

Test Report (LTE)

Applicant: Shanghai Notion Information Technology CO. LTD

Address of Applicant: Floor 5,Building 5,NO 289,Bisheng Rd, Pudong district, Shanghai, China

Manufacturer: Shanghai Notion Information Technology CO. LTD

Address of Manufacturer: Floor 5,Building 5,NO 289,Bisheng Rd, Pudong district, Shanghai, China

Equipment Under Test (EUT)

Product Name: 4G LTE Indoor Modem + Wifi Router

Model No.: R01, R05, R051, R0511, R0516, P01, P05, P051, P0511, P056I, AH-R0516-HP

FCC ID: 2AR45-CPE001

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

Date of sample receipt: June 11, 2019

Date of Test: June 12, 2019-July 01, 2019

Date of report issued: July 01, 2019

Test Result : PASS *

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

Authorized Signature:



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	July 01, 2019	Original

Prepared By:

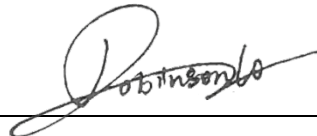


Date:

July 01, 2019

Project Engineer

Check By:



Date:

July 01, 2019

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1091	Pass* (Please refer to MPE Report)
RF Output Power	Part 2.1046 Part 27.50(c)(10)/(d)(4)	Pass
Peak-to-Average Ratio	FCC Part 27.50(a)	Pass
Modulation Characteristics	Part 2.1047	N/A
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 27.53(h)/(g)	Pass
Spurious Emissions at Antenna Terminal	Part 2.1051 Part 27.53(h)/(g)	Pass
Field Strength of Spurious Radiation	Part 2.1053 Part 27.53(h)/(g)	Pass
Out of band emission, Band Edge	Part 27.53(h)/(g)	Pass
Frequency stability vs. temperature	Part 2.1055(a)(1)(b)	Pass
Frequency stability vs. voltage	Part 2.1055(d)(1)(2)	Pass

Remarks:

1. *Pass: The EUT complies with the essential requirements in the standard.*
2. *N/A: Not applicable.*

5 General Information

5.1 General Description of EUT

Product Name:	4G LTE Indoor Modem + Wifi Router
Model No.:	R01, R05, R051, R0511, R0516, P01, P05, P051, P0511, P056I, AH-R0516-HP
Test Model No:	AH-R0516-HP
Remark: All above models are identical in the same PCB layout, interior structure and electrical circuits. The only difference is model name for commercial purpose.	
Serial No.:	R0516190705000001
Hardware Version:	P056I_1_10
Software Version:	P056INotion3_CP_R0516_V001_2.174.000_20190419_174141/20190701 -- P056INotion3_AP_R0516_V001 release
Tested Sample(s) ID:	GTS201906000093-1
Support Networks:	LTE
Support Bands:	LTE Band 41
Channel Bandwidth:	LTE Band 41: 5MHz; 10MHz; 15MHz; 20MHz
TX Frequency:	LTE Band 41: 2496MHz ~2690MHz
Modulation type:	LTE Band 41: QPSK, 16QAM
Antenna type:	Integral Antenna
Antenna gain:	1.5dBi(Declare by applicant)
Power supply:	POWER ADAPTER Model:RD1201000-C55-91MG Input: AC 100-240V, 50/60Hz, 0.6A MAX Output: DC 12V, 1A Or Battery Li-Polymer: DC 3.7V, 3000mAh(11.1Wh)

Test Frequency

Test Mode	Channel Bandwidth	RF Channel		
		Lowest channel	Middle channel	Highest channel
LTE Band 41	5M	Channel 39675	Channel 40620	Channel 41565
		2498.5 MHz	2593.0 MHz	2687.5 MHz
	10M	Channel 39700	Channel 40620	Channel 41540
		2501.0 MHz	2593.0 MHz	2685.0 MHz
	15M	Channel 39725	Channel 40620	Channel 41515
		2503.5 MHz	2593.0 MHz	2682.5 MHz
	20M	Channel 39750	Channel 40620	Channel 41490
		2506.0 MHz	2593.0 MHz	2680.0 MHz

5.2 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is filing to comply with Section Part 22/24/27 of the FCC CFR 47 Rules.

5.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures document on ANSI C63.26:2015 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.

- **Industry Canada (IC) —Registration No.: 9079A-2**

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-2.

- **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. 301-309, 3/F., 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. 20 2018	Oct. 19 2019
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 20 2018	Oct. 19 2019
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 20 2018	Oct. 19 2019
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 26 2019	June. 25 2020
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 26 2019	June. 25 2020
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 26 2019	June. 25 2020
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 26 2019	June. 25 2020
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 26 2019	June. 25 2020
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 26 2019	June. 25 2020
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 26 2019	June. 25 2020
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	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

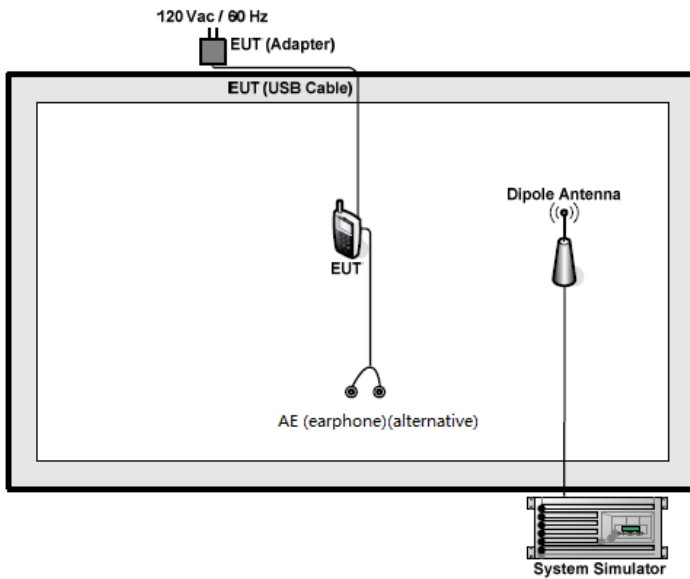
7 System test configuration

7.1 Test mode

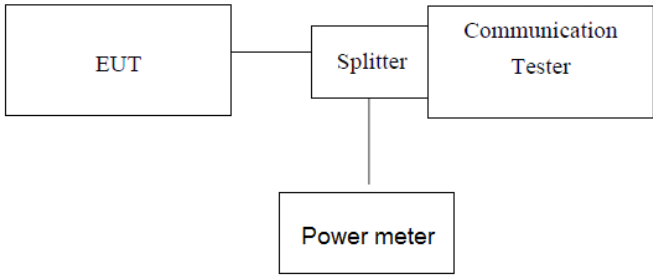
During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Test modes		
Band	Radiated	Conducted
LTE Band 41	■ QPSK and 16QAM link	■ QPSK and 16QAM link

7.2 Configuration of Tested System



7.3 Conducted Peak Output Power

Test Requirement:	Part 27.50(c)(10)/(d)(4)
Test Method:	FCC part2.1046
Limit:	2W
Test setup:	 <p style="text-align: center;"><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Procedure:	<ol style="list-style-type: none"> 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 41						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39675 2498.5MHz	Channel 40620 2593.0MHz	Channel 41565 2687.5MHz
5MHz	QPSK	1	0	22.53	22.57	22.65
		1	13	22.97	23.21	22.56
		1	24	22.22	22.27	22.28
		12	0	22.48	22.41	23.07
		12	6	23.40	22.46	23.29
		12	13	23.54	23.37	22.99
		25	0	22.90	23.52	22.92
	16QAM	1	0	23.38	22.28	22.80
		1	13	22.09	23.50	22.38
		1	24	23.11	23.72	22.01
		12	0	23.42	23.93	23.00
		12	6	22.75	22.97	23.11
		12	13	23.77	22.56	22.80
		25	0	22.43	23.71	23.62
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39700 2501.0MHz	Channel 40620 2593.0MHz	Channel 41540 2685.0MHz
10MHz	QPSK	1	0	23.34	23.83	22.80
		1	25	22.55	22.91	23.06
		1	49	23.47	23.23	22.32
		25	0	22.88	23.97	23.63
		25	13	23.40	22.40	22.54
		25	25	23.82	22.52	23.68
		50	0	23.59	23.12	22.94
	16QAM	1	0	22.61	22.72	23.06
		1	25	23.17	23.51	22.47
		1	49	22.71	23.94	23.28
		25	0	23.50	22.27	22.74
		25	13	23.45	22.98	22.61
		25	25	23.86	23.93	23.60
		50	0	23.51	22.81	22.22

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39725 2503.5MHz	Channel 40620 2593.0MHz	Channel 41515 2682.5MHz
15MHz	QPSK	1	0	23.21	22.04	22.24
		1	38	22.22	22.98	22.97
		1	74	22.03	23.78	23.53
		36	0	22.94	23.39	22.82
		36	18	23.78	23.21	23.42
		36	39	22.60	22.80	23.19
		75	0	22.95	22.72	22.03
	16QAM	1	0	22.40	22.30	23.68
		1	38	23.51	22.54	23.60
		1	74	22.54	23.76	22.84
		36	0	22.63	23.68	22.99
		36	18	23.79	23.90	23.07
		36	39	23.66	22.91	22.19
		75	0	23.77	22.48	23.62
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39750 2506.0MHz	Channel 40620 2593.0MHz	Channel 41490 2680.0MHz
20MHz	QPSK	1	0	23.49	23.57	23.94
		1	50	23.53	23.39	23.22
		1	99	23.51	23.60	23.38
		50	0	24.00	22.93	23.93
		50	25	23.84	22.86	23.61
		50	50	23.72	23.85	22.69
		100	0	22.60	23.45	22.29
	16QAM	1	0	23.89	23.11	23.41
		1	50	22.91	22.10	23.89
		1	99	23.70	22.50	22.27
		50	0	23.60	23.60	23.73
		50	25	22.74	23.54	23.28
		50	50	22.95	23.47	22.69
		100	0	22.84	22.62	23.79

EIRP:

Band 41						
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39675 2498.5MHz	Channel 40620 2593.0MHz	Channel 41565 2687.5MHz
5MHz	QPSK	1	0	24.03	24.07	24.15
		1	13	24.47	24.71	24.06
		1	24	23.72	23.77	23.78
		12	0	23.98	23.91	24.57
		12	6	24.9	23.96	24.79
		12	13	25.04	24.87	24.49
		25	0	24.4	25.02	24.42
	16QAM	1	0	24.88	23.78	24.3
		1	13	23.59	25	23.88
		1	24	24.61	25.22	23.51
		12	0	24.92	25.43	24.5
		12	6	24.25	24.47	24.61
		12	13	25.27	24.06	24.3
		25	0	23.93	25.21	25.12
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39700 2501.0MHz	Channel 40620 2593.0MHz	Channel 41540 2685.0MHz
10MHz	QPSK	1	0	24.84	25.33	24.3
		1	25	24.05	24.41	24.56
		1	49	24.97	24.73	23.82
		25	0	24.38	25.47	25.13
		25	13	24.9	23.9	24.04
		25	25	25.32	24.02	25.18
		50	0	25.09	24.62	24.44
	16QAM	1	0	24.11	24.22	24.56
		1	25	24.67	25.01	23.97
		1	49	24.21	25.44	24.78
		25	0	25	23.77	24.24
		25	13	24.95	24.48	24.11
		25	25	25.36	25.43	25.1
		50	0	25.01	24.31	23.72

Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39725 2503.5MHz	Channel 40620 2593.0MHz	Channel 41515 2682.5MHz
15MHz	QPSK	1	0	24.71	23.54	23.74
		1	38	23.72	24.48	24.47
		1	74	23.53	25.28	25.03
		36	0	24.44	24.89	24.32
		36	18	25.28	24.71	24.92
		36	39	24.1	24.3	24.69
		75	0	24.45	24.22	23.53
	16QAM	1	0	23.9	23.8	25.18
		1	38	25.01	24.04	25.1
		1	74	24.04	25.26	24.34
		36	0	24.13	25.18	24.49
		36	18	25.29	25.4	24.57
		36	39	25.16	24.41	23.69
		75	0	25.27	23.98	25.12
Bandwidth	Mode	RB Size	RB Offset	Actual output power(dBm)		
				Channel 39750 2506.0MHz	Channel 40620 2593.0MHz	Channel 41490 2680.0MHz
20MHz	QPSK	1	0	24.99	25.07	25.44
		1	50	25.03	24.89	24.72
		1	99	25.01	25.1	24.88
		50	0	25.5	24.43	25.43
		50	25	25.34	24.36	25.11
		50	50	25.22	25.35	24.19
		100	0	24.1	24.95	23.79
	16QAM	1	0	25.39	24.61	24.91
		1	50	24.41	23.6	25.39
		1	99	25.2	24	23.77
		50	0	25.1	25.1	25.23
		50	25	24.24	25.04	24.78
		50	50	24.45	24.97	24.19
		100	0	24.34	24.12	25.29

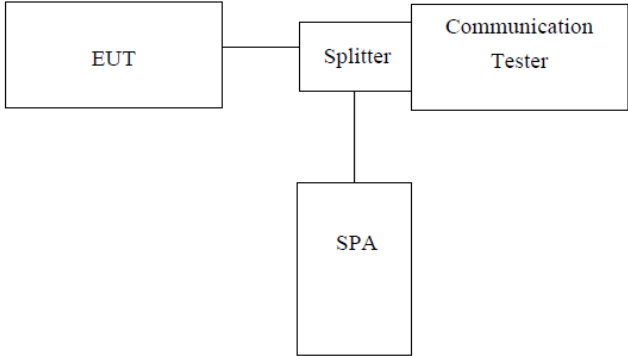
7.4 Peak-to-Average Ratio

Test Requirement:	FCC Part 27.50
Test Method:	FCC part2.1046
Limit:	13db
Test setup:	<pre> graph LR CC[Control Computer] --> EUT[EUT] PS[Power Supply] --> EUT EUT --> PD[Power Divider] PD --> WC[Wireless Communication] PD --> SA[Spectrum Analyzer] </pre>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 7.1 for details
Test results:	Pass

Measurement data:

Test Band	Test mode		Peak to Average Ratio (dB)			Limit (dB)	Result
			Low Ch.	Middle Ch.	High Ch.		
LTE Band 41	QPSK	5M	4.01	3.23	3.27	13.00	PASS
		10M	5.20	5.23	5.49	13.00	PASS
		15M	3.45	4.23	4.54	13.00	PASS
		20M	3.82	4.16	4.93	13.00	PASS
	16QAM	5M	4.50	3.48	3.17	13.00	PASS
		10M	5.88	3.16	5.78	13.00	PASS
		15M	5.81	4.90	5.37	13.00	PASS
		20M	4.01	3.79	5.19	13.00	PASS

7.5 Occupy Bandwidth

Test Requirement:	FCC Part 27.53(h)/(g)
Test Method:	FCC part2.1049
Test setup:	 <p style="text-align: center;"><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

