FCC PART 24E

TEST AND MEASUREMENT REPORT

For

Whoop Wireless, Inc.

5913 NW 31st Ave., Fort Lauderdale,

Germantown, FL 33309, USA

FCC ID: 2AEQJ-CP4-001

Report Type:	Product Type:
Original Report	Industrial Booster

Prepared By:	Ronak Patel Test Engineer
Report Number:	R1506022-24 Rev B
Report Date:	2015-07-29
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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1506022-24	Original Report	2015-07-09
1	R1506022-24 Rev A	Updated test data	2015-07-27
2	R1506022-24 Rev B	Updated test data	2015-07-29

1 General Information

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Whoop Wireless, Inc.* and their product model: CP4-001, FCC ID: 2AEQJ-CP4-001, which will henceforth be referred to as the EUT (Equipment under Test). The EUT is a cellular band amplifier for both downlink and uplink. The EUT operates in the frequency band of 1900MHz for LTE, GSM, CDMA and WCDMA in uplink and downlink.

1.2 Mechanical Description

The EUT measures approximately 17cm (L) x 13cm (W) x3cm (H) and weighs 1kg.

The test data gathered are from typical production sample, serial number: R1506022-1, assigned by BACL.

1.3 Objective

This type approval report is prepared on behalf of *Whoop Wireless, Inc.* in accordance with Part 2, Subpart J, Part 20.21, Part 24 Subpart E, of the Federal Communication Commission's rules.

The objective is to determine compliance with FCC/IC rules for RF output power, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation and band edge

1.4 Related Submittal(s)/Grant(s)

No Related Submittals

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 20.21 – Signal Boosters
Part 24 Subpart E – Broadband PCS

Applicable Standards: TIA/EIA603-D, C63.4-2014, FCC KDB 935210.

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 CISPR16-4-2:2011, The Treatment of Uncertainty in EMC Measurements, the values ranging from ±2.0 dB for Conducted Emissions tests and ±4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at BACL Corp.

1.7 Test Facility

Bay area compliance Laboratories Corp. (BACL) is:
1- An independent Commercial Test Laboratory accredited to **ISO 17025: 2005** by **A2LA**, in the fields of: Electromagnetic Compatibility & Telecommunications covering Emissions, Immunity, Radio, RF Exposure, Safety and Telecom. This includes NEBS (Network Equipment Building System), Wireless RF, Telecommunications Terminal Equipment (TTE); Network Equipment; Information Technology Equipment (ITE); Medical Electrical Equipment; Industrial, Commercial, and Medical Test Equipment; Professional Audio and Video Equipment; Electronic (Digital) Products; Industrial and Scientific Instruments; Cabled Distribution Systems and Energy Efficiency Lighting.

2- An ENERGY STAR Recognized Laboratory, for the LM80 Testing, a wide variety of Luminares and Computers.

3- A NIST Designated Phase-I and Phase-II CAB including: ACMA (Australian Communication and Media Authority), BSMI (Bureau of Standards, Metrology and Inspection of Taiwan), IDA (Infocomm Development Authority of Singapore), IC(Industry Canada), Korea (Ministry of Communications Radio Research Laboratory), NCC (Formerly DGT; Directorate General of Telecommunication of Chinese Taipei) OFTA (Office of the Telecommunications Authority of Hong Kong), Vietnam, VCCI - Voluntary Control Council for Interference of Japan and a designated EU CAB (Conformity Assessment Body) (Notified Body) for the EMC and R&TTE Directives.

4- A Product Certification Body accredited to **ISO Guide 65:1996** by **A2LA** to certify:
1- Unlicensed, Licensed radio frequency devices and Telephone Terminal Equipment for the FCC. Scope A1, A2, A3, A4, B1, B2, B3, B4 & C.
2. Radio Standards Specifications (RSS) in the Category I Equipment Standards List and All Broadcasting Technical Standards (BETS) in Category I Equipment Standards List for Industry Canada.
3. Radio Communication Equipment for Singapore.
4. Radio Equipment Specifications, GMDSS Marine Radio Equipment Specifications, and Fixed Network Equipment Specifications for Hong Kong.
5. Japan MIC Telecommunication Business Law (A1, A2) and Radio Law (B1, B2 and B3).
6. Audio/Video, Battery Charging Systems, Computers, Displays, Enterprise Servers, Imaging Equipment, Set-Top Boxes, Telephony, Televisions, Ceiling Fans, CFLs (Including GU24s),Decorative Light Strings, Integral LED Lamps, Luminaires, Residential Ventilating Fans.

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

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

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

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

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

2 System Test Configuration

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-D.
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. The device was set to normal operating mode.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 EUT Internal Configuration

Manufacturer	Description	Model	Serial Number
Zore Access Tech	30-00010-PCB	CP4-002 REV A	-

2.5 Local Support Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers
Dell	Laptop	Latitude D600	CN-0X2034-48643-3A6-8307
Agilent	Signal Generator	E4438C	MY45091309
Agilent	Signal Studio for WCDMA/LTE	N7600B	-

2.6 Power Supply and Line Filters

Manufacturers	Descriptions	Models	Serial Numbers
Switching Adapter	AC Adapter	GQ15-050250-CU	-

2.7 Interface Ports and Cabling

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

3 Summary of Test Results

FCC Rules	Description of Tests	Results
§2.1046, §24.232(c)	RF Output Power	Compliant
§2.1049, §24.238(b)	Occupied Bandwidth	Compliant
§2.1053, §24.238(a)	Spurious Radiated Emissions	Compliant
§2.1053, §22.917(a)	Spurious Emissions at Antenna Terminals	Compliant
§2.1053, §22.917(b)	Band Edge	Compliant
§2.1055, §22.355	Frequency Stability	N/A[1]
§20.21	Out of Band Rejection	Compliant
§2.1091	RF Exposure	Compliant

N/A[1] -The unit is a signal booster.

4 FCC §2.1046 & §24.232(c) – RF Output Power

4.1 Applicable Standards

According to FCC §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

4.2 Test Procedure

Conducted:

The EUT was connected to the spectrum analyzer and Signal Generator followed by 50Ω-75Ω matching pad.

4.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2014-10-16	1 year
Agilent	Signal Generator	E4438C	MY45091309	2014-07-15	1 year

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

4.4 Test Environmental Conditions

Temperature:	21-23° C
Relative Humidity:	42-48 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Ronak Patel 2015-06-08 to 2015-06-29 in the RF Site.

4.5 Test Results

ALC OFF

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
GSM/GPRS	1900 MHz Downlink	Low	1930.2	-44.1	12.11	56.21
		Middle	1960.0	-48.1	13.27	61.37
		High	1989.8	-46.1	12.87	58.97
	1900 MHz Uplink	Low	1850.2	-48	11.17	59.17
		Middle	1880.0	-46	12.43	58.43
		High	1909.8	-42	13.98	55.98

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
CDMA/EVDO	1900 MHz Downlink	Low	1930.8	-45.1	15.14	60.24
		Middle	1960.0	-48.1	15.64	63.74
		High	1989.2	-47.1	15.12	62.22
	1900 MHz Uplink	Low	1850.8	-48	13.73	61.73
		Middle	1880.0	-47	14.42	61.42
		High	1909.2	-43	15.47	58.47

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
WCDMA	1900 MHz Downlink	Low	1932.4	-49.1	15.49	64.59
		Middle	1960.0	-51.1	16.04	67.14
		High	1987.6	-52.1	15.71	67.81
	1900 MHz Uplink	Low	1852.4	-49	12.44	61.44
		Middle	1880.0	-46	13.5	59.5
		High	1907.6	-42	14.47	56.47

LTE Band 2 DL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
QPSK	1.4	1930.7	-51.10	15.59	66.69
		1960	-53.10	15.63	68.73
		1989.3	-52.10	15.02	67.12
	3	1931.5	-50.10	15.67	65.77
		1960	-51.10	15.60	66.7
		1988.5	-50.10	15.35	65.45
	5	1932.5	-48.10	15.33	63.43
		1960	-50.10	15.25	65.35
		1987.5	-49.10	15.66	64.76
	10	1935	-47.10	15.82	62.92
		1960	-49.10	15.85	64.95
		1985	-48.10	15.25	63.35
	15	1937.5	-46.10	15.06	61.16
		1960	-46.10	15.35	61.45
		1982.5	-44.10	13.46	57.56
	20	1940	-45.10	15.52	60.62
		1960	-46.10	15.34	61.44
		1980	-43.10	12.82	55.92
16-QAM	1.4	1930.7	-50.10	15.60	65.7
		1960	-53.10	15.38	68.48
		1989.3	-51.10	15.53	66.63
	3	1931.5	-50.10	15.76	65.86
		1960	-51.10	15.52	66.62
		1988.5	-50.10	15.10	65.2
	5	1932.5	-48.10	15.54	63.64
		1960	-50.10	15.72	65.82
		1987.5	-50.10	15.17	65.27
	10	1935	-46.10	15.82	61.92
		1960	-48.10	15.47	63.57
		1985	-46.10	14.68	60.78
	15	1937.5	-45.10	15.35	60.45
		1960	-48.10	15.11	63.21
		1982.5	-45.10	14.40	59.5
	20	1940	-46.10	15.89	61.99
		1960	-47.10	15.00	62.1
		1980	-44.10	13.66	57.76

LTE Band 2 DL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
64-QAM	1.4	1930.7	-50.10	15.41	65.51
		1960	-52.10	15.81	67.91
		1989.3	-50.10	15.64	65.74
	3	1931.5	-51.10	15.54	66.64
		1960	-53.10	15.14	68.24
		1988.5	-51.10	15.65	66.75
	5	1932.5	-49.10	15.61	64.71
		1960	-50.10	15.32	65.42
		1987.5	-49.10	15.87	64.97
	10	1935	-47.10	15.04	62.14
		1960	-49.10	15.47	64.57
		1985	-48.10	15.61	63.71
	15	1937.5	-45.10	15.48	60.58
		1960	-47.10	15.37	62.47
		1982.5	-43.10	13.88	56.98
	20	1940	-47.10	15.05	62.15
		1960	-47.10	15.89	62.99
		1980	-45.10	13.51	58.61

LTE Band 2 UL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
QPSK	1.4	1850.7	-50	15.77	65.77
		1880	-49	15.56	64.56
		1909.3	-46	15.77	61.77
	3	1851.5	-47	14.02	61.02
		1880	-45	15.68	60.68
		1908.5	-43	15.76	58.76
	5	1852.5	-45	13.15	58.15
		1880	-45	15.65	60.65
		1907.5	-42	15.22	57.22
	10	1855	-47	12.7	59.7
		1880	-44	15.89	59.89
		1905	-43	14.37	57.37
	15	1857.5	-46	13.31	59.31
		1880	-40	13.56	53.56
		1902.5	-43	13.48	56.48
	20	1860	-45	12.58	57.58
		1880	-42	13.29	55.29
		1900	-48	15.18	63.18
16-QAM	1.4	1850.7	-51	15.43	66.43
		1880	-50	15.40	65.4
		1909.3	-47	15.39	62.39
	3	1851.5	-48	15.07	63.07
		1880	-45	13.50	58.5
		1908.5	-44	13.66	57.66
	5	1852.5	-46	12.56	58.56
		1880	-45	13.44	58.44
		1907.5	-46	14.67	60.67
	10	1855	-44	11.18	55.18
		1880	-42	12.09	54.09
		1905	-37	14.19	51.19
	15	1857.5	-46	12.51	58.51
		1880	-44	11.92	55.92
		1902.5	-45	12.86	57.86
	20	1860	-45	11.50	56.5
		1880	-47	11.36	58.36
		1900	-47	13.20	60.2

LTE Band 2 UL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
64-QAM	1.4	1850.7	-49	14.95	63.95
		1880	-48	15.19	63.19
		1909.3	-45	15.46	60.46
	3	1851.5	-43	13.17	56.17
		1880	-43	13.75	56.75
		1908.5	-43	15.28	58.28
	5	1852.5	-45	15.86	60.86
		1880	-40	15.22	55.22
		1907.5	-37	15.72	52.72
	10	1855	-47	15.30	62.3
		1880	-39	15.18	54.18
		1905	-38	15.53	53.53
	15	1857.5	-45	14.38	59.38
		1880	-39	14.88	53.88
		1902.5	-37	14.78	51.78
	20	1860	-44	13.05	57.05
		1880	-38	14.70	52.7
		1900	-44	15.19	59.19

ALC ON

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
GSM/GPRS	1900 MHz Downlink	Low	1930.2	-41.1	14.63	55.73
		Middle	1960.0	-45.1	14.86	59.96
		High	1989.8	-43.1	14.49	57.59
	1900 MHz Uplink	Low	1850.2	-45	11.08	56.08
		Middle	1880.0	-43	12.48	55.48
		High	1909.8	-39	13.83	52.83

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
CDMA/EVDO	1900 MHz Downlink	Low	1930.8	-42.1	15.54	57.64
		Middle	1960.0	-45.1	16.11	61.21
		High	1989.2	-44.1	15.77	59.87
	1900 MHz Uplink	Low	1850.8	-45	13.28	58.28
		Middle	1880.0	-44	14.2	58.2
		High	1909.2	-40	15.2	55.2

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
WCDMA	1900 MHz Downlink	Low	1932.4	-46.1	15.72	61.82
		Middle	1960.0	-48.1	15.27	63.37
		High	1987.6	-49.1	14.76	63.86
	1900 MHz Uplink	Low	1852.4	-46	15.65	61.65
		Middle	1880.0	-43	12.88	55.88
		High	1907.6	-39	14.68	53.68

LTE Band 2 DL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
QPSK	1.4	1930.7	-48.1	15.67	63.77
		1960	-50.1	15.47	65.57
		1989.3	-49.1	15.4	64.5
	3	1931.5	-47.1	16.44	63.54
		1960	-48.1	15.96	64.06
		1988.5	-47.1	16.09	63.19
	5	1932.5	-45.1	15.76	60.86
		1960	-47.1	16.27	63.37
		1987.5	-46.1	16.33	62.43
	10	1935	-44.1	16.16	60.26
		1960	-46.1	15.77	61.87
		1985	-45.1	16.28	61.38
	15	1937.5	-43.1	14.55	57.65
		1960	-43.1	16.63	59.73
		1982.5	-41.1	14	55.1
	20	1940	-42.1	15.89	57.99
		1960	-43.1	15.58	58.68
		1980	-40.1	13.15	53.25
16-QAM	1.4	1930.7	-47.1	15.67	62.77
		1960	-50.1	15.47	65.57
		1989.3	-48.1	15.4	63.5
	3	1931.5	-47.1	16.44	63.54
		1960	-48.1	15.96	64.06
		1988.5	-47.1	16.09	63.19
	5	1932.5	-45.1	16.04	61.14
		1960	-47.1	16	63.1
		1987.5	-47.1	15.35	62.45
	10	1935	-43.1	15.55	58.65
		1960	-45.1	15.84	60.94
		1985	-43.1	15.2	58.3
	15	1937.5	-42.1	15.49	57.59
		1960	-45.1	14.9	60
		1982.5	-42.1	14.47	56.57
	20	1940	-43.1	16	59.1
		1960	-44.1	15.25	59.35
		1980	-41.1	14.02	55.12

LTE Band 2 DL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
64-QAM	1.4	1930.7	-47.1	15.8	62.9
		1960	-49.1	15.76	64.86
		1989.3	-47.1	16.13	63.23
	3	1931.5	-48.1	15.94	64.04
		1960	-50.1	15.75	65.85
		1988.5	-48.1	15.73	63.83
	5	1932.5	-46.1	15.95	62.05
		1960	-47.1	15.24	62.34
		1987.5	-46.1	16.9	63
	10	1935	-44.1	14.53	58.63
		1960	-46.1	16.75	62.85
		1985	-45.1	16.15	61.25
	15	1937.5	-42.1	15.85	57.95
		1960	-44.1	15.61	59.71
		1982.5	-40.1	14.21	54.31
	20	1940	-44.1	14.86	58.96
		1960	-44.1	16.39	60.49
		1980	-42.1	13.79	55.89

LTE Band 2 UL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
QPSK	1.4	1850.7	-47	15.94	62.94
		1880	-46	15.85	61.85
		1909.3	-43	16.96	59.96
	3	1851.5	-44	13.87	57.87
		1880	-42	15.76	57.76
		1908.5	-40	15.89	55.89
	5	1852.5	-42	13.78	55.78
		1880	-42	15.98	57.98
		1907.5	-39	15.86	54.86
	10	1855	-44	12.09	56.09
		1880	-41	16.82	57.82
		1905	-40	14.72	54.72
	15	1857.5	-43	13.33	56.33
		1880	-37	13.92	50.92
		1902.5	-40	13.66	53.66
	20	1860	-42	13.21	55.21
		1880	-39	13.62	52.62
		1900	-45	15.82	60.82
16-QAM	1.4	1850.7	-48	16.02	64.02
		1880	-47	15.37	62.37
		1909.3	-44	16	60
	3	1851.5	-45	14.65	59.65
		1880	-42	13.41	55.41
		1908.5	-41	13.94	54.94
	5	1852.5	-43	12.77	55.77
		1880	-42	13.94	55.94
		1907.5	-43	14.86	57.86
	10	1855	-41	11.28	52.28
		1880	-39	13.42	52.42
		1905	-34	14.47	48.47
	15	1857.5	-43	13.15	56.15
		1880	-41	12.65	53.65
		1902.5	-42	13.4	55.4
	20	1860	-42	11.81	53.81
		1880	-44	11.35	55.35
		1900	-44	12.79	56.79

LTE Band 2 UL

Modulation Type	Channel Bandwidth (MHz)	Channel Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
64-QAM	1.4	1850.7	-46	16.86	62.86
		1880	-45	15.88	60.88
		1909.3	-42	17.43	59.43
	3	1851.5	-40	12.9	52.9
		1880	-40	13.67	53.67
		1908.5	-40	15.73	55.73
	5	1852.5	-42	16.47	58.47
		1880	-37	14.8	51.8
		1907.5	-34	15.63	49.63
	10	1855	-44	15.58	59.58
		1880	-36	15.39	51.39
		1905	-35	16.46	51.46
	15	1857.5	-42	14.73	56.73
		1880	-36	15.38	51.38
		1902.5	-34	14.97	48.97
	20	1860	-41	13.15	54.15
		1880	-35	14.43	49.43
		1900	-41	15.11	56.11

5 FCC §2.1049 & §24.238(b) - Occupied Bandwidth

5.1 Applicable Standards

Requirements: §24.238(b)

5.2 Test Procedure

The EUT was connected to the spectrum analyzer and Signal Generator followed by 50Ω-75Ω matching pad.

The resolution bandwidth of the spectrum analyzer was set to at least 1to 5% of the OBW and the 26 dB & 99% bandwidth was recorded.

5.3 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates	Calibration Interval
Agilent	Spectrum Analyzer	E4440A	MY44303352	2015-06-22	1 year
Agilent	Signal Generator	E4438C	MY45091309	2014-07-15	1 year

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

5.4 Test Environmental Conditions

Temperature:	21-23° C
Relative Humidity:	42-48 %
ATM Pressure:	101.4-102 kPa

The testing was performed by Ronak Patel on 2015-06-08 to 2015-06-29 in the RF Site.

5.5 Test Results

Please refer to the following tables and plots.

ALC OFF

Mode		Channel	Frequency (MHz)	26dB Bandwidth (kHz)	
				Input	Output
GSM/GPRS	1900 MHz Downlink	Low	1930.2	305.044	312.620
		Middle	1960.0	311.797	315.043
		High	1989.8	303.576	321.309
	1900 MHz Uplink	Low	1850.2	303.394	310.017
		Middle	1880.0	307.680	314.370
		High	1909.8	313.984	318.261

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
CDMA/EVDO	1900 MHz Downlink	Low	1930.8	1.455	1.475
		Middle	1960.0	1.459	1.454
		High	1989.2	1.453	1.469
	1900 MHz Uplink	Low	1850.8	1.466	1.459
		Middle	1880.0	1.459	1.470
		High	1909.2	1.466	1.472

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
WCDMA	1900 MHz Downlink	Low	1932.4	4.859	4.805
		Middle	1960.0	4.853	4.786
		High	1987.6	4.886	4.783
	1900 MHz Uplink	Low	1852.4	4.880	4.807
		Middle	1880.0	4.862	4.882
		High	1907.6	4.920	4.883

LTE QPSK Band 2

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
LTE 1.4 MHz	1900 MHz Downlink	Low	1930.7	1.383	1.345
		Middle	1960.0	1.380	1.390
		High	1989.3	1.383	1.373
	1900 MHz Uplink	Low	1850.7	1.337	1.368
		Middle	1880.0	1.359	1.363
		High	1909.3	1.339	1.398
LTE 3 MHz	1900 MHz Downlink	Low	1931.5	3.113	3.062
		Middle	1960.0	3.112	3.089
		High	1988.5	3.112	3.065
	1900 MHz Uplink	Low	1851.5	3.081	3.136
		Middle	1880.0	3.080	3.090
		High	1908.5	3.140	3.106
LTE 5 MHz	1900 MHz Downlink	Low	1932.5	5.103	5.161
		Middle	1960.0	5.192	5.171
		High	1987.5	5.132	5.035
	1900 MHz Uplink	Low	1852.5	5.133	5.132
		Middle	1880.0	5.219	5.111
		High	1907.5	5.174	5.153
LTE 10 MHz	1900 MHz Downlink	Low	1935	10.308	10.172
		Middle	1960	10.467	10.277
		High	1985	10.568	10.249
	1900 MHz Uplink	Low	1855	10.629	10.192
		Middle	1880	10.642	10.397
		High	1905	10.653	10.248
LTE 15 MHz	1900 MHz Downlink	Low	1937.5	15.859	15.248
		Middle	1960.0	15.845	15.024
		High	1982.5	15.748	15.078
	1900 MHz Uplink	Low	1857.5	15.817	15.260
		Middle	1880.0	15.739	15.435
		High	1902.5	15.782	15.227
LTE 20 MHz	1900 MHz Downlink	Low	1940	20.915	20.282
		Middle	1960	20.953	20.053
		High	1980	20.940	20.031
	1900 MHz Uplink	Low	1860	20.928	20.601
		Middle	1880	21.029	20.853
		High	1900	21.135	20.187

LTE 16QAM Band 2

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
LTE 1.4 MHz	1900 MHz Downlink	Low	1930.7	1.368	1.474
		Middle	1960.0	1.374	1.474
		High	1989.3	1.348	1.463
	1900 MHz Uplink	Low	1850.7	1.383	1.345
		Middle	1880.0	1.356	1.350
		High	1909.3	1.348	1.346
LTE 3 MHz	1900 MHz Downlink	Low	1931.5	3.079	3.165
		Middle	1960.0	3.116	3.182
		High	1988.5	3.145	3.179
	1900 MHz Uplink	Low	1851.5	3.141	3.153
		Middle	1880.0	3.092	3.092
		High	1908.5	3.140	3.058
LTE 5 MHz	1900 MHz Downlink	Low	1932.5	5.189	5.197
		Middle	1960.0	5.144	5.227
		High	1987.5	5.221	5.224
	1900 MHz Uplink	Low	1852.5	5.153	5.161
		Middle	1880.0	5.184	5.216
		High	1907.5	5.129	5.142
LTE 10 MHz	1900 MHz Downlink	Low	1935	10.603	10.375
		Middle	1960	10.410	10.316
		High	1985	10.282	10.450
	1900 MHz Uplink	Low	1855	10.576	10.164
		Middle	1880	10.288	10.275
		High	1905	10.526	10.306
LTE 15 MHz	1900 MHz Downlink	Low	1937.5	15.738	15.346
		Middle	1960.0	15.717	15.327
		High	1982.5	15.746	15.132
	1900 MHz Uplink	Low	1857.5	15.759	15.207
		Middle	1880.0	15.791	15.662
		High	1902.5	15.790	15.245
LTE 20 MHz	1900 MHz Downlink	Low	1940	20.904	20.221
		Middle	1960	20.863	19.829
		High	1980	20.942	19.936
	1900 MHz Uplink	Low	1860	21.050	19.993
		Middle	1880	21.062	20.251
		High	1900	21.058	20.266

LTE 64QAM Band 2

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
LTE 1.4 MHz	1900 MHz Downlink	Low	1930.7	1.384	1.363
		Middle	1960.0	1.379	1.378
		High	1989.3	1.355	1.359
	1900 MHz Uplink	Low	1850.7	1.356	1.341
		Middle	1880.0	1.332	1.351
		High	1909.3	1.357	1.336
LTE 3 MHz	1900 MHz Downlink	Low	1931.5	3.099	3.103
		Middle	1960.0	3.106	3.094
		High	1988.5	3.112	3.044
	1900 MHz Uplink	Low	1851.5	3.121	3.102
		Middle	1880.0	3.121	3.102
		High	1908.5	3.074	3.107
LTE 5 MHz	1900 MHz Downlink	Low	1932.5	5.219	5.145
		Middle	1960.0	5.213	5.175
		High	1987.5	5.240	5.008
	1900 MHz Uplink	Low	1852.5	5.176	5.130
		Middle	1880.0	5.275	5.181
		High	1907.5	5.184	5.191
LTE 10 MHz	1900 MHz Downlink	Low	1935	10.424	10.124
		Middle	1960	10.419	10.355
		High	1985	10.402	10.065
	1900 MHz Uplink	Low	1855	10.413	10.119
		Middle	1880	10.258	10.325
		High	1905	10.376	10.103
LTE 15 MHz	1900 MHz Downlink	Low	1937.5	15.679	15.453
		Middle	1960.0	15.689	15.308
		High	1982.5	15.669	14.577
	1900 MHz Uplink	Low	1857.5	15.682	15.363
		Middle	1880.0	15.639	15.366
		High	1902.5	15.759	15.340
LTE 20 MHz	1900 MHz Downlink	Low	1940	21.016	19.880
		Middle	1960	21.061	19.563
		High	1980	20.891	19.332
	1900 MHz Uplink	Low	1860	20.929	19.985
		Middle	1880	20.836	20.696
		High	1900	20.948	20.219

ALC ON

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (kHz)	
				Input	Output
GSM/GPRS	1900 MHz Downlink	Low	1930.2	305.044	309.714
		Middle	1960.0	311.797	314.285
		High	1989.8	303.576	308.922
	1900 MHz Uplink	Low	1850.2	303.394	310.703
		Middle	1880.0	307.680	315.762
		High	1909.8	313.984	315.590

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
CDMA/EVDO	1900 MHz Downlink	Low	1930.8	1.455	1.438
		Middle	1960.0	1.459	1.437
		High	1989.2	1.453	1.430
	1900 MHz Uplink	Low	1850.8	1.466	1.432
		Middle	1880.0	1.459	1.431
		High	1909.2	1.466	1.430

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
WCDMA	1900 MHz Downlink	Low	1932.4	4.859	4.655
		Middle	1960.0	4.853	4.697
		High	1987.6	4.886	4.674
	1900 MHz Uplink	Low	1852.4	4.880	4.664
		Middle	1880.0	4.862	4.681
		High	1907.6	4.920	4.678

LTE QPSK Band 2

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
LTE 1.4 MHz	1900 MHz Downlink	Low	1930.7	1.383	1.278
		Middle	1960.0	1.380	1.310
		High	1989.3	1.383	1.285
	1900 MHz Uplink	Low	1850.7	1.337	1.331
		Middle	1880.0	1.359	1.315
		High	1909.3	1.339	1.303
LTE 3 MHz	1900 MHz Downlink	Low	1931.5	3.113	2.962
		Middle	1960.0	3.112	2.967
		High	1988.5	3.112	2.955
	1900 MHz Uplink	Low	1851.5	3.081	2.978
		Middle	1880.0	3.080	2.988
		High	1908.5	3.140	2.993
LTE 5 MHz	1900 MHz Downlink	Low	1932.5	5.103	4.896
		Middle	1960.0	5.192	4.922
		High	1987.5	5.132	4.831
	1900 MHz Uplink	Low	1852.5	5.133	4.940
		Middle	1880.0	5.219	4.926
		High	1907.5	5.174	4.920
LTE 10 MHz	1900 MHz Downlink	Low	1935	10.308	9.761
		Middle	1960	10.467	9.734
		High	1985	10.568	9.698
	1900 MHz Uplink	Low	1855	10.629	9.695
		Middle	1880	10.642	9.888
		High	1905	10.653	9.727
LTE 15 MHz	1900 MHz Downlink	Low	1937.5	15.859	14.595
		Middle	1960.0	15.845	14.503
		High	1982.5	15.748	14.410
	1900 MHz Uplink	Low	1857.5	15.817	14.344
		Middle	1880.0	15.739	14.732
		High	1902.5	15.782	14.540
LTE 20 MHz	1900 MHz Downlink	Low	1940	20.915	19.443
		Middle	1960	20.953	18.837
		High	1980	20.940	19.087
	1900 MHz Uplink	Low	1860	20.928	18.934
		Middle	1880	21.029	19.555
		High	1900	21.135	18.764

LTE 16QAM Band 2

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
LTE 1.4 MHz	1900 MHz Downlink	Low	1930.7	1.368	1.285
		Middle	1960.0	1.374	1.264
		High	1989.3	1.348	1.277
	1900 MHz Uplink	Low	1850.7	1.383	1.318
		Middle	1880.0	1.356	1.306
		High	1909.3	1.348	1.309
LTE 3 MHz	1900 MHz Downlink	Low	1931.5	3.079	2.950
		Middle	1960.0	3.116	2.977
		High	1988.5	3.145	2.972
	1900 MHz Uplink	Low	1851.5	3.141	2.971
		Middle	1880.0	3.092	2.991
		High	1908.5	3.140	2.978
LTE 5 MHz	1900 MHz Downlink	Low	1932.5	5.189	4.924
		Middle	1960.0	5.144	4.918
		High	1987.5	5.221	4.902
	1900 MHz Uplink	Low	1852.5	5.153	4.930
		Middle	1880.0	5.184	4.939
		High	1907.5	5.129	4.902
LTE 10 MHz	1900 MHz Downlink	Low	1935	10.603	9.634
		Middle	1960	10.410	9.736
		High	1985	10.282	9.810
	1900 MHz Uplink	Low	1855	10.576	9.768
		Middle	1880	10.288	9.807
		High	1905	10.526	9.798
LTE 15 MHz	1900 MHz Downlink	Low	1937.5	15.738	14.613
		Middle	1960.0	15.717	14.513
		High	1982.5	15.746	14.515
	1900 MHz Uplink	Low	1857.5	15.759	14.614
		Middle	1880.0	15.791	14.810
		High	1902.5	15.790	14.676
LTE 20 MHz	1900 MHz Downlink	Low	1940	20.904	19.570
		Middle	1960	20.863	19.137
		High	1980	20.942	19.163
	1900 MHz Uplink	Low	1860	21.050	19.217
		Middle	1880	21.062	19.887
		High	1900	21.058	19.219

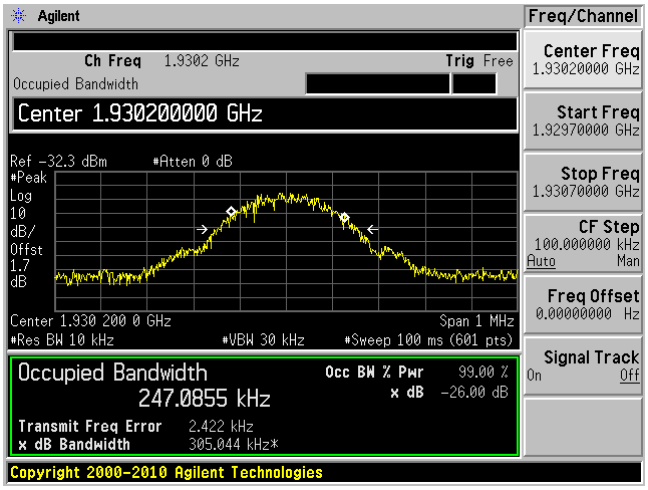
LTE 64QAM Band 2

Mode		Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	
				Input	Output
LTE 1.4 MHz	1900 MHz Downlink	Low	1930.7	1.384	1.279
		Middle	1960.0	1.379	1.297
		High	1989.3	1.355	1.289
	1900 MHz Uplink	Low	1850.7	1.356	1.281
		Middle	1880.0	1.332	1.285
		High	1909.3	1.357	1.292
LTE 3 MHz	1900 MHz Downlink	Low	1931.5	3.099	2.971
		Middle	1960.0	3.106	2.995
		High	1988.5	3.112	2.976
	1900 MHz Uplink	Low	1851.5	3.121	2.980
		Middle	1880.0	3.121	2.960
		High	1908.5	3.074	2.954
LTE 5 MHz	1900 MHz Downlink	Low	1932.5	5.219	4.896
		Middle	1960.0	5.213	4.957
		High	1987.5	5.240	4.887
	1900 MHz Uplink	Low	1852.5	5.176	4.939
		Middle	1880.0	5.275	4.962
		High	1907.5	5.184	4.965
LTE 10 MHz	1900 MHz Downlink	Low	1935	10.424	9.701
		Middle	1960	10.419	9.735
		High	1985	10.402	9.673
	1900 MHz Uplink	Low	1855	10.413	9.689
		Middle	1880	10.258	9.887
		High	1905	10.376	9.805
LTE 15 MHz	1900 MHz Downlink	Low	1937.5	15.679	14.532
		Middle	1960.0	15.689	14.845
		High	1982.5	15.669	14.608
	1900 MHz Uplink	Low	1857.5	15.682	14.474
		Middle	1880.0	15.639	14.453
		High	1902.5	15.759	14.482
LTE 20 MHz	1900 MHz Downlink	Low	1940	21.016	19.260
		Middle	1960	21.061	19.181
		High	1980	20.891	19.180
	1900 MHz Uplink	Low	1860	20.929	19.314
		Middle	1880	20.836	19.479
		High	1900	20.948	19.347

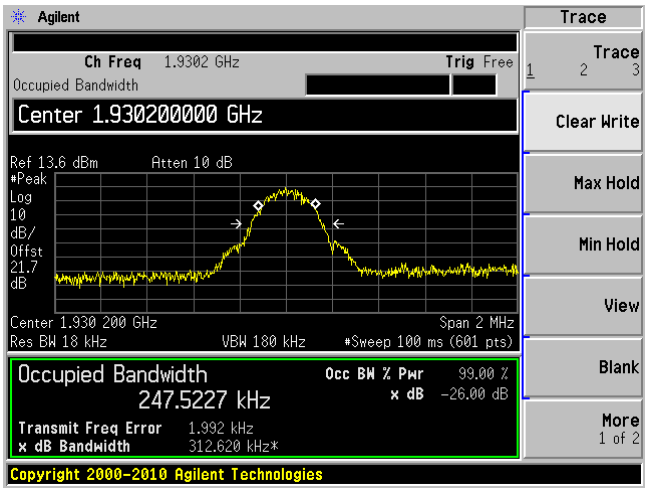
ALC OFF

GSM/GPRS DL

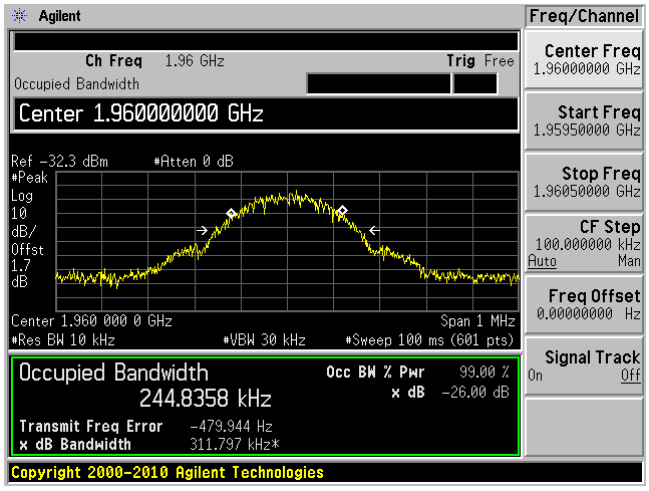
Low I/P



Low O/P



Middle I/P



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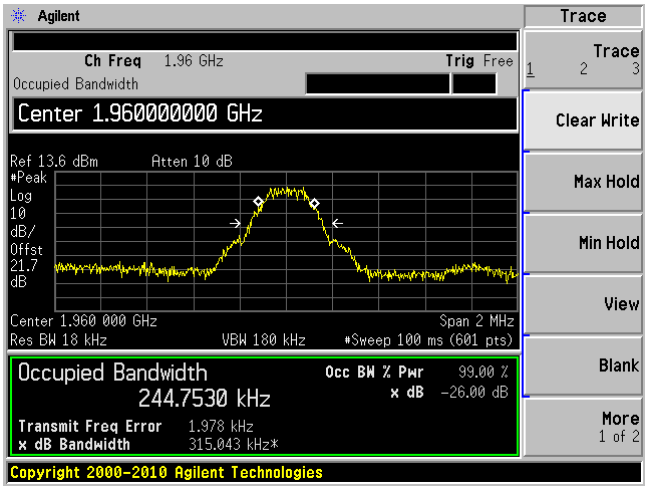

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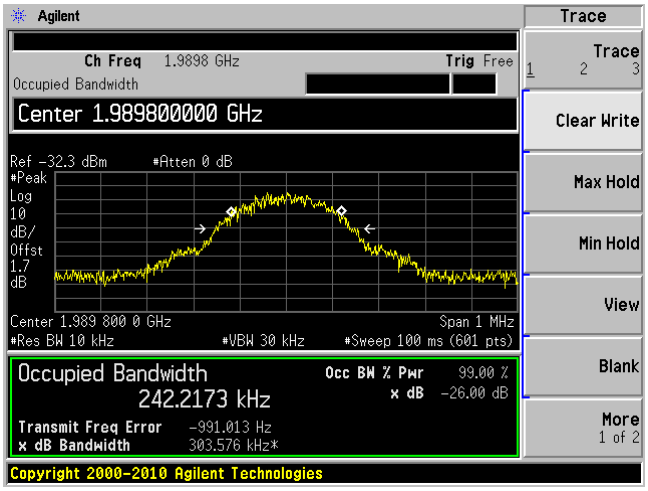

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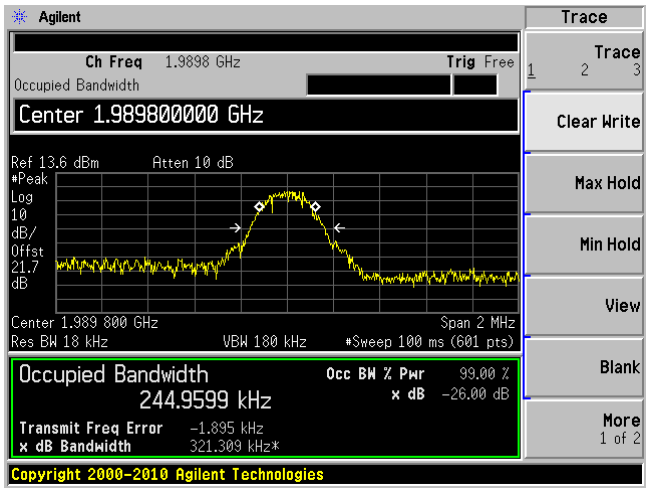
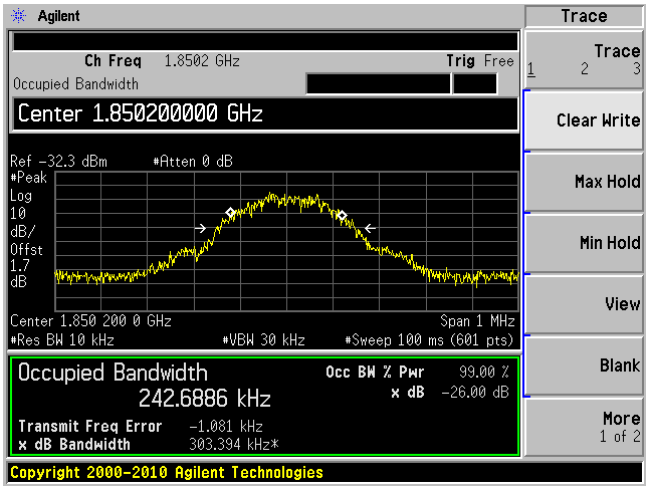


GSM/GPRS UL

Low I/P



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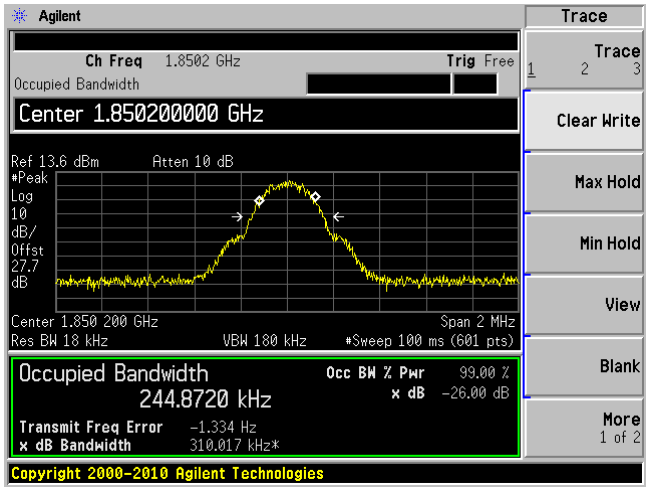
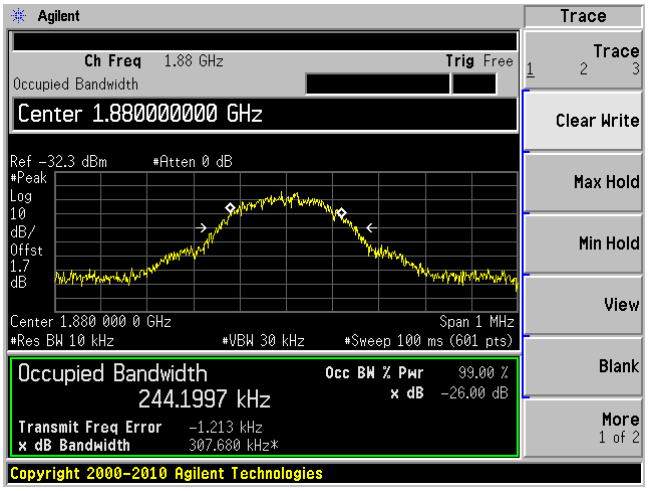


Middle I/P



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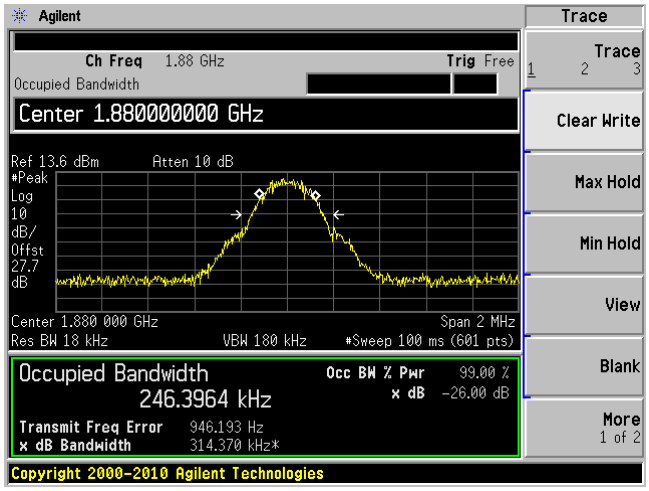

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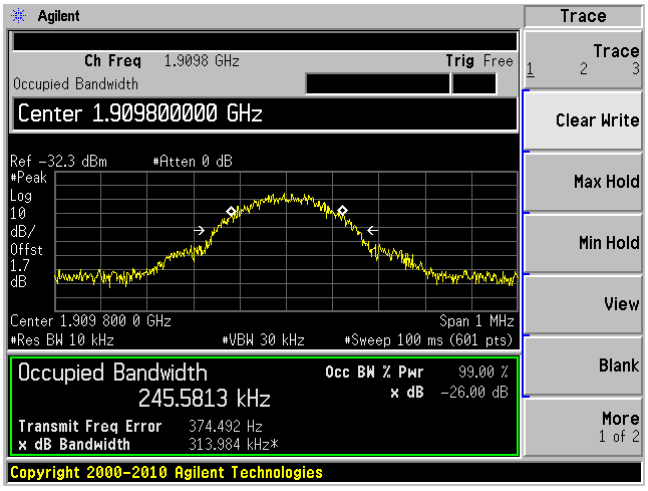

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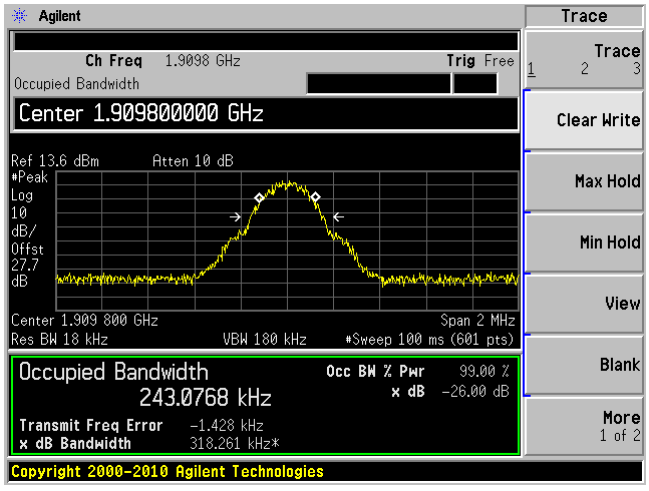

CDMA / EVDO DL

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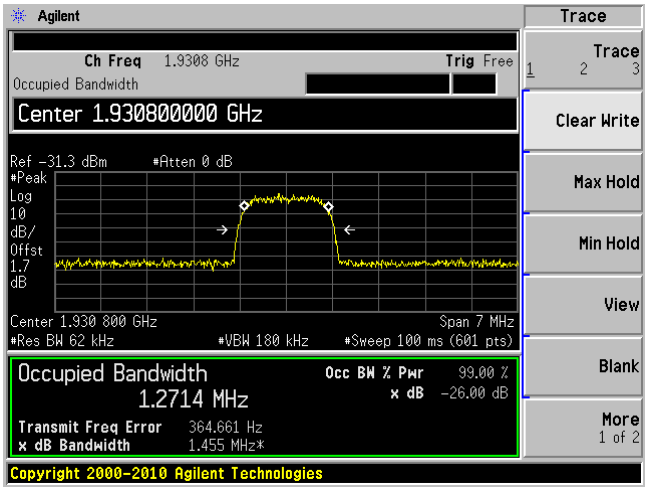

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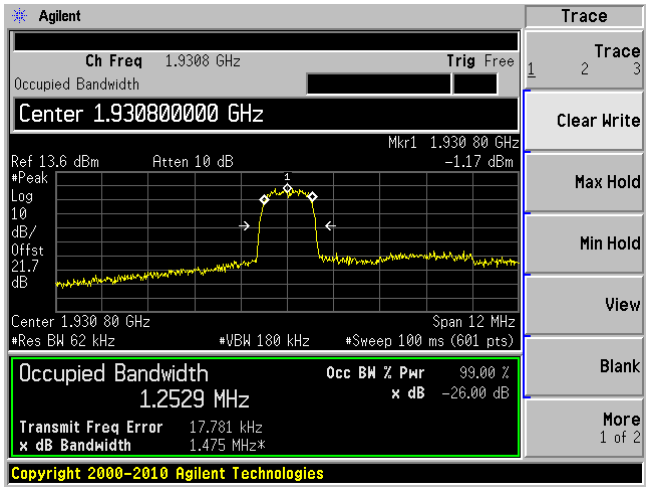
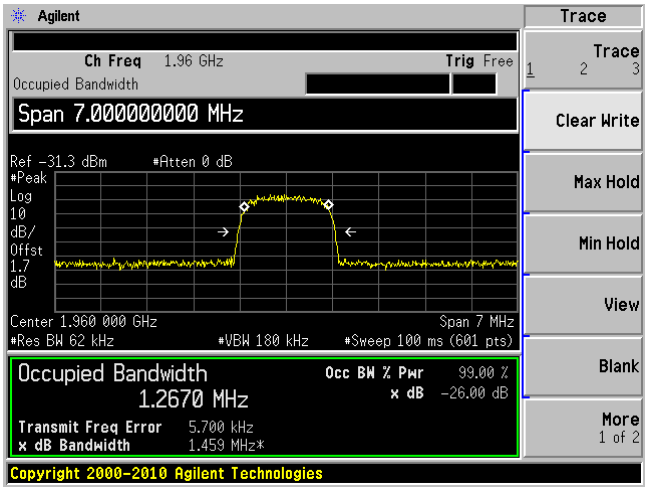
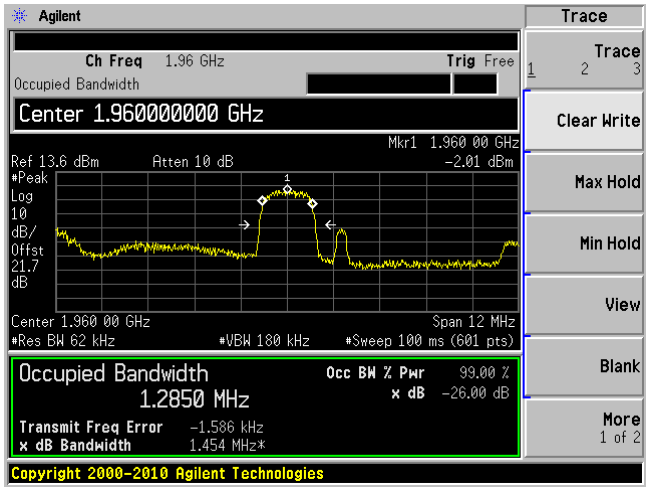


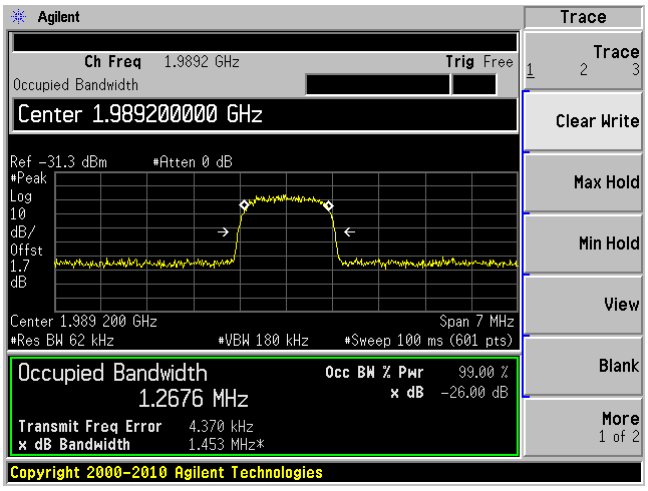
Middle I/P



Middle O/P



High I/P



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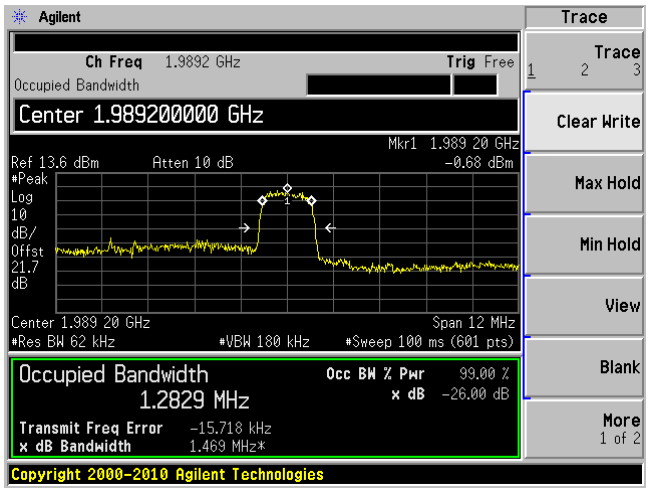
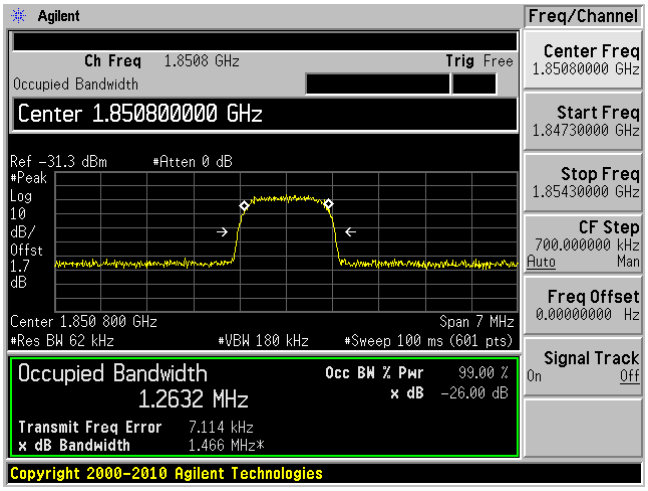


CDMA / EVDO UL

Low I/P



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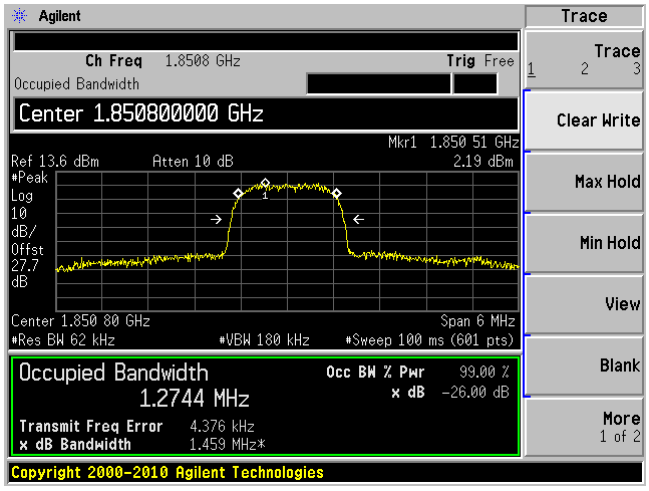
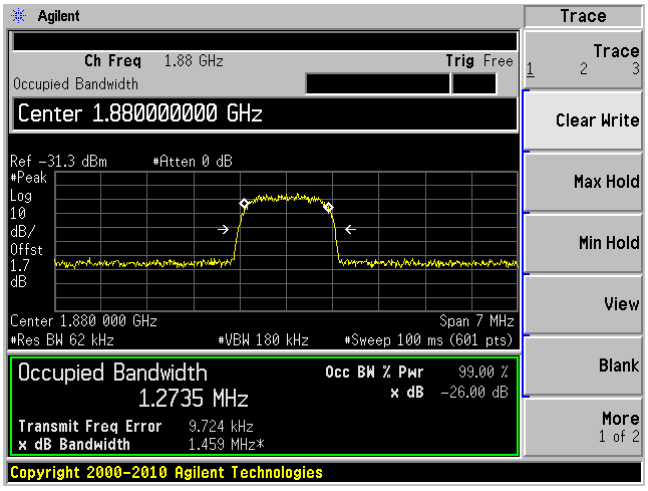


Middle I/P



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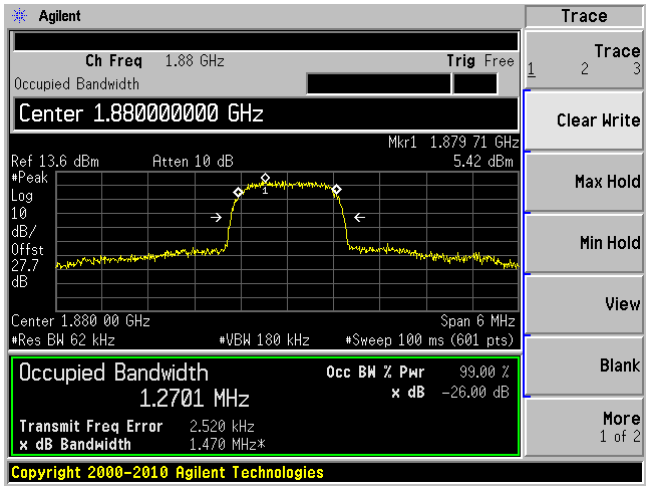

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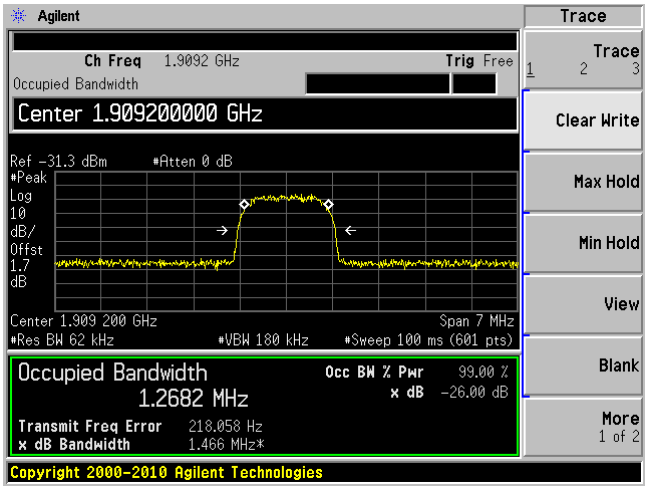

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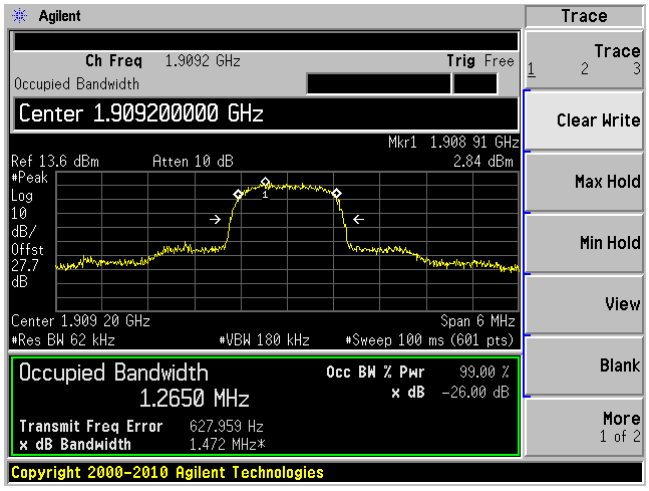

WCDMA DL

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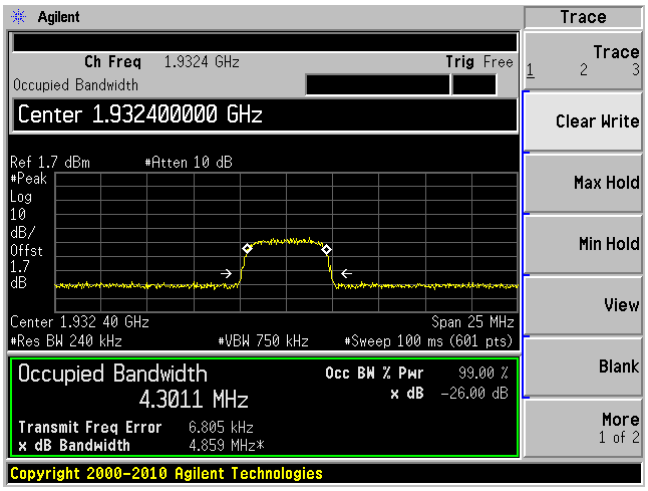

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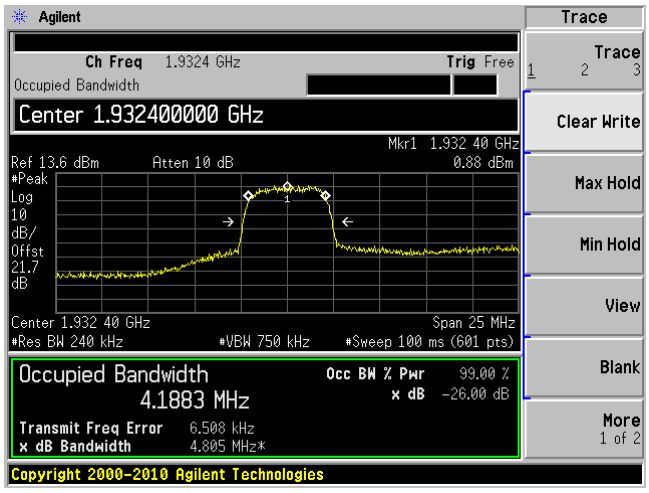

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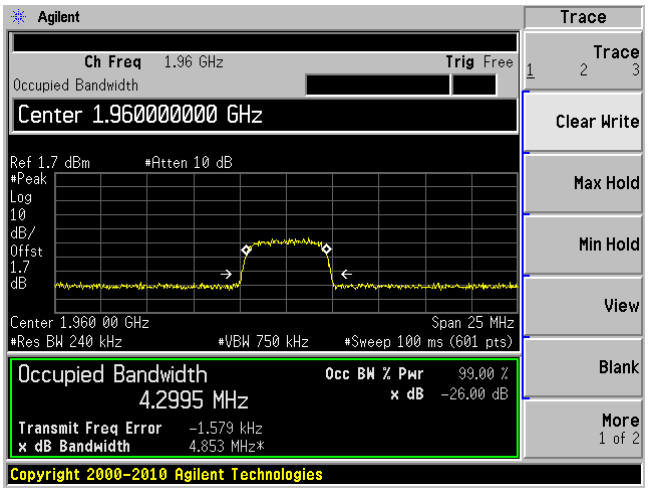

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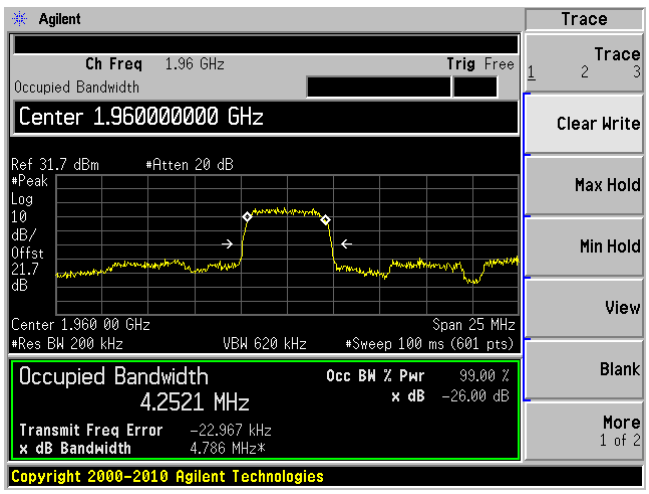

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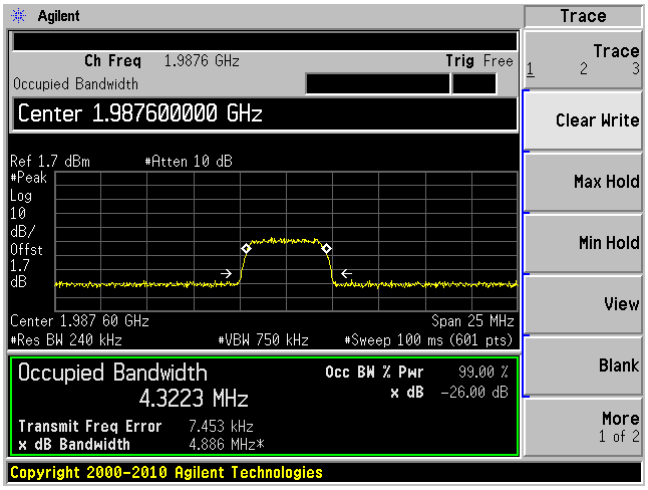

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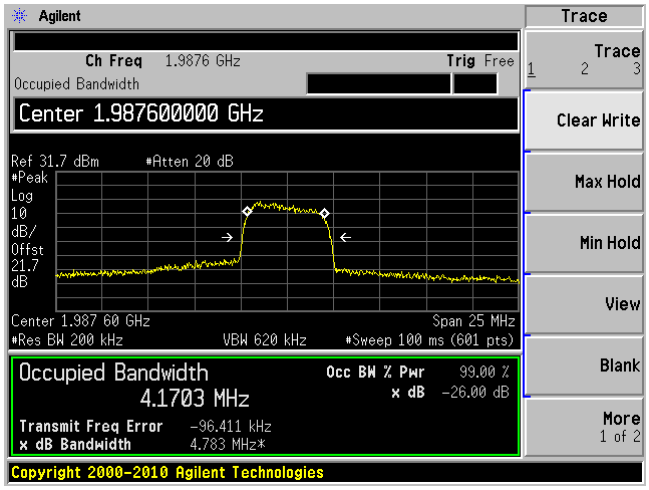
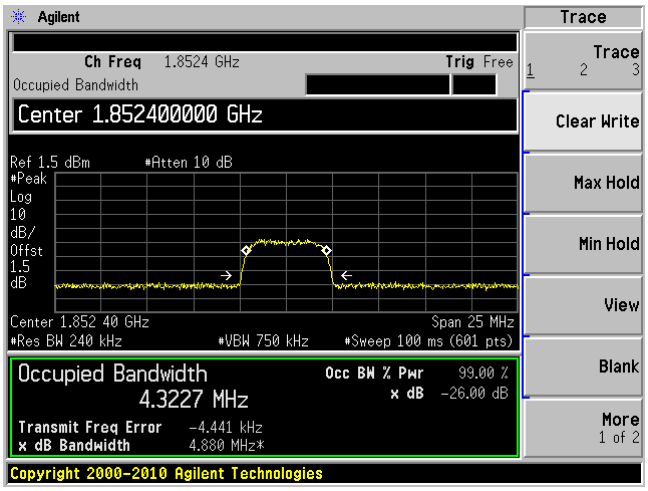


WCDMA UL

Low I/P



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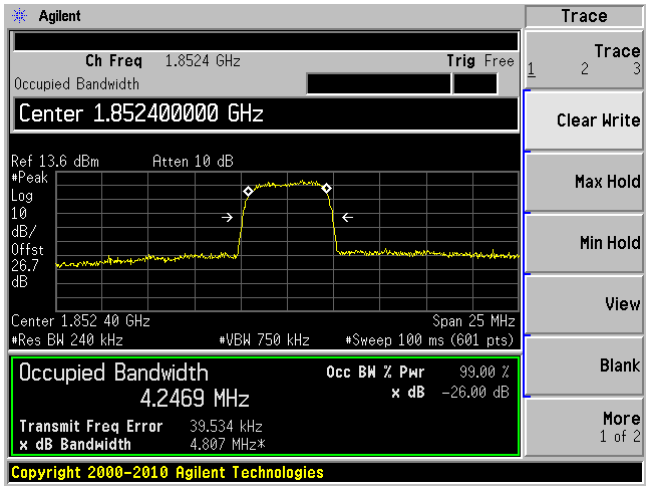

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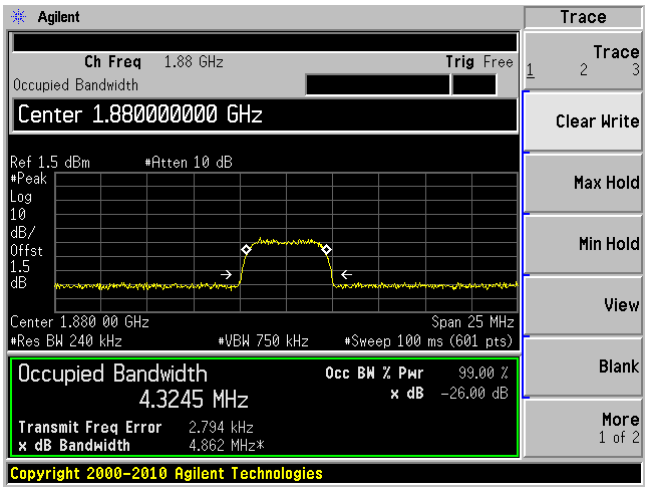

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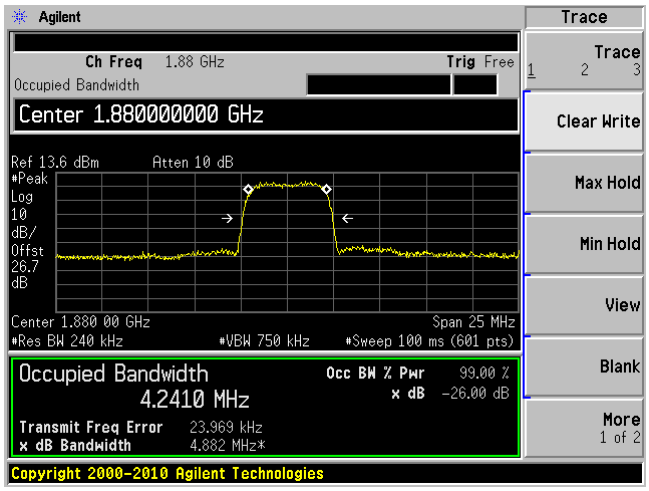

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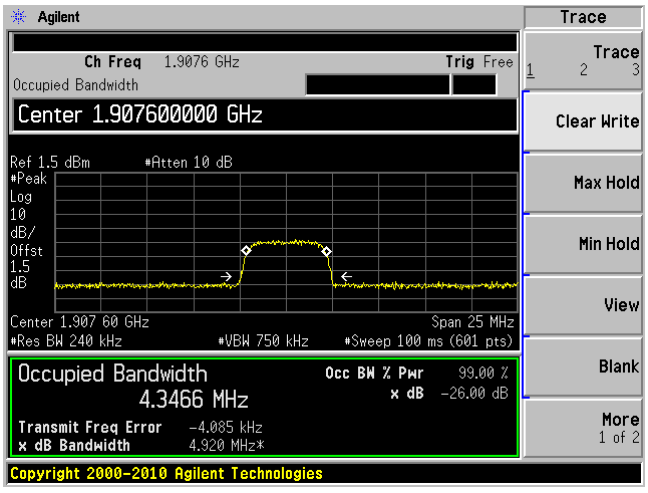

