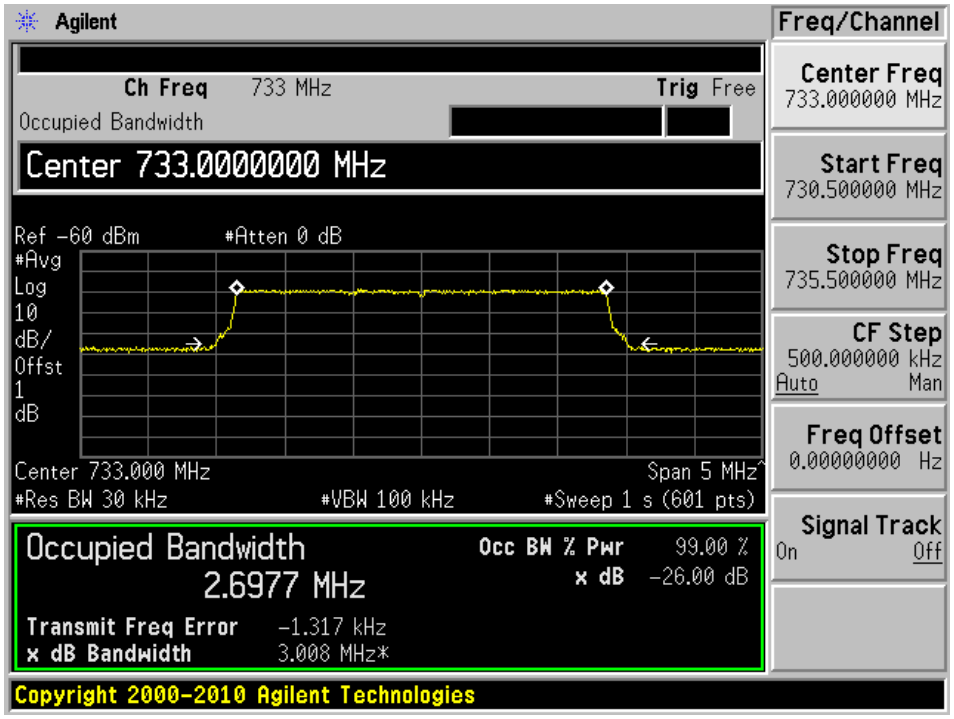


Output

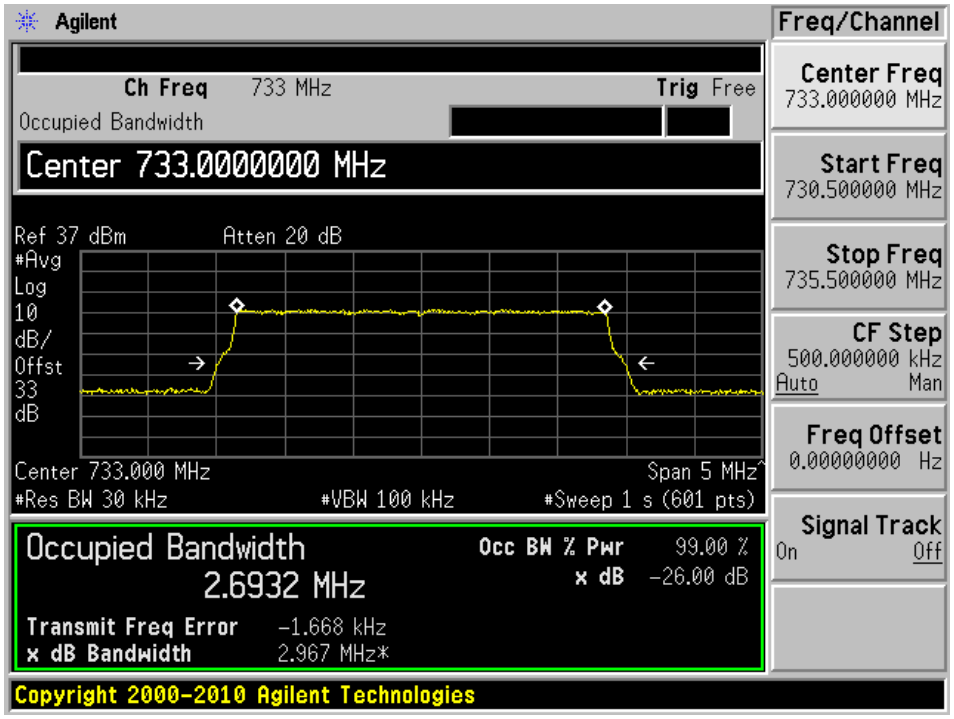


LTE-16QAM (3 MHz), Frequency: 733 MHz

Input

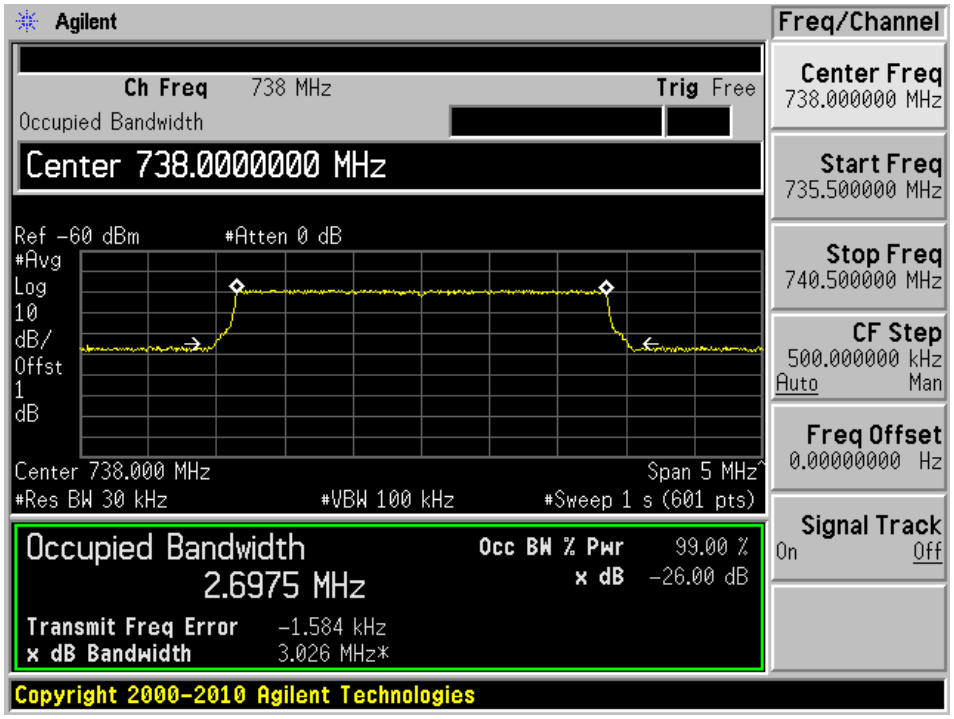


Output

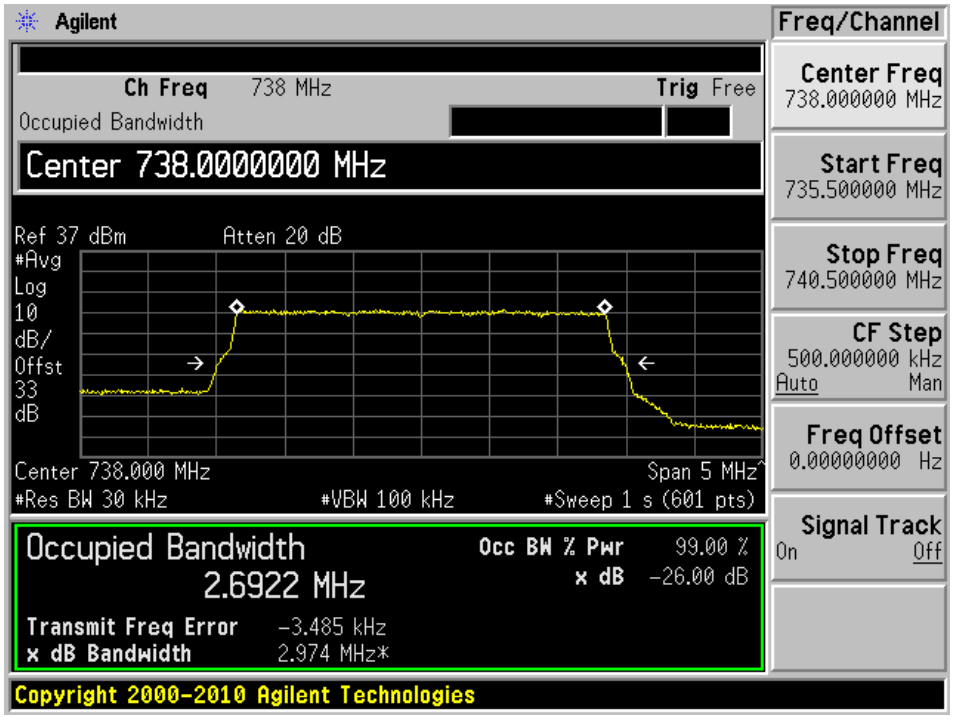


LTE-16QAM (3 MHz), Frequency: 738 MHz

Input

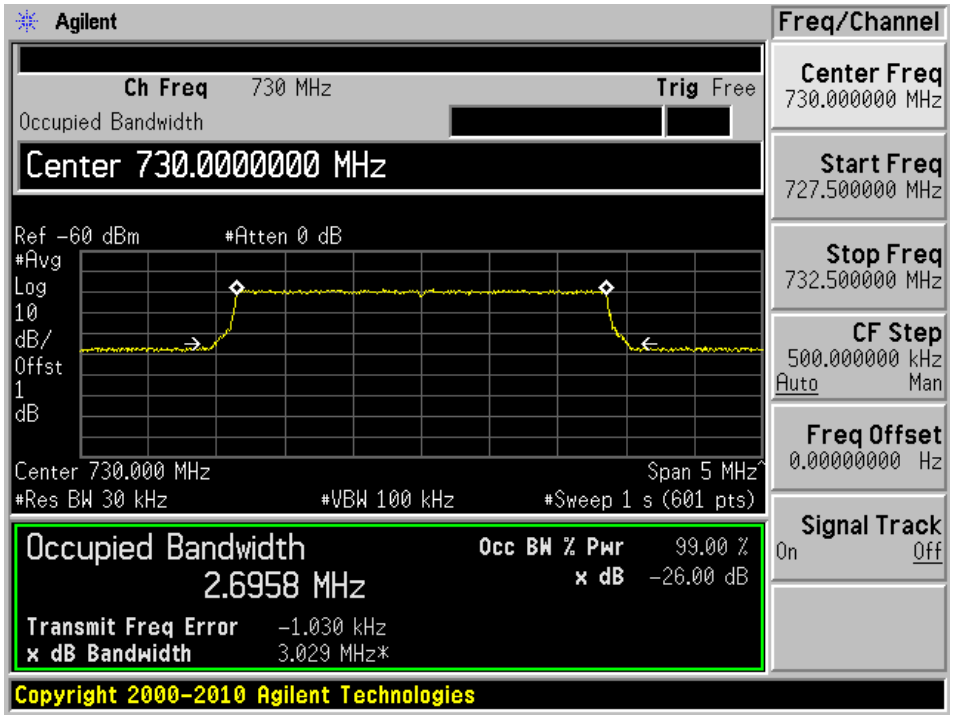


Output

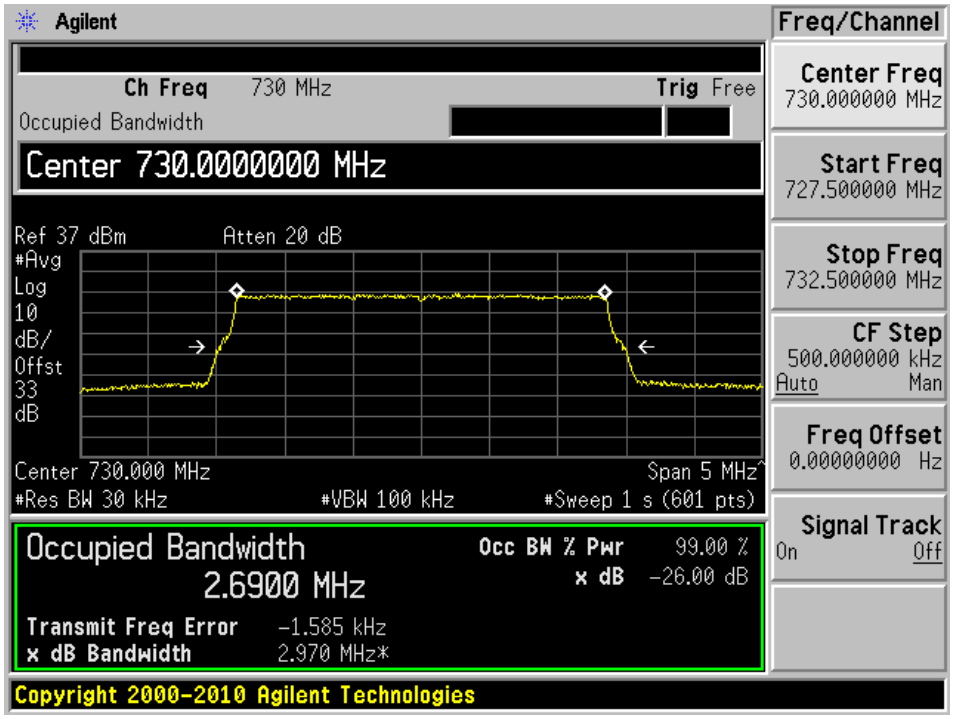


LTE-64QAM (3 MHz), Frequency: 730 MHz

Input

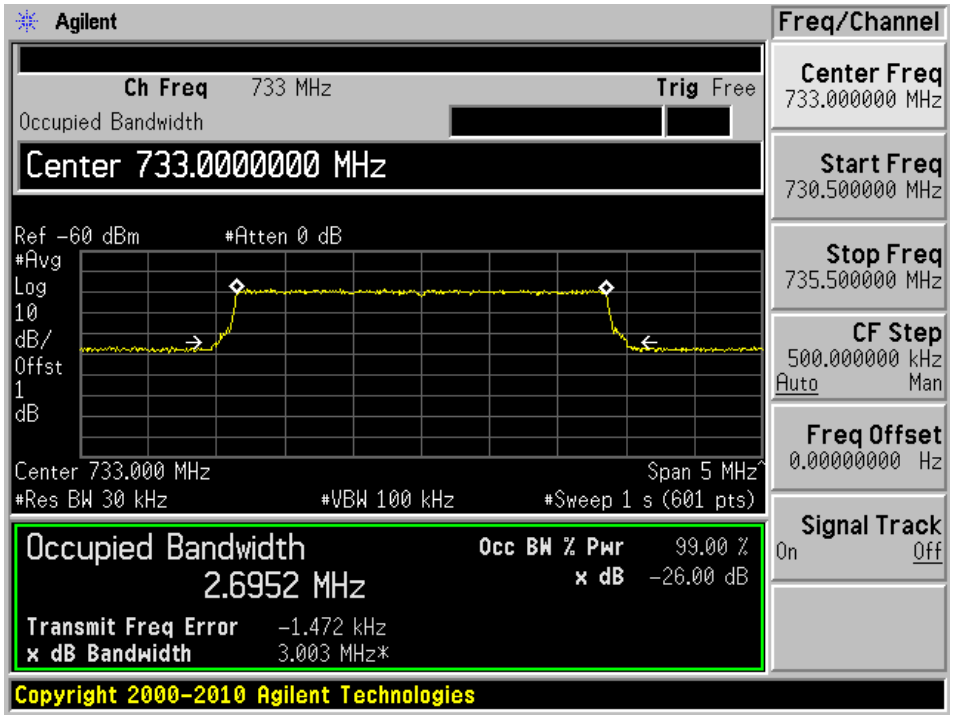


Output

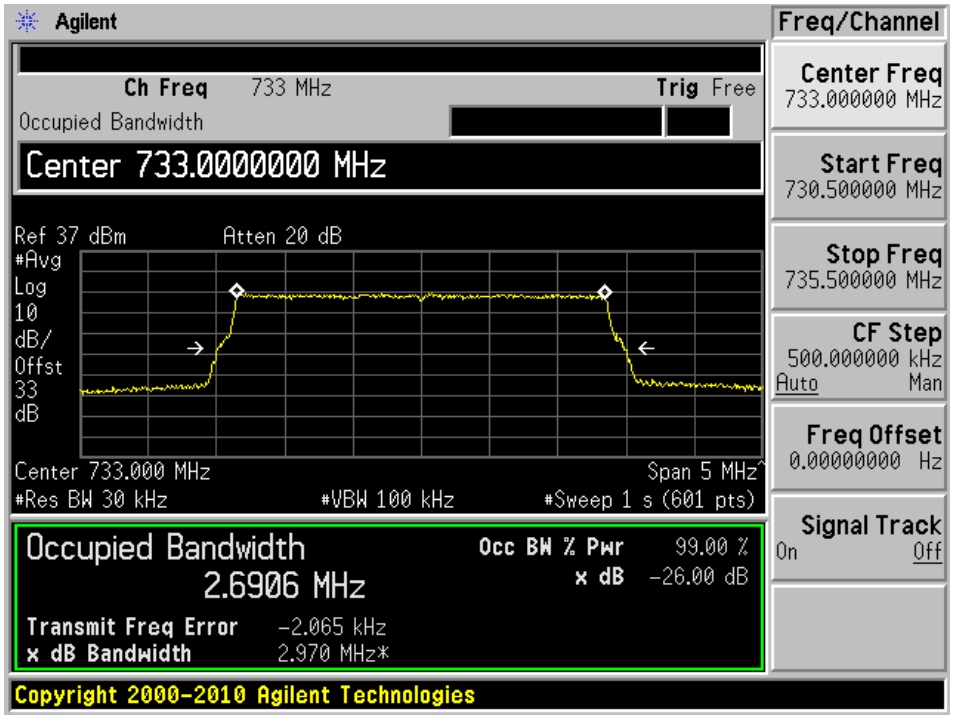


LTE-64QAM (3 MHz), Frequency: 733 MHz

Input

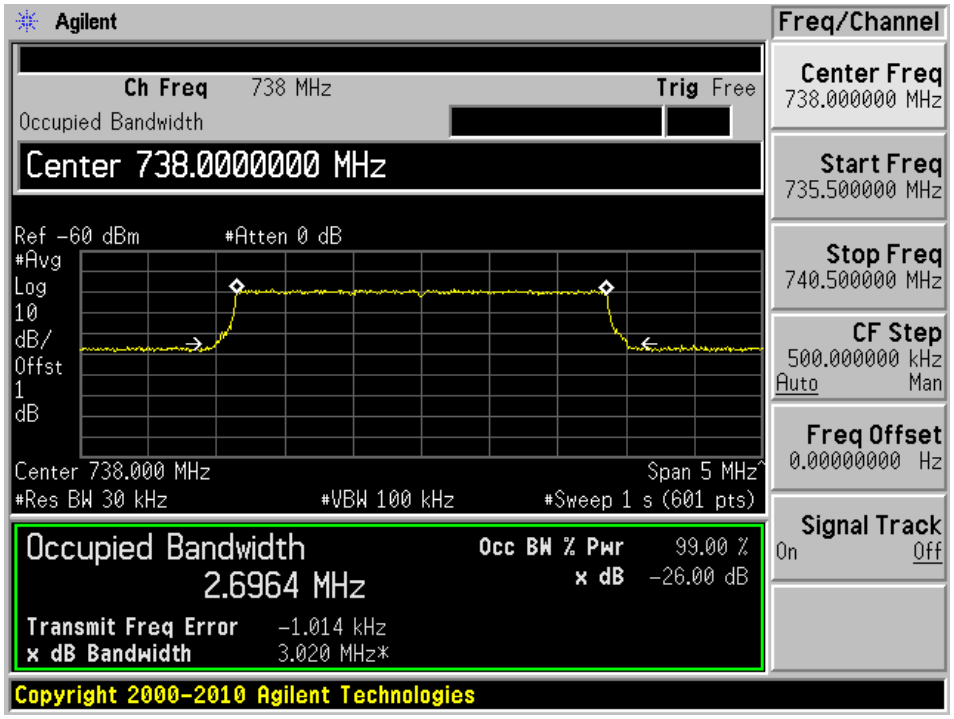


Output

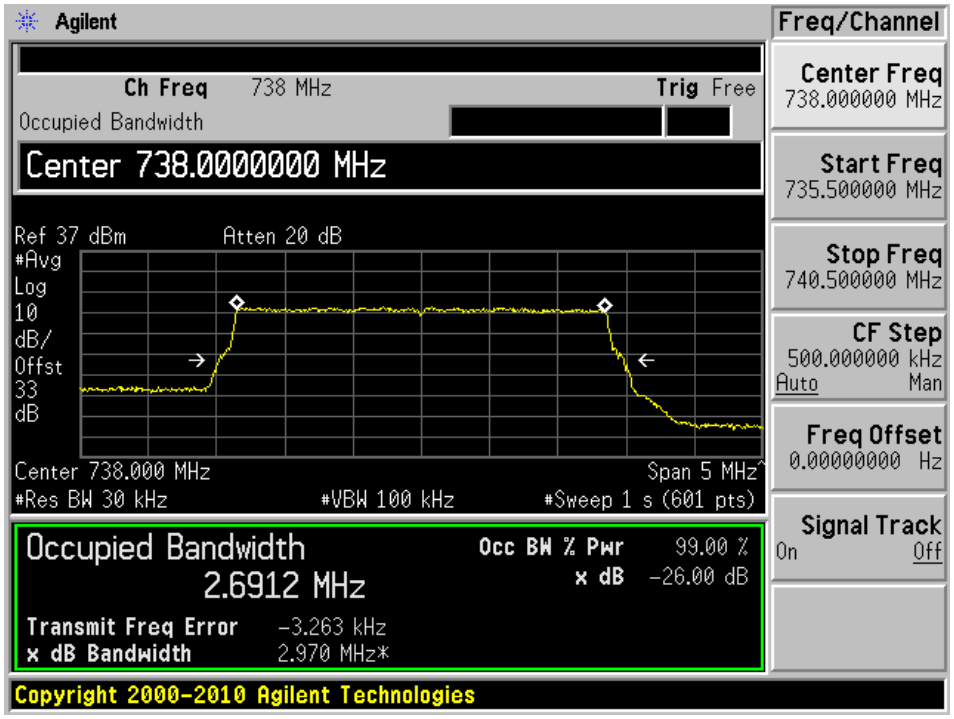


LTE-64QAM (3 MHz), Frequency: 738 MHz

Input

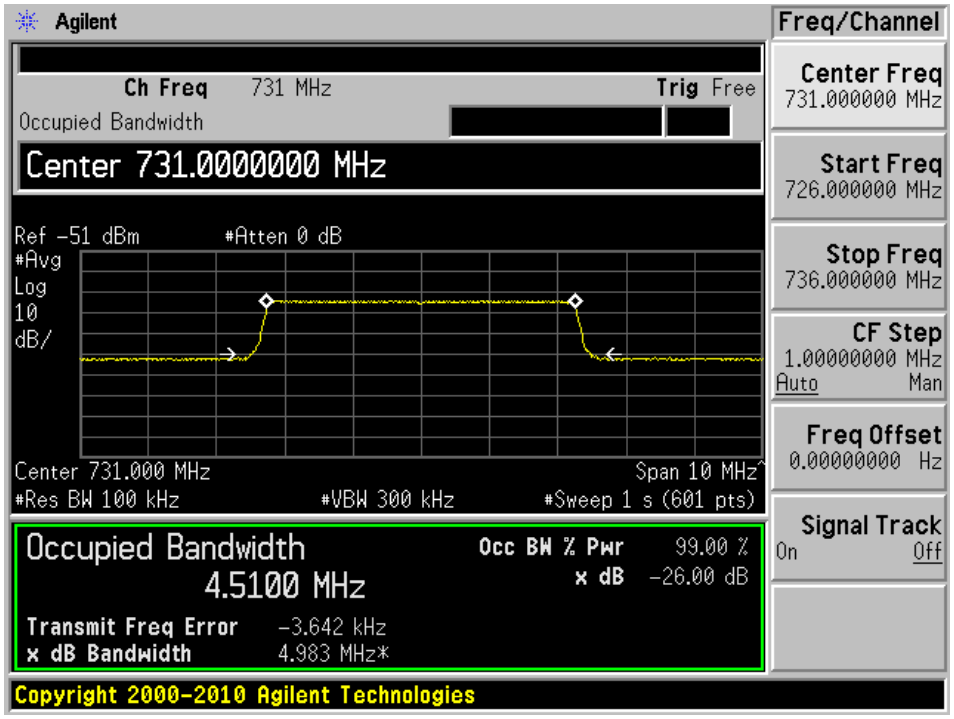


Output

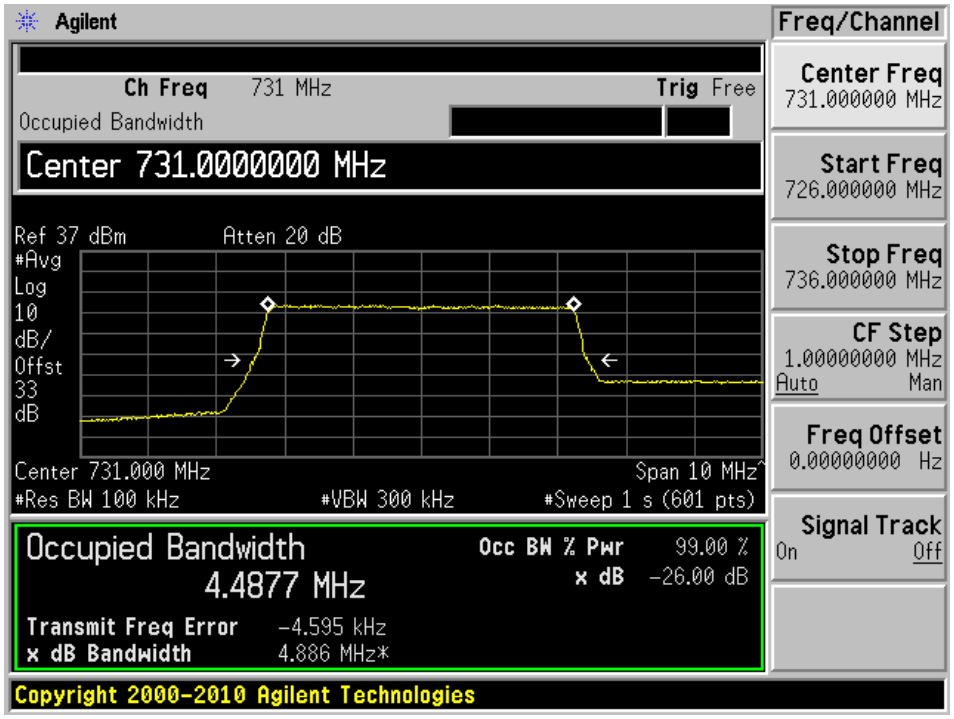


LTE-QPSK (5 MHz), Frequency: 731 MHz

Input

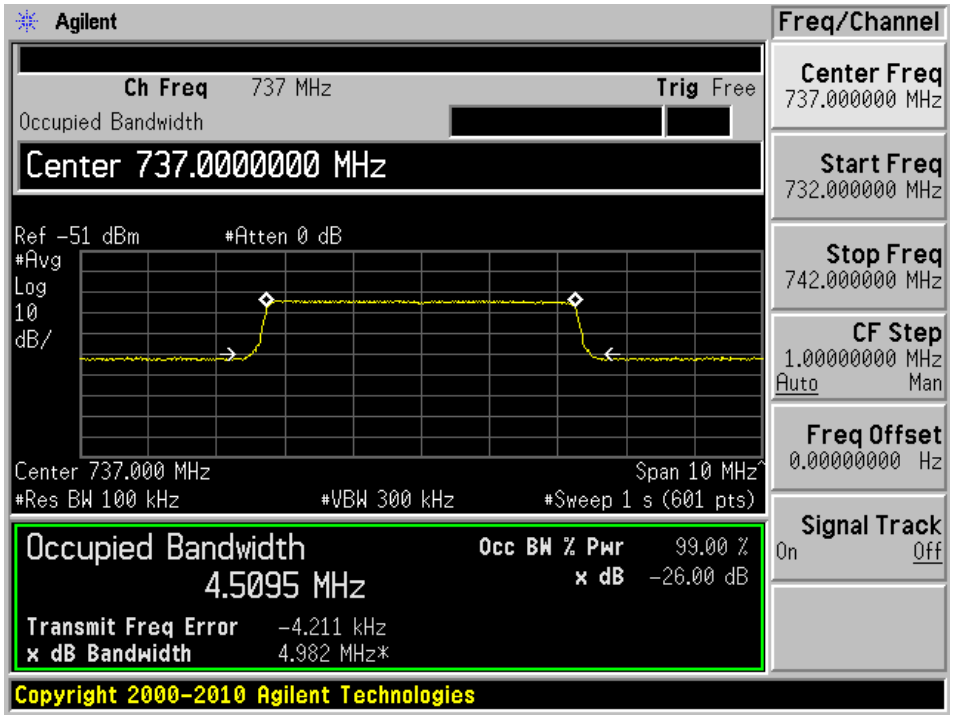


Output

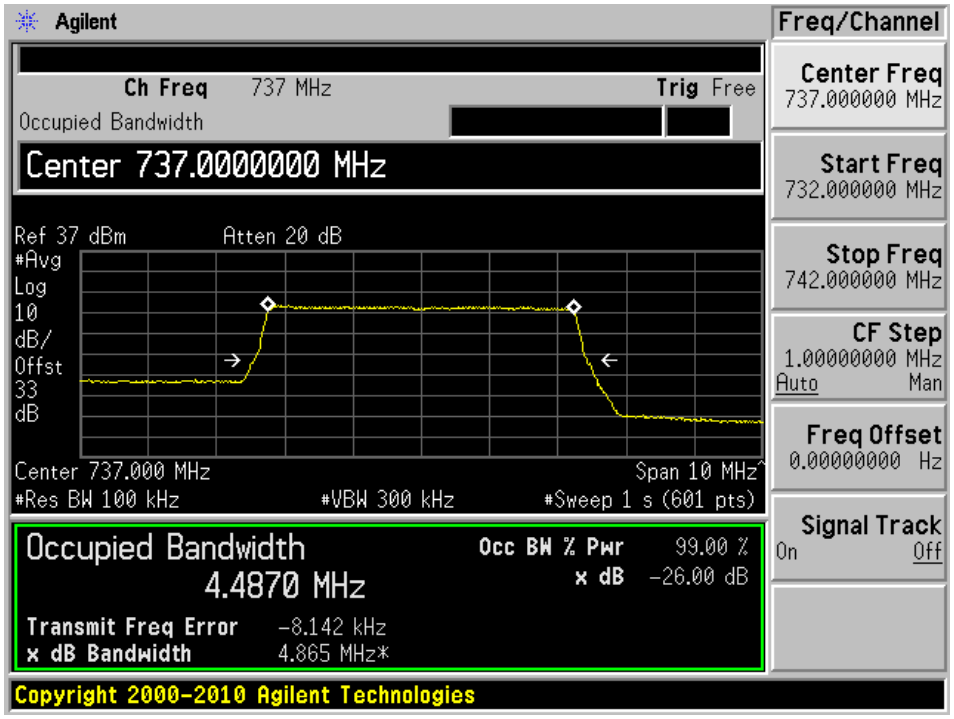


LTE-QPSK (5 MHz), Frequency: 737 MHz

Input

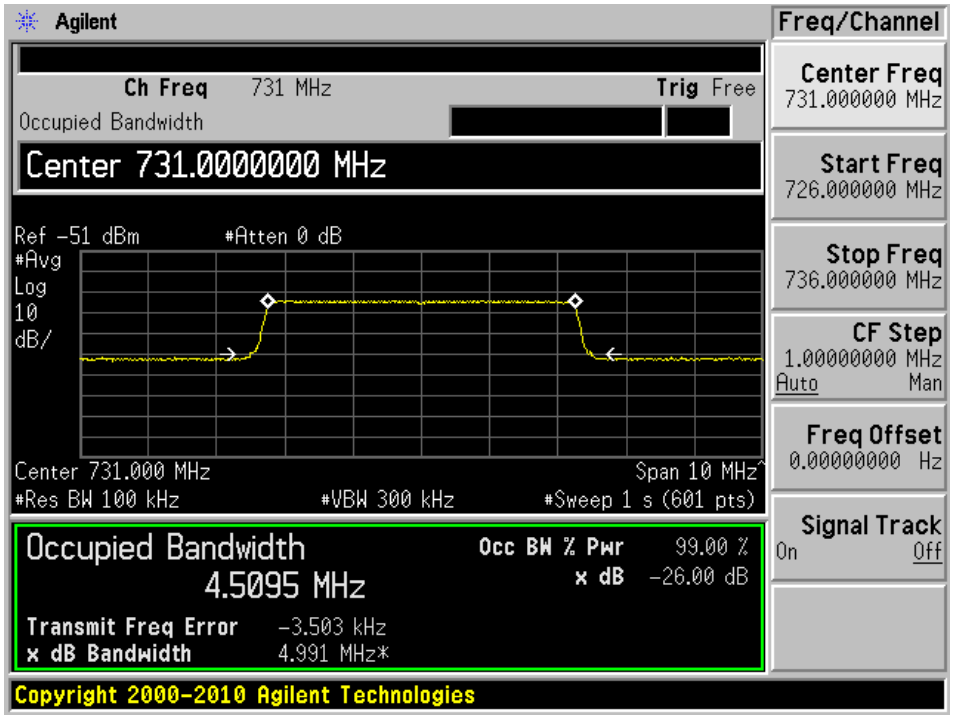


Output

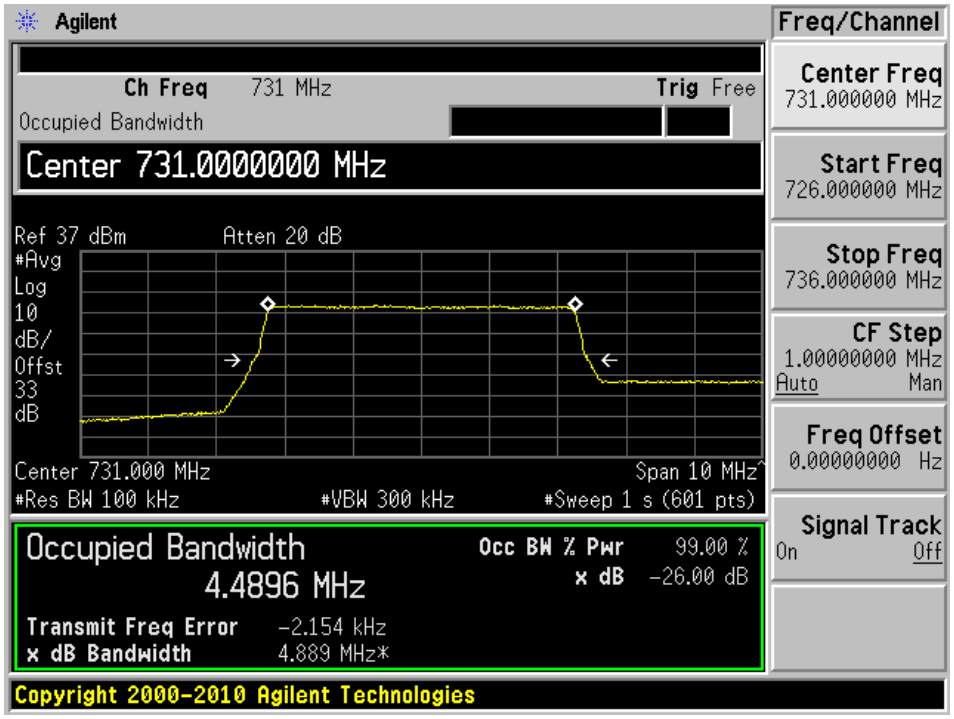


LTE-16QAM (5 MHz), Frequency: 731 MHz

Input

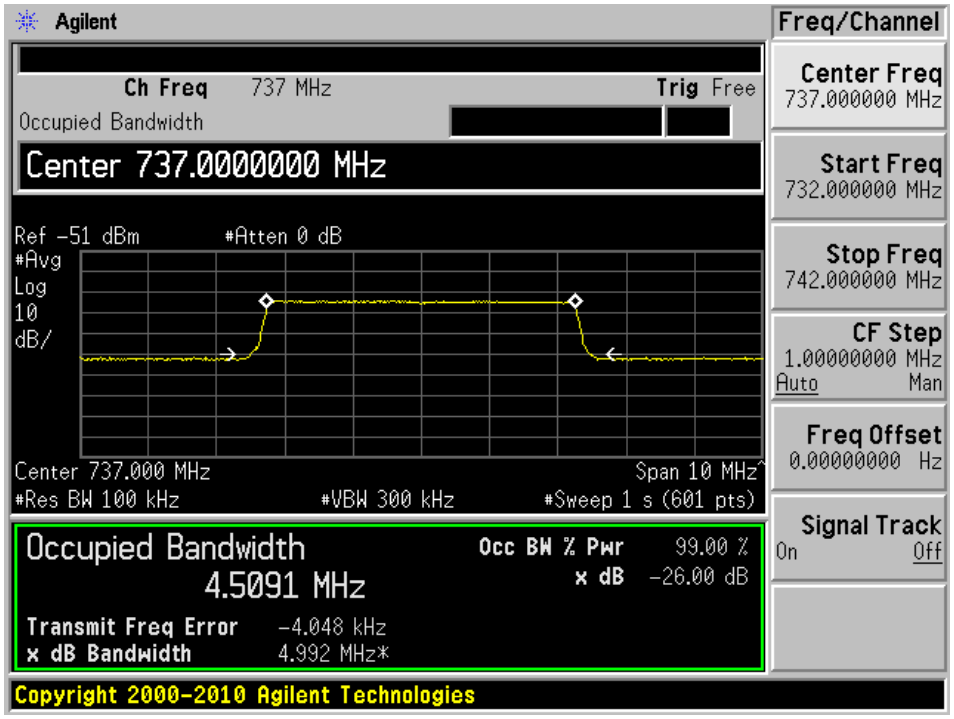


Output

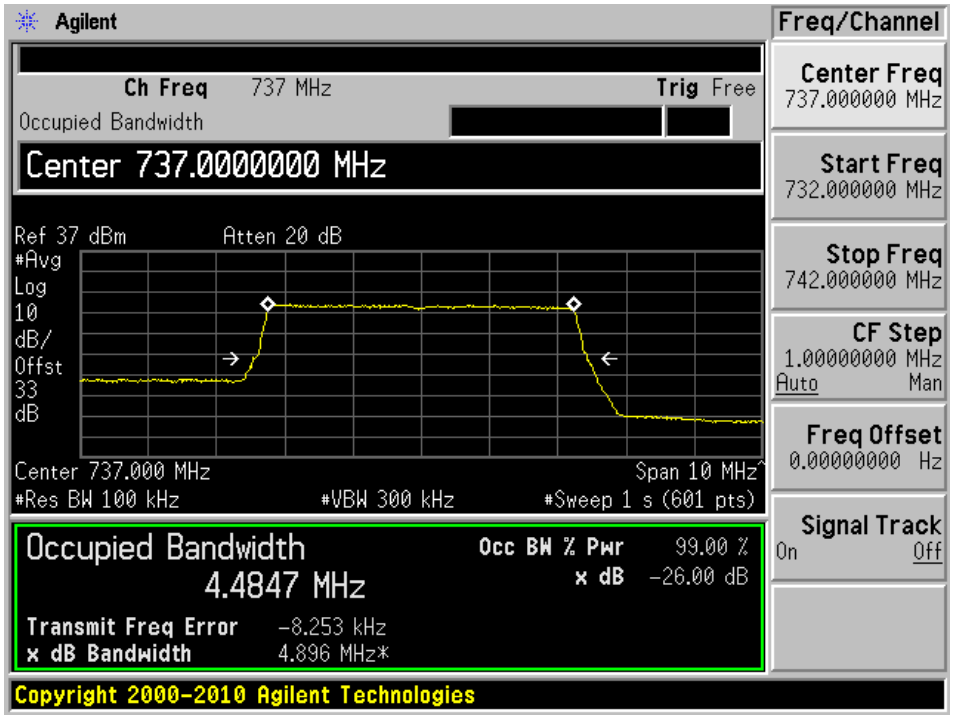


LTE-16QAM (5 MHz), Frequency: 737 MHz

Input

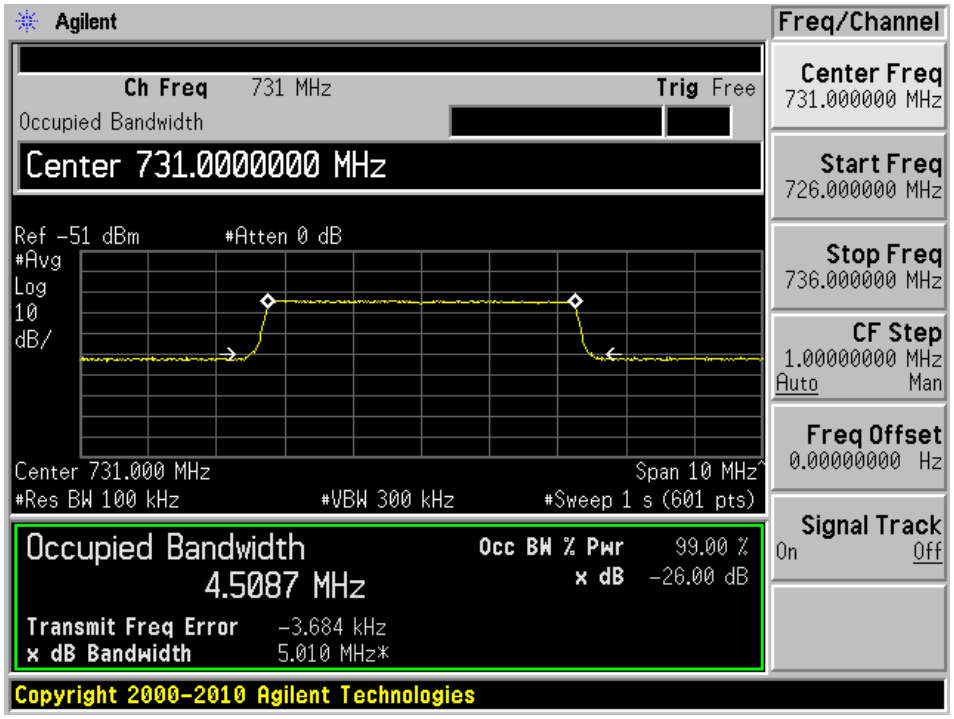


Output

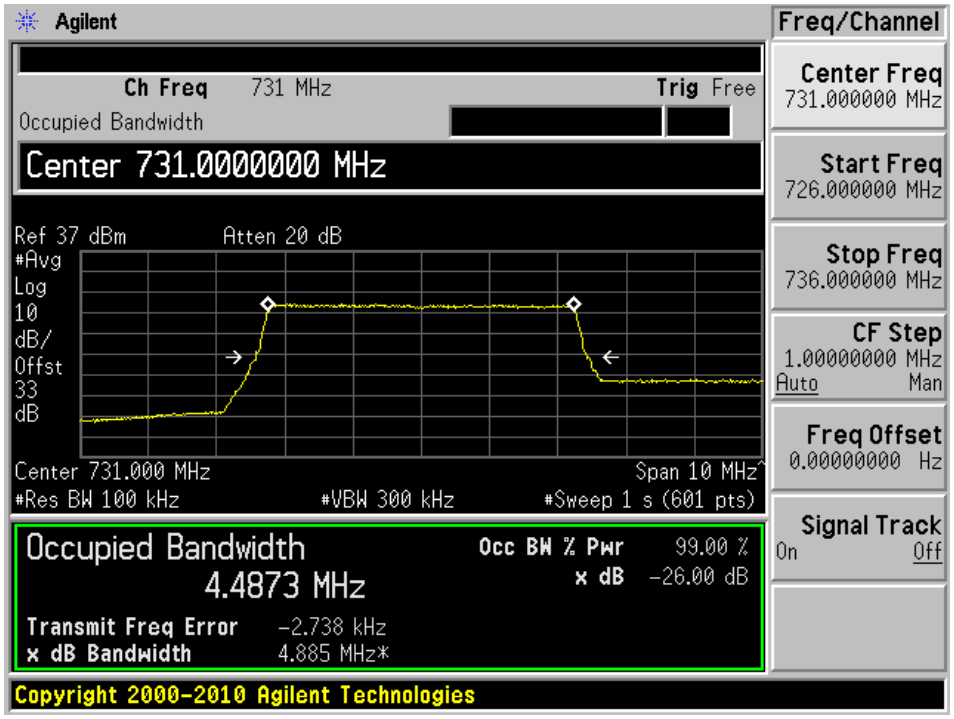


LTE-64QAM (5 MHz), Frequency: 731 MHz

Input

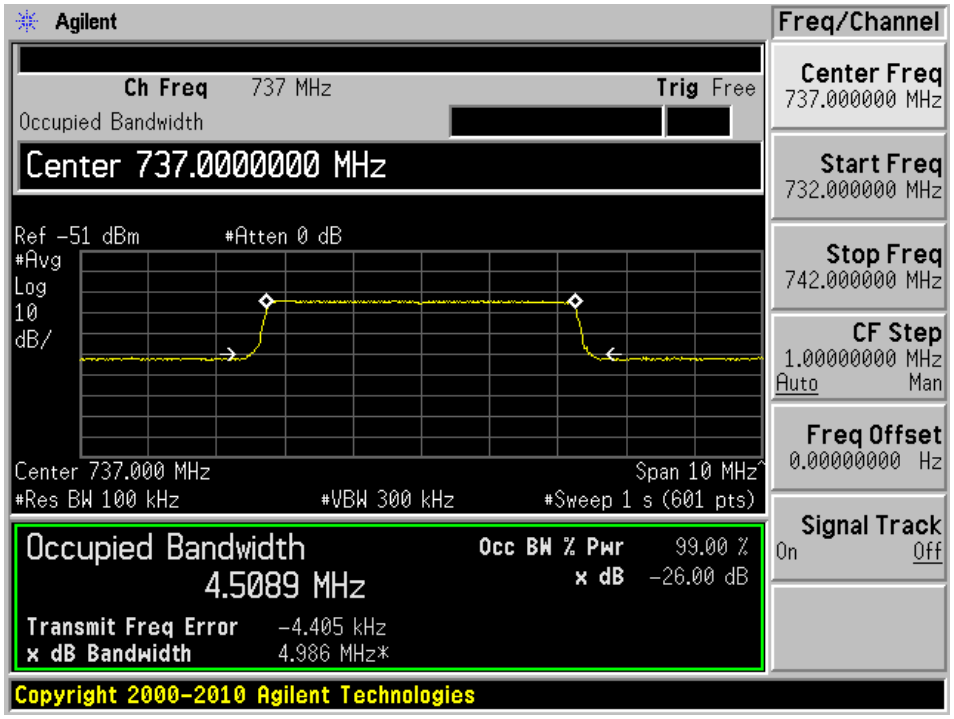


Output

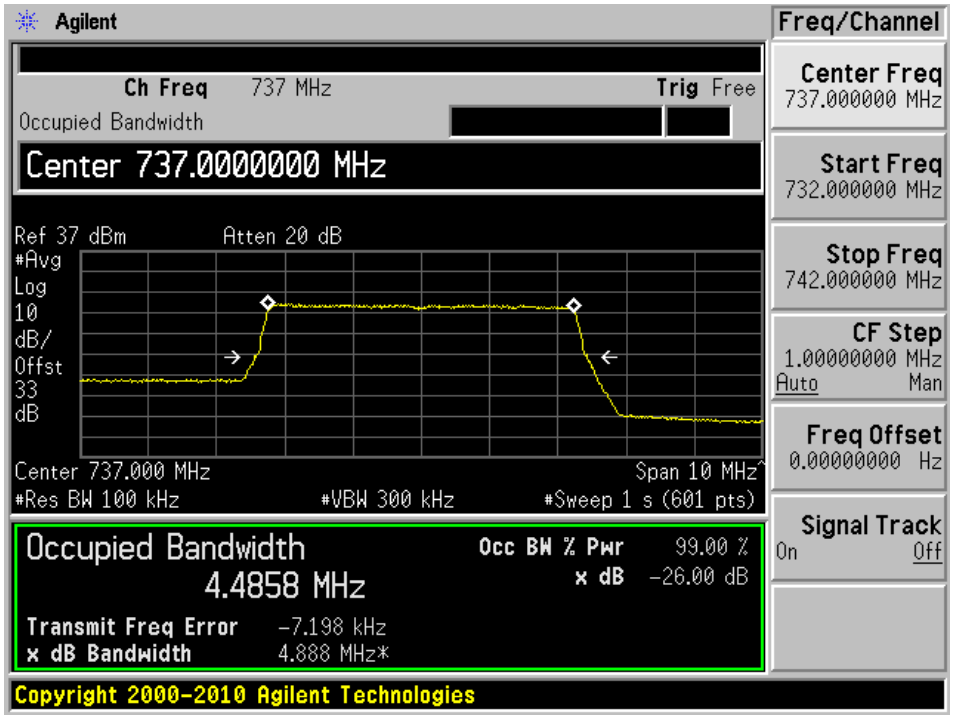


LTE-64QAM (5 MHz), Frequency: 737 MHz

Input

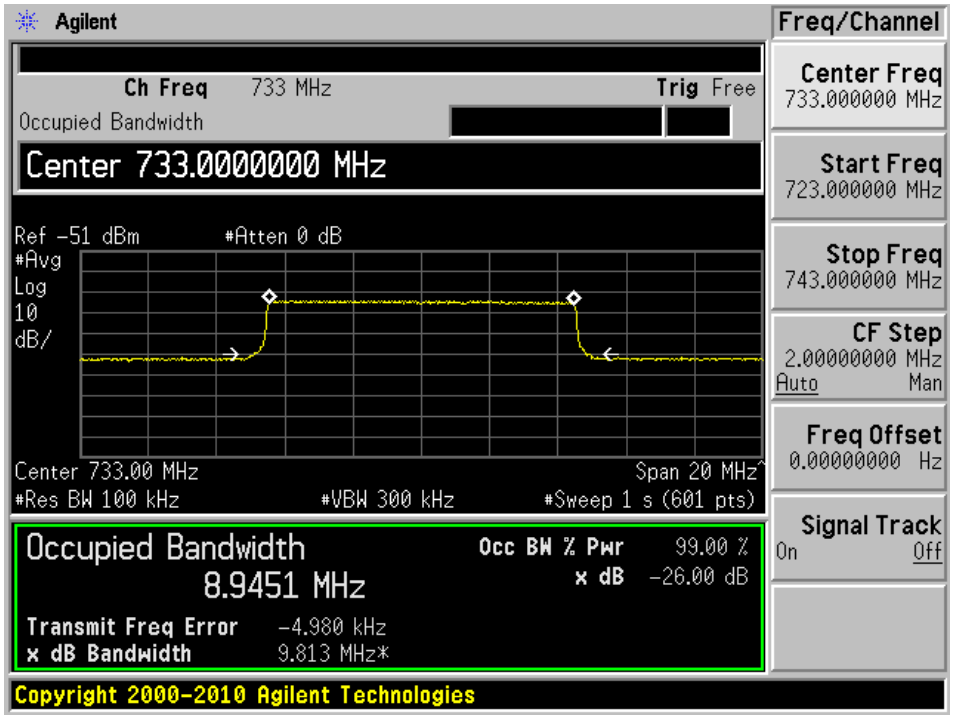


Output

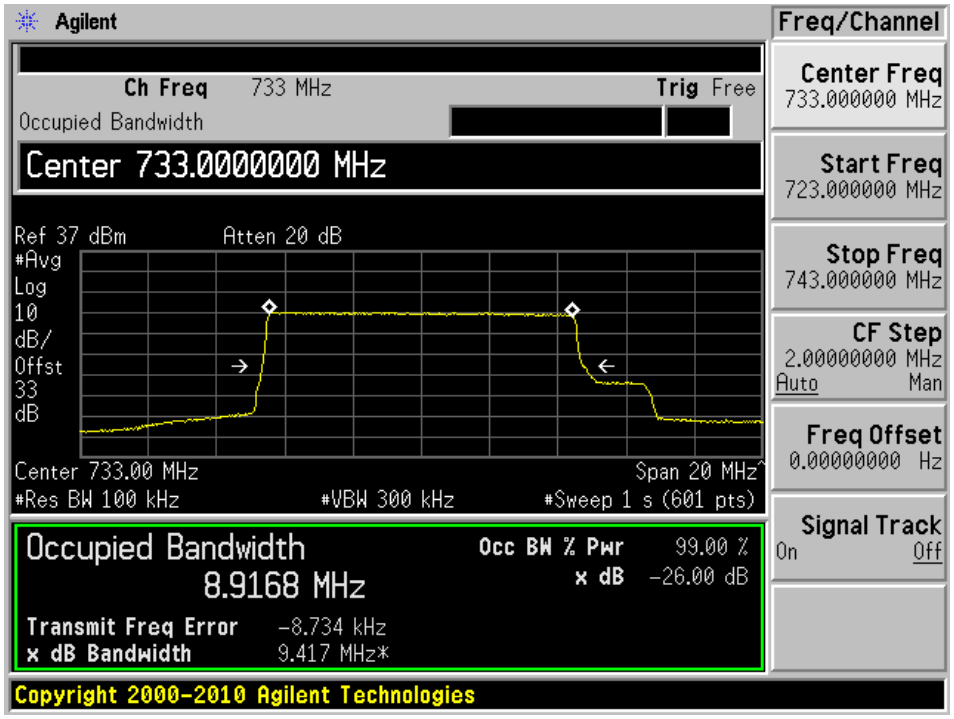


LTE-QPSK (10 MHz), Frequency: 733 MHz

Input

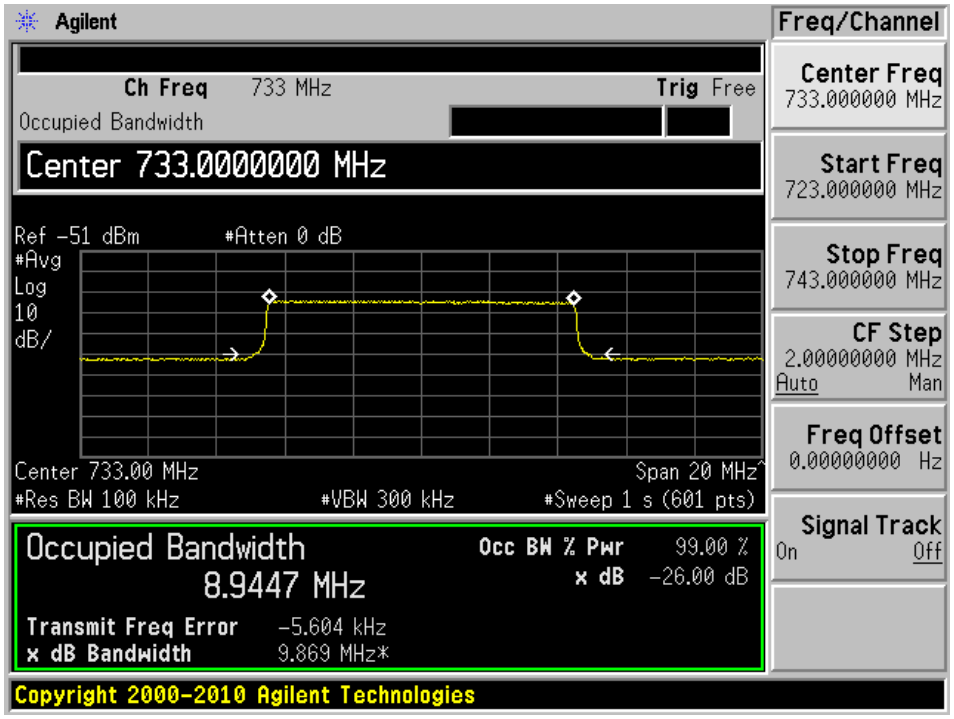


Output

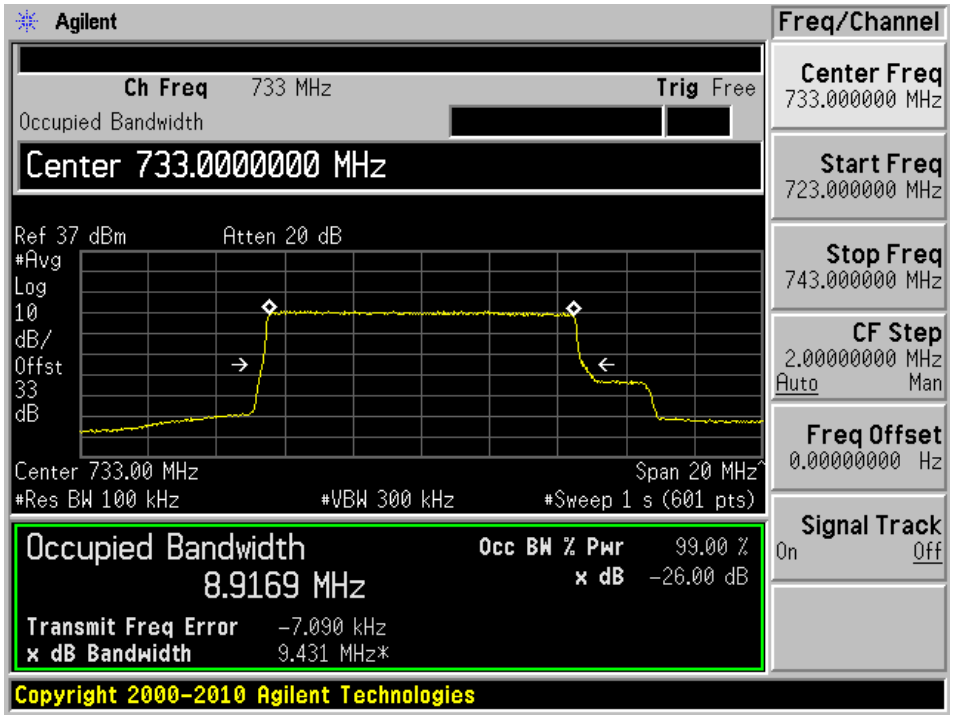


LTE-16QAM (10 MHz), Frequency: 733 MHz

Input

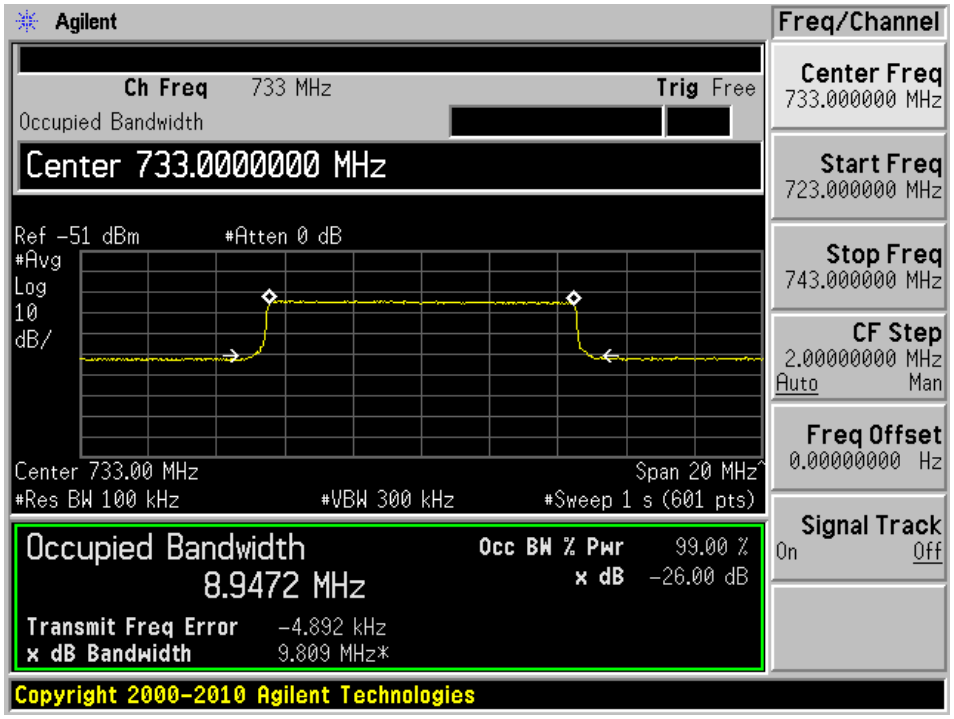


Output

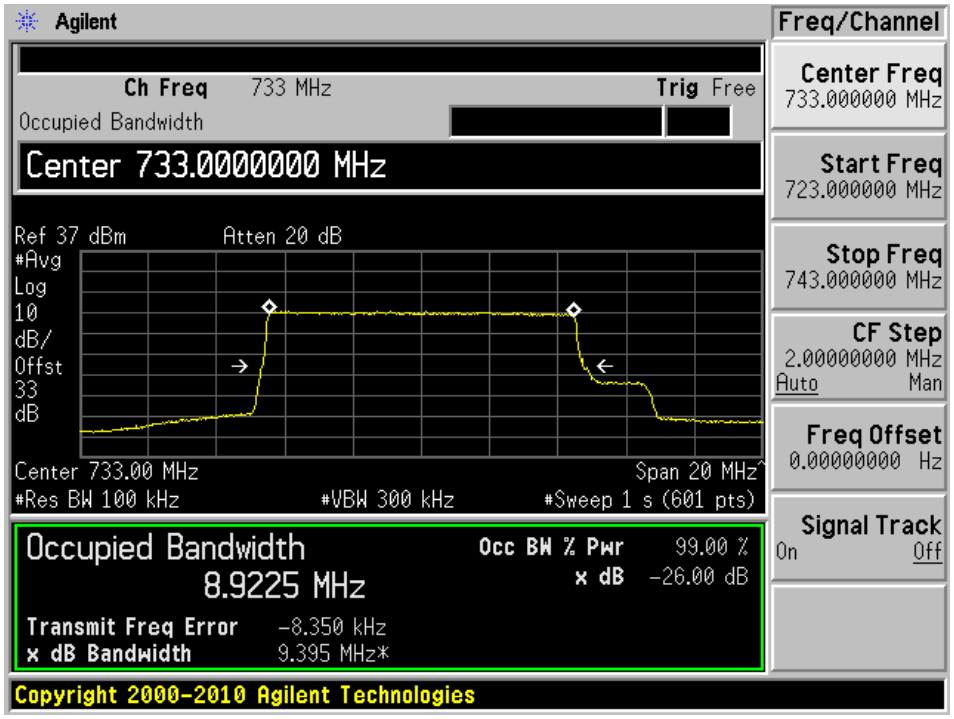


LTE-64QAM (10 MHz), Frequency: 733 MHz

Input



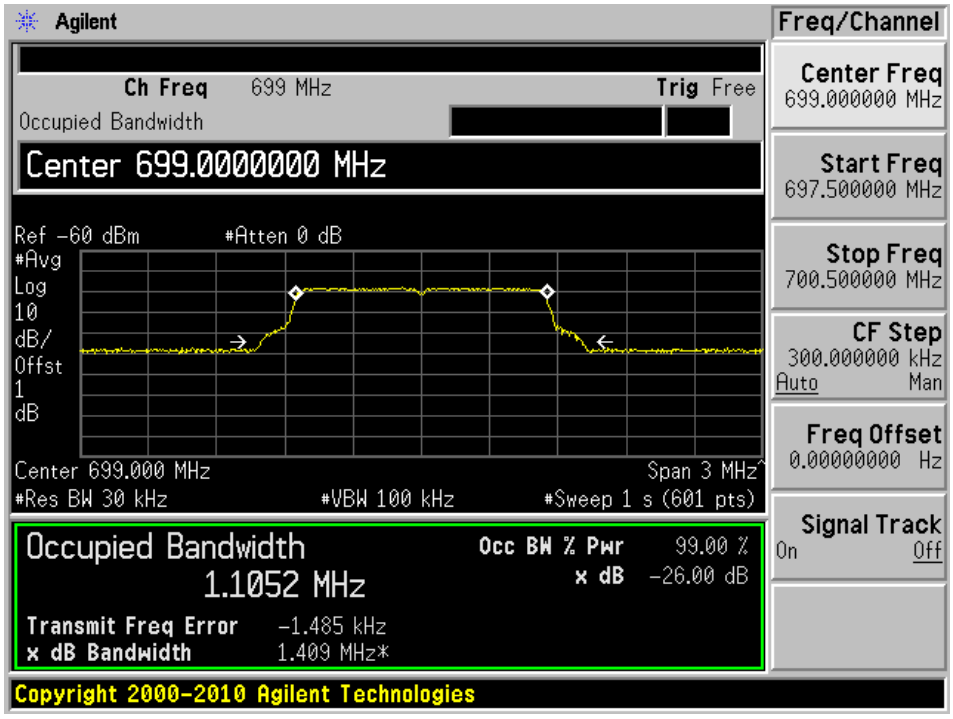
Output



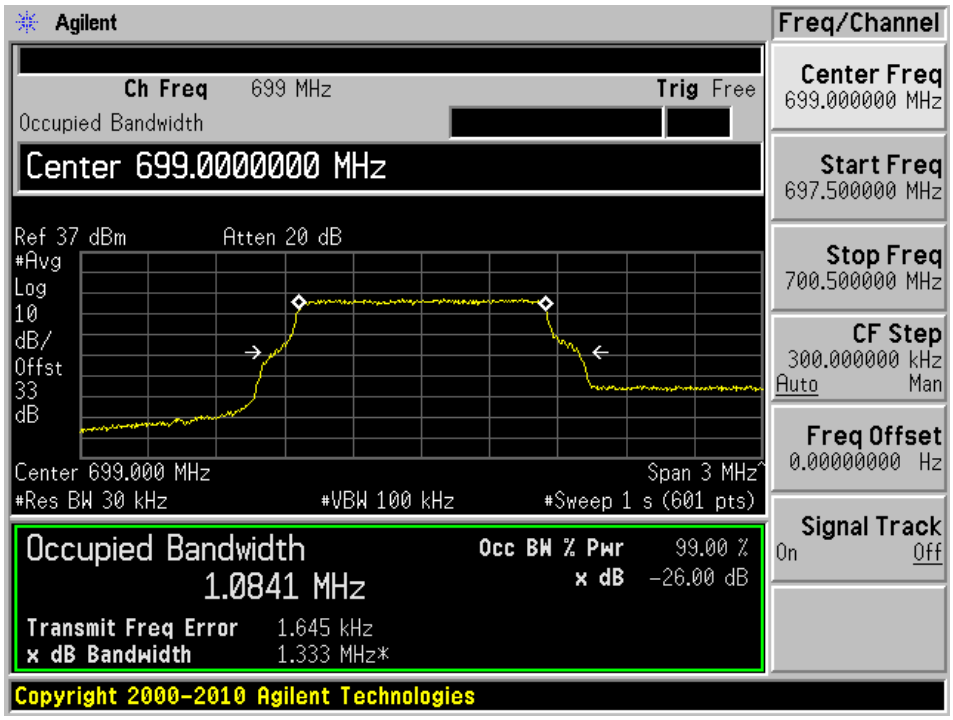
UL: 698-710 MHz

LTE-QPSK (1.4 MHz), Frequency: 699 MHz

Input

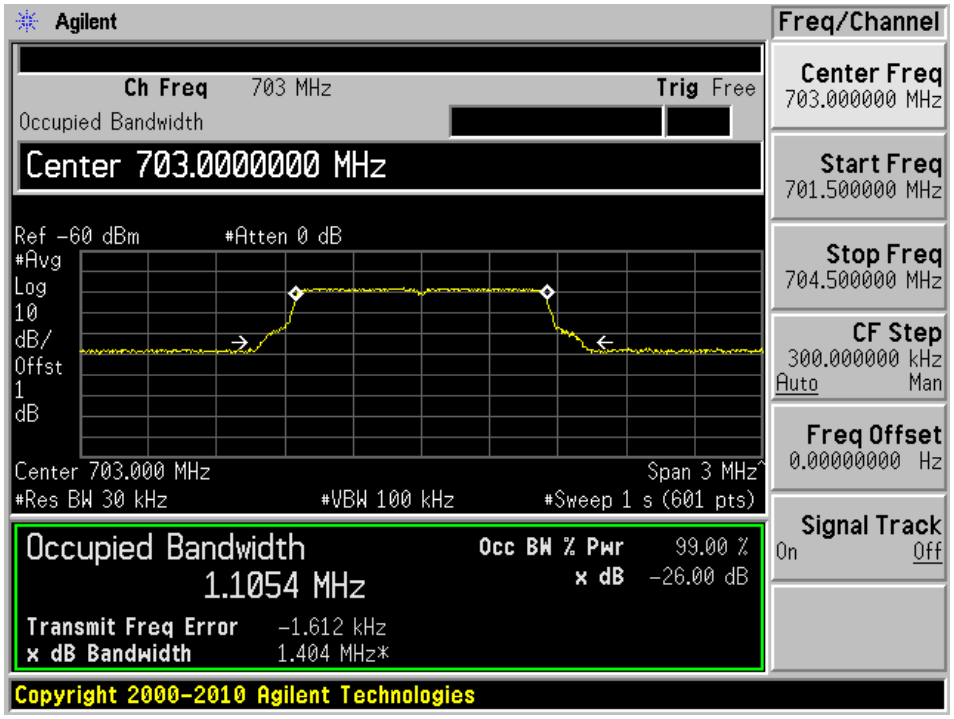


Output

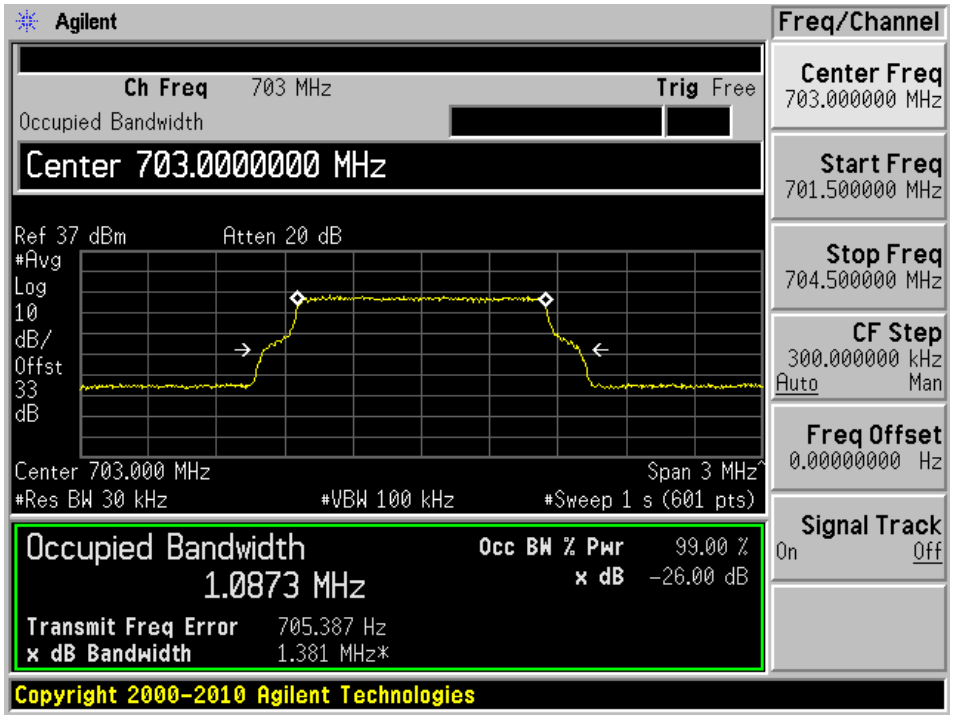


LTE-QPSK (1.4 MHz), Frequency: 703 MHz

Input

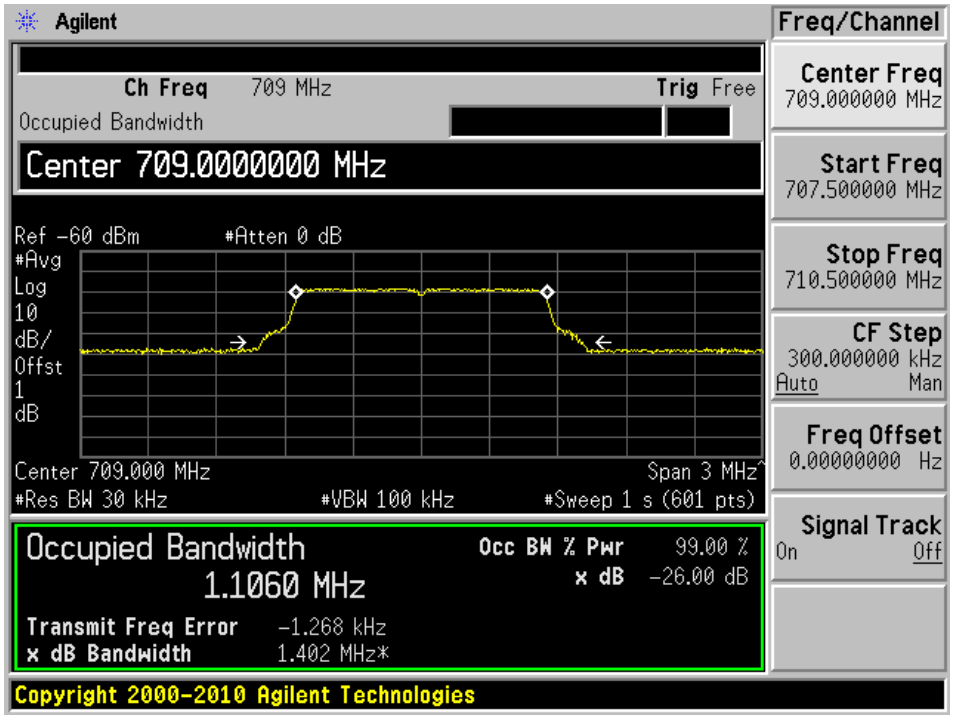


Output

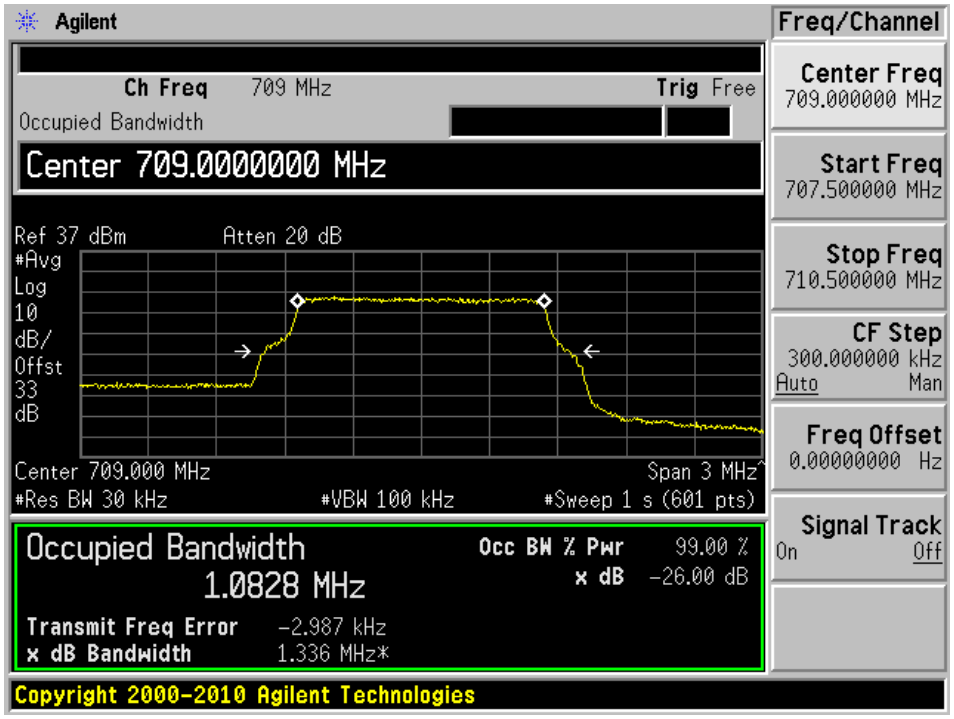


LTE-QPSK (1.4 MHz), Frequency: 709 MHz

Input

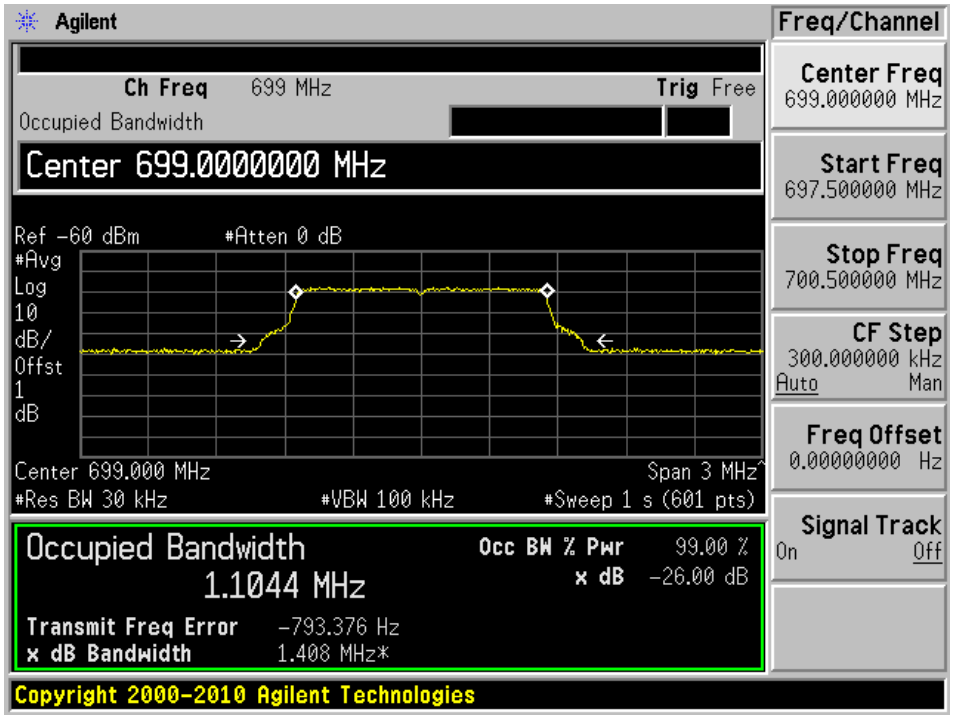


Output

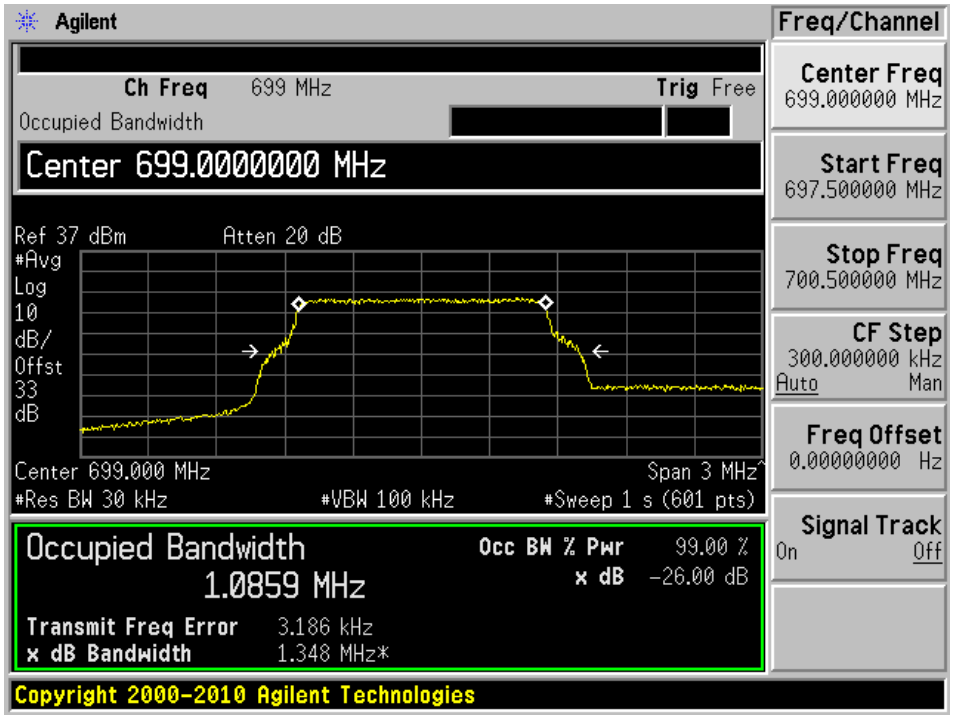


LTE-16QAM (1.4 MHz), Frequency: 699 MHz

Input

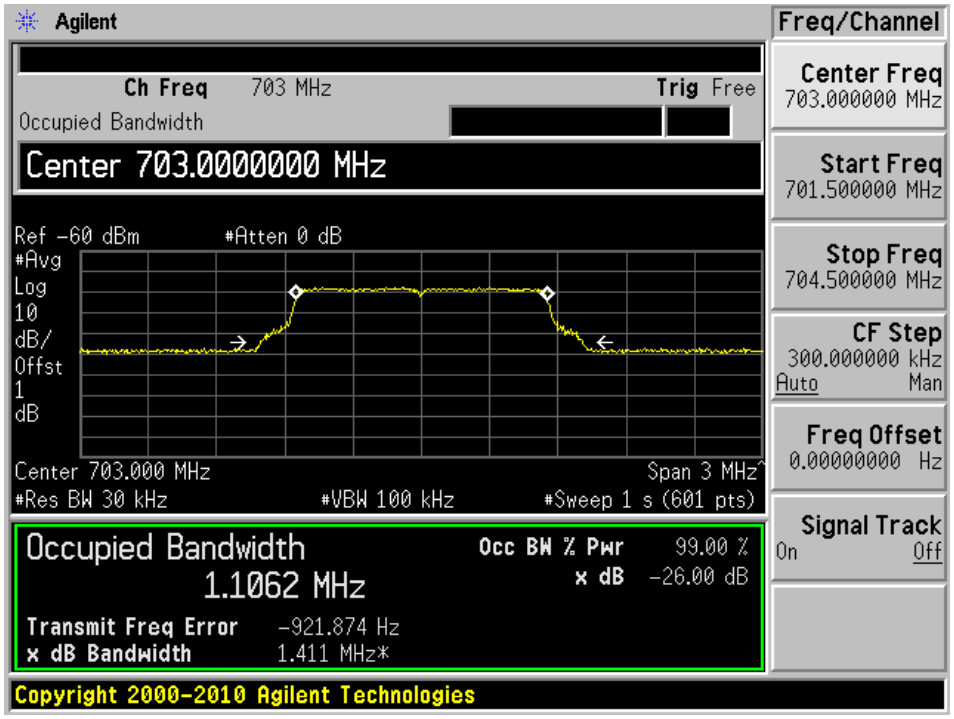


Output

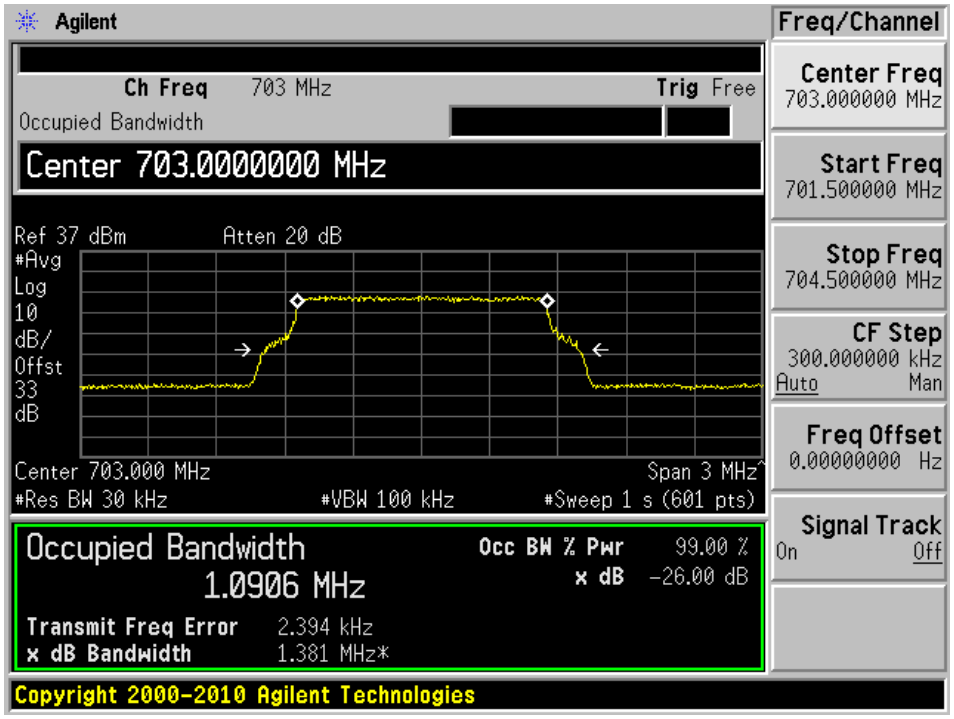


LTE-16QAM (1.4 MHz), Frequency: 703 MHz

Input

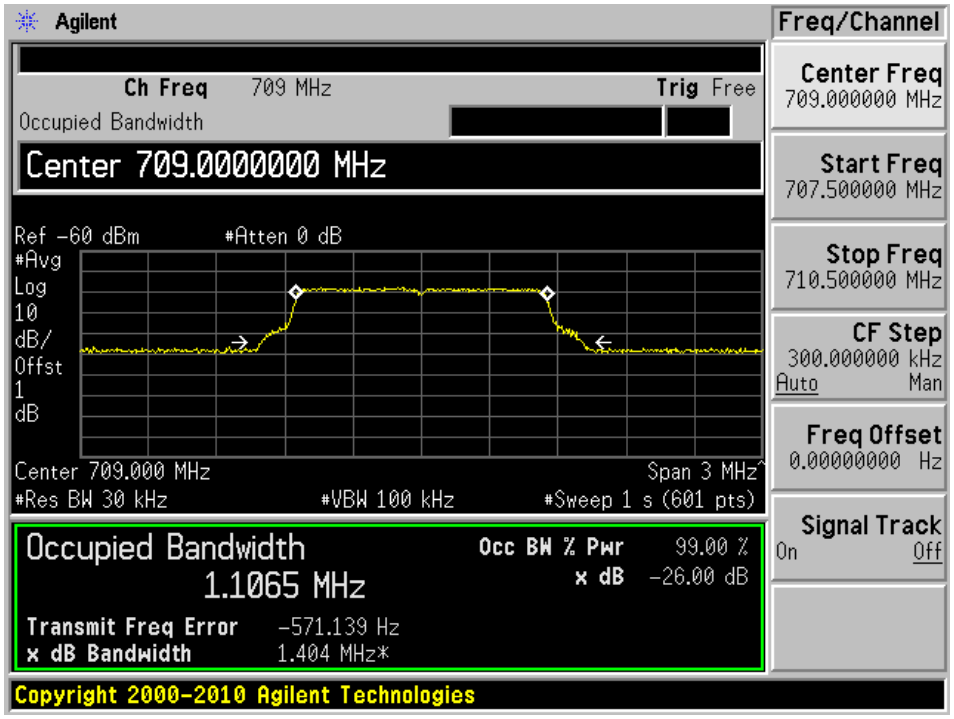


Output

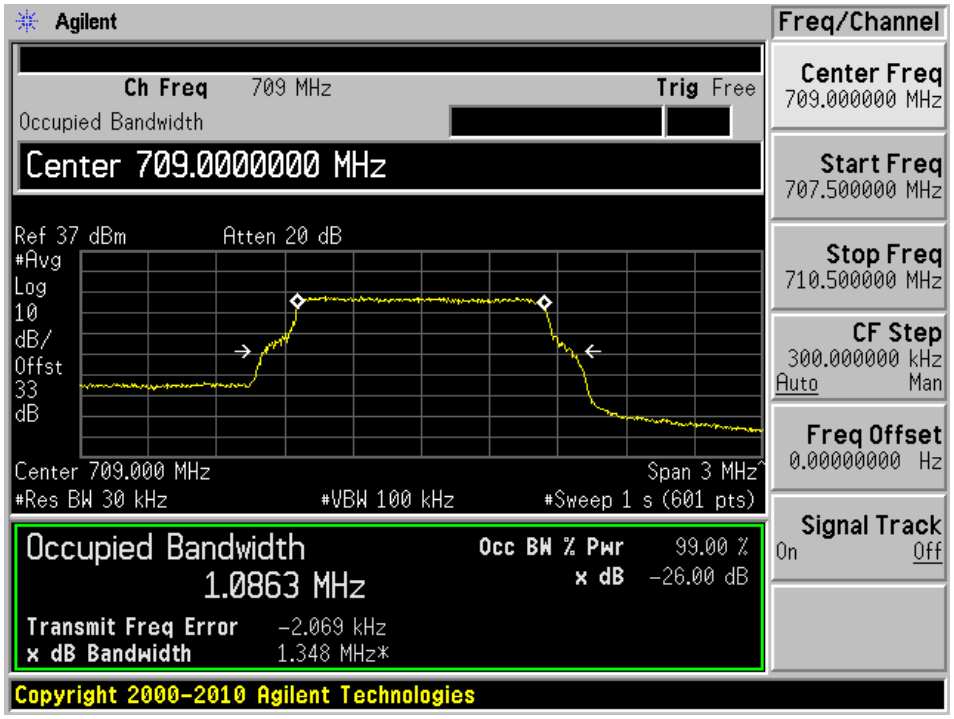


LTE-16QAM (1.4 MHz), Frequency: 709 MHz

Input

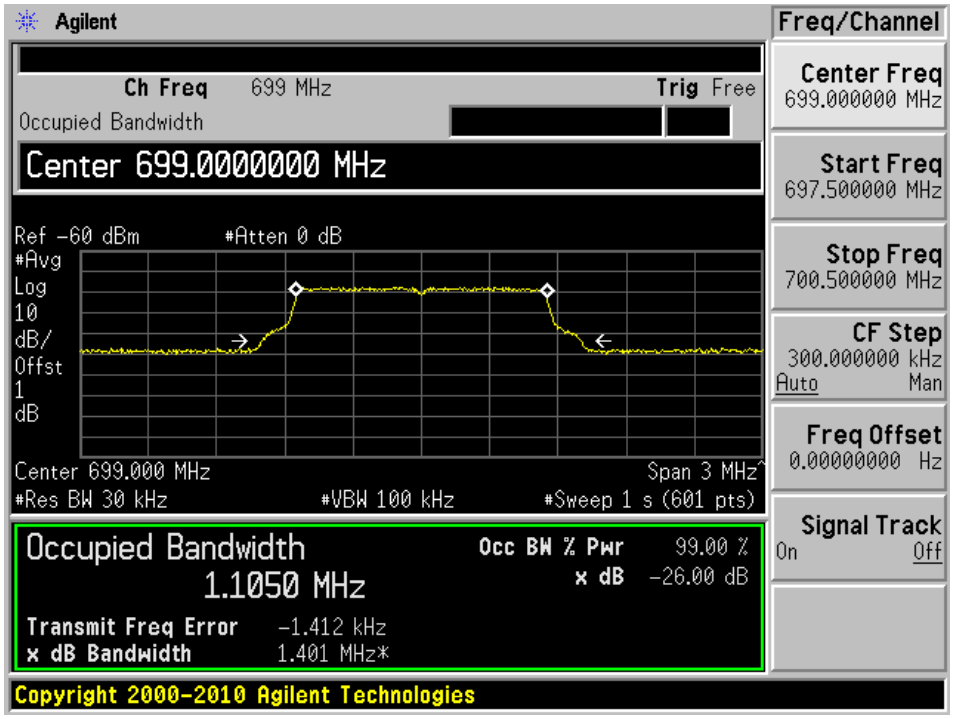


Output

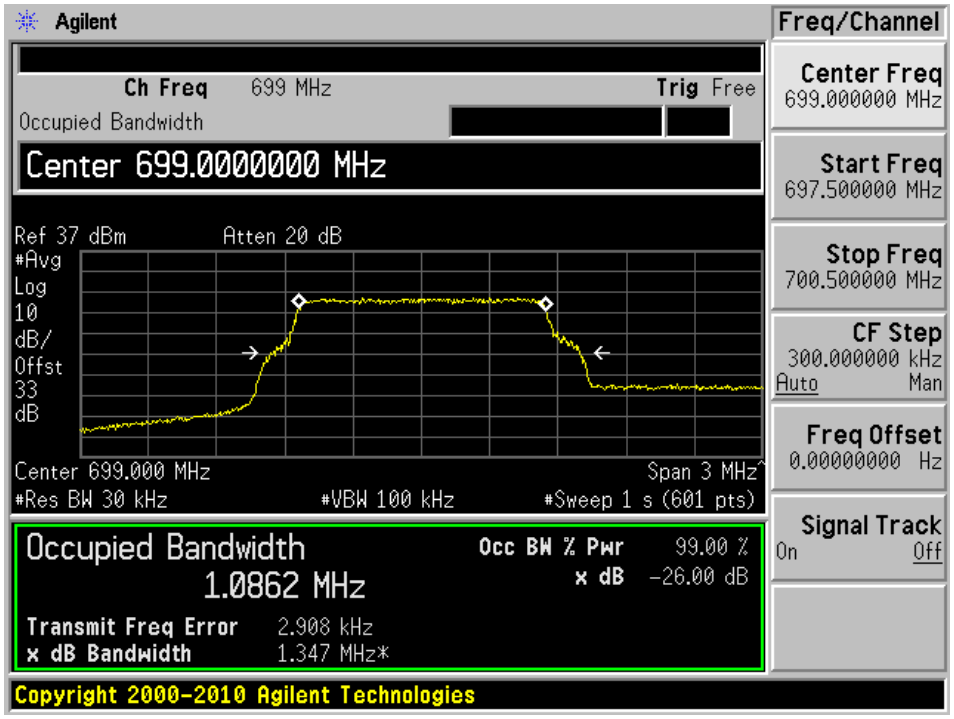