Measurement Data

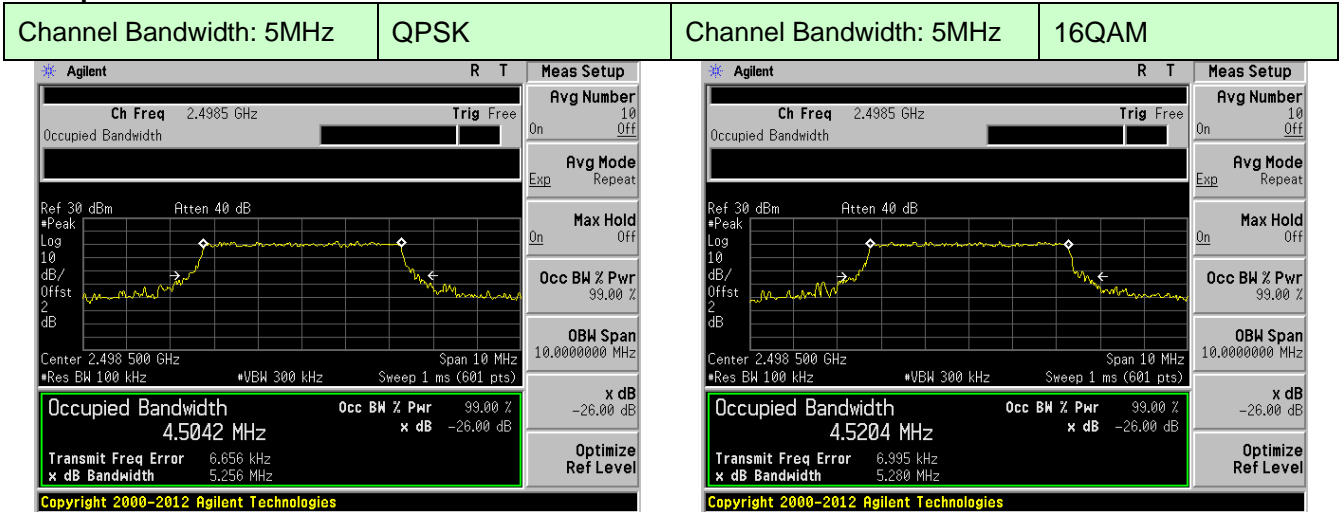
QPSK mode:

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (MHz)	-26dB bandwidth (MHz)
			RB Size	RB Offset		
LTE Band 41	5MHz	Low range	6	0	4.5042	5.256
		Mid range	6	0	4.5143	5.176
		High range	6	0	4.5331	5.316
	10MHz	Low range	15	0	8.9378	9.721
		Mid range	15	0	8.9523	10.222
		High range	15	0	8.9766	9.686
	15MHz	Low range	25	0	13.4297	14.896
		Mid range	25	0	13.4259	15.130
		High range	25	0	13.4498	15.496
	20MHz	Low range	50	0	17.8618	20.111
		Mid range	50	0	17.8413	19.538
		High range	50	0	17.9065	20.251

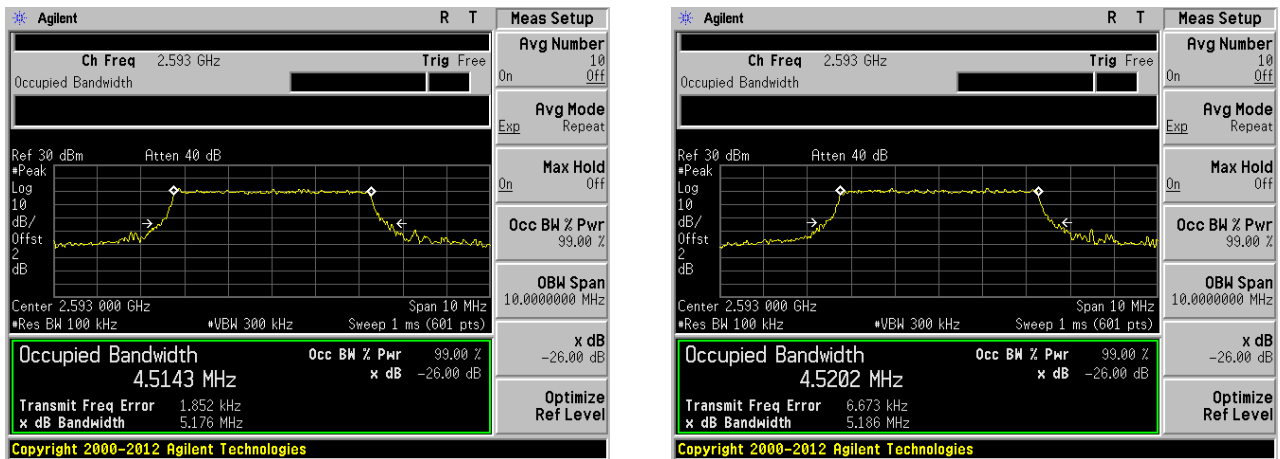
16QAM mode:

EUT Mode	Channel Bandwidth	Channel	RB Configure		99% Occupy bandwidth (MHz)	-26dB bandwidth (MHz)
			RB Size	RB Offset		
LTE Band 41	5MHz	Low range	6	0	4.5204	5.280
		Mid range	6	0	4.5202	5.186
		High range	6	0	4.5319	5.270
	10MHz	Low range	15	0	8.9577	10.211
		Mid range	15	0	8.9482	10.027
		High range	15	0	8.9527	9.935
	15MHz	Low range	25	0	13.4554	15.276
		Mid range	25	0	13.4361	15.830
		High range	25	0	13.4510	15.334
	20MHz	Low range	50	0	17.8413	20.234
		Mid range	50	0	17.8745	20.063
		High range	50	0	17.8751	20.087

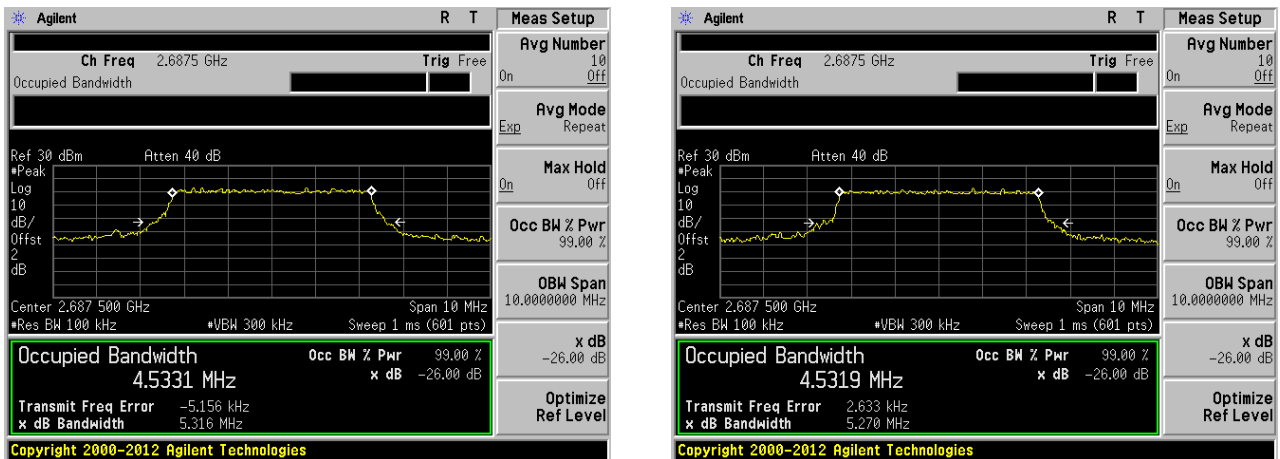
Test plot as follows:



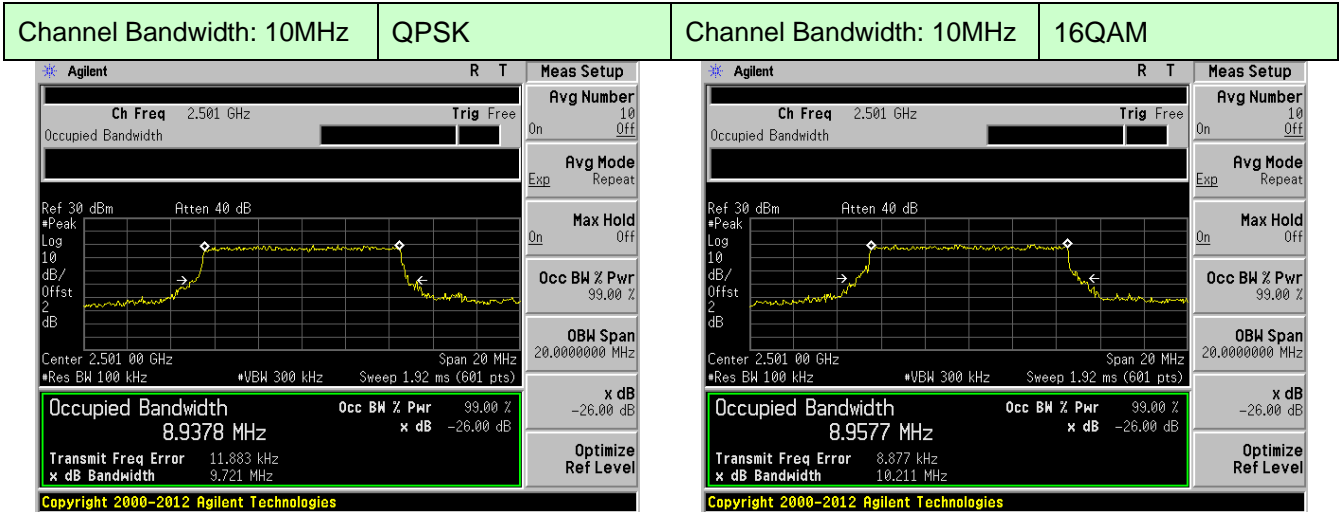
Lowest channel



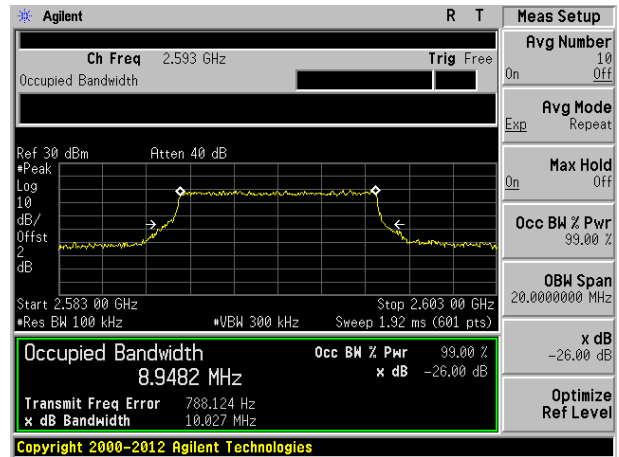
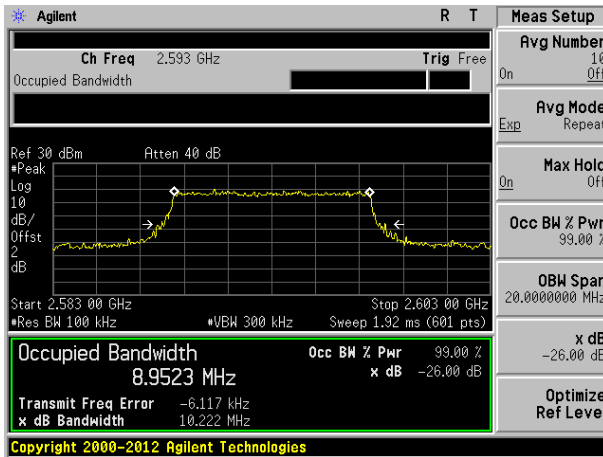
Middle channel



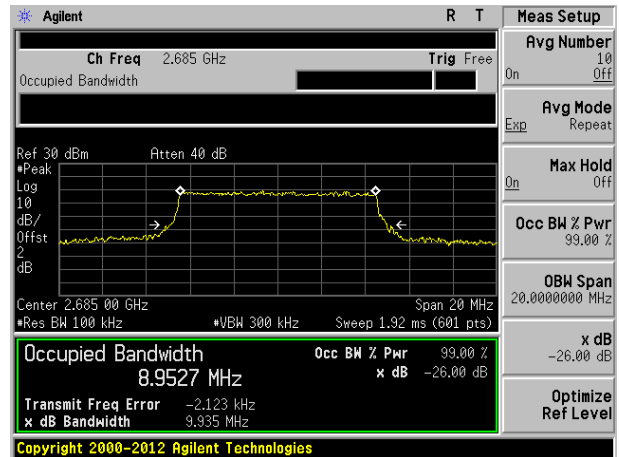
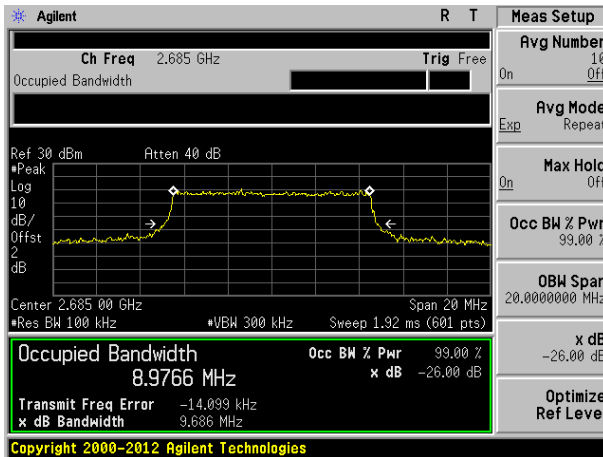
Highest channel



