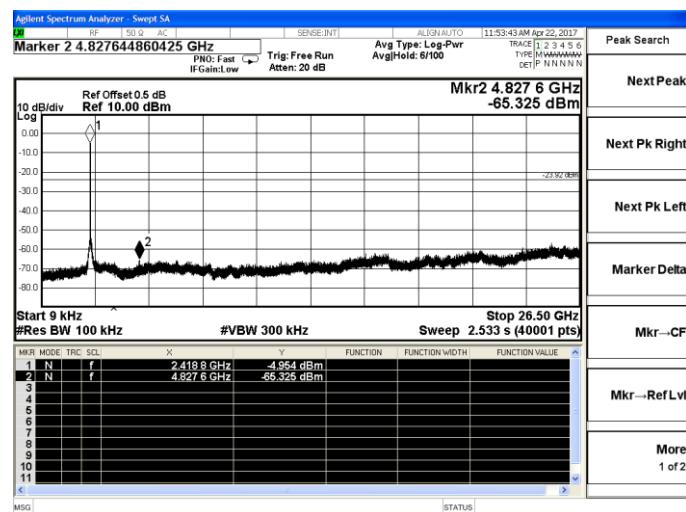
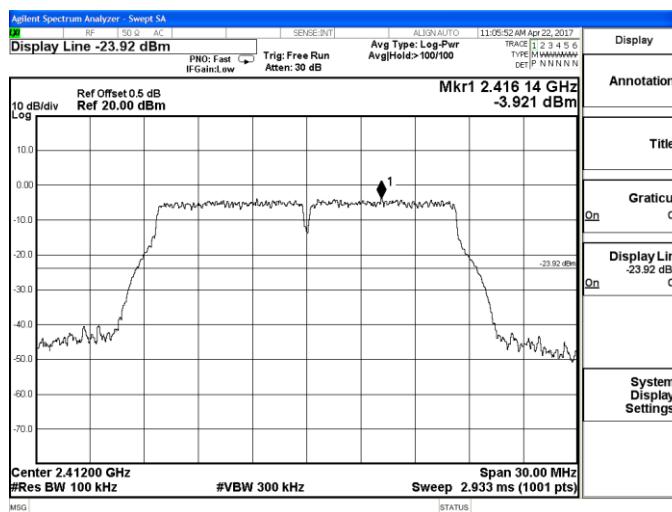
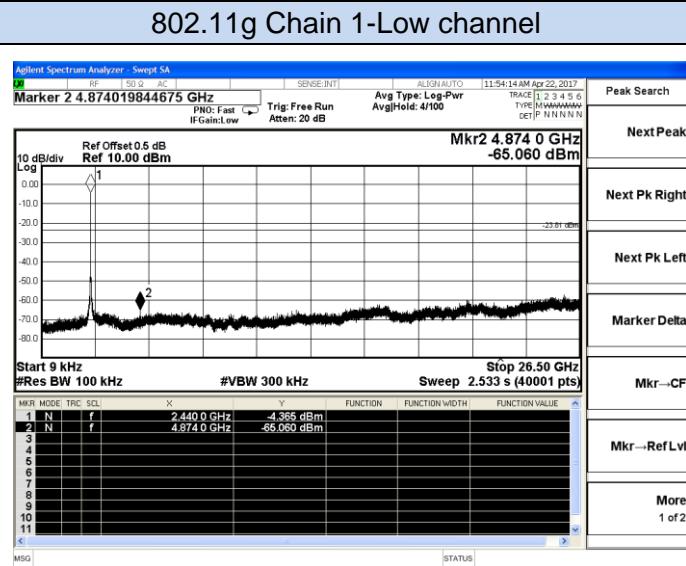
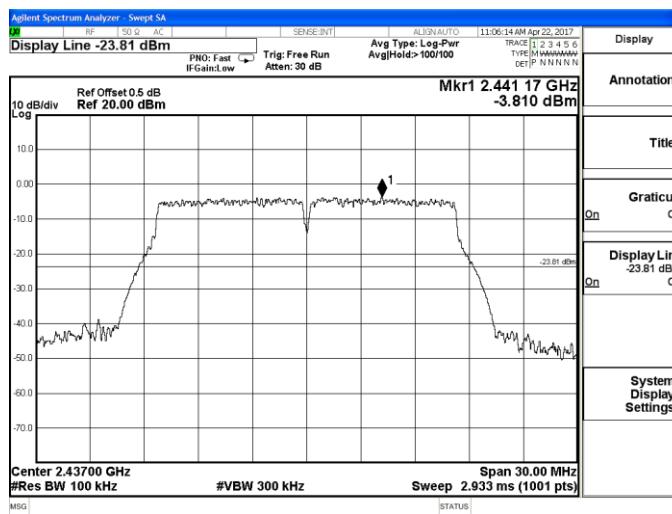


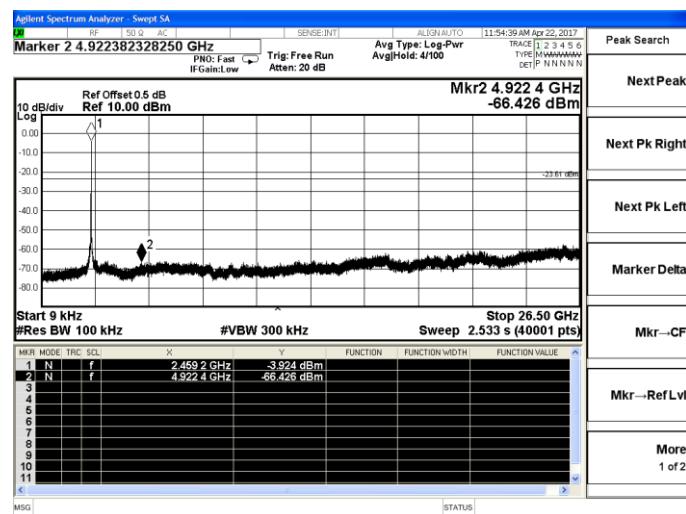
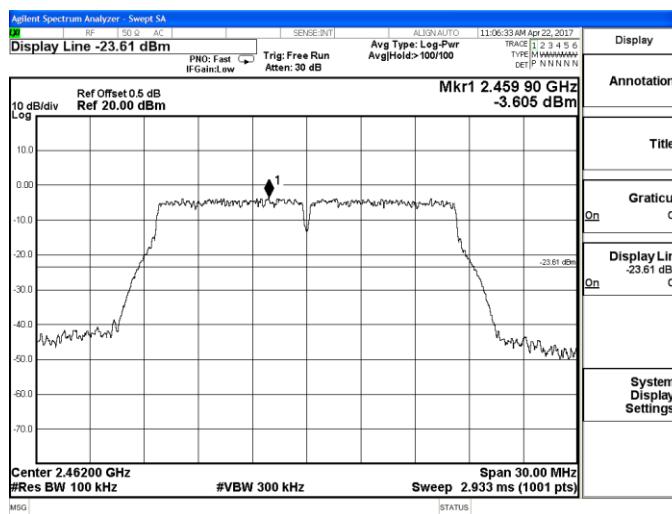
Test plot of Conducted Spurious Emission



802.11g Chain 1-Low channel Reference



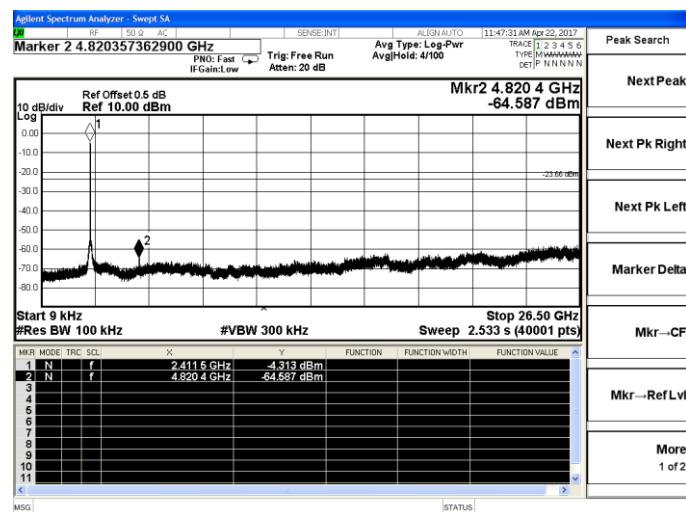
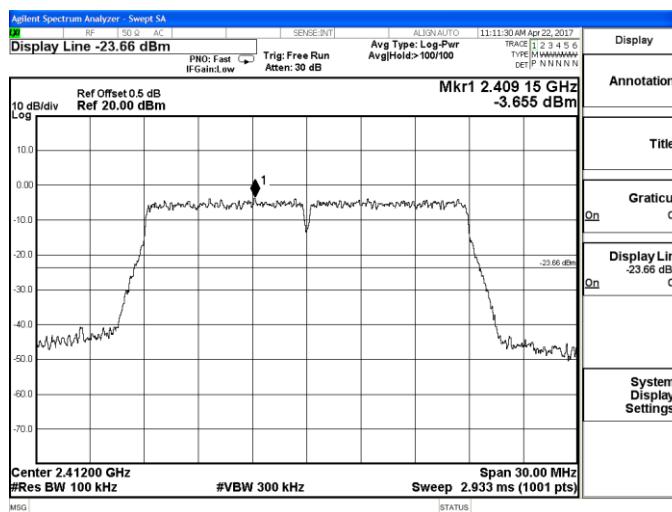
802.11g Chain 1-Middle channel Reference



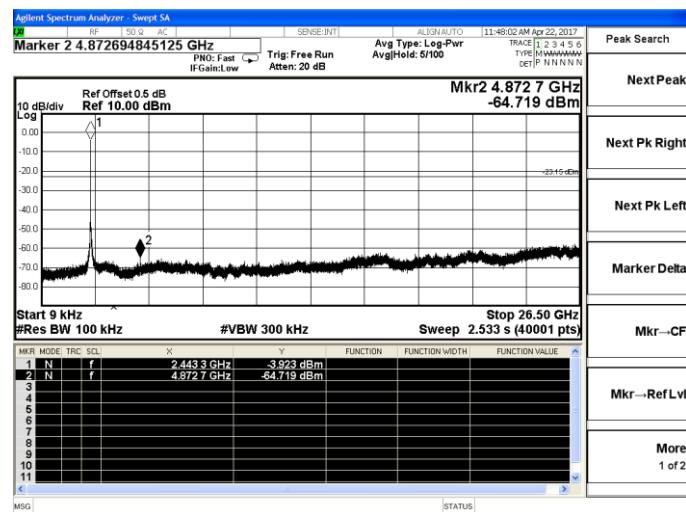
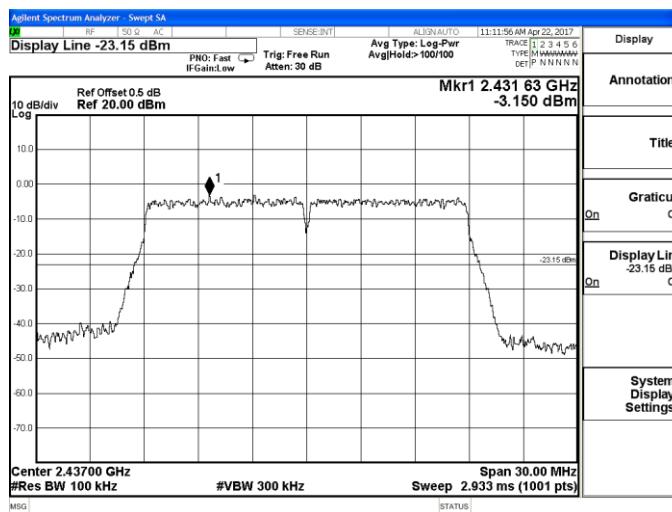
802.11g Chain 1-High channel Reference

802.11g Chain 1-High channel

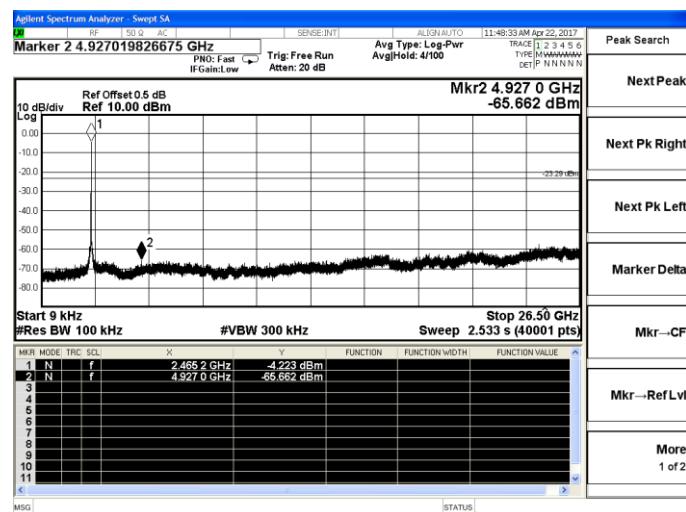
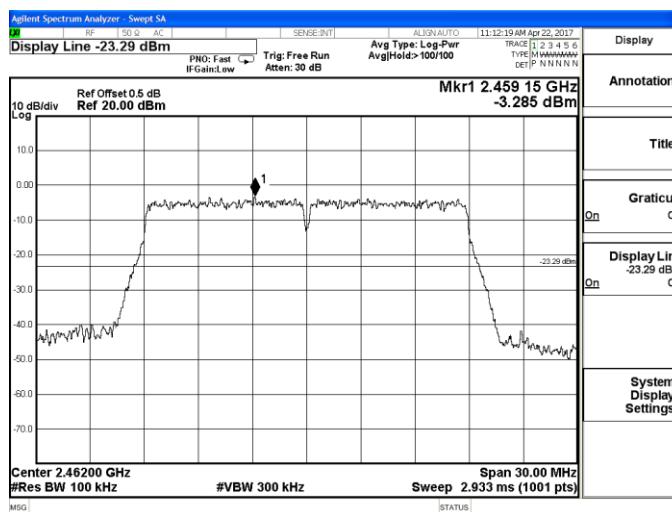
Test plot of Conducted Spurious Emission



