



Electromagnetic Compatibility Test Report

Test Report No: EXT 080709

Issued on: July 08, 2009

Product Name
Access Point – EXRP 30N

Tested According to
FCC 47 CFR, Part 15, Subpart E

Tests Performed for
Extricom Ltd.

Haim Levanon Street, P.O. Box 39040, Tel-Aviv 61390, Israel
Tel: +972-3-7451000, Fax: +972-3-7451001"

QualiTech EMC Laboratory, ECI Telecom

30 Hasivim Street,
Petah-Tikva, 49517, Israel
Tel: + 972-3-926 8443
Fax: + 972-3-928 7490



ELECTRICAL TESTING
CERT #1633.01

The information contained herein is the property of QualiTech, EMC Lab and is supplied without liability for errors or omissions.

*The copyright for this document vests in QualiTech, EMC Lab.
All rights reserved.*

This Test Report may not be reproduced, by any method, without the written permission of the QualiTech, EMC Lab.

If and when such permission is granted, the report must be reproduced only in the full format.

Test personnel



Tests Performed By: -----

Rami Nataf


Sergey Kapustin

Report Prepared By: -----



Bina Talkar

Report Reviewed By: -----



Y. Zucker
QA and Lab. Manager
QualiTech EMC Laboratory

Test Report details:

Customer's Representative: A.Y. Erez
Issued on: 08.07.2009

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 set up 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

Test Spec. Clause	Test Case	Remarks
47 CFR §15.403 (i) & RSS-Gen §4.6.1	Emission Bandwidth (26dB BW)	Comply
47 CFR §15.407 (a) (1) & RSS-210 §A9.2(1)	Peak Output Power, 5180-5250 MHz	Comply
47 CFR §15.407 (a) (1) & RSS-210 §A9.2(1) & §A9.5(2)	Peak Power Spectral Density	Comply
47 CFR §15.407 (a) (6)	Peak Excursion	Comply
47 CFR §15.407 (b) (1) & §15.407 (b)(6) & RSS-210 §A8.5, §A9.3(1), §2.2	Conducted Spurious Emissions	Comply
47 CFR §15.407 (b) (1) & (b)(6) & RSS-210, §A9.3(1), §A8.5, §2.2	Spurious Radiated Emissions, Restricted Bands	Comply
§15.209 & RSS- Gen. §6 & §7.2.3.2 & RSS-GEN 4.10	Radiated Emissions (Receive mode)	Comply
§15.107/207 & RSS-Gen sec.7.2.2	Power line Emission, 110 VAC	Comply
§15.203 & RSS- Gen. §7.1.4	Antenna Connector requirement	Comply



ELECTRICAL TESTING
CERT #1633.01

Table of Contents

1. GENERAL DESCRIPTION.....	6
2. METHOD OF MEASUREMENTS	7
2.1. Conducted RF Measurements:.....	7
2.2. Radiated Emission measurements:	7
2.3. Power line Emission measurements:	7
2.4. Worst Case Results:.....	8
3. TEST FACILITY & UNCERTAINTY OF MEASUREMENT	9
3.1. Accreditation/ Registration reference:.....	9
3.2. Test Facility description	9
3.3. Uncertainty of Measurement:	10
4. REPORT OF MEASUREMENTS AND EXAMINATIONS.....	11
4.1. Emission Bandwidth (26dB BW)	11
4.2. Maximum Peak Output Power, 5180-5250 MHz	30
4.3. Peak Power Spectral Density.....	33
4.4. Peak Excursion	53
4.5. Conducted Spurious Emissions	73
4.6. Spurious Radiated Emissions, Restricted Bands	102
4.7. Radiated Emission, Receive Mode	122
4.8. Conducted Power line Emission measurements	125
4.9. Antenna Connector Requirements	127
5. APPENDIX	128

1. General Description

Description of the EUT system/test Item:

Product name: IEEE 802.11a/b/g/n Wireless Access Point

Model: Access Point – EXRP 30N

Transmit Power:

802.11b: 236mW

802.11g: 171mW

802.11a: 79mW

802.11n: 87mW

Frequency range:

802.11b/g: 2.412 – 2.462 GHz

802.11a: 5.15-5.250, 5.745-5.825 GHz

Transmit Data rate:

Protocol	Rate [Mbps]							
802.11a	9		12	18	24	36	48	54
802.11b	1	2	5.5	11				
802.11g	6		12	18	24	36	48	54
802.11n 20MHz	13		26	39	52	78	104	117 130
802.11n 40MHz	30		60	90	120	180	240	270 300

Type of Modulation:

Protocol	Modulation
802.11a	OFDM (64QAM, 16QAM, QPSK, BPSK)
802.11b	DSSS (CCQ, DQPSK, DBPSK)
802.11g	DSSS/OFDM (64QAM, 16QAM, QPSK, BPSK, CCK, DQPSK, DBPSK)

Gain:

2.4GHz/5GHz: 4 dBi

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 measuring instrument 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.

“UNII –Part 15 Subpart E Measurements” and “Updated Procedure for Peak Transmit Power in the U-NII band” DA 02-2138 procedures published on August 2002 were applied.

a. Emission bandwidth: Using a RBW equal to 1% of the EBW (measured, compared with the RBW setting, and repeated until the RBW/EBW of 1% was the setting), the View button was used to capture the emission. The widest width of the emission that is 26dB down from the peak was measured.

b. Peak Conducted Output Power: Method 1 was used. The device was configured to transmit continuously. The span of the spectrum analyzer was set to 50MHz (>EBW), using the “Sample Detector mode” (bin width <0.5RBW) and setting the trigger to “free run”, 100 traces were averaged in power averaging mode. The band power measurement function was used to integrate the power across the 26dB EBW of the signal.

c. PSD: Method 2 was used. The device was configured to transmit continuously. The span of the spectrum analyzer was set to 30MHz (>EBW), using the “Sample Detector mode” and 100 sweeps were averaged in power averaging mode.

d. Peak Excursion: The device was configured to transmit continuously. The span of the spectrum analyzer was set to 30MHz (>EBW), settings of 1st trace as reported and settings of 2nd trace using the settings of Method 1. The test was repeated for the lowest, middle and highest channel frequencies.

2.2. 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 emissions. 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 through 360 degrees, 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 system cables to the worst-case position. 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.

2.3. 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.

2.4. Worst Case Results:

Worst case result is determined as the channel with the highest output power. Worst-case results of various modulation modes were determined as the modulation with the highest output power, and that was reported.

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 ≥ 80 dB at 15 kHz ≥ 90 dB at 100 kHz Electric field > 120 dB from 1MHz to 1GHz > 110 dB 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	± 3.49 dB, 30MHz to 1GHz
Transmission Loss measured at 5 positions, at 1.5m height	± 3 dB, 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 ≥ 80 dB at 15 kHz ≥ 90 dB at 100 kHz Electric field > 120 dB from 1MHz to 1GHz > 110 dB 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	± 3 dB 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.	1.8	3.6
	30MHz÷230MHz, Ver. polar.	2.0	3.9
	230MHz÷1000MHz, Horiz. polar.	1.5	3.0
	230MHz÷1000MHz, Vert. polar.	1.5	3.0
Conducted Emission	9 kHz÷150 kHz	1.4	2.8
	150 kHz÷30MHz	1.1	2.2

Note: The compliance/ non-compliance statement of the EUT with the requirements of this standard do not take into account the uncertainties of the measurement stated in this document

Note: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

4. Report of Measurements and Examinations

4.1. Emission Bandwidth (26dB BW)

Reference document:	47 CFR §15.403 (i)		
Test Requirements:	For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.		
Test Method:	See sec.2.1a	Comply	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 100kHz, VBW: 300kHz, Peak detector		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.1.1 to 4.1.27	

Test results:

Frequency: 5180MHz - 5250 MHz,

Transmitter Model: WMIA-199N/EU

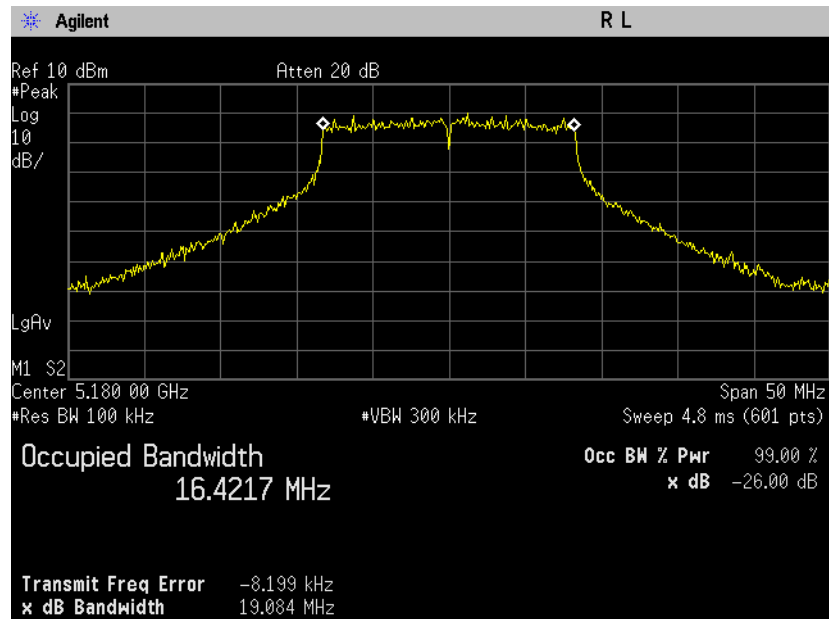
		Frequency [GHz]	Data Rate [Mbps]	26 dB Bandwidth [MHz]	Ref. Plots
802.11a					
Low	Output 0	5.180	54	19.084	4.1.1
	Output 1	5.180		19.470	4.1.2
	Output 2	5.180		19.578	4.1.3
Middle	Output 0	5.200		18.061	4.1.4
	Output 1	5.200		18.831	4.1.5
	Output 2	5.200		18.842	4.1.6
High	Output 0	5.240		19.317	4.1.7
	Output 1	5.240		19.279	4.1.8
	Output 2	5.240		19.284	4.1.9

		Frequency [GHz]	Data Rate [Mbps]	26 dB Bandwidth [MHz]	Ref. Plots
802.11n 20 MHz					
Low	Output 0	5.180	130	19.006	4.1.10
	Output 1	5.180		19.017	4.1.11
	Output 2	5.180		18.997	4.1.12
Middle	Output 0	5.200		21.306	4.1.13
	Output 1	5.200		21.586	4.1.14
	Output 2	5.200		21.591	4.1.15
High	Output 0	5.240		20.959	4.1.16
	Output 1	5.240		21.198	4.1.17
	Output 2	5.240		21.313	4.1.18
802.11n 40 MHz					
Low	Output 0	5.190	300	38.119	4.1.19
	Output 1	5.190		38.441	4.1.20
	Output 2	5.190		38.806	4.1.21
High	Output 0	5.230		38.474	4.1.22
	Output 1	5.230		39.073	4.1.23
	Output 2	5.230		39.340	4.1.24

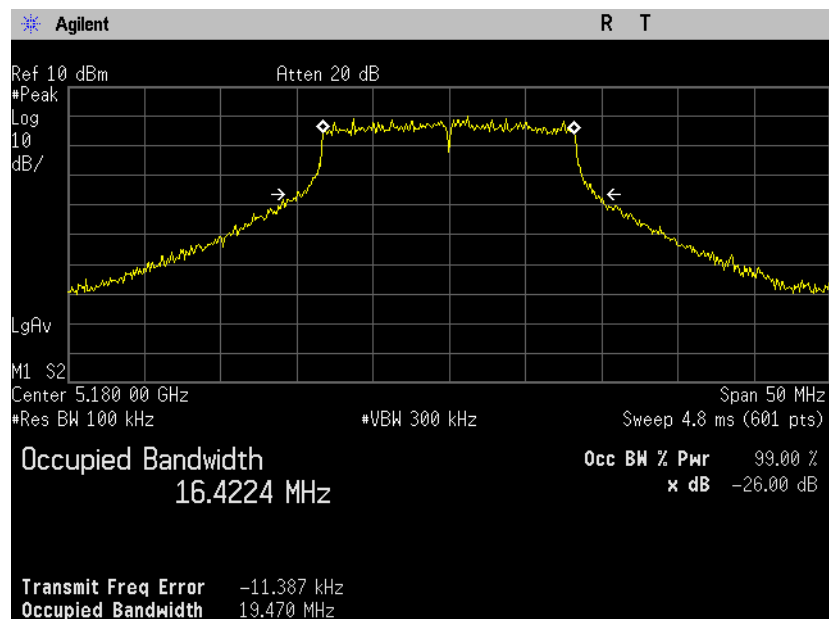
Transmitter Model: WLM54AG

		Frequency [GHz]	Data Rate [Mbps]	26 dB Bandwidth [MHz]	Ref. Plots
802.11a					
Low	-	5.180	54	18.563	4.1.25
Middle	-	5.200		18.517	4.1.26
High	-	5.240		18.445	4.1.27

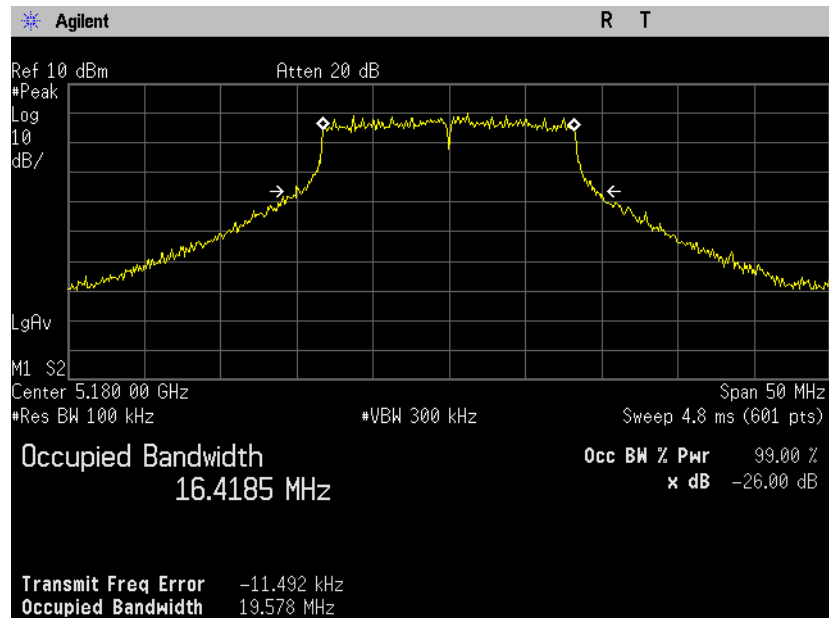
5180MHz - 5250 MHz
Transmitter Model: WMIA-199N/EU
802.11a
Low Frequency, Output 0
Plot 4.1.1



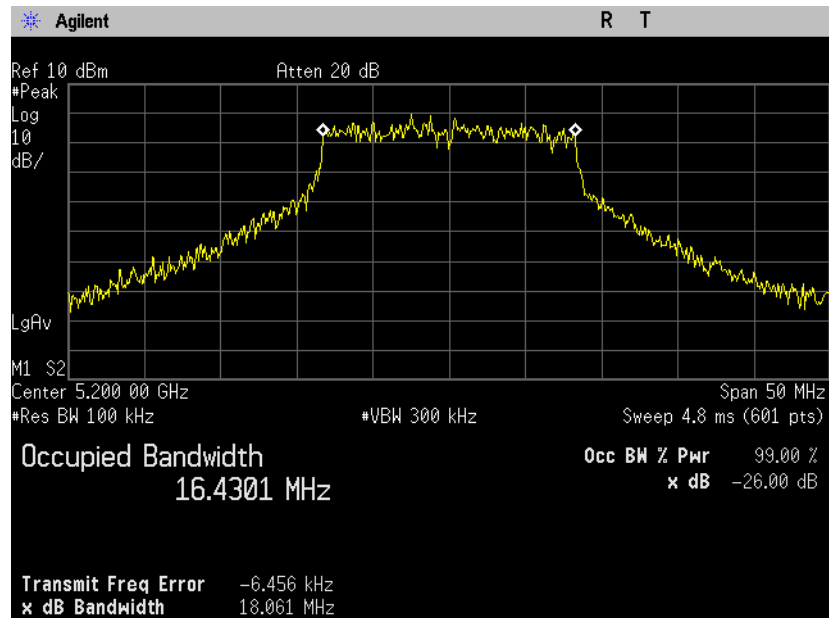
Low Frequency, Output 1
Plot 4.1.2



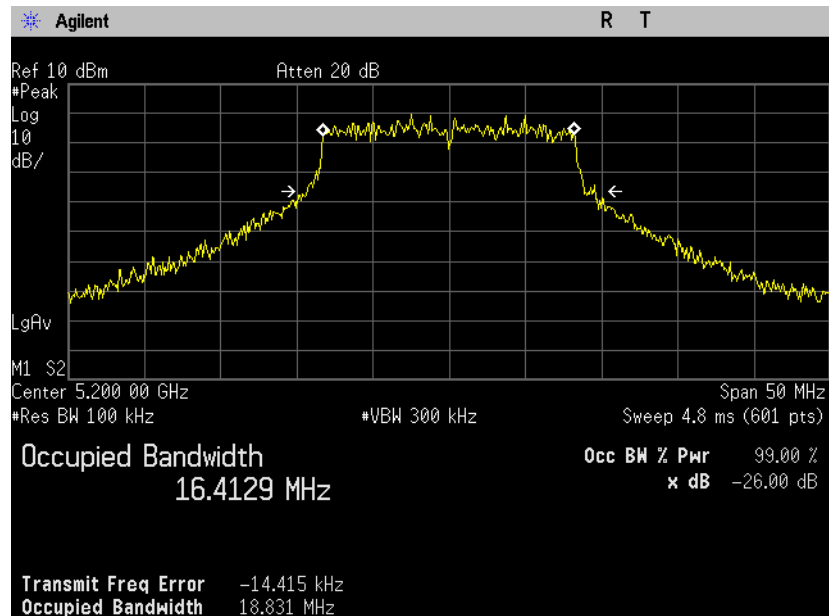
Low Frequency, Output 2
Plot 4.1.3



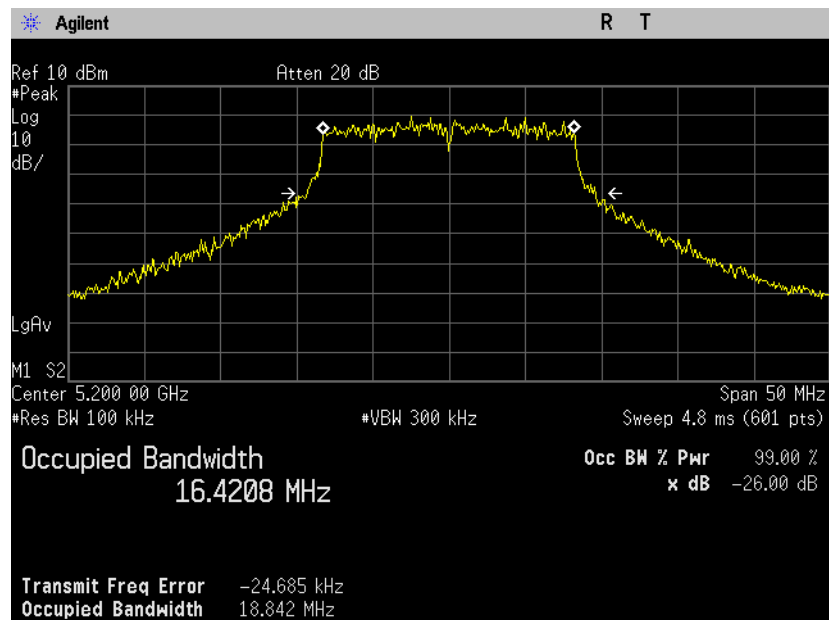
Middle Frequency, Output 0
Plot 4.1.4



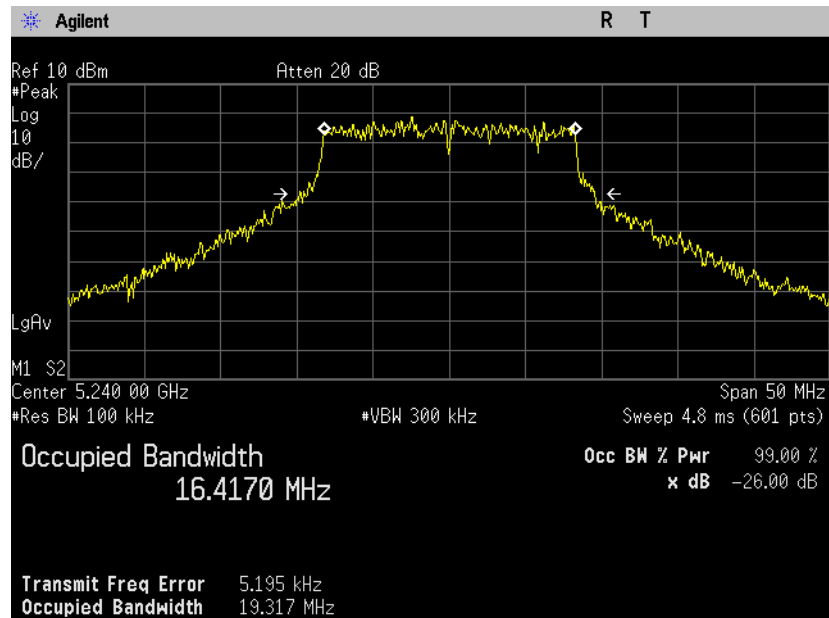
Middle Frequency Output 1
Plot 4.5



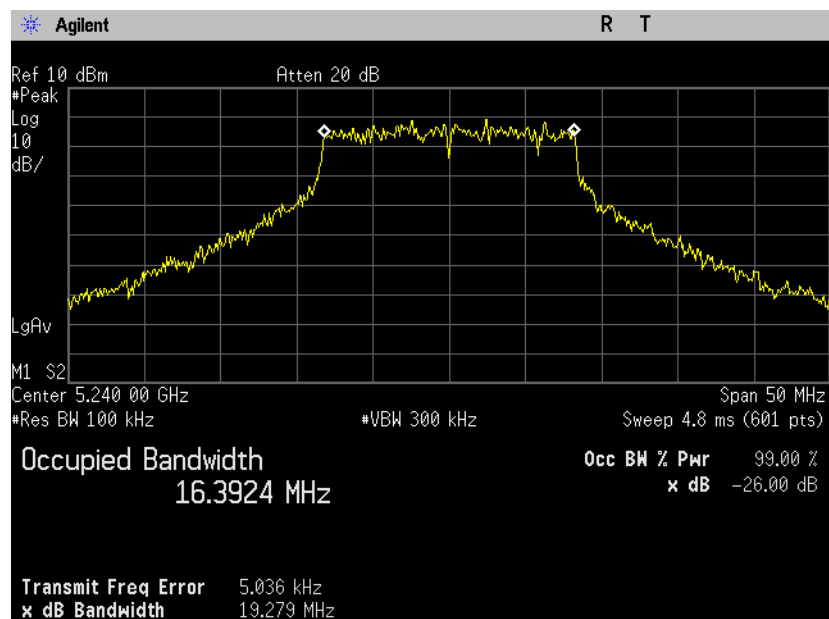
Middle Frequency Output 2
Plot 4.1.6



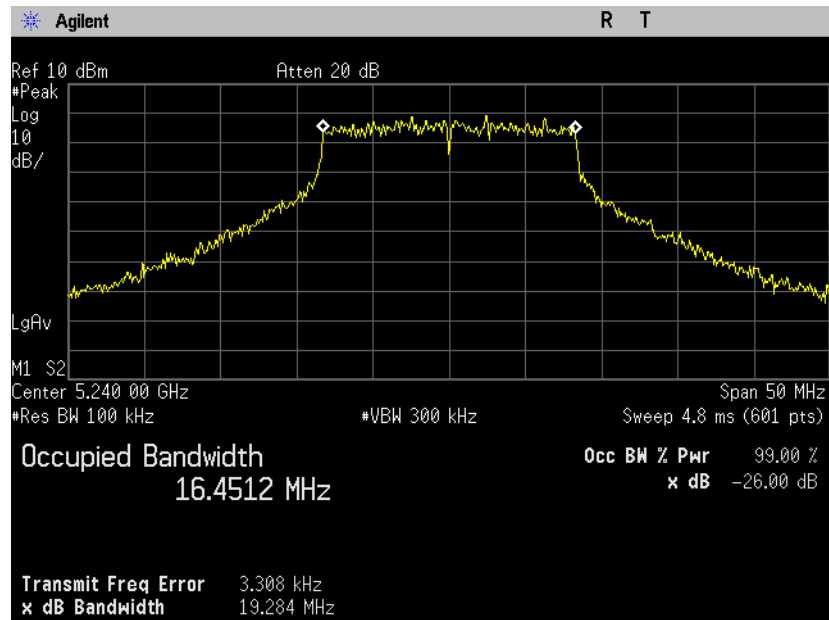
High Frequency, Output 0 Plot 4.1.7



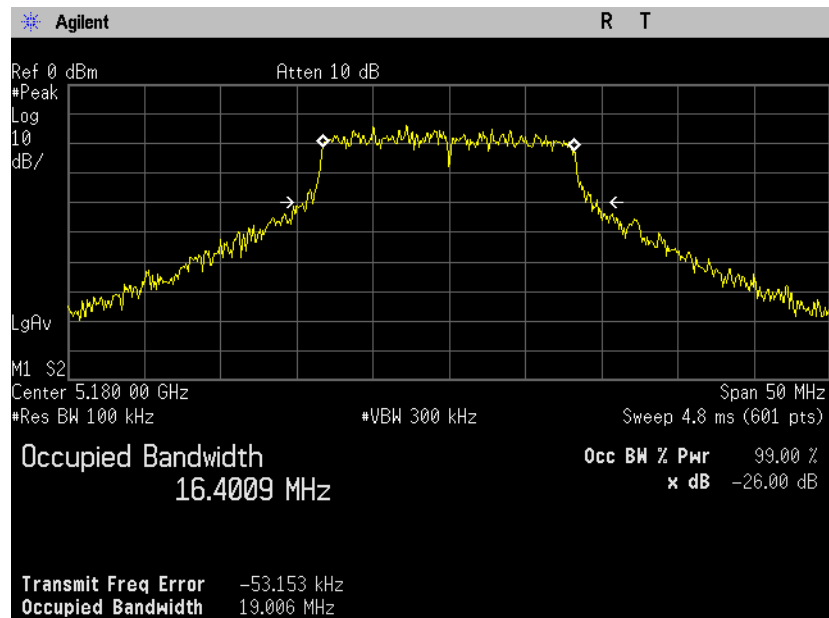
High Frequency, Output 1 Plot 4.1.8



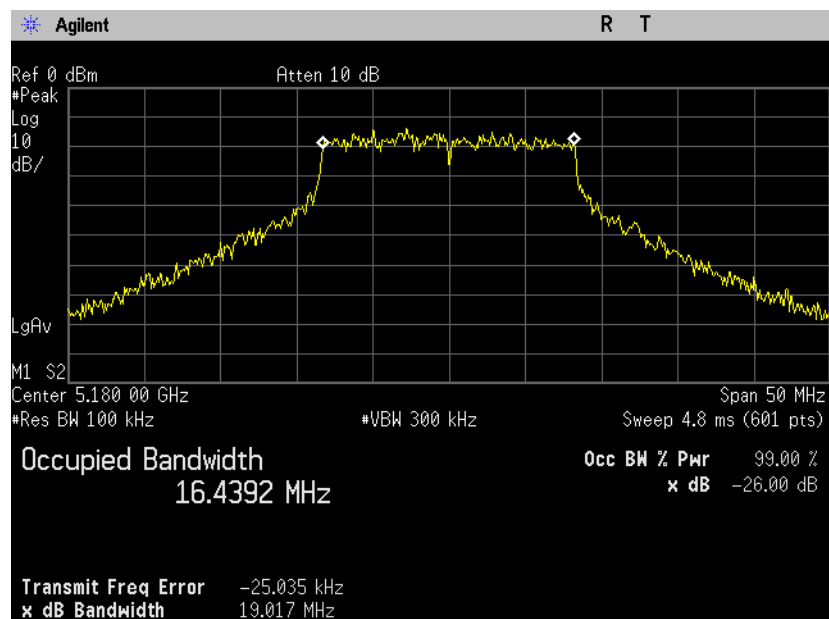
High Frequency, Output 2 Plot 4.1.9



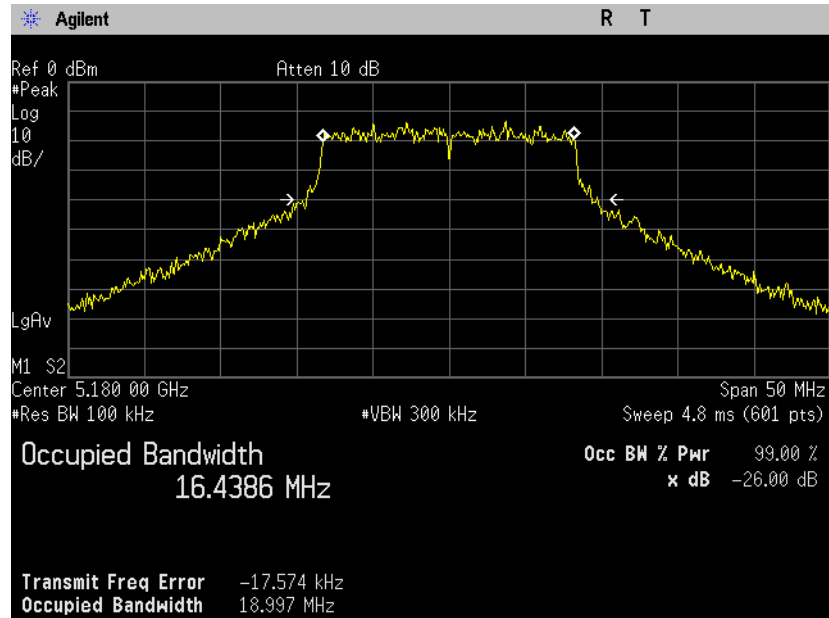
Transmitter Model: WMIA-199N/EU
802.11n 20 MHz
Low Frequency, Output 0
Plot 4.1.10



