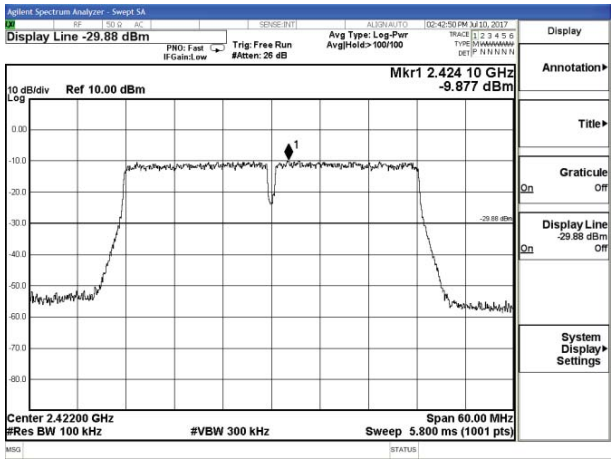
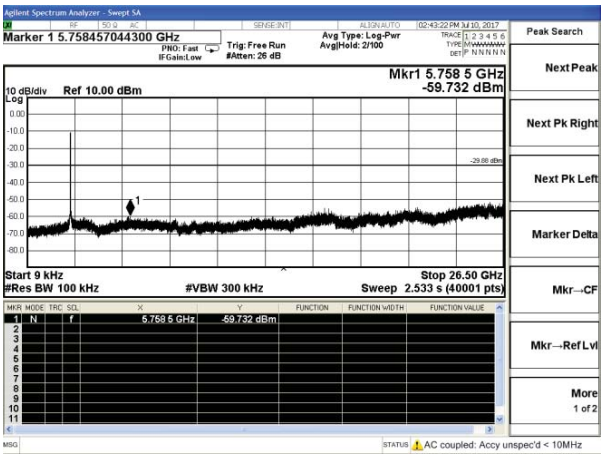
RF Conducted Spurious Emission

