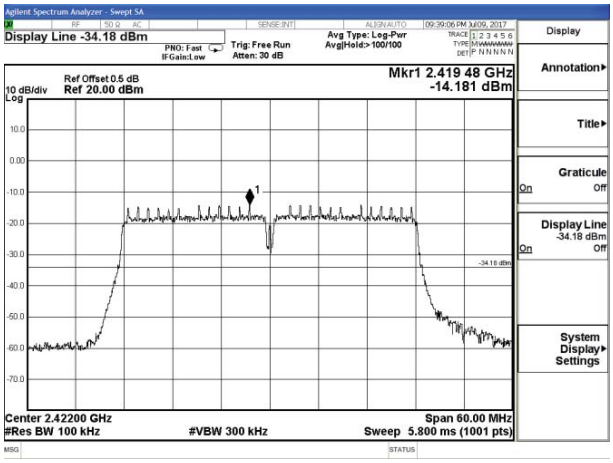
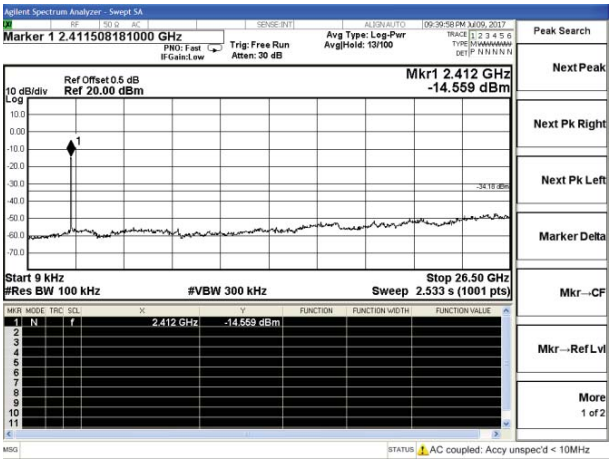
RF Conducted Spurious Emissions

IEEE 802.11n HT40

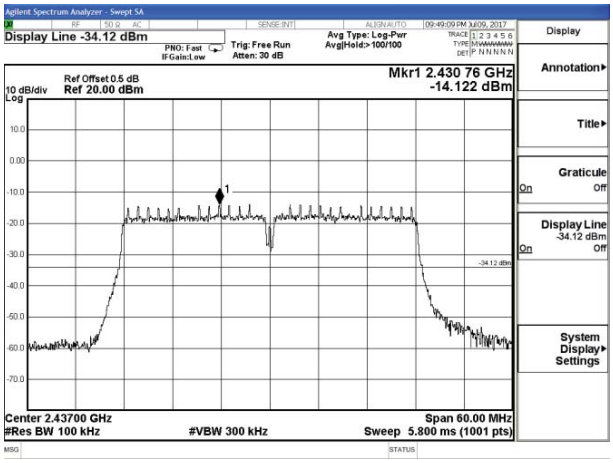
Antenna 1



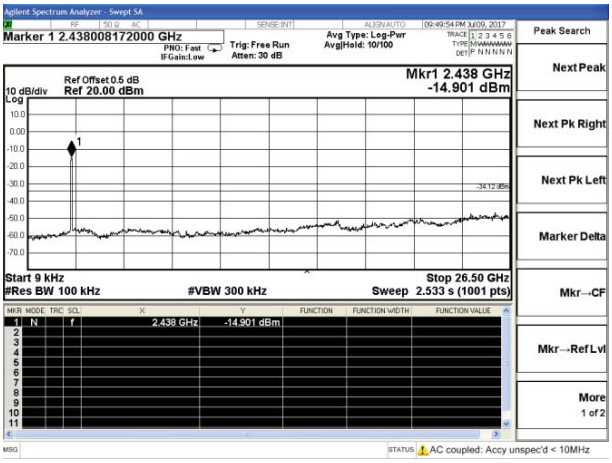
2392 MHz – 2452 MHz



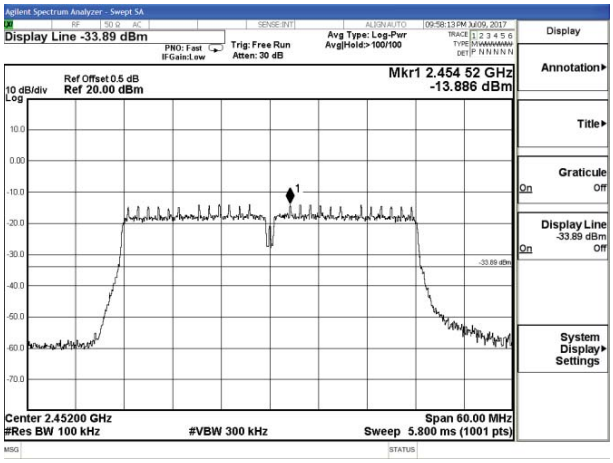
9 KHz – 26.5 GHz



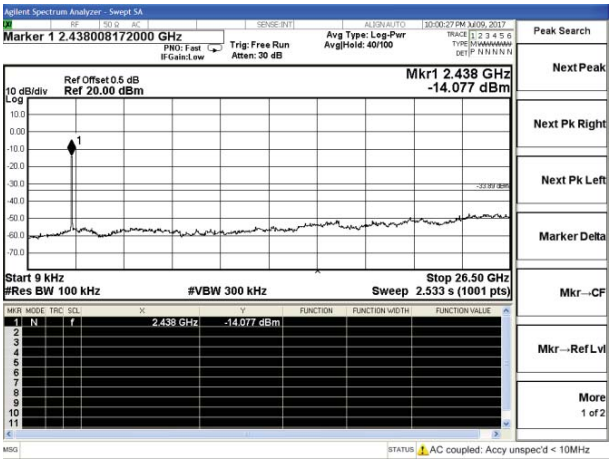
2407 MHz – 2467 MHz



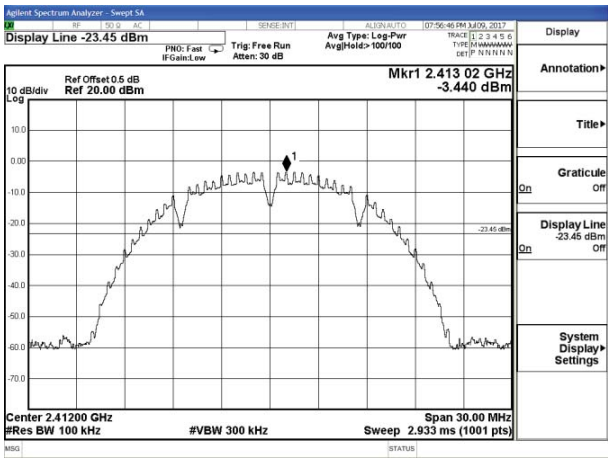
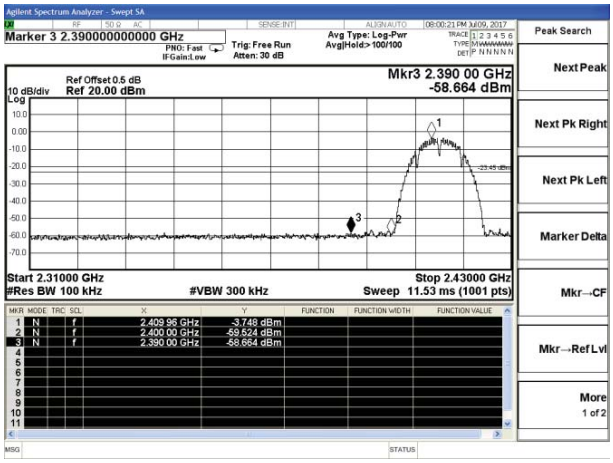
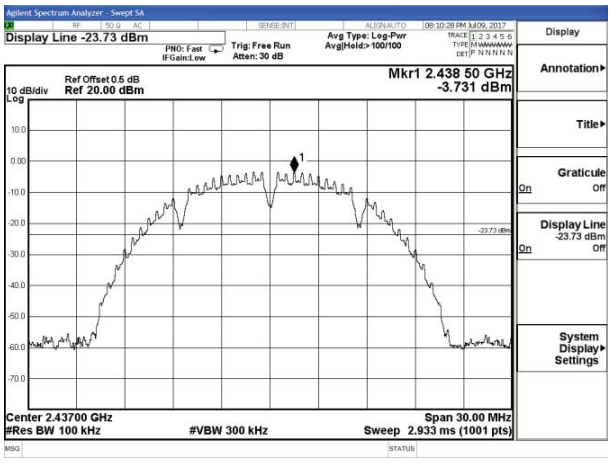
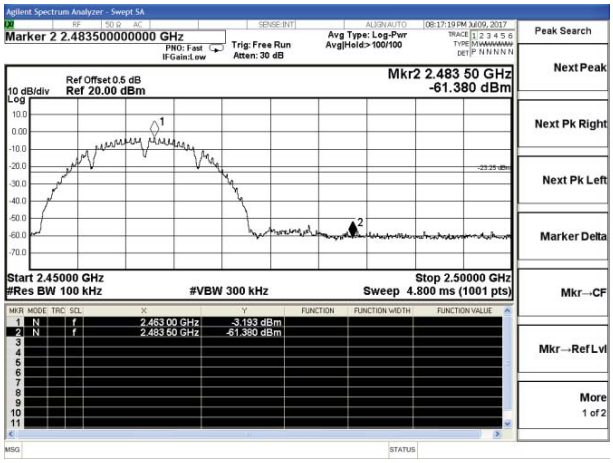
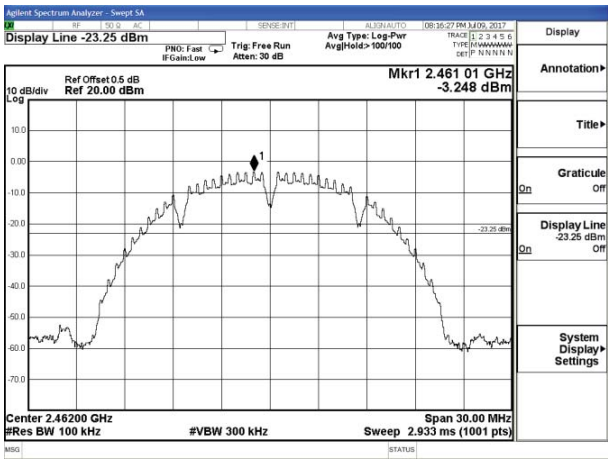
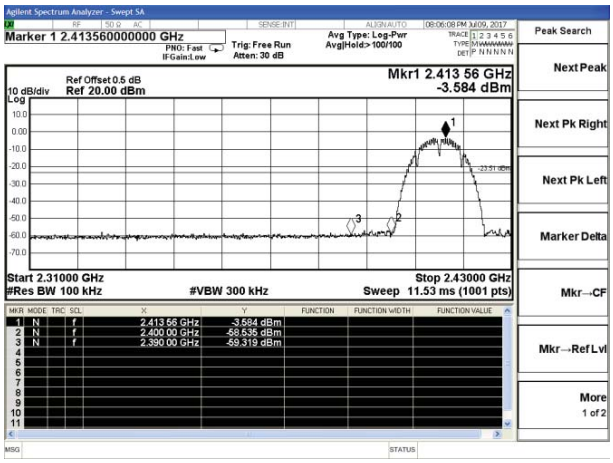
9 KHz – 26.5 GHz