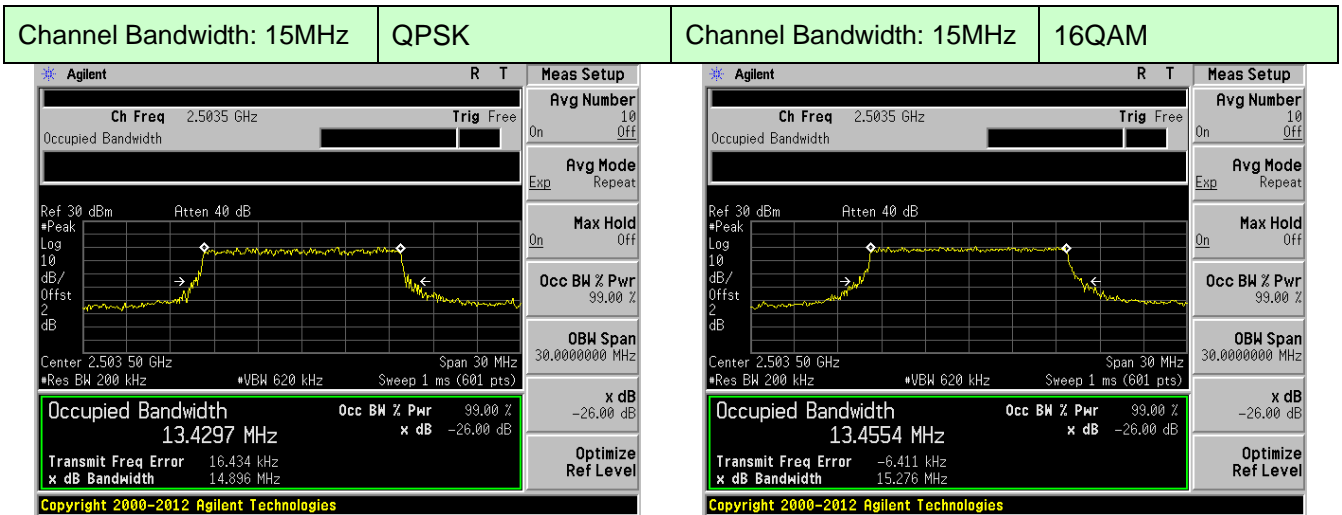
Lowest channel



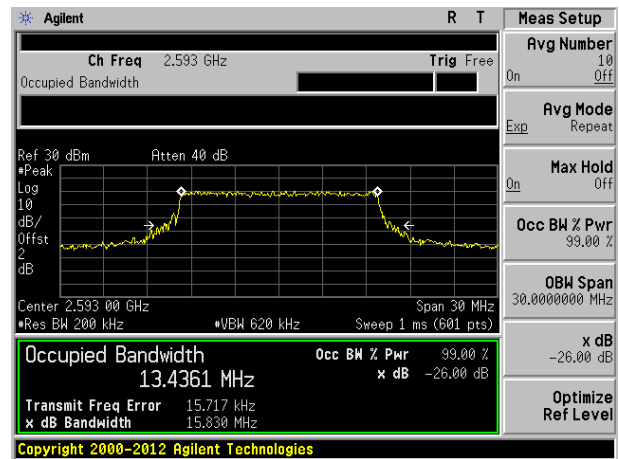
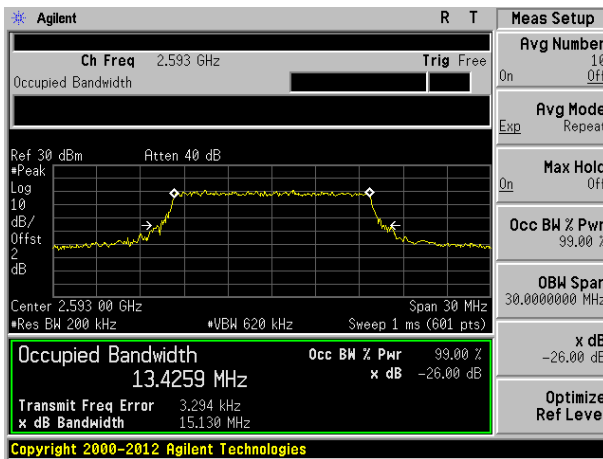
Middle channel



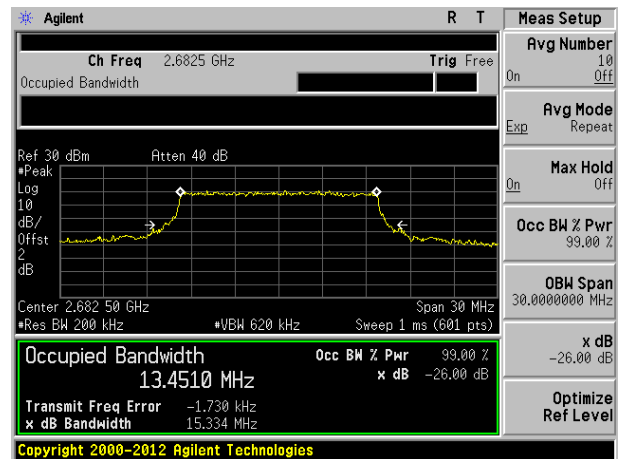
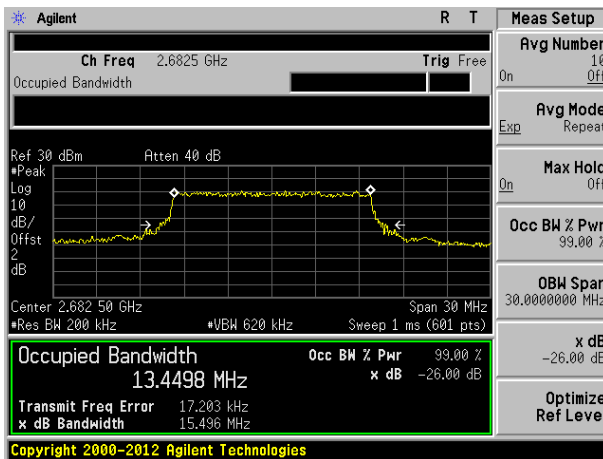
Highest channel



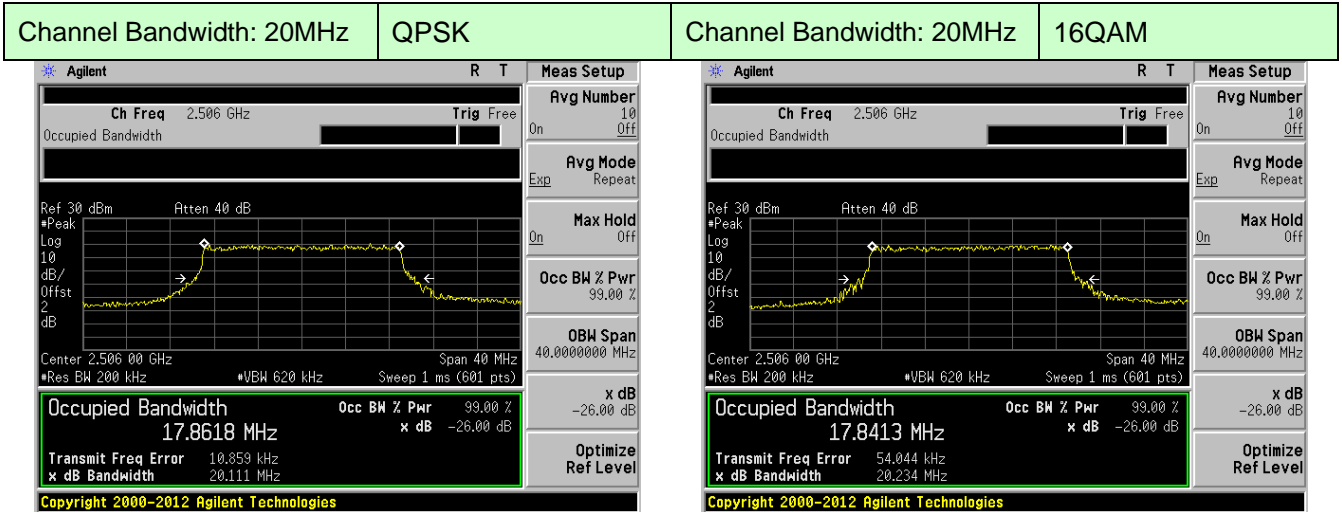
Lowest channel



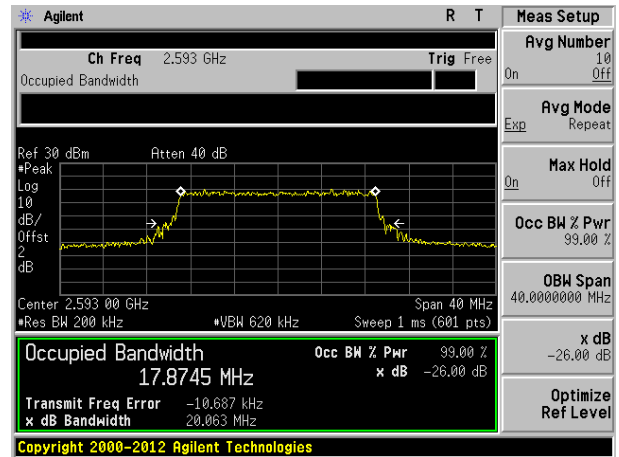
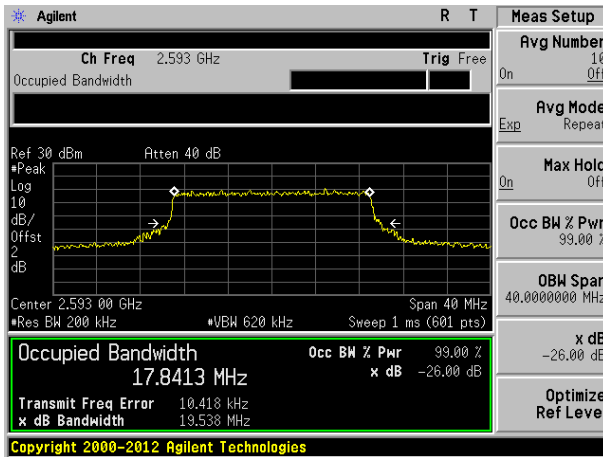
Middle channel



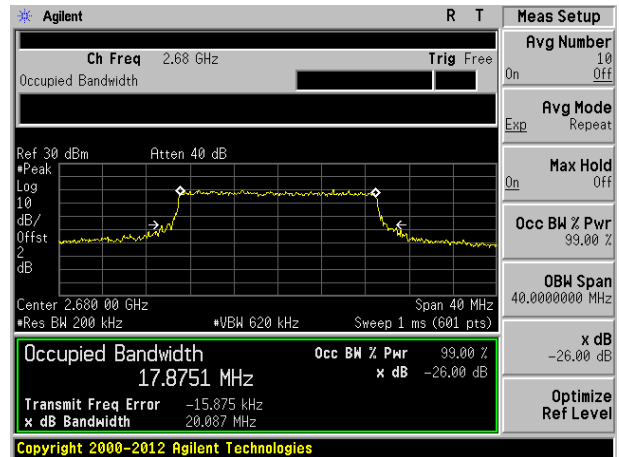
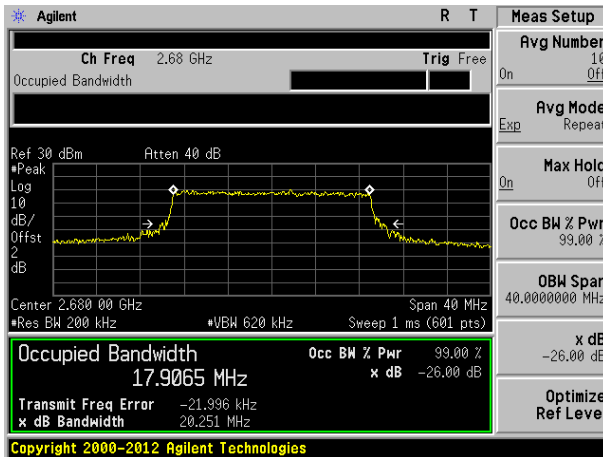
Highest channel



Lowest channel



Middle channel

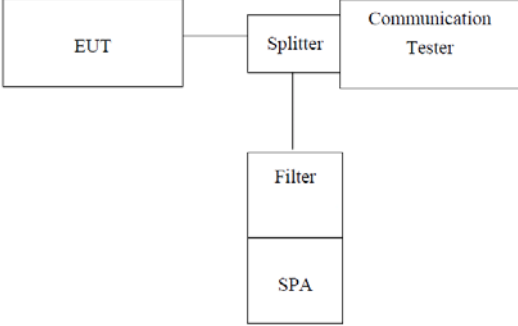


Highest channel

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.

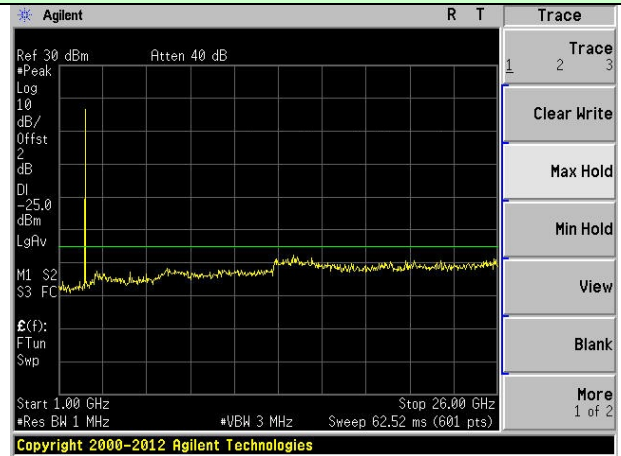
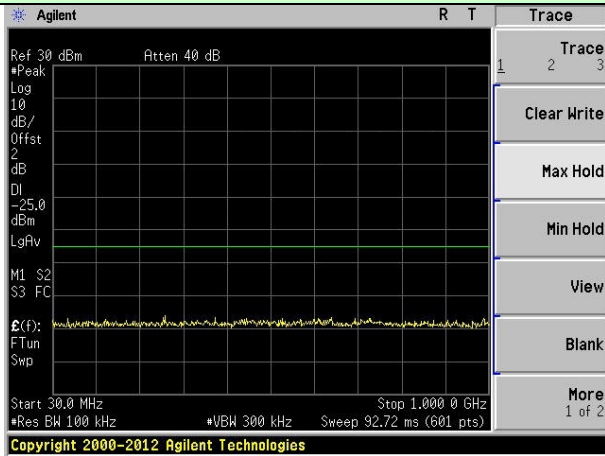
7.7 Out of band emission at antenna terminals

Test Requirement:	FCC Part 27.53(h)/(g)
Test Method:	FCC part2.1051
Limit:	25dBm
Test setup:	 <p style="text-align: center;"><i>Note: Measurement setup for testing on Antenna connector</i></p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 6.1 for details
Test results:	Pass

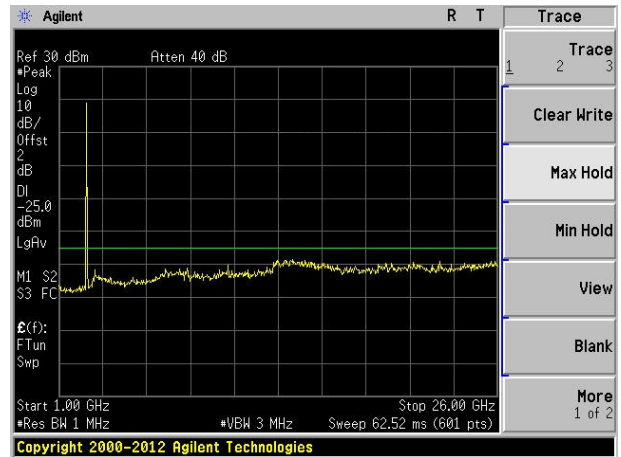
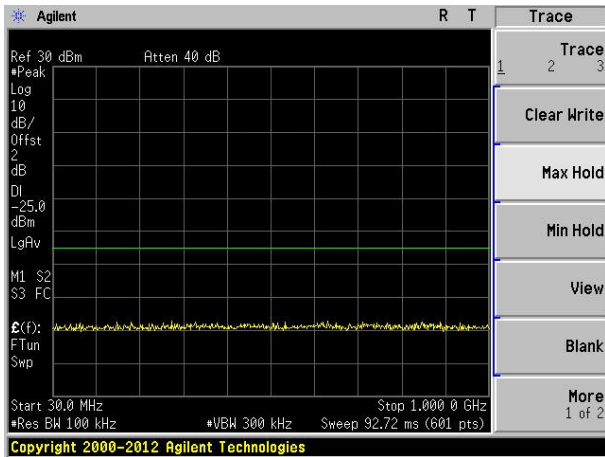
Remark: Both modulation modes have been tested, showing only the worst QPSK test data.