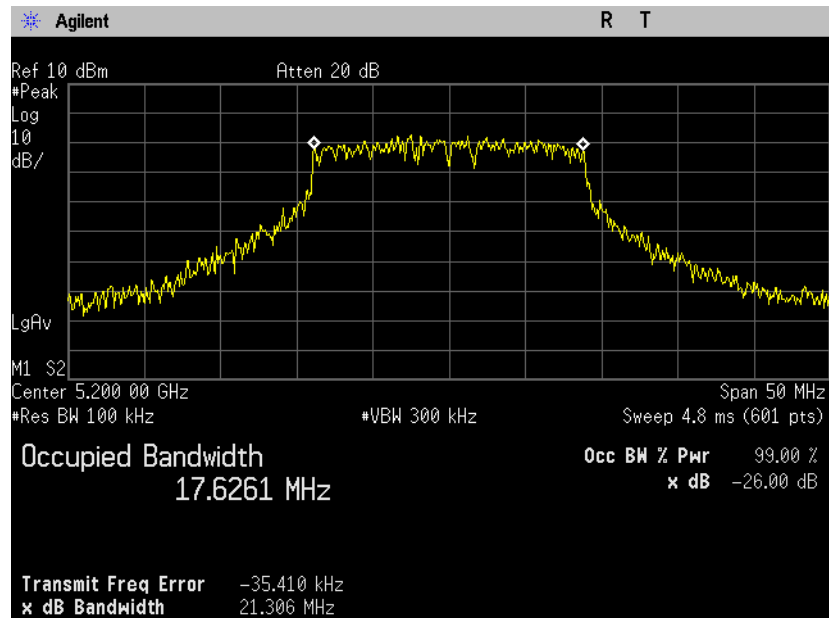
Low Frequency, Output 1
Plot 4.1.11



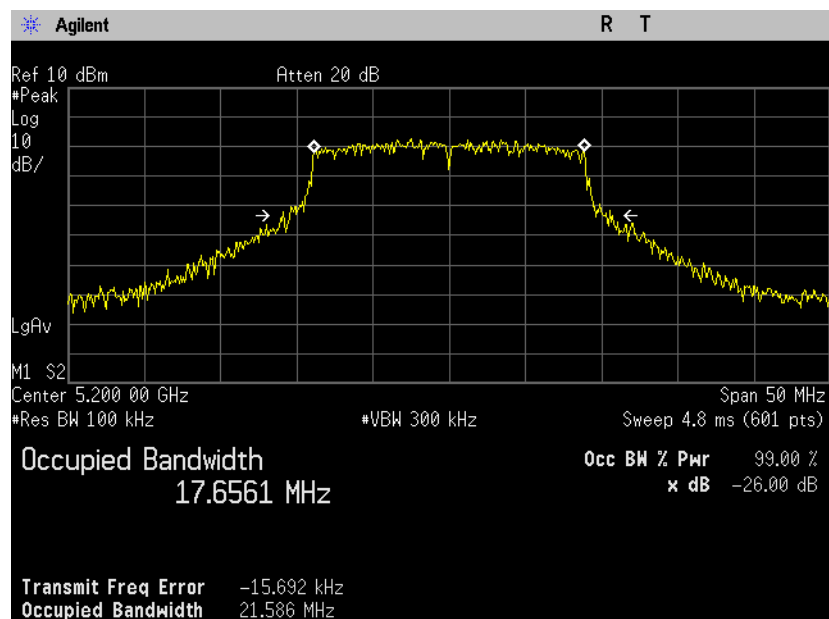
Low Frequency, Output 2
Plot 4.1.12



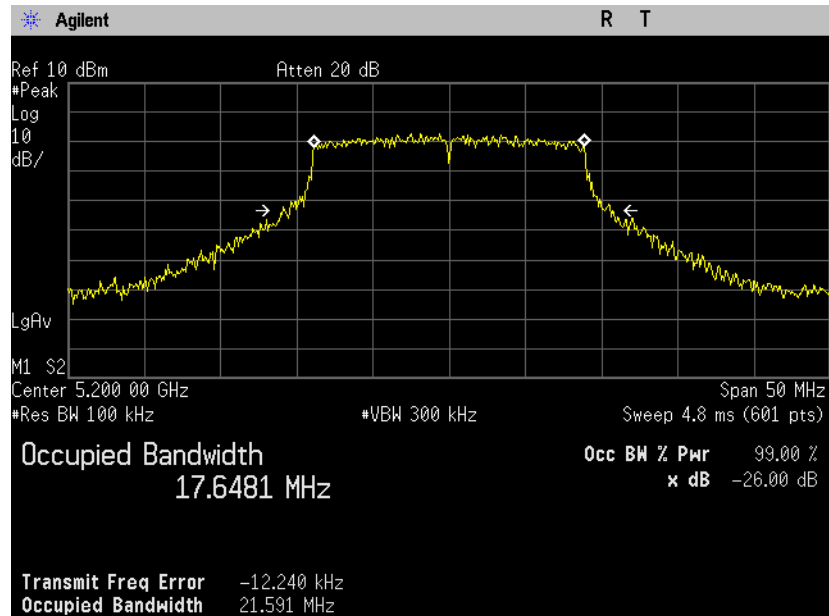
Middle Frequency, Output 0
Plot 4.1.13



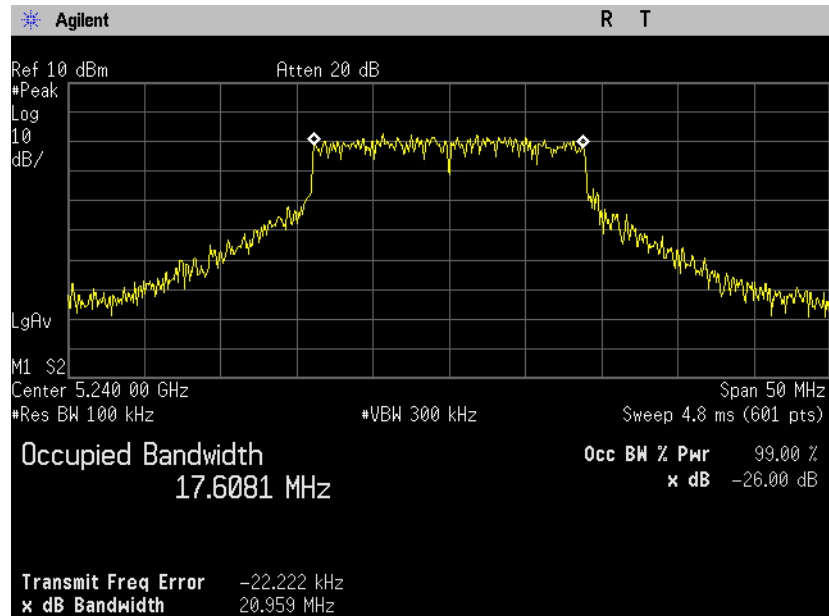
Middle Frequency, Output 1
Plot 4.1.14



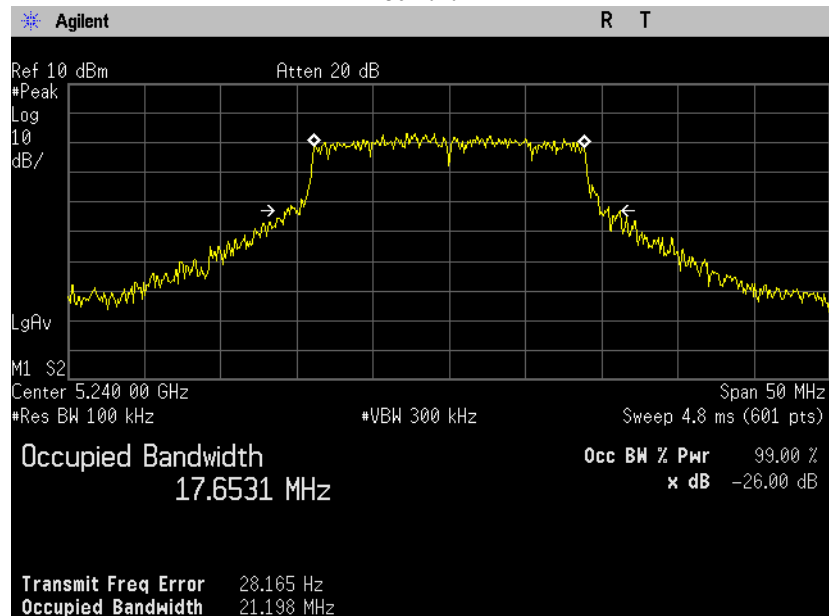
Middle Frequency, Output 2
Plot 4.1.15



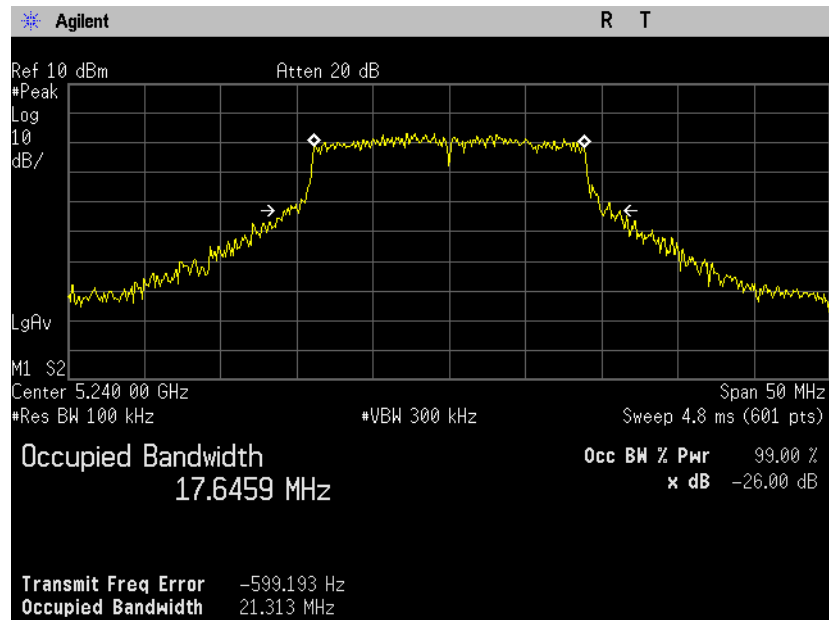
High Frequency, Output 0 Plot 4.1.16



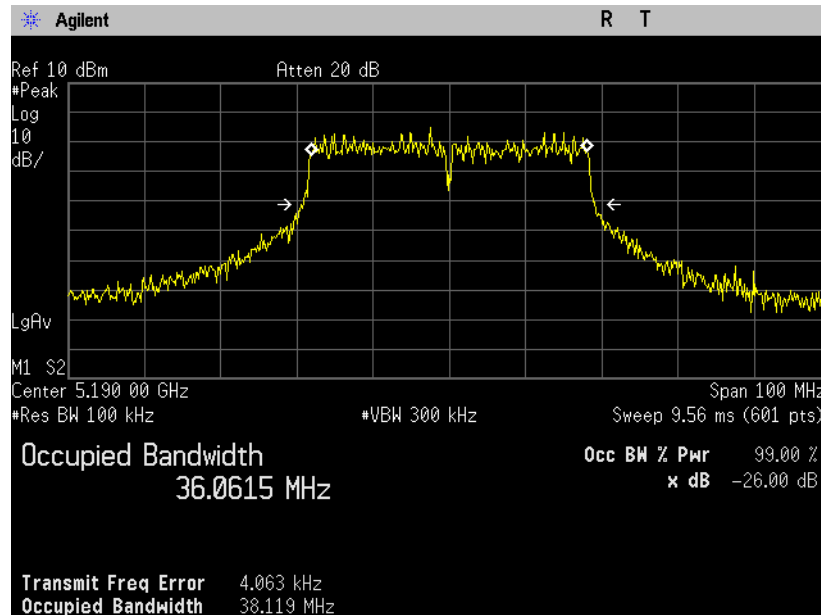
High Frequency, Output 1 Plot 4.1.17



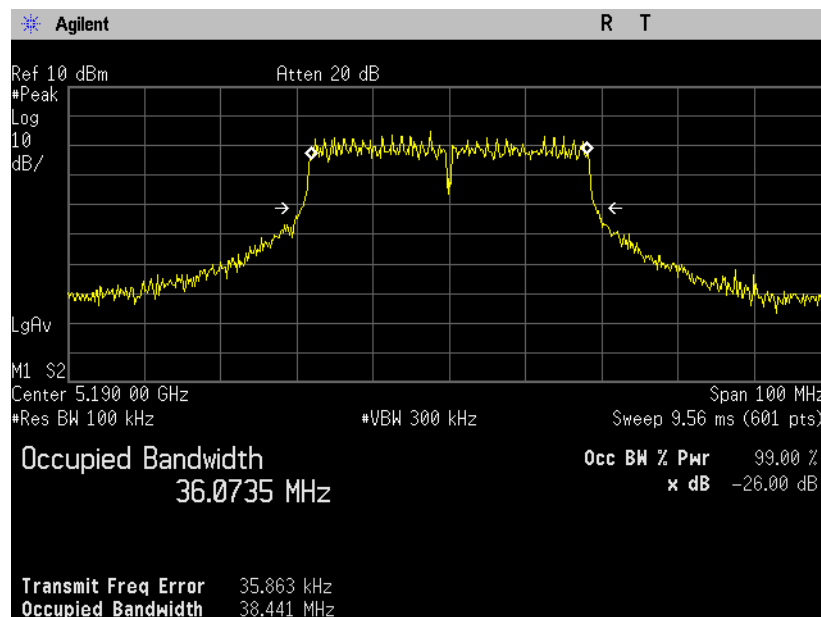
High Frequency, Output 2
Plot 4.1.18



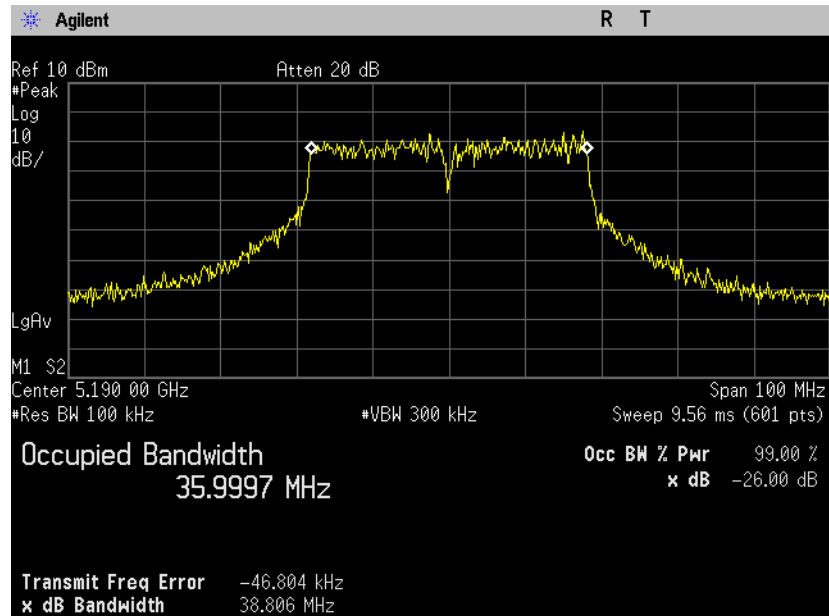
Transmitter Model: WMIA-199N/EU
802.11n 40 MHz,
Low Frequency, Output 0
Plot 4.1.19



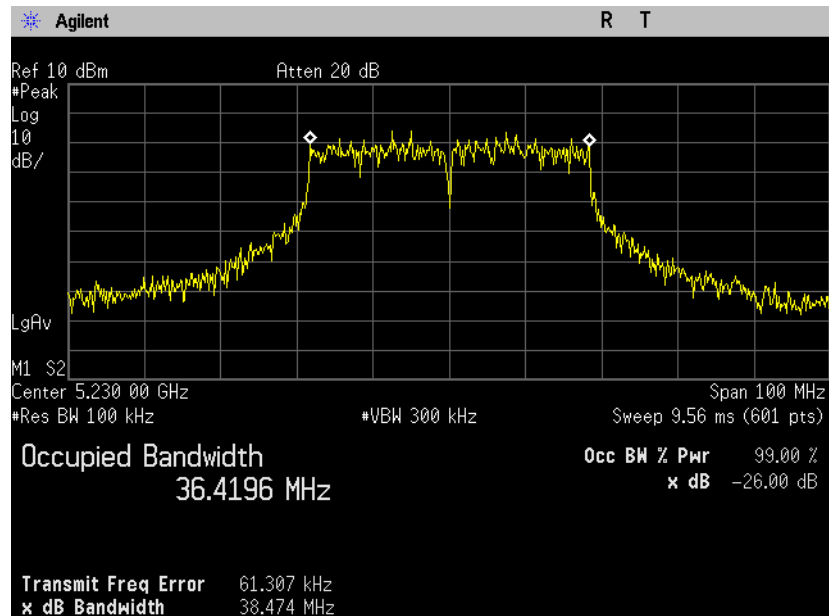
Low Frequency, Output 1
Plot 4.1.20



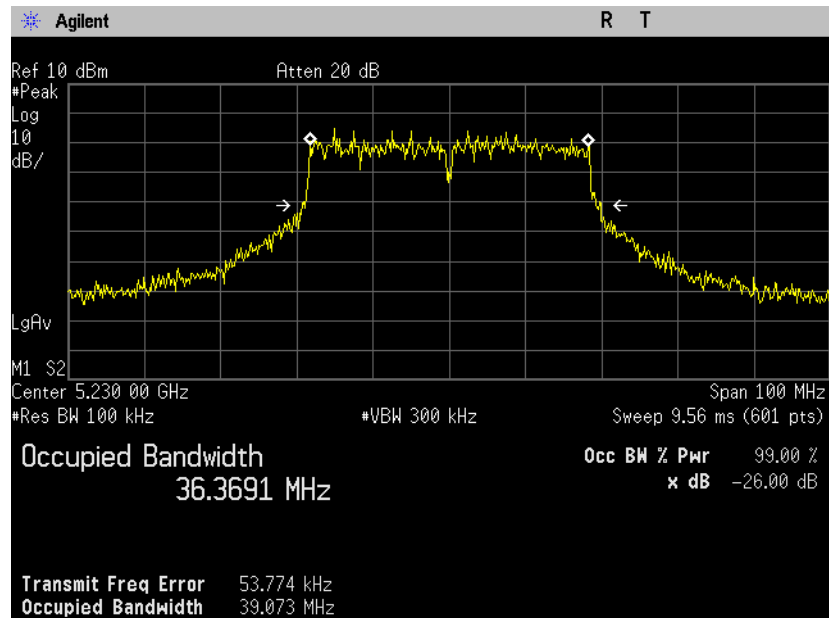
Low Frequency, Output 2
Plot 4.1.21



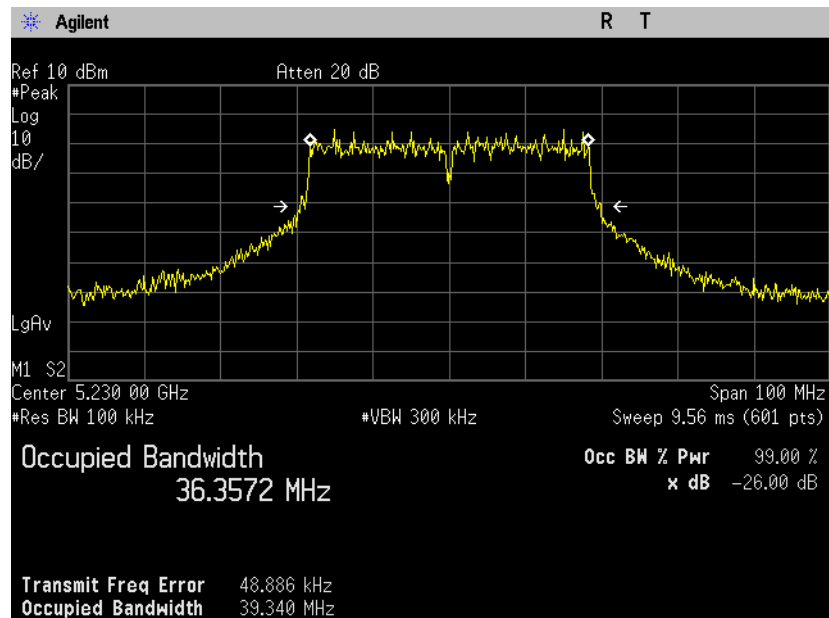
High Frequency, Output 0
Plot 4.1.22



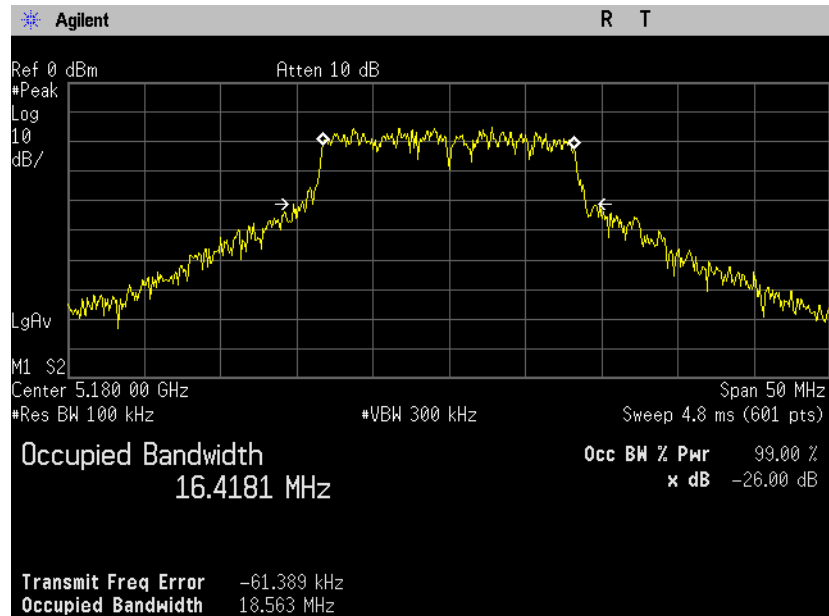
High Frequency, Output 1 Plot 4.1.23



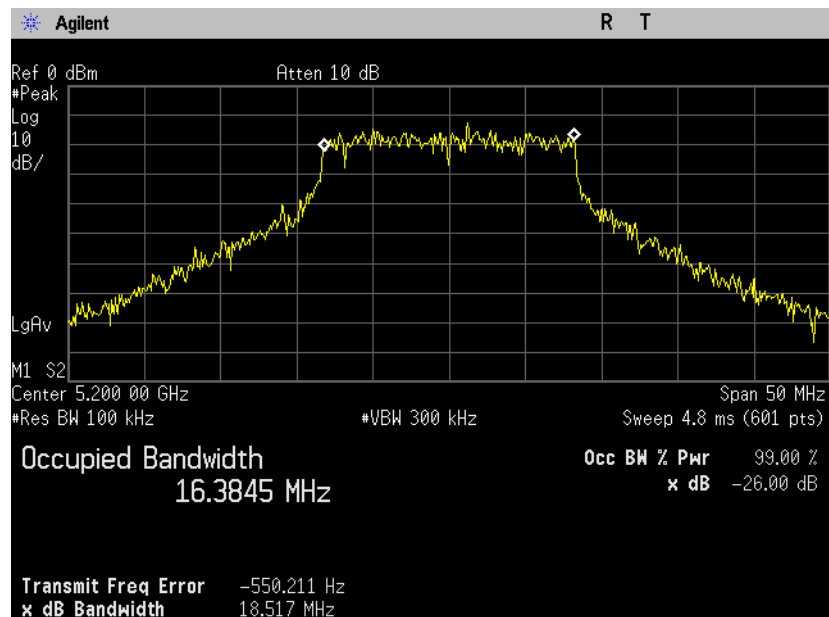
High Frequency, Output 2 Plot 4.1.24



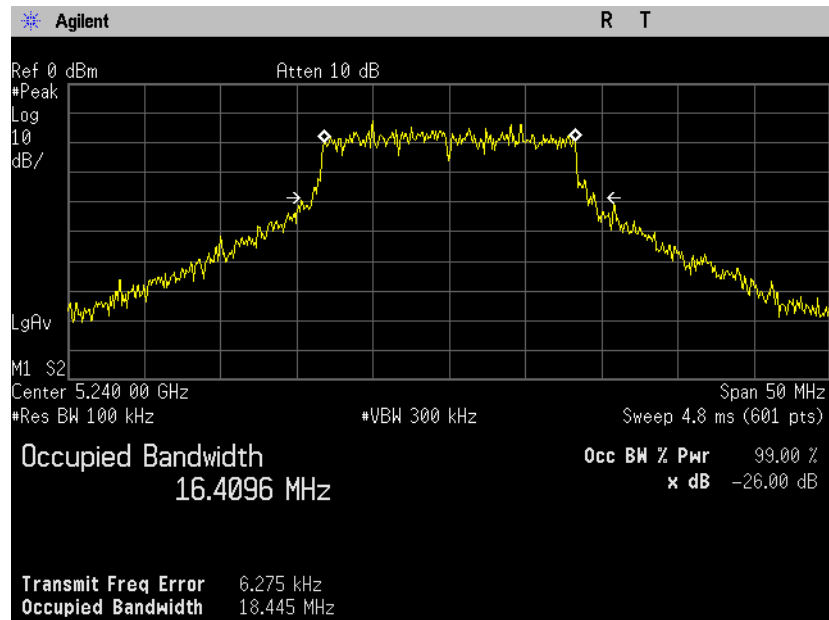
Transmitter Model: WLM54AG
Low Frequency
Plot 4.1.25



Middle Frequency
Plot 4.1.26



High Frequency Plot 4.1.27



4.2. Maximum Peak Output Power, 5180-5250 MHz

Reference document:	47 CFR §15.407 (a) (1)		
Test Requirements:	<p>For the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW or $4 \text{ dBm} + 10 \log B$, where B is the 26-dB emission bandwidth in MHz. In addition, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> <p>For the 5.25–5.35 GHz and 5.47–5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or $11 \text{ dBm} + 10 \log B$, where B is the 26 dB emission bandwidth in megahertz. In addition, the peak power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p>		
Test Method:	See sec 2.1b (Method 1)	Comply	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 1MHz, VBW: 3MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	-	

Peak results:
5150-5250MHz Band:
Transmitter Model: WLM54AG

Frequency [MHz]	26 dB Bandwidth (B) [MHz]	Measured Peak Power [dBm]	Power Limit (4 + 10Log B) [dBm]	Margin [dB]
802.11a				
5180	18.563	11.16	16.69	-5.53
5200	18.517	11.03	16.68	-5.65
5240	18.445	11.15	16.66	-5.51

Transmitter model: WMIA-199N/EU

		Frequency [MHz]	26 dB Bandwidth (B)* [MHz]	Maximum Peak Output Power [dBm]	Total Peak Power [mW]	Total power [dBm]	Power Limit (4 + 10Log B) [dBm]	Margin [dB]
802.11a								
Low	Output 0	5180	19.084	7.07	15.4	11.86	16.81	-4.95
	Output 1	5180		7.09				
	Output 2	5180		7.12				
Middle	Output 0	5200	18.061	7.56	17.5	12.43	16.57	-4.14
	Output 1	5200		7.56				
	Output 2	5200		7.86				
High	Output 0	5240	19.279	7.84	18.0	12.56	16.85	-4.29
	Output 1	5240		7.69				
	Output 2	5240		7.84				
802.11n 20 MHz								
Low	Output 0	5180	18.997	6.01	12.6	10.99	16.79	-5.81
	Output 1	5180		5.80				
	Output 2	5180		6.78				
Middle	Output 0	5200	21.306	6.81	13.8	11.39	17.00	-5.61
	Output 1	5200		5.87				
	Output 2	5200		7.11				
High	Output 0	5240	20.959	6.66	13.7	11.38	17.00	-5.62
	Output 1	5240		6.42				
	Output 2	5240		6.74				

*Minimum measured value

		Frequency [MHz]	26 dB Bandwidth (B) * [MHz]	Maximum Peak Output Power [dBm]	Total Peak Power [mW]	Total power [dBm]	Power Limit (4 + 10Log B) [dBm]	Margin [dB]
802.11n 40 MHz								
Low	Output 0	5190	38.119	7.12	17.1	12.32	17.00	-4.68
	Output 1	5190		7.65				
	Output 2	5190		7.85				
High	Output 0	5230	38.474	7.53	17.3	12.39	17.00	-4.61
	Output 1	5230		7.42				
	Output 2	5230		7.9				

*Minimum measured value

4.3. Peak Power Spectral Density

Reference document:	47 CFR §15.407 (a) (1) & RSS-210 § A9.5(2)		
Test Requirements:	<p>For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.</p> <p>For the 5.25–5.35 GHz and 5.47–5.725 GHz, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi</p>		
Test Method:	See sec 2.1c (Method 2)	Comply	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 1MHz , VBW: 3MHz , Sweep Time: Auto		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.3.1 to 4.3.27	

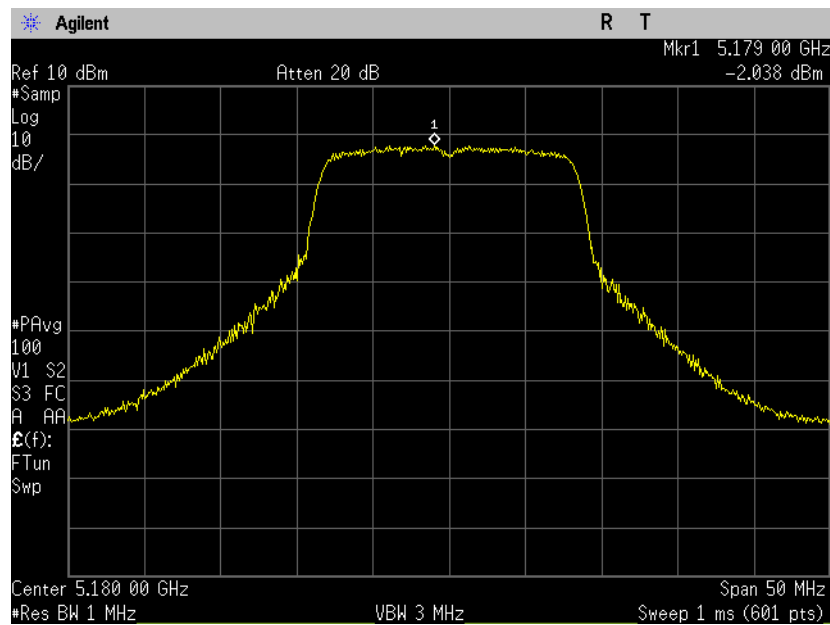
Test results: Transmitter Model: WMIA-199N/EU
Frequency: 5150 MHz - 5250 MHz,

		Frequency [MHz]	Data Rate [Mbps]	PPSD [dBm/1MHz]	Total PPSD [dBm/1MHz]	PPSD Limit [dBm/1MHz]	Margin [dB]	Ref. Plots
802.11 a								
Low	Output 0	5180	6	-2.038	3.149	4	0.851	4.3.1
	Output 1	5180	6	-2.421				4.3.2
	Output 2	5180	6	-0.620				4.3.3
Middle	Output 0	5200	6	-2.487	3.127	4	0.873	4.3.4
	Output 1	5200	6	-2.383				4.3.5
	Output 2	5200	6	-0.397				4.3.6
High	Output 0	5240	6	-3.173	2.552	4	1.448	4.3.7
	Output 1	5240	6	-2.812				4.3.8
	Output 2	5240	6	-0.997				4.3.9
802.11n 20 MHz								
Low	Output 0	5180	6.5	-2.486	2.905	4	1.095	4.3.10
	Output 1	5180	6.5	-2.688				4.3.11
	Output 2	5180	6.5	-0.708				4.3.12
Middle	Output 0	5175	6.5	-1.699	3.347	4	0.653	4.3.13
	Output 1	5175	6.5	-1.840				4.3.14
	Output 2	5175	6.5	-0.808				4.3.15
High	Output 0	5240	6.5	-2.611	3.073	4	0.927	4.3.16
	Output 1	5240	6.5	-2.164				4.3.17
	Output 2	5240	6.5	-0.588				4.3.18
802.11n 40 MHz								
Low	Output 0	5190	13.5	-4.261	0.646	4	3.354	4.3.19
	Output 1	5190	13.5	-4.438				4.3.20
	Output 2	5190	13.5	-3.709				4.3.21
High	Output 0	5230	13.5	-4.896	0.653	4	3.347	4.3.22
	Output 1	5230	13.5	-4.327				4.3.23
	Output 2	5230	13.5	-3.288				4.3.24

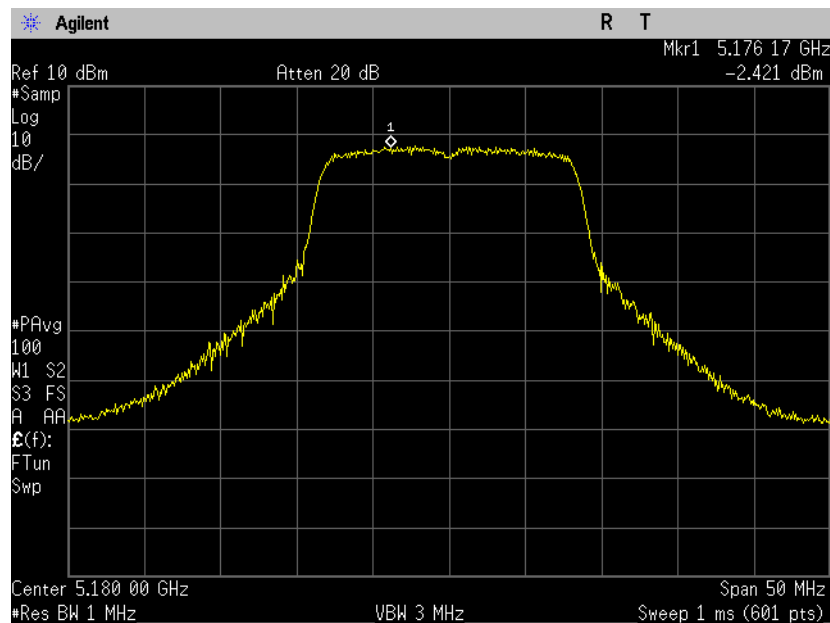
Transmitter Model: WLM54AG

	Frequency [MHz]	Data Rate [Mbps]	PPSD [dBm/1MHz]	PPSD Limit [dBm/1MHz]	Margin [dB]	Ref. Plots
802.11a						
Low	5180	6	2.602	4	-1.398	4.3.25
Middle	5200	6	2.698		-1.302	4.3.26
High	5240	6	2.642		-1.358	4.3.27

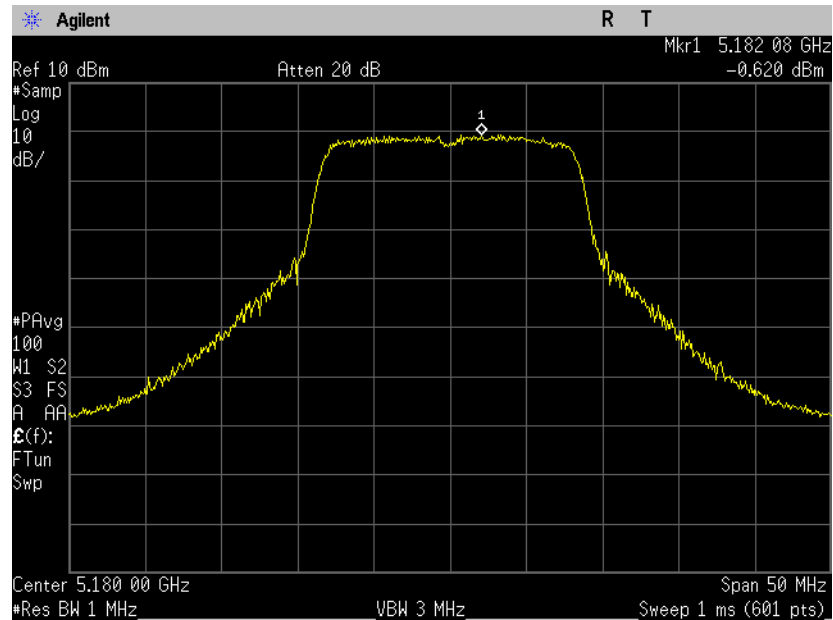
5150 MHz - 5250 MHz
Transmitter Model: WMIA-199N/EU
802.11a
Low Frequency, Output 0
Plot 4.3.1



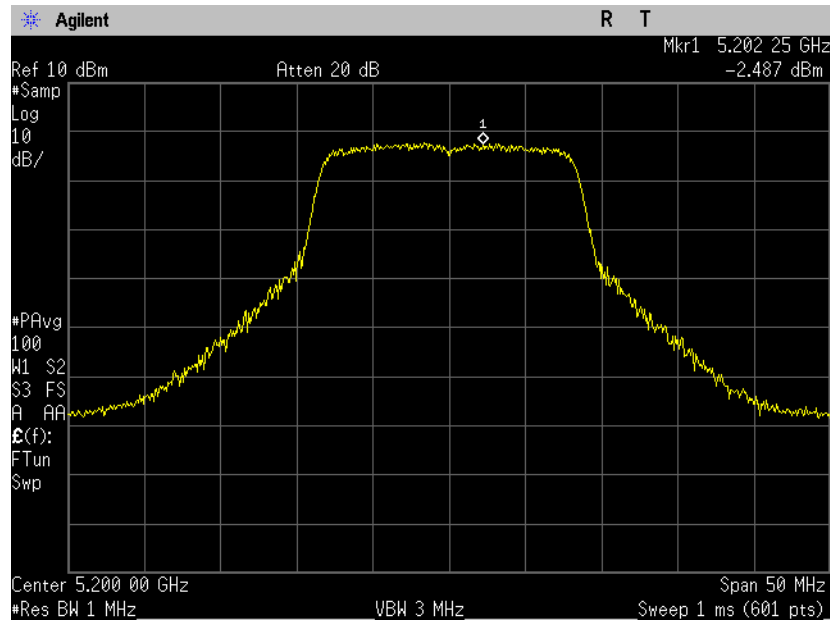
Low Frequency, Output 1
Plot 4.3.2



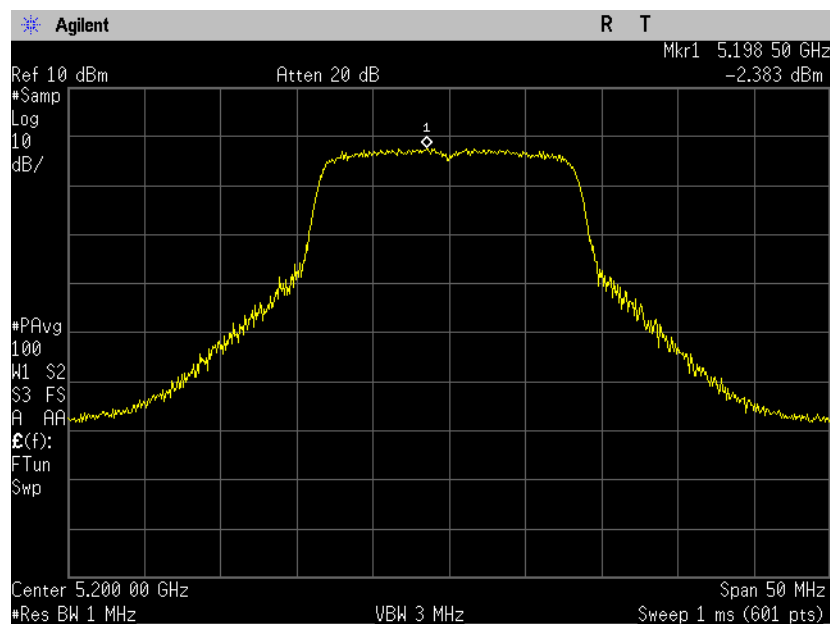
Low Frequency, Output 2
Plot 4.3.3



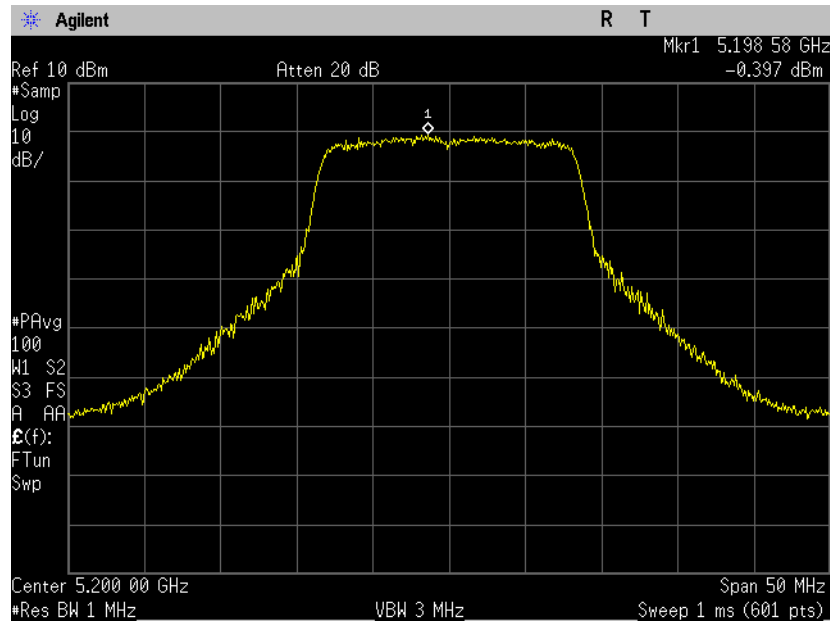
Middle Frequency, Output 0
Plot 4.3.4



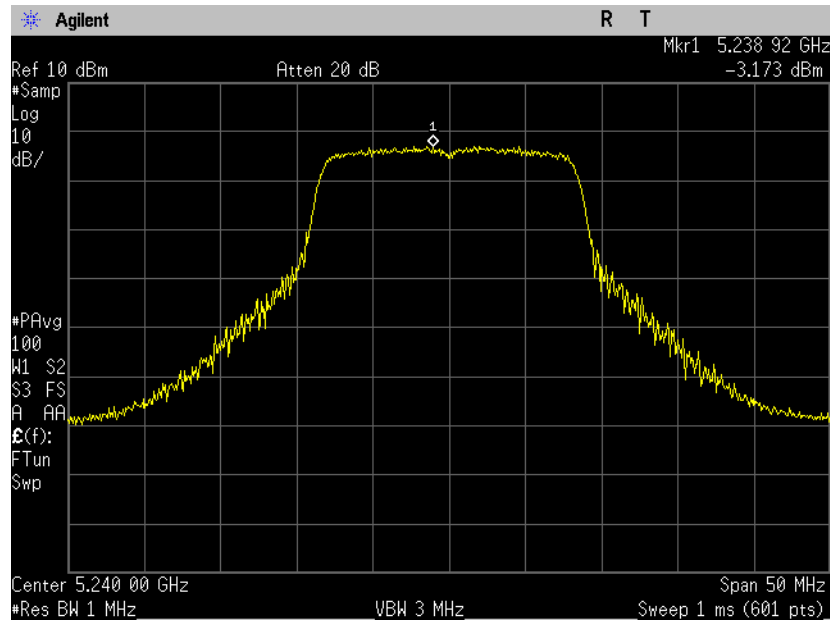
Middle Frequency, Output 1
Plot 4.3.5



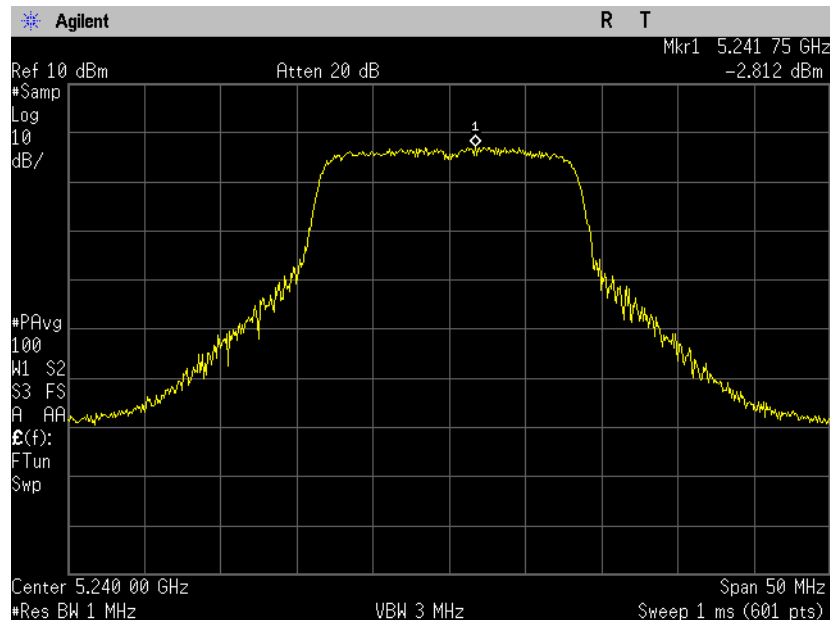
Middle Frequency, Output 2
Plot 4.3.6



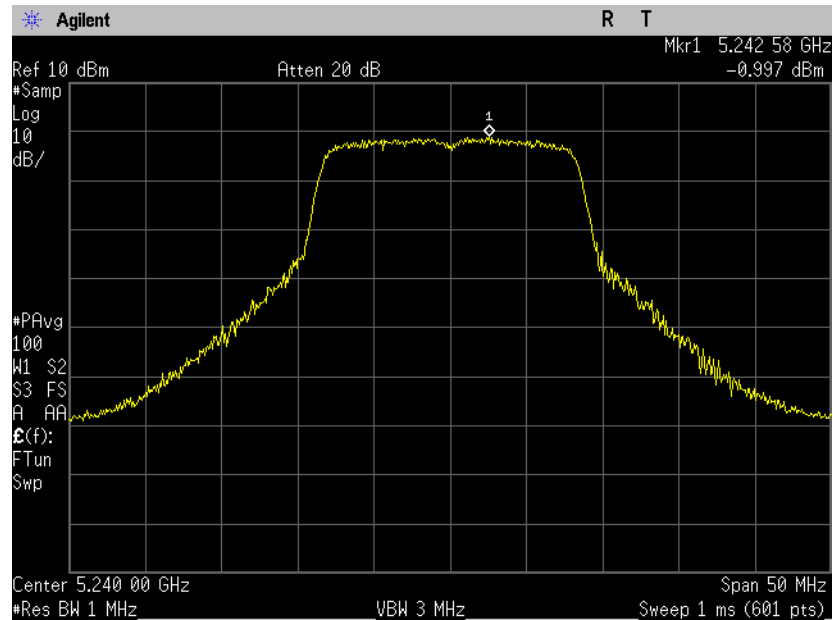
High Frequency, Output 0 Plot 4.3.7



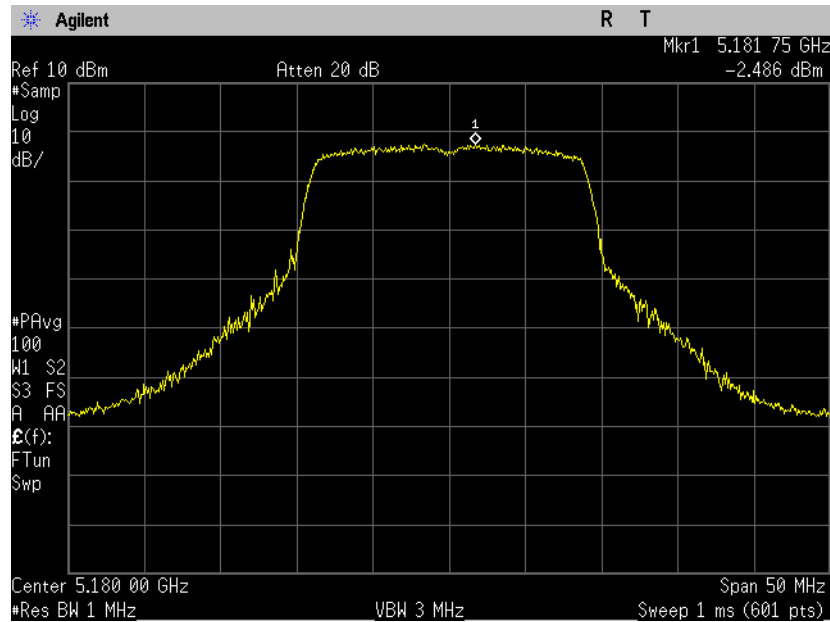
High Frequency, Output 1 Plot 4.3.8



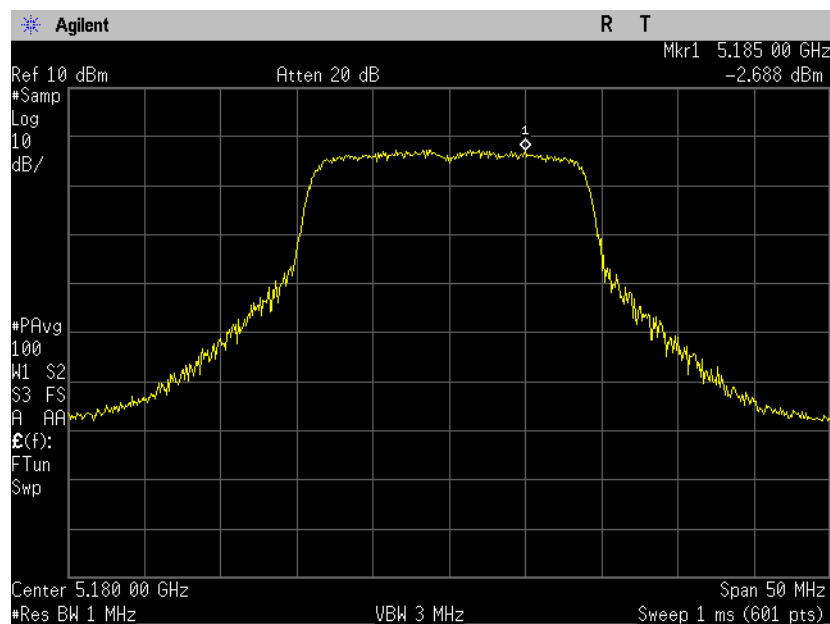
High Frequency, Output 2 Plot 4.3.9



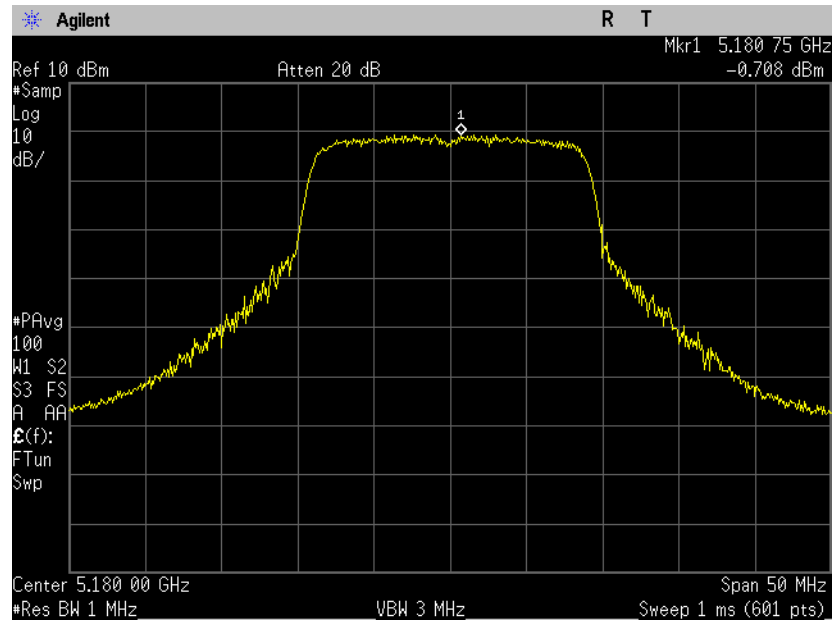
802.11n 20 MHz
Low Frequency, Output 0
Plot 4.3.10



