



FCC Test Report - EDR

**Product Name: HUAWEI ASCEND X;
HSPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth;
HUAWEI U9000; U9000;**

Model Number: HUAWEI U9000-81/U9000-81

**Report No: SYBH(Z-RF)025032011-2005
FCC ID: QISU9000-81
IC:6369A-U900081**

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2. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
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REPORT ON **FCC 47CFR part 15 subpart C Test of HUAWEI ASCEND X;
 HSPA/UMTS/GPRS/GSM/EDGE Mobile Phone with
 Bluetooth; HUAWEI U9000; U9000;**

M/N: HUAWEI U9000-81/U9000-81

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REGULATION **FCC CFR47 Part 2: Subpart J;**

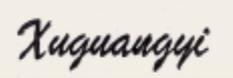
FCC CFR47 Part 15: Subpart C;

RSS-Gen Issue 2

RSS-210 Issue

CONCLUSION **Pass**

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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	RSS-210 Issue	Description	Result
15.247 (a) (1)	Annex 2 & Annex 8	20dB bandwidth measurement	PASS
15.247 (a) (1)	Annex 1 & Annex 2 & Annex 6	Carrier frequency separation measurement	PASS
15.247 (a) (1) III	Annex 8	Number of hopping channel	PASS
15.247 (a) (1) III	Annex 8	Time of occupancy	PASS
15.247 (b) (1)	Annex 4& Annex 13	Peak output power	PASS
15.247 (d)	Annex 2 & Annex 8	Band edge compliance measurement	PASS
15.247 (d)	Annex 13	Conducted RF spurious	PASS
15.247 (d) / 15.205 & 15.209	Annex 7	Radiated spurious emission & Radiated restricted band measurement	PASS
15.207	Annex 13	Conducted emission test for power port	PASS



2 Product Description

2.1 Production Information

2.1.1 General Description

HUAWEI ASCEND X; HSPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; HUAWEI U9000; U9000 - HUAWEI U9000-81/U9000-81 is subscriber equipment in the WCDMA/GSM system. The HSPA/UMTS frequency band is Band I, Band II, Band IV and Band V. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSPA/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.

2.1.2 Support function and Service

The EUT support the Bluetooth's function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Data and Voice	Modulation: $\pi/4$ -DQPSK		/
Data and Voice	Modulation: 8DPSK		

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

Mar.30, 2011 to Mar.31, 2011

3.2 General Set up Description

The Bluetooth hopping frequency system of EUT can Support 2.4GHz Band. For compliance with FCC regulation 47CFR part15 subpart C, we set the mobile phone as following test mode to do all compliance tests.

Bluetooth MODE:

TM1: GFSK Modulation
 π /4-DQPSK
8DPSK



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 checked="" type="checkbox"/> YES	<input type="checkbox"/> NO

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

Channel spacing:	1 MHz
Channel separation:	1 MHz

4.1.3 Type of Emission

Table 6 Type of Emission

Emission Designation:	-
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According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

4.1.4 Antenna Information

Table 7 Antenna Information

Type:	Integrated / Internal
Maximum Gain(dBi):	0 (from 2400MHz to 2500MHz)



4.1.5 Environmental Requirements

Table 8 Environmental Requirements

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

4.1.6 Power Source

Table 9 Power Source

AC voltage nominal:	~120V
AC voltage range	~100V-240V
AC current maximal:	650mA

4.1.7 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.

4.1.8 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 10 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 11 Board Information

HUAWEI ASCEND X; HSPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; HUAWEI U9000; U9000;		
HUAWEI U9000-81/U9000-81		
Board and Module		
Equipment Designation / Description	IMEI	Hardware Version
MAINBOARD	356161040006223	PR2.32

4.2.2 Battery Technical Data

Name	Qty.	Manufacture	Serials number	Description
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	YJCB107HI0202713	Battery Model: HHB4Z1 Rated capacity: 1400mAh Nominal Voltage: $\text{---} +3.7\text{V}$ Charging Voltage: $\text{---} +4.2\text{V}$

4.2.3 FCC Identification

Grantee Code: QIS
Product Code: U9000-81
FCC Identification: QISU9000-81

4.2.4 IC Identification

Grantee Code: 6369A
Product Code: U900081
IC Identification: 6369A-U900081



5 Main Test Instruments

Table 12 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
Receiver	R&S	ESU26	100150	07.06.2011
Pre-Amplifier	R&S	SCA-SCU 18	10003	07.08.2011
Pre-Amplifier	R&S	SCA-SCU 26	3357-3358	07.08.2011
BiLog Antenna	SCHWARZBE CK	VULB 9163	9163-356	05.14.2011
Horn Antenna	R&S	HF906	100683	05.14.2011
Horn Antenna	ETS-Lindgren	3160	00091989	09.20.2011
LISN	R&S	ENV216	100382	08.11.2011
Signal Analyzer	Agilent	E4440A	3608083811	12.17.2011
Universal Radio Communication Tester	R&S	CBT	3608053990	05.21.2011



6 Transmitter Measurements

6.1 20dB bandwidth measurement

6.1.1 Test Conditions

Table 13 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	76%
Test Configurations:	TM1 at channel No.0, 40, 78

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 15.247 (a) (1) and DA 00-705

6.1.2.2 Supporting Standards

Table 14 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

Not Applicable.

6.1.3 Test Method and Setup

- (a) Connect test port of mobile phone to universal communication tester.
- (b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function, then set the measured frequency number and test the 20dB bandwidth with universal communication tester.

Test setup

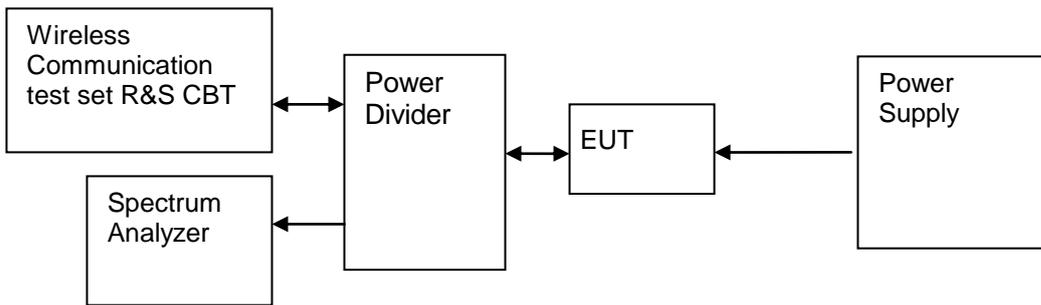


Figure 1. Test Set-up

6.1.4 Measurement Results

Table 15 Measurement Results (Modulation: $\pi/4$ -DQPSK)

Bandwidth Type	Channel Position	Channel Number	Frequency [GHz]	Measured Bandwidth [MHz]	Result
20dB	B	0	2.402	1.286M	Pass
20dB	M	40	2.442	1.284M	Pass
20dB	T	78	2.480	1.285M	Pass

Table 16 Measurement Results (Modulation: 8DPSK)

Bandwidth Type	Channel Position	Channel Number	Frequency [GHz]	Measured Bandwidth [MHz]	Result
20dB	B	0	2.402	1.289M	Pass
20dB	M	40	2.442	1.286M	Pass
20dB	T	78	2.480	1.285M	Pass

6.1.5 Conclusion

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

6.2 Carrier frequency separation measurement

6.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	76%
Test Configurations:	TM1 at channel No.39, 40, 41

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 15.247 (a) (1) and DA 00-705

6.2.2.2 Supporting Standards

Table 18 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

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Table 19 Limits (Modulation: $\pi/4$ -DQPSK)

Regulation:	≥ 0.025 or $2/3$ of the 20 dB bandwidth
Limit:	$\geq 2/3 \times 1.284\text{M} = 0.856$ MHz

Table 20 Limits (Modulation: 8DPSK)

Regulation:	≥ 0.025 or $2/3$ of the 20 dB bandwidth
Limit:	$\geq 2/3 \times 1.286\text{M} = 0.857$ MHz

6.2.3 Test Method and Setup

- (a) Connect test port of mobile phone to spectrum analyzer and universal communication tester.
- (b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function, then set the measured frequency number to two adjacent channels separately and test the carrier frequency separation with spectrum analyzer.

Test setup

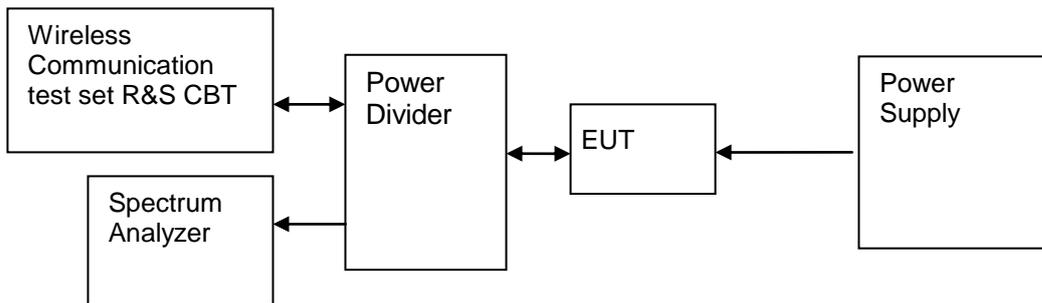


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 21 Measurement Results (Modulation: $\pi/4$ -DQPSK)

Channel No.	Frequency [GHz]	Channel No.	Frequency [GHz]	Measured frequency separation [MHz]	Limit [MHz]	Result
40	2.442	39	2.441	1.20	≥ 0.856	Pass
40	2.442	41	2.443	1.15	≥ 0.856	Pass

Table 22 Measurement Results (Modulation: 8DPSK)

Channel No.	Frequency [GHz]	Channel No.	Frequency [GHz]	Measured frequency separation [MHz]	Limit [MHz]	Result
40	2.442	39	2.441	1.15	≥ 0.857	Pass
40	2.442	41	2.443	0.90	≥ 0.857	Pass

6.2.5 Conclusion

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

6.3 Number of hopping channel

6.3.1 Test Conditions

Table 23 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	76%
Test Configurations:	TM1 at hopping frequency state

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 15.247 (a) (1) iii and DA 00-705

6.3.2.2 Supporting Standards

Table 24 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

Number of hopping channel should be compliance with the requirements in part15.247 (a) (1) iii.

Table 25 Limits

Limits	≥ 15 hopping frequency channel
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6.3.3 Test Method and Setup

- (a) Connect test port of mobile phone to spectrum analyzer and universal communication tester.
- (b) Set the mobile phone to transmit maximum output power at 2.4GHz and switch on frequency hopping function, then set enough count time (larger than 5000 times) to get all the hopping frequency channel displayed on the screen of spectrum analyzer.
- (c) Count the quantity of peaks to get the number of hopping channels.

Test setup

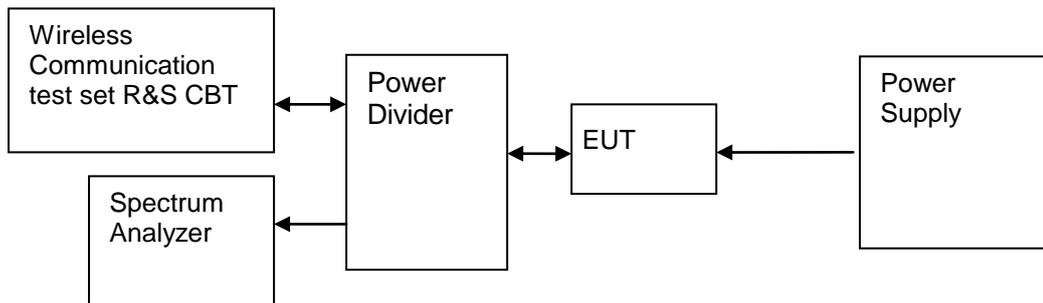


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 26 Measurement Results (Modulation: $\pi/4$ -DQPSK)

Measured frequency range [MHz]	Channel No. range	Measured Channel No.	Limit	Result
2400 to 2483.5	0-78	79	≥ 15	Pass

Table 27 Measurement Results (Modulation: 8-DPSK)

Measured frequency range [MHz]	Channel No. range	Measured Channel No.	Limit	Result
2400 to 2483.5	0-78	79	≥ 15	Pass

6.3.5 Conclusion

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



6.4 Time of occupancy

6.4.1 Test Conditions

Table 28 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	76%
Test Configurations:	TM1 at hopping frequency state

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 15.247 (a) (1) iii and DA 00-705

6.4.2.2 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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6.4.2.3 Limits

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

Table 30 Limits

Limits for time of occupancy	$\leq 0.4s$
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6.4.3 Test Method and Setup

- Connect test port of mobile phone to spectrum analyzer and universal communication tester.
- Set the mobile phone to transmit maximum output power at 2.4GHz and switch on frequency hopping function.
- Set the span of spectrum analyzer to 0 Hz, and set the resolution bandwidth to 1 MHz and the video bandwidth to 1 MHz, then get the time domain measured diagram. and set sweep time to 2 times of one burst occupancy time, and measure the time of occupancy of one burst.
- Set the resolution bandwidth to 1 MHz and the video bandwidth to 3 MHz, and set the sweep time to a period (0.4 seconds multiplied by the number of hopping channels employed), and count the number of the bursts.
- Calculate the time of occupancy in a period with time occupancy of a burst and quantity of bursts.

Test setup

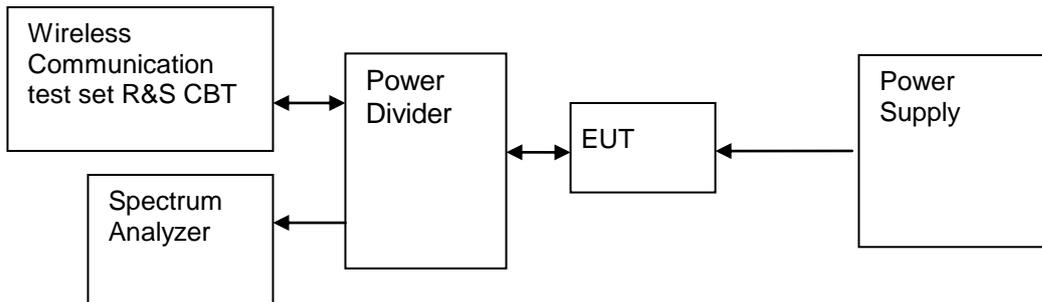


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 31 Measurement Results (Modulation: $\pi/4$ -DQPSK)

Time of Single Slot [ms]	Numbers of slots in a period	Time of occupied in a period [s]	Limit [s]	Result
2.883	106.7	0.3076	≤ 0.4	Pass

Table 32 Measurement Results (Modulation: 8DPSK)

Time of Single Slot [ms]	Numbers of slots in a period	Time of occupied in a period [s]	Limit [s]	Result
2.917	106.7	0.3112	≤ 0.4	Pass

Note: The result is measured at 2-DH5\3-DH5 mode in $\pi/4$ -DQPSK\8DPSK modulation, which has longest time in one transmission burst.

6.4.5 Conclusion

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



6.5 Peak output power

6.5.1 Test Conditions

Table 33 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	76%
Test Configurations:	TM1 at channel No.0, 40, 78

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 15.247 (b) (1) and DA 00-705

6.5.2.2 Supporting Standards

Table 34 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 (b) (1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watt.

Table 35 Limits

2.4GHz and 5.8GHz hopping frequency system	1 Watt (=30 dBm)
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6.5.3 Test Method and Setup

- Connect test port of mobile phone to universal communication tester.
- Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- Then set the mobile phone to transmit at high, middle and low frequency and measure the conducted output power separately.

Test setup

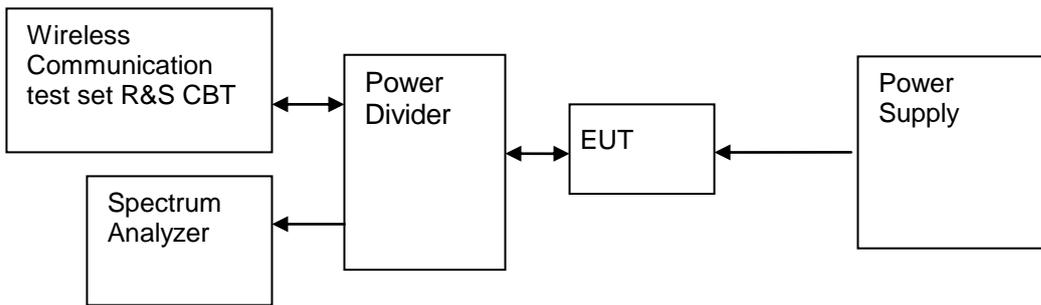


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 36 Measurement Results (Modulation: $\pi/4$ -DQPSK)

Channel	Channel No.	Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
Bottom	0	2402	-2.57	< 30	Pass
Middle	40	2442	-2.63	< 30	Pass
Top	78	2480	-3.71	< 30	Pass

Table 37 Measurement Results (Modulation: 8DPSK)

Channel	Channel No.	Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
Bottom	0	2402	-2.60	< 30	Pass
Middle	40	2442	-2.61	< 30	Pass
Top	78	2480	-3.71	< 30	Pass

6.5.5 Conclusion

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

6.6 Band edge spurious emission

6.6.1 Test Conditions

Table 38 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	76%
Test Configurations:	TM1 at channel No. 0, 78 and frequency hopping state

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 15.247 (d) and DA 00-705

6.6.2.2 Supporting Standards

Table 39 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.6.2.3 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 40 Limits

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

- Connect test port of mobile phone to spectrum analyzer and universal communication tester
- Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- Then set the mobile phone to transmit at high, low frequency and measure the conducted band edge spurious separately.
- Switch on the frequency hopping function, and repeat above measurement.

Test setup

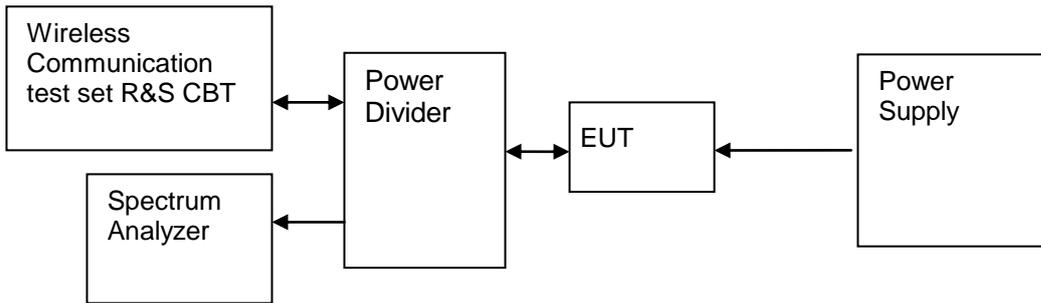


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 41 Measurement Results for Band Edge immediately outside the 2.4GHz Band
 (Modulation: $\pi/4$ -DQPSK)

	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
Low Edge	0	2402	-4.02	Off	-52.68	< -24.02	Pass
	-	-	-4.78	On	-54.90	< -24.78	Pass
High Edge	78	2480	-5.18	Off	-54.31	< -25.18	Pass
	-	-	-7.39	On	-53.49	< -27.39	Pass

Table 42 Measurement Results for Band Edge immediately outside the 2.4GHz Band
 (Modulation: 8DPSK)

	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
Low Edge	0	2402	-3.95	Off	-53.68	< -23.95	Pass
	-	-	-3.95	On	-54.00	< -23.95	Pass
High Edge	78	2480	-5.21	Off	-54.53	< -25.21	Pass
	-	-	-5.21	On	-52.35	< -25.21	Pass

6.6.5 Conclusion

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



6.7 Conducted RF spurious

6.7.1 Test Conditions

Table 43 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	76%
Test Configurations:	TM1 at channel No.0, 40, 78

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 15.247 (d) and DA 00-705

6.7.2.2 Supporting Standards

Table 44 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
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6.7.2.3 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 45 Limits

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

- Connect test port of mobile phone to spectrum analyzer and universal communication tester
- Set the mobile phone to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- Then set the mobile phone to transmit at high, middle and low frequency and measure the conducted band edge spurious separately.
- Switch on the frequency hopping function, and repeat above measurement.

Test setup

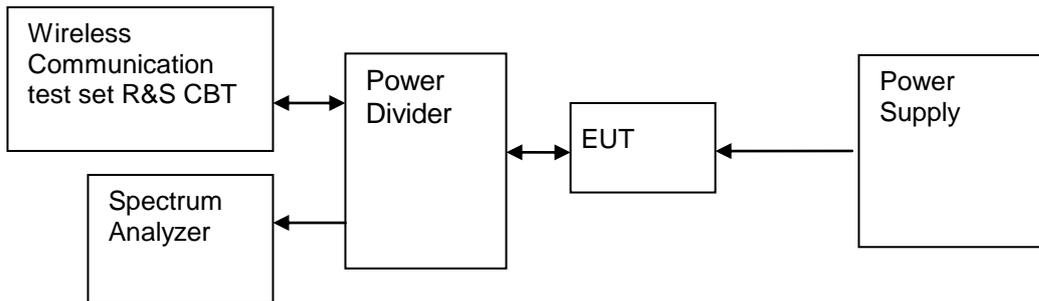


Figure 7. Test Set-up

6.7.4 Measurement Results

Table 46 Measurement Results (Modulation: $\pi/4$ -DQPSK)

Test Frequency Range	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
9kHz-25GHz	0	2402	-6.16	Off	-44.68	< -26.16	Pass
9kHz-25GHz	40	2442	-4.86	Off	-45.17	< -24.86	Pass
9kHz-25GHz	78	2480	-6.65	Off	-44.71	< -26.65	Pass

Table 47 Measurement Results (Modulation: 8DPSK)

Test Frequency Range	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
9kHz-25GHz	0	2402	-5.96	Off	-44.56	< -25.96	Pass
9kHz-25GHz	40	2442	-5.97	Off	-44.24	< -25.97	Pass
9kHz-25GHz	78	2480	-6.43	Off	-44.48	< -26.43	Pass

6.7.5 Conclusion

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



6.8 Radiated spurious emission & spurious in restricted band

6.8.1 Test Conditions

Table 48 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Enclosure
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1 at channel No.0, 40, 78

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 15.247 (d), 15.205 & 15.209 and DA 00-705

6.8.2.2 Supporting Standards

Table 49 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

6.8.2.3 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 50 Limits

Frequency (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (meters)	Detector
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	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) (see above table).

6.8.3 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 (2003). 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, 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 with the BTS simulator through Air interface. The Mobile Phone transmits maximum output power at 2.4GHz and switch off frequency hopping function.

Measurement bandwidth: 30 MHz - 1000 MHz: 120 kHz

Measurement bandwidth: 1000 MHz - 10th Carrier Frequency: 1 MHz

Test set up

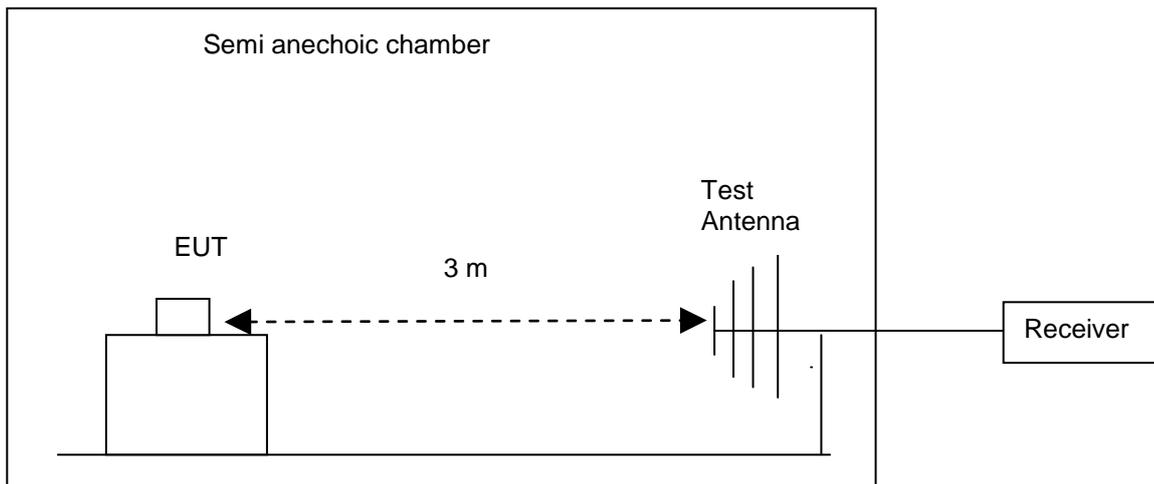


Figure 8. Test Set up

6.8.4 Measurement Results

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

Measured Result of channel: 0 (2402MHz)

Table 51 MEASUREMENT RESULT

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
33.104000	24.50	11.7	40.0	15.5	120.0	103.00	HORIZONTAL
53.940000	21.70	12.7	40.0	18.3	145.0	212.00	HORIZONTAL
84.404000	21.80	10.1	43.5	21.7	112.0	215.00	VERTICAL
203.432000	22.90	12.2	43.5	20.6	106.0	50.00	HORIZONTAL
314.552000	22.90	15.8	46.0	23.1	141.0	130.00	HORIZONTAL
754.780000	31.90	24.1	46.0	14.1	152.0	120.00	VERTICAL
3877.700000	3.60	-20.1	54.0	50.4	145.0	58.00	HORIZONTAL
5872.300000	5.40	-16.3	54.0	48.6	110.0	123.00	VERTICAL
8895.100000	8.10	-11.9	54.0	45.9	121.0	107.00	VERTICAL
12682.400000	12.70	-6.1	54.0	41.3	100.0	348.00	HORIZONTAL
15094.100000	13.10	-5.0	54.0	40.9	124.0	64.00	HORIZONTAL
17898.800000	15.80	-1.1	54.0	38.2	104.0	108.00	HORIZONTAL
2310.000000	39.00	33.3	54.0	15.0	128.0	271.00	HORIZONTAL
2390.000000	39.40	33.5	54.0	14.6	141.0	210.00	HORIZONTAL



2483.500000	40.00	33.7	54.0	14.0	145.0	107.00	HORIZONTAL
2500.000000	39.60	33.8	54.0	14.4	191.0	230.00	HORIZONTAL

Measured Result of channel: 40 (2442MHz)

Table 52 MEASUREMENT RESULT

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
32.988000	25.30	11.7	40.0	14.7	121.0	154.00	HORIZONTAL
53.456000	19.70	12.7	40.0	20.3	105.0	52.00	VERTICAL
134.404000	20.90	9.0	43.5	22.6	121.0	314.00	HORIZONTAL
268.648000	21.40	14.5	46.0	24.6	112.0	33.00	VERTICAL
438.828000	25.90	18.9	46.0	20.1	114.0	320.00	HORIZONTAL
788.088000	32.60	24.6	46.0	13.4	152.0	129.00	VERTICAL
2978.500000	3.00	-21.8	54.0	51.0	100.0	271.00	VERTICAL
4882.100000	4.30	-18.1	54.0	49.7	100.0	119.00	VERTICAL
7194.100000	6.00	-15.3	54.0	48.0	100.0	17.00	VERTICAL
9613.800000	8.80	-10.5	54.0	45.2	100.0	344.00	VERTICAL
12791.700000	12.90	-6.0	54.0	41.1	100.0	165.00	HORIZONTAL
17670.100000	15.40	-1.3	54.0	38.6	100.0	73.00	VERTICAL

Measured Result of channel: 78 (2480MHz)

Table 53 MEASUREMENT RESULT

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
33.004000	24.70	11.7	40.0	15.3	145.0	245.00	VERTICAL
58.770000	19.80	12.7	40.0	20.2	112.0	252.00	VERTICAL
135.000000	18.80	9.0	43.5	24.7	174.0	125.00	HORIZONTAL
234.200000	17.50	13.7	46.0	28.5	112.0	10.00	HORIZONTAL
314.712000	20.90	15.8	46.0	25.1	140.0	210.00	HORIZONTAL
750.500000	31.90	24.1	46.0	14.1	185.0	120.00	VERTICAL
3218.300000	4.00	-21.5	54.0	50.0	121.0	326.00	VERTICAL
4616.100000	5.30	-18.7	54.0	48.7	110.0	107.00	HORIZONTAL
6189.700000	6.10	-16.0	54.0	47.9	114.0	194.00	VERTICAL
9867.700000	9.60	-10.3	54.0	44.4	100.0	270.00	VERTICAL
12852.700000	13.50	-6.2	54.0	40.5	154.0	84.00	HORIZONTAL
17996.500000	17.10	-0.5	54.0	36.9	125.0	100.00	HORIZONTAL
2310.000000	39.00	33.3	54.0	15.0	108.0	241.00	HORIZONTAL
2390.000000	39.40	33.5	54.0	14.6	141.0	240.00	HORIZONTAL
2483.500000	40.00	33.7	54.0	14.0	125.0	17.00	HORIZONTAL
2500.000000	39.50	33.8	54.0	14.5	101.0	310.00	HORIZONTAL

6.8.5 Conclusion

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

6.9 Conducted Emission at Power Port

6.9.1 Test Conditions

Table 54 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	23.5°C
Relative humidity:	55 %
Test Configurations:	TM1 at channel No. 40

6.9.2 Test Specifications and Limits

6.9.2.1 Specification

CFR 47 (FCC) part 15.207 and DA 00-705

6.9.2.2 Supporting Standards

Table 55 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
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6.9.2.3 Limits

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

Table 56 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.

6.9.3 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: 2003.

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 Mobile Phone to transmitter the maximum power which defined in specification of product. The Mobile Phone operated on the typical channel.

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

Test Set-up

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

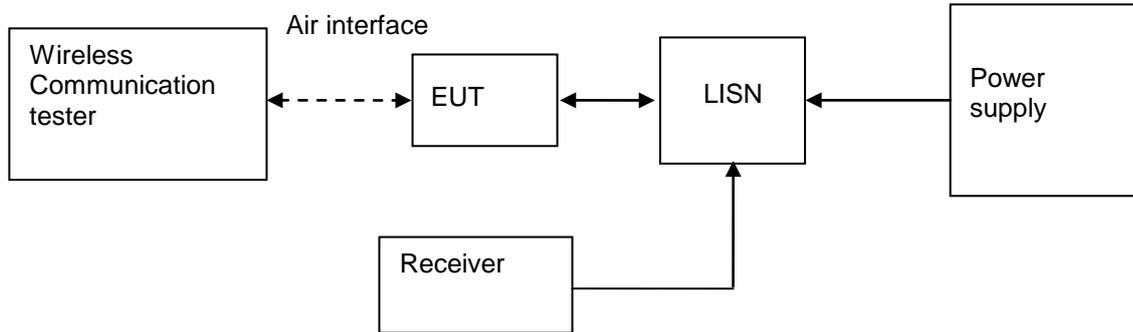


Figure 9. Test Set-up

6.9.4 Measurement Results

Table 57 MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.200000	55.40	10.1	64	8.6	N	FLO
0.266000	51.90	10.0	61	9.1	N	FLO
0.268000	51.70	10.0	61	9.3	N	FLO
0.400000	47.40	10.0	58	10.6	N	FLO
1.676000	43.50	10.1	56	12.5	N	FLO
2.078000	42.50	10.1	56	13.5	N	FLO

Table 58 MEASUREMENT RESULT:AV DECTER

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.268000	38.30	10.0	51	12.7	N	FLO
0.602000	36.30	10.1	46	9.7	N	FLO
1.210000	32.10	10.1	46	13.9	N	FLO
2.154000	30.20	10.1	46	15.8	L1	FLO
5.060000	23.10	10.2	50	26.9	N	FLO
21.780000	16.40	10.4	50	33.6	L1	FLO

6.9.5 Conclusion

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



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 59 System Measurement Uncertainty

Items		Extended Uncertainty
20dB bandwidth measurement	Magnitude (%)	U=0.2%; k=2
Carrier frequency separation measurement	Magnitude (%)	U=0.2%; k=2
Time of occupancy	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= 2.0dB; k=2
Radiated spurious emission & Radiated restricted band measurement	Field strength (dB μ V/m)	U=2.2dB; k=2 U=5dB; k=2
Conducted emission test for power port	Disturbance Voltage(dB μ V)	U=4dB; k=2



8 Appendices List

Appendix A	Measurement Results 20dB bandwidth measurement	7 pages
Appendix B	Measurement Results Carrier frequency separation measurement	3 pages
Appendix C	Measurement Results Number of hopping channel	3 pages
Appendix D	Measurement Results Time of occupancy	5 pages
Appendix E	Measurement Results Peak output power	7 pages
Appendix F	Measurement Results Band edge compliance measurement	9 pages
Appendix G	Measurement Results Conducted RF spurious	19 pages
Appendix H	Measurement Results Radiated spurious emission	12 pages
Appendix I	Measurement Results Conducted emission test for power port	2 pages
Appendix J	Photos of Test Setup	3 pages

----- End of Report -----



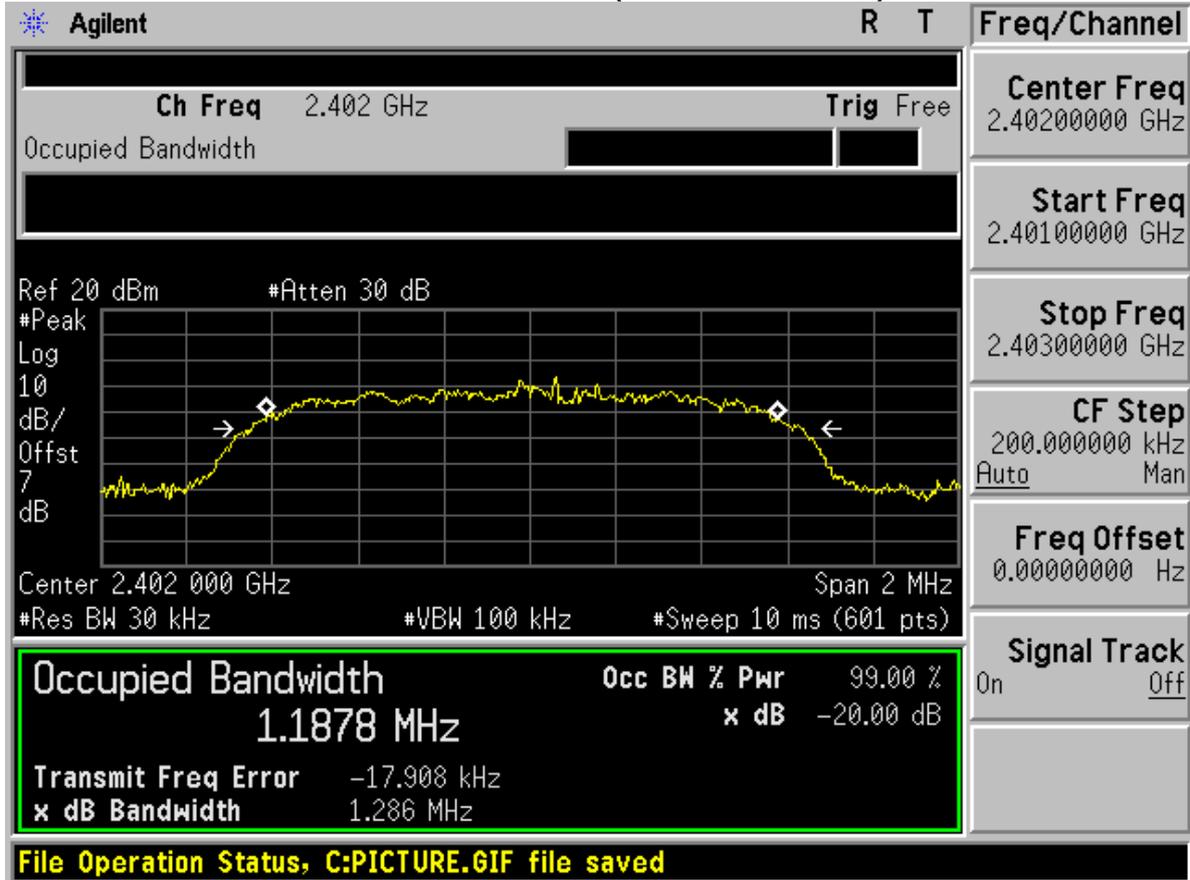
Appendix A

20dB bandwidth measurement

According to FCC Part 15.247 (a) (1)



Modulation: $\pi/4$ -DQPSK Channel 0 (2402MHz)





Channel 40 (2442MHz)

Agilent
R T

Ch Freq 2.442 GHz **Trig** Free

Occupied Bandwidth

Freq/Channel

Center Freq
2.44200000 GHz

Start Freq
2.44100000 GHz

Stop Freq
2.44300000 GHz

CF Step
200.000000 kHz
Auto Man

Freq Offset
0.00000000 Hz

Signal Track
On Off

Ref 20 dBm #Atten 30 dB

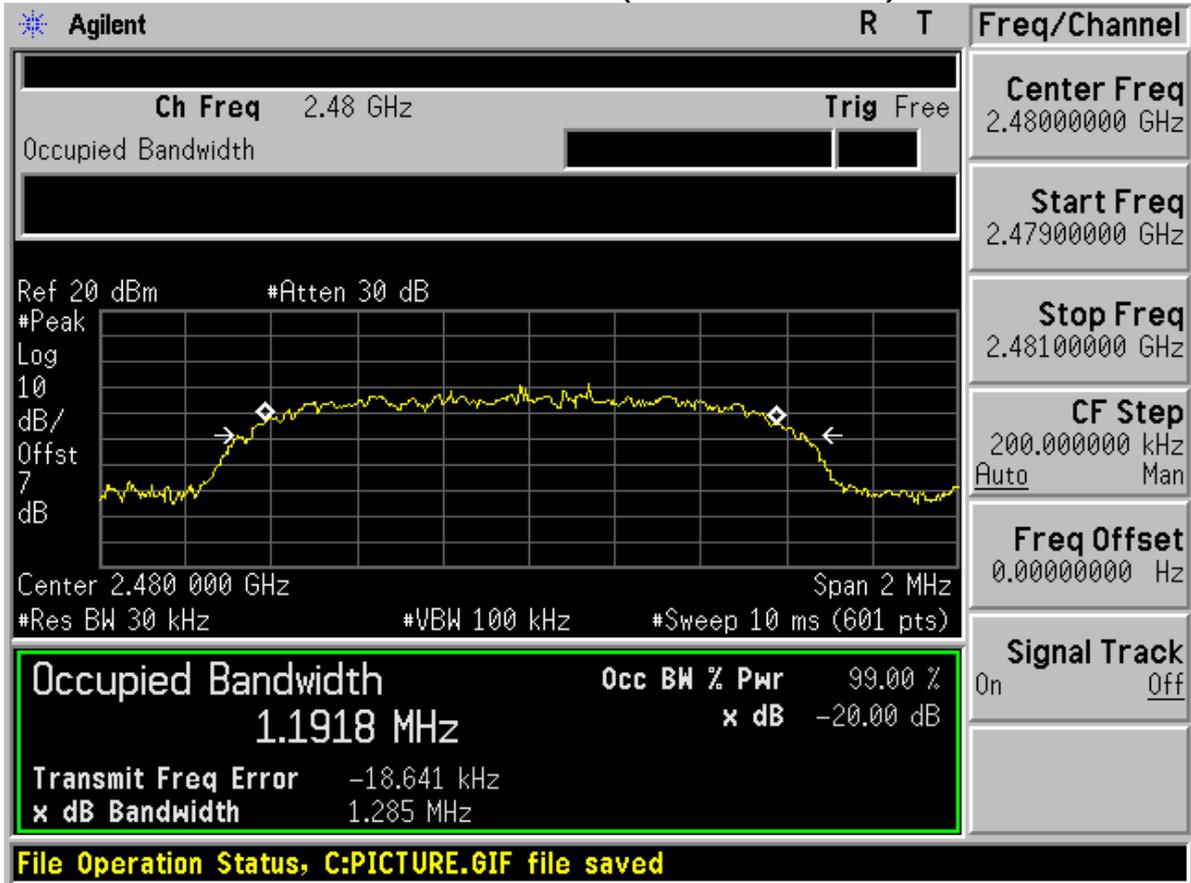
Center 2.442 000 GHz Span 2 MHz
 #Res BW 30 kHz #VBW 100 kHz #Sweep 10 ms (601 pts)

Occupied Bandwidth	Occ BW % Pwr 99.00 %
1.1867 MHz	x dB -20.00 dB
Transmit Freq Error	-20.805 kHz
x dB Bandwidth	1.284 MHz

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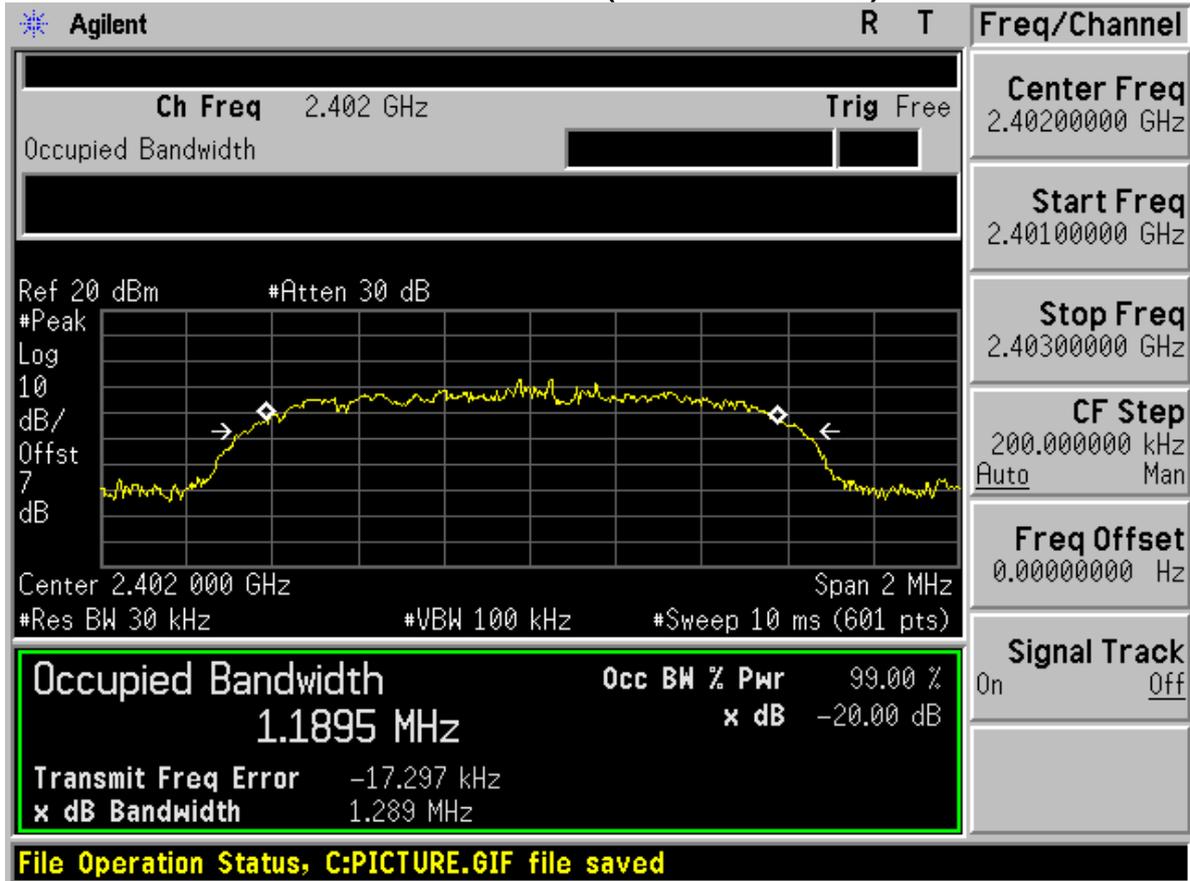


Channel 78 (2480MHz)



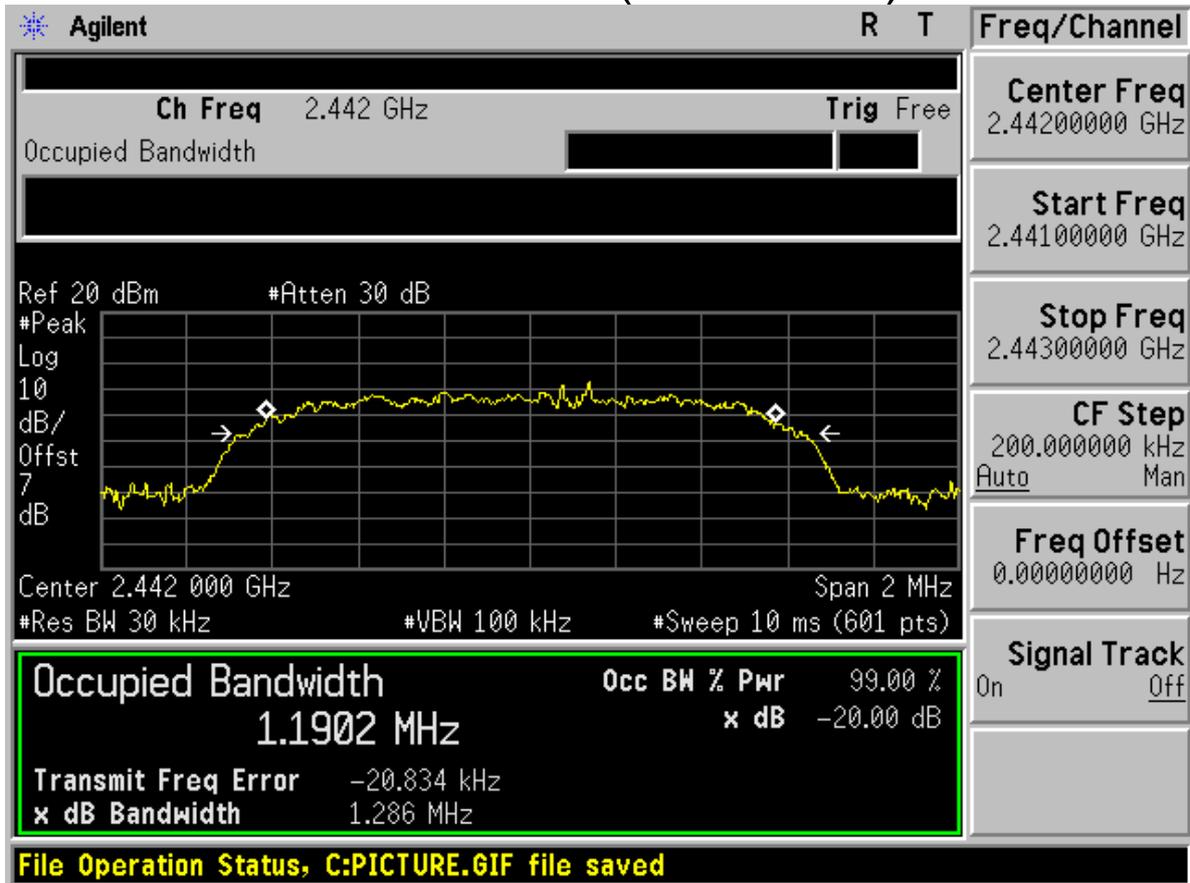


Modulation: 8DPSK Channel 0 (2402MHz)



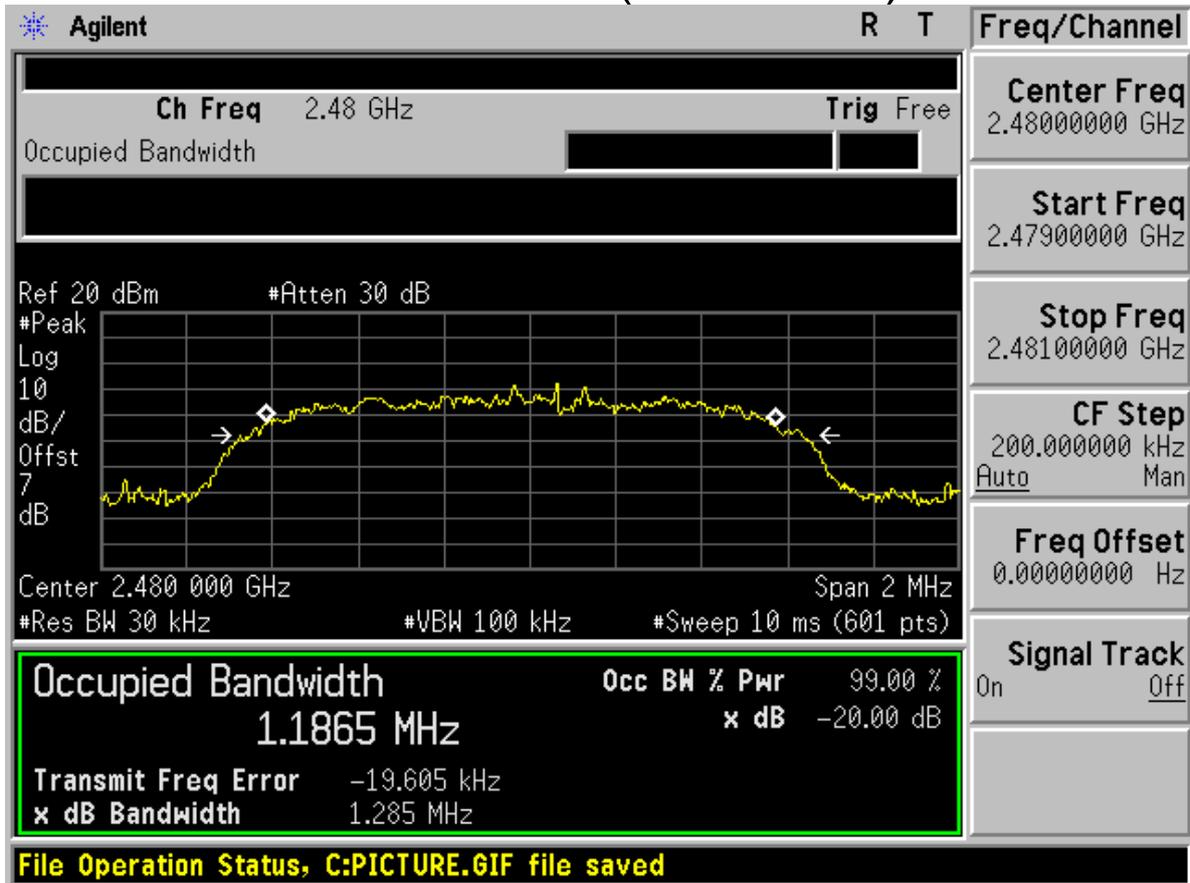


Channel 40 (2442MHz)





Channel 78 (2480MHz)





Appendix B

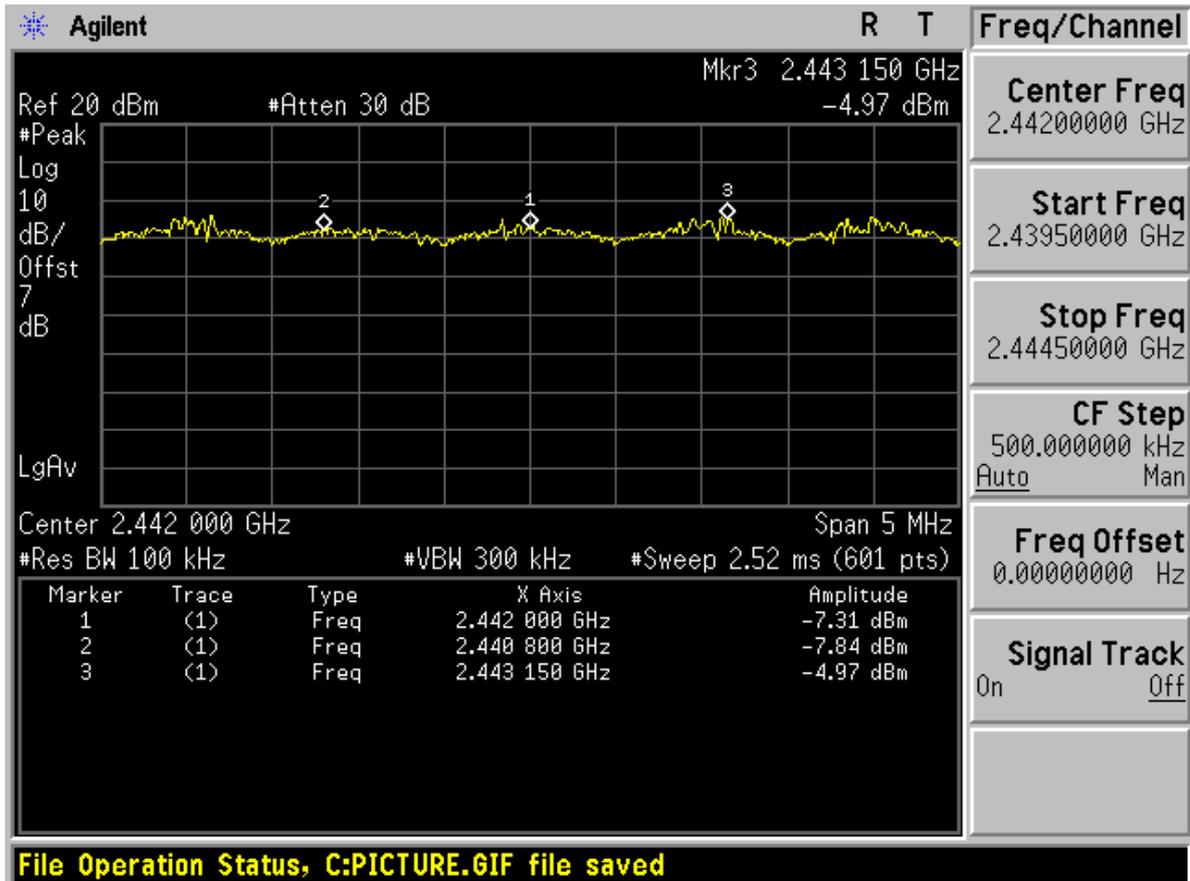
Carrier frequency separation measurement

According to FCC Part 15.247 (a) (1)



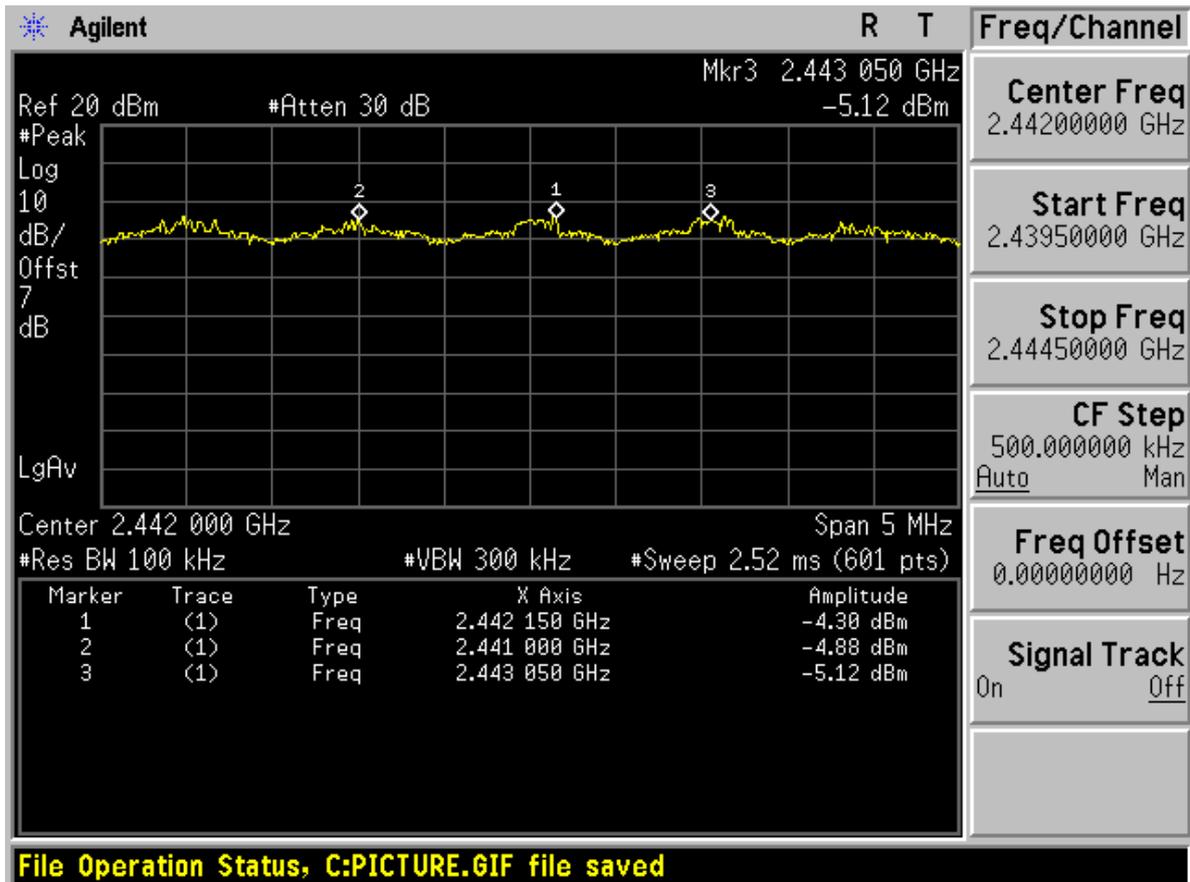
Modulation: $\pi/4$ -DQPSK

Centred at Channel 40





Modulation: 8DPSK Centred at Channel 40





Appendix C

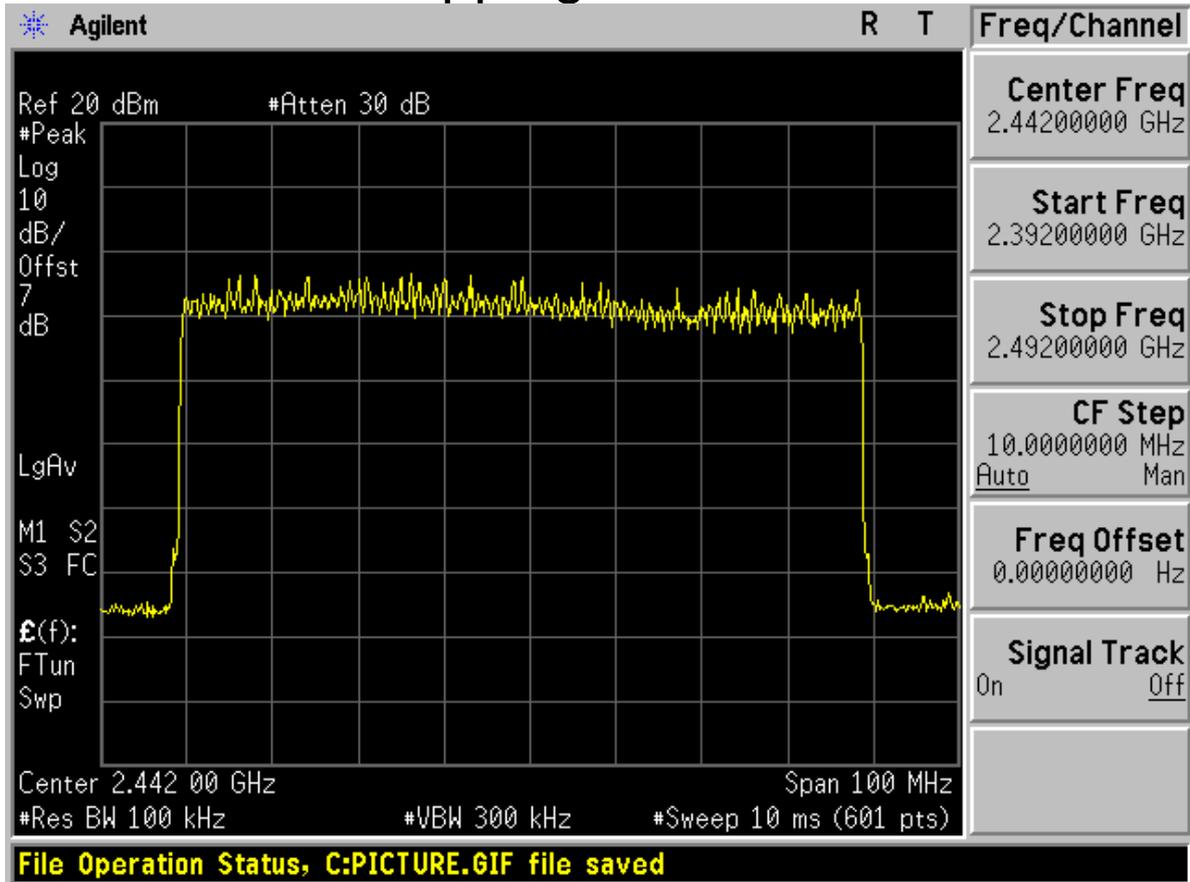
Number of hopping channel

According to FCC Part 15.247 (a) (1) iii



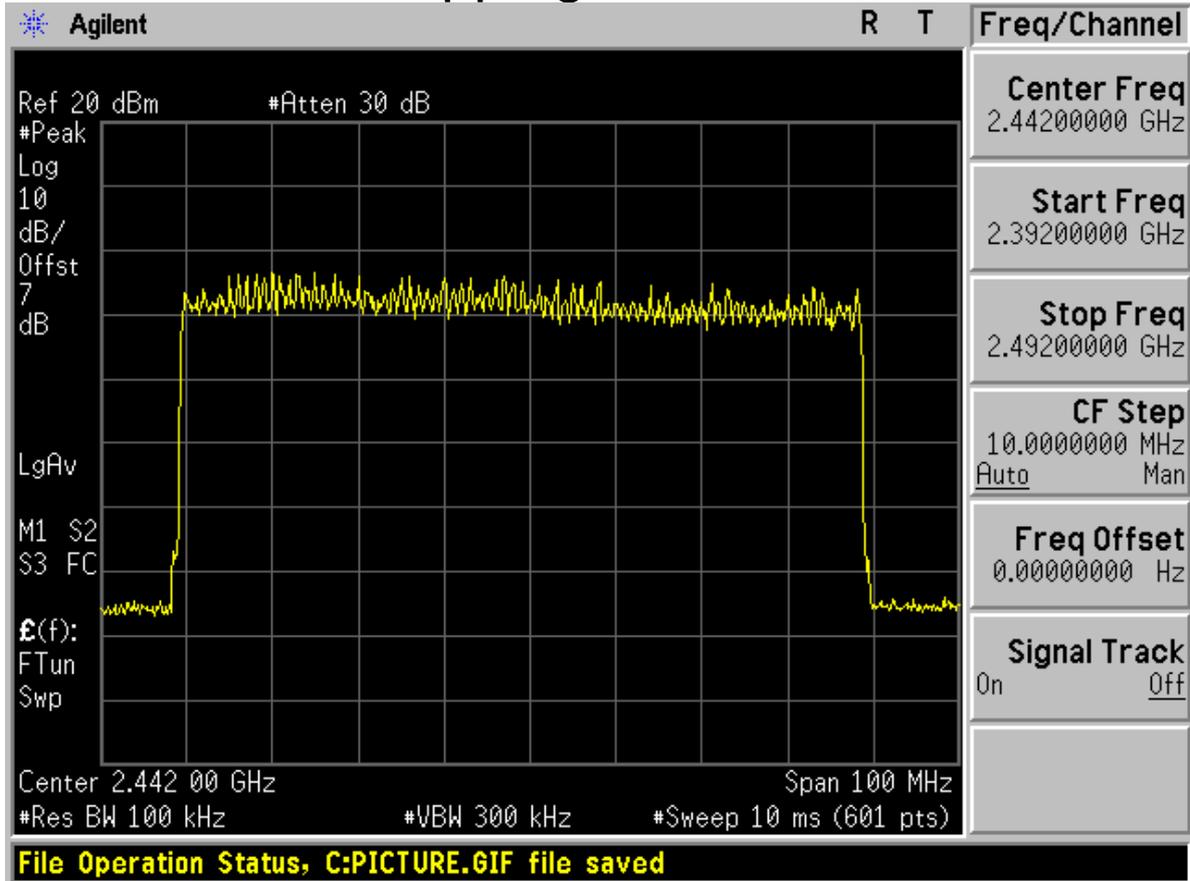
Modulation: $\pi/4$ -DQPSK

Total hopping channels = 79





Modulation: 8DPSK Total hopping channels = 79





Appendix D

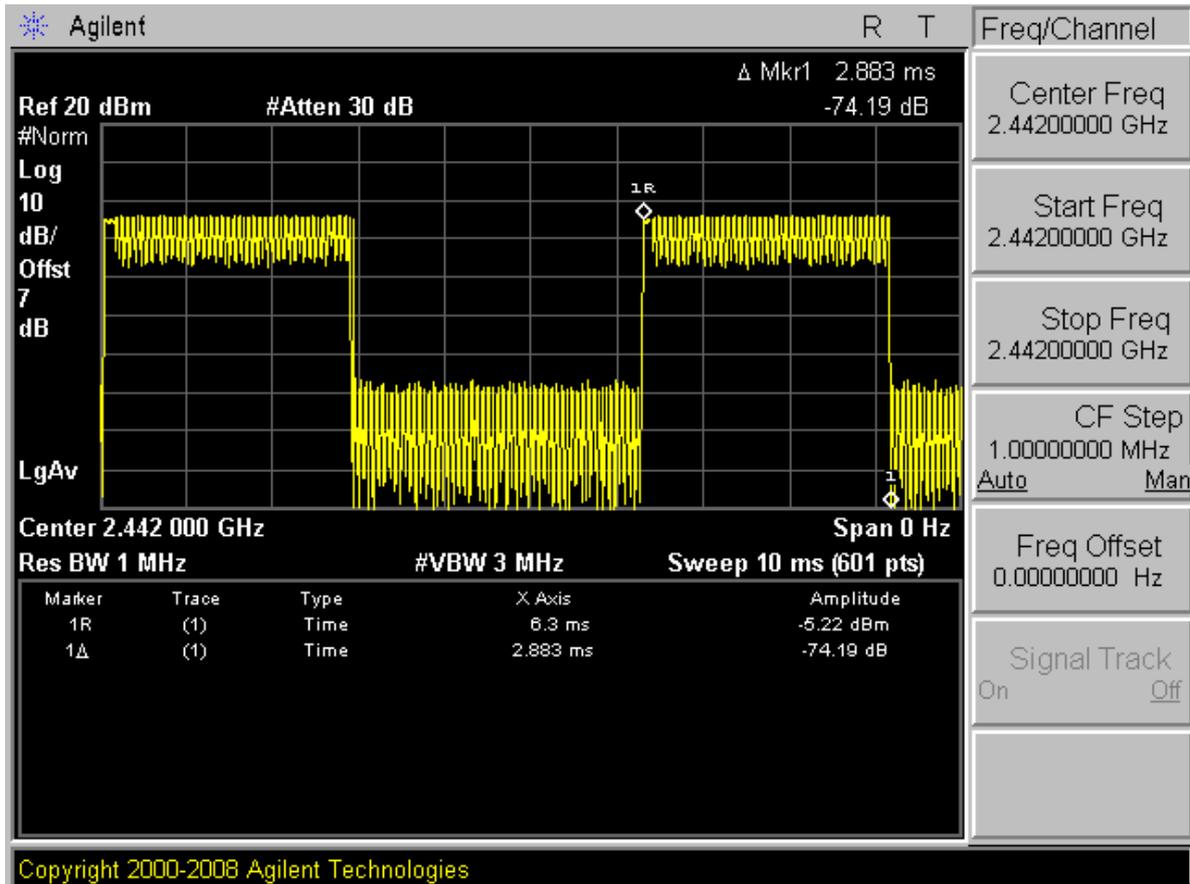
Time of occupancy

According to FCC Part 15.247 (a) (1) iii



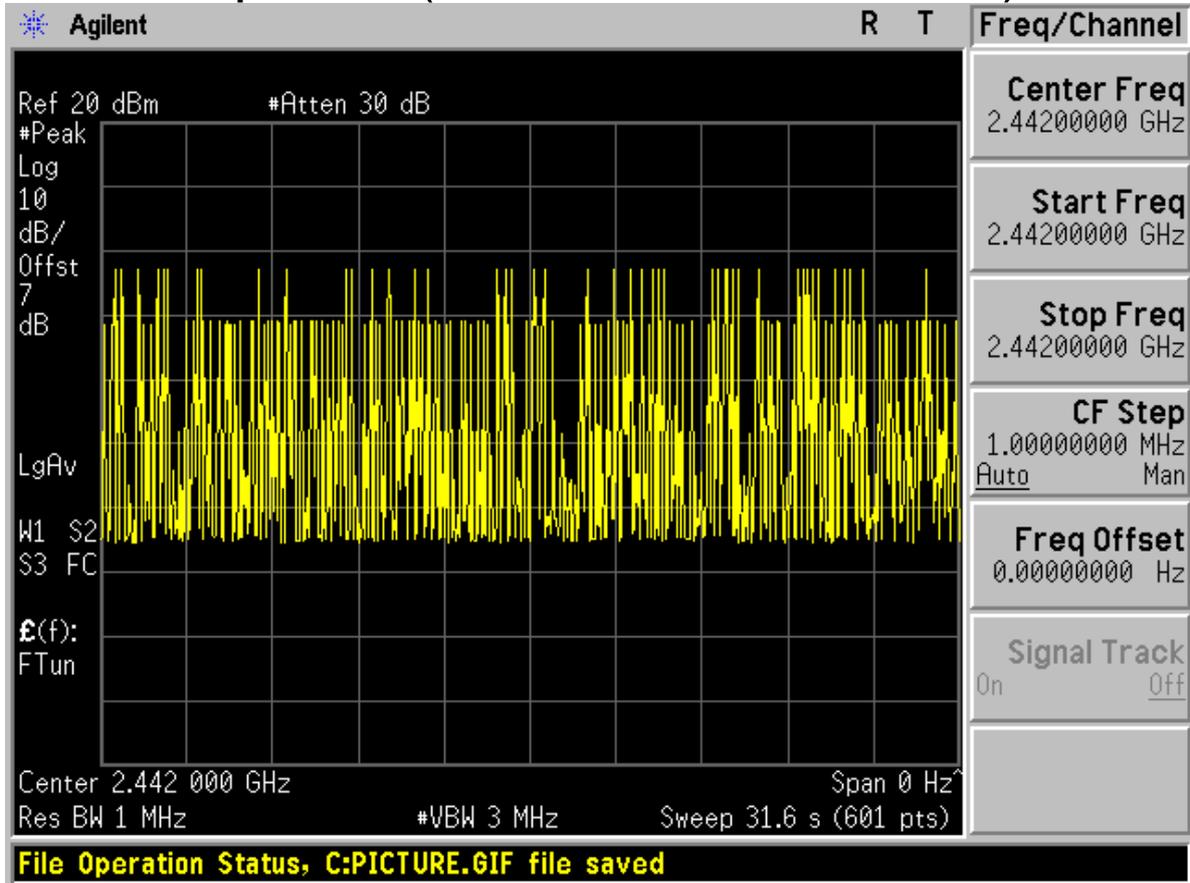
Modulation: $\pi/4$ -DQPSK

A burst (One time slot)





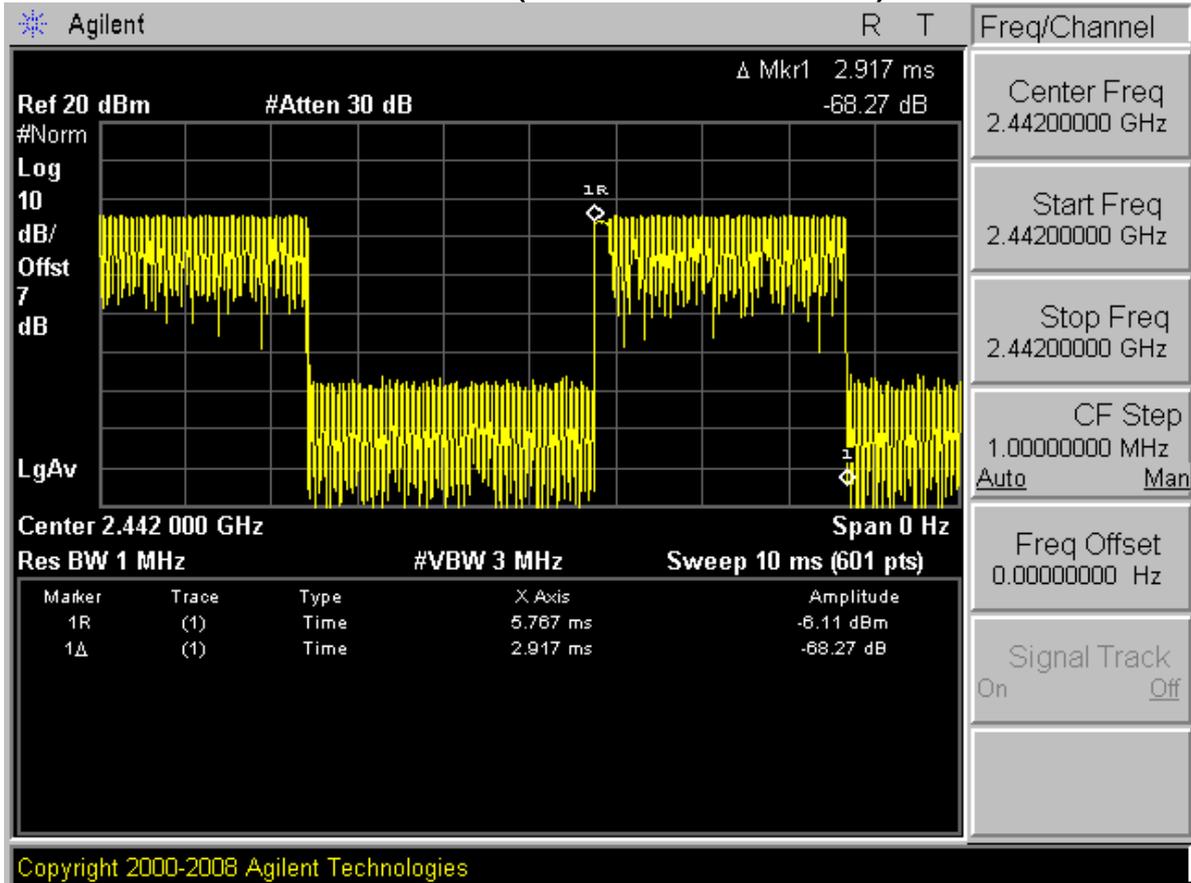
A period (Less than 106.7 burst)





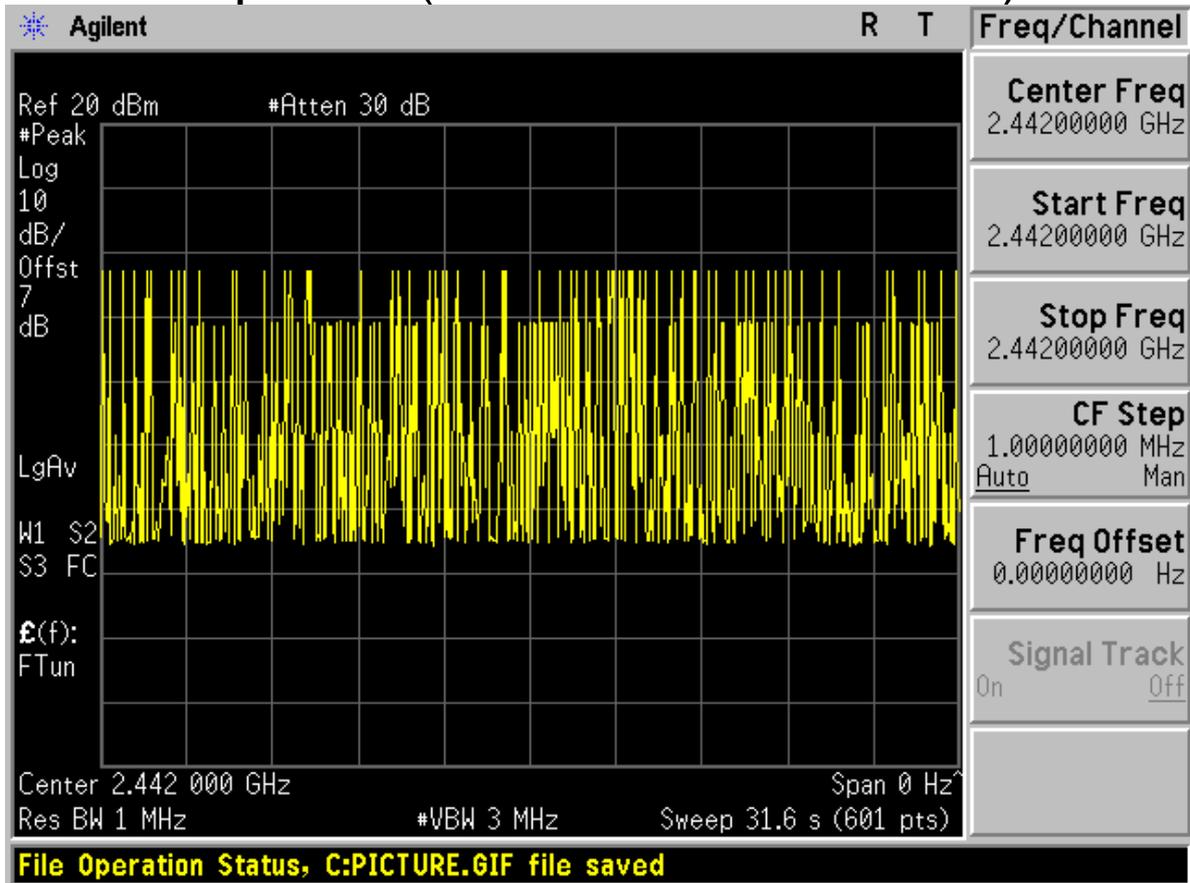
Modulation: 8DPSK

A burst (One time slot)





A period (Less than 106.7 burst)





Appendix E

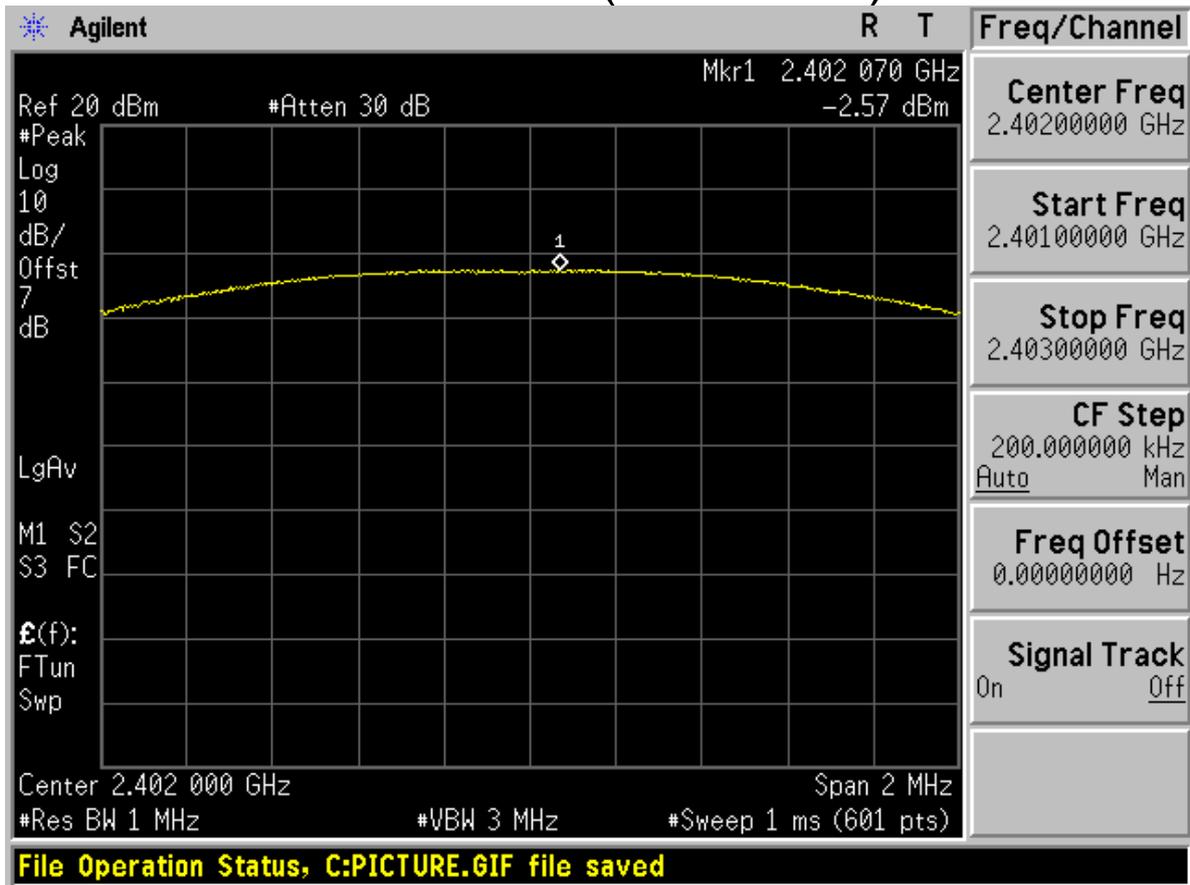
Peak output power

According to FCC Part 15.247 (b) (1)



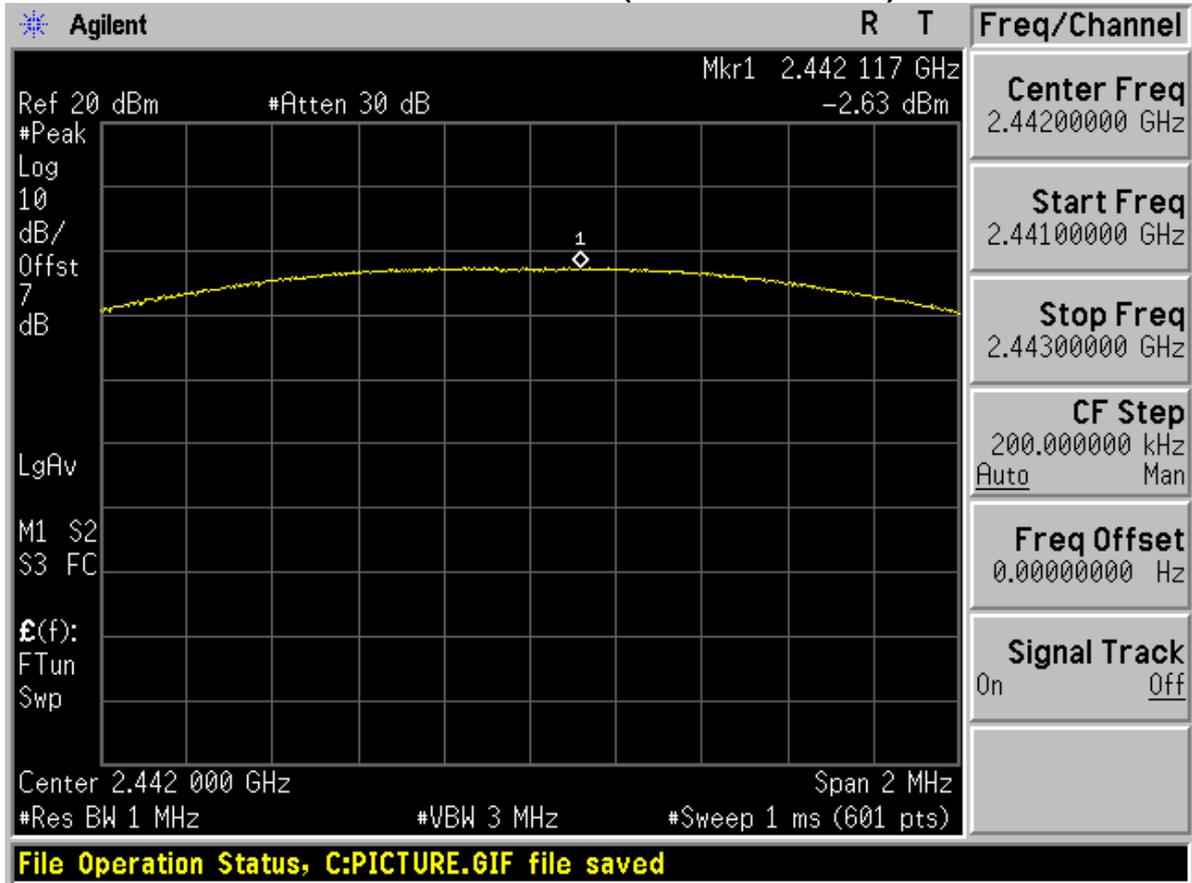
Modulation: $\pi/4$ -DQPSK

Channel 0 (2402MHz)



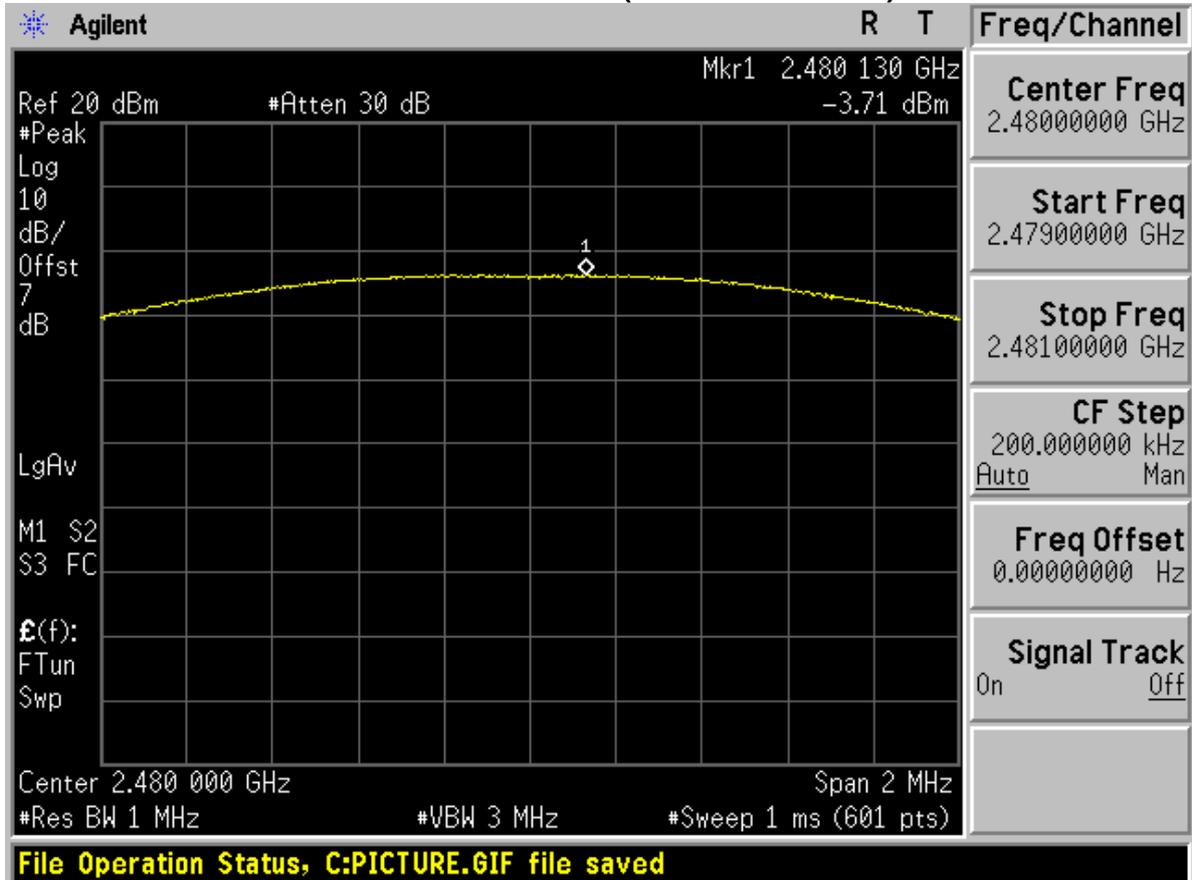


Channel 40 (2442MHz)



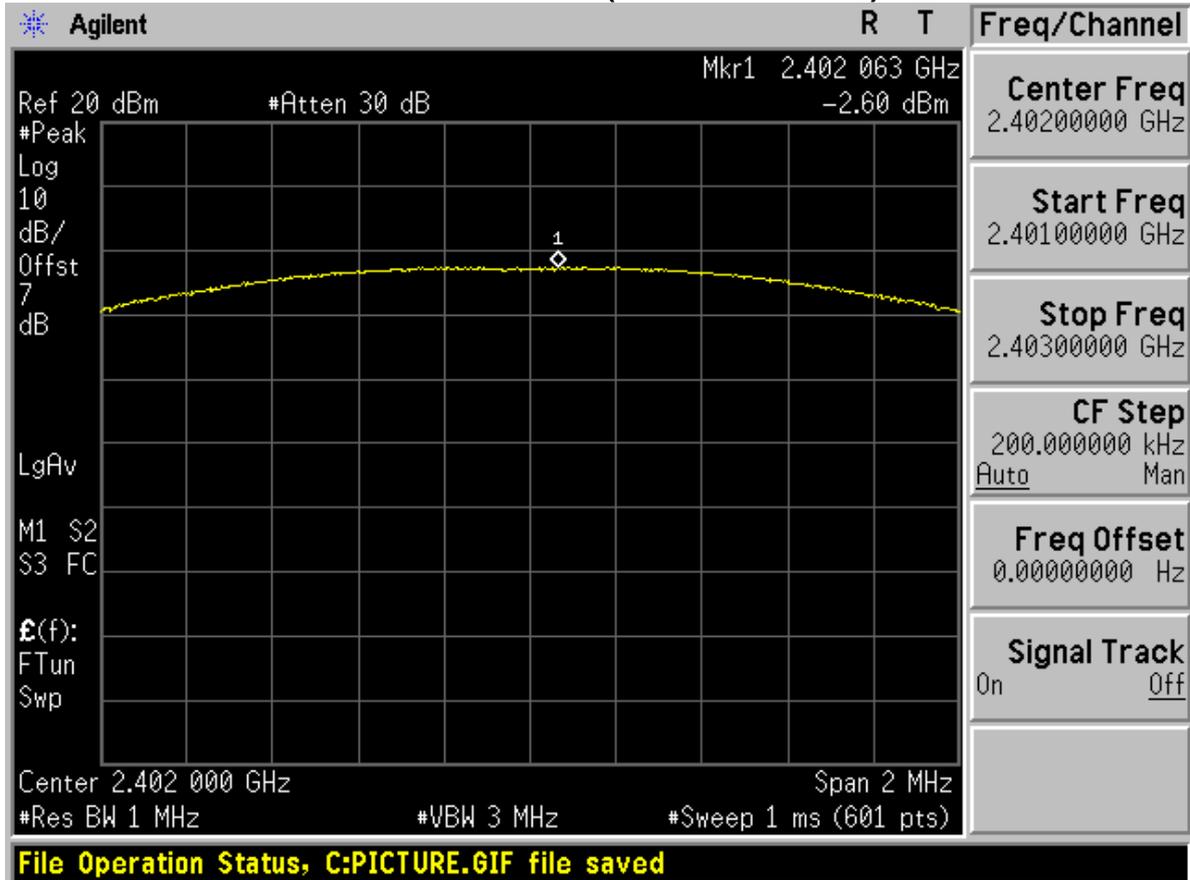


Channel 78 (2480MHz)



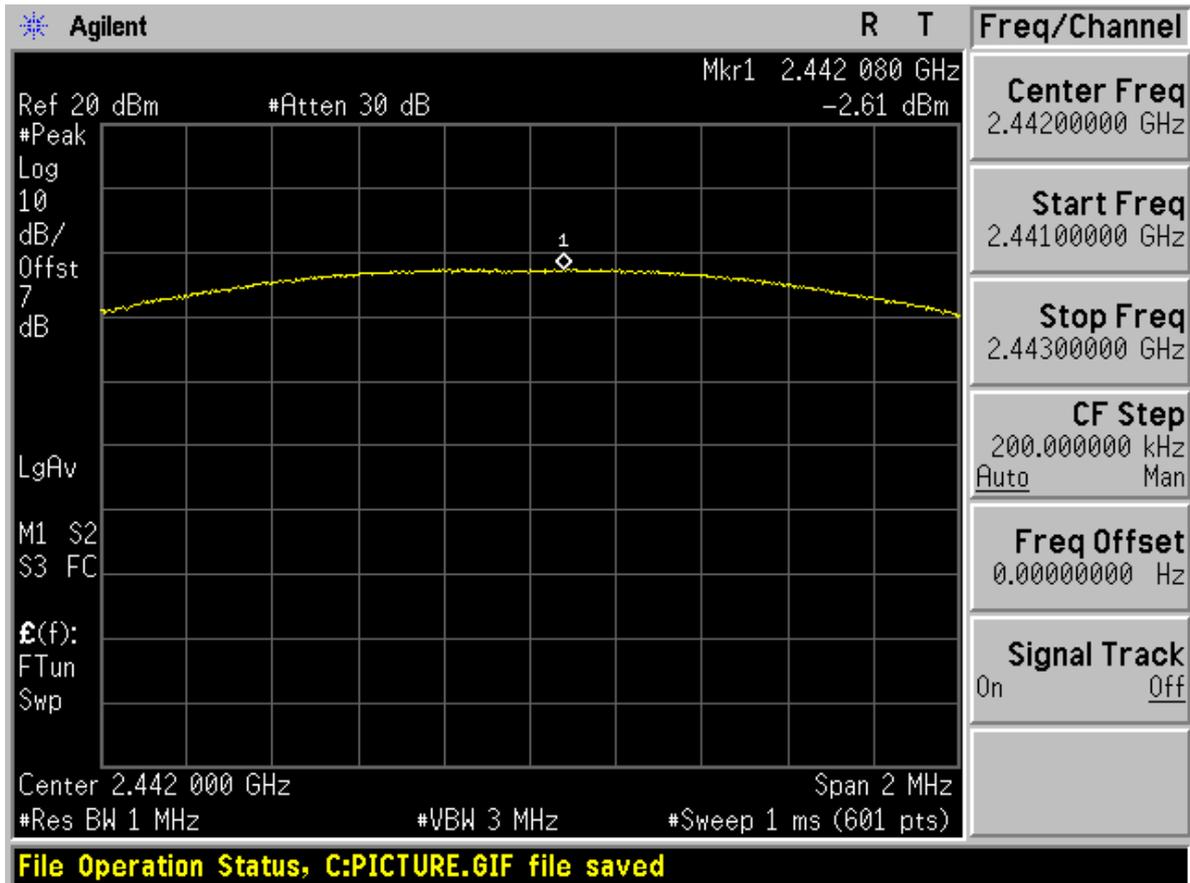


Modulation: 8DPSK Channel 0 (2402MHz)



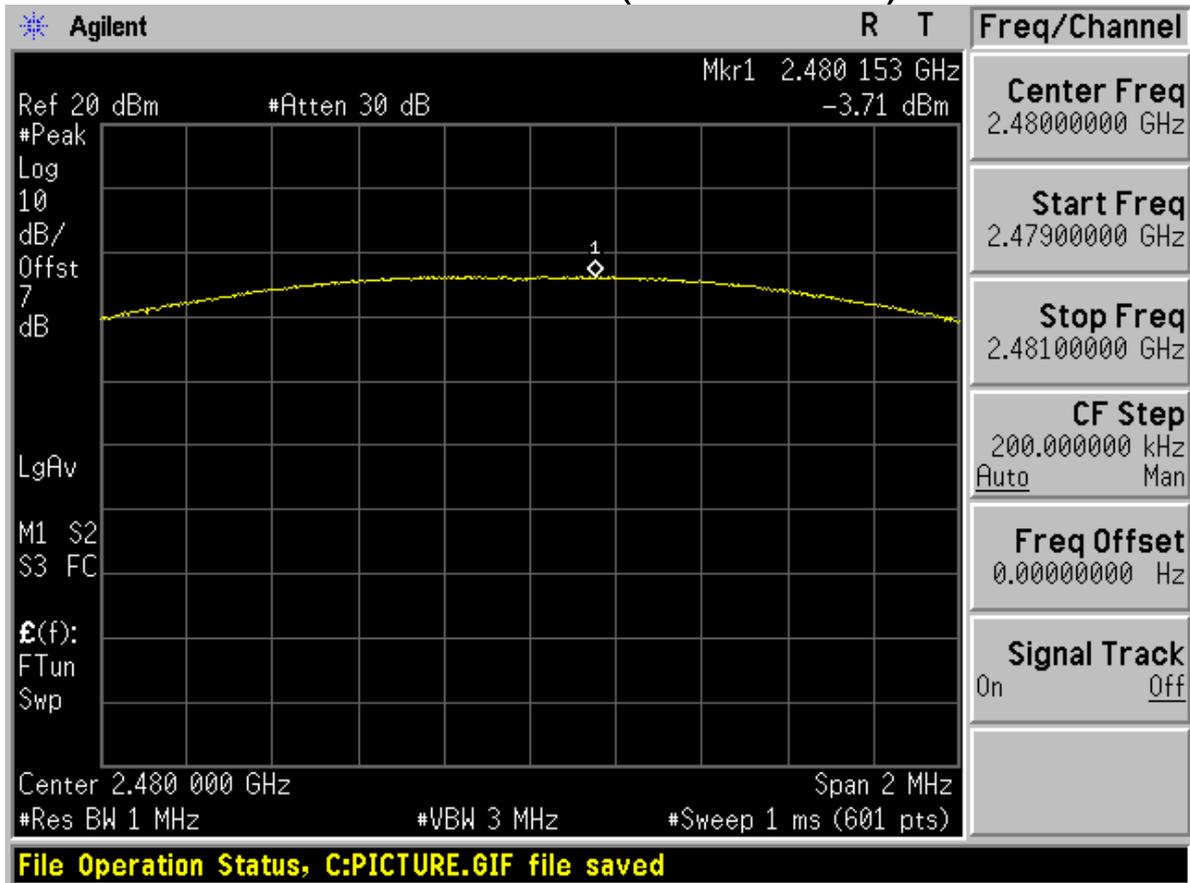


Channel 40 (2442MHz)





Channel 78 (2480MHz)





Appendix F

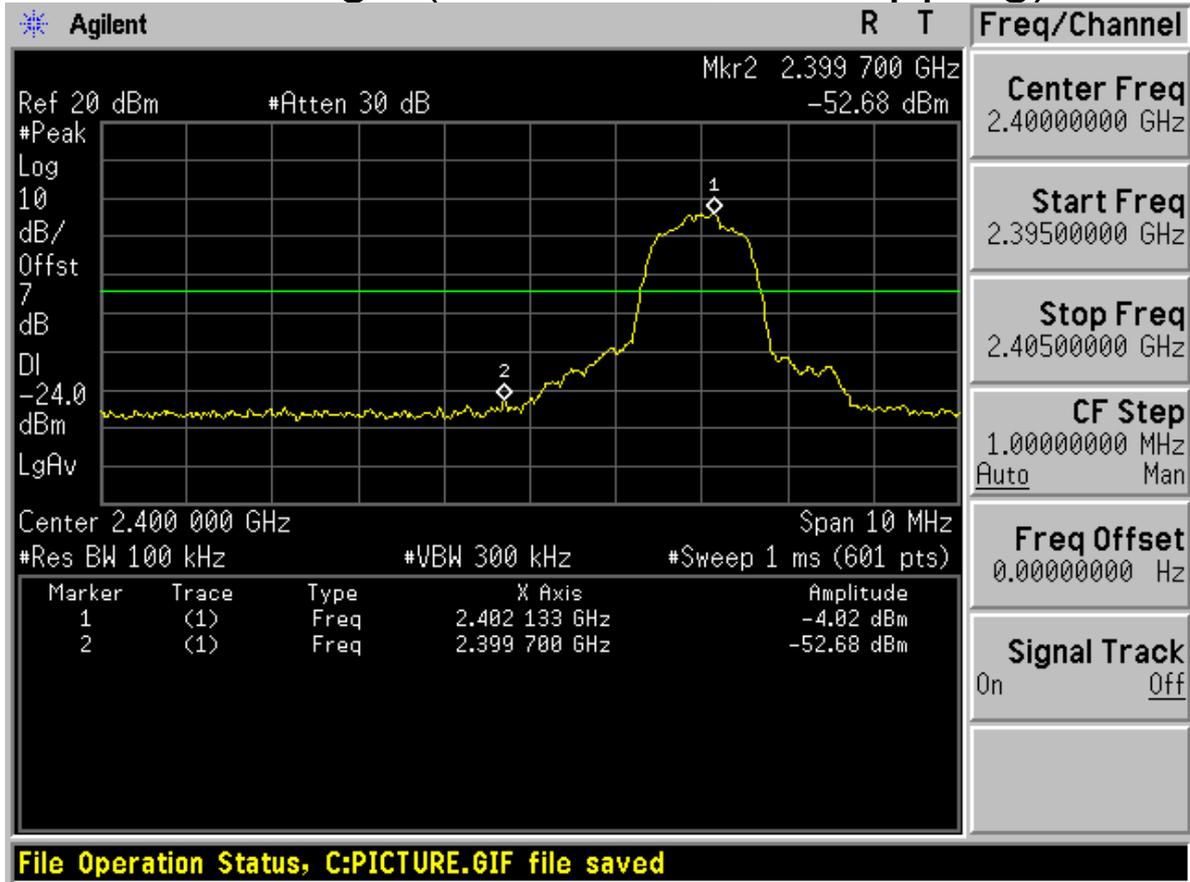
Band edge spurious emission

According to FCC Part 15.247 (d)



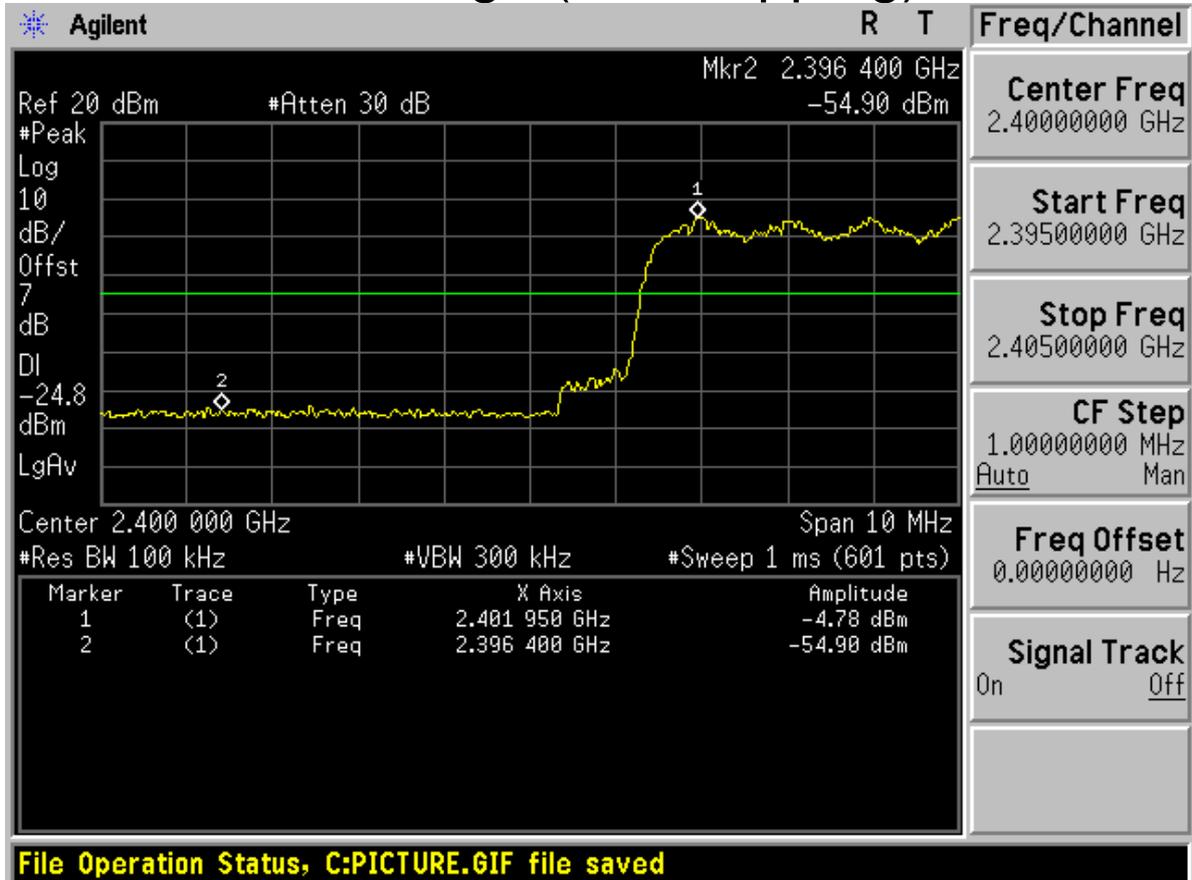
Modulation: $\pi/4$ -DQPSK

Low edge (Channel 0, no hopping)



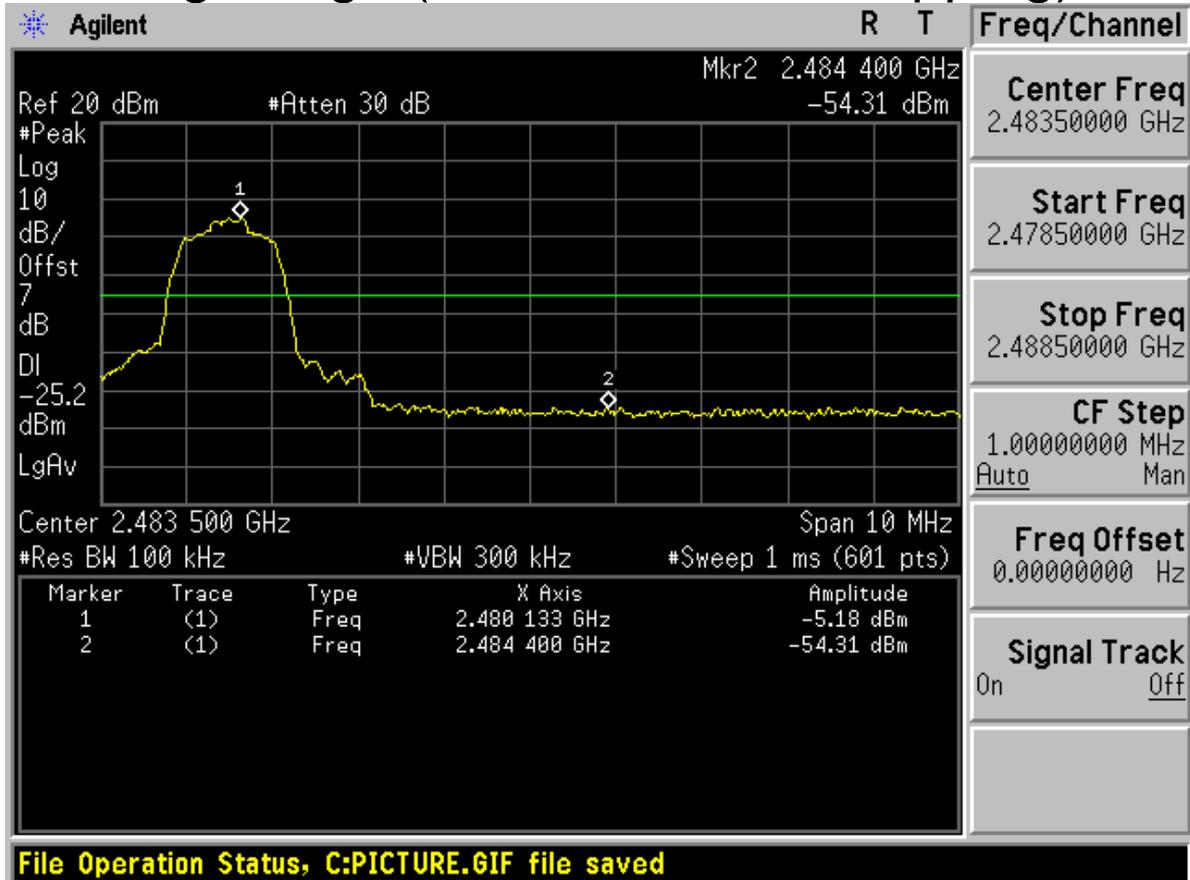


Low edge (with hopping)



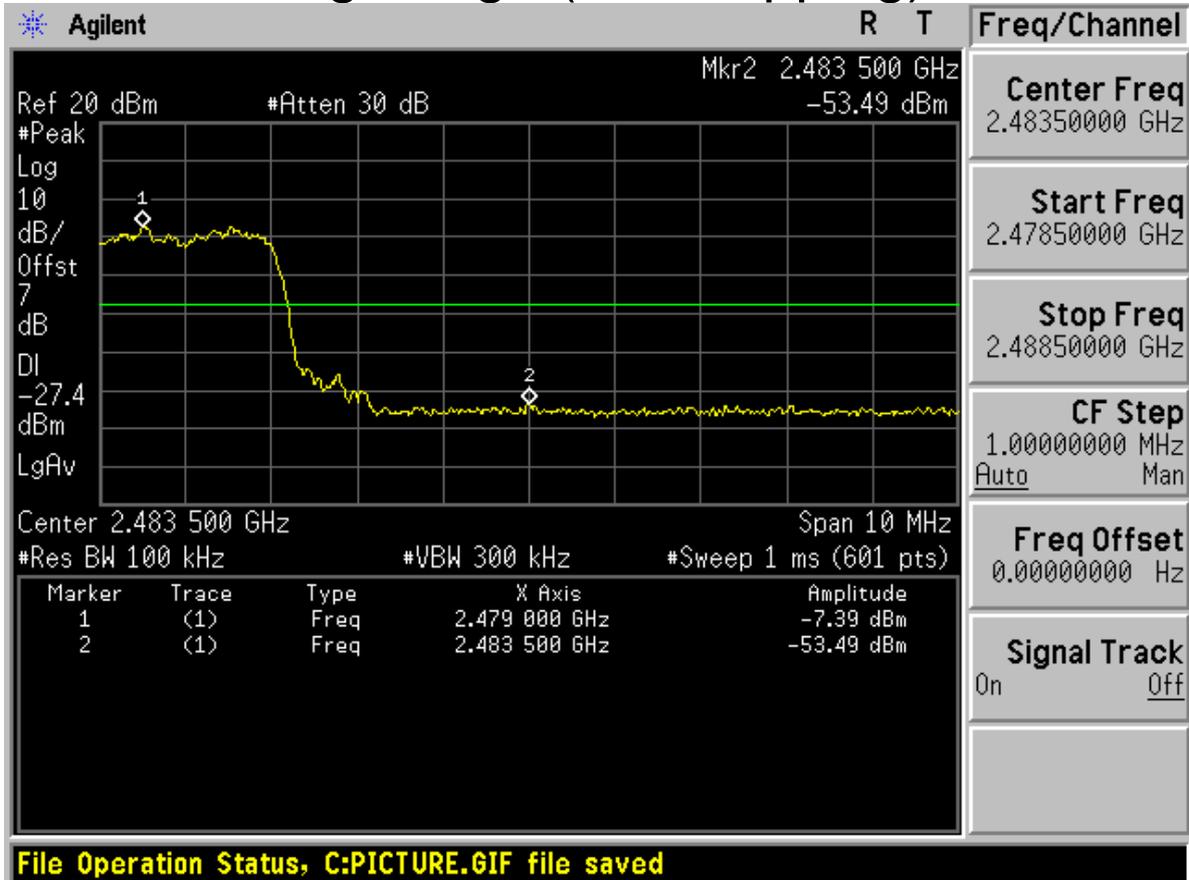


High edge (Channel 78, no hopping)



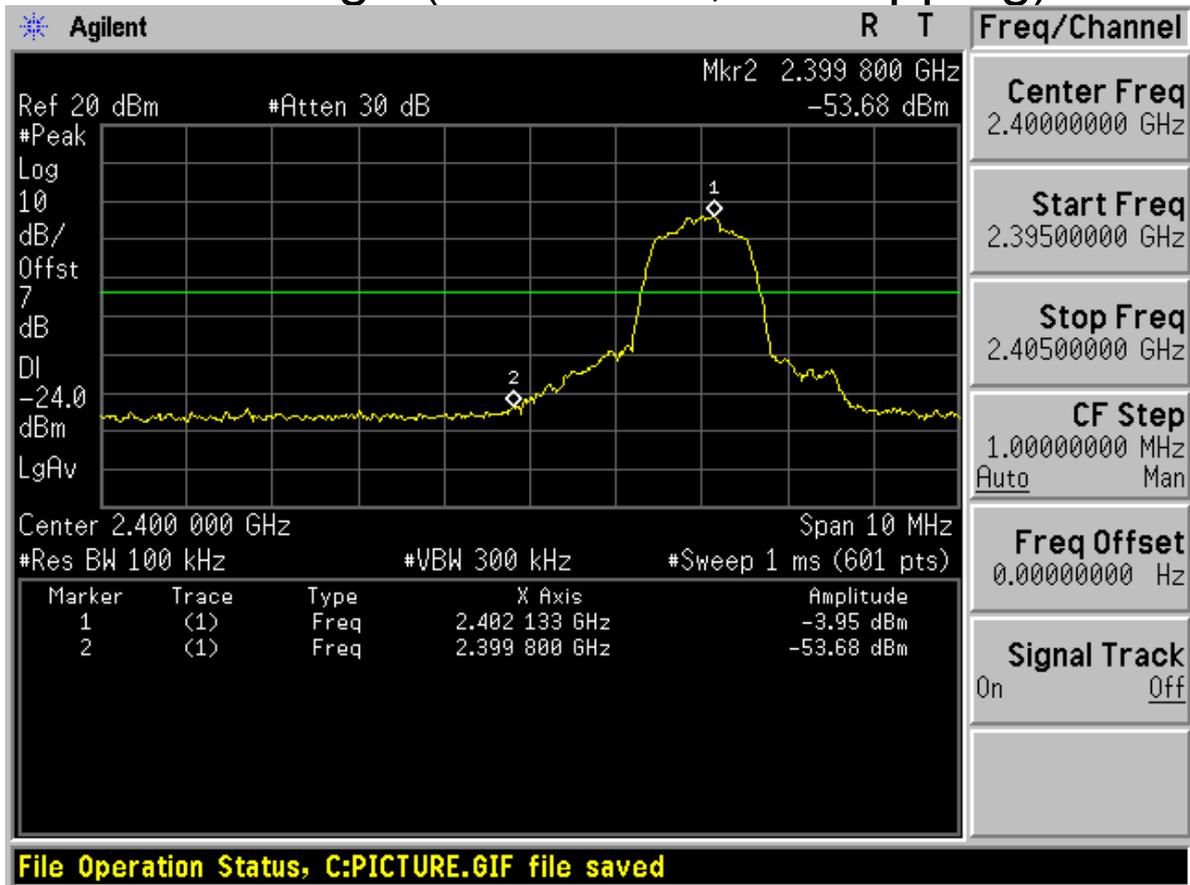


High edge (with hopping)



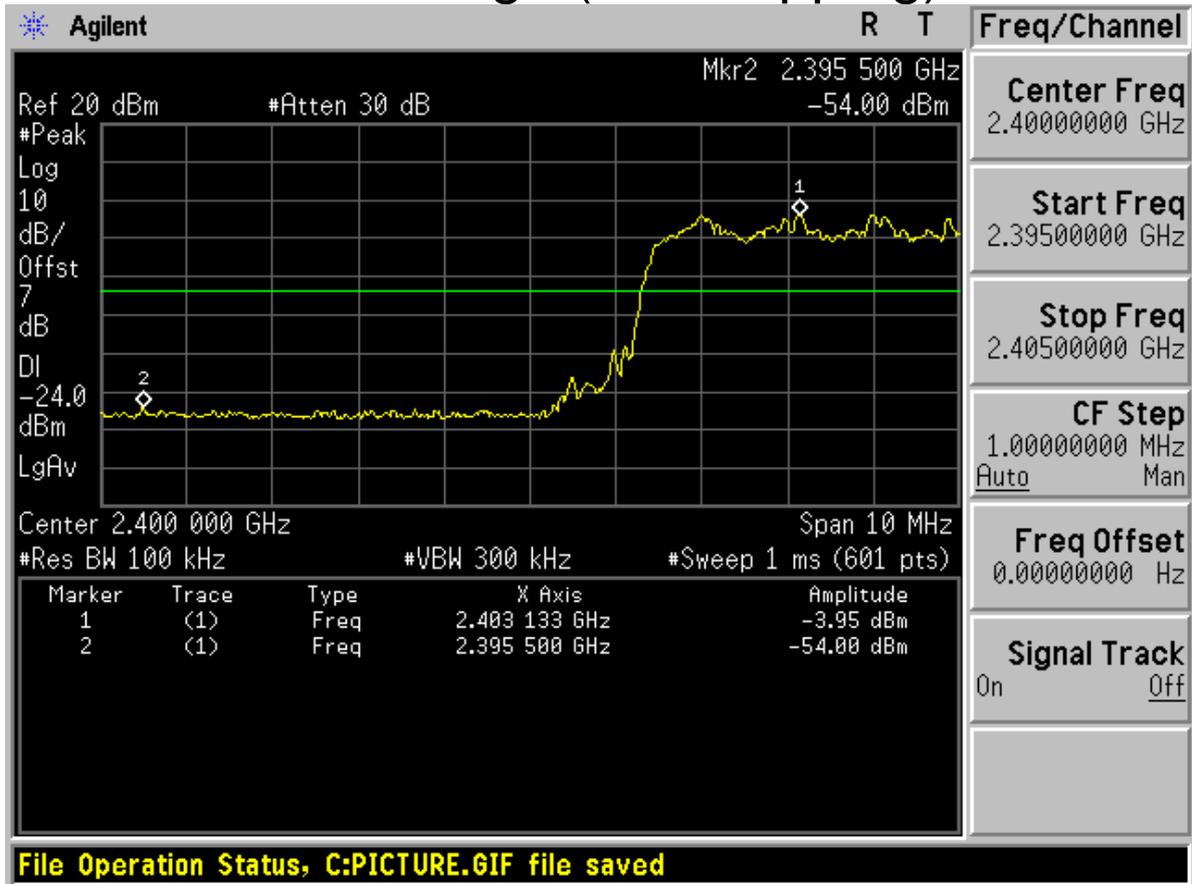


Modulation: 8DPSK Low edge (Channel 0, no hopping)



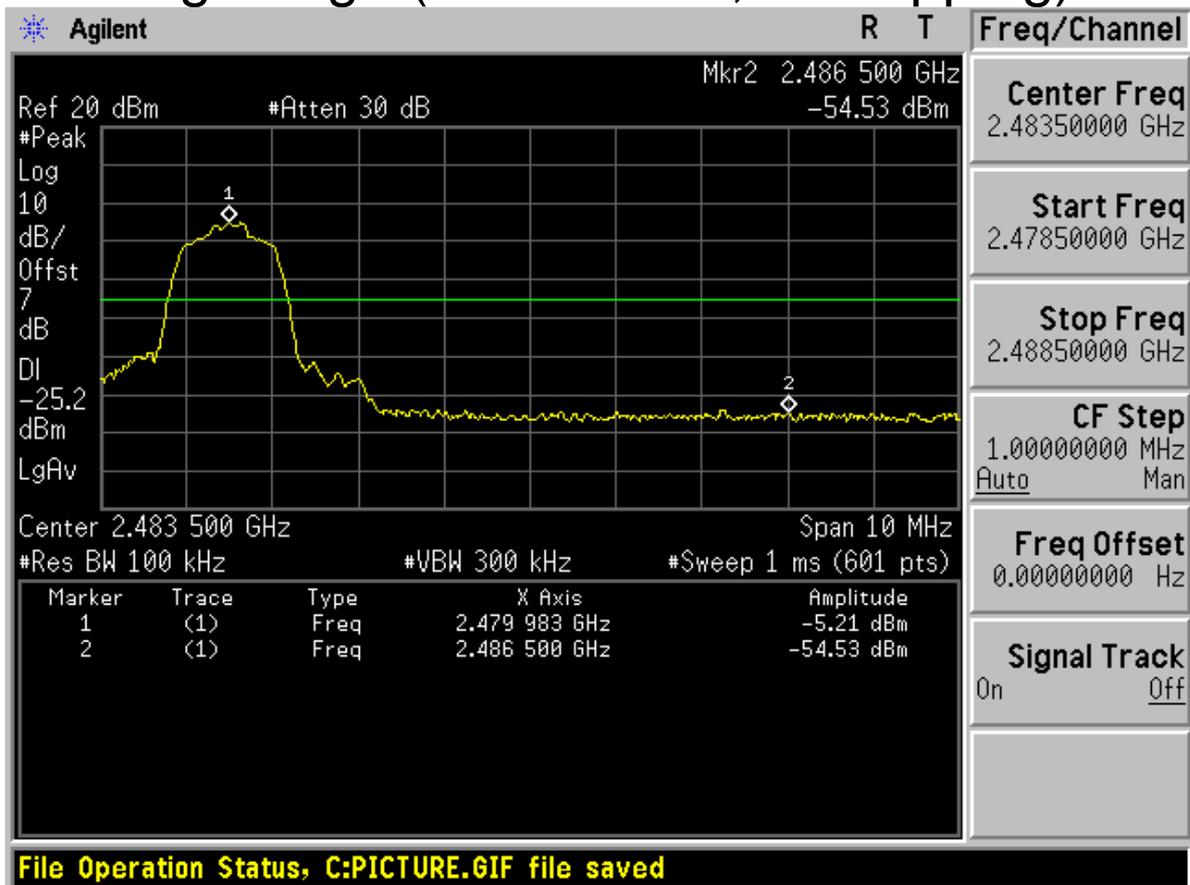


Low edge (with hopping)



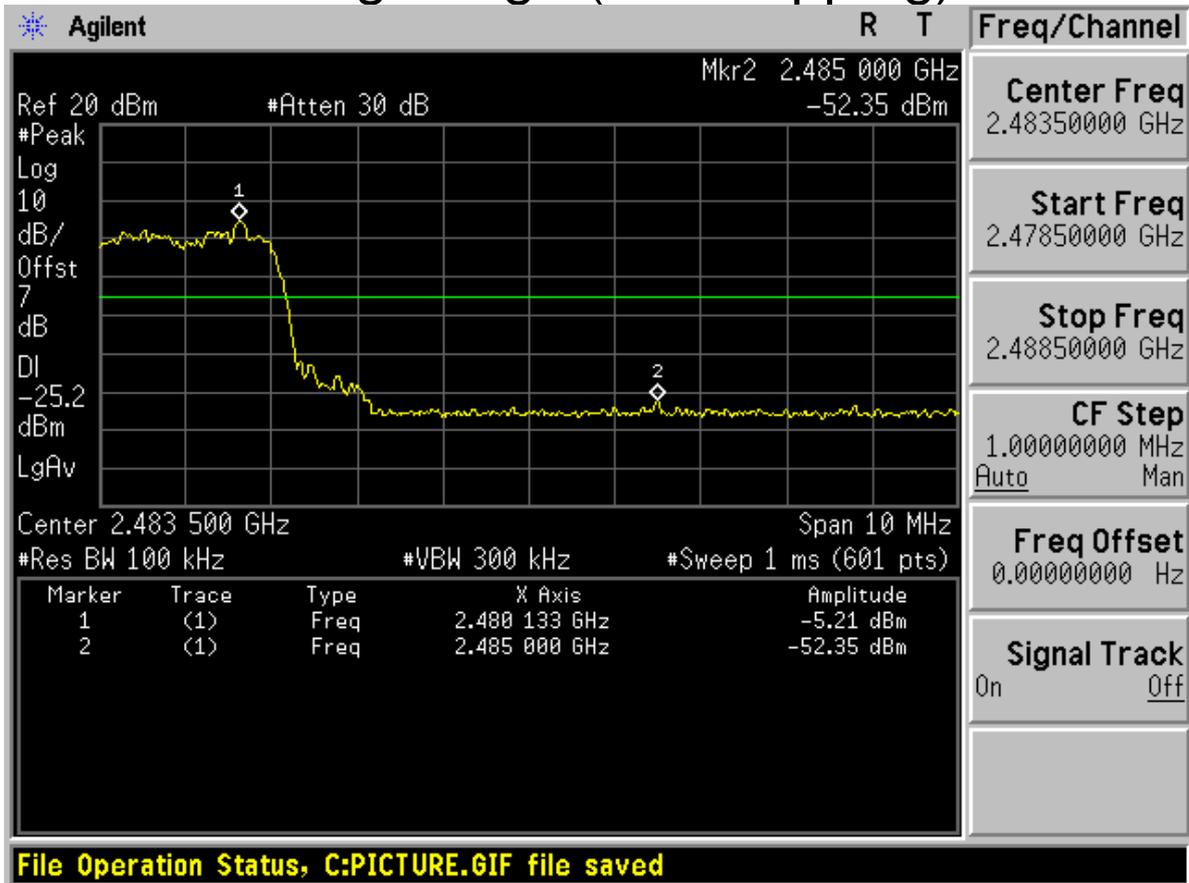


High edge (Channel 78, no hopping)





High edge (with hopping)





Appendix G

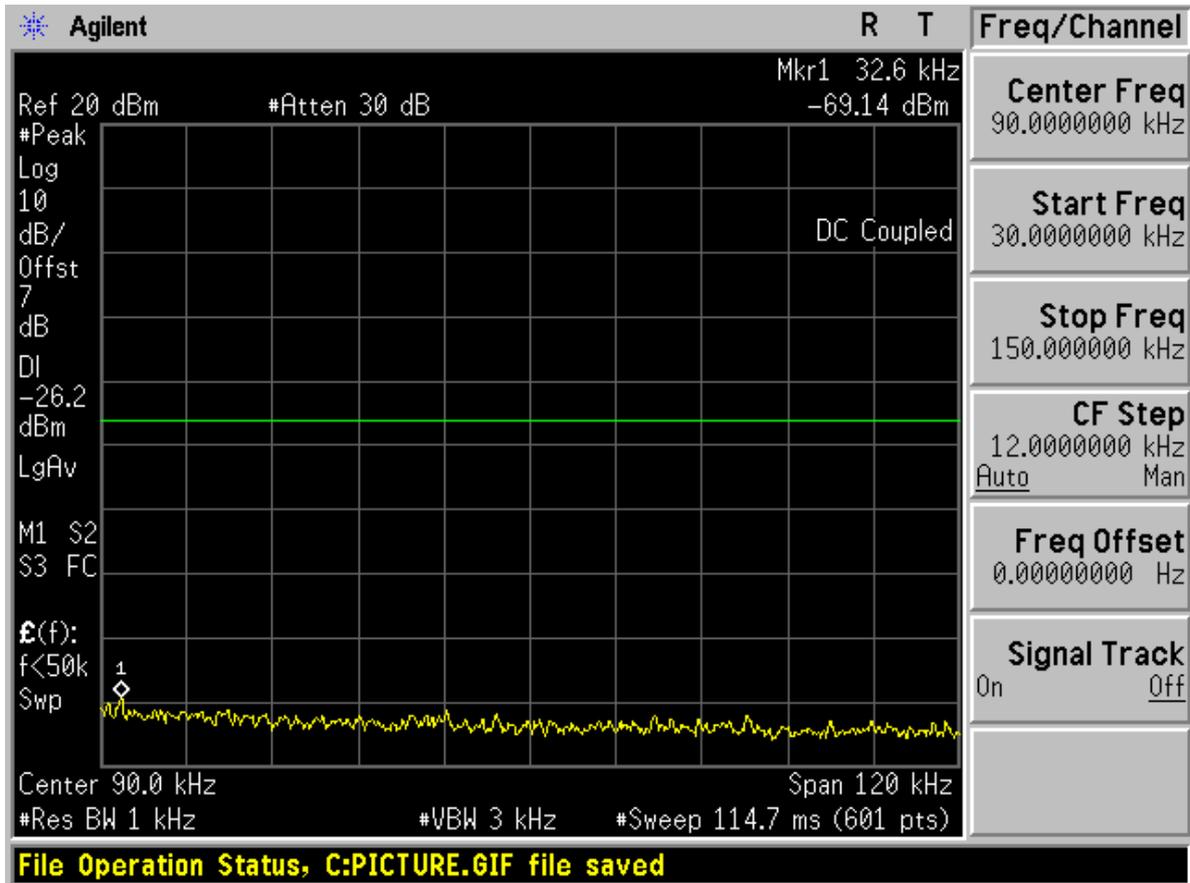
Conducted RF spurious

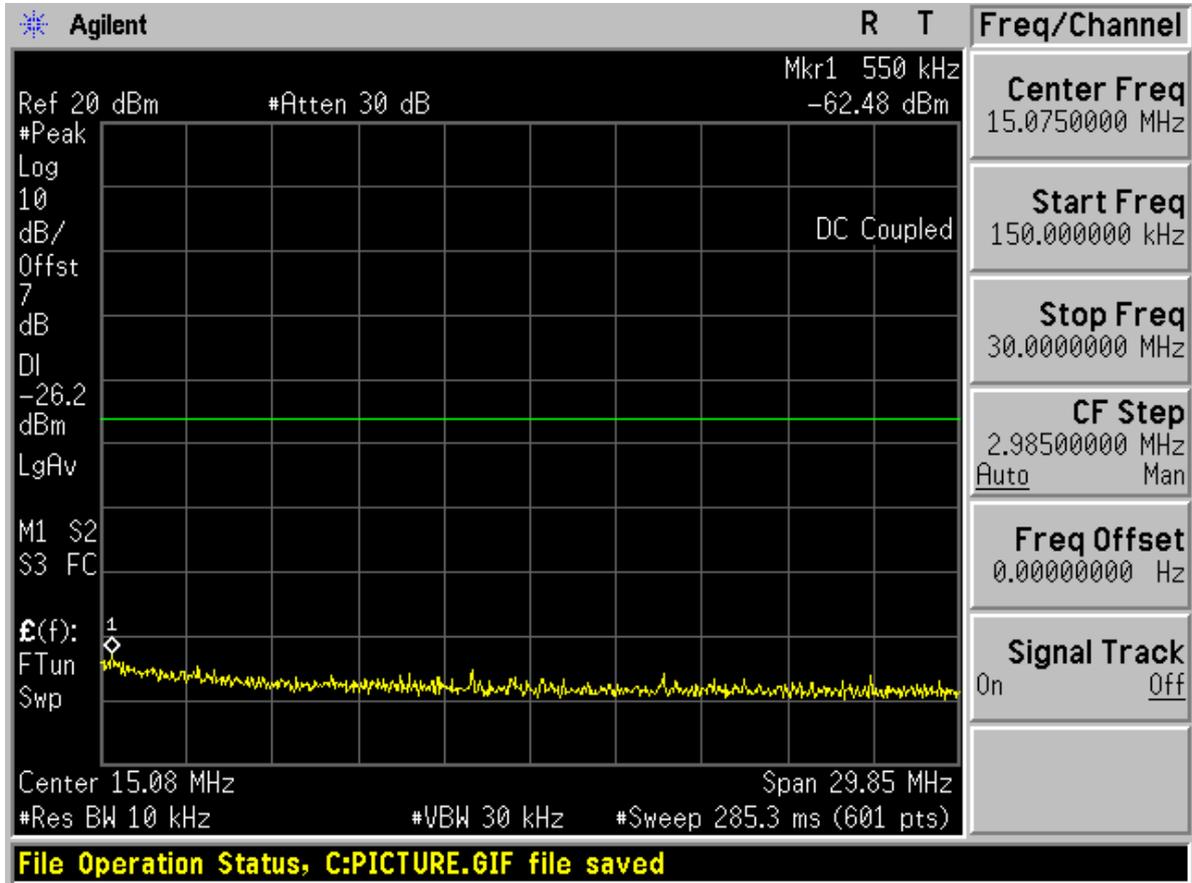
According to FCC Part 15.247 (d)

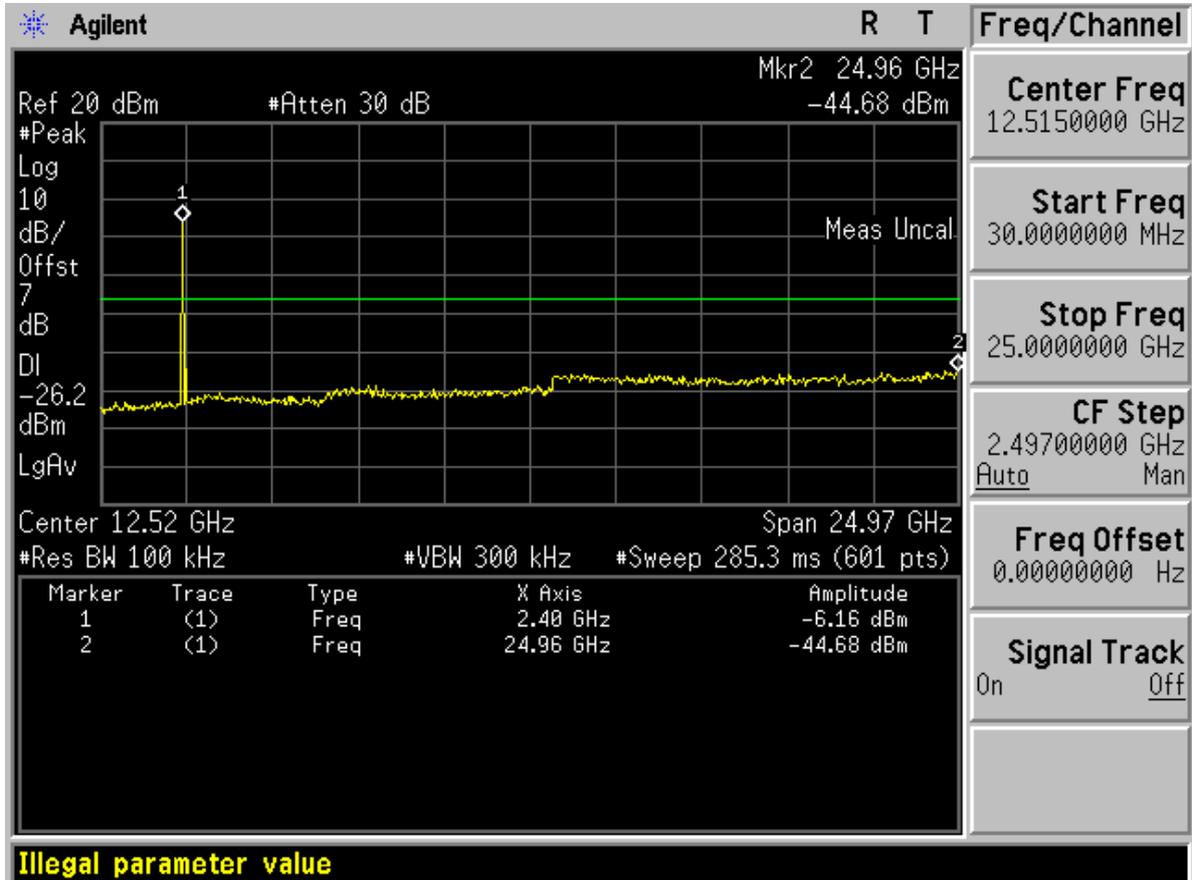


Modulation: $\pi/4$ -DQPSK

Channel 0

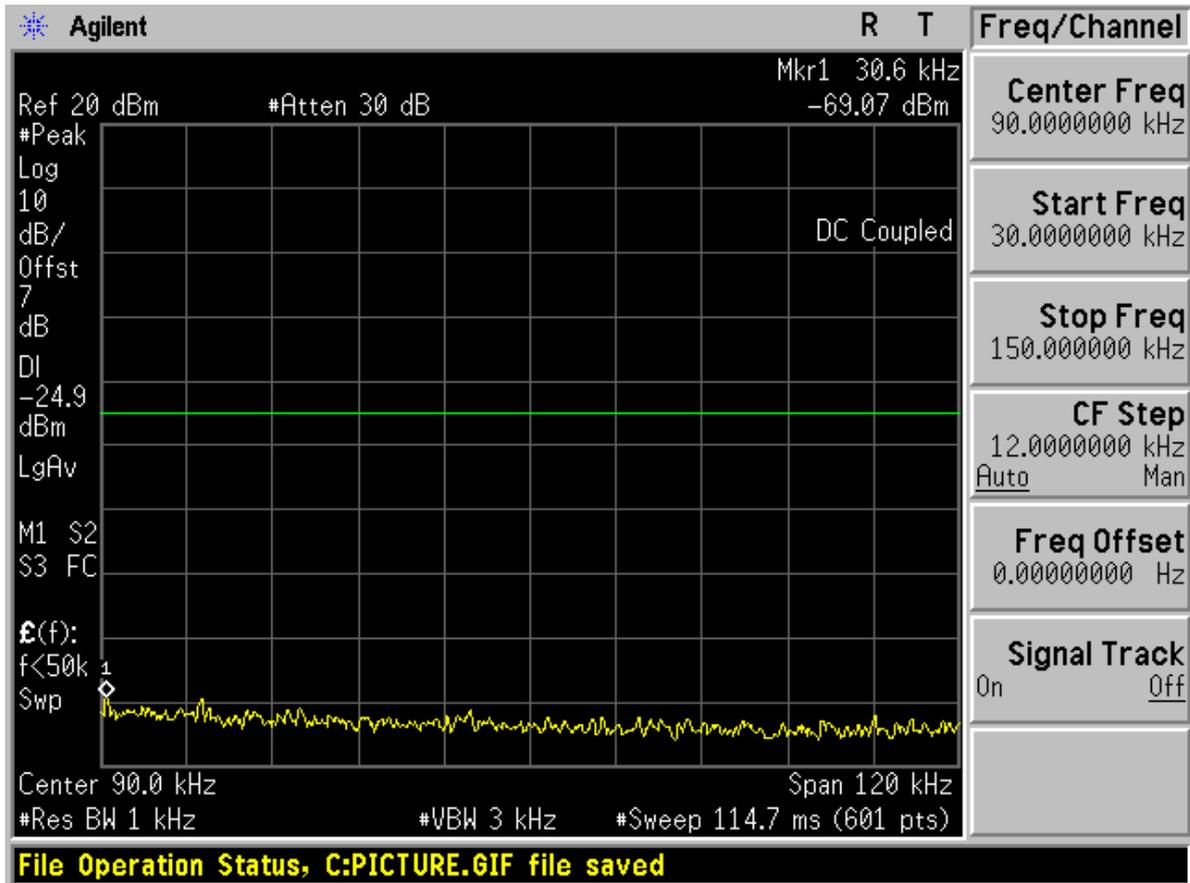


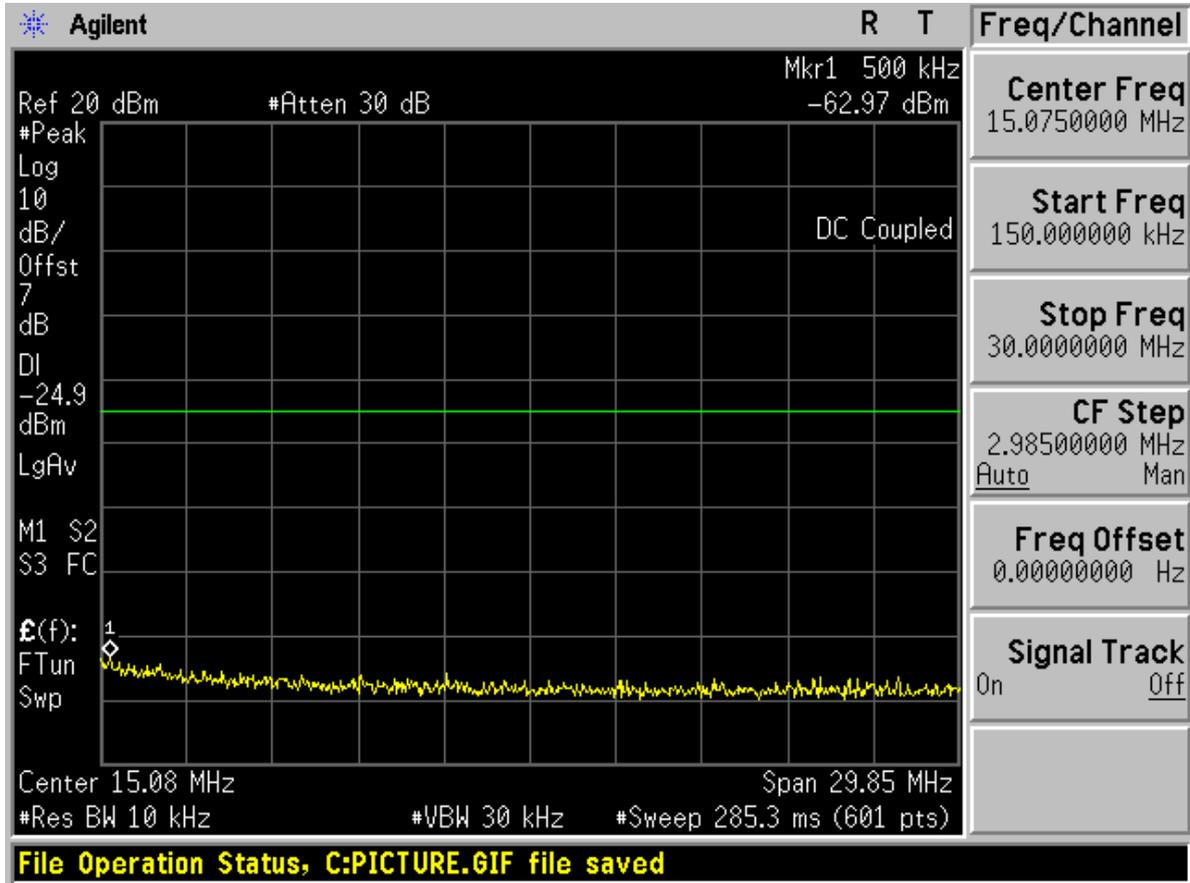


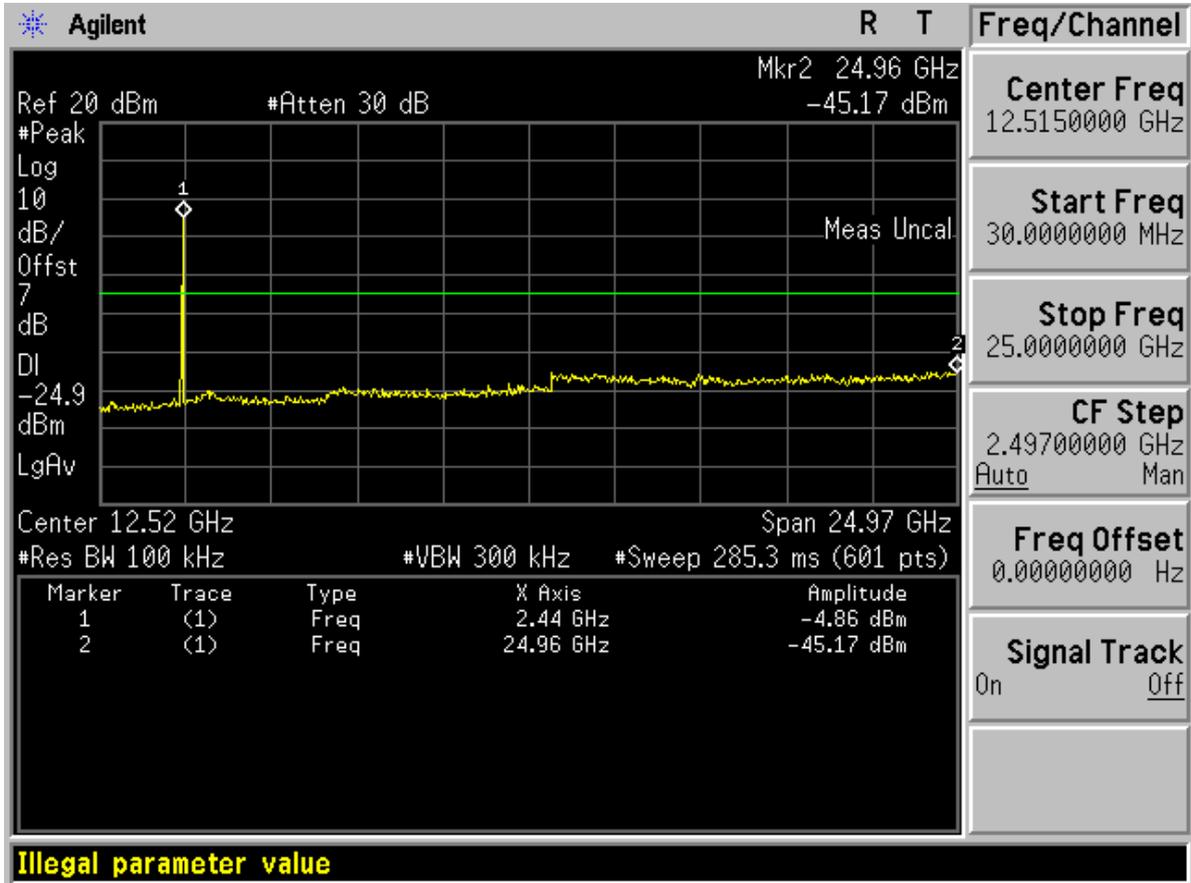




Channel 40

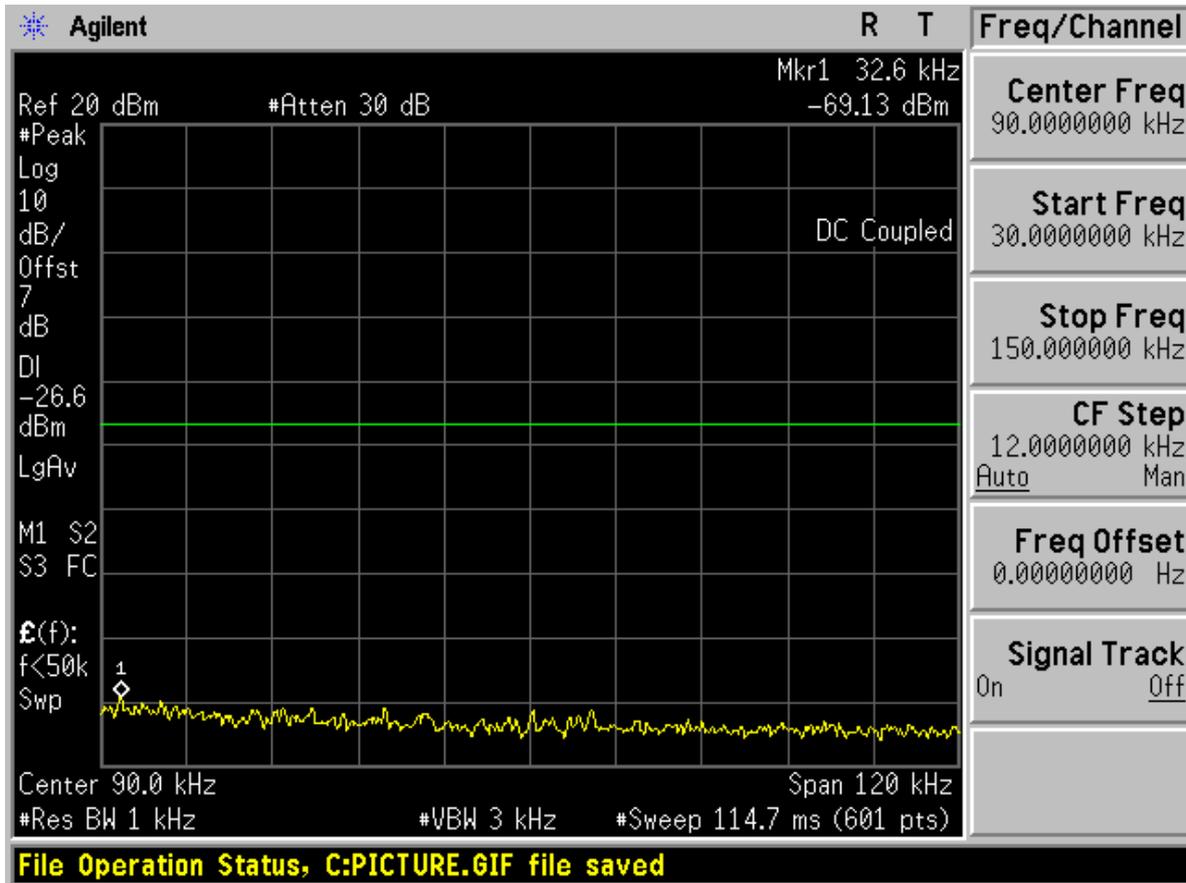


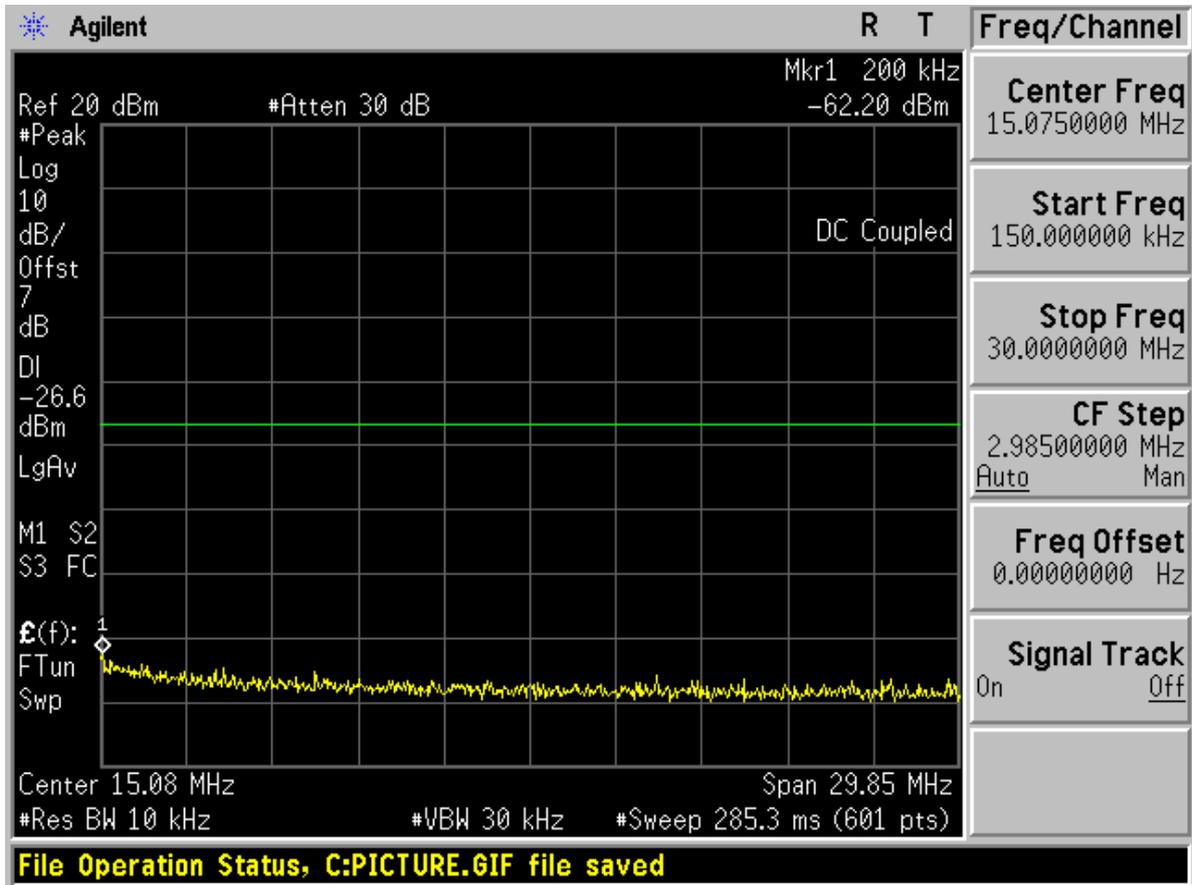


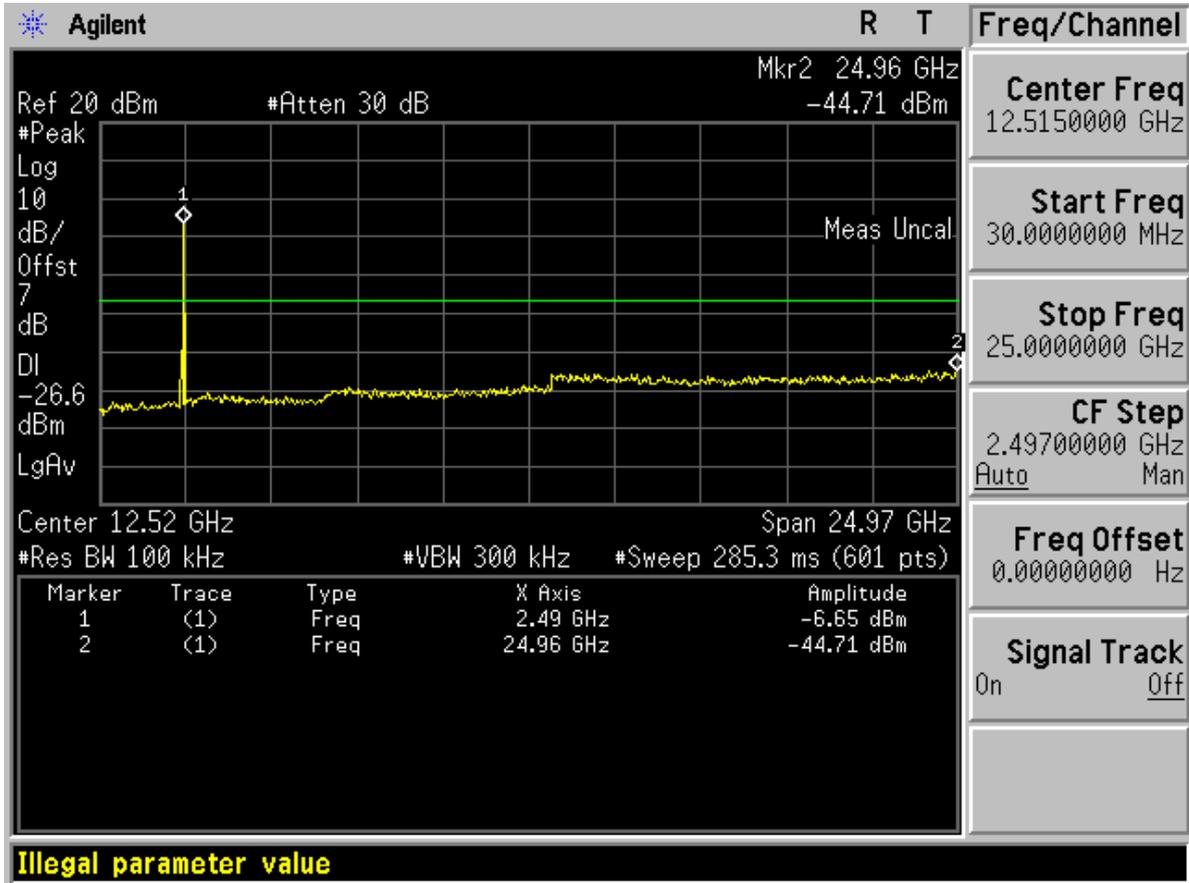




Channel 78

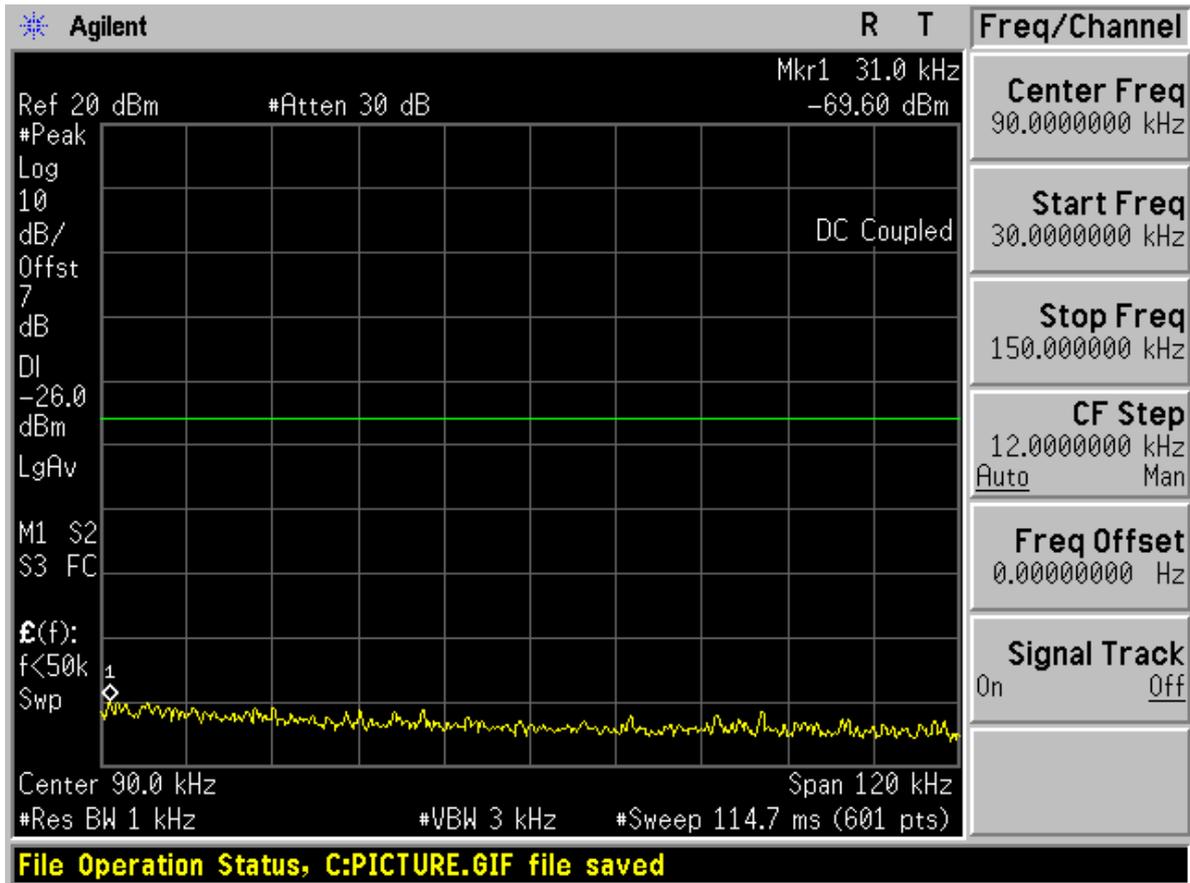


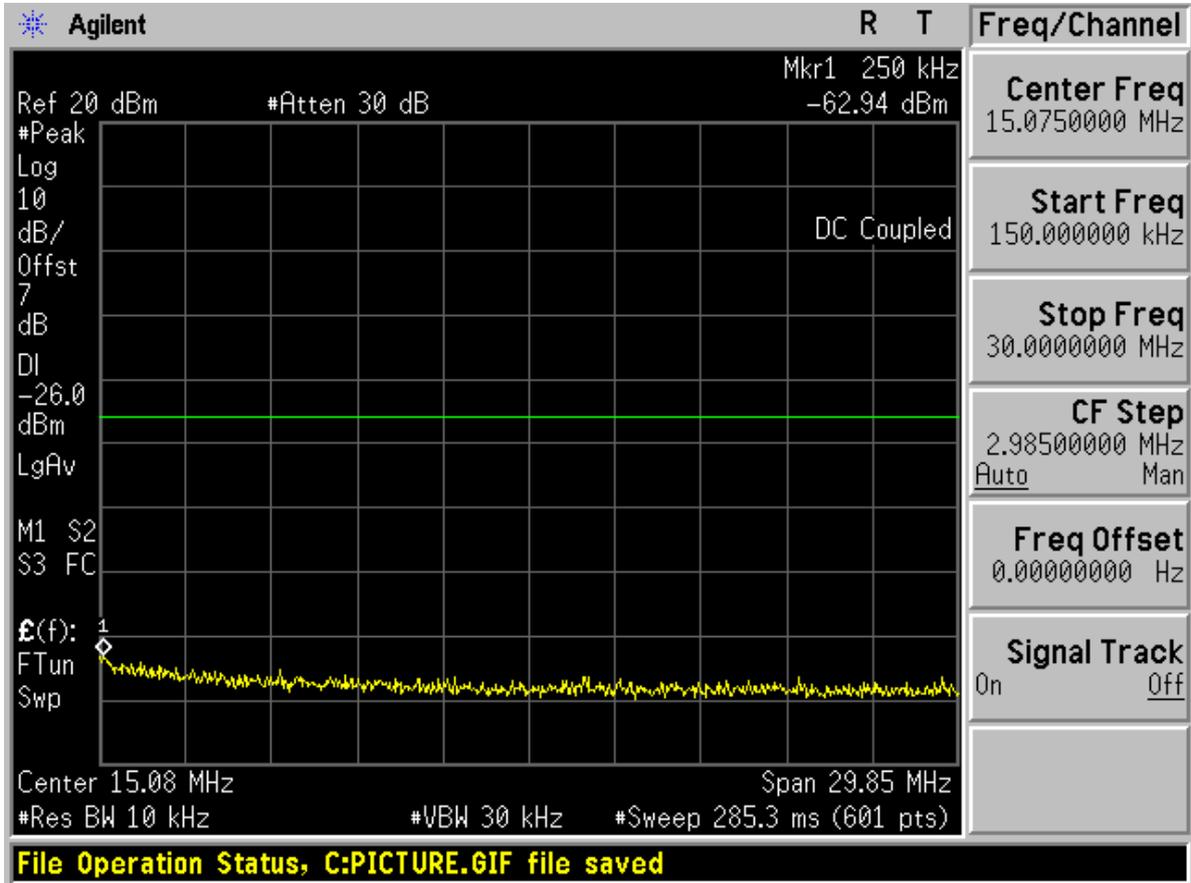


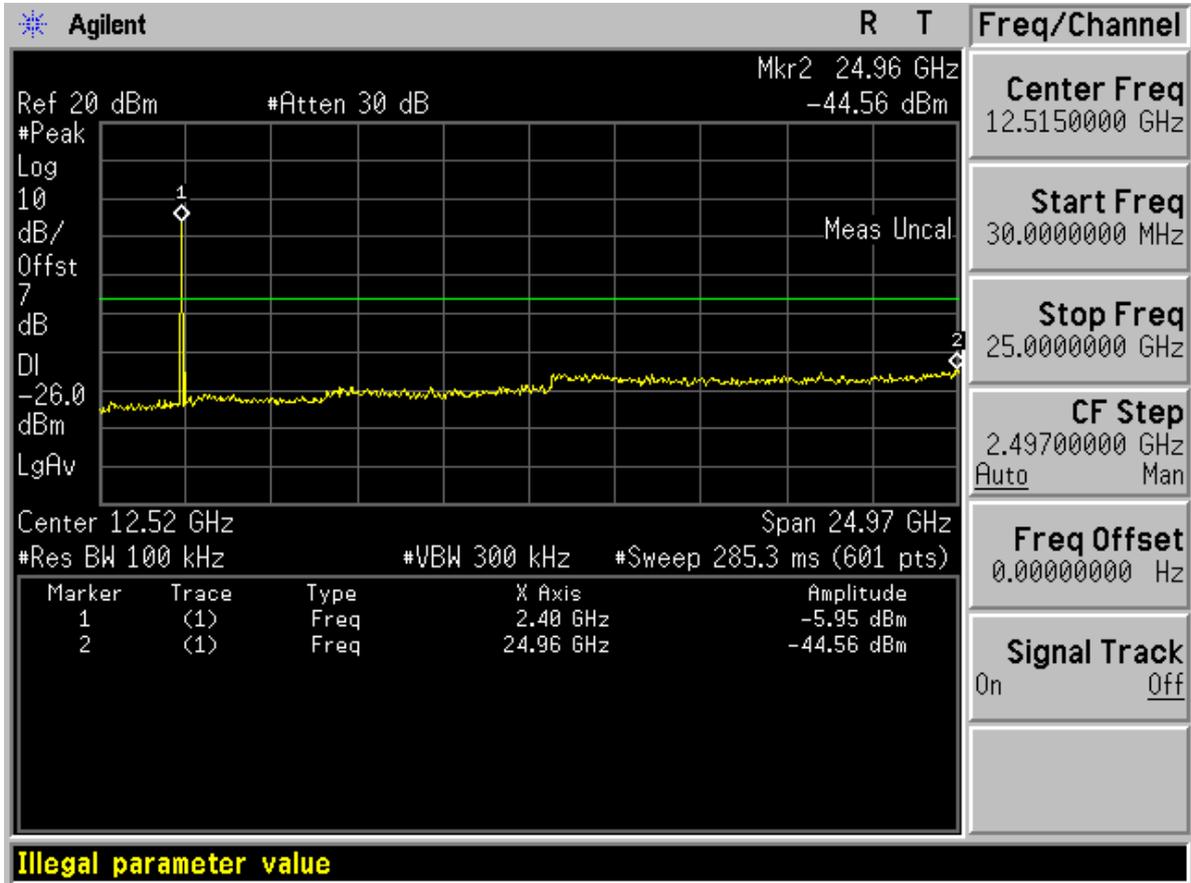




Modulation: 8DPSK Channel 0

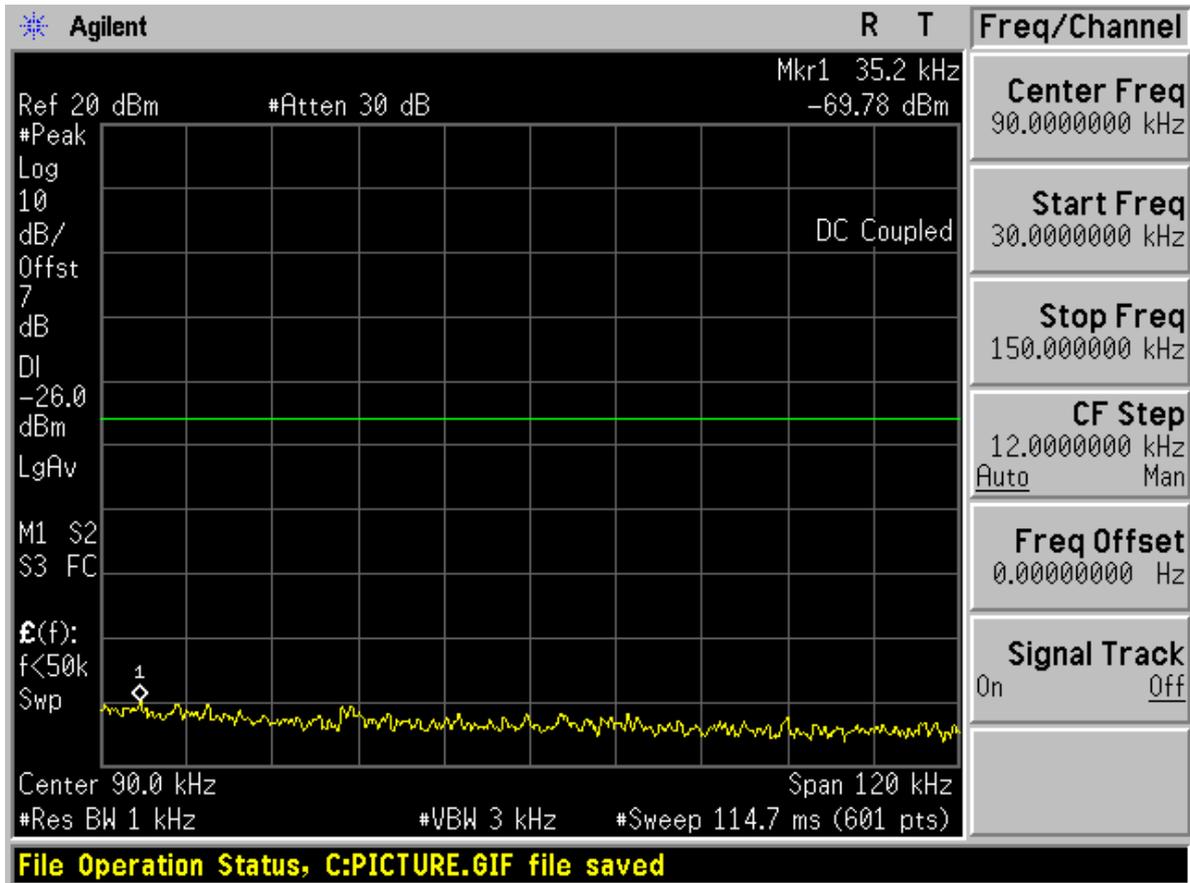


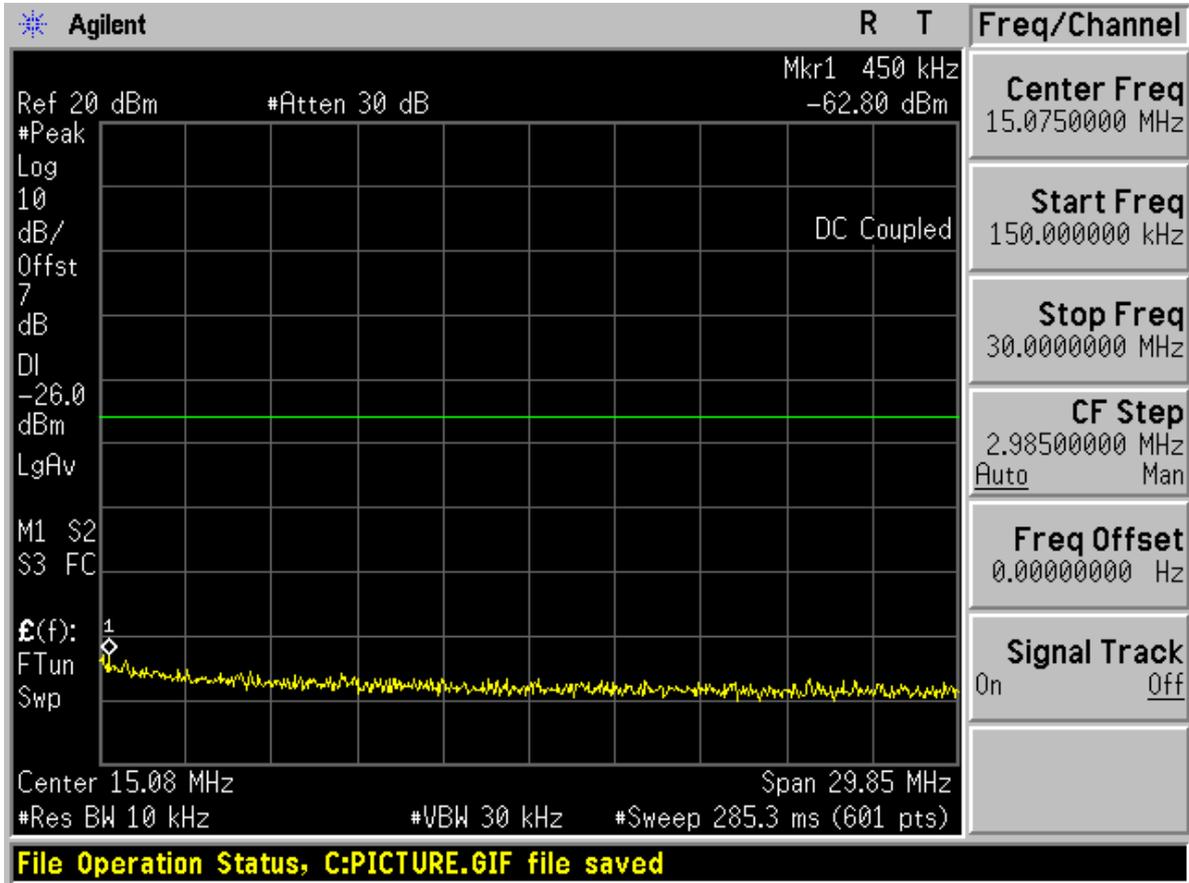


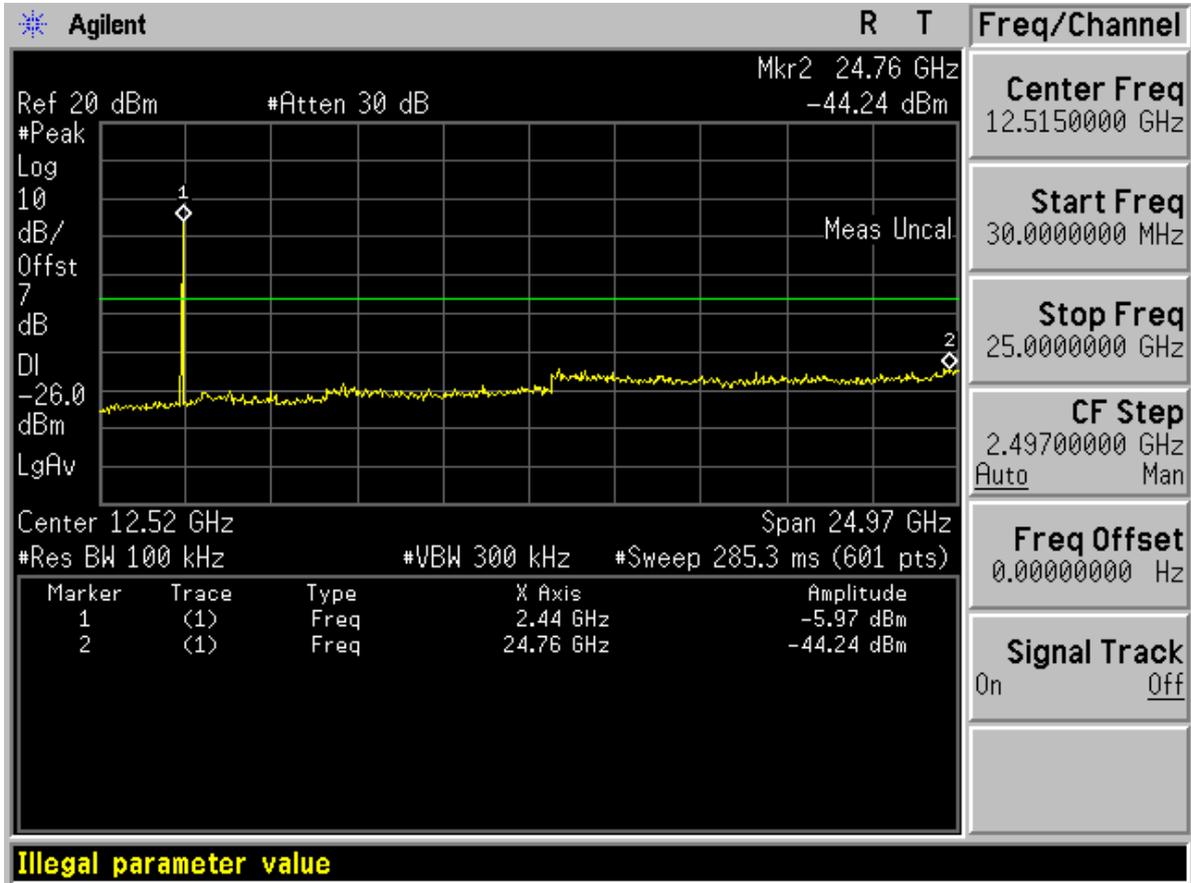




Channel 40

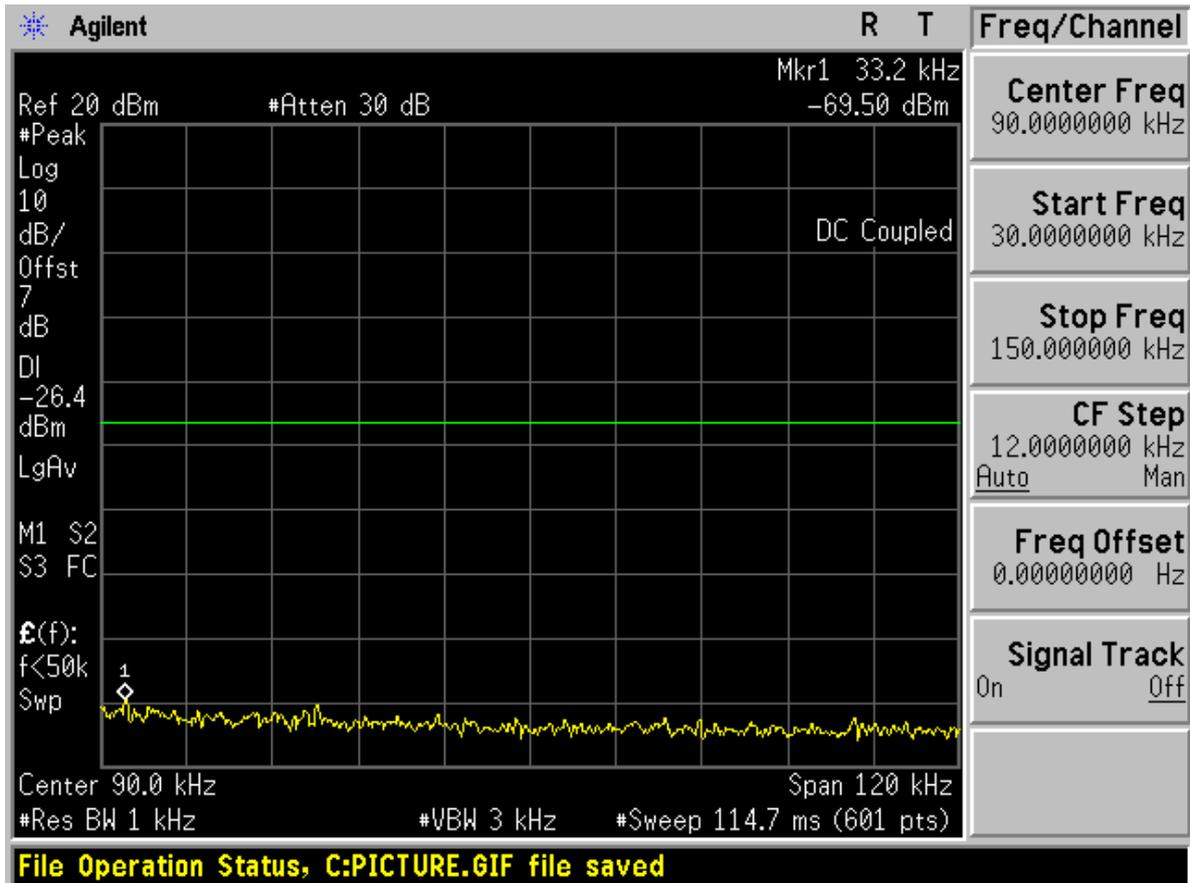


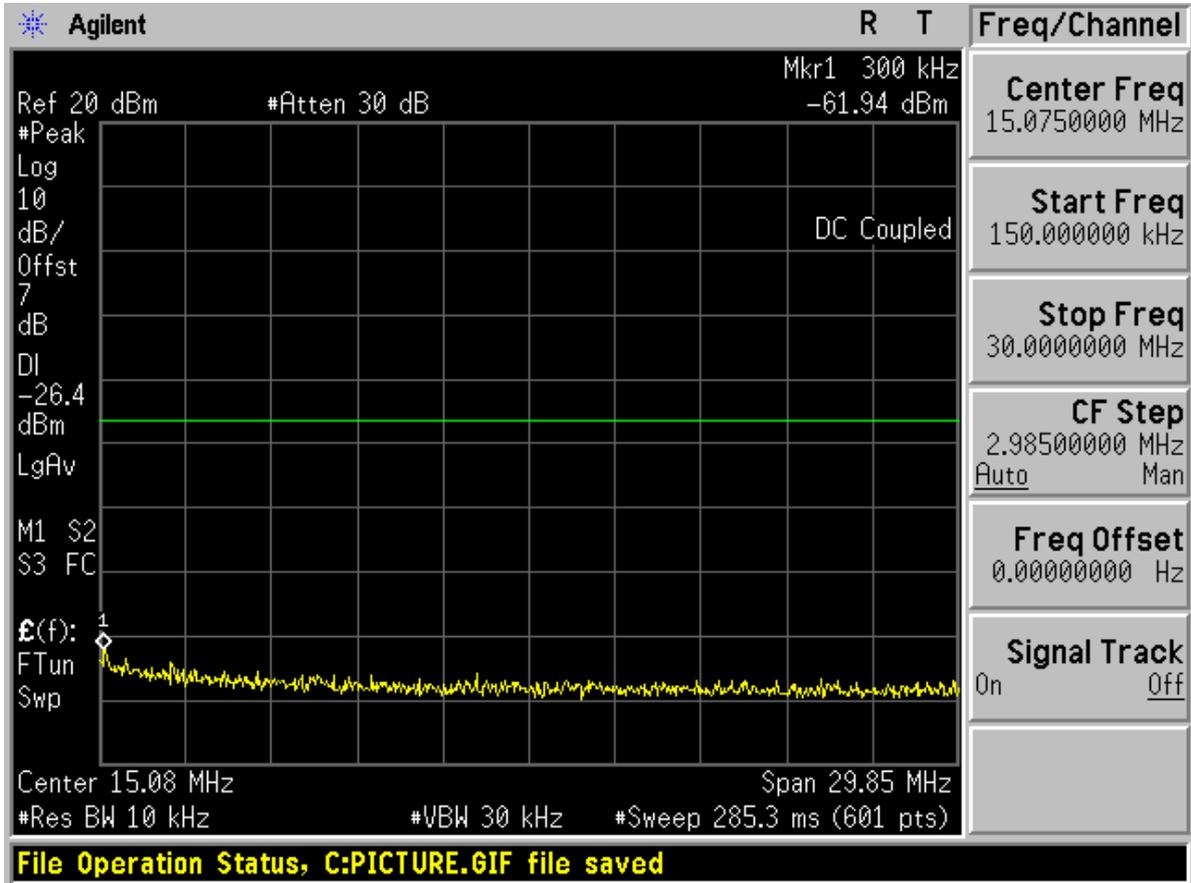


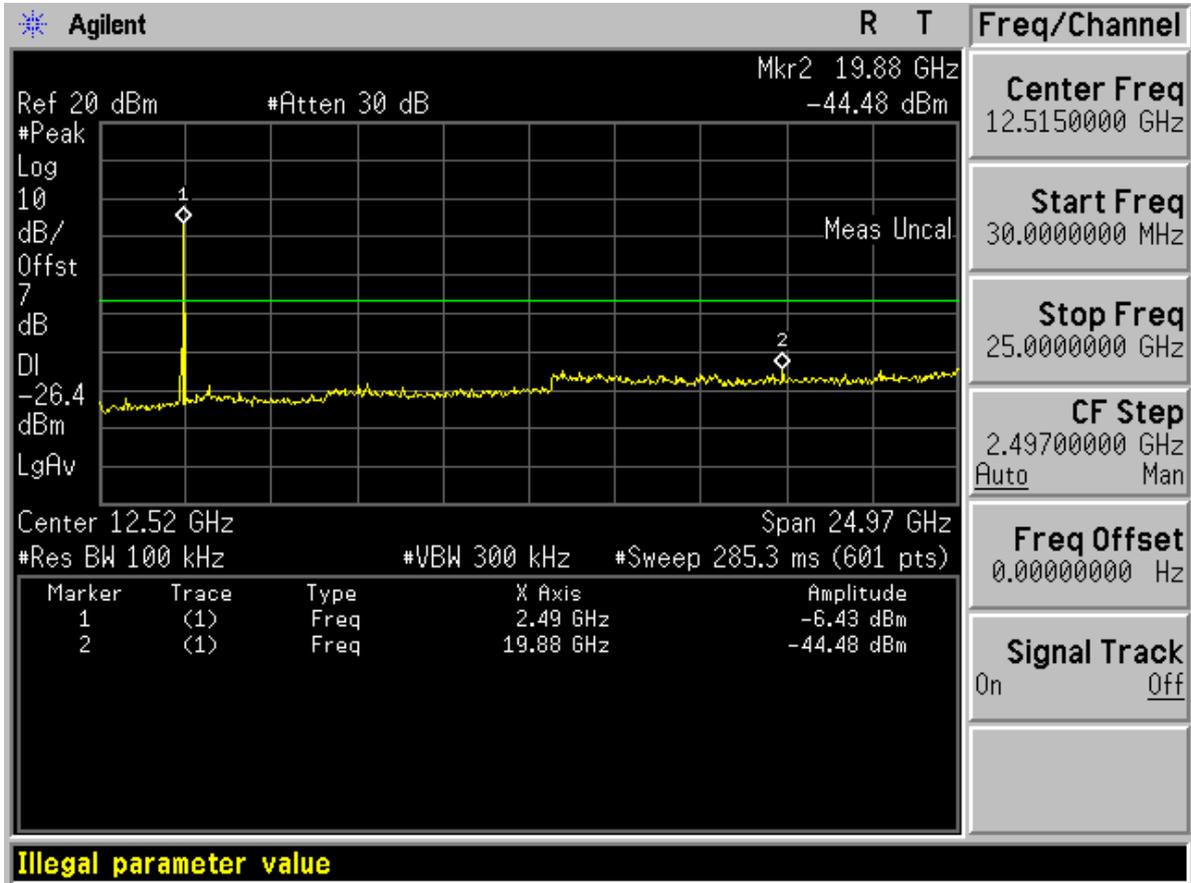




Channel 78









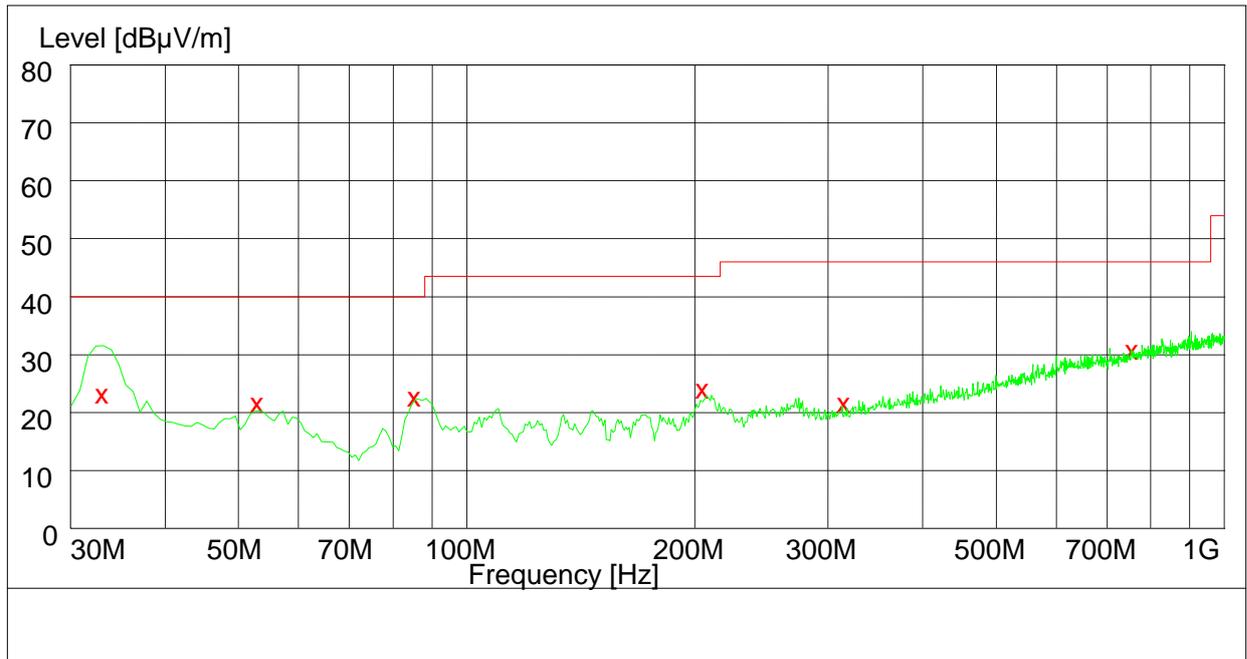
Appendix H

Radiated spurious emission

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



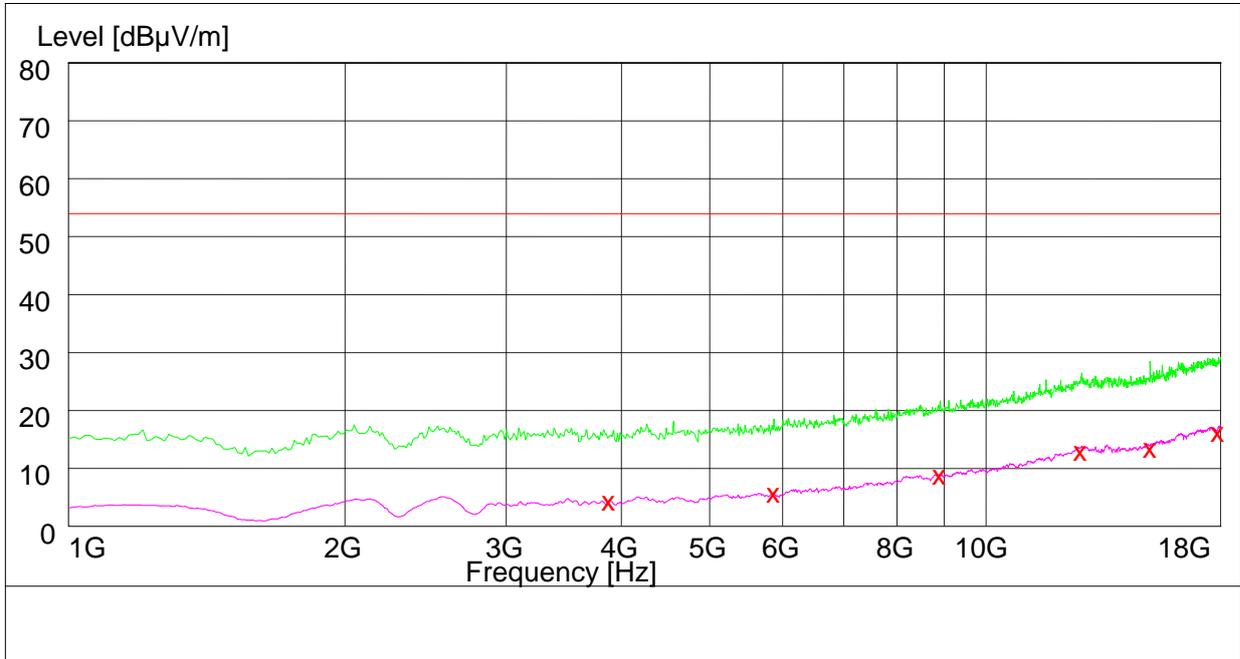
Channel 0 30MHz to 1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
33.104000	24.50	11.7	40.0	15.5	120.0	103.00	HORIZONTAL
53.940000	21.70	12.7	40.0	18.3	145.0	212.00	HORIZONTAL
84.404000	21.80	10.1	43.5	21.7	112.0	215.00	VERTICAL
203.432000	22.90	12.2	43.5	20.6	106.0	50.00	HORIZONTAL
314.552000	22.90	15.8	46.0	23.1	141.0	130.00	HORIZONTAL
754.780000	31.90	24.1	46.0	14.1	152.0	120.00	VERTICAL



1GHz to 18GHz



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

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
3877.700000	3.60	-20.1	54.0	50.4	145.0	58.00	HORIZONTAL
5872.300000	5.40	-16.3	54.0	48.6	110.0	123.00	VERTICAL
8895.100000	8.10	-11.9	54.0	45.9	121.0	107.00	VERTICAL
12682.400000	12.70	-6.1	54.0	41.3	100.0	348.00	HORIZONTAL
15094.100000	13.10	-5.0	54.0	40.9	124.0	64.00	HORIZONTAL
17898.800000	15.80	-1.1	54.0	38.2	104.0	108.00	HORIZONTAL

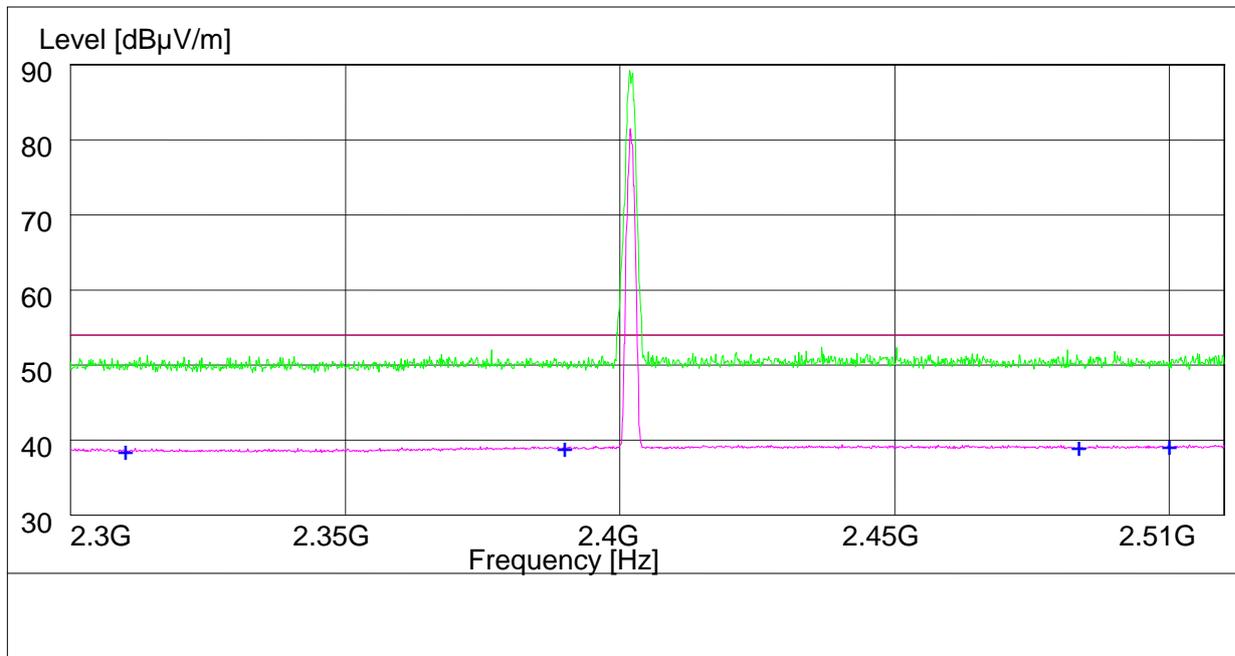


18GHz to 26GHz

Note: No peak found in pre- test.



2.30GHz to 2.51GHz

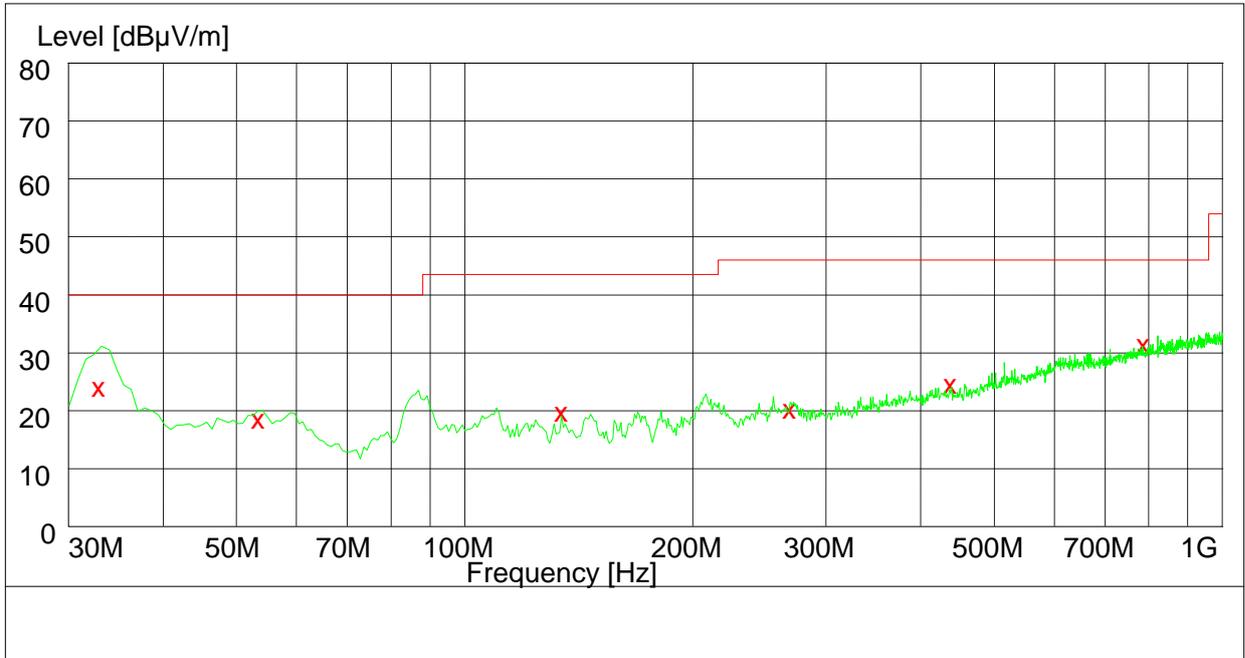


Note: The peak exceeds the limit line is carrier frequency.

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	39.00	33.3	54.0	15.0	128.0	271.00	HORIZONTAL
2390.000000	39.40	33.5	54.0	14.6	141.0	210.00	HORIZONTAL
2483.500000	40.00	33.7	54.0	14.0	145.0	107.00	HORIZONTAL
2500.000000	39.60	33.8	54.0	14.4	191.0	230.00	HORIZONTAL



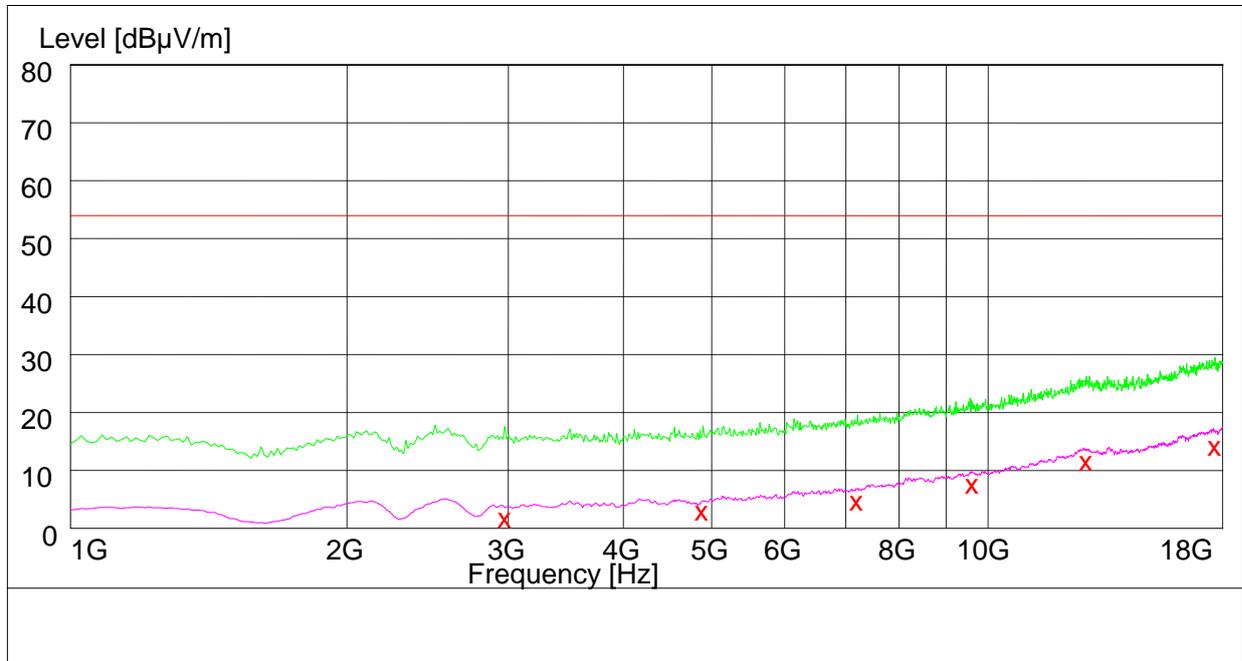
Channel 40 30MHz to 1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Plarization
32.988000	25.30	11.7	40.0	14.7	121.0	154.00	HORIZONTAL
53.456000	19.70	12.7	40.0	20.3	105.0	52.00	VERTICAL
134.404000	20.90	9.0	43.5	22.6	121.0	314.00	HORIZONTAL
268.648000	21.40	14.5	46.0	24.6	112.0	33.00	VERTICAL
438.828000	25.90	18.9	46.0	20.1	114.0	320.00	HORIZONTAL
788.088000	32.60	24.6	46.0	13.4	152.0	129.00	VERTICAL



1GHz to 18GHz



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

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2978.500000	3.00	-21.8	54.0	51.0	100.0	271.00	VERTICAL
4882.100000	4.30	-18.1	54.0	49.7	100.0	119.00	VERTICAL
7194.100000	6.00	-15.3	54.0	48.0	100.0	17.00	VERTICAL
9613.800000	8.80	-10.5	54.0	45.2	100.0	344.00	VERTICAL
12791.700000	12.90	-6.0	54.0	41.1	100.0	165.00	HORIZONTAL
17670.100000	15.40	-1.3	54.0	38.6	100.0	73.00	VERTICAL

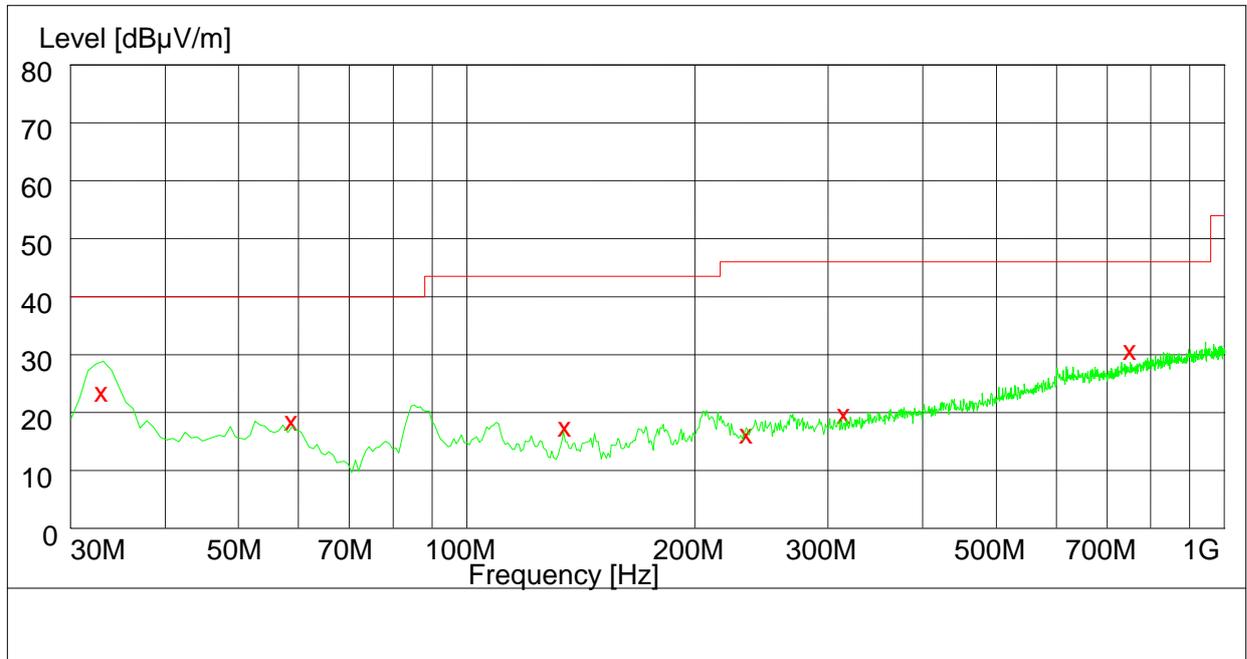


18GHz to 26GHz

Note: No peak found in pre- test.



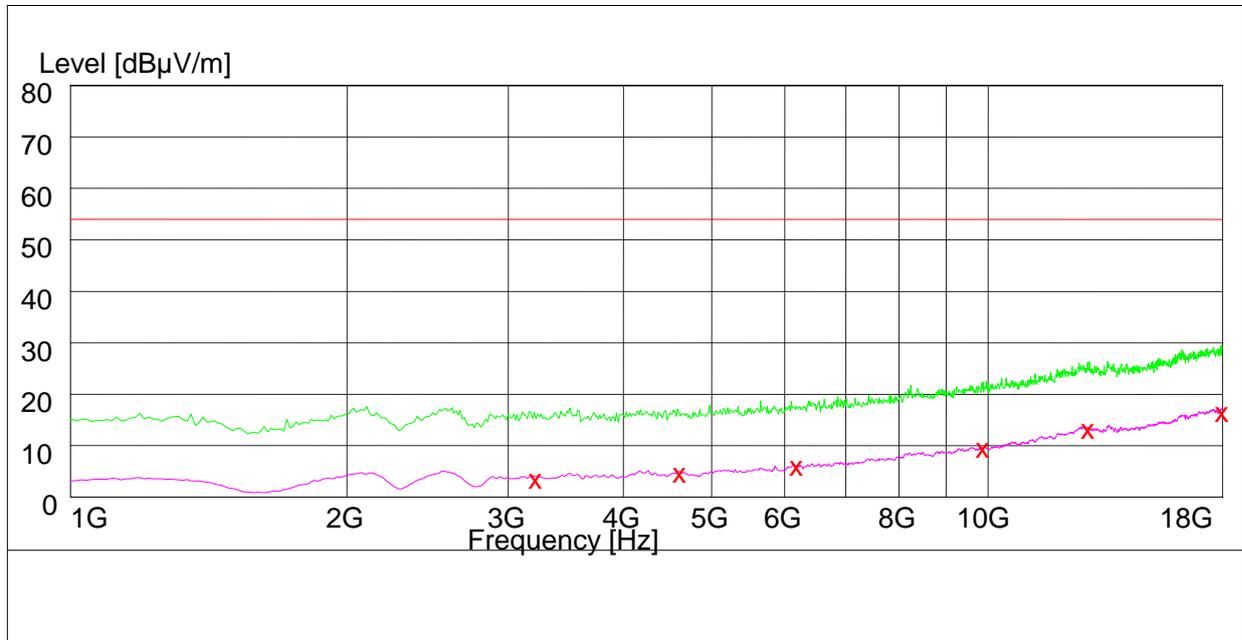
Channel 78 30MHz to 1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
33.004000	24.70	11.7	40.0	15.3	145.0	245.00	VERTICAL
58.770000	19.80	12.7	40.0	20.2	112.0	252.00	VERTICAL
135.000000	18.80	9.0	43.5	24.7	174.0	125.00	HORIZONTAL
234.200000	17.50	13.7	46.0	28.5	112.0	10.00	HORIZONTAL
314.712000	20.90	15.8	46.0	25.1	140.0	210.00	HORIZONTAL
750.500000	31.90	24.1	46.0	14.1	185.0	120.00	VERTICAL



1GHz to 18GHz



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

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
3218.300000	4.00	-21.5	54.0	50.0	121.0	326.00	VERTICAL
4616.100000	5.30	-18.7	54.0	48.7	110.0	107.00	HORIZONTAL
6189.700000	6.10	-16.0	54.0	47.9	114.0	194.00	VERTICAL
9867.700000	9.60	-10.3	54.0	44.4	100.0	270.00	VERTICAL
12852.700000	13.50	-6.2	54.0	40.5	154.0	84.00	HORIZONTAL
17996.500000	17.10	-0.5	54.0	36.9	125.0	100.00	HORIZONTAL

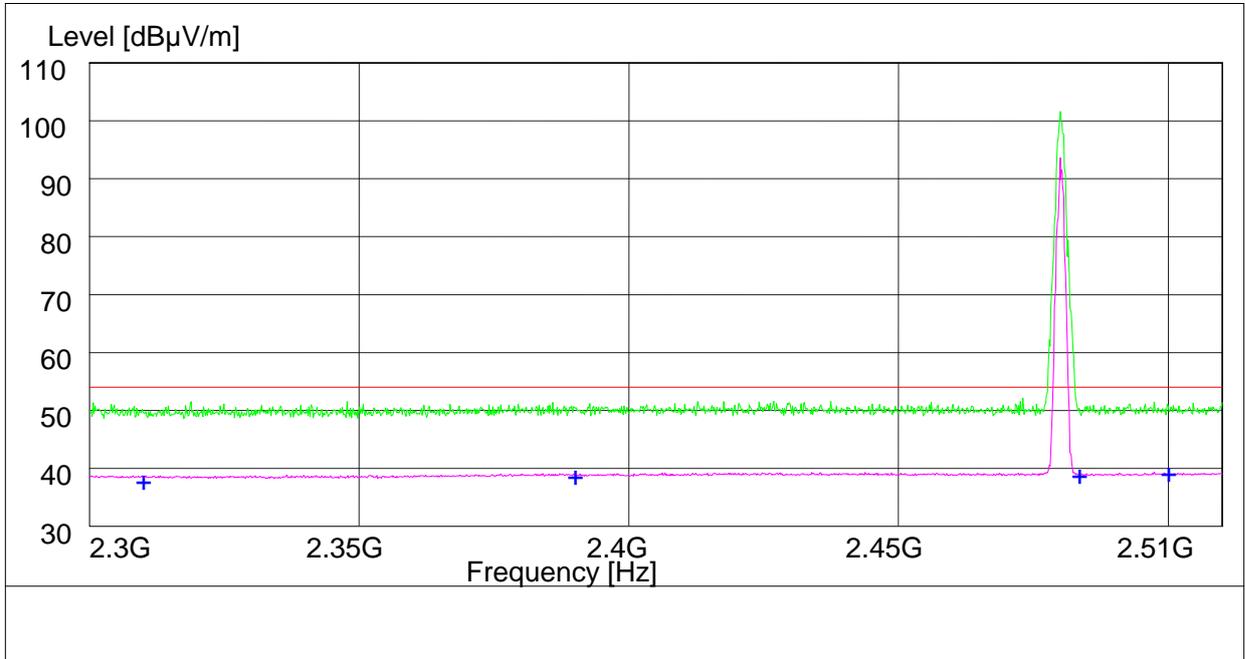


18GHz to 26GHz

Note: No peak found in pre- test.



2.30GHz to 2.51GHz



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

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	39.00	33.3	54.0	15.0	108.0	241.00	HORIZONTAL
2390.000000	39.40	33.5	54.0	14.6	141.0	240.00	HORIZONTAL
2483.500000	40.00	33.7	54.0	14.0	125.0	17.00	HORIZONTAL
2500.000000	39.50	33.8	54.0	14.5	101.0	310.00	HORIZONTAL



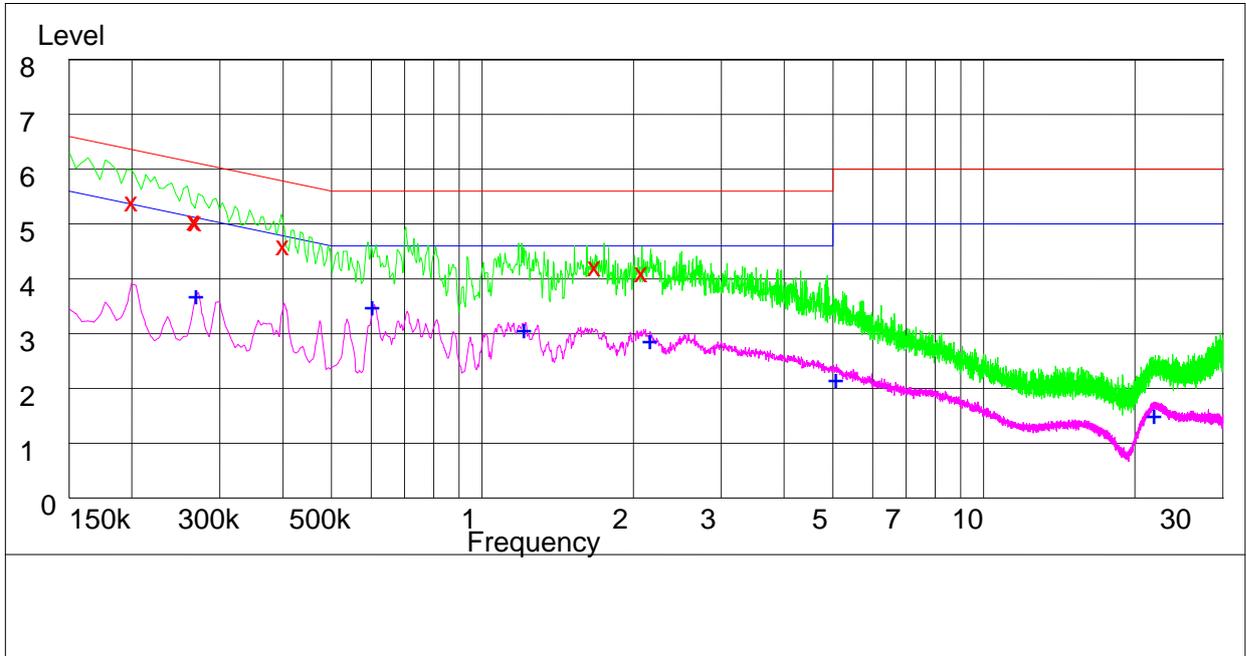
Appendix I

Conducted Emission at Power Port

According to FCC Part 15.207



Channel 40



MEASUREMENT RESULT: QP Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.200000	55.40	10.1	64	8.6	N	FLO
0.266000	51.90	10.0	61	9.1	N	FLO
0.268000	51.70	10.0	61	9.3	N	FLO
0.400000	47.40	10.0	58	10.6	N	FLO
1.676000	43.50	10.1	56	12.5	N	FLO
2.078000	42.50	10.1	56	13.5	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.268000	38.30	10.0	51	12.7	N	FLO
0.602000	36.30	10.1	46	9.7	N	FLO
1.210000	32.10	10.1	46	13.9	N	FLO
2.154000	30.20	10.1	46	15.8	L1	FLO
5.060000	23.10	10.2	50	26.9	N	FLO
21.780000	16.40	10.4	50	33.6	L1	FLO



Appendix J

Photos of Test Setup



1 Radiated Spurious Emissions



Radiated Disturbance (30MHz-1GHz)



Radiated Disturbance (1GHz~18GHz)



Radiated Disturbance (above 18GHz)

2 Conducted Emissions



Conducted Emissions for AC Ports