MOTOROLA MOBILITY

MOBILE DEVICES BUSINESS

PRODUCT SAFETY AND COMPLIANCE
EMC LABORATORY

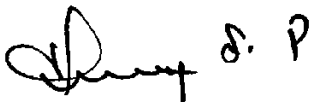
EMC TEST REPORT

Test Report Number – 24229-1 WLAN @ 5.2 GHz

Report Date – December 3, 2010

The test results contained herein relate only to the model(s) identified. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics.

As the responsible EMC Engineer, I hereby declare that the equipment tested as specified in this report conforms to the requirements indicated.

Signature:  Name: Thanigaiselvan Palaniswami

Title: EMC Engineer Date: December 6, 2010

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Test Report Details

Tests Performed By:	ADR Testing Service Location Code: ADR LV Motorola Mobility Inc Product Safety and Compliance Group 600 North US Hwy 45 Libertyville, IL 60048 PH (847) 523-6167 Fax (847) 523-4538 FCC Registration Number: 316588 Industry Canada Number: 109O-1
Tests Requested By:	Motorola Mobility Inc. 600 North US Hwy 45 Libertyville, IL 60048
Product Type:	Cellular Phone
Signaling Capability:	WCDMA 850 & 1900, GSM 850 & 1900, EDGE 850 & 1900, Bluetooth, WLAN a/b/g/n
FCC ID:	IHDP56LS1
Serial Numbers:	LOLAAH0036
Testing Complete Date:	December 6, 2010

Applicable Standards

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

__X__ Part 15 Subpart E – Unlicensed National Information Infrastructure Devices

Applicable Standards: ANSI 63.4 2003, RSS-210 Issue 7

Summary of Testing

Test	Test Name	Pass/Fail
1	26 dB Bandwidth	Pass
2	Peak Power	Pass
3	Peak Power Spectral Density	Pass
4	Peak Excursion ration	Pass
5	Frequency Stability	Pass
6	AC Line Conducted Emissions	Pass

Test	Test Name	Results
1	26 dB Bandwidth	Pass
2	Peak Power	Pass
3	Peak Power Spectral Density	Pass
4	Peak Excursion ration	Pass
5	Frequency Stability	Pass
6	AC Line Conducted Emissions	Pass

General and Special Conditions

The Cellular Phone hereinafter referred to as the Equipment under Test or EUT was tested using a fully charged battery when applicable. Where a battery could not be used due to the need for a controlled variation of input voltage, an external power supply was utilized.

All testing was done in an indoor controlled environment. The temperature and the relative humidity were maintained within the ANSI C63.4 2003 Standard requirements during the entire duration of testing.

Equipment and Cable Configurations

The EUT was tested in a stand-alone configuration that is representative of typical use.

Measuring Equipment and Calibration Information

Manufacturer	Equipment Type	Model No.	Serial Number	Calibration Due Date
Rohde Schwarz	Receiver	ESI26	100001	9/23/2011
Agilent	Signal Analyzer	N9020A	US46470586	12/18/10
Attenuator	Weinschel	AS-6	6675	NCR
Attenuator	Weinschel	AS-6	6677	NCR
ETS	LISN	3810/2	00062907	9/08/2011
ETS	LISN	3810/2	00062912	9/08/2011

All test equipment was within their calibration date during the time of testing. When equipment went out of calibration during testing it was replaced using a similar piece of calibrated equipment. All these equipments are listed in the equipment list. All equipment is on a one-year calibration cycle.

Description of WLAN Transmitter

The EUT offers WLAN, operating in the 2.4 GHz and 5 GHz bands, as a feature. This report covers operation in the 5 GHz Sub band 1 only. The WLAN antenna is mounted inside of the EUT. The antenna installation is permanent. For a more thorough description of the functionality please refer to Exhibit 12 of this package.

As a WLAN transmitter, it is designed operate with other WLAN devices as defined by the industrial standard. In this application, the device is battery operated.

De Facto EIRP Limit – Pursuant 47 CFR 15.407(a) (1); RSS-210 Section A8.4.

Criterion: The conducted output power limit of 50 mW or 4 dBm + 10 log B, where B is the 26-dB emission bandwidth in MHz is based on the use of antennas with directional gains that do not exceed 6 dB_i. If transmitting antennas of directional gain greater than 6 dB_i are used, the conducted output power and the peak power spectral density from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB_i.

The antenna employed by this transmitter is intended to be omni-directional, and thus will not exhibit directional gain in excess of 6 dB_i. The conducted power is less than the limits set forth (see elsewhere in this report for details).

Measurement Procedures and Data

26 dB Bandwidth

Measurement Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

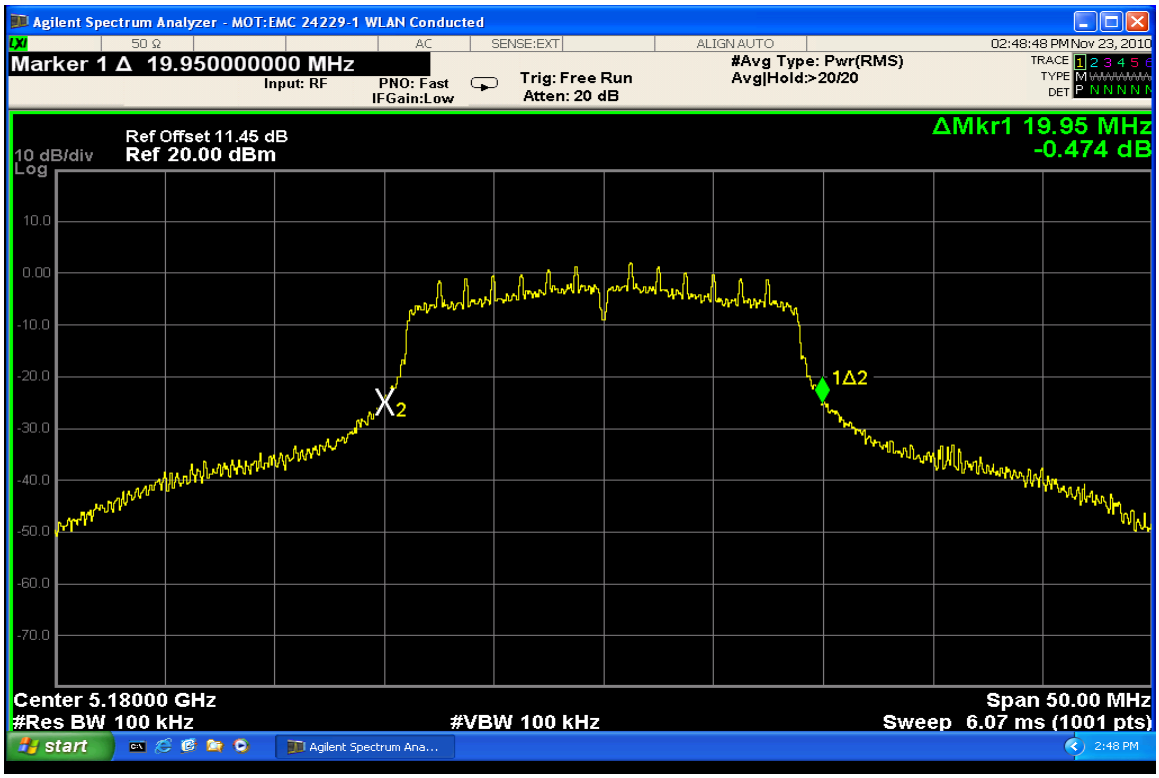
1. RBW ≥ 100 kHz
2. VBW ≥ RBW
3. Sweep = auto
4. Detector function = peak
5. Trace = max hold

The trace was allowed to stabilize. The marker-to-peak function was used to set the marker to the peak of the emission. The marker-delta function was used to measure 26 dB down one side of the emission. The marker-delta function and marker was moved to the other side of the emission until it was even with the reference marker. The marker-delta reading at this point was the 26 dB bandwidth of the emission.