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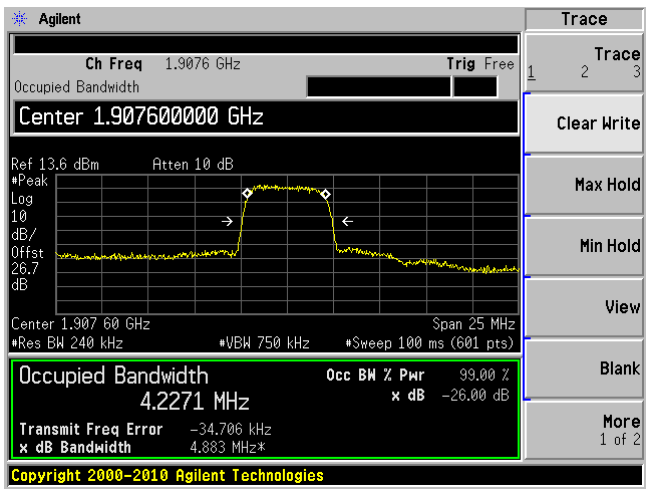
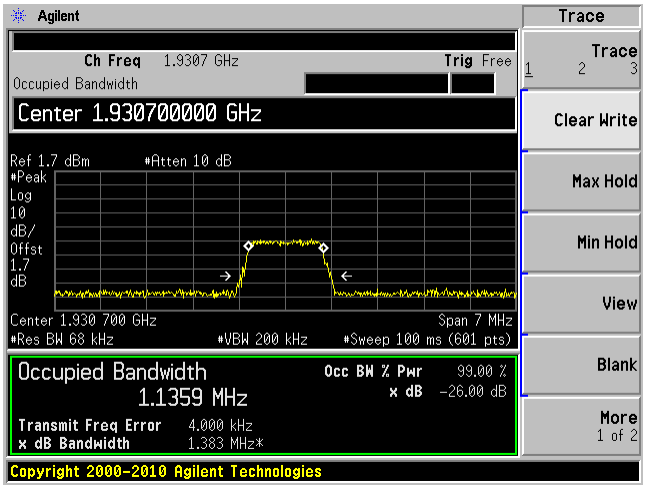


LTE 1.4MHz QPSK DL

Low I/P



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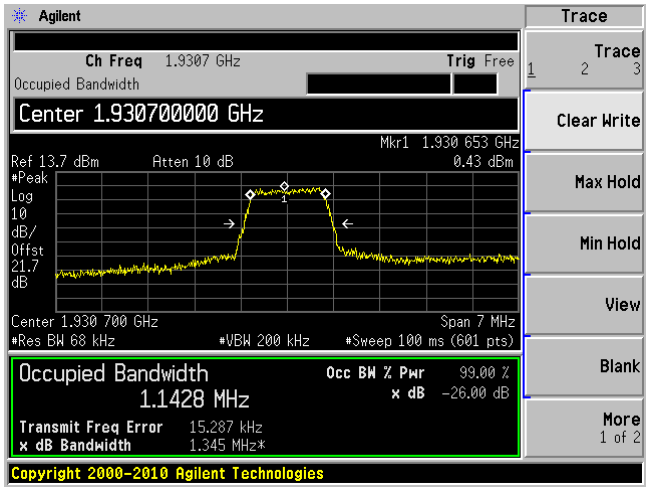

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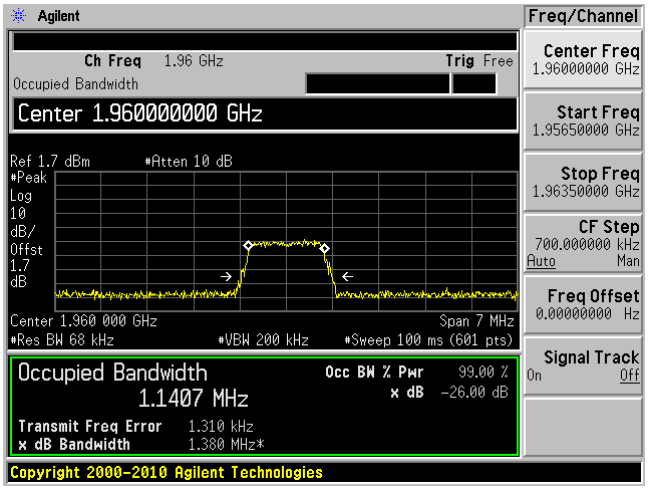

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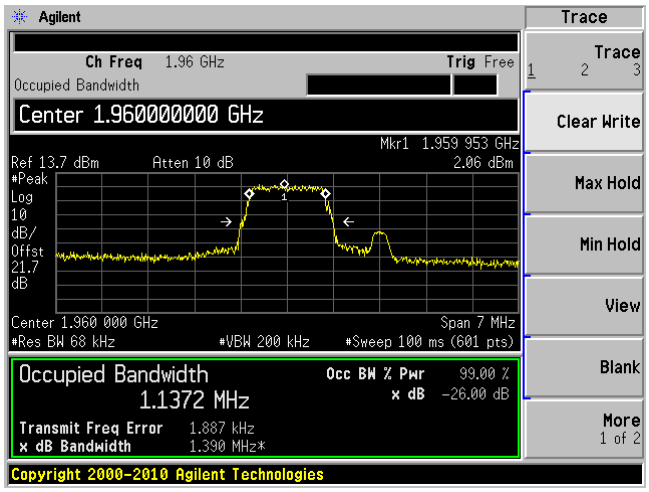

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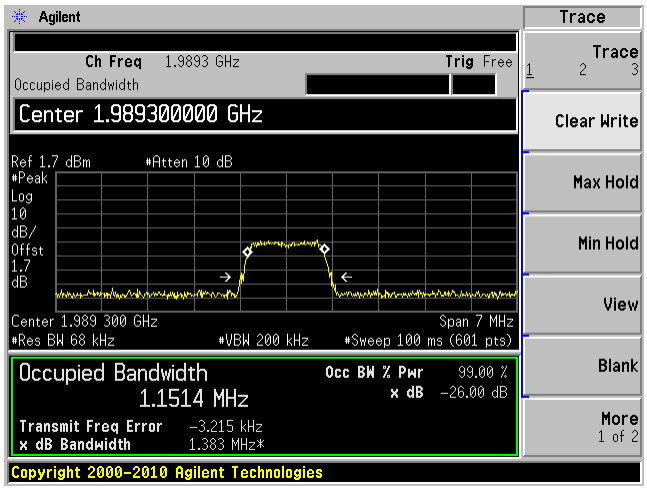

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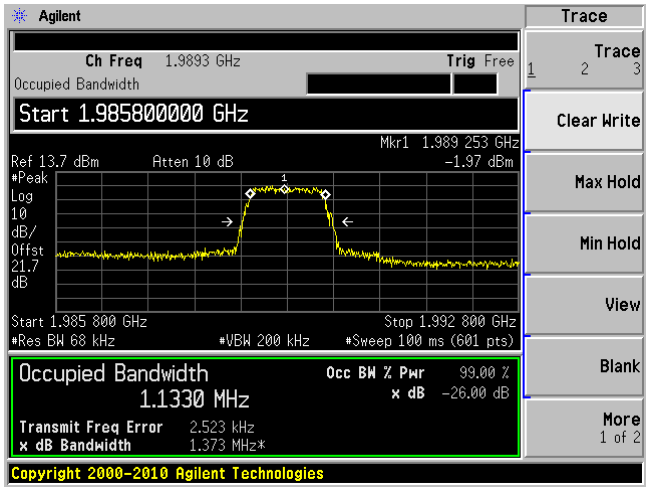
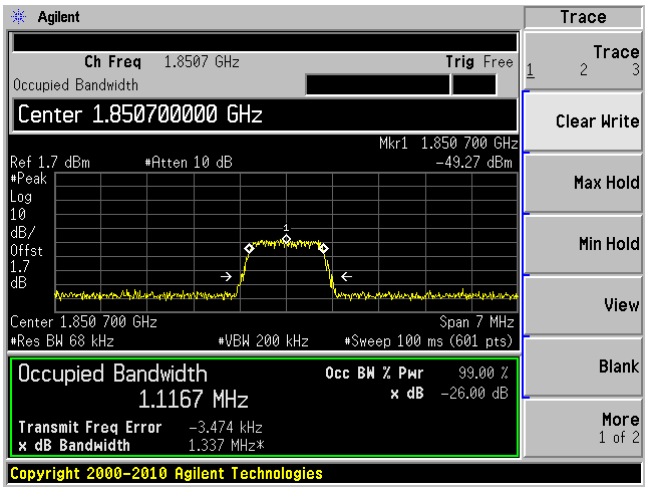


LTE 1.4MHz QPSK UL

Low I/P



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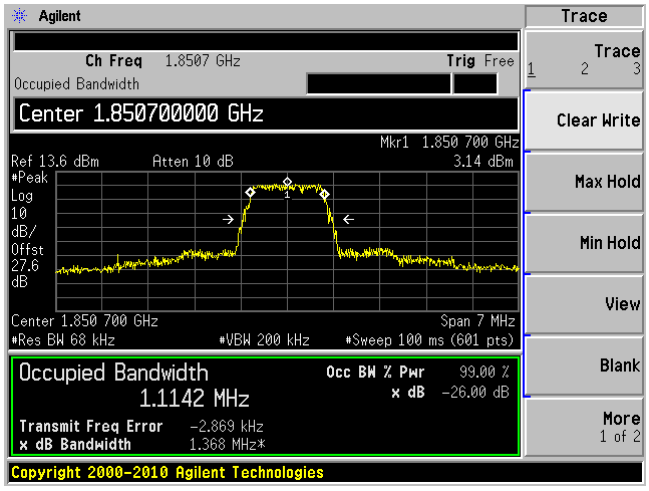

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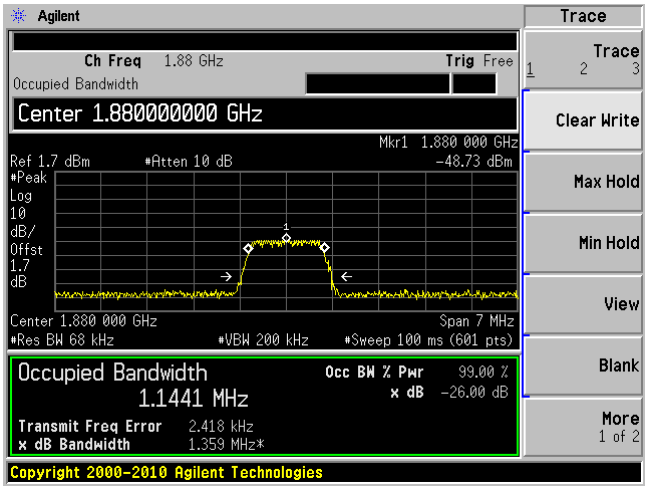

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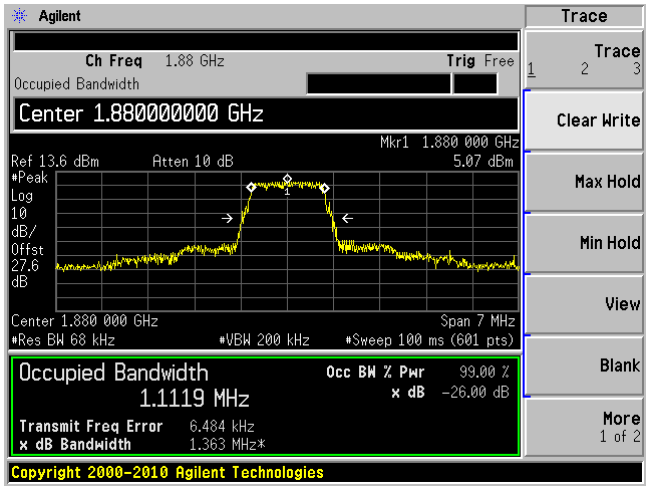

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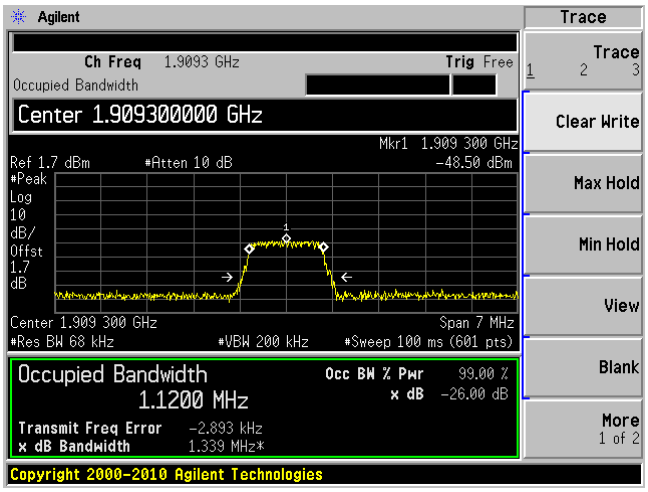

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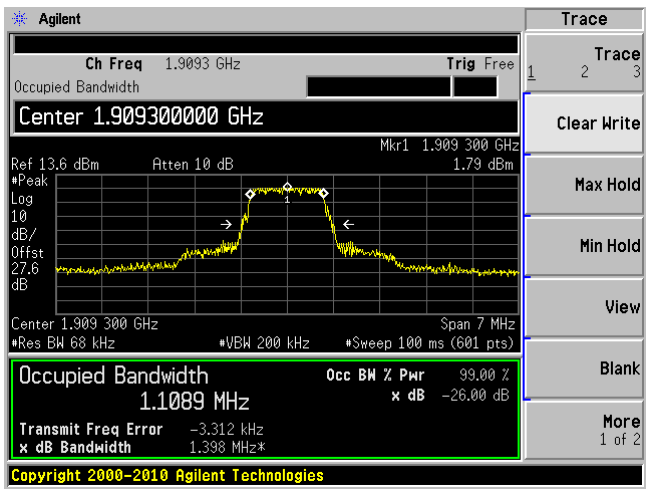
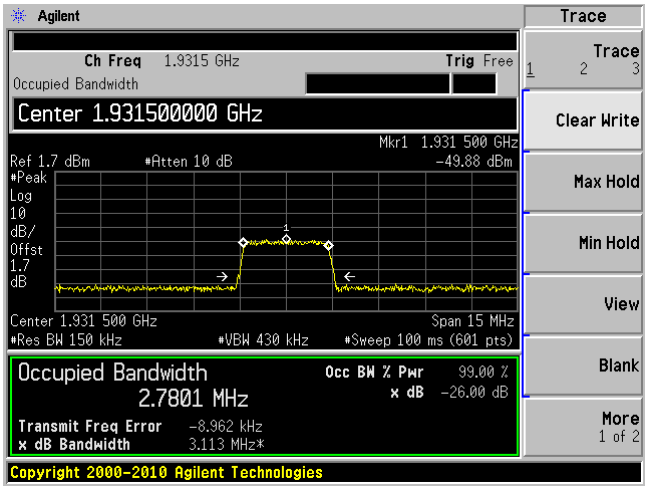


LTE 3MHz QPSK DL

Low I/P



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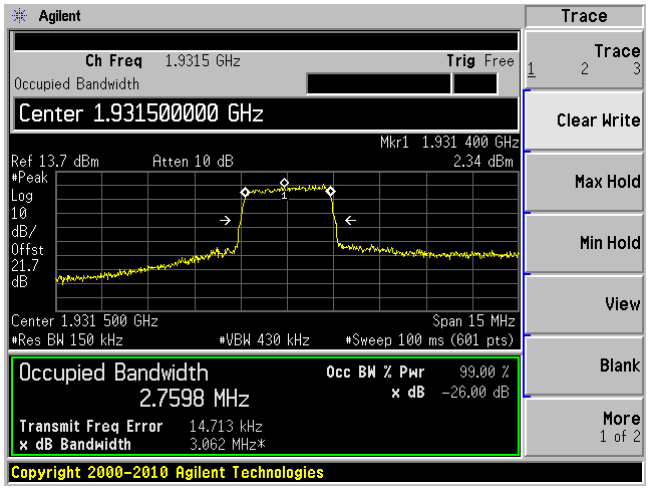

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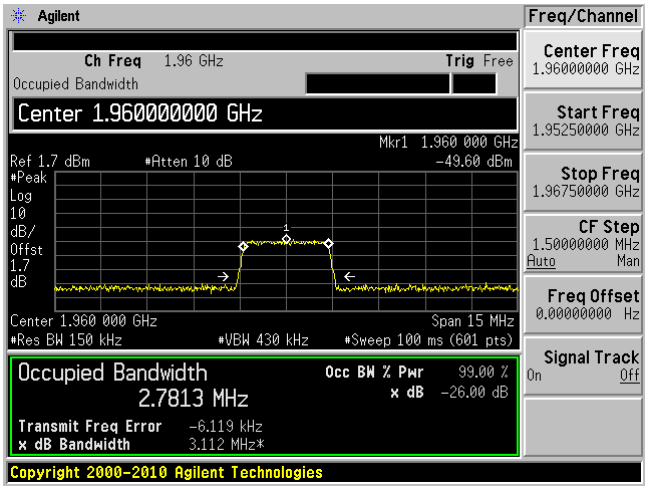

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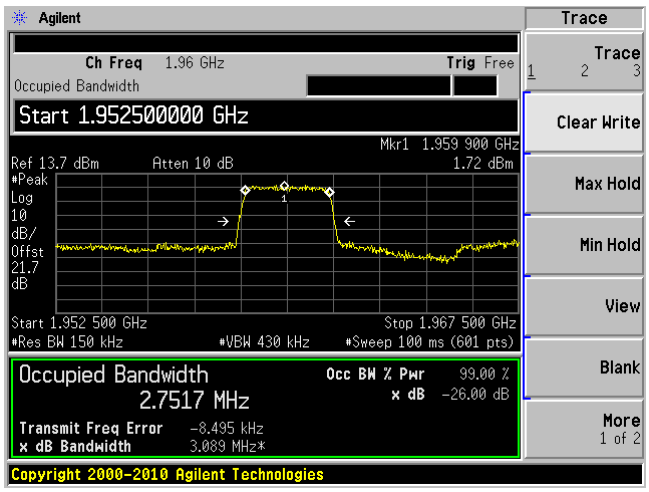

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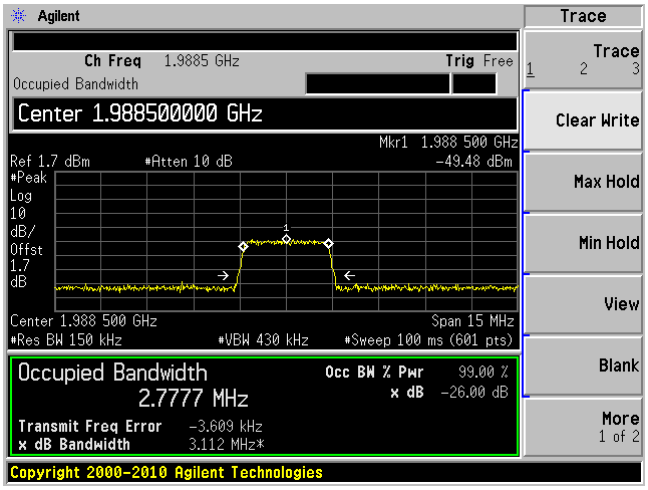

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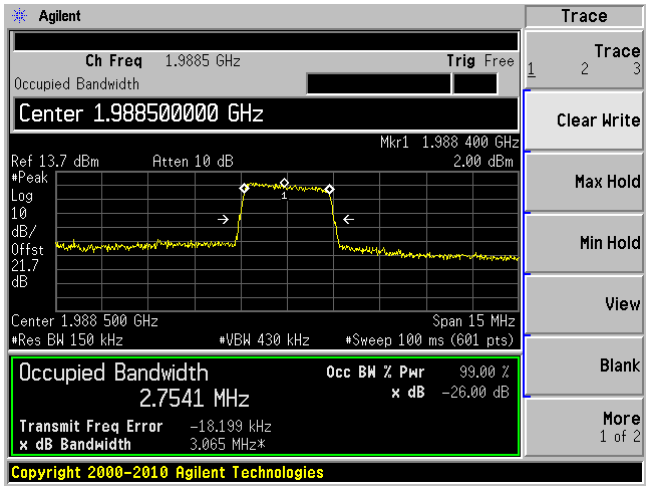
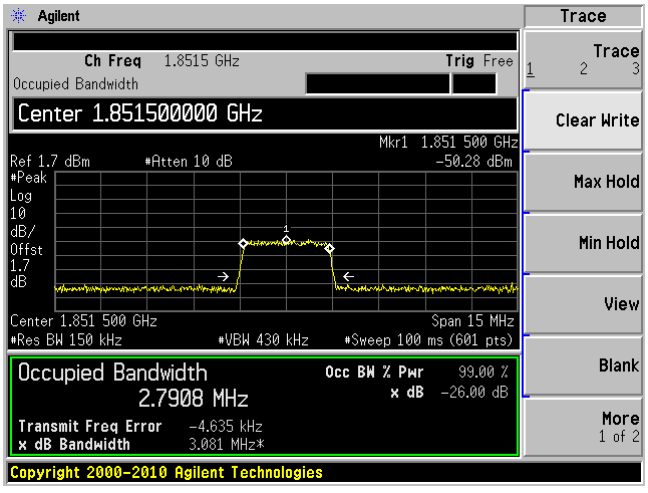


LTE 3MHz QPSK UL

Low I/P



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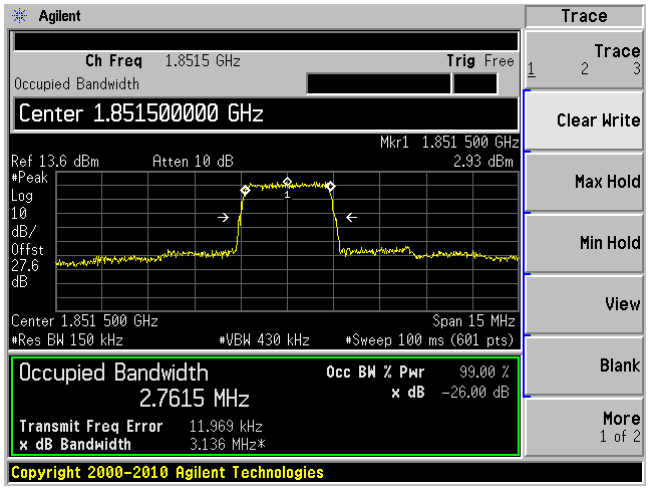

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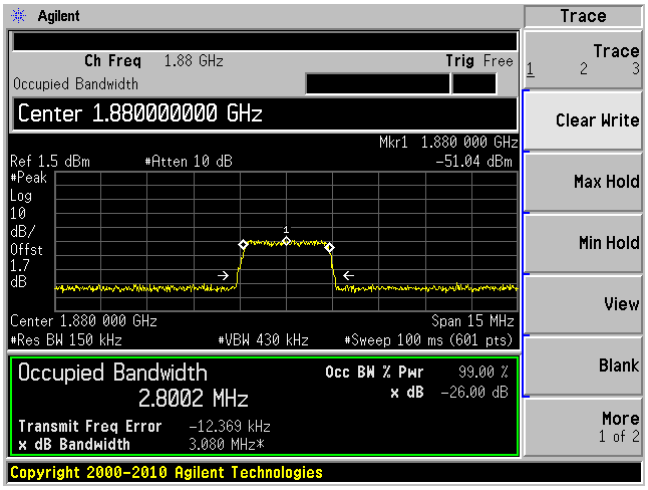

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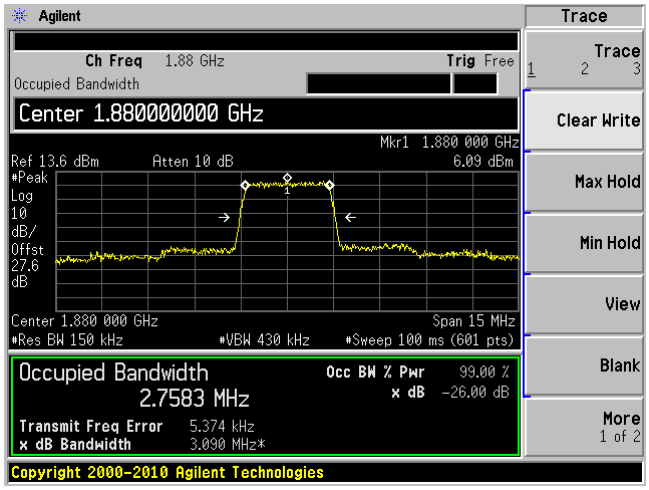

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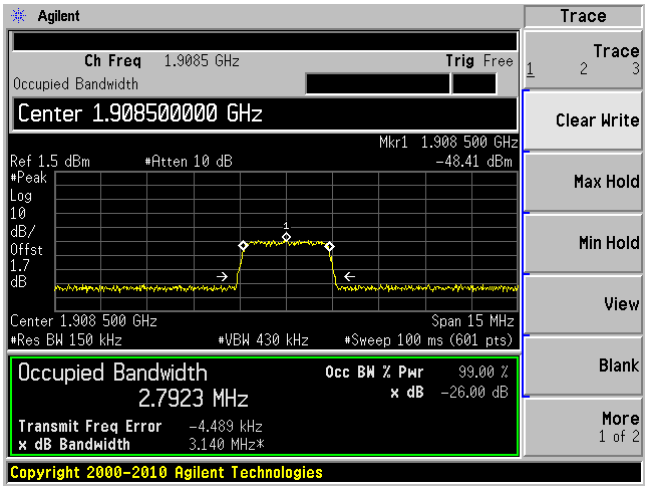

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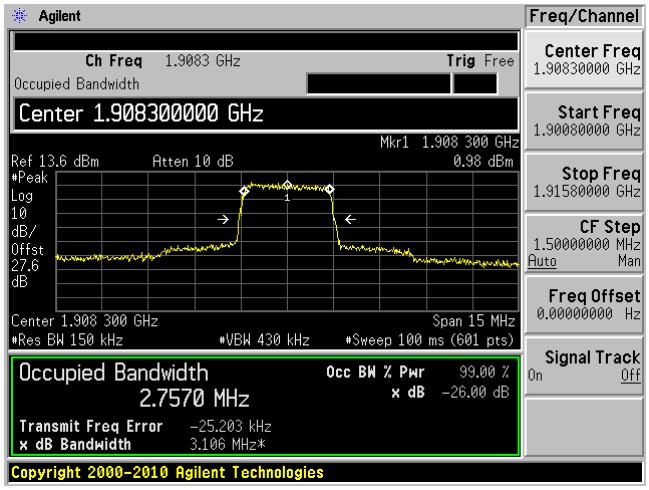
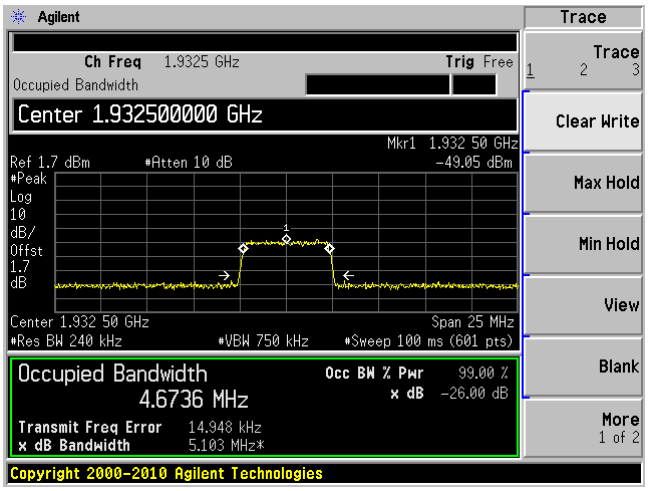


LTE 5MHz QPSK DL

Low I/P



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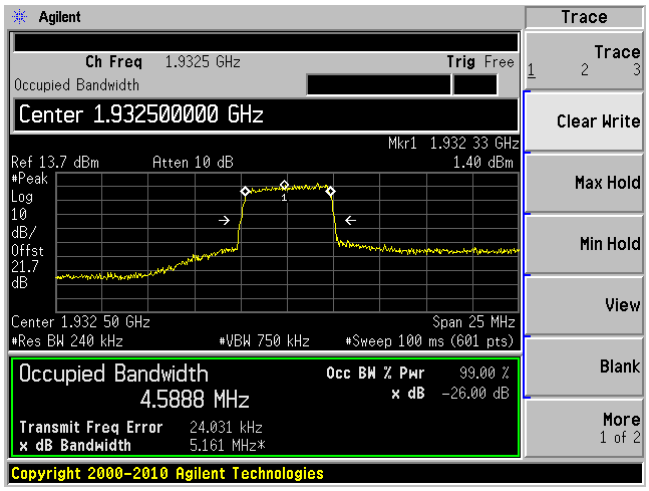
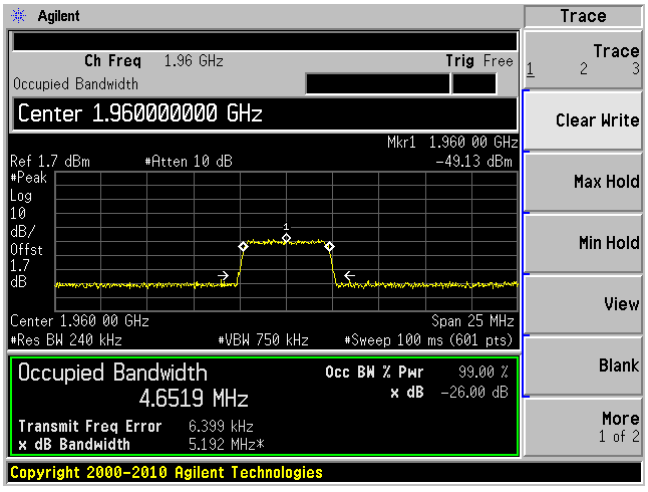
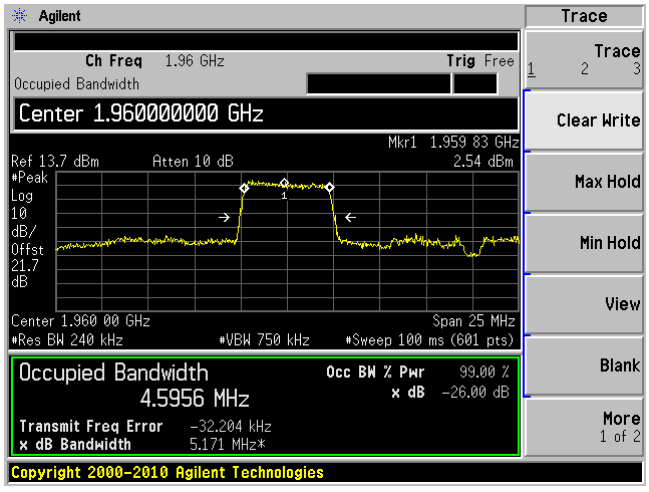


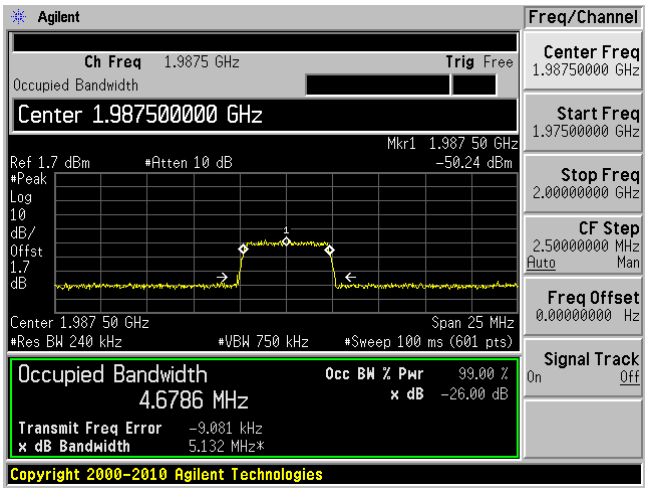
Middle I/P



Middle O/P



High I/P



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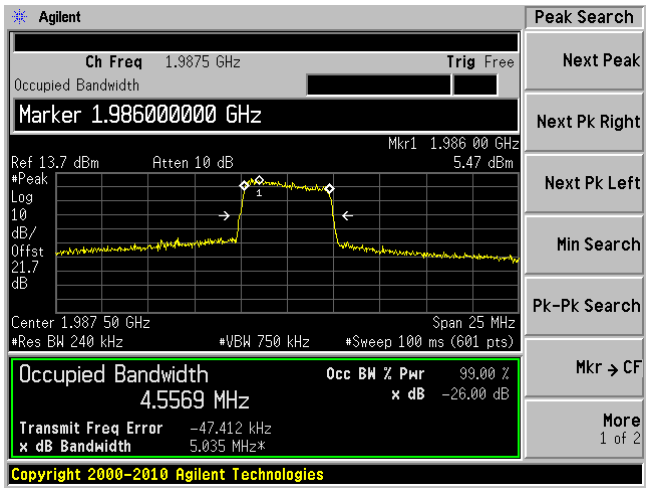
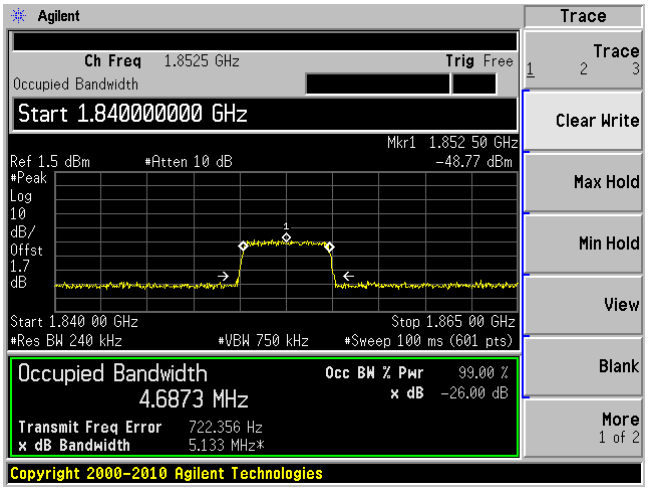


LTE 5MHz QPSK UL

Low I/P



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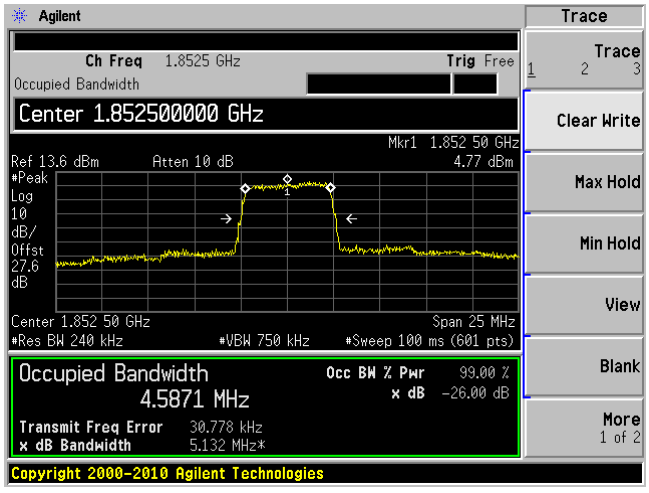

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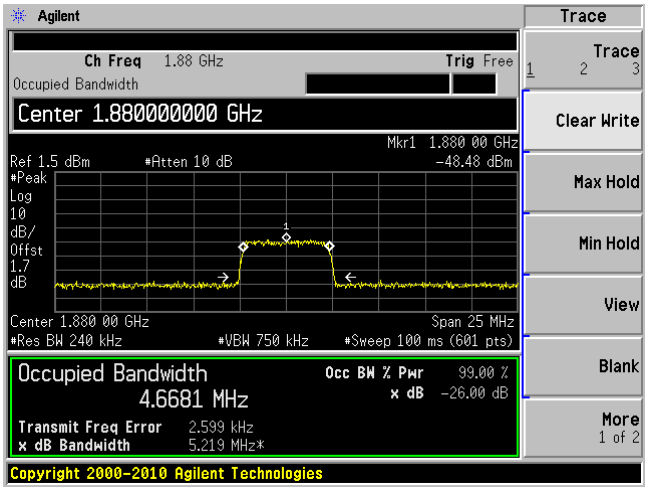
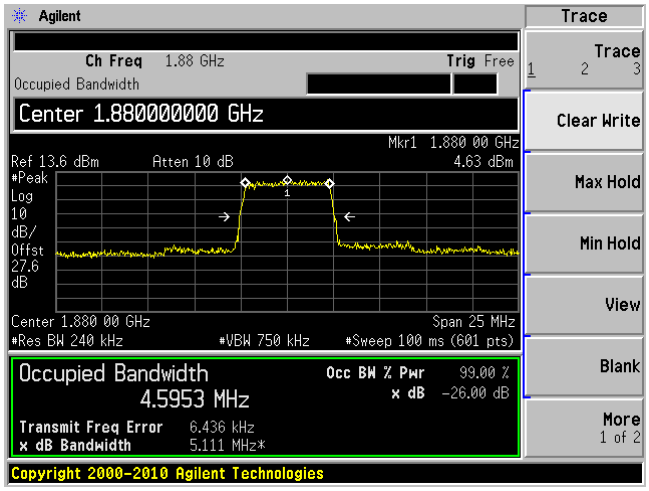
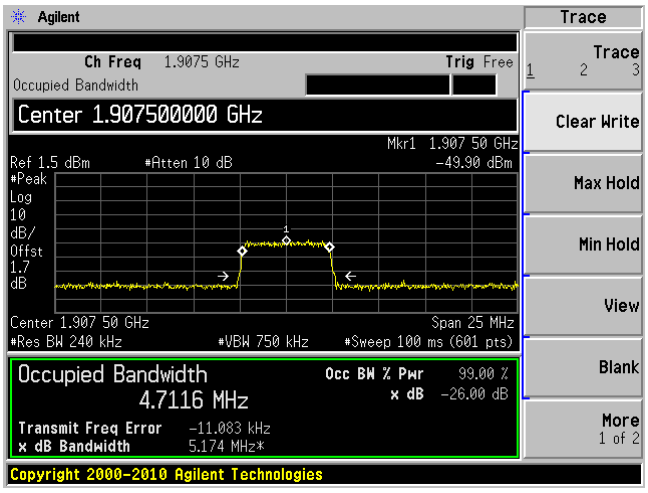


Middle O/P



High I/P



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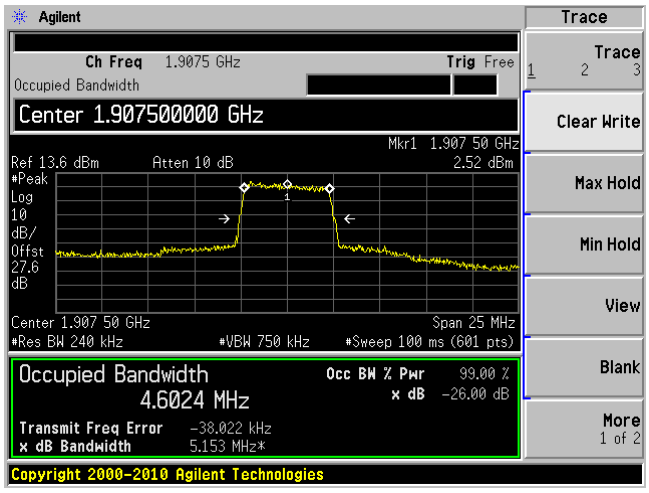
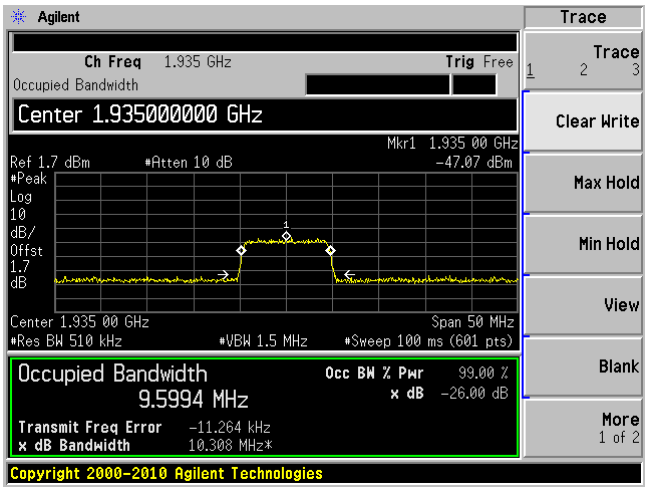


LTE 10MHz QPSK DL

Low I/P



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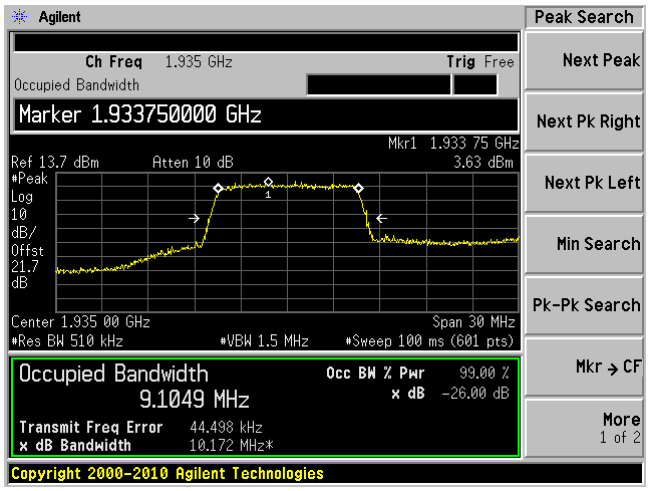
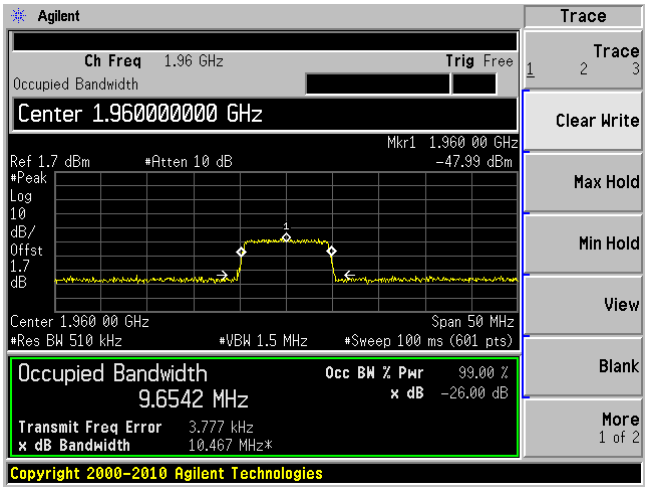


Middle I/P



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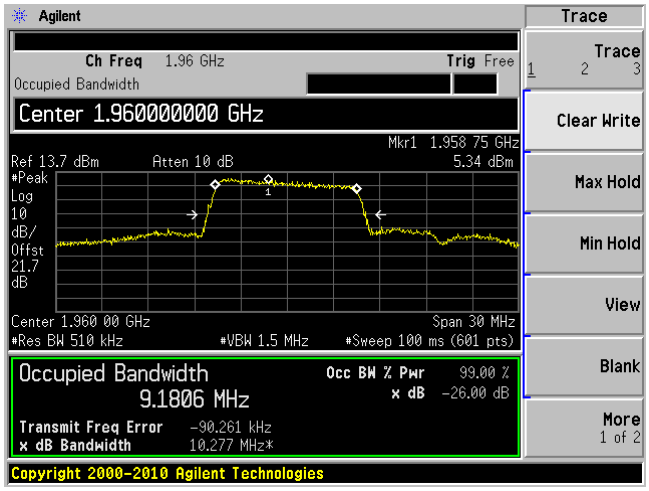

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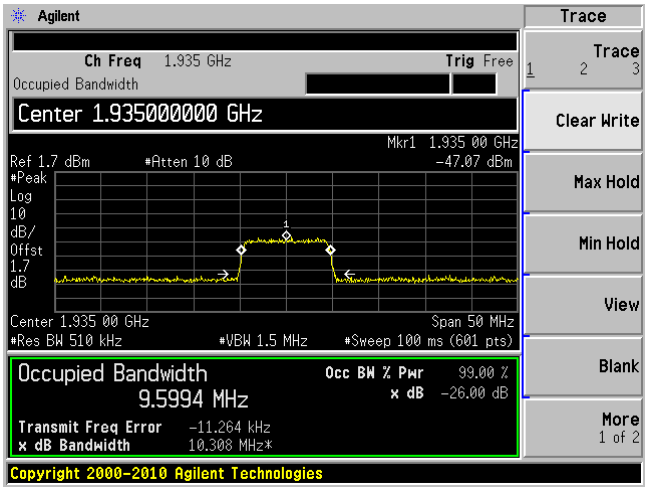
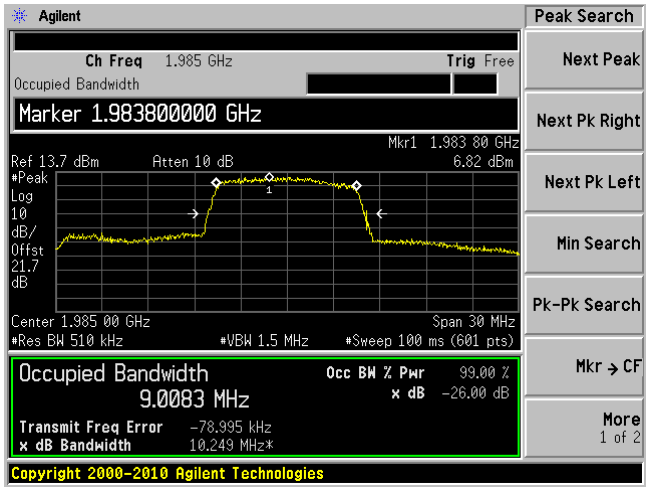
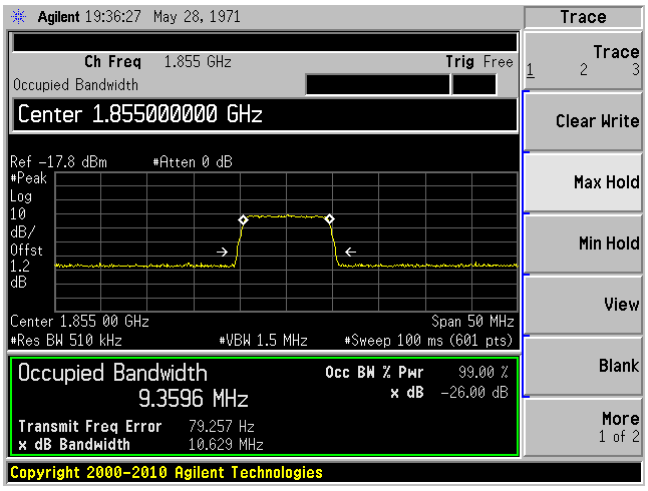


High O/P



LTE 10MHz QPSK UL

Low I/P



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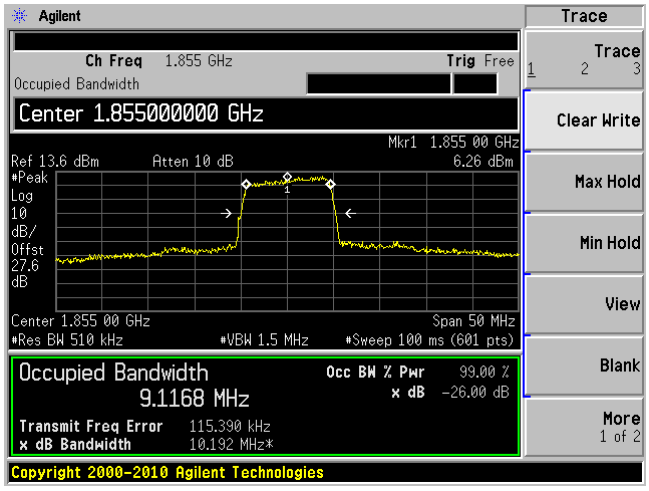

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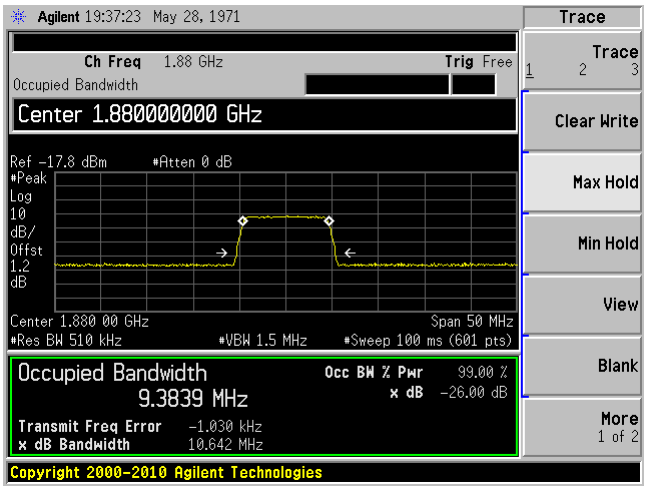

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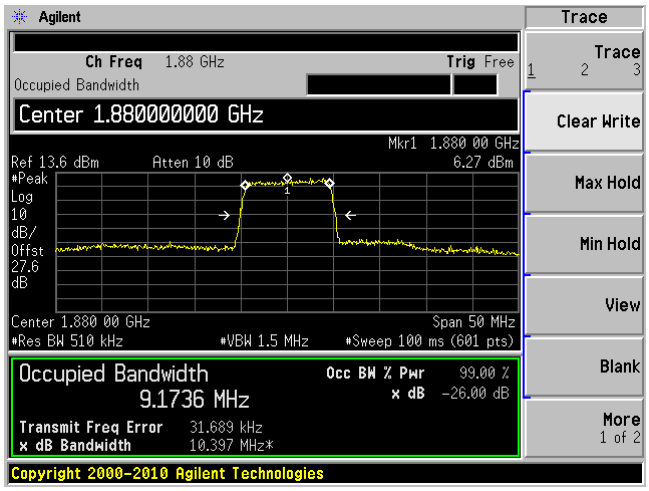

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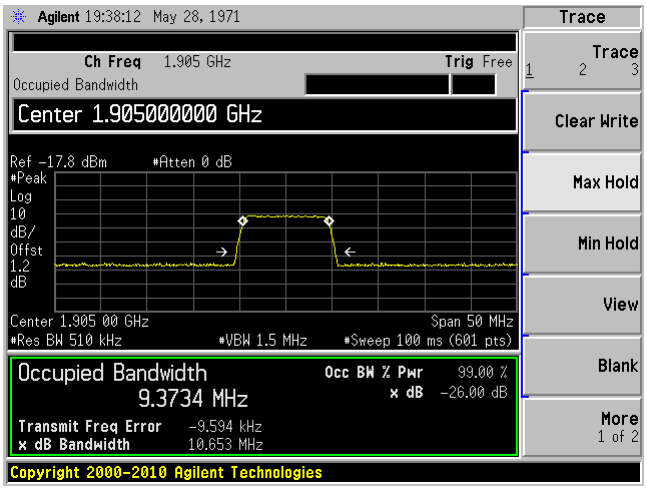

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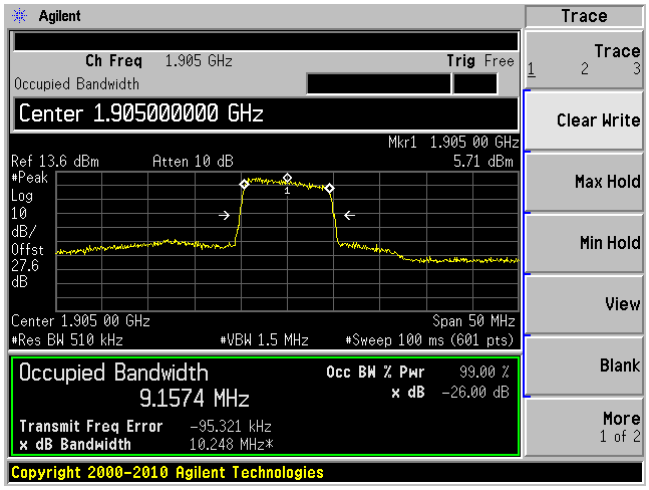
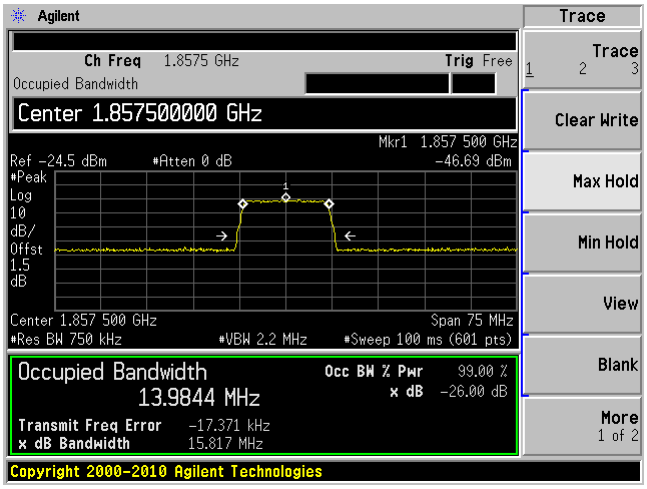


LTE 15MHz QPSK UL

Low I/P



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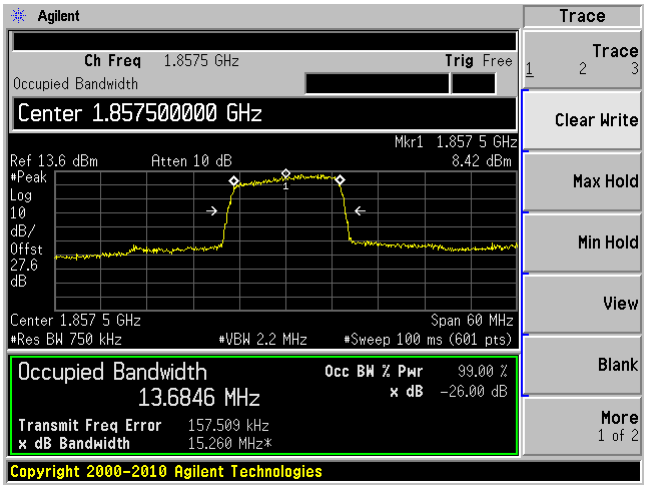

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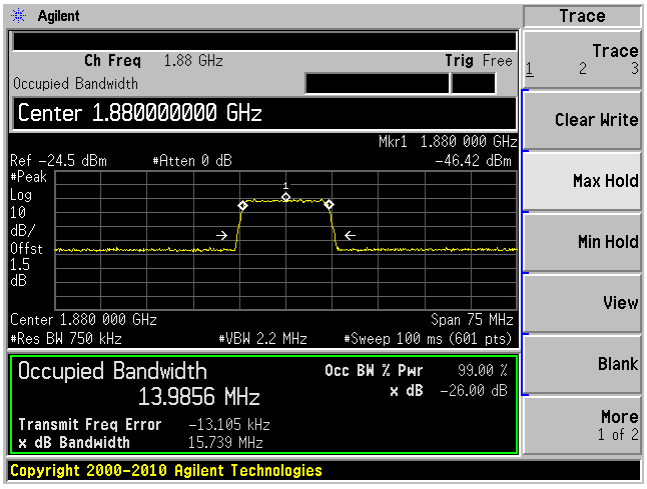

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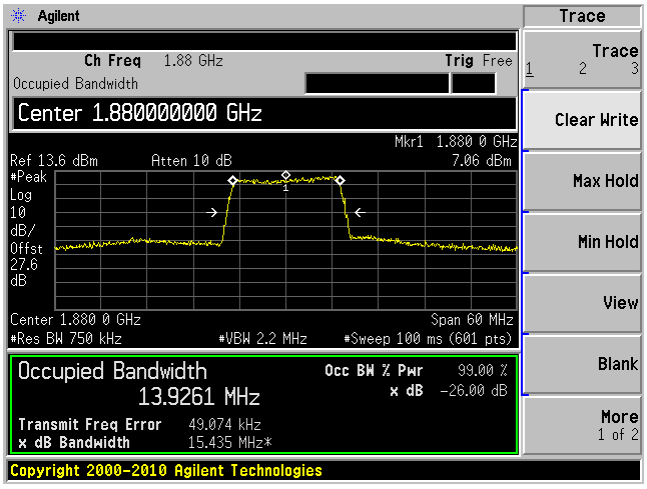

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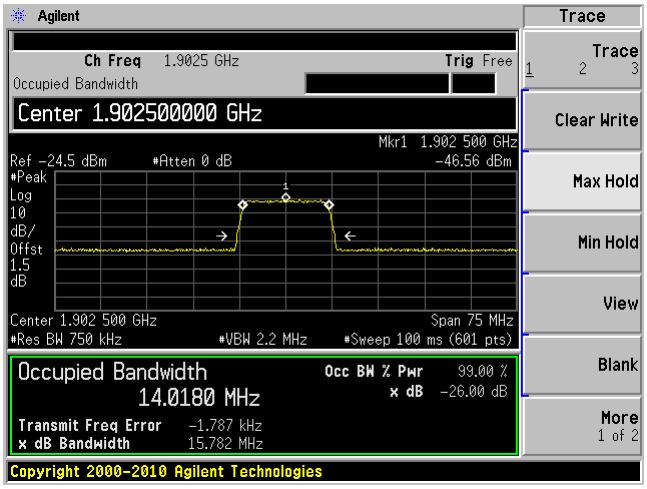

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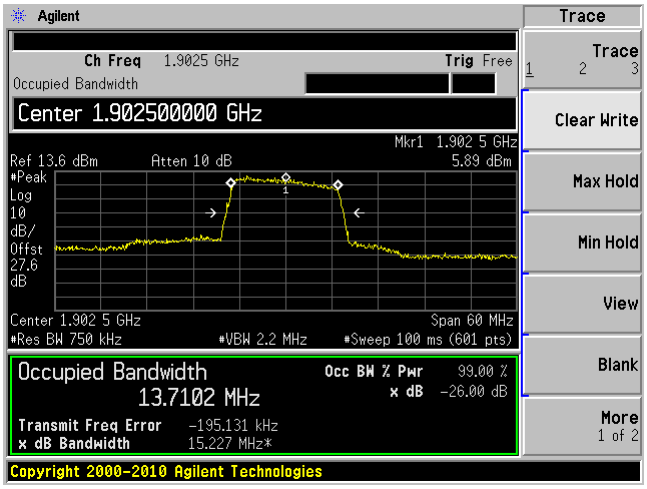
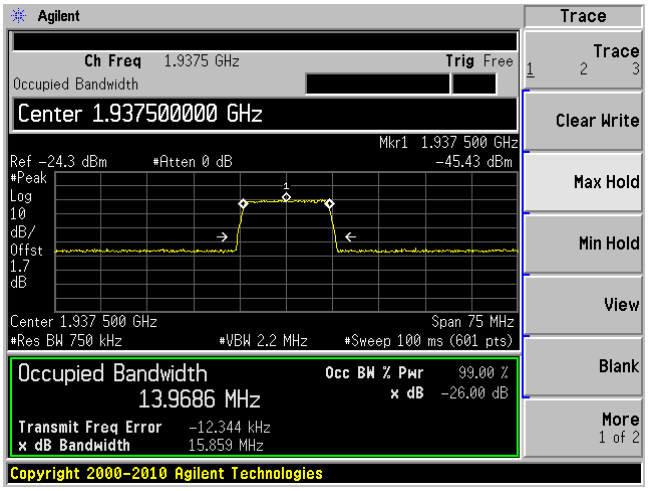


LTE 15MHz QPSK DL

Low I/P



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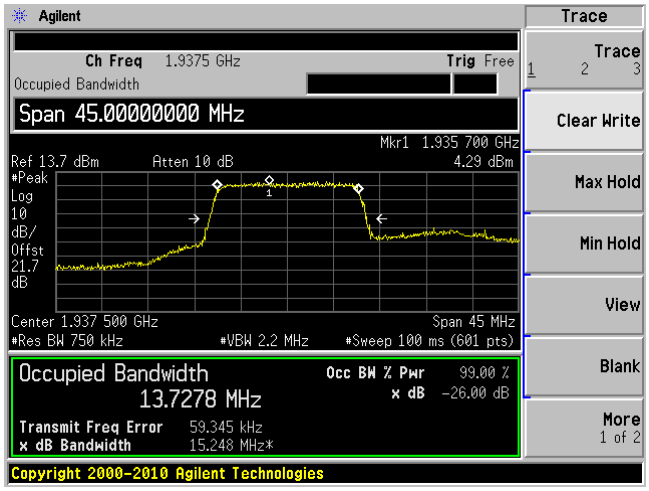

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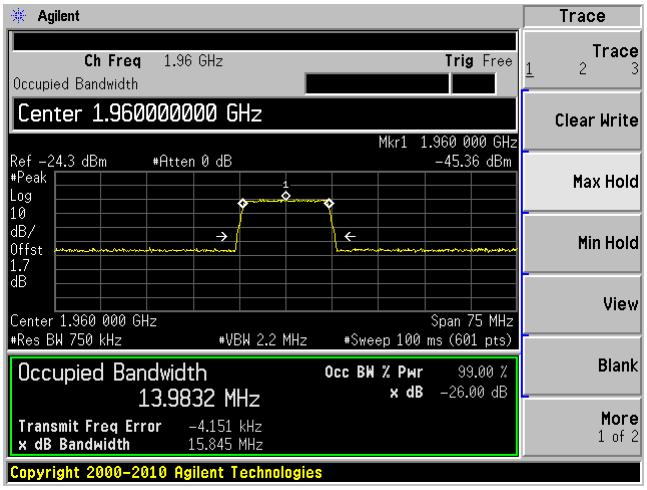

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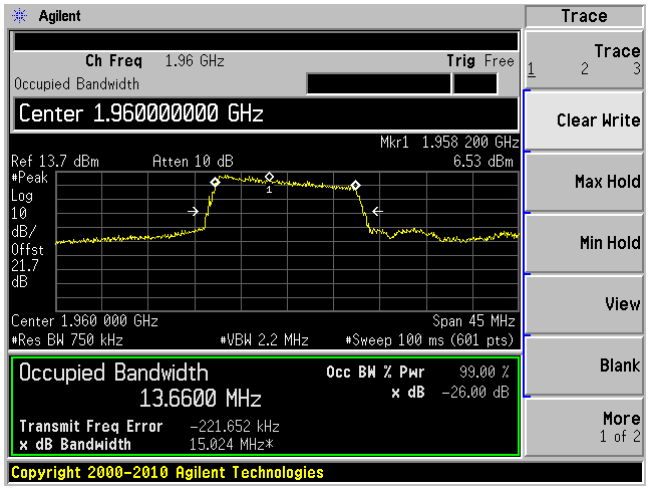

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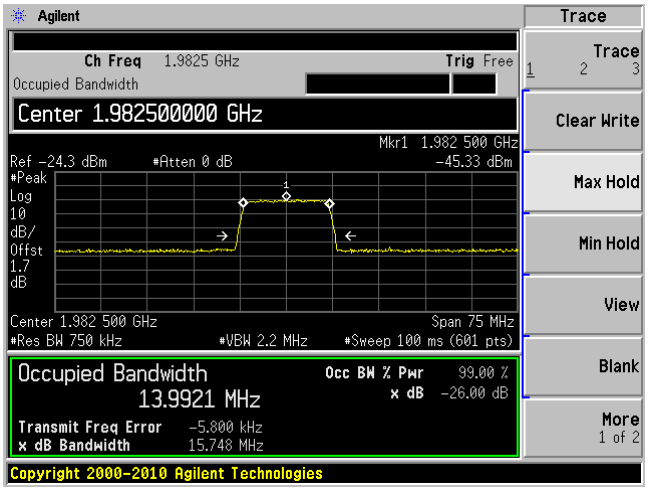

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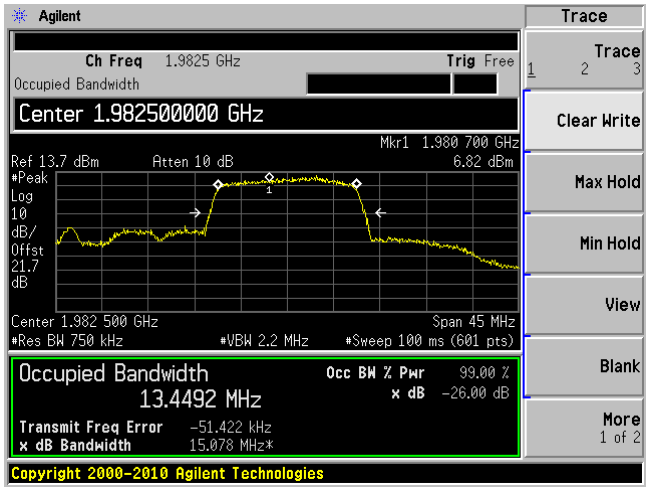
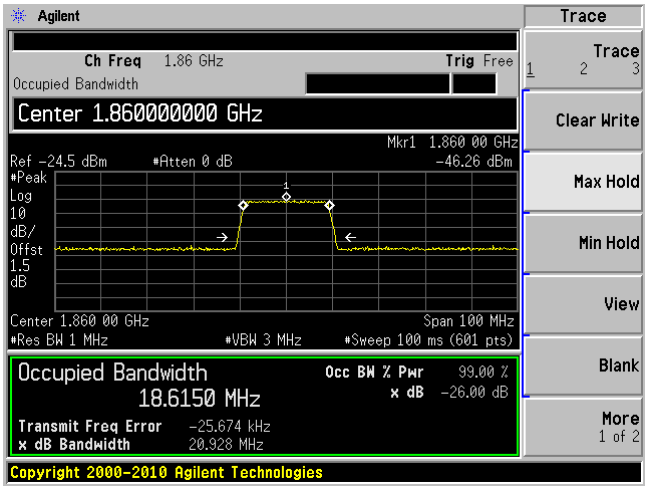


LTE 20MHz QPSK UL

Low I/P



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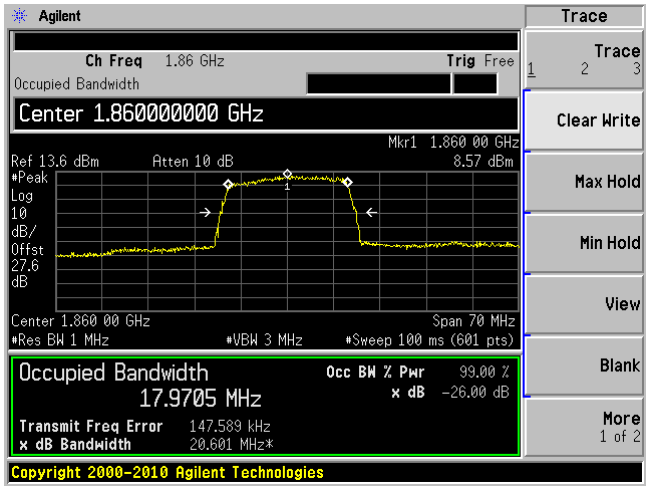

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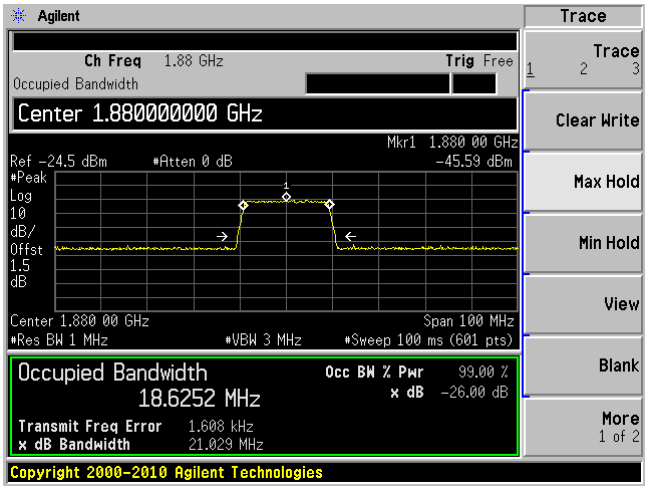

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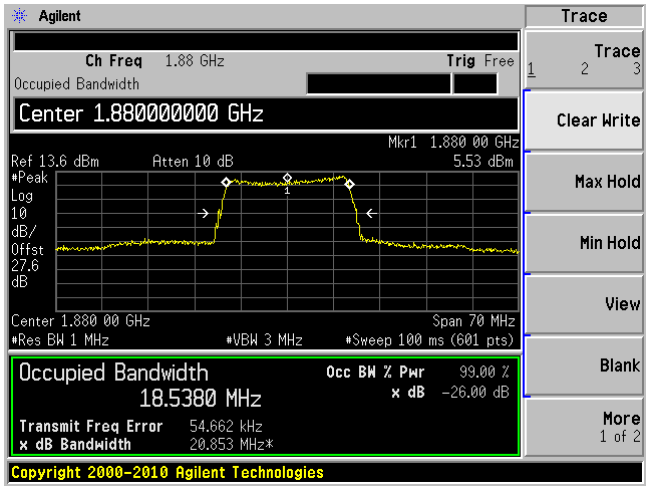

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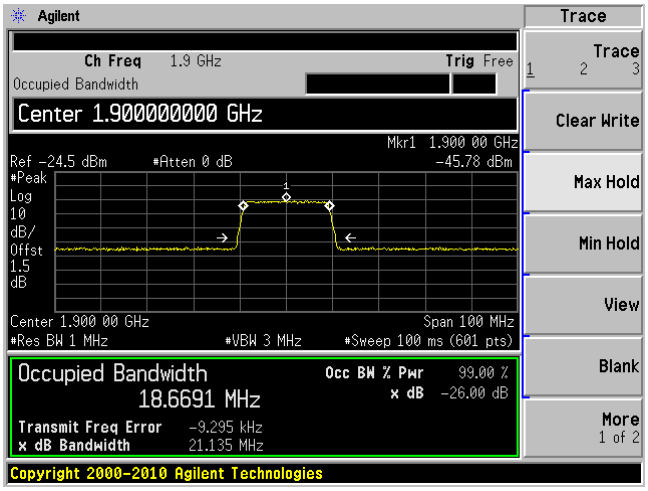

