Lab Code: 200167-0

FCC PART 27

TEST AND MEASUREMENT REPORT

For

Cellphone-Mate, Inc.

48820 Kato Road, Suite 300B,

Fremont, CA 94539, USA

FCC ID: RSNCM700A
Model: CM700A

Report Type:	**Product Type:**
Original Report	700 MHz Bi-Direction Amplifier

Test Engineer:	Lionel Lara
Report Number:	R1109014-27
Report Date:	2011-09-21
Reviewed By:	Victor Zhang EMC/RF Lead
Prepared By: (SP)	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1109014-27	Original Report	2011-09-21

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Cellphone-Mate Inc*. and their product, model: *CM700A, FCC ID: RSNCM700A,* which will henceforth be referred to as the EUT (Equipment Under Test). The EUT is a LTE Bi-directional amplifier with N type female antenna connectors that operates in the Lower 700 MHz band. The LTE Band support three modulations: QPSK, 16QAM, 64QAM.

Amplifier Specification

Parameters		Specification
Frequency	Downlink	728-746 MHz
	Uplink	698-716 MHz
Output Power		Maximum, 2 Watt
AC Power		110 V, 60Hz
Power Consumption		15 Watt

1.2 Mechanical Description

The EUT measures 14cm **(L)** x 12cm **(W)** x 3cm **(H)**, and weighs approximately 802.5 g.

The test data gathered are from production sample, sample number: CM110815-Z0046 provided by the manufacturer.

1.3 Objective

This type approval report is prepared on behalf of *Cellphone-Mate, Inc*. in accordance with Part 2, Subpart J, and Part 27 of the Federal Communication Commissions rules.

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

1.4 Related Submittal(s)/Grant(s)

N/A

1.5 Test Methodology

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

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

All radiated and conducted 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

N/A, signal was sent through EUT using a signal generator, device was set to normal operating mode.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Local Support Equipment and Software List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Signal Generator	SMIQ03	DE23746
Dell	Laptop	PP05L	37140867901
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309
Agilent	Signal Studio for 3GPP LTE	N7624B	-

2.5 Internal Configurations of EUT

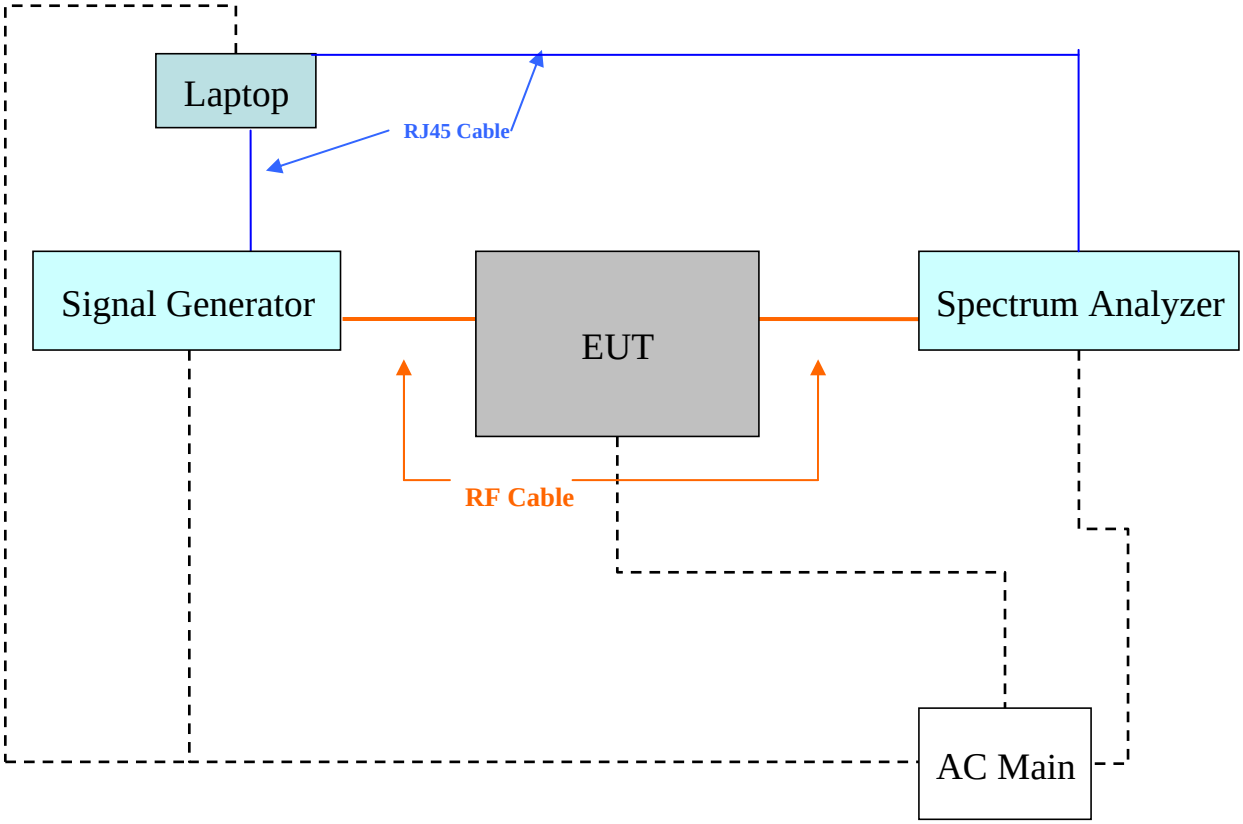
Manufacturer	Description	Model	Serial Number
Cellphone-Mate Inc	Main PCB Board	CM700A	-

2.6 Interface Ports and Cables

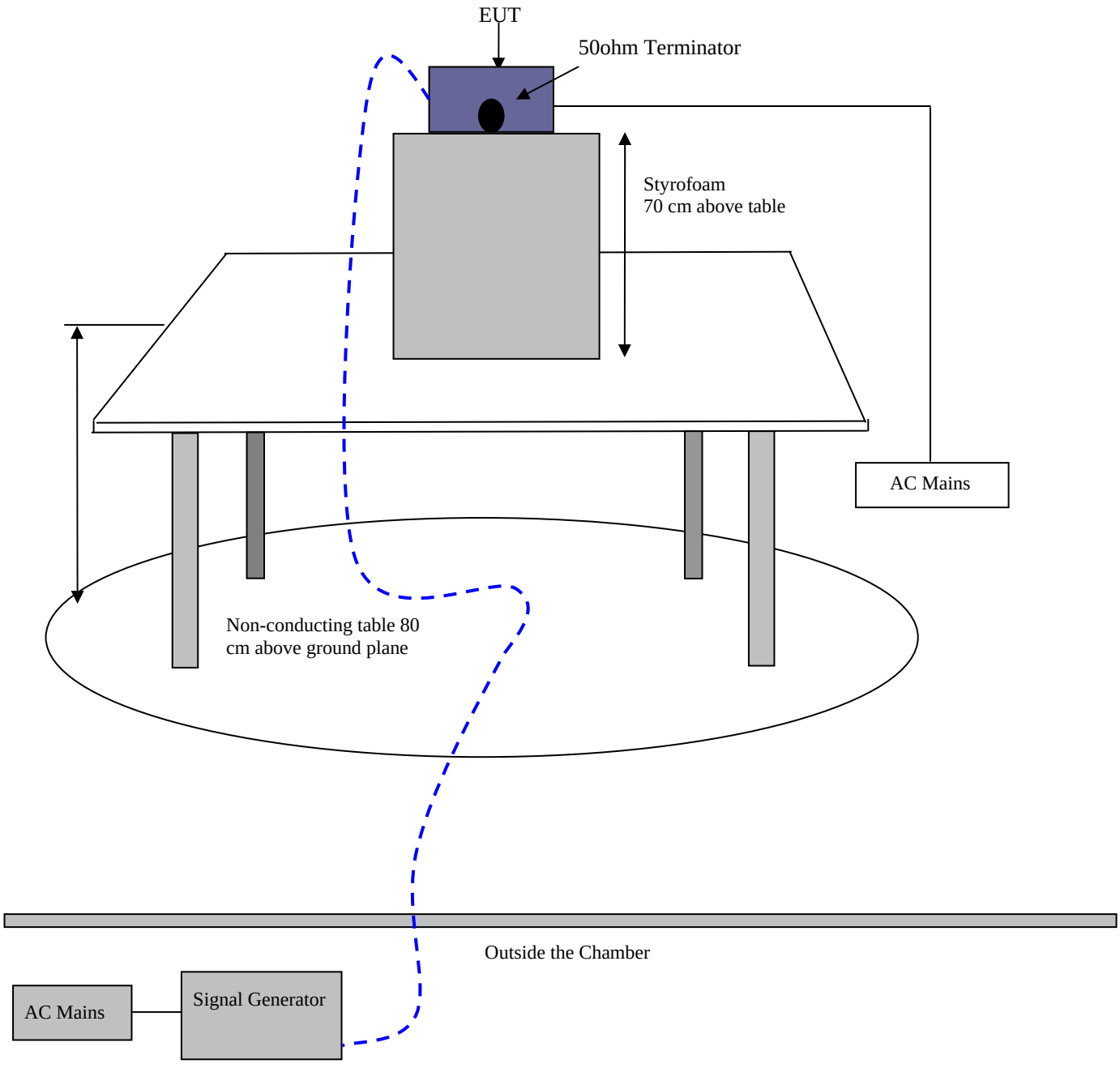
Cable Description	Length (m)	To	From
RF Cable	< 1	EUT	Spectrum Analyzer
RF Cable	< 1	EUT	Signal Generator

2.7 Test Setup Block Diagram

Conducted Emissions



Radiated Emissions



3 SUMMARY OF TEST RESULTS

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

N/A*: Not applicable.
Note[1]: EUT is an amplifier; frequency stability testing is not required.

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 Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11

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

4.4 Test Environmental Conditions

Temperature:	20-25°C
Relative Humidity:	42-46 %
ATM Pressure:	101-102 kPa

The testing was performed by Lionel Lara from 2011-09-12 to 2011-09-16 at RF Site.

4.5 Test Results

Maximum Output Power (LTE) – Downlink

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Downlink 728-746 MHz	QPSK (1.4 MHz)	729	-59.50	6.25
	QPSK (1.4 MHz)	737	-63.00	5.49
	QPSK (1.4 MHz)	745	-60.50	7.14
	16QAM (1.4 MHz)	729	-59.50	6.32
	16QAM (1.4 MHz)	737	-63.00	5.50
	16QAM (1.4 MHz)	745	-61.00	6.72
	64QAM (1.4 MHz)	729	-59.20	6.56
	64QAM (1.4 MHz)	737	-63.00	5.50
	64QAM (1.4 MHz)	745	-60.30	7.26
	QPSK (3 MHz)	730	-61.20	5.99
	QPSK (3 MHz)	737	-64.00	4.69
	QPSK (3 MHz)	744	-63.00	5.69
	16QAM (3 MHz)	730	-61.00	6.15
	16QAM (3 MHz)	737	-64.00	4.70
	16QAM (3 MHz)	744	-64.00	4.82
	64QAM (3 MHz)	730	-61.00	6.15
	64QAM (3 MHz)	737	-64.00	4.69
	64QAM (3 MHz)	744	-64.20	4.63
	QPSK (5 MHz)	731	-60.20	7.05
	QPSK (5 MHz)	737	-61.40	6.93
	QPSK (5 MHz)	743	-61.60	7.13
	16QAM (5 MHz)	731	-60.30	6.97
	16QAM (5 MHz)	737	-61.50	6.85
	16QAM (5 MHz)	743	-61.60	7.12
	64QAM (5 MHz)	731	-60.20	7.05
	64QAM (5 MHz)	737	-61.30	7.00
	64QAM (5 MHz)	743	-61.40	7.27
	QPSK (10 MHz)	733	-60.40	7.13
	QPSK (10 MHz)	741	-63.40	5.67
	16QAM (10 MHz)	733	-60.30	7.21
	16QAM (10 MHz)	741	-63.00	6.00
	64QAM (10 MHz)	733	-60.20	7.28
	64QAM (10 MHz)	741	-63.00	6.00

Maximum Output Power (LTE) – Uplink

Mode	Modulation	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Uplink 698-716 MHz	QPSK (1.4 MHz)	699	-41.00	23.20
	QPSK (1.4 MHz)	709	-45.00	21.26
	QPSK (1.4 MHz)	715	-40.00	21.64
	16QAM (1.4 MHz)	699	-41.00	23.05
	16QAM (1.4 MHz)	709	-45.40	20.81
	16QAM (1.4 MHz)	715	-39.70	21.77
	64QAM (1.4 MHz)	699	-41.30	22.83
	64QAM (1.4 MHz)	709	-45.70	20.56
	64QAM (1.4 MHz)	715	-40.20	21.36
	QPSK (3 MHz)	700	-42.80	22.75
	QPSK (3 MHz)	709	-46.00	20.52
	QPSK (3 MHz)	714	-41.00	21.96
	16QAM (3 MHz)	700	-43.00	22.55
	16QAM (3 MHz)	709	-46.60	20.04
	16QAM (3 MHz)	714	-41.00	21.98
	64QAM (3 MHz)	700	-43.00	22.51
	64QAM (3 MHz)	709	-46.50	20.09
	64QAM (3 MHz)	714	-41.50	21.52
	QPSK (5 MHz)	701	-41.70	24.29
	QPSK (5 MHz)	709	-44.30	21.98
	QPSK (5 MHz)	713	-40.70	23.04
	16QAM (5 MHz)	701	-42.10	23.81
	16QAM (5 MHz)	709	-44.60	21.61
	16QAM (5 MHz)	713	-41.10	22.62
	64QAM (5 MHz)	701	-42.50	23.47
	64QAM (5 MHz)	709	-45.00	21.29
	64QAM (5 MHz)	713	-41.50	22.31
	QPSK (10 MHz)	703	-42.90	23.52
	QPSK (10 MHz)	711	-42.70	22.42
	16QAM (10 MHz)	703	-43.20	23.15
	16QAM (10 MHz)	711	-43.20	21.92
	64QAM (10 MHz)	703	-43.40	22.97
	64QAM (10 MHz)	711	-43.30	21.77

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 Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11

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

6.4 Test Environmental Conditions

Temperature:	20-25°C
Relative Humidity:	42-46 %
ATM Pressure:	101-102 kPa

The testing was performed by Lionel Lara from 2011-09-12 to 2011-09-16 at RF Site.

6.5 Test Results

Occupied Bandwidth (LTE) – Downlink

Mode	Modulation	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Downlink 728-746 MHz	QPSK (1.4 MHz)	737	1.1727	1.1662
	16QAM (1.4 MHz)	737	1.1723	1.1664
	64QAM (1.4 MHz)	737	1.1727	1.1663
	QPSK (3 MHz)	737	2.7320	2.7308
	16QAM (3 MHz)	737	2.7335	2.7332
	64QAM (3 MHz)	737	2.7310	2.7317
	QPSK (5 MHz)	737	4.5007	4.4992
	16QAM (5 MHz)	737	4.5047	4.5012
	64QAM (5 MHz)	737	4.5029	4.5003
	QPSK (10 MHz)	733	8.9338	8.9057
	16QAM (10 MHz)	733	8.9375	8.9034
	64QAM (10 MHz)	733	8.9362	8.9055

Occupied Bandwidth (LTE) – Uplink

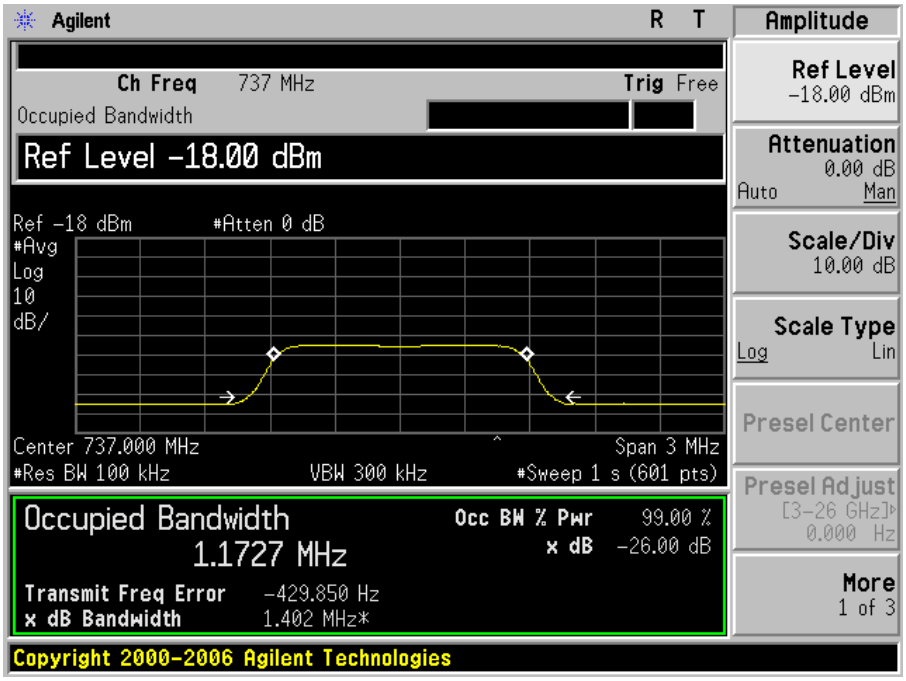
Mode	Modulation	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
Uplink 698-716 MHz	QPSK (1.4 MHz)	709	1.1500	1.1542
	16QAM (1.4 MHz)	709	1.1486	1.1537
	64QAM (1.4 MHz)	709	1.1505	1.1536
	QPSK (3 MHz)	709	2.7211	2.7190
	16QAM (3 MHz)	709	2.7196	2.7208
	64QAM (3 MHz)	709	2.7153	2.7161
	QPSK (5 MHz)	709	4.4749	4.4797
	16QAM (5 MHz)	709	4.4799	4.4864
	64QAM (5 MHz)	709	4.4794	4.4805
	QPSK (10 MHz)	703	8.9068	8.8668
	16QAM (10 MHz)	703	8.9130	8.8735
	64QAM (10 MHz)	703	8.9170	8.8784

Please refer to the following plots.

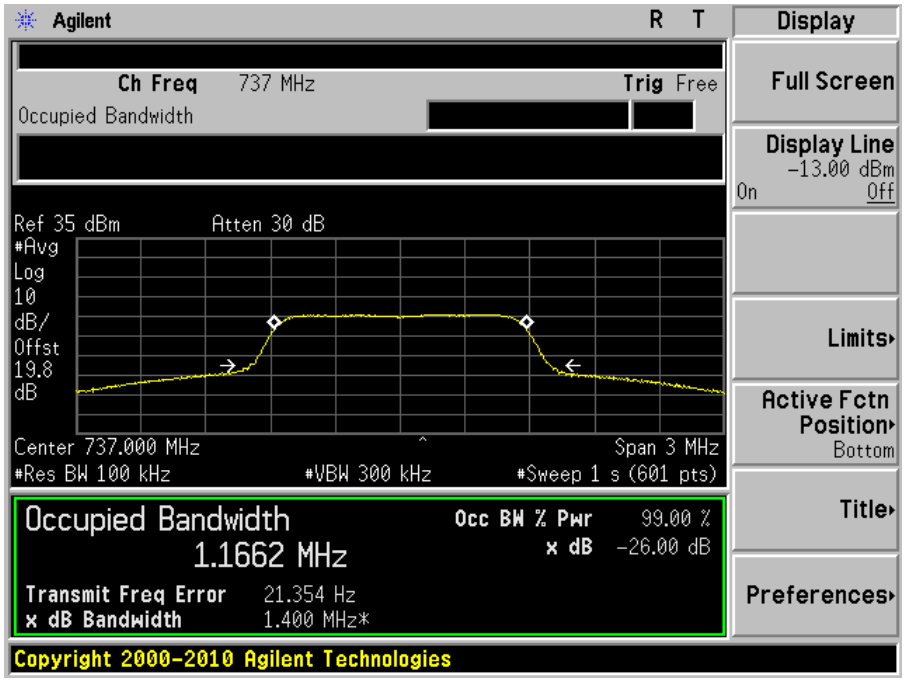
DL: 728-746 MHz

LTE-QPSK (1.4 MHz), Frequency: 737 MHz

Input

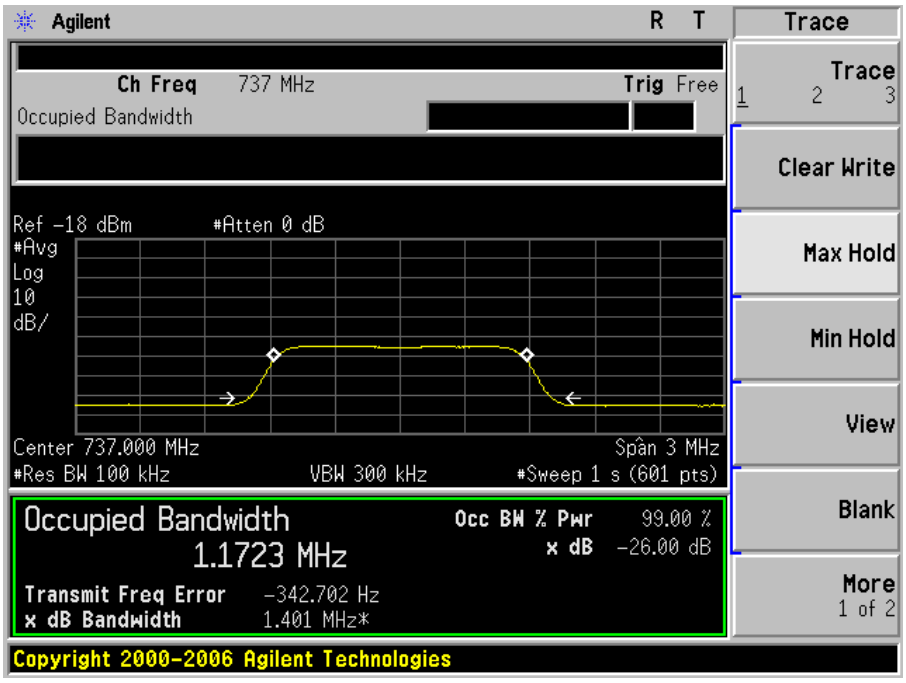


Output

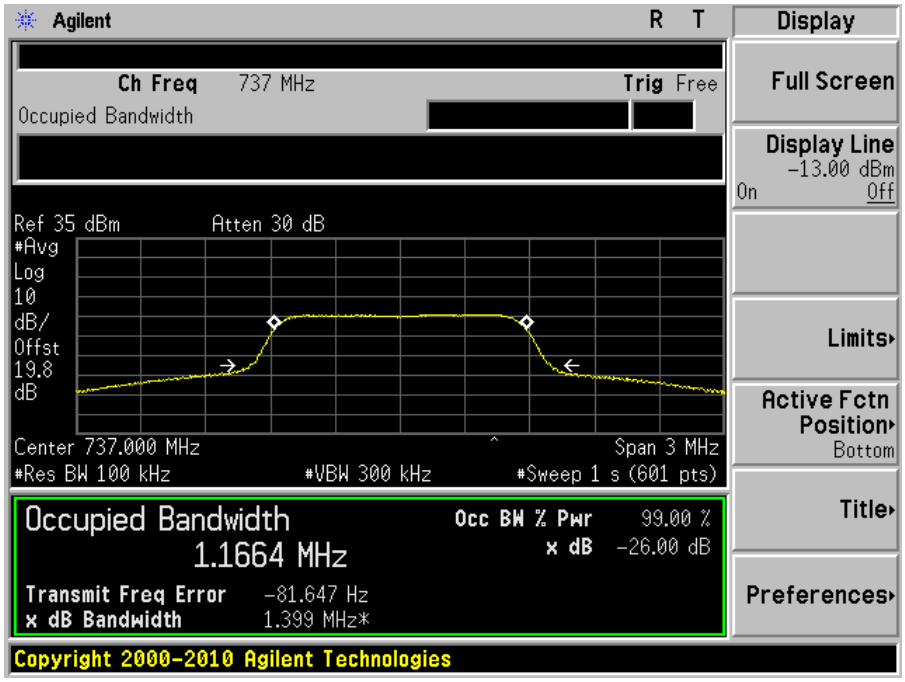


LTE-16QAM (1.4 MHz), Frequency: 737 MHz

Input

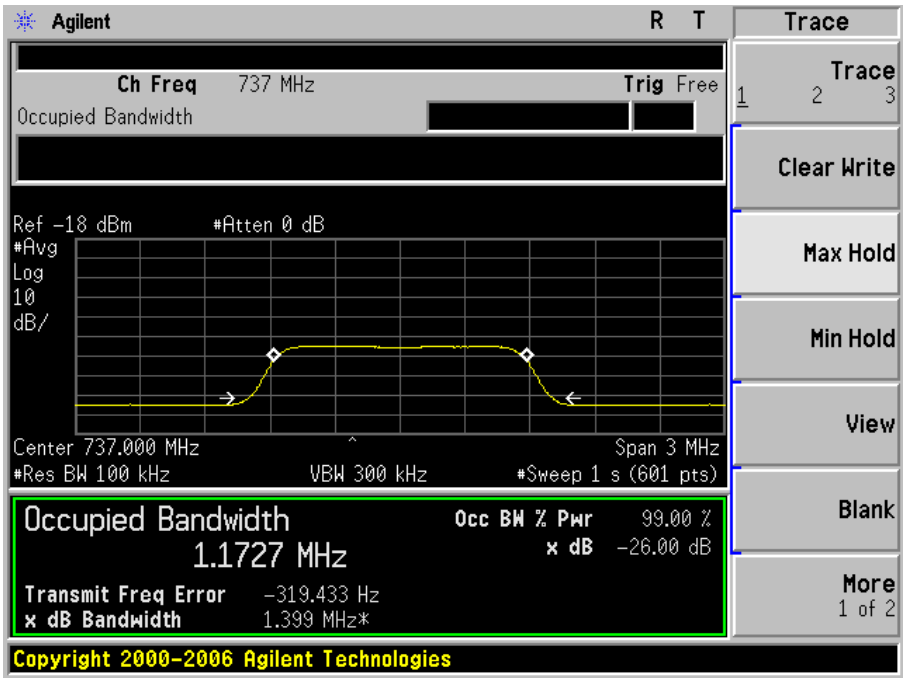


Output



LTE-64QAM (1.4 MHz), Frequency: 737 MHz

Input



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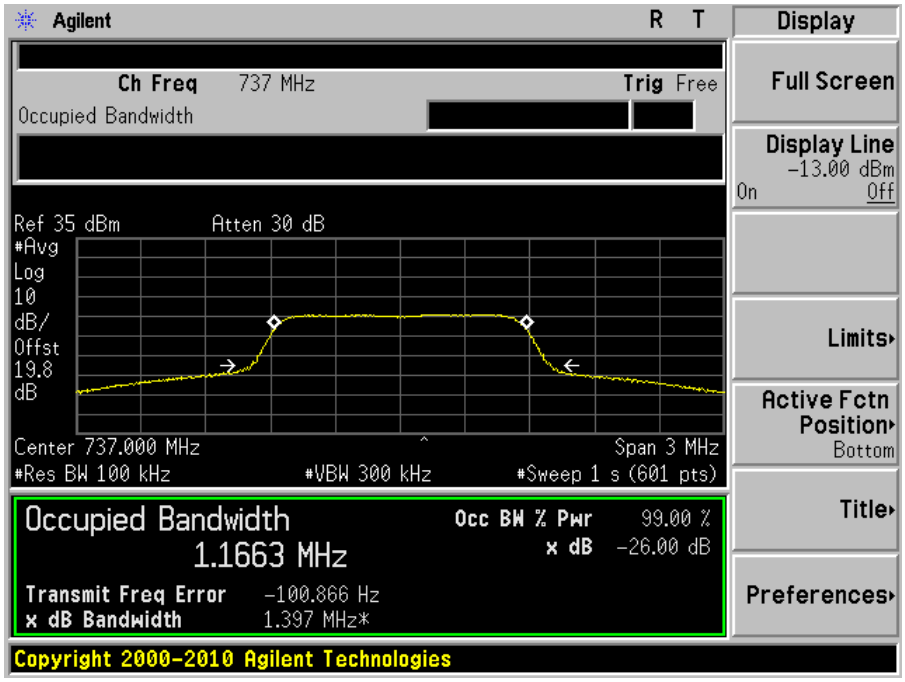
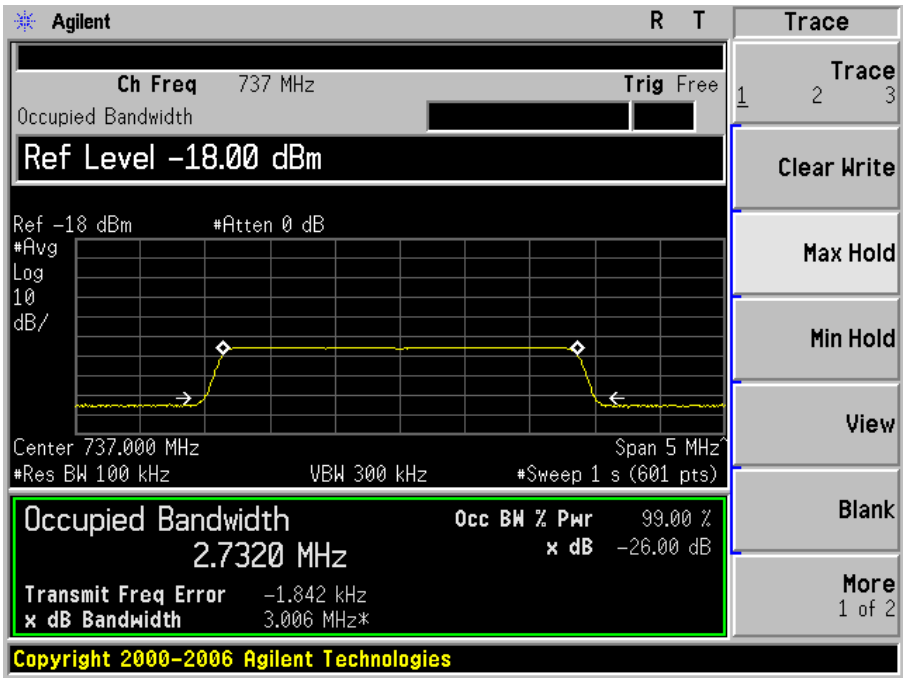
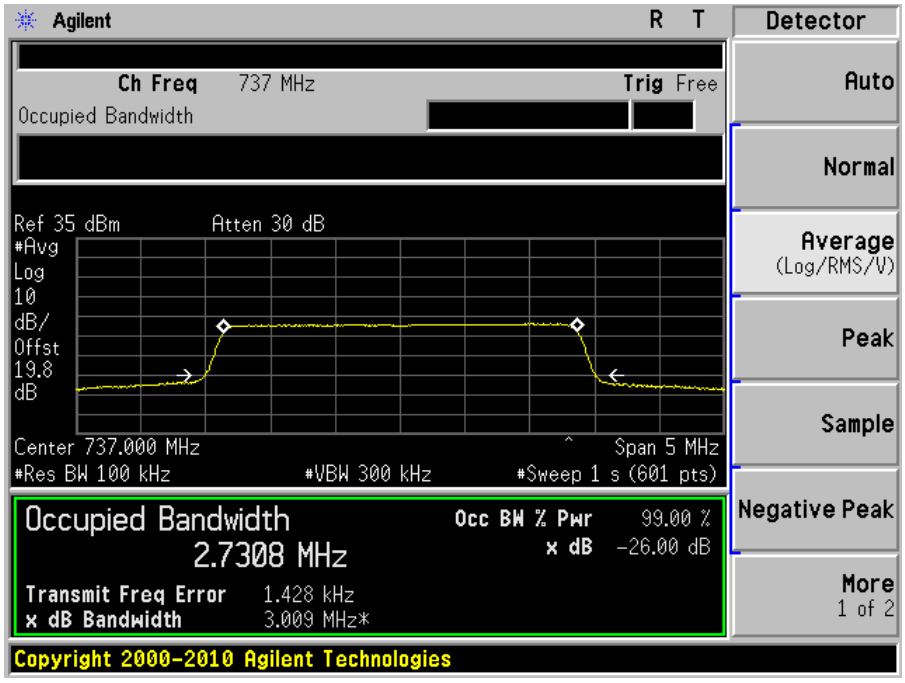


