



FCC RF Test Report

Product Name: Vodafone Mobile Wi-Fi

Model Number:R210

Report No: SYBH(Z-RF)018032012-2003

FCC ID: QISR210

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1 Summary

The table below summarizes the measurements and results for the EUT. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	Description	Result
15.247 (a) (2)	Bandwidth measurement	PASS
15.247 (b) (3)	Conducted Peak output power	PASS
15.247 (d)	Band edge compliance measurement	PASS
15.247 (d)	Conducted RF spurious	PASS
15.247 (e)	Power spectral density	PASS
15.247 (d) / 15.205 & 15.209	Radiated spurious emission & Radiated restricted band measurement	PASS
15.207	Conducted emission test for power port	PASS



2 Product Description

2.1 Production Information

2.1.1 General Description

R210 is a LTE/DC-HSPA+/HSPA/UMTS/GSM triple mode and WiFi Wireless mobile Router; it can be used as a WiFi Access Point based on standard of IEEE802.11b/g/n. It supports 3G WCDMA and 4G LTE wireless internet accessing function. About 3G WCDMA wireless mode, it supports WCDMA and HSDPA/HSUPA/HSPA+, operating in Band1 (2100MHz) and Band 8(900M), and the 4G LTE, operating in Band3, Band7 and Band20 and GSM 4 bands. The WiFi frequency is 2.4GHz.

R210 supports 1Tx2Rx for 3G WCDMA and 4G LTE, WiFi only supports 1Tx1Rx.

Note: Only WIFI function was considered in this report.

2.1.2 Support function and Service

The EUT support the function and service as follows:

Characteristics	Description
TX/RX Operating Band	2400 MHz to 2483.5 MHz
IEEE 802.11 WLAN Mode Supported	802.11b: Supported 802.11g: Supported 802.11n : Supported
Channel Bandwidth	802.11b: 20 MHz 802.11g: 20 MHz 802.11n: 20 MHz,
TX Power Control (TPC)	Supported
Type of Modulation	802.11b: DSSS 802.11g: OFDM 802.11n: OFDM



2.2 Modification Information

For original equipment, following table is not application.

Table 2 Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information
Not applicable!				



3 Test Site Description

The test site of:

***Huawei Technologies Co. Ltd.
P.O. Box 518129
Huawei base, bantian,
Longgang District, Shenzhen, China***

3.1 Testing Period

The test have been performed during the period of

Mar.27, 2012 –Apr.01, 2012

3.2 Test Modes

NOTE: Typical working modes for each IEEE 802.11 mode are selected to perform tests.

Test Mode	Test Modes Description
TM1	IEEE 802.11b
TM2	IEEE 802.11g
TM3	IEEE 802.11n of 20 MHz, using SISO mode

NOTE: All relevant operation modes have been tested, and the worst case data is included in this report.



4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 3 Frequency Range

Uplink band:	2400 to 2483.5 MHz	
Downlink band:	2400 to 2483.5 MHz	
Hop frequency support:	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO

4.1.2 Channel Spacing / Separation

Table 4 Channel Spacing / raster

Channel spacing:	22 MHz
Channel raster:	5 MHz

4.1.3 Antenna Information

Table 5 Antenna Information

Type:	Integrated / Internal
Maximum Gain(dBi):	1.2 (from 2400MHz to 2500MHz)



4.1.4 Environmental Requirements

Table 6 Environmental Requirements

Minimum temperature:	0 °C
Maximum temperature:	+ 35 °C
Relative Humidity:	5%-95%

4.1.5 Power Source

Table 7 Power Source

AC voltage nominal:	~120V
AC voltage range	~100V-240V

4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (9).

Please reference the document Tune-up Procedure in TCF.



4.2 EUT Identification List

4.2.1 Board Information

Table 8 Board Information

Vodafone Mobile Wi-Fi		
R210		
Board and Module		
Hardware Version	Software Version	Serial Number
CL1E589M22	11.433.11.01.11	X6U2C11151500558

4.2.2 Adapter Technical Data

Name	Manufacture	Description
Adapter	HUAWEI	Adapter Model: HW-050200U3W Input Voltage : 100-240V ¹ ~50/60Hz, 0.5A MAX Output Voltage: === 5.0V 2.0A

4.2.3 Battery Technical Data

Name	Manufacture	Description
Li-ion Battery	HUAWEI	Battery Model: HB5P1H Rated capacity: 3000mAh Nominal Voltage: === +3.7V Charging Voltage: === +4.2V

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: R210
FCC Identification: QISR210



5 Main Test Instruments

Table 9 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sep.27,2012
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr.20,2012
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2012
Temperature Chamber	WEISS	WKL64	24600294	Feb.13,2013
Signal generator	Agilent	E8257D	MY49281095	Jul.09.2012
Test receiver	R&S	ESU26	100150	May.29.2012
Tunable Dipole	Schwarzbeck	D69250- UHAP/D69250 -VHAP	919/1009	Jan.29.2013
Tunable Dipole	Schwarzbeck	D69250- UHAP/D69250 -VHAP	979/917	Jan.29.2013
Horn Antenna	R & S	HF906	100683	May.15, 2012
Horn Antenna	R & S	HF906	100684	Jul.01, 2012
Broadband Antenna	Schwarzbeck	VULB 9163	9163-357	May.15, 2012
Broadband Antenna	Schwarzbeck	VULB 9163	9163-356	May.15, 2012



6 Transmitter Measurements

6.1 Bandwidth measurement

6.1.1 Test Conditions

Table 10 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at channel No.1, 6, 11

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 15.247 (a) (2) and KDB 558074

6.1.2.2 Supporting Standards

Table 11 Supporting Standards:

ANSI C63.4-2009	American National Standard for Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices

6.1.2.3 Limits

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

Table 12 Limits

Limits	≥ 500kHz
--------	----------

6.1.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power at 2.4GHz, then set the measured frequency number and test the bandwidth with spectrum analyzer.

Test setup

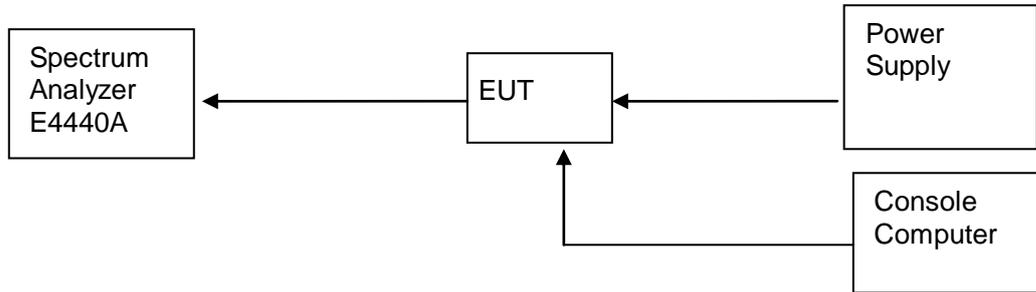


Figure 1. Test Set-up

6.1.4 Measurement Results

Table 13 Measurement Results

Test condition	Channel Position	Channel Number	Frequency [GHz]	Bandwidth Type	Measured Bandwidth [MHz]	Result
TM1	B	1	2.412	6dB	8.13	Pass
				99%	12.66	Pass
	M	6	2.437	6dB	8.61	Pass
				99%	12.71	Pass
	T	11	2.462	6dB	8.12	Pass
				99%	12.78	Pass
TM2	B	1	2.412	6dB	16.40	Pass
				99%	16.55	Pass
	M	6	2.437	6dB	16.47	Pass
				99%	16.61	Pass
	T	11	2.462	6dB	16.39	Pass
				99%	16.61	Pass
TM3	B	1	2.412	6dB	17.39	Pass
				99%	17.50	Pass
	M	6	2.437	6dB	17.39	Pass
				99%	17.54	Pass
	T	11	2.462	6dB	17.43	Pass
				99%	17.54	Pass

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix A.



6.2 Peak output power

6.2.1 Test Conditions

Table 14 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at channel No.1, 6, 11

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 15.247 (b) (3) and KDB 558074

6.2.2.2 Supporting Standards

Table 15 Supporting Standards:

ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices
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6.2.2.3 Limits

Compliance with part 15.247 (b) (3), for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level.

Table 16 Limits

2.4GHz and 5.8GHz system using digital modulation	1 Watt / 30 dBm
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6.2.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer.
- (b) Set the EUT to transmit maximum output power.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted output power separately.

Test setup

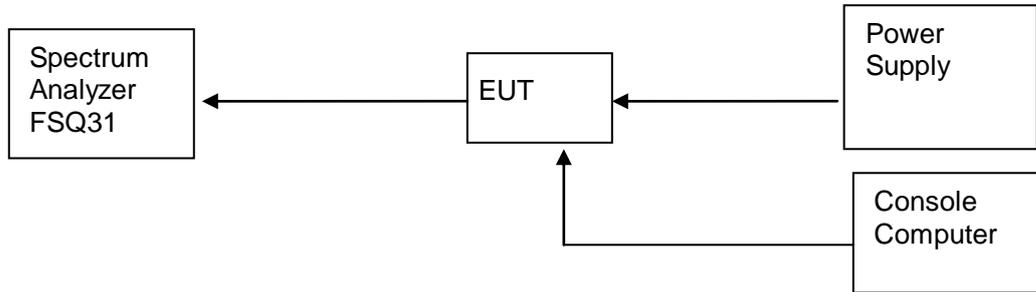


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 17 Measurement Results

Test condition	Channel	Channel No.	Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
TM1	B	1	2412	16.26	< 30	Pass
	M	6	2437	16.78	< 30	Pass
	T	11	2462	16.09	< 30	Pass
TM2	B	1	2412	19.38	< 30	Pass
	M	6	2437	20.03	< 30	Pass
	T	11	2462	19.40	< 30	Pass
TM3	B	1	2412	19.53	< 30	Pass
	M	6	2437	19.94	< 30	Pass
	T	11	2462	19.58	< 30	Pass

6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.



6.3 Band edge spurious emission

6.3.1 Test Conditions

Table 18 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at channel No. 1, 11

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 15.247(d) and KDB 558074

6.3.2.2 Supporting Standards

Table 19 Supporting Standards:

ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices
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6.3.2.3 Limits

Compliance with part 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

Table 20 Limits

Band edge spurious:	20 dBc/100kHz
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6.3.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz
- (c) Then set the EUT to transmit at high, low frequency and measure the conducted band edge spurious separately.

Test setup

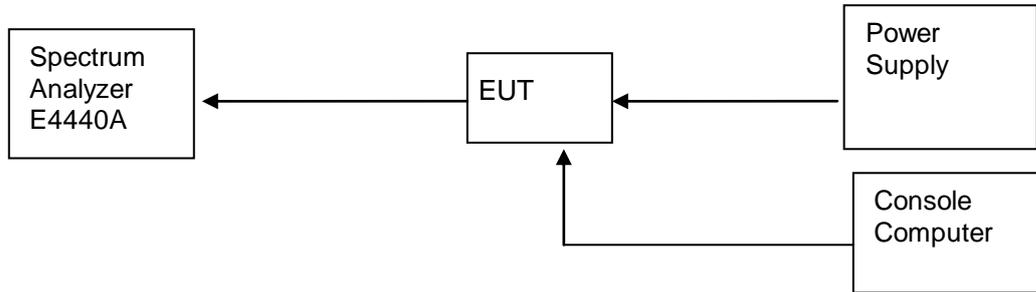


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 21 Measurement Results

Test condition		Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Result
TM1	Low Edge	1	2412	4.94	-46.96	-15.10	Pass
	High Edge	11	2462	2.53	-48.28	-17.50	Pass
TM2	Low Edge	1	2412	0.34	-31.18	-19.60	Pass
	High Edge	11	2462	-0.13	-34.60	-20.10	Pass
TM3	Low Edge	1	2412	0.44	-31.38	-19.60	Pass
	High Edge	11	2462	-0.12	-33.90	-20.10	Pass

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix C.

6.4 Conducted RF spurious

6.4.1 Test Conditions

Table 22 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at channel No.1, 6, 11

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 15.247 (d) and KDB 558074

6.4.2.2 Supporting Standards

Table 23 Supporting Standards:

ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices
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6.4.2.3 Limits

Compliance with part 15.247 (d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required.

Table 24 Limits

Band edge spurious:	20 dBc/100kHz
---------------------	---------------

6.4.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz and.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.

Test setup

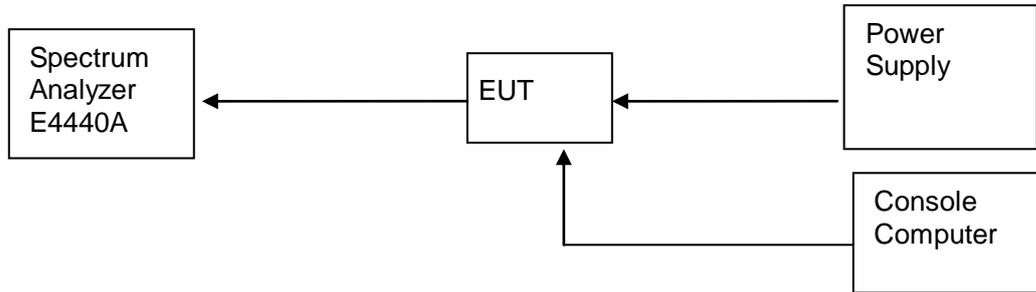


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 25 Measurement Results

Test condition	Test Frequency Range	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Result
TM1	9KHz-26GHz	1	2412	7.67	-42.50	-12.3	Pass
	9KHz-26GHz	6	2437	7.92	-41.73	-12.1	Pass
	9KHz-26GHz	11	2462	7.14	-44.07	-12.9	Pass
TM2	9KHz-26GHz	1	2412	7.40	-44.07	-12.6	Pass
	9KHz-26GHz	6	2437	10.15	-40.56	-9.9	Pass
	9KHz-26GHz	11	2462	8.34	-43.21	-11.7	Pass
TM3	9KHz-26GHz	1	2412	8.10	-44.26	-11.9	Pass
	9KHz-26GHz	6	2437	7.87	-42.63	-12.2	Pass
	9KHz-26GHz	11	2462	6.71	-43.38	-13.3	Pass

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D.



6.5 Power spectral density

6.5.1 Test Conditions

Table 26 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at channel No.1, 6, 11

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 15.247 (e) and KDB 558074

6.5.2.2 Supporting Standards

Table 27 Supporting Standards:

ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices
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6.5.2.3 Limits

Compliance with part 15.247 (e), For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. The same method of determining the conducted output power shall be used to determine the power spectral density.

Table 28 Limits

Band edge spurious:	8 dBm/3kHz
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6.5.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer
- (b) Set the EUT to transmit maximum output power at 2.4GHz and.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.

Test setup

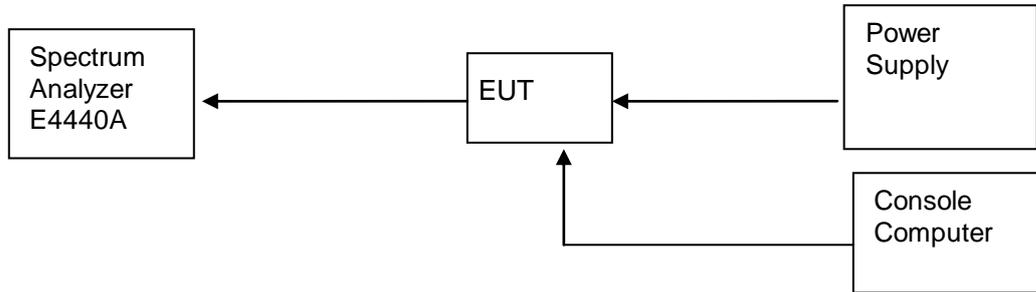


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 29 Measurement Results

Test condition	Channel No.	Carrier Frequency [MHz]	Measured Power spectral density [dBm]	Limit [dBm]	Result
TM1	1	2412	-8.24	<8	Pass
	6	2437	-8.19	<8	Pass
	11	2462	-7.92	<8	Pass
TM2	1	2412	-12.28	<8	Pass
	6	2437	-12.81	<8	Pass
	11	2462	-13.43	<8	Pass
TM3	1	2412	-12.07	<8	Pass
	6	2437	-12.47	<8	Pass
	11	2462	-13.56	<8	Pass

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to appendix E.



6.6 Radiated spurious emission & spurious in restricted band

6.6.1 Test Conditions

Table 30 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at channel No.1, 6, 11

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 15.247 (d), 15.205 & 15.209 and KDB 558074

6.6.2.2 Supporting Standards

Table 31 Supporting Standards:

ANSI C63.10-2009	American National Standard for Testing Unlicensed Wireless Devices
ANSI C63.4: 2009	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

6.6.2.3 Limits

According to part 15.247 (d) / 15.205 & 15.209, all spurious emission in the frequency range from 30MHz to 10th harmonics of carrier frequency should be meet the requirement of following table.

Table 32 Limits

Frequency (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)	Detector
0.009 - 0.490	2400/F(kHz)	20*lg(2400/F(kHz))	300	QP
0.490 - 1.705	24000/F(kHz)	20*lg(24000/F(kHz))	30	QP
1.705 - 30	30	29.5	30	QP
30 – 88	100	40	3	QP
88 – 216	150	43.5	3	QP
216 – 960	200	46	3	QP
960 -1000	500	54	3	QP
Above 1000	500	54	3	AV
Above 1000	500	74	3	PK

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table 42).

6.6.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4:2009. The Radiated Disturbance measurements were made using a Rohde and Schwarz Test Receiver and control software.

A preliminary scan and a final scan of the emissions were made by using test script of software; the emissions were measured using a Quasi-Peak Detector below 1GHz, Peak Detector and AV Detector above 1GHz. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°, The receive antenna has two polarizations V and H.

A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other nonmetallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z axes) axis positions such that emissions from the EUT are maximized.

The EUT was communicated with the BTS simulator through Air interface. The EUT operated on the typical channel.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 kHz
Measurement bandwidth: 1000 MHz – 10th Carrier Frequency: 1 MHz

Test set up

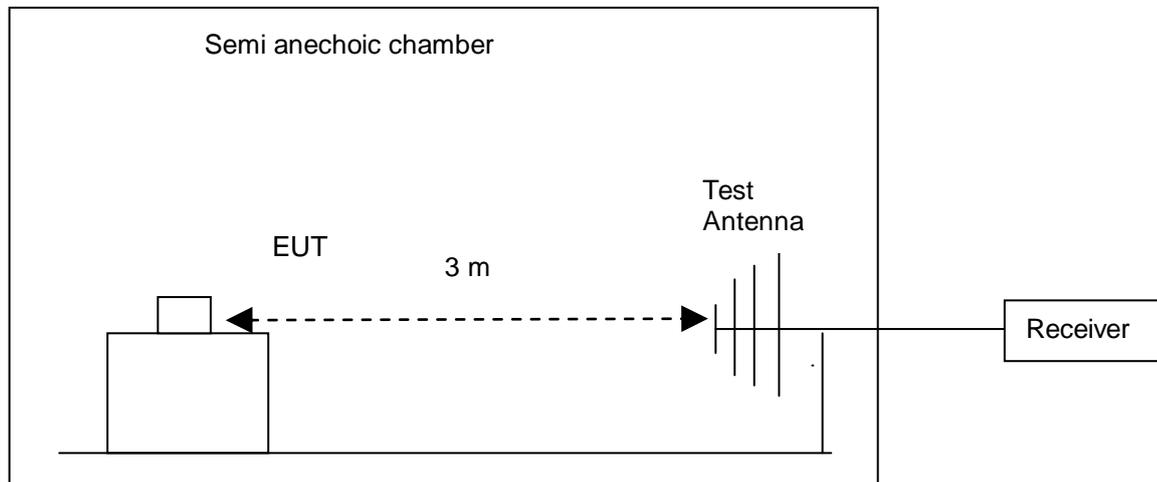


Figure 6. Test Set up

6.6.4 Measurement Results

Note 1: The following measurement results exceed the limit line is the carrier frequency.

Note 2: This test was carried out in all the test modes, here only the worst test result was shown.

Test condition	Channel No.	Carrier Frequency [MHz]	Measured	Result
TM1	1	2412	Refer to Appendix F	Pass
	6	2437	Refer to Appendix F	Pass
	11	2462	Refer to Appendix F	Pass
TM2	1	2412	Refer to Appendix F	Pass
	6	2437	Refer to Appendix F	Pass
	11	2462	Refer to Appendix F	Pass



TM3	1	2412	Refer to Appendix F	Pass
	6	2437	Refer to Appendix F	Pass
	11	2462	Refer to Appendix F	Pass

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix F.



6.7 Conducted Emission at Power Port

6.7.1 Test Conditions

Table 33 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	TM1 at channel No. 6

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 15.207 and KDB 558074

6.7.2.2 Supporting Standards

Table 34 Supporting Standards:

ANSI C63.4: 2009	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
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6.7.2.3 Limits

Compliance with part15.207, conducted emission must meet the requirement of following table.

Table 35 Limits

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Note: * Decreases with the logarithm of the frequency.

6.7.3 Test Method and Setup

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2009.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

The EUT was communicated with the BTS simulator through Air interface, the BTS simulator controls the Wireless Modem to transmitter the maximum power which defined in specification of product. The Wireless Modem operated on the typical channel.

Measurement bandwidth (RBW) for 150kHz to 30 MHz: 9 kHz;

Test Set-up

The EUT was setup in the screened chamber and operated under nominal conditions.

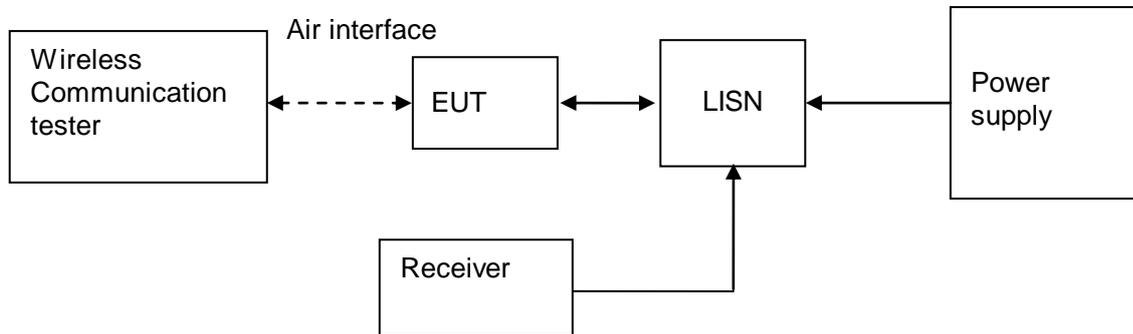


Figure 7. Test Set-up

6.7.4 Measurement Results

Table 36 MEASUREMENT RESULT:QP DECTER

Frequency	Level	Transducer	Limit	Margin	Line	PE
MHz	dB μ V	dB	dB μ V	dB		
0.181416	48.7	9.7	64.4	15.7	L1	FLO
0.182224	49.1	9.7	64.4	15.3	L1	FLO
0.396086	40.0	9.7	57.9	17.9	N	FLO
0.424170	45.6	9.7	57.4	11.8	L1	FLO
0.698502	38.7	9.7	56.0	17.3	L1	FLO
1.191660	35.8	9.7	56.0	20.2	N	FLO

Table 37 MEASUREMENT RESULT:AV DECTER

Frequency	Level	Transducer	Limit	Margin	Line	PE
MHz	dB μ V	dB	dB μ V	dB		
0.177835	32.9	9.7	54.6	21.7	L1	FLO
0.274226	36.8	9.7	51.0	14.2	L1	FLO
0.311374	27.5	9.7	49.9	22.4	N	FLO
0.418328	36.8	9.7	47.5	10.7	L1	FLO
0.695392	24.7	9.7	46.0	21.3	L1	FLO
1.199805	24.4	9.7	46.0	21.6	N	FLO

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix G.



7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Table 38 System Measurement Uncertainty

Items		Extended Uncertainty
20dB bandwidth measurement	Magnitude (%)	U=0.2%; k=2
Peak output power	Power(dBm)	U=0.39dB; k=2
Band edge compliance measurement	Disturbance Power(dBm)	U=2.0dB; k=2
Conducted RF spurious	Disturbance Power(dBm)	U=0.4dB; k=2
Power spectral density	Disturbance Power(dBm)	U=0.4dB; k=2
Radiated spurious emission & Radiated restricted band measurement	Field strength (dB μ V/m)	U=4.1dB; k=2 U=4.1dB; k=2
Conducted emission test for power port	Disturbance Voltage(dB μ V)	U=3.4dB; k=2



8 Appendices

Appendix A	Measurement Results Bandwidth measurement
Appendix B	Measurement Results Peak output power
Appendix C	Measurement Results Band edge compliance measurement
Appendix D	Measurement Results Conducted RF spurious
Appendix E	Measurement Results Power spectral density
Appendix F	Measurement Results Radiated spurious emission
Appendix G	Measurement Results Conducted emission test for power port
Appendix H	Photos of Test Setup

(END OF REPORT)



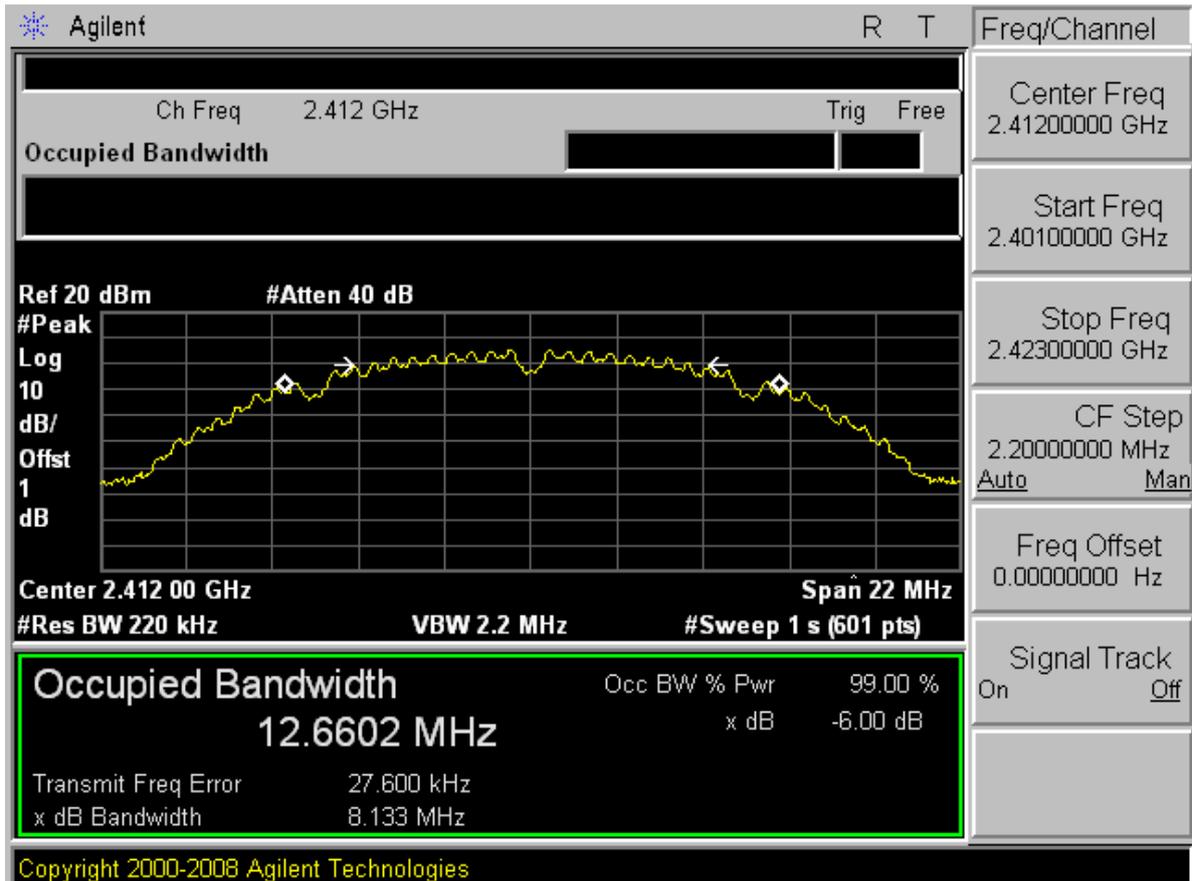
Appendix A

Bandwidth measurement

According to FCC Part 15.247 (a) (2)

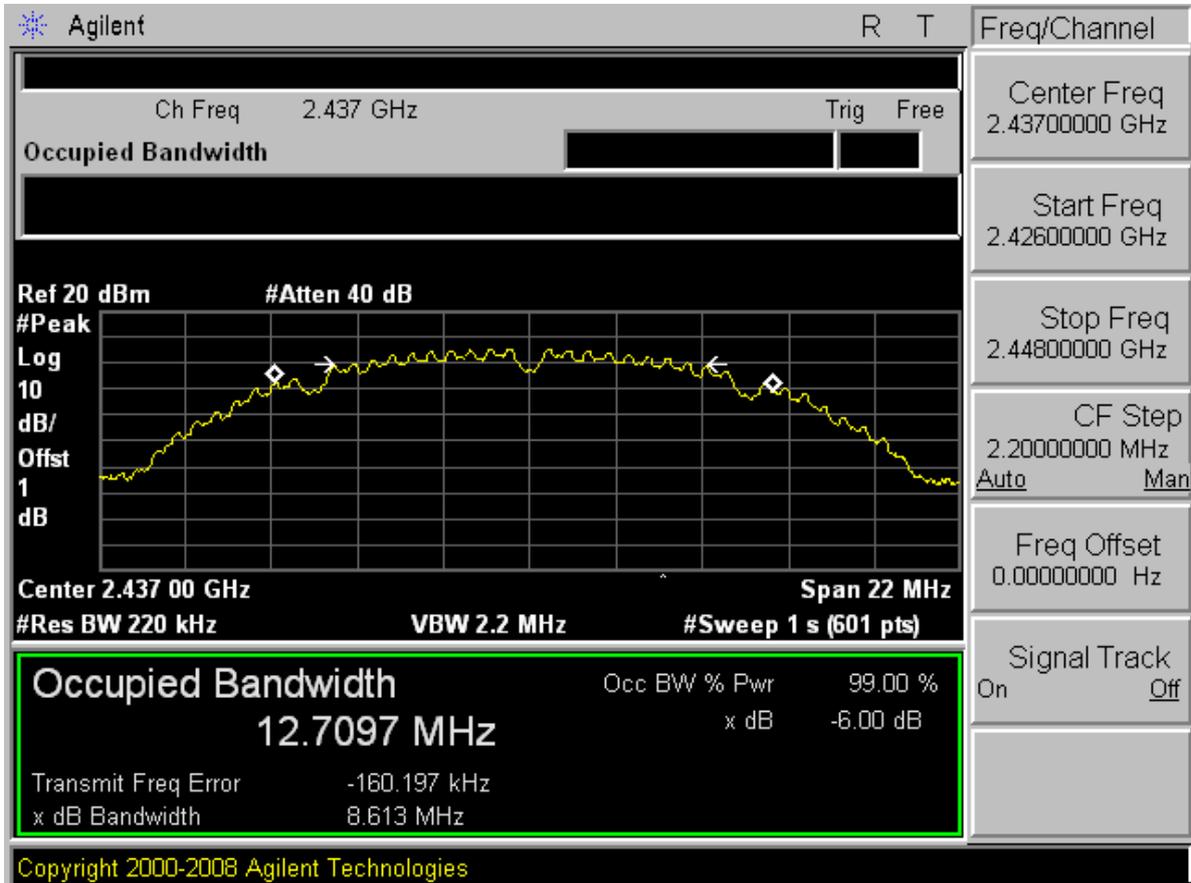


TM1 Channel 1 (2412MHz)