Test plot as follows:

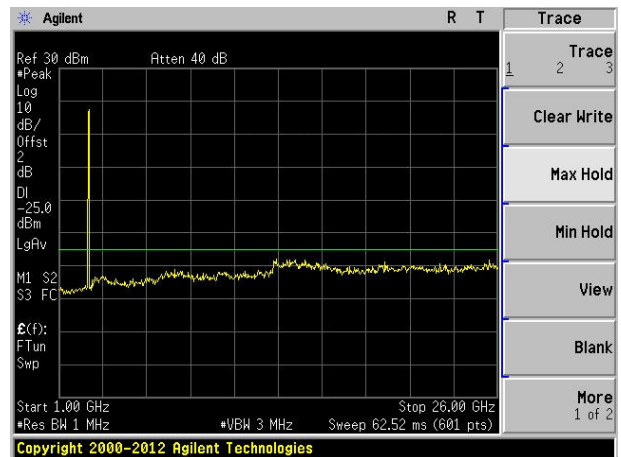
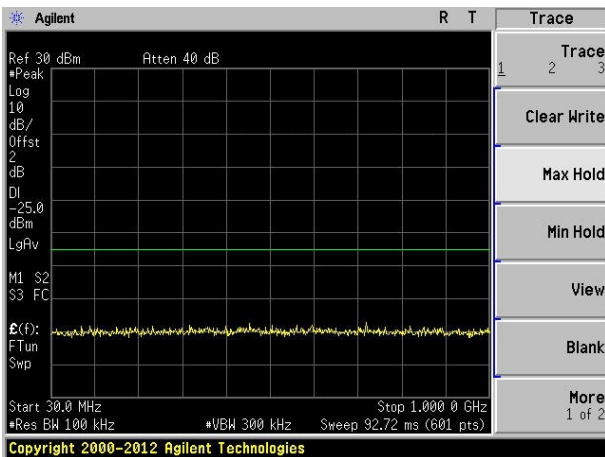
Test Mode: LTE Band 41 Channel Bandwidth: 5MHz



Lowest channel

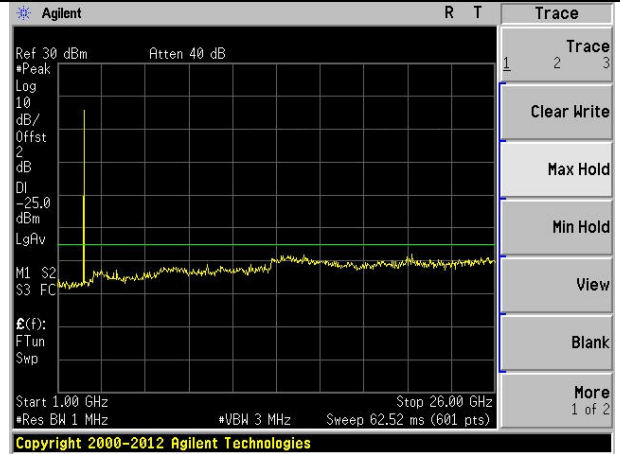
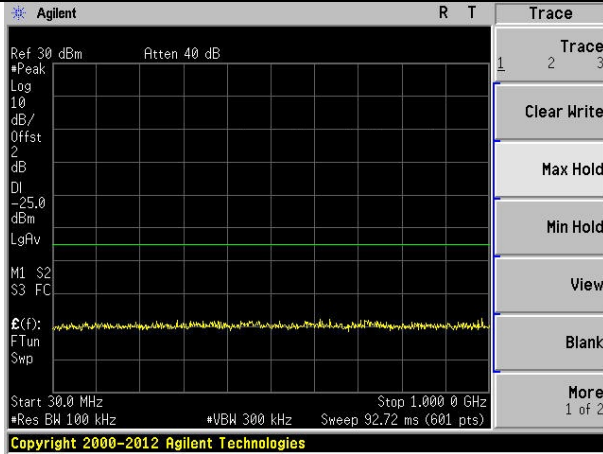


Middle channel

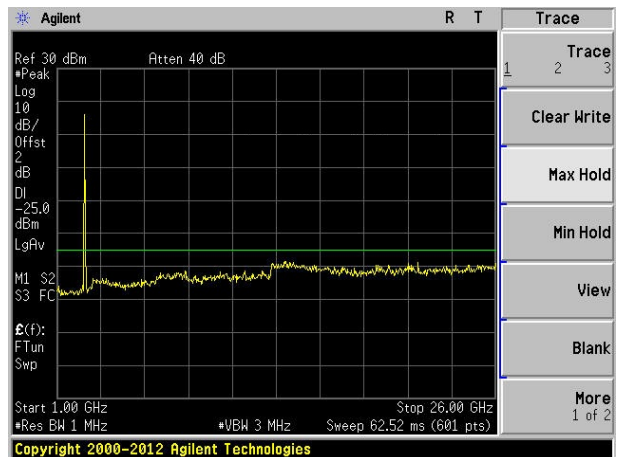
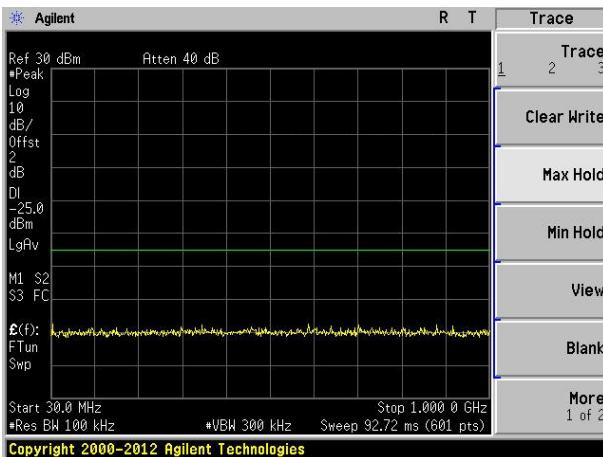


Highest channel

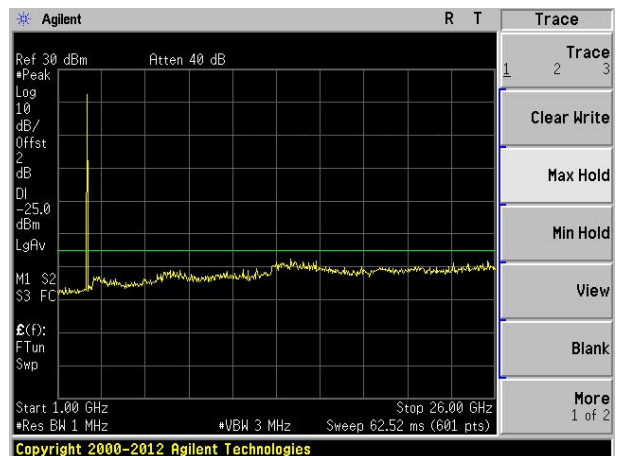
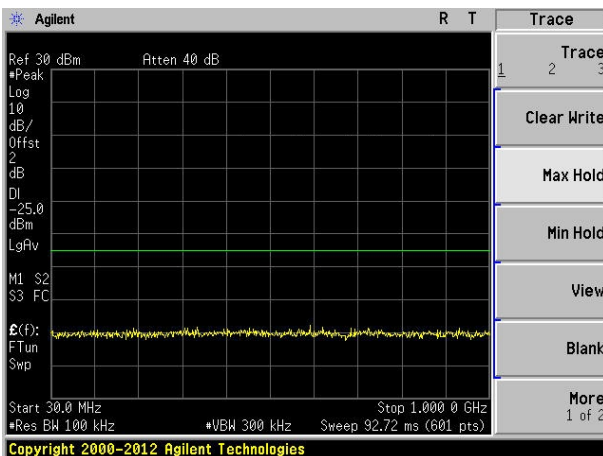
Test Mode: LTE Band 41 Channel Bandwidth: 10MHz



Lowest channel

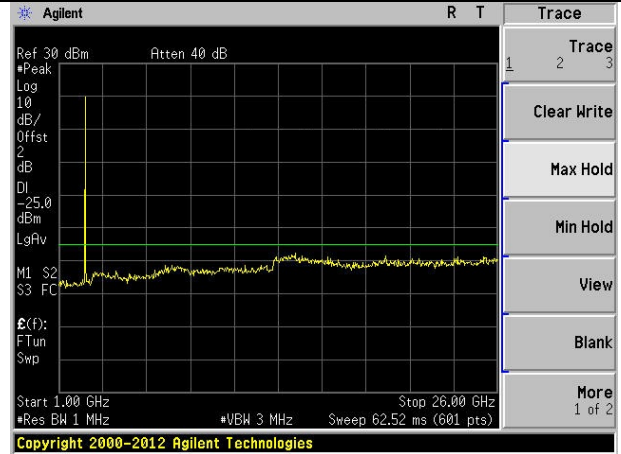
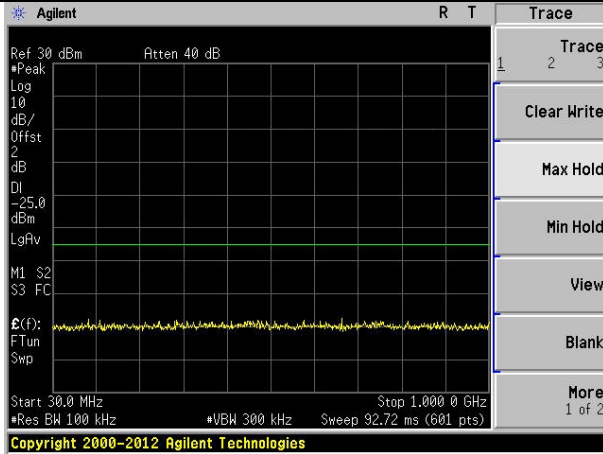


Middle channel

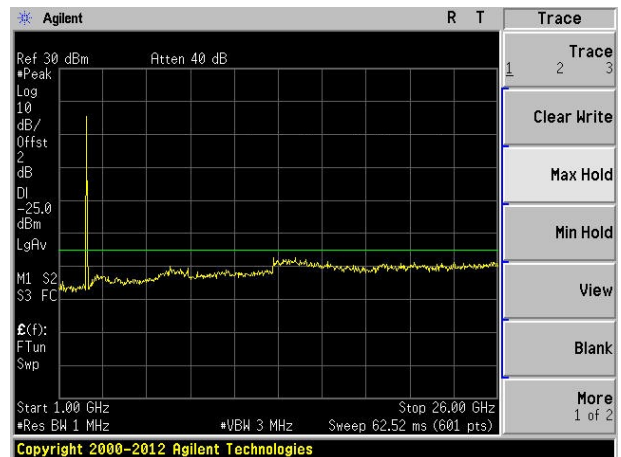
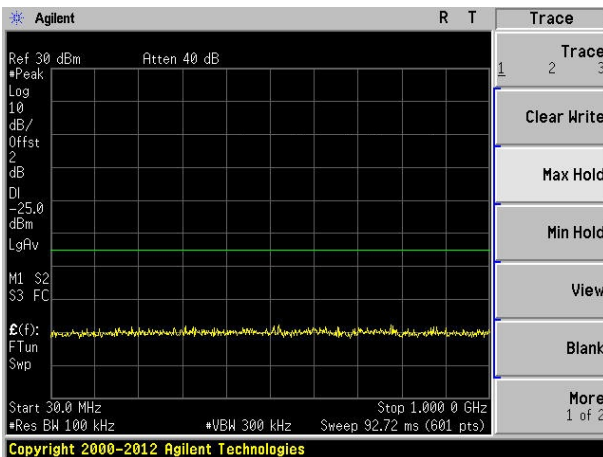


Highest channel

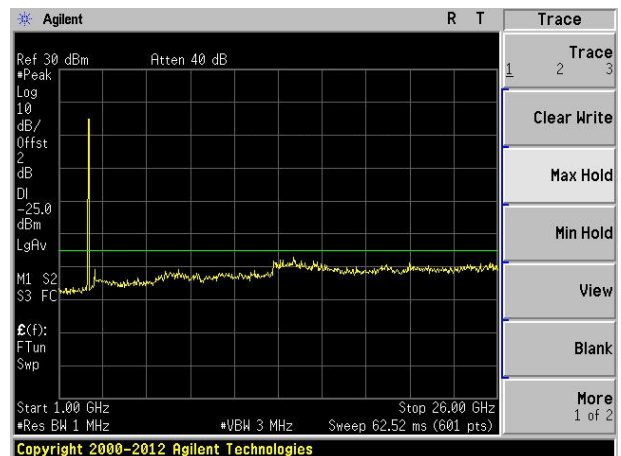
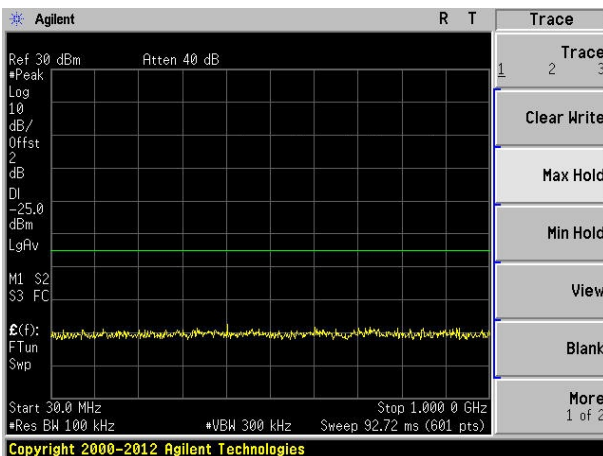
Test Mode: LTE Band 41 Channel Bandwidth: 15MHz



Lowest channel

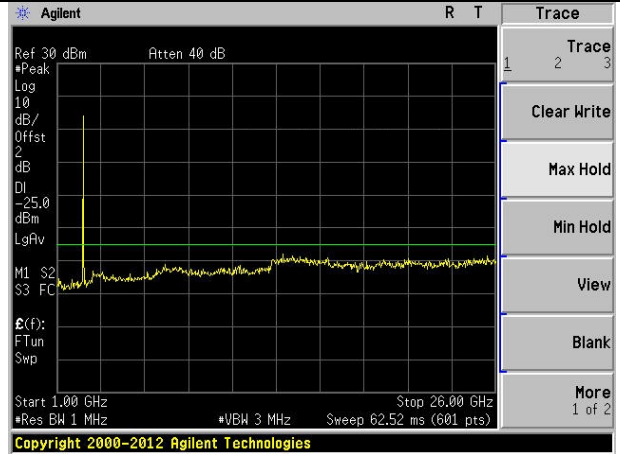
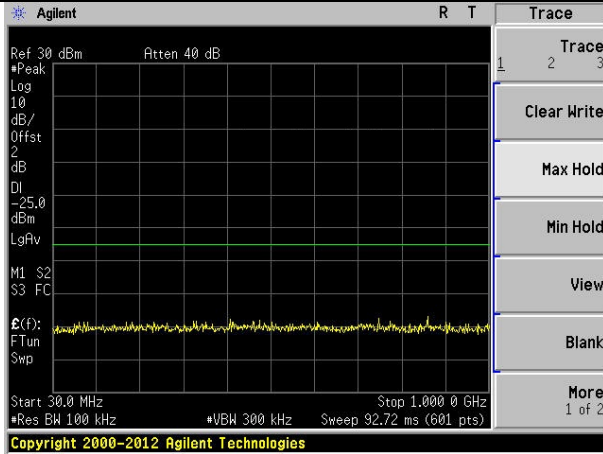