LTE-QPSK (3 MHz), Frequency: 737 MHz

Input

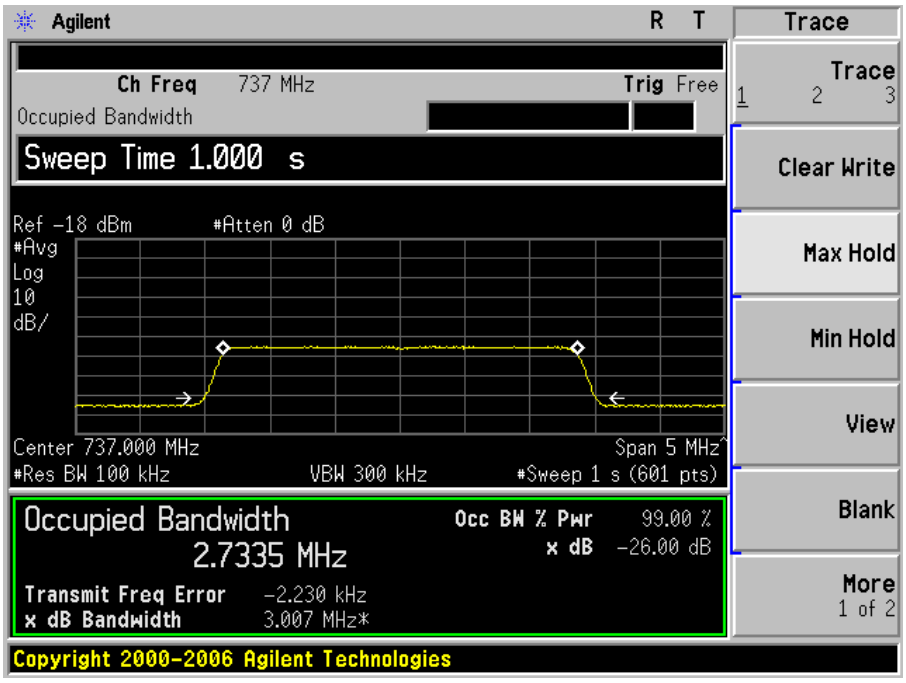


Output

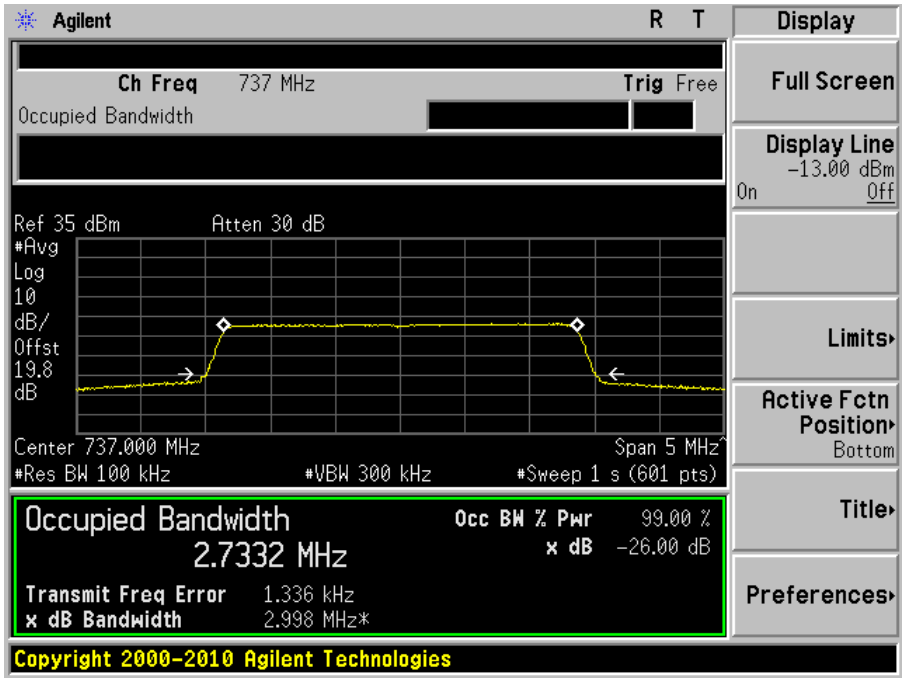


LTE-16QAM (3 MHz), Frequency: 737 MHz

Input

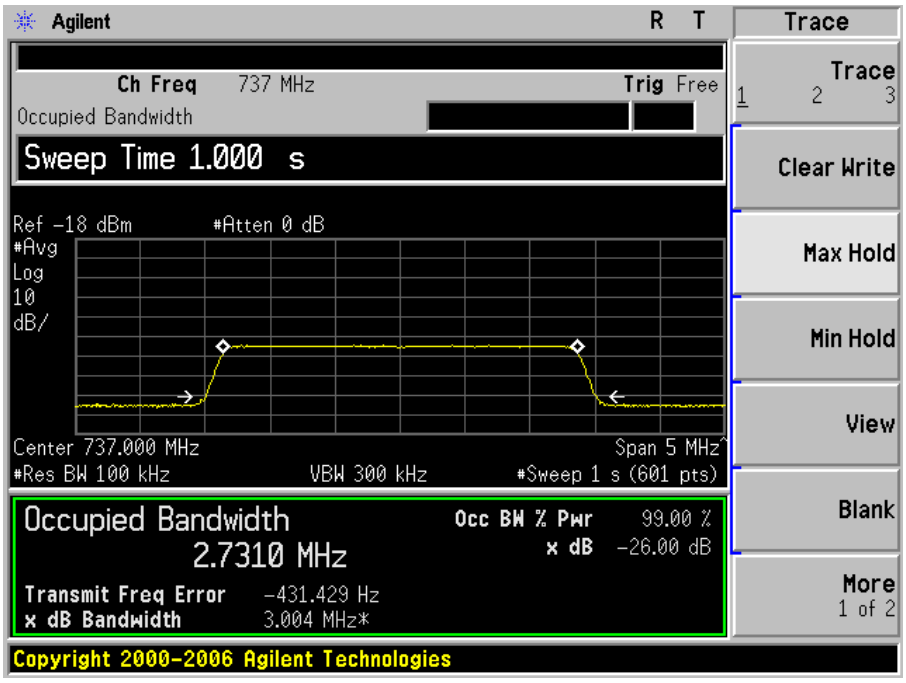


Output



LTE-64QAM (3 MHz), Frequency: 737 MHz

Input



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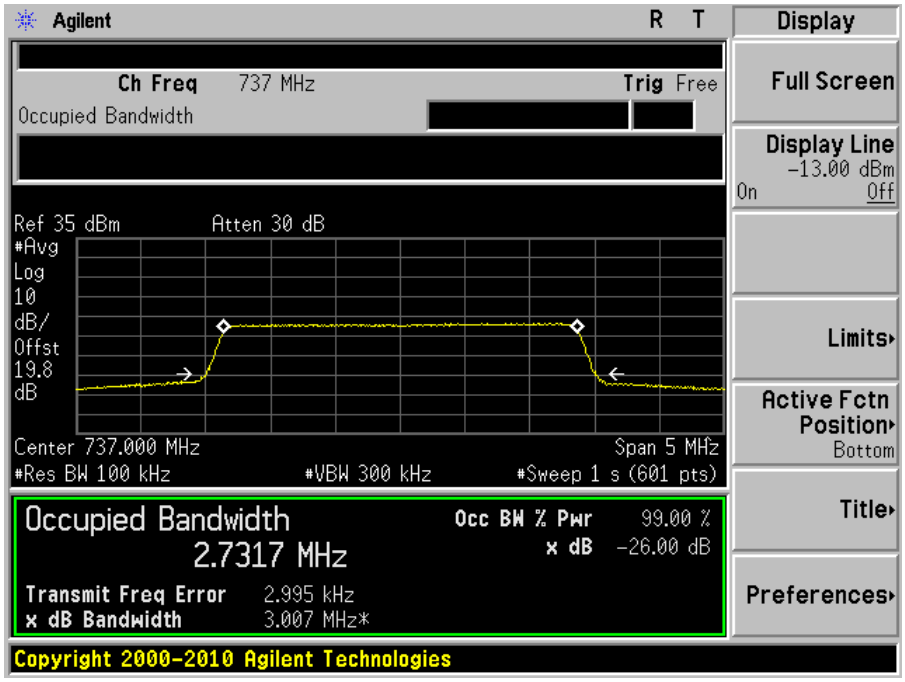
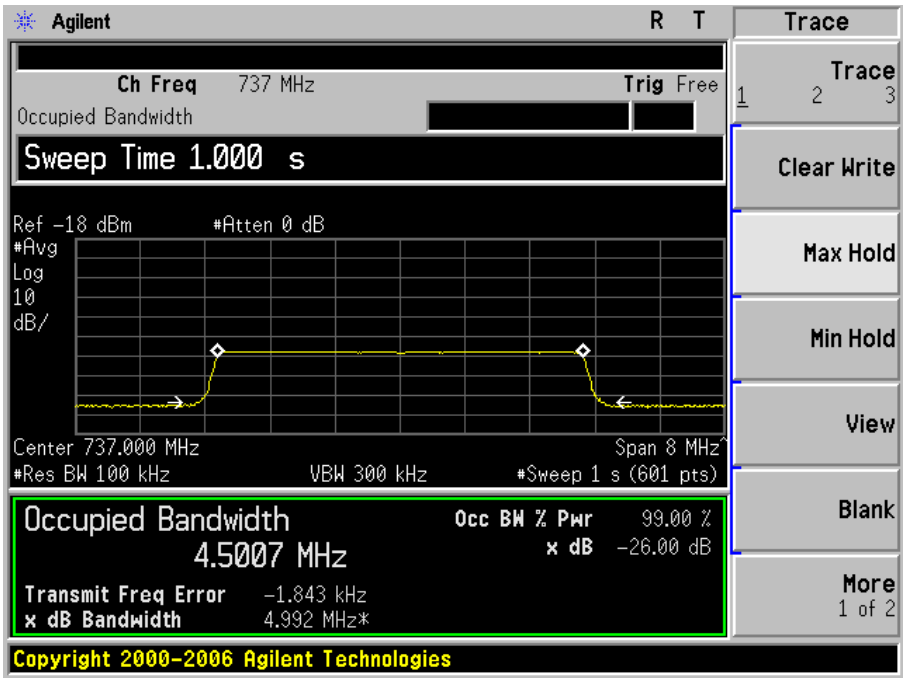


LTE-QPSK (5 MHz), Frequency: 737 MHz

Input



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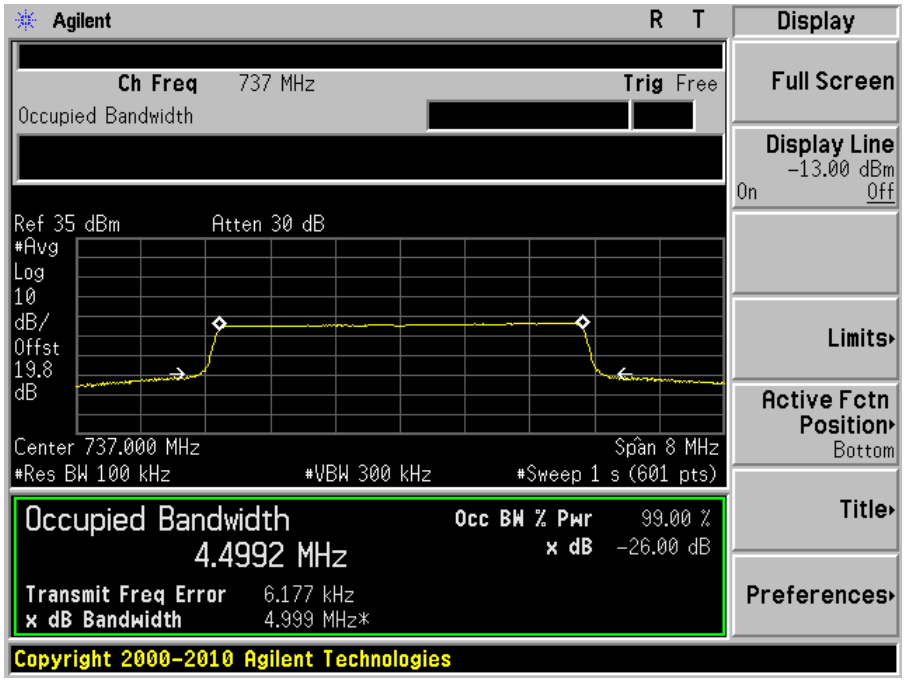
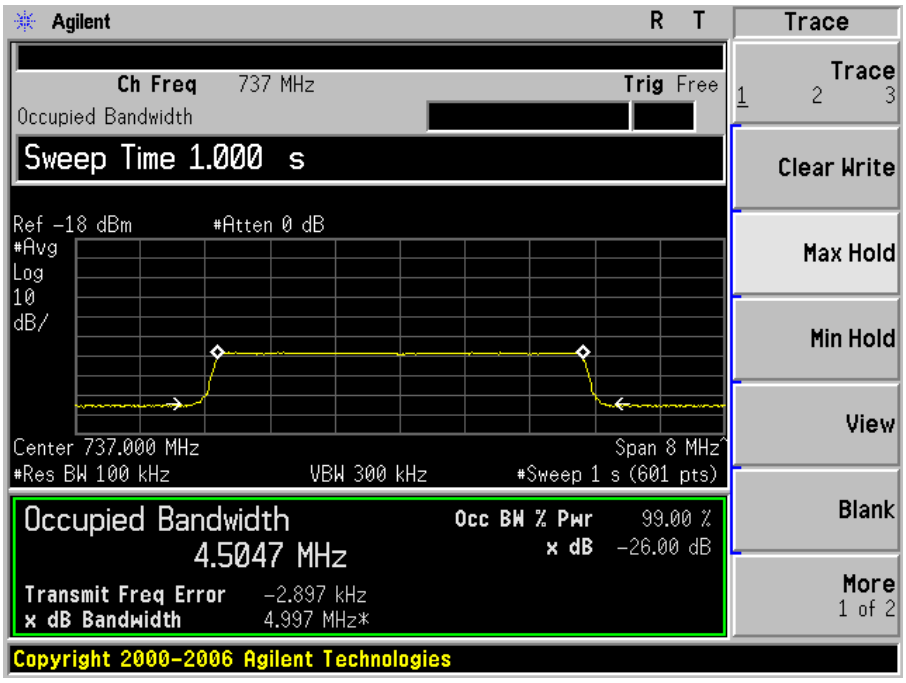
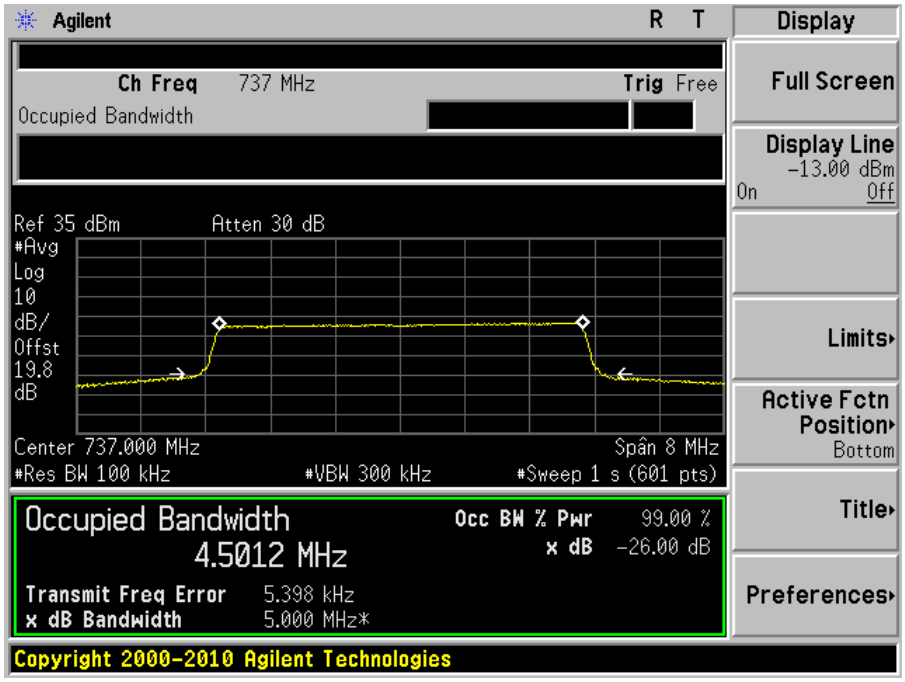


LTE-16QAM (5 MHz), Frequency: 737 MHz

Input

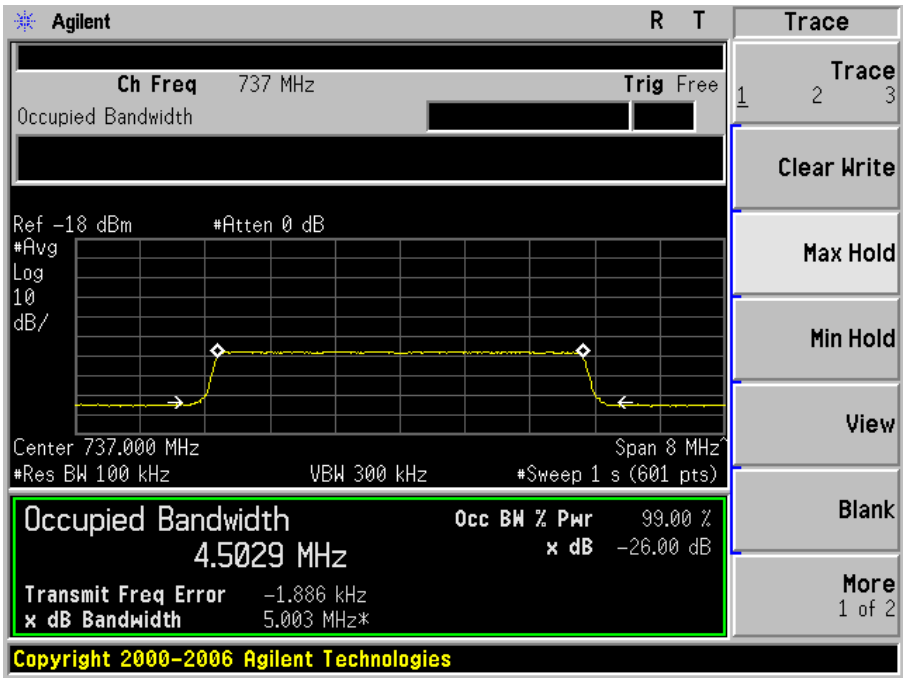


Output



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

Input



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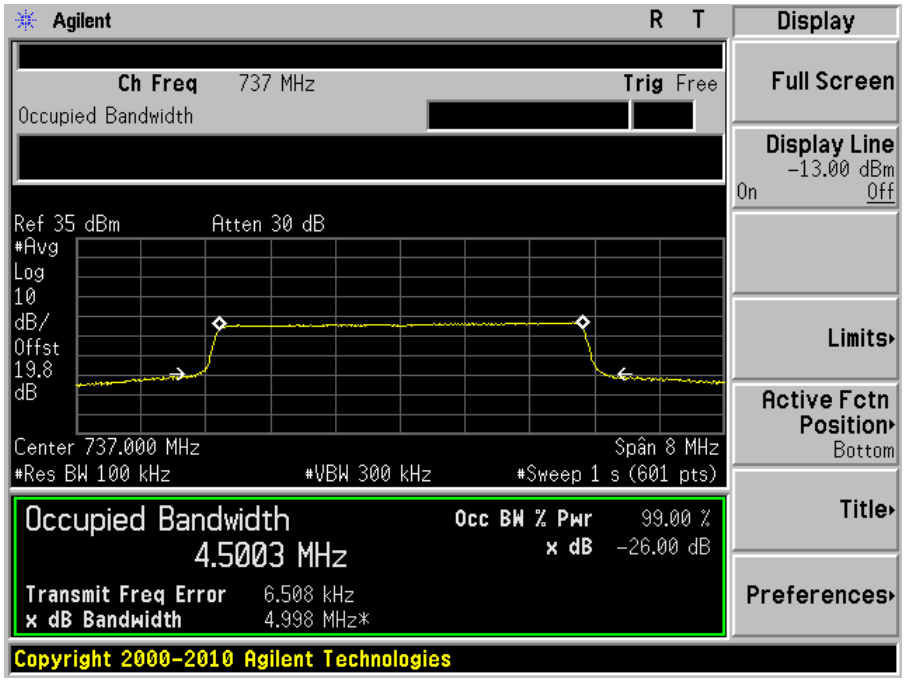
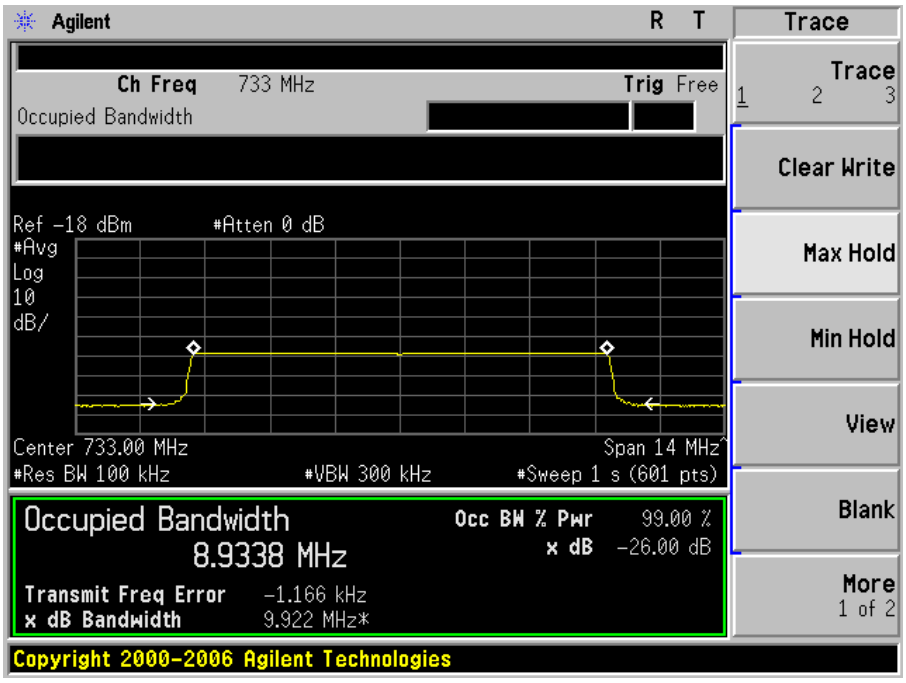
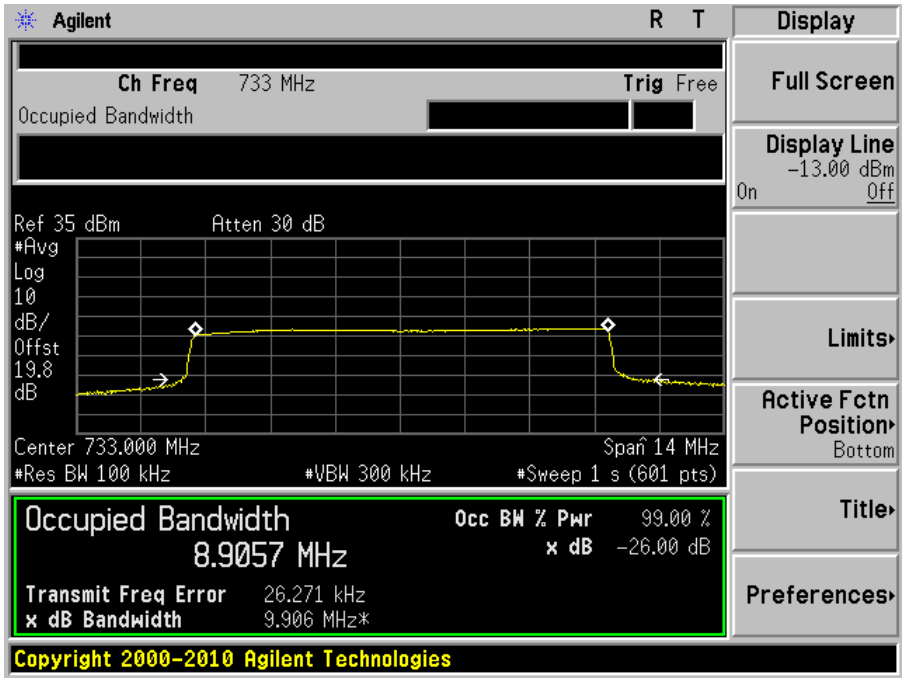


