



# **FCC RF Test Report**

**Product Name: HUAWEI IDEOS X3;  
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with  
Bluetooth; IDEOS X3**

**Model Number: HUAWEI U8510-5,U8510-5**

**Report No: SYBH(Z-RF)005092011-2005  
FCC ID: QISU8510-5**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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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

<b>FCC Measurement Specification</b>	<b>Description</b>	<b>Result</b>
15.247 (a) (2)	Bndwidth 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

HUAWEI U8510-5,U8510-5 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band II and Band V. The GSM/GPRS/EDGE frequency band includes GSM850 and DCS1800 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

**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:

Table 2 Service and Test mode List

Service Name	mode	Characteristic	Corresponding Test Mode	Note
Data	DSSS	Modulation: QPSK	TM1	
Data	OFDM	Modulation: 64QAM	TM2	
Data	OFDM	Modulation: 64QAM 16QAM,BPSK,QPSK	TM3	

### 2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

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

**Sep.04, 2011 –Sep.06, 2011**

#### **3.2 General Set up Description**

The WLAN digitally modulated systems of the EUT can Support 2.4GHz Band. For compliance with FCC regulation 47CFR part15 subpart C, we set the EUT as following test modes to do all compliance tests.

##### **WLAN MODE:**

**TM1:** DSSS mode ,QPSK Modulation,11Mbps data rate

**TM2:** OFDM mode,64QAM Modulation,54 Mbps data rate

**TM3:** OFDM mode,64QAM Modulation,65 Mbps data rate



## 4 Product Description

### 4.1 Technical Characteristics

#### 4.1.1 Frequency Range

Table 4 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 5 Channel Spacing / raster

Channel spacing:	22 MHz
Channel raster:	5 MHz

#### 4.1.3 Antenna Information

Table 6 Antenna Information

Type:	Integrated / Internal
Maximum Gain(dBi):	-1.7 (from 2400MHz to 2500MHz)



#### 4.1.4 Environmental Requirements

Table 7 Environmental Requirements

Minimum temperature:	- 10 °C
Maximum temperature:	+ 55 °C
Relative Humidity:	5%-95%

#### 4.1.5 Power Source

Table 8 Power Source

AC voltage nominal:	~120V
AC voltage range	~100V-240V
AC current maximal:	0.2A

#### 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.

#### 4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8).

The voltage and current in the final RF stage is:

Table 9 Applied RF module DC Voltages and Currents

Voltage:	 +3.7V
Current:	100mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)



## 4.2 EUT Identification List

### 4.2.1 Board Information

Table 10 Board Information

HUAWEI IDEOS X3; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X3		
HUAWEI U8510-5,U8510-5		
Main board		
Hardware Version	Software Version	Serial Number
HD2U851M	U8510-5V100R001C32B831	E5M7NB1180200089

### 4.2.2 Adapter Technical Data

AC/DCAdapter Model	HW-050100U1W
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V  1A
Rated Power	5W

### 4.2.3 Battery Technical Data

Name	Manufacture	Description
Rechargeable Li-ion	Huawei Technologies Co., Ltd.	Battery Model: HB4J1H Rated capacity: 1200mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

### 4.2.4 FCC Identification

Grantee Code: QIS  
 Product Code: U8510-5  
 FCC Identification: QISU8510-5



## 5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sep.27,2011
Universal Radio Communication Tester	R&S	CMU200	105822	Oct.24,2011
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug.04,2012
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr.24,2012
Signal Analyzer	R&S	FSQ40	100025	Oct.09,2011
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2011
Temperature Chamber	ESPEC	MW3030	611403	May.12,2012
Signal Generator	R&S	SMR40	100325	May.12,2012
Vector Signal Generator	R&S	SMU200A	104162	Sep.07,2012
Spectrum Analyzer	R&S	FSU26	EG26725	Mar.07,2012
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec.13.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec.13.2011
Horn Antenna	R & S	HF906	359287/005	May.07, 2012
Horn Antenna	R & S	HF906	359287/006	April.27, 2012
Broadband Antenna	SCHAFFNER	CBL 6112B	2536	Sep.21, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	Jun.11, 2012
Test receiver	R&S	ESU26	36090302083	Jun.17.2012
Horn Antenna	ETS-LINDGREN	3160	60008	Sep.20.2011
Horn Antenna	ETS-LINDGREN	3160	60006	Oct.27.2011



## 6 Transmitter Measurements

### 6.1 Bandwidth measurement

#### 6.1.1 Test Conditions

Table 12 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 13 Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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##### 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 14 Limits

Limits	≥ 500kHz
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#### 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 6dB bandwidth with spectrum analyzer.

**Test setup**

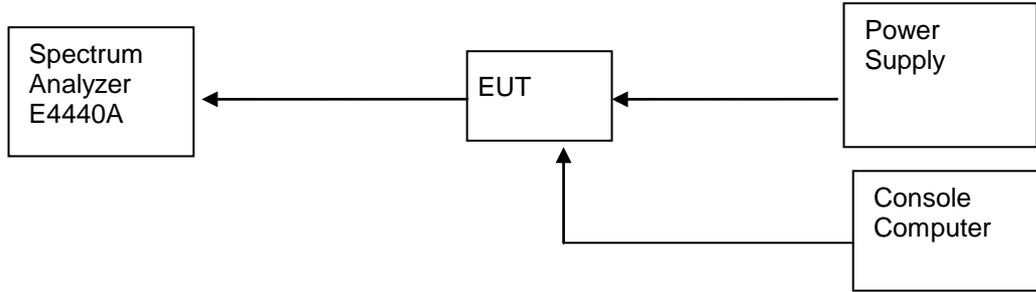


Figure 1. Test Set-up

**6.1.4 Measurement Results**

Table 15 Measurement Results

Test condition	Channel Number	Frequency [GHz]	Bandwidth Type	Measured Bandwidth [MHz]	Result
TM1	1	2.412	6dB Bandwidth	9.177	Pass
			99% Bandwidth	12.547	Pass
	6	2.437	6dB Bandwidth	8.871	Pass
			99% Bandwidth	12.608	Pass
	11	2.462	6dB Bandwidth	12.538	Pass
			99% Bandwidth	9.202	Pass
TM2	1	2.412	6dB Bandwidth	16.307	Pass
			99% Bandwidth	16.425	Pass
	6	2.437	6dB Bandwidth	16.233	Pass
			99% Bandwidth	16.398	Pass
	11	2.462	6dB Bandwidth	16.253	Pass
			99% Bandwidth	16.456	Pass
TM3	1	2.412	6dB Bandwidth	17.197	Pass
			99% Bandwidth	17.605	Pass
	6	2.437	6dB Bandwidth	17.143	Pass
			99% Bandwidth	17.586	Pass
	11	2.462	6dB Bandwidth	17.496	Pass
			99% Bandwidth	17.621	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 16 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 17 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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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 18 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

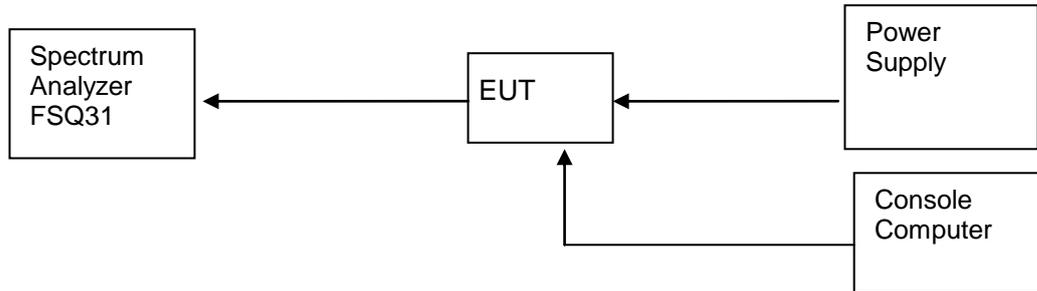


Figure 2. Test Set-up

## 6.2.4 Measurement Results

Table 19 Measurement Results

Test condition	Channel	Channel No.	Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
TM1	Bottom	1	2412	16.19	< 30	Pass
	Middle	6	2437	15.99	< 30	Pass
	Top	11	2462	15.61	< 30	Pass
TM2	Bottom	1	2412	14.14	< 30	Pass
	Middle	6	2437	13.74	< 30	Pass
	Top	11	2462	13.49	< 30	Pass
TM3	Bottom	1	2412	11.14	< 30	Pass
	Middle	6	2437	11.11	< 30	Pass
	Top	11	2462	10.90	< 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 20 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 21 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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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 22 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

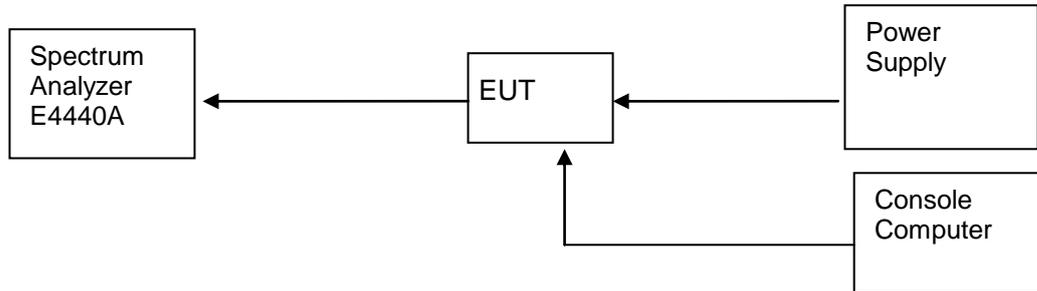


Figure 3. Test Set-up

## 6.3.4 Measurement Results

Table 23 Measurement Results

Test condition		Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Result
TM1	Low Edge	1	2412	4.17	-32.45	-15.83	Pass
	High Edge	11	2462	3.57	-39.23	-16.43	Pass
TM2	Low Edge	1	2412	-1.28	-33.80	-21.28	Pass
	High Edge	11	2462	-0.97	-30.52	-20.97	Pass
TM3	Low Edge	1	2412	-3.63	-39.35	-23.63	Pass
	High Edge	11	2462	-4.37	-41.36	-24.37	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 24 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 25 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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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 26 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

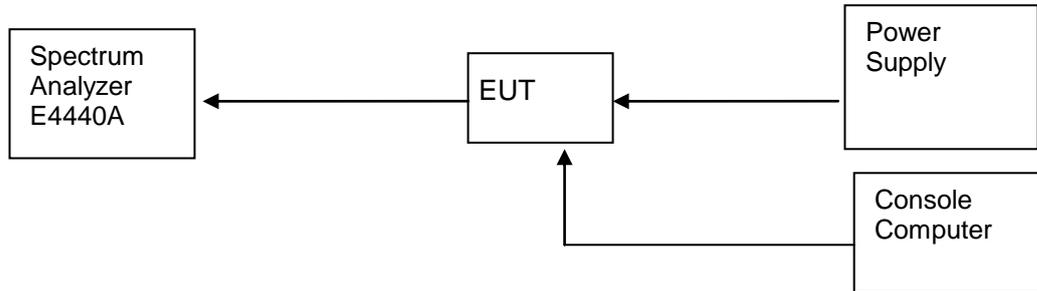


Figure 4. Test Set-up

## 6.4.4 Measurement Results

Table 27 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	9.66	-42.76	-10.34	Pass
	9kHz-26GHz	6	2437	9.51	-42.88	-10.49	Pass
	9kHz-26GHz	11	2462	8.66	-42.47	-11.34	Pass
TM2	9kHz-26GHz	1	2412	5.85	-43.10	-14.15	Pass
	9kHz-26GHz	6	2437	5.29	-42.78	-14.71	Pass
	9kHz-26GHz	11	2462	5.20	-41.27	-14.80	Pass
TM3	9kHz-26GHz	1	2412	1.66	-42.89	-18.34	Pass
	9kHz-26GHz	6	2437	-0.44	-42.44	-20.44	Pass
	9kHz-26GHz	11	2462	-0.17	-42.00	-20.17	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 28 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 29 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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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 30 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

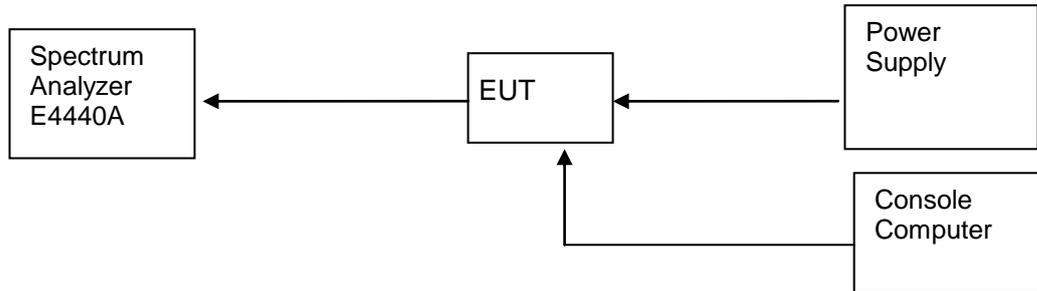


Figure 5. Test Set-up

## 6.5.4 Measurement Results

Table 31 Measurement Results

Test condition	Channel No.	Carrier Frequency [MHz]	Measured Power spectral density [dBm]	Limit [dBm]	Result
TM1	1	2412	-10.06	8	Pass
	6	2437	-10.50	8	Pass
	11	2462	-10.59	8	Pass
TM2	1	2412	-15.18	8	Pass
	6	2437	-15.53	8	Pass
	11	2462	-15.59	8	Pass
TM3	1	2412	-20.35	8	Pass
	6	2437	-20.74	8	Pass
	11	2462	-20.52	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 32 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 33 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
ANSI C63.4: 2003	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 10<sup>th</sup> harmonics of carrier frequency should be meet the requirement of following table.

Table 34 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. 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.

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 – 10<sup>th</sup> Carrier Frequency: 1 MHz

### Test set up

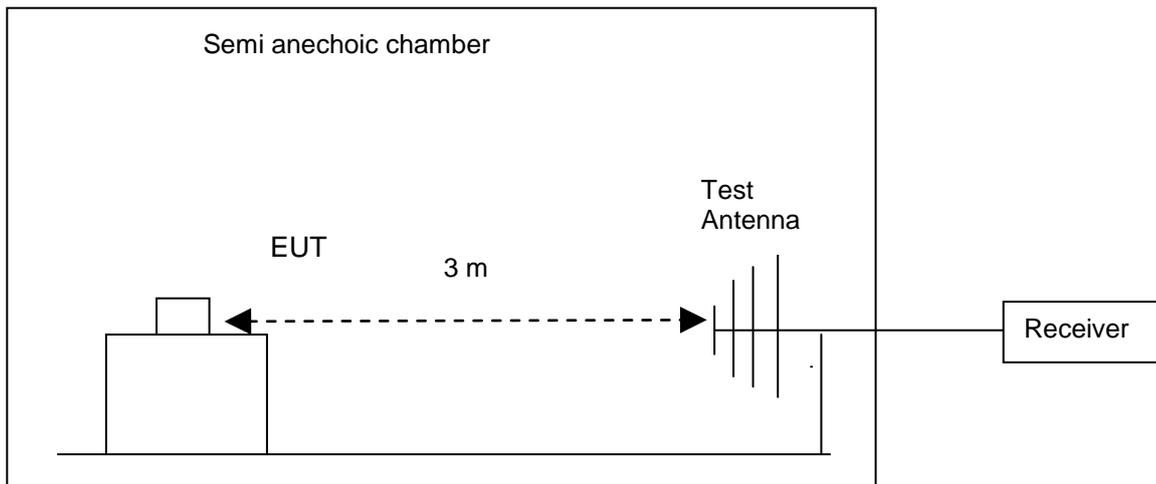


Figure 6. Test Set up

### 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 35 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 36 Supporting Standards:

ANSI C63.4: 2003	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
------------------	--

#### 6.7.2.3 Limits

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

Table 37 Limits

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	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.

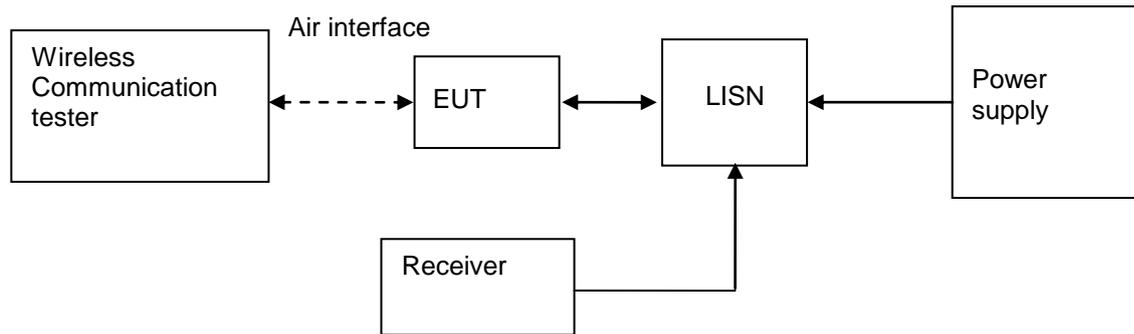


Figure 7. Test Set-up

## 6.7.4 Measurement Results

Table 38 MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.196000	52.20	10.1	64	11.8	N	FLO
0.260000	47.80	10.0	61	13.2	N	FLO
0.780000	45.60	10.1	56	10.4	N	FLO
1.690000	41.80	10.1	56	14.2	N	FLO
2.144000	40.40	10.1	56	15.6	N	FLO
24.130000	31.80	10.4	60	28.2	N	FLO

Table 39 MEASUREMENT RESULT:AV DECTER

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.194000	35.60	10.1	54	18.4	N	FLO
0.324000	35.40	10.0	50	14.6	N	FLO
0.650000	31.80	10.1	46	14.2	N	FLO
1.138000	29.50	10.1	46	16.5	N	FLO
2.166000	29.30	10.1	46	16.7	N	FLO
4.998000	23.10	10.2	46	22.9	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 40 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 $\mu$ V/m)	U=4.1dB; k=2 U=4.1dB; k=2
Conducted emission test for power port	Disturbance Voltage(dB $\mu$ V)	U=3.4dB; k=2



## 8 Appendices

Appendix A	Measurement Results 6dB 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)



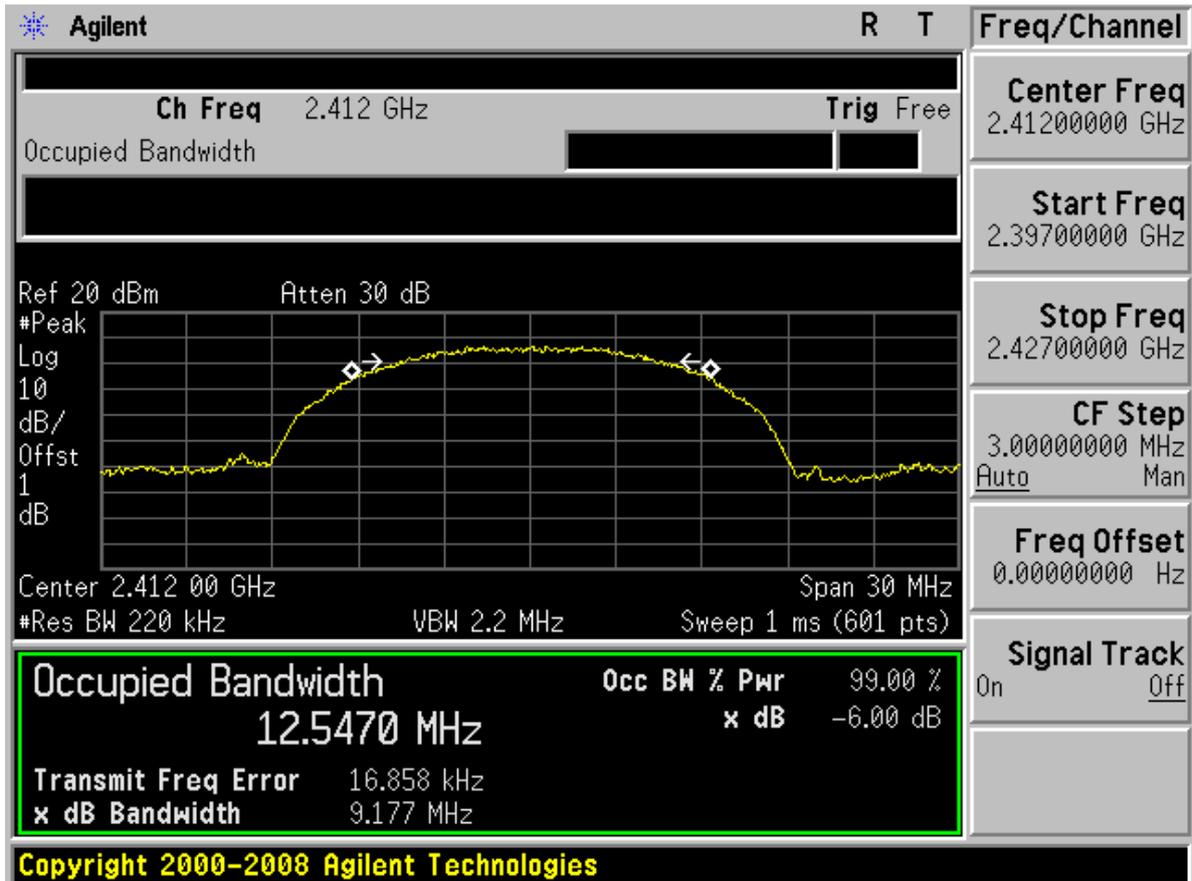
# **Appendix A**

## Bandwidth measurement

According to FCC Part 15.247 (a) (2)