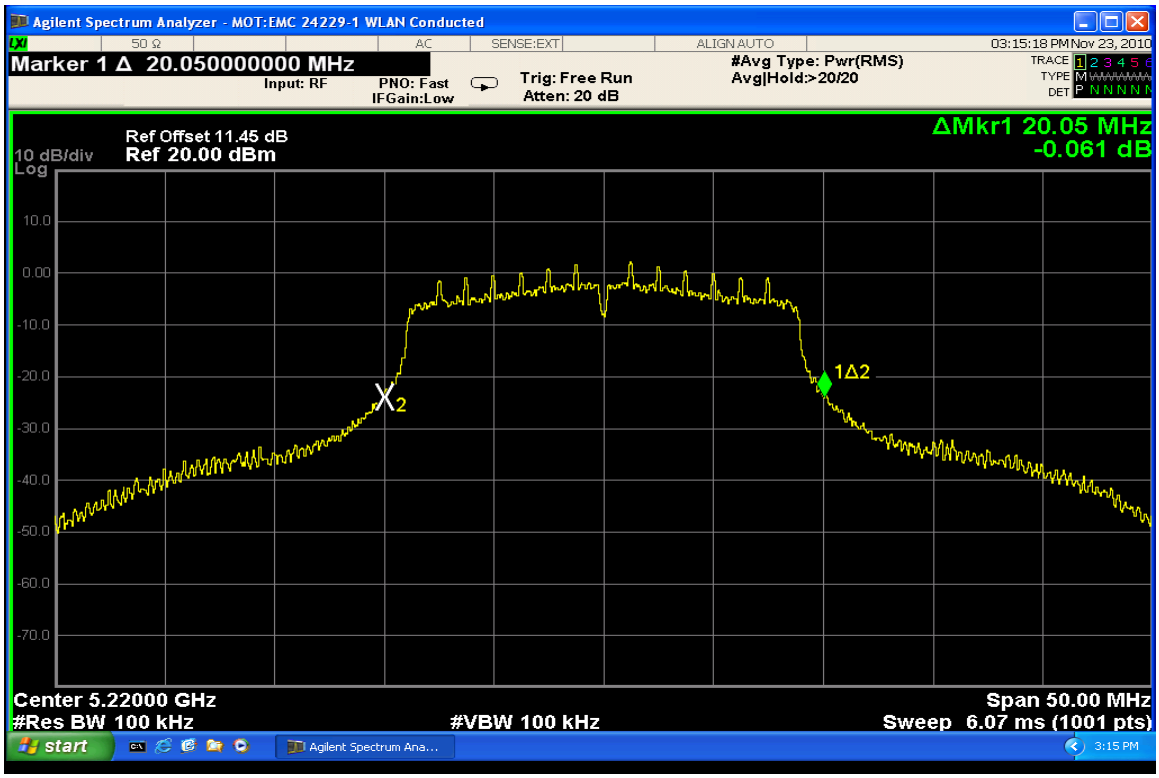
Measurement Results

See attached

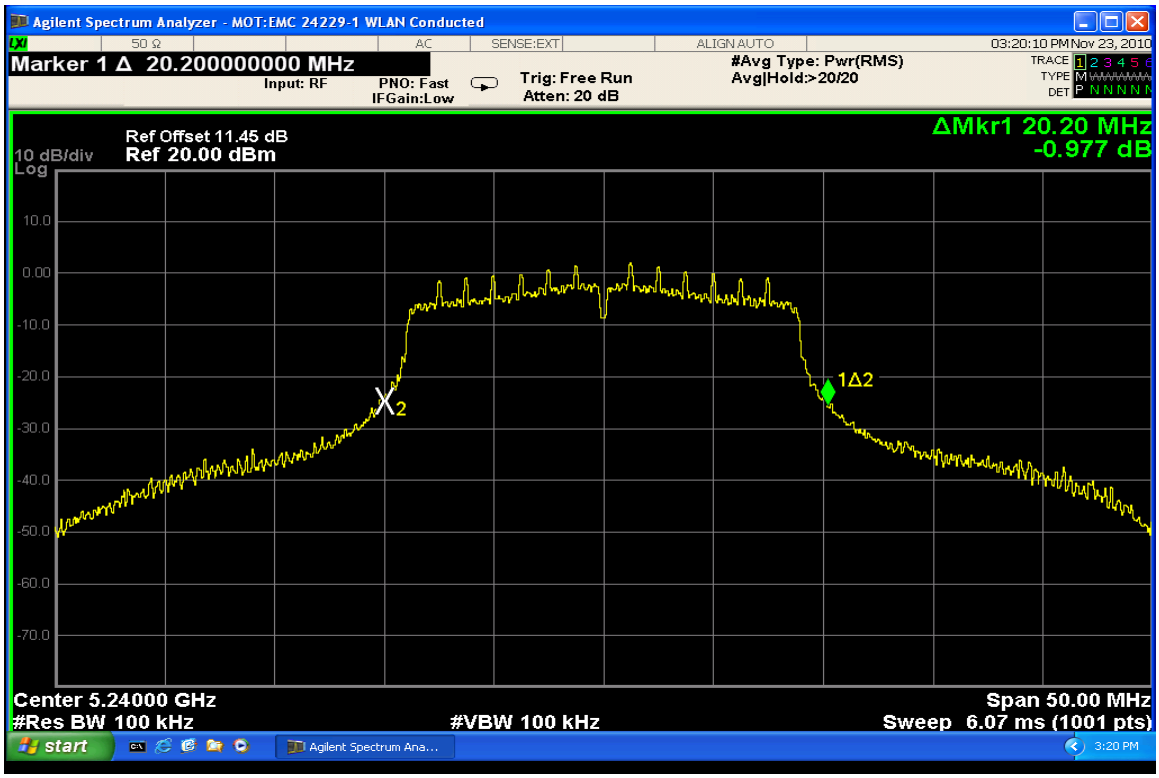
802.11 n Mode @ 6.5 Mbps



26 dB Bandwidth Channel 36 @ 6.5 Mbps



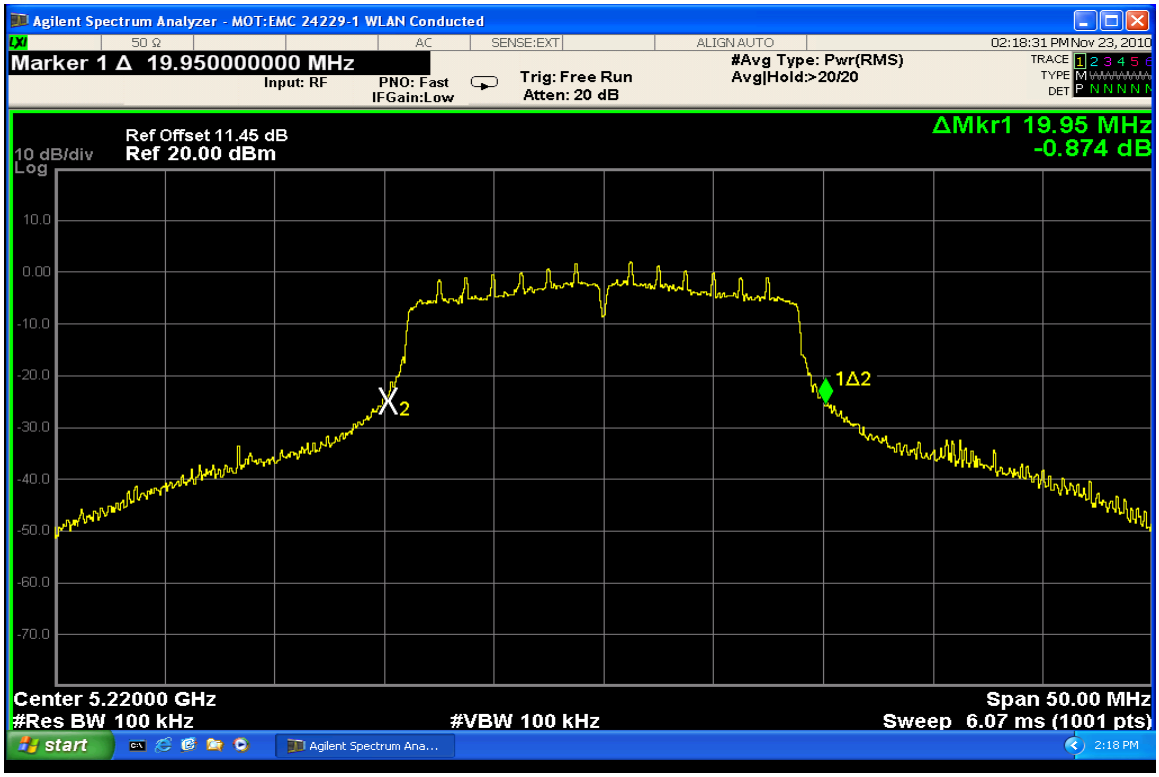
26 dB Bandwidth Channel 44 @ 6.5 Mbps



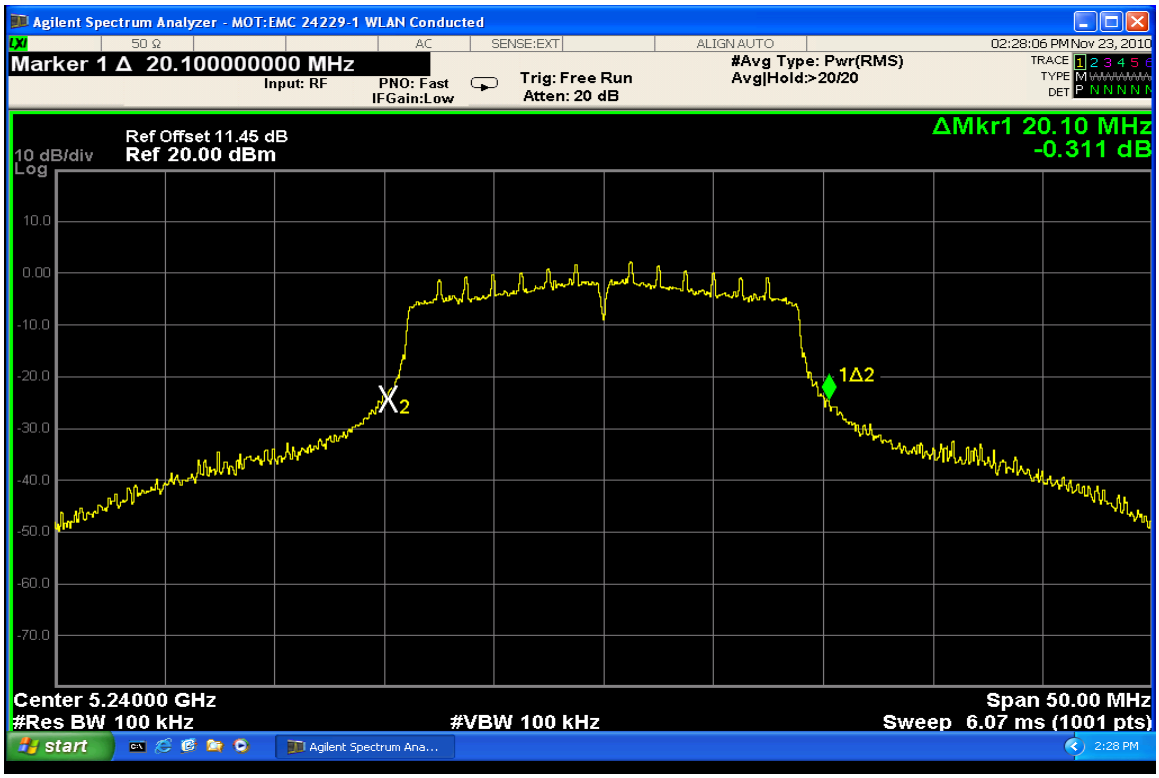
26 dB Bandwidth Channel 48 @ 6.5 Mbps

802.11 n Mode @ 14.4 Mbps

26 dB Bandwidth Channel 36 @ 14.4 Mbps

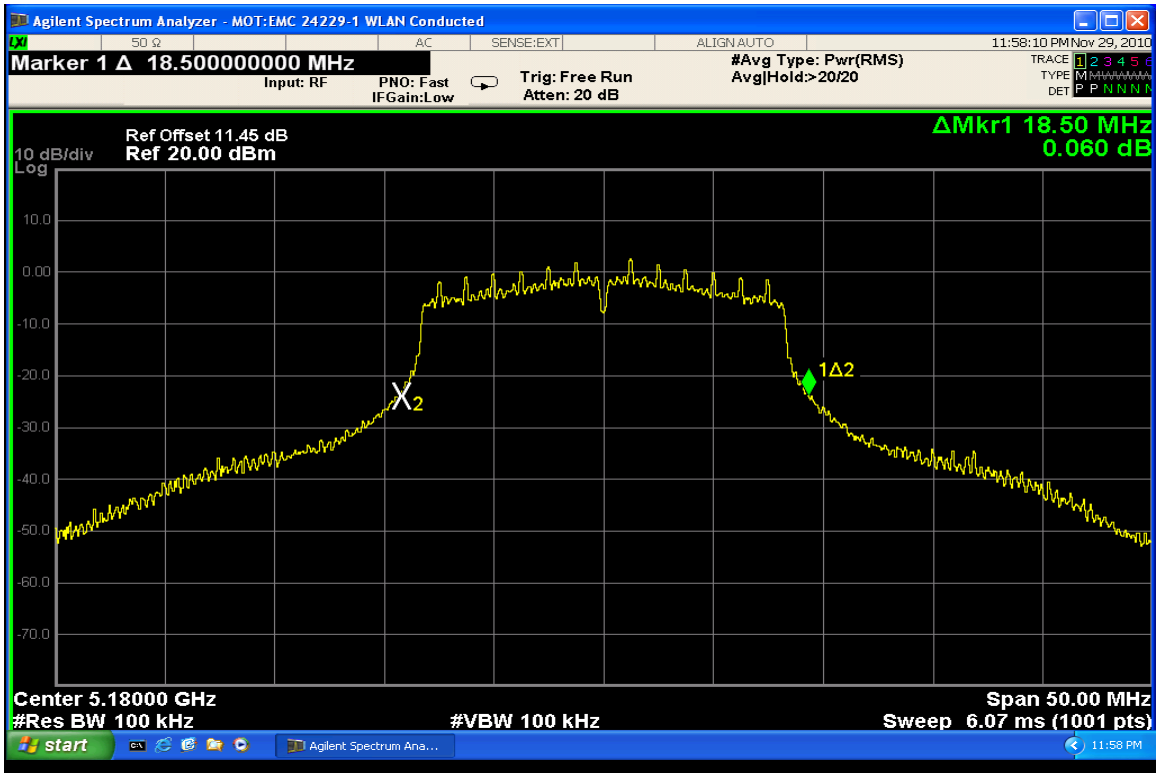


26 dB Bandwidth Channel 44 @ 14.4 Mbps



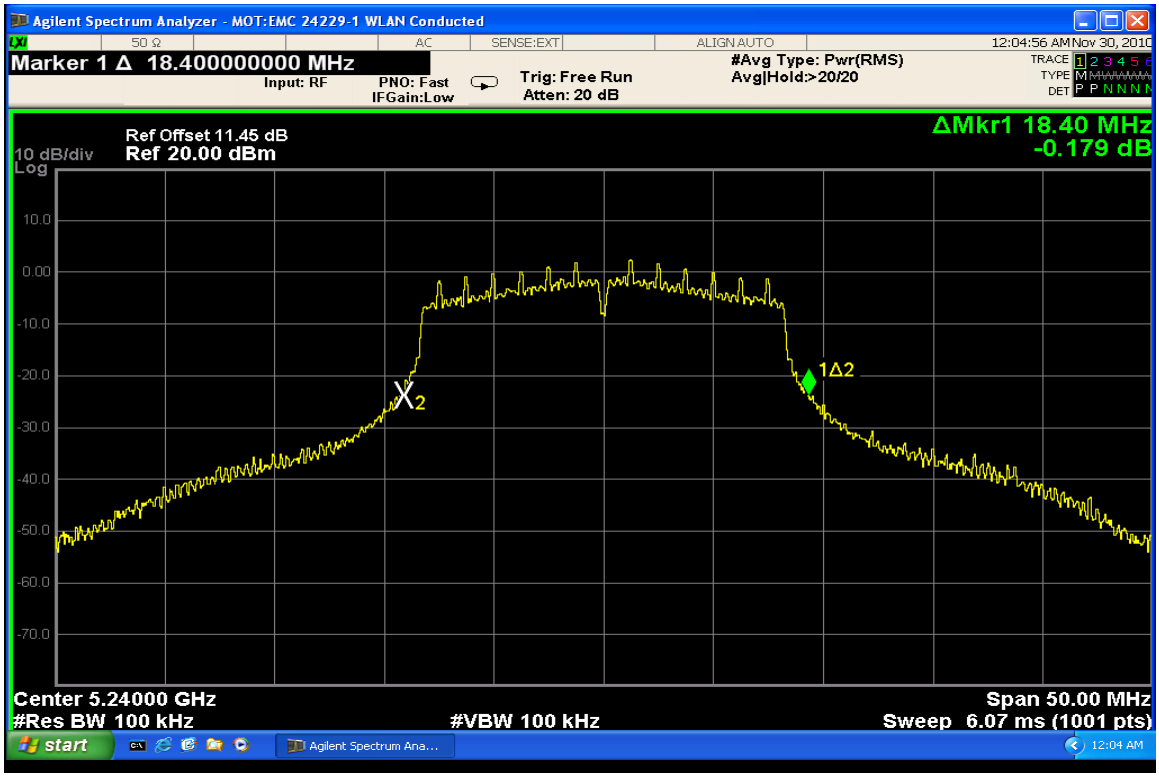
26 dB Bandwidth Channel 48 @ 14.4 Mbps

802.11 a Mode @ 12 Mbps



26 dB Bandwidth Channel 36 @ 12 Mbps

26 dB Bandwidth Channel 44 @ 12 Mbps



26 dB Bandwidth Channel 48 @ 12 Mbps

PEAK OUTPUT POWER

Measurement Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the Spectrum analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage. Initially, an average detector is used to measure power in the low, middle and high channels for all data rates. The average measurements are used to determine which data rate is to be fully tested for each supported mode. Using a peak detector, the power is then measured for the applicable data rates.