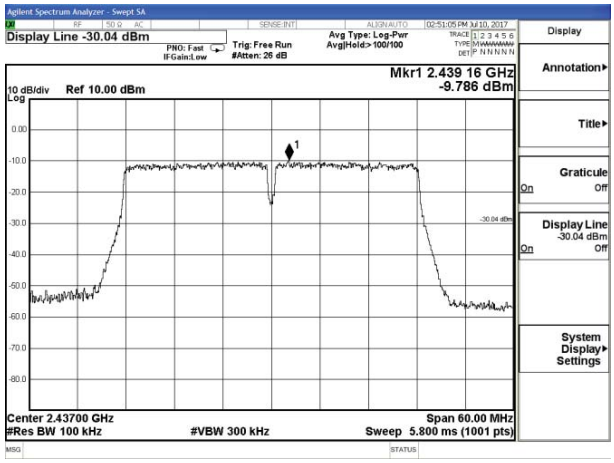
Antenna 0

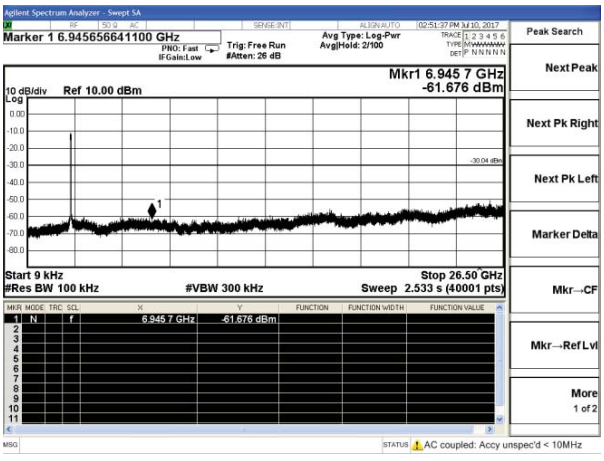
IEEE 802.11n HT40



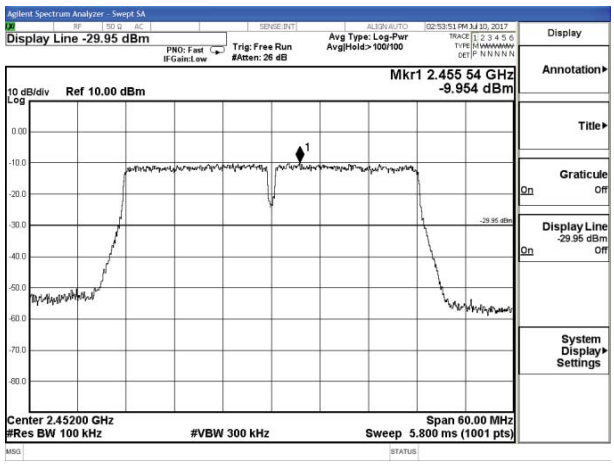


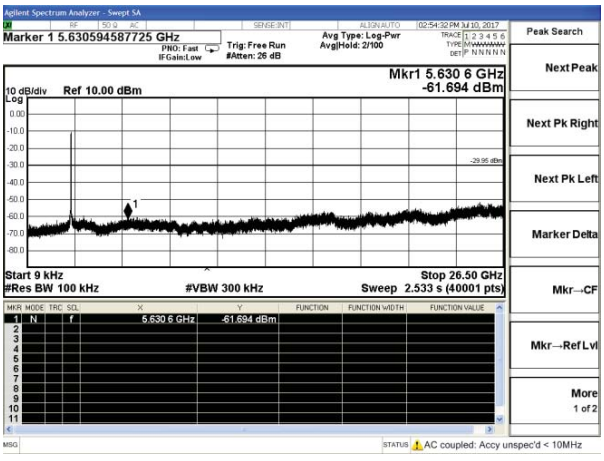
2392 MHz – 2452 MHz | 9 KHz – 26.5 GHz





2407 MHz – 2467 MHz | 9 KHz – 26.5 GHz



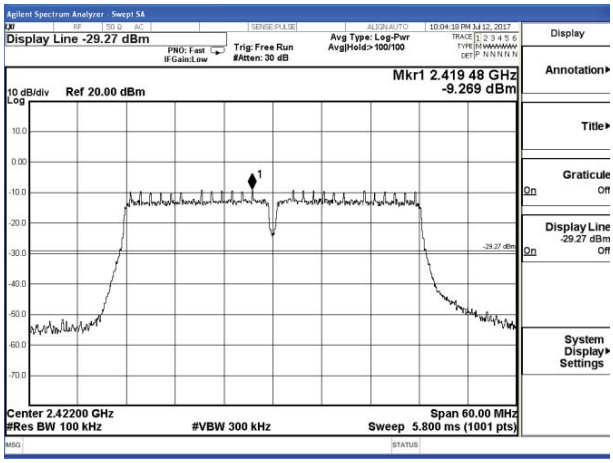


2422 MHz – 2482 MHz | 9 KHz – 26.5 GHz

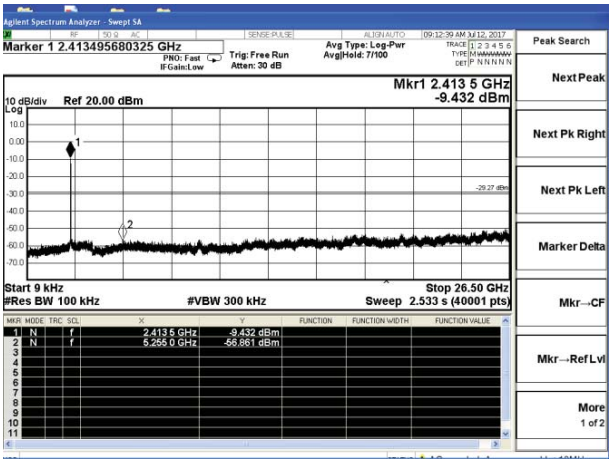
RF Conducted Spurious Emissions

IEEE 802.11n HT40

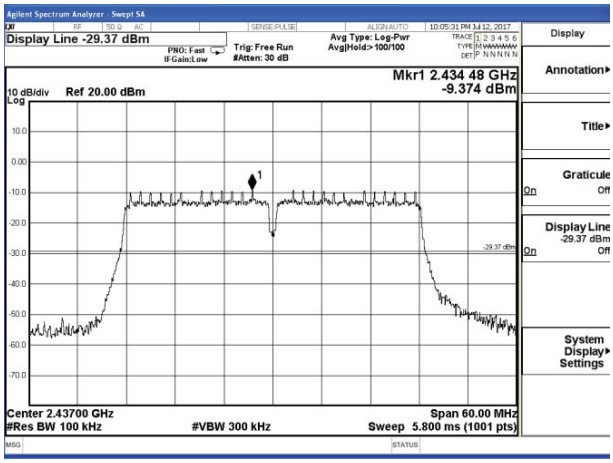
Antenna 1



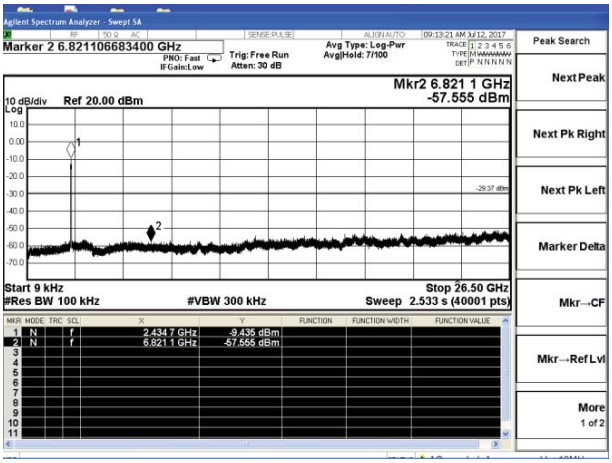
2392 MHz – 2452 MHz



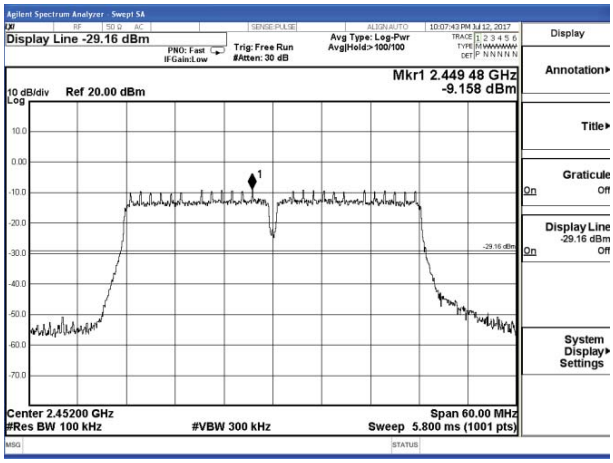
9 KHz – 26.5 GHz



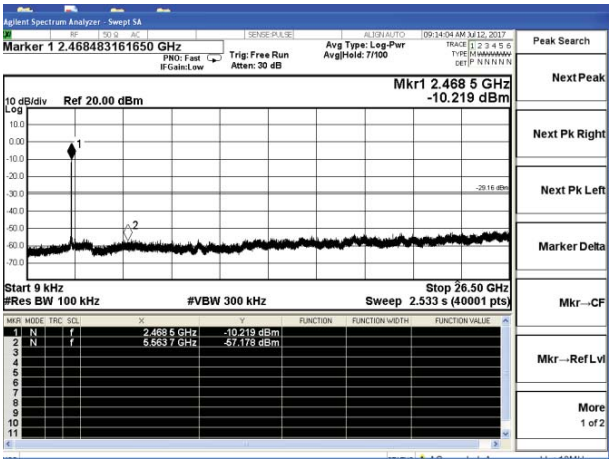
2407 MHz – 2467 MHz



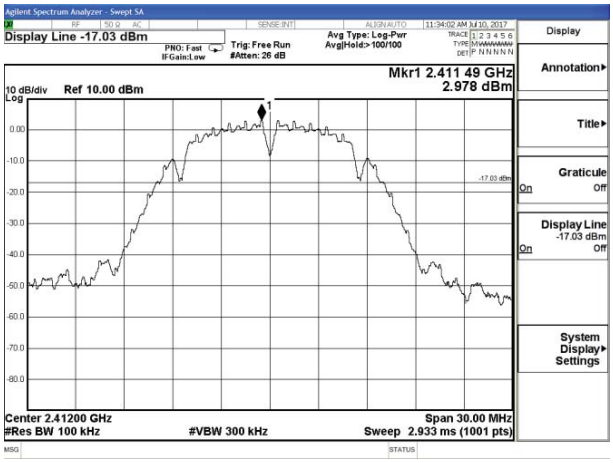
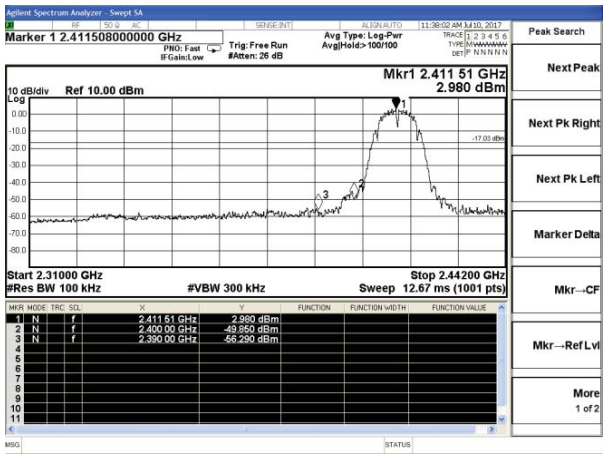
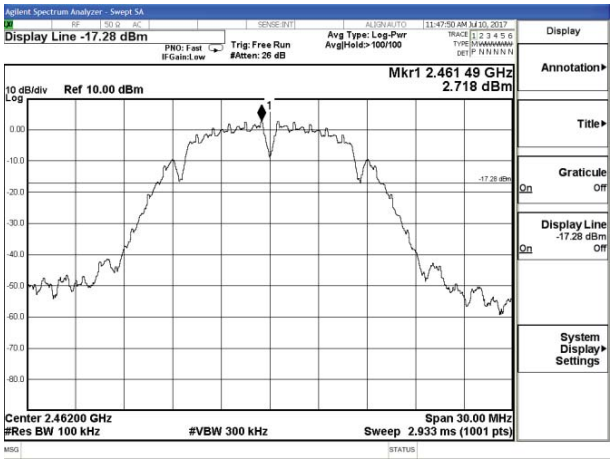
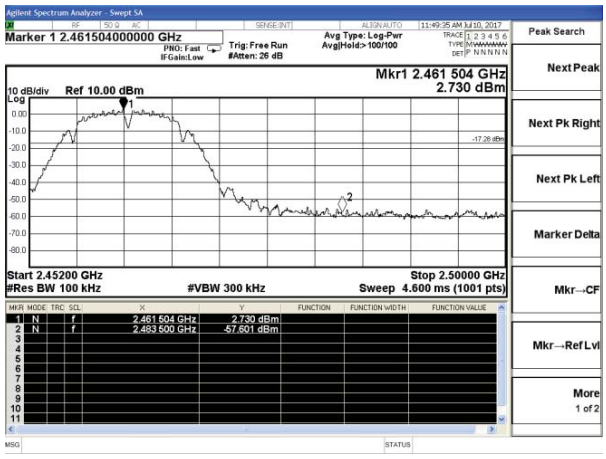
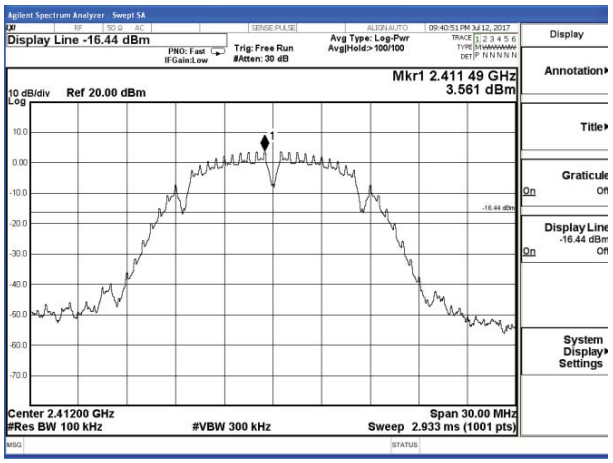
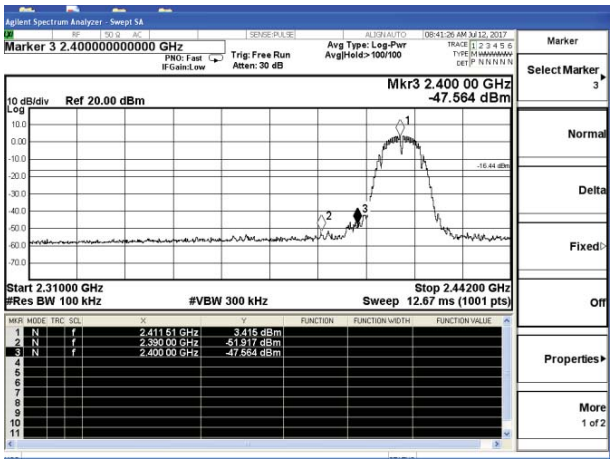
9 KHz – 26.5 GHz

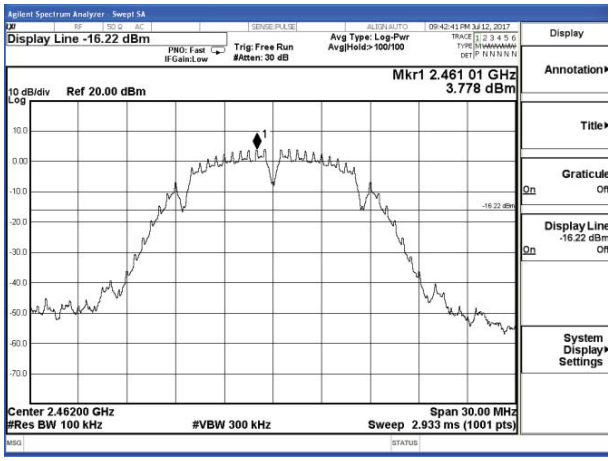
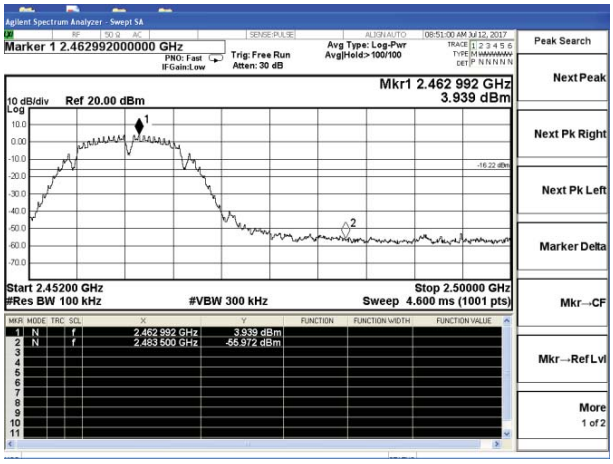


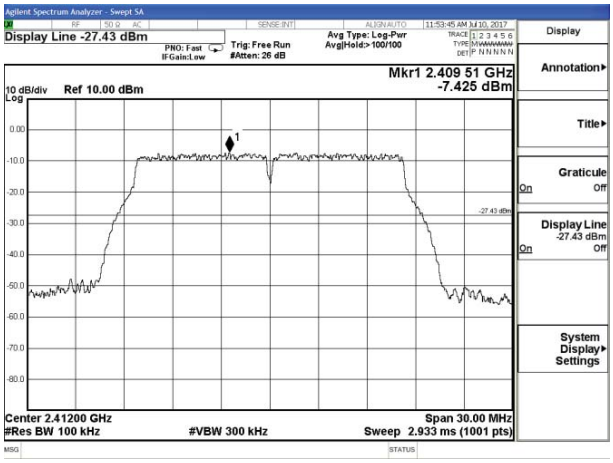
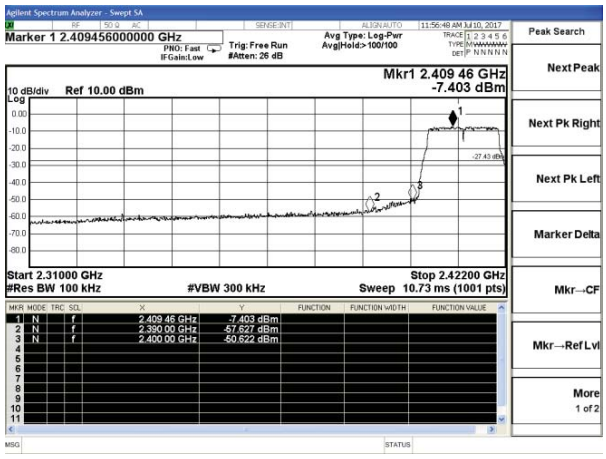
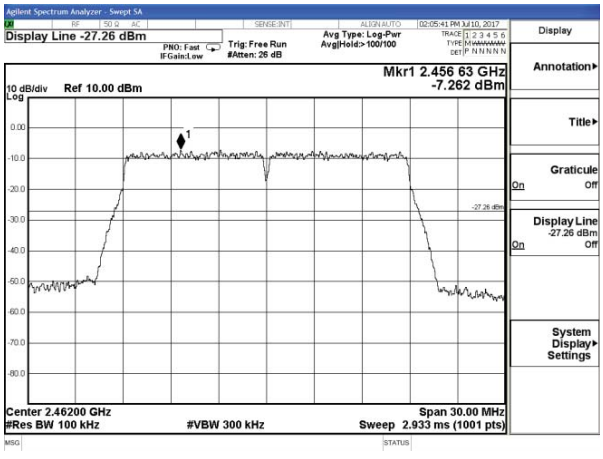
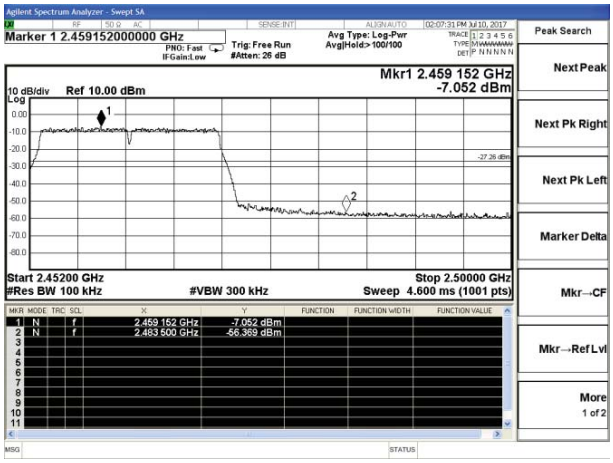
2422 MHz – 2482 MHz