LTE-64QAM (1.4 MHz), Frequency: 699 MHz

Input

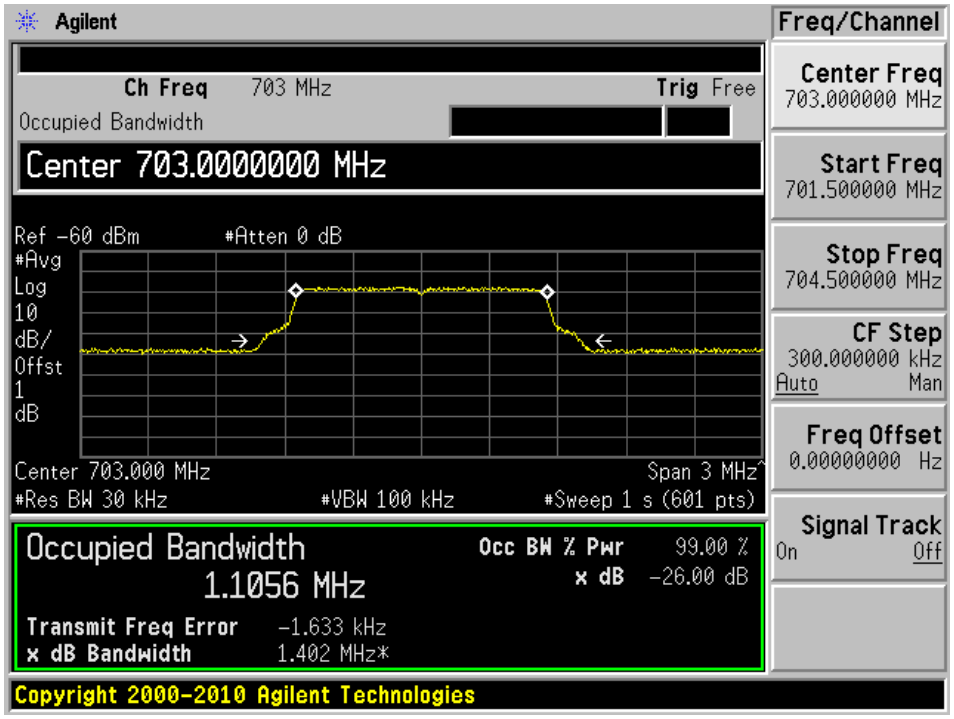


Output

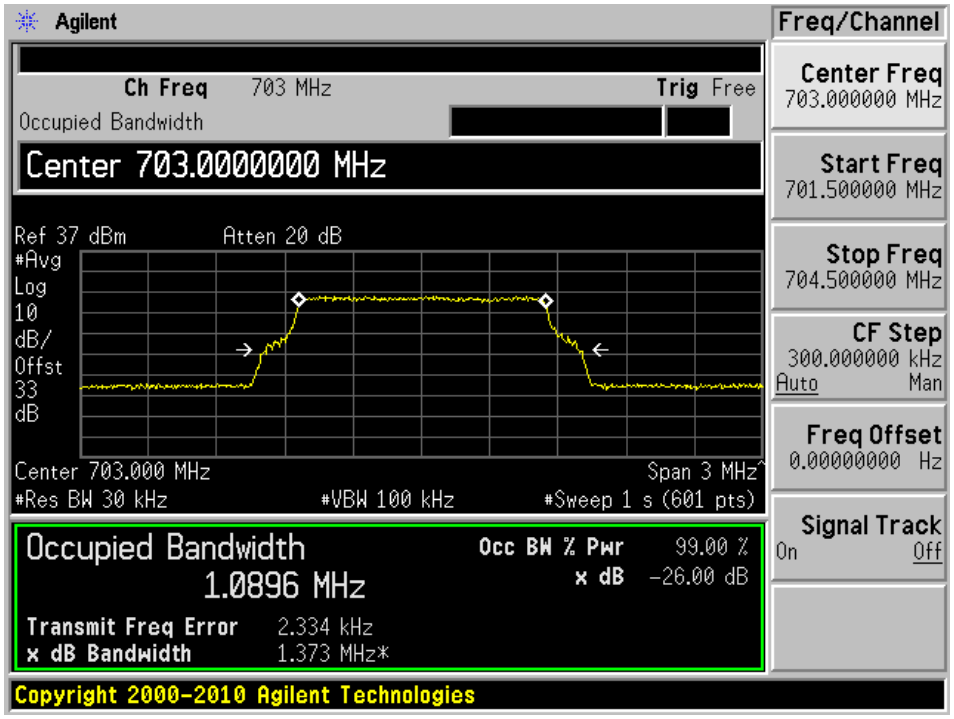


LTE-64QAM (1.4 MHz), Frequency: 703 MHz

Input

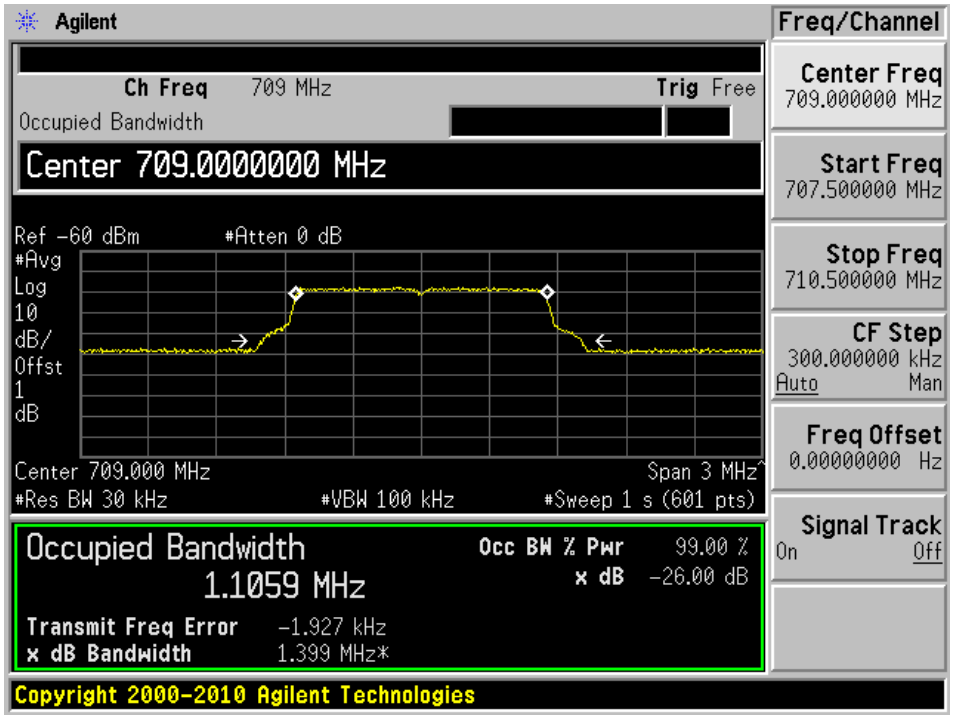


Output

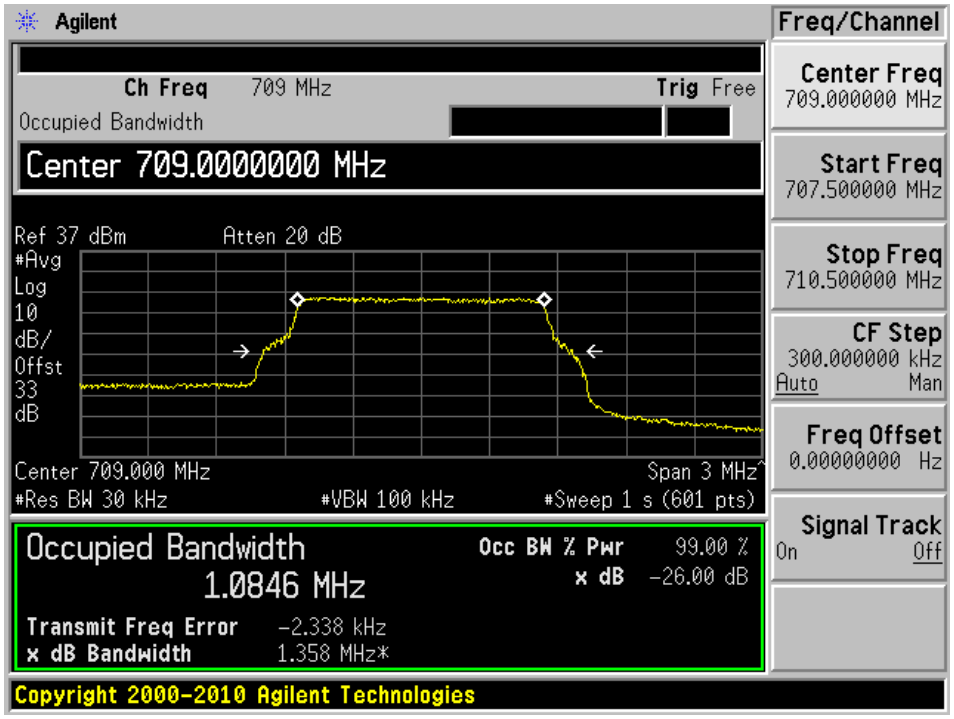


LTE-64QAM (1.4 MHz), Frequency: 709 MHz

Input

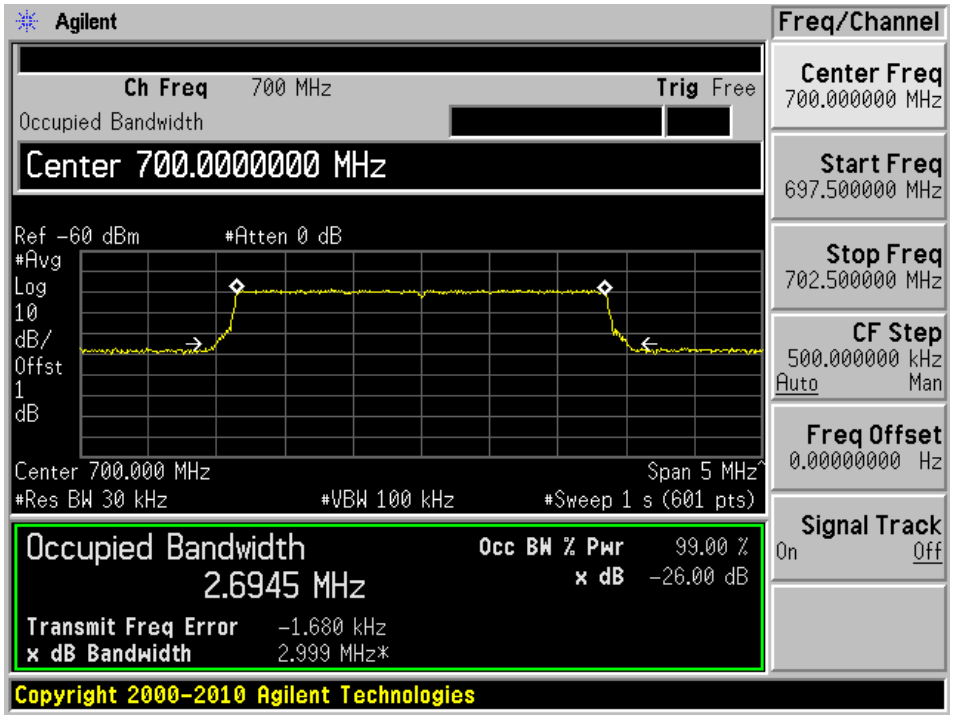


Output

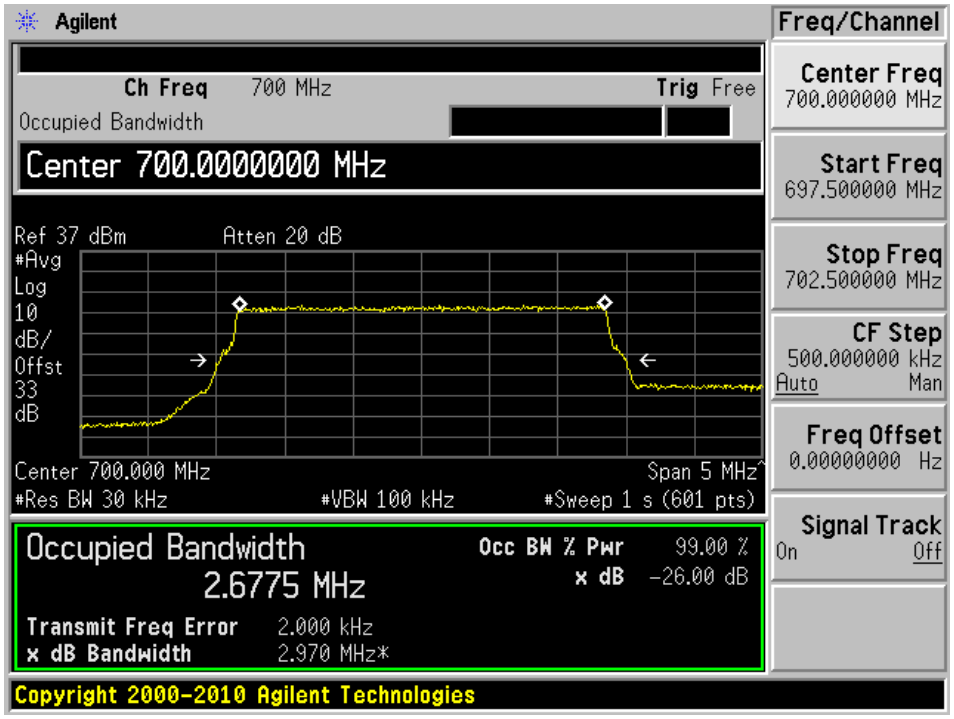


LTE-QPSK (3 MHz), Frequency: 700 MHz

Input

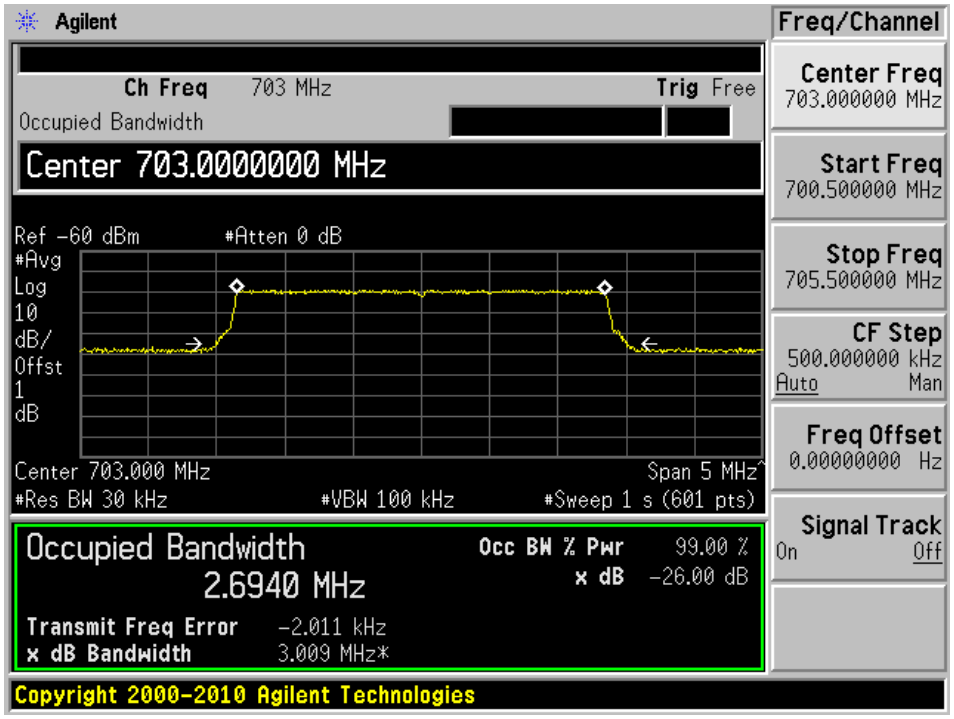


Output

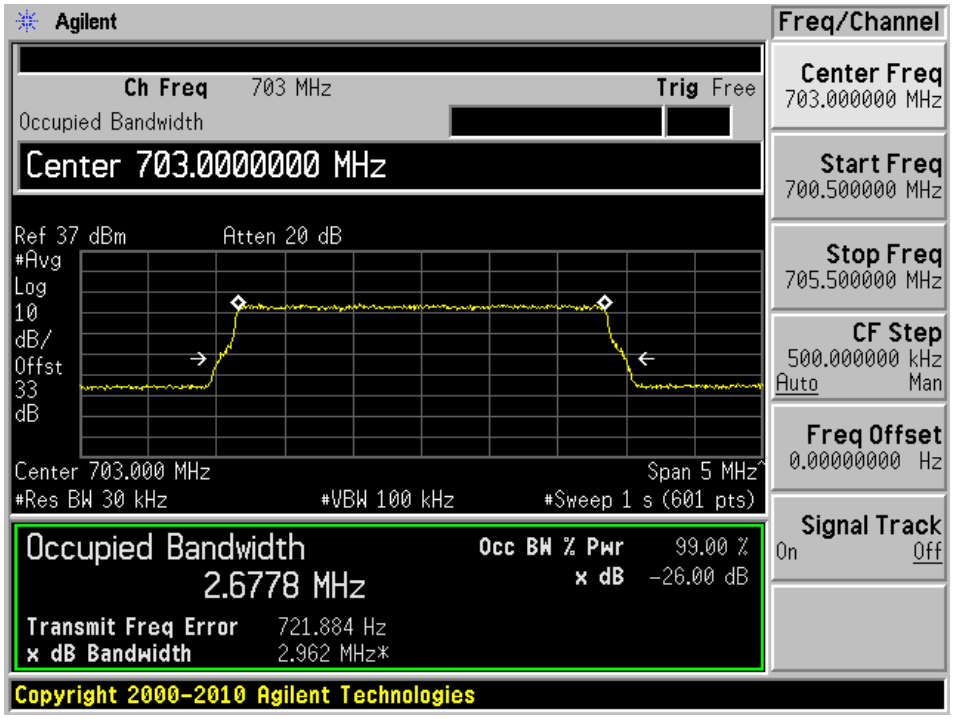


LTE-QPSK (3 MHz), Frequency: 703 MHz

Input

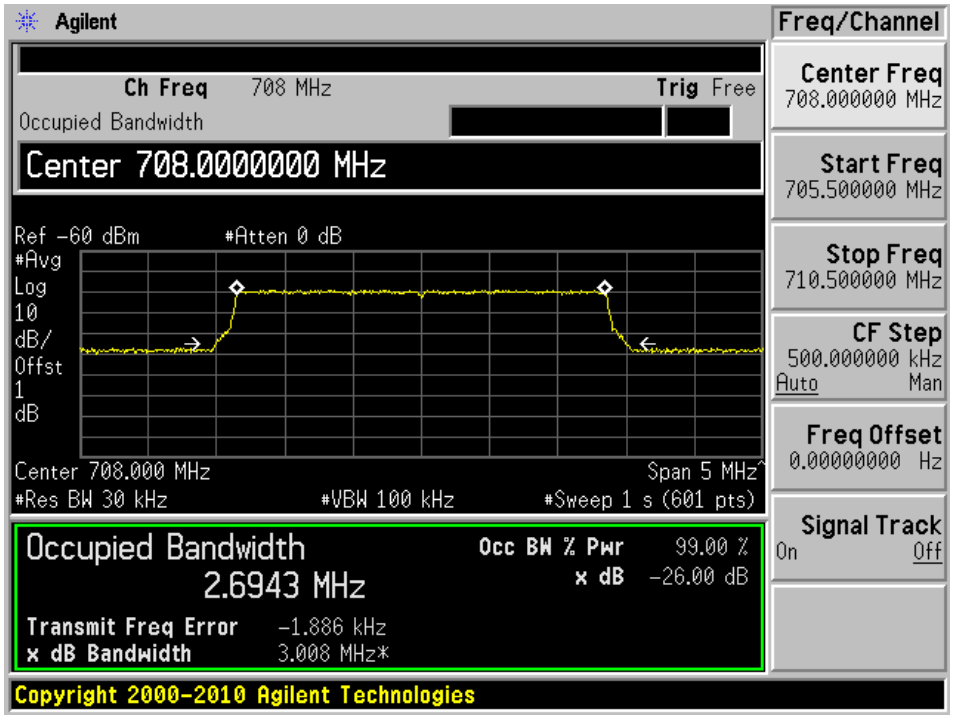


Output

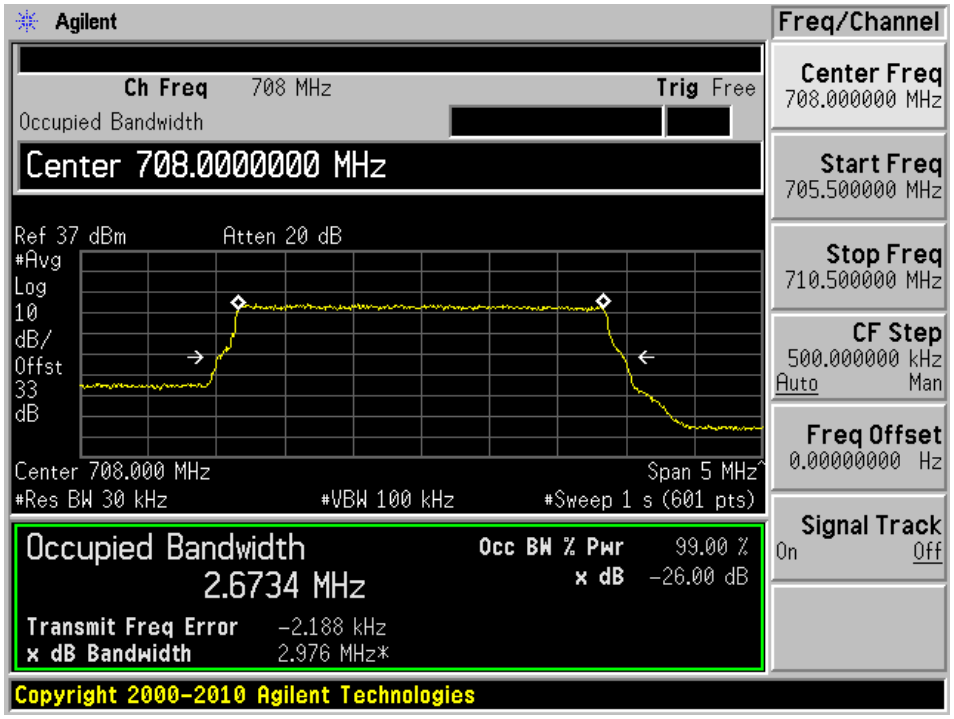


LTE-QPSK (3 MHz), Frequency: 708 MHz

Input

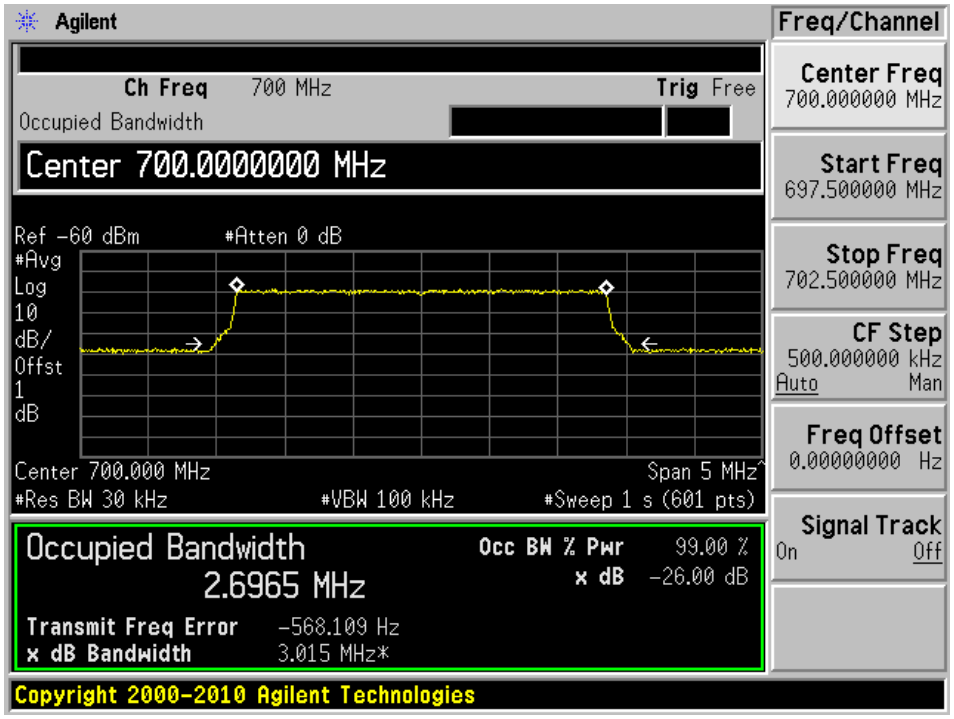


Output

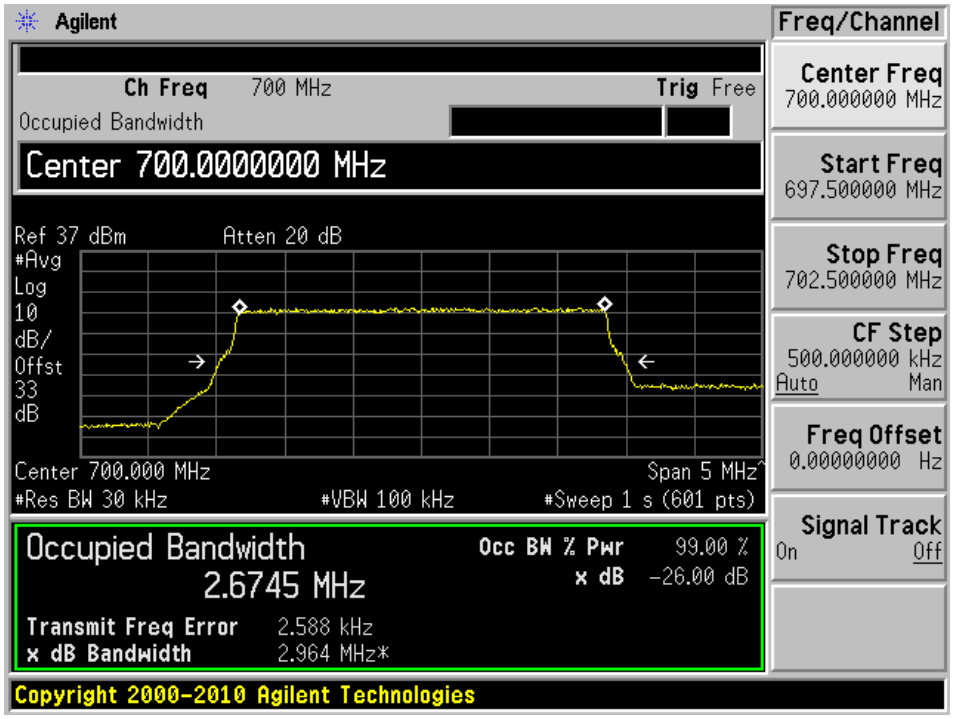


LTE-16QAM (3 MHz), Frequency: 700 MHz

Input

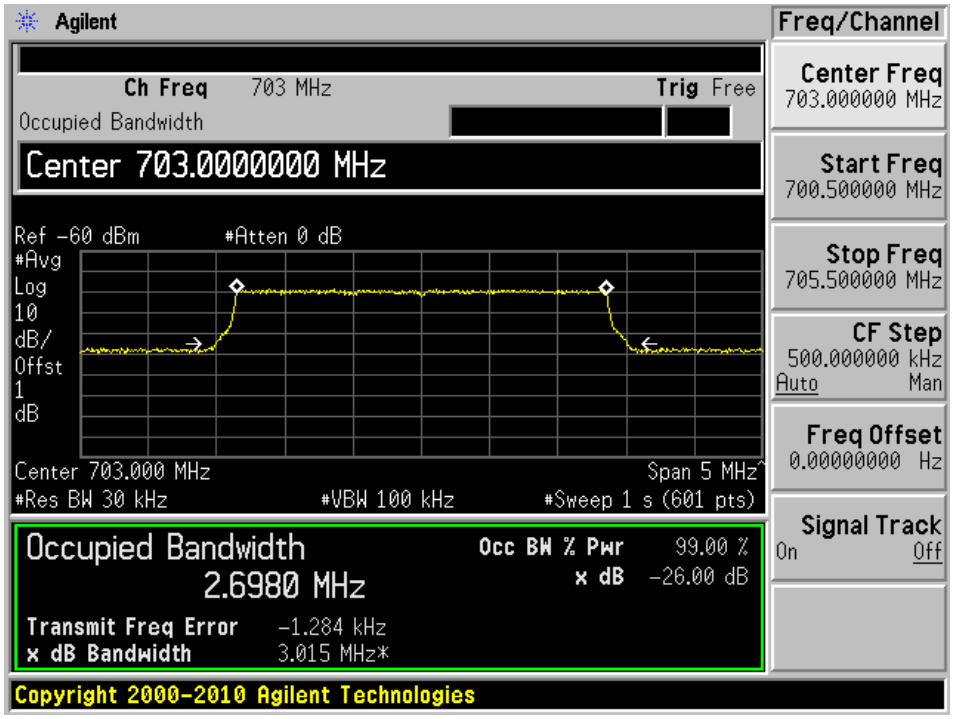


Output

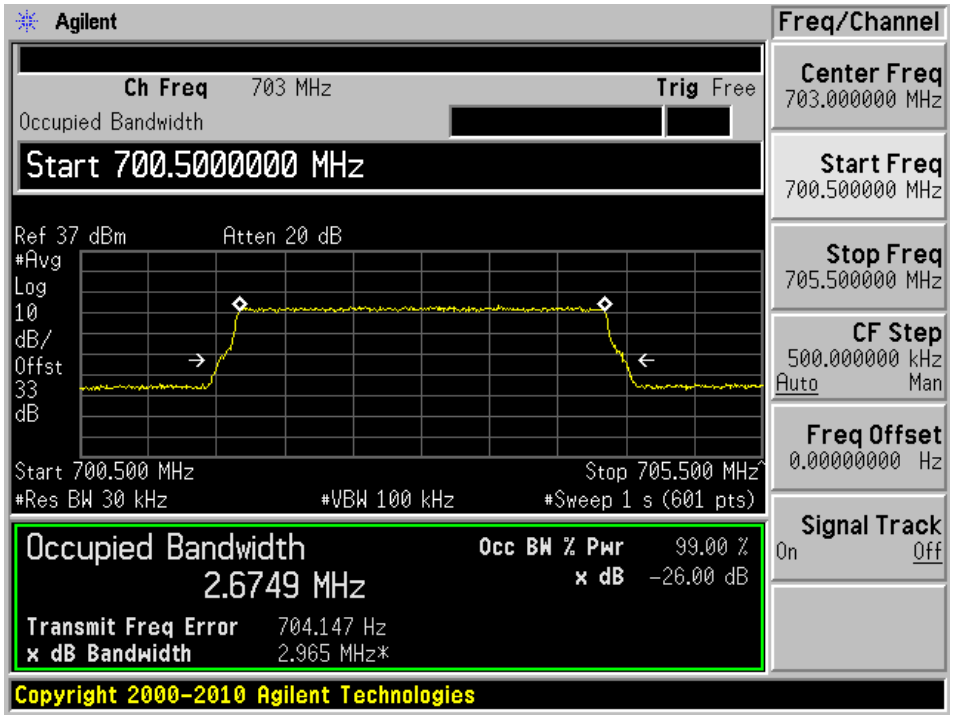


LTE-16QAM (3 MHz), Frequency: 703 MHz

Input

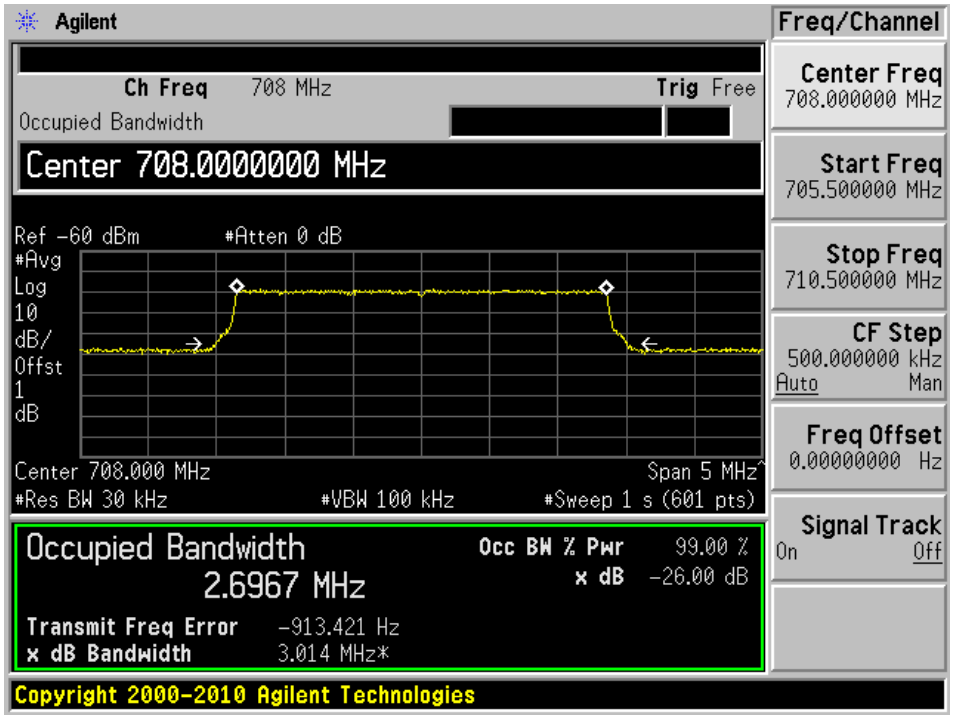


Output

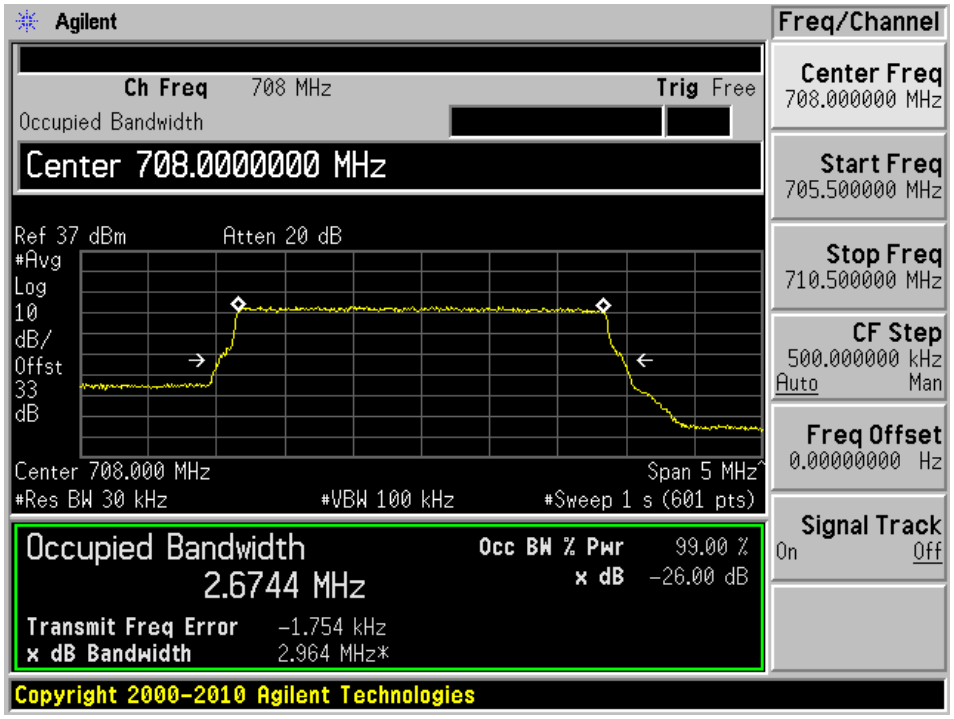


LTE-16QAM (3 MHz), Frequency: 708 MHz

Input

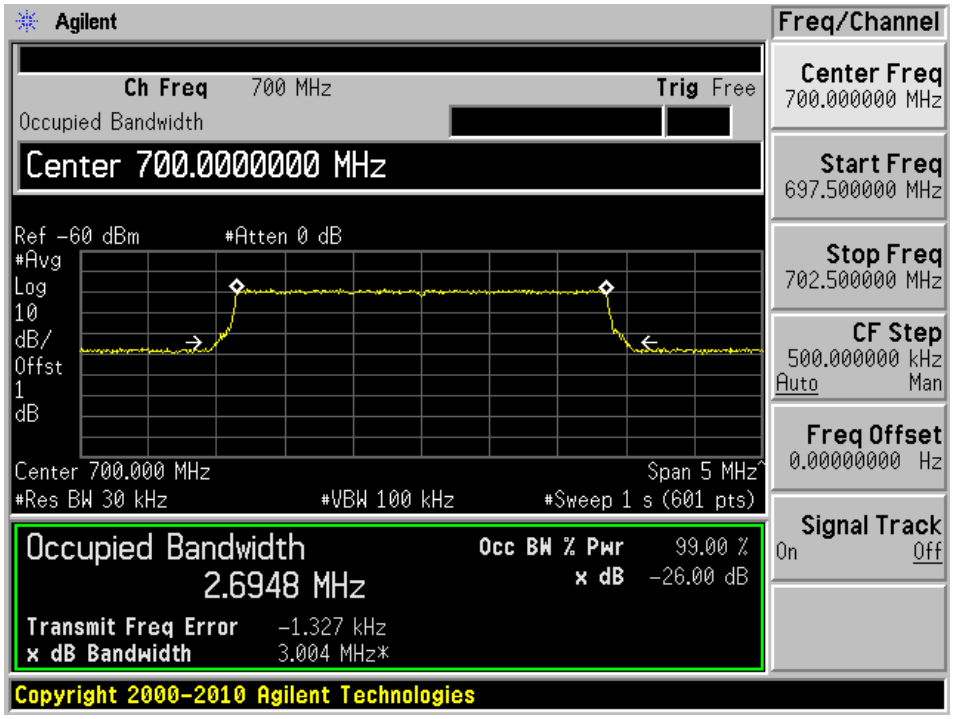


Output

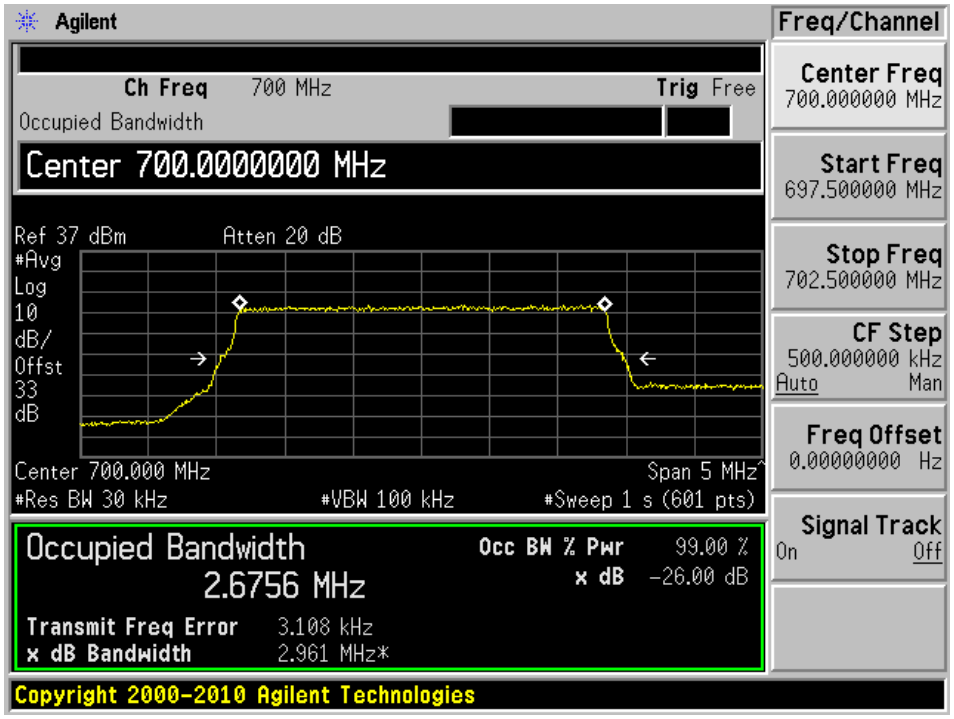


LTE-64QAM (3 MHz), Frequency: 700 MHz

Input

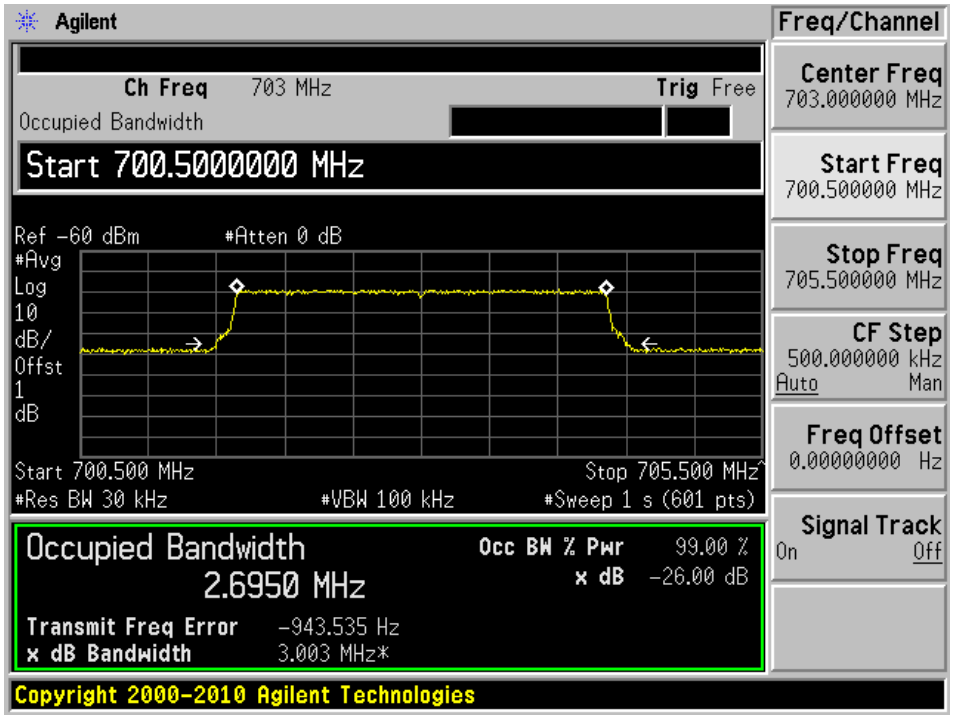


Output

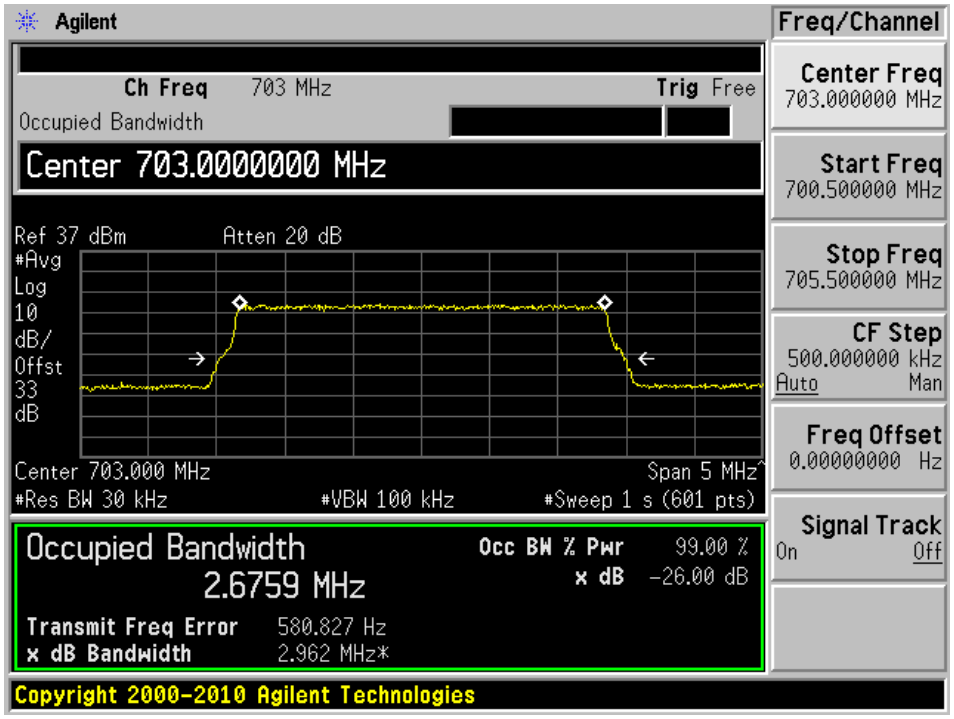


LTE-64QAM (3 MHz), Frequency: 703 MHz

Input

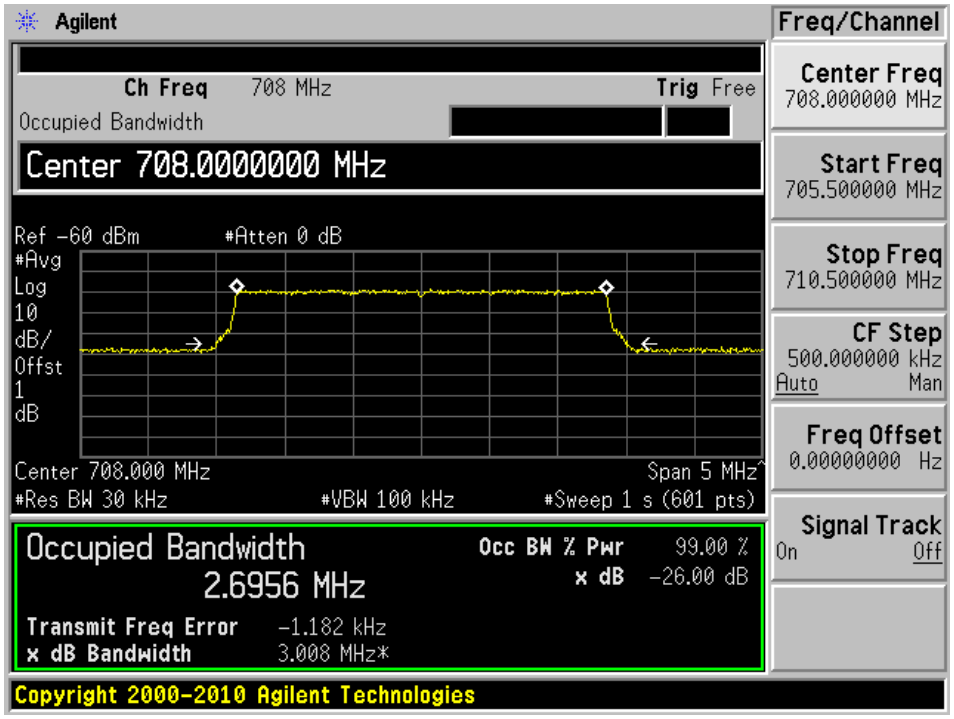


Output

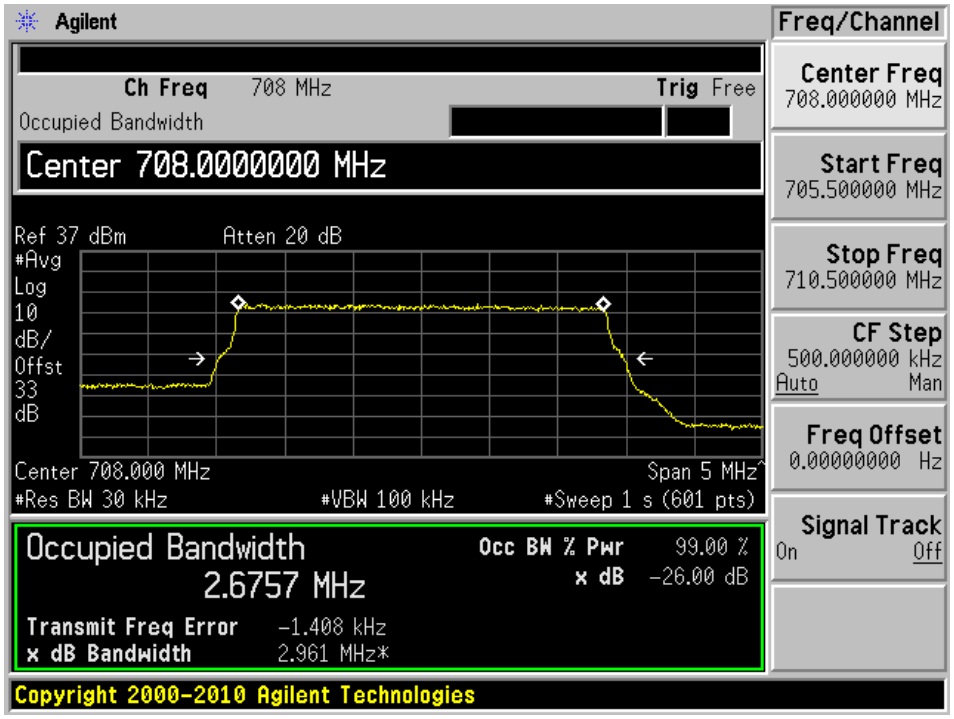


LTE-64QAM (3 MHz), Frequency: 708 MHz

Input

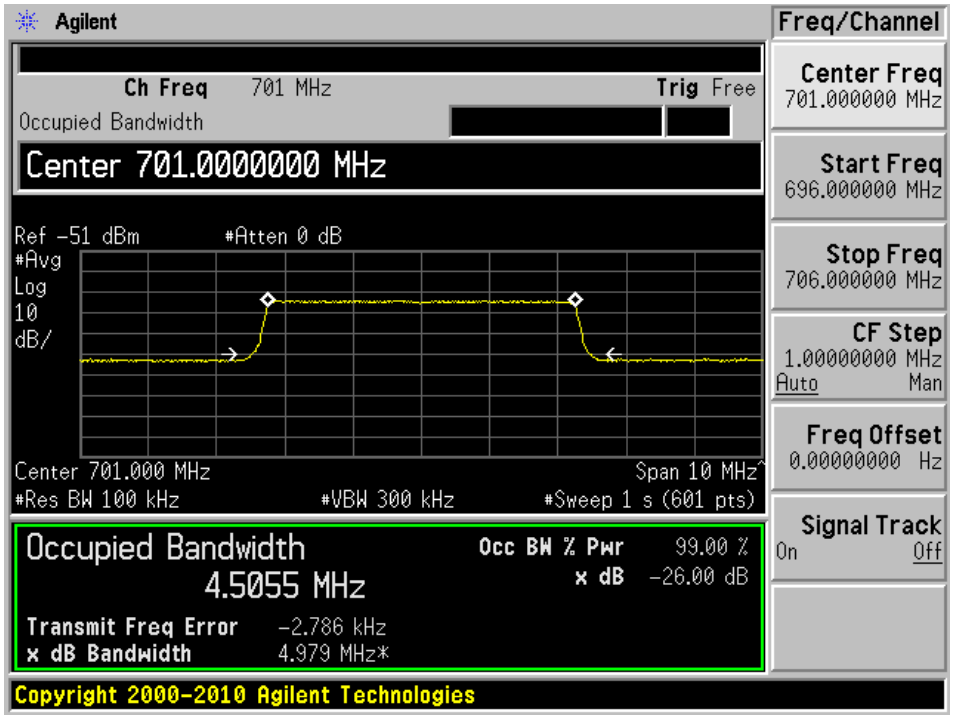


Output

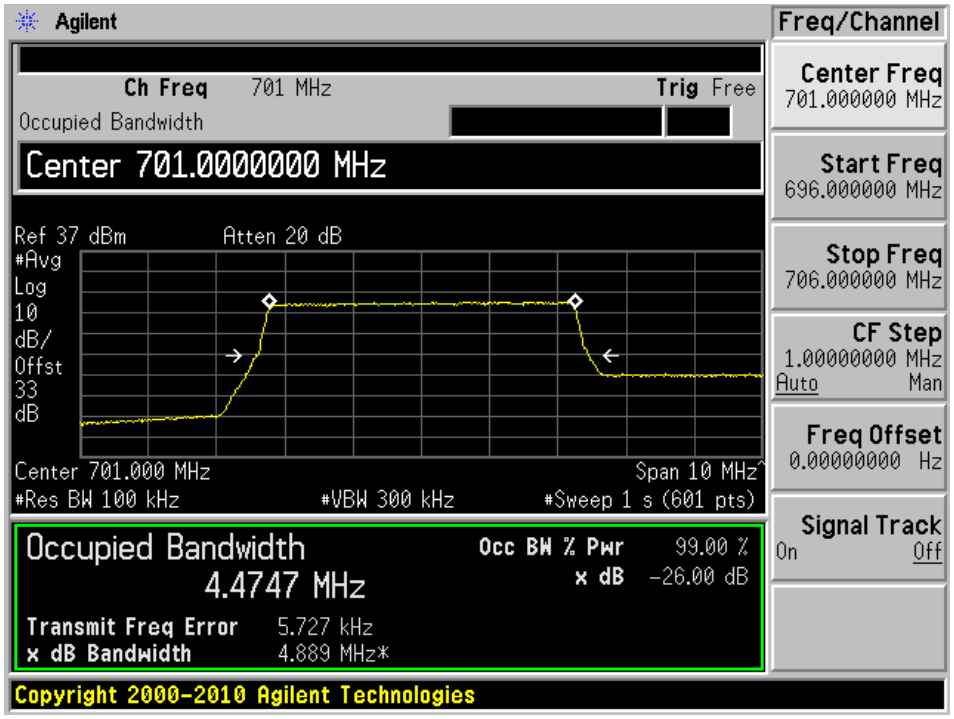


LTE-QPSK (5 MHz), Frequency: 701 MHz

Input

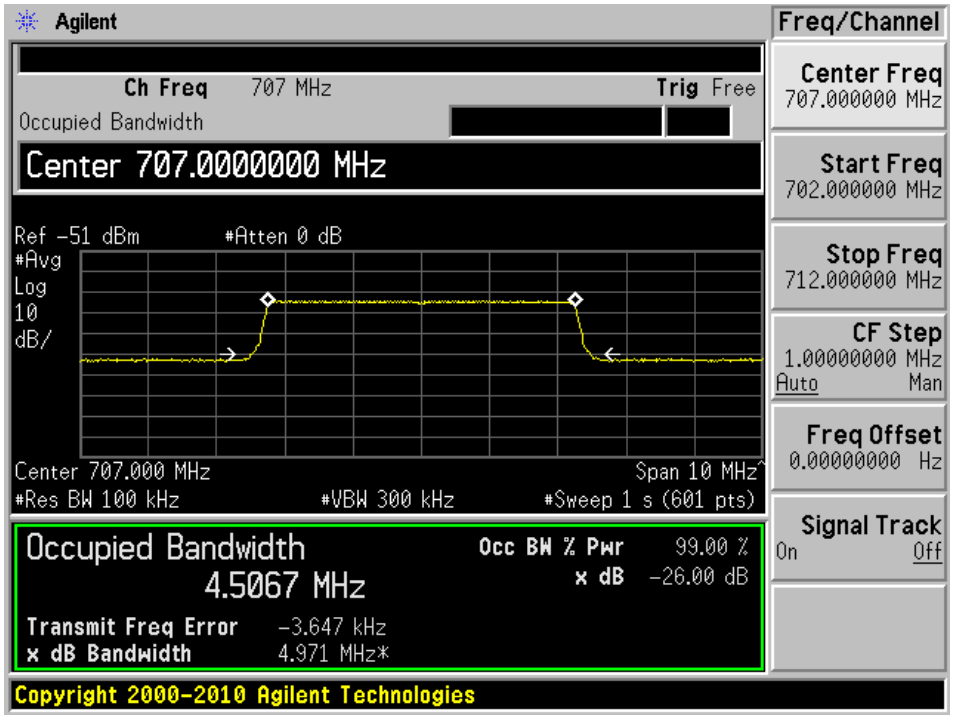


Output

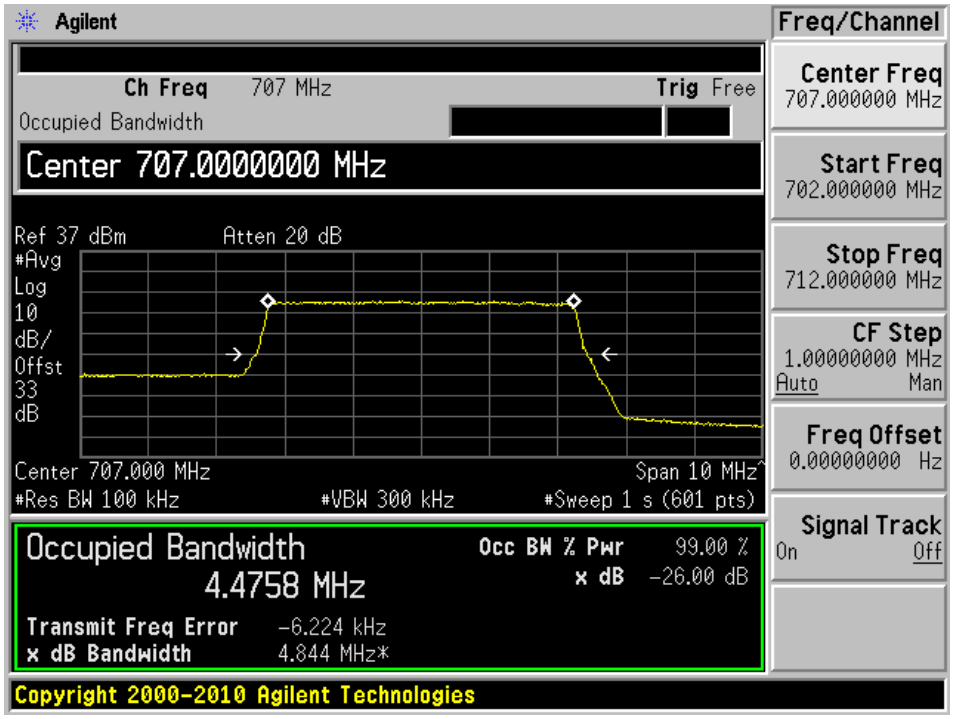


LTE-QPSK (5 MHz), Frequency: 707 MHz

Input

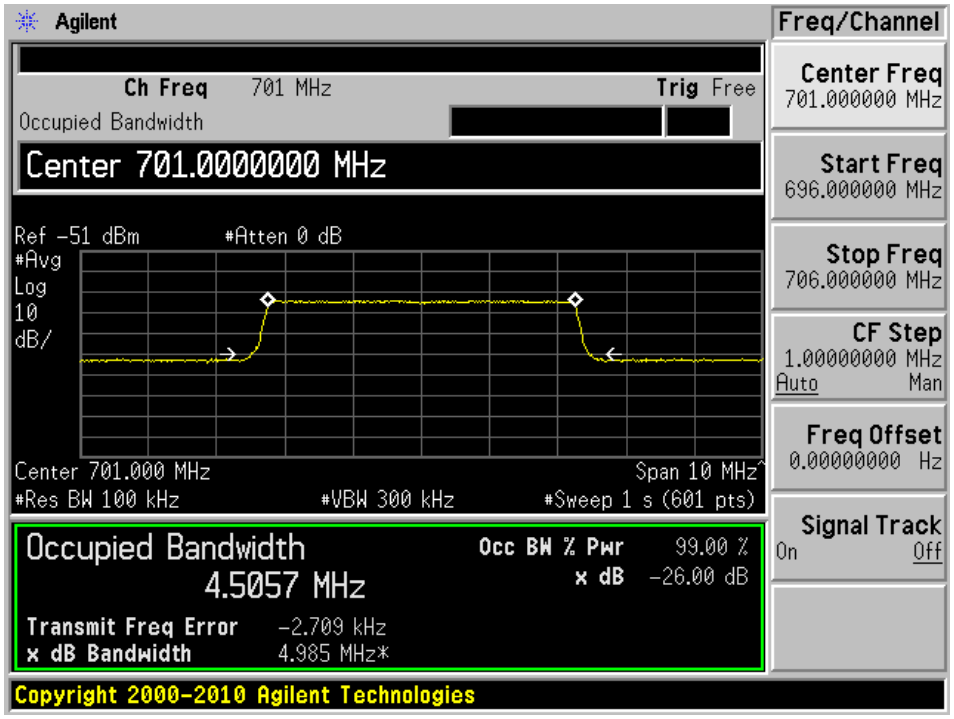


Output

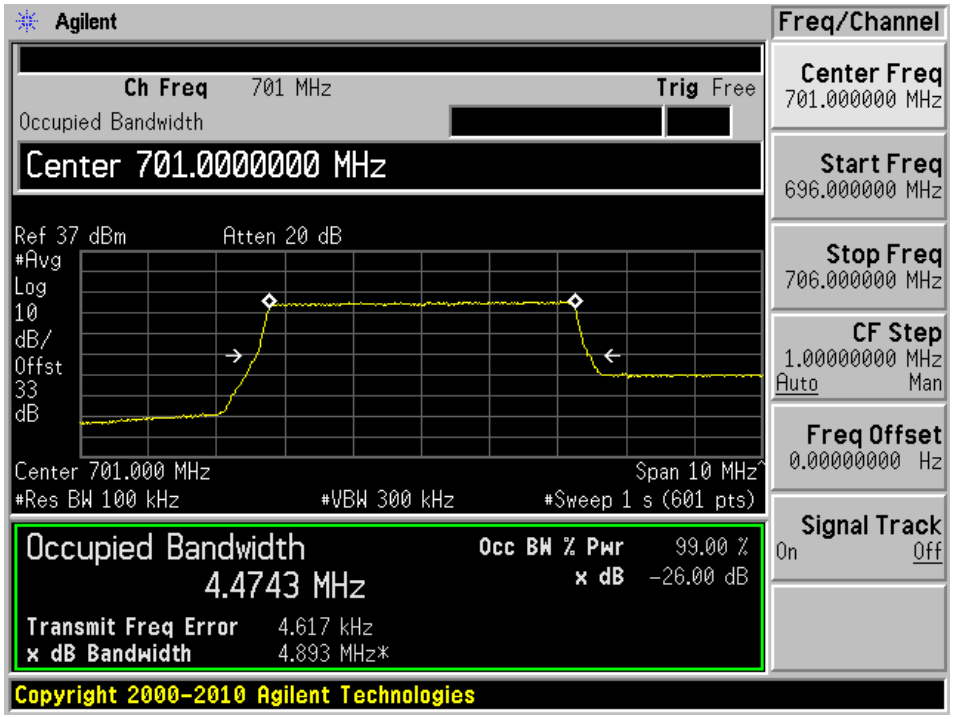


LTE-16QAM (5 MHz), Frequency: 701 MHz

Input

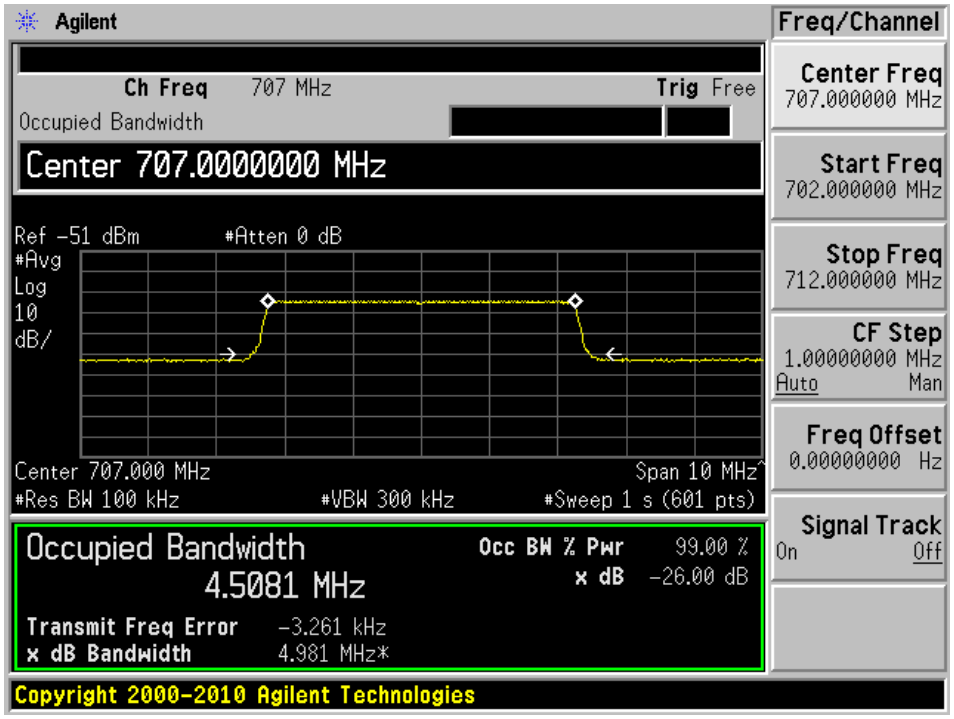


Output

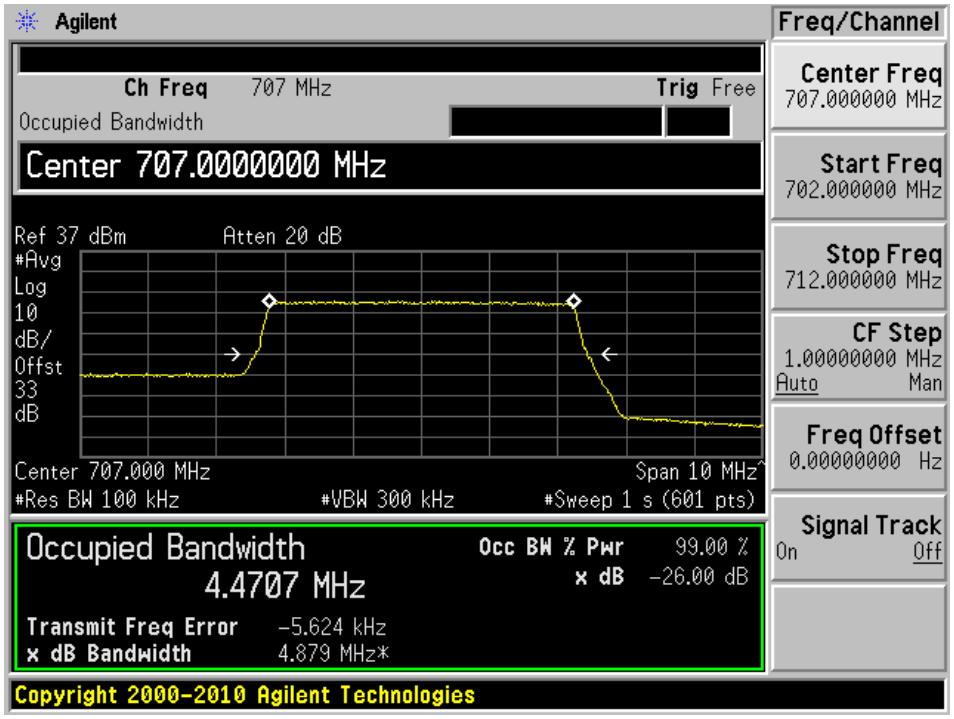


LTE-16QAM (5 MHz), Frequency: 707 MHz

Input

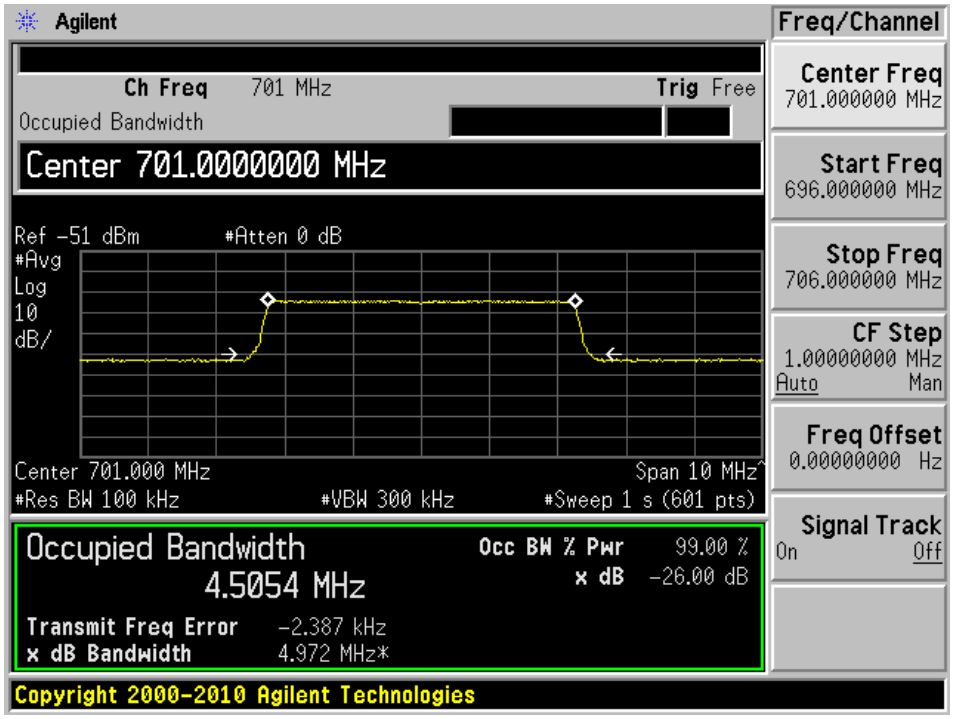


Output

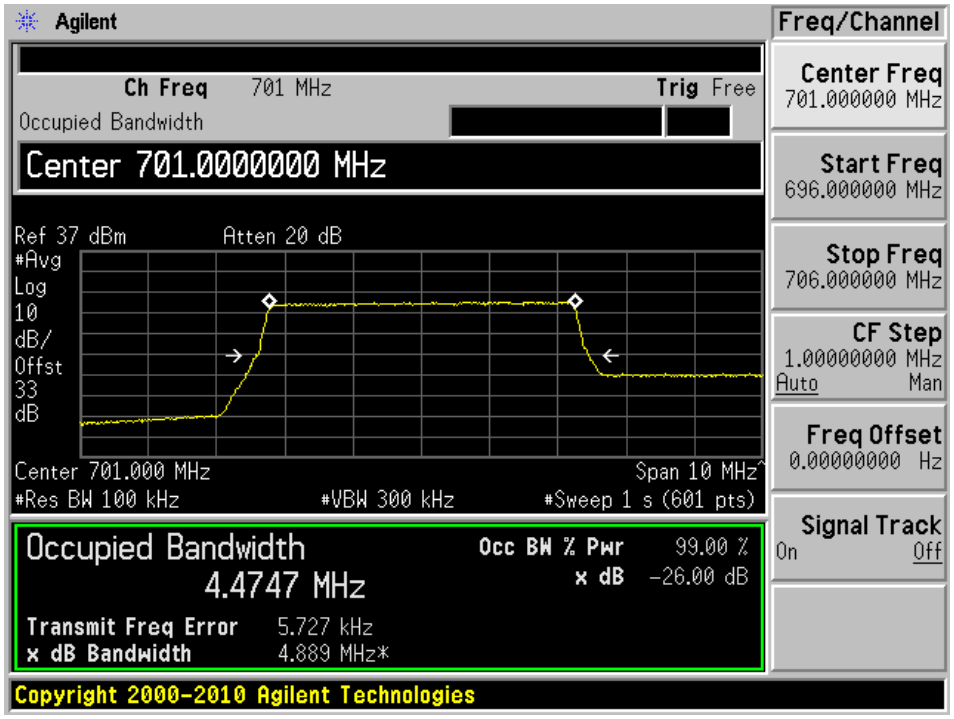


LTE-64QAM (5 MHz), Frequency: 701 MHz

Input

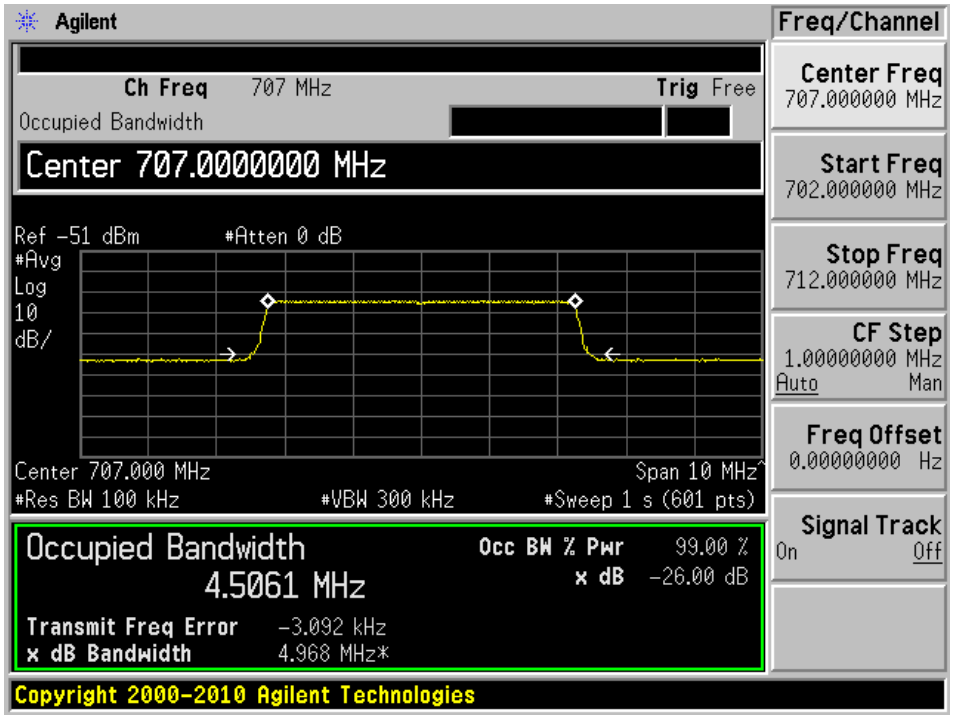


Output

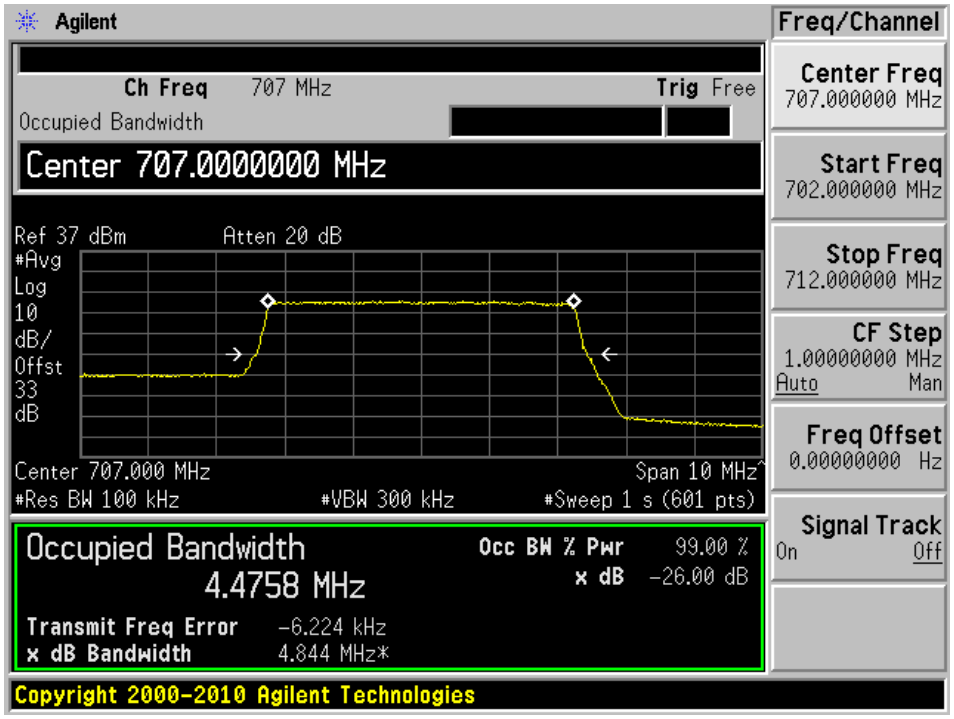


LTE-64QAM (5 MHz), Frequency: 707 MHz

Input

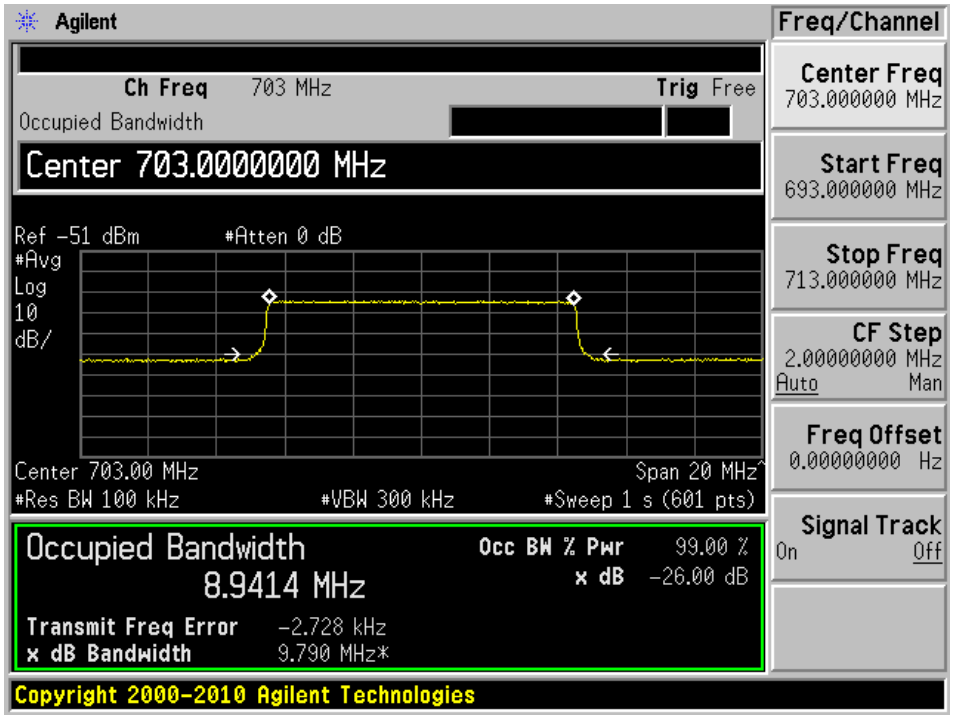


Output

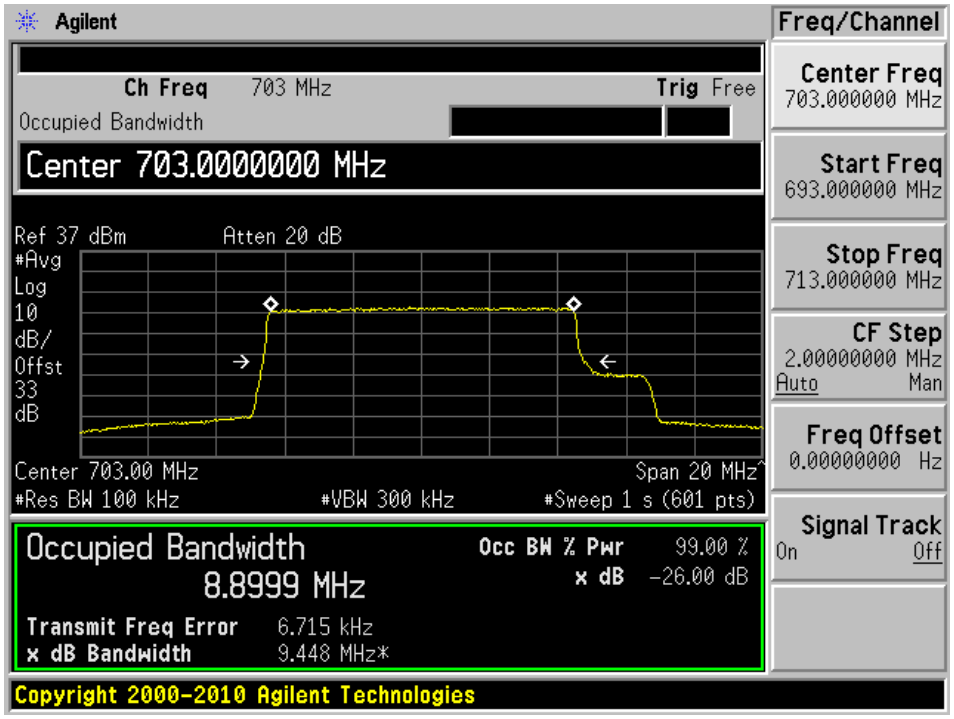


LTE-QPSK (10 MHz), Frequency: 703 MHz

Input

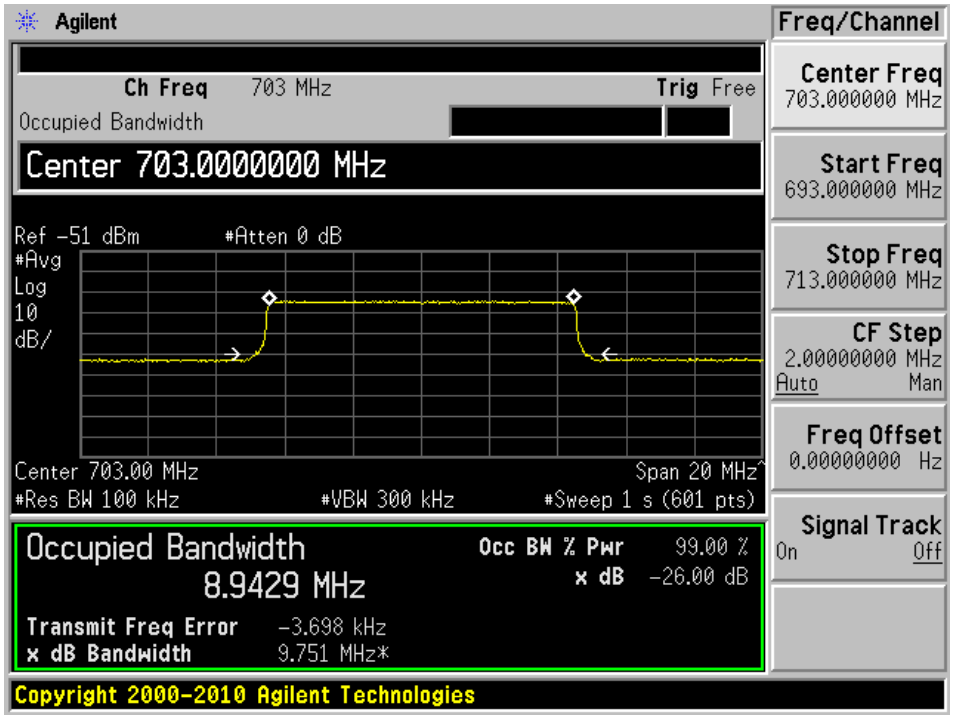


Output

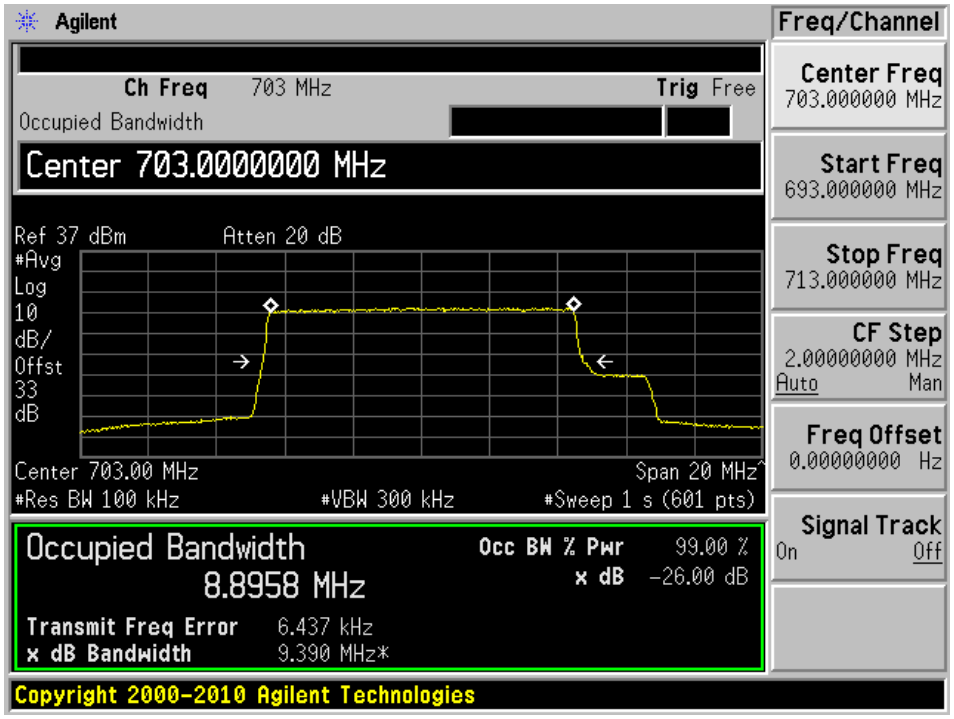


LTE-16QAM (10 MHz), Frequency: 703 MHz

Input

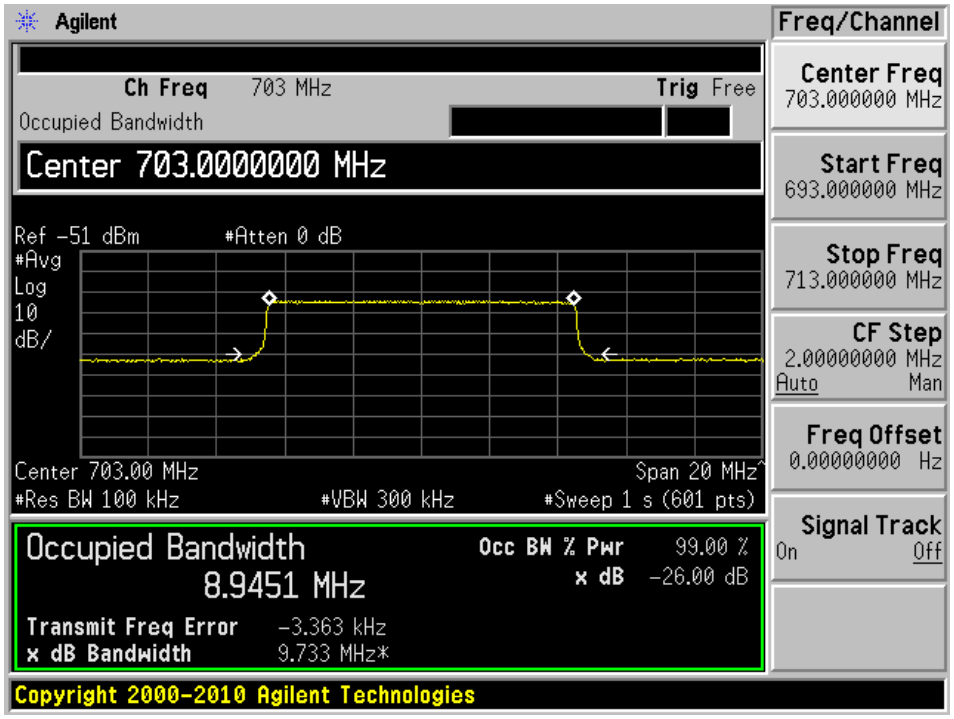


Output

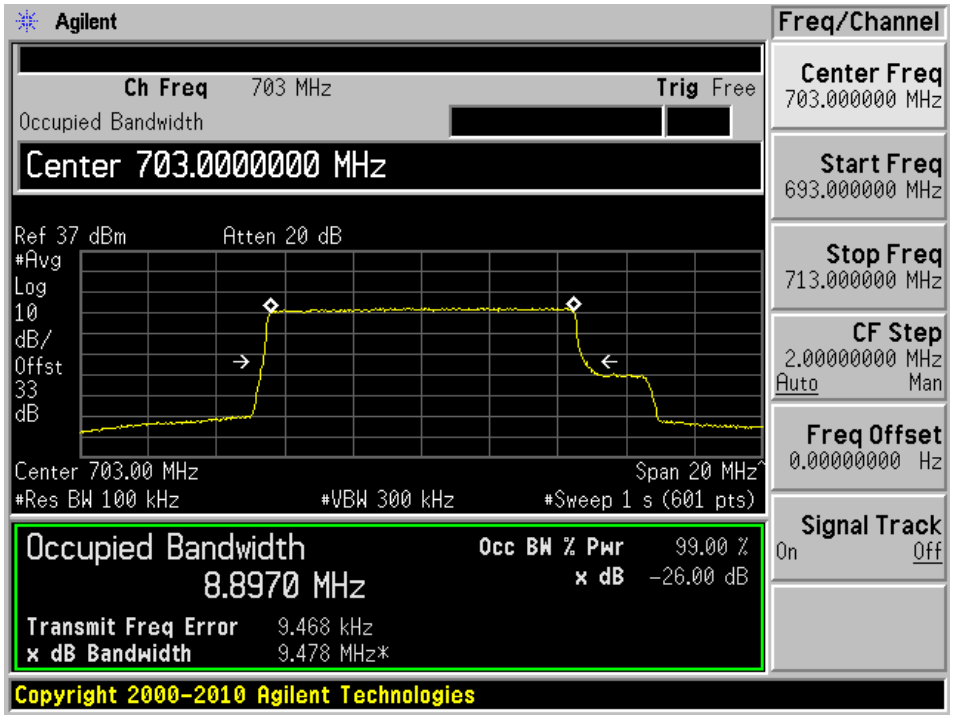


LTE-64QAM (10 MHz), Frequency: 703 MHz

Input



Output

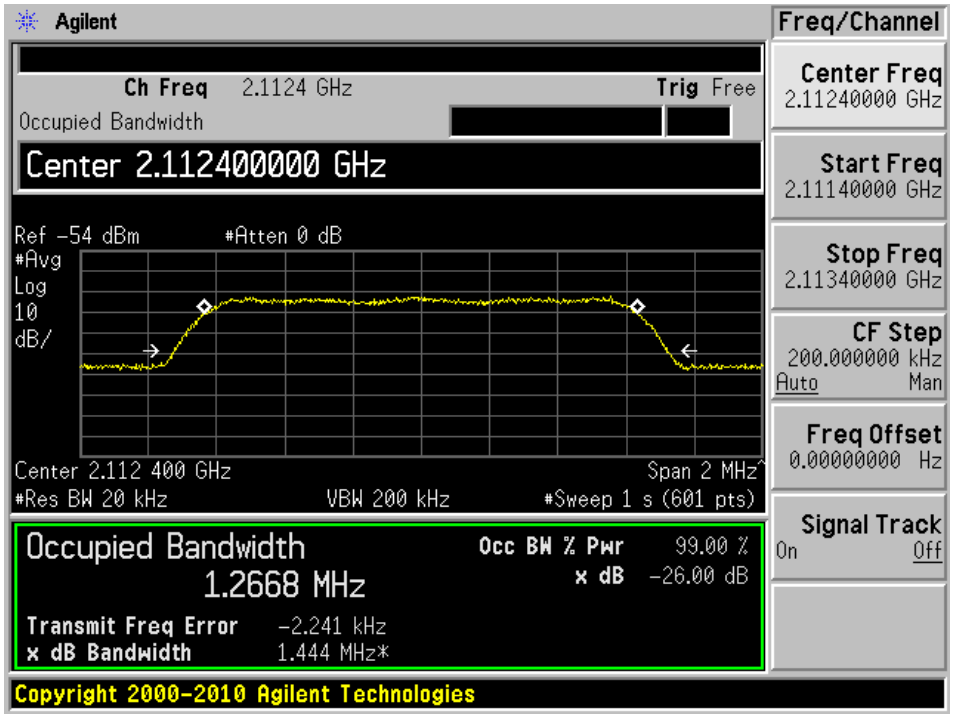