Measurement Results

See Attached

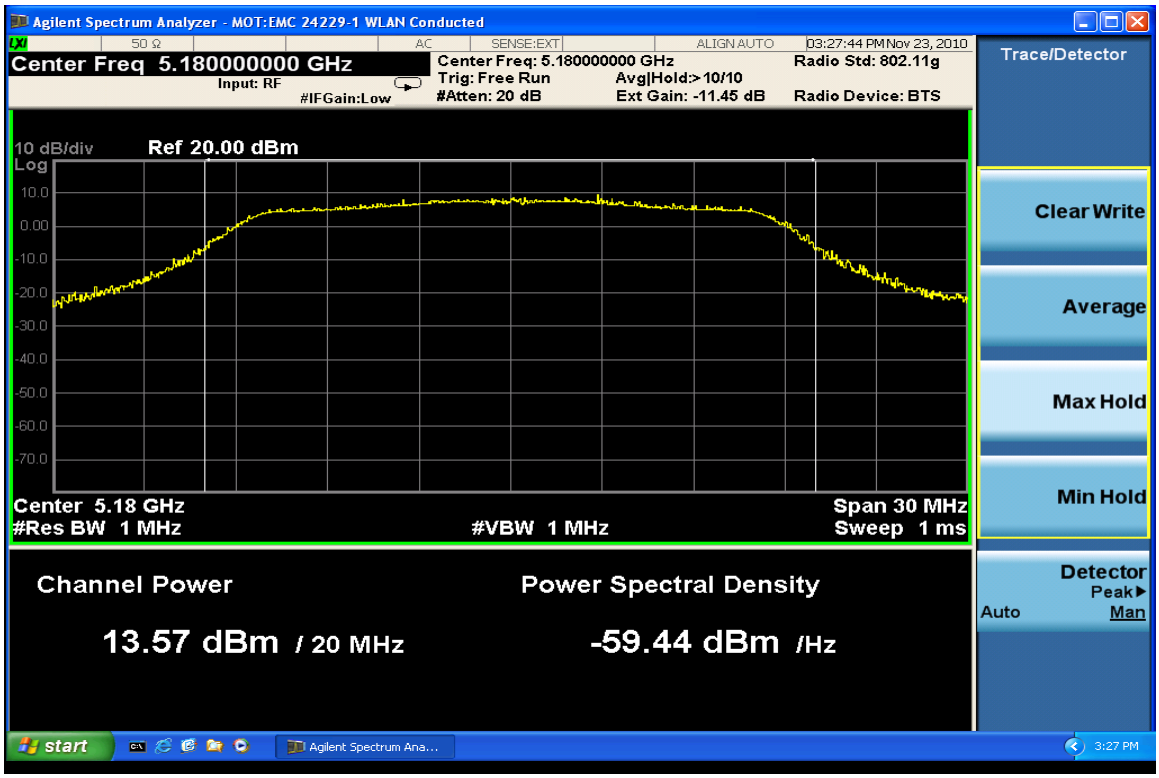
Initial average power measurements in the 5 GHz band

Average power (dBm) for 802.11n in 5 GHz																	
		20 MHz BW, 400 ns GI								20 MHz BW, 800 ns GI							
Freq	CH	7.2 Mbps	14.4 Mbps	21.7 Mbps	28.9 Mbps	43.3 Mbps	57.8 Mbps	65 Mbps	72.2 Mbps	6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
5180	36	11.66	11.31	11.63	10.85	10.98	11.04	10.84	8.5	11.05	10.97	10.67	10.76	10.78	10.69	10.8	8.39
5200	40	11.12	10.97	10.75	10.94	10.86	10.82	10.81	8.56	11.17	11.09	10.72	10.74	10.88	10.83	10.82	8.63
5220	44	11.13	11.15	10.87	10.94	10.99	10.87	10.95	8.5	11.05	11.21	10.94	10.93	10.87	10.88	10.87	8.69
5240	48	11.17	11.14	10.96	11.04	11.13	11	11	8.73	11.31	11.09	10.86	11	10.98	10.93	10.88	8.71

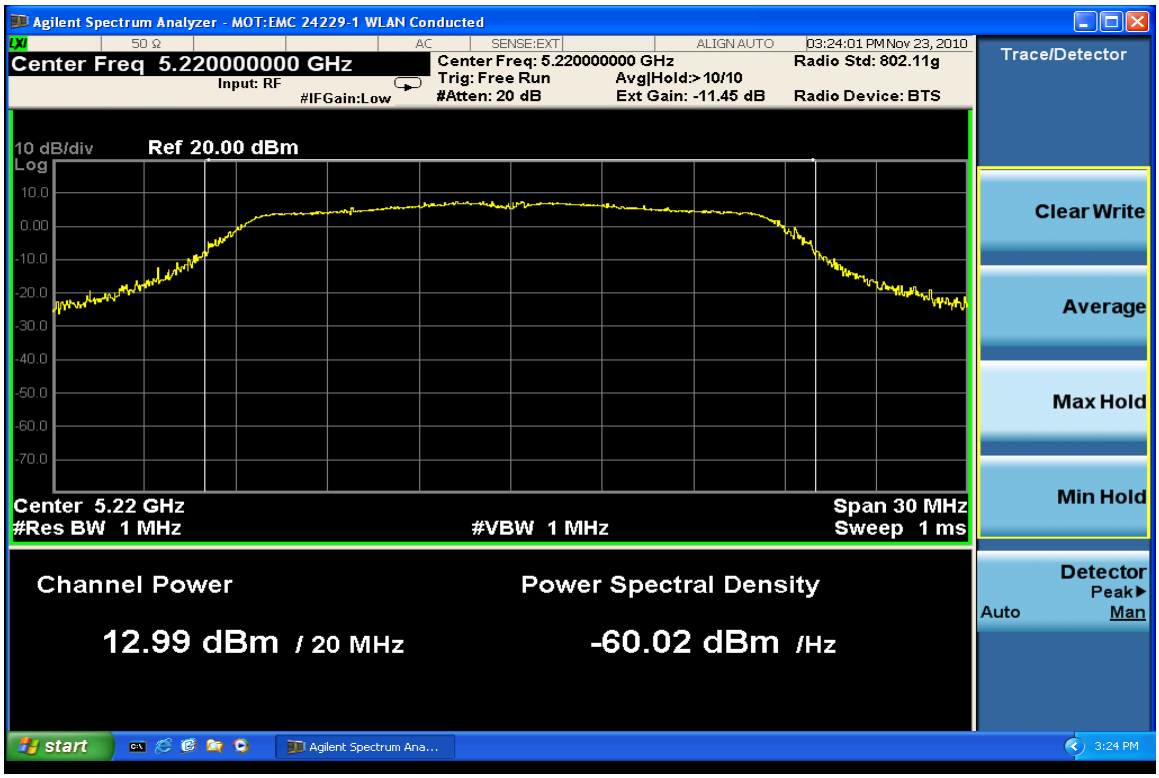
Average power (dBm) for 802.11a in 5 GHz										
			20 MHz BW							
Band	Freq	CH	6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
UNII Subband 1	5180	36	11.22	11.27	11.32	11.06	10.85	10.98	10.82	10.81
5180 to 5240	5200	40	11.2	11.16	11.27	10.93	10.92	10.81	10.83	10.84
	5220	44	11.31	11.39	11.25	9.88	9.72	11.15	11.07	10.98
	5240	48	11.31	11.22	11.36	11.1	11.09	11.08	10.99	11.03

Based on these initial measurements, it was determined that testing will be performed in the 14.4 Mbps data rate for the 802.11n 400ns GI mode and 6.5 Mbps data rate for 802.11n 800ns GI mode and 12 Mbps for the 802.11 a mode. Plots showing the peak power measurements for the applicable data rates follow.