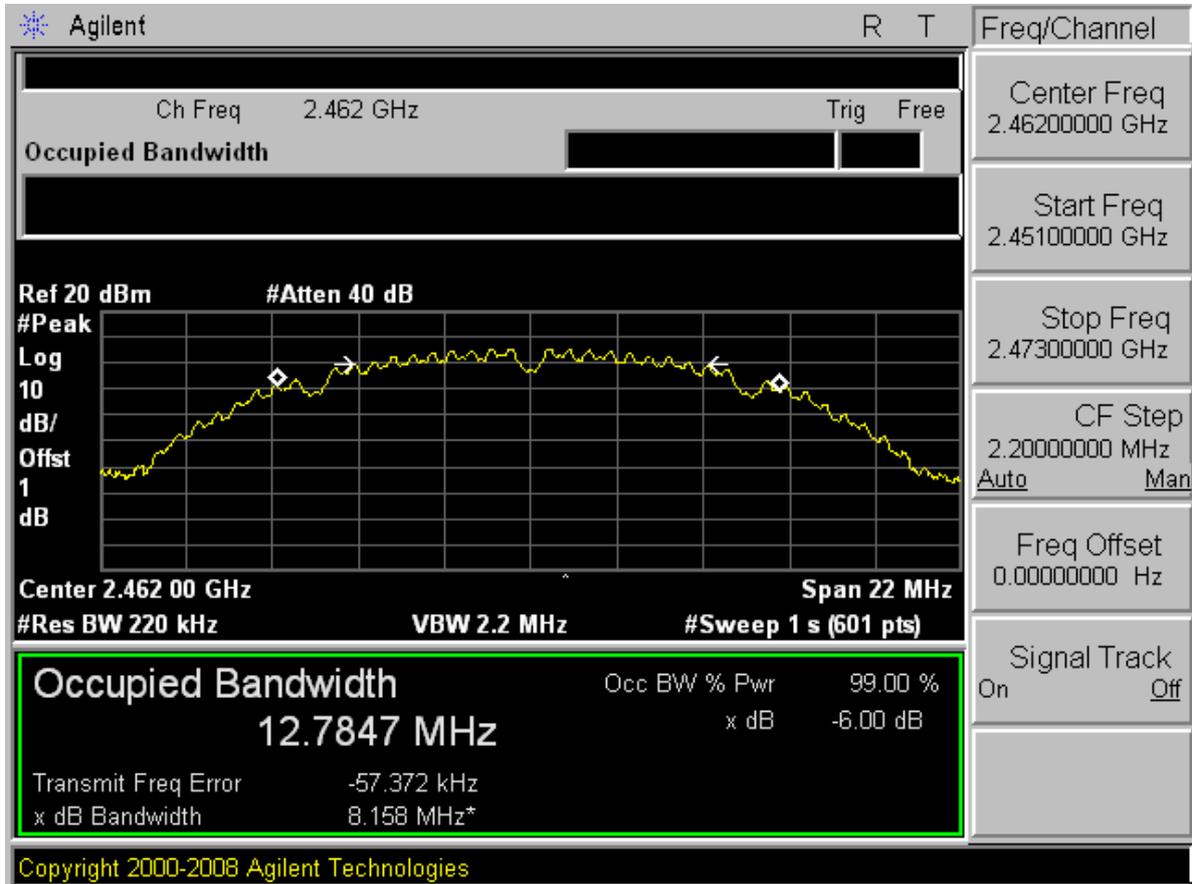


Channel 6 (2437MHz)





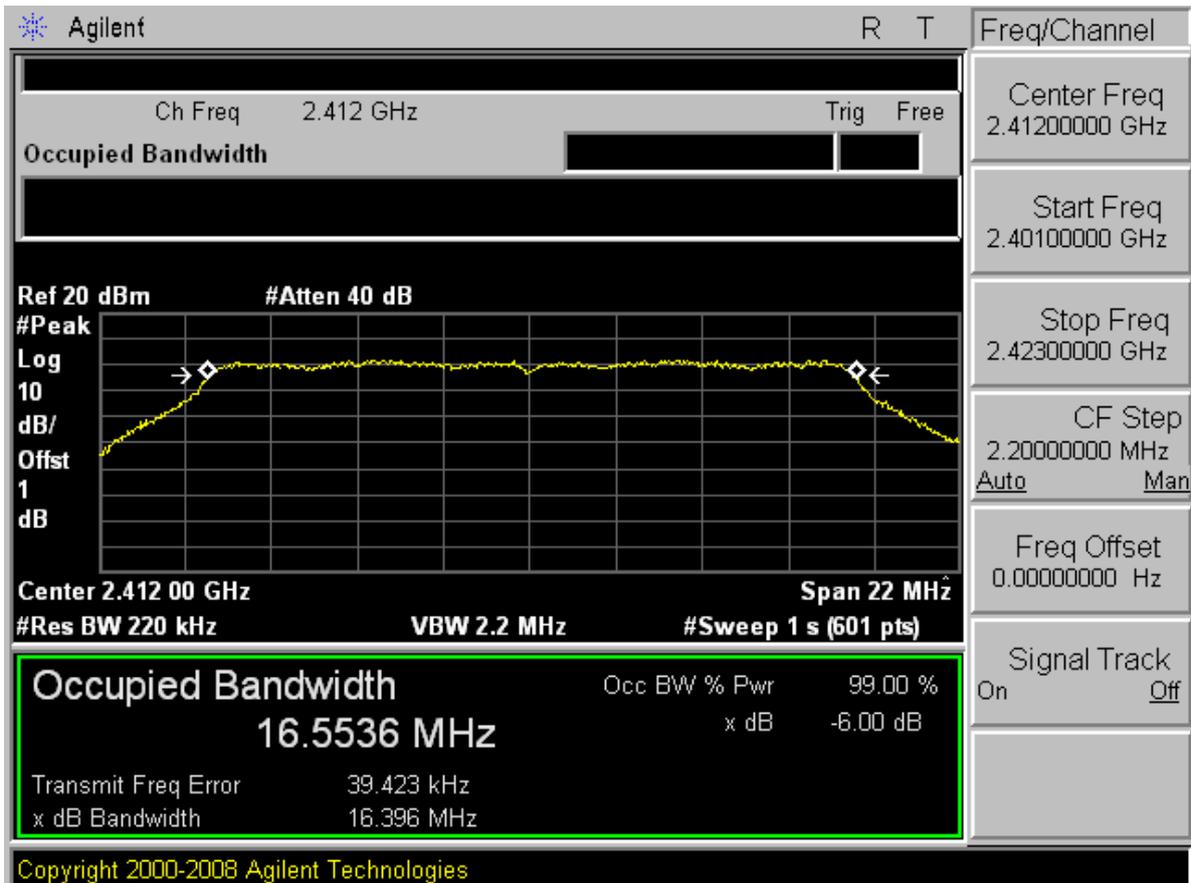
Channel 11 (2462MHz)





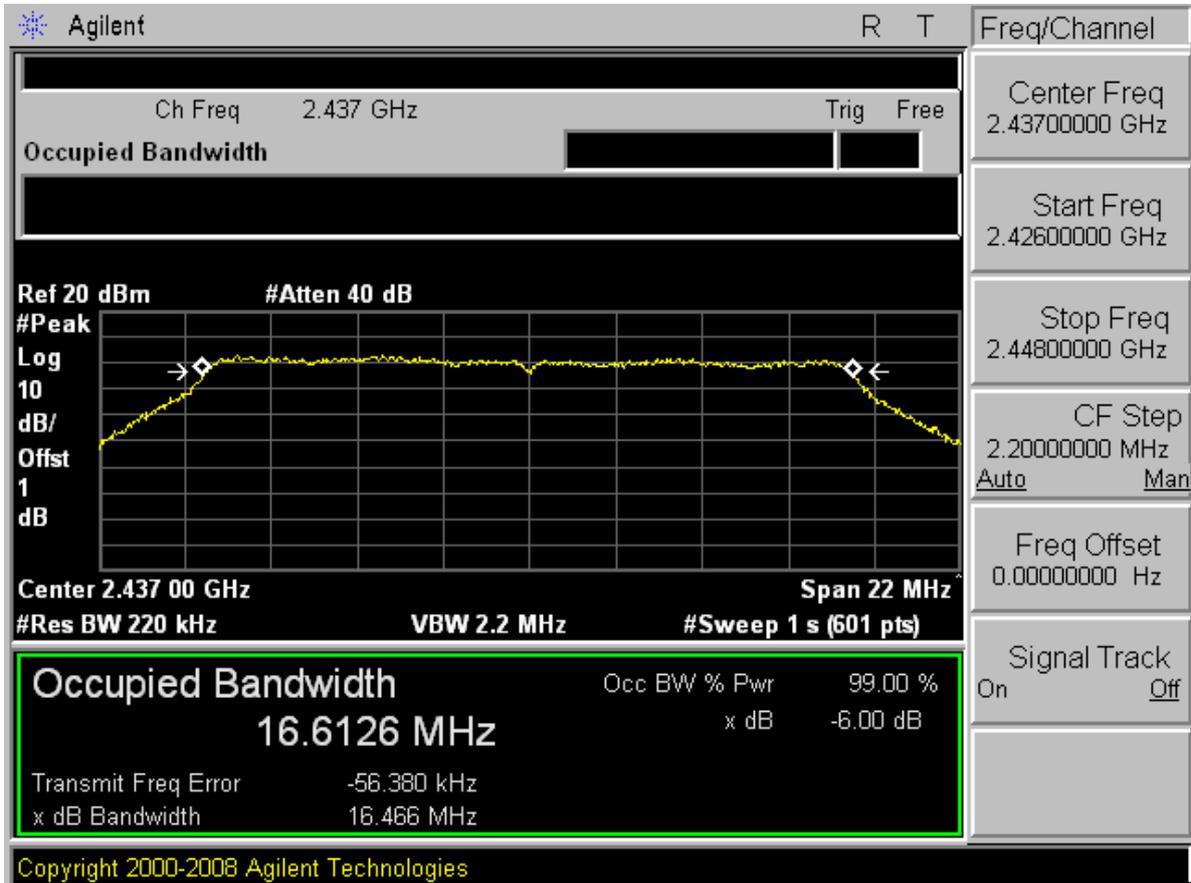
TM2

Channel 1 (2412MHz)



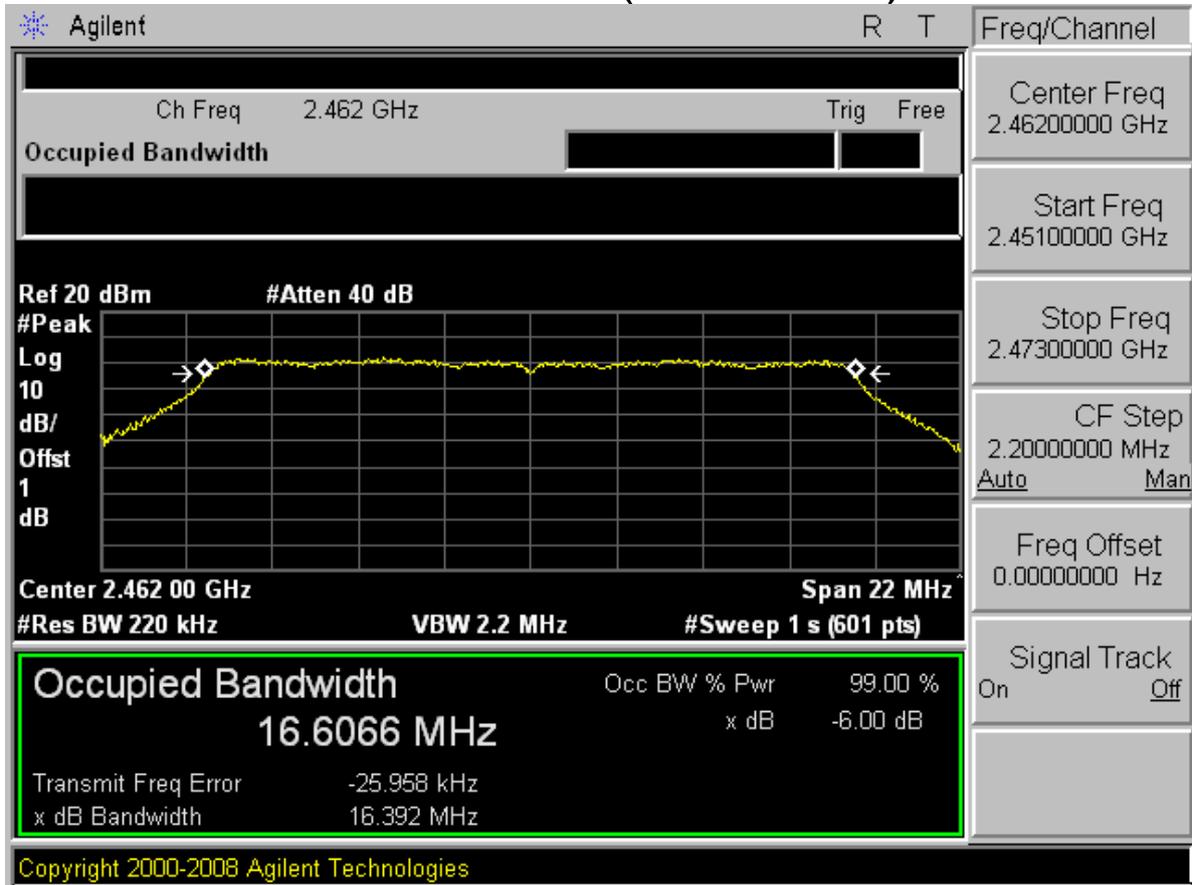


Channel 6 (2437MHz)



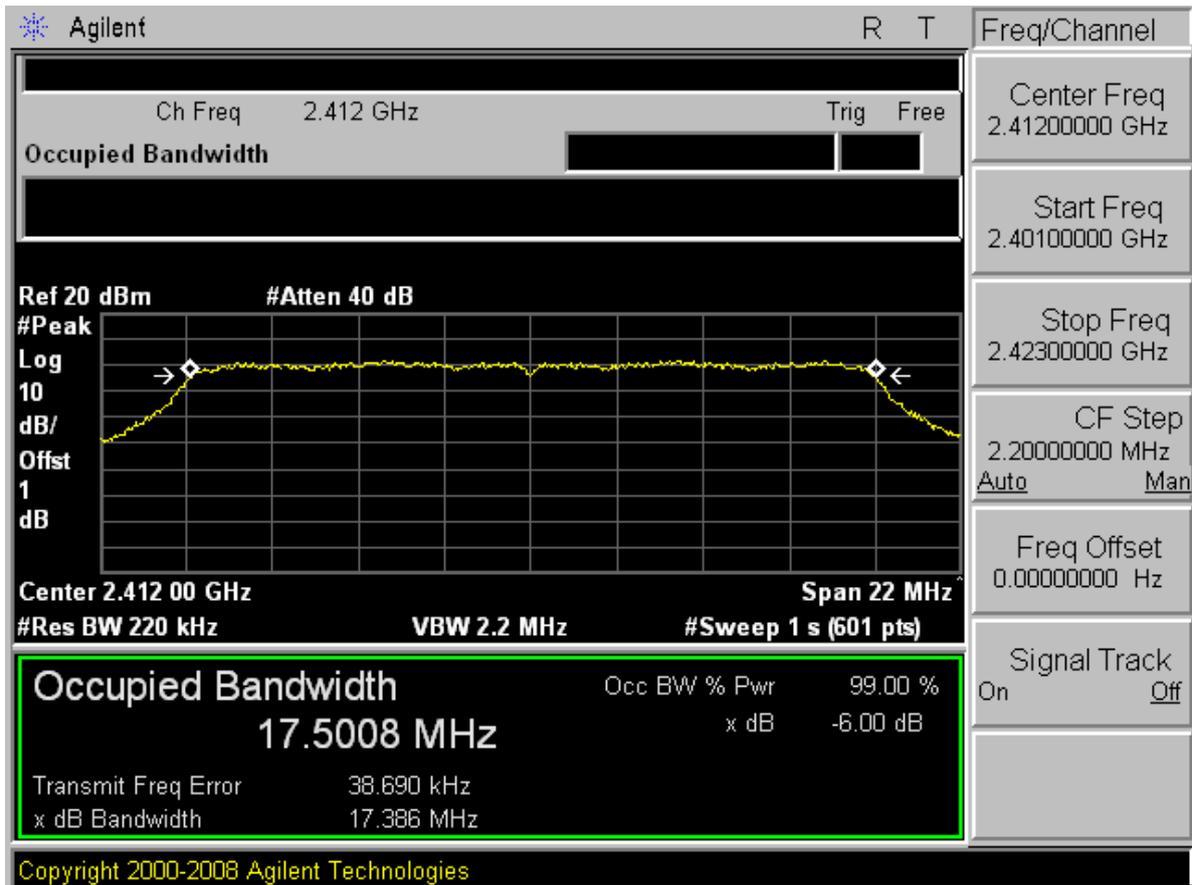


Channel 11 (2462MHz)



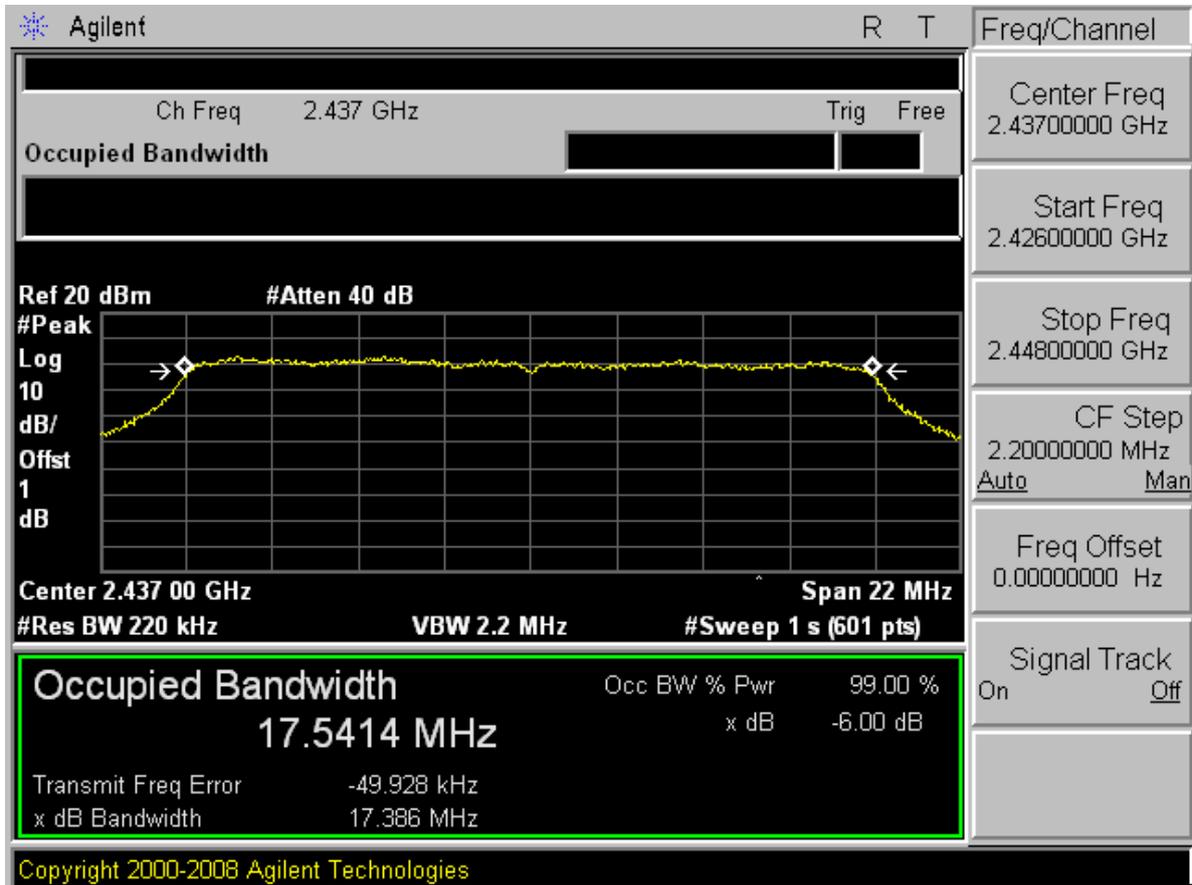


TM3 Channel 1 (2412MHz)



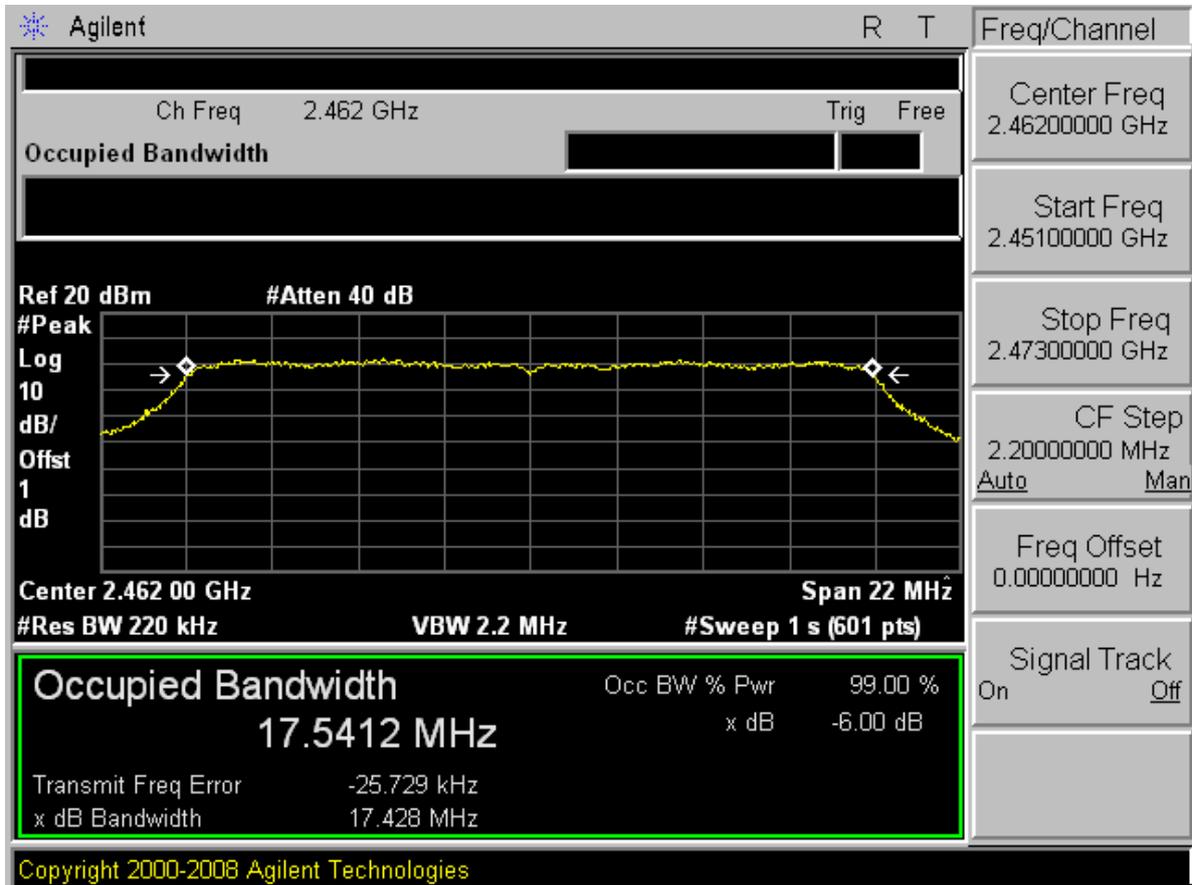


Channel 6 (2437MHz)





Channel 11 (2462MHz)



-----The END-----



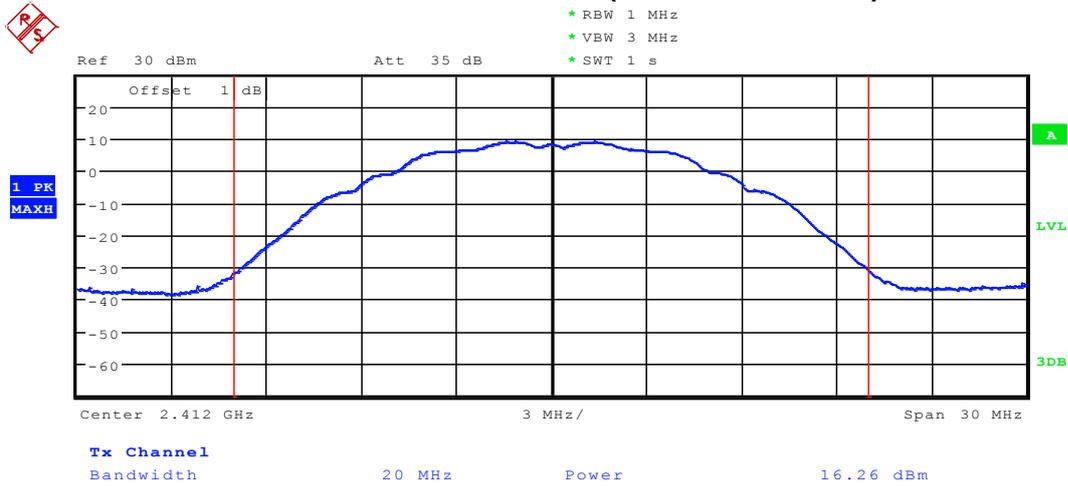
Appendix B

Conducted Peak output power

According to FCC Part 15.247 (b) (3)



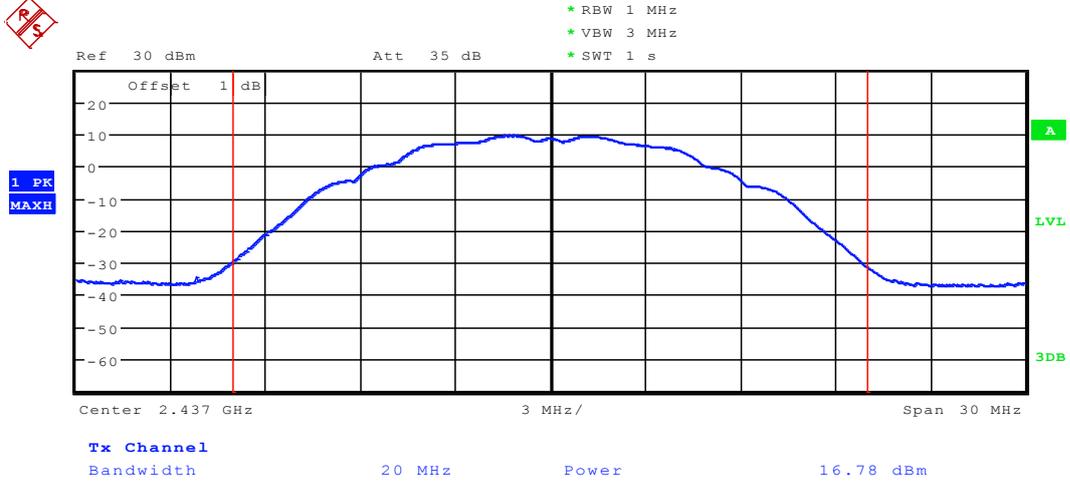
TM1 Channel 1 (2412MHz)



Date: 29.MAR.2012 00:49:24



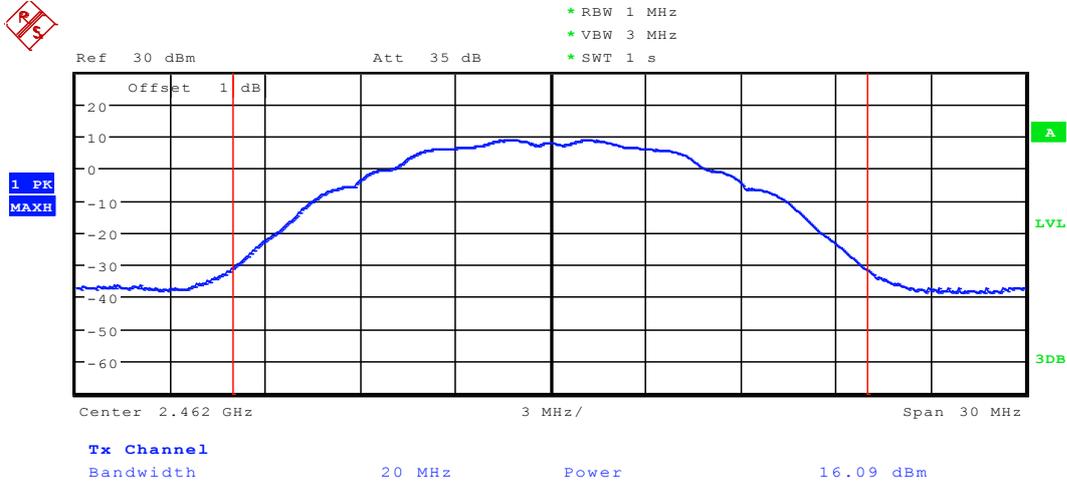
Channel 6 (2437MHz)



Date: 29.MAR.2012 01:07:13



Channel 11 (2462MHz)

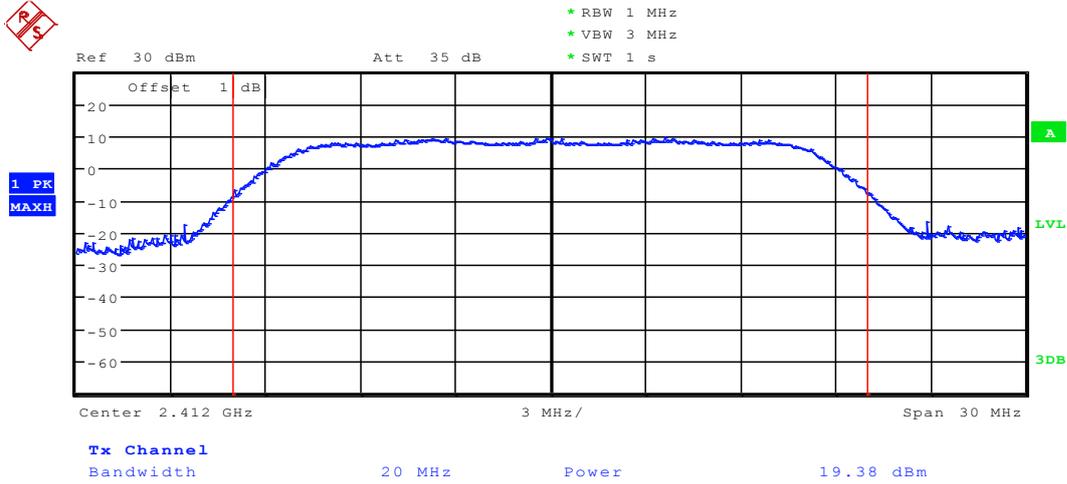


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TM2

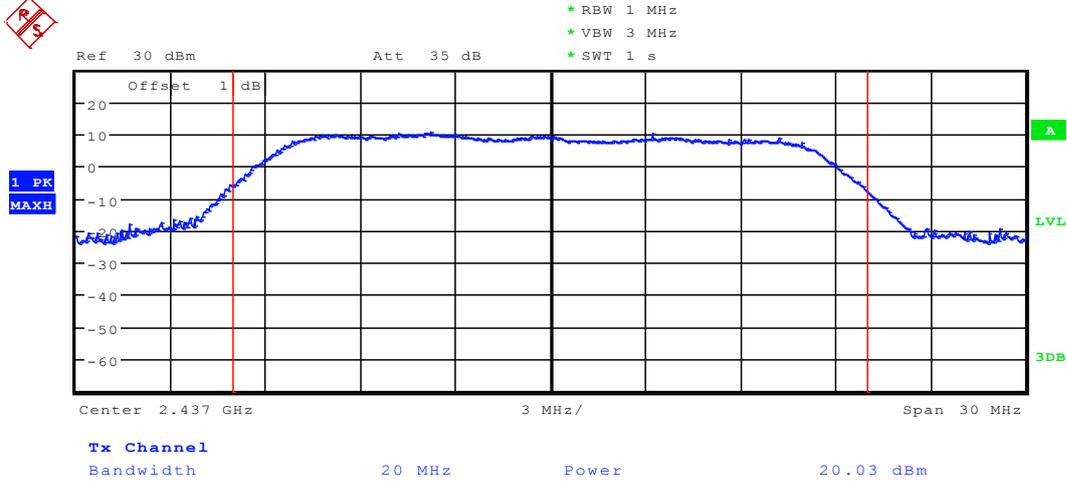
Channel 1 (2412MHz)