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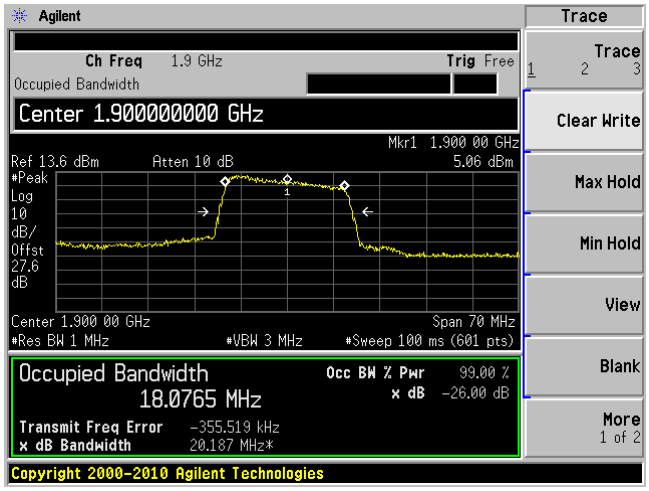
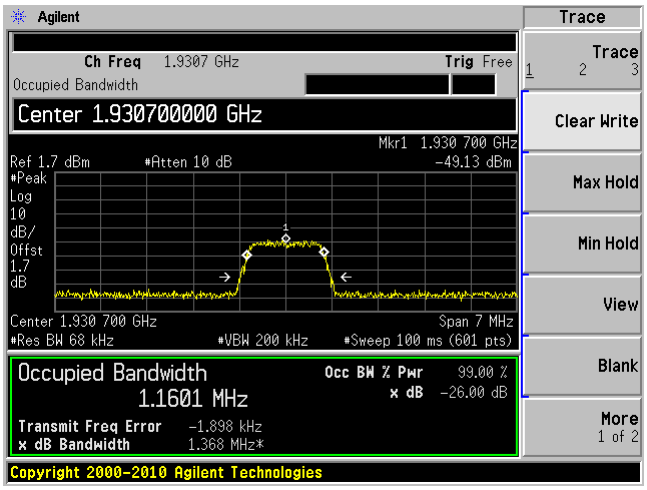


LTE 1.4MHz 16QAM DL

Low I/P



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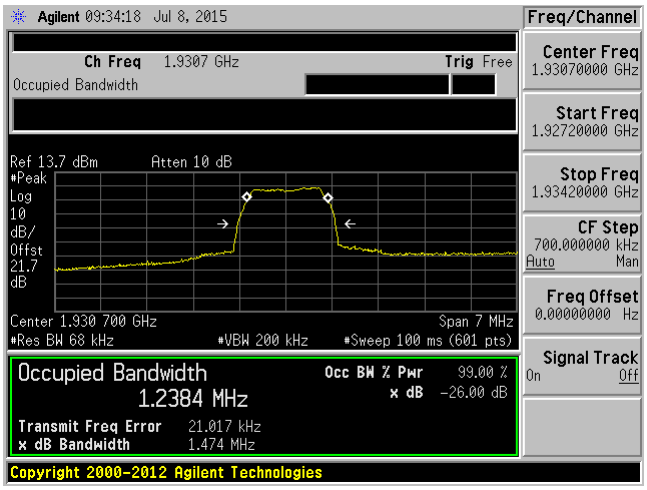

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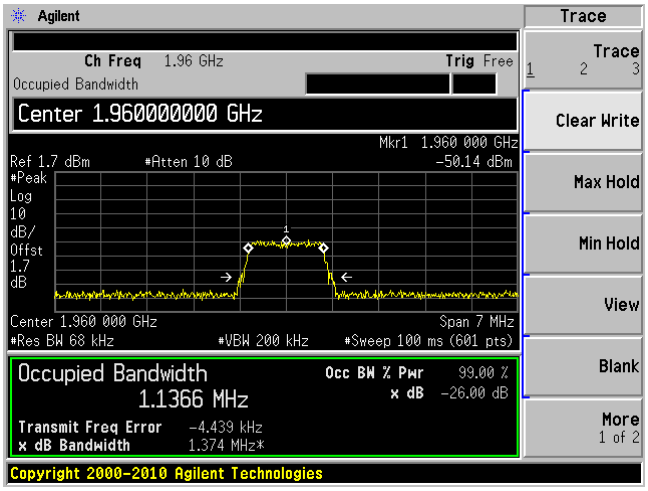

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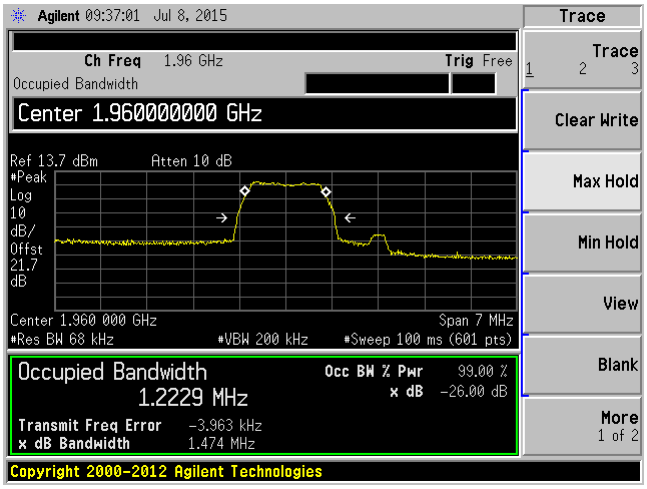

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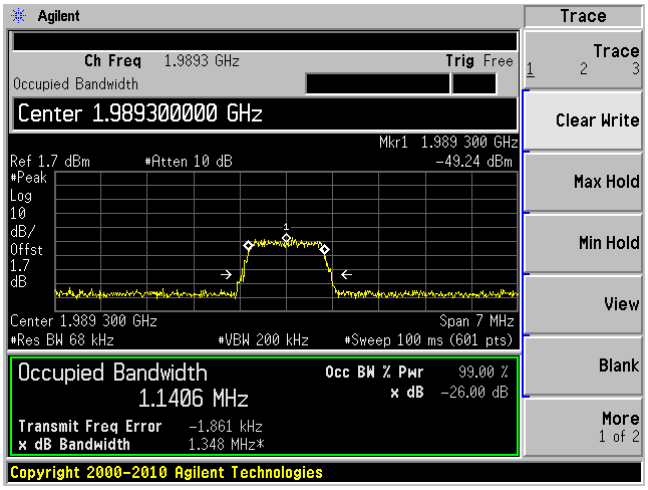

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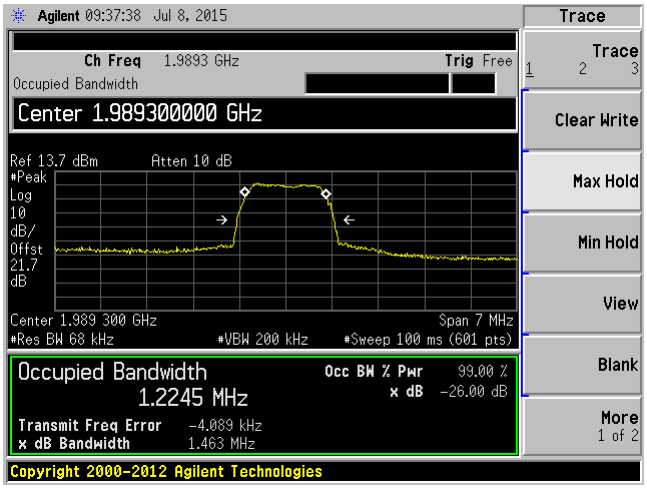
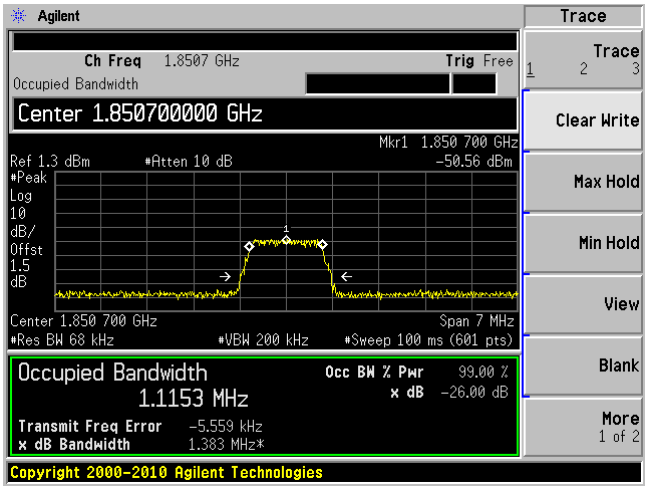


LTE 1.4MHz 16QAM UL

Low I/P



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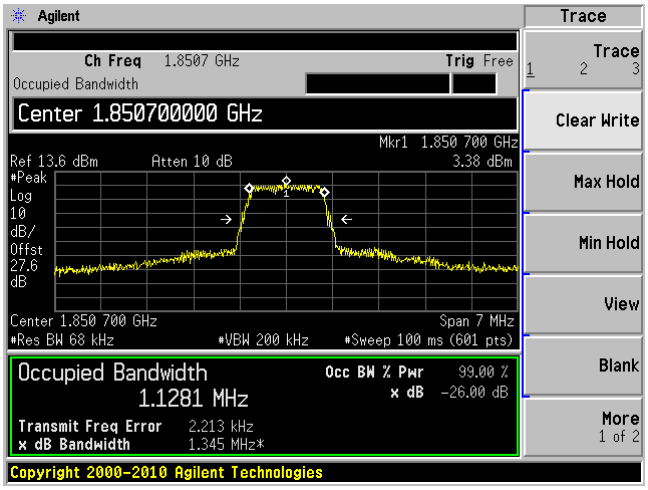

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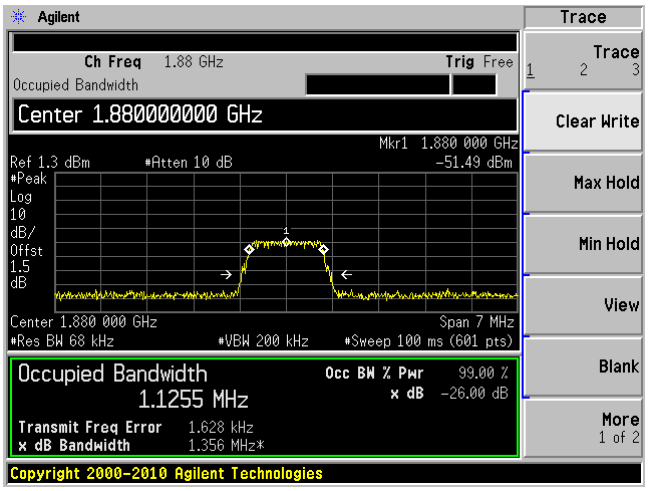

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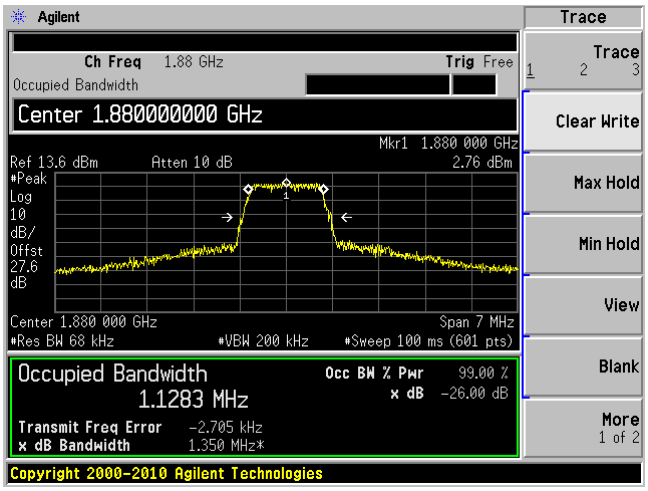

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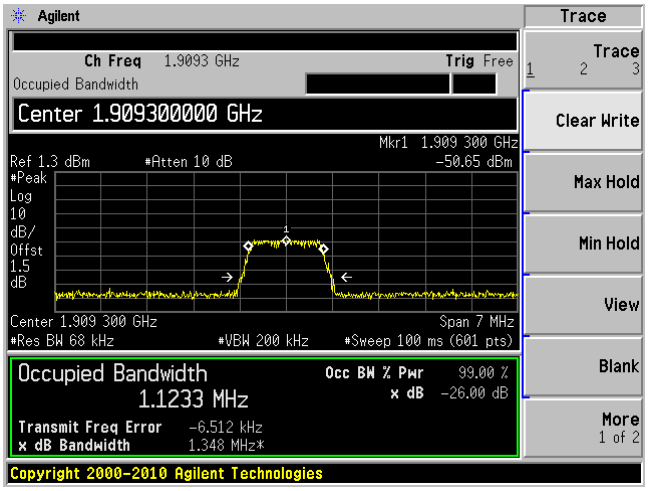

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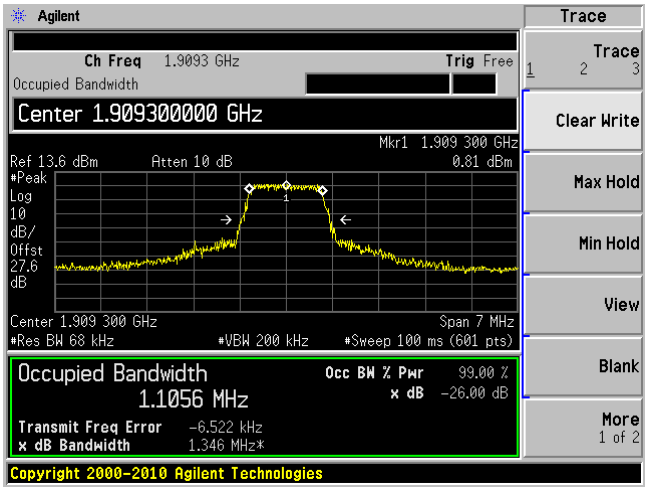
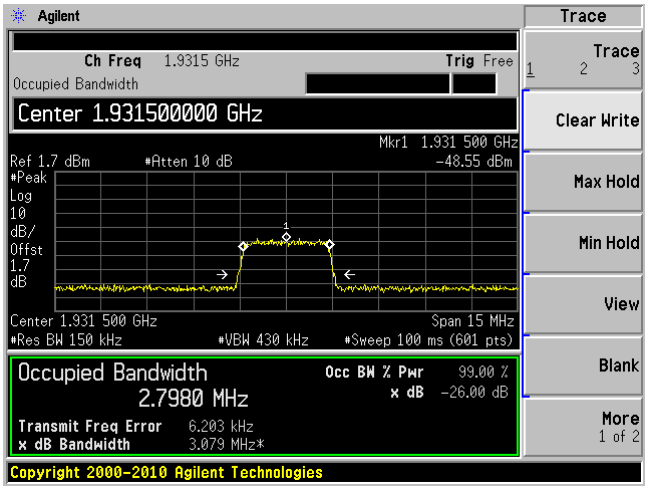


LTE 3MHz 16QAM DL

Low I/P



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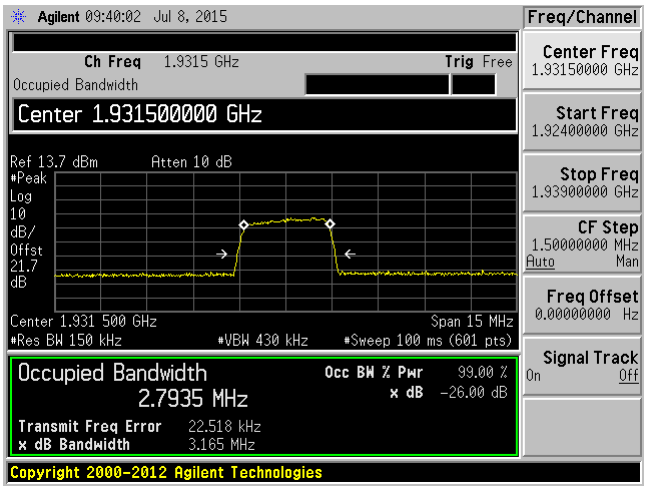

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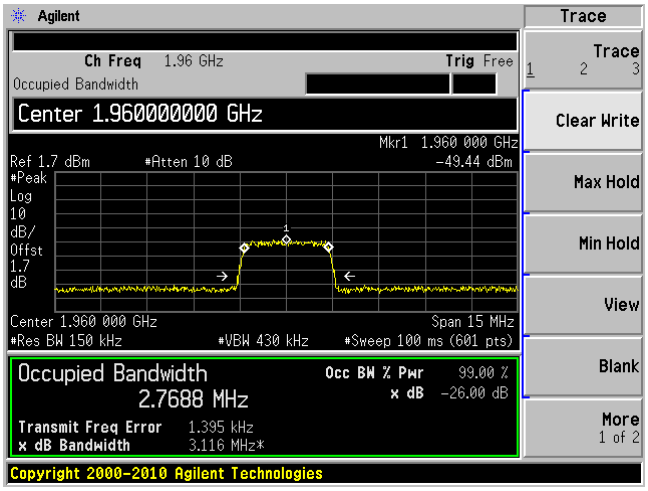

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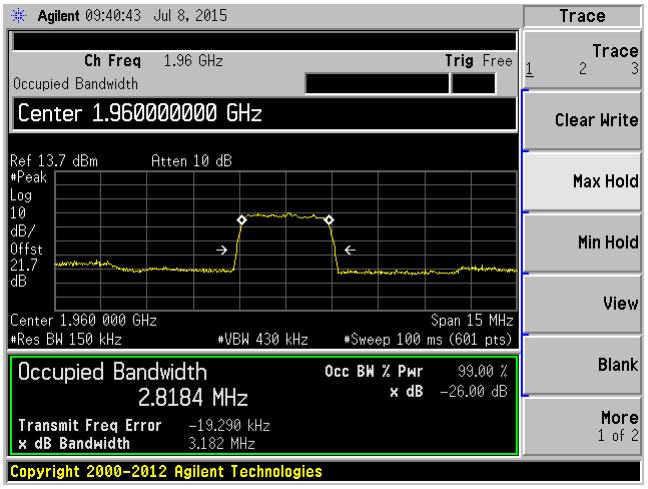

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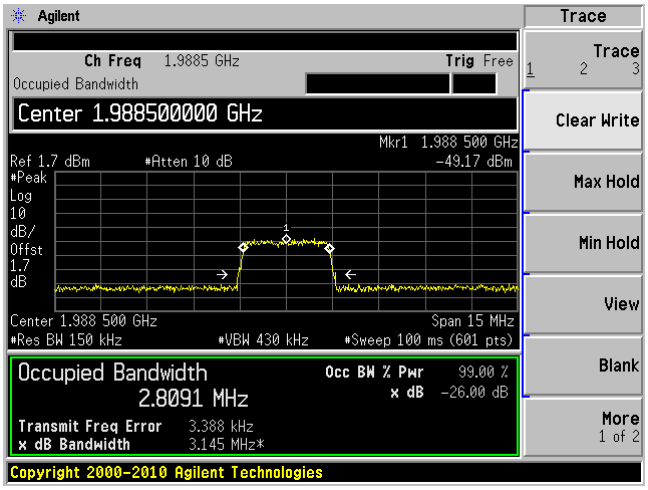

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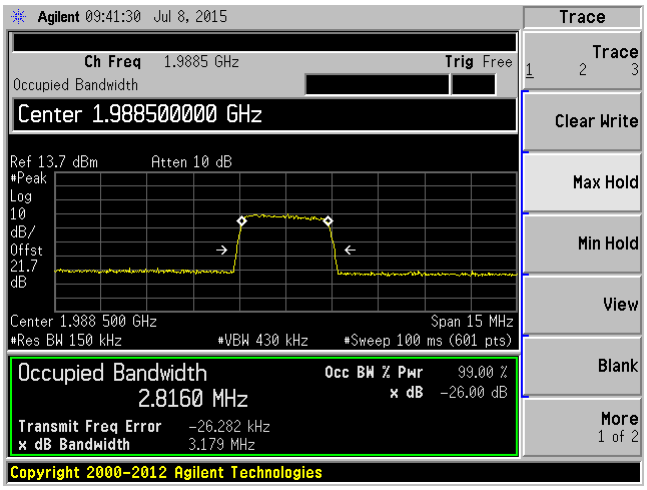
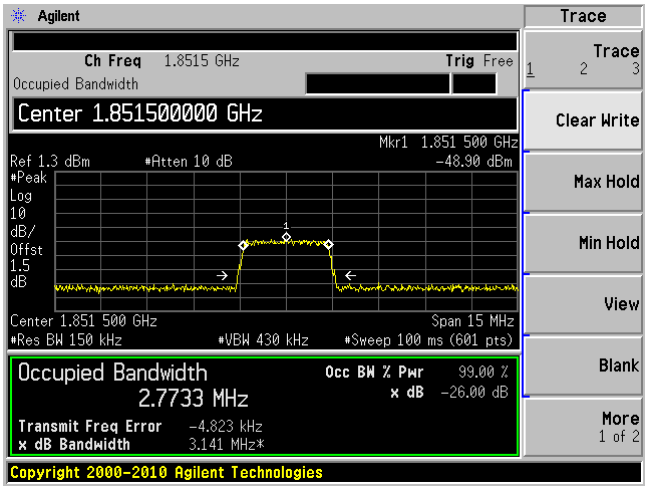


LTE 3MHz 16QAM UL

Low I/P



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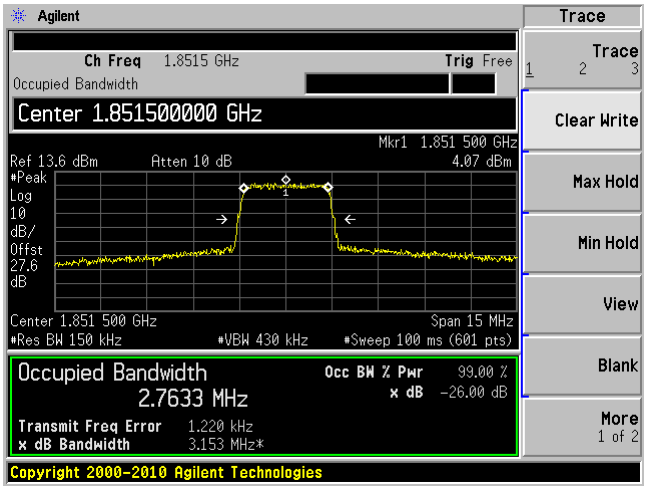
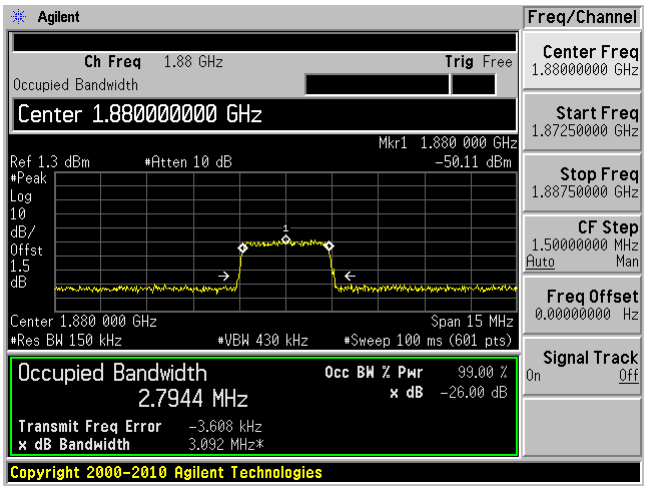
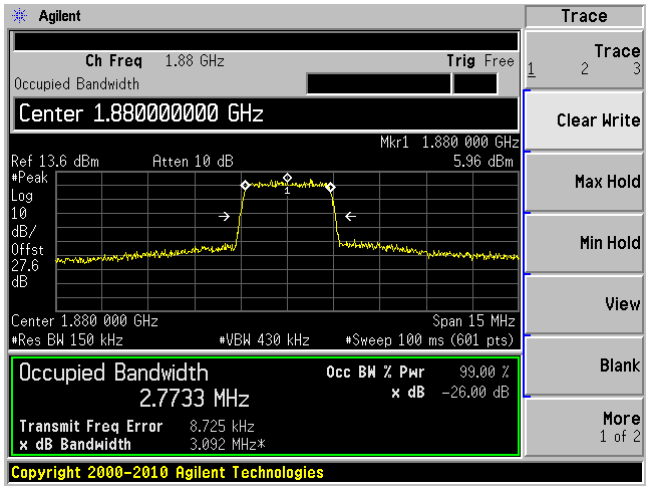


Middle I/P



Middle O/P



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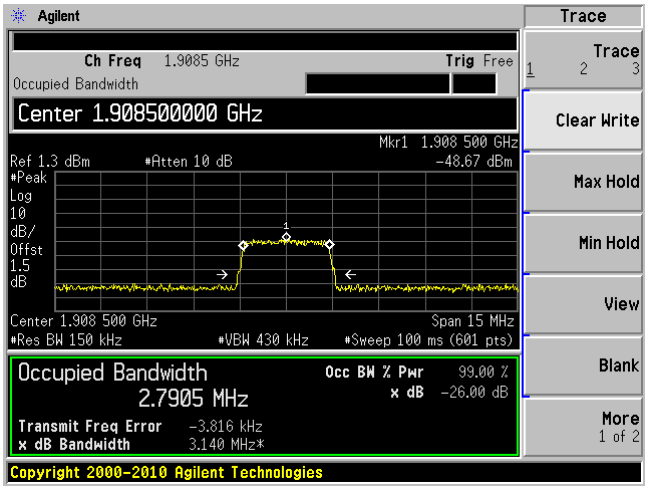
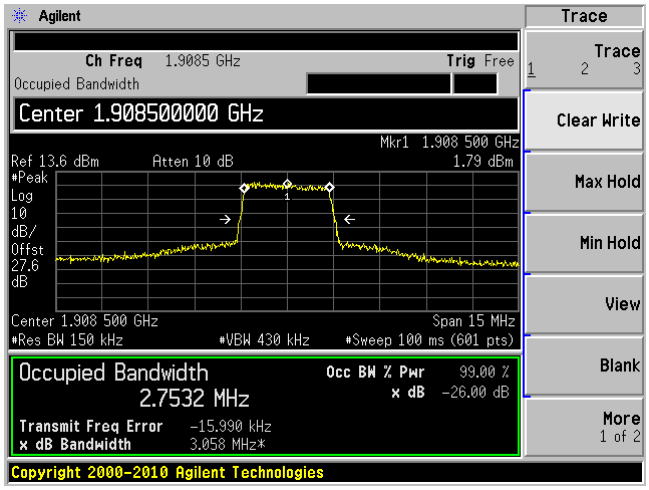
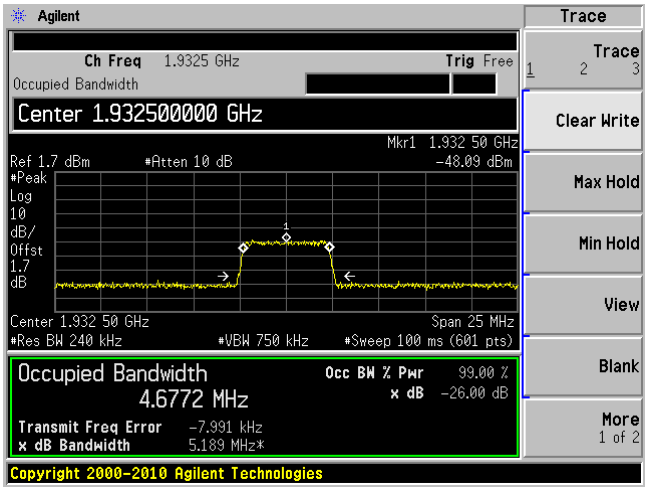


High O/P



LTE 5MHz 16QAM DL

Low I/P



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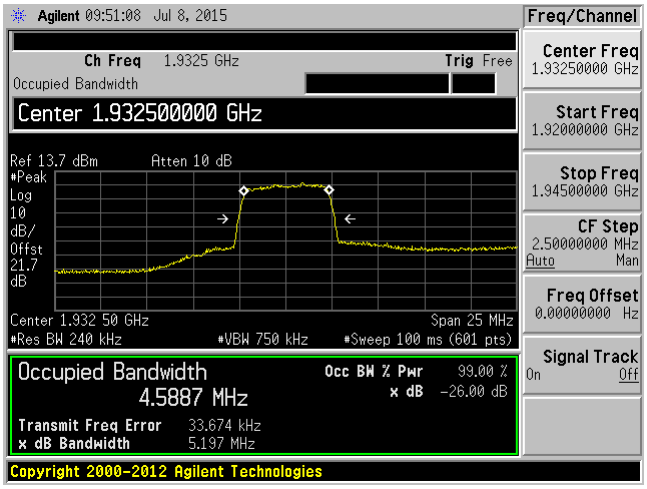

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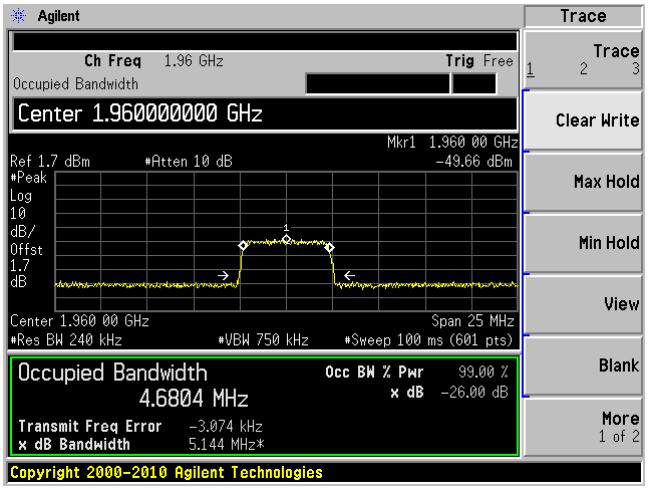

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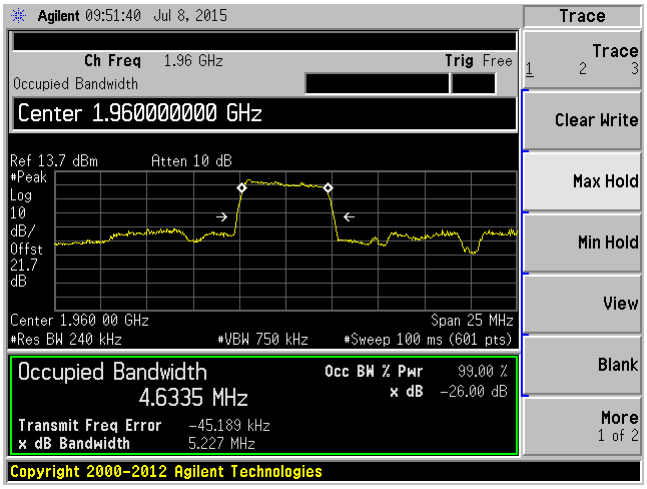

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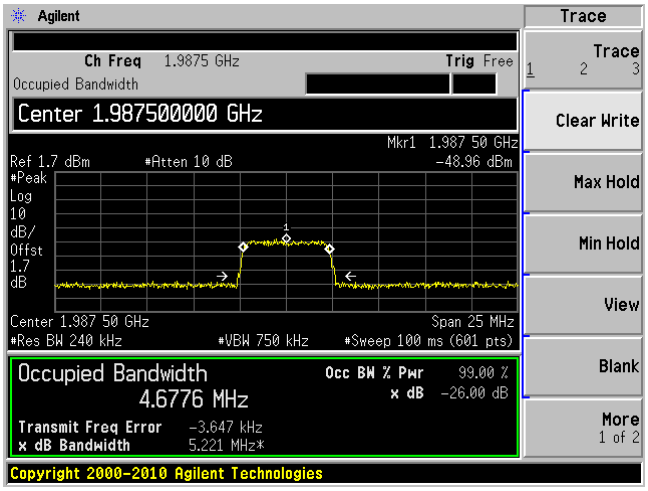

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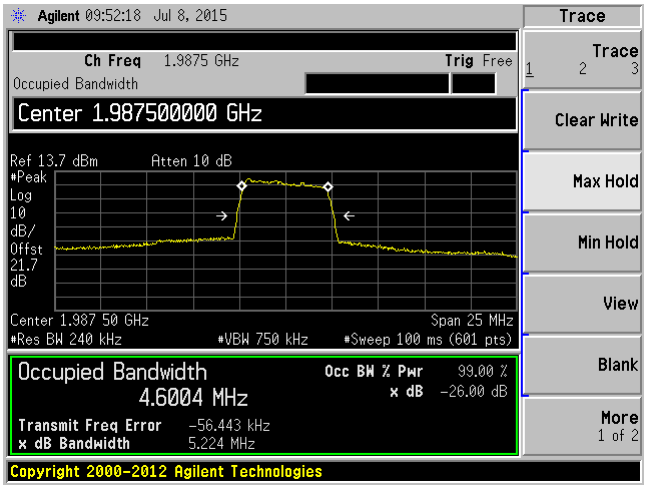
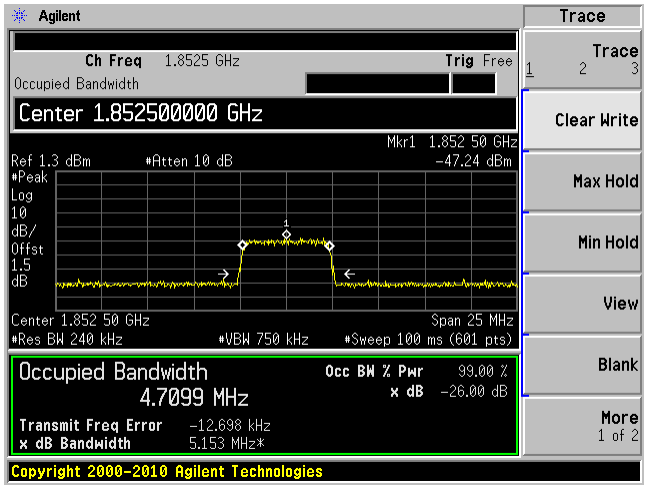


LTE 5MHz 16QAM UL

Low I/P



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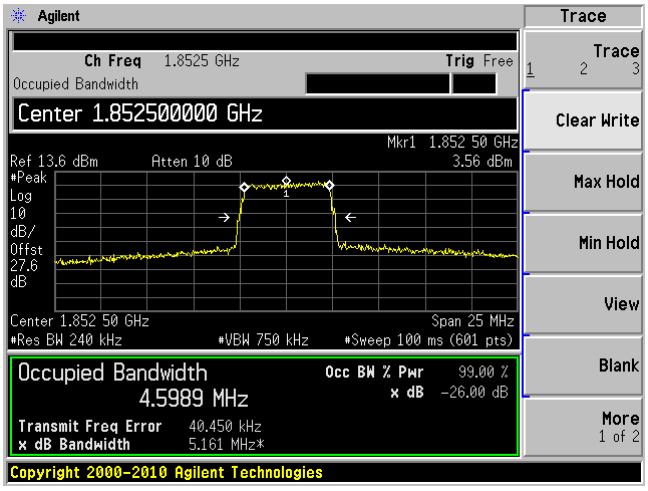

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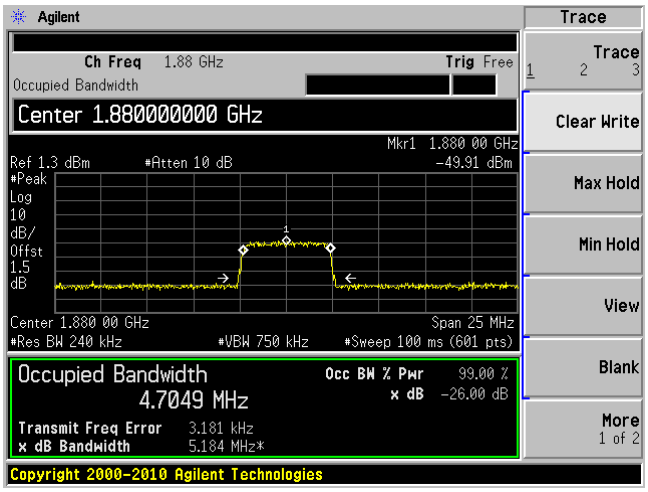

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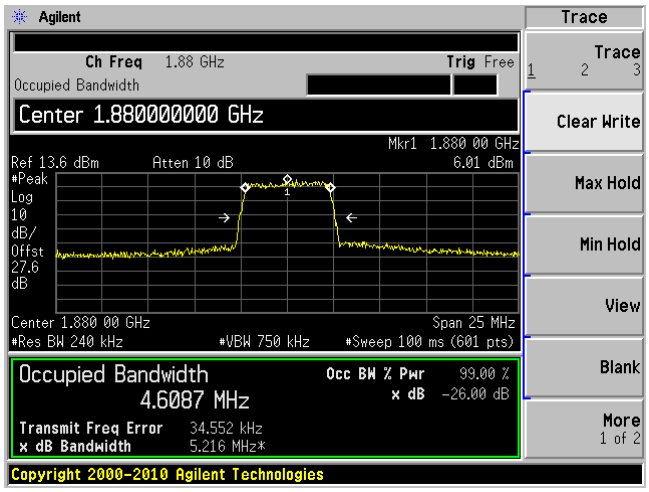

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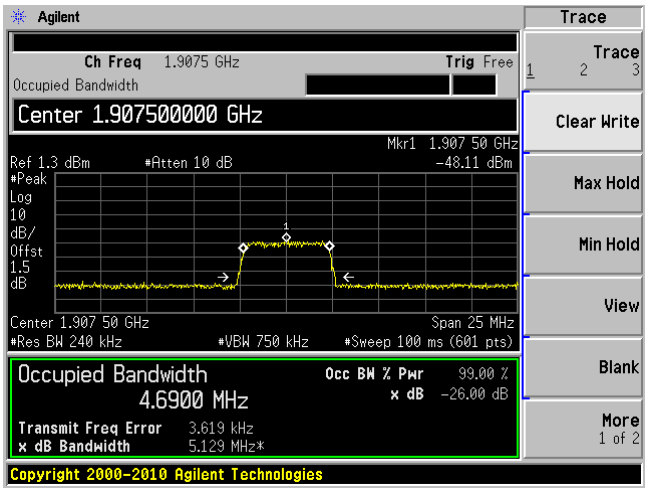

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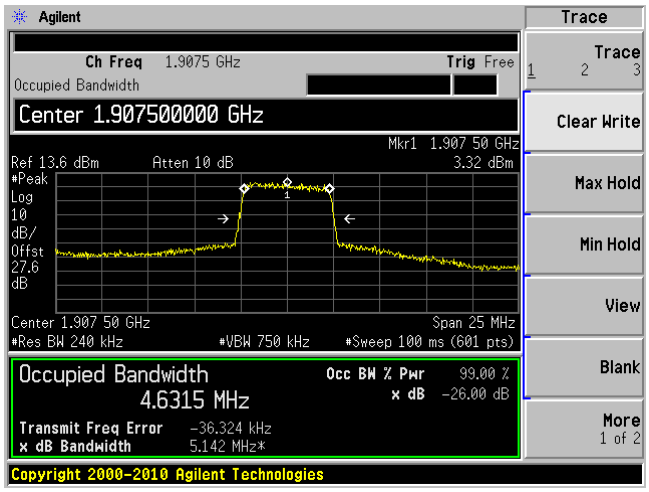
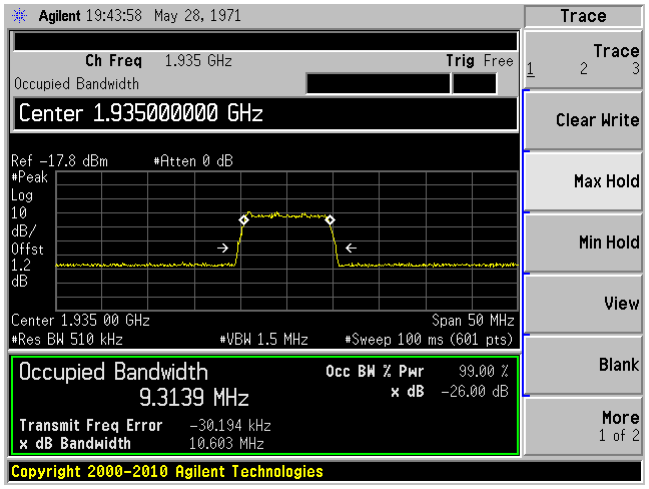


LTE 10MHz 16QAM DL

Low I/P



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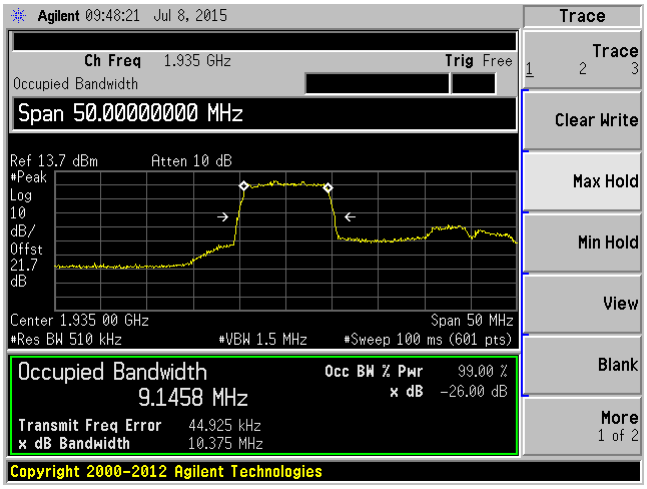

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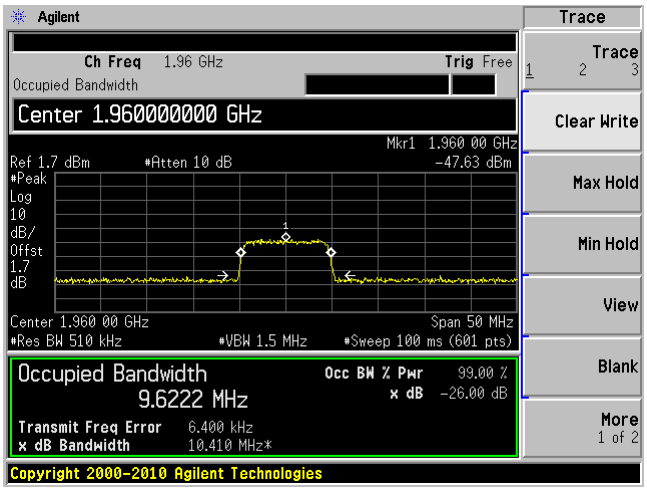

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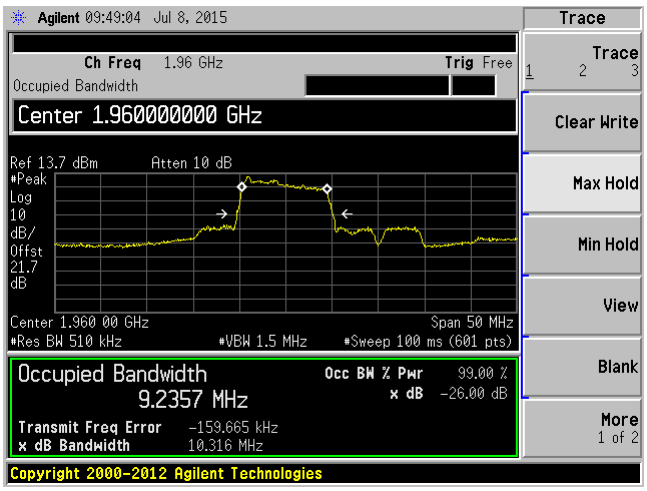

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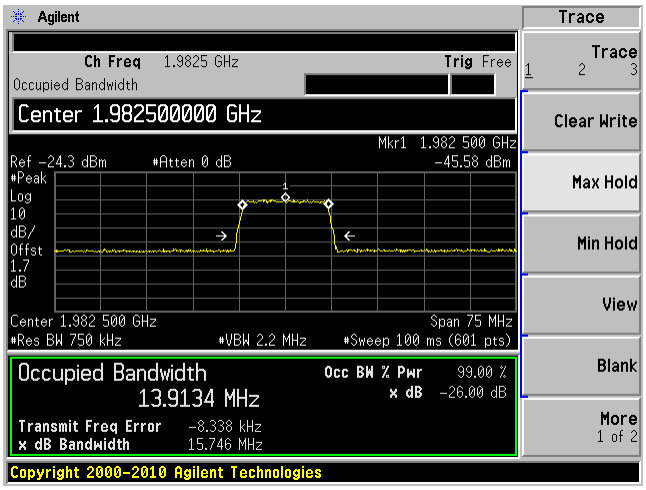

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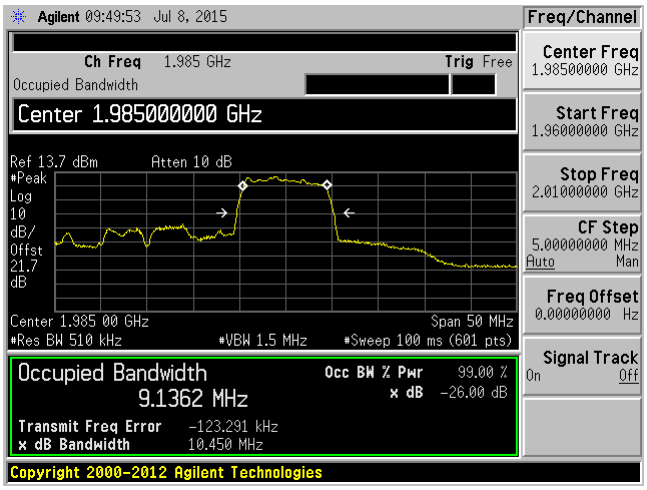
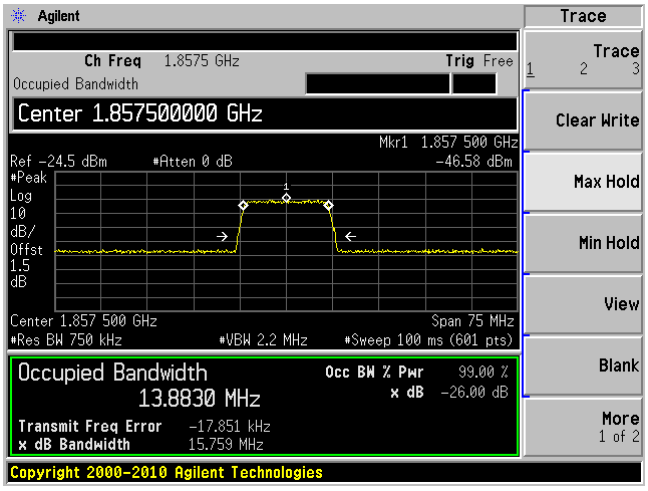


LTE 10MHz 16QAM UL

Low I/P



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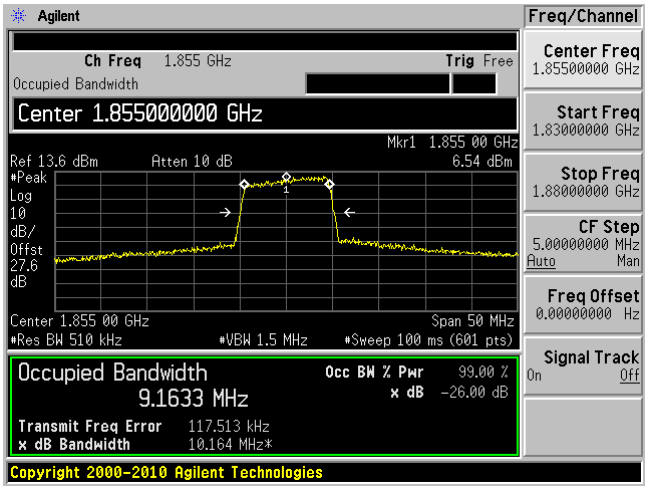

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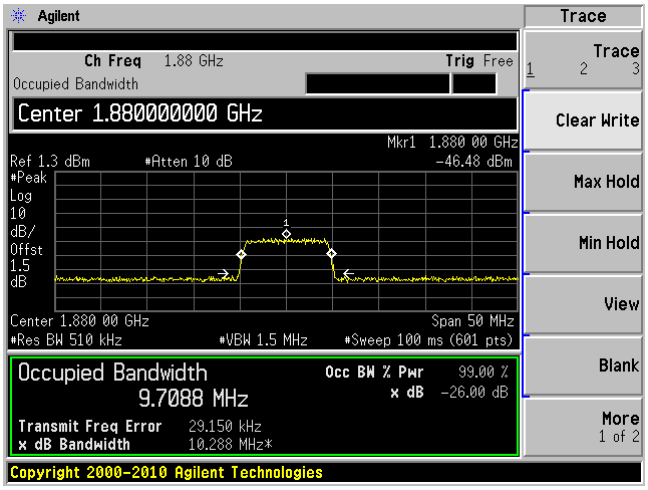

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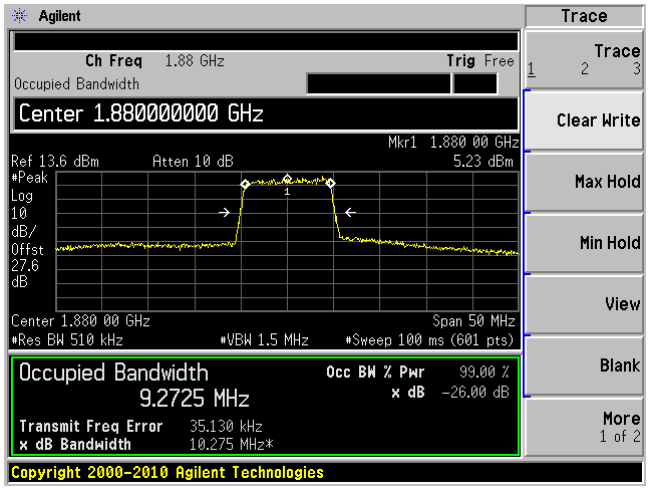

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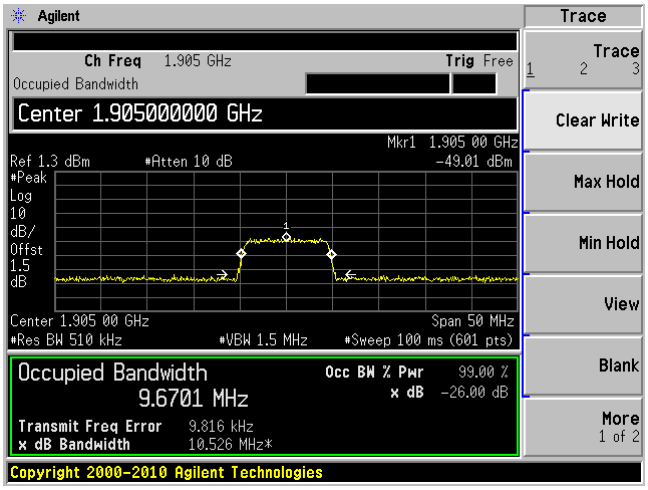

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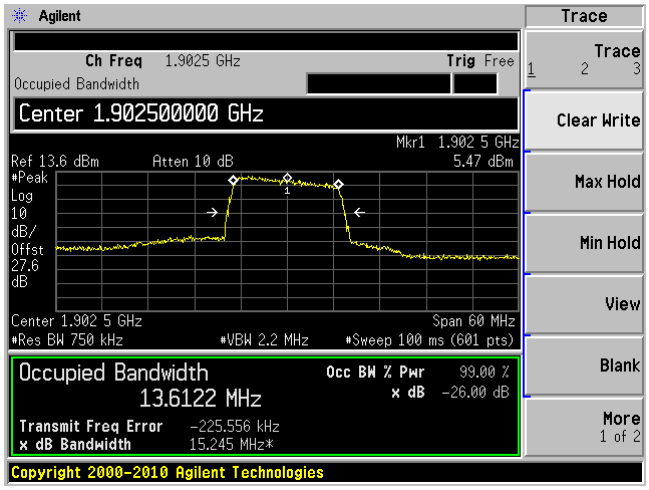
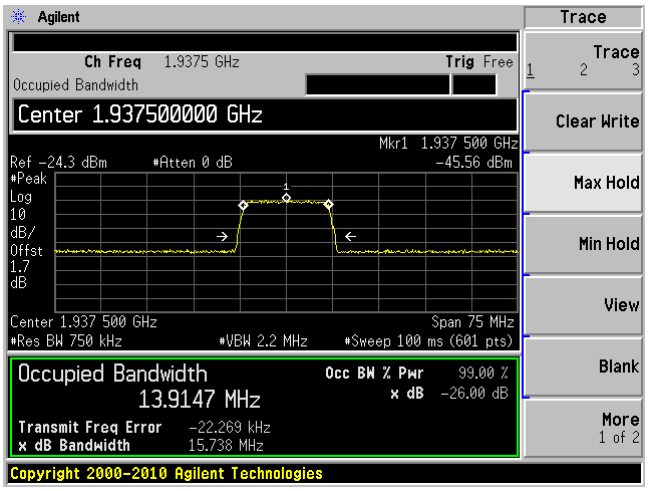


LTE 15MHz 16QAM DL

Low I/P



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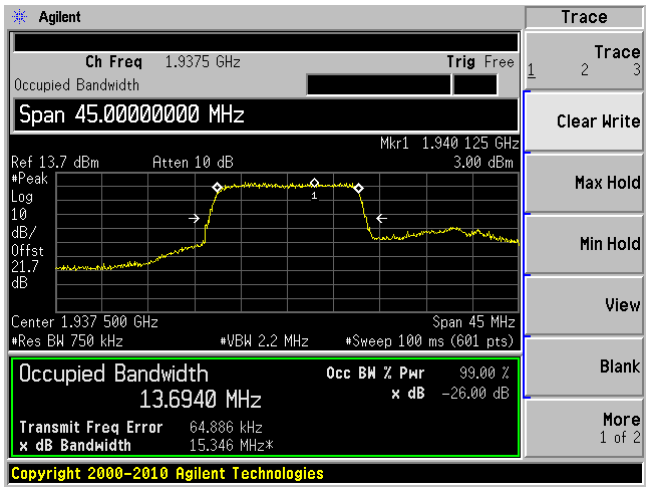

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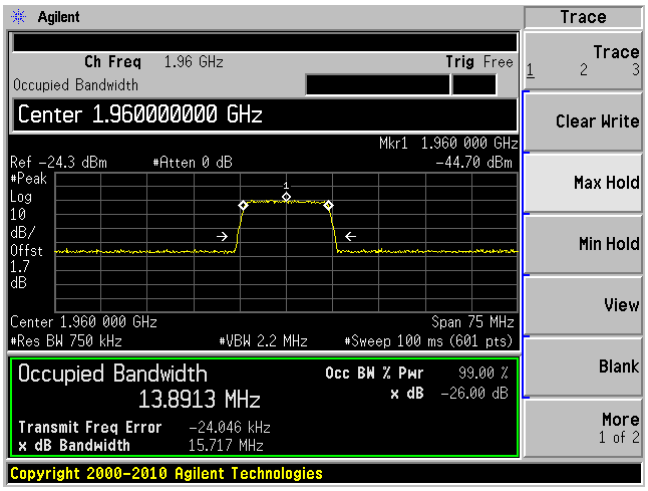

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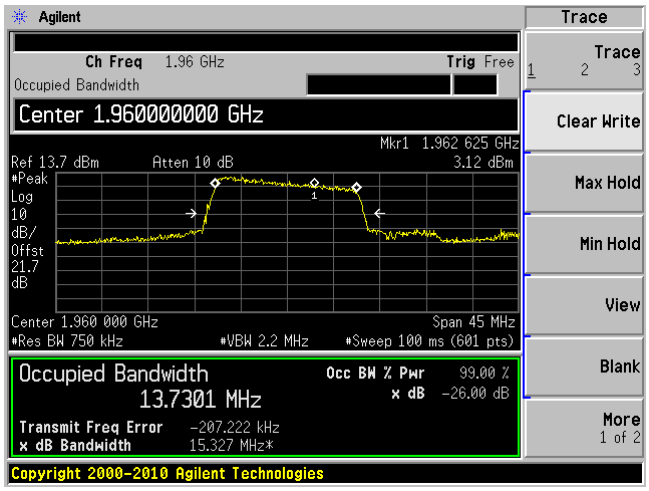

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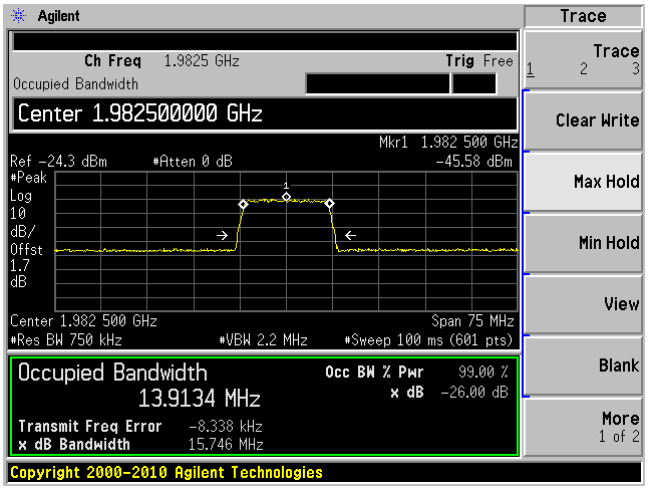

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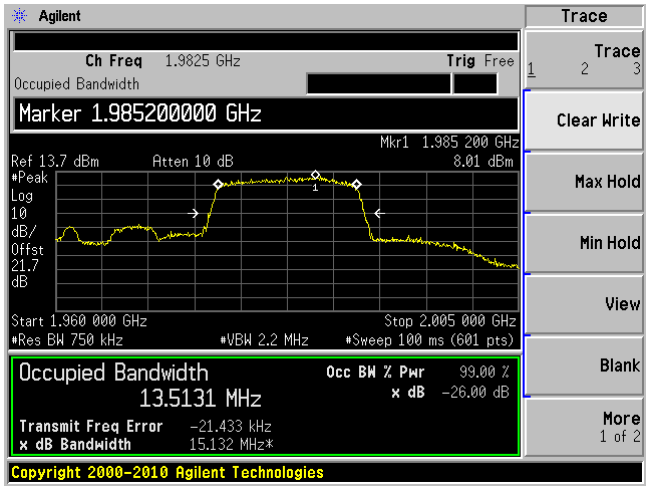
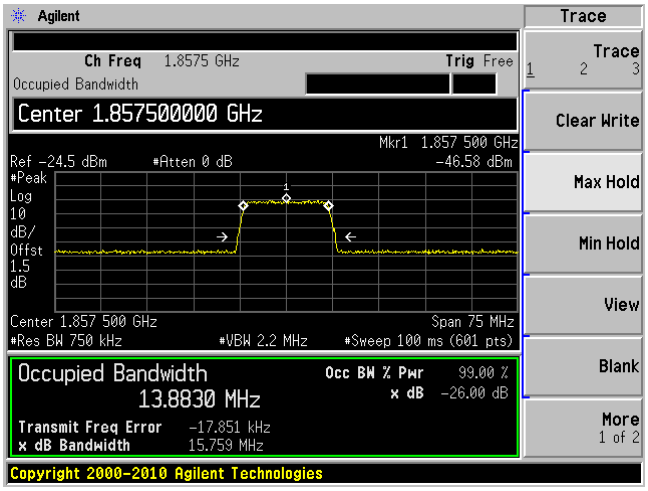


LTE 15MHz 16QAM UL

Low I/P



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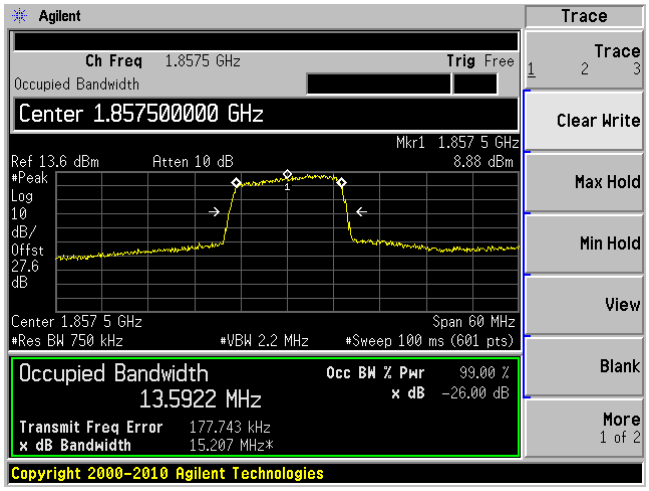

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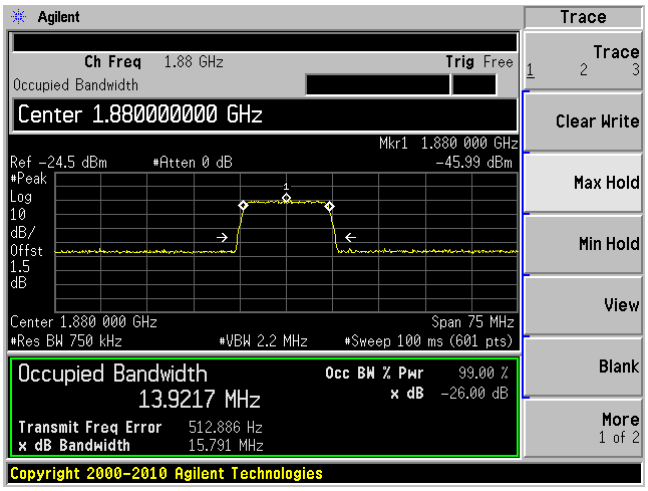

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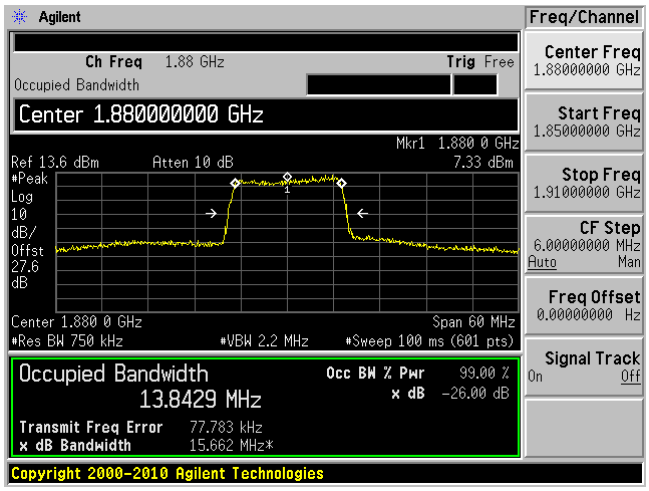

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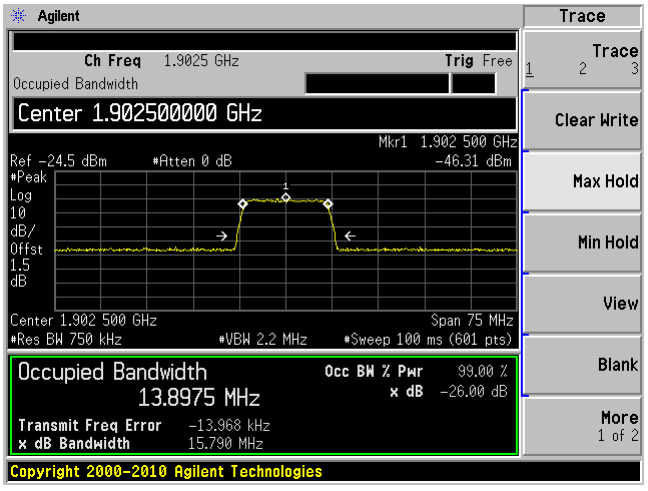

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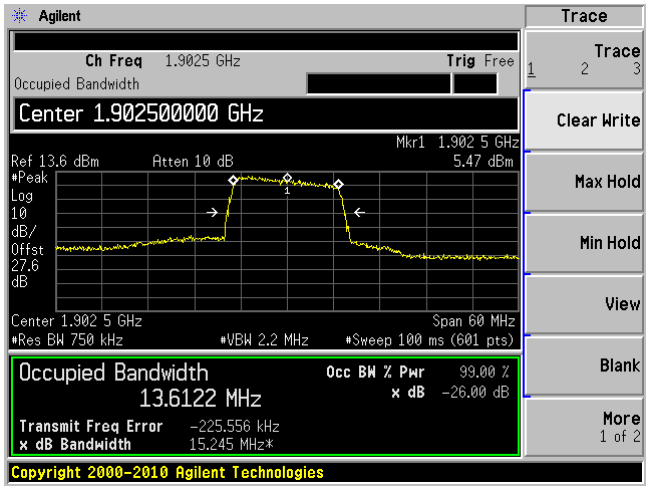
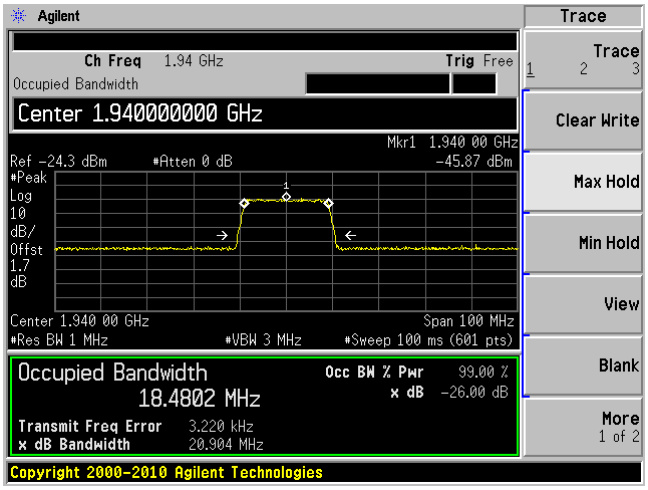


LTE 20MHz 16QAM DL

Low I/P



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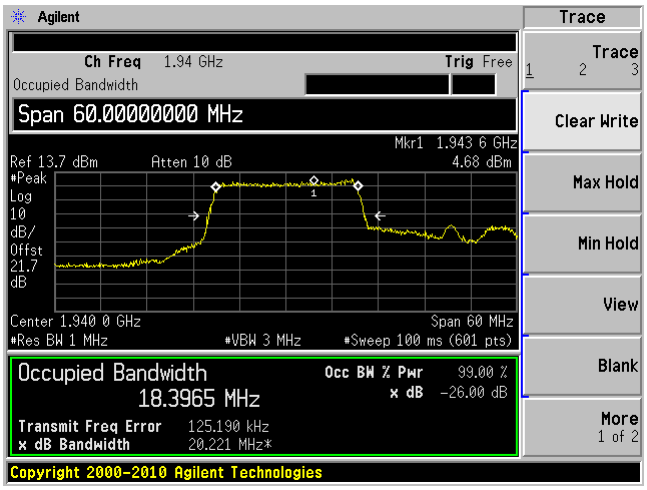

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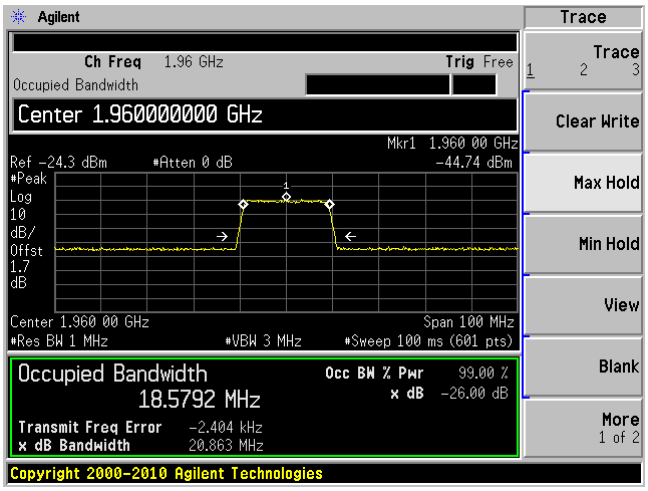

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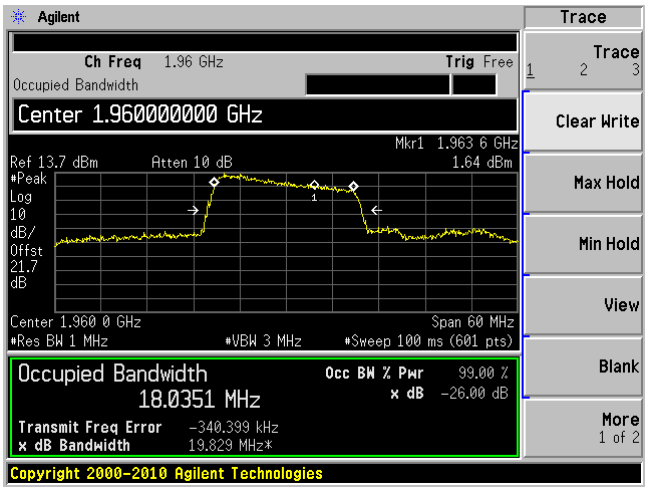

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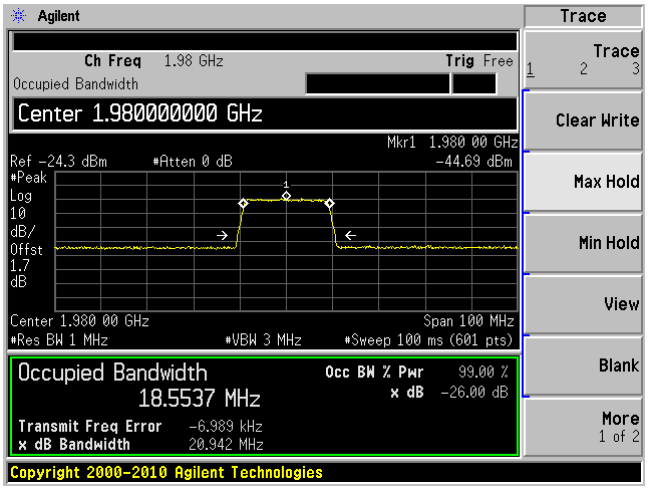