Middle channel

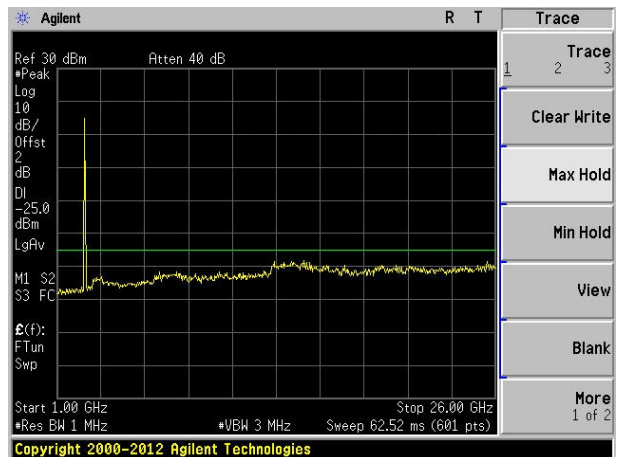
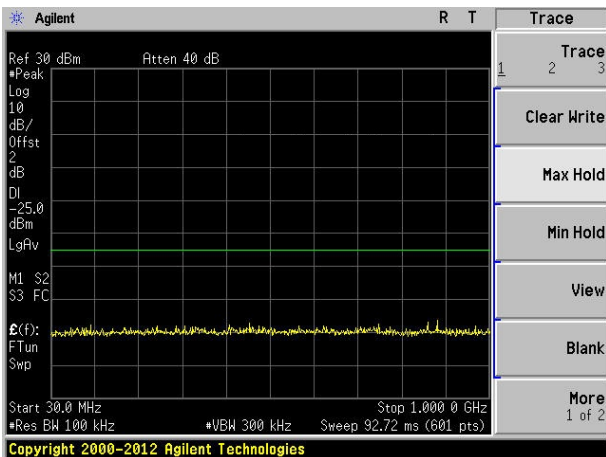


Highest channel

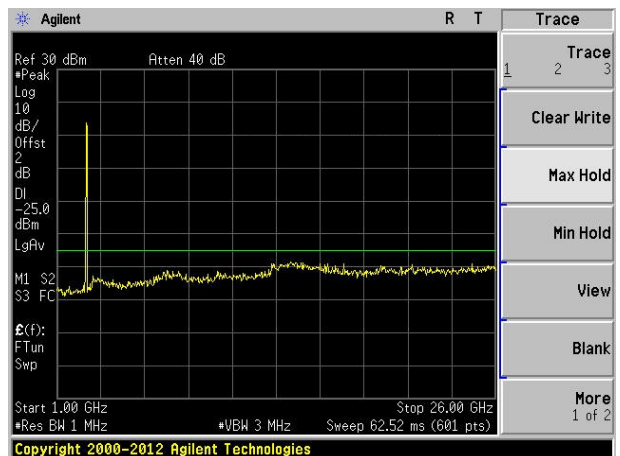
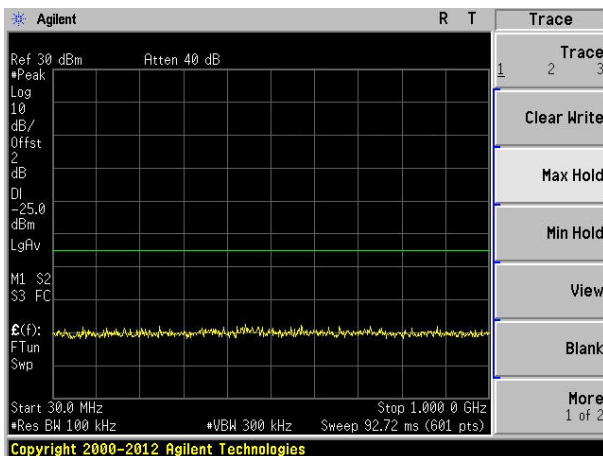
Test Mode: LTE Band 41 Channel Bandwidth: 20MHz



Lowest channel



Middle channel



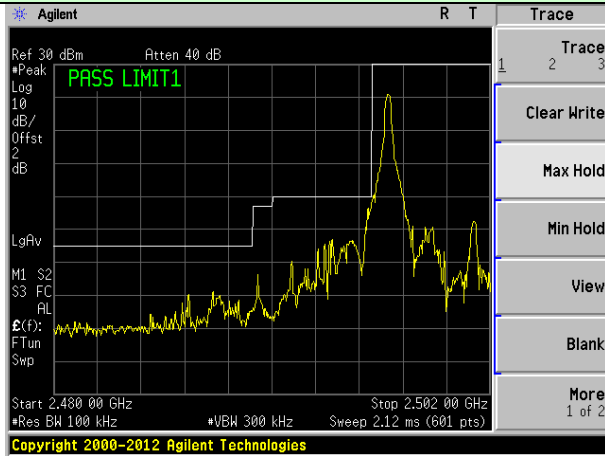
Highest channel

Band Edge:

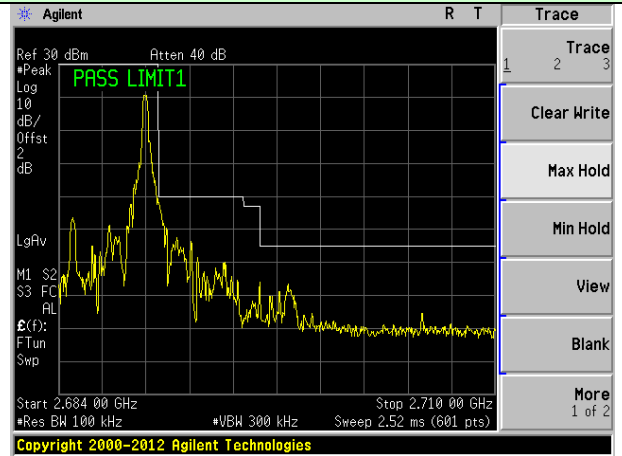
QPSK mode:

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

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



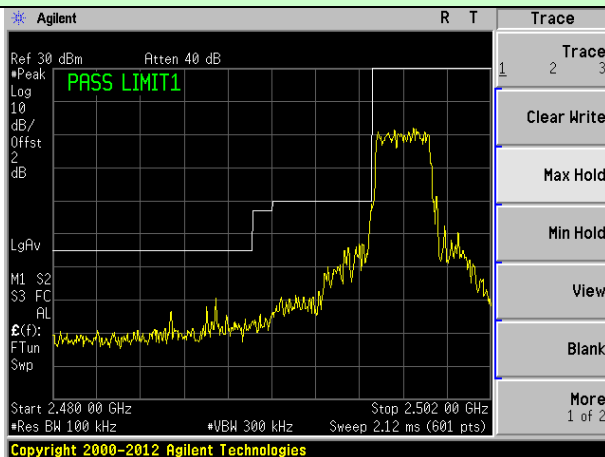
Lowest channel



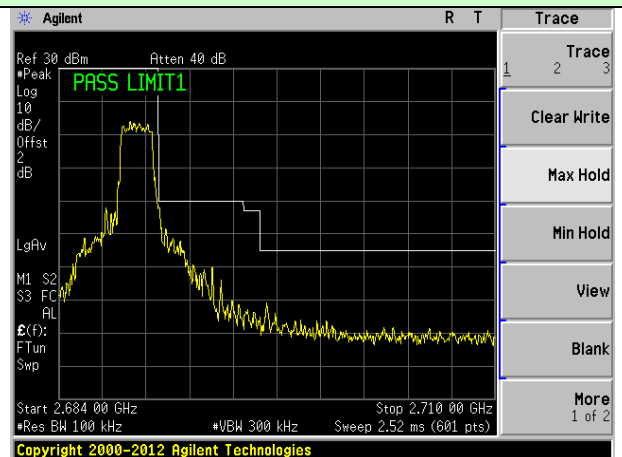
Highest channel

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

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



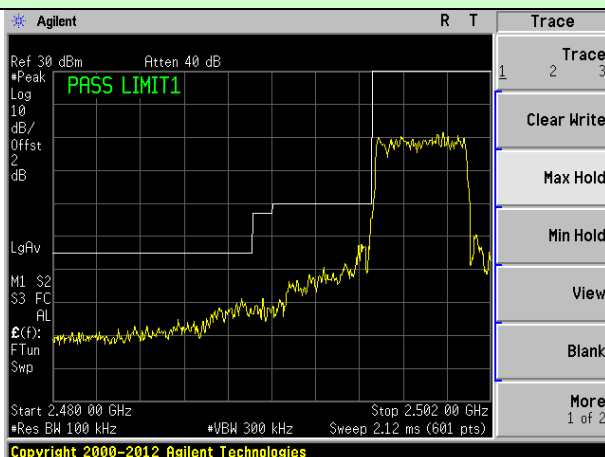
Lowest channel



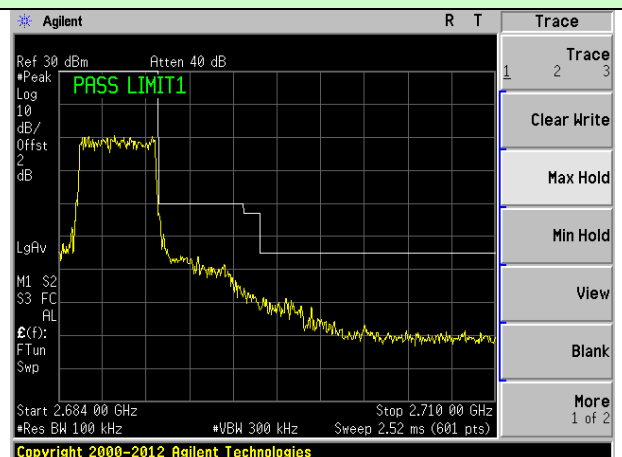
Highest channel

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

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

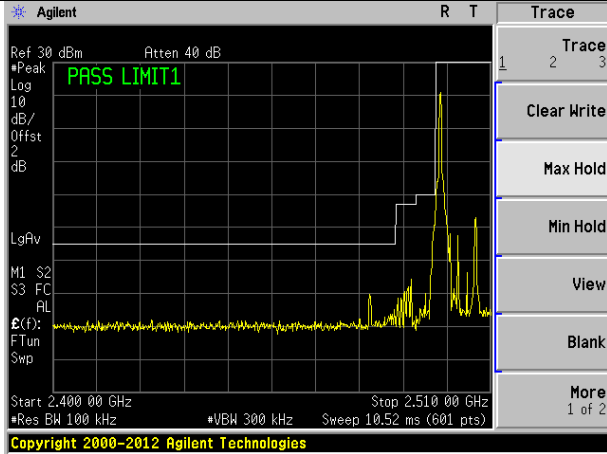


Lowest channel

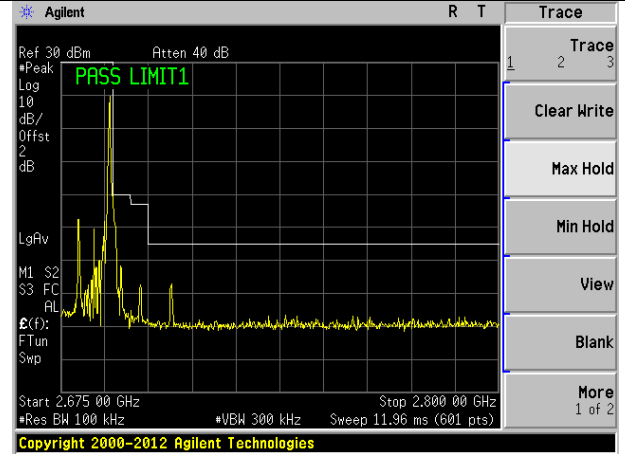


Highest channel

10MHz Bandwidth (RB size:1# RB offset:0#) 10MHz Bandwidth (RB size:1# RB offset:49#)

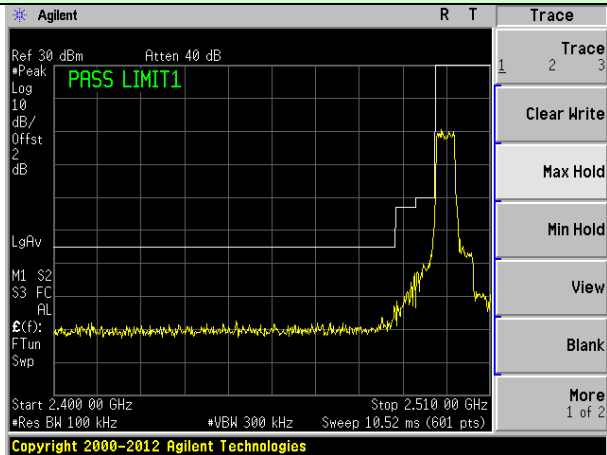


Lowest channel

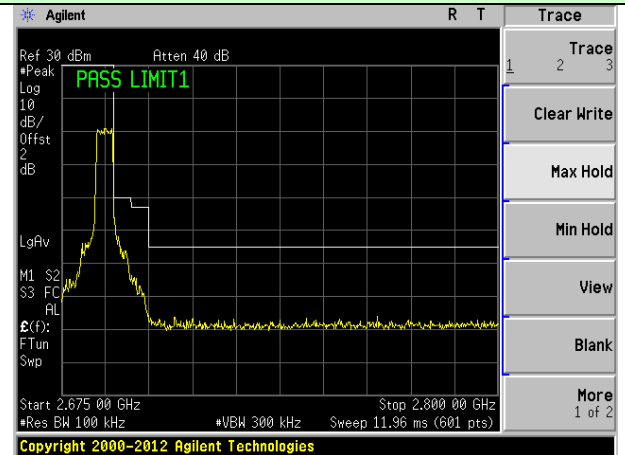


Highest channel

10MHz Bandwidth (RB size:25# RB offset:0#) 10MHz Bandwidth (RB size:25# RB offset:25#)

