

Test Report (LTE)

Applicant: Shenzhen TVIS Technology Co. , Ltd

Address of Applicant: 501 Longgang Internef Company Training and Developmenf
Cenfre Bantion, Longgang, Shenzhen, China

Manufacturer/Factory: Shenzhen TVIS Technology Co. , Ltd

Address of 501 Longgang Internef Company Training and Developmenf
Manufacturer /Factory: Cenfre Bantion, Longgang, Shenzhen, China

Equipment Under Test (EUT)

Product Name: Intelligent body temperature rapid screening system

Model No.: HV-8S101

FCC ID: 2AWDE-HV-8S101

Applicable standards: FCC CFR Title 47 Part 2
FCC CFR Title 47 Part 27

Date of sample receipt: April 01, 2020

Date of Test: April 02-29, 2020

Date of report issued: April 30, 2020

Test Result : PASS *

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

A circular blue ink stamp from GTS (Global United Technology Services Co., Ltd.) is visible. The stamp contains the text "GTS" in the center, "GLOBAL UNITED TECHNOLOGY SERVICES CO., LTD." around the perimeter, and "EST. 2018" at the bottom. A handwritten signature in black ink is written over the stamp.

Robinson Lo

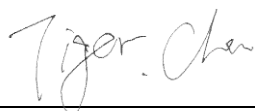
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	April 30, 2020	Original

Prepared By:



Date:

April 30, 2020

Project Engineer

Check By:



Date:

April 30, 2020

Reviewer

3 Contents

Page

1	COVER PAGE	1
2	VERSION	2
3	CONTENTS	3
4	TEST SUMMARY	4
5	GENERAL INFORMATION	5
5.1	GENERAL DESCRIPTION OF EUT	5
5.2	RELATED SUBMITTAL(S) / GRANT (S)	6
5.3	TEST METHODOLOGY.....	6
5.4	TEST FACILITY	6
5.5	TEST LOCATION.....	6
6	TEST INSTRUMENTS LIST	7
7	SYSTEM TEST CONFIGURATION	8
7.1	TEST MODE	8
7.2	CONFIGURATION OF TESTED SYSTEM	8
7.3	CONDUCTED OUTPUT POWER & EIRP	9
7.4	PEAK-TO-AVERAGE RATIO	16
7.5	OCCUPY BANDWIDTH.....	24
7.6	MODULATION CHARACTERISTIC.....	39
7.7	OUT OF BAND EMISSION AT ANTENNA TERMINALS.....	39
7.8	FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT.....	58
7.9	FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT.....	63
7.10	FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT.....	65
8	TEST SETUP PHOTO	67
9	EUT CONSTRUCTIONAL DETAILS	67

4 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Pass* (Please refer to MPE Report)
RF Output Power	Part 2.1046 Part 27.50(d)(4)	Pass
Peak-to-Average Ratio	FCC Part 27.50(d)(5)	Pass
Modulation Characteristics	Part 2.1047	N/A
99% & -26 dB Occupied Bandwidth	Report only	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 27.53(h)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 27.53(h)	Pass
Out of band emission, Band Edge	Part 27.53(h)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	Pass

Pass: The EUT complies with the essential requirements in the standard.

N/A: Not applicable.

5 General Information

5.1 General Description of EUT

Product Name:	Intelligent body temperature rapid screening system
Model No.:	HV-8S101
Serial No.:	N/A
Tested Sample(s) ID:	GTS202003000193-1
Hardware Version:	N/A
Software Version:	N/A
Support Networks:	LTE
Support Bands:	LTE Band 4
Channel Bandwidth:	1.4MHz; 3MHz; 5MHz; 10MHz; 15MHz; 20MHz
TX Frequency:	1710.70MHz-1754.30MHz
Modulation type:	QPSK, 16QAM
Antenna type:	External antenna with RP-SMA connector
Antenna gain:	0dBi (declare by manufacturer)
Power supply:	AC ADAPTER Model: DJ-U60S-12 Input: AC 100-240V, 50/60Hz, 1.5A MAX Output: DC 12V/5A

5.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 27 of the FCC CFR 47 Rules.

5.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on TIA/EIA 603 and FCC CFR 47.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057

5.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC —Registration No.: 381383**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files. Registration 381383.

- **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

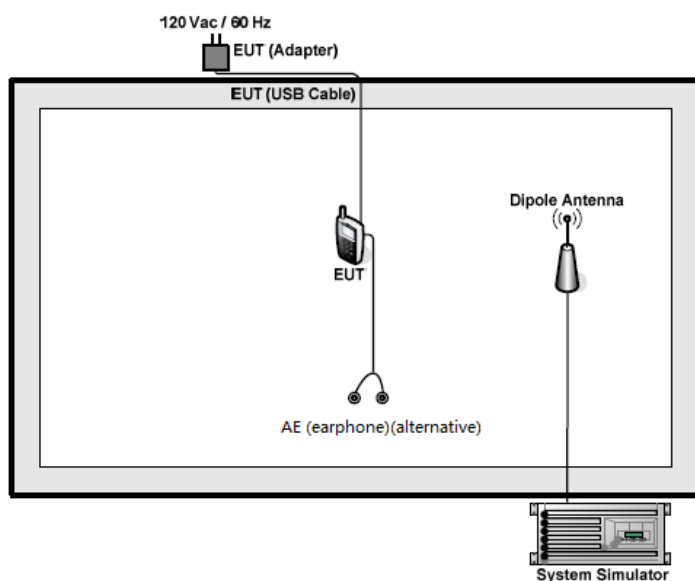
7 System test configuration

7.1 Test mode

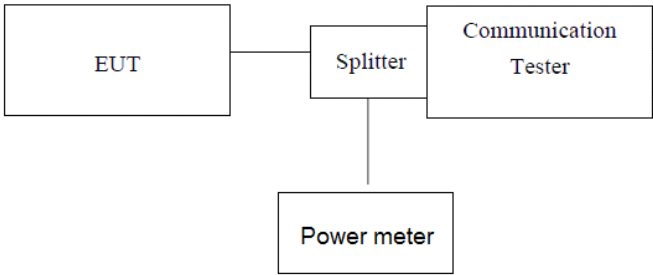
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
LTE Band 4	■ QPSK and 16QAM link	■ QPSK and 16QAM link

7.2 Configuration of Tested System



7.3 Conducted Output Power & EIRP

Test Requirement:	Part 27.50(d)(4)
Test Method:	FCC part2.1046
Limit:	LTE Band 4: 1W
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement. 3. Set EUT at maximum power through base station. 4. Select lowest, middle, and highest channels for each band and different modulation. 5. Measure the maximum burst average power.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Band 4						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19957 1710.7MHz	Channel 20175 1732.5MHz	Channel 20393 1754.3MHz
1.4MHz	QPSK	1	0	22.18	22.77	22.97
		1	2	22.68	22.36	22.88
		1	5	22.46	22.19	22.09
		3	0	22.27	22.31	22.04
		3	1	22.50	22.27	22.15
		3	2	22.87	22.07	22.35
		6	0	22.45	22.58	22.96
	16QAM	1	0	22.67	22.26	22.08
		1	2	22.69	22.98	22.79
		1	5	22.44	22.11	22.98
		3	0	22.54	22.57	22.90
		3	1	22.30	22.12	22.24
		3	2	22.05	22.41	22.99
		6	0	22.89	22.19	22.73
Bandwidth	Mode	RB Size	RB Offset	Actual output po2wer(dBm)		
				Channel 19965 1711.5MHz	Channel 20175 1732.5MHz	Channel 20385 1753.5MHz
3MHz	QPSK	1	0	22.64	22.88	22.22
		1	8	22.71	22.86	22.14
		1	14	22.77	22.39	22.90
		8	0	22.77	22.81	22.84
		8	4	22.76	22.81	22.58
		8	7	22.29	22.45	22.42
		15	0	22.35	22.72	22.65
	16QAM	1	0	22.36	22.05	22.64
		1	8	22.36	22.99	22.38
		1	14	22.53	22.22	22.43
		8	0	22.43	22.22	22.36
		8	4	22.83	22.71	22.83
		8	7	22.57	22.14	22.47
		15	0	22.42	22.88	22.81

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19975 1712.5MHz	Channel 20175 1732.5MHz	Channel 20375 1752.5MHz
5MHz	QPSK	1	0	22.32	22.57	22.85
		1	13	22.21	22.90	22.20
		1	24	22.44	22.37	22.96
		12	0	22.08	22.60	22.34
		12	6	22.54	22.63	22.22
		12	13	22.61	22.05	22.14
		25	0	22.30	22.17	22.83
	16QAM	1	0	22.91	22.60	22.56
		1	13	22.66	22.02	22.69
		1	24	22.40	22.35	22.91
		12	0	22.35	22.20	22.97
		12	6	22.06	22.54	22.31
		12	13	22.62	22.20	22.96
		25	0	22.62	22.78	22.53
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20000 1715.0MHz	Channel 20175 1732.5MHz	Channel 20350 1750.0MHz
10MHz	QPSK	1	0	22.90	22.39	22.95
		1	25	22.46	22.35	22.56
		1	49	22.07	22.15	22.25
		25	0	22.26	22.44	22.64
		25	13	22.98	22.25	22.03
		25	25	22.85	22.98	22.22
		50	0	22.49	22.41	22.20
	16QAM	1	0	22.84	22.92	22.09
		1	25	22.08	22.83	22.80
		1	49	22.28	22.77	22.66
		25	0	22.24	22.21	22.02
		25	13	22.38	22.95	22.02
		25	25	22.08	22.00	22.26
		50	0	22.86	22.73	22.60

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20025 1717.5MHz	Channel 20175 1732.5MHz	Channel 20325 1747.5MHz
15MHz	QPSK	1	0	22.56	22.06	22.33
		1	38	22.14	22.19	22.57
		1	74	22.38	22.55	22.16
		36	0	22.28	22.88	22.52
		36	18	22.56	22.71	22.45
		36	39	22.39	22.58	22.92
		75	0	22.72	22.49	22.73
	16QAM	1	0	22.07	22.02	22.05
		1	38	22.44	22.74	22.27
		1	74	22.70	22.73	22.22
		36	0	22.23	22.62	22.73
		36	18	22.05	22.24	22.85
		36	39	22.31	22.24	22.46
		75	0	22.44	22.88	22.90
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20050 1720.0MHz	Channel 20175 1732.5MHz	Channel 20300 1745.0MHz
20MHz	QPSK	1	0	22.85	22.68	22.49
		1	50	22.94	22.69	22.87
		1	99	22.75	22.87	22.73
		50	0	22.93	22.52	22.84
		50	25	22.69	22.91	22.29
		50	50	22.42	22.77	22.14
		100	0	22.94	22.27	22.51
	16QAM	1	0	22.99	22.69	22.14
		1	50	22.24	22.36	22.69
		1	99	22.45	22.74	22.00
		50	0	22.64	22.90	22.31
		50	25	22.84	22.07	22.13
		50	50	22.21	22.76	22.29
		100	0	22.68	22.97	22.95

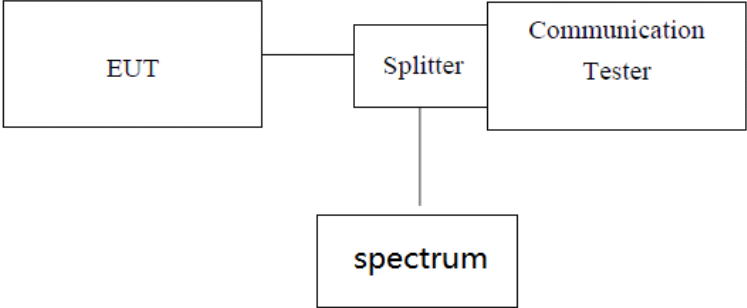
EIRP:

Band 4						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19957 1710.7MHz	Channel 20175 1732.5MHz	Channel 20393 1754.3MHz
1.4MHz	QPSK	1	0	22.18	22.77	22.97
		1	2	22.68	22.36	22.88
		1	5	22.46	22.19	22.09
		3	0	22.27	22.31	22.04
		3	1	22.50	22.27	22.15
		3	2	22.87	22.07	22.35
		6	0	22.45	22.58	22.96
	16QAM	1	0	22.67	22.26	22.08
		1	2	22.69	22.98	22.79
		1	5	22.44	22.11	22.98
		3	0	22.54	22.57	22.90
		3	1	22.30	22.12	22.24
		3	2	22.05	22.41	22.99
		6	0	22.89	22.19	22.73
Bandwidth	Mode	RB Size	RB Offset	Actual output po2wer(dBm)		
				Channel 19965 1711.5MHz	Channel 20175 1732.5MHz	Channel 20385 1753.5MHz
3MHz	QPSK	1	0	22.64	22.88	22.22
		1	8	22.71	22.86	22.14
		1	14	22.77	22.39	22.90
		8	0	22.77	22.81	22.84
		8	4	22.76	22.81	22.58
		8	7	22.29	22.45	22.42
		15	0	22.35	22.72	22.65
	16QAM	1	0	22.36	22.05	22.64
		1	8	22.36	22.99	22.38
		1	14	22.53	22.22	22.43
		8	0	22.43	22.22	22.36
		8	4	22.83	22.71	22.83
		8	7	22.57	22.14	22.47
		15	0	22.42	22.88	22.81

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 19975 1712.5MHz	Channel 20175 1732.5MHz	Channel 20375 1752.5MHz
5MHz	QPSK	1	0	22.32	22.57	22.85
		1	13	22.21	22.90	22.20
		1	24	22.44	22.37	22.96
		12	0	22.08	22.60	22.34
		12	6	22.54	22.63	22.22
		12	13	22.61	22.05	22.14
		25	0	22.30	22.17	22.83
	16QAM	1	0	22.91	22.60	22.56
		1	13	22.66	22.02	22.69
		1	24	22.40	22.35	22.91
		12	0	22.35	22.20	22.97
		12	6	22.06	22.54	22.31
		12	13	22.62	22.20	22.96
		25	0	22.62	22.78	22.53
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20000 1715.0MHz	Channel 20175 1732.5MHz	Channel 20350 1750.0MHz
10MHz	QPSK	1	0	22.90	22.39	22.95
		1	25	22.46	22.35	22.56
		1	49	22.07	22.15	22.25
		25	0	22.26	22.44	22.64
		25	13	22.98	22.25	22.03
		25	25	22.85	22.98	22.22
		50	0	22.49	22.41	22.20
	16QAM	1	0	22.84	22.92	22.09
		1	25	22.08	22.83	22.80
		1	49	22.28	22.77	22.66
		25	0	22.24	22.21	22.02
		25	13	22.38	22.95	22.02
		25	25	22.08	22.00	22.26
		50	0	22.86	22.73	22.60

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20025 1717.5MHz	Channel 20175 1732.5MHz	Channel 20325 1747.5MHz
15MHz	QPSK	1	0	22.56	22.06	22.33
		1	38	22.14	22.19	22.57
		1	74	22.38	22.55	22.16
		36	0	22.28	22.88	22.52
		36	18	22.56	22.71	22.45
		36	39	22.39	22.58	22.92
		75	0	22.72	22.49	22.73
	16QAM	1	0	22.07	22.02	22.05
		1	38	22.44	22.74	22.27
		1	74	22.70	22.73	22.22
		36	0	22.23	22.62	22.73
		36	18	22.05	22.24	22.85
		36	39	22.31	22.24	22.46
		75	0	22.44	22.88	22.90
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 20050 1720.0MHz	Channel 20175 1732.5MHz	Channel 20300 1745.0MHz
20MHz	QPSK	1	0	22.85	22.68	22.49
		1	50	22.94	22.69	22.87
		1	99	22.75	22.87	22.73
		50	0	22.93	22.52	22.84
		50	25	22.69	22.91	22.29
		50	50	22.42	22.77	22.14
		100	0	22.94	22.27	22.51
	16QAM	1	0	22.99	22.69	22.14
		1	50	22.24	22.36	22.69
		1	99	22.45	22.74	22.00
		50	0	22.64	22.90	22.31
		50	25	22.84	22.07	22.13
		50	50	22.21	22.76	22.29
		100	0	22.68	22.97	22.95

7.4 Peak-to-Average Ratio

Test Requirement:	FCC Part 27.50
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The transmitter output port was connected to base station. 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement. 3. Set EUT at maximum power through base station. 4. Select lowest, middle, and highest channels for each band and different modulation. 5. Measure the maximum burst average power. 6. Record the maximum peak-to-average ratio value.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

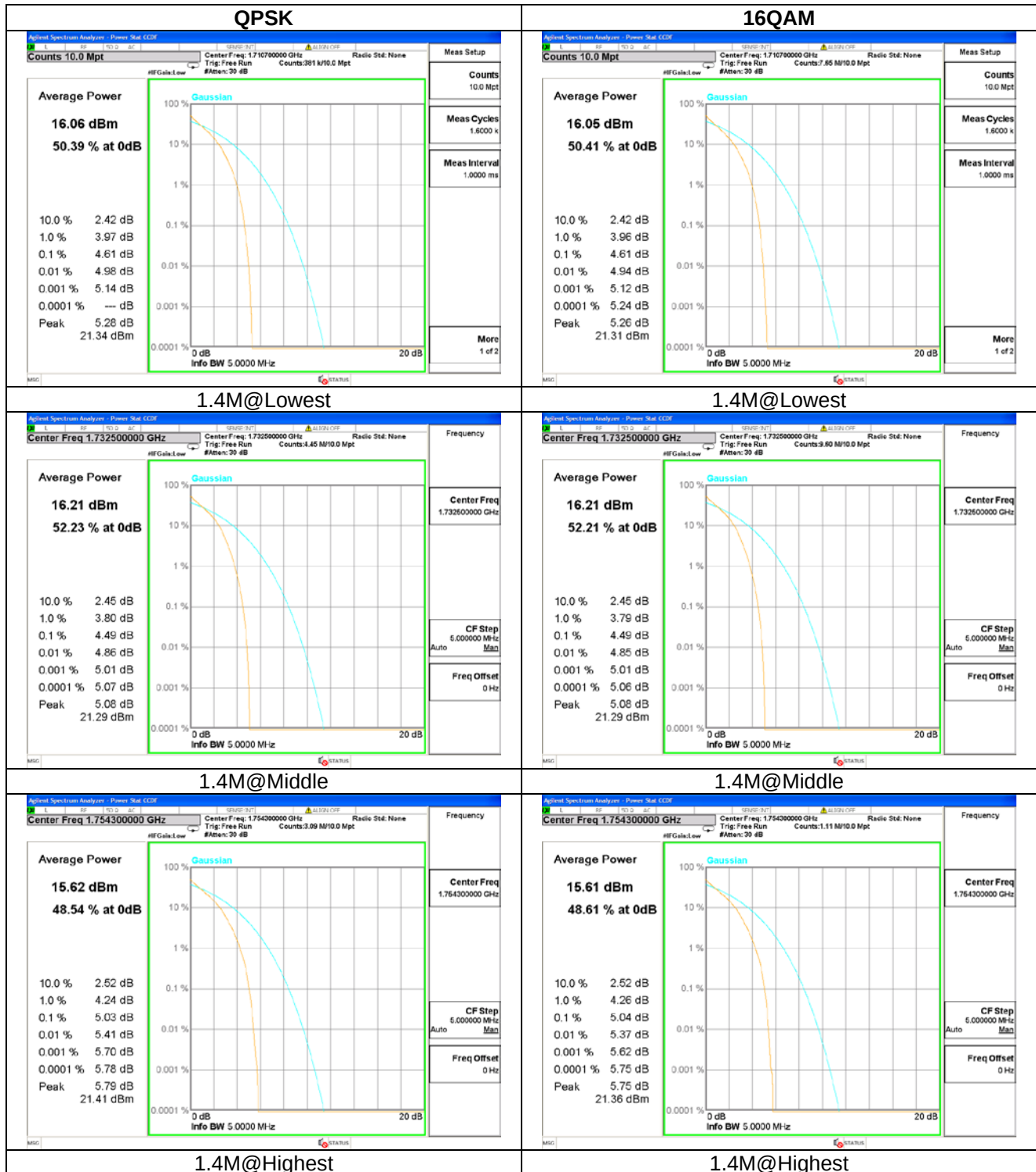
Measurement data:

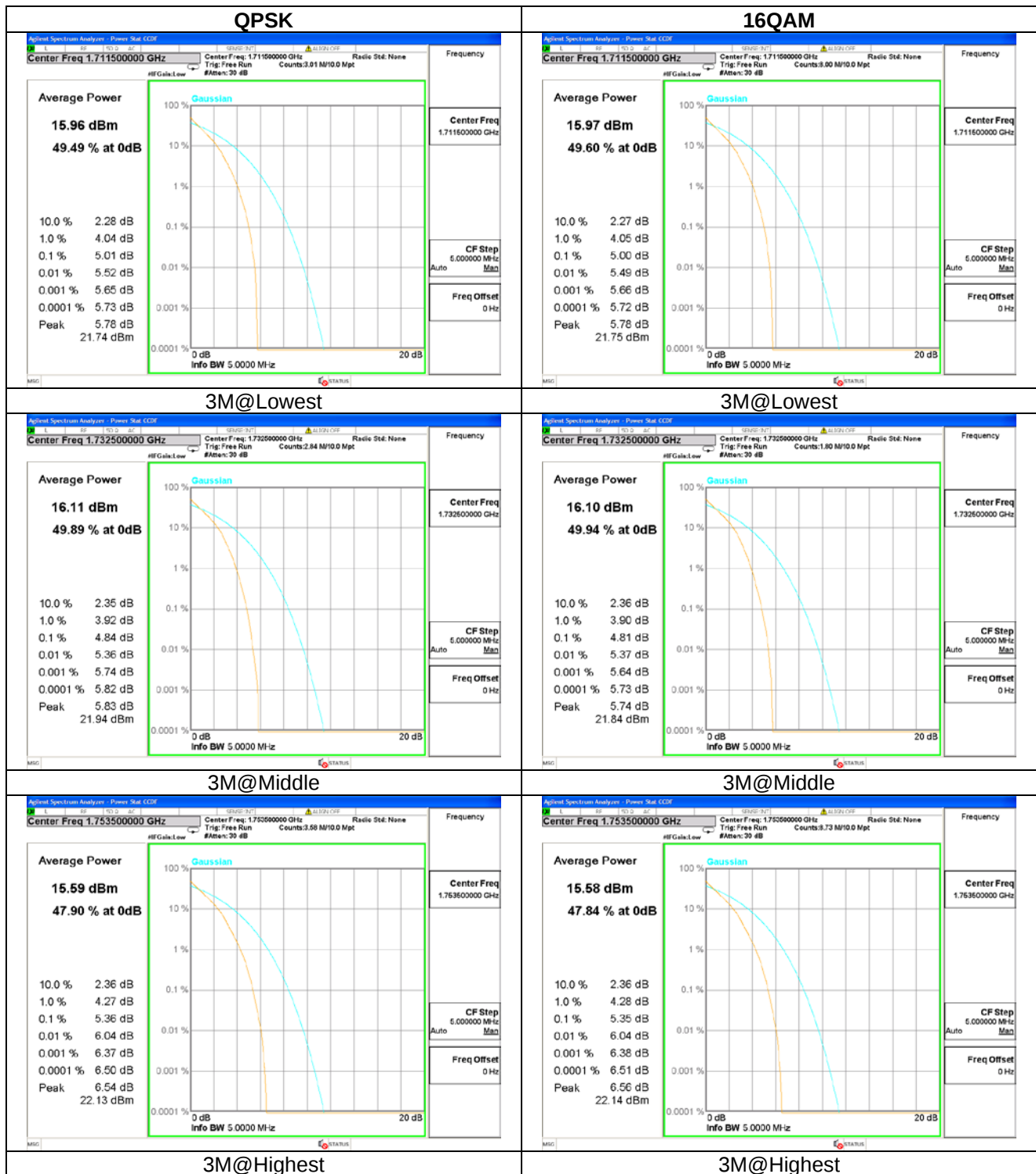
QPSK mode:

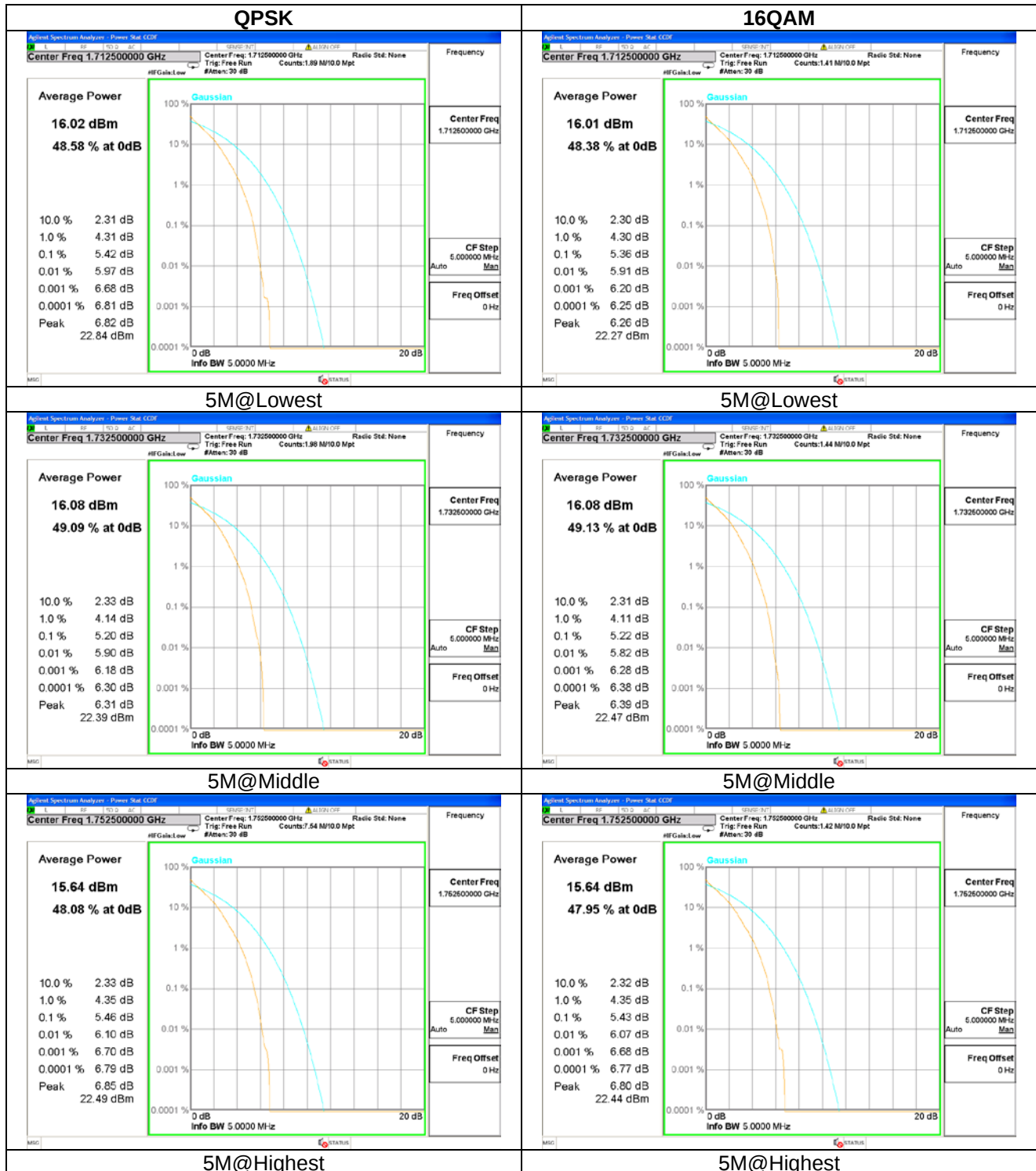
Test Band	Bandwidth	Peak to Average Ratio (dB)			Limit (dB)	Result
		Low Ch.	Middle Ch.	High Ch.		
LTE Band 4	1.4MHz	4.61	4.49	5.03	13	PASS
	3MHz	5.01	4.84	5.36	13	PASS
	5MHz	5.45	5.20	5.46	13	PASS
	10MHz	6.07	6.16	6.08	13	PASS
	15MHz	6.79	6.86	6.71	13	PASS
	20MHz	7.18	7.22	7.06	13	PASS

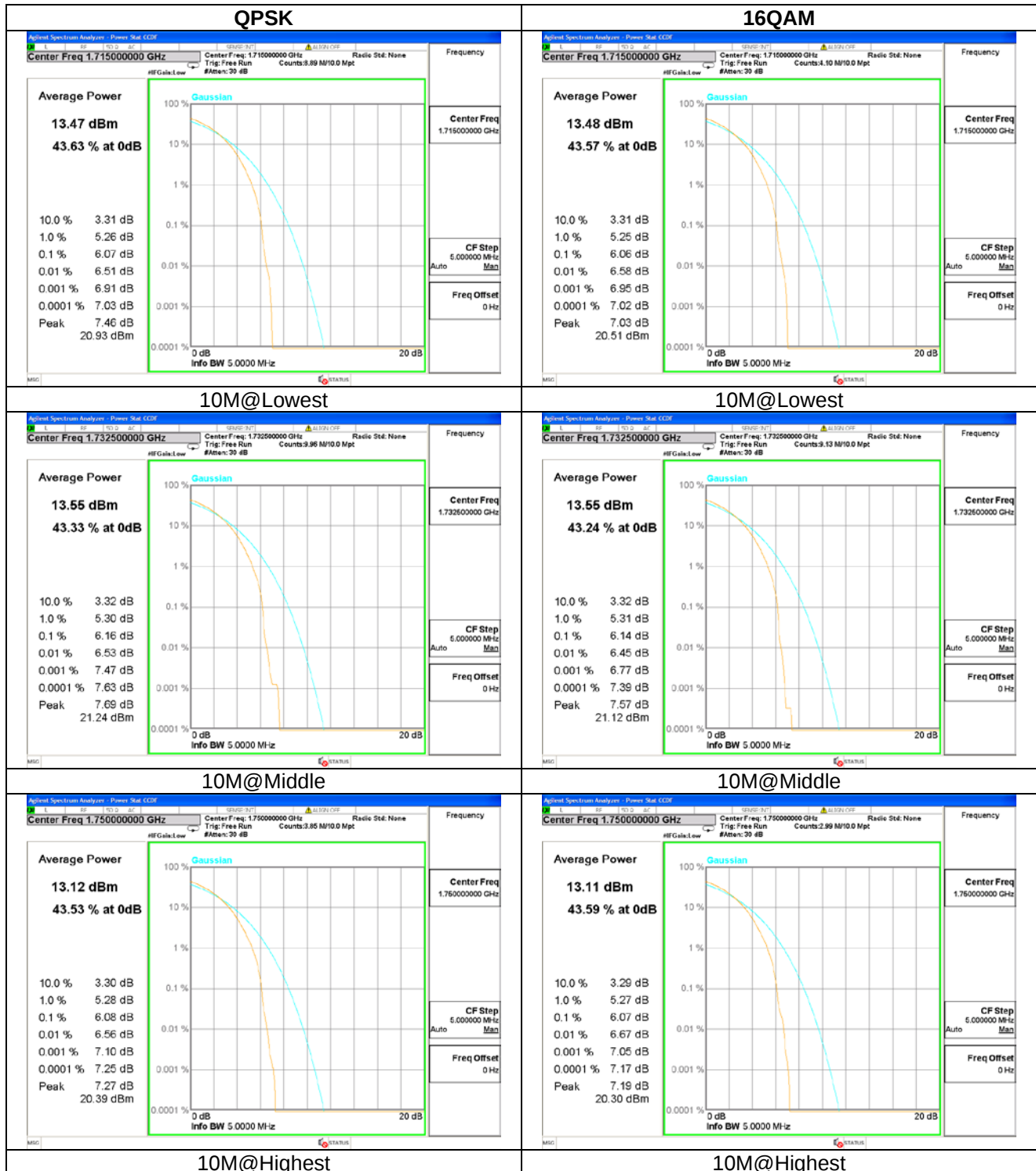
16QAM mode:

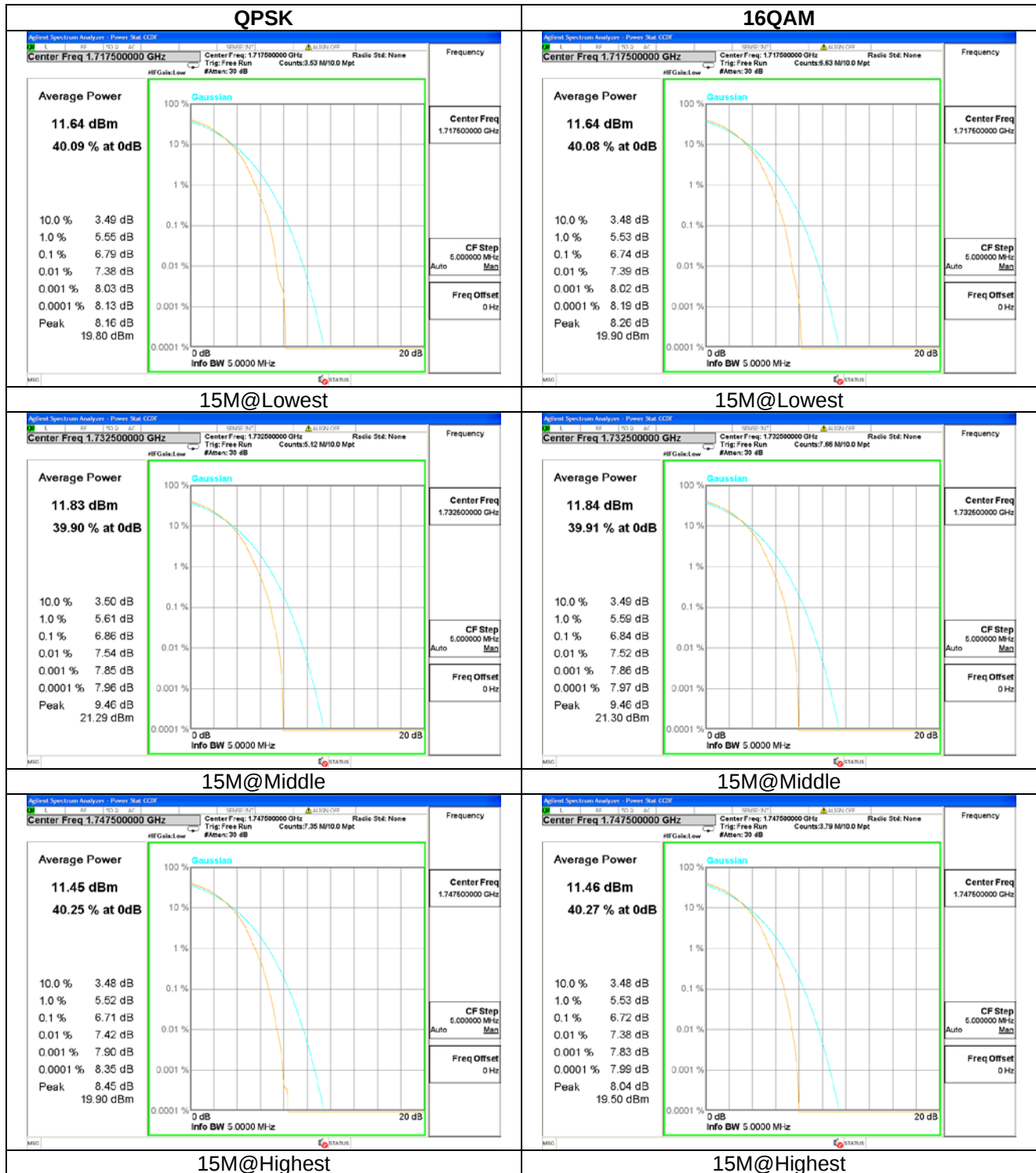
Test Band	Bandwidth	Peak to Average Ratio (dB)			Limit (dB)	Result
		Low Ch.	Middle Ch.	High Ch.		
LTE Band 4	1.4MHz	4.64	4.49	5.04	13	PASS
	3MHz	5.00	4.81	5.35	13	PASS
	5MHz	5.36	5.22	5.43	13	PASS
	10MHz	6.06	6.14	6.07	13	PASS
	15MHz	6.74	6.84	6.72	13	PASS
	20MHz	7.18	7.13	7.04	13	PASS

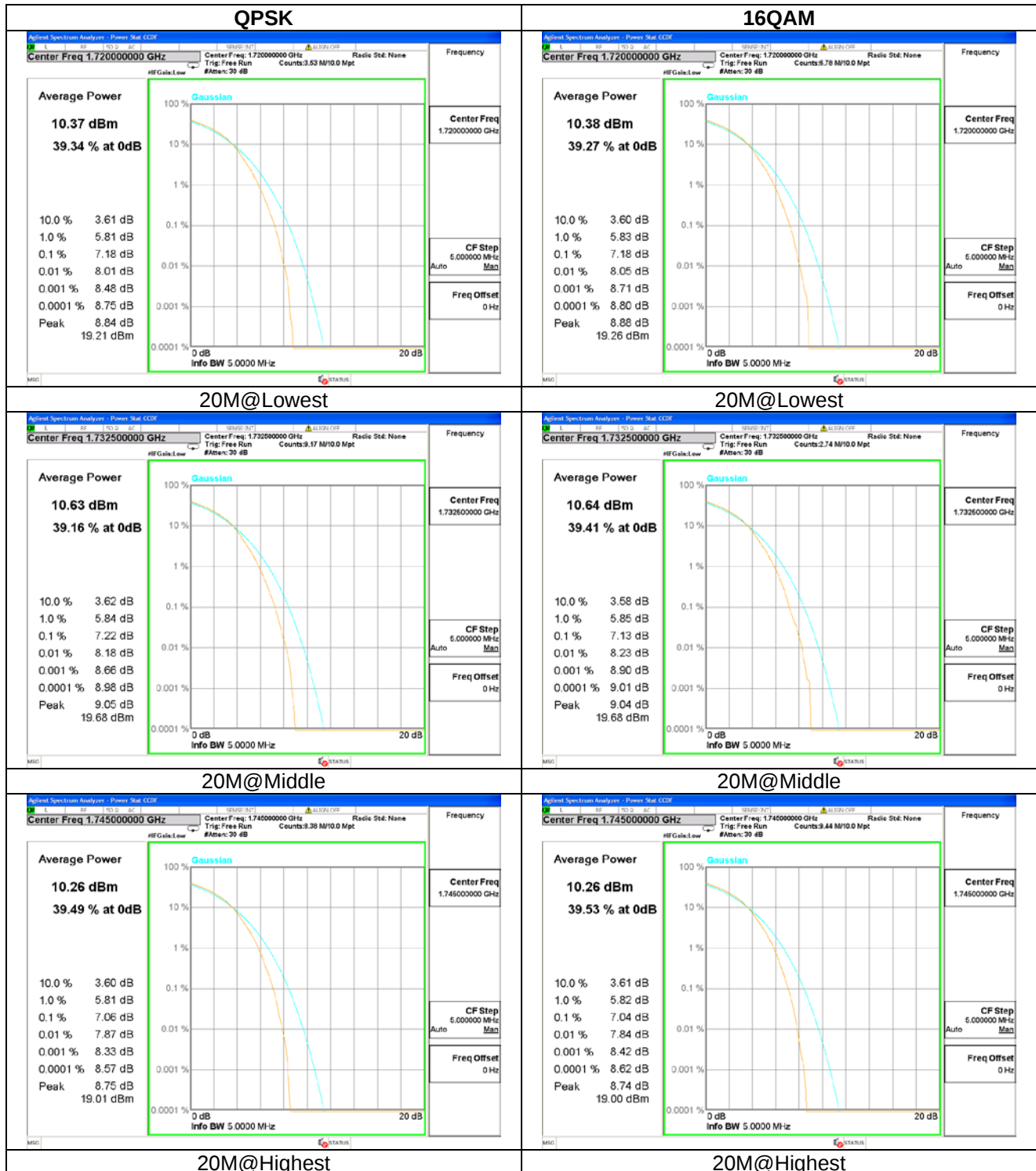




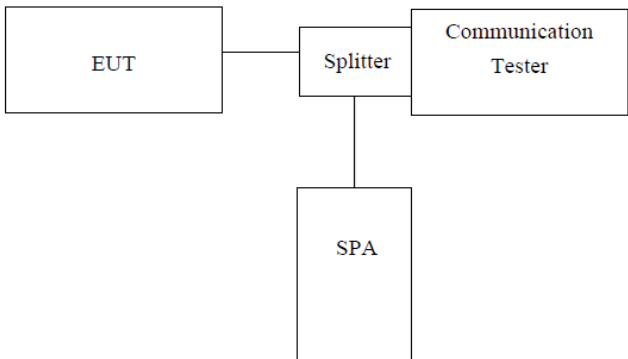








7.5 Occupy Bandwidth

Test Method:	FCC part2.1049
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer 2. RBW was set to about 1% of emission BW, VBW= 3 times RBW. 3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

QPSK mode:

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 4	1.4MHz	Low range	6	0	1101.20	1300.00
		Mid range	6	0	1101.40	1343.00
		High range	6	0	1101.10	1365.00
	3MHz	Low range	15	0	2680.40	2908.00
		Mid range	15	0	2683.60	2962.00
		High range	15	0	2689.80	2946.00
	5MHz	Low range	25	0	4521.20	5031.00
		Mid range	25	0	4514.40	5011.00
		High range	25	0	4518.90	5031.00
	10MHz	Low range	50	0	8933.90	9789.00
		Mid range	50	0	8917.10	9672.00
		High range	50	0	8917.10	9672.00
	15MHz	Low range	75	0	13439.40	14608.00
		Mid range	75	0	13337.10	14366.00
		High range	75	0	13407.50	14593.00
	20MHz	Low range	100	0	17880.00	19076.00
		Mid range	100	0	17785.90	18883.00
		High range	100	0	17893.10	19021.00

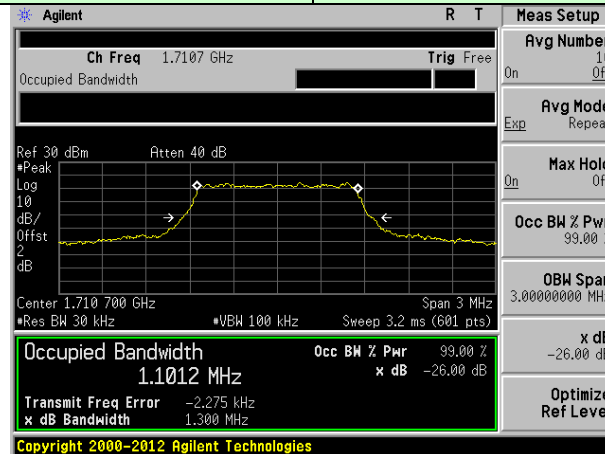
16QAM mode:

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
			RB Size	RB Offset		
LTE Band 4	1.4MHz	Low range	6	0	1101.90	1300.00
		Mid range	6	0	1102.00	1343.00
		High range	6	0	1092.30	1313.00
	3MHz	Low range	15	0	2685.80	2922.00
		Mid range	15	0	2685.40	2947.00
		High range	15	0	2688.80	2955.00
	5MHz	Low range	25	0	4523.90	5008.00
		Mid range	25	0	4517.70	5024.00
		High range	25	0	4522.70	4973.00
	10MHz	Low range	50	0	8941.40	9840.00
		Mid range	50	0	8935.80	9720.00
		High range	50	0	8916.80	9626.00
	15MHz	Low range	75	0	13423.70	14381.00
		Mid range	75	0	13321.90	14423.00
		High range	75	0	13414.90	14607.00
	20MHz	Low range	100	0	17814.50	18970.00
		Mid range	100	0	17737.20	18738.00
		High range	100	0	17921.30	19126.00

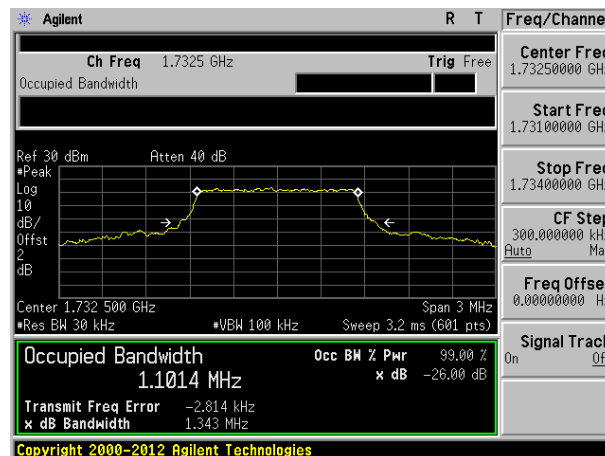
Test plot as follows:

QPSK mode:

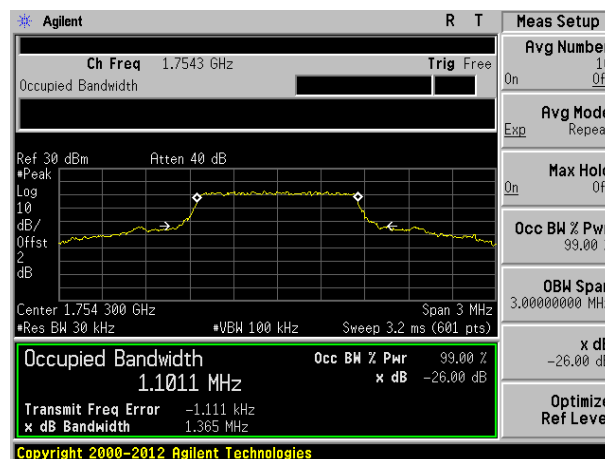
Test band: LTE Band 4	Channel Bandwidth: 1.4MHz
-----------------------	---------------------------