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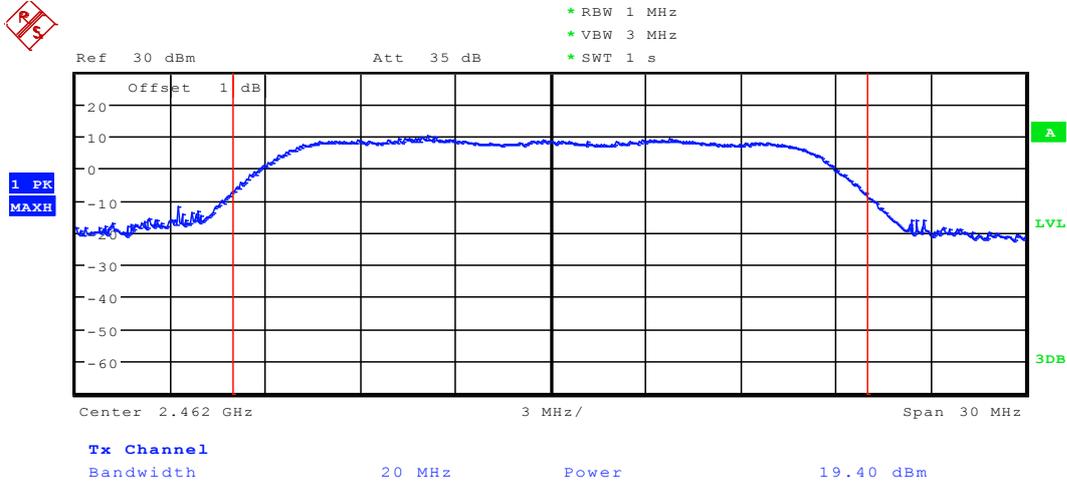
Channel 6 (2437MHz)



Date: 29.MAR.2012 00:58:02



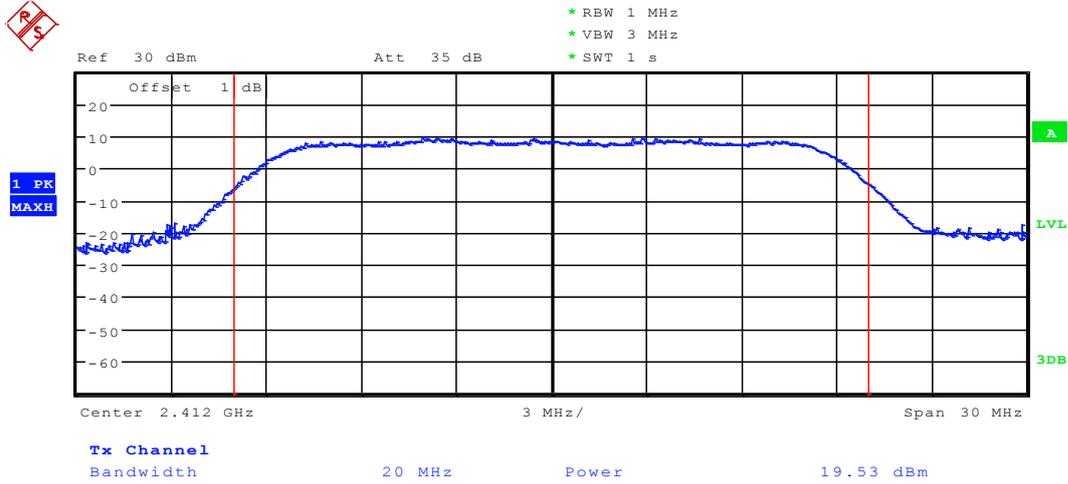
Channel 11 (2462MHz)



Date: 29.MAR.2012 01:11:12



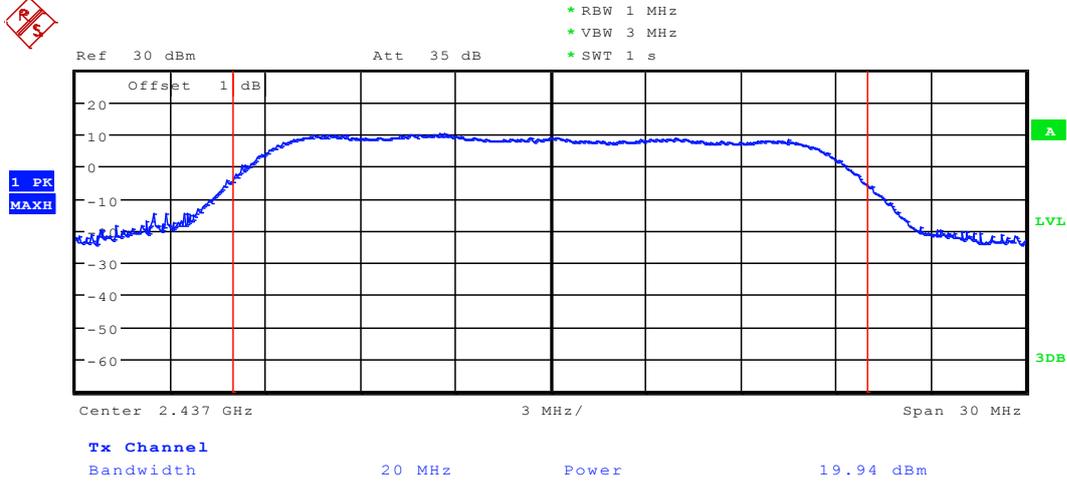
TM3 Channel 1 (2412MHz)



Date: 29.MAR.2012 00:54:24



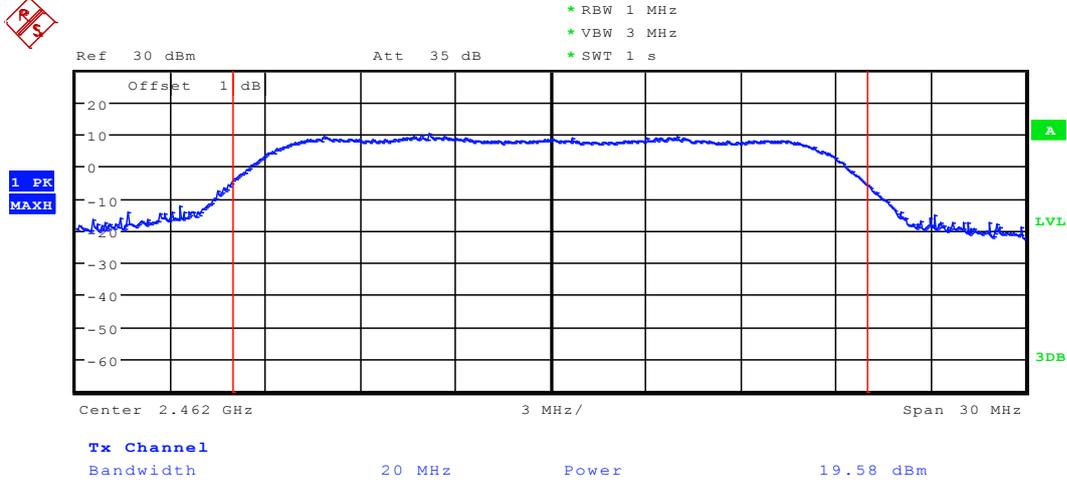
Channel 6 (2437MHz)



Date: 29.MAR.2012 00:55:57



Channel 11 (2462MHz)



Date: 29.MAR.2012 01:15:01

-----The END-----



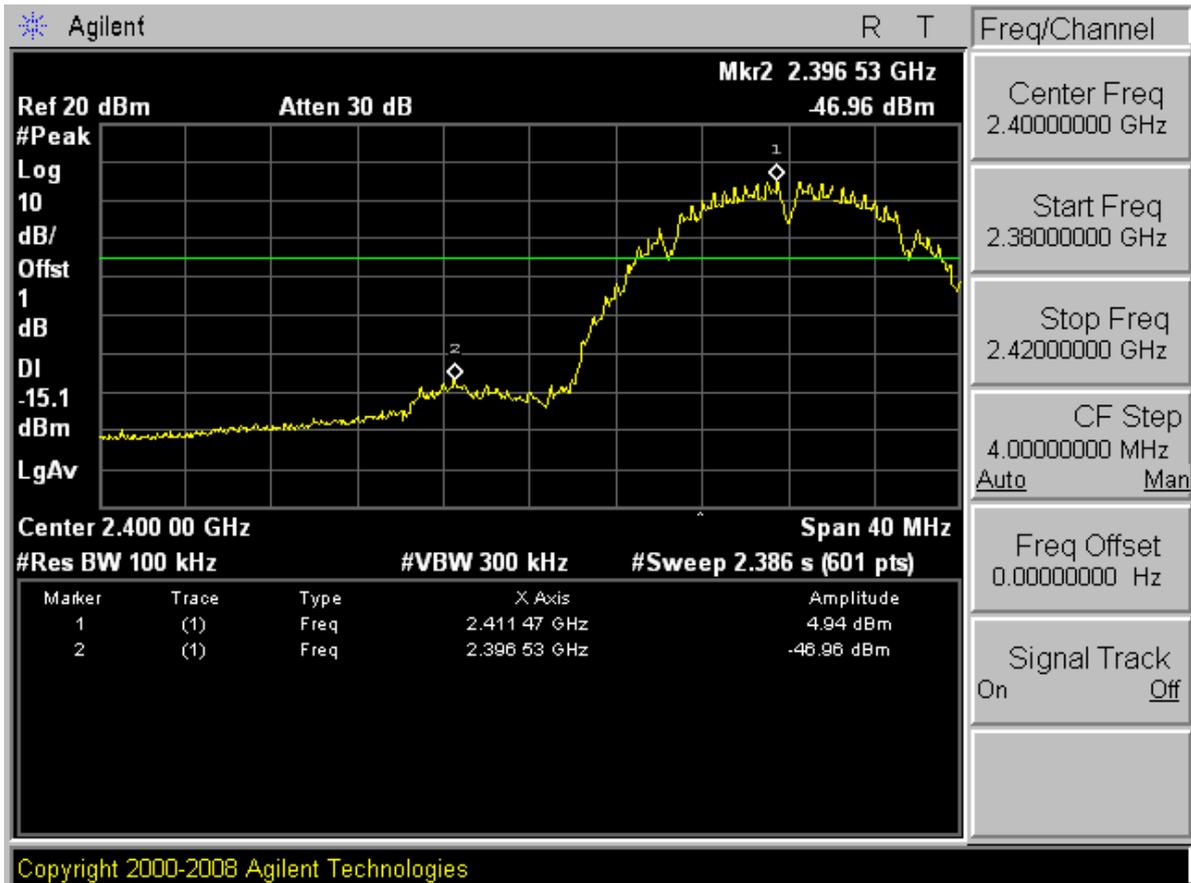
Appendix C

Band edge spurious emission

According to FCC Part 15.247 (d)