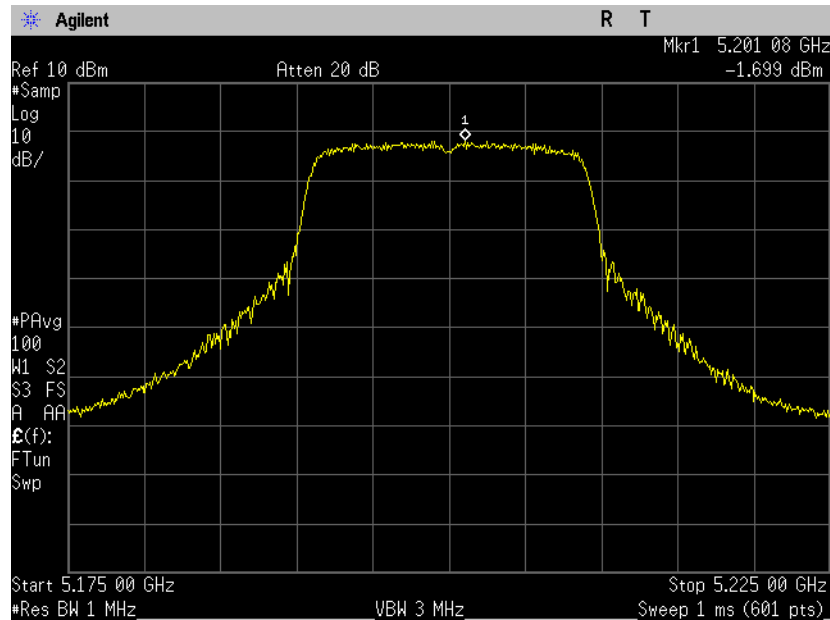
Low Frequency, Output 1
Plot 4.3.11



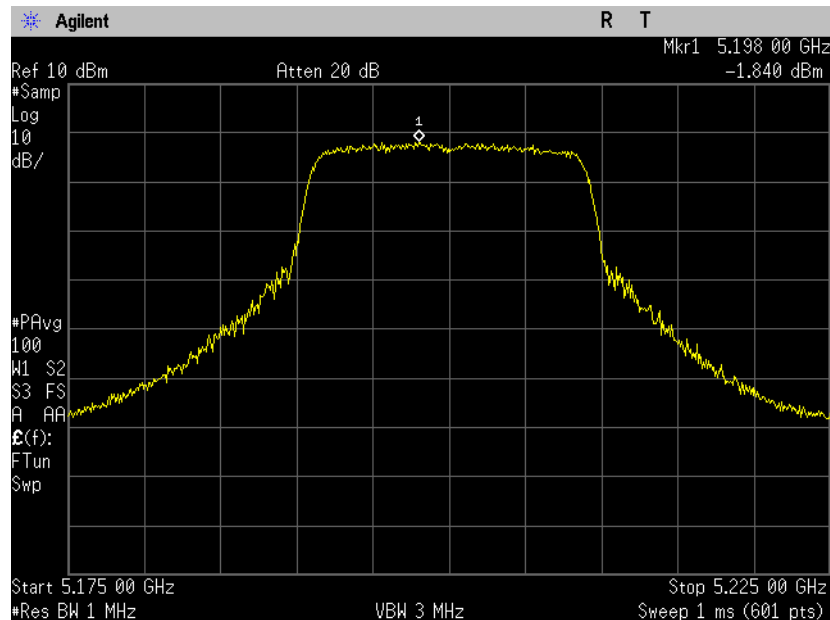
Low Frequency, Output 2
Plot 4.3.12



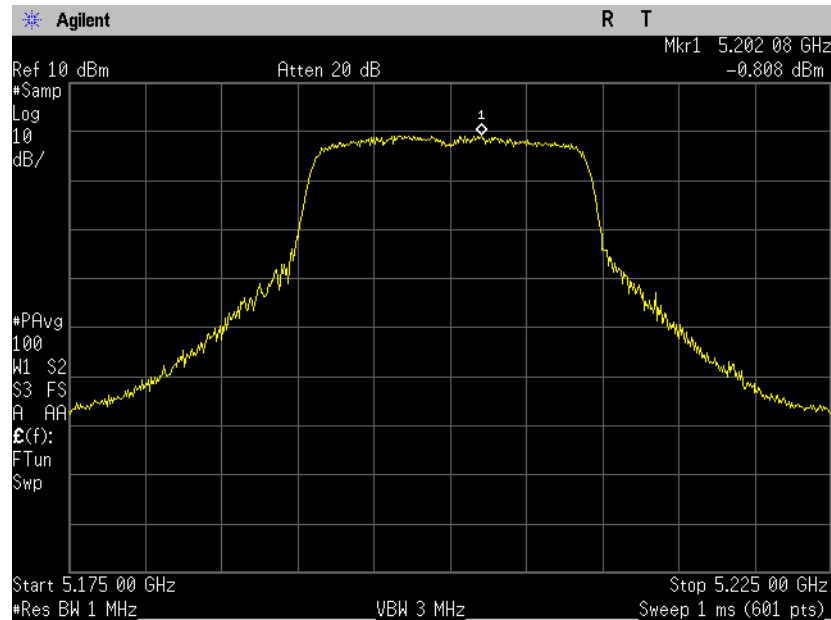
Middle Frequency, Output 0
Plot 4.3.13



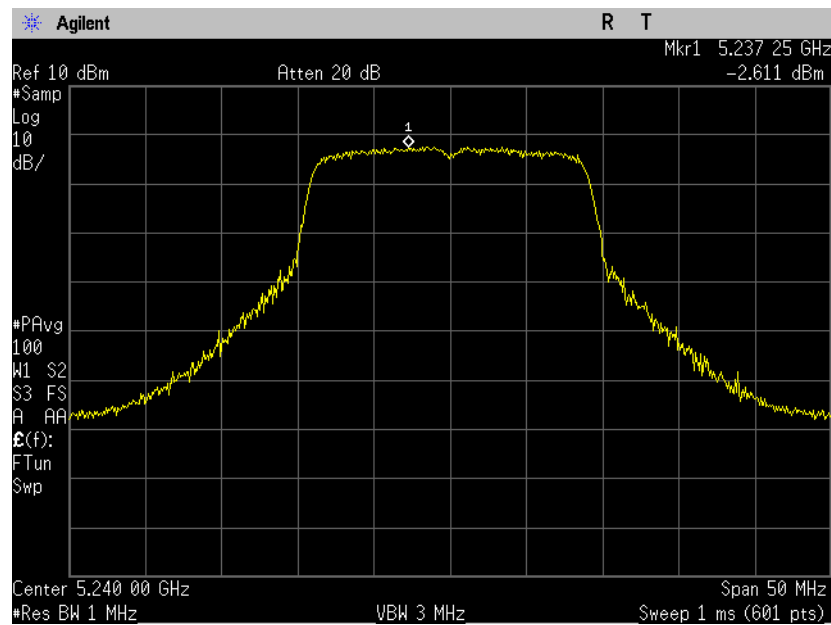
Middle Frequency, Output 1
Plot 4.3.14



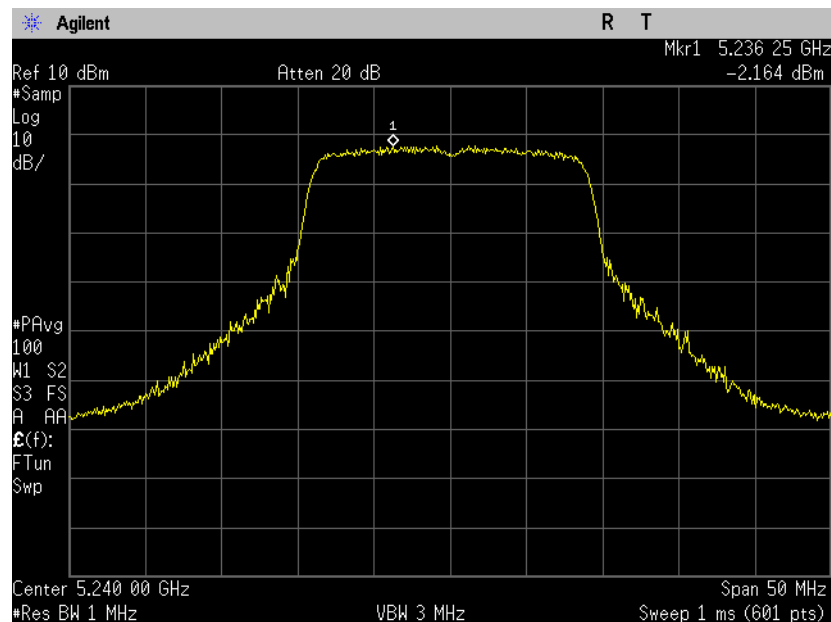
Middle Frequency, Output 2
Plot 4.3.15



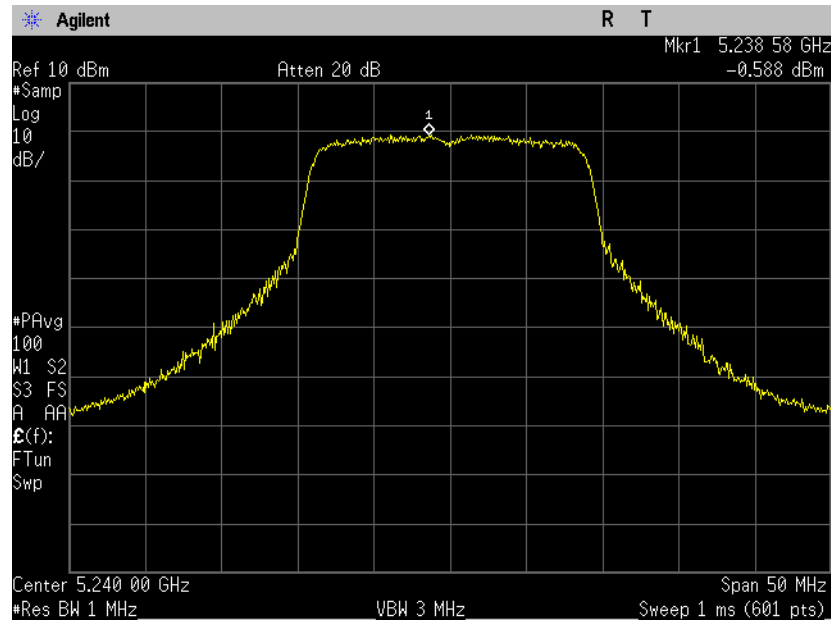
High Frequency, Output 0 Plot 4.3.16



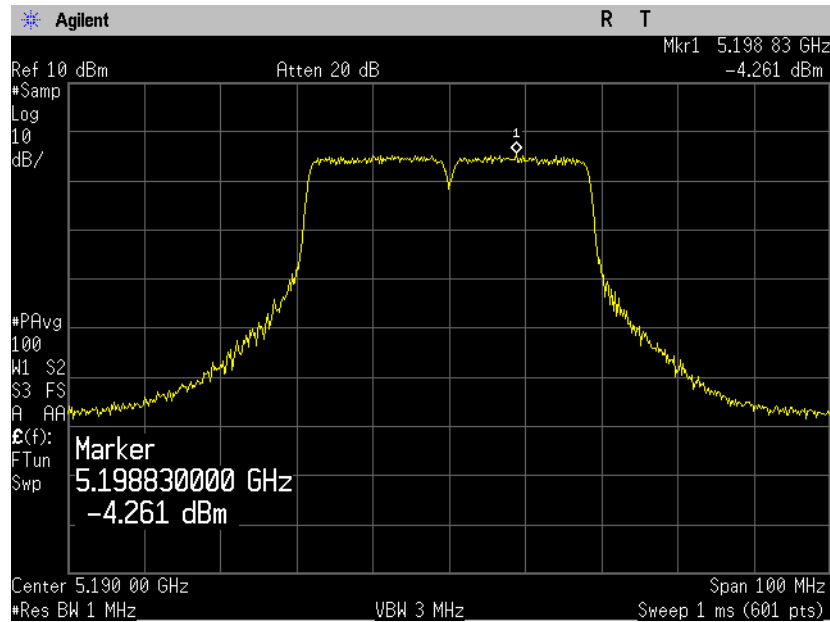
High Frequency, Output 1 Plot 4.3.17



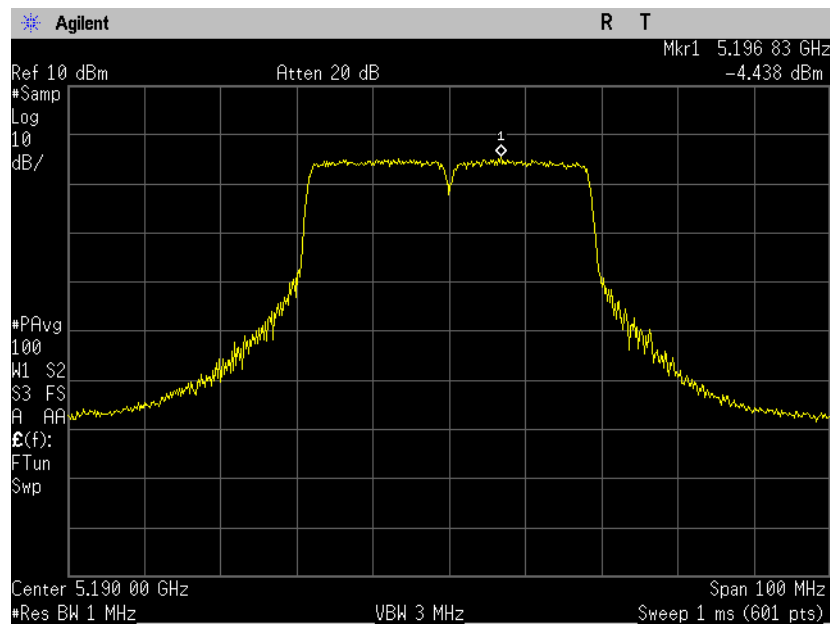
High Frequency, Output 2 Plot 4.3.18



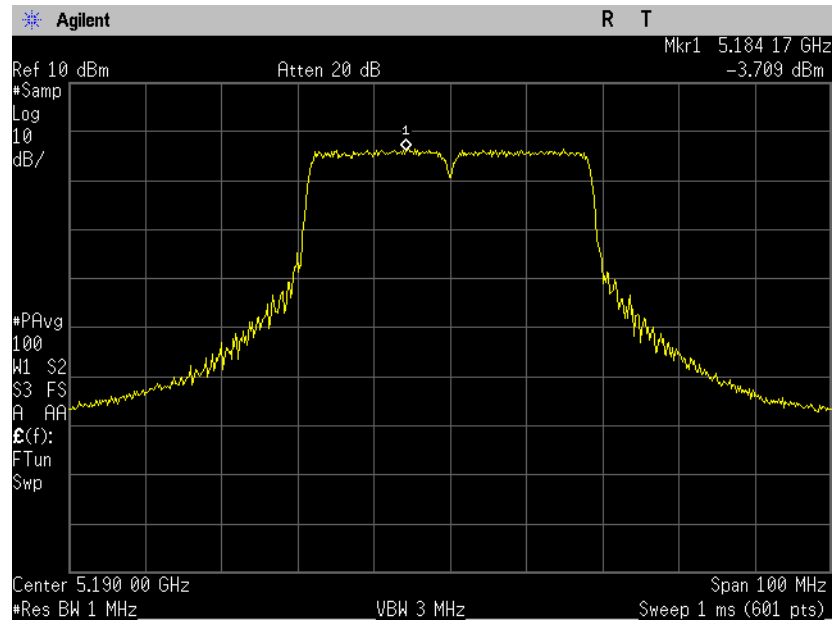
802.11n 40 MHz
Low Frequency, Output 0
Plot 4.3.19



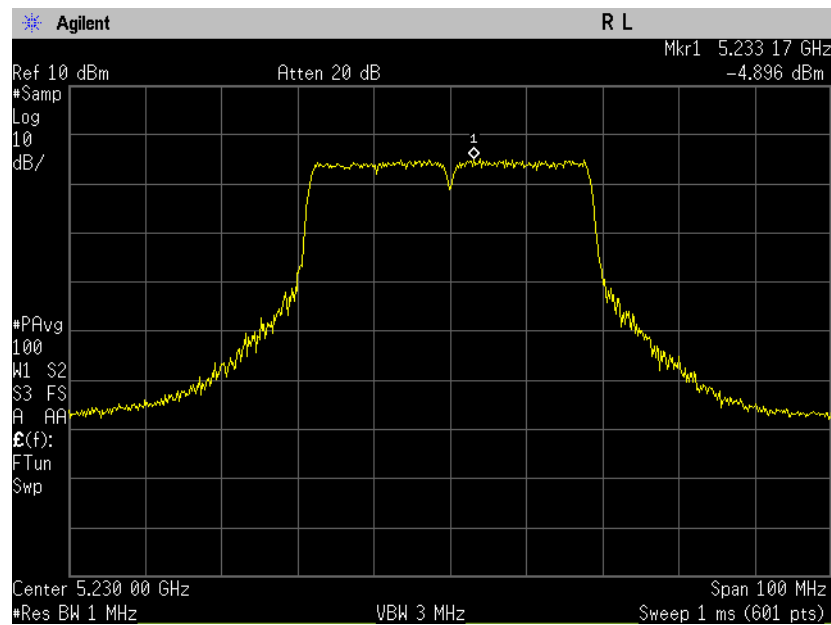
Low Frequency, Output 1
Plot 4.3.20



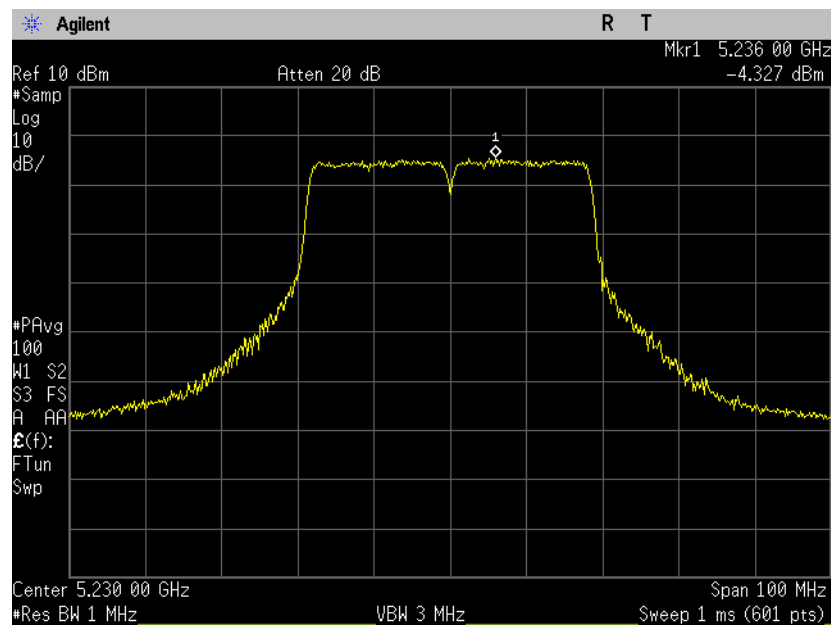
Low Frequency, Output 2
Plot 4.3.21



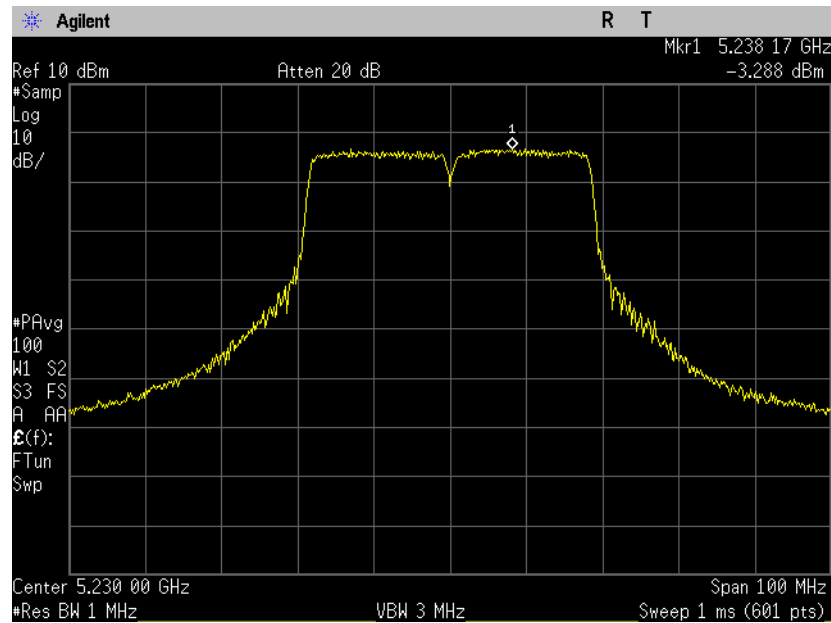
High Frequency, Output 0 Plot 4.3.22



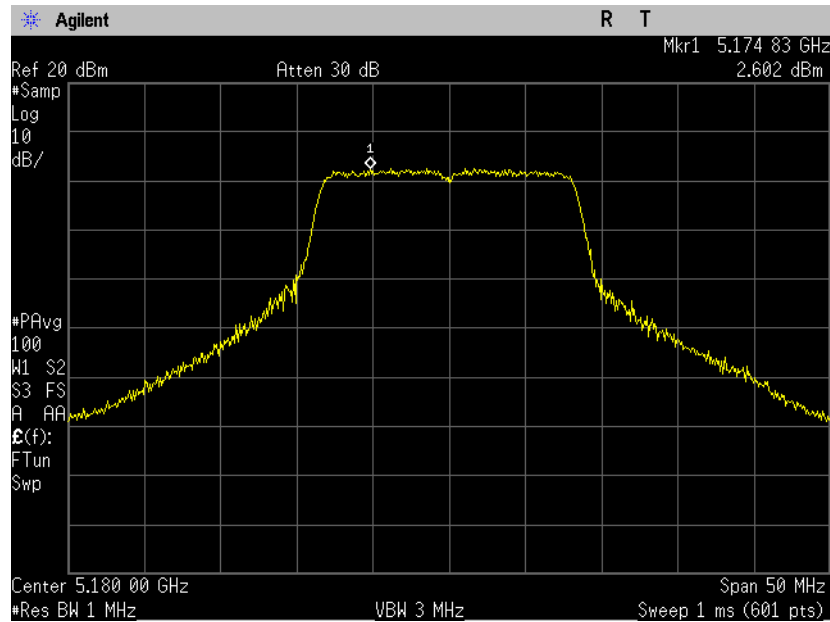
High Frequency, Output 1 Plot 4.3.23



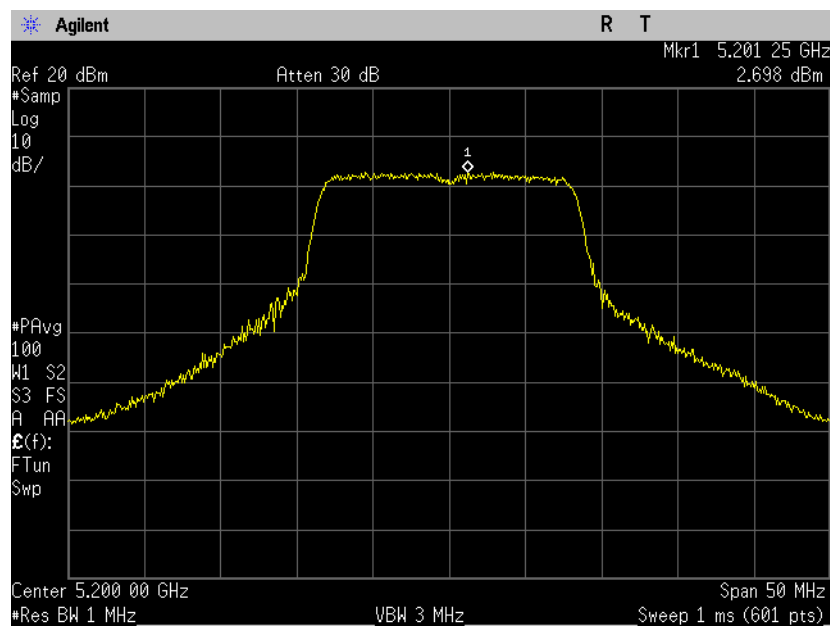
High Frequency, Output 2
Plot 4.3.24



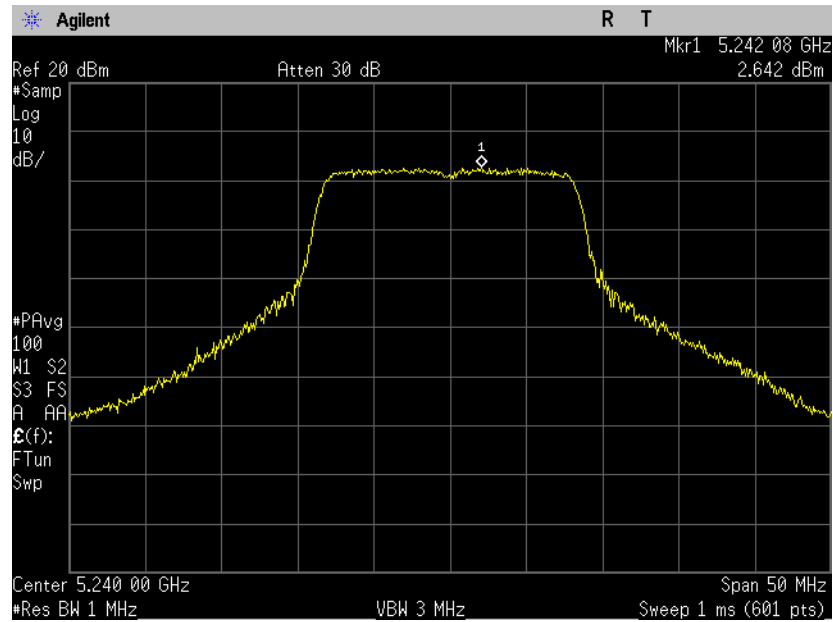
Transmitter Model: WLM54AG
802.11a
Low Frequency
Plot 4.3.25



Middle Frequency
Plot 4.3.26



High Frequency Plot 4.3.27



4.4. Peak Excursion

Reference document:	47 CFR §15.407 (a) (6)		
Test Requirements:	The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.		
Test Method:	See sec 2.1d	Comply	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	Trace 1:RBW: 1MHz , VBW: 3MHz , Peak Det., Max Hold, Sweep Time: Auto, Trace 2: RBW: 1MHz , VBW: 3MHz , Sample Detector, 100 traces averaged		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.4.1 to 4.4.27	

Test Results:

Frequency: 5150 MHz - 5250 MHz,

Transmitter Model: WMIA-199N/EU

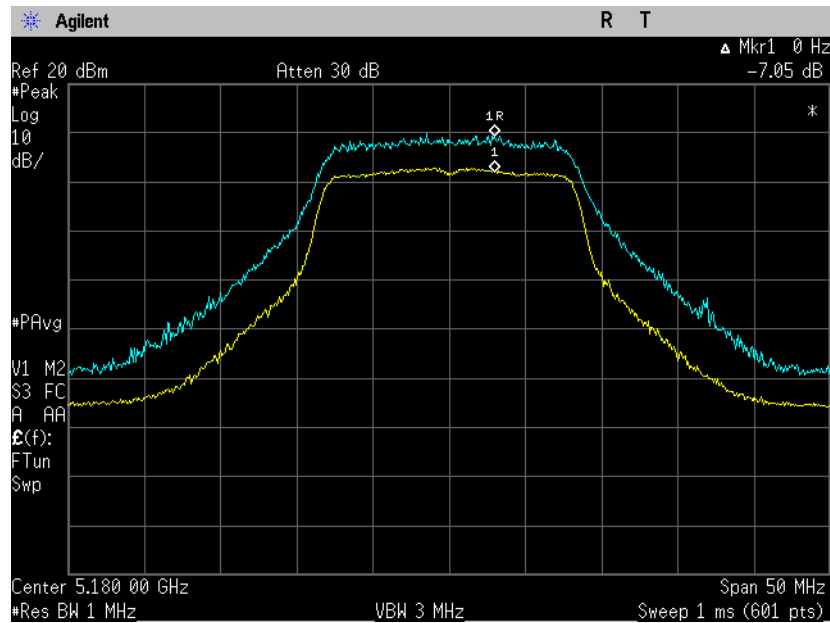
		Frequency [MHz]	Peak Excursion [dB]	Limit [dB]	Margin [dB]	Ref. Plots
802.11a						
Low	Output 0	5180	-7.05	13	-20.05	4.4.1
	Output 1	5180	-6.22	13	-19.22	4.4.2
	Output 2	5180	-6.90	13	-19.9	4.4.3
Middle	Output 0	5200	7.40	13	-5.6	4.4.4
	Output 1	5200	-6.15	13	-19.15	4.4.5
	Output 2	5200	-5.63	13	-18.63	4.4.6
High	Output 0	5240	-8.85	13	-21.85	4.4.7
	Output 1	5240	-6.94	13	-19.94	4.4.8
	Output 2	5240	-5.18	13	-18.18	4.4.9

		Frequency [MHz]	Peak Excursion [dB]	Limit [dB]	Margin [dB]	Ref. Plots
802.11n 20 MHz						
Low	Output 0	5180	-7.41	13	-20.41	4.4.10
	Output 1	5180	-5.30	13	-18.3	4.4.11
	Output 2	5180	-5.78	13	-18.78	4.4.12
Middle	Output 0	5200	-5.09	13	-18.09	4.4.13
	Output 1	5200	-4.72	13	-17.72	4.4.14
	Output 2	5200	-4.99	13	-17.99	4.4.15
High	Output 0	5240	-5.44	13	-18.44	4.4.16
	Output 1	5240	-5.14	13	-18.14	4.4.17
	Output 2	5240	-5.45	13	-18.45	4.4.18
802.11n 40 MHz						
Low	Output 0	5190	-6.62	13	-19.62	4.4.19
	Output 1	5190	-5.82	13	-18.82	4.4.20
	Output 2	5190	-5.43	13	-18.43	4.4.21
High	Output 0	5230	-5.87	13	-18.87	4.4.22
	Output 1	5230	-5.88	13	-18.88	4.4.23
	Output 2	5230	-5.60	13	-18.6	4.4.24

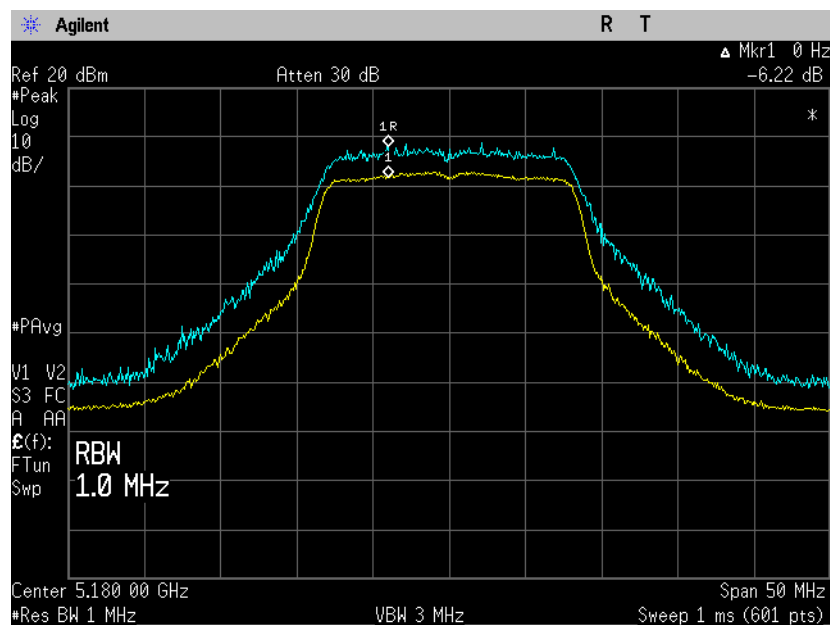
Transmitter Model: WLM54AG

		Frequency [MHz]	Peak Excursion [dB]	Limit [dB]	Margin [dB]	Ref. Plots
802.11a						
Low	-	5180	-4.13	13	-17.13	4.4.25
Middle	-	5200	-4.32	13	-17.32	4.4.26
High	-	5240	-3.57	13	-16.57	4.4.27

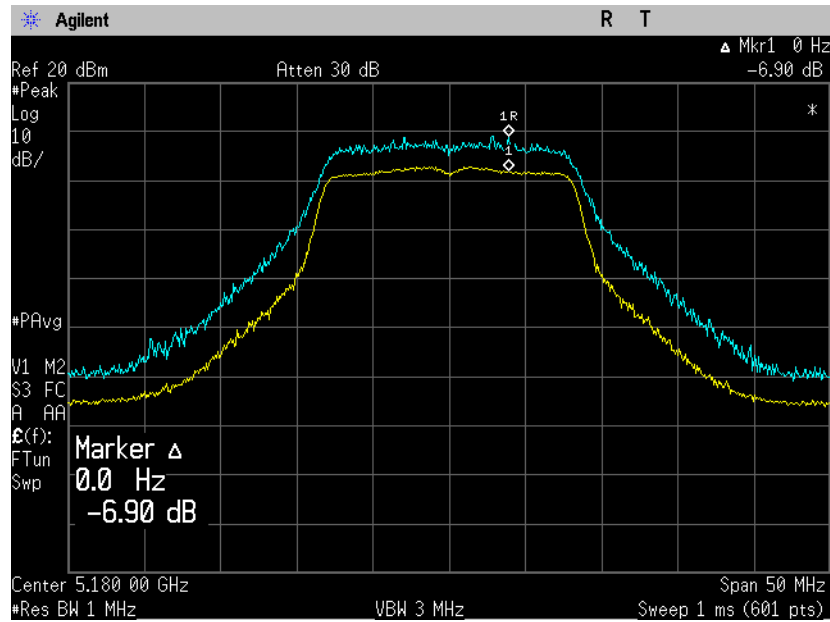
5150MHz - 5250 MHz
Transmitter Model: WMIA-199N/EU
802.11a
Low Frequency, Output 0
Plot 4.4.1