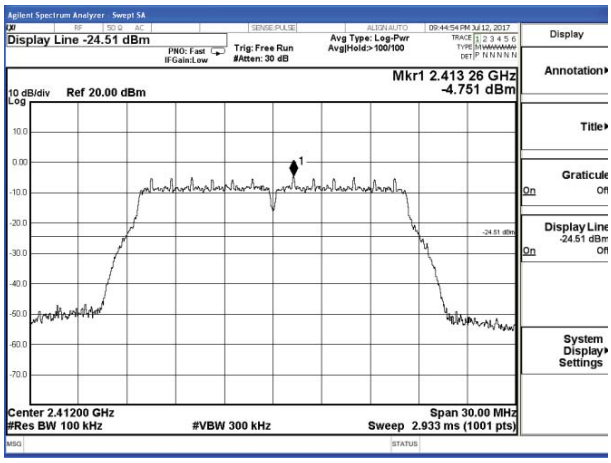
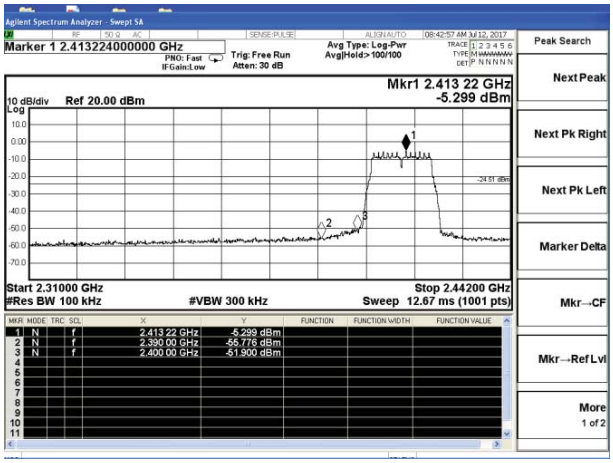
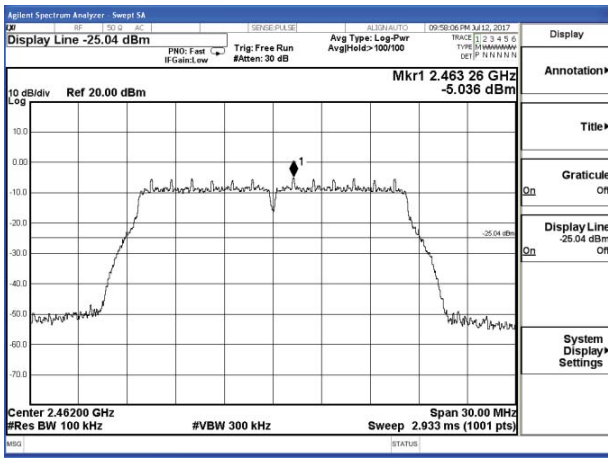
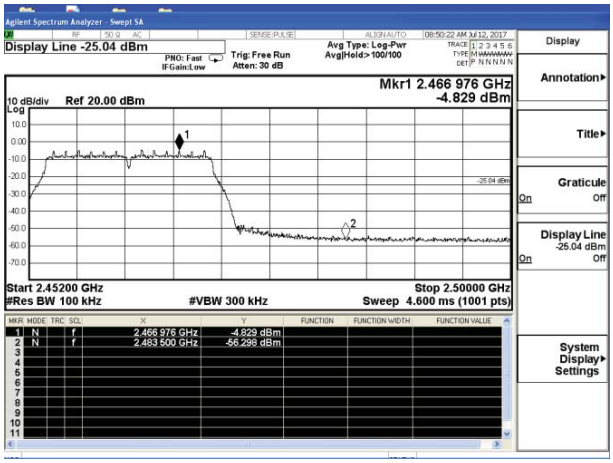
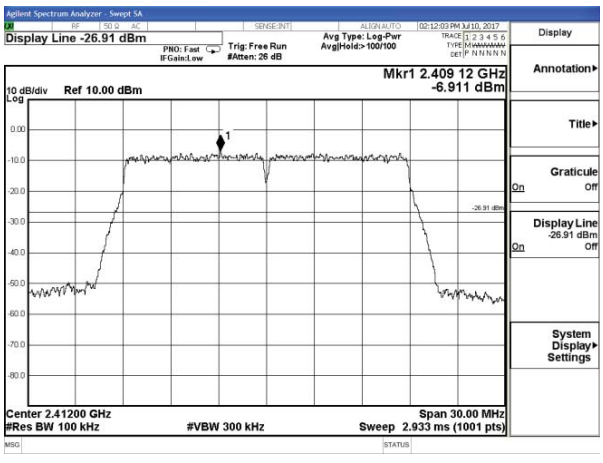
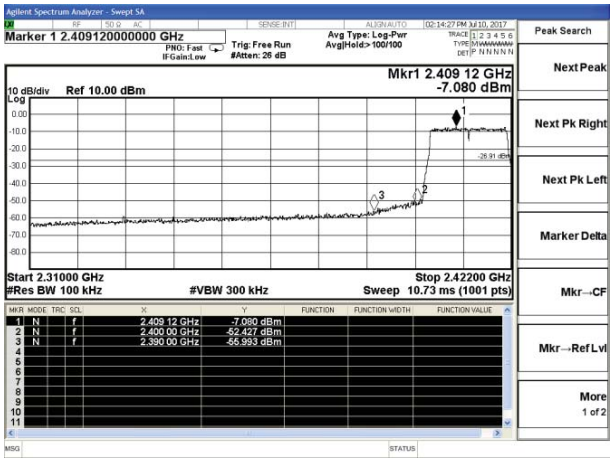


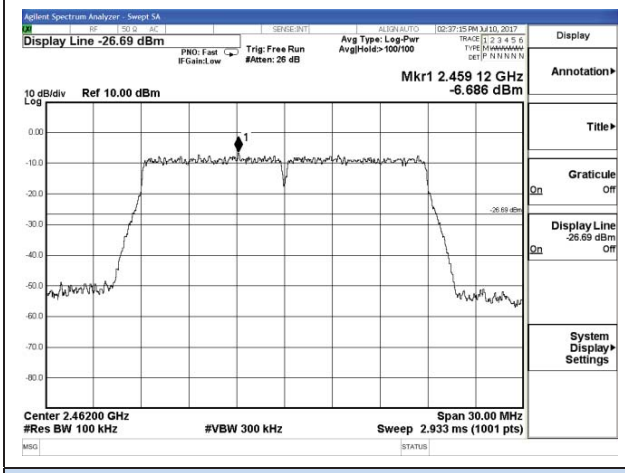
9 KHz – 26.5 GHz

Band-edge measurements for conducted emissions	
IEEE 802.11b	
Antenna 0	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz
	
2447 MHz – 2477 MHz	Channel 11 / 2462 MHz
Antenna 1	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz

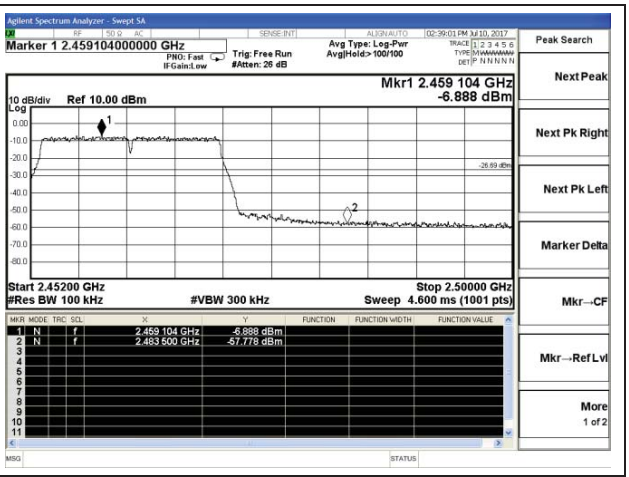
Band-edge measurements for conducted emissions	
IEEE 802.11b	
Antenna 1	
	
2447 MHz – 2477 MHz	Channel 11 / 2462 MHz

Band-edge measurements for conducted emissions	
IEEE 802.11g	
Antenna 0	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz
	
2447 MHz – 2477 MHz	Channel 11 / 2462 MHz

Band-edge measurements for conducted emissions	
IEEE 802.11g	
Antenna 1	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz
	
2447 MHz – 2477 MHz	Channel 11 / 2462 MHz
Band-edge measurements for conducted emissions	
IEEE 802.11n HT20	
Antenna 0	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz

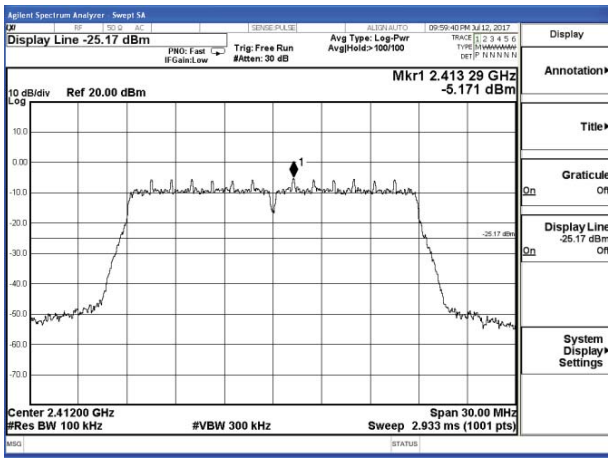


2447 MHz – 2477 MHz

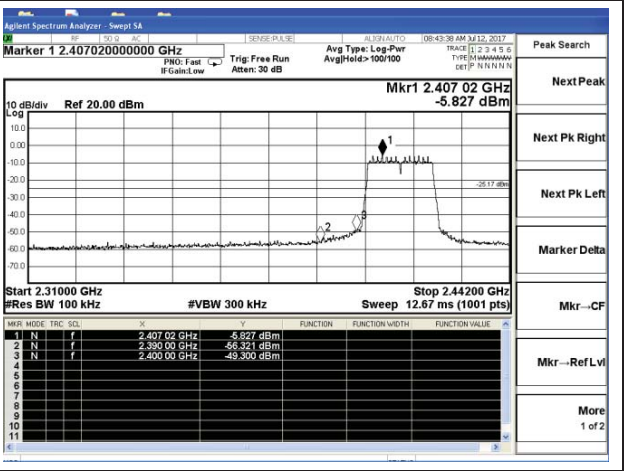


Channel 11 / 2462 MHz

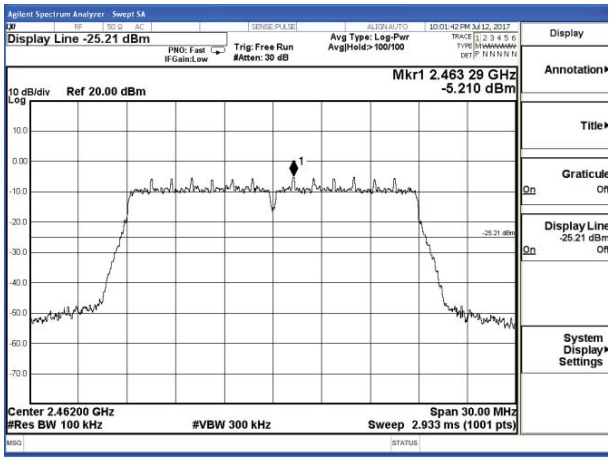
Antenna 1



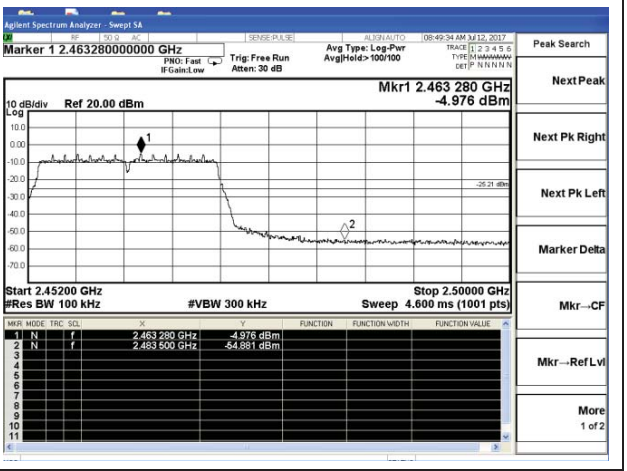
2397 MHz – 2427 MHz



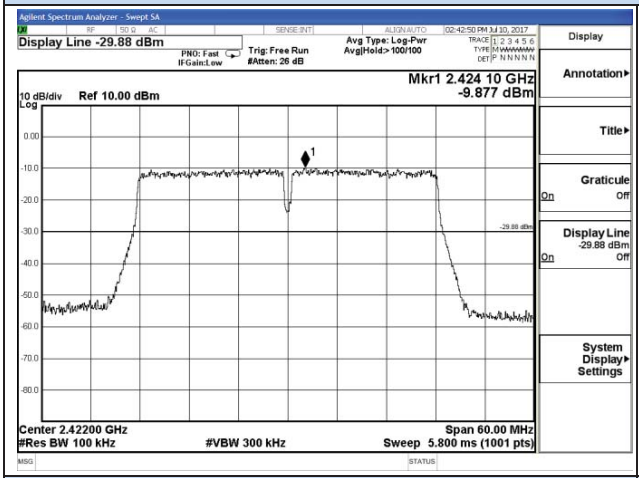
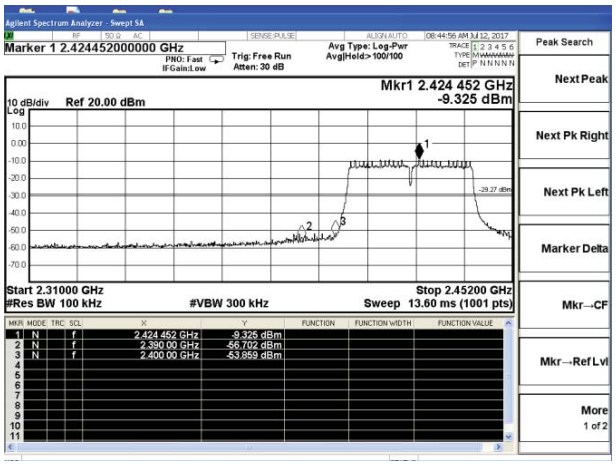
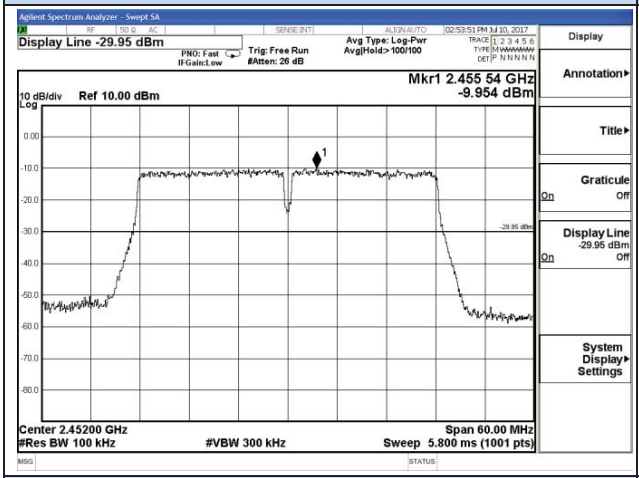
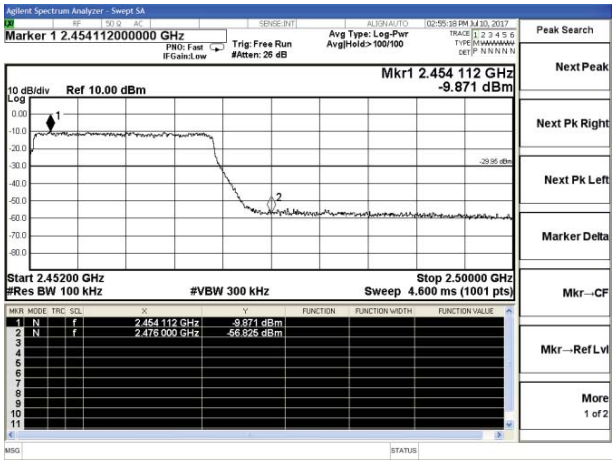
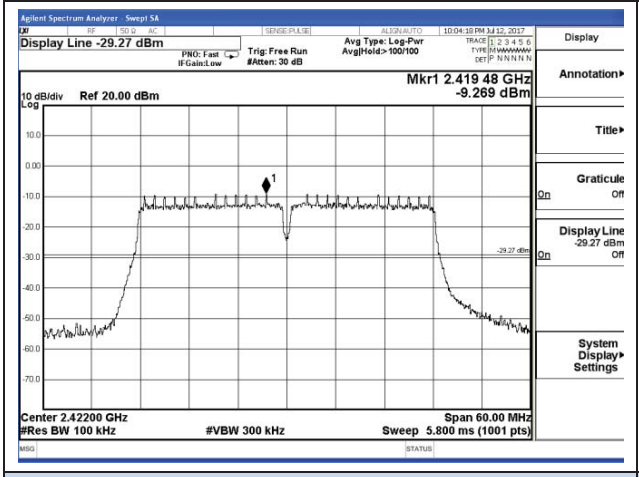
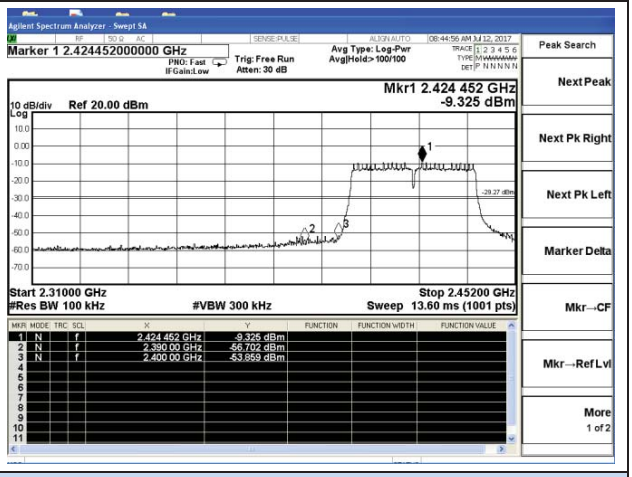
Channel 1 / 2412 MHz

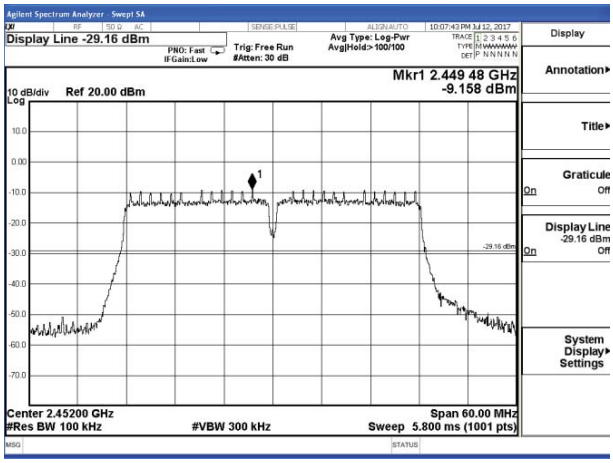
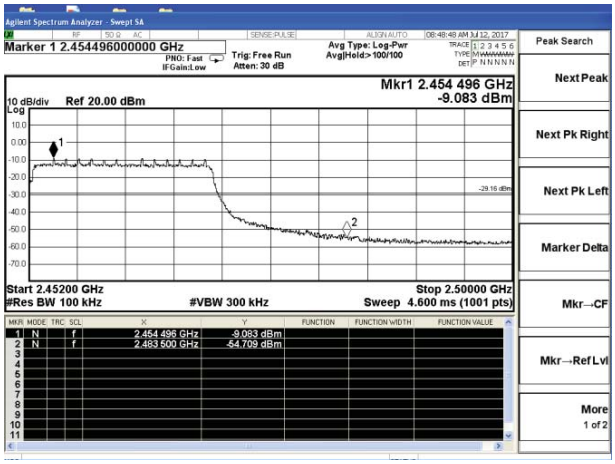


2447 MHz – 2477 MHz



Channel 11 / 2462 MHz

Band-edge measurements for conducted emissions	
IEEE 802.11n HT40	
Antenna 0	
	
2392 MHz – 2452 MHz	Channel 3 / 2422 MHz
	
2422 MHz – 2482 MHz	Channel 9 / 2452 MHz
Antenna 1	
	
2392 MHz – 2452 MHz	Channel 3 / 2422 MHz

Band-edge measurements for conducted emissions	
IEEE 802.11n HT40	
Antenna 1	
	
2422 MHz – 2482 MHz	Channel 9 / 2452 MHz

5.7. Power line conducted emissions

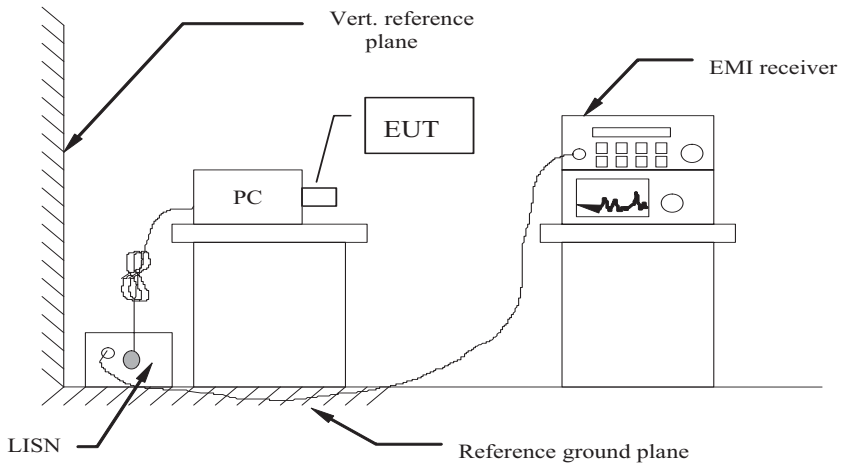
5.7.1 Standard Applicable

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 are listed as follows:

Frequency Range (MHz)	Limits (dBμV)	
	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

* Decreasing linearly with the logarithm of the frequency

5.7.2 Block Diagram of Test Setup

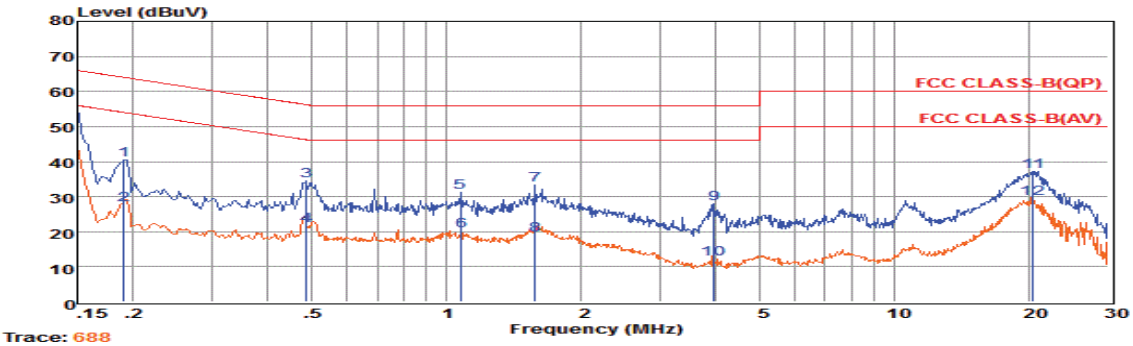


5.7.3 Test Results

PASS.

The test data please refer to following page.

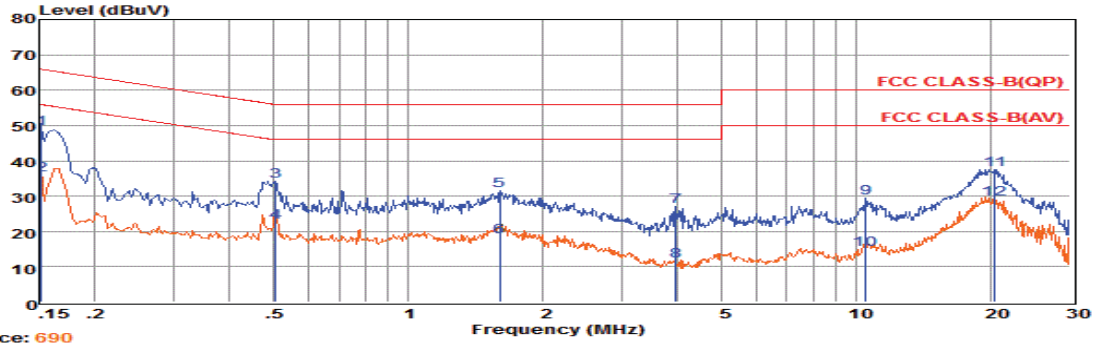
AC Conducted Emission @ AC 120V/60Hz @ IEEE 802.11b



Trace: 688
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.19	20.69	9.62	0.02	10.00	40.33	64.02	-23.69	QP
2	0.19	8.05	9.62	0.02	10.00	27.69	54.02	-26.33	Average
3	0.49	14.94	9.62	0.04	10.00	34.60	56.23	-21.63	QP
4	0.49	2.19	9.62	0.04	10.00	21.85	46.23	-24.38	Average
5	1.08	11.58	9.63	0.05	10.00	31.26	56.00	-24.74	QP
6	1.08	0.52	9.63	0.05	10.00	20.20	46.00	-25.80	Average
7	1.58	13.53	9.64	0.05	10.00	33.22	56.00	-22.78	QP
8	1.58	-0.68	9.64	0.05	10.00	19.01	46.00	-26.99	Average
9	3.96	8.35	9.65	0.06	10.00	28.06	56.00	-27.94	QP
10	3.96	-7.38	9.65	0.06	10.00	12.33	46.00	-33.67	Average
11	20.38	17.33	9.75	0.12	10.00	37.20	60.00	-22.80	QP
12	20.38	9.67	9.75	0.12	10.00	29.54	50.00	-20.46	Average