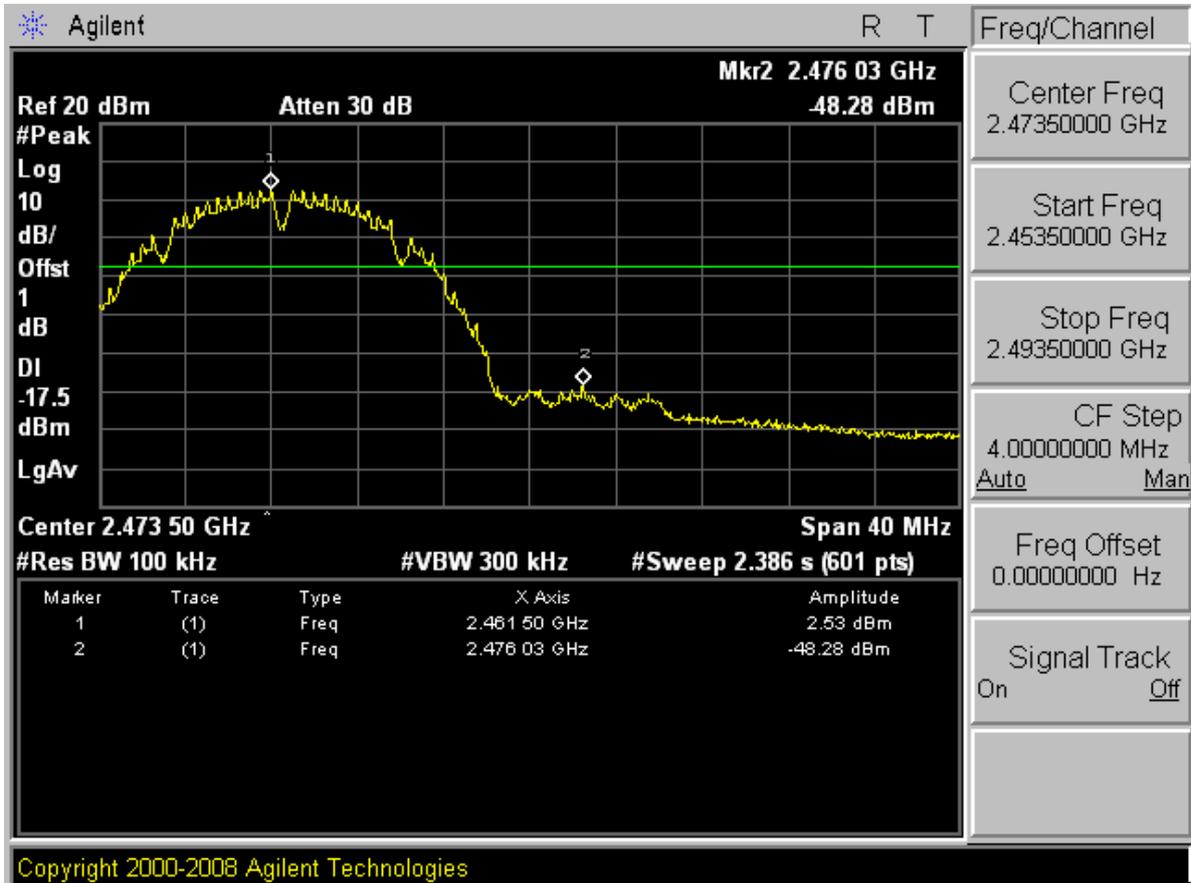


TM1 Low edge



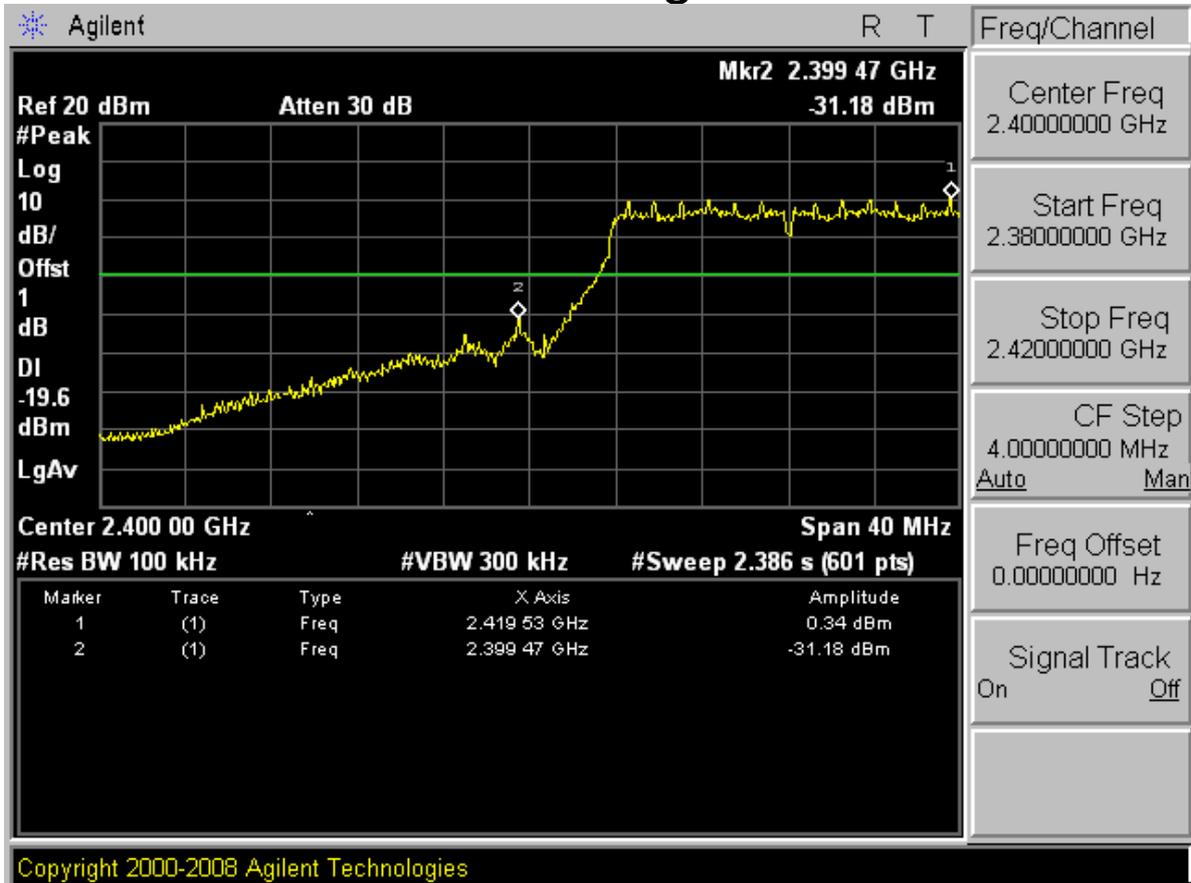


High edge



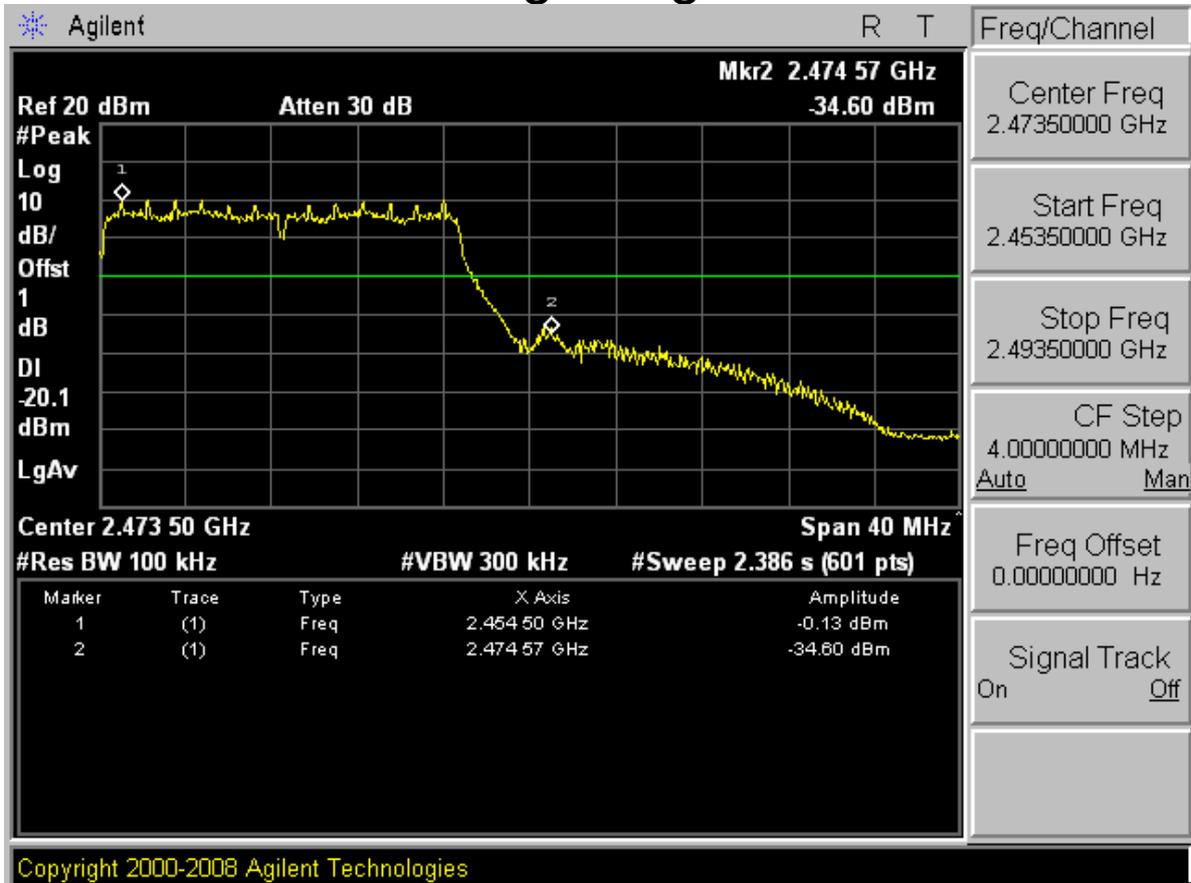


TM2 Low edge





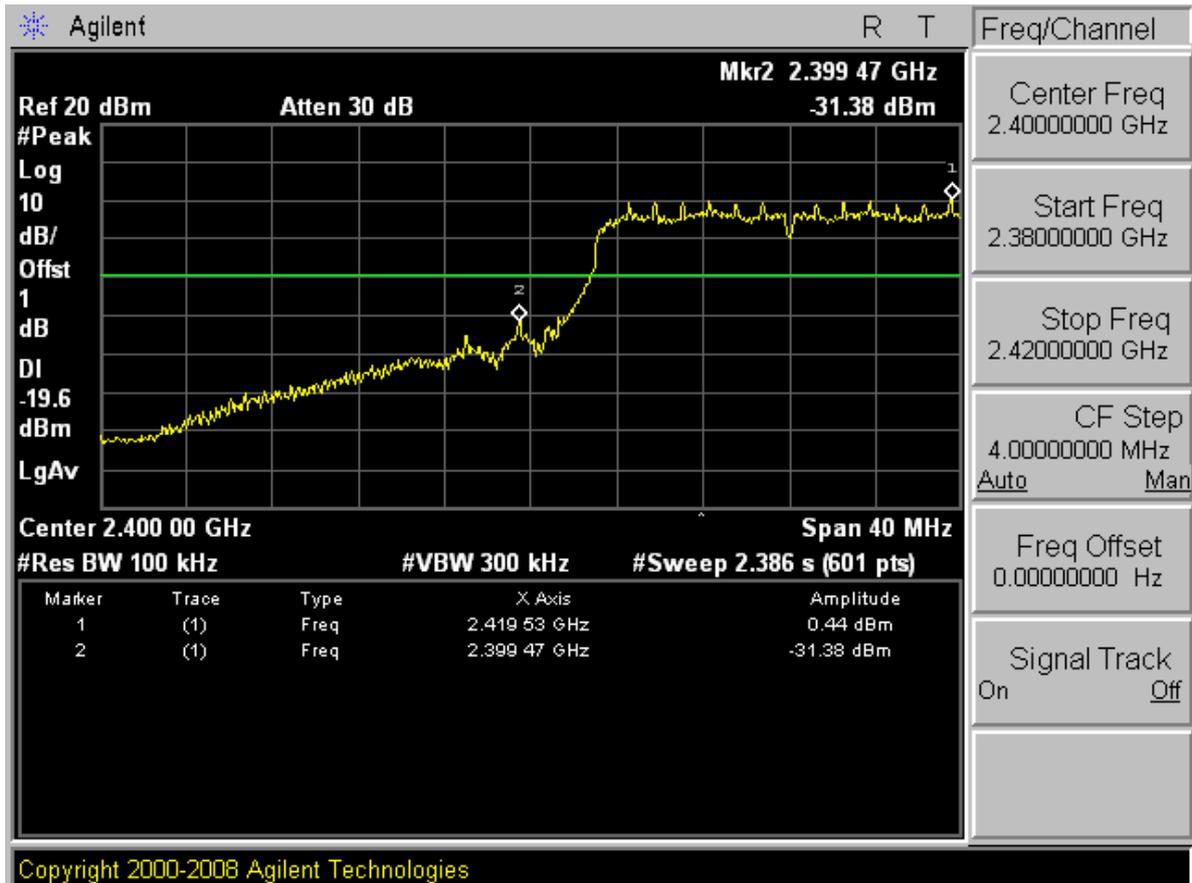
High edge





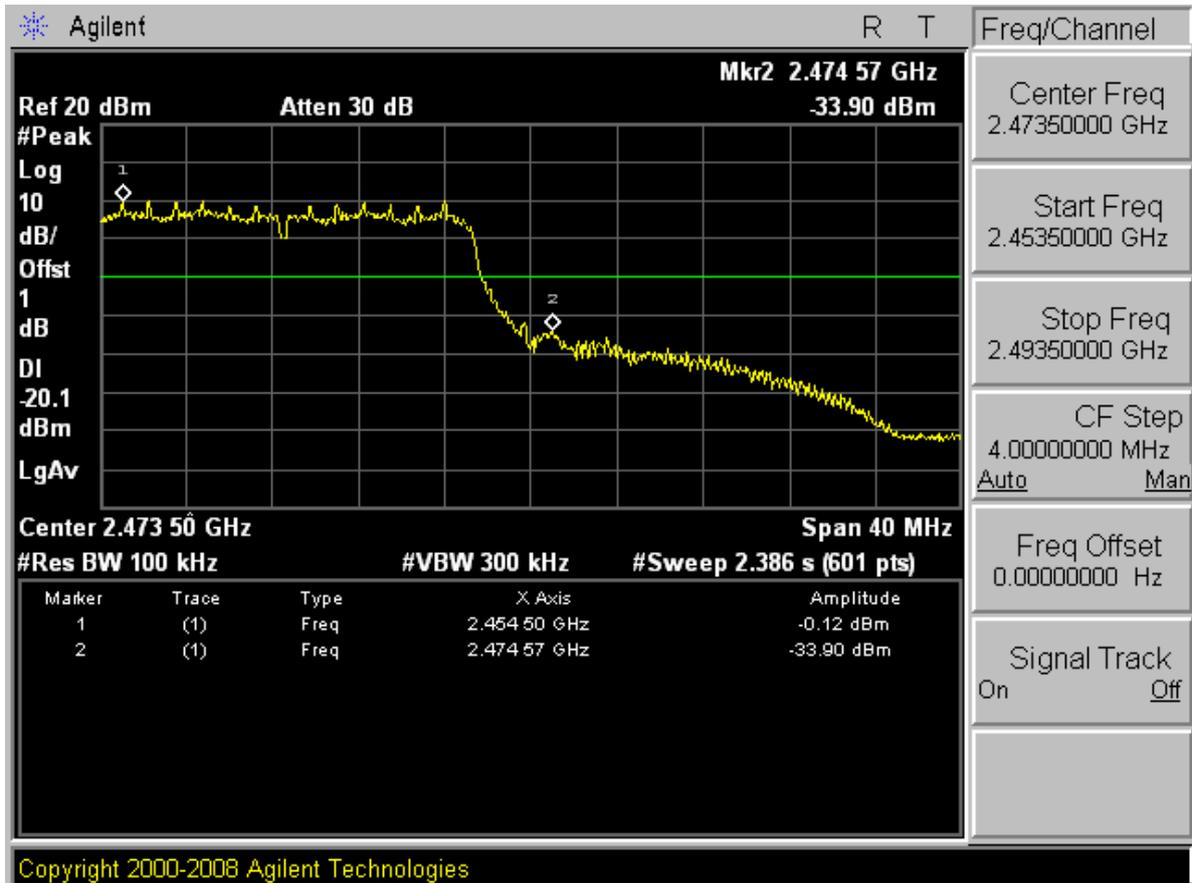
TM3

Low edge





High edge



-----The END-----



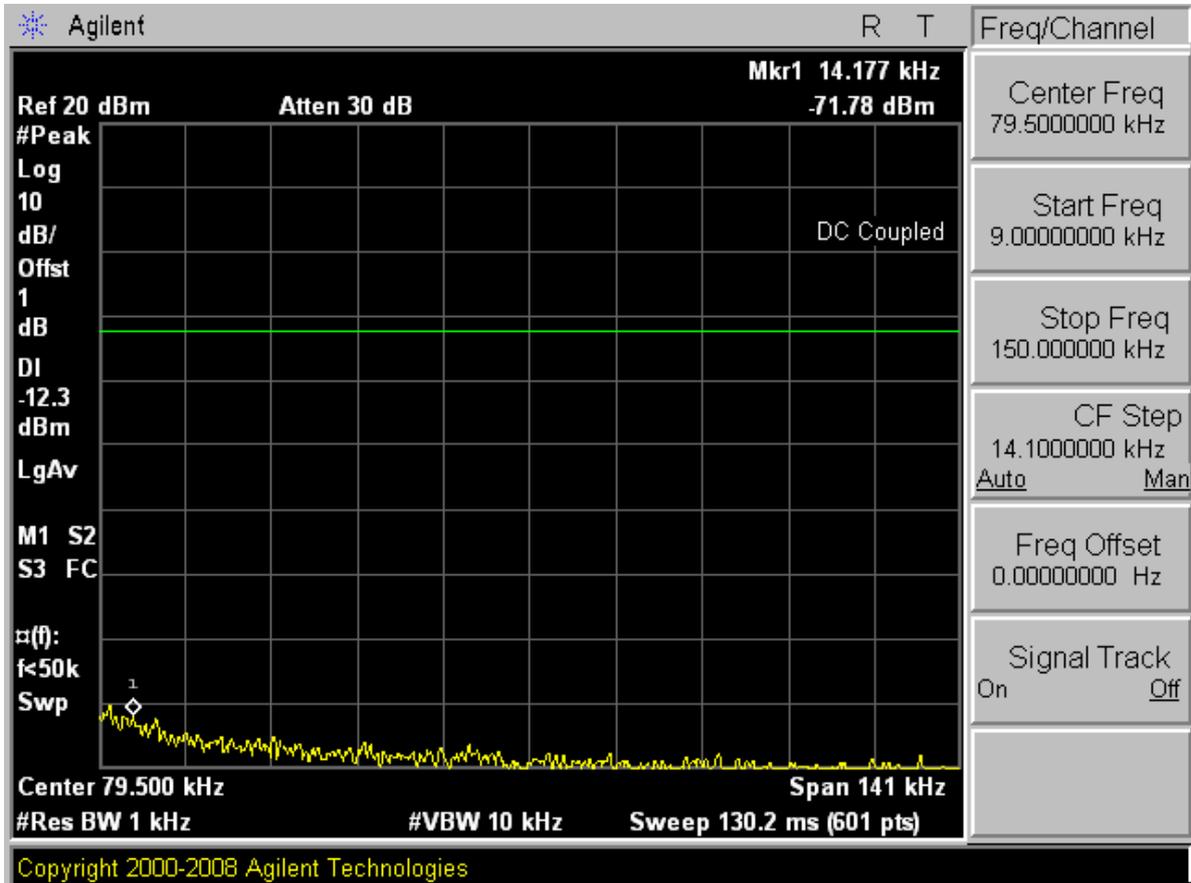
Appendix D

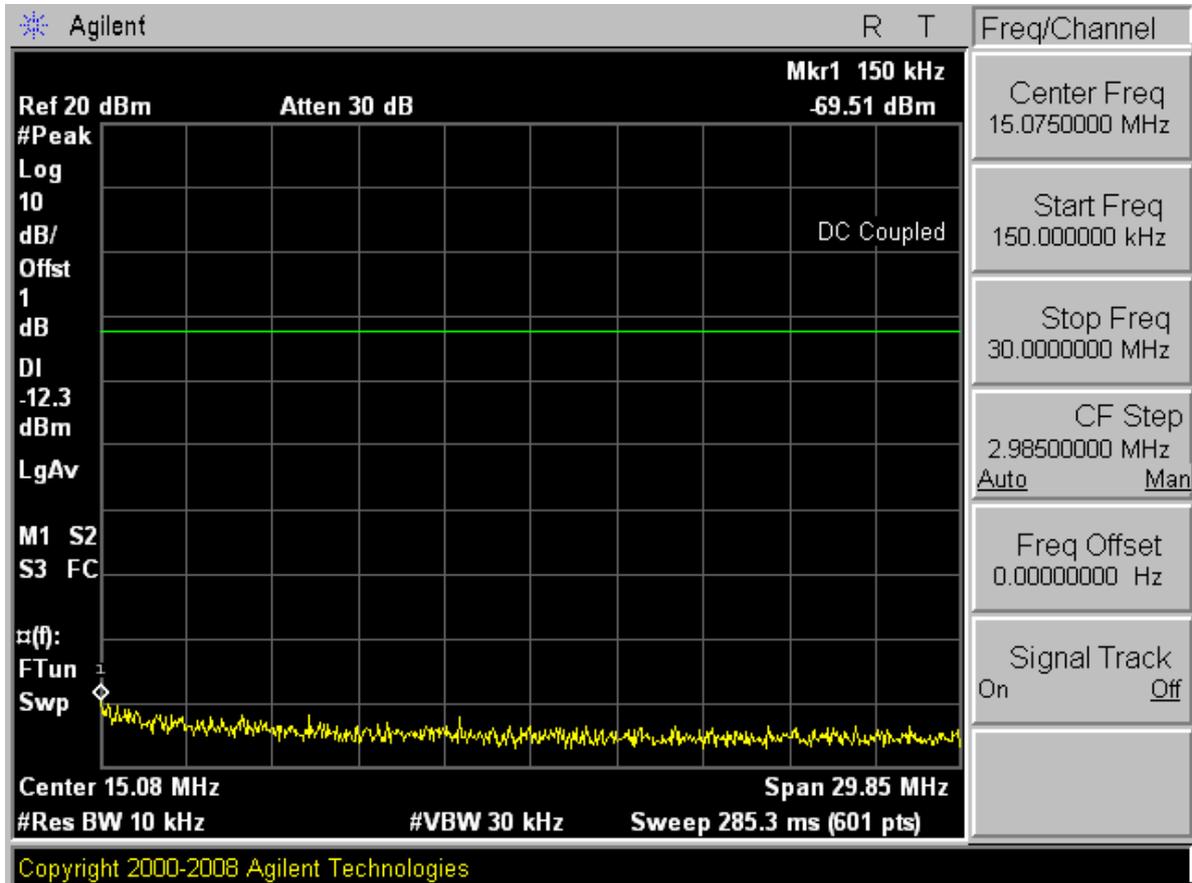
Conducted RF spurious

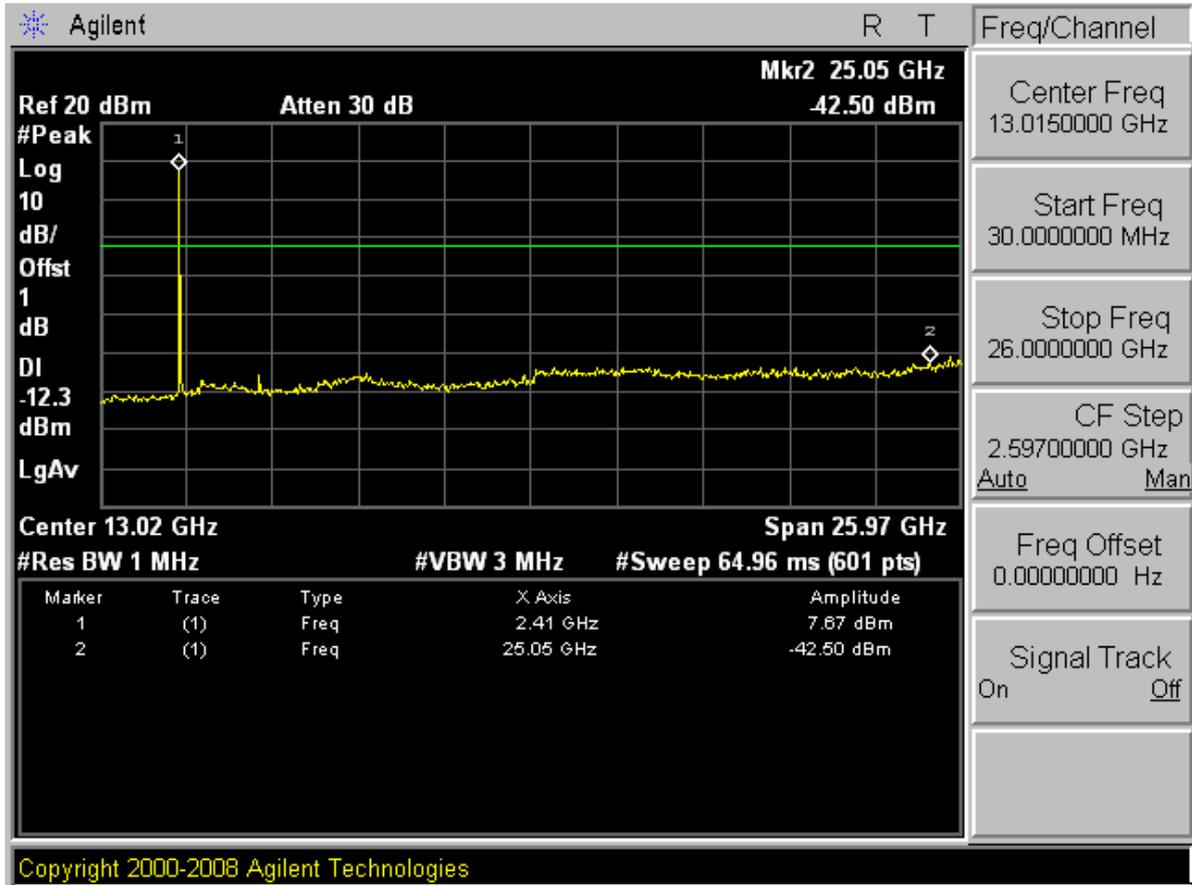
According to FCC Part 15.247 (d)