802.11n-HT20 Chain 0-Low channel Reference



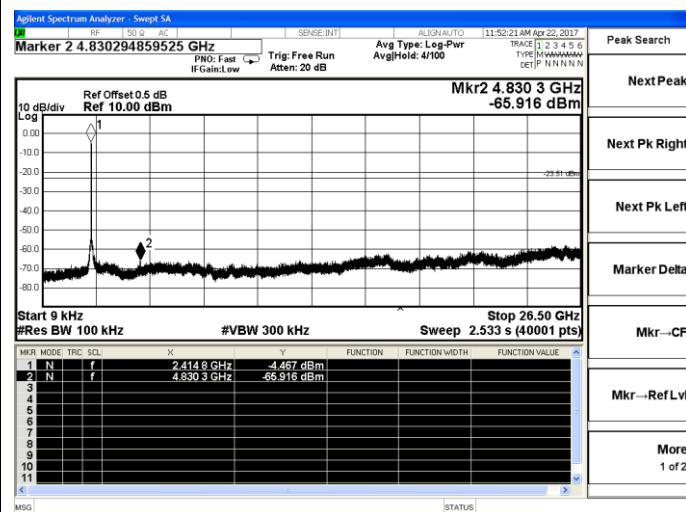
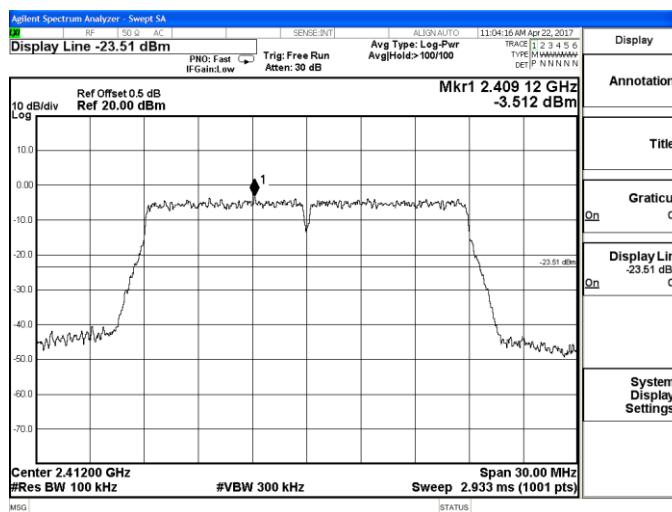
802.11n-HT20 Chain 0-Middle channel Reference



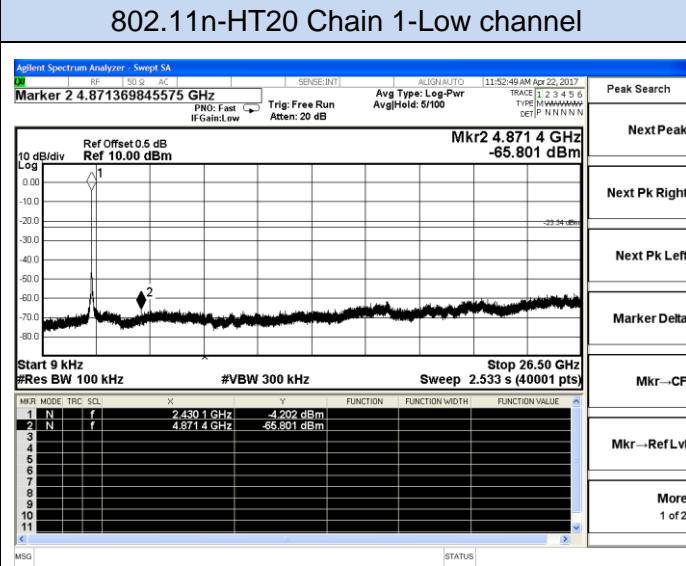
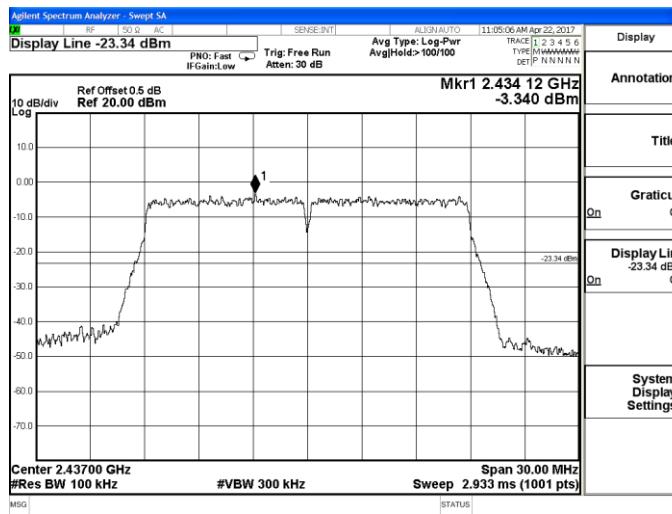
802.11n-HT20 Chain 0-High channel Reference

802.11n-HT20 Chain 0-High channel

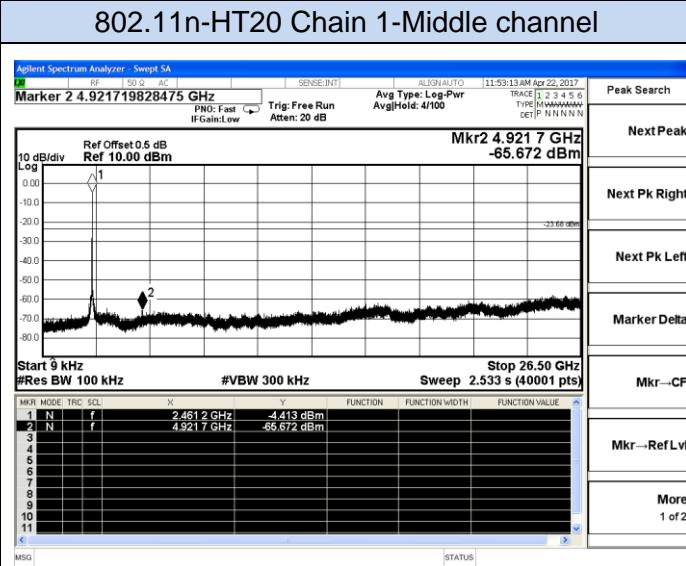
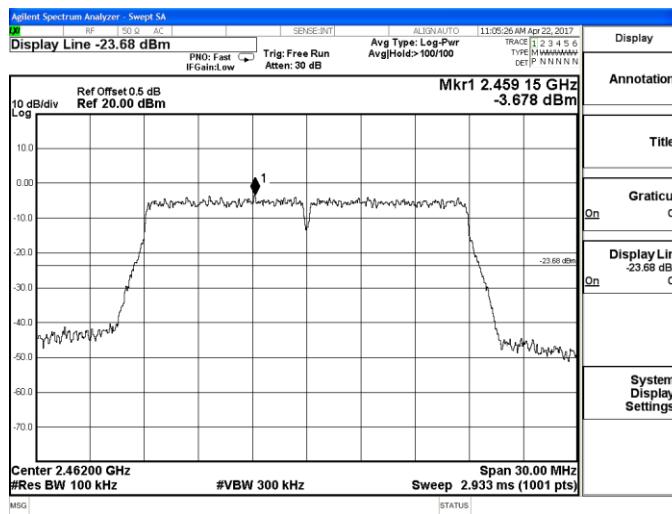
Test plot of Conducted Spurious Emission



802.11n-HT20 Chain 1-Low channel Reference



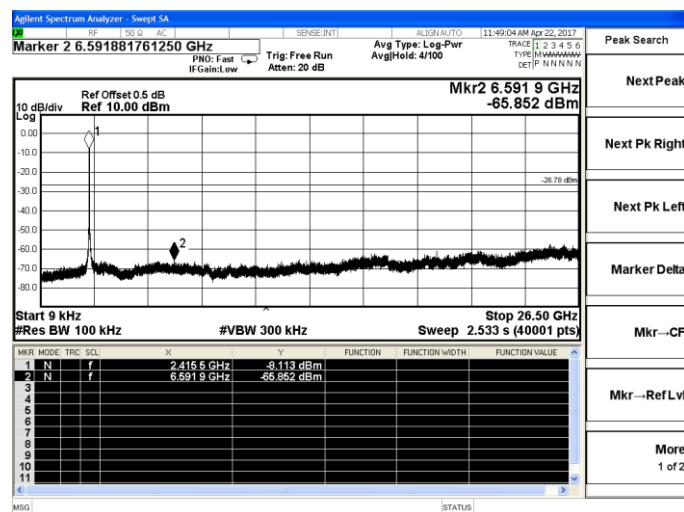
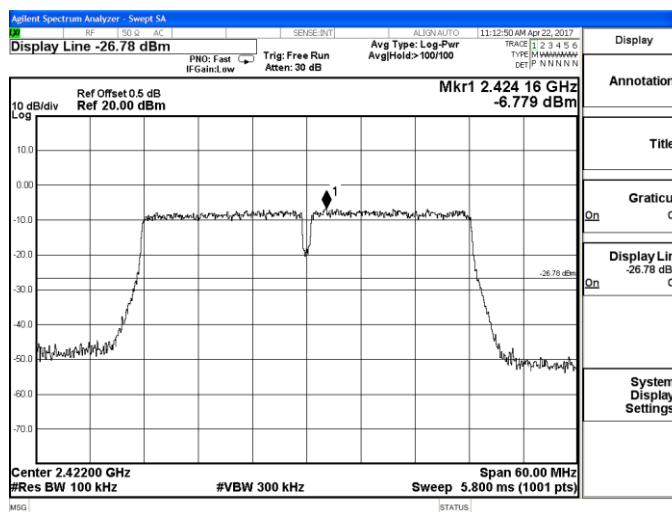
802.11n-HT20 Chain 1-Middle channel Reference



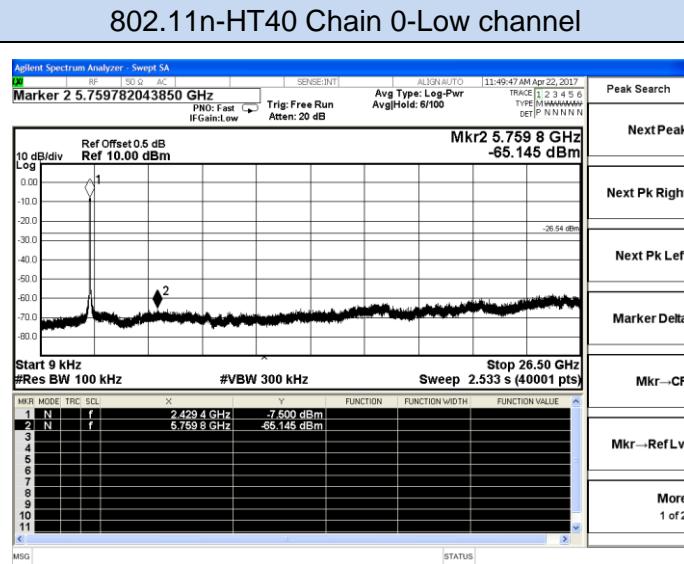
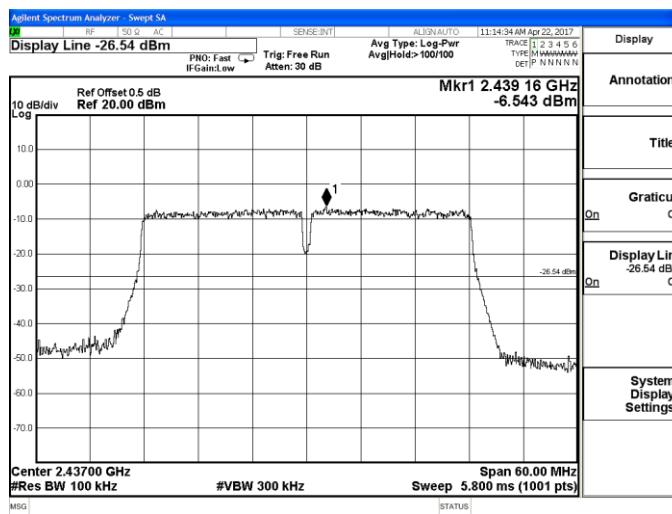
802.11n-HT20 Chain 1-High channel Reference

802.11n-HT20 Chain 1-High channel

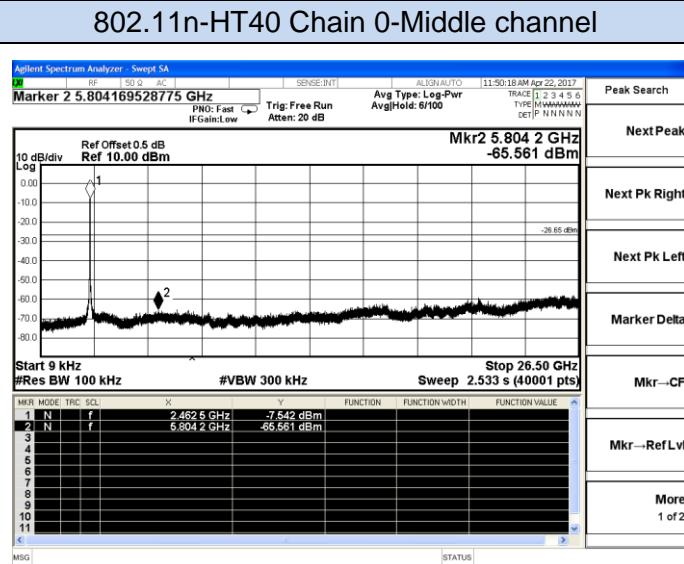
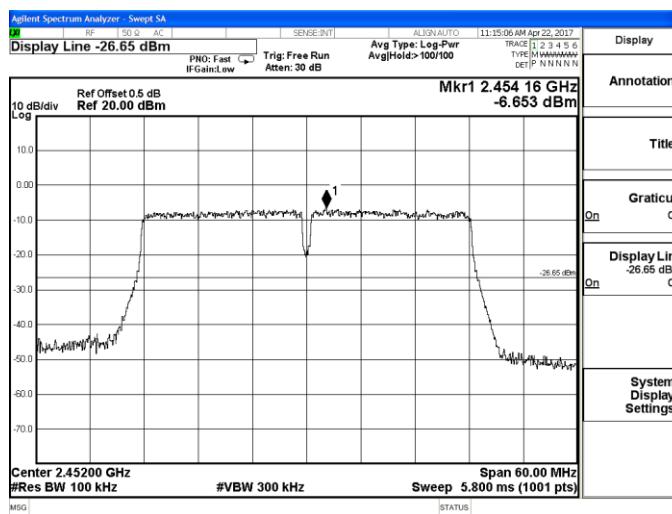
Test plot of Conducted Spurious Emission