2110-2155 MHz / 1710-1755 MHz

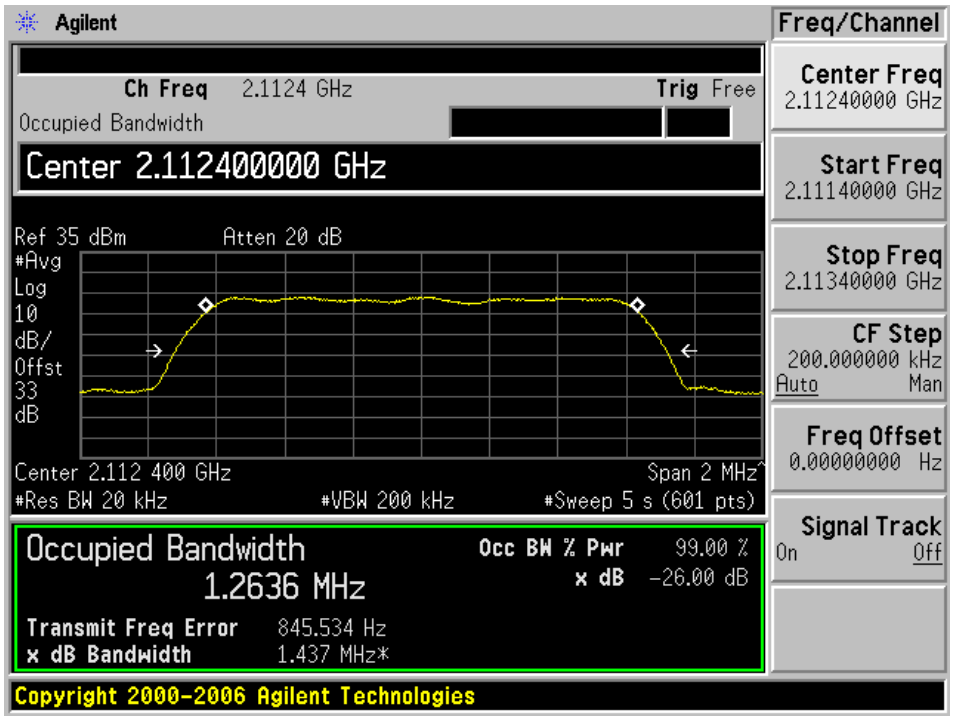
Downlink

Low Channel – AWS, Frequency: 2112.4 MHz

Input

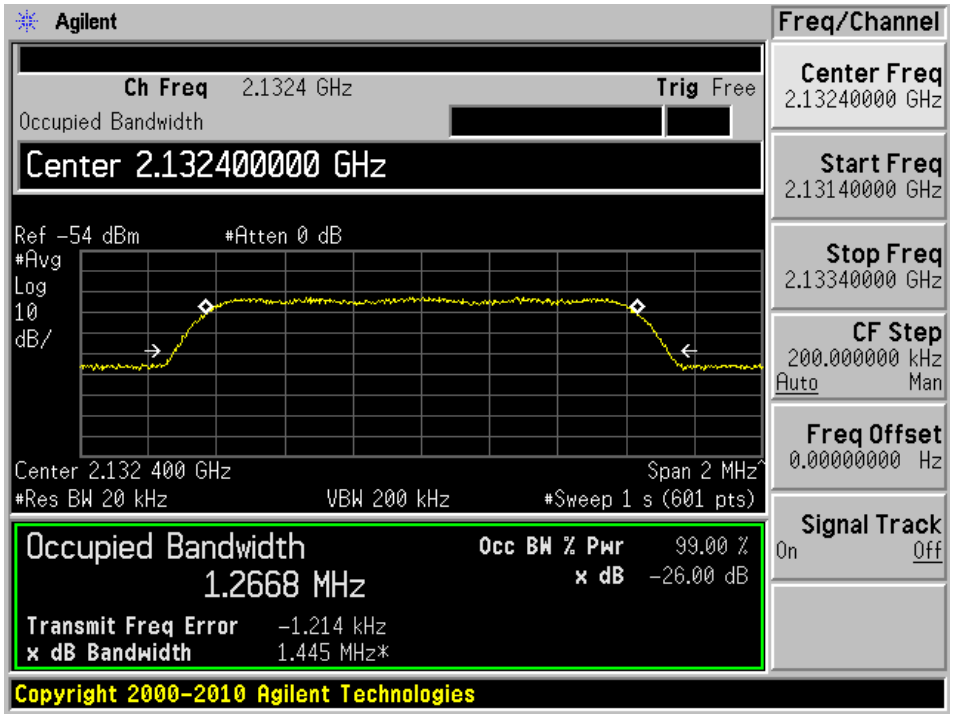


Output

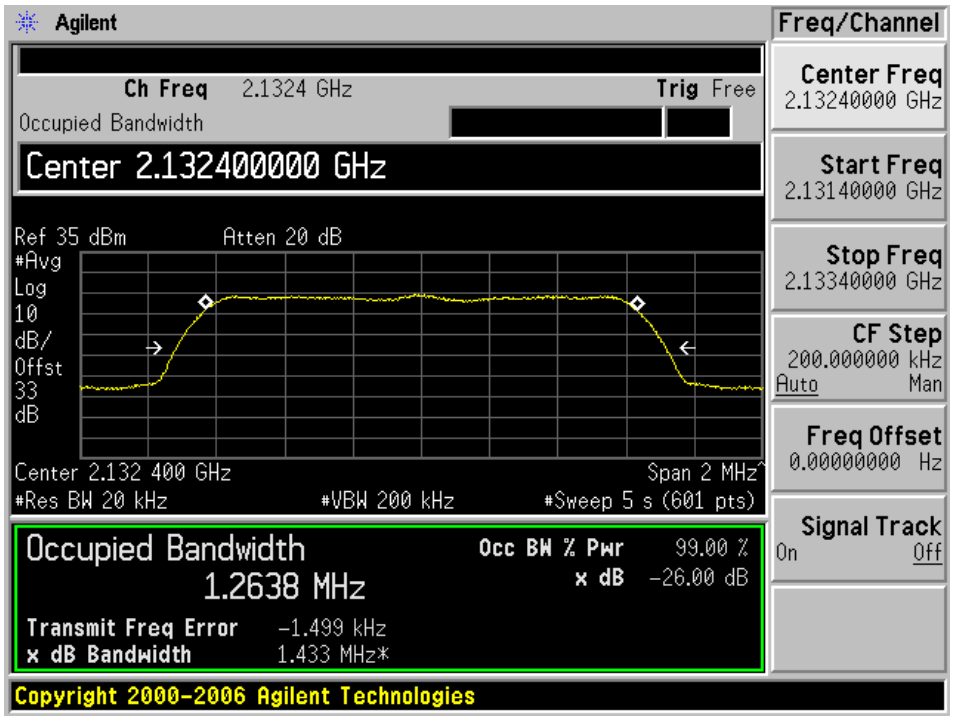


Middle Channel – AWS, Frequency: 2132.4MHz

Input

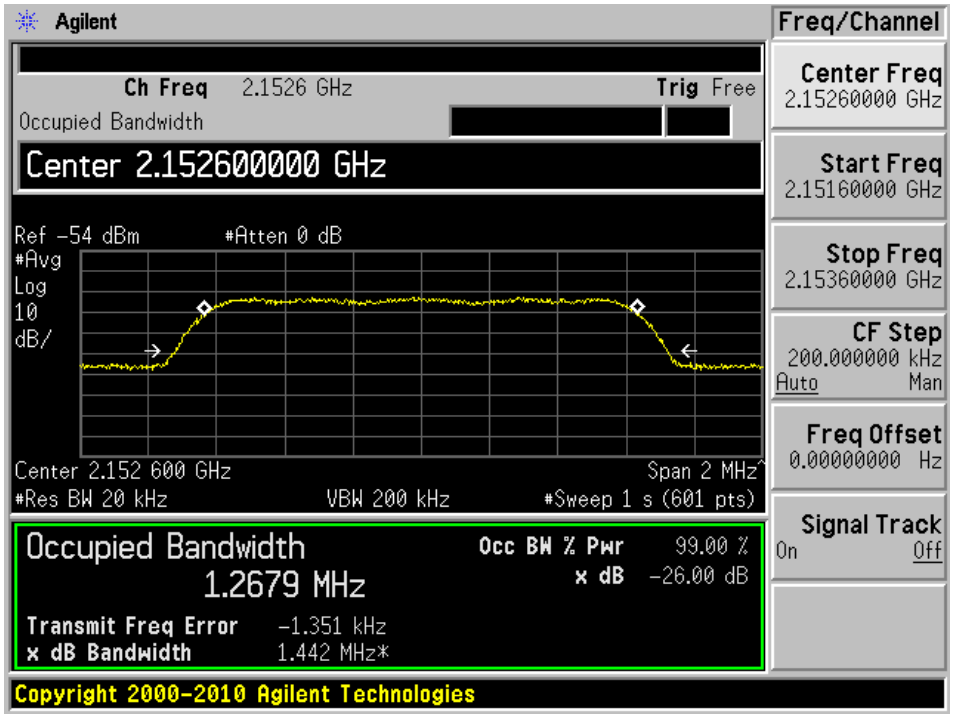


Output

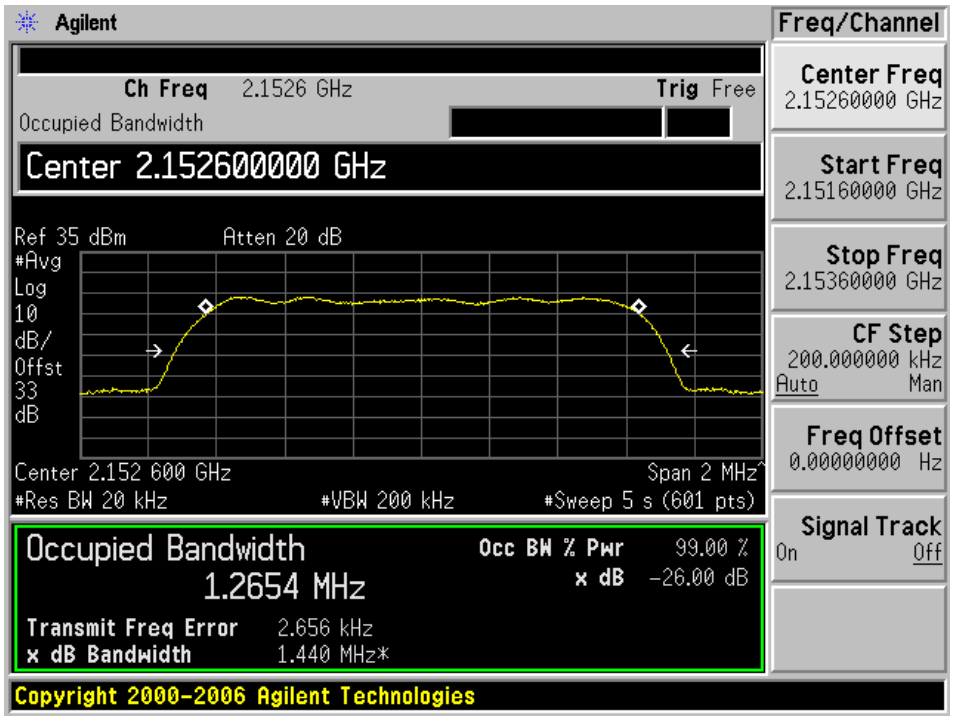


High Channel – AWS, Frequency: 2152.6 MHz

Input



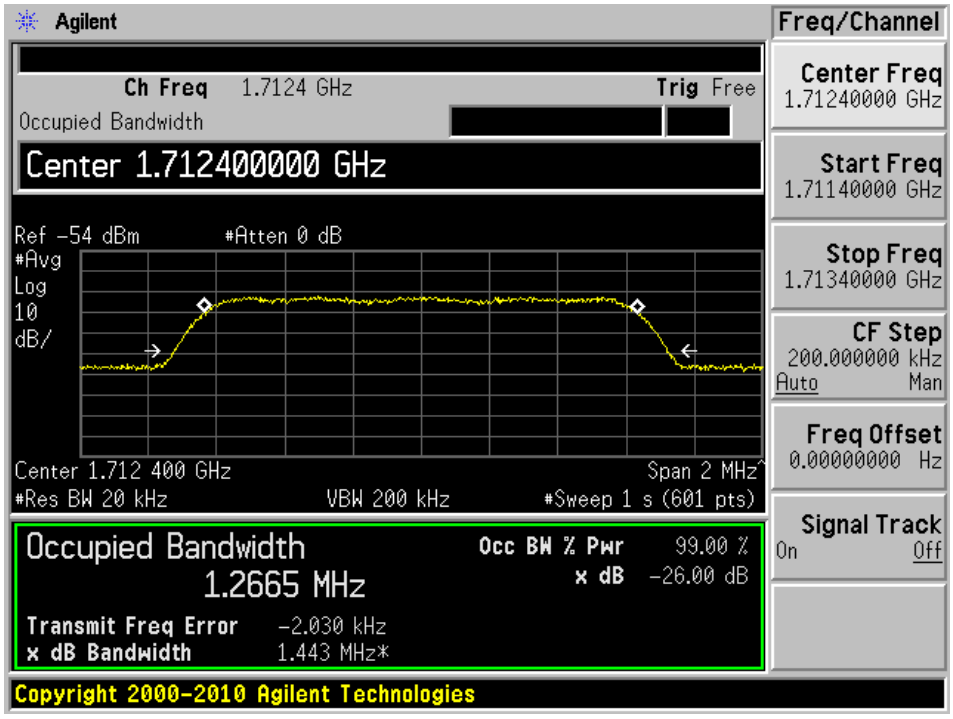
Output



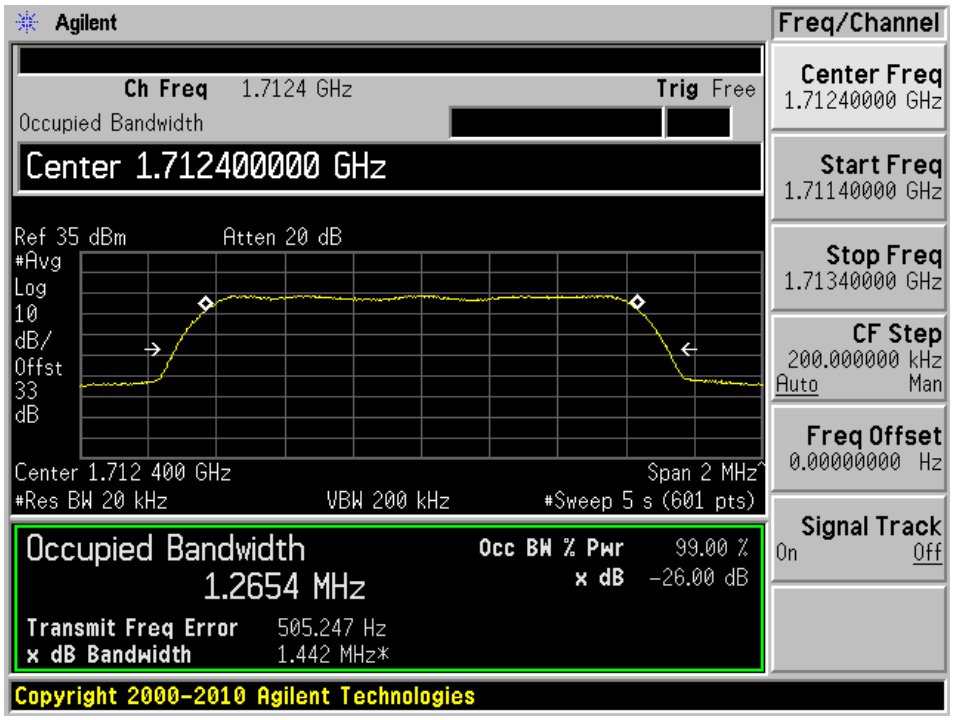
Uplink

Low Channel – AWS, Frequency: 1712.4 MHz

Input

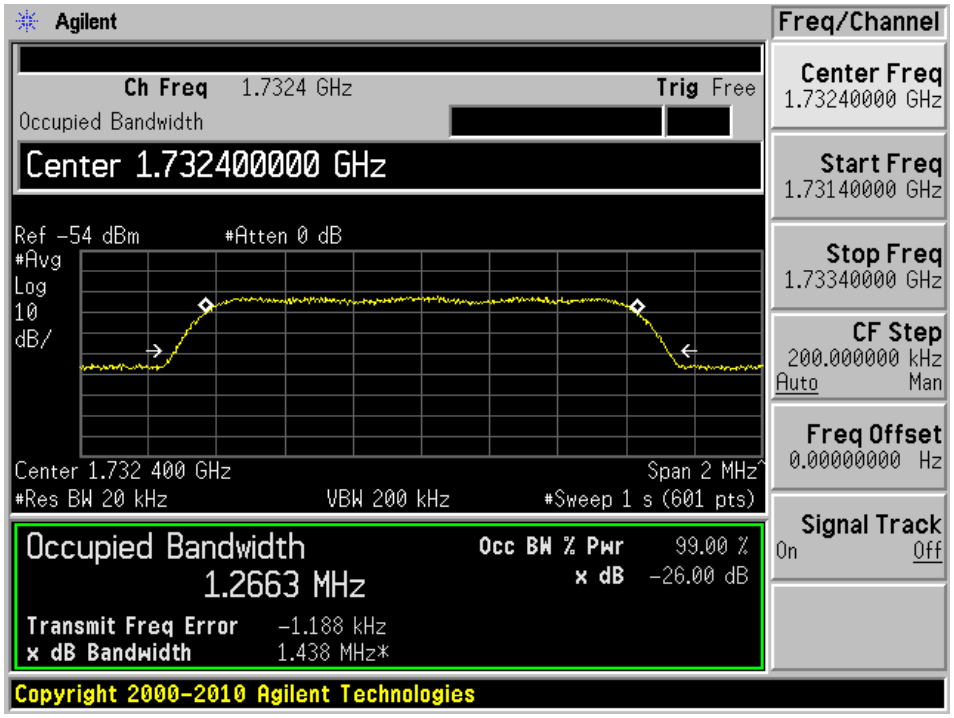


Output

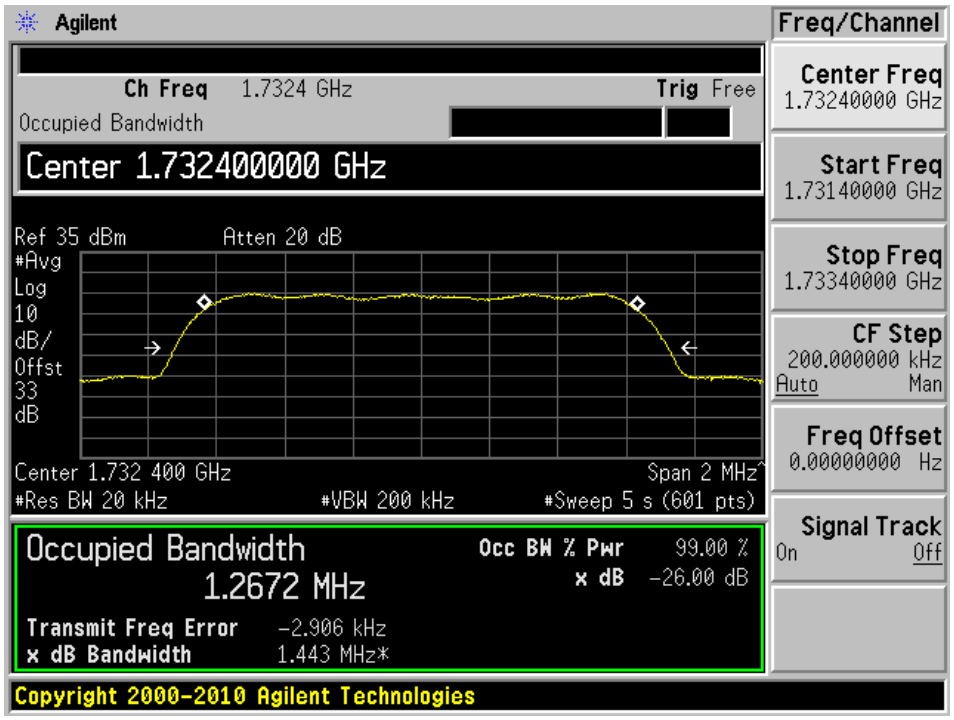


Middle Channel – AWS, Frequency: 1732.4MHz

Input

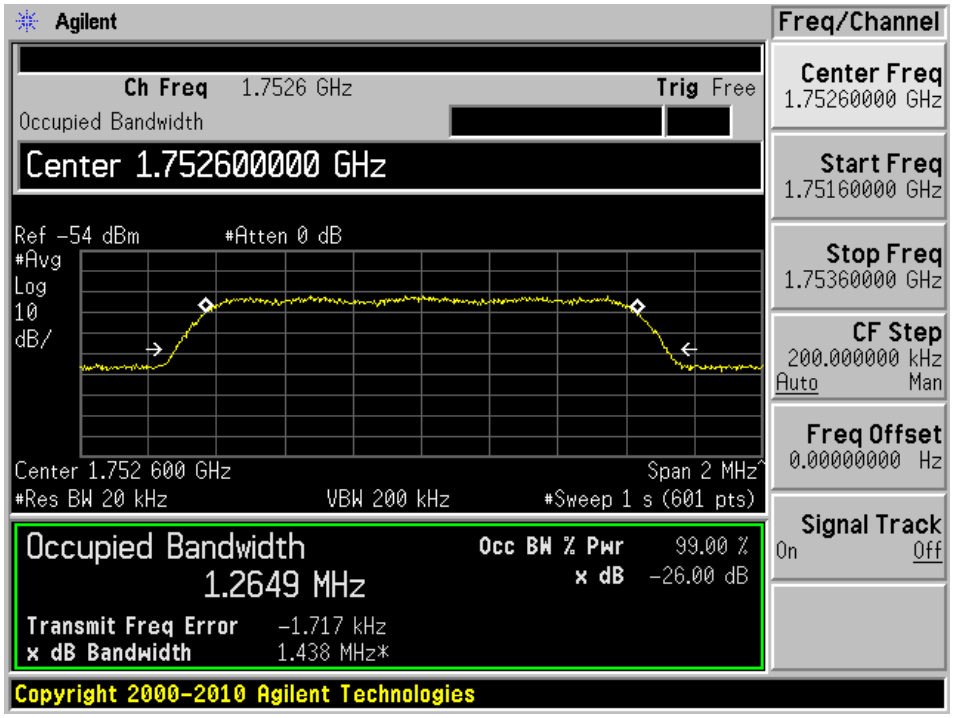


Output

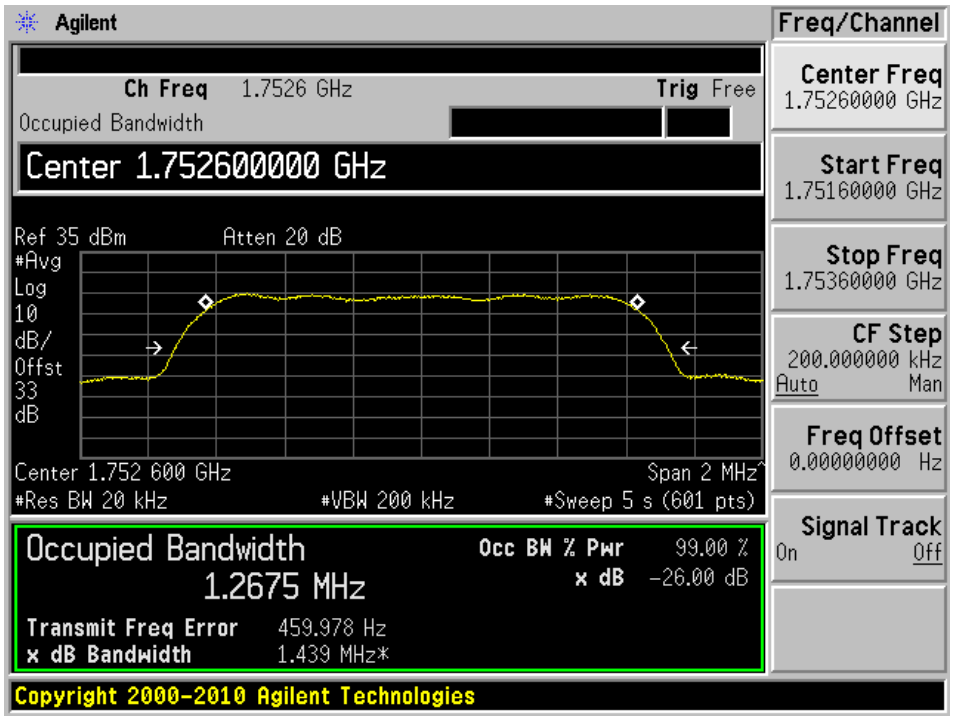


High Channel – AWS, Frequency: 1752.6 MHz

Input



Output



7 FCC §2.1053 & §27.53 - SPURIOUS RADIATED EMISSIONS

7.1 Applicable Standard

Requirements: FCC §2.1053, §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:	21-24 °C
Relative Humidity:	42-44 %
ATM Pressure:	101-103 kPa

The testing was performed by Jerry Huang on 2010-08-28 in 5 Meter Chamber #3.

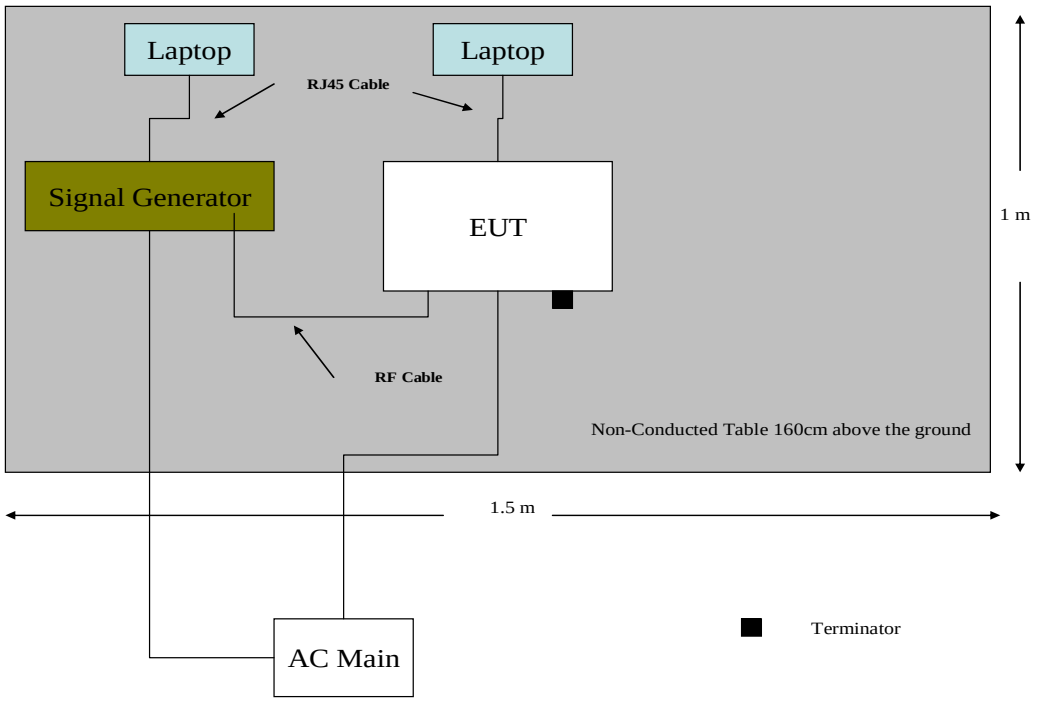
7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	EMI Test Receiver	ESCI 1166.5950K03	100337	2010-03-24
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Hewlett Packard	Pre amplifier	8447D	2944A06639	2010-06-18
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2010-05-0
Agilent	Signal Generator	E4438C	MY42083251	2009-12-08

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

Radiated Emission



7.6 Summary of Test Results

The worst case reading as follows:

Technology	Frequency Bands	Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Frequency Range
LTE	DL:746-757 MHz	Note [1]	-	-	30 MHz – 22 GHz
	UL: 776-787 MHz	Note [1]	-	-	30 MHz – 22 GHz
	DL: 728-740 MHz	Note [1]	-	-	30 MHz – 22 GHz
	UL: 698-710 MHz	Note [1]	-	-	30 MHz – 22 GHz
AWS	DL: 2110-2155 MHz	Note [1]	-	-	30 MHz – 22 GHz
	UL: 1710-1755MHz	Note [1]	-	-	30 MHz – 22 GHz

Note [1]: All harmonics were on the noise floor level and/or 20dB below the limit.
All digital signals were tested on another standard.

7.7 Test Results

DL: 746-757 MHz

Modulation: CW Signal – 752 MHz (Scan from 30 MHz to 22 GHz @ 3 Meter Distance)

Indicated		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)		
1504	-	-		-	-	-	-	-	-	-	Note [1]
1504	-	-	-	-	-	-	-	-	-	-	Note [1]

UL: 776-787 MHz

Modulation: CW Signal – 782 MHz (Scan from 30 MHz to 22 GHz @ 3 Meter Distance)

Indicated		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)		
1562	-	-		-	-	-	-	-	-	-	Note [1]
1562	-	-	-	-	-	-	-	-	-	-	Note [1]

DL: 728-740 MHz

Modulation: CW Signal – 733 MHz (Scan from 30 MHz to 22 GHz @ 3 Meter Distance)

Indicated		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)		
1466	-	-		-	-	-	-	-	-	-	Note [1]
1466	-	-	-	-	-	-	-	-	-	-	Note [1]

