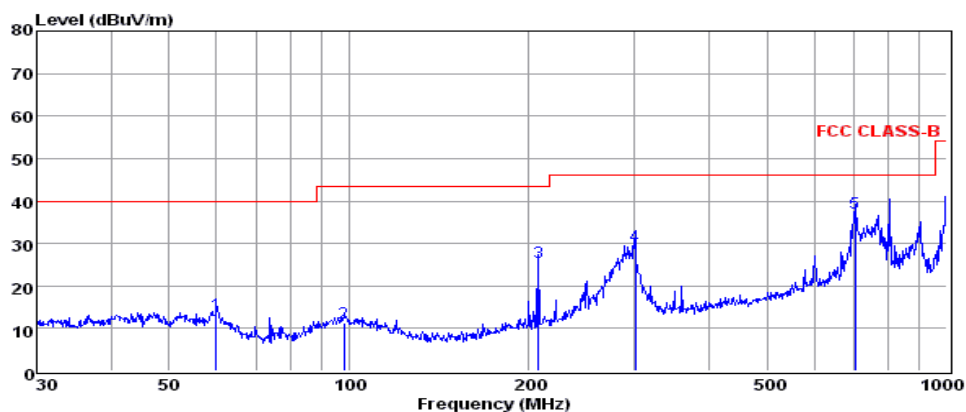




Env./Ins:
pol:

24°C/56%
HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	59.86	0.12	0.49	12.70	13.31	40.00	-26.69	QP
2	98.14	-2.40	0.61	13.04	11.25	43.50	-32.25	QP
3	207.12	13.84	0.86	10.79	25.49	43.50	-18.01	QP
4	301.42	15.17	1.13	13.08	29.38	46.00	-16.62	QP
5	701.76	16.79	1.70	18.83	37.32	46.00	-8.68	QP

Note: 1. All readings are Quasi-peak values.

2. Measured= Reading + Antenna Factor + Cable Loss

3. The emission that ate 20db blow the official limit are not reported

Note:

- 1). Pre-scan all modes and recorded the worst case results in this report (IEEE 802.11b (High Channel)).
Emission level (dBuV/m) = 20 log Emission level (uV/m).
- 2). Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.5.8. Results for Radiated Emissions (Above 1GHz)

IEEE 802.11b

Channel 1 / 2412MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4824.00	60.50	33.06	35.04	3.94	62.47	74.00	-11.53	Peak	Horizontal
4824.00	43.98	33.06	35.04	3.94	45.95	54.00	-8.05	Average	Horizontal
4824.00	58.79	33.06	35.04	3.94	60.76	74.00	-13.24	Peak	Vertical
4824.00	43.02	33.06	35.04	3.94	44.99	54.00	-9.01	Average	Vertical
16884.00	57.00	38.22	40.17	5.91	60.96	74.00	-13.04	Peak	Horizontal
16884.00	46.11	38.22	40.17	5.91	50.07	54.00	-3.93	Average	Horizontal
16884.00	60.23	38.22	40.17	5.91	64.19	74.00	-9.81	Peak	Vertical
16884.00	45.52	38.22	40.17	5.91	49.48	54.00	-4.52	Average	Vertical

Channel 6 / 2437MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	62.32	33.16	35.15	3.96	64.29	74.00	-9.71	Peak	Horizontal
4874.00	43.59	33.16	35.15	3.96	45.56	54.00	-8.44	Average	Horizontal
4874.00	58.70	33.16	35.15	3.96	60.67	74.00	-13.33	Peak	Vertical
4874.00	42.61	33.16	35.15	3.96	44.58	54.00	-9.42	Average	Vertical
17059.00	56.09	38.3	40.25	5.95	60.09	74.00	-13.91	Peak	Horizontal
17059.00	45.28	38.3	40.25	5.95	49.28	54.00	-4.72	Average	Horizontal
17059.00	61.22	38.3	40.25	5.95	65.22	74.00	-8.78	Peak	Vertical
17059.00	46.23	38.3	40.25	5.95	50.23	54.00	-3.77	Average	Vertical

Channel 11 / 2462MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4924.00	60.35	33.26	35.14	3.98	62.45	74.00	-11.55	Peak	Horizontal
4924.00	45.83	33.26	35.14	3.98	47.93	54.00	-6.07	Average	Horizontal
4924.00	57.36	33.26	35.14	3.98	59.46	74.00	-14.54	Peak	Vertical
4924.00	42.13	33.26	35.14	3.98	44.23	54.00	-9.77	Average	Vertical
17234.00	55.89	38.38	40.32	5.99	59.94	74.00	-14.06	Peak	Horizontal
17234.00	45.24	38.38	40.32	5.99	49.29	54.00	-4.71	Average	Horizontal
17234.00	61.51	38.38	40.32	5.99	65.56	74.00	-8.44	Peak	Vertical
17234.00	45.14	38.38	40.32	5.99	49.19	54.00	-4.81	Average	Vertical

IEEE 802.11g

Channel 1 / 2412MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4824.00	58.25	33.06	35.04	3.94	60.21	74.00	-13.79	Peak	Horizontal
4824.00	44.57	33.06	35.04	3.94	46.53	54.00	-7.47	Average	Horizontal
4824.00	55.87	33.06	35.04	3.94	57.83	74.00	-16.17	Peak	Vertical
4824.00	42.53	33.06	35.04	3.94	44.49	54.00	-9.51	Average	Vertical
16884.00	57.67	38.22	40.17	5.91	61.63	74.00	-12.37	Peak	Horizontal
16884.00	45.58	38.22	40.17	5.91	49.54	54.00	-4.46	Average	Horizontal
16884.00	60.18	38.22	40.17	5.91	64.14	74.00	-9.86	Peak	Vertical
16884.00	46.29	38.22	40.17	5.91	50.25	54.00	-3.75	Average	Vertical

Channel 6 / 2437MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	56.92	33.16	35.15	3.96	58.89	74.00	-15.11	Peak	Horizontal
4874.00	42.87	33.16	35.15	3.96	44.84	54.00	-9.16	Average	Horizontal
4874.00	55.95	33.16	35.15	3.96	57.92	74.00	-16.08	Peak	Vertical
4874.00	41.40	33.16	35.15	3.96	43.37	54.00	-10.63	Average	Vertical
17059.00	58.00	38.3	40.25	5.95	62.00	74.00	-12.00	Peak	Horizontal
17059.00	44.75	38.3	40.25	5.95	48.75	54.00	-5.25	Average	Horizontal
17059.00	59.90	38.3	40.25	5.95	63.90	74.00	-10.10	Peak	Vertical
17059.00	45.61	38.3	40.25	5.95	49.61	54.00	-4.39	Average	Vertical