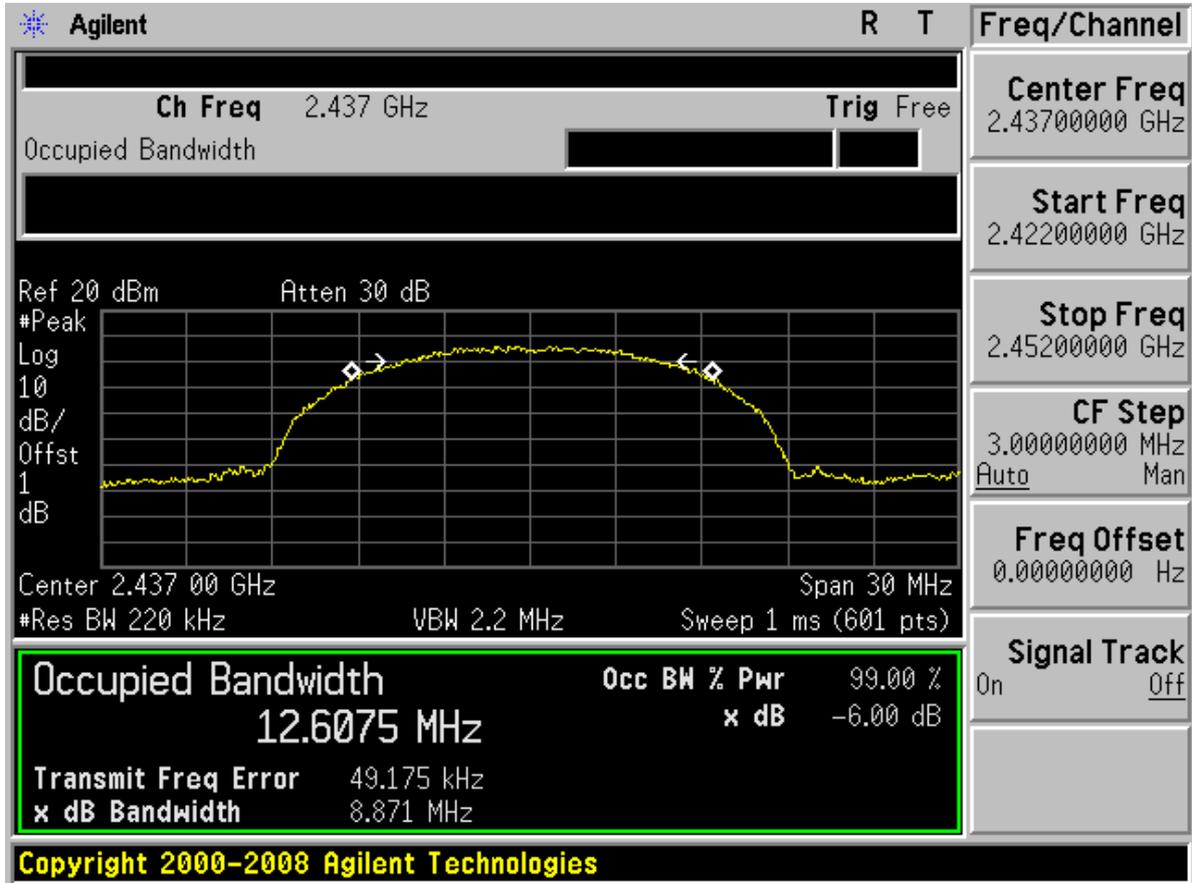


# TM1 Channel 1 (2412MHz)



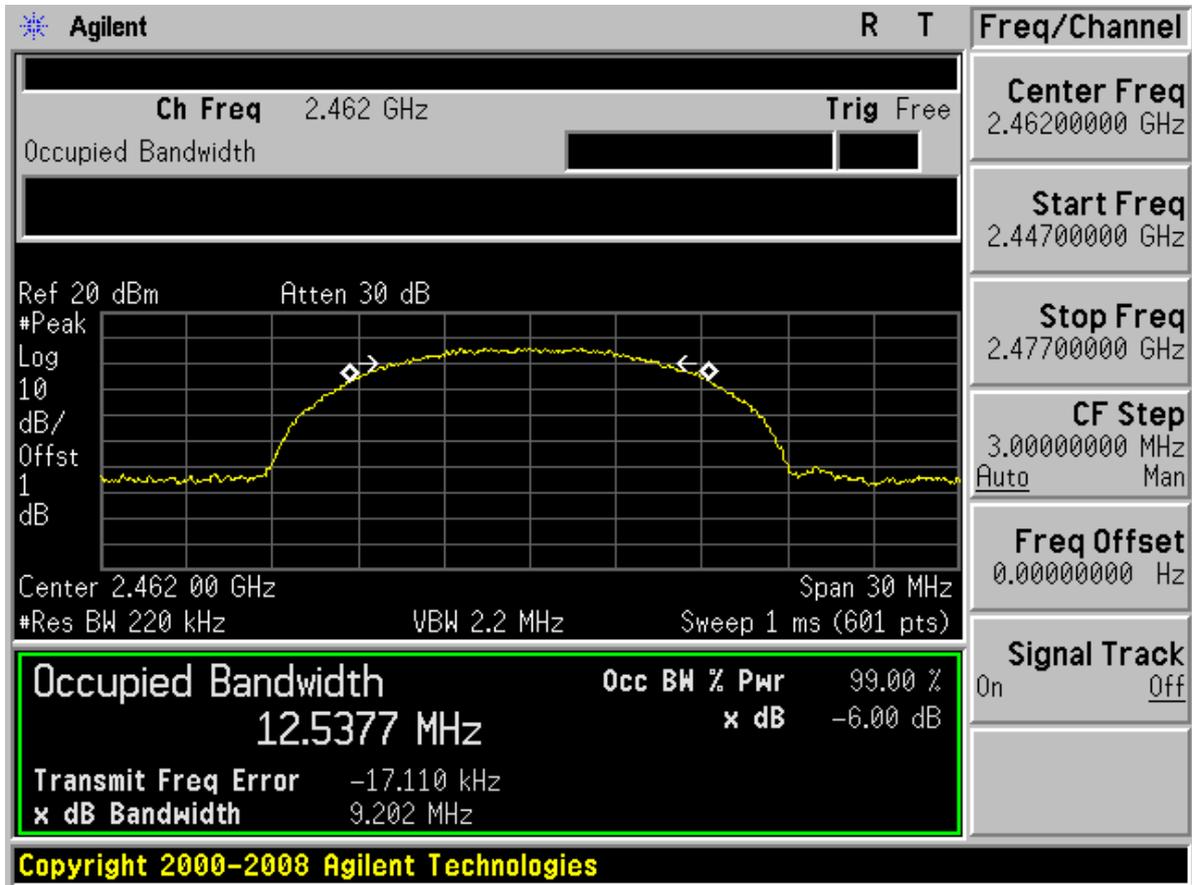


# Channel 6 (2437MHz)



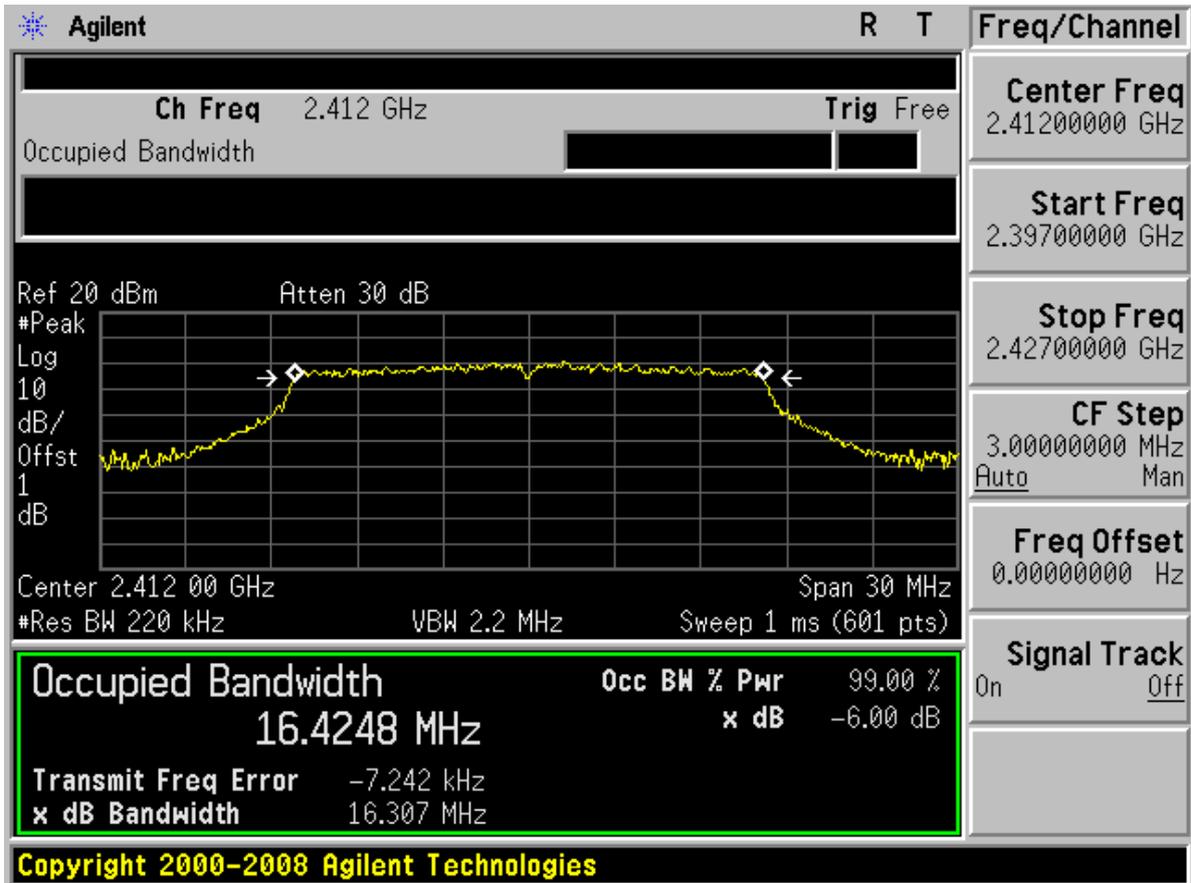


# Channel 11 (2462MHz)



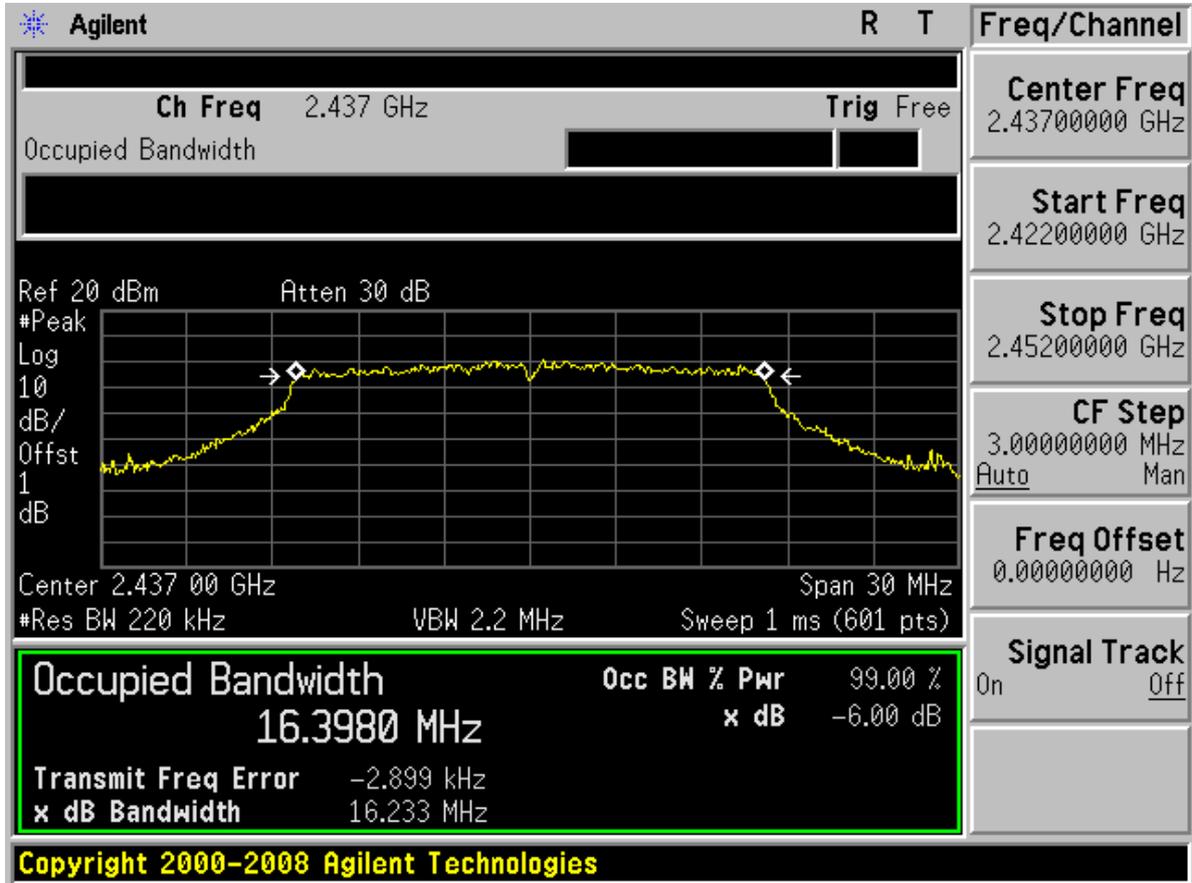


# TM2 Channel 1 (2412MHz)



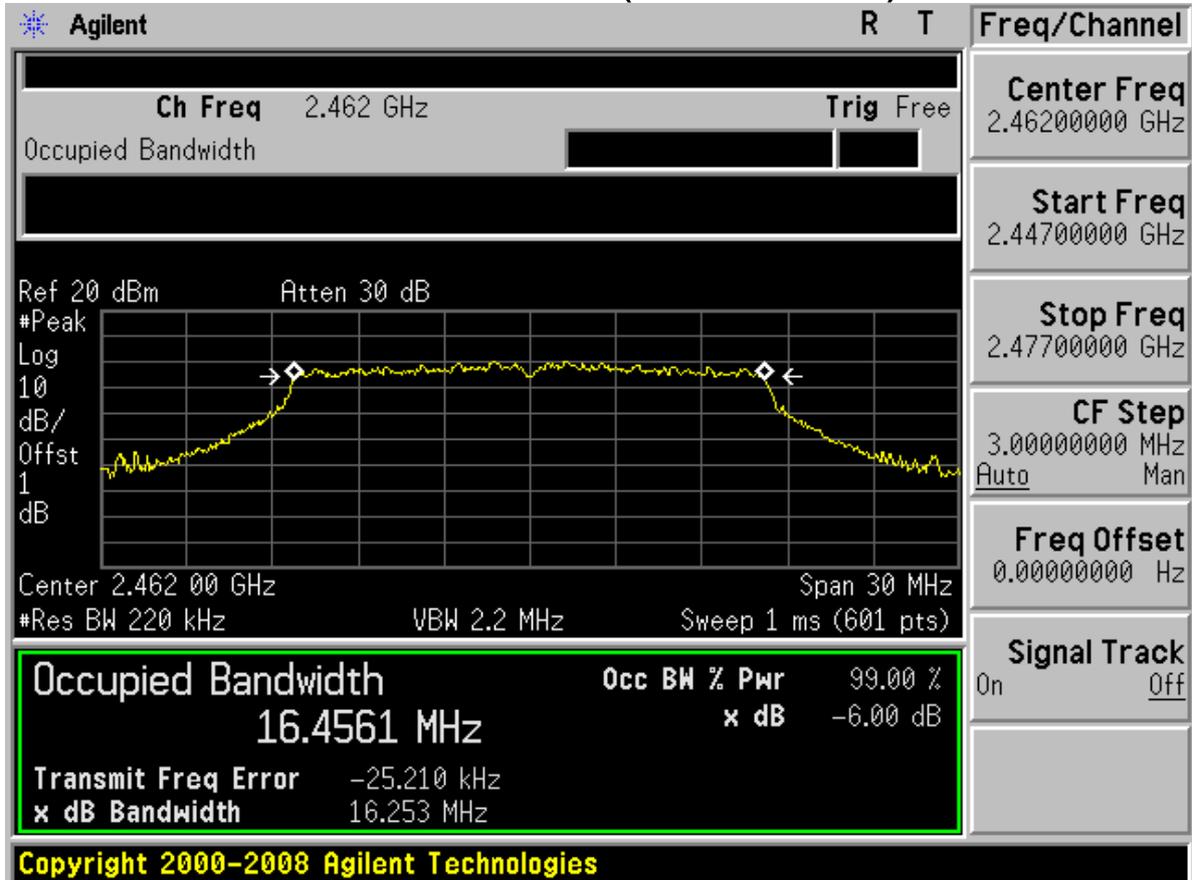


# Channel 6 (2437MHz)



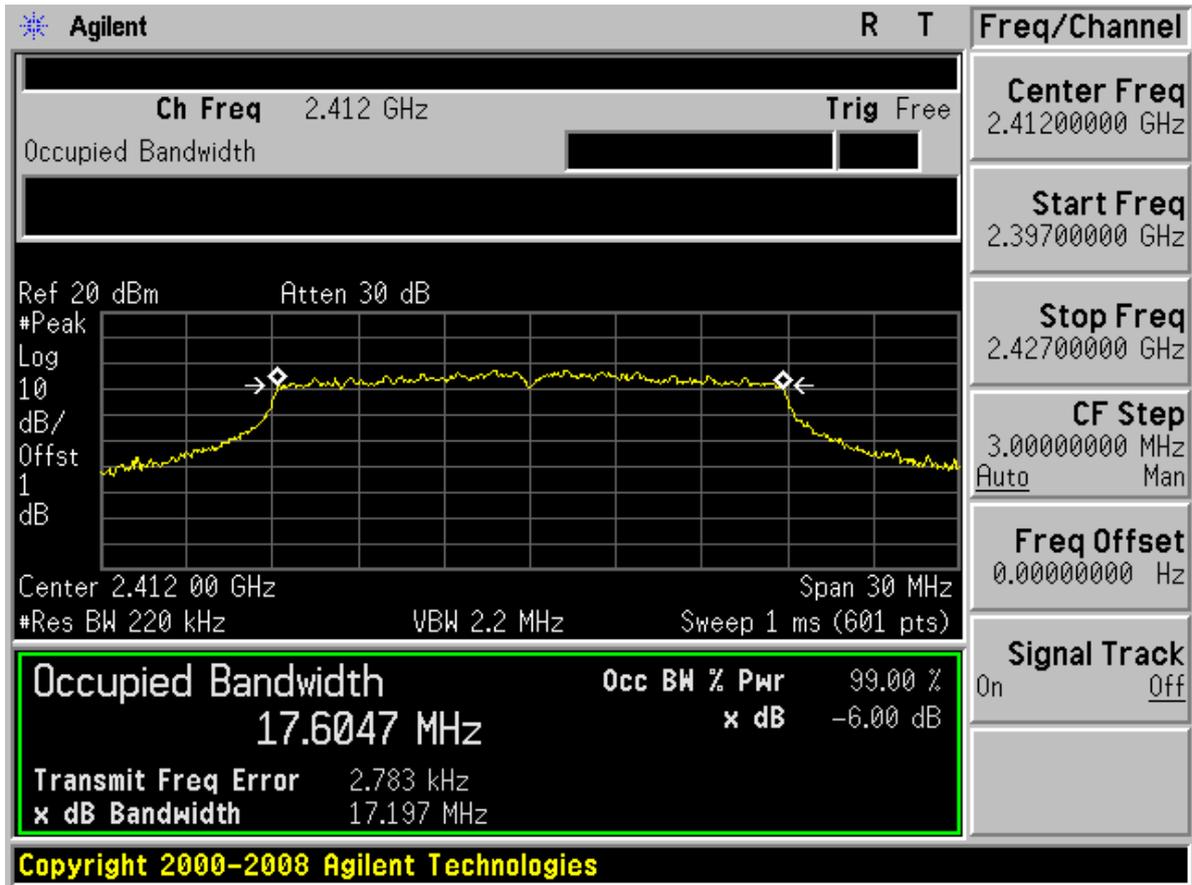


# Channel 11 (2462MHz)





# TM3 Channel 1 (2412MHz)









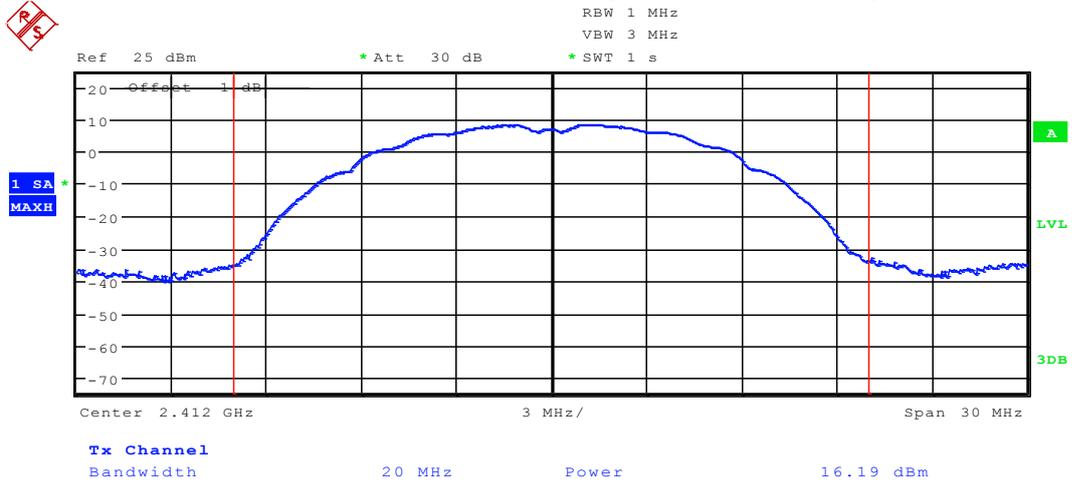
## **Appendix B**

# Conducted Peak output power

According to FCC Part 15.247 (b) (3)

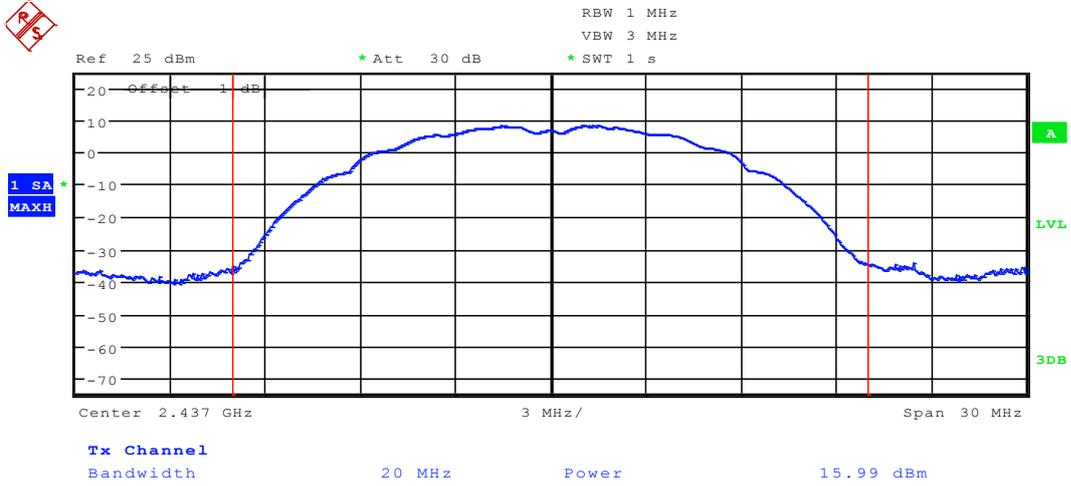


# TM1 Channel 1 (2412MHz)



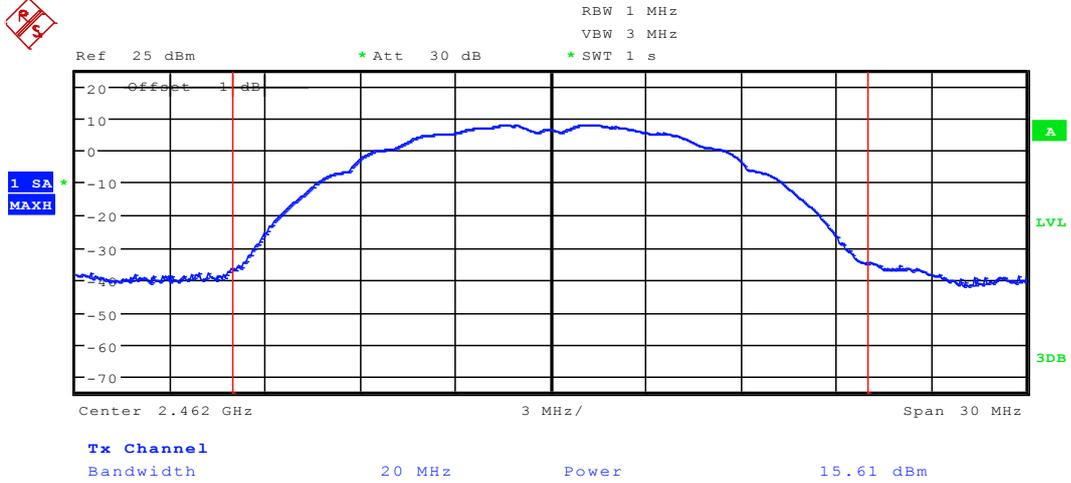


# Channel 6 (2437MHz)



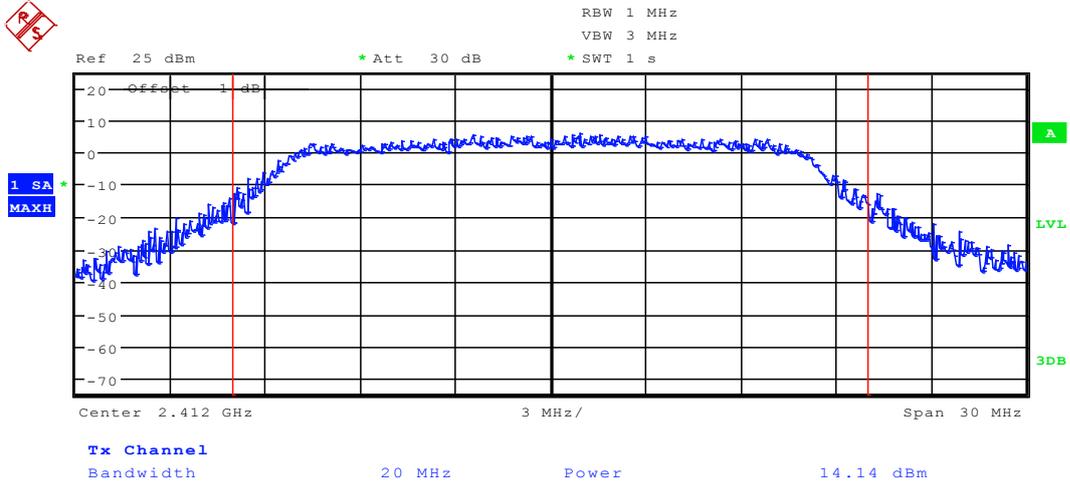


# Channel 11 (2462MHz)



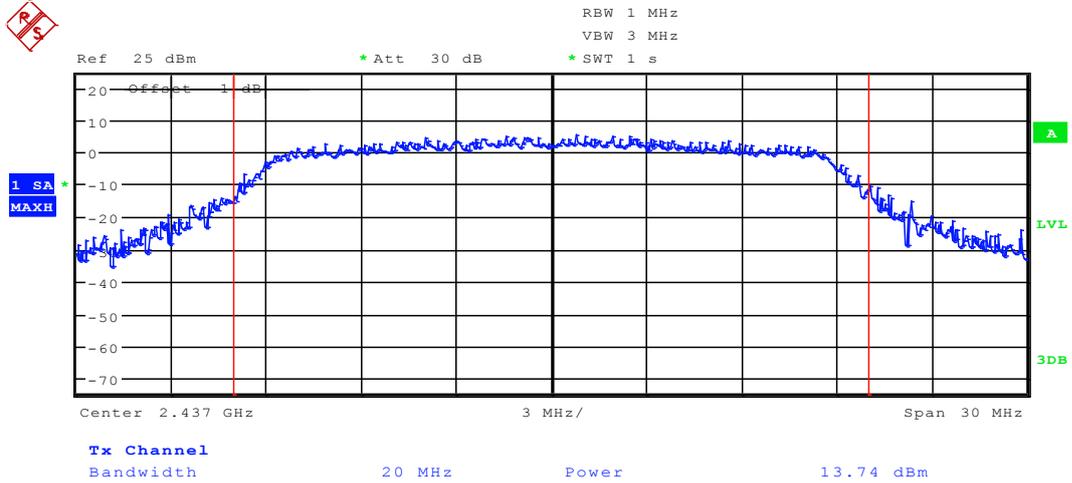


# TM2 Channel 1 (2412MHz)



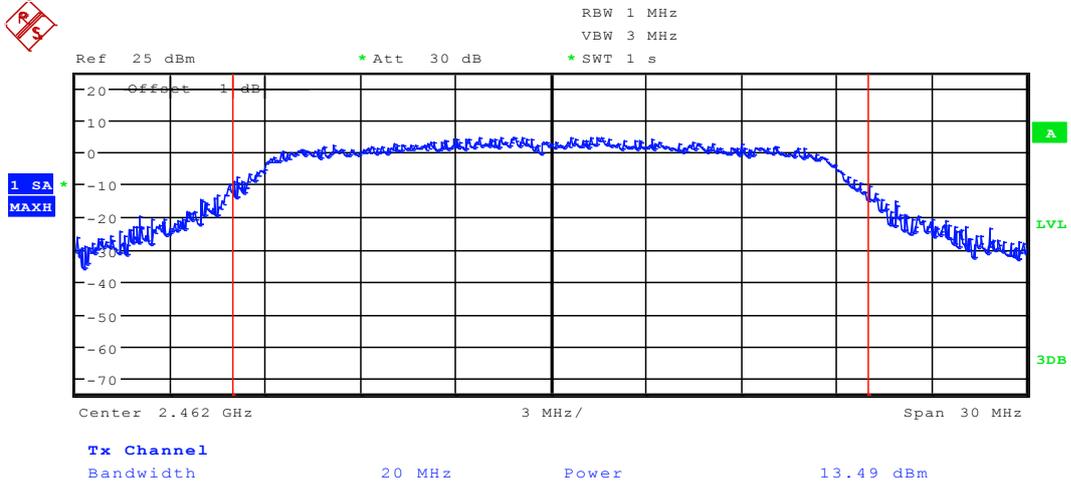


# Channel 6 (2437MHz)



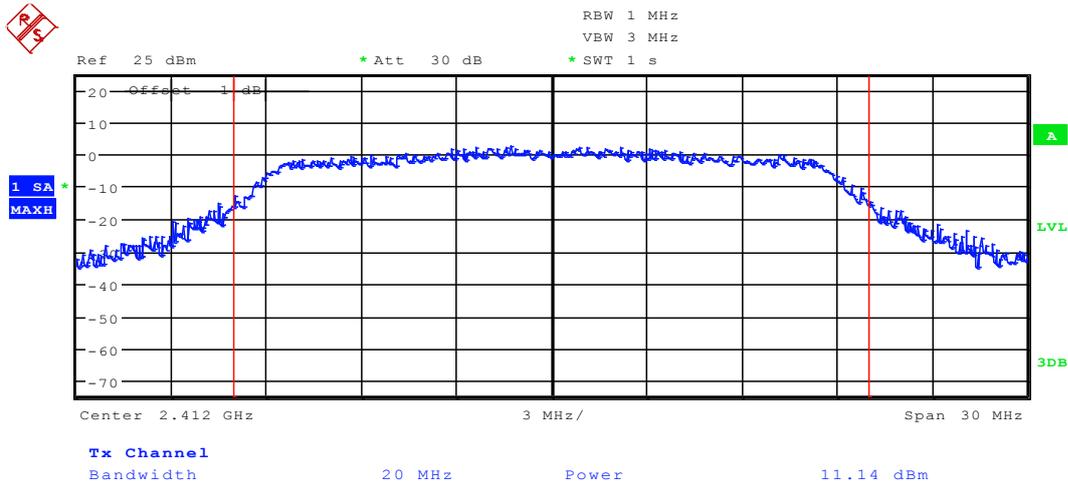


# Channel 11 (2462MHz)



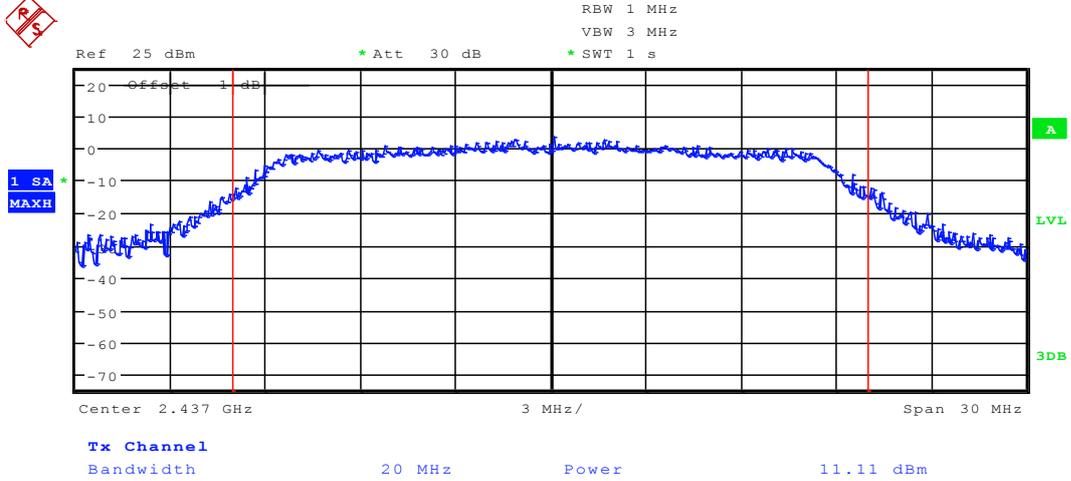


# TM3 Channel 1 (2412MHz)



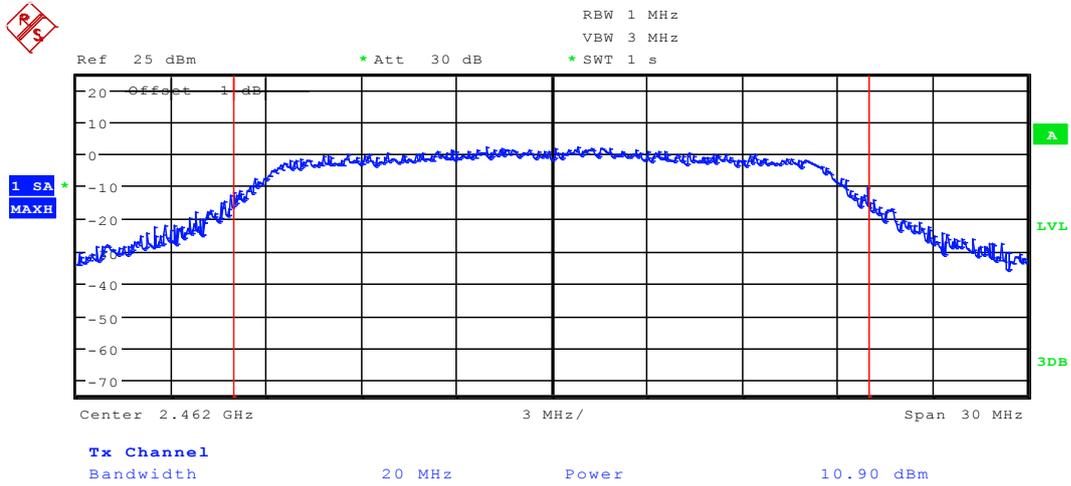


# Channel 6 (2437MHz)





# Channel 11 (2462MHz)





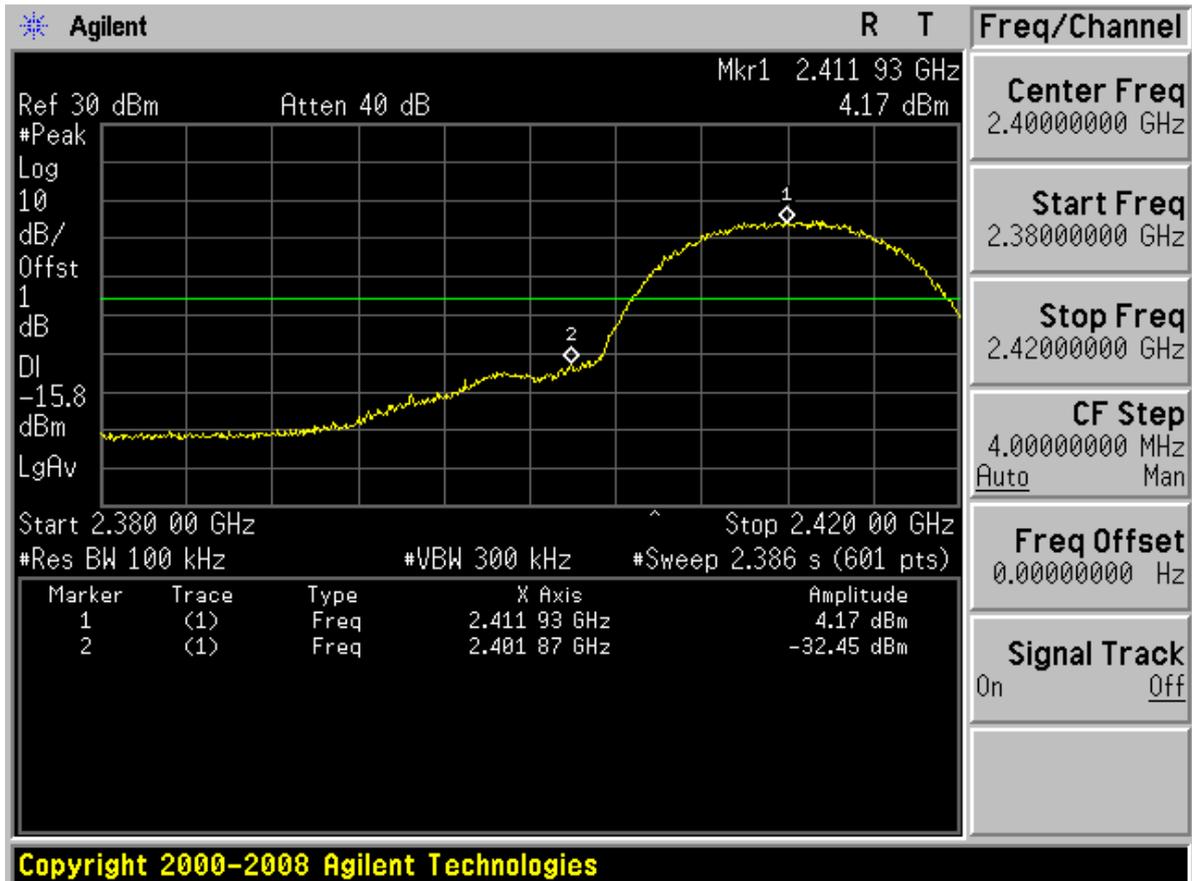
# **Appendix C**

## **Band edge spurious emission**

**According to FCC Part 15.247 (d)**

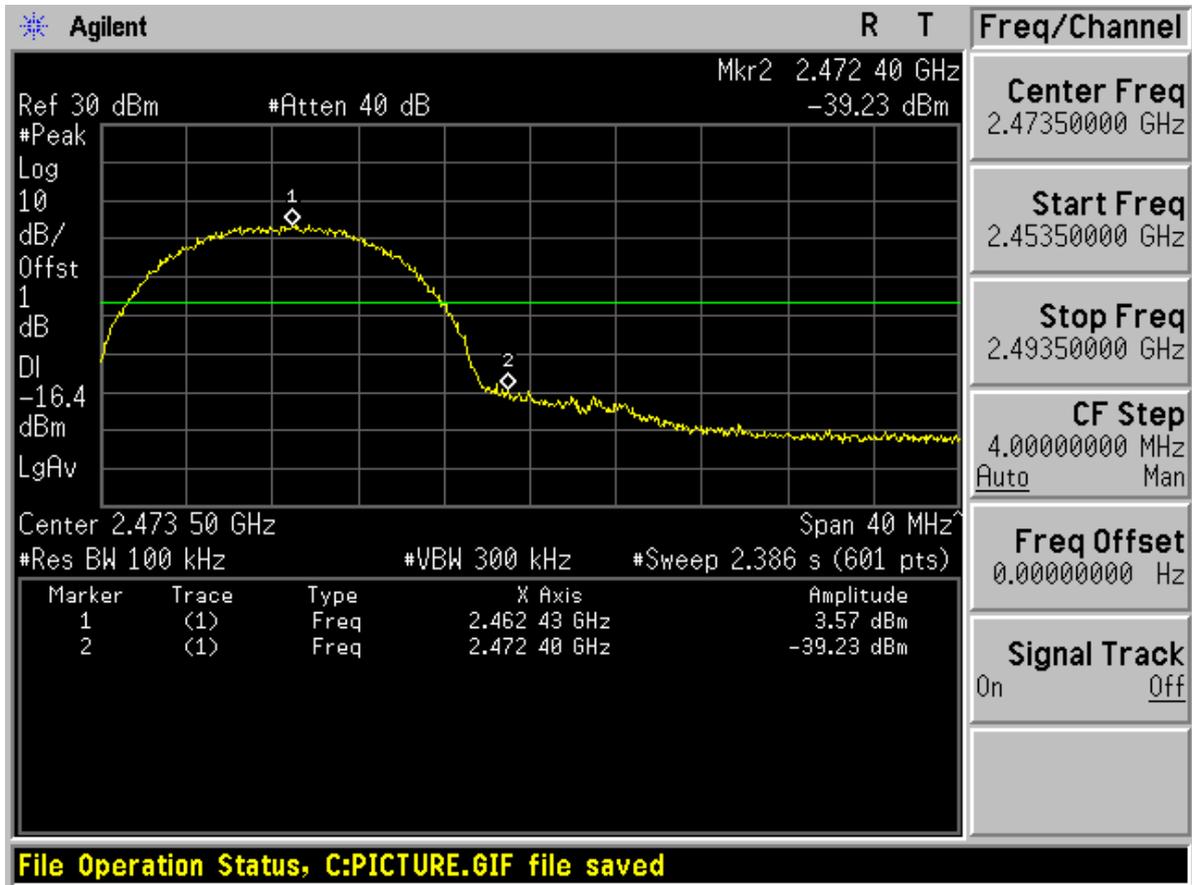


# TM1 Low edge



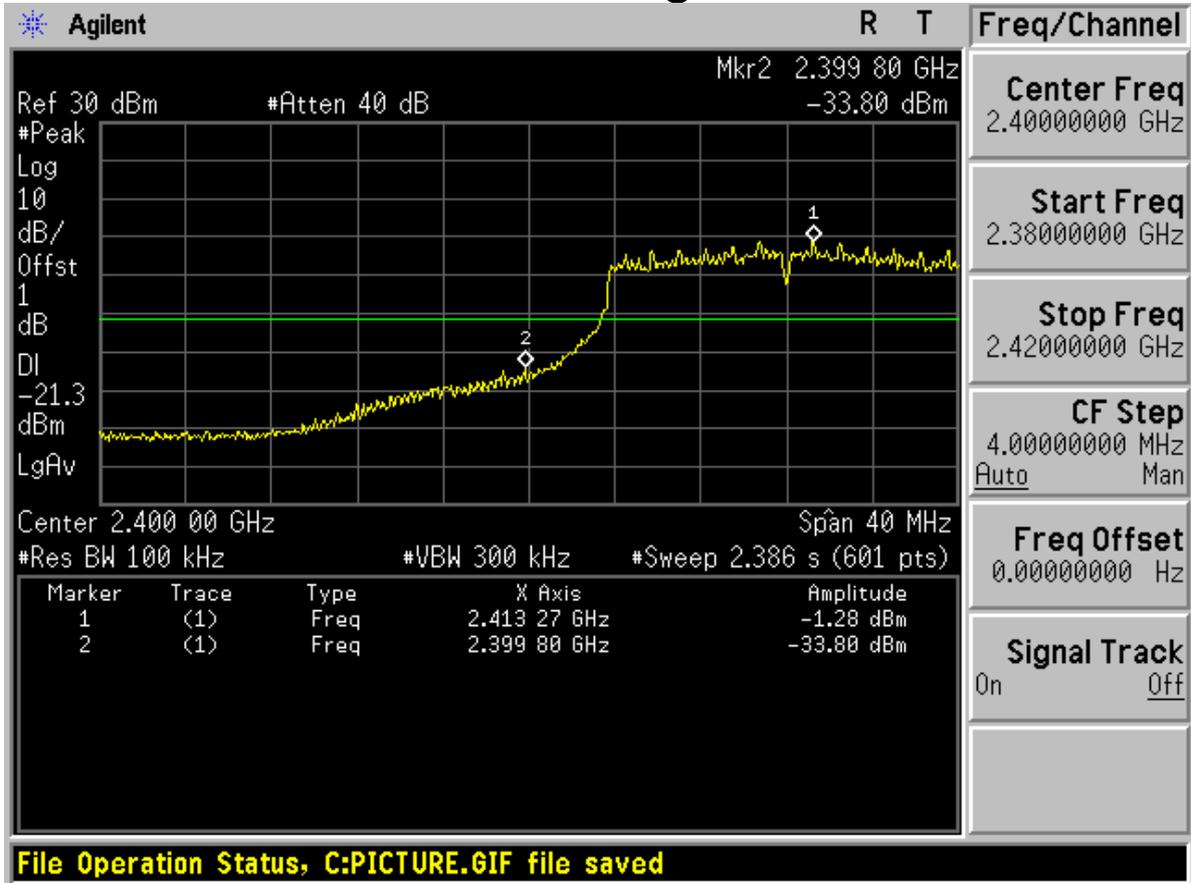


# High edge



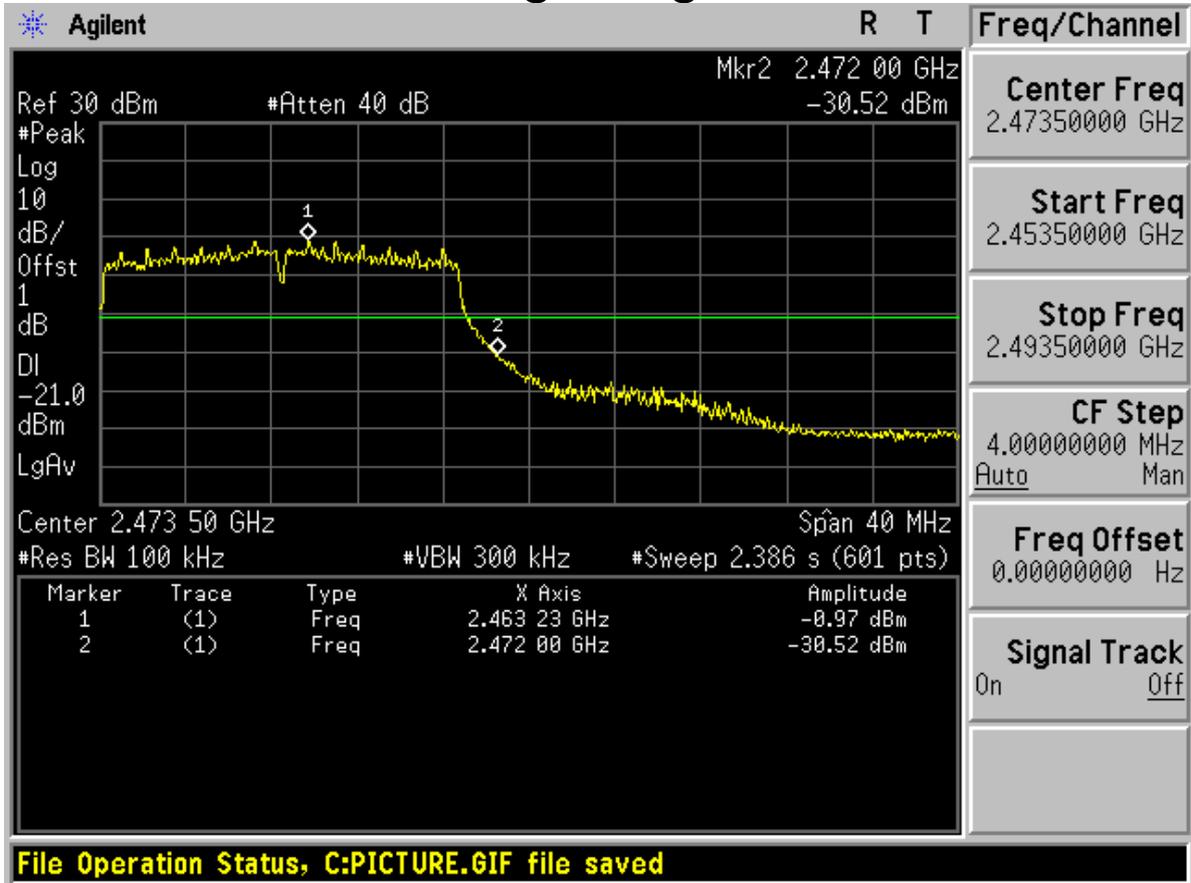


# TM2 Low edge





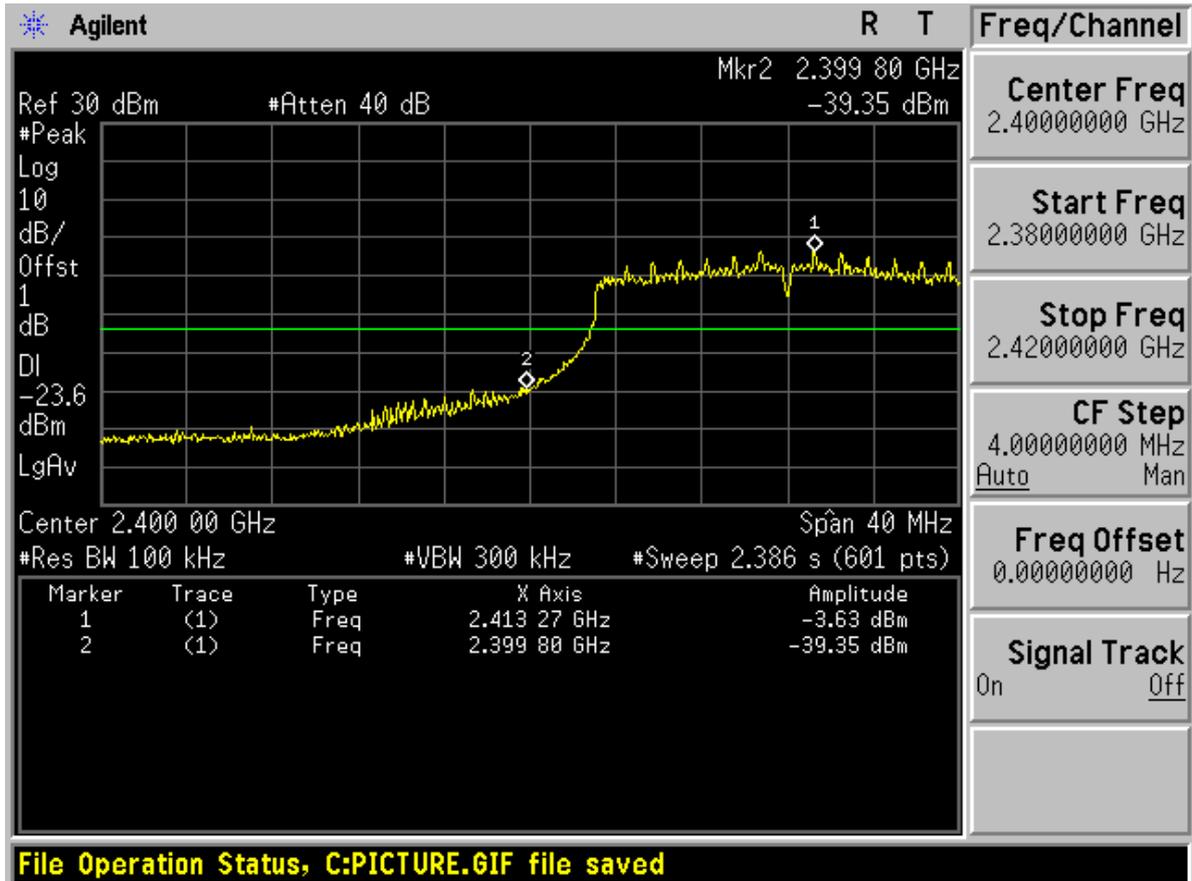
# High edge





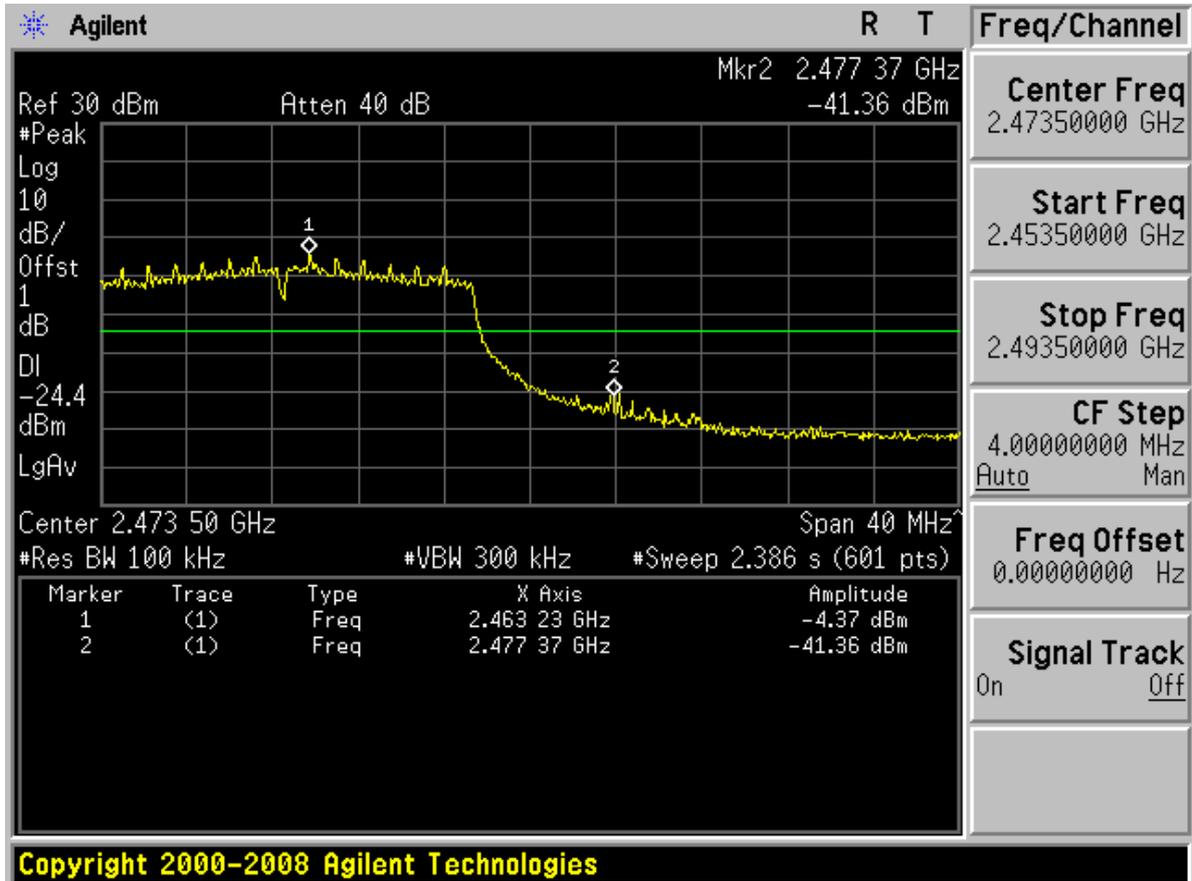
# TM3

## Low edge





# High edge





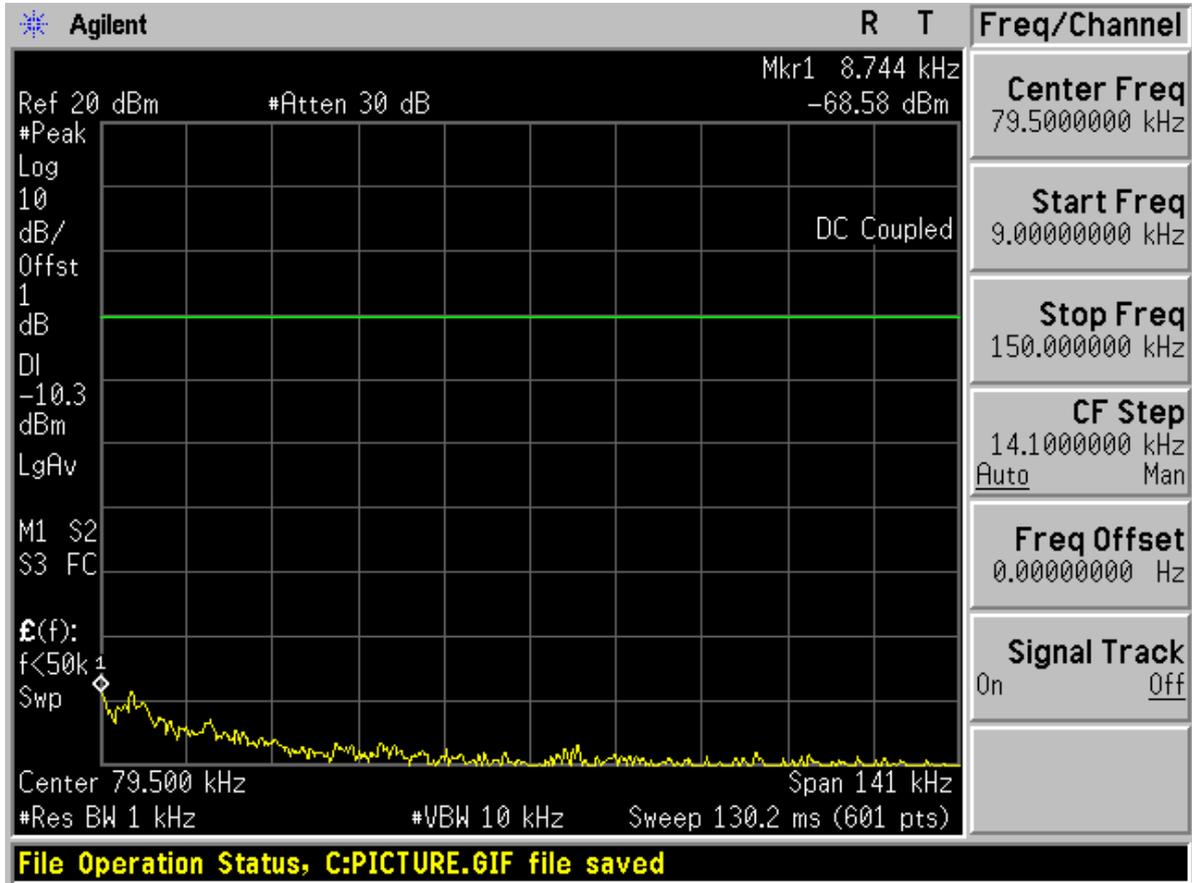
## **Appendix D**

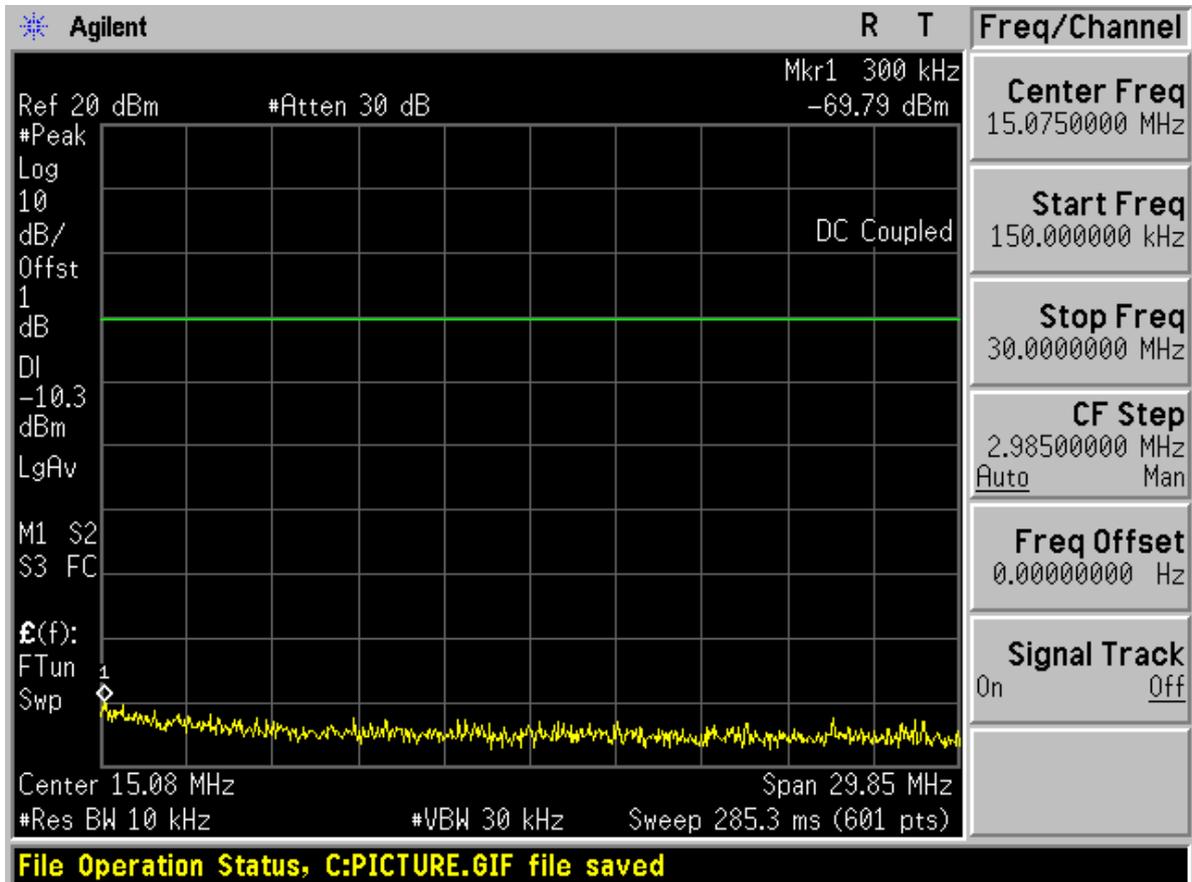
# Conducted RF spurious

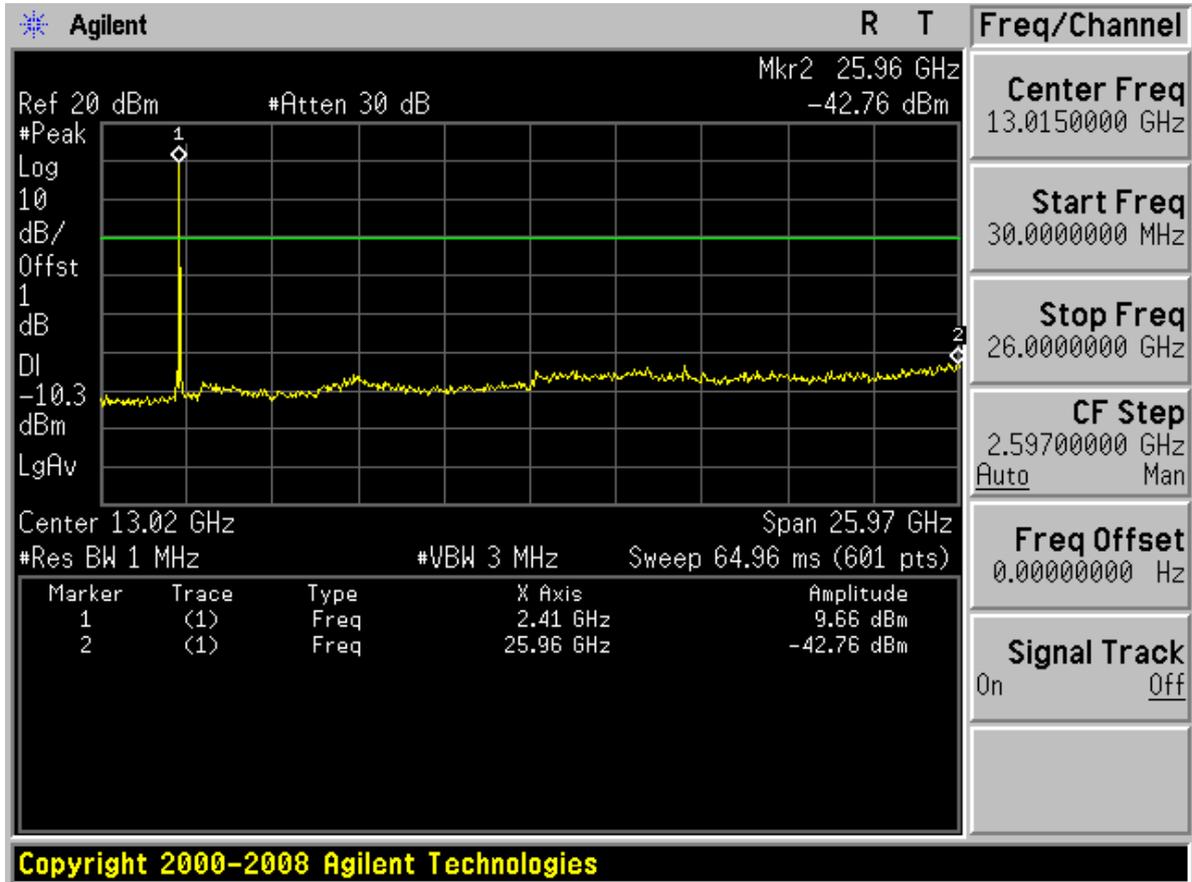
According to FCC Part 15.247 (d)



# TM1 Channel 1

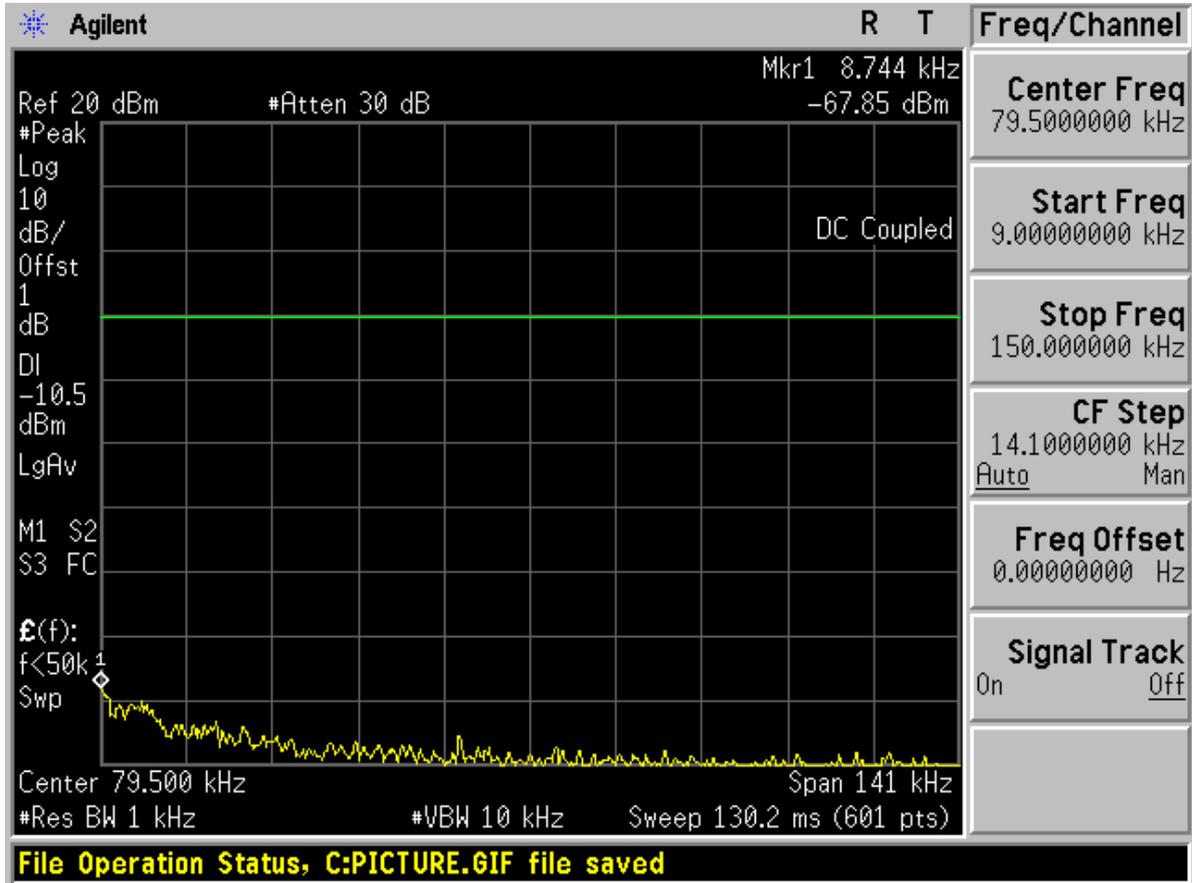


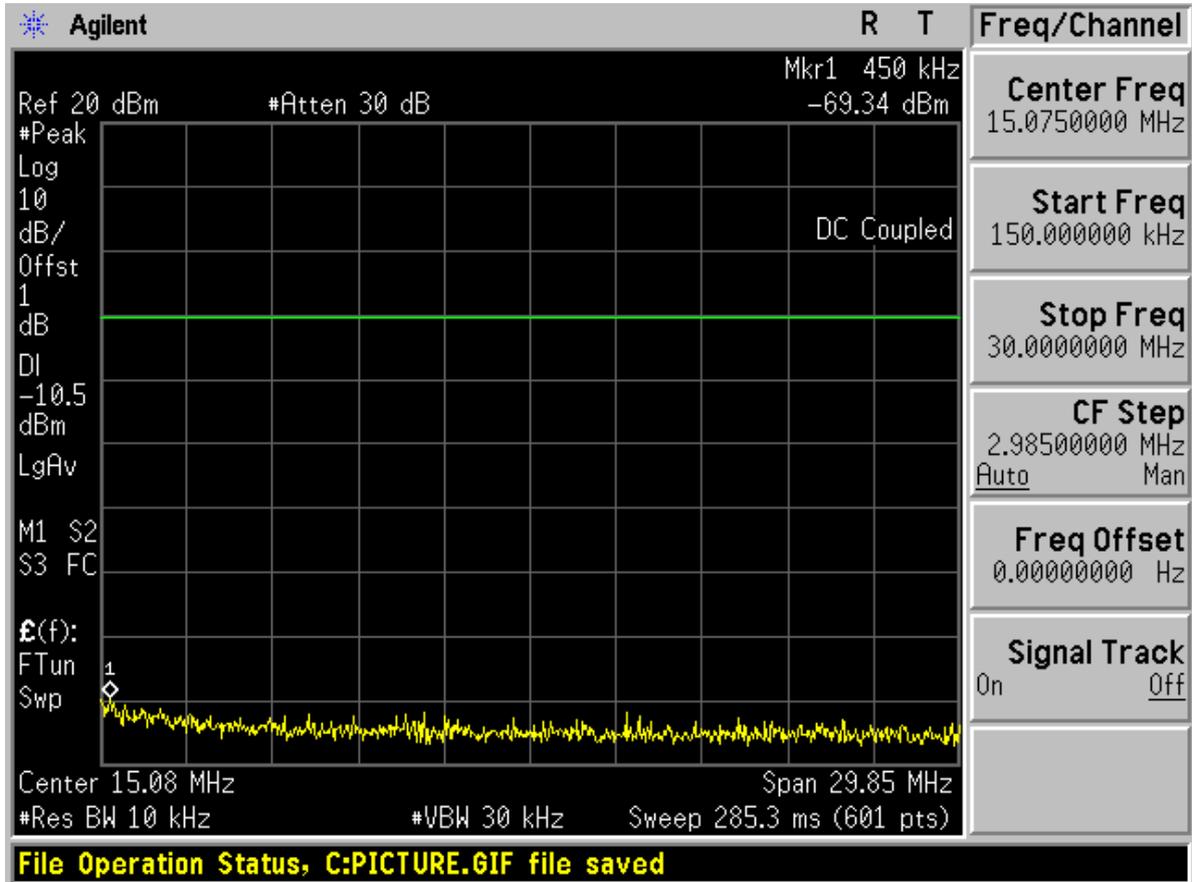


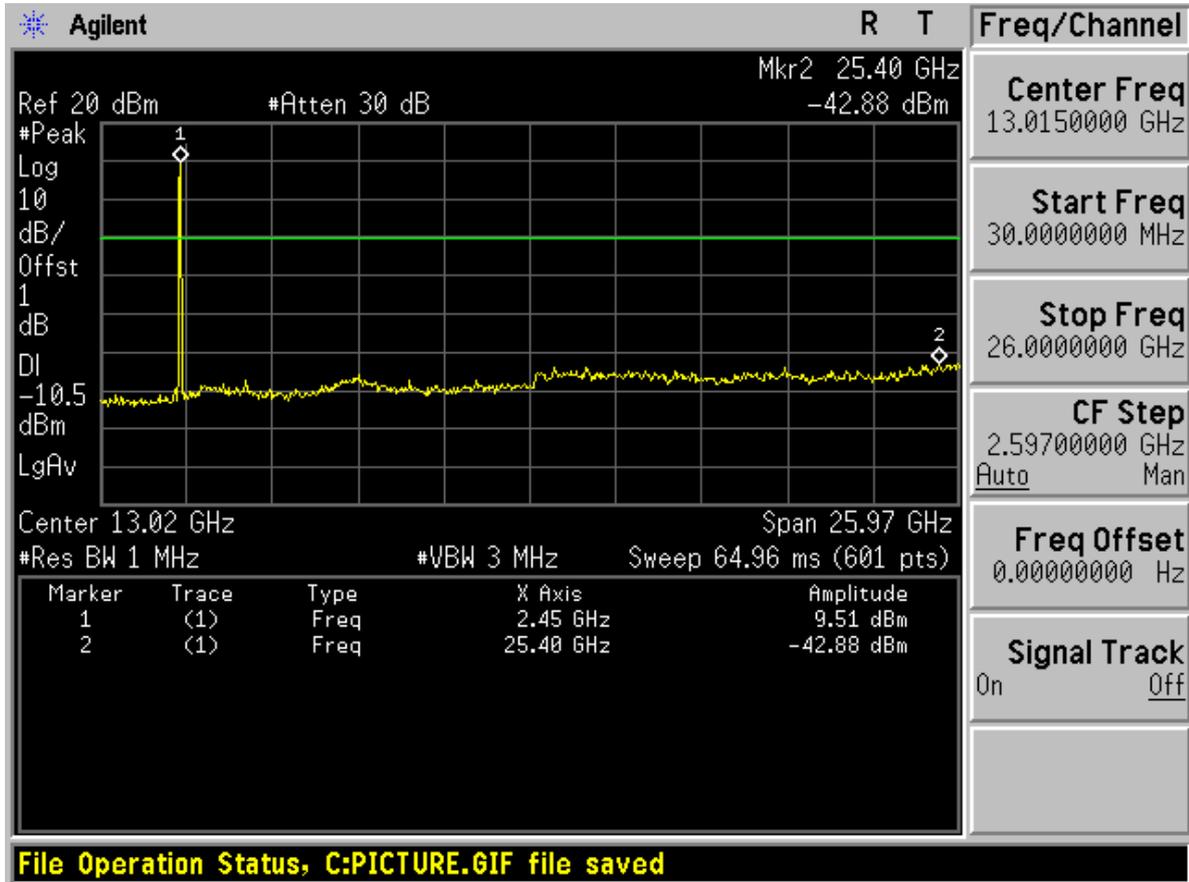




# Channel 6

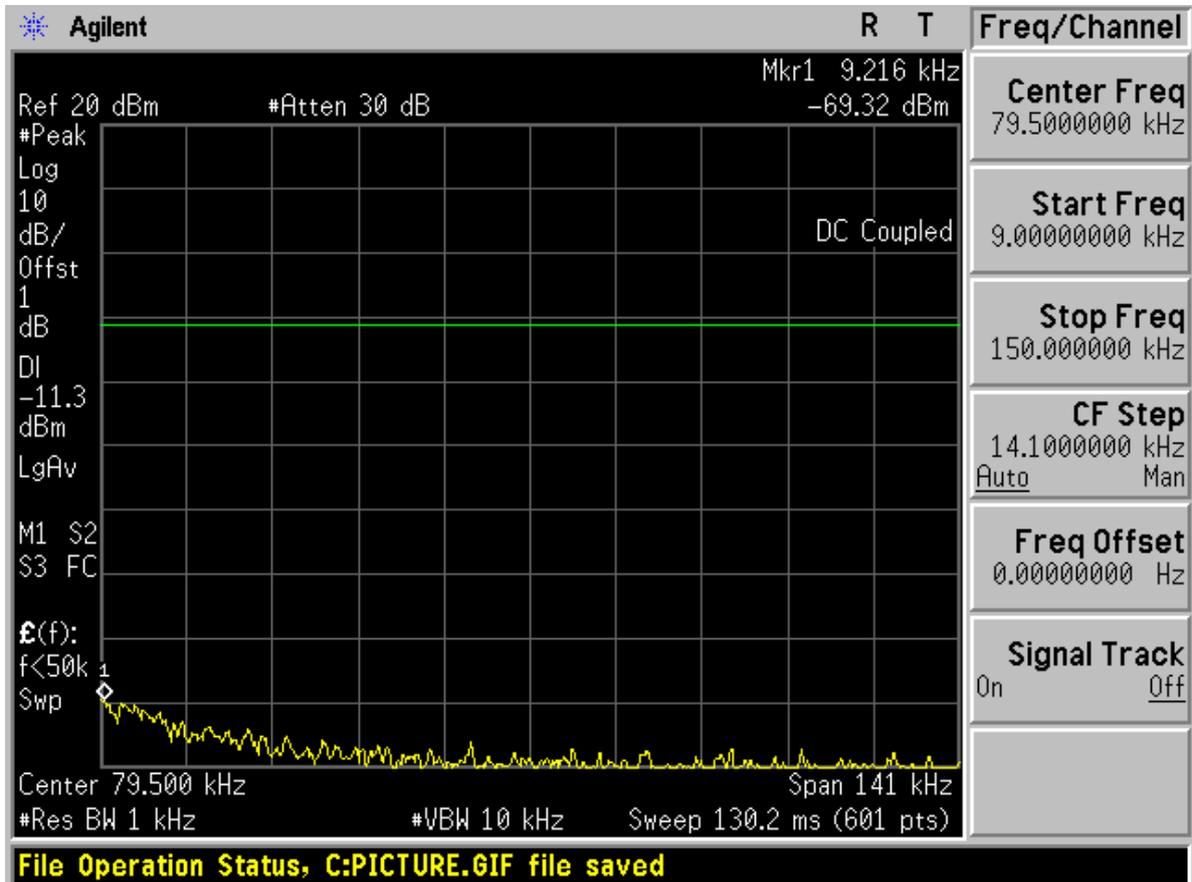


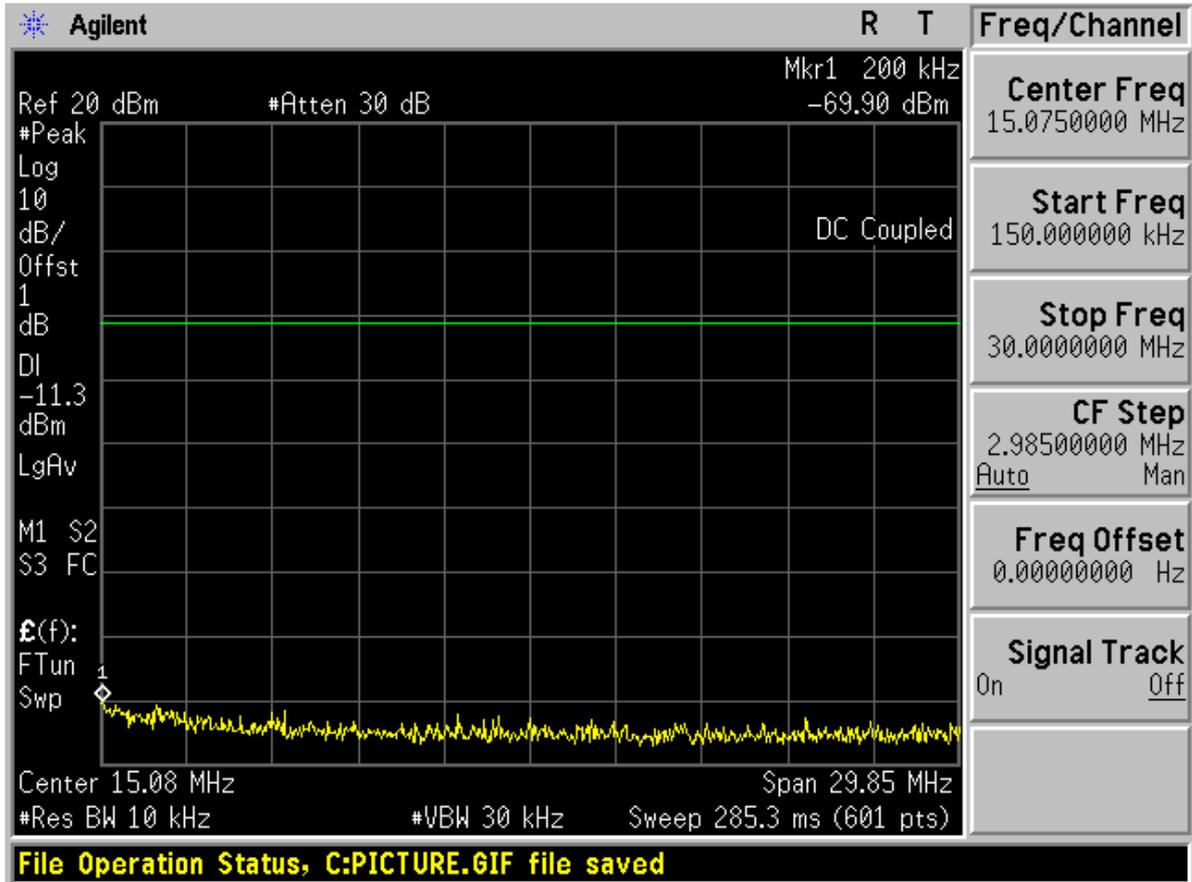


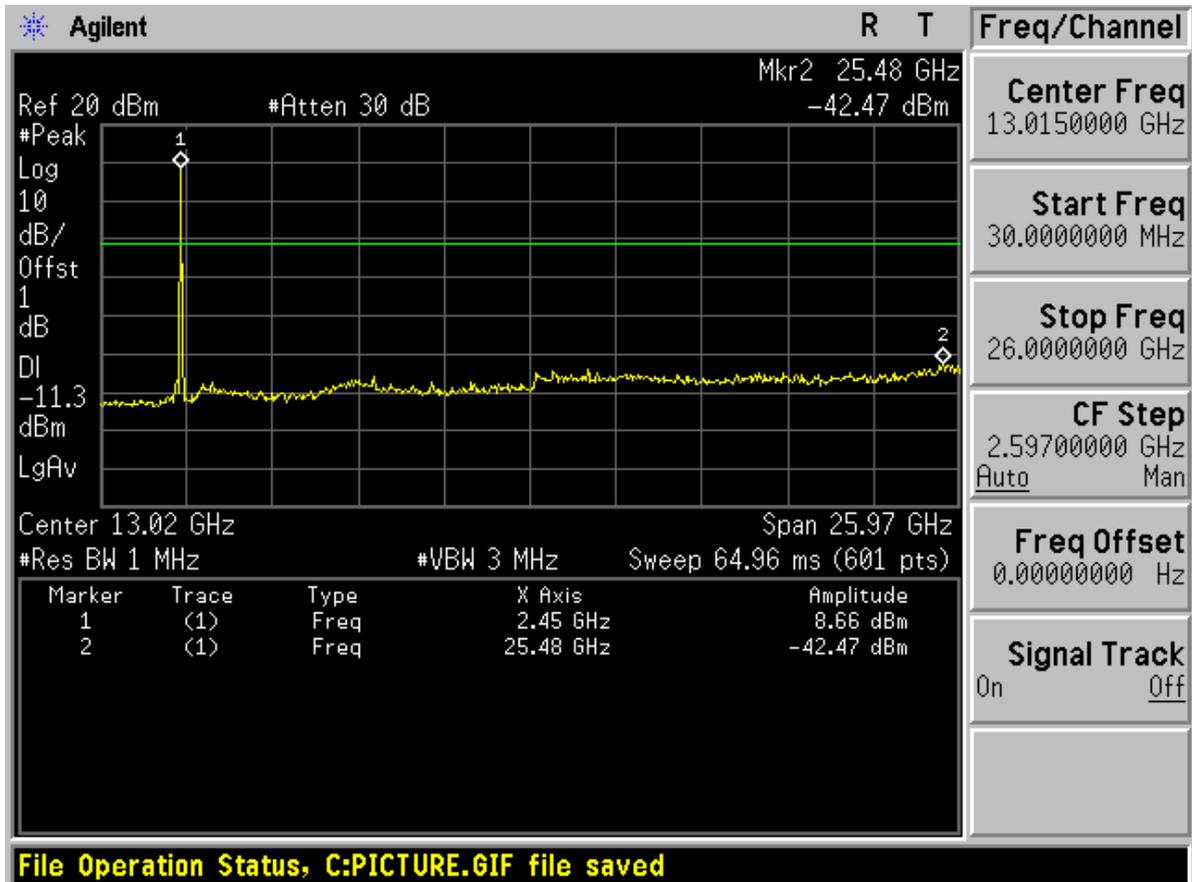




# Channel 11

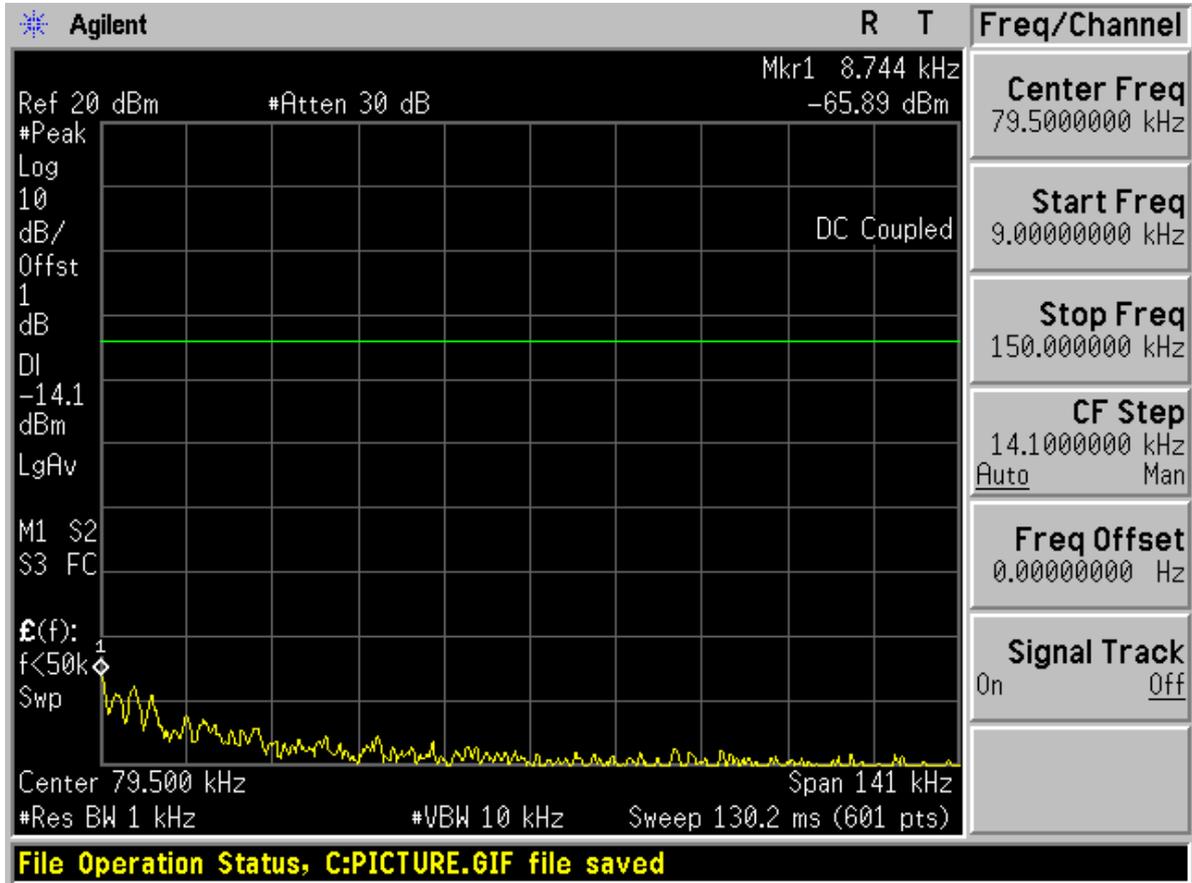


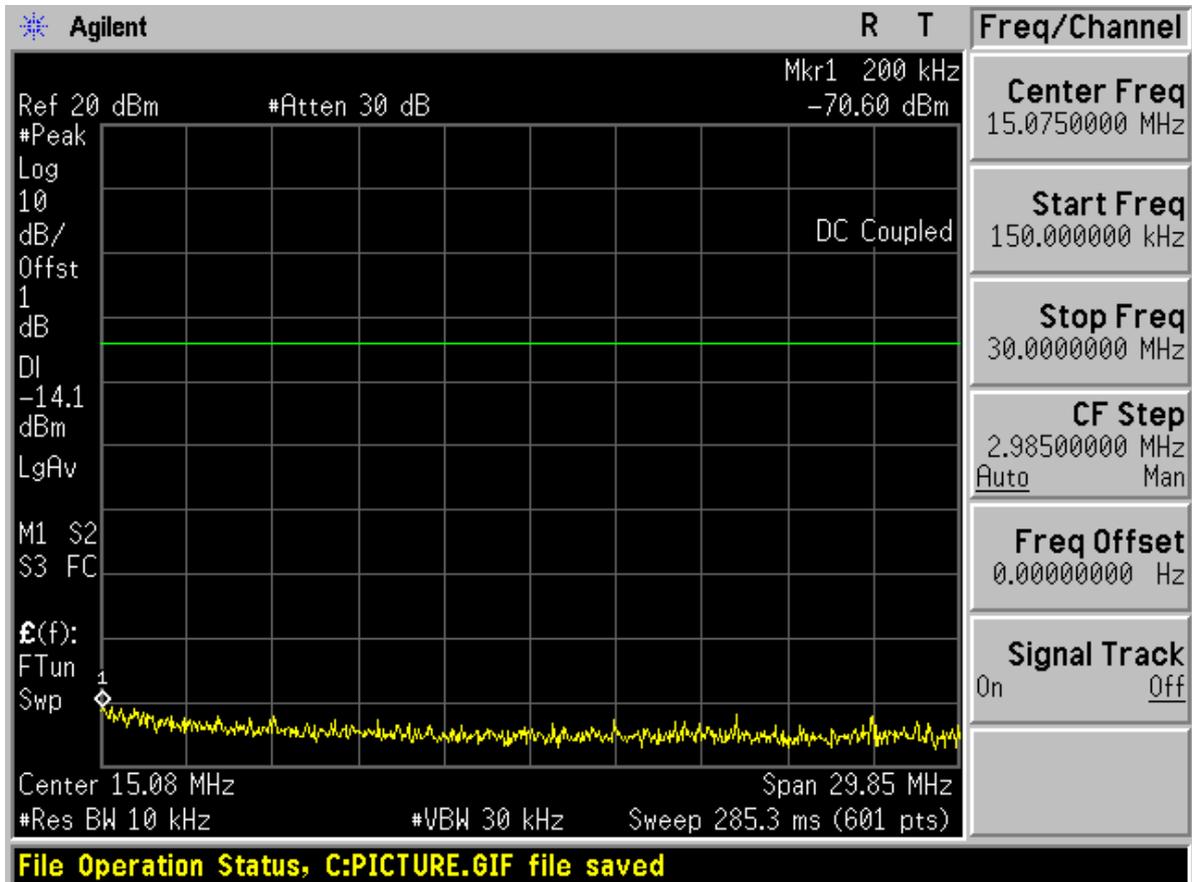


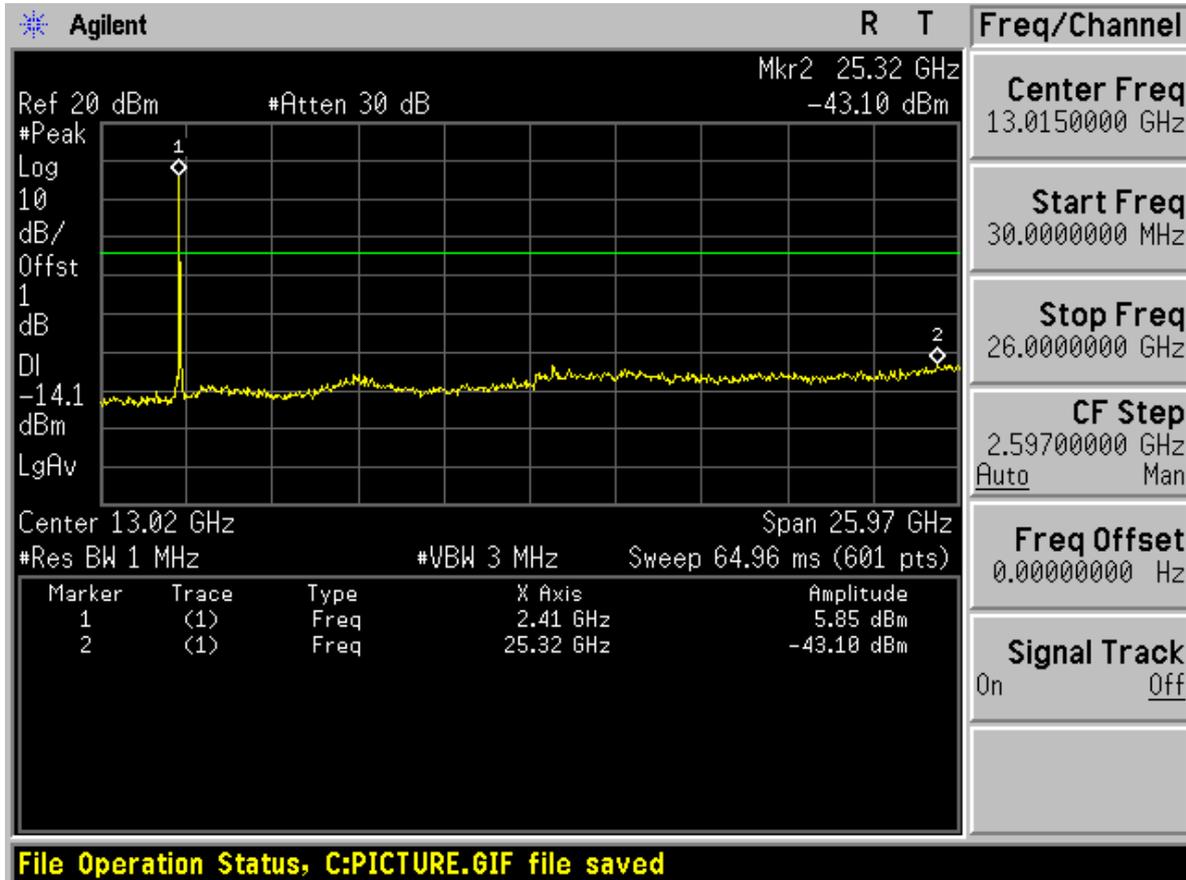




# TM2 Channel 1

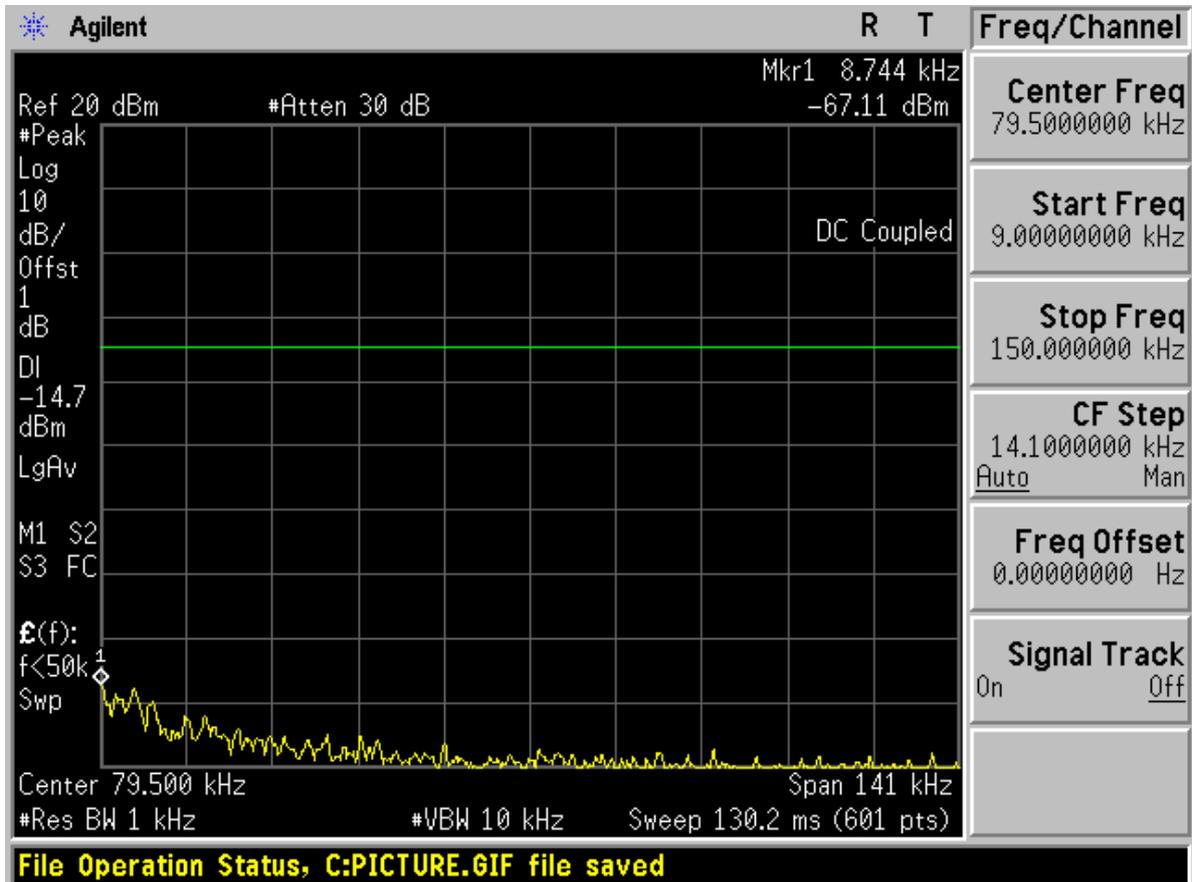


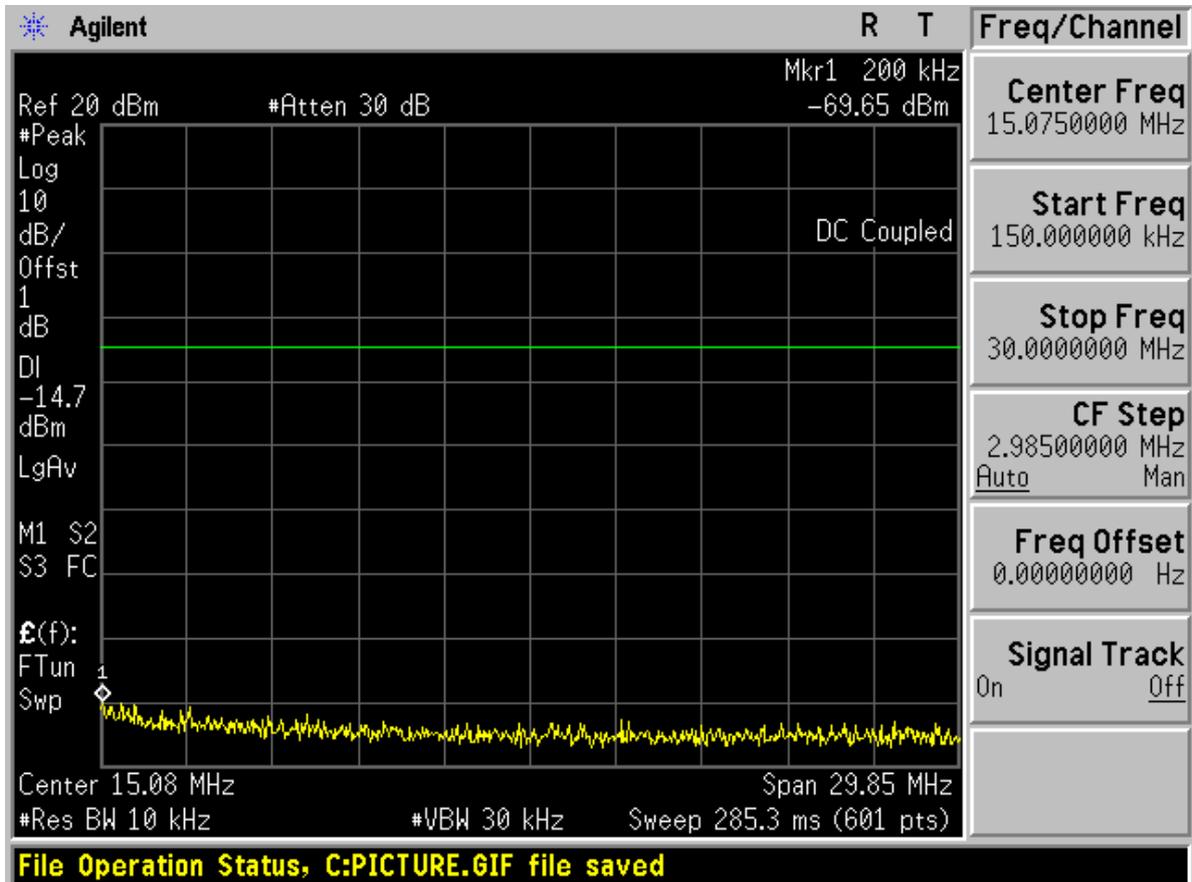


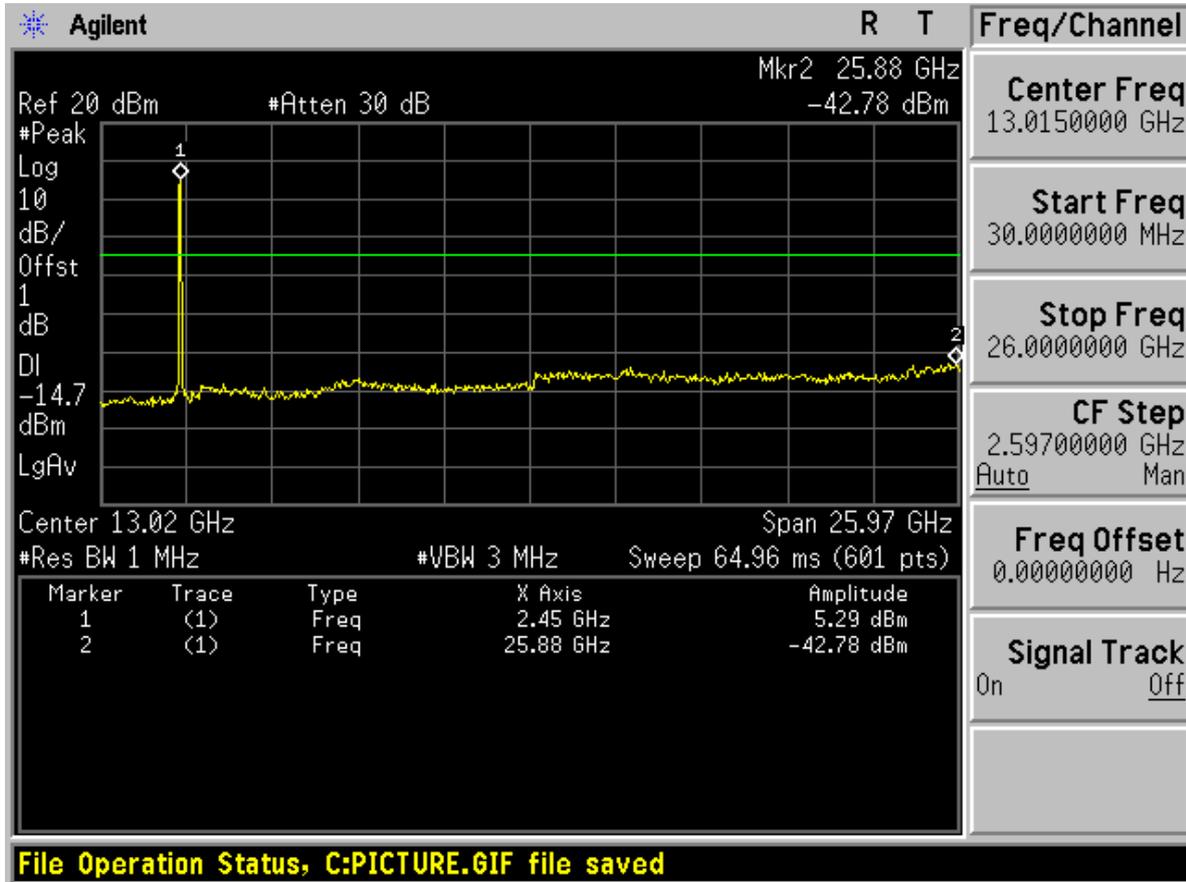




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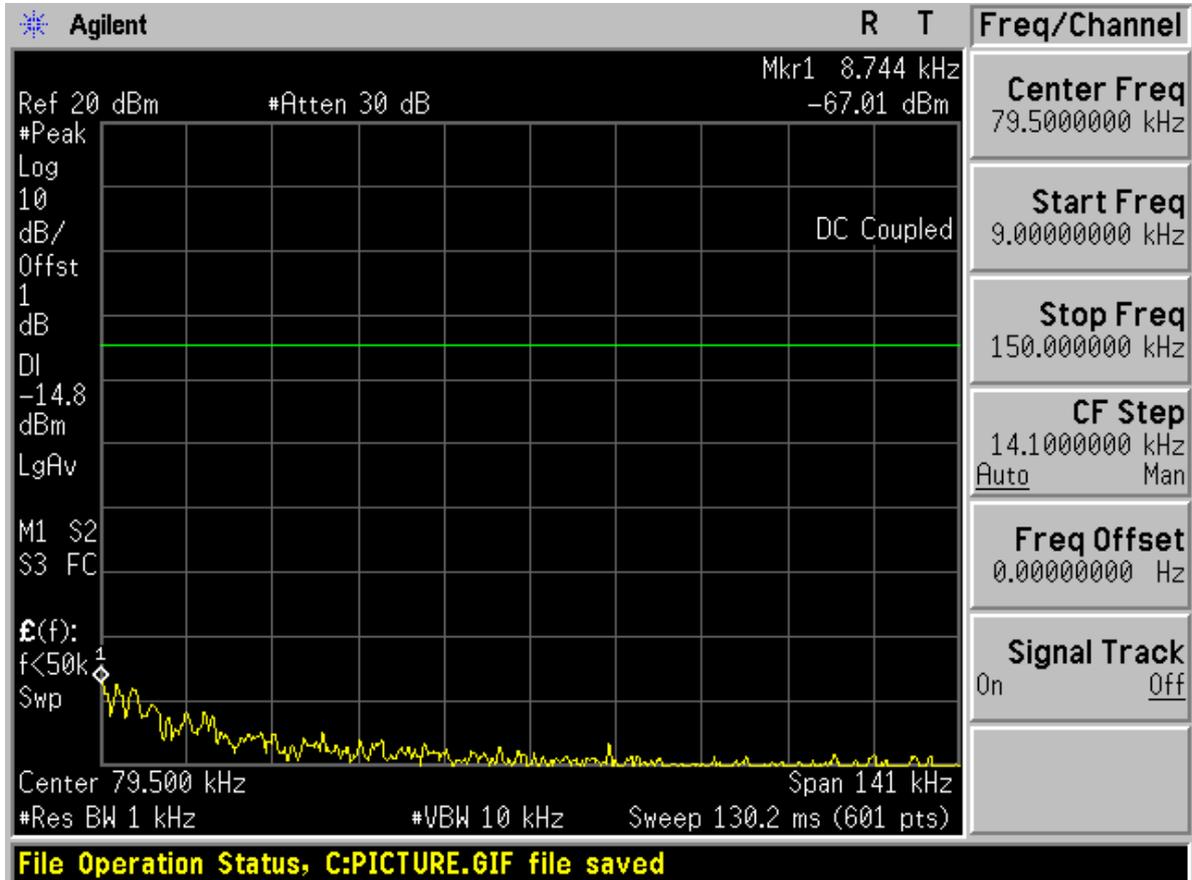


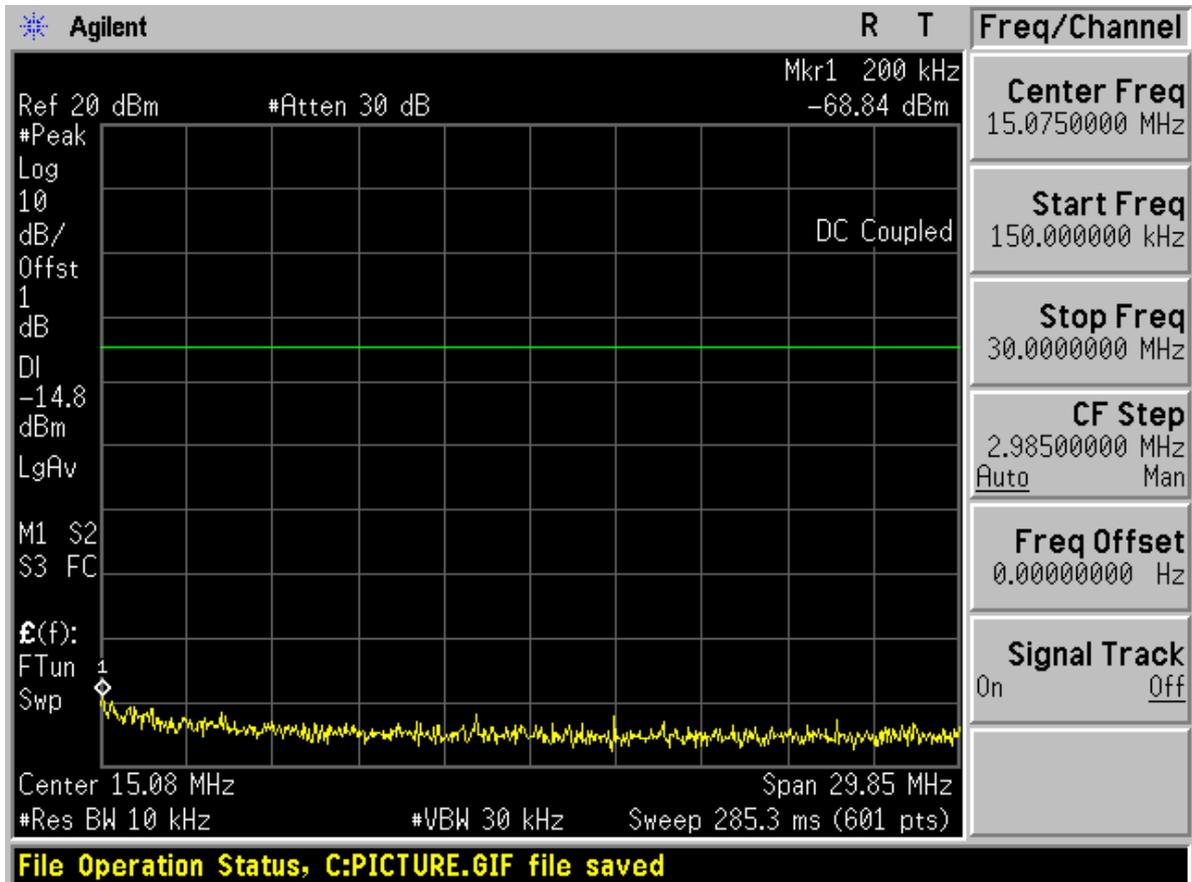


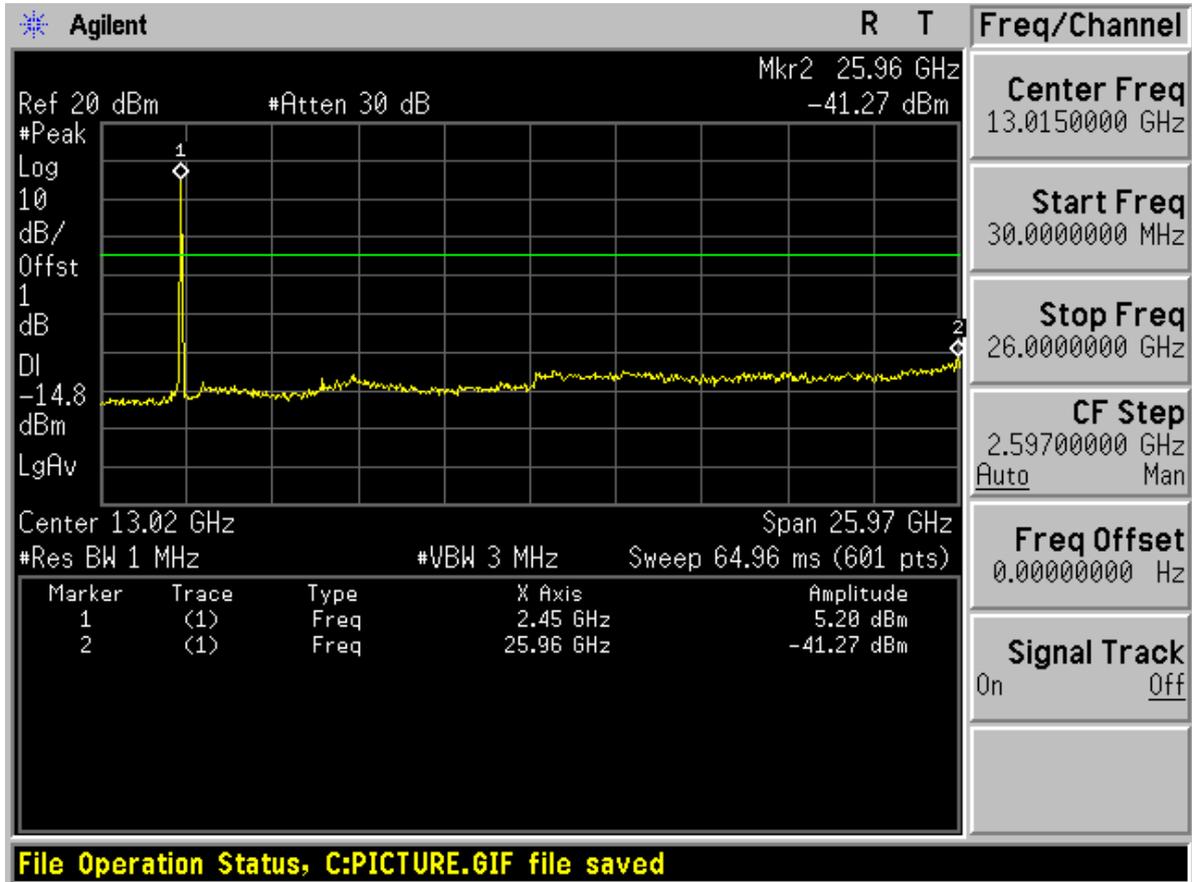




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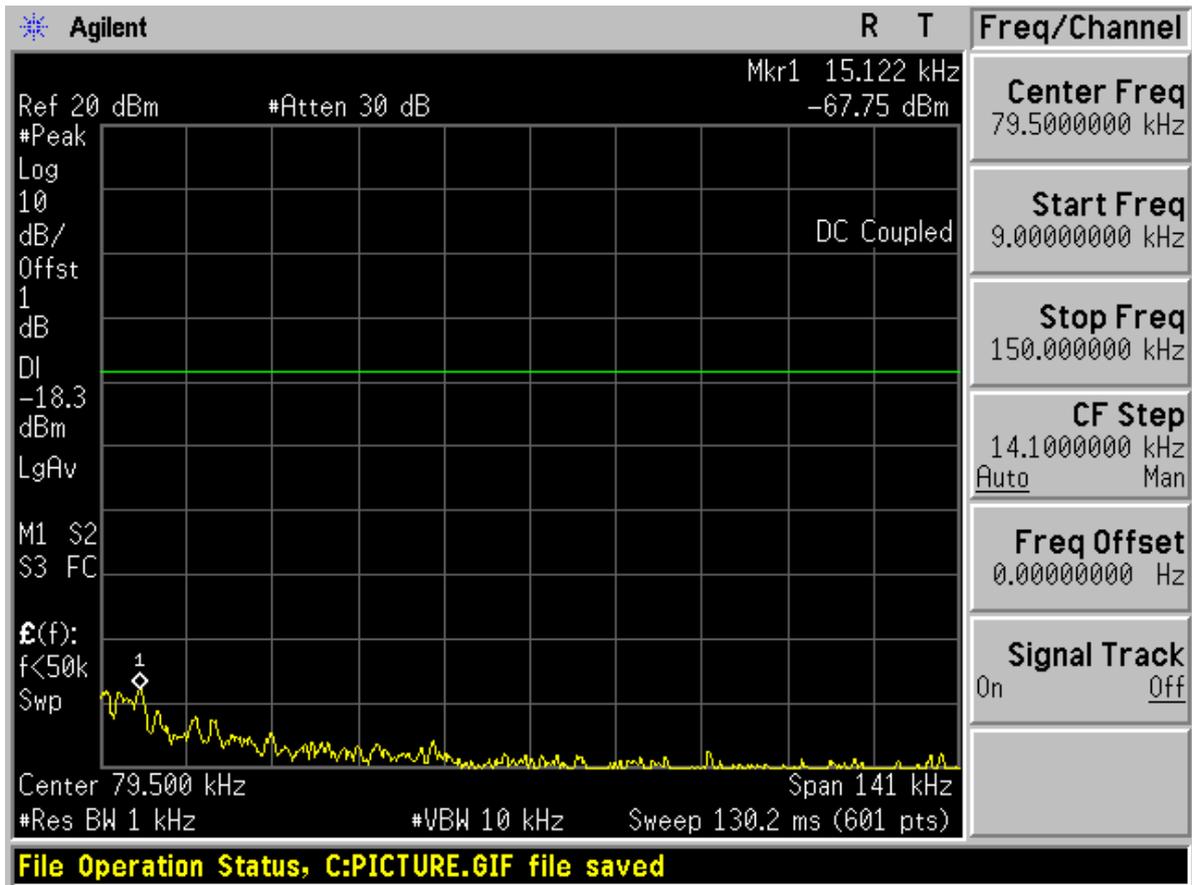


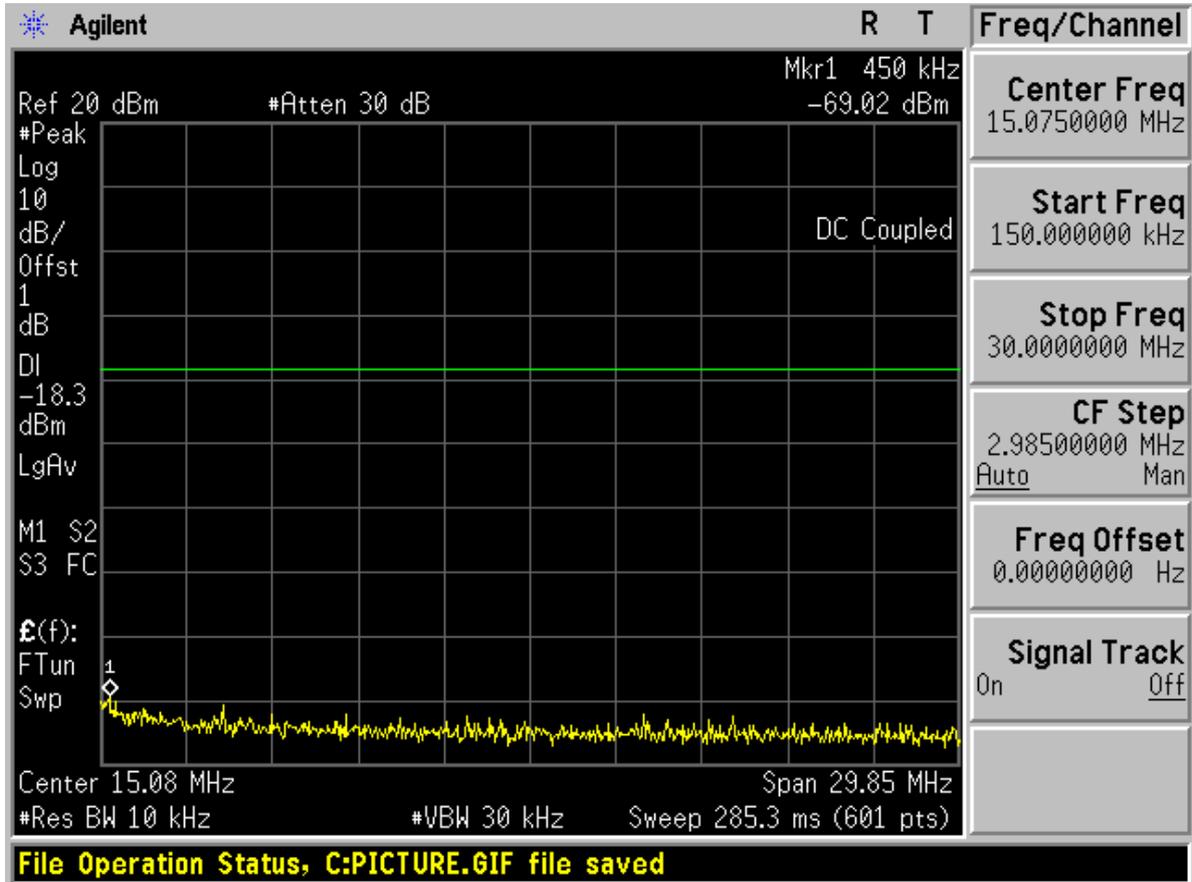


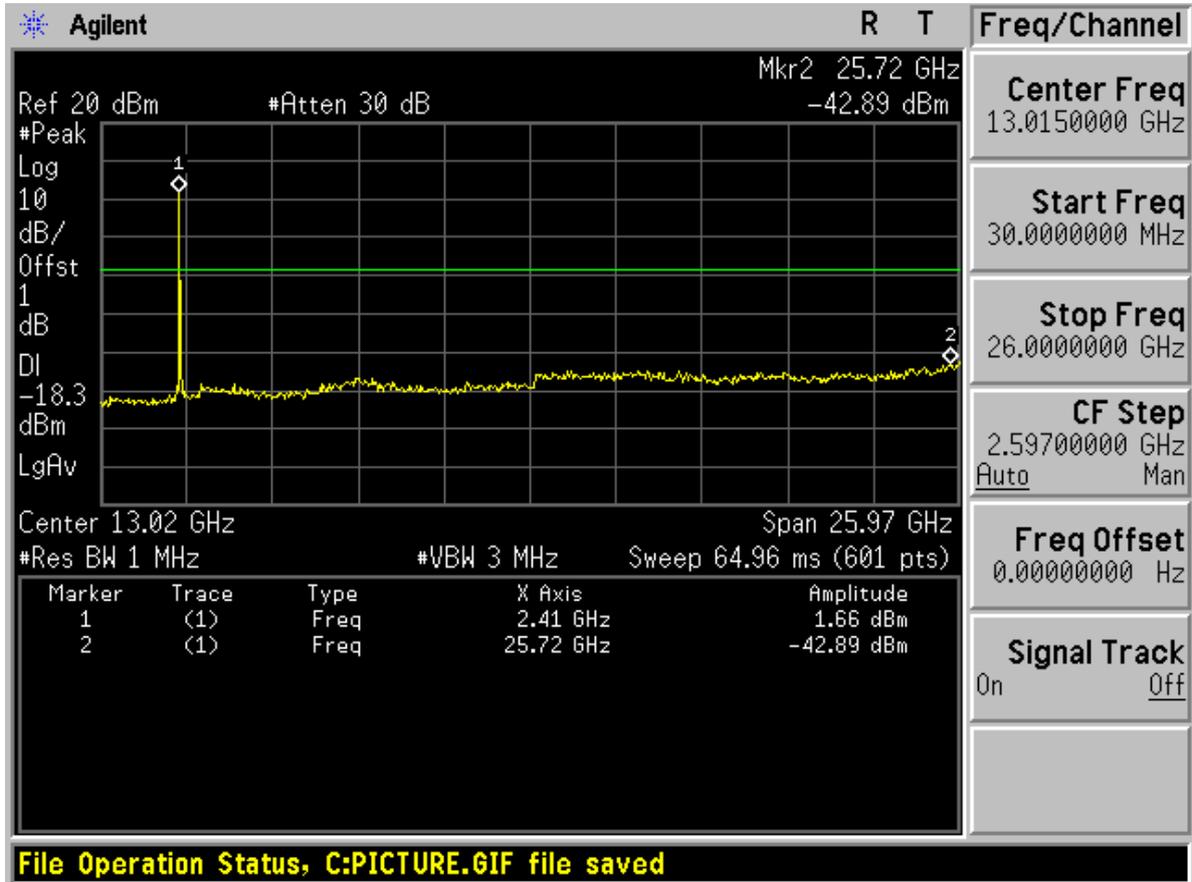




# TM3 Channel 1

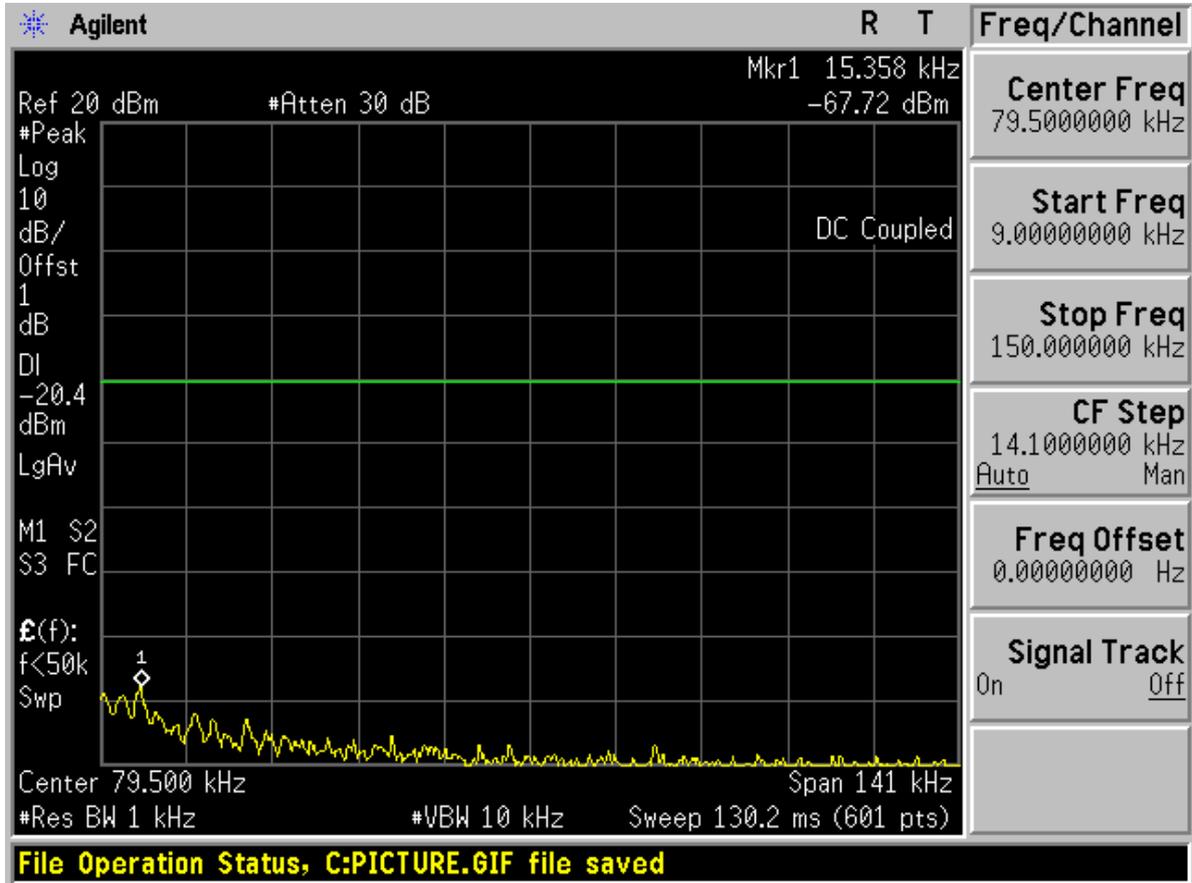


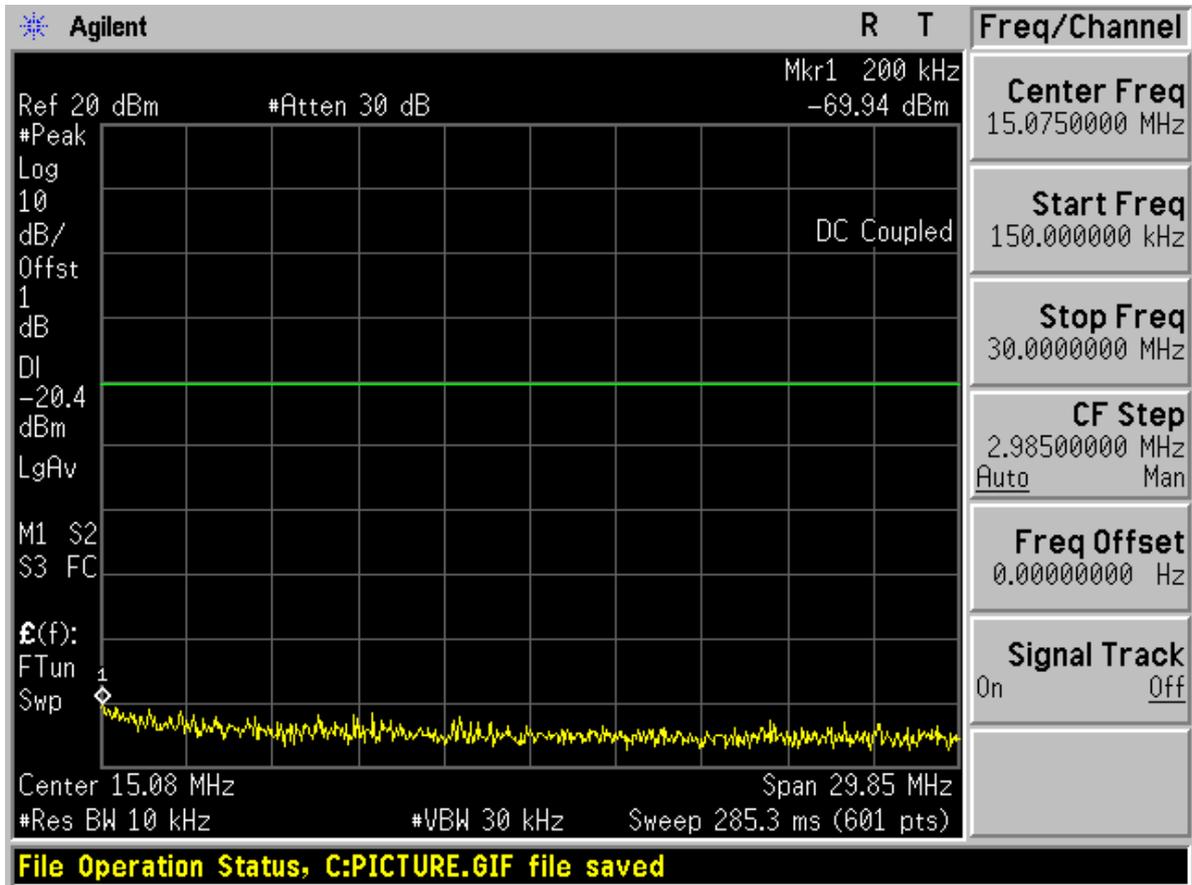


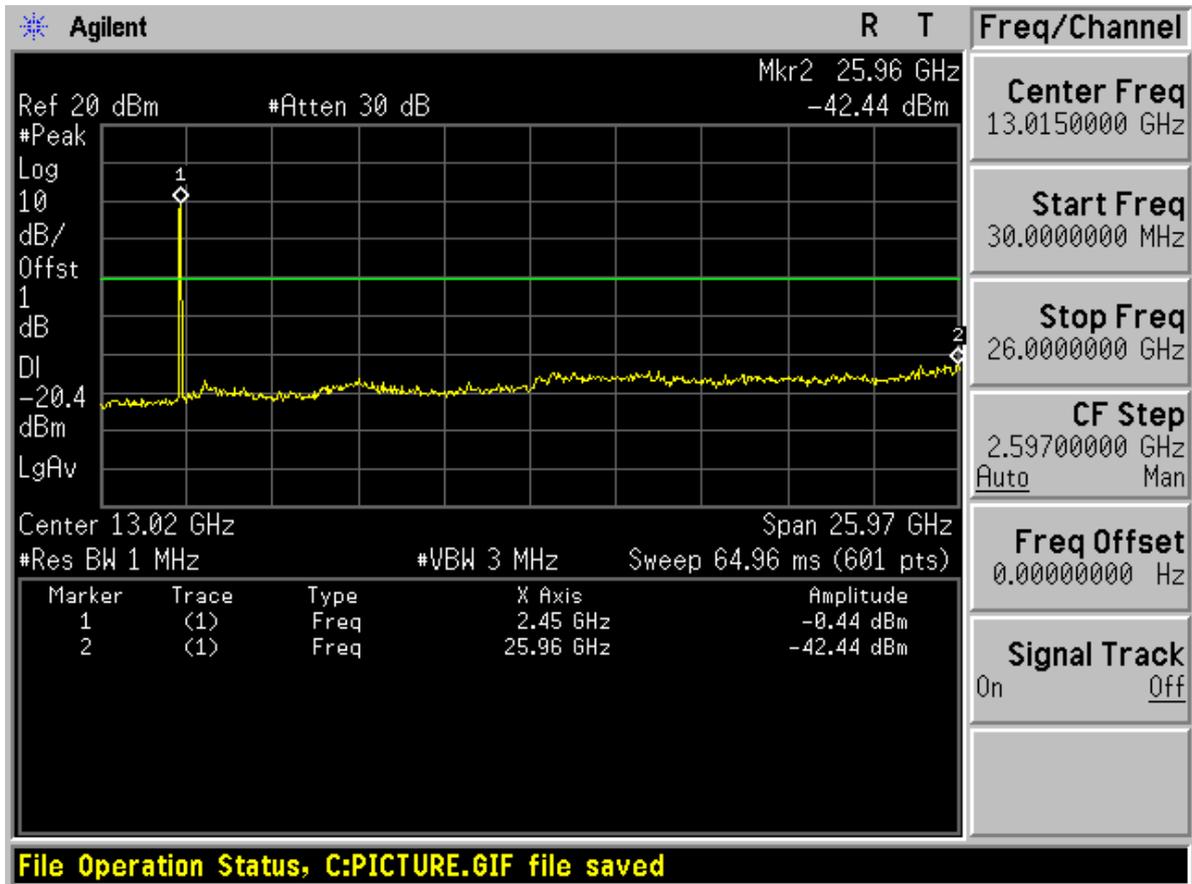




# Channel 6

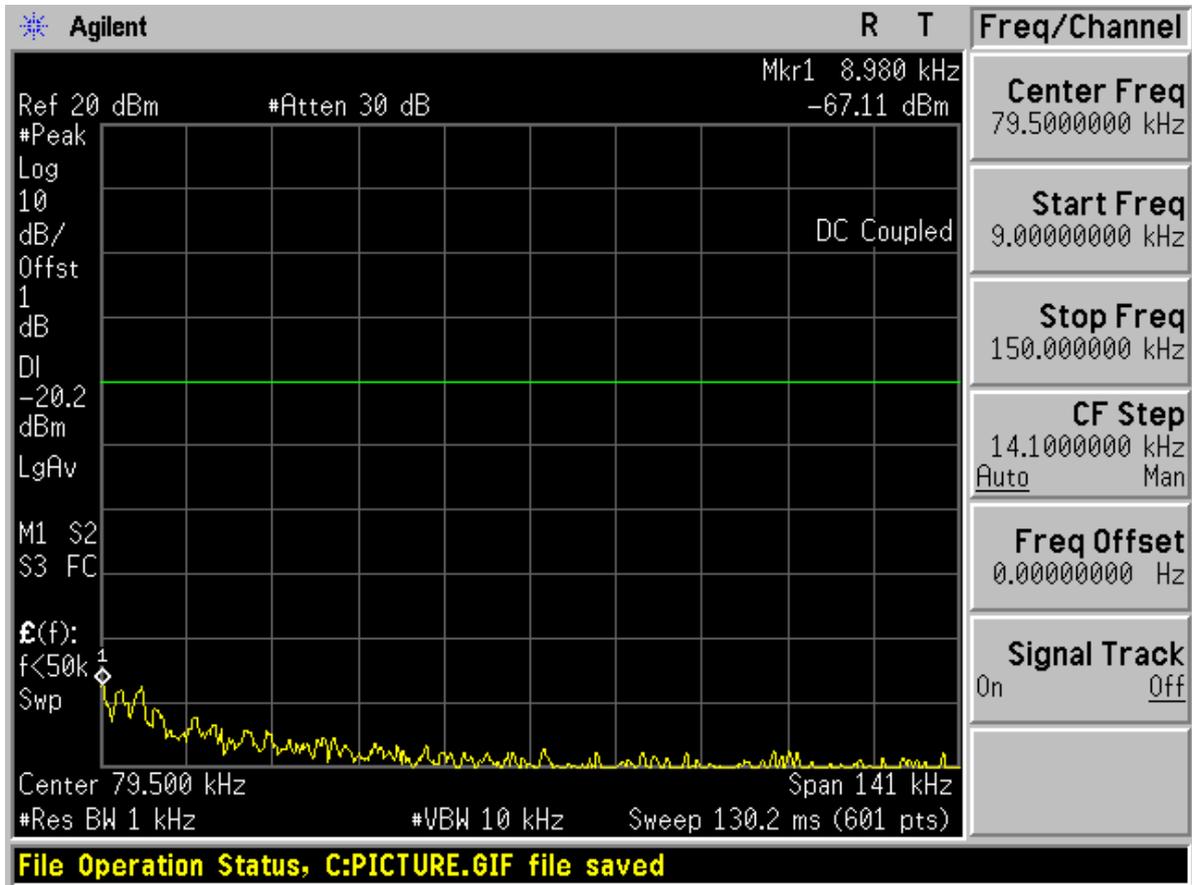


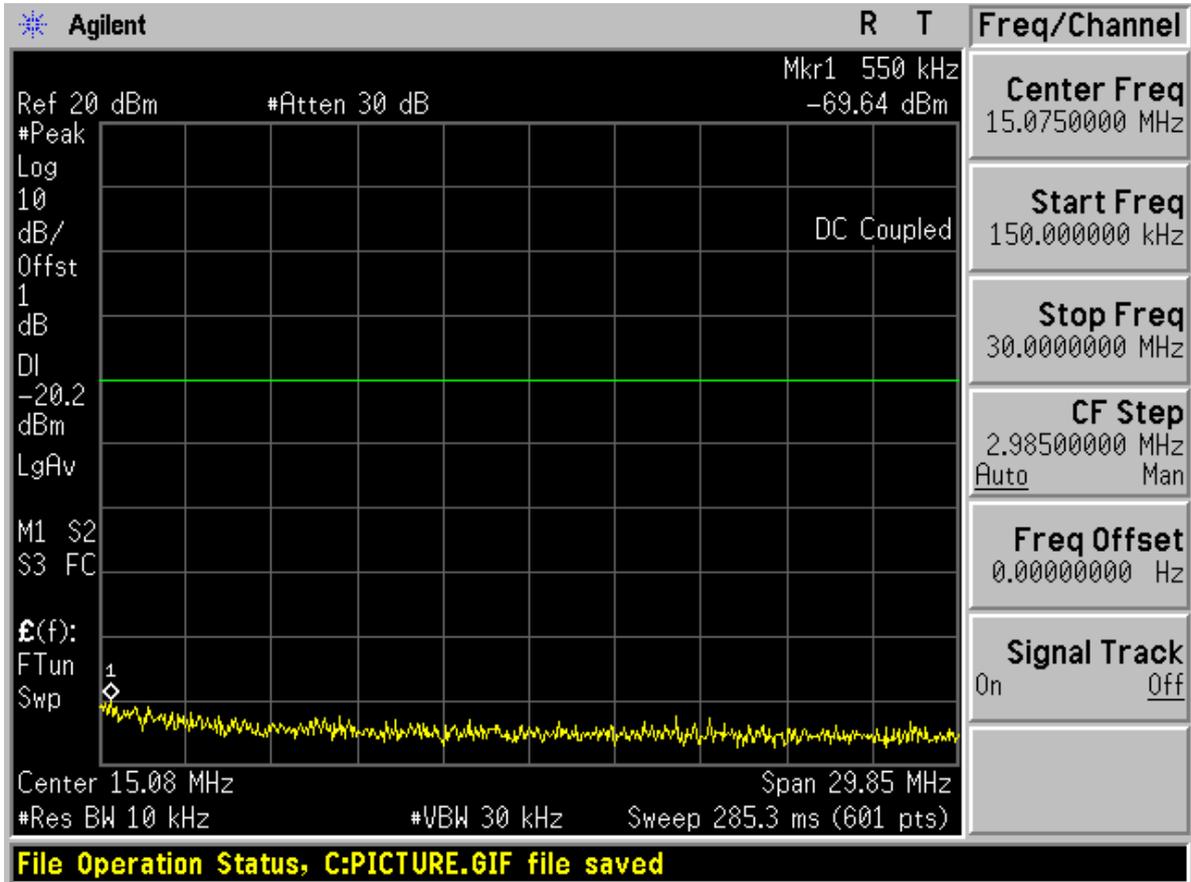


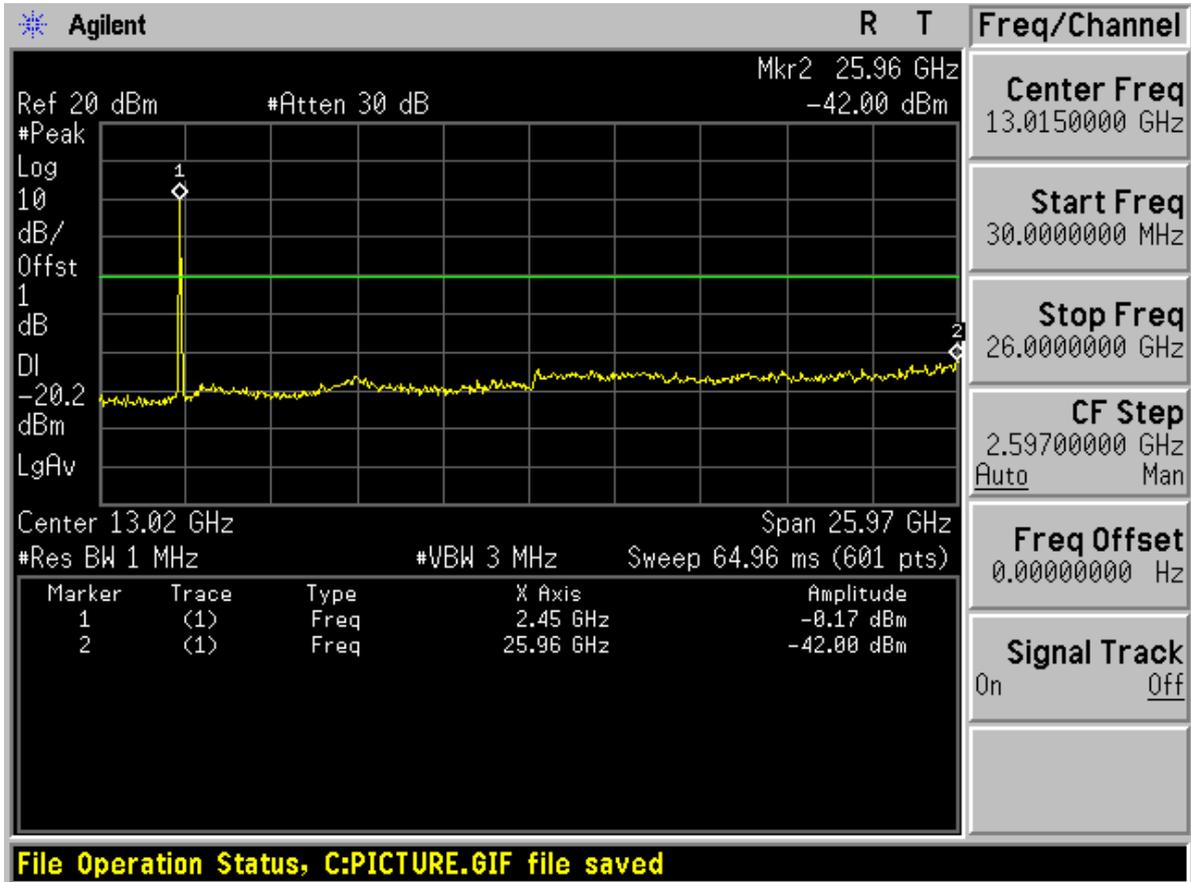




# Channel 11









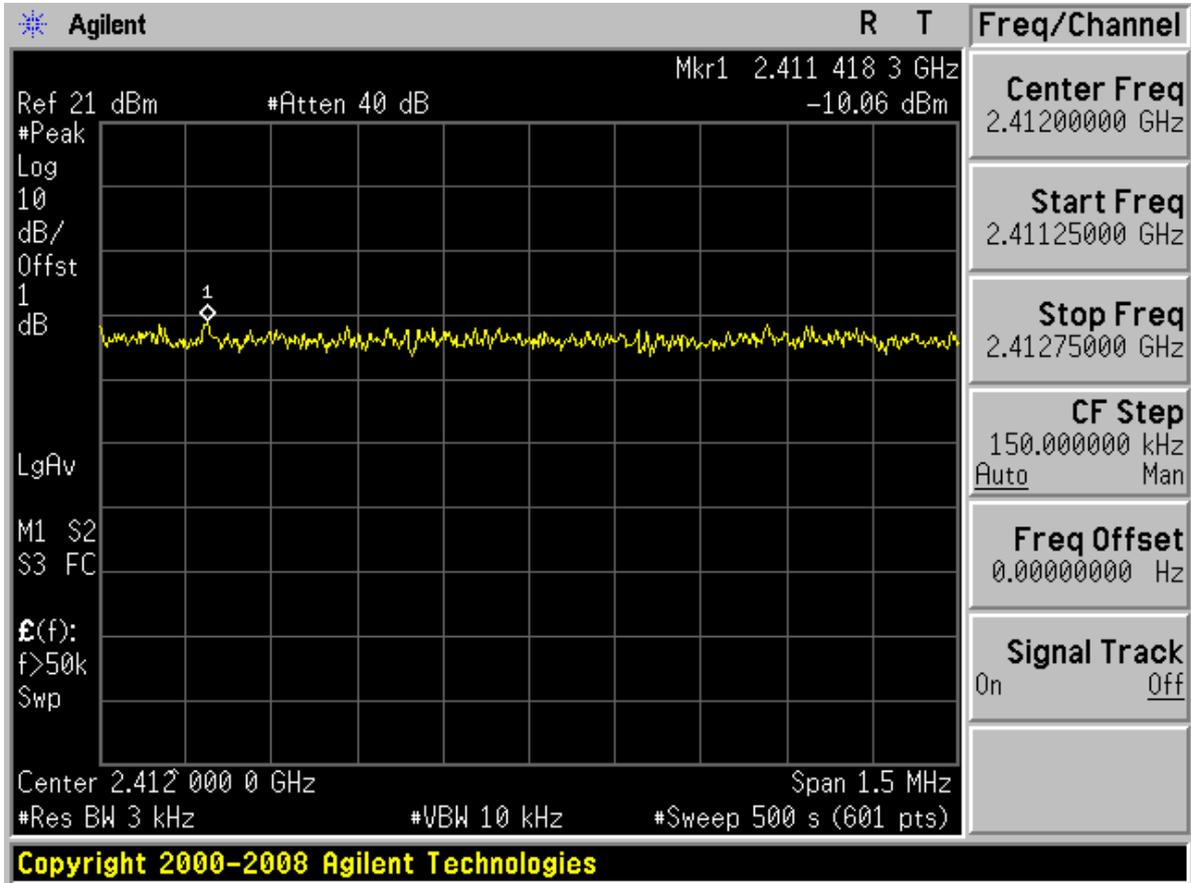
# **Appendix E**

## Power spectral density

According to FCC Part 15.247 (e)

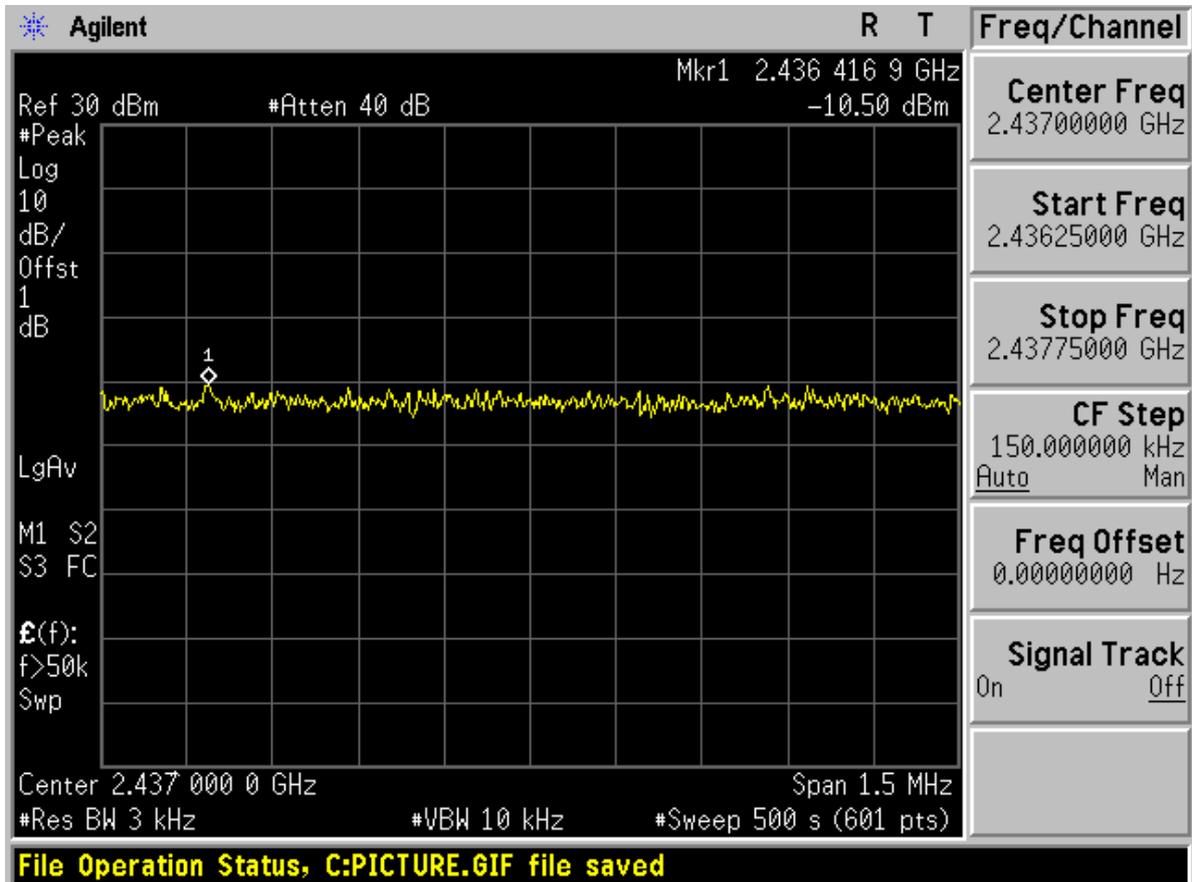


# TM1 Channel 1



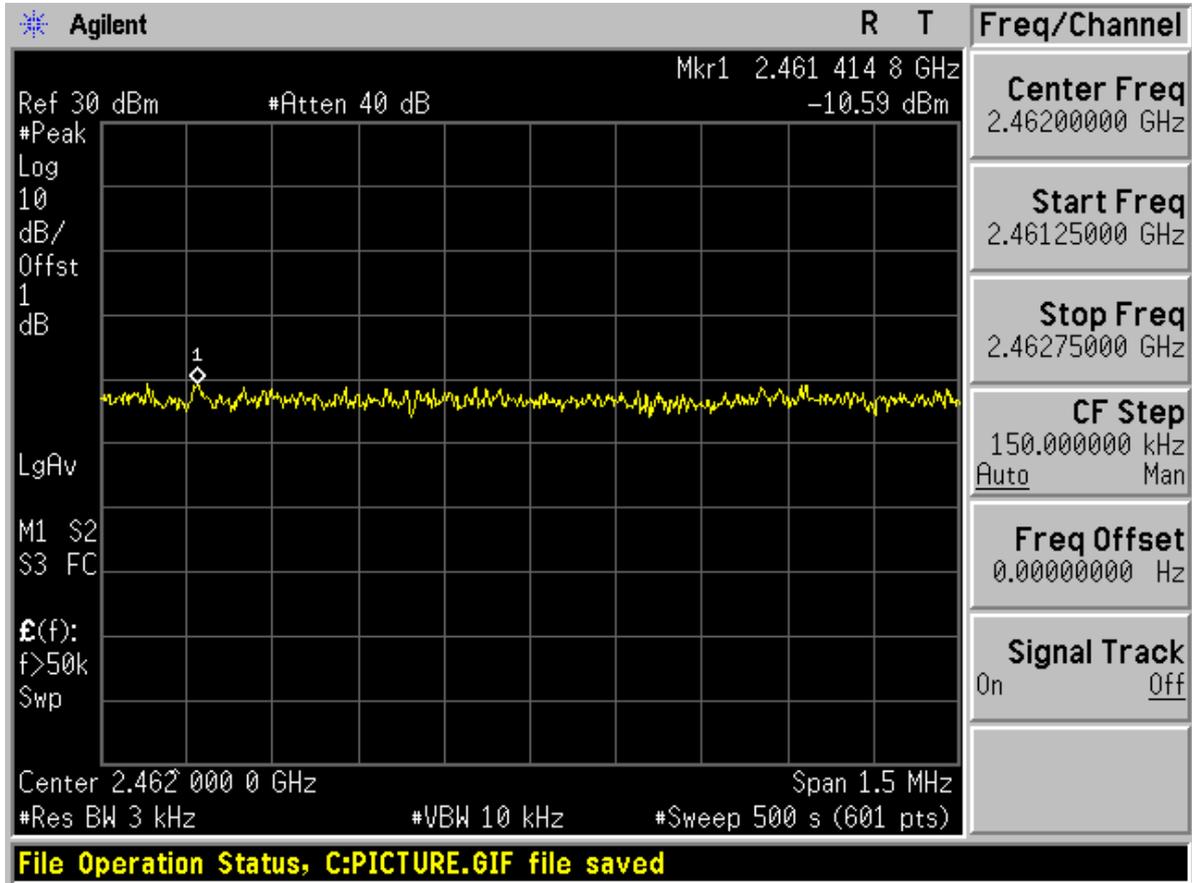


# Channel 6



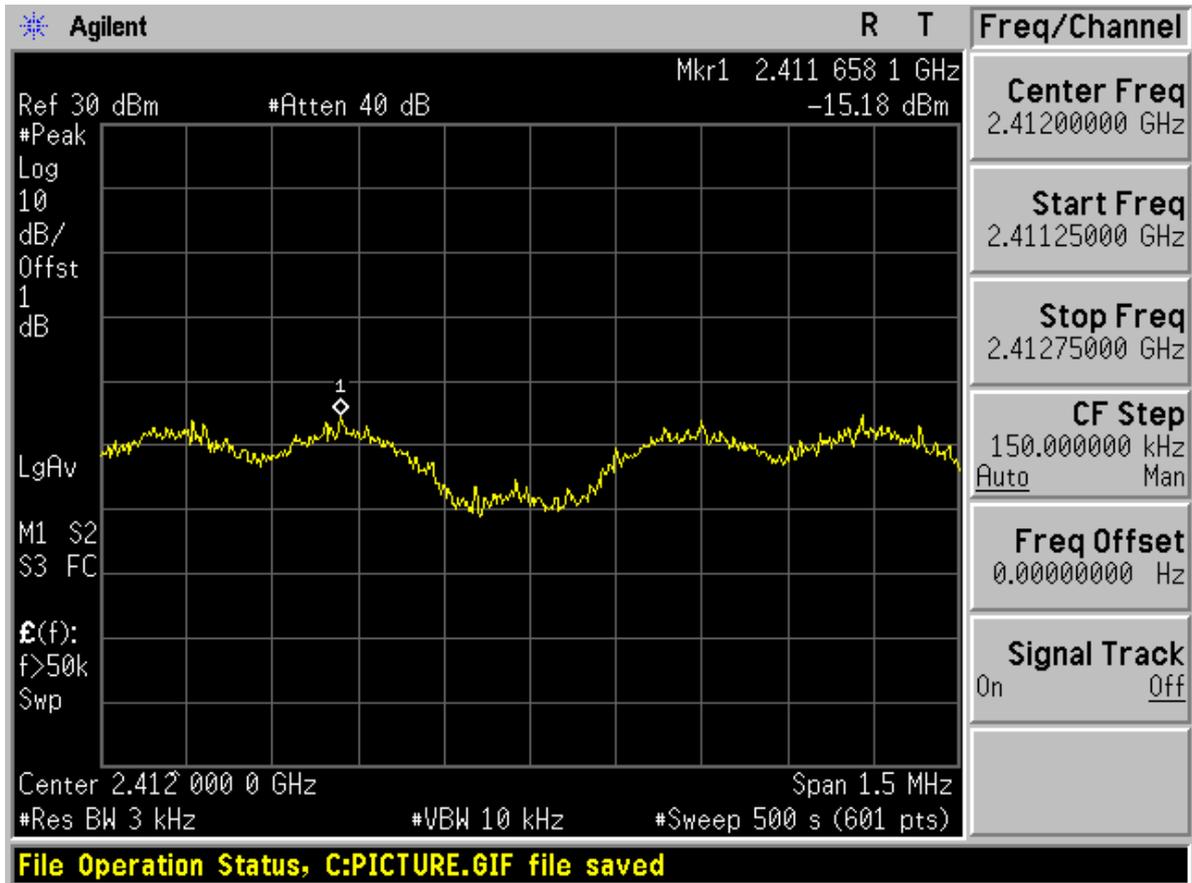


# Channel 11



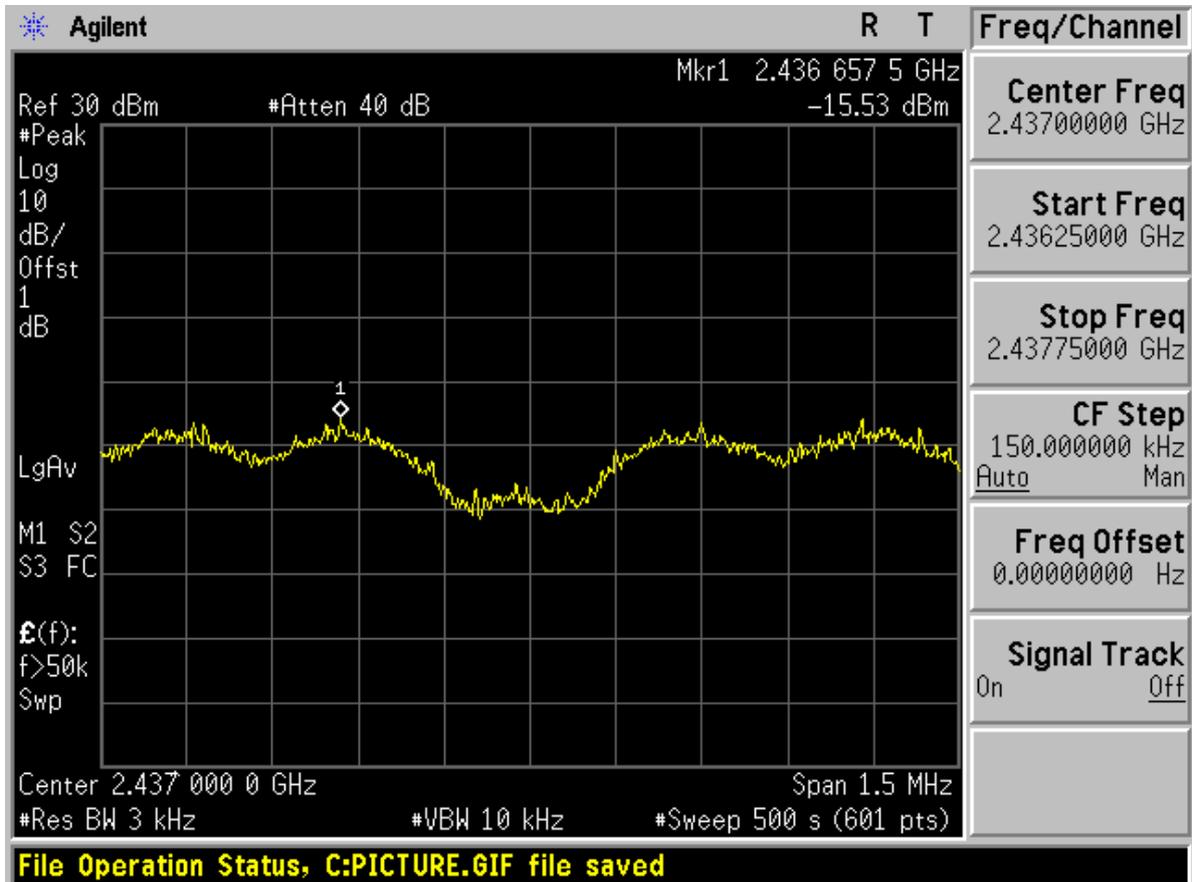


# TM2 Channel 1



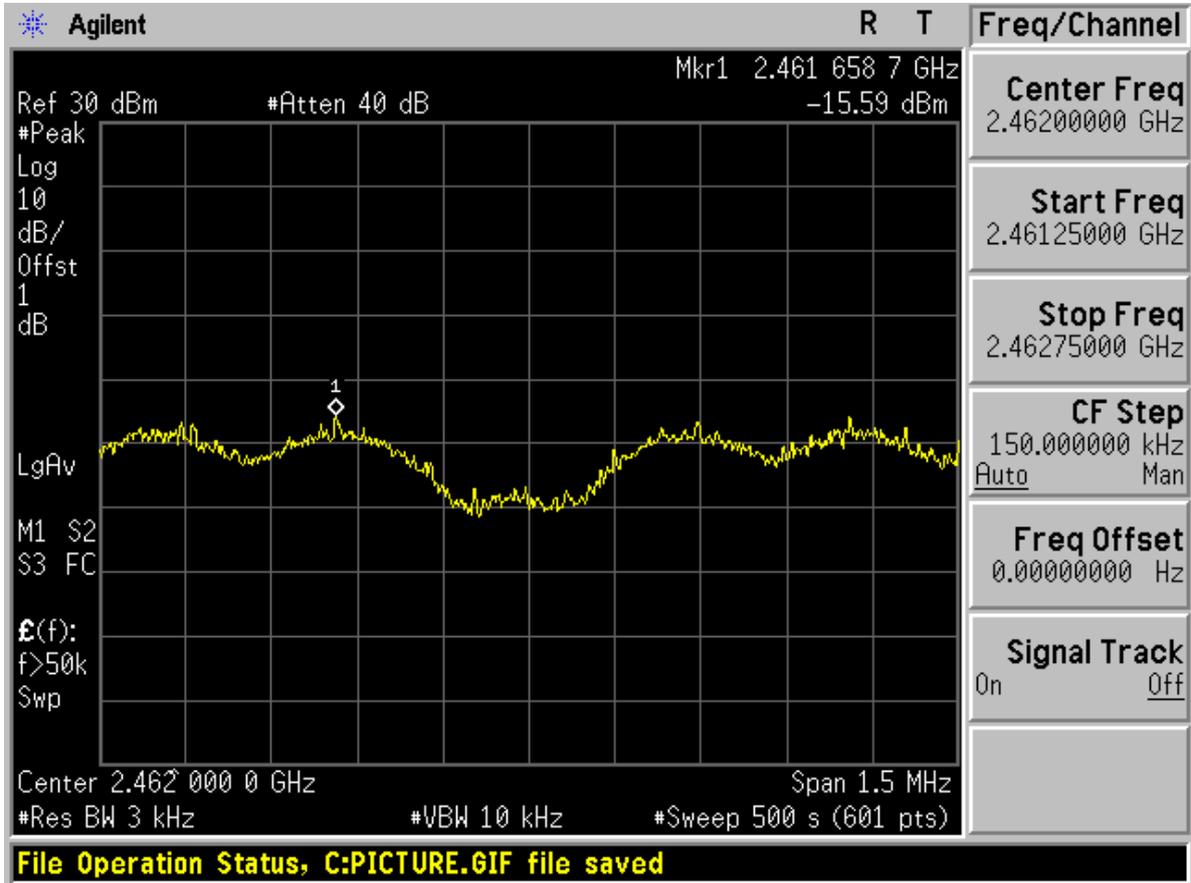


# Channel 6



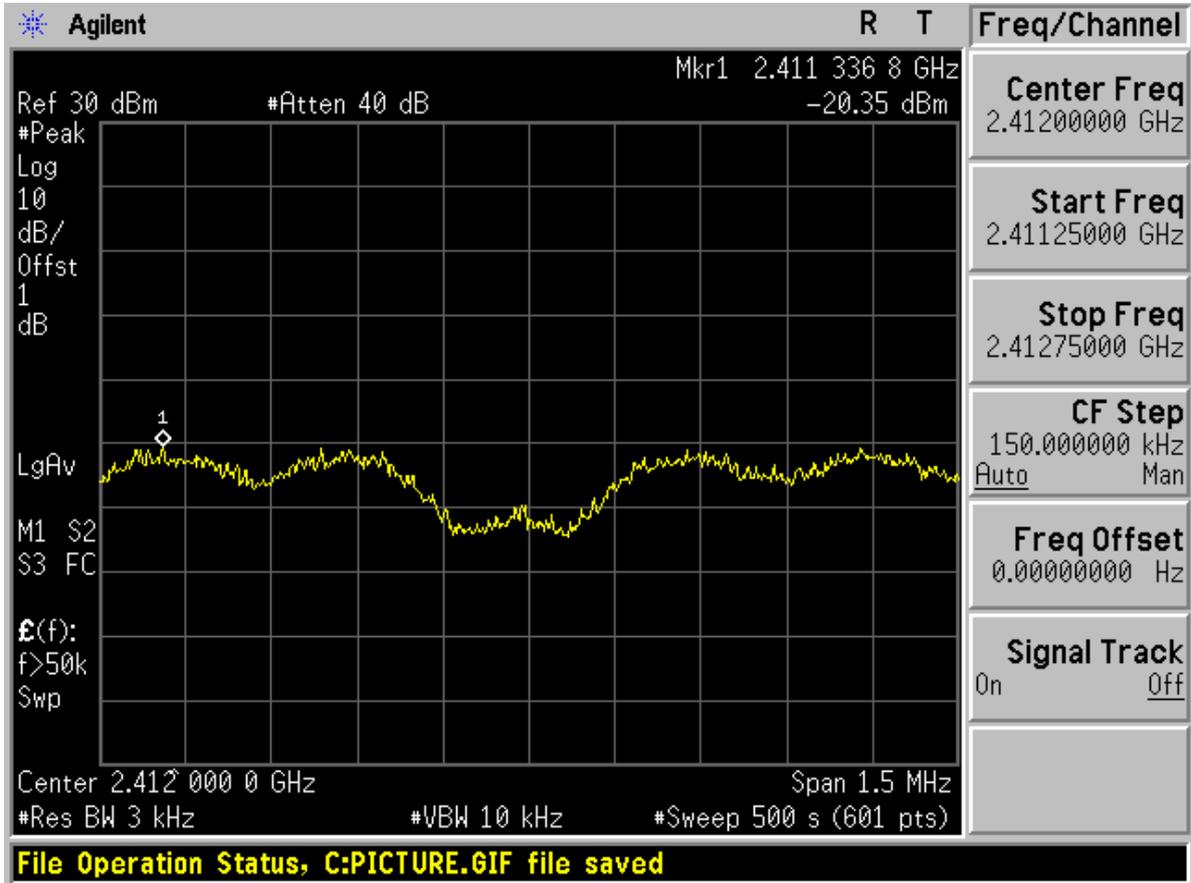


# Channel 11



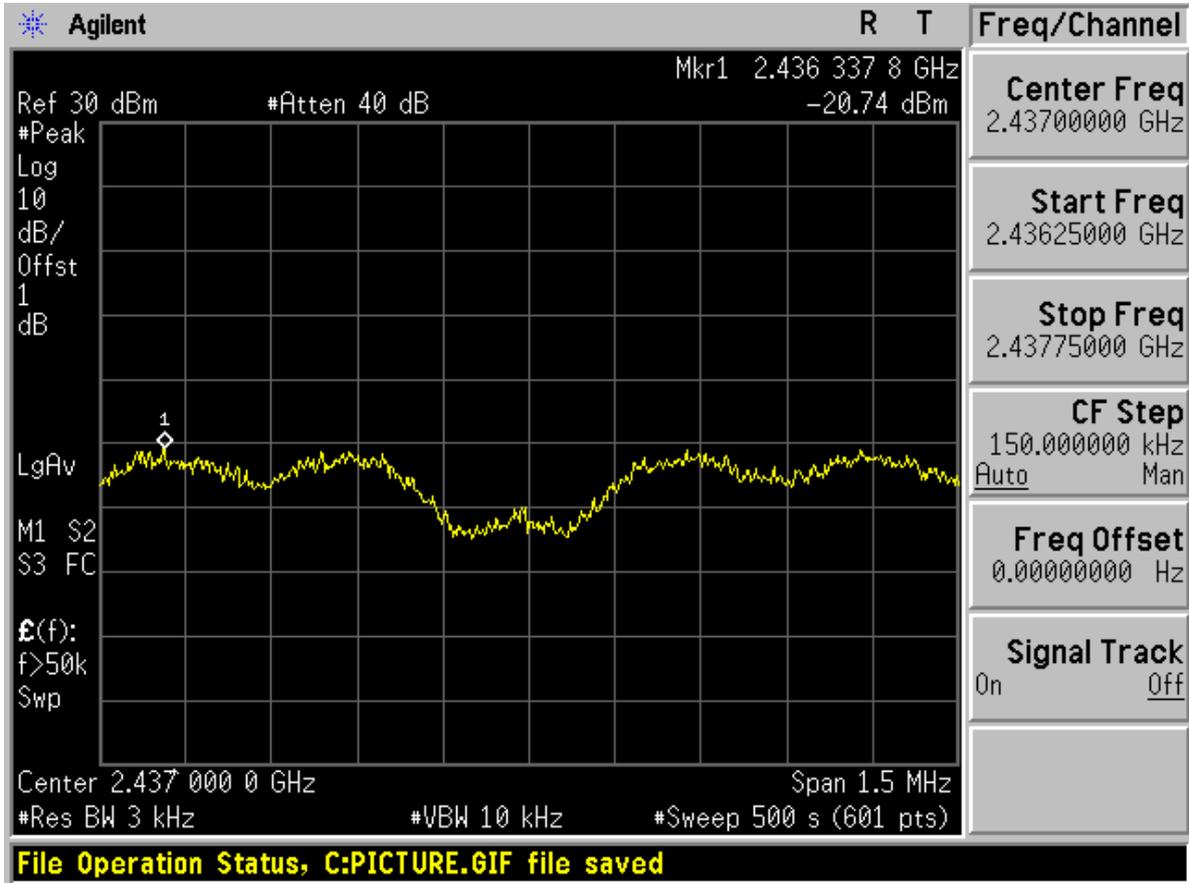


# TM3 Channel 1



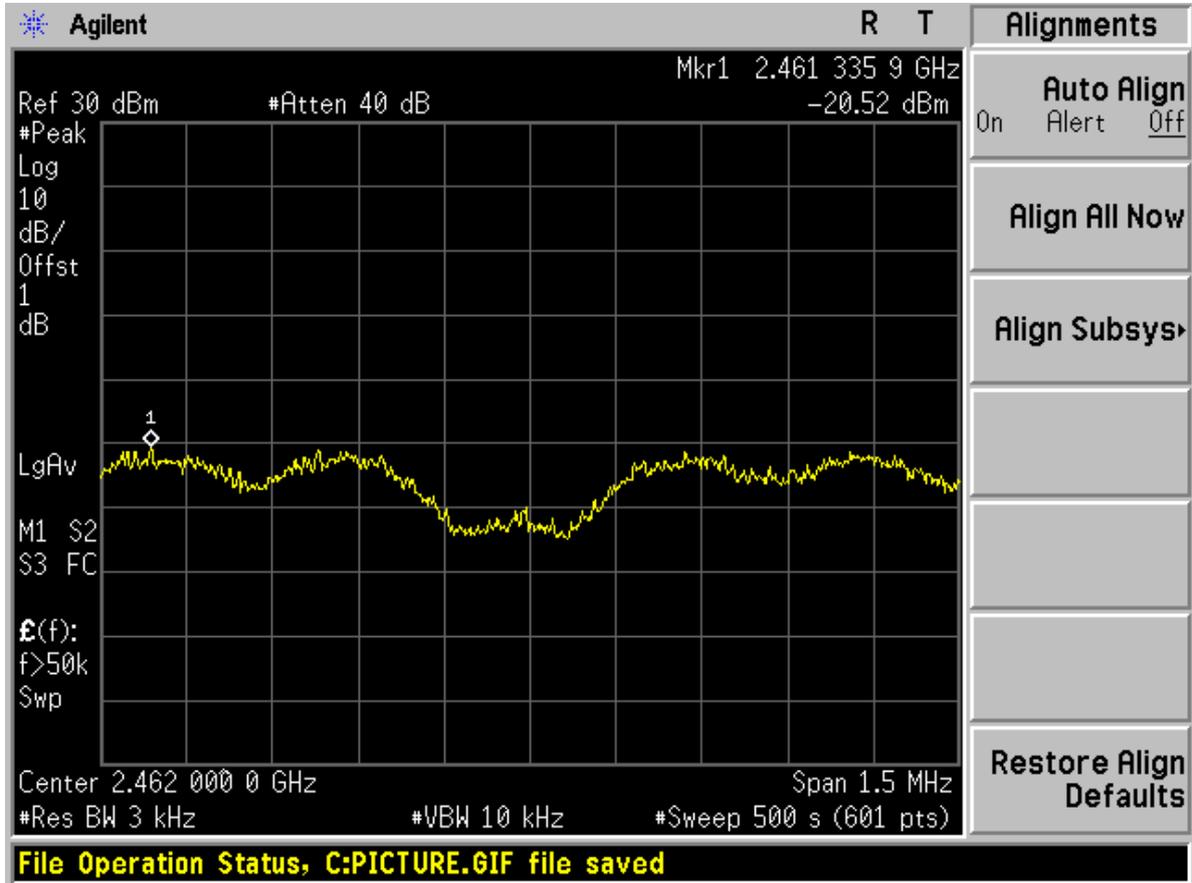


## Channel 6





# Channel 11





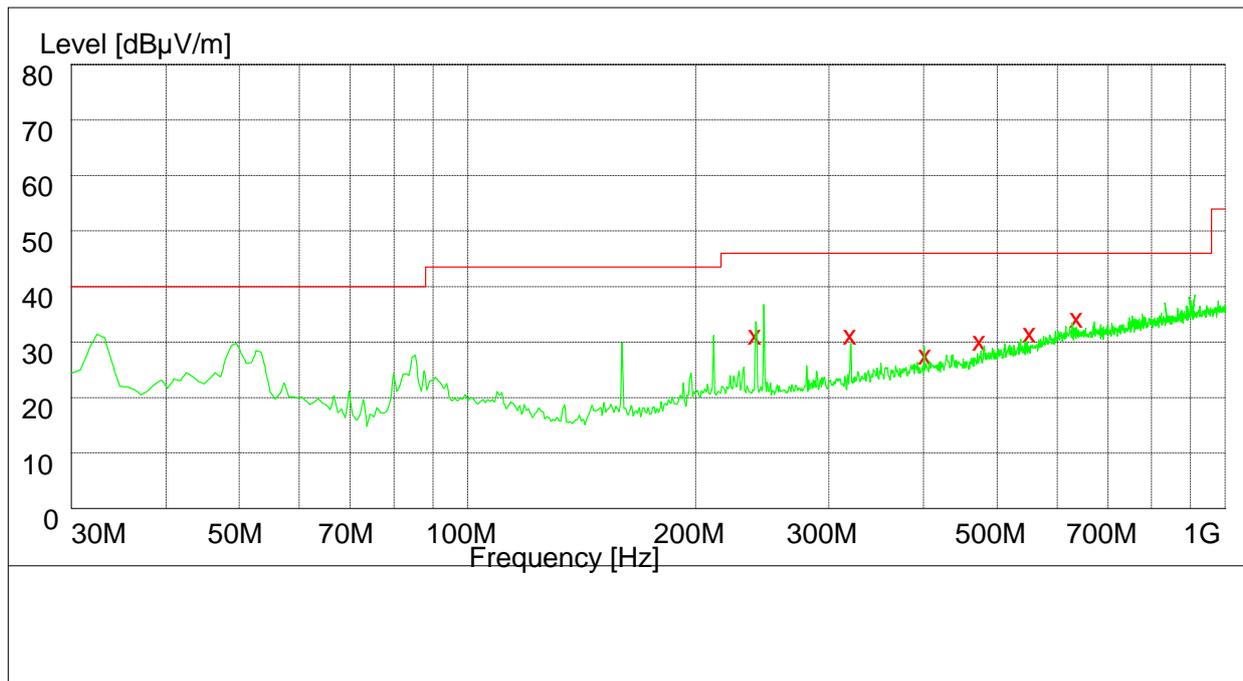
## **Appendix F**

# **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).**



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Plarization
229.100000	31.50	13.3	46.0	14.5	100.0	329.00	VERTICAL
319.200000	30.60	16.0	46.0	14.4	125.0	203.00	HORIZONTAL
401.300000	27.80	17.8	46.0	28.2	110.0	325.00	VERTICAL
475.200000	30.60	19.5	46.0	15.4	141.0	122.00	HORIZONTAL
555.000000	31.10	21.5	46.0	14.9	108.0	309.00	VERTICAL
638.100000	33.50	22.8	46.0	12.5	107.0	213.00	HORIZONTAL