UL: 698-710 MHz

Modulation: CW Signal – 703 MHz (Scan from 30 MHz to 22 GHz @ 3 Meter Distance)

Indicated		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)		
1406	-	-		-	-	-	-	-	-	-	Note [1]
1406	-	-	-	-	-	-	-	-	-	-	Note [1]

DL: 2110-2155 MHz

Modulation: CW Signal – 2132.4 MHz (Scan from 30 MHz to 22 GHz @ 3 Meter Distance)

Indicated		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)		
4264.8	-	-		-	-	-	-	-	-	-	Note [1]
4264.8	-	-	-	-	-	-	-	-	-	-	Note [1]

UL: 1710-1755 MHz

Modulation: CW Signal – 1732.4MHz (Scan from 30 MHz to 22GHz @ 3 Meter Distance)

Indicated		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	-	-		-	-	-	-	-	-	-	Note [1]
3464.8	-	-	-	-	-	-	-	-	-	-	Note [1]

Note [1]: All harmonics were on the noise floor level and/or 20dB below the limit.
All digital signals were tested on another standard.

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

8.1 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

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:	21-24°C
Relative Humidity:	40-43 %
ATM Pressure:	101-103 kPa

The testing was performed by Dennis Huang from 2010-08-24 to 2010-08-26 at RF Site.

8.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2010-05-09
Agilent	Signal Generator	E4438C	MY42083251	2009-12-08

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

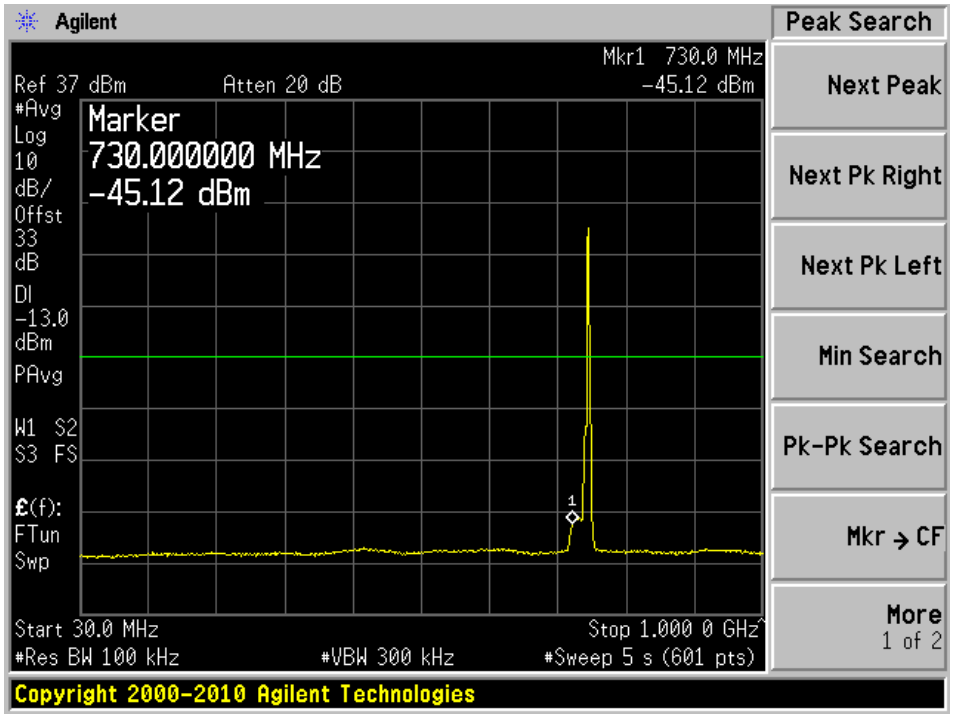
8.5 Test Results

Please refer to the following plots.

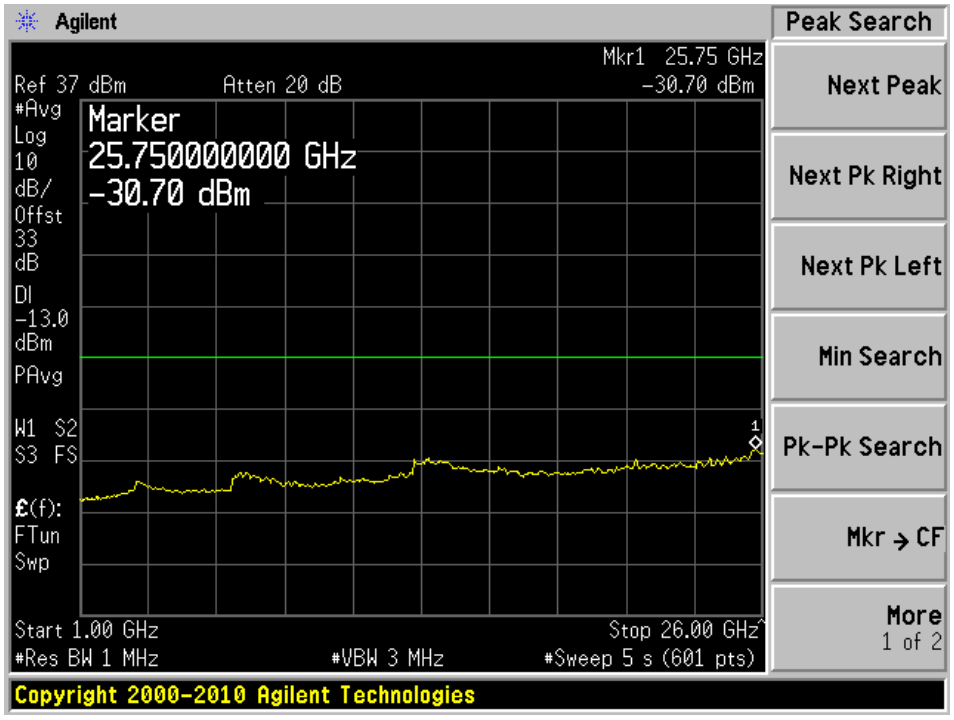
DL: 746-757 MHz

Worst Case - LTE-QPSK (1.4 MHz), Frequency: 752 MHz

Plot 1: 30 MHz to 1 GHz

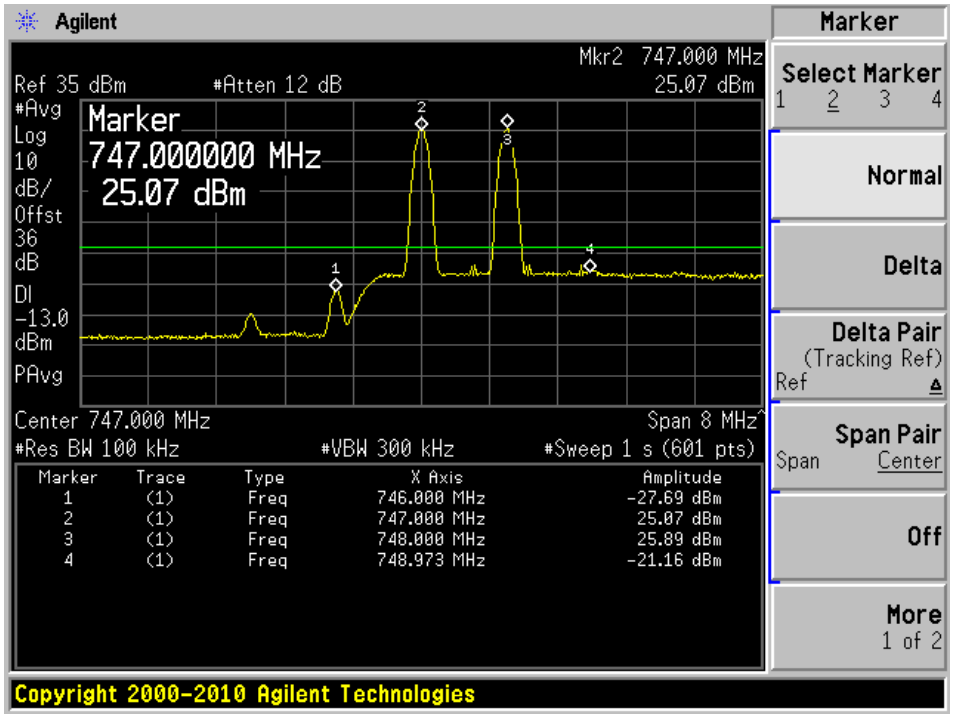


Plot 2: Above 1 GHz

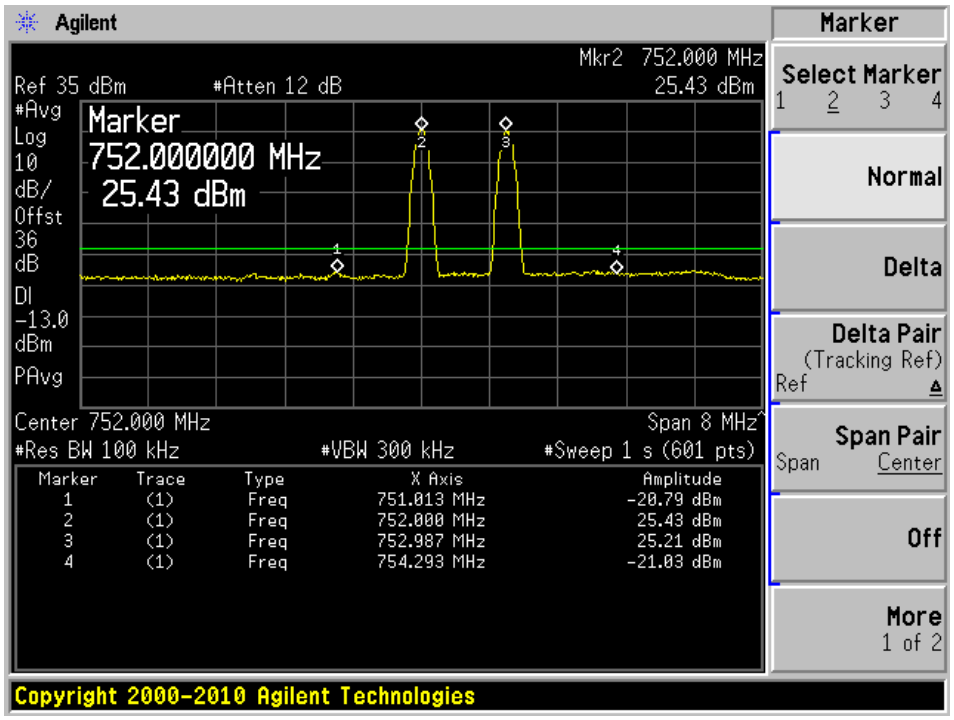


Inter-Modulation:

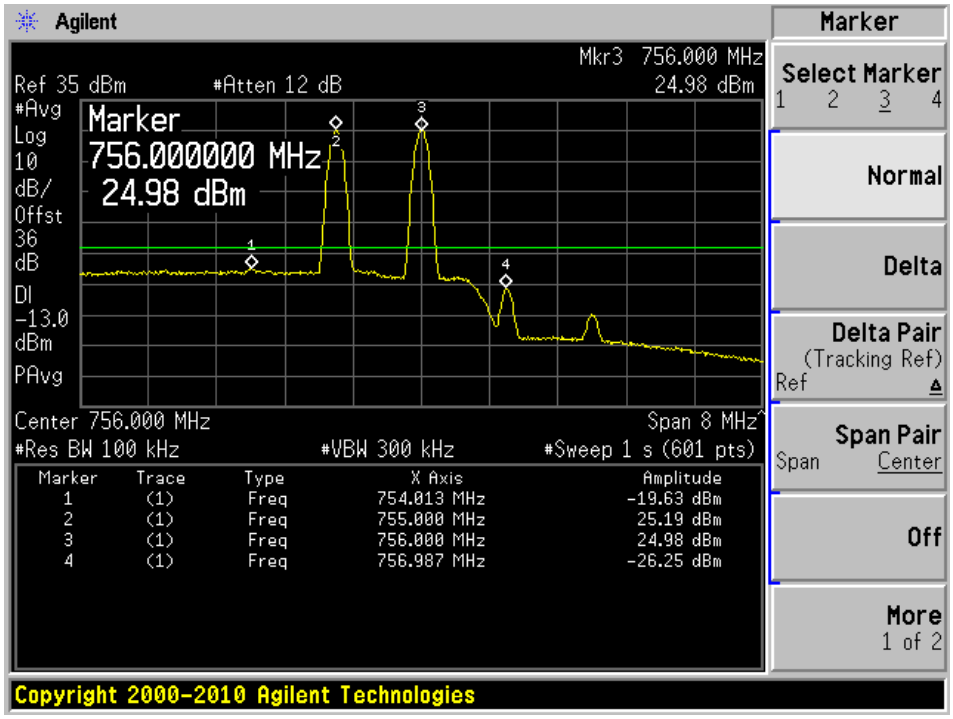
Lowest Frequency



Middle Frequency



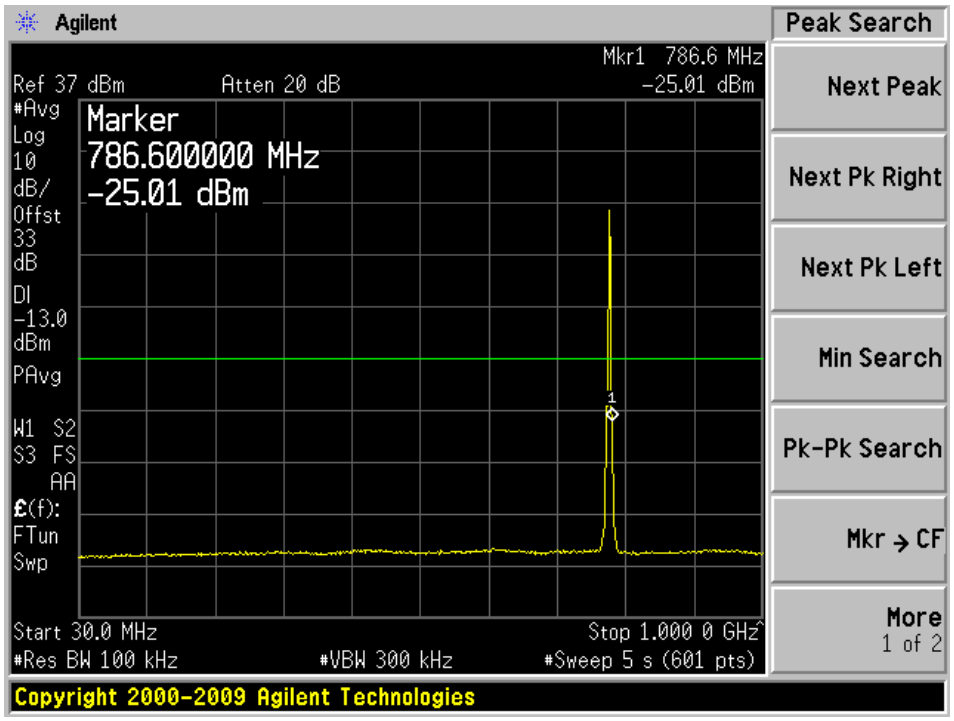
Highest Frequency



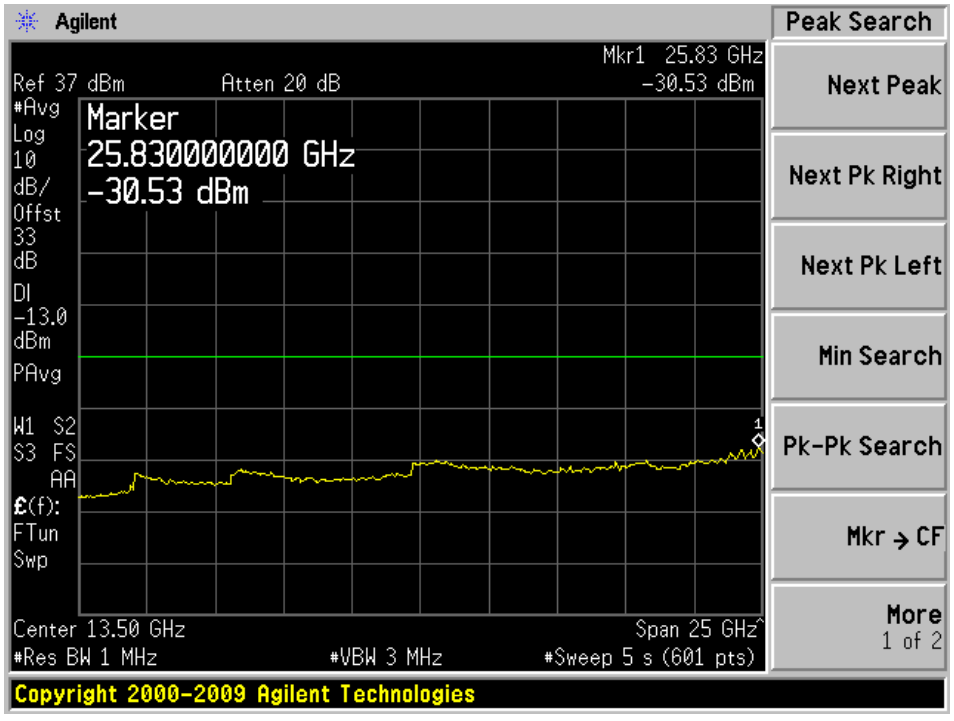
UL: 776-787 MHz

Worst Case - LTE-QPSK (1.4 MHz), Frequency: 782 MHz

Plot 1: 30 MHz to 1 GHz

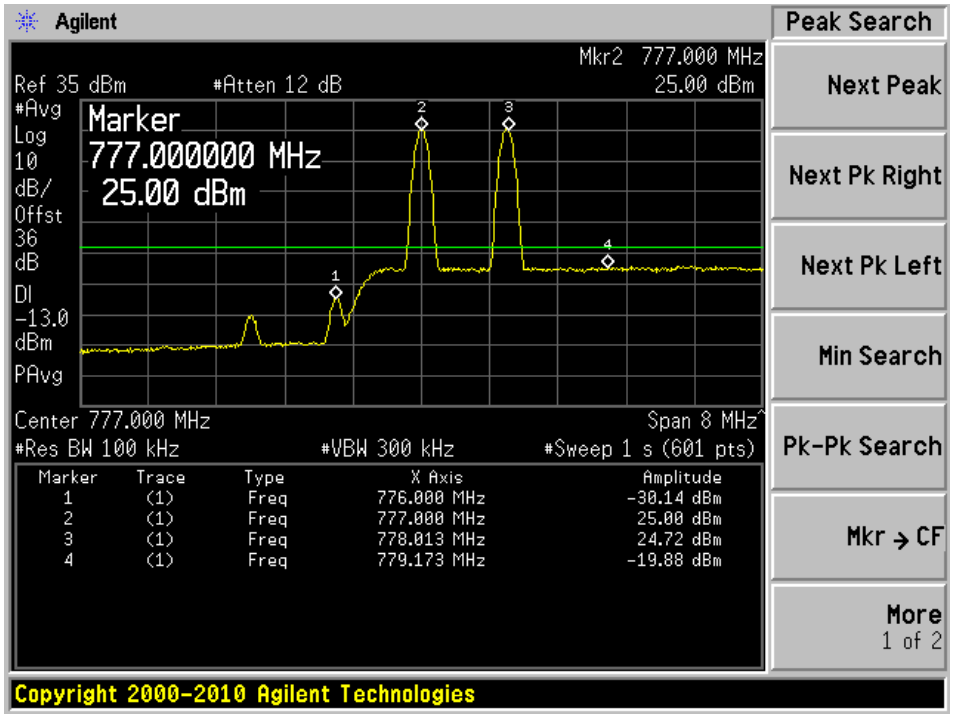


Plot 2: Above 1 GHz

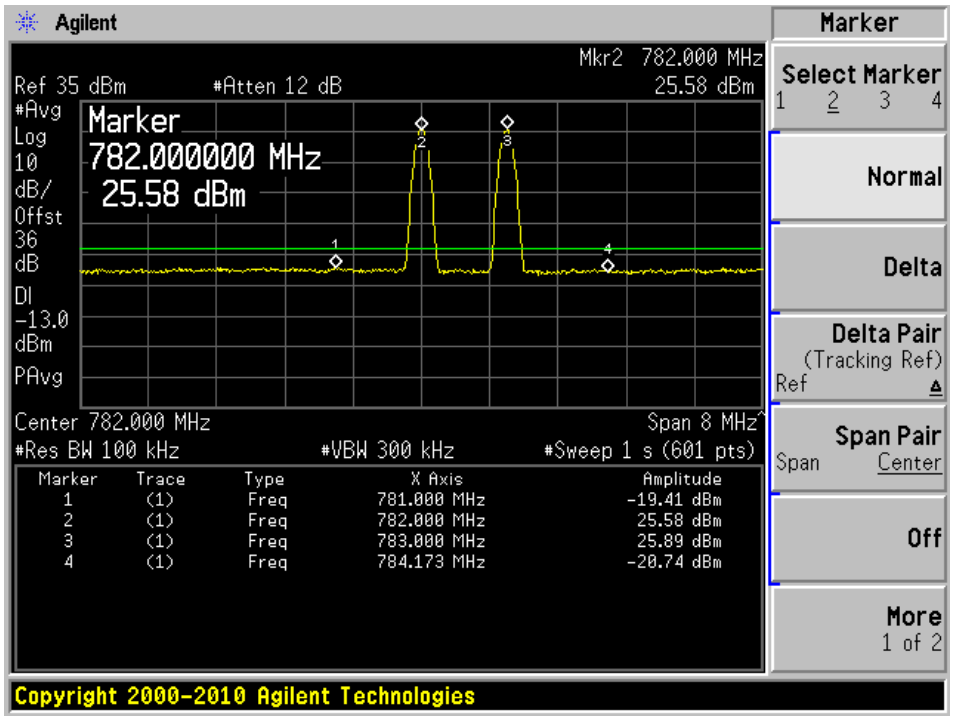


Inter-modulation:

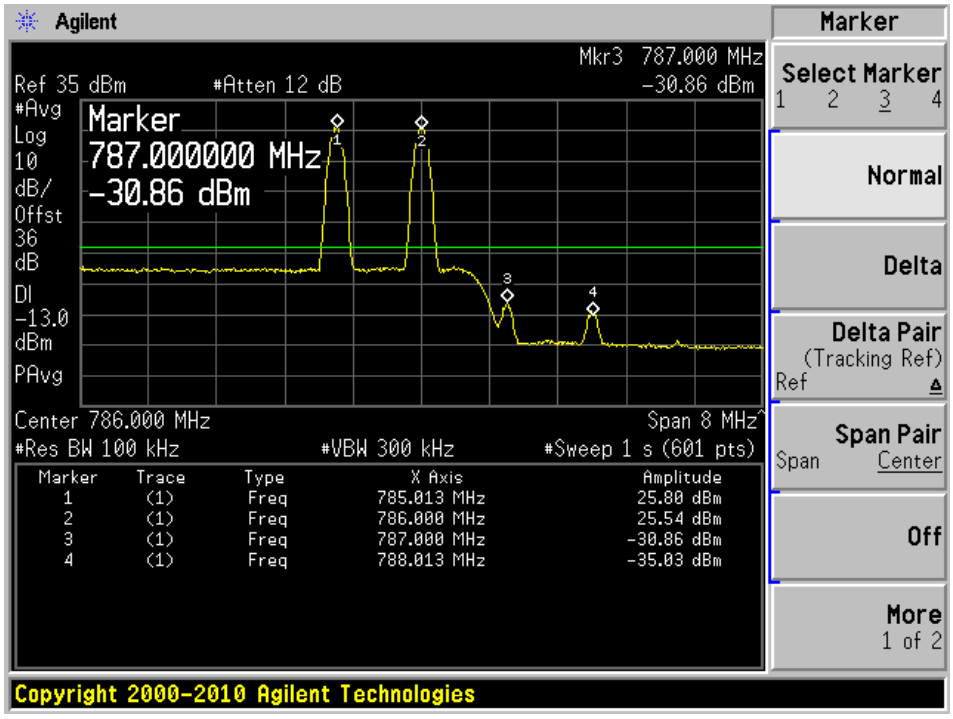
Lowest Frequency



Middle Frequency



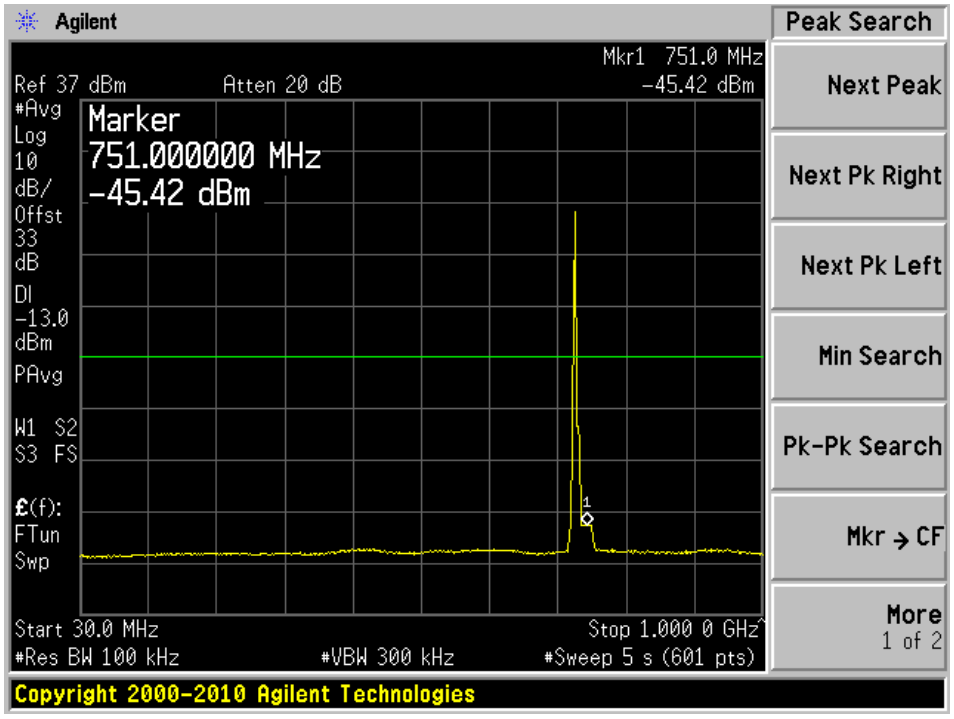
Highest Frequency



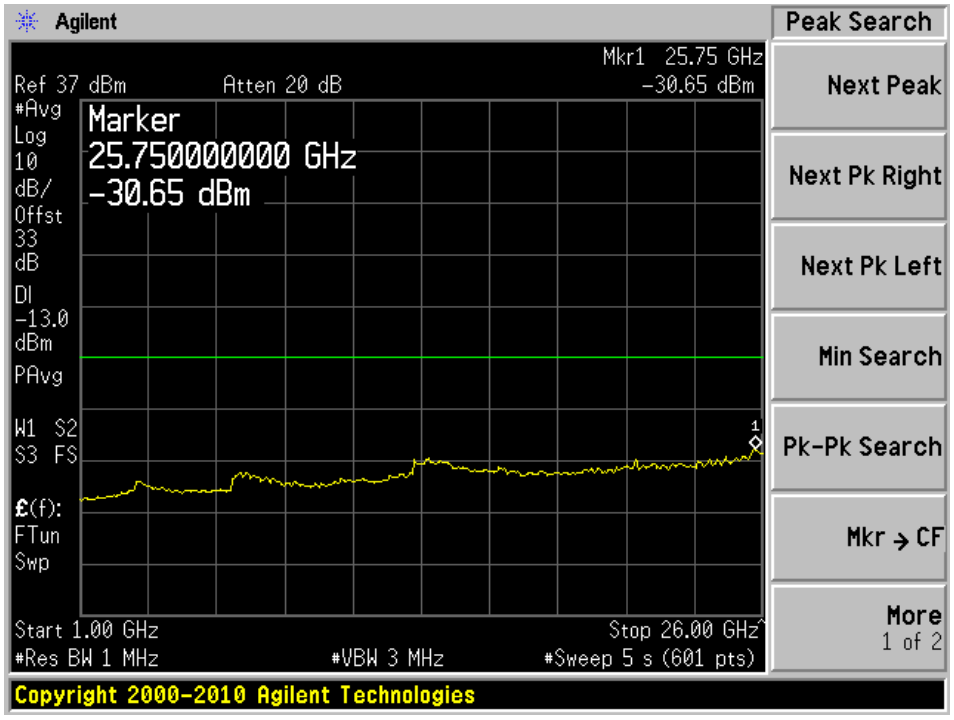
DL: 728-740 MHz

Worst Case - LTE-QPSK (1.4 MHz), Frequency: 733 MHz

Plot 1: 30 MHz to 1 GHz

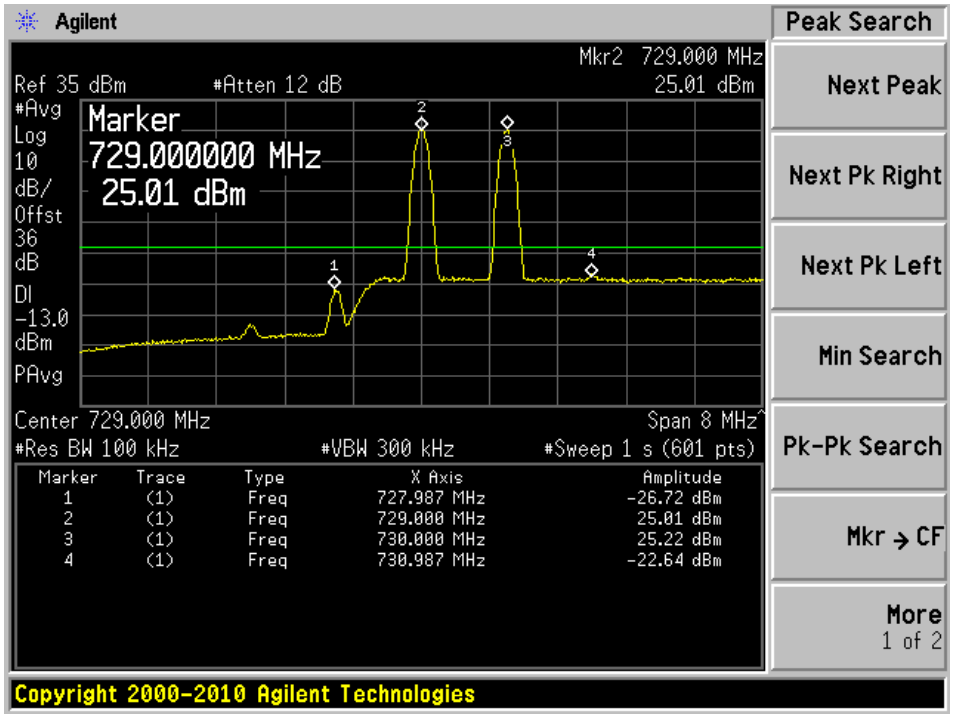


Plot 2: Above 1 GHz

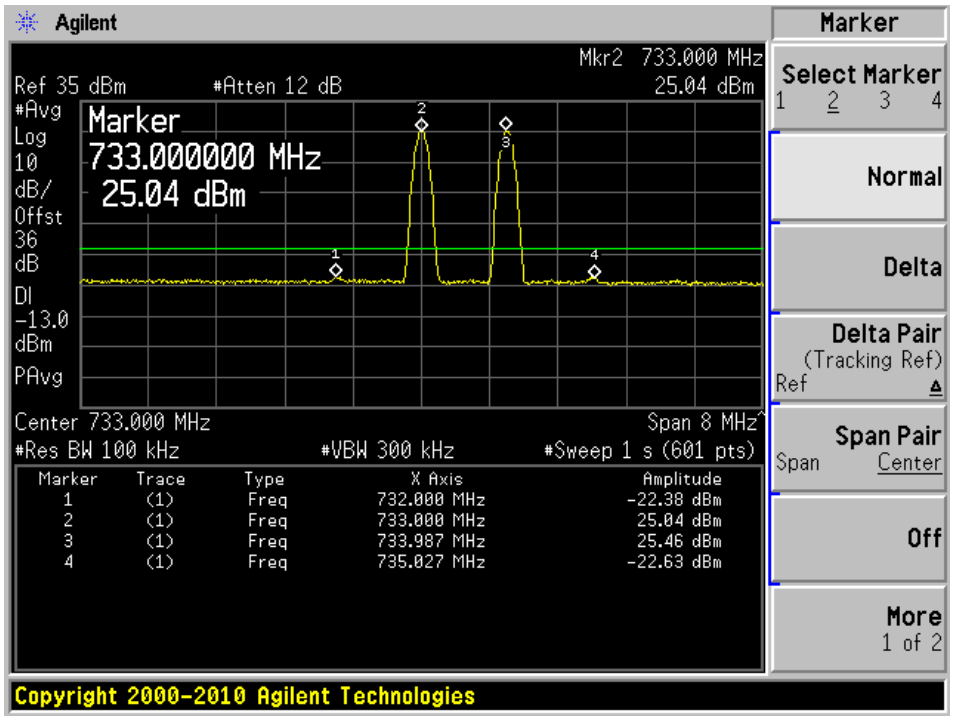


Inter-Modulation:

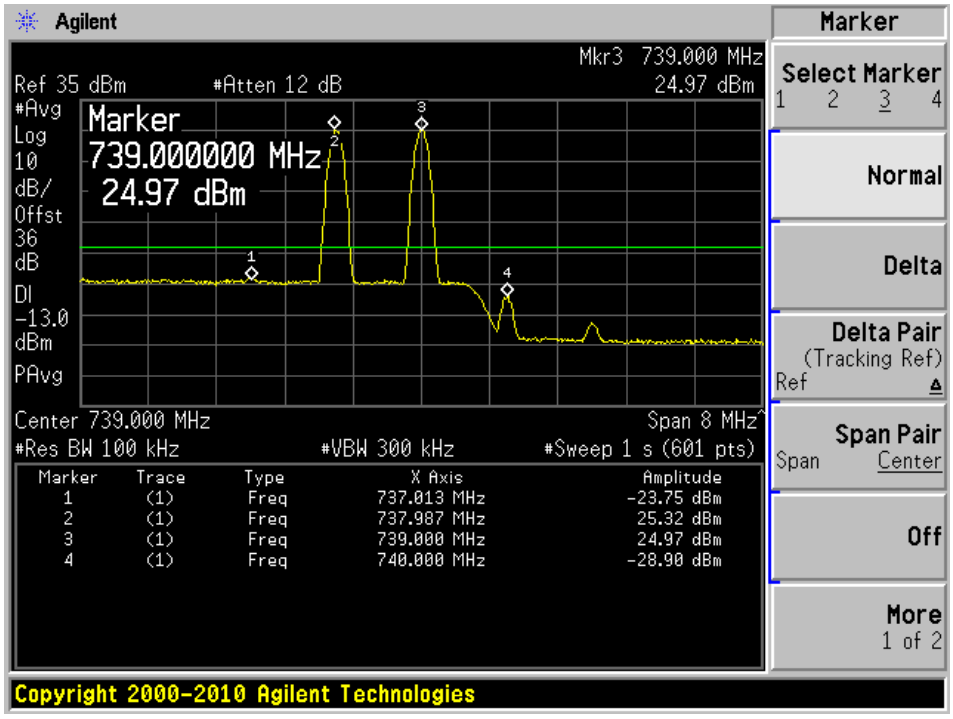
Lowest Frequency



Middle Frequency



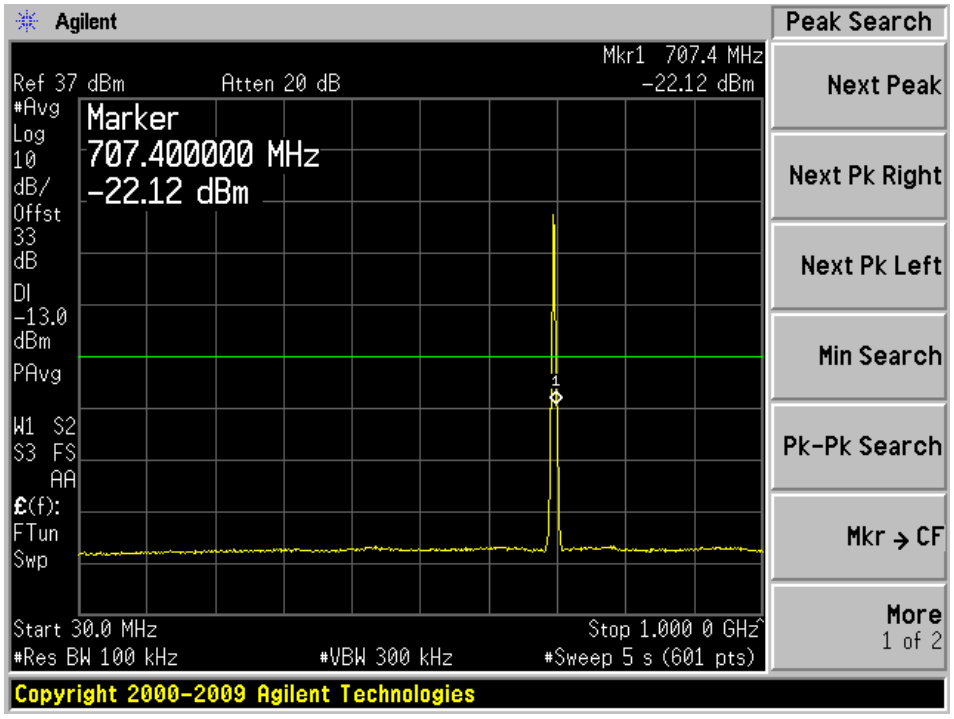
Highest Frequency



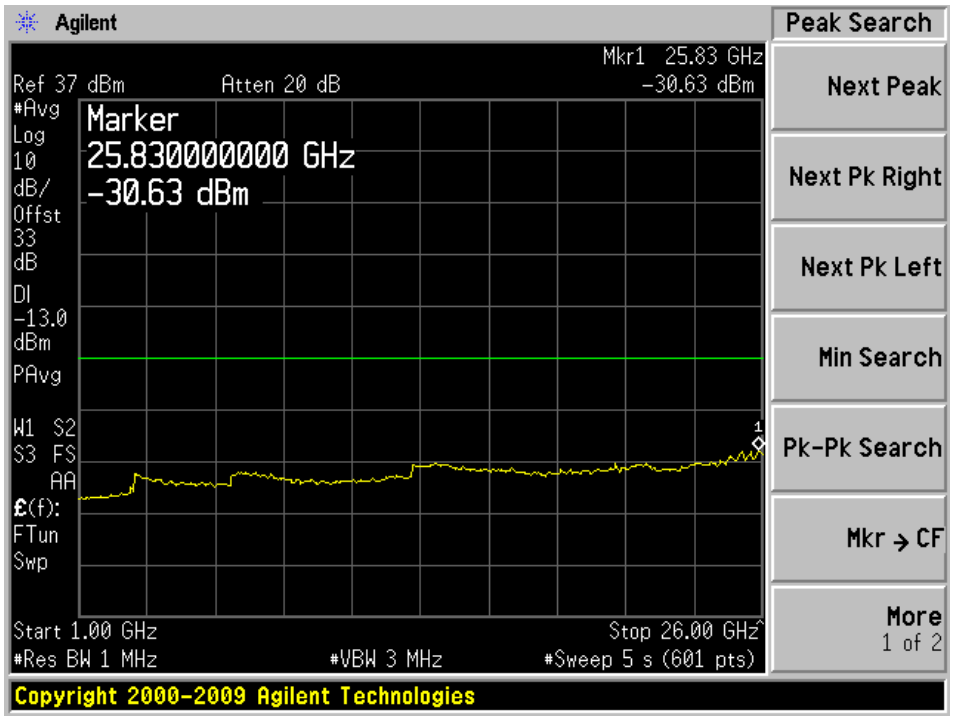
UL: 698-710 MHz

Worst Case - LTE-QPSK (1.4 MHz), Frequency: 703 MHz

Plot 1: 30 MHz to 1 GHz

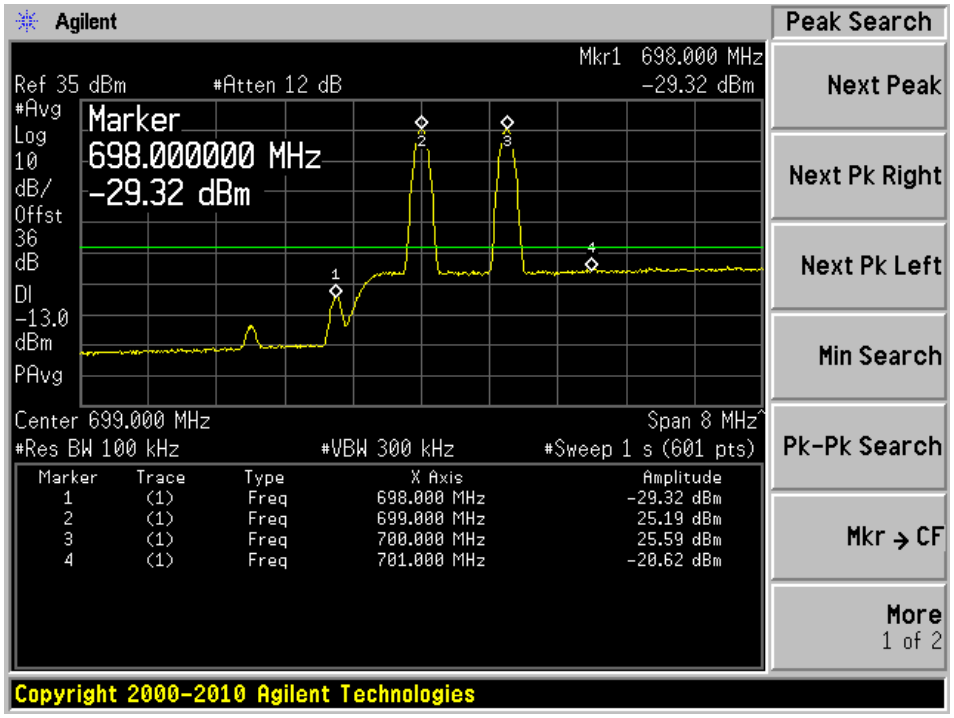


Plot 2: Above 1 GHz

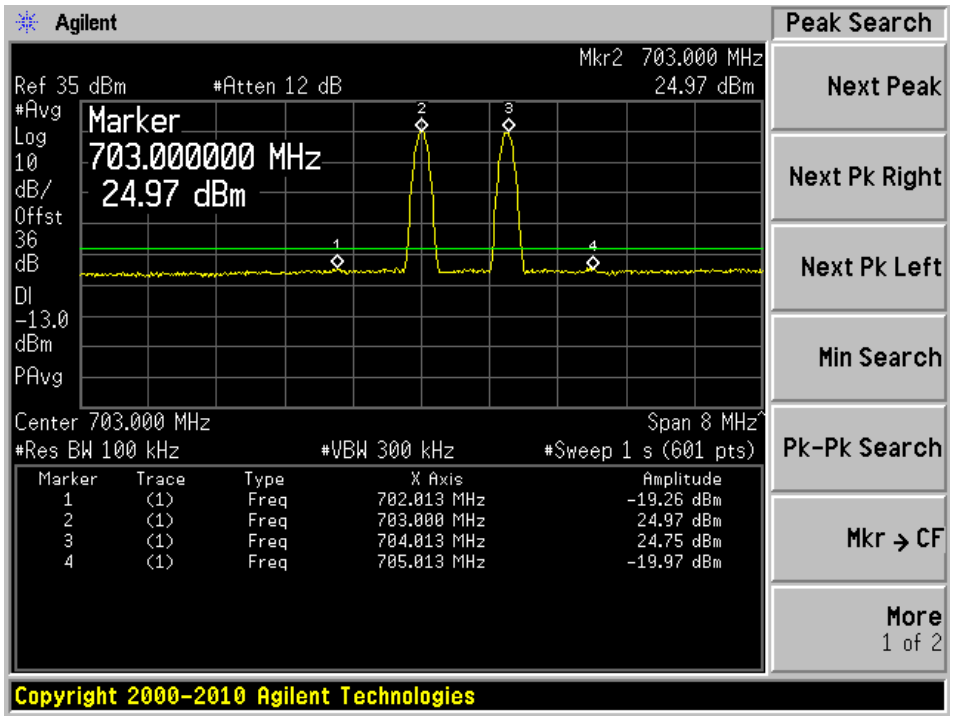


Inter-Modulation:

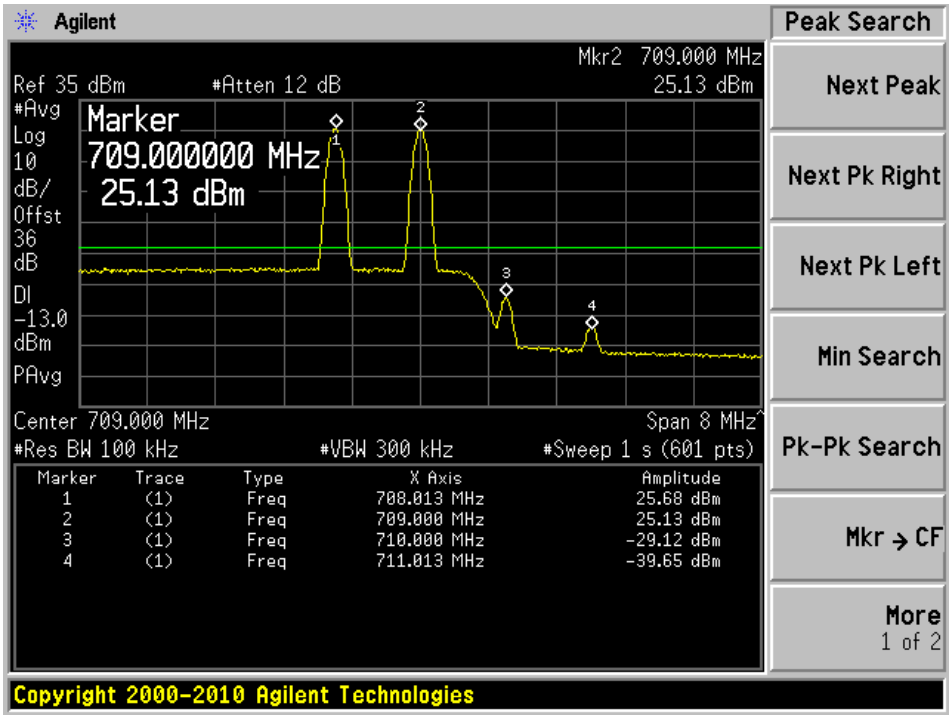
Lowest Frequency



Middle Frequency



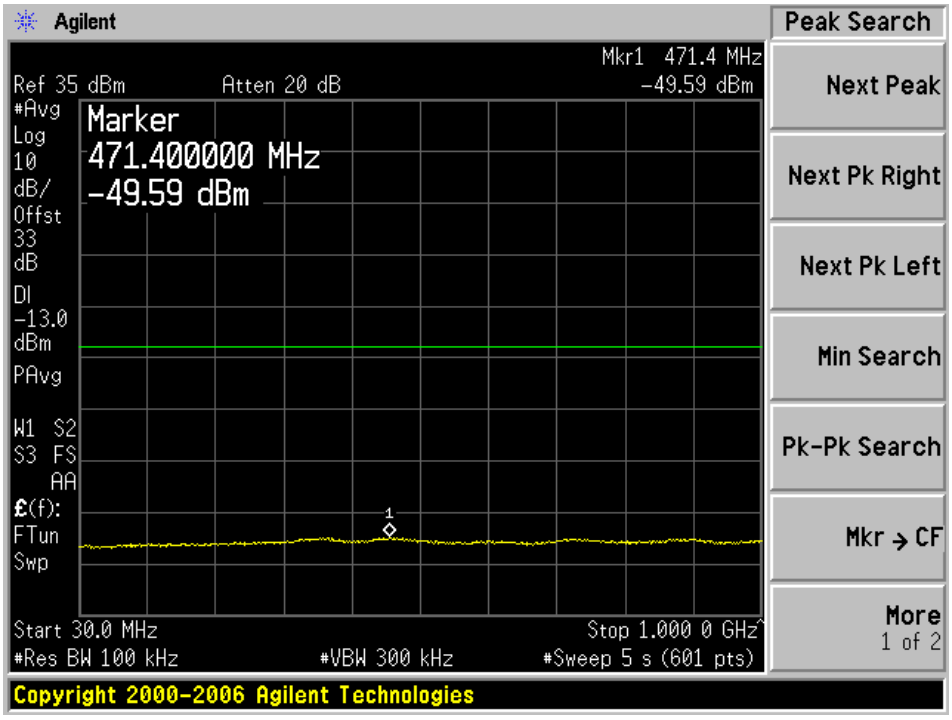
Highest Frequency



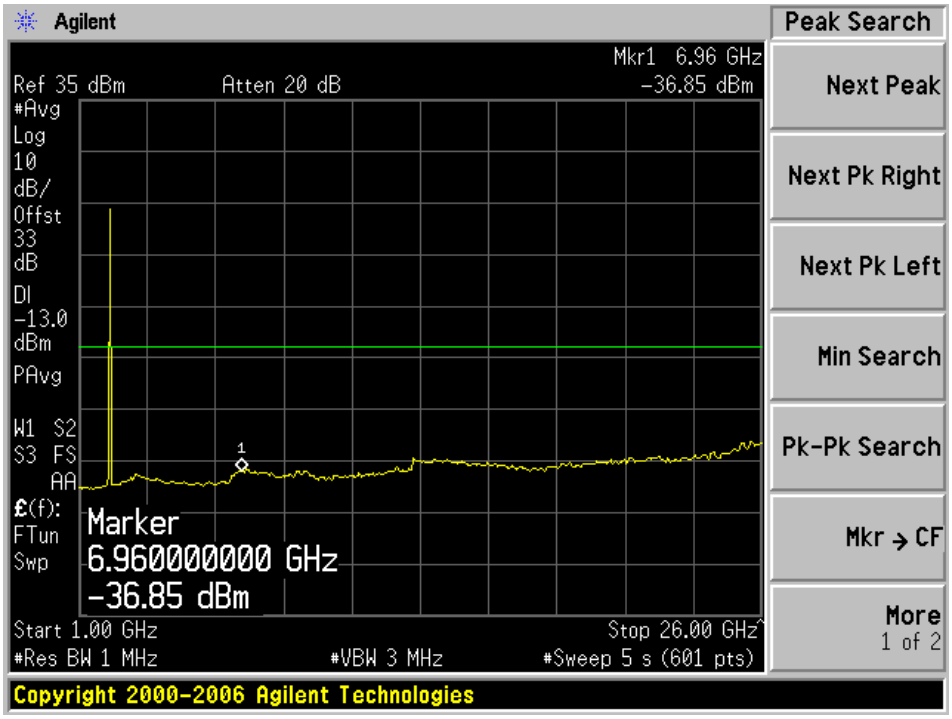
DL: 2110-2155 MHz

Modulation: 1xEVDO

Plot 1: 30 MHz to 1 GHz

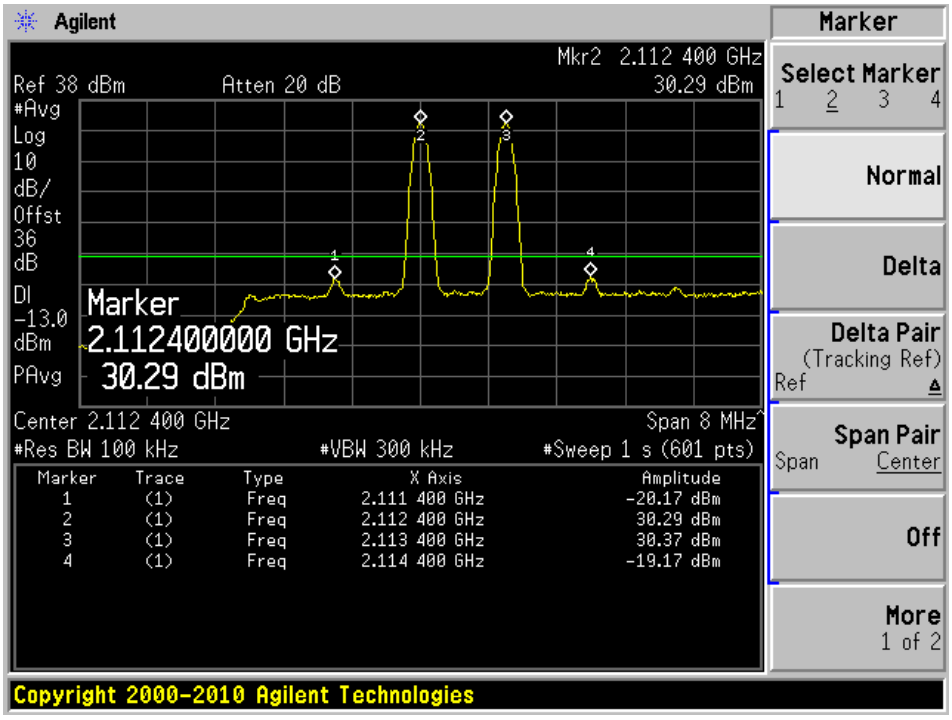


Plot 2: Above 1 GHz

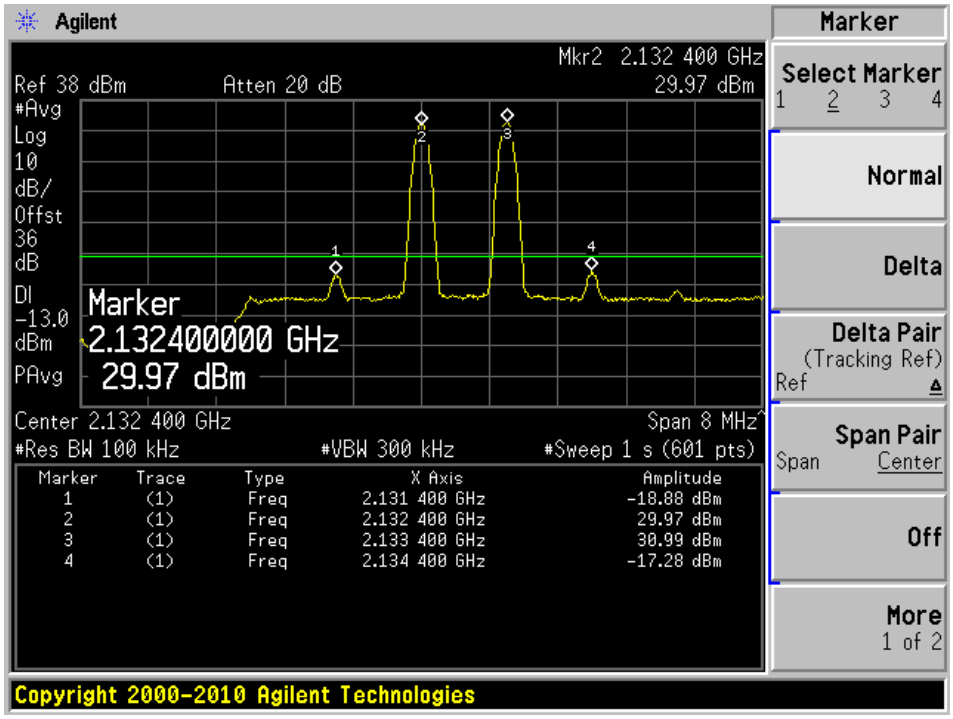


Inter-Modulation:

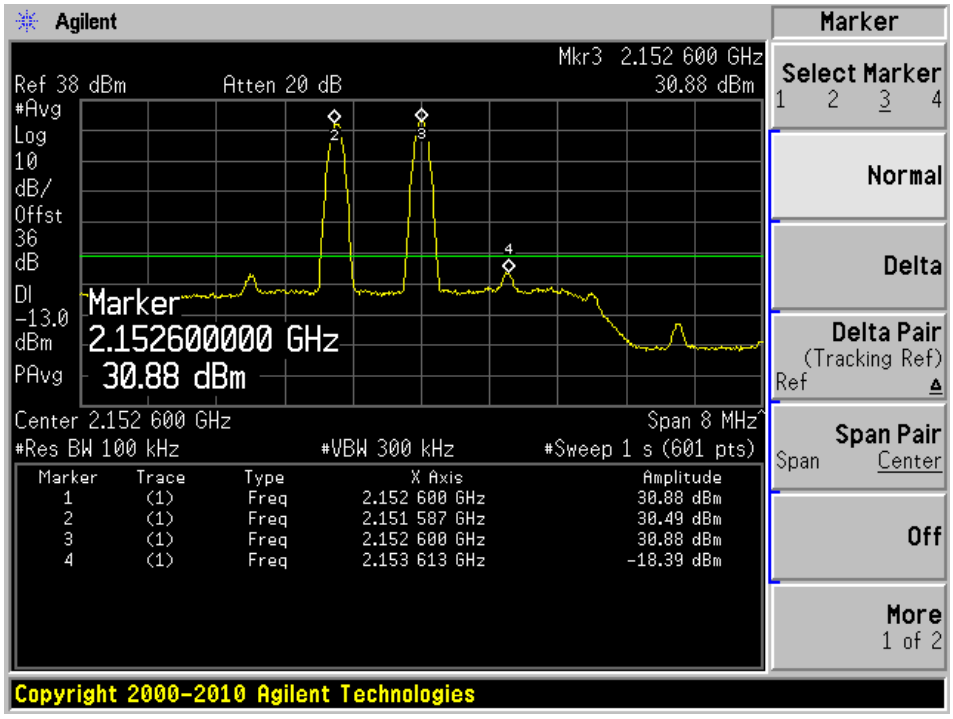
Lowest Frequency



Middle Frequency



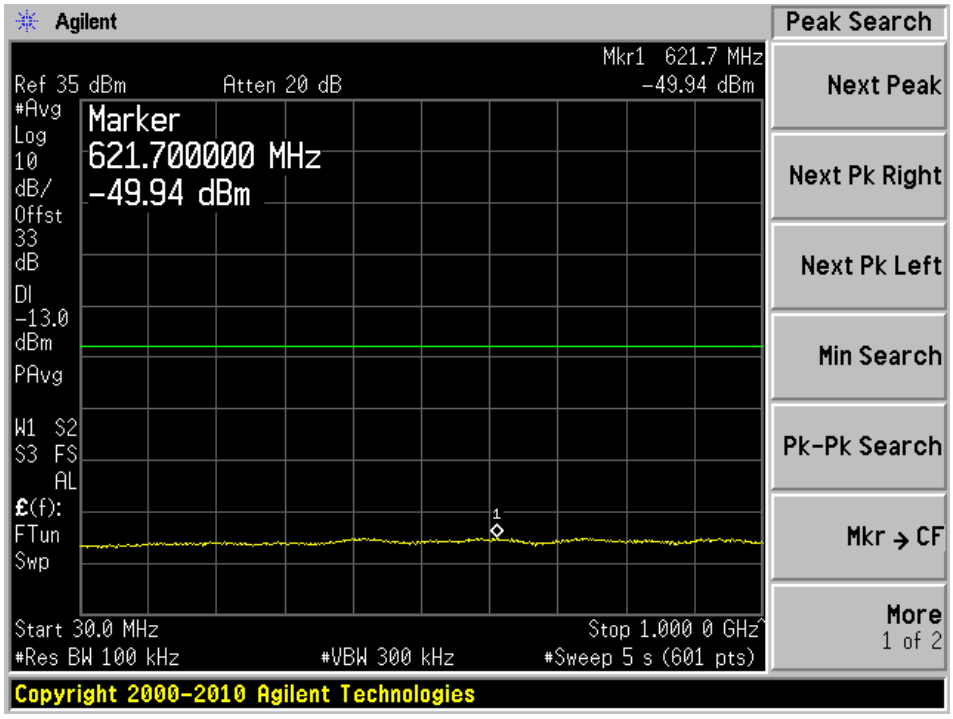
Highest Frequency



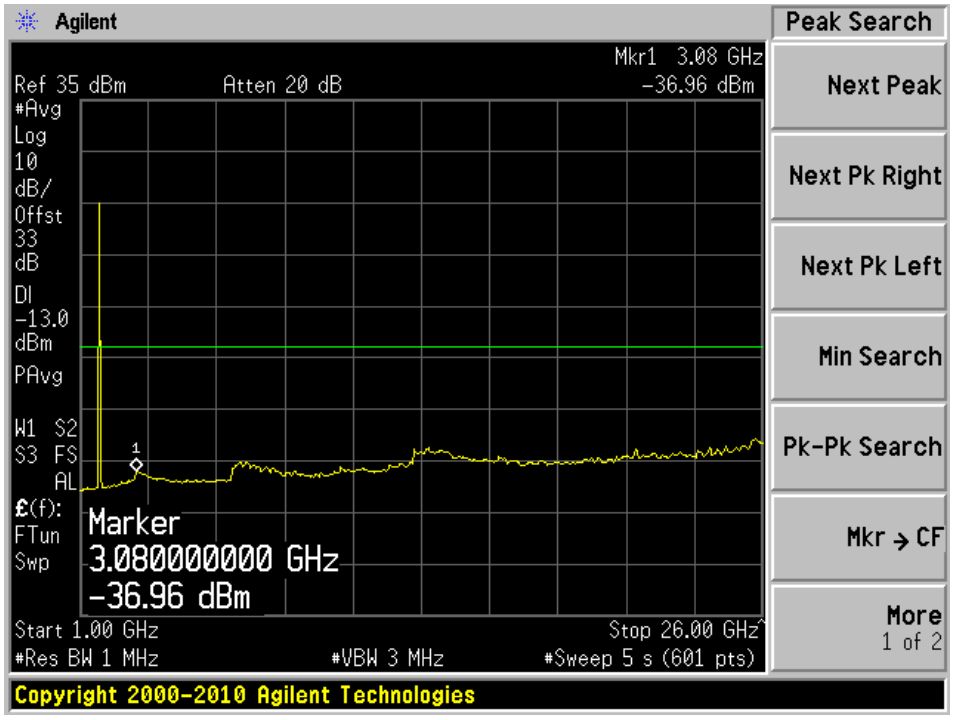
UL: 1710-1755 MHz

Modulation: 1xEVDO

Plot 1: 30 MHz to 1 GHz

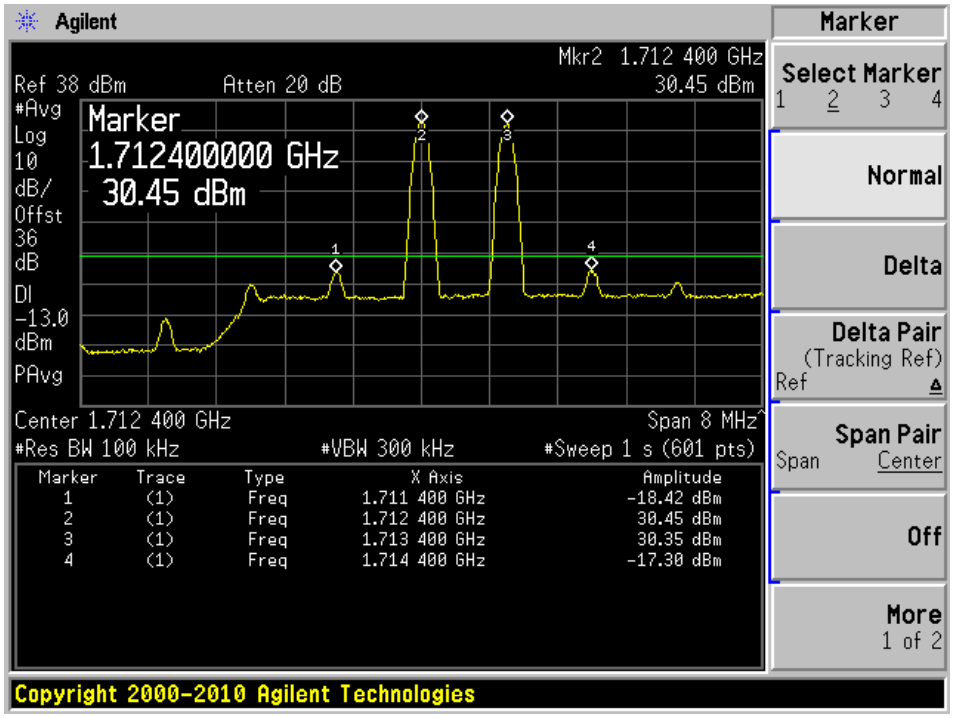


Plot 2: Above 1 GHz

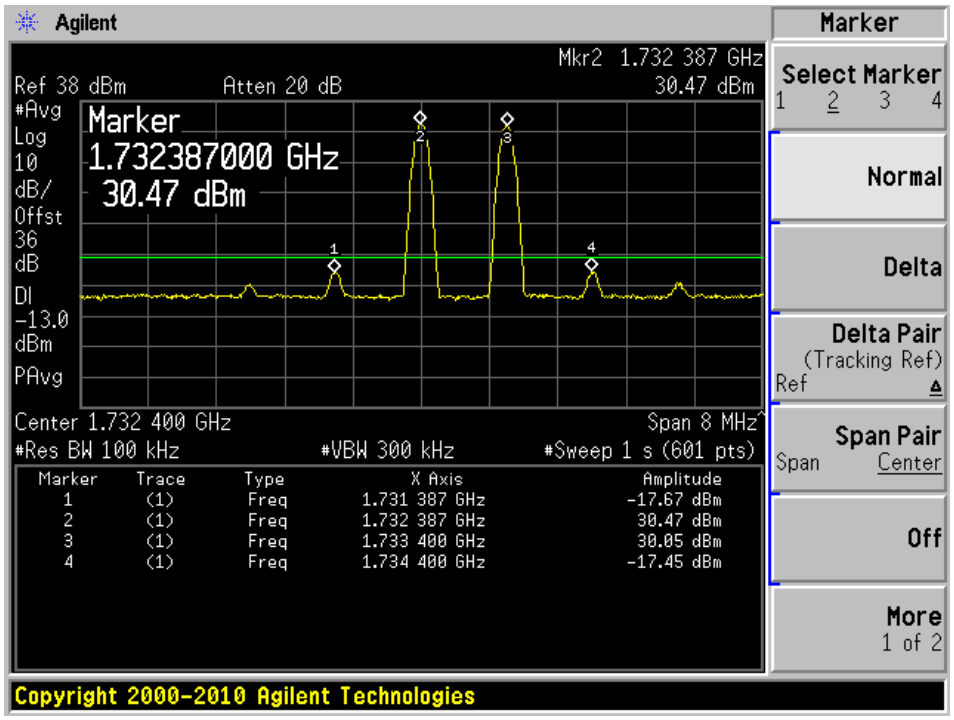


Inter-Modulation:

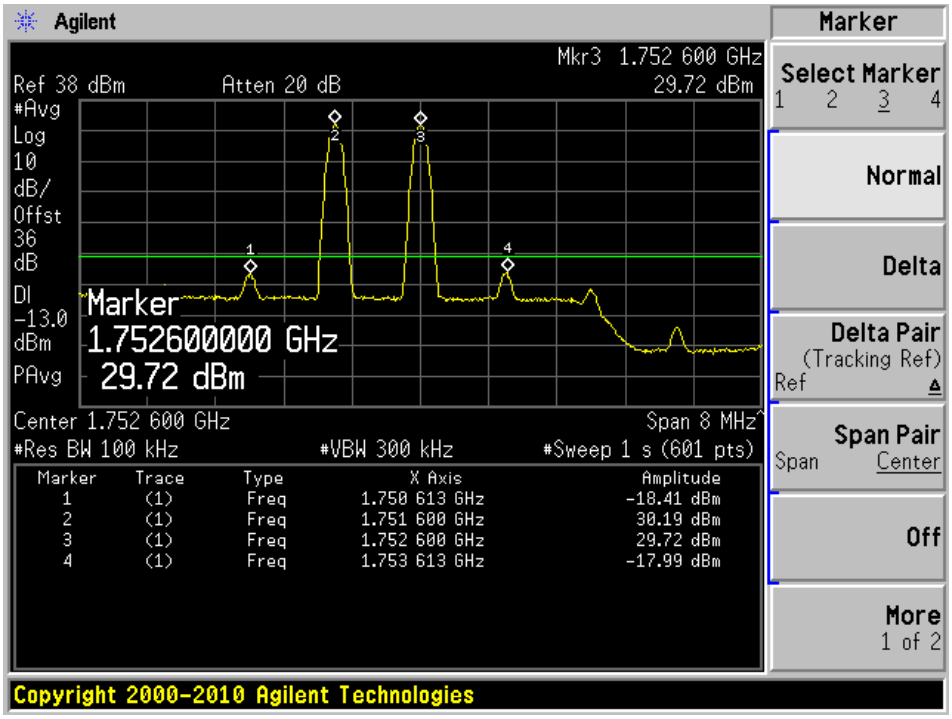
Lowest Frequency



Middle Frequency



Highest Frequency



9 FCC §27.53 – BAND EDGE

9.1 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.

9.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

9.3 Test Environmental Conditions

Temperature:	21-24°C
Relative Humidity:	40-43 %
ATM Pressure:	101-103 kPa

The testing was performed by Dennis Huang on from 2010-08-24 to 2010-08-26 in RF Site.

9.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	MY44303352	2010-05-09
Agilent	Signal Generator	E4438C	MY42083251	2009-12-08

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

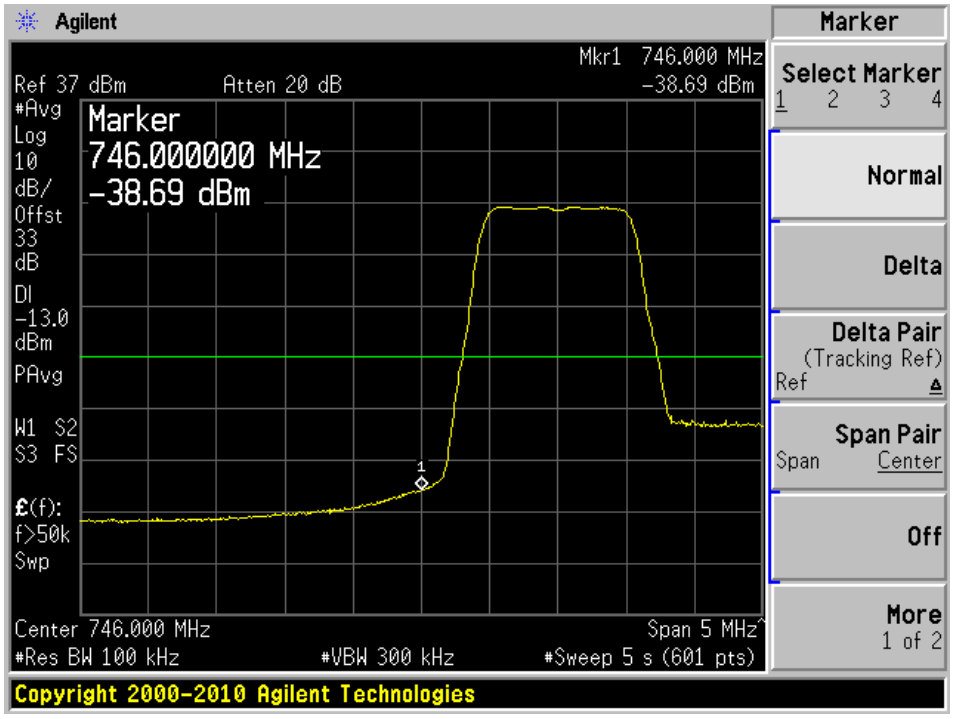
9.5 Test Results

Please refer to the following plots.

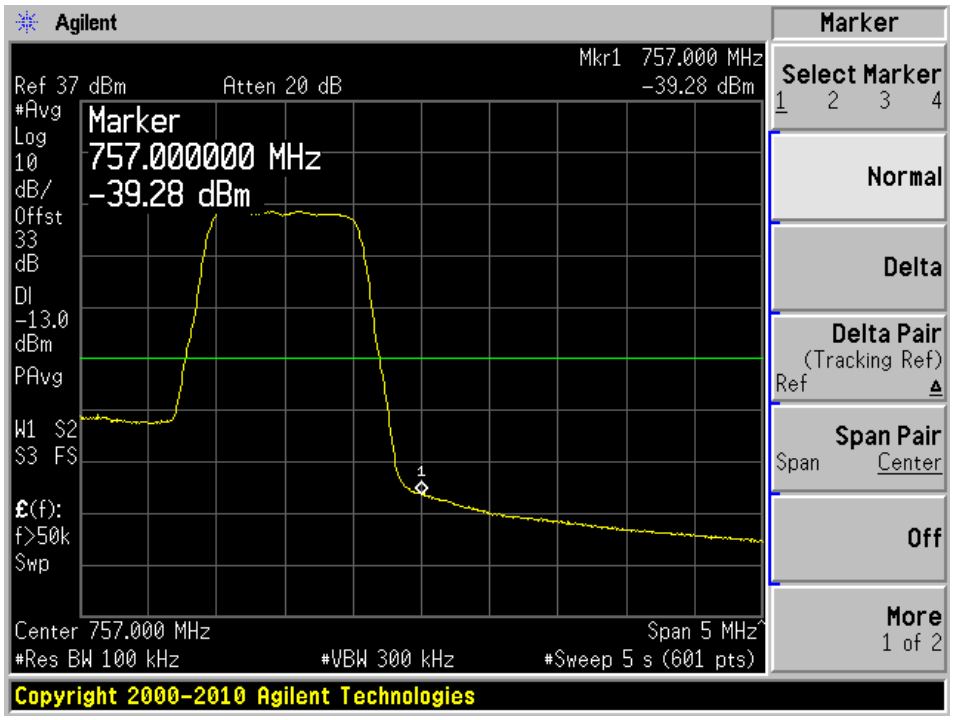
DL: 746-757 MHz

Modulation: LTE-QPSK (1.4 MHz):

Plot 1: Lowest Edge

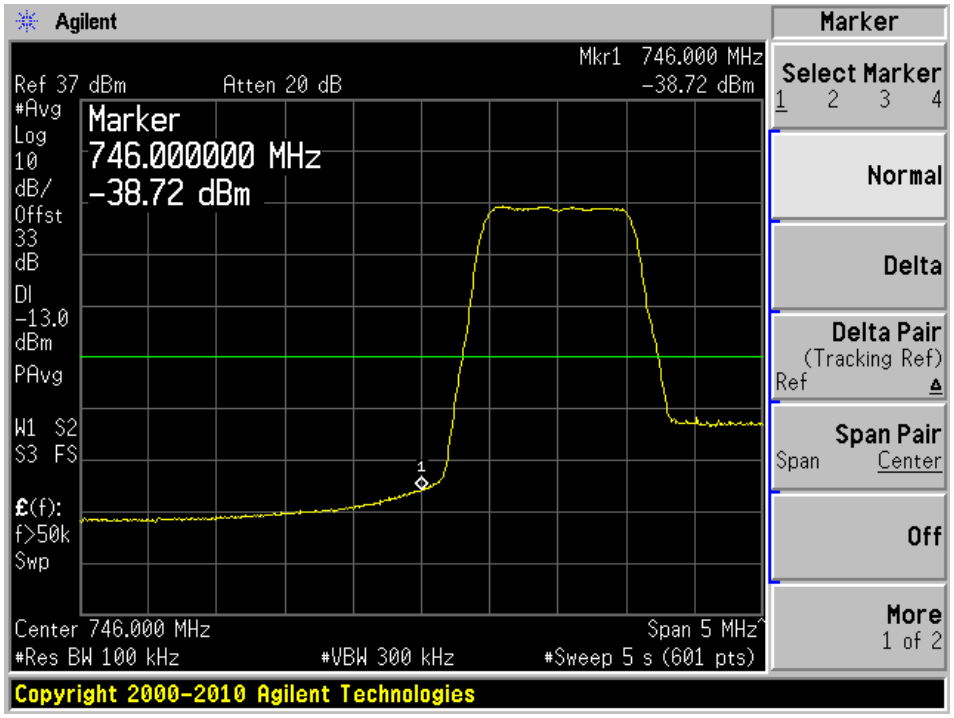


Plot 2: Highest Edge

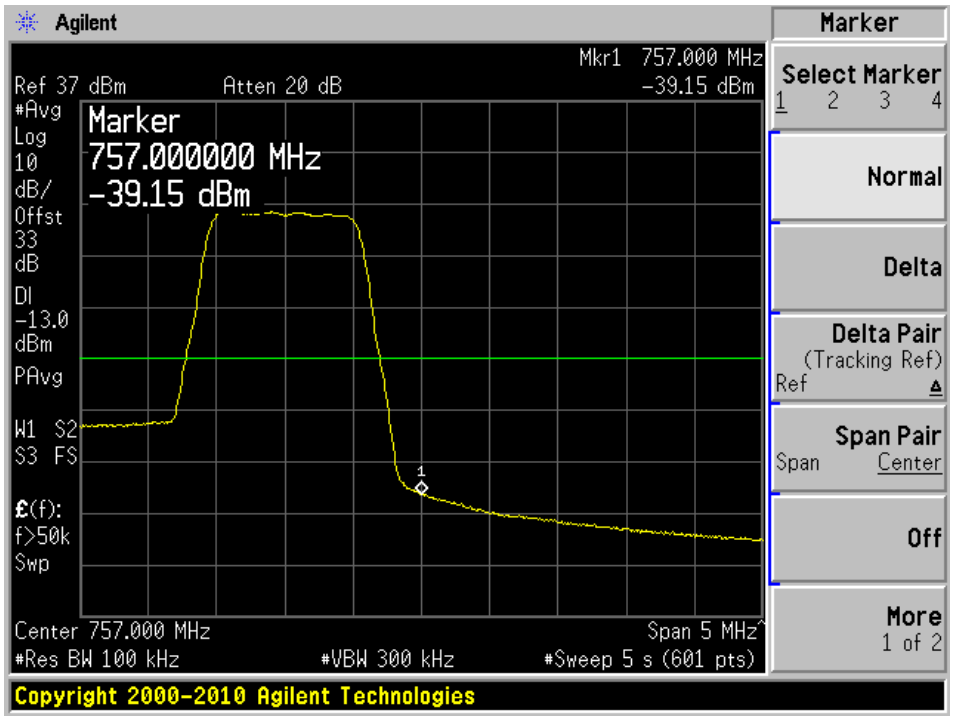


Modulation: LTE-16QAM (1.4 MHz):

Plot 1: Lowest Edge

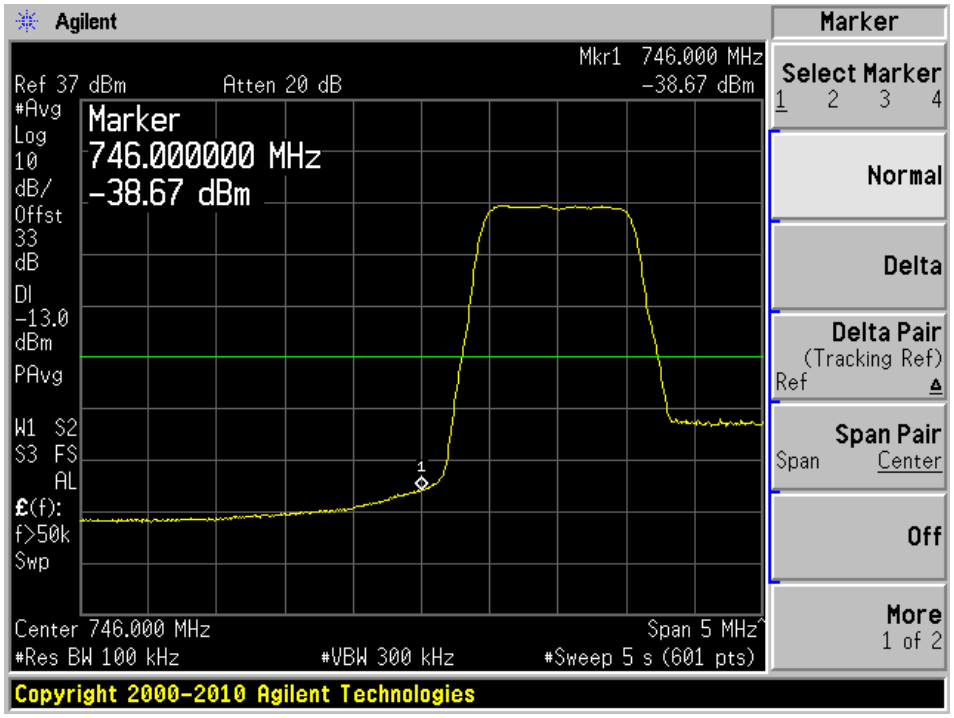


Plot 2: Highest Edge

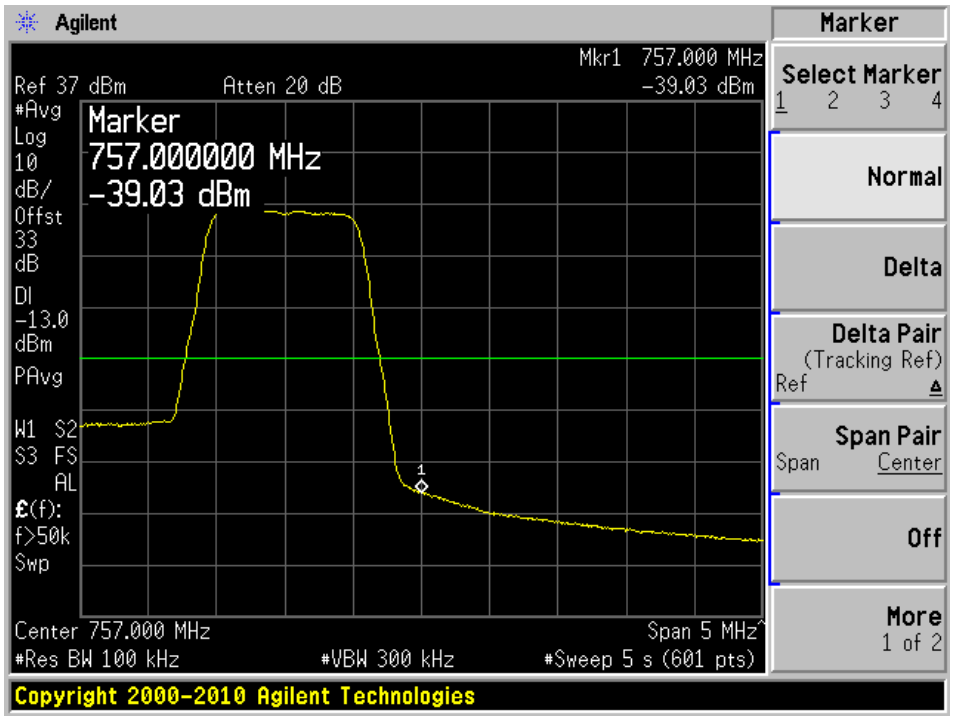


Modulation: LTE-64QAM (1.4 MHz):

Plot 1: Lowest Edge

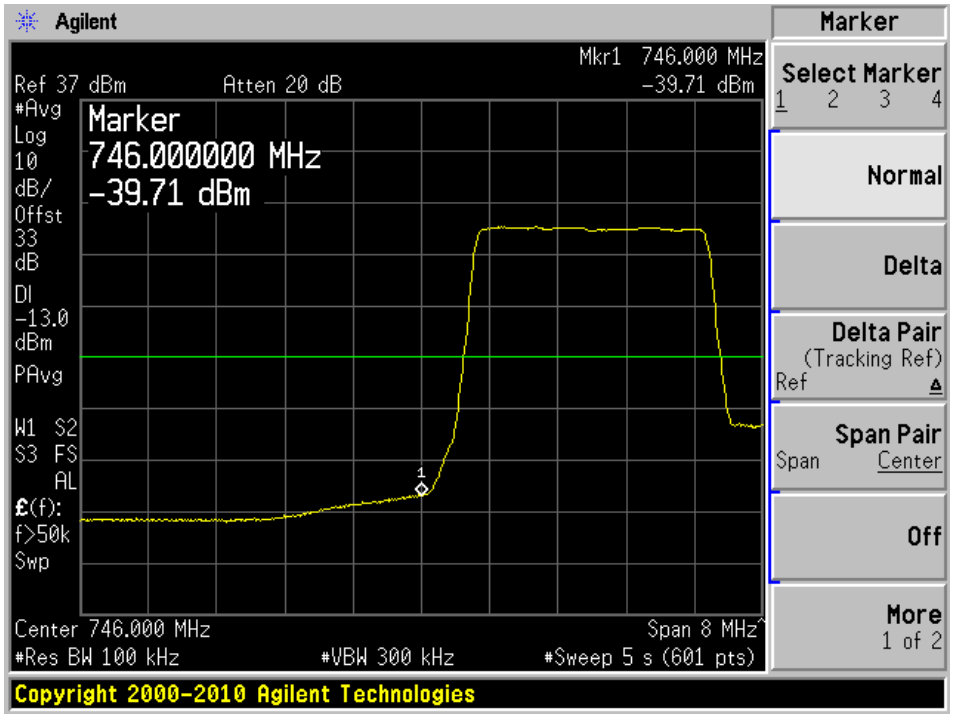


Plot 2: Highest Edge

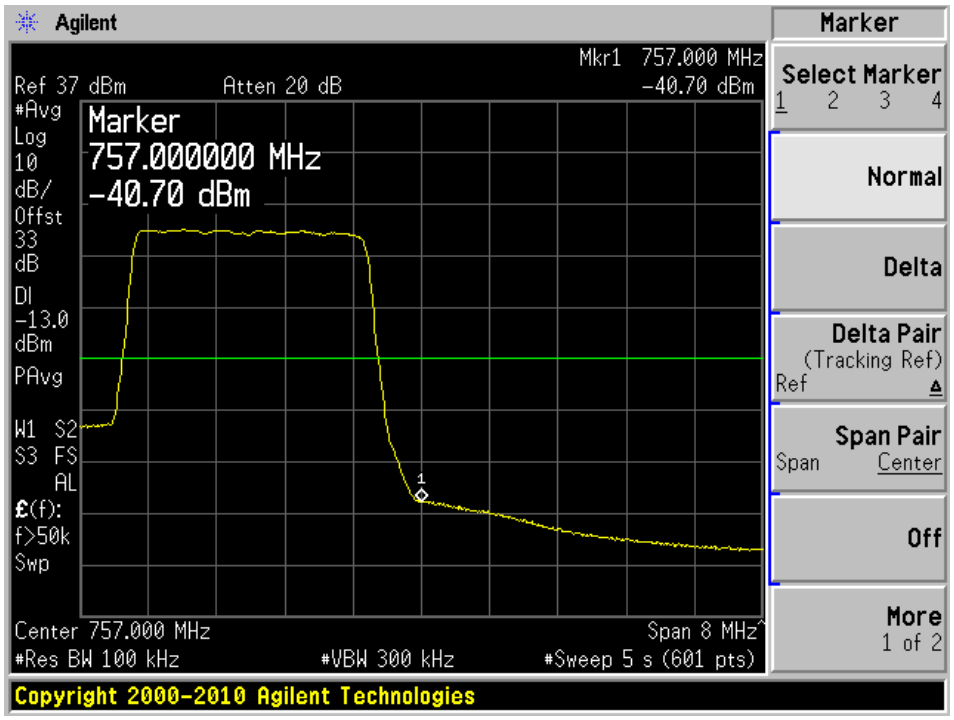


Modulation: LTE-QPSK (3 MHz):

Plot 1: Lowest Edge

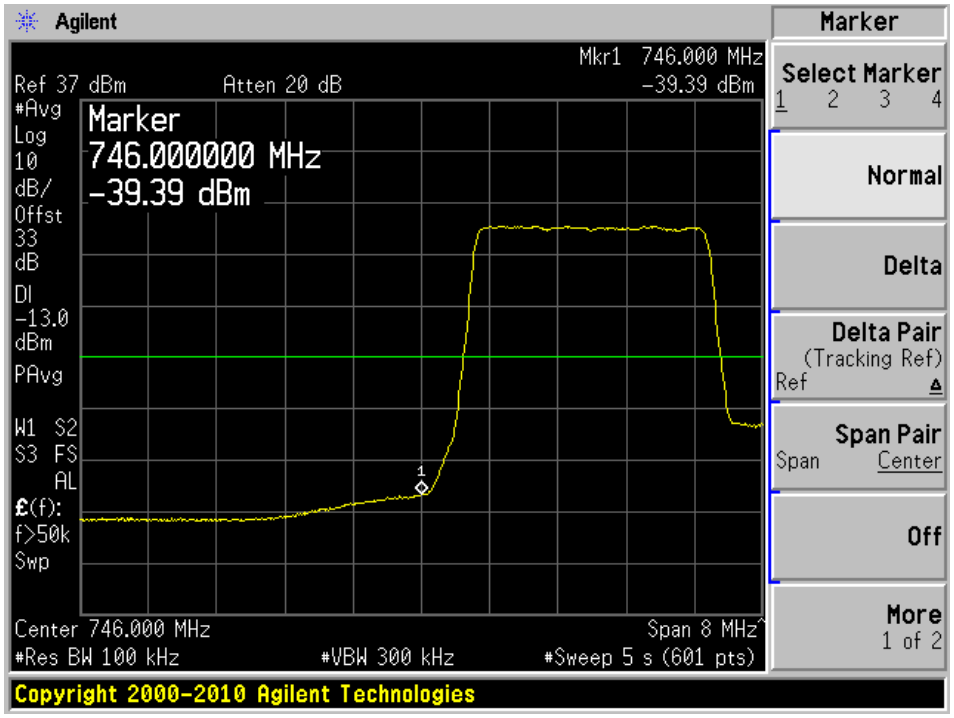


Plot 2: Highest Edge

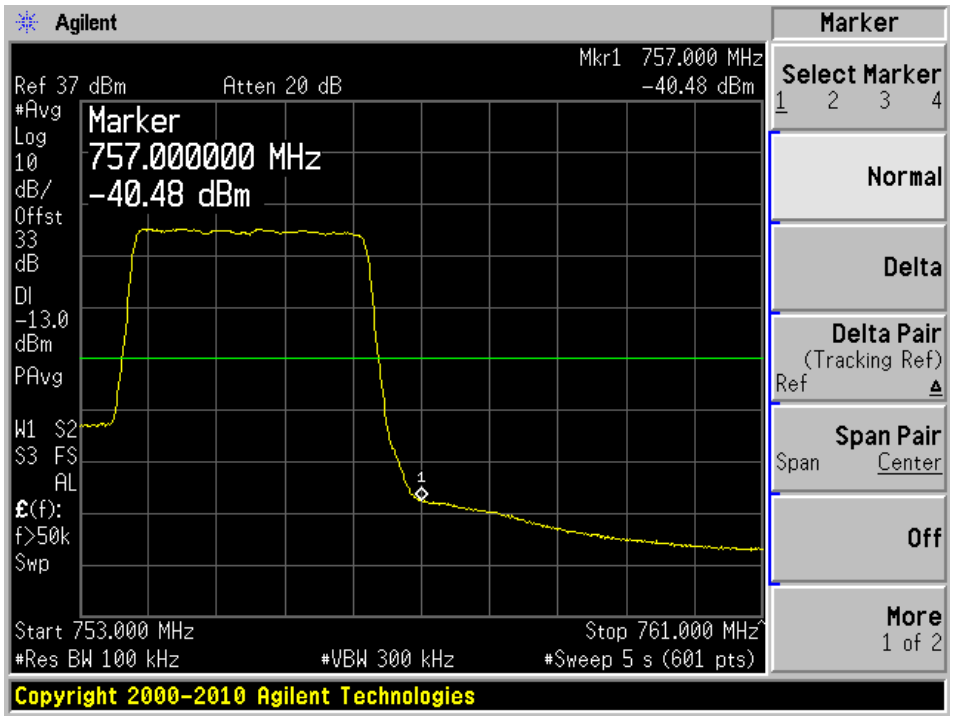


Modulation: LTE-16QAM (3 MHz):

Plot 1: Lowest Edge

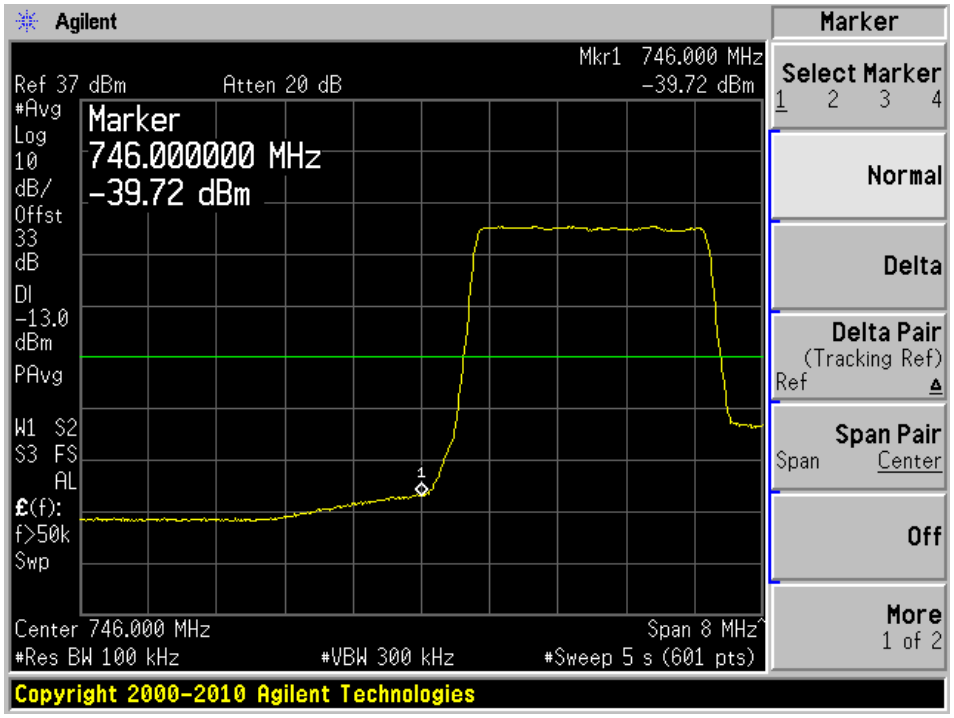


Plot 2: Highest Edge

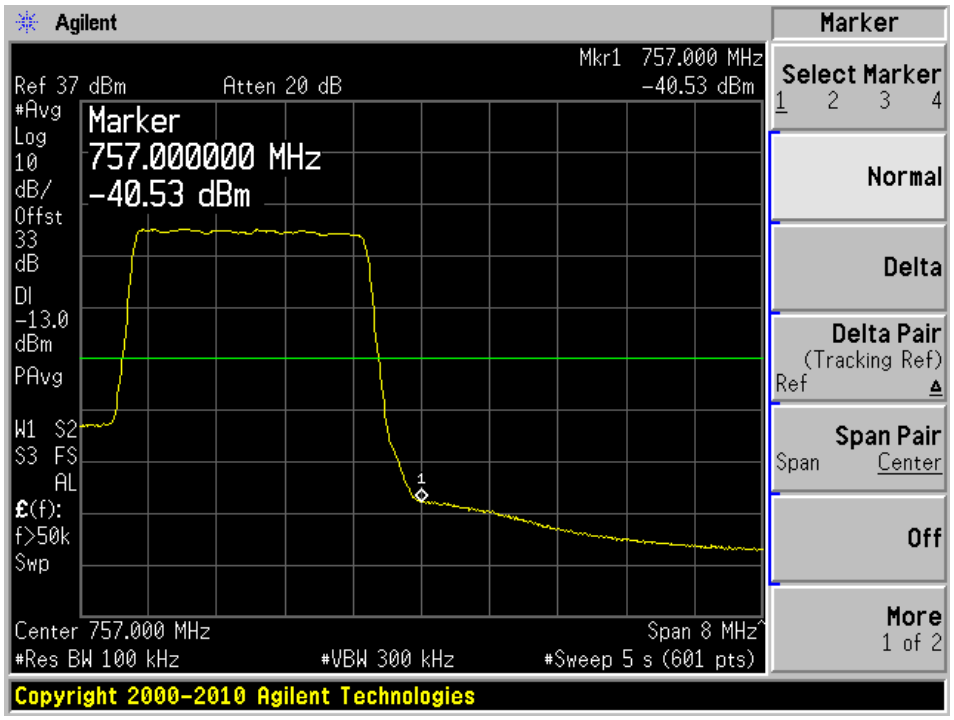


Modulation: LTE-64QAM (3 MHz):

Plot 1: Lowest Edge

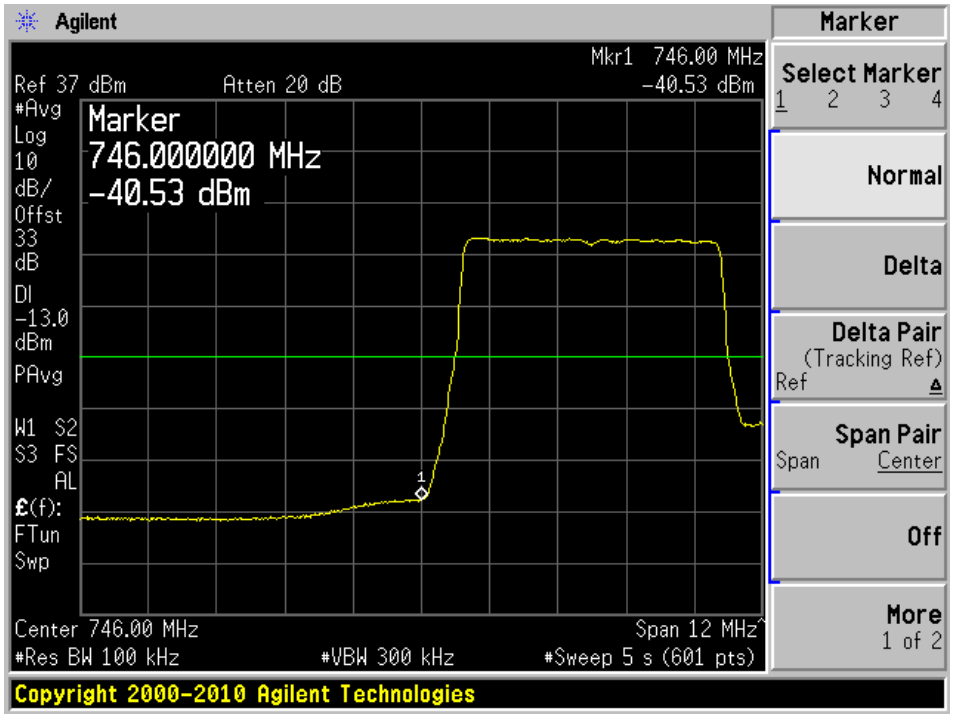


Plot 2: Highest Edge

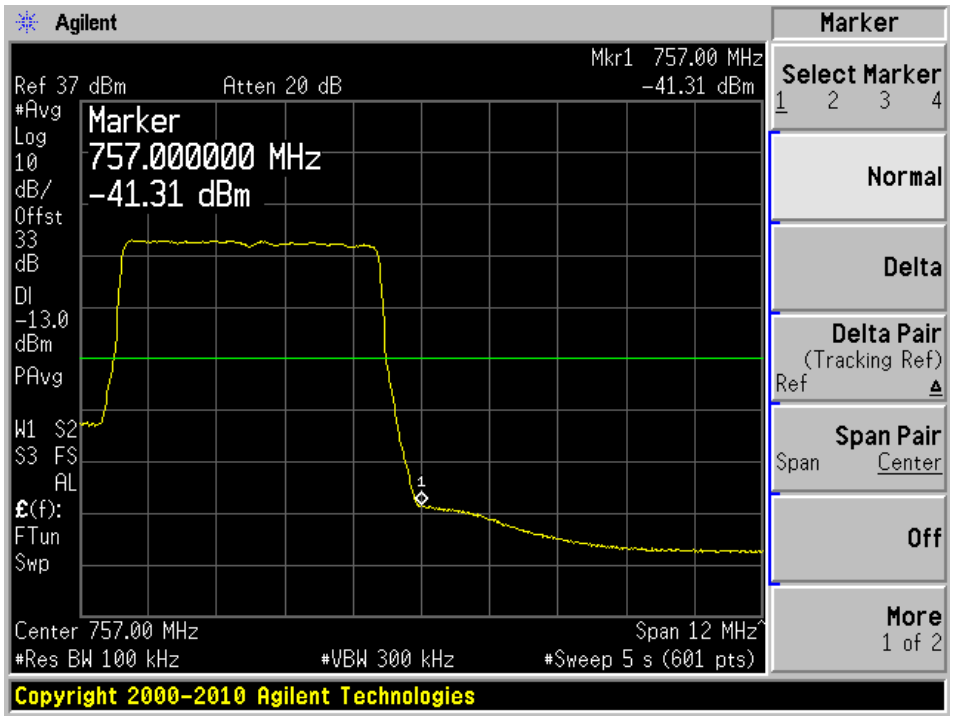


Modulation: LTE-QPSK (5 MHz):

Plot 1: Lowest Edge

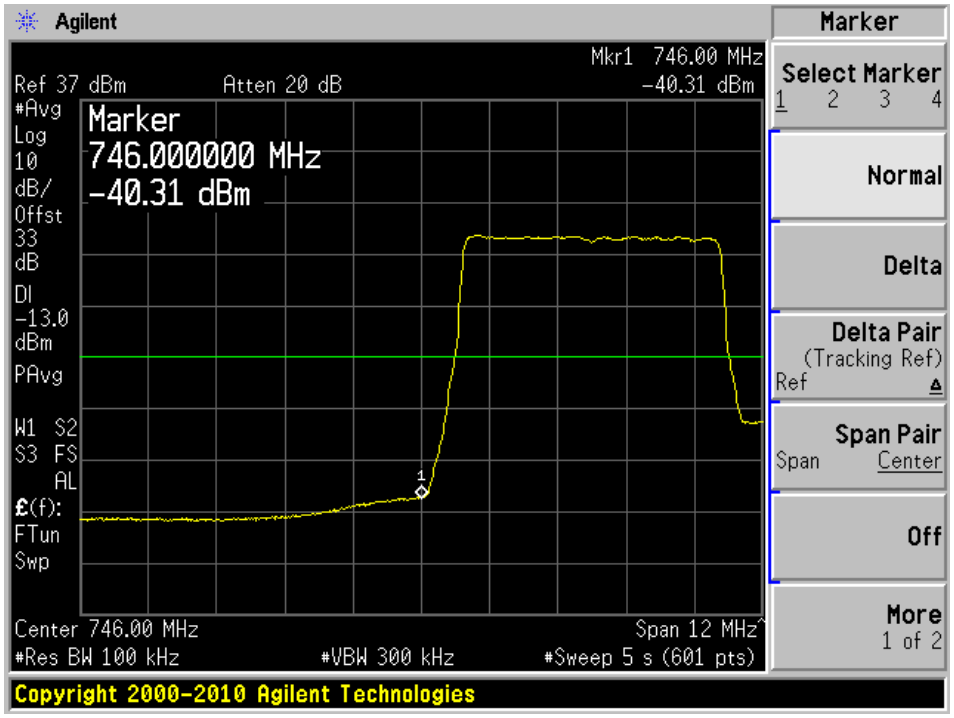


Plot 2: Highest Edge

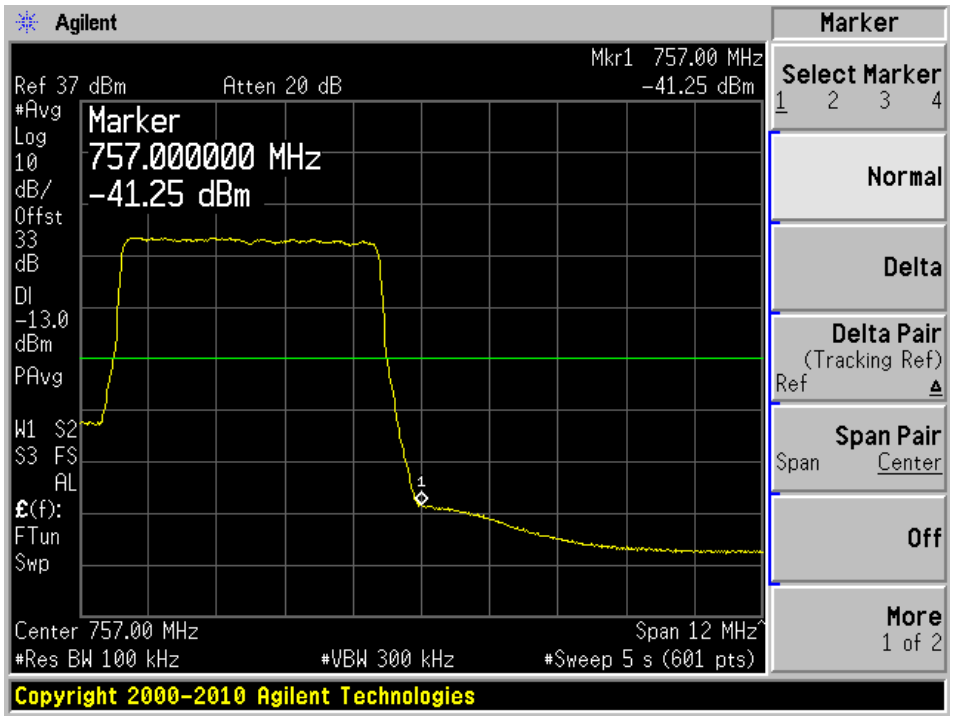


Modulation: LTE-16QAM (5 MHz):