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

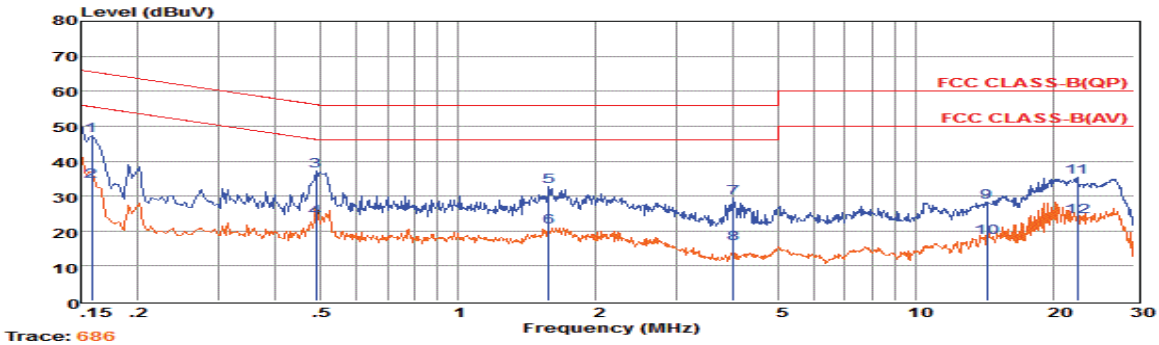


Trace: 690
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	29.31	9.70	0.02	10.00	49.03	65.91	-16.88	QP
2	0.15	16.18	9.70	0.02	10.00	35.90	55.91	-20.01	Average
3	0.50	14.52	9.62	0.04	10.00	34.18	56.00	-21.82	QP
4	0.50	3.03	9.62	0.04	10.00	22.69	46.00	-23.31	Average
5	1.60	11.76	9.63	0.05	10.00	31.44	56.00	-24.56	QP
6	1.60	-1.17	9.63	0.05	10.00	18.51	46.00	-27.49	Average
7	3.96	7.44	9.65	0.06	10.00	27.15	56.00	-28.85	QP
8	3.96	-8.14	9.65	0.06	10.00	11.57	46.00	-34.43	Average
9	10.51	9.55	9.72	0.08	10.00	29.35	60.00	-30.65	QP
10	10.51	-4.83	9.72	0.08	10.00	14.97	50.00	-35.03	Average
11	20.38	17.60	9.87	0.12	10.00	37.59	60.00	-22.41	QP
12	20.38	9.20	9.87	0.12	10.00	29.19	50.00	-20.81	Average

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

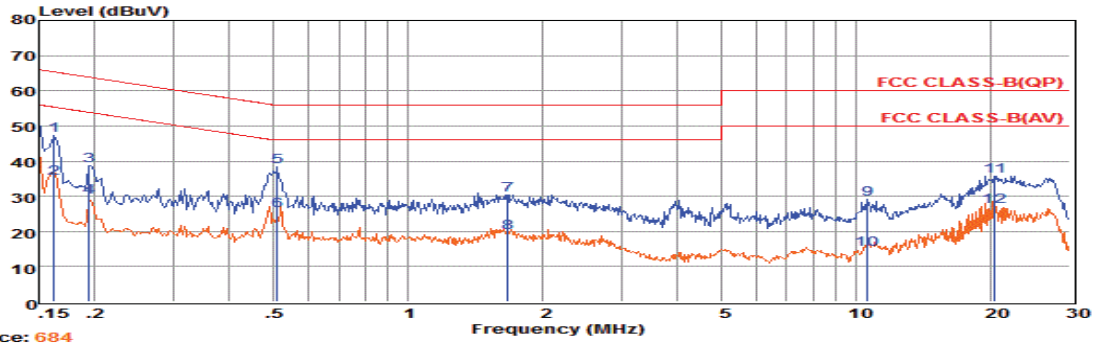
AC Conducted Emission @ AC 240V/60Hz @ IEEE 802.11b



Trace: 686
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.16	27.78	9.58	0.02	10.00	47.38	65.56	-18.18	QP
2	0.16	14.74	9.58	0.02	10.00	34.34	55.55	-21.21	Average
3	0.49	17.42	9.62	0.04	10.00	37.08	56.19	-19.11	QP
4	0.49	4.06	9.62	0.04	10.00	23.72	46.17	-22.45	Average
5	1.58	13.00	9.64	0.05	10.00	32.69	56.00	-23.31	QP
6	1.58	1.39	9.64	0.05	10.00	21.08	46.00	-24.92	Average
7	3.99	9.85	9.65	0.06	10.00	29.56	56.00	-26.44	QP
8	3.99	-3.40	9.65	0.06	10.00	16.31	46.00	-29.69	Average
9	14.29	8.44	9.71	0.10	10.00	28.25	60.00	-31.75	QP
10	14.29	-1.68	9.71	0.10	10.00	18.13	50.00	-31.87	Average
11	22.54	15.47	9.71	0.12	10.00	35.30	60.00	-24.70	QP
12	22.54	4.39	9.71	0.12	10.00	24.22	50.00	-25.78	Average

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



Trace: 684
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.16	27.48	9.67	0.02	10.00	47.17	65.34	-18.17	QP
2	0.16	15.43	9.67	0.02	10.00	35.12	55.33	-20.21	Average
3	0.19	19.15	9.60	0.02	10.00	38.77	63.84	-25.07	QP
4	0.19	10.17	9.60	0.02	10.00	29.79	53.84	-24.05	Average
5	0.51	18.71	9.62	0.04	10.00	38.37	56.00	-17.63	QP
6	0.51	6.16	9.62	0.04	10.00	25.82	46.00	-20.18	Average
7	1.67	10.71	9.63	0.05	10.00	30.39	56.00	-25.61	QP
8	1.67	-0.19	9.63	0.05	10.00	19.49	46.00	-26.51	Average
9	10.62	9.45	9.72	0.08	10.00	29.25	60.00	-30.75	QP
10	10.62	-4.79	9.72	0.08	10.00	15.01	50.00	-34.99	Average
11	20.38	15.79	9.87	0.12	10.00	35.78	60.00	-24.22	QP
12	20.38	7.14	9.87	0.12	10.00	27.13	50.00	-22.87	Average

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 modes and recorded the worst case results in this report (IEEE 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §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 V03 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 Peak 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 ≤ 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 – 20log D + 104.8

Where:
E = electric field strength in dBμV/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

For Antenna Chain 0

IEEE 802.11b							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-54.963	2.0	0.00	41.437	Peak	74.00	PASS
2310.000	-65.711	2.0	0.00	30.689	AV	54.00	PASS
2390.000	-50.560	2.0	0.00	45.840	Peak	74.00	PASS
2390.000	-61.638	2.0	0.00	34.762	AV	54.00	PASS
2483.500	-49.265	2.0	0.00	47.135	Peak	74.00	PASS
2483.500	-59.152	2.0	0.00	37.248	AV	54.00	PASS
2500.000	-49.480	2.0	0.00	46.920	Peak	74.00	PASS
2500.000	-60.865	2.0	0.00	35.535	AV	54.00	PASS

IEEE 802.11g							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-48.489	2.0	0.00	47.911	Peak	74.00	PASS
2310.000	-65.665	2.0	0.00	30.735	AV	54.00	PASS
2390.000	-54.484	2.0	0.00	41.916	Peak	74.00	PASS
2390.000	-59.786	2.0	0.00	36.614	AV	54.00	PASS
2483.500	-49.985	2.0	0.00	46.415	Peak	74.00	PASS
2483.500	-59.085	2.0	0.00	37.315	AV	54.00	PASS
2500.000	-50.197	2.0	0.00	46.203	Peak	74.00	PASS
2500.000	-60.797	2.0	0.00	35.603	AV	54.00	PASS

IEEE 802.11n HT20							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-55.430	2.0	0.00	40.970	Peak	74.00	PASS
2310.000	-66.171	2.0	0.00	30.229	AV	54.00	PASS
2390.000	-48.269	2.0	0.00	48.131	Peak	74.00	PASS
2390.000	-60.939	2.0	0.00	35.461	AV	54.00	PASS
2483.500	-50.416	2.0	0.00	45.984	Peak	74.00	PASS
2483.500	-60.700	2.0	0.00	35.700	AV	54.00	PASS
2500.000	-52.072	2.0	0.00	44.328	Peak	74.00	PASS
2500.000	-60.209	2.0	0.00	36.191	AV	54.00	PASS

IEEE 802.11n HT40							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-55.865	2.0	0.00	40.535	Peak	74.00	PASS
2310.000	-66.363	2.0	0.00	30.037	AV	54.00	PASS
2390.000	-49.304	2.0	0.00	47.096	Peak	74.00	PASS
2390.000	-60.701	2.0	0.00	35.699	AV	54.00	PASS
2483.500	-49.008	2.0	0.00	47.392	Peak	74.00	PASS
2483.500	-60.292	2.0	0.00	36.108	AV	54.00	PASS
2500.000	-50.626	2.0	0.00	45.774	Peak	74.00	PASS
2500.000	-62.492	2.0	0.00	33.908	AV	54.00	PASS

For Antenna Chain 1

IEEE 802.11b								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
2310.000	-49.784	2.0	0.000	46.616	Peak	74.00	-27.384	PASS
2310.000	-57.559	2.0	0.000	38.841	AV	54.00	-15.159	PASS
2390.000	-46.282	2.0	0.000	50.118	Peak	74.00	-23.882	PASS
2390.000	-57.559	2.0	0.000	38.841	AV	54.00	-15.159	PASS
2483.500	-46.560	2.0	0.000	49.840	Peak	74.00	-24.160	PASS
2483.500	-58.060	2.0	0.000	38.340	AV	54.00	-15.660	PASS
2500.000	-45.833	2.0	0.000	50.567	Peak	74.00	-23.433	PASS
2500.000	-58.960	2.0	0.000	37.440	AV	54.00	-16.560	PASS

IEEE 802.11g								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
2310.000	-49.539	2.0	0.000	46.861	Peak	74.00	-27.139	PASS
2310.000	-61.434	2.0	0.000	34.966	AV	54.00	-19.034	PASS
2390.000	-44.479	2.0	0.000	51.921	Peak	74.00	-22.079	PASS
2390.000	-57.959	2.0	0.000	38.441	AV	54.00	-15.559	PASS
2483.500	-46.025	2.0	0.000	50.375	Peak	74.00	-23.625	PASS
2483.500	-58.137	2.0	0.000	38.263	AV	54.00	-15.737	PASS
2500.000	-46.334	2.0	0.000	50.066	Peak	74.00	-23.934	PASS
2500.000	-59.044	2.0	0.000	37.356	AV	54.00	-16.644	PASS

IEEE 802.11 n HT20								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
2310.000	-48.150	2.0	0.000	48.250	Peak	74.00	-25.750	PASS
2310.000	-61.450	2.0	0.000	34.950	AV	54.00	-19.050	PASS
2390.000	-42.529	2.0	0.000	53.871	Peak	74.00	-20.129	PASS
2390.000	-57.837	2.0	0.000	38.563	AV	54.00	-15.437	PASS
2483.500	-46.058	2.0	0.000	50.342	Peak	74.00	-23.658	PASS
2483.500	-58.137	2.0	0.000	38.263	AV	54.00	-15.737	PASS
2500.000	-46.975	2.0	0.000	49.425	Peak	74.00	-24.575	PASS
2500.000	-59.044	2.0	0.000	37.356	AV	54.00	-16.644	PASS

0

IEEE 802.11 n HT40								
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
2310.000	-50.288	2.0	0.000	46.112	Peak	74.00	-27.888	PASS
2310.000	-61.668	2.0	0.000	34.732	AV	54.00	-19.268	PASS
2390.000	-40.456	2.0	0.000	55.944	Peak	74.00	-18.056	PASS
2390.000	-58.665	2.0	0.000	37.735	AV	54.00	-16.265	PASS
2483.500	-37.602	2.0	0.000	58.798	Peak	74.00	-15.202	PASS
2483.500	-58.909	2.0	0.000	37.491	AV	54.00	-16.509	PASS
2500.000	-47.384	2.0	0.000	49.016	Peak	74.00	-24.984	PASS
2500.000	-59.759	2.0	0.000	36.641	AV	54.00	-17.359	PASS

For Combined Antenna Chain 0, Antenna Chain 1

IEEE 802.11n HT20										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
2310.000*	-55.430	-48.150	-47.41	5.010*	0.000	56.35	Peak	74.00	-28.190	PASS
2310.000	-66.171	-61.450	-60.19	5.010*	0.000	43.57	AV	54.00	-20.086	PASS
2390.000	-48.269	-42.529	-41.50	5.010*	0.000	62.26	Peak	74.00	-27.098	PASS
2390.000	-60.939	-57.837	-56.11	5.010*	0.000	47.65	AV	54.00	-18.512	PASS
2483.500*	-50.416	-46.058	-44.70	5.010*	0.000	59.06	Peak	74.00	-26.556	PASS
2483.500	-60.700	-58.137	-56.22	5.010*	0.000	47.54	AV	54.00	-18.184	PASS
2500.000	-52.072	-46.975	-45.80	5.010*	0.000	57.96	Peak	74.00	-27.152	PASS
2500.000	-60.209	-59.044	-56.58	5.010*	0.000	47.18	AV	54.00	-18.605	PASS