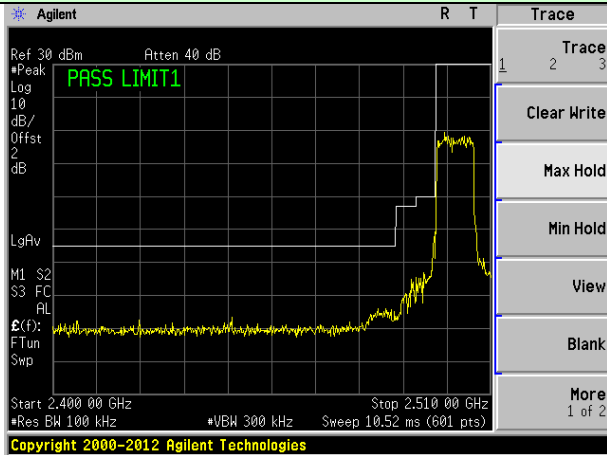


Lowest channel

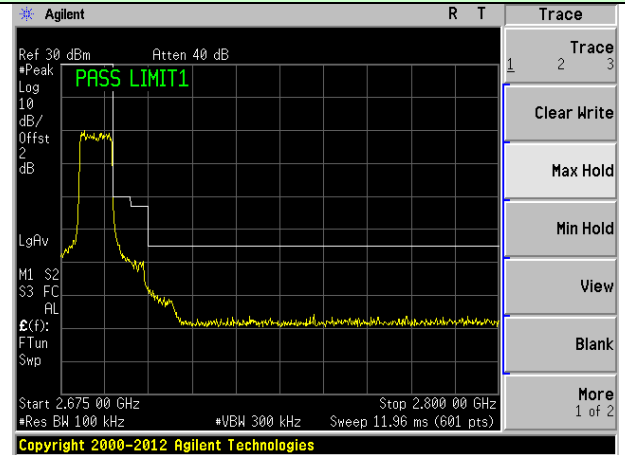


Highest channel

10MHz Bandwidth (RB size:50# RB offset:0#) 10MHz Bandwidth (RB size:50# RB offset:0#)

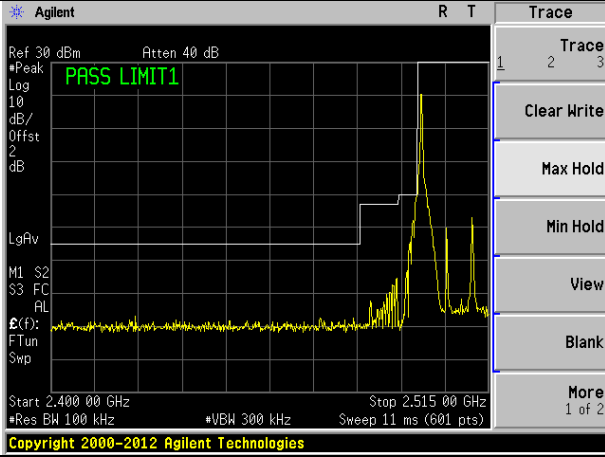


Lowest channel

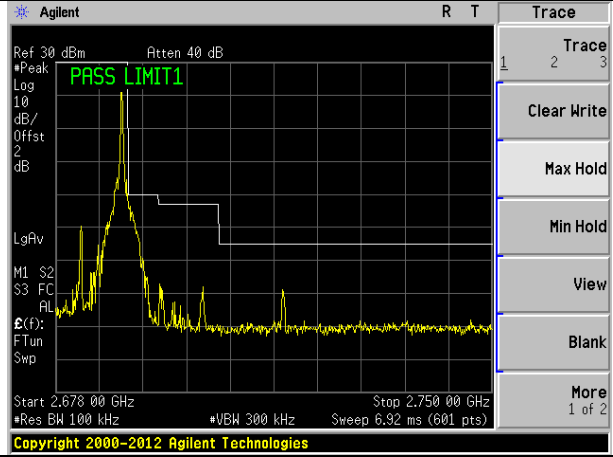


Highest channel

15MHz Bandwidth (RB size:1# RB offset:0#) 15MHz Bandwidth (RB size:1# RB offset:74#)

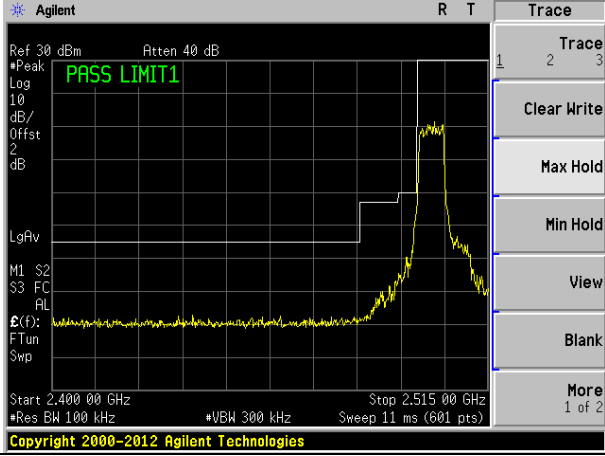


Lowest channel

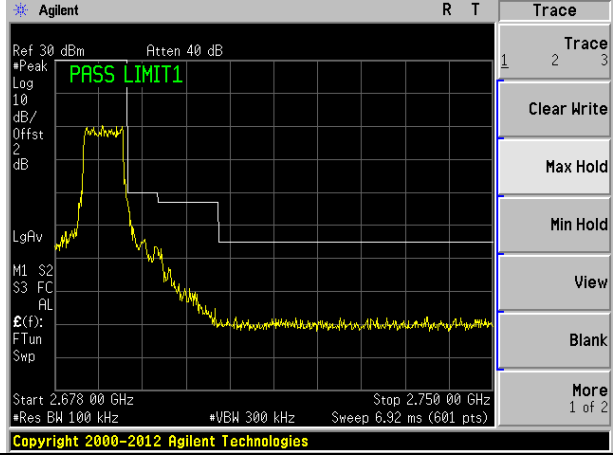


Highest channel

15MHz Bandwidth (RB size:36# RB offset:0#) 15MHz Bandwidth (RB size:36# RB offset:39#)

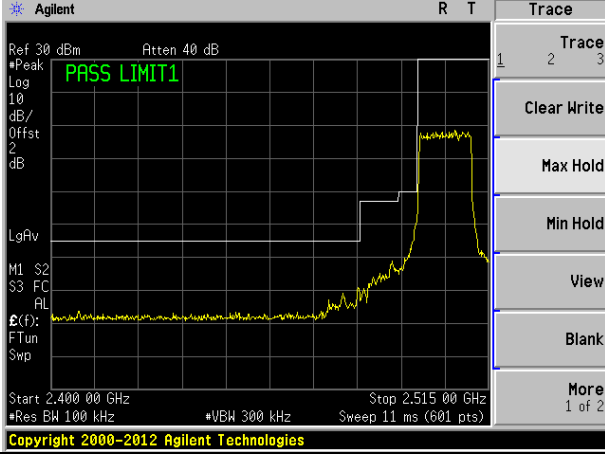


Lowest channel

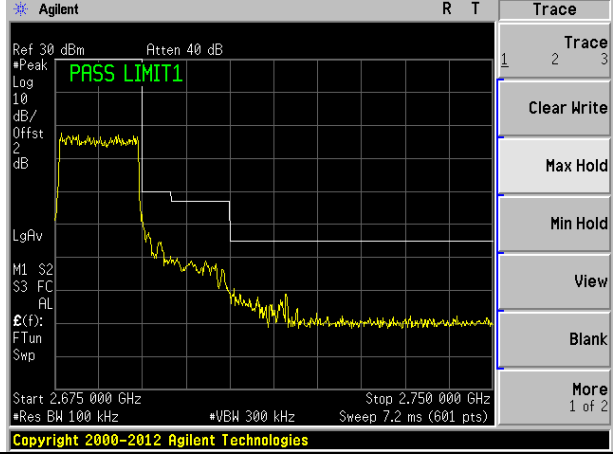


Highest channel

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

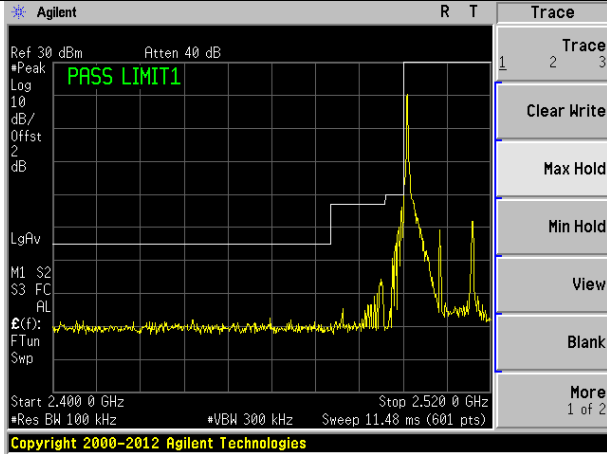


Lowest channel

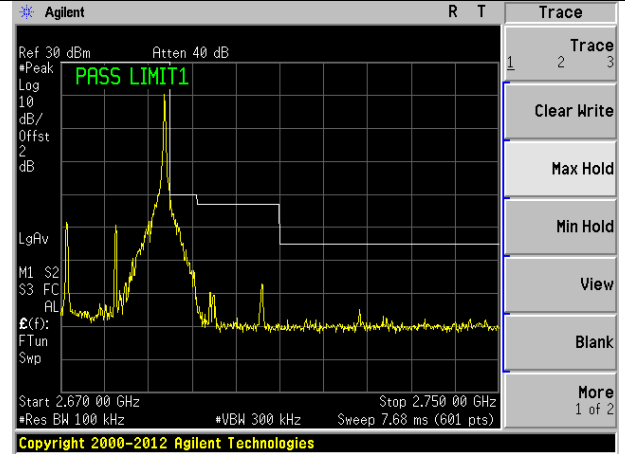


Highest channel

20MHz Bandwidth (RB size:1# RB offset:0#) 20MHz Bandwidth (RB size:1# RB offset:99#)

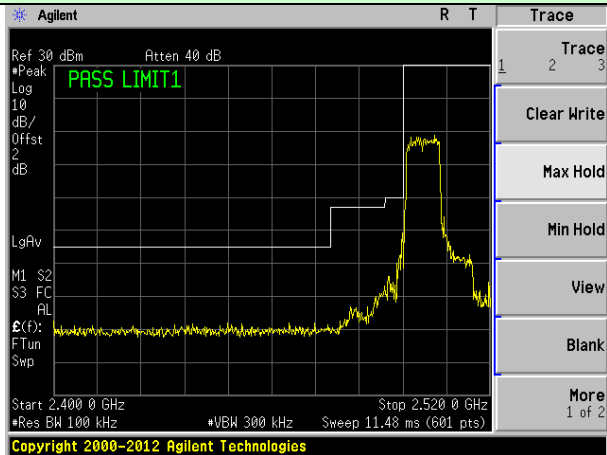


Lowest channel

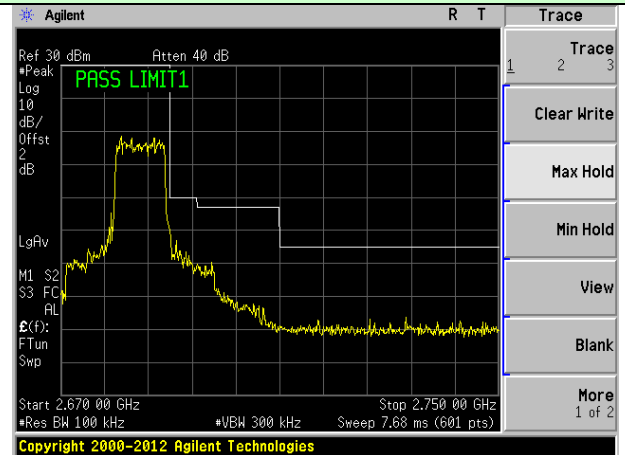


Highest channel

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

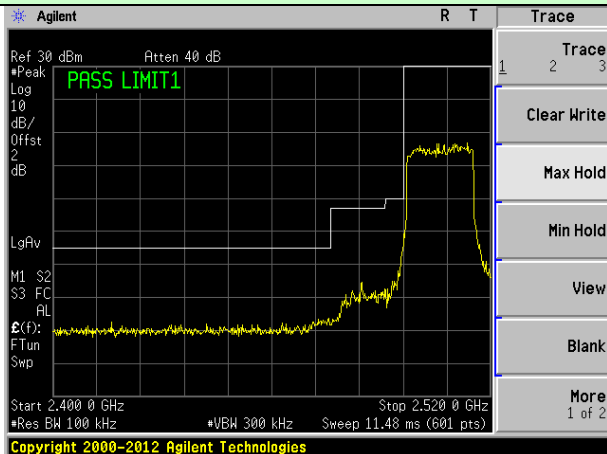


Lowest channel

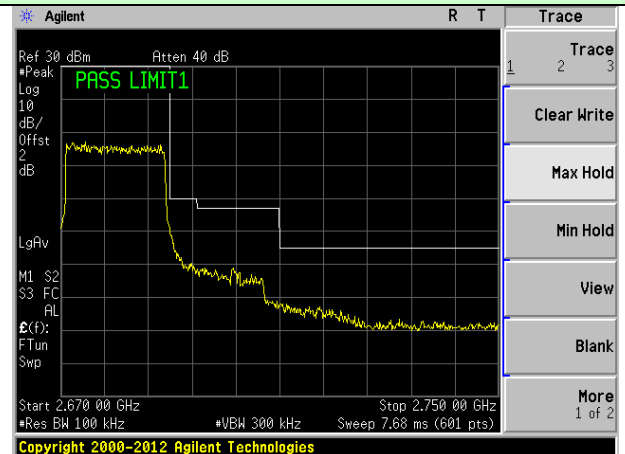


Highest channel

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



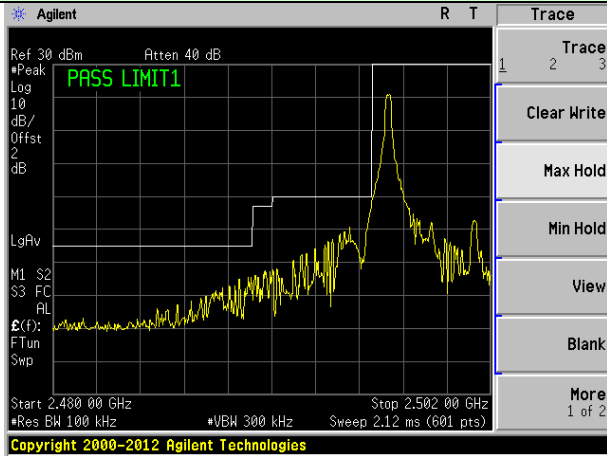
Lowest channel



Highest channel

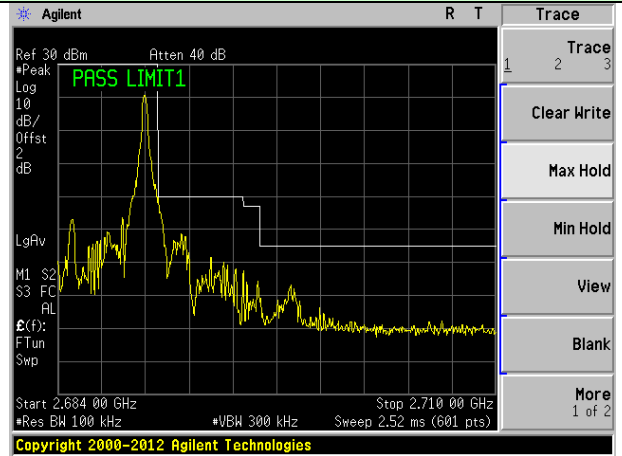
16QAM mode:

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



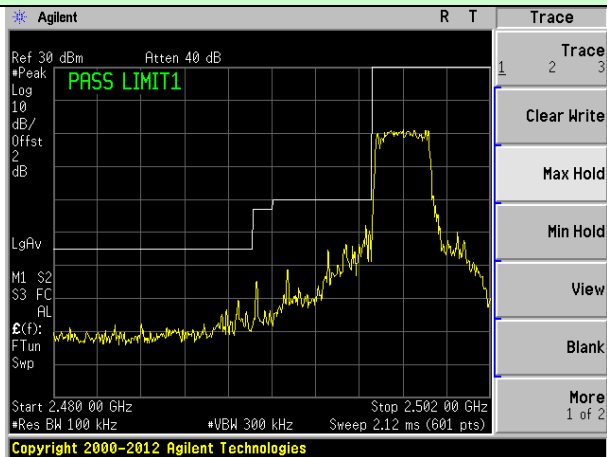
Lowest channel

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



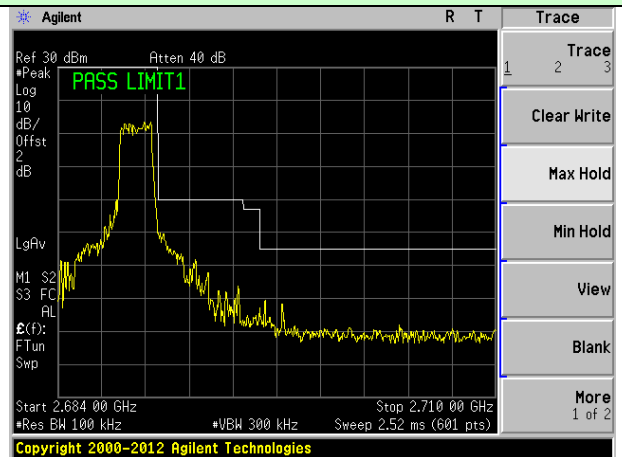
Highest channel

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



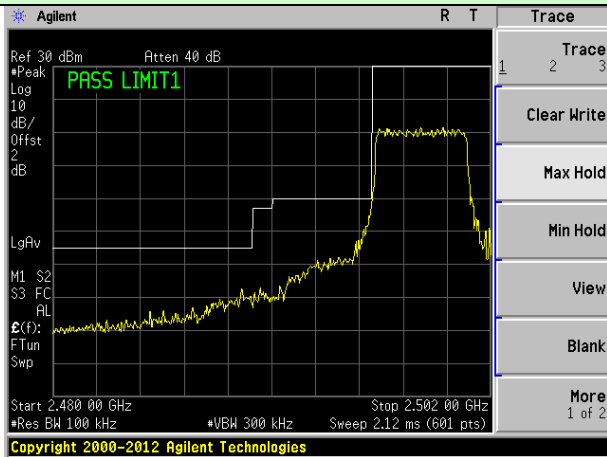
Lowest channel

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



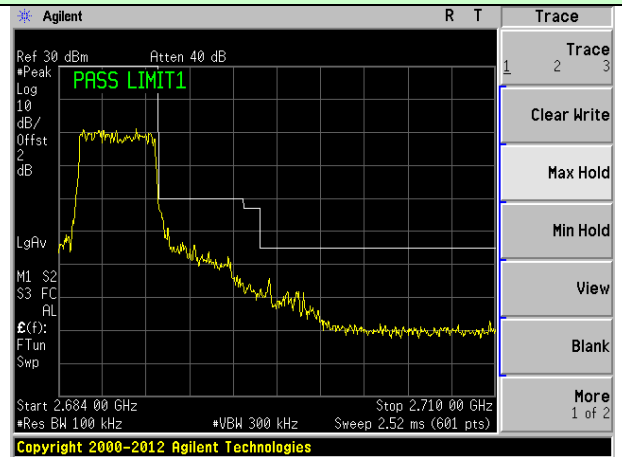
Highest channel

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



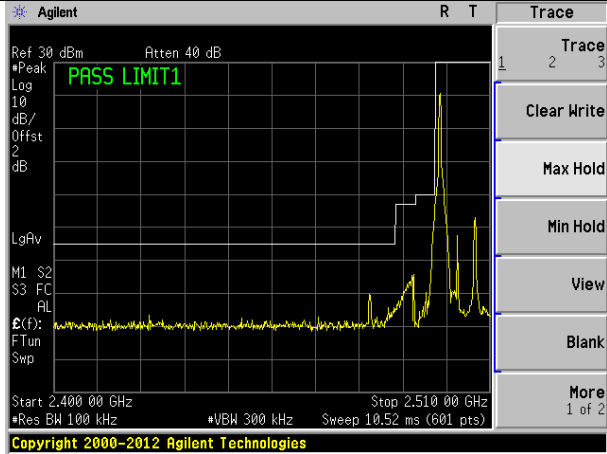
Lowest channel

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

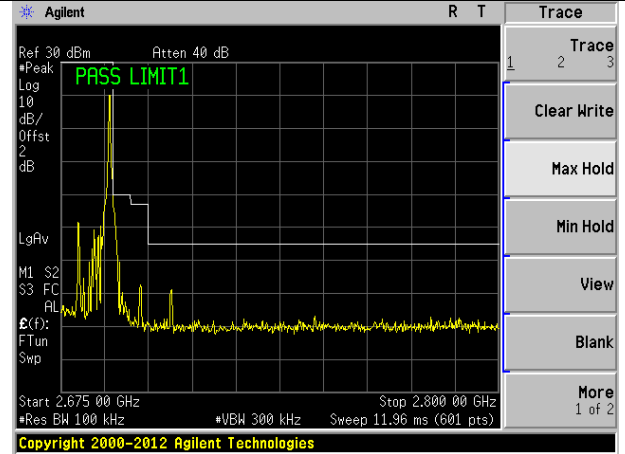


Highest channel

10MHz Bandwidth (RB size:1# RB offset:0#) 10MHz Bandwidth (RB size:1# RB offset:49#)

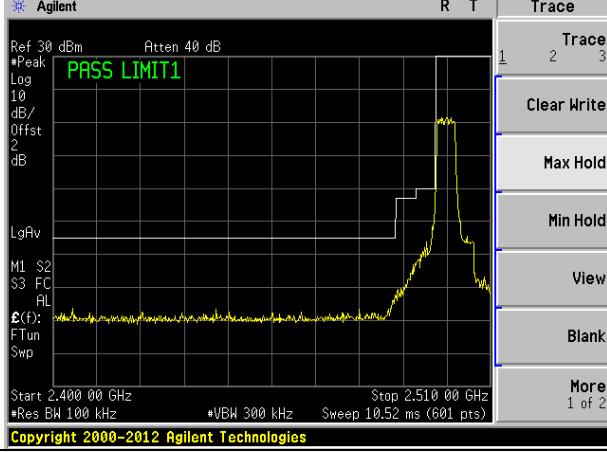


Lowest channel

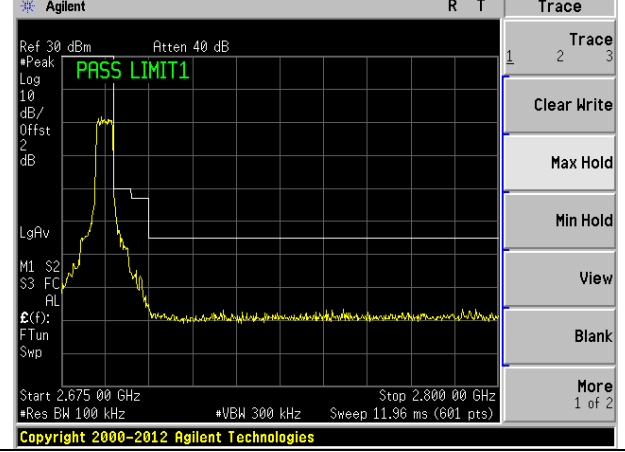


Highest channel

10MHz Bandwidth (RB size:25# RB offset:0#) 10MHz Bandwidth (RB size:25# RB offset:25#)

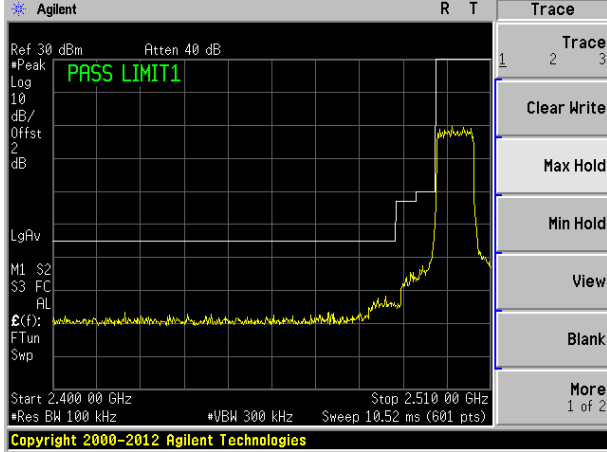


Lowest channel

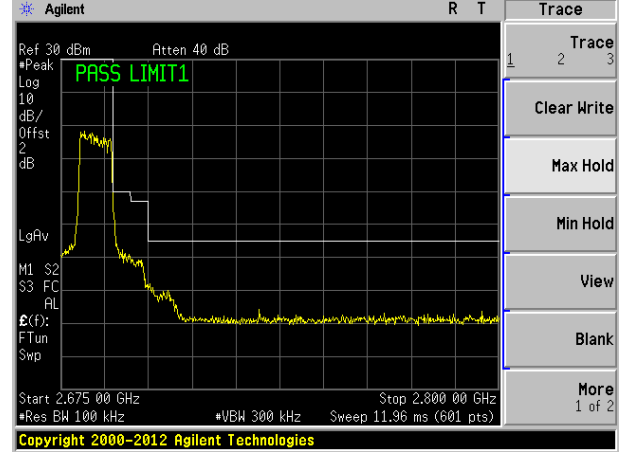


Highest channel

10MHz Bandwidth (RB size:50# RB offset:0#) 10MHz Bandwidth (RB size:50# RB offset:0#)

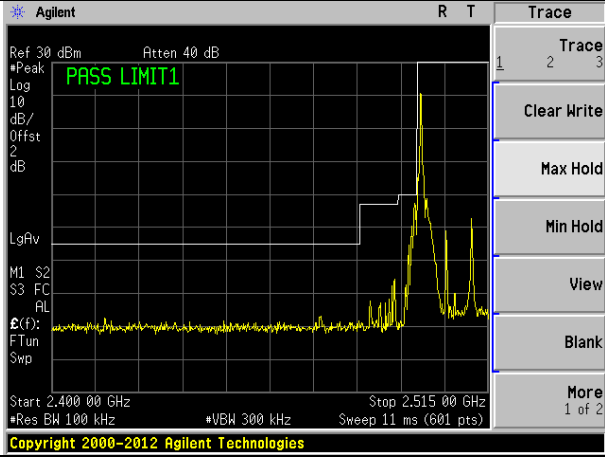


Lowest channel

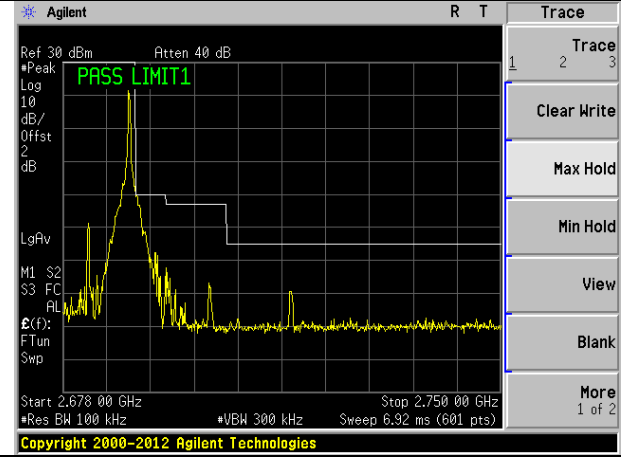


Highest channel

15MHz Bandwidth (RB size:1# RB offset:0#) 15MHz Bandwidth (RB size:1# RB offset:74#)

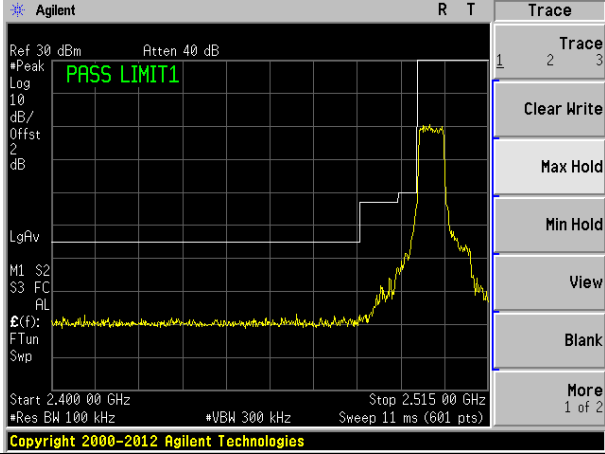


Lowest channel

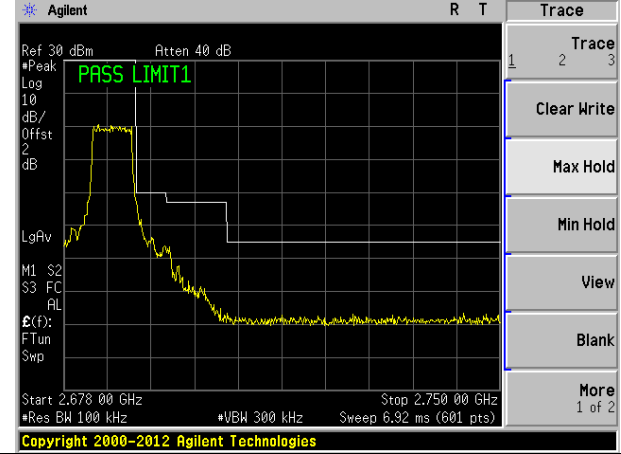


Highest channel

15MHz Bandwidth (RB size:36# RB offset:0#) 15MHz Bandwidth (RB size:36# RB offset:39#)