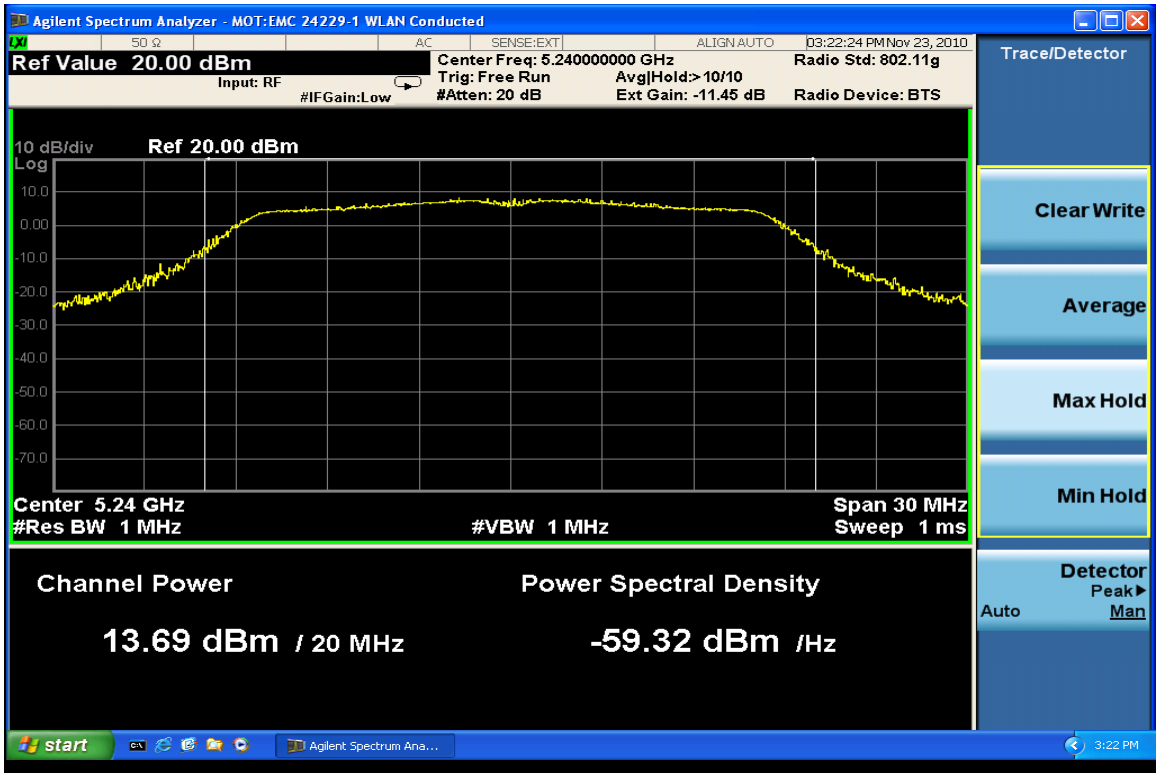
802.11 n @ 6.5 Mbps



Max. Power Channel 36 @ 6.5 Mbps

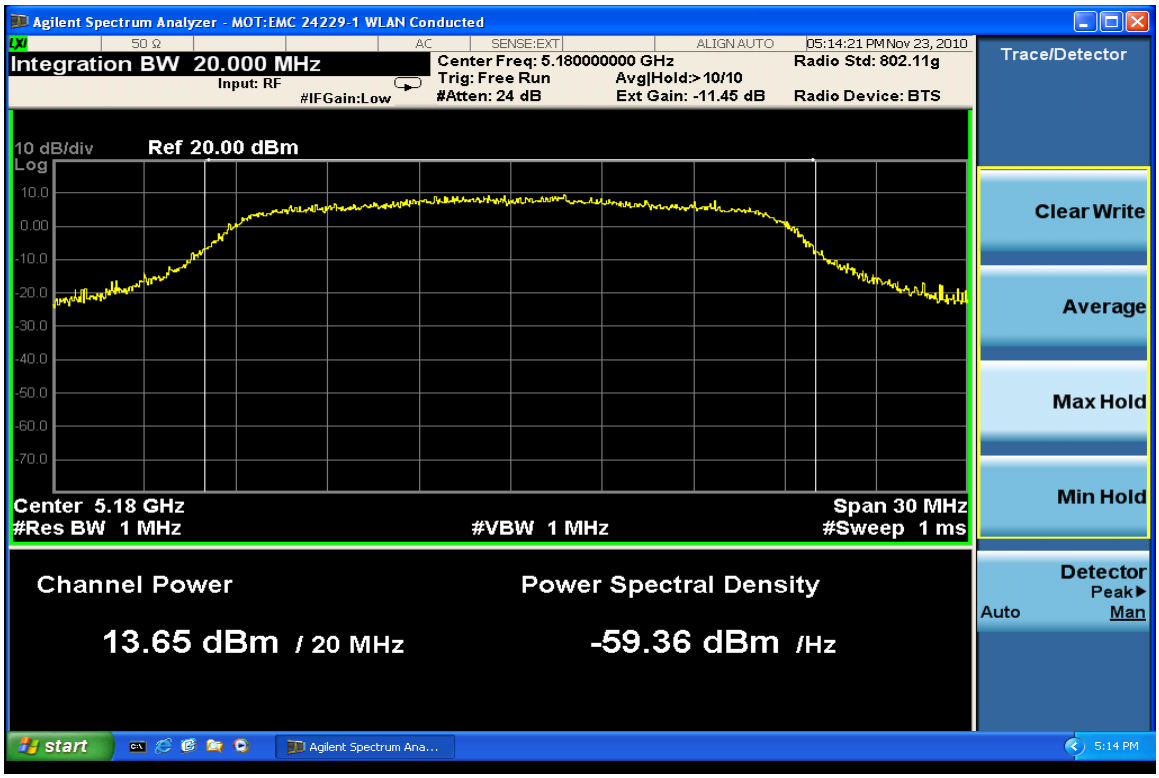


Max. Power Channel 44 @ 6.5 Mbps

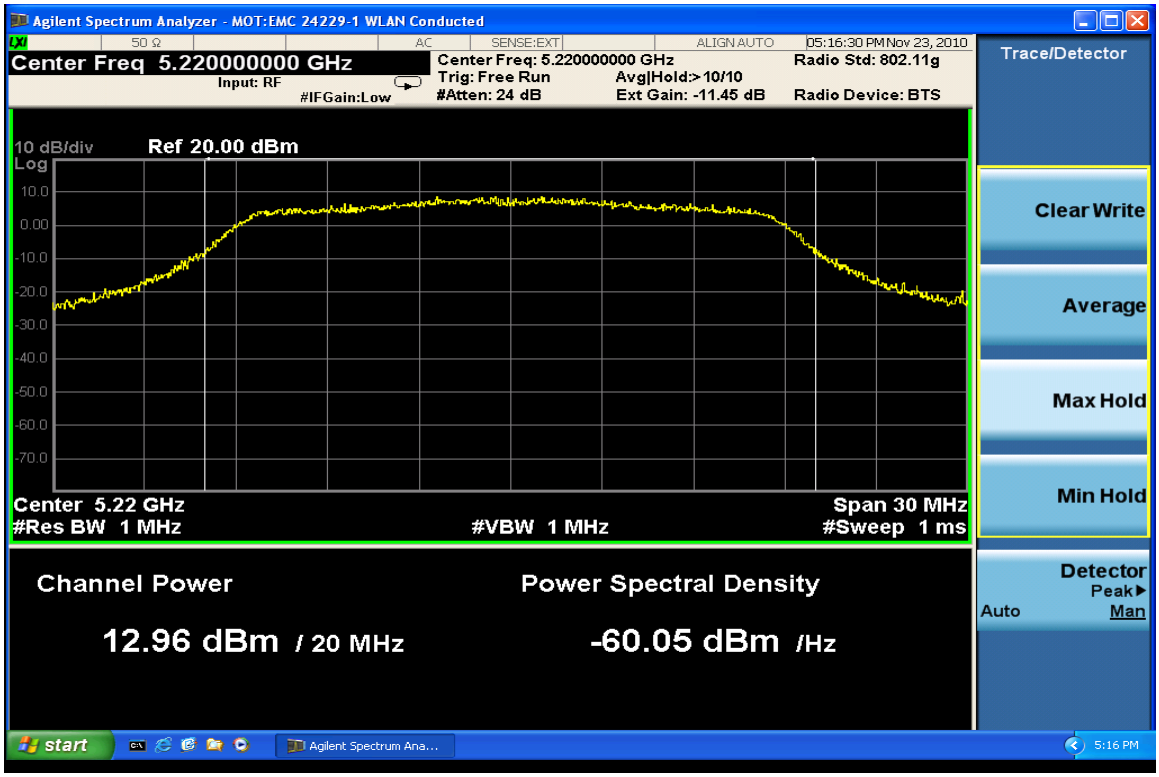


Max. Power Channel 48 @ 6.5 Mbps

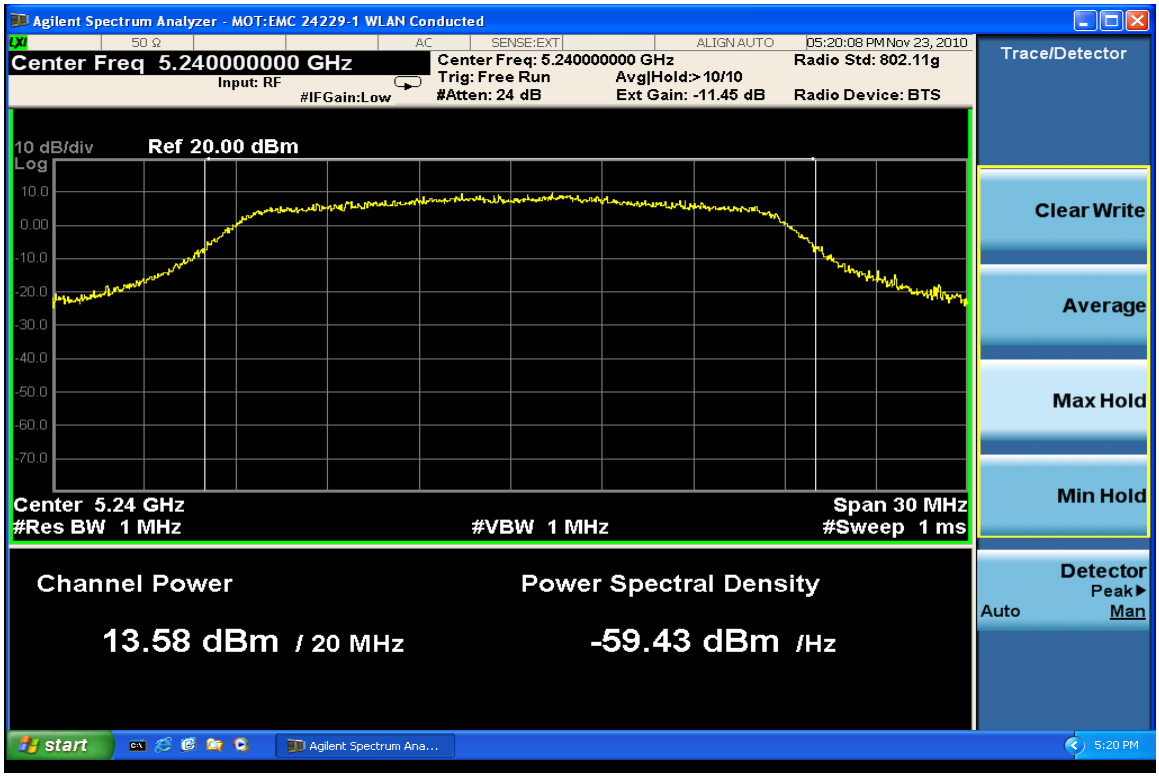
802.11 n @ 14.4 Mbps



Max. Power Channel 36 @ 14.4 Mbps

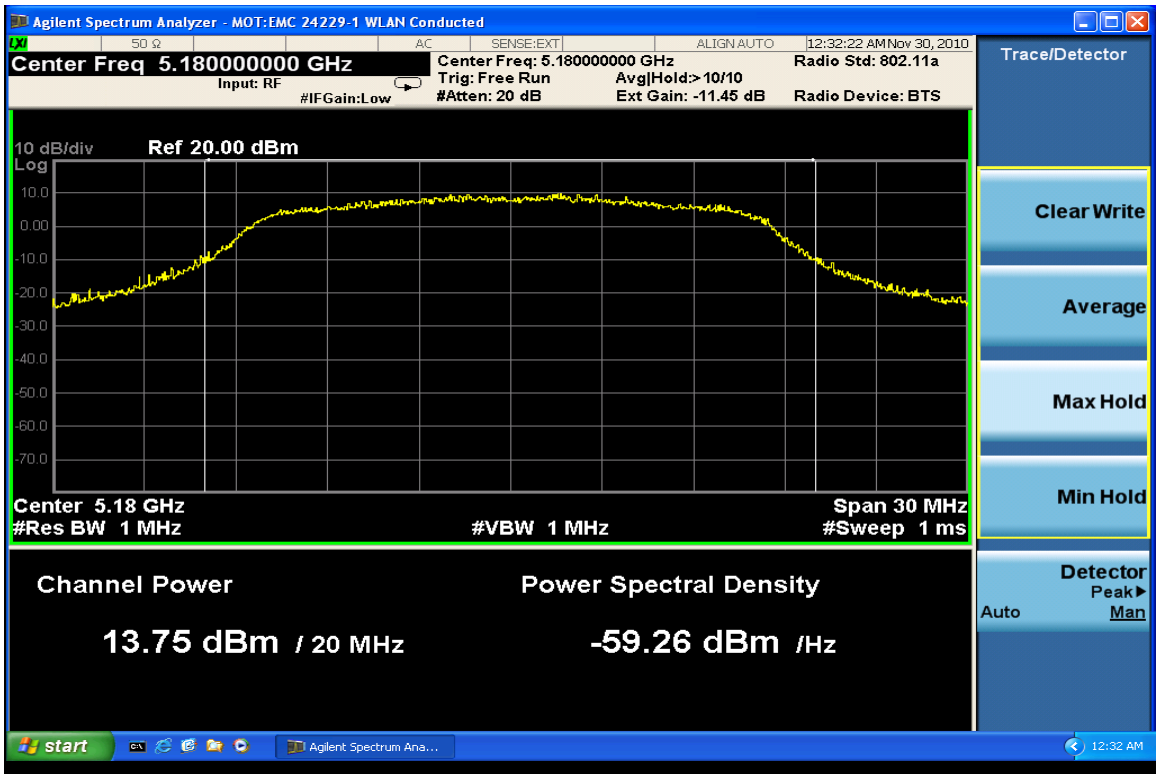


Max. Power Channel 44 @ 14.4 Mbps

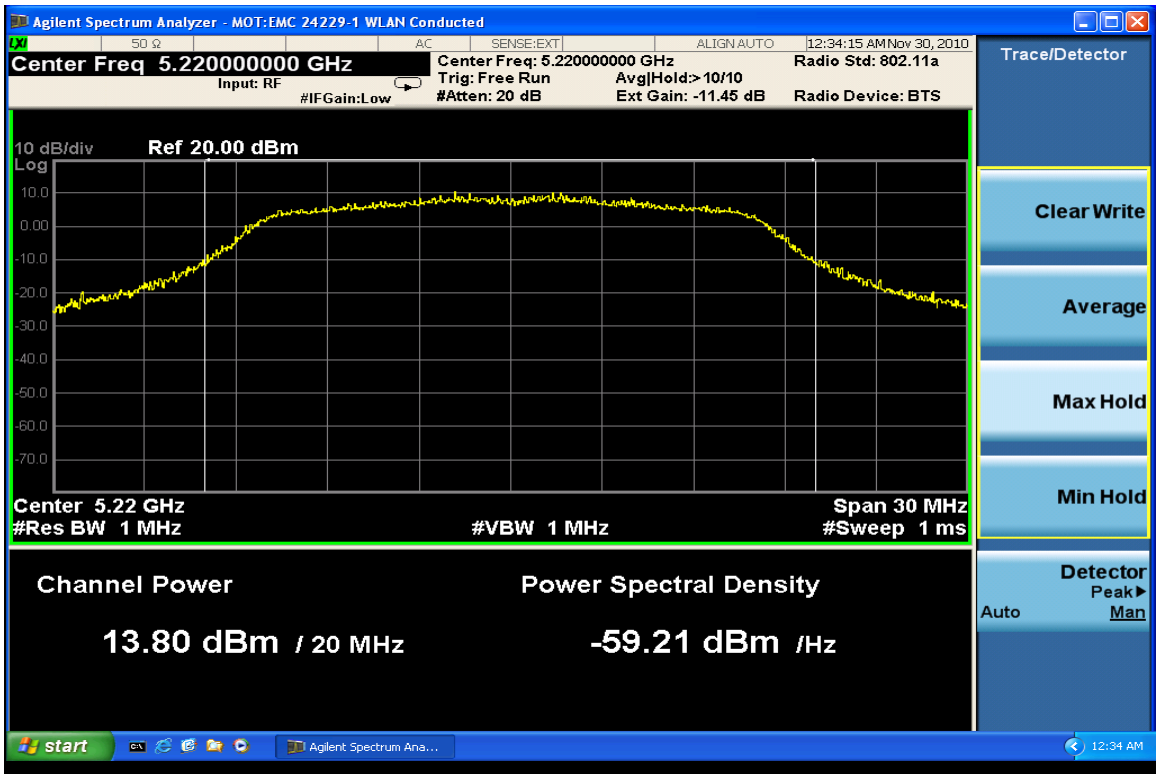


Max. Power Channel 48 @ 14.4 Mbps

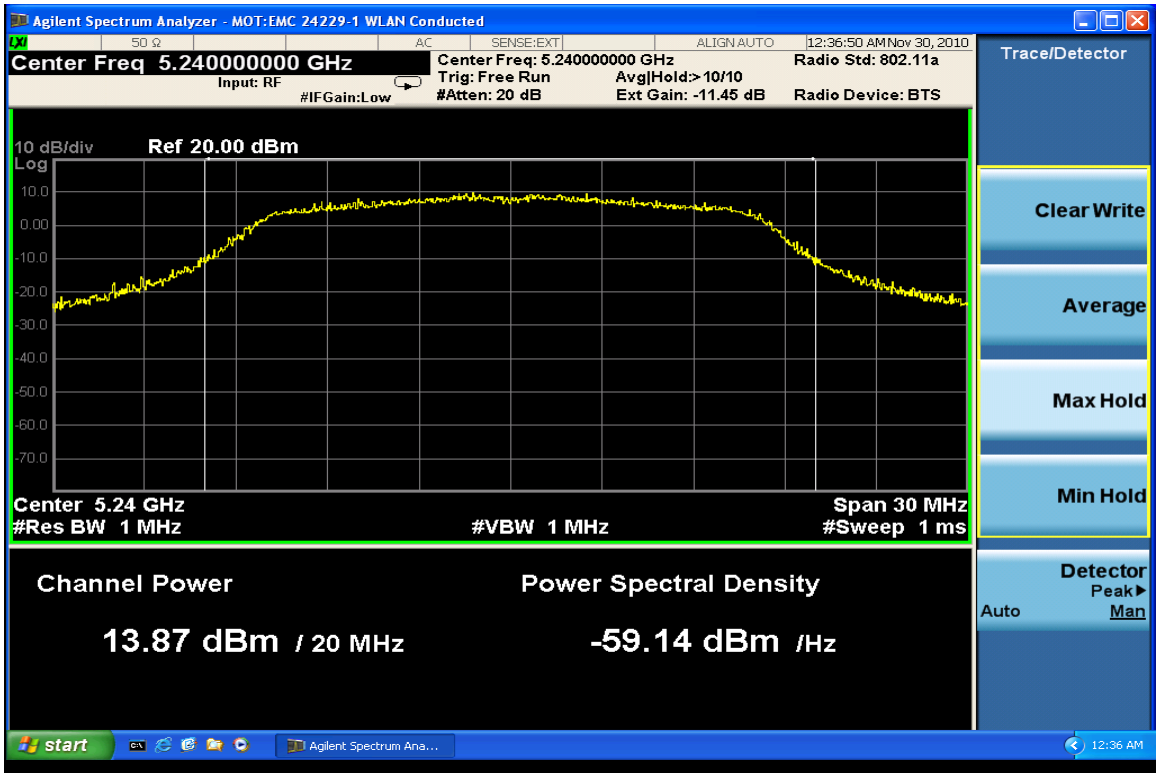
802.11 a @ 12 Mbps



Max. Power Channel 36 @ 12 Mbps



Max. Power Channel 44 @ 12 Mbps



Max. Power Channel 48 @ 12 Mbps

Peak Power Spectral Density

Measurement Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

The spectrum analyzer used the following settings:

1. Span = 25 MHz
2. VBW = 3 MHz
3. RBW= 1 MHz
4. Sweep = auto
5. Detector function = Sample Detector

The trace was allowed to stabilize. The EUT was transmitting at its maximum data rate.

Measurement Results

5180 MHz	5220 MHz	5240 MHz
0.27	0.65	0.73

802.11 n @ 6.5 Mbps

5180 MHz	5220 MHz	5240 MHz
0.24	0.88	1.14

802.11 n @ 14.4 Mbps

5180 MHz	5220 MHz	5240 MHz
1.01	1.10	1.12

802.11 a @ 12 Mbps

Peak Excursion Ratio

Measurement Procedure

The RF output port of the Equipment-Under-Test is directly coupled to the input of the EMC analyzer through a specialized RF connector and a 10dB passive attenuator. A fully charged battery was used for the supply voltage.

Measurement Results

See attached

Frequency	Channel No	Mode	Data Rate	Peak Power	Modulation envelope using peak and max	Peak Excursion
5180	36	a	12	13.75	9.62	4.13
5220	44	a	12	13.8	9.42	4.38
5240	48	a	12	13.87	10.05	3.82
5180	36	n	6.5	13.57	9.32	4.25
5220	44	n	6.5	12.99	9.07	3.92
5240	48	n	6.5	13.69	8.88	4.81
5180	36	n	14.4	13.65	10.25	3.4
5220	44	n	14.4	12.96	10.23	2.73
5240	48	n	14.4	13.58	10.66	2.92

FREQUENCY STABILITY

Measurement Procedure

The equipment under test is placed in an environmental chamber. The antenna port of the Equipment under Test is directly coupled to the input of the spectrum analyzer through a specialized RF connector. A power supply is attached as the primary voltage supply.