LTE-QPSK (10 MHz), Frequency: 733 MHz

Input



Output



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

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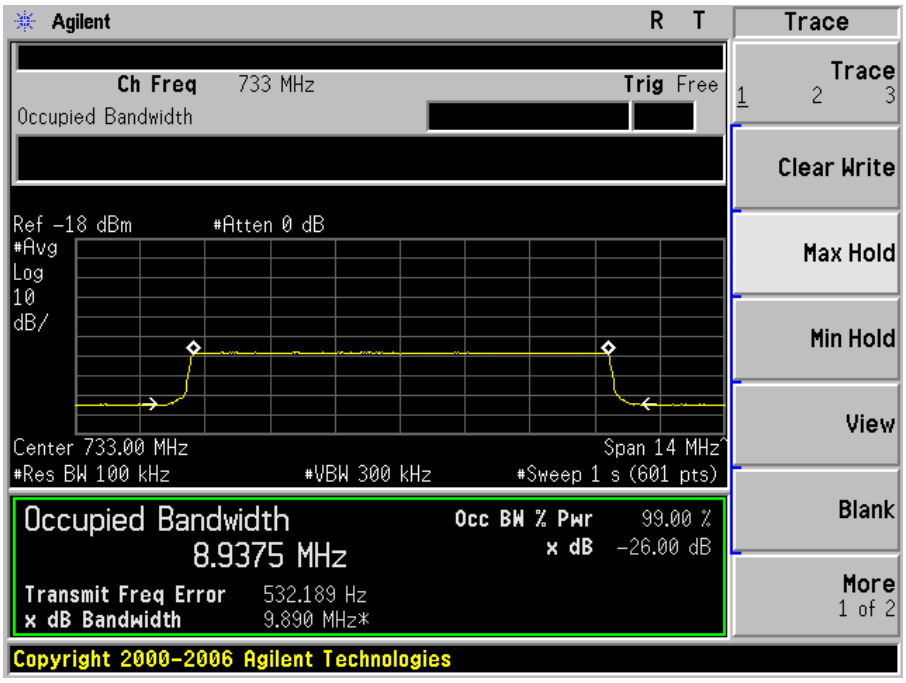

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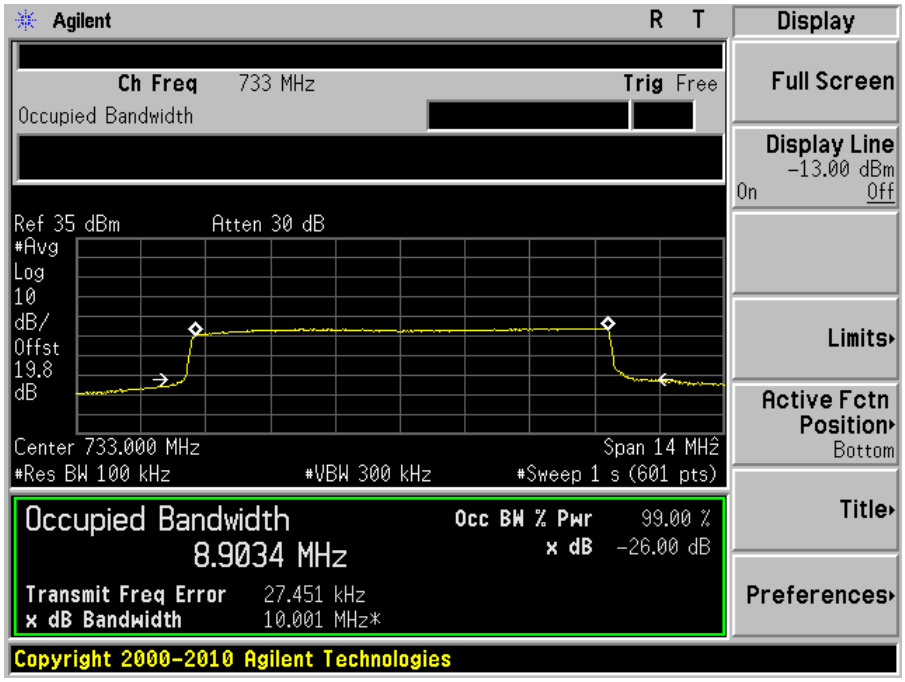
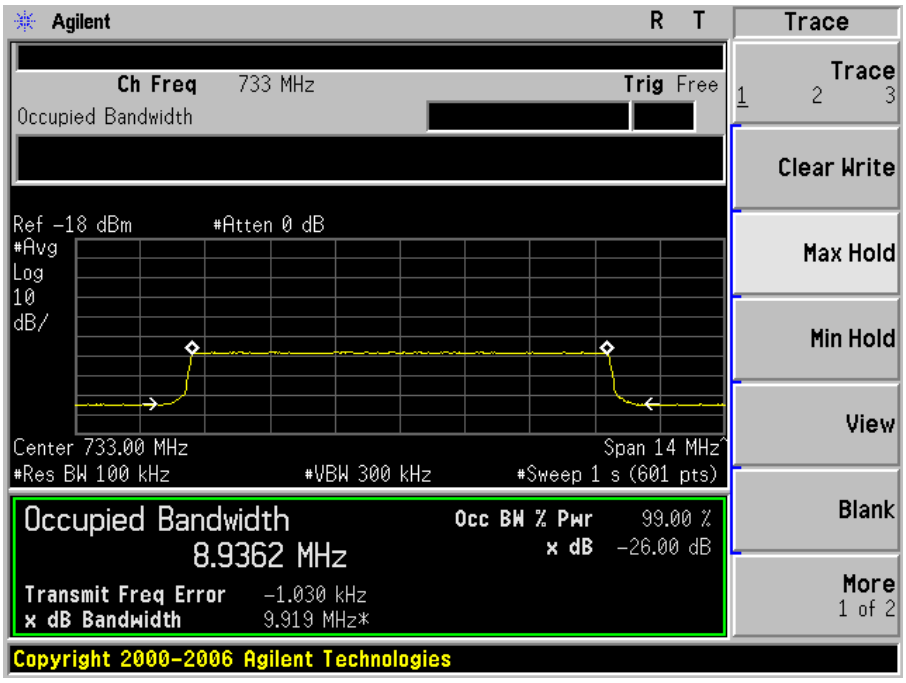
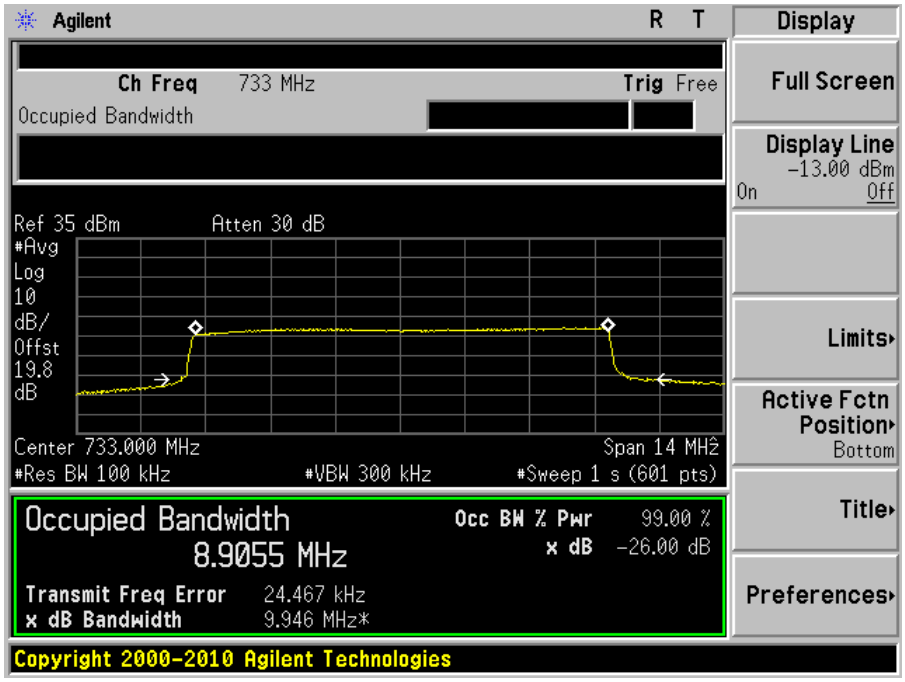