Lowest channel

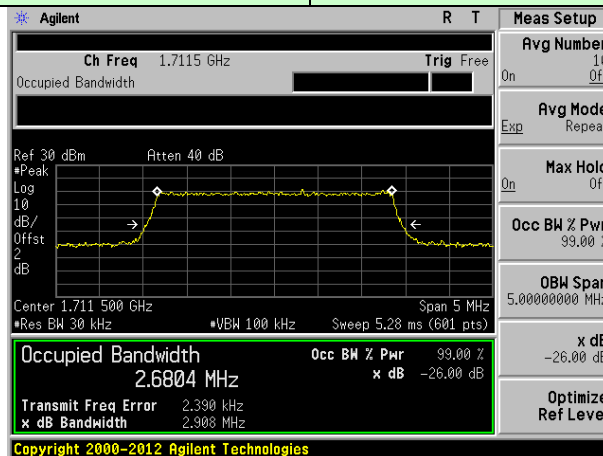


Middle channel

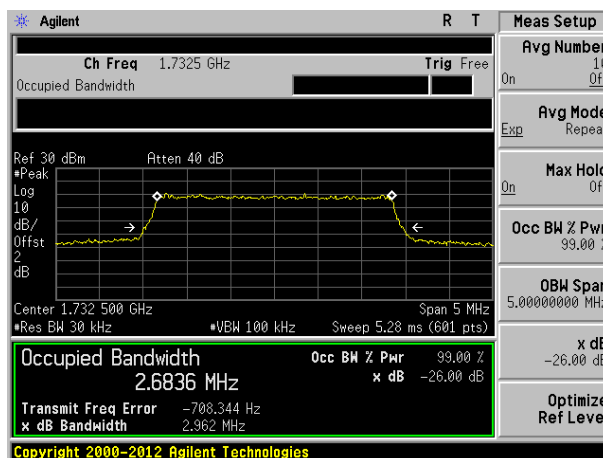


Highest channel

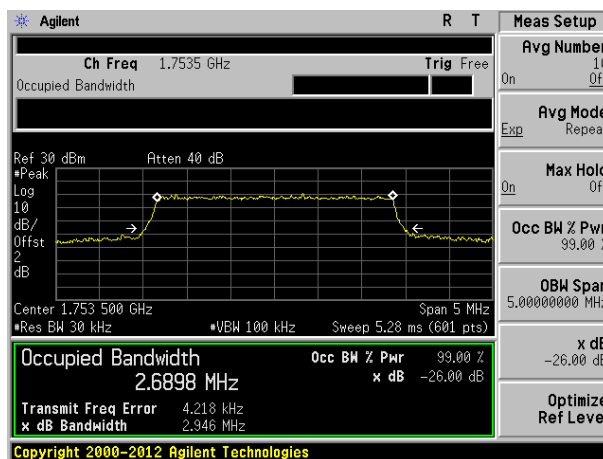
Test band: LTE Band 4	Channel Bandwidth: 3MHz
-----------------------	-------------------------



Lowest channel



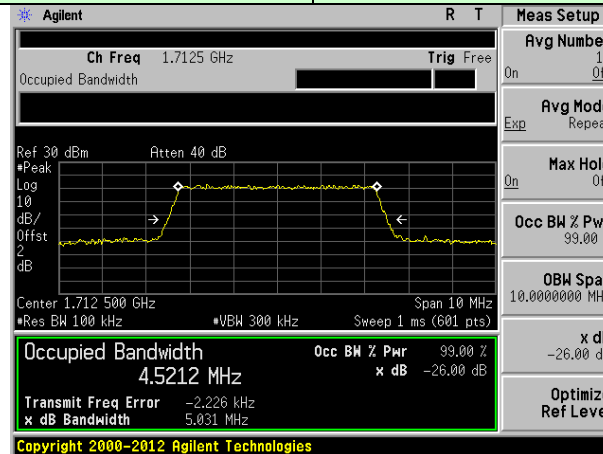
Middle channel



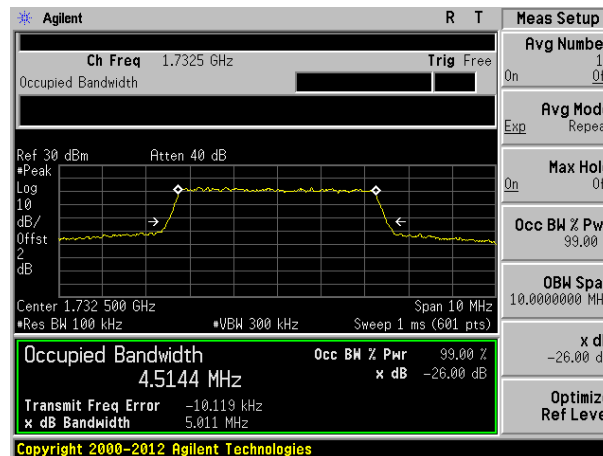
Highest channel

Test band: LTE Band 4

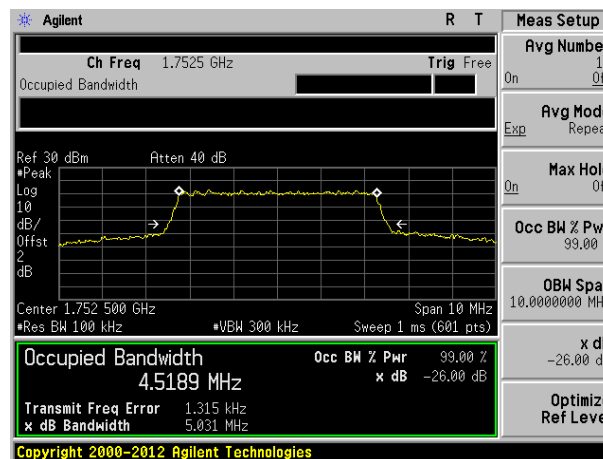
Channel Bandwidth: 5MHz



Lowest channel

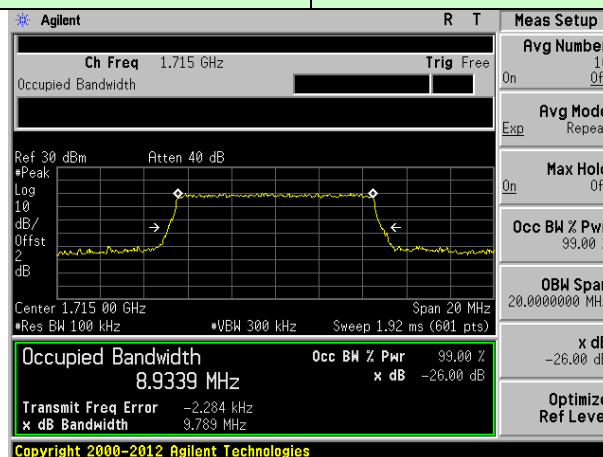


Middle channel

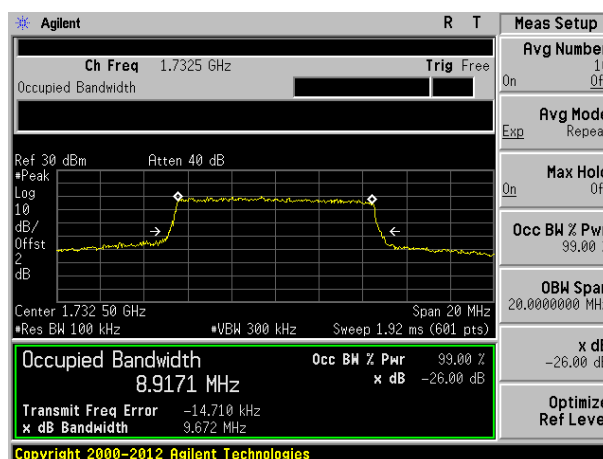


Highest channel

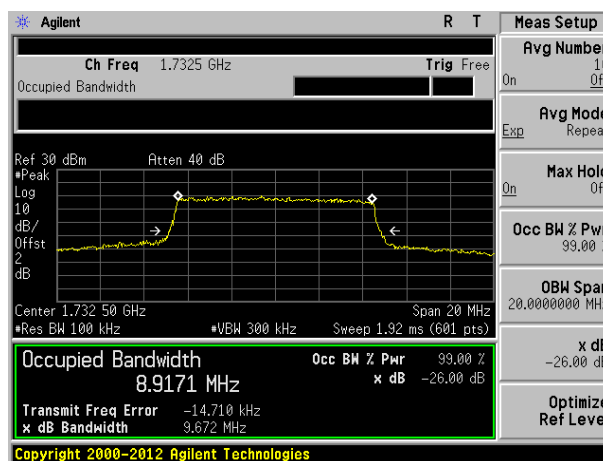
Test band: LTE Band 4	Channel Bandwidth: 10MHz
-----------------------	--------------------------



Lowest channel

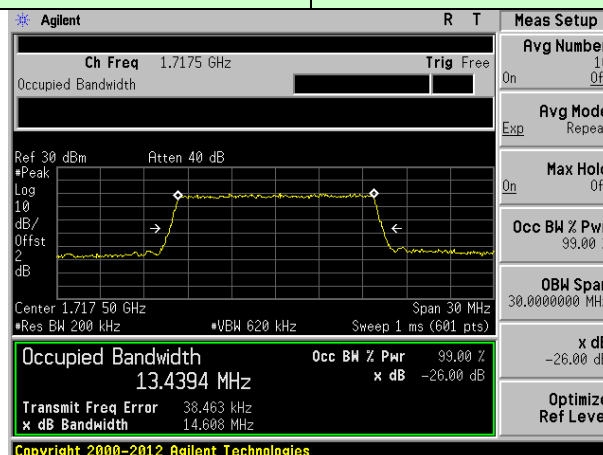


Middle channel

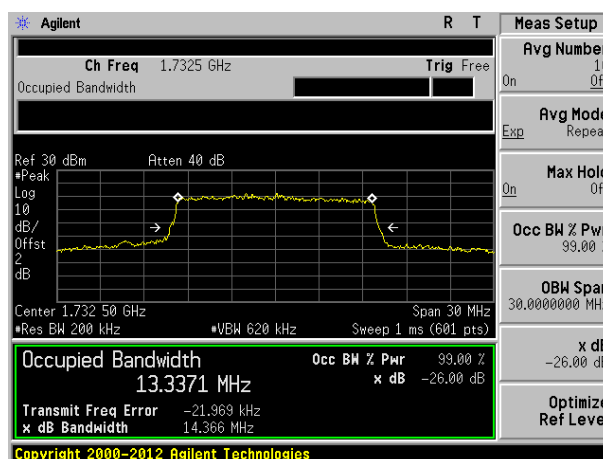


Highest channel

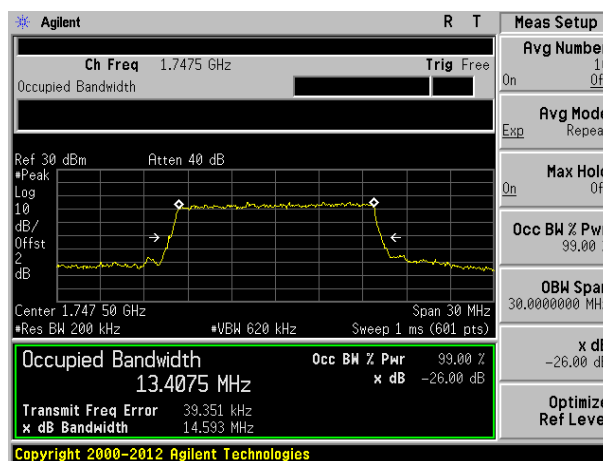
Test band: LTE Band 4	Channel Bandwidth: 15MHz
-----------------------	--------------------------



Lowest channel

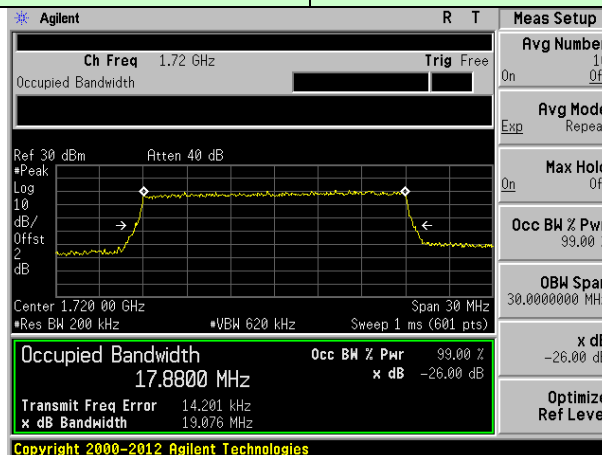


Middle channel

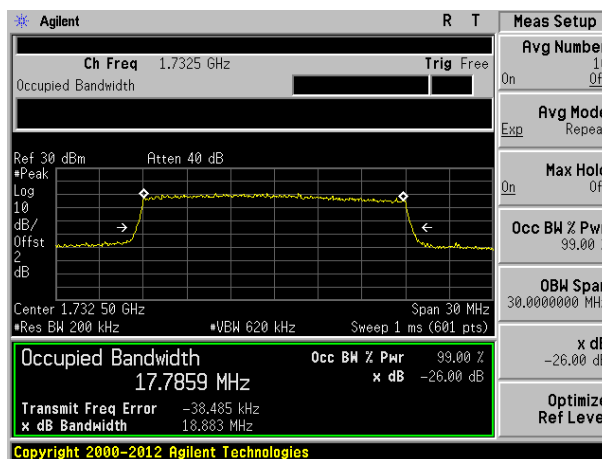


Highest channel

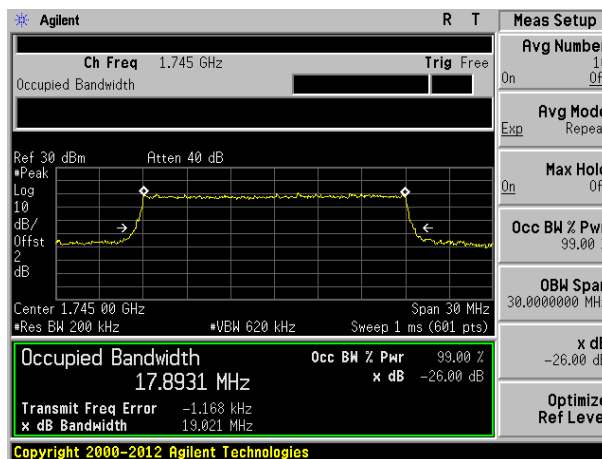
Test band: LTE Band 4	Channel Bandwidth: 20MHz
-----------------------	--------------------------



Lowest channel



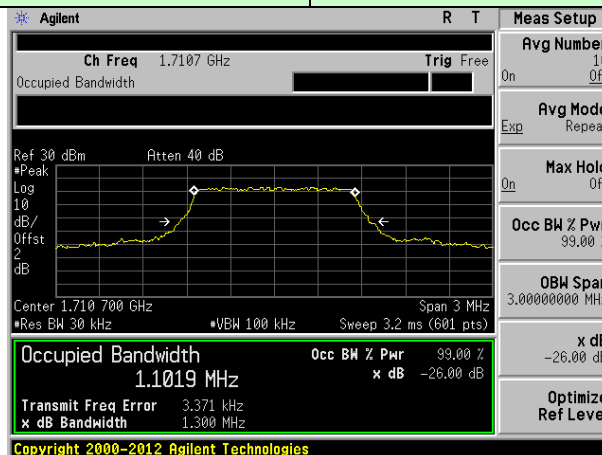
Middle channel



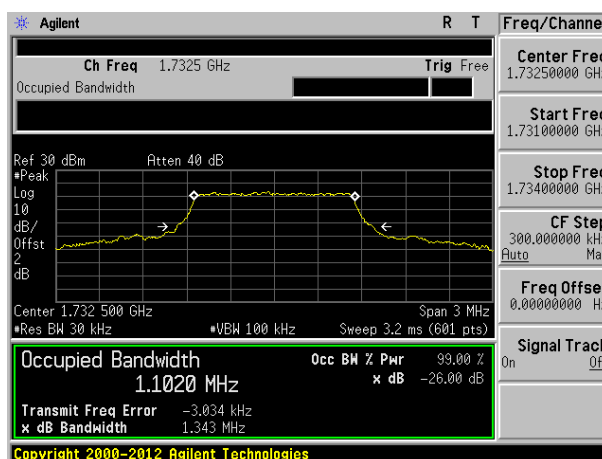
Highest channel

16QAM mode:

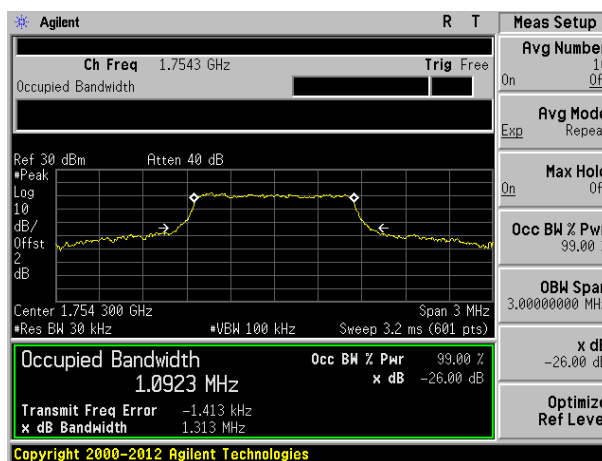
Test band: LTE Band 4	Channel Bandwidth: 1.4MHz
-----------------------	---------------------------



Lowest channel

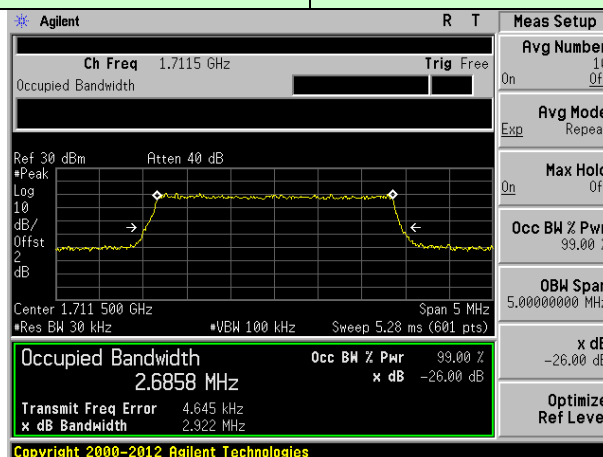


Middle channel

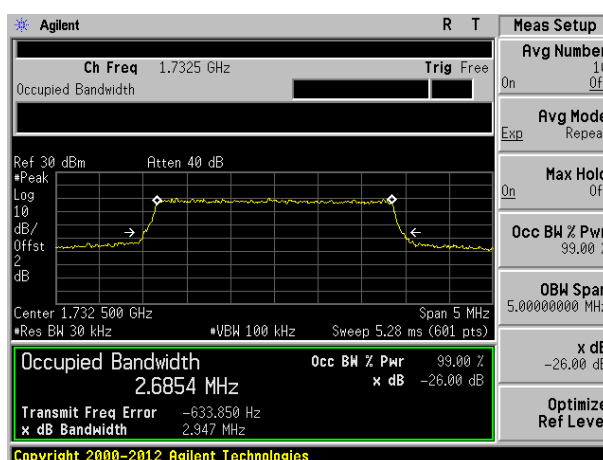


Highest channel

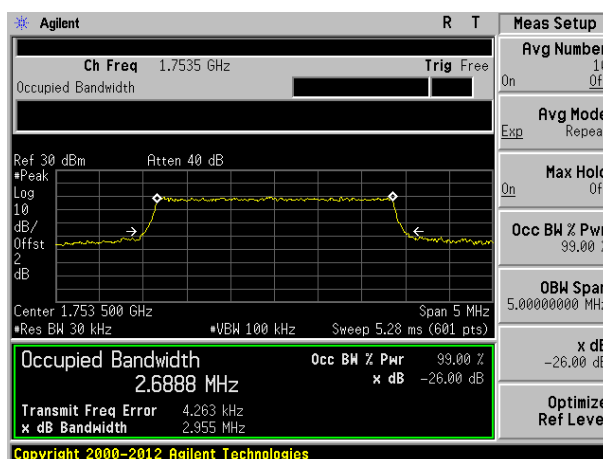
Test band: LTE Band 4	Channel Bandwidth: 3MHz
-----------------------	-------------------------



Lowest channel

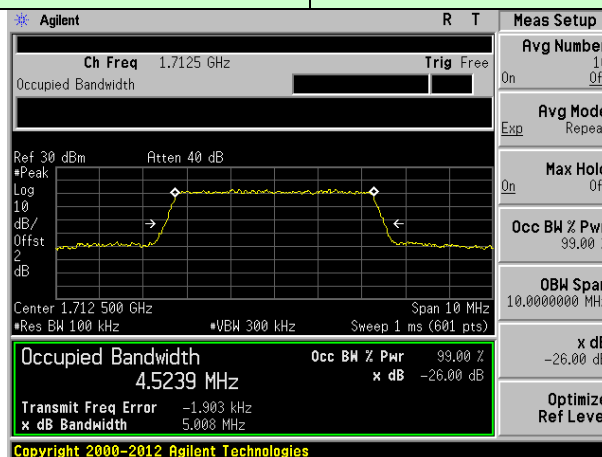


Middle channel

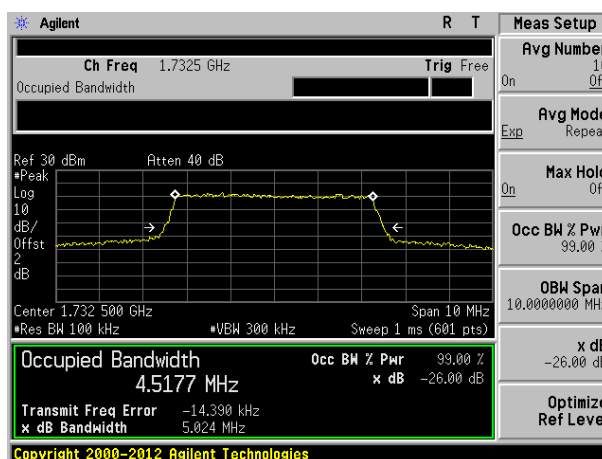


Highest channel

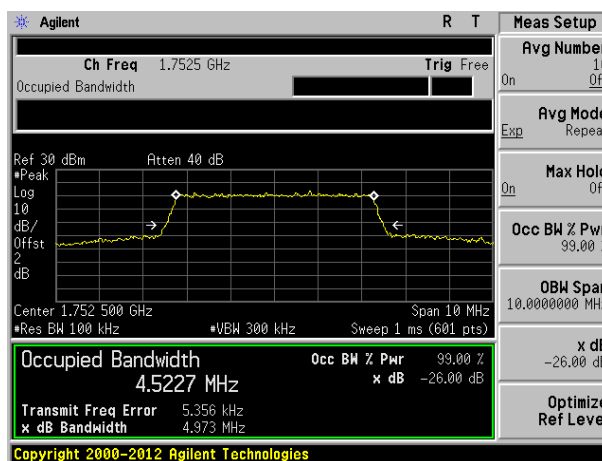
Test band: LTE Band 4	Channel Bandwidth: 5MHz
-----------------------	-------------------------