802.11n-HT40 Chain 0-Low channel Reference



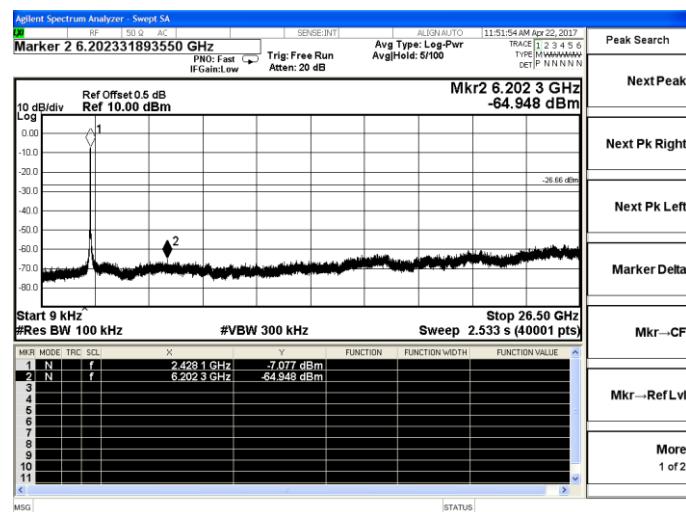
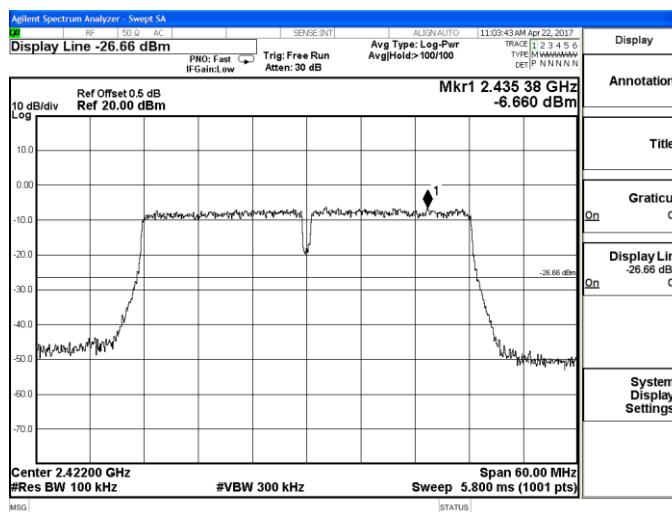
802.11n-HT40 Chain 0-Middle channel Reference



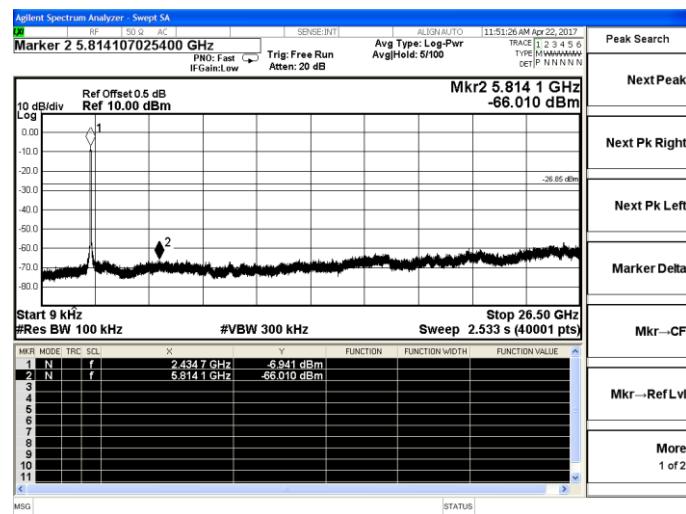
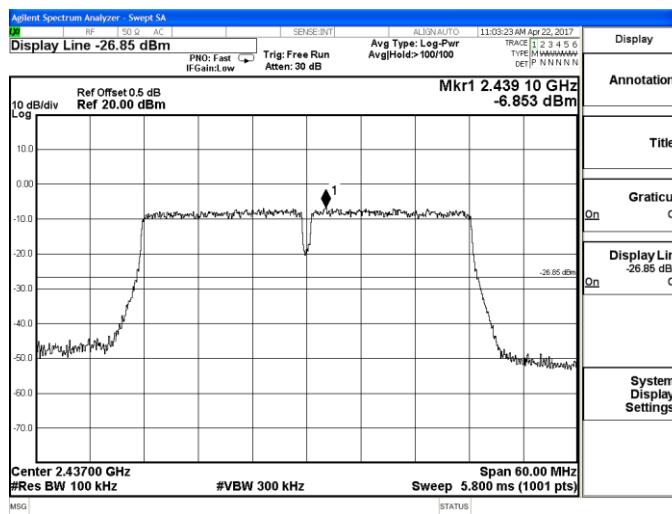
802.11n-HT40 Chain 0-High channel Reference

802.11n-HT40 Chain 0-High channel

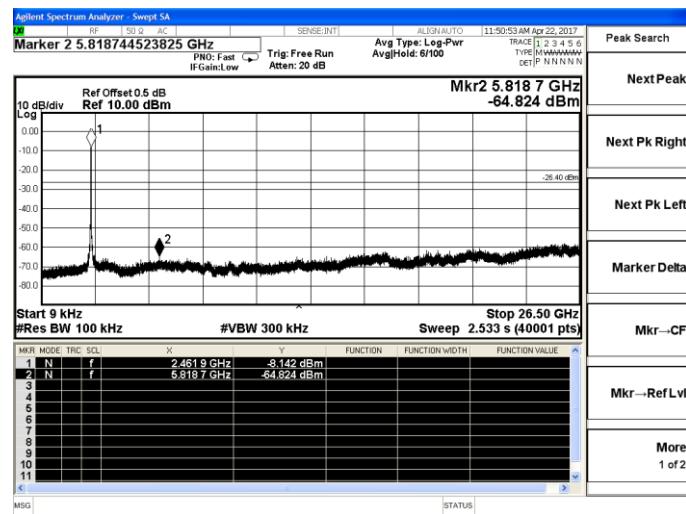
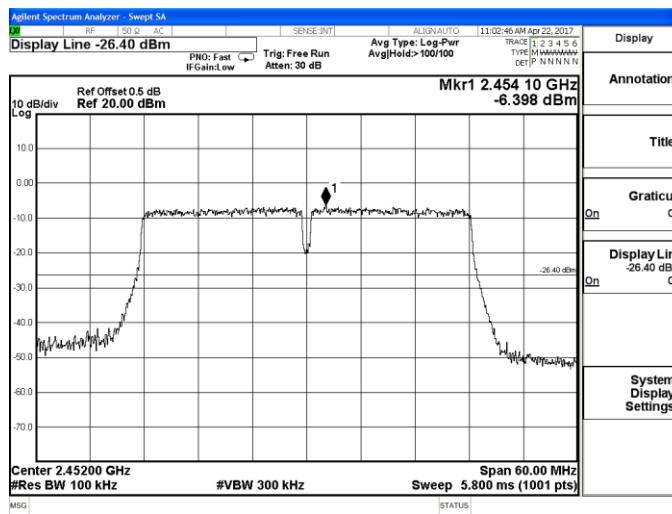
Test plot of Conducted Spurious Emission



802.11n-HT40 Chain 1-Low channel Reference



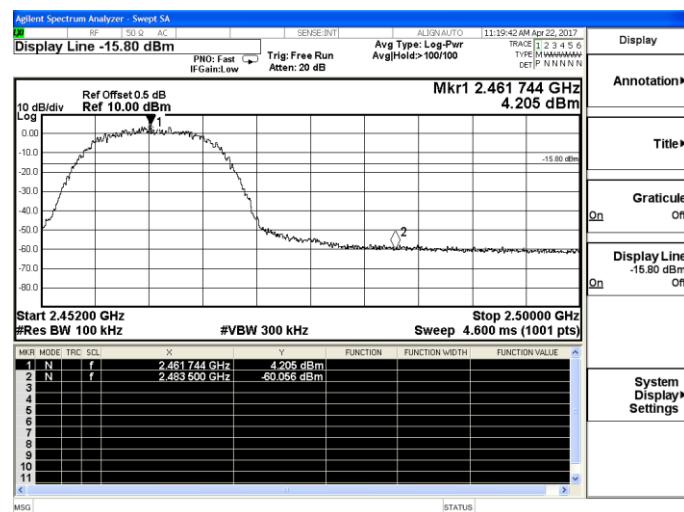
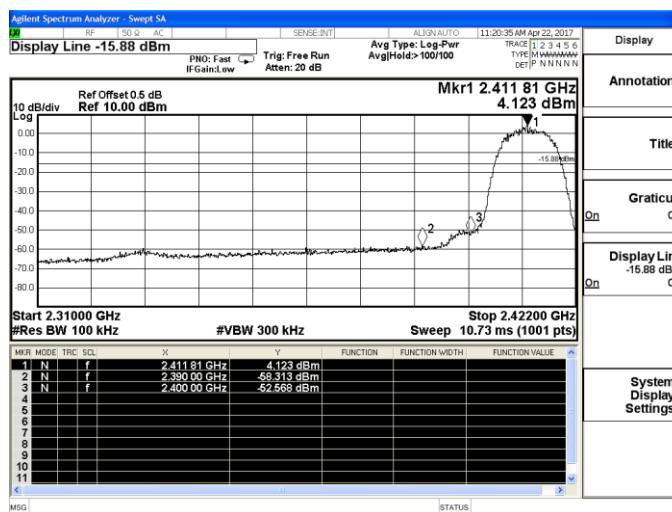
802.11n-HT40 Chain 1-Middle channel Reference



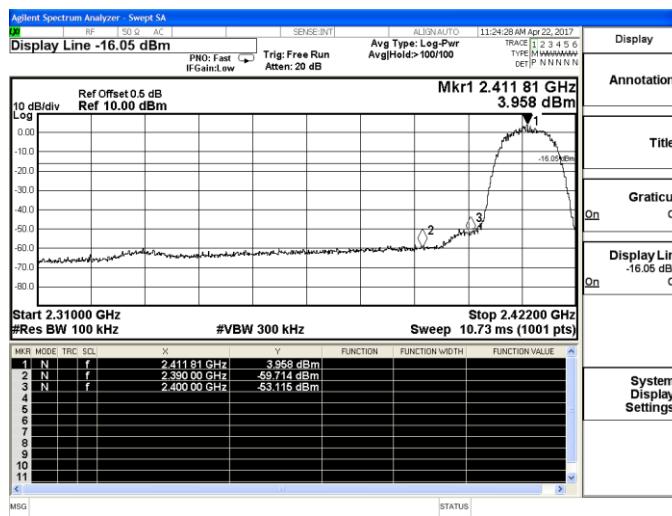
802.11n-HT40 Chain 1-High channel Reference