LTE-64QAM (10 MHz), Frequency: 733 MHz

Input



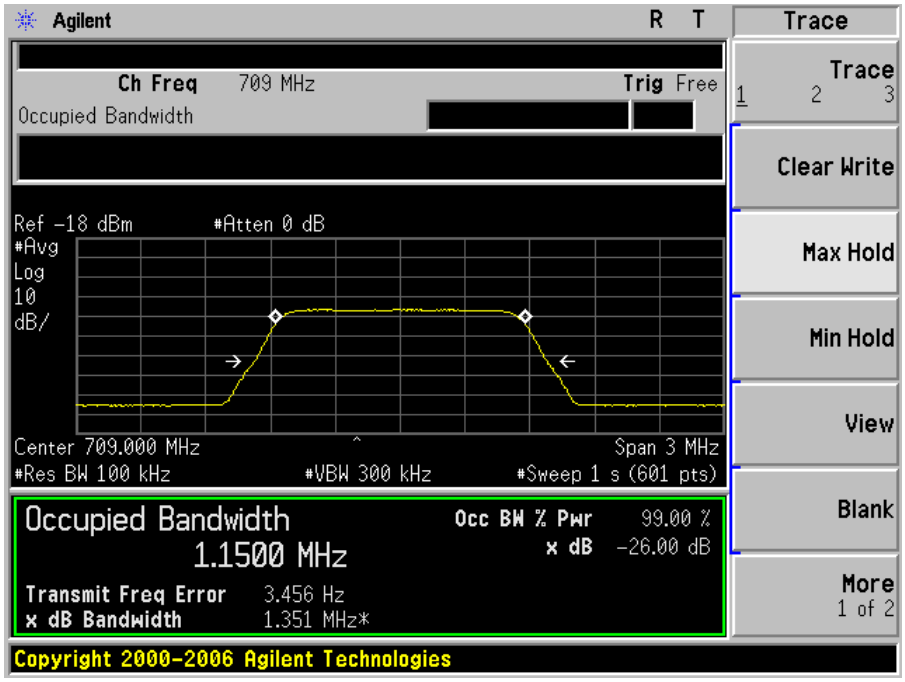
Output



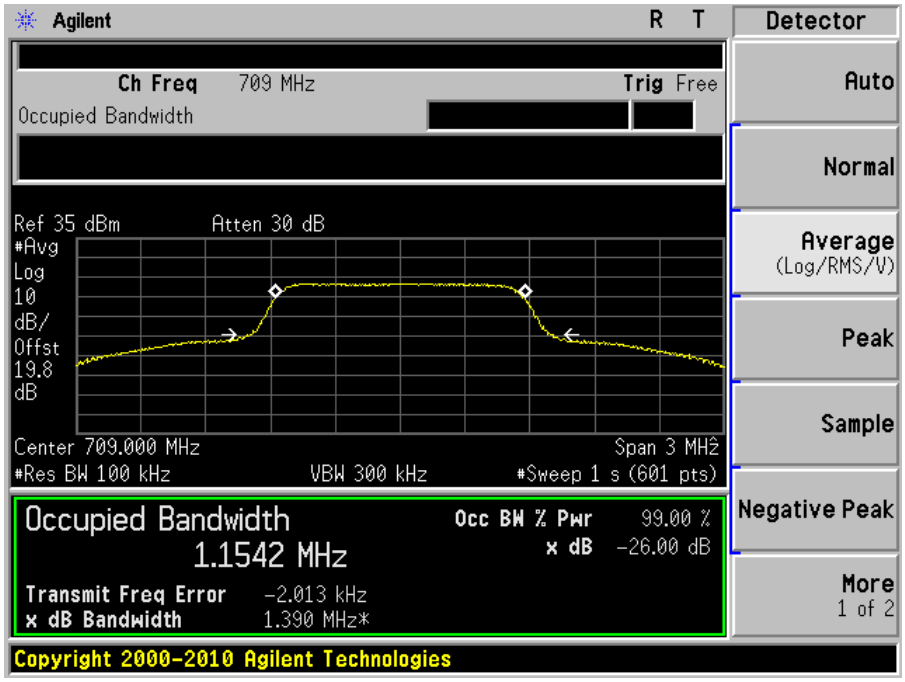
UL: 698-716 MHz

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

Input

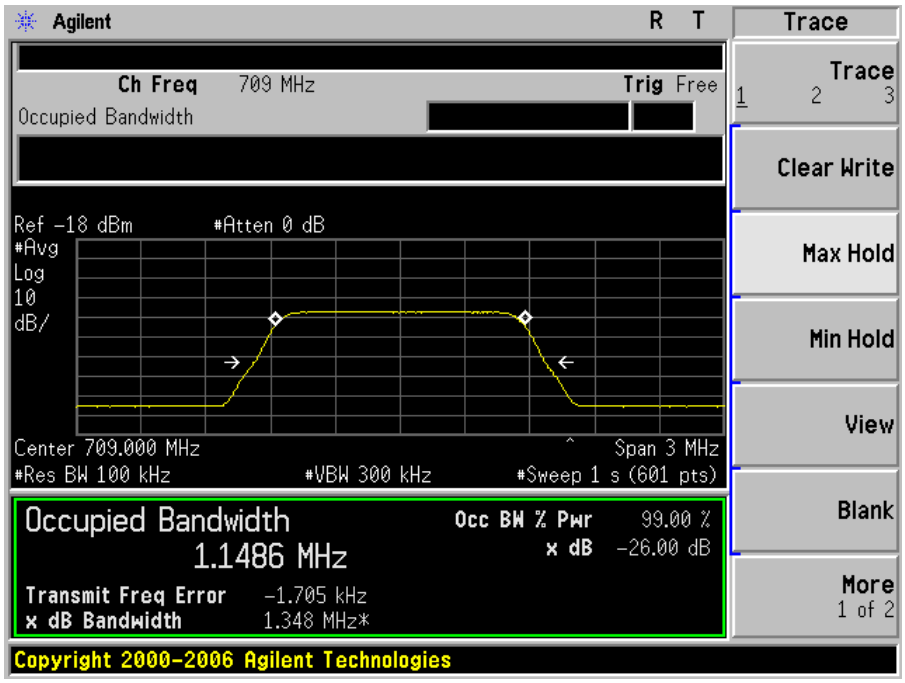


Output

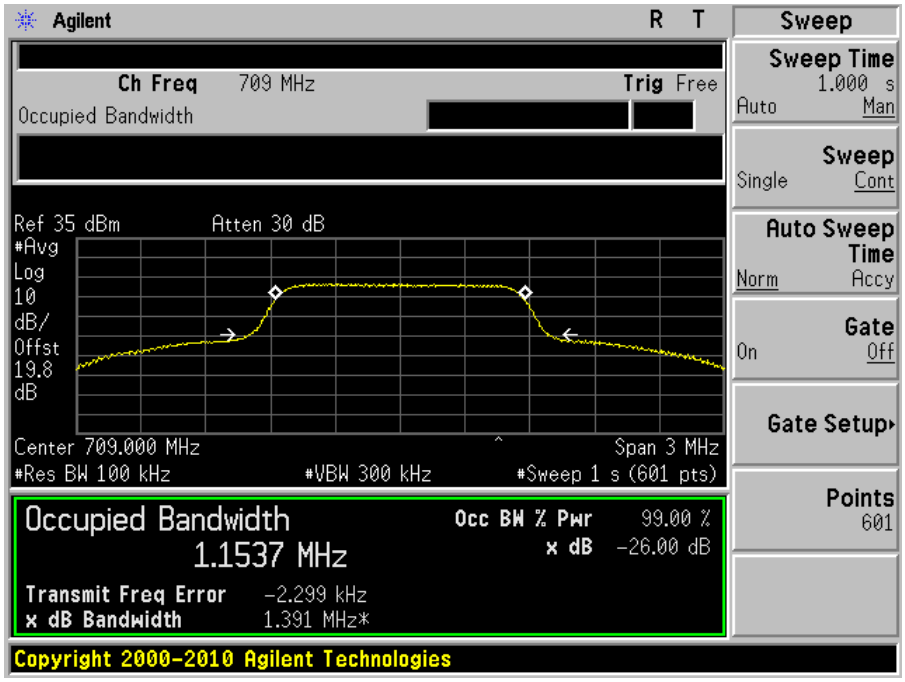


LTE-16QAM (1.4 MHz), Frequency: 709 MHz

Input

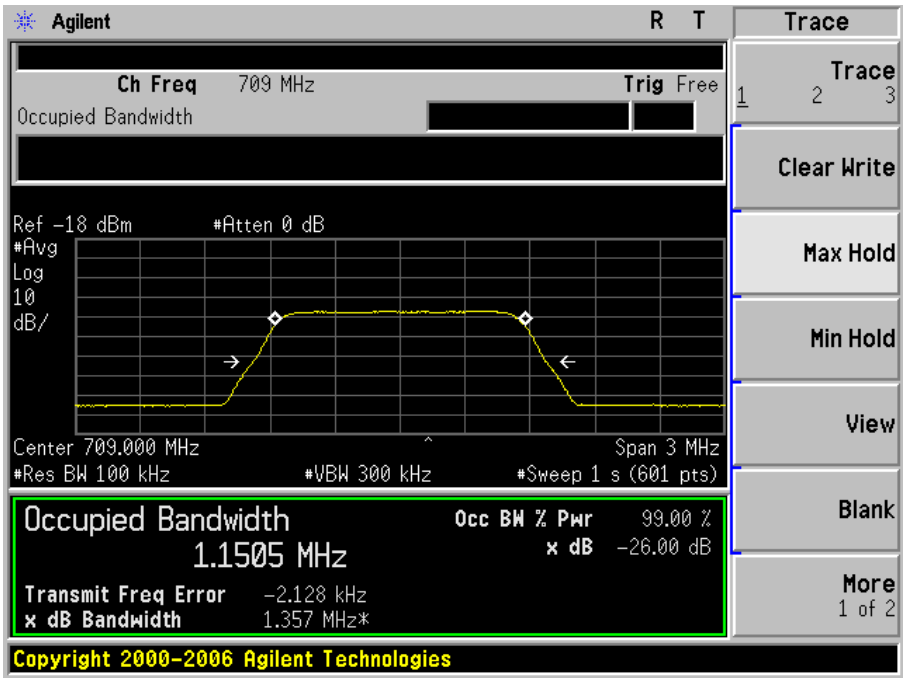


Output

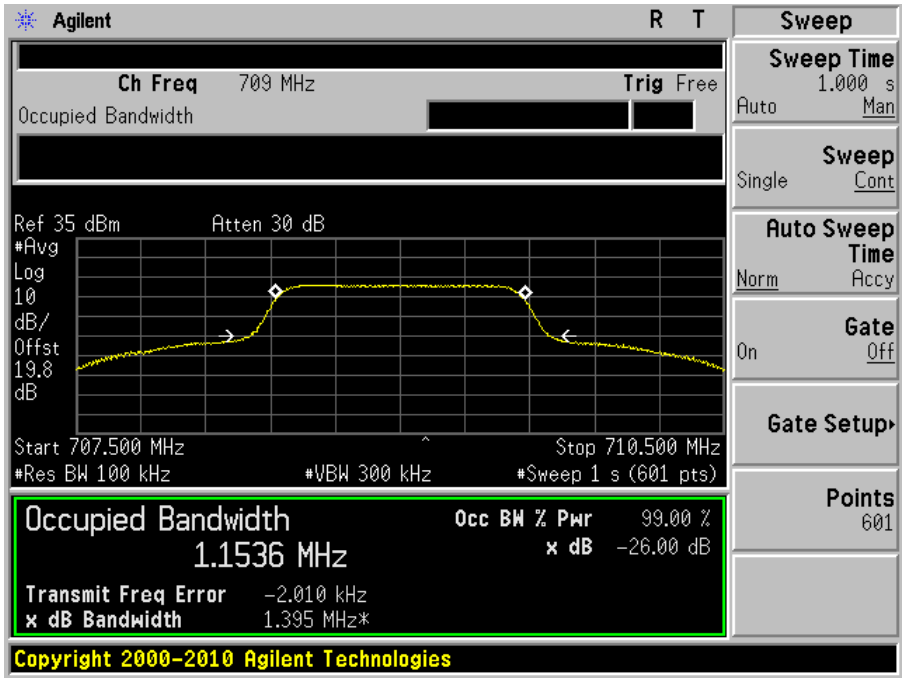


LTE-64QAM (1.4 MHz), Frequency: 709 MHz

Input

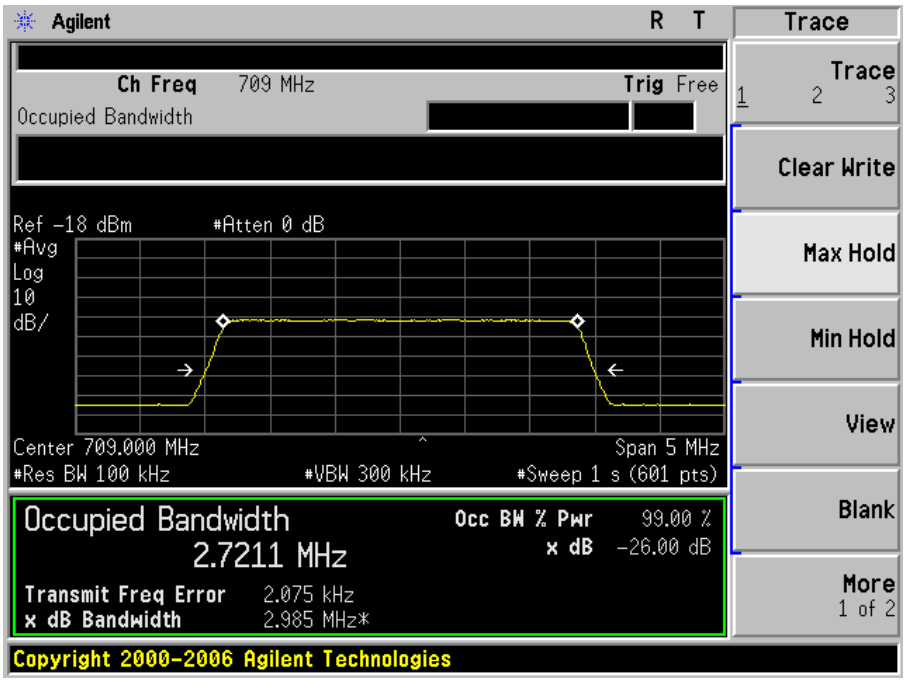


Output

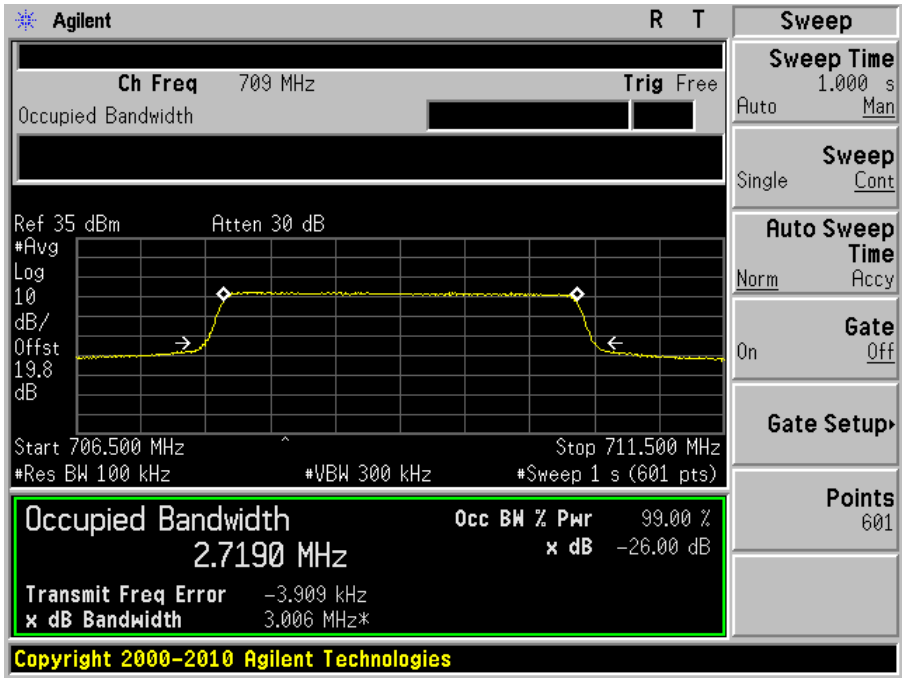


LTE-QPSK (3 MHz), Frequency: 709 MHz

Input

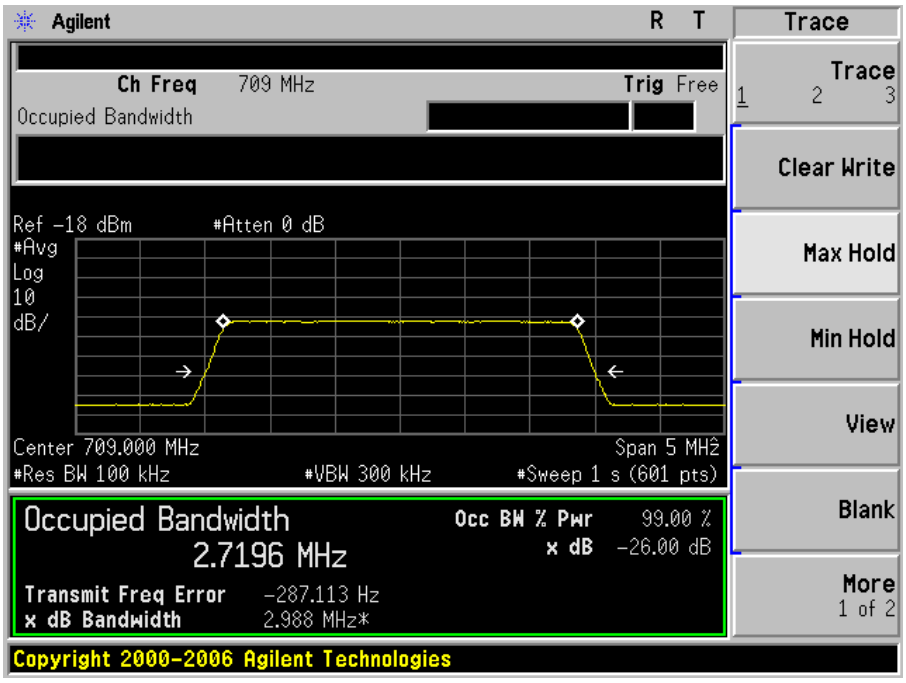


Output

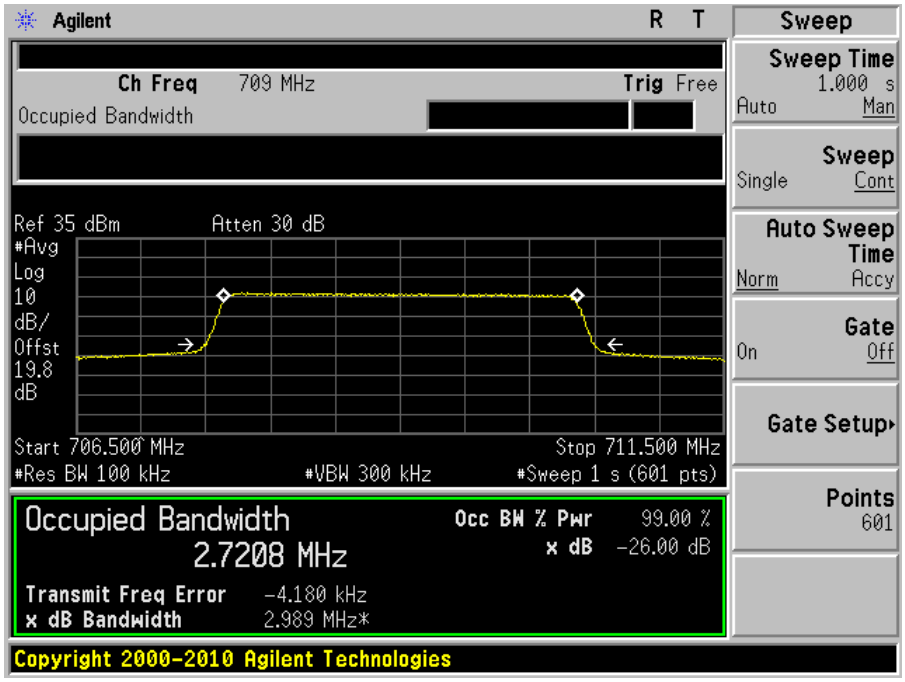


LTE-16QAM (3 MHz), Frequency: 709 MHz

Input

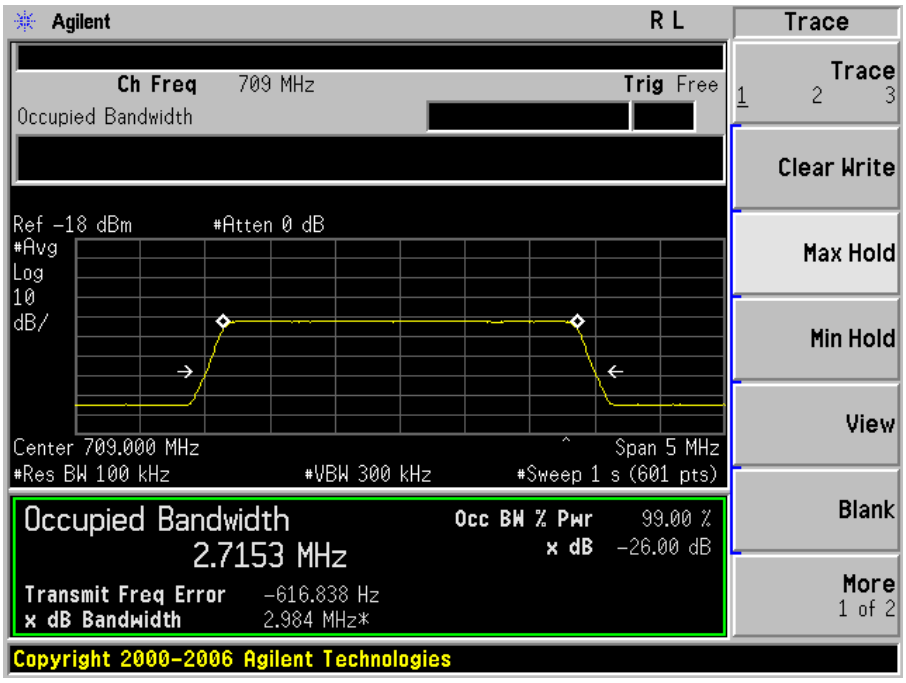


Output

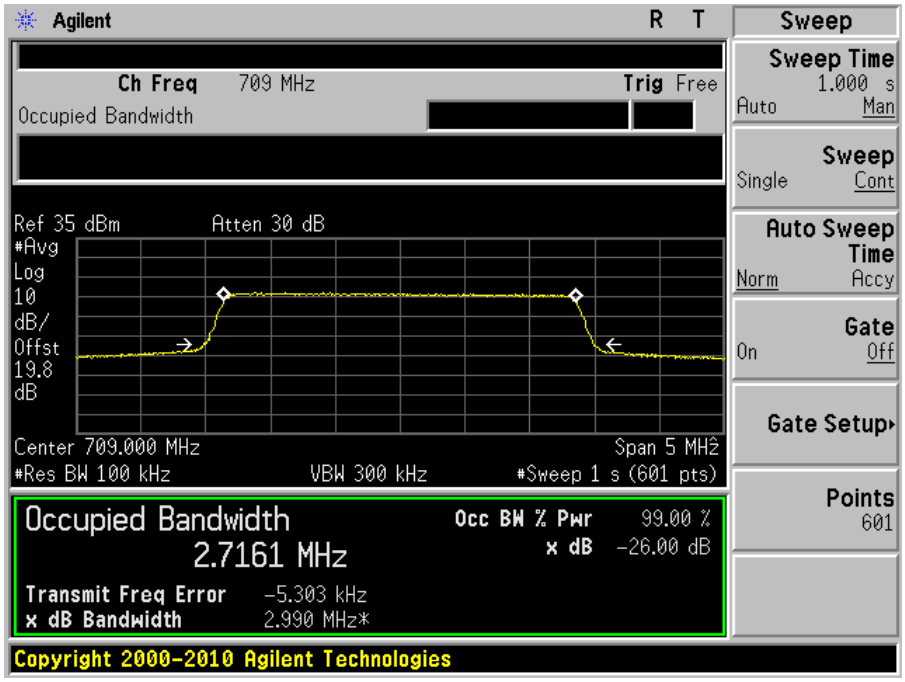


LTE-64QAM (3 MHz), Frequency: 709 MHz

Input

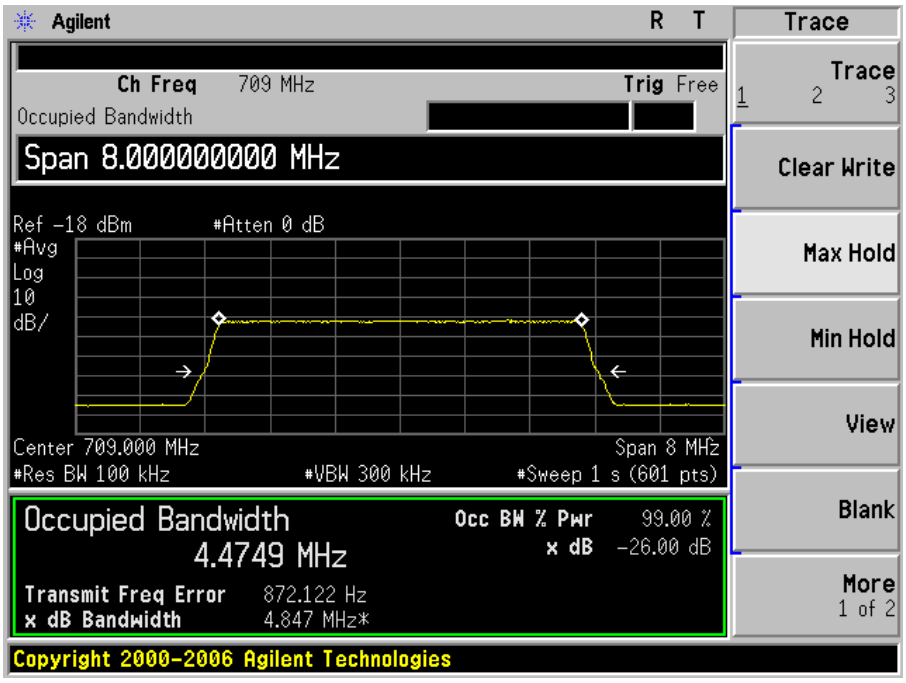


Output

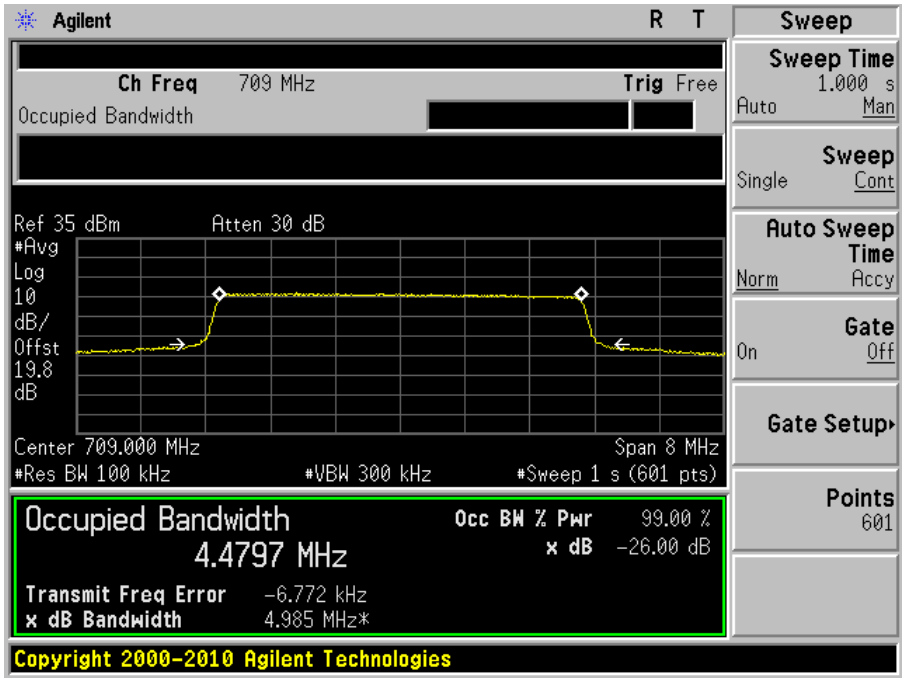


LTE-QPSK (5 MHz), Frequency: 709 MHz

Input

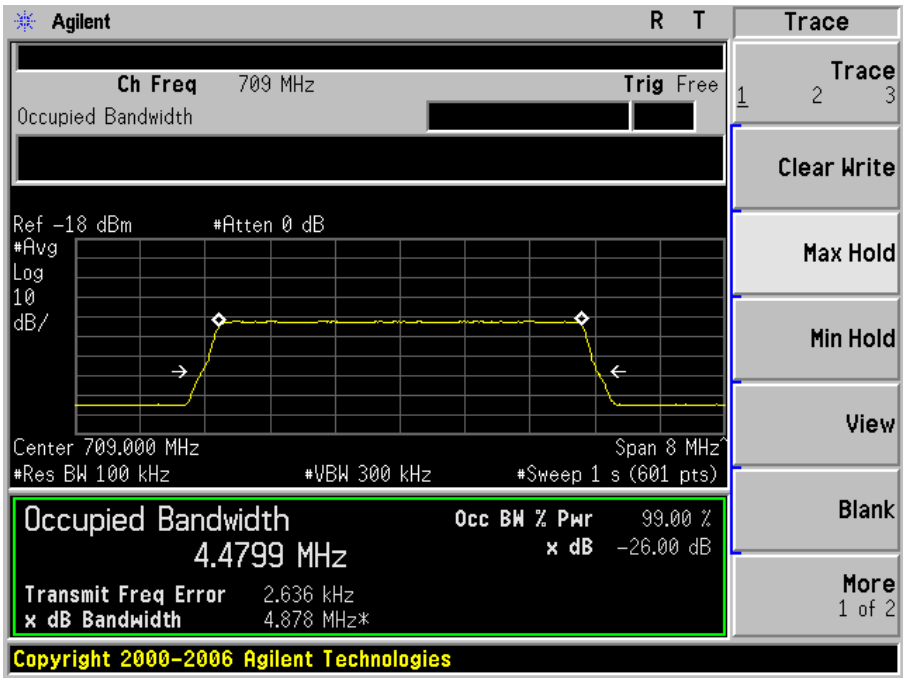


Output

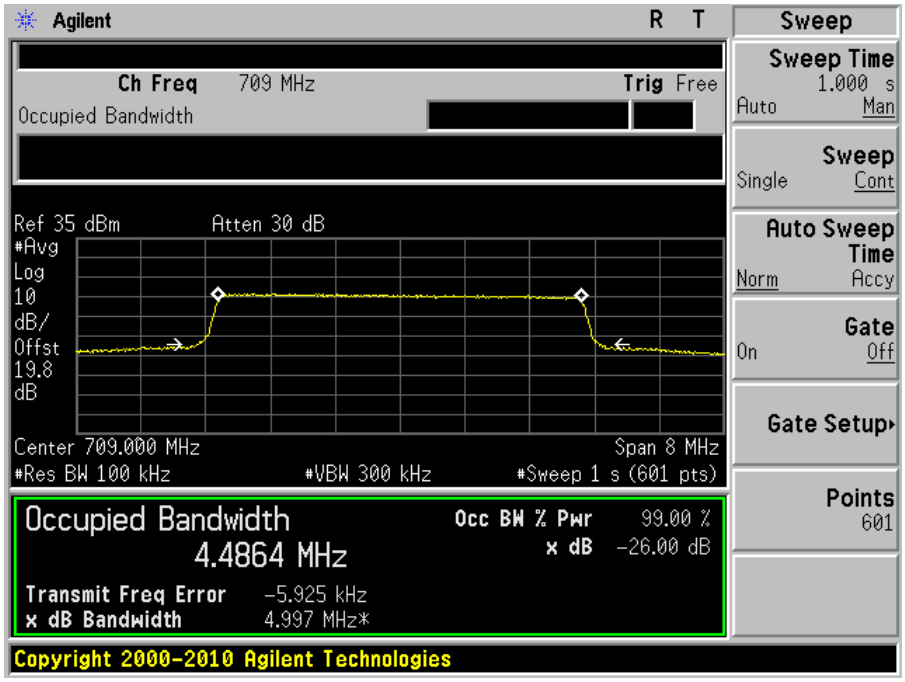


LTE-16QAM (5 MHz), Frequency: 709 MHz

Input

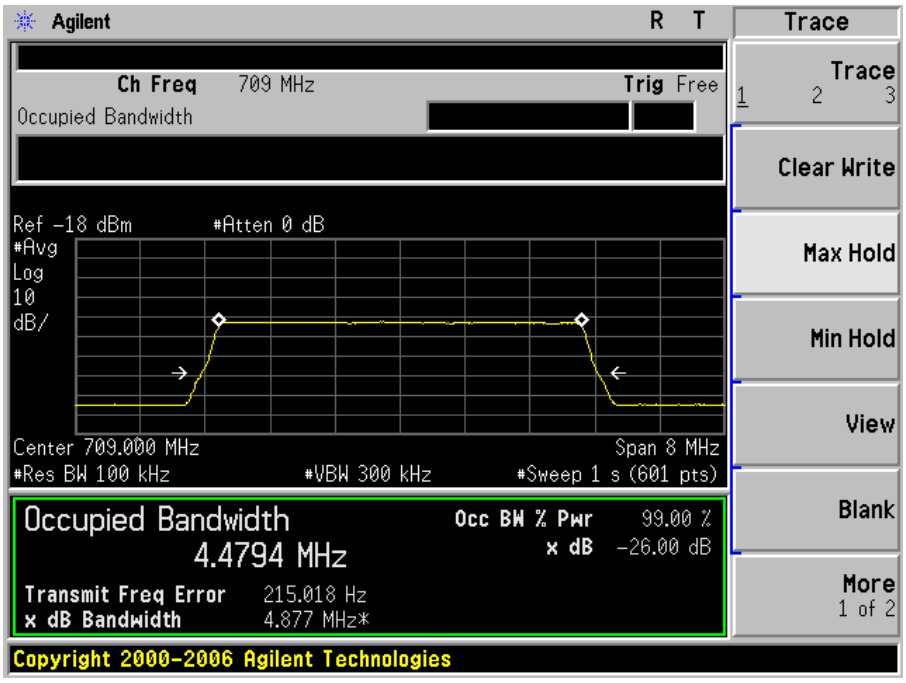


Output

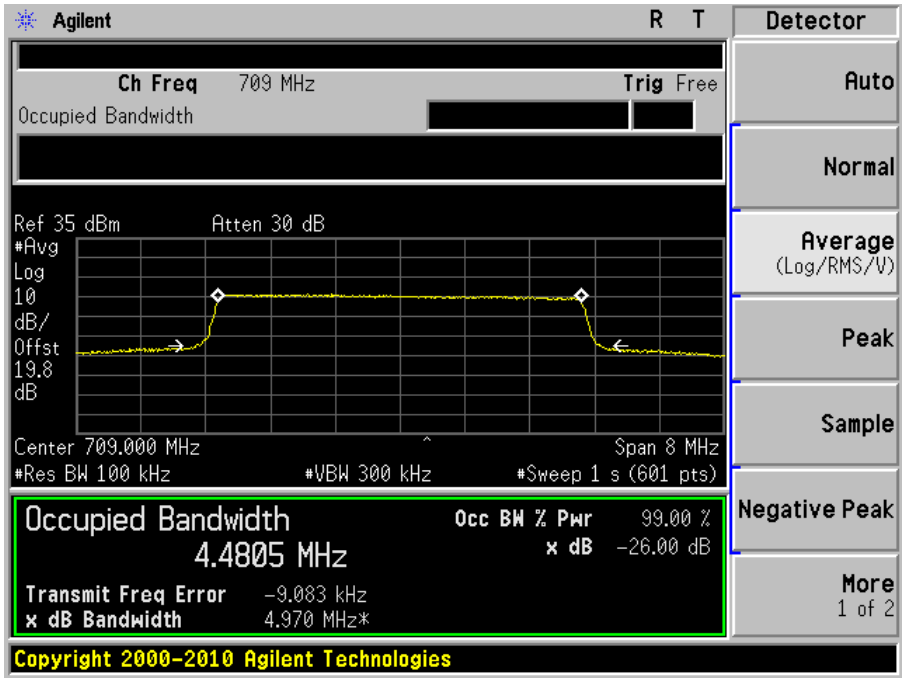


LTE-64QAM (5 MHz), Frequency: 709 MHz

Input

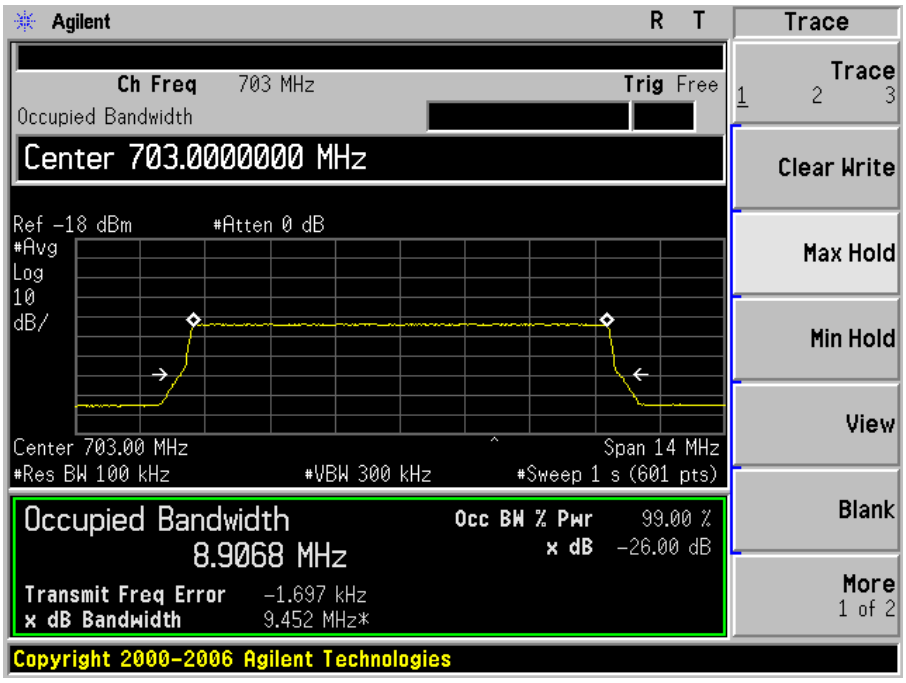


Output

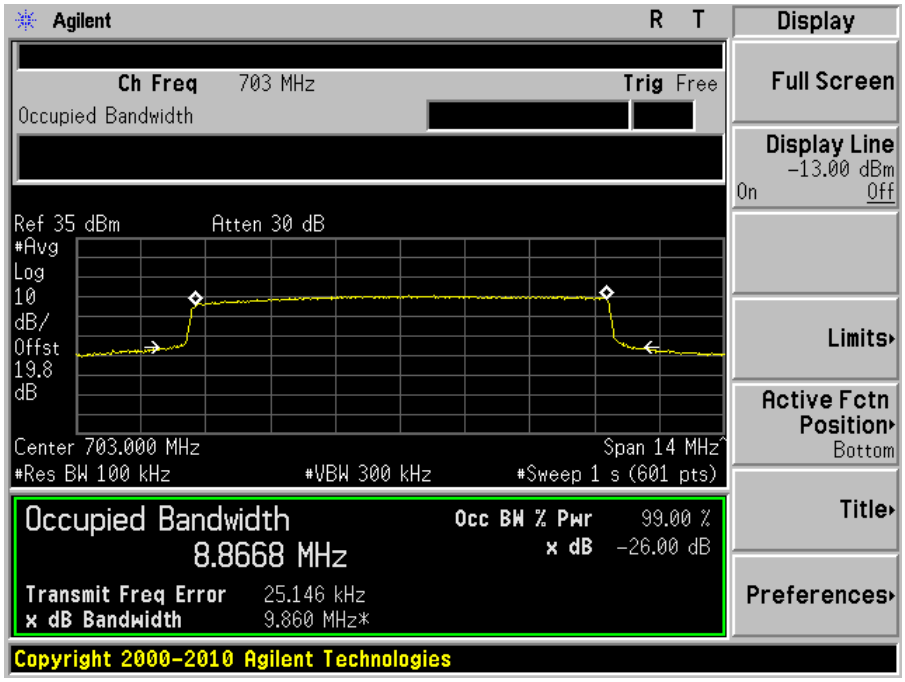


LTE-QPSK (10 MHz), Frequency: 703 MHz

Input

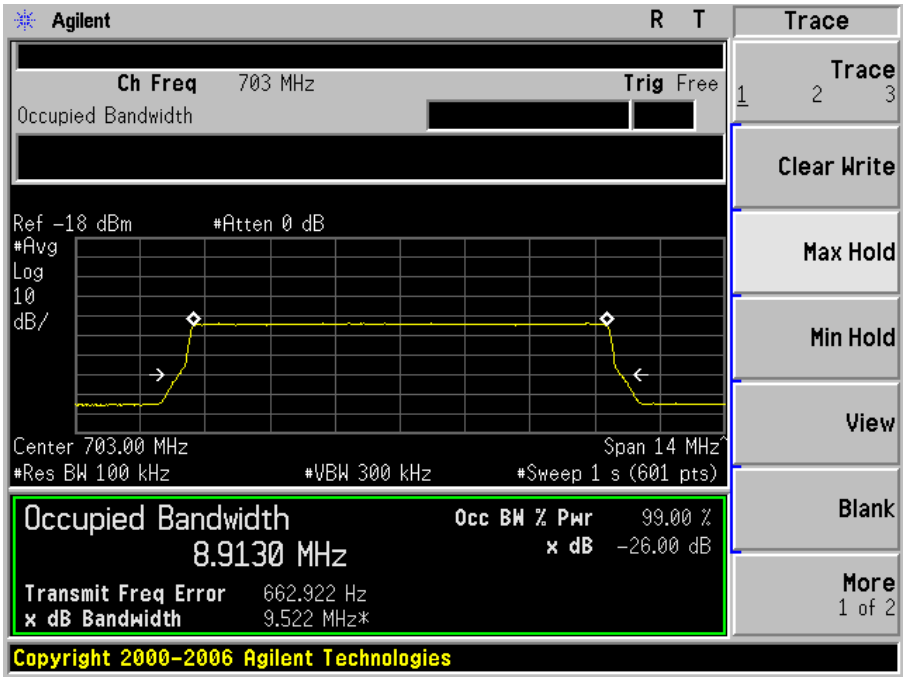


Output

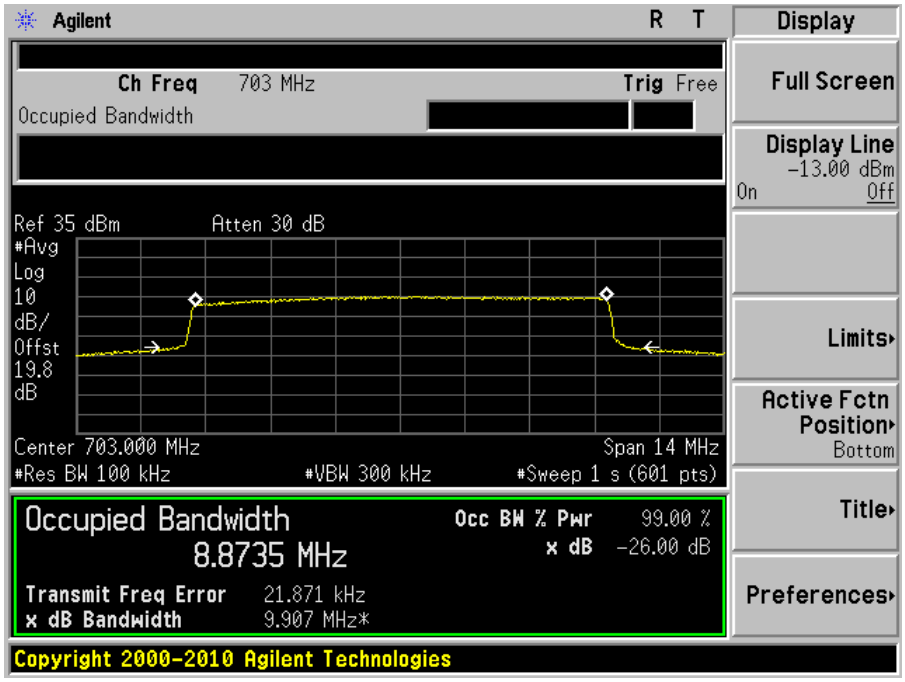


LTE-16QAM (10 MHz), Frequency: 703 MHz

Input

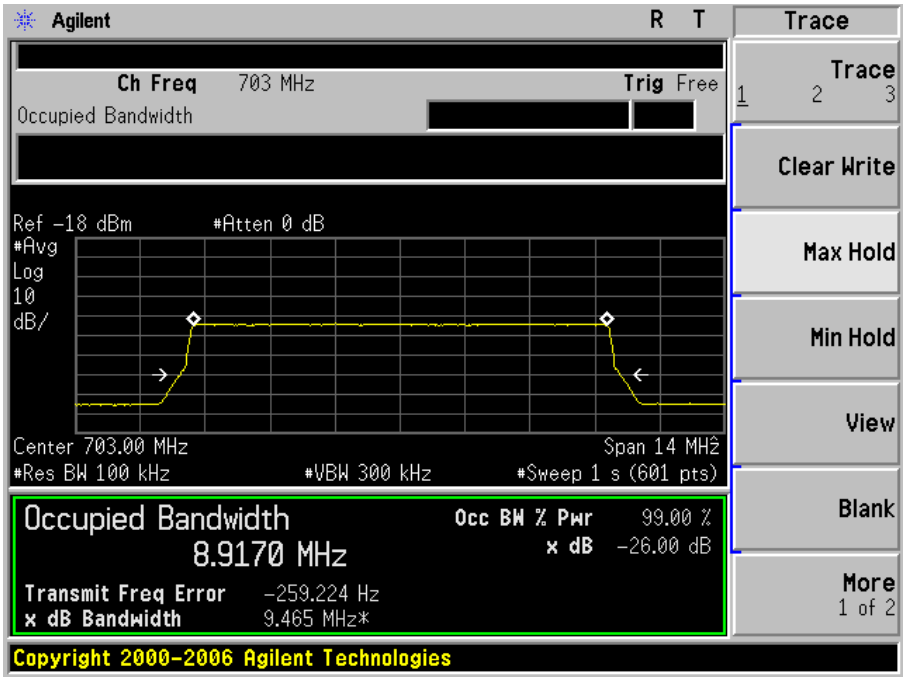


Output

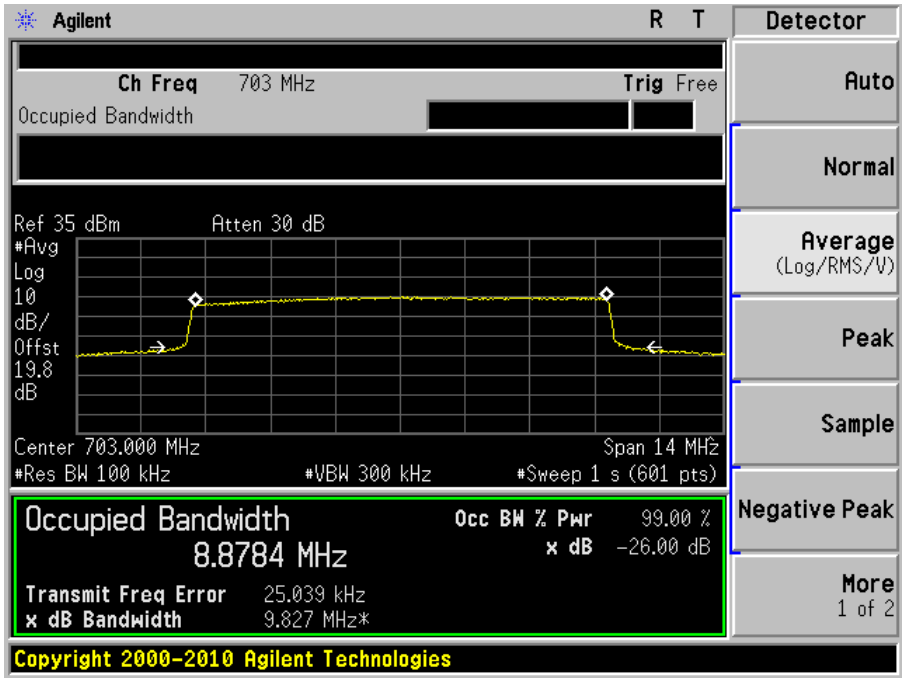


LTE-64QAM (10 MHz), Frequency: 703 MHz

Input



Output



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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Spectrum Analyzer	E4440A	US45303156	2010-08-09
Agilent	Signal Generator	E4438C	MY45091309	2011-04-28
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB1	A020106-1	2011-05-17
Hewlett Packard	Pre amplifier	8447D	2944A06639	2011-06-09
A.R.A Inc	Horn antenna	DRG-1181A	1132	2010-11-29
Mini-Circuits	Pre Amplifier	ZVA-183-S	570400946	2011-05-09

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

7.4 Test Environmental Conditions

Temperature:	20-25°C
Relative Humidity:	39-44 %
ATM Pressure:	101-102 kPa

The testing was performed by Lionel Lara from 2011-09-12 to 2011-09-16 at Chamber3.