Lowest channel

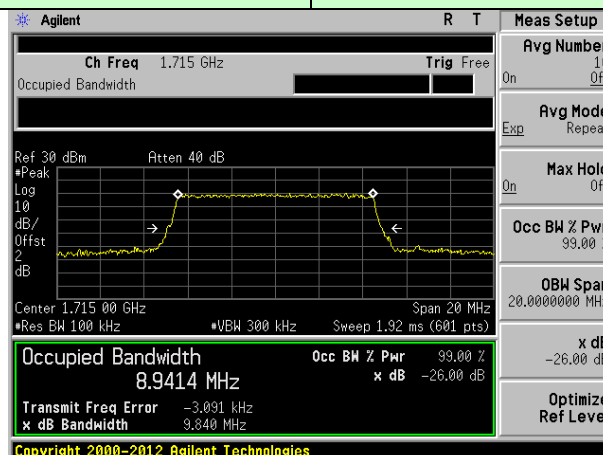


Middle channel

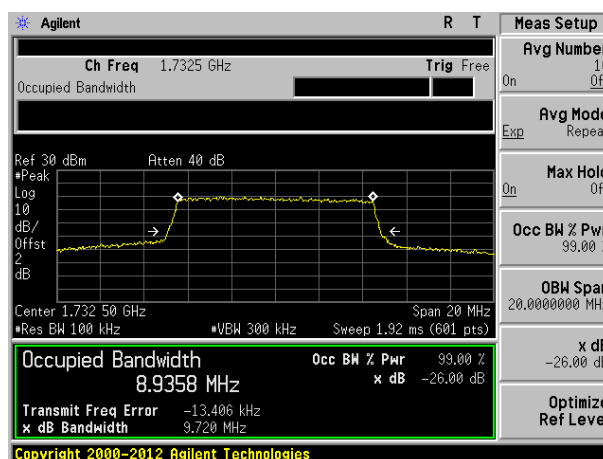


Highest channel

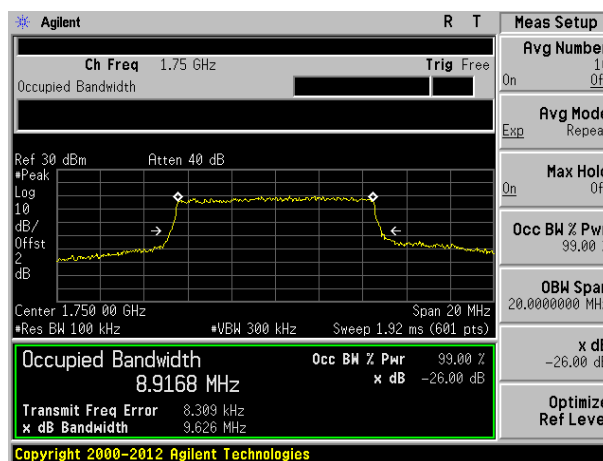
Test band: LTE Band 4	Channel Bandwidth: 10MHz
-----------------------	--------------------------



Lowest channel

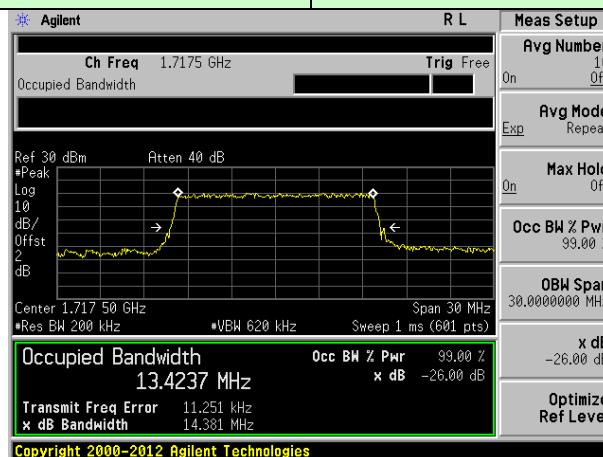


Middle channel

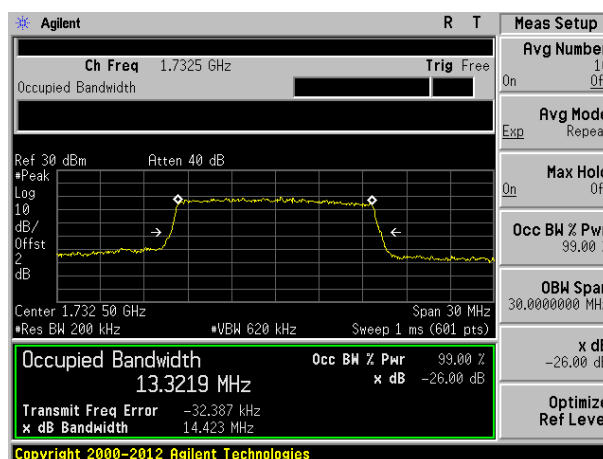


Highest channel

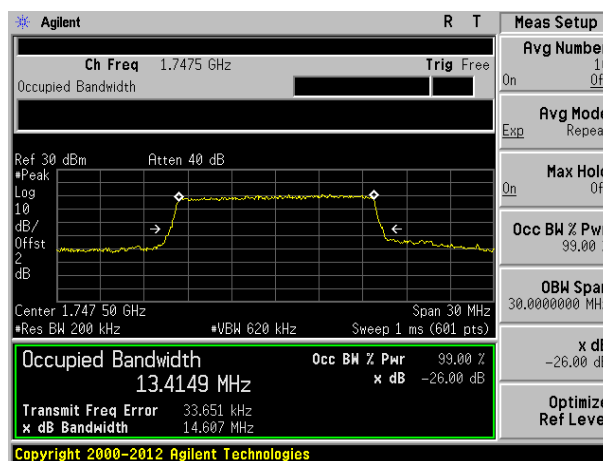
Test band: LTE Band 4	Channel Bandwidth: 15MHz
-----------------------	--------------------------



Lowest channel

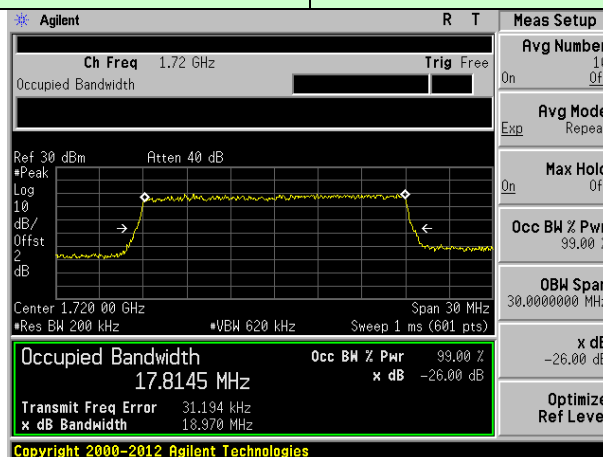


Middle channel

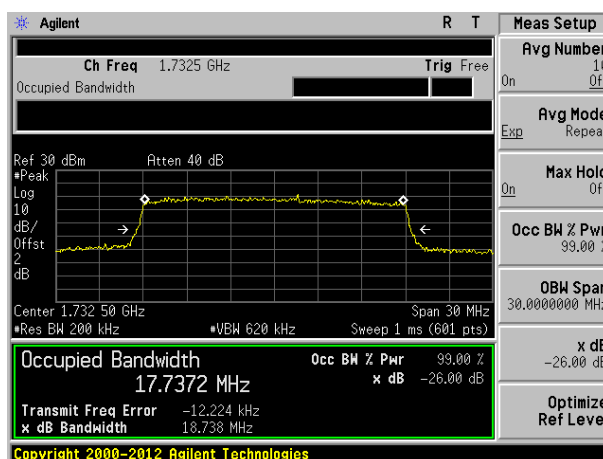


Highest channel

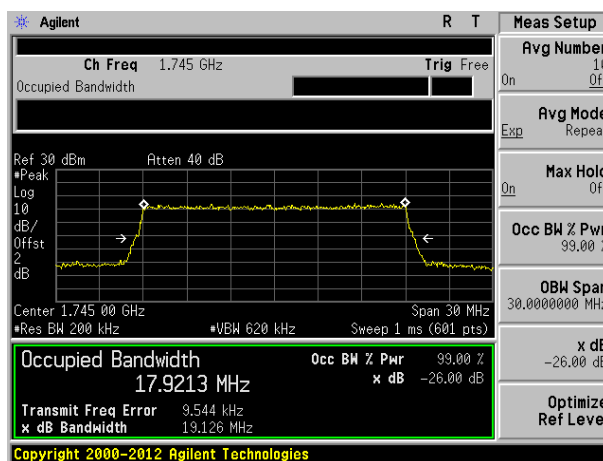
Test band: LTE Band 4	Channel Bandwidth: 20MHz
-----------------------	--------------------------



Lowest channel



Middle channel

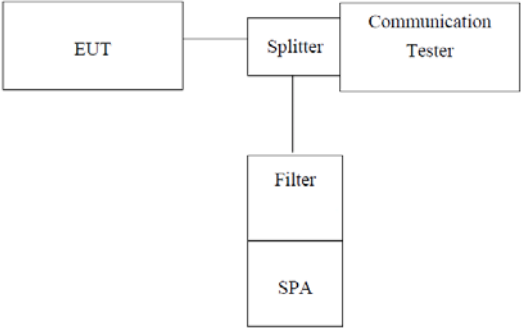


Highest channel

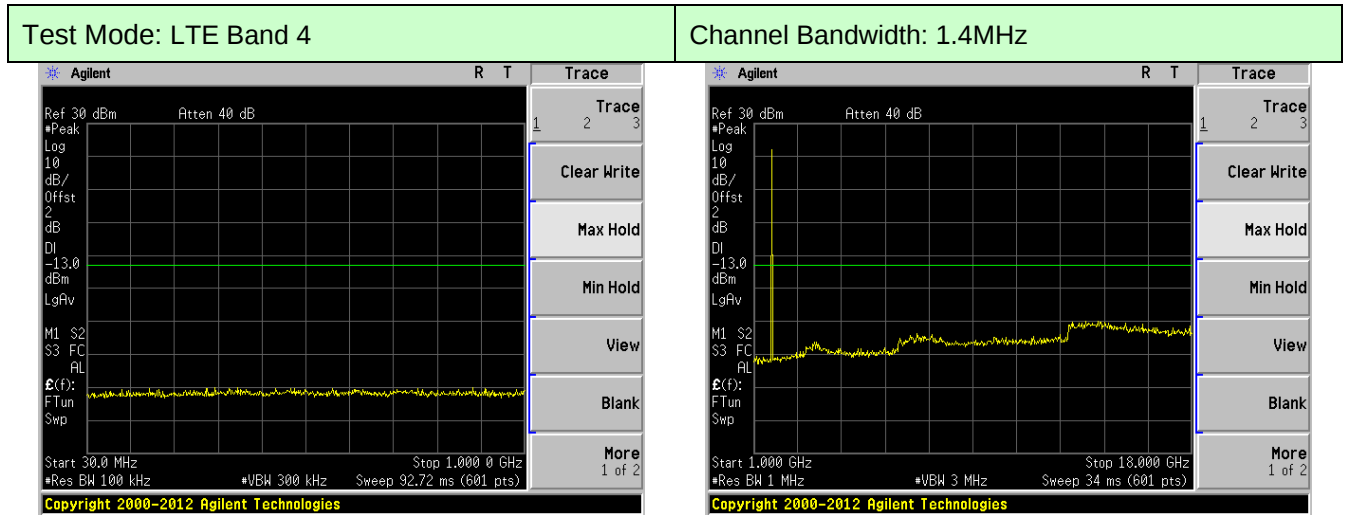
7.6 MODULATION CHARACTERISTIC

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

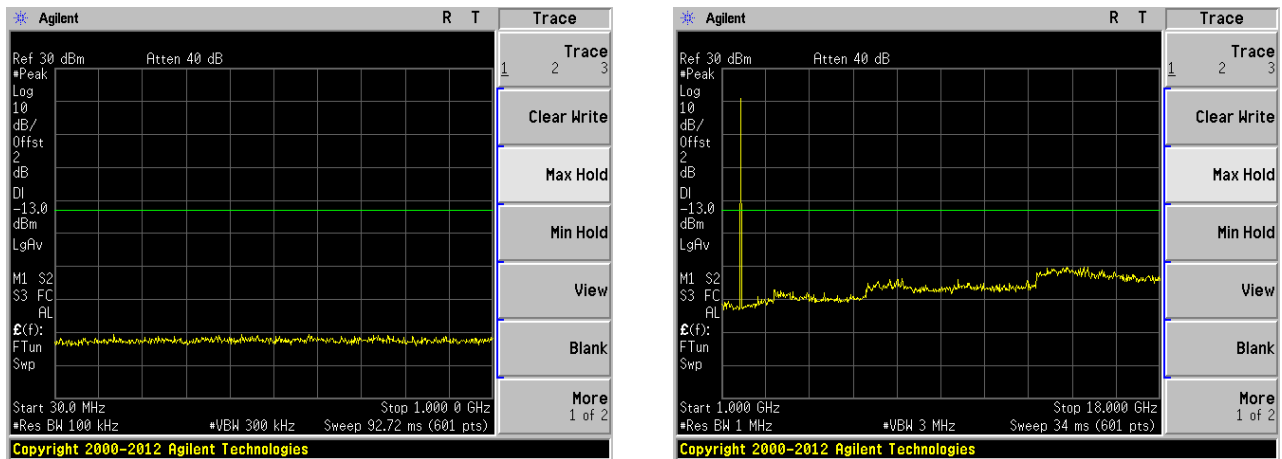
7.7 Out of band emission at antenna terminals

Test Requirement:	FCC Part 27.53(h)
Test Method:	FCC part2.1051
Limit:	-13dBm
Test setup:	 <i>Note: Measurement setup for testing on Antenna connector</i>
Test Procedure:	1 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. 2 The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic. 3 For the out of band: Set the RBW, VBW = 1MHz, Start=30MHz, Stop= 10th harmonic. 4 Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

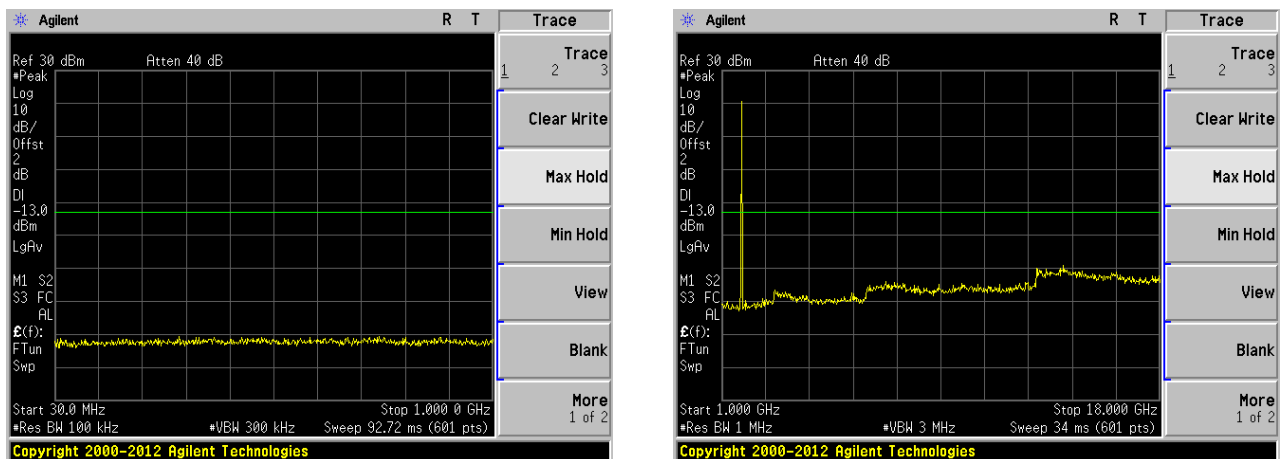
Test plot as follows:



Lowest channel



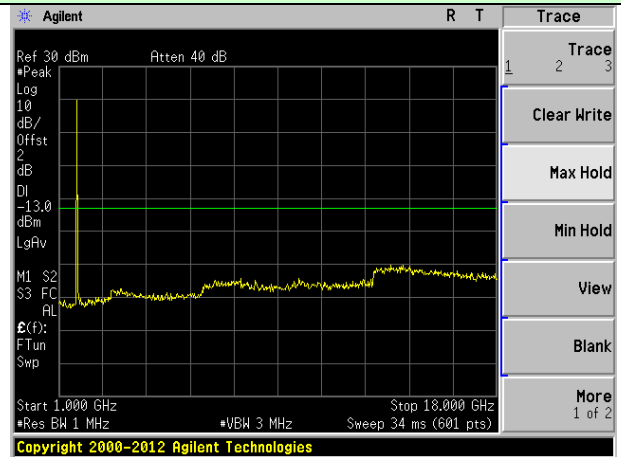
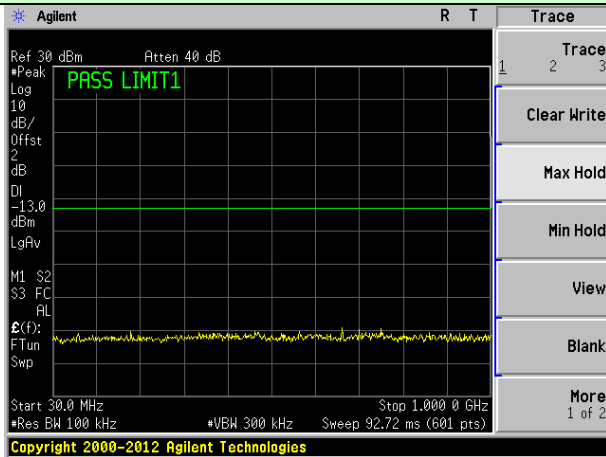
Middle channel



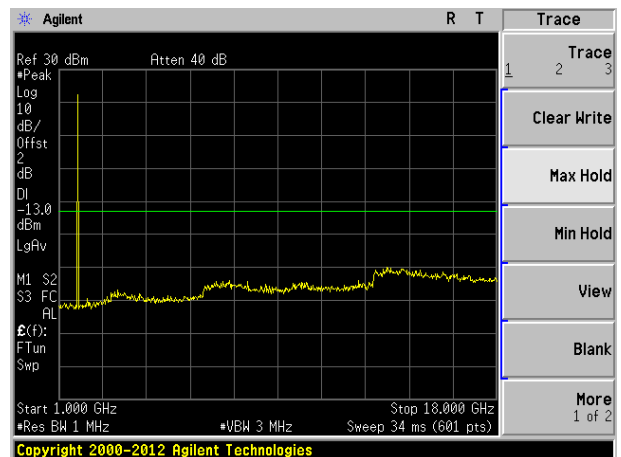
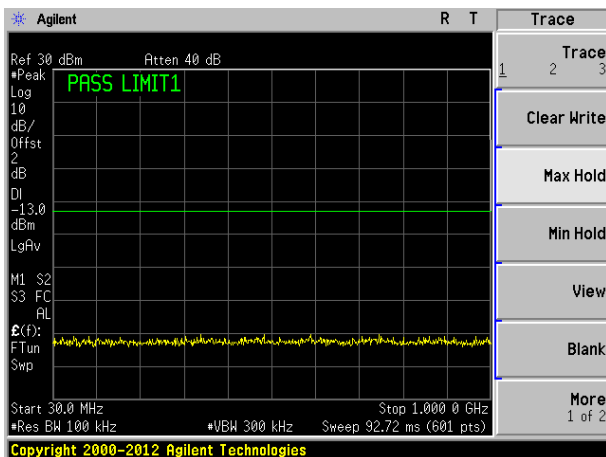
Highest channel

Test Mode: LTE Band 4

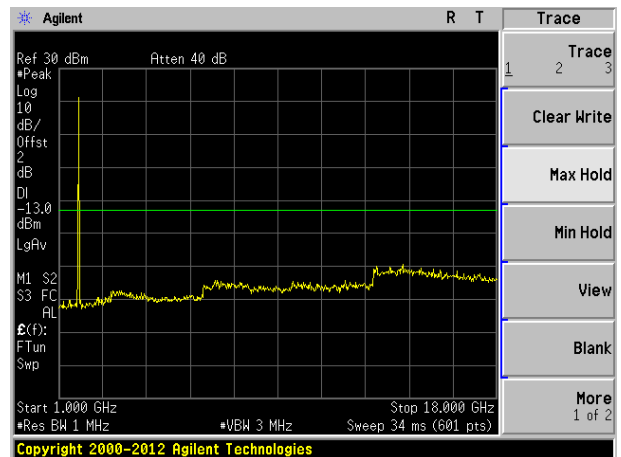
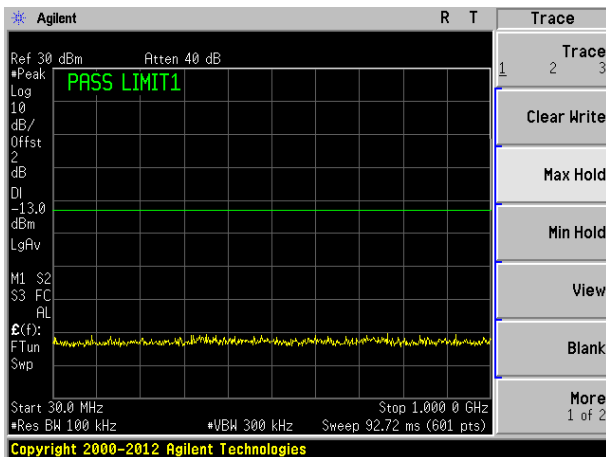
Channel Bandwidth: 3MHz



Lowest channel

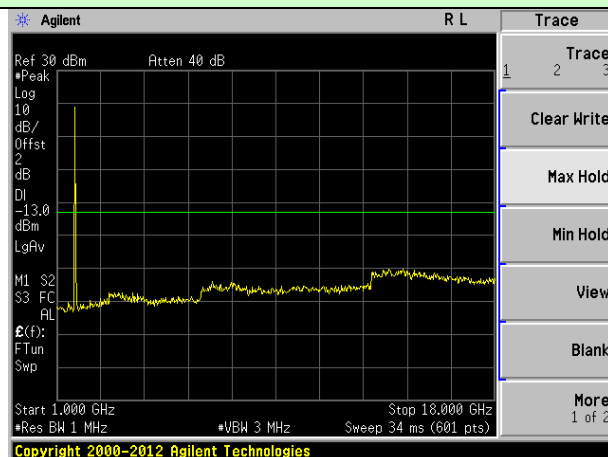
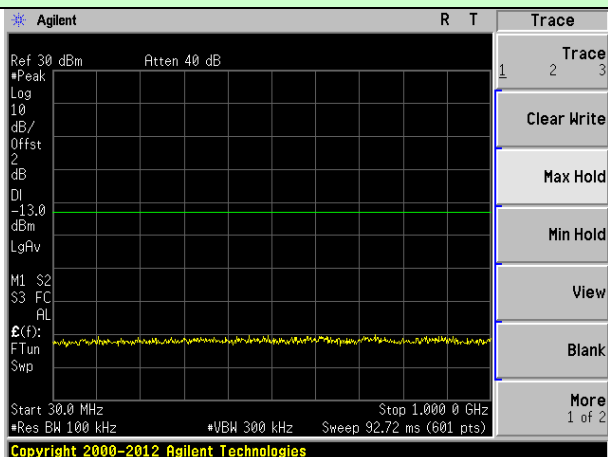