IEEE 802.11n HT40										
Frequency (MHz)	Conducted Power (dBm)			Directional Gain (dB)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Over limit dB	Verdict
	Antenna 0	Antenna 1	Sum							
2310.000*	-55.865	-50.288	-49.226	5.010*	0.000	54.53	Peak	74.00	-27.399	PASS
2310.000	-66.363	-61.668	-60.399	5.010*	0.000	43.36	AV	54.00	-20.134	PASS
2390.000	-49.304	-40.456	-39.924	5.010*	0.000	63.84	Peak	74.00	-26.899	PASS
2390.000	-60.701	-58.665	-56.554	5.010*	0.000	47.21	AV	54.00	-18.655	PASS
2483.500*	-49.008	-37.602	-37.299	5.010*	0.000	66.46	Peak	74.00	-19.975	PASS
2483.500	-60.292	-58.909	-56.535	5.010*	0.000	47.22	AV	54.00	-18.249	PASS
2500.000	-50.626	-47.384	-45.699	5.010*	0.000	58.06	Peak	74.00	-26.159	PASS
2500.000	-62.492	-59.759	-57.904	5.010*	0.000	45.86	AV	54.00	-18.775	PASS

Remark:

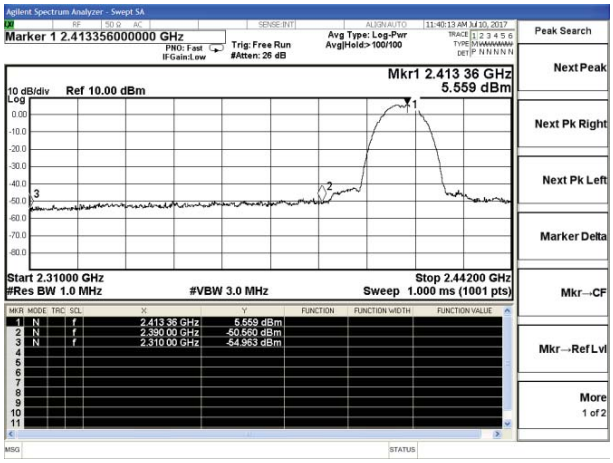
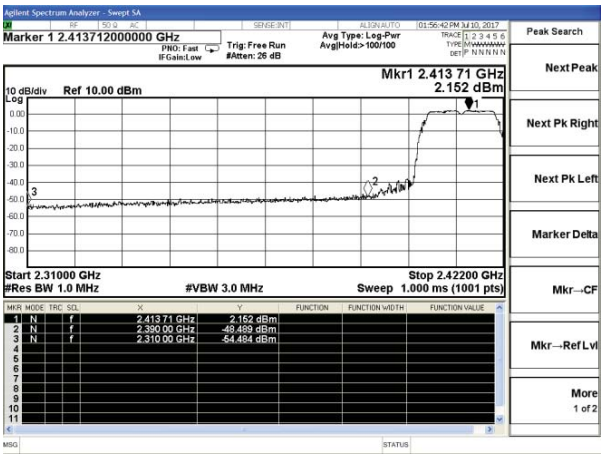
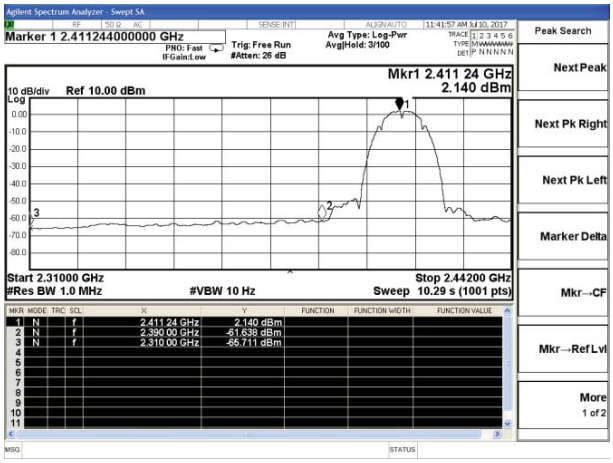
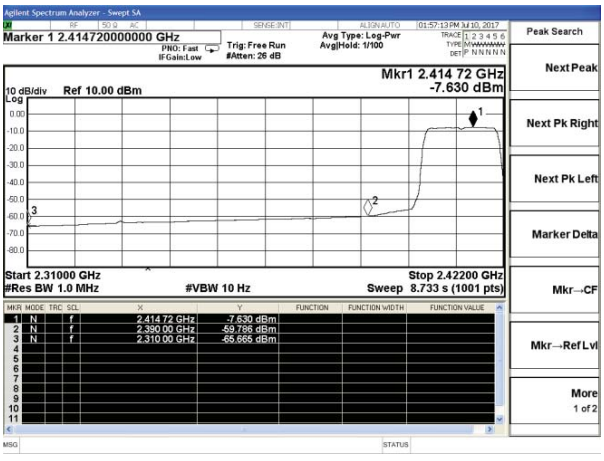
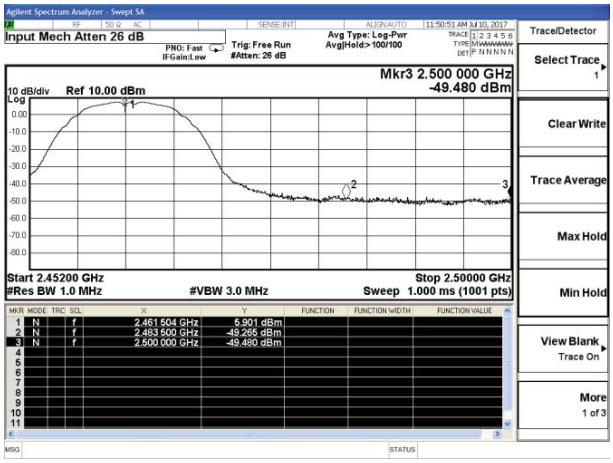
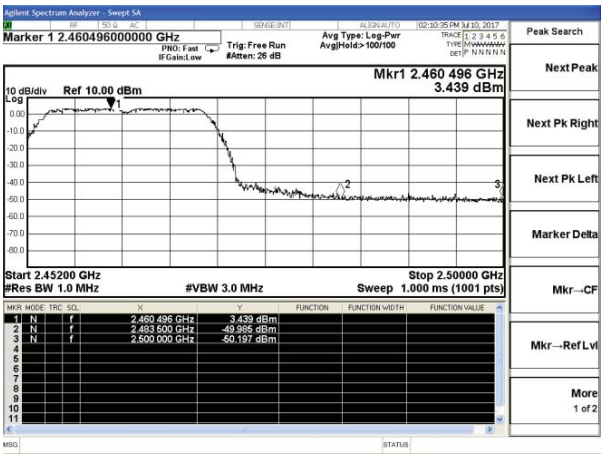
1. *Measured Band-edge measurements for radiated emissions at difference data rate for each mode and recorded worst case for each mode.*
2. *Test results including cable loss;*
3. *Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20; 13.5Mbps at IEEE 802.11n HT40;*
4. *"---"means that the fundamental frequency not for 15.209 limits requirement.*
5. *No need measure Average values if Peak values meets Average limits;*
6. ** means maximum values of frequency band 2310 – 2390 MHz, 2483.5 – 2500 MHz;*
7. *For MIMO with CCD technology device, The Directional Gain= Gain of individual transmit antennas (dBi) + Array gain;*

Array gain = 10 log (N_{ant}), where N_{ant} is the number of transmit antennas.

8. **5.010=2.000+10*log(2).*
9. *Covert Radiated E Level At 3m = Conducted average power + Directional Gain + 104.77-20*log(2);*
10. *Please refer to following plots;*

Band-edge measurements for radiated emissions

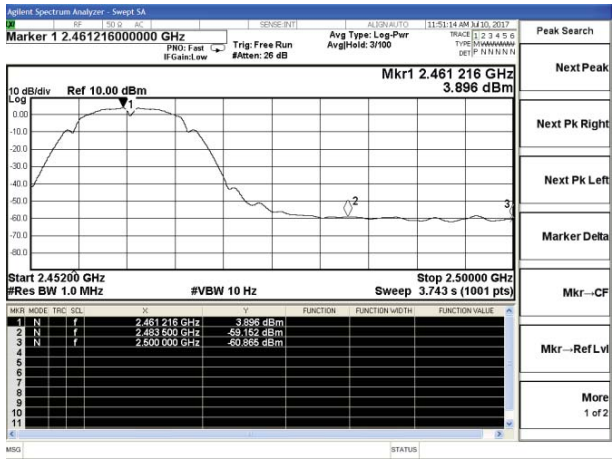
Antenna 0

IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz – Peak	Channel 1 / 2412 MHz – Peak
	