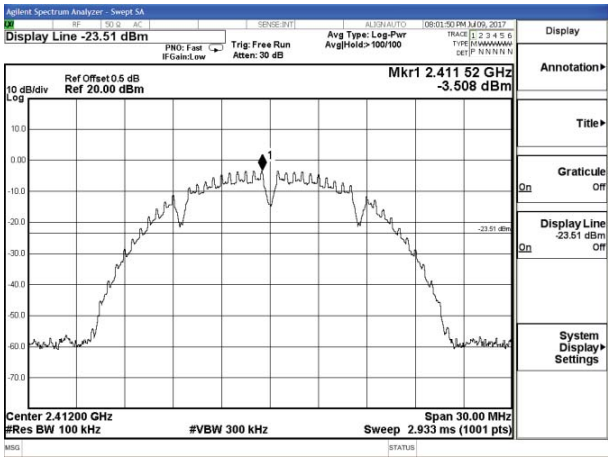
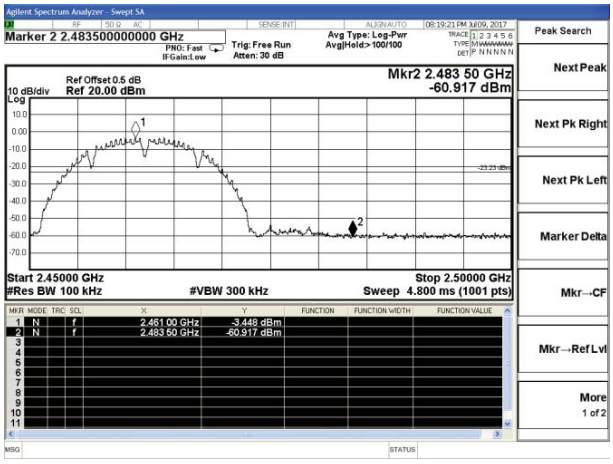


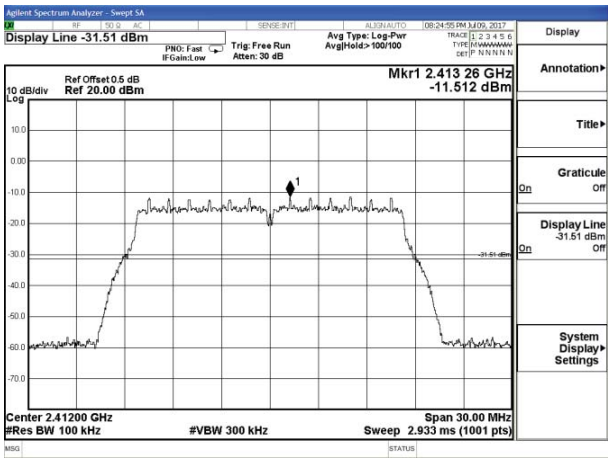
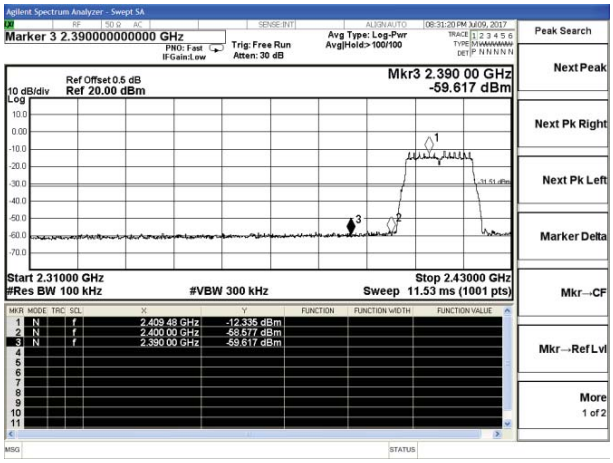
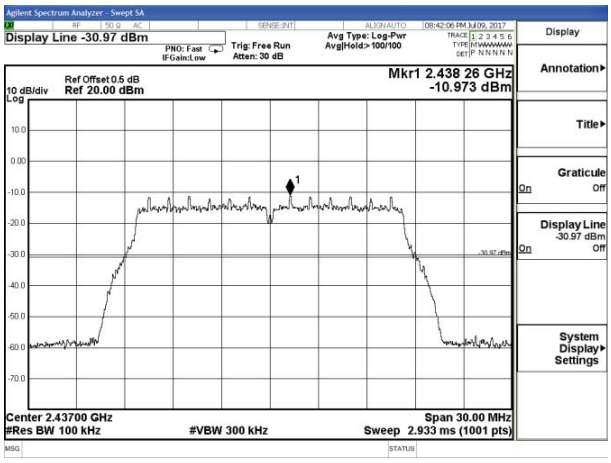
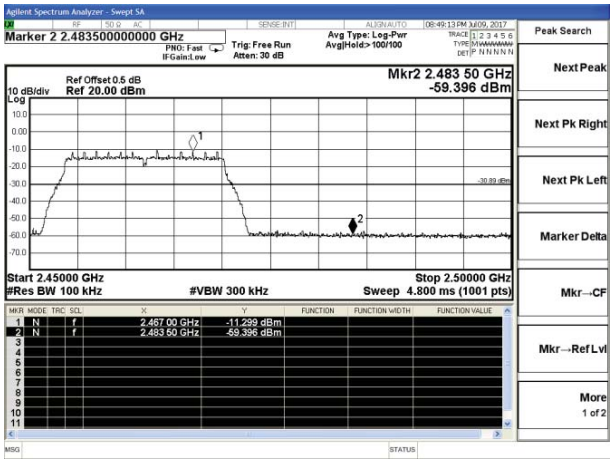
2422 MHz – 2482 MHz

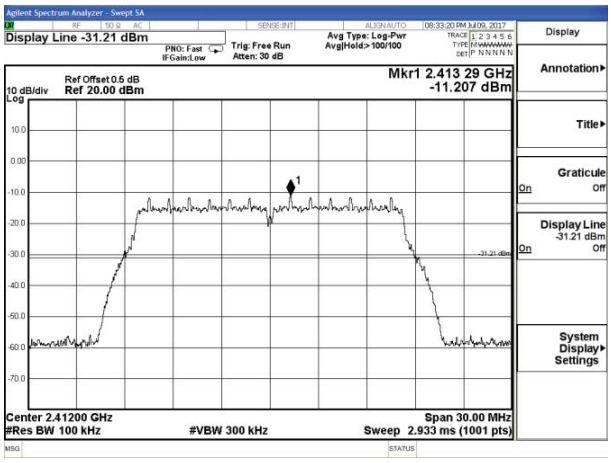
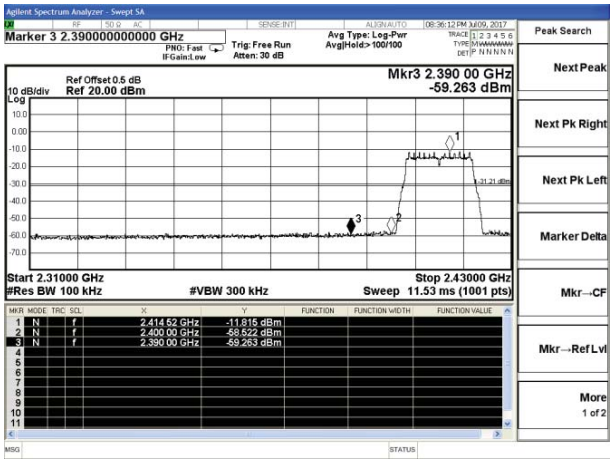
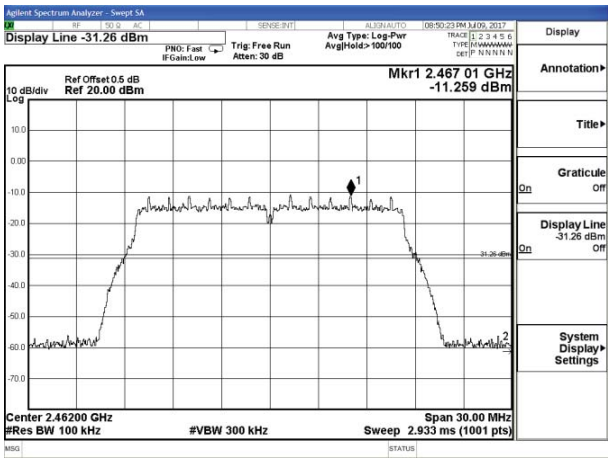
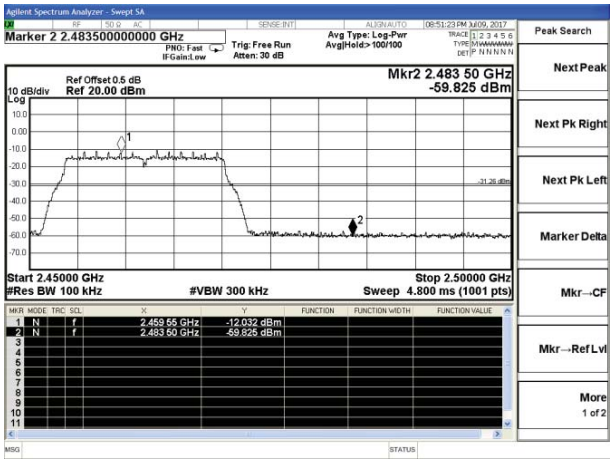
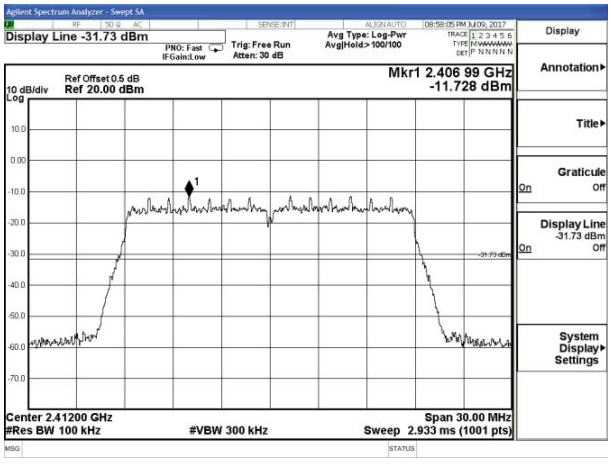
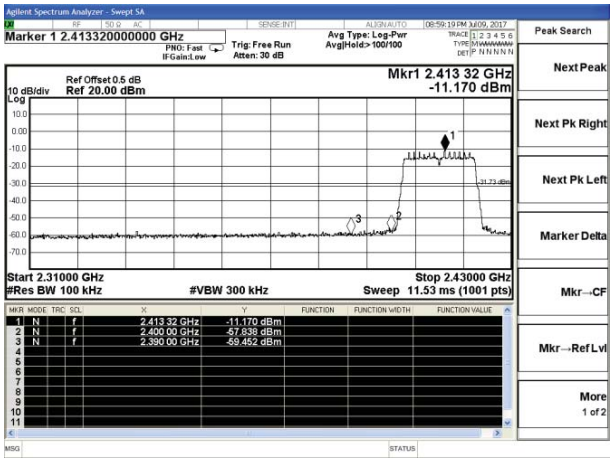