Channel 11 / 2462MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4924.00	59.15	33.26	35.14	3.98	61.25	74.00	-12.75	Peak	Horizontal
4924.00	42.14	33.26	35.14	3.98	44.24	54.00	-9.76	Average	Horizontal
4924.00	57.38	33.26	35.14	3.98	59.48	74.00	-14.52	Peak	Vertical
4924.00	41.01	33.26	35.14	3.98	43.11	54.00	-10.89	Average	Vertical
17234.00	57.09	38.38	40.32	5.99	61.14	74.00	-12.86	Peak	Horizontal
17234.00	45.30	38.38	40.32	5.99	49.35	54.00	-4.65	Average	Horizontal
17234.00	61.04	38.38	40.32	5.99	65.09	74.00	-8.91	Peak	Vertical
17234.00	45.34	38.38	40.32	5.99	49.39	54.00	-4.61	Average	Vertical

IEEE 802.11n HT20

Channel 1 / 2412MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4824.00	58.59	33.06	35.04	3.94	60.55	74.00	-13.45	Peak	Horizontal
4824.00	43.62	33.06	35.04	3.94	45.58	54.00	-8.42	Average	Horizontal
4824.00	55.66	33.06	35.04	3.94	57.62	74.00	-16.38	Peak	Vertical
4824.00	43.50	33.06	35.04	3.94	45.46	54.00	-8.54	Average	Vertical
16884.00	56.90	38.22	40.17	5.91	60.86	74.00	-13.14	Peak	Horizontal
16884.00	44.89	38.22	40.17	5.91	48.85	54.00	-5.15	Average	Horizontal
16884.00	61.03	38.22	40.17	5.91	64.99	74.00	-9.01	Peak	Vertical
16884.00	46.19	38.22	40.17	5.91	50.15	54.00	-3.85	Average	Vertical

Channel 6 / 2437MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4874.00	57.01	33.16	35.15	3.96	58.98	74.00	-15.02	Peak	Horizontal
4874.00	42.71	33.16	35.15	3.96	44.68	54.00	-9.32	Average	Horizontal
4874.00	56.01	33.16	35.15	3.96	57.98	74.00	-16.02	Peak	Vertical
4874.00	41.71	33.16	35.15	3.96	43.68	54.00	-10.32	Average	Vertical
17059.00	57.13	38.3	40.25	5.95	61.13	74.00	-12.87	Peak	Horizontal
17059.00	45.44	38.3	40.25	5.95	49.44	54.00	-4.56	Average	Horizontal
17059.00	60.91	38.3	40.25	5.95	64.91	74.00	-9.09	Peak	Vertical
17059.00	47.06	38.3	40.25	5.95	51.06	54.00	-2.94	Average	Vertical

Channel 11 / 2462MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4924.00	57.76	33.26	35.14	3.98	59.86	74.00	-14.14	Peak	Horizontal
4924.00	41.43	33.26	35.14	3.98	43.53	54.00	-10.47	Average	Horizontal
4924.00	57.50	33.26	35.14	3.98	59.60	74.00	-14.40	Peak	Vertical
4924.00	41.03	33.26	35.14	3.98	43.13	54.00	-10.87	Average	Vertical
17234.00	57.44	38.38	40.32	5.99	61.49	74.00	-12.51	Peak	Horizontal
17234.00	45.13	38.38	40.32	5.99	49.18	54.00	-4.82	Average	Horizontal
17234.00	60.25	38.38	40.32	5.99	64.30	74.00	-9.70	Peak	Vertical
17234.00	47.01	38.38	40.32	5.99	51.06	54.00	-2.94	Average	Vertical

BT LE

Channel 1 / 2402MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4804.00	56.29	33.06	35.04	3.94	58.25	74.00	-15.75	Peak	Horizontal
4804.00	40.63	33.06	35.04	3.94	42.59	54.00	-11.41	Average	Horizontal
4804.00	53.34	33.06	35.04	3.94	55.30	74.00	-18.70	Peak	Vertical
4804.00	37.07	33.06	35.04	3.94	39.03	54.00	-14.97	Average	Vertical
16814.00	54.19	38.22	40.17	5.91	58.15	74.00	-15.85	Peak	Horizontal
16814.00	42.35	38.22	40.17	5.91	46.31	54.00	-7.69	Average	Horizontal
16814.00	57.44	38.22	40.17	5.91	61.40	74.00	-12.60	Peak	Vertical
16814.00	43.08	38.22	40.17	5.91	47.04	54.00	-6.96	Average	Vertical

Channel 19 / 2440MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4880.00	54.64	33.16	35.15	3.96	56.61	74.00	-17.39	Peak	Horizontal
4880.00	38.46	33.16	35.15	3.96	40.43	54.00	-13.57	Average	Horizontal
4880.00	51.65	33.16	35.15	3.96	53.62	74.00	-20.38	Peak	Vertical
4880.00	37.51	33.16	35.15	3.96	39.48	54.00	-14.52	Average	Vertical
17080.00	54.73	38.3	40.25	5.95	58.73	74.00	-15.27	Peak	Horizontal
17080.00	42.91	38.3	40.25	5.95	46.91	54.00	-7.09	Average	Horizontal
17080.00	56.59	38.3	40.25	5.95	60.59	74.00	-13.41	Peak	Vertical
17080.00	44.04	38.3	40.25	5.95	48.04	54.00	-5.96	Average	Vertical

Channel 40 / 2480MHz

Freq. MHz	Reading dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4960.00	54.01	33.26	35.14	3.98	56.11	74.00	-17.89	Peak	Horizontal
4960.00	38.70	33.26	35.14	3.98	40.80	54.00	-13.20	Average	Horizontal
4960.00	53.72	33.26	35.14	3.98	55.82	74.00	-18.18	Peak	Vertical
4960.00	37.90	33.26	35.14	3.98	40.00	54.00	-14.00	Average	Vertical
17360.00	54.57	38.38	40.32	5.99	58.62	74.00	-15.38	Peak	Horizontal
17360.00	41.73	38.38	40.32	5.99	45.78	54.00	-8.22	Average	Horizontal
17360.00	56.65	38.38	40.32	5.99	60.70	74.00	-13.30	Peak	Vertical
17360.00	42.28	38.38	40.32	5.99	46.33	54.00	-7.67	Average	Vertical

Notes:

1. Measuring frequencies from 9 KHz~10th harmonic or 26.5GHz (which is less), No emission found between lowest internal used/generated frequency to 30MHz.
2. Radiated emissions measured in frequency range from 9 KHz~10th harmonic or 26.5GHz (which is less) were made with an instrument using Peak detector mode.

3. Data of measurement within this frequency range shown “---” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
4. Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20

5.6. Conducted Spurious Emissions and Band Edges Test

5.6.1. Standard Applicable

According to §15.247 (d): 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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

5.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
RB / VB (Emission in restricted band)	100KHz/300KHz
RB / VB (Emission in non-restricted band)	100KHz/300KHz

5.6.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9 KHz to 26.5GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

5.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 5.4.4.