Frequency measurements are made at the extremes of the temperature range -30º C to +50º C and at intervals of 10º C with the primary supply voltage set to the nominal battery operating voltage. A period of time sufficient to stabilize all components of the equipment is allowed at each frequency measurement. The maximum variation of frequency is measured.

Measurement Results

Attached

Temp	channel	mode	data rate	Frequency	Initial Frequency	Deviation
-30 C	44	a	12	5220.78	5220.21	-0.57
-20 C	44	a	12	5218.53	5220.21	1.68
-10 C	44	a	12	5222.4	5220.21	-2.19
0 C	44	a	12	5218.35	5220.21	1.86
10 C	44	a	12	5218.5	5220.21	1.71
20 C	44	a	12	5222.31	5220.21	-2.1
30 C	44	a	12	5222.52	5220.21	-2.31
40 C	44	a	12	5219.22	5220.21	0.99
50 C	44	a	12	5218.38	5220.21	1.83
						0
20 C	44	a	12	5217.96	5220.21	2.25

Temp	channel	mode	data rate	Frequency	Initial Frequency	Deviation
-30 C	44	n	6.5	5219.73	5220.36	0.63
-20 C	44	n	6.5	5221.44	5220.36	-1.08
-10 C	44	n	6.5	5217.87	5220.36	2.49
0 C	44	n	6.5	5221.5	5220.36	-1.14
10 C	44	n	6.5	5220.42	5220.36	-0.06
20 C	44	n	6.5	5218.77	5220.36	1.59
30 C	44	n	6.5	5221.65	5220.36	-1.29
40 C	44	n	6.5	5218.95	5220.36	1.41
50 C	44	n	6.5	5218.95	5220.36	1.41
						0
20 C	44	n	6.5	5221.86	5220.36	-1.5

Temp	channel	mode	data rate	Frequency	Initial Frequency	Deviation
-30 C	44	n	14.4	5221.5	5217.99	-3.51
-20 C	44	n	14.4	5221.17	5217.99	-3.18
-10 C	44	n	14.4	5221.02	5217.99	-3.03
0 C	44	n	14.4	5221.8	5217.99	-3.81
10 C	44	n	14.4	5221.14	5217.99	-3.15
20 C	44	n	14.4	5218.86	5217.99	-0.87
30 C	44	n	14.4	5221.74	5217.99	-3.75
40 C	44	n	14.4	5221.14	5217.99	-3.15
50 C	44	n	14.4	5218.2	5217.99	-0.21
20 C	44	n	14.4	5219.1	5217.99	-1.11

AC LINE CONDUCTED EMISSIONS

Measurement Procedure

Measured levels of ac power line conducted emission shall be the radio-noise voltage from the line probe or across the 50 Ω LISN port, where permitted, terminated into a 50 Ω noise meter, or where permitted or required, the radio-noise current on the power line sensed by a current probe.

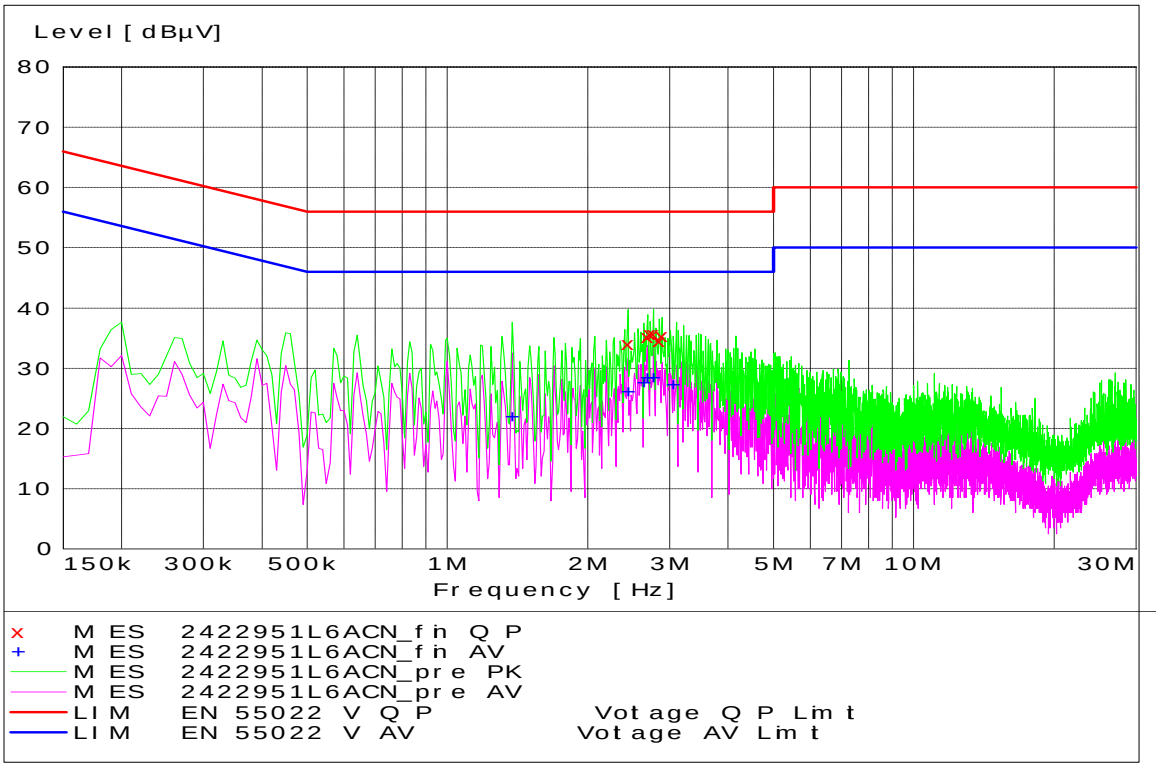
All radio-noise voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord or calibrated extension cord by the use of mating plugs and receptacles on the EUT and LISN. Equipment shall be tested with power cords that are normally supplied using an LISN, the 50 Ω measuring port is terminated by a 50 Ω radio-noise meter or a 50 Ω resistive load. All other ports are terminated in 50 Ω.

Detectors – Quasi Peak and Average Detector.

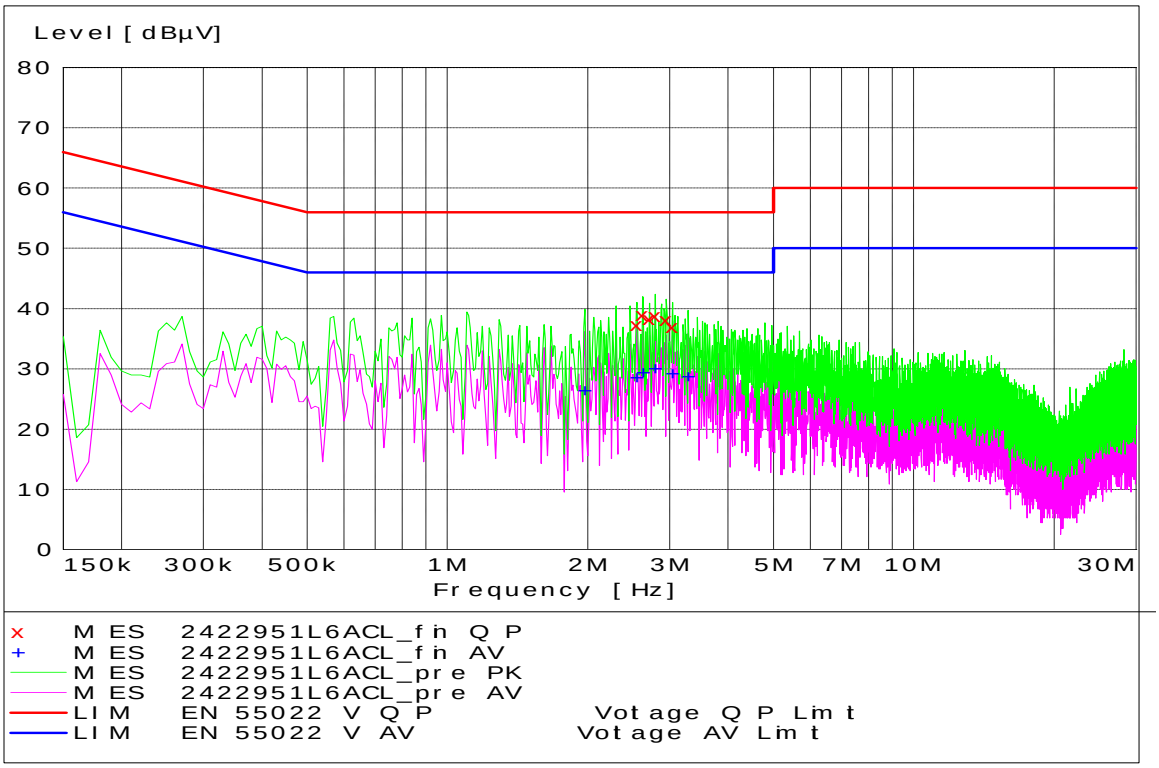
Measurement Results

See attached:

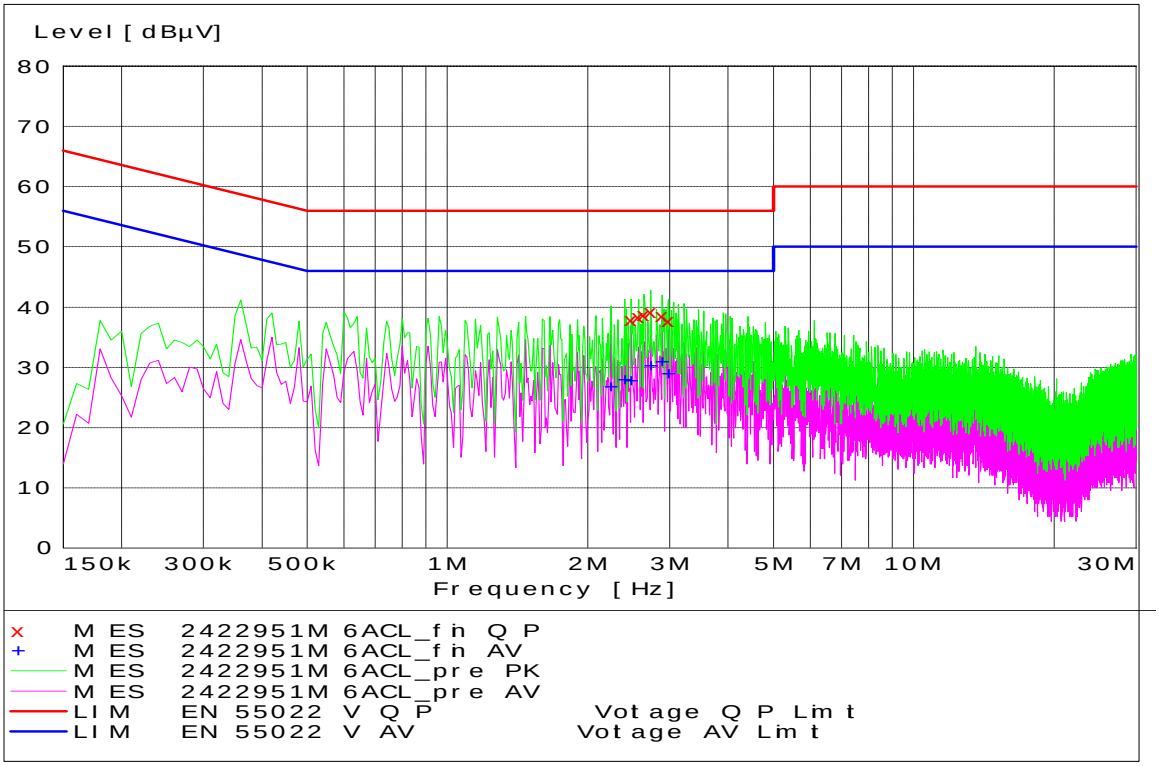
802.11 n @ 6.5 Mbps



WLAN Channel 36 - Tx Mode - Neutral Coupling



WLAN Channel 36 - Tx Mode – Line Coupling



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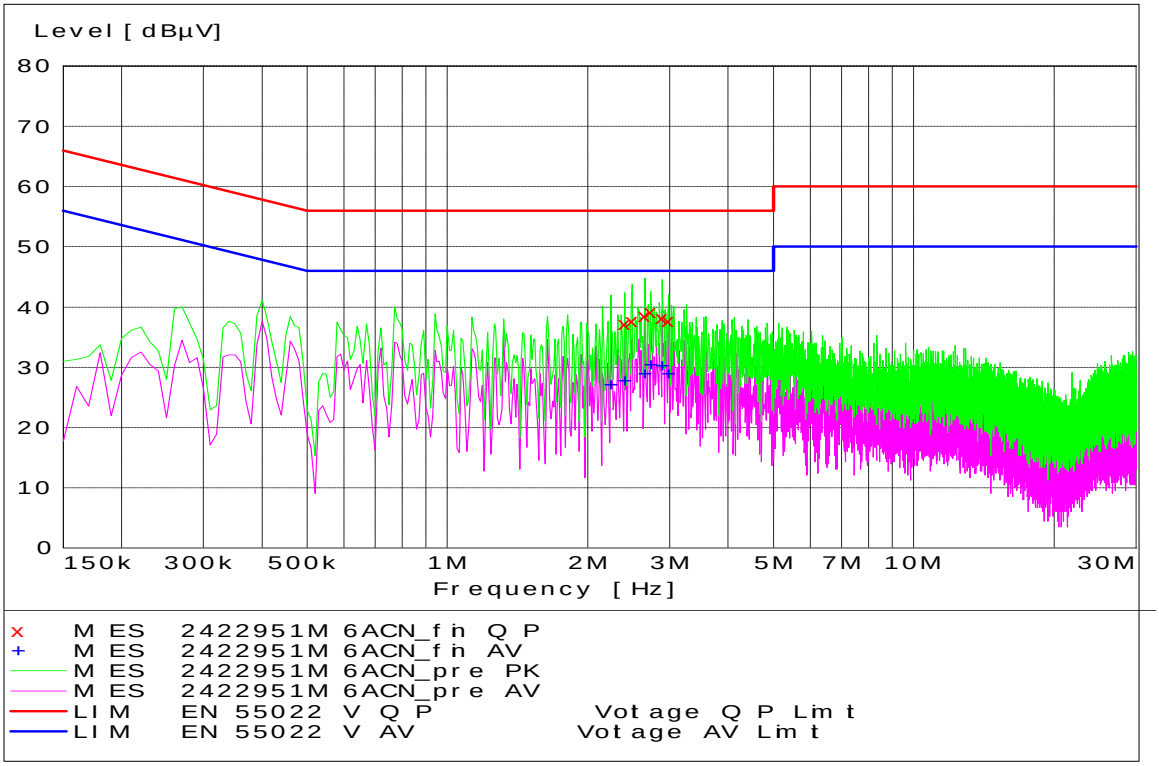
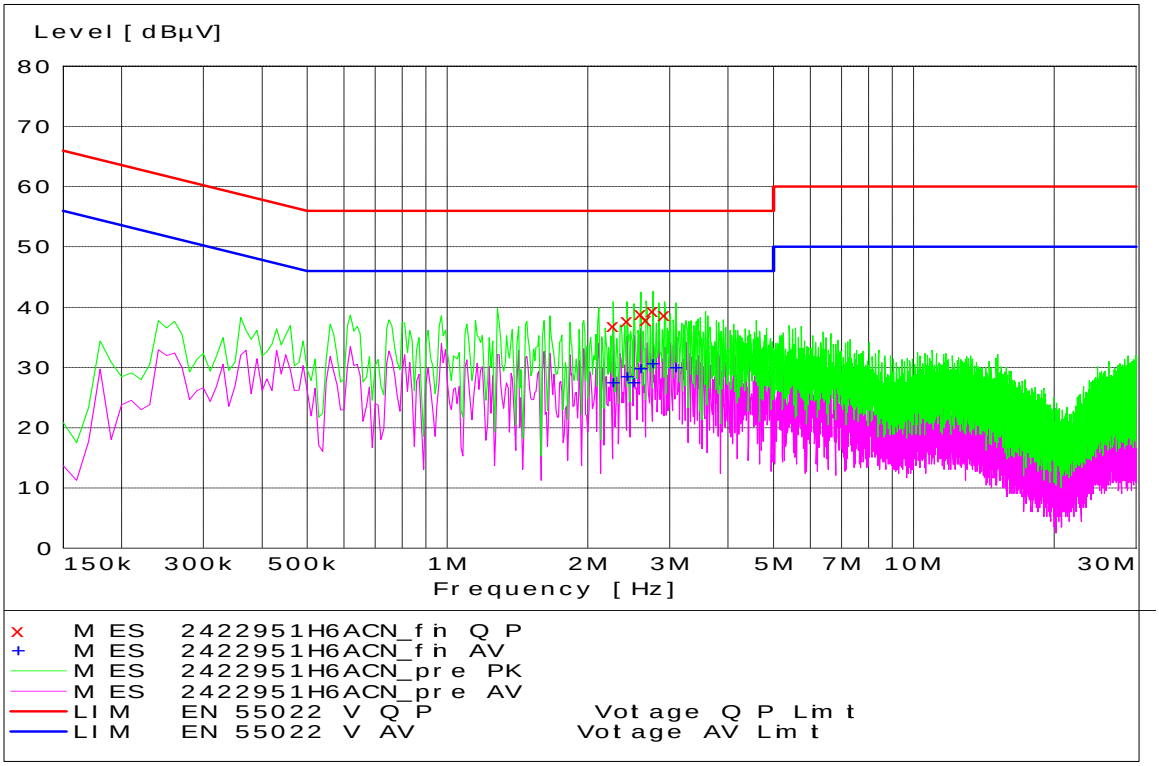
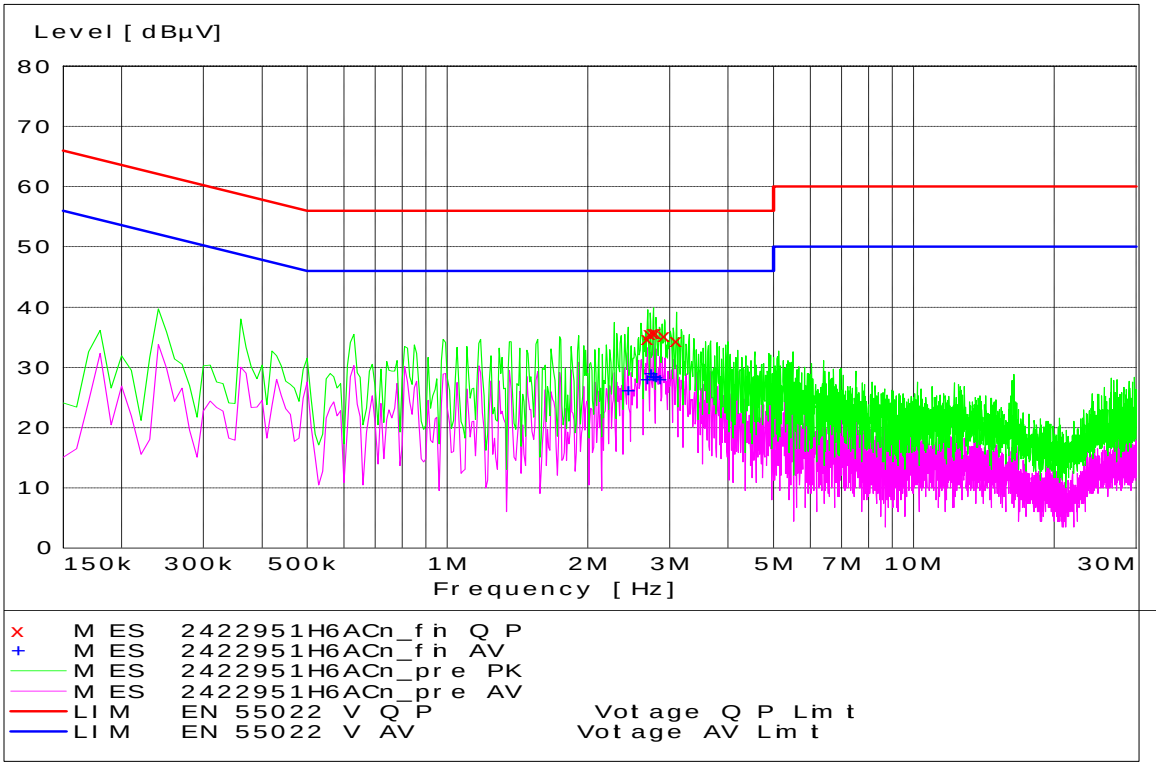