Plot 1: Lowest Edge

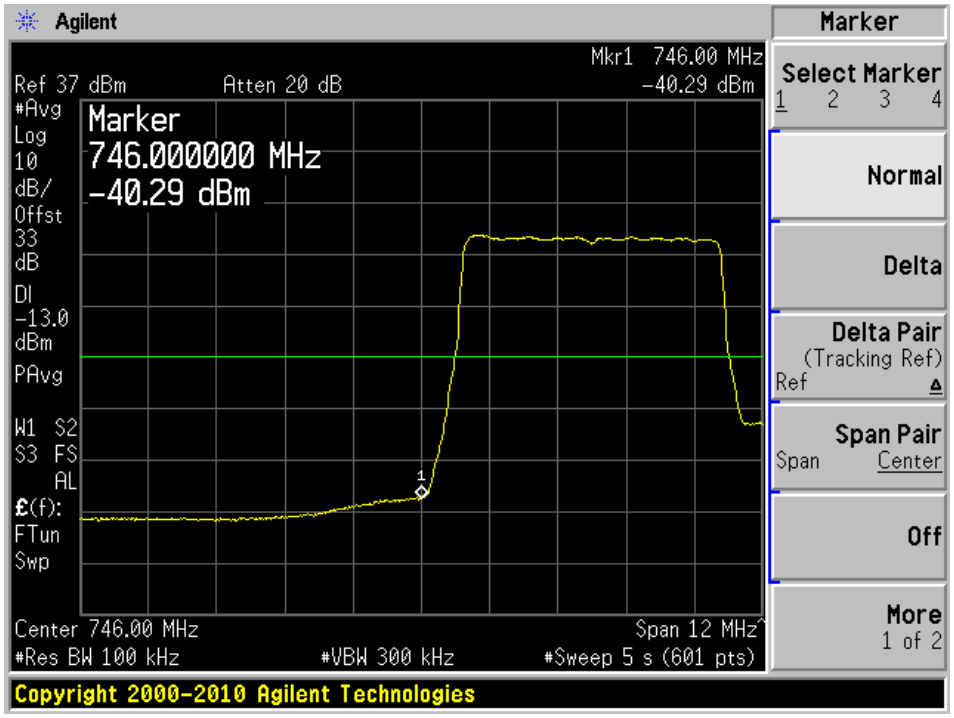


Plot 2: Highest Edge

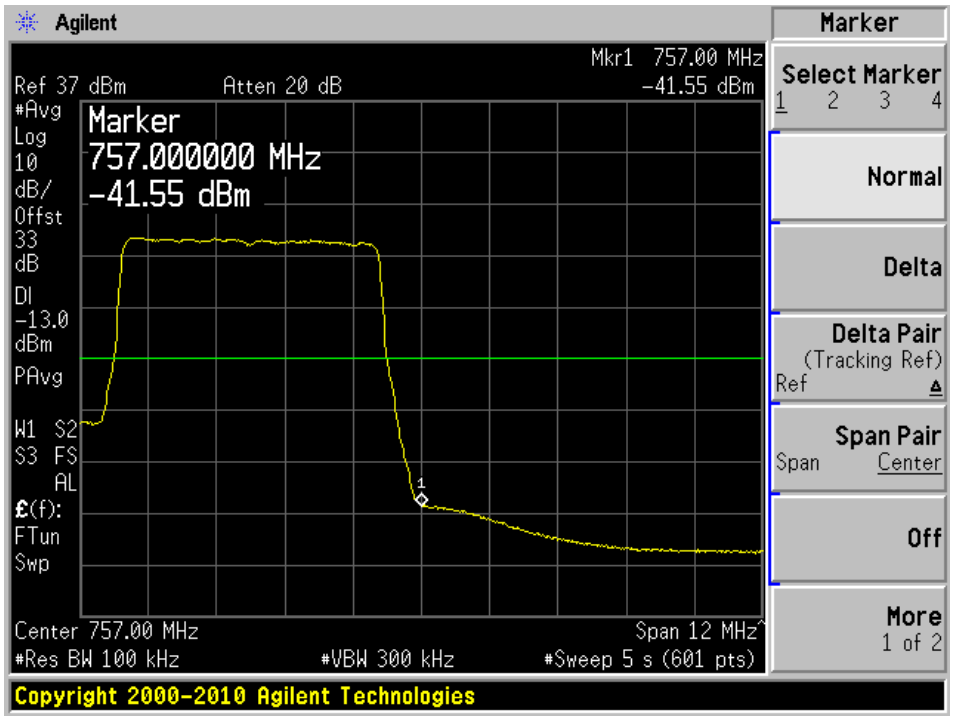


Modulation: LTE-64QAM (5 MHz):

Plot 1: Lowest Edge

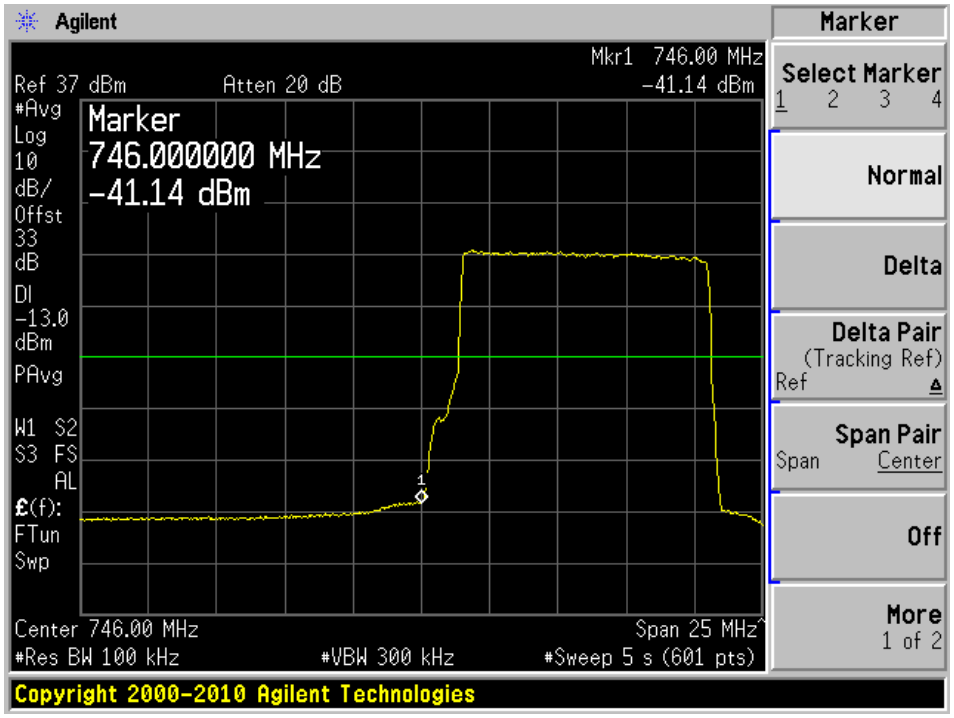


Plot 2: Highest Edge

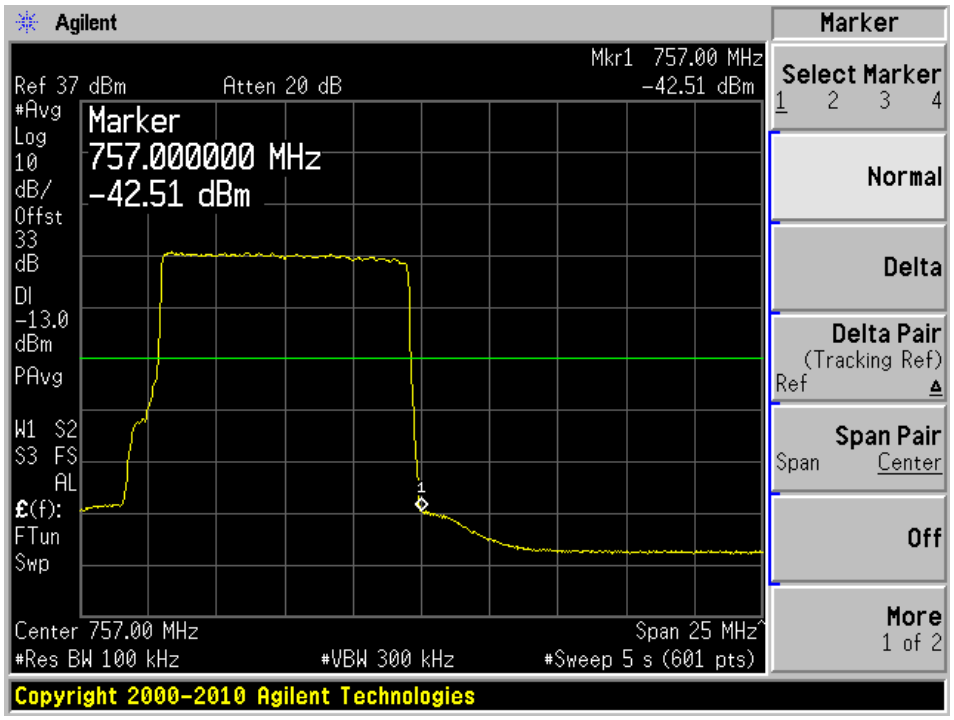


Modulation: LTE-QPSK (10 MHz):

Plot 1: Lowest Edge

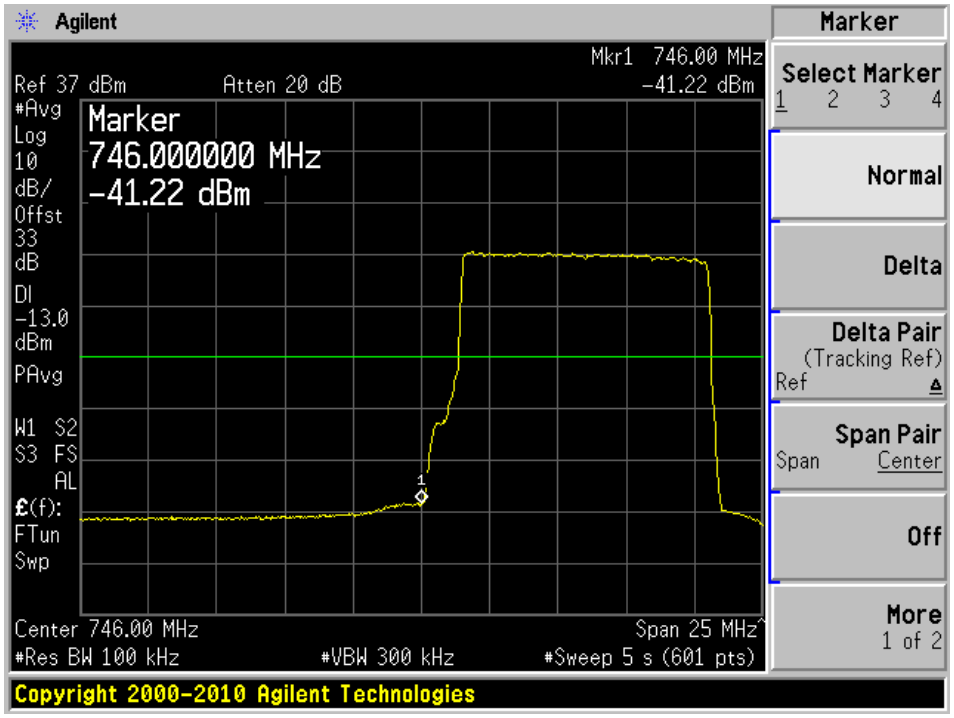


Plot 2: Highest Edge

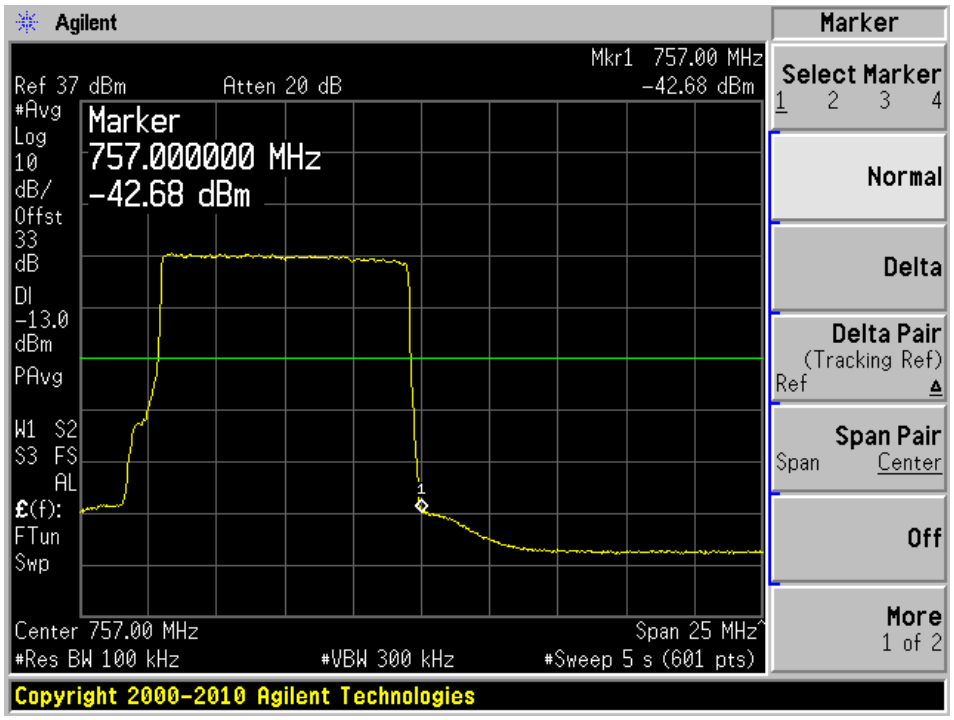


Modulation: LTE-16QAM (10 MHz):

Plot 1: Lowest Edge

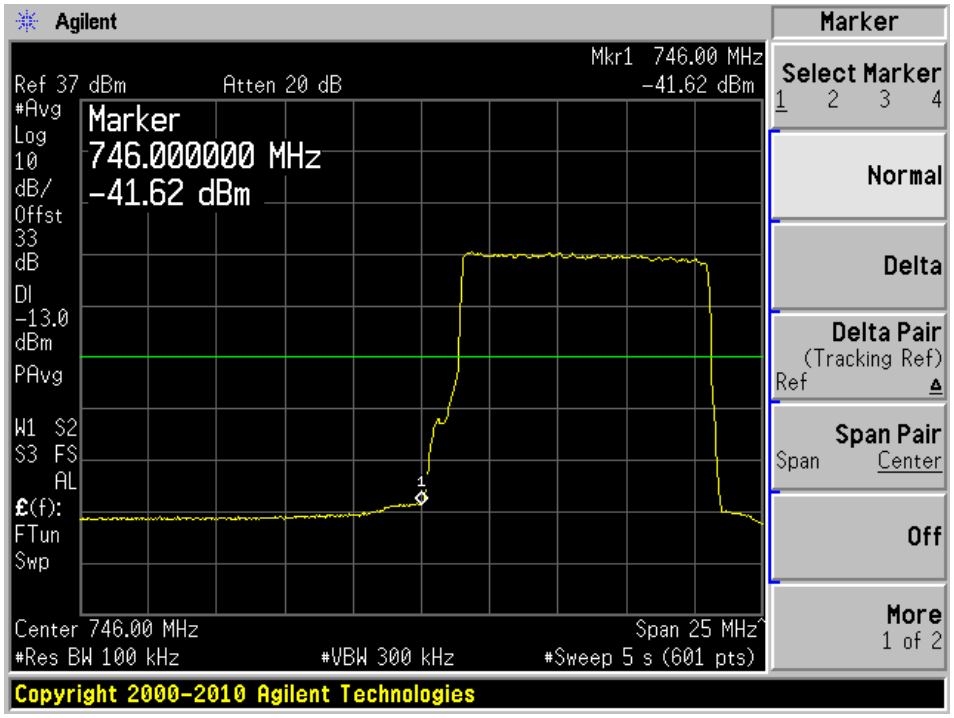


Plot 2: Highest Edge

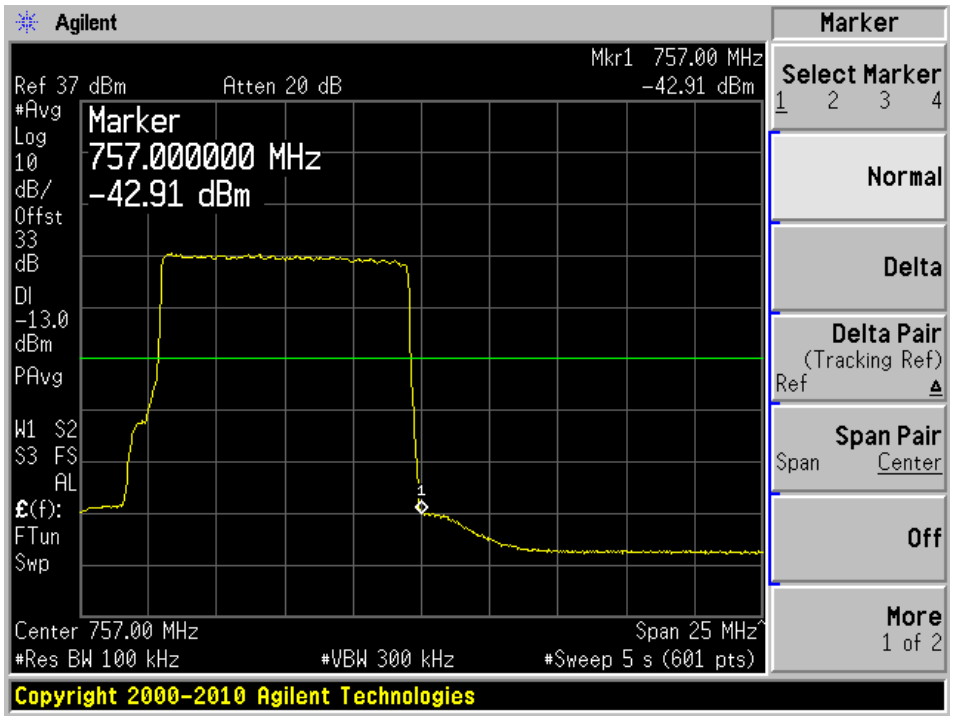


Modulation: LTE-64QAM (10 MHz):

Plot 1: Lowest Edge



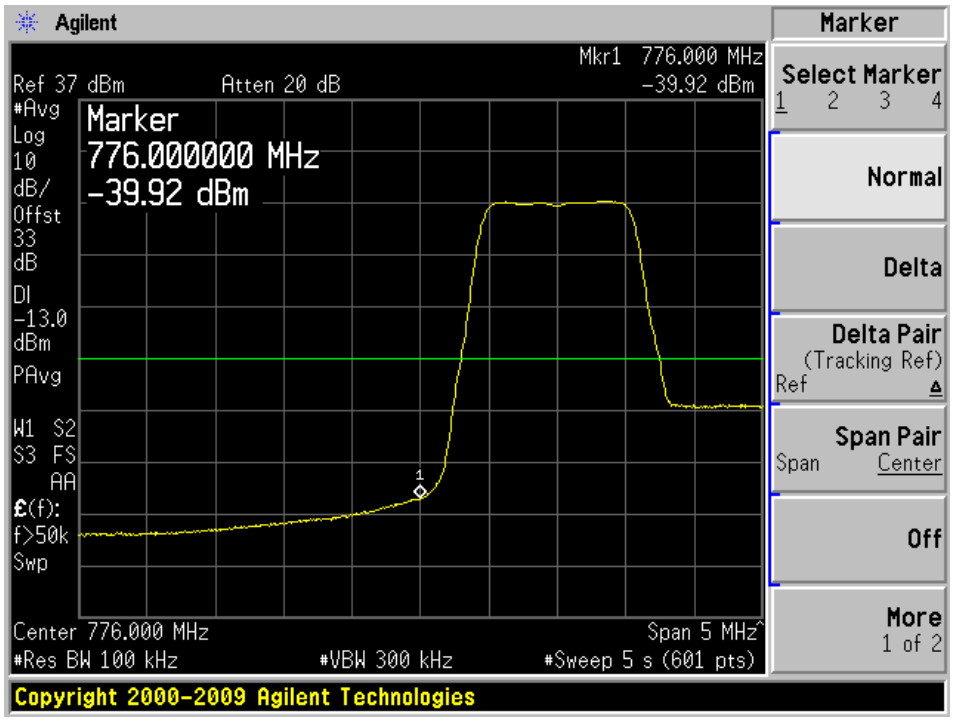
Plot 2: Highest Edge



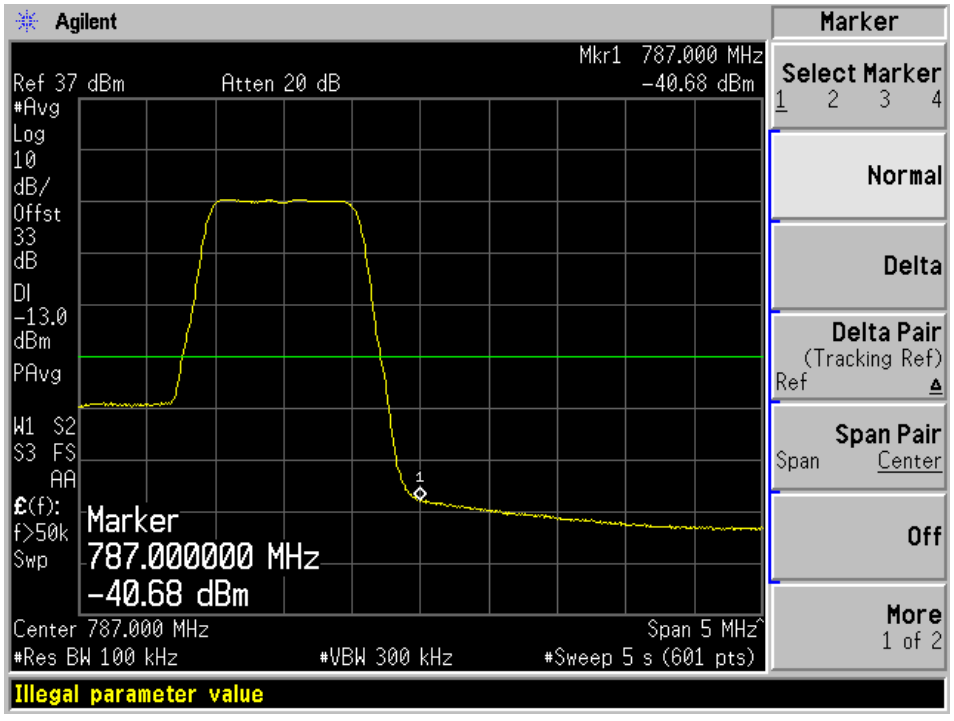
UL: 776-787 MHz

Modulation: LTE-QPSK (1.4 MHz):

Plot 1: Lowest Edge

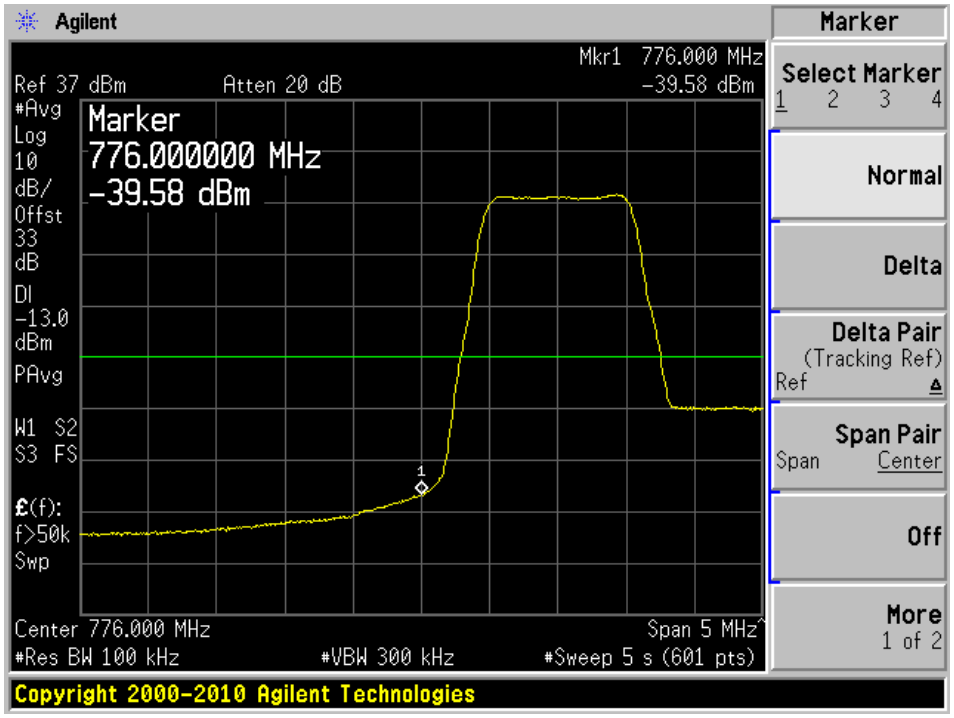


Plot 2: Highest Edge

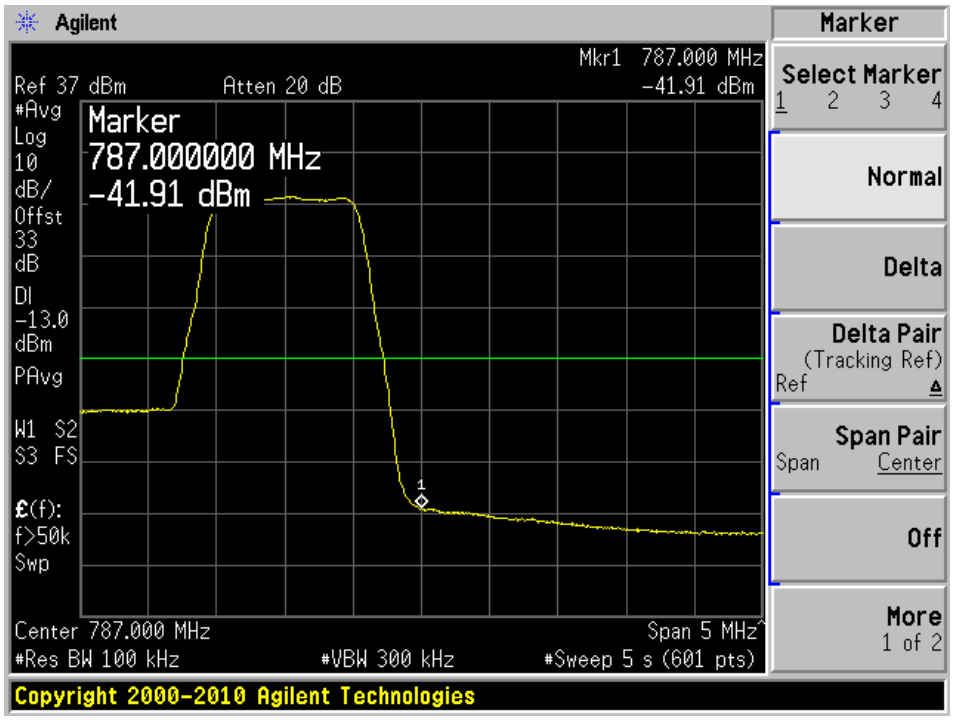


Modulation: LTE-16QAM (1.4 MHz):

Plot 1: Lowest Edge

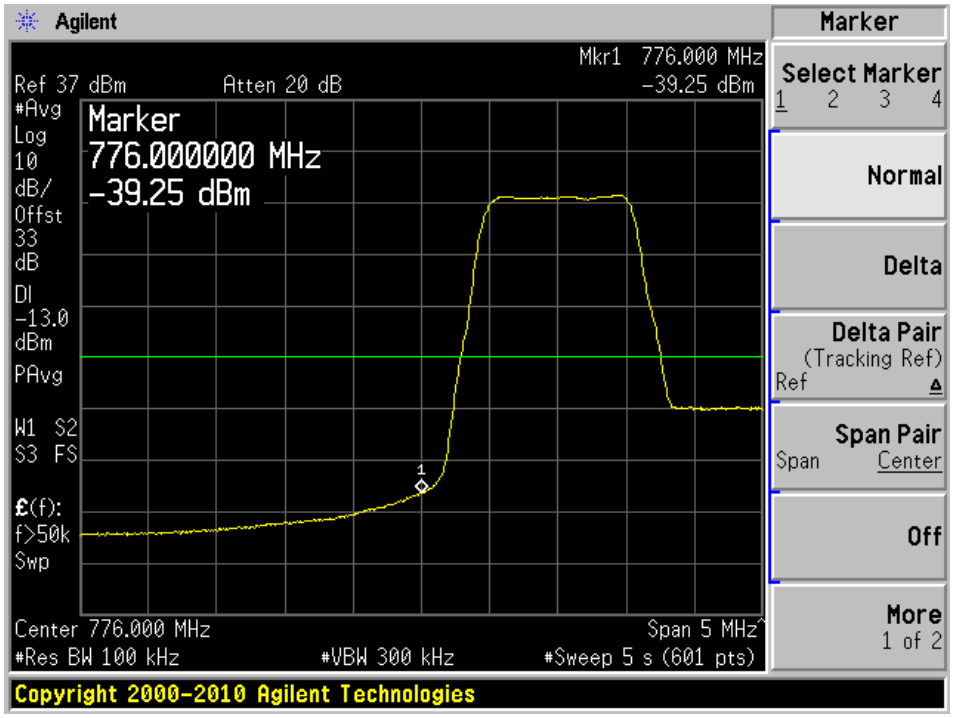


Plot 2: Highest Edge

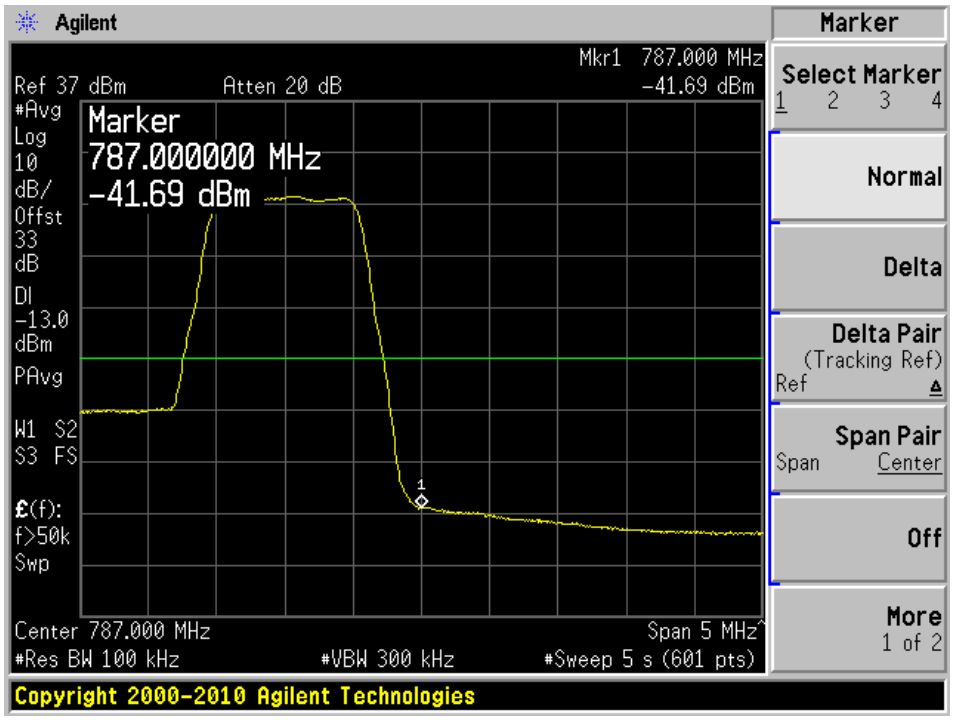


Modulation: LTE-64QAM (1.4 MHz):

Plot 1: Lowest Edge

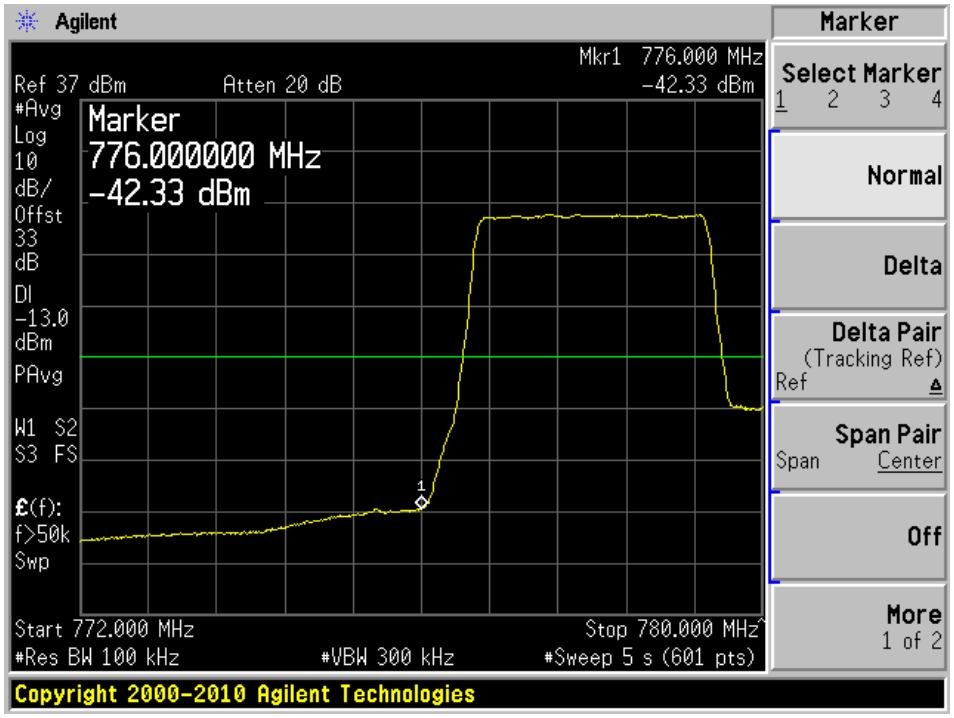


Plot 2: Highest Edge

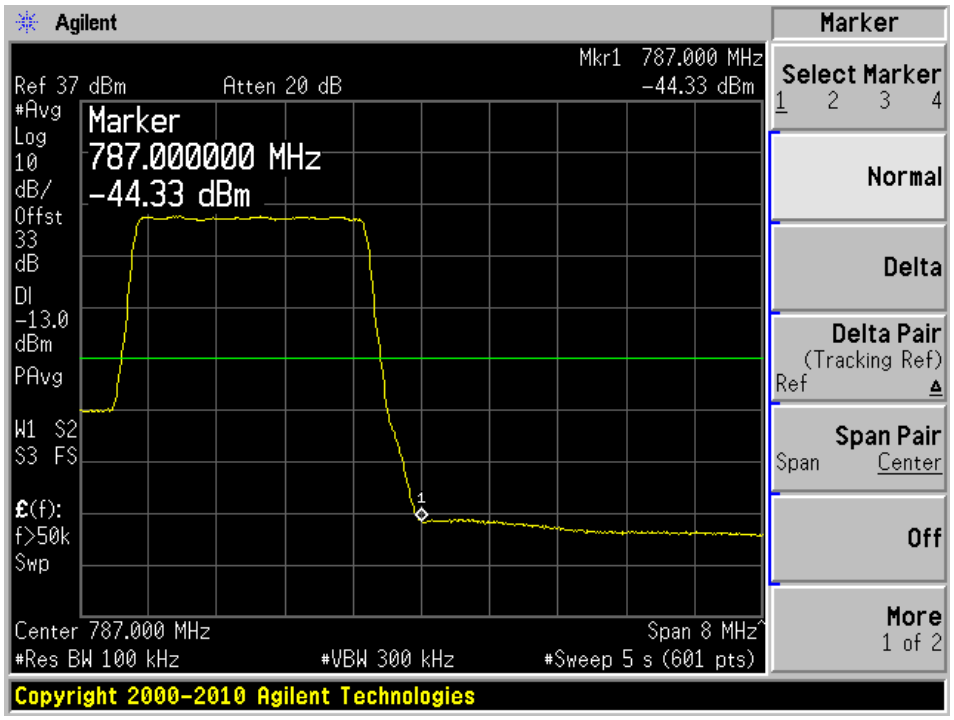


Modulation: LTE-QPSK (3 MHz):

Plot 1: Lowest Edge

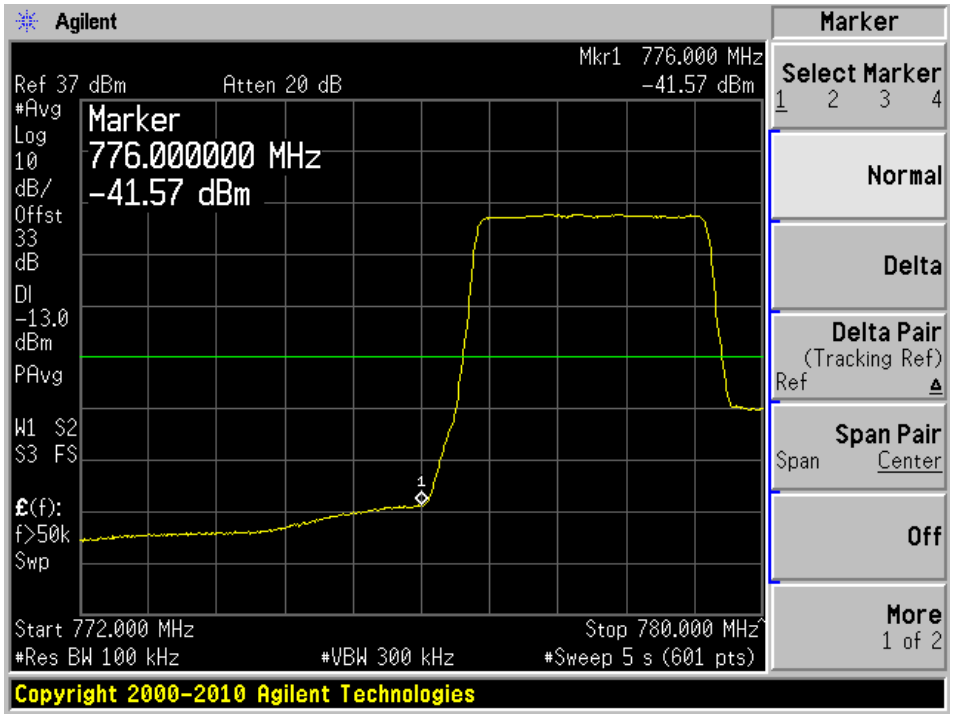


Plot 2: Highest Edge

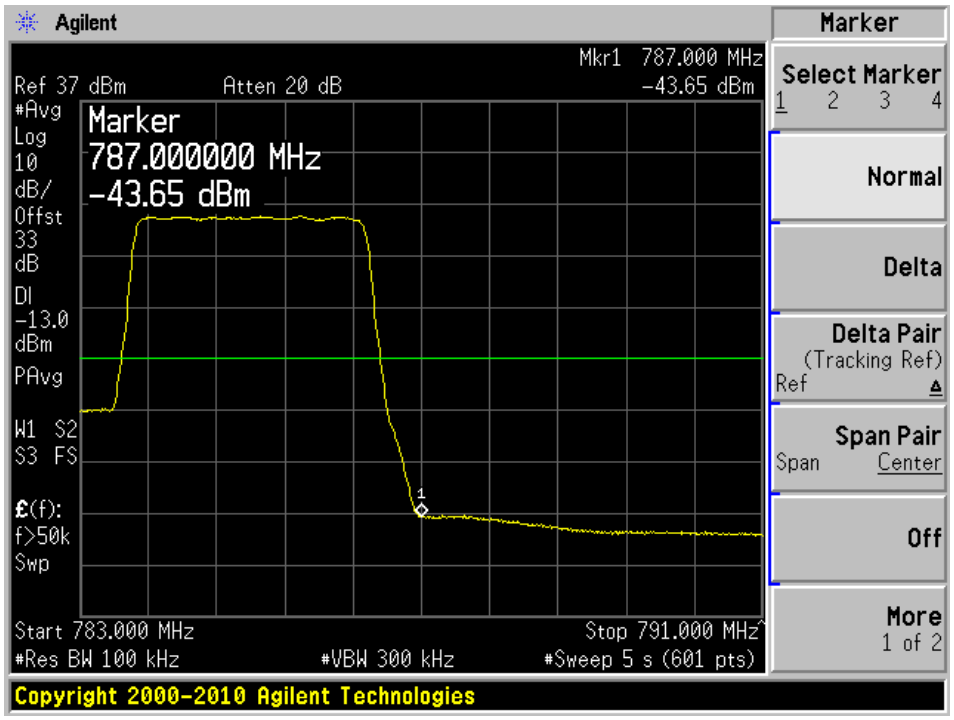


Modulation: LTE-16QAM (3 MHz):

Plot 1: Lowest Edge

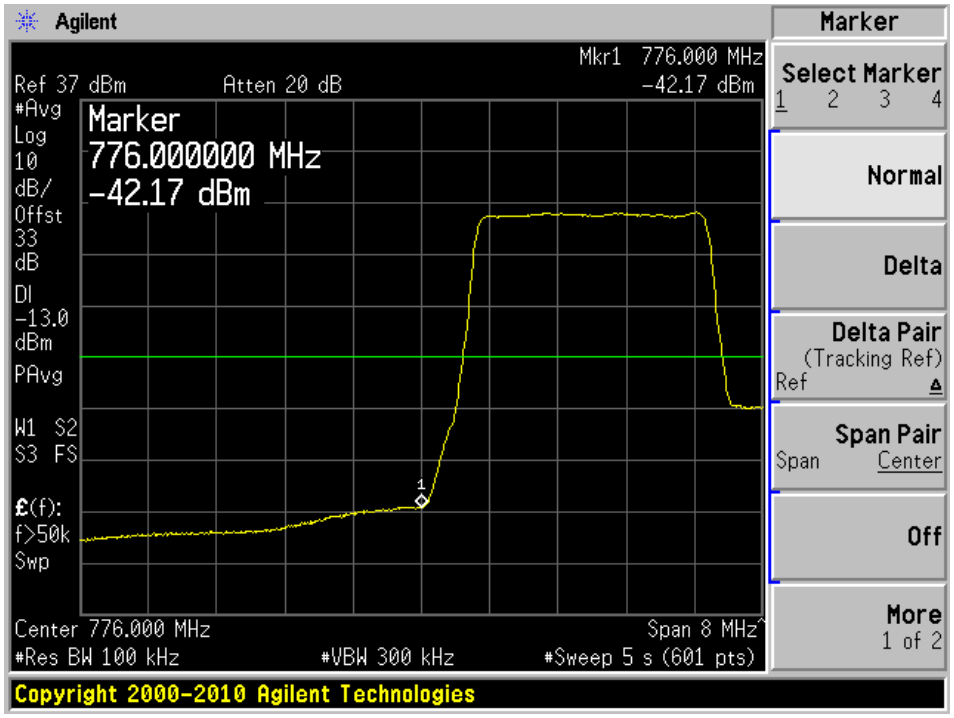


Plot 2: Highest Edge

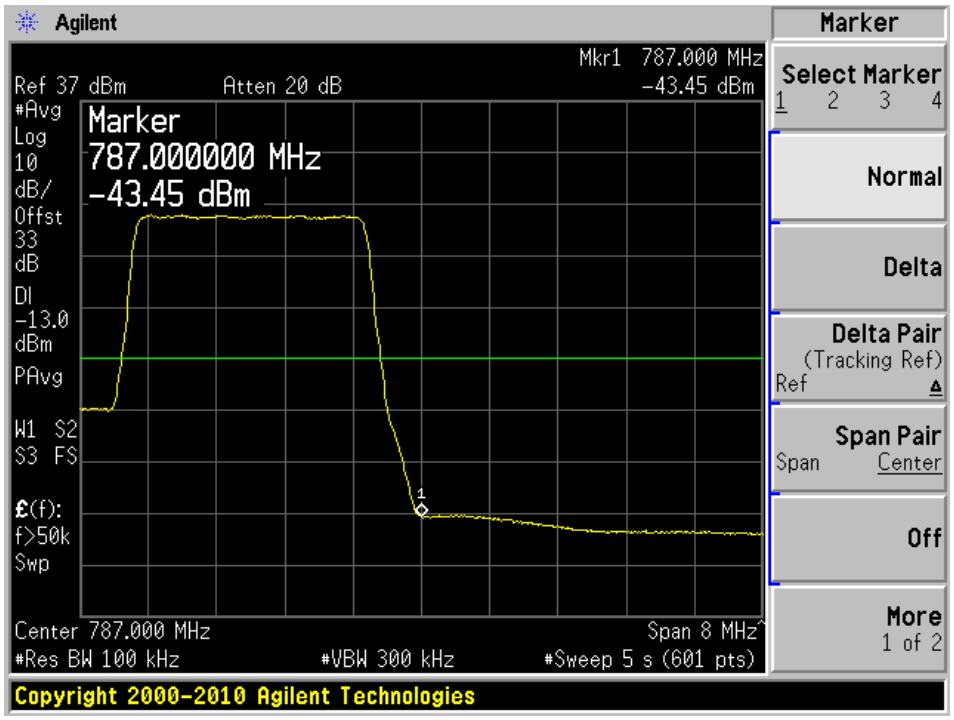


Modulation: LTE-64QAM (3 MHz):

Plot 1: Lowest Edge

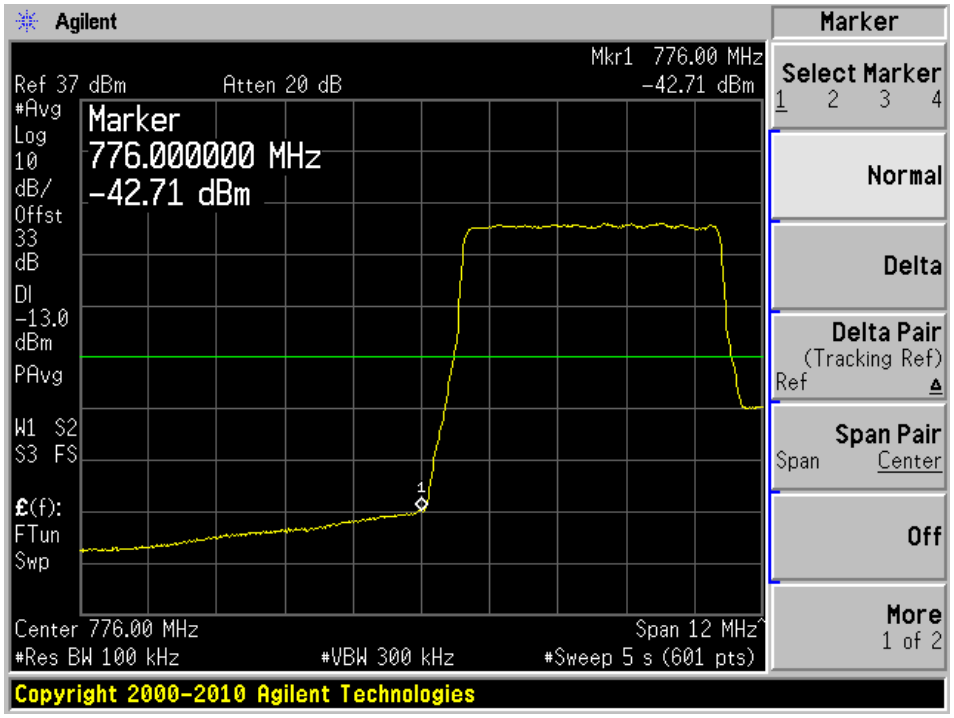


Plot 2: Highest Edge

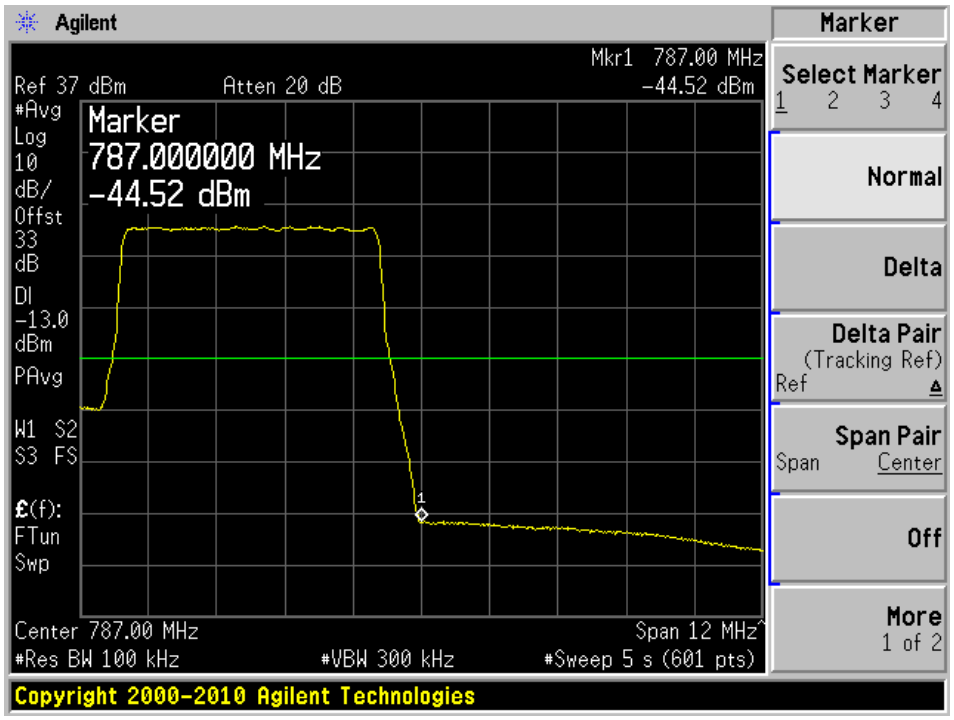


Modulation: LTE-QPSK (5 MHz):

Plot 1: Lowest Edge

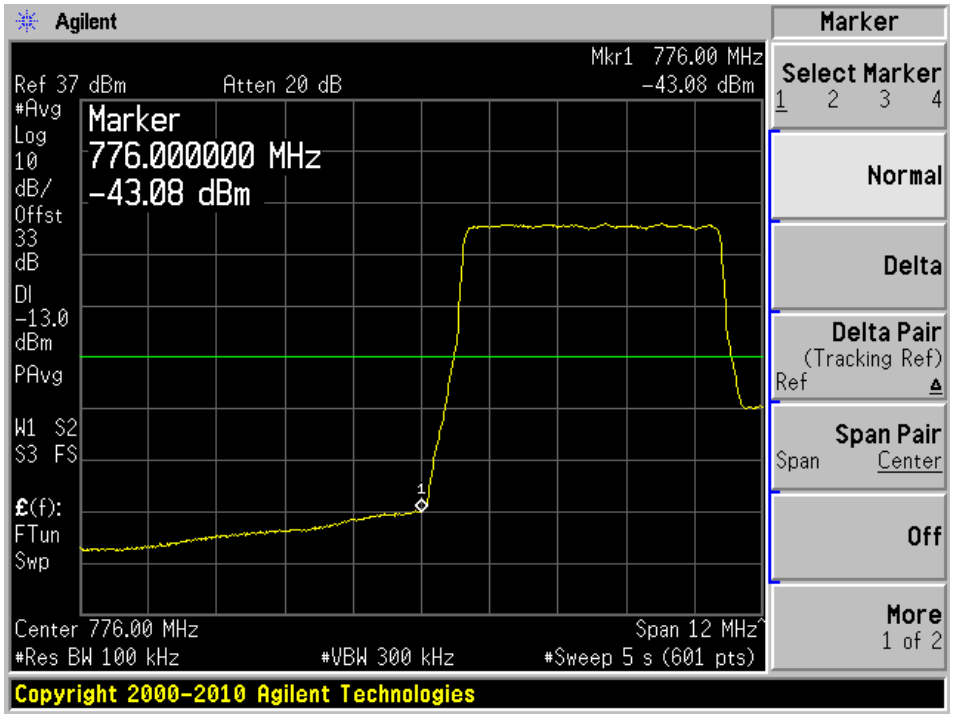


Plot 2: Highest Edge

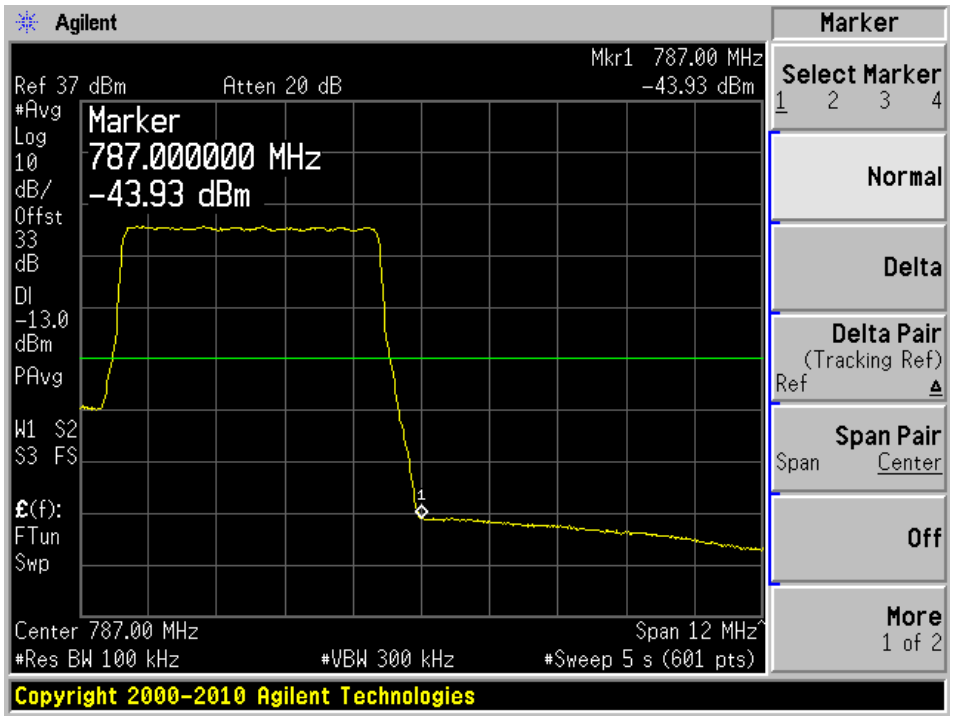


Modulation: LTE-16QAM (5 MHz):

Plot 1: Lowest Edge

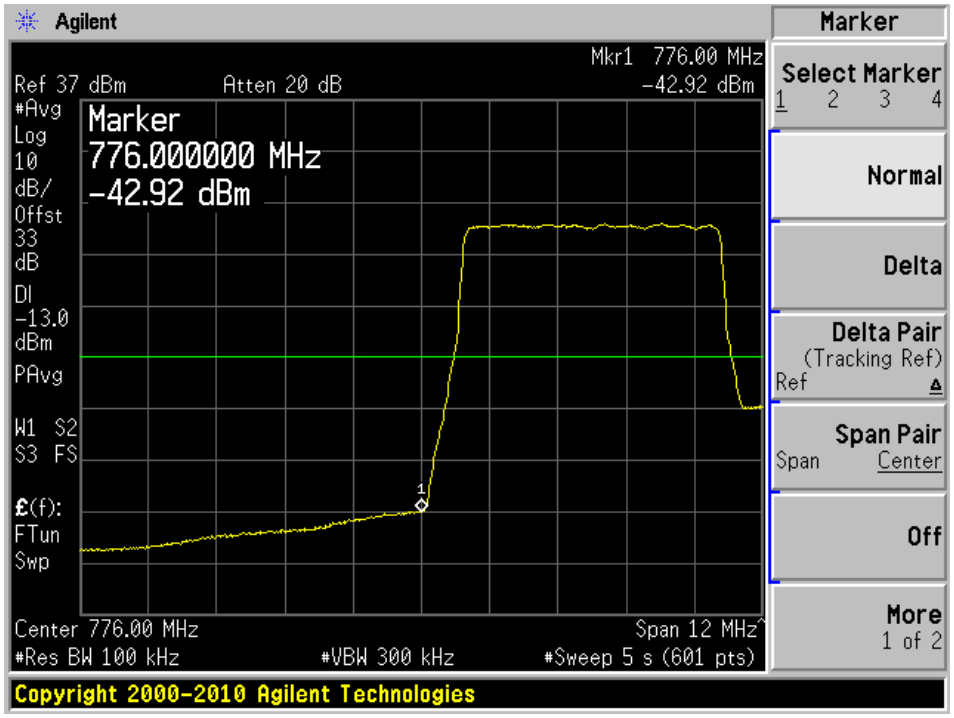


Plot 2: Highest Edge

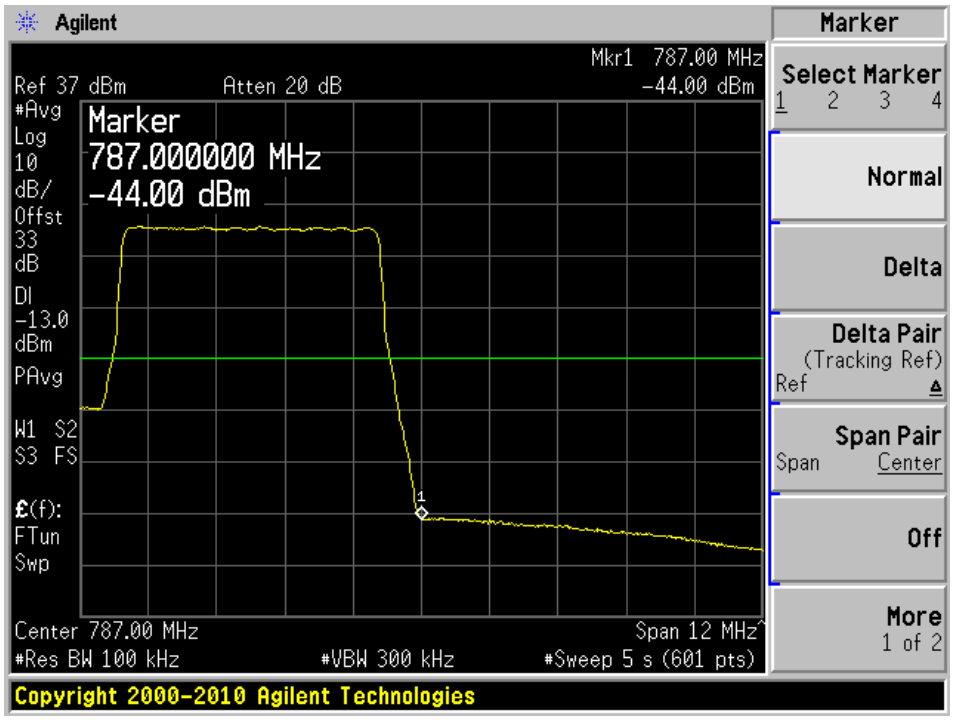


Modulation: LTE-64QAM (5 MHz):

Plot 1: Lowest Edge

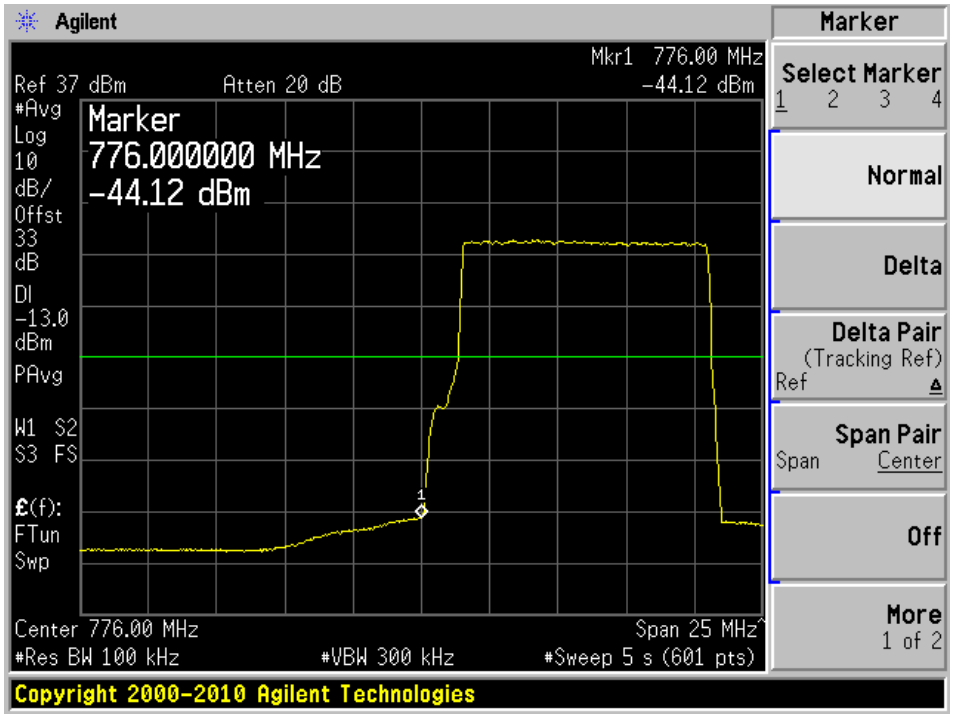


Plot 2: Highest Edge

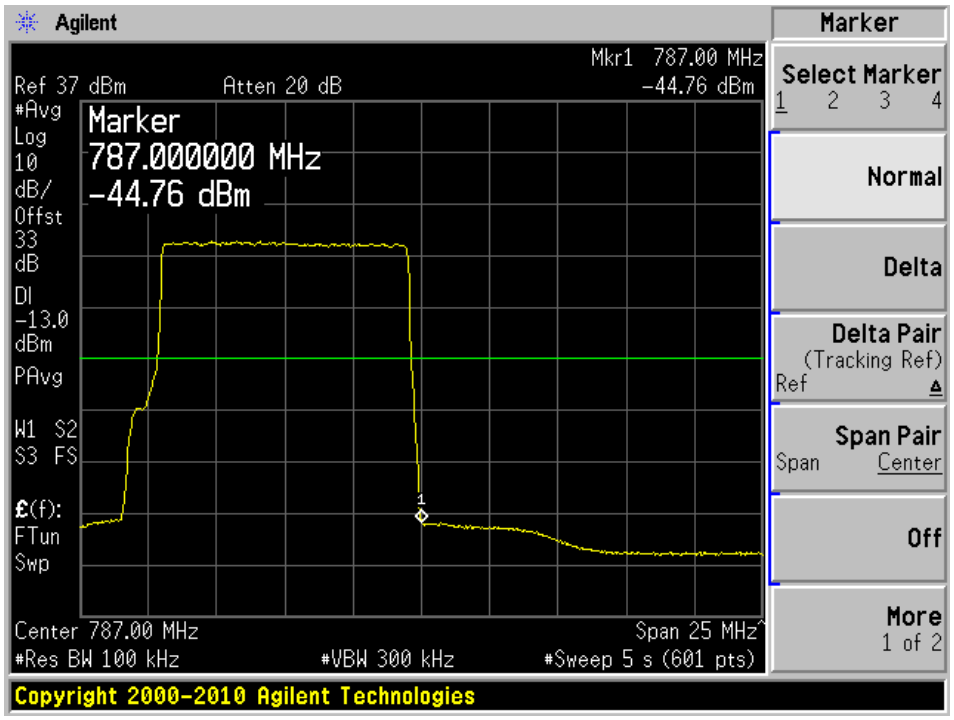


Modulation: LTE-QPSK (10 MHz):