5.6.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.6.6. Test Results of Conducted Spurious Emissions

Temperature	25°C	Humidity	60%
Test Engineer	Kyle.Yin	Configurations	IEEE 802.11b/g/n & BT LE

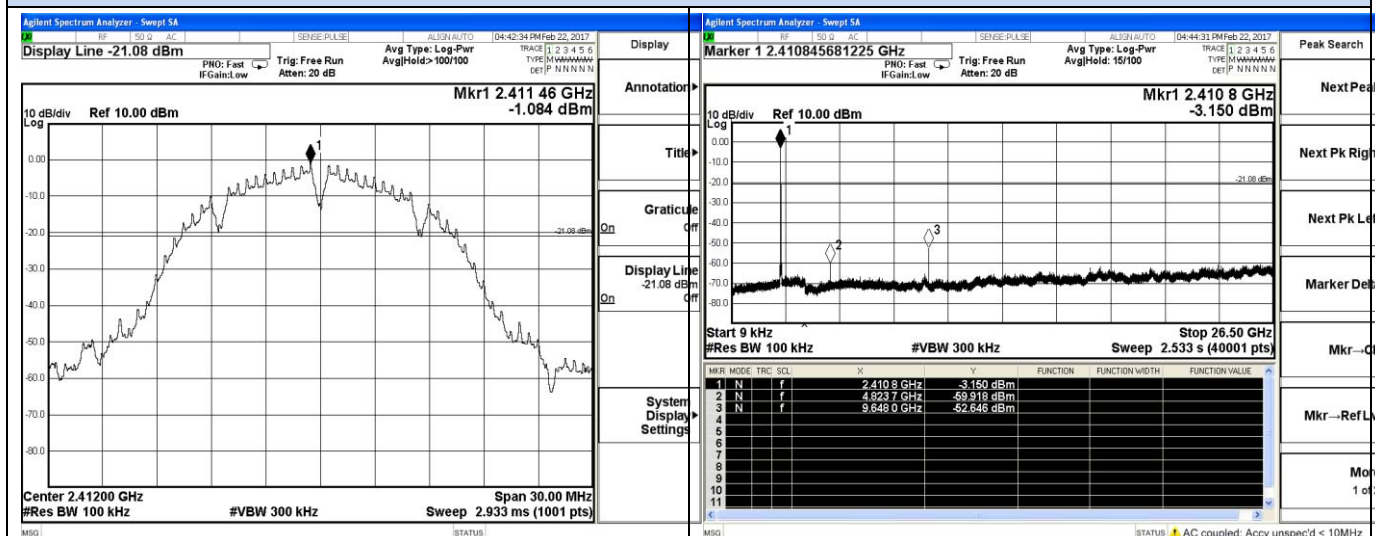
Test Mode	Channel	Frequency (MHz)	Spurious RF Conducted Emission (dBc)	Limits (dBc)	Verdict
IEEE 802.11b	1	2412	<-20	-20	PASS
	6	2437	<-20		
	11	2462	<-20		
IEEE 802.11g	1	2412	<-20	-20	PASS
	6	2437	<-20		
	11	2462	<-20		
IEEE 802.11n HT20	1	2412	<-20	-20	PASS
	6	2437	<-20		
	11	2462	<-20		
BT – LE	0	2402	<-20	-20	PASS
	19	2440	<-20		
	39	2480	<-20		

Remark:

1. Measured RF conducted spurious emission 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;
“---“means that the fundamental frequency not for 15.209 limits requirement.
4. Please refer to following plots;