WLAN Channel 44 - Tx Mode - Neutral Coupling

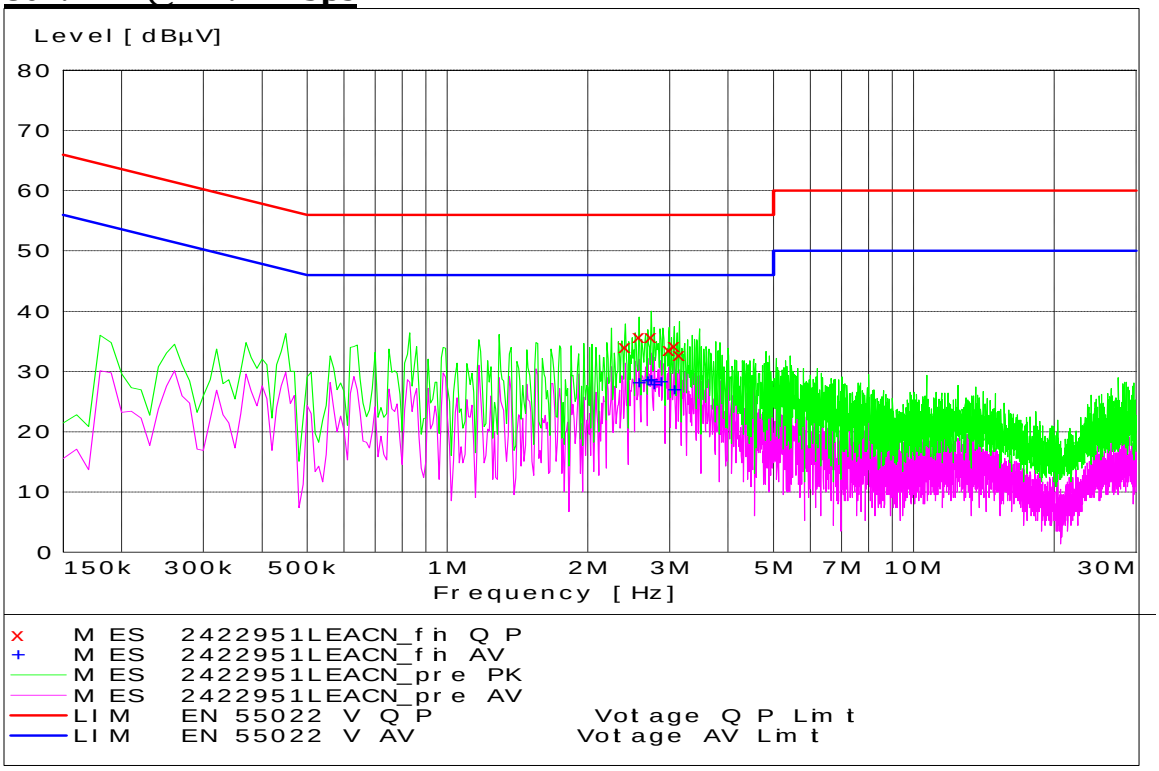


WLAN Channel 48 - Tx Mode - Line Coupling

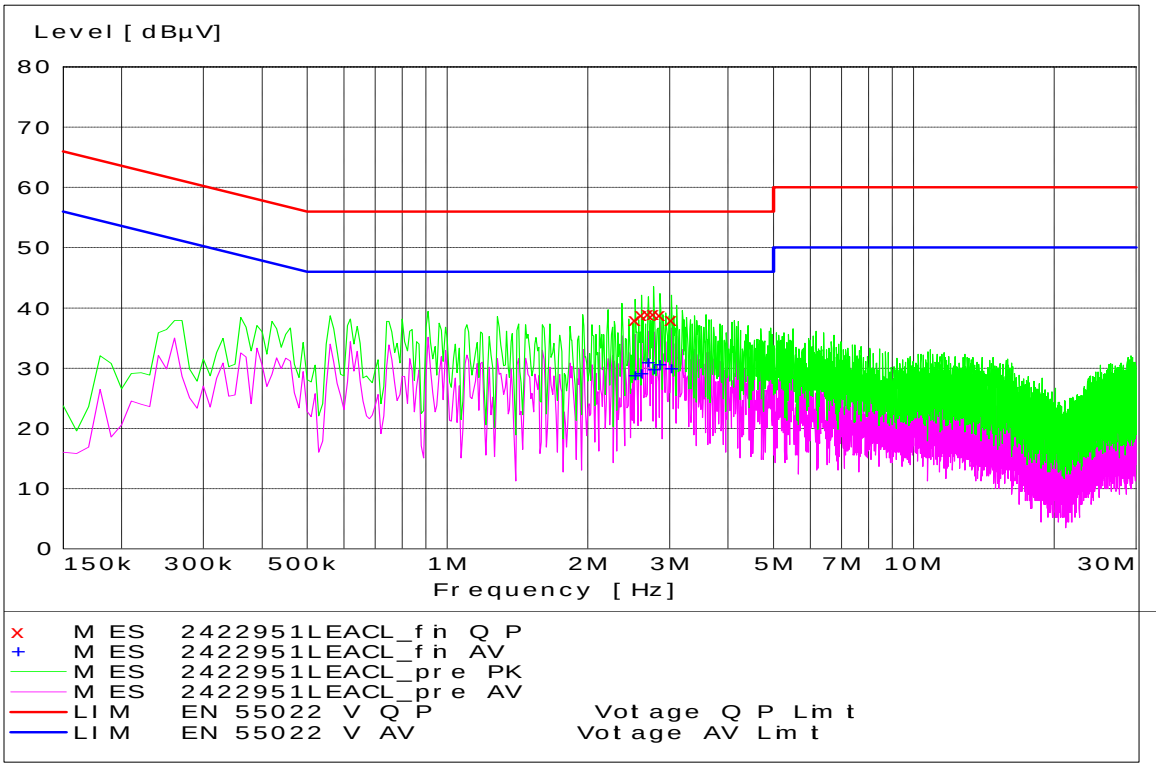


WLAN Channel 48 - Tx Mode - Neutral Coupling

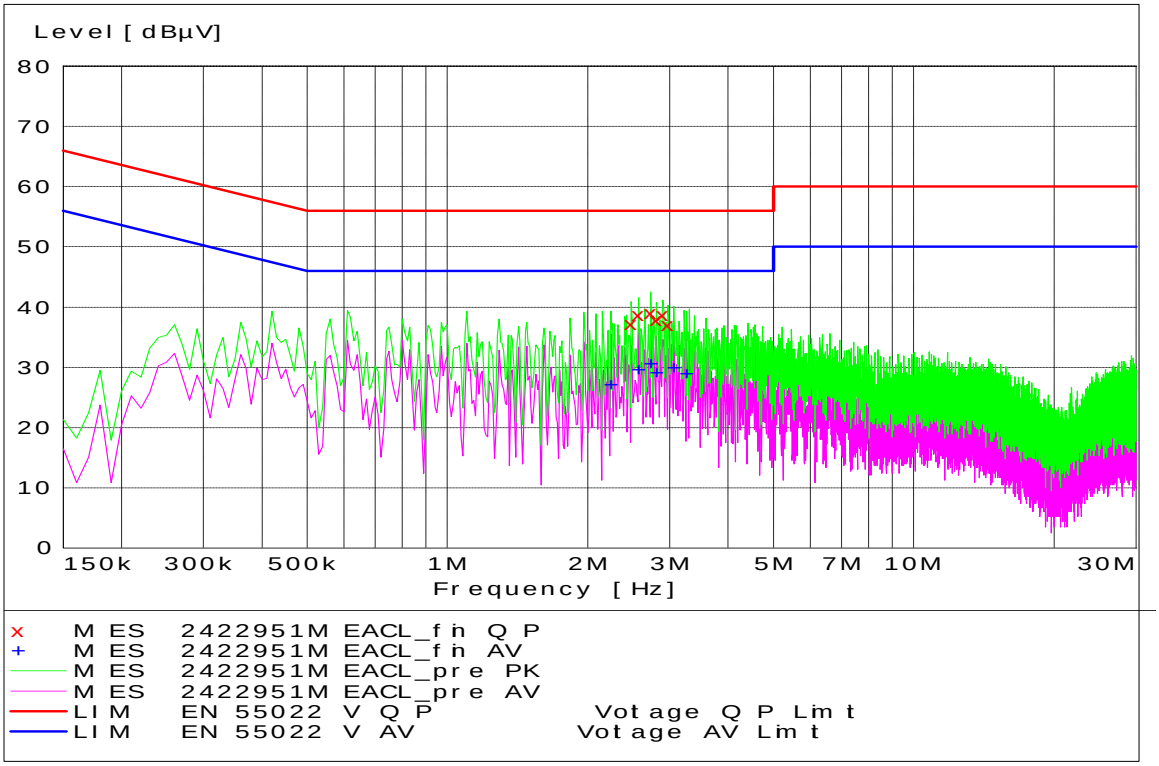
802.11 n @ 14.4 Mbps



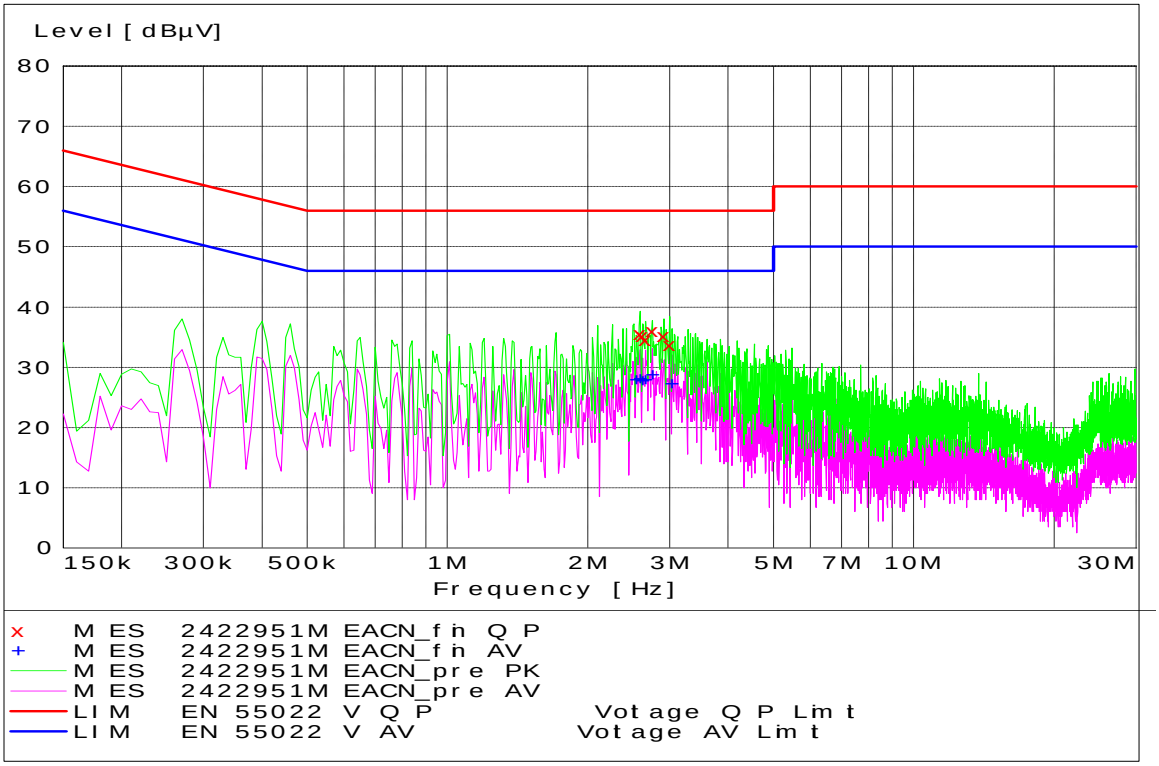
WLAN Channel 36 - Tx Mode - Neutral Coupling



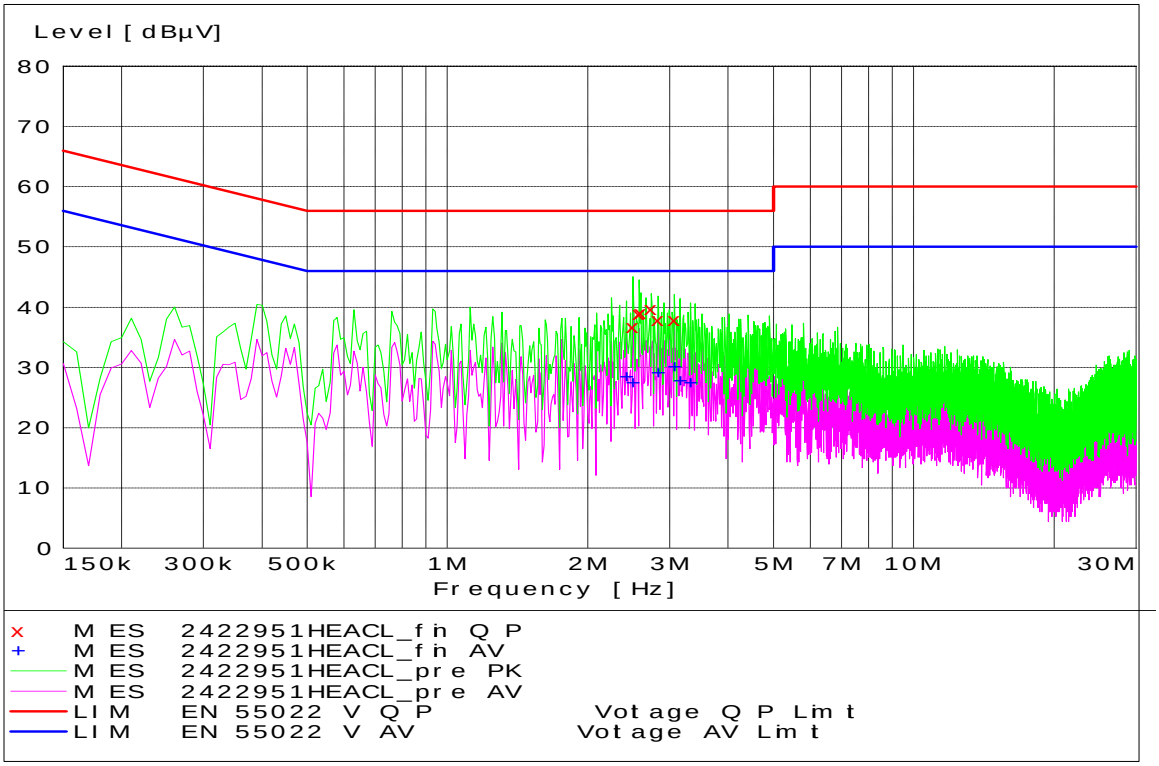
WLAN Channel 36 - Tx Mode – Line Coupling



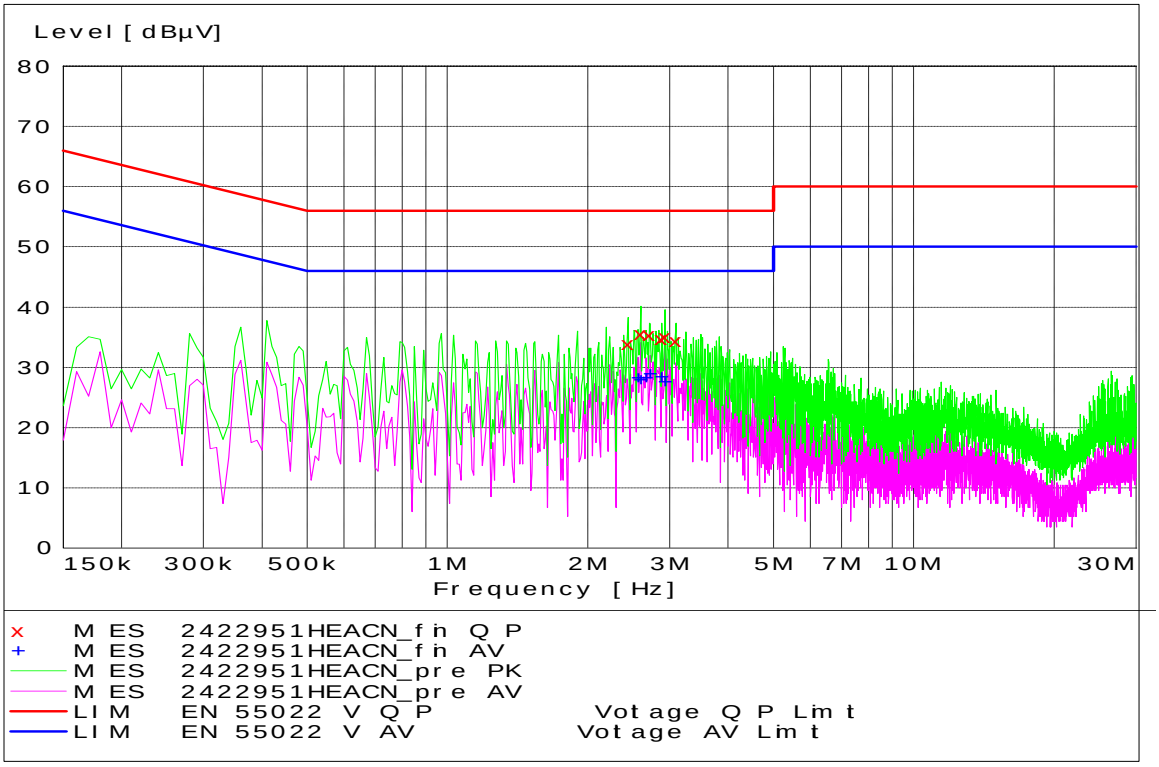
WLAN Channel 44 - Tx Mode - Line Coupling