Middle channel

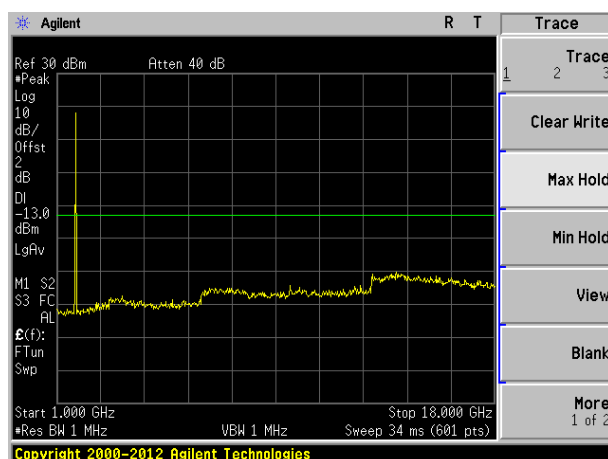
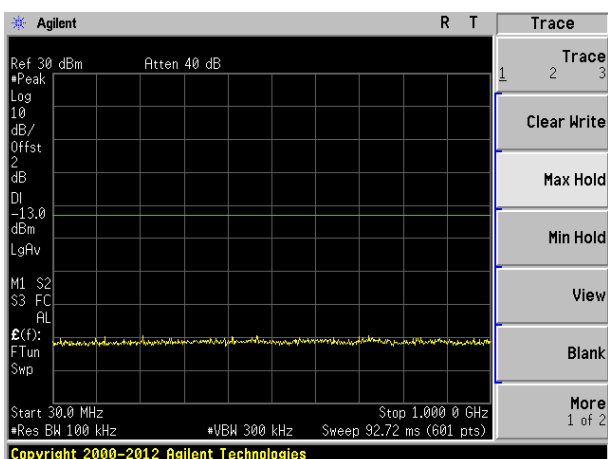


Highest channel

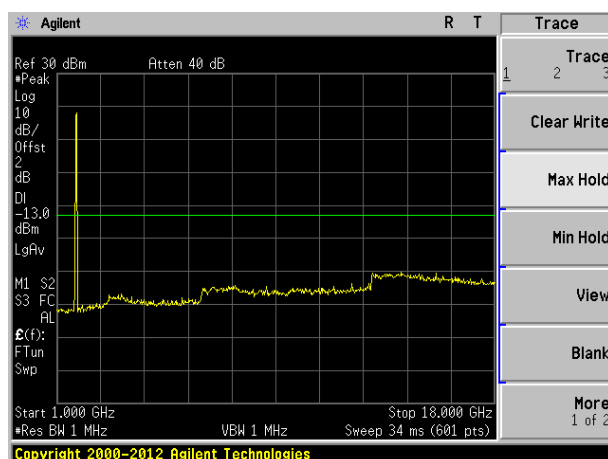
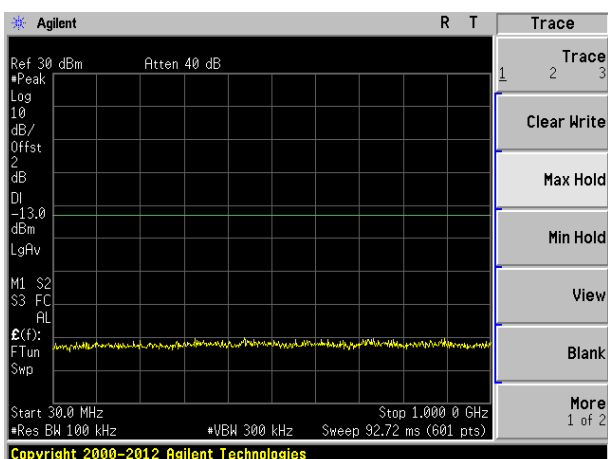
Test Mode: LTE Band 4	Channel Bandwidth: 5MHz
-----------------------	-------------------------



Lowest channel



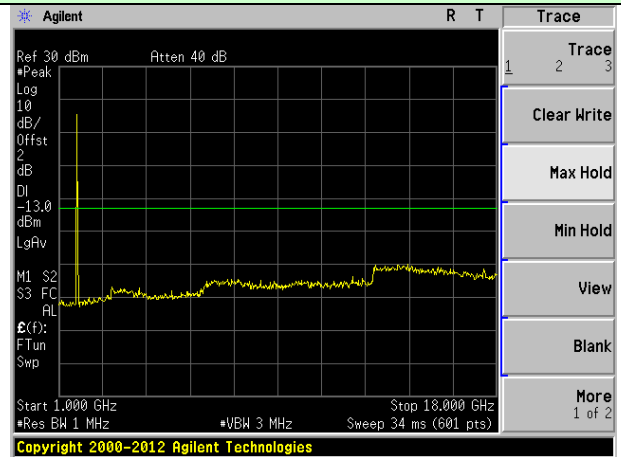
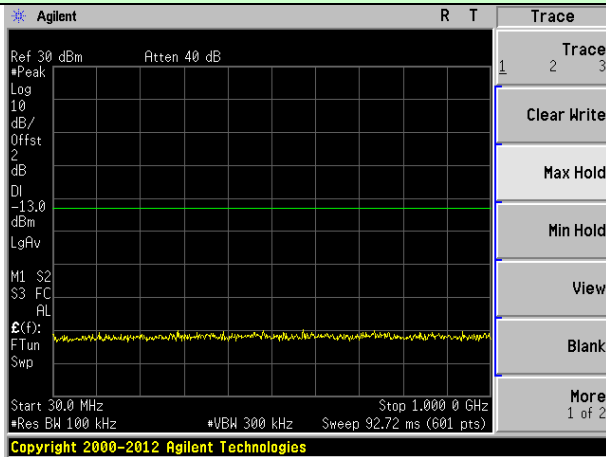
Middle channel



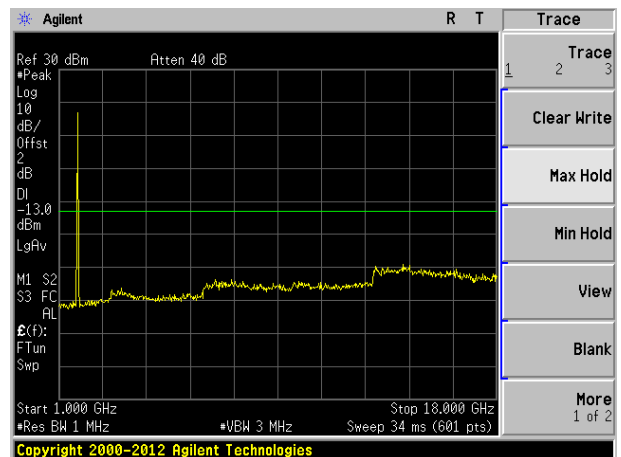
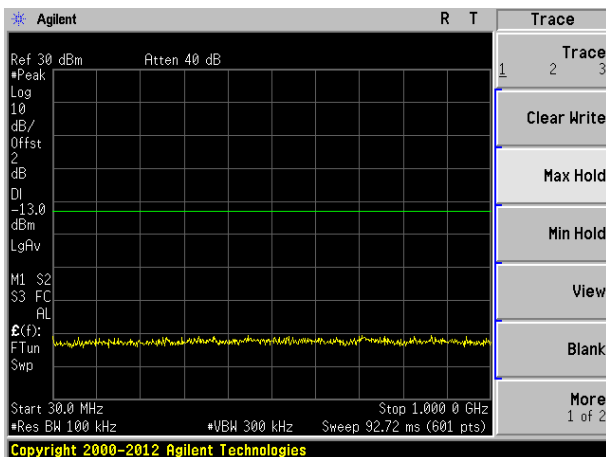
Highest channel

Test Mode: LTE Band 4

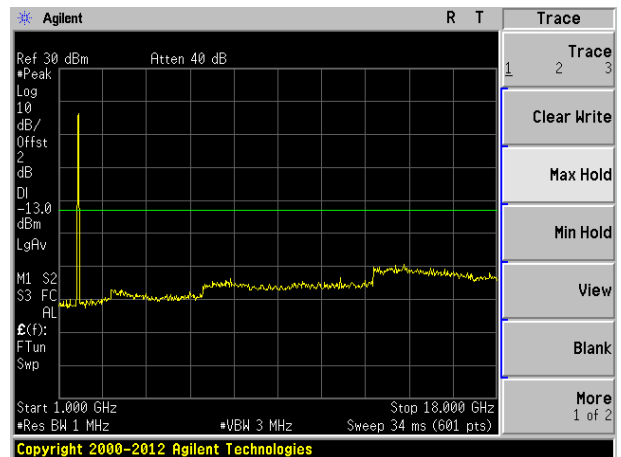
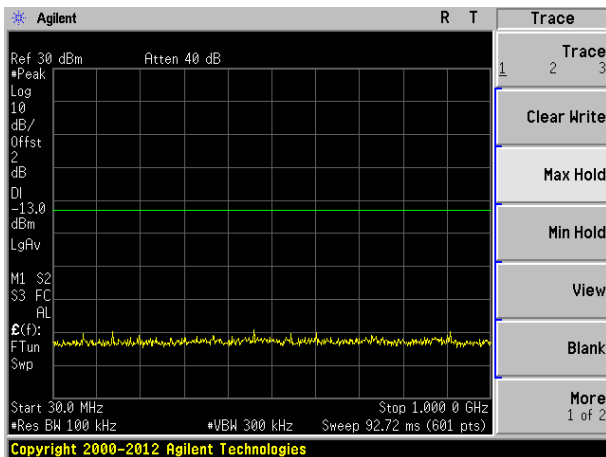
Channel Bandwidth: 10MHz



Lowest channel

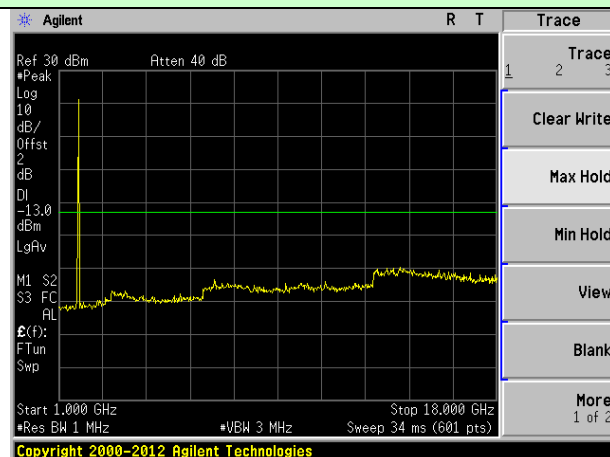
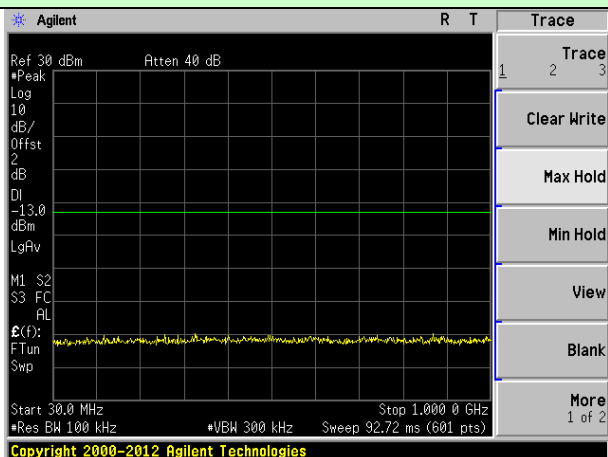


Middle channel

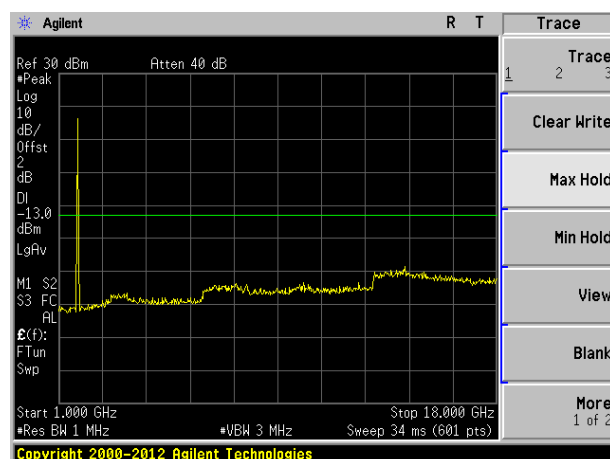
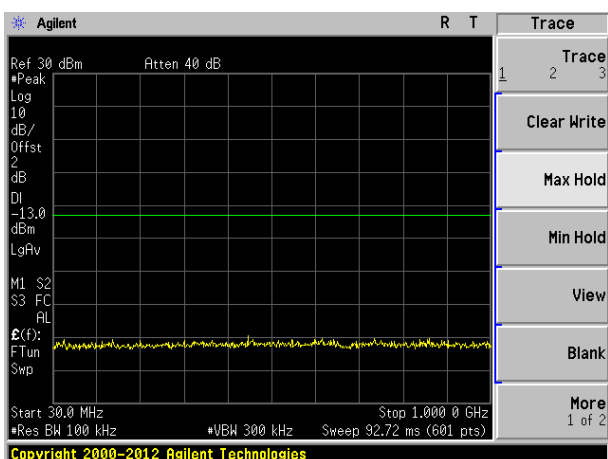


Highest channel

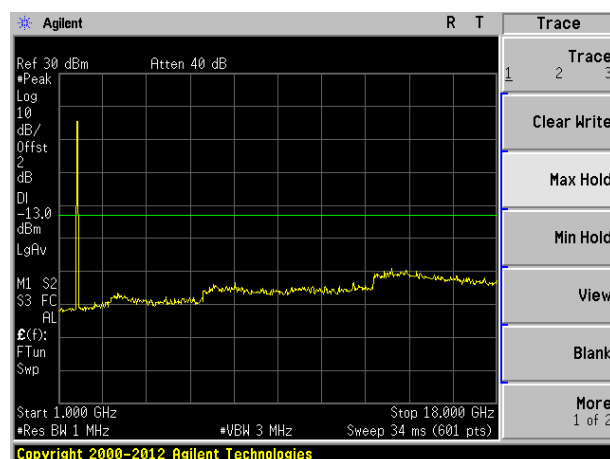
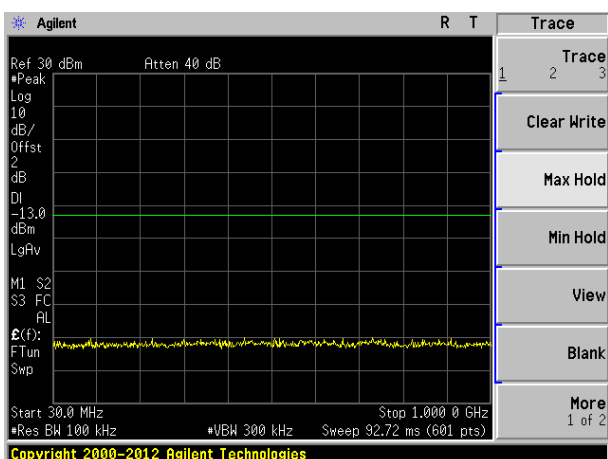
Test Mode: LTE Band 4	Channel Bandwidth: 15MHz
-----------------------	--------------------------



Lowest channel

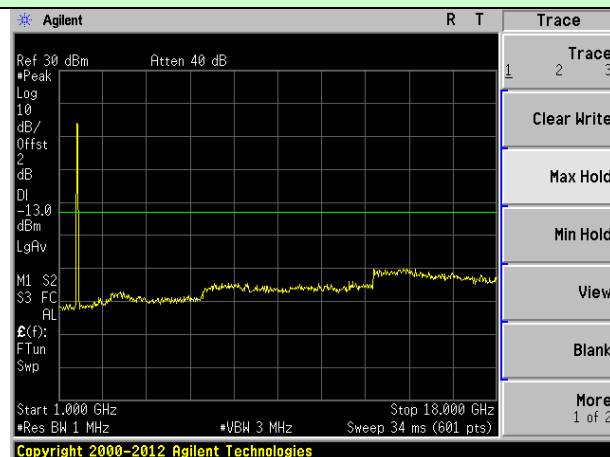
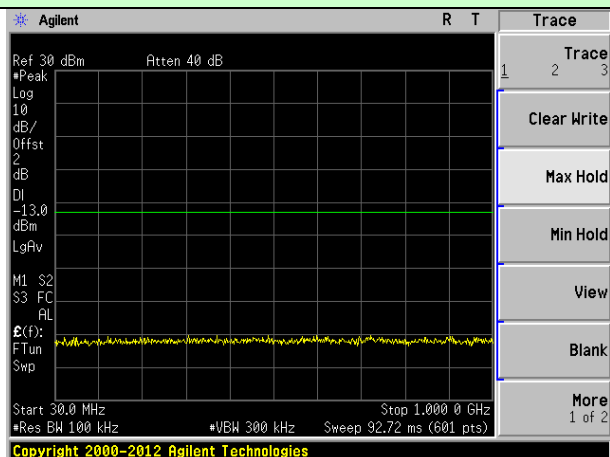


Middle channel

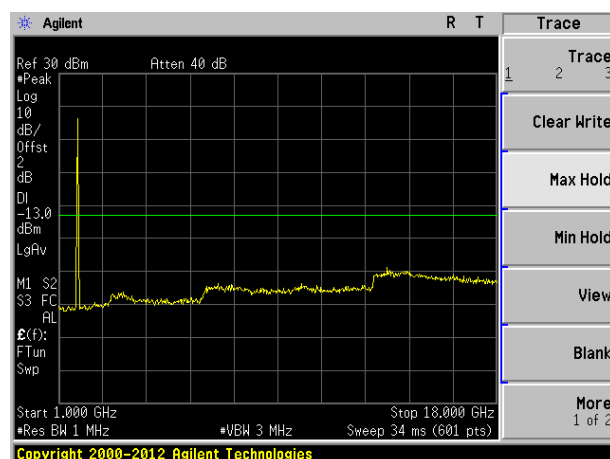
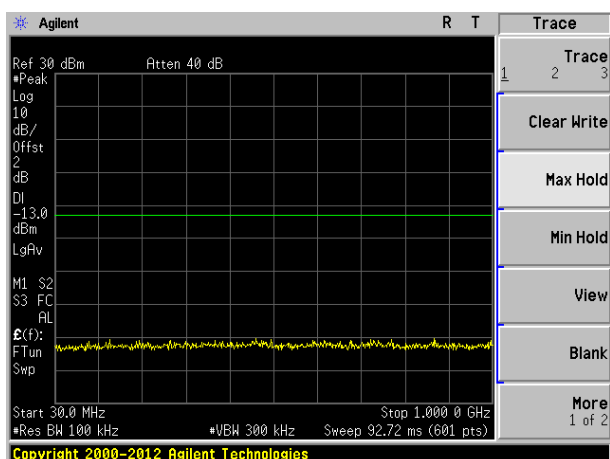


Highest channel

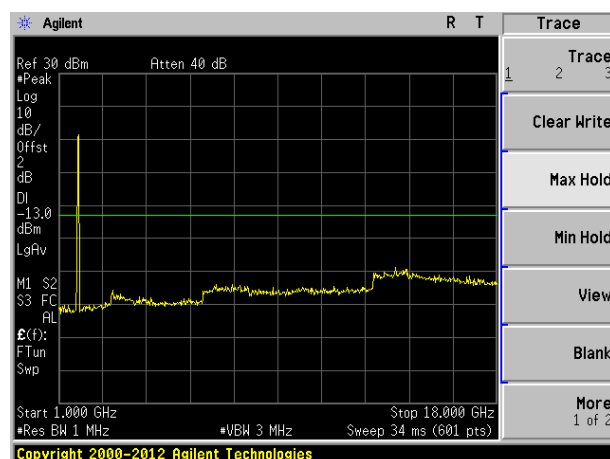
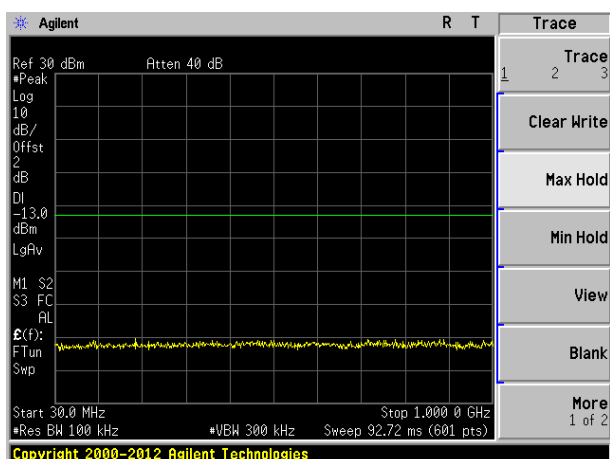
Test Mode: LTE Band 4	Channel Bandwidth: 20MHz
-----------------------	--------------------------



Lowest channel



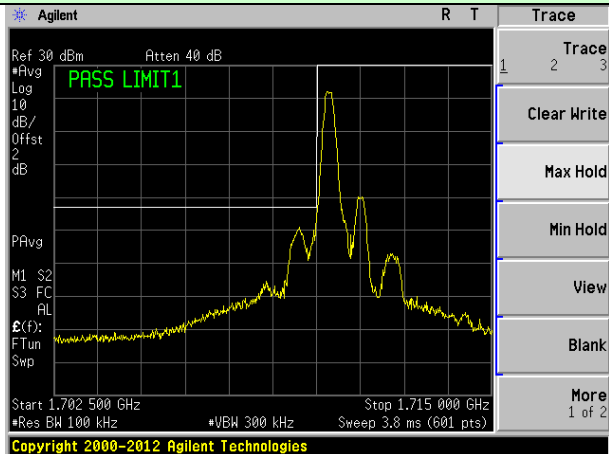
Middle channel



Highest channel

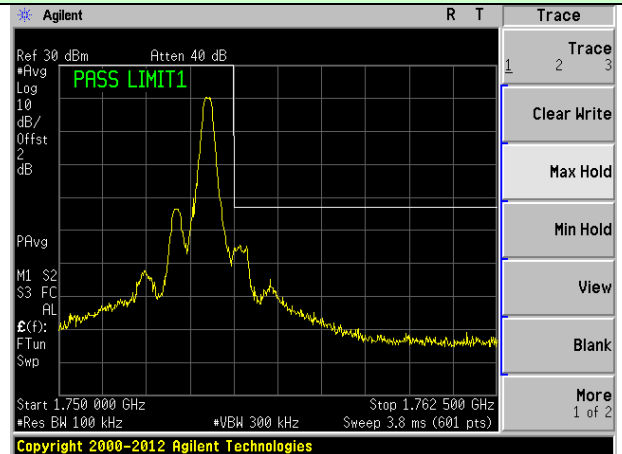
**Band Edge:
QPSK mode:**

1.4MHz Bandwidth (RB size:1# RB offset:0#)



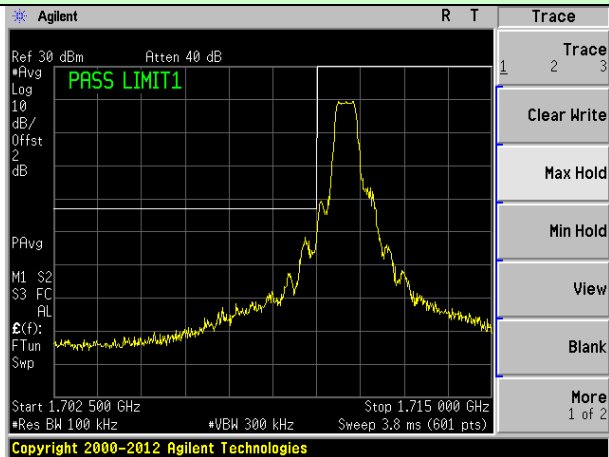
Lowest channel

1.4MHz Bandwidth (RB size:1# RB offset:5#)