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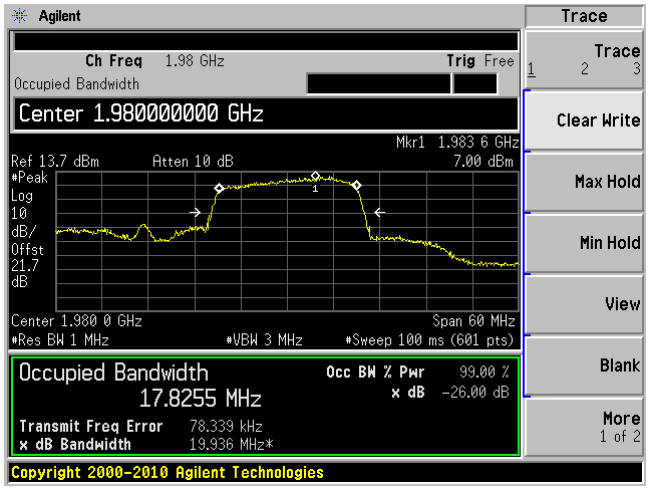
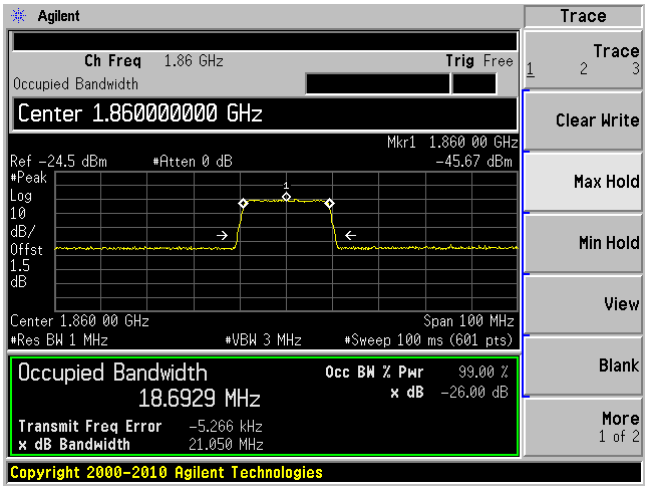


LTE 20MHz 16QAM UL

Low I/P



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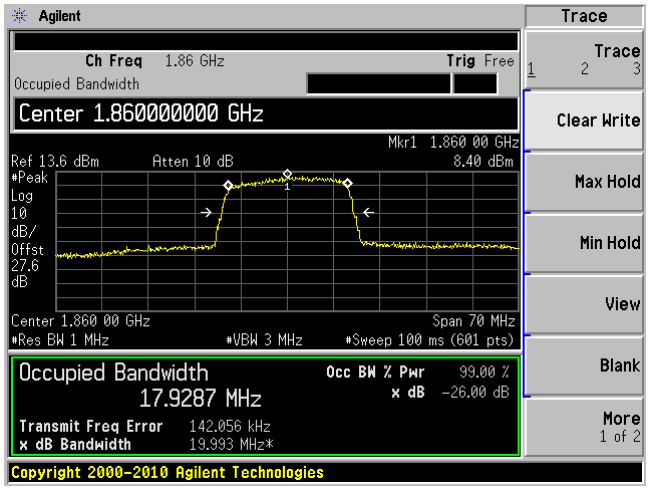

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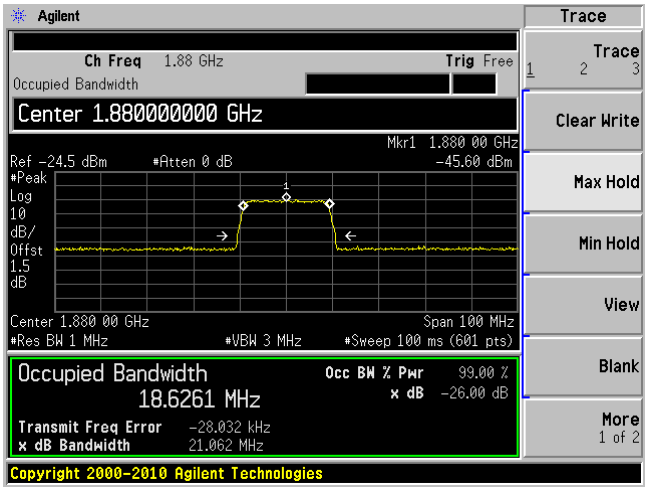

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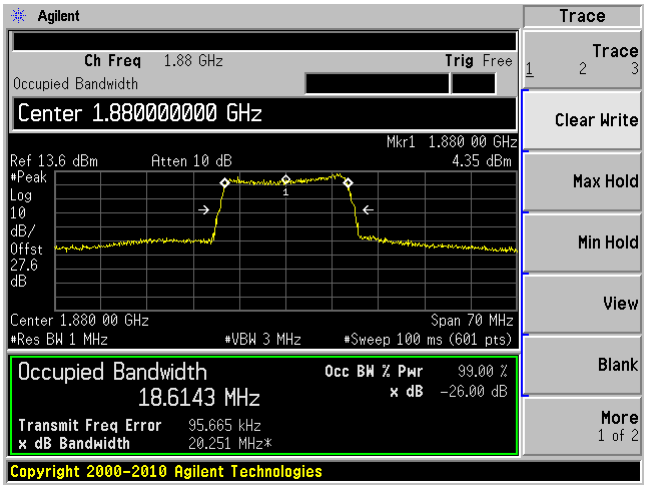

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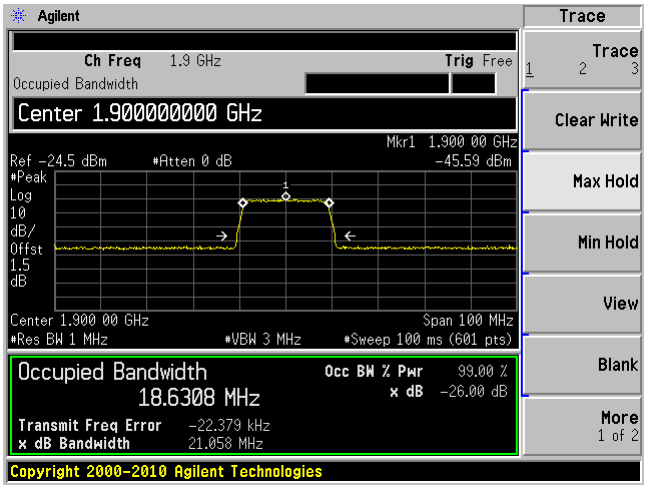

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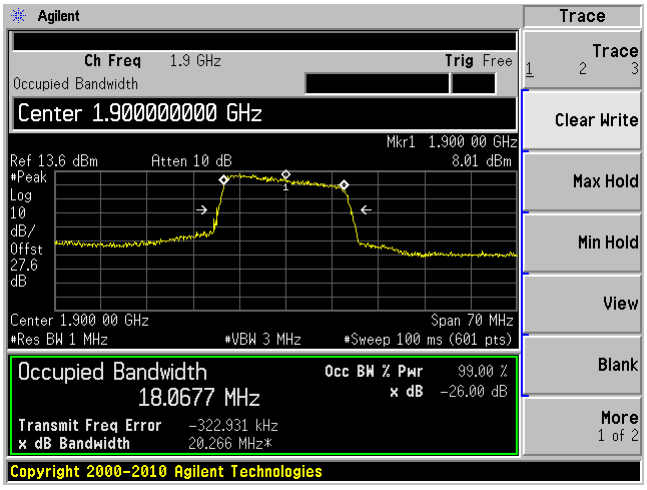
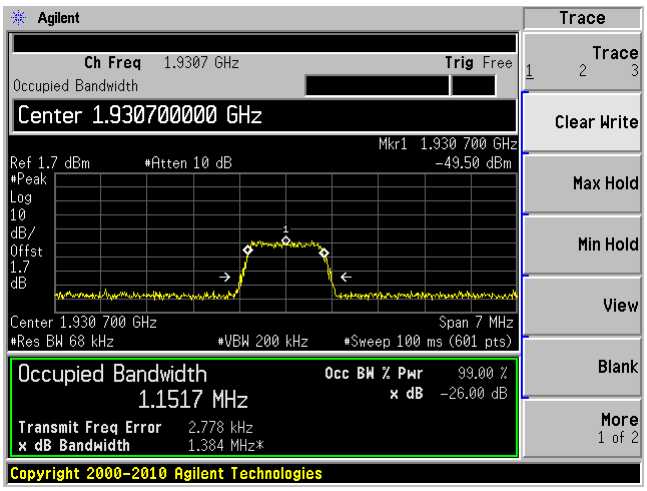
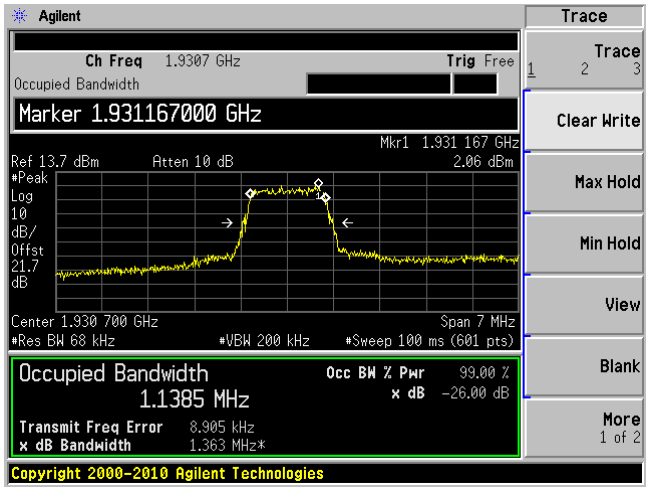


LTE 1.4MHz 64QAM DL

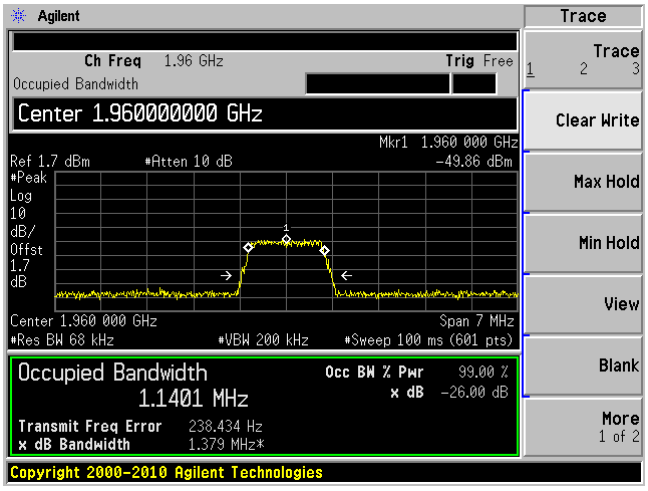
Low I/P



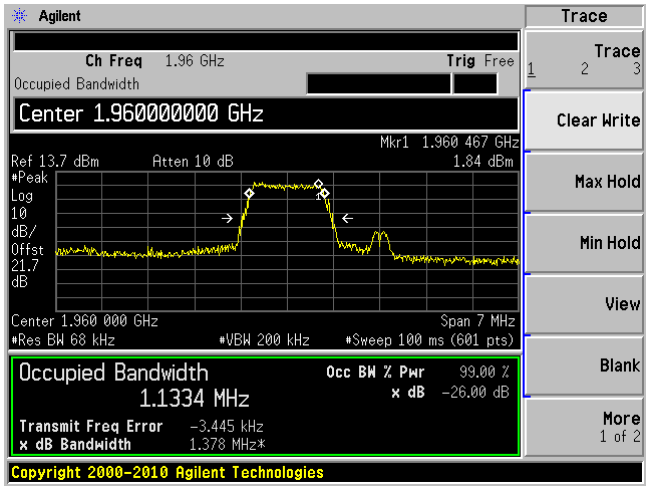
Low O/P



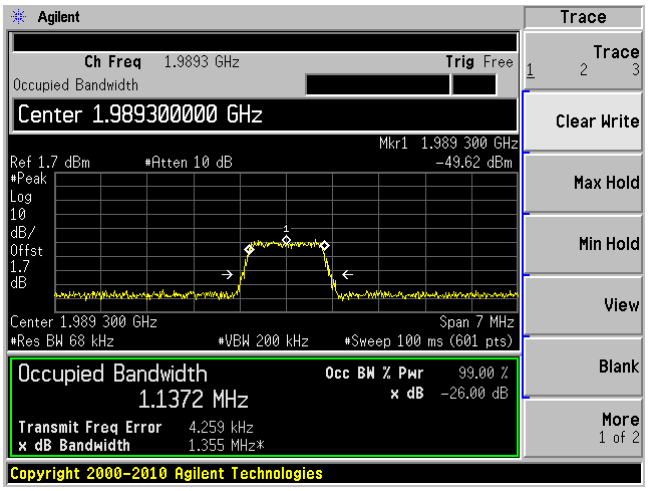
Middle I/P



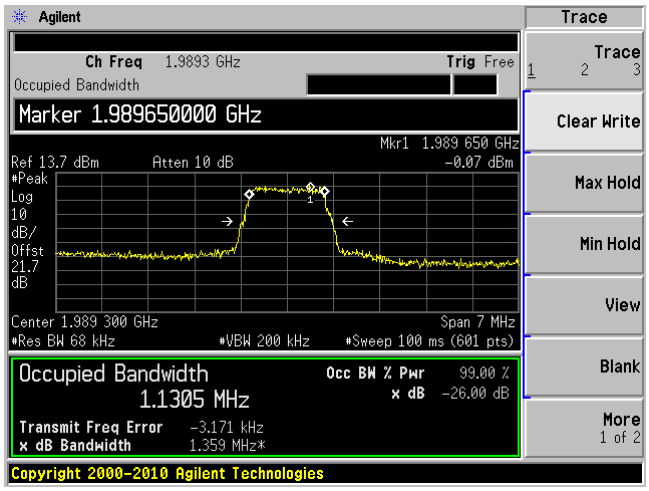
Middle O/P



High I/P

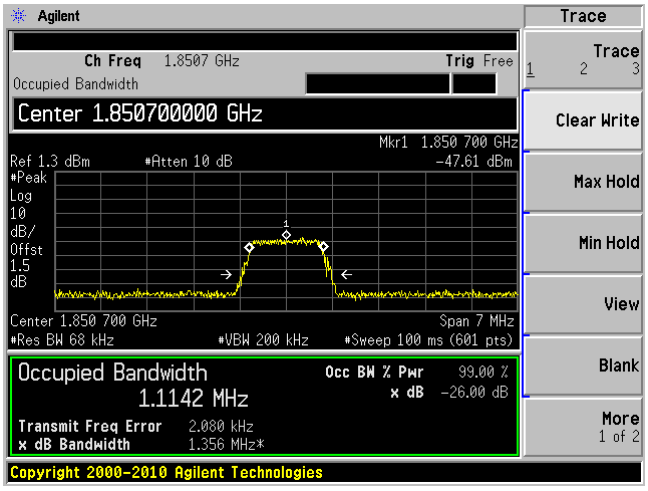


High O/P



LTE 1.4MHz 64QAM UL

Low I/P



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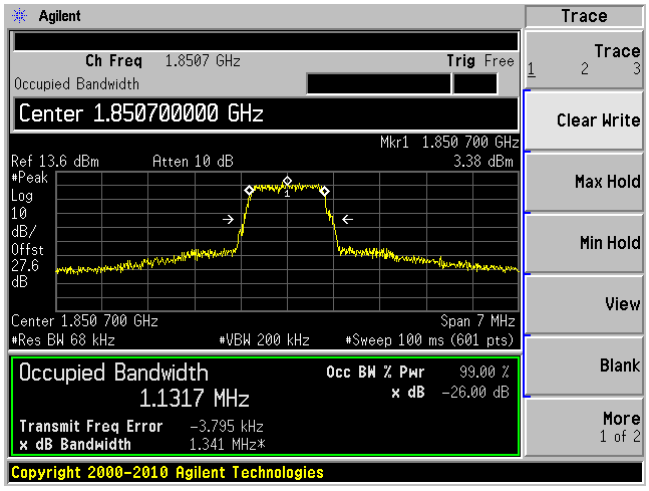

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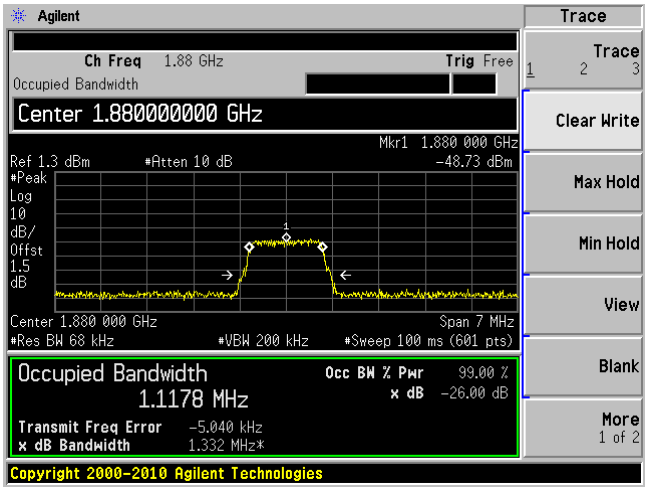

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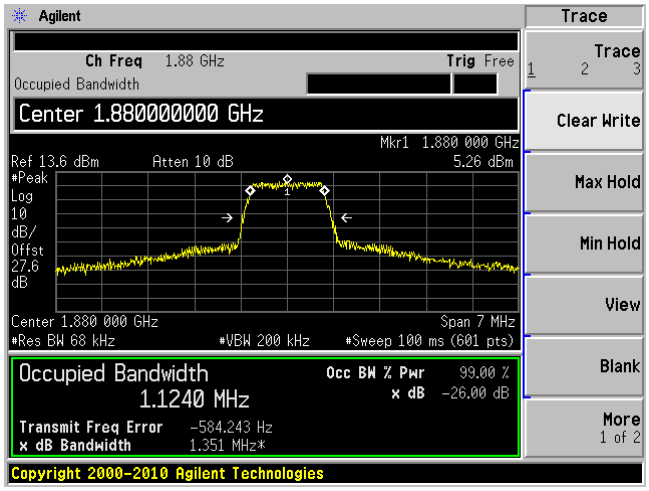

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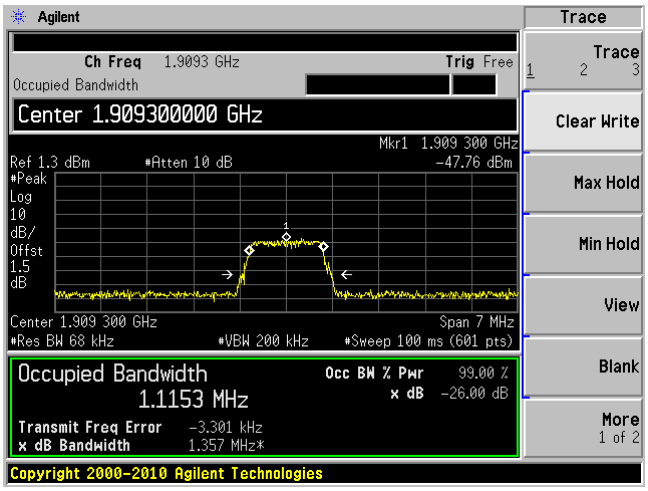
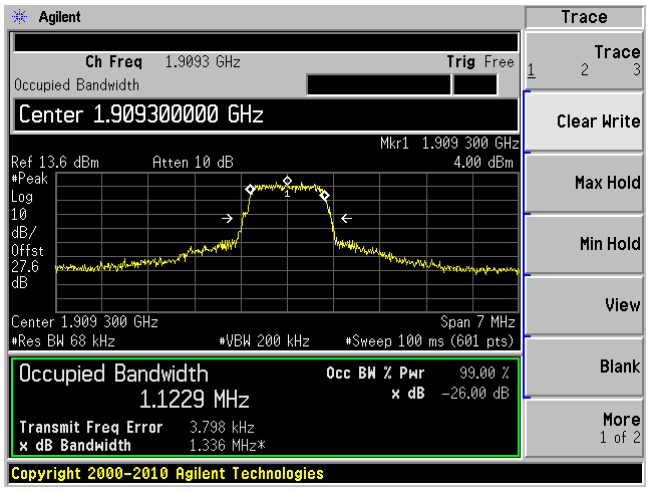
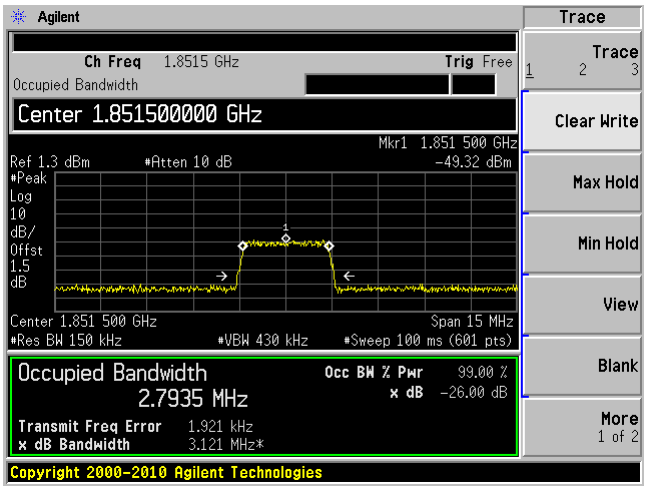


High O/P



LTE 3MHz 64QAM UL

Low I/P



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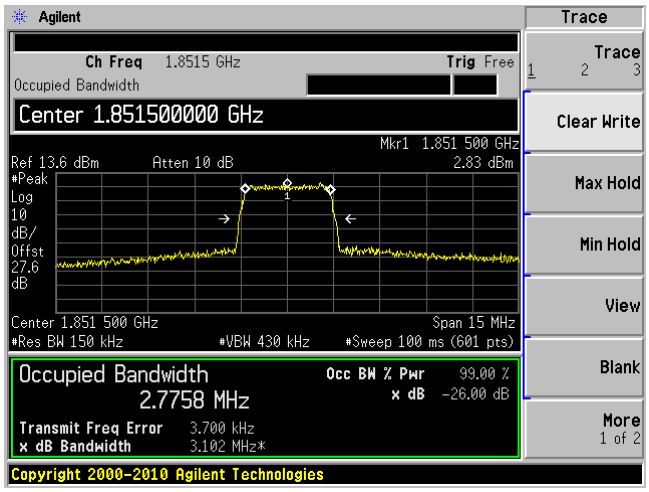

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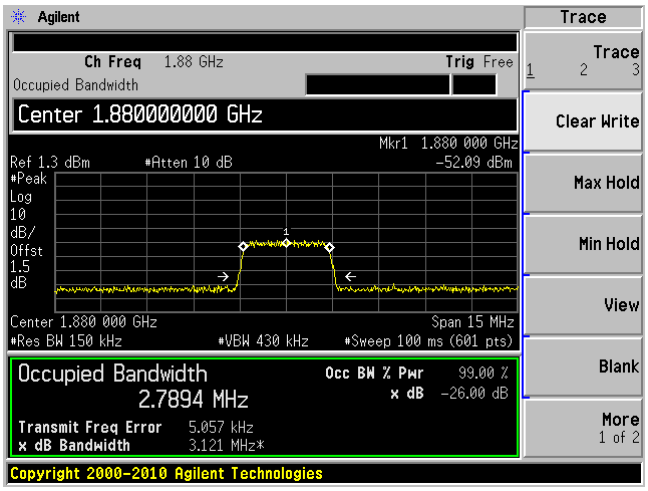

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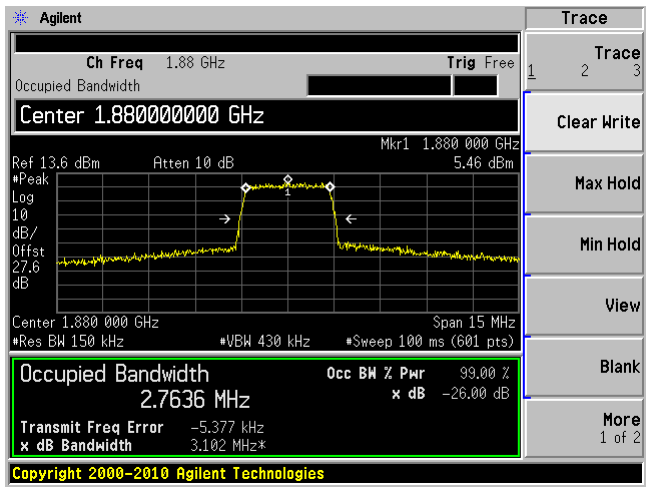

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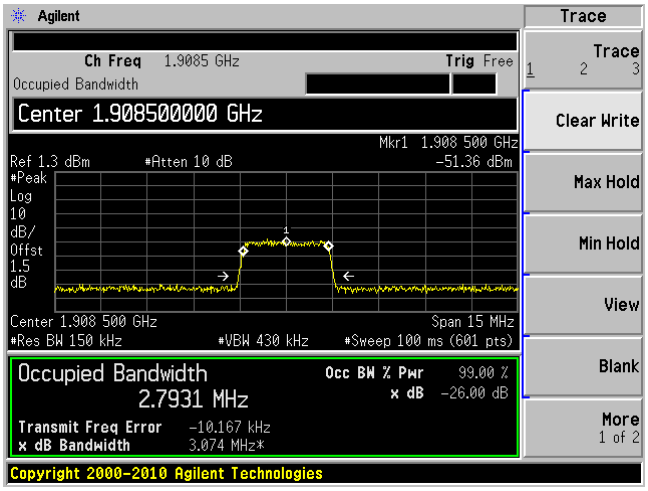

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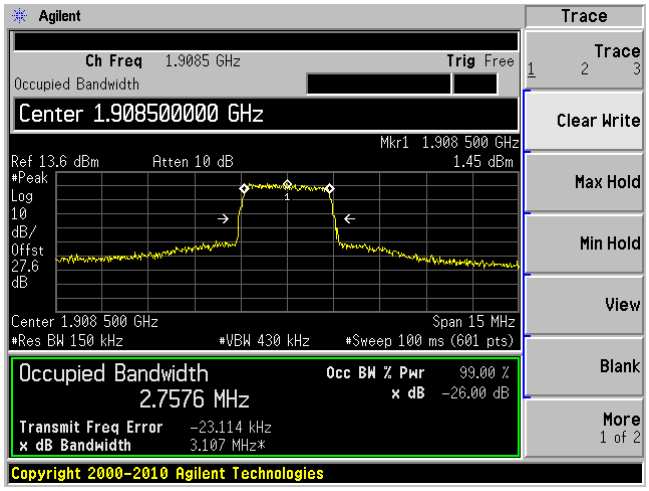
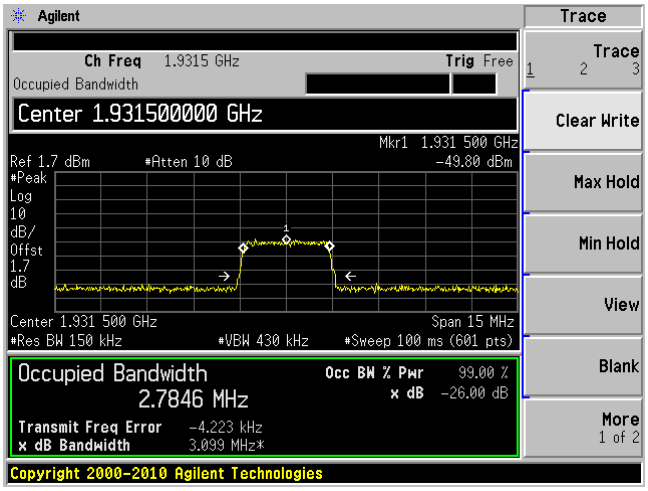


LTE 3MHz 64QAM DL

Low I/P



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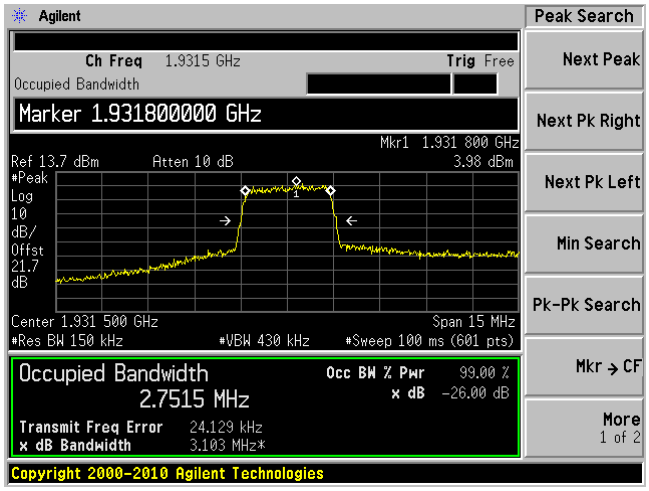

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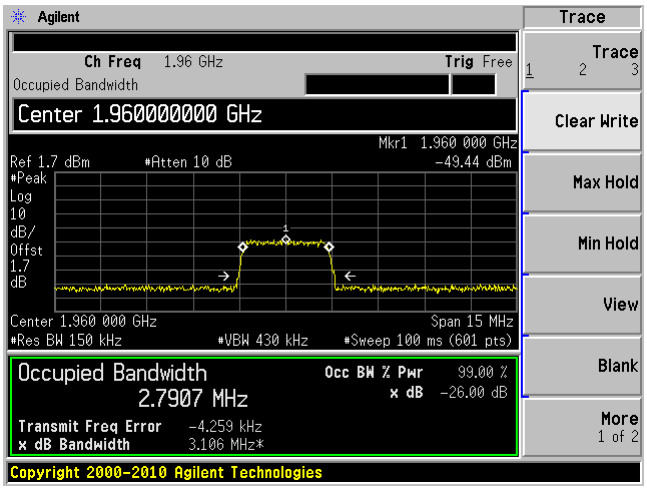

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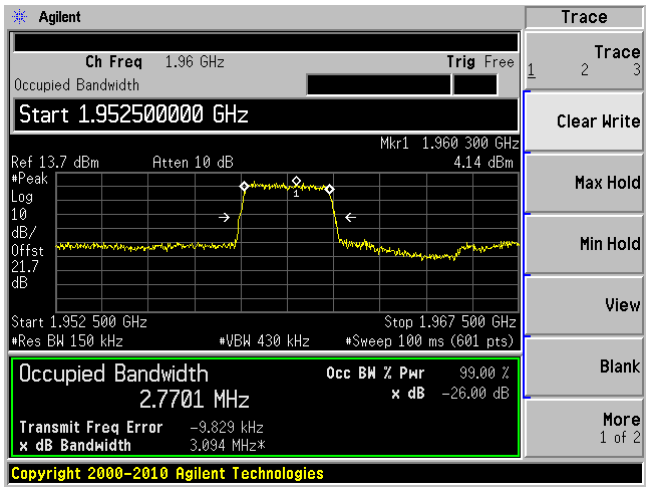

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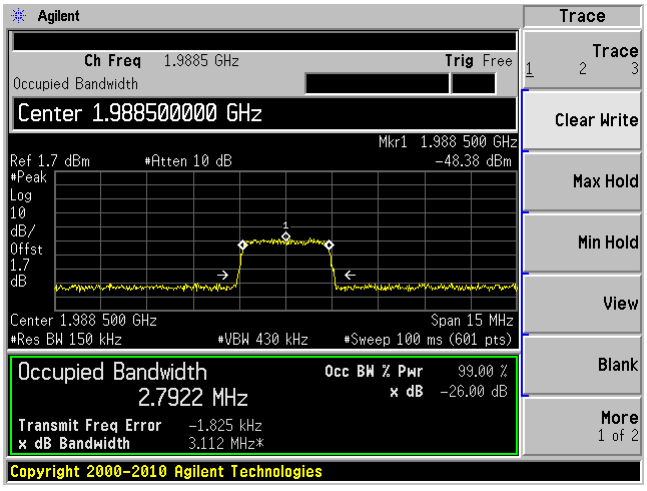

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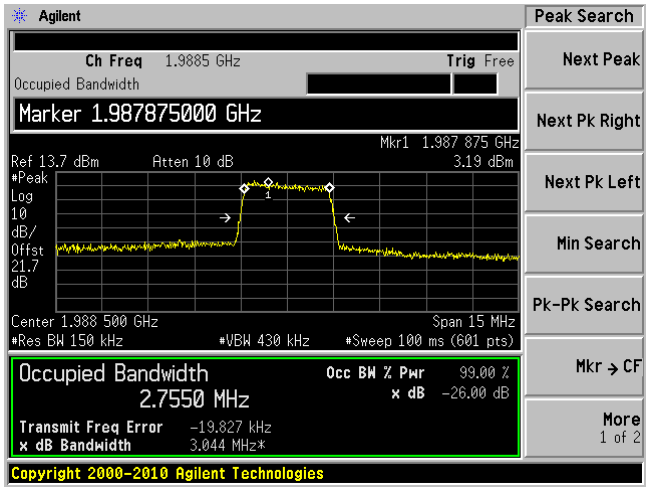
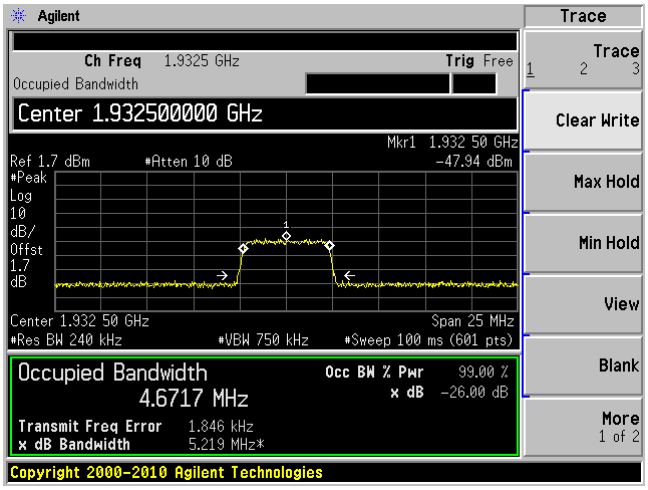


LTE 5MHz 64QAM DL

Low I/P



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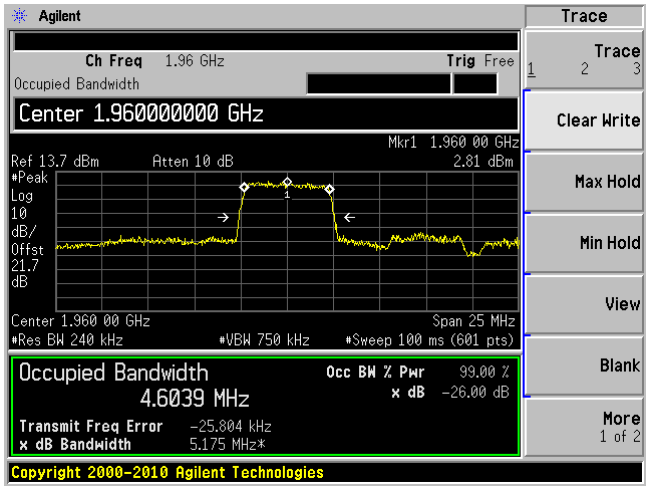

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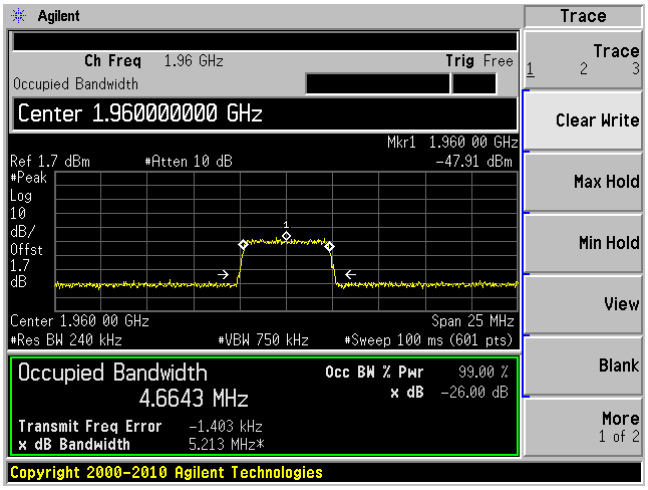

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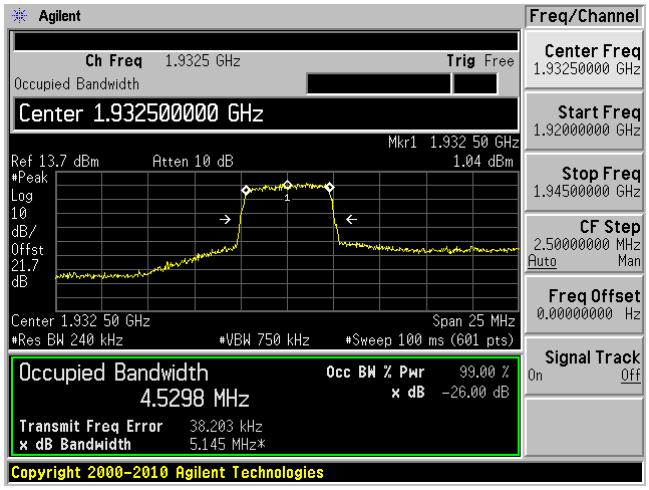

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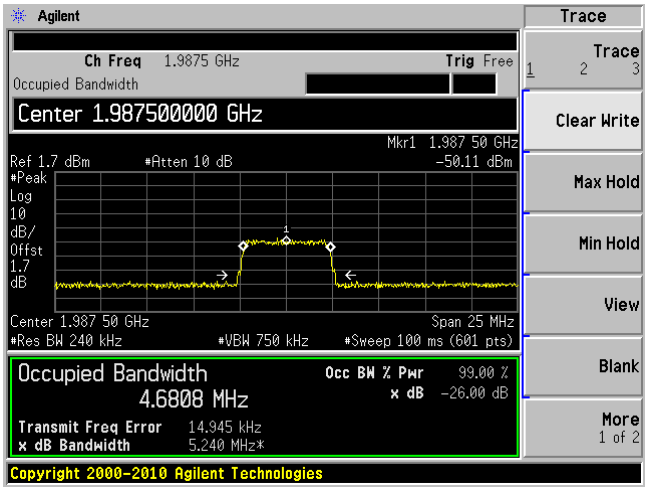

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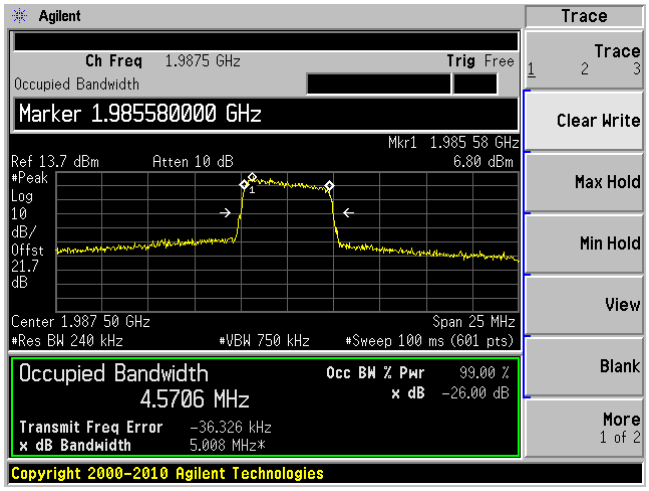
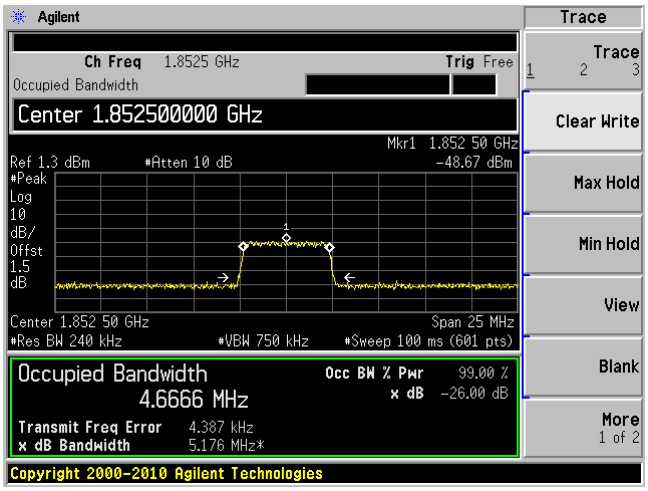


LTE 5MHz 64QAM UL

Low I/P



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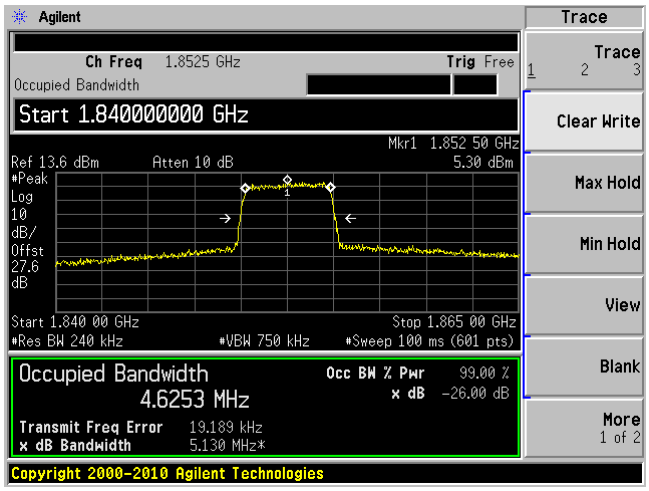

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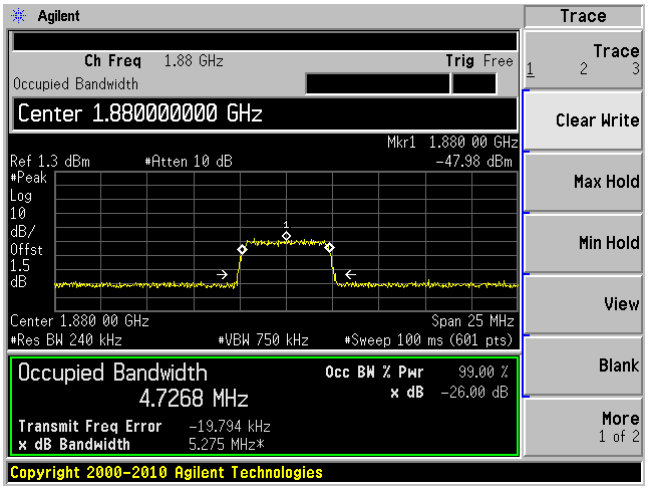

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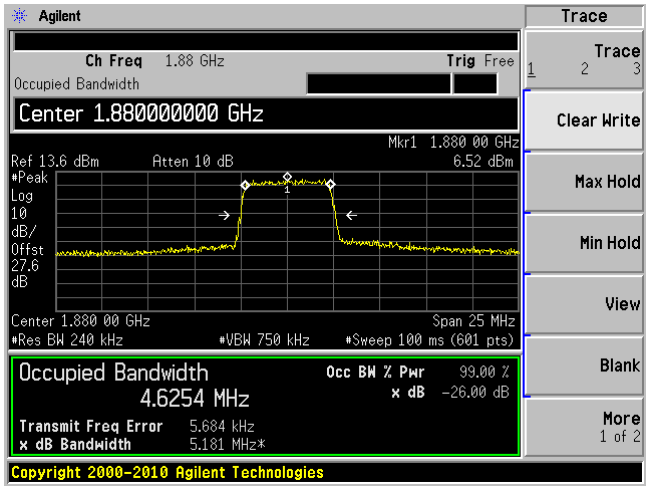

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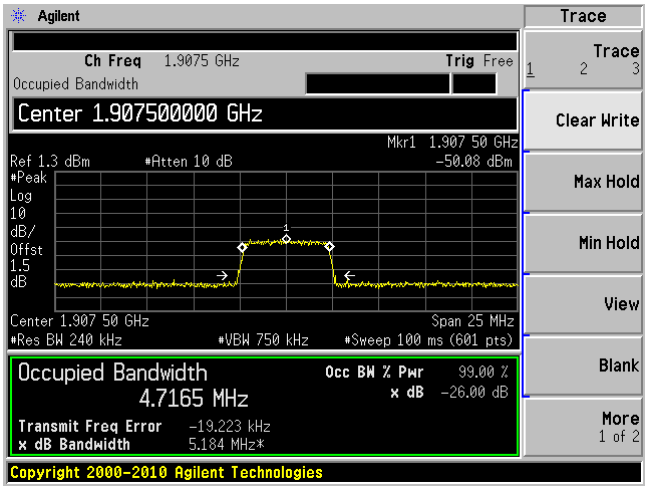

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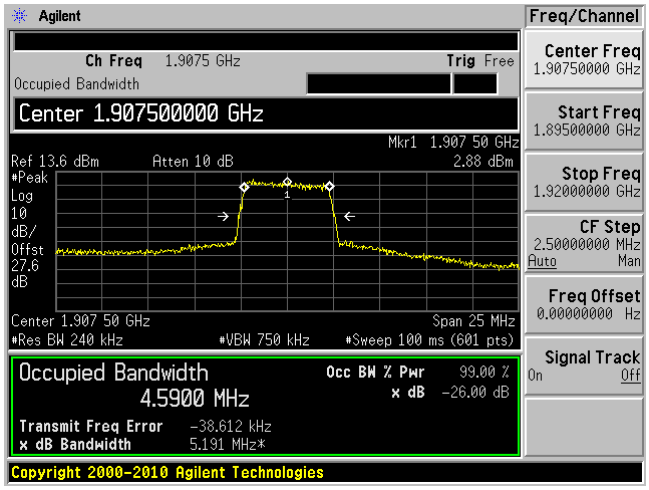
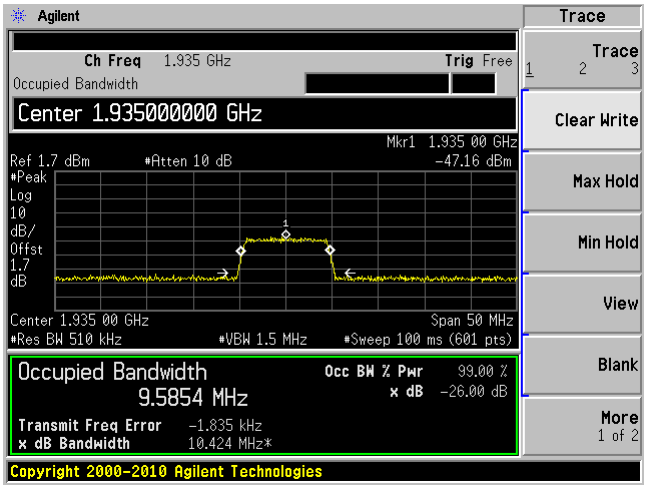


LTE 10MHz 64QAM DL

Low I/P



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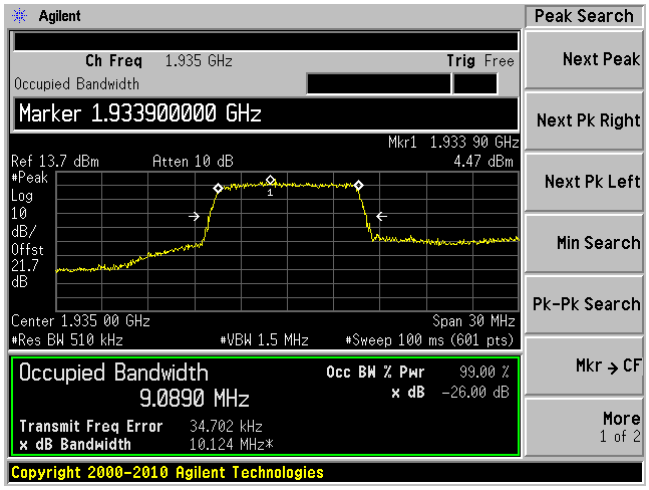
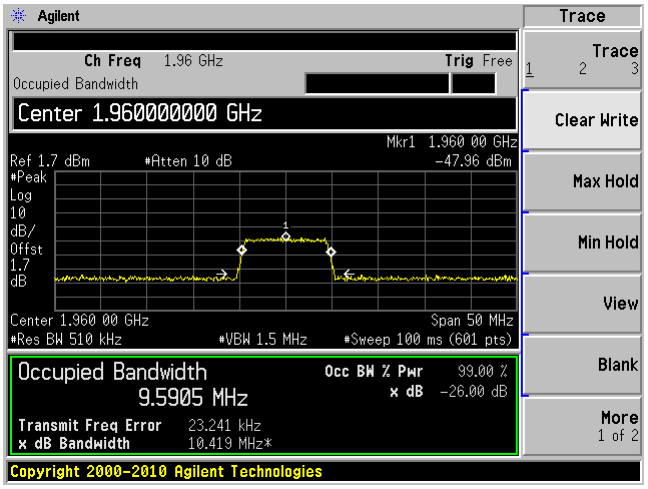


Middle I/P



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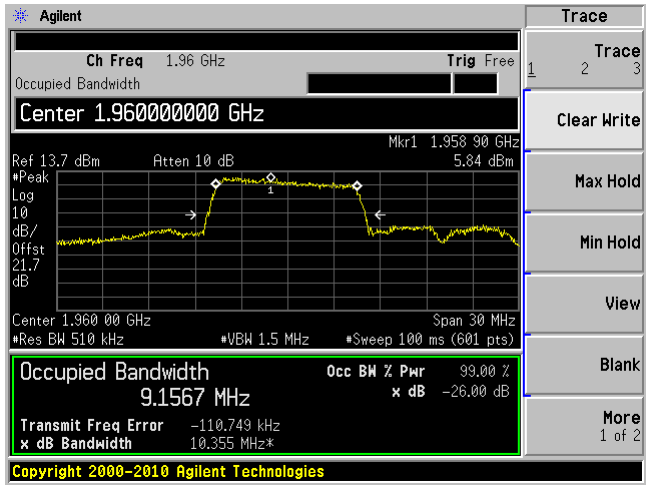

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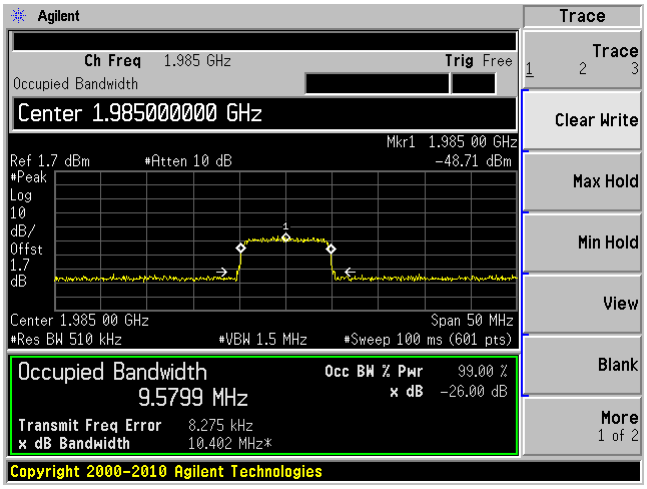

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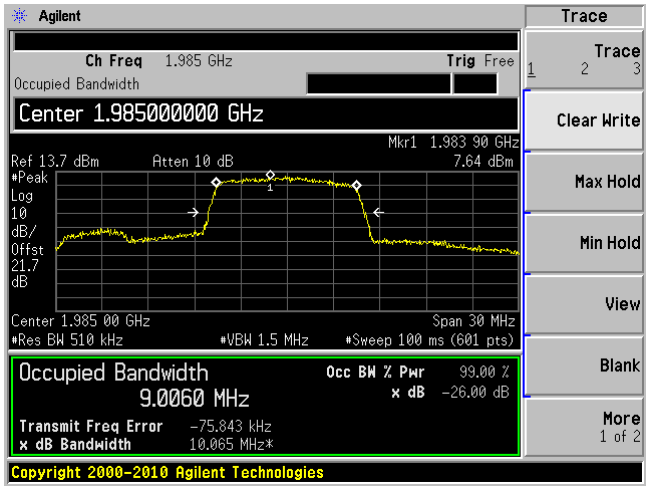
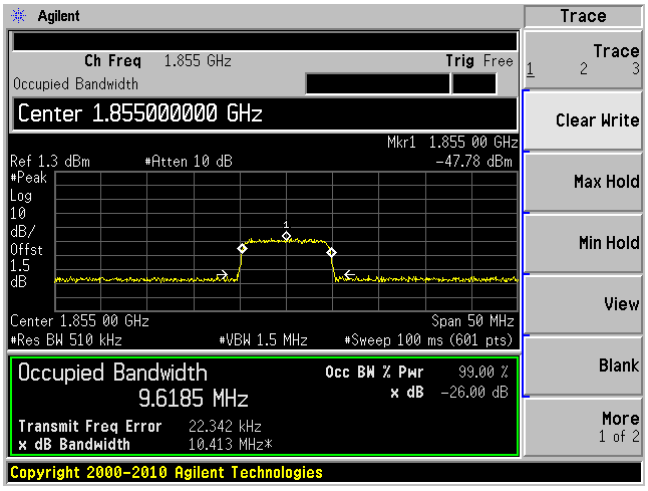


LTE 10MHz 64QAM UL

Low I/P



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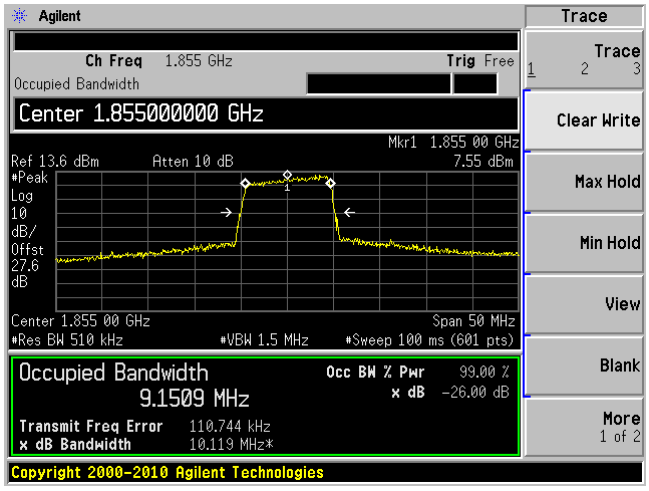

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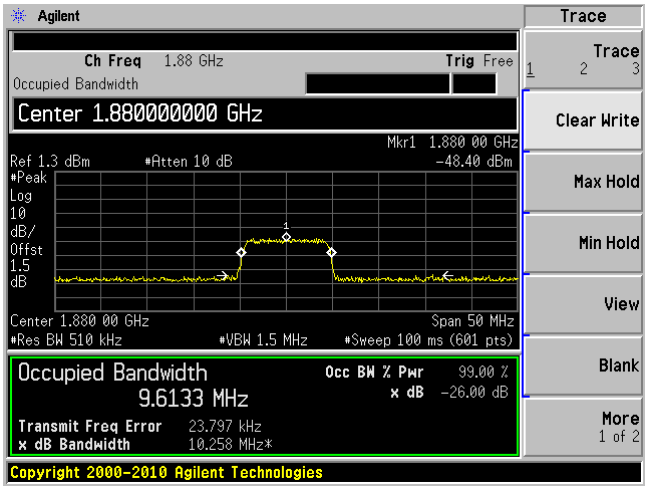
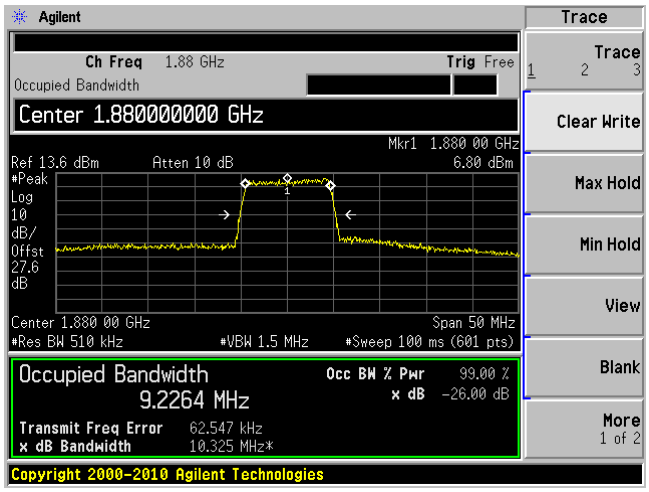


Middle O/P



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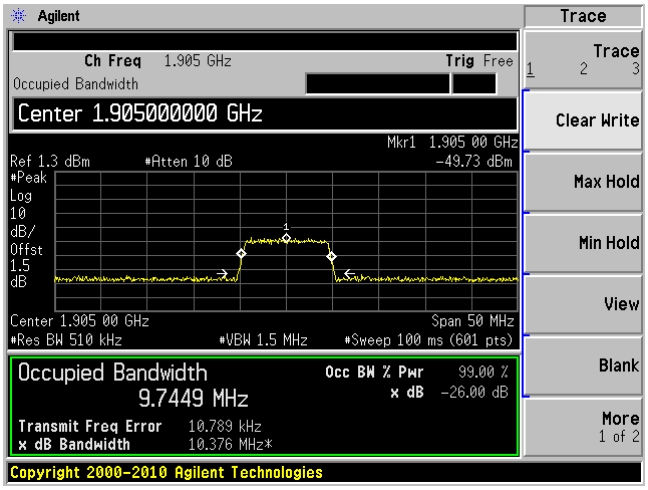

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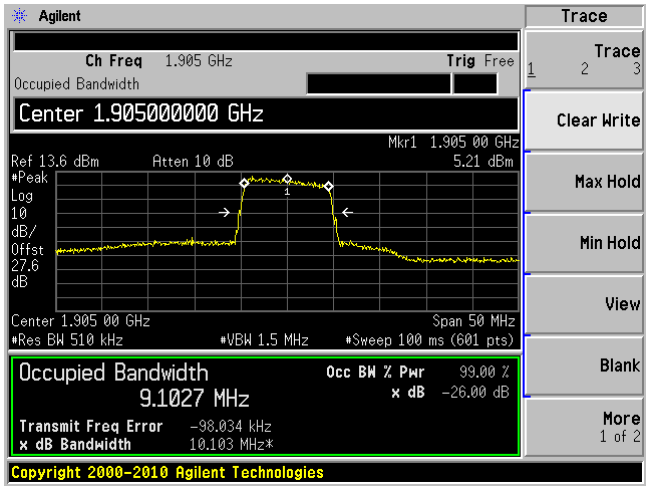
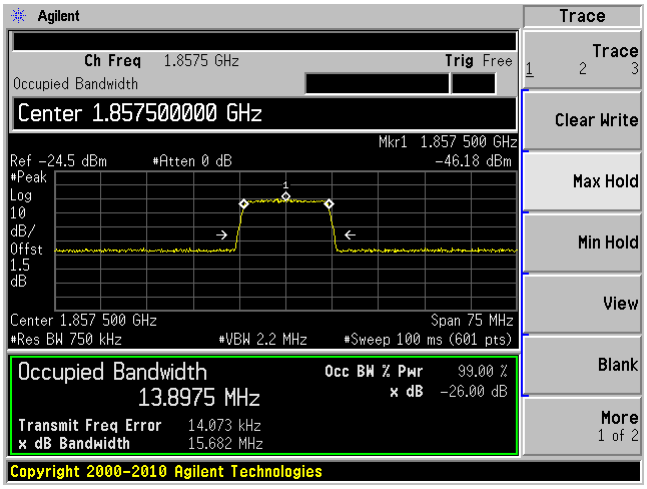


LTE 15MHz 64QAM UL

Low I/P



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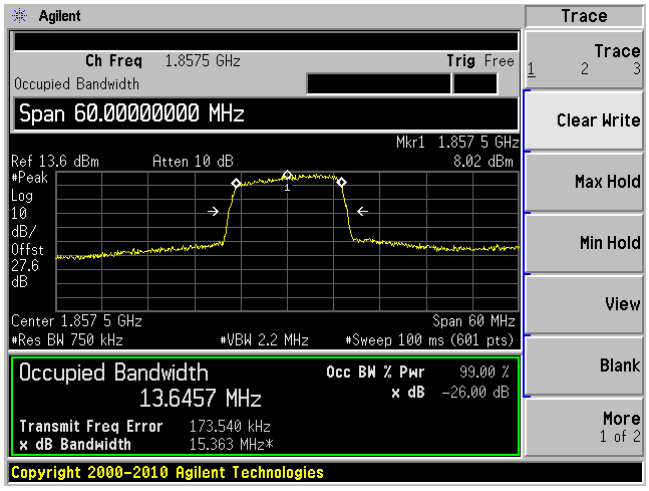

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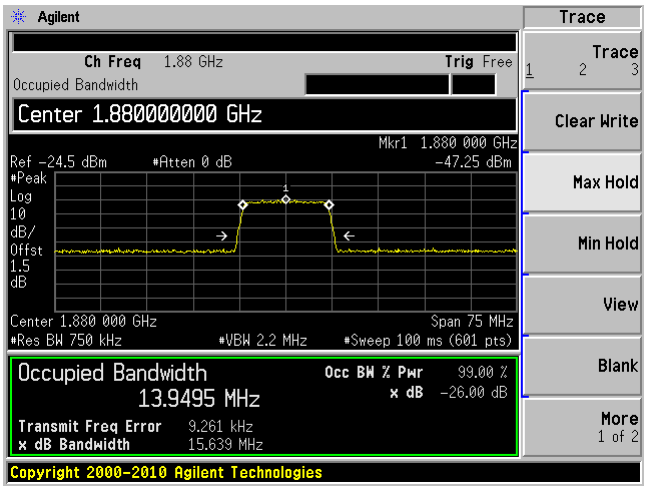

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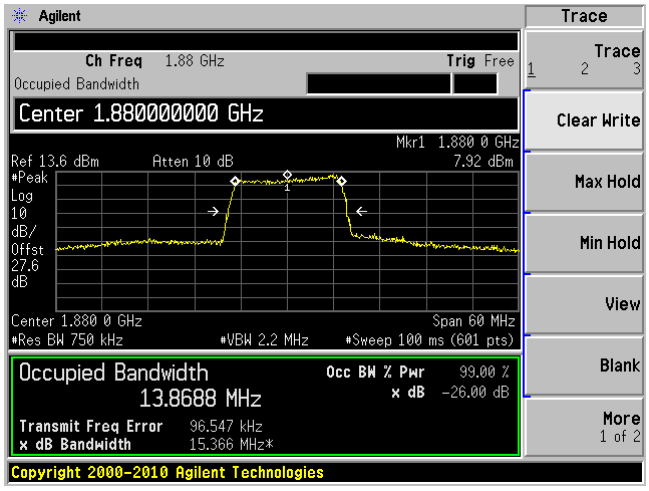

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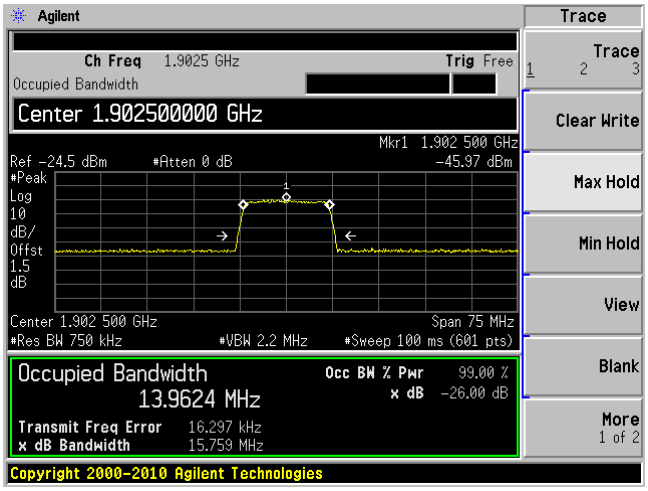

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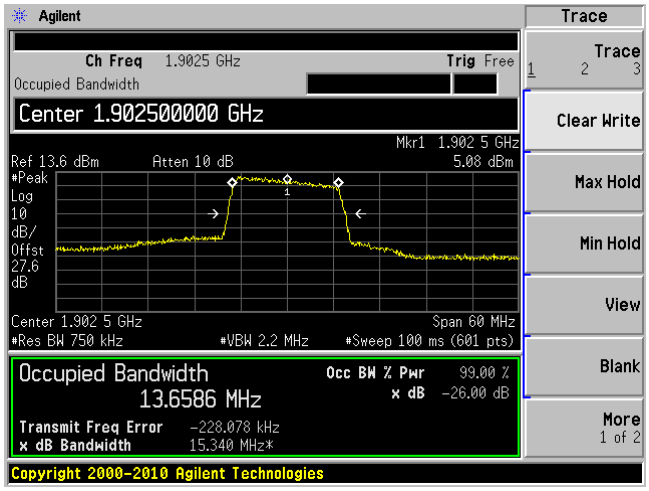
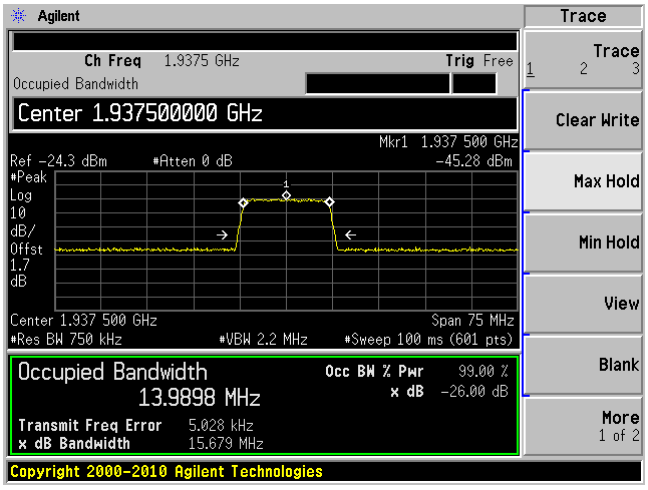
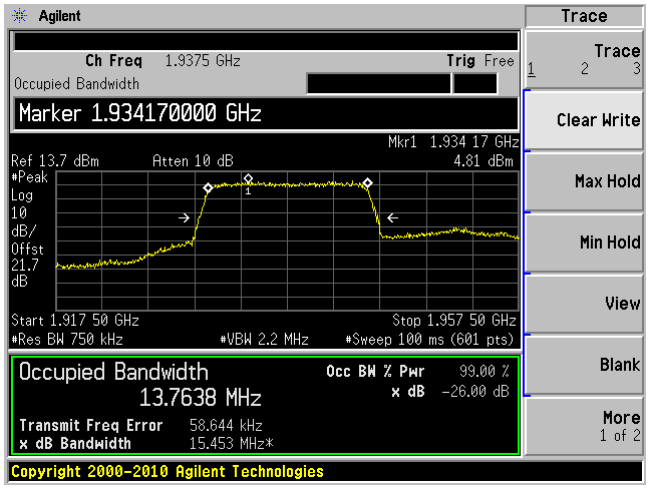


LTE 15MHz 64QAM DL

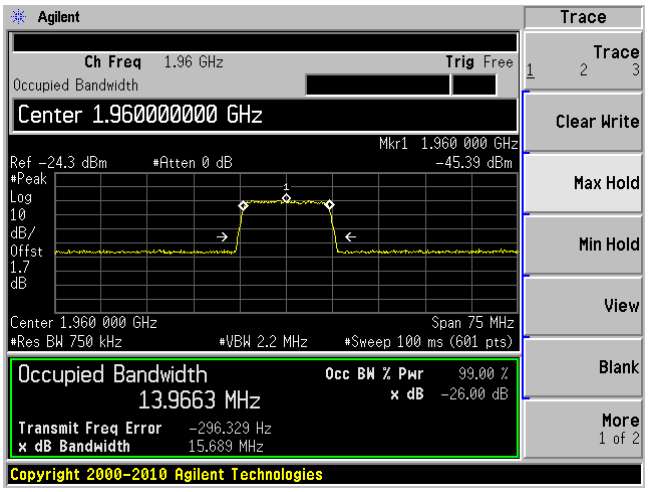
Low I/P



Low O/P



Middle I/P



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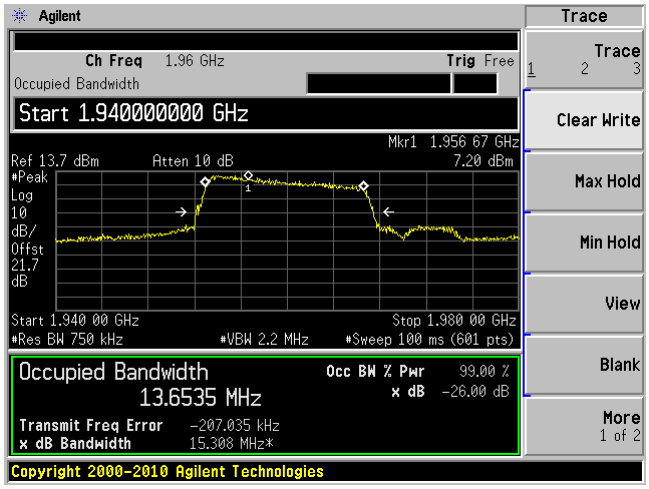

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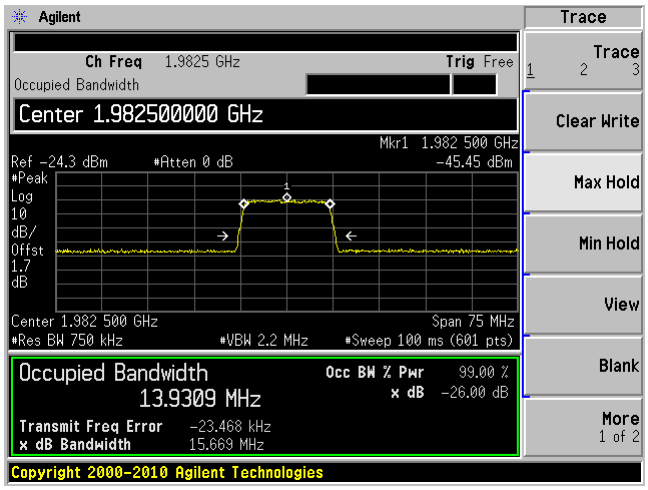