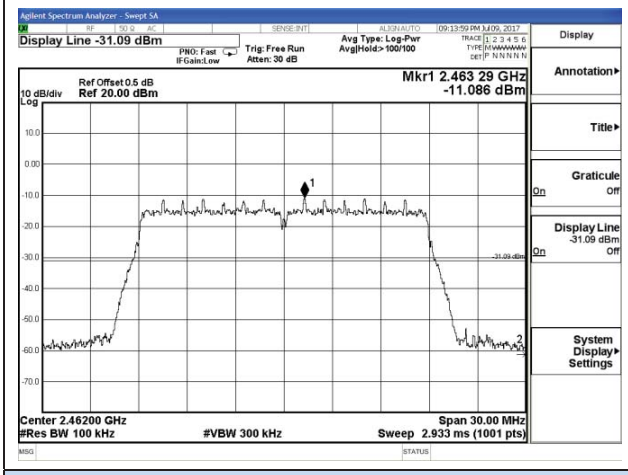
9 KHz – 26.5 GHz

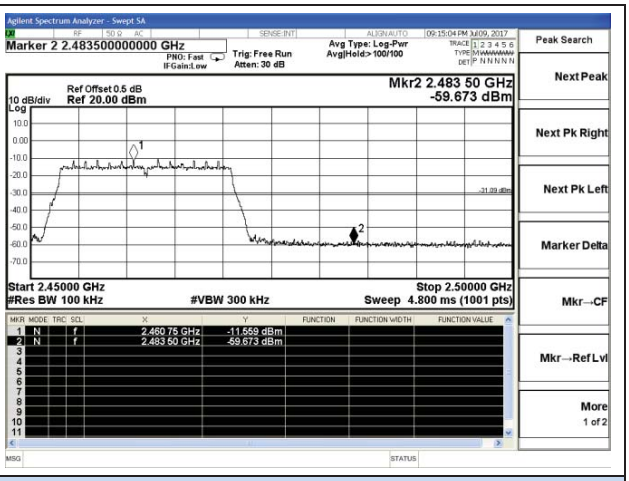
Band-edge measurements for conducted emissions	
IEEE 802.11b	
Antenna 0	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz
	
2447 MHz – 2477 MHz	Channel 11 / 2462 MHz
Antenna 1	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz

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

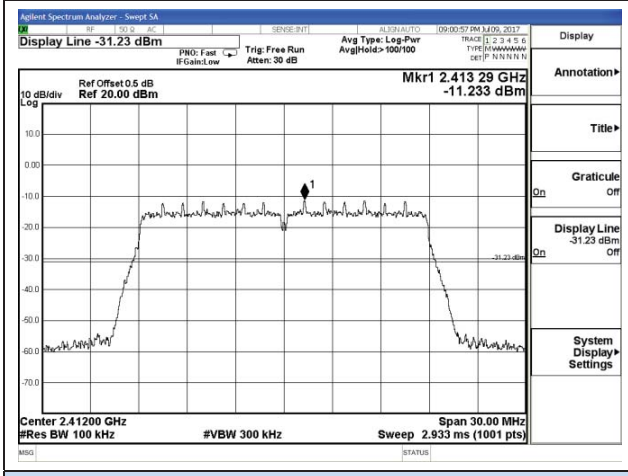
Band-edge measurements for conducted emissions	
IEEE 802.11g	
Antenna 1	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz
	
2447 MHz – 2477 MHz	Channel 11 / 2462 MHz
Band-edge measurements for conducted emissions	
IEEE 802.11n HT20	
Antenna 0	
	
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz

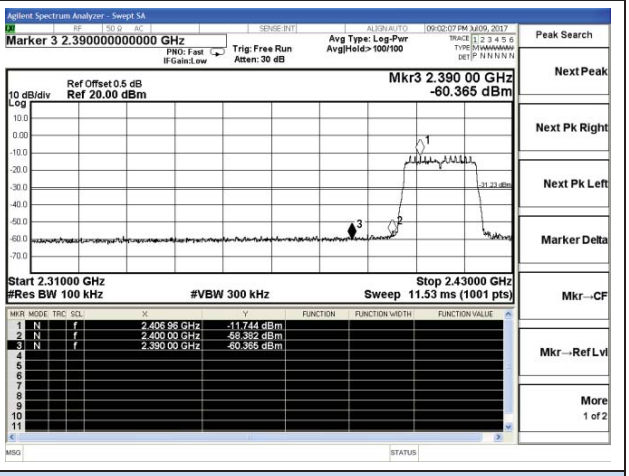




2447 MHz – 2477 MHz	Channel 11 / 2462 MHz

Antenna 1



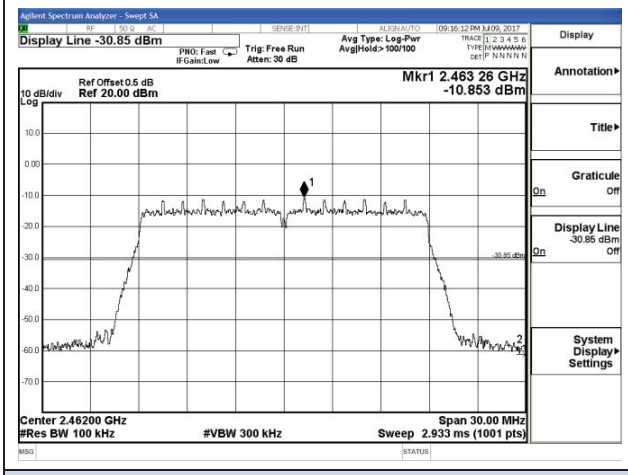


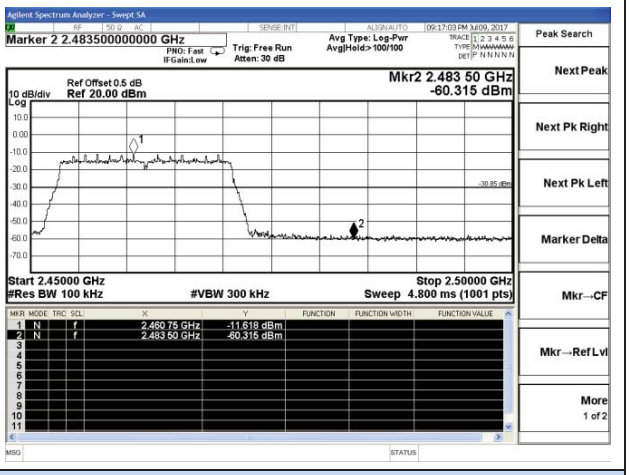
2397 MHz – 2427 MHz	Channel 1 / 2412 MHz

Band-edge measurements for conducted emissions

IEEE 802.11n HT20

Antenna 1



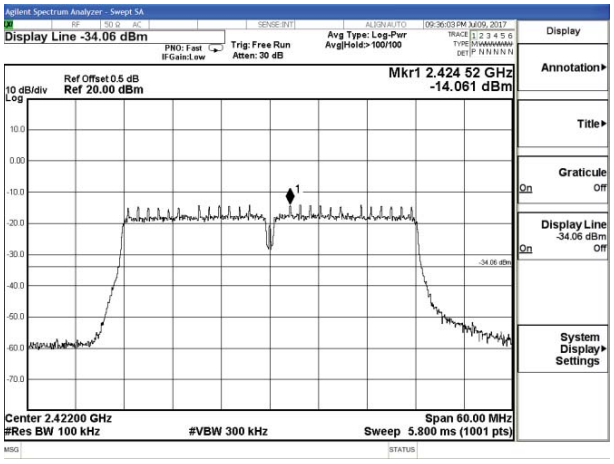


2447 MHz – 2477 MHz	Channel 11 / 2462 MHz

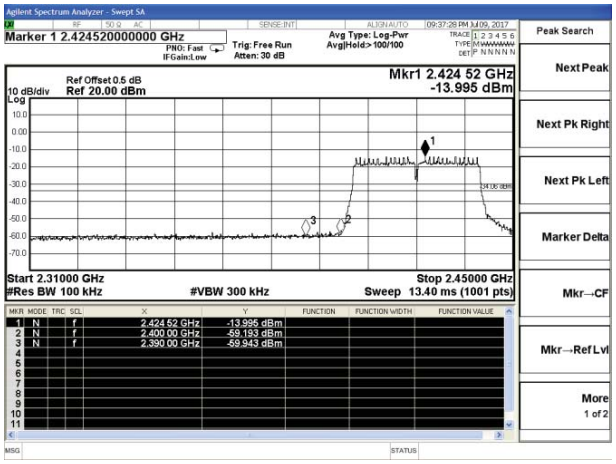
Band-edge measurements for conducted emissions