7.5 Summary of Test Results

The worst case reading as follows:

Technology	Frequency Bands	Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Frequency Range
LTE	DL: 728-746 MHz	Note ¹	-	-	30 MHz – 10 GHz
	UL: 698-716 MHz	Note ¹	-	-	30 MHz – 10 GHz

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

7.6 Test Results

DL: 728-746 MHz

Modulation: CW Signal – 737 MHz (Scan from 30 MHz to 10 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)		
-	-	-	-	-	-	-	-	-	-	-	Note ¹

UL: 698-716 MHz

Modulation: CW Signal – 709 MHz (Scan from 30 MHz to 10 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)		
-	-	-	-	-	-	-	-	-	-	-	Note ¹

Note ¹: All harmonics were on the noise floor level and/or 20 dB 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 10^{th} harmonic.

8.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28
Rohde & Schwarz	Signal Generator	SMIQ03	DE23746	2010-03-31
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11

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

8.4 Test Environmental Conditions

Temperature:	20-25°C
Relative Humidity:	42-46 %
ATM Pressure:	101-102 kPa

The testing was performed by Lionel Lara from 2011-09-12 to 2011-09-16 at RF Site.

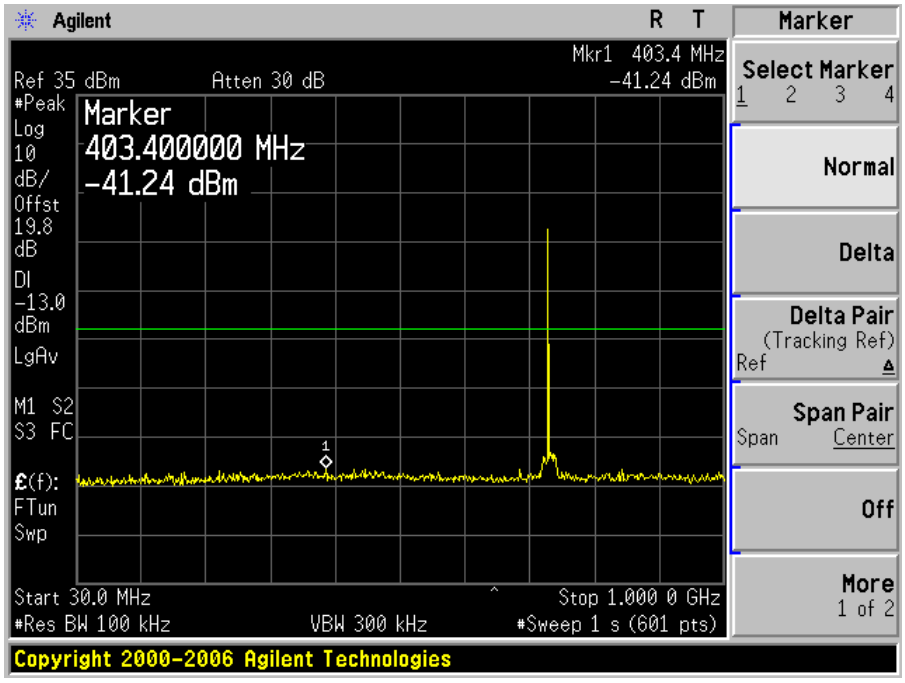
8.5 Test Results

Please refer to the following plots.

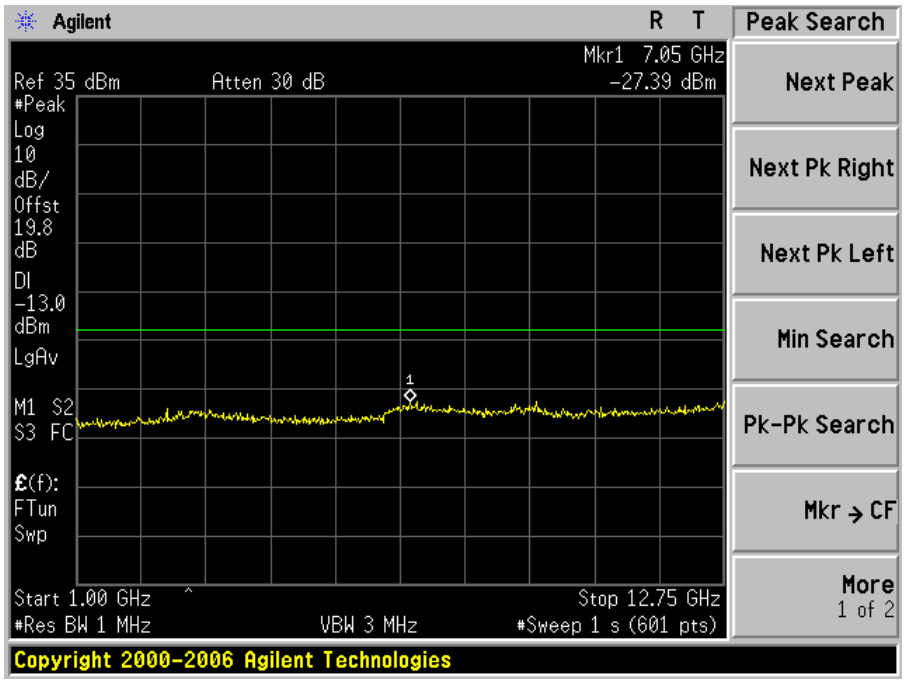
DL: 728-746 MHz

Modulation: CW Signal, Frequency: 737 MHz

Plot 1: 30 MHz to 1 GHz



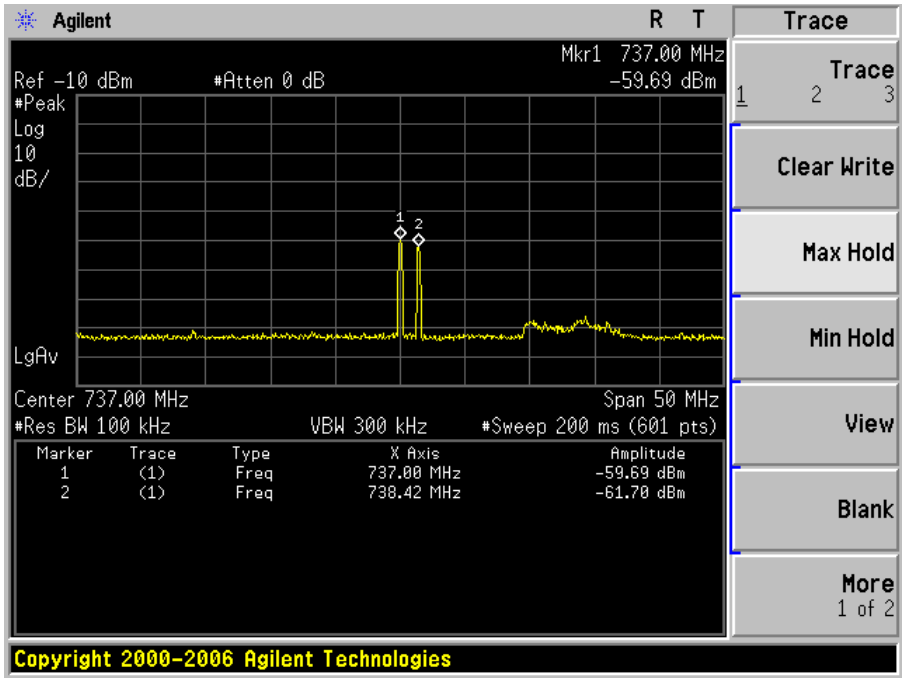
Plot 2: Above 1 GHz



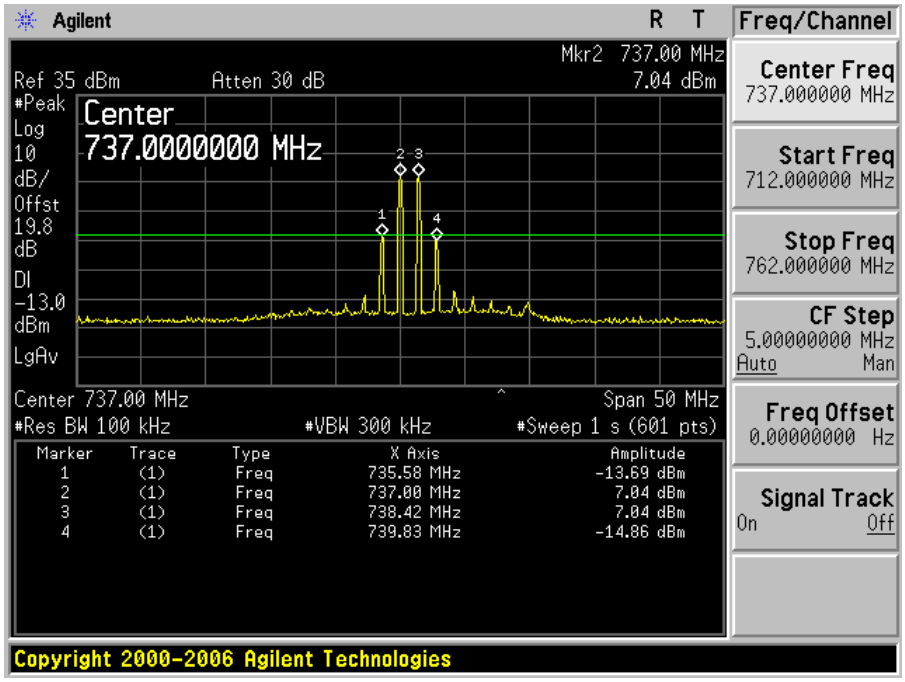
Inter-Modulation:

Middle Channel

Input



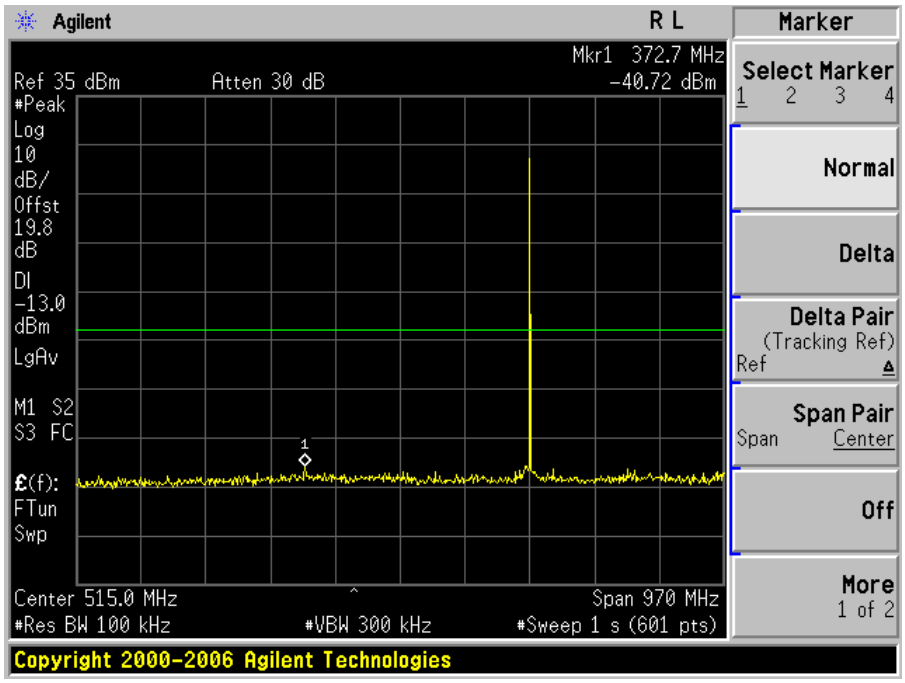
Output



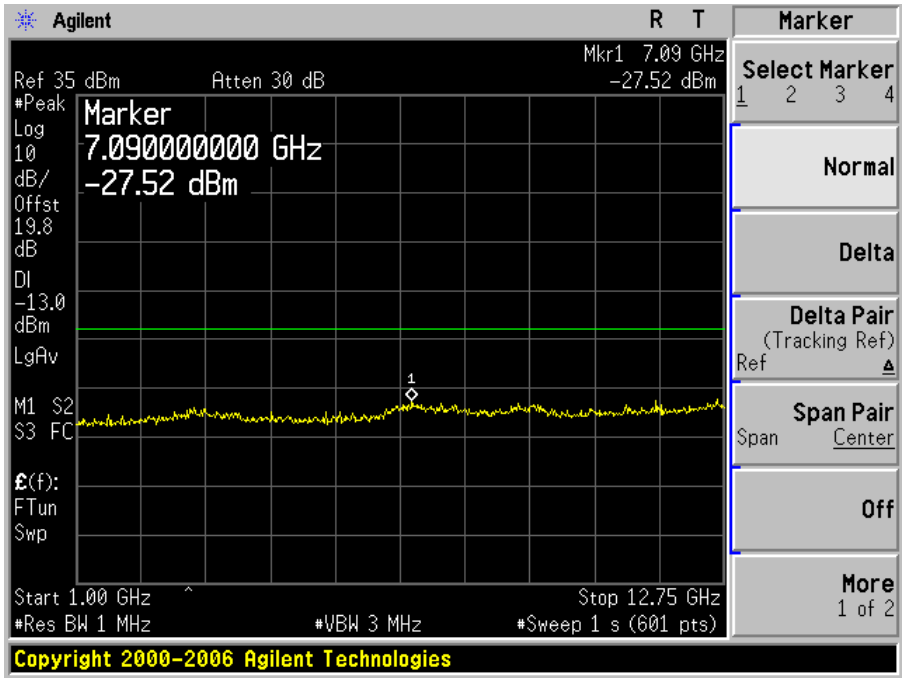
UL: 698-716 MHz

Modulation: CW Signal, Frequency: 709 MHz

Plot 1: 30 MHz to 1 GHz



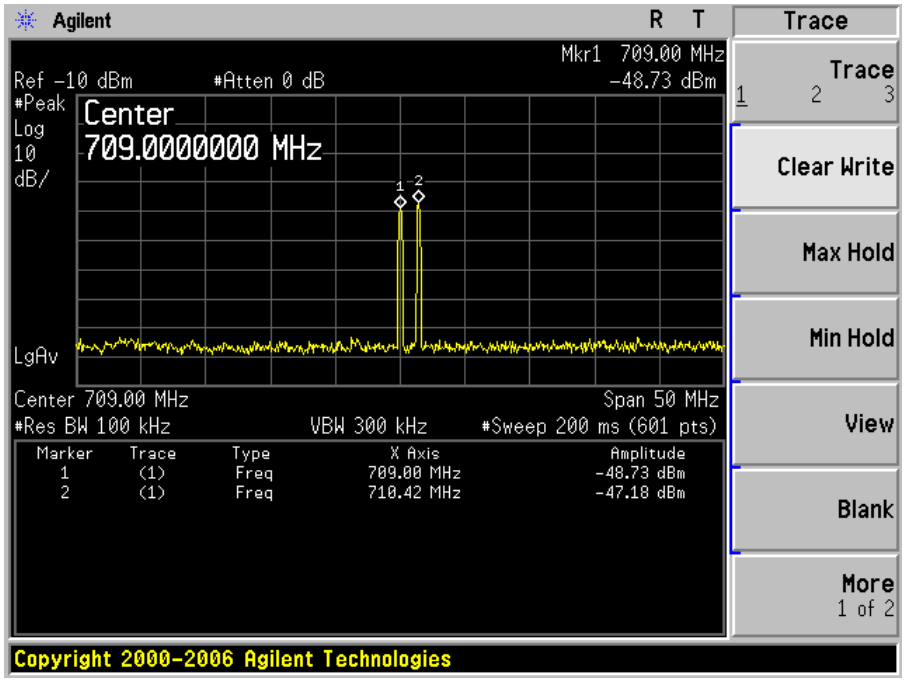
Plot 2: Above 1 GHz



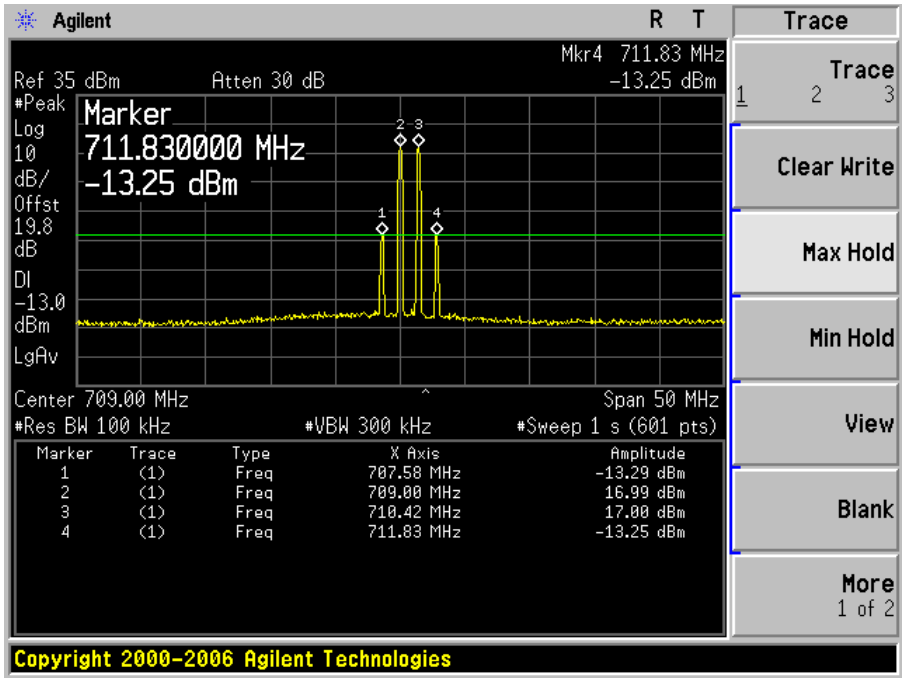
Inter-modulation:

Middle Channel

Input



Output



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 Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28
Agilent	Spectrum Analyzer	E4446A	US44300386	2011-08-11

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

9.4 Test Environmental Conditions

Temperature:	20-25°C
Relative Humidity:	42-46 %
ATM Pressure:	101-102 kPa

The testing was performed by Lionel Lara from 2011-09-12 to 2011-09-16 at RF Site.

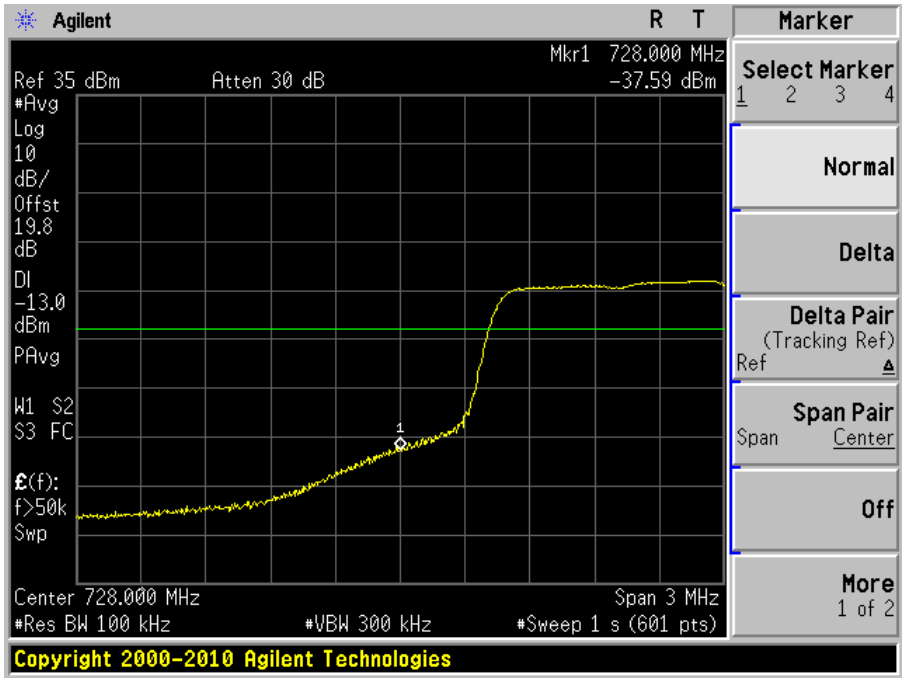
9.5 Test Results

Please refer to the following plots.

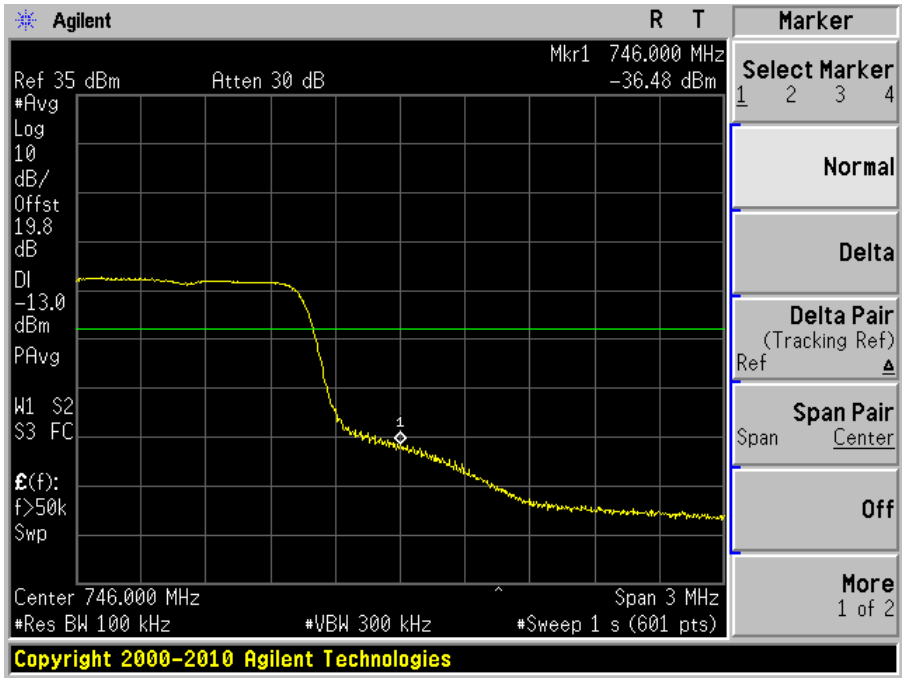
DL: 728-746 MHz

Modulation: LTE-QPSK (1.4 MHz):

Plot 1: Lowest Edge

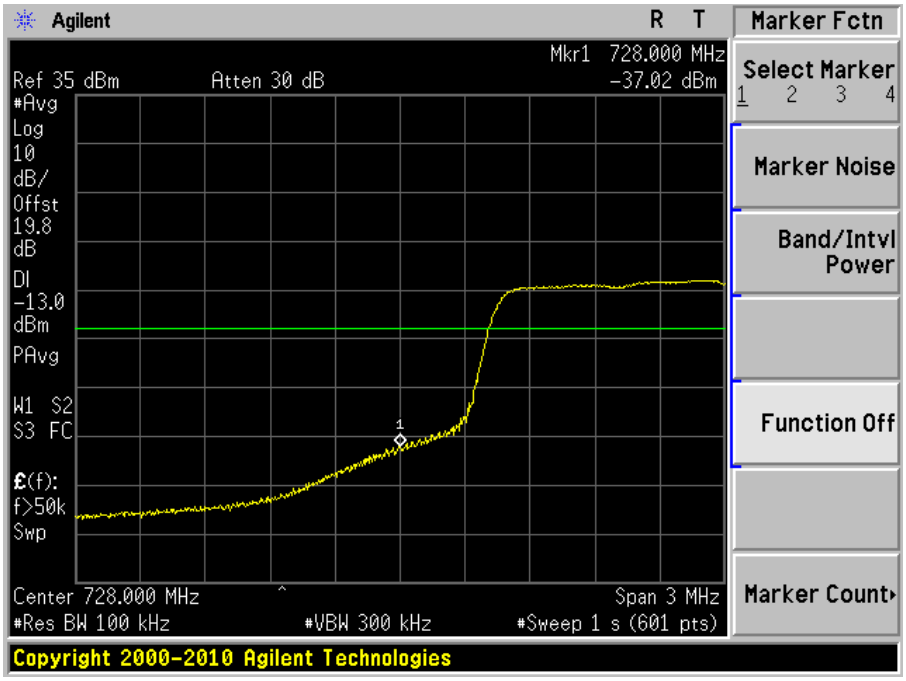


Plot 2: Highest Edge

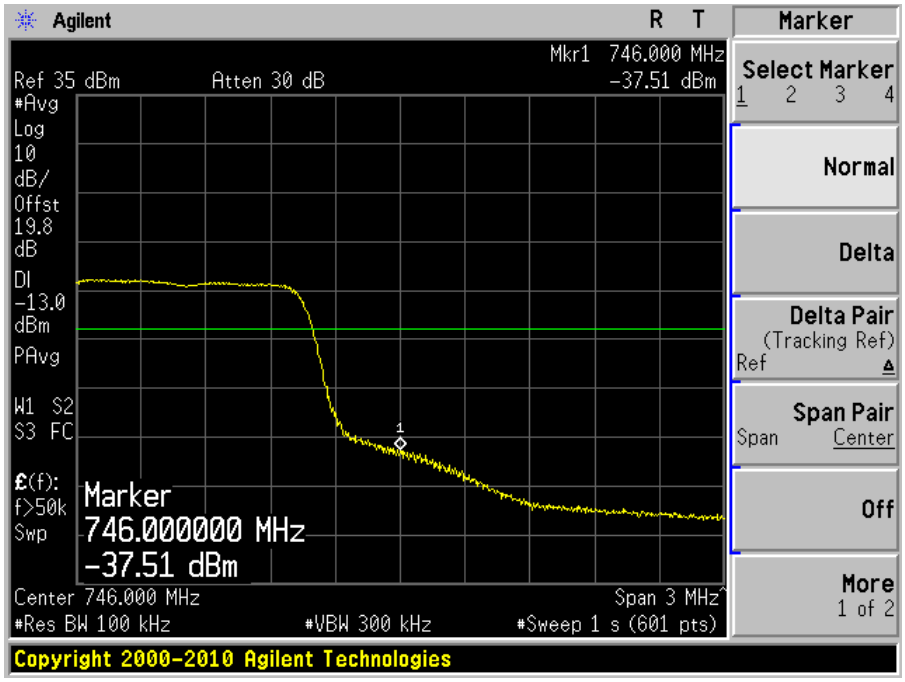


Modulation: LTE-16QAM (1.4 MHz):

Plot 1: Lowest Edge

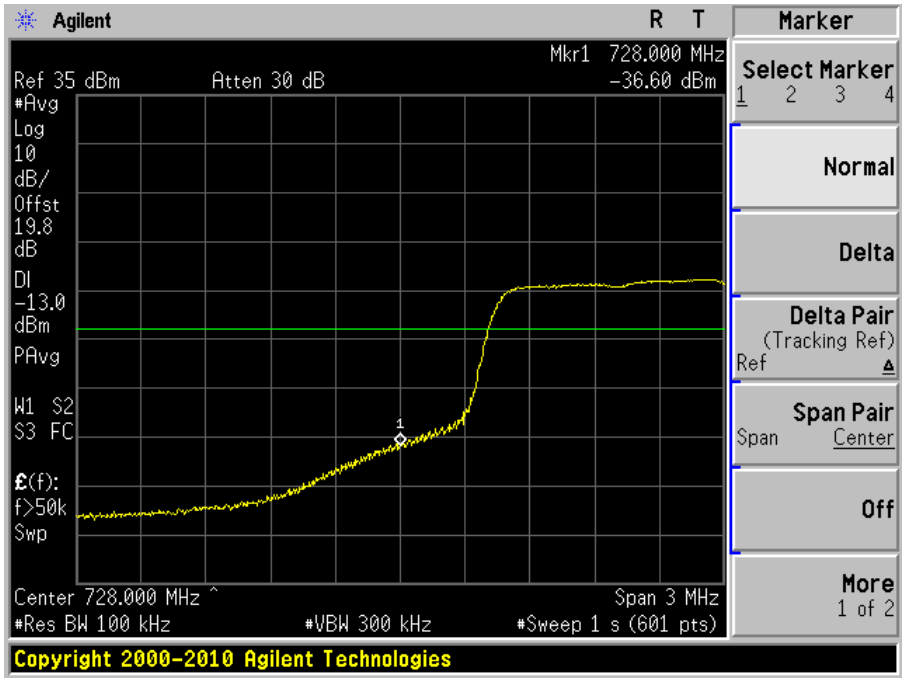


Plot 2: Highest Edge

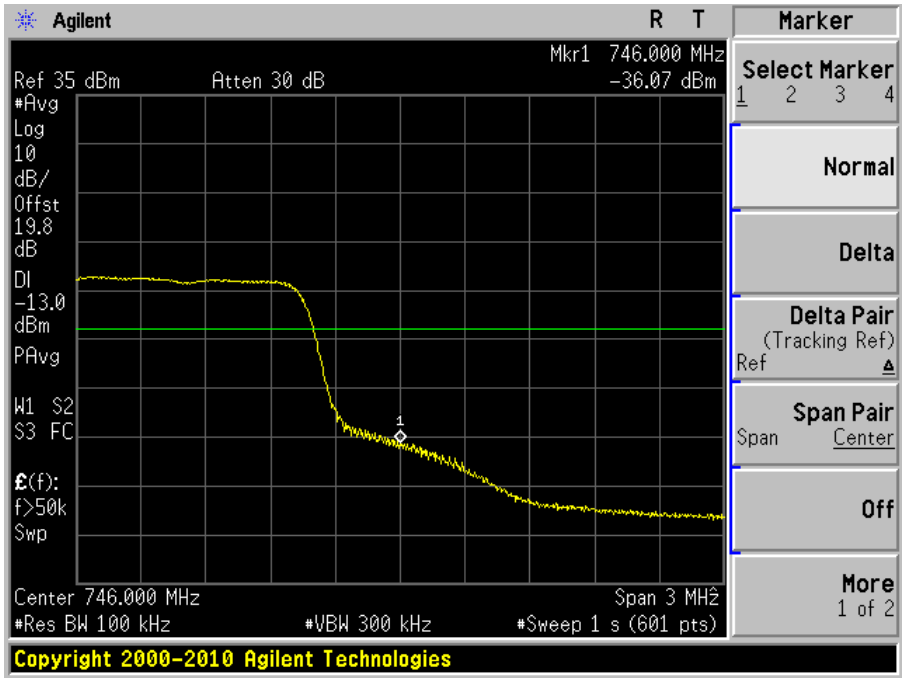


Modulation: LTE-64QAM (1.4 MHz):