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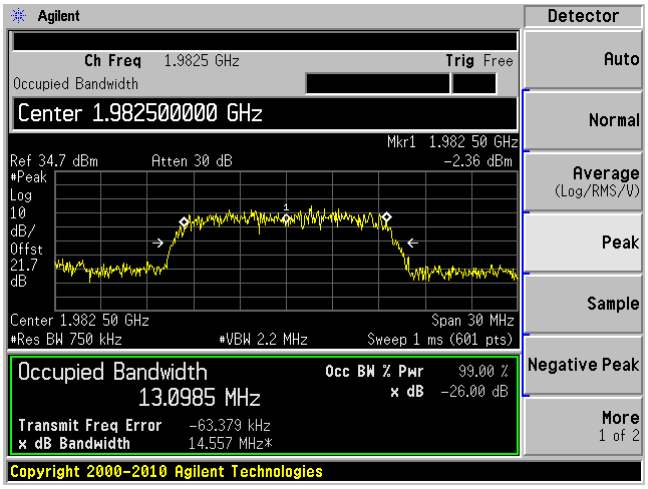

LTE 20MHz 64QAM DL

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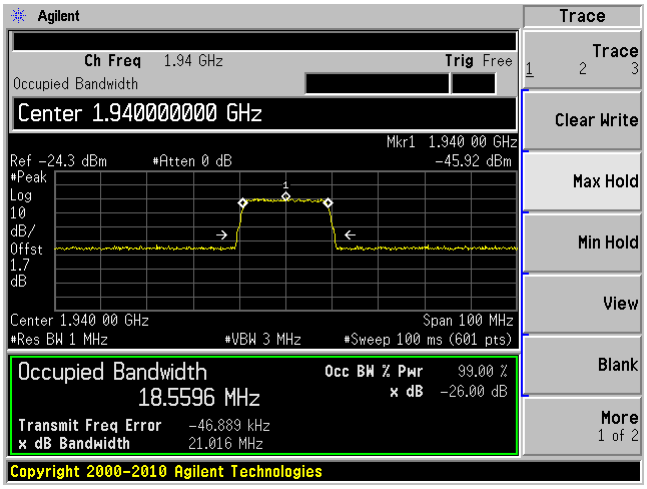

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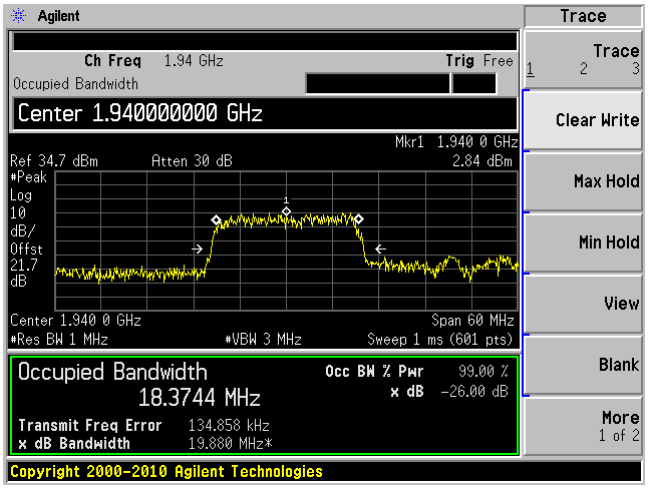

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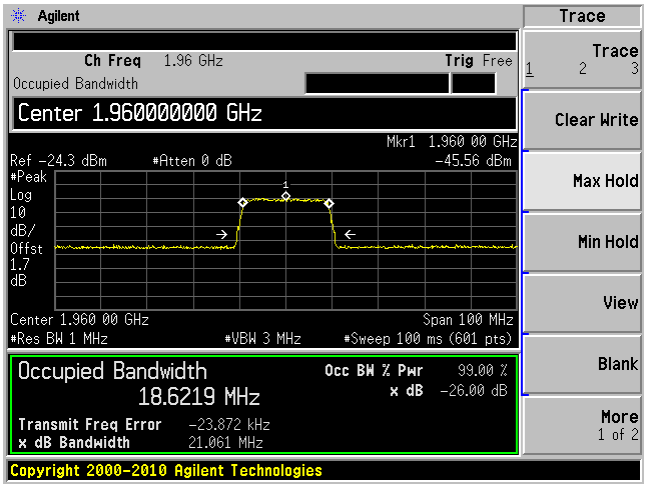

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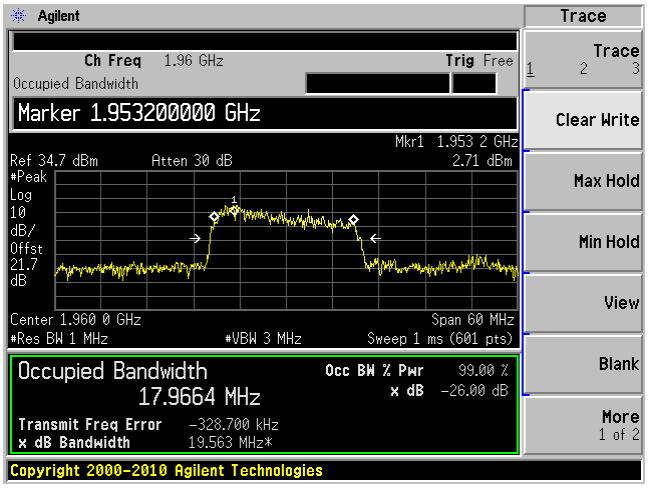

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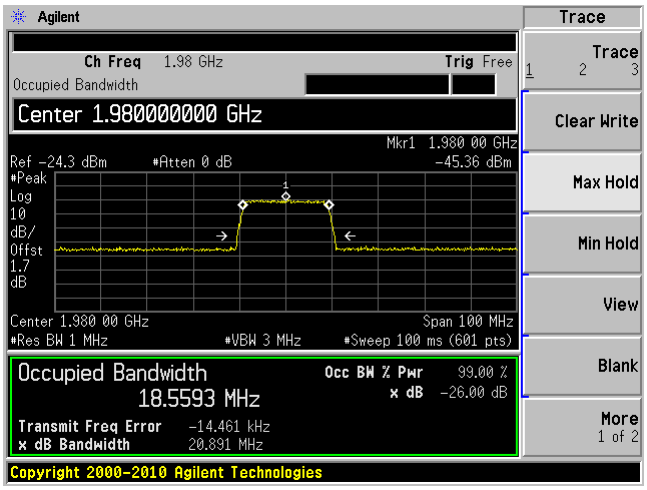

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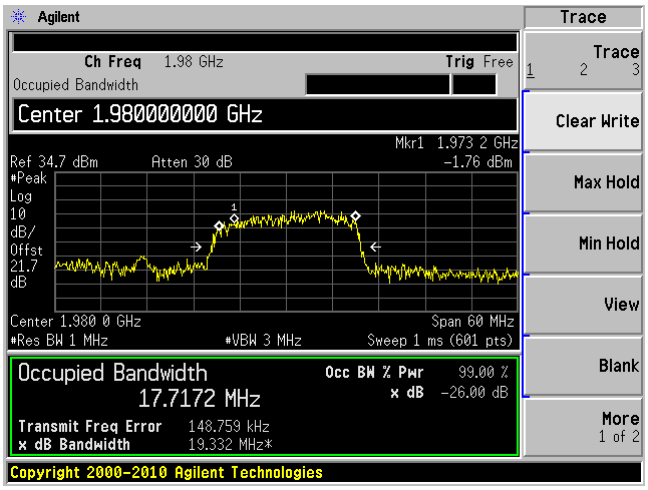
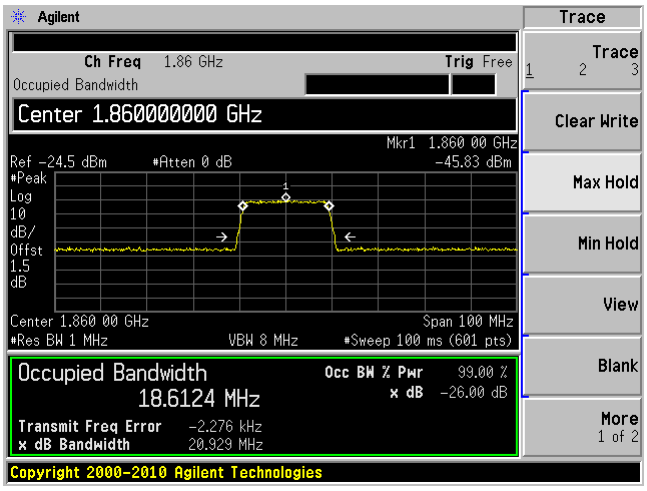


LTE 20MHz 64QAM UL

Low I/P



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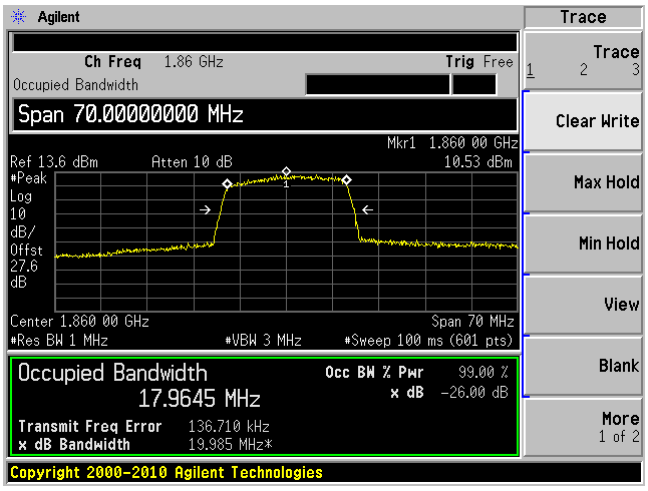

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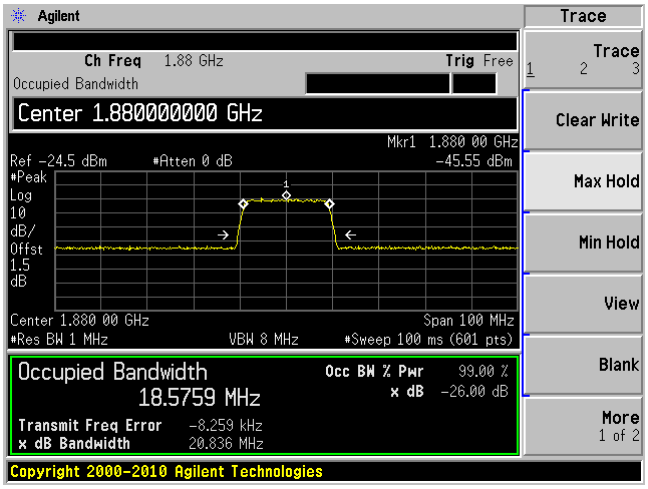

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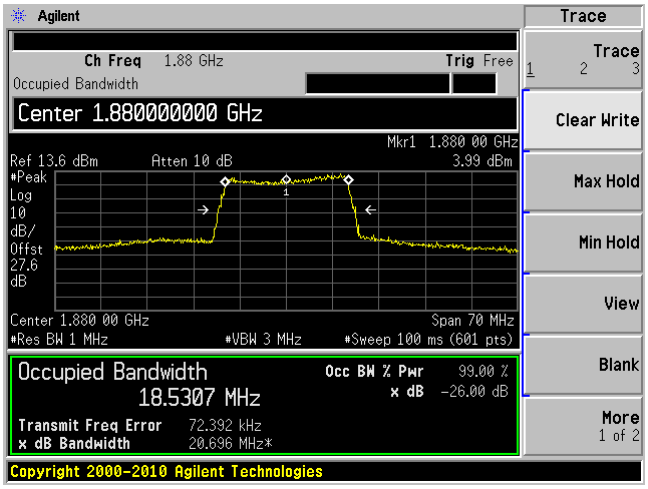

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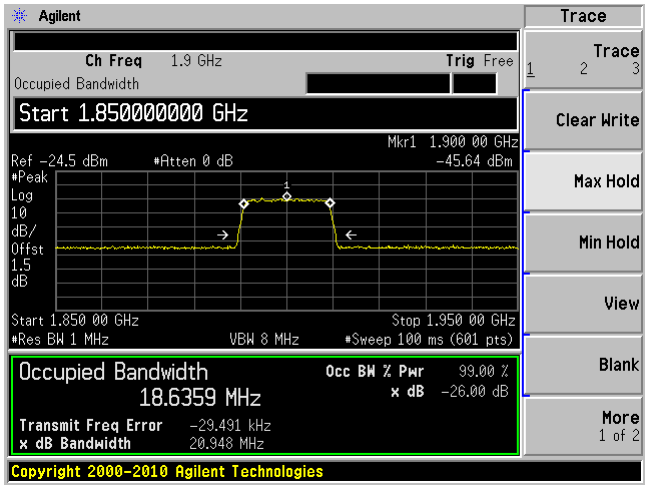

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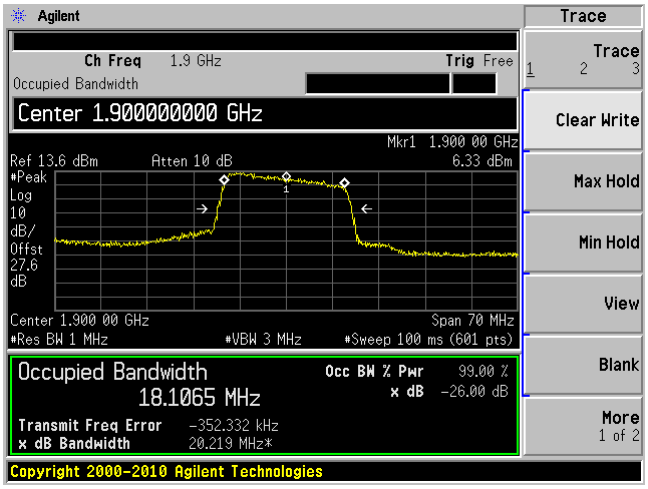
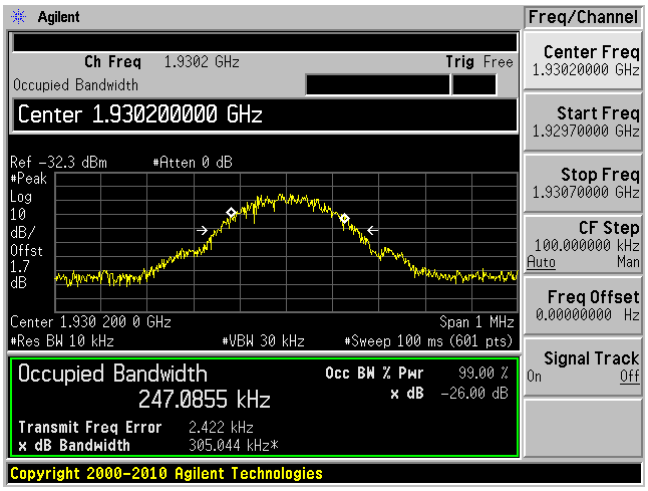


ALC ON

GSM/GPRS DL

Low I/P



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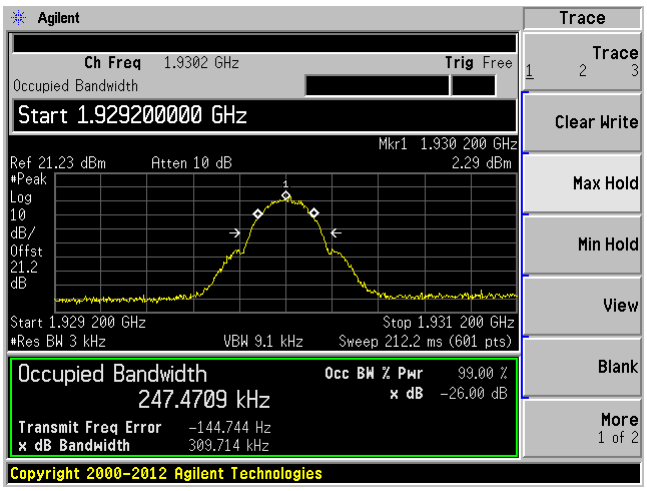

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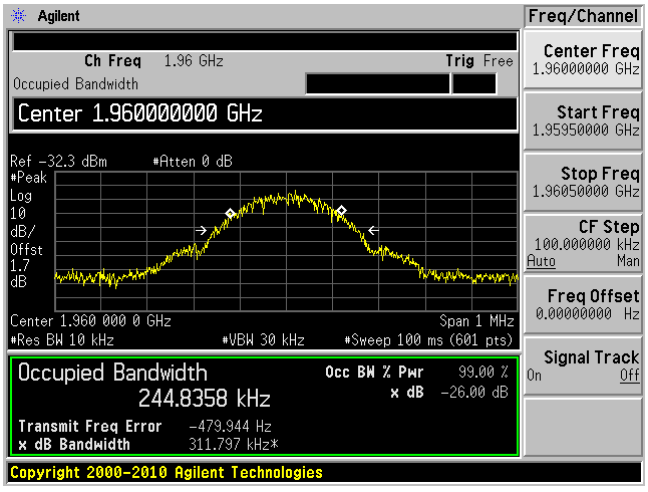

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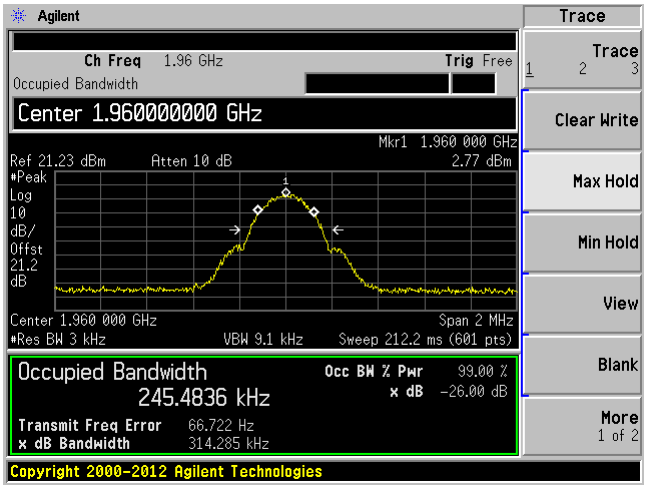

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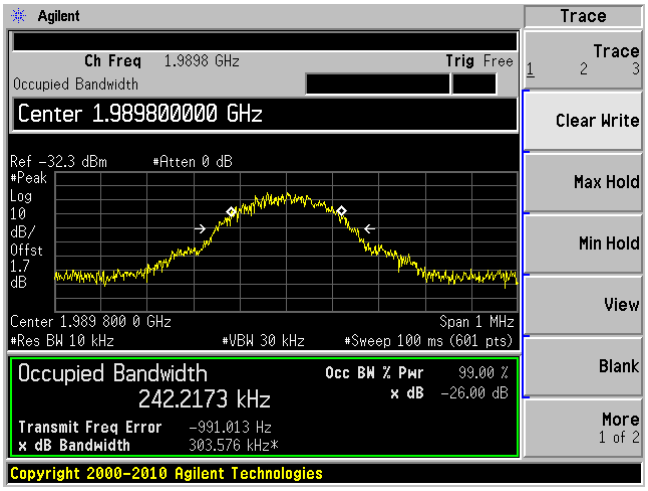

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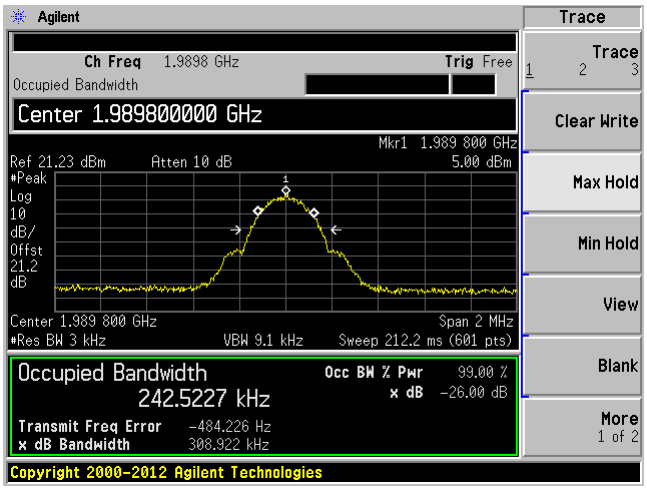
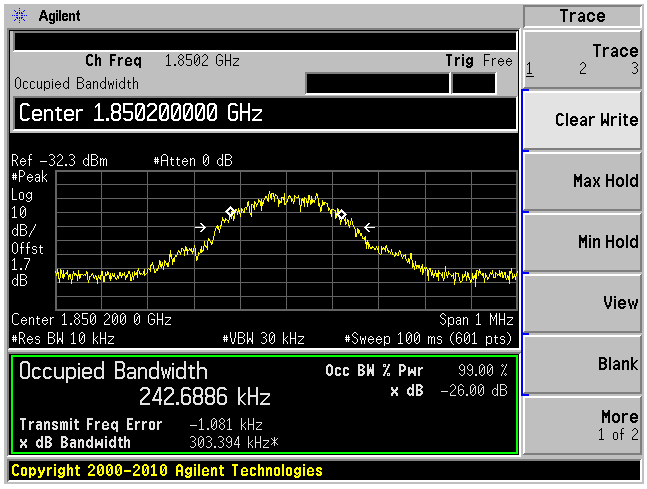


GSM/GPRS UL

Low I/P



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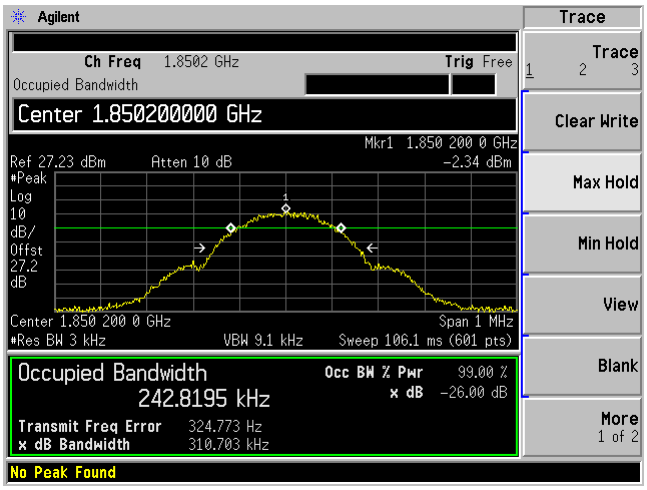

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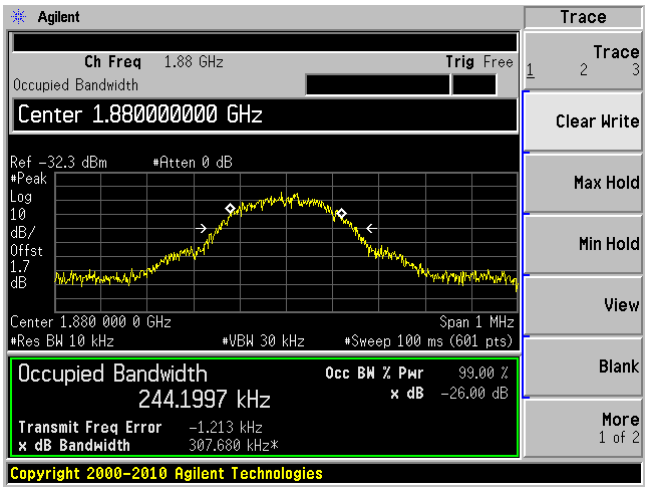

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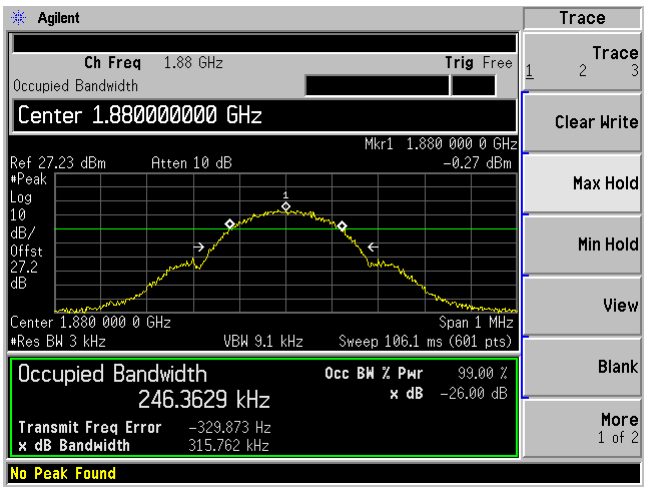

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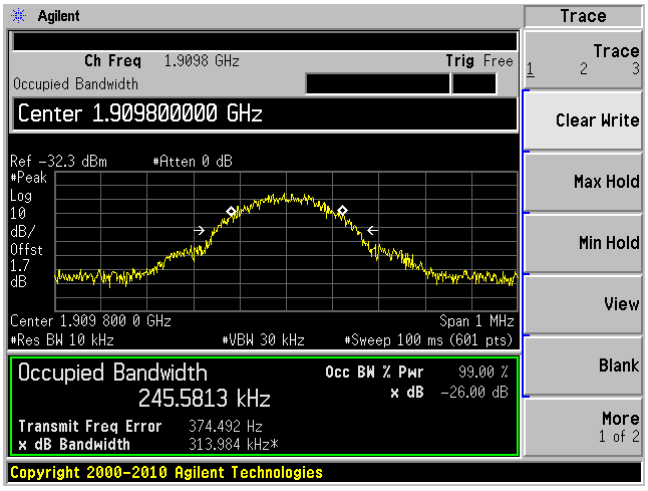

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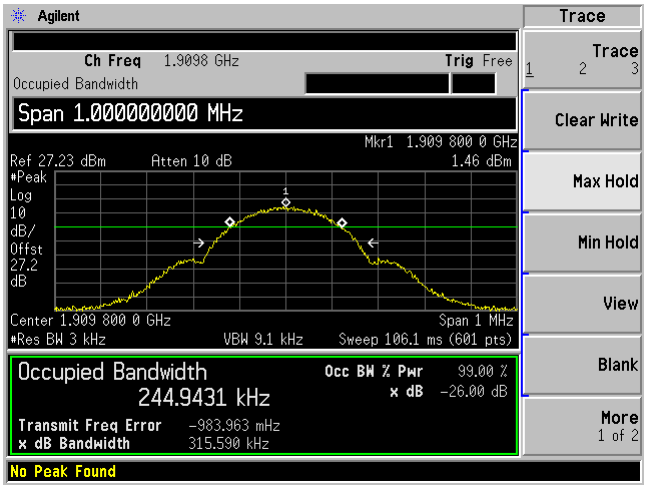
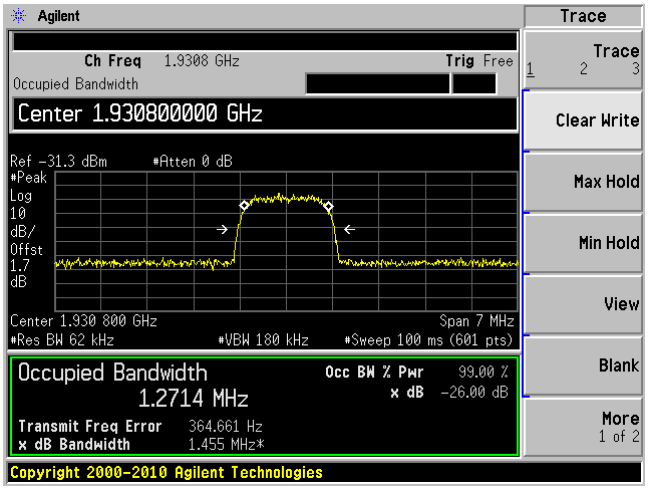


CDMA / EVDO DL

Low I/P



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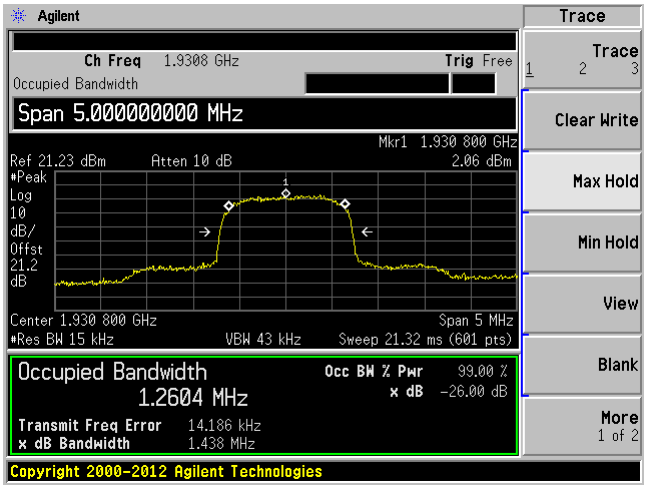

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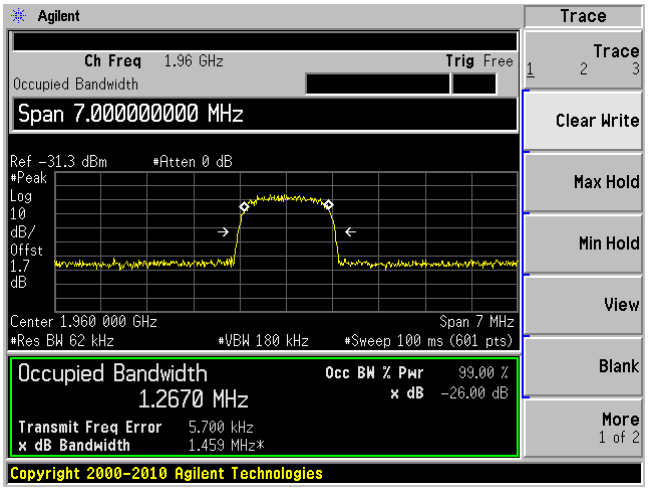

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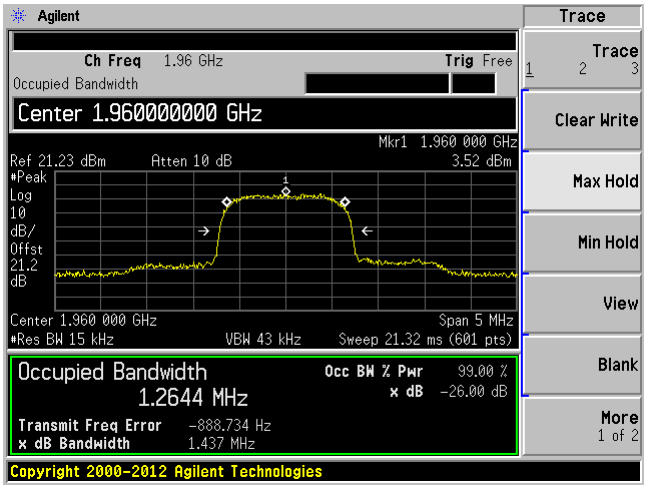

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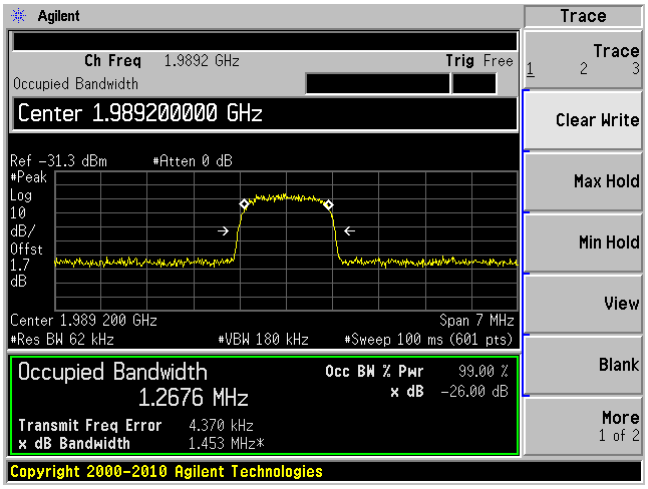

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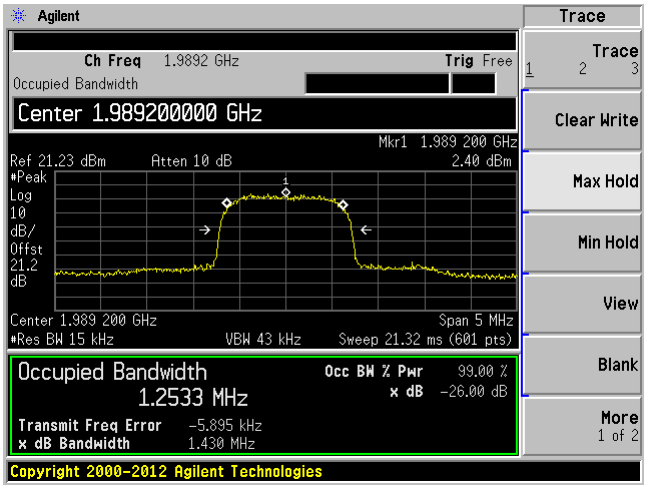
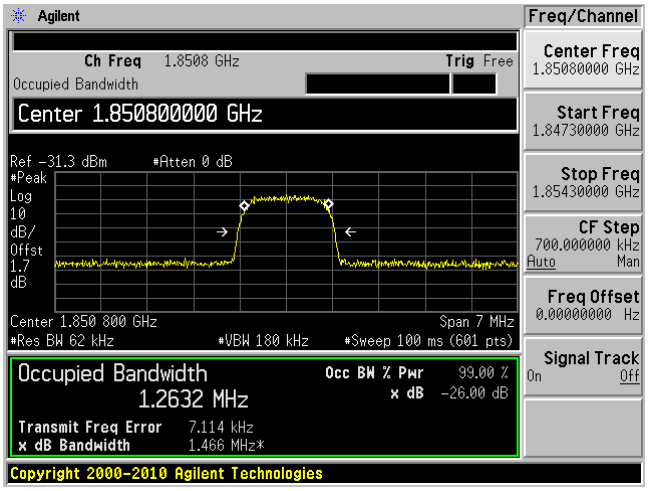


CDMA / EVDO UL

Low I/P



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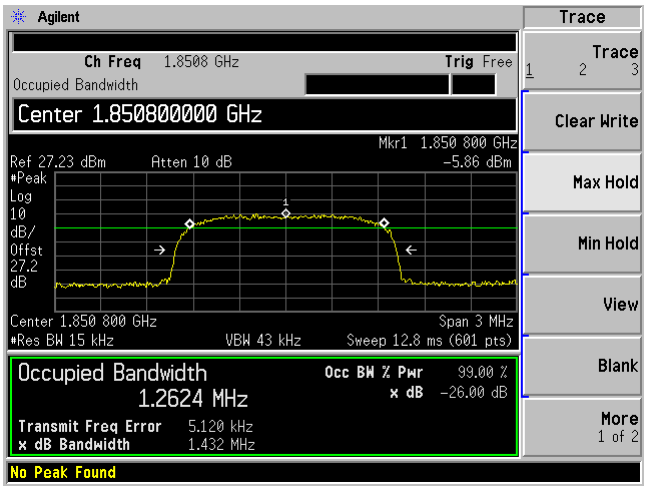

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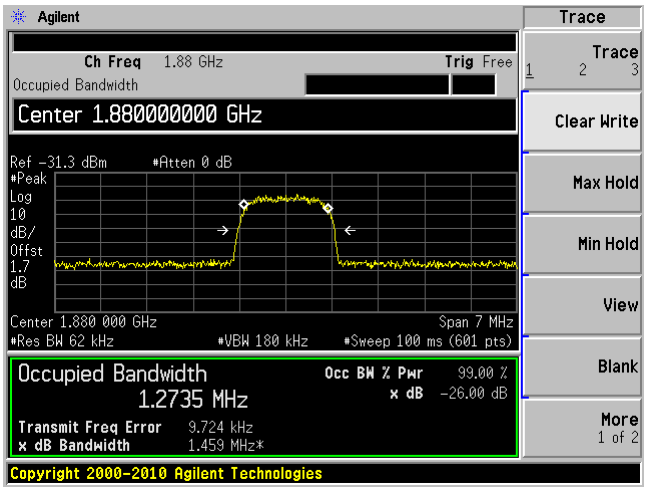

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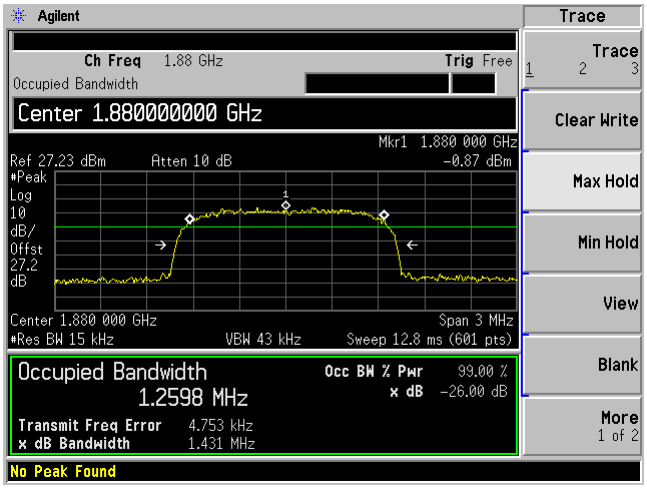

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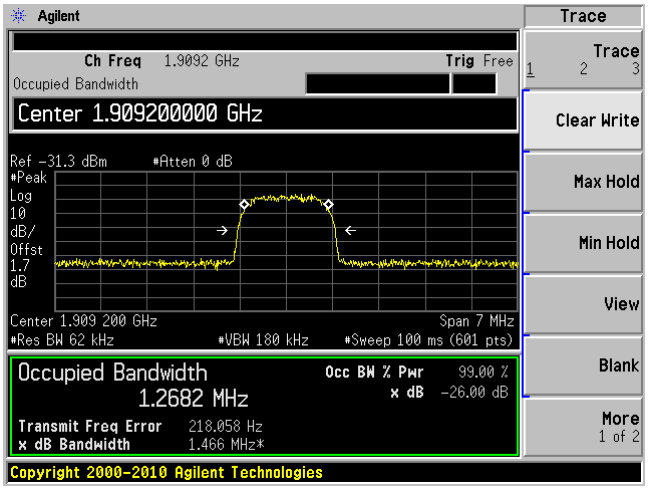

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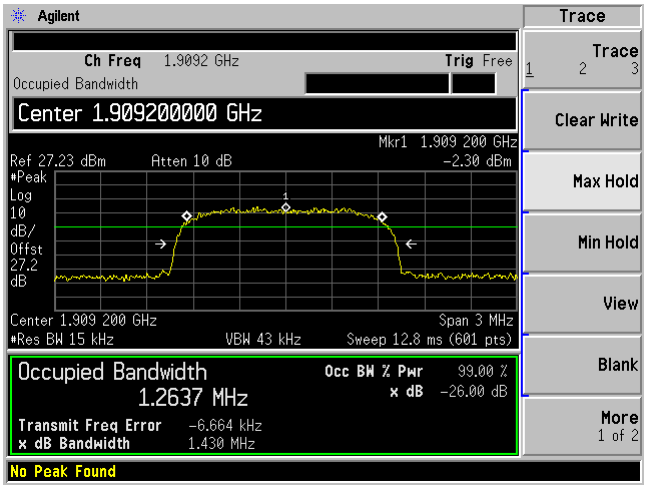
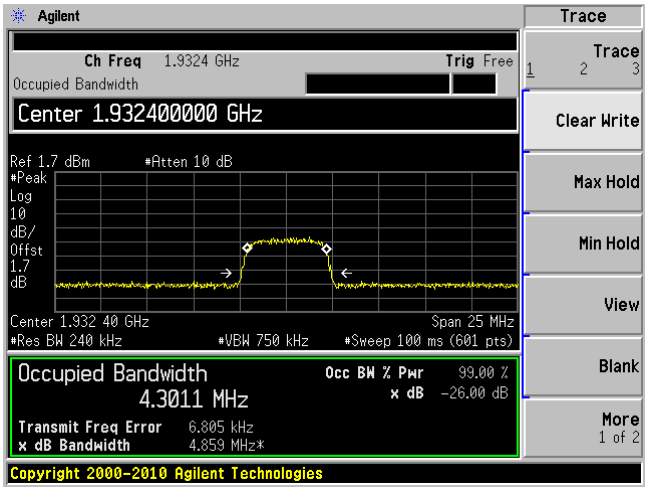
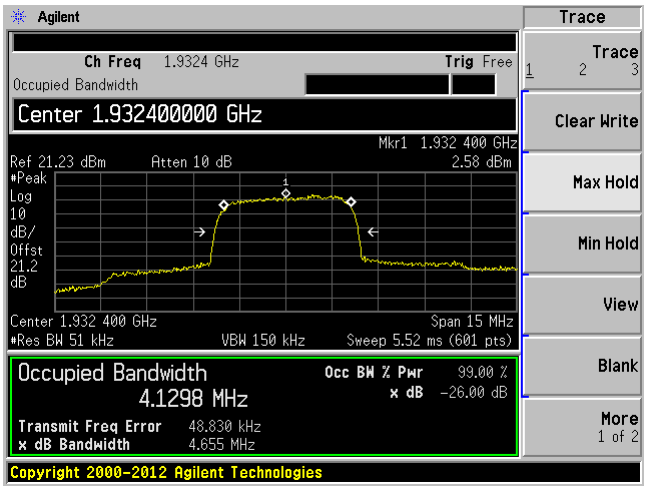


WCDMA DL

Low I/P



Low O/P



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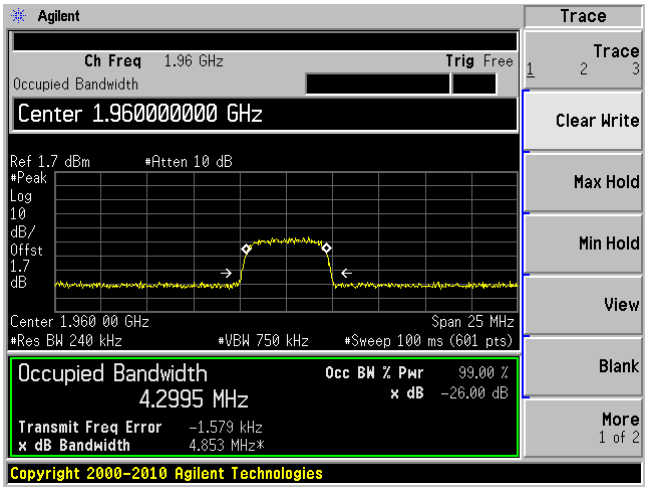

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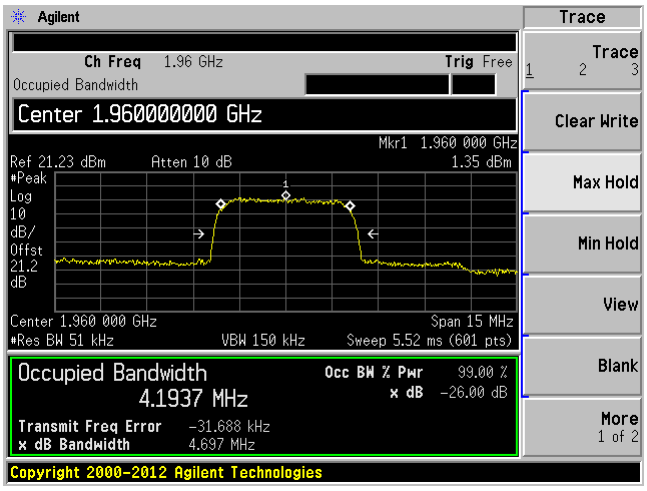

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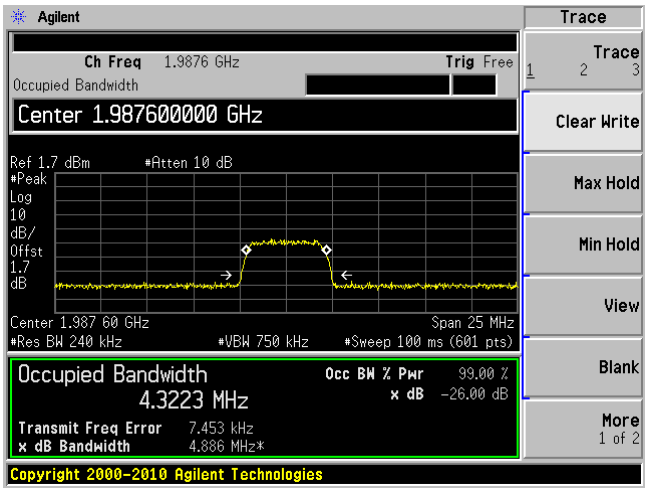

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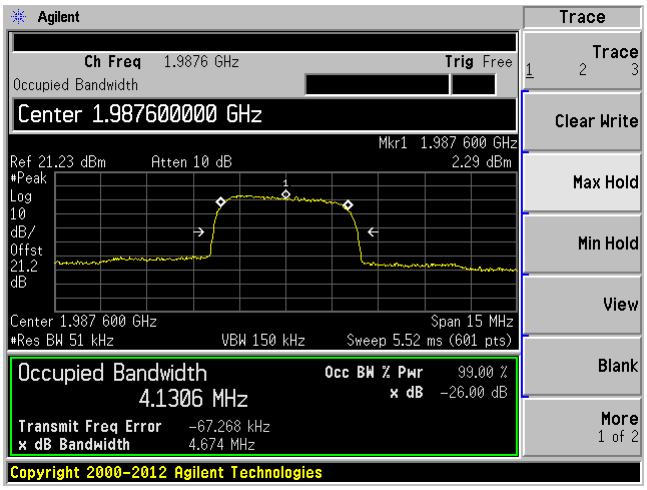
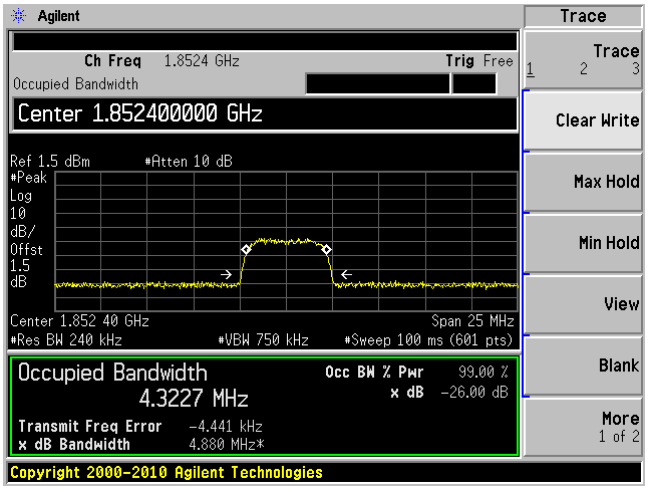


WCDMA UL

Low I/P



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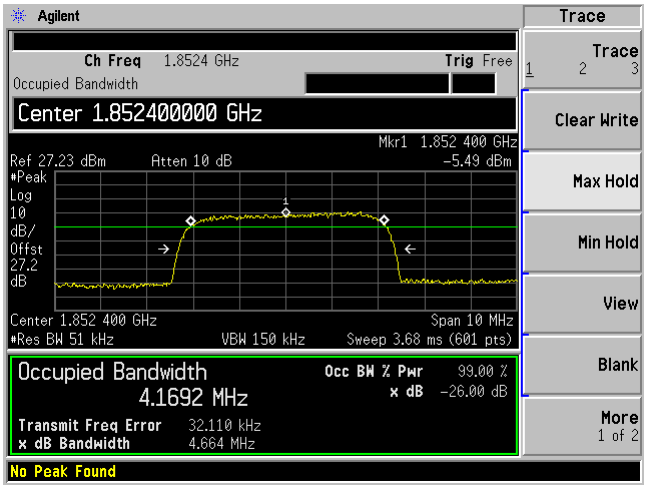

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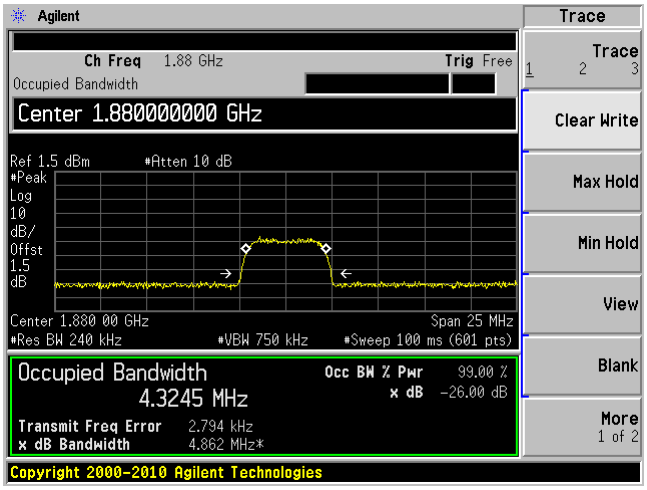

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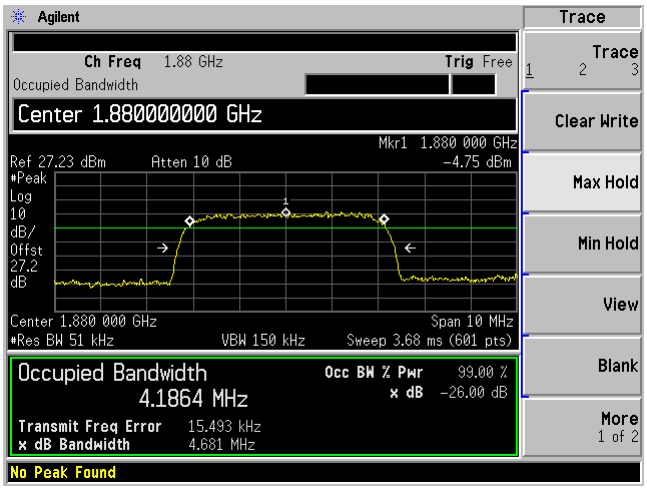

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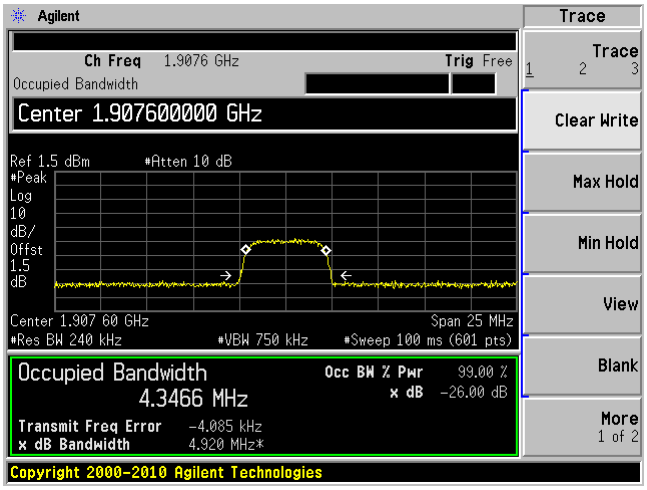

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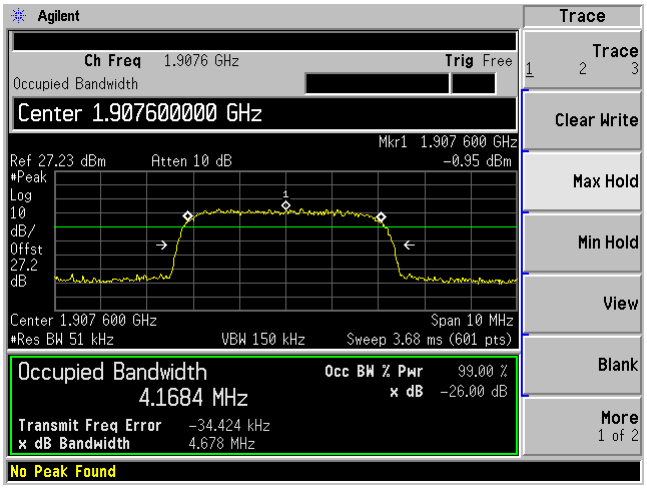
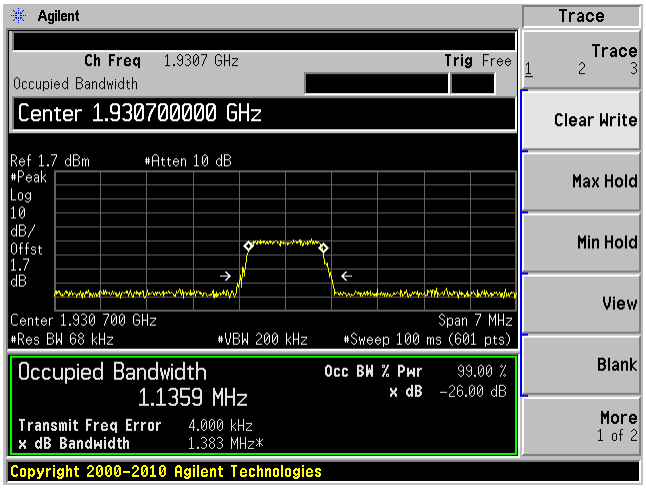
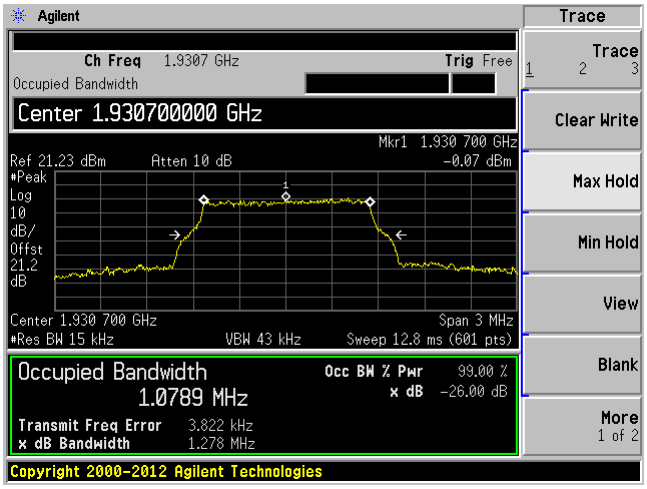


LTE 1.4MHz QPSK DL

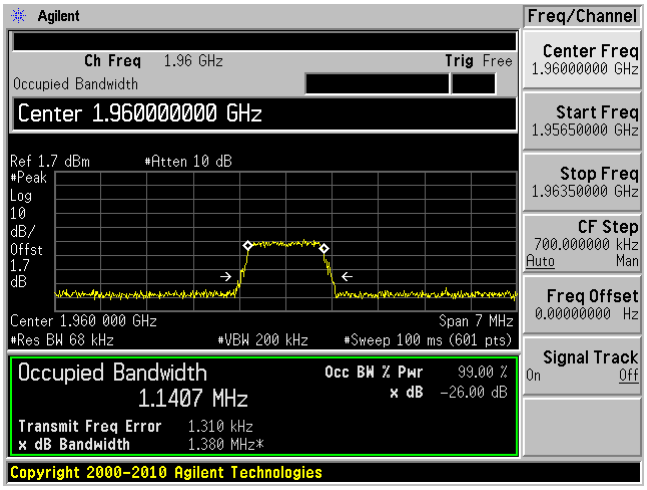
Low I/P



Low O/P



Middle I/P



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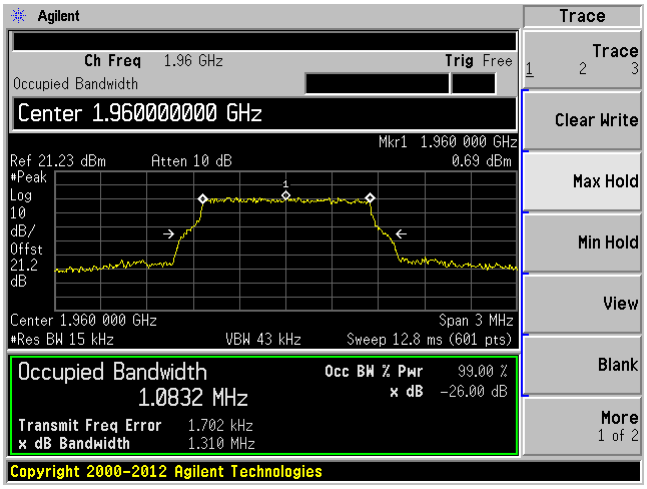

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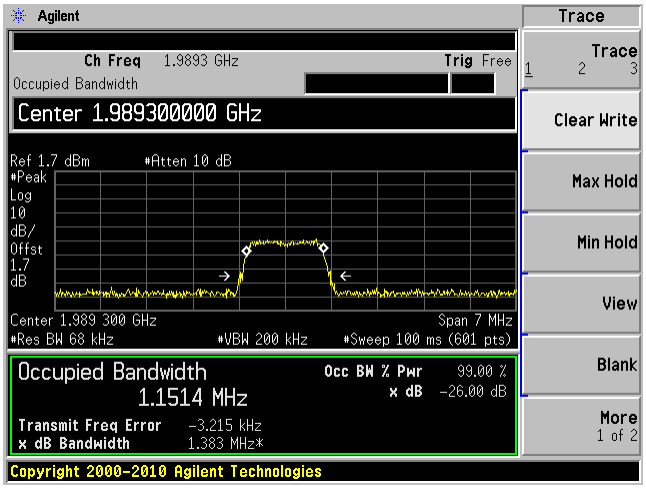

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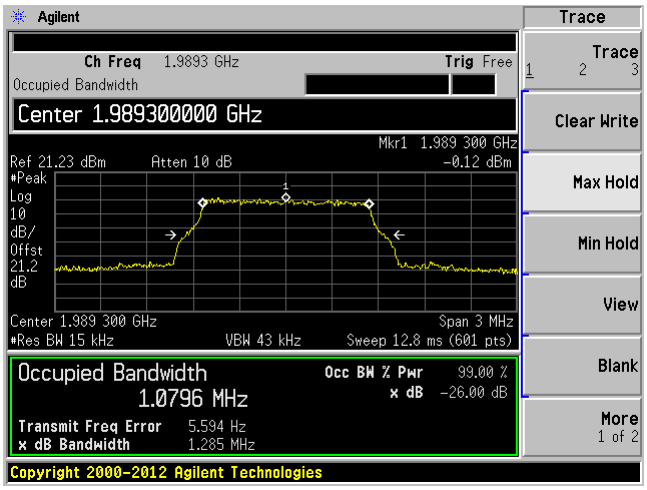
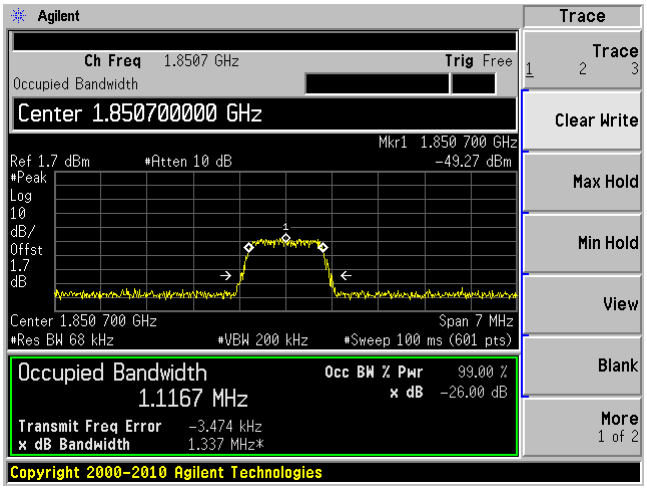


LTE 1.4MHz QPSK UL

Low I/P



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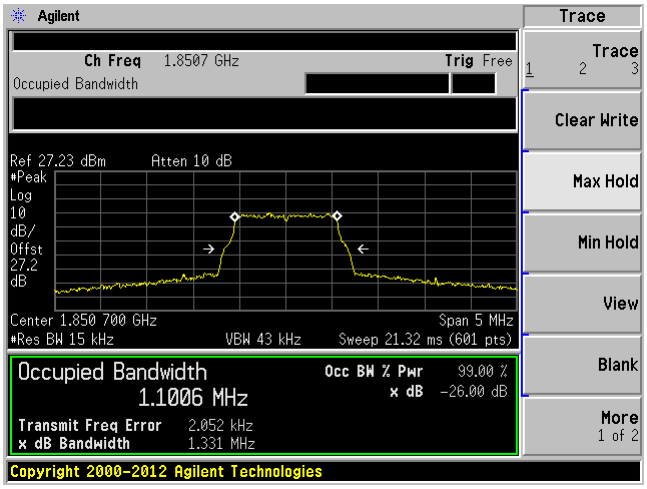

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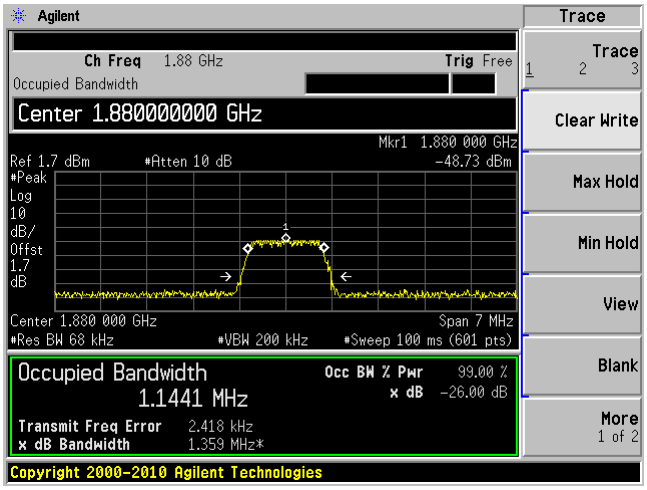

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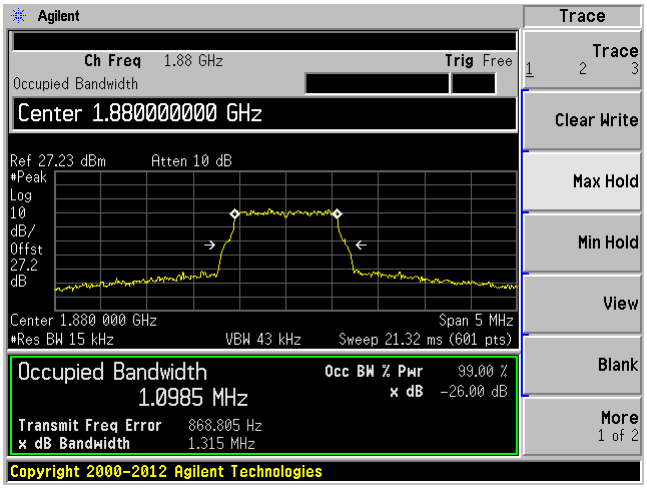

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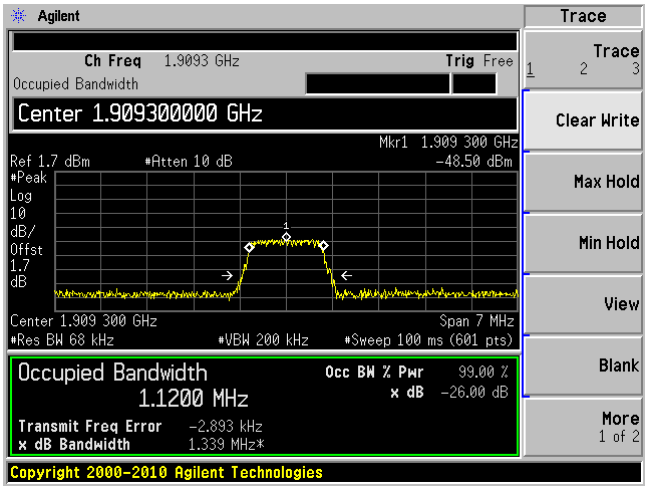

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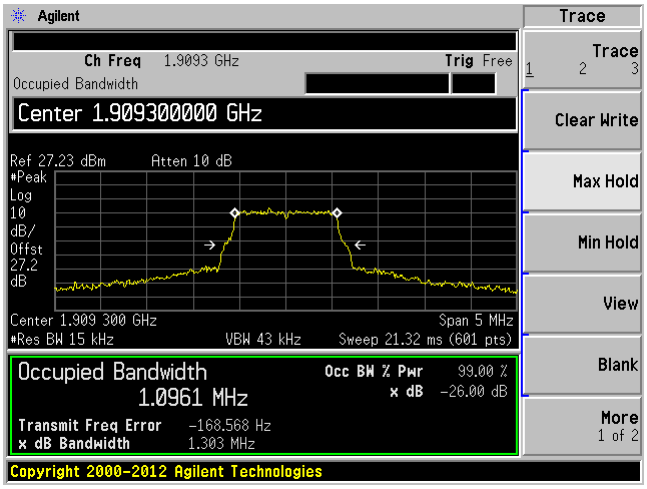

LTE 3MHz QPSK DL

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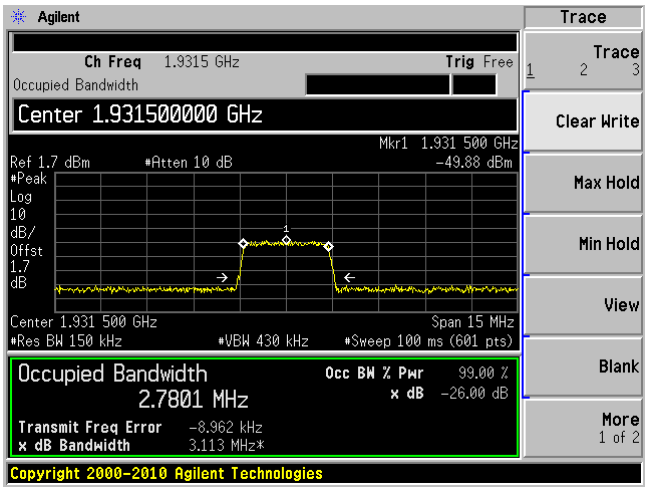

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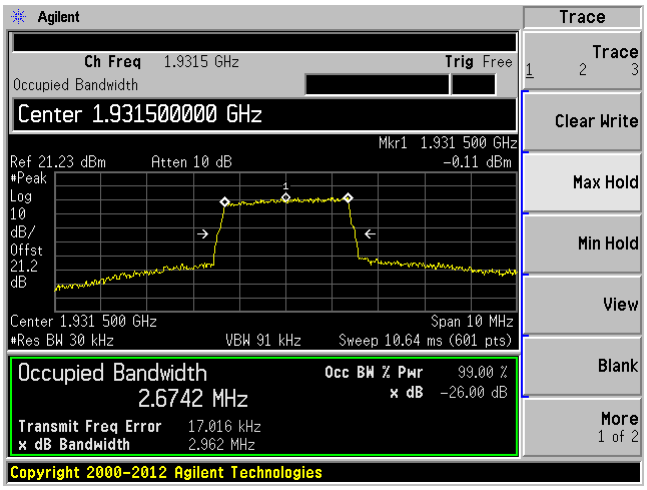

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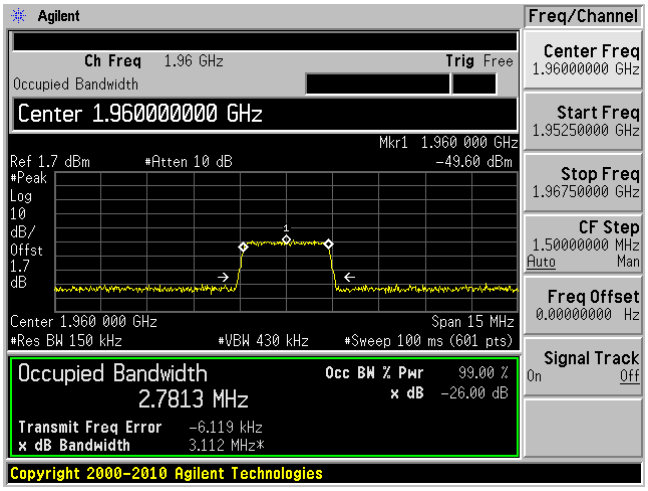

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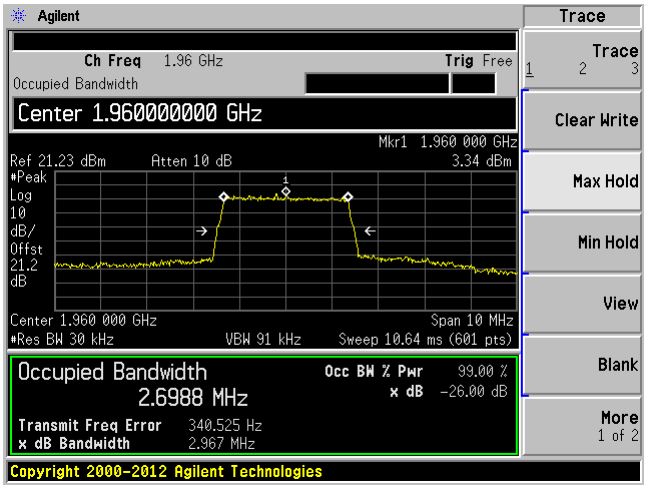

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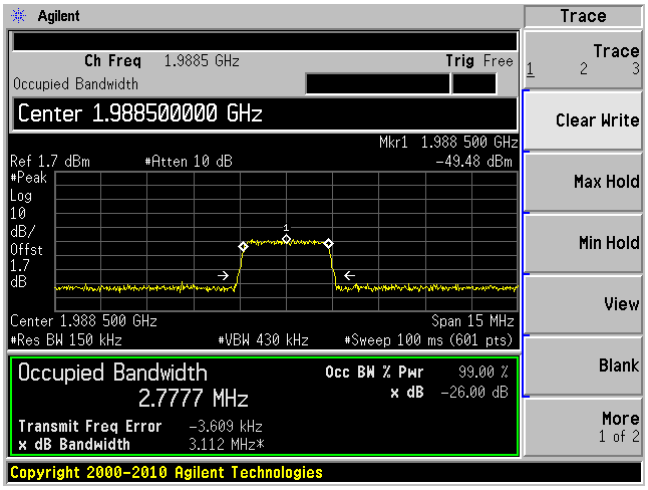