IEEE 802.11n HT40

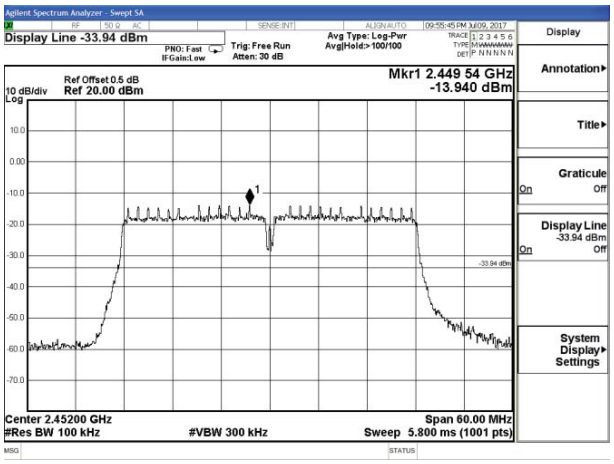
Antenna 0



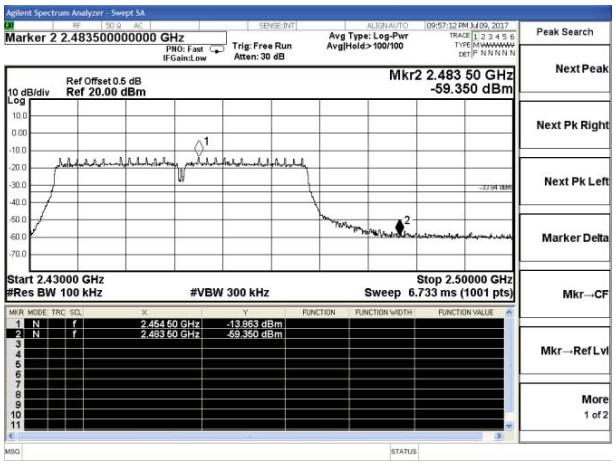
2392 MHz – 2452 MHz



Channel 3 / 2422 MHz

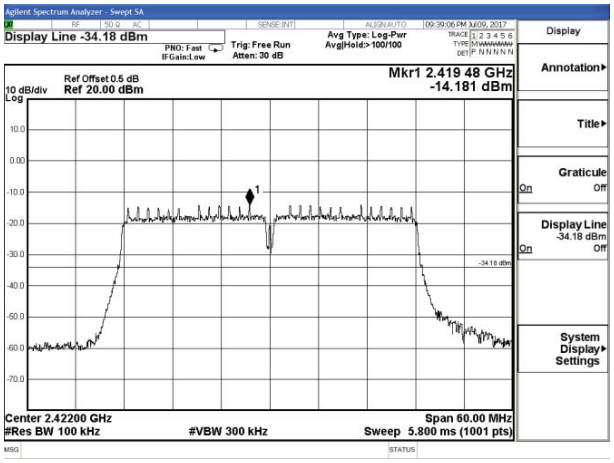


2422 MHz – 2482 MHz

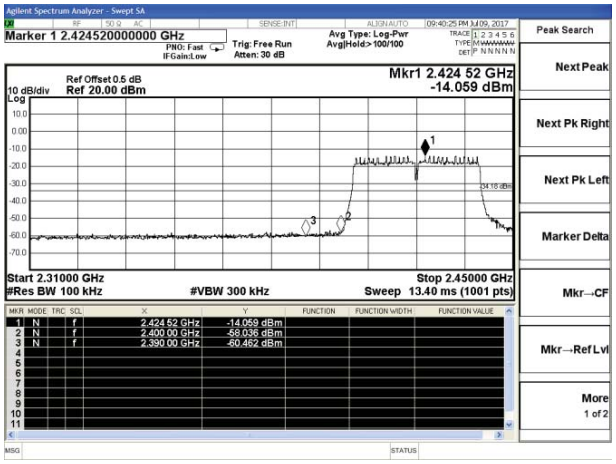


Channel 9 / 2452 MHz

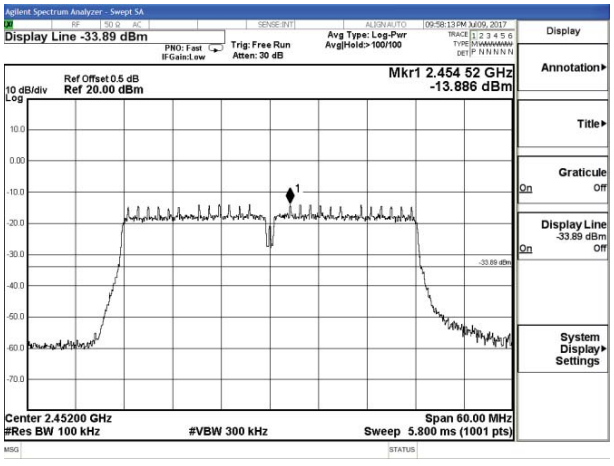
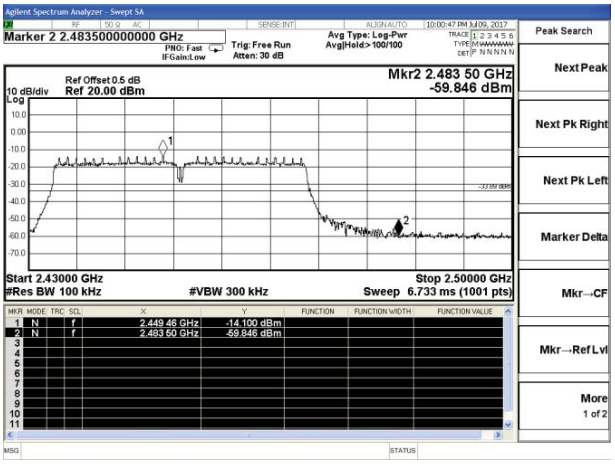
Antenna 1



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

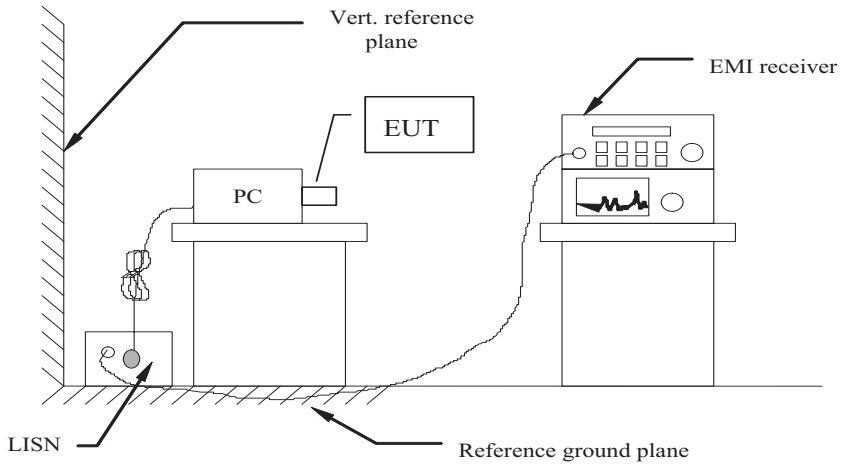
5.7.1 Standard Applicable

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

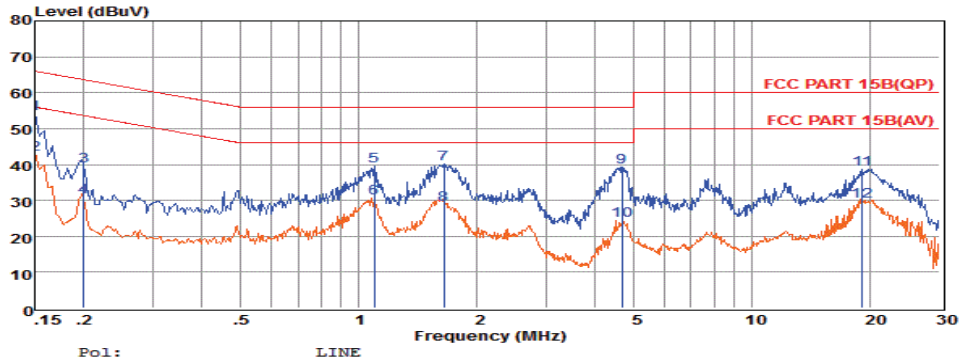


5.7.3 Test Results

PASS.

The test data please refer to following page.

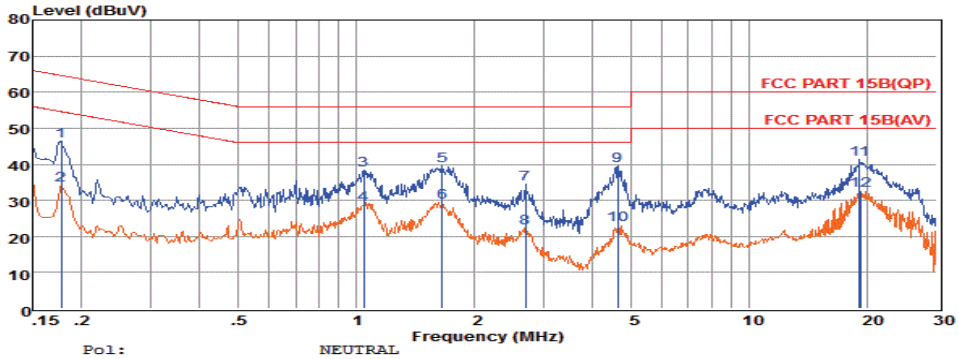
AC Conducted Emission @ AC 120V/60Hz @ IEEE 802.11b



Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	34.54	9.57	0.02	10.00	54.13	66.00	-11.87	QP
2	0.15	23.21	9.57	0.02	10.00	42.80	55.99	-13.19	Average
3	0.20	19.76	9.63	0.02	10.00	39.41	63.62	-24.21	QP
4	0.20	11.19	9.63	0.02	10.00	30.84	53.62	-22.78	Average
5	1.09	19.84	9.63	0.05	10.00	39.52	56.00	-16.48	QP
6	1.09	11.04	9.63	0.05	10.00	30.72	46.00	-15.28	Average
7	1.64	20.37	9.64	0.05	10.00	40.06	56.00	-15.94	QP
8	1.65	9.12	9.64	0.05	10.00	28.81	46.00	-17.19	Average
9	4.67	19.59	9.65	0.06	10.00	39.30	56.00	-16.70	QP
10	4.67	4.61	9.65	0.06	10.00	24.32	46.00	-21.68	Average
11	19.12	18.79	9.75	0.12	10.00	38.66	60.00	-21.34	QP
12	19.12	10.00	9.75	0.12	10.00	29.87	50.00	-20.13	Average

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

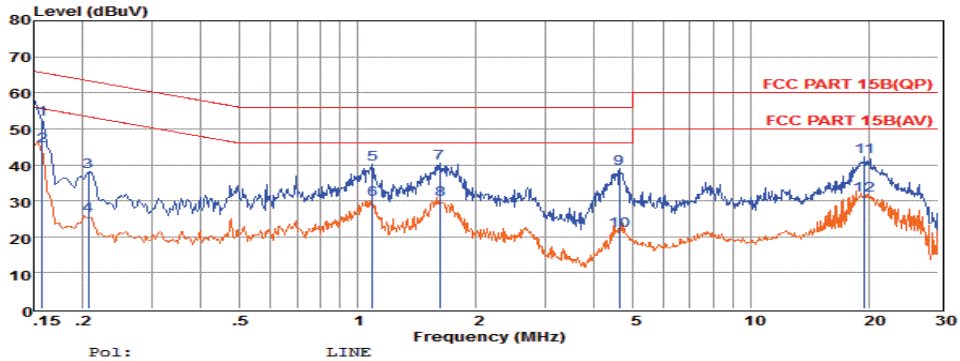


Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.18	26.75	9.64	0.02	10.00	46.41	64.59	-18.18	QP
2	0.18	14.54	9.63	0.02	10.00	34.19	54.59	-20.40	Average
3	1.04	18.55	9.63	0.05	10.00	38.23	56.00	-17.77	QP
4	1.04	9.07	9.63	0.05	10.00	28.75	46.00	-17.25	Average
5	1.65	19.91	9.63	0.05	10.00	39.59	56.00	-16.41	QP
6	1.65	9.67	9.63	0.05	10.00	29.35	46.00	-16.65	Average
7	2.69	14.67	9.64	0.05	10.00	34.36	56.00	-21.64	QP
8	2.69	2.60	9.64	0.05	10.00	22.29	46.00	-23.71	Average
9	4.62	19.73	9.66	0.06	10.00	39.45	56.00	-16.55	QP
10	4.62	3.50	9.66	0.06	10.00	23.22	46.00	-22.78	Average
11	19.12	21.25	9.85	0.12	10.00	41.22	60.00	-18.78	QP
12	19.20	12.75	9.86	0.12	10.00	32.73	50.00	-17.27	Average

