



FCC Test Report

Product Name: cdma2000 Digital Mobile Phone

Model Number: HUAWEI C8512/ C8512

Report No: SYBH(Z-RF)009082011-2002
FCC ID: QISC8512

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REGULATION	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part 15: Subpart C;
START OF TEST	Aug.04, 2011
END OF TEST	Aug.08, 2011
Final Judgement:	Pass

Approved By

Aug.10, 2011
Date

Dai Linjun
Name

Signature

Reviewed By

Aug.10, 2011
Date

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Aug.10, 2011
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1 Summary

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

Table 1 Summary of results

FCC Measurement Specification	Description	Result
15.247 (a) (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

cdma2000 Digital Mobile Phone-HUAWEI C8512/ C8512 is subscriber equipment in the CDMA/EVDO system. The frequency band is US Cellular. The Mobile Phone implements such functions as RF signal receiving/transmitting, CDMA2000 1x and 1XEV-DO protocol processing, voice, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service). 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.

HUAWEI C8511/C8511 is a cdma2000 Digital Mobile Phone mobile phone with Bluetooth, which supports CDMA 1x EVDO Mobile Phone with Bluetooth.

HUAWEI C8512/C8512 is a cdma2000 Digital Mobile Phone mobile phone with Bluetooth, which supports CDMA 1x EVDO Mobile Phone with Bluetooth.

The difference between HUAWEI C8511/C8511 and HUAWEI C8512/C8512 is showed in the following table.

	HUAWEI C8511/C8511	HUAWEI C8512/C8512
CDMA 1X&EVDO CELL	the same	the same
FLASH	the same	the same
PCB	the same	the same
Appearance	the same	the same
Bluetooth mode	the same	the same
WLAN mode	the same	the same
BT/ WLAN antenna	the same	the same
External camera	the same	the same
USIM card	support	No
Adapter	the same	the same
Battery	the same	the same

So HUAWEI C8512/C8512 test data refer to SYBH(Z-RF)008082011 of HUAWEI C8511/C8511 test report.

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
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Data and Voice	Modulation: GFSK	TM1	/
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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

Aug.04, 2011 to Aug.08, 2011

3.2 General Set up Description

The Bluetooth hopping frequency system of Mobile Phone 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



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:	☒ YES	☐ NO

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

Channel spacing:	1 MHz
Channel separation:	1 MHz

4.1.3 Antenna Information

Table 6 Antenna Information

Type:	Integrated / Internal
Maximum Gain(dBi):	-2.3(from 2400MHz to 2500MHz)

4.1.4 Environmental Requirements

Table 7 Environmental Requirements

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

4.1.5 Power Source

Table 8 Power Source

AC voltage nominal:	~120V
AC voltage range	~100V-240V
AC current maximal:	1A

4.1.6 Tune-up Procedure

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

Please reference the document Tune-up Procedure in TCF.

4.1.7 Applied DC Voltages and Currents

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

The voltage and current in the final RF stage is:

Table 9 Applied RF module DC Voltages and Currents

Voltage:	--- +3.6~4.2 V
Current:	100mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)



4.2 EUT Identification List

4.2.1 Board Information

Table 10 Board Information

cdma2000 Digital Mobile Phone		
HUAWEI C8512/C8512		
Hardware Version	Software Version	Serial Number
HC1C851M	C8512V100R001C179B623	T5C2C11161300153

4.2.2 Adapter

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

4.2.3 Battery

Name	Manufacture	Description
Rechargeable Li-ion	Huawei Technologies Co., Ltd.	Battery Model: HB4J1 Rated capacity: 1050mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: C8512
FCC Identification: QISC8512



5 Main Test Instruments

Table 11 Main Test Equipments

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



6 Transmitter Measurements

6.1 20dB bandwidth measurement

6.1.1 Test Conditions

Table 12 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55%
Test Configurations:	TM1 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 13 Supporting Standards:

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

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

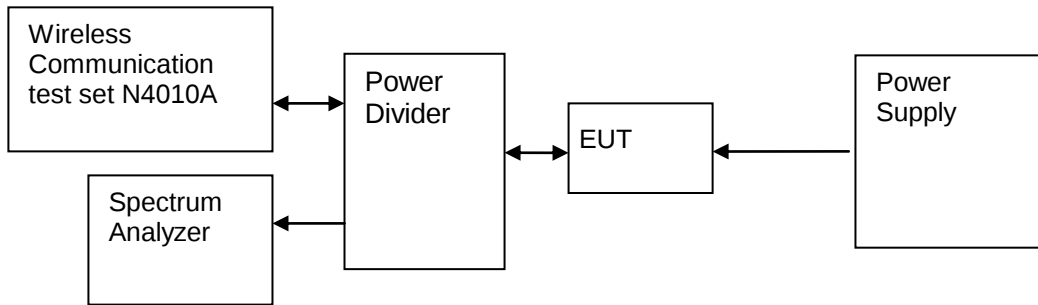


Figure 1. Test Set-up

6.1.4 Measurement Results

Table 14 Measurement Results

Bandwidth Type	Channel Position	Channel Number	Frequency [GHz]	Measured Bandwidth [MHz]	Result
20dB	B	0	2.402	0.941M	Pass
20dB	M	40	2.442	0.976M	Pass
20dB	T	78	2.480	0.958M	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 15 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °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 16 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 17 Limits

Regulation:	≥ 0.025 or $2/3$ of the 20 dB bandwidth
Limit:	$\geq 2/3 \times 0.976\text{M} = 0.651 \text{ MHz}$

6.2.3 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 measured frequency number to two adjacent channels separately and test the carrier frequency separation with spectrum analyzer.

Test setup

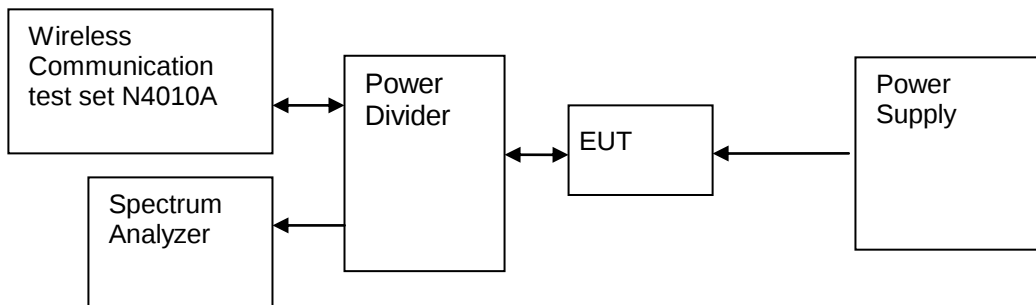


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 18 Measurement Results

Channel No.	Frequency [GHz]	Channel No.	Frequency [GHz]	Measured frequency separation [MHz]	Limit [MHz]	Result
40	2.442	39	2.441	0.85	≥ 0.651	Pass
40	2.442	41	2.443	1.0	≥ 0.651	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 19 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55%
Test Configurations:	TM1 at hopping frequency state

6.3.2 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 20 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 21 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

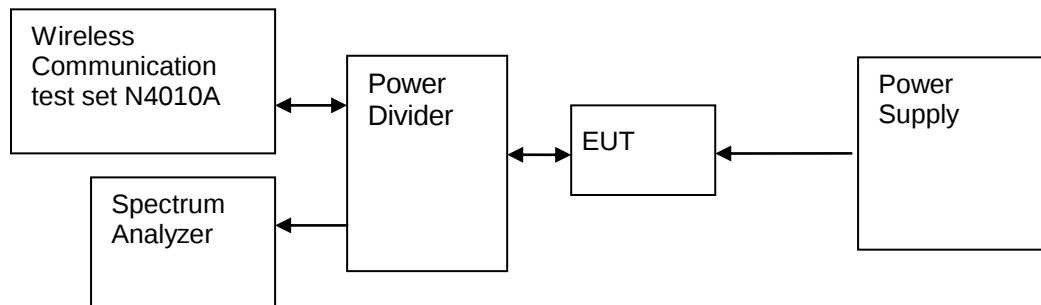


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 22 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 23 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 24 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 25 Limits

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

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

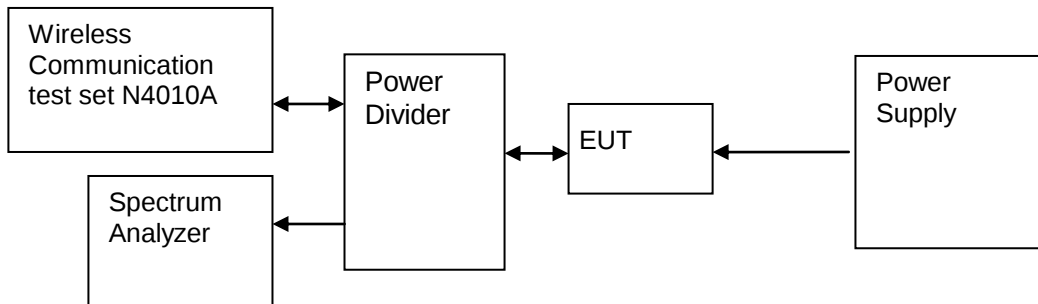


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 26 Measurement Results

Time of Single Slot [ms]	Numbers of slots in a period	Time of occupied in a period [s]	Limit [s]	Result
2.9	106.7	0.30943	≤ 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 27 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °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 28 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 29 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

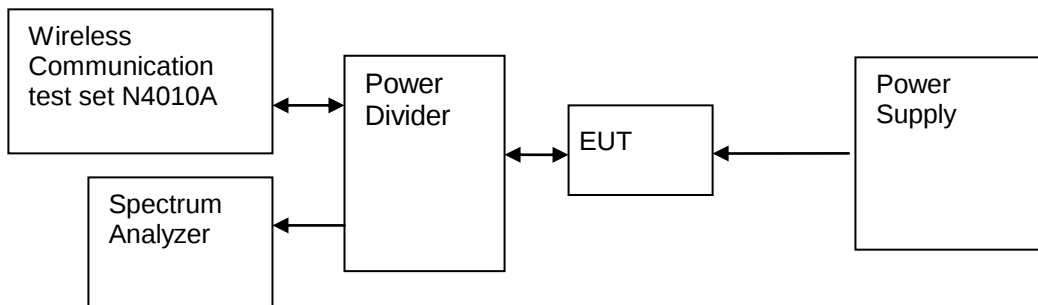


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 30 Measurement Results

Channel	Channel No.	Center Freq.[MHz]	Meas. Level (Cond.) [dBm]	Limit [dBm]	Result
Bottom	0	2402	4.68	< 30	Pass
Middle	40	2442	5.80	< 30	Pass
Top	78	2480	5.75	< 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 31 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
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 32 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 33 Limits

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

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

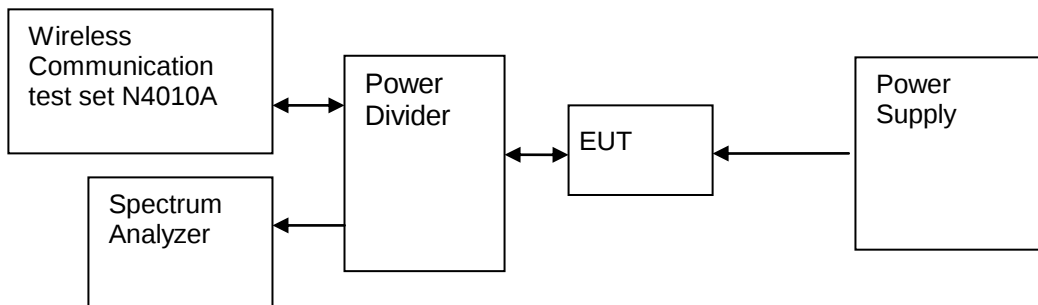


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 34 Measurement Results for Band Edge immediately outside the 2.4GHz Band

	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
Low Edge	0	2402	4.73	Off	-50.04	< -15.27	Pass
	-	-	4.53	On	-53.21	< -15.47	Pass
High Edge	78	2480	5.45	Off	-52.65	< -14.55	Pass
	-	-	5.16	On	-53.08	< -14.84	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 35 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55%
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 36 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 37 Limits

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

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

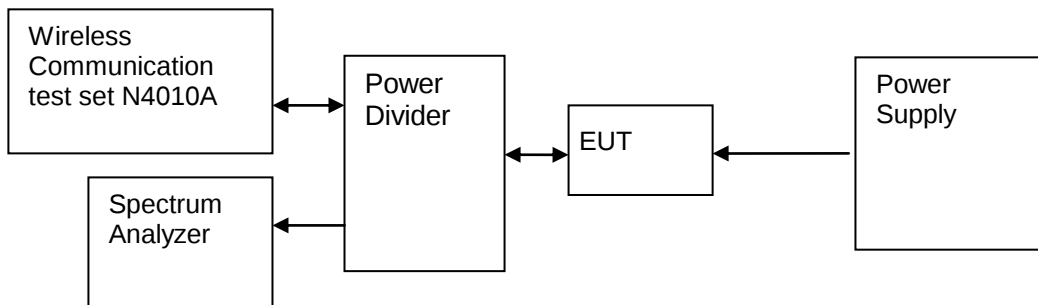


Figure 7. Test Set-up

6.7.4 Measurement Results

Table 38 Measurement Results

Test Frequency Range	Channel No.	Carrier Frequency [MHz]	Carrier Power [dBm]	Frequency Hopping	Max. Spurious Level [dBm]	Limit [dBm]	Result
9kHz-25GHz	0	2402	5.53	Off	-39.70	< -14.47	Pass
9kHz-25GHz	40	2442	5.70	Off	-43.50	< -14.30	Pass
9kHz-25GHz	78	2480	4.42	Off	-46.94	< -15.58	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 39 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 40 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 41 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	AV
Above 1000	500	74	3	PK

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a) (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 (2009). The EUT was set-up on insulator 80cm above the Ground Plane. The

set-up and test methods were according to ANSI C63.4. The Radiated Disturbance measurements were made using a Rohde and Schwarz Test Receiver and control software.

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

The EUT was communicated with the BTS simulator through Air interface. The 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

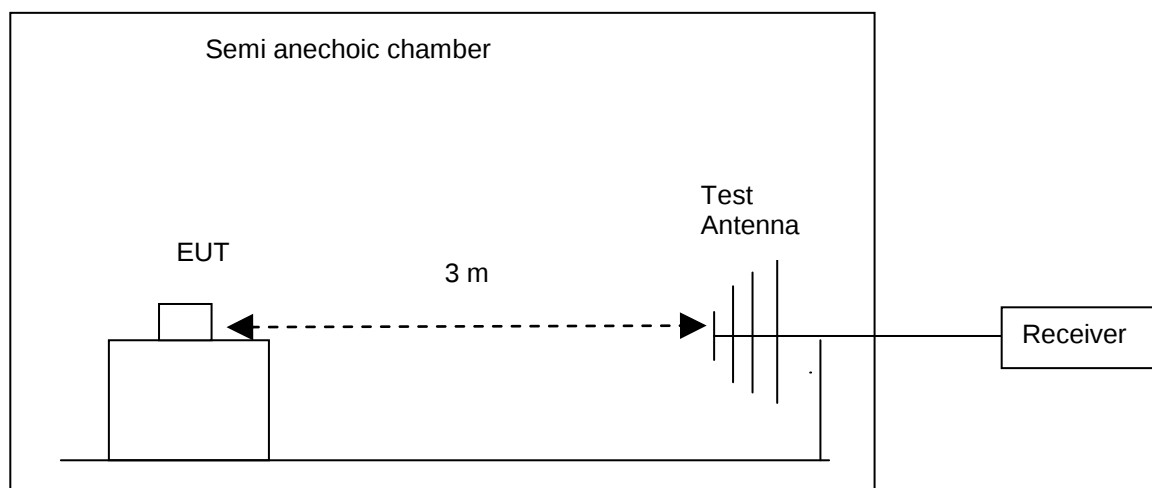


Figure 8. Test Set up

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 42 MEASUREMENT RESULT (30MHz to 1GHz)

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
33.000000	29.50	11.7	40.0	10.5	100.0	114.00	VERTICAL
245.728000	21.40	14.1	46.0	24.6	104.0	75.00	HORIZONTAL
292.288000	23.00	15.3	46.0	23.0	130.0	263.00	VERTICAL
552.248000	26.50	21.4	46.0	19.5	125.0	228.00	HORIZONTAL
846.352000	31.40	25.5	46.0	14.6	113.0	327.00	HORIZONTAL
984.480000	32.70	27.0	54.0	21.3	168.0	160.00	VERTICAL

MEASUREMENT RESULT: PK Detector (1GHz to 18GHz)

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
4824.000000	49.40	-3.6	74.0	24.6	146.0	279.00	VERTICAL
9296.000000	44.90	5.9	74.0	29.1	182.0	279.00	HORIZONTAL
13988.000000	47.80	13.0	74.0	26.2	114.0	279.00	HORIZONTAL
2310.000000	59.30	33.3	74.0	14.7	181.0	126.00	VERTICAL
2390.000000	59.00	33.5	74.0	15.0	125.0	85.00	HORIZONTAL
2483.500000	59.20	33.8	74.0	14.8	164.0	286.00	HORIZONTAL
2500.000000	59.60	33.8	74.0	14.4	144.0	311.00	HORIZONTAL

Table 43 MEASUREMENT RESULT: AV Detector (1GHz to 18GHz)

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
4824.000000	46.60	-3.6	54.0	7.4	130.0	280.00	VERTICAL
9391.200000	32.80	6.2	54.0	21.1	102.0	280.00	HORIZONTAL
14504.800000	37.10	14.6	54.0	16.9	186.0	280.00	VERTICAL
2310.000000	46.70	33.3	54.0	7.3	100.0	215.00	HORIZONTAL
2390.000000	46.90	33.5	54.0	7.1	172.0	64.00	HORIZONTAL
2483.500000	47.00	33.8	54.0	7.0	133.0	241.00	VERTICAL
2500.000000	47.10	33.8	54.0	6.9	200.0	108.00	VERTICAL

Measured Result of channel: 40 (2442MHz)

Table 44 MEASUREMENT RESULT (30MHz to 1GHz)

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
33.600000	29.30	11.7	40.0	10.7	105.0	95.00	VERTICAL
245.780000	21.30	14.1	46.0	24.7	110.0	142.00	HORIZONTAL
292.288000	25.20	15.3	46.0	20.8	100.0	210.00	VERTICAL
618.208000	28.10	22.7	46.0	17.9	137.0	178.00	HORIZONTAL
758.664000	30.30	24.1	46.0	15.7	126.0	348.00	VERTICAL
933.264000	32.30	26.5	46.0	13.7	158.0	194.00	VERTICAL

Table 45 MEASUREMENT RESULT: PK Detector (1GHz to 18GHz)

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	41.80	-5.9	74.0	32.2	100.0	135.00	VERTICAL
4876.000000	41.00	-3.5	74.0	31.0	112.0	78.00	HORIZONTAL
14518.400000	48.50	14.9	74.0	25.5	134.0	216.00	HORIZONTAL

Table 46 MEASUREMENT RESULT: AV Detector (1GHz to 18GHz)

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	24.70	-5.9	54.0	29.3	161.0	107.00	VERTICAL
9527.200000	32.90	6.4	54.0	21.1	102.0	165.00	HORIZONTAL
14518.400000	36.90	14.9	54.0	17.1	125.0	88.00	HORIZONTAL

Measured Result of channel: 78 (2480MHz)

Table 47 MEASUREMENT RESULT (30MHz to 1GHz)

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
33.420000	22.10	11.7	40.0	17.9	103.0	132.00	VERTICAL
47.848000	22.00	12.9	40.0	18.0	112.0	54.00	VERTICAL
53.280000	22.60	12.7	40.0	17.4	124.0	98.00	HORIZONTAL
245.728000	22.30	14.1	46.0	23.7	118.0	204.00	HORIZONTAL
610.448000	29.10	22.6	46.0	16.9	147.0	318.00	HORIZONTAL
938.696000	32.00	26.3	46.0	14.0	170.0	164.00	VERTICAL

Table 48 MEASUREMENT RESULT: PK Detector (1GHz to 18GHz)

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	42.80	-5.9	74.0	31.2	100.0	0.00	HORIZONTAL
7643.000000	42.60	3.0	74.0	31.4	200.0	7.00	VERTICAL
14488.000000	48.80	14.5	74.0	25.2	200.0	208.00	VERTICAL
2310.000000	59.10	33.3	74.0	154.9	147.0	29.00	VERTICAL
2390.000000	58.80	33.5	74.0	15.2	126.0	291.00	HORIZONTAL
2483.500000	59.90	33.8	74.0	14.1	115.0	198.00	HORIZONTAL
2500.000000	59.00	33.8	74.0	15.0	188.0	249.00	HORIZONTAL

Table 49 MEASUREMENT RESULT: AV Detector (1GHz to 18GHz)

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	26.80	-5.9	54.0	27.2	100.0	0.00	VERTICAL
7639.500000	30.00	3.0	54.0	24.0	179.0	7.00	VERTICAL
14498.500000	36.20	14.5	54.0	17.8	197.0	210.00	VERTICAL
2310.000000	46.60	33.3	54.0	7.4	104.0	297.00	VERTICAL
2390.000000	47.10	33.5	54.0	6.9	120.0	359.00	VERTICAL
2483.500000	47.20	33.8	54.0	6.8	163.0	123.00	HORIZONTAL
2500.000000	47.00	33.8	54.0	7.0	112.0	86.00	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 50 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	25°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 51 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 52 Limits

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

Note: * Decreases with the logarithm of the frequency.

6.9.3 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: 2009.

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

The EUT was communicated with the BTS simulator through Air interface, the BTS simulator controls the 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 EUT was setup in the screened chamber and operated under nominal conditions.

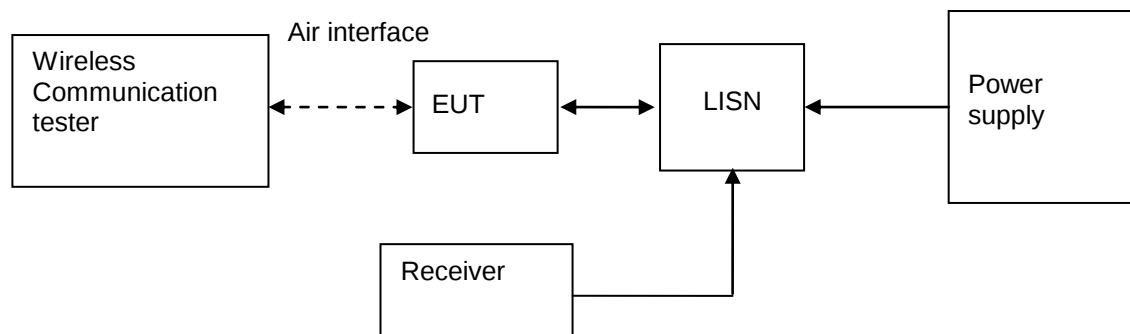


Figure 9. Test Set-up

6.9.4 Measurement Results

Table 53 MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.186000	51.10	10.1	64	12.9	N	FLO	FLO
0.234000	47.00	10.0	62	15.0	N	FLO	FLO
1.776000	43.00	10.1	56	13.0	N	FLO	FLO
2.150000	50.50	10.1	56	5.5	N	FLO	FLO
2.196000	48.10	10.1	56	7.9	N	FLO	FLO
2.292000	38.70	10.1	56	17.3	N	FLO	FLO

Table 54 MEASUREMENT RESULT:AV DECTER

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.608000	33.80	10.1	46	12.2	N	FLO	FLO
1.074000	34.40	10.1	46	11.6	N	FLO	FLO
1.494000	35.70	10.1	46	10.3	N	FLO	FLO
2.008000	37.60	10.1	46	8.4	N	FLO	FLO
2.146000	37.80	10.1	46	8.2	L1	FLO	FLO
2.288000	37.50	10.1	46	8.5	N	FLO	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 55 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 (dBμV/m)	U=2.2dB; k=2
		U=5dB; k=2
Conducted emission test for power port	Disturbance Voltage(dBμV)	U=4dB; k=2



8 Appendices List

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

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



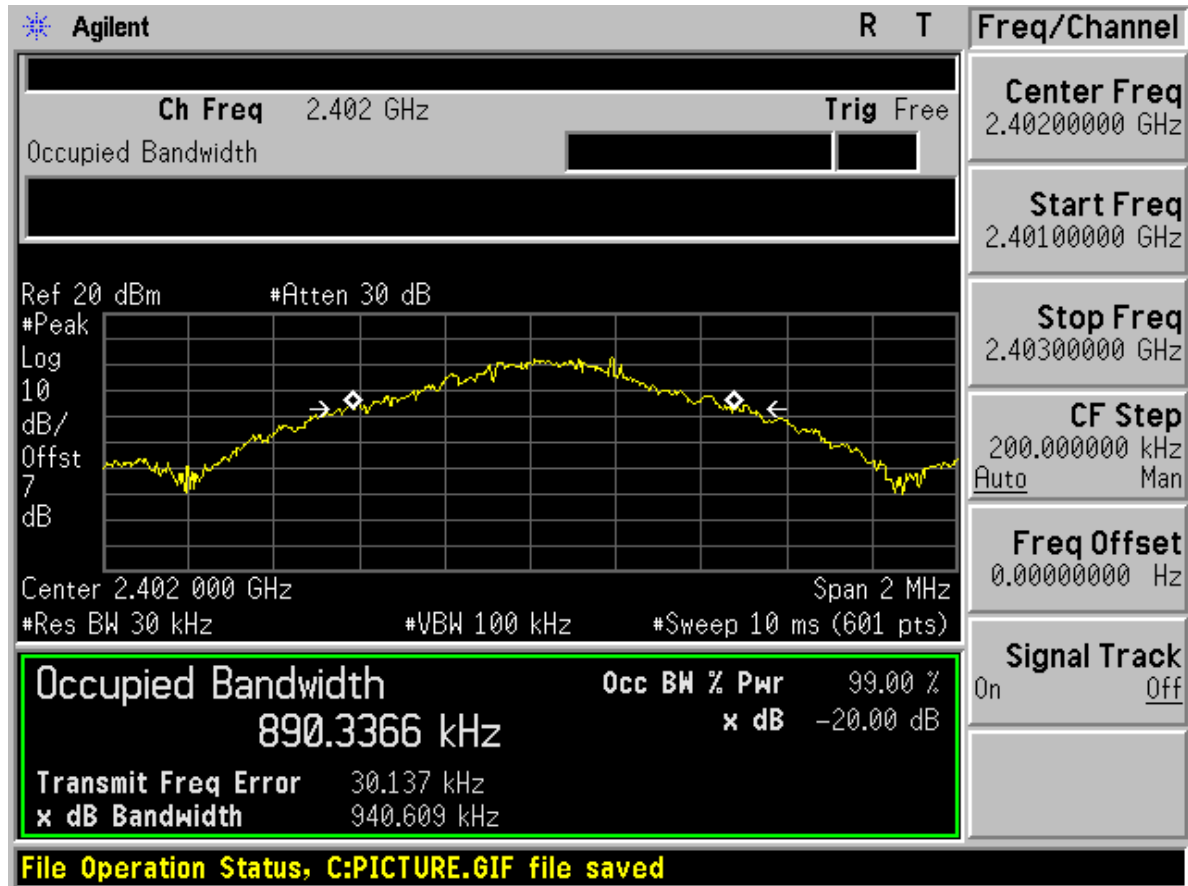
Appendix A

20dB bandwidth measurement

According to FCC Part 15.247 (a) (1)

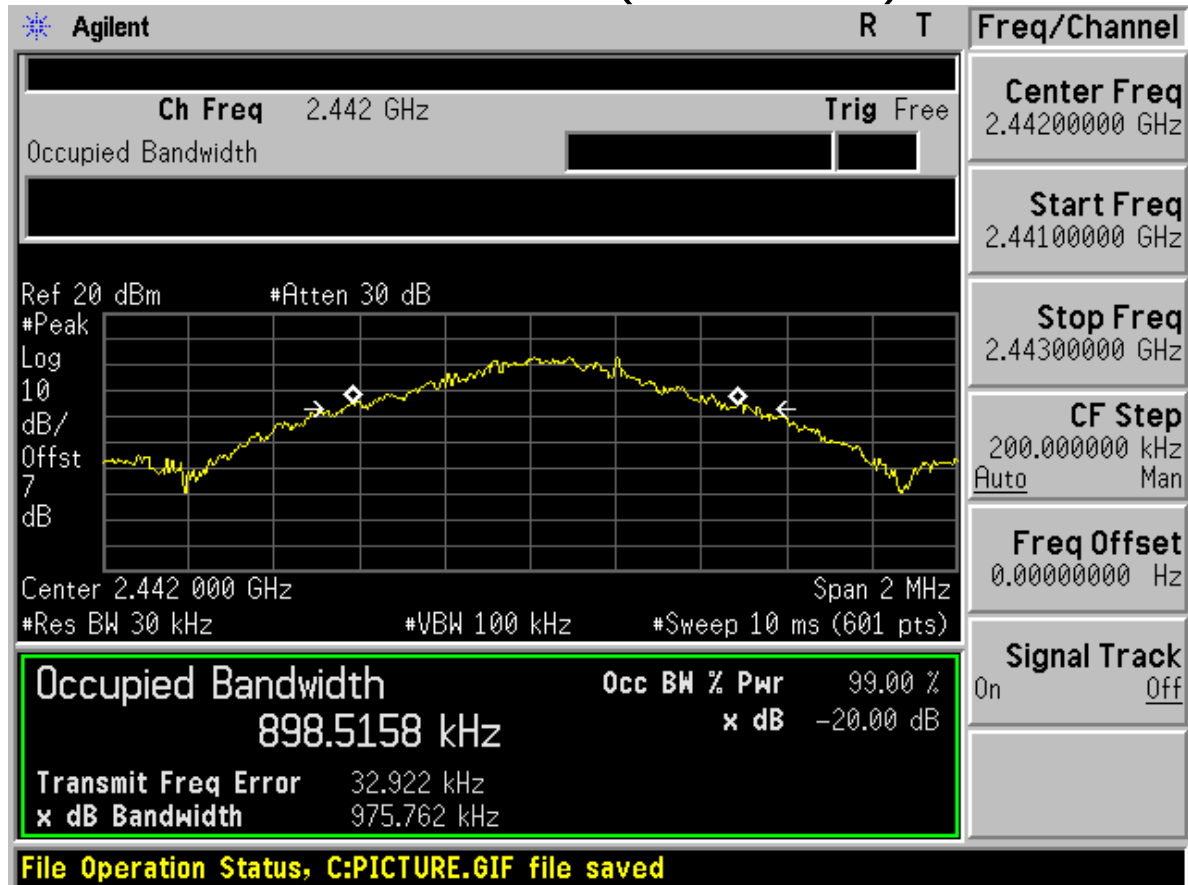


Channel 0 (2402MHz)



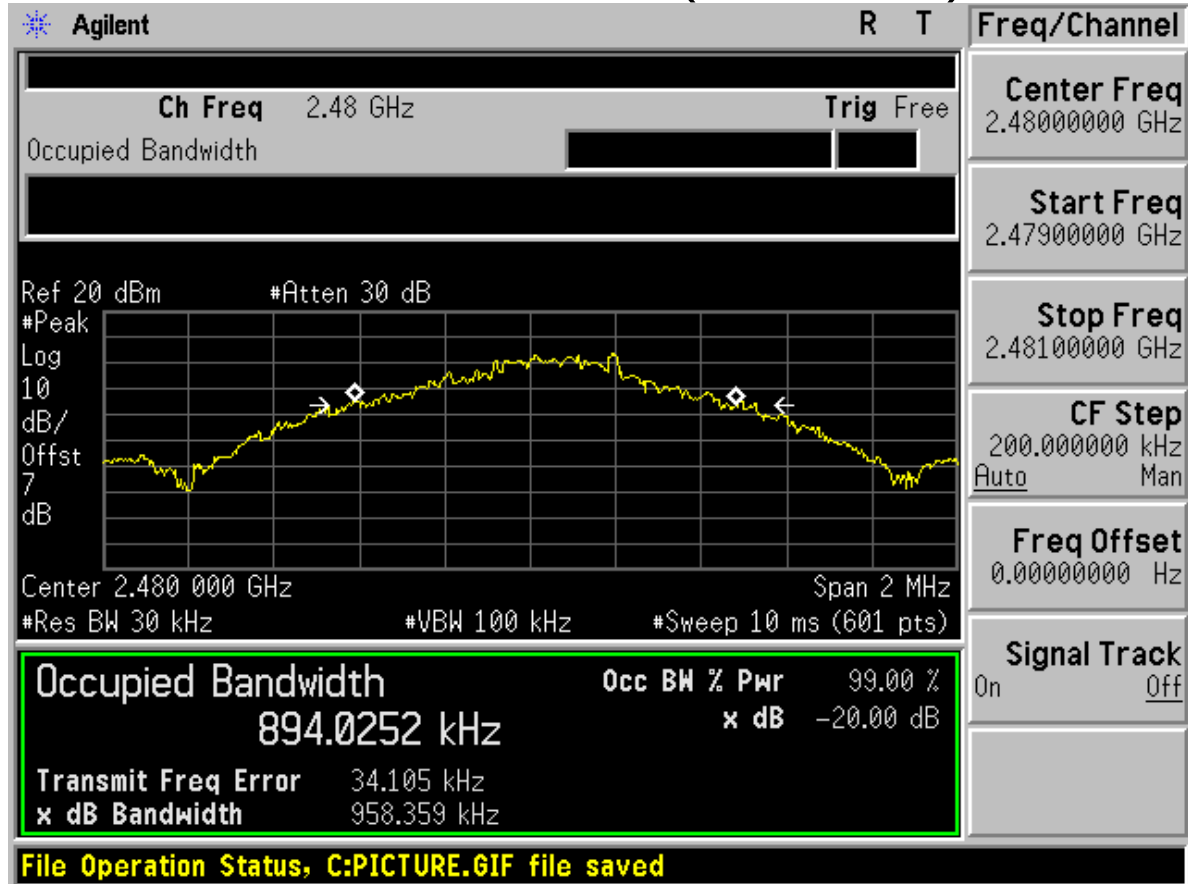


Channel 40 (2442MHz)





Channel 78 (2480MHz)





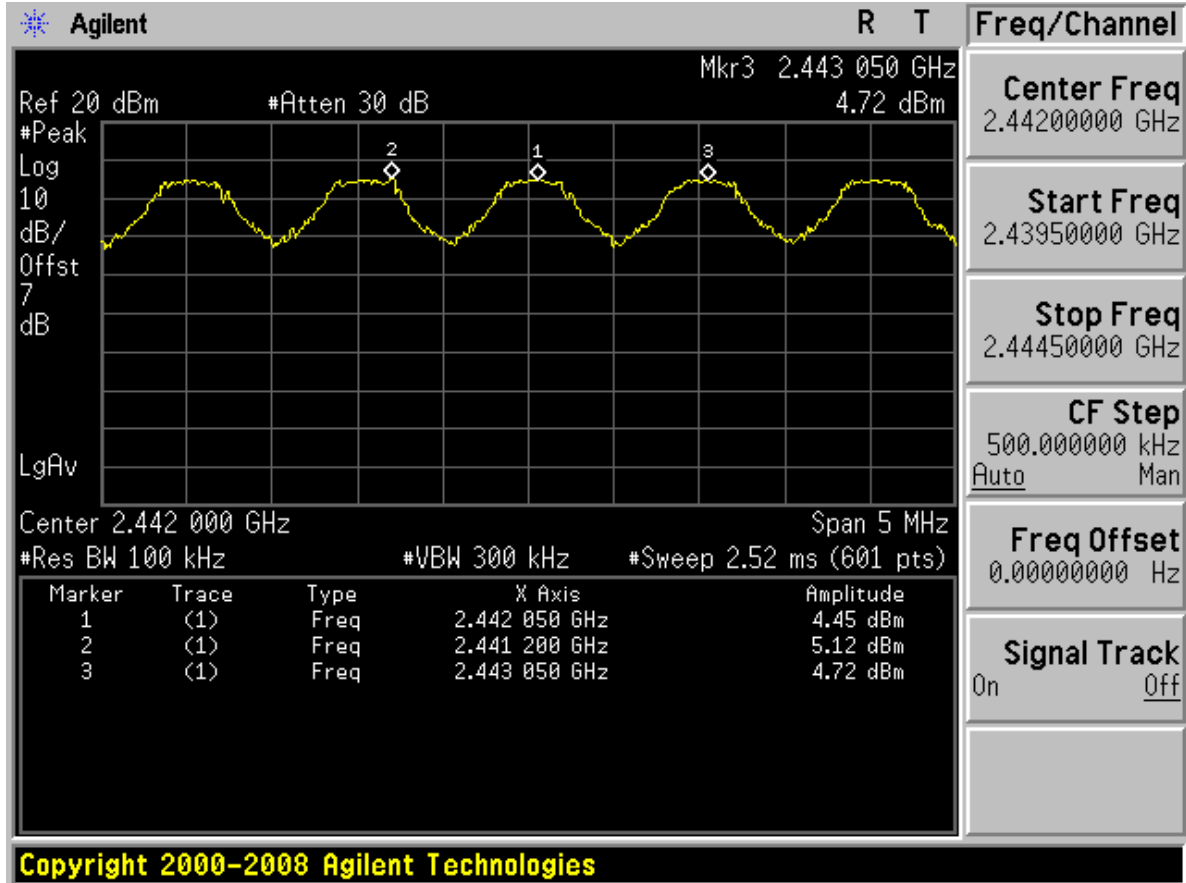
Appendix B

Carrier frequency separation measurement

According to FCC Part 15.247 (a) (1)



Centred at Channel 40





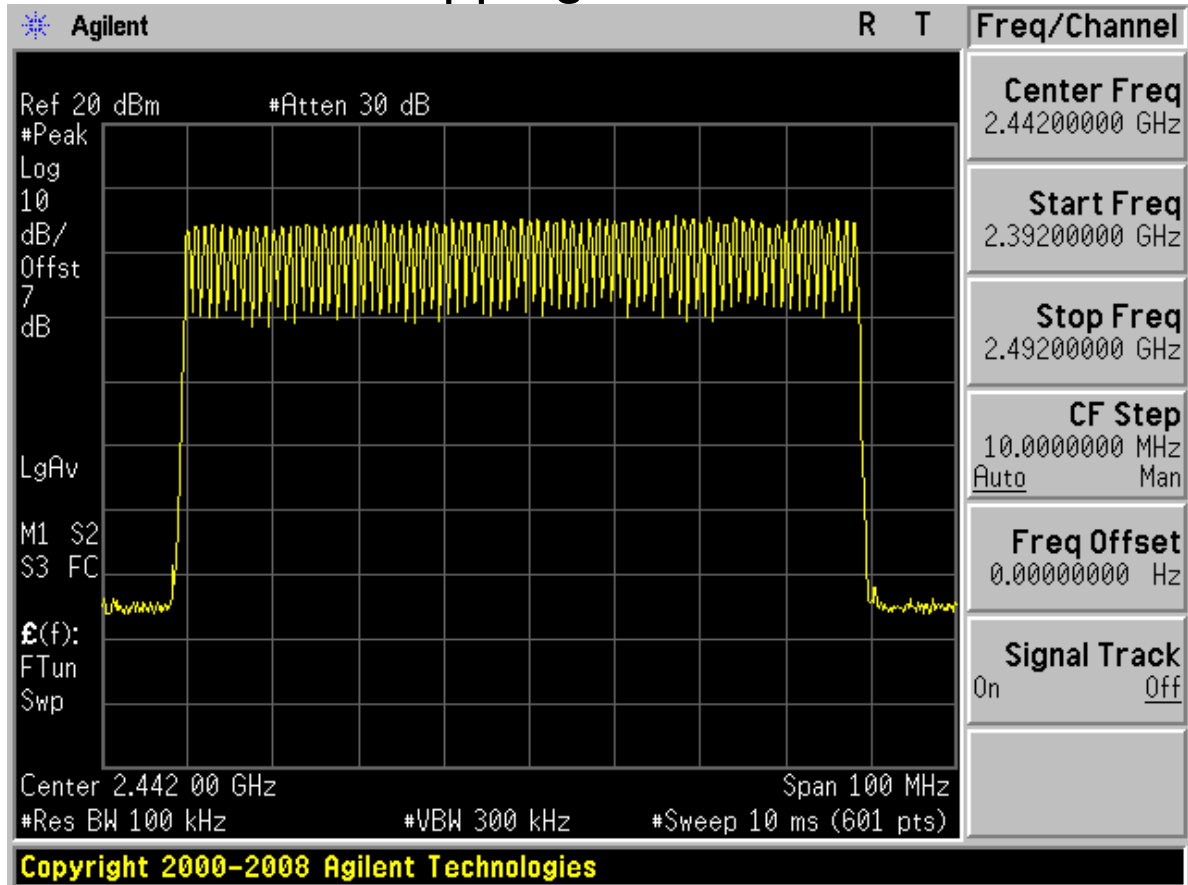
Appendix C

Number of hopping channel

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



Total hopping channels = 79





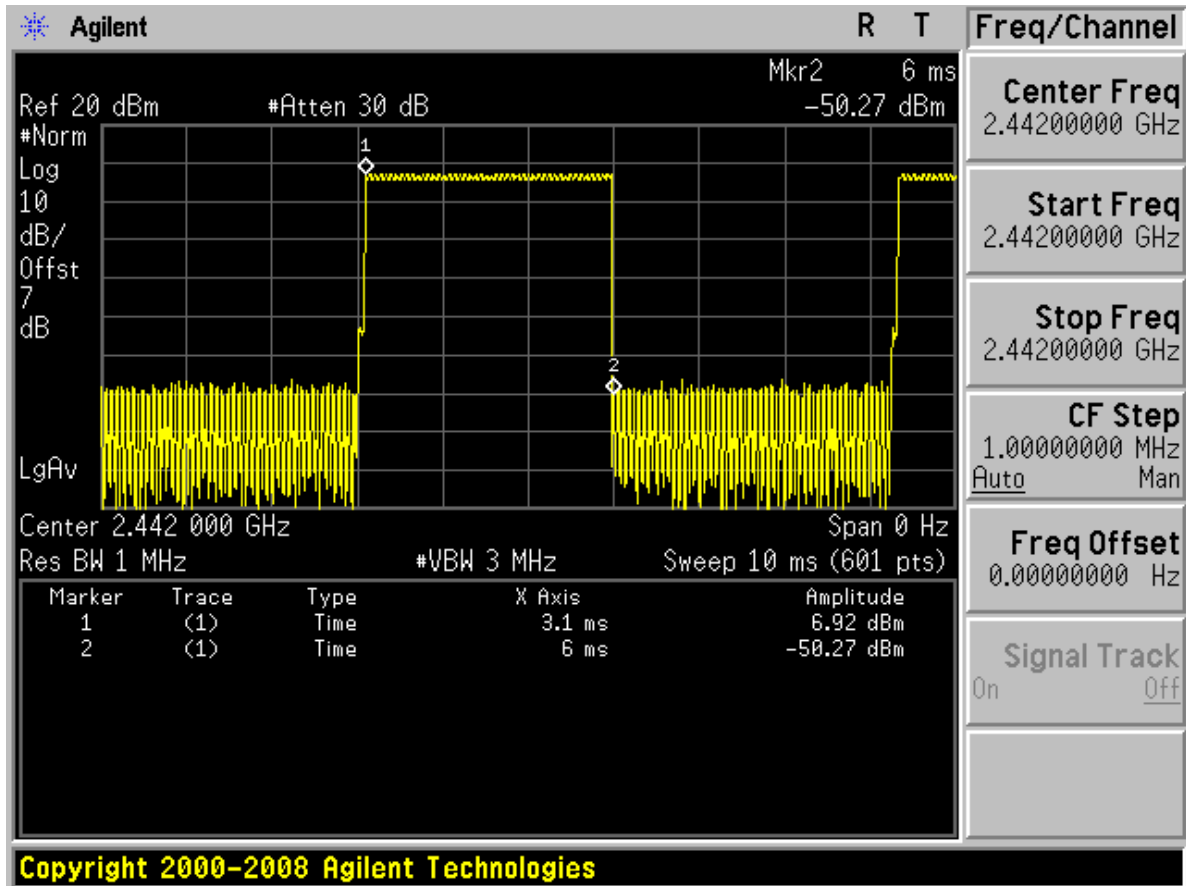
Appendix D

Time of occupancy

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

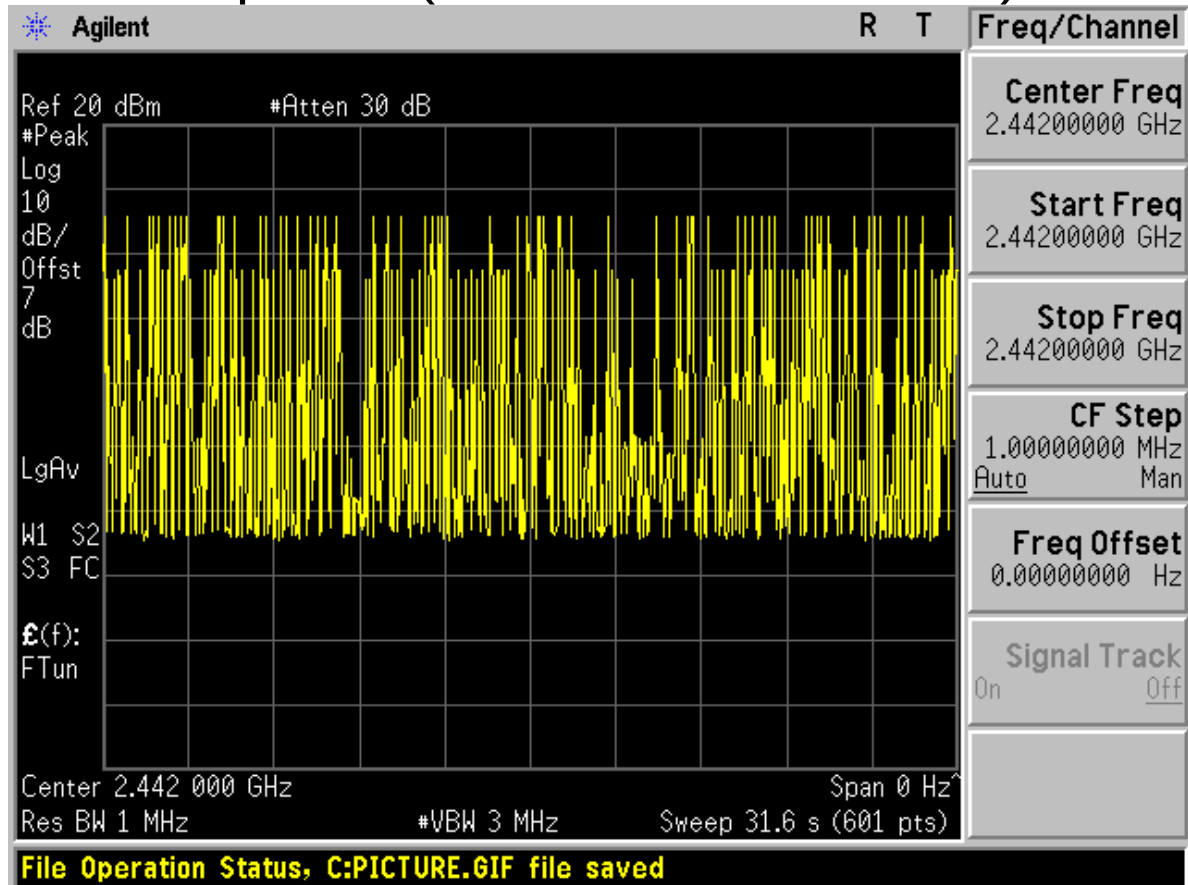


A burst (One time slot)





A period (Less than 106.7 burst)





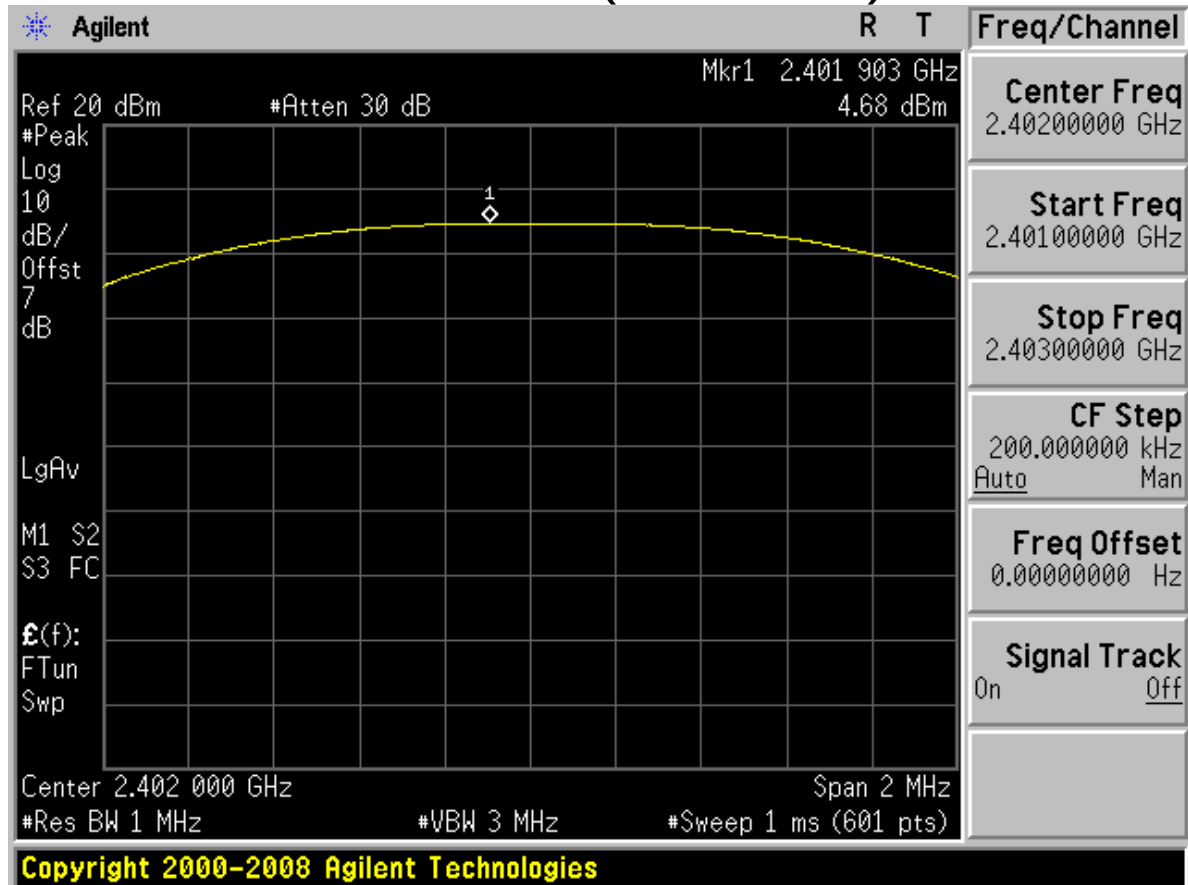
Appendix E

Peak output power

According to FCC Part 15.247 (b) (1)

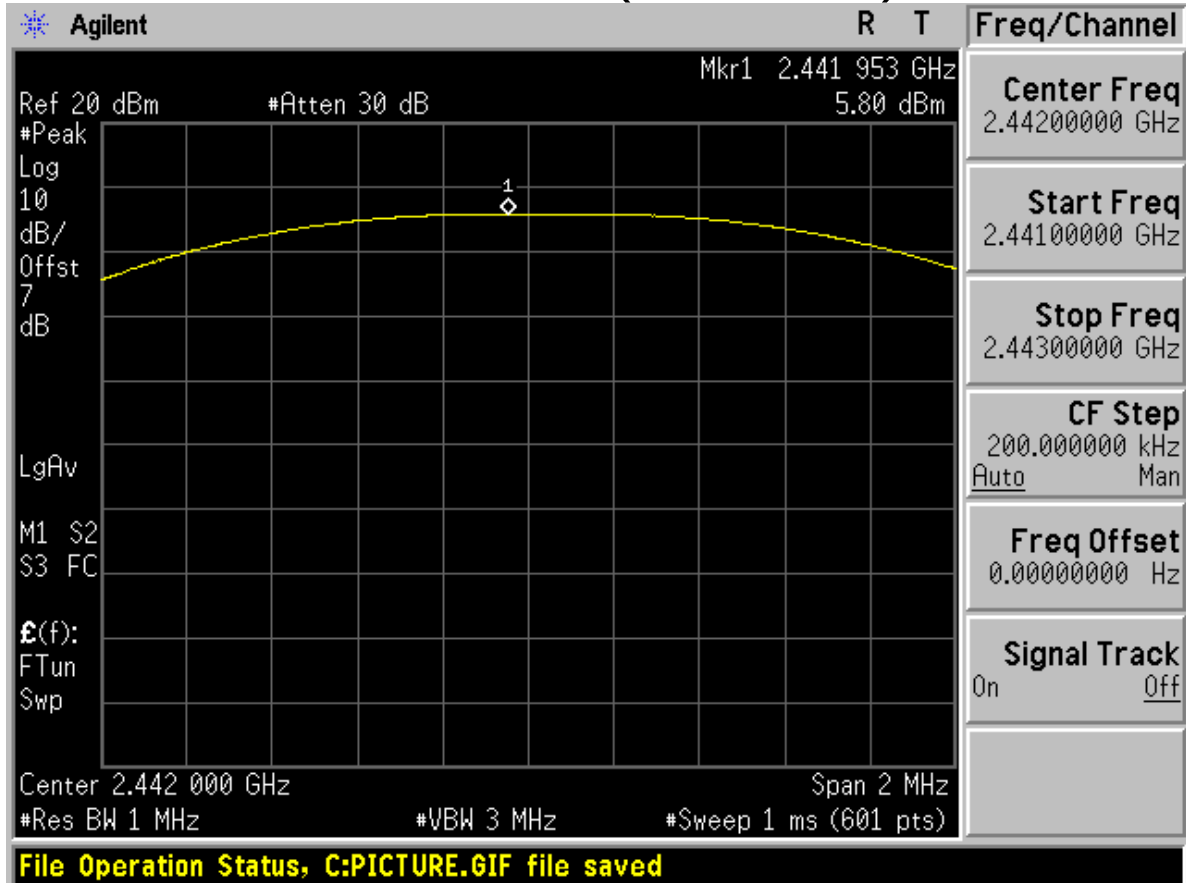


Channel 0 (2402MHz)



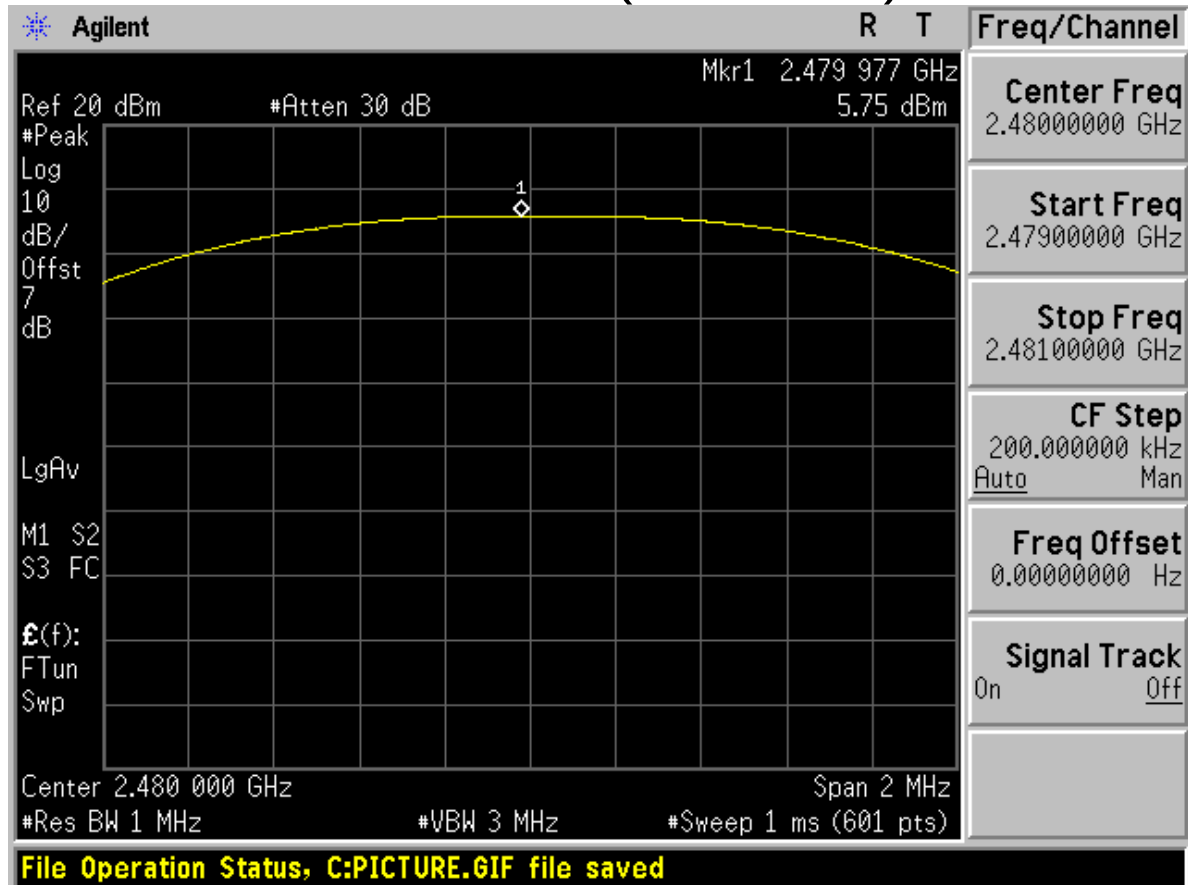


Channel 40 (2442MHz)





Channel 78 (2480MHz)





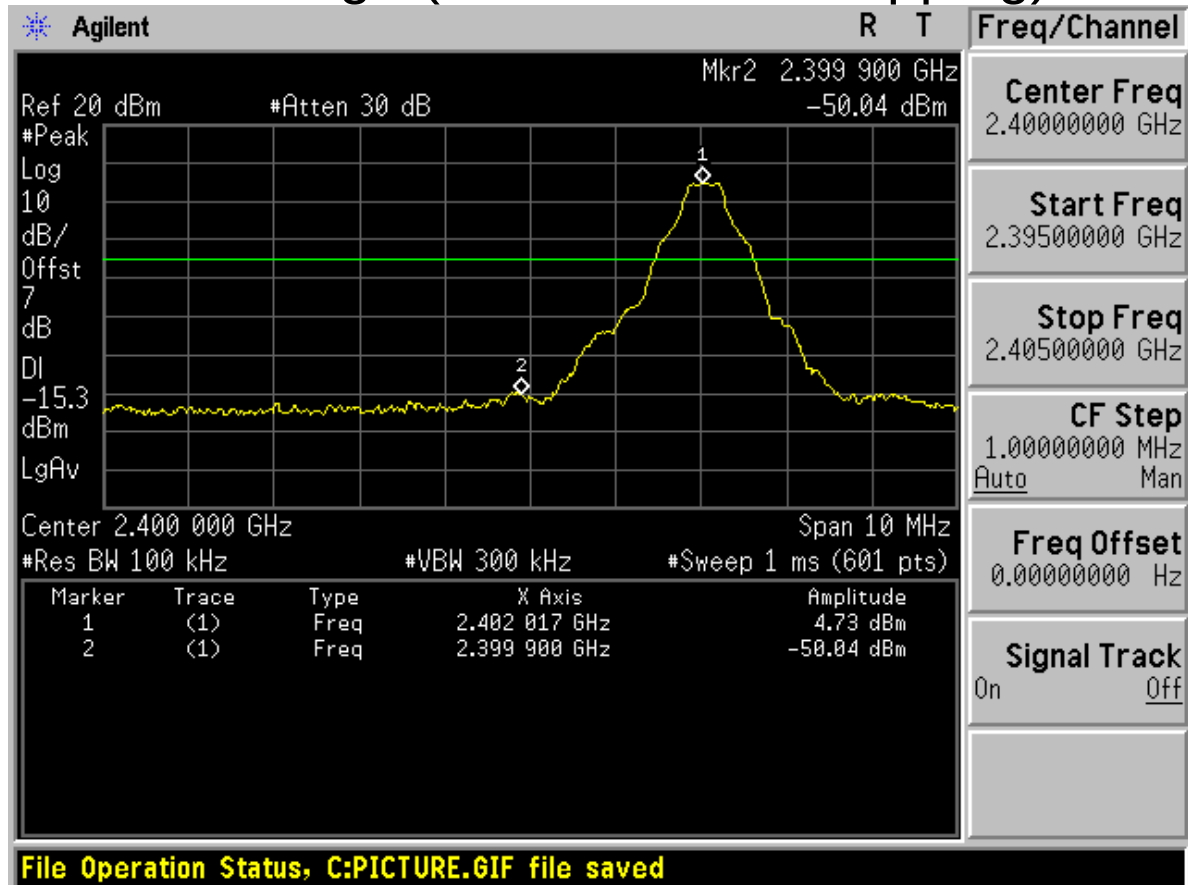
Appendix F

Band edge spurious emission

According to FCC Part 15.247 (d)

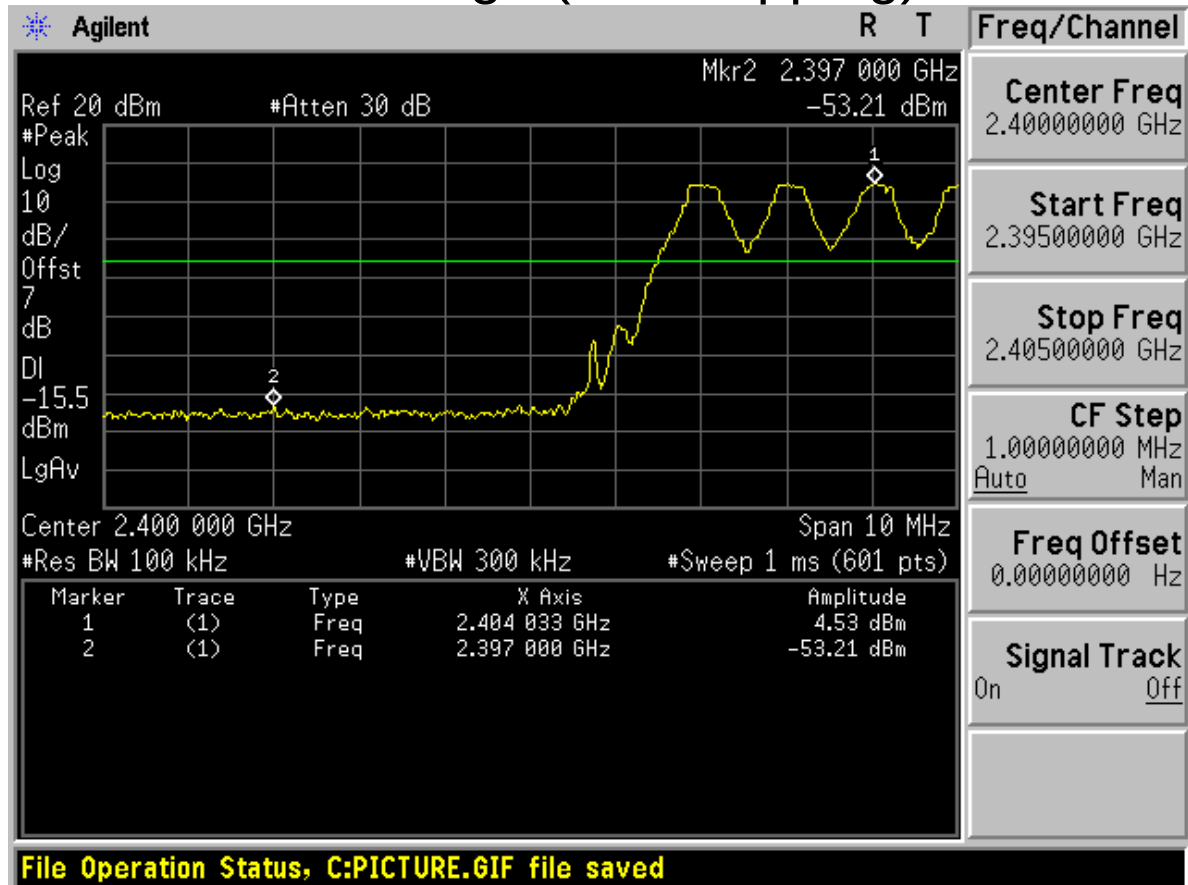


Low edge (Channel 0, no hopping)



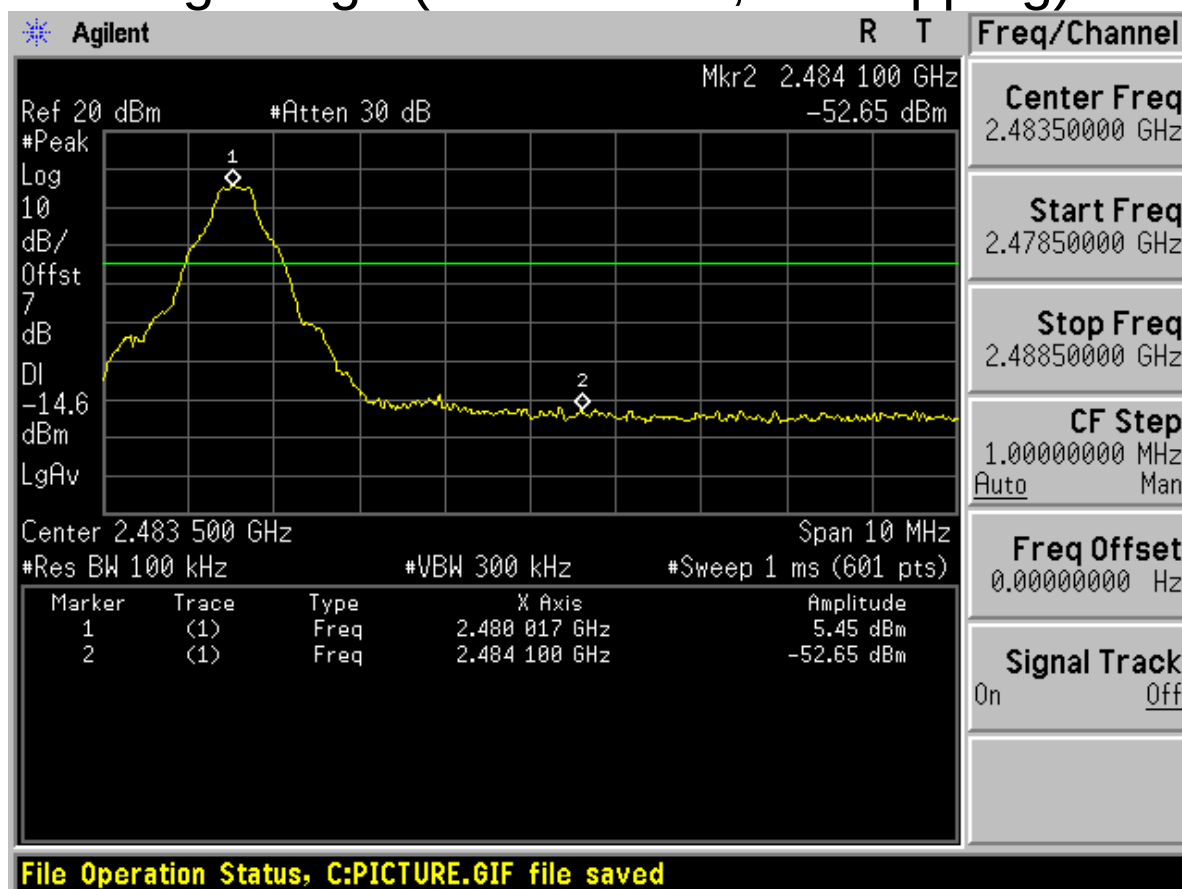


Low edge (with hopping)



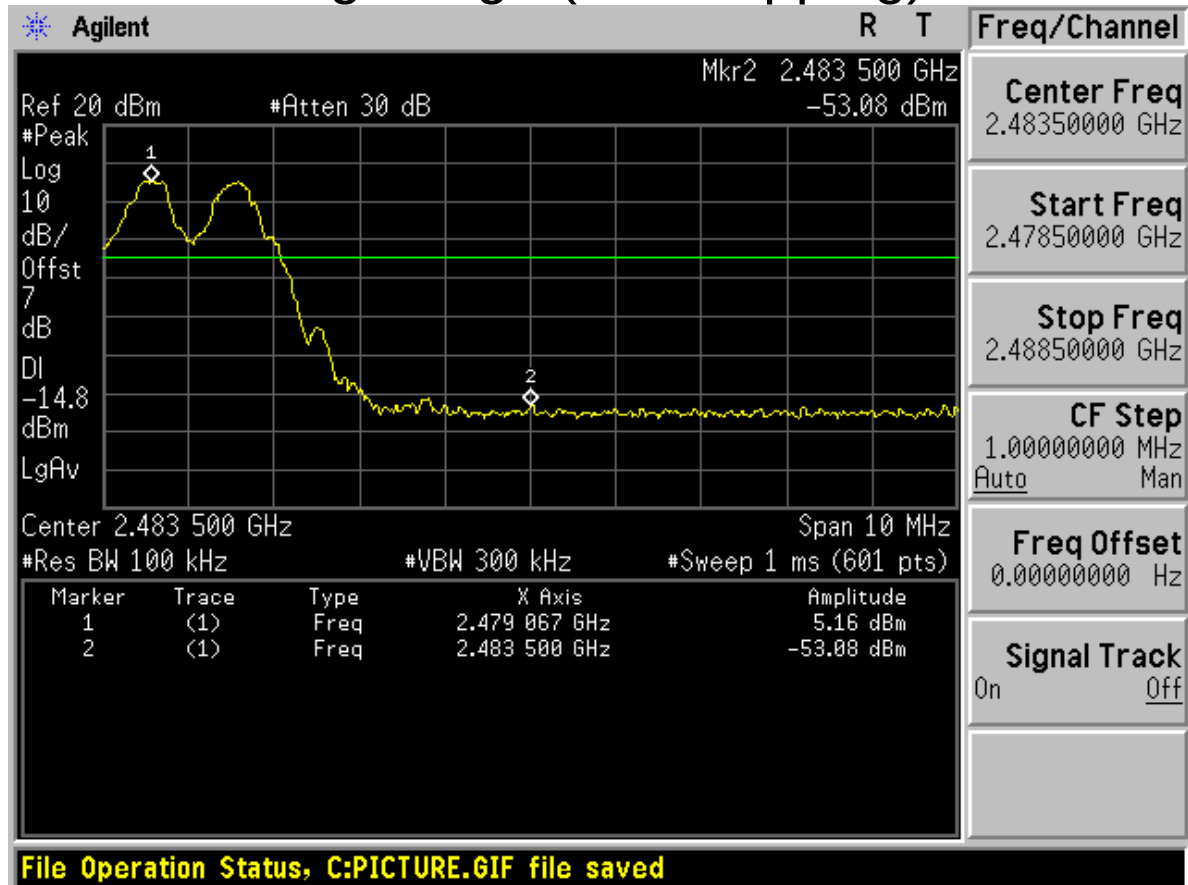


High edge (Channel 78, no hopping)





High edge (with hopping)





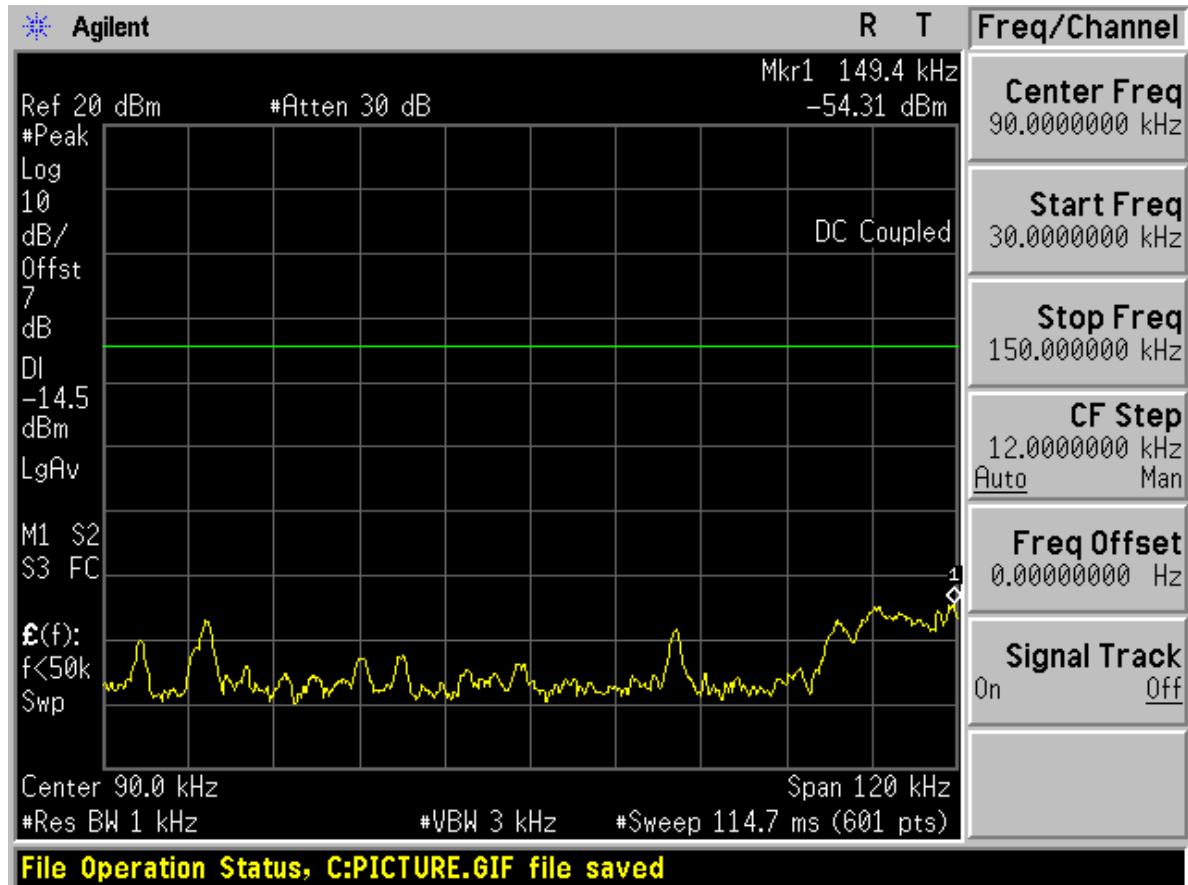
Appendix G

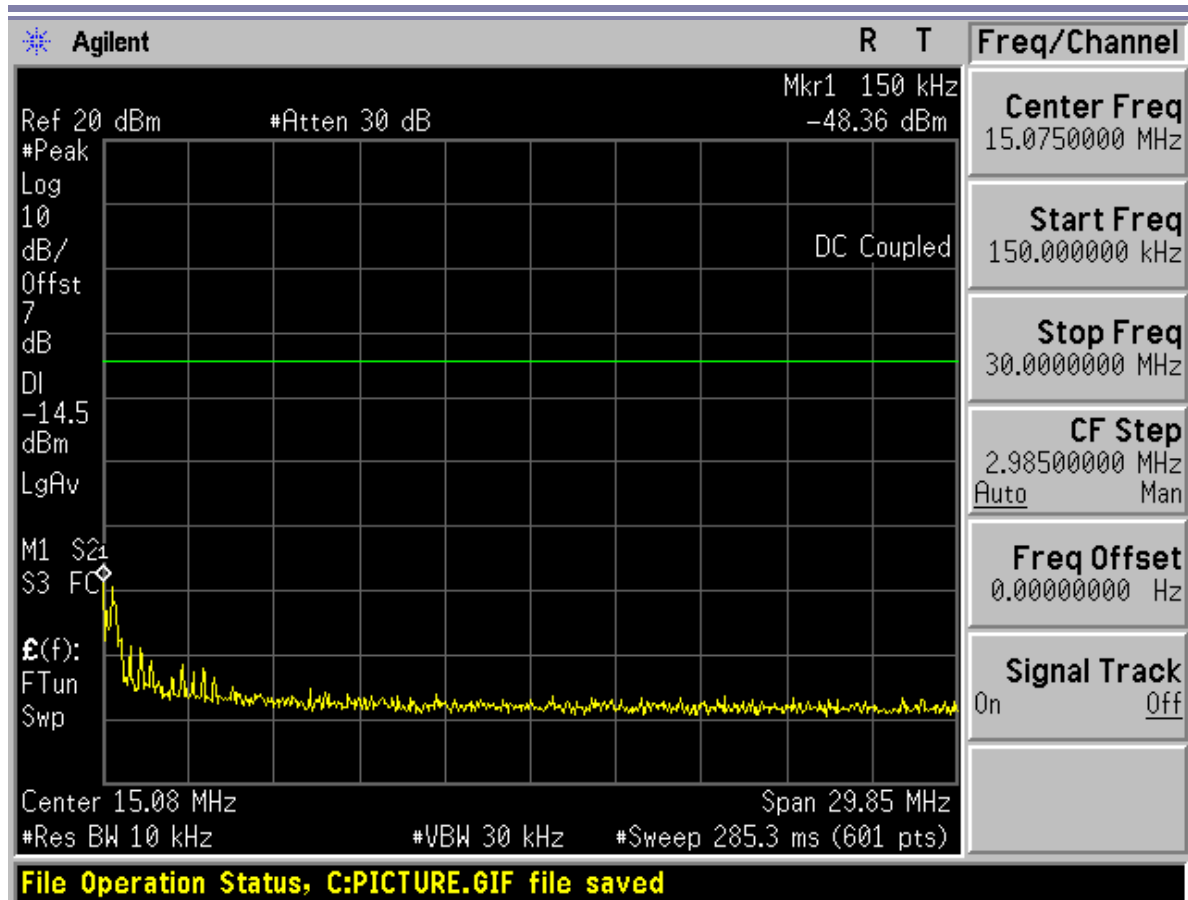
Conducted RF spurious

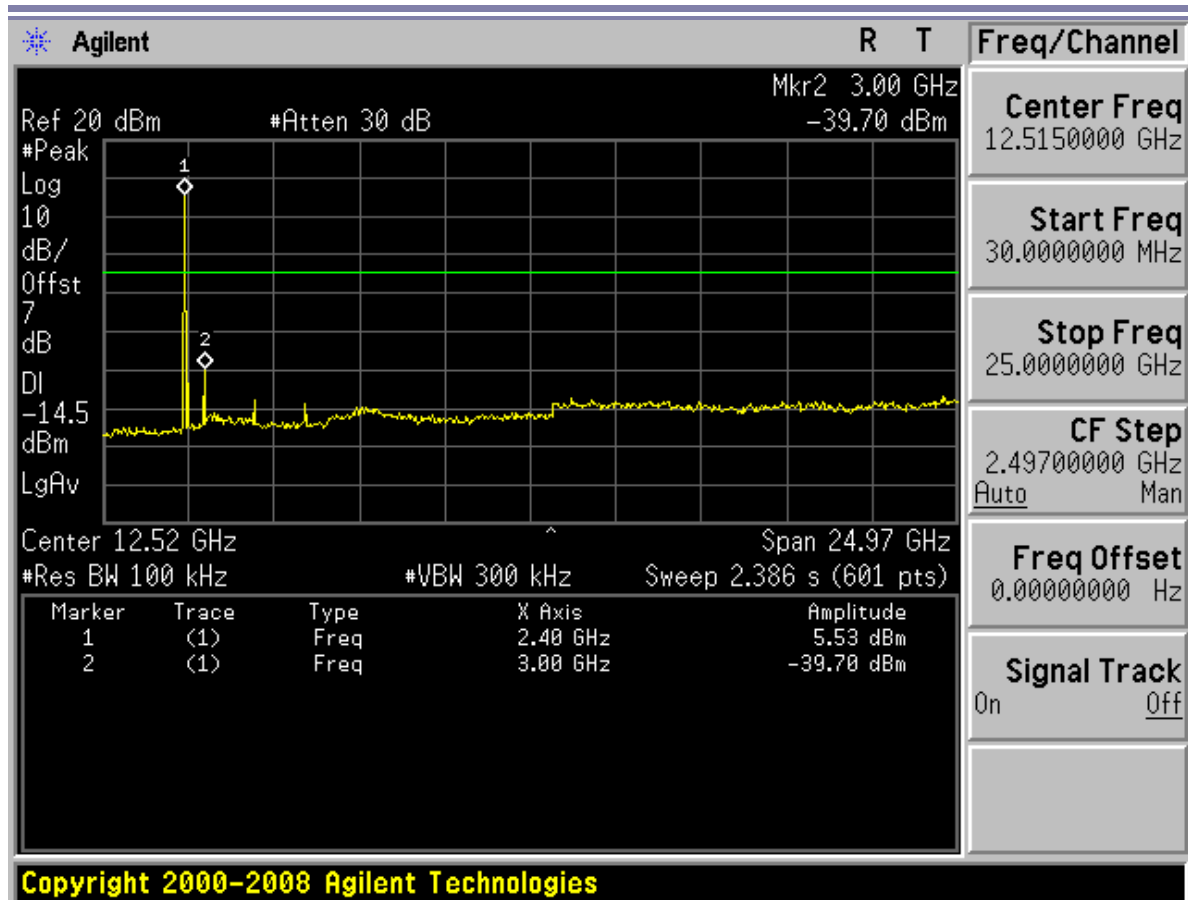
According to FCC Part 15.247 (d)



Channel 0

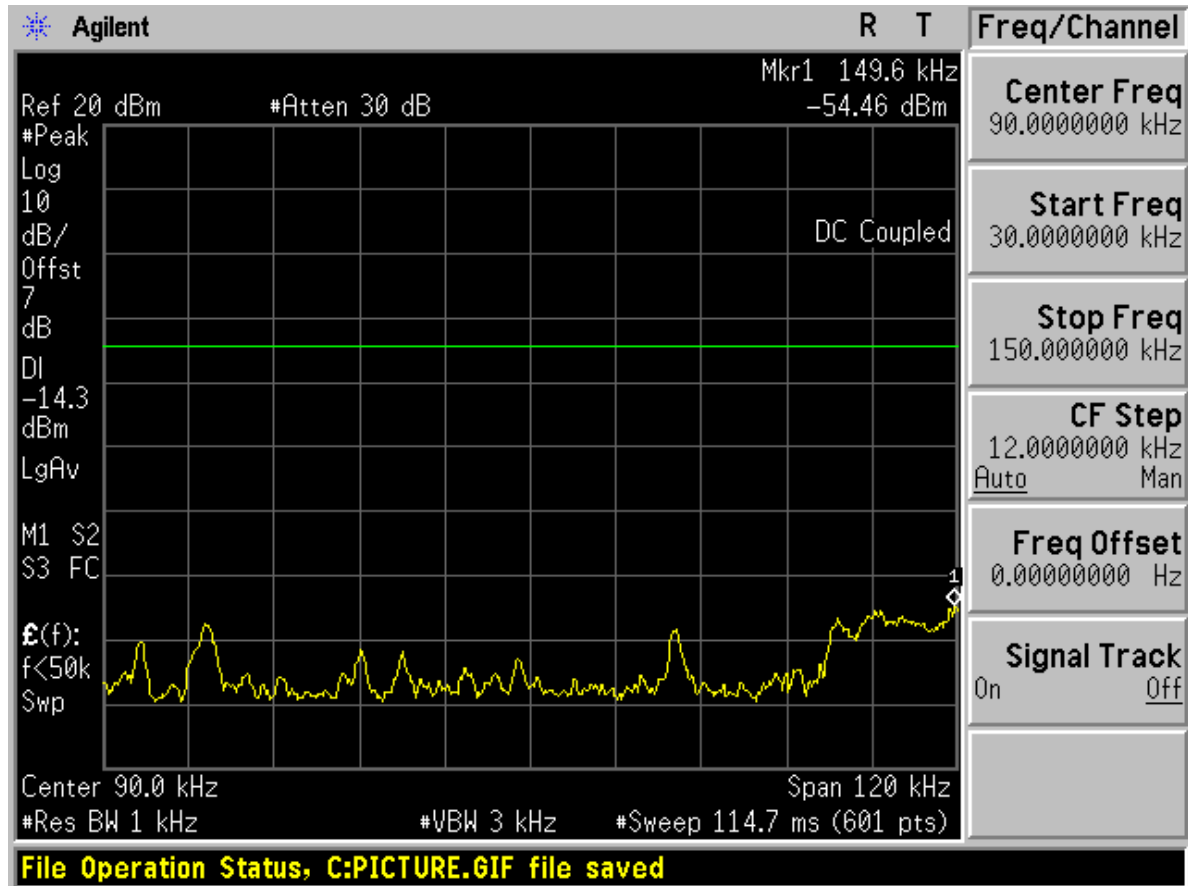


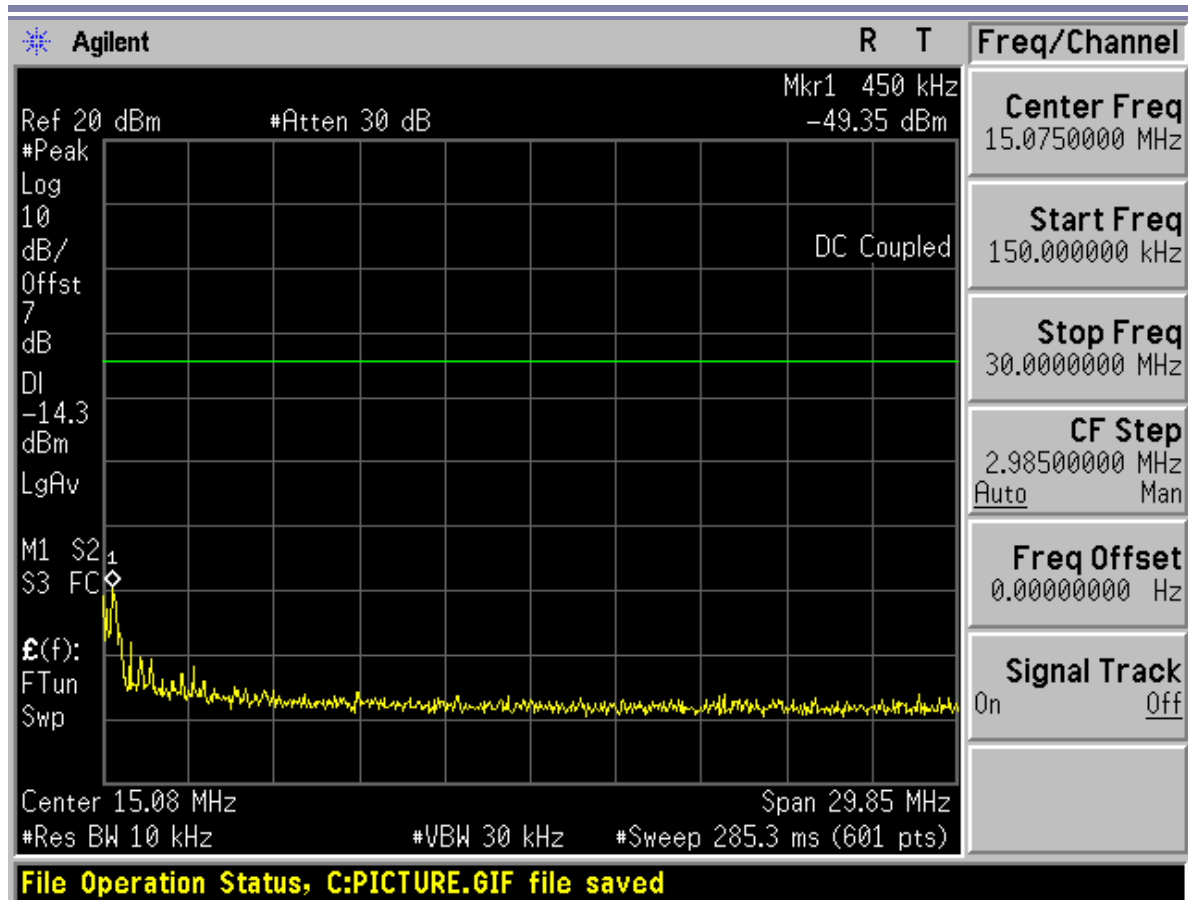


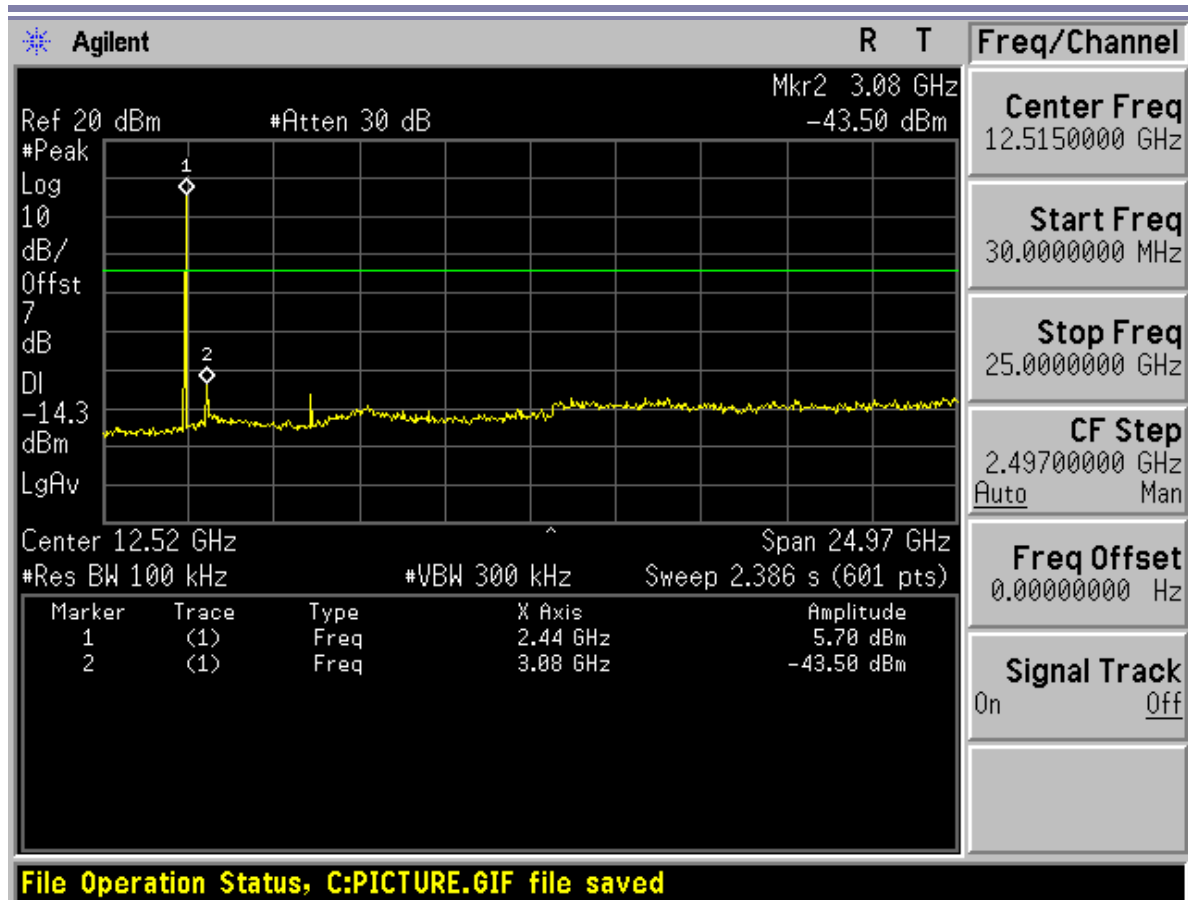




Channel 40

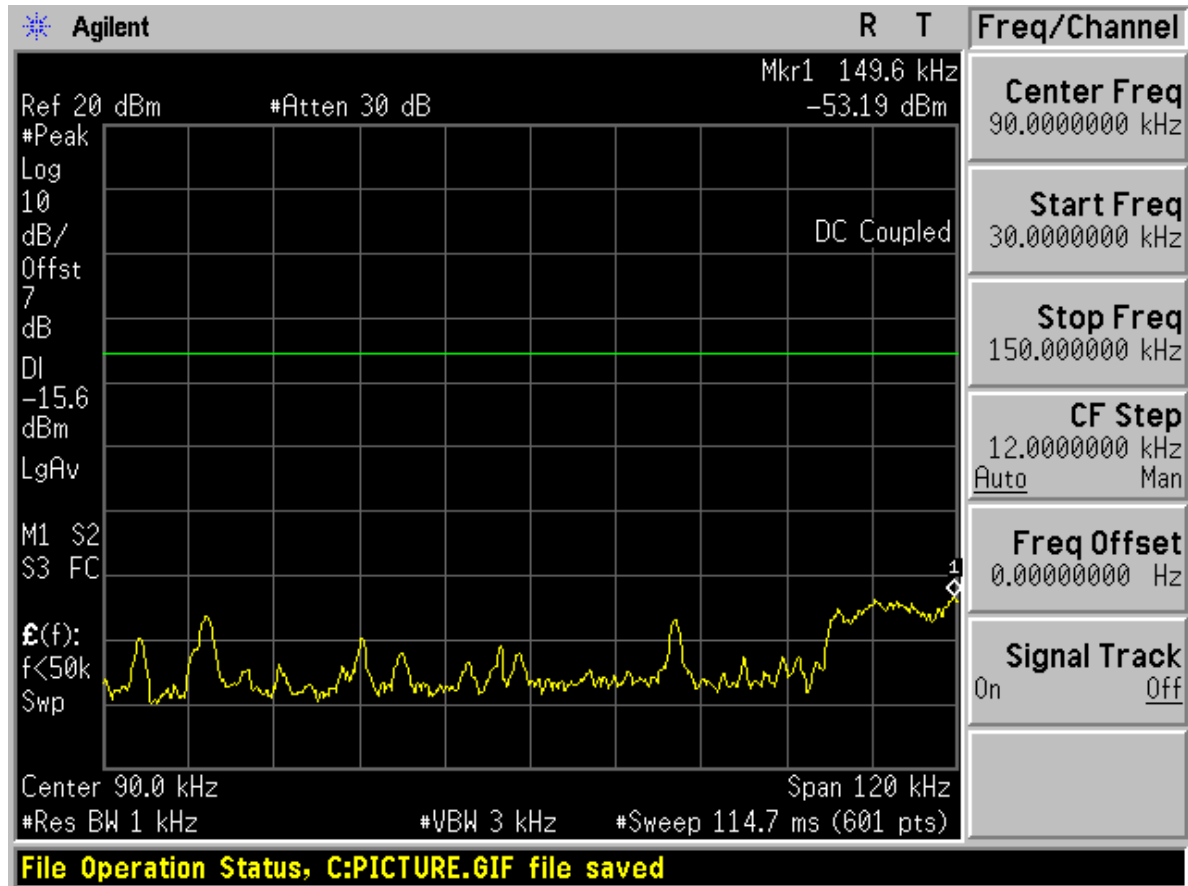


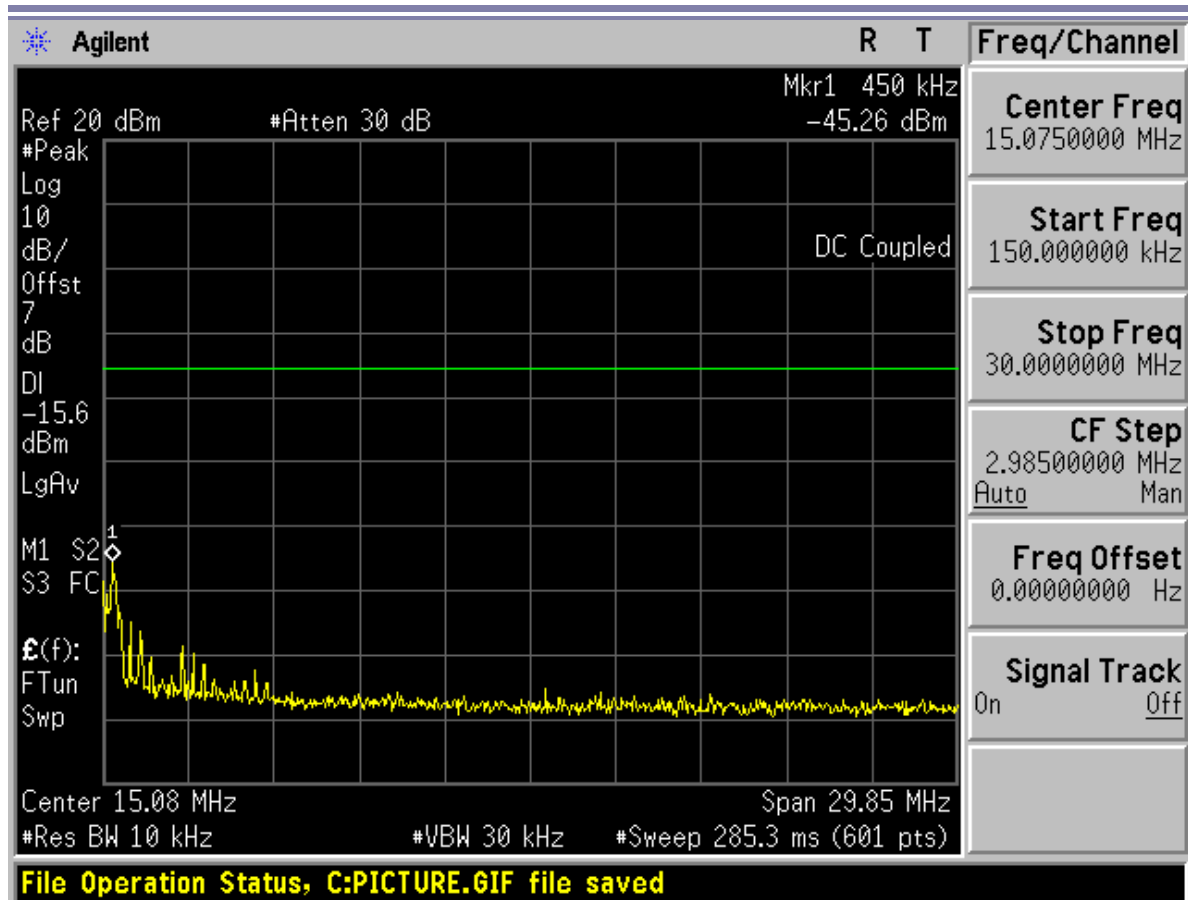


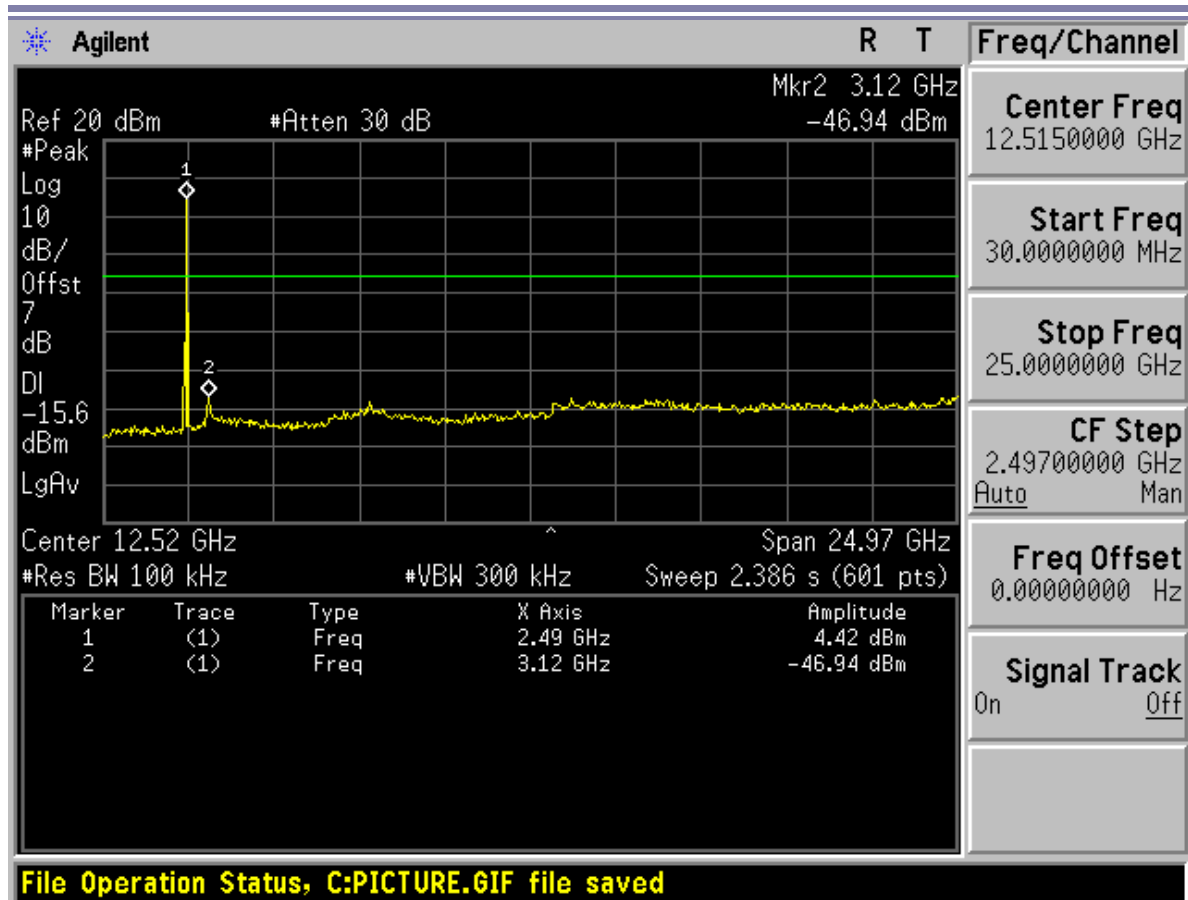




Channel 78









Appendix H

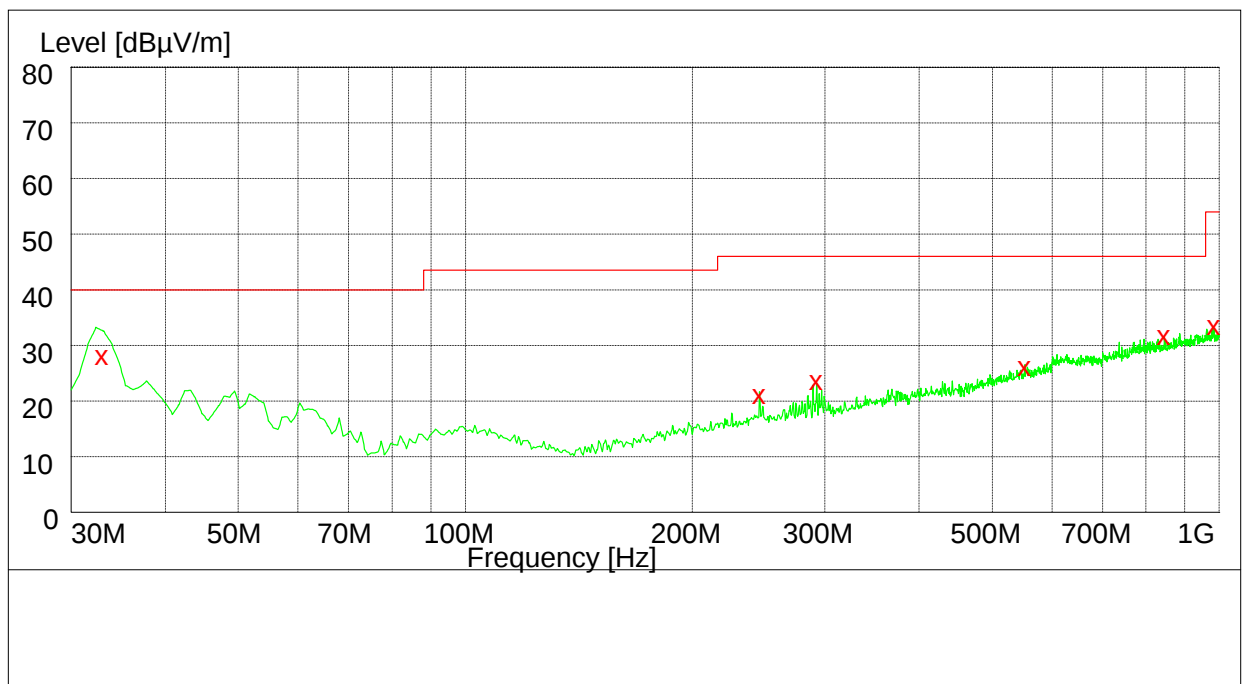
Radiated spurious emission

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



This test was carried out in all the test modes, Here only the worst test result was shown.

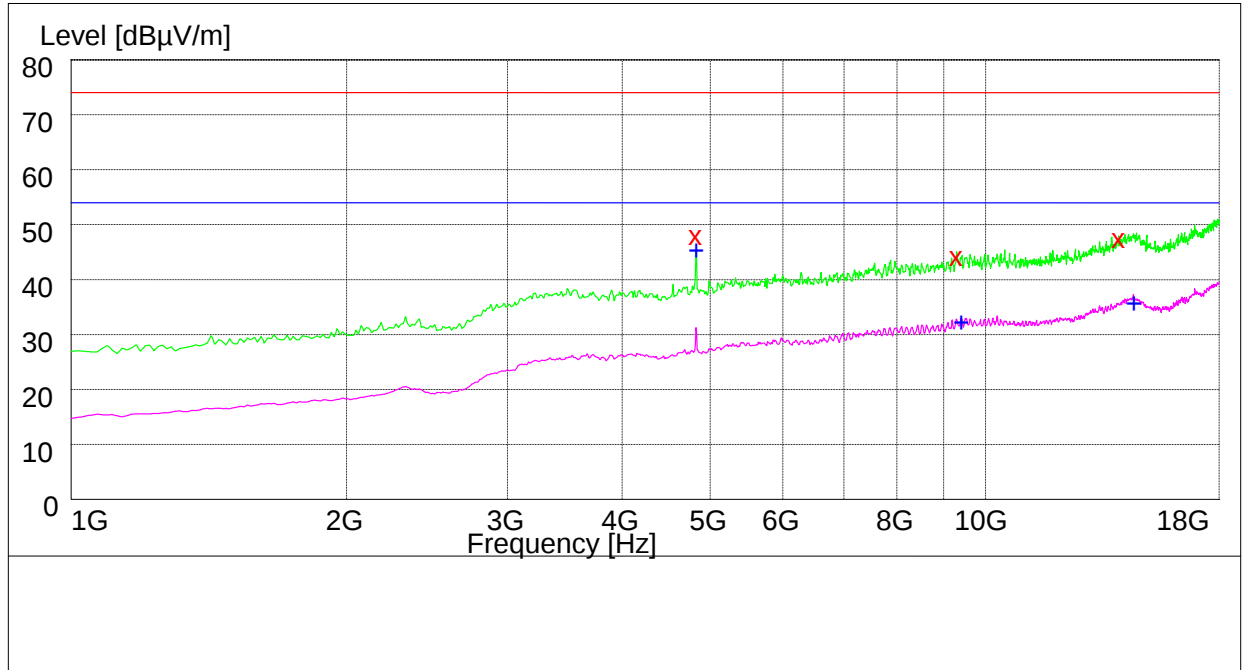
Channel 0 30MHz to 1GHz



Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Plarization
33.000000	29.50	11.7	40.0	10.5	100.0	114.00	VERTICAL
245.728000	21.40	14.1	46.0	24.6	104.0	75.00	HORIZONTAL
292.288000	23.00	15.3	46.0	23.0	130.0	263.00	VERTICAL
552.248000	26.50	21.4	46.0	19.5	125.0	228.00	HORIZONTAL
846.352000	31.40	25.5	46.0	14.6	113.0	327.00	HORIZONTAL
984.480000	32.70	27.0	54.0	21.3	168.0	160.00	VERTICAL



1GHz to 18GHz



Note: Signal suppressed with a 2.4 GHz band rejection filter

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
4824.000000	49.40	-3.6	74.0	24.6	146.0	279.00	VERTICAL
9296.000000	44.90	5.9	74.0	29.1	182.0	279.00	HORIZONTAL
13988.000000	47.80	13.0	74.0	26.2	114.0	279.00	HORIZONTAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
4824.000000	46.60	-3.6	54.0	7.4	130.0	280.00	VERTICAL
9391.200000	32.80	6.2	54.0	21.1	102.0	280.00	HORIZONTAL
14504.800000	37.10	14.6	54.0	16.9	186.0	280.00	VERTICAL

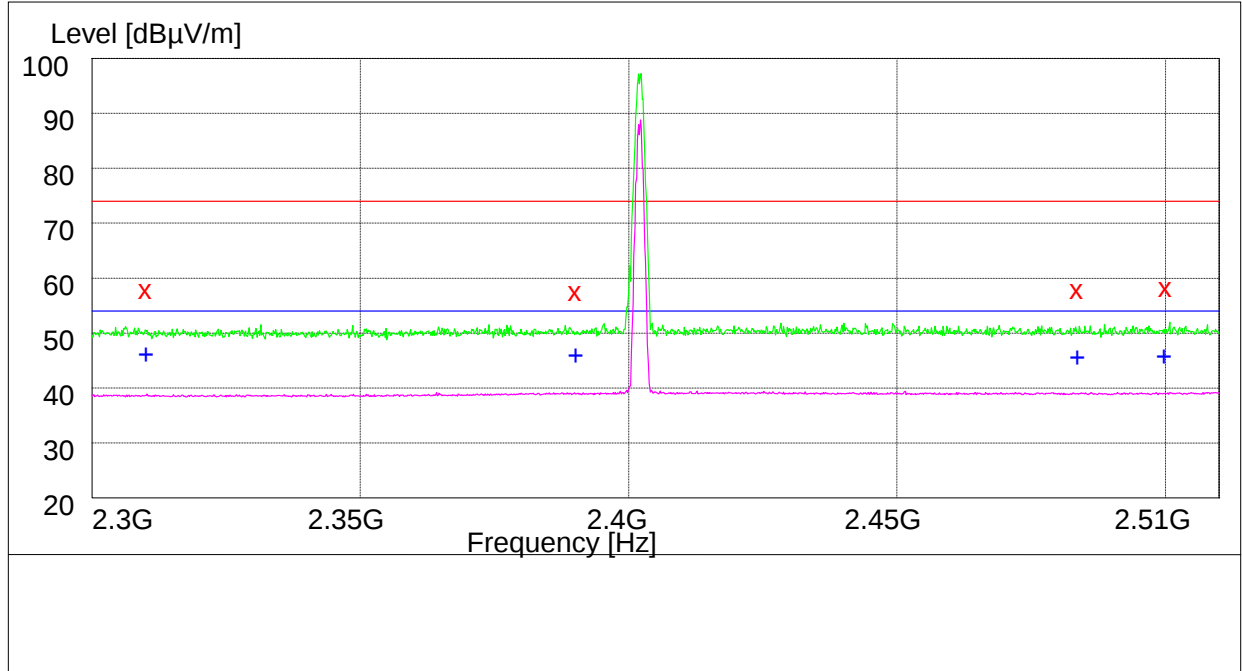


18GHz to 26GHz

Note: No peak found in pre- test.



2.30GHz to 2.51GHz



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

MEASUREMENT RESULT: PK Detector

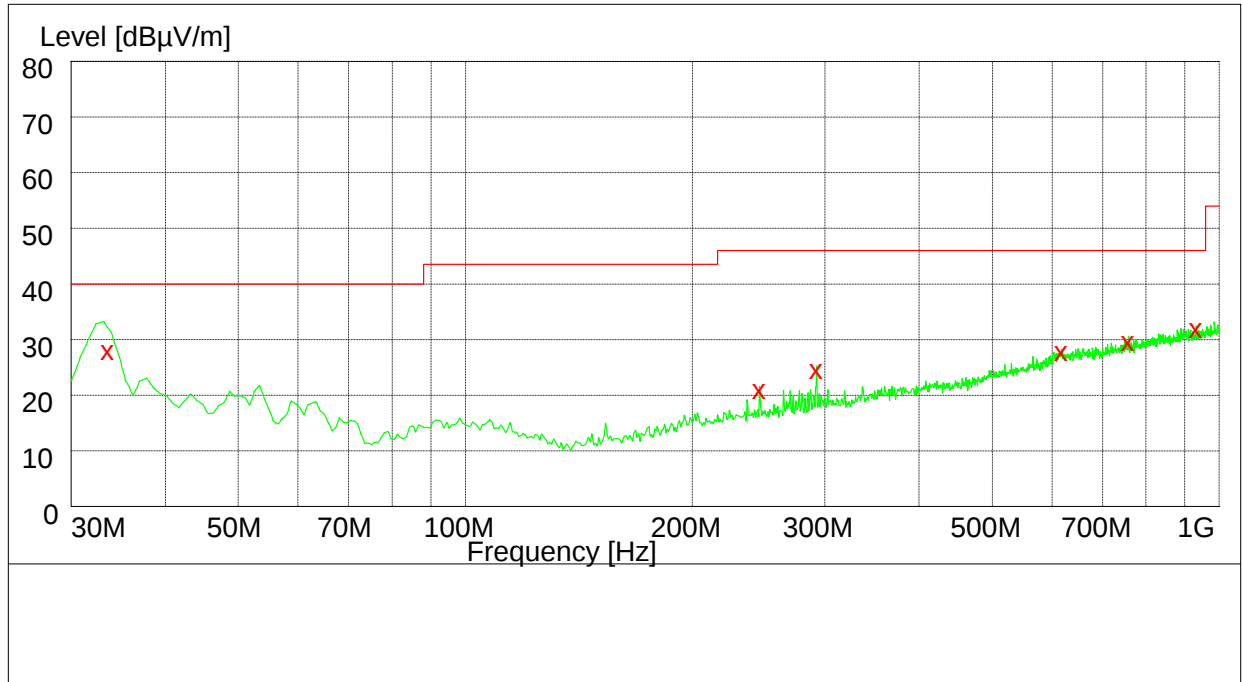
Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	59.30	33.3	74.0	14.7	181.0	126.00	VERTICAL
2390.000000	59.00	33.5	74.0	15.0	125.0	85.00	HORIZONTAL
2483.500000	59.20	33.8	74.0	14.8	164.0	286.00	HORIZONTAL
2500.000000	59.60	33.8	74.0	14.4	144.0	311.00	HORIZONTAL

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	46.70	33.3	54.0	7.3	100.0	215.00	HORIZONTAL
2390.000000	46.90	33.5	54.0	7.1	172.0	64.00	HORIZONTAL
2483.500000	47.00	33.8	54.0	7.0	133.0	241.00	VERTICAL
2500.000000	47.10	33.8	54.0	6.9	200.0	108.00	VERTICAL



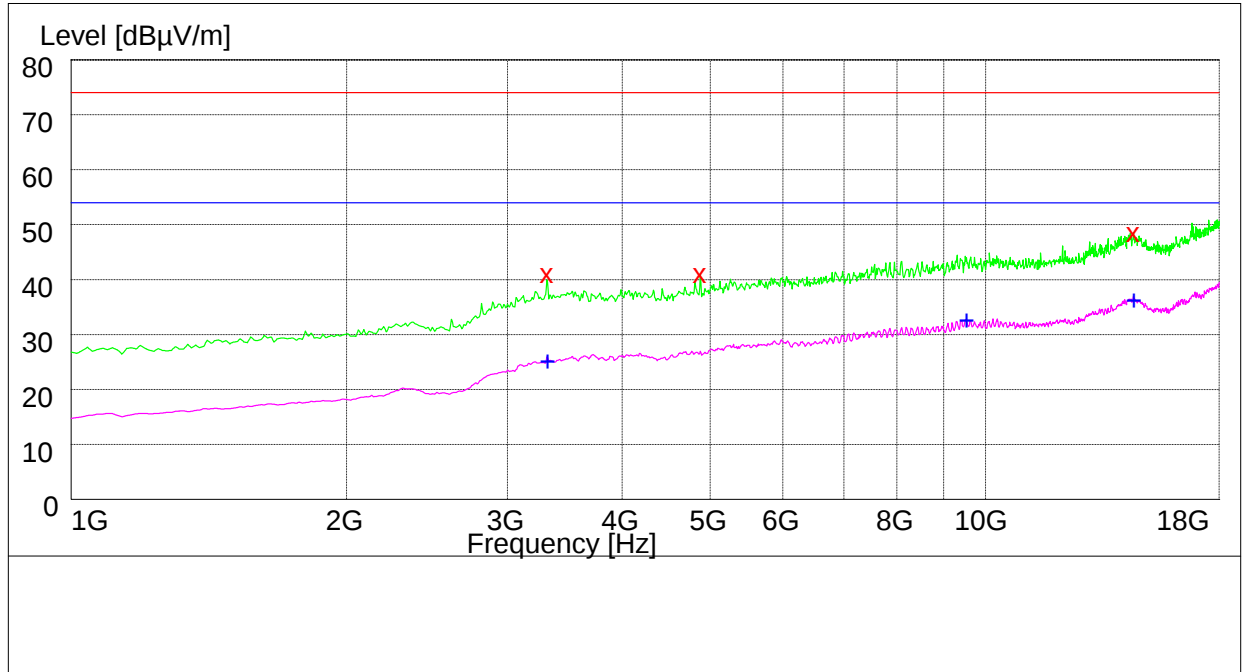
Channel 40 30MHz to 1GHz



Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
33.600000	29.30	11.7	40.0	10.7	105.0	95.00	VERTICAL
245.780000	21.30	14.1	46.0	24.7	110.0	142.00	HORIZONTAL
292.288000	25.20	15.3	46.0	20.8	100.0	210.00	VERTICAL
618.208000	28.10	22.7	46.0	17.9	137.0	178.00	HORIZONTAL
758.664000	30.30	24.1	46.0	15.7	126.0	348.00	VERTICAL
933.264000	32.30	26.5	46.0	13.7	158.0	194.00	VERTICAL



1GHz to 18GHz



Note: Signal suppressed with a 2.4 GHz band rejection filter

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	41.80	-5.9	74.0	32.2	100.0	135.00	VERTICAL
4876.000000	41.00	-3.5	74.0	31.0	112.0	78.00	HORIZONTAL
14518.400000	48.50	14.9	74.0	25.5	134.0	216.00	HORIZONTAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	24.70	-5.9	54.0	29.3	161.0	107.00	VERTICAL
9527.200000	32.90	6.4	54.0	21.1	102.0	165.00	HORIZONTAL
14518.400000	36.90	14.9	54.0	17.1	125.0	88.00	HORIZONTAL

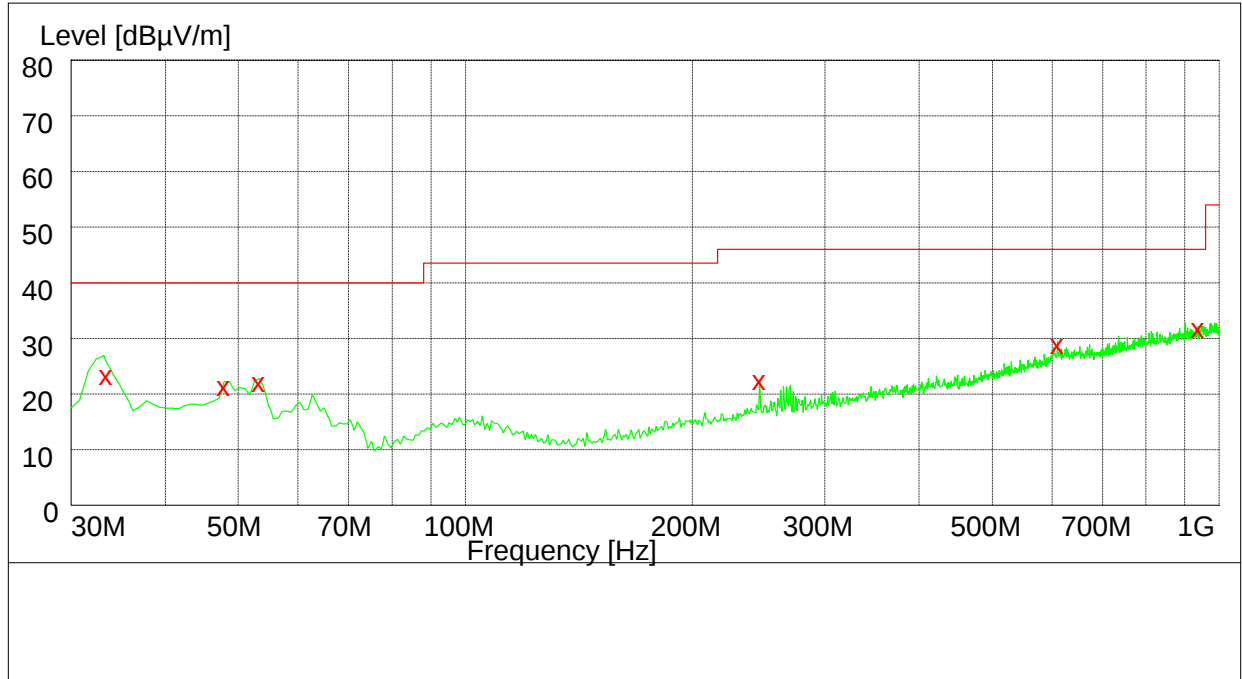


18GHz to 26GHz

Note: No peak found in pre- test.



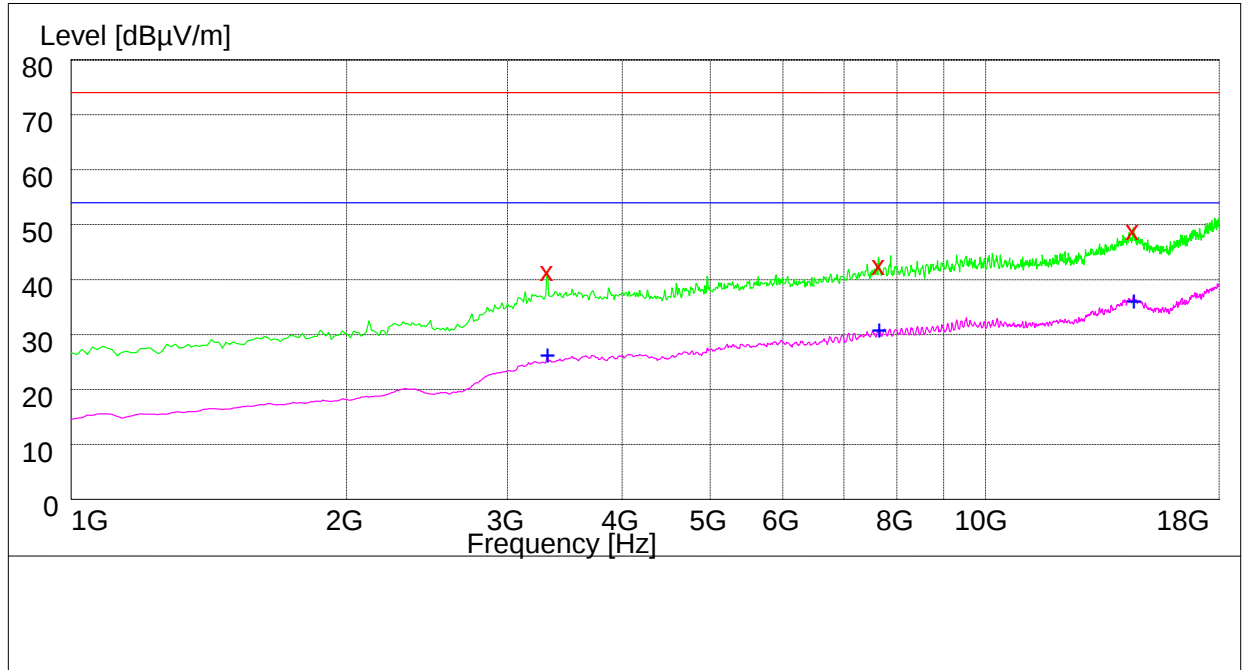
Channel 78 30MHz to 1GHz



Frequency MHz	Level dB μ V/m	Transd dB	Limit dB μ V/m	Margin dB	Height cm	Azimuth deg	Polarization
33.420000	22.10	11.7	40.0	17.9	103.0	132.00	VERTICAL
47.848000	22.00	12.9	40.0	18.0	112.0	54.00	VERTICAL
53.280000	22.60	12.7	40.0	17.4	124.0	98.00	HORIZONTAL
245.728000	22.30	14.1	46.0	23.7	118.0	204.00	HORIZONTAL
610.448000	29.10	22.6	46.0	16.9	147.0	318.00	HORIZONTAL
938.696000	32.00	26.3	46.0	14.0	170.0	164.00	VERTICAL



1GHz to 18GHz



Note: Signal suppressed with a 2.4 GHz band rejection filter

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	42.80	-5.9	74.0	31.2	100.0	0.00	HORIZONTAL
7643.000000	42.60	3.0	74.0	31.4	200.0	7.00	VERTICAL
14488.000000	48.80	14.5	74.0	25.2	200.0	208.00	VERTICAL

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
3318.500000	26.80	-5.9	54.0	27.2	100.0	0.00	VERTICAL
7639.500000	30.00	3.0	54.0	24.0	179.0	7.00	VERTICAL
14498.500000	36.20	14.5	54.0	17.8	197.0	210.00	VERTICAL

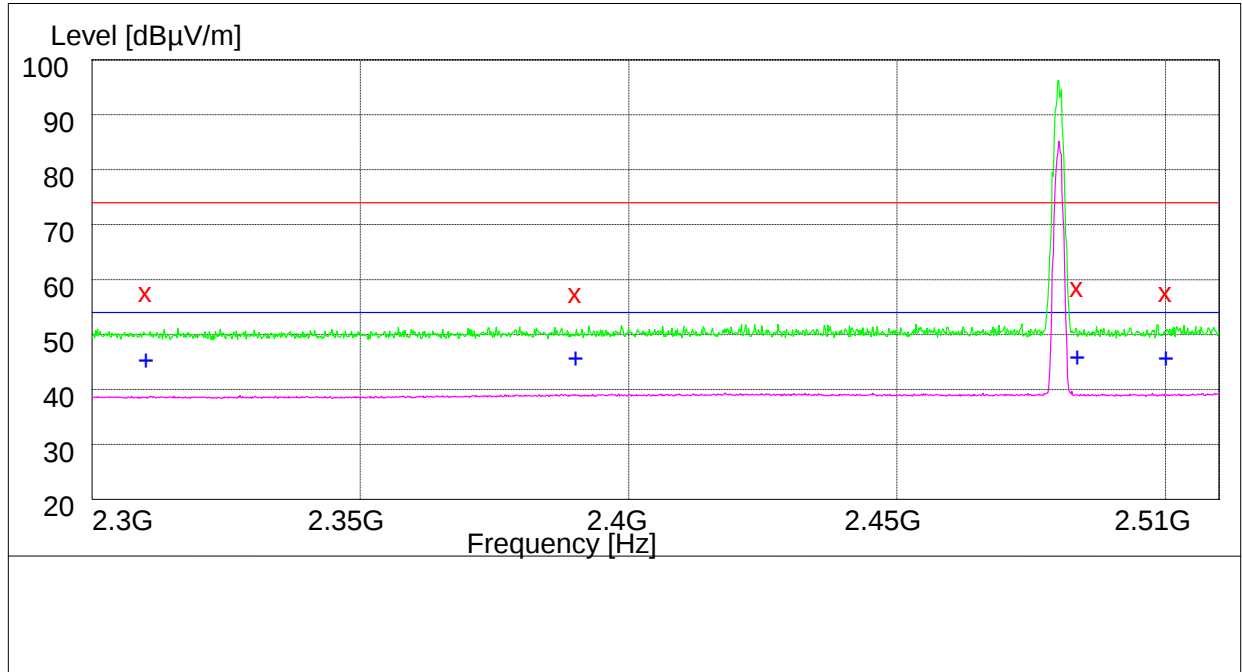


18GHz to 26GHz

Note: No peak found in pre- test.



2.30GHz to 2.51GHz



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

MEASUREMENT RESULT: PK Detector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	59.10	33.3	74.0	154.9	147.0	29.00	VERTICAL
2390.000000	58.80	33.5	74.0	15.2	126.0	291.00	HORIZONTAL
2483.500000	59.90	33.8	74.0	14.1	115.0	198.00	HORIZONTAL
2500.000000	59.00	33.8	74.0	15.0	188.0	249.00	HORIZONTAL

MEASUREMENT RESULT: AVDetector

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Height cm	Azimuth deg	Polarization
2310.000000	46.60	33.3	54.0	7.4	104.0	297.00	VERTICAL
2390.000000	47.10	33.5	54.0	6.9	120.0	359.00	VERTICAL
2483.500000	47.20	33.8	54.0	6.8	163.0	123.00	HORIZONTAL
2500.000000	47.00	33.8	54.0	7.0	112.0	86.00	HORIZONTAL



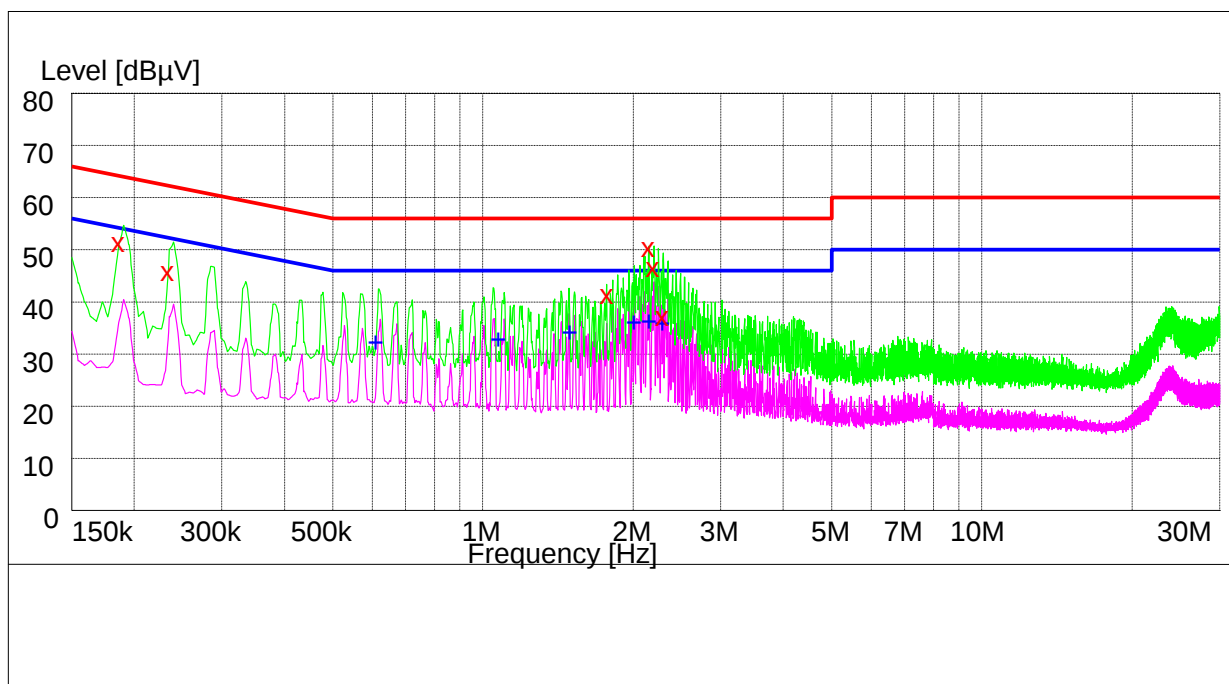
Appendix I

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
0.186000	51.10	10.1	64	12.9	N	FLO
0.234000	47.00	10.0	62	15.0	N	FLO
1.776000	43.00	10.1	56	13.0	N	FLO
2.150000	50.50	10.1	56	5.5	N	FLO
2.196000	48.10	10.1	56	7.9	N	FLO
2.292000	38.70	10.1	56	17.3	N	FLO

MEASUREMENT RESULT: AV Detector

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.608000	33.80	10.1	46	12.2	N	FLO
1.074000	34.40	10.1	46	11.6	N	FLO
1.494000	35.70	10.1	46	10.3	N	FLO
2.008000	37.60	10.1	46	8.4	N	FLO
2.146000	37.80	10.1	46	8.2	L1	FLO
2.288000	37.50	10.1	46	8.5	N	FLO