802.11n-HT40 Chain 1-High channel

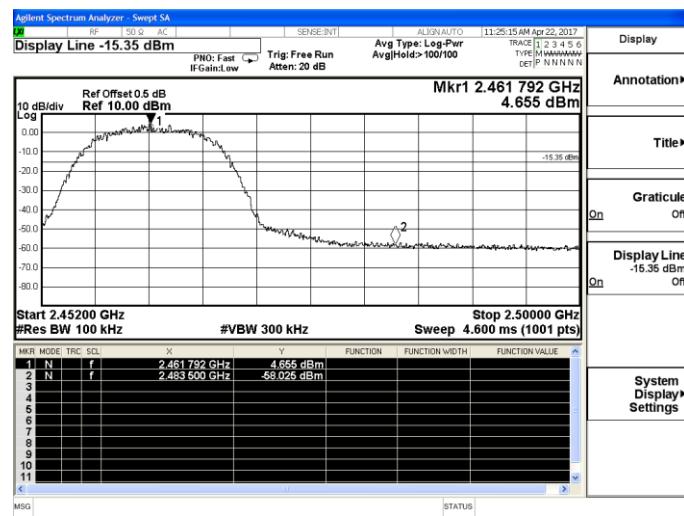
Test plot of Band Edges Test



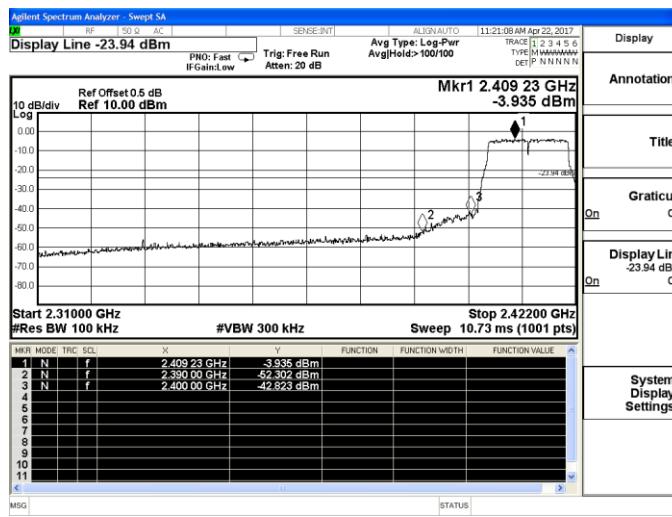
802.11b Chain 0-Low channel



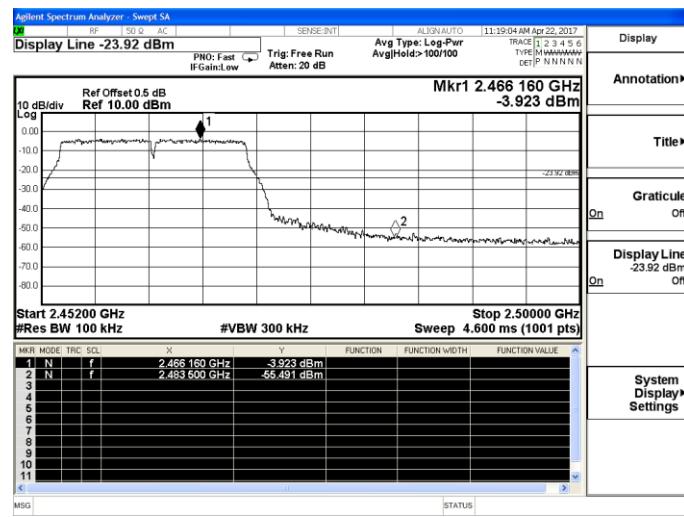
802.11b Chain 0-High channel



802.11b Chain 1-Low channel



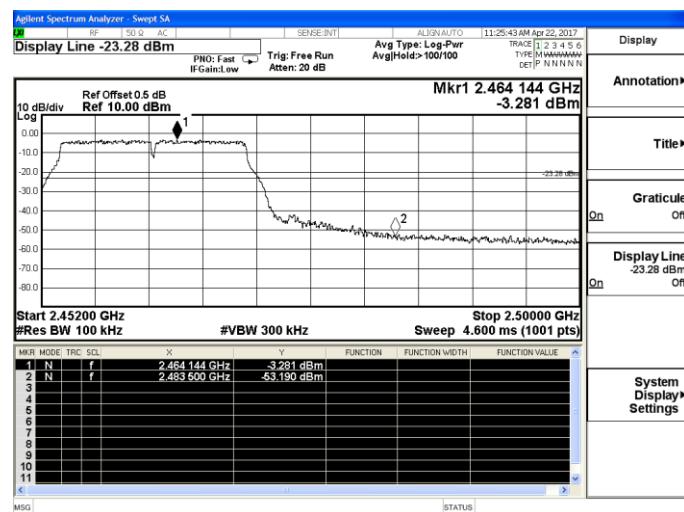
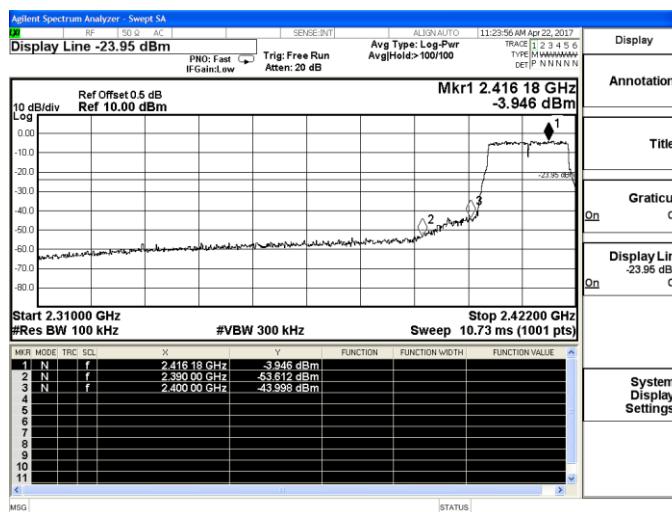
802.11b Chain 1-High channel



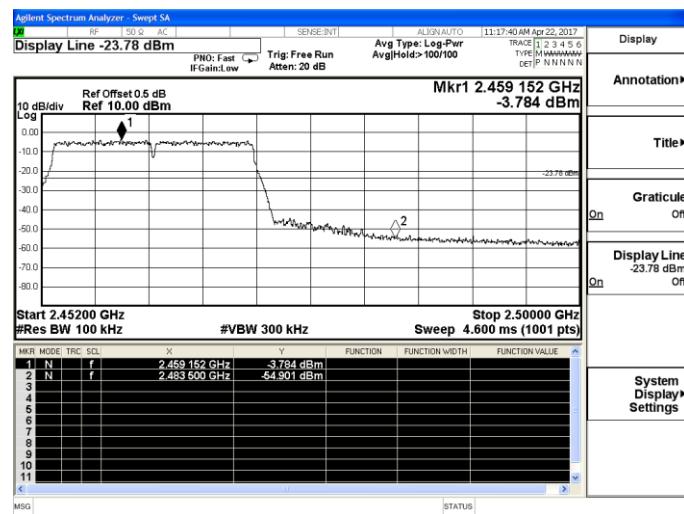
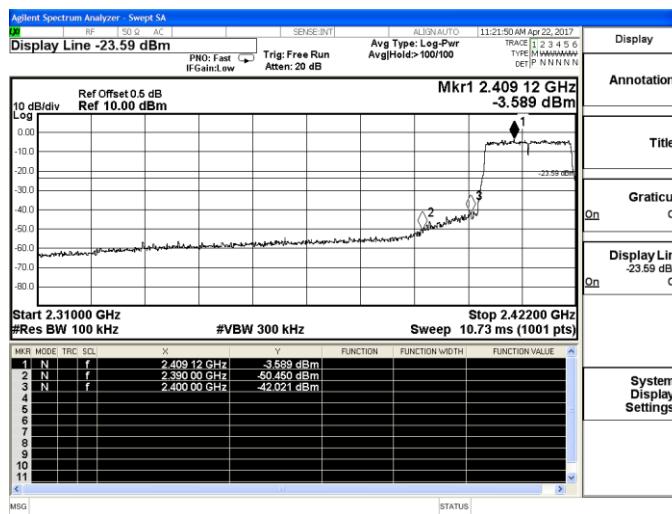
802.11g Chain 0-Low channel

802.11g Chain 0-High channel

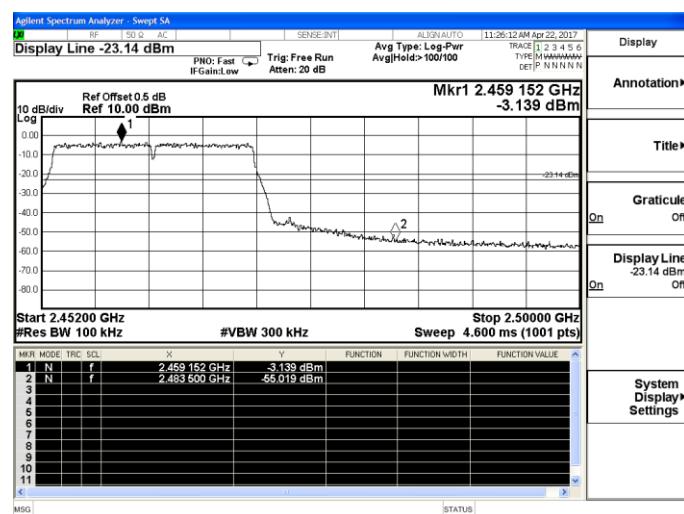
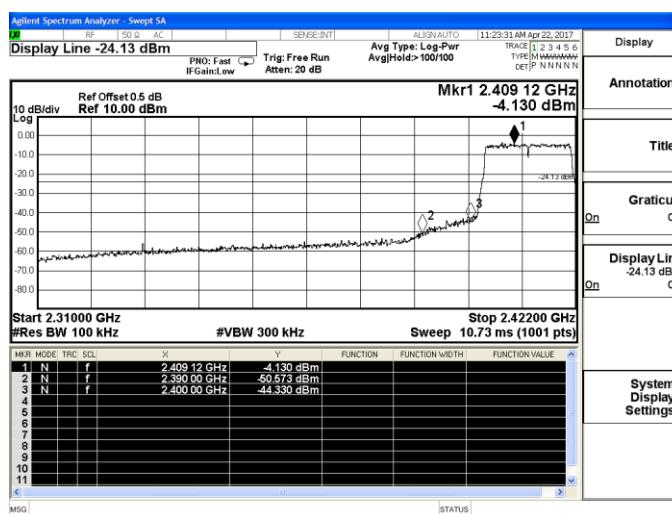
Test plot of Band Edges Test



802.11g Chain 1-Low channel

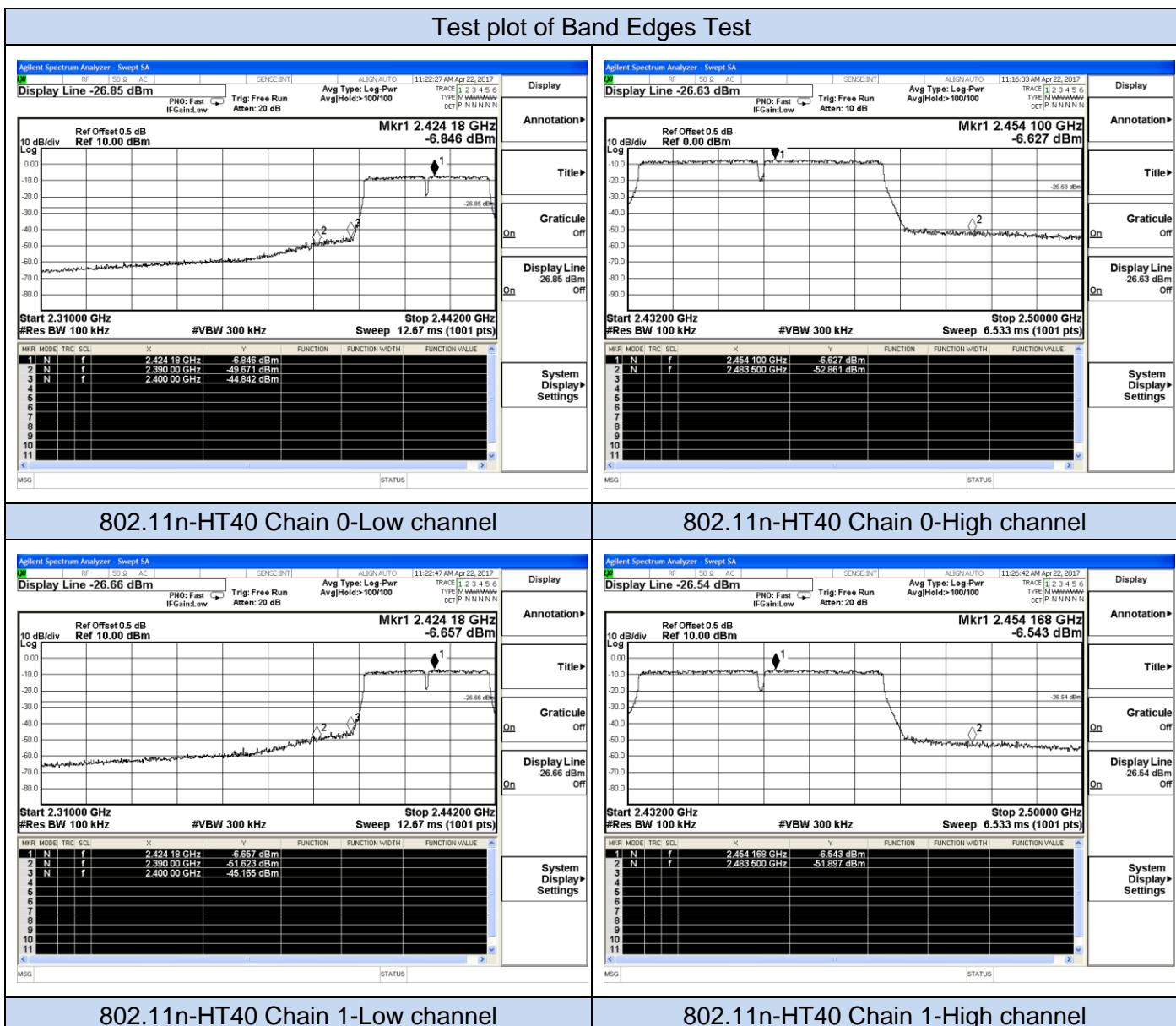


802.11n-HT20 Chain 0-Low channel



802.11n-HT20 Chain 1-Low channel

802.11n-HT20 Chain 1-High channel



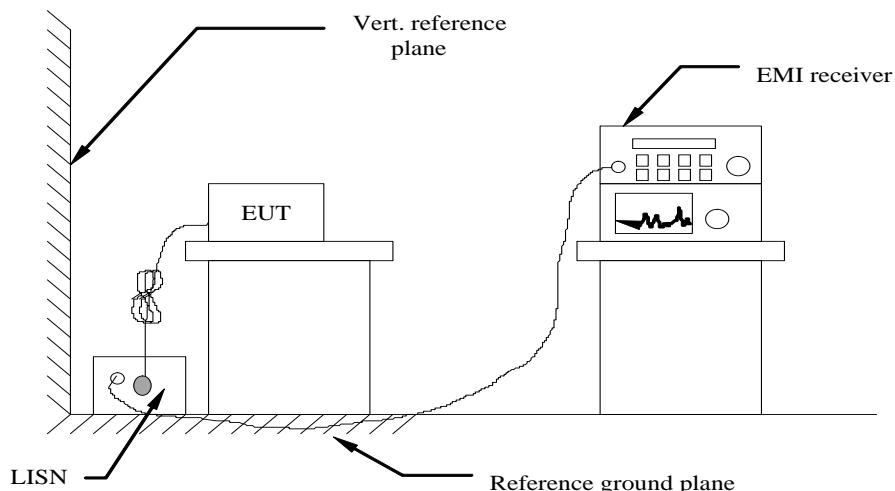
5.7. AC Power line conducted emissions

5.7.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolts (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