Channel 1 / 2412 MHz – Average	Channel 1 / 2412 MHz – Average
	
Channel 11 / 2412 MHz – Peak	Channel 11 / 2412 MHz – Peak

Band-edge measurements for radiated emissions

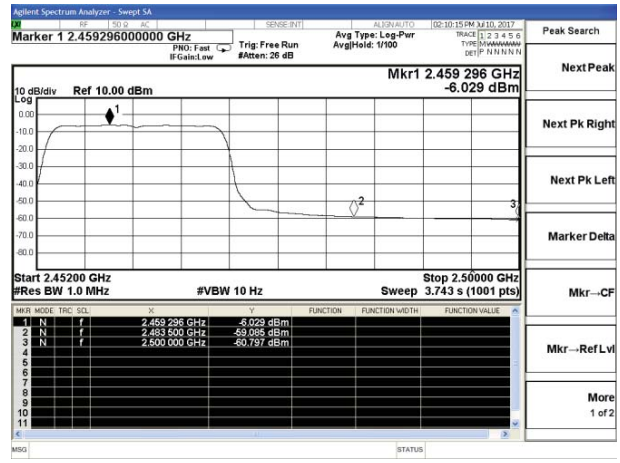
Antenna 0

IEEE 802.11b



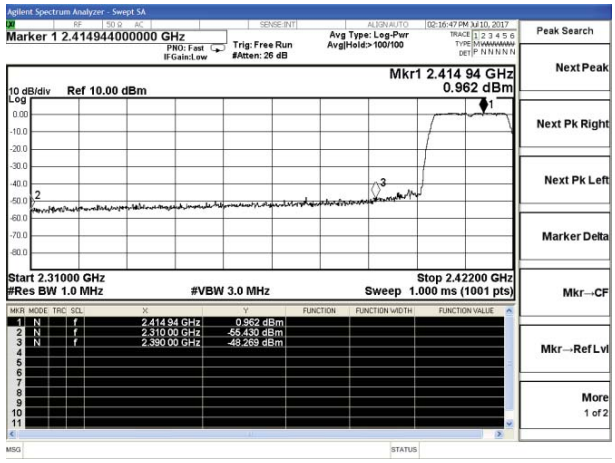
Channel 11 / 2462 MHz – Average

IEEE 802.11g



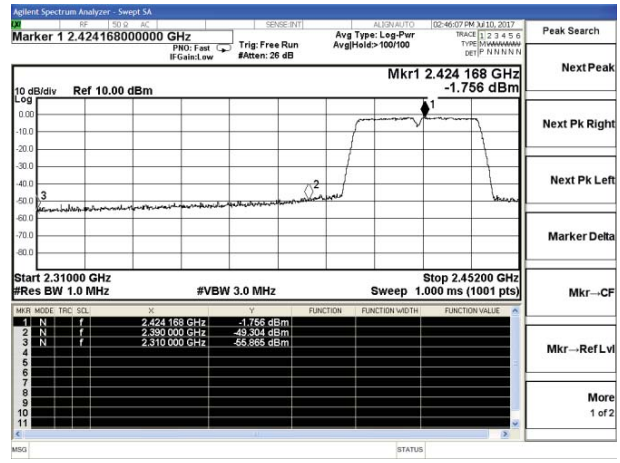
Channel 11 / 2462 MHz – Average

IEEE 802.11n HT20

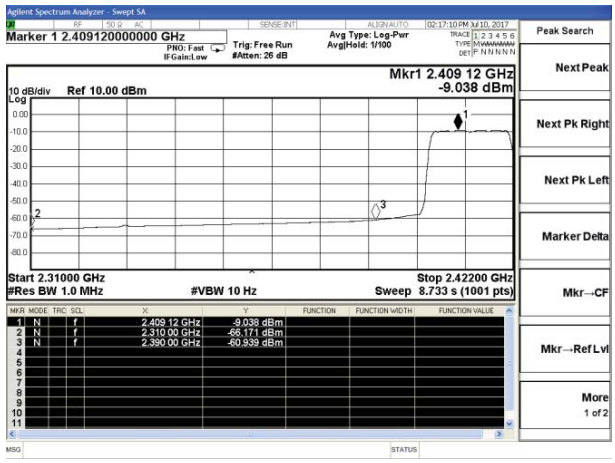


Channel 1 / 2412 MHz – Peak

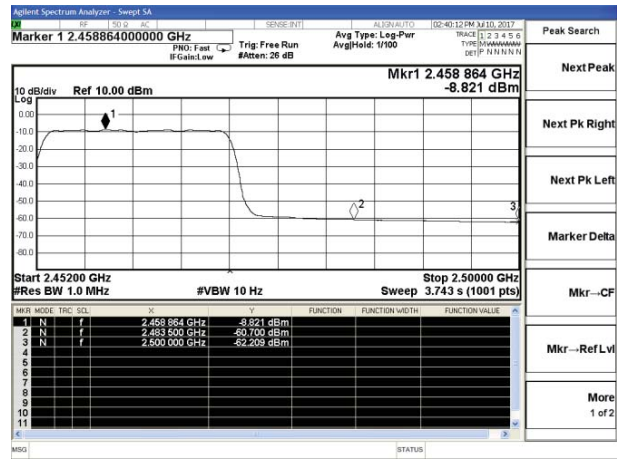
IEEE 802.11n HT40



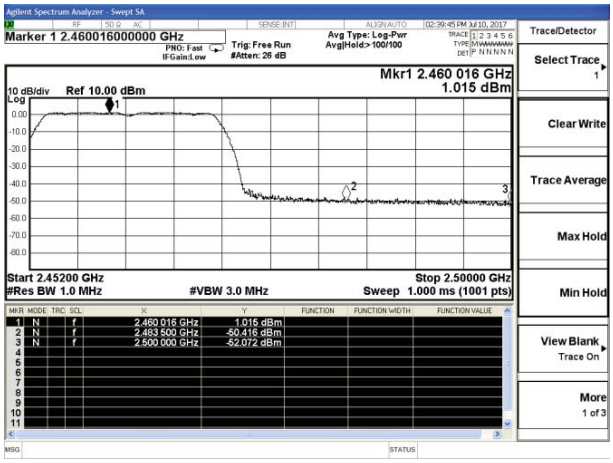
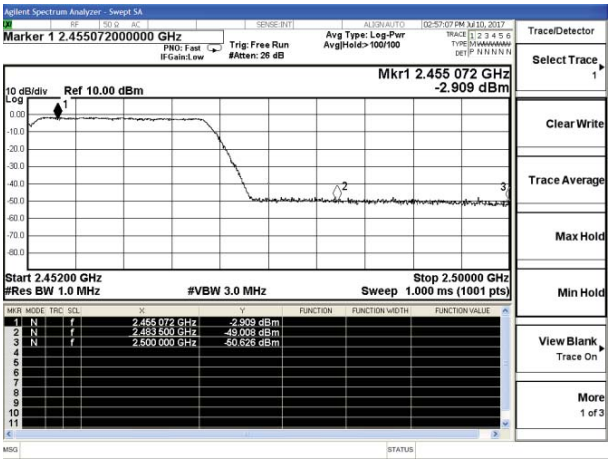
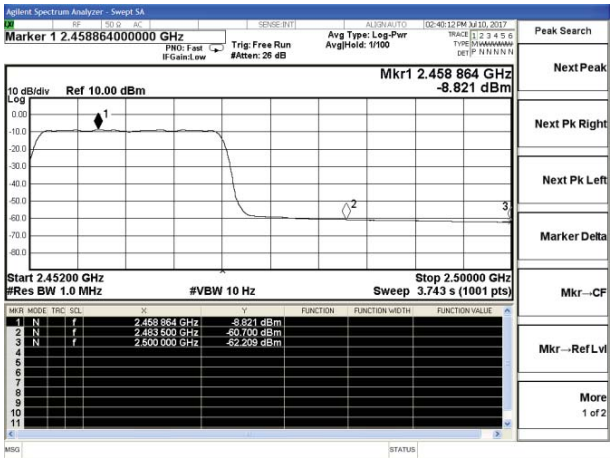
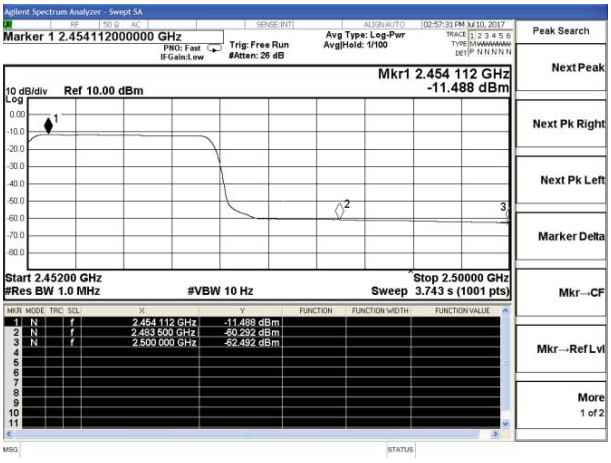
Channel 3 / 2422 MHz – Peak



Channel 1 / 2412 MHz – Average

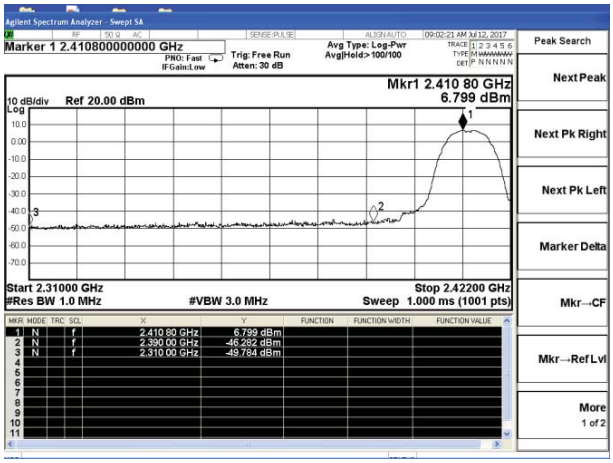
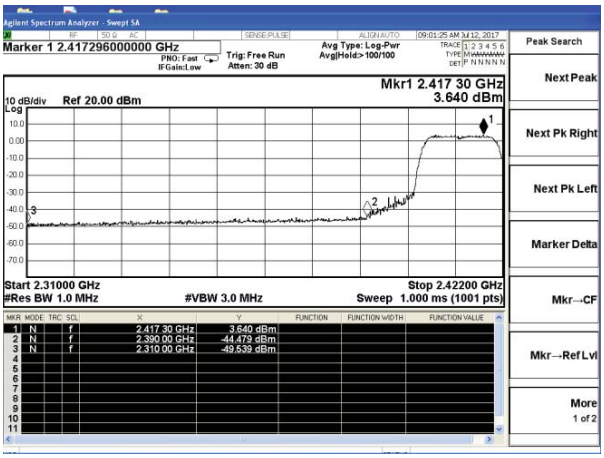
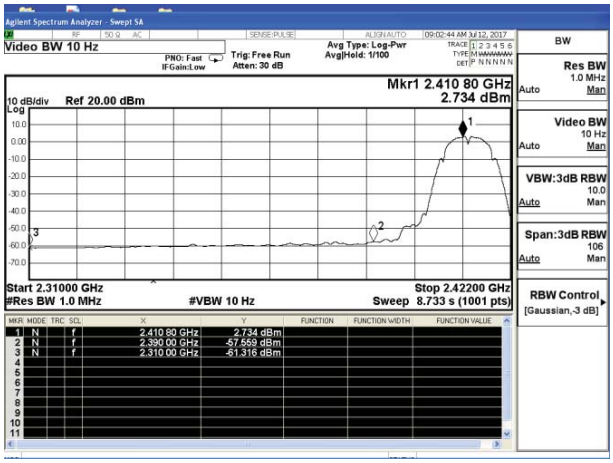
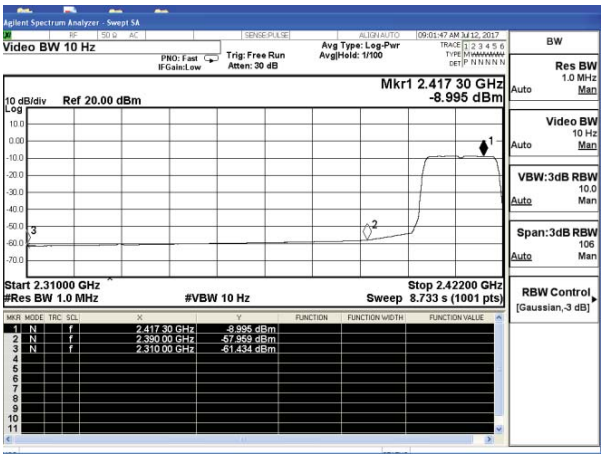
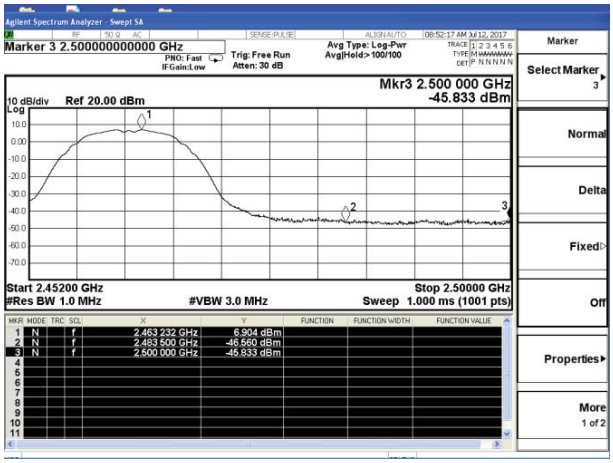
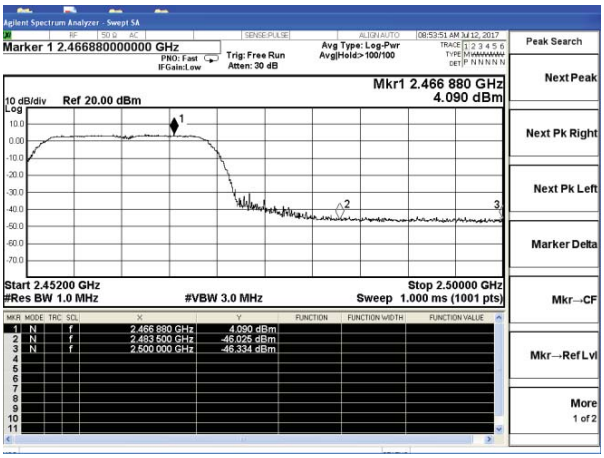


Channel 3 / 2422 MHz – Average

Band-edge measurements for radiated emissions	
Antenna 0	
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 11 / 2462 MHz – Peak	Channel 9 / 2452 MHz – Peak
	