Plot 1: Lowest Edge

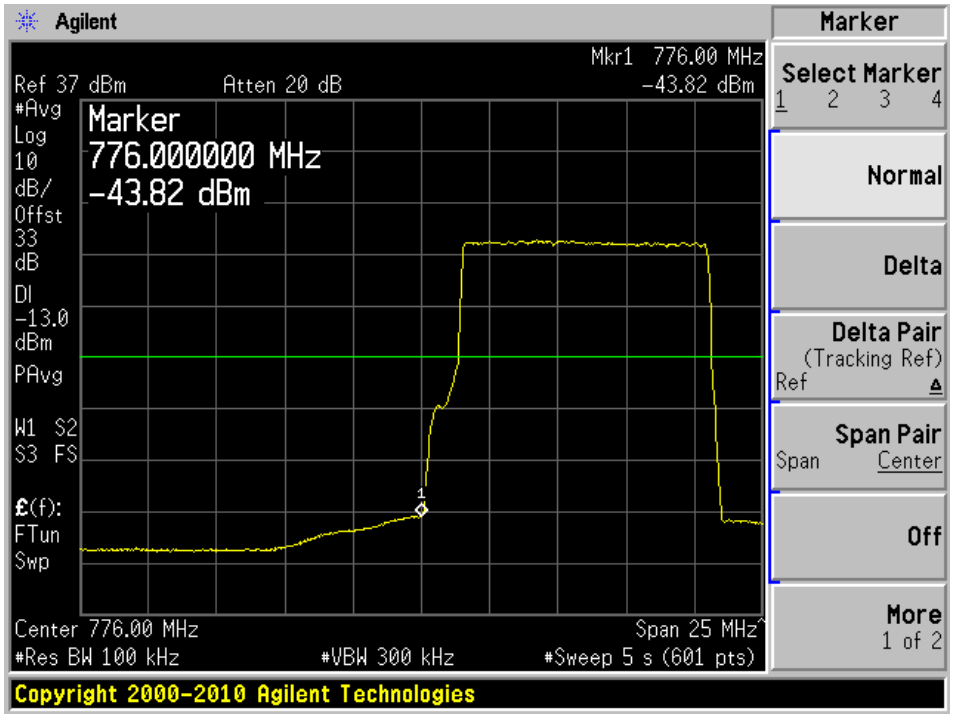


Plot 2: Highest Edge

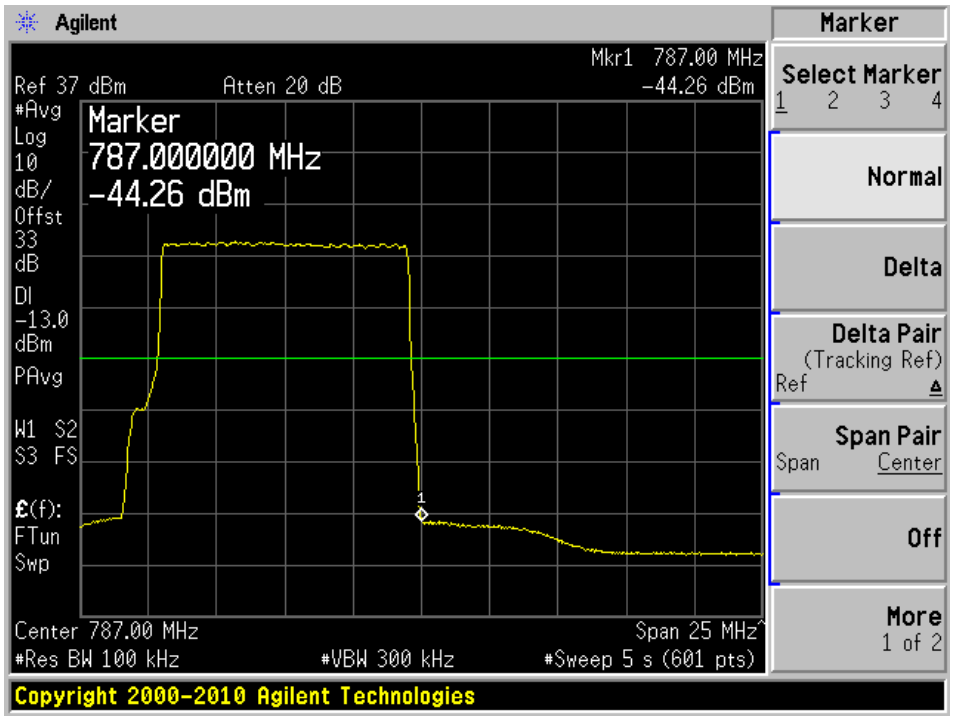


Modulation: LTE-16QAM (10 MHz):

Plot 1: Lowest Edge

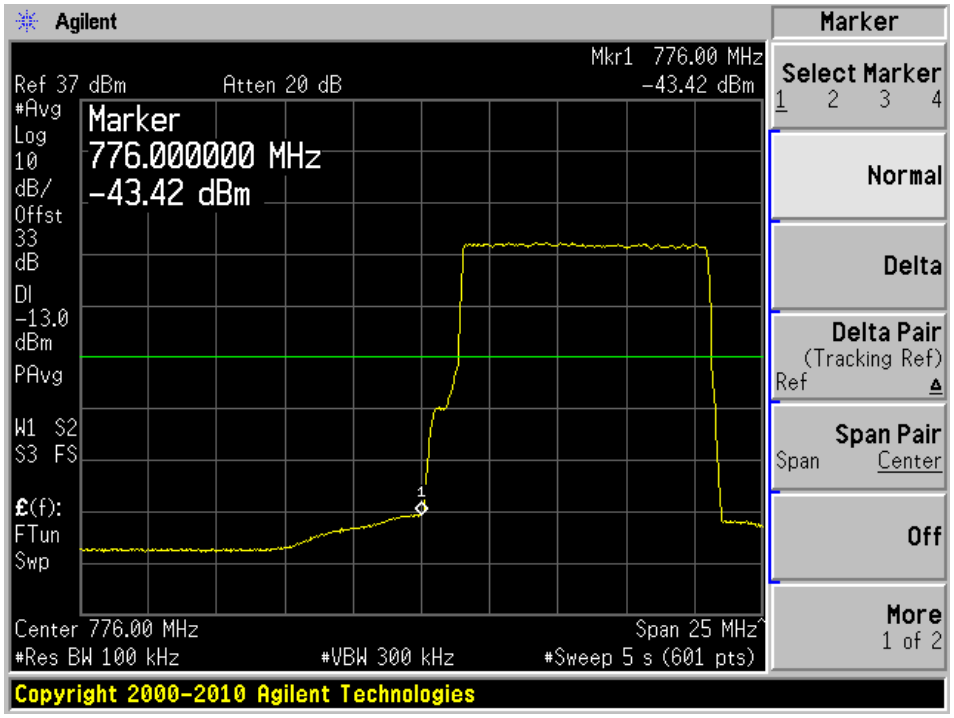


Plot 2: Highest Edge

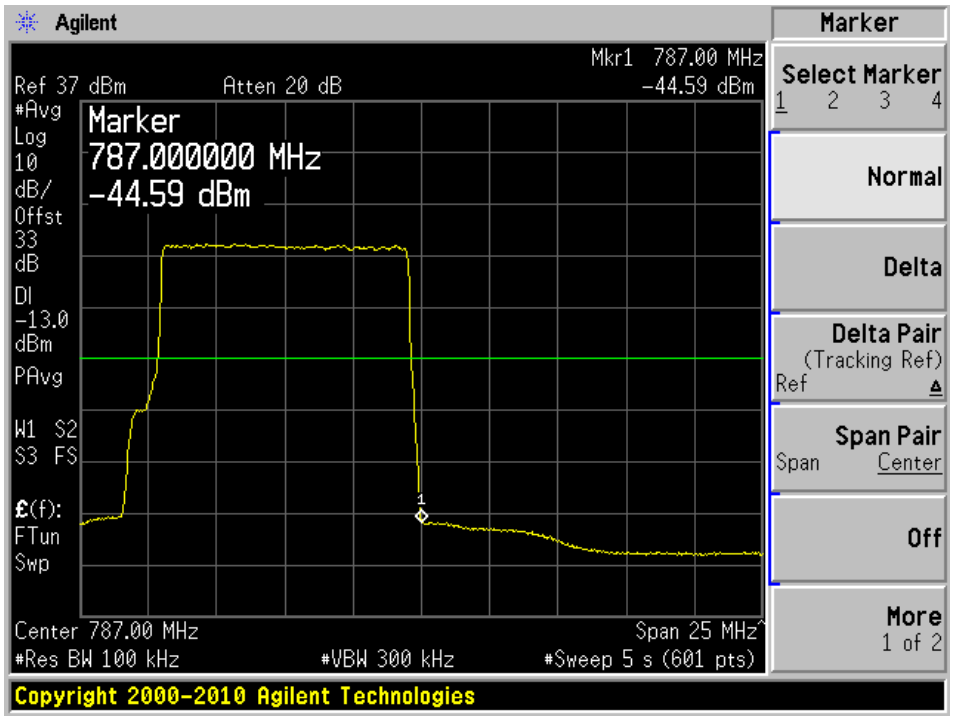


Modulation: LTE-64QAM (10 MHz):

Plot 1: Lowest Edge



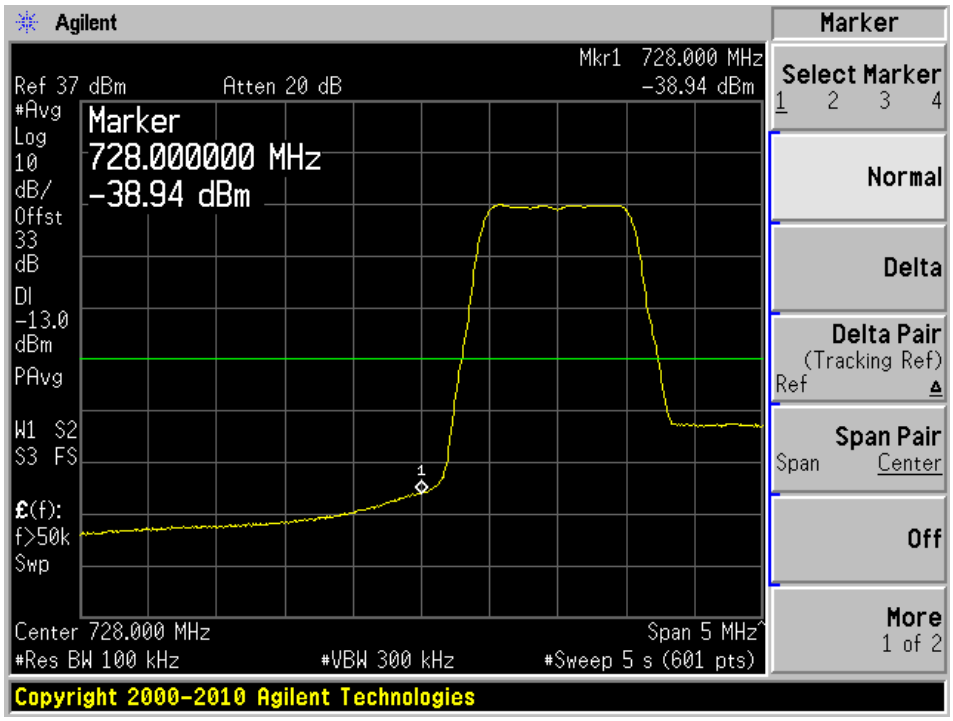
Plot 2: Highest Edge



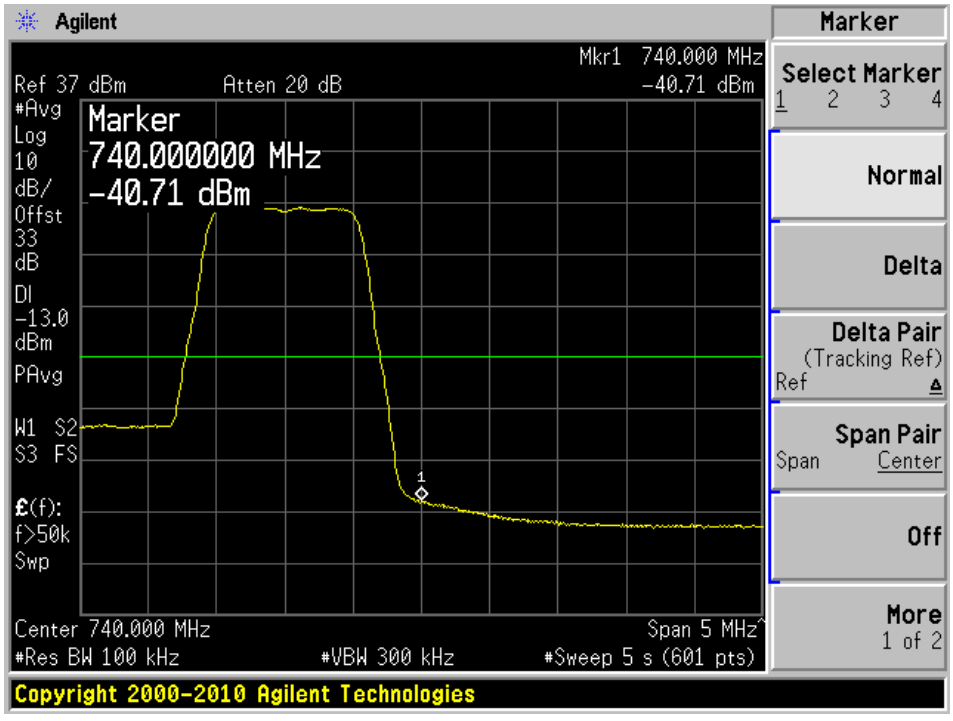
DL: 728-740 MHz

Modulation: LTE-QPSK (1.4 MHz):

Plot 1: Lowest Edge

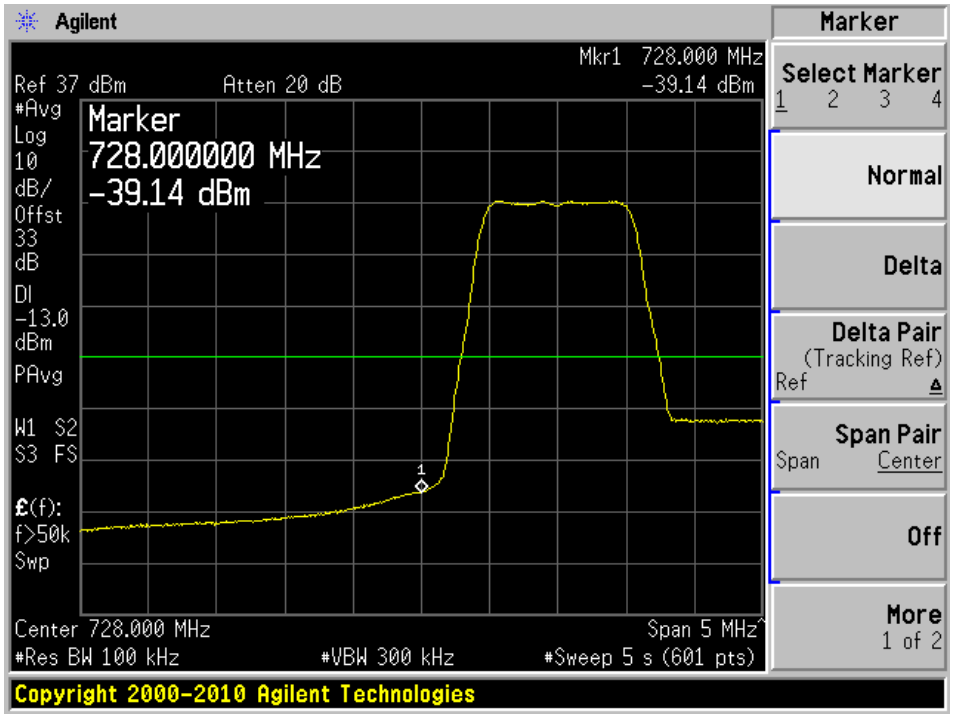


Plot 2: Highest Edge

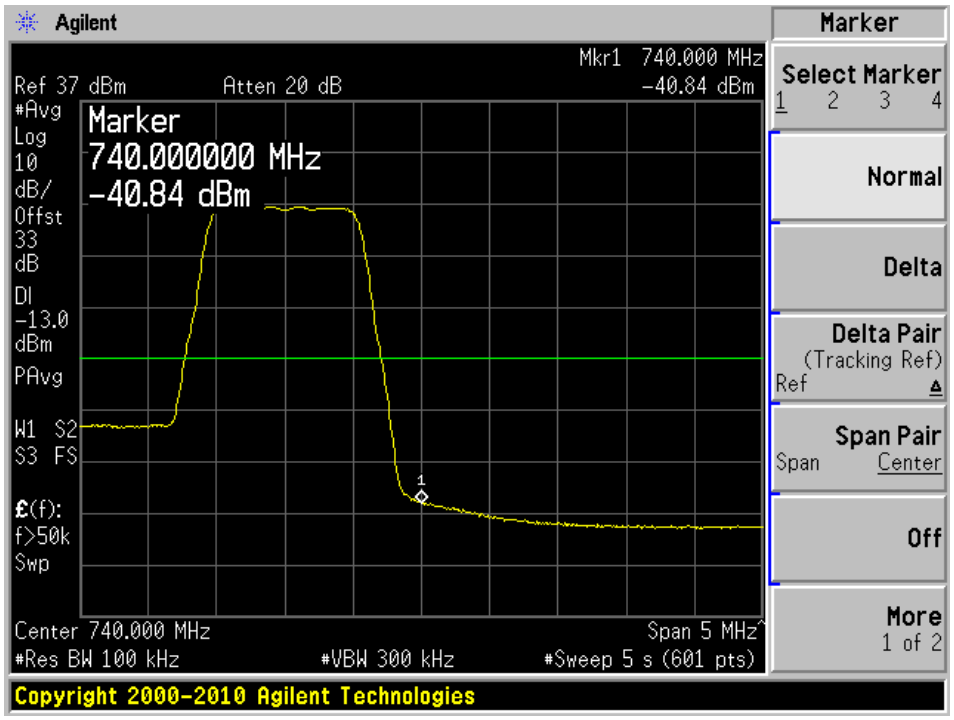


Modulation: LTE-16QAM (1.4 MHz):

Plot 1: Lowest Edge

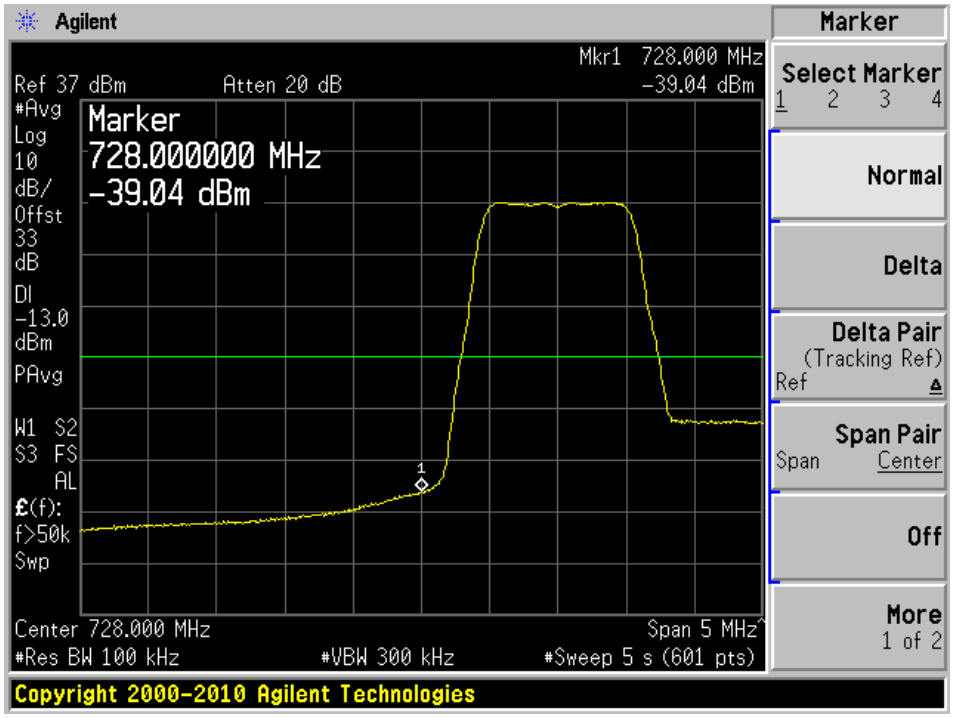


Plot 2: Highest Edge

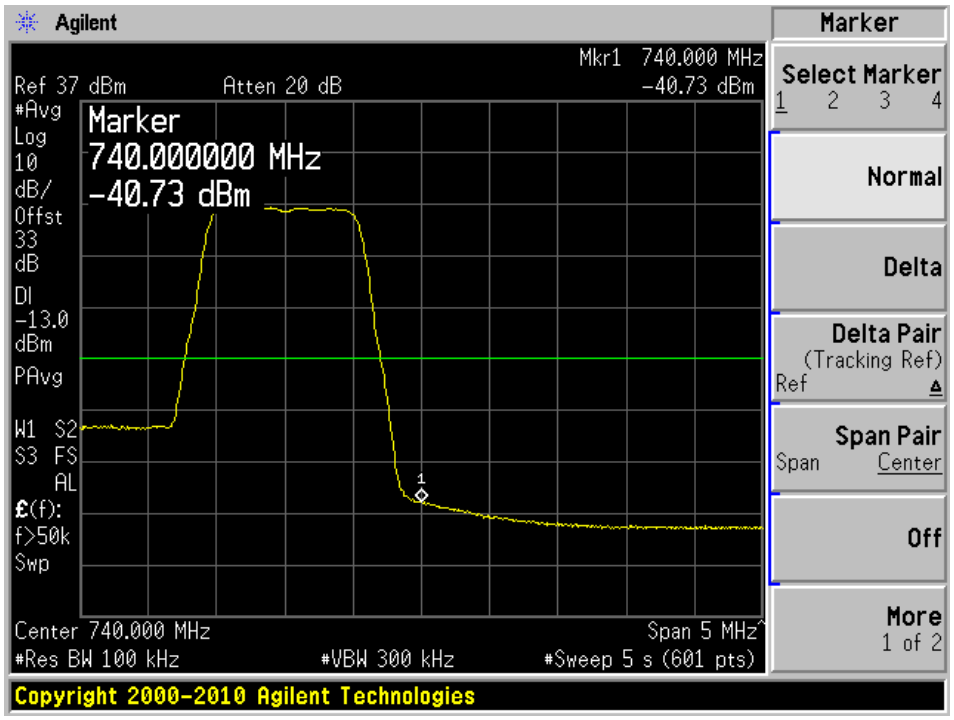


Modulation: LTE-64QAM (1.4 MHz):

Plot 1: Lowest Edge

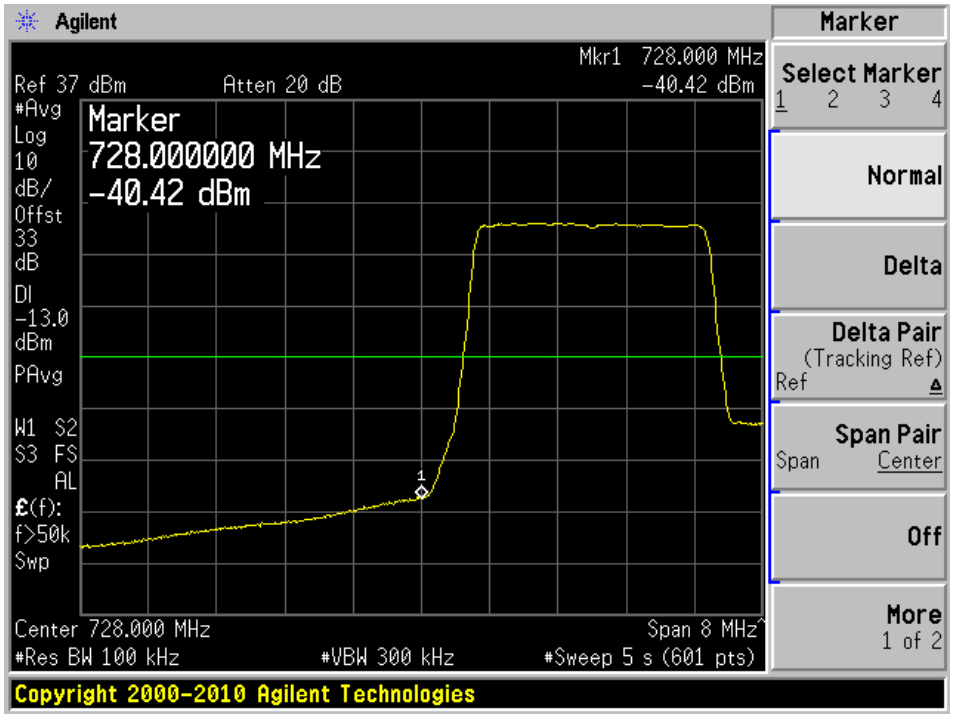


Plot 2: Highest Edge

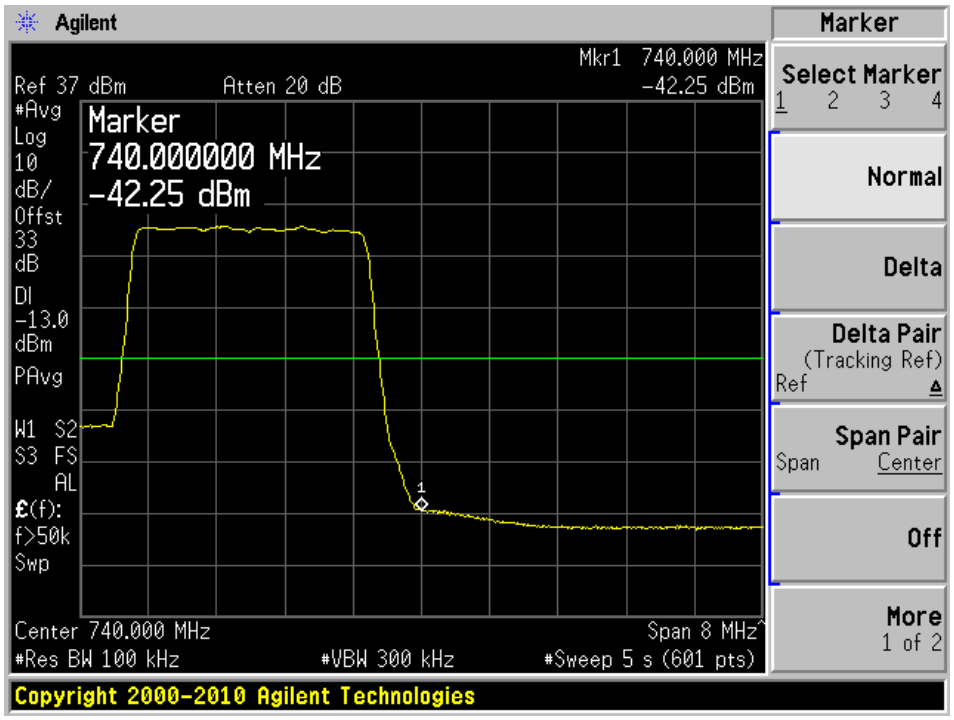


Modulation: LTE-QPSK (3 MHz):

Plot 1: Lowest Edge

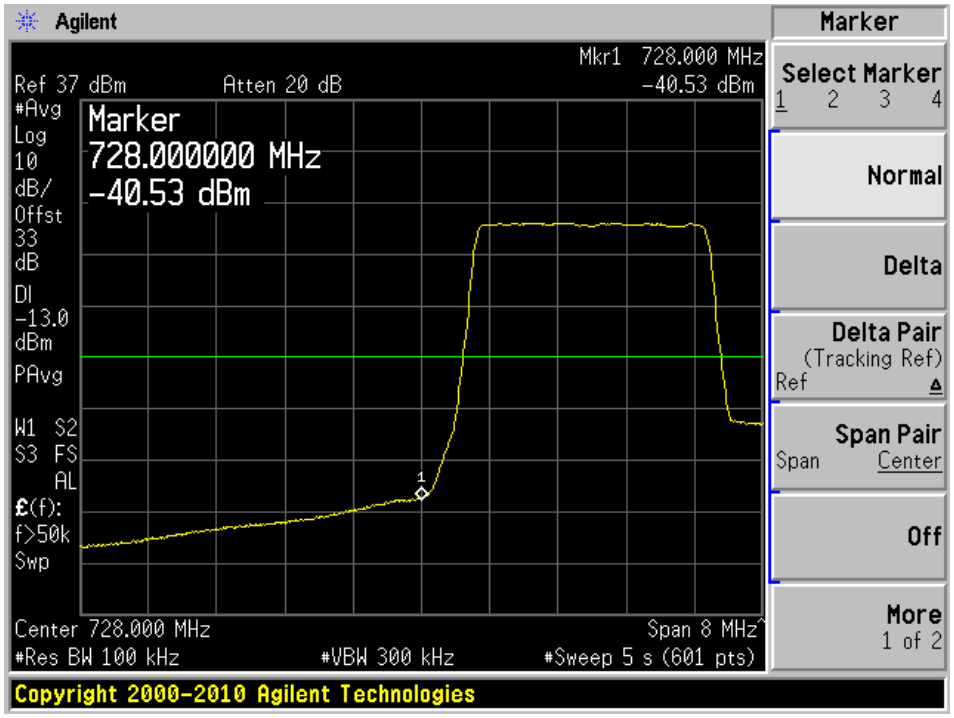


Plot 2: Highest Edge

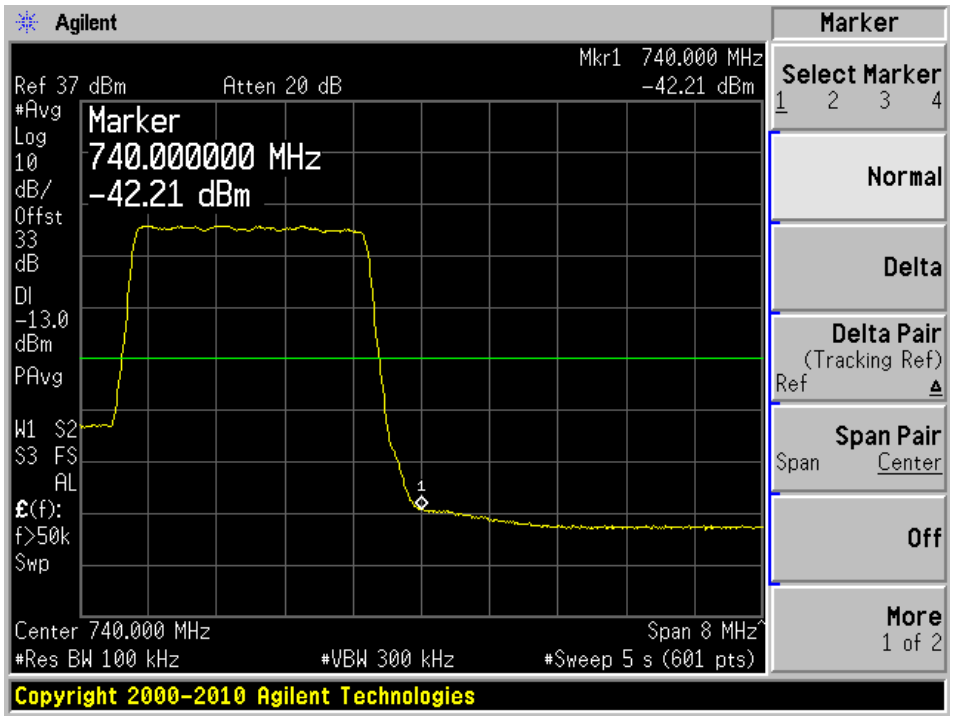


Modulation: LTE-16QAM (3 MHz):

Plot 1: Lowest Edge

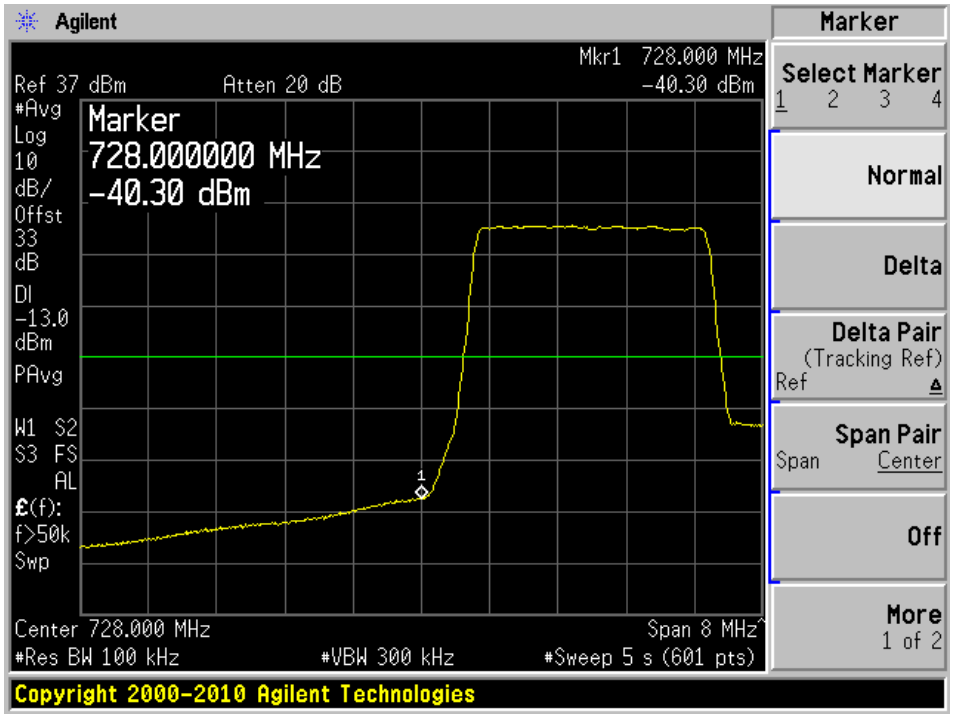


Plot 2: Highest Edge

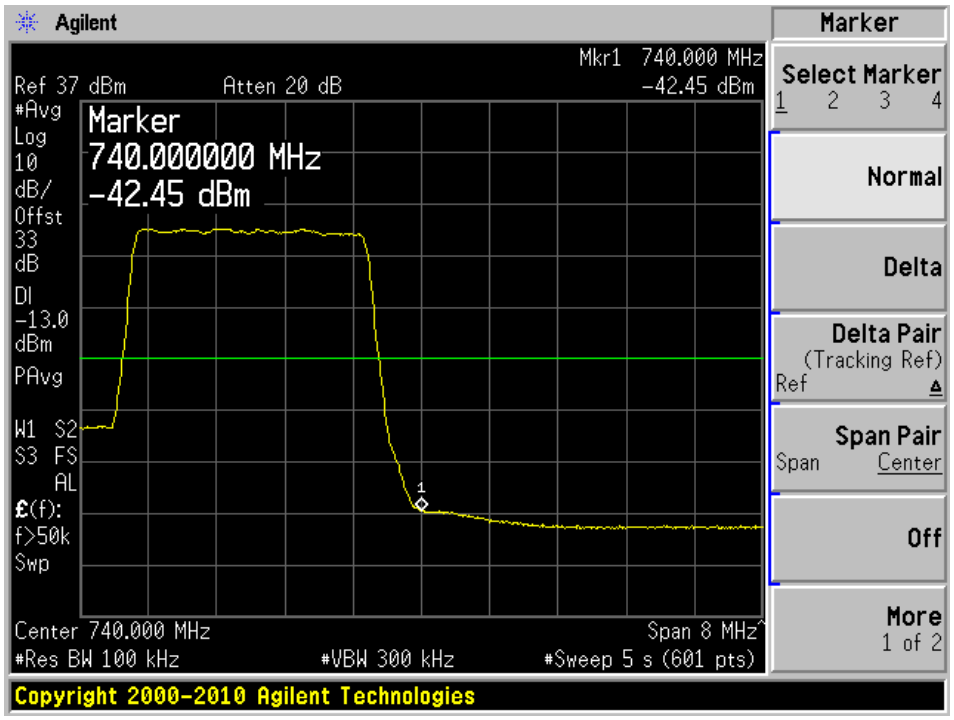


Modulation: LTE-64QAM (3 MHz):

Plot 1: Lowest Edge

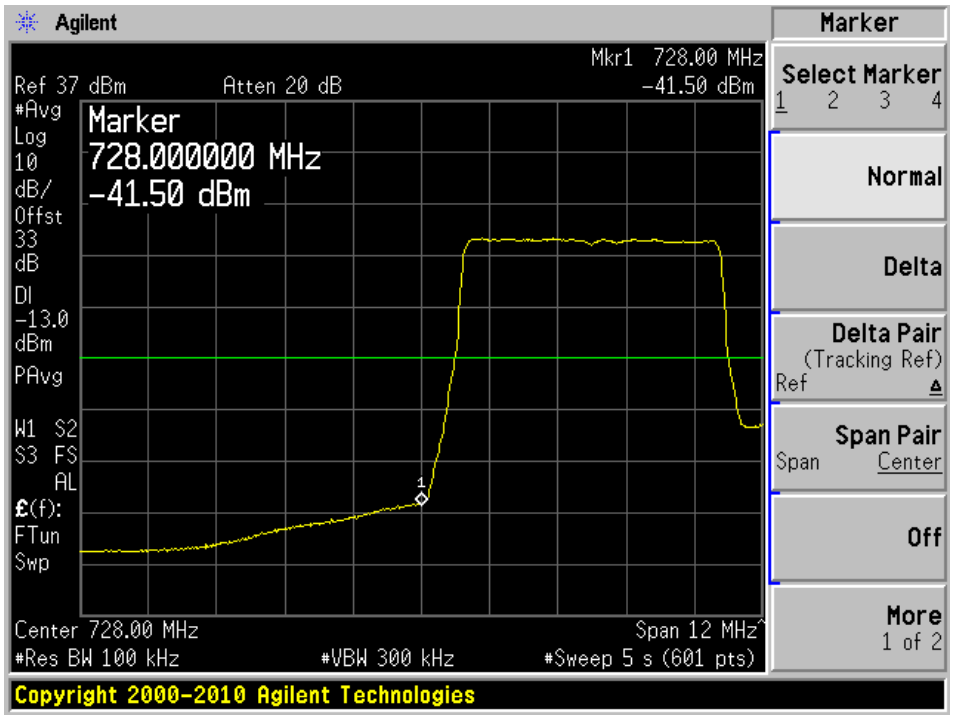


Plot 2: Highest Edge

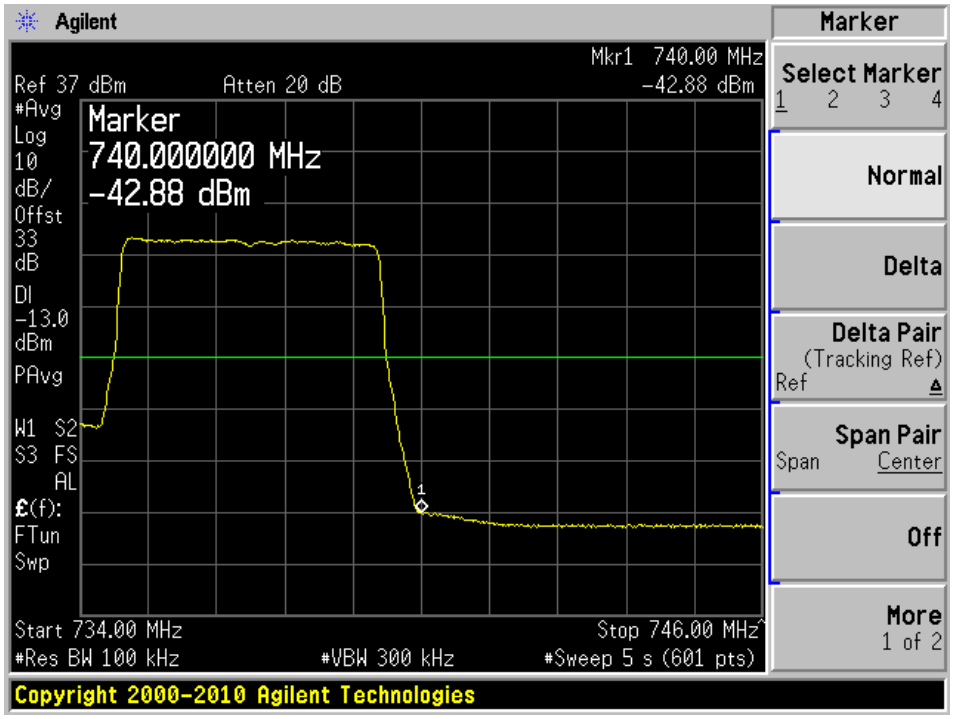


Modulation: LTE-QPSK (5 MHz):

Plot 1: Lowest Edge

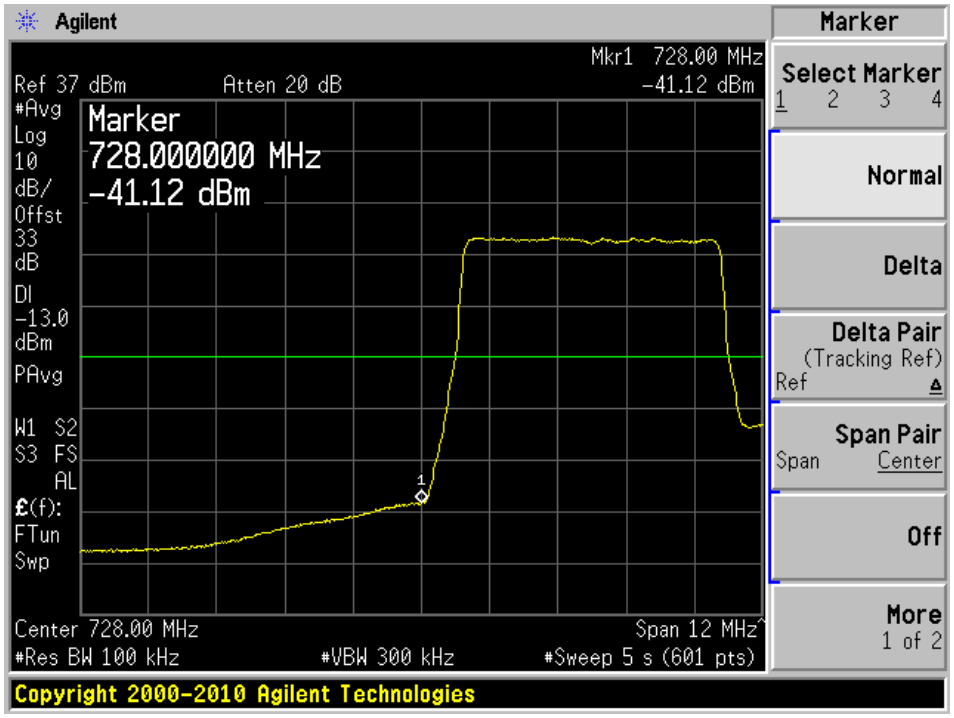


Plot 2: Highest Edge

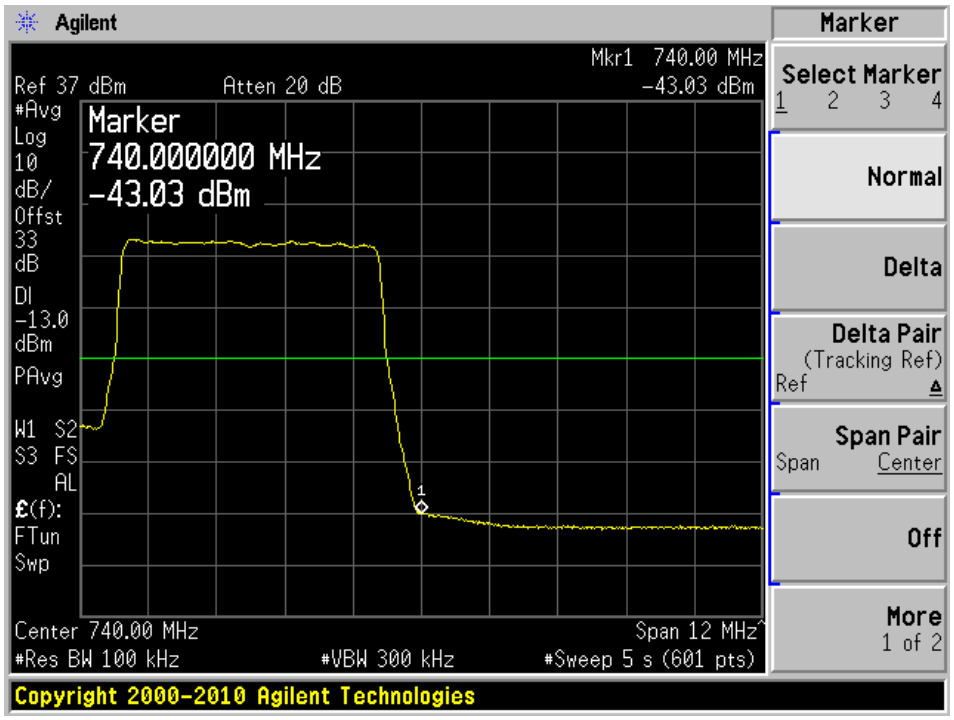


Modulation: LTE-16QAM (5 MHz):

Plot 1: Lowest Edge

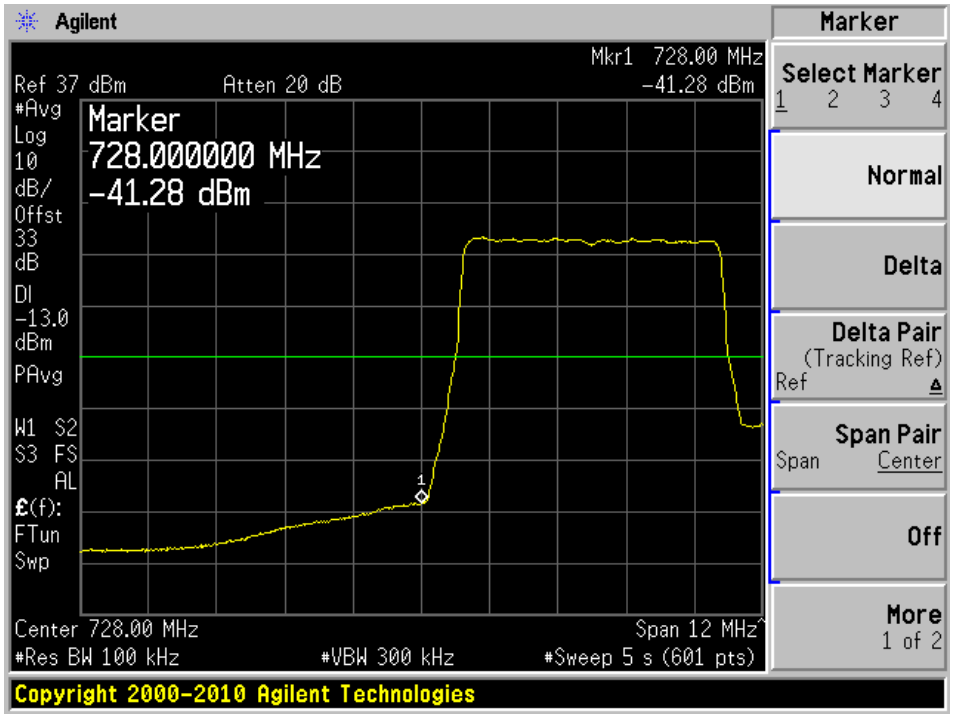


Plot 2: Highest Edge

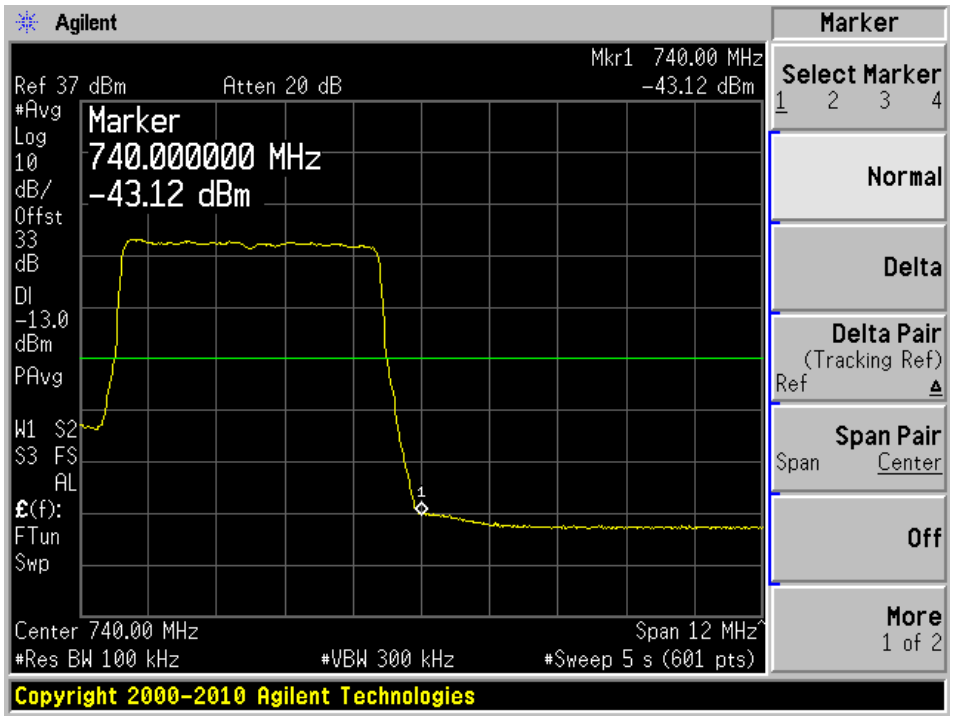


Modulation: LTE-64QAM (5 MHz):

Plot 1: Lowest Edge

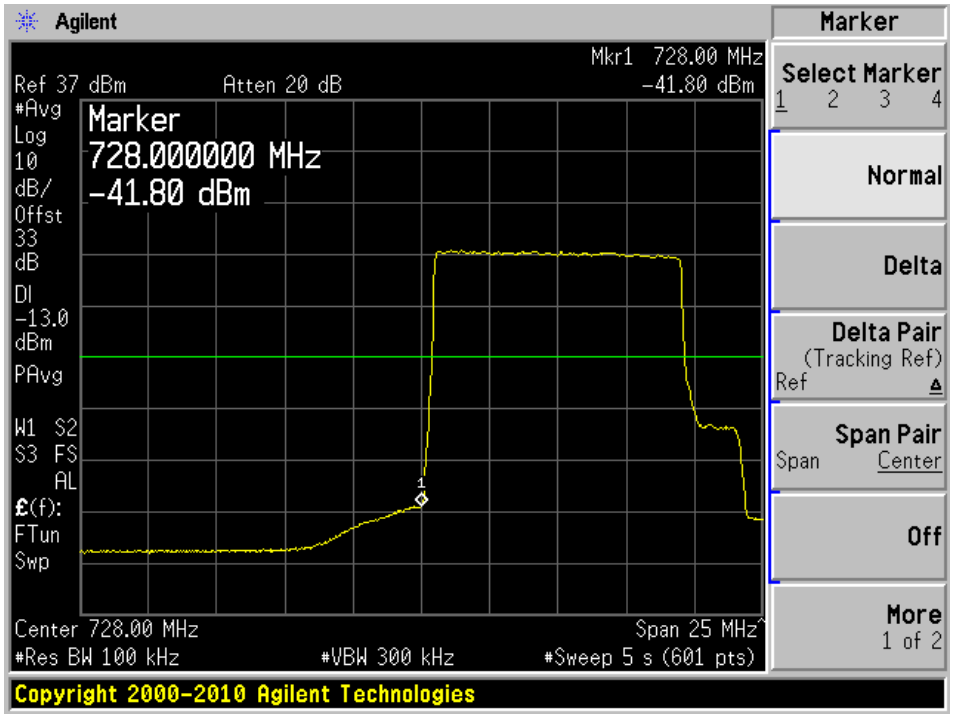


Plot 2: Highest Edge

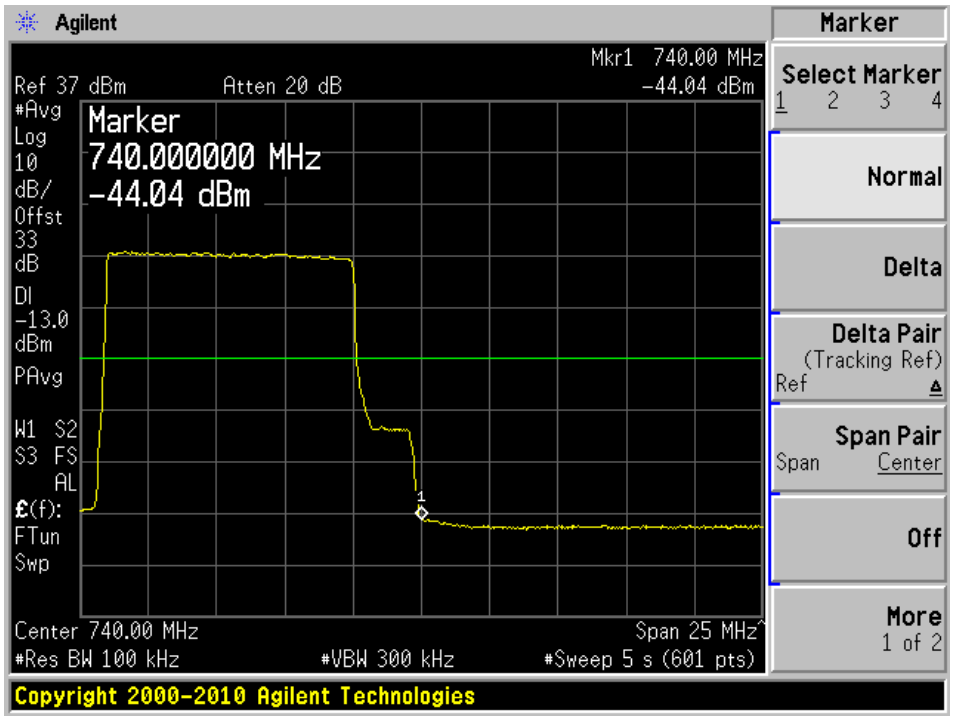


Modulation: LTE-QPSK (10 MHz):

Plot 1: Lowest Edge

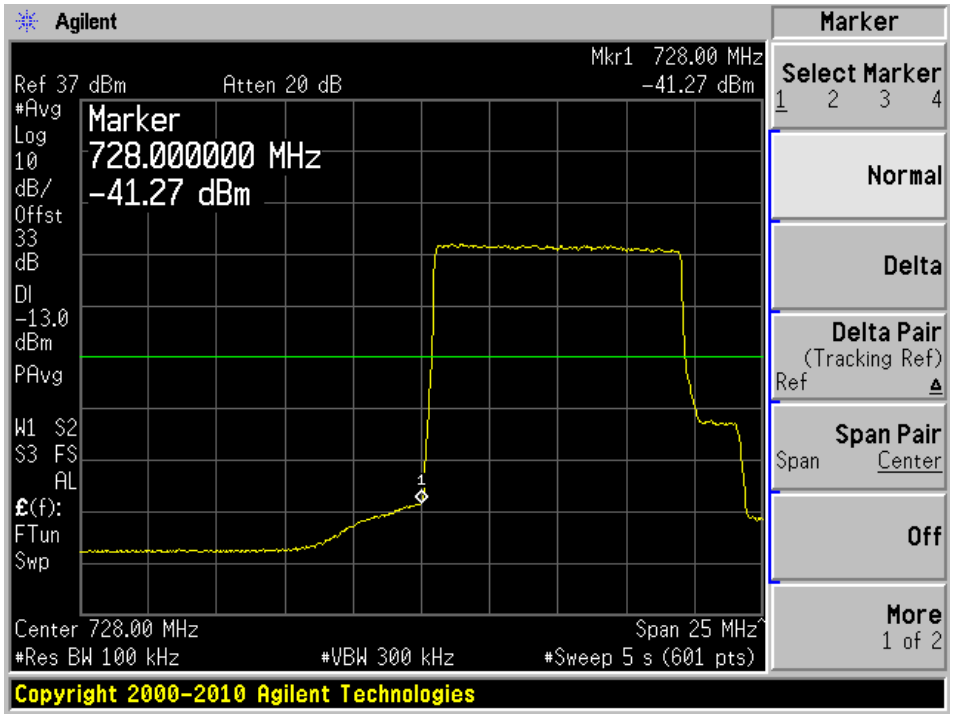


Plot 2: Highest Edge

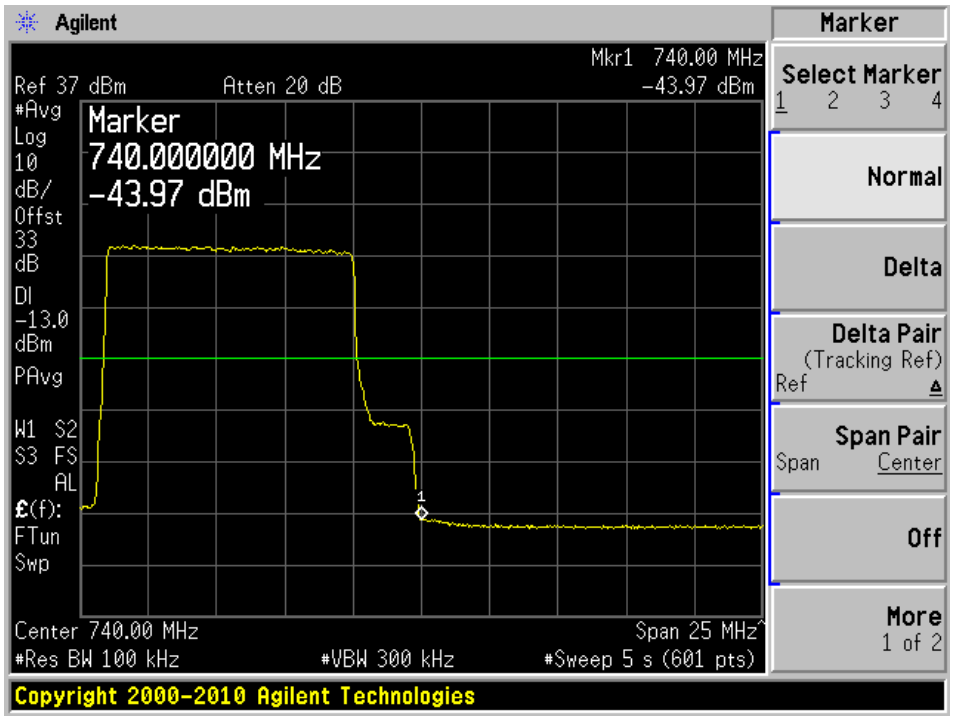


Modulation: LTE-16QAM (10 MHz):

Plot 1: Lowest Edge

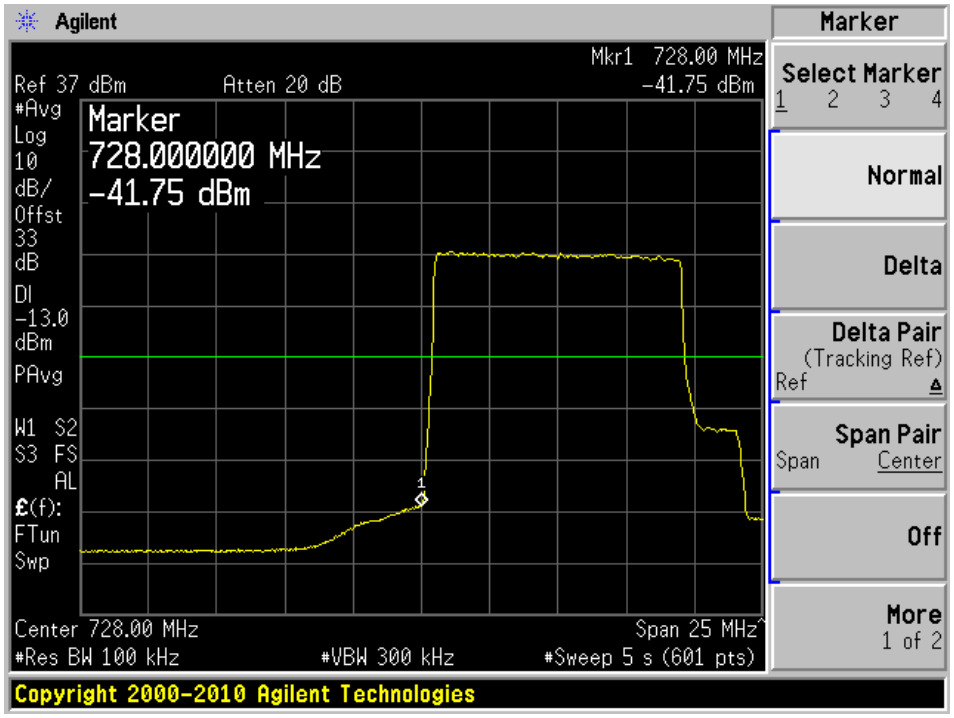


Plot 2: Highest Edge

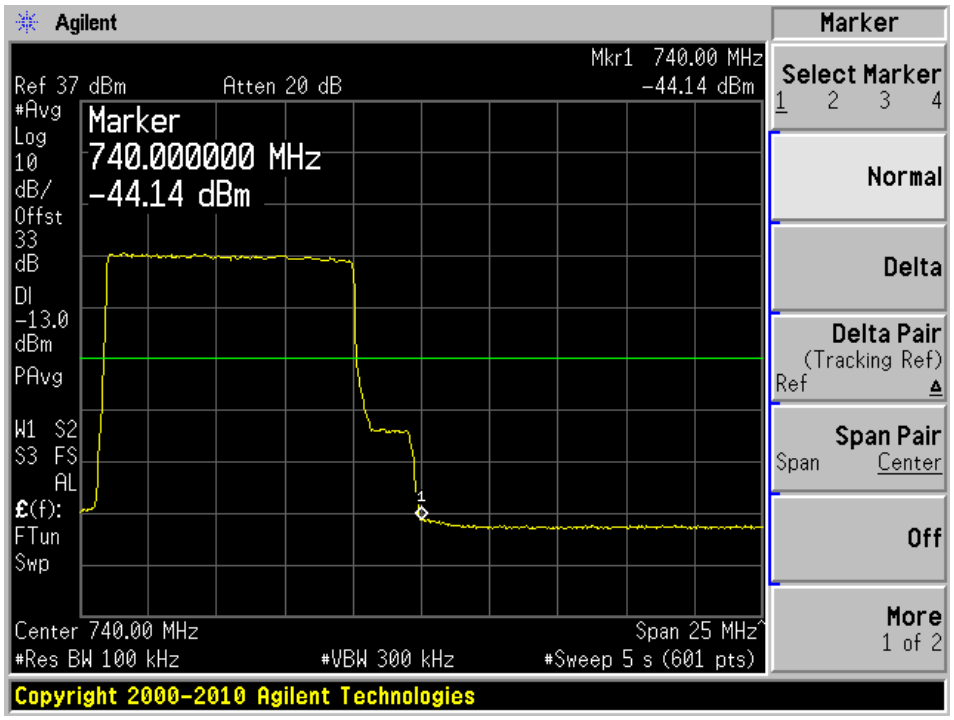


Modulation: LTE-64QAM (10 MHz):