Plot 1: Lowest Edge

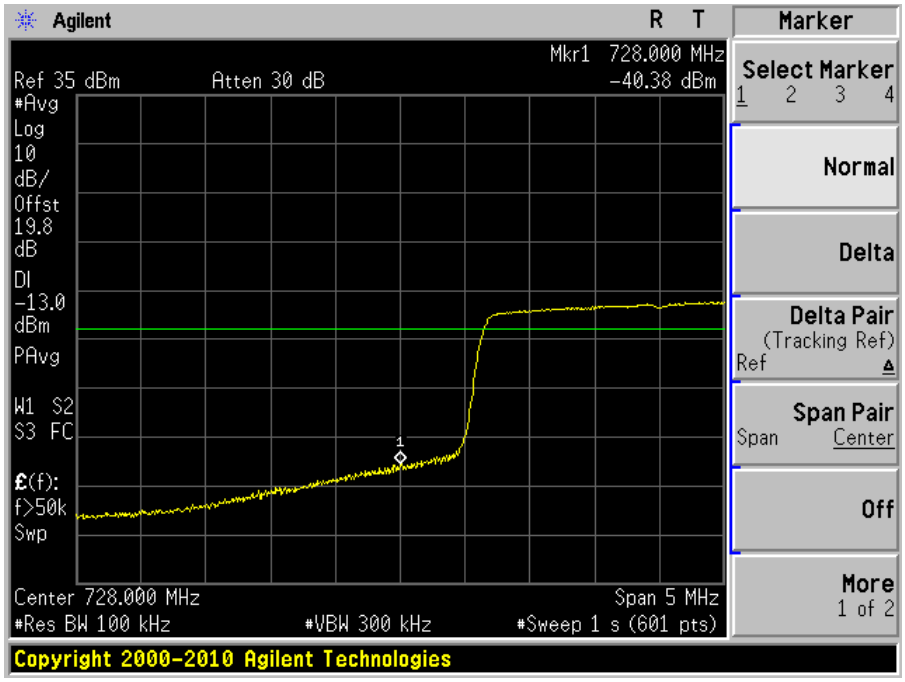


Plot 2: Highest Edge

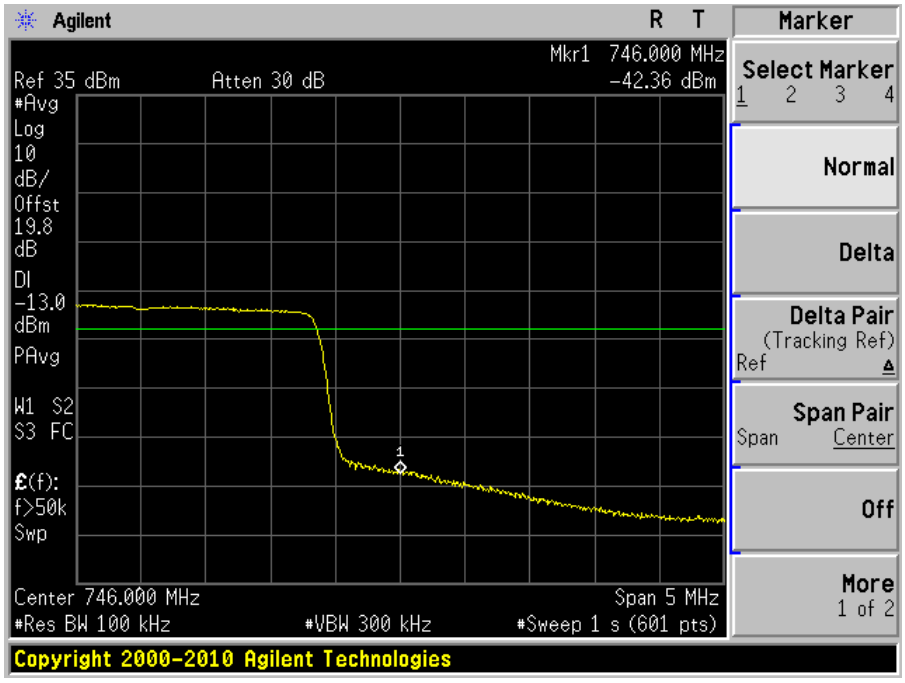


Modulation: LTE-QPSK (3 MHz):

Plot 1: Lowest Edge

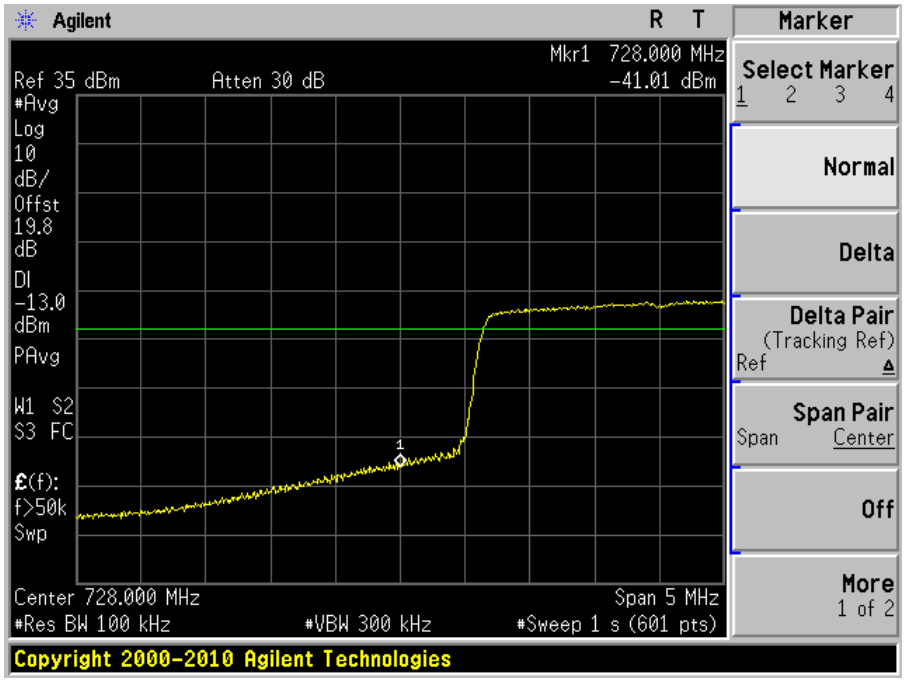


Plot 2: Highest Edge

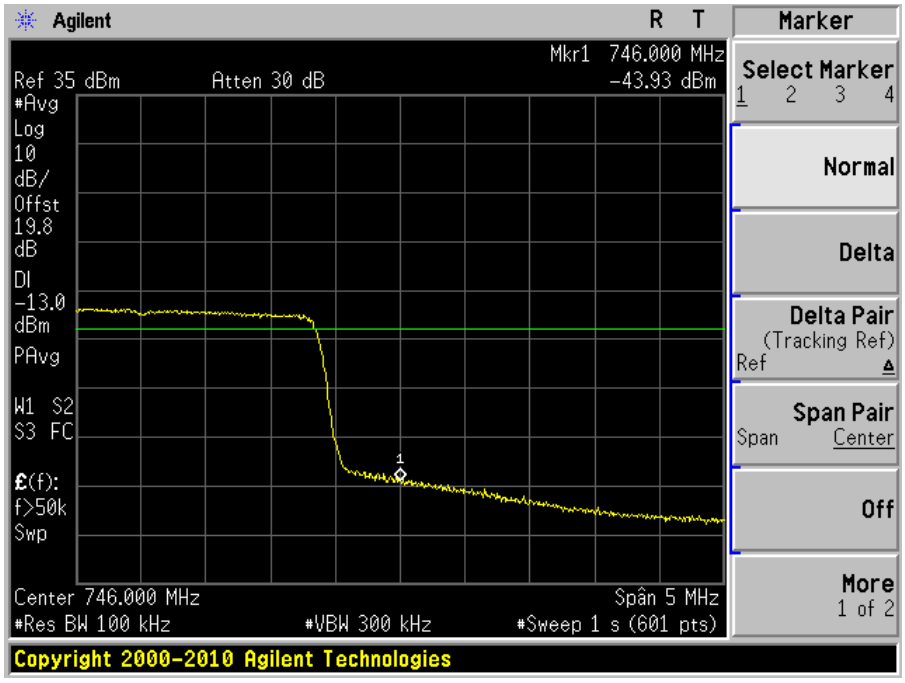


Modulation: LTE-16QAM (3 MHz):

Plot 1: Lowest Edge

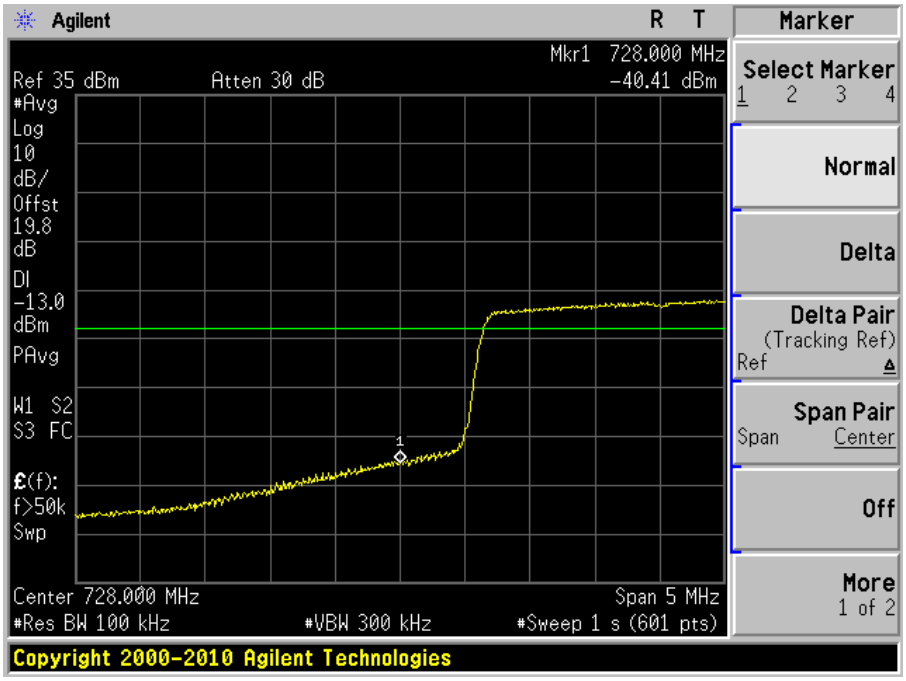


Plot 2: Highest Edge

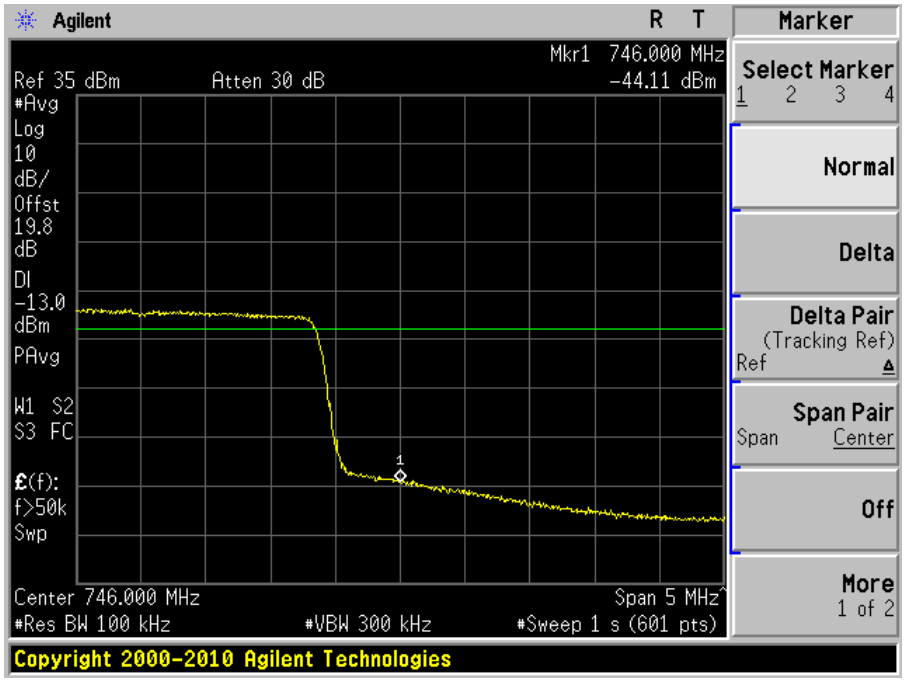


Modulation: LTE-64QAM (3 MHz):

Plot 1: Lowest Edge

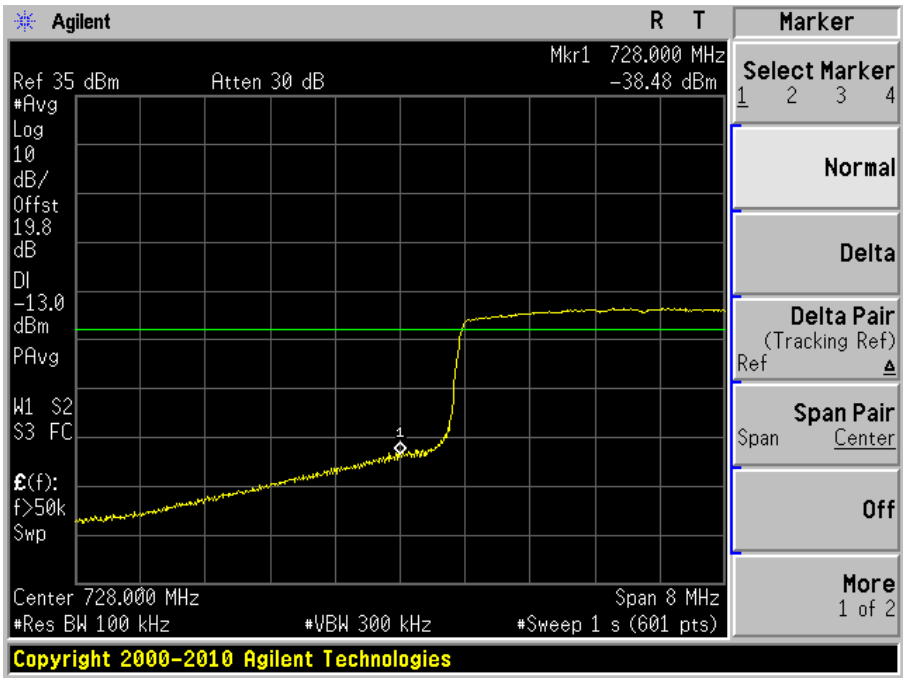


Plot 2: Highest Edge

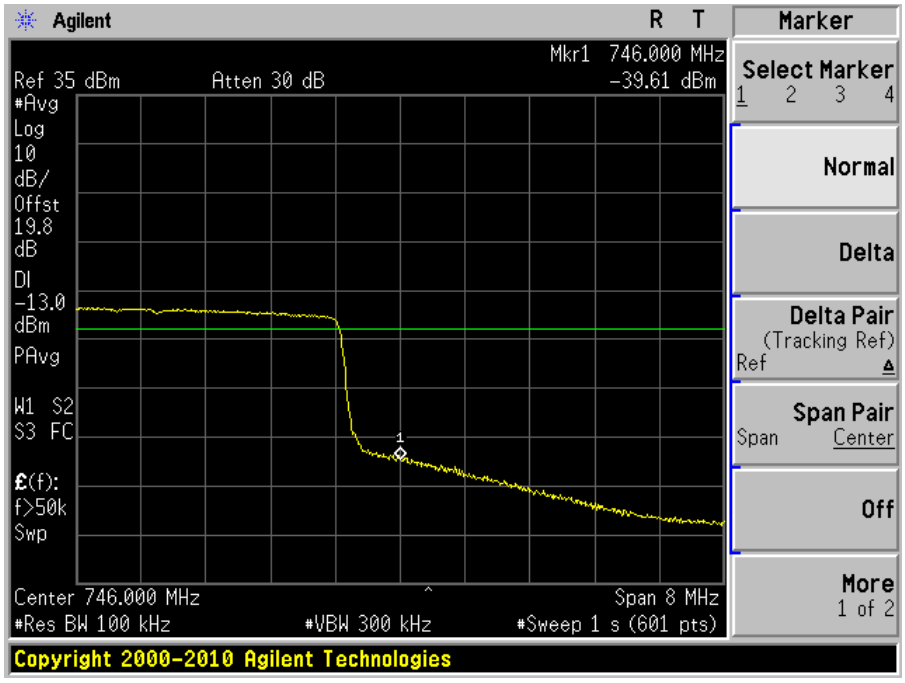


Modulation: LTE-QPSK (5 MHz):

Plot 1: Lowest Edge

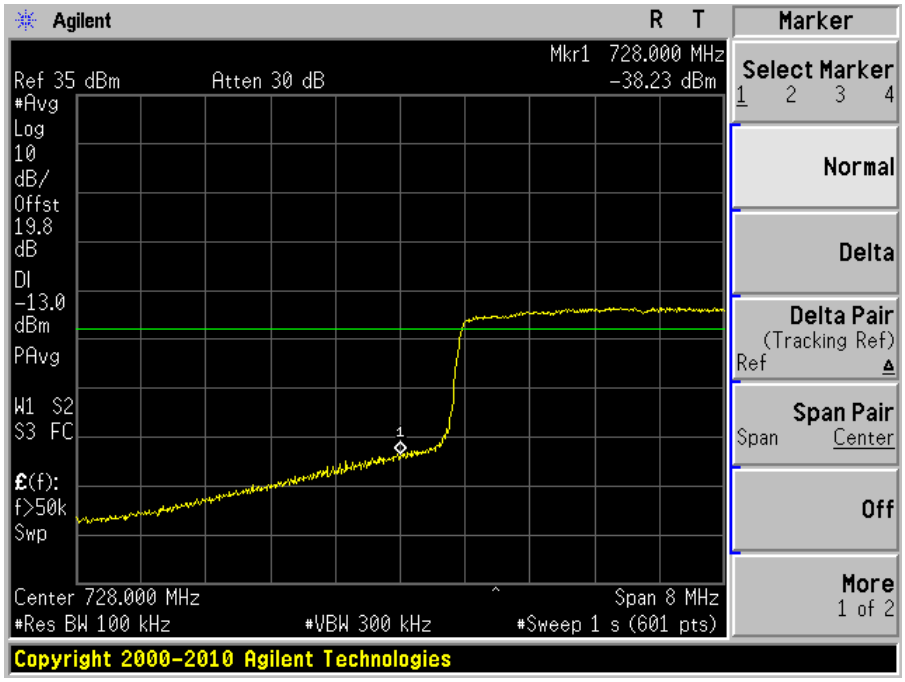


Plot 2: Highest Edge

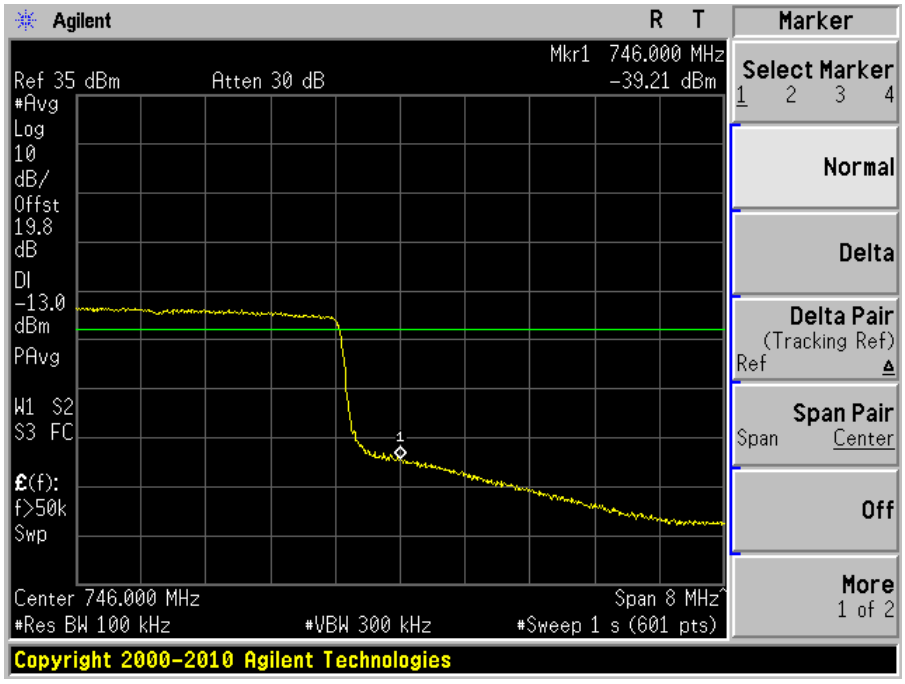


Modulation: LTE-16QAM (5 MHz):

Plot 1: Lowest Edge

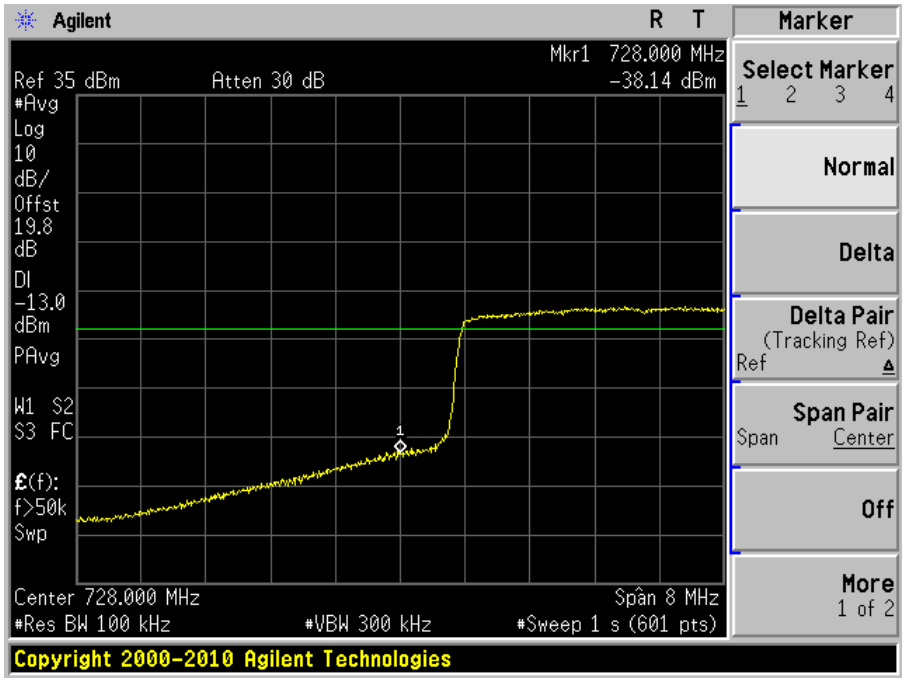


Plot 2: Highest Edge

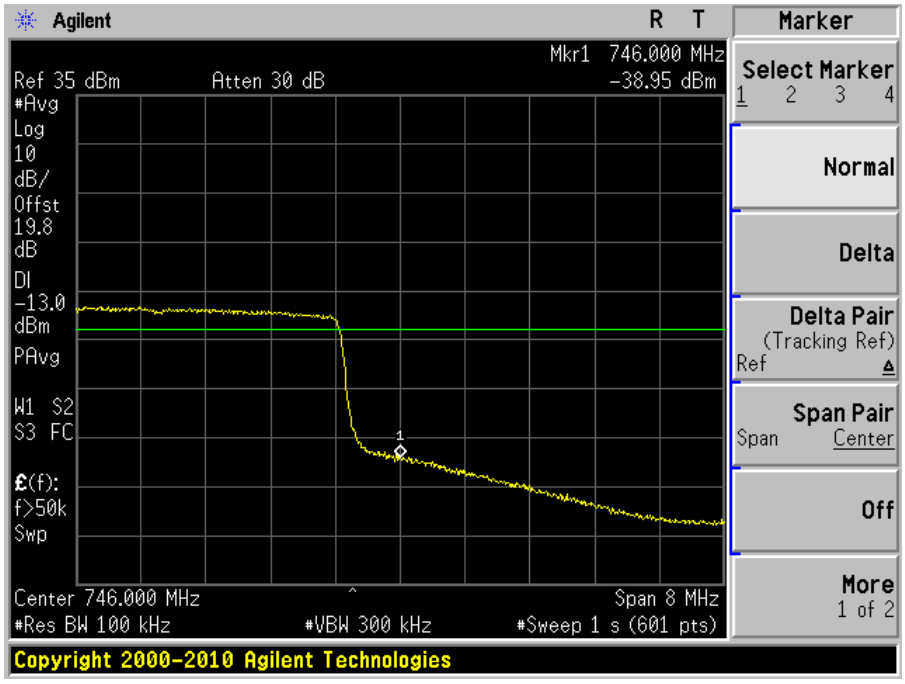


Modulation: LTE-64QAM (5 MHz):