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

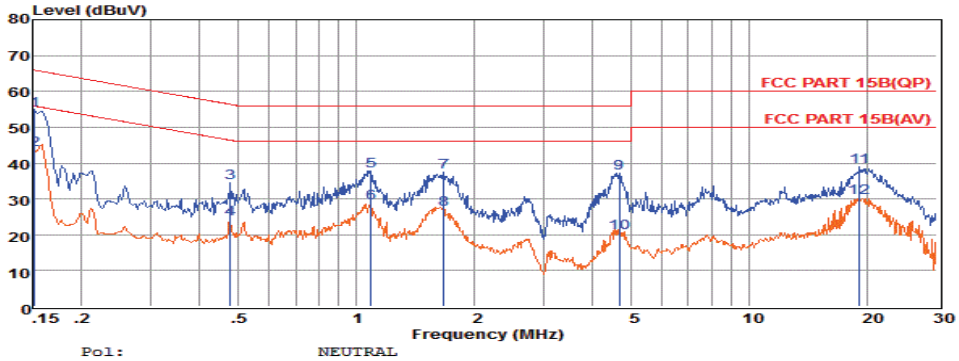
AC Conducted Emission @ AC 240V/50Hz @ IEEE 802.11b



Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.16	33.04	9.58	0.02	10.00	52.64	65.60	-12.96	QP
2	0.16	25.54	9.58	0.02	10.00	45.14	55.60	-10.46	Average
3	0.21	18.41	9.63	0.03	10.00	38.07	63.36	-25.29	QP
4	0.21	6.08	9.63	0.03	10.00	25.74	53.36	-27.62	Average
5	1.09	20.33	9.63	0.05	10.00	40.01	56.00	-15.99	QP
6	1.09	10.66	9.63	0.05	10.00	30.34	46.00	-15.66	Average
7	1.62	20.71	9.64	0.05	10.00	40.40	56.00	-15.60	QP
8	1.62	10.75	9.64	0.05	10.00	30.44	46.00	-15.56	Average
9	4.62	19.33	9.65	0.06	10.00	39.04	56.00	-16.96	QP
10	4.62	2.12	9.65	0.06	10.00	21.83	46.00	-24.17	Average
11	19.43	22.38	9.75	0.12	10.00	42.25	60.00	-17.75	QP
12	19.43	11.68	9.75	0.12	10.00	31.55	50.00	-18.45	Average

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



Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	35.04	9.70	0.02	10.00	54.76	65.91	-11.15	QP
2	0.15	23.96	9.70	0.02	10.00	43.68	55.91	-12.23	Average
3	0.48	14.83	9.62	0.04	10.00	34.49	56.36	-21.87	QP
4	0.48	4.75	9.62	0.04	10.00	24.41	46.36	-21.95	Average
5	1.09	18.12	9.63	0.05	10.00	37.80	56.00	-18.20	QP
6	1.09	9.16	9.63	0.05	10.00	28.84	46.00	-17.16	Average
7	1.67	17.67	9.63	0.05	10.00	37.35	56.00	-18.65	QP
8	1.67	7.51	9.63	0.05	10.00	27.19	46.00	-18.81	Average
9	4.67	17.52	9.66	0.06	10.00	37.24	56.00	-18.76	QP
10	4.67	0.86	9.66	0.06	10.00	20.58	46.00	-25.42	Average
11	19.12	18.89	9.85	0.12	10.00	38.86	60.00	-21.14	QP
12	19.12	10.27	9.85	0.12	10.00	30.24	50.00	-19.76	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)	Over limit dB	Verdict
2310.000	-50.640	2.000	0.000	46.560	Peak	74.00	-27.440	PASS
2310.000	-62.883	2.000	0.000	34.317	AV	54.00	-19.683	PASS
2390.000	-48.982	2.000	0.000	48.218	Peak	74.00	-25.782	PASS
2390.000	-61.627	2.000	0.000	35.573	AV	54.00	-18.427	PASS
2483.500	-49.113	2.000	0.000	46.560	Peak	74.00	-27.440	PASS
2483.500	-61.314	2.000	0.000	34.317	AV	54.00	-19.683	PASS
2500.000	-50.434	2.000	0.000	48.218	Peak	74.00	-25.782	PASS
2500.000	-61.900	2.000	0.000	35.573	AV	54.00	-18.427	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	-51.067	2.000	0.000	46.133	Peak	74.00	-27.867	PASS
2310.000	-62.833	2.000	0.000	34.367	AV	54.00	-19.633	PASS
2390.000	-49.339	2.000	0.000	47.861	Peak	74.00	-26.139	PASS
2390.000	-61.313	2.000	0.000	35.887	AV	54.00	-18.113	PASS
2483.500	-49.490	2.000	0.000	47.710	Peak	74.00	-26.290	PASS
2483.500	-60.980	2.000	0.000	36.220	AV	54.00	-17.780	PASS
2500.000	-49.706	2.000	0.000	47.494	Peak	74.00	-26.506	PASS
2500.000	-61.380	2.000	0.000	35.820	AV	54.00	-18.180	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	-51.240	2.000	0.000	45.960	Peak	74.00	-28.040	PASS
2310.000	-62.850	2.000	0.000	34.350	AV	54.00	-19.650	PASS
2390.000	-49.992	2.000	0.000	47.208	Peak	74.00	-26.792	PASS
2390.000	-61.257	2.000	0.000	35.943	AV	54.00	-18.057	PASS
2483.500	-48.937	2.000	0.000	45.960	Peak	74.00	-28.040	PASS
2483.500	-60.922	2.000	0.000	34.350	AV	54.00	-19.650	PASS
2500.000	-50.332	2.000	0.000	35.943	Peak	74.00	-18.057	PASS
2500.000	-61.347	2.000	0.000	48.263	AV	54.00	-25.737	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)	Over limit dB	Verdict
2310.000	-50.765	2.000	0.000	46.435	Peak	74.00	-27.565	PASS
2310.000	-62.898	2.000	0.000	34.302	AV	54.00	-19.698	PASS
2390.000	-49.885	2.000	0.000	47.315	Peak	74.00	-26.685	PASS
2390.000	-61.416	2.000	0.000	35.784	AV	54.00	-18.216	PASS
2483.500	-44.804	2.000	0.000	46.435	Peak	74.00	-27.565	PASS
2483.500	-60.997	2.000	0.000	34.302	AV	54.00	-19.698	PASS
2500.000	-49.003	2.000	0.000	35.784	Peak	74.00	-18.216	PASS
2500.000	-61.525	2.000	0.000	52.396	AV	54.00	-21.604	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	-51.751	2.000	0.000	45.449	Peak	74.00	-28.551	PASS
2310.000	-62.853	2.000	0.000	34.347	AV	54.00	-19.653	PASS
2390.000	-48.695	2.000	0.000	35.607	Peak	74.00	-18.393	PASS
2390.000	-61.593	2.000	0.000	47.321	AV	54.00	-26.679	PASS
2483.500	-49.879	2.000	0.000	34.347	Peak	74.00	-19.653	PASS
2483.500	-60.742	2.000	0.000	48.505	AV	54.00	-25.495	PASS
2500.000	-50.470	2.000	0.000	47.321	Peak	74.00	-26.679	PASS
2500.000	-61.845	2.000	0.000	36.458	AV	54.00	-17.542	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	-52.003	2.000	0.000	45.197	Peak	74.00	-28.803	PASS
2310.000	-62.862	2.000	0.000	34.338	AV	54.00	-19.662	PASS
2390.000	-50.370	2.000	0.000	46.830	Peak	74.00	-27.170	PASS
2390.000	-61.335	2.000	0.000	35.865	AV	54.00	-18.135	PASS
2483.500	-50.181	2.000	0.000	45.197	Peak	74.00	-26.981	PASS
2483.500	-60.913	2.000	0.000	34.338	AV	54.00	-17.713	PASS
2500.000	-49.301	2.000	0.000	35.865	Peak	74.00	-26.101	PASS
2500.000	-61.395	2.000	0.000	47.019	AV	54.00	-18.195	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	-50.659	2.000	0.000	46.541	Peak	74.00	-27.459	PASS
2310.000	-62.822	2.000	0.000	34.378	AV	54.00	-19.622	PASS
2390.000	-49.708	2.000	0.000	47.492	Peak	74.00	-26.508	PASS
2390.000	-61.267	2.000	0.000	35.933	AV	54.00	-18.067	PASS
2483.500	-49.709	2.000	0.000	47.491	Peak	74.00	-26.509	PASS
2483.500	-60.946	2.000	0.000	36.254	AV	54.00	-17.746	PASS
2500.000	-49.511	2.000	0.000	47.689	Peak	74.00	-26.311	PASS
2500.000	-61.363	2.000	0.000	35.837	AV	54.00	-18.163	PASS