TM1 Channel 1

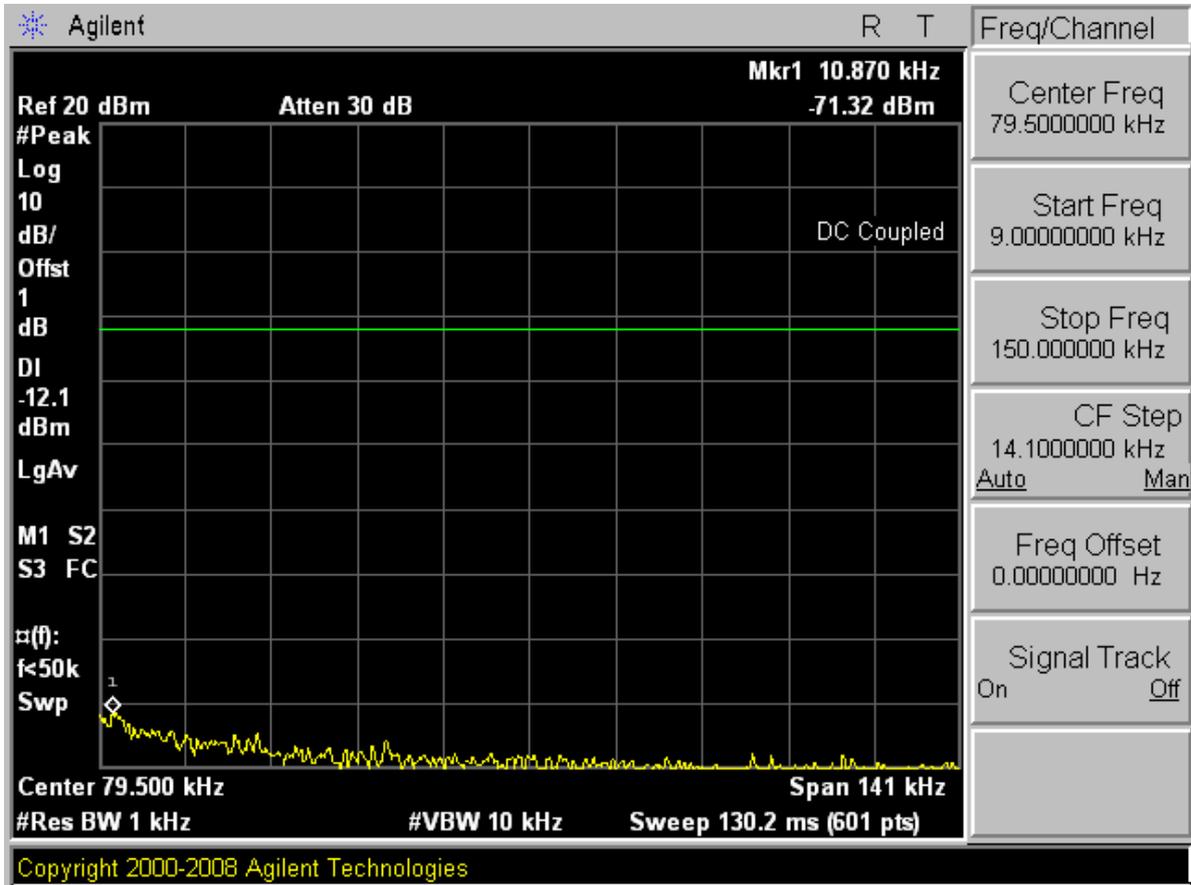


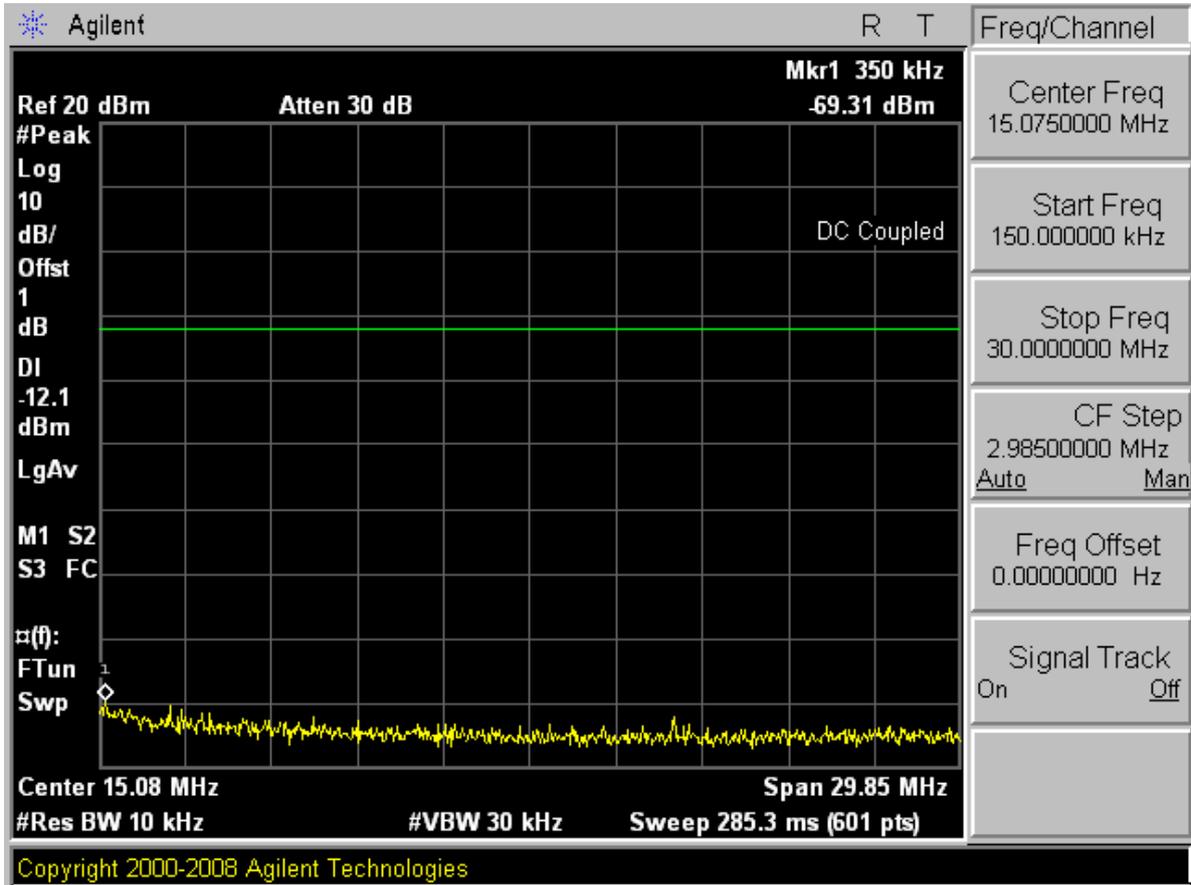


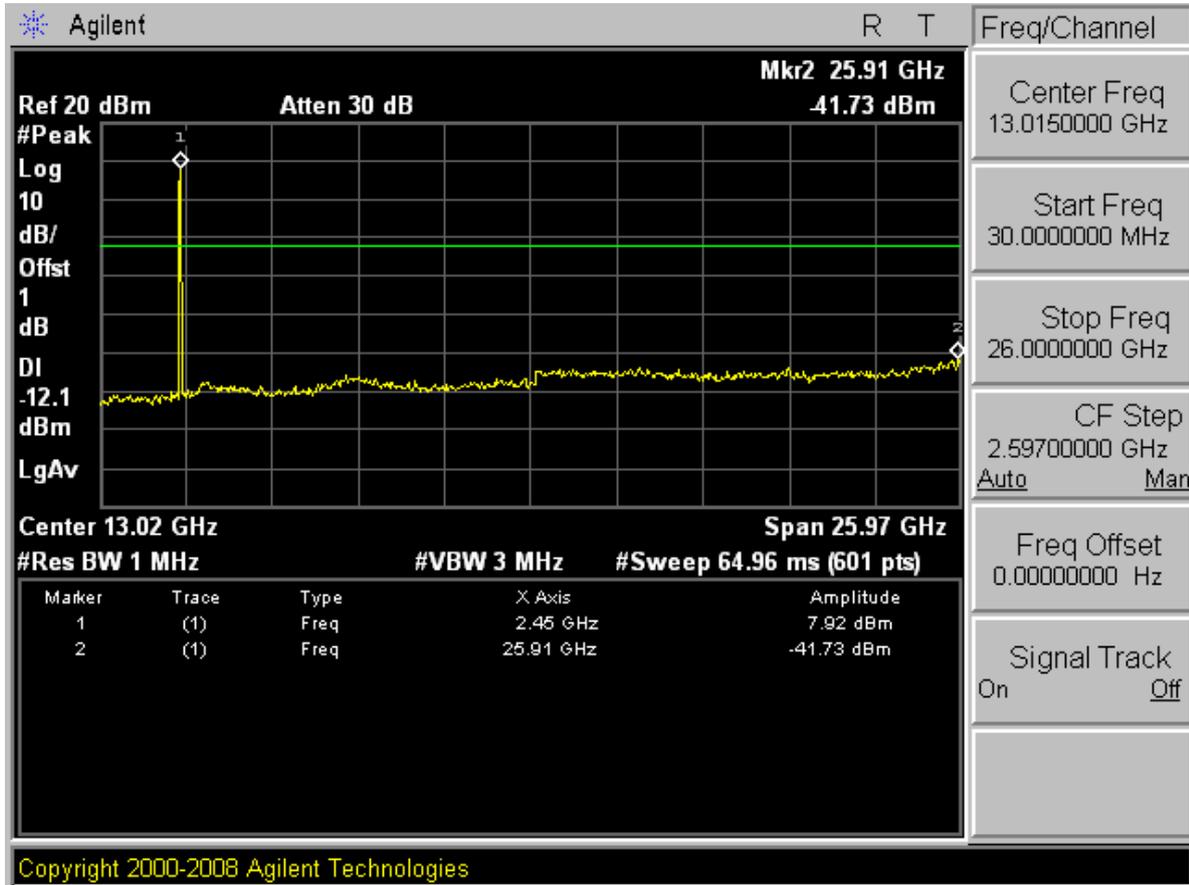




Channel 6

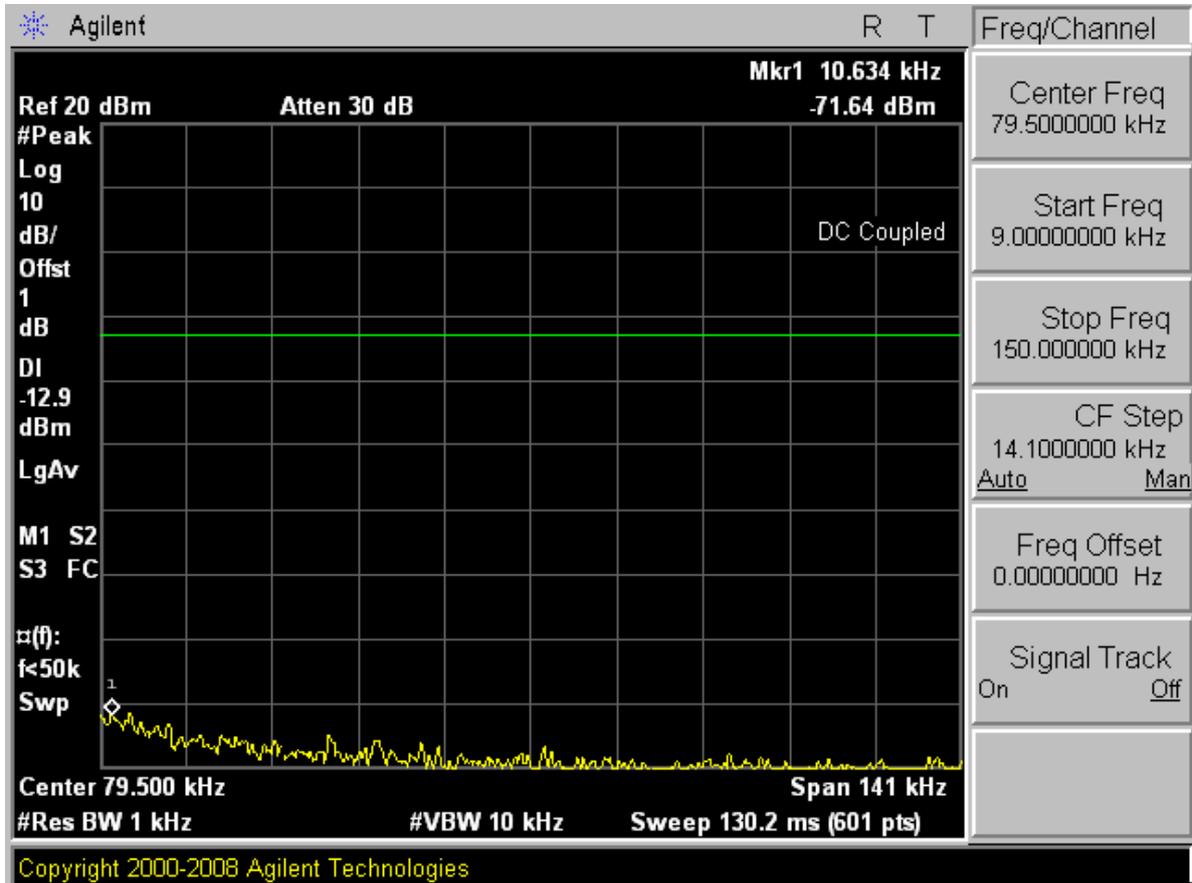


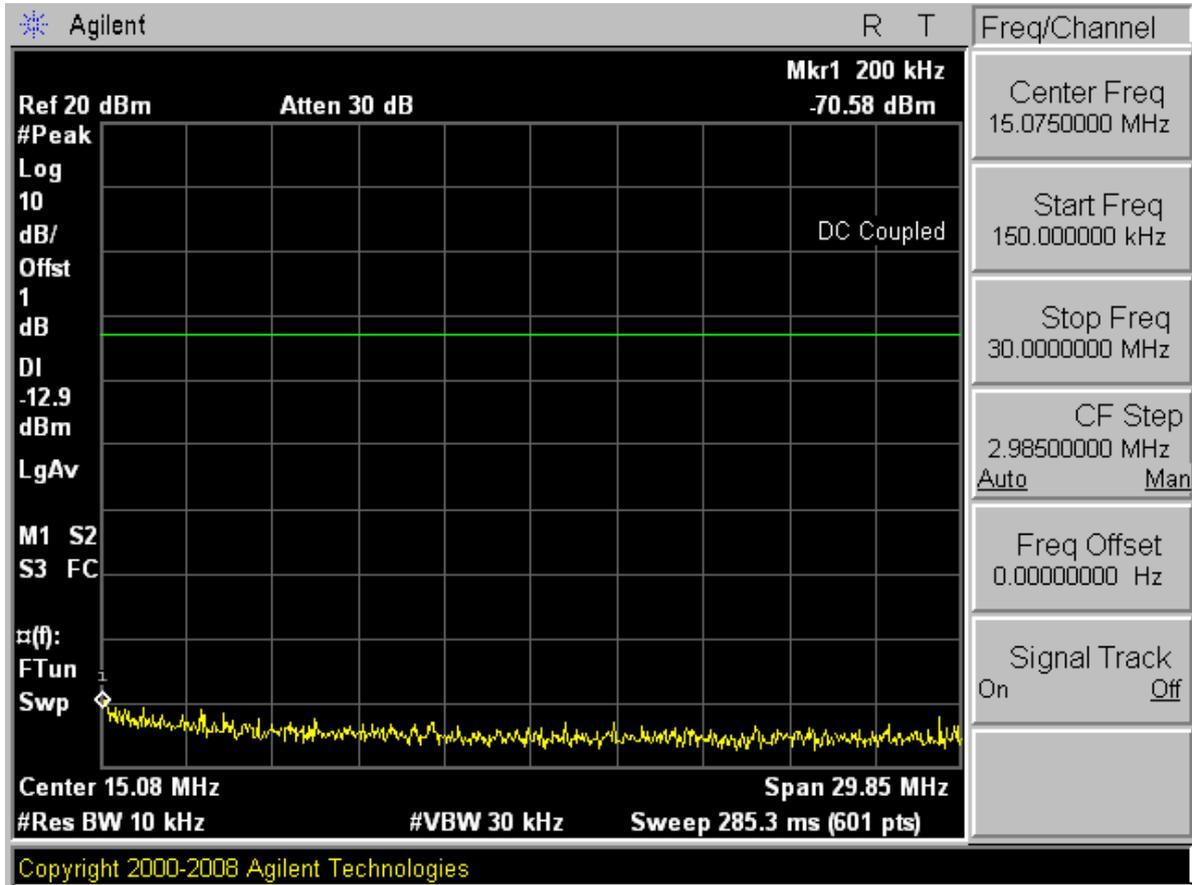


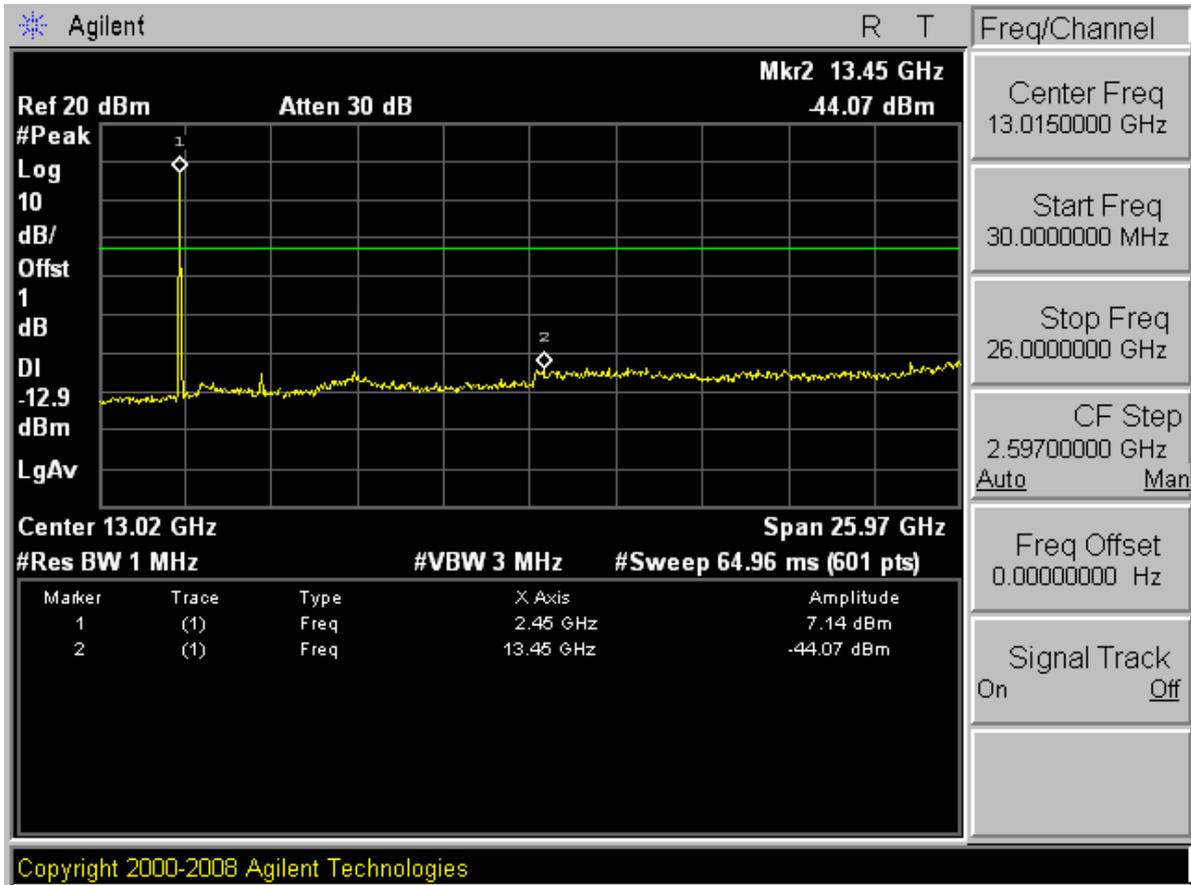




Channel 11

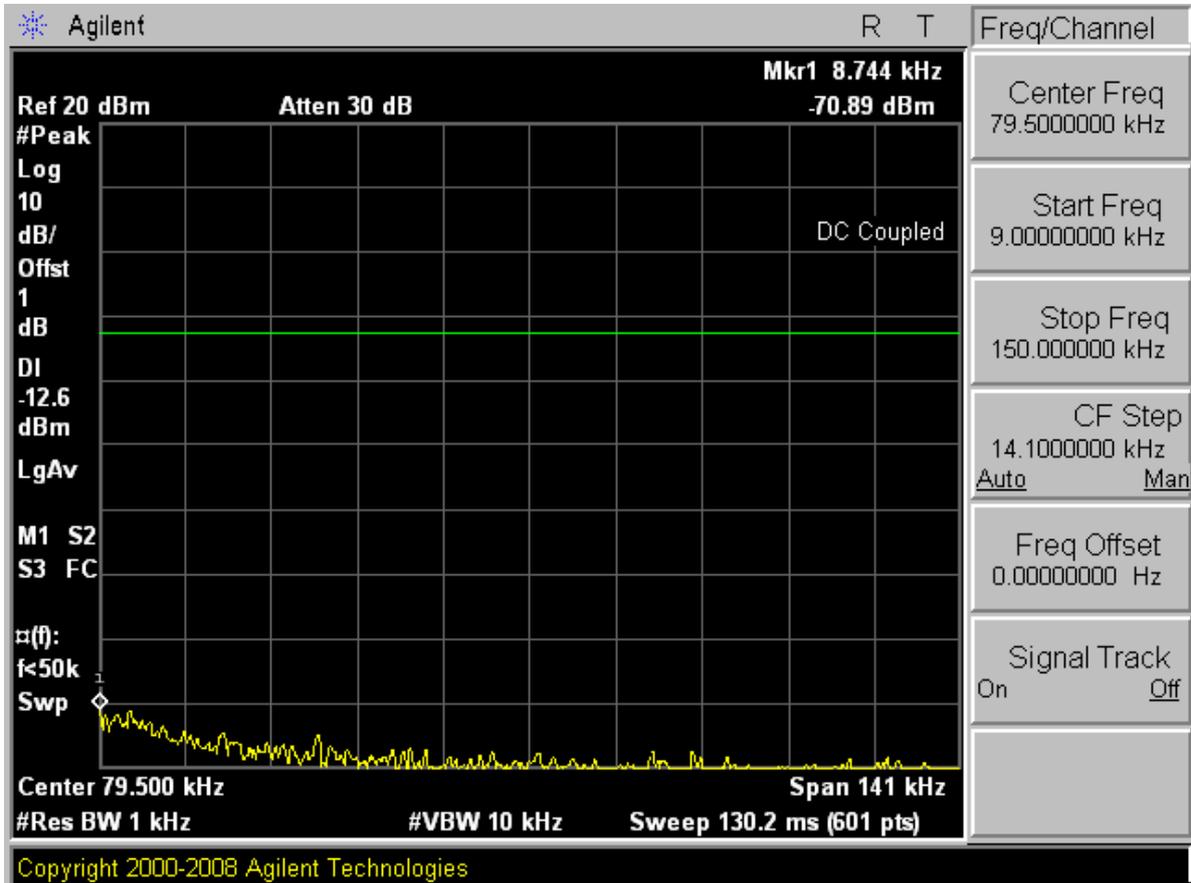


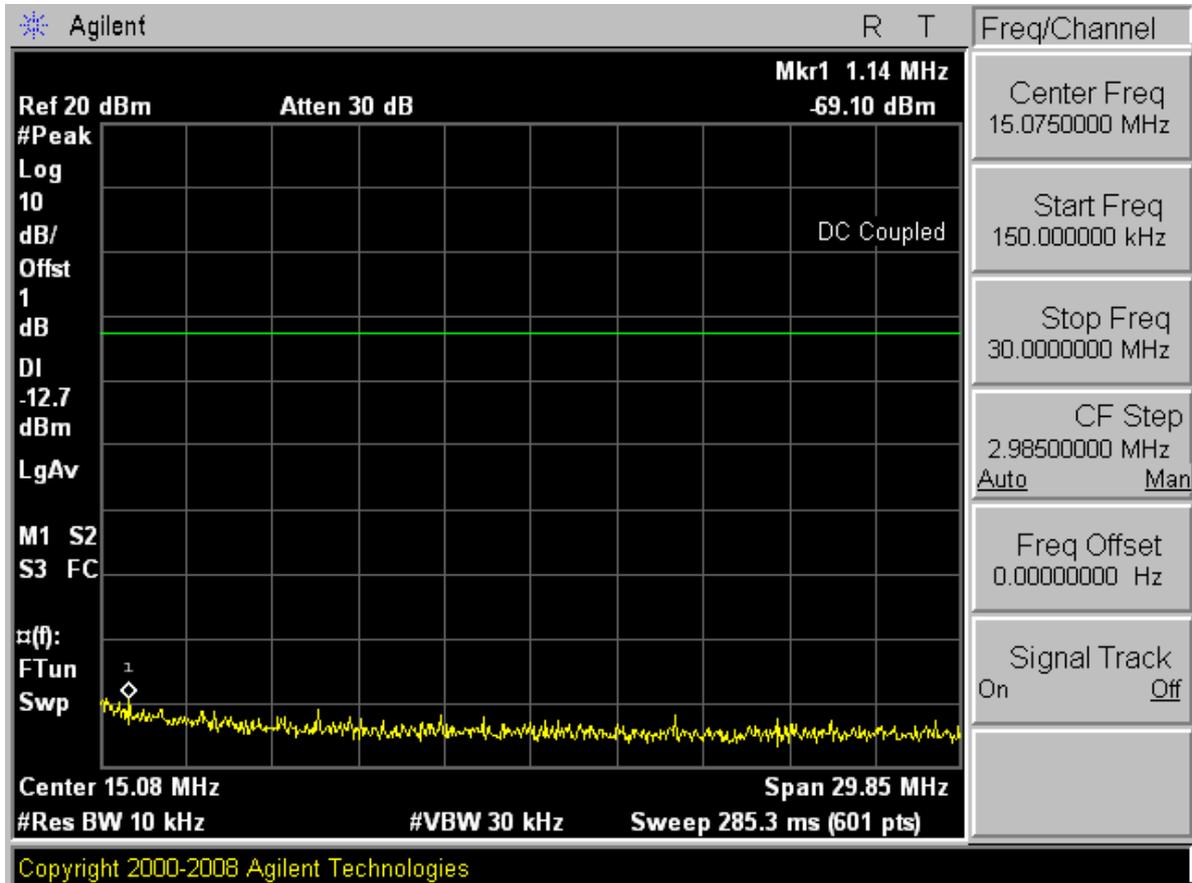


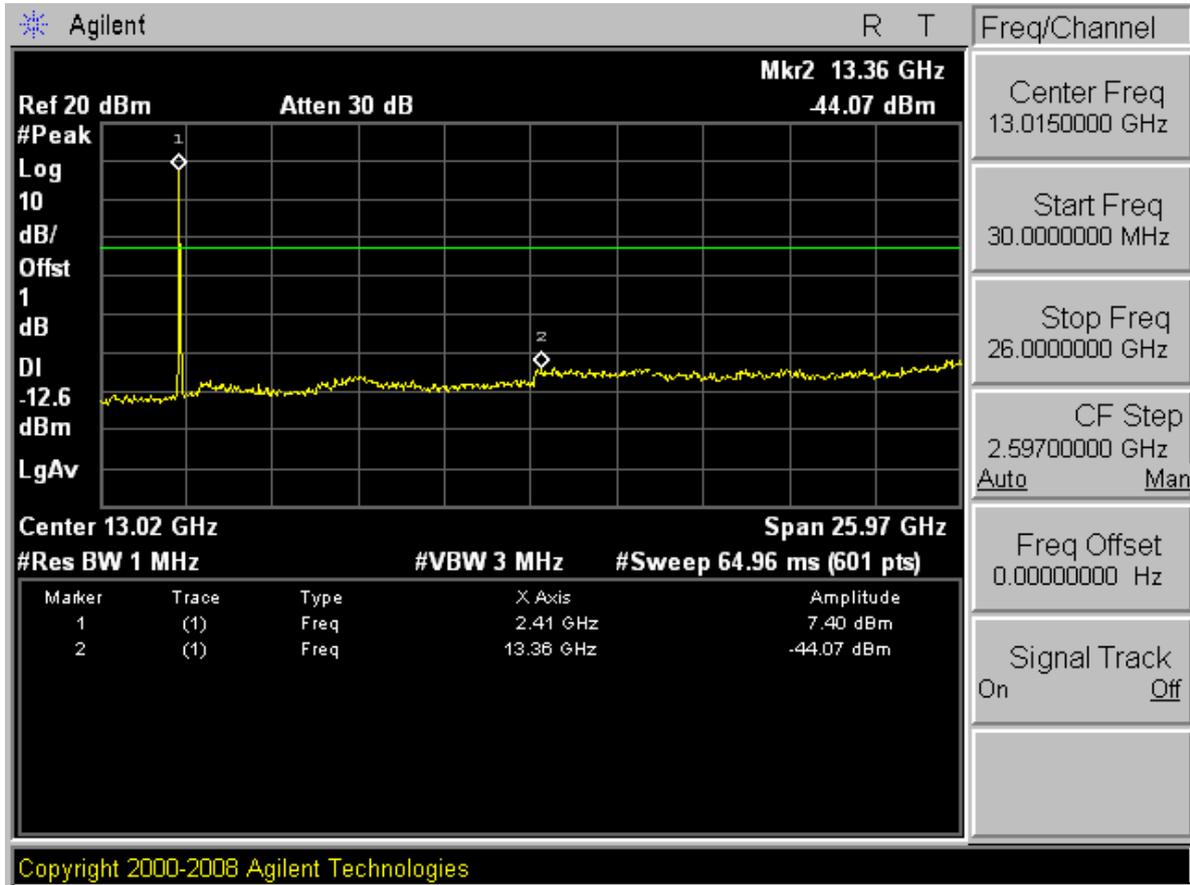




TM2 Channel 1

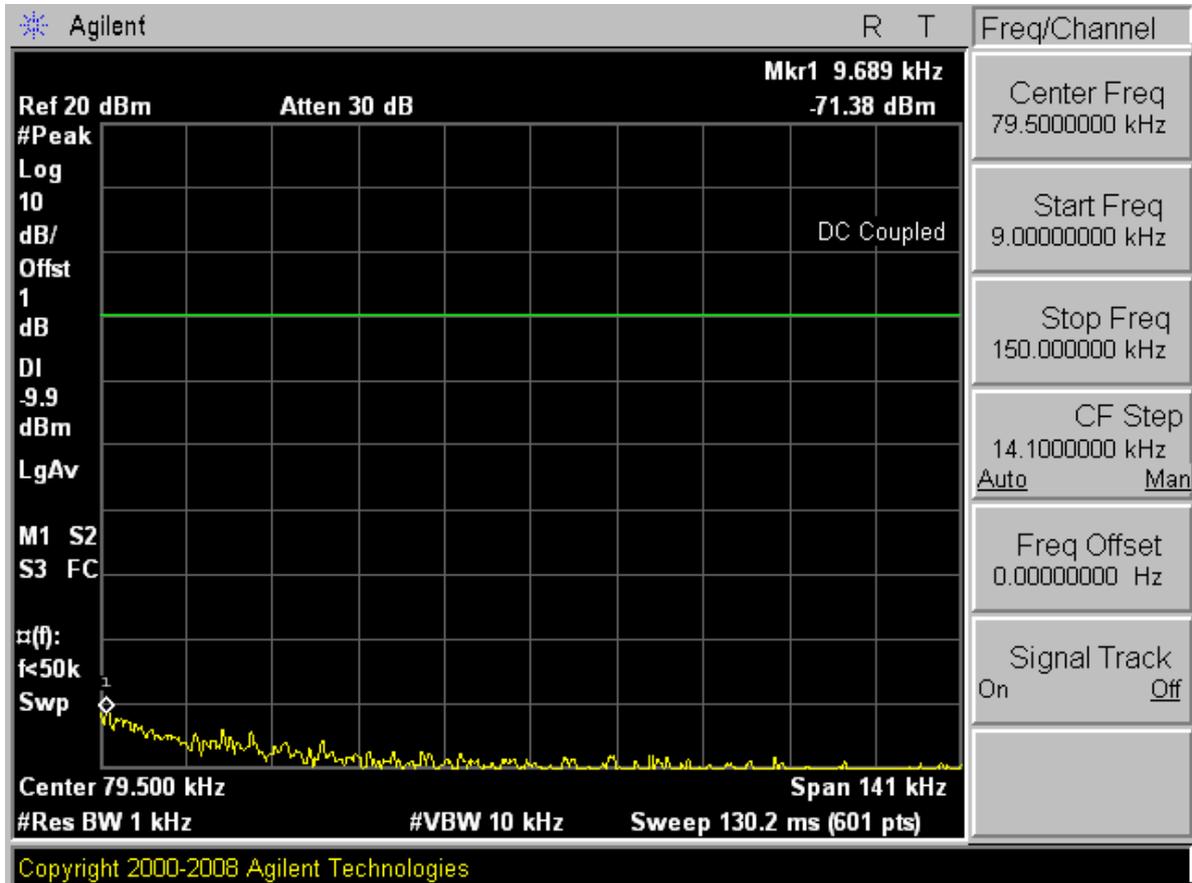


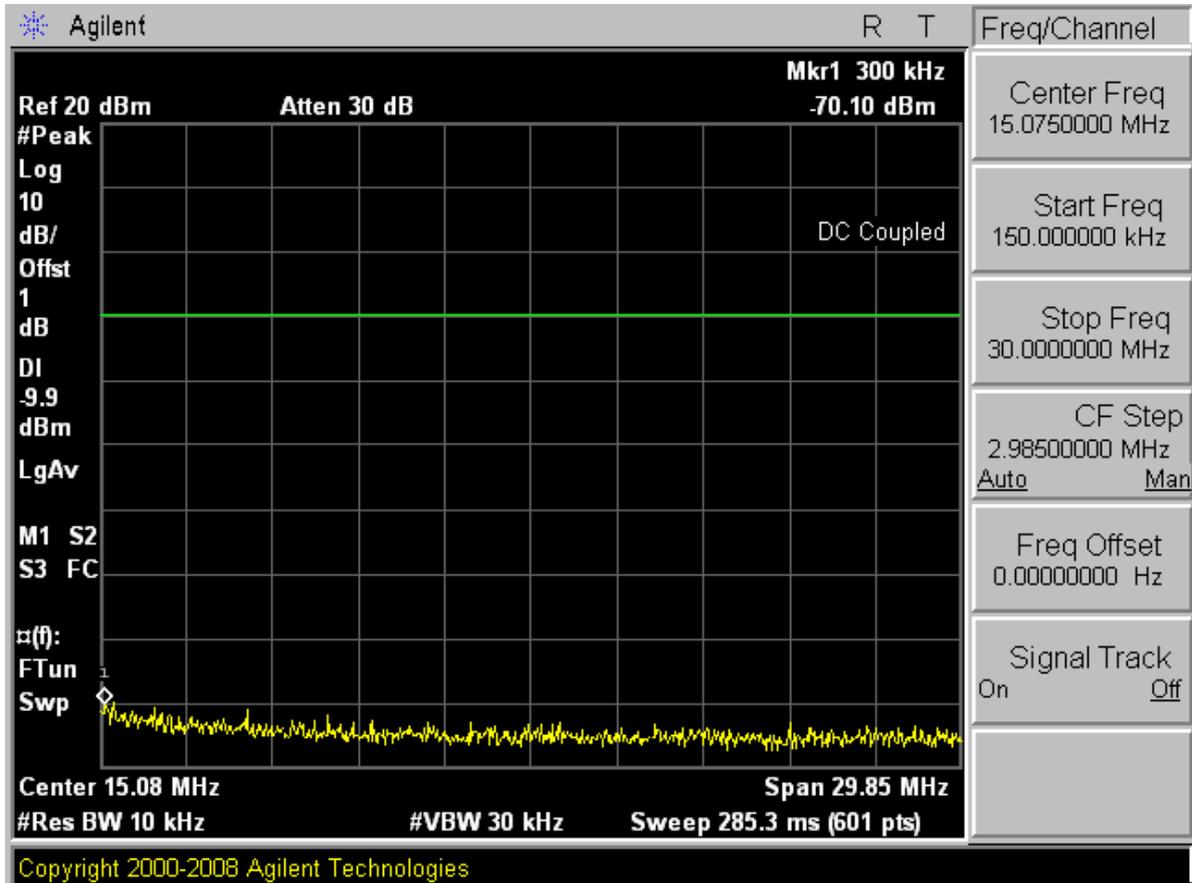


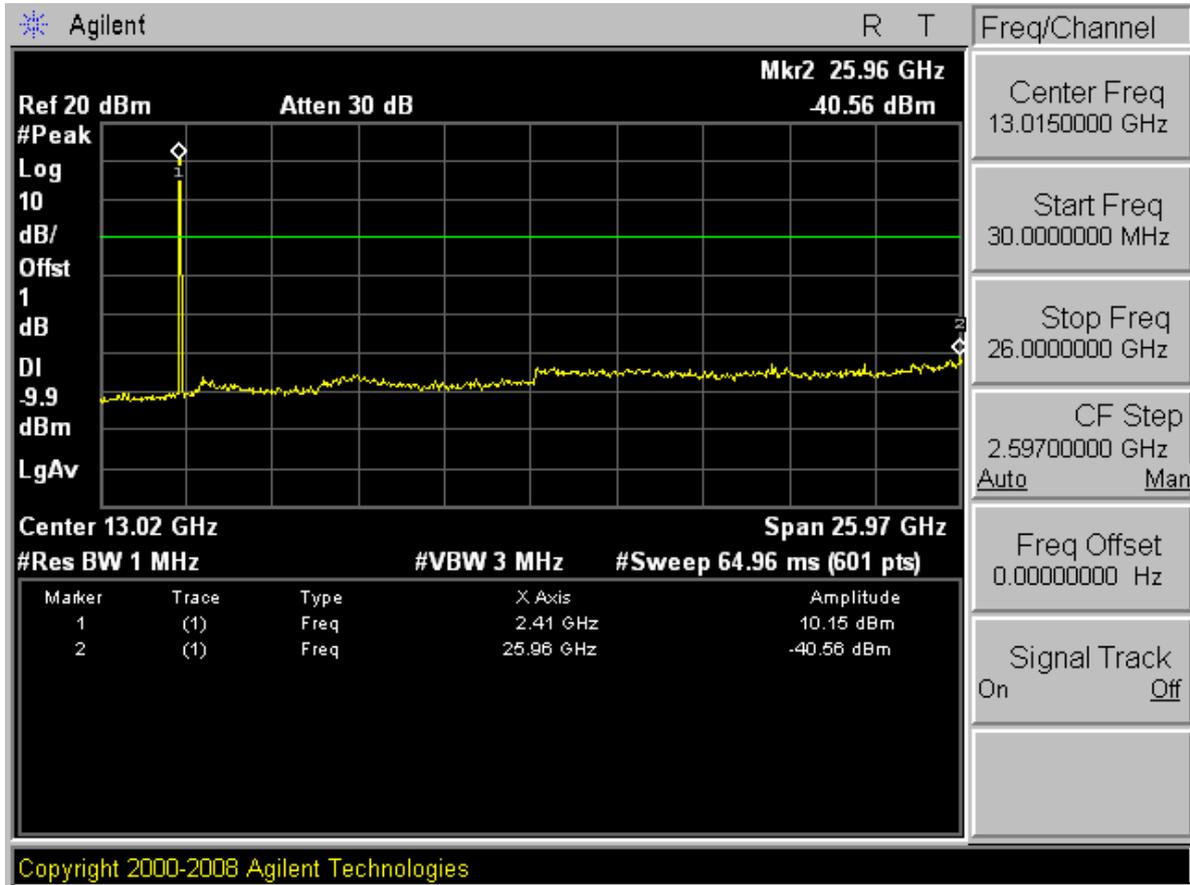




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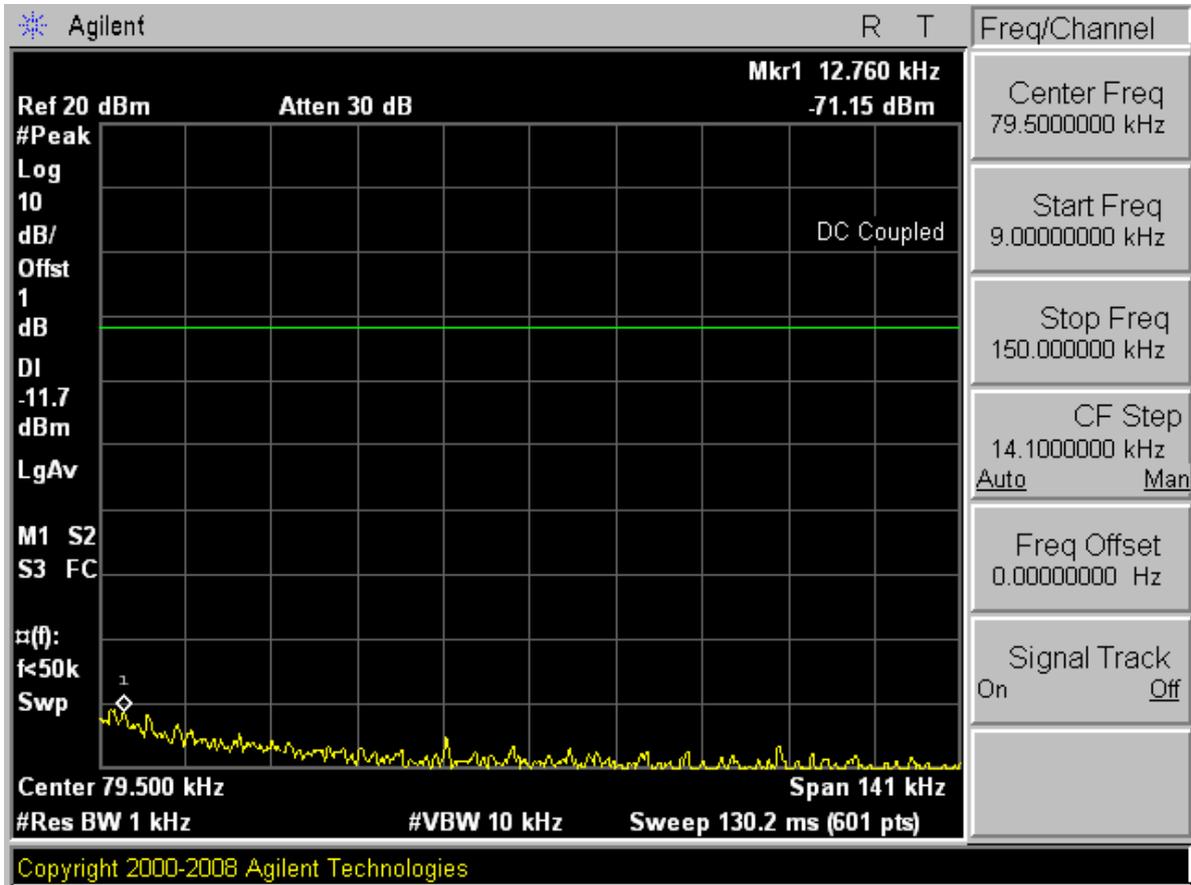


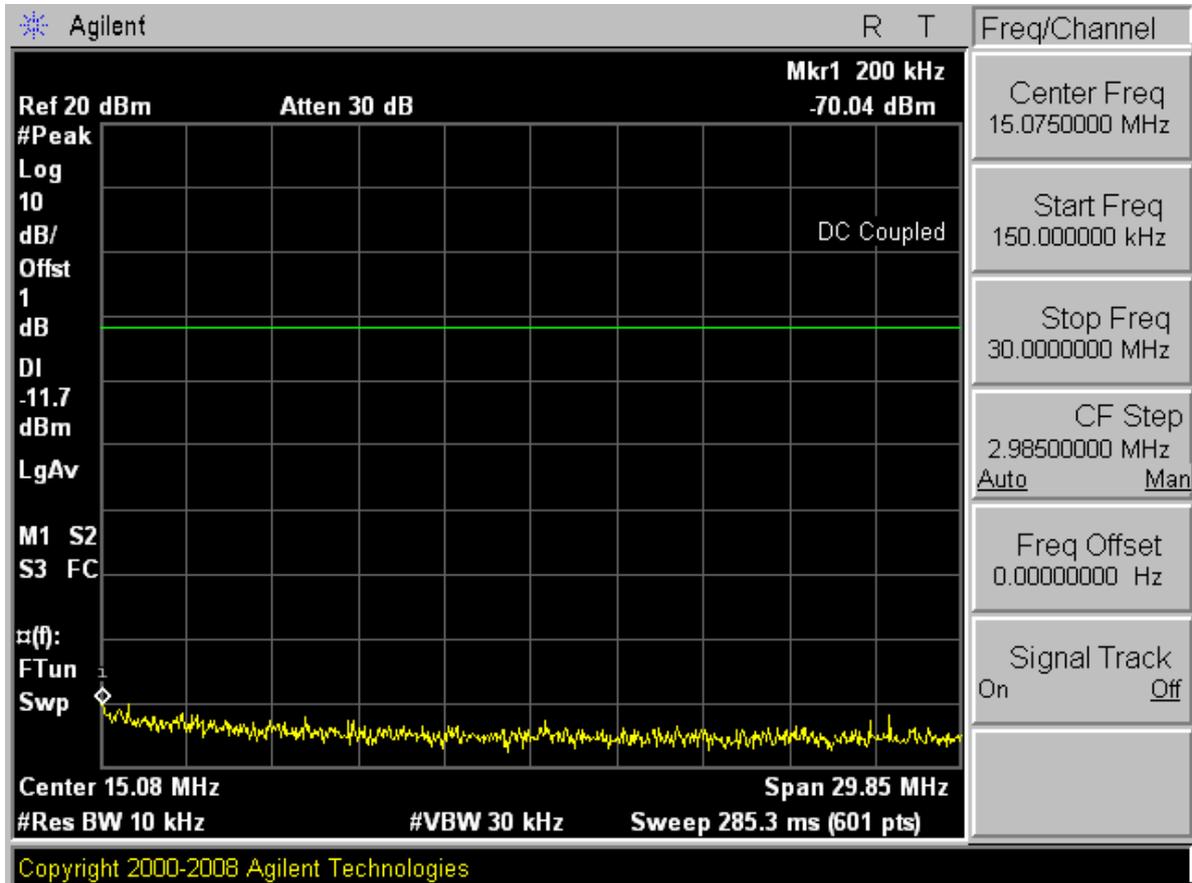


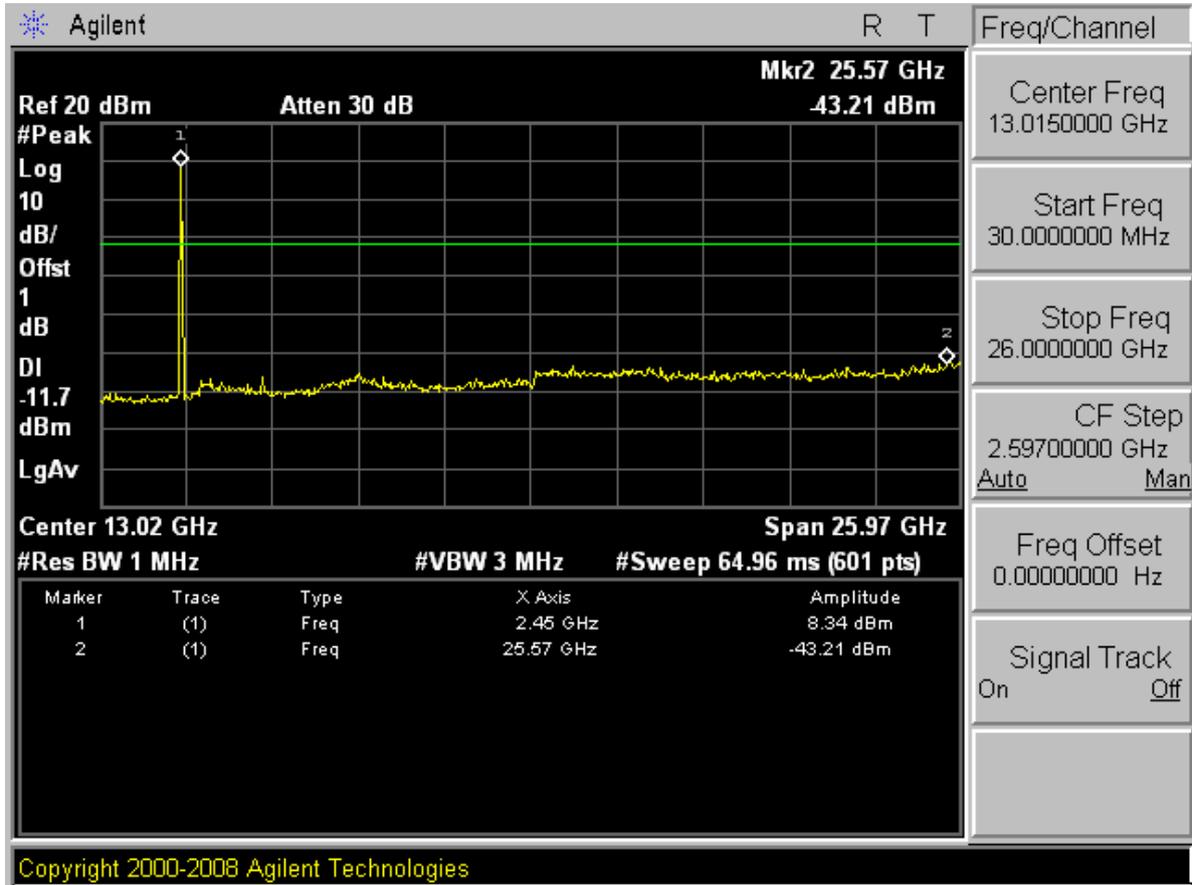




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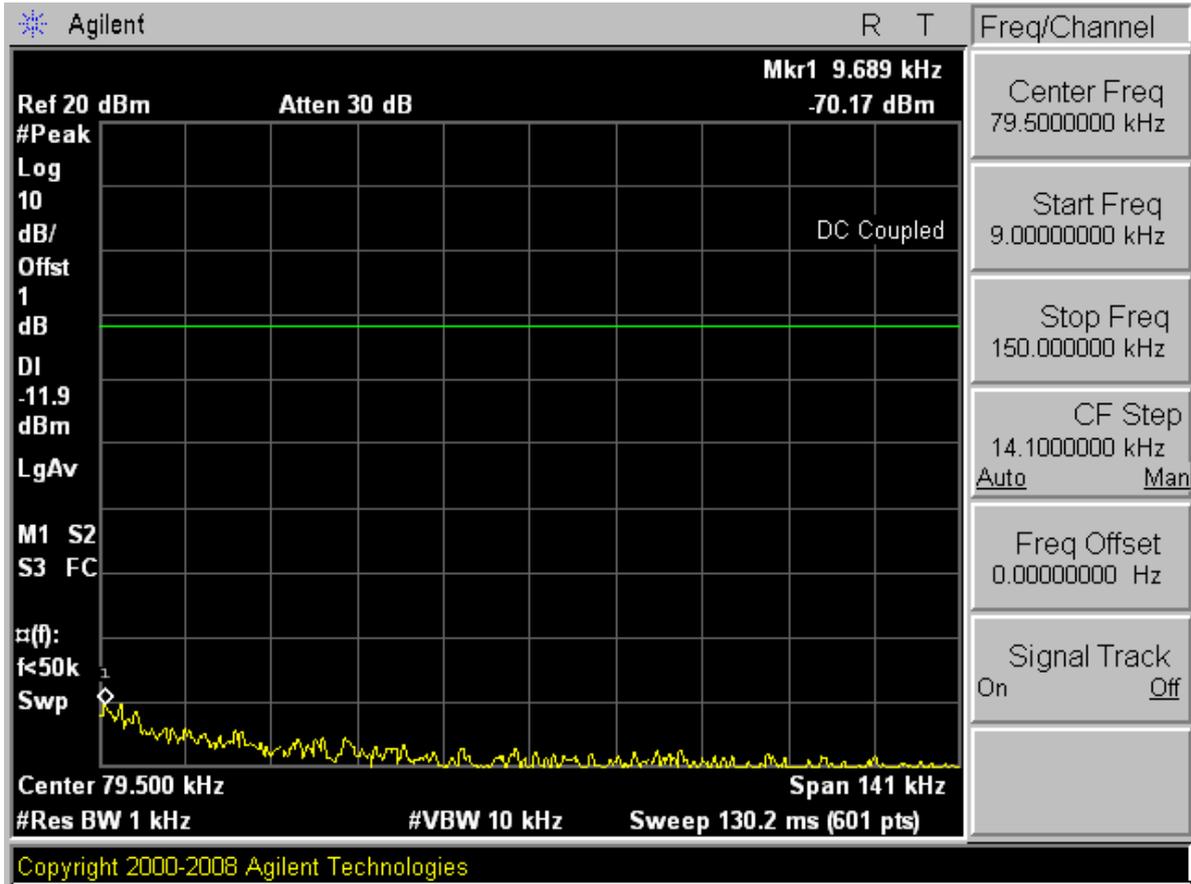