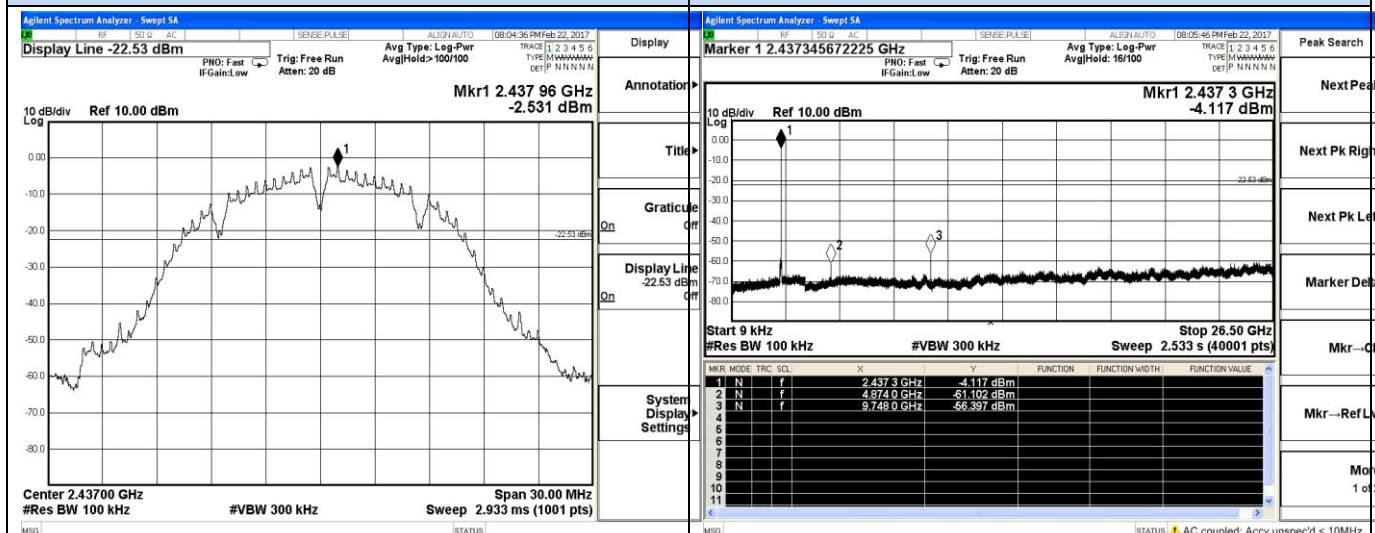
RF Conducted Spurious Emission

IEEE 802.11b



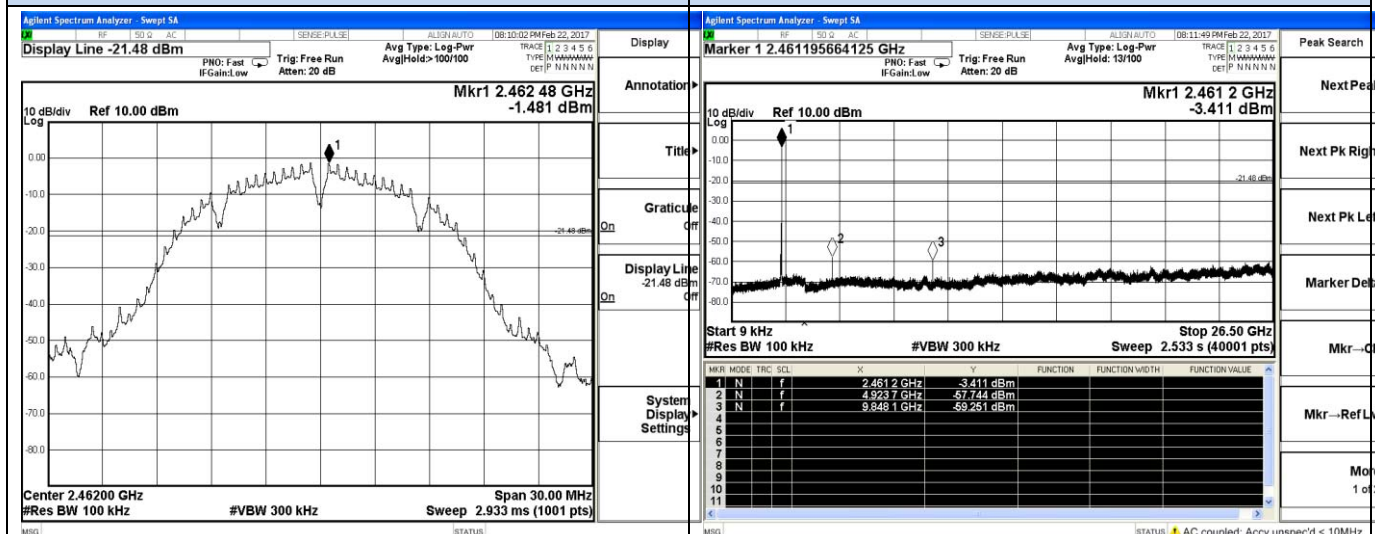
2397 MHz – 2427 MHz

9 KHz – 26.5 GHz



2422 MHz – 2452 MHz

9 KHz – 26.5 GHz

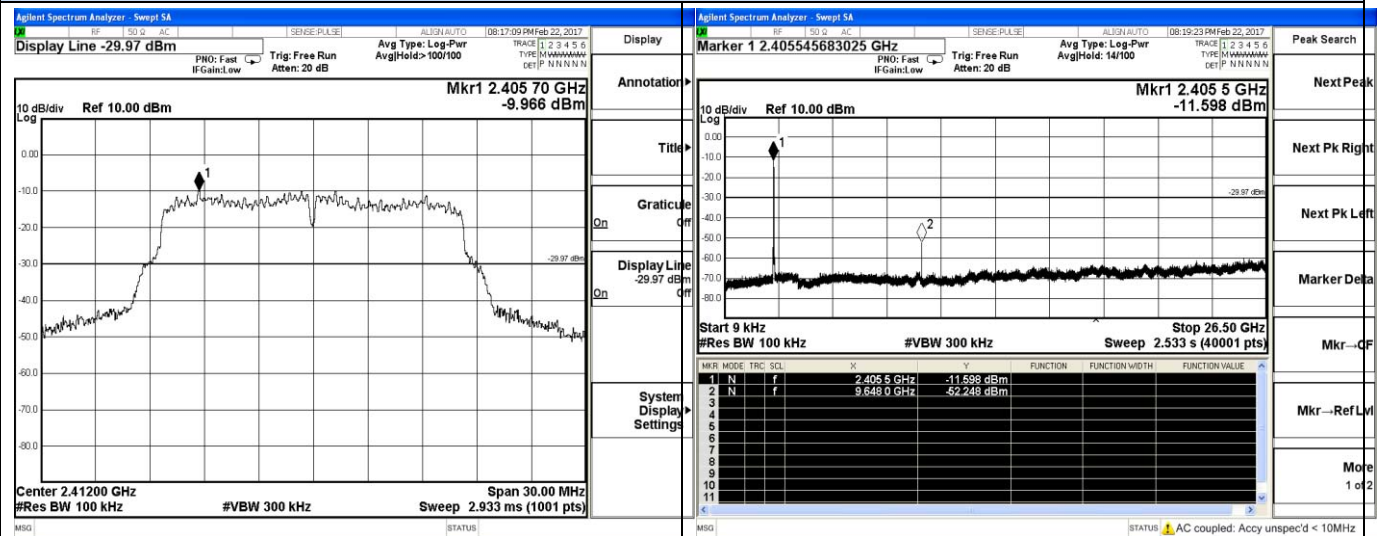


2447 MHz – 2477 MHz

9 KHz – 26.5 GHz