Plot 1: Lowest Edge



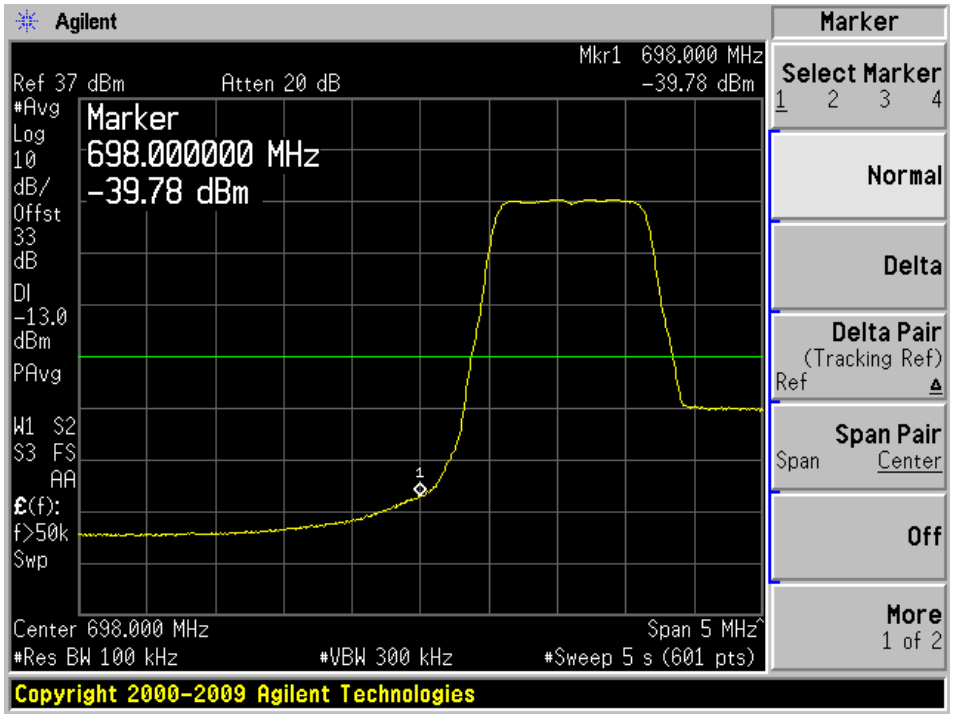
Plot 2: Highest Edge



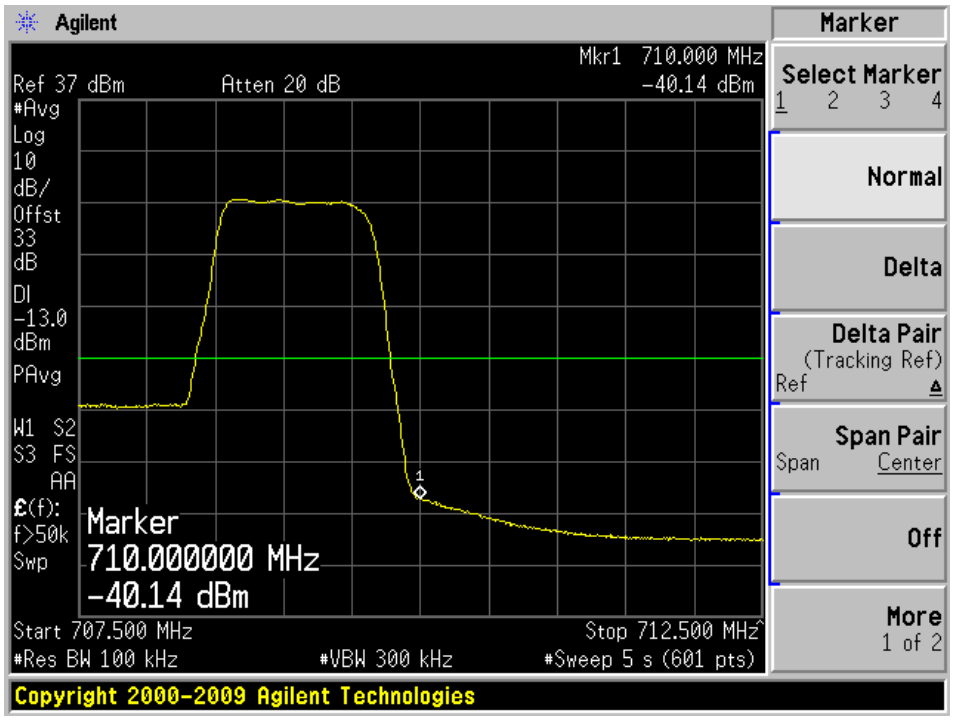
UL: 698-710 MHz

Modulation: LTE-QPSK (1.4 MHz):

Plot 1: Lowest Edge

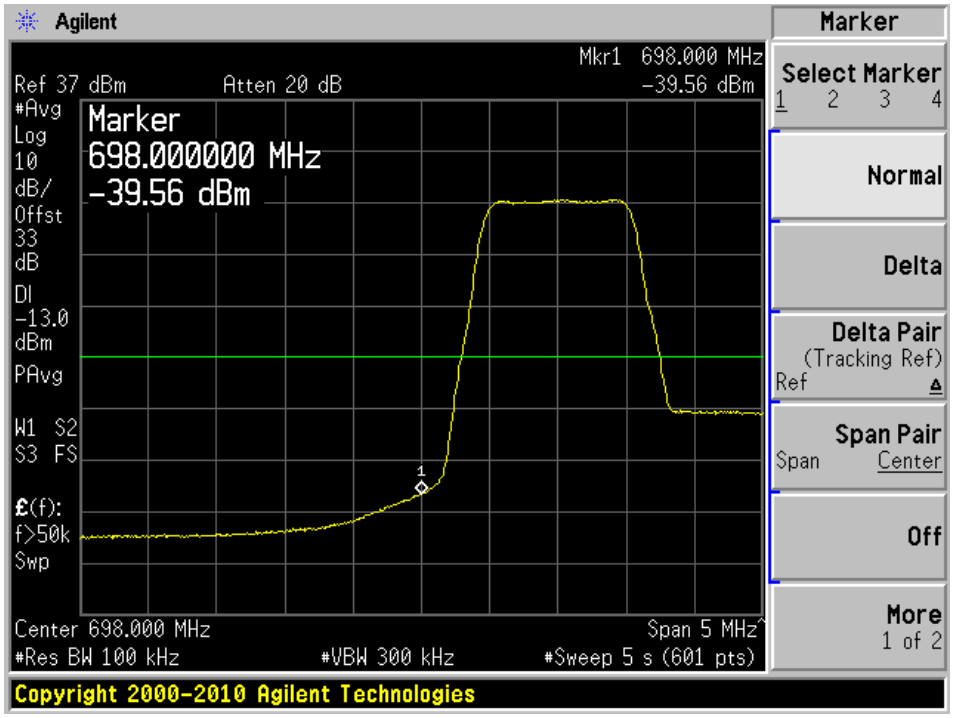


Plot 2: Highest Edge

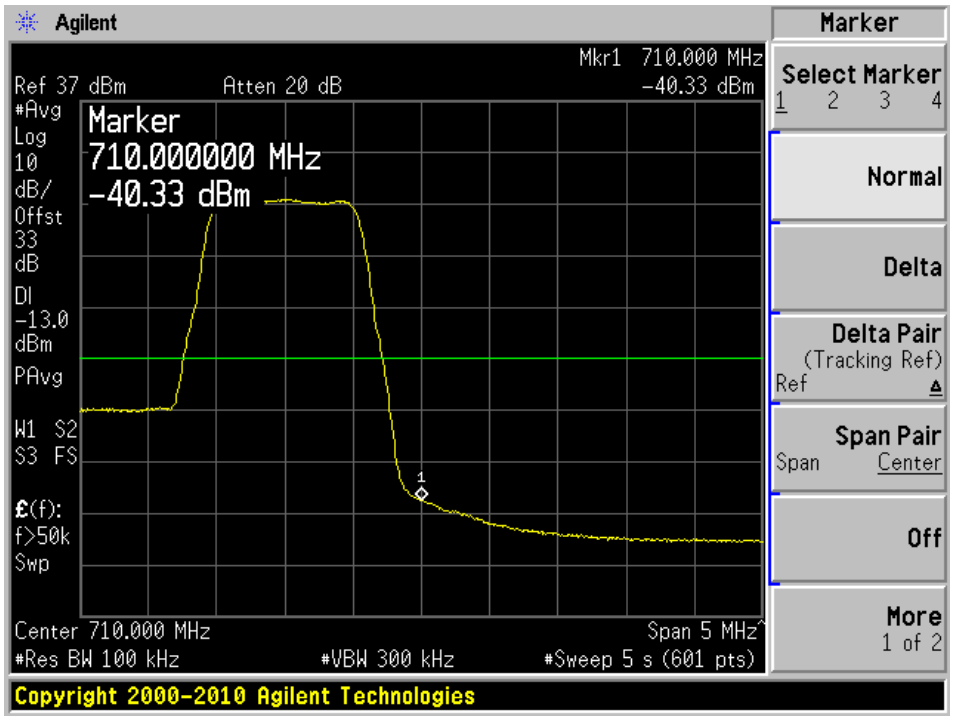


Modulation: LTE-16QAM (1.4 MHz):

Plot 1: Lowest Edge

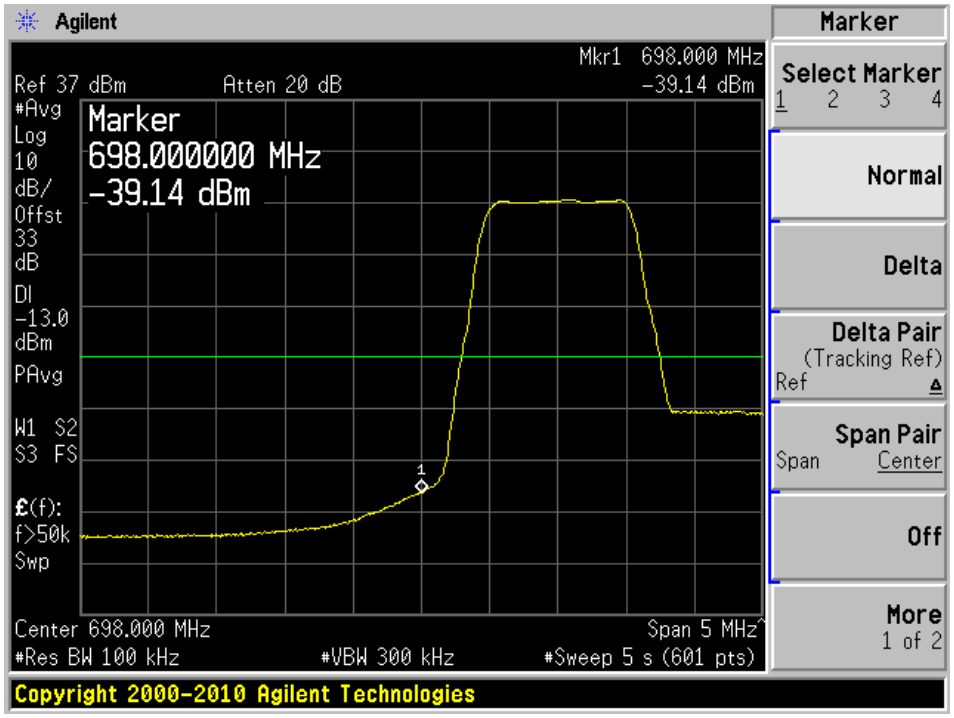


Plot 2: Highest Edge

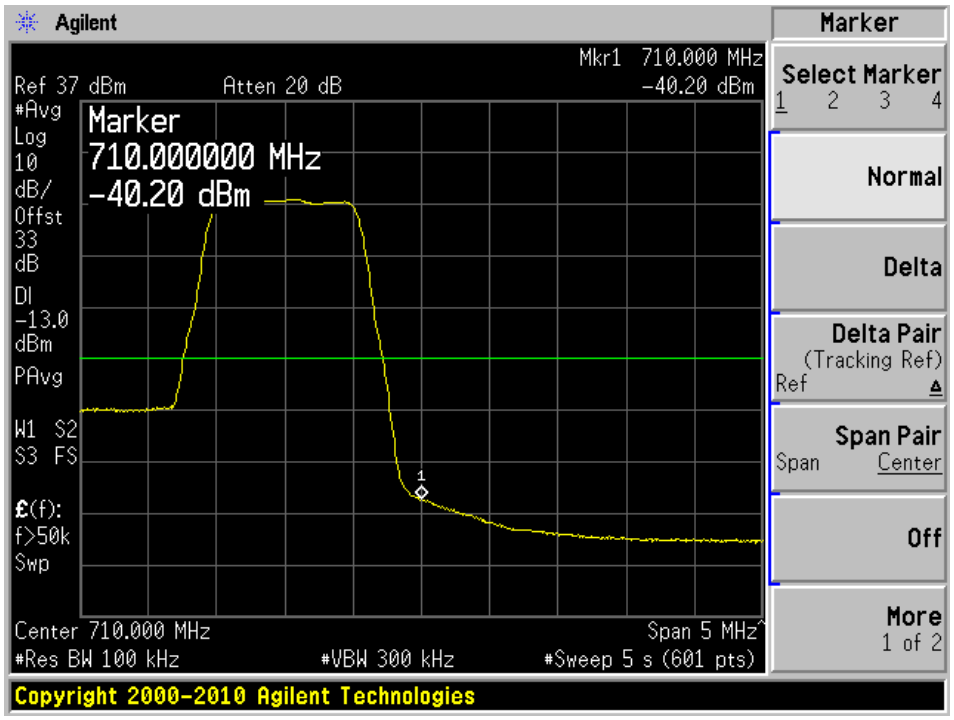


Modulation: LTE-64QAM (1.4 MHz):

Plot 1: Lowest Edge

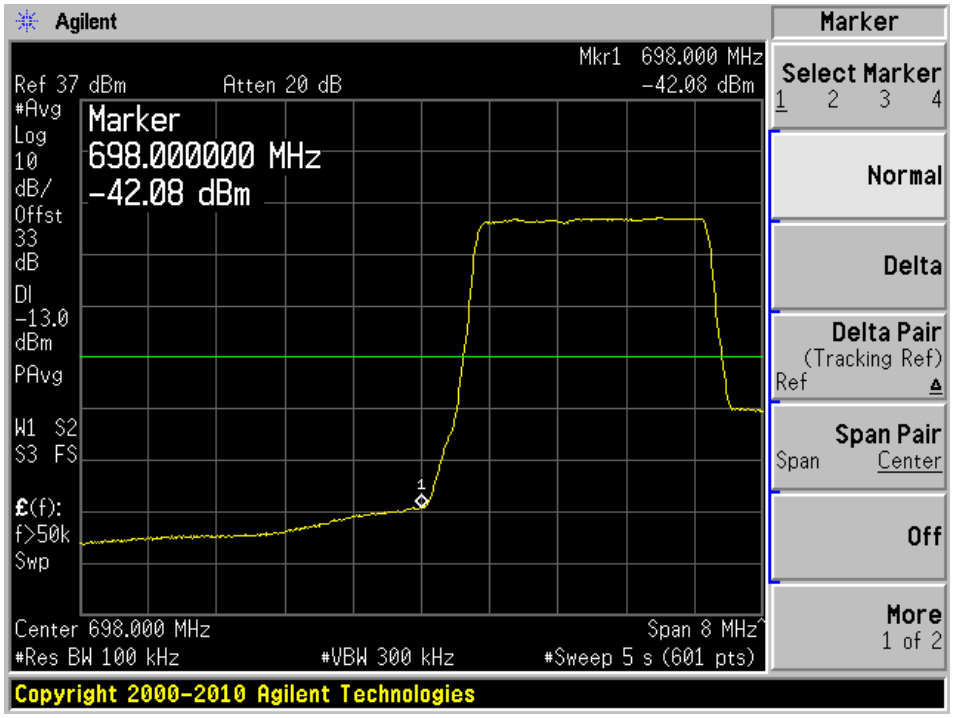


Plot 2: Highest Edge

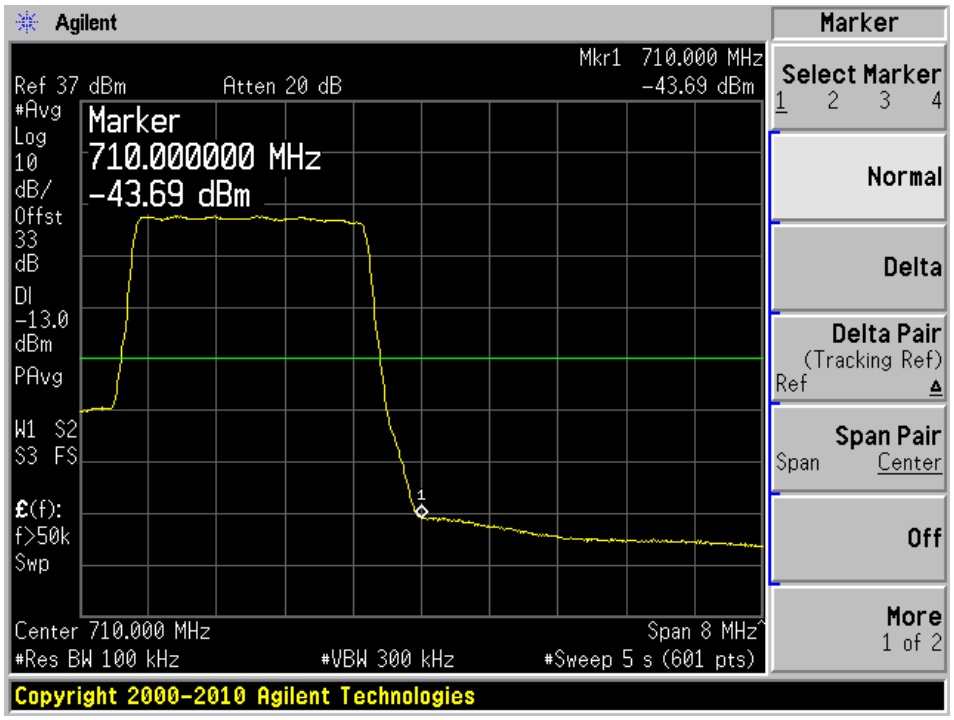


Modulation: LTE-QPSK (3 MHz):

Plot 1: Lowest Edge

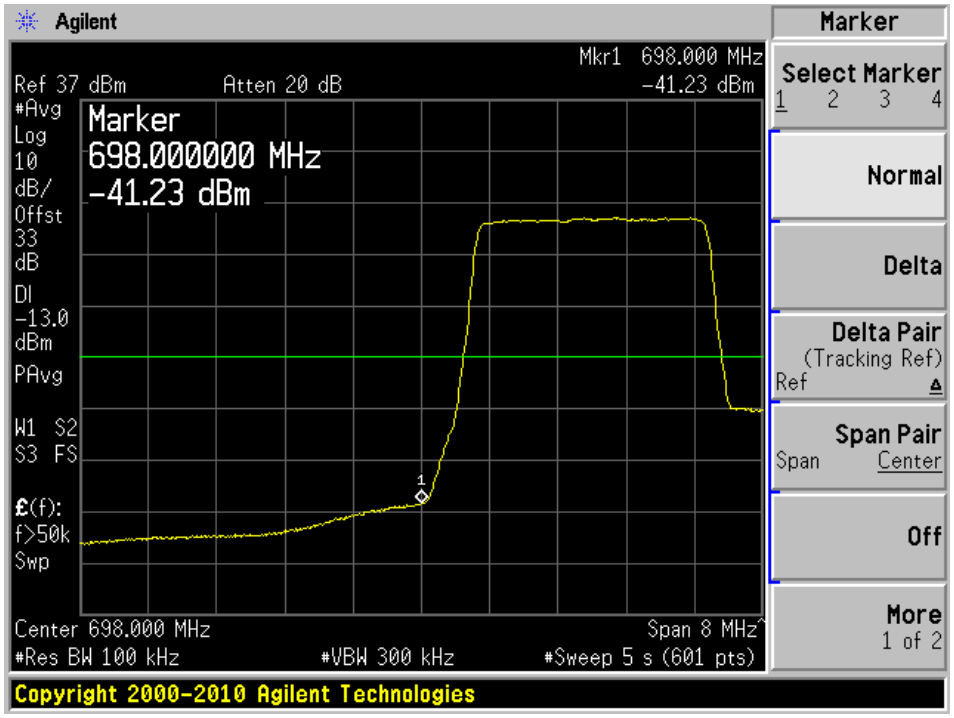


Plot 2: Highest Edge

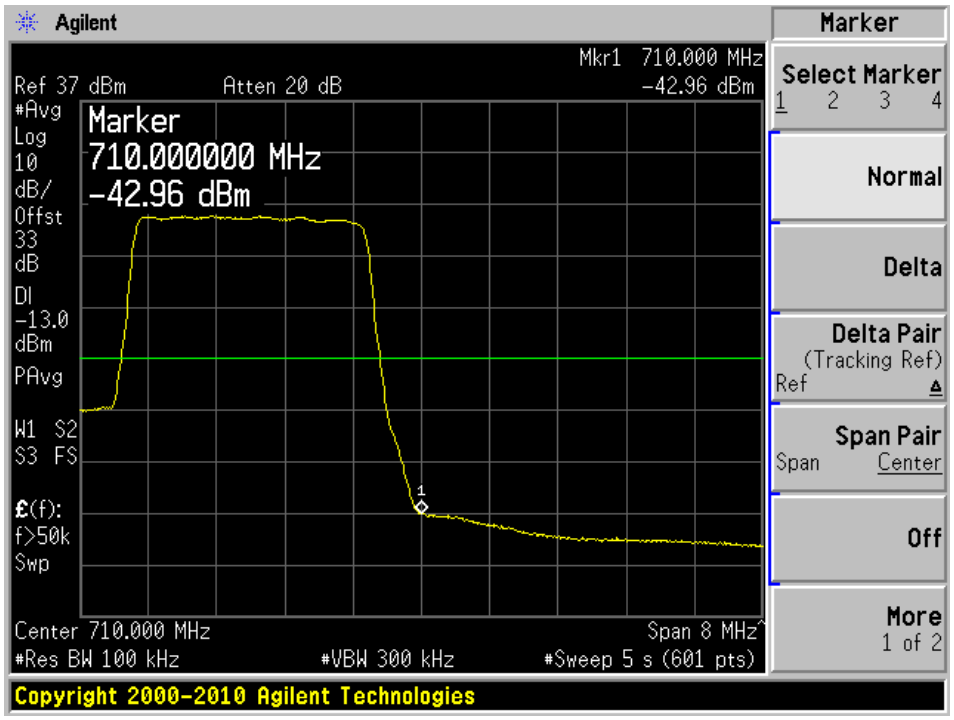


Modulation: LTE-16QAM (3 MHz):

Plot 1: Lowest Edge

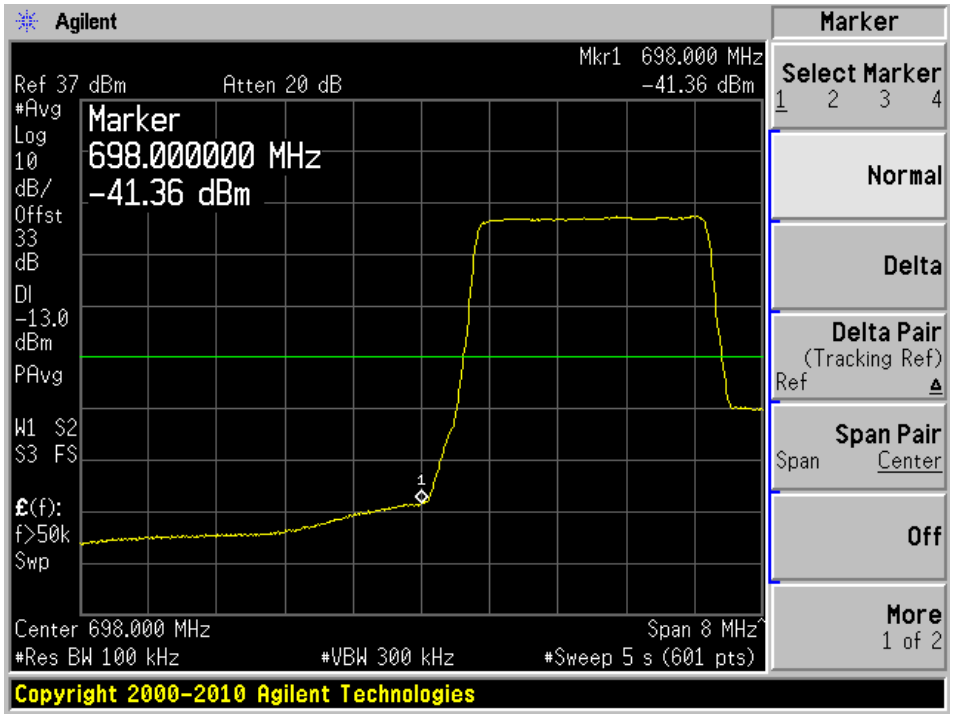


Plot 2: Highest Edge

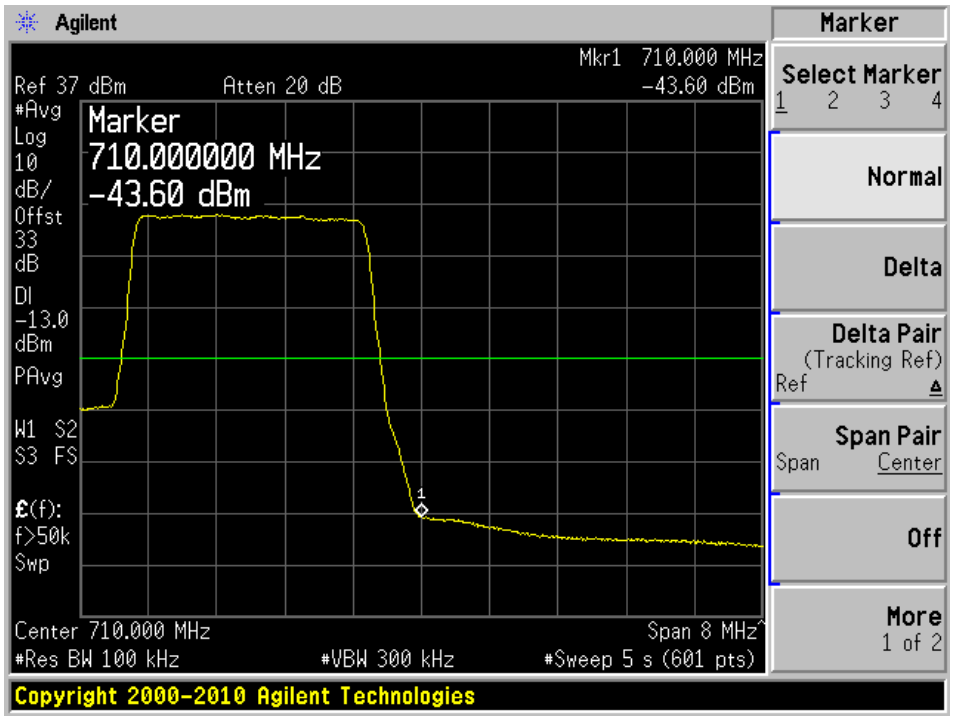


Modulation: LTE-64QAM (3 MHz):

Plot 1: Lowest Edge

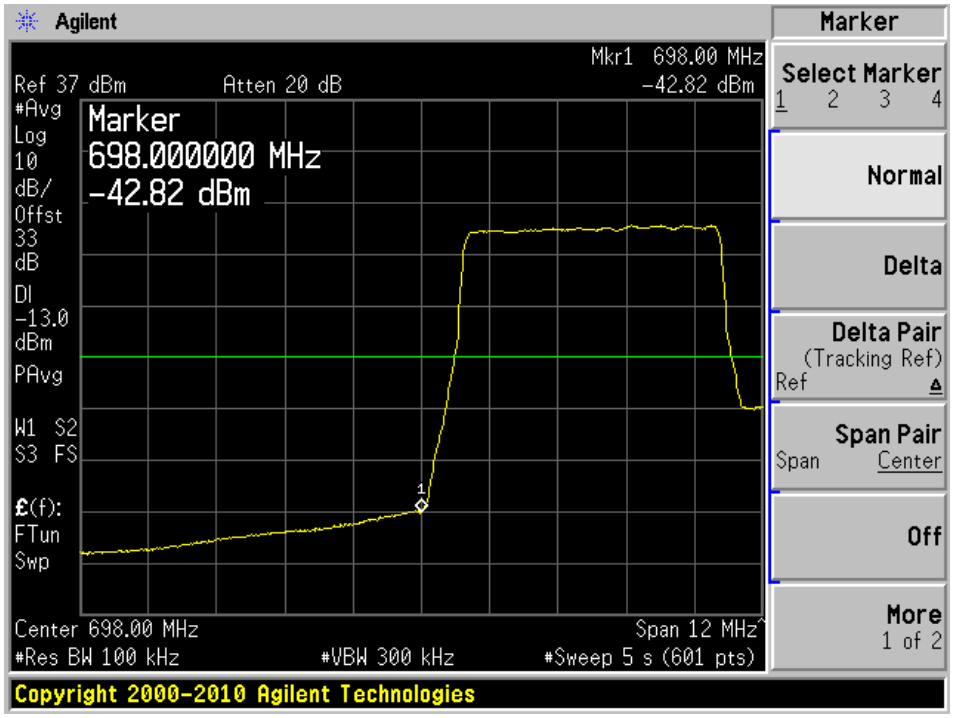


Plot 2: Highest Edge

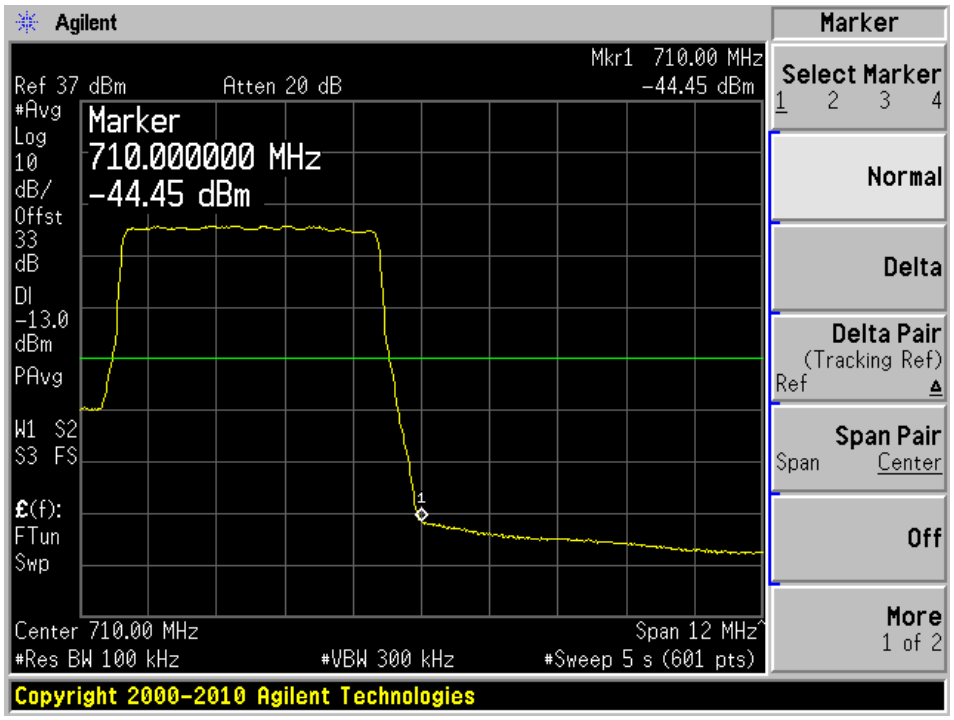


Modulation: LTE-QPSK (5 MHz):

Plot 1: Lowest Edge

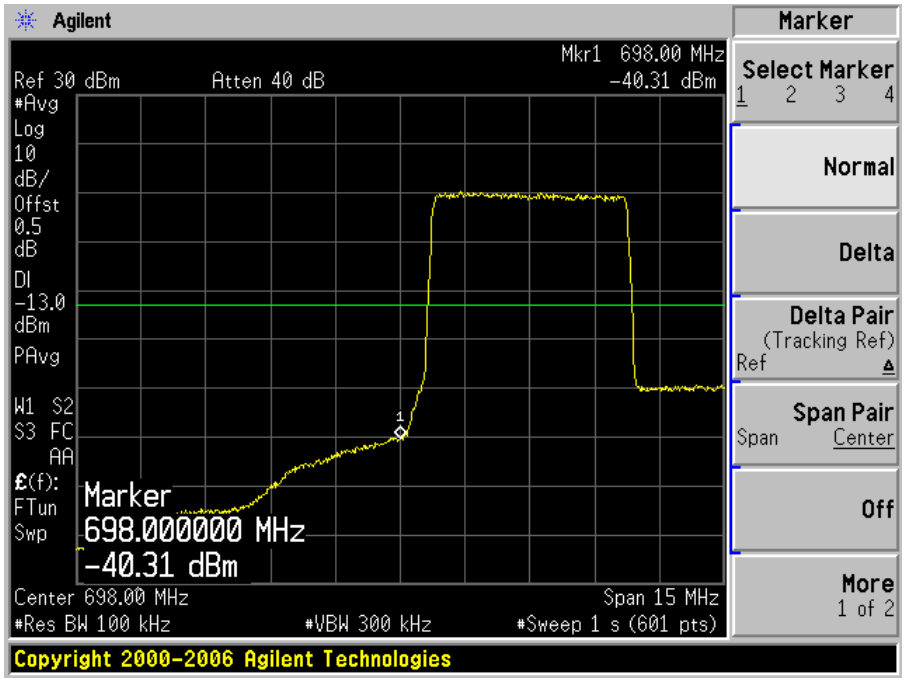


Plot 2: Highest Edge

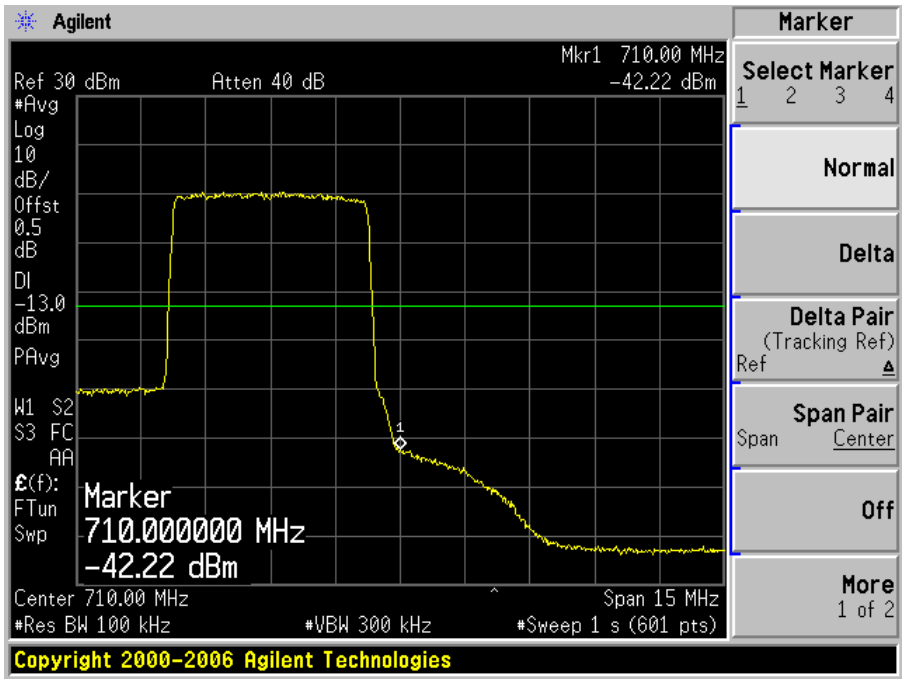


Modulation: LTE-16QAM (5 MHz):

Plot 1: Lowest Edge

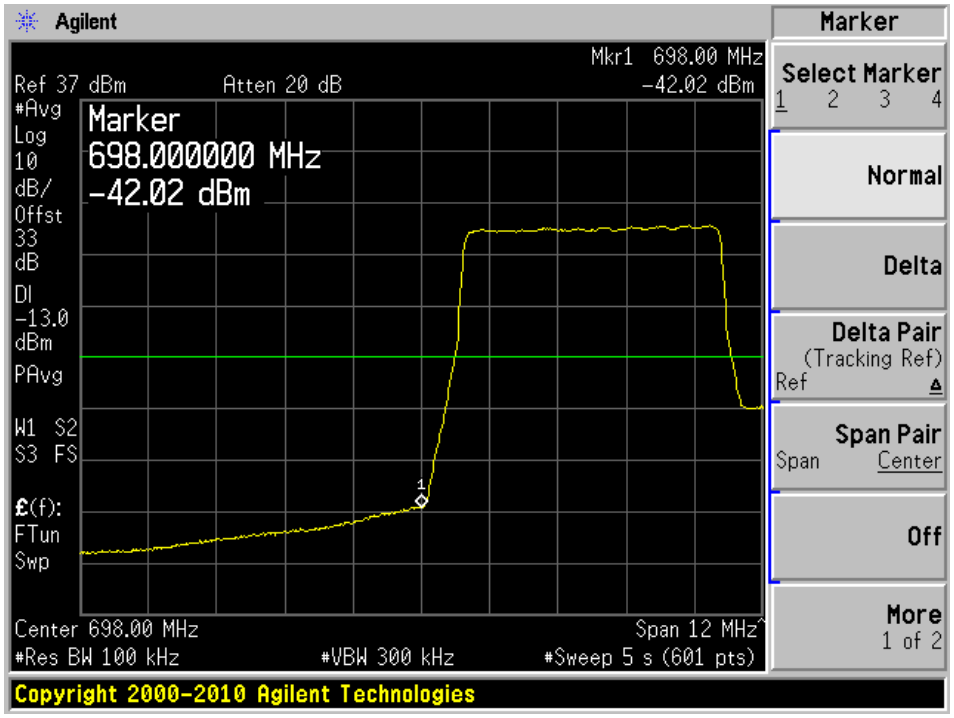


Plot 2: Highest Edge

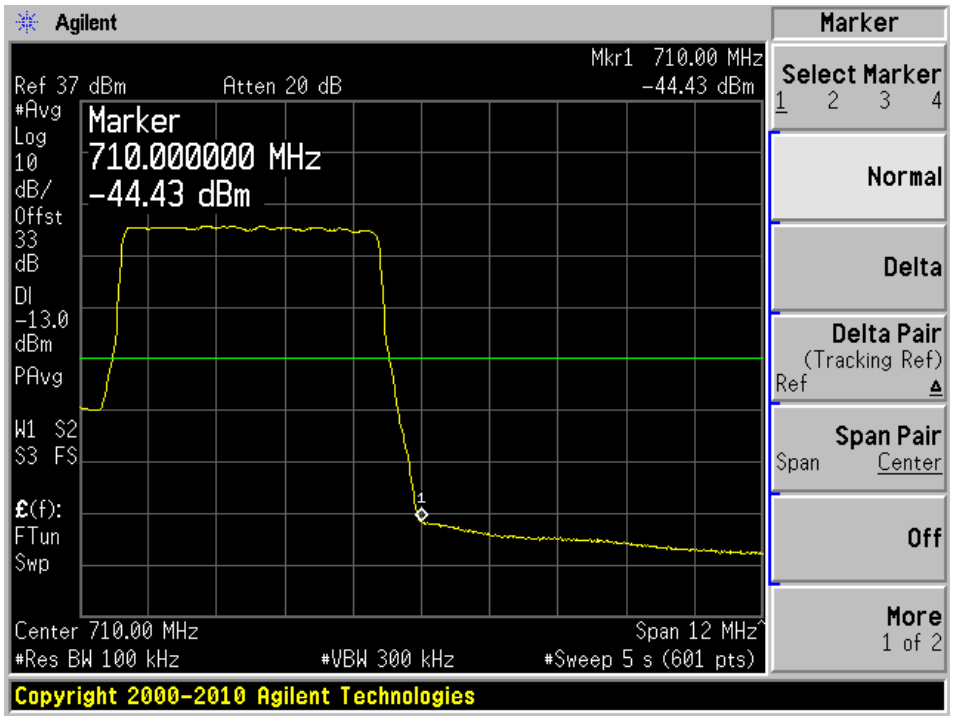


Modulation: LTE-64QAM (5 MHz):

Plot 1: Lowest Edge

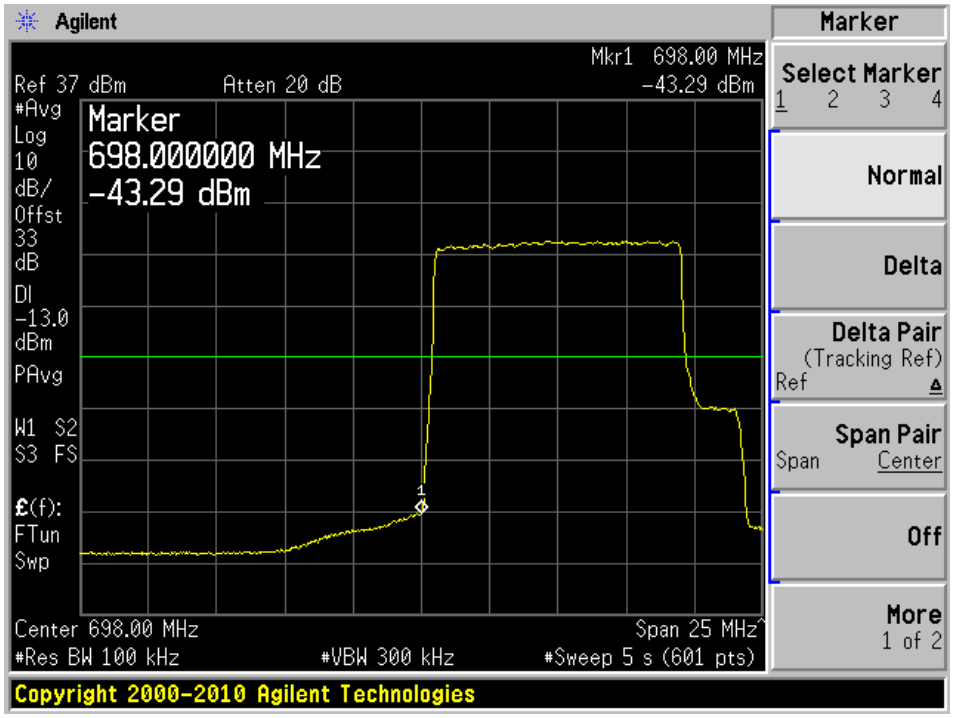


Plot 2: Highest Edge

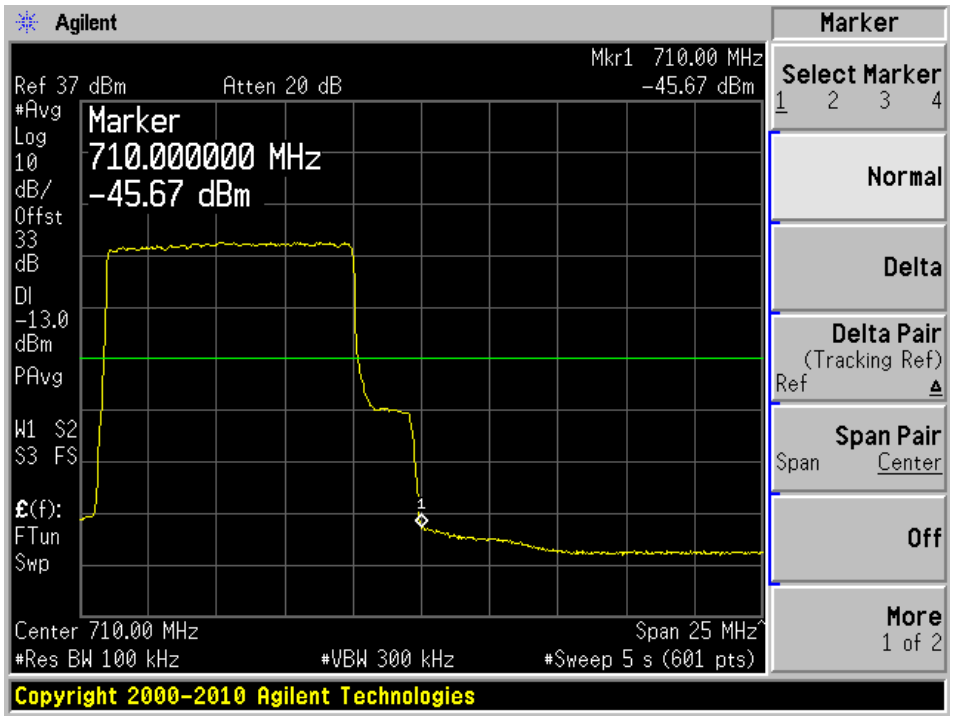


Modulation: LTE-QPSK (10 MHz):

Plot 1: Lowest Edge

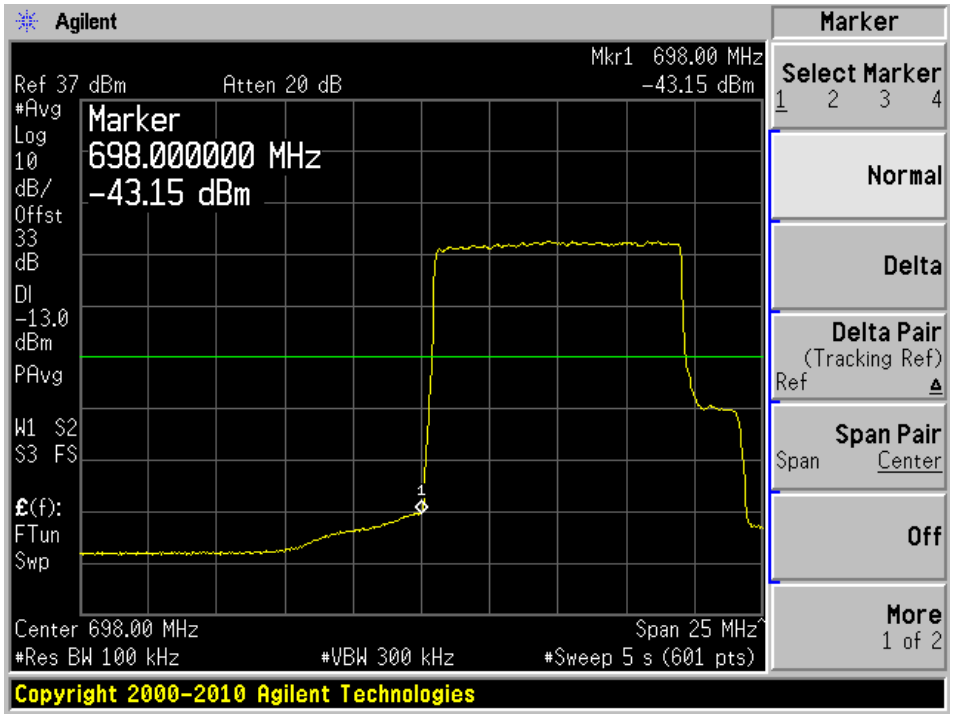


Plot 2: Highest Edge

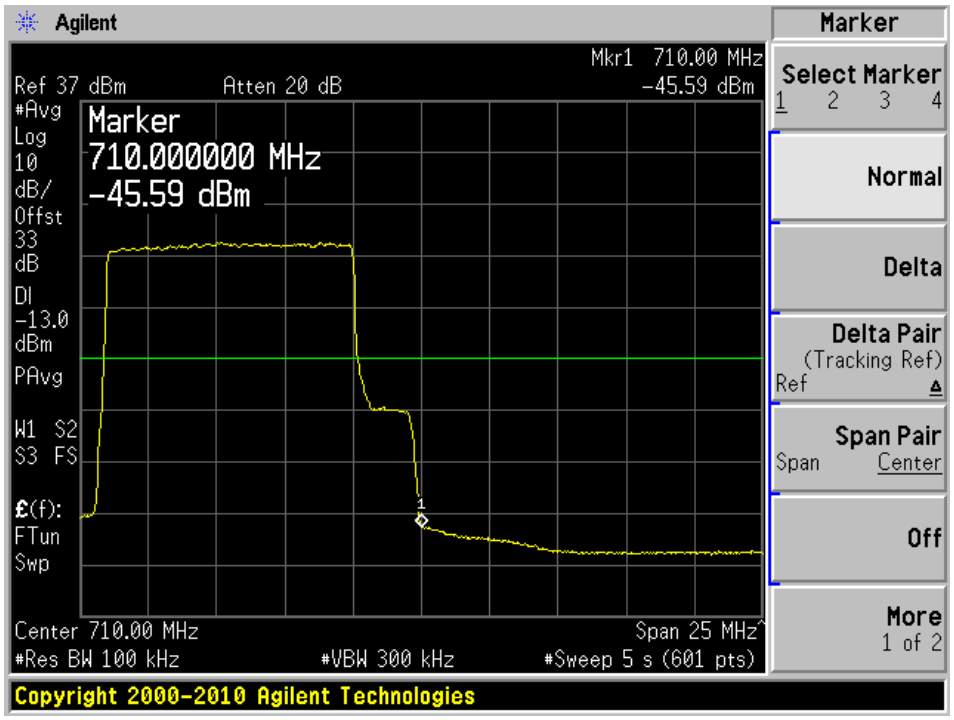


Modulation: LTE-16QAM (10 MHz):

Plot 1: Lowest Edge

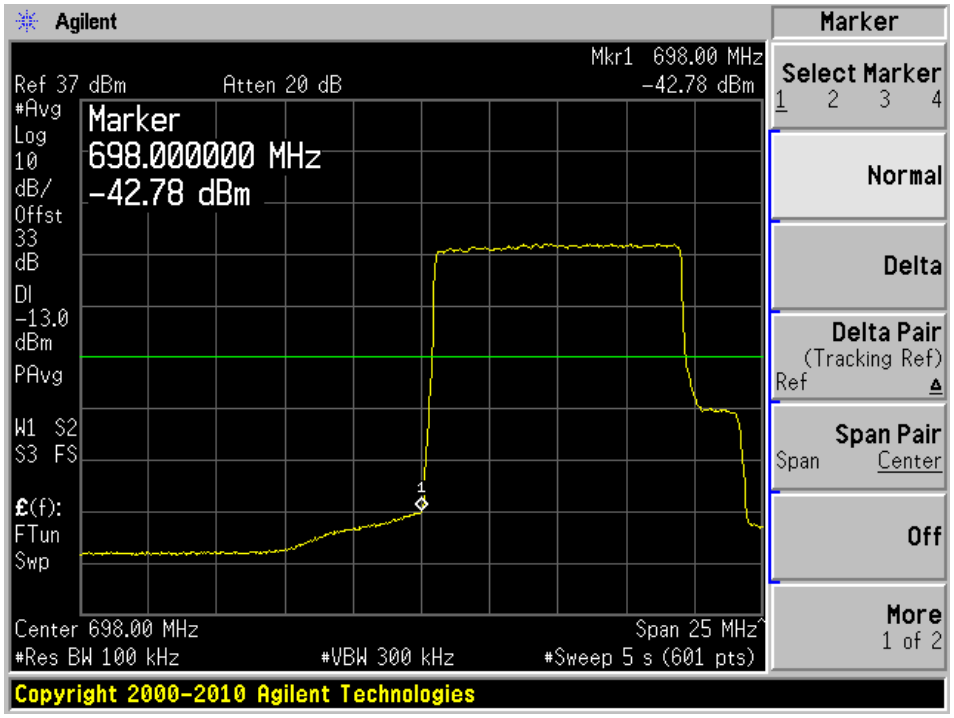


Plot 2: Highest Edge

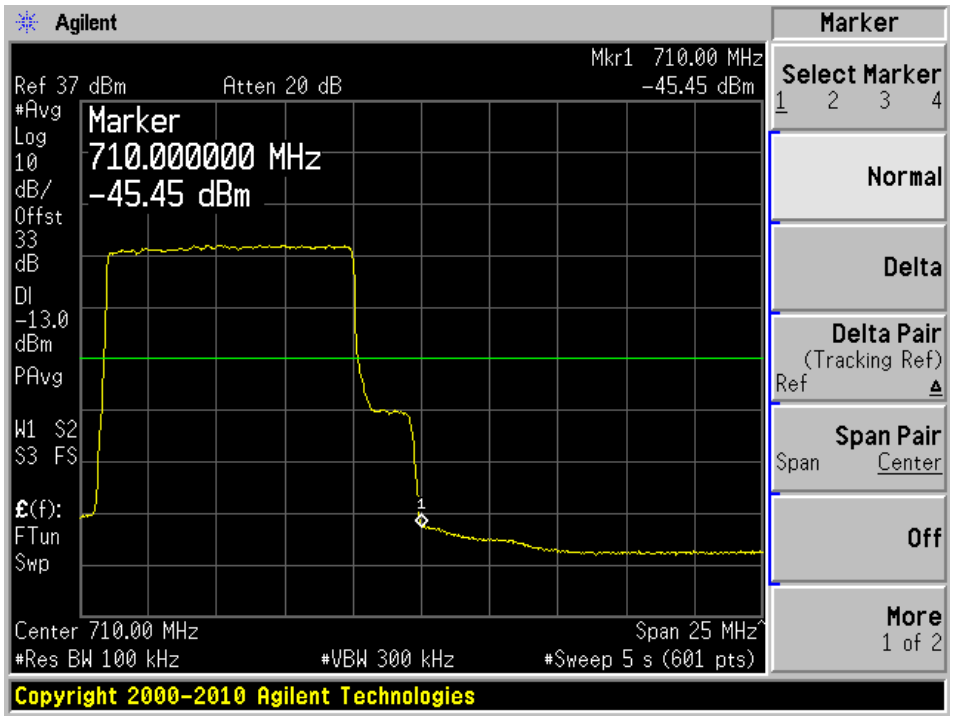


Modulation: LTE-64QAM (10 MHz):

Plot 1: Lowest Edge



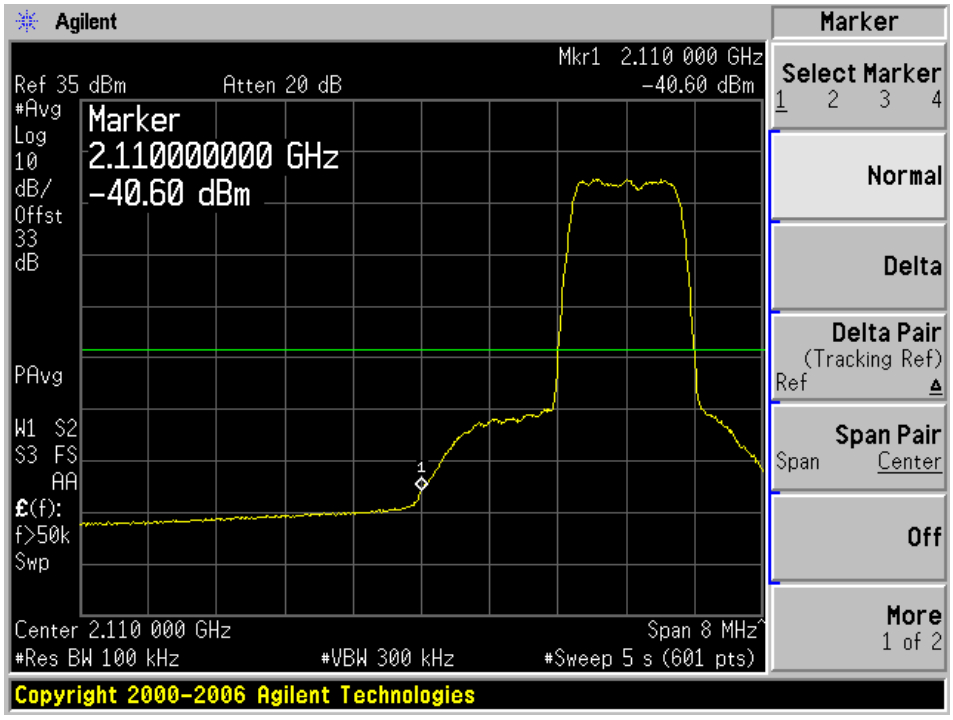
Plot 2: Highest Edge



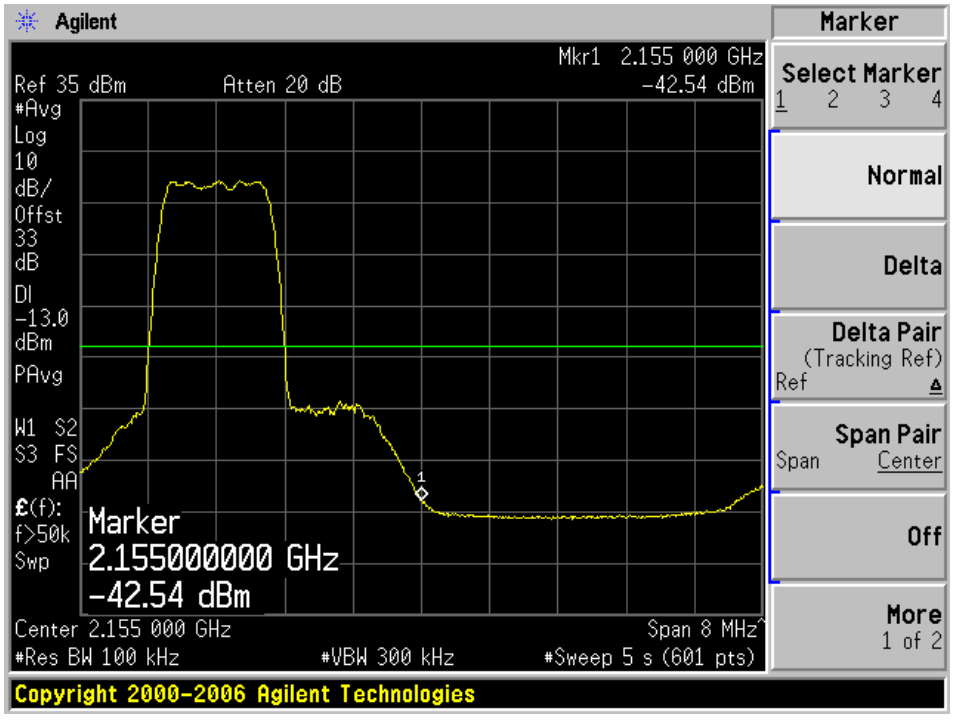
DL: 2110-2155 MHz

Modulation: 1xEVDO

Plot 1: Lowest Edge



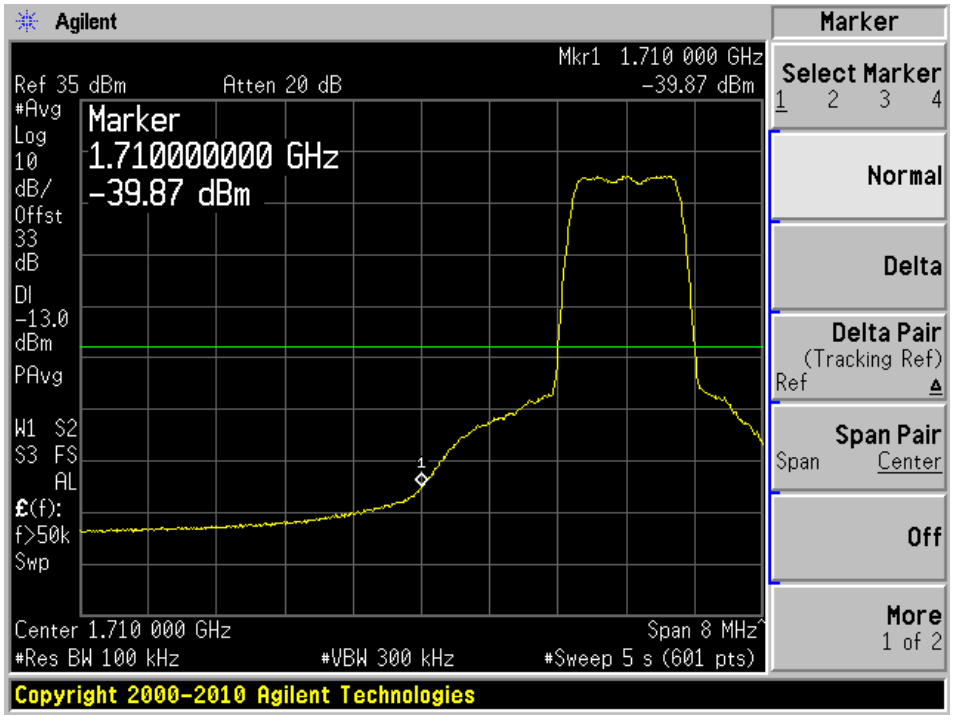
Plot 2: Highest Edge



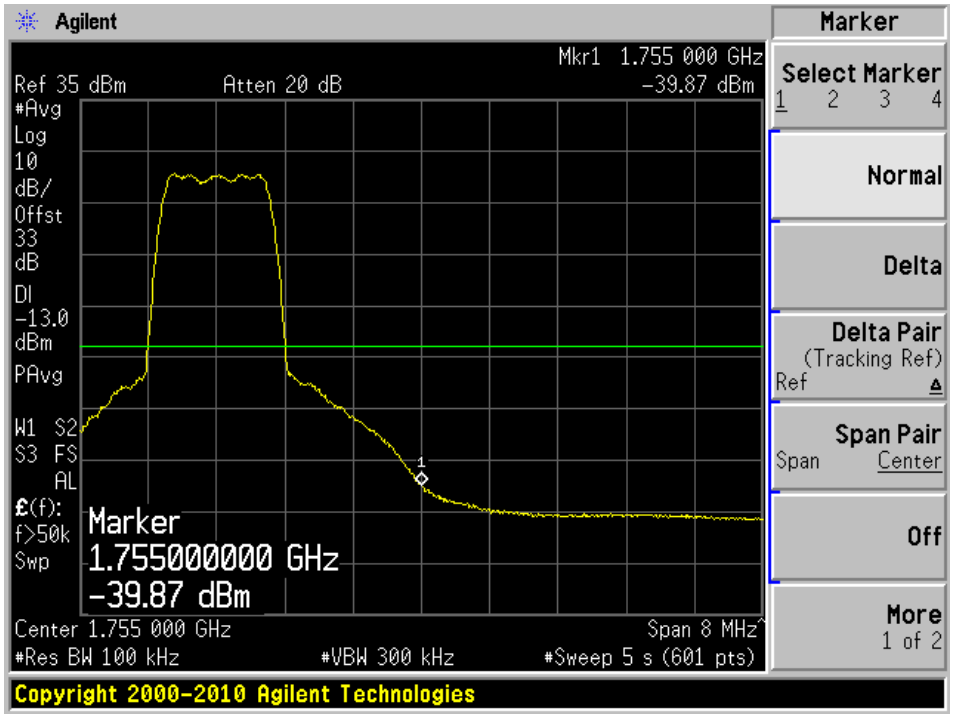
UL: 1710-1755 MHz

Modulation: 1xEVDO

Plot 1: Lowest Edge



Plot 2: Highest Edge



10 FCC §2.1055 & §27.54 – FREQUENCY STABILITY

10.1 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.

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.

10.3 Test Results

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

11 FCC §1.1307(b) & §27.52 & §2.1091 - RF EXPOSURE

11.1 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

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

DL: 746-757 MHz and 728-740 MHz

Maximum peak output power at antenna input terminal (dBm):	25.32
Maximum peak output power at antenna input terminal (mW):	340.4
Prediction distance (cm):	50
Prediction frequency (MHz):	749
Antenna Gain, typical (dBi):	12
Maximum Antenna Gain (numeric):	15.85
Power density at predication frequency and distance (mW/cm^2):	0.171
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.499

UL: 776-787 MHz and 698-710 MHz

Maximum peak output power at antenna input terminal (dBm):	25.35
Maximum peak output power at antenna input terminal (mW):	342.76
Prediction distance (cm):	50
Prediction frequency (MHz):	782
Antenna Gain, typical (dBi):	2
Maximum Antenna Gain (numeric):	1.585
Power density at predication frequency and distance (mW/cm^2):	0.017
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.521

DL: 2110-2155 MHz

Maximum peak output power at antenna input terminal (dBm):	30.15
Maximum peak output power at antenna input terminal (mW):	1035.14
Prediction distance (cm):	50
Prediction frequency (MHz):	2154.6
Antenna Gain, typical (dBi):	12
Maximum Antenna Gain (numeric):	15.85
Power density at predication frequency and distance (mW/cm^2):	0.523
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

UL: 1710-1755 MHz

Maximum peak output power at antenna input terminal (dBm):	30.91
Maximum peak output power at antenna input terminal (mW):	1233.10
Prediction distance (cm):	50
Prediction frequency (MHz):	1754.6
Antenna Gain, typical (dBi):	2
Maximum Antenna Gain (numeric):	1.585
Power density at predication frequency and distance (mW/cm^2):	0.062
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

Test Result

For downlink, the outdoor antenna with 12 dBi gain should have at least 50 cm prediction distance to meet the MPE limit, the highest power density level at 50 cm is 0.523 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm².

For uplink, the indoor antenna with 2 dBi gain should have at least 50 cm prediction distance to meet the MPE limit, the highest power density level at 50 cm is 0.062 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm².