Electromagnetic Compatibility
Test Report

Test Report No: MOT 181011
Issued on: June 6, 2012 Rev.4

Product Name
EWP2200 Semi Rugged VoWLAN Phone

Tested According to
FCC 47 CFR, Part 15, Subparts C
IC RSS-210, Issue 8

Tests Performed for
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ELECTRICAL TESTING
CERT #1633.01

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Test Report details:

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Customer's representative: Eli Basri

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Revision details:

Version	Date	Details/Reasons	Page no
Rev. 1	18.10.2011	-	-
Rev. 2	08.05.2012	Comment 27: Test procedure of conducted RF measurements was corrected for DSS technology	8
		Comment 11: Test Method of bandedge measurement was corrected	8
		Comment 7: Test procedure of Radiated Emissions Measurements in the restricted bands was corrected	8
		Comment 6: Test procedure of Radiated Emission measurements was corrected	8
		Comment 8: Worst Case Result definition was corrected	9
		Comment 9: Test procedure of Power Line Emission measurements was corrected	9
		Comment 28: Test results of two additional modulations were added	12
		Comment 29: RBW values changed to 8 MHz as shown on the plots	23
		Comment 28: Test results of two additional modulations were added	23
		Comment 31: Activity definition was corrected	29
		Comment 28: Two additional modulation were added	29
		Comment 30: Limit of bandedges compliance measurements was corrected	29
		Comment 12: Definition of the emission level measured was corrected	45
		Comment 30: Limit value of conducted spurious emission was corrected	53
		Comment 9: Definition of worst case statement was corrected	58
Rev. 3	30.05.2012	Comment 2: In Sec.4.6 Band edge locations indicated on the plots 4.6.1 – 4.6.12	29-34
		Comment 17: Test results sentence corrected in Sec.4.11	57
Rev .4	10.06.12	Comment 2:Retesting was performed in order to clarify the location of bandedge	29-34
	10.06.12	Comment 3: the list of measuring equipment used was revised according to the last calibration data	61

Assessment information:

This report contains an assessment of the EUT against Electromagnetic Compatibility based upon tests carried out on the samples submitted. The results contained in this report relate only to the items tested. Manufactured products will not necessarily give identical results due to production and measurement tolerances. QualiTech, EMC Lab does not assume responsibility for any conclusion and generalization drawn from the test results with regards to other specimens or samples of type of the equipment represented by test item.

The EUT was setup and exercised using the configuration, modes of operation and arrangements defined in this report only.

Modifications:

Modifications made to the EUT

None

Modifications made to the Test Standard

None

Summary of Compliance Status

Bluetooth

Test Spec. Clause	Test Case	Remarks
47 CFR §15.247 (a) (1),DA 00-705, RSS-210 section A8.1 (2)	20dB Bandwidth	Comply
47 CFR §15.247 (a) (1), DA 00-705, RSS-210 section A8.1 (2)	Carrier Frequency Separation	Comply
47 CFR §15.247 (a) (1)(iii), DA 00-705, RSS-210 section A8.1 (2)	Number of Hopping Channels	Comply
47 CFR §15.247 (a) (1) (iii), DA 00-705, RSS-210 section A8.1 (2)	Average Time of Occupancy (Dwell Time)	Comply
47 CFR §15.247 (b) (1), DA 00-705, RSS-210 section A8.1 (2)	Maximum Peak Output Power	Comply
47 CFR §15.247 (d), DA 00-705, RSS-210 Section A8.5	Band-edge compliance of RF Conducted Emission	Comply
47 CFR §15.247 (d), §15.209(a) & DA 00-705, RSS-210 Section A8.5	Radiated Spurious Emissions, Restricted Bands (2310-2390MHz, 2483.5-2500MHz)	Comply
47 CFR §15.247 (d) , §15.209(a) & DA 00-705, RSS-210 Section A8.5	Radiated Spurious Emissions, Restricted Bands	Comply
47 CFR §15.247 (d), DA 00-705, RSS-210 Section A8.5	Spurious Emission- Conducted	Comply
47 CFR §15.203, RSS-Gen, Section 7.1.4	Antenna Connector Requirements	Comply
47 CFR §15.407(b)(6) & §15.107/207, ICES-003 RSS-GEN section 7.2.3.2	Power line Emission measurements	Comply

Table of Contents

1. General Description

Description of the EUT system/test Item:

Product name: EWP2200 Semi Rugged VoWLAN Phone

Model: EWP2200

FCC ID: AZ489FT7052

IC ID: 109U-89FT7052

Description:

The EUT is a Smartphone which provides mobile voice and data communications over wireless network to users inside an enterprise.
It is capable of operating in the unlicensed 2.4 GHz band using 802.11b/g/n protocols or in applicable 5 GHz bands using the 802.11a/n protocol.
The EUT also contains a Bluetooth technology for short range interfaces and EWP2200 has an additional 3.2Mp auto-focus camera.

Maximum Peak Output Power: 8.551 mW

Frequency range: 2400-2483.5 GHz

Type of Modulation:

Protocol	Modulation
Bluetooth	8-PSK,GFSK,DQPSK

Antenna Specification:

Type: Integral (on board) PIFA Dual Band

Antenna Gain:
2412MHz +2.4dBi
2437MHz +2.4dBi
2462MHz +3.0dBi
2472MHz +3.0dBi
2484MHz +3.2dBi

2. Method of Measurements

2.1. Conducted RF Measurements:

The RF output of the transmitter under test was directly connected to the input of the Spectrum analyzer through a specialized antenna connector provided by the manufacturer, and an attenuator as specified. The external attenuator and cable loss were added to the reading. Worst-case results of the various modulation modes (where applicable) were reported.

For carrier frequency separation, number of hopping frequencies, time of occupancy, 20dB BW, peak output power, band edge emissions, and spurious emissions were measured according the guidelines in DA 00-705.

For Maximum conducted output Set the following spectrum analyzer settings:
Span>5 times the 20 dB bandwidth, RBW > the 20 dB bandwidth of the emission being measured, VBW ≥ RBW, Sweep = auto, Detector function = peak, Trace = max hold
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

For spurious emissions measurement, the spectrum from 9 KHz to 40GHz was investigated with the transmitter set to the lowest, middle and highest channel frequencies.

For bandedge measurement allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-delta value now displayed must comply with the limit specified in this Section. Submit this plot.

2.2. Radiated Emissions Measurements in the restricted bands:

For radiated emissions, which fall in the restricted bands the spectrum from 1MHz to 25GHz was investigated following the guidelines in ANSI C63.4-2003, with the transmitter set to the lowest, middle and highest channel frequencies. Measurements were performed with peak detector and repeated averaged with VBW=10Hz. Only Peak detection plots are presented**.** Worst-case results of the various modulation modes (where applicable) were reported.

2.3. Radiated Emission measurements:

Measurements were performed at a 3-meter measurement distance in the semi-anechoic chamber in order to evaluate the radiated electromagnetic interference characteristics of the EUT. The EUT was placed on a non-metallic table/support, 0.8m above the turntable, was configured, arranged and operated in a manner consistent with typical application and load conditions. The test program of exercising the equipment ensured that various parts of the EUT were exercised to permit detection of all EUT disturbances.
An appropriate antenna depending upon the frequency range, per ANSI C63.4-2003 clause 4.1.5 was used. While the turntable was being rotated, the height of the antenna was varied from 1 to 4m for the frequency range of 30MHz to 1GHz. The highest radiated emission was detected by manipulating the EUT through three axis(x,y,z) and system cables,worst-case results are reported by max hold function. This process was repeated for both antenna polarizations. The spectrum up to 40GHz was investigated for spurious emissions, using a band-reject filter where appropriate.
The amplitudes of worst-case emission were measured with the detector modes and resolution bandwidths over various frequency ranges according to the requirements of ANSI C63.4-2003 clause 4.2.

2.4. Worst Case Results:

In order to determine the worst case emissions for all modes/data rates/tests, all modes/data rates were investigated for each required test to determine which produces the worst- case data and then full testing was performed in that mode/data rate.

2.5. Power Line Emission measurements:

The EUT was placed on a non-conductive table/support 80 cm above the reference ground plane. The EUT was configured in accordance with ANSI C63.4-2003 using a 50µH/50 ohm LISN.

Compliance with the provisions was based on the measurements of the radio frequency voltage between each line and the ground at the power terminal.

3. Test Facility & Uncertainty of Measurement

3.1. Accreditation/ Registration reference:

- *A2LA Certificate Number: 1633.01*

3.2. Test Facility description

The tests were performed at the EMC Laboratory, QualiTech Division, ECI Telecom Group

Address: 30, Hasivim St., Petah Tikva, Israel.
Tel: 972-3-926-8443

3m Anechoic Chamber:

The 3m-screened chamber is used in two configurations: the semi-anechoic configuration for Radiated Emission measurements and the full-anechoic configuration for Radiated Immunity tests.

Semi Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	9.5m x 6.5m x 5.2m
Antenna height	1 - 4m
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls
Normalized Site Attenuation measured at 5 positions	±3.49dB, 30MHz to 1GHz
Transmission Loss measured at 5 positions, at 1.5m height	±3dB, 1GHz to 18GHz

Full-Anechoic Configuration:

Measurement distance	3m
Chamber dimensions	7m x 4m x 3m
Antenna height	1.55m at Horizontal & Vertical polarizations
Shielding Effectiveness	Magnetic field ≥80dB at 15 kHz ≥90dB at 100 kHz Electric field >120dB from 1MHz to 1GHz >110dB from 1GHz to 10GHz
Absorbing material	Ferrite tiles on the walls and ceiling Frankonia hybrid absorbing material in selected positions on the walls and floor
Field Uniformity to EN61000-4-3	±3dB 80MHz to 18GHz

3.3. Uncertainty of Measurement:

Test Name	Test Method & Range	Uncertainty	
		Combined std. Uc(y) [dB]	**Expanded U** [dB]
Radiated Emission	30MHz÷230MHz, Horiz. polar. 30MHz÷230MHz, Ver. polar. 230MHz÷1000MHz, Horiz. polar. 230MHz÷1000MHz, Vert. polar.	1.8 2.0 1.5 1.5	3.6 3.9 3.0 3.0
Conducted Emission	9 kHz÷150 kHz 150 kHz÷30MHz	1.4 1.1	2.8 2.2

4. Bluetooth: Report of Measurements and examinations

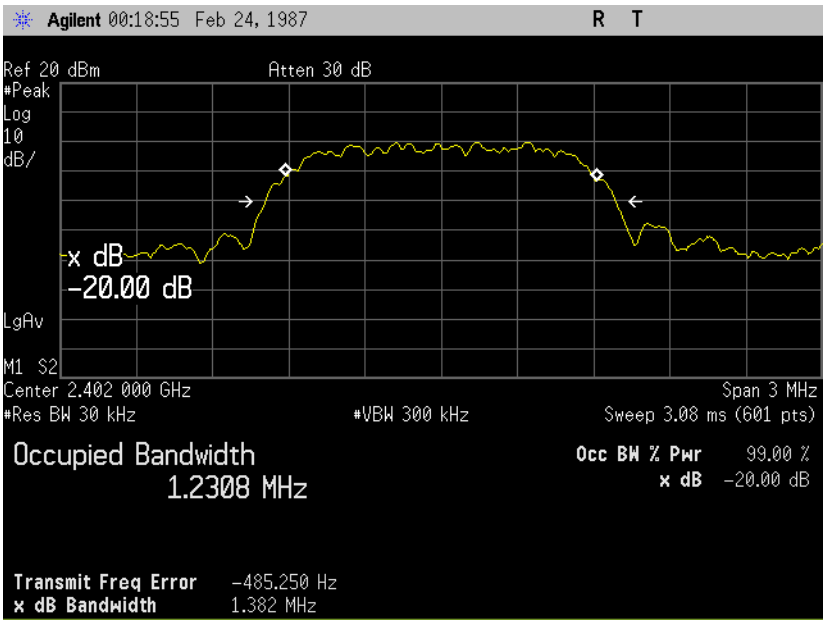
4.1. 20dB Bandwidth

Reference document:	47 CFR §15.247 (a) (1) & DA 00-705		
Test Requirements:	20dB Bandwidth of the hopping channel		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 30kHz, VBW: 300kHz, Span: 3MHz		
Hopping function:	Disabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.1.1 – Plot 4.1.9	

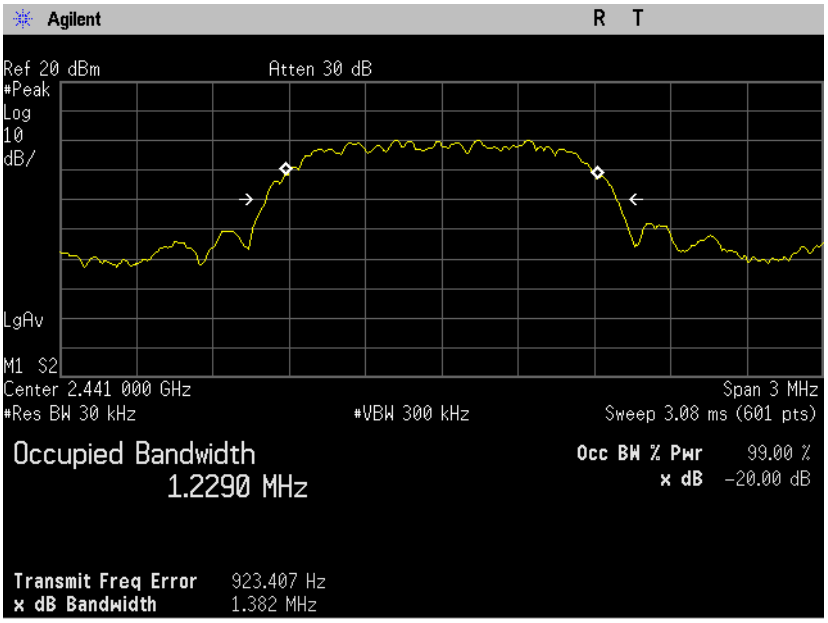
Test results:

Frequency [GHz]	20dB BW [kHz]	Reference Plots
DQPSK modulation		
2.402	1382	4.1.1
2.441	1382	4.1.2
2.480	1386	4.1.3
GFSK modulation		
2.402	957.995	4.1.4
2.441	956.995	4.1.5
2.480	955.822	4.1.6
8PSK modulation		
2.402	1367	4.1.7
2.441	1368	4.1.8
2.480	1366	4.1.9

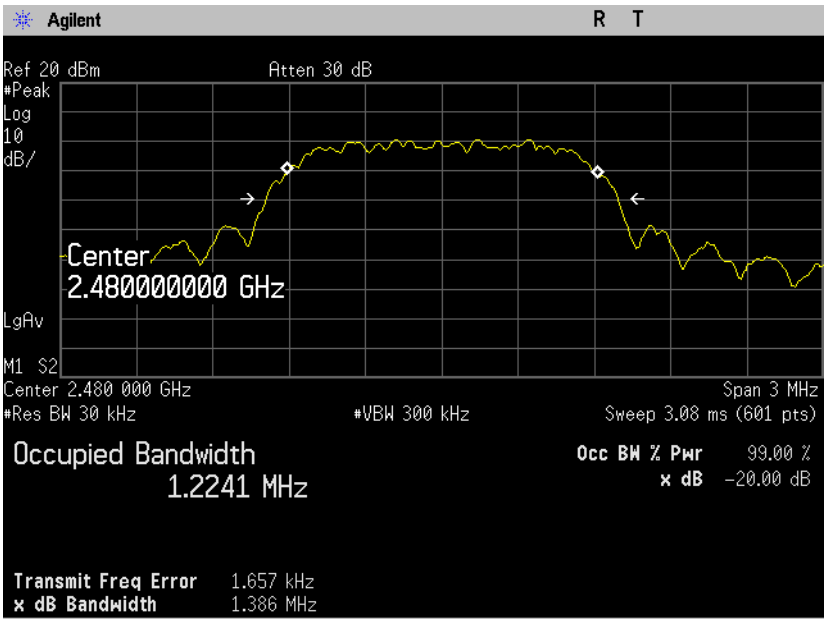
2.402 GHz – DQPSK modulation
Plot 4.1.1



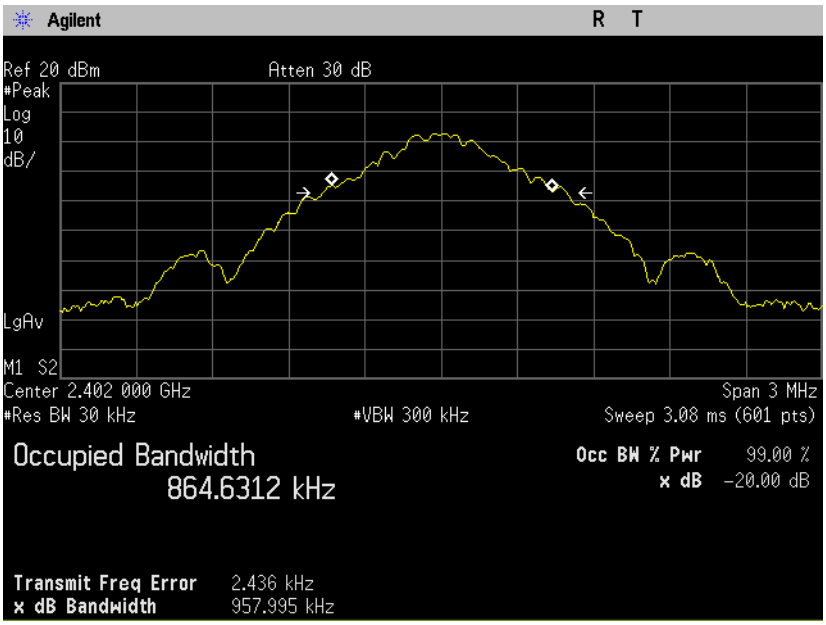
2.441 GHz – DQPSK modulation
Plot 4.1.2



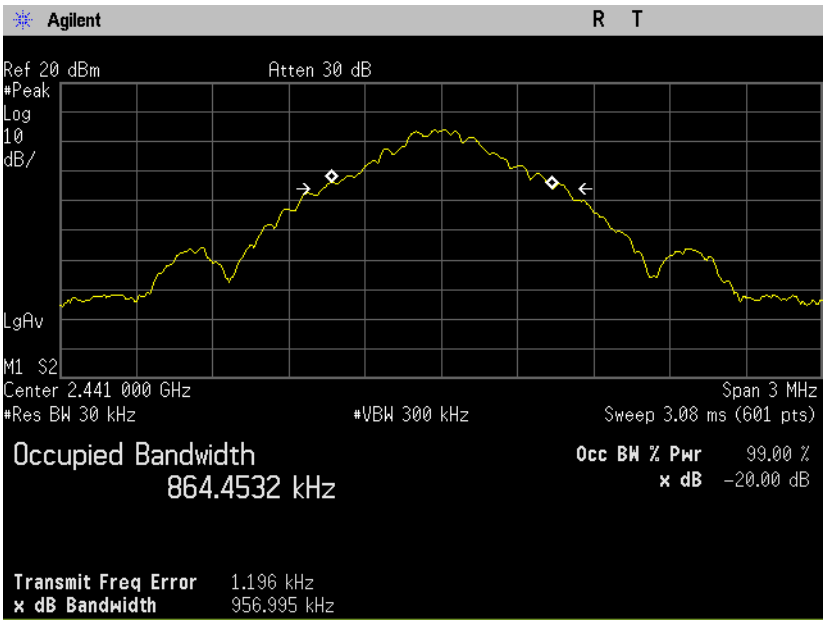
2.480 GHz – DQPSK modulation
Plot 4.1.3



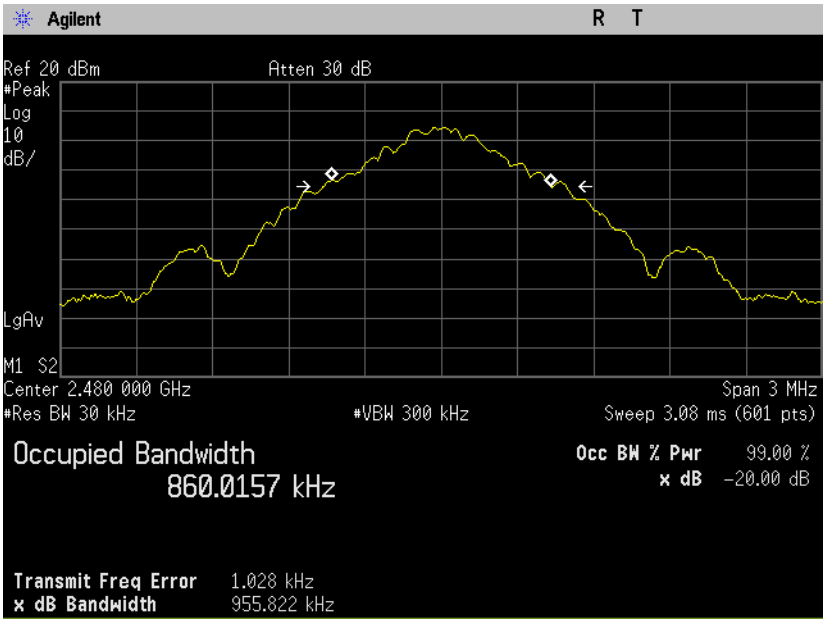
2.402 GHz – GFSK modulation
Plot 4.1.4



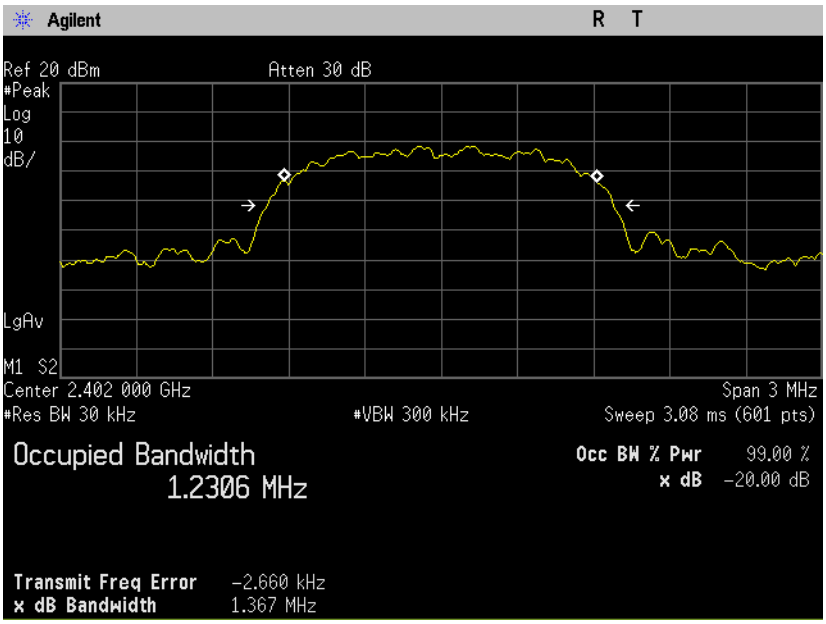
2.441 GHz – GFSK modulation
Plot 4.1.5



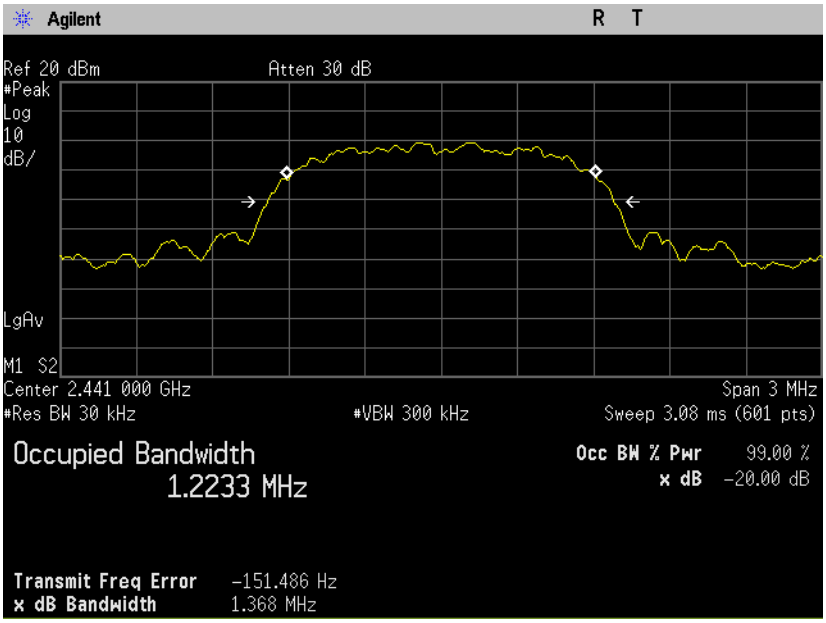
2.480 GHz – GFSK modulation
Plot 4.1.6



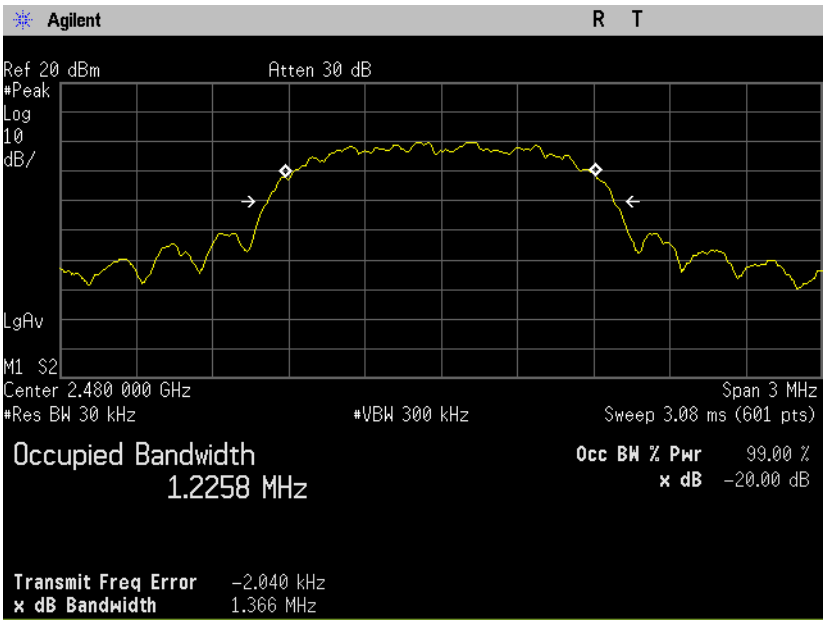
2.402 GHz – 8PSK modulation
Plot 4.1.7



2.441 GHz – 8PSK modulation
Plot 4.1.8



2.480 GHz – 8PSK modulation
Plot 4.1.9



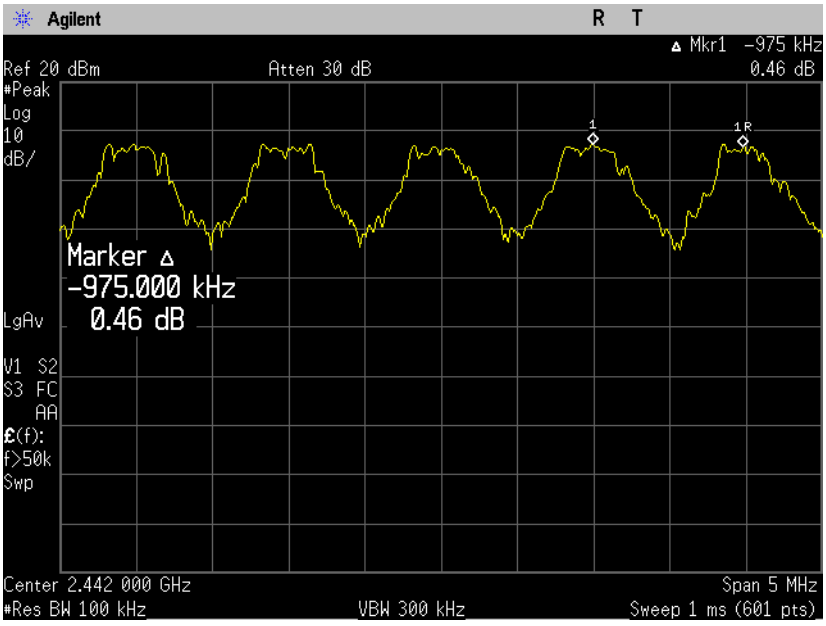
4.2. Carrier Frequency Separation

Reference document:	**47 CFR §15.247 (a) (1) & DA 00-705**		
Test Requirements:	In the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 100kHz, VBW: 300kHz		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.2	

Test results:

20dB BW [kHz]	Carrier separation [kHz]	Result
1386	975	Pass

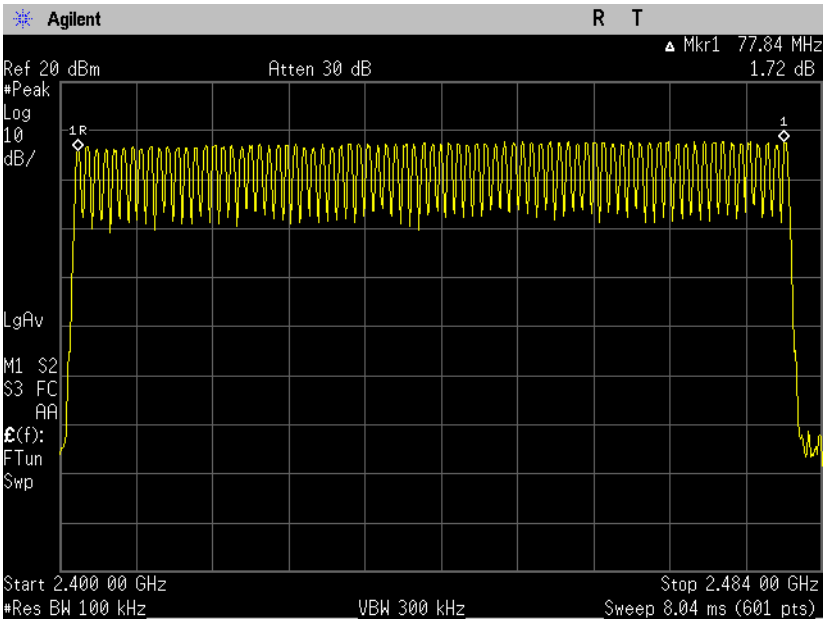
Plot 4.2



4.3. Number of Hopping Channels

Reference document:	**47 CFR §15.247 (a) (1)(iii) & DA 00-705**		
Test Requirements:	Hopping system shall use at least 15 non-overlapping channels.		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 1MHz, VBW: 3MHz		
Hopping function:	Enabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	79 hopping channels	See Plot 4.3	

Plot 4.3



4.4. Average Time of Occupancy (Dwell Time)

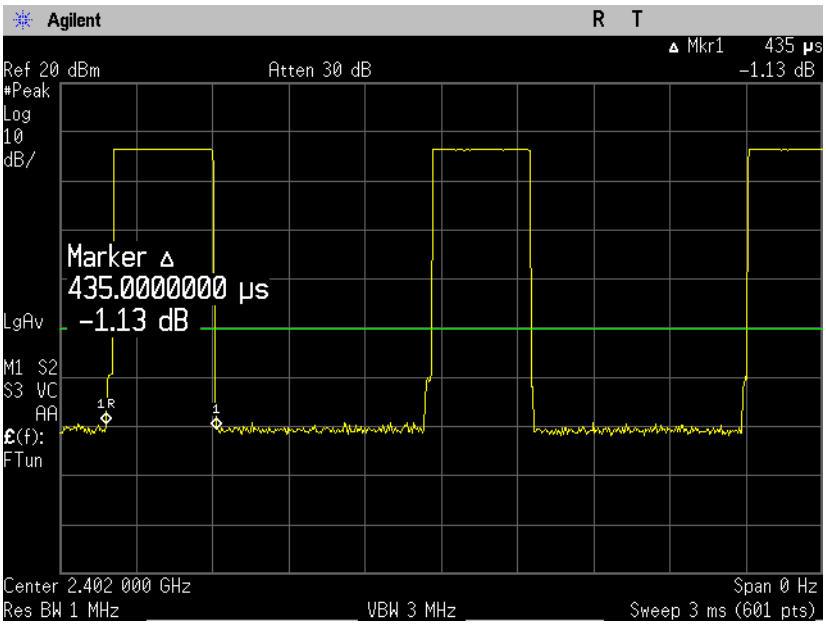
Reference document:	**47 CFR §15.247 (a) (1) (iii) & DA 00-705**		
Test Requirements:	The average time of occupancy on any channel shall not be greater than 0.4seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 1MHz, VBW: 3MHz, Span:0 centered on hopping channel		
Hopping function:	Disabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.4.1– Plot 4.4.3	

Test results:

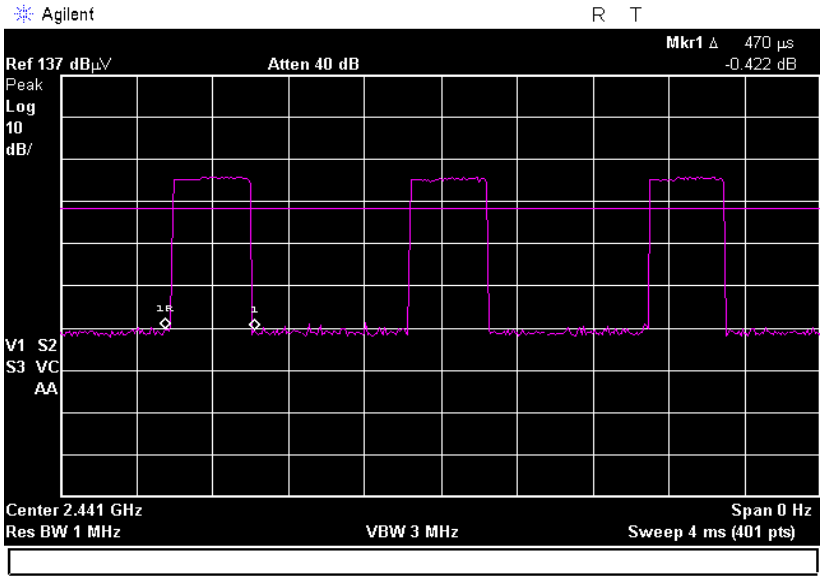
Frequency [GHz]	Time slot length [msec]	Reference Plot	Dwell time [Sec]	Limit [Sec]	Result
2.402	0.435	4.4.1	0.279	0.4	Pass
2.441	0.470	4.4.2	0.301	0.4	Pass
2.480	0.440	4.4.3	0.282	0.4	Pass

Dwell Time = Time Slot Length * Hop Rate/Number of Hopping Channels* Period Time
Period Time= 0.4sec * 79, Hop Rate =1600 1/s

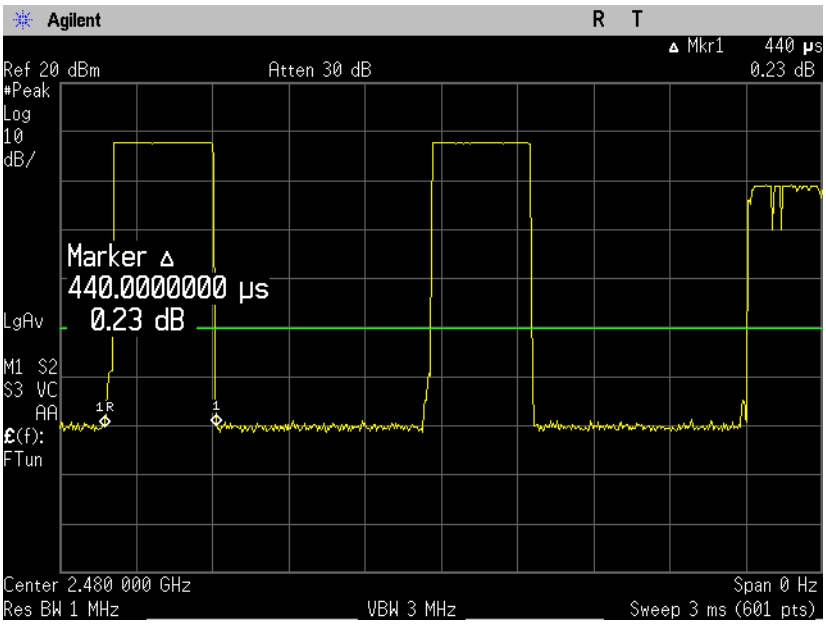
Plot 4.4.1



Plot 4.4.2



Plot 4.4.3


Agilent
R T
Mkr1 440 µs
0.23 dB
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
Marker Δ
440.0000000 µs
0.23 dB
LgAv
M1 S2
S3 VC
AA
£(f):
FTun
Center 2.480 000 GHz
Res BW 1 MHz
VBW 3 MHz
Span 0 Hz
Sweep 3 ms (601 pts)

4.5. Maximum Peak Output Power

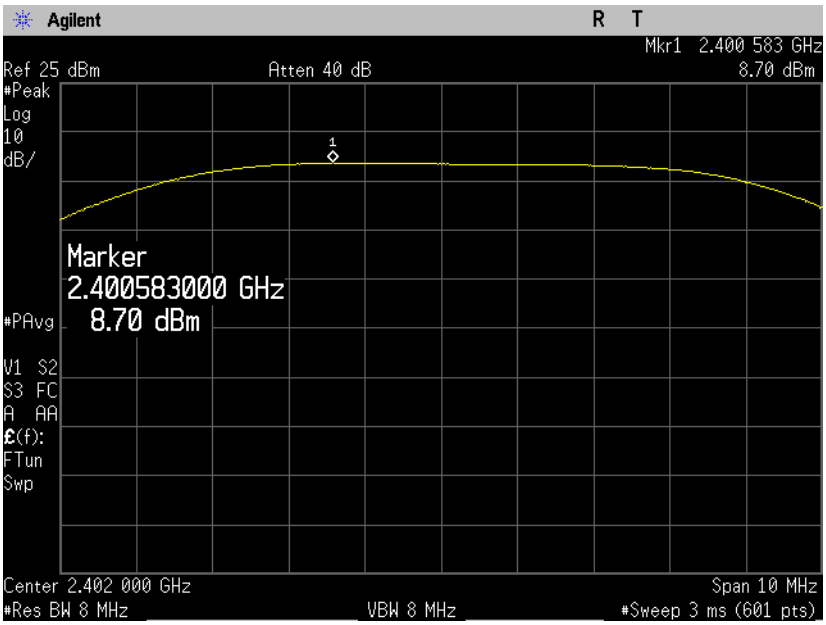
Reference document:	**47 CFR §15.247 (b) (1) & DA 00-705**		
Test Requirements:	The maximum peak output power shall not exceed 1Watt (30dBm)		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 8MHz, VBW: 8MHz,		
Hopping function:	Disabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.5.1 – Plot 4.5.9	

Test results:

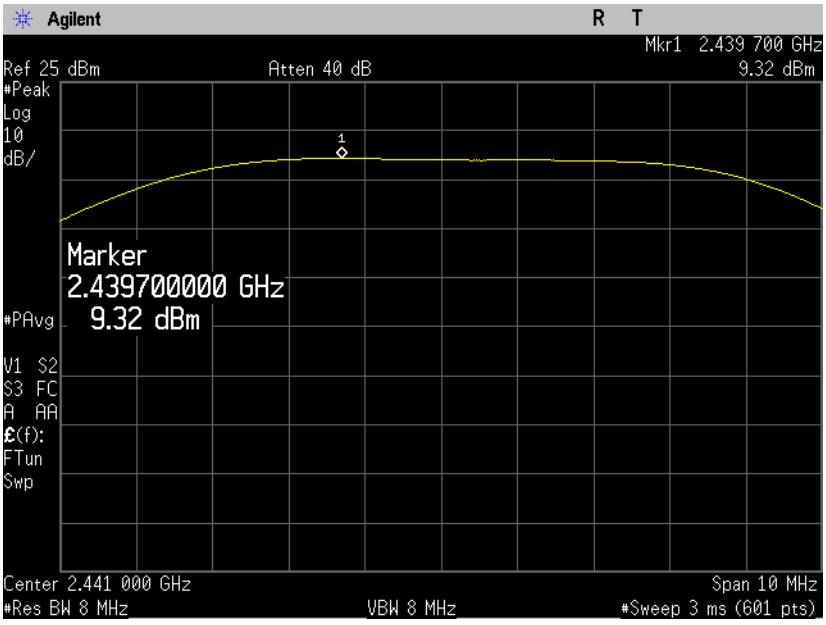
Frequency [GHz]	Max. Peak Output power* [dBm]	Max. Peak Output power* [mW]	Reference Plots	Result
GFSK modulation				
2.402	8.7	7.413	4.5.1	Pass
2.441	9.32	8.551	4.5.2	Pass
2.480	9.17	8.260	4.5.3	Pass
DQPSK modulation				
2.402	6.93	4.932	4.5.4	Pass
2.441	7.96	6.252	4.5.5	Pass
2.480	8.31	6.776	4.5.6	Pass
8PSK modulation				
2.402	7.45	5.559	4.5.7	Pass
2.441	8.49	7.063	4.5.8	Pass
2.480	8.84	7.656	4.5.9	Pass

*Corrected for external attenuations & cable

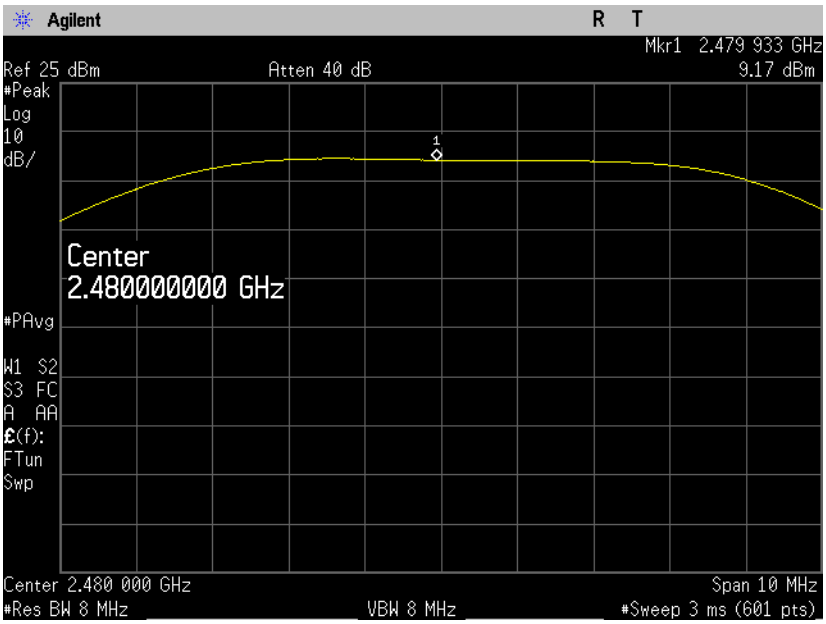
2.402 GHz – GFSK modulation
Plot 4.5.1



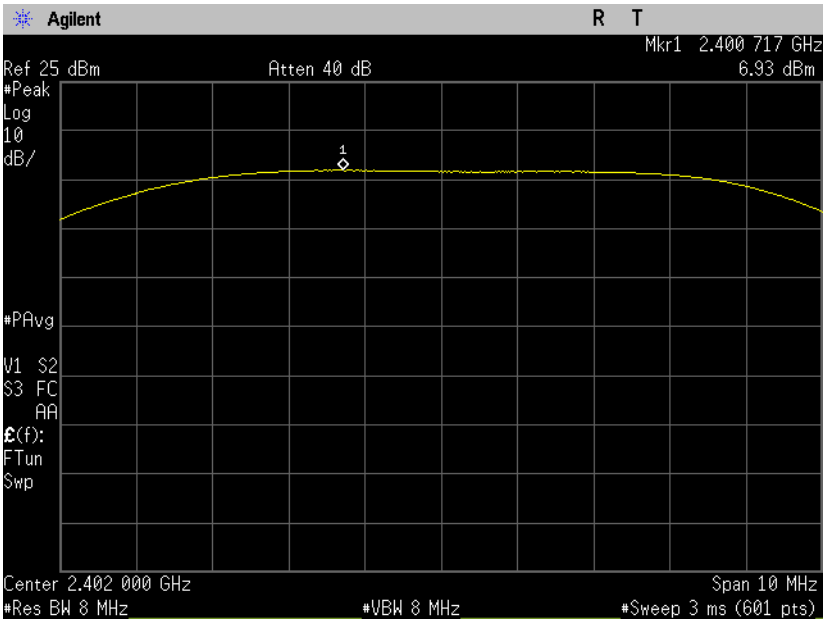
2.441 GHz – GFSK modulation
Plot 4.5.2



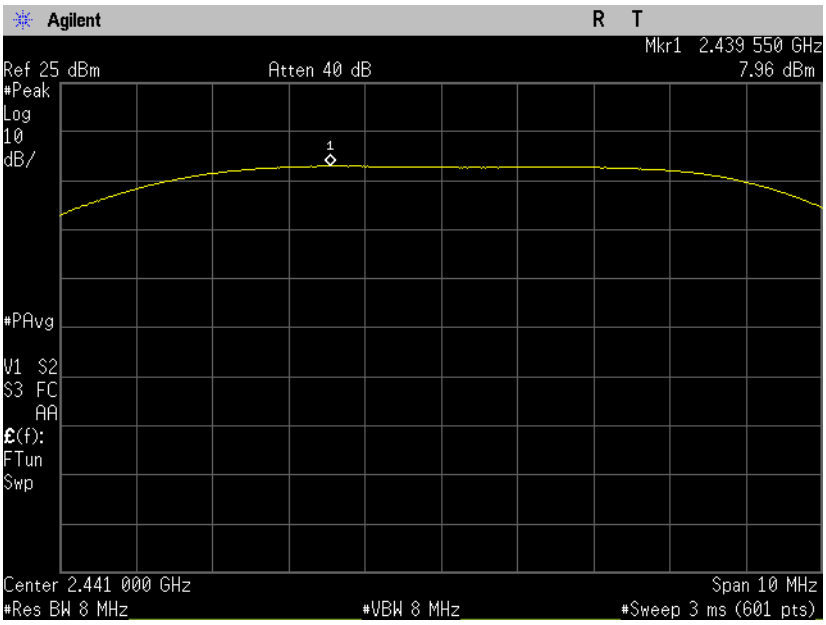
2.480 GHz – GFSK modulation
Plot 4.5.3



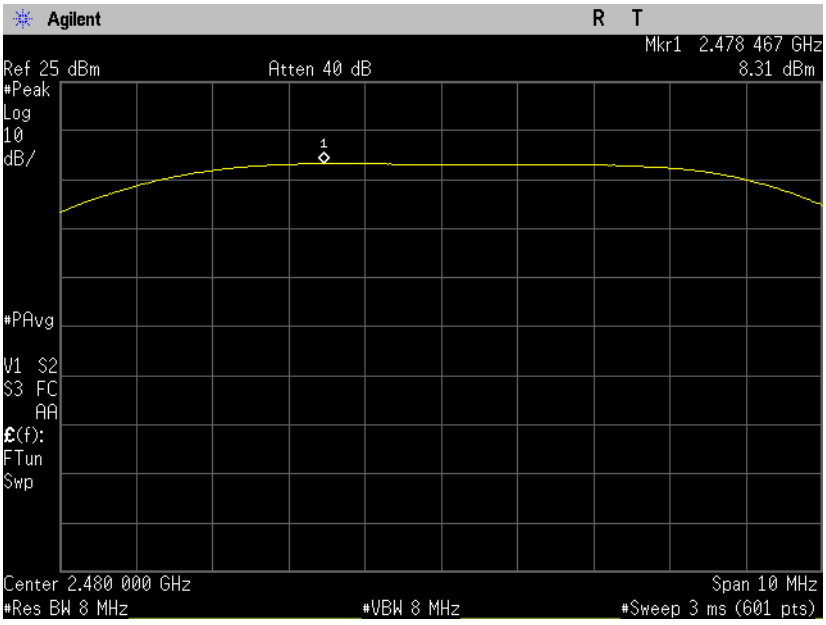
2.402 GHz – DQPSK modulation
Plot 4.5.4



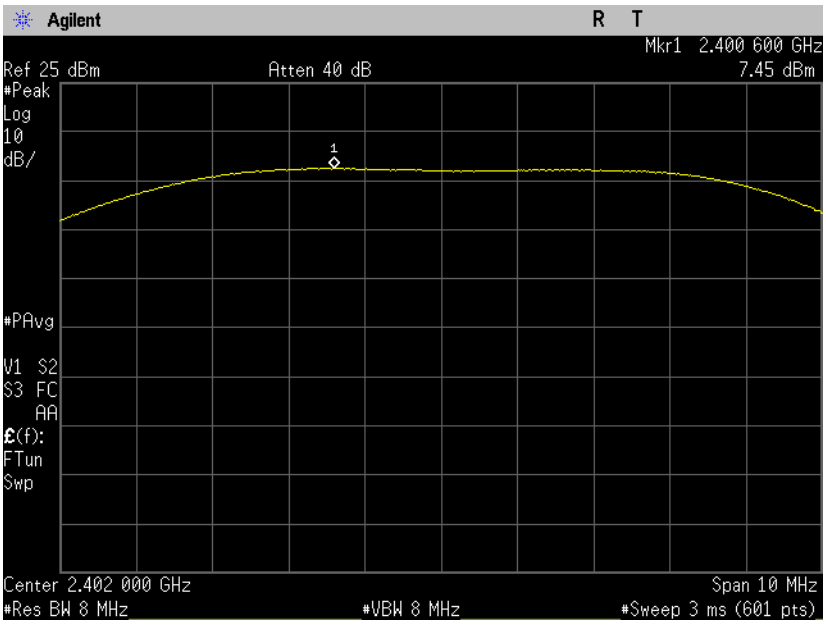
2.441 GHz – DQPSK modulation
Plot 4.5.5



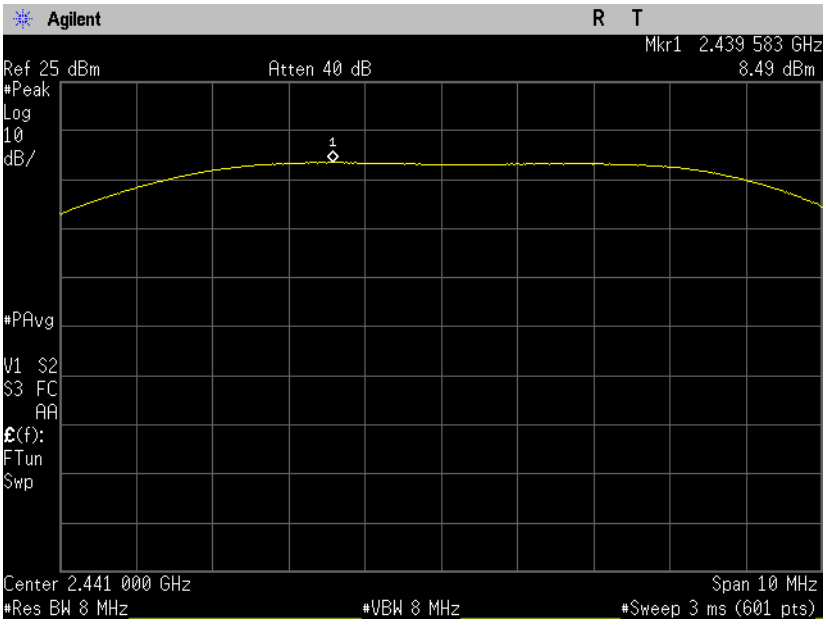
2.480 GHz – DQPSK modulation
Plot 4.5.6



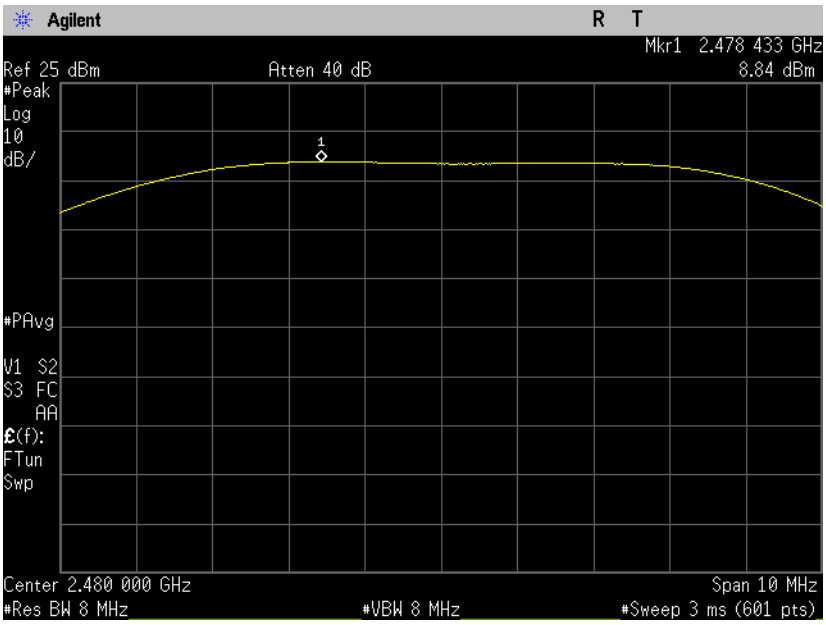
2.402 GHz – 8PSK modulation
Plot 4.5.7



2.441 GHz – 8PSK modulation
Plot 4.5.8



2.480 GHz – 8PSK modulation
Plot 4.5.9



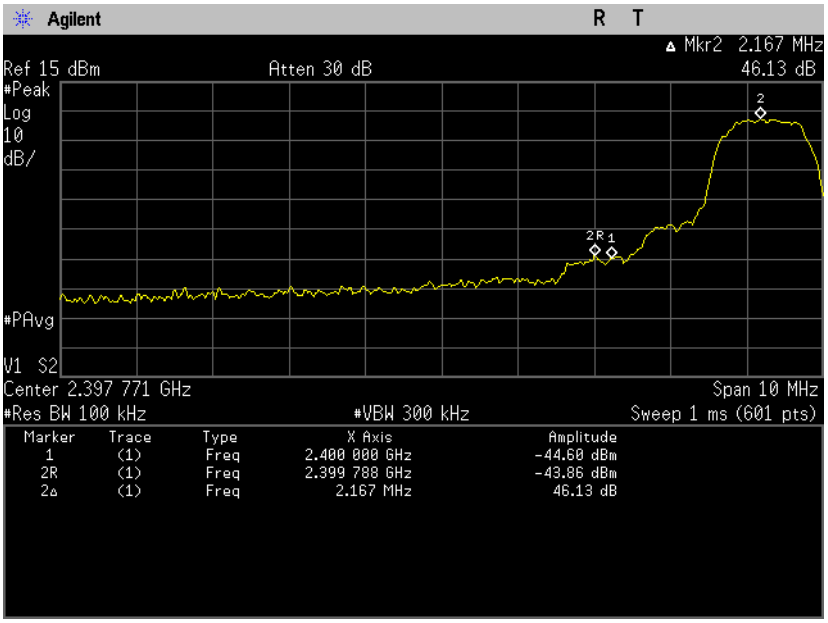
4.6. Band-edge compliance of RF Conducted Emission

Reference document:	**47 CFR §15.247 (d) & DA 00-705**		
Test Requirements and limit:	In any 100 kHz bandwidth outside the frequency band in which the digitally modulated 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 30dB instead of 20dB. Attenuation below the general limits specified in Section §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (See §15.205(c).		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 100kHz, VBW: 300kHz		
Hopping function:	Disabled/Enabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.6.1 – Plot 4.6.12	

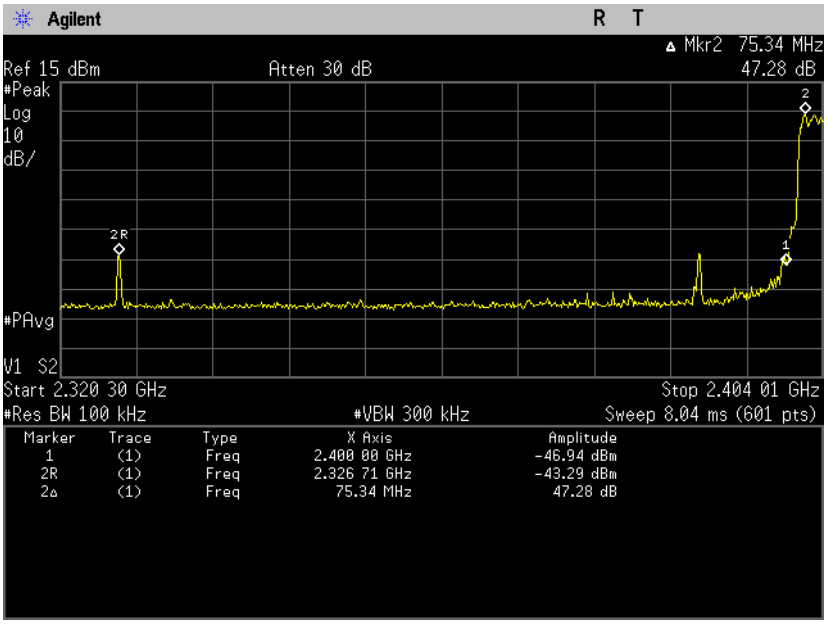
Test results:

Activity	Measured emission [dBc]	Limit [dBc]	Reference Plots	Result
8PSK modulation				
Hopping disabled, lowest frequency	-46.13	-20	4.6.1	Pass
Hopping enabled, lowest frequency	-47.28	-20	4.6.2	Pass
Hopping disabled, highest frequency	-55.64	-20	4.6.3	Pass
Hopping enabled, highest frequency	-59.03	-20	4.6.4	Pass
GFSK modulation				
Hopping disabled, lowest frequency	-59.37	-20	4.6.5	Pass
Hopping enabled, lowest frequency	-50.00	-20	4.6.6	Pass
Hopping disabled, highest frequency	-59.16	-20	4.6.7	Pass
Hopping enabled, highest frequency	-58.26	-20	4.6.8	Pass
DQPSK modulation				
Hopping disabled, lowest frequency	-45.11	-20	4.6.9	Pass
Hopping enabled lowest frequency	-47.79	-20	4.6.10	Pass
Hopping disabled, highest frequency	-54.81	-20	4.6.11	Pass
Hopping enabled highest frequency	-58.81	-20	4.6.12	Pass

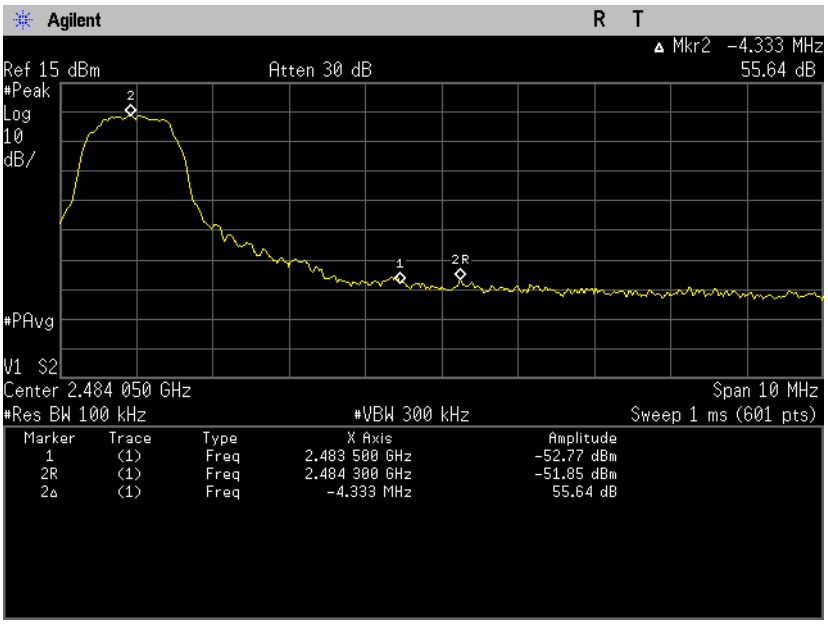
8PSK modulation
Hopping disabled, lowest frequency
Plot 4.6.1



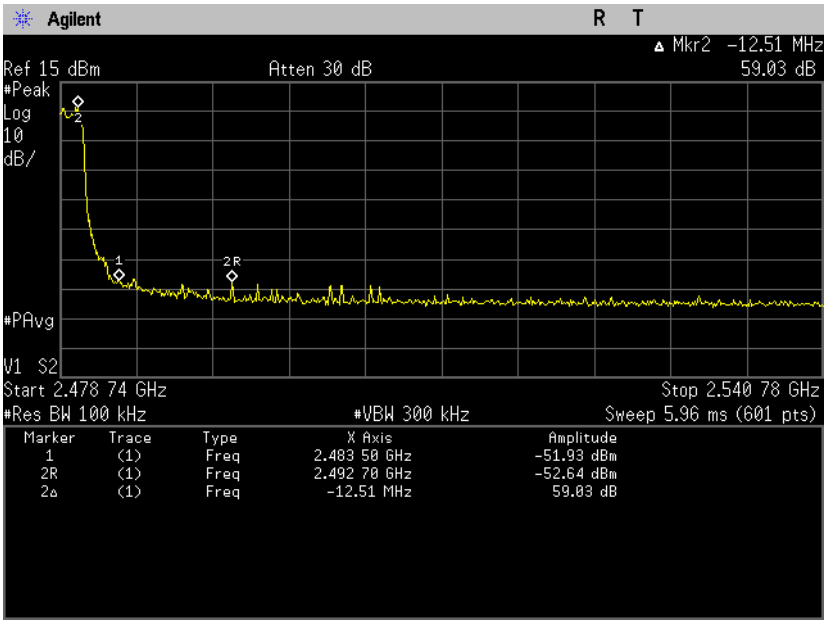
8PSK modulation
Hopping enabled, lowest frequency
Plot 4.6.2



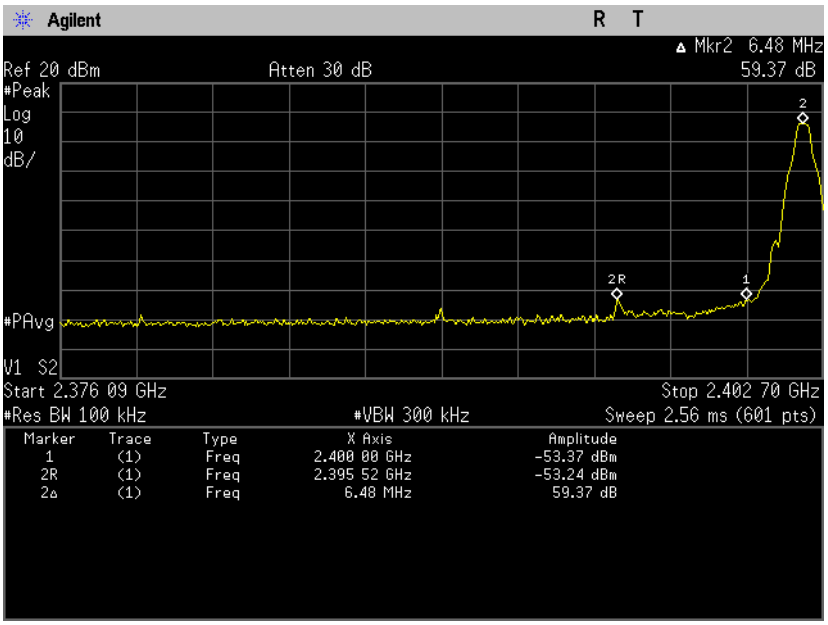
8PSK modulation
Hopping disabled, highest frequency
Plot 4.6.3



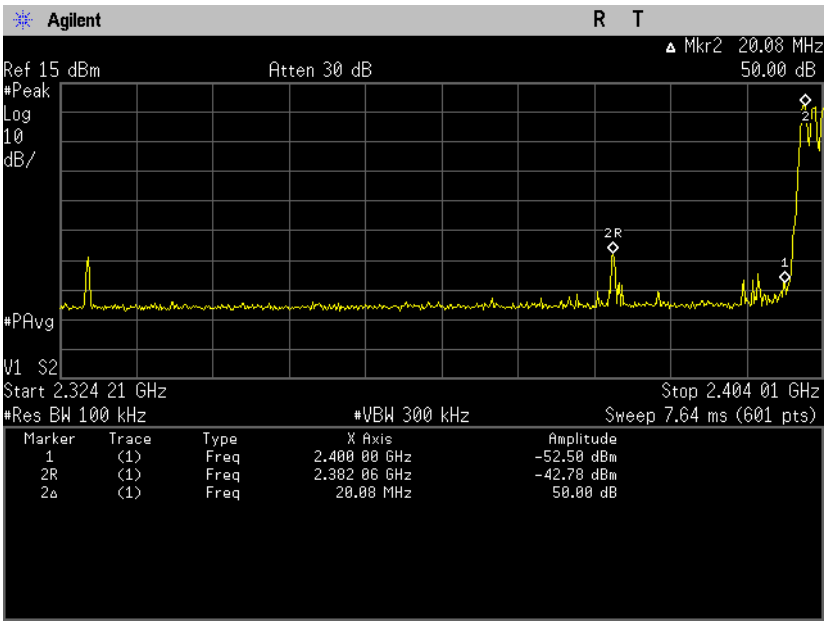
8PSK modulation
Hopping enabled, highest frequency
Plot 4.6.4



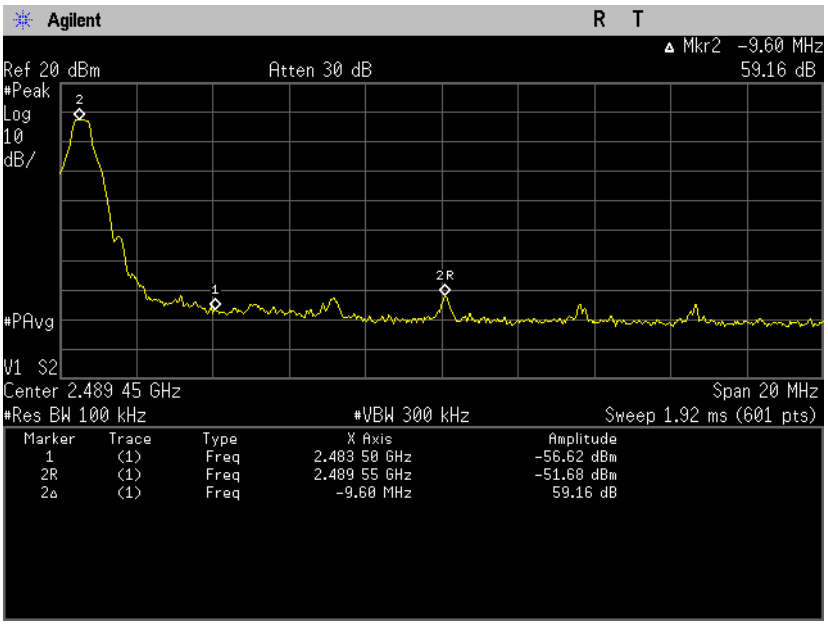
GFSK modulation
Hopping disabled, lowest frequency
Plot 4.6.5



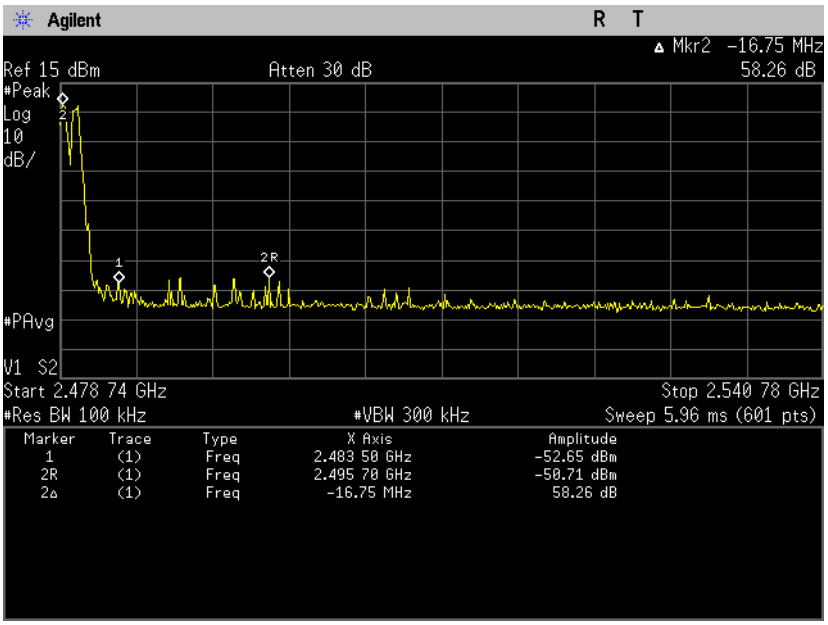
GFSK modulation
Hopping enabled, lowest frequency
Plot 4.6.6



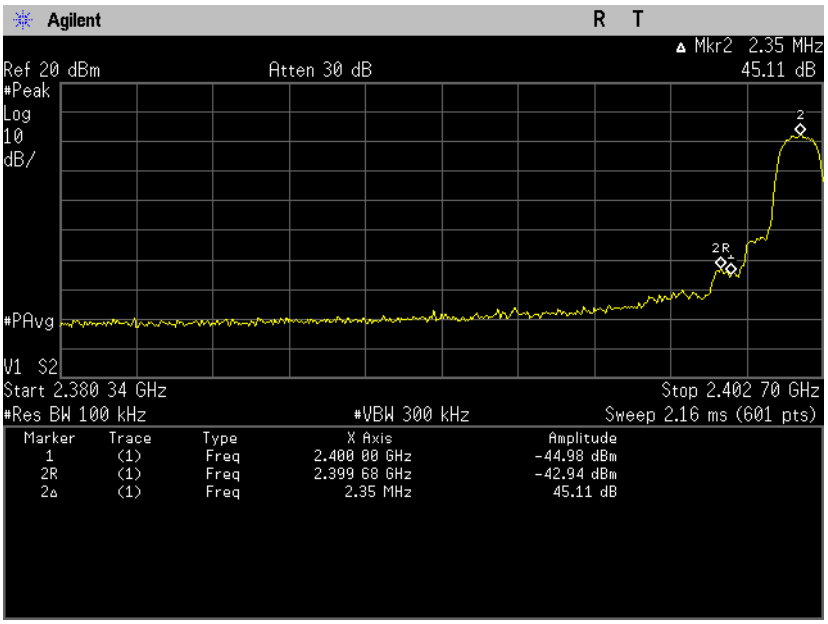
GFSK modulation
Hopping disabled, highest frequency
Plot 4.6.7



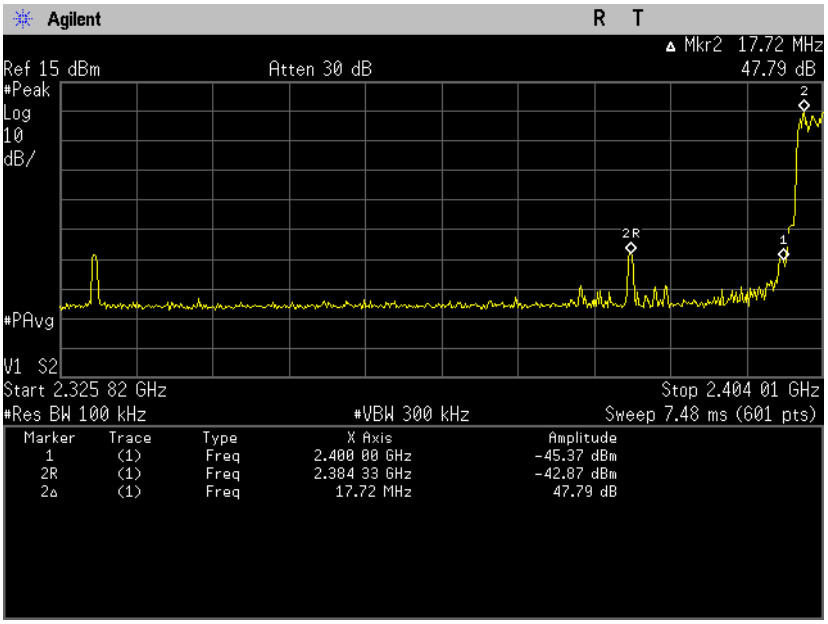
GFSK modulation
Hopping enabled, highest frequency
Plot 4.6.8



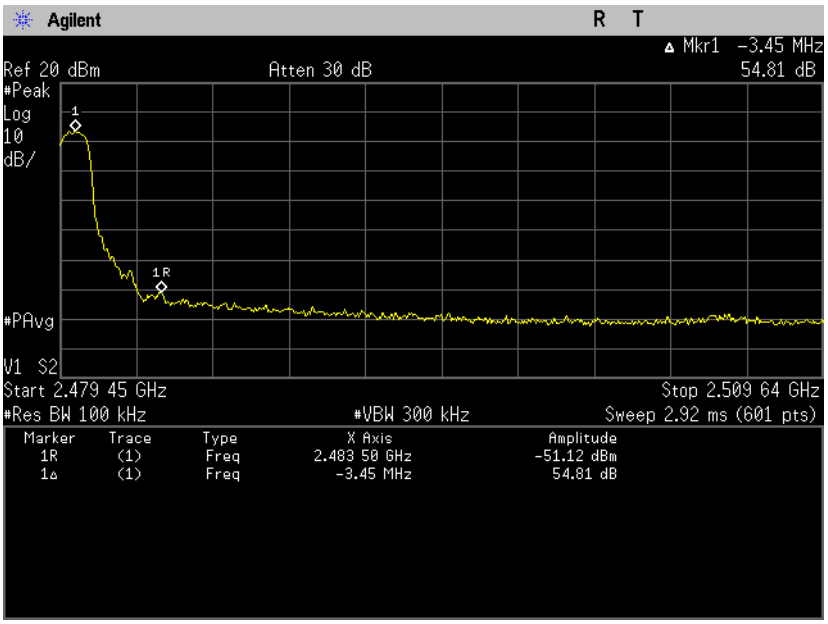
DQPSK modulation
Hopping disabled, lowest frequency
Plot 4.6.9



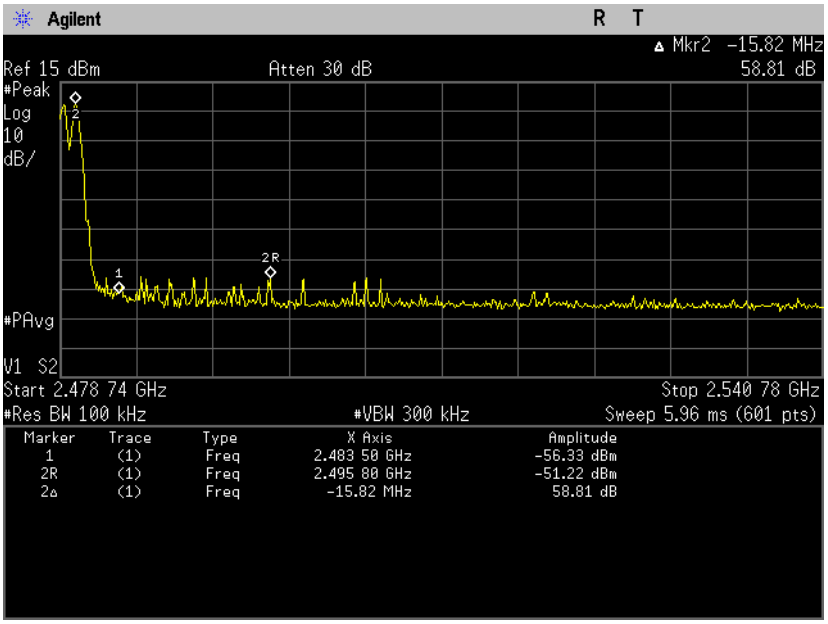
DQPSK modulation
Hopping enabled, lowest frequency
Plot 4.6.10



DQPSK modulation
Hopping disabled, highest frequency
Plot 4.6.11



DQPSK modulation
Hopping enabled, highest frequency
Plot 4.6.12



4.7. Radiated Spurious Emissions, Restricted Bands (2310-2390MHz, 2483.5-2500MHz)

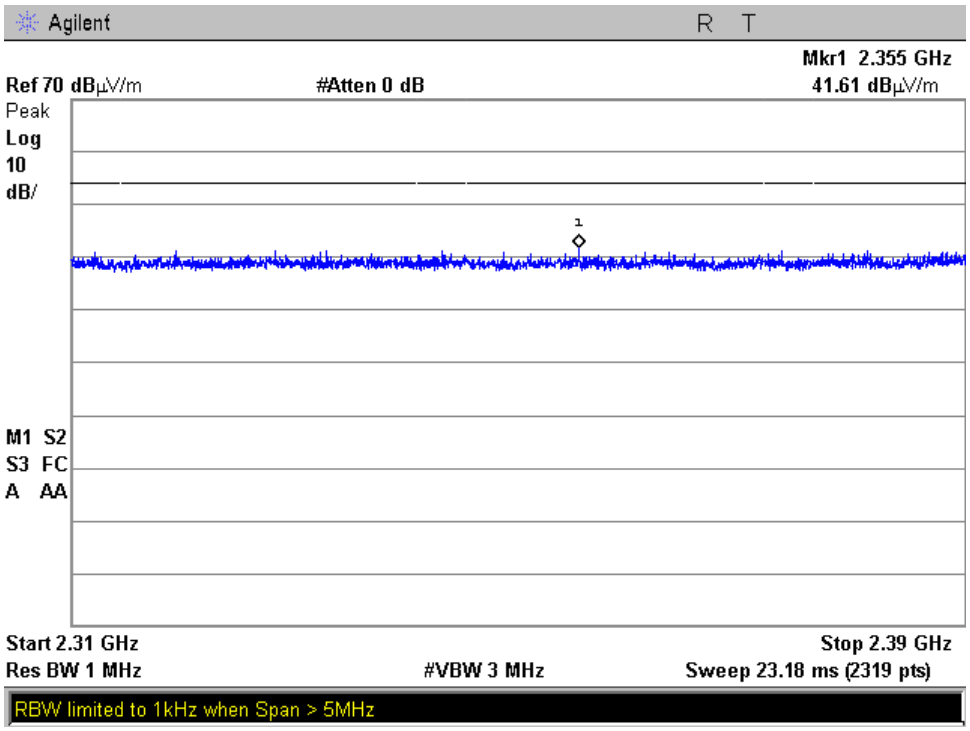
Reference document:	**47 CFR §15.247 (d) & §15.209(a) & DA 00-705**		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c).		
Test setup:	See Sec. 2.2	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Radiated		
S.A. Settings:	RBW: 1MHz, VBW: 3MHz, 10Hz		
Hopping function:	Disabled/Enabled		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.7.1 – Plot 4.7.16	

Test results:

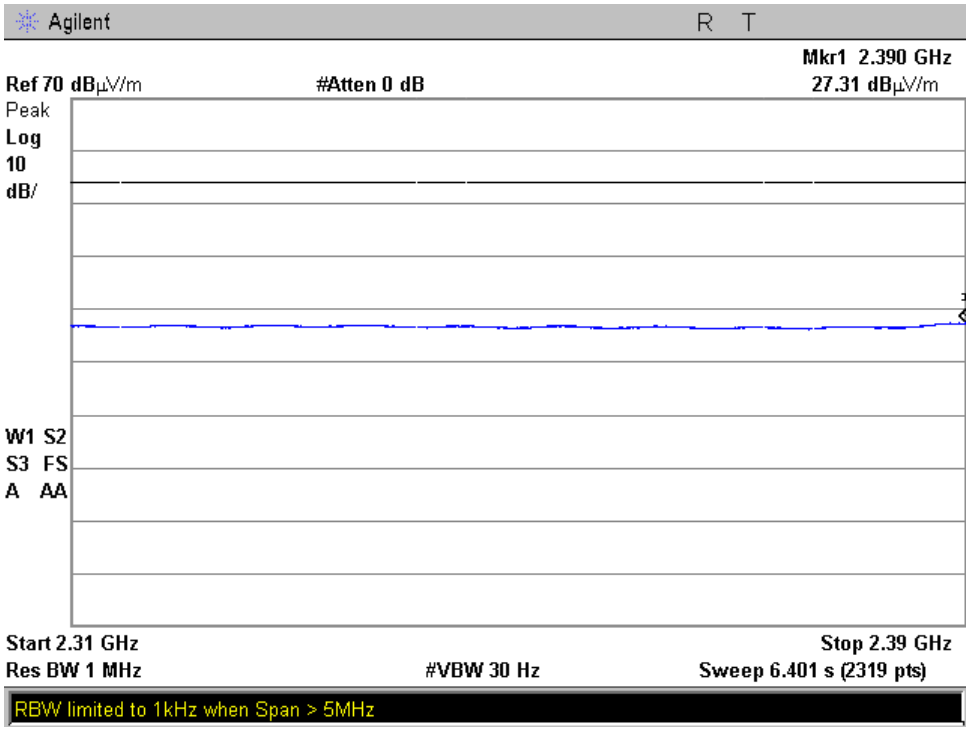
Channel	Detector type	Max. Measured in restricted band at 3m [dBµV/m]	Limit [dBµV/m]	Reference Plots	Result
Hopping off, lowest frequency ,2402 MHz	Peak	52.39	74	4.7.1 & 4.7.3	Pass
	Average	40.27	54	4.7.2 & 4.7.4	Pass
Hopping on	Peak	68.29	74	4.7.5 & 4.7.7	Pass
	Average	44.59	54	4.7.6 & 4.7.8	Pass
Hopping off, highest frequency,2480 MHz	Peak	62.21	74	4.7.9 & 4.7.11	Pass
	Average	51.66	54	4.7.10 & 4.7.12	Pass
Hopping on	Peak	63.98	74	4.7.13 & 4.7.15	Pass
	Average	44.41	54	4.7.14 & 4.7.16	Pass

Note: Radiated Emission [dBµV/m] = measured [dBµV] + Correction-factor [dB(1/m)]
Correction Factor = Antenna factor + Cable Loss

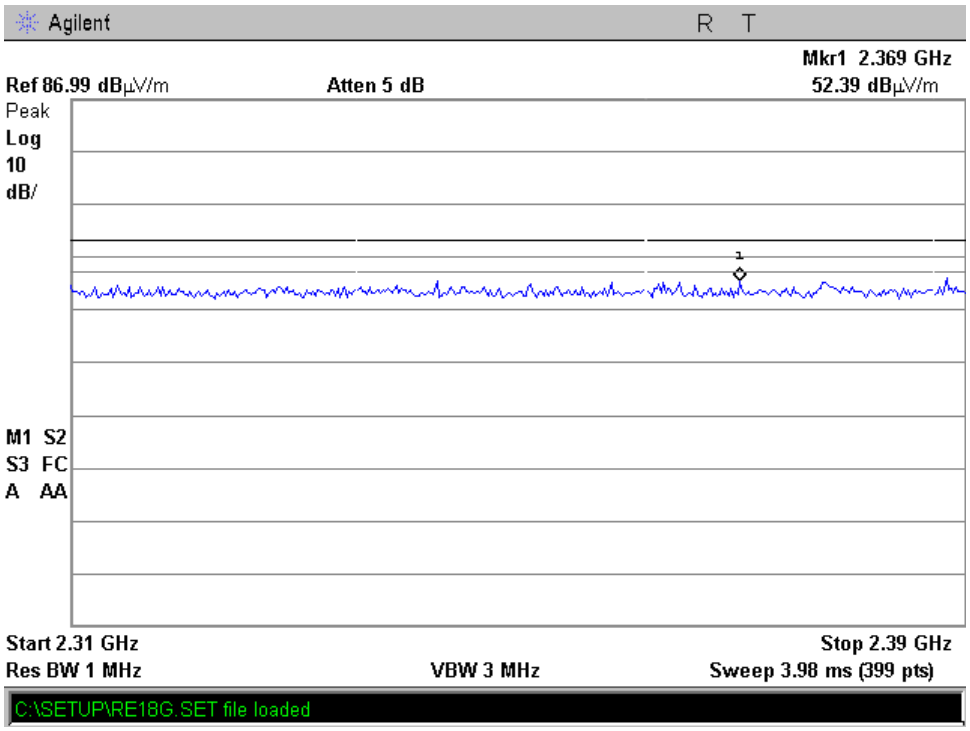
Single mode, 2402MHz
Lowest Frequency
Horizontal Polarization
Peak
Plot 4.7.1



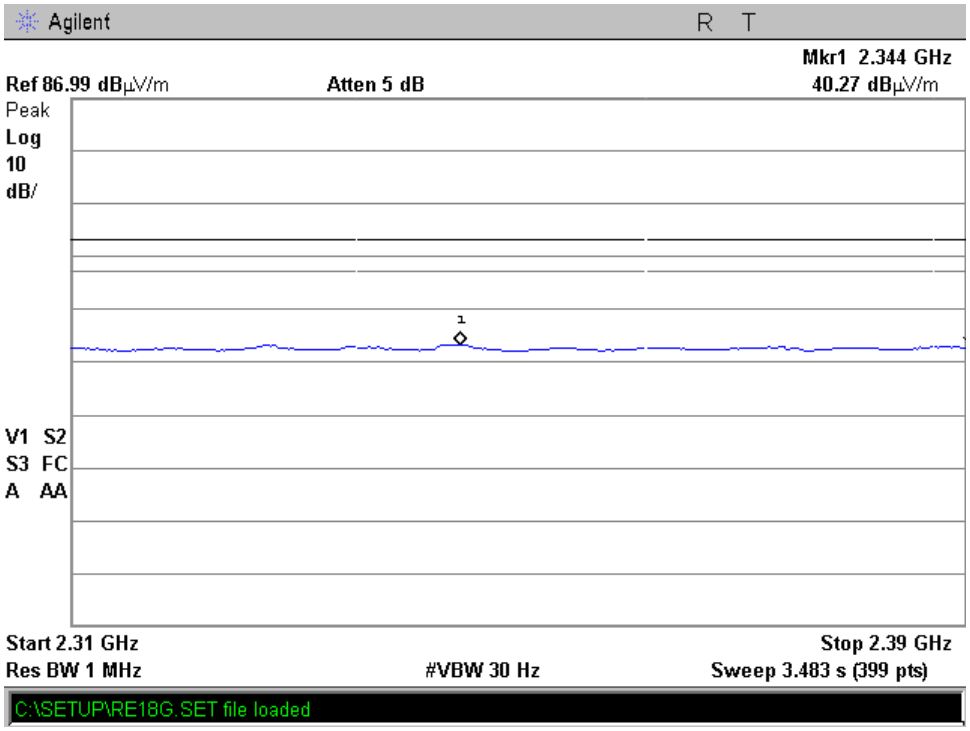
Horizontal Polarization
Average
Plot 4.7.2



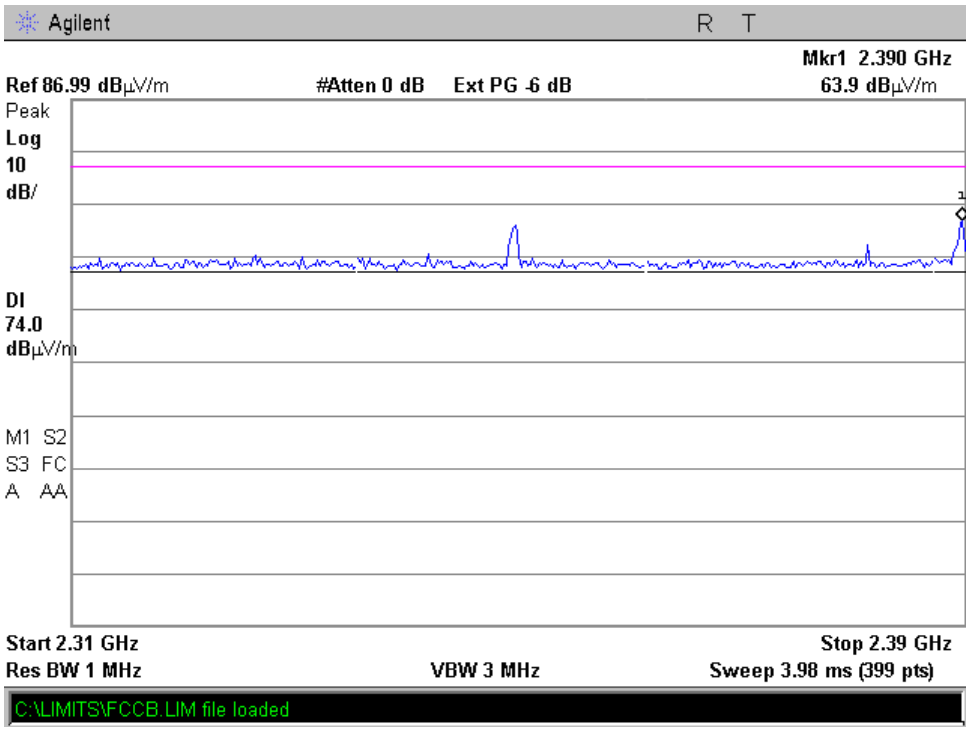
Single mode, 2402MHz
Lowest Frequency
Vertical Polarization
Peak
Plot 4.7.3



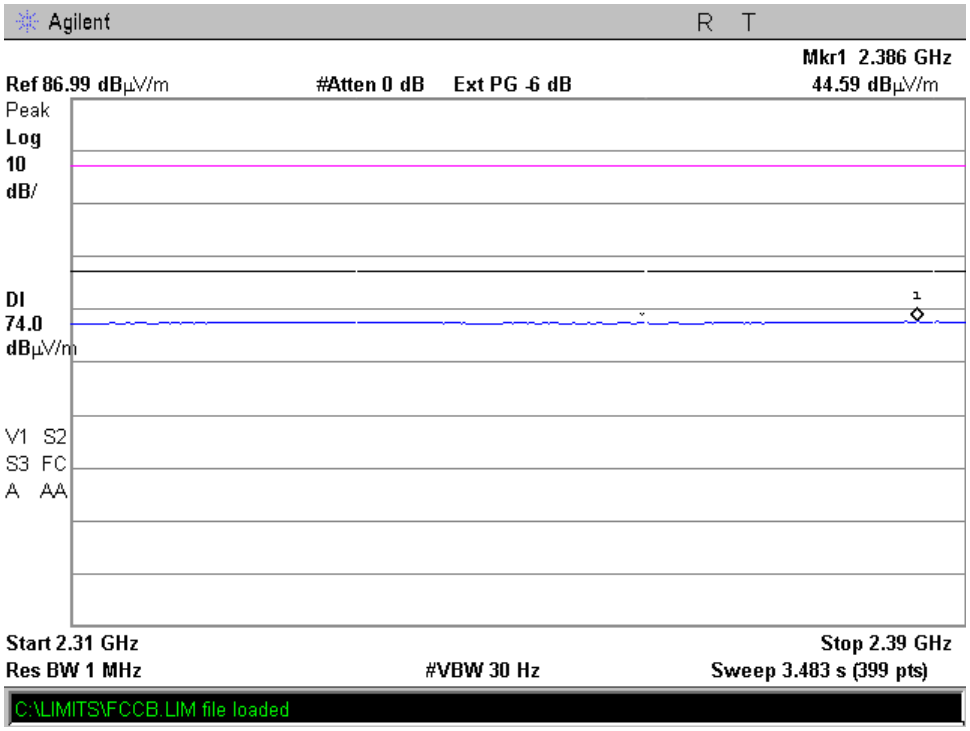
Vertical Polarization
Average
Plot 4.7.4



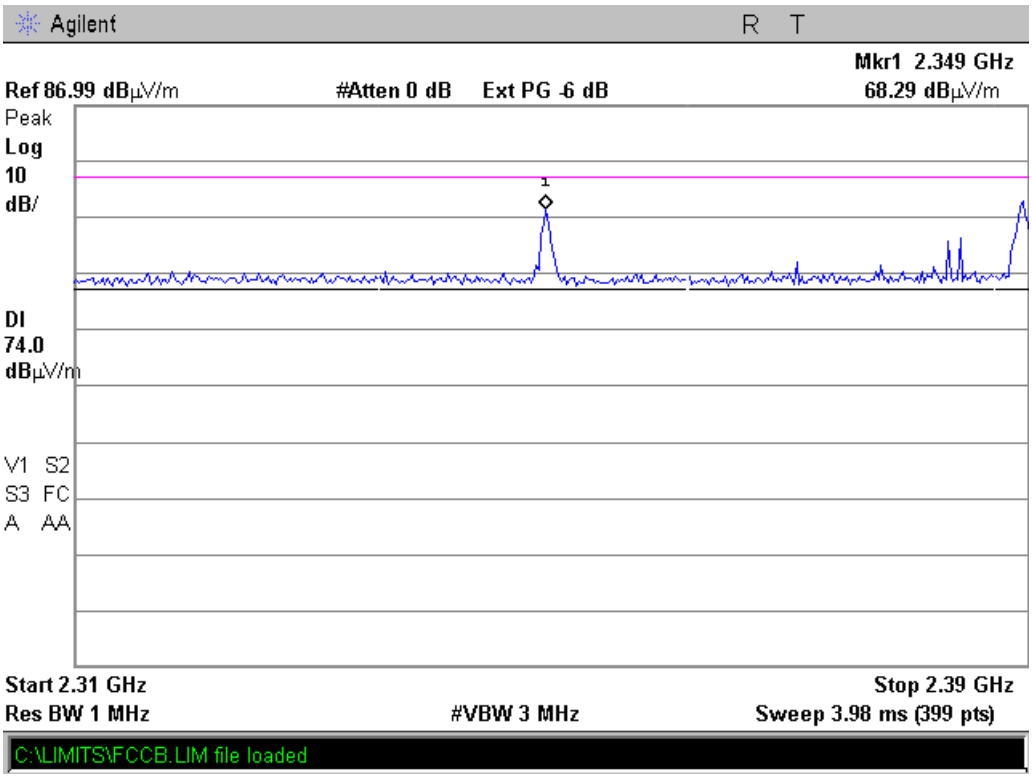
Hopping mode
Horizontal Polarization
Peak
Plot 4.7.5



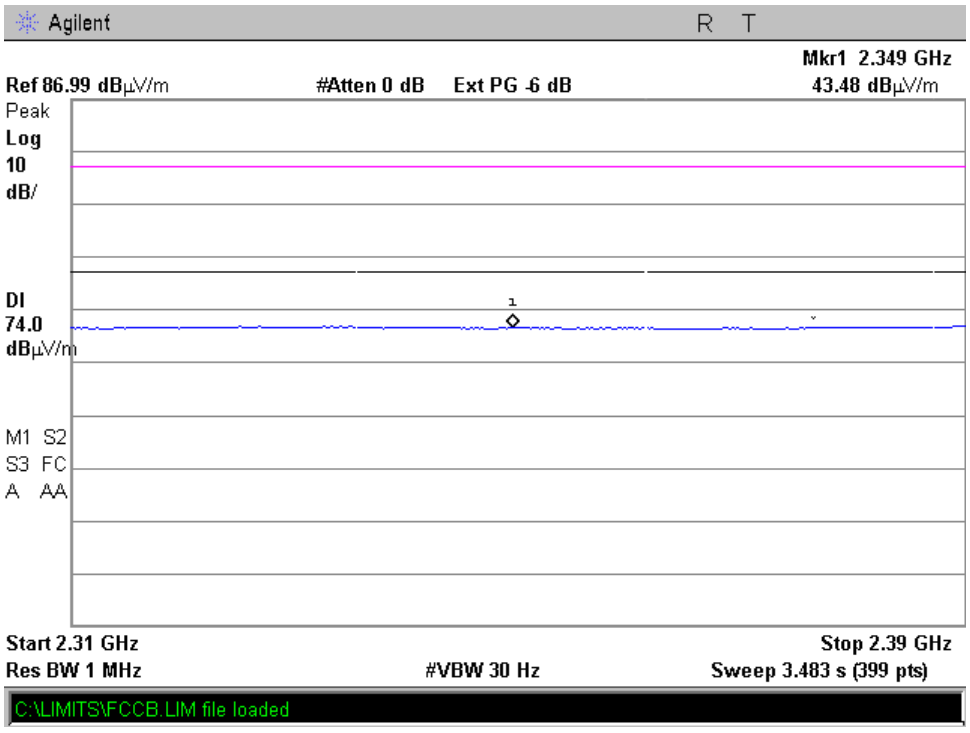
Horizontal Polarization
Average
Plot 4.7.6



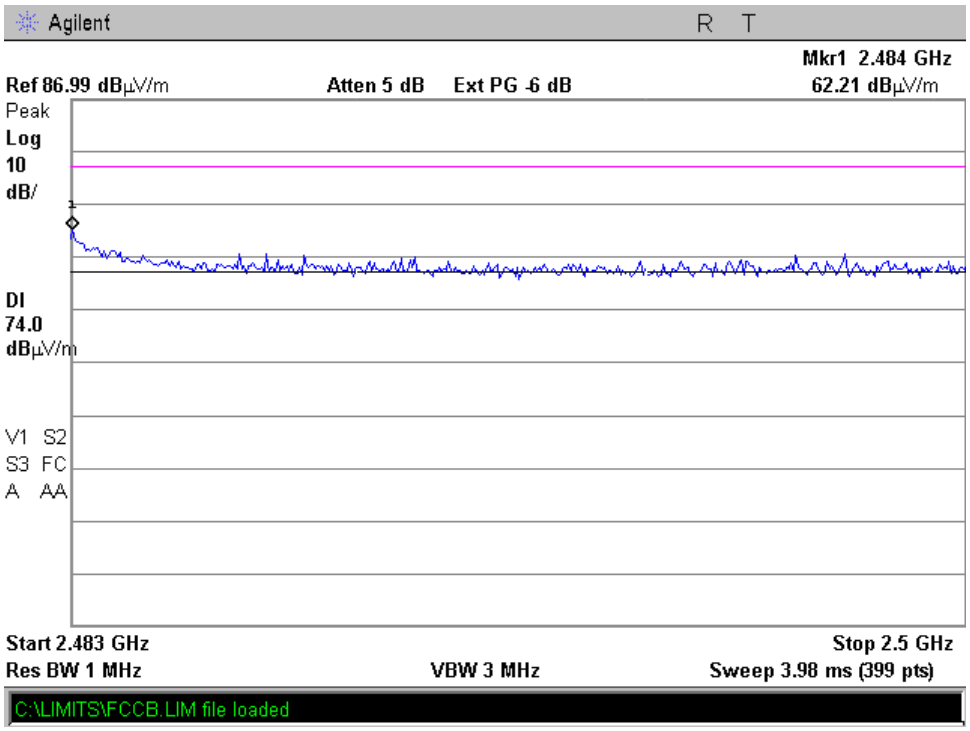
Hopping mode
Vertical Polarization
Peak
Plot 4.7.7



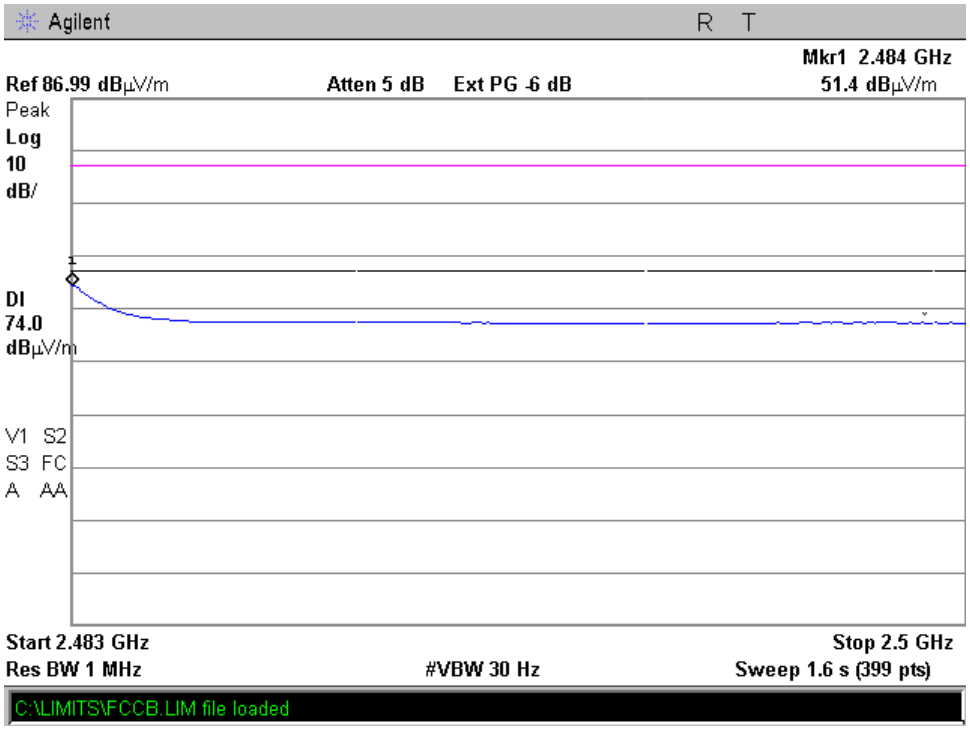
Vertical Polarization
Average
Plot 4.7.8



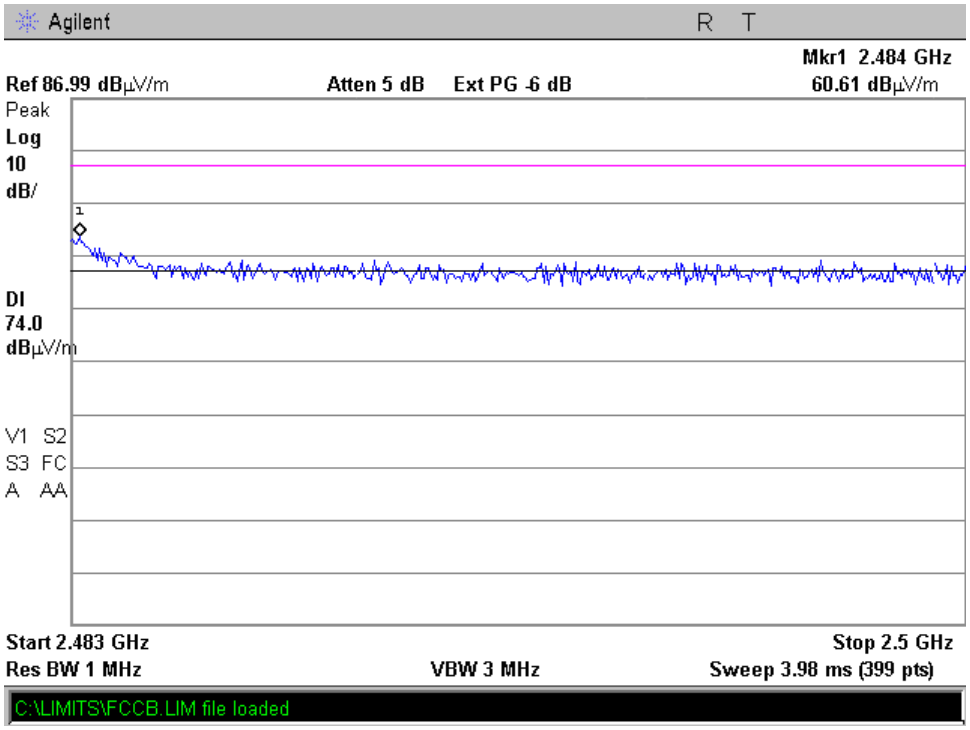
Single mode, 2480MHz
Highest Frequency
Vertical Polarization
Peak
Plot 4.7.9



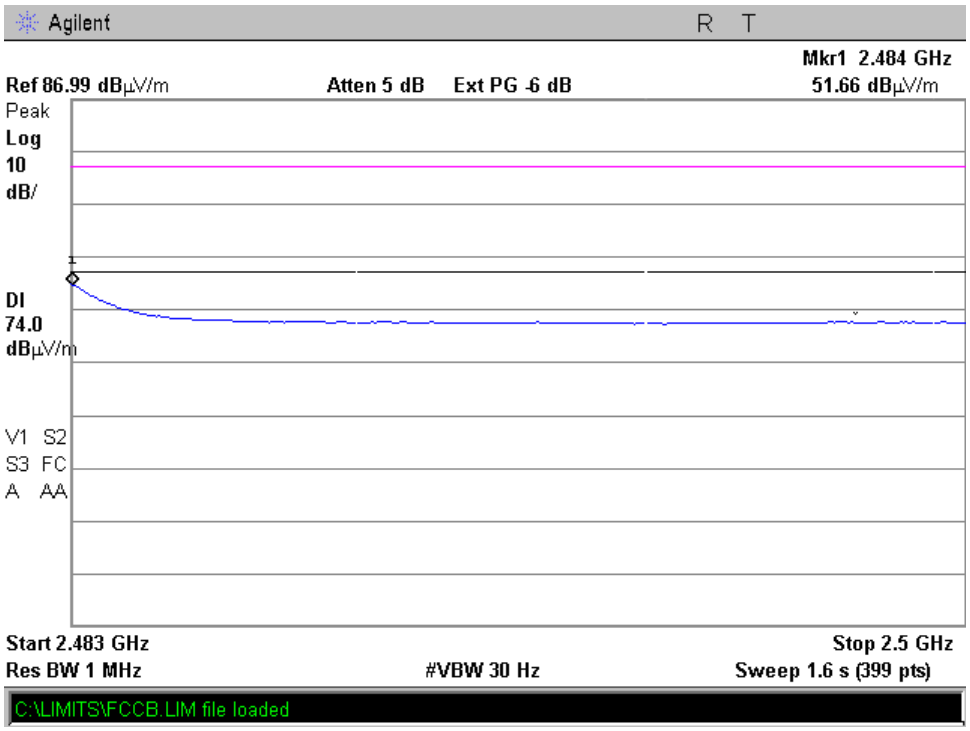
Average
Plot 4.7.10



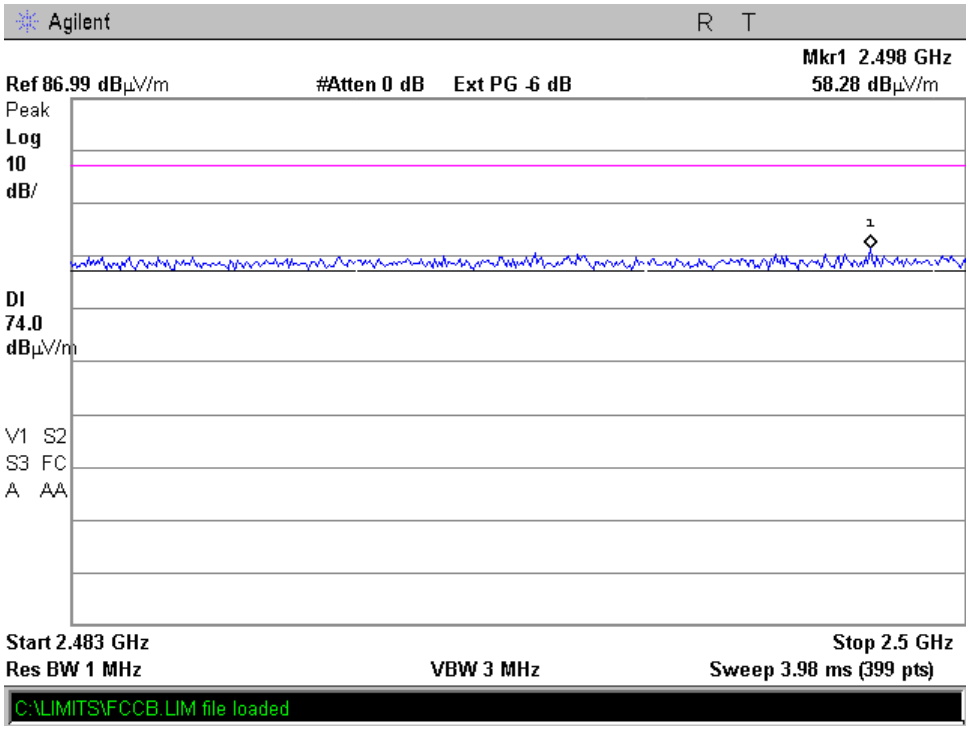
Single mode, 2480MHz
Highest Frequency
Horizontal Polarization
Peak Plot 4.7.11



Vertical Polarization
Average
Plot 4.7.12

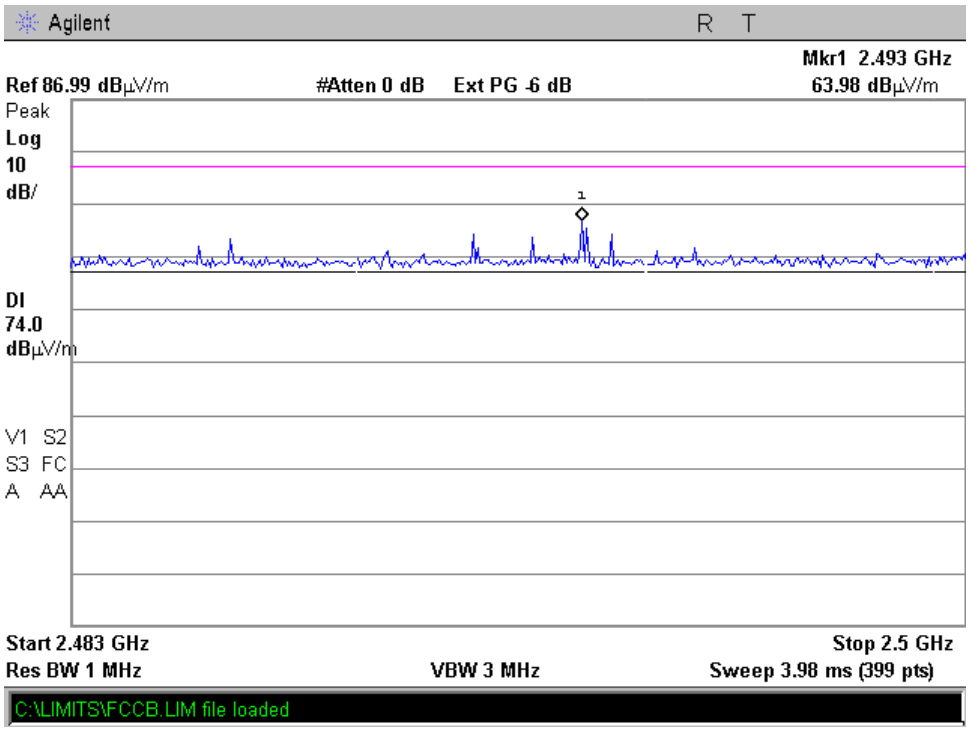


Hopping mode
Highest Frequency
Horizontal Polarization
Peak
Plot 4.7.13



Horizontal Polarization
Average
Plot 4.7.14

Hopping mode
Vertical Polarization
Peak
Plot 4.7.15



Vertical Polarization
Average
Plot 4.7.16

4.8. Radiated Spurious Emissions, Restricted Bands

Reference document:	**47 CFR §15.247 (d) & §15.209(a) & DA 00-705**		
Test Requirements:	The emissions from an intentional radiator shall not exceed the field strength levels specified in §15.209(a).		
Test setup:	See Sec. 2.2	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Radiated		
S.A. Settings:	f >1GHz: Peak: RBW= 1MHz, VBW= 3MHz, Average: VBW= 10 Hz f<1GHz: RBW: 120kHz,VBW**:** 300kHz		
Hopping function:	Disabled (lowest, middle, and highest)		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	Plots 4.8.1 – Plot 4.8.13	

Test result

All measurements were done in horizontal and vertical polarizations; the results show the worst case

Lowest Frequency, 2402 MHz					
Frequency [MHz]	Detector	Spurious level [dBµV/m]	Limit [dBµV/m]	Reference Plot	Result
No any emissions were found				4.8.1 - 4.8.3	Pass

Middle Frequency, 2441 MHz					
Frequency [MHz]	Detector	Spurious level [dBµV/m]	Limit [dBµV/m]	Reference Plot	Result
No any emissions were found				4.8.4 - 4.8.6	Pass

Highest Frequency, 2480 MHz					
Frequency [MHz]	Detector	Spurious level [dBµV/m]	Limit [dBµV/m]	Reference Plot	Result
No any emissions were found				4.8.7 - 4.8.9	Pass

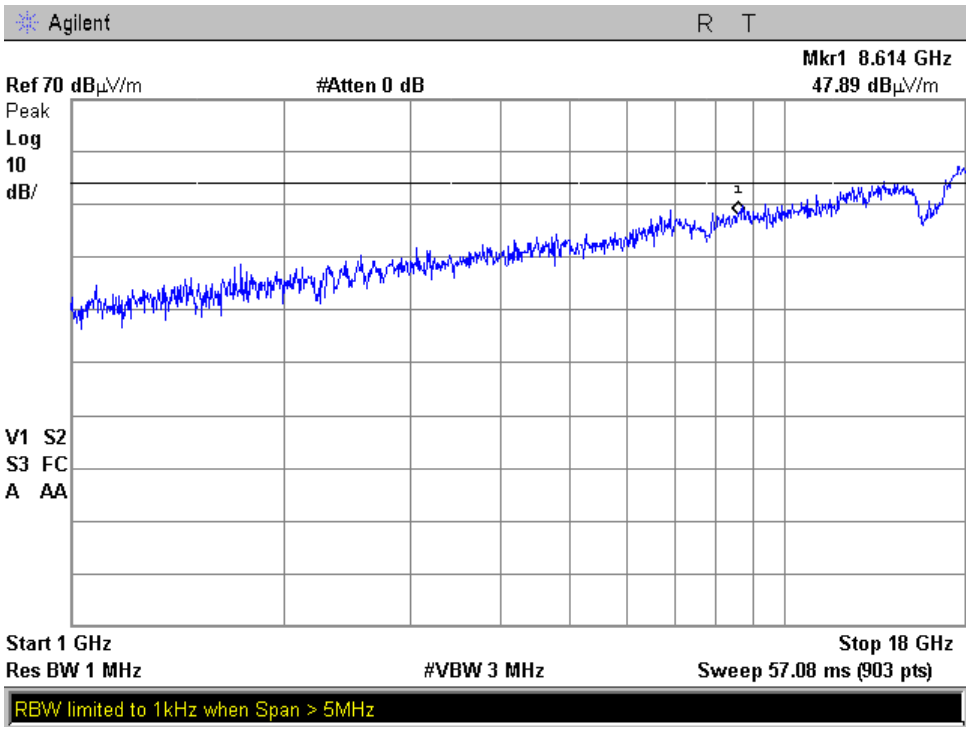
Test results below 1GHz:

All measurements were done in horizontal and vertical polarizations; the results show the worst case for all frequencies.

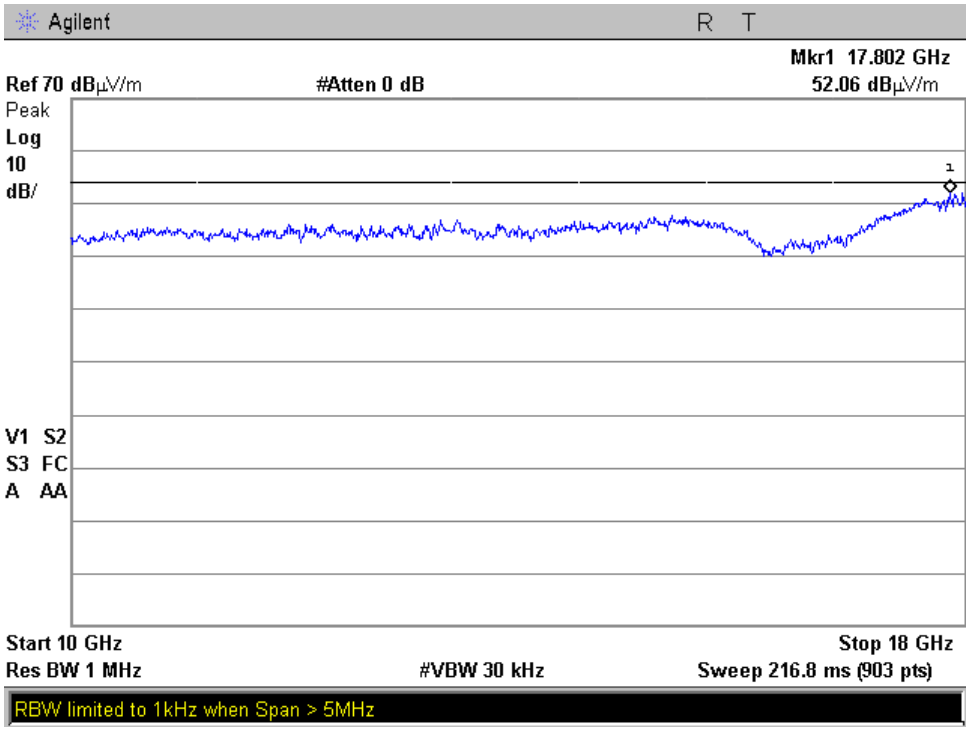
Frequency [MHz]	Detector	Spurious level [dBµV/m]	Limit [dBµV/m]	Reference Plot	Result
No any emissions were found				4.8.10 – 4.8.13	pass

Note: Radiated Emission [dBµV/m] = measured [dBµV] + Correction-factor [dB(1/m)]
Correction Factor = Antenna factor + Cable Loss + Filter I/L

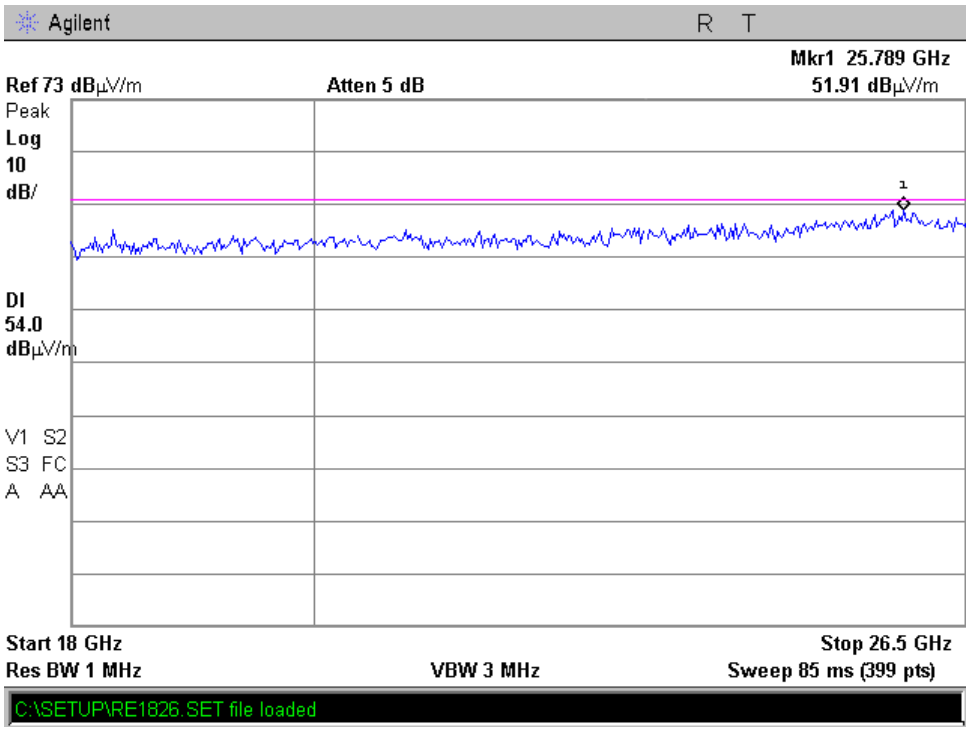
Lowest Frequency, 2402 MHz
Horizontal & Vertical Polarization
Plot 4.8.1



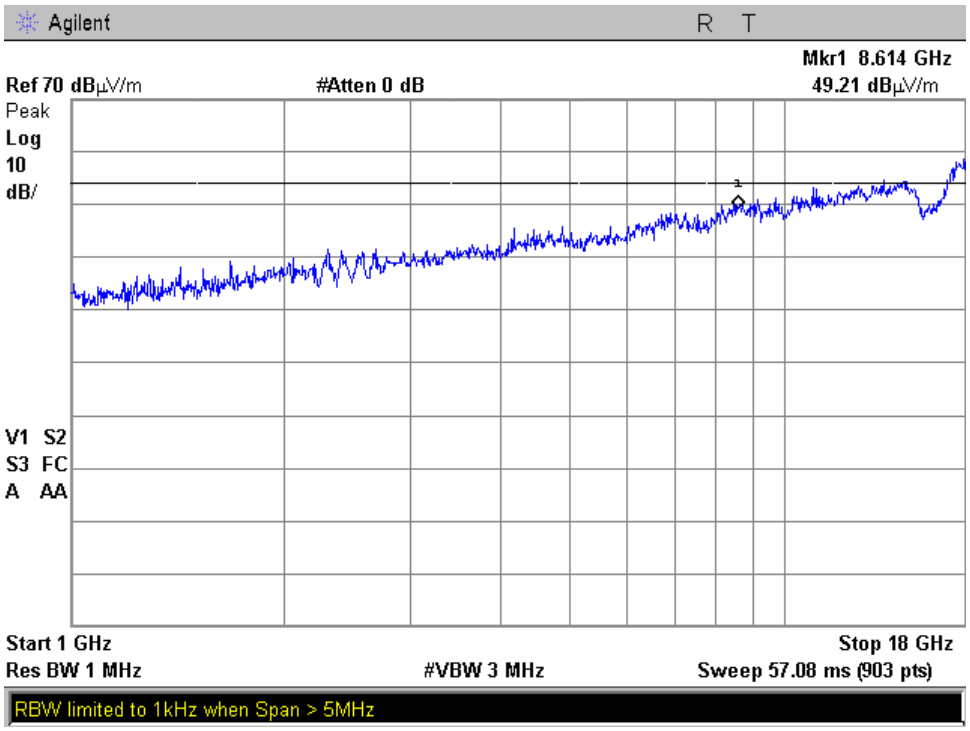
Horizontal & Vertical Polarization
Plot 4.8.2



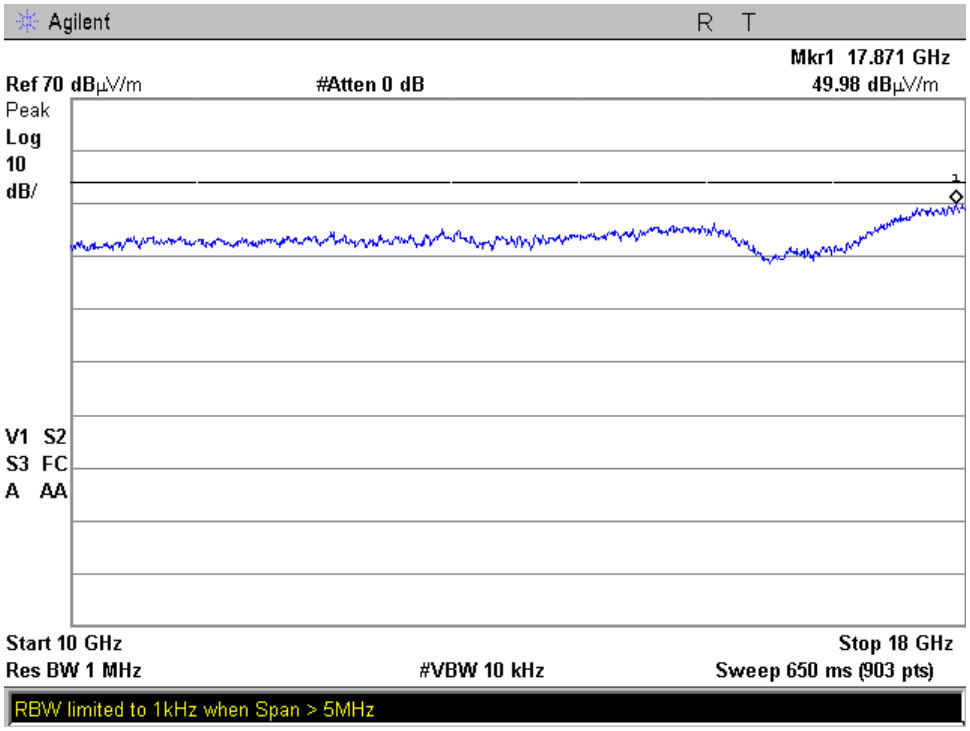
Horizontal & Vertical Polarization
Plot 4.8.3



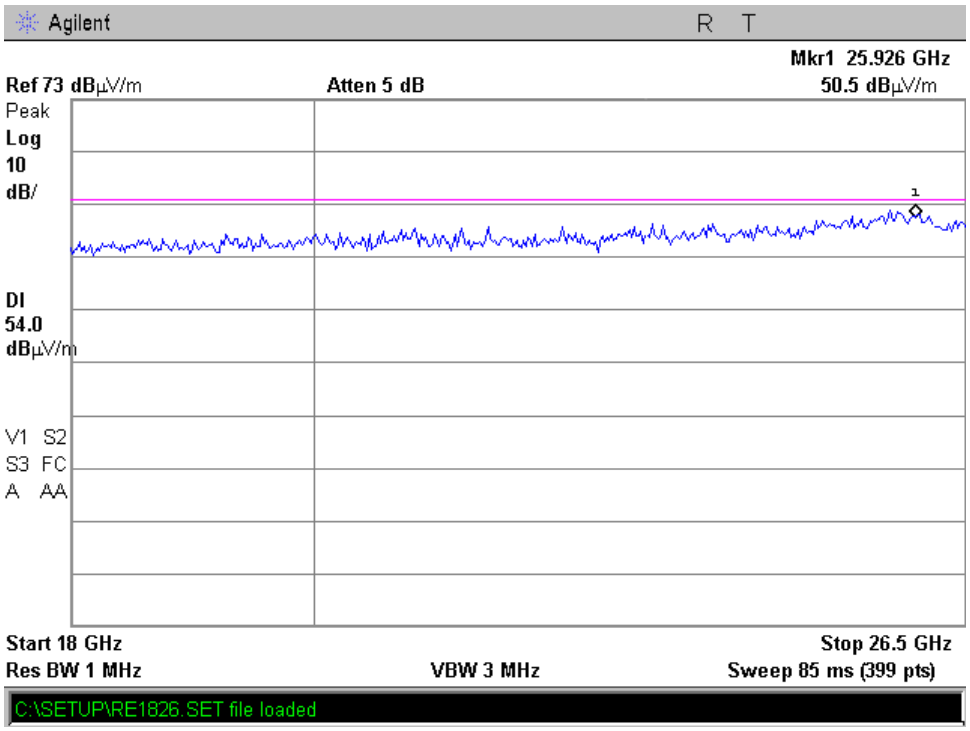
Middle Frequency, 2441 MHz
Horizontal & Vertical Polarization
Plot 4.8.4



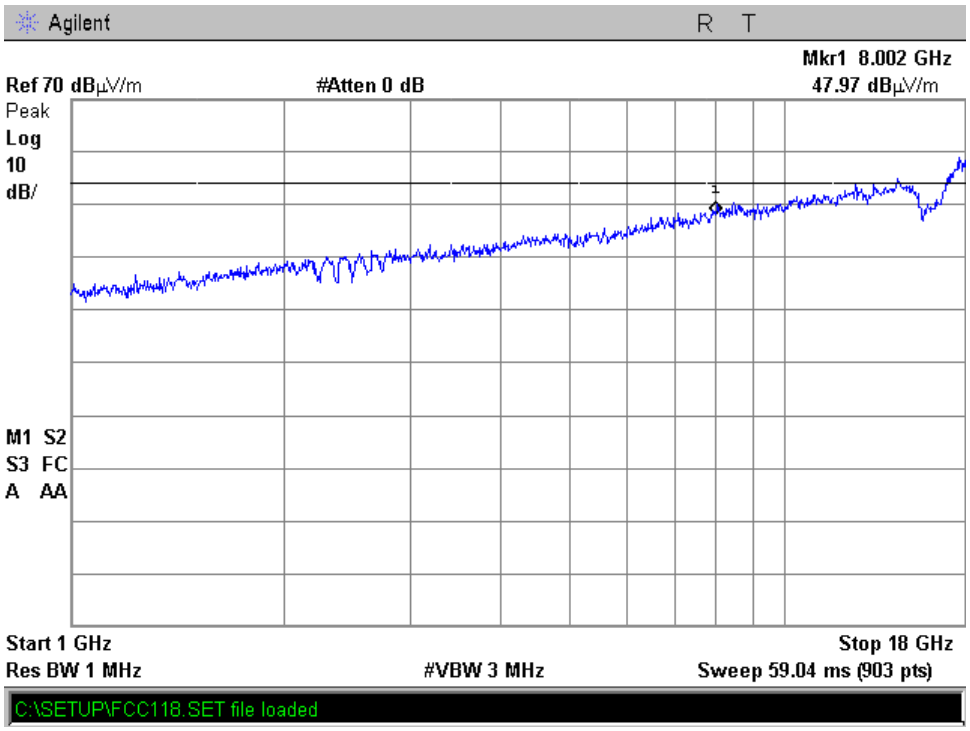
Horizontal & Vertical Polarization
Plot 4.8.5



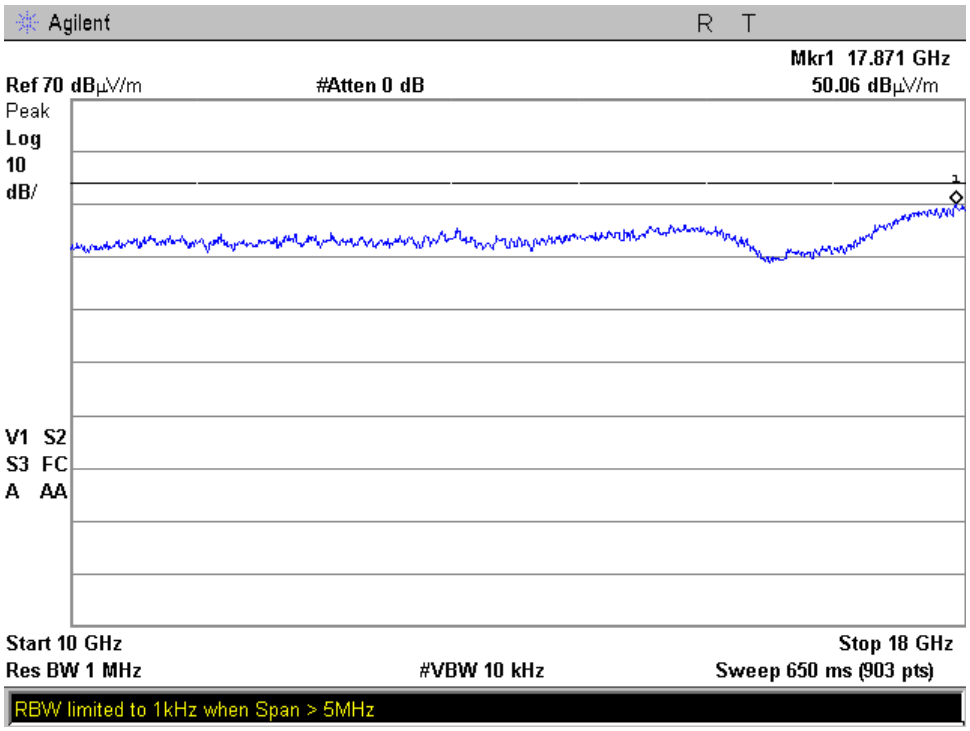
Horizontal & Vertical Polarization
Plot 4.8.6



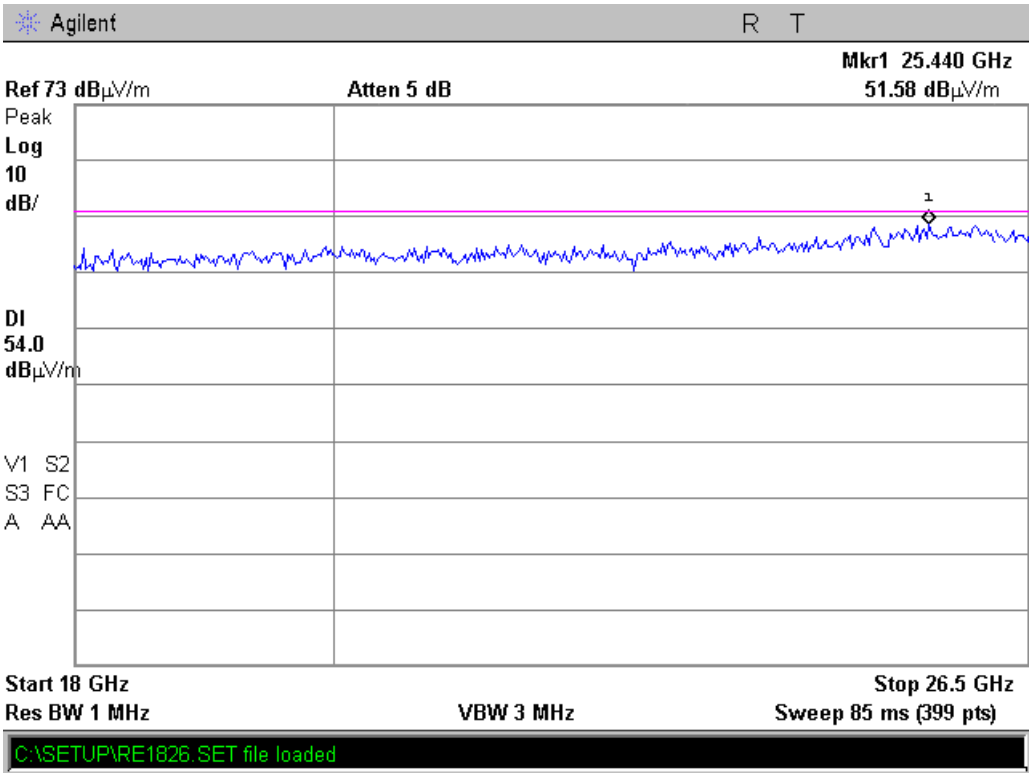
Highest Frequency, 2480 MHz
Horizontal & Vertical Polarization
Plot 4.8.7



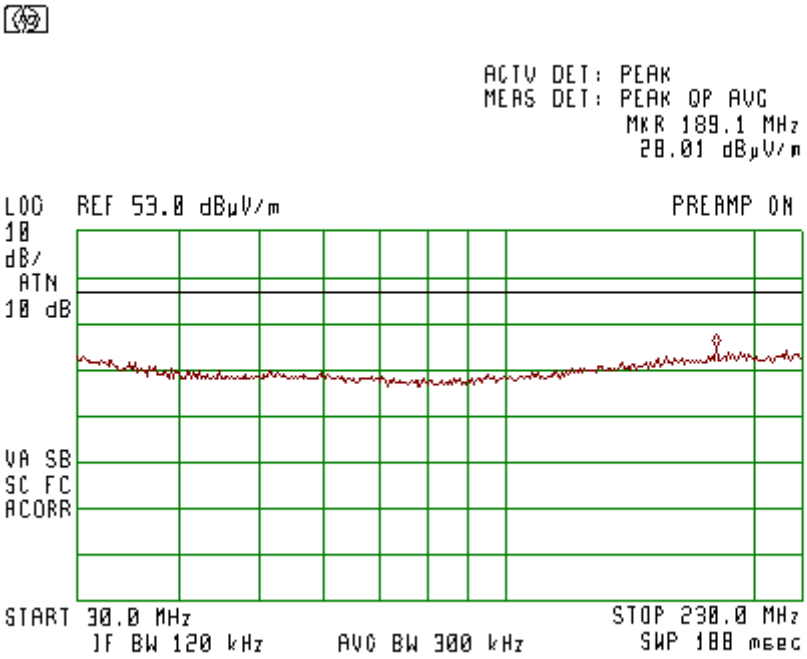
Horizontal & Vertical Polarization
Plot 4.8.8



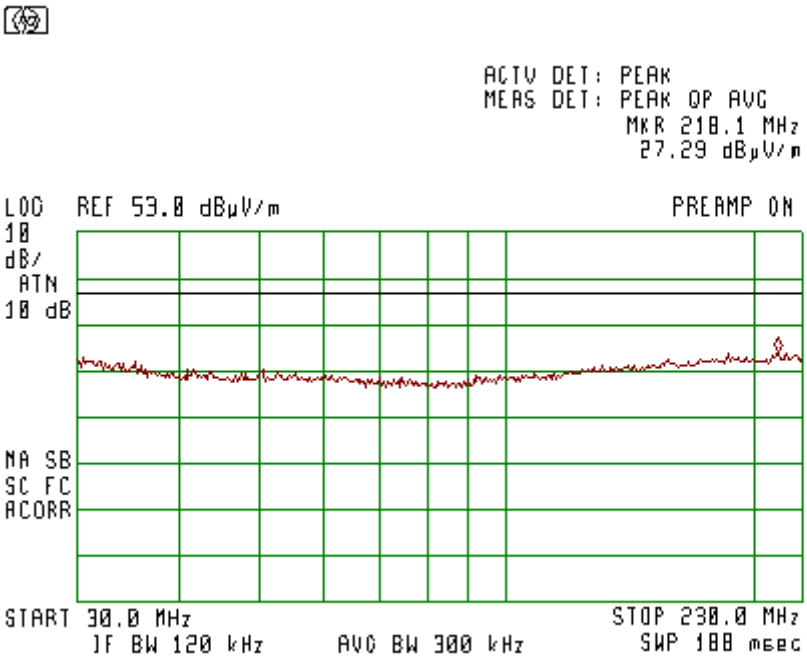
Horizontal & Vertical Polarization
Plot 4.8.9



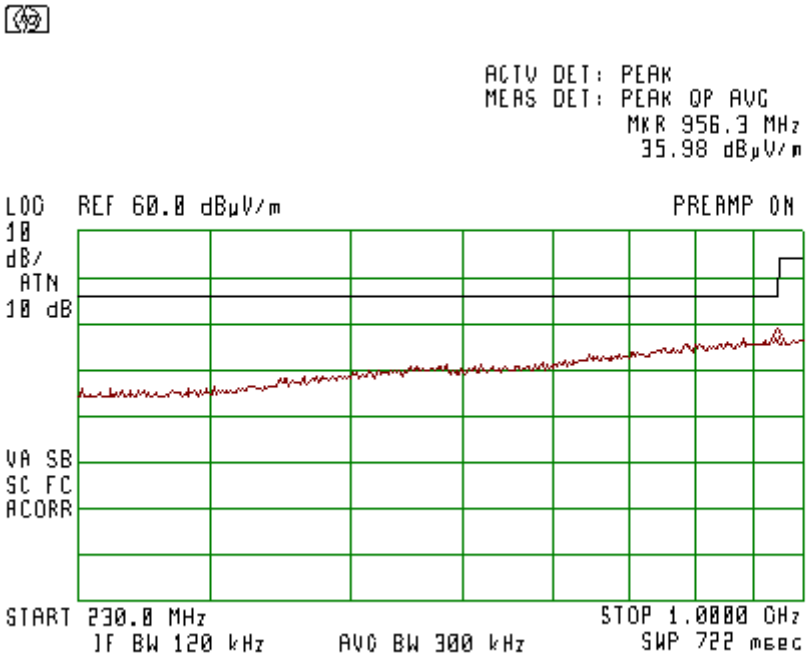
Radiated Spurious Emissions Below 1 GHz
Worst case for all frequencies
Horizontal Polarization
Plot 4.8.10



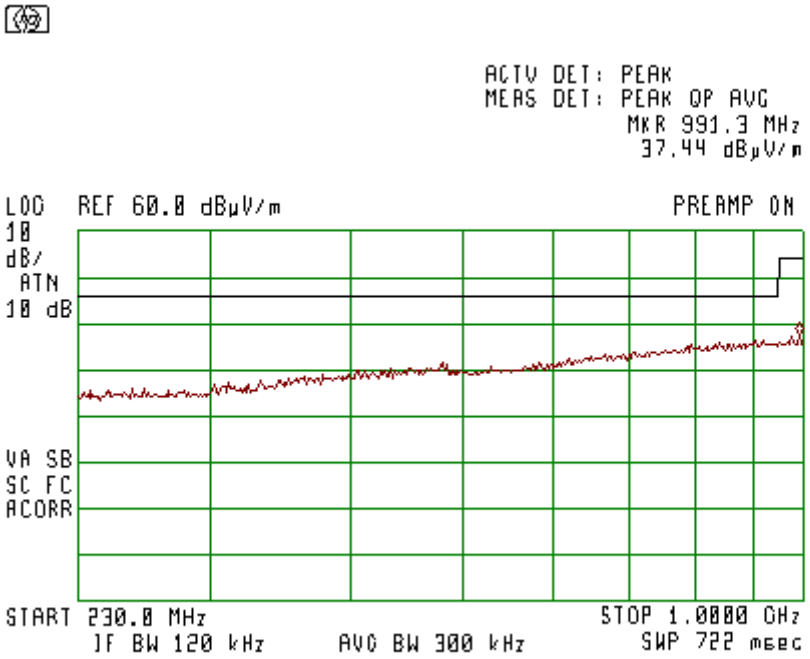
Vertical Polarization
Plot 4.8.11



Horizontal Polarization
Plot 4.8.12



Vertical Polarization
Plot 4.8.13



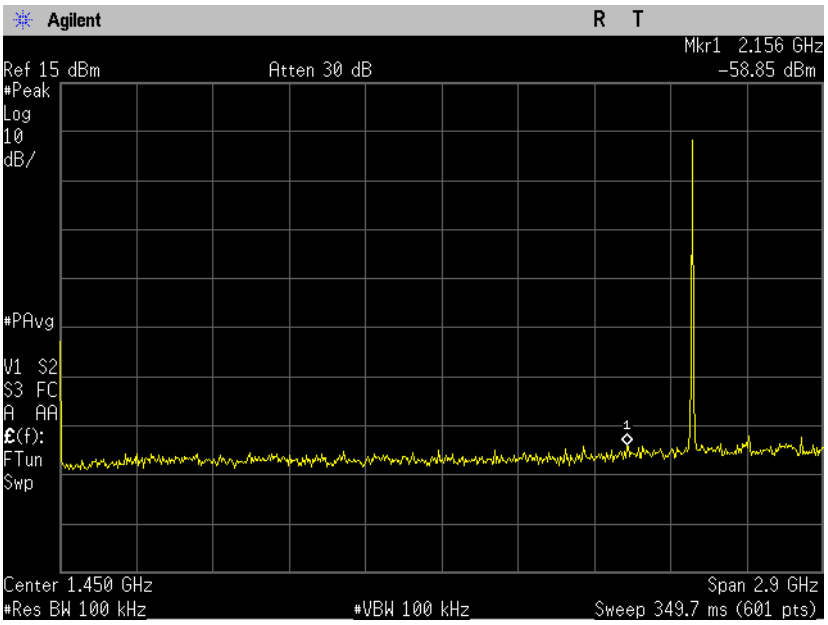
4.9. Spurious Emission- Conducted

Reference document:	**47 CFR §15.247 (d) & DA 00-705**		
Test Requirements:	In any 100 kHz bandwidth outside the frequency band at least 20 dB below the highest level of the desired power.		
Test setup:	See Sec. 2.1	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	RBW: 100kHz, VBW: 100kHz,		
Hopping function:	Disabled (lowest, middle, and highest)		
Environment conditions:	Ambient Temperature: 22°c	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.9.1 – Plot 4.9.6	

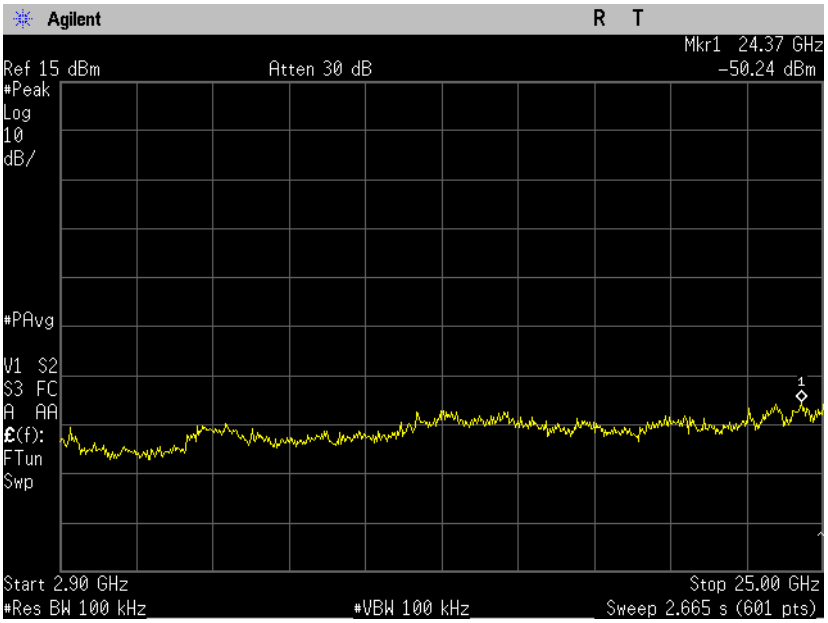
Test results:

Frequency [GHz]	Spurious Frequency [GHz]	Emissions limit	Reference Plots	Result
2.402	All readings At least -40dBc	-20dBc	4.9.1 & 4.9.2	Pass
2.441	All readings At least -40dBc		4.9.3 & 4.9.4	Pass
2.480	All readings At least -40dBc		4.9.5 & 4.9.6	Pass

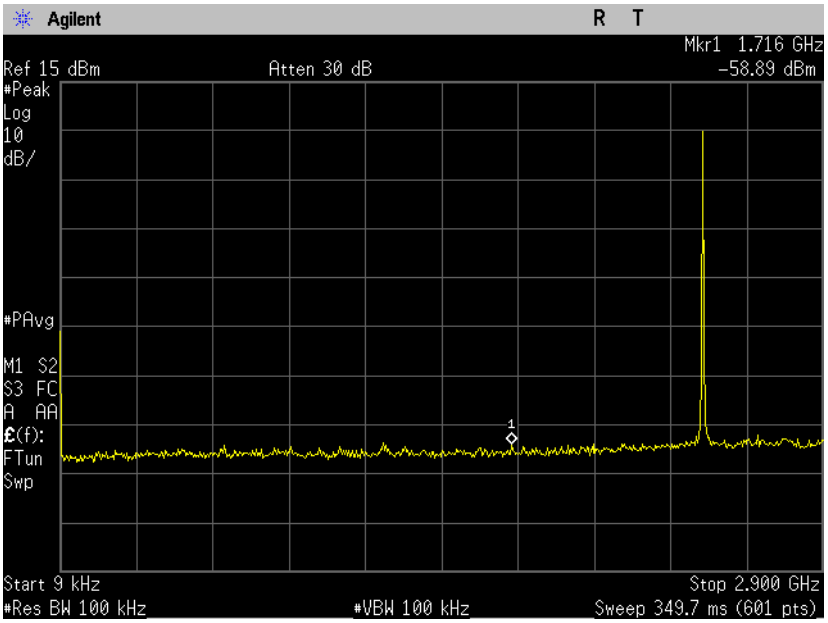
Spurious Emission- Conducted
Frequency 2.402GHz
Plot 4.9.1



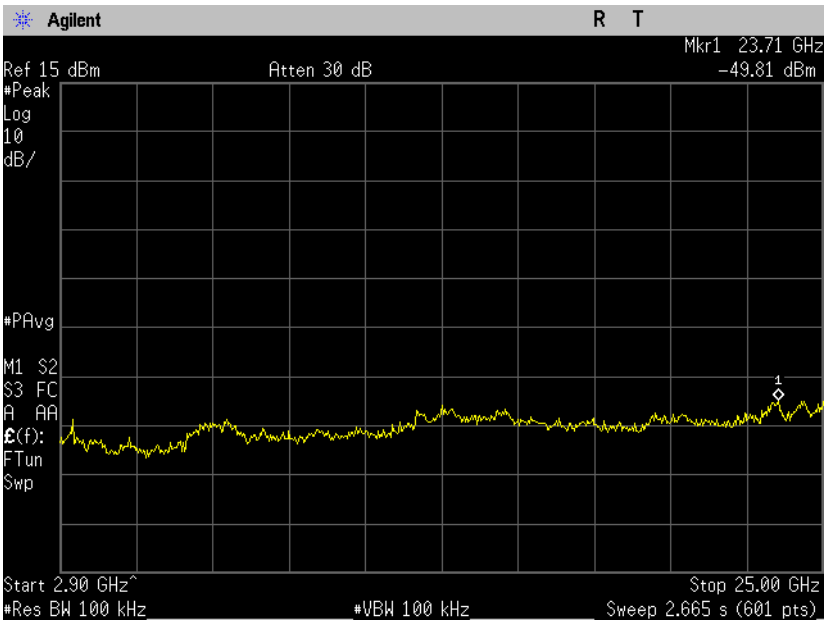
Plot 4.9.2



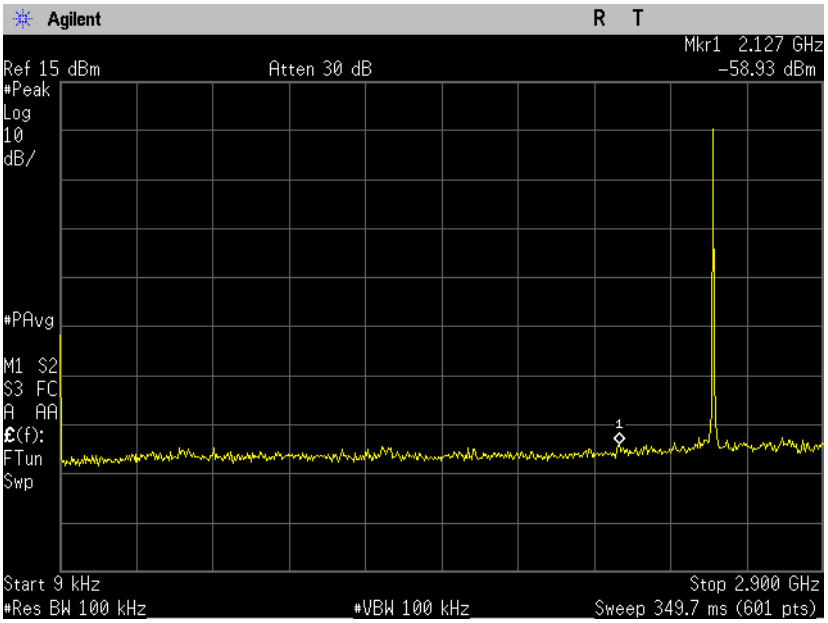
Frequency 2.441
Plot 4.9.3



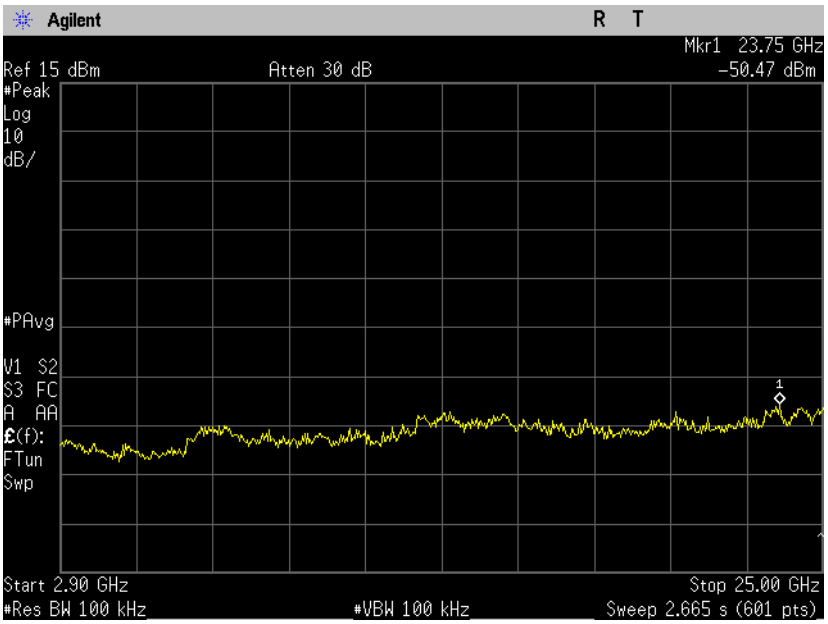
Plot 4.9.4



Frequency 2480
Plot 4.9.5



Plot 4.9.6



4.10. Antenna Connector Requirements

Reference document:	**47 CFR §15.203**	
Test Requirements:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with provisions of this section.	
Test Result:	The EWP2200 Semi Rugged VoWLAN Phone employs for Bluetooth and WLAN an Integral (on board) PIFA dual Band.	**Pass**

4.11. Power Line Emissions measurements

Reference document:	**47 CFR §15.107/207**		
Test Requirements:	The radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in §15.107. The emissions from an intentional radiator shall not exceed the field strength levels specified in §15.207. Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Sec.15.207.		
Test setup:	See Sec. 2.5	**Pass**	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted Emissions		
S.A. Settings:	f <30MHz: RBW: 9kHz, VBW:30kHz		
Radio device:	Idle		
Environment conditions:	Ambient Temperature: 21°c	Relative Humidity: 54%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.11.1 - Plot 4.11.4	

Test Results:
Worst case results of unintentional emissions and emissions measured at the 110VAC charger port.

"Phase" Lead

Frequency [MHz]	Measured Result [dBµV]		Class B Limits [dBµV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.767768	38	23.6	56.00	46.00	-18.00	-22.40	Pass
0.508303	38.9	24	56.00	46.00	-17.10	-22.00	Pass
0.320533	39.4	29.4	59.69	49.69	-20.29	-20.29	Pass
1.602735	37	18.8	56.00	46.00	-19.00	-27.20	Pass
1.783115	36.6	22.9	56.00	46.00	-19.40	-23.10	Pass
2.051	34.4	22.4	56.00	46.00	-21.60	-23.60	Pass

"Neutral" Lead

Frequency [MHz]	Measured Result [dBµV]		Class B Limits [dBµV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.593063	36.3	26.2	56.00	46.00	-19.70	-19.80	Pass
0.191489	36.5	25.8	63.97	53.97	-27.47	-28.17	Pass
0.329369	37.9	30.5	59.47	49.47	-21.57	-18.97	Pass
0.790036	35.8	25.2	56.00	46.00	-20.20	-20.80	Pass
2.43638	33.6	19.2	56.00	46.00	-22.40	-26.80	Pass
1.587	32	15.8	56.00	46.00	-24.00	-30.20	Pass

Measured at the PC 110VAC port

"Phase" Lead

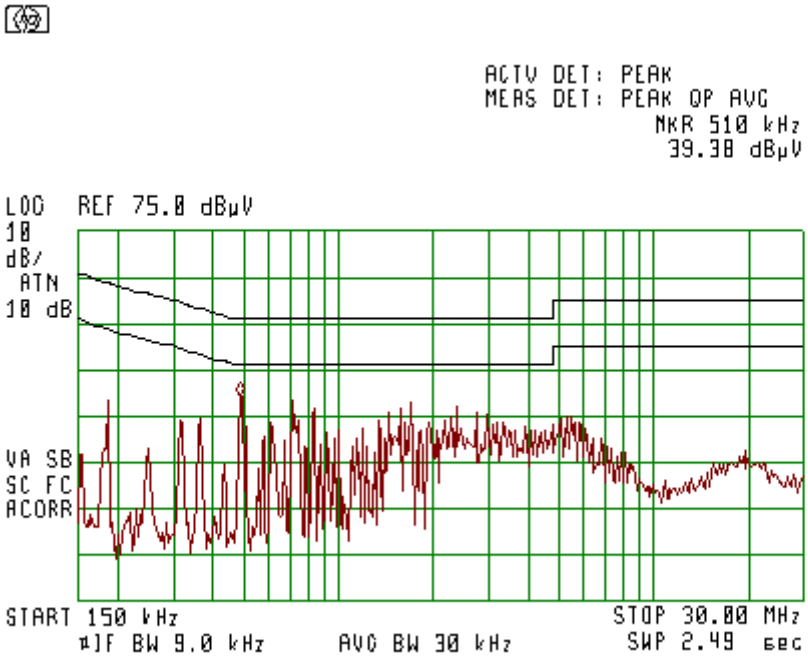
Frequency [MHz]	Measured Result [dBµV]		Class B Limits [dBµV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.15	39.4	19	66.00	56.00	-26.60	-37.00	Pass
0.164974	60.9	39.7	65.21	55.21	-4.31	-15.51	Pass
0.19671	51.6	29.1	63.75	53.75	-12.15	-24.65	Pass
0.220327	50.2	28.6	62.81	52.81	-12.61	-24.21	Pass
0.41442	36.9	7.3	57.56	47.56	-20.66	-40.26	Pass
21.96	33.3	27.3	60.00	50.00	-26.70	-22.70	Pass

"Neutral" Lead

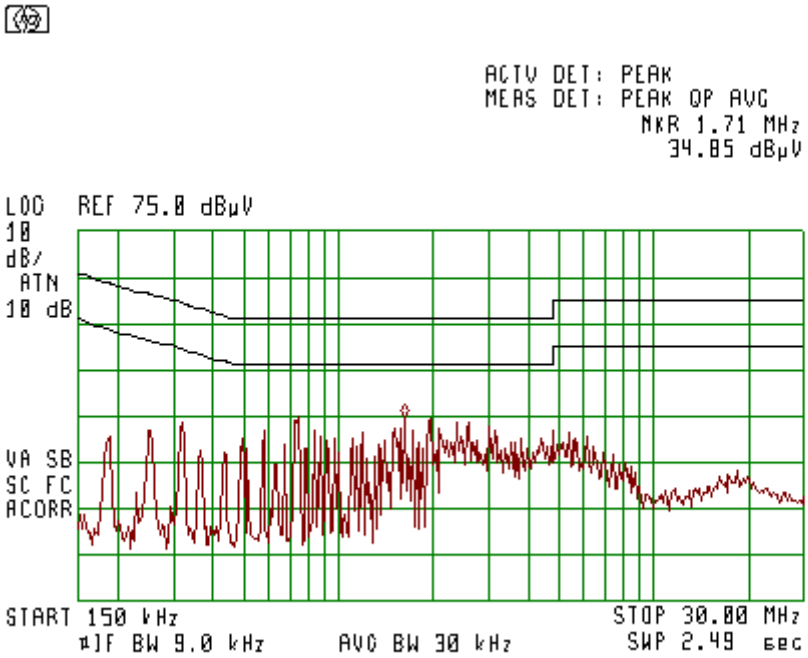
Frequency [MHz]	Measured Result [dBµV]		Class B Limits [dBµV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.160989	53.7	48.1	65.41	55.41	-11.71	-7.31	Pass
0.150000	36.7	17.5	66.00	56.00	-29.30	-38.50	Pass
0.230453	54.7	27	62.43	52.43	-7.73	-25.43	Pass
0.382123	43.7	10.3	58.23	48.23	-14.53	-37.93	Pass
0.56082	31	10.8	56.00	46.00	-25.00	-35.20	Pass
3.028	28.6	22.4	56.00	46.00	-27.40	-23.60	Pass

Measured at the charger 110VAC port

Phase Lead
Plot 4.11.1

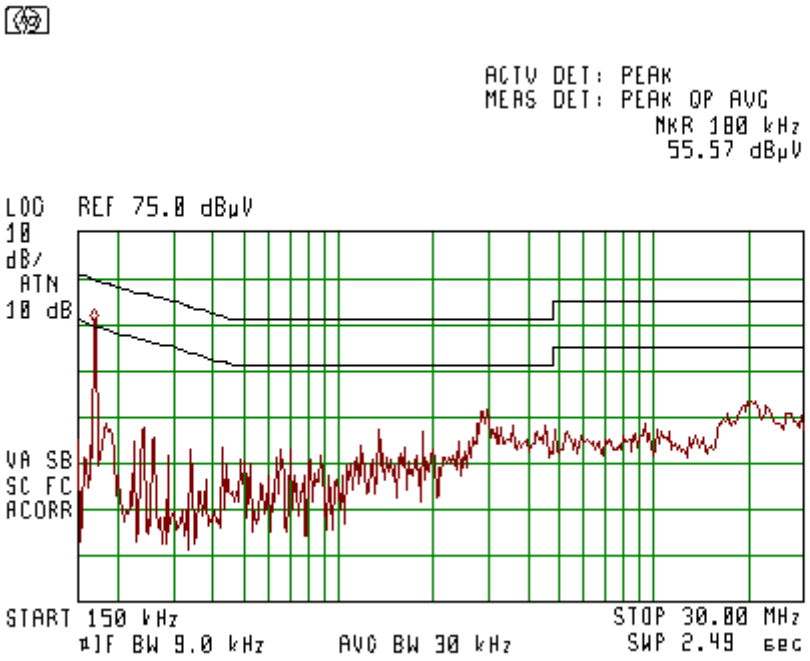


Neutral Lead
Plot 4.11.2

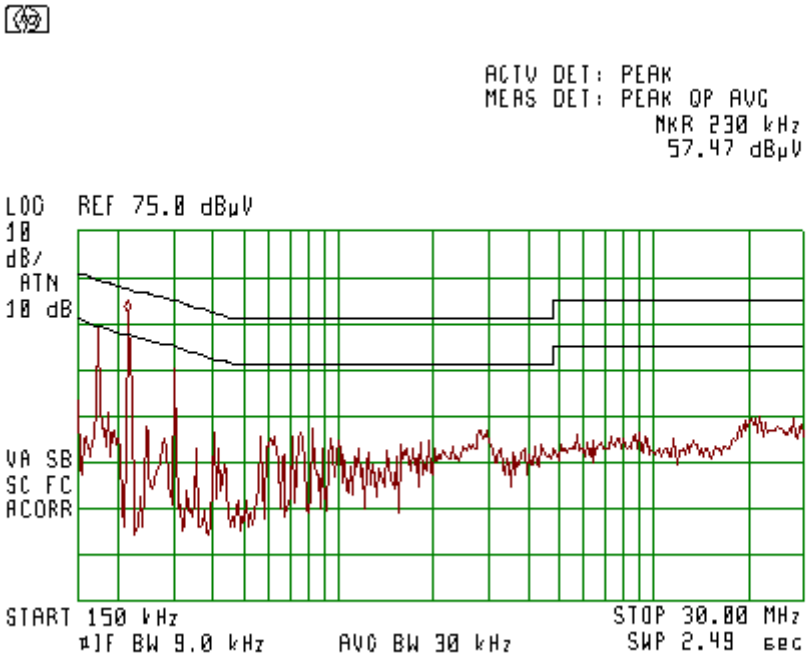


Measured at the PC 110VAC port

Phase Lead
Plot 4.11.3



Neutral Lead
Plot 4.11.4



5. Appendix

Appendix A: List of Measuring Equipment used:

Equipment	Manufacturer/ Model	Serial Number	Due date
CISPR16 EMI Receiver	HP8546A	3710A00392	17-11-12
Spectrum Analyzer 100 Hz ÷ 26.5 GHz	Agilent E7405A	US41160436	24-11-12
LNA Amplifier 1 GHz ÷ 18 GHz	AMP – 5D-010180-30-10P-GW	618653	07-03-13
Power meter	Agilent N1911A	MY45100784	12-10-12
Dual Ridged Guide Ant.1-18 GHz	A.R.A DRG 118/A	17188	23-01-13
Antenna 15 GHz ÷ 40 GHz	Schwarzbeck BBHA 9170	BBHA9170214	03-02-13
Turn table	HD100	100/693	-
Antenna Mast	HD 100	100/693	-
Biconical 20 –200 MHz	Seibersdorf, PBA 320	301	20-01-15
Log-Periodic 200 – 1000 MHz	Schwarzbeck VUSLP9111	VUSLP9111184	20-01-15
Pre-Amplifier	MiTeq, AMF-5F-18002650-30-10P	945372	07-03-13
LISN	Fischer 50/250-25-2	-	05-03-13
Transient Limiter	HP11947A	-	05-03-13
Notch Filter	Micro-Tronics BRM50702-05	0001	04-03-13

Appendix B: Accreditation Certificate

ilac-MRA

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

QUALITECH (ECI TELECOM)

Petach-Tikva, ISRAEL

for technical competence in the field of

Electrical Testing

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 22nd day of March 2011.

President & CEO
For the Accreditation Council
Certificate Number 1633.01
Valid to September 30, 2012

A2LA

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Electrical Scope of Accreditation.

End of the Test Report