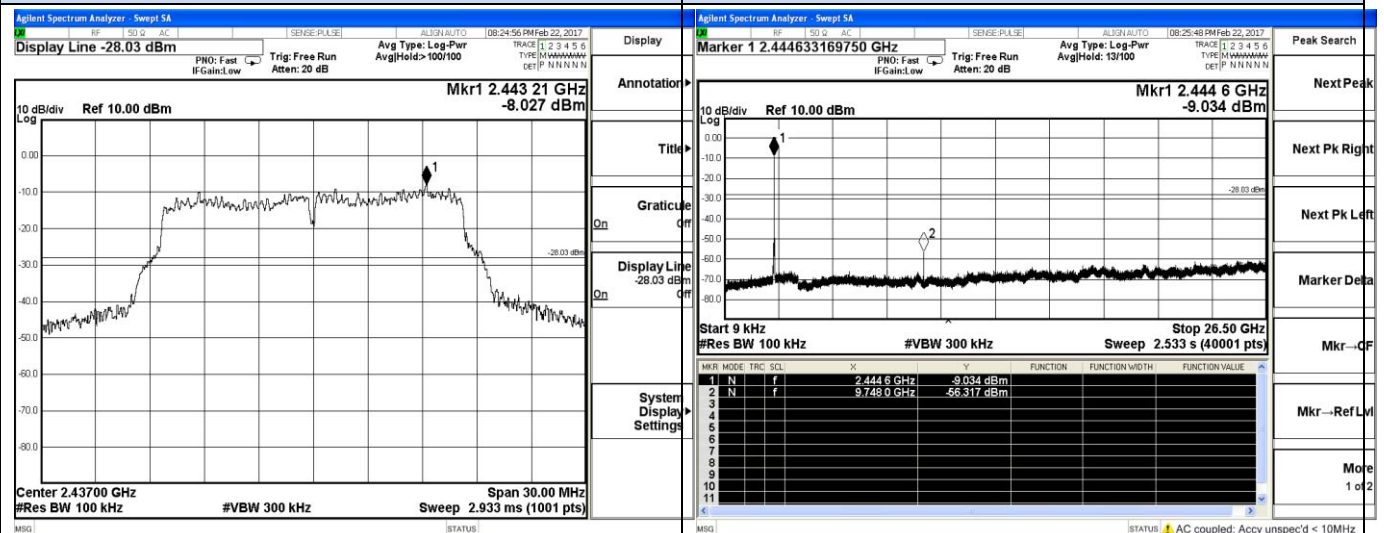
RF Conducted Spurious Emission

IEEE 802.11g



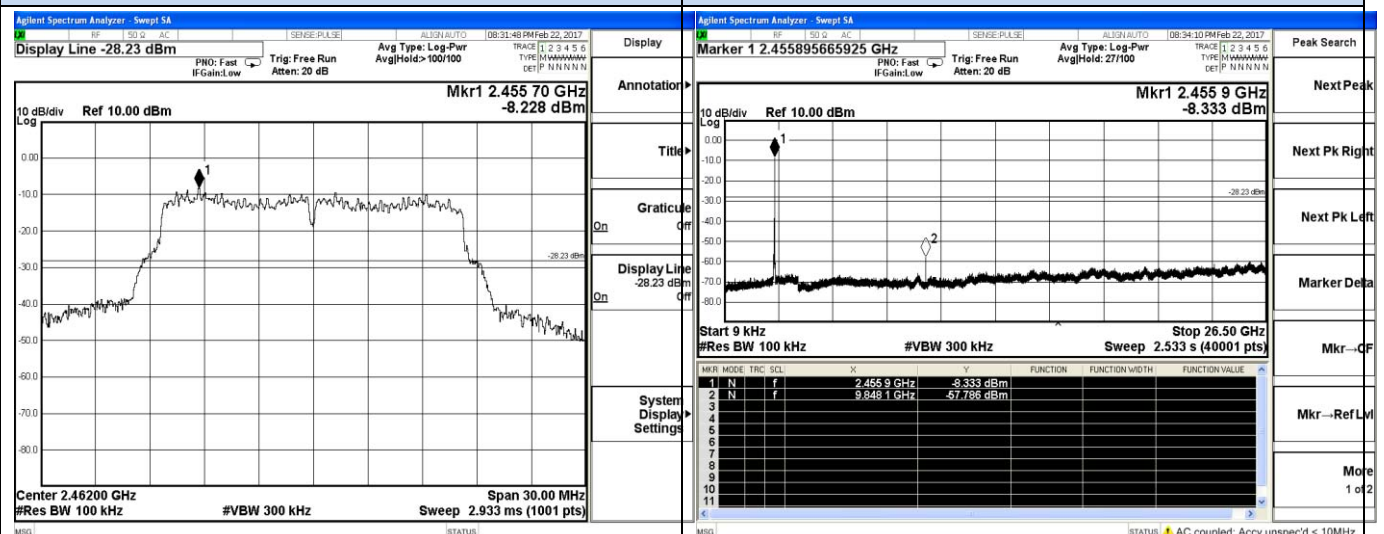
2397 MHz – 2427 MHz

9 KHz – 26.5 GHz



2422 MHz – 2452 MHz

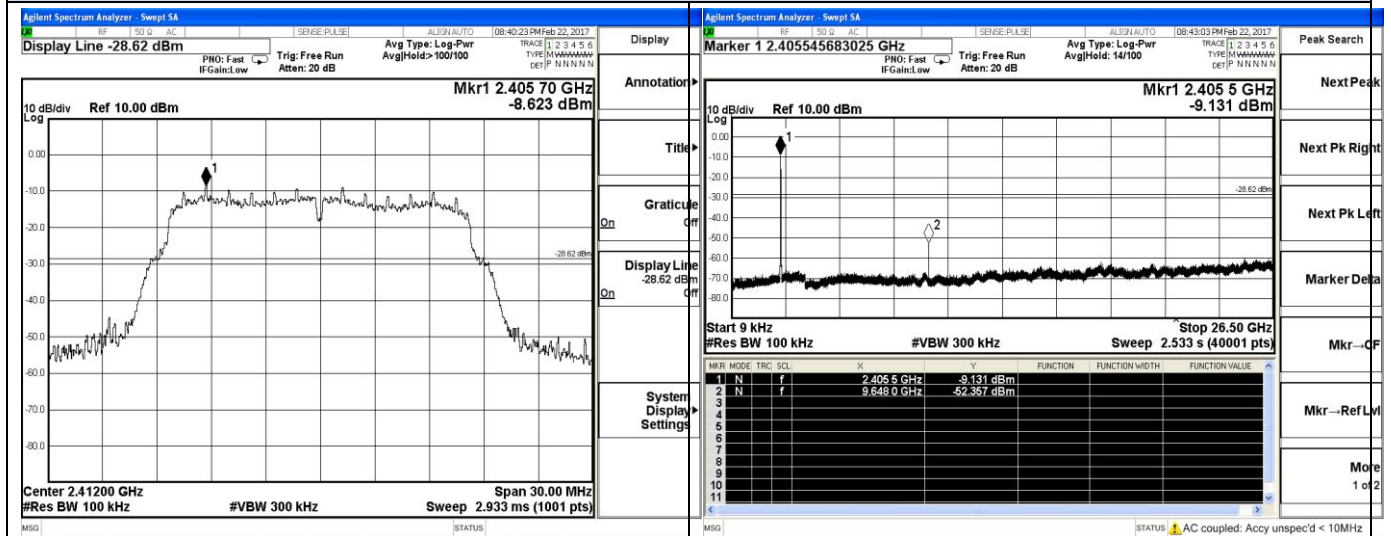
9 KHz – 26.5 GHz



2447 MHz – 2477 MHz

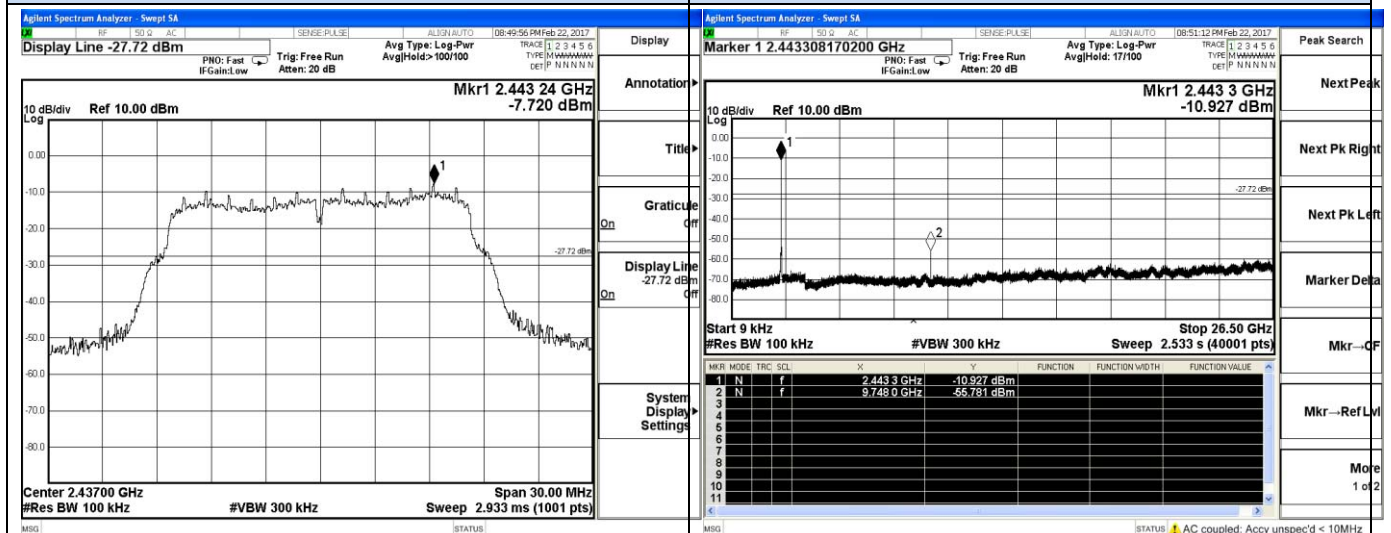
9 KHz – 26.5 GHz