WLAN Channel 44 - Tx Mode - Neutral Coupling

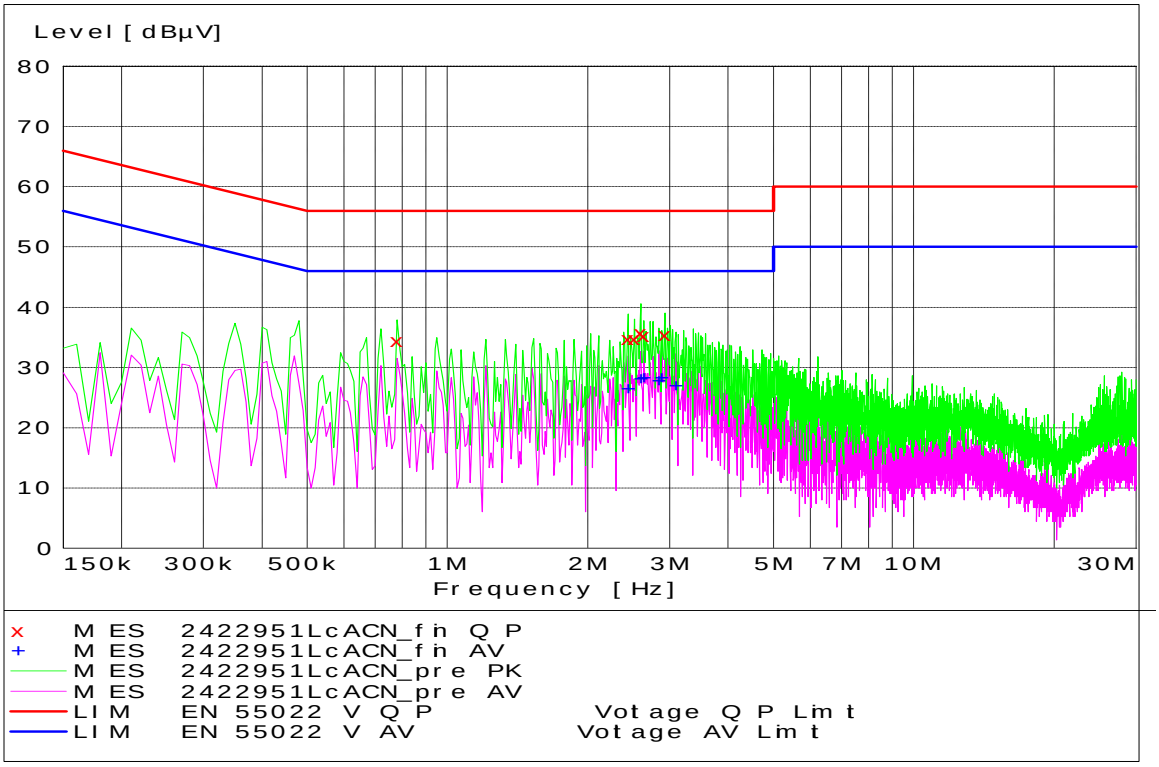


WLAN Channel 48 - Tx Mode - Line Coupling

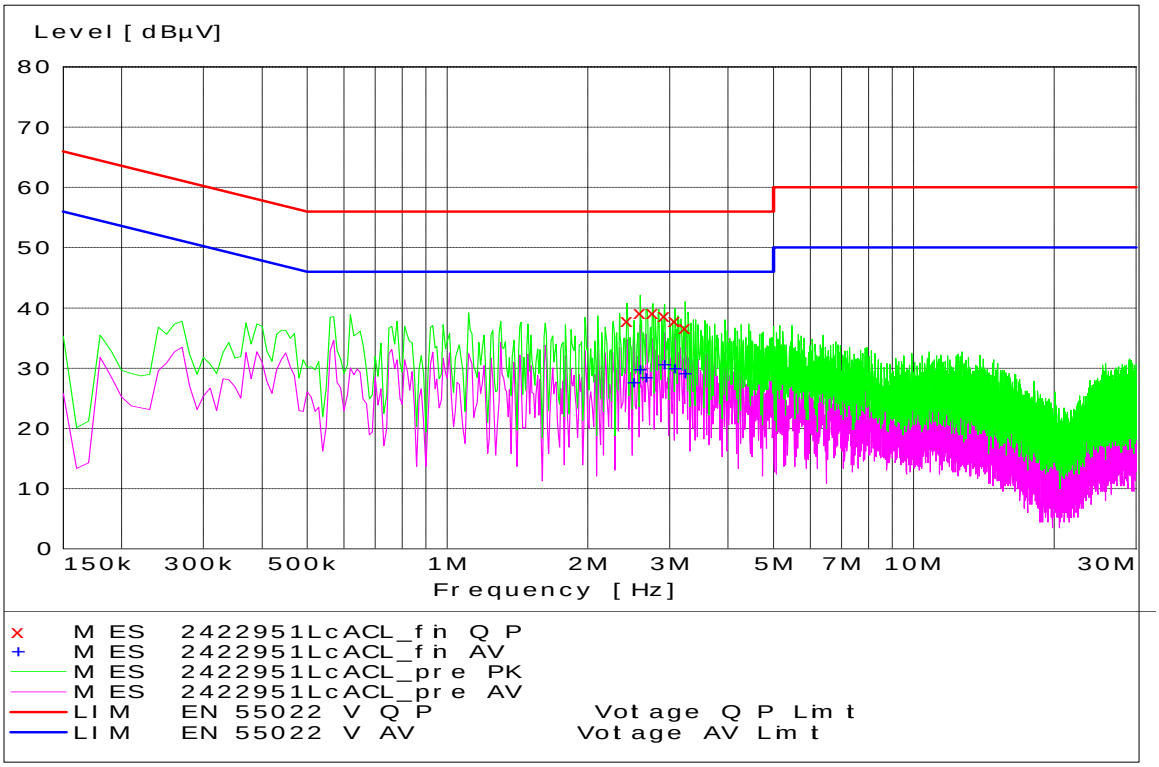


WLAN Channel 48 - Tx Mode - Neutral Coupling

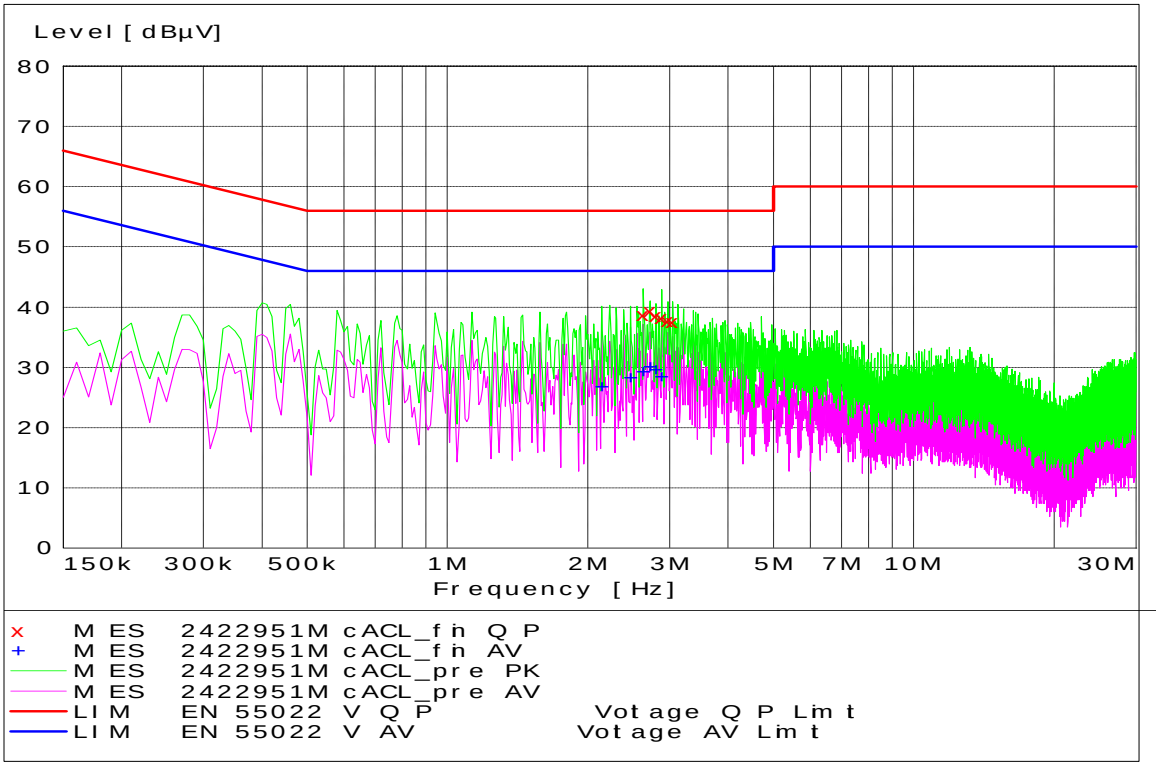
802.11 a @ 12 Mbps



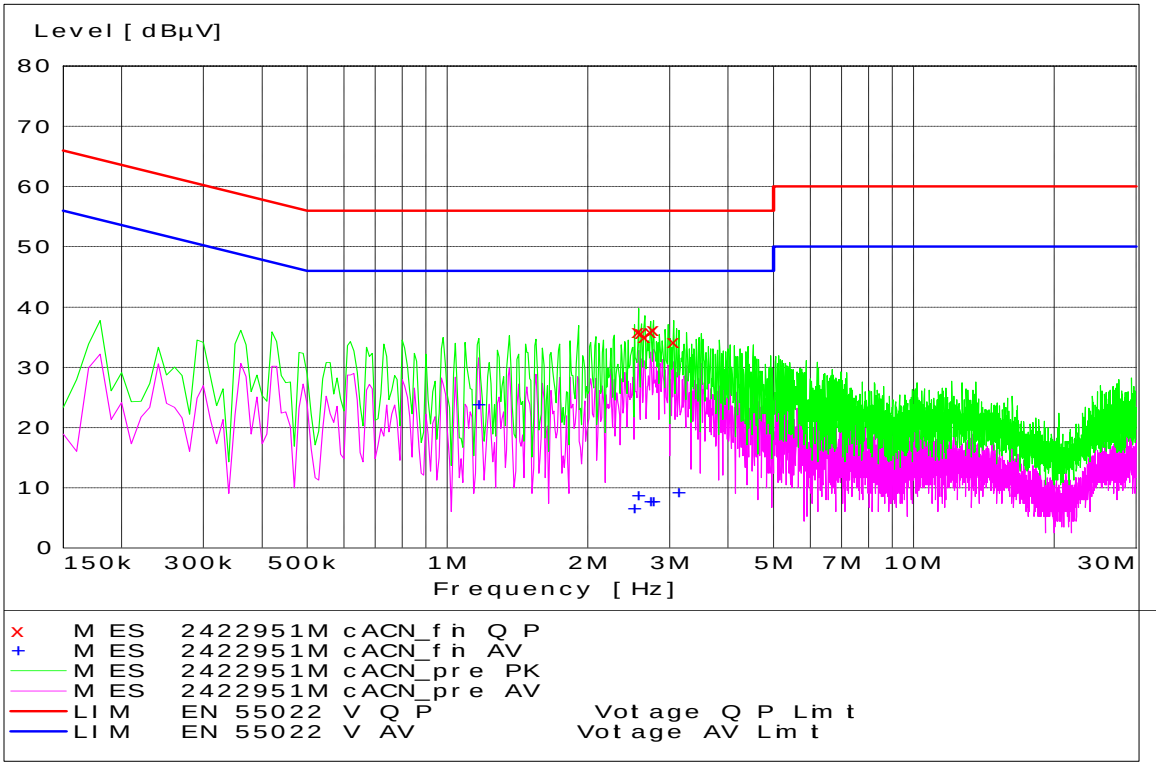
WLAN Channel 36 - Tx Mode - Neutral Coupling



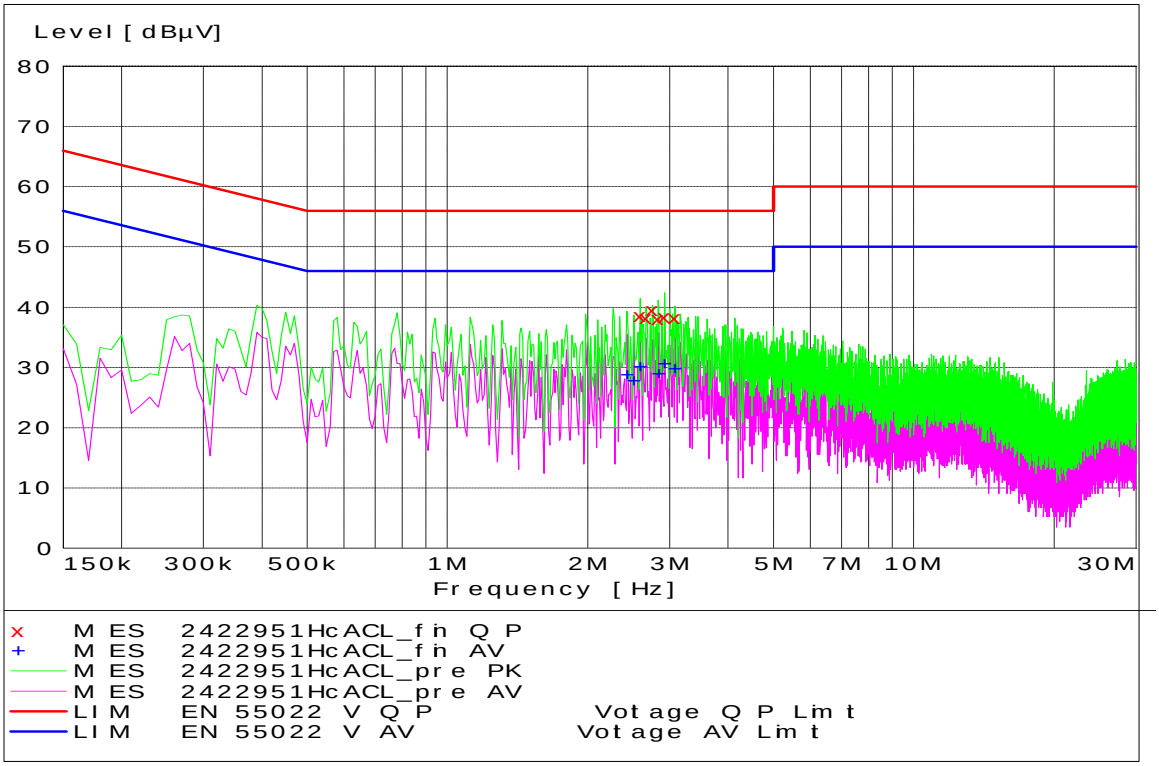
WLAN Channel 36 - Tx Mode – Line Coupling



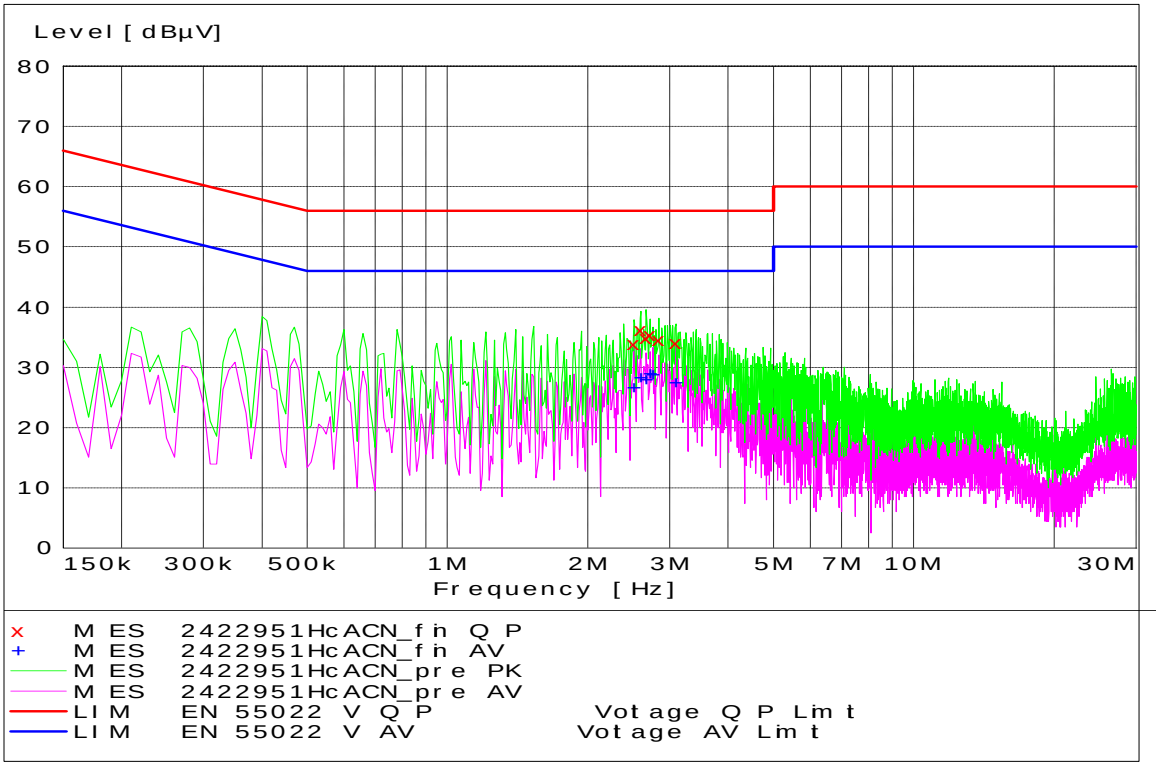
WLAN Channel 44 - Tx Mode - Line Coupling



WLAN Channel 44 - Tx Mode - Neutral Coupling



WLAN Channel 48 - Tx Mode - Line Coupling



WLAN Channel 48 - Tx Mode - Neutral Coupling

End of Test Report