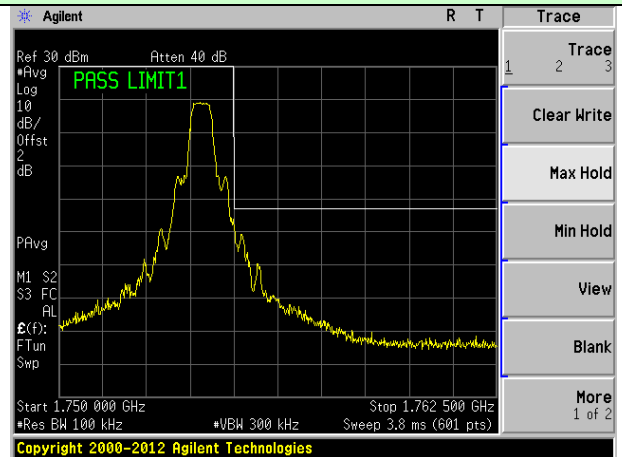
Highest channel

1.4MHz Bandwidth (RB size:3# RB offset:0#)



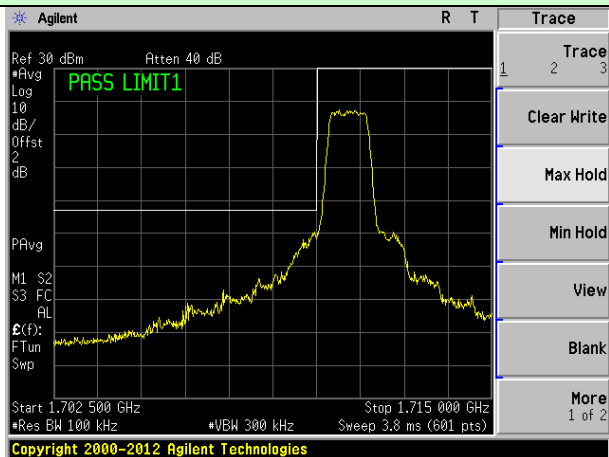
Lowest channel

1.4MHz Bandwidth (RB size:3# RB offset:2#)



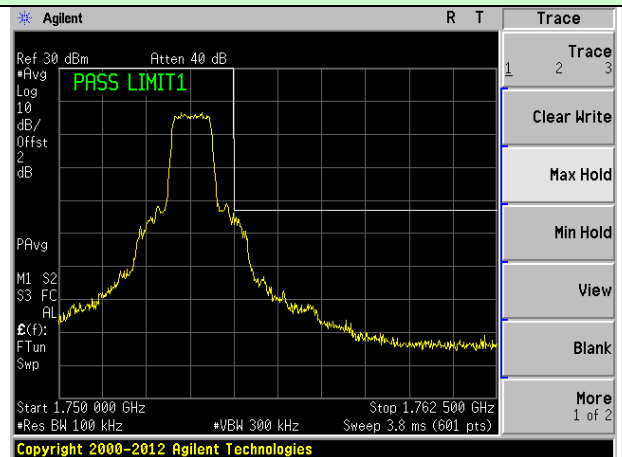
Highest channel

1.4MHz Bandwidth (RB size:6# RB offset:0#)



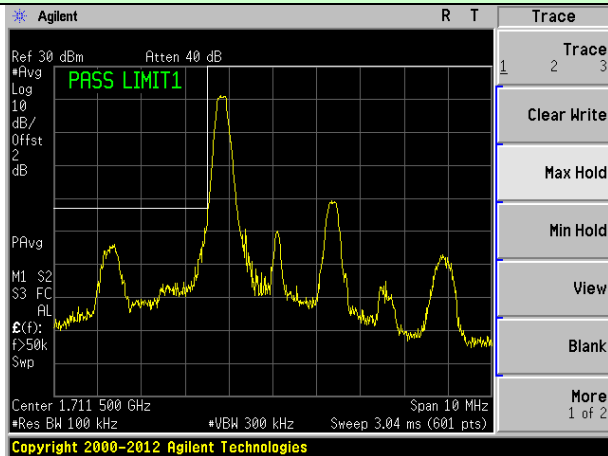
Lowest channel

1.4MHz Bandwidth (RB size:6# RB offset:0#)



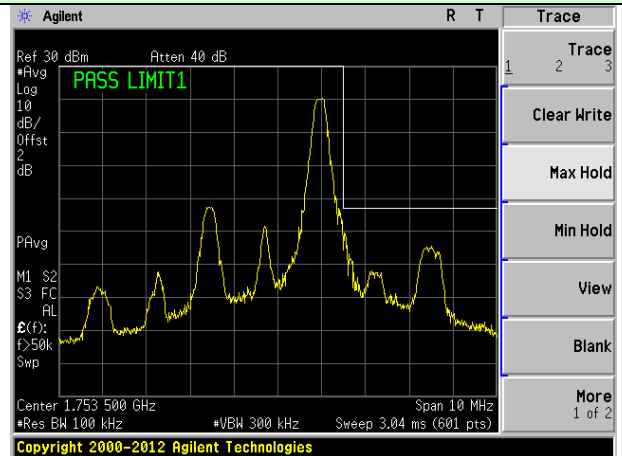
Highest channel

3MHz Bandwidth (RB size:1# RB offset:0#)



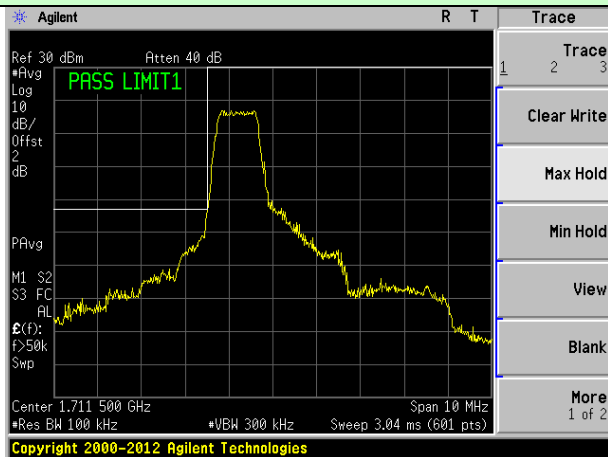
Lowest channel

3MHz Bandwidth (RB size:1# RB offset:14#)



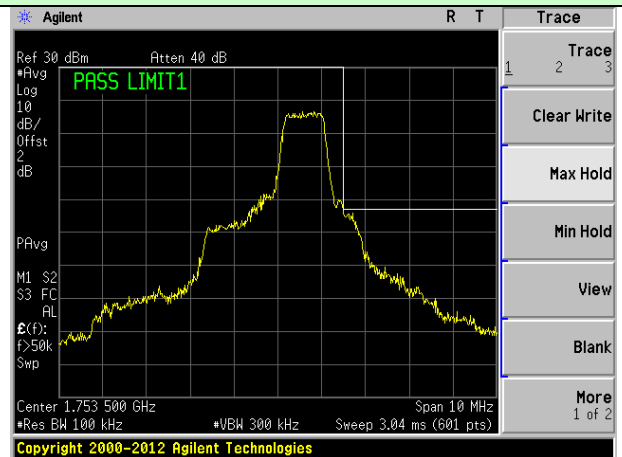
Highest channel

3MHz Bandwidth (RB size:8# RB offset:0#)



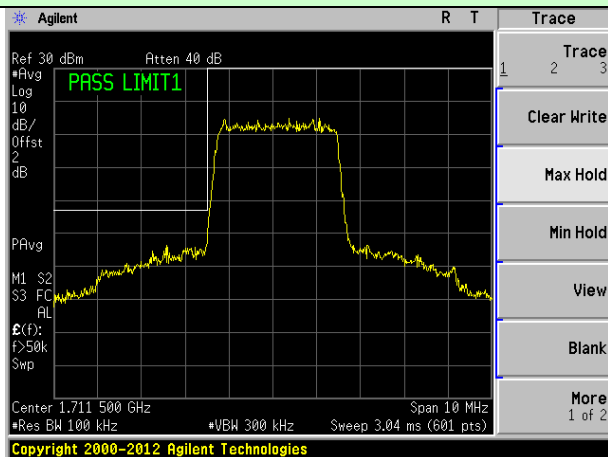
Lowest channel

3MHz Bandwidth (RB size:8# RB offset:7#)



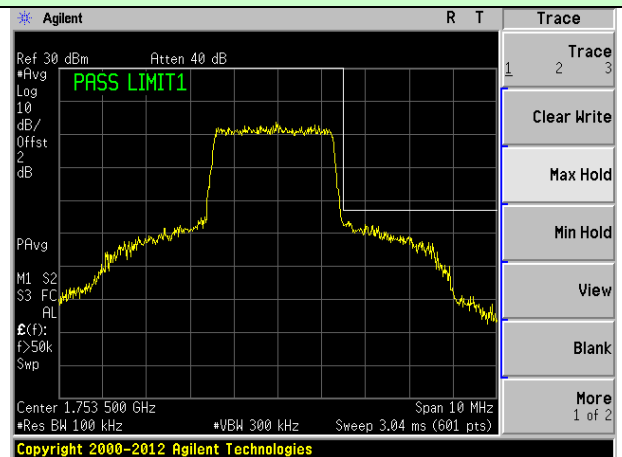
Highest channel

3MHz Bandwidth (RB size:15# RB offset:0#)

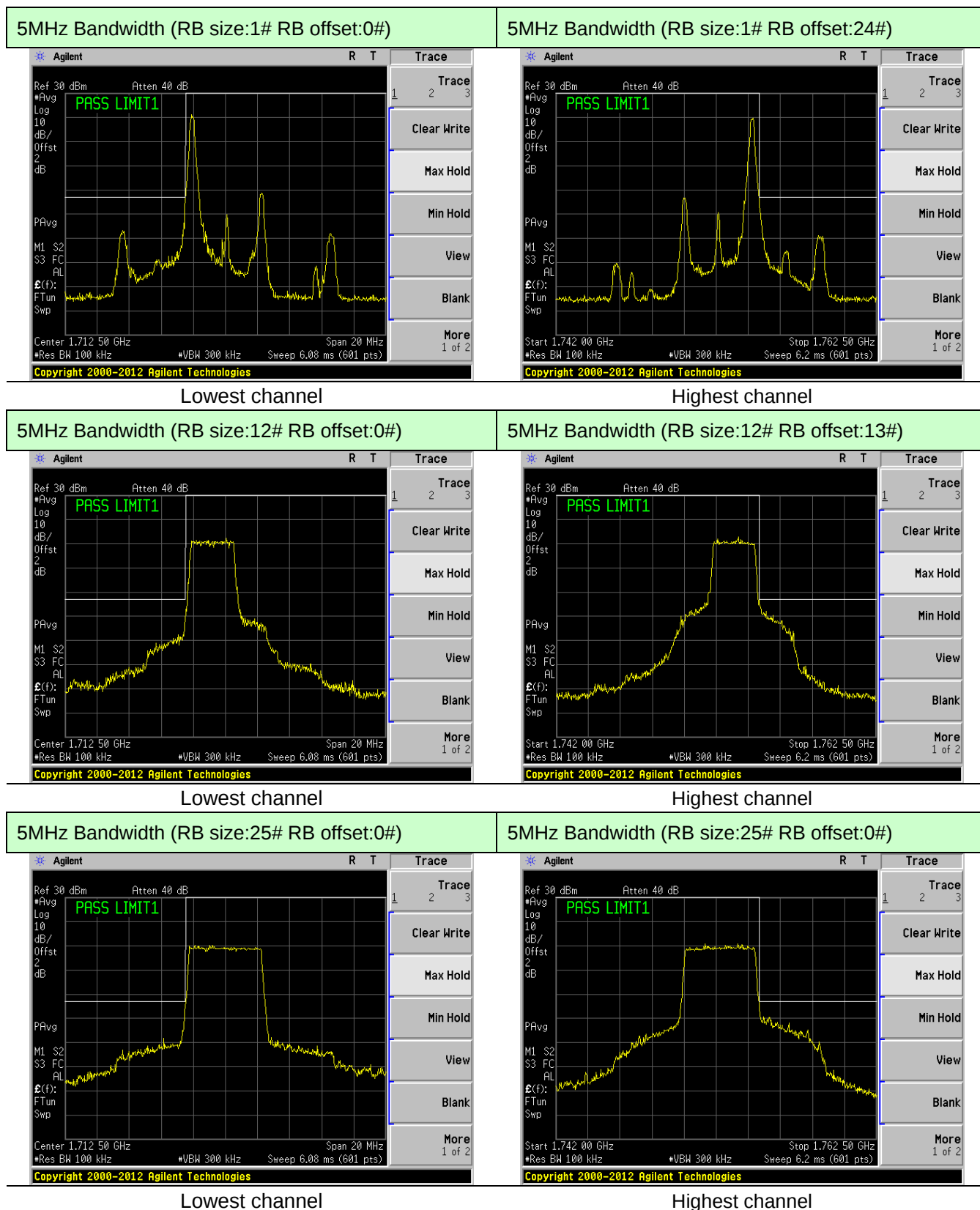


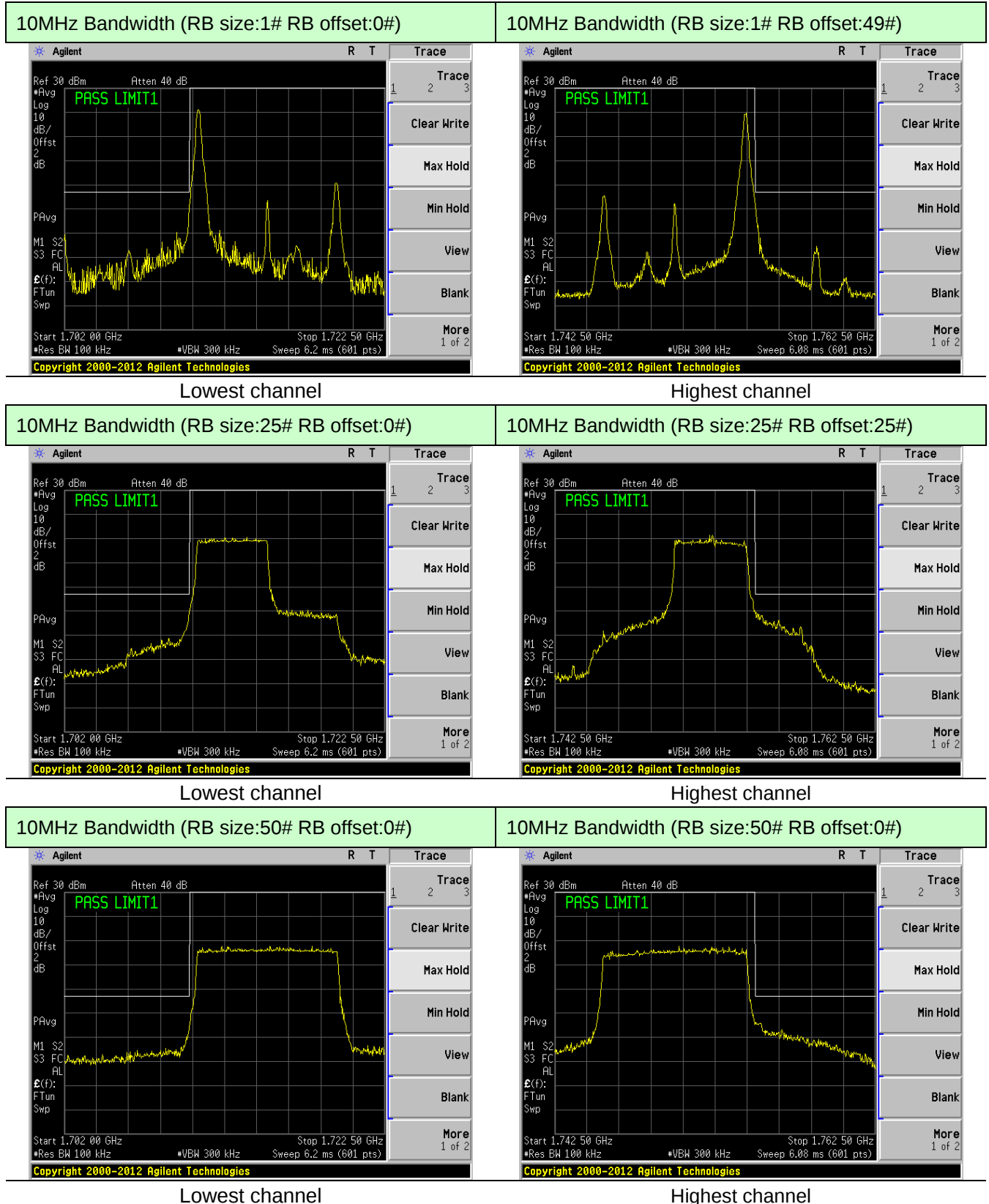
Lowest channel

3MHz Bandwidth (RB size:15# RB offset:0#)

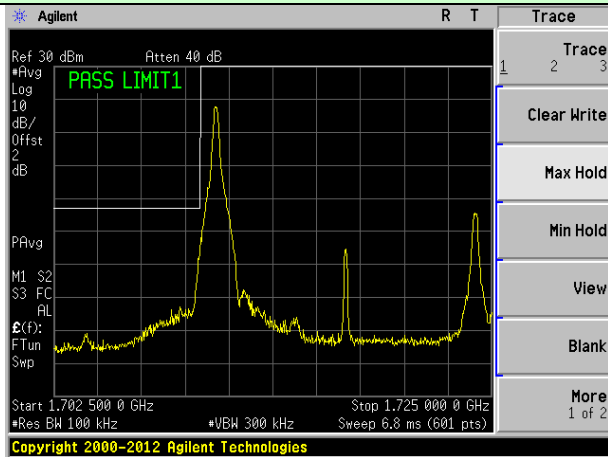


Highest channel

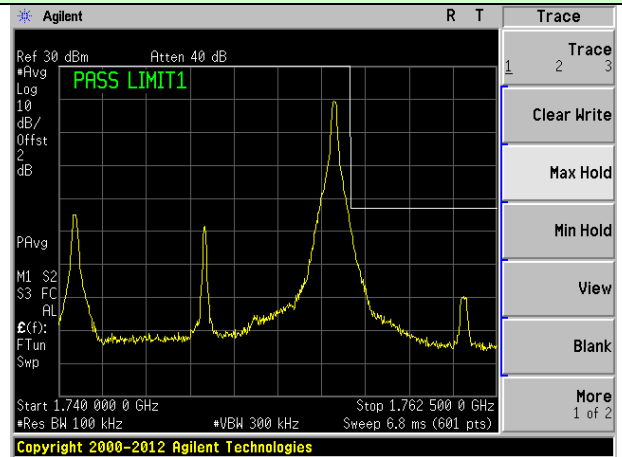




15MHz Bandwidth (RB size:1# RB offset:0#)



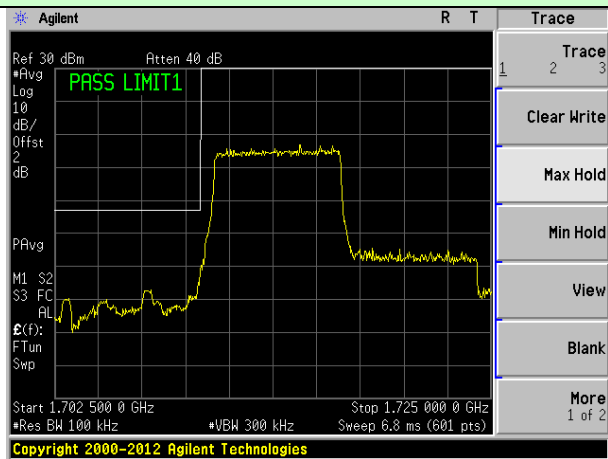
15MHz Bandwidth (RB size:1# RB offset:74#)



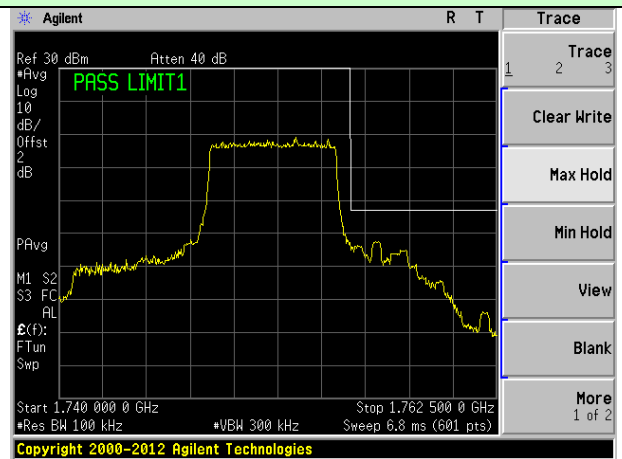
Lowest channel

Highest channel

15MHz Bandwidth (RB size:36# RB offset:0#)



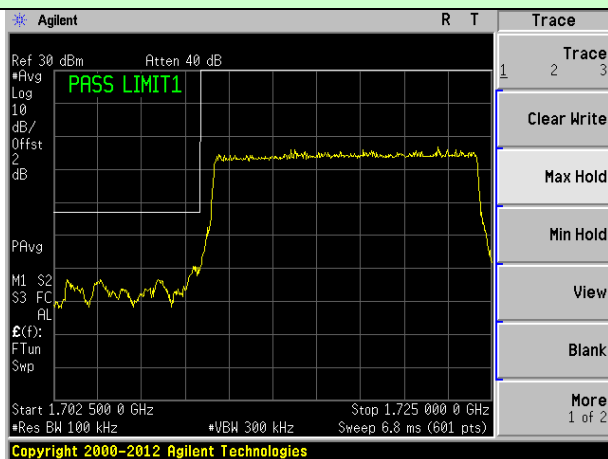
15MHz Bandwidth (RB size:36# RB offset:39#)



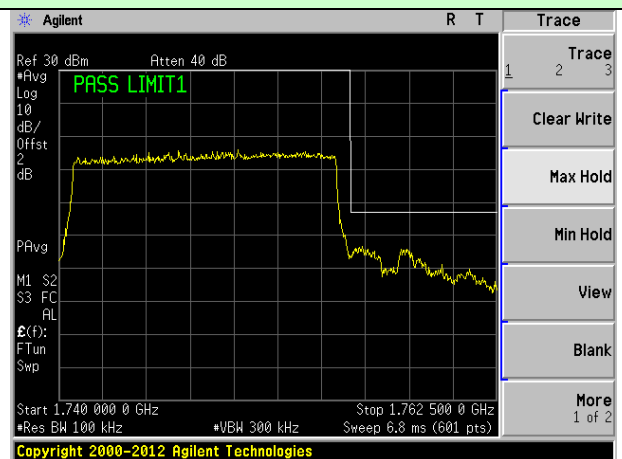
Lowest channel

Highest channel

15MHz Bandwidth (RB size:75# RB offset:0#)