RF Conducted Spurious Emission IEEE 802.11n HT20



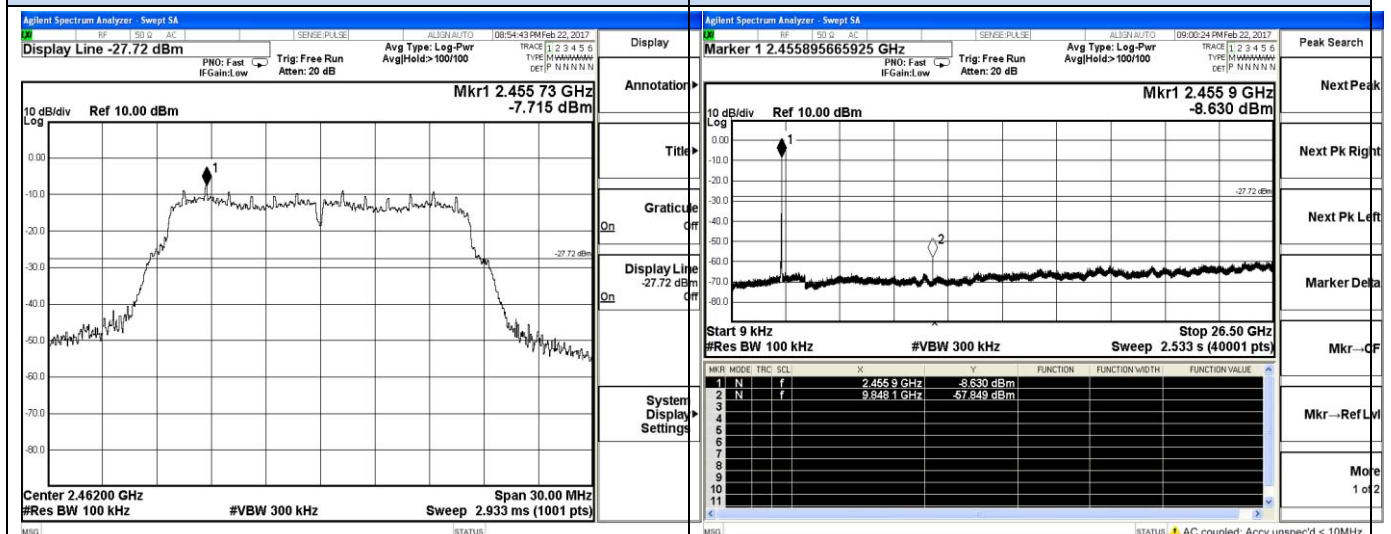
2397 MHz – 2427 MHz

9 KHz – 26.5 GHz



2422 MHz – 2452 MHz

9 KHz – 26.5 GHz

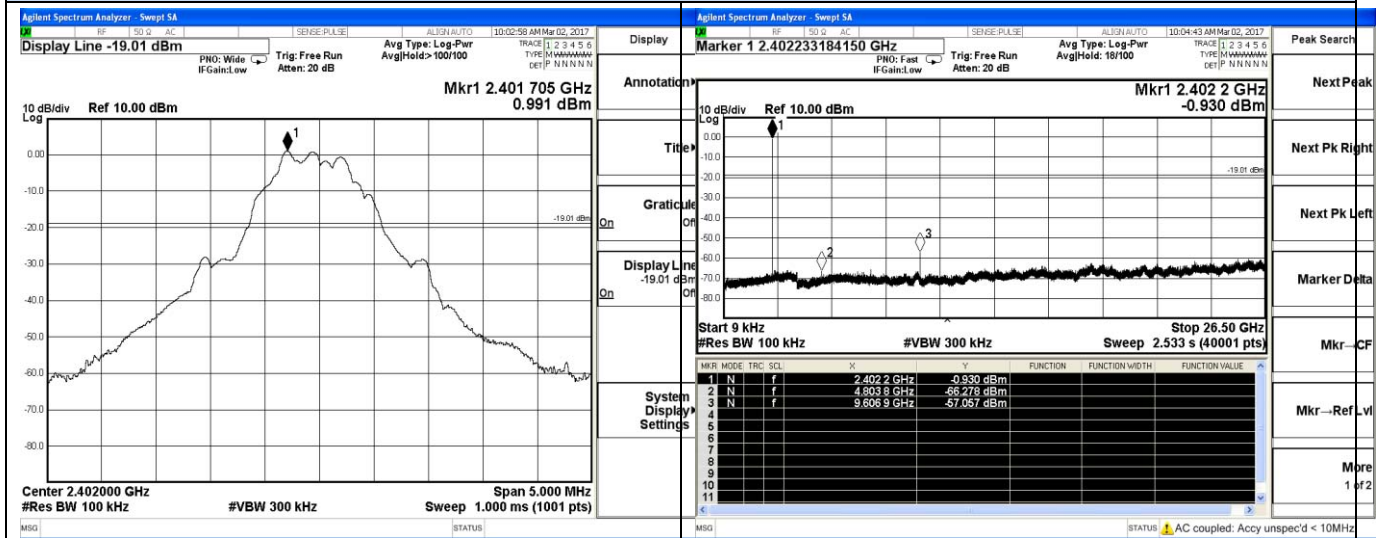


2447 MHz – 2477 MHz

9 KHz – 26.5 GHz

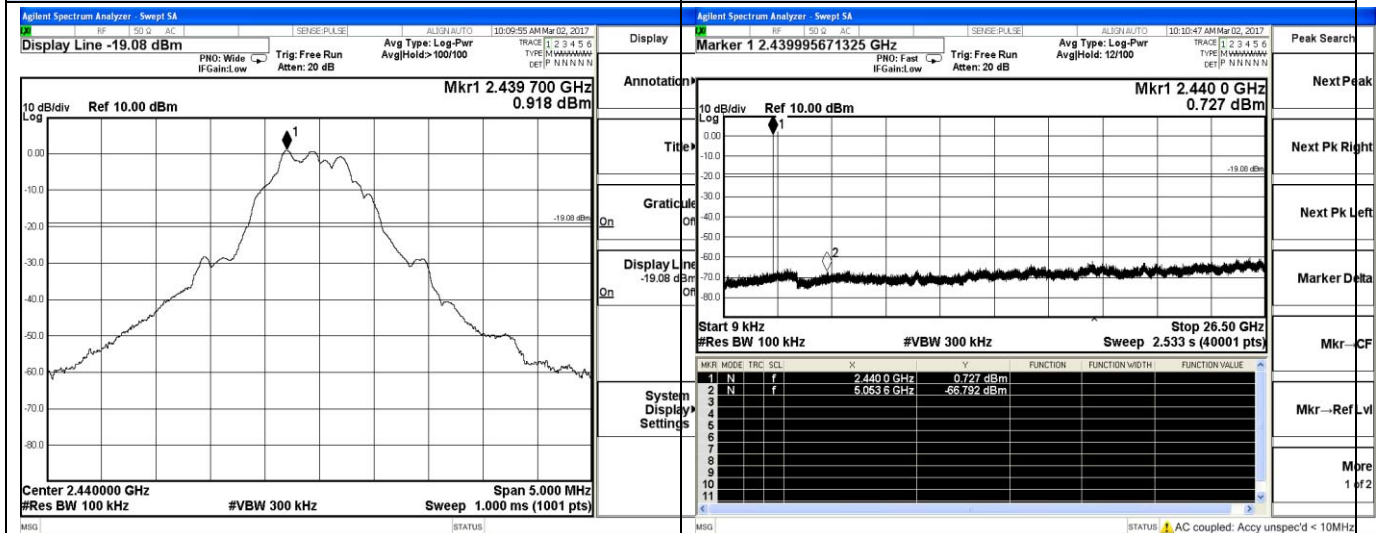