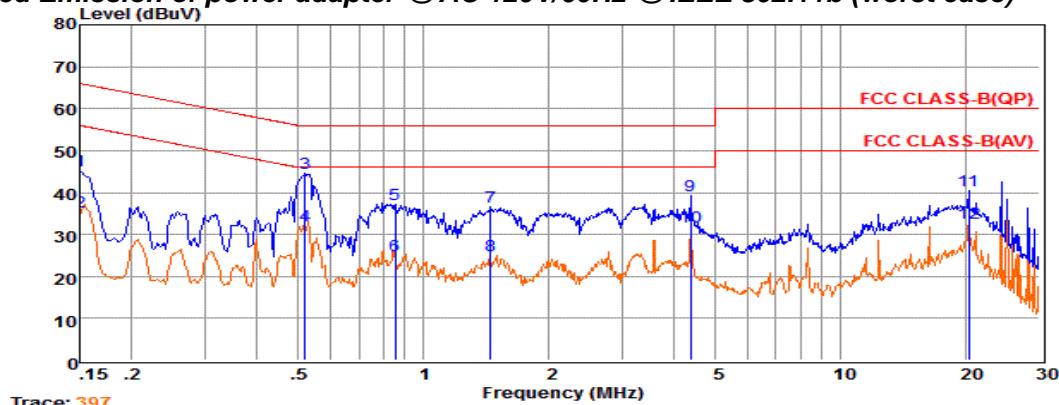
5.7.2 Block Diagram of Test Setup



5.7.3 Test Results

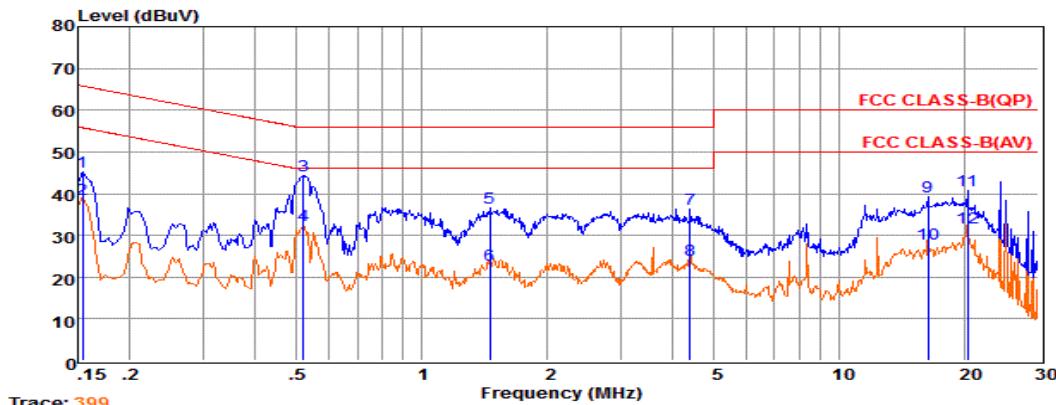
PASS.

The test data please refer to following page.

AC Conducted Emission of power adapter @ AC 120V/60Hz @ IEEE 802.11b (worst case)

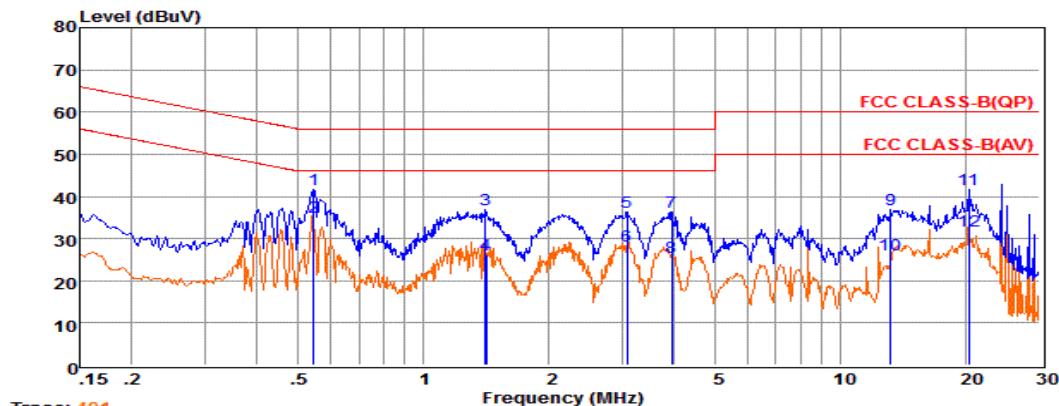
Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	dB
1	0.15	25.69	9.57	0.02	10.00	45.28	66.00	-20.72 QP
2	0.15	15.73	9.57	0.02	10.00	35.32	55.99	-20.67 Average
3	0.52	24.87	9.62	0.04	10.00	44.53	56.00	-11.47 QP
4	0.52	12.34	9.62	0.04	10.00	32.00	46.00	-14.00 Average
5	0.86	17.64	9.63	0.04	10.00	37.31	56.00	-18.69 QP
6	0.86	5.35	9.63	0.04	10.00	25.02	46.00	-20.98 Average
7	1.45	16.76	9.64	0.05	10.00	36.45	56.00	-19.55 QP
8	1.45	5.15	9.64	0.05	10.00	24.84	46.00	-21.16 Average
9	4.36	19.50	9.65	0.06	10.00	39.21	56.00	-16.79 QP
10	4.36	12.11	9.65	0.06	10.00	31.82	46.00	-14.18 Average
11	20.27	20.46	9.75	0.12	10.00	40.33	60.00	-19.67 QP
12	20.27	12.83	9.75	0.12	10.00	32.70	50.00	-17.30 Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

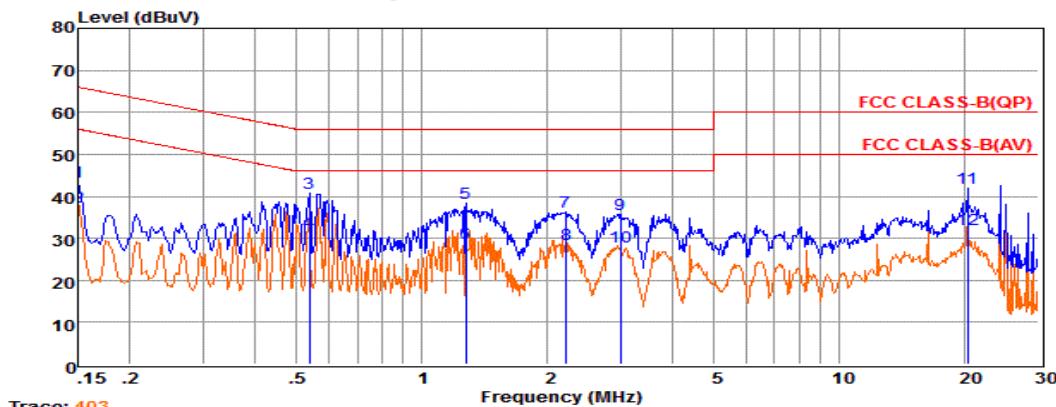


Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
MHz	dBuV	dB	dB	dB	dBuV	dBuV	dBuV	dB
1	0.15	25.54	9.69	0.02	10.00	45.25	65.78	-20.53 QP
2	0.15	18.82	9.69	0.02	10.00	38.53	55.77	-17.24 Average
3	0.52	24.75	9.62	0.04	10.00	44.41	56.00	-11.59 QP
4	0.52	12.68	9.62	0.04	10.00	32.34	46.00	-13.66 Average
5	1.46	17.02	9.63	0.05	10.00	36.70	56.00	-19.30 QP
6	1.46	3.30	9.63	0.05	10.00	22.98	46.00	-23.02 Average
7	4.38	16.63	9.66	0.06	10.00	36.35	56.00	-19.65 QP
8	4.38	4.45	9.66	0.06	10.00	24.17	46.00	-21.83 Average
9	16.31	19.51	9.75	0.11	10.00	39.37	60.00	-20.63 QP
10	16.31	8.22	9.75	0.11	10.00	28.08	50.00	-21.92 Average
11	20.27	20.76	9.88	0.12	10.00	40.76	60.00	-19.24 QP
12	20.27	11.74	9.88	0.12	10.00	31.74	50.00	-18.26 Average

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

AC Conducted Emission of power adapter @ AC 240V/60Hz @ IEEE 802.11b (worst case)

Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.



Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

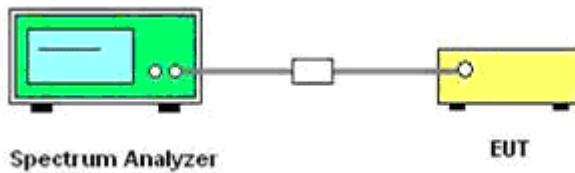
***Note: Pre-scan all mode and recorded the worst case results in this report (802.11b).

5.8. Band-edge measurements for radiated emissions

5.8.1 Standard Applicable

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.8.2. Test Setup Layout



5.8.3. Measuring Instruments and Setting

Please refer to section 6 of equipment list in this report. The following table is the setting of Spectrum Analyzer.

5.8.4. Test Procedures

According to KDB 558074 D01 V03R05 for Antenna-port conducted measurement. Antenna-port conducted measurements may also be used as an alternative to radiated measurements for demonstrating compliance in the restricted frequency bands. If conducted measurements are performed, then proper impedance matching must be ensured and an additional radiated test for cabinet/case spurious emissions is required.

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100kHz bandwidth from band edge, for Radiated emissions restricted band RBW=1MHz, VBW=3MHz for peak detector and RBW=1MHz, VBW=1/B for AV detector.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.
6. Measure the conducted output power (in dBm) using the detector specified by the appropriate regulatory agency (see 12.2.2, 12.2.3, and 12.2.4 for guidance regarding measurement procedures for determining quasi-peak, peak, and average conducted output power, respectively).
7. Add the maximum transmit antenna gain (in dBi) to the measured output power level to determine the EIRP level (see 12.2.5 for guidance on determining the applicable antenna gain)
8. Add the appropriate maximum ground reflection factor to the EIRP level (6 dB for frequencies \leq 30 MHz, 4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive and 0 dB for frequencies $>$ 1000 MHz).

9. For devices with multiple antenna-ports, measure the power of each individual chain and sum the EIRP of all chains in linear terms (e.g., Watts, mW).
 10. Convert the resultant EIRP level to an equivalent electric field strength using the following relationship:

$$E = EIRP - 20\log D + 104.77 = EIRP + 95.23$$
- Where:
- E = electric field strength in dB μ V/m,
EIRP = equivalent isotropic radiated power in dBm
D = specified measurement distance in meters.
11. Since the out-of-band characteristics of the EUT transmit antenna will often be unknown, the use of a conservative antenna gain value is necessary. Thus, when determining the EIRP based on the measured conducted power, the upper bound on antenna gain for a device with a single RF output shall be selected as the maximum in-band gain of the antenna across all operating bands, or 2 dBi, whichever is greater. However, for devices that operate in multiple frequency bands while using the same transmit antenna, the highest gain of the antenna within the operating band nearest in frequency to the restricted band emission being measured may be used in lieu of the overall highest gain when the emission is at a frequency that is within 20 percent of the nearest band edge frequency, but in no case shall a value less than 2 dBi be used.
 12. Compare the resultant electric field strength level to the applicable regulatory limit.
 13. Perform radiated spurious emission test duress until all measured frequencies were complete.

5.8.5 Test Results

Frequency (MHz)	Conducted Power (dBm)		Antenna Gain (dBi)	Covert Radiated E Level At 3m (dB μ V/m)		Detector	Limit (dB μ V/m)	Verdict
	Chain 0	Chain 1		Chain 0	Chain 1			
2310.000	-52.960	-53.909	2.50	44.800	43.851	Peak	74.00	PASS
2310.000	-65.277	-65.277	2.50	32.483	32.483	AV	54.00	PASS
2390.000	-50.294	-48.532	2.50	47.466	49.228	Peak	74.00	PASS
2390.000	-60.750	-60.390	2.50	37.010	37.370	AV	54.00	PASS
2483.500	-48.367	-49.224	2.50	49.393	48.536	Peak	74.00	PASS
2483.500	-59.785	-59.738	2.50	37.975	38.022	AV	54.00	PASS
2500.000	-50.777	-51.260	2.50	46.983	46.500	Peak	74.00	PASS
2500.000	-61.493	-61.547	2.50	36.267	36.213	AV	54.00	PASS

Frequency (MHz)	Conducted Power (dBm)		Antenna Gain (dBi)	Covert Radiated E Level At 3m (dB μ V/m)		Detector	Limit (dB μ V/m)	Verdict
	Chain 0	Chain 1		Chain 0	Chain 1			
2310.000	-52.195	-52.371	2.50	45.565	45.389	Peak	74.00	PASS
2310.000	-63.681	-63.559	2.50	34.079	34.201	AV	54.00	PASS
2390.000	-41.867	-36.720	2.50	55.893	61.040	Peak	74.00	PASS
2390.000	-54.529	-54.597	2.50	43.231	43.163	AV	54.00	PASS
2483.500	-42.564	-44.678	2.50	55.196	53.082	Peak	74.00	PASS
2483.500	-55.934	-55.996	2.50	41.826	41.764	AV	54.00	PASS
2500.000	-45.687	-46.409	2.50	52.073	51.351	Peak	74.00	PASS
2500.000	-58.244	-58.132	2.50	39.516	39.628	AV	54.00	PASS

IEEE 802.11n HT20							
Frequency (MHz)	Conducted Power (dBm)		Antenna Gain (dBi)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
	Chain 0	Chain 1					
2310.000	-52.735	-52.565	2.50	48.121	Peak	74.00	PASS
2310.000	-63.687	-63.699	2.50	37.077	AV	54.00	PASS
2390.000	-34.021	-34.550	2.50	66.493	Peak	74.00	PASS
2390.000	-53.488	-53.126	2.50	47.467	AV	54.00	PASS
2483.500	-41.575	-42.574	2.50	58.724	Peak	74.00	PASS
2483.500	-55.588	-55.587	2.50	45.183	AV	54.00	PASS
2500.000	-46.798	-46.781	2.50	53.981	Peak	74.00	PASS
2500.000	-58.174	-58.138	2.50	42.614	AV	54.00	PASS