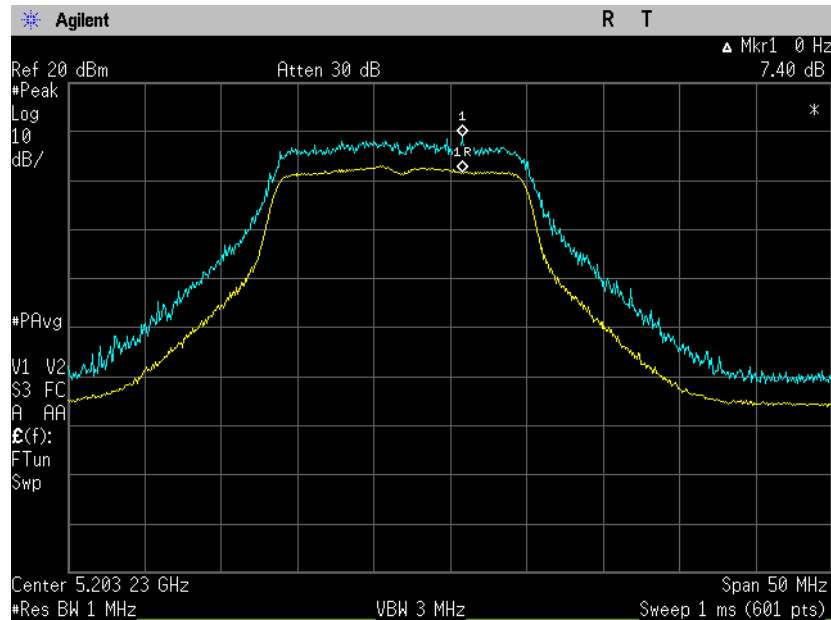
Low Frequency, Output 1
Plot 4.4.2



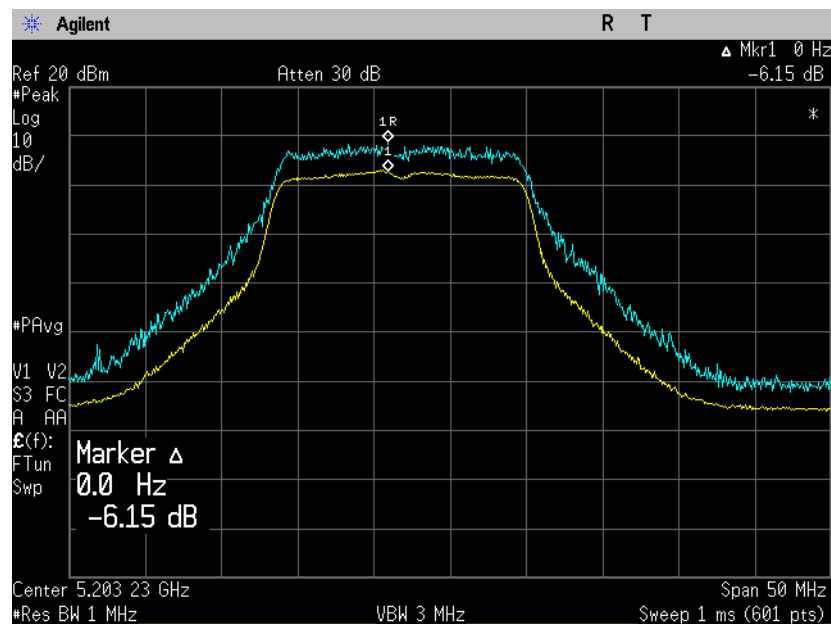
Low Frequency, Output 2
Plot 4.4.3



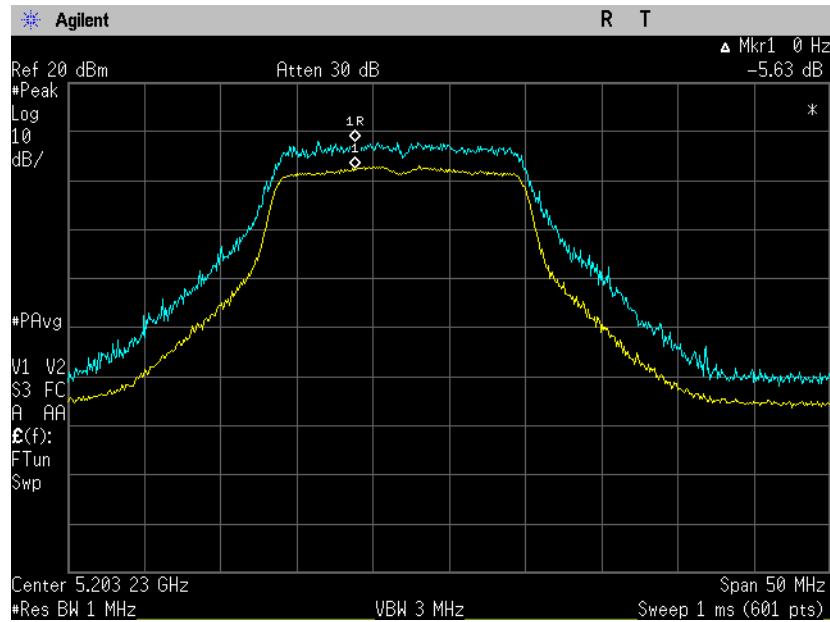
Middle Frequency, Output 0 Plot 4.4.4



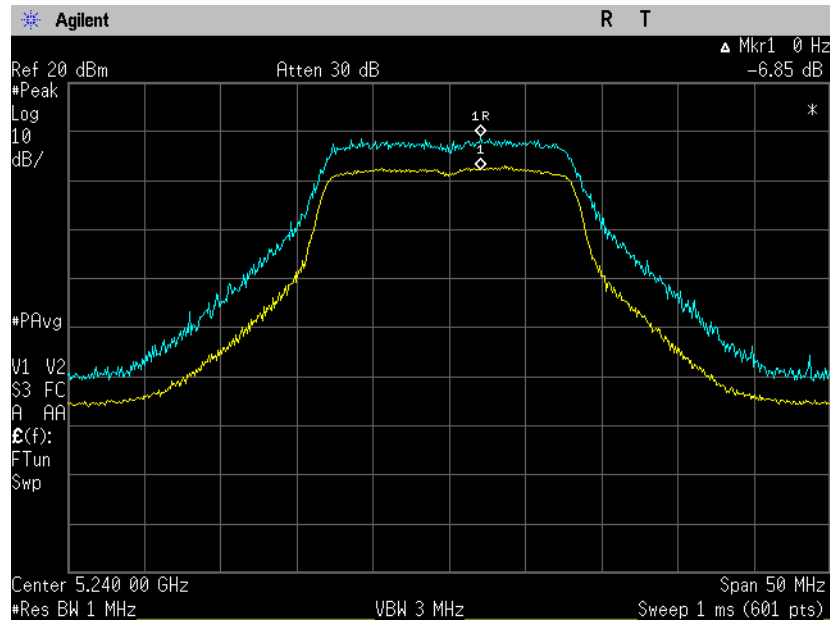
Middle Frequency, Output 1 Plot 4.4.5



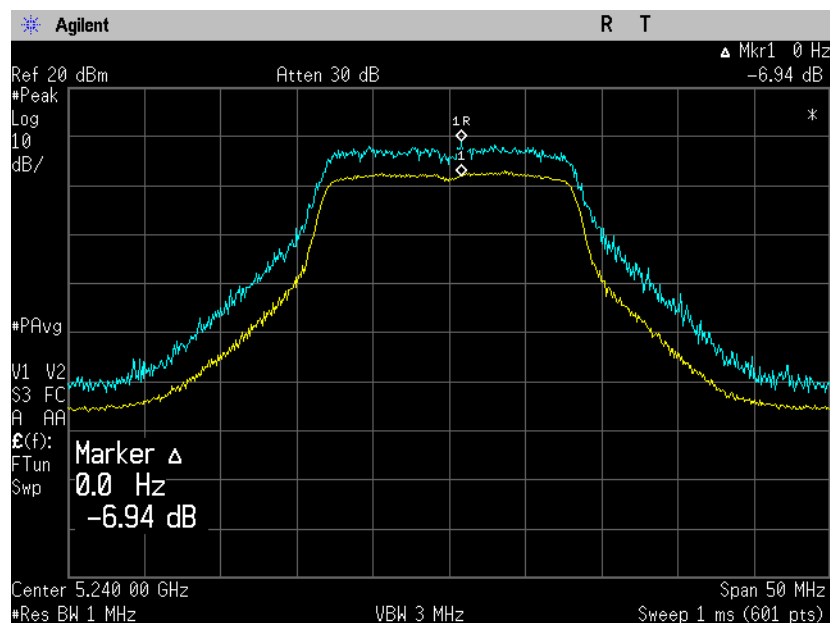
Middle Frequency, Output 2 Plot 4.4.6



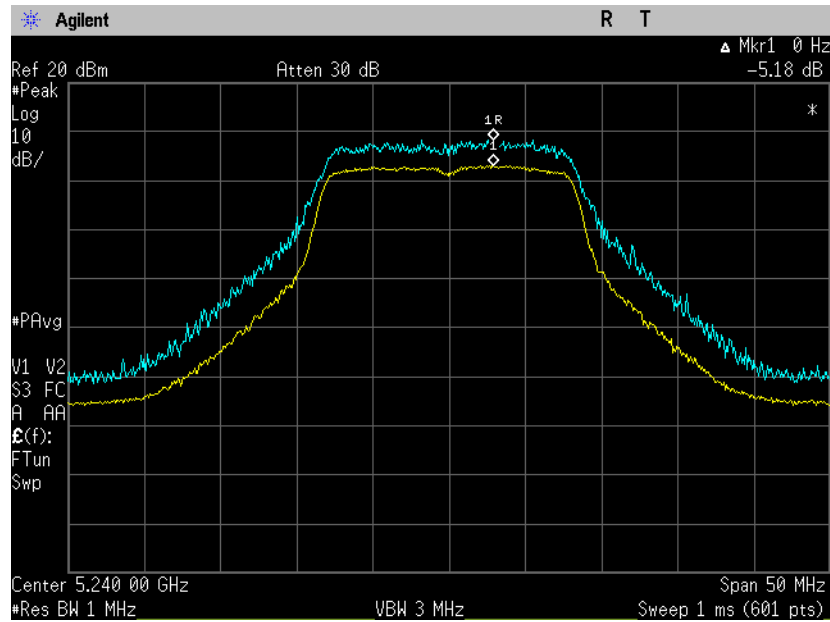
High Frequency, Output 0 Plot 4.4.7



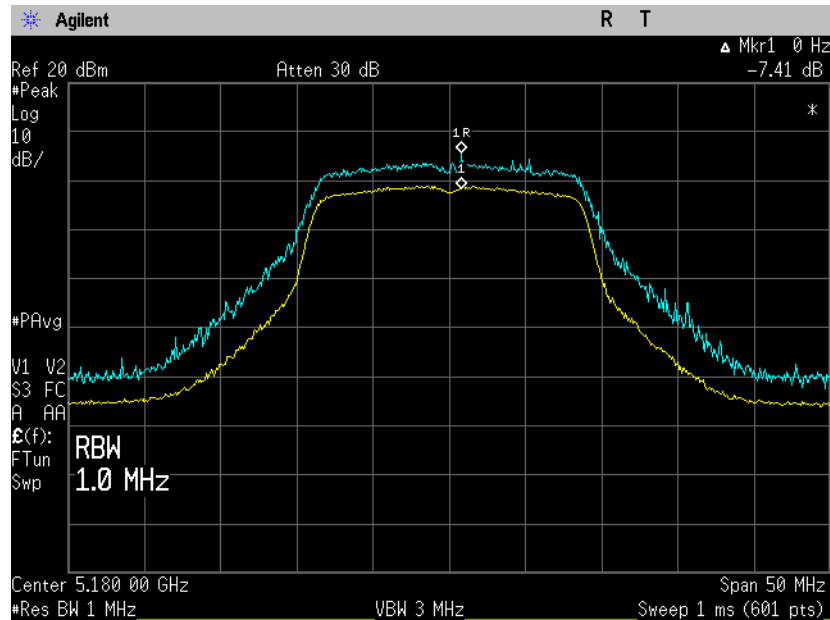
High Frequency, Output 1 Plot 4.4.8



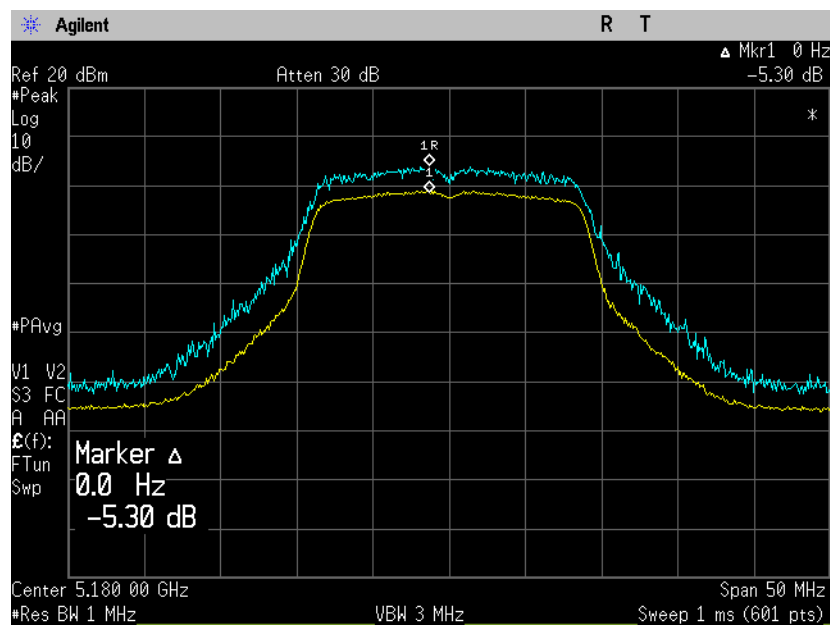
High Frequency, Output 2 Plot 4.4.9



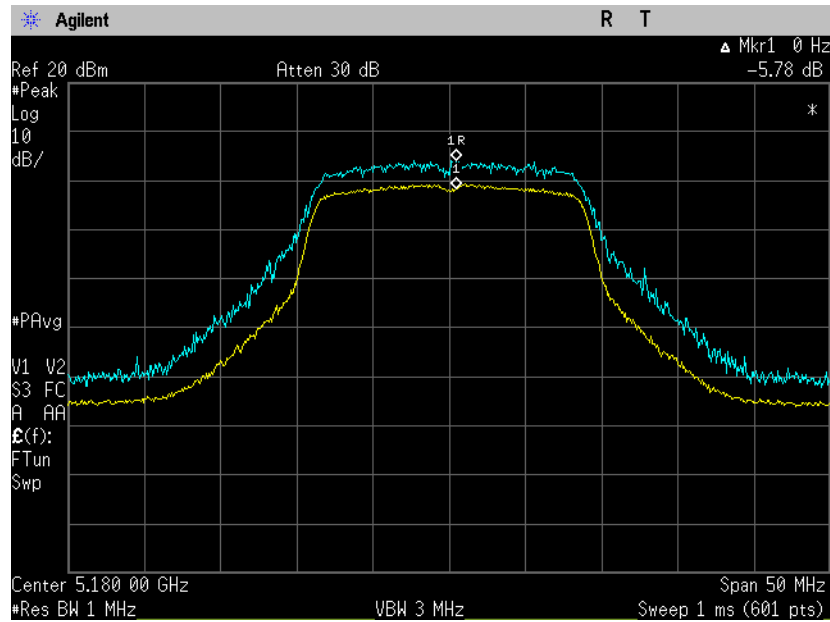
**802.11n 20 MHz
Low Frequency, Output 0
Plot 4.4.10**



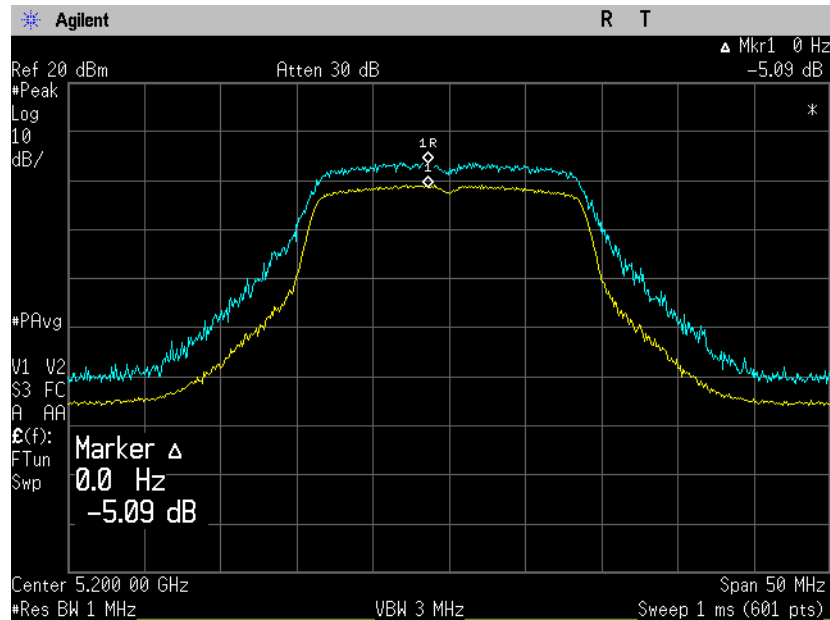
**Low Frequency, Output 1
Plot 4.4.11**



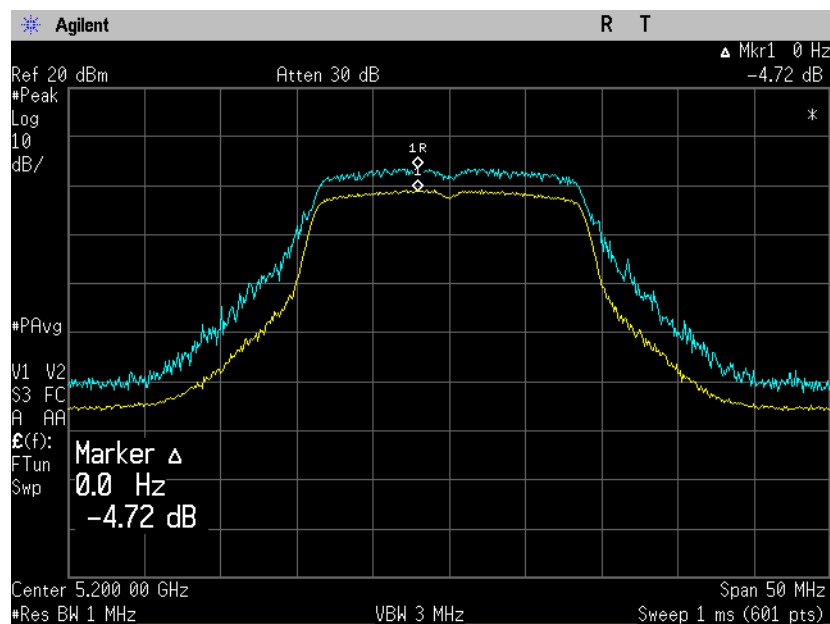
Low Frequency, Output 2 Plot 4.4.12



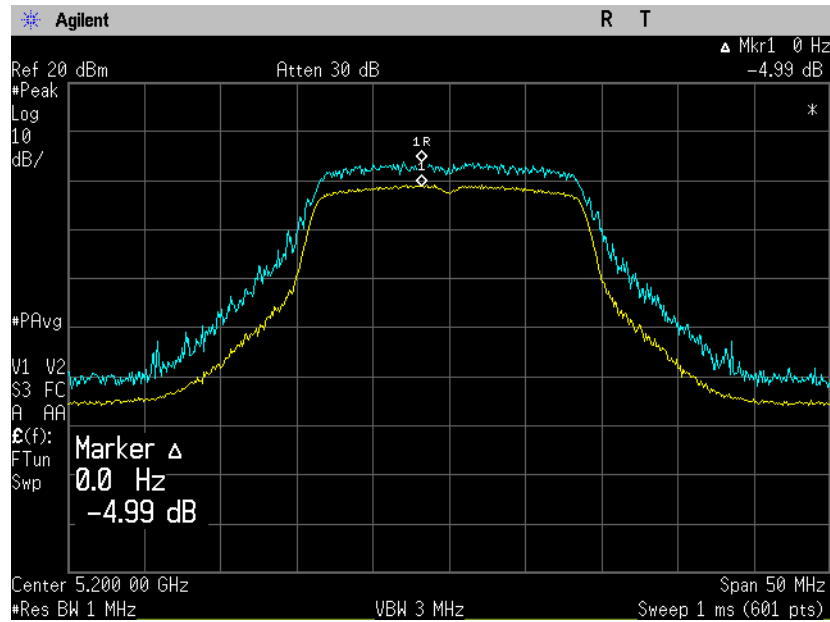
Middle Frequency, Output 0
Plot 4.4.13



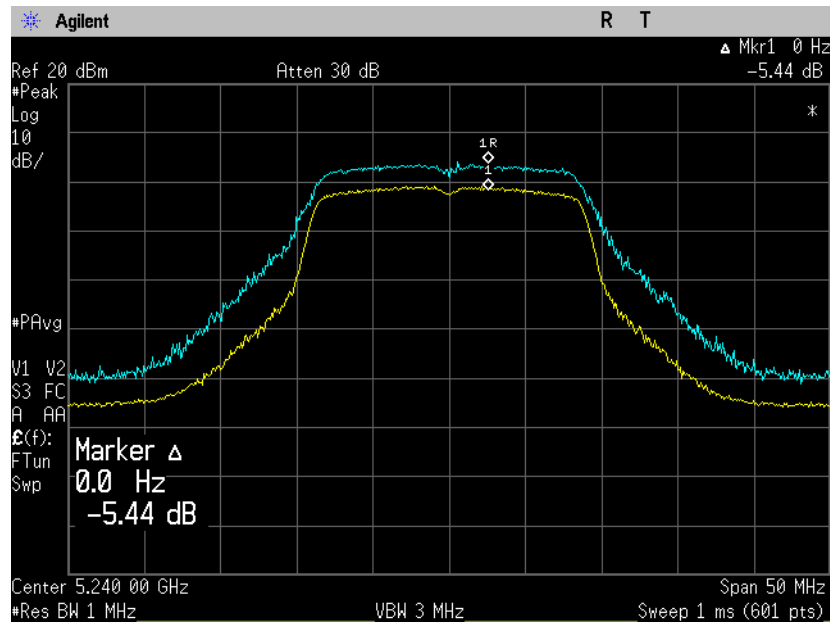
Middle Frequency, Output 1
Plot 4.4.14



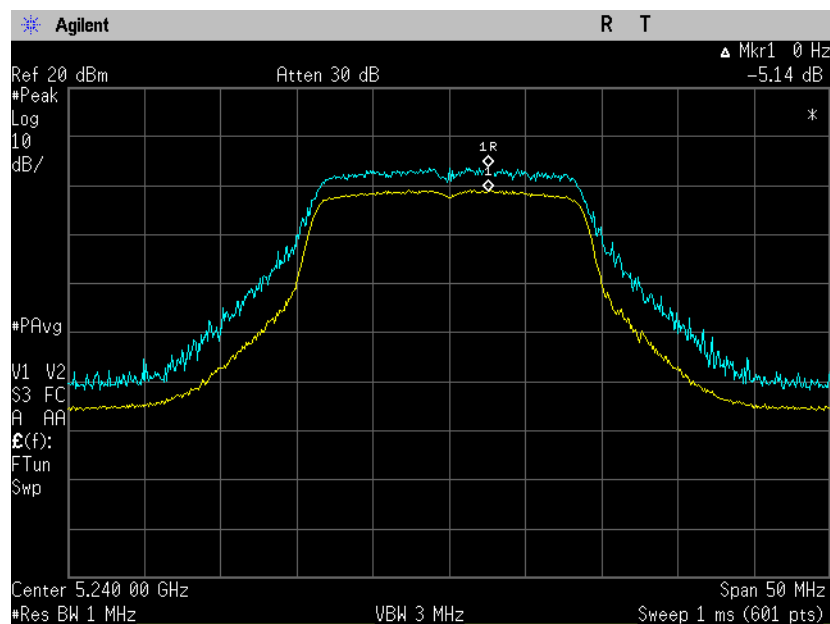
Middle Frequency, Output 2 Plot 4.4.15



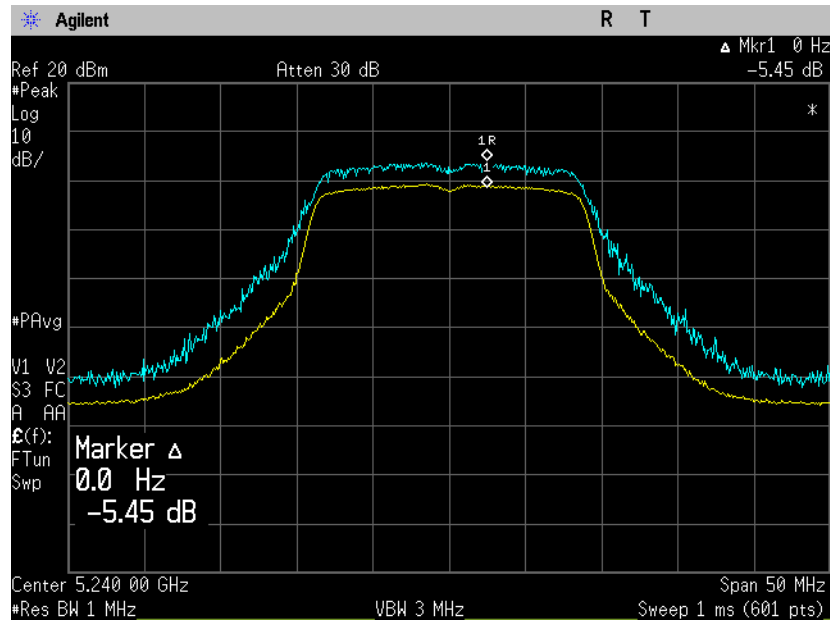
High Frequency, Output 0 Plot 4.4.16



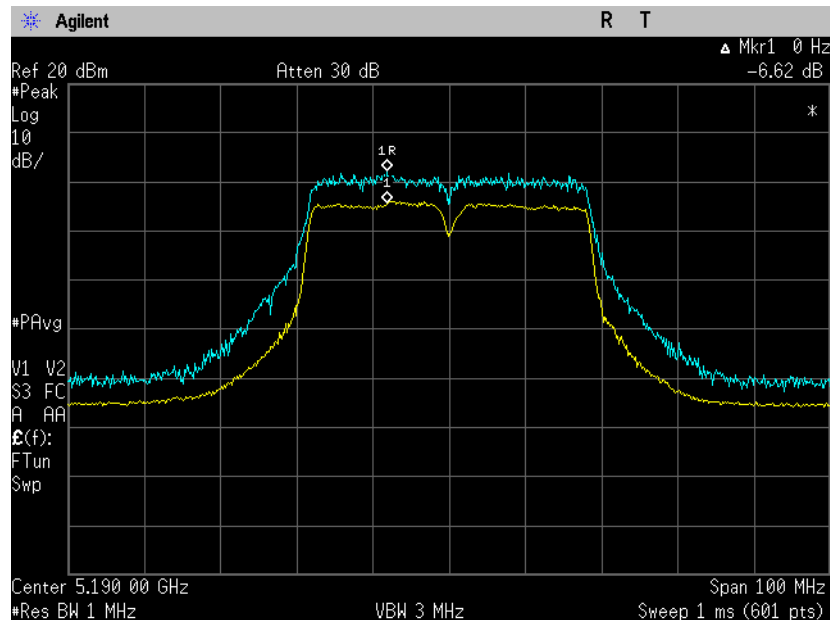
High Frequency, Output 1 Plot 4.4.17



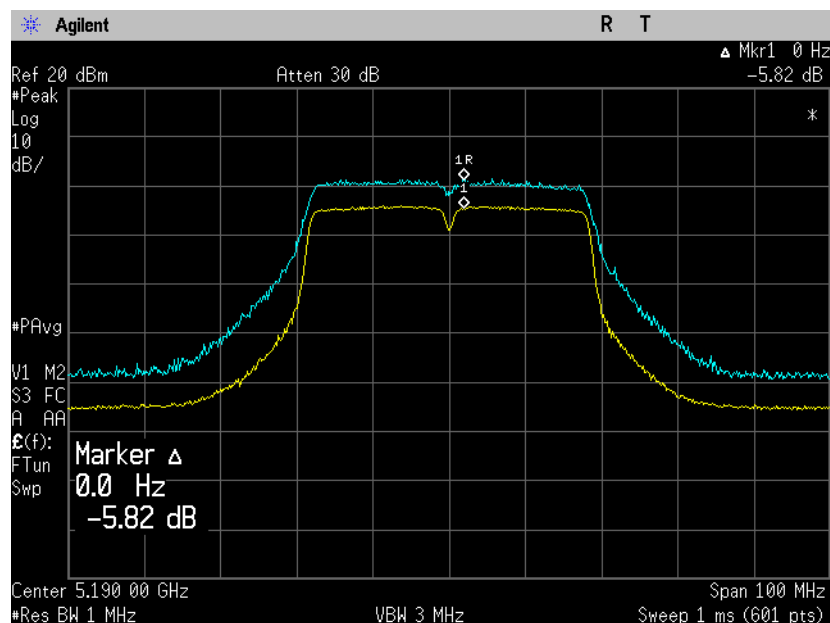
High Frequency, Output 2 Plot 4.4.18



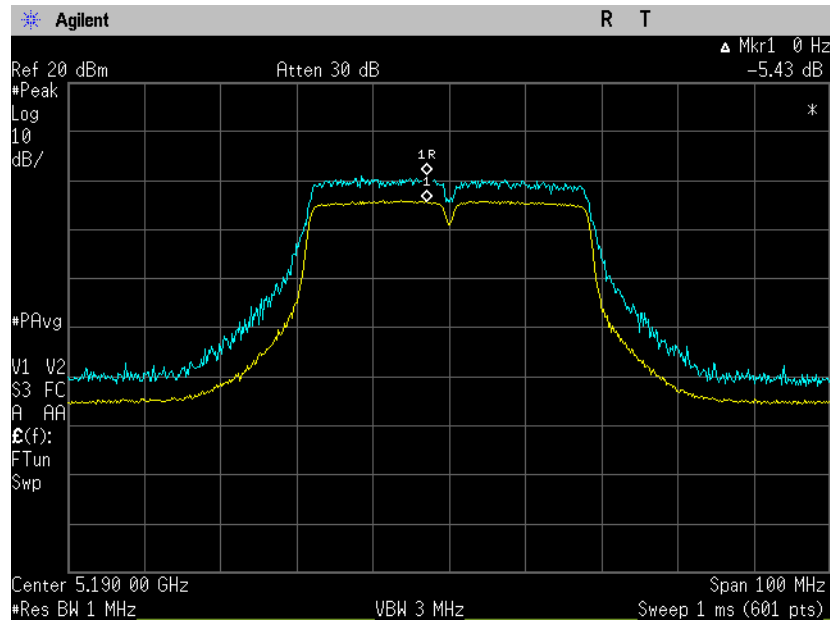
802.11n 40 MHz
Low Frequency, Output 0
Plot 4.4.19



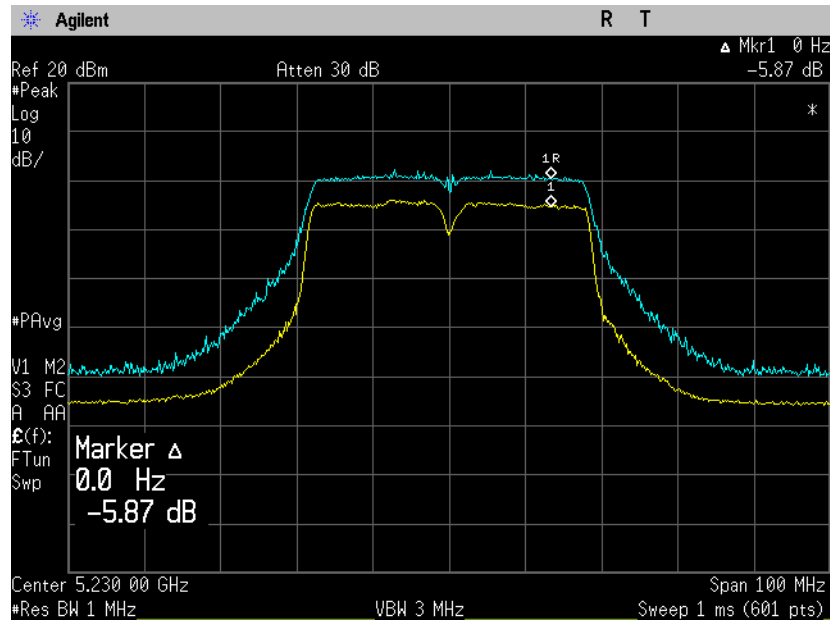
Low Frequency, Output 1
Plot 4.4.20



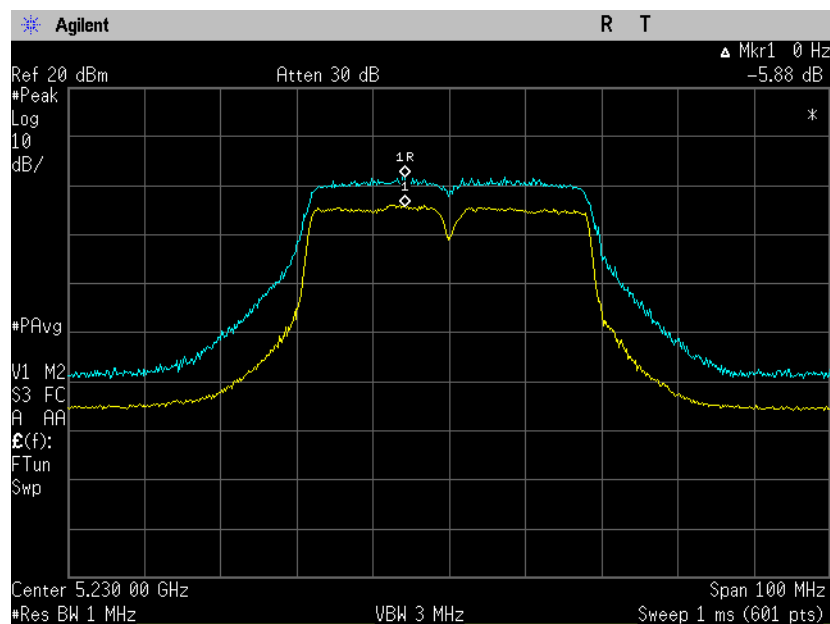
Low Frequency, Output 2 Plot 4.4.21



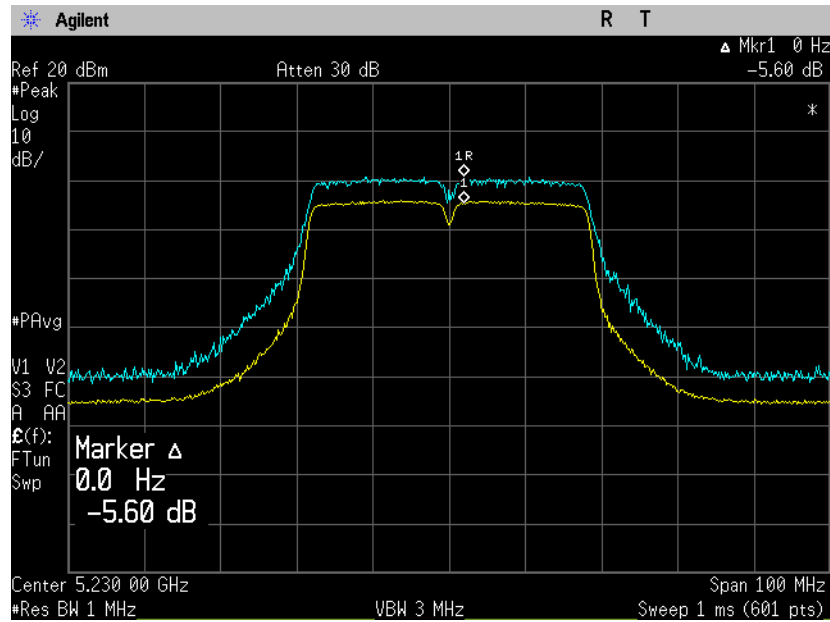
High Frequency, Output 0 Plot 4.4.22



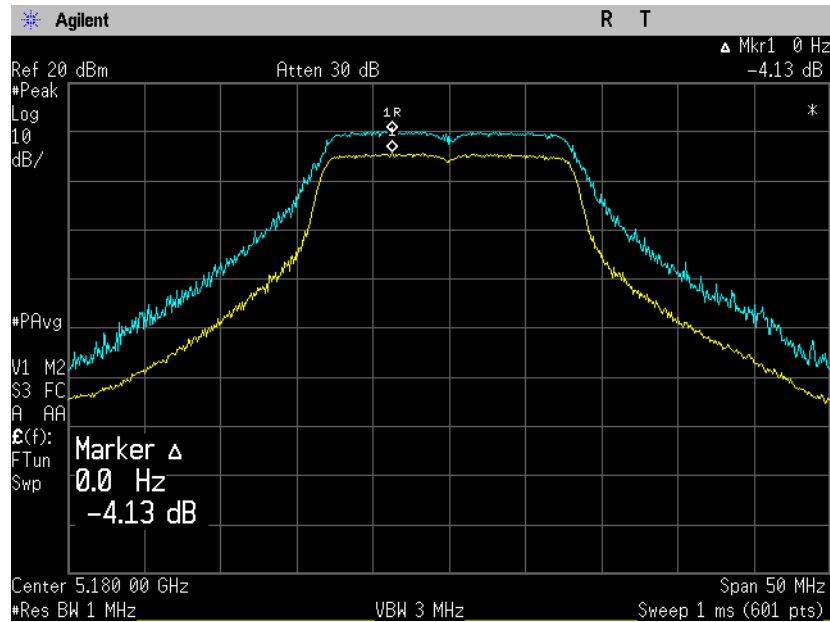
High Frequency, Output 1 Plot 4.4.23



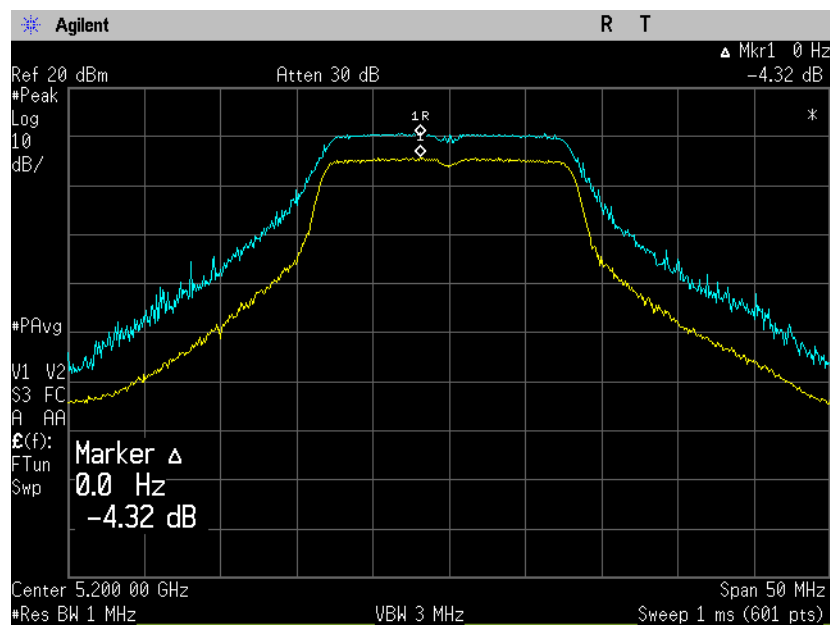
High Frequency, Output 2 Plot 4.4.24



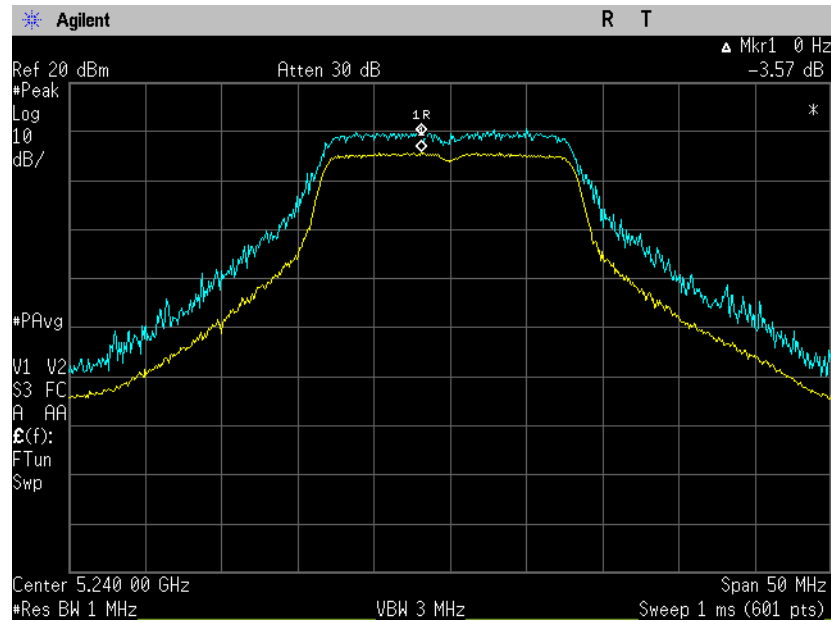
Transmitter Model: WLM54AG
Low Frequency
Plot 4.4.25



Middle Frequency
Plot 4.4.26



High Frequency Plot 4.4.27



4.5. Conducted Spurious Emissions

Reference document:	47 CFR §15.407 (b) (1) & §15.407 (b)(6)		
Test Requirements:	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHZ, unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Sec. 15.209.		
Test Method:	See sec 2.1	Comply	
Method of testing:	Conducted		
Operating conditions:	Under normal test conditions		
S.A. Settings:	RBW: 1 MHz, VBW:1 MHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.5.1 to 4.5.41	

Test results:
Spurious
5150MHz - 5250 MHz,
Transmitter Model: WMIA-199N/EU

	Frequency [MHz]	Data Rate [Mbps]	Measured Value [dBm/MHz]	EIRP Value Limit [dBm/MHz]	Ref. Plots
802.11a					
Low	5180	54	*	-27	4.5.1
		54	*	-27	4.5.2
		54	*	-27	4.5.3
Middle	5200	54	*	-27	4.5.4
		54	*	-27	4.5.5
		54	*	-27	4.5.6
High	5240	54	*	-27	4.5.7
		54	*	-27	4.5.8
		54	*	-27	4.5.9
802.11n 20 MHz					
Low	5180	130	*	-27	4.5.10
		130	*	-27	4.5.11
		130	*	-27	4.5.12
Middle	5200	130	*	-27	4.5.13
		130	*	-27	4.5.14
		130	*	-27	4.5.15
High	5240	130	*	-27	4.5.16
		130	*	-27	4.5.17
		130	*	-27	4.5.18
802.11n 40 MHz					
Low	5190	300	*	-27	4.5.19
		300	*	-27	4.5.20
		300	*	-27	4.5.21
High	5230	300	*	-27	4.5.22
		300	*	-27	4.5.23
		300	*	-27	4.5.24

*All emissions at least 10 dB below -27dBm. For EIRP calculation: the gain of the antenna is uncertain, however worst-case gain would be 4dBi.

Transmitter Model: WLM54AG

	Frequency [MHz]	Data Rate [Mbps]	Measured Value [dBm/MHz]	EIRP Value Limit [dBm/MHz]	Ref. Plots
802.11a					
Low	5180	54	*	-27	4.5.25
		54	*	-27	4.5.26
		54	*	-27	4.5.27
Middle	5200	54	*	-27	4.5.28
		54	*	-27	4.5.29
		54	*	-27	4.5.30
High	5240	54	*	-27	4.5.31
		54	*	-27	4.5.32
		54	*	-27	4.5.33

*All emissions at least 10 dB below -27dBm. For EIRP calculation: the gain of the antenna is uncertain, however worst-case gain would be 4dBi.

Band Edge

Frequency: 5150MHz - 5250 MHz,

Transmitter Model: WMIA-199N/EU

	Frequency [MHz]	Data Rate [Mbps]	Measured Value [dBm/MHz]	EIRP Value Limit [dBm/MHz]	Ref. Plots
802.11a					
Low	5180	54	*	-27	4.5.34
High	5240	54	*	-27	4.5.35
802.11n 20 MHz					
Low	5180	130	*	-27	4.5.36
High	5240	130	*	-27	4.5.37
802.11n 40 MHz					
Low	5190	300	*	-27	4.5.38
High	5230	300	*	-27	4.5.39

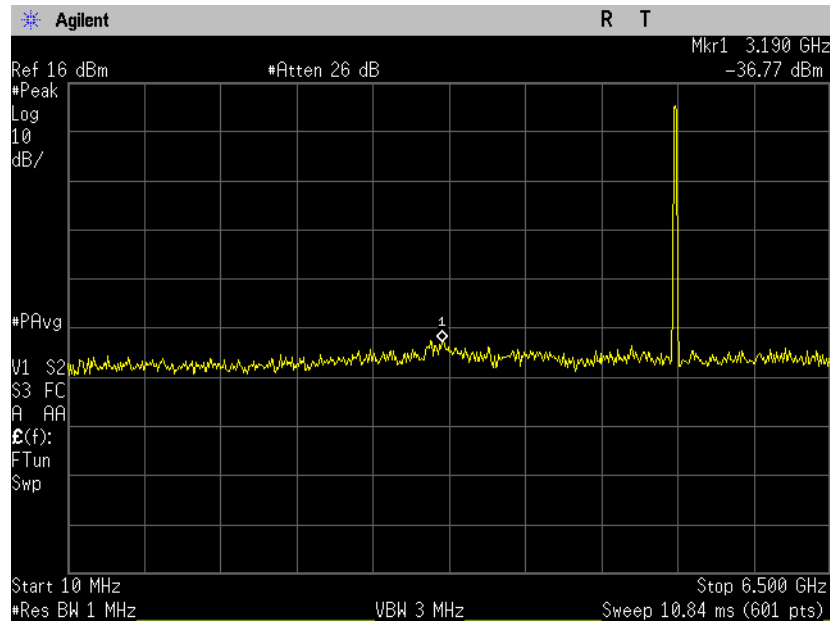
*All emissions at least 10 dB below -27dBm. For EIRP calculation: the gain of the antenna is uncertain, however worst-case gain would be 4dBi.

Transmitter model, Radio Model: WLM54AG

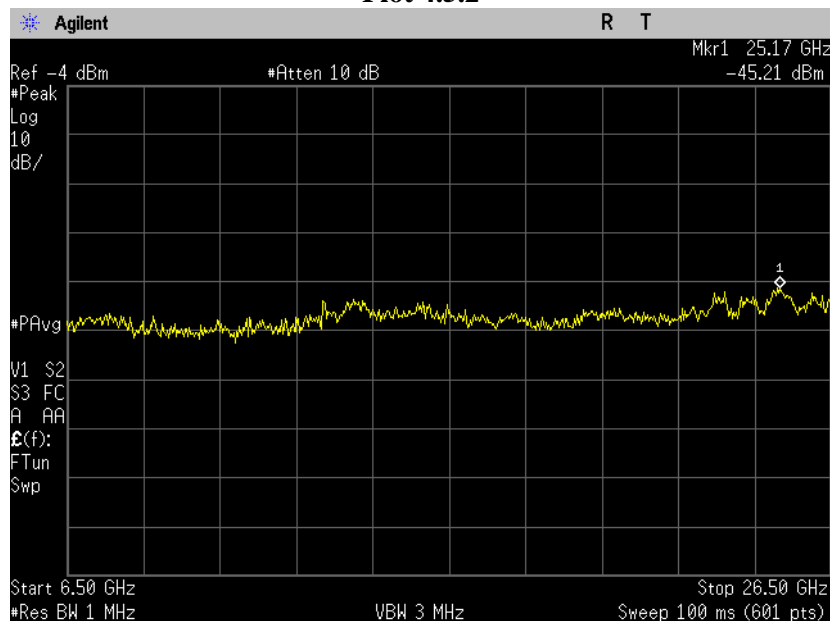
	Frequency [MHz]	Data Rate [Mbps]	Measured Value [dBm/MHz]	EIRP Value Limit [dBm/MHz]	Ref. Plots
802.11a					
Low	5180	54	*	-27	4.5.40
High	5240	54	*	-27	4.5.41

*All emissions at least 10 dB below -27dBm. For EIRP calculation: the gain of the antenna is uncertain, however worst-case gain would be 4dBi.

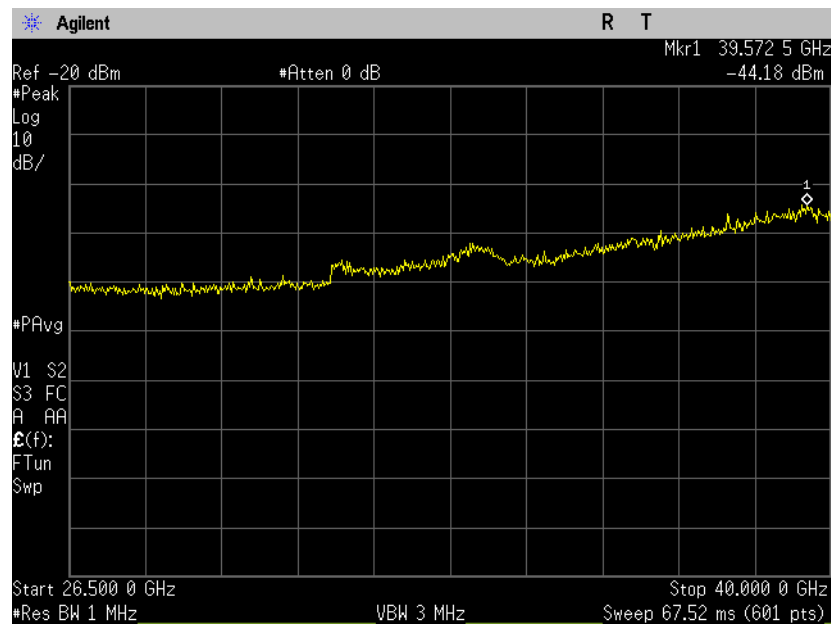
5150MHz - 5250 MHz
Transmitter Model: WMIA-199N/EU
3 channels combined
802.11a
Low Frequency
Plot 4.5.1



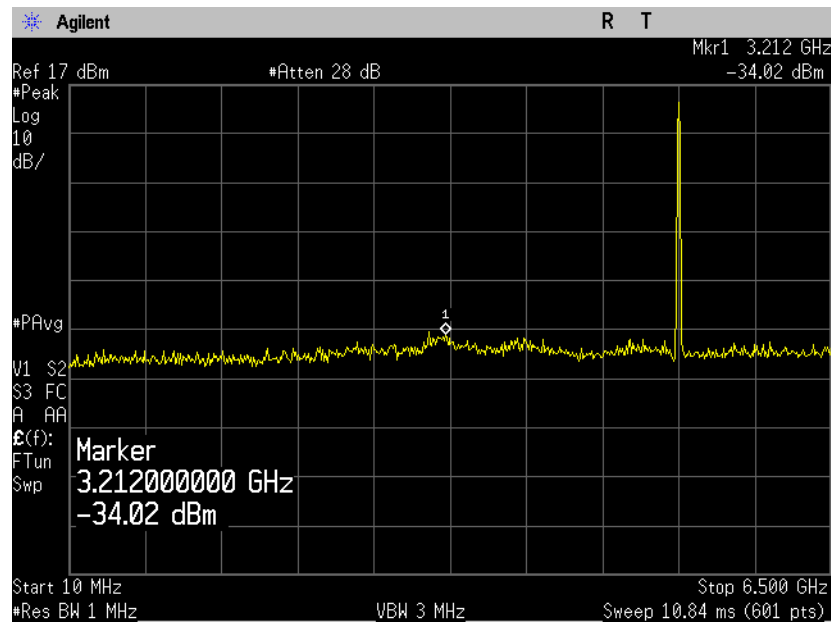
Low Frequency
Plot 4.5.2



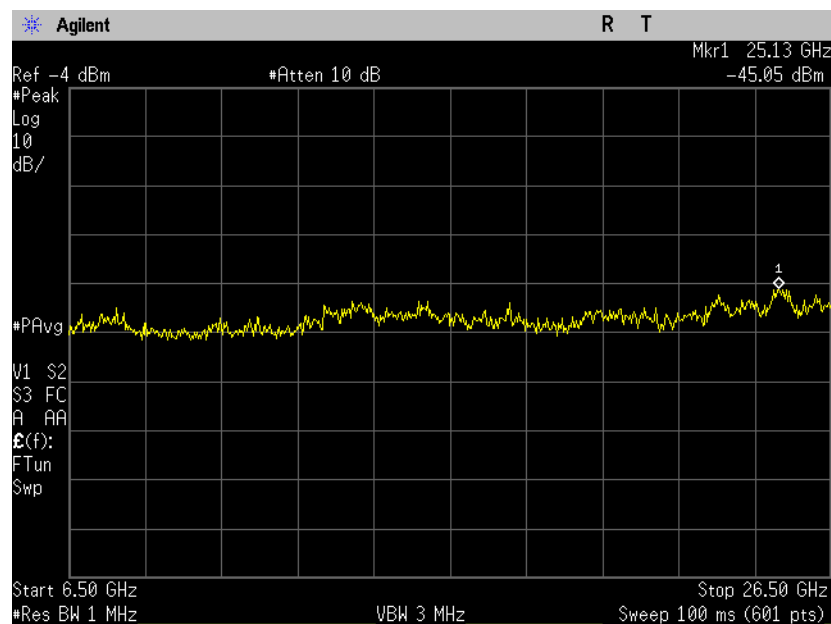
**Low Frequency
Plot 4.5.3**



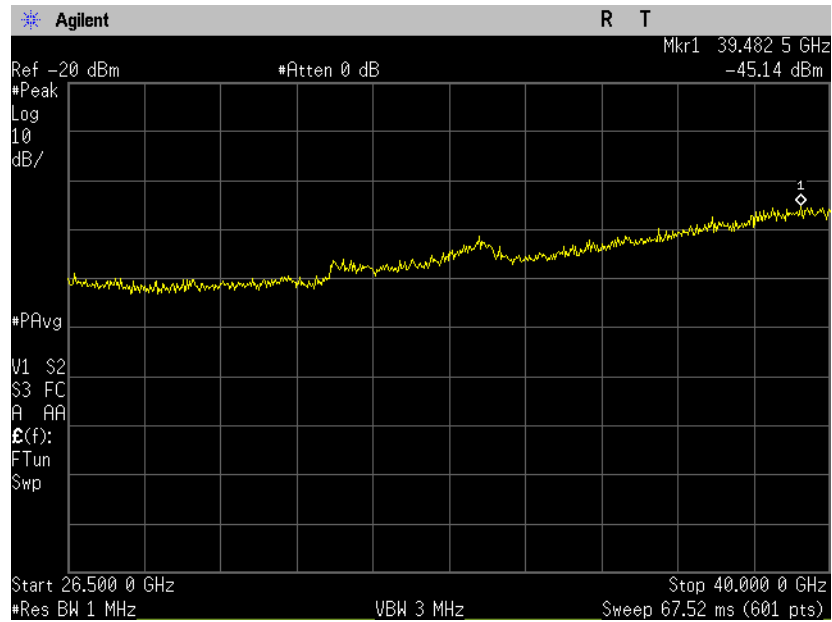
**Middle Frequency
Plot 4.5.4**



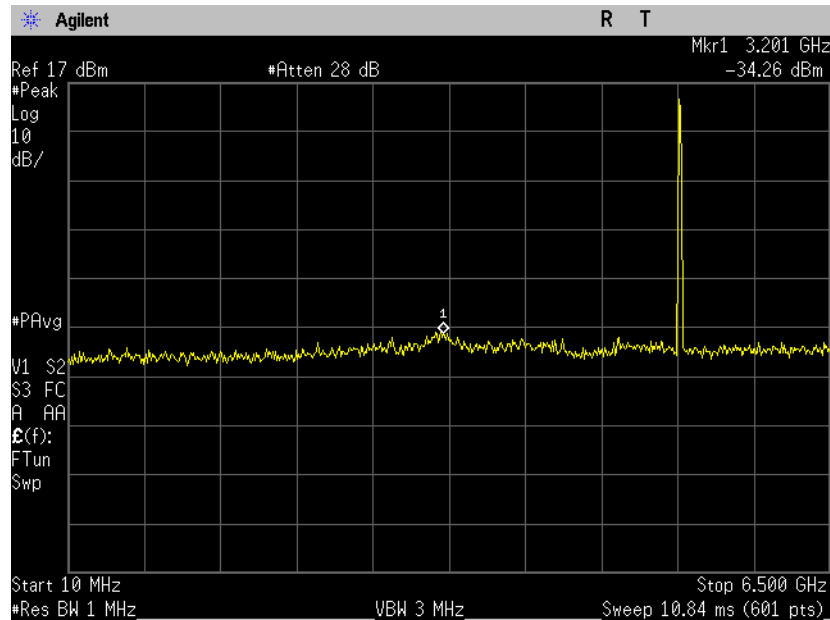
**Middle Frequency
Plot 4.5.5**



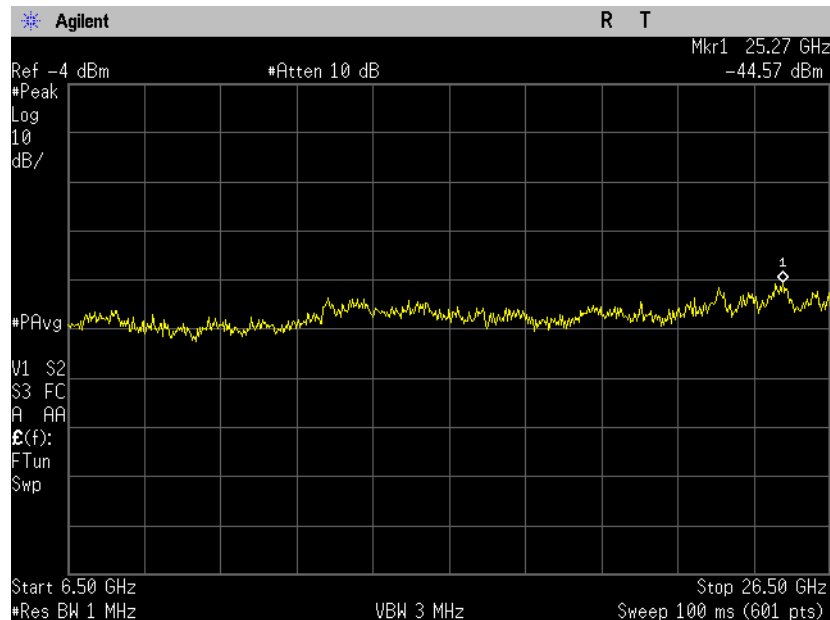
**Middle Frequency
Plot 4.5.6**



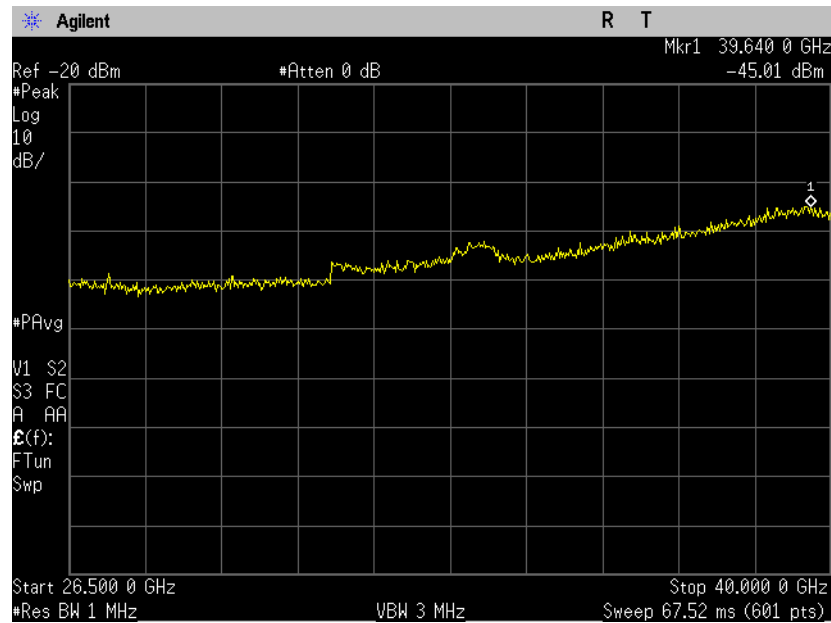
High Frequency Plot 4.5.7



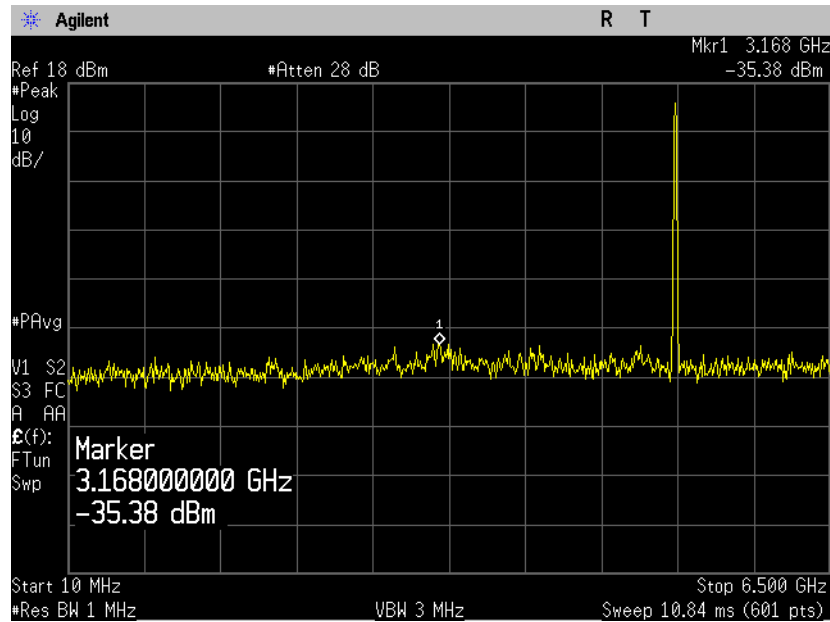
High Frequency Plot 4.5.8



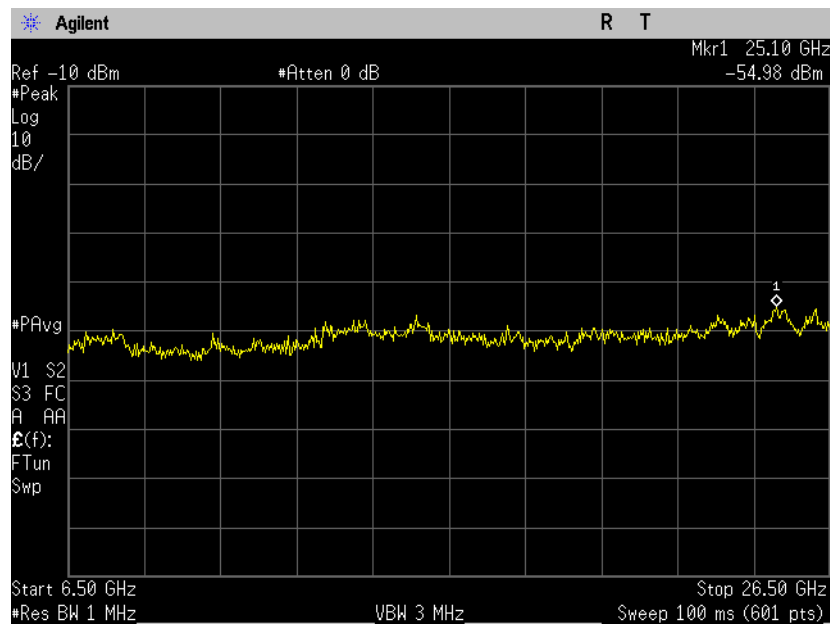
High Frequency Plot 4.5.9



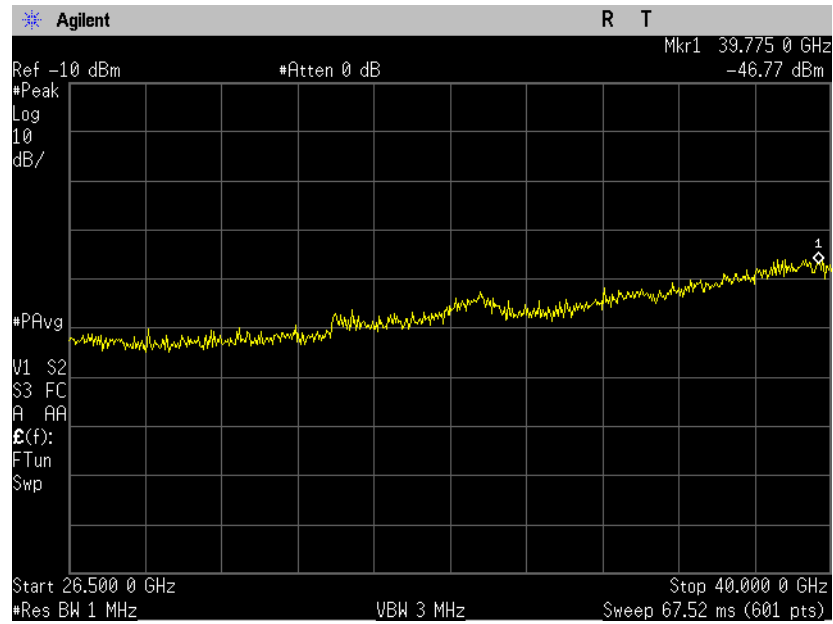
**802.11n 20 MHz
Low Frequency
Plot 4.5.10**



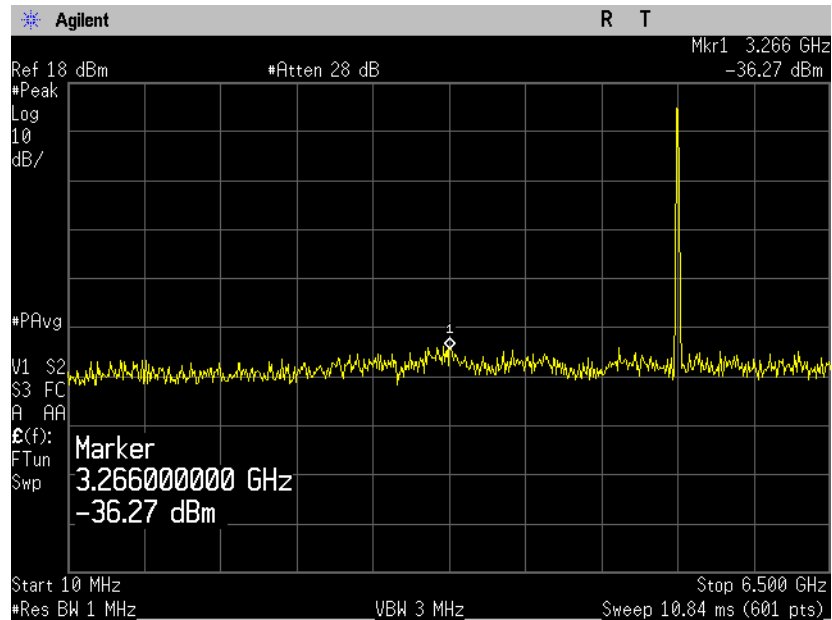
**Low Frequency
Plot 4.5.11**



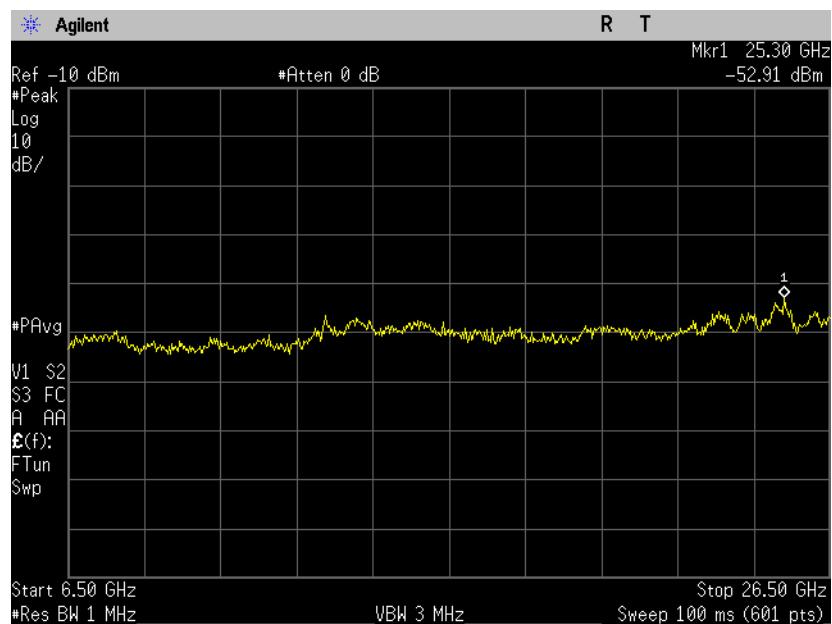
**Low Frequency
Plot 4.5.12**



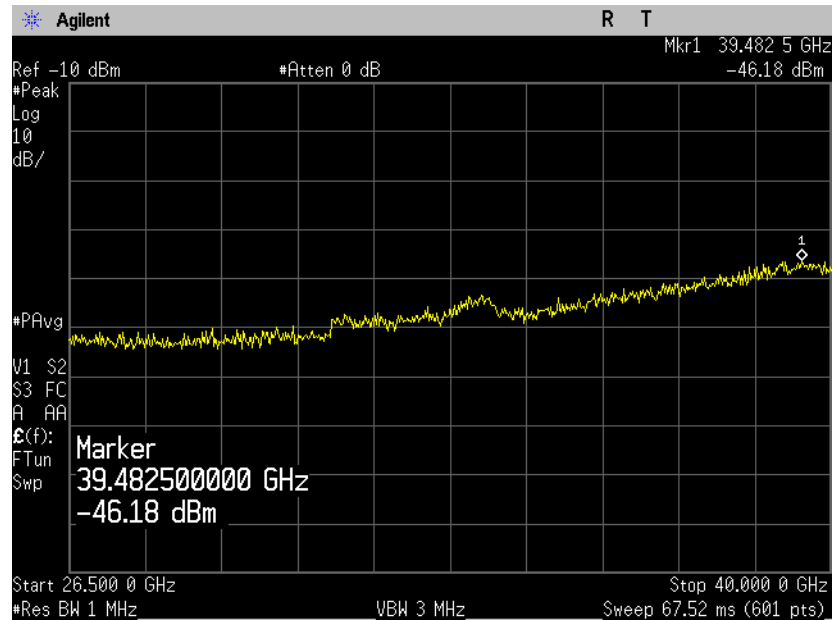
**Middle Frequency
Plot 4.5.13**



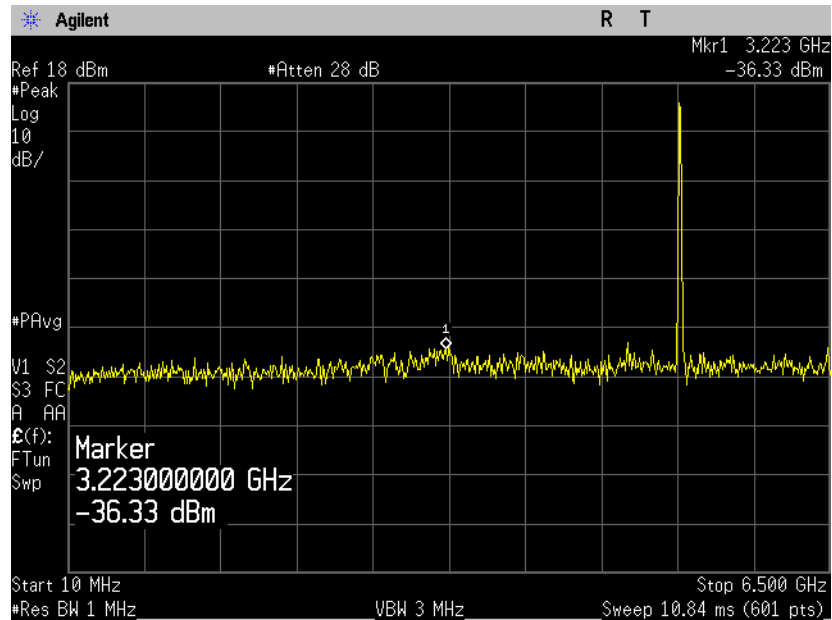
**Middle Frequency
Plot 4.5.14**



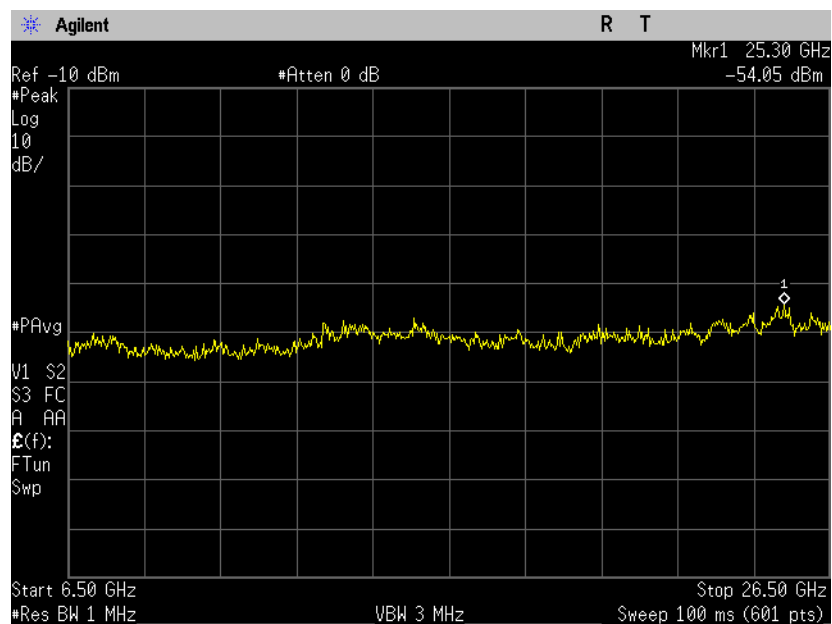
**Middle Frequency
Plot 4.5.15**



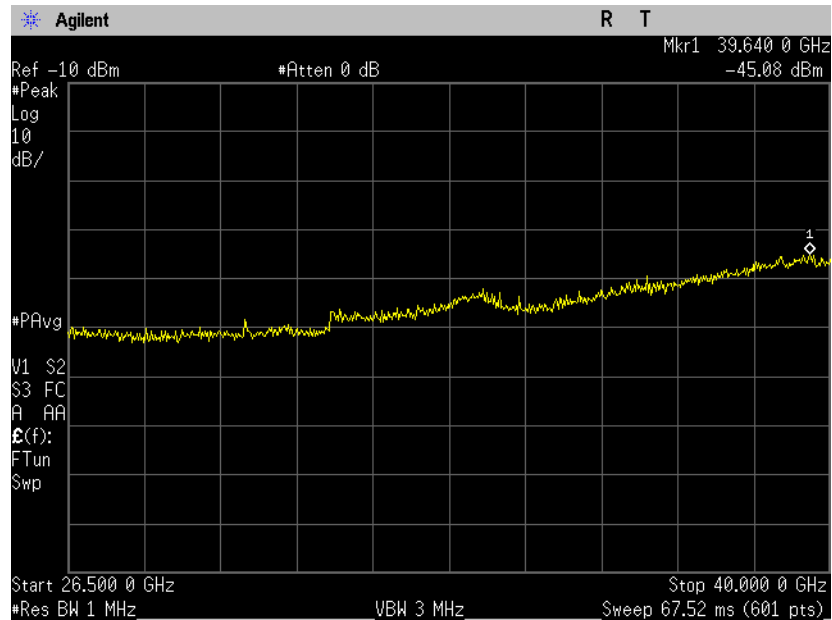
High Frequency Plot 4.5.16



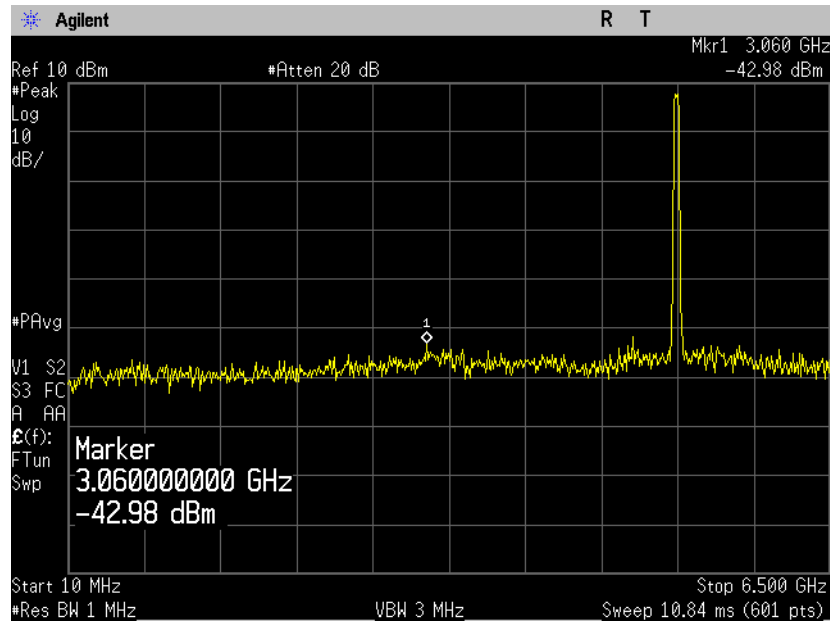
High Frequency Plot 4.5.17



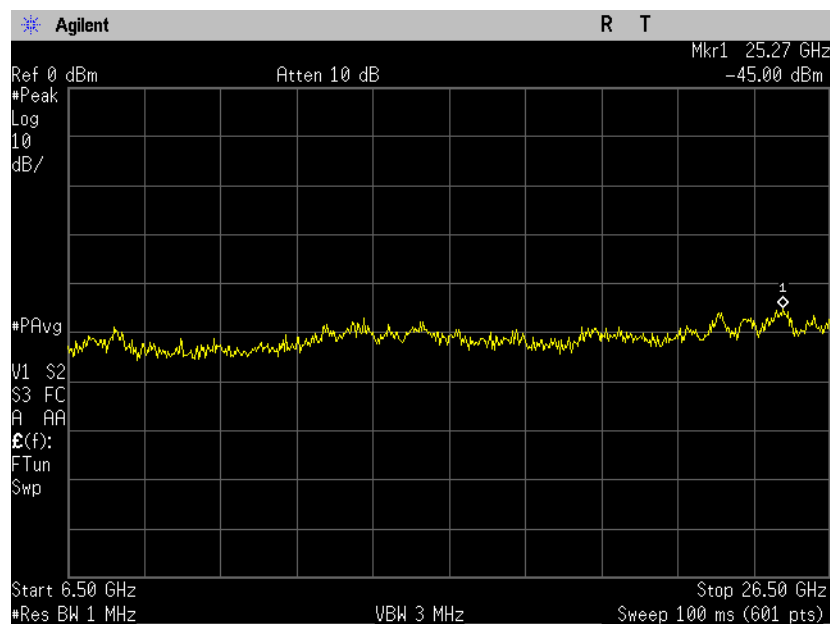
High Frequency Plot 4.5.18



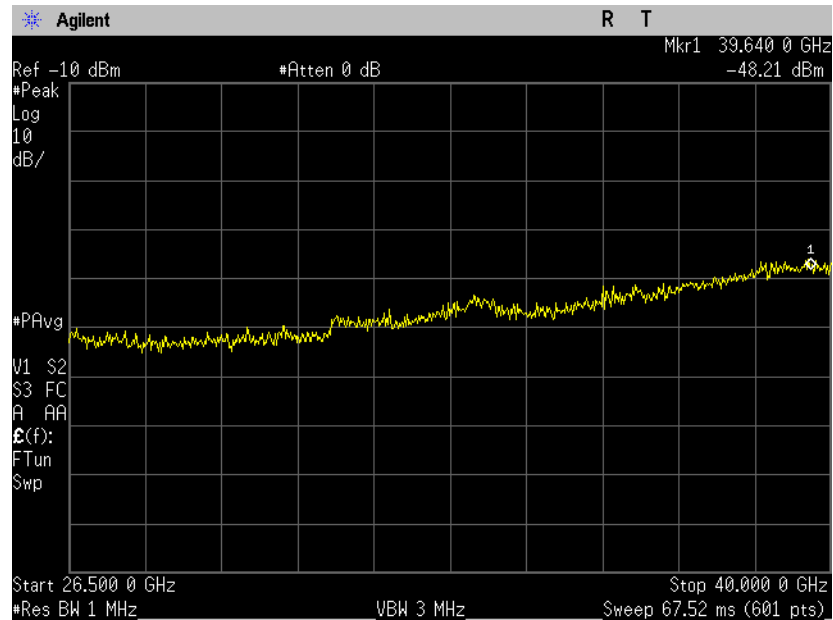
**802.11n 40 MHz
Low Frequency
Plot 4.5.19**



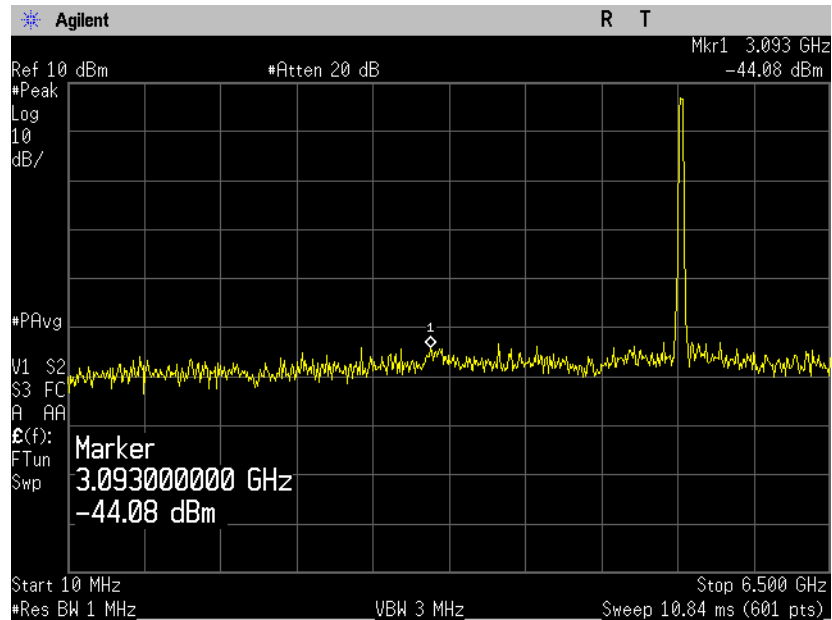
**Low Frequency
Plot 4.5.20**



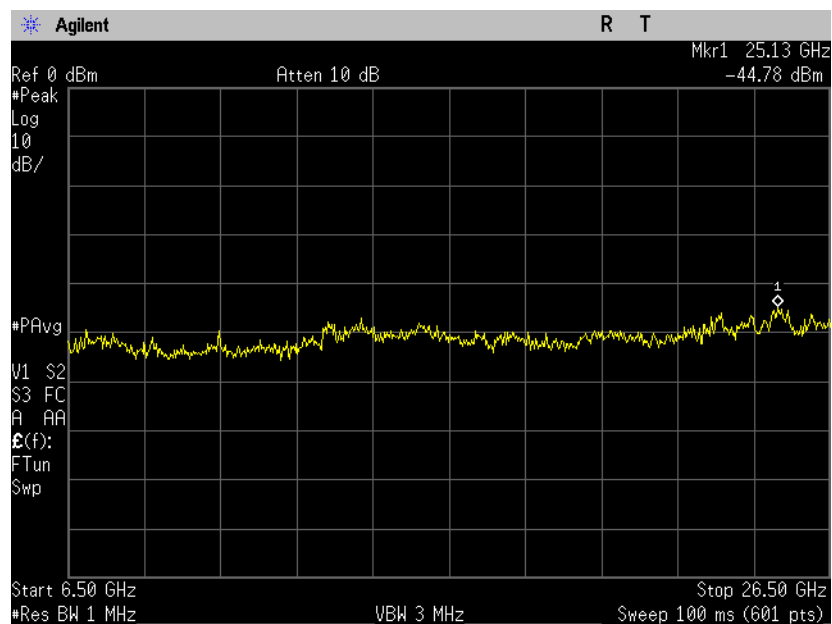
**Low Frequency
Plot 4.5.21**



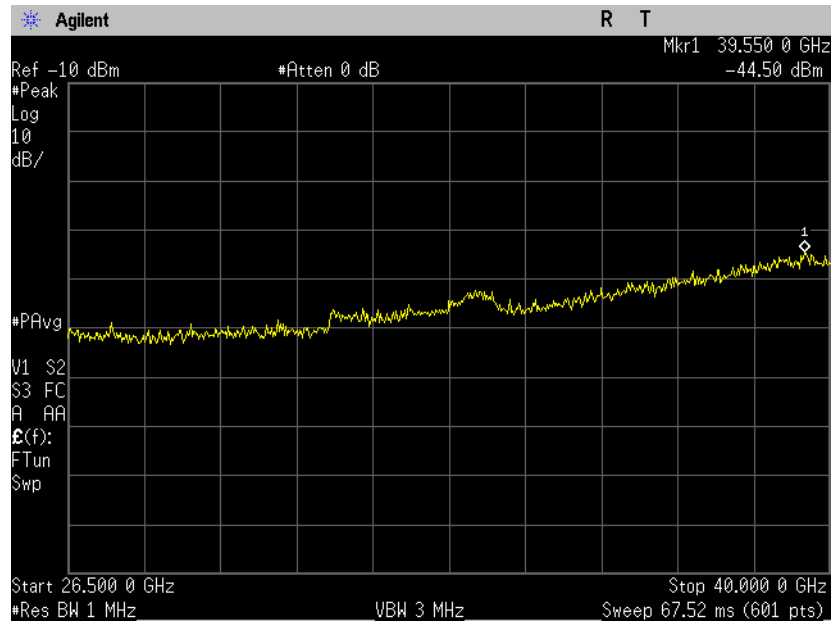
High Frequency Plot 4.5.22



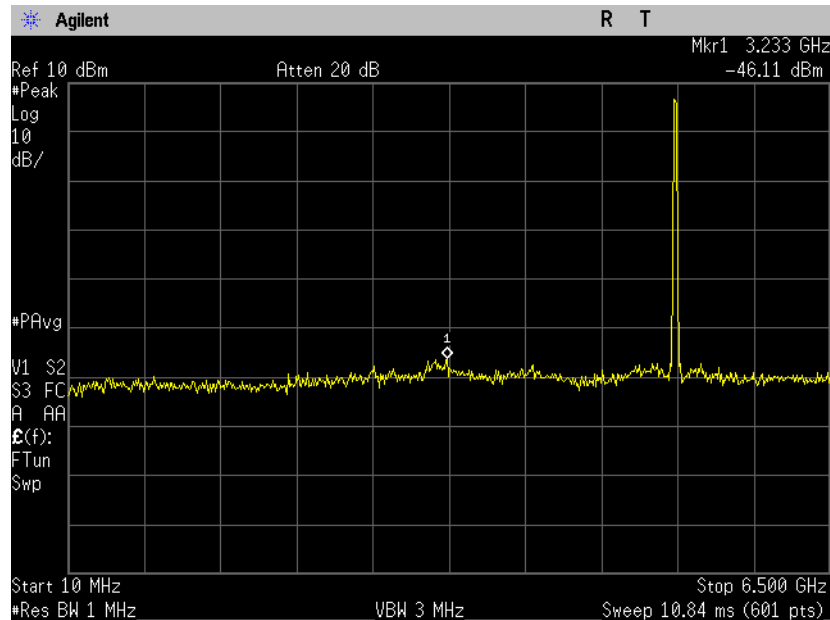
High Frequency Plot 4.5.23



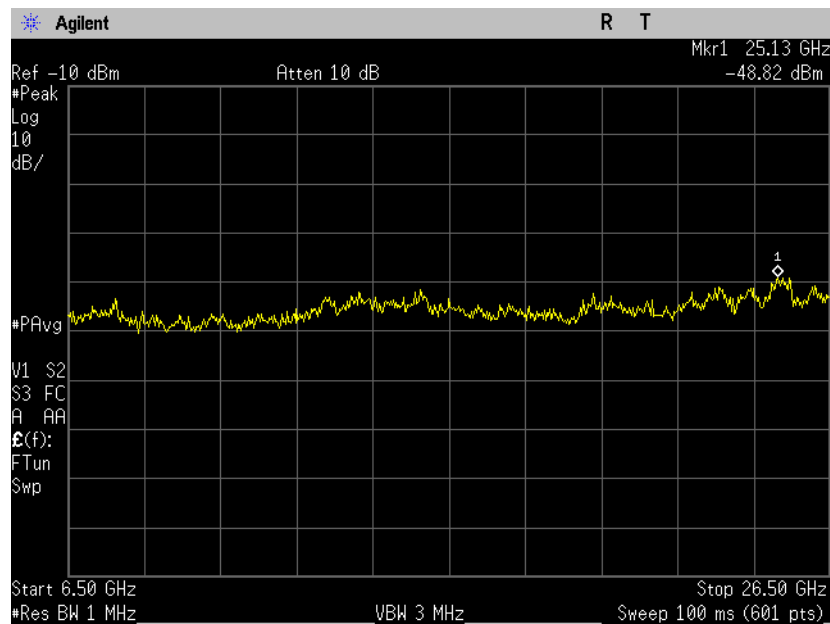
High Frequency Plot 4.5.24



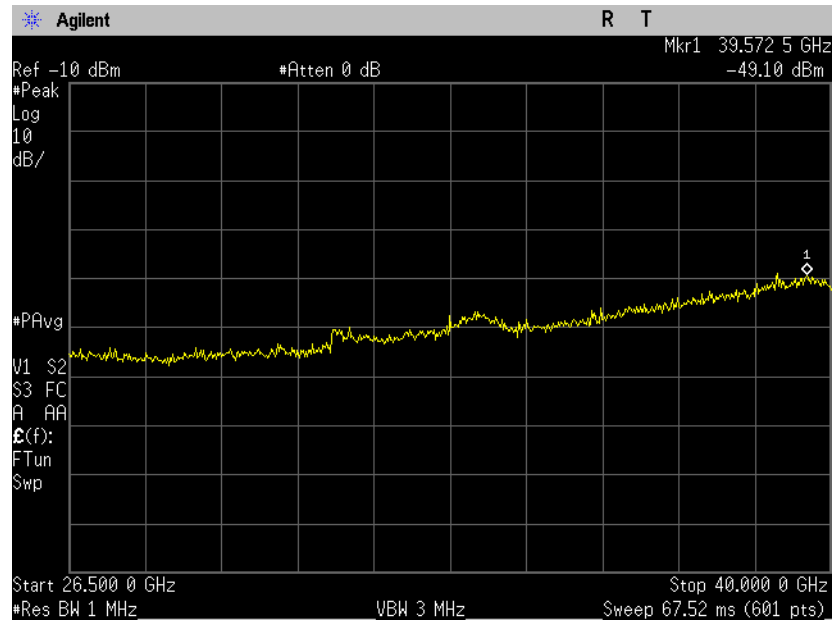
Transmitter Model: WLM54AG
802.11a
Low Frequency
Plot 4.5.25



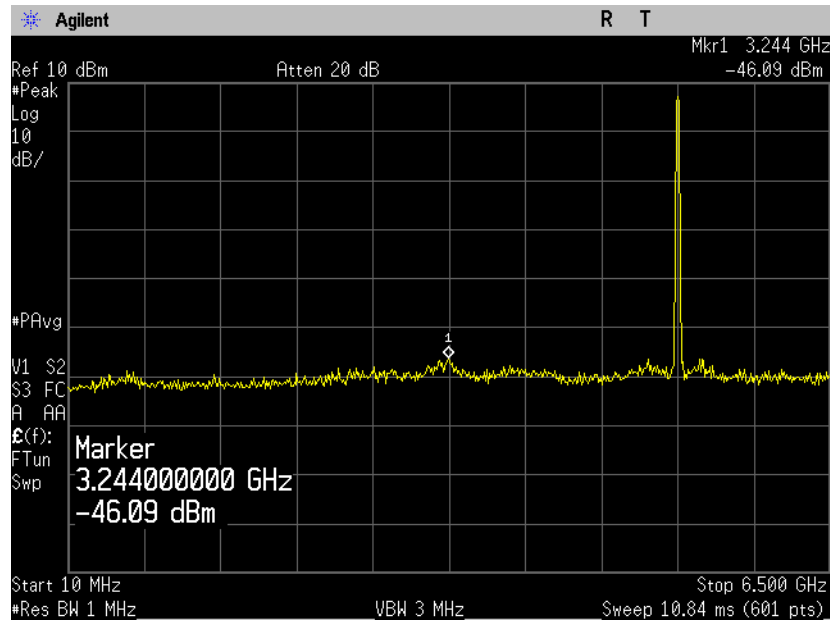
Low Frequency
Plot 4.5.26



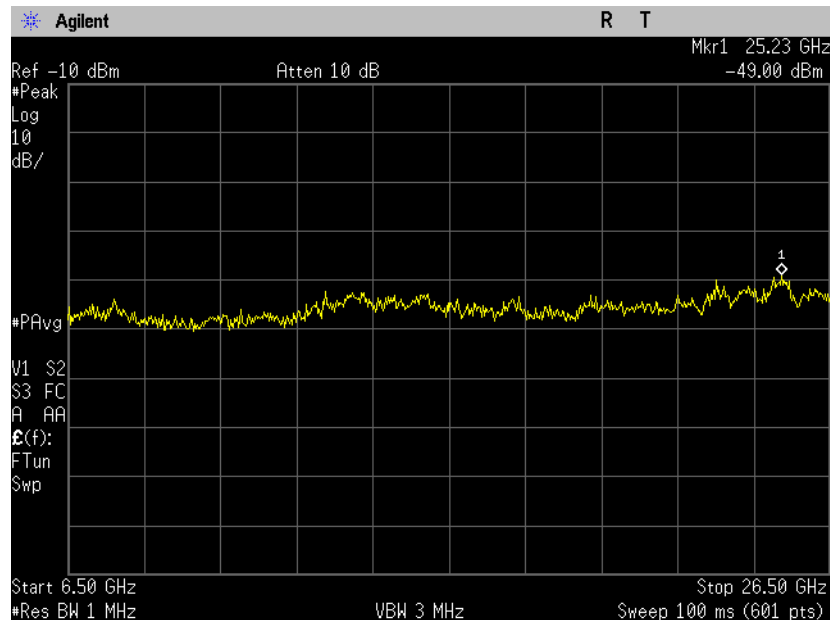
**Low Frequency
Plot 4.5.27**



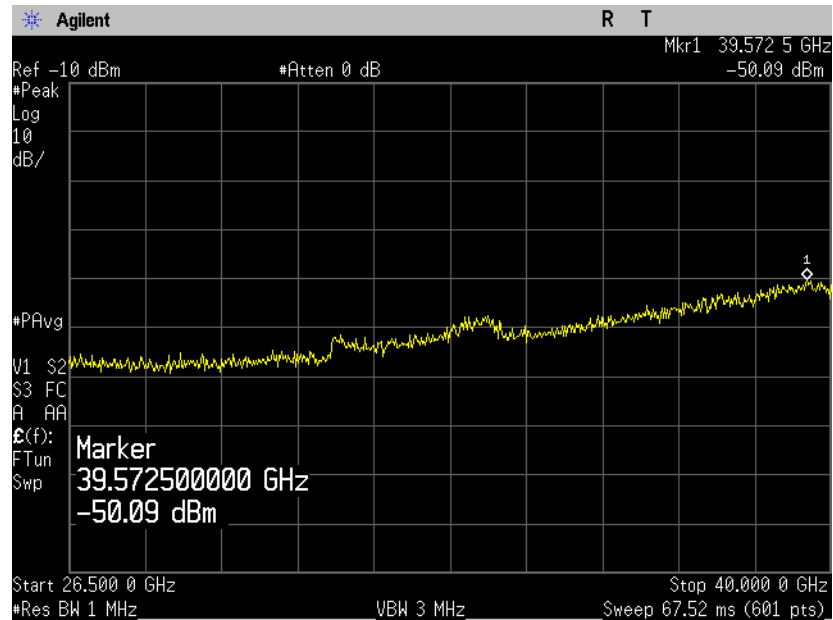
**Middle Frequency
Plot 4.5.28**



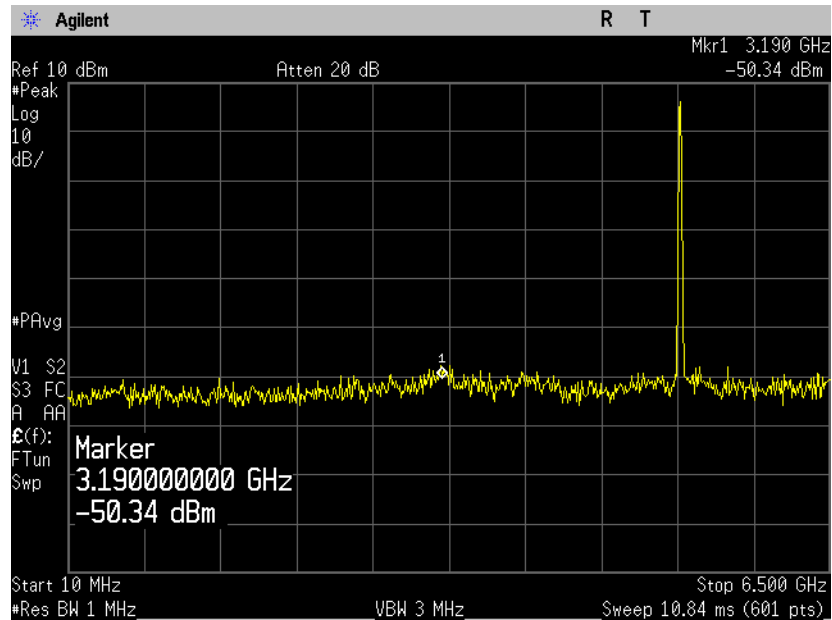
**Middle Frequency
Plot 4.5.29**



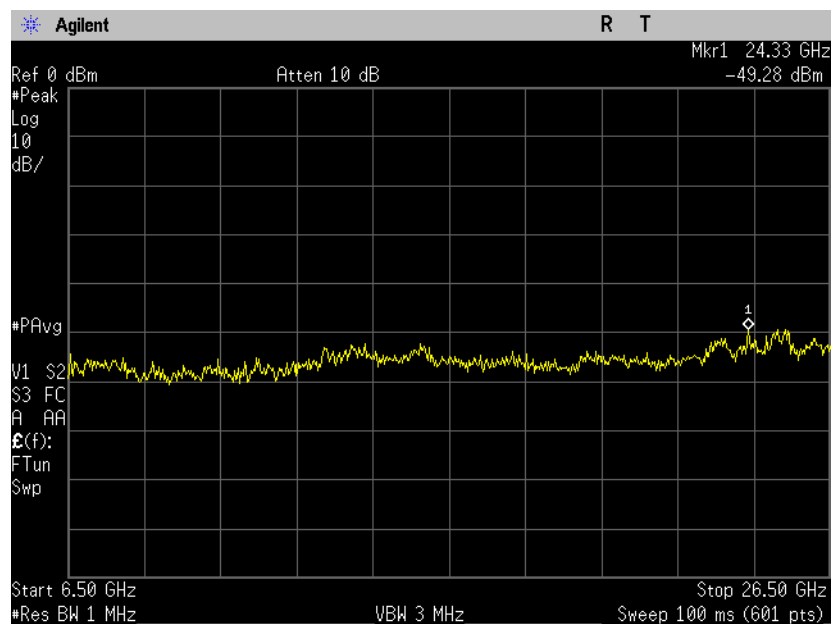
**Middle Frequency
Plot 4.5.30**



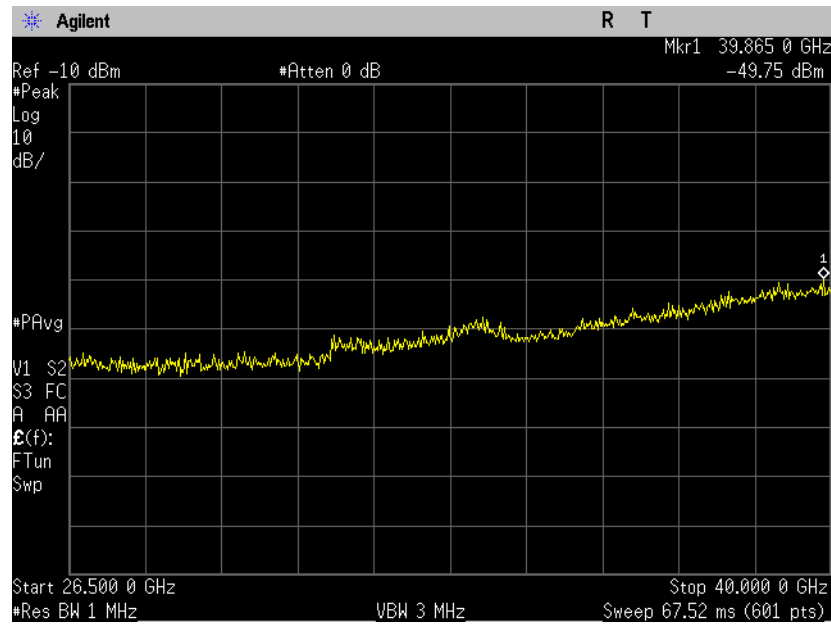
High Frequency Plot 4.5.31



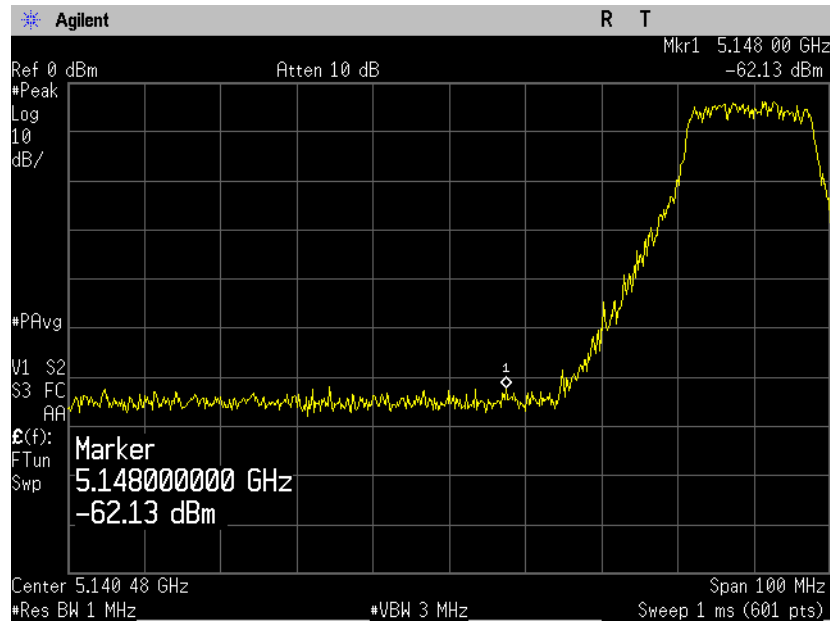
High Frequency Plot 4.5.32



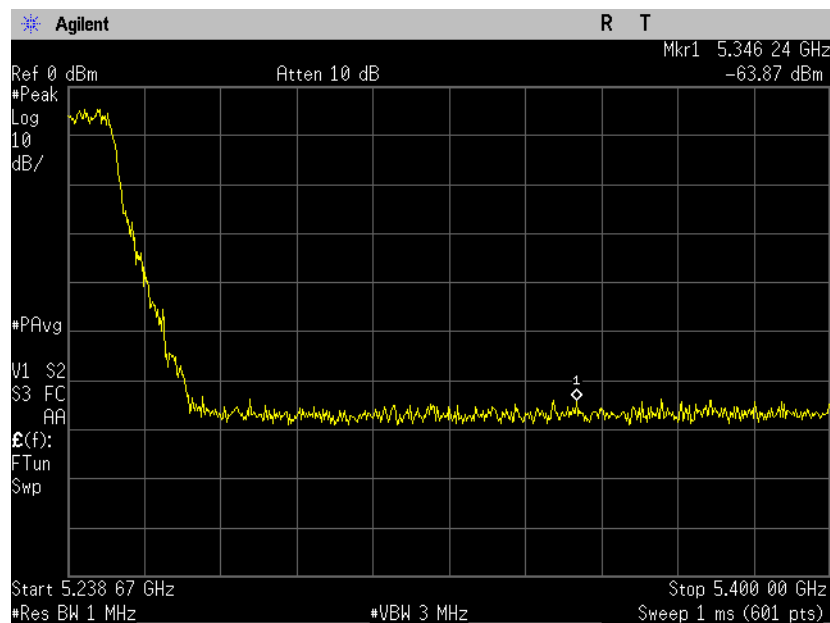
High Frequency Plot 4.5.33



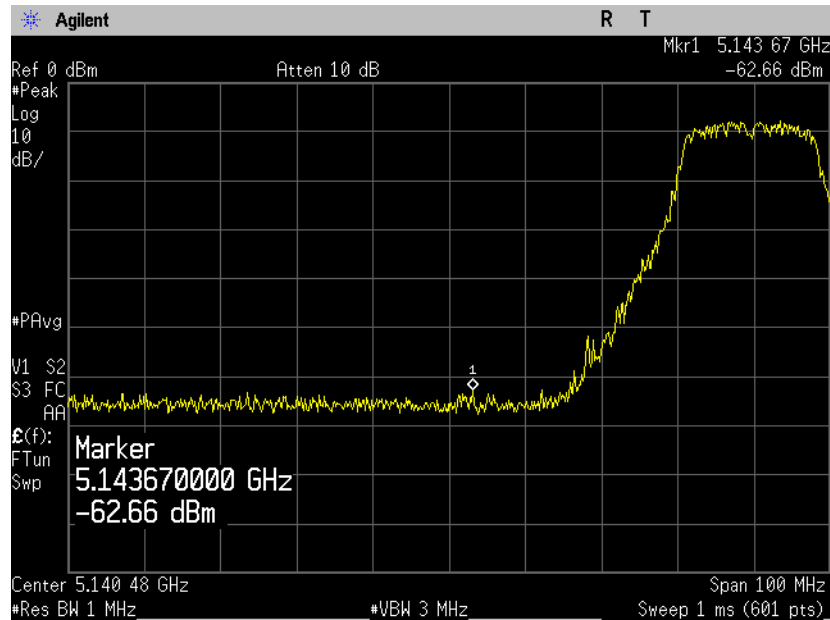
5150MHz - 5250 MHz
Transmitter Model: WMIA-199N/EU
3 channels combined
802.11a
Low Frequency
Plot 4.5.34



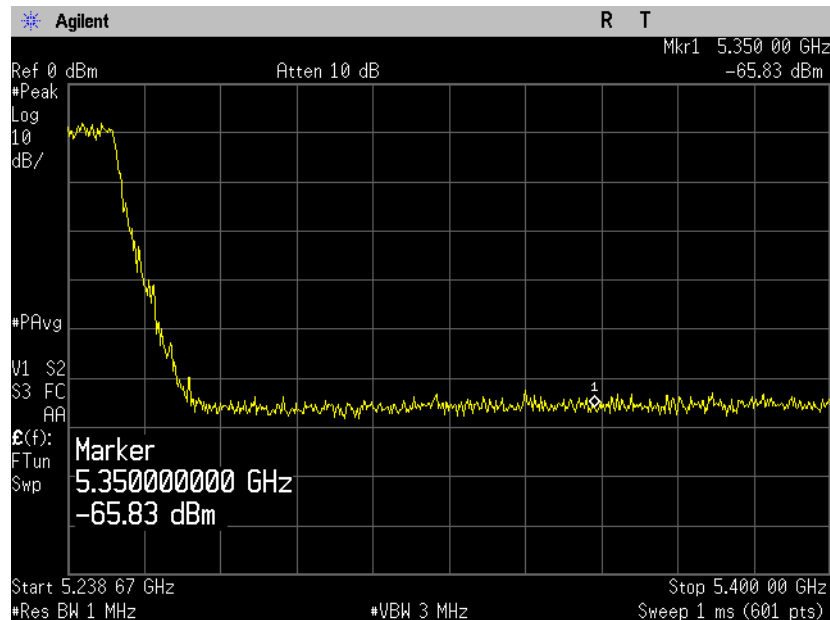
High Frequency
Plot 4.5.35



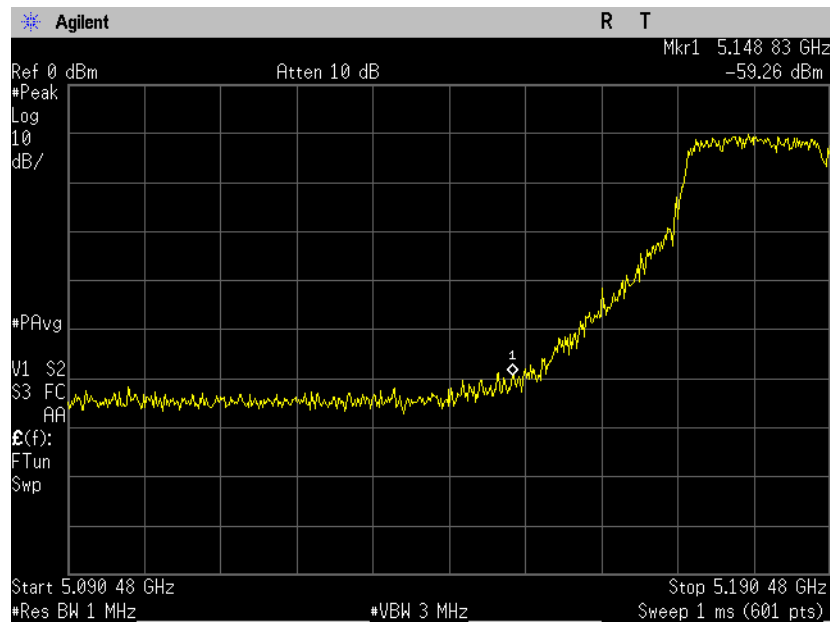
**802.11n 20 MHz
Low Frequency
Plot 4.5.36**



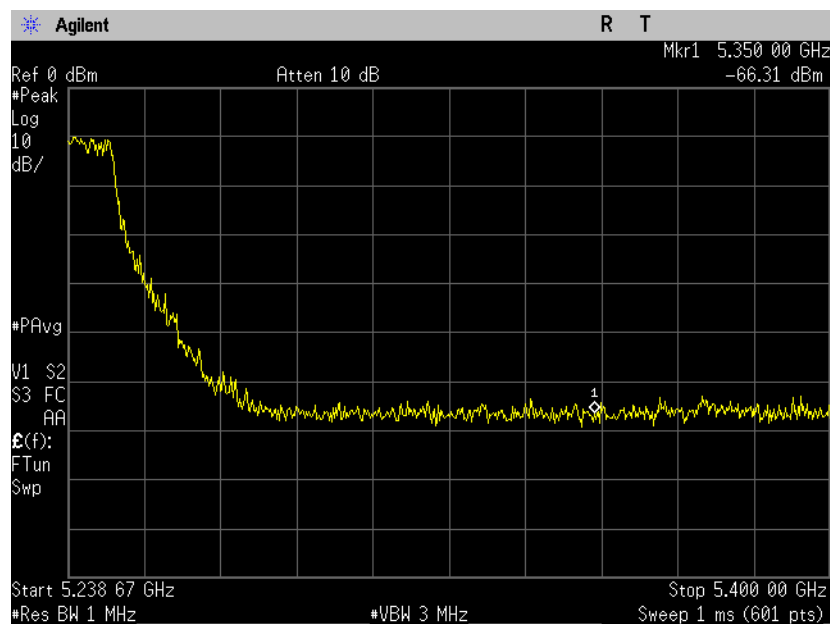
**High Frequency
Plot 4.5.37**



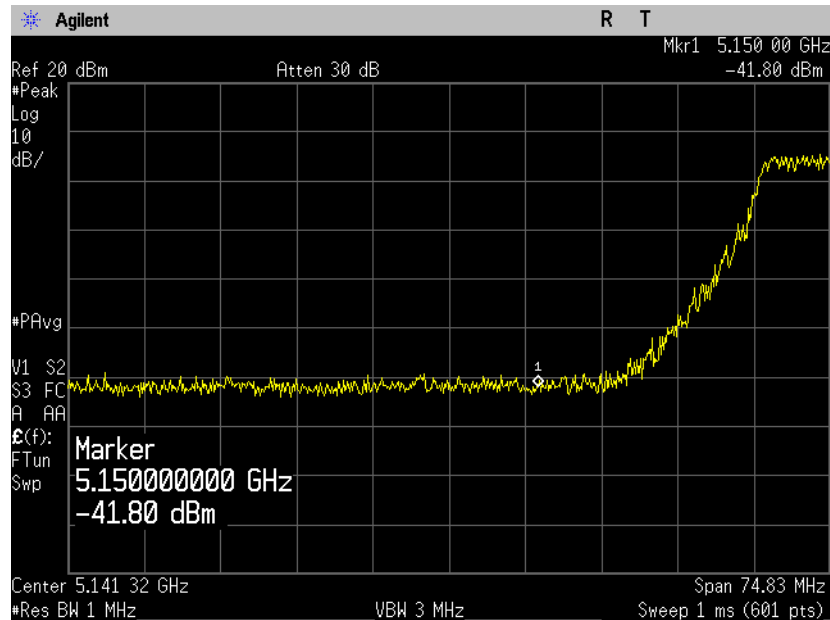
**802.11n 40MHz
Low Frequency
Plot 4.5.38**



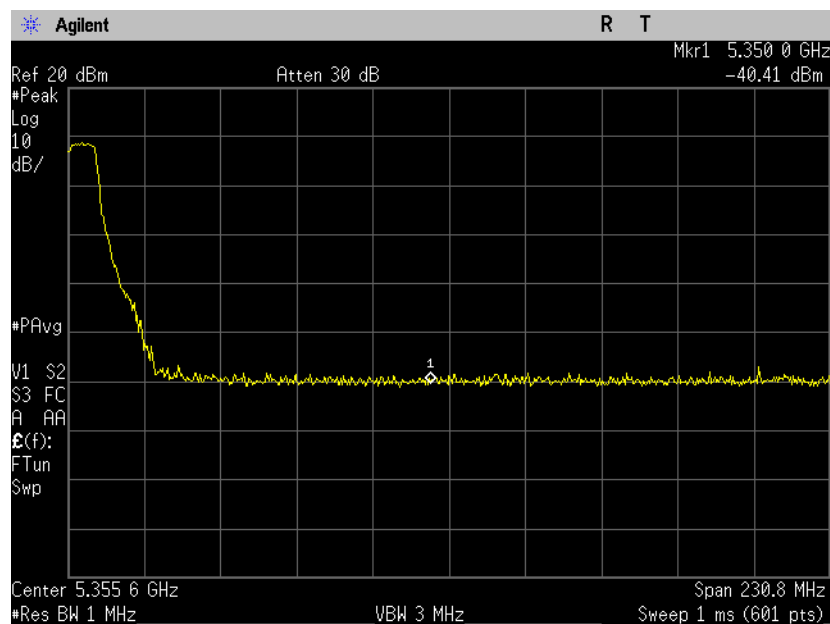
**High Frequency
Plot 4.5.39**



Transmitter Model: WLM54AG
802.11a
Low Frequency
Plot 4.5.40



High Frequency
Plot 4.5.41



4.6. Spurious Radiated Emissions, Restricted Bands

Reference document:	47 CFR §15.407 (b) (1) & §15.407 (b)(6)		
Test Requirements:	For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz, unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Sec. 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Sec. 15.207. The provisions of Sec. 15.205 apply to intentional radiators operating under this section.		
Test Method:	See sec 2.2, with High-pass filter where appropriate	Comply	
Method of testing:	Radiated		
Operating conditions:	Under normal test conditions		
S.A. Settings:	f>Peak: RBW= 1MHz, VBW= 3MHz, Average: VBW= 10 Hz f<1GHz: RBW= 120kHz, VBW= 300kHz,		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.6.1 to 4.6.32	

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 1, transmitting in 802.11a Modes:

Radio 0 model: WMIA-199N/EU, frequency 5240 MHz

Radio 1 model: WMIA-199N/EU, frequency 5220 MHz

Radio 2 model: WLM54AG, frequency 5180 MHz

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 1, 802.11a							
Operation 1	54	1125	Peak	V	51.7	74	-22.3
Operation 1	54	1125	Avg	V	49.9	54	-4.1
Operation 1	54	1250	Peak	V	46	74	-28
Operation 1	54	1250	Avg	V	43.2	54	-10.8
Operation 1	54	1375	Peak	V	47.9	74	-26.1
Operation 1	54	1375	Avg	V	45.5	54	-8.5

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 2, transmitting in 802.11a & 802.11n 0MHz Modes:

Radio 0 model: WMIA-199N/EU, frequency 5180 MHz, mode 802.11a

Radio 1 model: WMIA-199N/EU, frequency 5240 MHz, mode 802.11n 20MHz

Radio 2 model: WLM54AG, frequency 5220 MHz, mode 802.11a

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 2, 802.11a & 802.11n 20MHz							
Operation 2	54 & 130	1000	Peak	V	47.3	74	-26.7
Operation 2	54 & 130	1000	Avg	V	44.5	54	-9.5
Operation 2	54 & 130	1125	Peak	V	52.4	74	-21.6
Operation 2	54 & 130	1125	Avg	V	50.3	54	-3.7
Operation 2	54 & 130	1375	Peak	V	47.7	74	-26.3
Operation 2	54 & 130	1375	Avg	V	45.2	54	-8.8

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 3, transmitting in 802.11a & 802.11n 20MHz Modes:

Radio 0 model: WMIA-199N/EU, frequency 5180 MHz, mode 802.11n 20MHz

Radio 1 model: WMIA-199N/EU, frequency 5220 MHz, mode 802.11n 20MHz

Radio 2 model: WLM54AG, frequency 5240 MHz, mode 802.11a

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 3, 802.11a & 802.11n 20MHz							
Operation 3	54 & 130	1125	Peak	V	53.4	74	-20.6
Operation 3	54 & 130	1125	Avg	V	51.7	54	-2.3
Operation 3	54 & 130	1250	Peak	V	45.4	74	-28.6
Operation 3	54 & 130	1250	Avg	V	42.4	54	-11.6
Operation 3	54 & 130	1375	Peak	V	48.7	74	-25.3
Operation 3	54 & 130	1375	Avg	V	46.6	54	-7.4

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 4, transmitting in 802.11a & 802.11n 40MHz Modes:

Radio 0 model: WMIA-199N/EU, frequency 5190 MHz, mode 802.11n 40MHz

Radio 1 model: WMIA-199N/EU, frequency 5230 MHz, mode 802.11n 40MHz

Radio 2 model: WLM54AG, frequency 5240 MHz, mode 802.11a

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 4, 802.11a & 802.11n 40MHz							
Operation 4	54 & 300	1125	Peak	V	55.6	74	-18.4
Operation 4	54 & 300	1125	Avg	V	50.7	54	-3.3
Operation 4	54 & 300	1250	Peak	V	46.8	74	-27.2
Operation 4	54 & 300	1250	Avg	V	41.6	54	-12.4
Operation 4	54 & 300	1375	Peak	V	47.2	74	-26.8
Operation 4	54 & 300	1375	Avg	V	40.4	54	-13.6

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 5, transmitting in 802.11a Modes:

Radio 0 model: WMIA-199N/EU, frequency 5180 MHz, mode 802.11a

Radio 1 model: WMIA-199N/EU, frequency 5240 MHz, mode 802.11a

Radio 2 model: WLM54AG, frequency 5220 MHz, mode 802.11a

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 5, 802.11a							
Operation 5	54	All emissions at least 10 dB below the limit					

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 6, transmitting in 802.11a & 802.11n 20 MHz Modes:

Radio 0 model: WMIA-199N/EU, frequency 5180 MHz, mode 802.11n 20 MHz

Radio 1 model: WMIA-199N/EU, frequency 5240 MHz, mode 802.11n 20 MHz

Radio 2 model: WLM54AG, frequency 5220 MHz, mode 802.11a

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 6, 802.11a & 802.11n 20 MHz							
Operation 6	54 & 130	All emissions at least 10 dB below the limit					

Test result:

Worst case emission while three transmitters operating simultaneously.