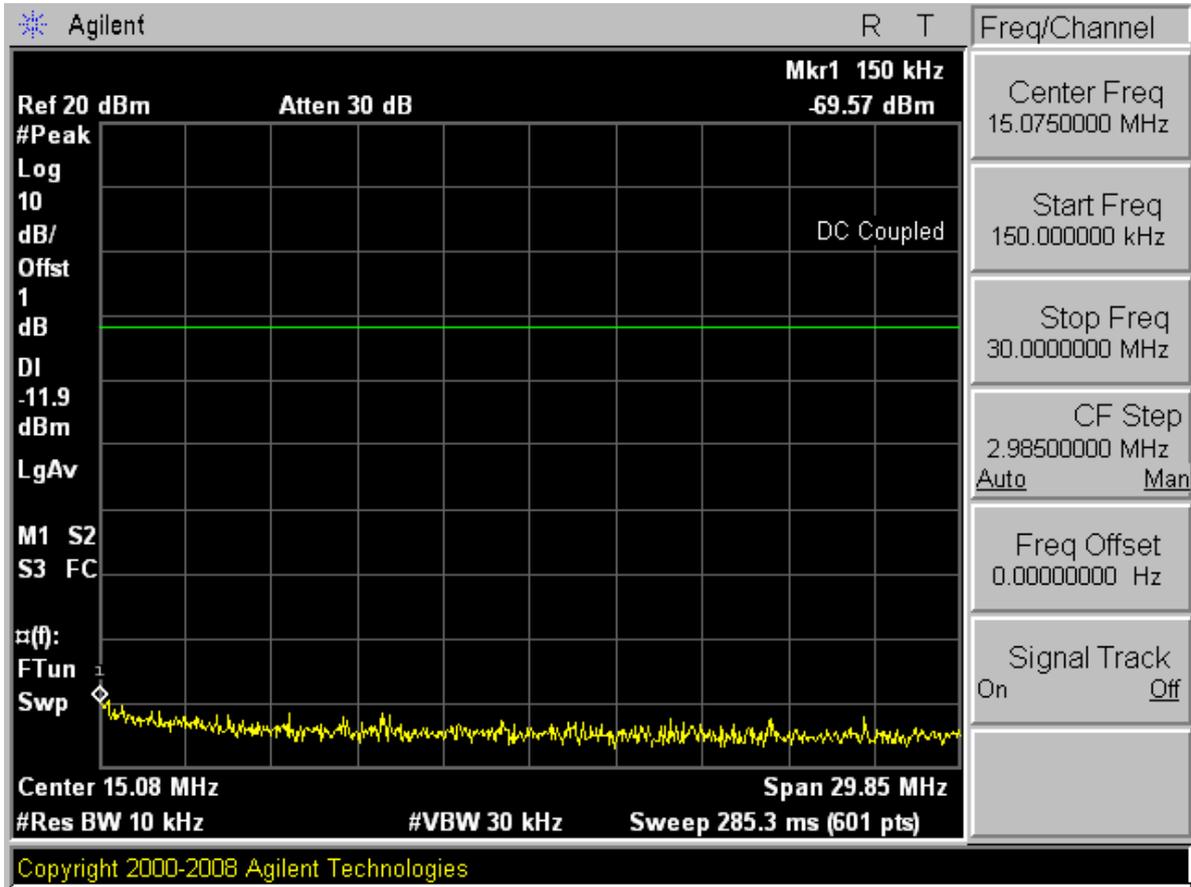


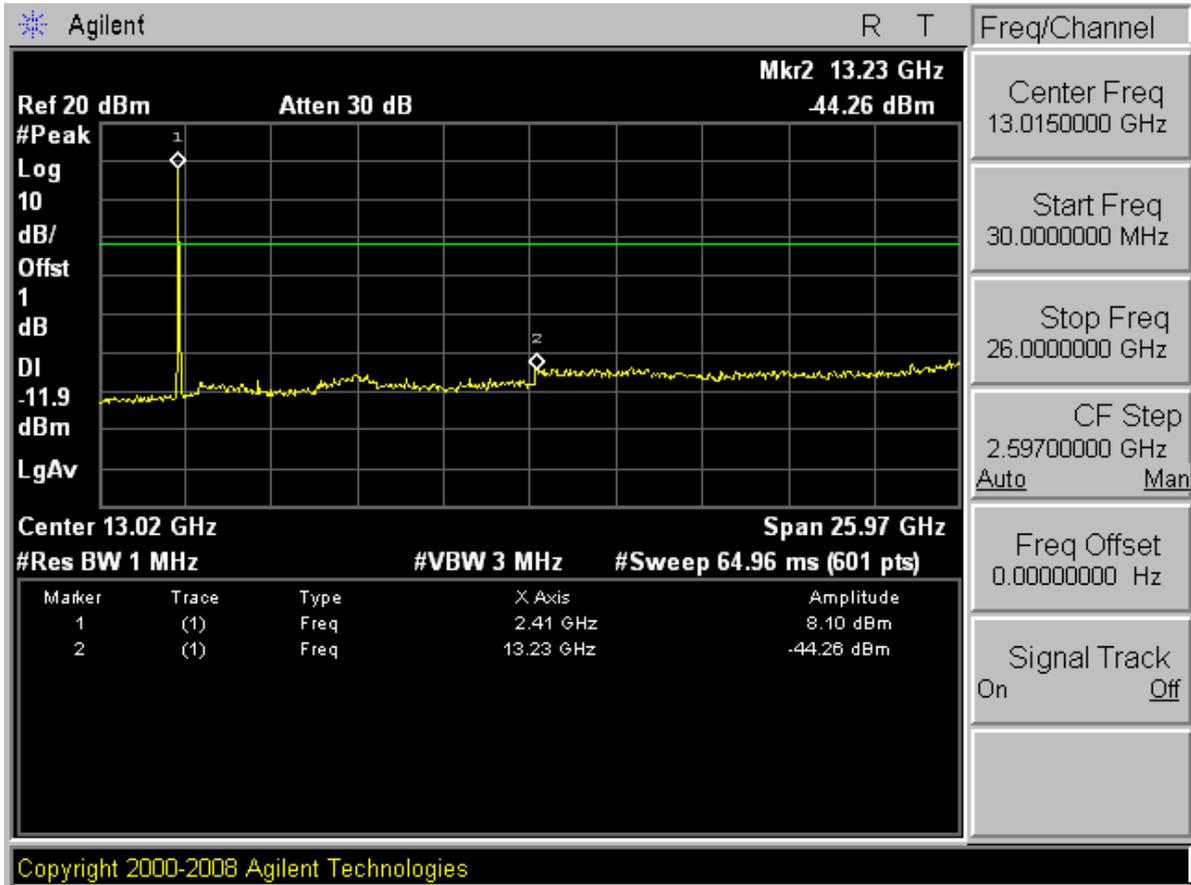




TM3 Channel 1

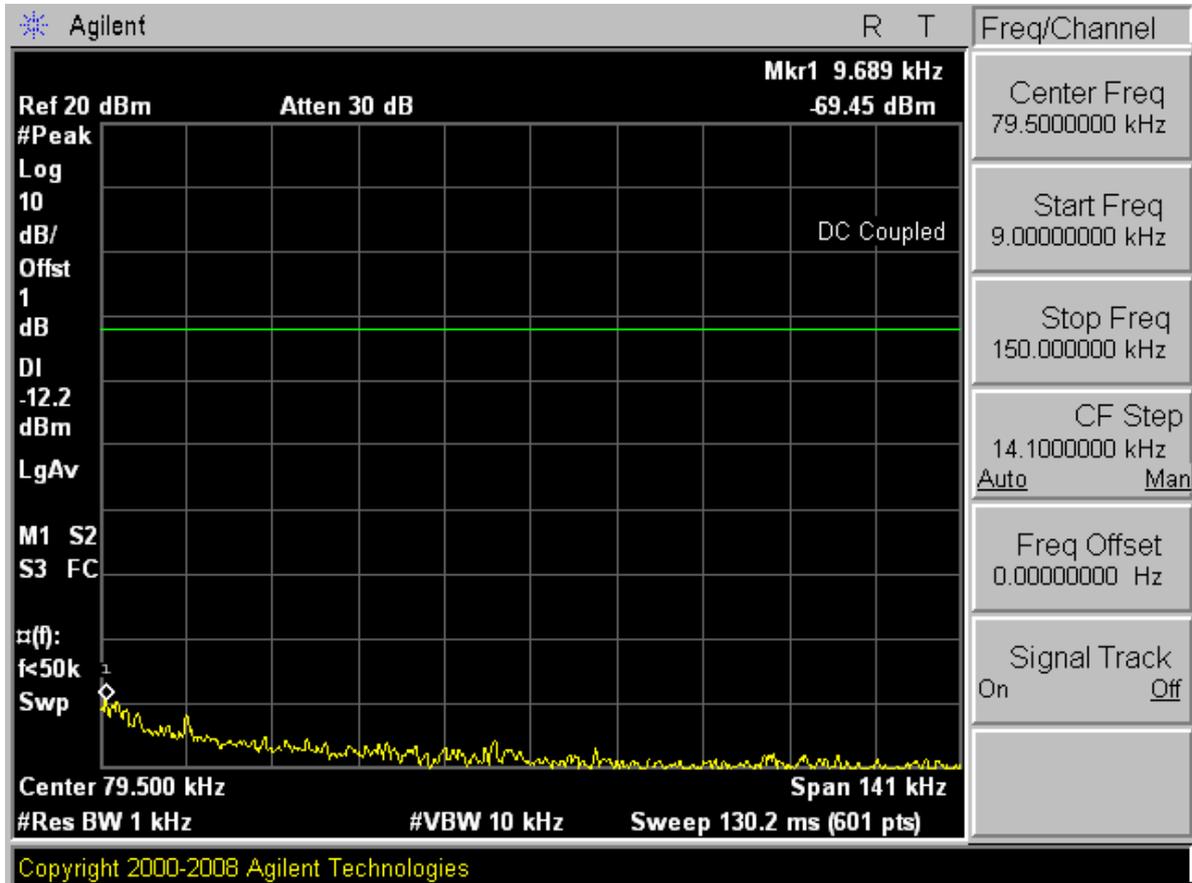


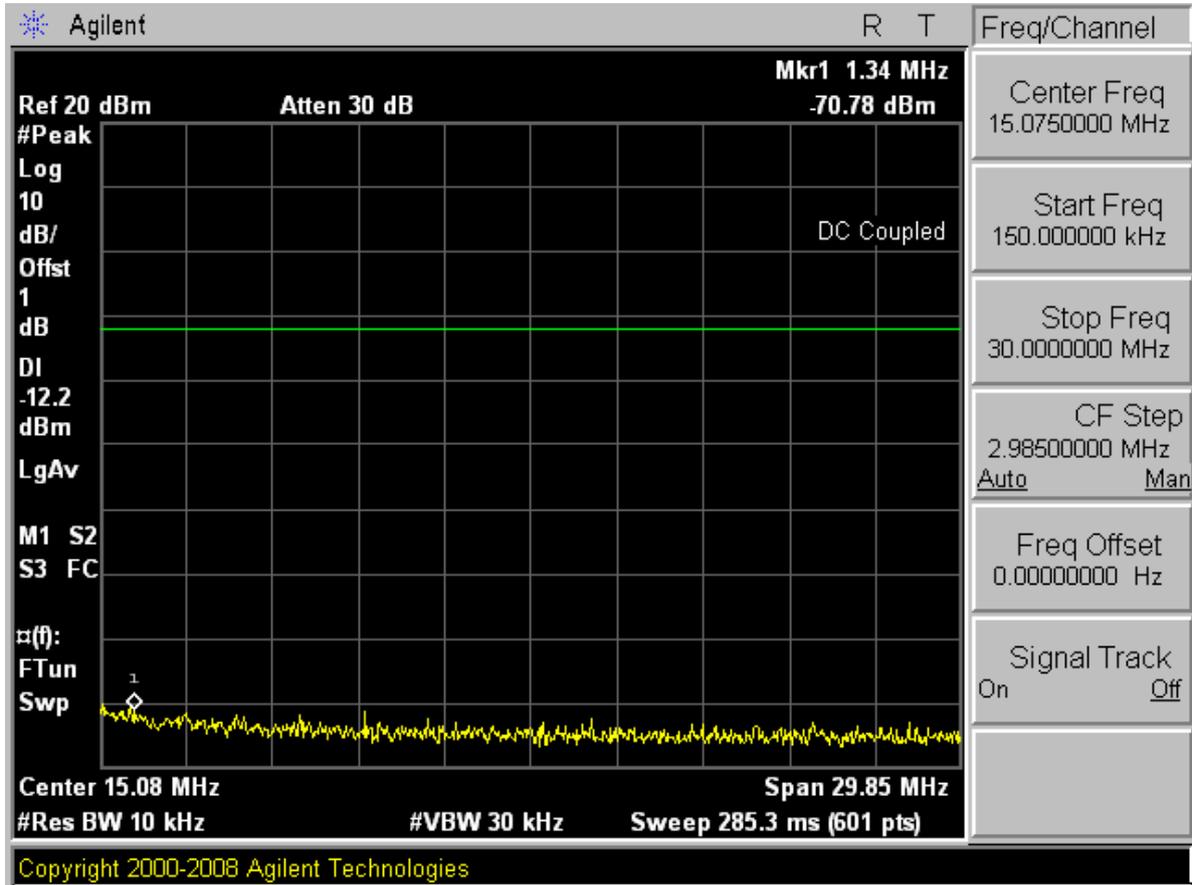


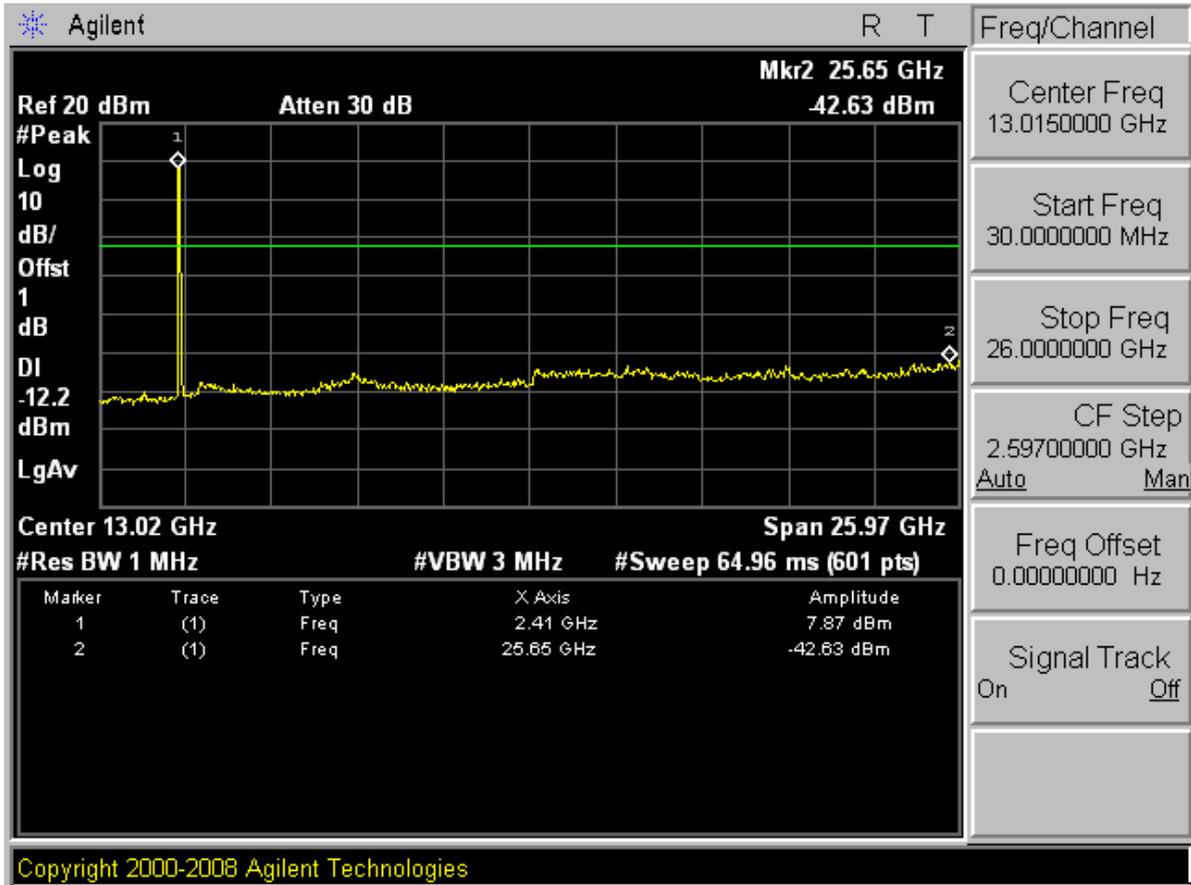




Channel 6

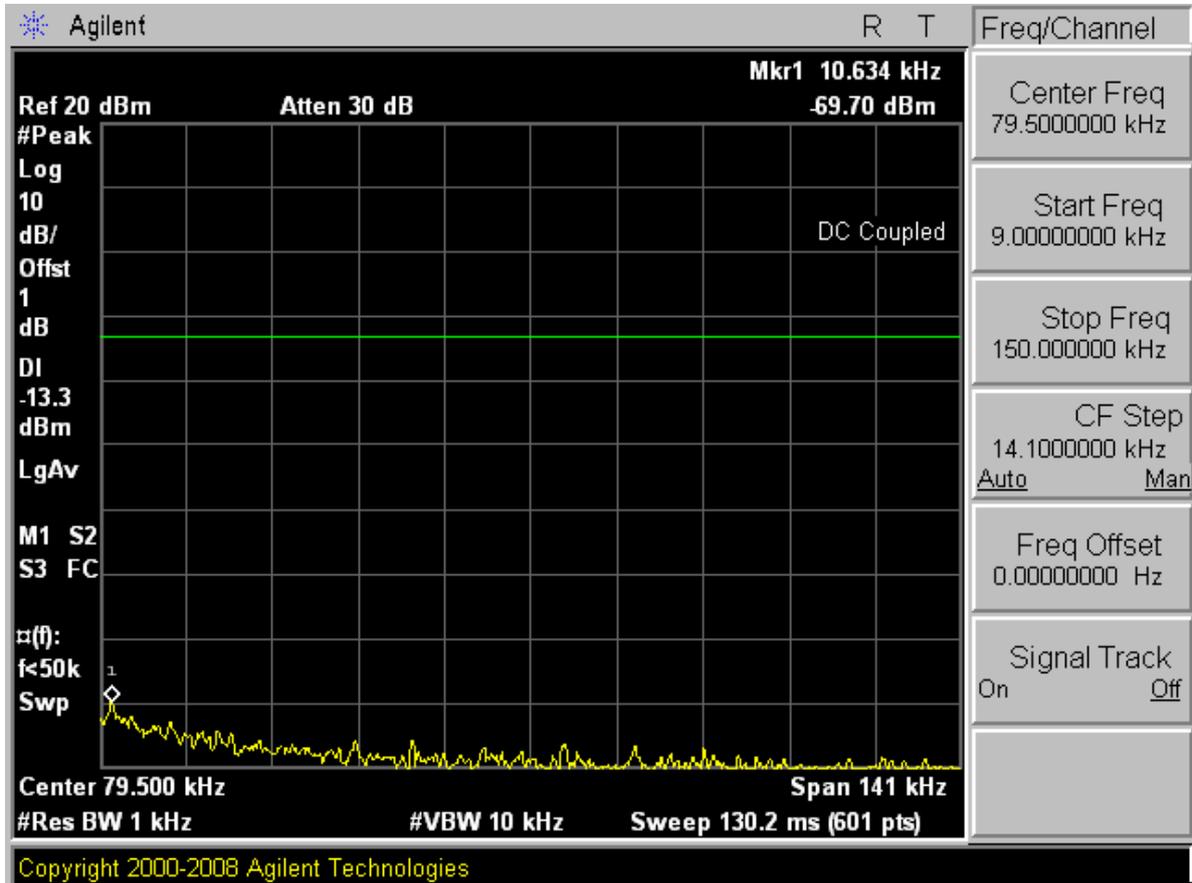


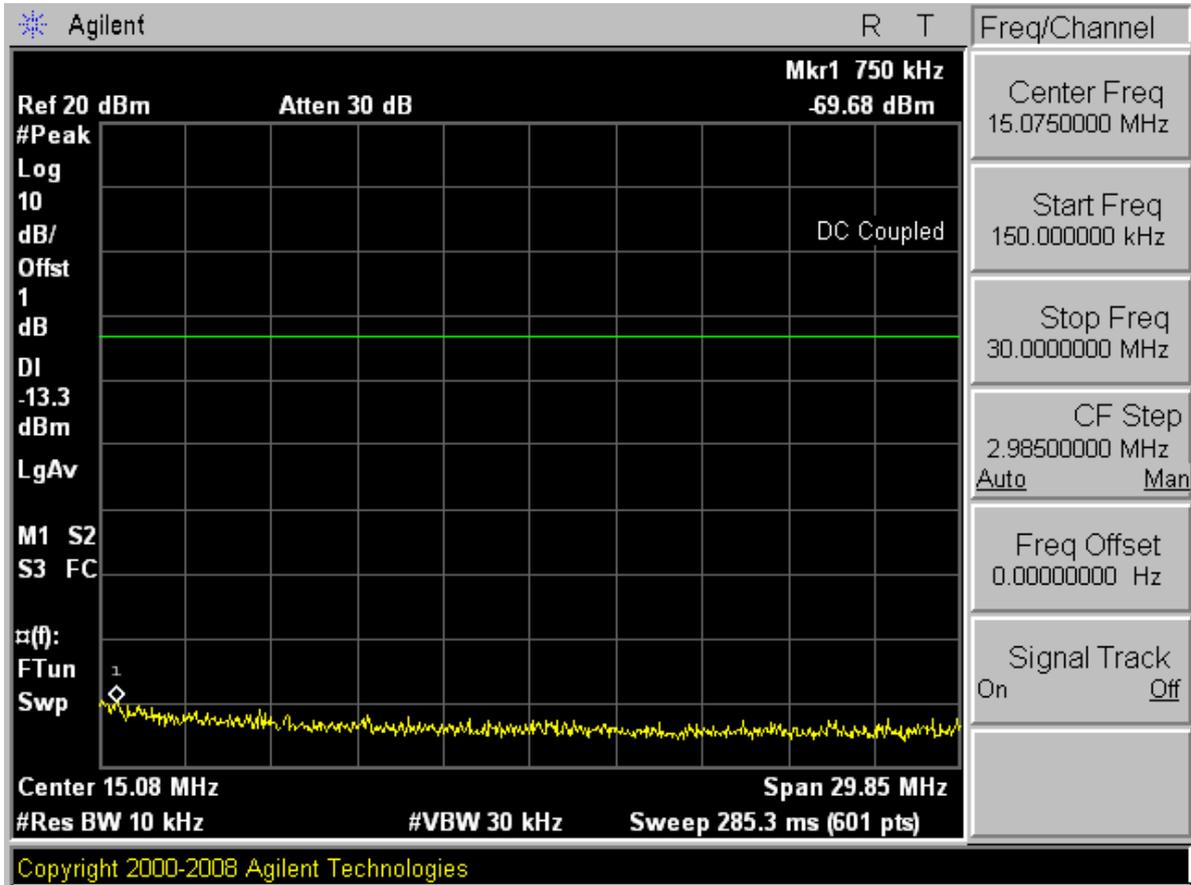


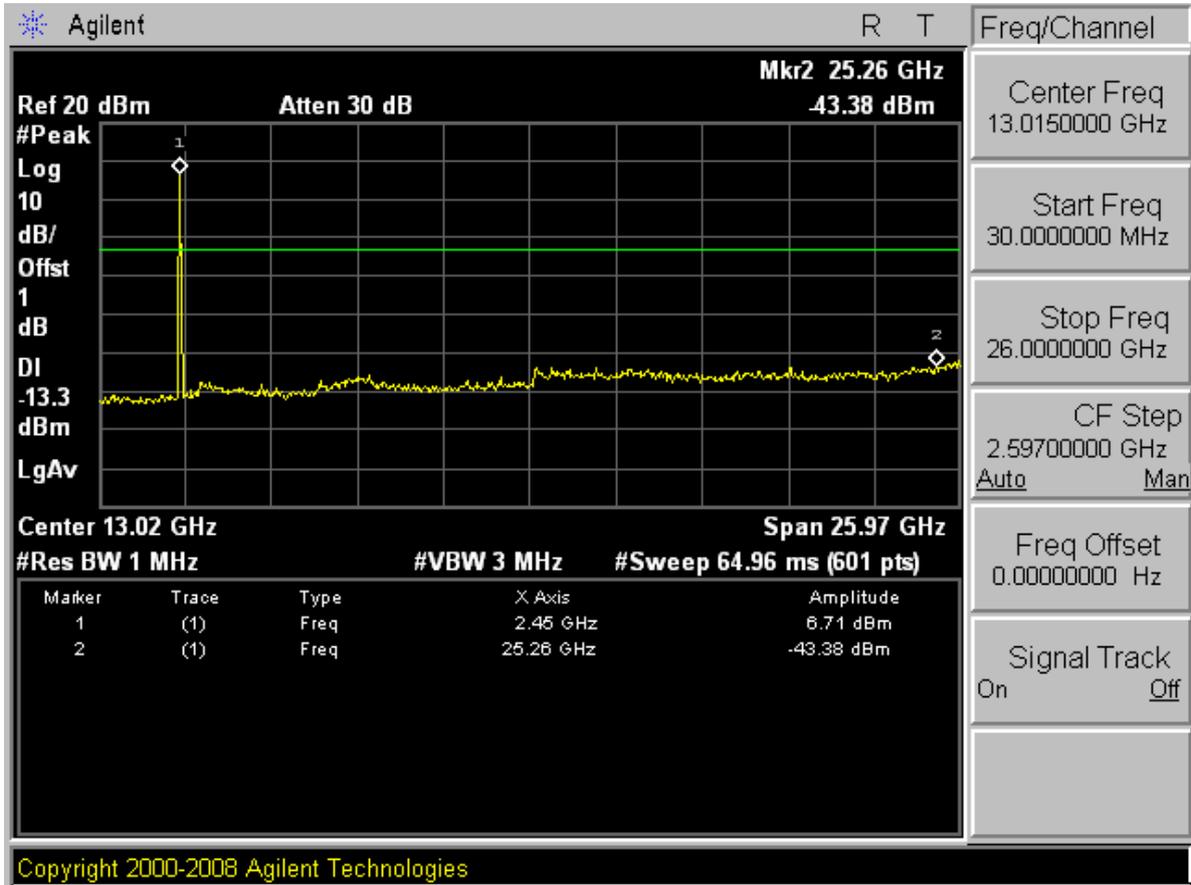




Channel 11







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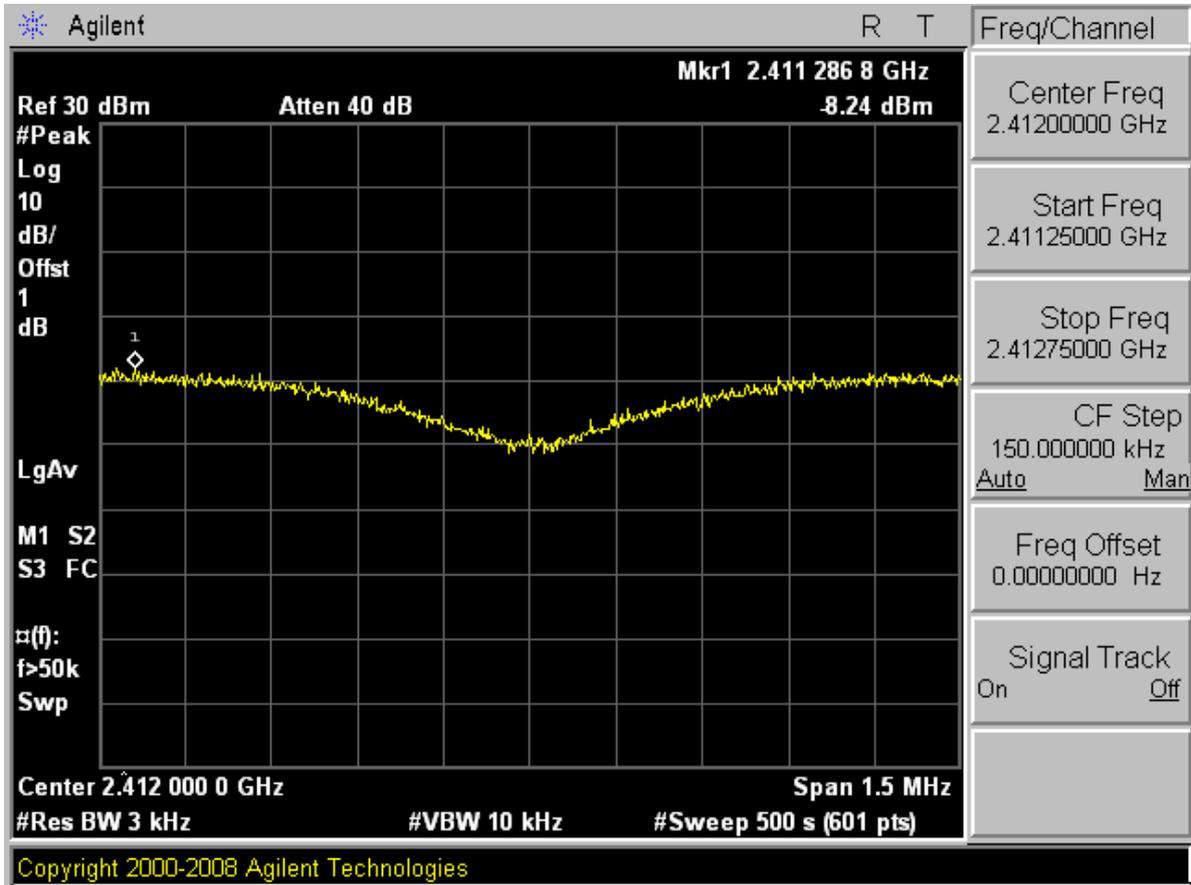
Appendix E

Power spectral density

According to FCC Part 15.247 (e)