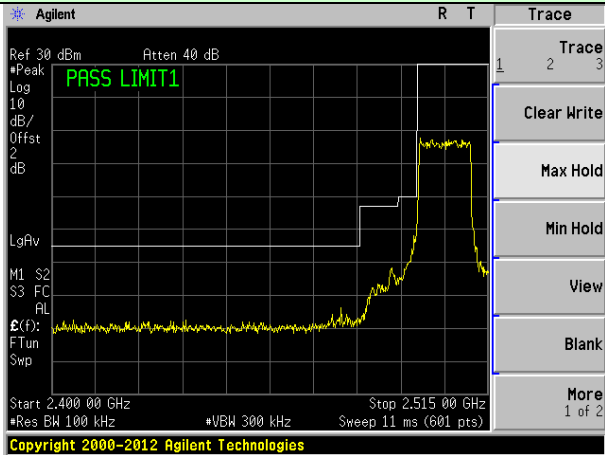


Lowest channel

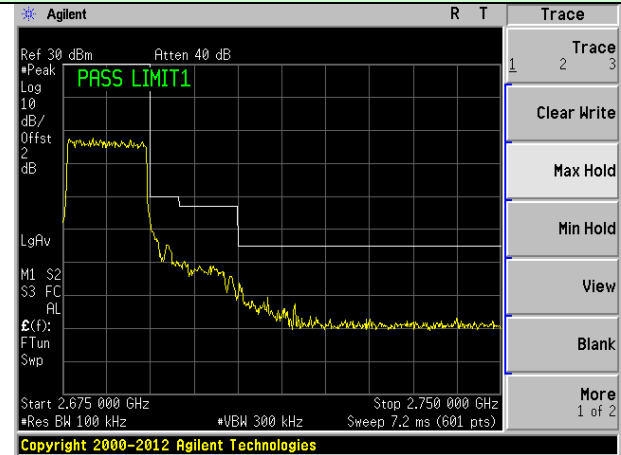


Highest channel

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

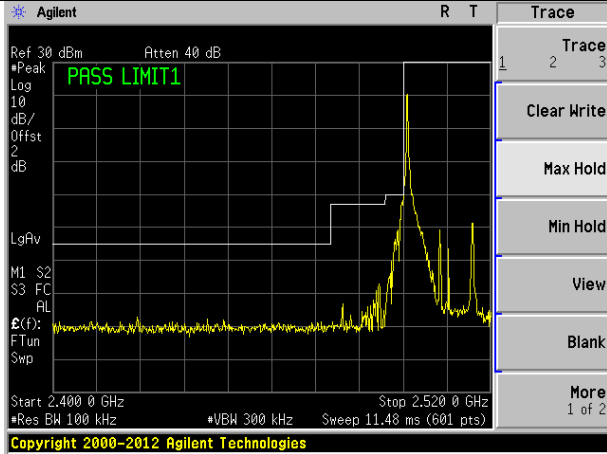


Lowest channel

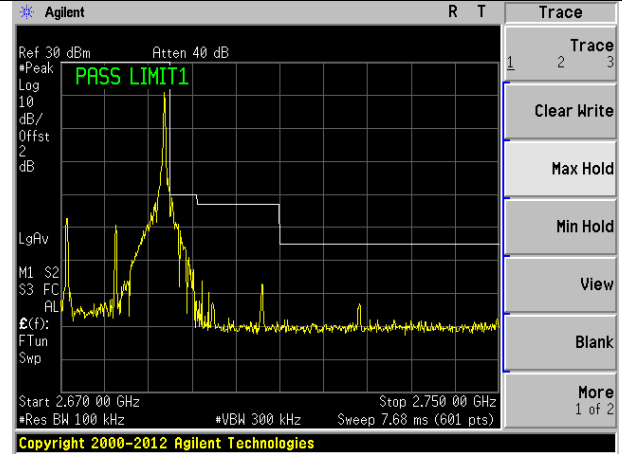


Highest channel

20MHz Bandwidth (RB size:1# RB offset:0#) 20MHz Bandwidth (RB size:1# RB offset:99#)

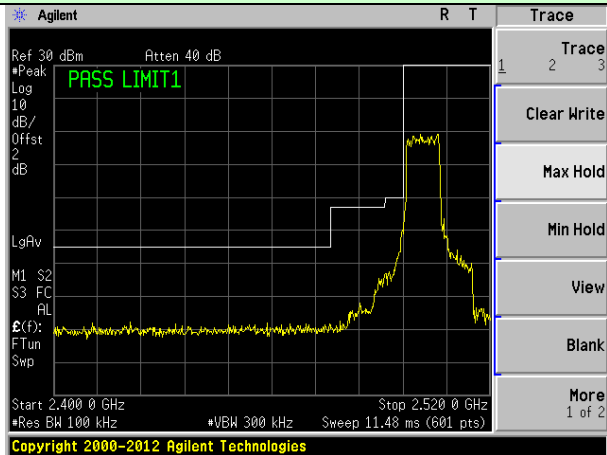


Lowest channel

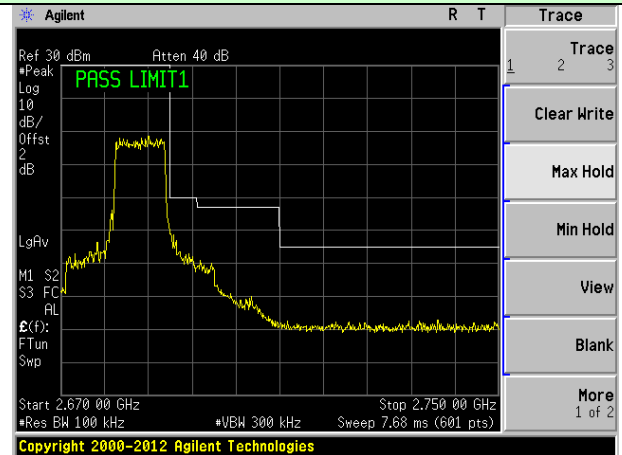


Highest channel

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

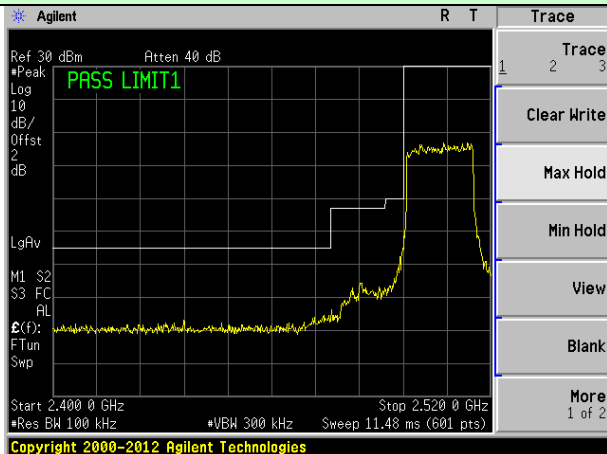


Lowest channel

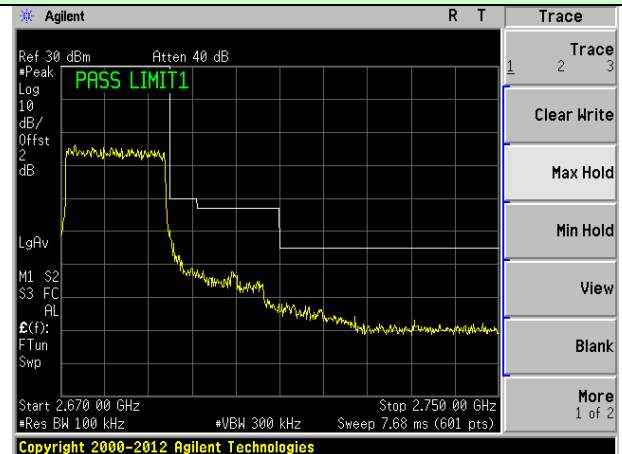


Highest channel

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

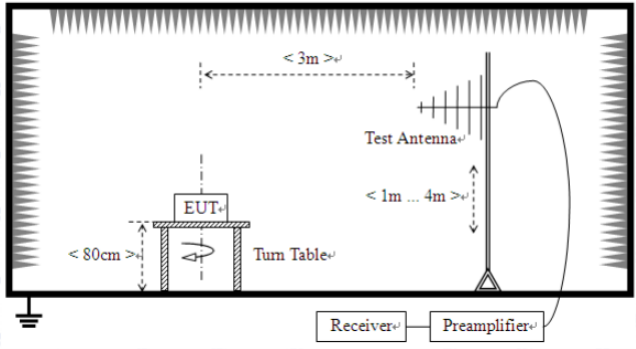
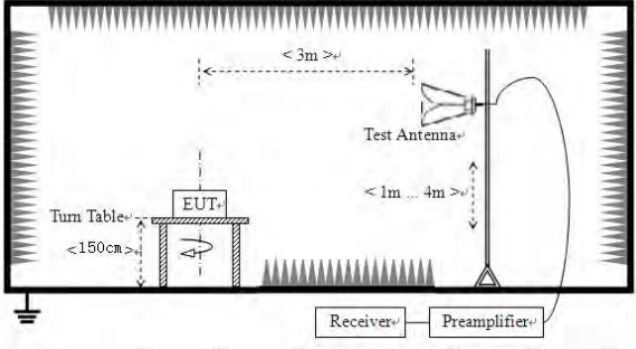
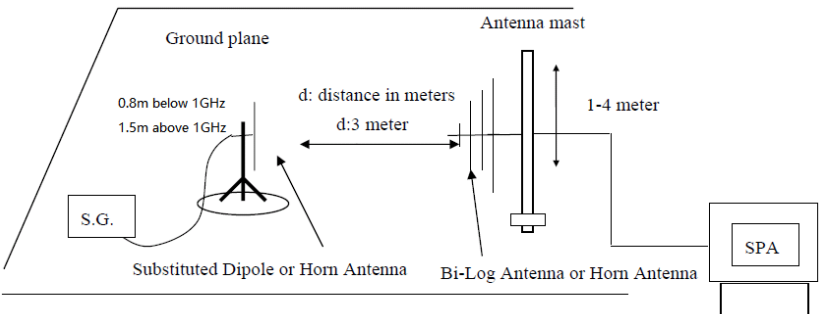


Lowest channel



Highest channel

7.8 Field strength of spurious radiation measurement

Test Requirement:	FCC Part 27.53(h)/(g)
Test Method:	FCC part 2.1053 and ANSI C63.26:2015
Limit:	-25dBm
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p>  <p>Substituted method:</p> 

Test Procedure:	<ol style="list-style-type: none"> 1. The EUT was placed on a 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

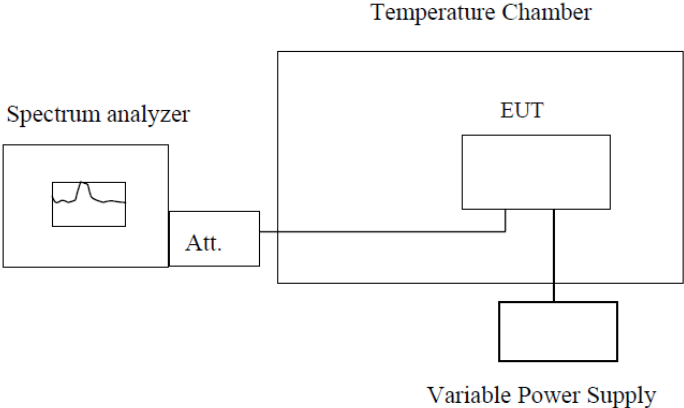
Measurement Data

Remark:

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

Test mode:		Band 41 (5MHz)		Test channel:	Lowest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result	
	Polarization	Level (dBm)			
5005.00	Vertical	-42.04	-25.00	Pass	
7507.50	V	-43.77			
10010.00	V	-41.03			
12512.50	V	-43.19			
15015.00	V	-42.58			
5005.00	Horizontal	-41.27	-25.00	Pass	
7507.50	H	-45.14			
10010.00	H	-44.70			
12512.50	H	-44.43			
15015.00	H	-43.85			
Test mode:		Band 41 (5MHz)		Test channel:	Middle
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result	
	Polarization	Level (dBm)			
5070.00	Vertical	-43.16	-25.00	Pass	
7605.00	V	-41.44			
10140.00	V	-41.34			
12675.00	V	-43.15			
15210.00	V	-44.48			
5070.00	Horizontal	-41.54	-25.00	Pass	
7605.00	H	-44.78			
10140.00	H	-44.09			
12675.00	H	-45.38			
15210.00	H	-42.76			
Test mode:		Band 41 (5MHz)		Test channel:	Highest
Frequency (MHz)	Spurious Emission		Limit (dBm)	Result	
	Polarization	Level (dBm)			
5135.00	Vertical	-42.20	-25.00	Pass	
7702.50	V	-43.24			
10270.00	V	-43.93			
12837.50	V	-42.55			
15405.00	V	-42.75			
5135.00	Horizontal	-41.11	-25.00	Pass	
7702.50	H	-44.01			
10270.00	H	-45.18			
12837.50	H	-47.23			
15405.00	H	-44.03			

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:	 <p style="text-align: center;">Note : Measurement setup for testing on Antenna connector</p>
Test procedure:	<ol style="list-style-type: none"> 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

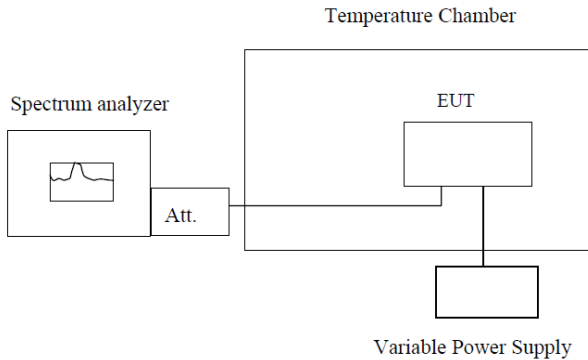
Modulation Mode: QPSK

Reference Frequency: LTE Band 41 Middle channel= 40620					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12	-30	54	0.0286	2.5	Pass
	-20	61	0.0323		
	-10	51	0.0273		
	0	42	0.0224		
	10	49	0.0261		
	20	42	0.0224		
	30	70	0.0372		
	40	63	0.0335		
	50	61	0.0323		

Modulation Mode: 16QAM

Reference Frequency: LTE Band 41 Middle channel= 40620					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12	-30	75	0.0433	2.5	Pass
	-20	83	0.0479		
	-10	71	0.0410		
	0	63	0.0364		
	10	67	0.0387		
	20	59	0.0342		
	30	103	0.0593		
	40	87	0.0502		
	50	83	0.0479		

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:	 <p style="text-align: center;">Temperature Chamber</p> <p style="text-align: center;">Spectrum analyzer</p> <p style="text-align: center;">Att.</p> <p style="text-align: center;">EUT</p> <p style="text-align: center;">Variable Power Supply</p> <p>Note : Measurement setup for testing on Antenna connector</p>
Test procedure:	<ol style="list-style-type: none"> 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

Modulation Mode: QPSK

Reference Frequency: LTE Band 41 Middle channel= 40620					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	8	47	0.0250	2.5	Pass
	12	54	0.0289		
	15	62	0.0327		

Modulation Mode: 16QAM

Reference Frequency: LTE Band 41 Middle channel= 40620					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	8	104	0.0602	2.5	Pass
	12	75	0.0434		
	15	85	0.0490		

8 Test Setup Photo

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

9 EUT Constructional Details

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

-----End-----