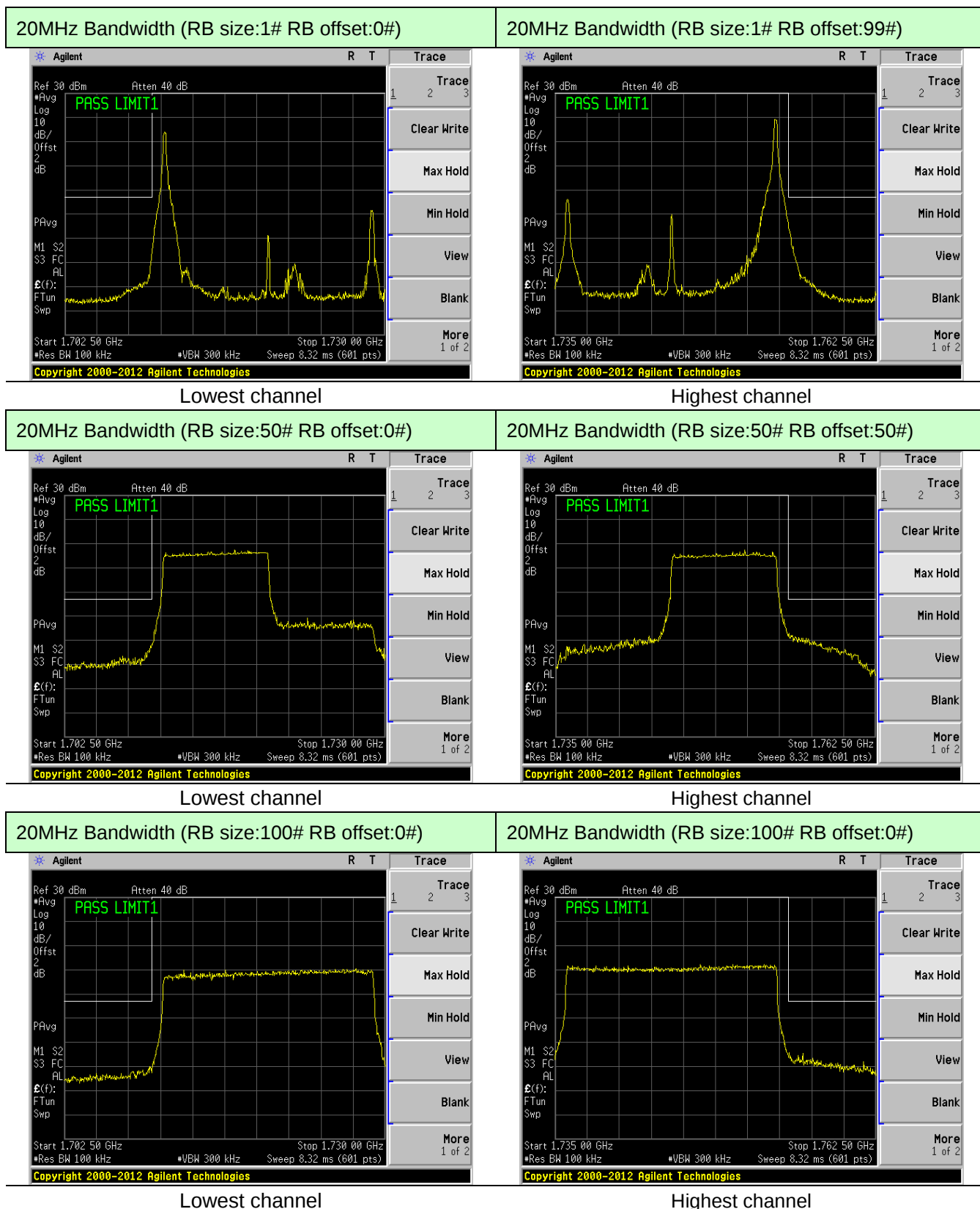


15MHz Bandwidth (RB size:75# RB offset:0#)



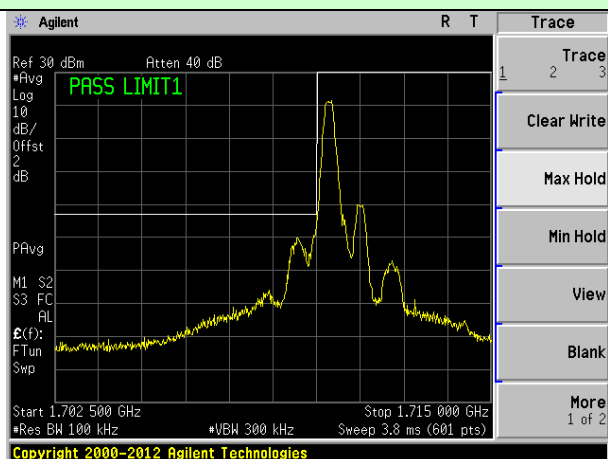
Lowest channel

Highest channel



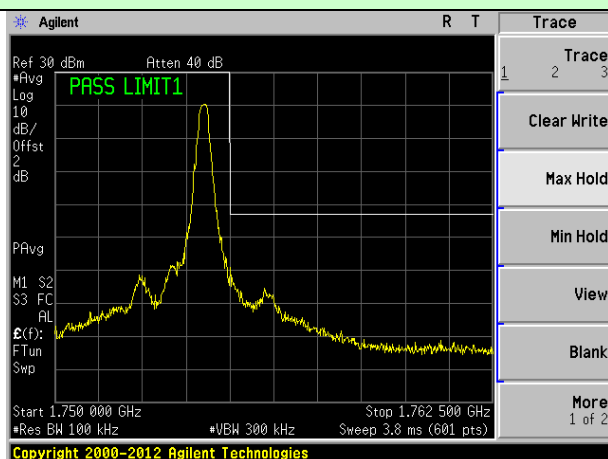
LTE Band 4 (16QAM mode):

1.4MHz Bandwidth (RB size:1# RB offset:0#)



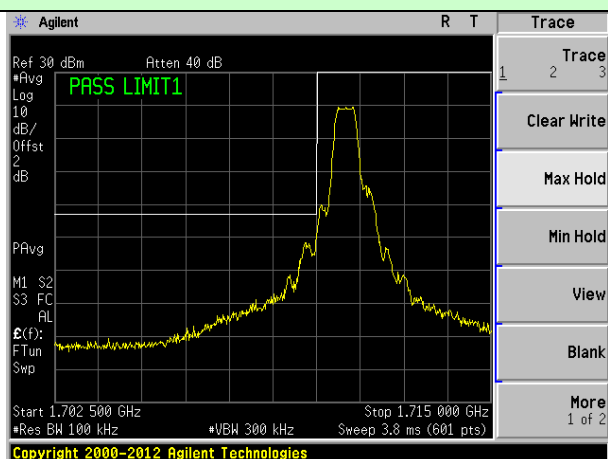
Lowest channel

1.4MHz Bandwidth (RB size:1# RB offset:5#)



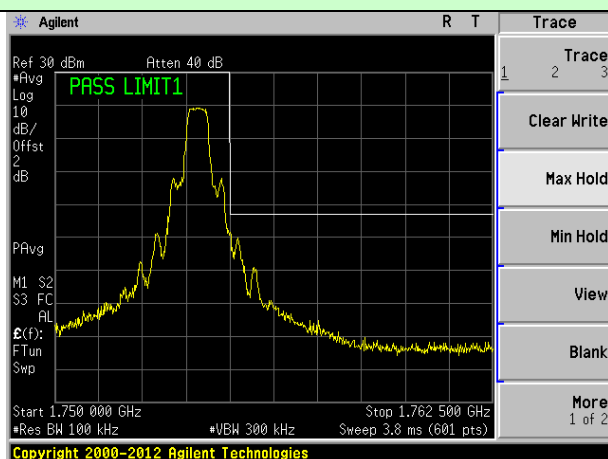
Highest channel

1.4MHz Bandwidth (RB size:3# RB offset:0#)



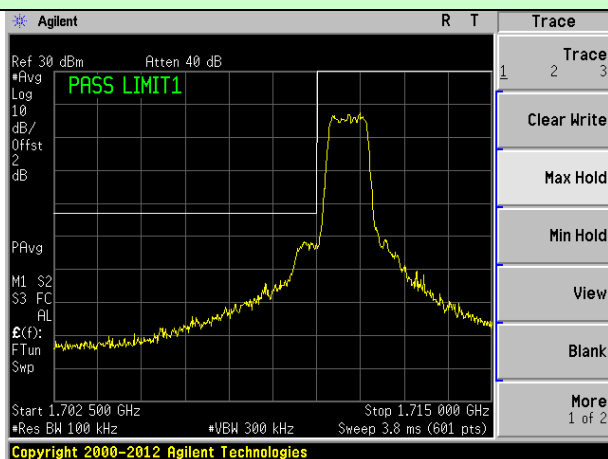
Lowest channel

1.4MHz Bandwidth (RB size:3# RB offset:2#)



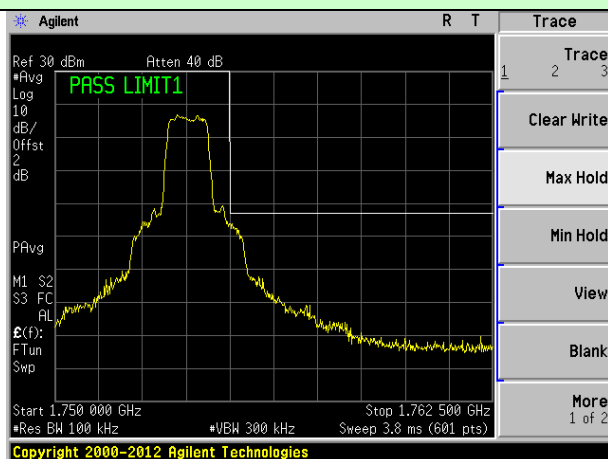
Highest channel

1.4MHz Bandwidth (RB size:6# RB offset:0#)

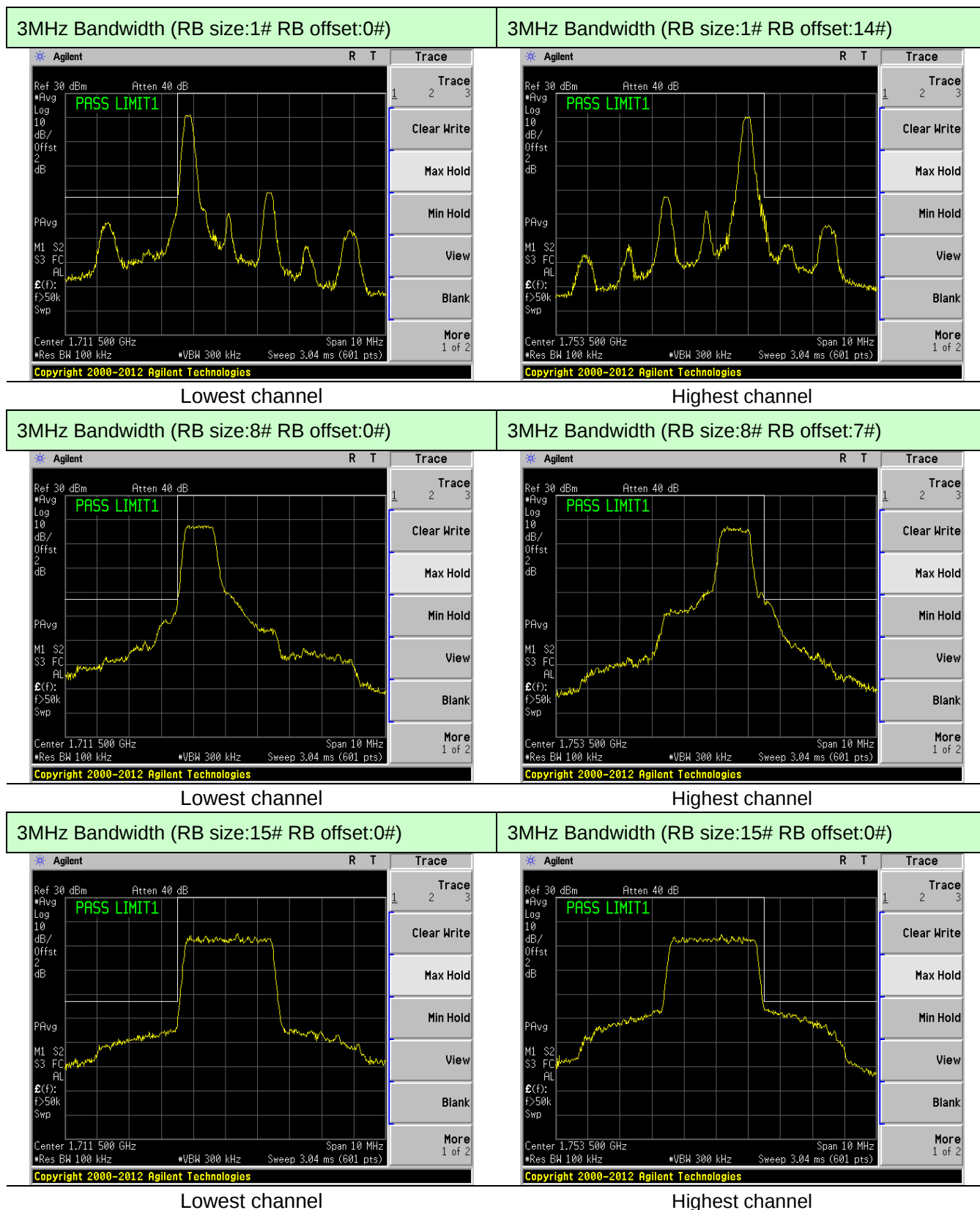


Lowest channel

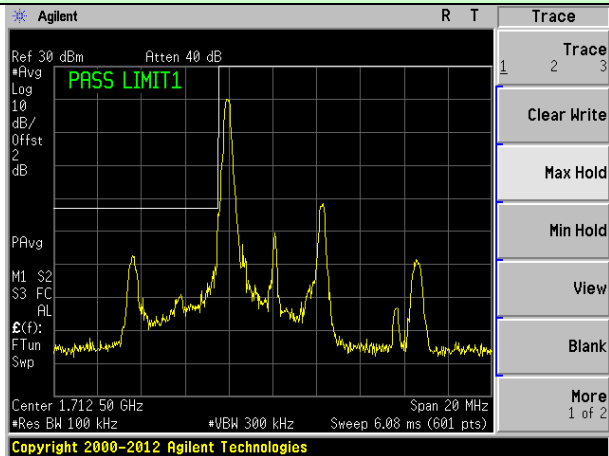
1.4MHz Bandwidth (RB size:6# RB offset:0#)



Highest channel

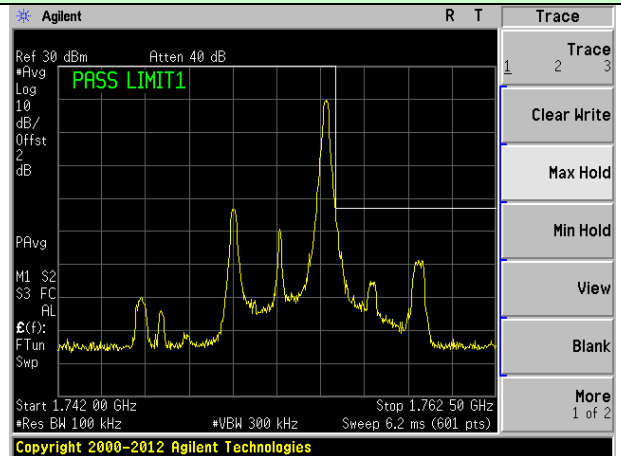


5MHz Bandwidth (RB size:1# RB offset:0#)



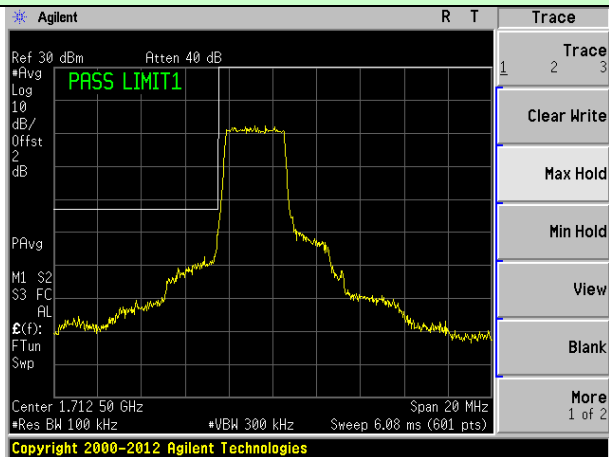
Lowest channel

5MHz Bandwidth (RB size:1# RB offset:24#)



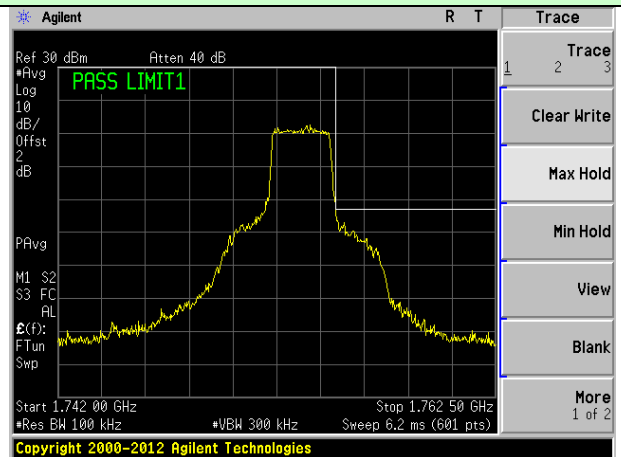
Highest channel

5MHz Bandwidth (RB size:12# RB offset:0#)



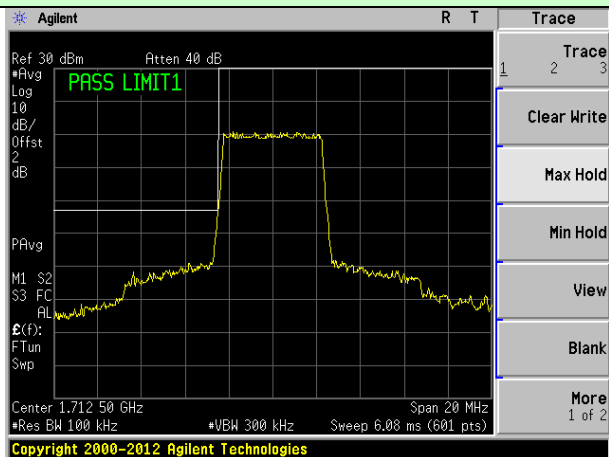
Lowest channel

5MHz Bandwidth (RB size:12# RB offset:13#)



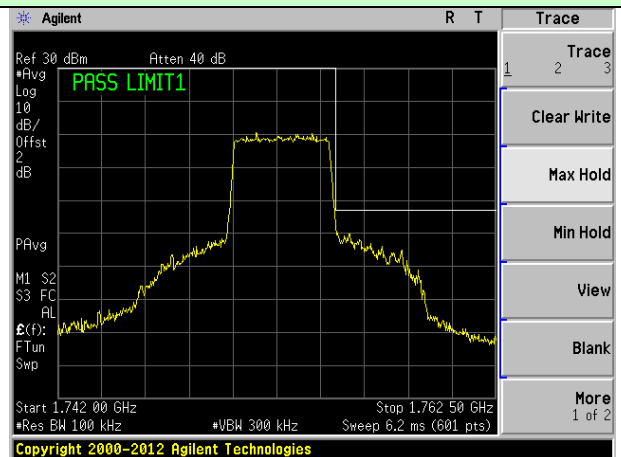
Highest channel

5MHz Bandwidth (RB size:25# RB offset:0#)

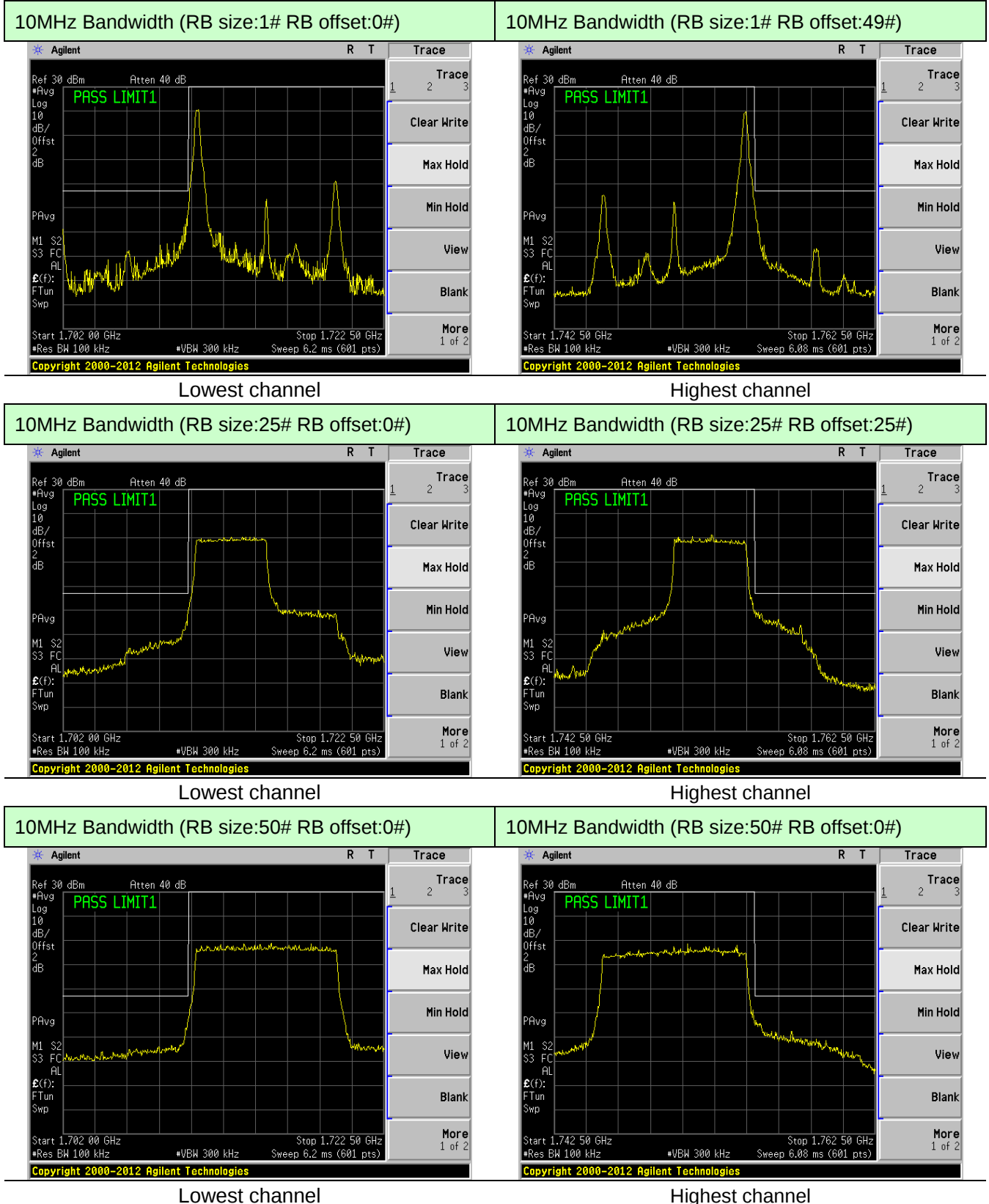


Lowest channel

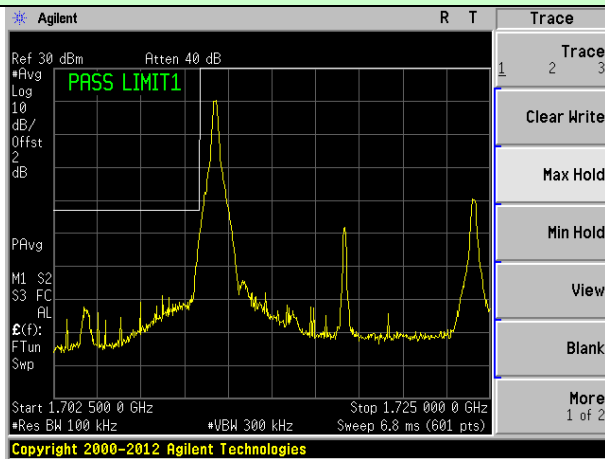
5MHz Bandwidth (RB size:25# RB offset:0#)