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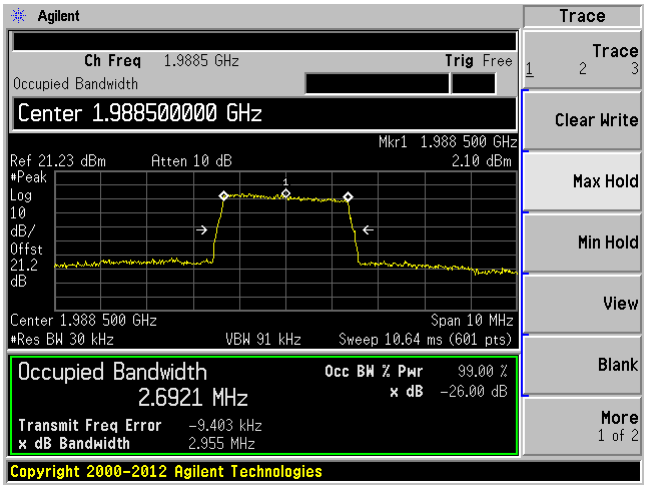
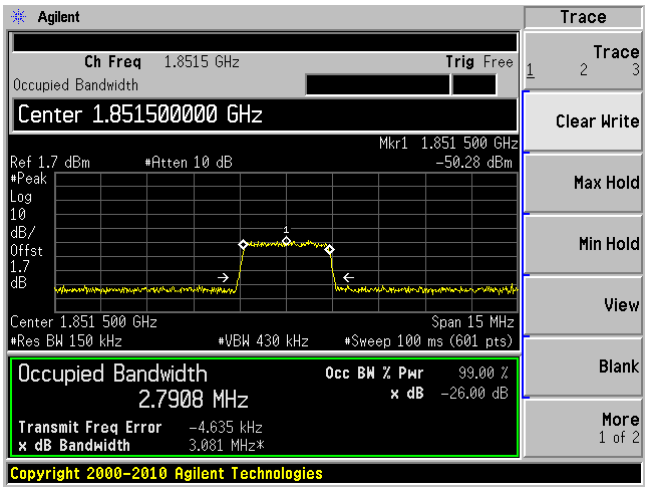


LTE 3MHz QPSK UL

Low I/P



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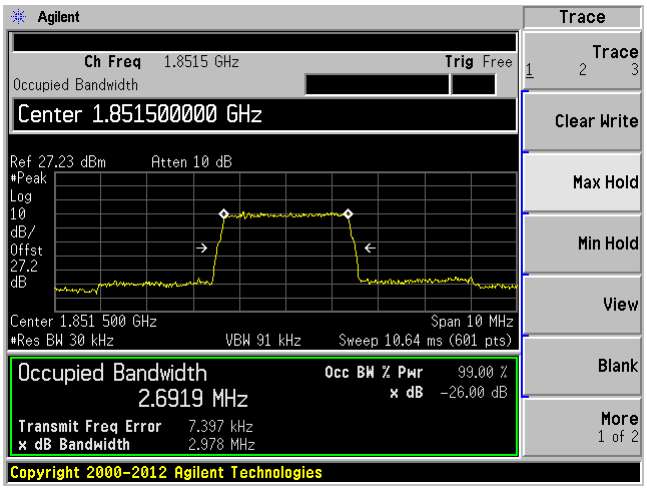

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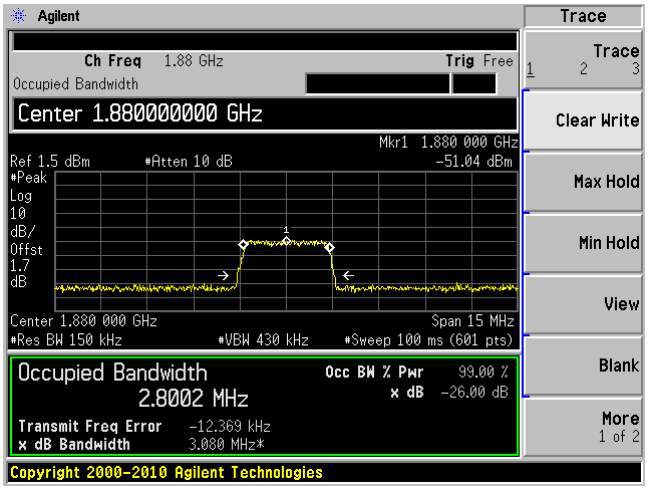

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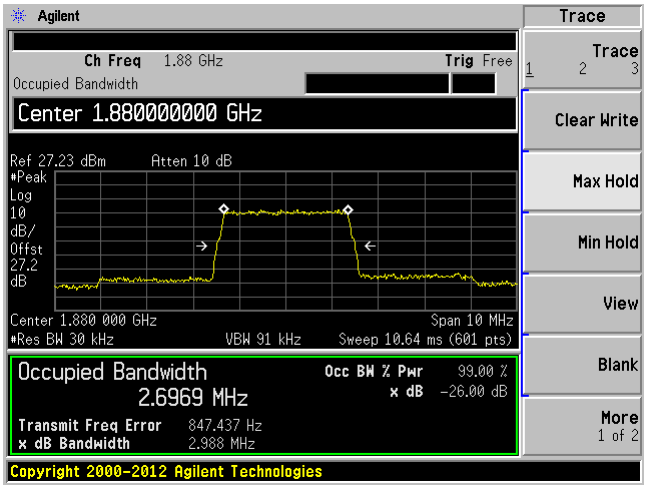

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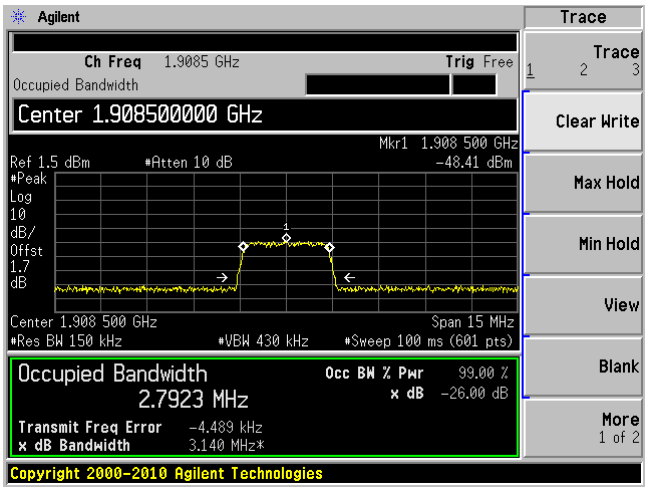

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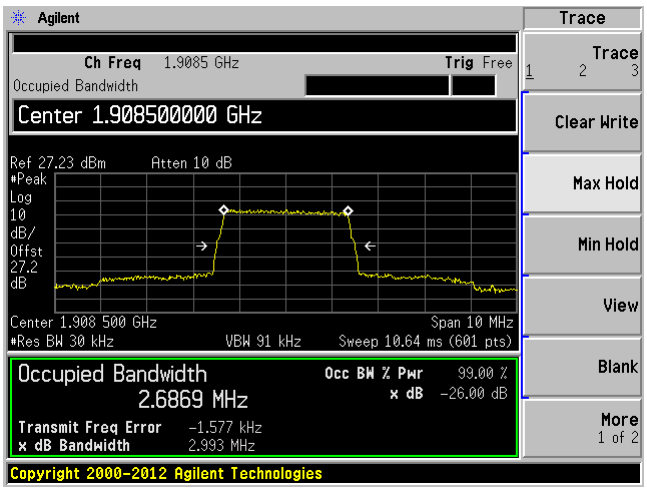
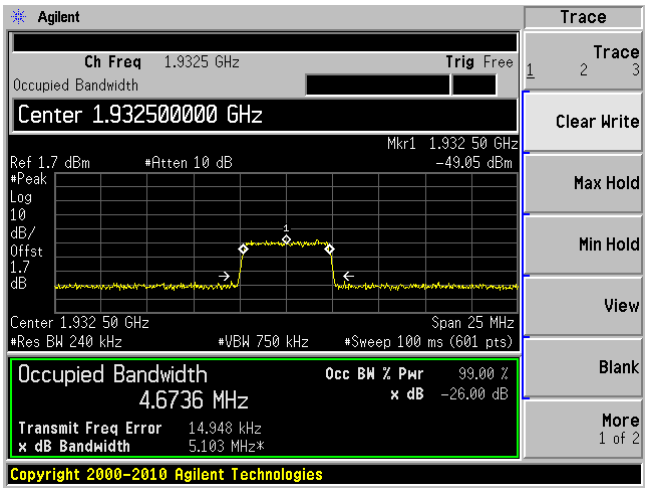


LTE 5MHz QPSK DL

Low I/P



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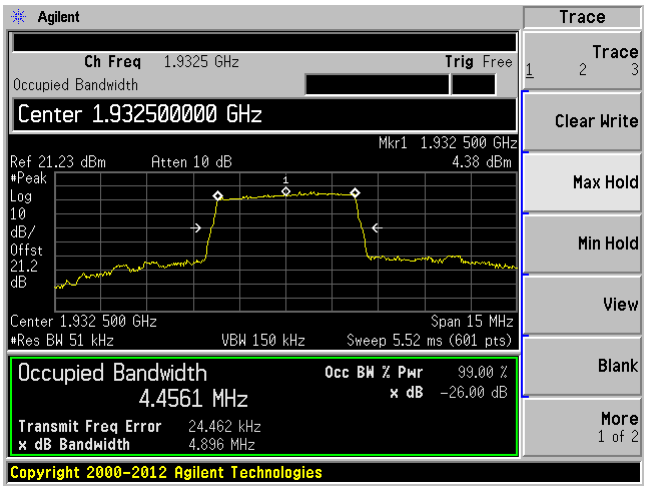

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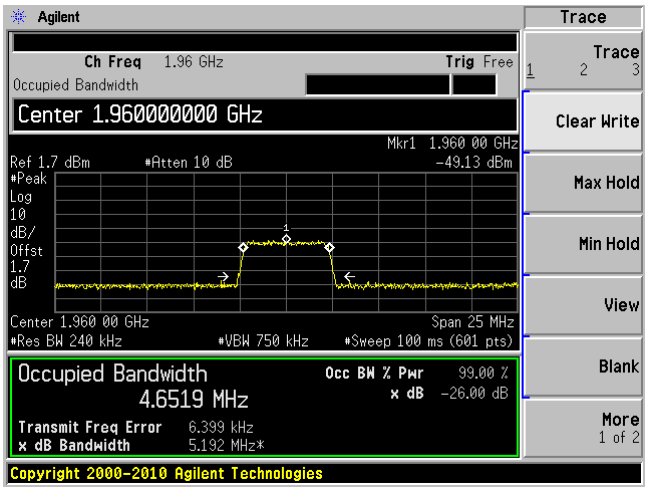

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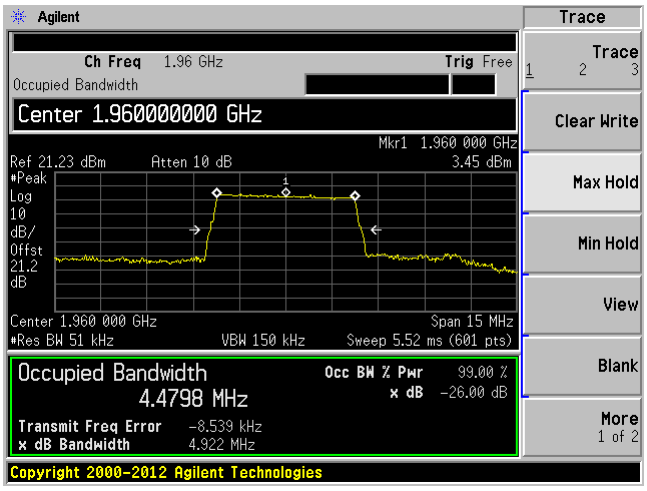

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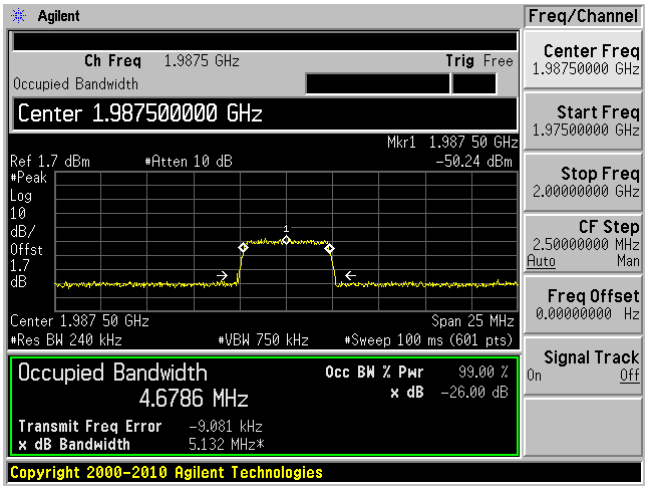

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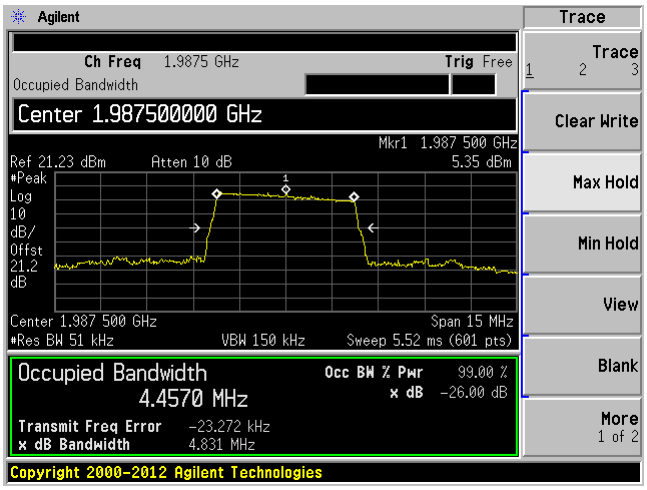
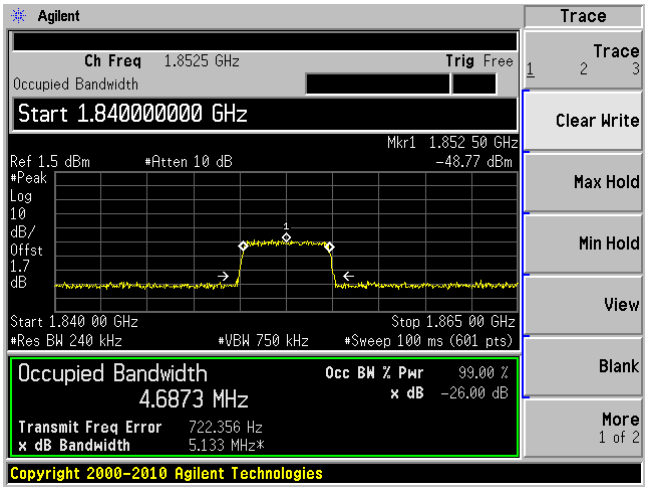


LTE 5MHz QPSK UL

Low I/P



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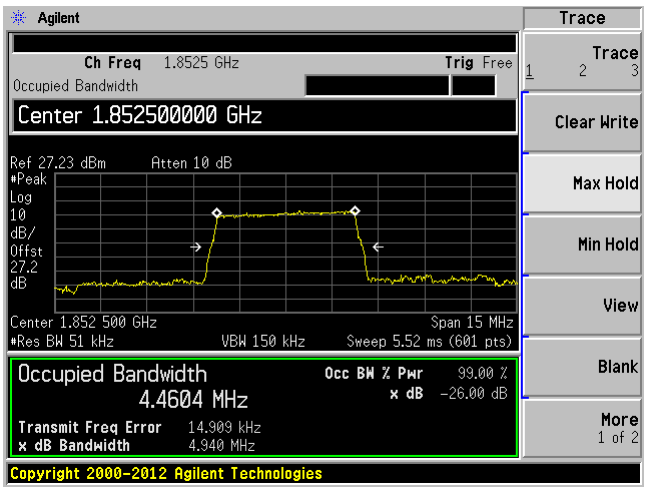

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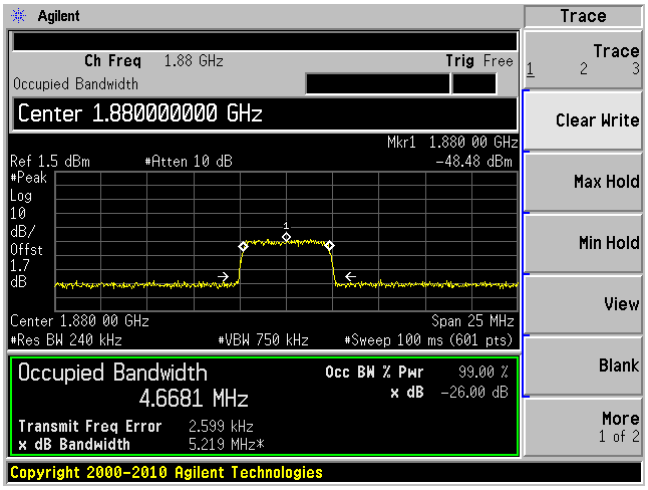

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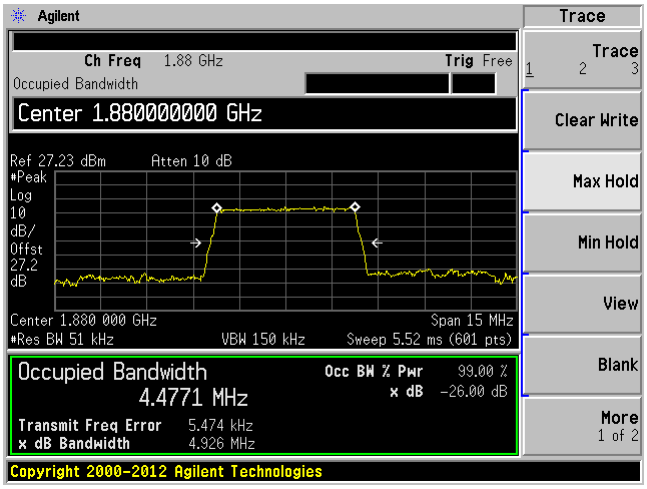

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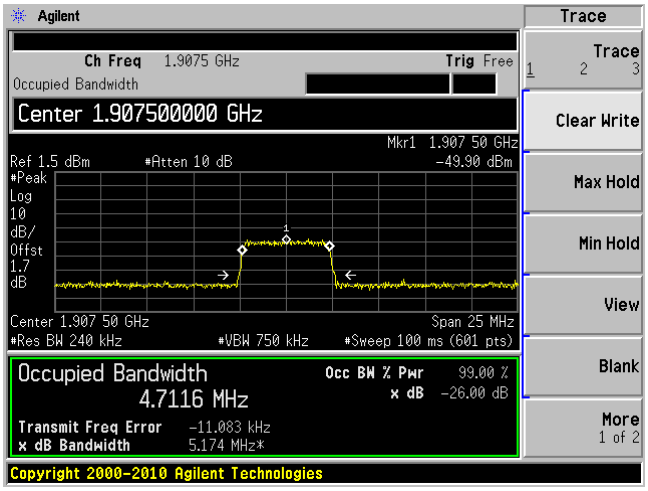

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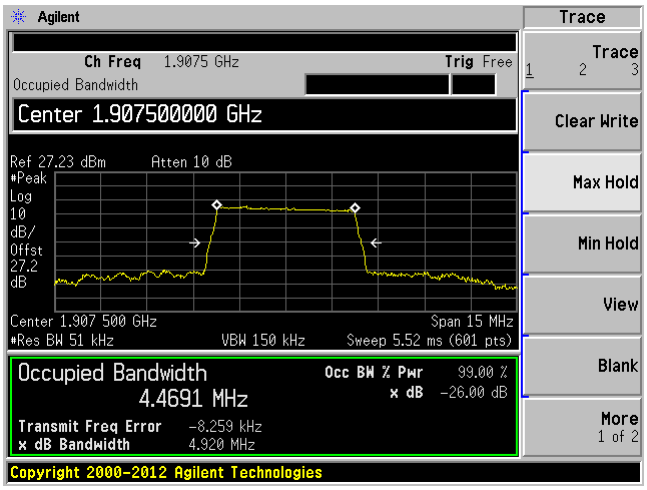
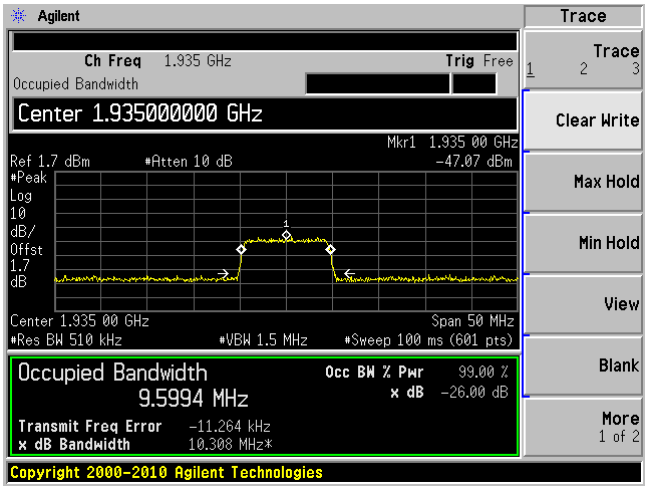


LTE 10MHz QPSK DL

Low I/P



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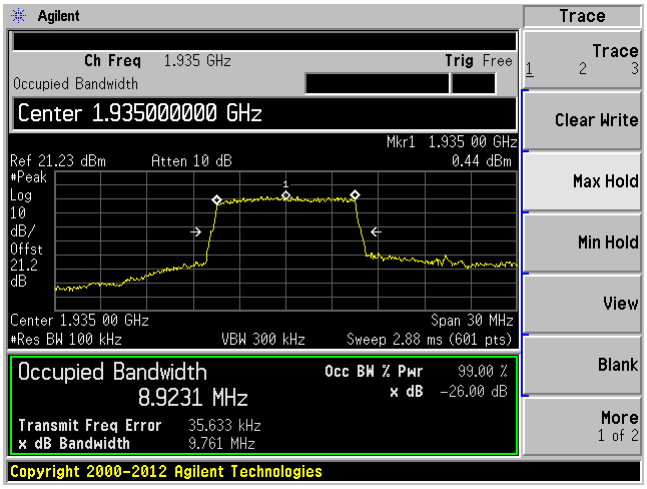

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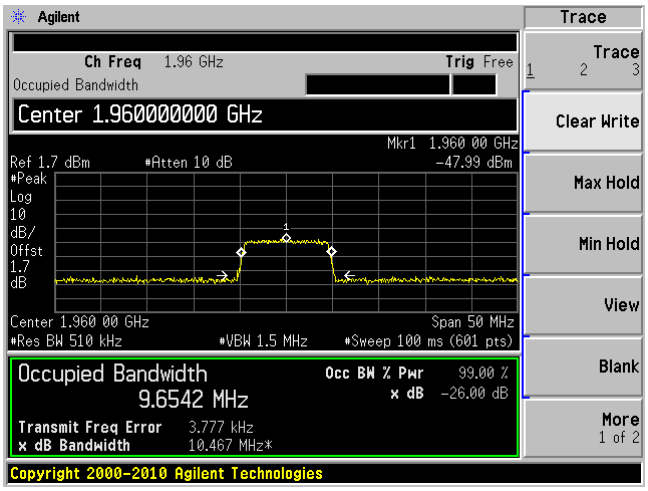

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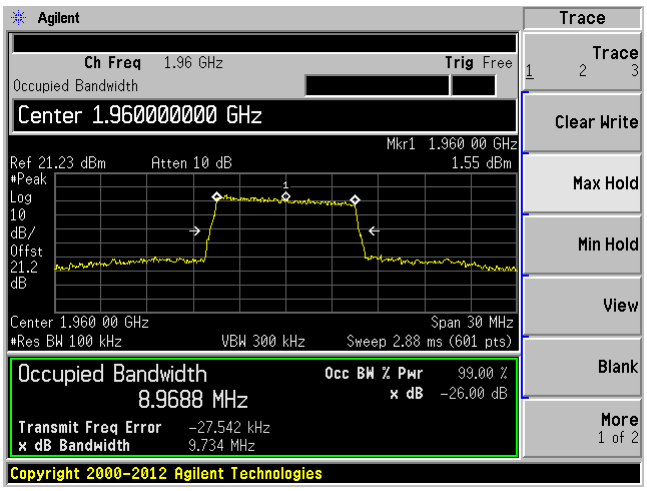

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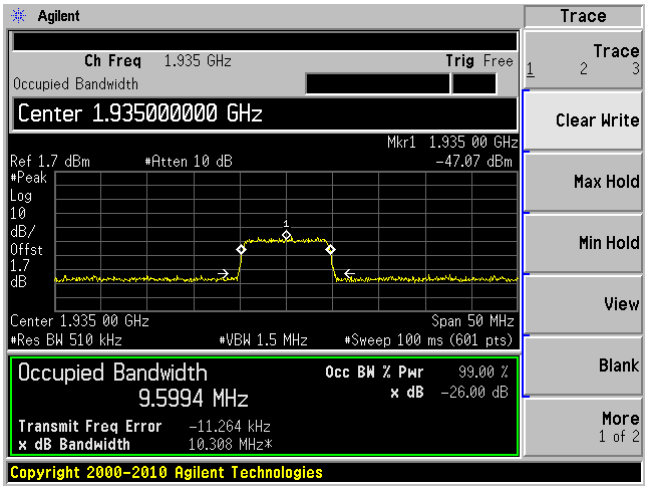

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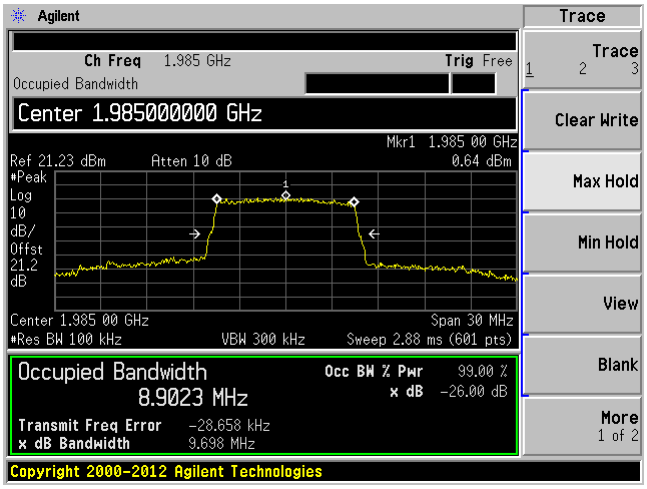
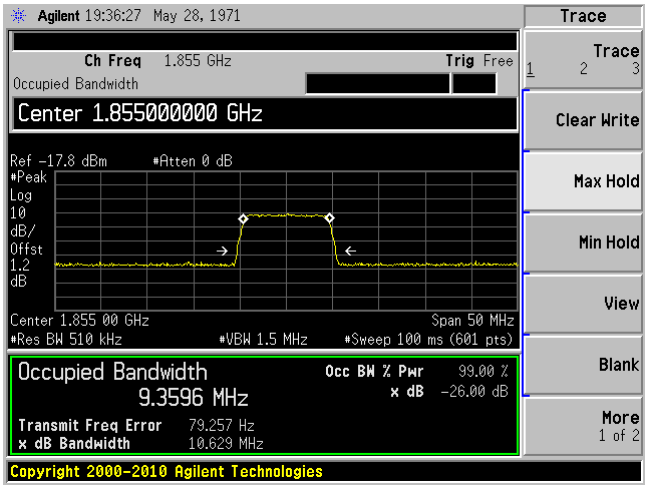


LTE 10MHz QPSK UL

Low I/P



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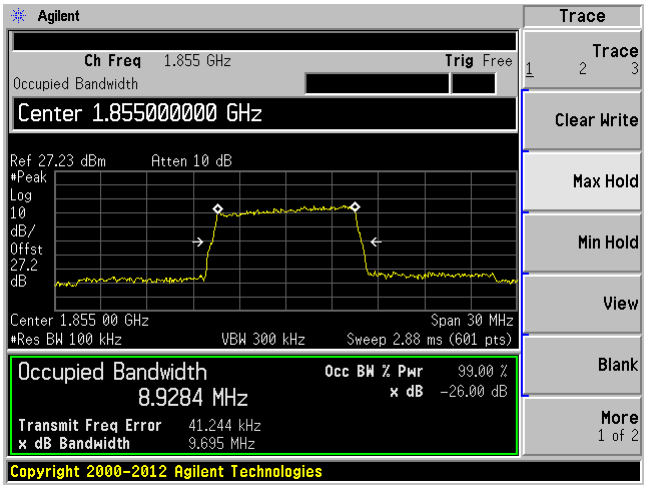

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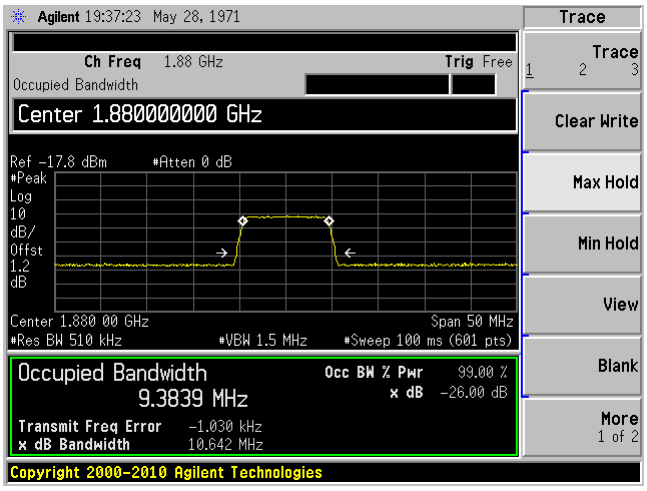

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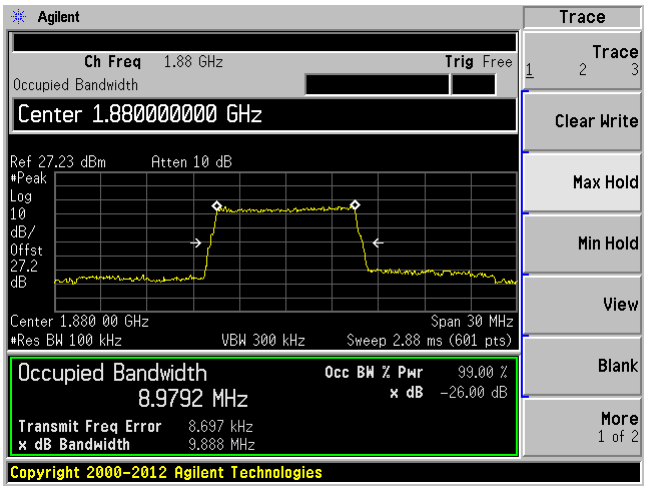

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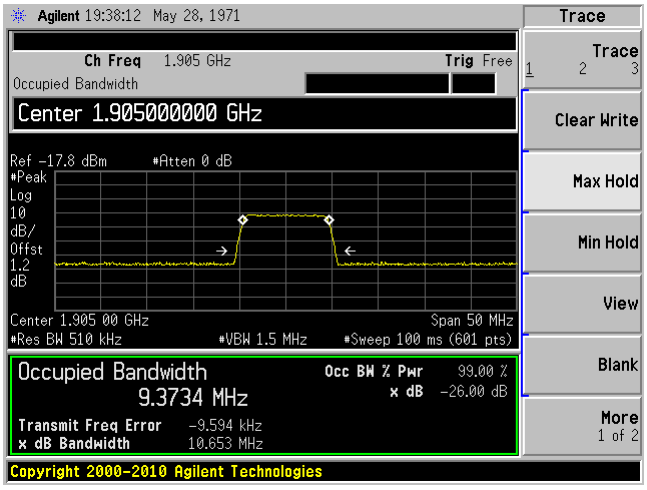

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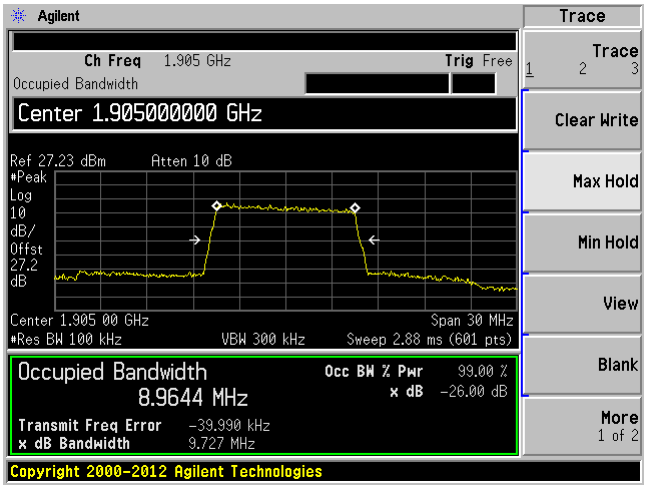
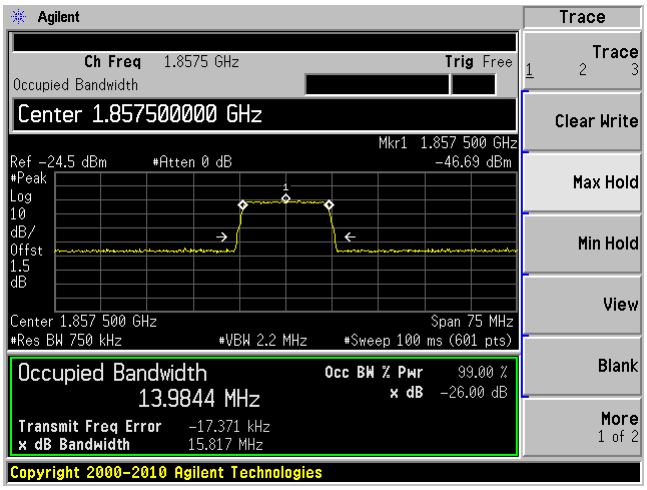


LTE 15MHz QPSK UL

Low I/P



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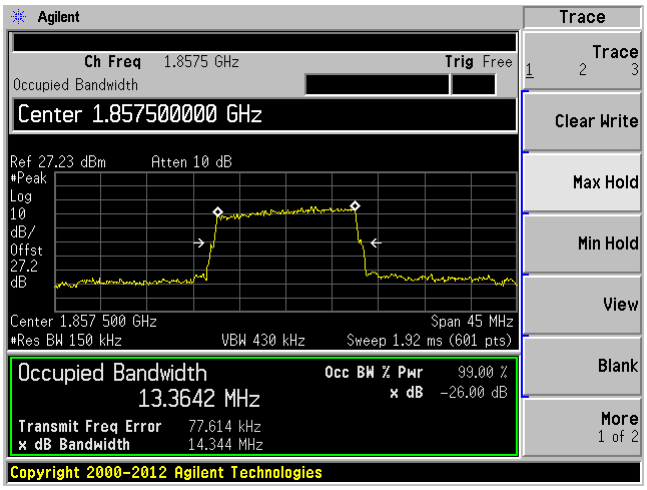

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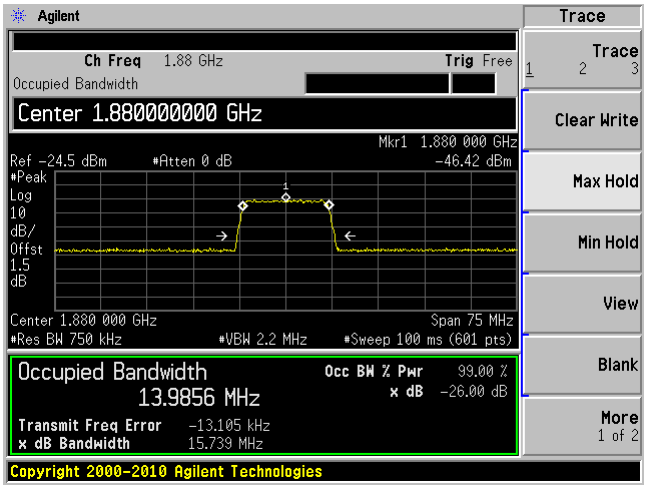

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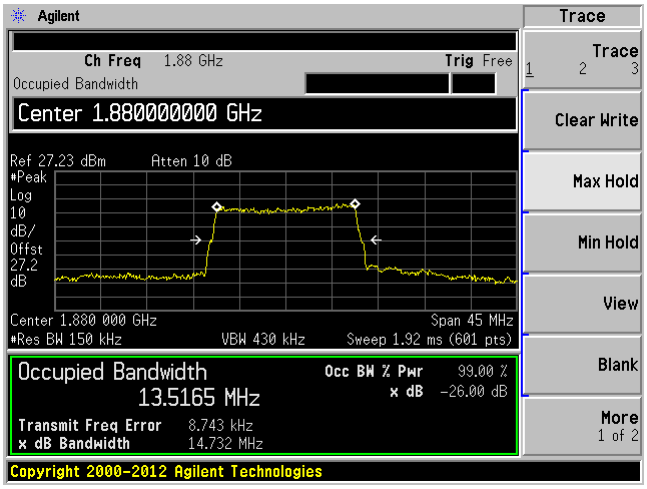

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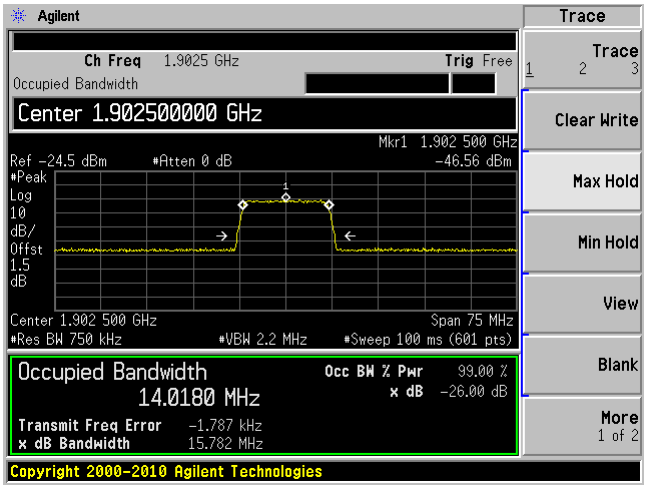

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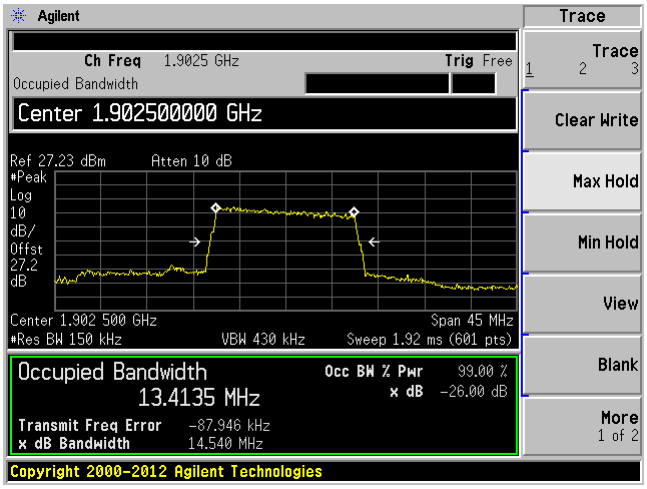
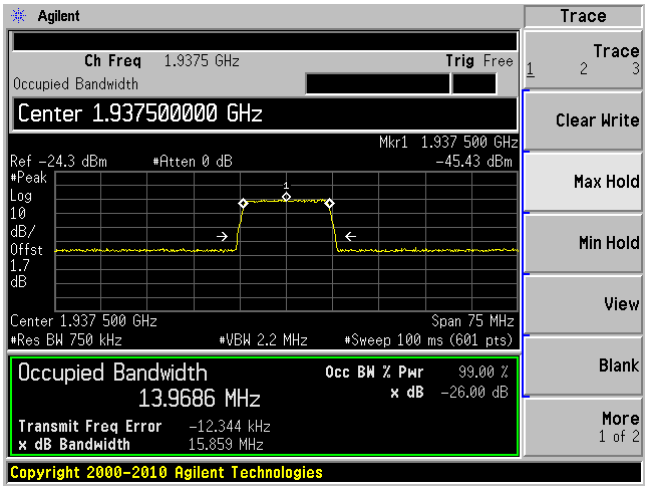
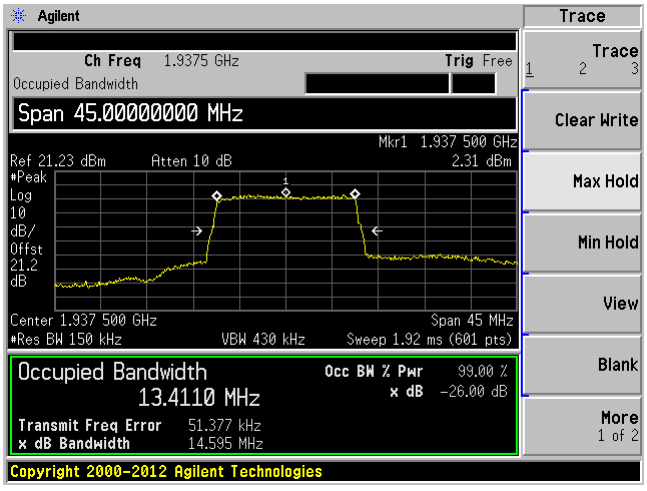


LTE 15MHz QPSK DL

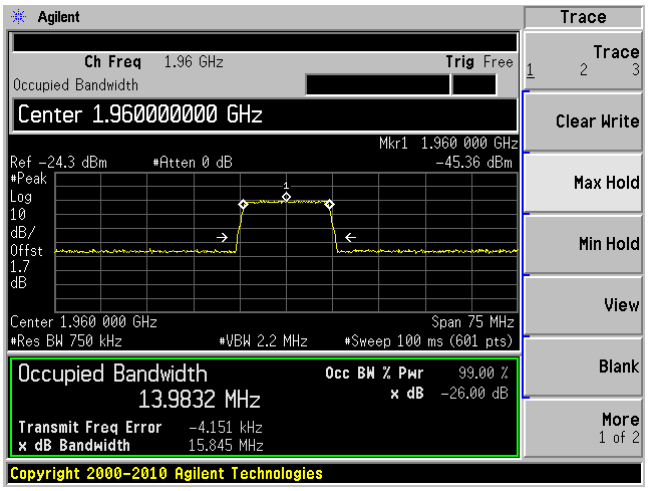
Low I/P



Low O/P



Middle I/P



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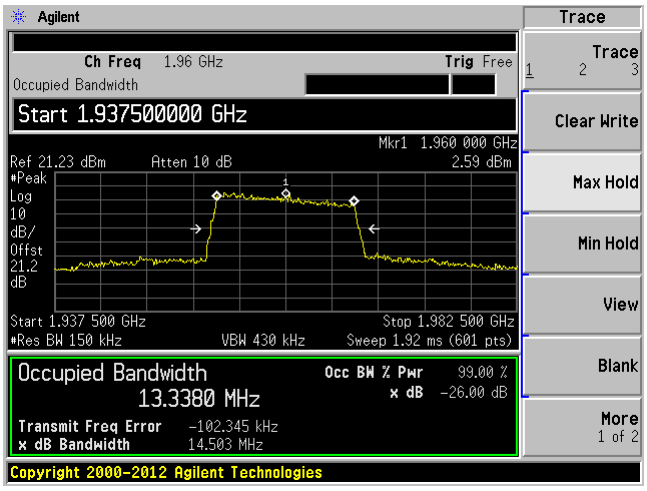
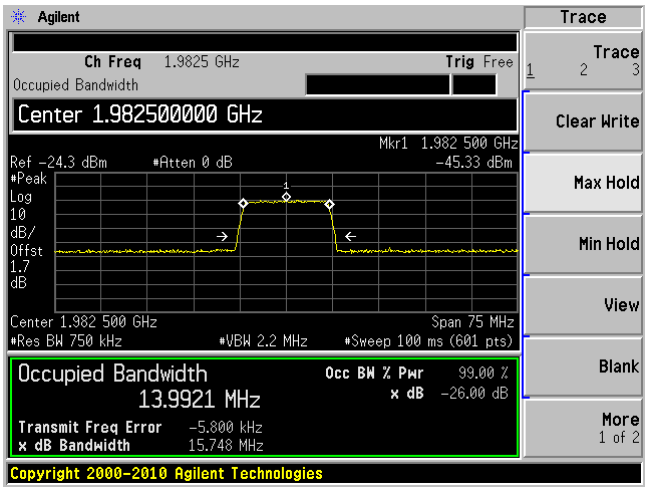
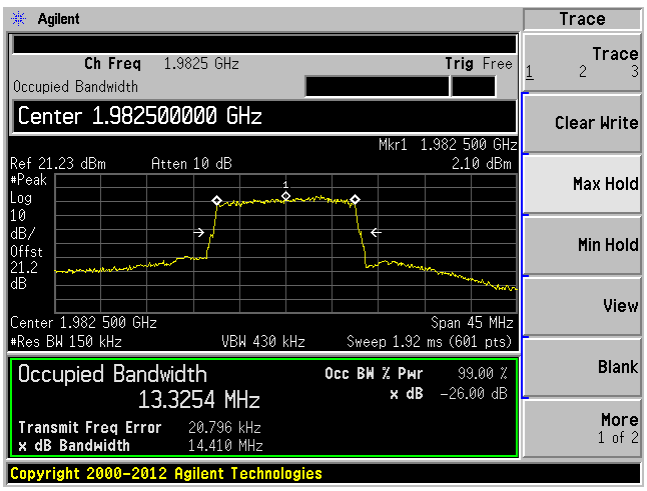


High I/P



High O/P



LTE 20MHz QPSK UL

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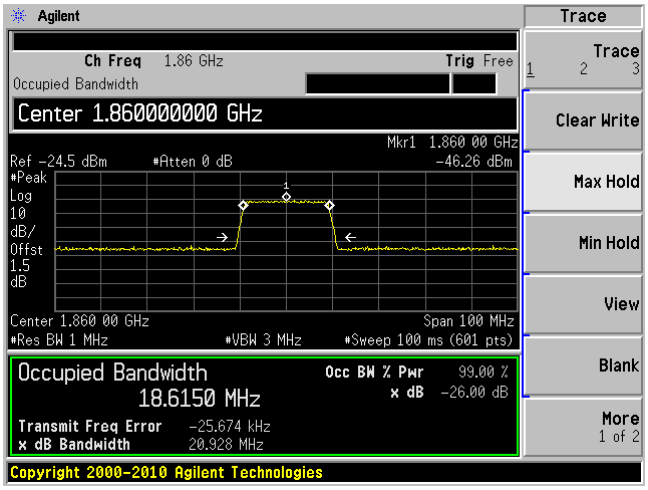

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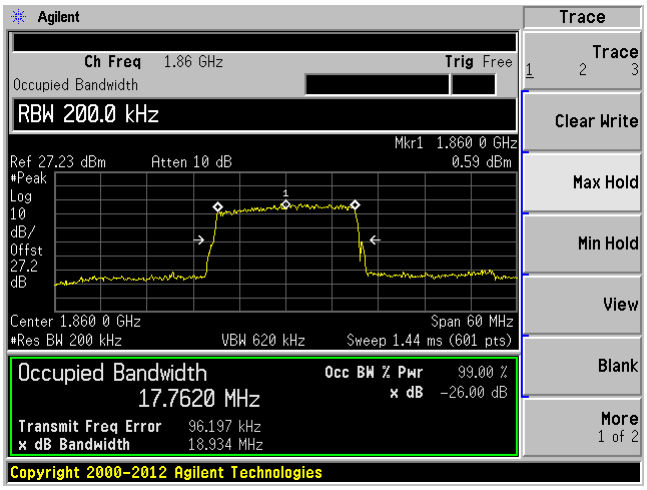

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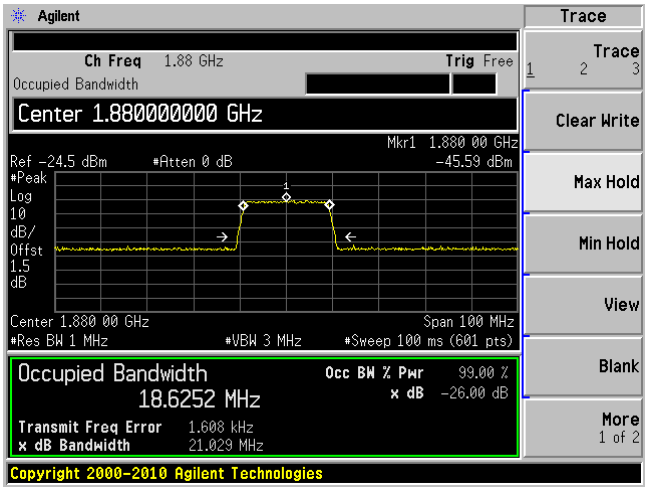

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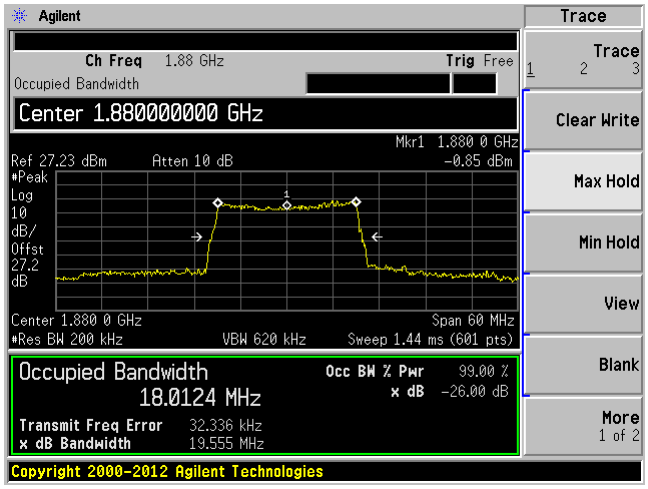

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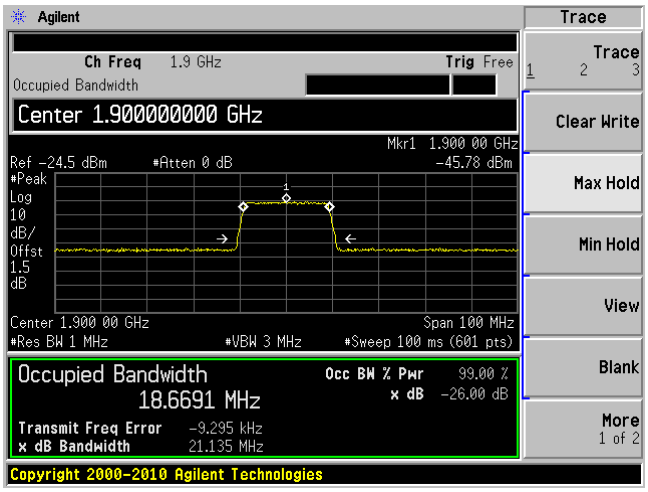

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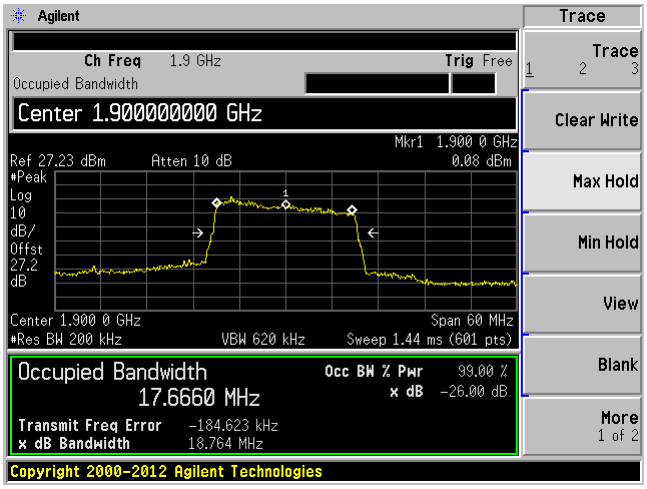
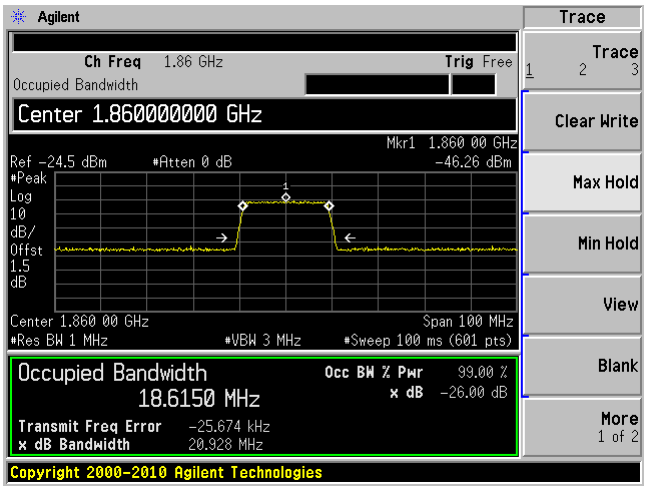


LTE 20MHz QPSK DL

Low I/P



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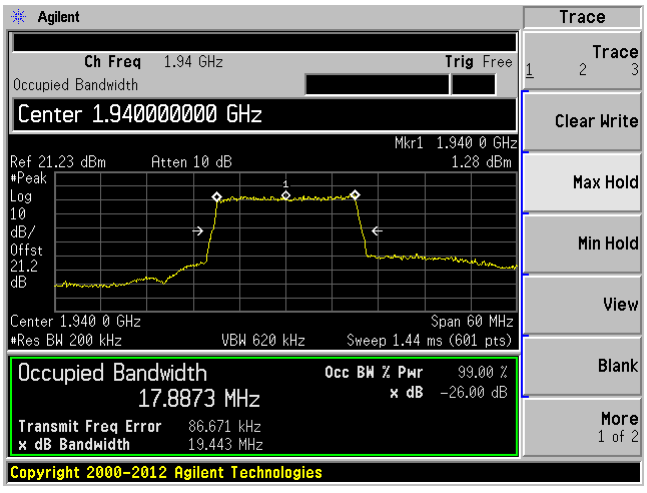

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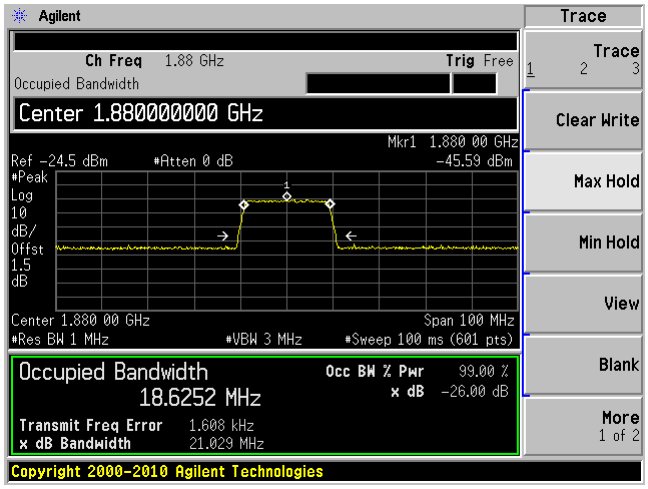

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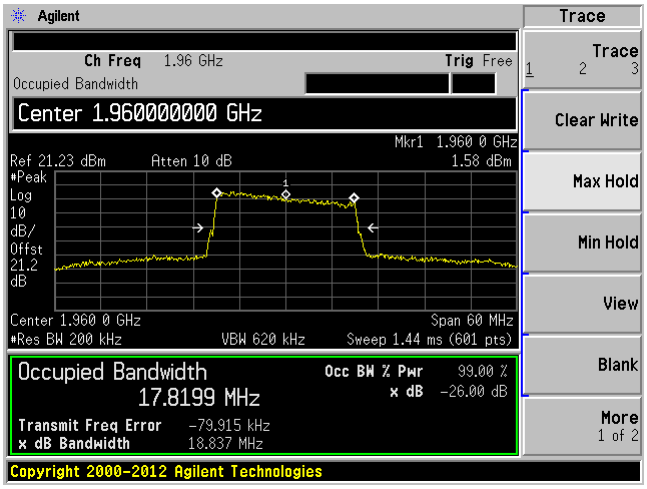

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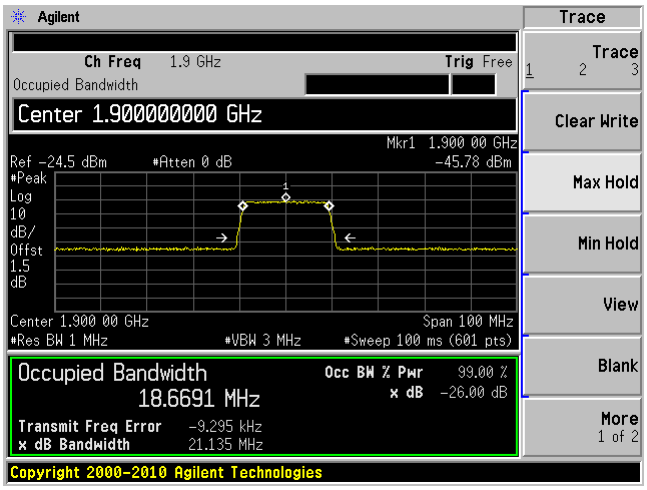

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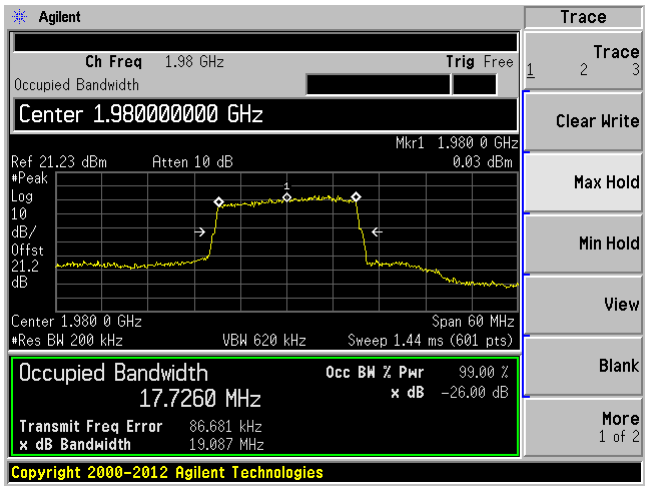
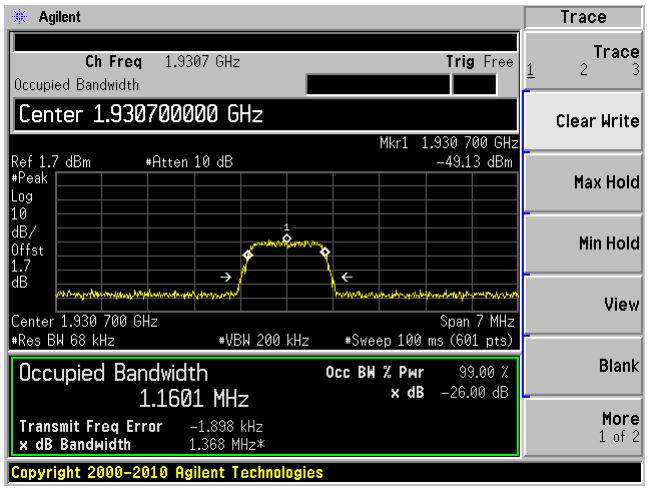


LTE 1.4MHz 16QAM DL

Low I/P



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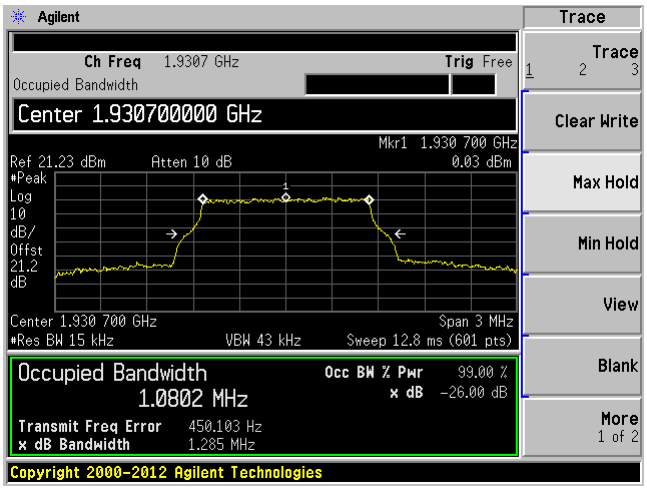
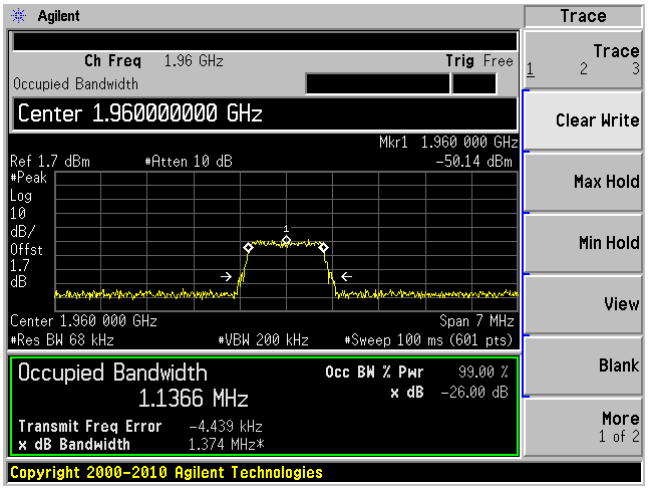
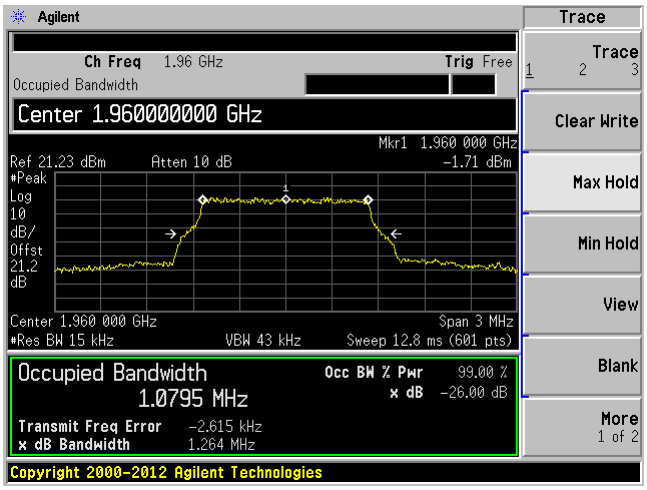


Middle I/P



Middle O/P



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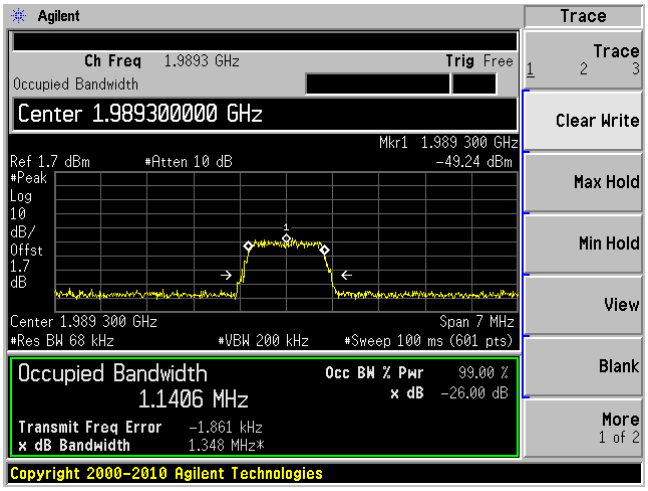

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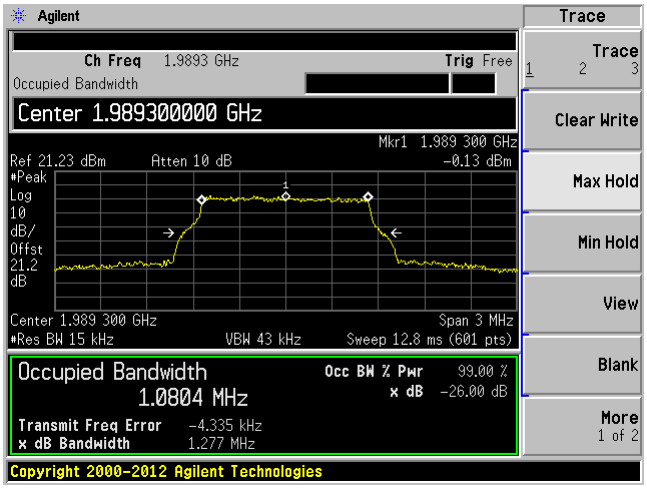
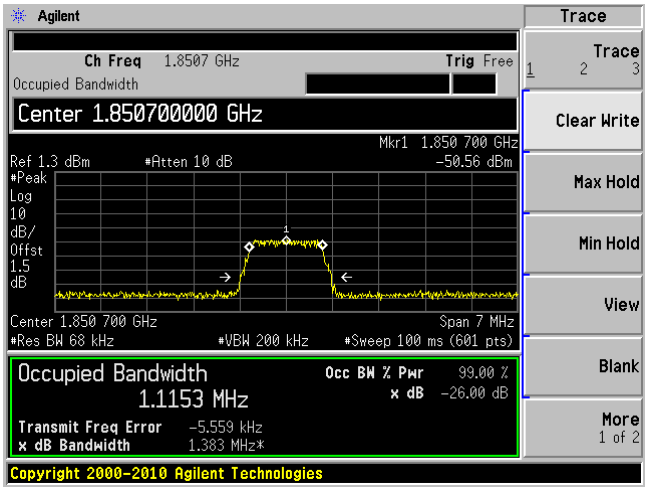


LTE 1.4MHz 16QAM UL

Low I/P



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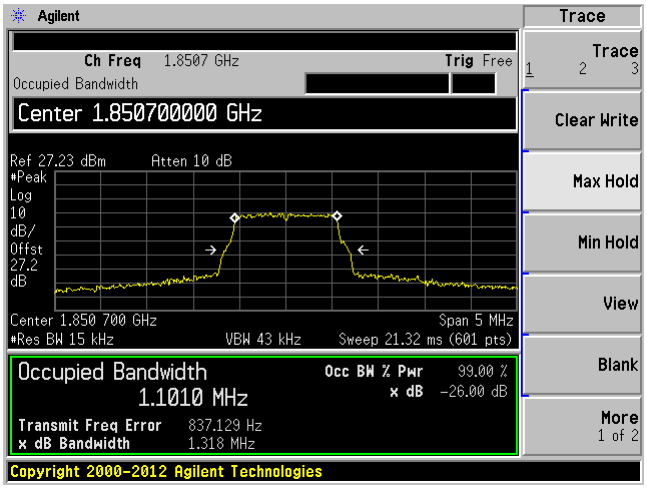

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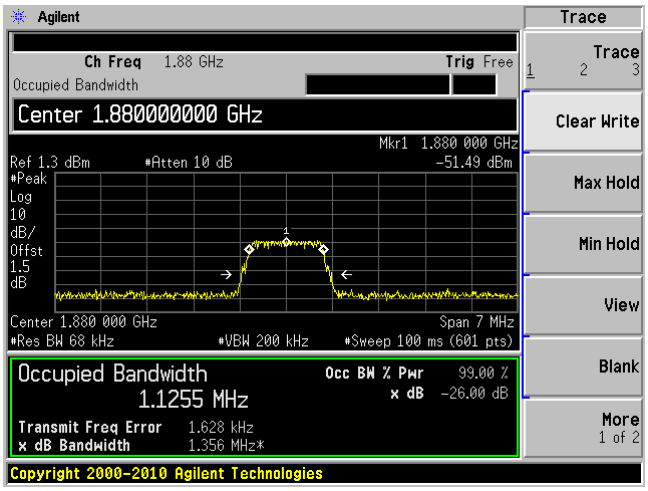

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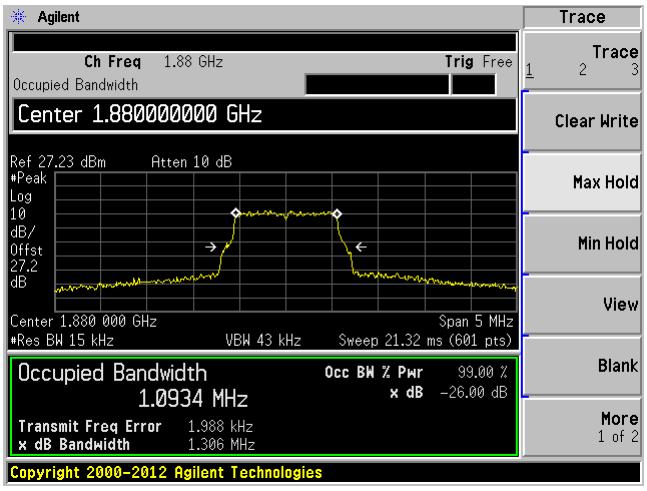

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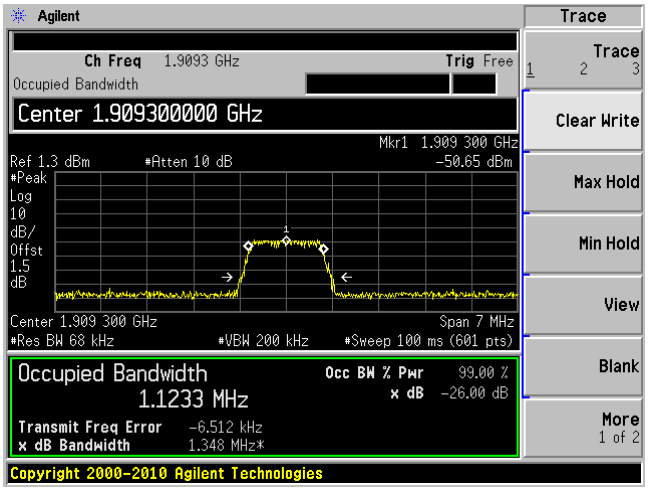