RF Conducted Spurious Emission

BT LE



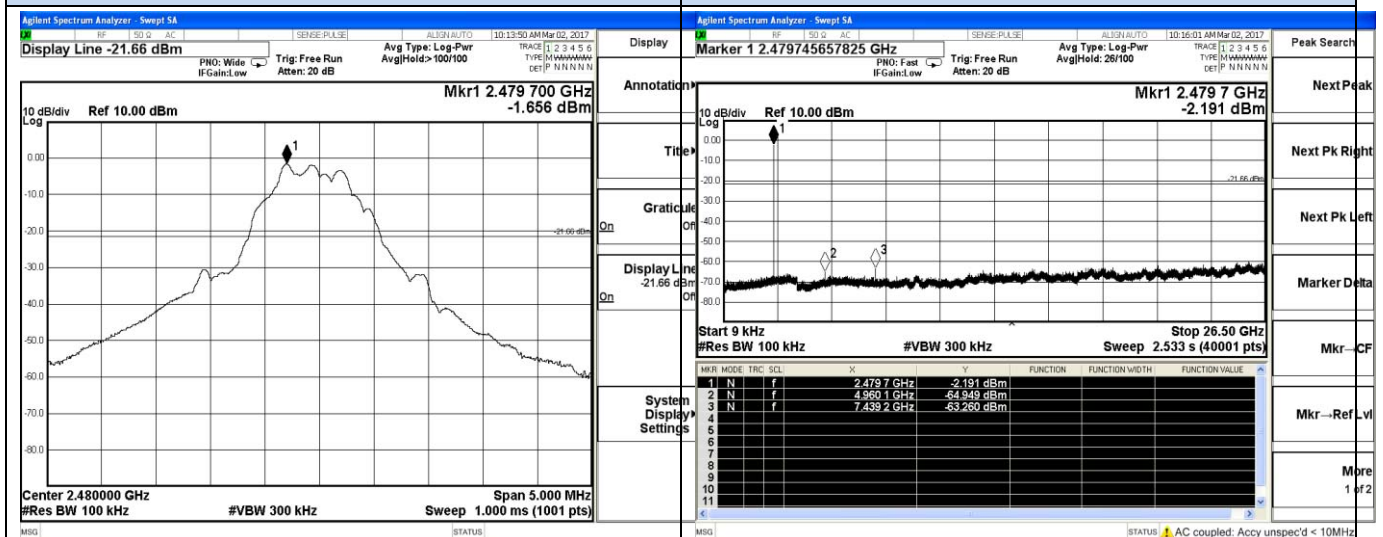
2399.5 MHz – 2404.5 MHz

9 KHz – 26.5 GHz



2437.5 MHz - 2442.5 MHz

9 KHz – 26.5 GHz

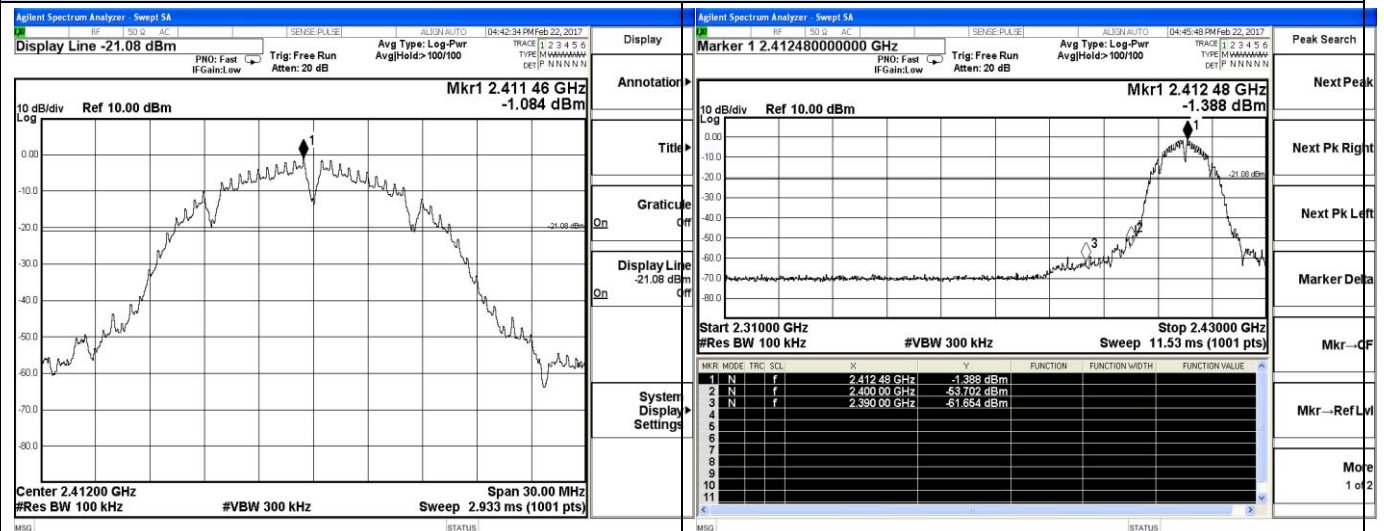


2477.5 MHz - 2482.5 MHz

9 KHz – 26.5 GHz

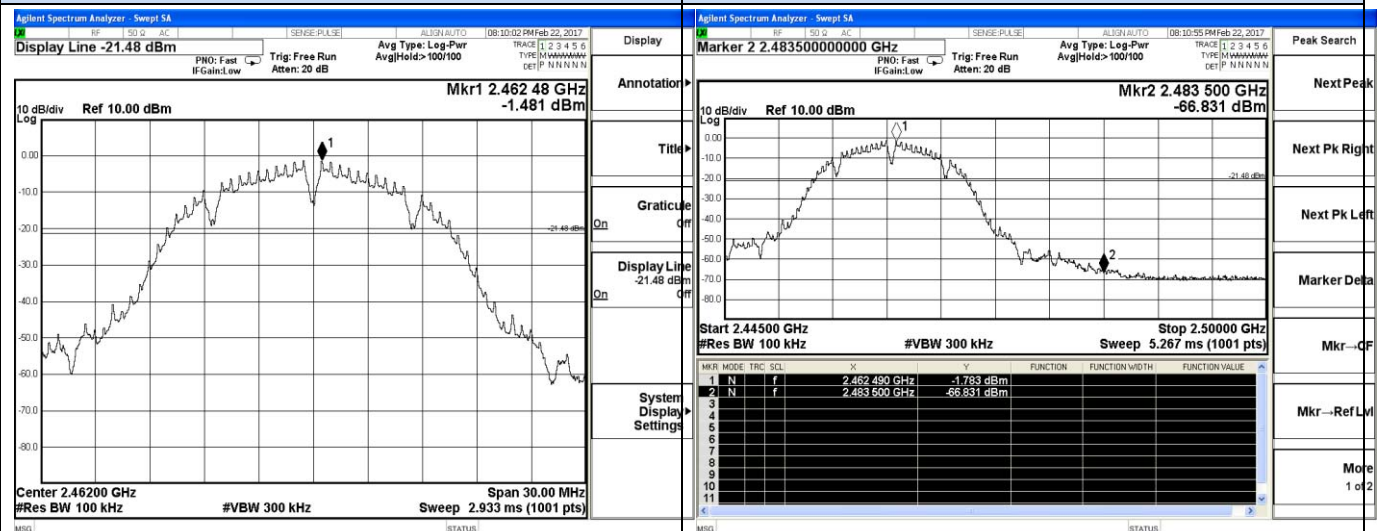
Band-edge measurements for conducted emissions