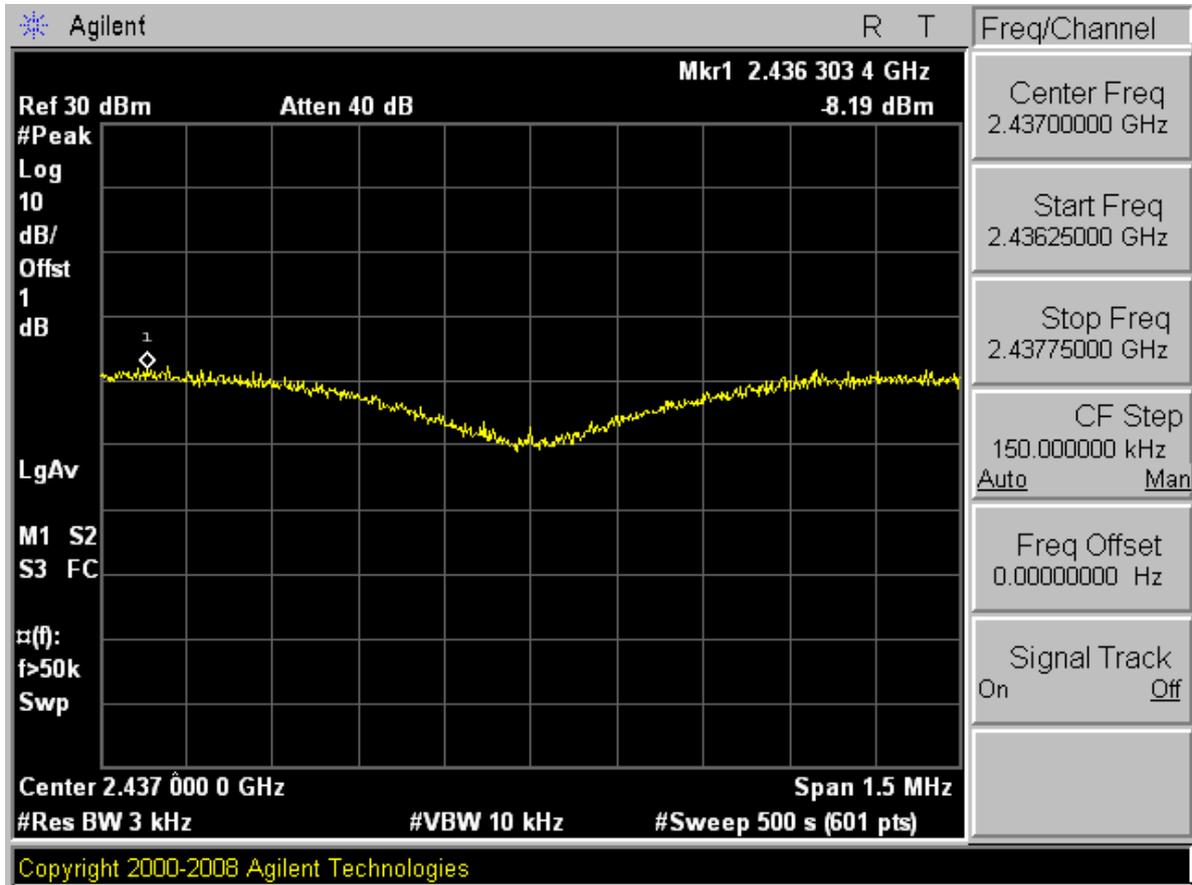


TM1 Channel 1



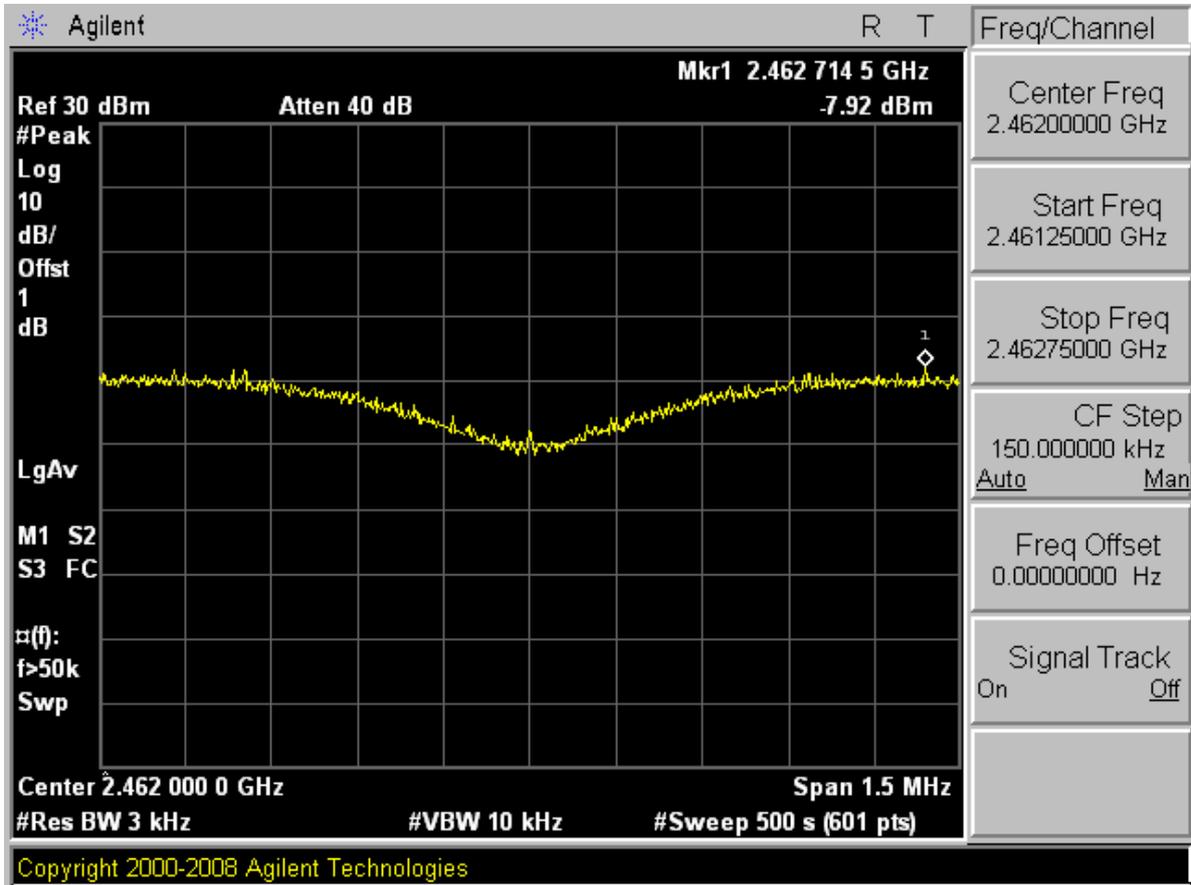


Channel 6



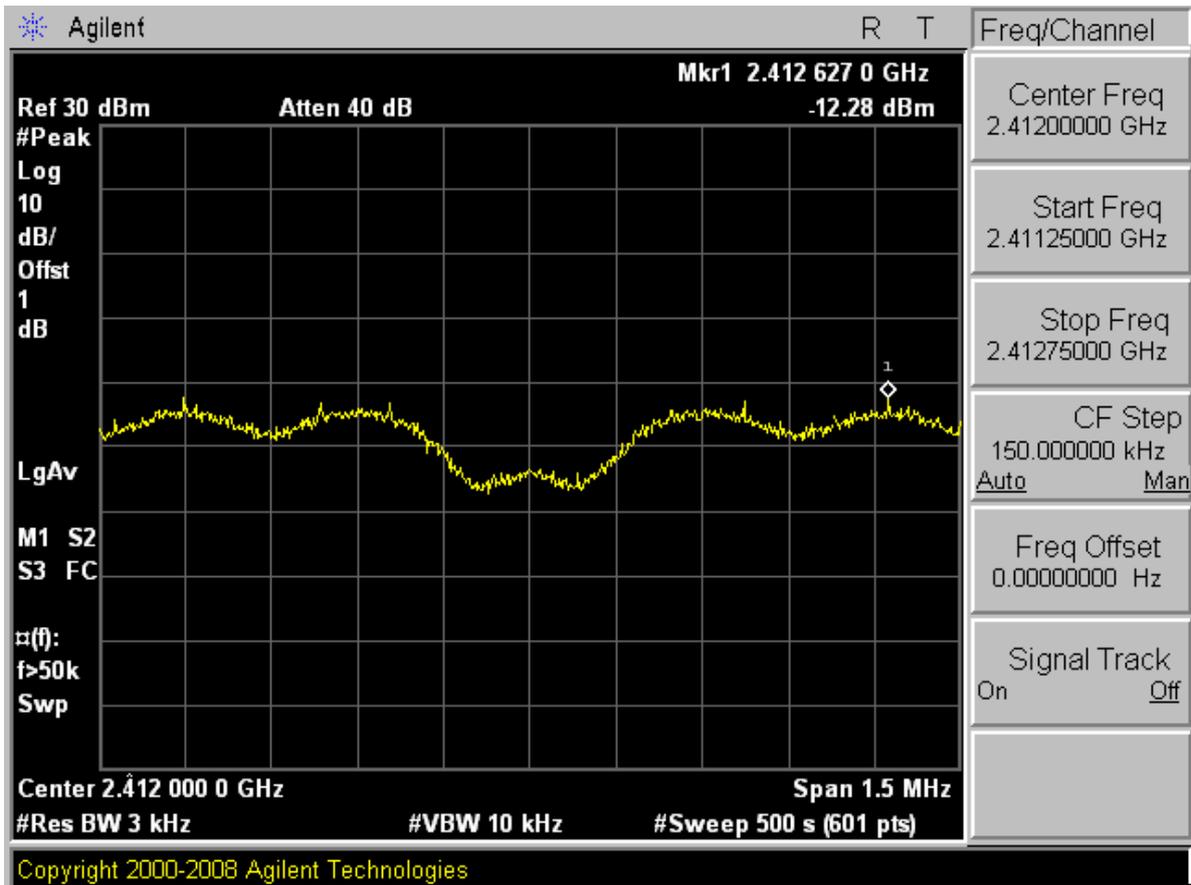


Channel 11



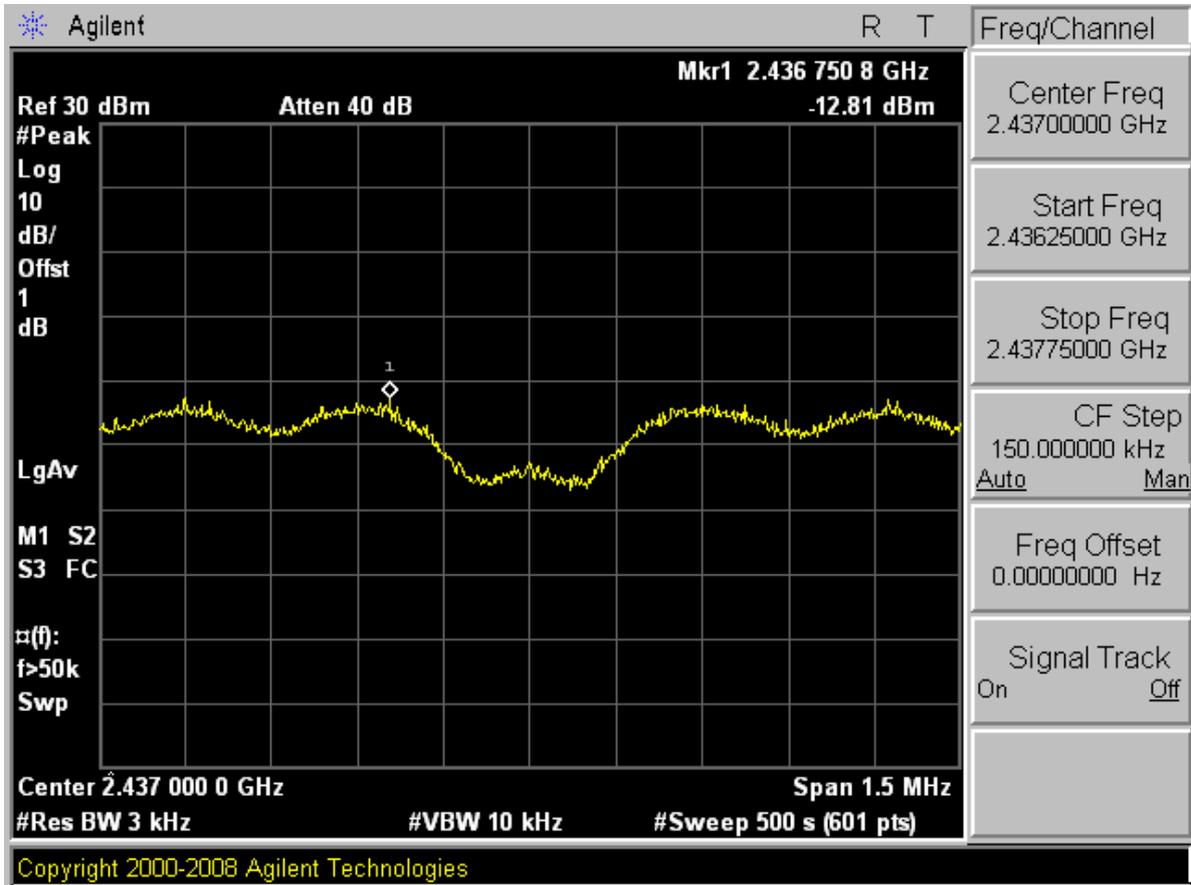


TM2 Channel 1



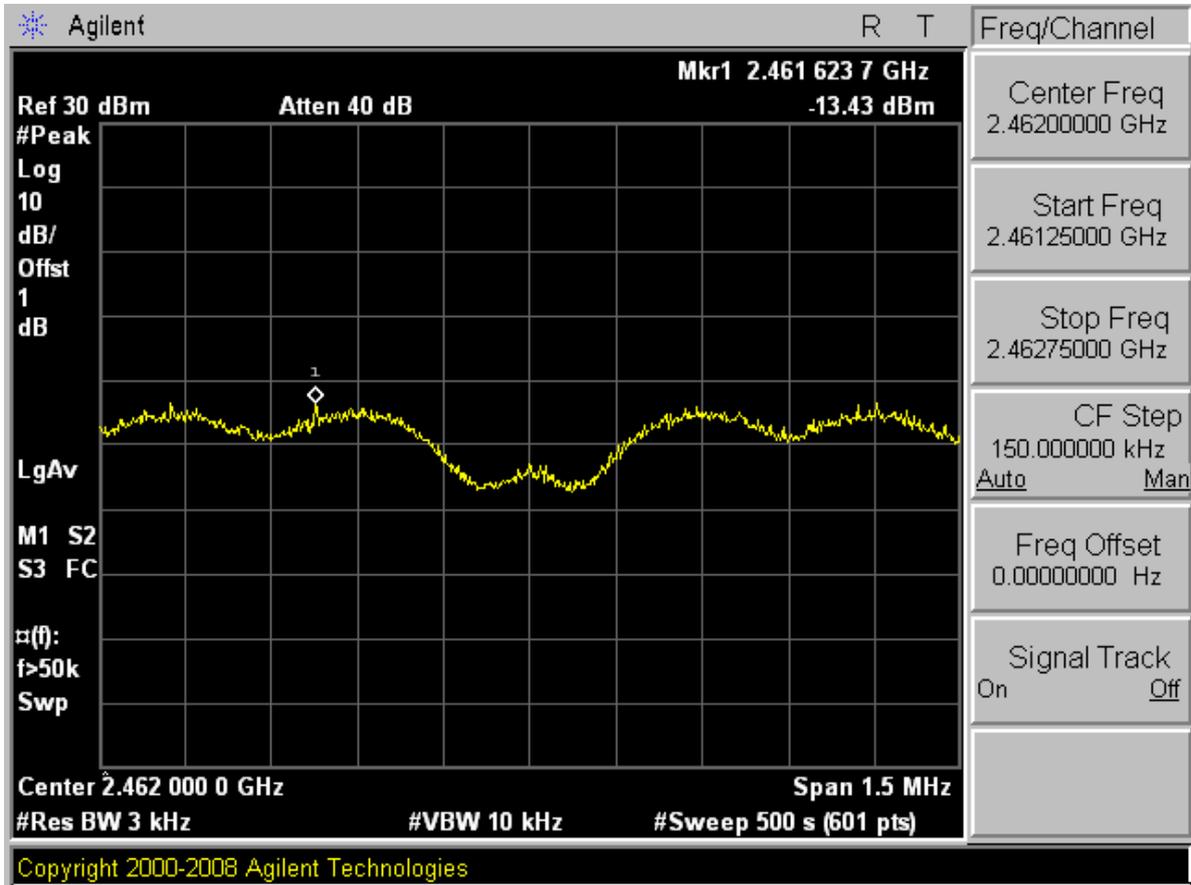


Channel 6



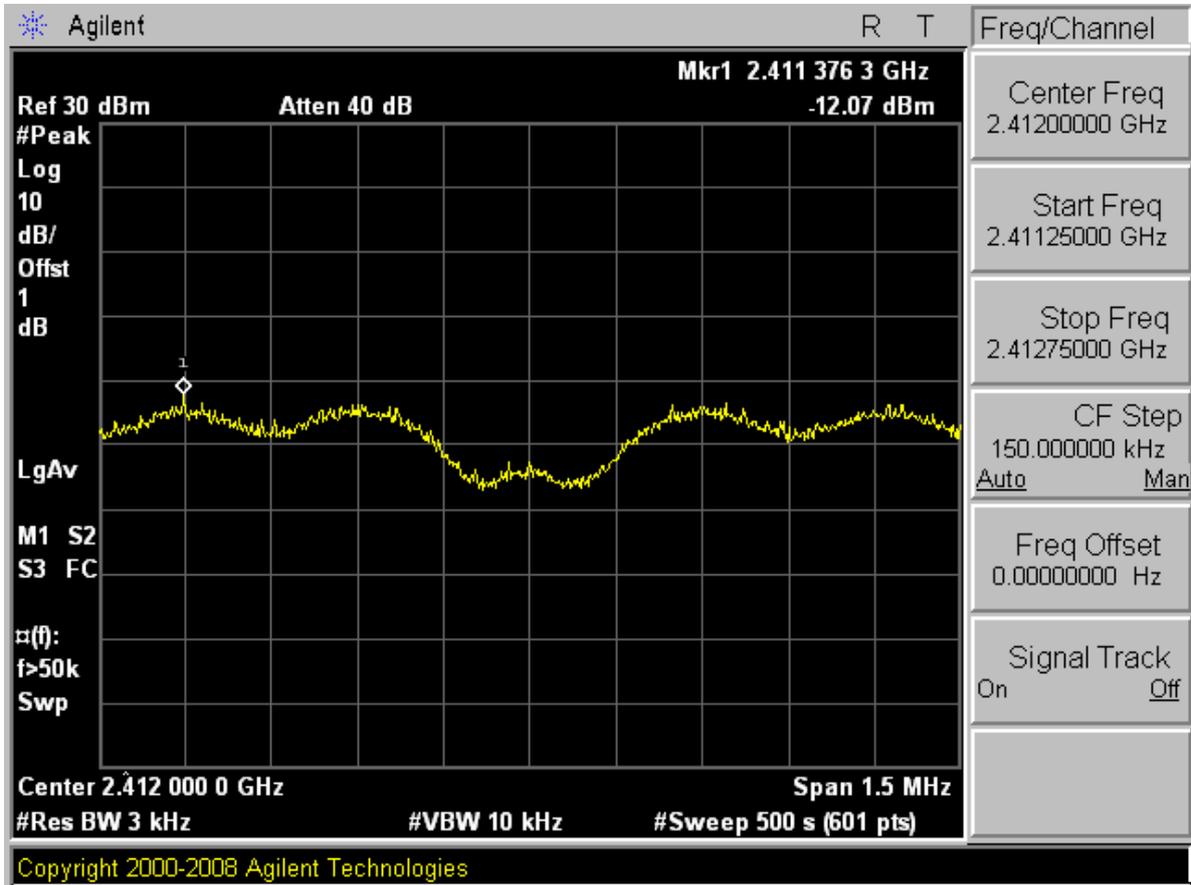


Channel 11



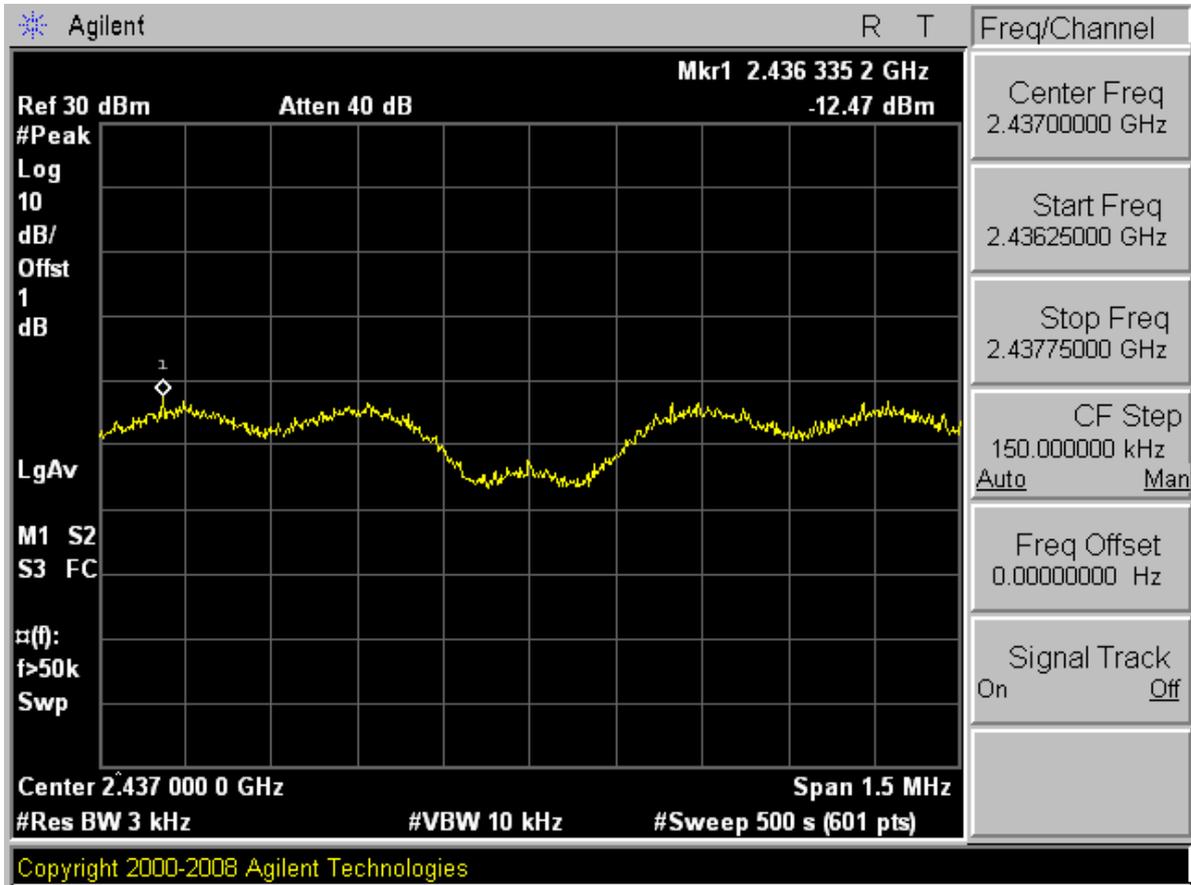


TM3 Channel 1



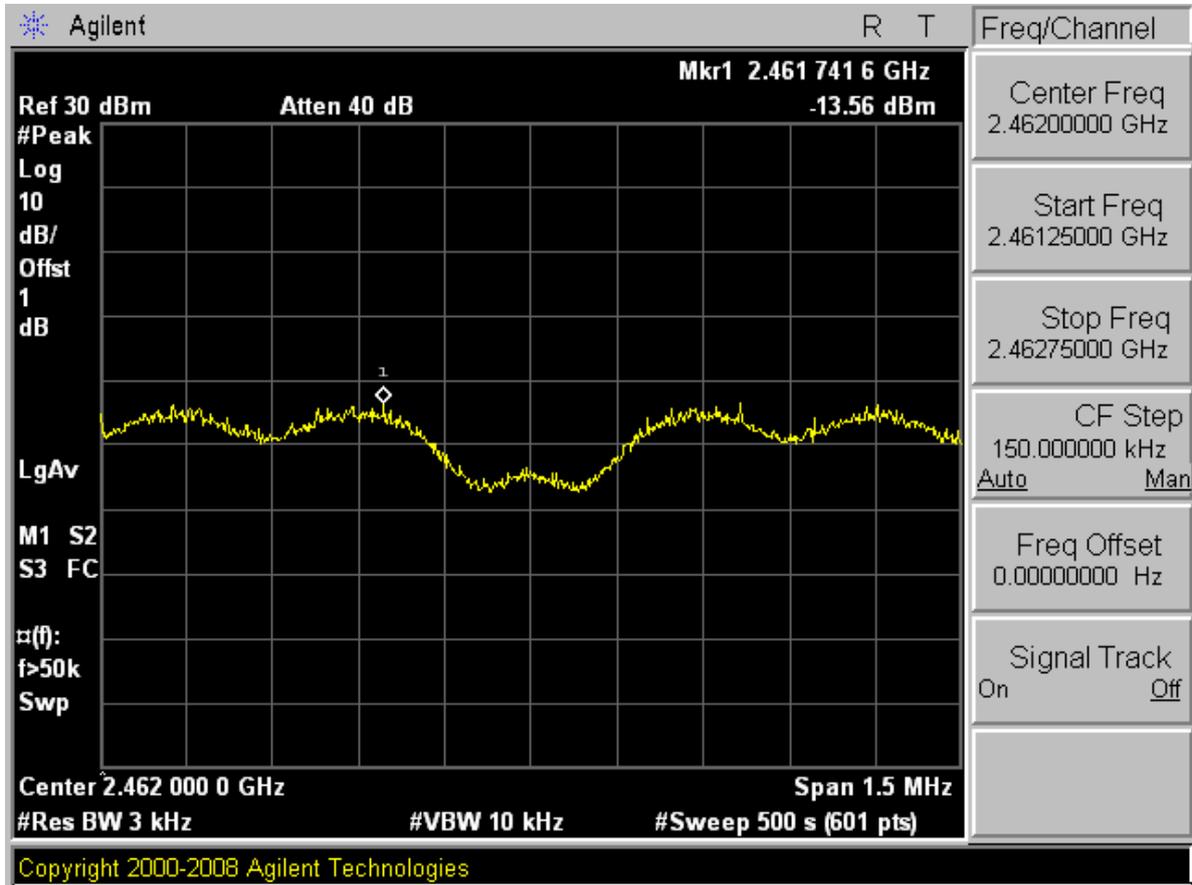


Channel 6





Channel 11



-----The END-----



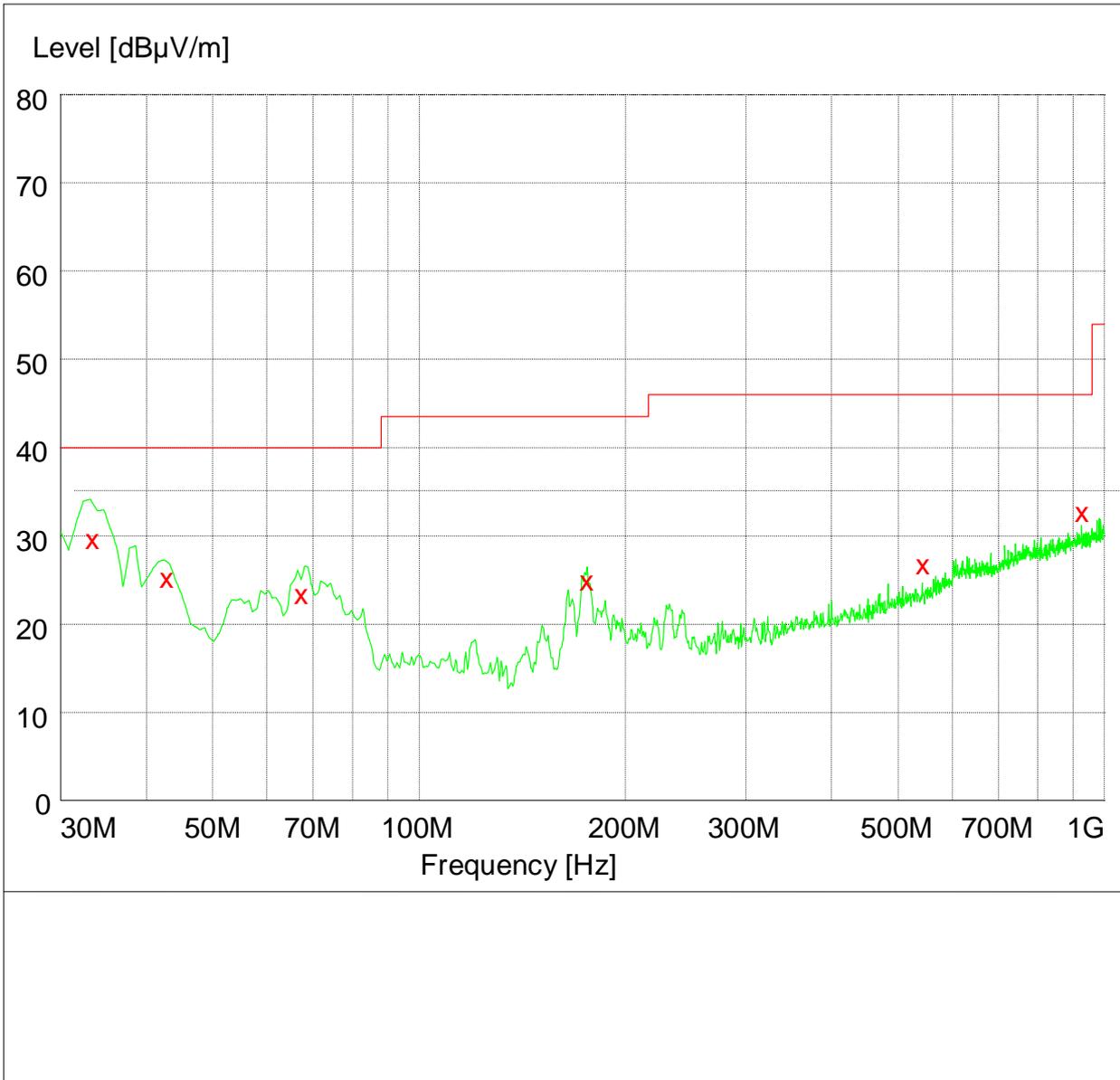
Appendix F

Radiated Spurious Emission & Spurious in Restricted Band

according to FCC Part 15.247(d) & 15.205 & 15.209

Part 1: Testing Range of “30 MHz to 1 GHz”

- Note 1: The test results and plot for testing range of “30 MHz to 1 GHz” showed as below is **the WORST case for all Test Modes and Channels**. This range will not be presented for each Test Mode and each Channel.
- Note 2: **The emissions in this range are mainly from the Platform Device (Notepad PC and its ancillary components).**



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.360000	30.20	14.8	40.0	9.8	100.0	221.00	VERTICAL
42.840000	25.90	15.1	40.0	14.1	100.0	109.00	VERTICAL
67.200000	23.90	11.4	40.0	16.1	100.0	107.00	VERTICAL



175.500000	25.50	10.9	43.5	18.0	100.0	202.00	VERTICAL
542.340000	27.20	19.8	46.0	18.8	107.0	340.00	VERTICAL
925.680000	33.30	25.1	46.0	12.7	100.0	213.00	HORIZONTAL



Part 2: Testing Range of “18 GHz to 26.5 GHz”

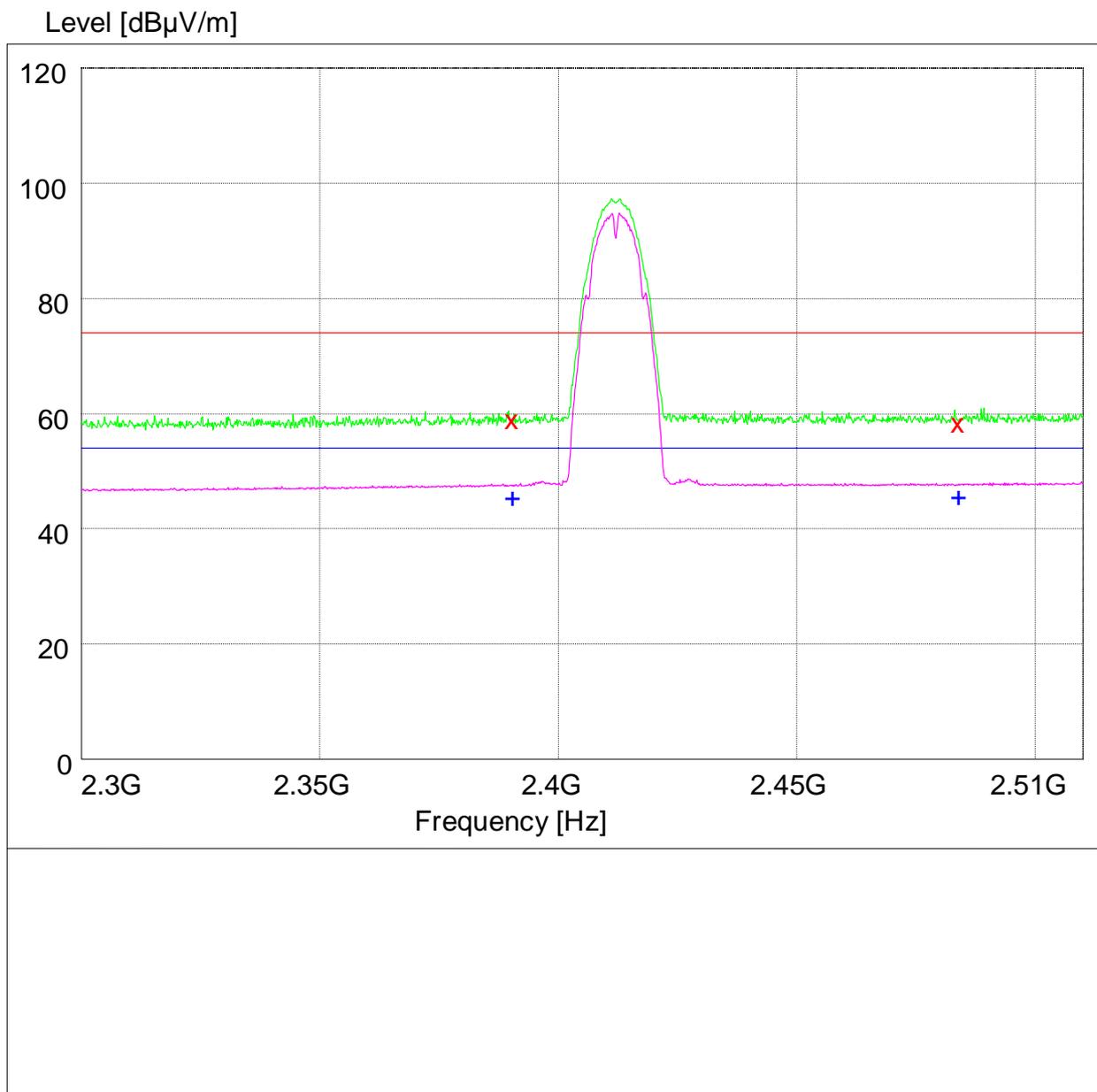
Note: No peak found in pre- test.