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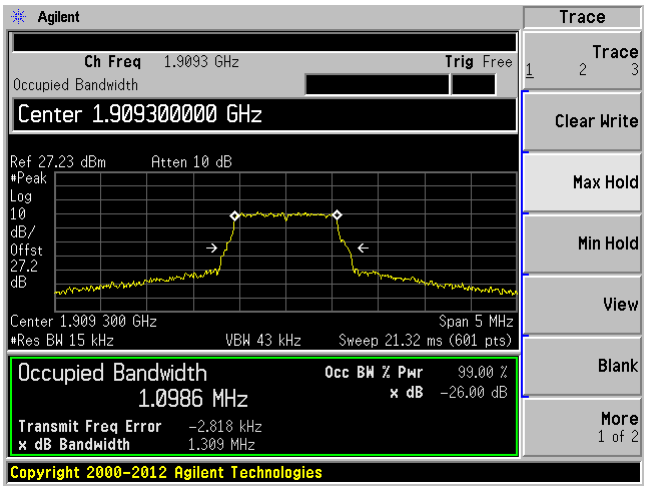
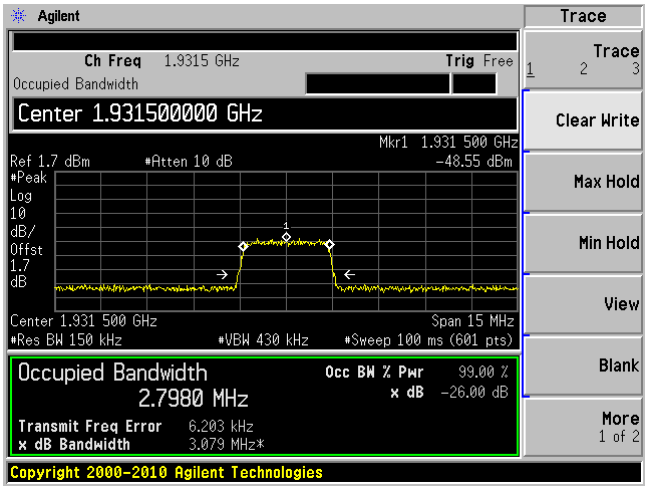


LTE 3MHz 16QAM DL

Low I/P



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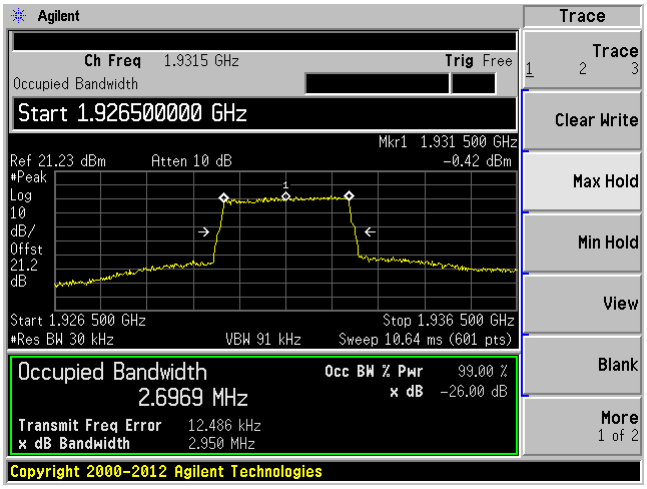

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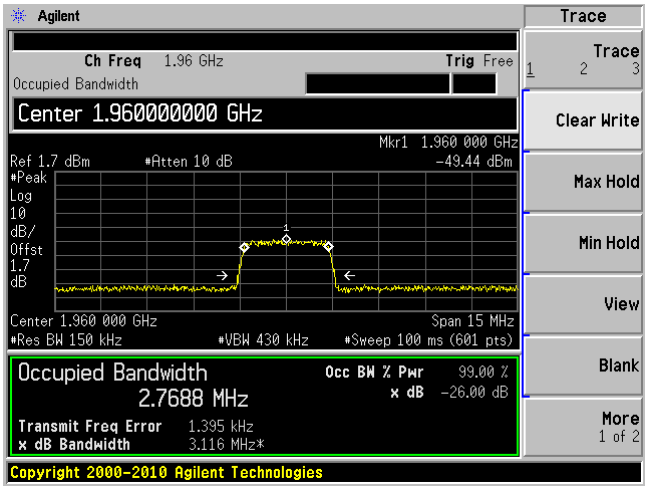
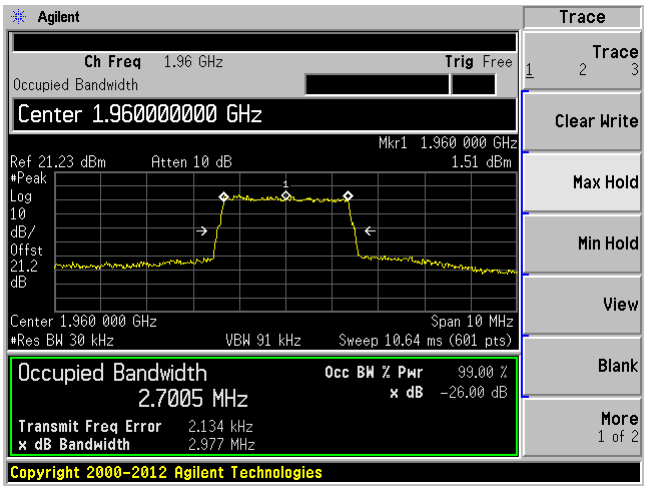


Middle O/P



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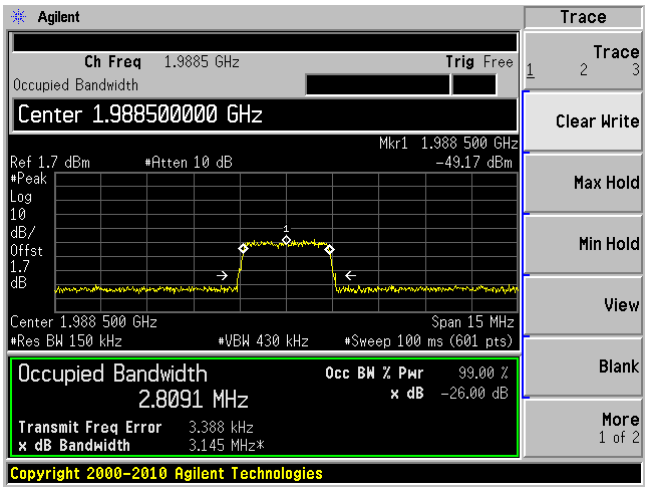

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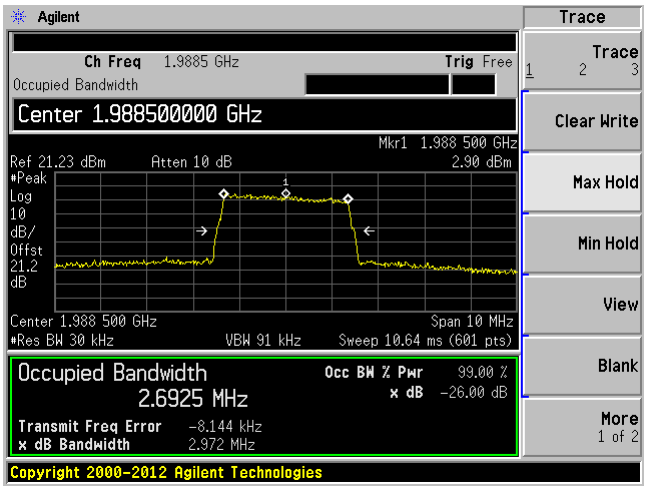
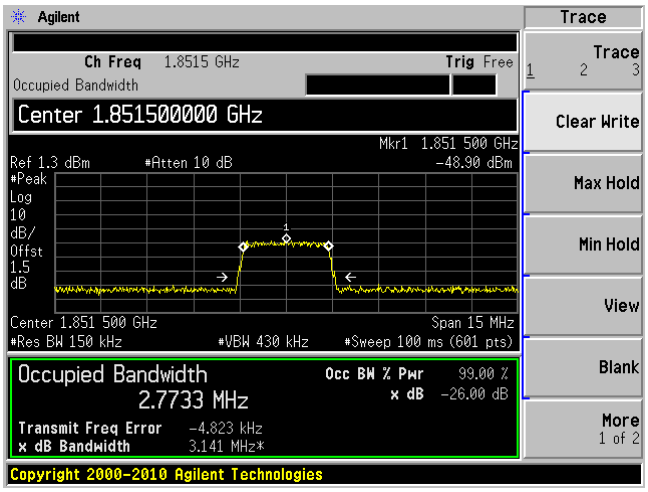


LTE 3MHz 16QAM UL

Low I/P



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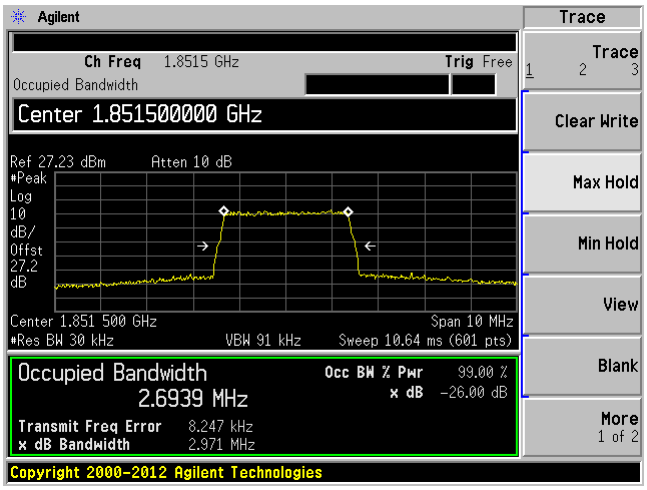

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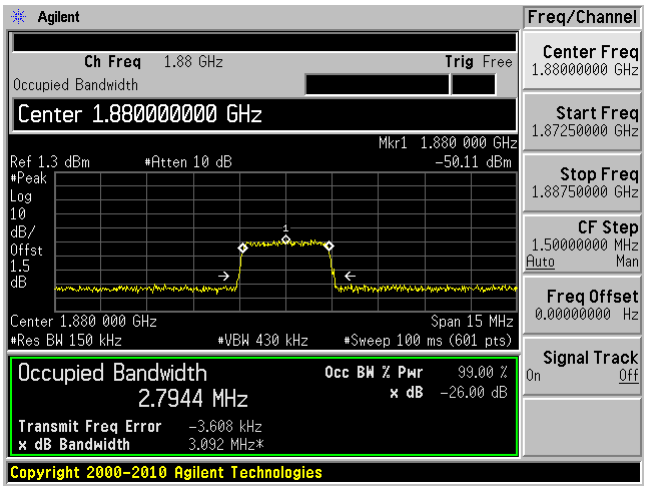

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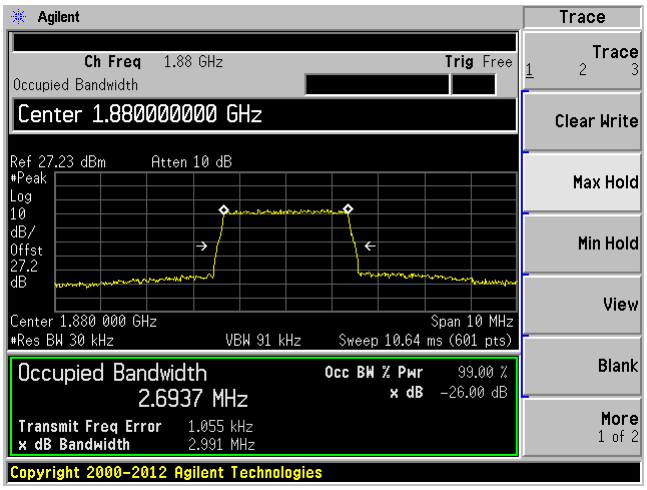

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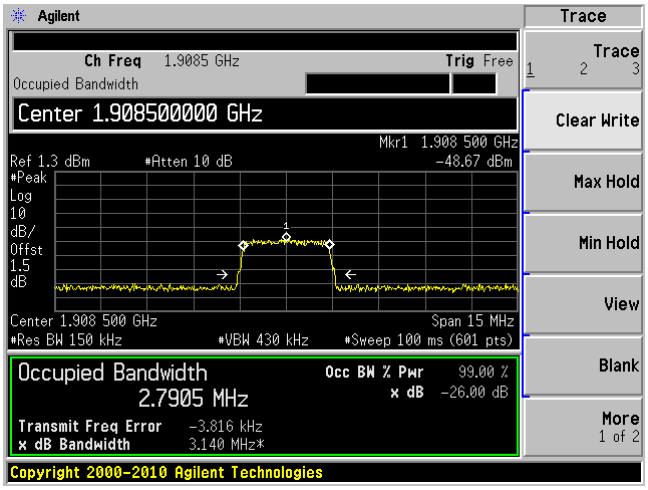

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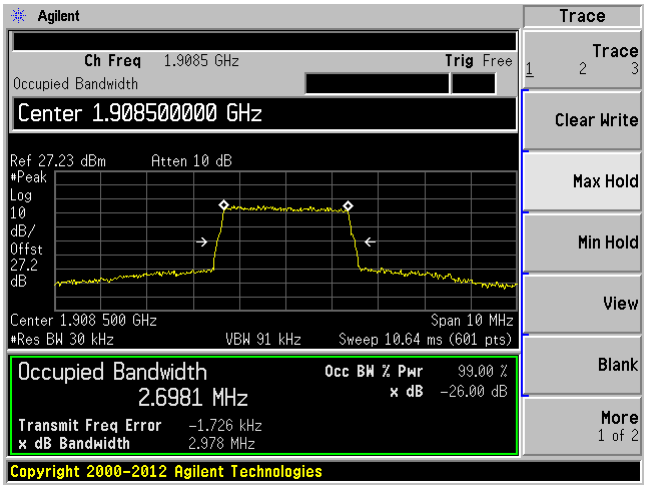
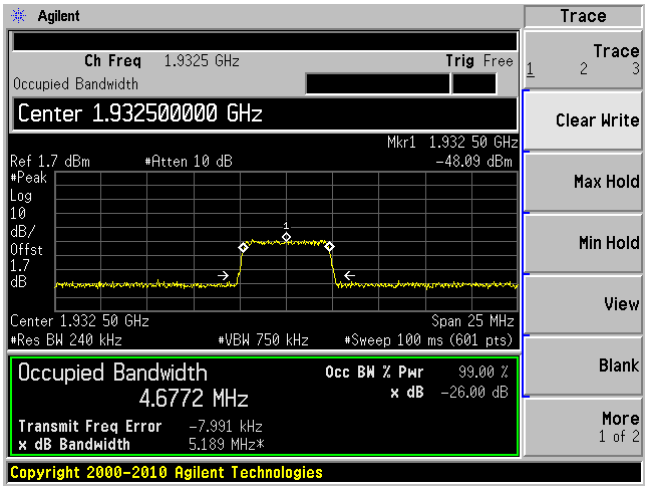


LTE 5MHz 16QAM DL

Low I/P



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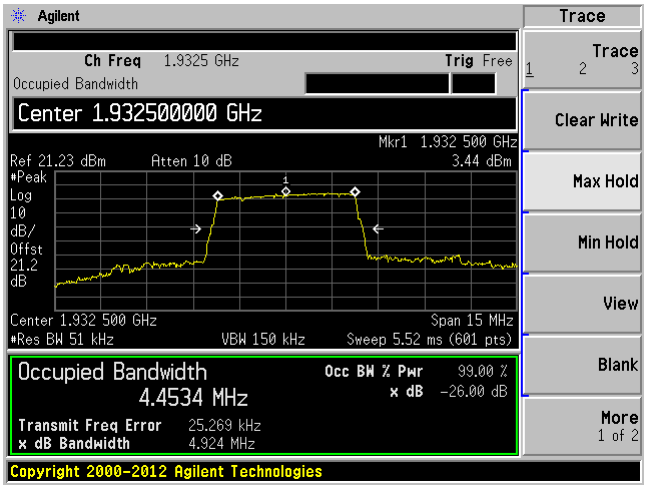

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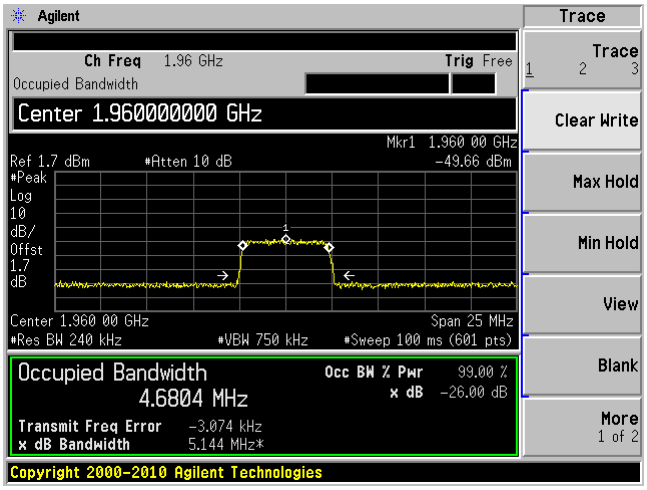

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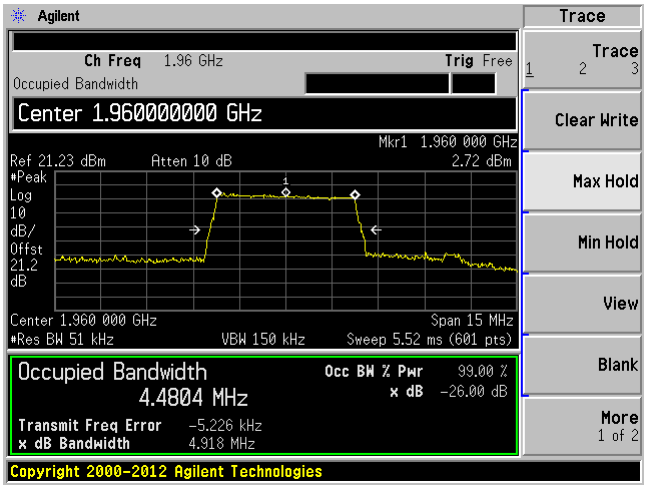

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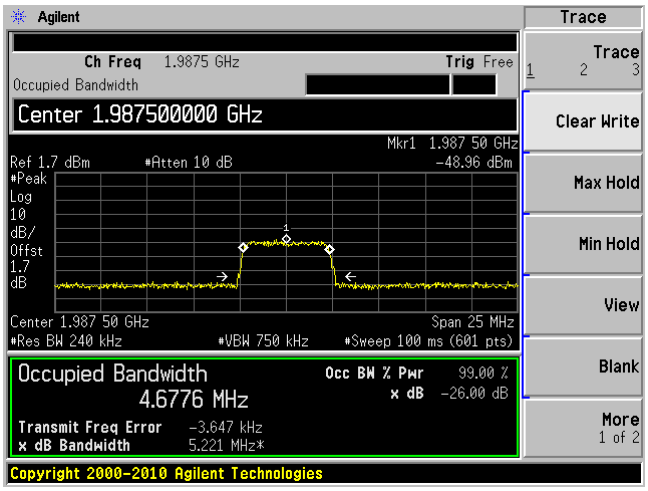

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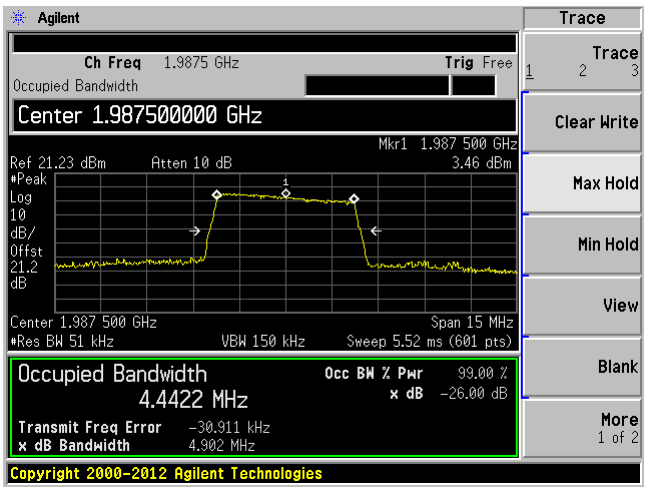
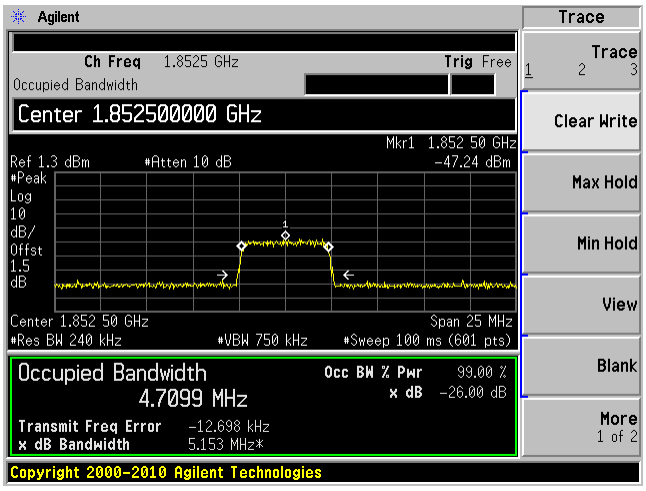
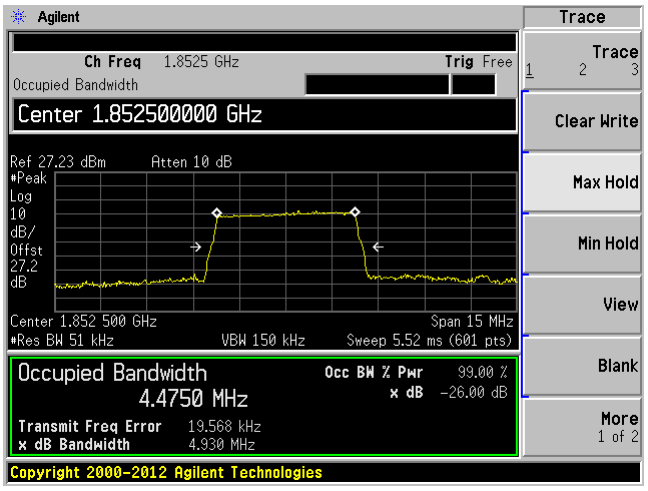


LTE 5MHz 16QAM UL

Low I/P



Low O/P



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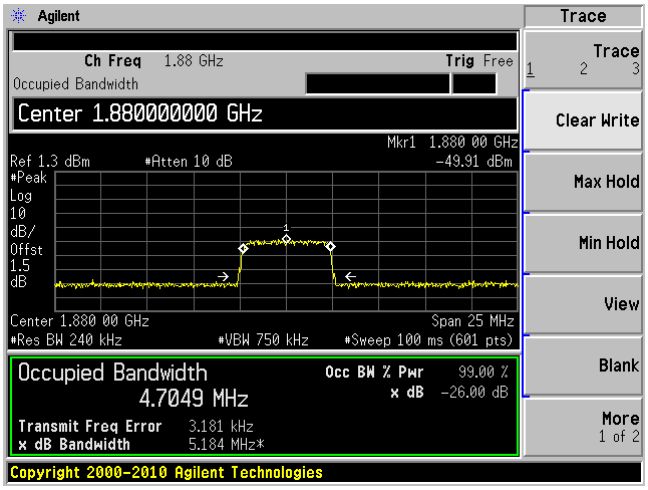

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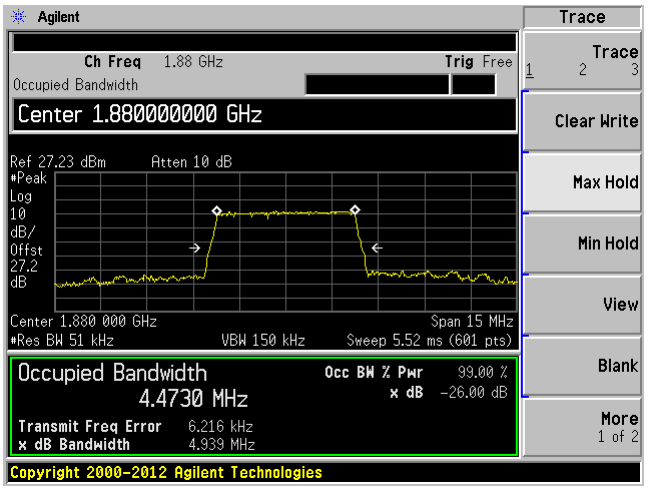

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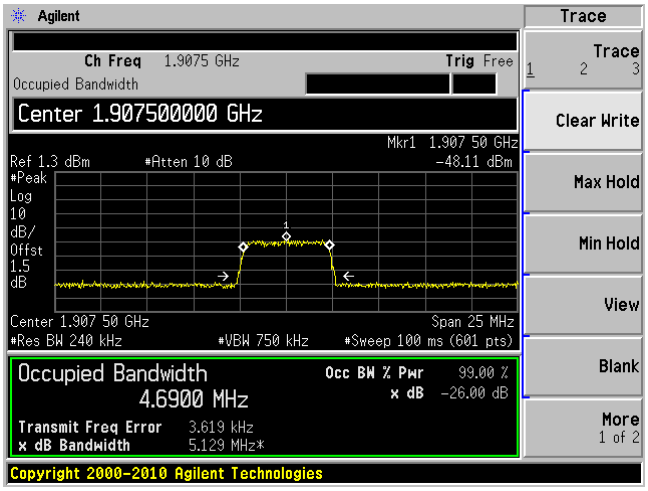

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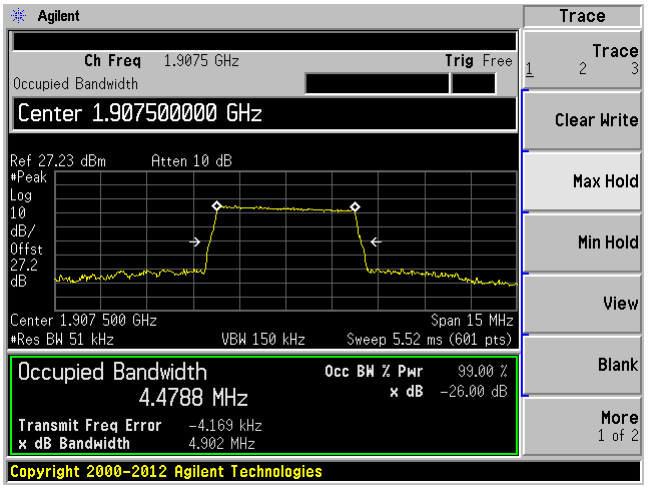
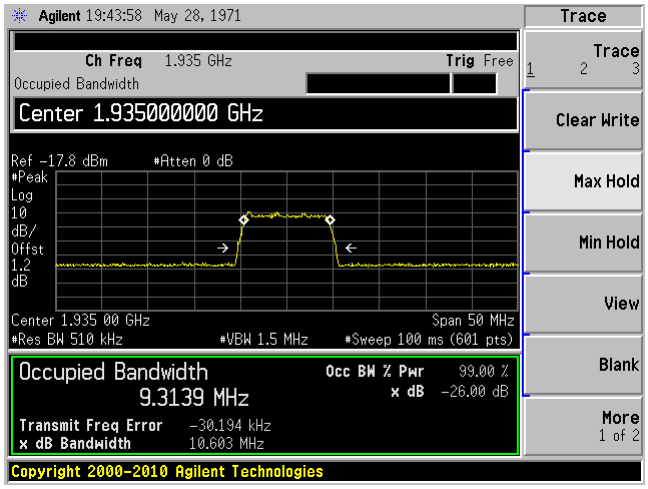
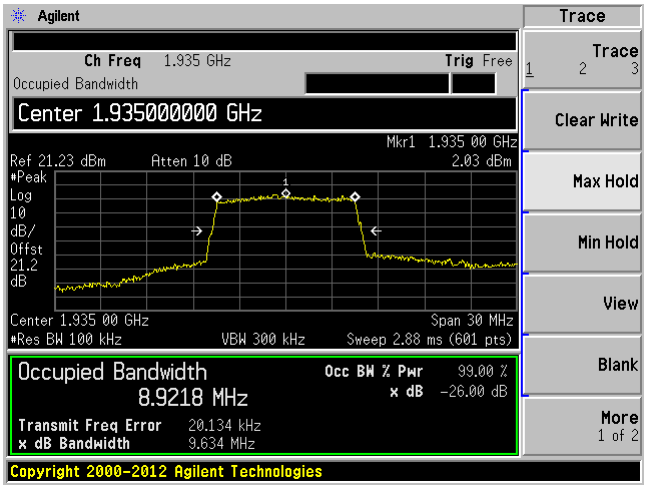


LTE 10MHz 16QAM DL

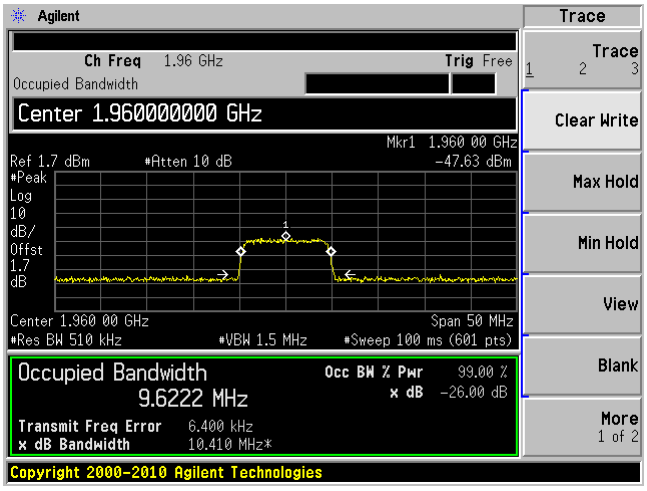
Low I/P



Low O/P



Middle I/P



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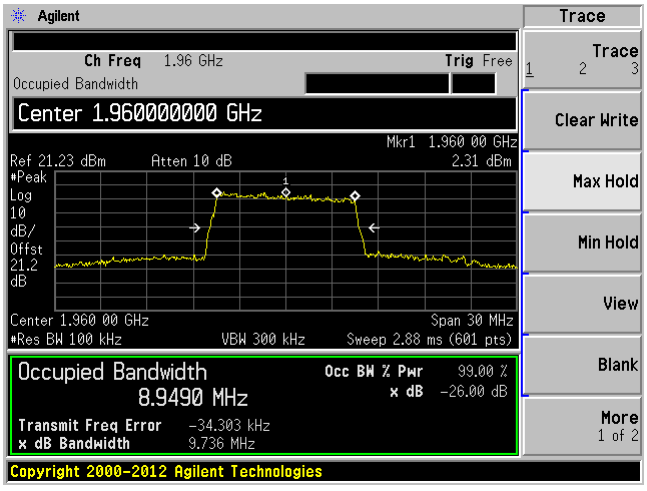

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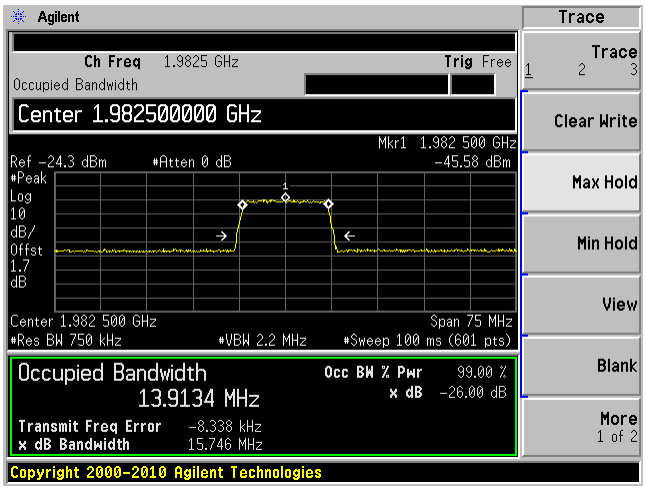

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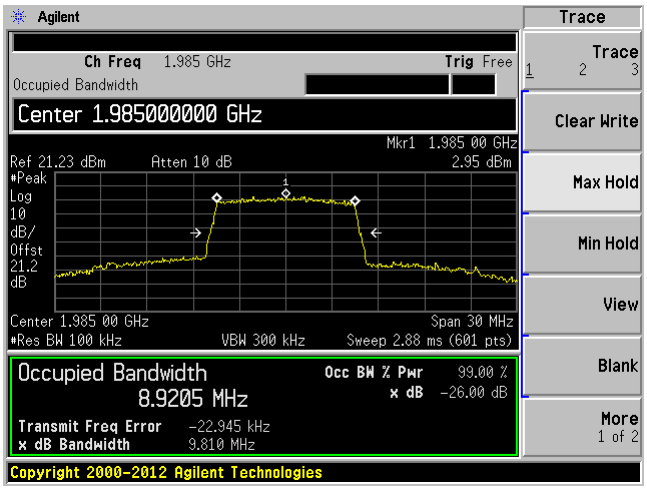
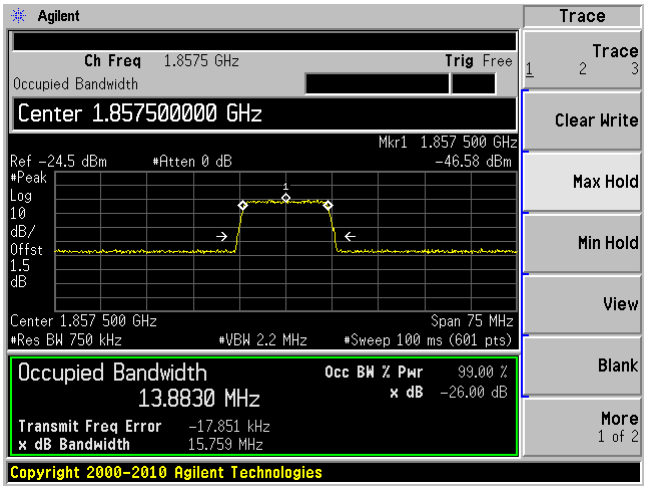


LTE 10MHz 16QAM UL

Low I/P



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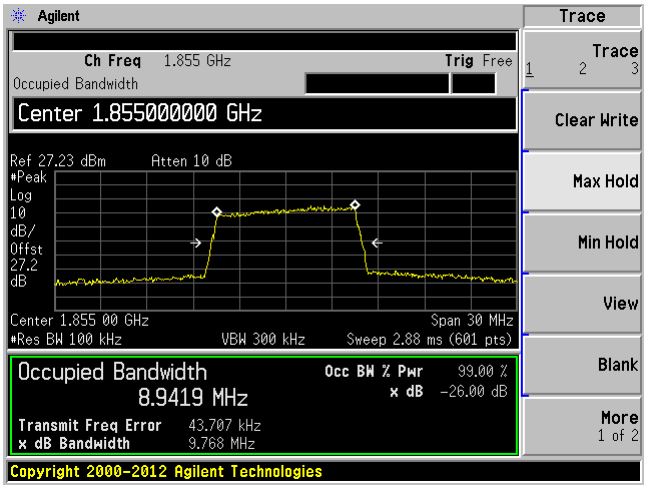

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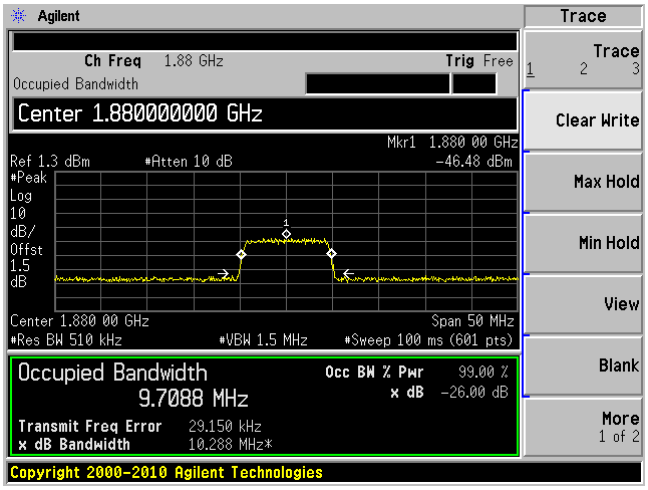

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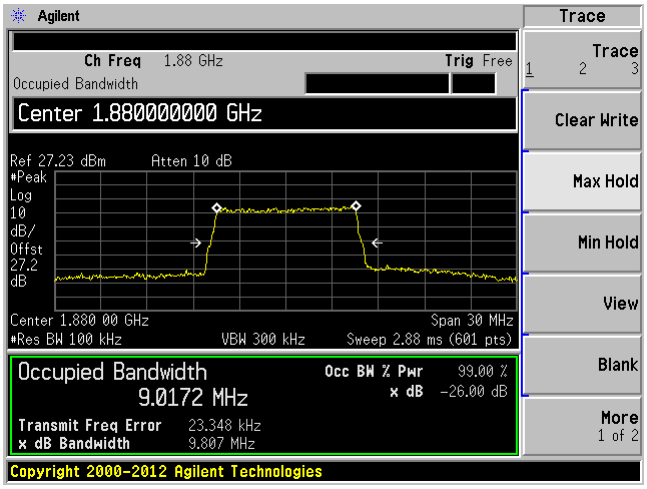

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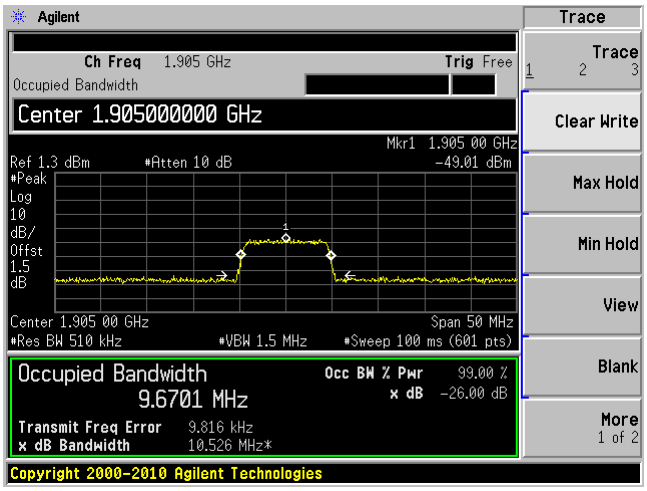

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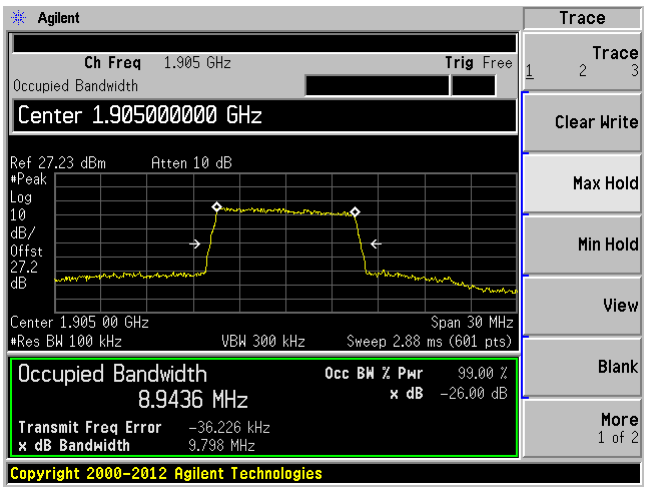

LTE 15MHz 16QAM DL

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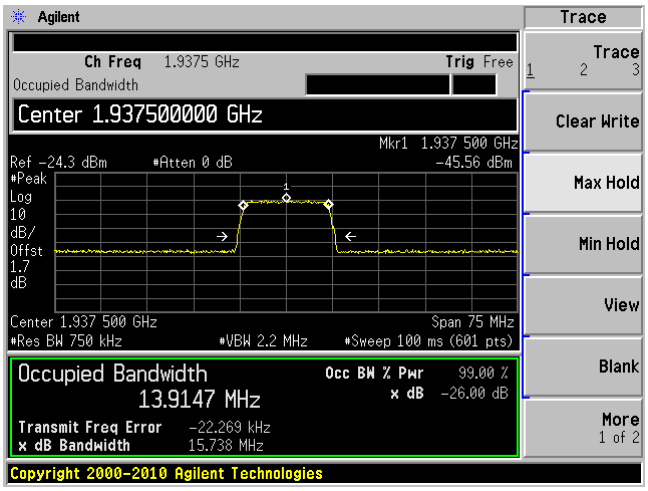

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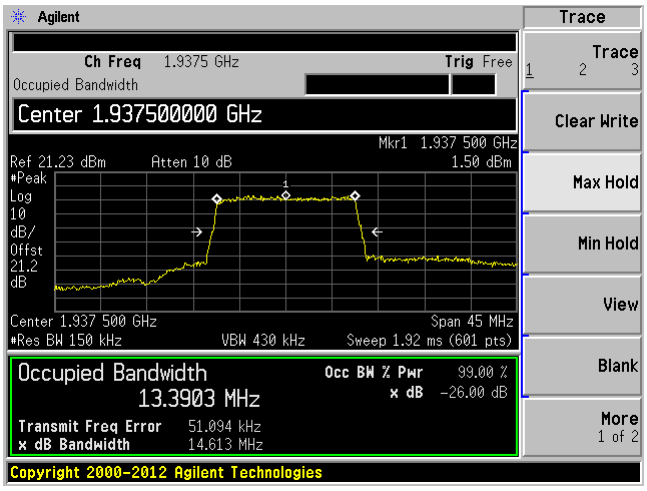

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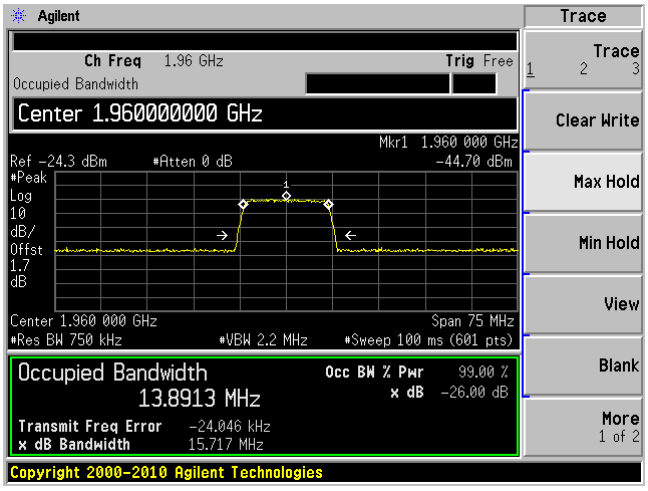

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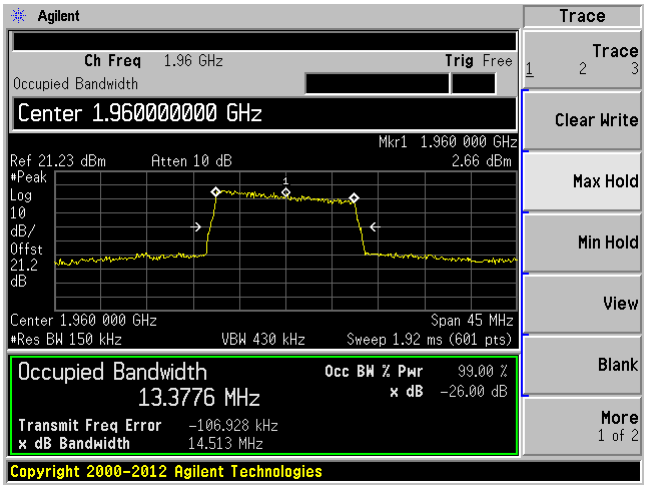

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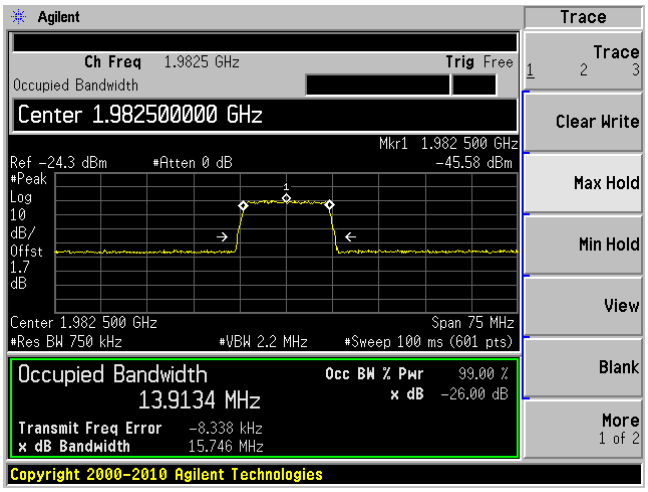

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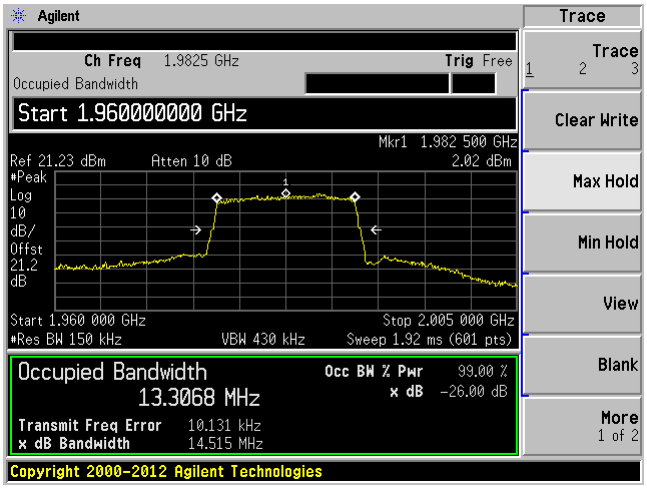
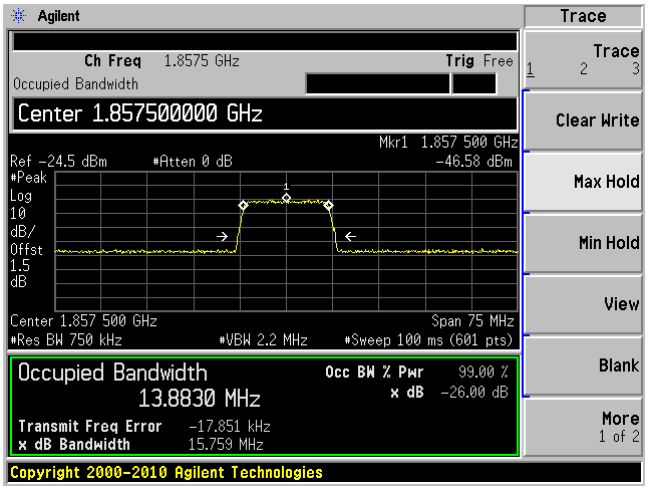


LTE 15MHz 16QAM UL

Low I/P



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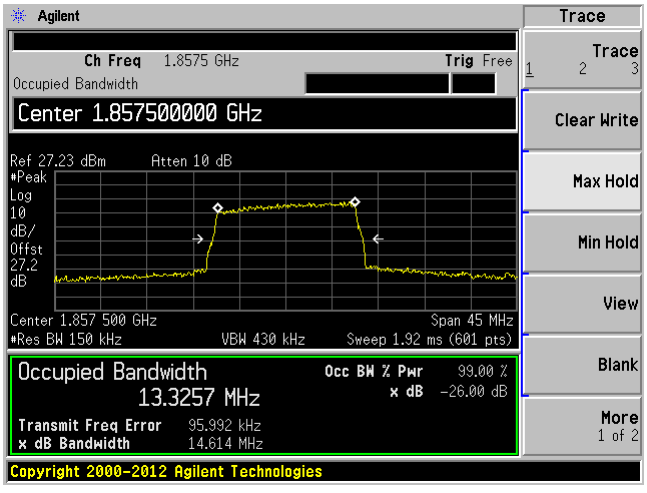

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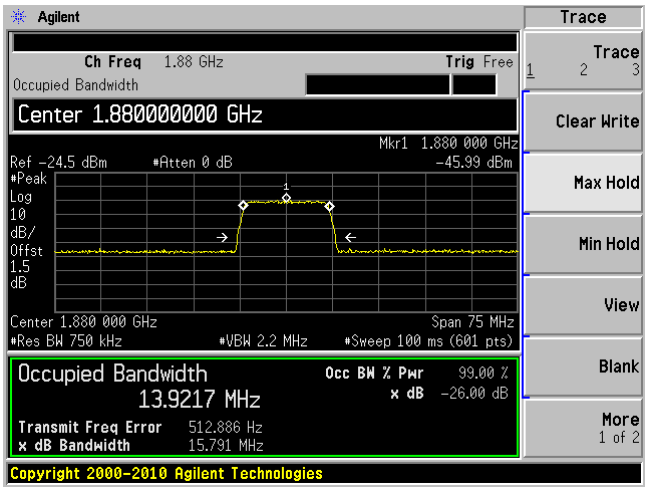

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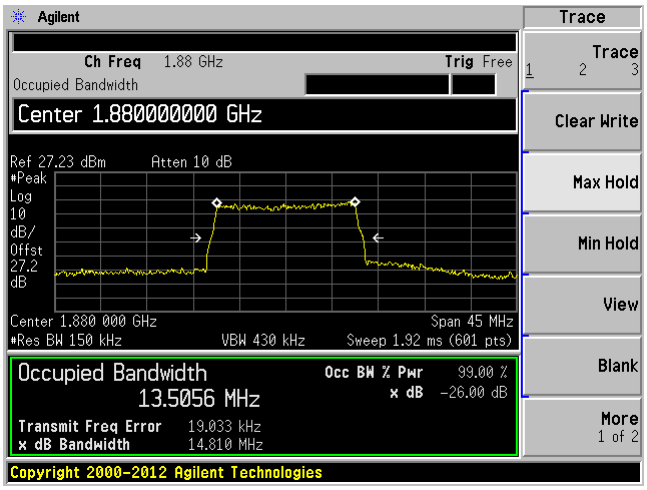

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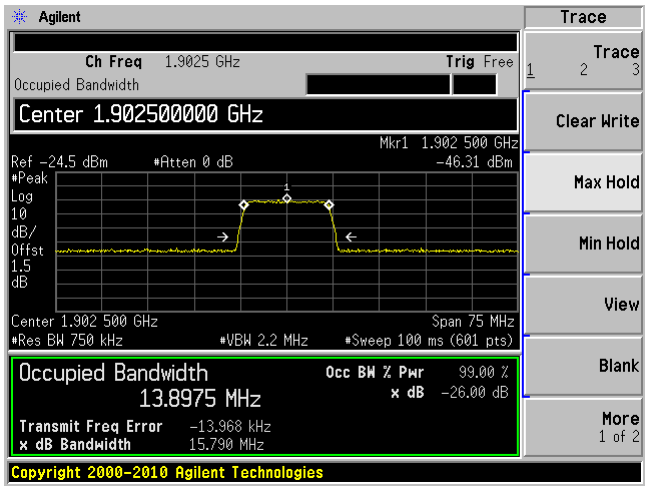

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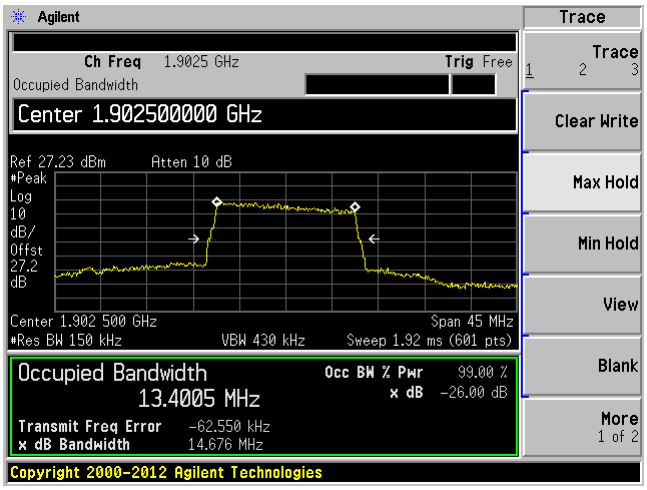
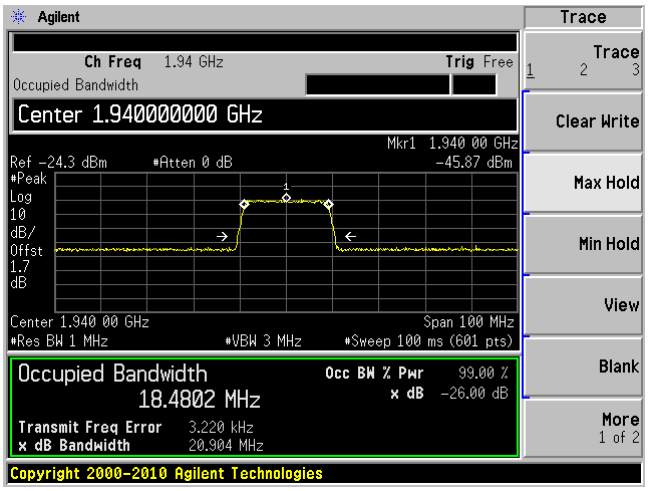


LTE 20MHz 16QAM DL

Low I/P



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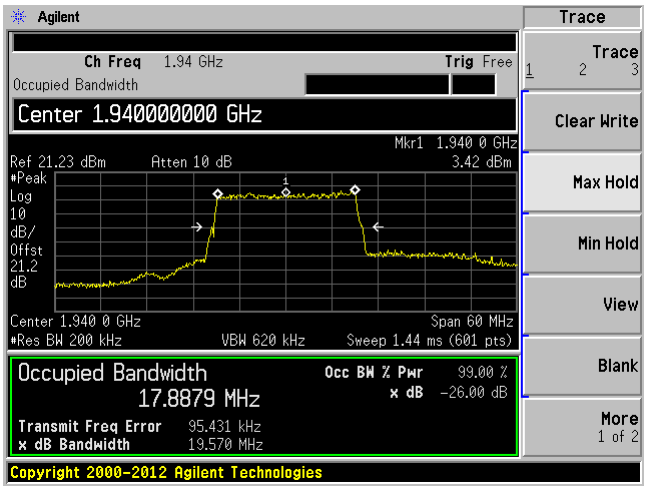

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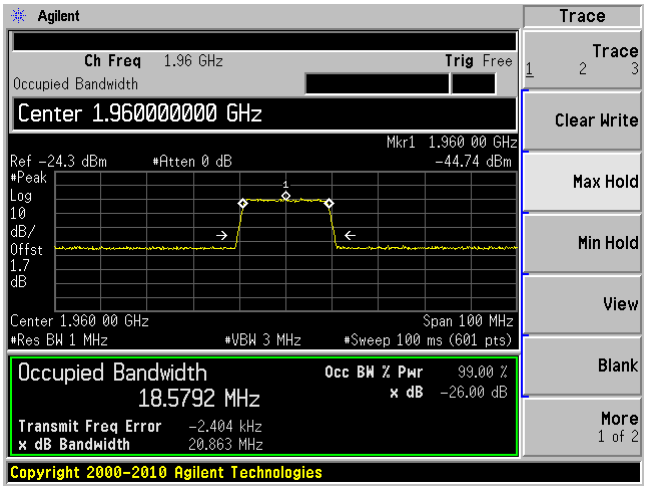

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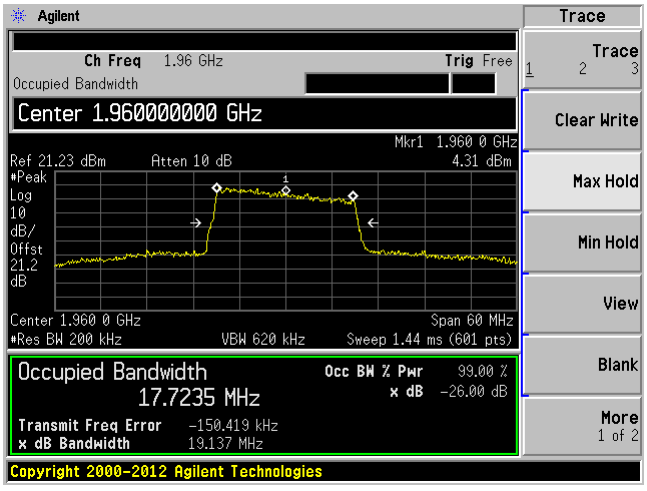

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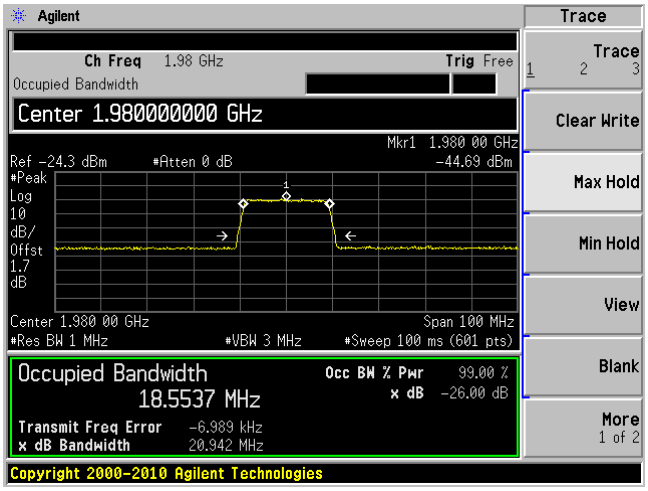

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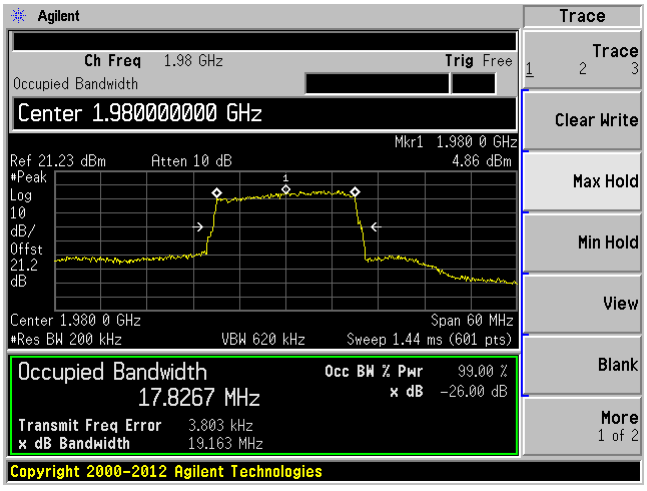
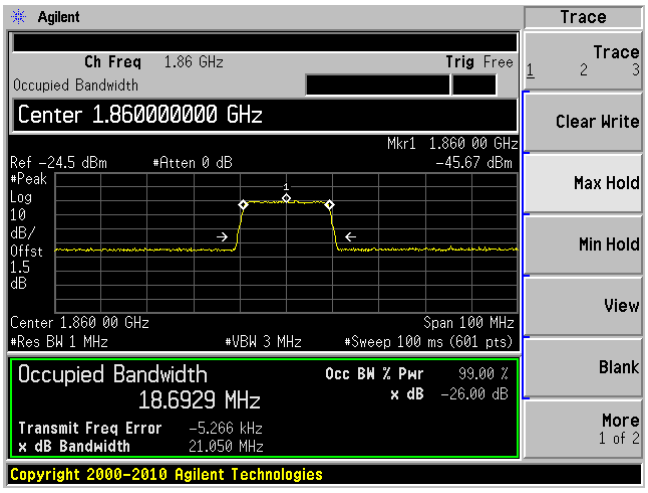


LTE 20MHz 16QAM UL

Low I/P



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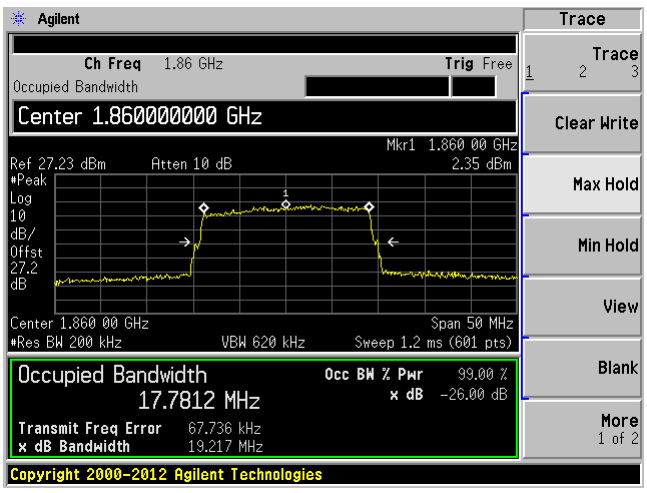

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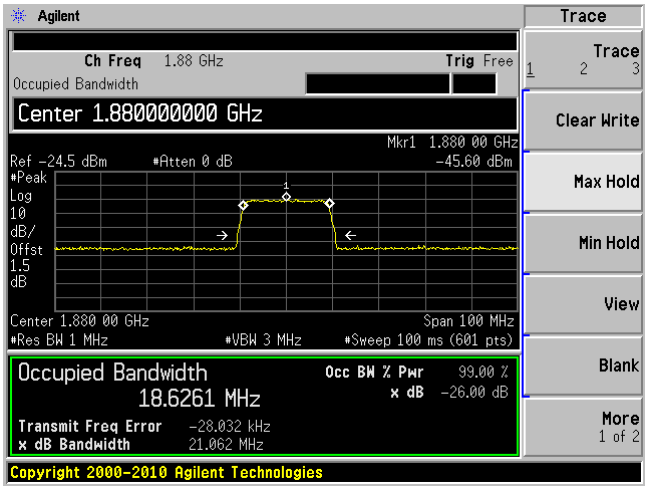

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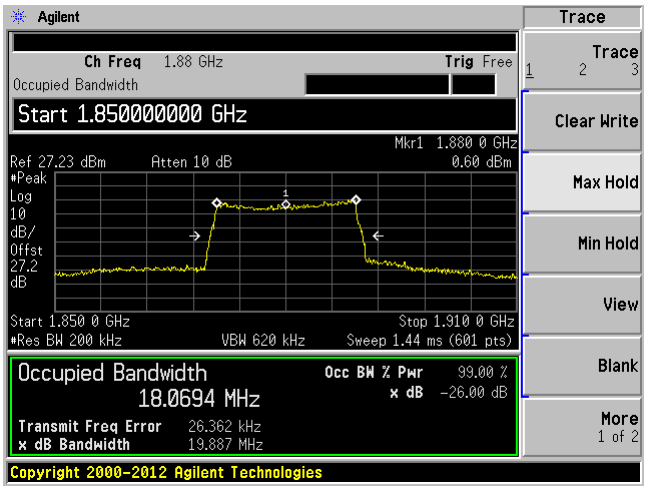

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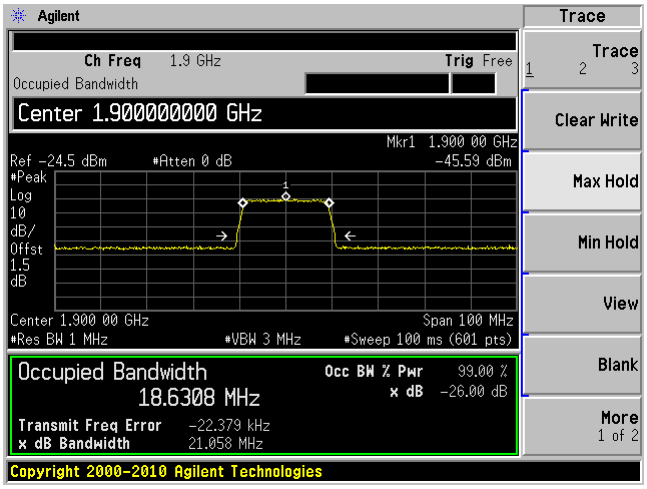

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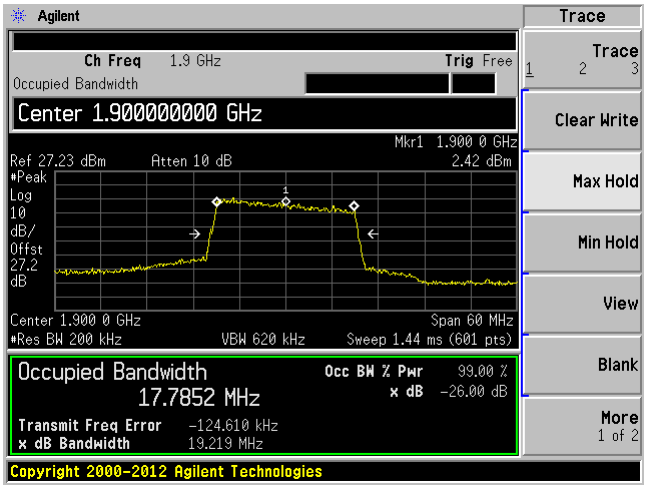
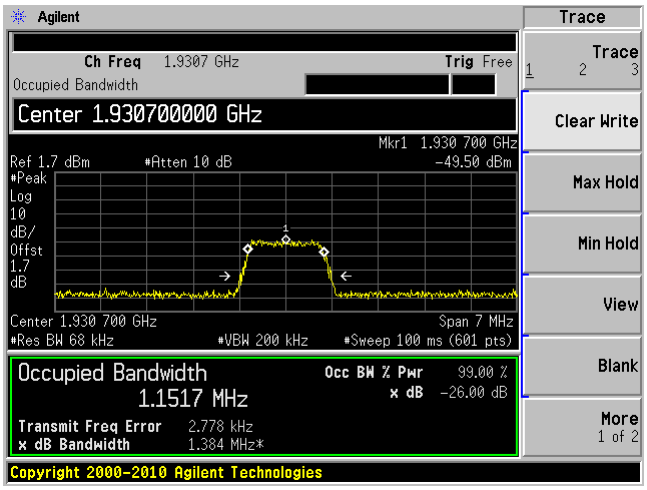


LTE 1.4MHz 64QAM DL

Low I/P



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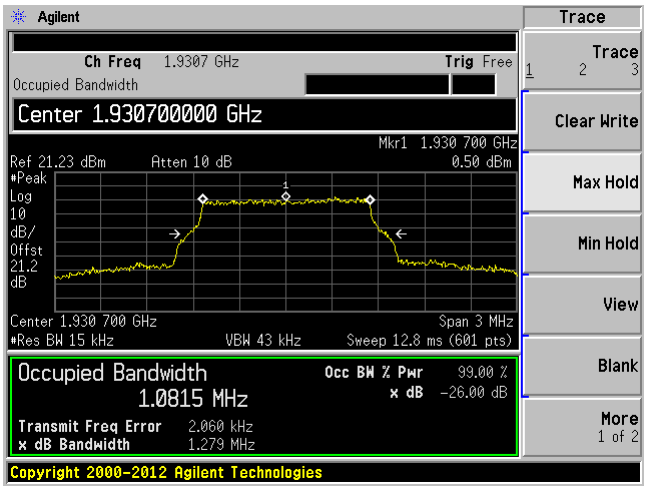

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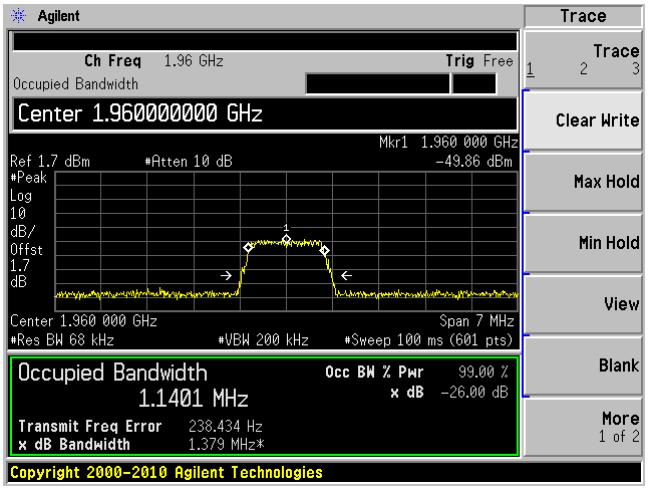

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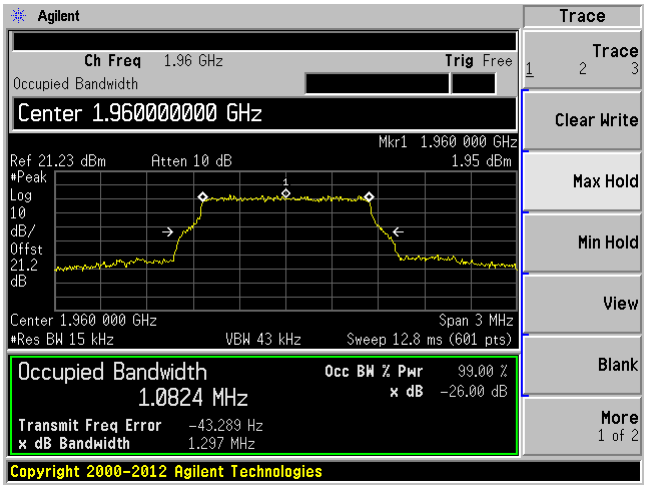

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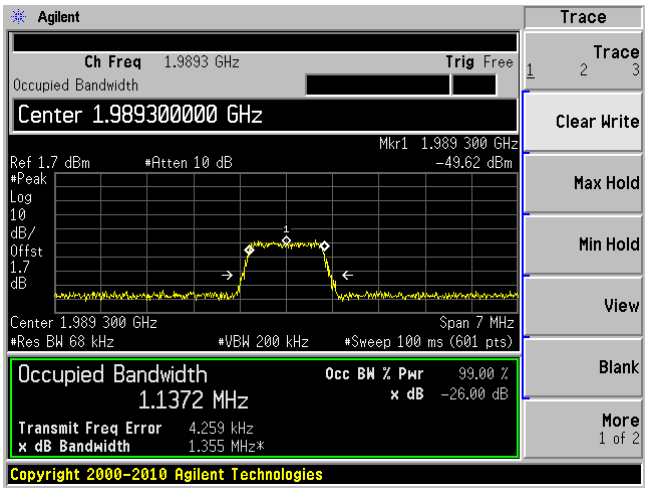