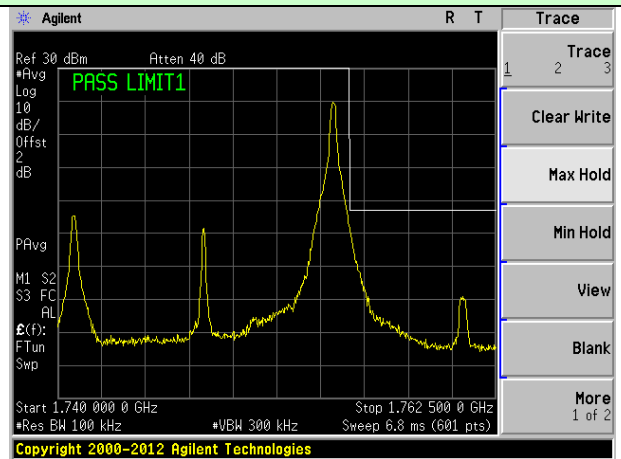
Highest channel



15MHz Bandwidth (RB size:1# RB offset:0#)



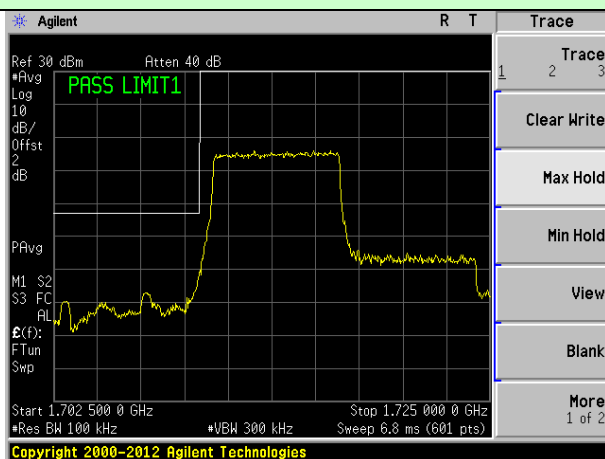
15MHz Bandwidth (RB size:1# RB offset:74#)



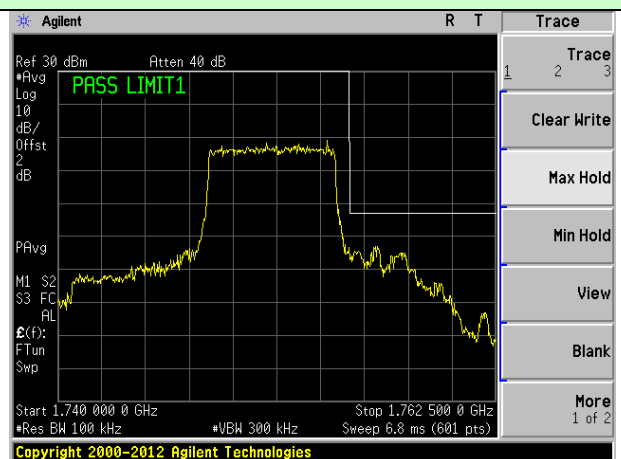
Lowest channel

Highest channel

15MHz Bandwidth (RB size:36# RB offset:0#)



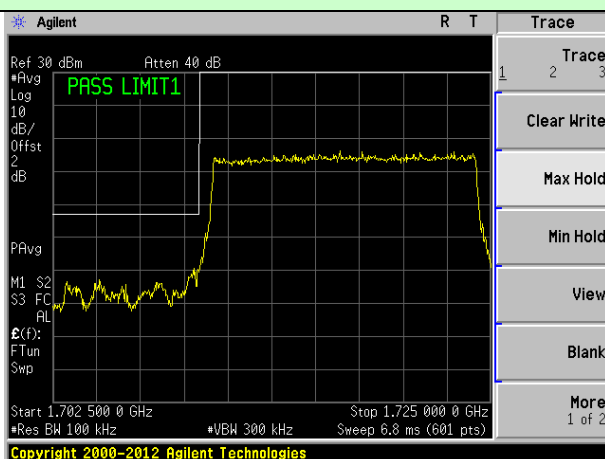
15MHz Bandwidth (RB size:36# RB offset:39#)



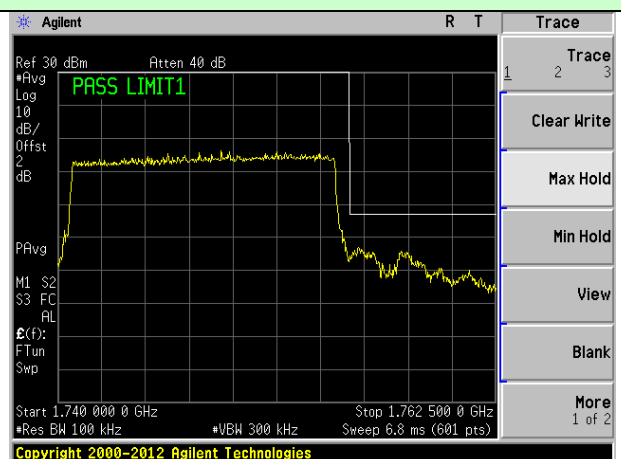
Lowest channel

Highest channel

15MHz Bandwidth (RB size:75# RB offset:0#)



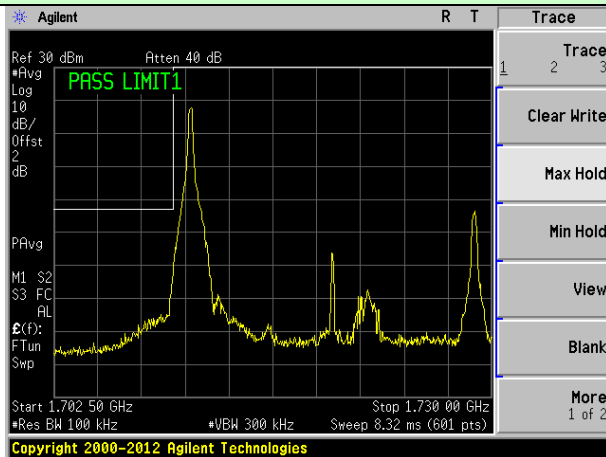
15MHz Bandwidth (RB size:75# RB offset:0#)



Lowest channel

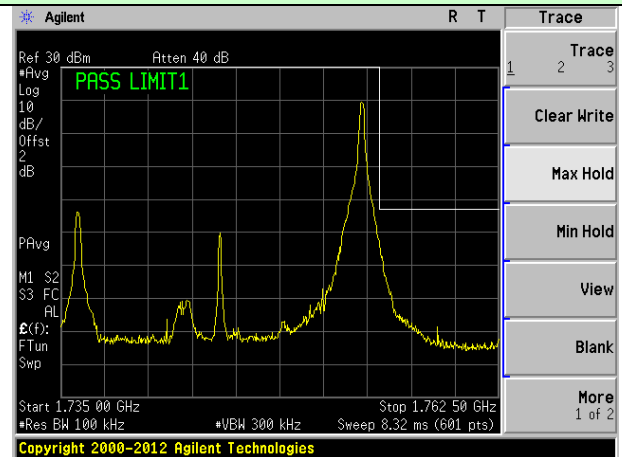
Highest channel

20MHz Bandwidth (RB size:1# RB offset:0#)



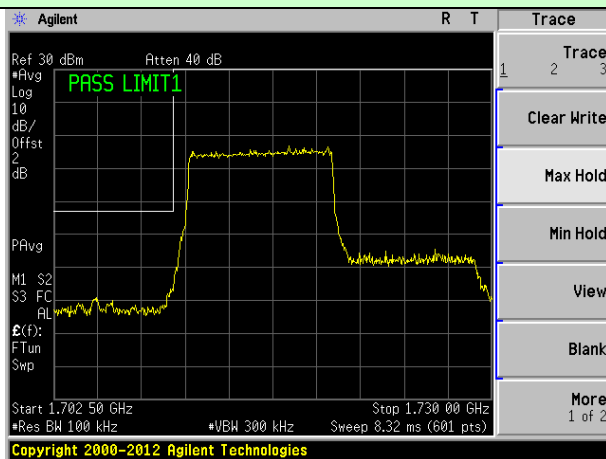
Lowest channel

20MHz Bandwidth (RB size:1# RB offset:99#)



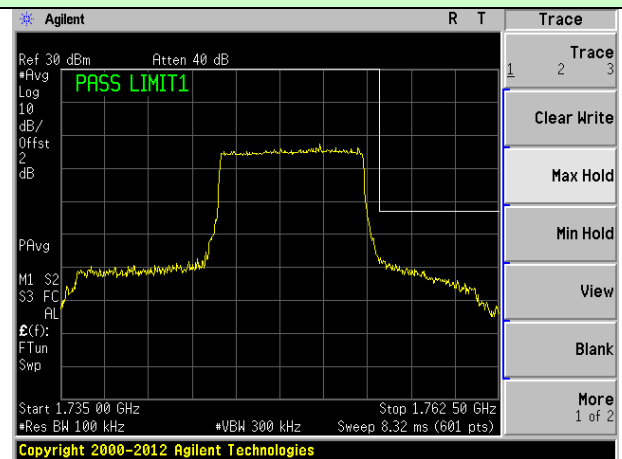
Highest channel

20MHz Bandwidth (RB size:50# RB offset:0#)



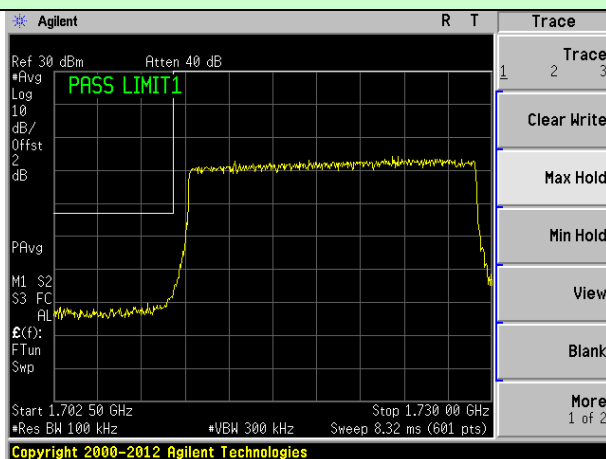
Lowest channel

20MHz Bandwidth (RB size:50# RB offset:50#)



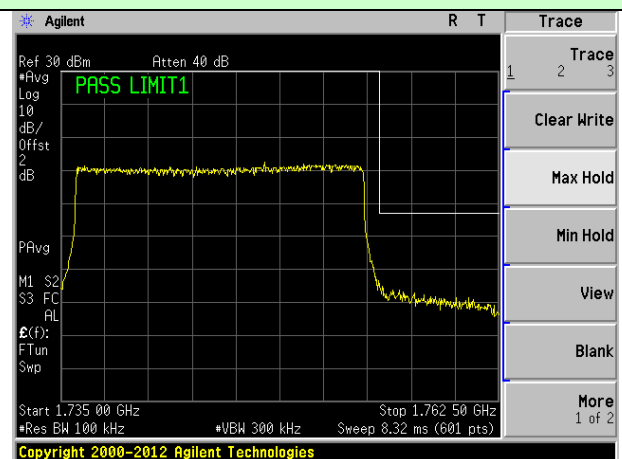
Highest channel

20MHz Bandwidth (RB size:100# RB offset:0#)



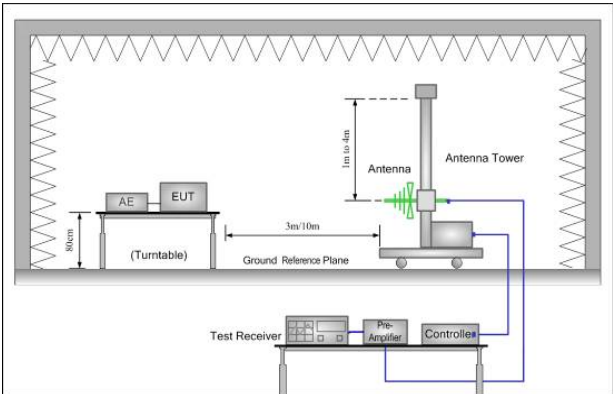
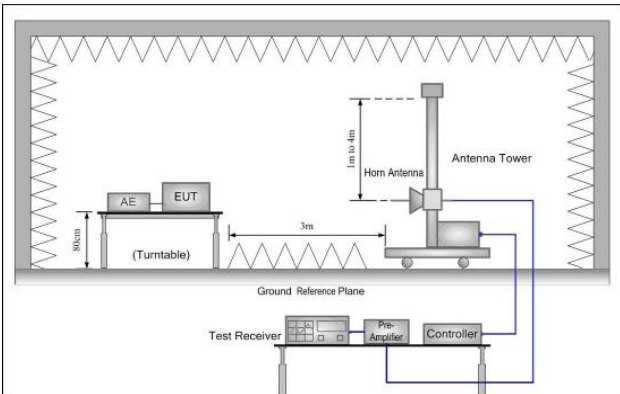
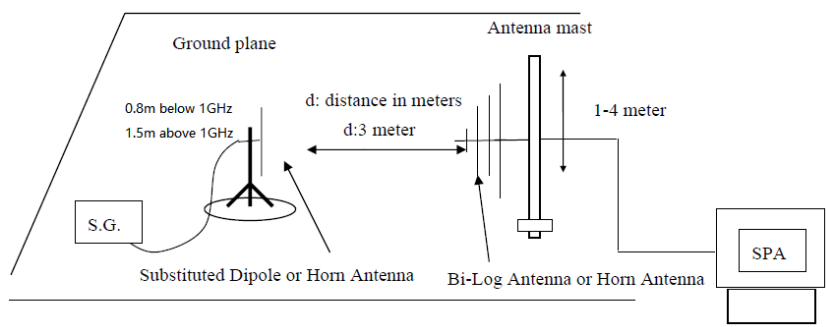
Lowest channel

20MHz Bandwidth (RB size:100# RB offset:0#)



Highest channel

7.8 Field strength of spurious radiation measurement

Test Requirement:	FCC Part 27.53(h)
Test Method:	FCC part2.1053
Limit:	4:-13dBm
Test setup:	Below 1GHz  Above 1GHz  Substituted method: 

Test Procedure:	1. The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. 4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. $\text{ERP / EIRP} = \text{S.G. output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

Remark:

1. The emission behavior belongs to narrowband spurious emission.
2. Only the worst case report
3. The emission levels of below 1 GHz are very lower than the limit and not show in test report.

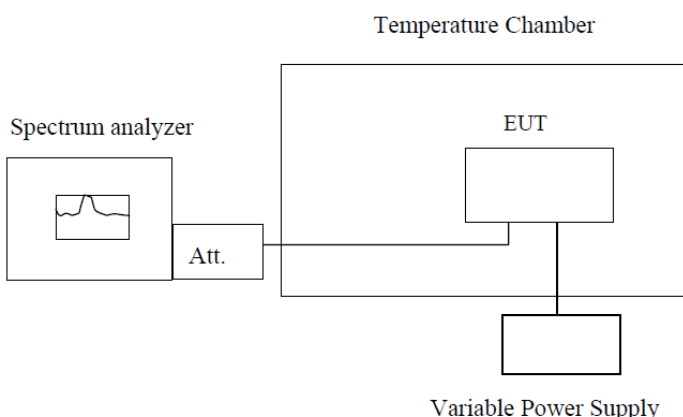
QPSK mode:

Test mode:	LTE Band 4(1.4MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3421.40	Vertical	-42.33	-13.00	Pass
5132.10	V	-43.74		
6842.80	V	-44.75		
8553.50	V	-42.66		
10264.20	V	-39.44		
3421.40	Horizontal	-40.96	-13.00	Pass
5132.10	H	-44.38		
6842.80	H	-42.76		
8553.50	H	-43.17		
10264.20	H	-40.23		
Test mode:	LTE Band 4(10MHz)		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3465.00	Vertical	-43.29	-13.00	Pass
5197.50	V	-44.77		
6930.00	V	-42.83		
8662.50	V	-43.81		
10395.00	V	-39.71		
3465.00	Horizontal	-44.06	-13.00	Pass
5197.50	H	-42.57		
6930.00	H	-44.00		
8662.50	H	-42.48		
10395.00	H	-40.83		
Test mode:	LTE Band 4(10MHz)		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3508.60	Vertical	-43.34	-13.00	Pass
5262.90	V	-44.75		
7017.20	V	-43.76		
8771.50	V	-41.67		
10525.80	V	-40.72		
3508.60	Horizontal	-41.97	-13.00	Pass
5262.90	H	-43.39		
7017.20	H	-44.77		
8771.50	H	-43.18		
10525.80	H	-41.00		

Test mode:	LTE Band 4(5MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3425.00	Vertical	-42.34	-13.00	Pass
5137.50	V	-44.07		
6850.00	V	-41.31		
8562.50	V	-43.46		
10275.00	V	-42.75		
3425.00	Horizontal	-41.56	-13.00	Pass
5137.50	H	-45.40		
6850.00	H	-44.95		
8562.50	H	-44.66		
10275.00	H	-44.10		
Test mode:	LTE Band 4(5MHz)		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3465.00	Vertical	-43.46	-13.00	Pass
5197.50	V	-41.74		
6930.00	V	-41.62		
8662.50	V	-43.42		
10395.00	V	-44.78		
3465.00	Horizontal	-41.83	-13.00	Pass
5197.50	H	-45.04		
6930.00	H	-44.34		
8662.50	H	-45.61		
10395.00	H	-43.01		
Test mode:	LTE Band 4(5MHz)		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3505.00	Vertical	-42.50	-13.00	Pass
5257.50	V	-43.54		
7010.00	V	-44.21		
8762.50	V	-42.82		
10515.00	V	-43.08		
3505.00	Horizontal	-41.40	-13.00	Pass
5257.50	H	-44.27		
7010.00	H	-45.43		
8762.50	H	-47.46		
10515.00	H	-44.33		

Test mode:	LTE Band 4(20MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3440.00	Vertical	-43.73	-13.00	Pass
5160.00	V	-42.81		
6880.00	V	-44.36		
8600.00	V	-42.82		
10320.00	V	-40.37		
3440.00	Horizontal	-44.65	-13.00	Pass
5160.00	H	-45.01		
6880.00	H	-45.27		
8600.00	H	-43.79		
10320.00	H	-41.32		
Test mode:	LTE Band 4(20MHz)		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3465.00	Vertical	-43.31	-13.00	Pass
5197.50	V	-42.24		
6930.00	V	-44.66		
8662.50	V	-44.00		
10395.00	V	-41.92		
3465.00	Horizontal	-44.94	-13.00	Pass
5197.50	H	-47.09		
6930.00	H	-44.76		
8662.50	H	-43.68		
10395.00	H	-41.87		
Test mode:	LTE Band 4(20MHz)		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
	Polarization	Level (dBm)		
3490.00	Vertical	-44.42	-13.00	Pass
5235.00	V	-41.16		
6980.00	V	-43.42		
8725.00	V	-45.61		
10470.00	V	-42.04		
3490.00	Horizontal	-43.68	-13.00	Pass
5235.00	H	-47.56		
6980.00	H	-45.12		
8725.00	H	-44.85		
10470.00	H	-41.52		

7.9 Frequency stability V.S. Temperature measurement

Test Requirement:	FCC Part2.1055(a)(1)(b)
Test Method:	FCC Part2.1055(a)(1)(b)
Limit:	2.5ppm
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to –20°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

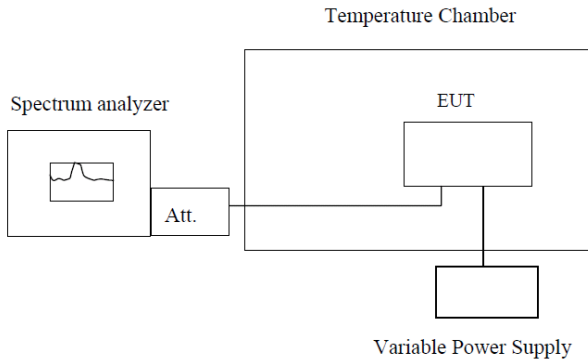
QPSK mode:

Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Power supplied (Vac)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
120	-30	104	0.0551	2.5	Pass
	-20	117	0.0624		
	-10	99	0.0527		
	0	81	0.0430		
	10	95	0.0503		
	20	81	0.0430		
	30	136	0.0721		
	40	122	0.0648		
	50	117	0.0624		

16QAM mode:

Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Power supplied (Vac)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
120	-30	96	0.0552	2.5	Pass
	-20	106	0.0611		
	-10	91	0.0523		
	0	80	0.0465		
	10	86	0.0494		
	20	75	0.0435		
	30	131	0.0757		
	40	111	0.0640		
	50	106	0.0611		

7.10 Frequency stability V.S. Voltage measurement

Test Requirement:	FCC Part2.1055(d)(1)(2)
Test Method:	FCC Part2.1055(d)(1)(2)
Limit:	2.5ppm
Test setup:	 Note : Measurement setup for testing on Antenna connector
Test procedure:	1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

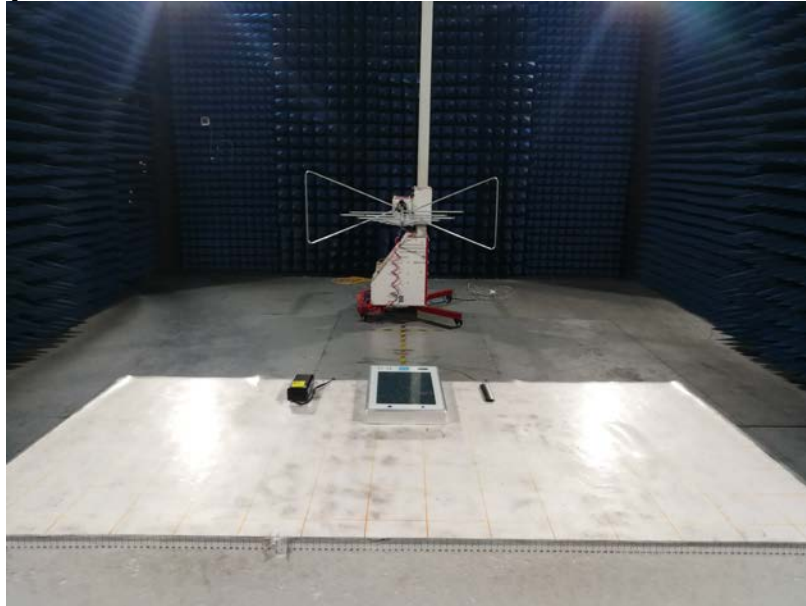
QPSK mode:

Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Temperature (°C)	Power supplied (Vac)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	100	96	0.1364	2.5	Pass
	120	118	0.1670		
	240	118	0.1670		

16QAM mode:

Reference Frequency: LTE Band 4 Middle channel=20175 channel=1732.5MHz					
Temperature (°C)	Power supplied (Vac)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	100	112	0.1578	2.5	Pass
	120	128	0.1804		
	240	143	0.2025		

8 Test Setup Photo



9 EUT Constructional Details

Reference to the **appendix II** for details.

-----End-----