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	-49.609	2.000	0.000	47.591	Peak	74.00	-26.409	PASS
2310.000	-62.869	2.000	0.000	34.331	AV	54.00	-19.669	PASS
2390.000	-49.425	2.000	0.000	47.775	Peak	74.00	-26.225	PASS
2390.000	-61.394	2.000	0.000	35.806	AV	54.00	-18.194	PASS
2483.500	-41.325	2.000	0.000	55.875	Peak	74.00	-18.125	PASS
2483.500	-61.000	2.000	0.000	36.200	AV	54.00	-17.800	PASS
2500.000	-48.817	2.000	0.000	48.383	Peak	74.00	-25.617	PASS
2500.000	-61.524	2.000	0.000	35.676	AV	54.00	-18.324	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*	-51.240	-50.659	-47.929	5.010*	0.000	52.341	Peak	74.00	-28.190	PASS
2310.000	-62.850	-62.822	-59.826	5.010*	0.000	40.444	AV	54.00	-20.086	PASS
2390.000	-49.992	-49.708	-46.837	5.010*	0.000	53.433	Peak	74.00	-27.098	PASS
2390.000	-61.257	-61.267	-58.252	5.010*	0.000	42.018	AV	54.00	-18.512	PASS
2483.500*	-48.937	-49.709	-46.296	5.010*	0.000	53.974	Peak	74.00	-26.556	PASS
2483.500	-60.922	-60.946	-57.924	5.010*	0.000	42.346	AV	54.00	-18.184	PASS
2500.000	-50.332	-49.511	-46.892	5.010*	0.000	53.378	Peak	74.00	-27.152	PASS
2500.000	-61.347	-61.363	-58.345	5.010*	0.000	41.925	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*	-50.765	-49.609	-47.138	5.010*	0.000	53.132	Peak	74.00	-27.399	PASS
2310.000	-62.898	-62.869	-59.873	5.010*	0.000	40.397	AV	54.00	-20.134	PASS
2390.000	-49.885	-49.425	-46.639	5.010*	0.000	53.631	Peak	74.00	-26.899	PASS
2390.000	-61.416	-61.394	-58.395	5.010*	0.000	41.875	AV	54.00	-18.655	PASS
2483.500*	-44.804	-41.325	-39.715	5.010*	0.000	60.555	Peak	74.00	-19.975	PASS
2483.500	-60.997	-61.000	-57.988	5.010*	0.000	42.282	AV	54.00	-18.249	PASS
2500.000	-49.003	-48.817	-45.899	5.010*	0.000	54.371	Peak	74.00	-26.159	PASS
2500.000	-61.525	-61.524	-58.514	5.010*	0.000	41.756	AV	54.00	-18.775	PASS

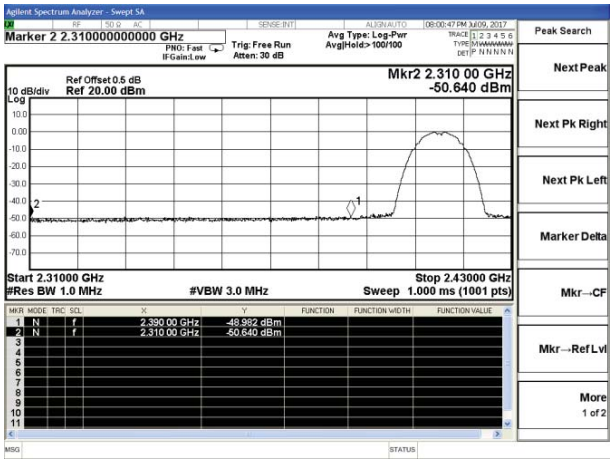
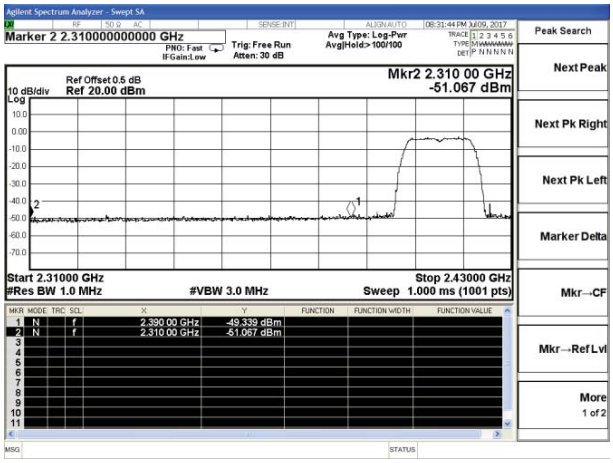
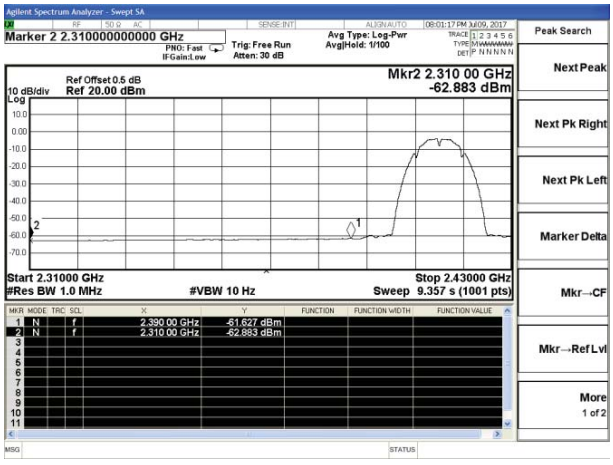
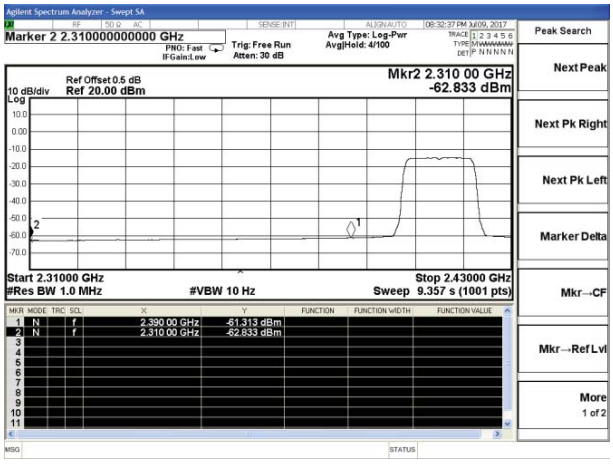
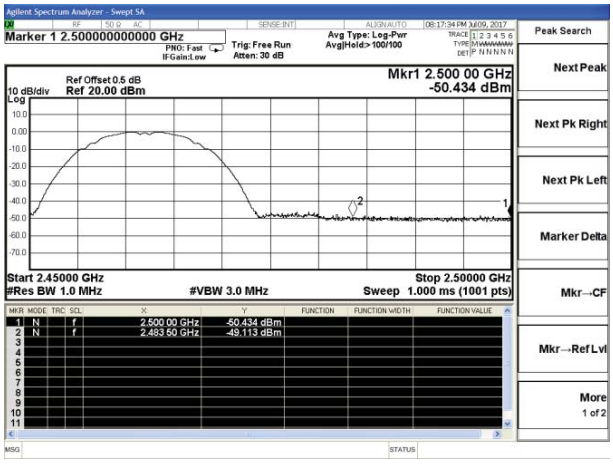
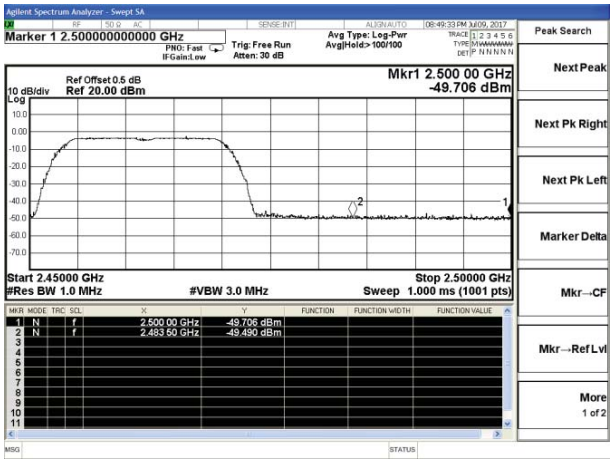
Remark:

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

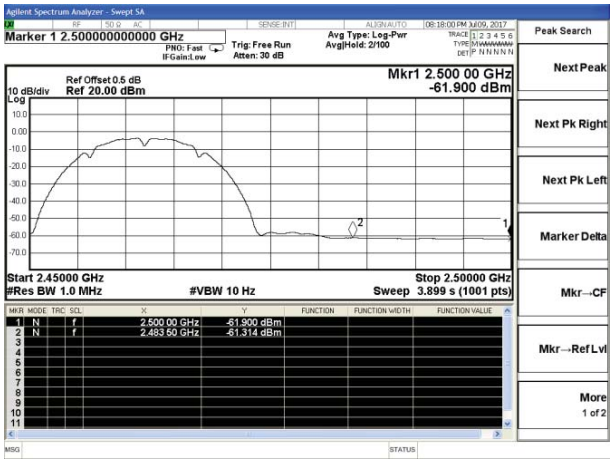
Antenna 0

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

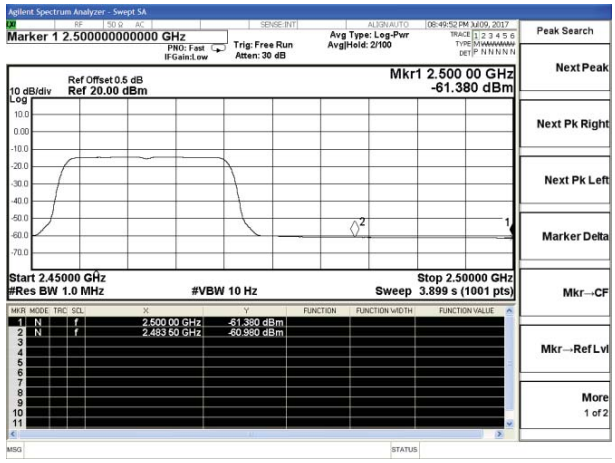
Antenna 0

IEEE 802.11b



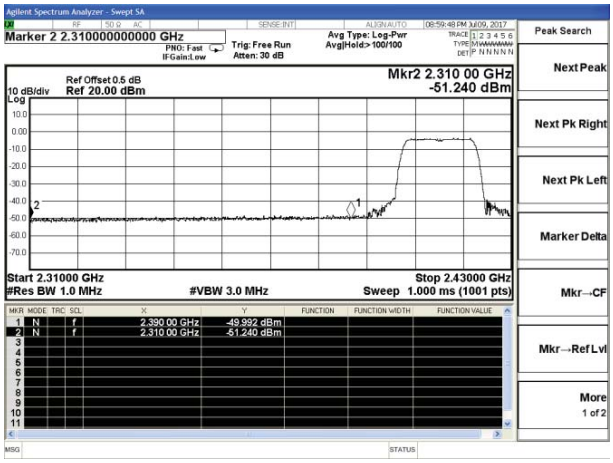
Channel 11 / 2462 MHz – Average

IEEE 802.11g



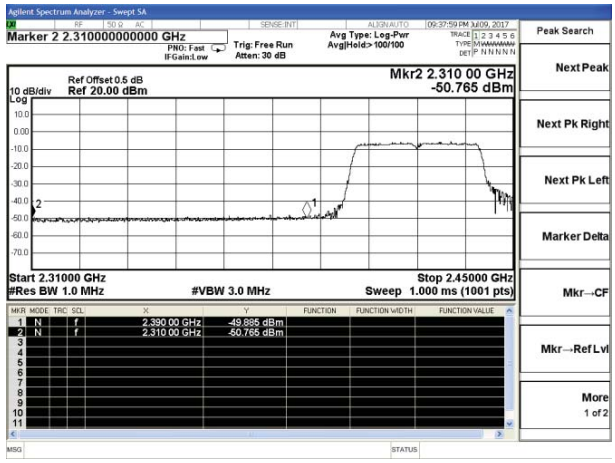
Channel 11 / 2462 MHz – Average

IEEE 802.11n HT20

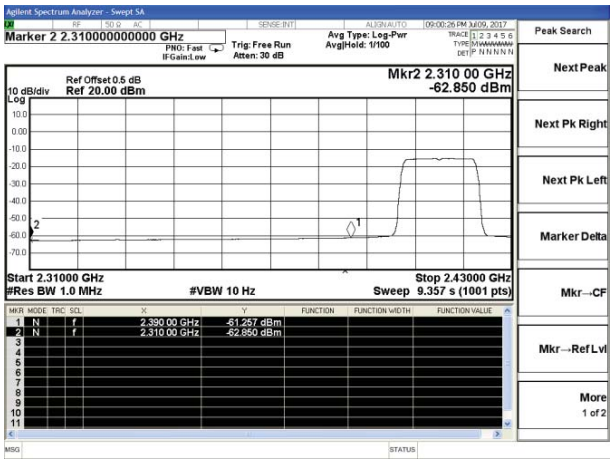


Channel 1 / 2412 MHz – Peak

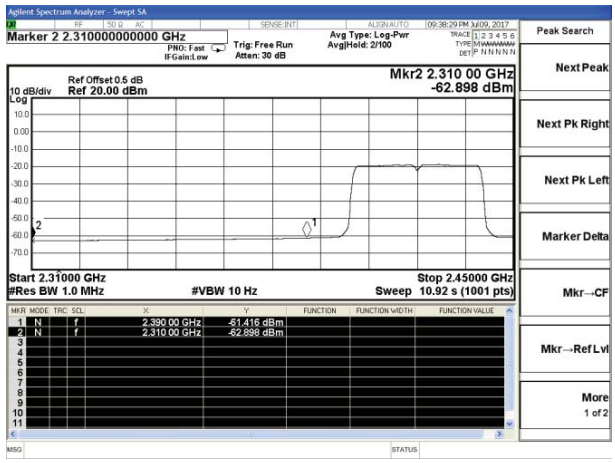
IEEE 802.11n HT40



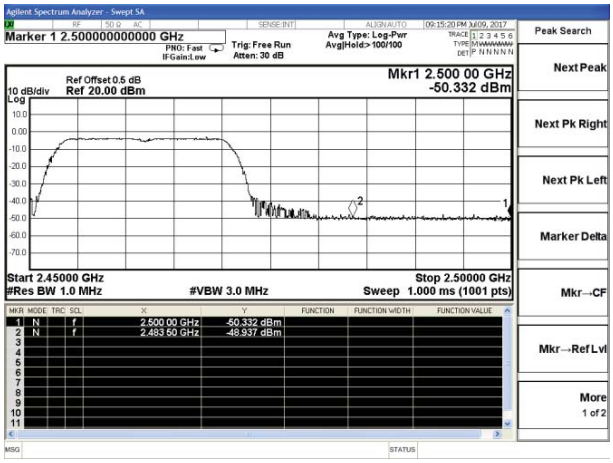
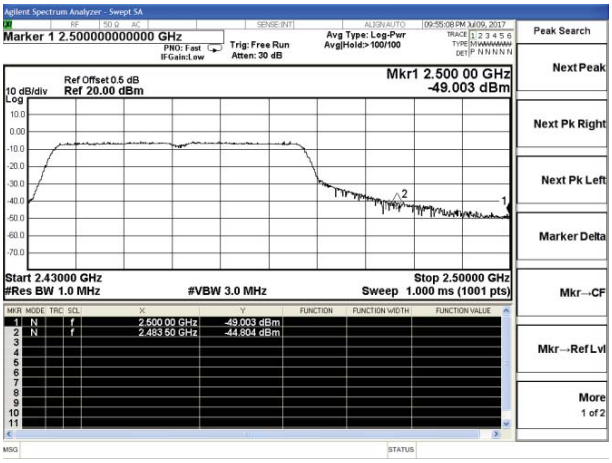
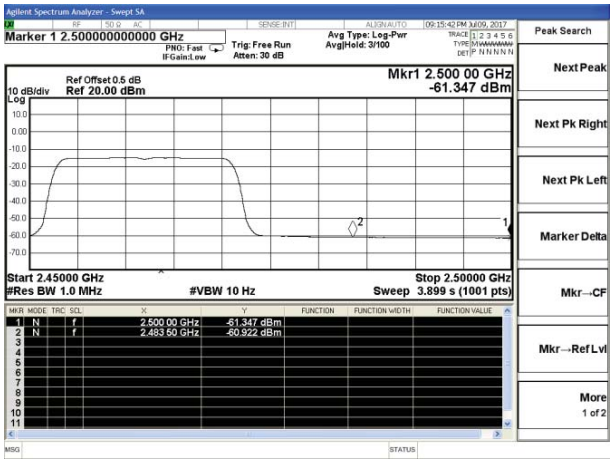
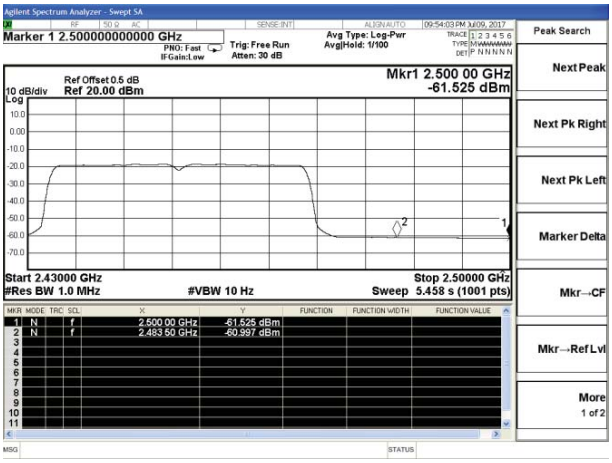
Channel 3 / 2422 MHz – Peak



Channel 1 / 2412 MHz – Average

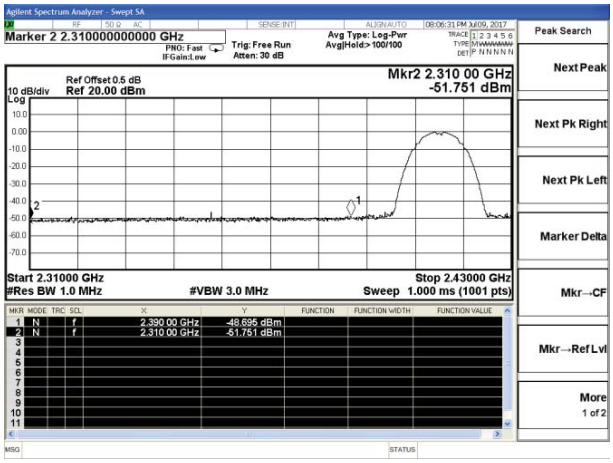
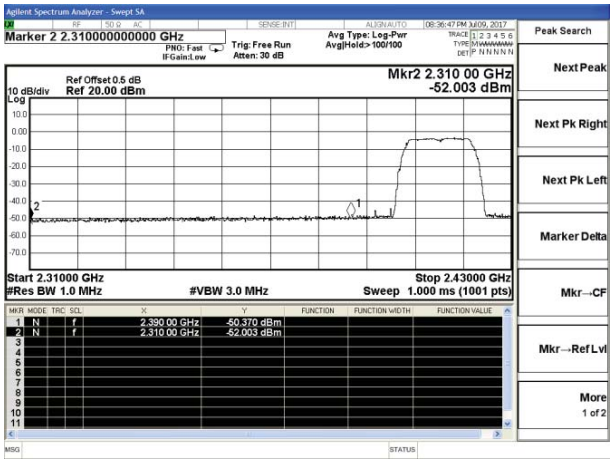
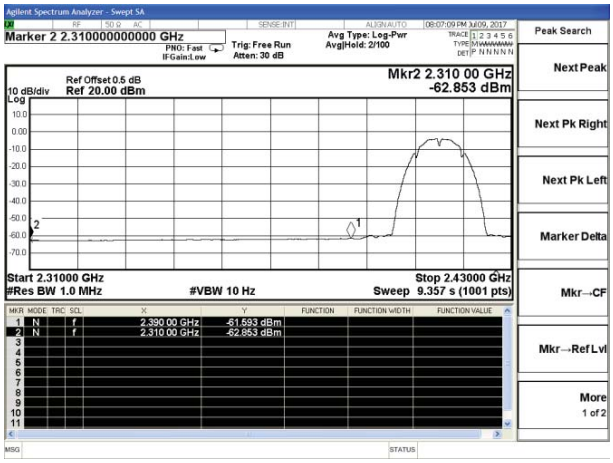
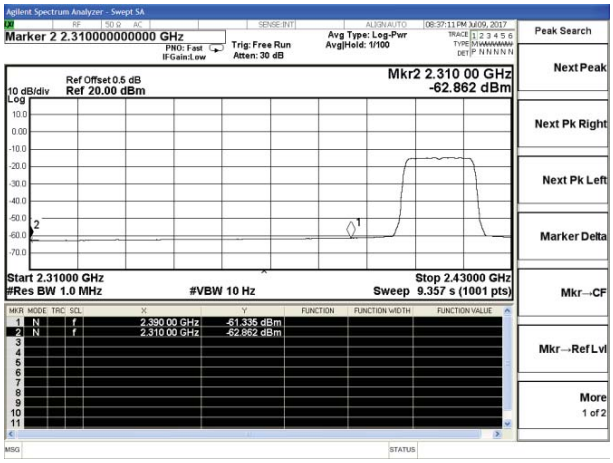
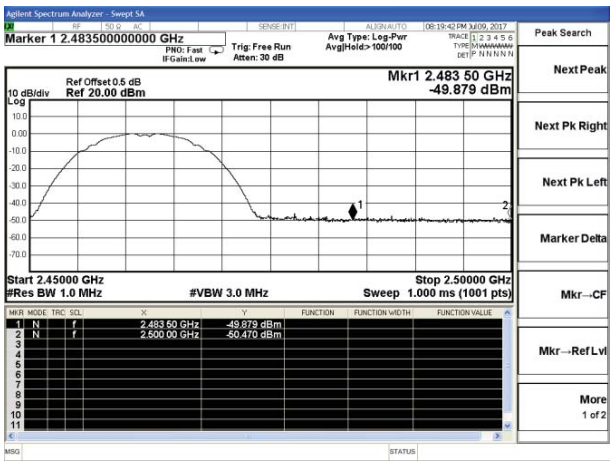
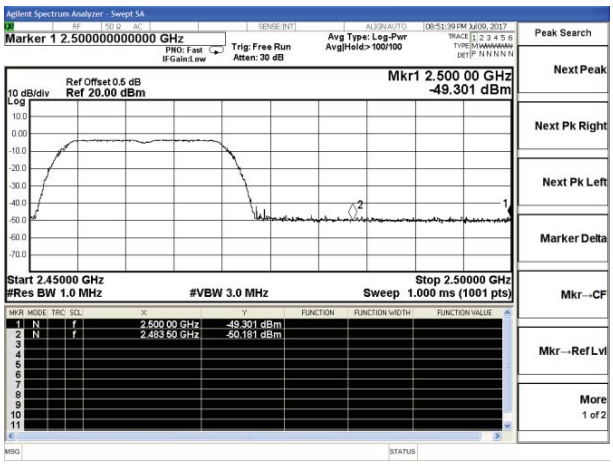


Channel 3 / 2422 MHz – Average

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

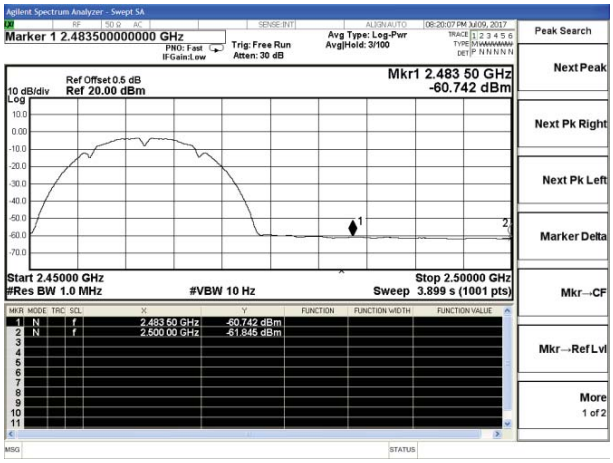
Antenna 1

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 / 2412 MHz – Peak	Channel 11 / 2412 MHz – Peak

Band-edge measurements for radiated emissions

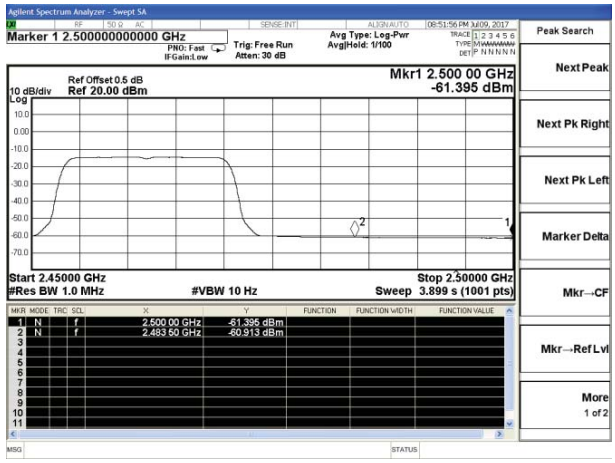
Antenna 1

IEEE 802.11b



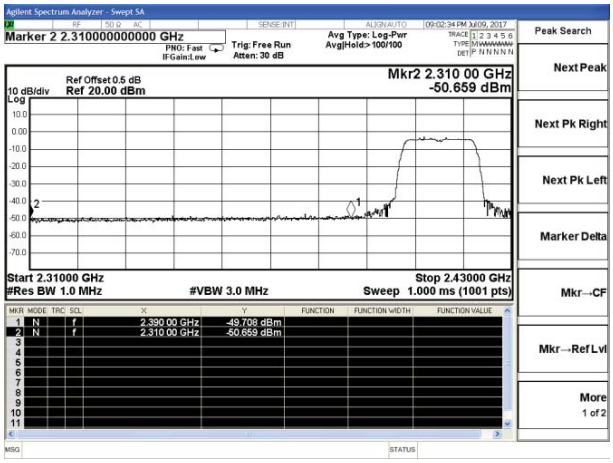
Channel 11 / 2462 MHz – Average

IEEE 802.11g



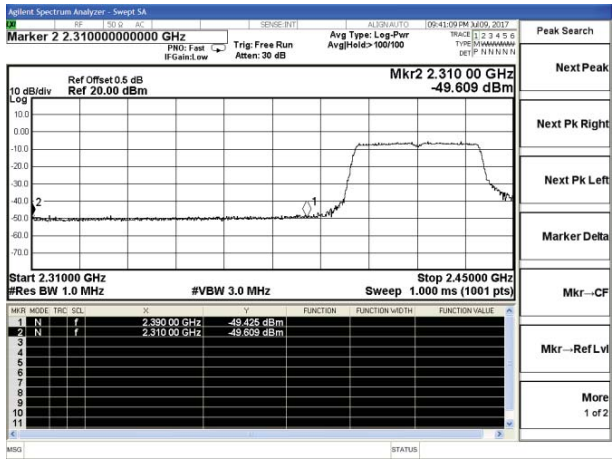
Channel 11 / 2462 MHz – Average

IEEE 802.11n HT20

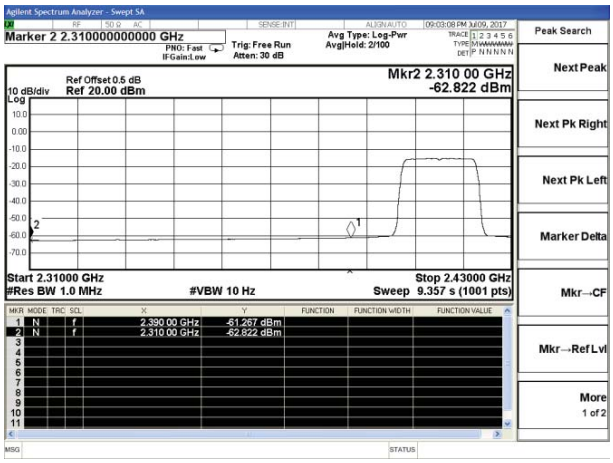


Channel 1 / 2412 MHz – Peak

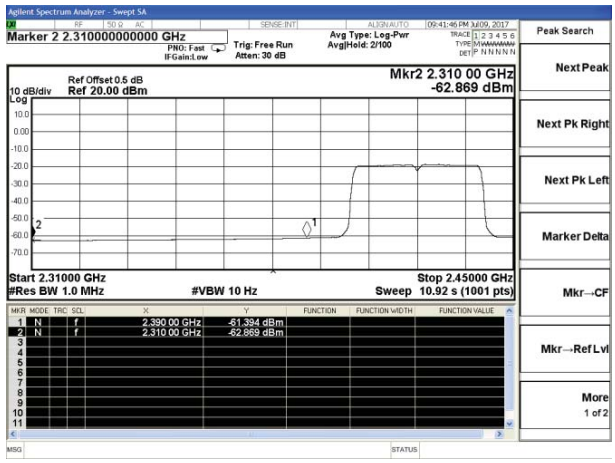
IEEE 802.11n HT40



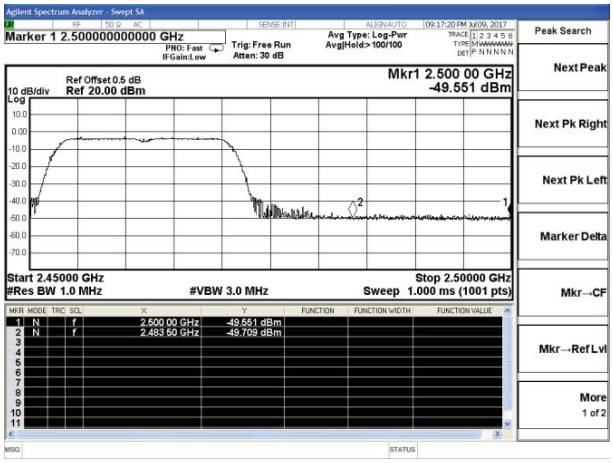
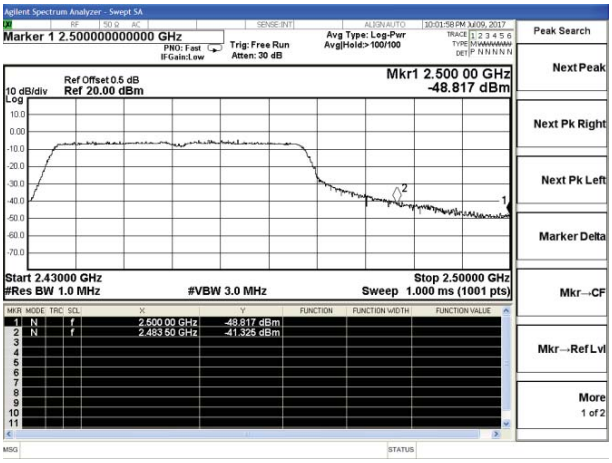
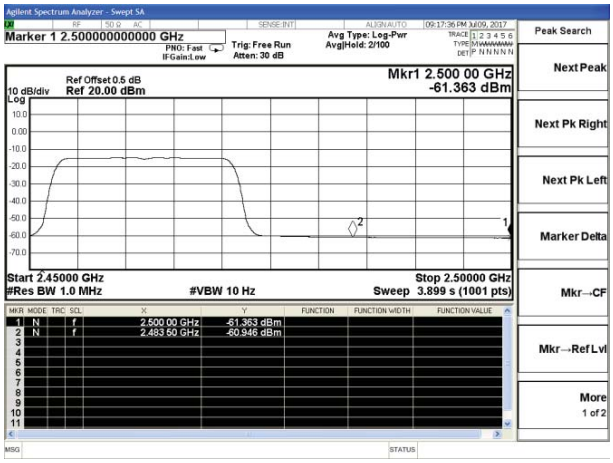
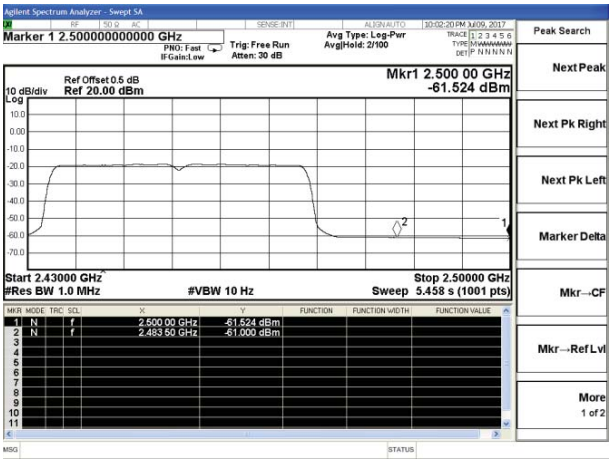
Channel 3 / 2422 MHz – Peak



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		8.48	8.10	8.24
Radiated power [dBm] Measured with DSSS modulation		10.155	9.812	10.081
Gain [dBi] Calculated		1.675	1.712	1.841
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		8.31	8.06	8.12
Radiated power [dBm] Measured with DSSS modulation		9.999	9.816	9.932
Gain [dBi] Calculated		1.689	1.756	1.812
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----------