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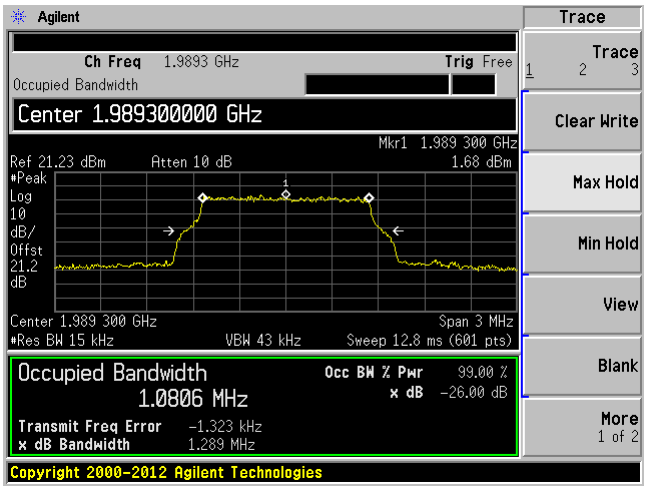
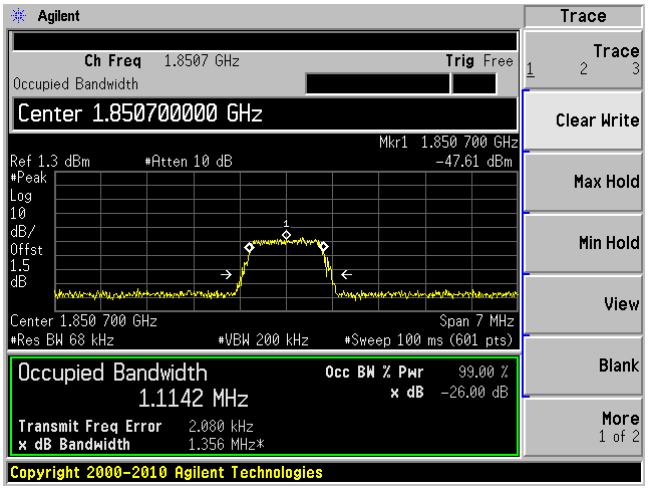


LTE 1.4MHz 64QAM UL

Low I/P



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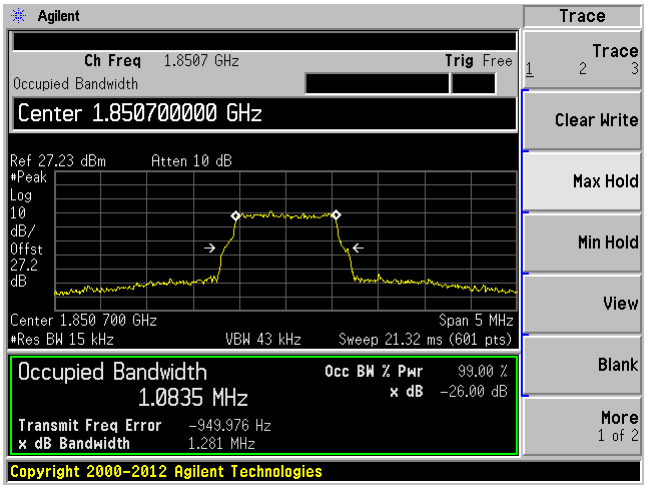

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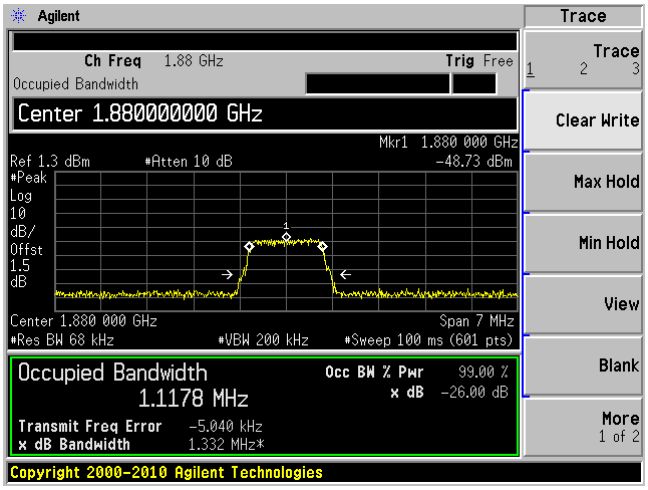

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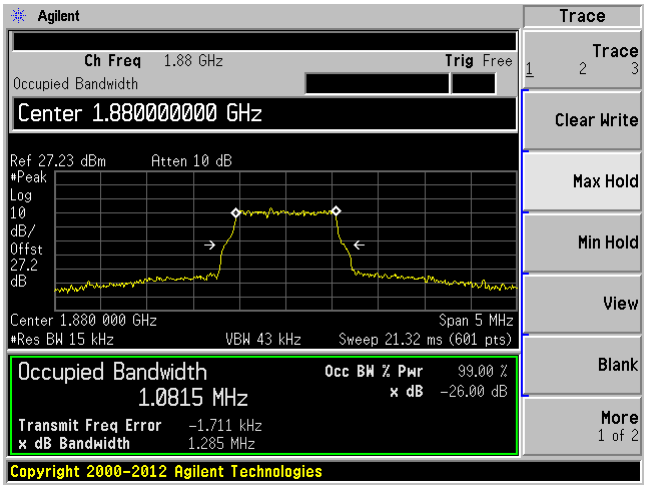

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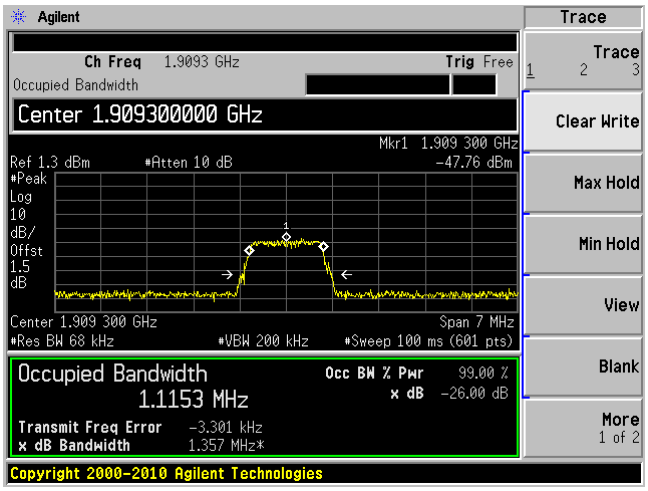

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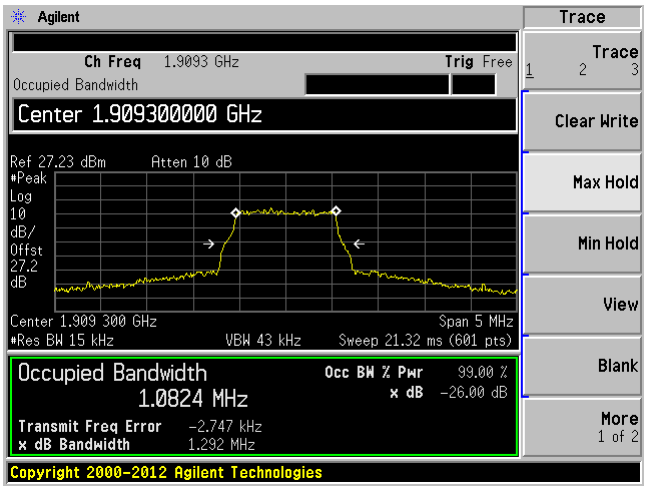
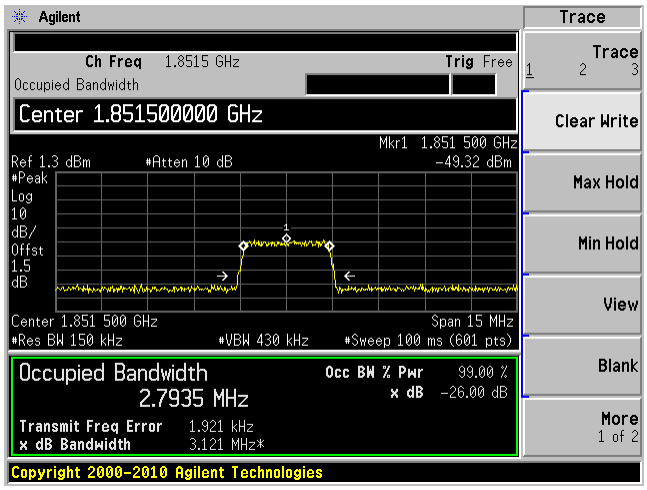


LTE 3MHz 64QAM UL

Low I/P



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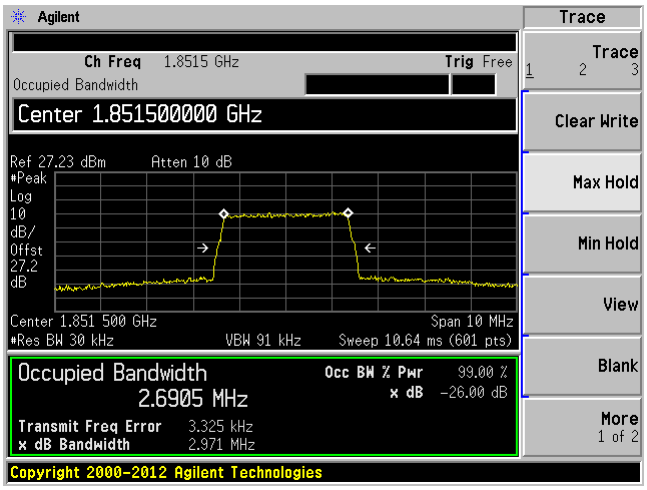

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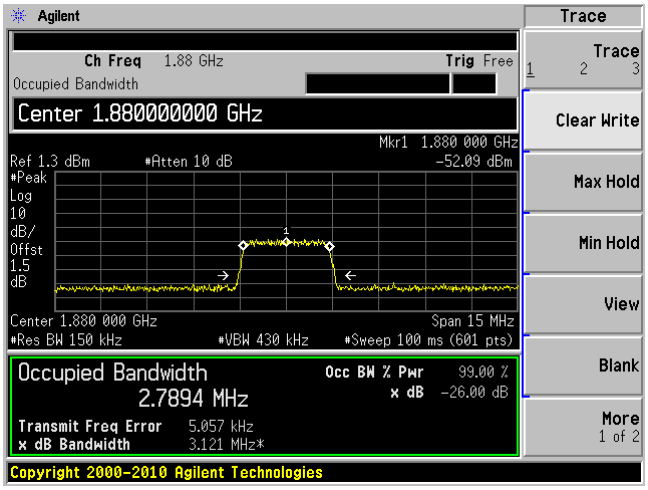

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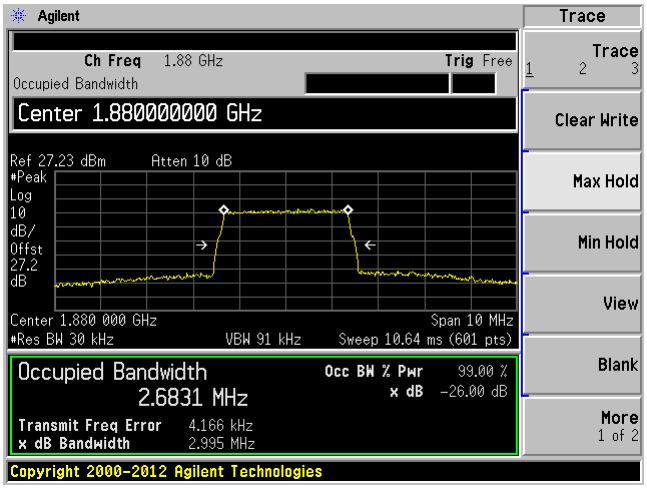

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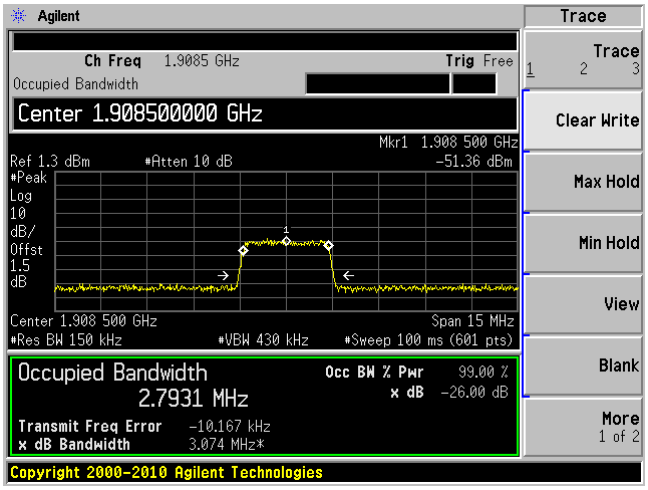

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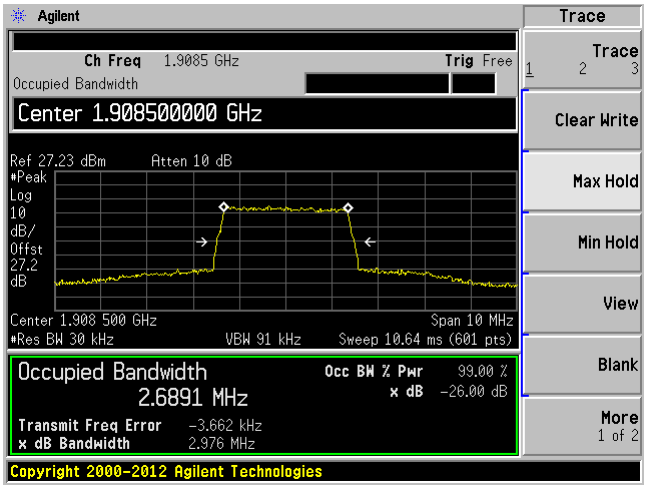
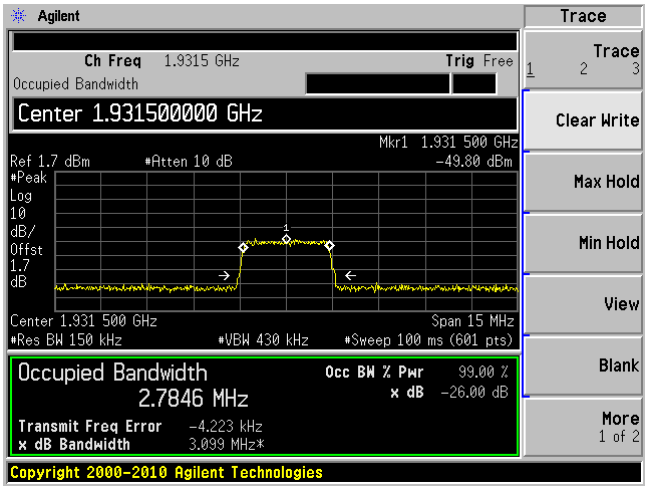
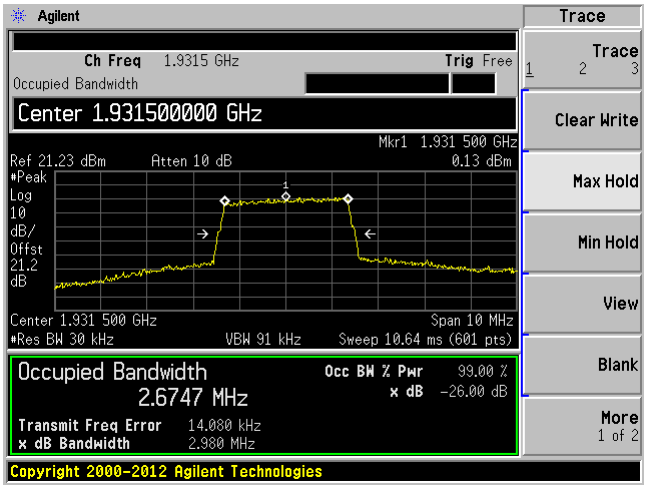


LTE 3MHz 64QAM DL

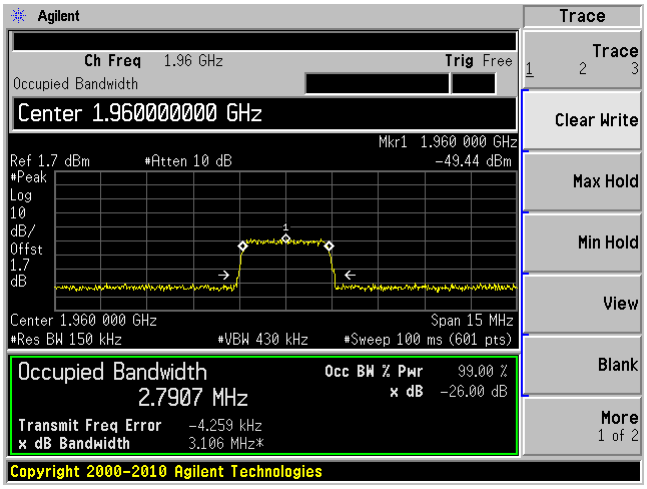
Low I/P



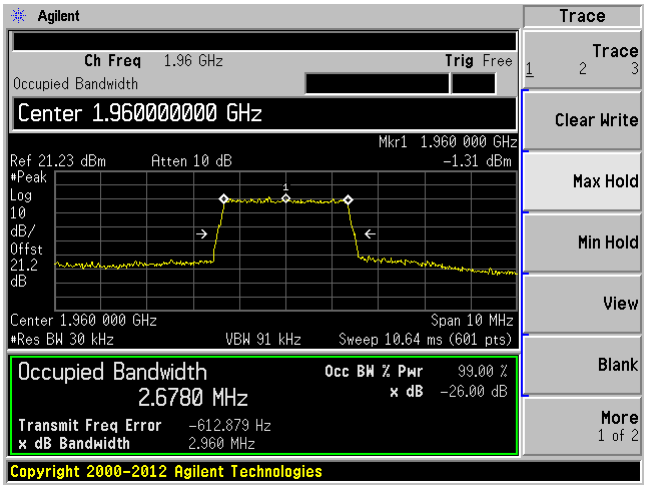
Low O/P



Middle I/P



Middle O/P



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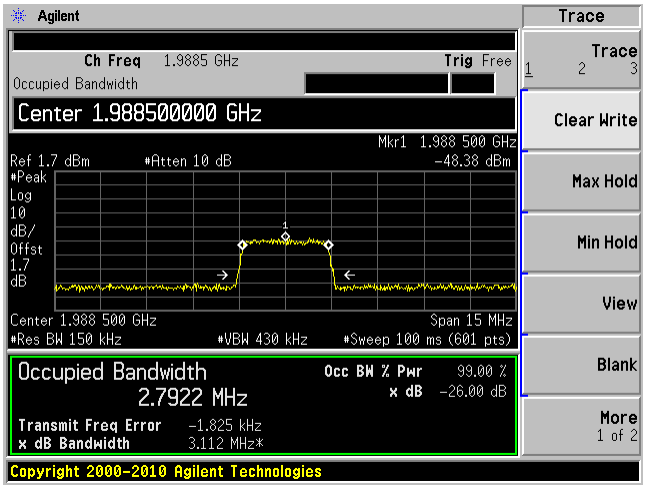
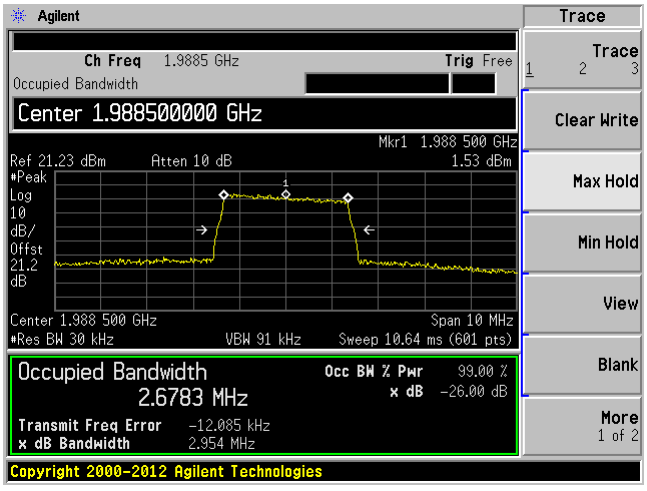


High O/P



LTE 5MHz 64QAM DL

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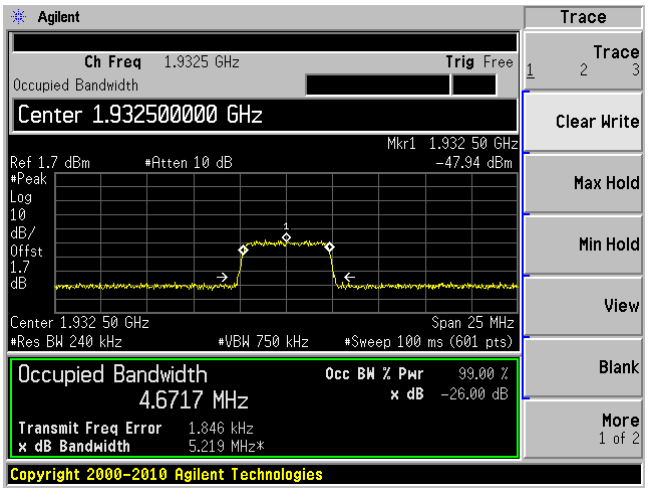

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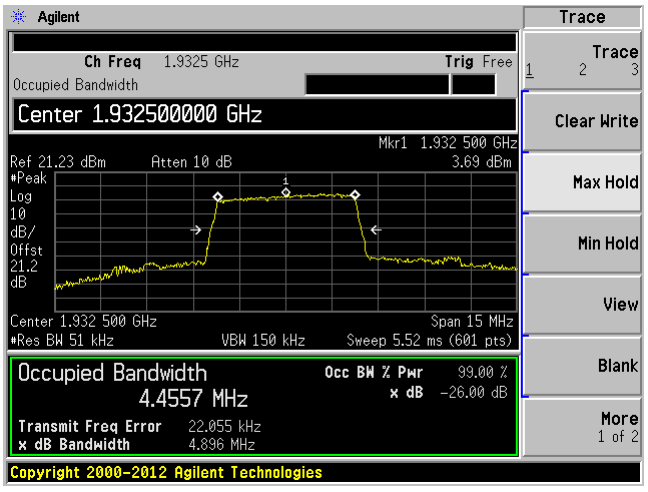

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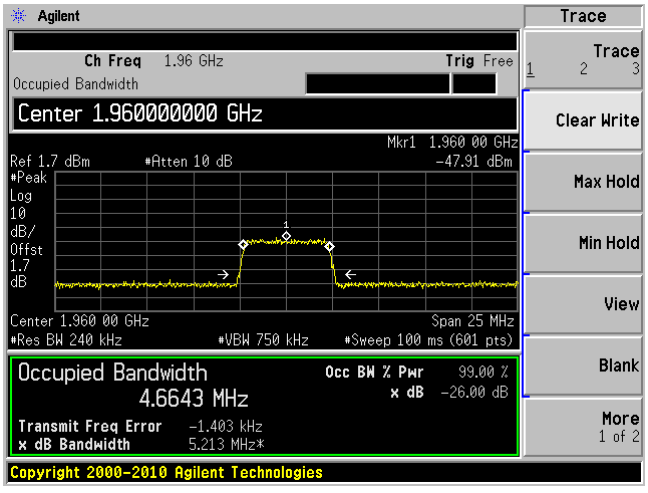

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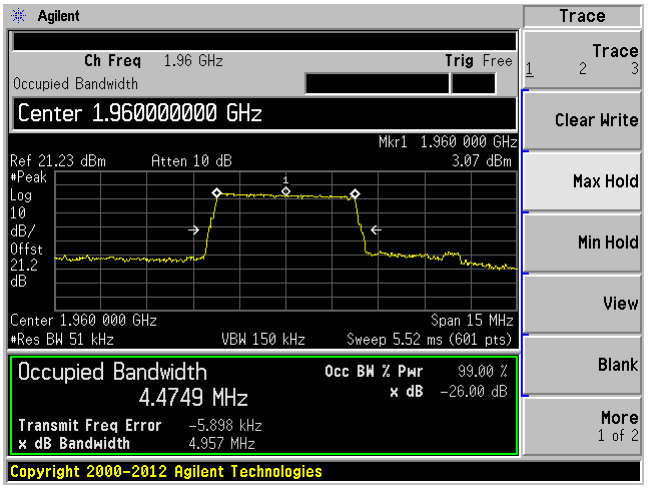

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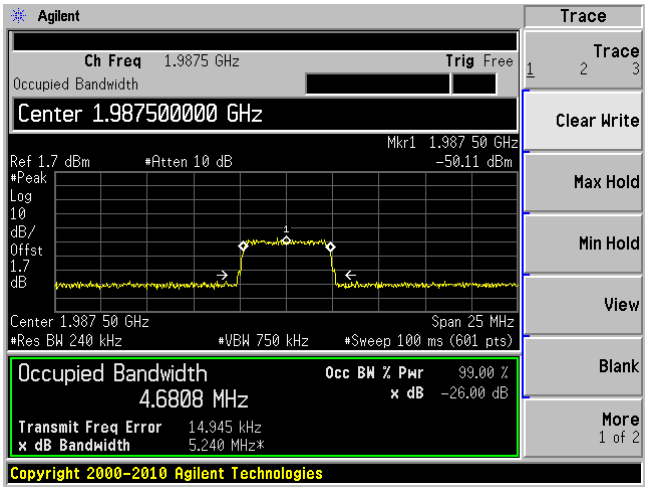

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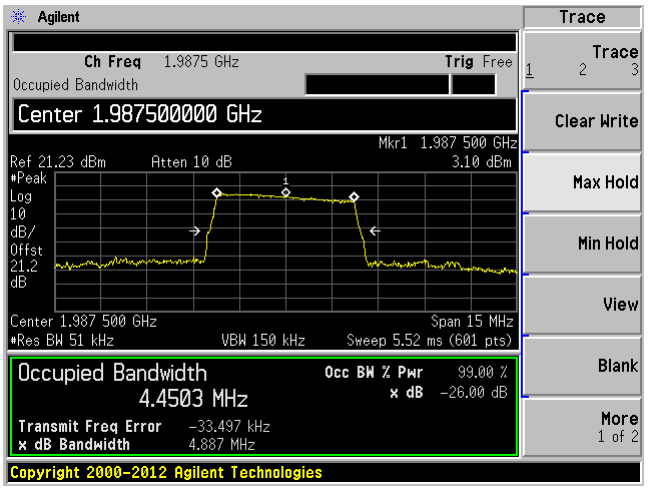
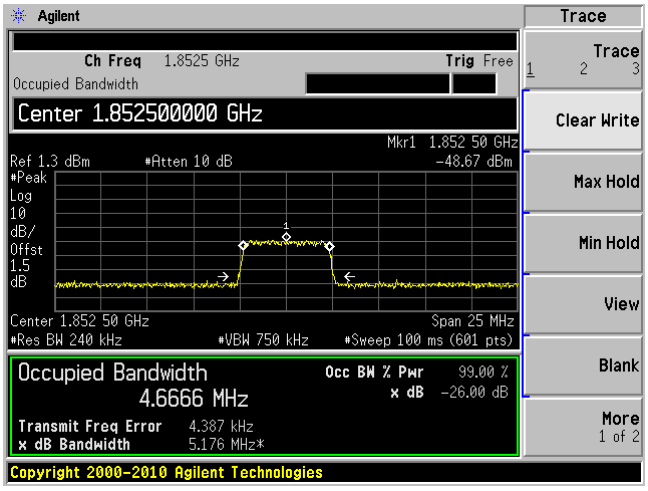


LTE 5MHz 64QAM UL

Low I/P



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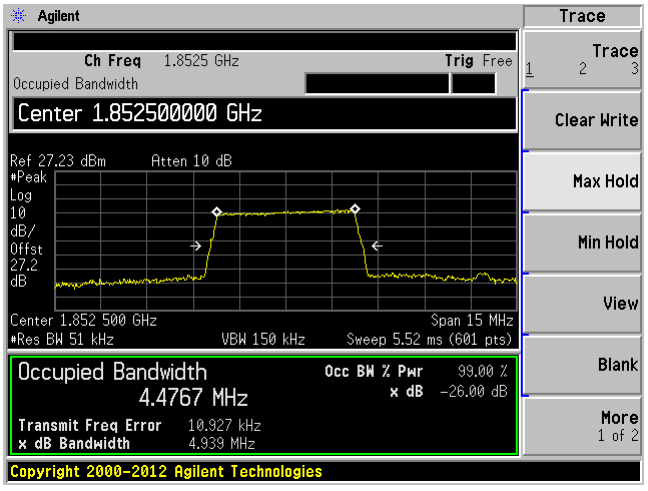

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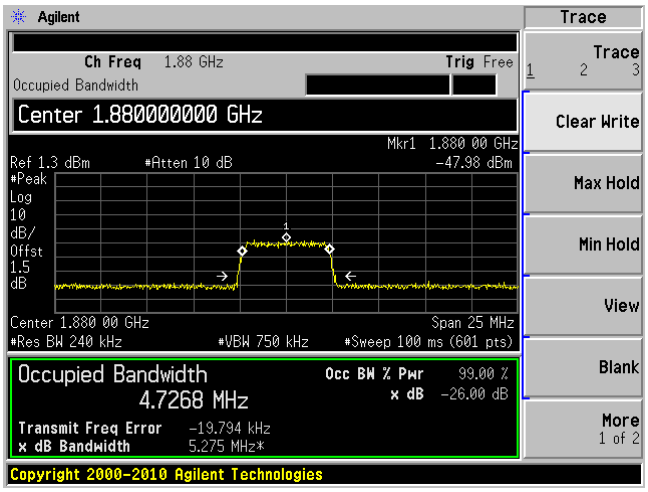

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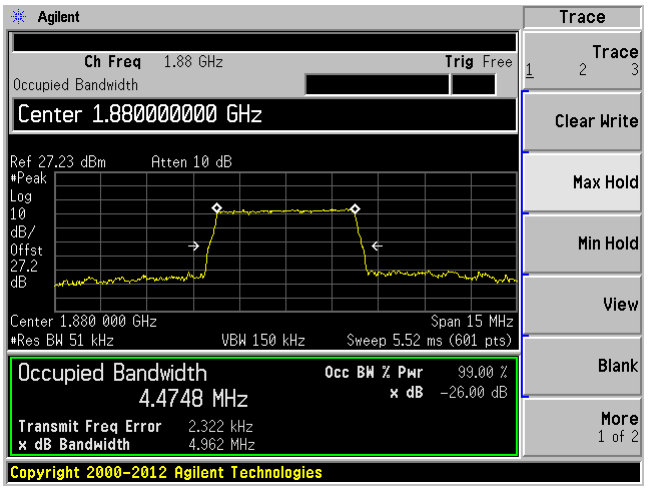

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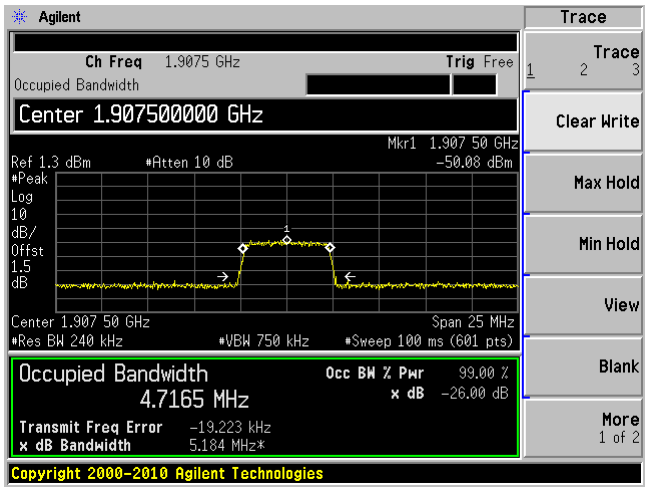

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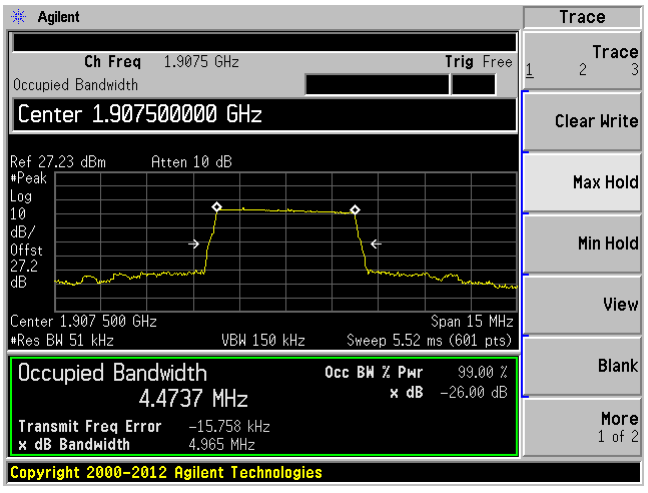
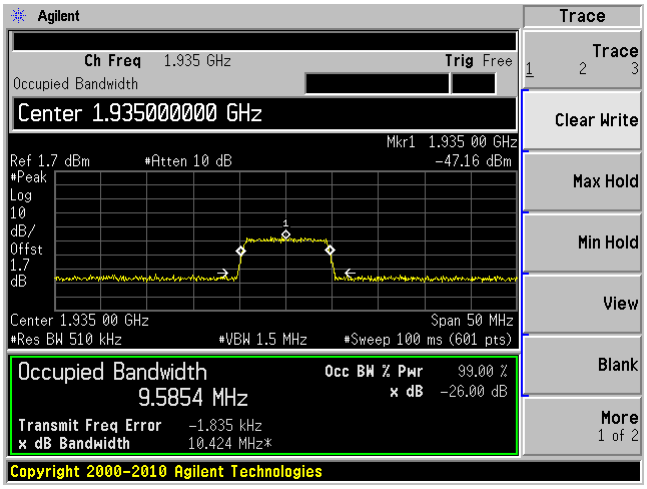


LTE 10MHz 64QAM DL

Low I/P



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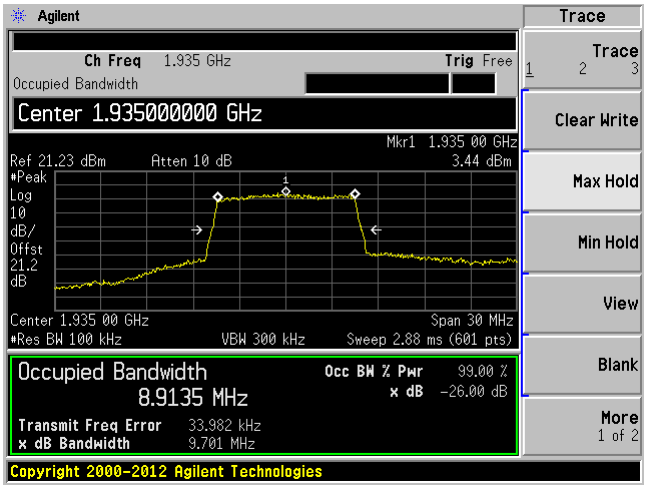

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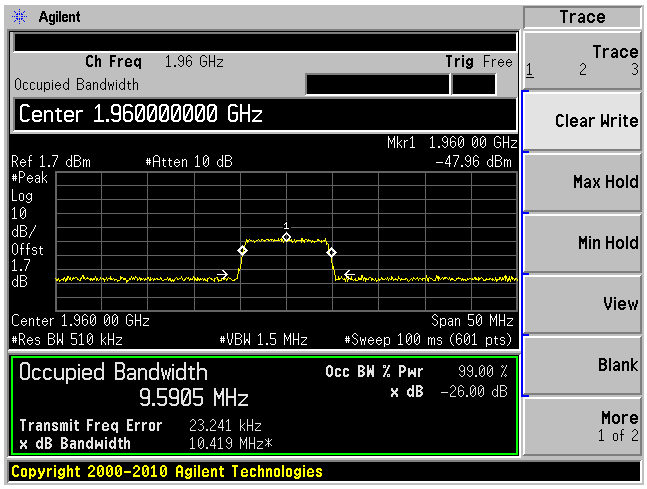

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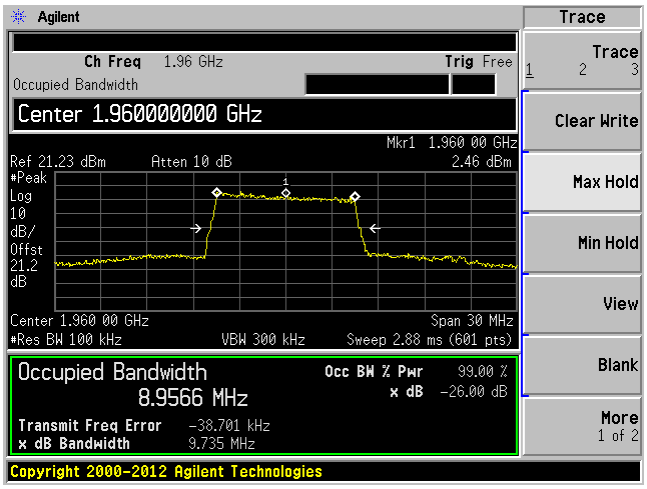

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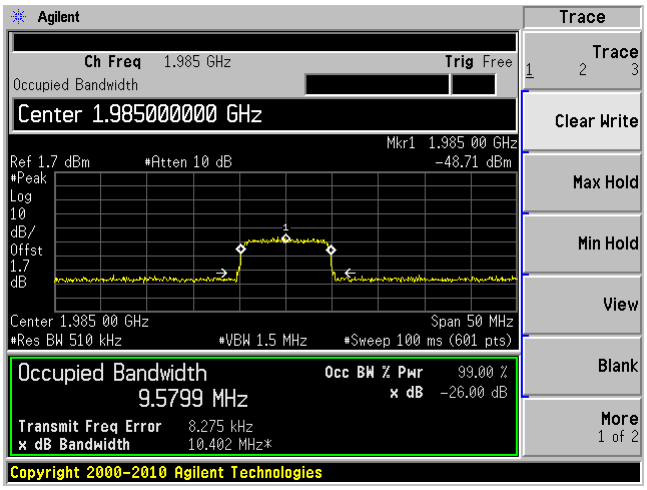

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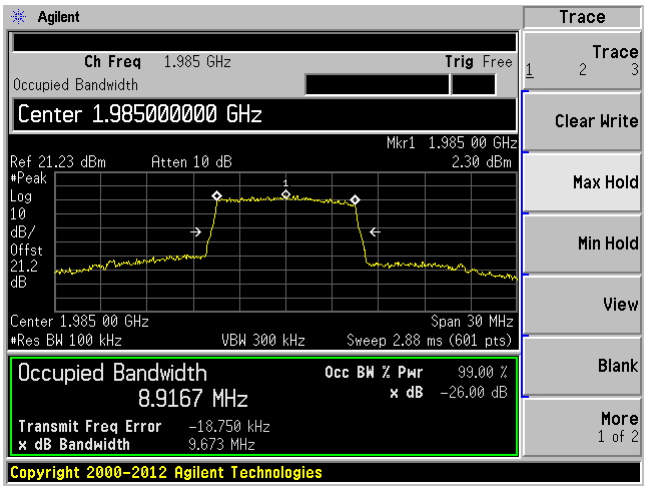
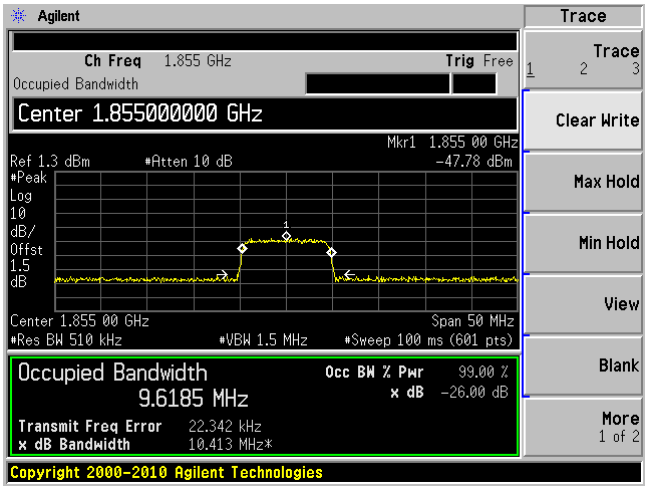


LTE 10MHz 64QAM UL

Low I/P



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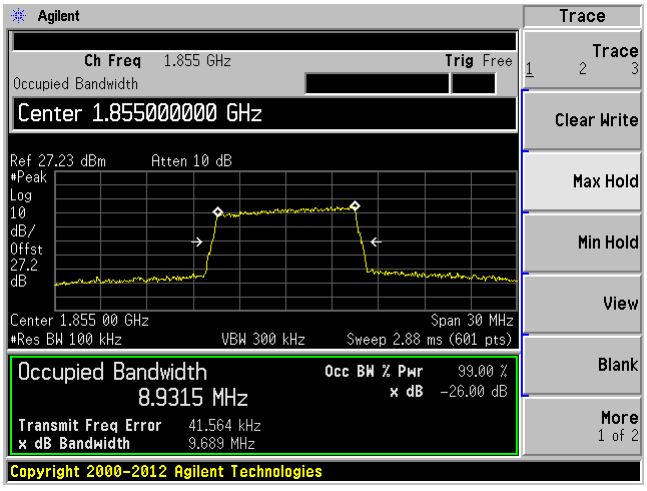

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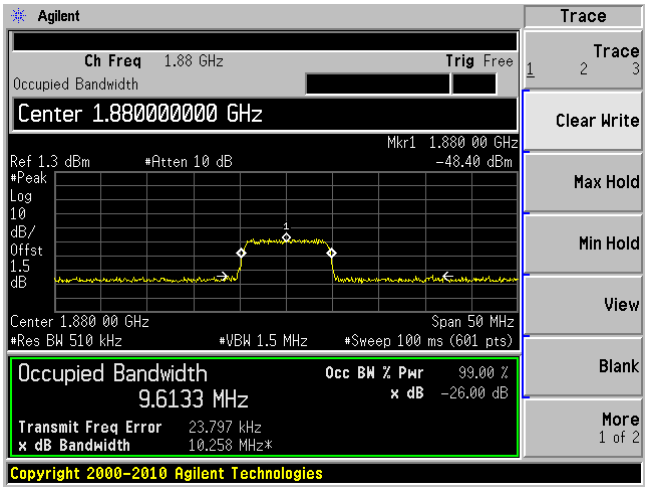

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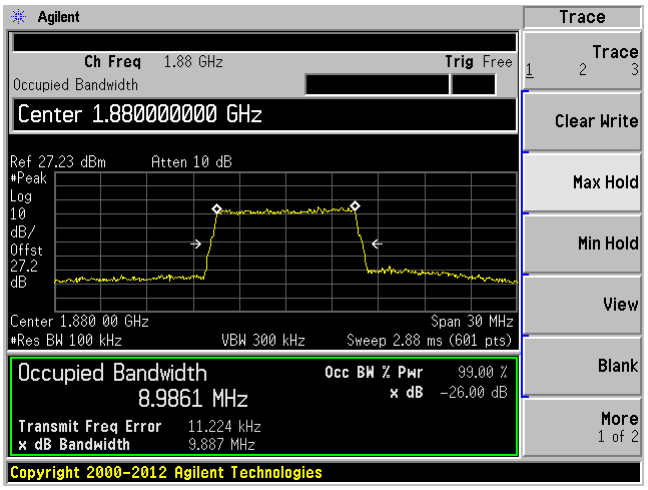

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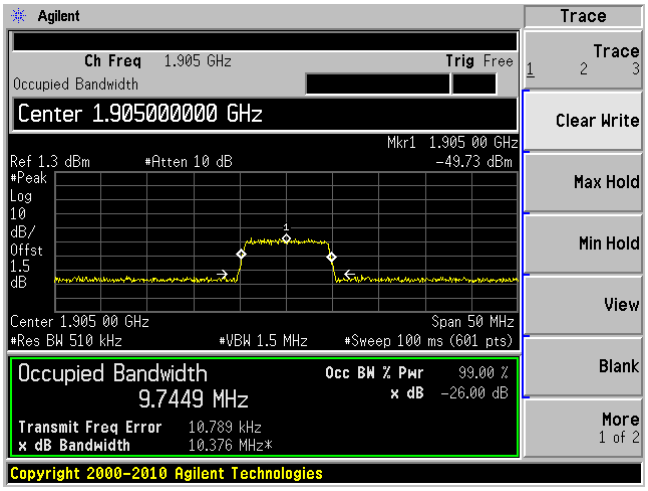

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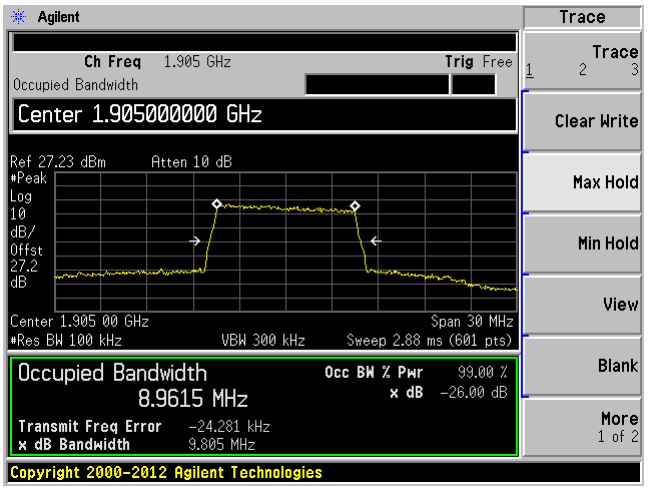
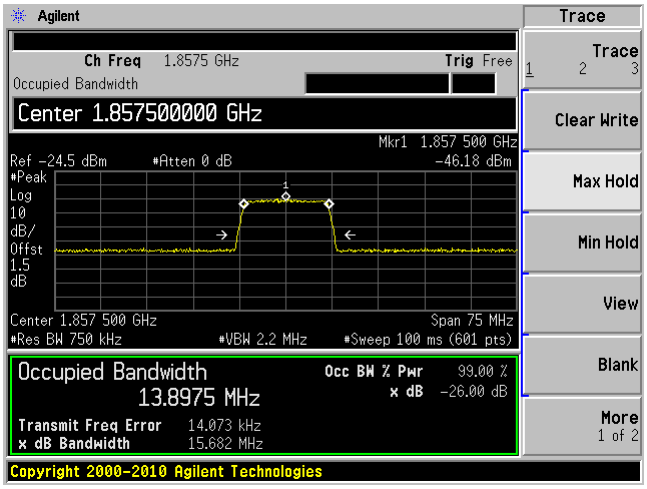
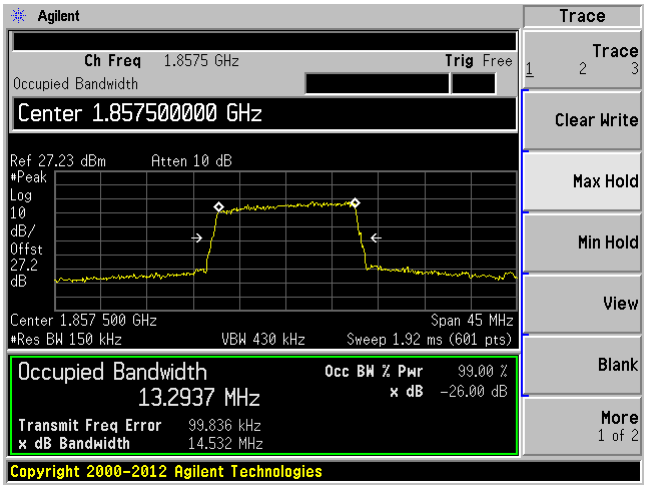


LTE 15MHz 64QAM UL

Low I/P



Low O/P



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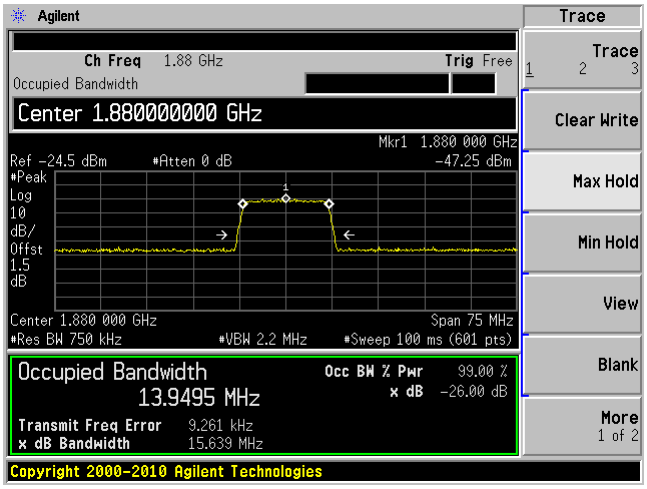

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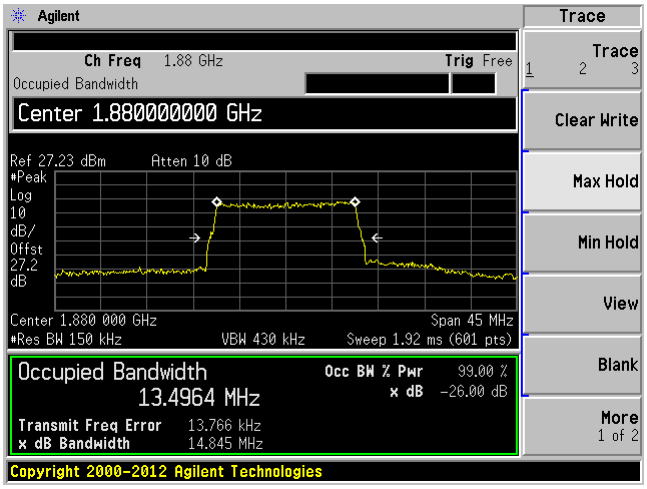

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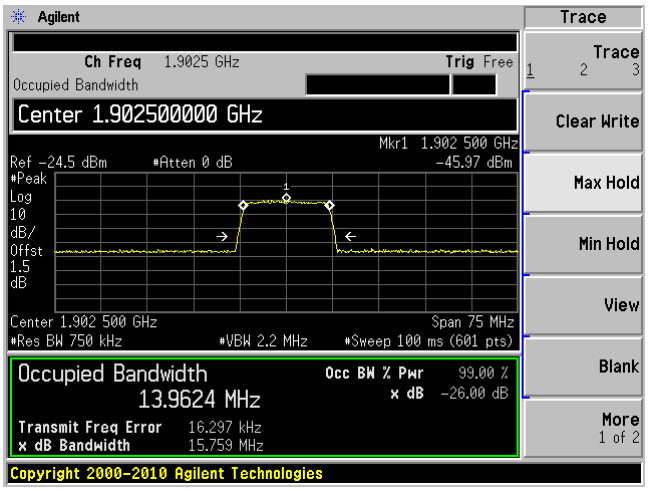

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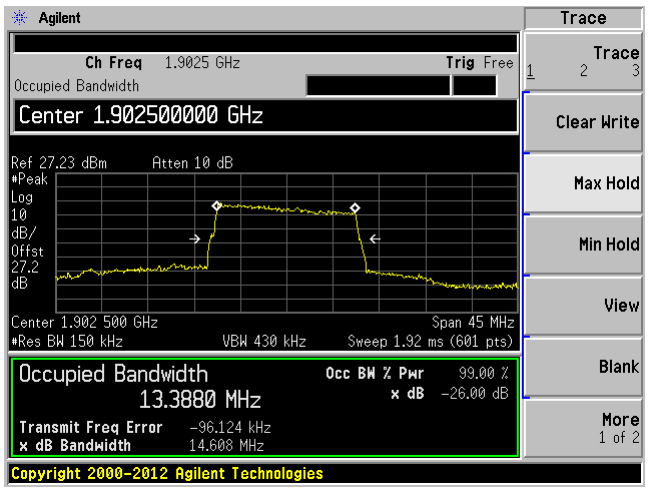
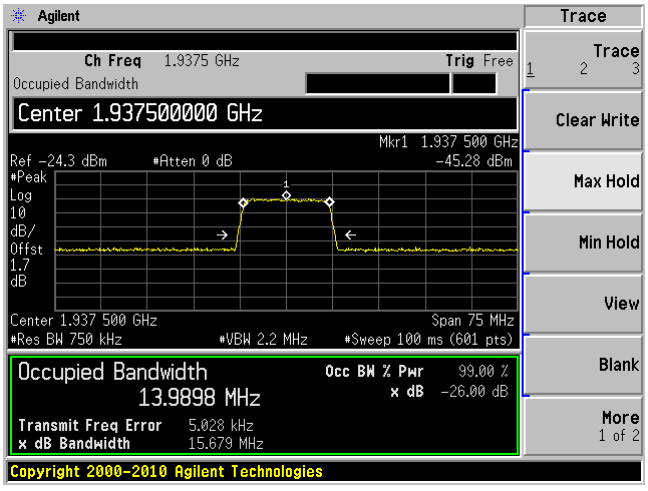


LTE 15MHz 64QAM DL

Low I/P



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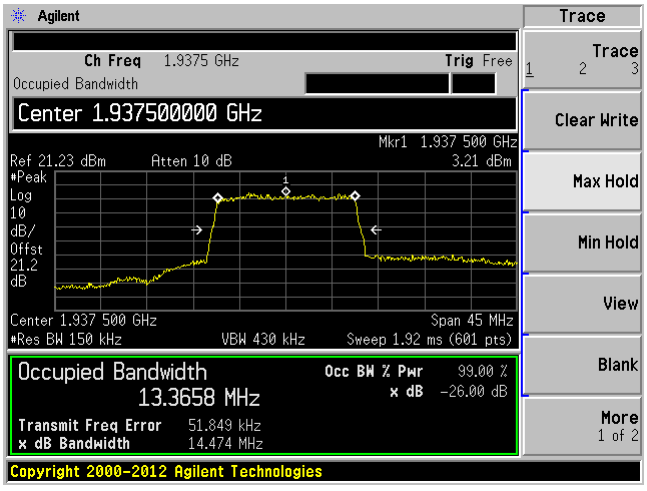

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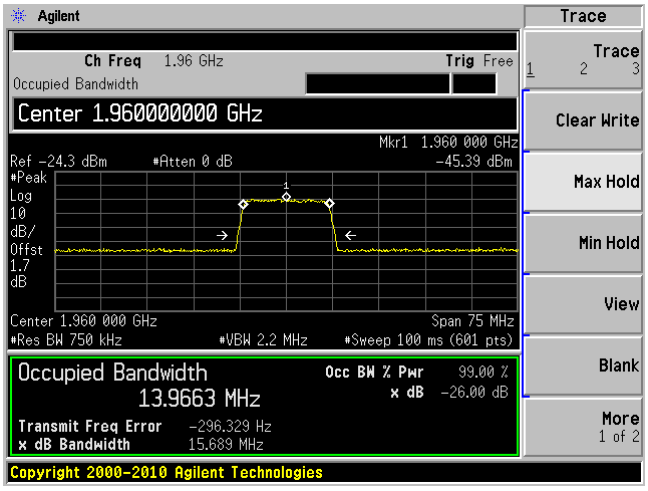

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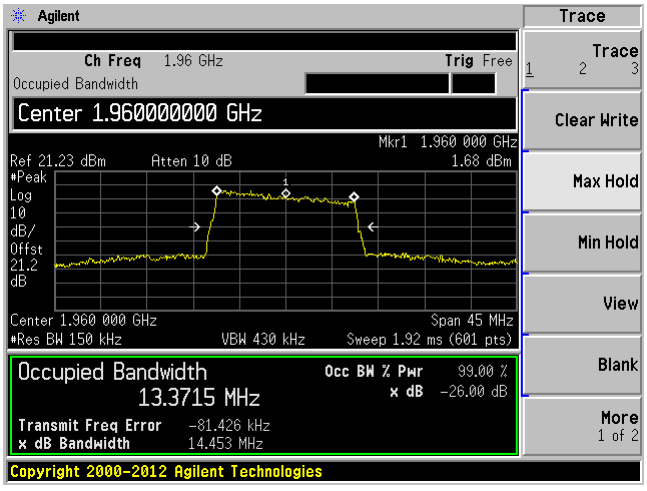

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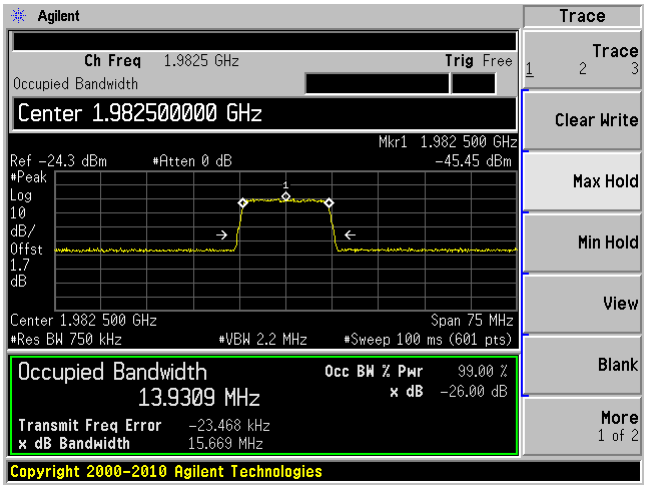

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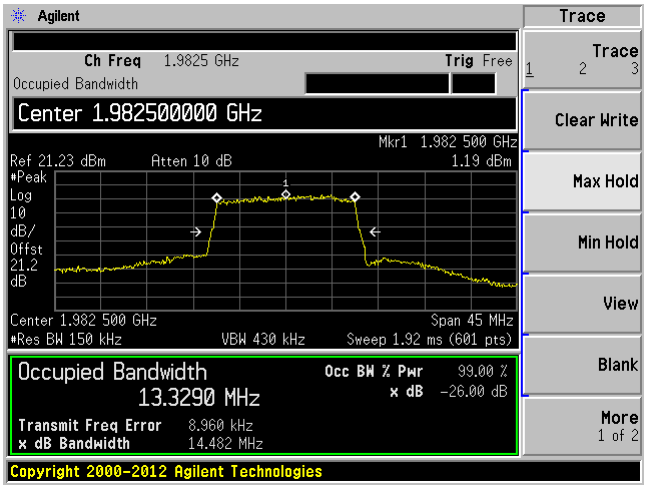
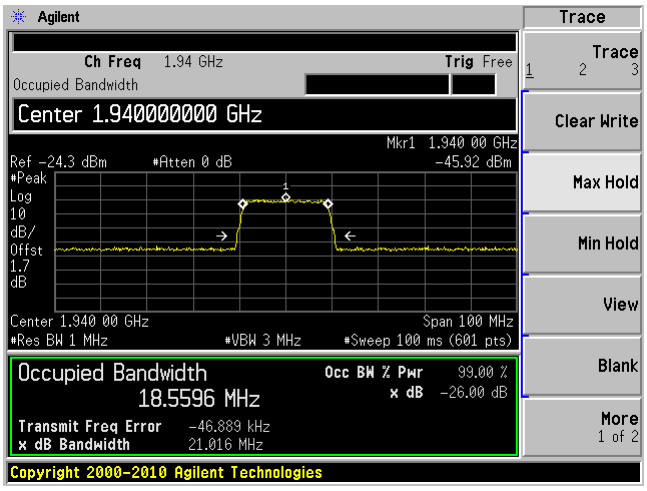


LTE 20MHz 64QAM DL

Low I/P



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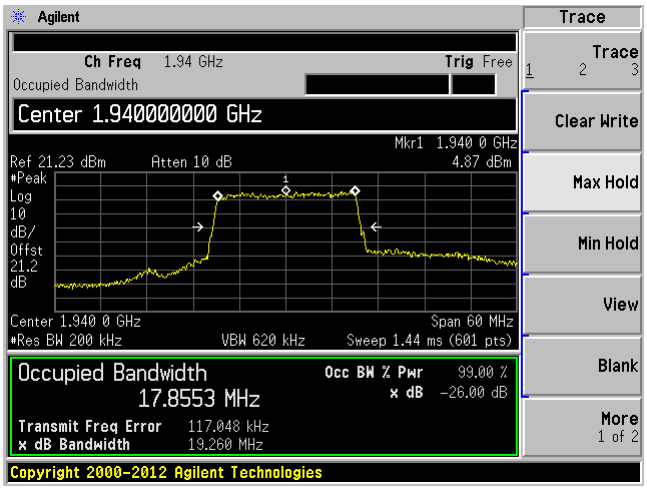

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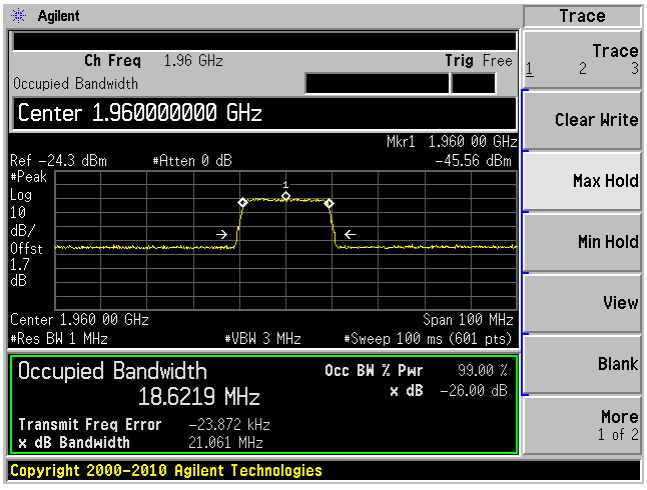

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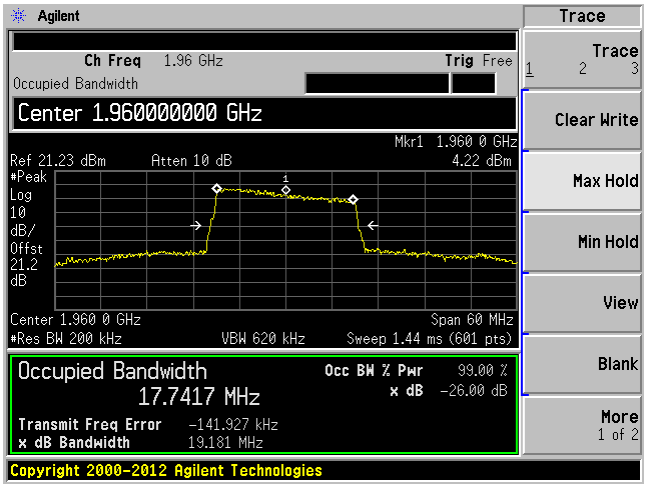

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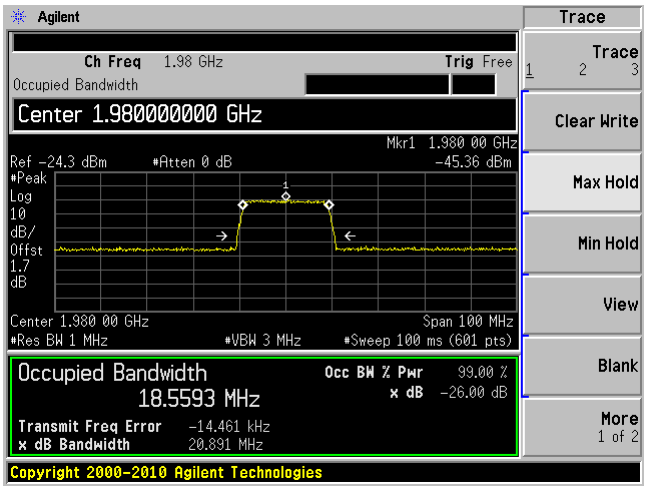

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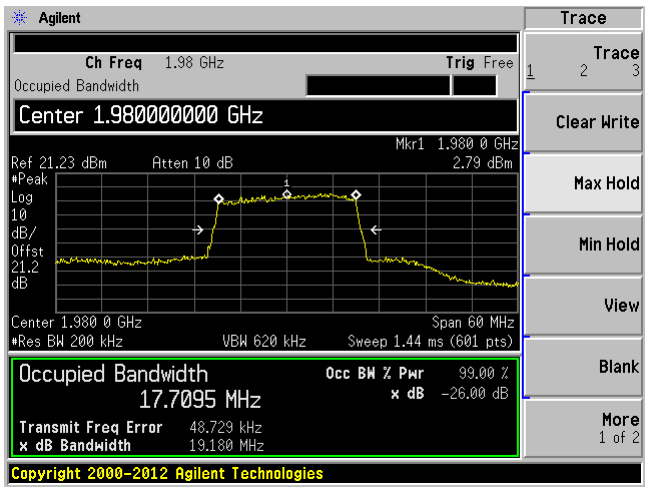
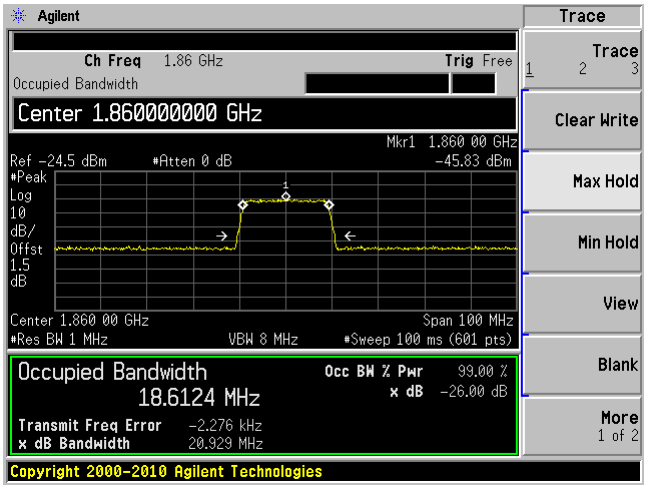


LTE 20MHz 64QAM UL

Low I/P



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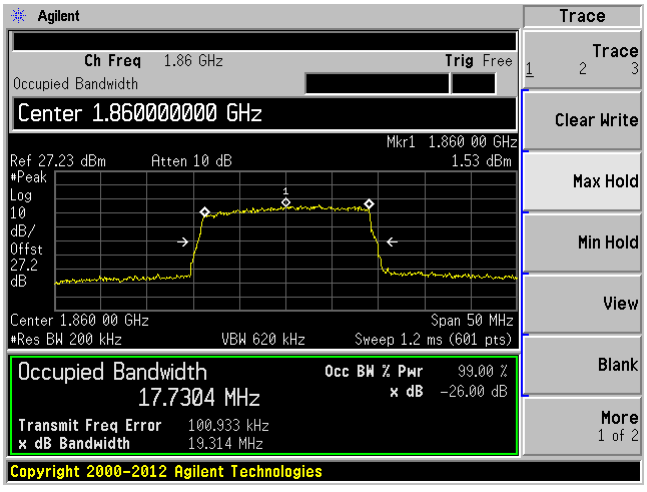

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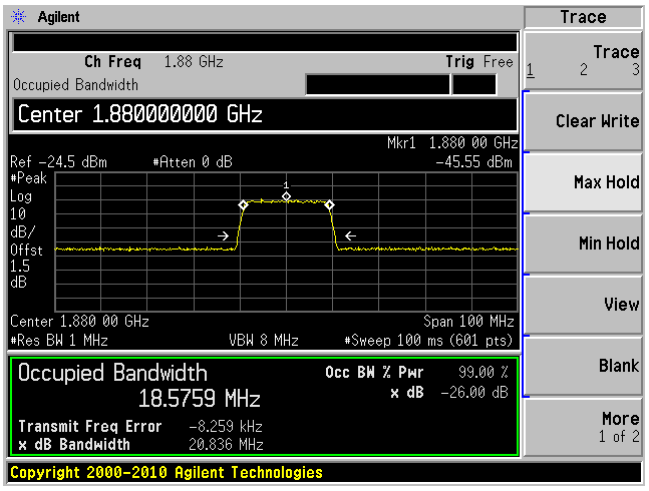

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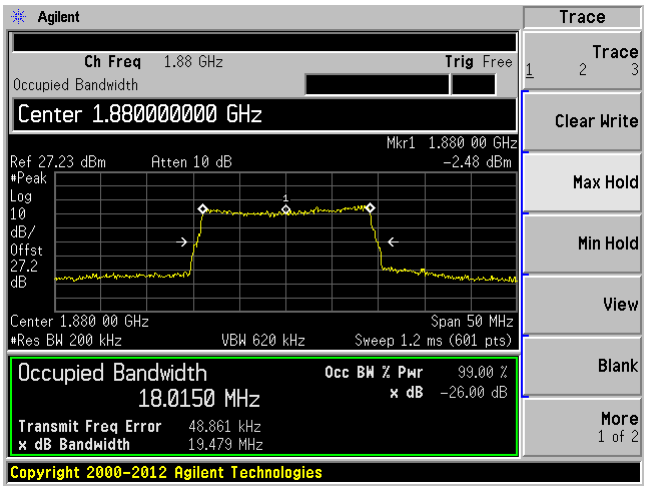

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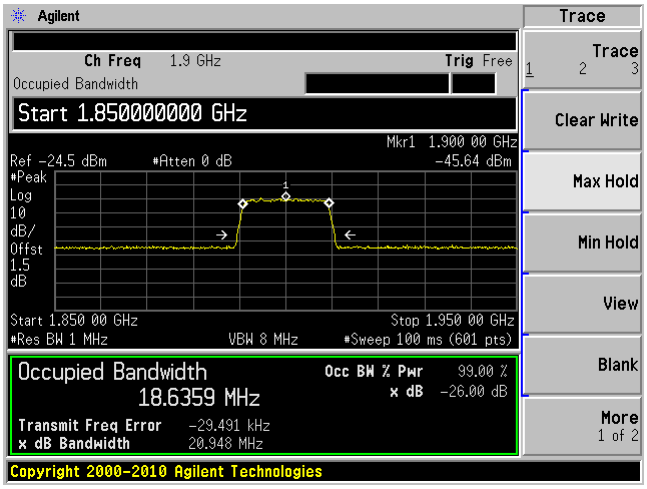

High O/P