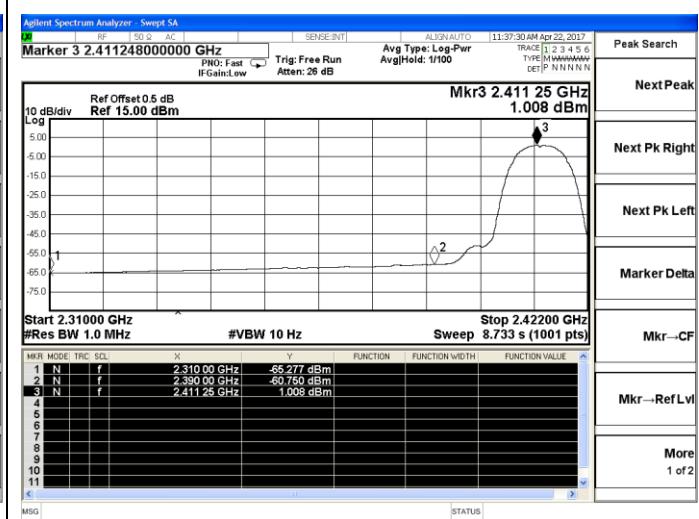
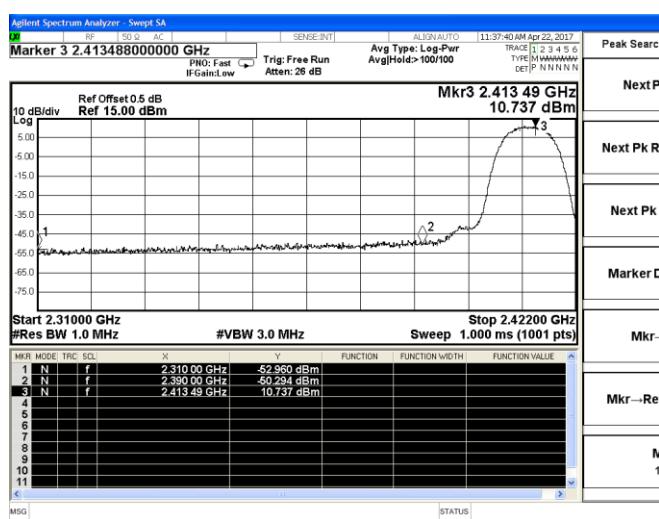
IEEE 802.11n HT40							
Frequency (MHz)	Conducted Power (dBm)		Antenna Gain (dBi)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
	Chain 0	Chain 1					
2310.000	-53.996	-52.793	2.50	47.417	Peak	74.00	PASS
2310.000	-64.814	-64.758	2.50	35.984	AV	54.00	PASS
2390.000	-38.124	-38.955	2.50	62.251	Peak	74.00	PASS
2390.000	-51.757	-51.699	2.50	49.042	AV	54.00	PASS
2483.500	-41.970	-42.369	2.50	58.605	Peak	74.00	PASS
2483.500	-54.354	-53.908	2.50	46.645	AV	54.00	PASS
2500.000	-46.268	-45.000	2.50	55.182	Peak	74.00	PASS
2500.000	-57.364	-57.226	2.50	43.476	AV	54.00	PASS

Remark:

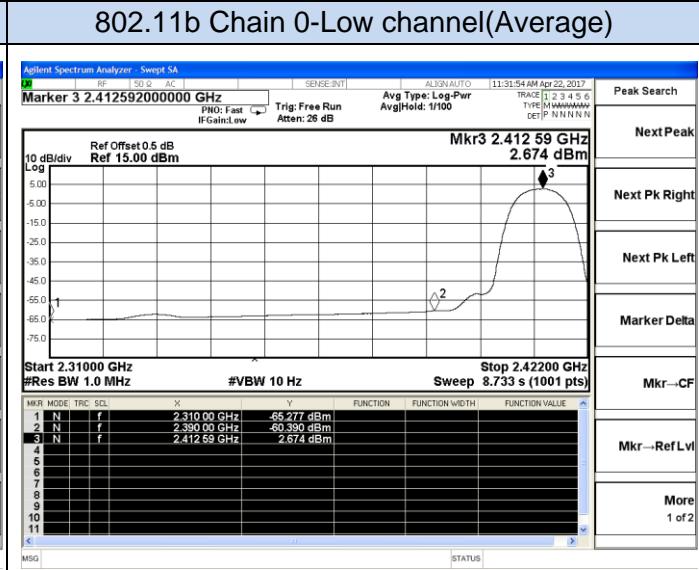
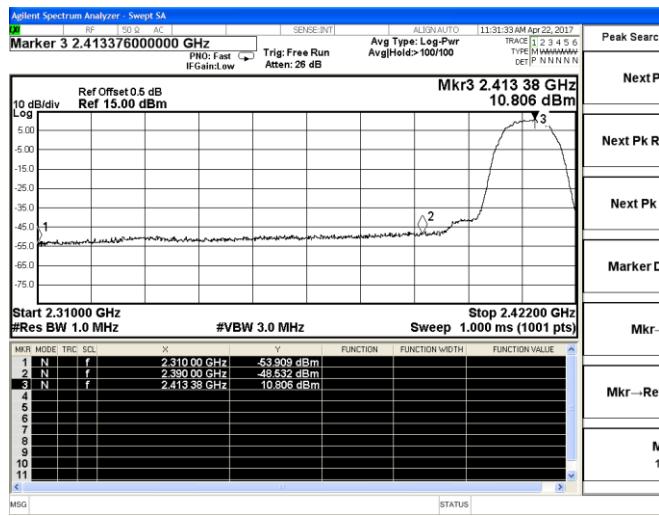
1. Measured output power at difference data rate for each mode and recorded worst case for each mode.
2. Test results including cable loss;
3. Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;
4. “---”means that the fundamental frequency not for 15.209 limits requirement.
5. please refer to following plots;

Band-edge measurements for conducted emissions

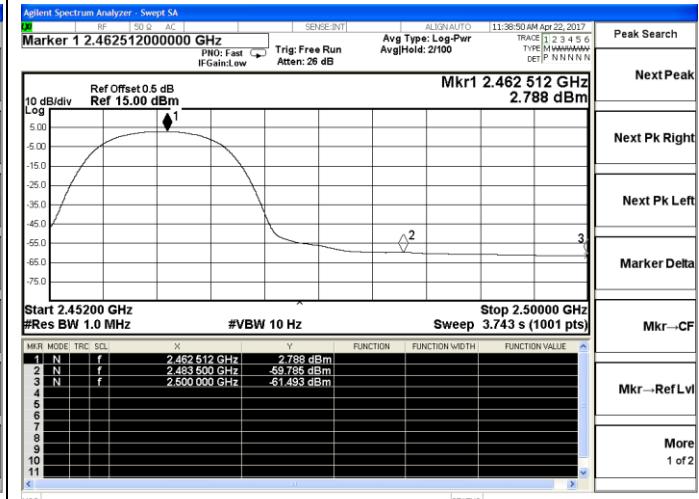
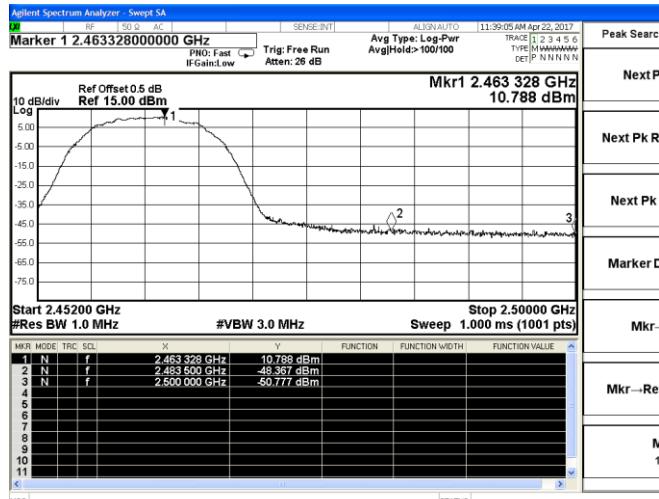
Test plot of Restricted Bands



802.11b Chain 0-Low channel(Peak)



802.11b Chain 1-Low channel(Peak)

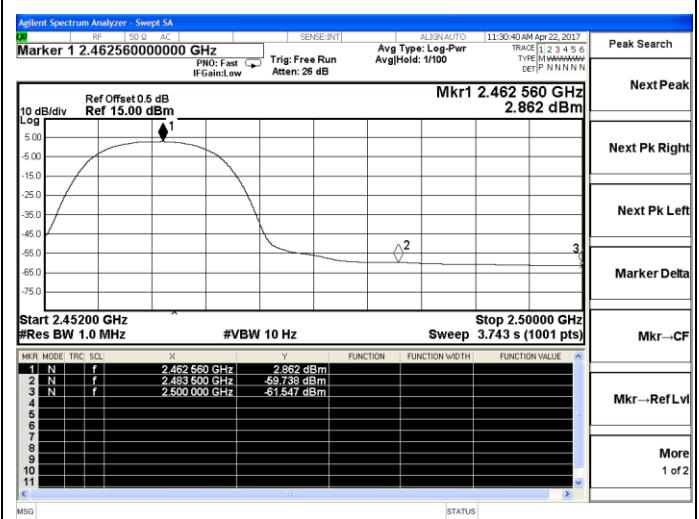
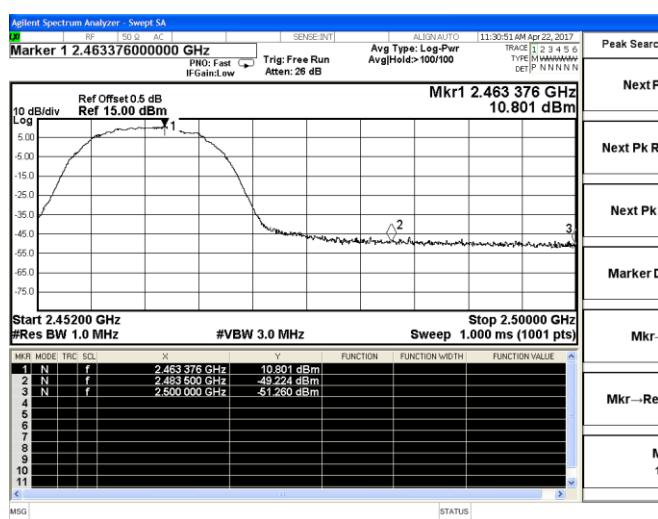


802.11b Chain 0-High channel(Peak)

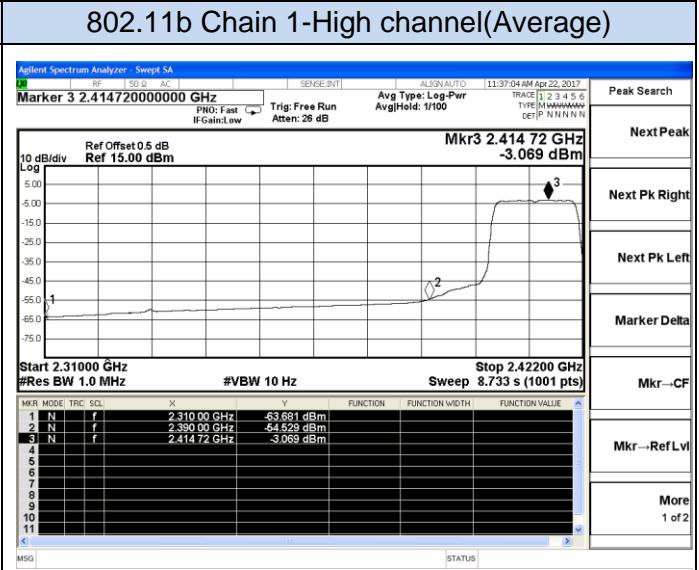
802.11b Chain 0-High channel(Average)

Band-edge measurements for conducted emissions

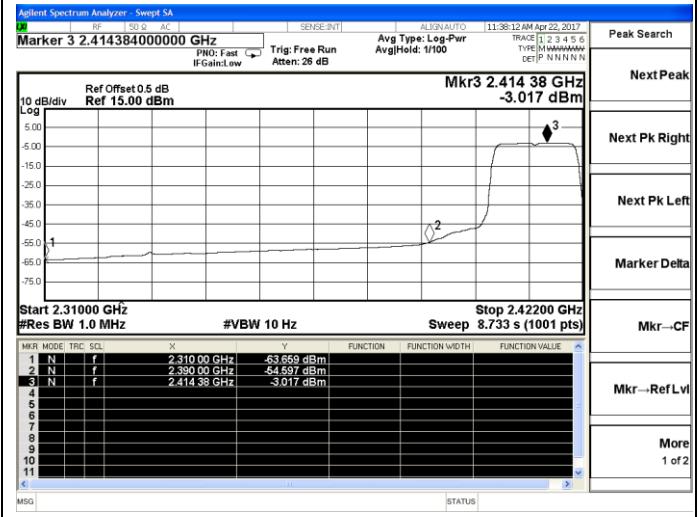
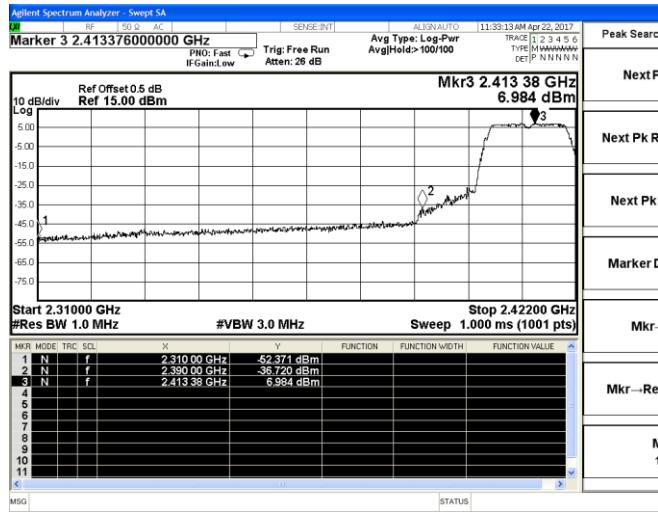
Test plot of Restricted Bands