Part 3: Testing Range of “2.3GHz to 2.5GHz”

- Note 1: The testing range of “1 GHz to 3 GHz” is for checking radiated emissions located in restricted bands near the EUT operating bands.
- Note 2: Two limits are required in the testing range above 1 GHz, that is Peak limit (74 dB μ V/m) and Average Limit (54 dB μ V/m).
- Note 3: The peak spike exceeds the limit line is EUT’s operating frequency.

1 Test Mode: 11b / Chain 1

1.1 Channel 01



Note: The peak exceeds the limit line is carrier frequency.

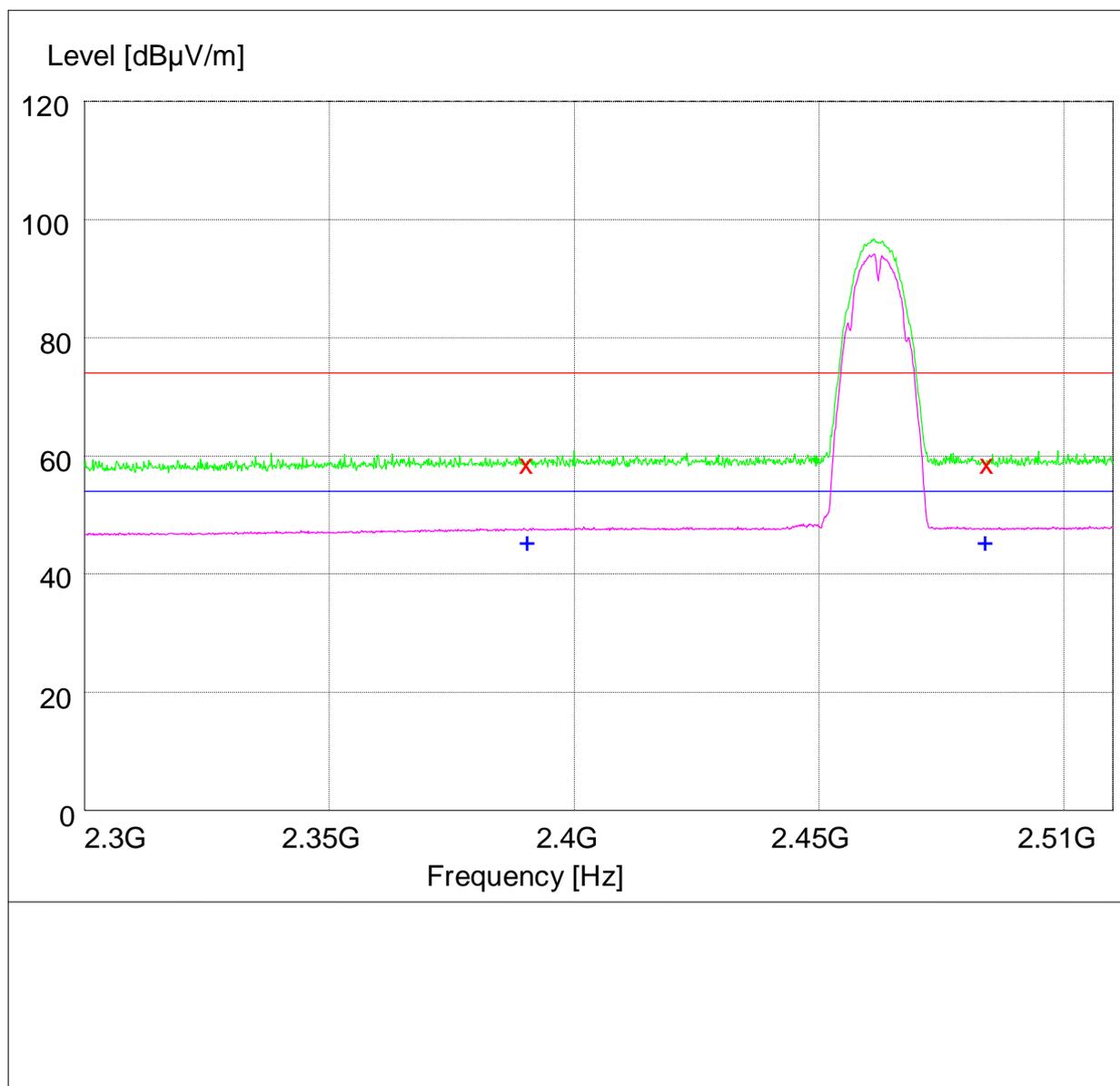
MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.70	33.5	74.0	14.3	199.0	324.00	VERTICAL
2483.500000	59.30	33.7	74.0	14.7	130.0	222.00	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	46.40	33.5	54.0	7.6	103.0	9.00	VERTICAL
2483.500000	46.60	33.7	54.0	7.4	115.0	348.00	HORIZONTAL

1.2 Channel 11





Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

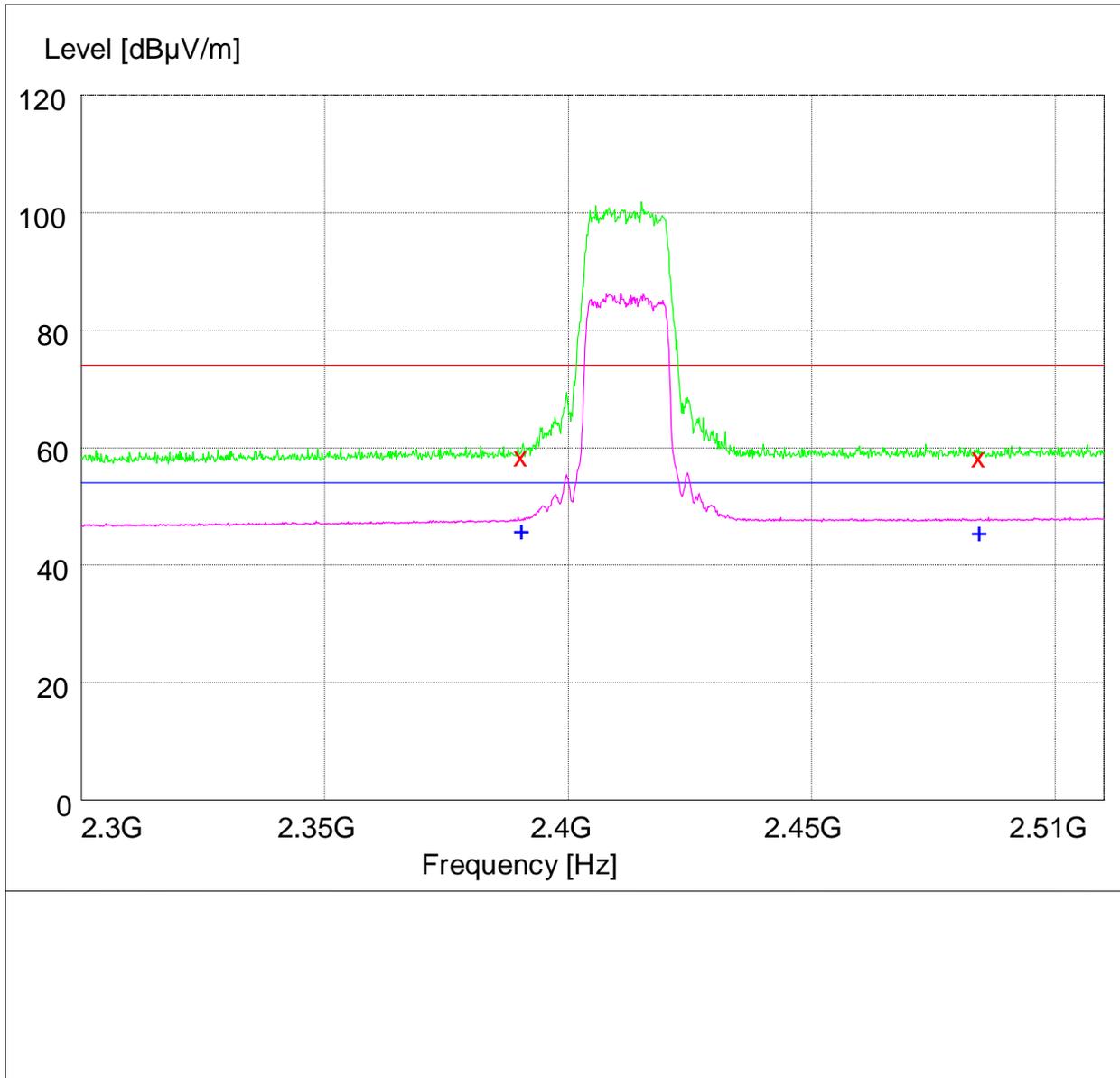
Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	55.72	33.5	74.0	18.28	172.0	183.00	HORIZONTAL
2483.500000	57.50	33.7	74.0	16.5	108.0	253.00	VERTICAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	41.20	33.5	54.0	12.8	153.0	253.00	VERTICAL
2483.500000	44.80	33.7	54.0	9.2	100.0	56.00	VERTICAL

2 Test Mode: 11g / Chain 1

2.1 Channel 01



Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

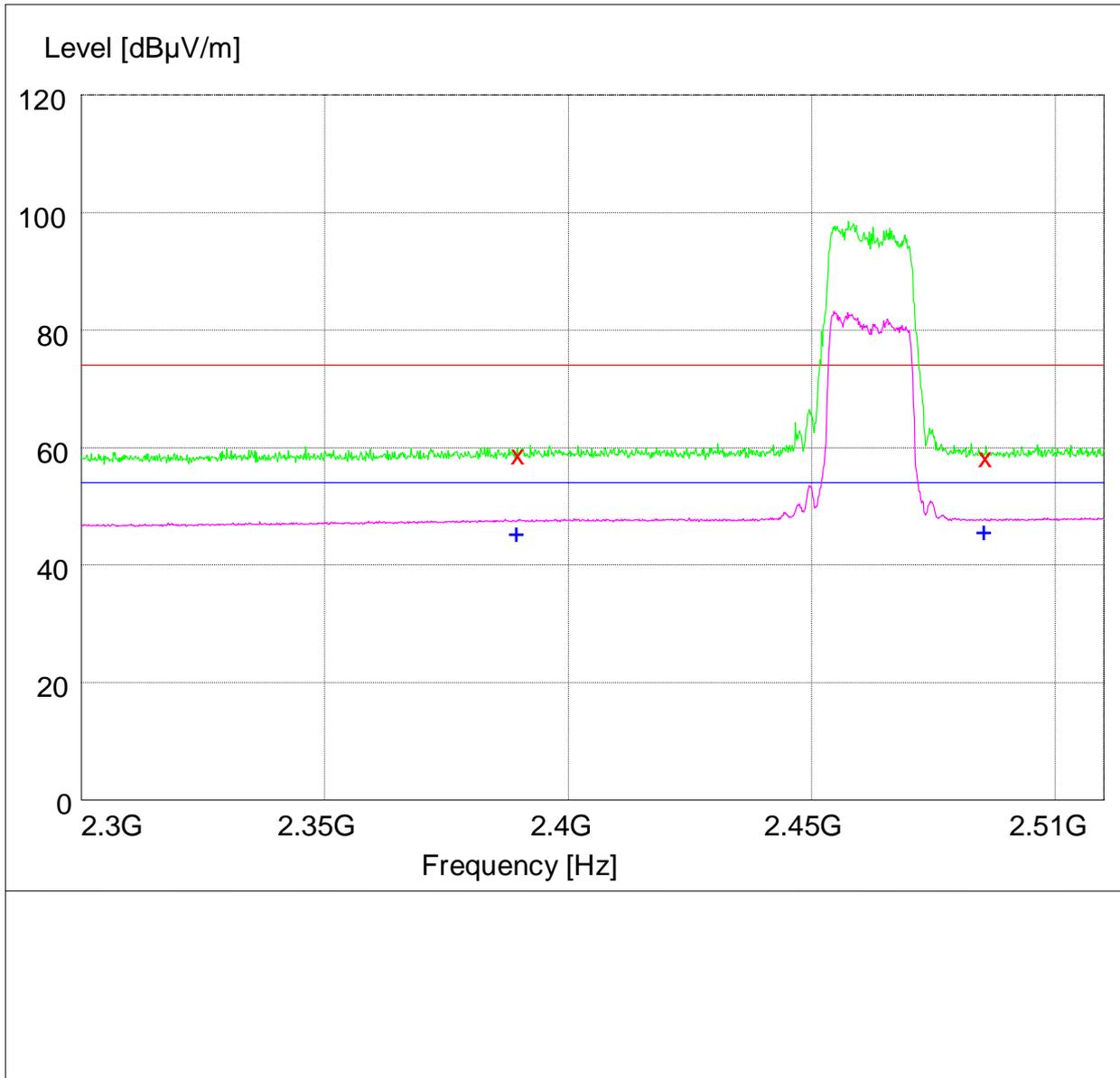
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.40	33.5	74.0	14.6	115.0	168.00	VERTICAL
2483.500000	59.20	33.7	74.0	14.8	143.0	87.00	HORIZONTAL

MEASUREMENT RESULT: AVDetector



Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	46.80	33.5	54.0	7.2	122.0	297.00	HORIZONTAL
2483.500000	46.50	33.7	54.0	7.5	173.0	311.00	HORIZONTAL

2.2 Channel 11



Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.40	33.5	74.0	14.6	111.0	256.00	VERTICAL



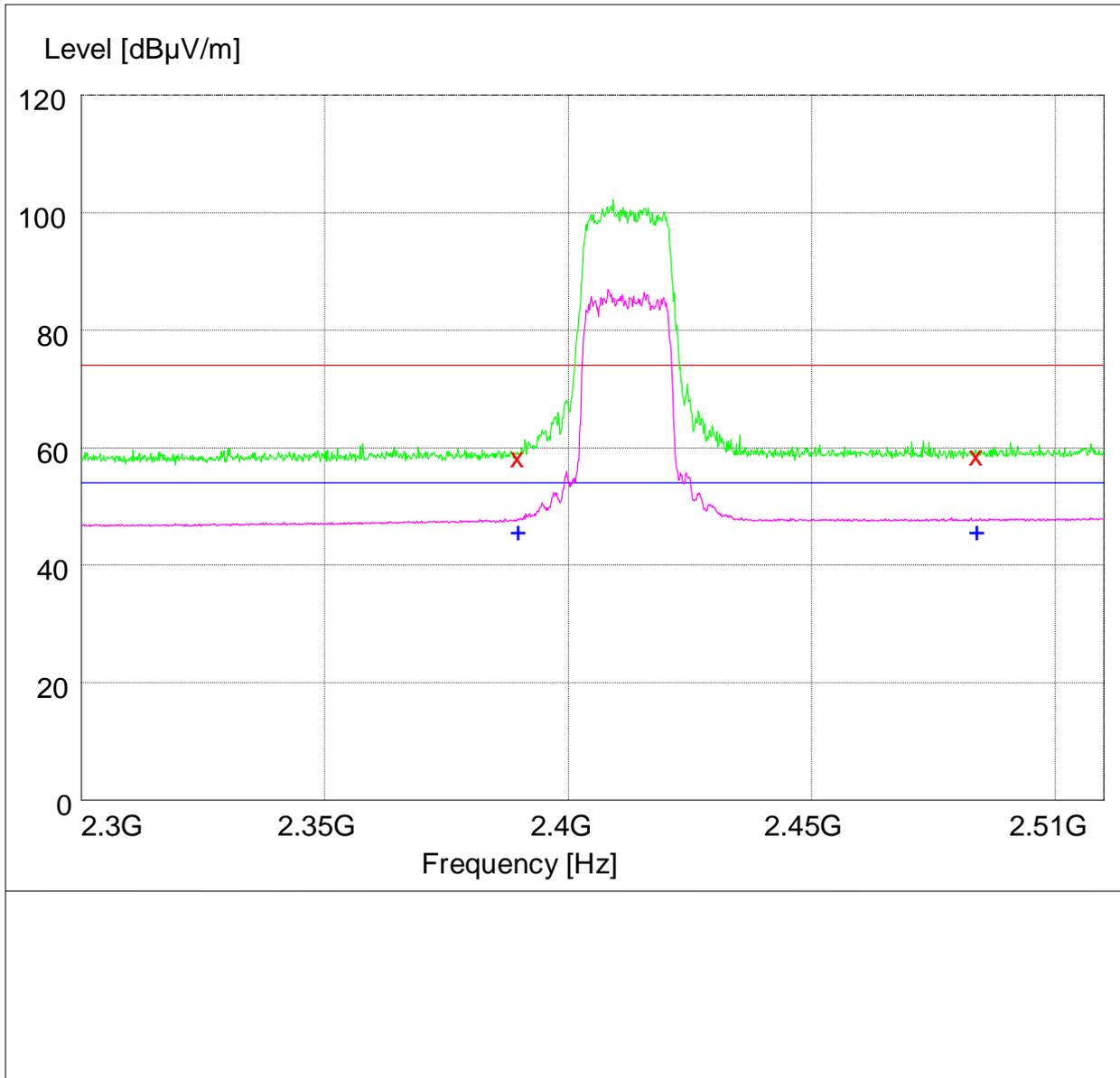
2483.500000	59.20	33.7	74.0	14.8	123.0	348.00	VERTICAL
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MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	46.40	33.5	54.0	7.6	173.0	325.00	VERTICAL
2483.500000	46.50	33.7	54.0	7.5	133.0	360.00	HORIZONTAL

3 Test Mode: 11n / Chain 1

3.1 Channel 01



Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

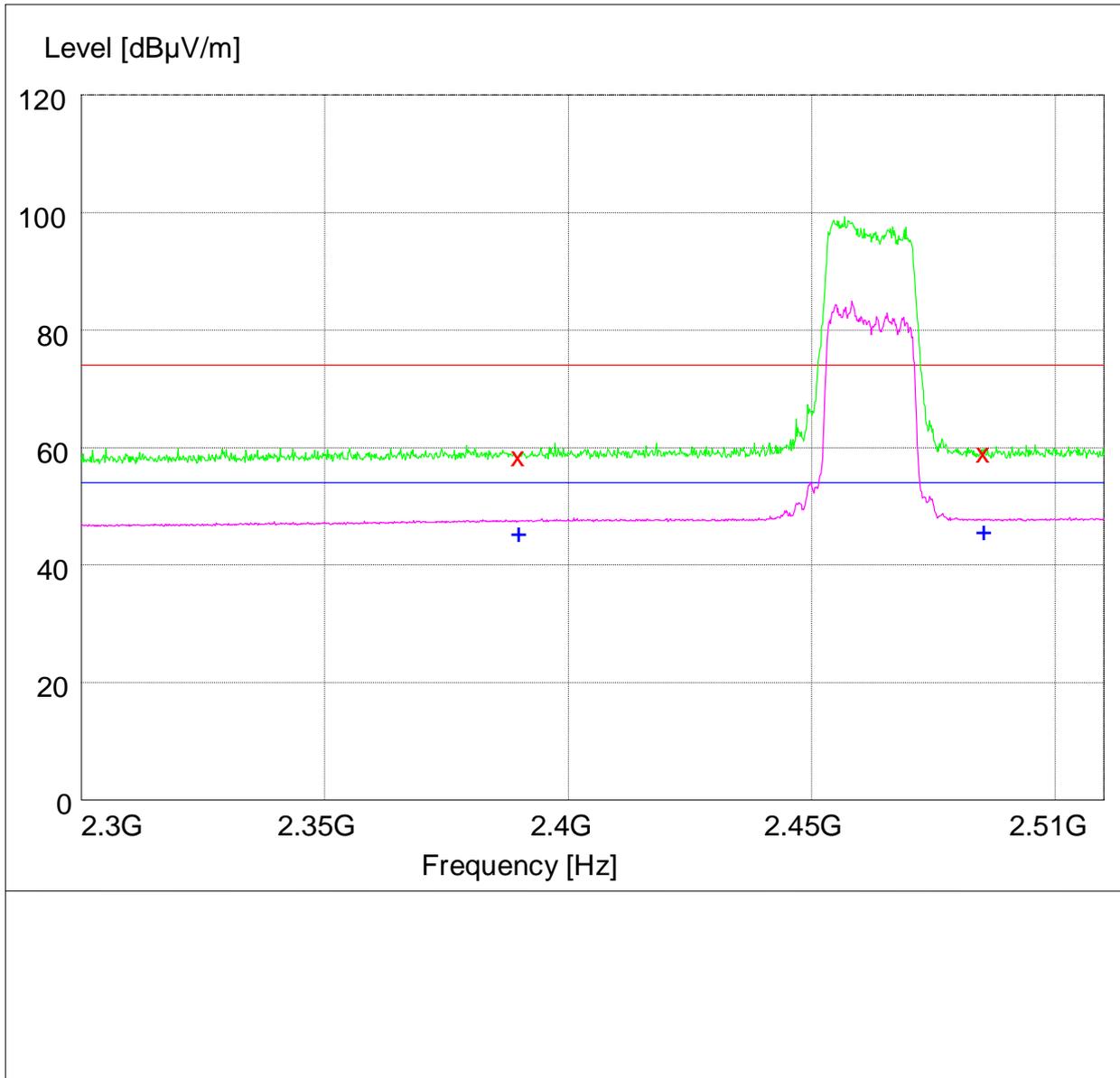
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.10	33.5	74.0	14.9	100.0	177.00	HORIZONTAL
2483.500000	59.40	33.7	74.0	14.6	169.0	254.00	VERTICAL

MEASUREMENT RESULT: AVDetector



Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	46.50	33.5	54.0	7.5	159.0	82.00	HORIZONTAL
2483.500000	46.50	33.7	54.0	7.5	164.0	183.00	VERTICAL

3.2 Channel 11



Note: The peak exceeds the limit line is carrier frequency.

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	55.80	33.5	74.0	18.2	100.0	105.00	VERTICAL



2483.500000	59.10	33.7	74.0	14.9	100.0	333.00	VERTICAL
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MEASUREMENT RESULT: AVDetector

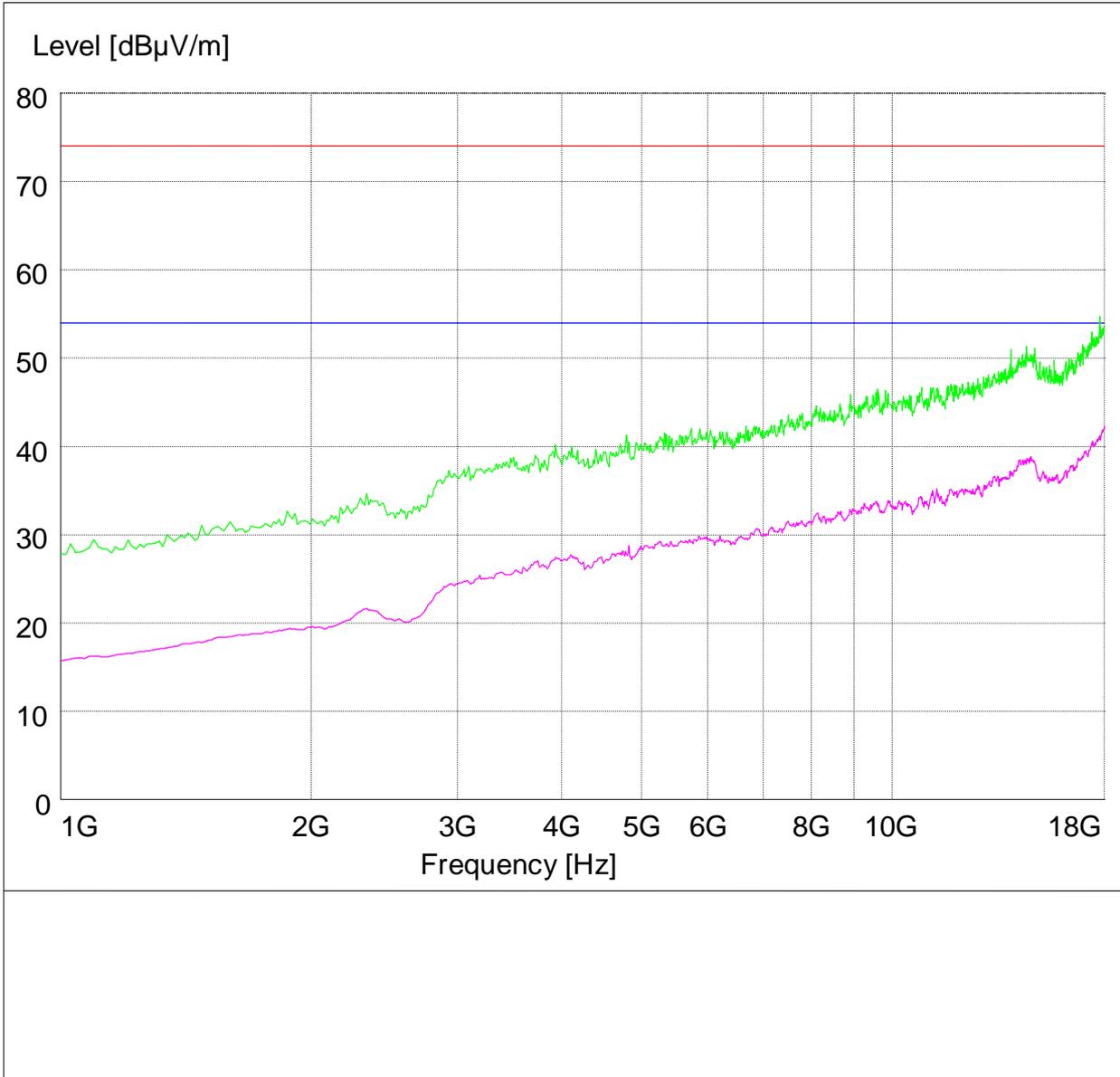
Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	41.20	33.5	54.0	12.8	200.0	348.00	VERTICAL
2483.500000	45.50	33.7	54.0	8.5	100.0	55.00	VERTICAL



3.3

Part 4: Testing Range of “3 GHz to 18 GHz”

- Note 1: The test results and plot for testing range of “30 MHz to 1 GHz” showed as below is **the WORST case for all Test Modes and Channels**. This range will not be presented for each Test Mode and each Channel.
- Note 2: The testing range of “3 GHz to 18 GHz” is for checking radiated emissions located in restricted bands faraway from the EUT operating bands.
- Note 3: Two limits are required in the testing range above 1 GHz, that is Peak limit (74 dB μ V/m) and Average Limit (54 dB μ V/m).



The END



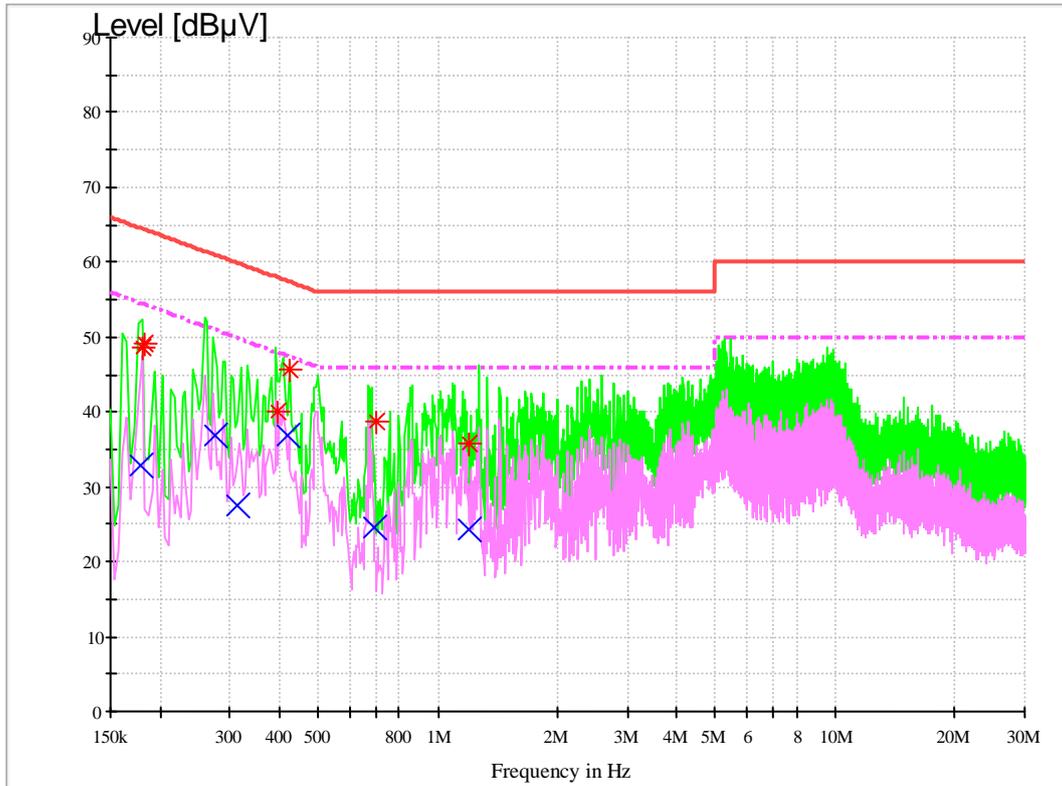
Appendix G

Conducted Emission at Power Port

According to FCC Part 15.207



Channel 6



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transducer dB	Limit dBµV	Margin dB	Line	PE
0.181416	48.7	9.7	64.4	15.7	L1	FLO
0.182224	49.1	9.7	64.4	15.3	L1	FLO
0.396086	40.0	9.7	57.9	17.9	N	FLO
0.424170	45.6	9.7	57.4	11.8	L1	FLO
0.698502	38.7	9.7	56.0	17.3	L1	FLO
1.191660	35.8	9.7	56.0	20.2	N	FLO



MEASUREMENT RESULT: AV Detector

Frequency	Level	Transducer	Limit	Margin	Line	PE
MHz	dB μ V	dB	dB μ V	dB		
0.177835	32.9	9.7	54.6	21.7	L1	FLO
0.274226	36.8	9.7	51.0	14.2	L1	FLO
0.311374	27.5	9.7	49.9	22.4	N	FLO
0.418328	36.8	9.7	47.5	10.7	L1	FLO
0.695392	24.7	9.7	46.0	21.3	L1	FLO
1.199805	24.4	9.7	46.0	21.6	N	FLO

The END