



FCC Test Report

**Product Name: HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone
with Bluetooth**

Model Number: HUAWEI U8110-5/U8110-5

**Report No: SYBHZ(R)E004092010EB-5
FCC ID: QISU8100-5**

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

Tel: +86 755 28780808 Fax: +86 755 89652518

Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
 2. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.
 3. The laboratory also has been listed by the VCCI to perform EMC measurements. The accreditation number is R2364, C2583, and T256.
 4. The test report is invalid if not marked with "exclusive stamp for the test report".
 5. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
 6. The test report is invalid if there is any evidence of erasure and/or falsification.
 7. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
 8. Normally, the test report is only responsible for the samples that have undergone the test.
 9. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.
1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
 2. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-1.



REPORT ON

FCC 47CFR part 15 subpart C Test of HUAWEI
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth

M/N: HUAWEI U8110-5/U8110-5

Report No: SYBHZ(R)E004092010EB-5

FCC ID: QISU8100-5

REGULATION

FCC CFR47 Part 2: Subpart J;

FCC CFR47 Part 15: Subpart C;

CONCLUSION

Pass

Approved By	<u>2010-09-17</u>	<u>Liuchunlin</u>	
	Date	Name	Signature

Reviewed By	<u>2010-09-17</u>	<u>Dailinjun</u>	
	Date	Name	Signature

Operator	<u>2010-09-16</u>	<u>Wenjianfeng</u>	
	Date	Name	Signature



Contents

1	<u>Summary</u>	5
2	<u>Product Description</u>	6
2.1	PRODUCTION INFORMATION	6
2.2	MODIFICATION INFORMATION.....	6
3	<u>Test Site Description</u>	7
3.1	TESTING PERIOD	7
3.2	GENERAL SET UP DESCRIPTION	7
4	<u>Product Description</u>	8
4.1	TECHNICAL CHARACTERISTICS	8
4.2	EUT IDENTIFICATION LIST	10
5	<u>Main Test Instruments</u>	11
6	<u>Transmitter Measurements</u>	12
6.1	20DB BANDWIDTH MEASUREMENT	12
6.2	CARRIER FREQUENCY SEPARATION MEASUREMENT	14
6.3	NUMBER OF HOPPING CHANNEL	16
6.4	TIME OF OCCUPANCY	18
6.5	PEAK OUTPUT POWER	20
6.6	BAND EDGE SPURIOUS EMISSION	22
6.7	CONDUCTED RF SPURIOUS	24
6.8	RADIATED SPURIOUS EMISSION & SPURIOUS IN RESTRICTED BAND	26
6.9	CONDUCTED EMISSION AT POWER PORT	29
7	<u>System Measurement Uncertainty</u>	31
8	<u>Appendices</u>	32



1 Summary

The table below summarizes the measurements and results for the HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth - HUAWEI U8110-5/U8110-5. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

FCC Measurement Specification	Description	Result
15.247 (a) (1)	20dB bandwidth measurement	PASS
15.247 (a) (1)	Carrier frequency separation measurement	PASS
15.247 (a) (1) III	Number of hopping channel	PASS
15.247 (a) (1) III	Time of occupancy	PASS
15.247 (b) (1)	Peak output power	PASS
15.247 (d)	Band edge compliance measurement	PASS
15.247 (d)	Conducted RF spurious	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

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth- HUAWEI U8110-5/U8110-5 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 GSM900 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.

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	Characteristic	Corresponding Test Mode	Note
Data and Voice	Modulation: GFSK,	TM1	

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!				



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.10, 2010 to Sep.15, 2010

3.2 General Set up Description

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

Bluetooth MODE:

TM1: GFSK Modulation



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:	-
-----------------------	---

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):	0.03 (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:	400mA

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:	 +2.8V
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

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth		
HUAWEI U8110-5/U8110-5		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
MAINBOARD	A97NAB1070603541	HD1U811M Ver.B

4.2.2 Adapter Technical Data

AC/DCAdapter Model	HS-050040U6
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V  400mA
Rated Power	2W
S/N	HKA9B1451124

4.2.3 Battery Technical Data

Name	Qty.	Manufacture	Serials number	Description
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	YAC9608HI201022 2	Battery Model: HB5A2H Rated capacity: 1150mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

4.2.4 FCC Identification

Grantee Code: QIS
 Product Code: U8100-5
 FCC Identification: QISU8100-5



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	05.24.2011
Pre-Amplifier	R&S	SCA-SCU 18	10003	NA
Pre-Amplifier	R&S	SCA-SCU 26	3357-3358	NA
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	09.20.2010
LISN	R&S	ENV216	100382	07.24.2011
Universal Radio Communication Tester	R&S	CBT	100548	02.21.2011
Spectrum Analyzer	Agilent	E4440A	3608083811	12.17.2010
Power Divider	Agilent	11667A	54723	NA



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:	23.5 °C
Relative humidity:	55%
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
---------------------	---

6.1.2.3 Limits

Not Applicable.

6.1.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer and universal communication tester.
- (b) Set the EUT 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 spectrum analyzer.

Test setup

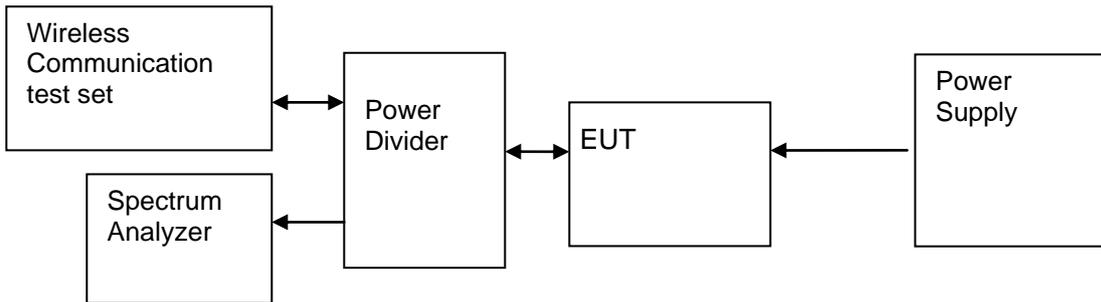


Figure 1. Test Set-up

6.1.4 Measurement Results

Table 15 Measurement Results

Bandwidth Type	Channel Position	Channel Number	Frequency [GHz]	Measured Bandwidth [MHz]	Result
20dB	B	0	2.402	0.963	PASS
20dB	M	40	2.442	0.963	PASS
20dB	T	78	2.480	0.967	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 16 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	23.5 °C
Relative humidity:	55%
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 17 Supporting Standards:

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

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 18 Limits

Regulation:	≥ 0.025 or $2/3$ of the 20 dB bandwidth
Limit:	$2/3 \times 0.967 = 0.64$

6.2.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer and universal communication tester.
- (b) Set the EUT 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

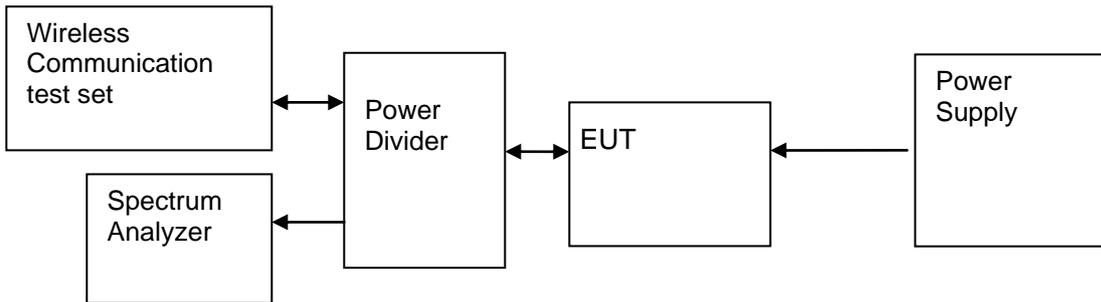


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 19 Measurement Results

Channel No.	Frequency [GHz]	Channel No.	Frequency [GHz]	Measured frequency separation [MHz]	Limit [MHz]	Result
40	2.442	39	2.441	0.983	0.64	PASS
40	2.442	41	2.443	0.992	0.64	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 20 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	22 °C
Relative humidity:	52 %
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 21 Supporting Standards:

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

6.3.2.3 Limits

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

Table 22 Limits

Limits	≥15 hopping frequency channel
--------	-------------------------------

6.3.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer and universal communication tester.
- (b) Set the EUT 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

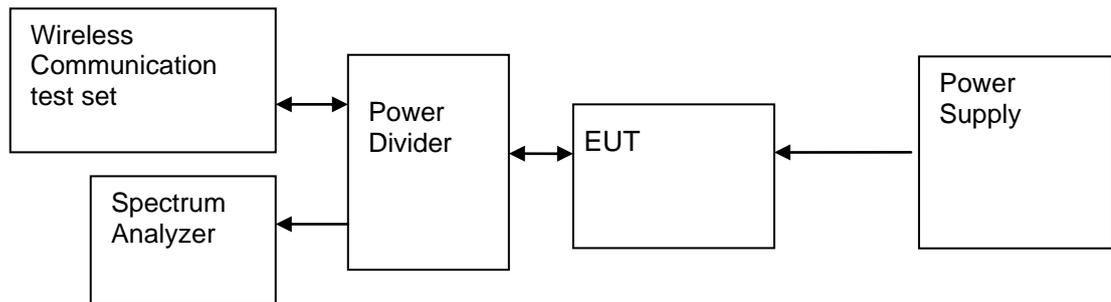


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 23 Measurement Results

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 24 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
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 25 Supporting Standards:

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

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 26 Limits

Limits for time of occupancy	$\leq 0.4s$
------------------------------	-------------

6.4.3 Test Method and Setup

- Connect test port of EUT to spectrum analyzer and universal communication tester.
- Set the EUT 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

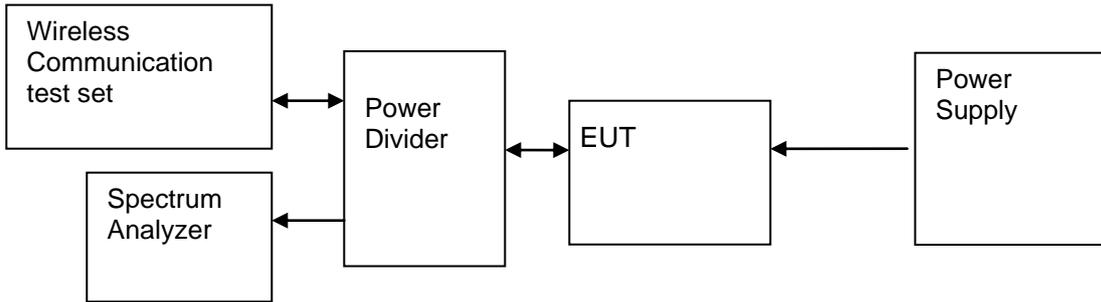


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 27 Measurement Results

Time of Single Slot [ms]	Numbers of slots in a period	Time of occupied in a period [s]	Limit [s]	Result
2.95	106.7	0.32	≤ 0.4	PASS

Note: The result is measured at DH5 mode in GFSK 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 28 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	23.5°C
Relative humidity:	55 %
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 29 Supporting Standards:

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

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 30 Limits

2.4GHz and 5.8GHz hopping frequency system	1 Watt / 30 dBm
Other frequency hopping systems	0.125 Watts / 21 dBm

6.5.3 Test Method and Setup

- (a) Connect test port of EUT to spectrum analyzer and universal communication tester.
- (b) Set the EUT to transmit maximum output power at 2.4GHz and switch off frequency hopping function.
- (c) Then set the EUT to transmit at high, middle and low frequency and measure the conducted output power separately.

Test setup

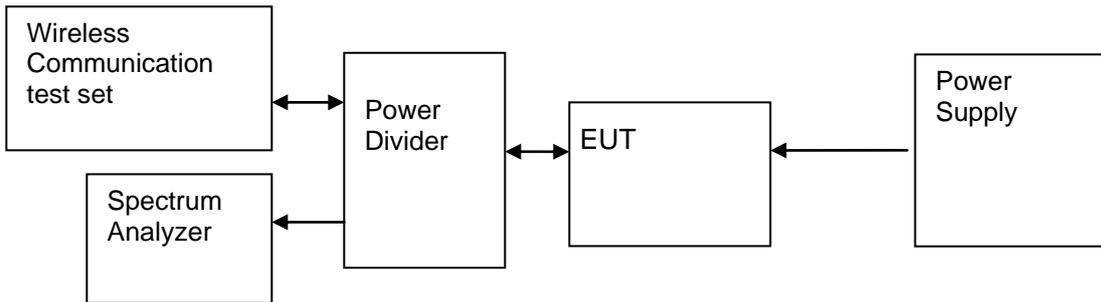


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 31 Measurement Results

Channel	Channel No.	Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
Bottom	0	2402	3.09	< 30	PASS
Middle	40	2442	2.75	< 30	PASS
Top	78	2480	1.64	< 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 32 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20°C
Relative humidity:	50 %
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 33 Supporting Standards:

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

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 34 Limits

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

6.6.3 Test Method and Setup

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

Test setup

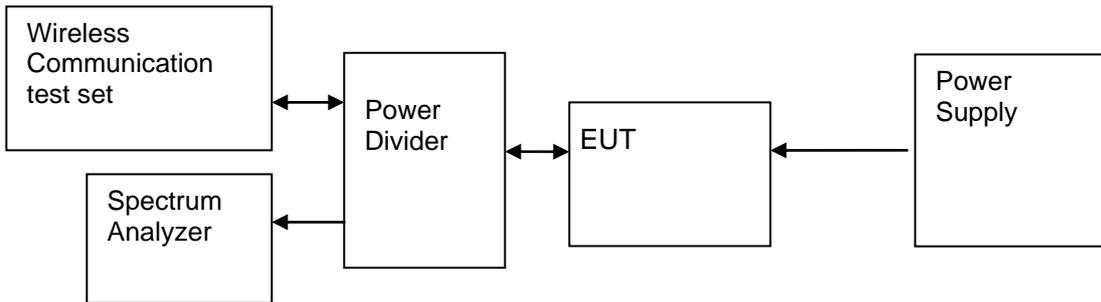


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 35 Measurement Results

	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
Low Edge	0	2402	2.91	Off	-53.60	< -17.1	PASS
	-	-	3.09	On	-53.60	< -17.0	PASS
High Edge	78	2480	1.63	Off	-53.42	< -18.4	PASS
	-	-	1.63	On	-53.46	< -18.4	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 36 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna Connector
Ambient temperature:	22 °C
Relative humidity:	53 %
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 37 Supporting Standards:

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

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 38 Limits

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

6.7.3 Test Method and Setup

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

Test setup

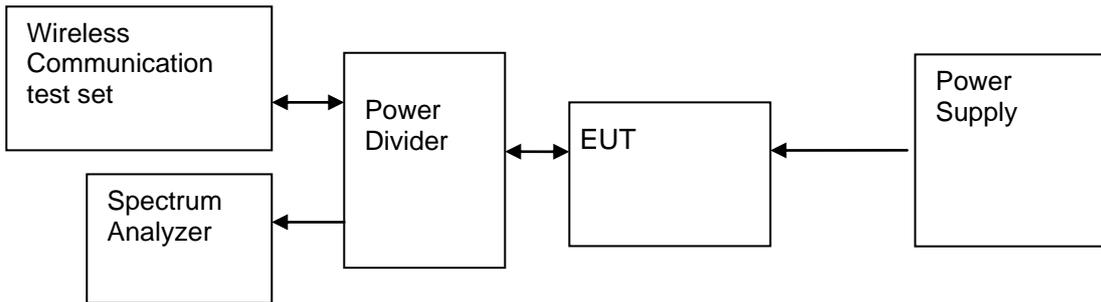


Figure 7. Test Set-up

6.7.4 Measurement Results

6.7.4.1 Measurement Results

Table 39 Measurement Results

Test Frequency Range	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
30kHz-25GHz	0	2402	2.37	Off	-46.29	< -17.8	PASS
30kHz-25GHz	40	2442	1.27	Off	-46.37	< -18.8	PASS
30kHz-25GHz	78	2480	0.60	Off	-46.63	< -19.4	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 40 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 41 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 42 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)(above table 42).

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

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

Test set up

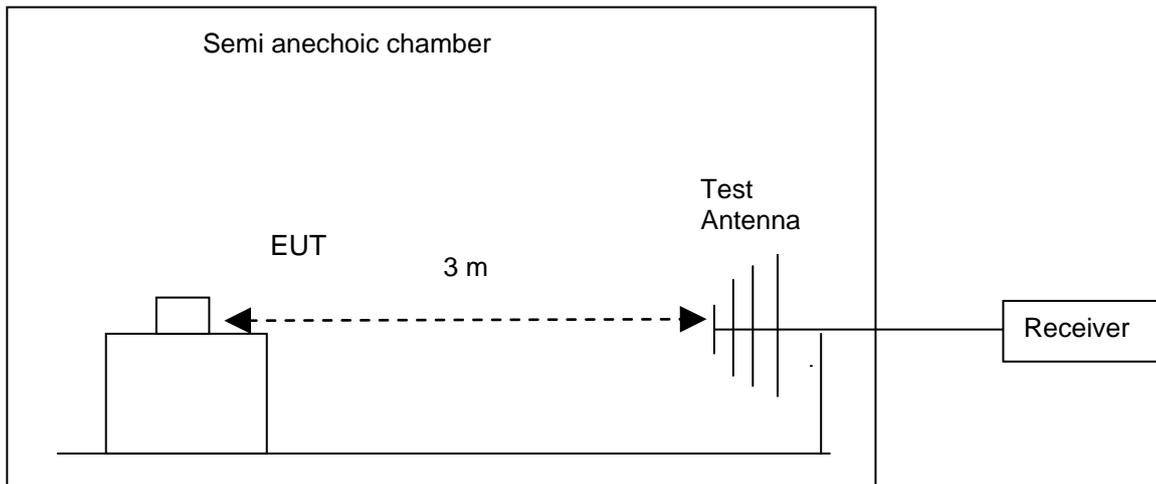


Figure 8. Test Set up

6.8.4 Measurement Results

6.8.4.1 Measurement Result

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

Measured Result of channel: 0 (2402MHz)

Table 43 MEASUREMENT RESULT

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
30.040000	22.80	11.7	40.0	218.2	245.0	278.00	HORIZONTAL
61.100000	22.80	12.4	40.0	17.2	147.0	312.00	HORIZONTAL
104.020000	24.10	13.1	43.5	19.4	278.0	125.00	VERTICAL
245.160000	21.10	14.1	46.0	24.9	178.0	258.00	HORIZONTAL
551.410000	30.80	21.6	46.0	15.2	274.0	146.00	VERTICAL
940.800000	36.10	26.5	46.0	9.9	123.0	197.00	HORIZONTAL
3093.000000	22.80	-8.7	54.0	31.2	215.0	244.00	VERTICAL
3840.500000	25.10	-6.2	54.0	28.9	235.0	153.00	VERTICAL
5160.000000	29.10	-3.3	54.0	24.9	152.0	101.00	HORIZONTAL
7210.400000	28.90	0.6	54.0	25.1	234.0	31.00	VERTICAL
11375.000000	32.50	7.1	54.0	21.5	140.0	12.00	VERTICAL
17850.000000	37.70	16.4	54.0	16.3	102.0	18.00	HORIZONTAL
2310.000000	38.00	33.3	54.0	16.0	210.0	342.00	HORIZONTAL



2390.000000	38.50	33.5	54.0	15.5	254.0	259.00	VERTICAL
2483.500000	38.40	33.7	54.0	15.6	123.0	110.00	VERTICAL
2500.000000	38.40	33.8	54.0	15.6	157.0	201.00	HORIZONTAL

Measured Result of channel: 40 (2442MHz)

Table 44 MEASUREMENT RESULT

Frequency (MHz)	Level (dB μ V/m)	Transd (dB)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
30.040000	21.10	11.7	40.0	18.7	257.0	12.00	HORIZONTAL
55.780000	20.50	12.7	40.0	19.5	145.0	40.00	VERTICAL
101.080000	20.40	13.1	43.5	23.1	250.0	163.00	HORIZONTAL
195.600000	28.60	12.0	43.5	14.9	120.0	311.00	VERTICAL
482.140000	31.20	19.6	46.0	14.8	120.0	142.00	HORIZONTAL
940.360000	33.50	26.6	46.0	12.5	248.0	350.00	HORIZONTAL
3358.000000	23.30	-7.9	54.0	30.7	253.0	315.00	VERTICAL
5167.000000	26.40	-3.3	54.0	27.6	125.0	51.00	VERTICAL
7575.000000	28.50	1.6	54.0	25.5	154.0	360.00	HORIZONTAL
9646.500000	29.80	5.2	54.0	24.2	250.0	229.00	VERTICAL
14190.500000	33.20	11.4	54.0	20.8	100.0	278.00	VERTICAL
17999.500000	36.80	17.3	54.0	17.2	178.0	100.00	HORIZONTAL

Measured Result of channel: 78 (2480MHz)

Table 45 MEASUREMENT RESULT

Frequency (MHz)	Level (dB μ V/m)	Transd (dB)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
31.210000	22.50	11.7	40.0	17.5	214.0	301.00	HORIZONTAL
51.100000	20.10	12.7	40.0	29.9	154.0	28.00	HORIZONTAL
101.040000	19.70	13.1	43.5	23.8	321.0	194.00	VERTICAL
188.450000	21.80	11.8	43.5	21.7	157.0	155.00	HORIZONTAL
240.100000	29.10	14.1	46.0	16.9	245.0	257.00	VERTICAL
481.850000	32.00	19.6	46.0	14.0	147.0	128.00	HORIZONTAL
3015.500000	22.70	-9.2	54.0	31.3	145.0	315.00	HORIZONTAL
4889.500000	25.70	-3.9	54.0	28.3	120.0	311.00	VERTICAL
6698.500000	26.80	-0.6	54.0	27.2	254.0	173.00	VERTICAL
9244.000000	29.40	4.5	54.0	24.6	210.0	360.00	VERTICAL
14198.500000	33.00	11.5	54.0	21.0	105.0	65.00	HORIZONTAL
17993.000000	37.00	17.3	54.0	17.0	149.0	270.00	VERTICAL
2310.000000	38.50	-11.7	54.0	15.5	168.0	180.00	VERTICAL
2390.000000	38.80	-11.5	54.0	15.2	110.0	359.00	HORIZONTAL
2483.500000	42.60	-11.3	54.0	11.4	217.0	26.00	HORIZONTAL
2500.000000	38.50	-11.2	54.0	15.5	109.0	166.00	VERTICAL

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 46 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 47 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
------------------	--

6.9.2.3 Limits

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

Table 48 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 EUT to transmitter the maximum power which defined in specification of product. The EUT 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.

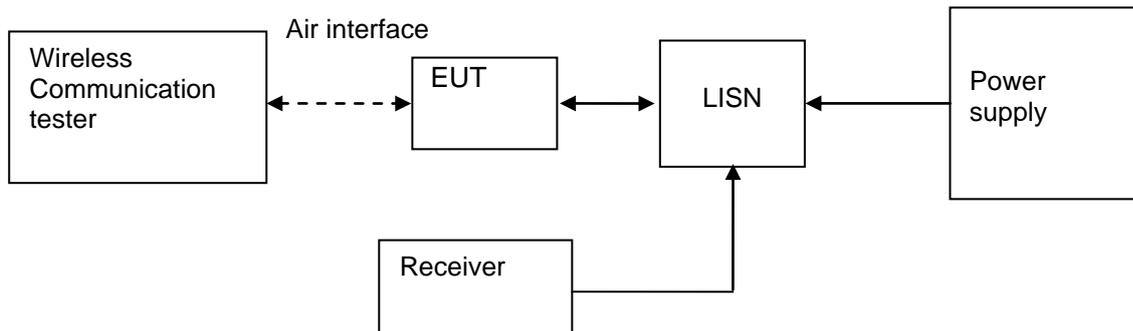


Figure 9. Test Set-up

6.9.4 Measurement Results

Table 49 MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.216000	44.20	10.0	63	18.8	N	FLO
0.792000	40.20	10.1	56	15.8	N	FLO
1.930000	41.30	10.1	56	14.7	N	FLO
2.850000	43.30	10.2	56	12.7	N	FLO
9.658000	46.20	10.3	60	13.8	N	FLO
17.998000	40.90	10.3	60	19.1	N	FLO

Table 50 MEASUREMENT RESULT:AV DECTER

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.286000	35.60	10.0	51	15.4	N	FLO
0.430000	35.00	10.0	47	12.0	N	FLO
1.940000	32.20	10.1	46	13.8	N	FLO
2.950000	36.20	10.2	46	9.8	N	FLO
8.288000	34.60	10.2	50	15.4	N	FLO
14.810000	31.40	10.3	50	18.6	N	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 51 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=4.1dB; k=2
Conducted emission test for power port	Disturbance Voltage(dB μ V)	U=3.4dB; k=2



8 Appendices

Appendix A	Measurement Results 20dB bandwidth measurement	7
Appendix B	Measurement Results Carrier frequency separation measurement	2
Appendix C	Measurement Results Number of hopping channel	2
Appendix D	Measurement Results Time of occupancy	3
Appendix E	Measurement Results Peak output power	4
Appendix F	Measurement Results Band edge compliance measurement	9
Appendix G	Measurement Results Conducted RF spurious	10
Appendix H	Measurement Results Radiated spurious emission	12
Appendix I	Measurement Results Conducted emission test for power port	2
Appendix J	Photos of Test Setup	3

(END OF REPORT)



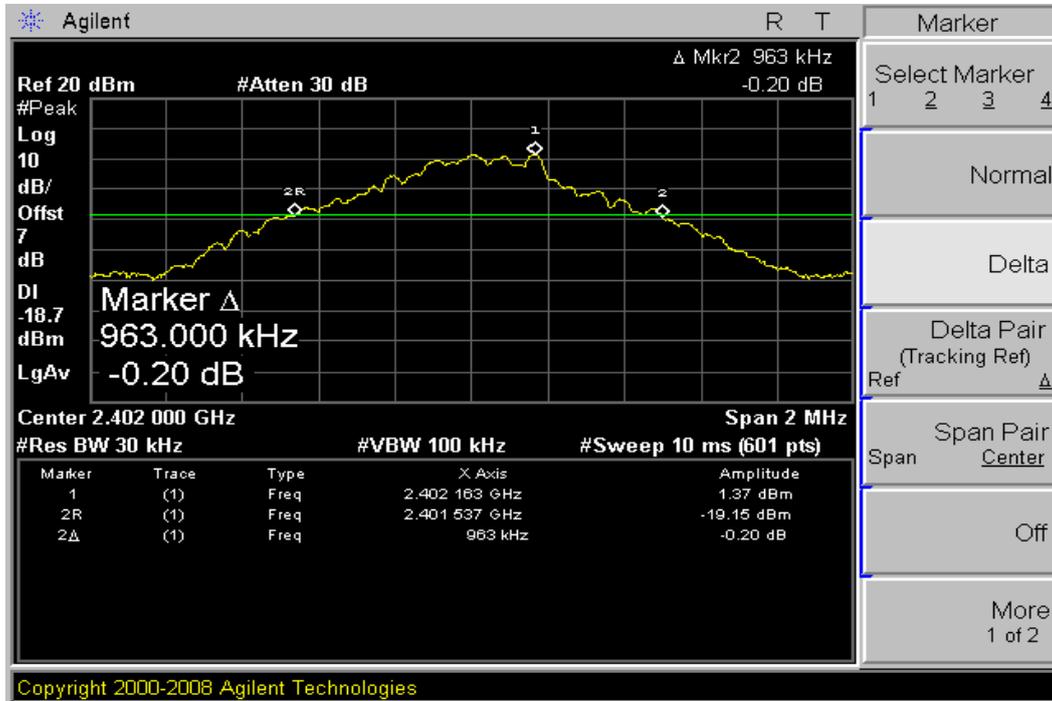
Appendix A

20dB bandwidth measurement

According to FCC Part 15.247 (a) (1)

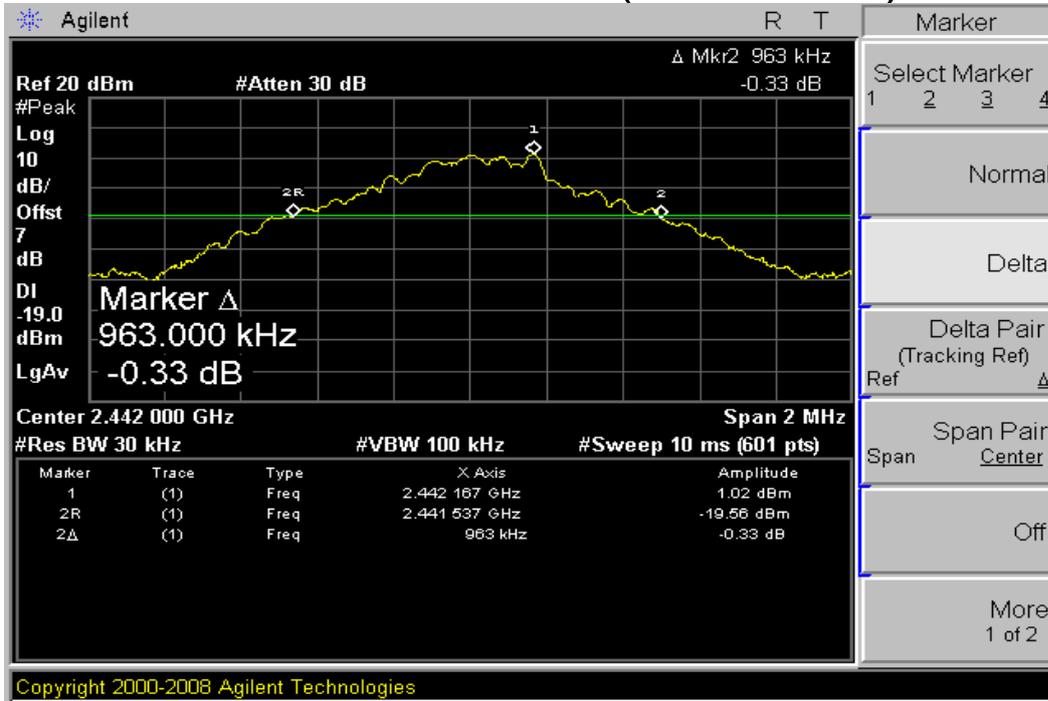


Channel 0 (2402MHz)

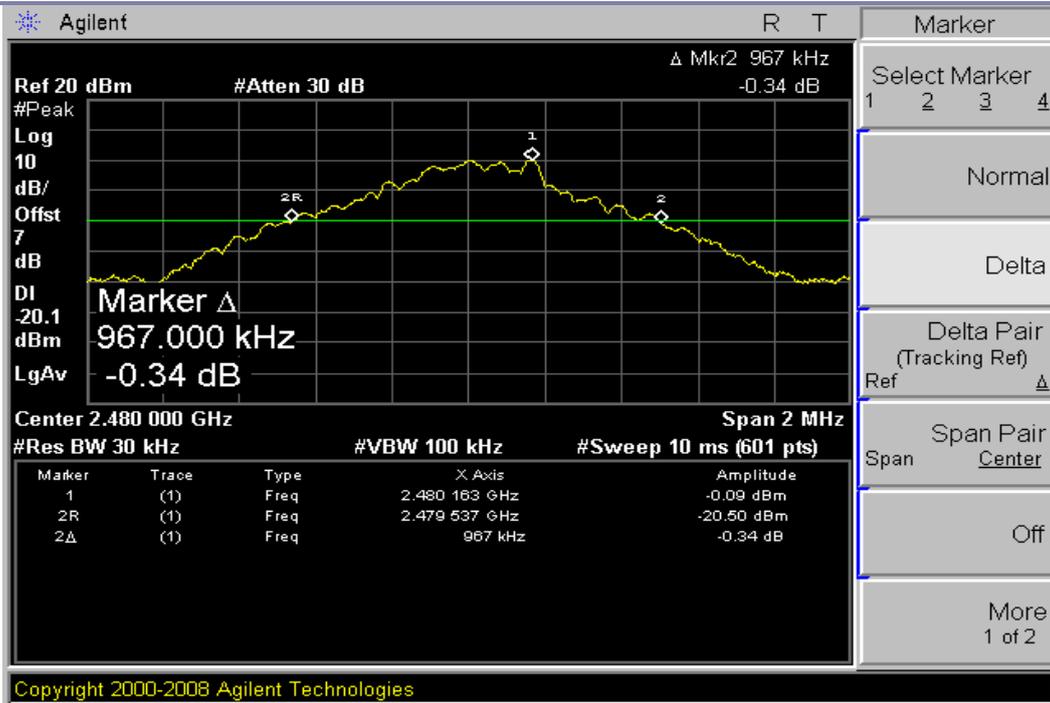




Channel 40 (2442MHz)



Channel 78 (2480MHz)





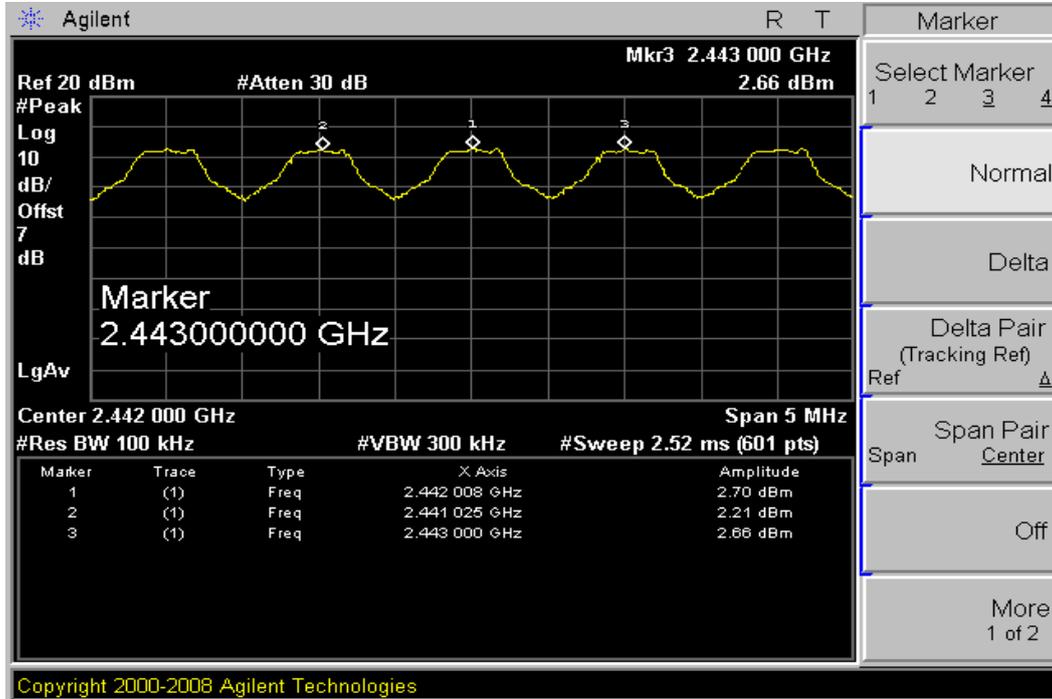
Appendix B

Carrier frequency separation measurement

According to FCC Part 15.247 (a) (1)



Centred at Channel 40





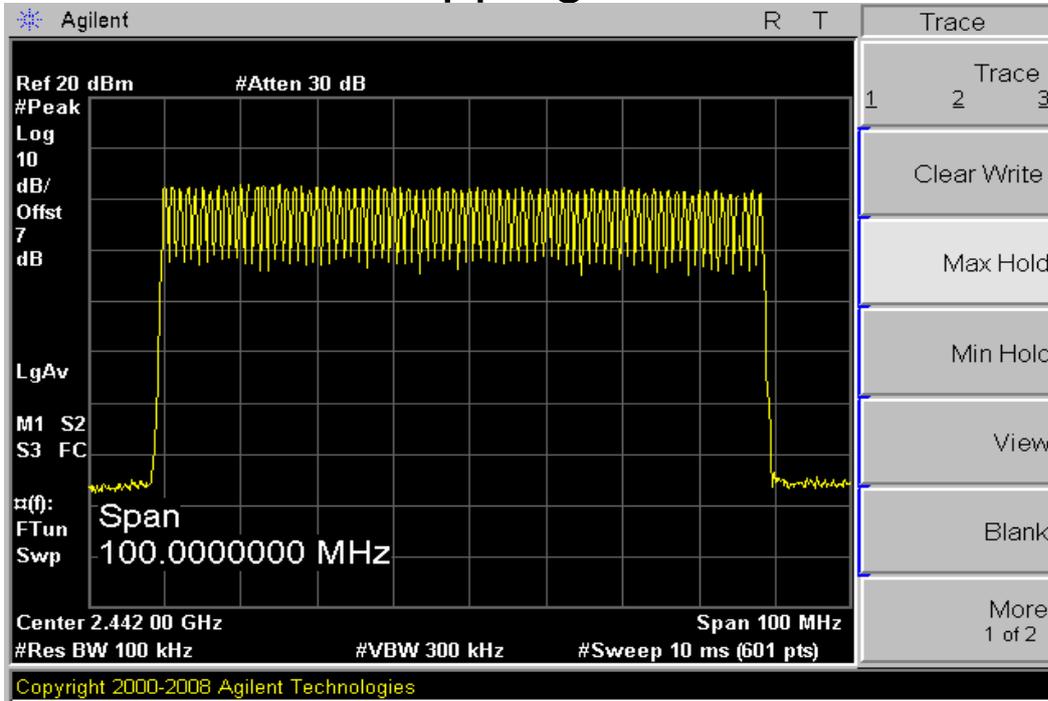
Appendix C

Number of hopping channel

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



Total hopping channels = 79





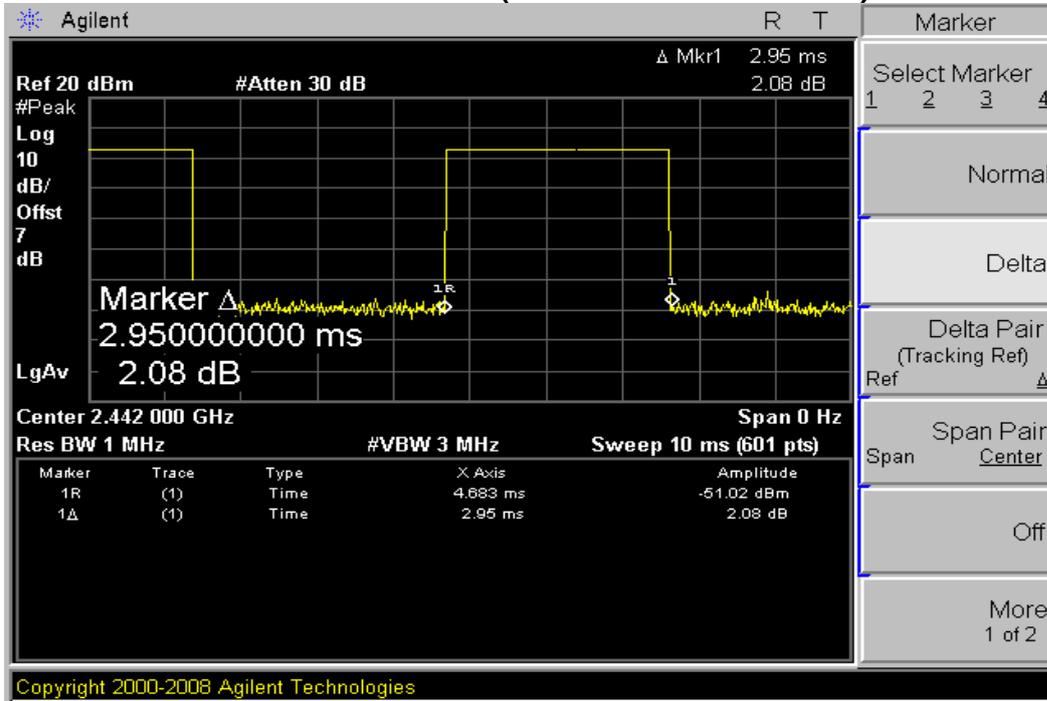
Appendix D

Time of occupancy

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

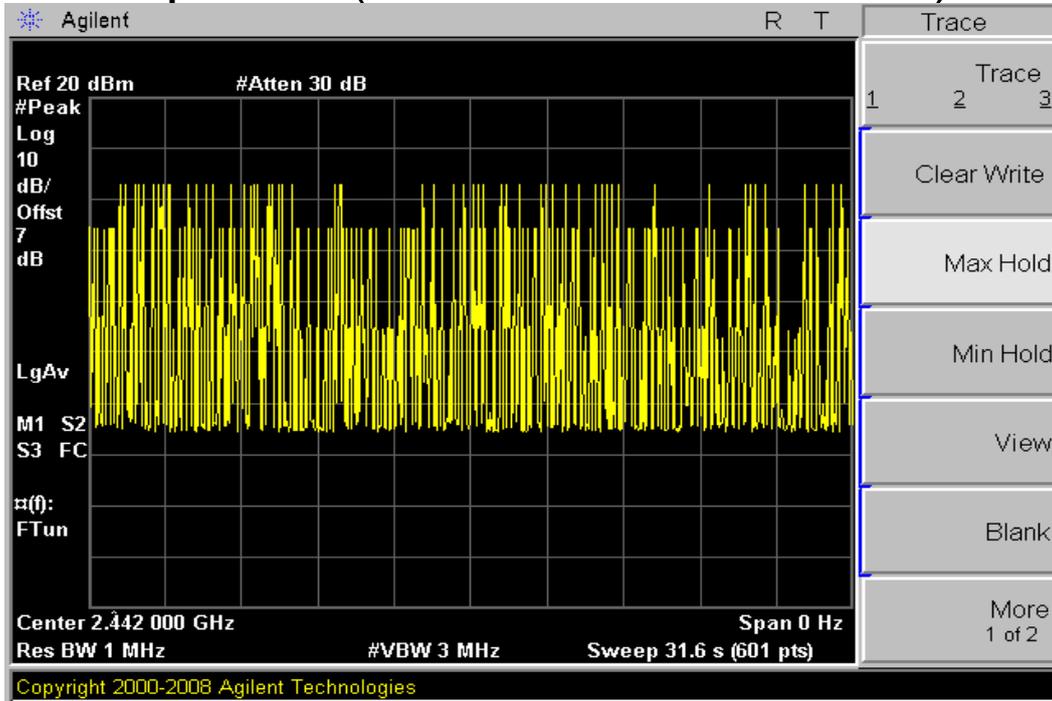


A burst (One time slot)





A period (Less than 106.7 burst)





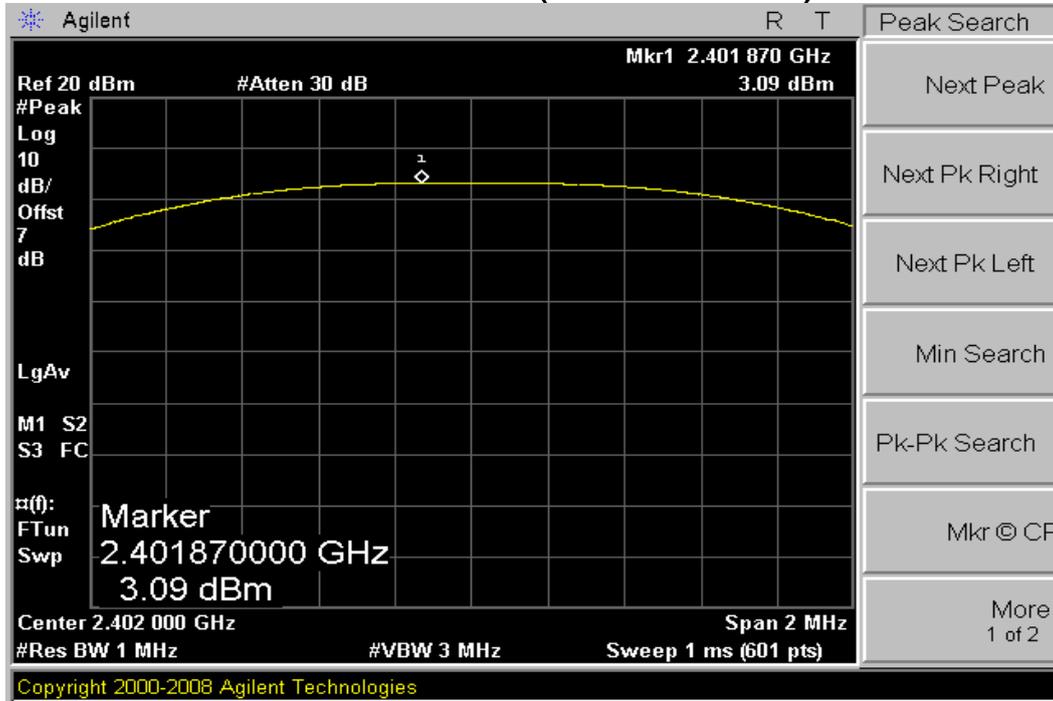
Appendix E

Peak output power

According to FCC Part 15.247 (b) (1)

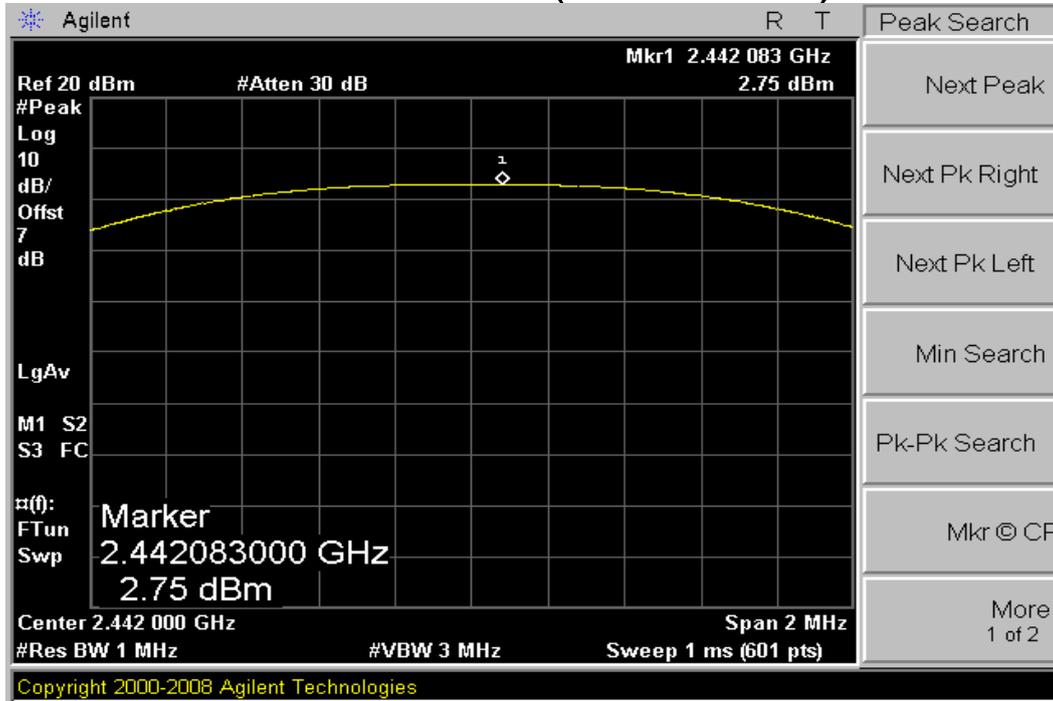


Channel 0 (2402MHz)



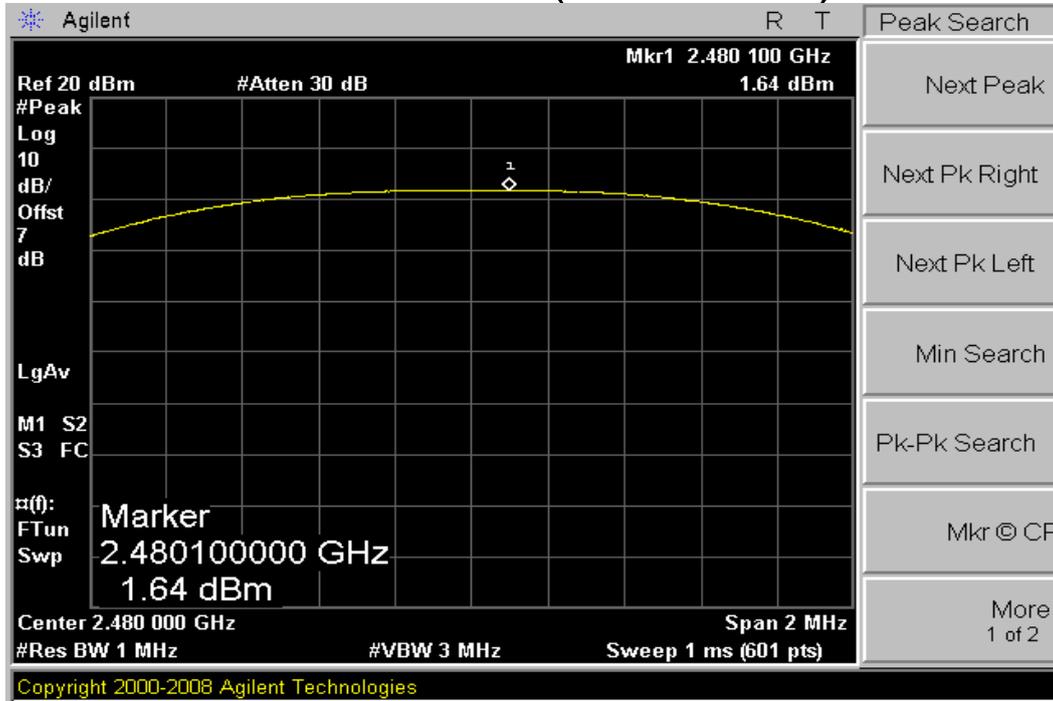


Channel 40 (2442MHz)





Channel 78 (2480MHz)





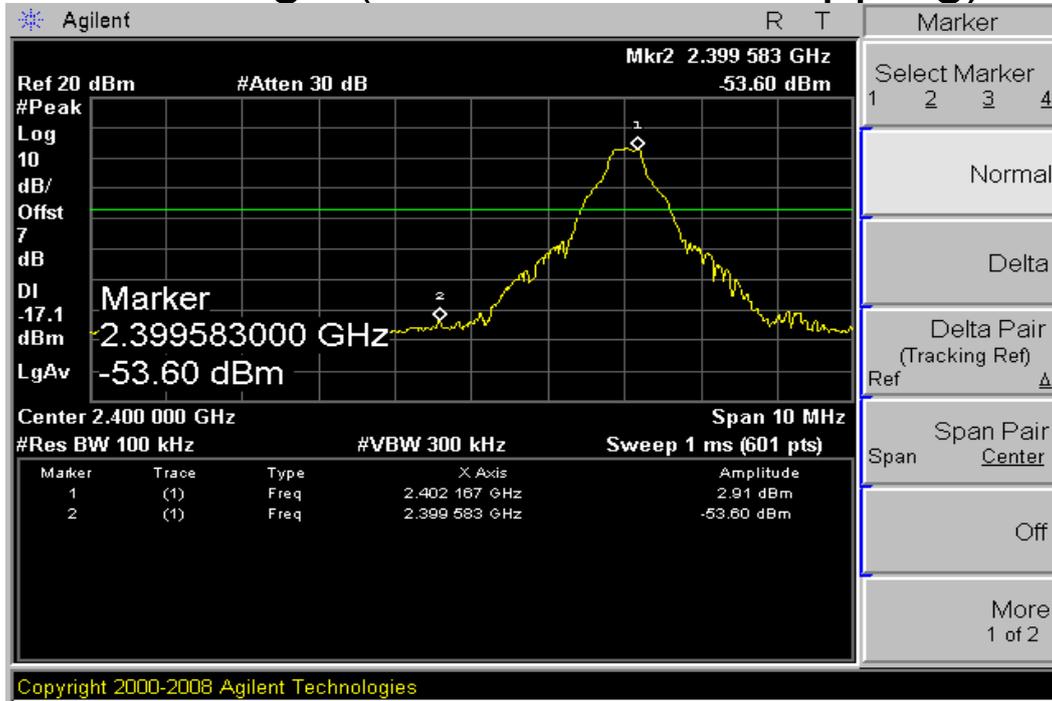
Appendix F

Band edge spurious emission

According to FCC Part 15.247 (d)

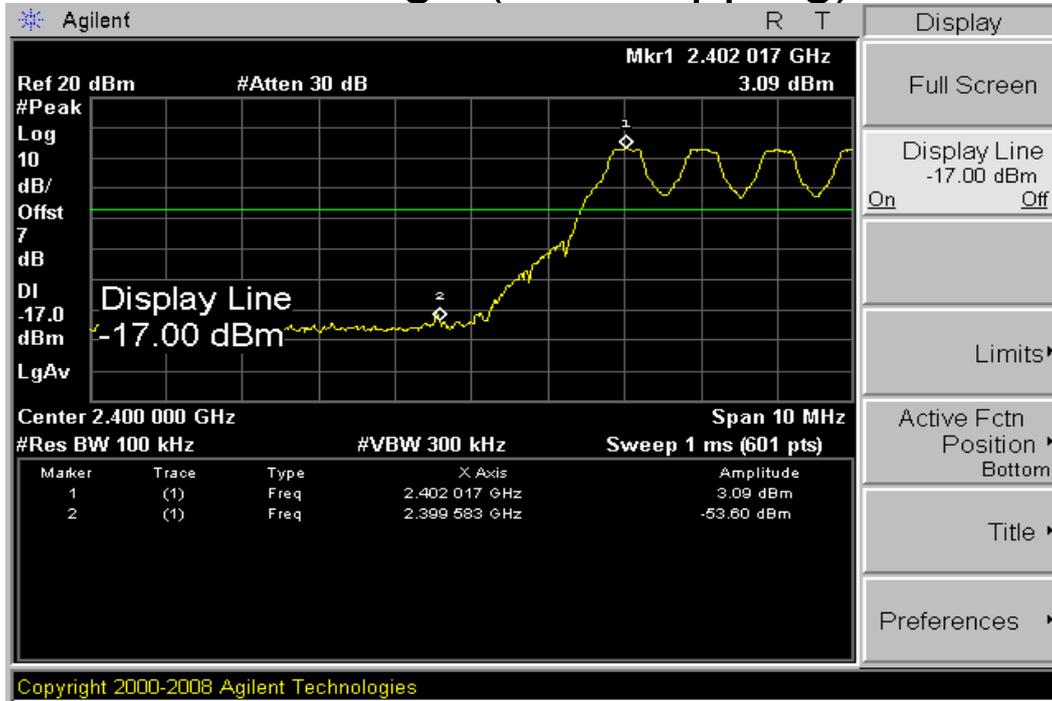


Low edge (Channel 0, no hopping)



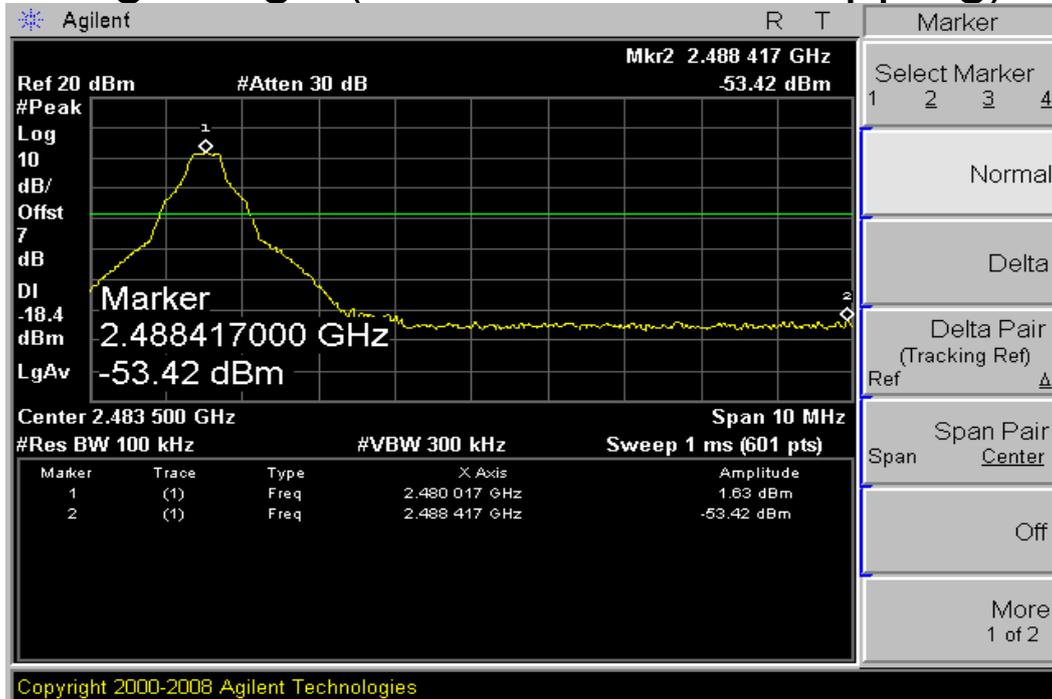


Low edge (with hopping)



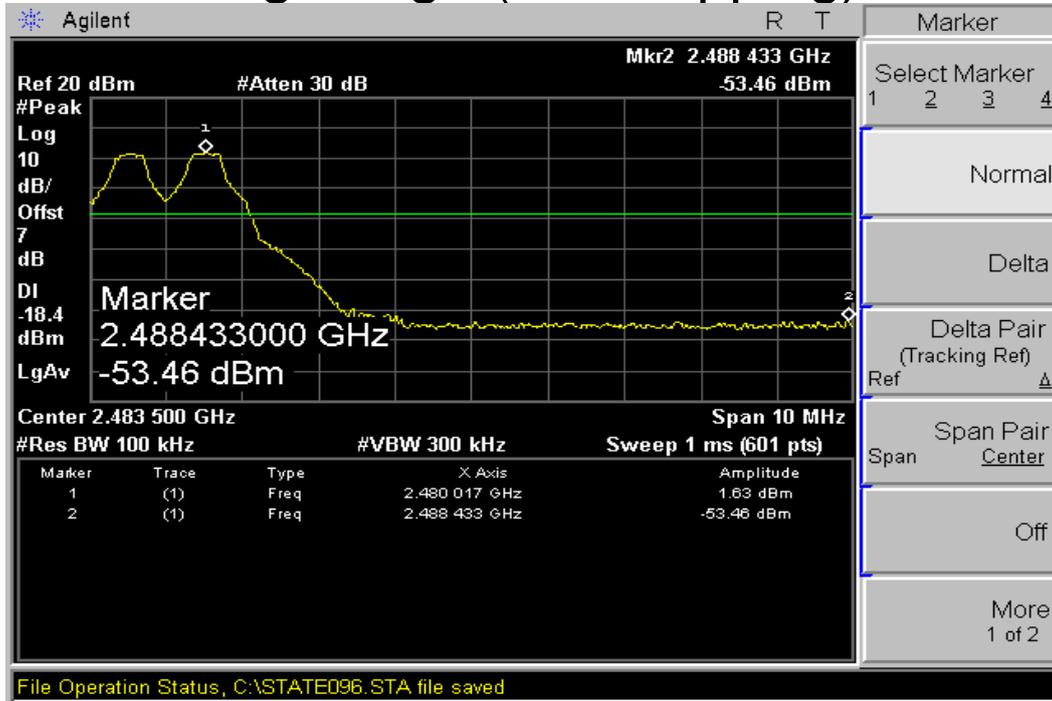


High edge (Channel 78, no hopping)





High edge (with hopping)





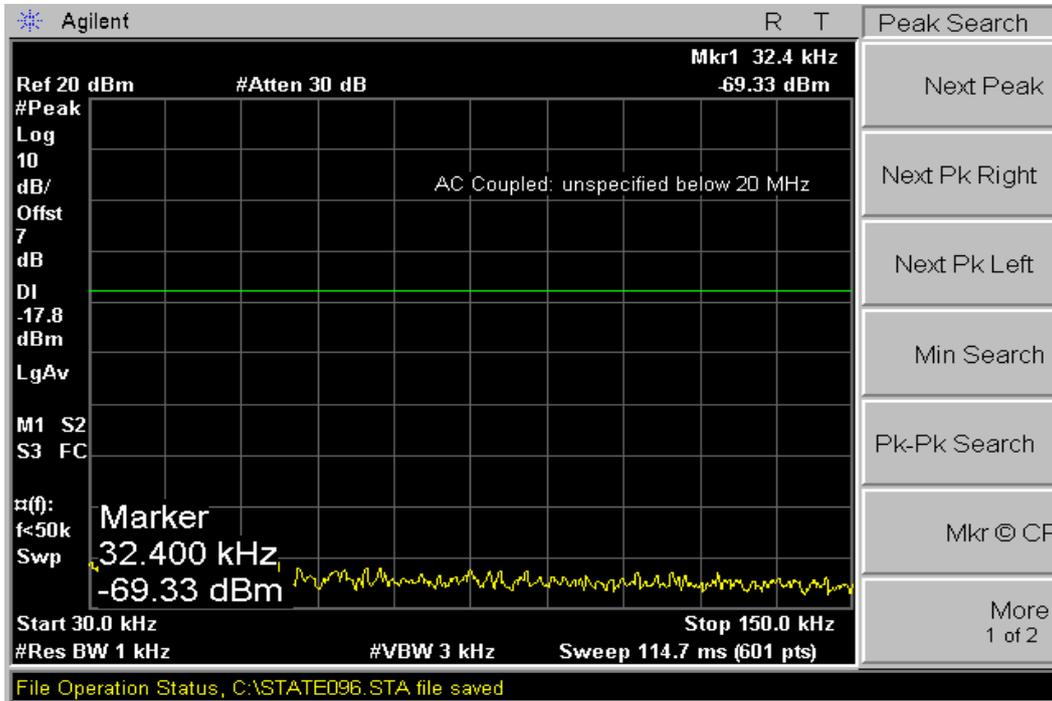
Appendix G

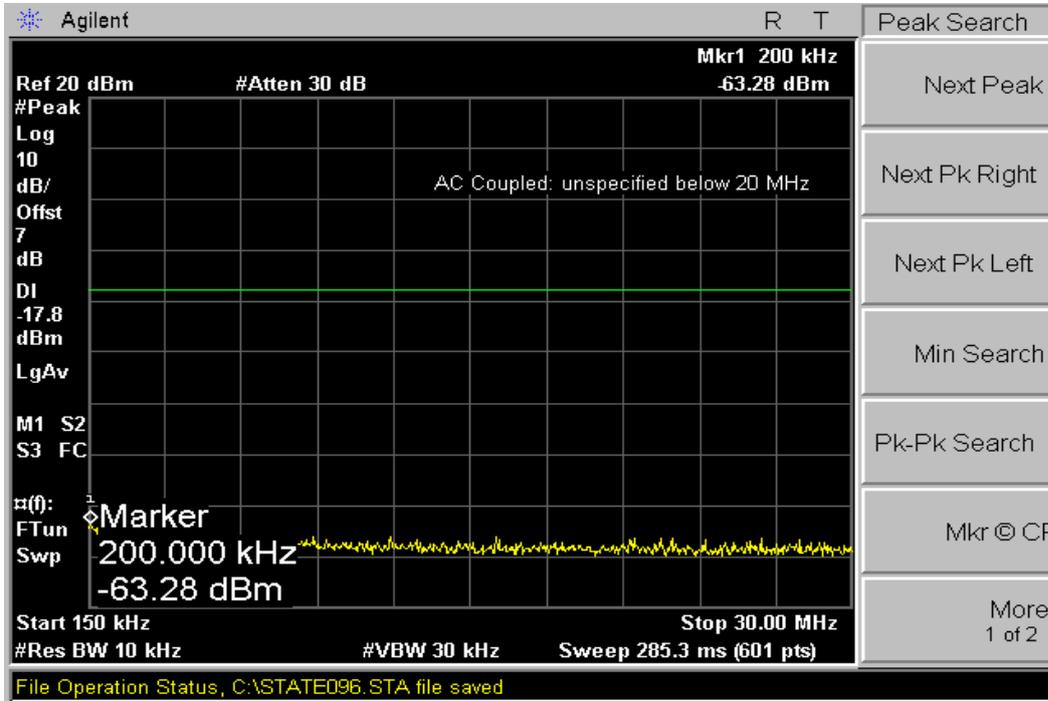
Conducted RF spurious

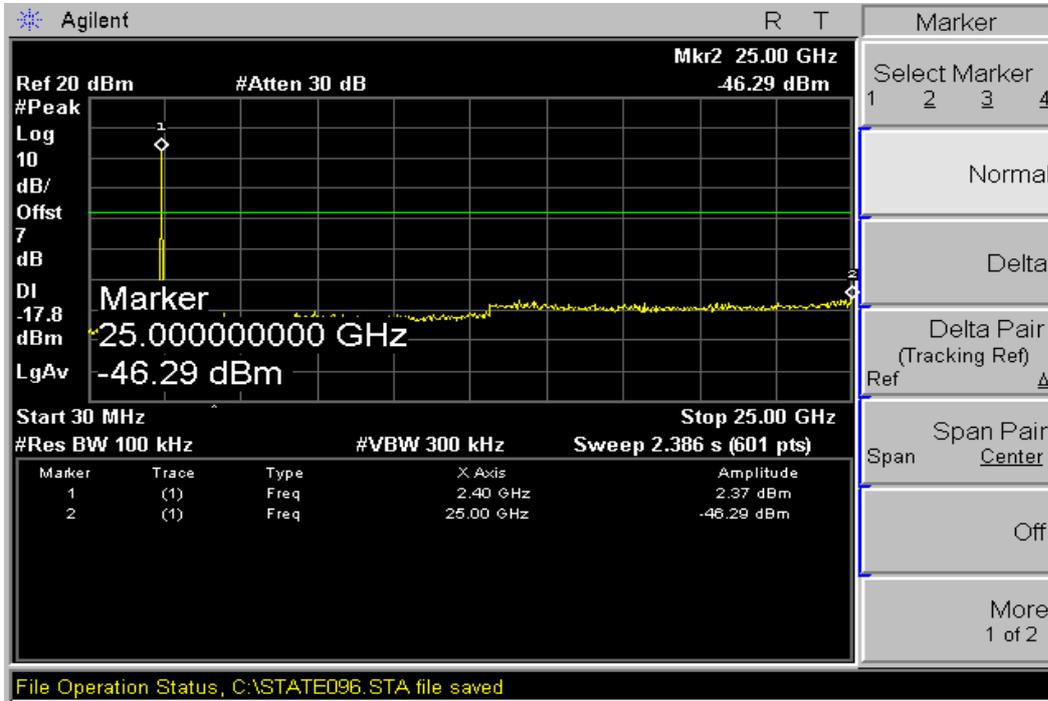
According to FCC Part 15.247 (d)



Channel 0

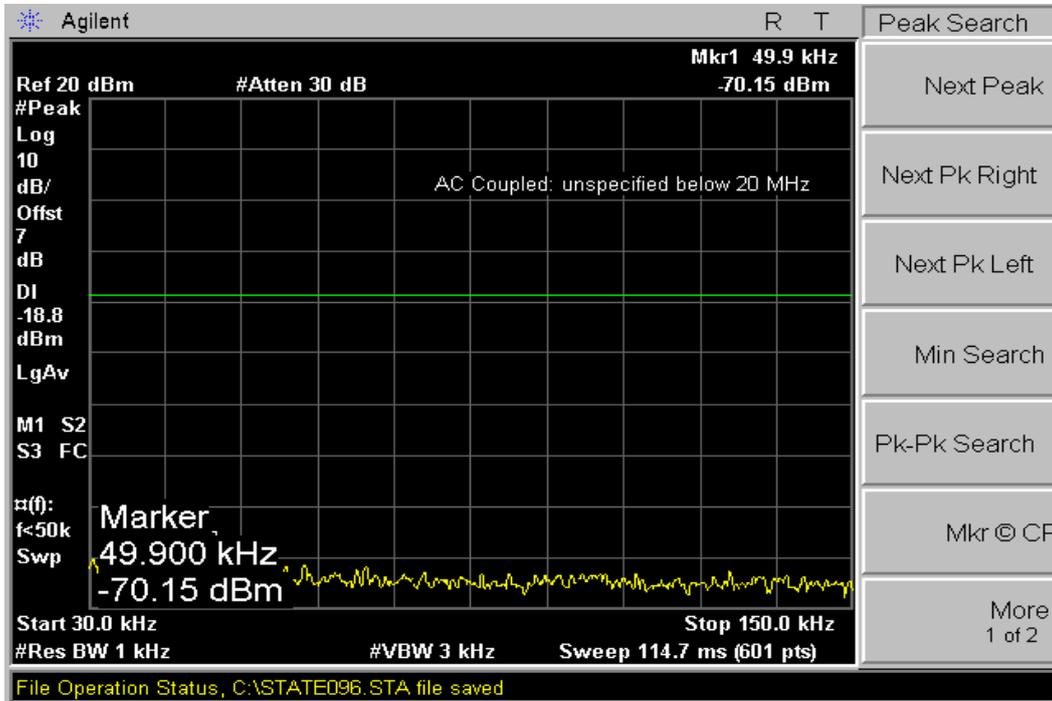


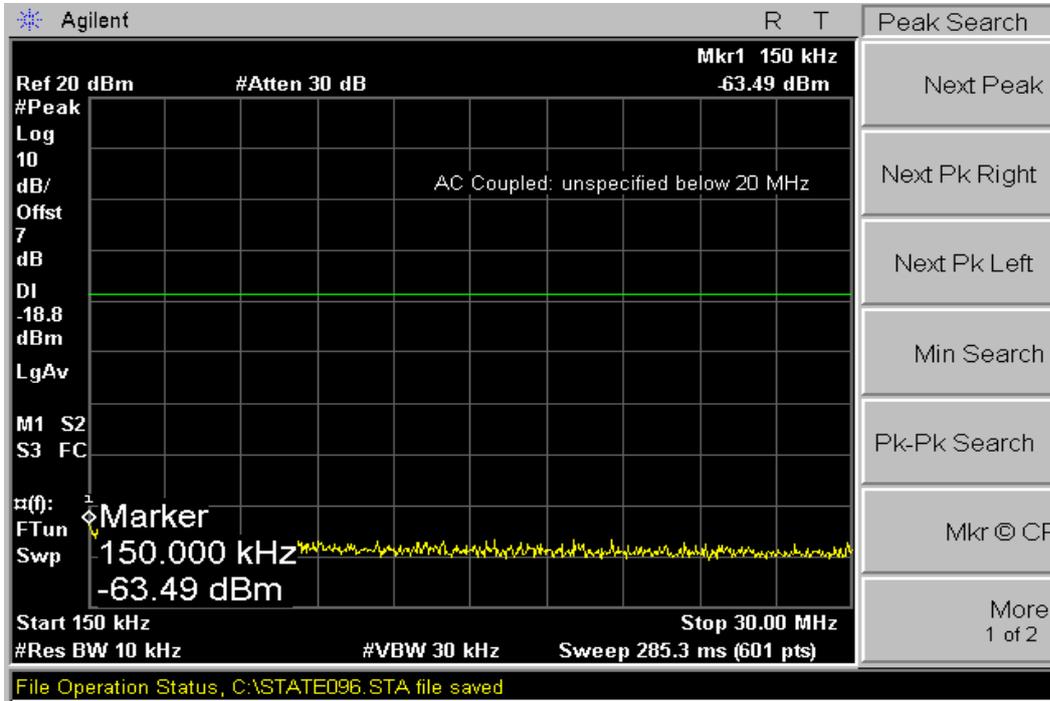


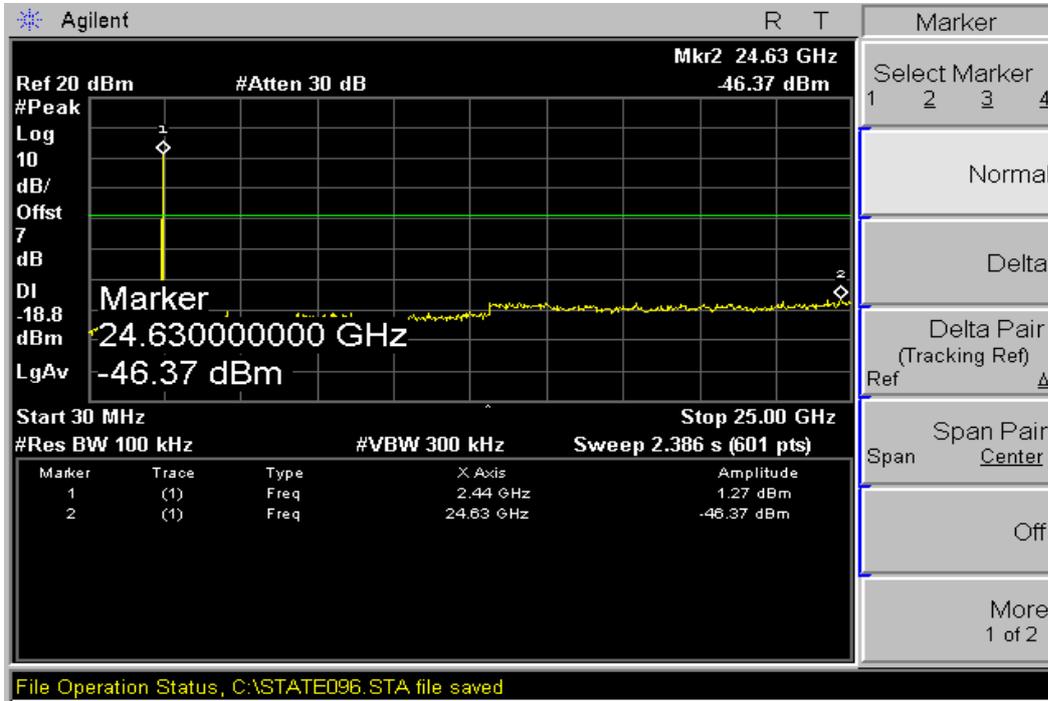




Channel 40

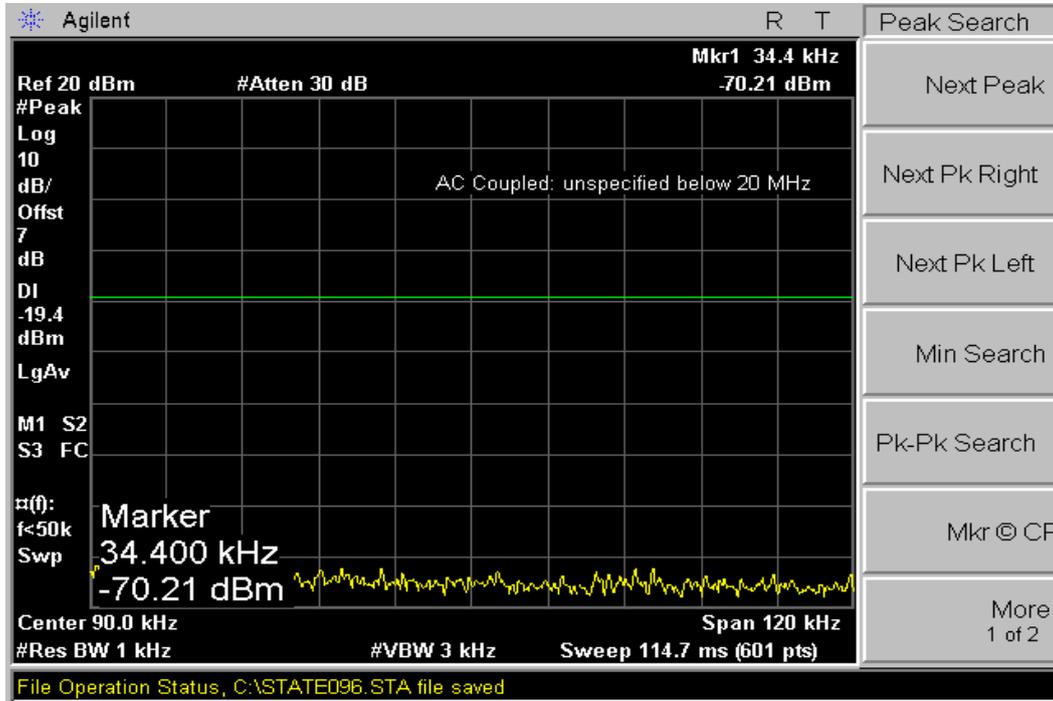


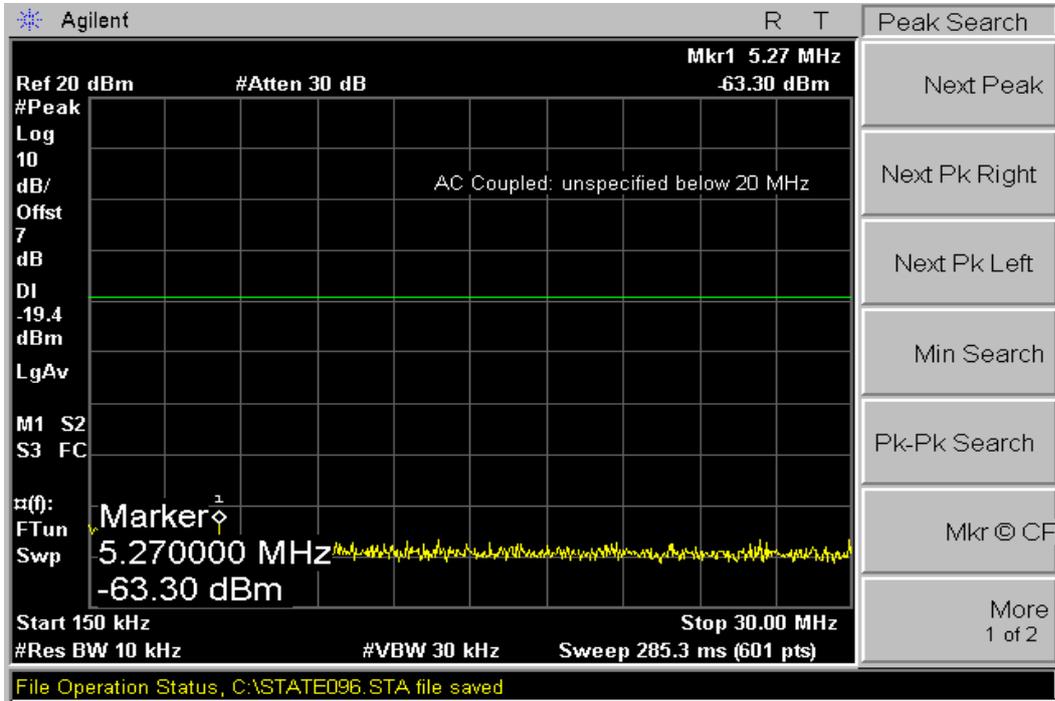


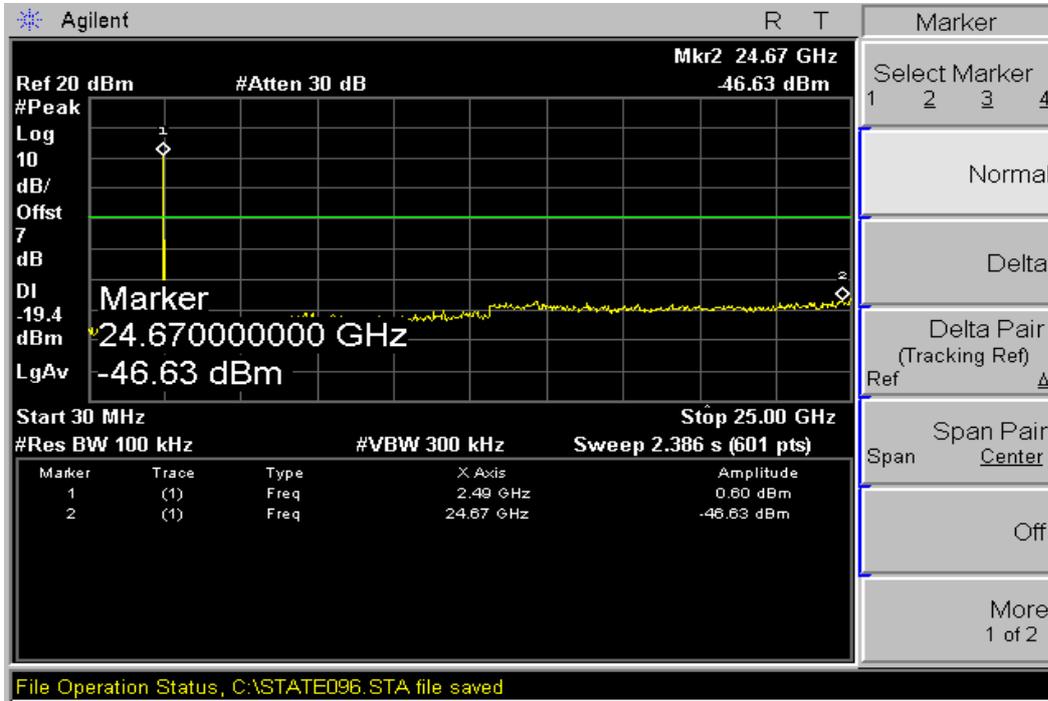




Channel 78









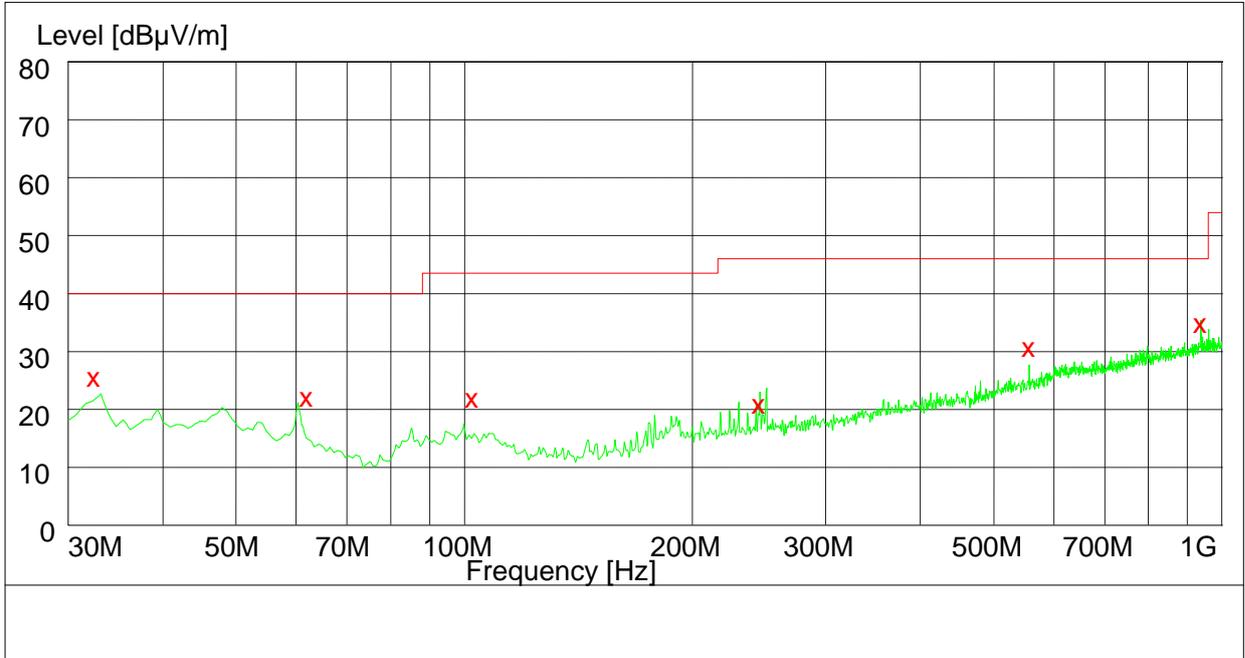
Appendix H

Radiated spurious emission

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



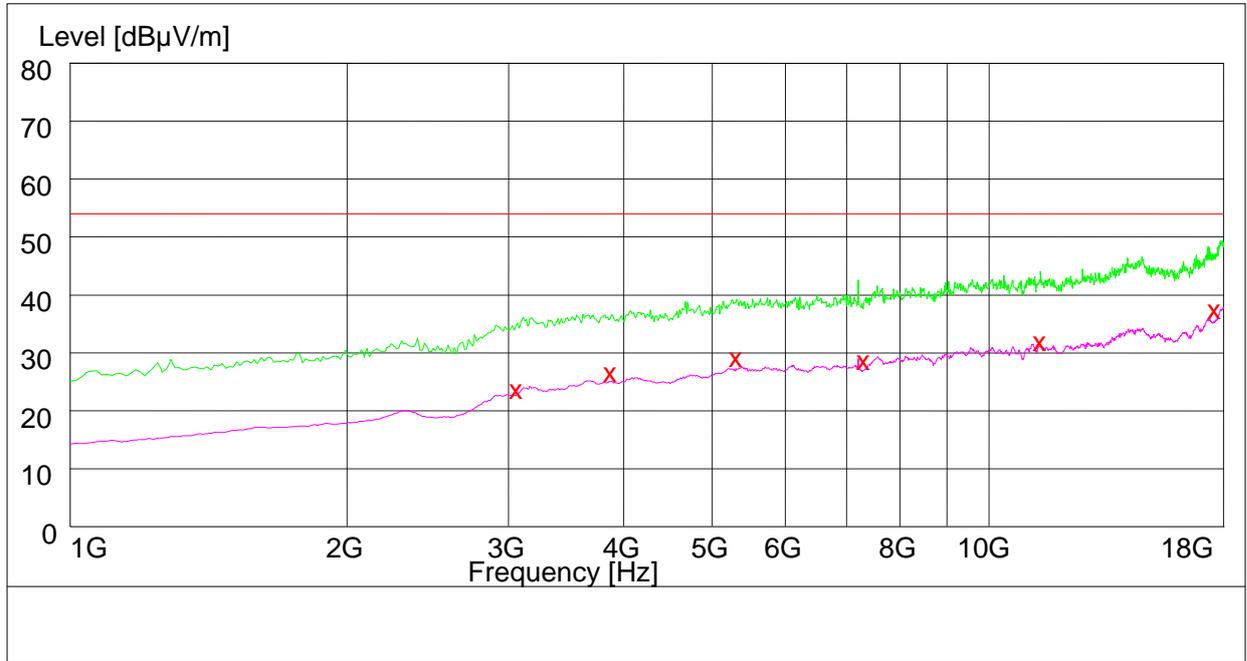
Channel 0 30MHz to 1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Plarization
30.040000	22.80	11.7	40.0	218.2	245.0	278.00	HORIZONTAL
61.100000	22.80	12.4	40.0	17.2	147.0	312.00	HORIZONTAL
104.020000	24.10	13.1	43.5	19.4	278.0	125.00	VERTICAL
245.160000	21.10	14.1	46.0	24.9	178.0	258.00	HORIZONTAL
551.410000	30.80	21.6	46.0	15.2	274.0	146.00	VERTICAL
940.800000	36.10	26.5	46.0	9.9	123.0	197.00	HORIZONTAL



1GHz to 18GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
3093.000000	22.80	-8.7	54.0	31.2	215.0	244.00	VERTICAL
3840.500000	25.10	-6.2	54.0	28.9	235.0	153.00	VERTICAL
5160.000000	29.10	-3.3	54.0	24.9	152.0	101.00	HORIZONTAL
7210.400000	28.90	0.6	54.0	25.1	234.0	31.00	VERTICAL
11375.000000	32.50	7.1	54.0	21.5	140.0	12.00	VERTICAL
17850.000000	37.70	16.4	54.0	16.3	102.0	18.00	HORIZONTAL

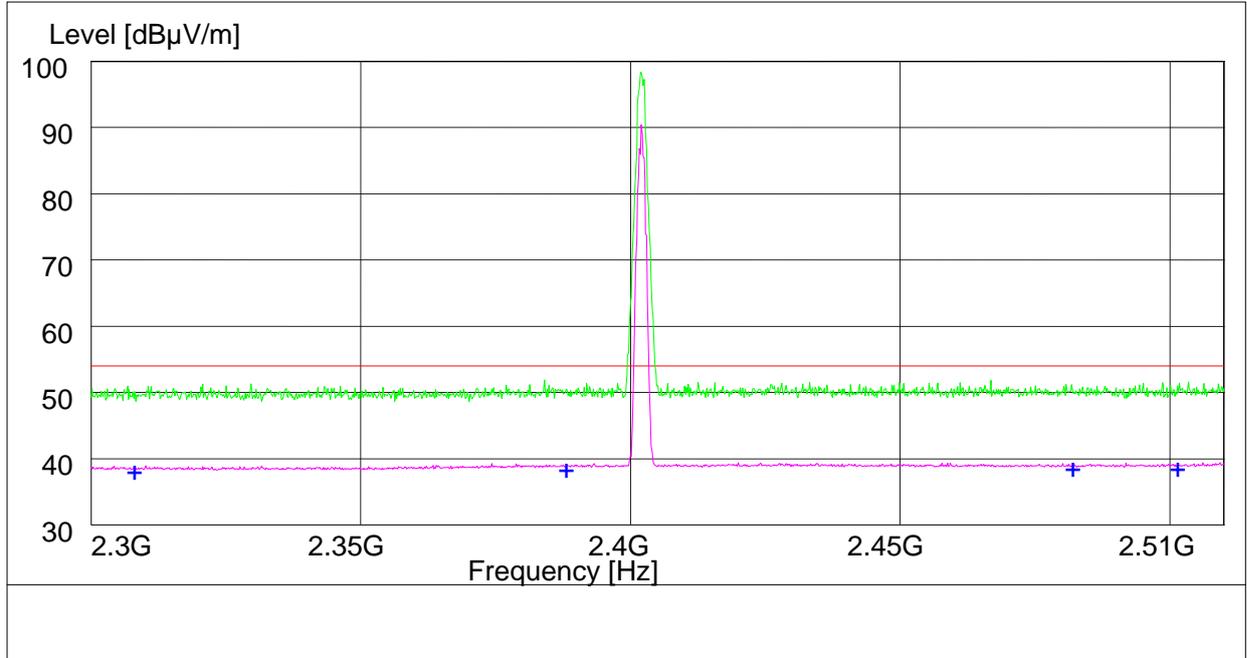


18GHz to 26GHz

Note: No peak found in pre- test.



2GHz to 3GHz

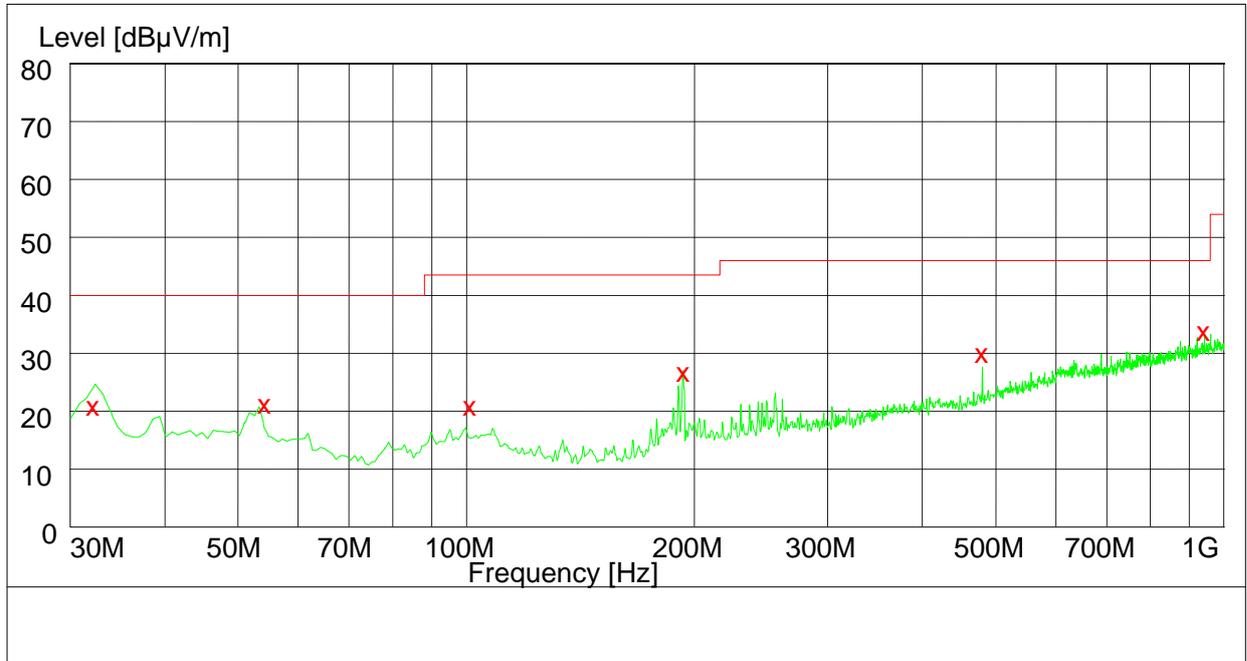


Note: The peak exceeds the limit line is carrier frequency.

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	38.00	33.3	54.0	16.0	210.0	342.00	HORIZONTAL
2390.000000	38.50	33.5	54.0	15.5	254.0	259.00	VERTICAL
2483.500000	38.40	33.7	54.0	15.6	123.0	110.00	VERTICAL
2500.000000	38.40	33.8	54.0	15.6	157.0	201.00	HORIZONTAL



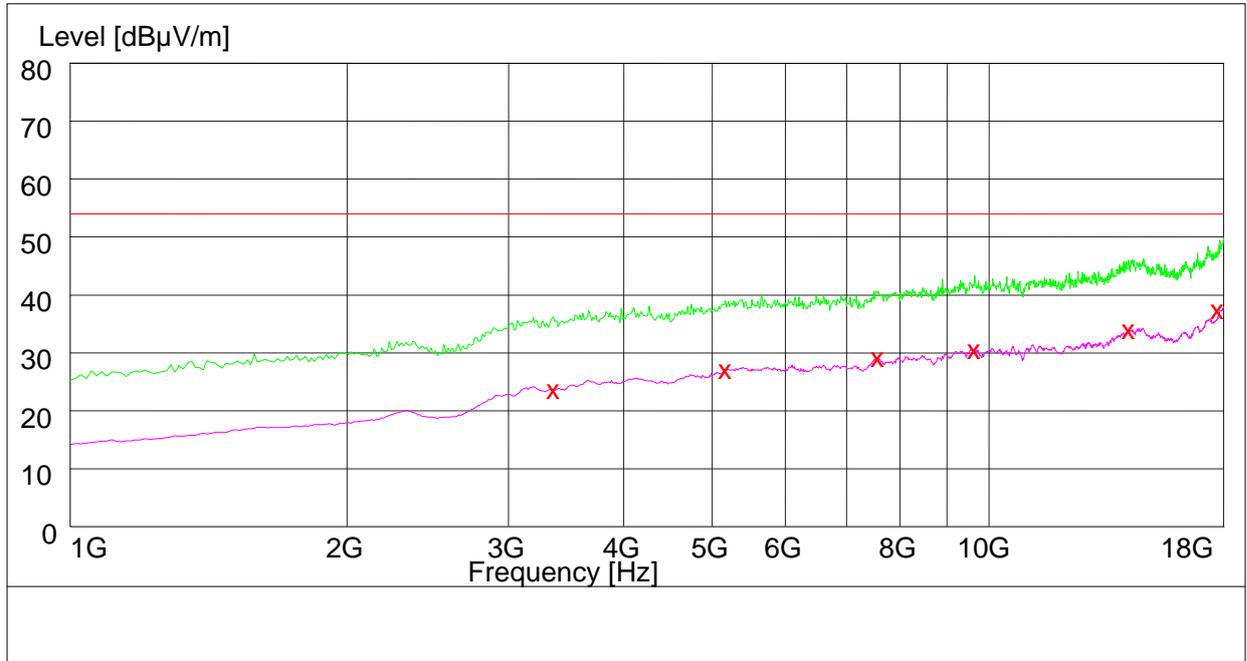
Channel 40 30MHz to 1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
30.040000	21.10	11.7	40.0	18.7	257.0	12.00	HORIZONTAL
55.780000	20.50	12.7	40.0	19.5	145.0	40.00	VERTICAL
101.080000	20.40	13.1	43.5	23.1	250.0	163.00	HORIZONTAL
195.600000	28.60	12.0	43.5	14.9	120.0	311.00	VERTICAL
482.140000	31.20	19.6	46.0	14.8	120.0	142.00	HORIZONTAL
940.360000	33.50	26.6	46.0	12.5	248.0	350.00	HORIZONTAL



1GHz to 18GHz



Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3358.000000	23.30	-7.9	54.0	30.7	253.0	315.00	VERTICAL
5167.000000	26.40	-3.3	54.0	27.6	125.0	51.00	VERTICAL
7575.000000	28.50	1.6	54.0	25.5	154.0	360.00	HORIZONTAL
9646.500000	29.80	5.2	54.0	24.2	250.0	229.00	VERTICAL
14190.500000	33.20	11.4	54.0	20.8	100.0	278.00	VERTICAL
17999.500000	36.80	17.3	54.0	17.2	178.0	100.00	HORIZONTAL

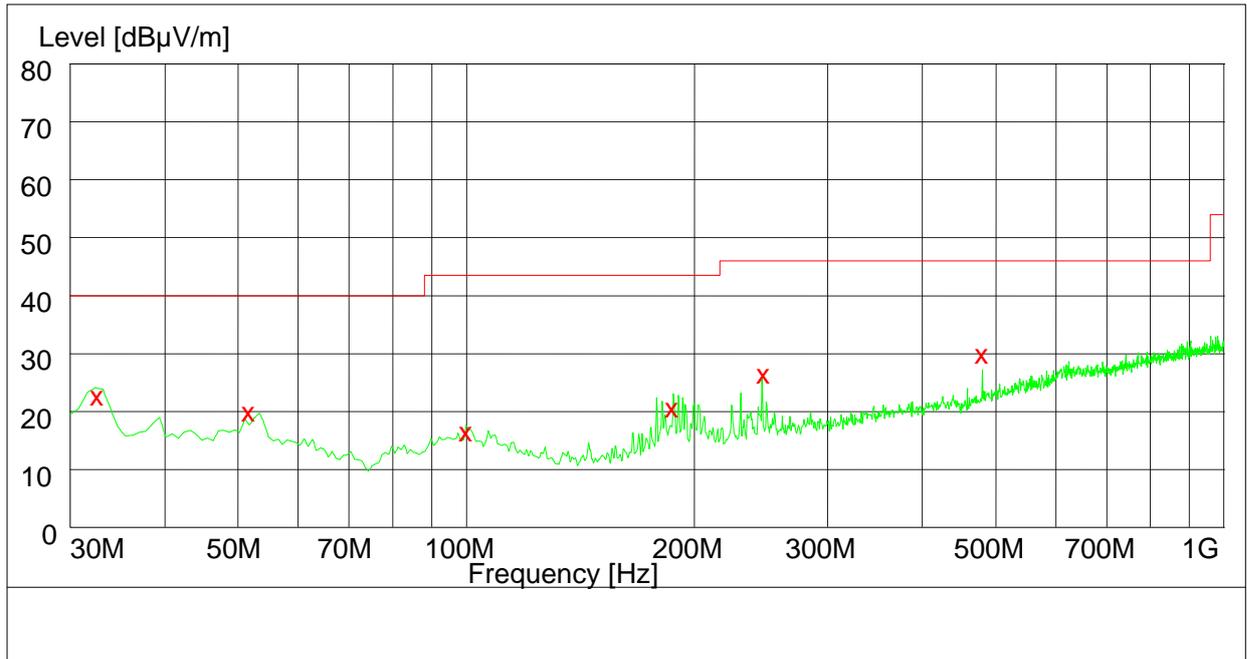


18GHz to 26GHz

Note: No peak found in pre- test.



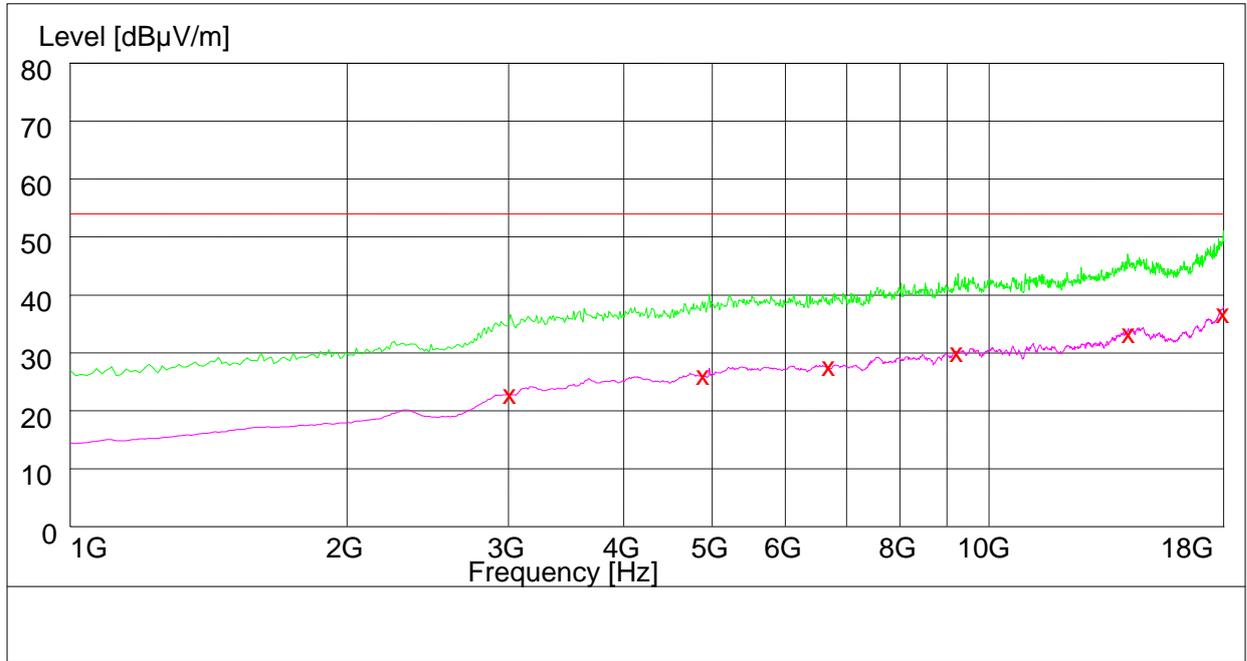
Channel 78 30MHz to 1GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
31.210000	22.50	11.7	40.0	17.5	214.0	301.00	HORIZONTAL
51.100000	20.10	12.7	40.0	29.9	154.0	28.00	HORIZONTAL
101.040000	19.70	13.1	43.5	23.8	321.0	194.00	VERTICAL
188.450000	21.80	11.8	43.5	21.7	157.0	155.00	HORIZONTAL
240.100000	29.10	14.1	46.0	16.9	245.0	257.00	VERTICAL
481.850000	32.00	19.6	46.0	14.0	147.0	128.00	HORIZONTAL



1GHz to 18GHz



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarization
3015.500000	22.70	-9.2	54.0	31.3	145.0	315.00	HORIZONTAL
4889.500000	25.70	-3.9	54.0	28.3	120.0	311.00	VERTICAL
6698.500000	26.80	-0.6	54.0	27.2	254.0	173.00	VERTICAL
9244.000000	29.40	4.5	54.0	24.6	210.0	360.00	VERTICAL
14198.500000	33.00	11.5	54.0	21.0	105.0	65.00	HORIZONTAL
17993.000000	37.00	17.3	54.0	17.0	149.0	270.00	VERTICAL

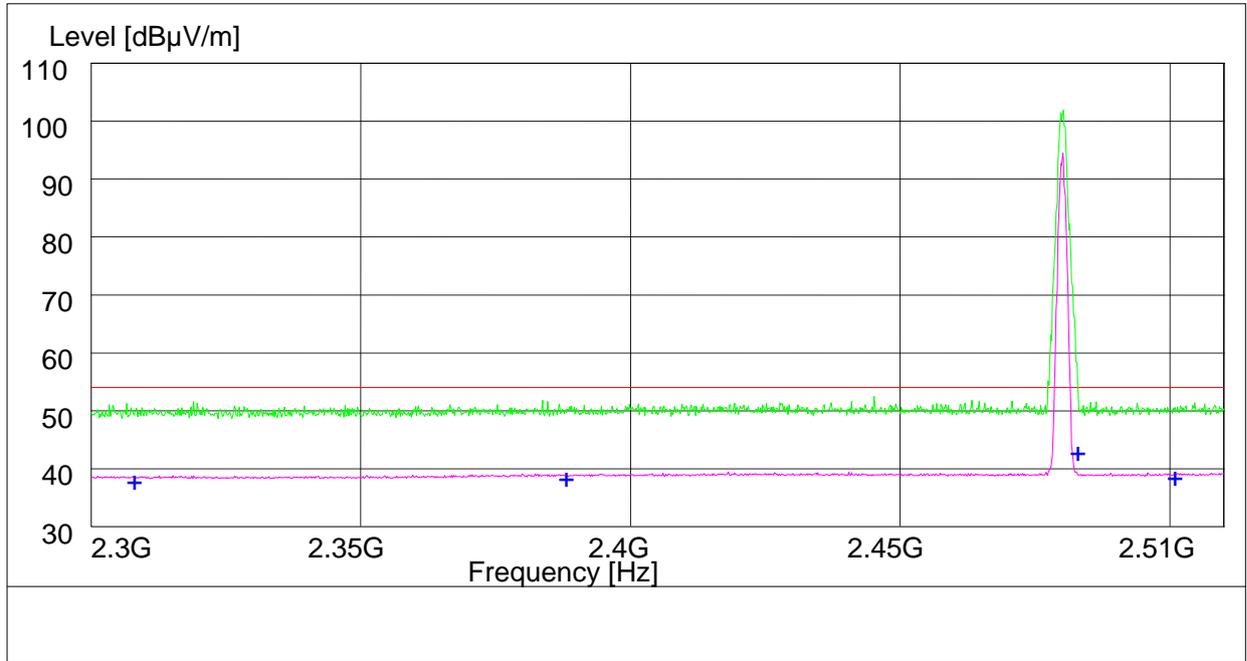


18GHz to 26GHz

Note: No peak found in pre- test.



2GHz to 3GHz



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	38.50	-11.7	54.0	15.5	168.0	180.00	VERTICAL
2390.000000	38.80	-11.5	54.0	15.2	110.0	359.00	HORIZONTAL
2483.500000	42.60	-11.3	54.0	11.4	217.0	26.00	HORIZONTAL
2500.000000	38.50	-11.2	54.0	15.5	109.0	166.00	VERTICAL



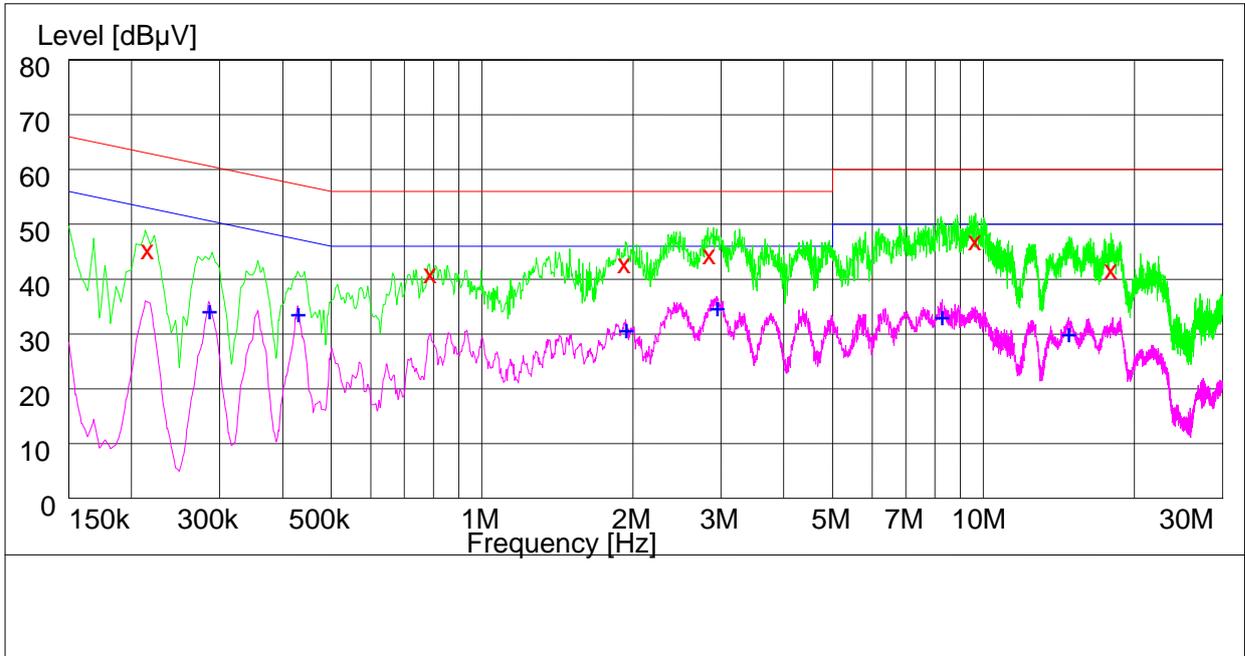
Appendix G

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
0.216000	44.20	10.0	63	18.8	N	FLO
0.792000	40.20	10.1	56	15.8	N	FLO
1.930000	41.30	10.1	56	14.7	N	FLO
2.850000	43.30	10.2	56	12.7	N	FLO
9.658000	46.20	10.3	60	13.8	N	FLO
17.998000	40.90	10.3	60	19.1	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.286000	35.60	10.0	51	15.4	N	FLO
0.430000	35.00	10.0	47	12.0	N	FLO
1.940000	32.20	10.1	46	13.8	N	FLO
2.950000	36.20	10.2	46	9.8	N	FLO
8.288000	34.60	10.2	50	15.4	N	FLO
14.810000	31.40	10.3	50	18.6	N	FLO

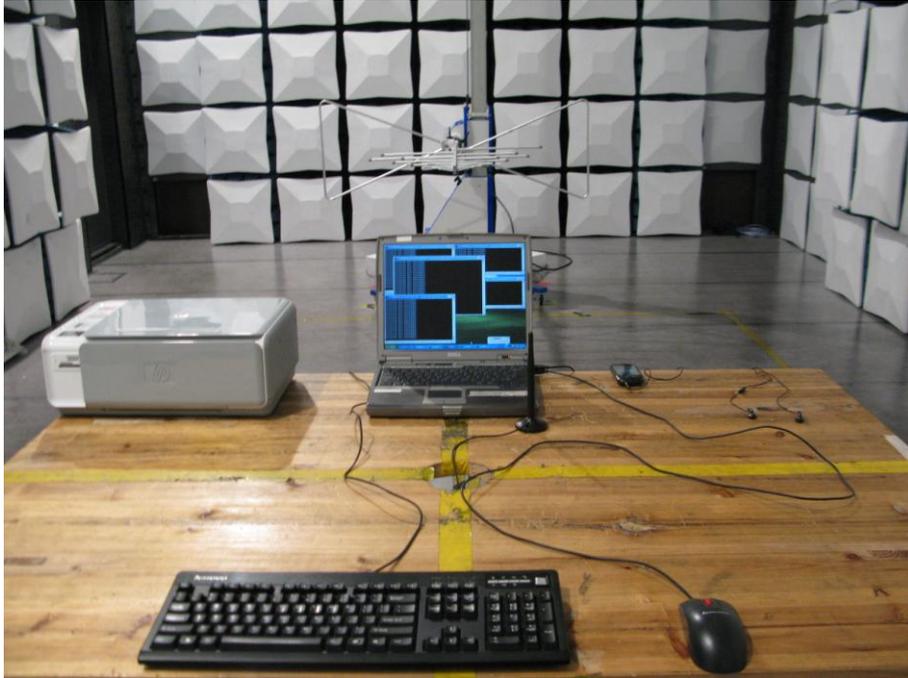


Appendix J

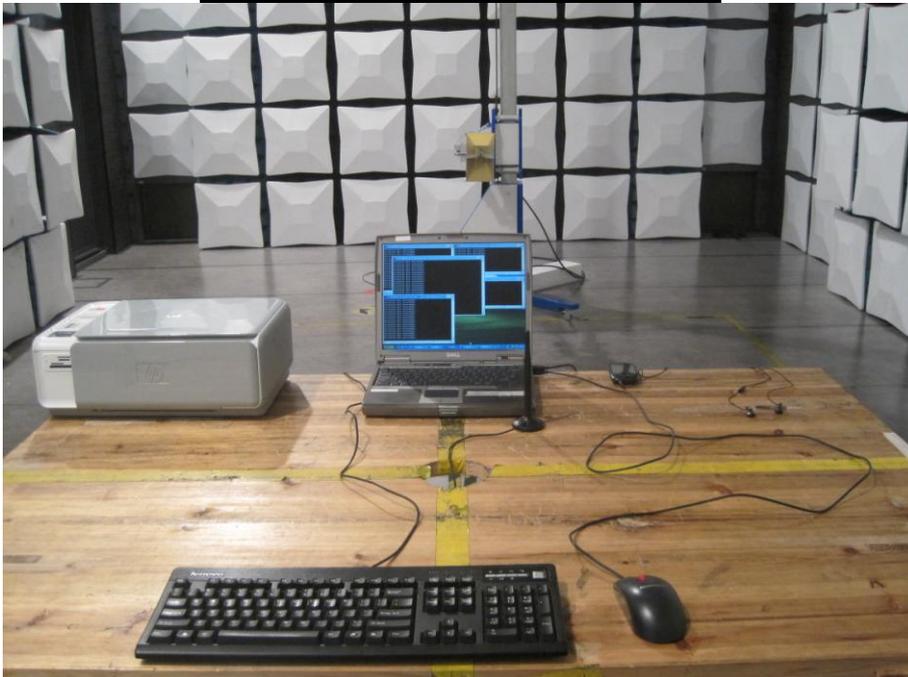
Photos of Test Setup



1 Radiated Spurious Emissions



Radiated Spurious Emission (below 2GHz)



Radiated Spurious Emission (2GHz to18GHz)



Radiated Spurious Emission (above 18GHz)

2 Conducted Emissions



Conducted Emissions for AC Ports