802.11b Chain 1-High channel(Peak)



802.11g Chain 0-Low channel(Peak)

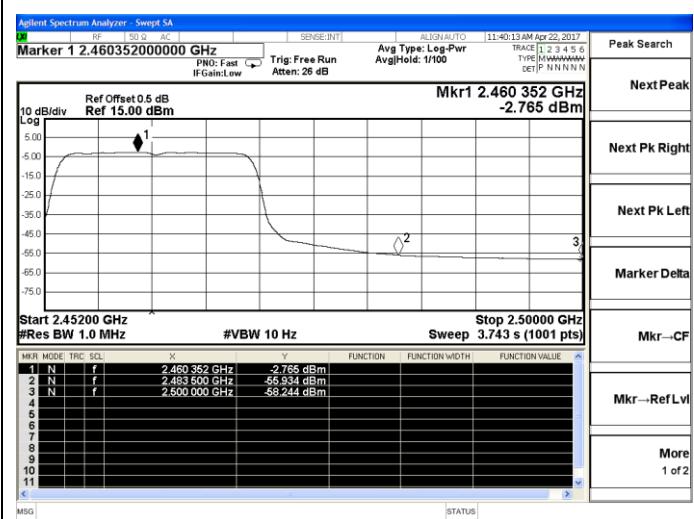
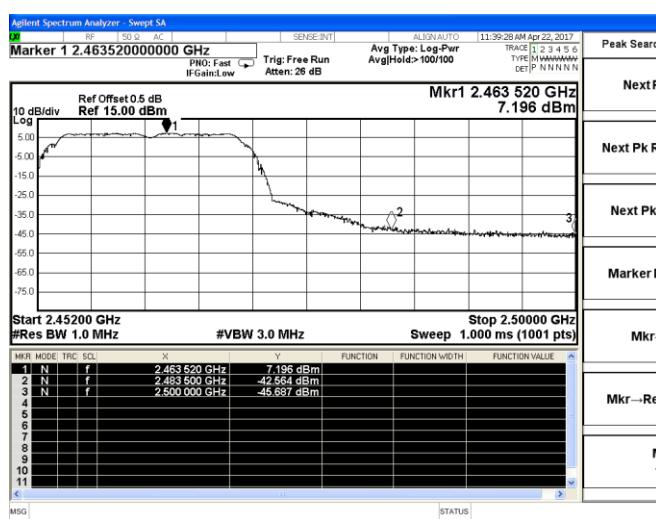


802.11g Chain 1-Low channel(Peak)

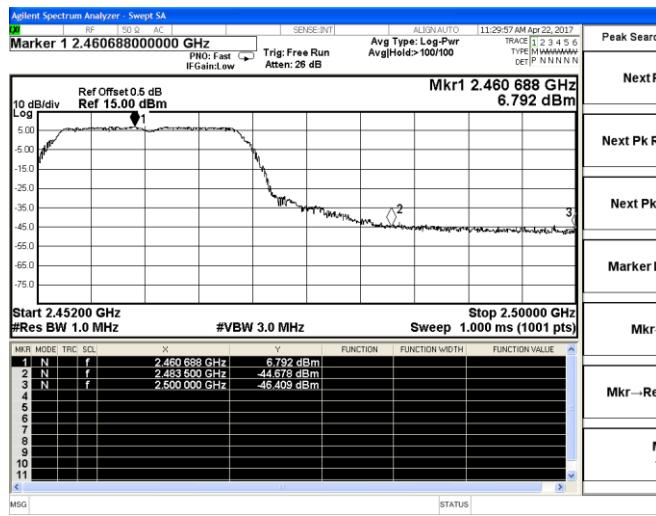
802.11g Chain 1-Low channel(Average)

Band-edge measurements for conducted emissions

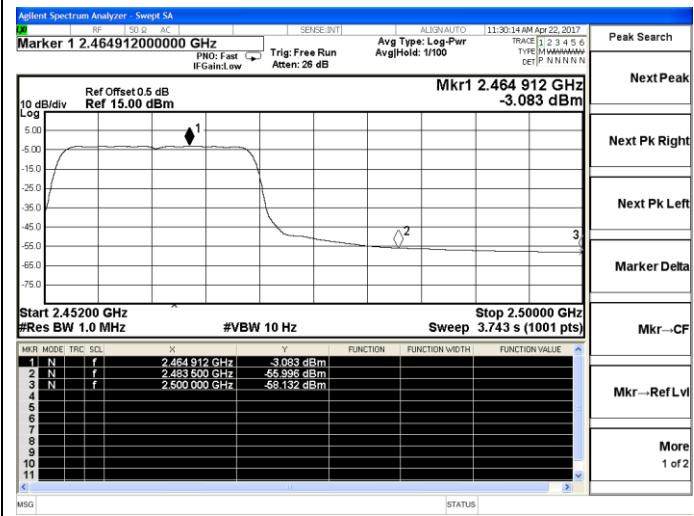
Test plot of Restricted Bands



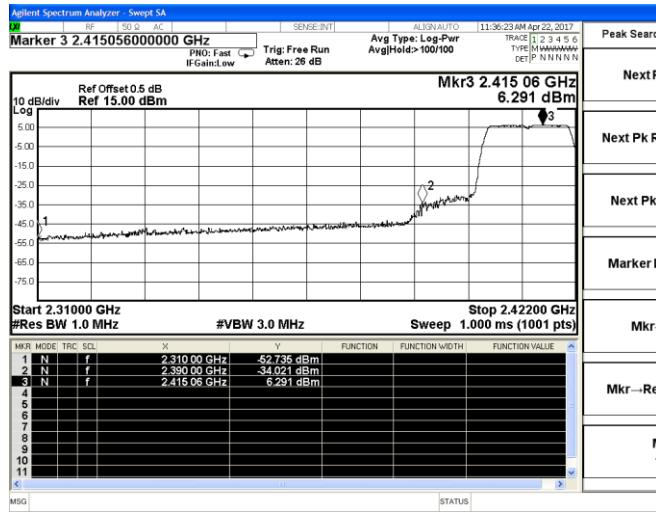
802.11g Chain 0-High channel(Peak)



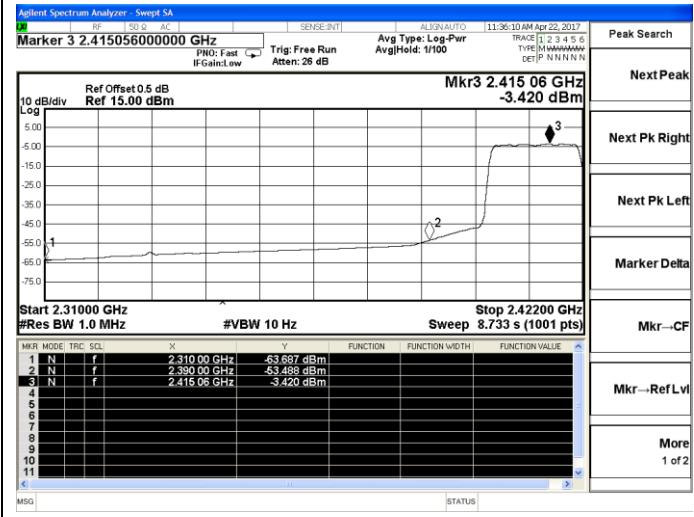
802.11g Chain 0-High channel(Average)



802.11g Chain 1-High channel(Peak)



802.11g Chain 1-High channel(Average)

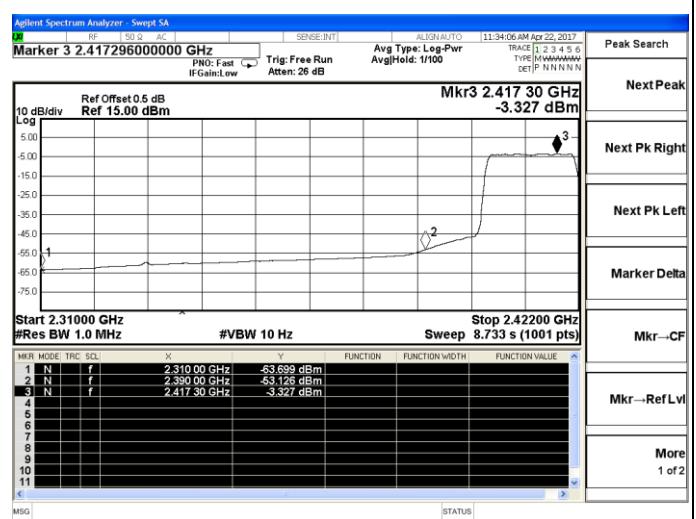
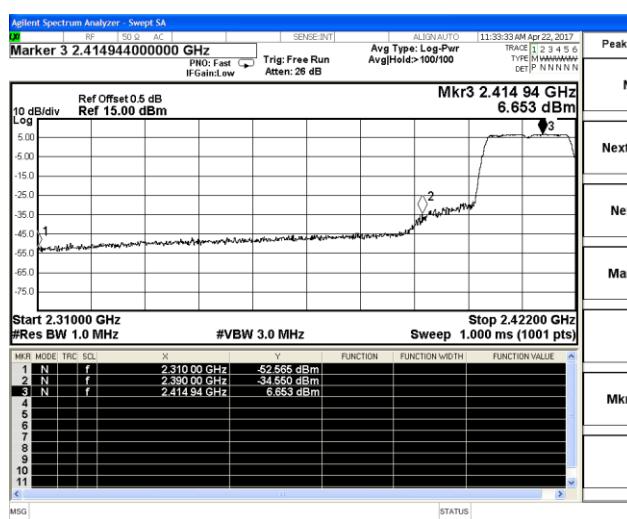


802.11n-HT20 Chain 0-Low channel(Peak)

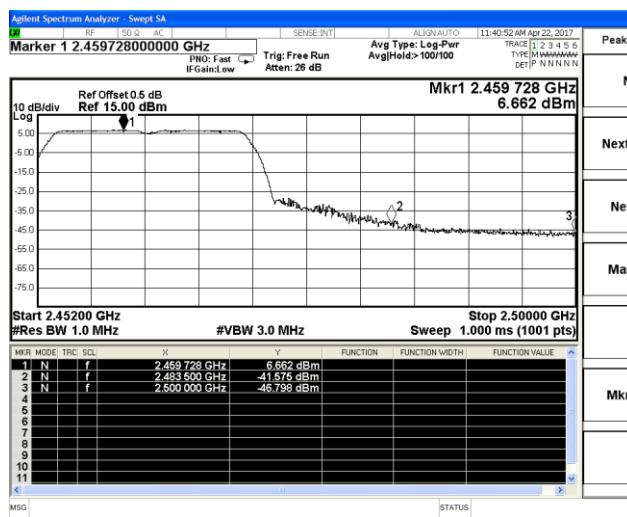
802.11n-HT20 Chain 0-Low channel(Average)

Band-edge measurements for conducted emissions

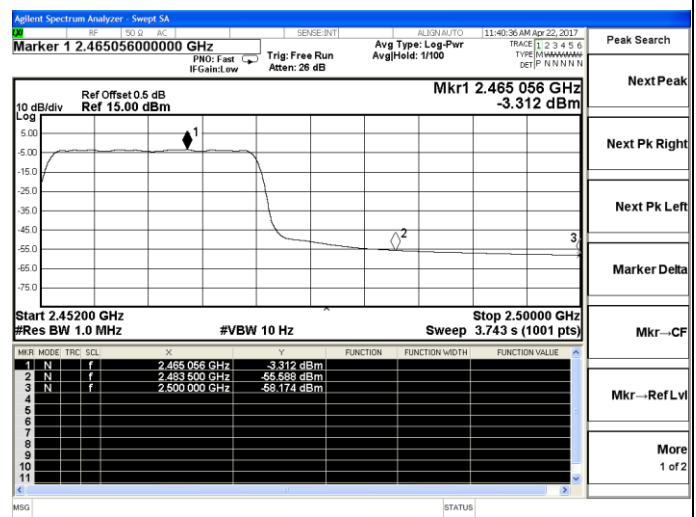
Test plot of Restricted Bands



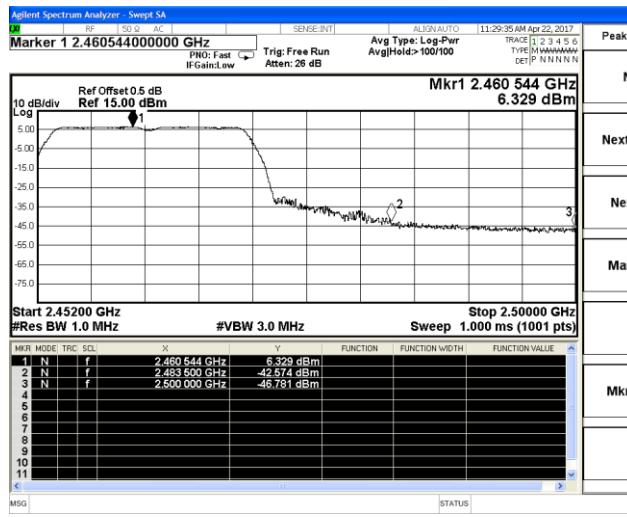
802.11n-HT20 Chain 1-Low channel(Peak)