Plot 1: Lowest Edge

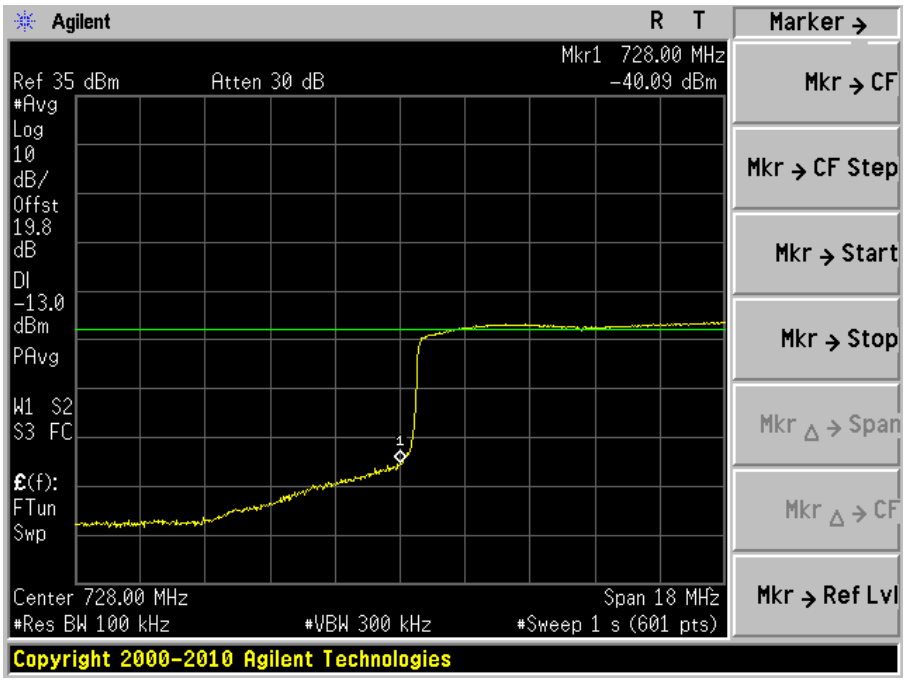


Plot 2: Highest Edge

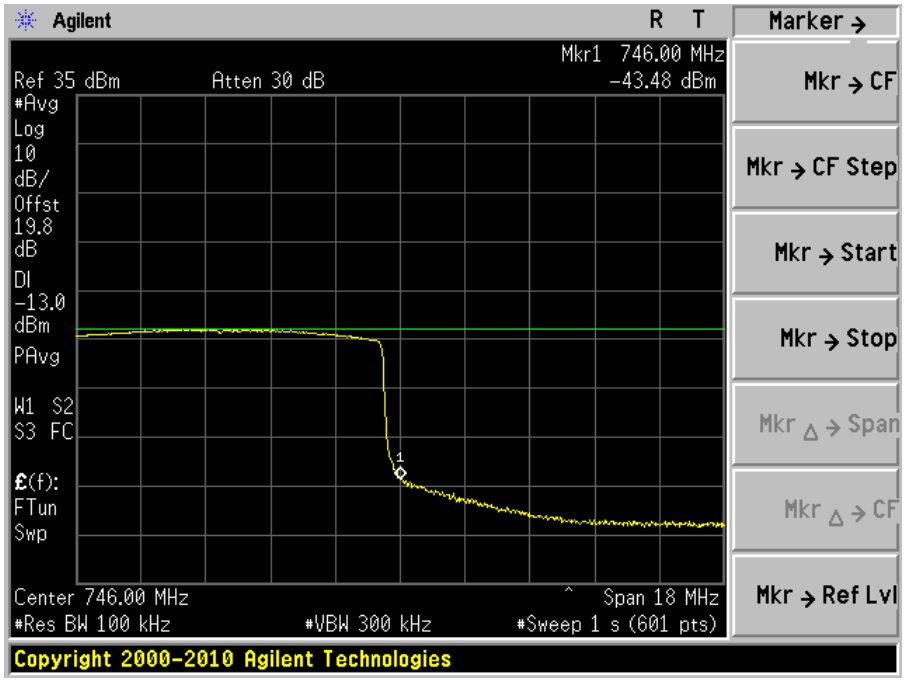


Modulation: LTE-QPSK (10 MHz):

Plot 1: Lowest Edge

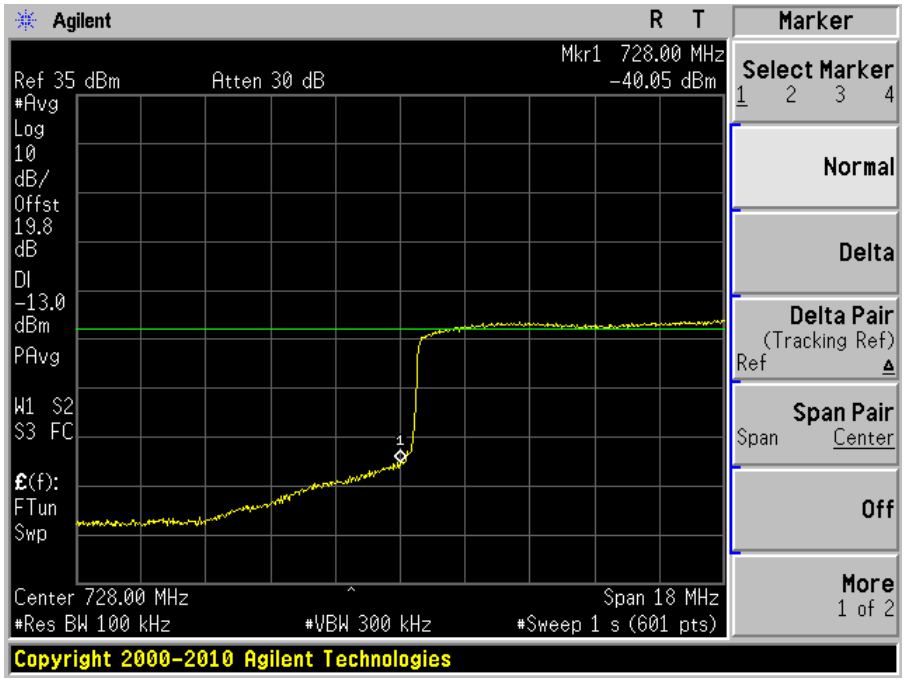


Plot 2: Highest Edge

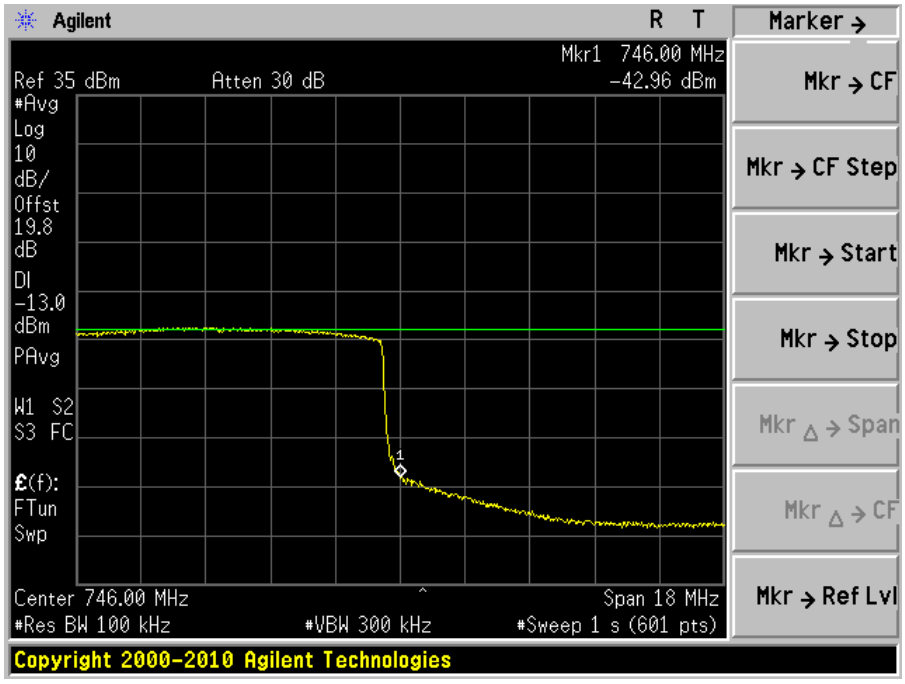


Modulation: LTE-16QAM (10 MHz):

Plot 1: Lowest Edge

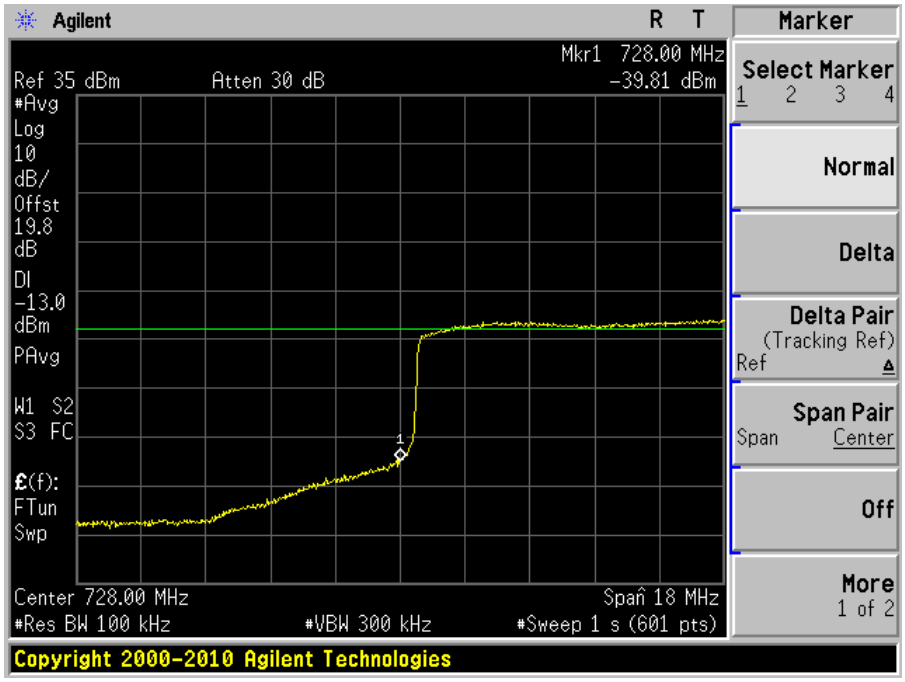


Plot 2: Highest Edge

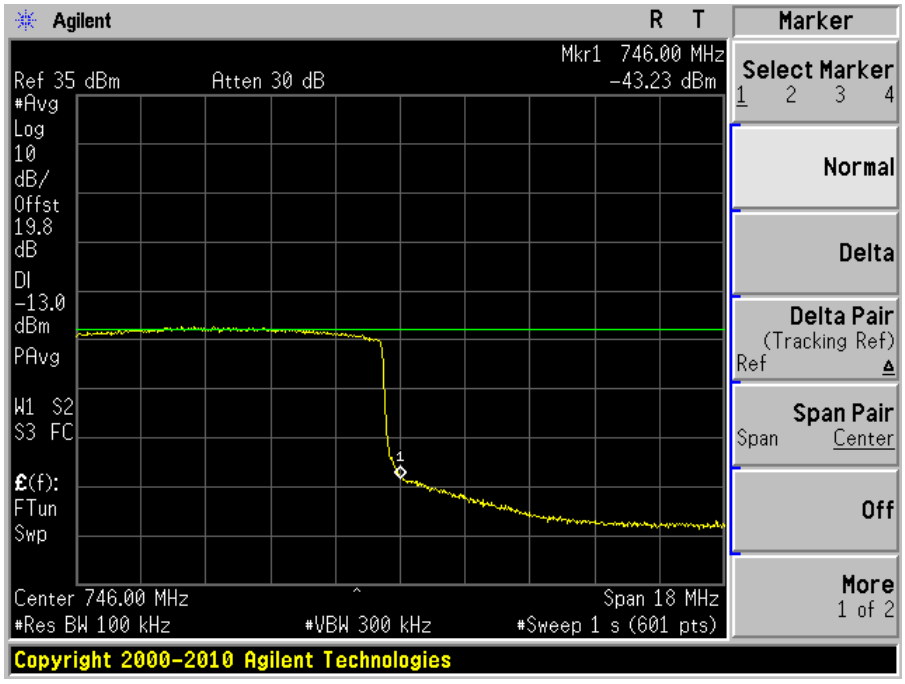


Modulation: LTE-64QAM (10 MHz):

Plot 1: Lowest Edge



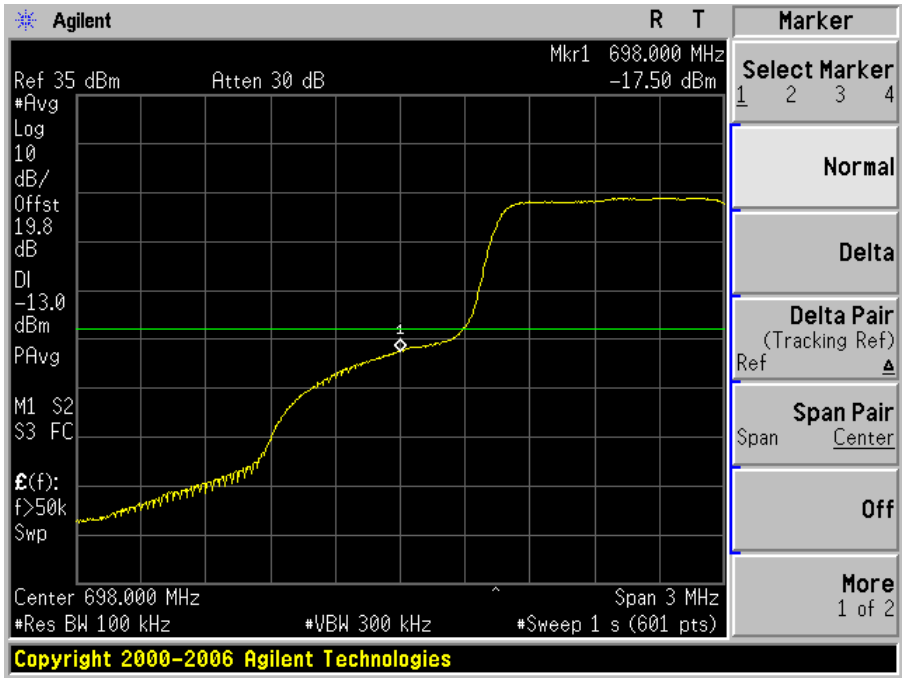
Plot 2: Highest Edge



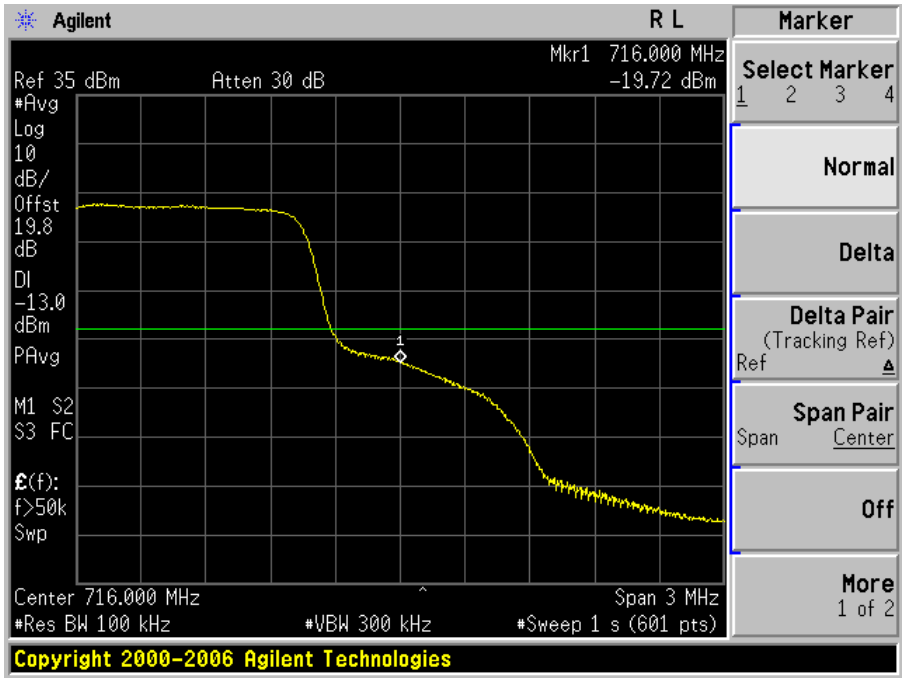
UL: 698-716 MHz

Modulation: LTE-QPSK (1.4 MHz):

Plot 1: Lowest Edge

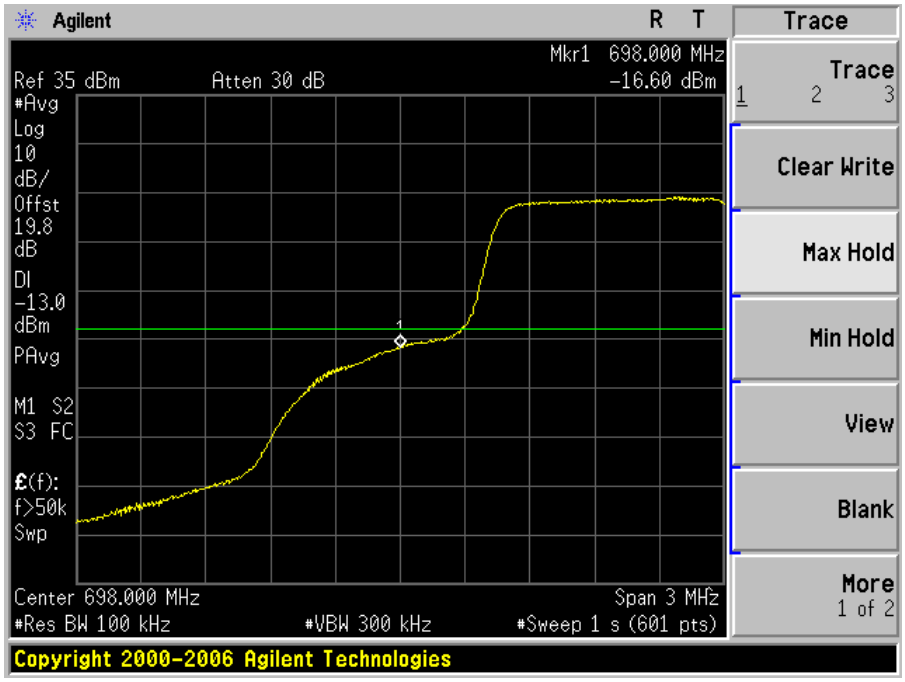


Plot 2: Highest Edge

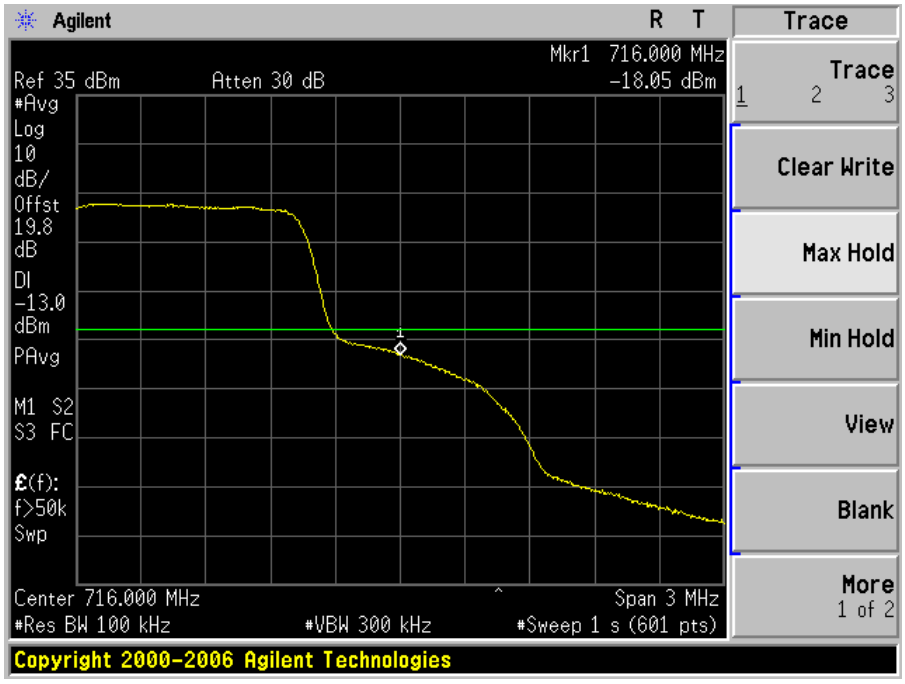


Modulation: LTE-16QAM (1.4 MHz):

Plot 1: Lowest Edge

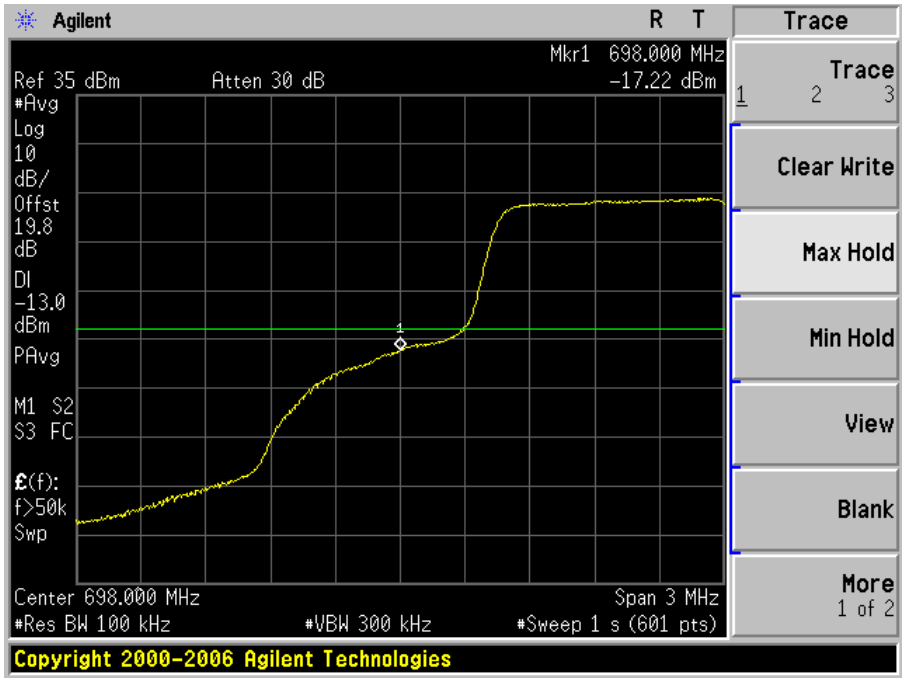


Plot 2: Highest Edge

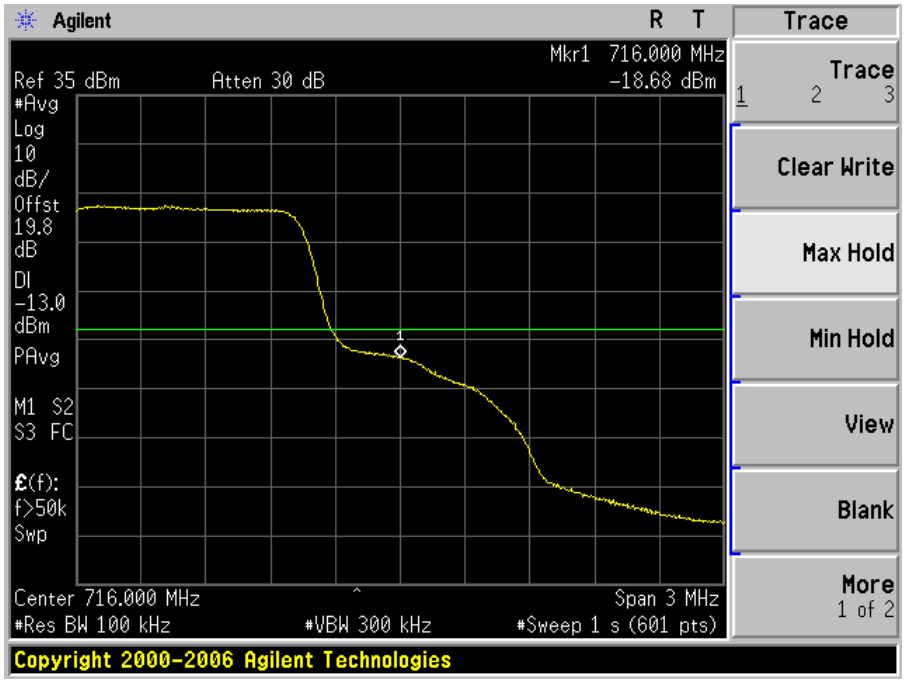


Modulation: LTE-64QAM (1.4 MHz):

Plot 1: Lowest Edge

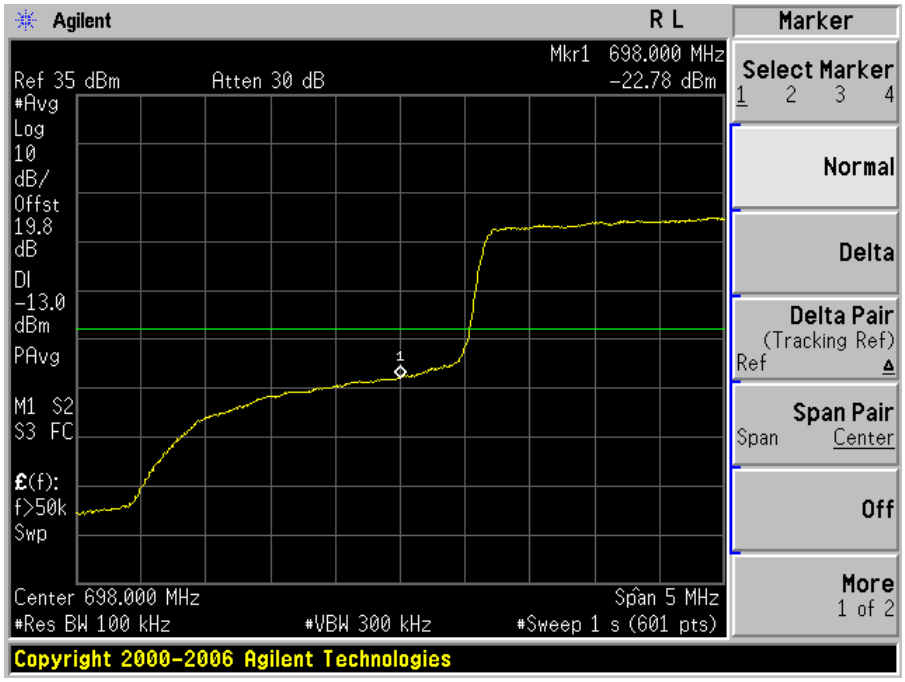


Plot 2: Highest Edge

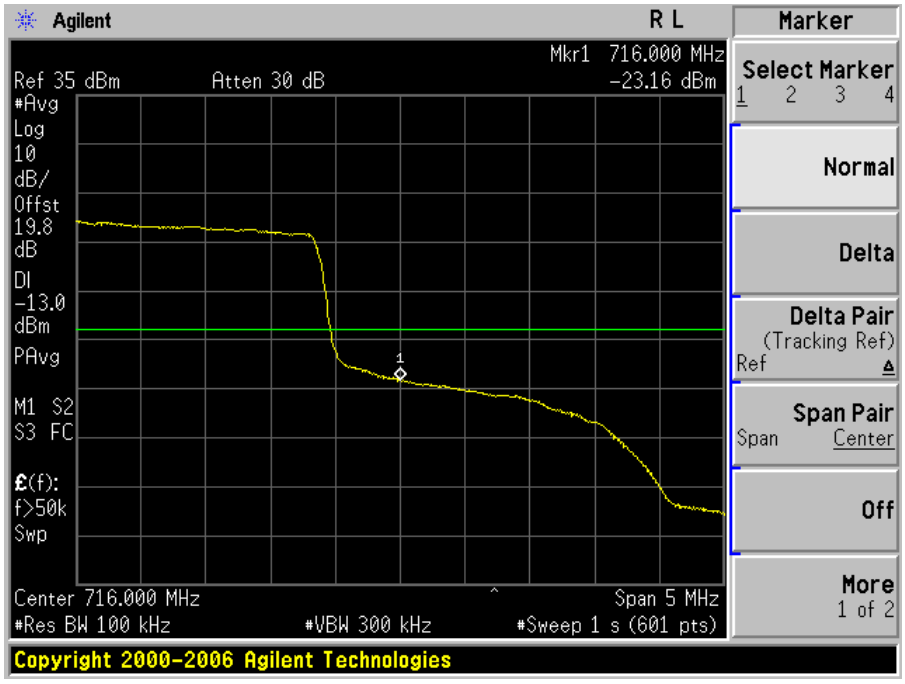


Modulation: LTE-QPSK (3 MHz):