Operation 7, transmitting in 802.11a & 802.11n 40 MHz Modes:

Radio 0 model: WMIA-199N/EU, frequency 5180 MHz, mode 802.11n 40 MHz

Radio 1 model: WMIA-199N/EU, frequency 5220 MHz, mode 802.11n 40 MHz

Radio 2 model: WLM54AG, frequency 5200 MHz, mode 802.11a

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

Channel Frequency [MHz]	Data Rate [Mbps]	Emission Frequency [MHz]	Detector Type	Polarization V/H	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
Operation 7, 802.11a & 802.11n 40 MHz							
Operation 7	54 & 300	All emissions at least 10 dB below the limit					

Test results below 1GHz:

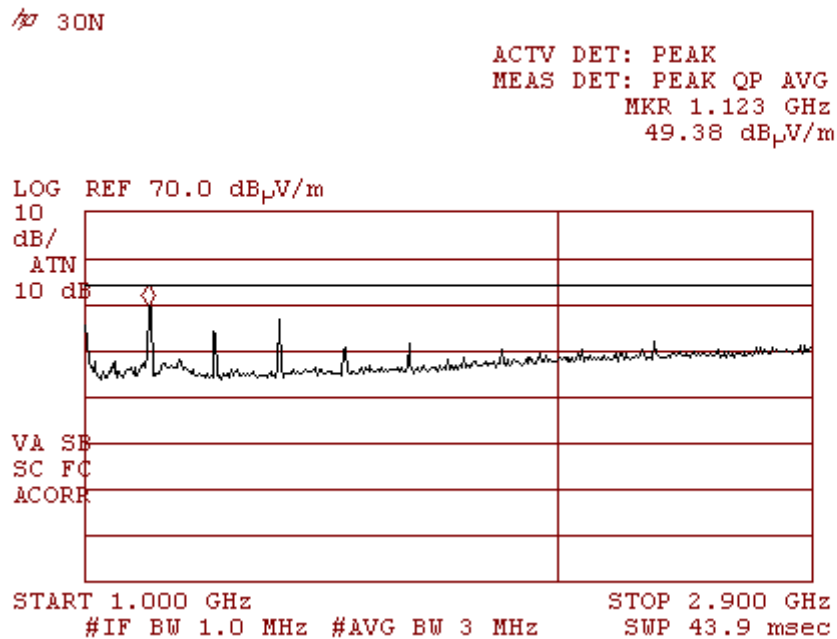
All measurements were done in horizontal and vertical polarizations; the results show the worst case for all mode and channel.

Frequency [MHz]	Emission Level [dBμV/m]	Detector Type	Polarization V/H	Limit [dBμV/m]	Margin [dB]
30.59	36.3	QP	V	40	-3.7
67.95	37.9	QP	V	40	-2.1
100	35.6	QP	V	43.5	-7.9
200	38.7	QP	H	43.5	-4.8
250	42.3	QP	H	46.5	-4.2
500	45.6	QP	H	46.5	-0.9
625	44.7	QP	H	46.5	-1.8

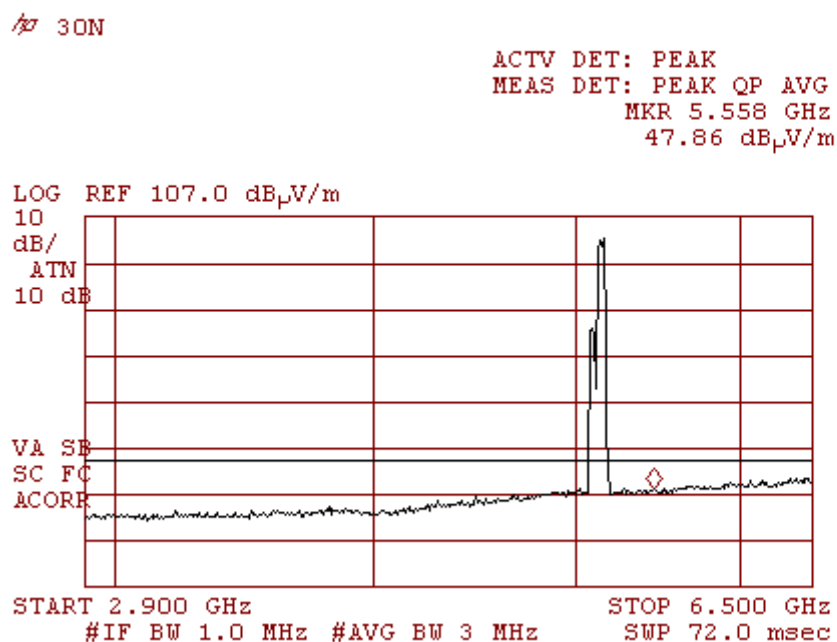
Note: Spurious Emission [dBμV/m] = measured [dBμV] + Correction-factor [dB (1/m)]

Correction Factor = Antenna factor + Cable Loss +Filter I/L.

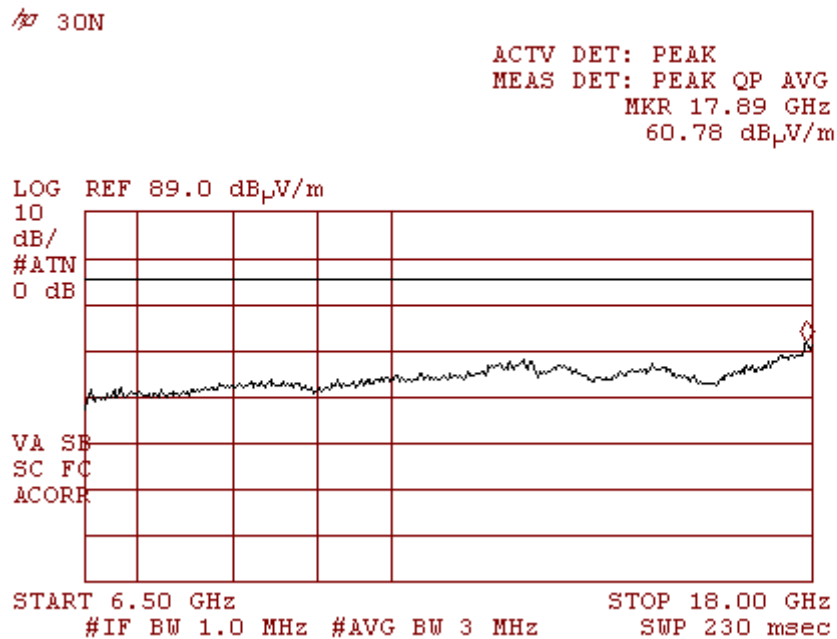
Operation 1
Vertical & Horizontal Polarization
Plot 4.6.1



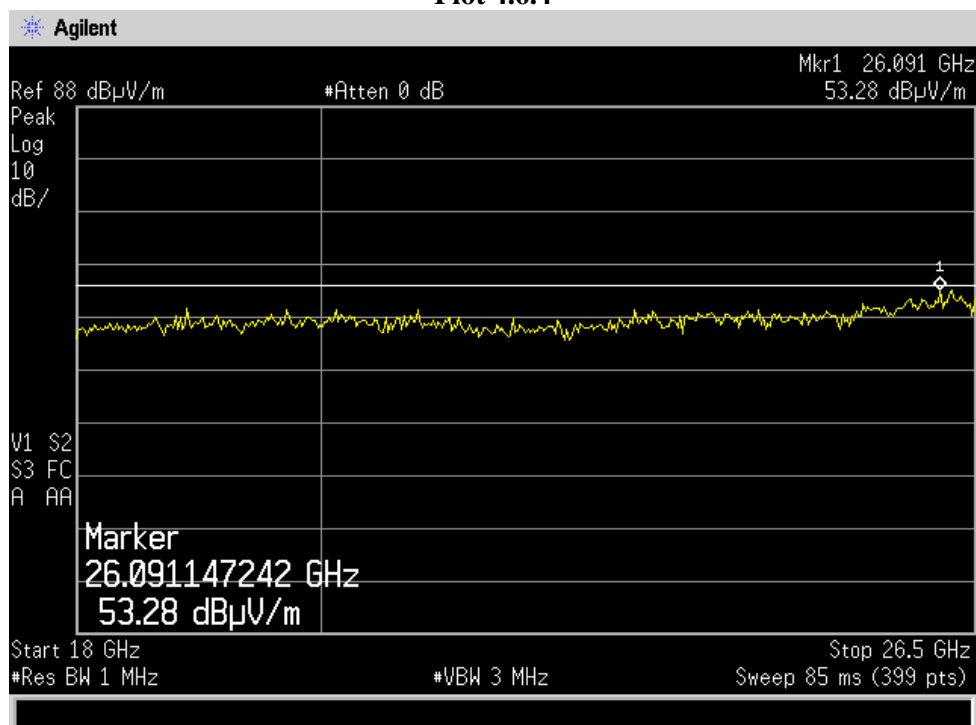
Vertical & Horizontal Polarization
Plot 4.6.2



Vertical & Horizontal Polarization
Plot 4.6.3



Vertical & Horizontal Polarization
Plot 4.6.4

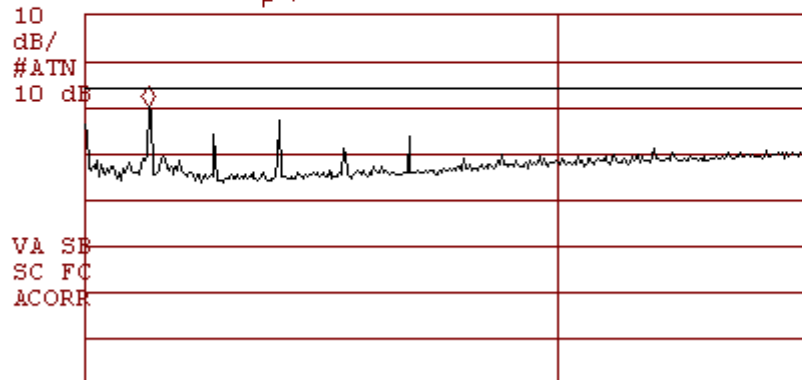


Operation 2
Vertical & Horizontal Polarization
Plot 4.6.5

30N

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.123 GHz
49.87 dB μ V/m

LOG REF 70.0 dB μ V/m



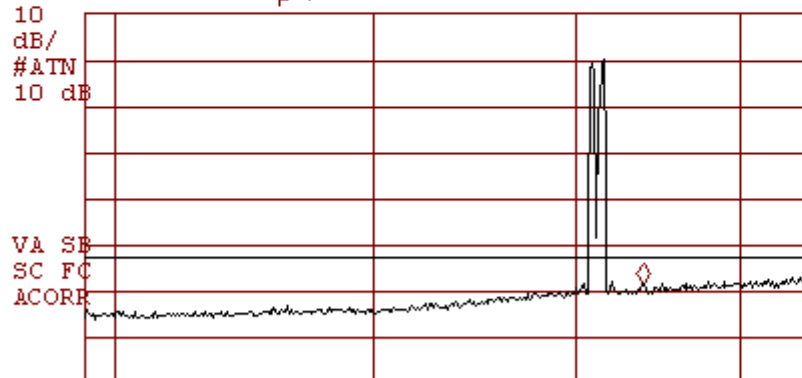
START 1.000 GHz STOP 2.900 GHz
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 43.9 msec

Vertical & Horizontal Polarization
Plot 4.6.6

30N

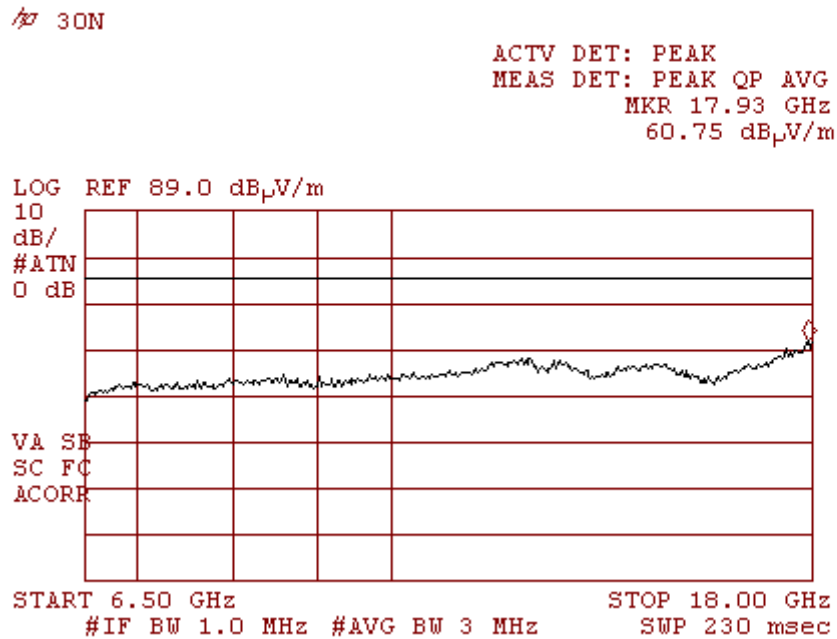
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 5.493 GHz
48.37 dB μ V/m

LOG REF 107.0 dB μ V/m

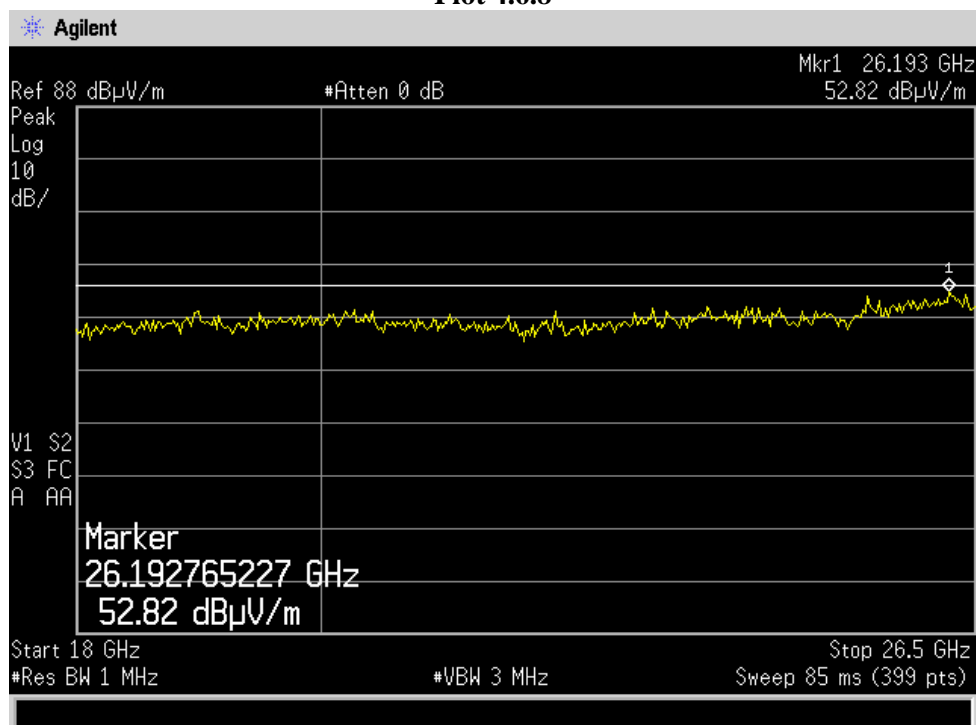


START 2.900 GHz STOP 6.500 GHz
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 72.0 msec

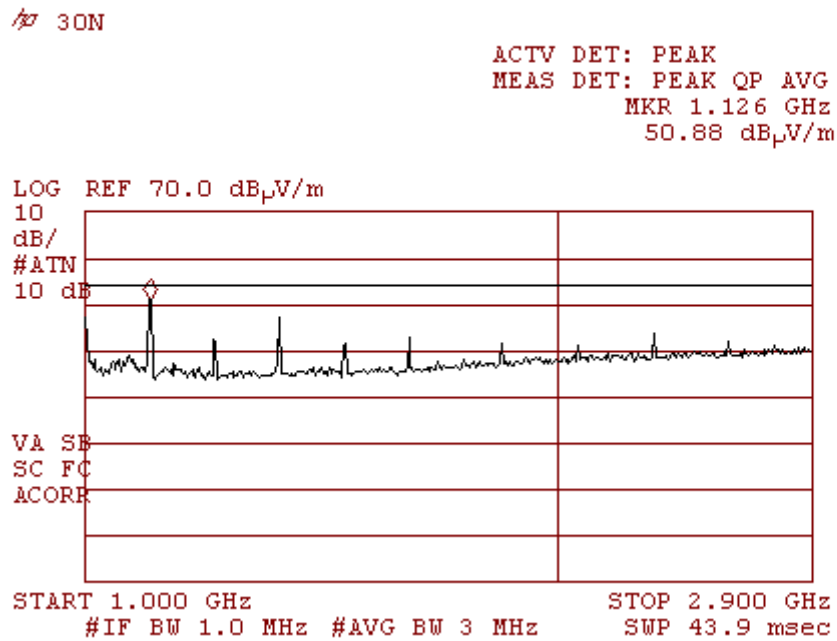
Vertical & Horizontal Polarization
Plot 4.6.7



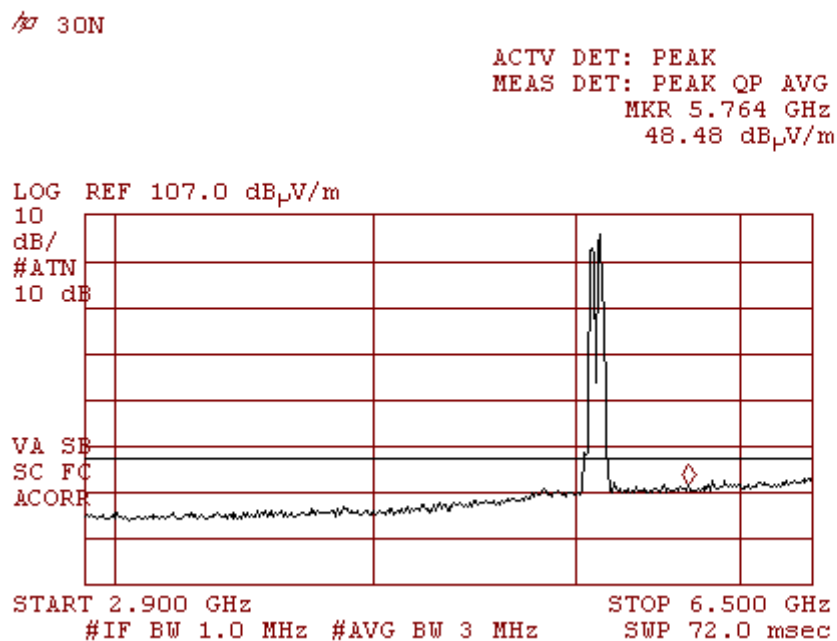
Vertical & Horizontal Polarization
Plot 4.6.8



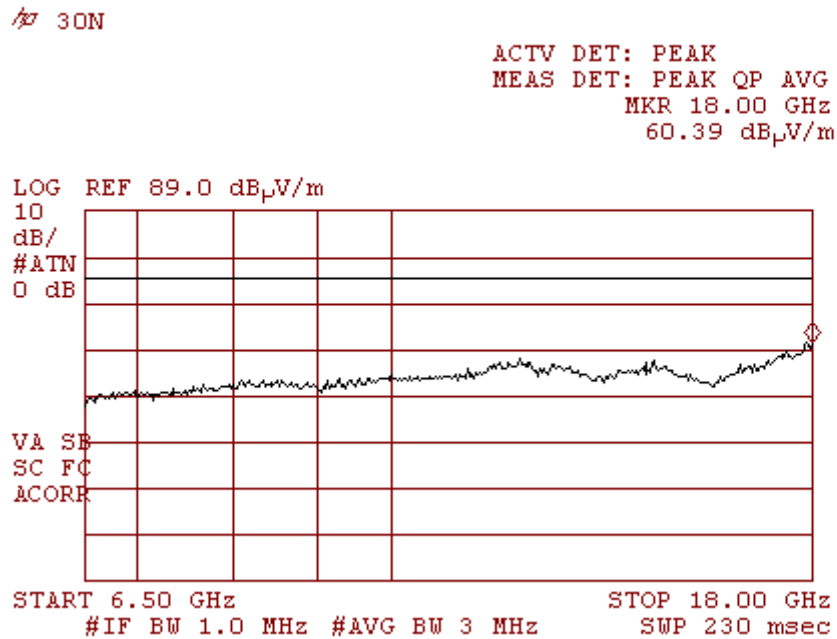
Operation 3
Vertical & Horizontal Polarization
Plot 4.6.9



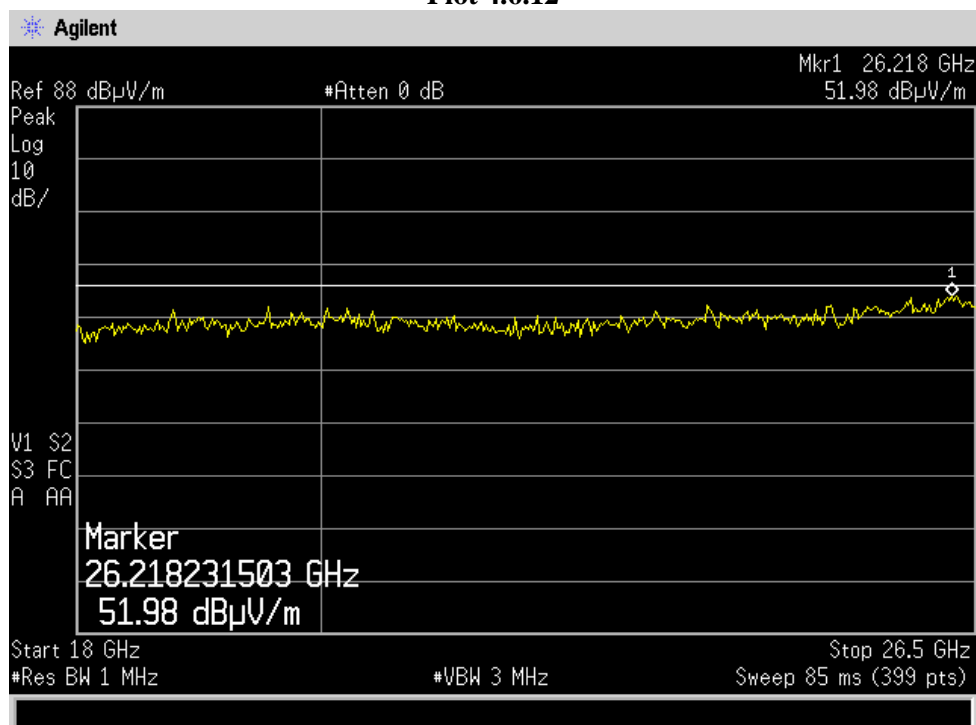
Vertical & Horizontal Polarization
Plot 4.6.10



Vertical & Horizontal Polarization
Plot 4.6.11



Vertical & Horizontal Polarization
Plot 4.6.12

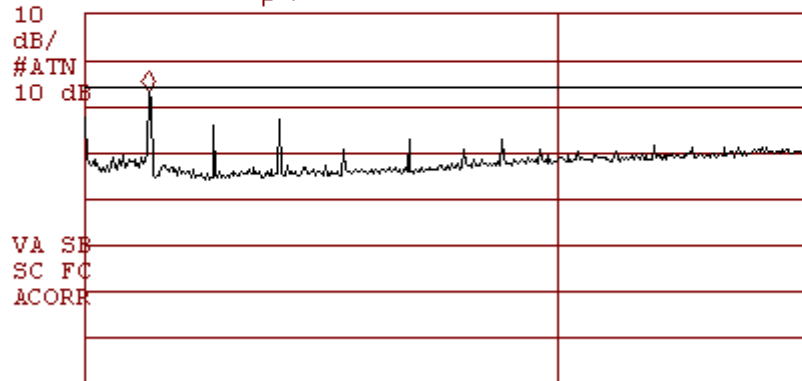


Operation 4
Vertical & Horizontal Polarization
Plot 4.6.13

~~30~~ 30N

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.123 GHz
52.94 dB μ V/m

LOG REF 70.0 dB μ V/m



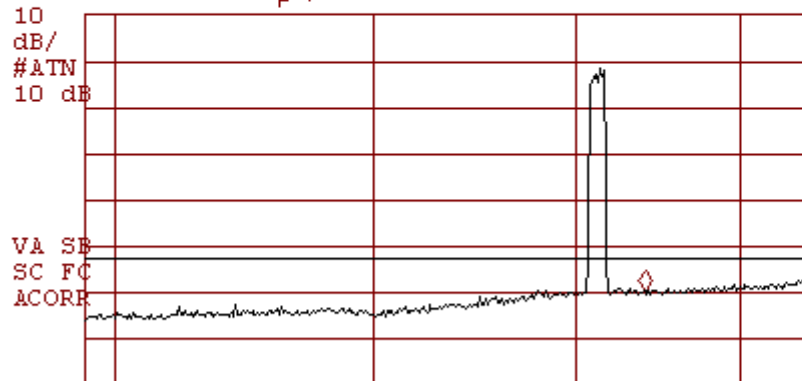
START 1.000 GHz STOP 2.900 GHz
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 43.9 msec

Vertical & Horizontal Polarization
Plot 4.6.14

~~30~~ 30N

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 5.504 GHz
47.04 dB μ V/m

LOG REF 107.0 dB μ V/m



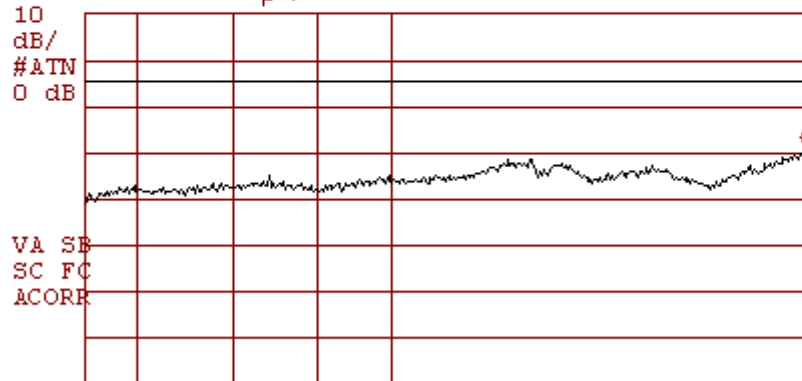
START 2.900 GHz STOP 6.500 GHz
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 72.0 msec

Vertical & Horizontal Polarization
Plot 4.6.15

~~30N~~

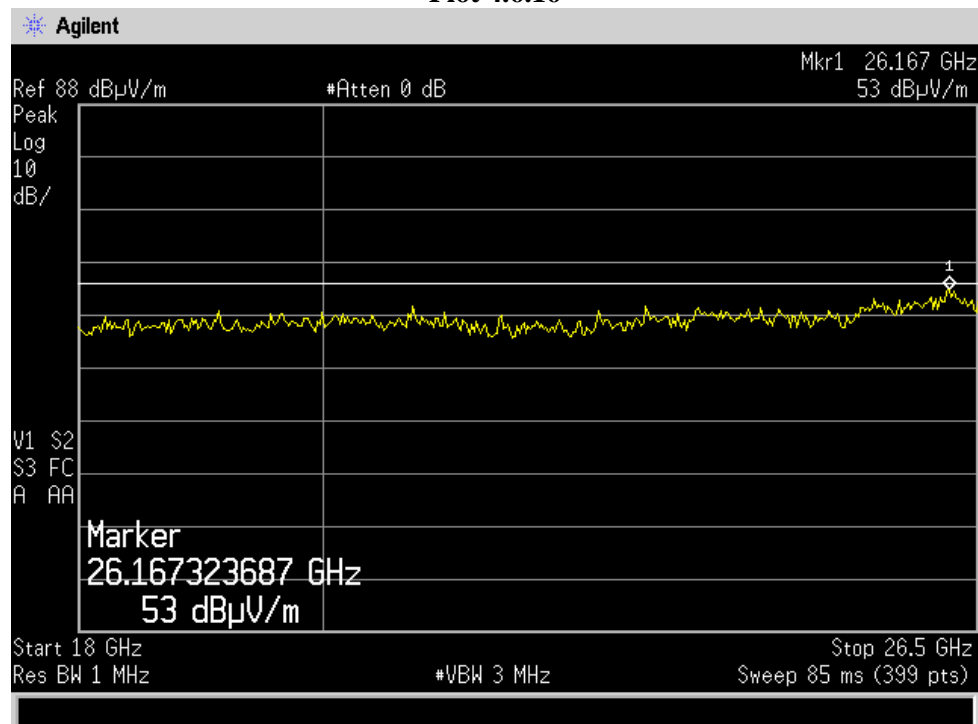
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 17.89 GHz
59.79 dB μ V/m

LOG REF 89.0 dB μ V/m

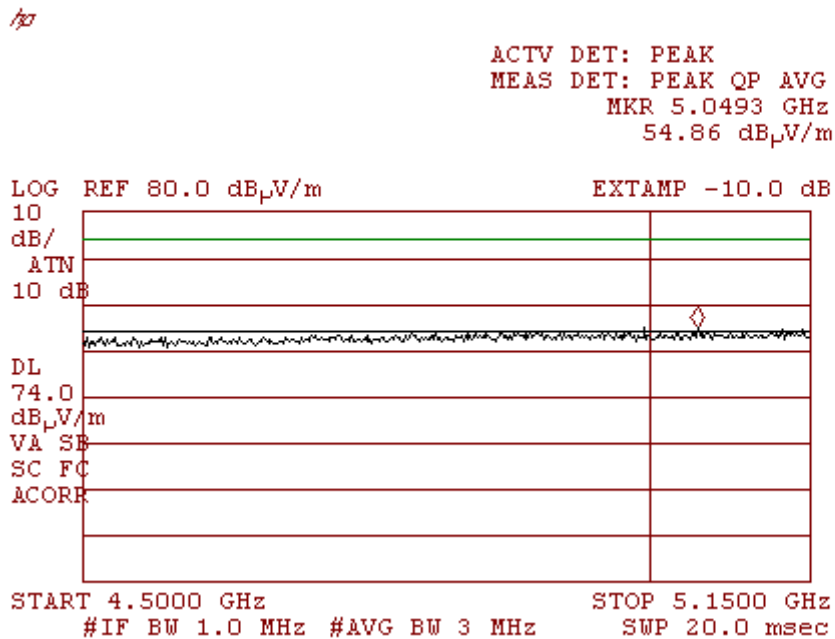


START 6.50 GHz STOP 18.00 GHz
#IF BW 1.0 MHz #AVG BW 3 MHz SWP 230 msec

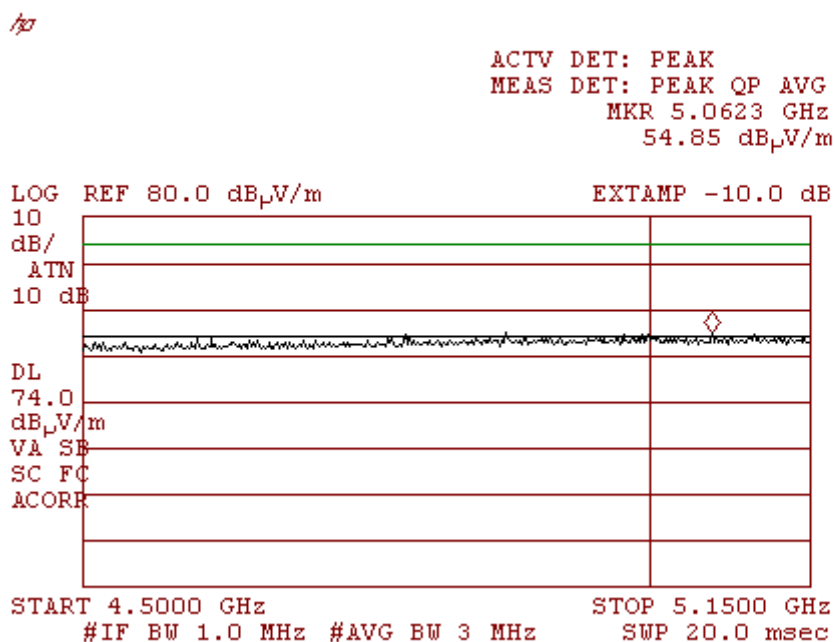
Vertical & Horizontal Polarization
Plot 4.6.16



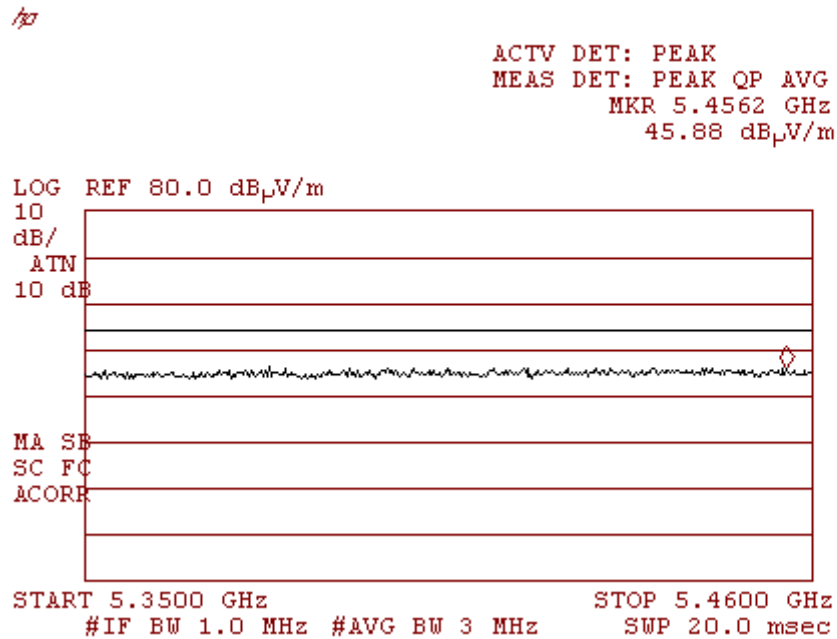
Operation 5
Low frequency
Vertical Polarization
Plot 4.6.17