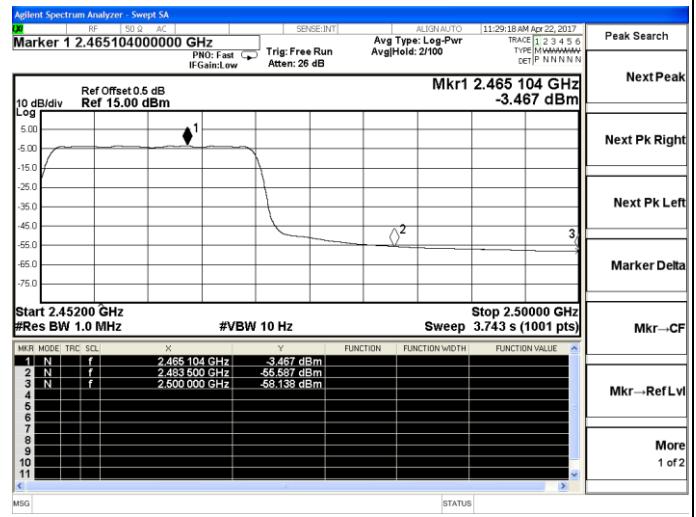
802.11n-HT20 Chain 1-Low channel(Average)



802.11n-HT20 Chain 0-High channel(Peak)



802.11n-HT20 Chain 0-High channel(Average)

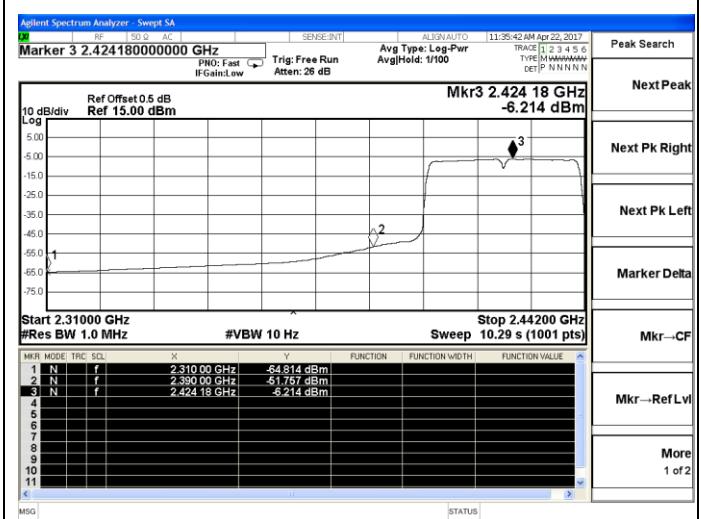
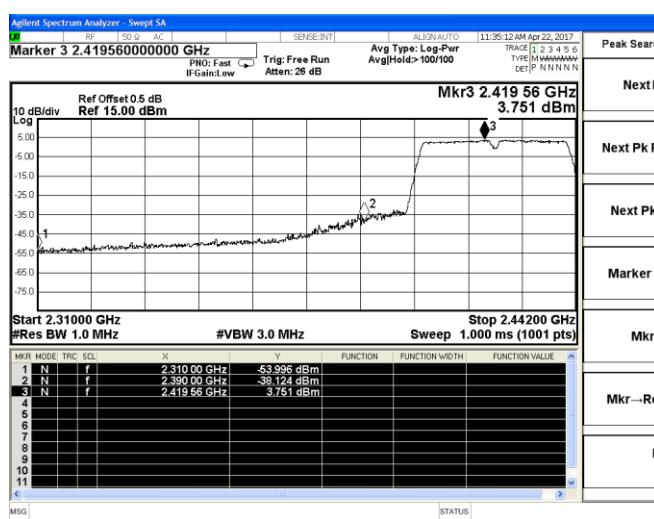


802.11n-HT20 Chain 1-High channel(Peak)

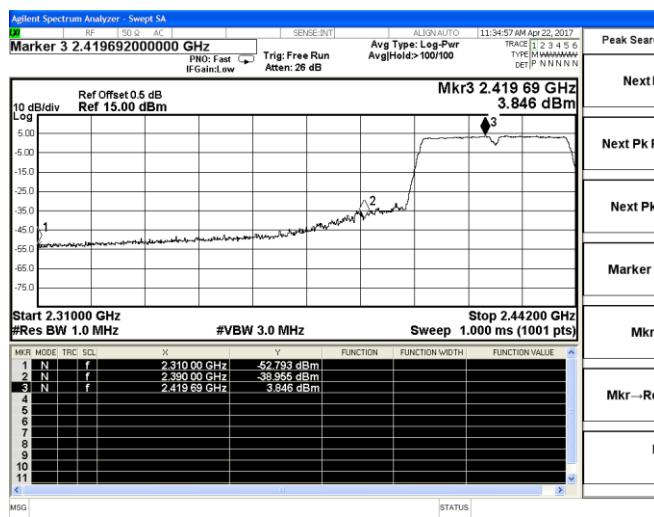
802.11n-HT20 Chain 1-High channel(Average)

Band-edge measurements for conducted emissions

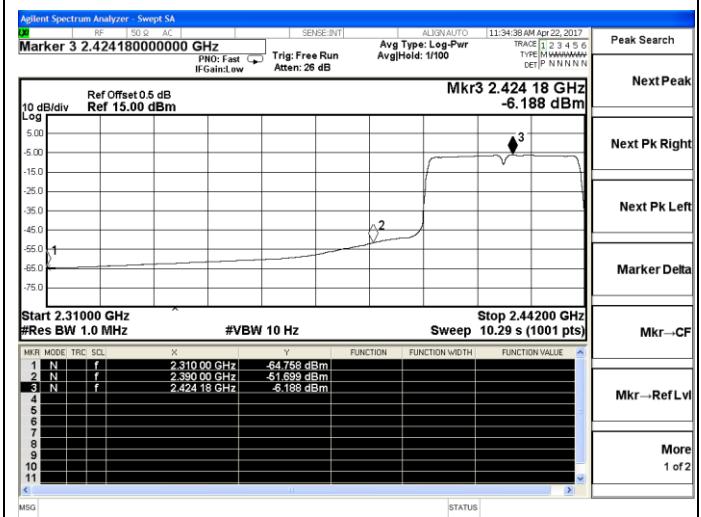
Test plot of Restricted Bands



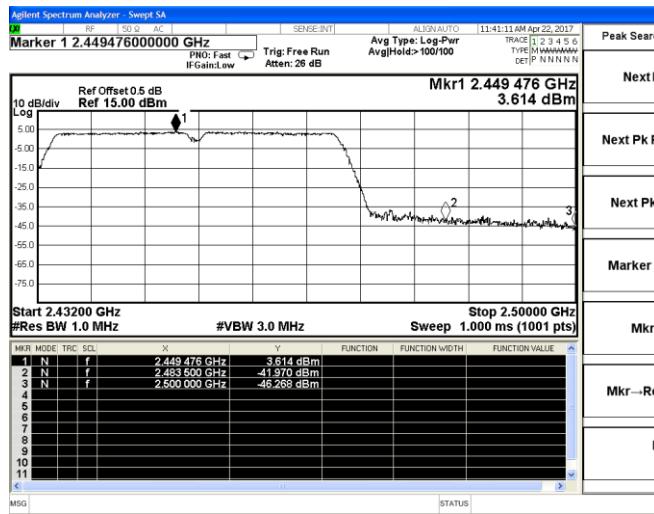
802.11n-HT40 Chain 0-Low channel(Peak)



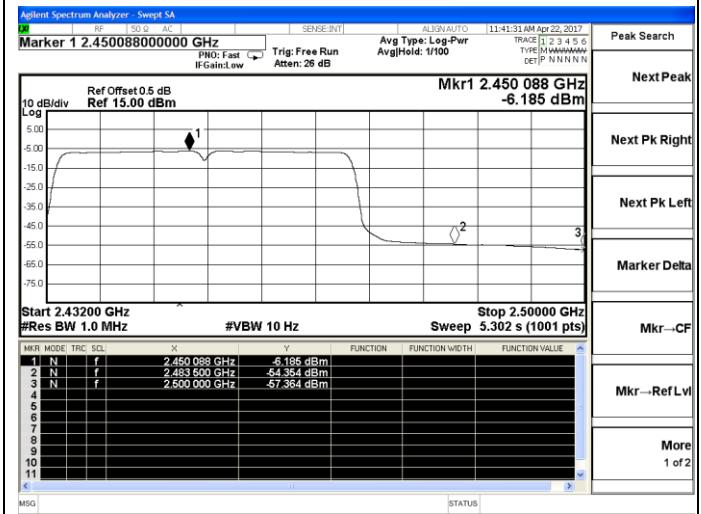
802.11n-HT40 Chain 0-Low channel(Average)



802.11n-HT40 Chain 1-Low channel(Peak)

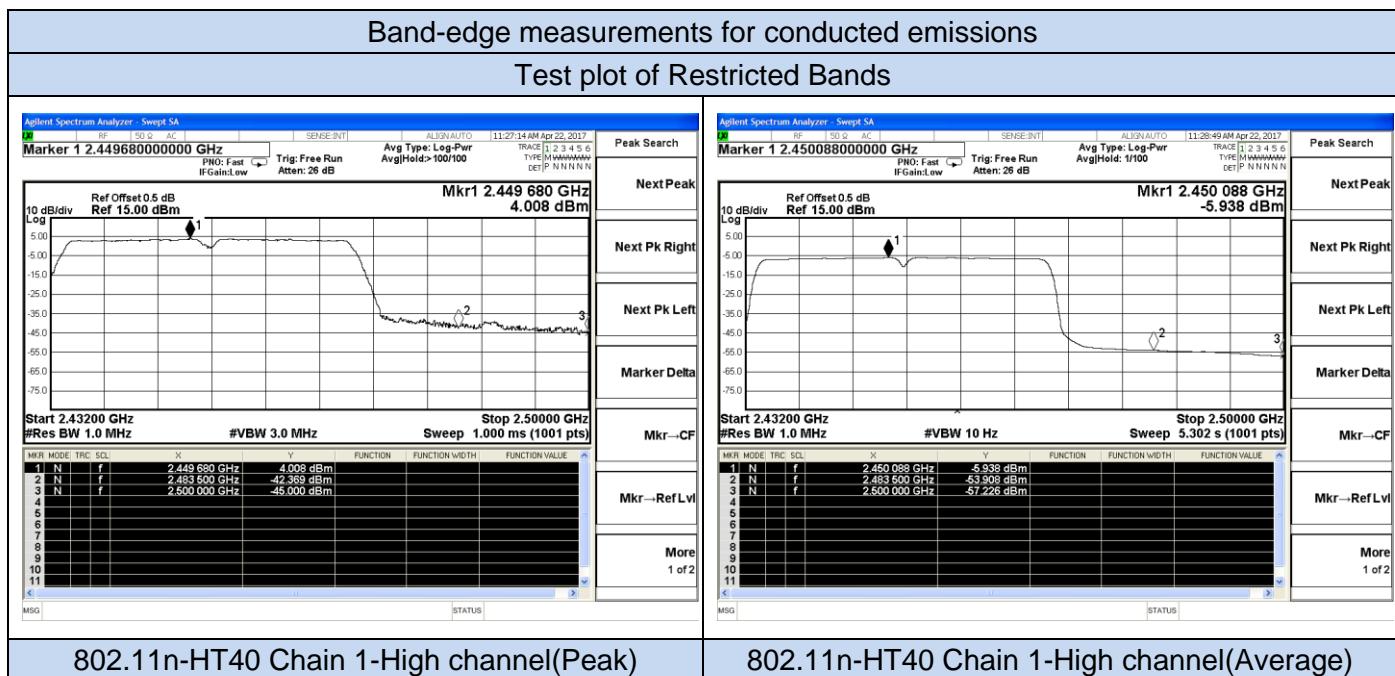


802.11n-HT40 Chain 1-Low channel(Average)



802.11n-HT40 Chain 0-High channel(Peak)

802.11n-HT40 Chain 0-High channel(Average)



5.9. Antenna Requirements

5.9.1 Standard Applicable

According to antenna requirement of §15.203.

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 the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

5.9.2 Antenna Connected Construction

5.9.2.1. Standard Applicable

According to § 15.203, 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.

5.9.2.2. Antenna Connector Construction

The gains of antenna used for transmitting is 2.5dBi, and the antenna is an External antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.

5.9.2.3. Results: Compliance.

6. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18, 2016	June 17, 2017
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16, 2016	July 15, 2017
Signal analyzer	Agilent	N9020A	MY50510140	9kHz~26.5GHz	October 27, 2016	October 27, 2017
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18, 2016	June 17, 2017
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18, 2016	June 17, 2017
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18, 2016	June 17, 2017
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18, 2016	June 17, 2017
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-18GHz 3m	June 18, 2016	June 17, 2017
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHz	June 18, 2016	June 17, 2017
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16, 2016	July 15, 2017
Amplifier	MITEQ	AMF-6F-2604 00	9121372	26.5GHz-40GHz	July 16, 2016	July 15, 2017
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18, 2016	June 17, 2017
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	30MHz-1GHz	June 10, 2016	June 09, 2017
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10, 2016	June 09, 2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	June 10, 2016	June 09, 2017
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18, 2016	June 17, 2017
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18, 2016	June 17, 2017
Power Meter	R&S	NRVS	100444	DC-40GHz	June 18, 2016	June 17, 2017
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	June 18, 2016	June 17, 2017
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	June 18, 2016	June 17, 2017
AC Power Source	HPC	HPA-500E	HPA-9100024	AC 0~300V	June 18, 2016	June 17, 2017
DC power Soure	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2016	June 17, 2017
Temp. and Humidigy Chamber	Giant Force	GTH-225-20-S	MAB0103-00	N/A	June 18, 2016	June 17, 2017
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18, 2016	June 17, 2017
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 18, 2016	June 17, 2017

Note: All equipment through GRGT EST calibration

7. TEST SETUP PHOTOGRAPHS OF EUT

Please refer to separated files for Test Setup Photos of the EUT.

8. EXTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for External Photos of the EUT.

9. INTERIOR PHOTOGRAPHS OF THE EUT

Please refer to separated files for Internal Photos of the EUT.

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