Plot 1: Lowest Edge

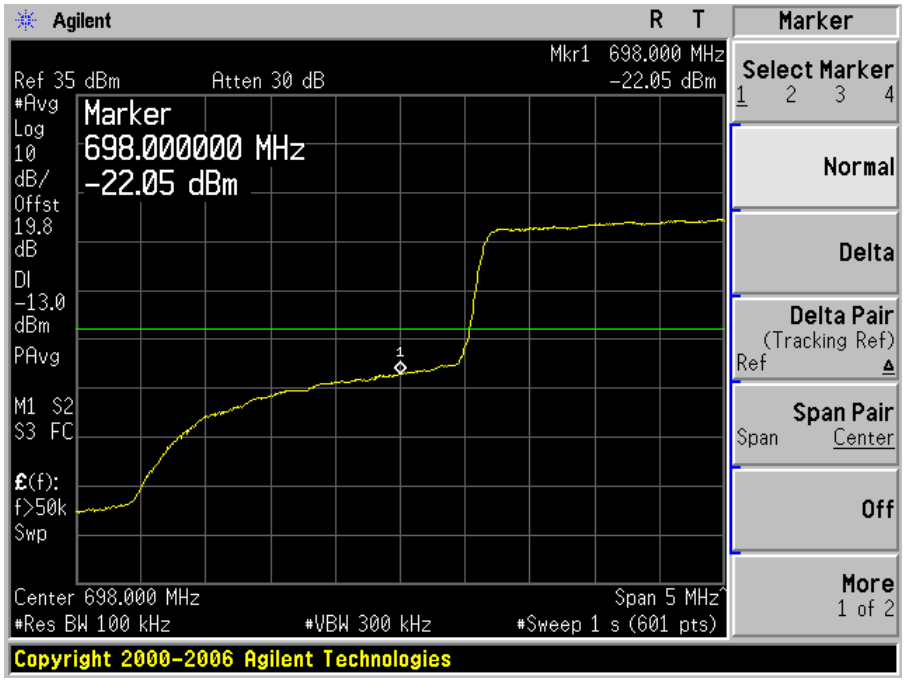


Plot 2: Highest Edge

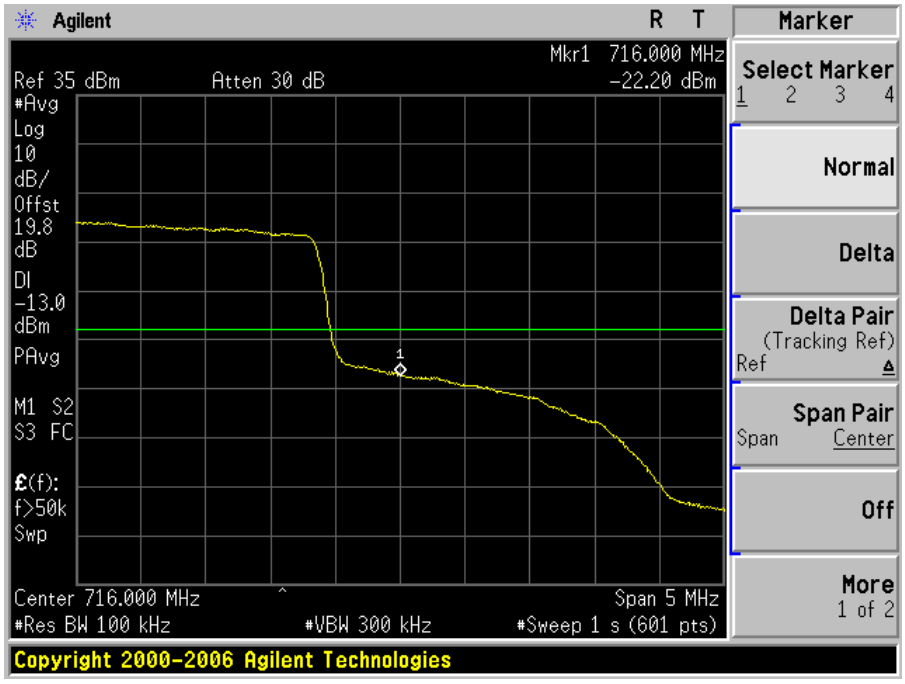


Modulation: LTE-16QAM (3 MHz):

Plot 1: Lowest Edge

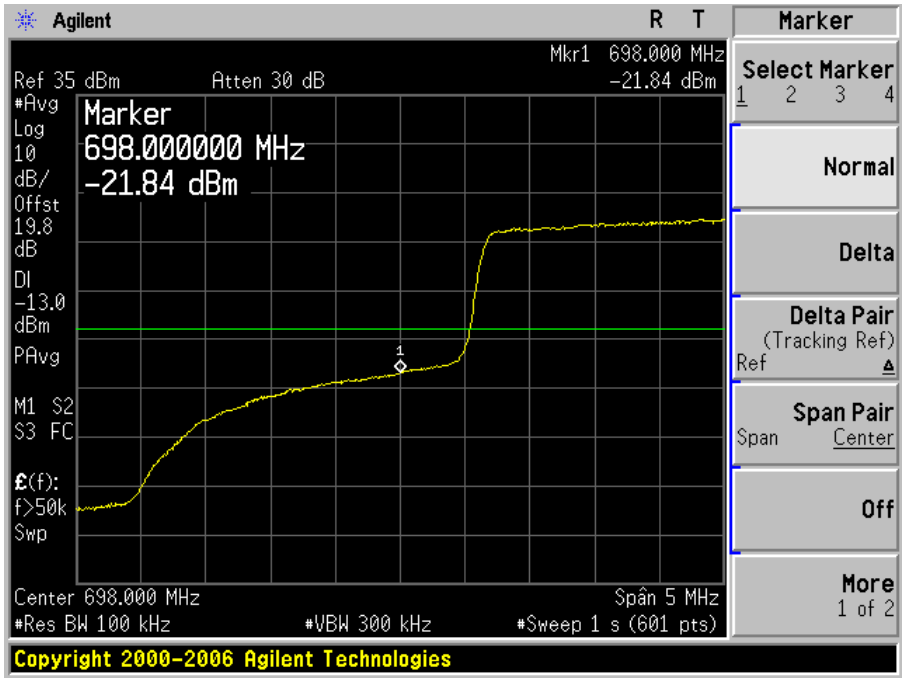


Plot 2: Highest Edge

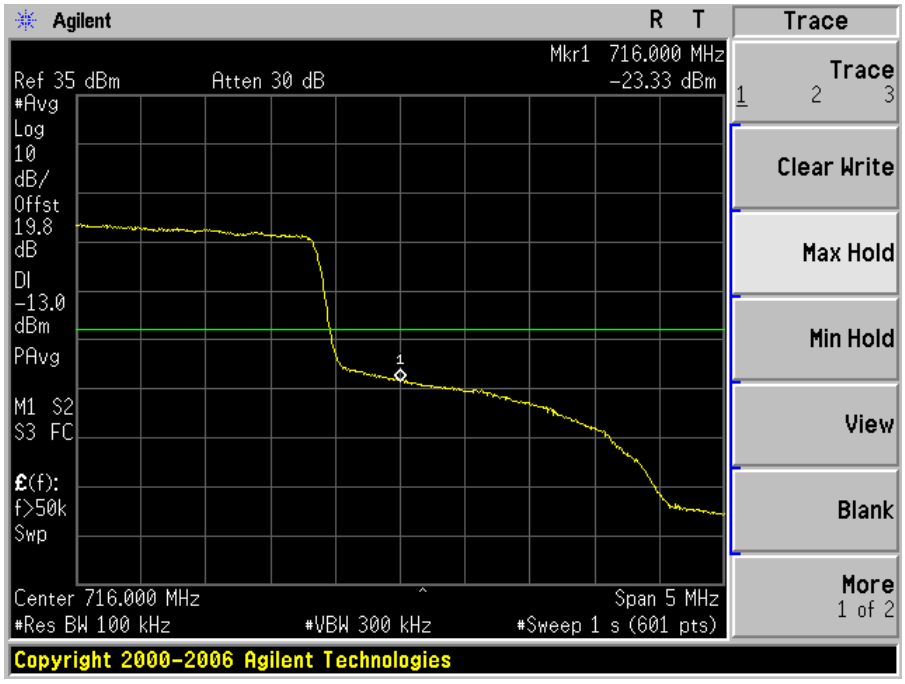


Modulation: LTE-64QAM (3 MHz):

Plot 1: Lowest Edge

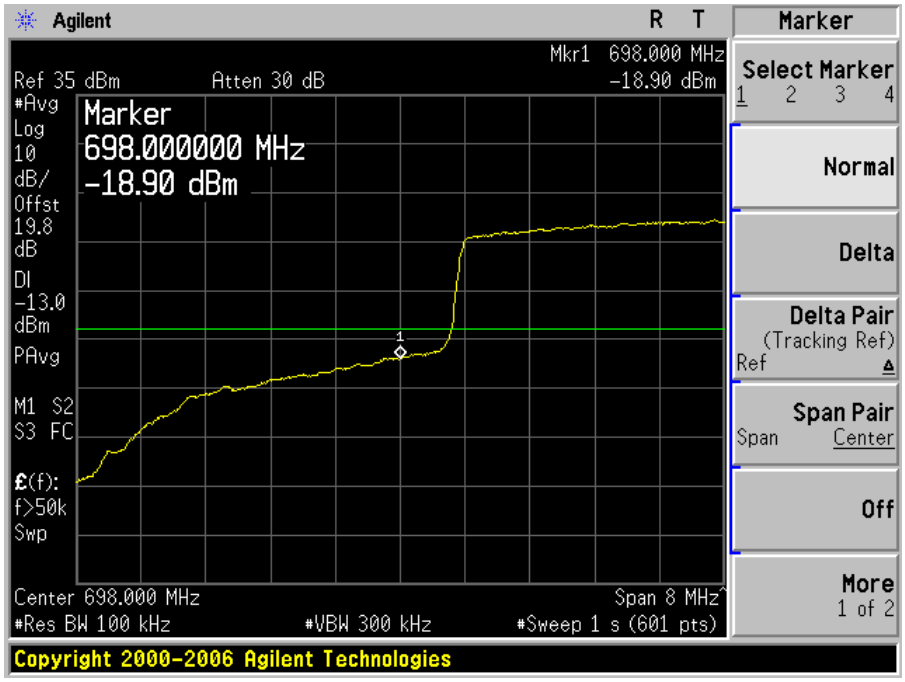


Plot 2: Highest Edge

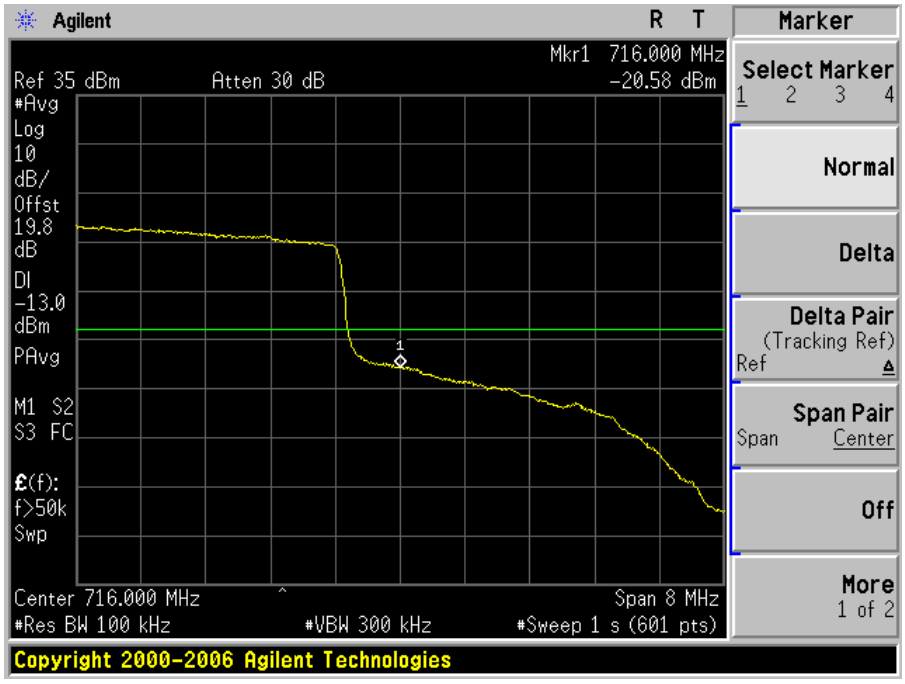


Modulation: LTE-QPSK (5 MHz):

Plot 1: Lowest Edge

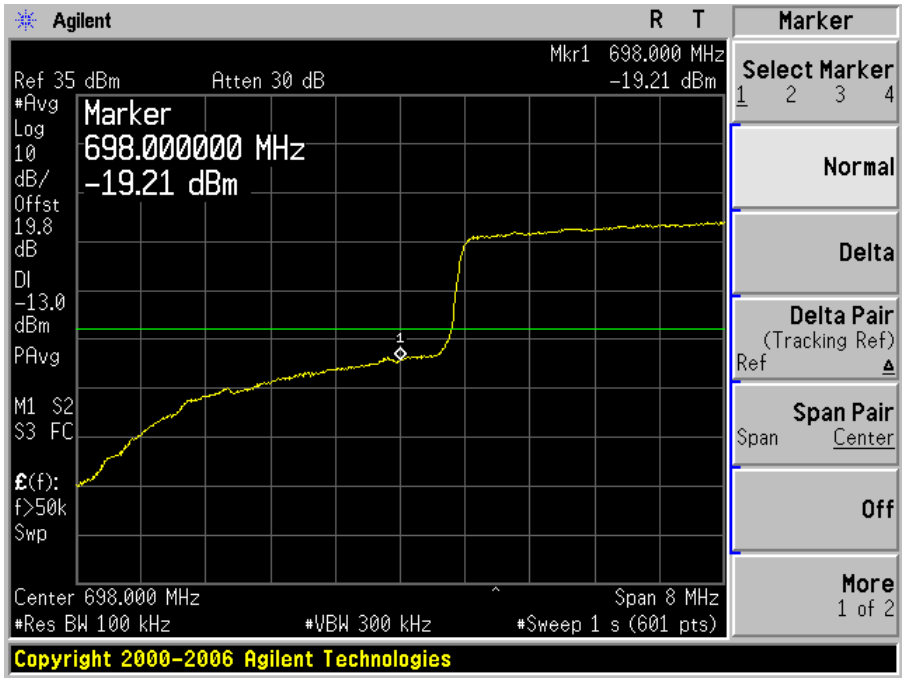


Plot 2: Highest Edge

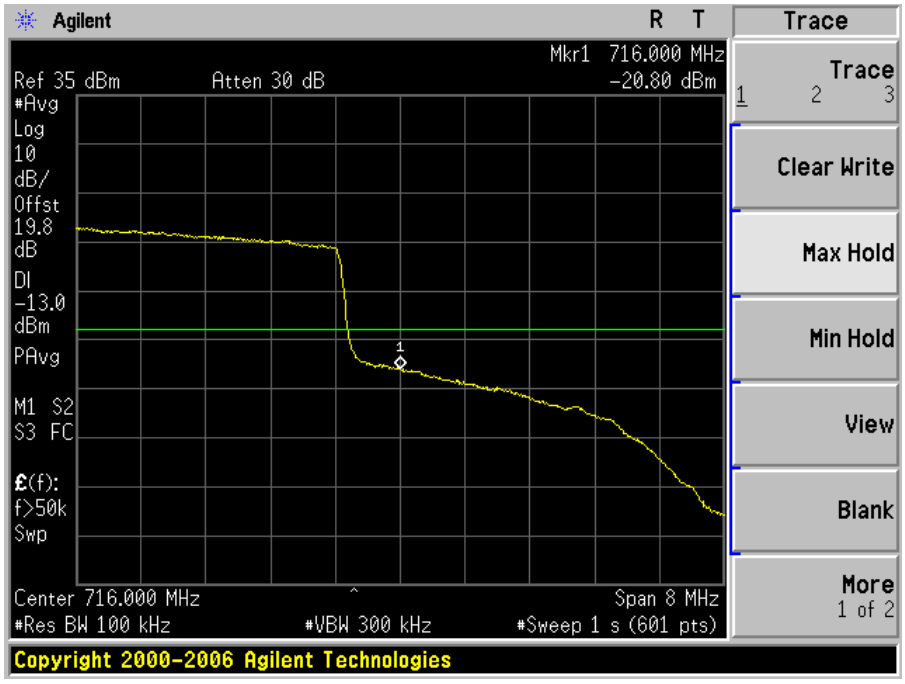


Modulation: LTE-16QAM (5 MHz):

Plot 1: Lowest Edge

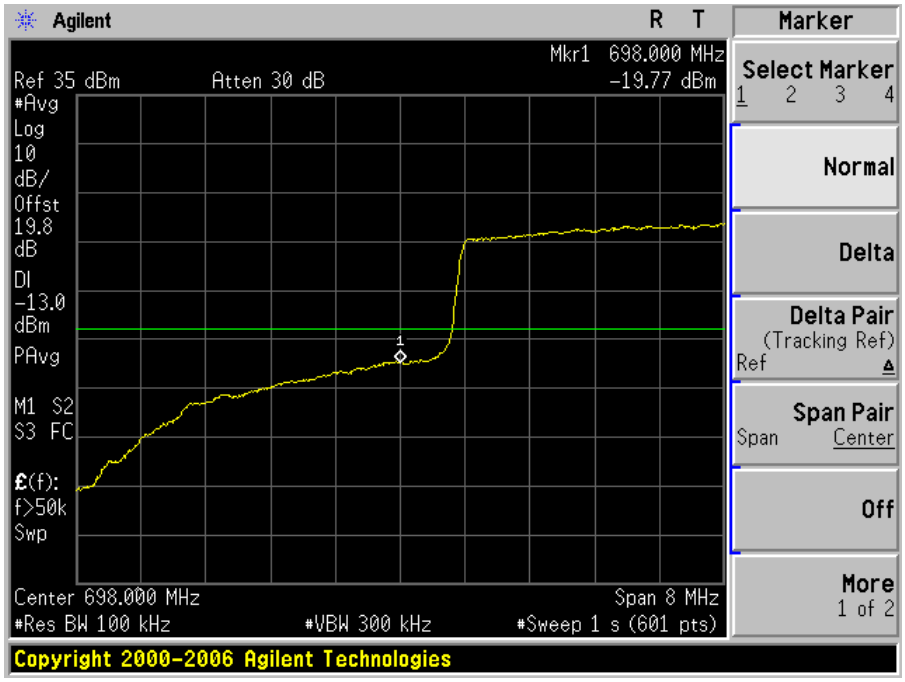


Plot 2: Highest Edge

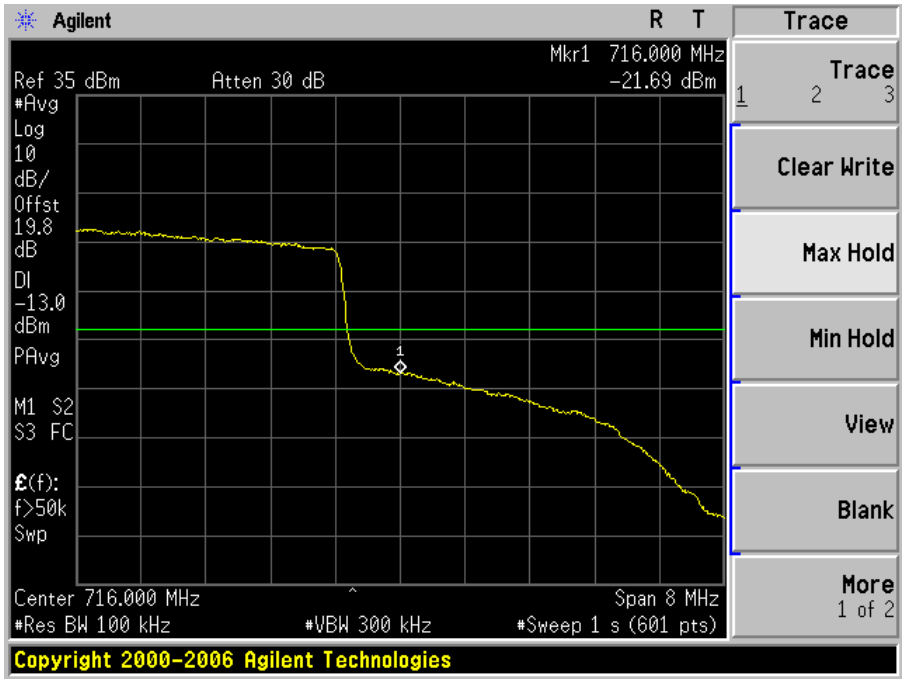


Modulation: LTE-64QAM (5 MHz):

Plot 1: Lowest Edge

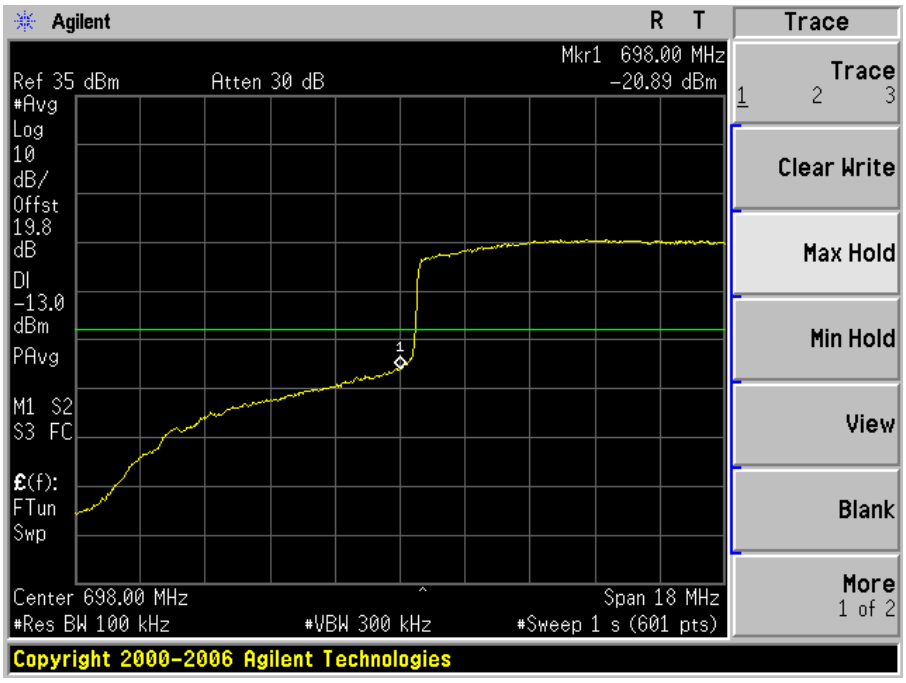


Plot 2: Highest Edge



Modulation: LTE-QPSK (10 MHz):

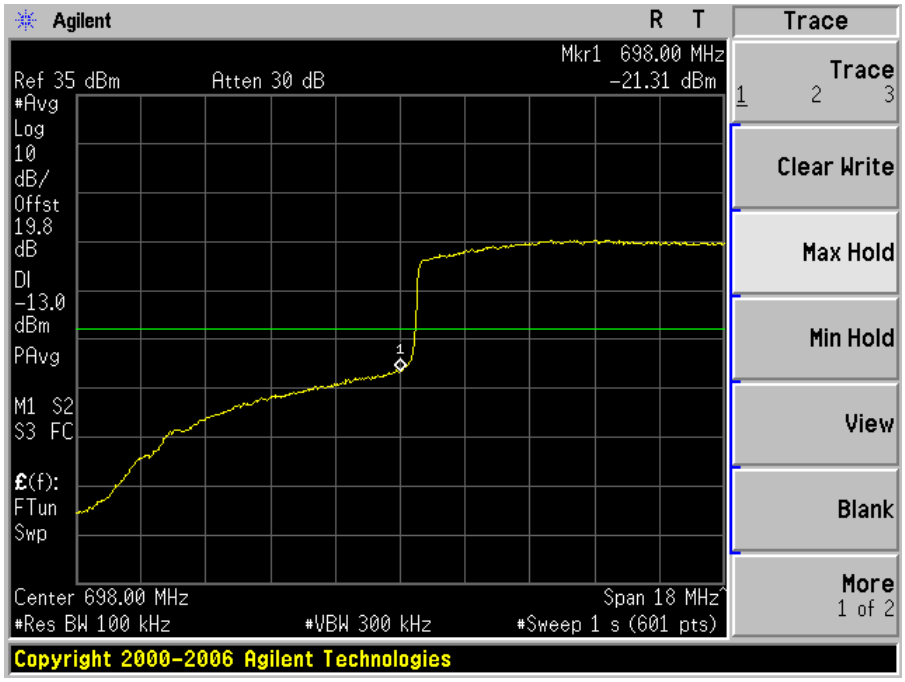
Plot 1: Lowest Edge



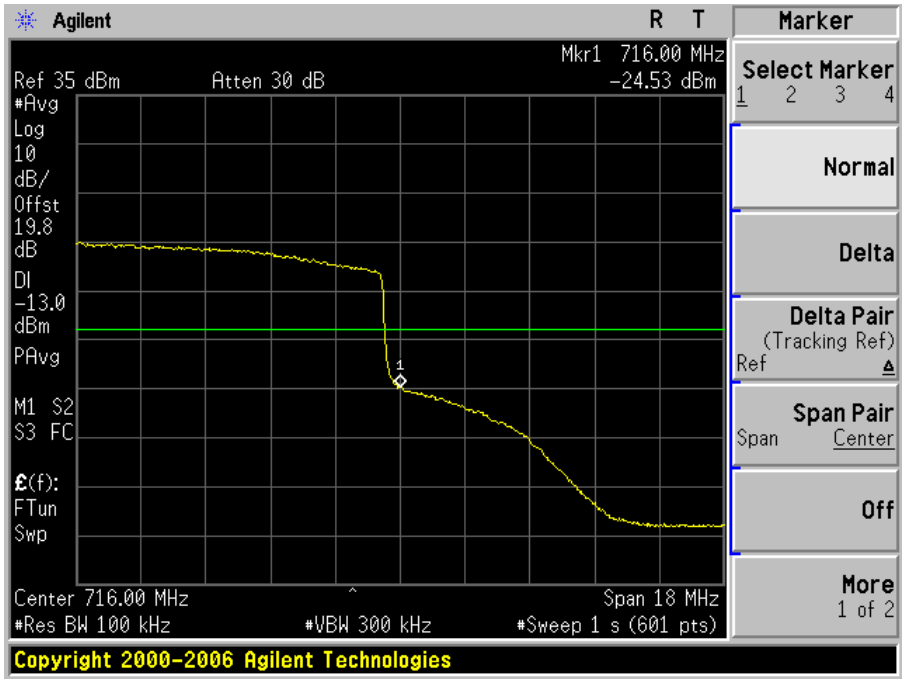
Plot 2: Highest Edge

Modulation: LTE-16QAM (10 MHz):

Plot 1: Lowest Edge

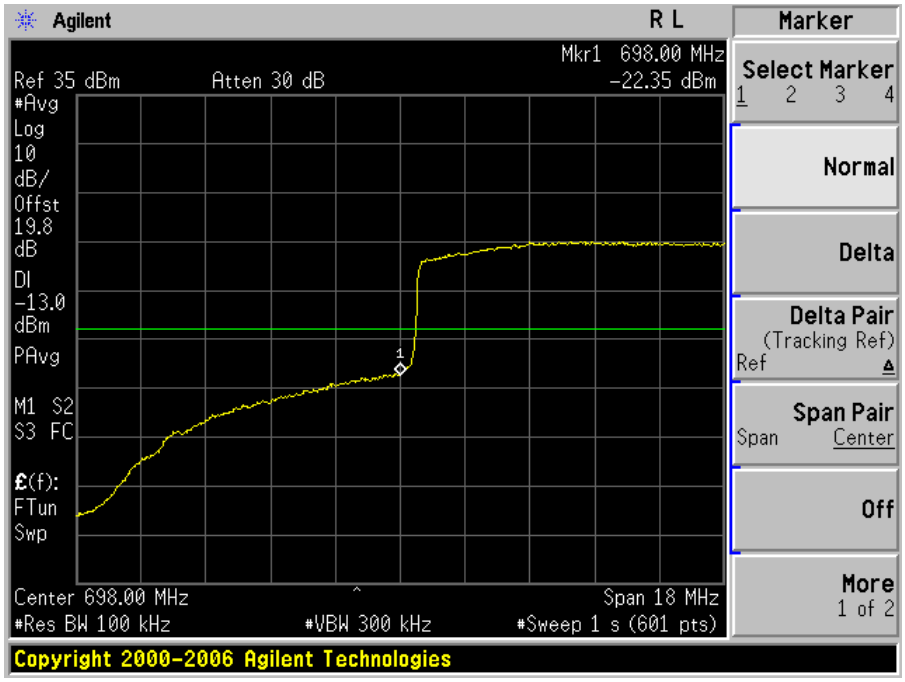


Plot 2: Highest Edge



Modulation: LTE-64QAM (10 MHz):

Plot 1: Lowest Edge



Plot 2: Highest Edge

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 an amplifier; the signal source is from the signal generator, so no frequency stability applied.

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

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: 728-746 MHz

Maximum peak output power at antenna input terminal (dBm):	7.28
Maximum peak output power at antenna input terminal (mW):	5.346
Prediction distance (cm):	25
Prediction frequency (MHz):	733
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.11
Power density at predication frequency and distance (mW/cm^2):	0.017
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.489

(Note: The MPE was calculated assuming the cable loss between EUT and the antenna was 0 dB.)

UL: 698-716 MHz

Maximum peak output power at antenna input terminal (dBm):	24.29
Maximum peak output power at antenna input terminal (mW):	268.534
Prediction distance (cm):	60
Prediction frequency (MHz):	701
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.11
Power density at predication frequency and distance (mW/cm^2):	0.149
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.467

(Note: The MPE was calculated assuming the cable loss between EUT and the antenna was 0 dB.)

Test Result

For downlink, the indoor antenna with 14 dBi gain should have at least 25 cm prediction distance to meet the MPE limit. For uplink, the outdoor antenna with 14 dBi gain should have at least 60 cm prediction distance to meet the MPE limit. The distance needs to be addressed in the user manual.