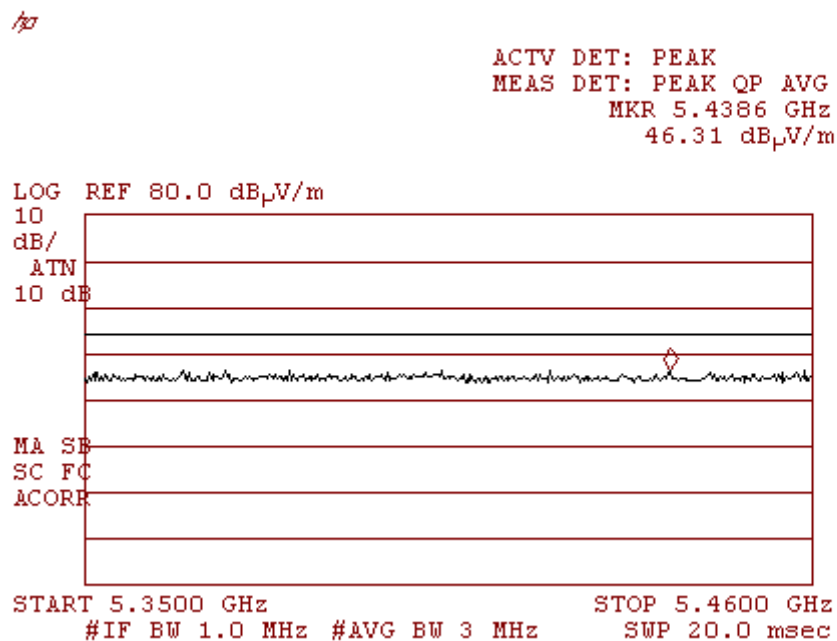
Horizontal Polarization
Plot 4.6.18



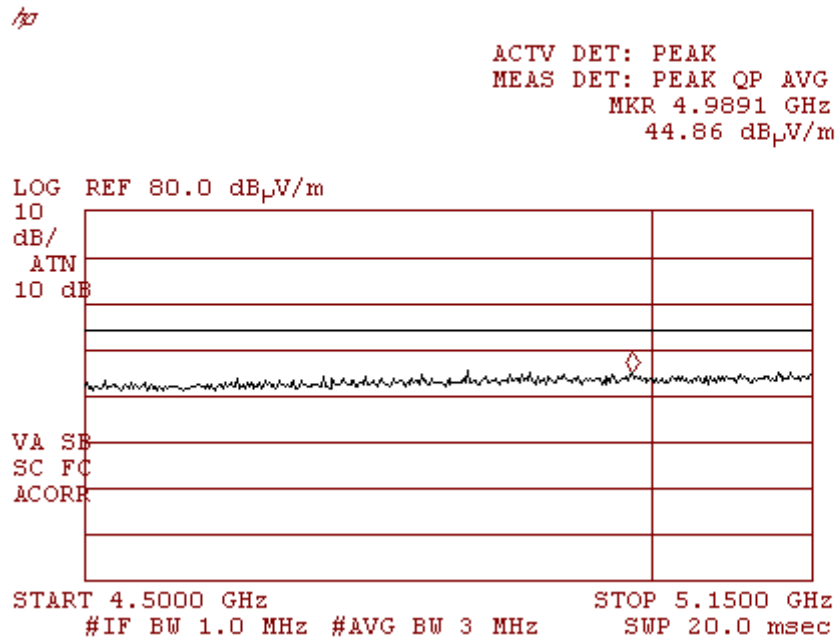
**High Frequency
Vertical Polarization
Plot 4.6.19**



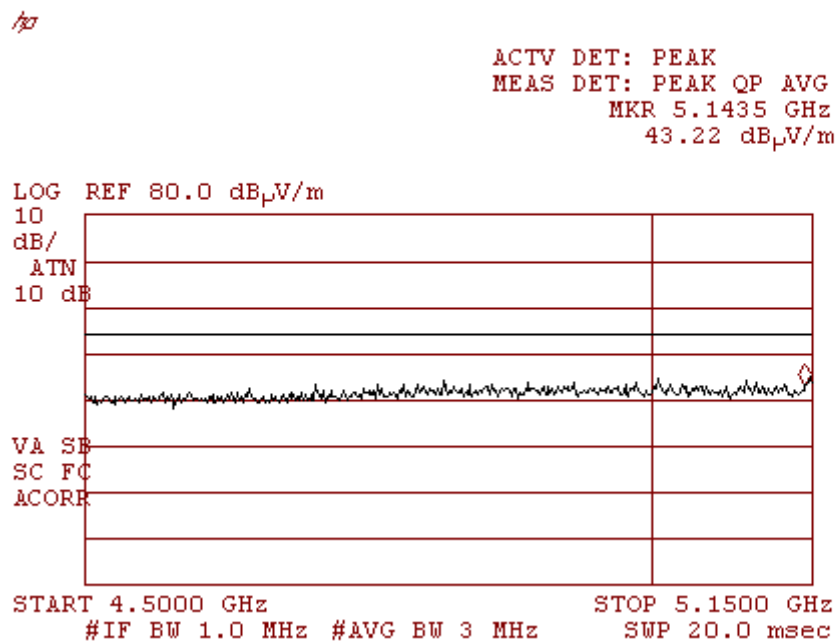
**Horizontal Polarization
Plot 4.6.20**



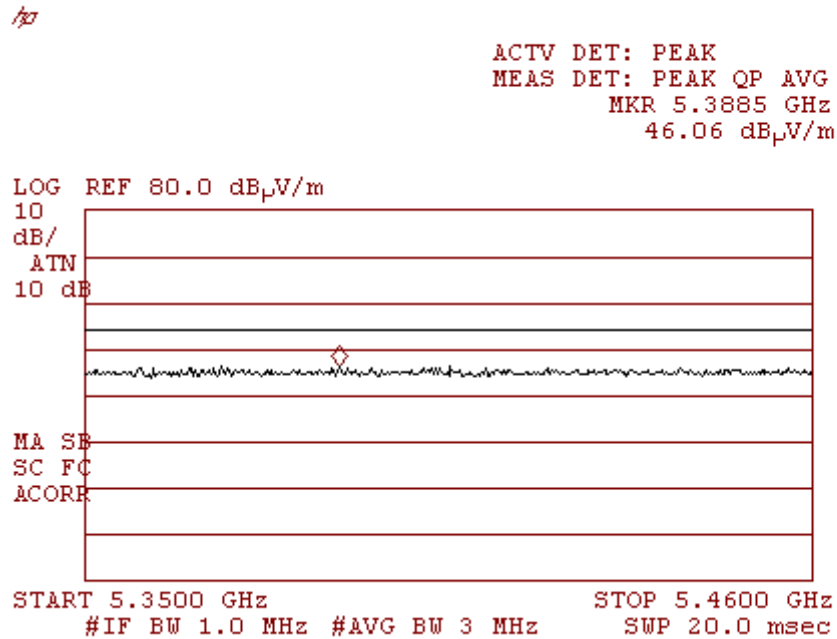
Operation 6
Lowest Frequency
Vertical Polarization
Plot 4.6.21



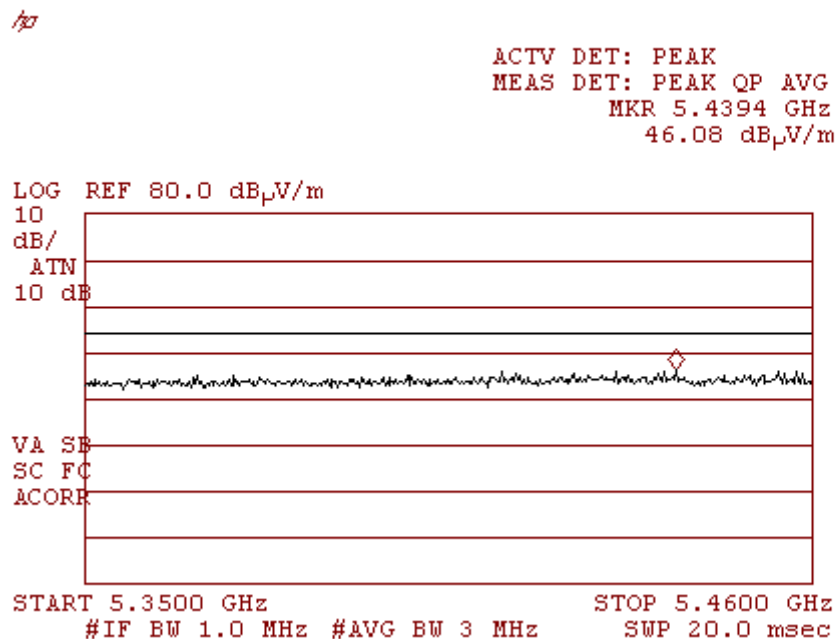
Horizontal Polarization
Plot 4.6.22



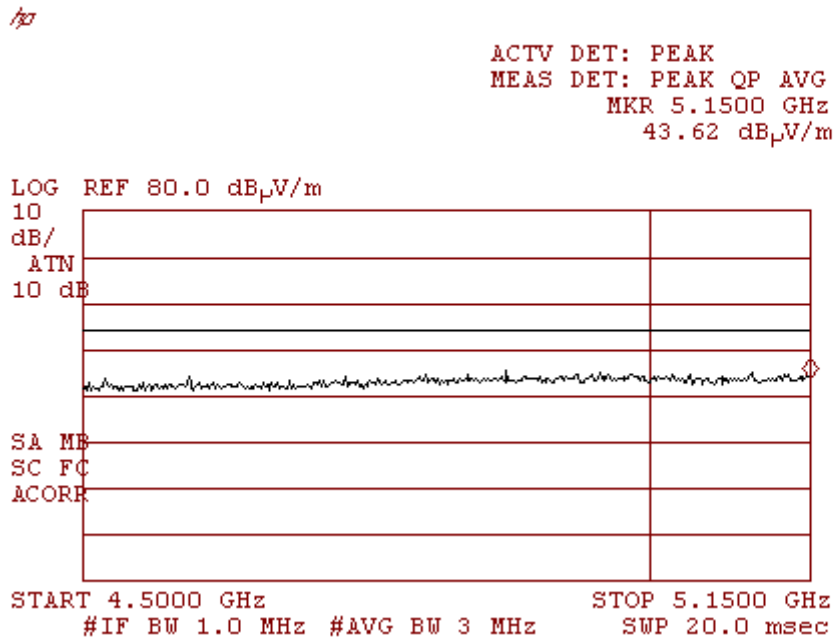
**Highest Frequency
Vertical Polarization
Plot 4.6.23**



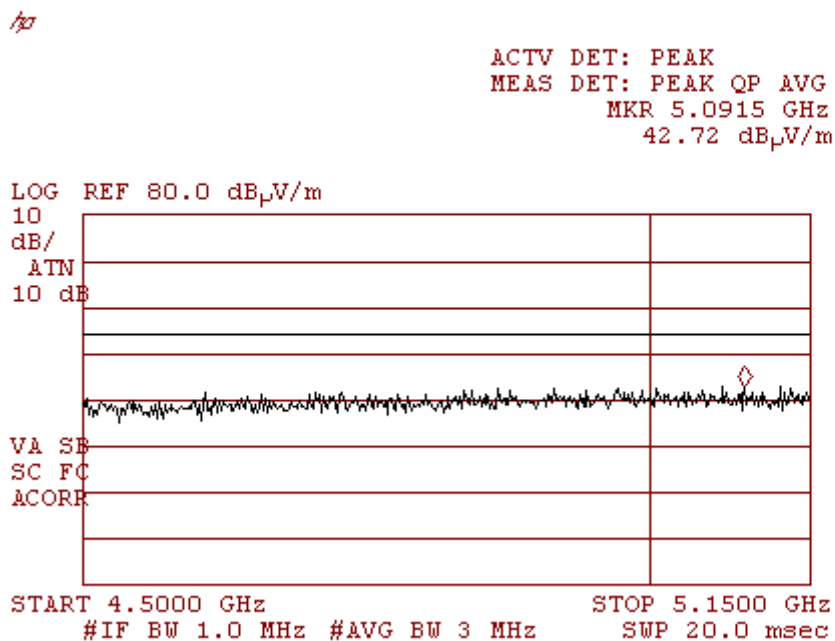
**Horizontal Polarization
Plot 4.6.24**



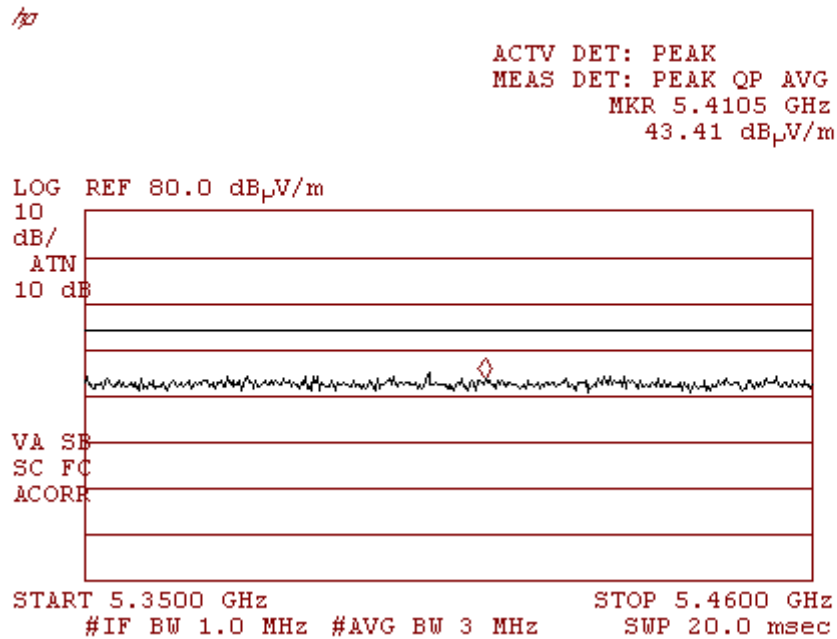
Operation 7
Lowest Frequency
Vertical Polarization
Plot 4.6.25



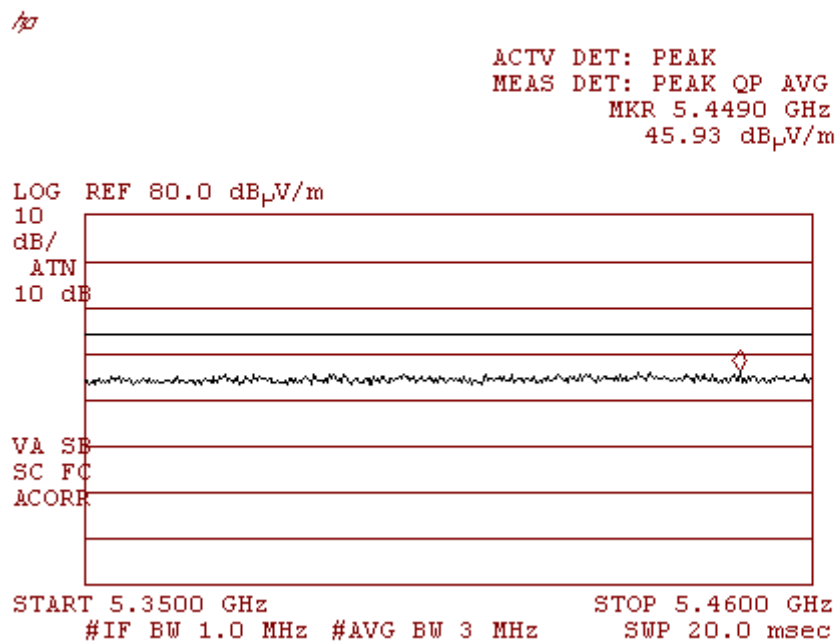
Horizontal Polarization
Plot 4.6.26



**Highest Frequency
Vertical Polarization
Plot 4.6.27**



**Horizontal Polarization
Plot 4.6.28**



Test results:

Radiated Emission below 1 GHz, Worst case

Transmit mode: while three transmitters operating simultaneously.

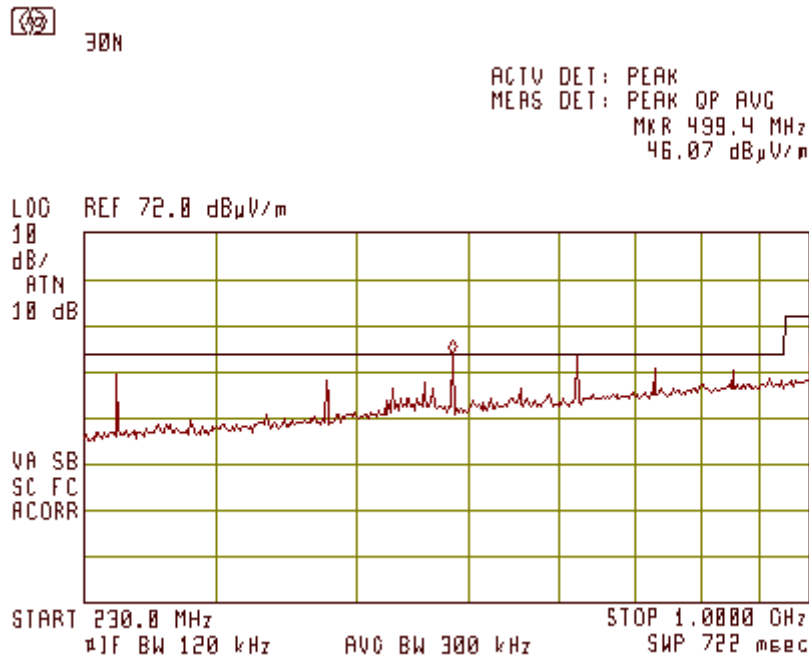
Radio 0 model: WMIA-199N/EU, frequency 2412 MHz, mode 802.11g

Radio 1 model: WMIA-199N/EU, frequency 5230 MHz, mode 802.11n 40MHz

Radio 2 model: WLM54AG, frequency 2462 MHz, mode 802.11b

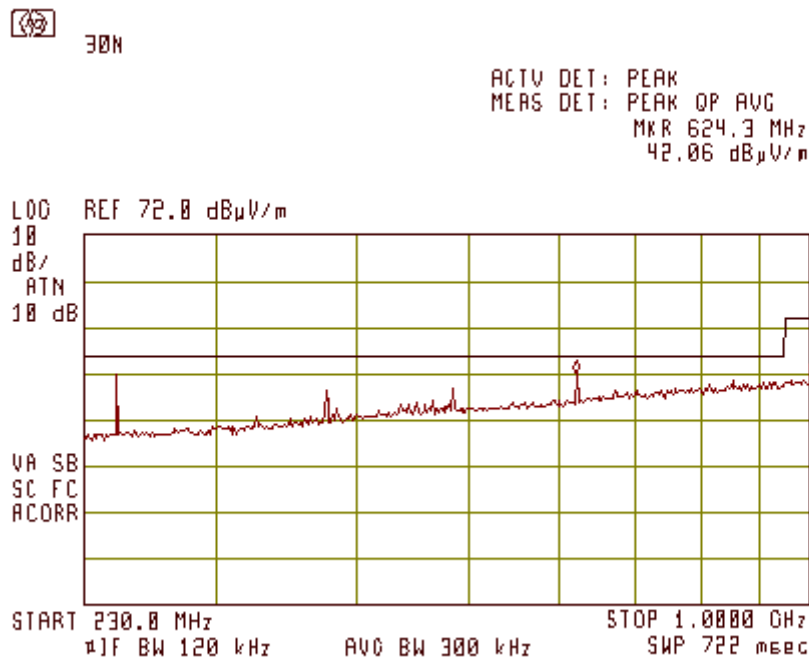
Vertical Polarization

Plot 4.6.29



Horizontal Polarization

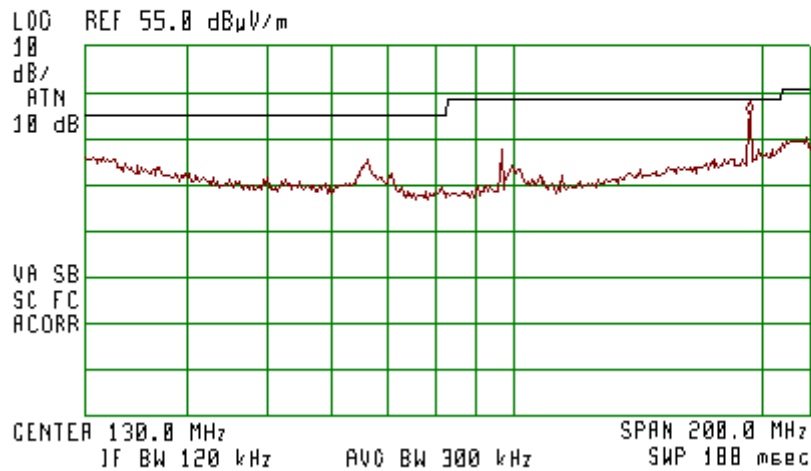
Plot 4.6.30



Horizontal Polarization
Plot 4.6.31



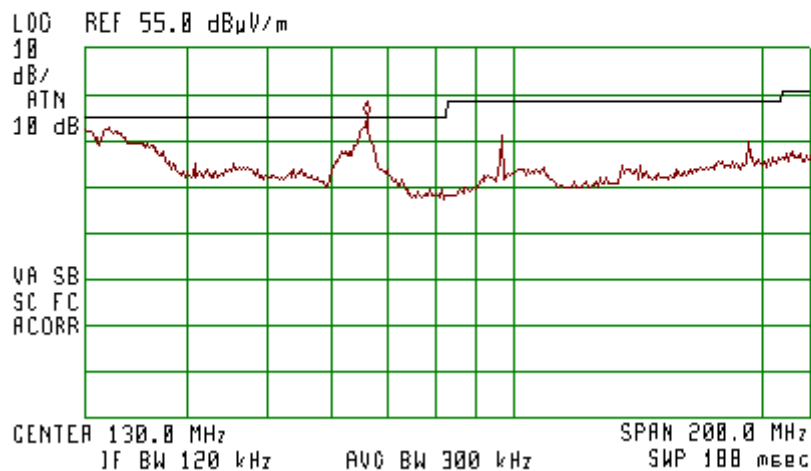
ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 201.0 MHz
40.06 dB μ V/m



Vertical Polarization
Plot 4.6.32



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
MKR 60.3 MHz
40.67 dB μ V/m



4.7. Radiated Emission, Receive Mode

Reference document:	47 CFR §15.109		
Test Requirements:	Emission Level shall not exceed §15.109 limits		
Test Method:	See sec 2.2	Comply	
Method of testing:	Radiated		
Operating conditions:	Under normal test conditions		
S.A. Settings:	f<1GHz: RBW= 120kHz, VBW= 300kHz, QP f> RBW= 1MHz, VBW= 3MHz for peak and 10 Hz for Average		
Mode of operation:	Receive		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plot 4.7.1 to Plot 4.7.4	

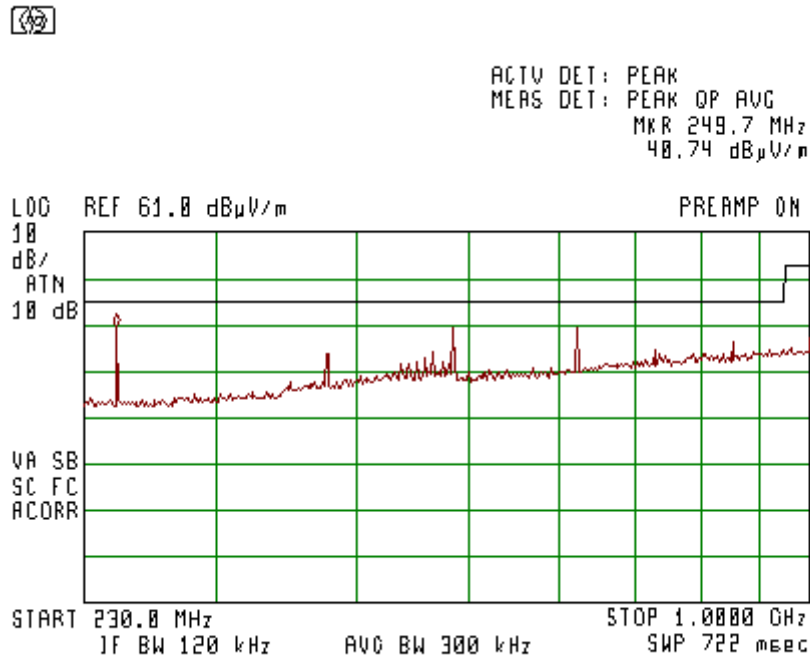
Test results:

All measurements were done in horizontal and vertical polarizations; all transmitters in receive mode, the results show the worst case.

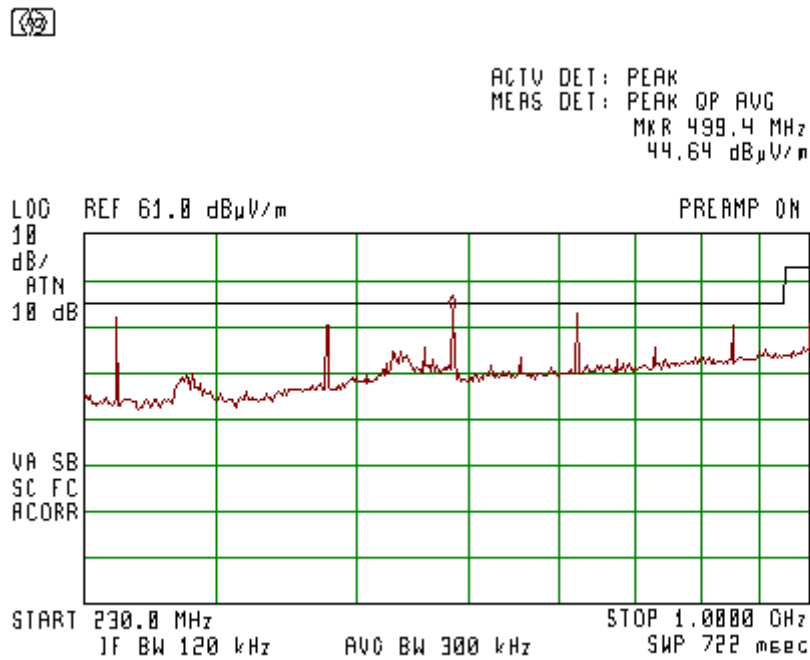
Frequency [MHz]	Emission Level [dBμV/m]	Detector Type	Polarization V/H	Limit [dBμV/m]	Margin [dB]
30.168	33.8	QP	V	40	-6.2
84.230	35.0	QP	H	40	-5
124.996	30.3	QP	H	43.5	-13.2
249.987	43.6	QP	V	46.5	-2.9
499.988	45.8	QP	H	46.5	-0.7
624.987	43.0	QP	H	46.5	-3.5

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

**Vertical Polarization
Plot 4.7.1**



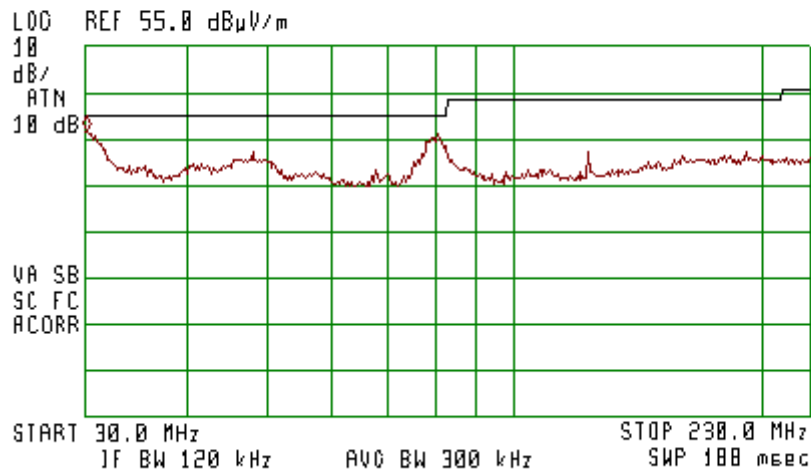
**Horizontal Polarization
Plot 4.7.2**



Vertical polarization
Plot 4.7.3

(45)

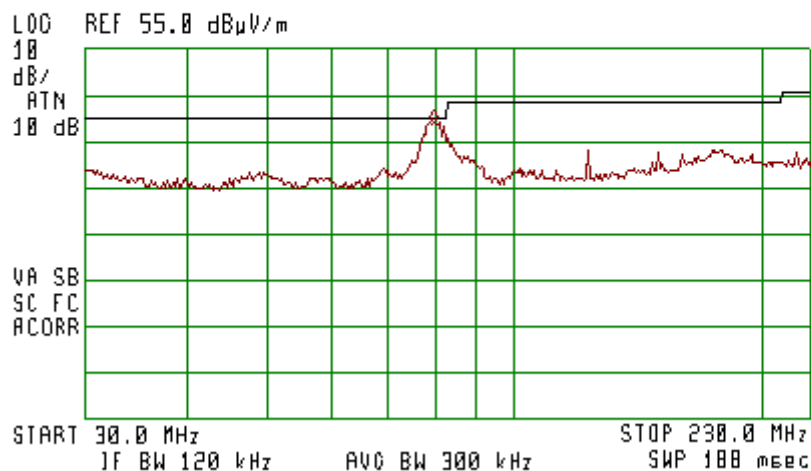
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
NKR 38.2 MHz
36.94 dB μ V/m



Horizontal polarization
Plot 4.7.4

(45)

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
NKR 84.4 MHz
39.30 dB μ V/m



4.8. Conducted Power line Emission measurements

Reference document:	47 CFR §15.107/207		
Test Requirements:	The radio frequency voltage that is conducted back onto the AC power line shall not exceed the limits specified in § 15.107/207		
Test setup:	See Sec. 2.3	Pass	
Operating conditions:	Under normal test conditions		
Method of testing:	Conducted		
S.A. Settings:	f <30MHz: RBW: 9kHz, VBW:30kHz		
Environment conditions:	Ambient Temperature: 22°C	Relative Humidity: 48%	Atmospheric Pressure: 1011.4 hPa
Test Result:	See below	See Plots 4.8.1 – 4.8.2	

Test Results:

Worst-case results of Transmit and Receive modes.

Transmit mode: while three transmitters operating simultaneously.

Radio 0 model: WMIA-199N/EU, frequency 2412 MHz, mode 802.11g

Radio 1 model: WMIA-199N/EU, frequency 5230 MHz, mode 802.11n 40MHz

Radio 2 model: WLM54AG, frequency 2462 MHz, mode 802.11b

“Phase” Lead

Frequency [MHz]	Measured Result [dBμV]		Class B Limits [dBμV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.196305	54.5	42.4	63.77	53.77	-9.27	-11.37	Pass
0.391042	41	35.7	58.04	48.04	-17.04	-12.34	Pass
0.685091	28.1	24.8	56.00	46.00	-27.90	-21.20	Pass
1.470231	27.9	23.8	56.00	46.00	-28.10	-22.20	Pass
3.526337	26.2	21.3	56.00	46.00	-29.80	-24.70	Pass
10.132483	42.3	42.1	60.00	50.00	-17.70	-7.90	Pass

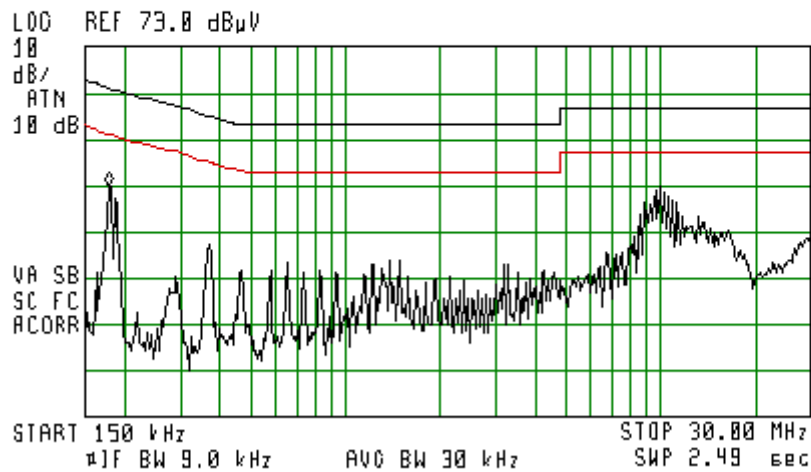
“Neutral” Lead

Frequency [MHz]	Measured Result [dBμV]		Class B Limits [dBμV]		Margin [dB]		Pass/Fail
	QP	AVR	QP	AVR	QP	AVR	
0.197603	54.6	46.3	63.71	53.71	-9.11	-7.41	Pass
0.295885	42	36	60.36	50.36	-18.36	-14.36	Pass
0.394821	40.6	36.5	57.96	47.96	-17.36	-11.46	Pass
1.376385	27.8	25.6	56.00	46.00	-28.20	-20.40	Pass
3.535531	25.8	18.3	56.00	46.00	-30.20	-27.70	Pass
10.440002	42.4	42.3	60.00	50.00	-17.60	-7.70	Pass

"Phase" Lead
Plot 4.8.1



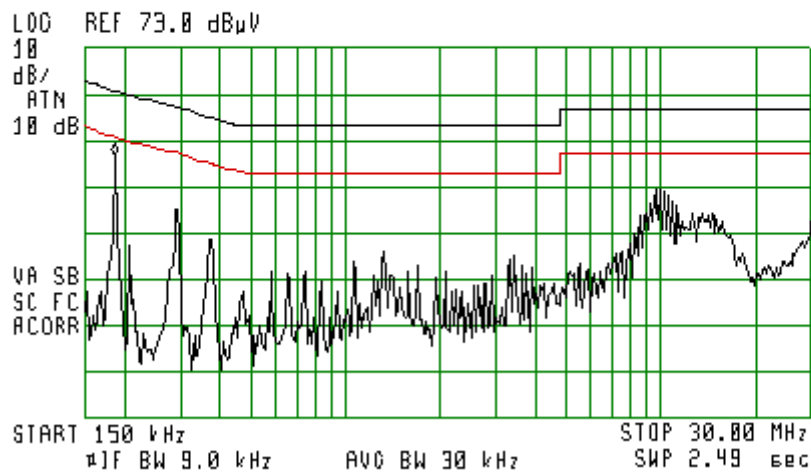
ACTV DET: PEAK
MEAS DET: PEAK OP AVG
NR 190 kHz
43.84 dBμV



"Neutral" Lead
Plot 4.8.2



ACTV DET: PEAK
MEAS DET: PEAK OP AVG
NR 200 kHz
49.61 dBμV



4.9. Antenna Connector Requirements

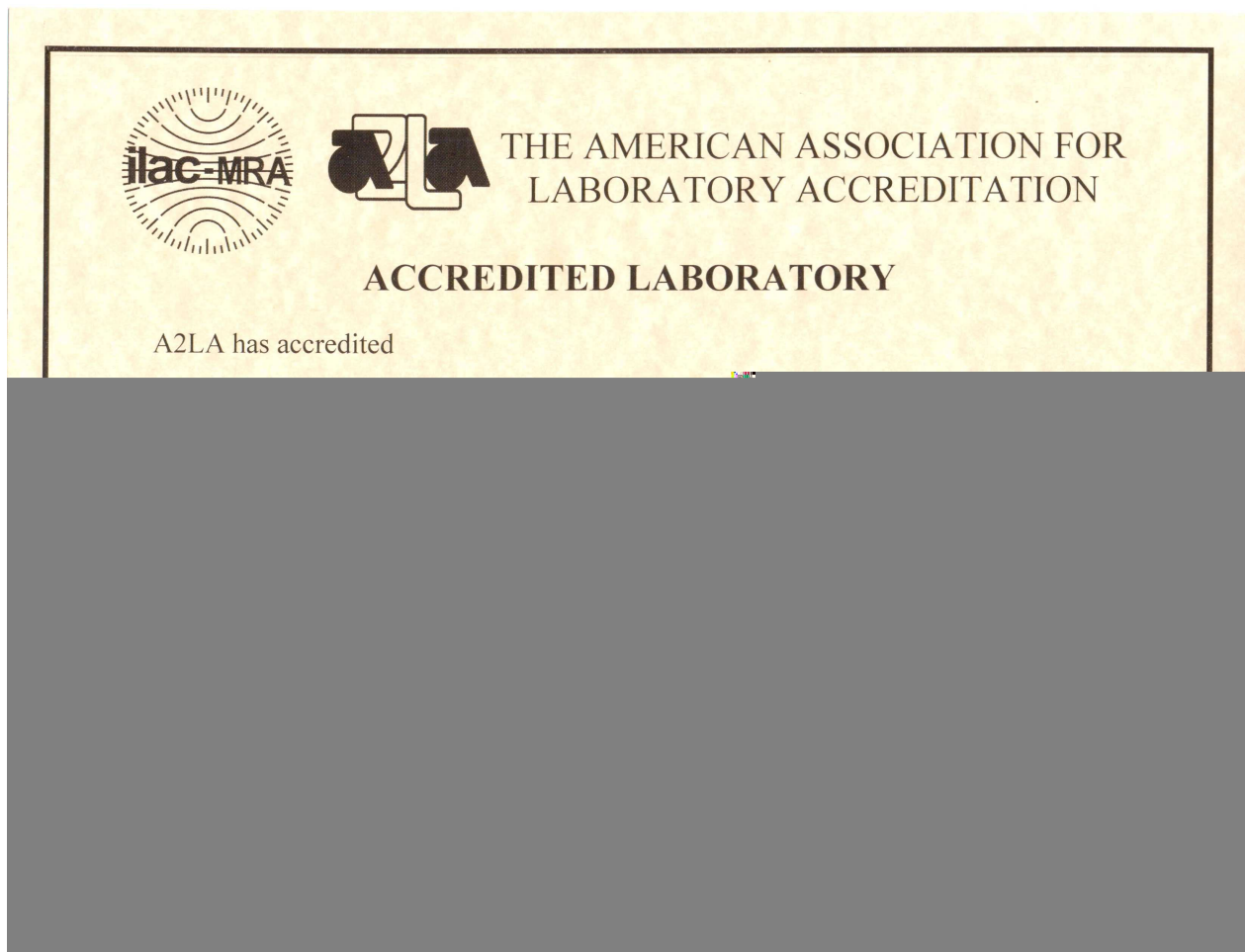
Reference document:	47 CFR §15.203	
Test Requirements:	An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with provisions of this section.	
Result:	The Access Point EXRP 30N employs internal PCB antennas.	Comply

5. Appendix

Appendix A: List of Measuring Equipment used:

Equipment	Manufacturer/ Model	Serial Number	Due date
CISPR16 EMI Receiver	HP8546A	3710A00392	30-06-10
Spectrum Analyzer 9kHz ÷ 22 GHz	HP 8593EM	3536A00131	30-06-10
Spectrum Analyzer 100 Hz ÷ 26.5 GHz	Agilent E7405A	US41160436	30-06-10
LNA Amplifier 1 GHz ÷ 18 GHz	AMP – 5D-010180-30-10P-GW	618653	30-06-10
Power meter	Agilent N1911A	MY45100784	23-02-10
Dual Ridged Guide Ant.1-18 GHz	EMCO 3115	9602-4677	30-06-10
Antenna 18 GHz ÷ 26.5 GHz	Alpha Industry 861A/599	505	30-06-10
Turn table	HD100	100/693	-
Antenna Mast	HD 100	100/693	-
Biconical 20 –200 MHz	Schwarzbeck VHBB9124	9124/0255	16-05-10
Log-Periodic 200 – 1000 MHz	Schwarzbeck VUSLP9111	VUSLP9111184	16-05-10
Pre-Amplifier	MiTeq, AMF-5F-18002650-30-10P	945372	30-06-10
LISN	Fischer 50/250-25-2	-	30-06-10
Transient Limiter	HP11947A	-	30-06-10
Notch Filter	Micro-Tronics BRM50702-05	0001	30-06-10
Spectrum Analyzer 3Hz-44GHz	Agilent E4446A	MY46180602	07.03.10
Peak Power Meter	Agilent N1911A	MY45100784	31.07.10
Wideband Power Sensor	Agilent N1921A	MY45241242	31.07.10

Appendix B: Accreditation Certificate



End of the Test Report