Channel 11 / 2462 MHz – Average	Channel 9 / 2452 MHz – Average

Band-edge measurements for radiated emissions

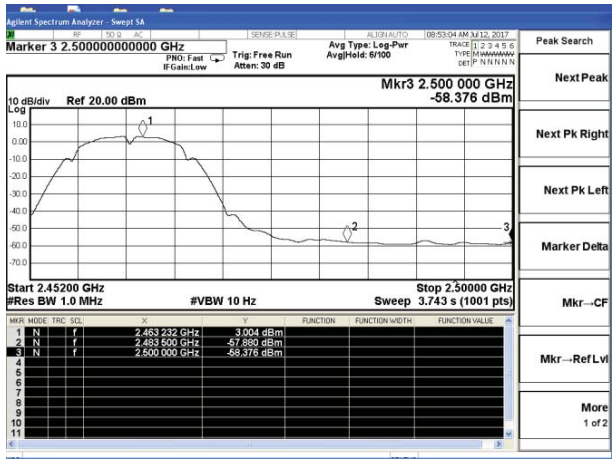
Antenna 1

IEEE 802.11b	IEEE 802.11g
	
Channel 1 / 2412 MHz – Peak	Channel 1 / 2412 MHz – Peak
	
Channel 1 / 2412 MHz – Average	Channel 1 / 2412 MHz – Average
	
Channel 11 / 2462 MHz – Peak	Channel 11 / 2462 MHz – Peak

Band-edge measurements for radiated emissions

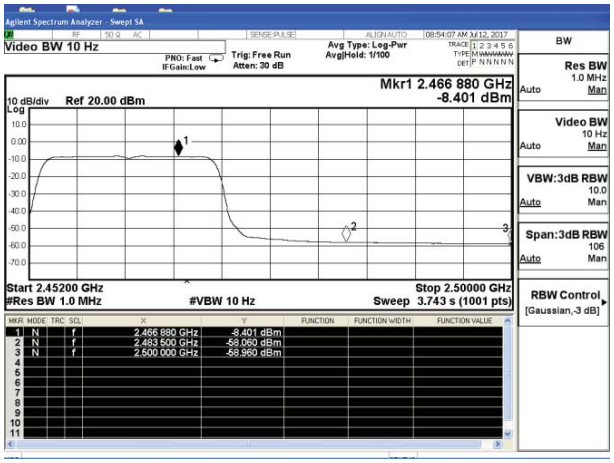
Antenna 1

IEEE 802.11b



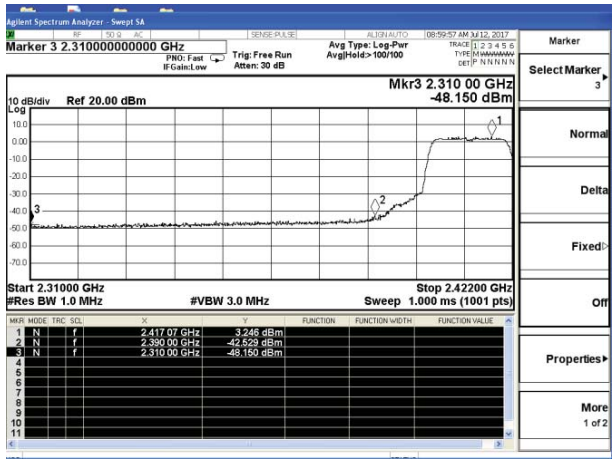
Channel 11 / 2462 MHz – Average

IEEE 802.11g



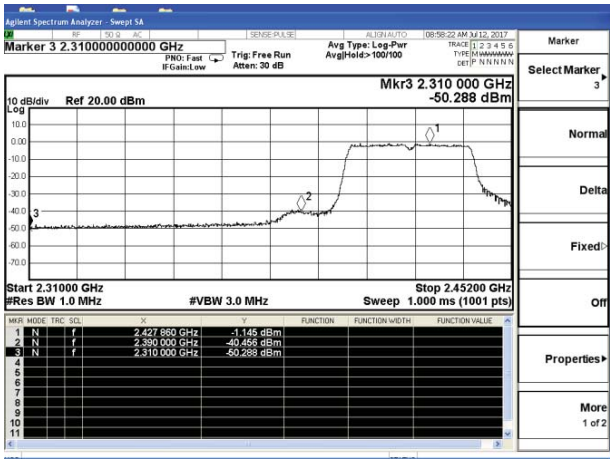
Channel 11 / 2462 MHz – Average

IEEE 802.11n HT20

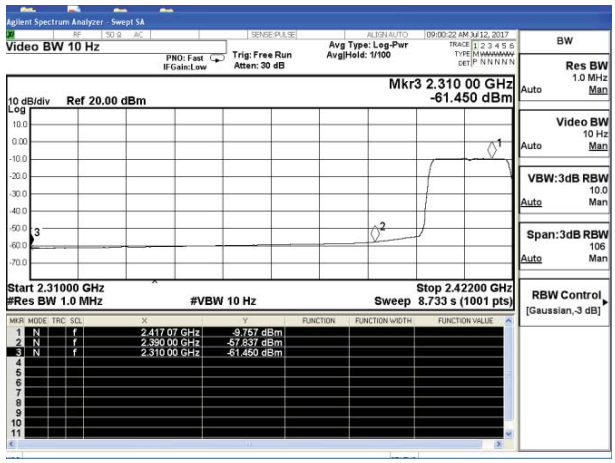


Channel 1 / 2412 MHz – Peak

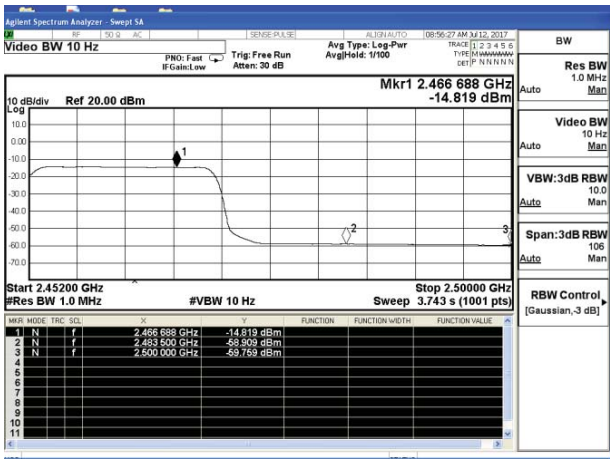
IEEE 802.11n HT40



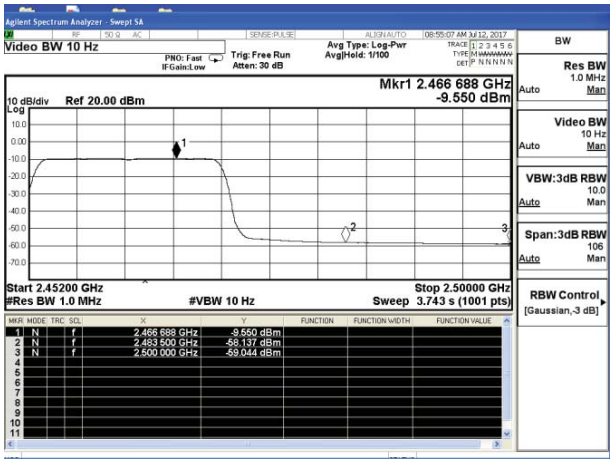
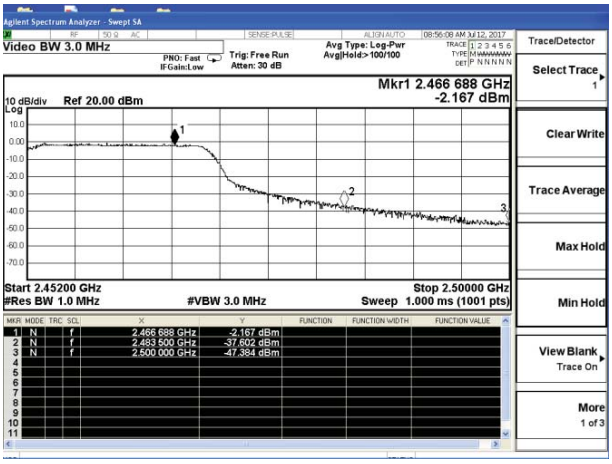
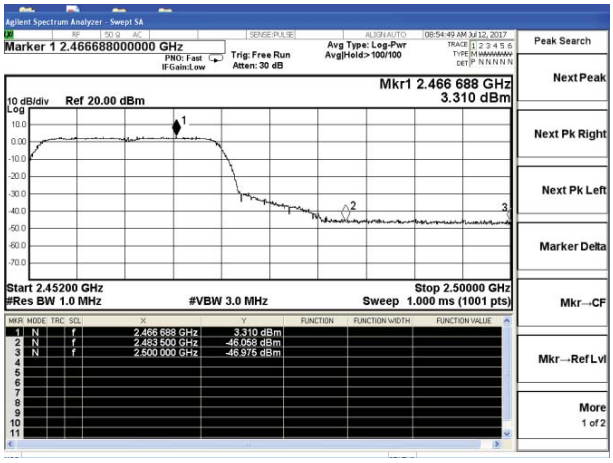
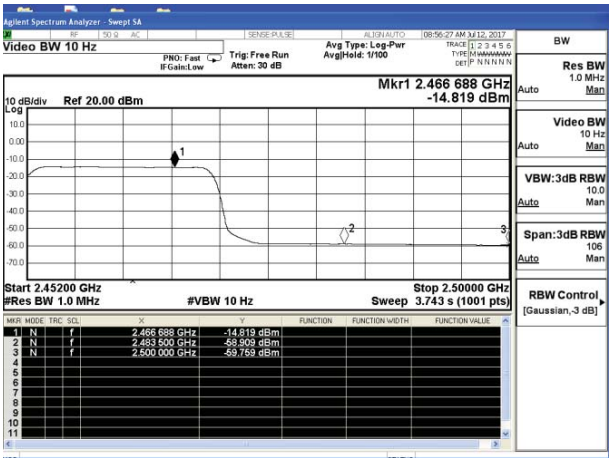
Channel 3 / 2422 MHz – Peak



Channel 1 / 2412 MHz – Average



Channel 3 / 2422 MHz – Average

Band-edge measurements for radiated emissions	
Antenna 1	
IEEE 802.11n HT20	IEEE 802.11n HT40
	
Channel 11 / 2462 MHz – Peak	Channel 9 / 2452 MHz – Peak
	
Channel 11 / 2462 MHz – Average	Channel 9 / 2452 MHz – 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 Connector Construction

The directional gains of antenna used for transmitting is 3.78 which is an R-SMA antenna and no consideration of replacement. Please see EUT photo for details.

5.9.3. Results: Compliance.

Measurement

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Conducted power refers ANSI C63.10:2013 Output power test procedure for DTS devices.

Radiated power refers to ANSI C63.10:2013 Radiated emissions tests.

Measurement parameters

Measurement parameter	
Detector:	Peak
Sweep Time:	Auto
Resolution bandwidth:	1MHz
Video bandwidth:	3MHz
Trace-Mode:	Max hold

Note: The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module. For normal WLAN devices, the IEEE 802.11b mode is used.

Limits

FCC	ISED
Antenna Gain	
6 dBi	

Antenna Chain 0

T_{nom}	V_{nom}	Lowest Channel 2412 MHz	Middle Channel 2437 MHz	Highest Channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		15.28	15.44	15.39
Radiated power [dBm] Measured with DSSS modulation		16.38	16.55	16.51
Gain [dBi] Calculated		1.103	1.113	1.118
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

Antenna Chain 1

T_{nom}	V_{nom}	Lowest Channel 2412 MHz	Middle Channel 2437 MHz	Highest Channel 2462 MHz
Conducted power [dBm] Measured with DSSS modulation		15.02	15.21	15.43
Radiated power [dBm] Measured with DSSS modulation		16.209	16.366	16.542
Gain [dBi] Calculated		1.189	1.156	1.112
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)	

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, 2017	June 17, 2018
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16, 2017	July 15, 2018
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, 2017	June 17, 2018
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18, 2017	June 17, 2018
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18, 2017	June 17, 2018
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18, 2017	June 17, 2018
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-18GHz 3m	June 18, 2017	June 17, 2018
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHzz	June 18, 2017	June 17, 2018
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16, 2017	July 15, 2018
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 16, 2017	July 15, 2018
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18, 2017	June 17, 2018
By-log Antenna	SCHWARZBEC	VULB9163	9163-470	30MHz-1GHz	June 10, 2017	June 09, 2018
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10, 2017	June 09, 2018
Horn Antenna	SCHWARZBEC	BBHA9170	BBHA9170154	15GHz-40GHz	June 10, 2017	June 09, 2018
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18, 2017	June 17, 2018
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18, 2017	June 17, 2018
Power Meter	R&S	NRVS	100444	DC-40GHz	June 18, 2017	June 17, 2018
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	June 18, 2017	June 17, 2018
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	June 18, 2017	June 17, 2018
AC Power Source	HPC	HPA-500E	HPA-9100024	AC 0~300V	June 18, 2017	June 17, 2018
DC power source	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2017	June 17, 2018
Temp. and Humidify Chamber	Giant Force	GTH-225-20-S	MAB0103-00	N/A	June 18, 2017	June 17, 2018
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18, 2017	June 17, 2018
RF CABLE-2m	JYE Bao	RG142	CB)35-2m	20MHz-1GHz	June 18, 2017	June 17, 2018
EMC Test software	Audix	E3	N/A	N/A	N/A	N/A

Note: All equipment through GRGT EST calibration

----------THE END OF REPORT----------