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

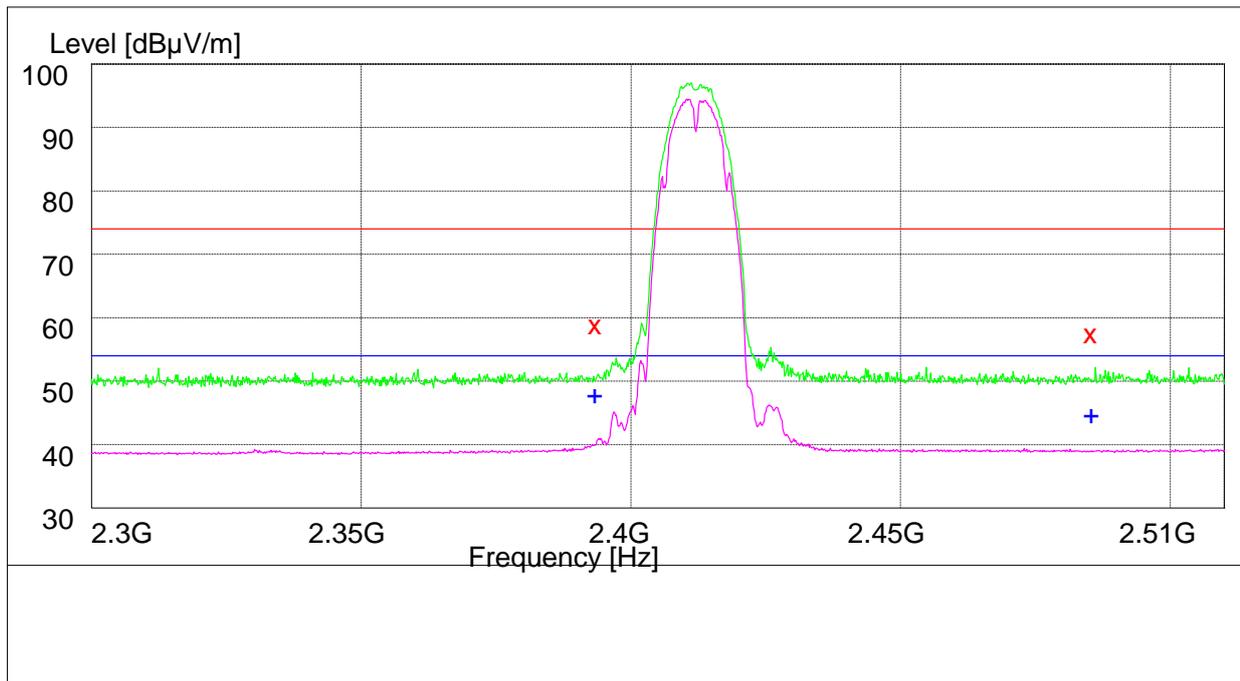
Note: No peak found in pre- test.

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

- Note 1: The testing range of “2.3 GHz to 2.5 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 $\mu$ V/m) and Average Limit (54 dB $\mu$ 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.

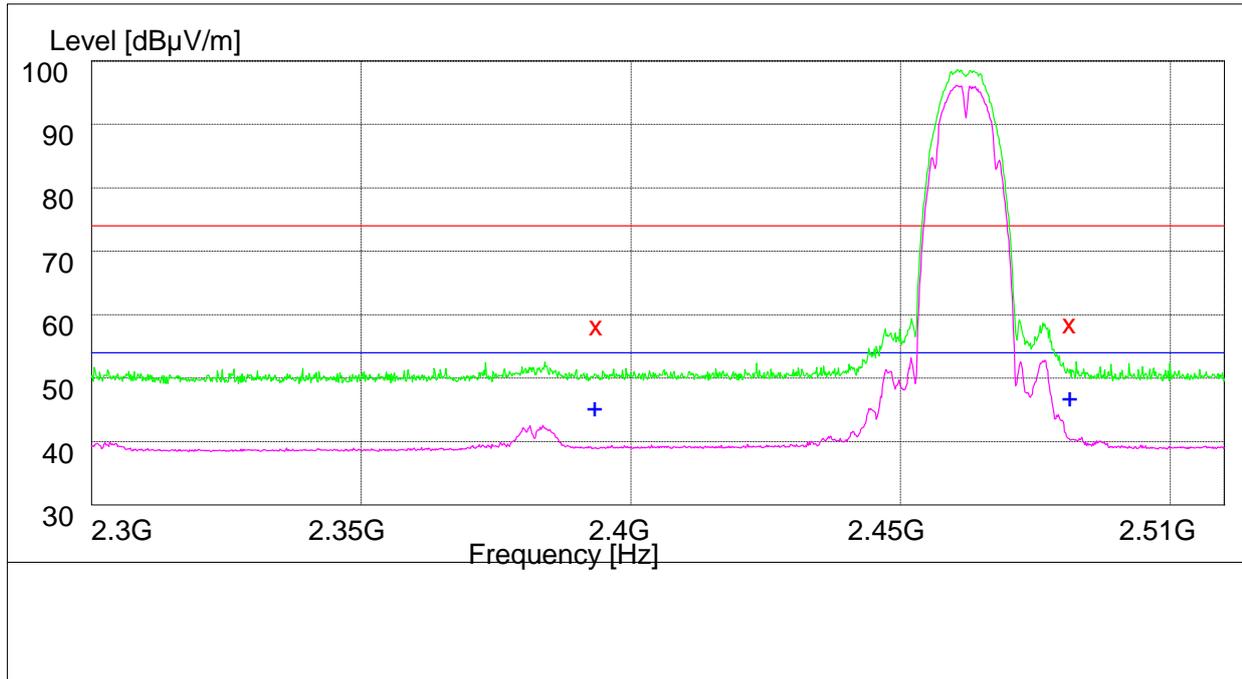
#### MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.30	33.5	74.0	14.7	111.0	105.00	VERTICAL
2483.500000	58.50	33.7	74.0	13.5	153.0	252.00	VERTICAL

#### MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	49.90	33.5	54.0	4.1	120.0	255.00	VERTICAL
2483.500000	46.40	33.7	54.0	7.6	103.0	102.00	HORIZONTAL

## 1.2 Channel 11



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

### MEASUREMENT RESULT: PK Detector

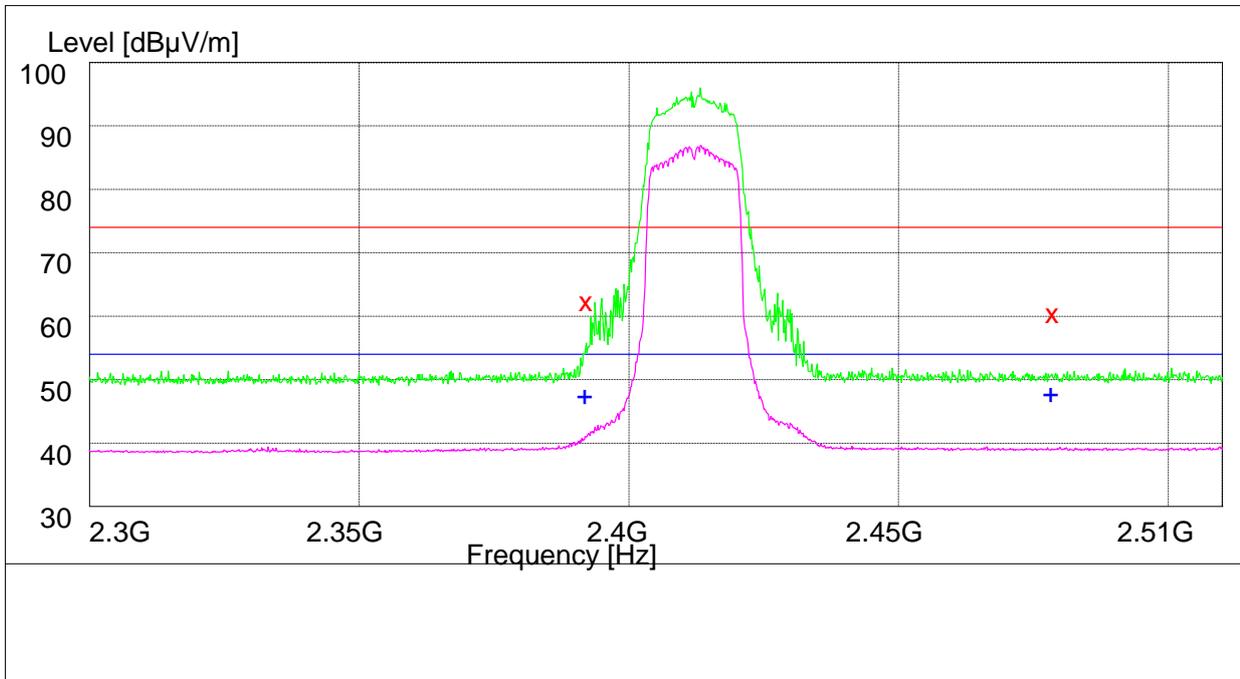
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	59.90	33.5	74.0	14.1	104.0	52.00	HORIZONTAL
2483.500000	59.50	33.7	74.0	14.5	104.0	227.00	VERTICAL

### MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	47.30	33.5	54.0	6.7	103.0	101.00	VERTICAL
2483.500000	48.50	33.7	54.0	5.5	159.0	123.00	HORIZONTAL

## 2 Test Mode: 11g / Chain 1

### 2.1 Channel 01



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

#### MEASUREMENT RESULT: PK Detector

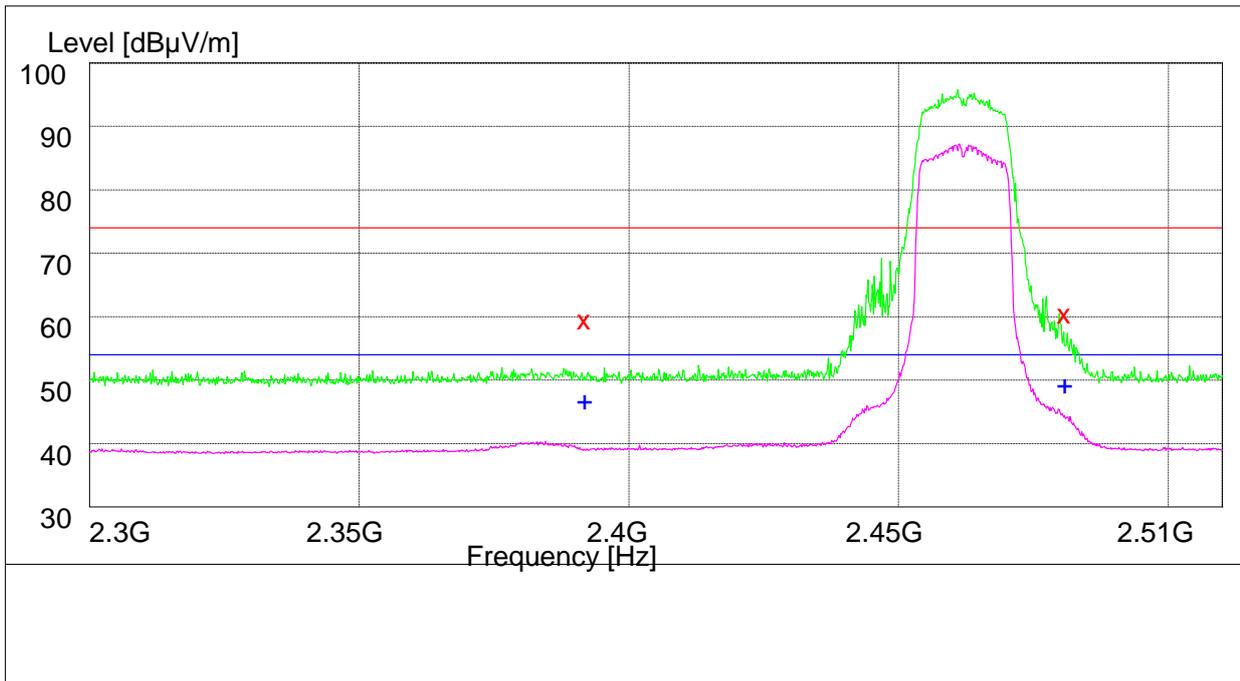
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	61.50	33.5	74.0	12.5	150.0	255.00	VERTICAL
2483.500000	60.30	33.7	74.0	13.7	103.0	102.00	VERTICAL

#### MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	47.90	33.5	54.0	6.1	120.0	246.00	VERTICAL
2483.500000	48.40	33.7	54.0	5.6	102.0	18.00	HORIZONTAL



## 2.2 Channel 11



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

### MEASUREMENT RESULT: PK Detector

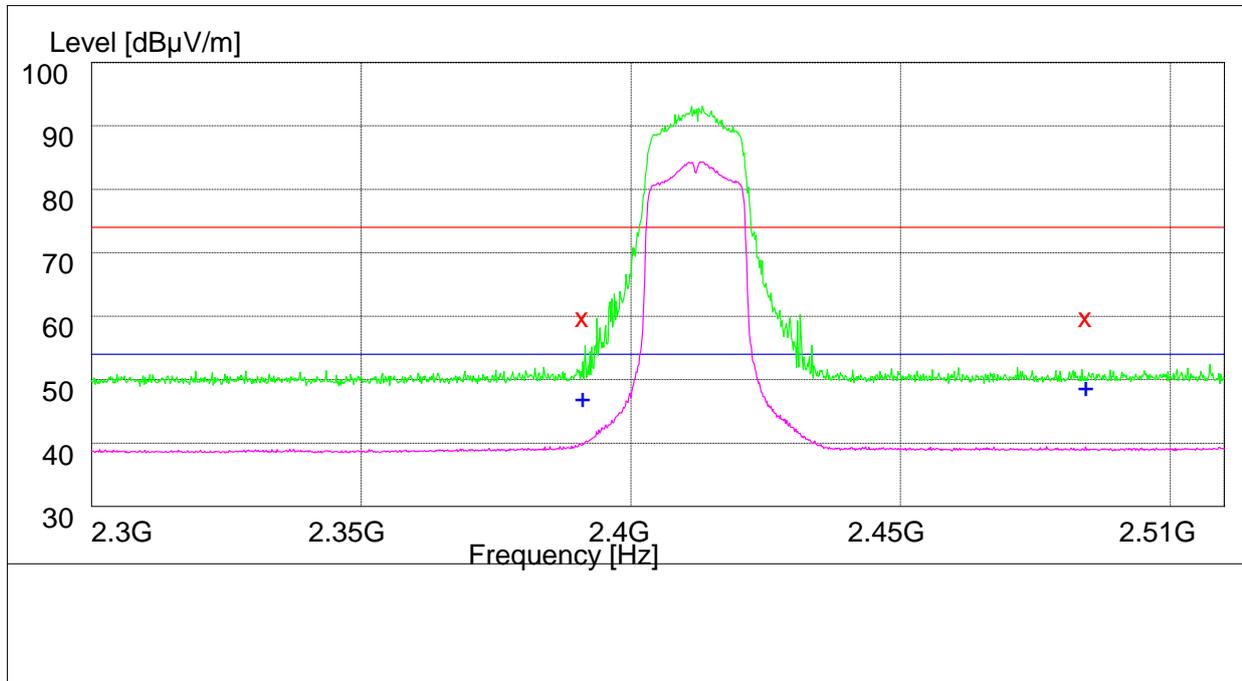
Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	60.90	33.5	74.0	13.1	120.0	201.00	HORIZONTAL
2483.500000	61.40	33.7	74.0	12.6	104.0	207.00	VERTICAL

### MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	48.30	33.5	54.0	5.7	123.0	201.00	VERTICAL
2483.500000	49.40	33.7	54.0	4.6	149.0	233.00	HORIZONTAL

### 3 Test Mode: 11n / Chain 1

#### 3.1 Channel 01



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

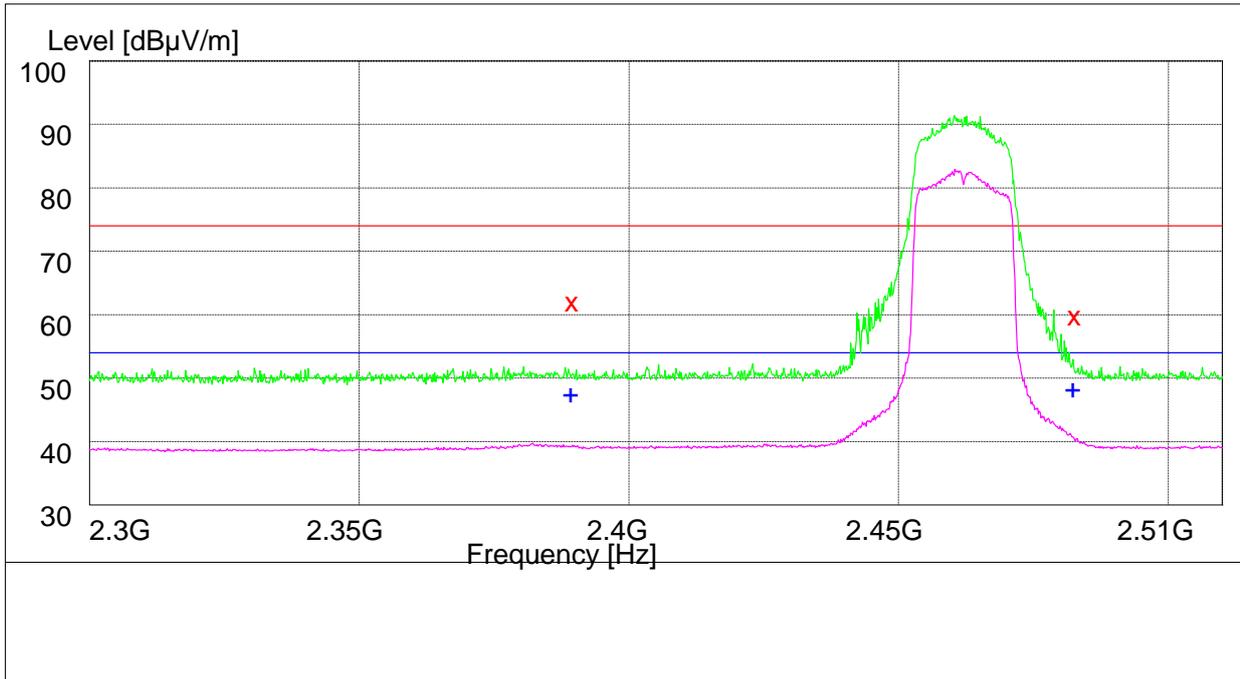
MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	60.50	33.5	74.0	13.5	100.0	115.00	VERTICAL
2483.500000	60.30	33.7	74.0	13.7	103.0	122.00	VERTICAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	47.80	33.5	54.0	6.2	140.0	206.00	VERTICAL
2483.500000	48.50	33.7	54.0	5.5	112.0	228.00	HORIZONTAL

### 3.2 Channel 11



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	61.50	33.5	74.0	12.5	150.0	221.00	HORIZONTAL
2483.500000	60.50	33.7	74.0	13.5	154.0	237.00	VERTICAL

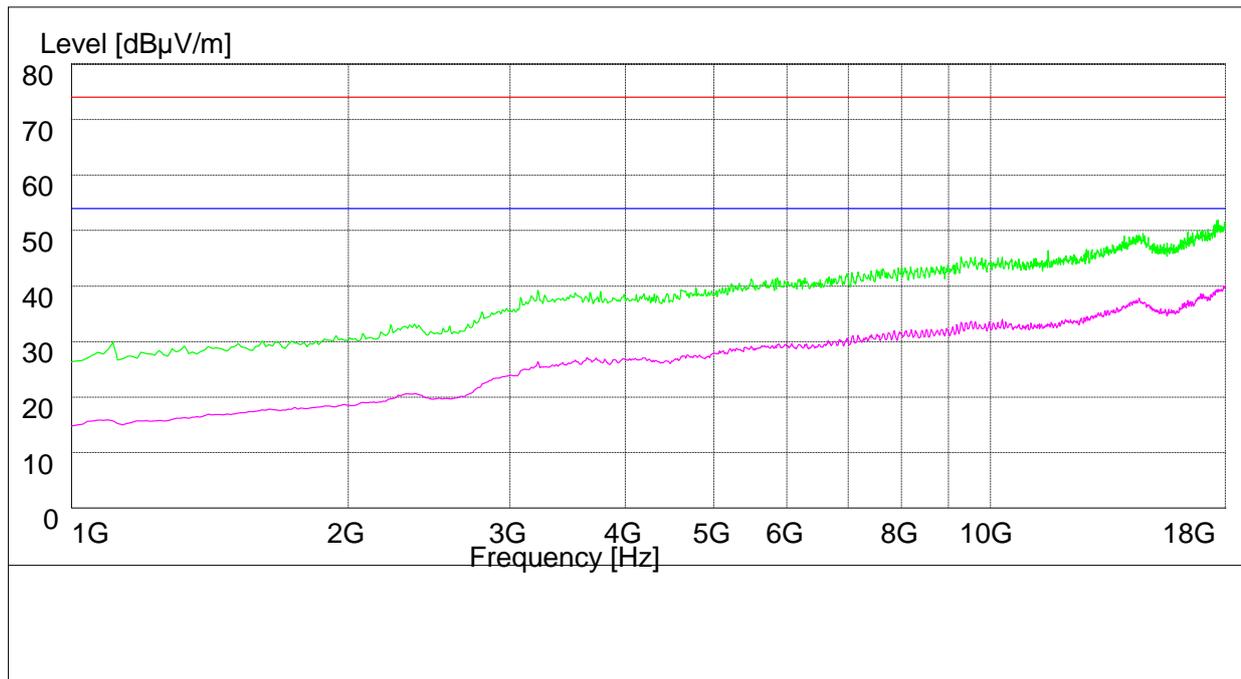
MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2390.000000	48.50	33.5	54.0	5.5	153.0	251.00	VERTICAL
2483.500000	49.60	33.7	54.0	4.4	109.0	103.00	HORIZONTAL

### 3.3

#### Part 4: Testing Range of “1 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 “1 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 $\mu$ V/m) and Average Limit (54 dB $\mu$ V/m).





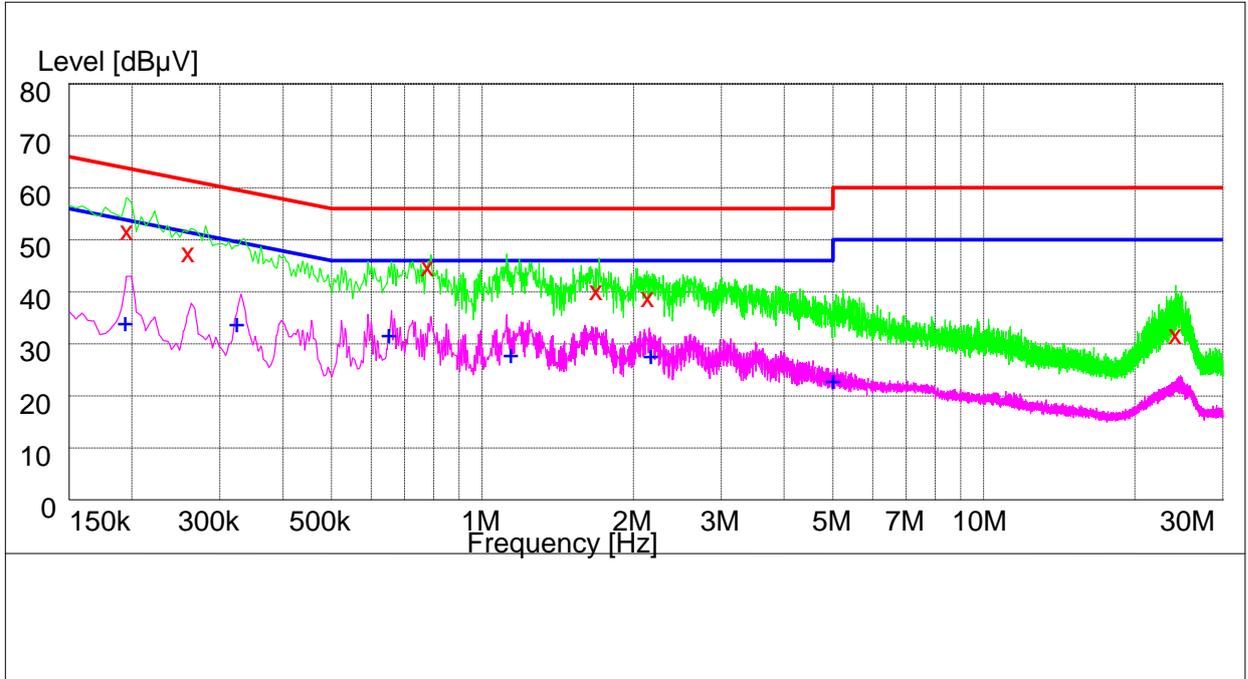
## **Appendix G**

# Conducted Emission at Power Port

According to FCC Part 15.207



## Channel 6



### MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.196000	52.20	10.1	64	11.8	N	FLO
0.260000	47.80	10.0	61	13.2	N	FLO
0.780000	45.60	10.1	56	10.4	N	FLO
1.690000	41.80	10.1	56	14.2	N	FLO
2.144000	40.40	10.1	56	15.6	N	FLO
24.130000	31.80	10.4	60	28.2	N	FLO

### MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.194000	35.60	10.1	54	18.4	N	FLO
0.324000	35.40	10.0	50	14.6	N	FLO
0.650000	31.80	10.1	46	14.2	N	FLO
1.138000	29.50	10.1	46	16.5	N	FLO
2.166000	29.30	10.1	46	16.7	N	FLO
4.998000	23.10	10.2	46	22.9	N	FLO