IEEE 802.11b



2397 MHz – 2427 MHz

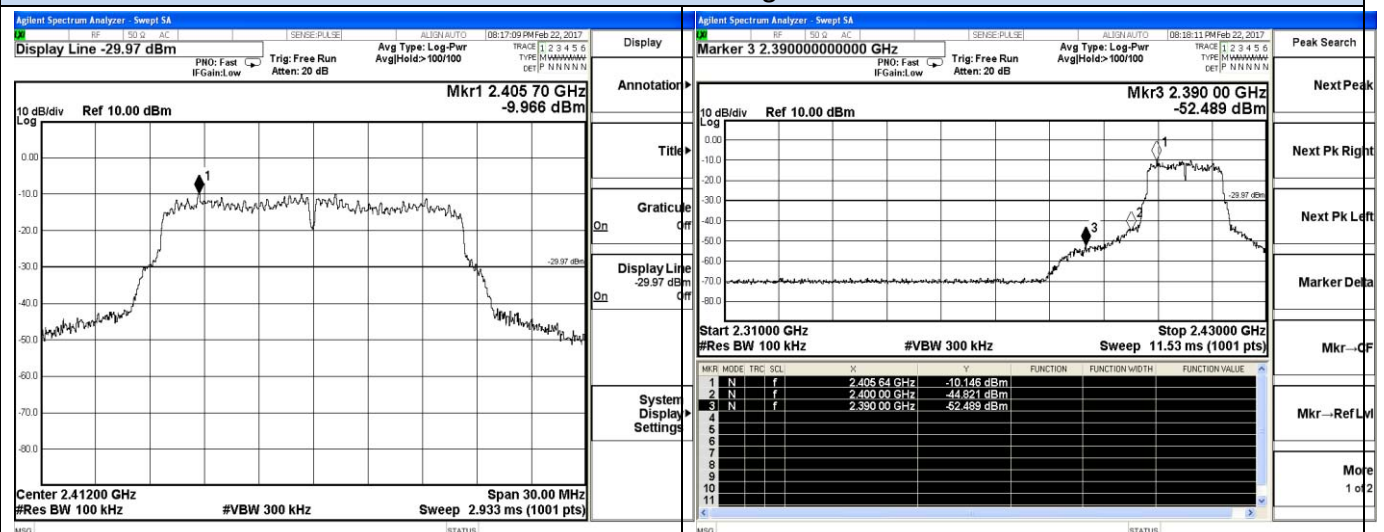
Channel 1 / 2412 MHz



2447 MHz – 2477 MHz

Channel 11 / 2462 MHz

IEEE 802.11g

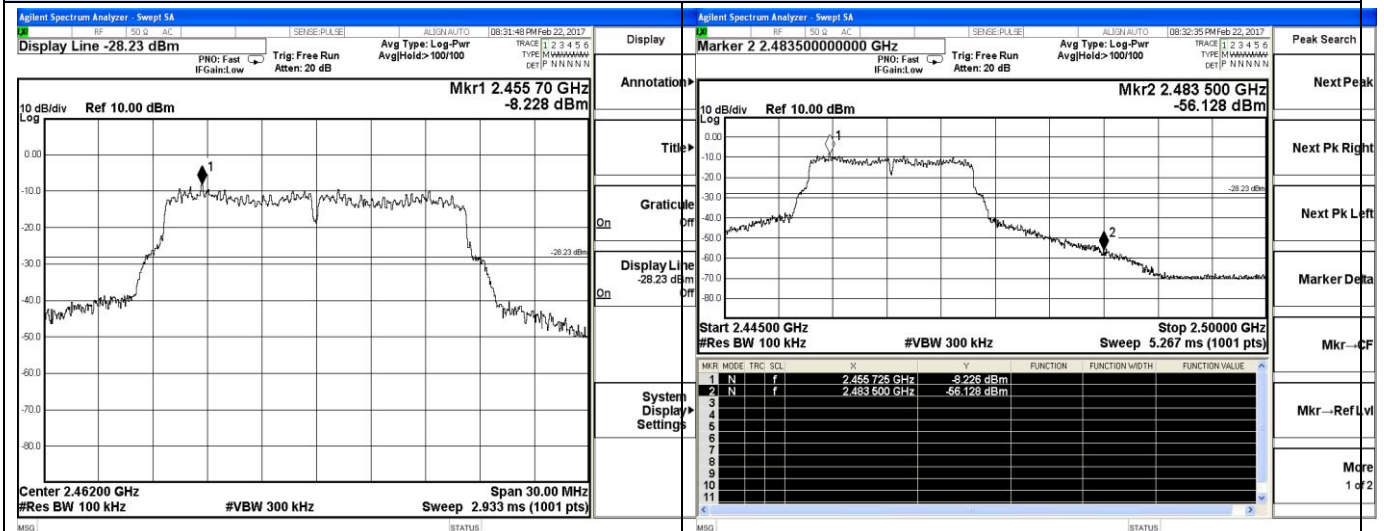


2397 MHz – 2427 MHz

Channel 1 / 2412 MHz

Band-edge measurements for conducted emissions

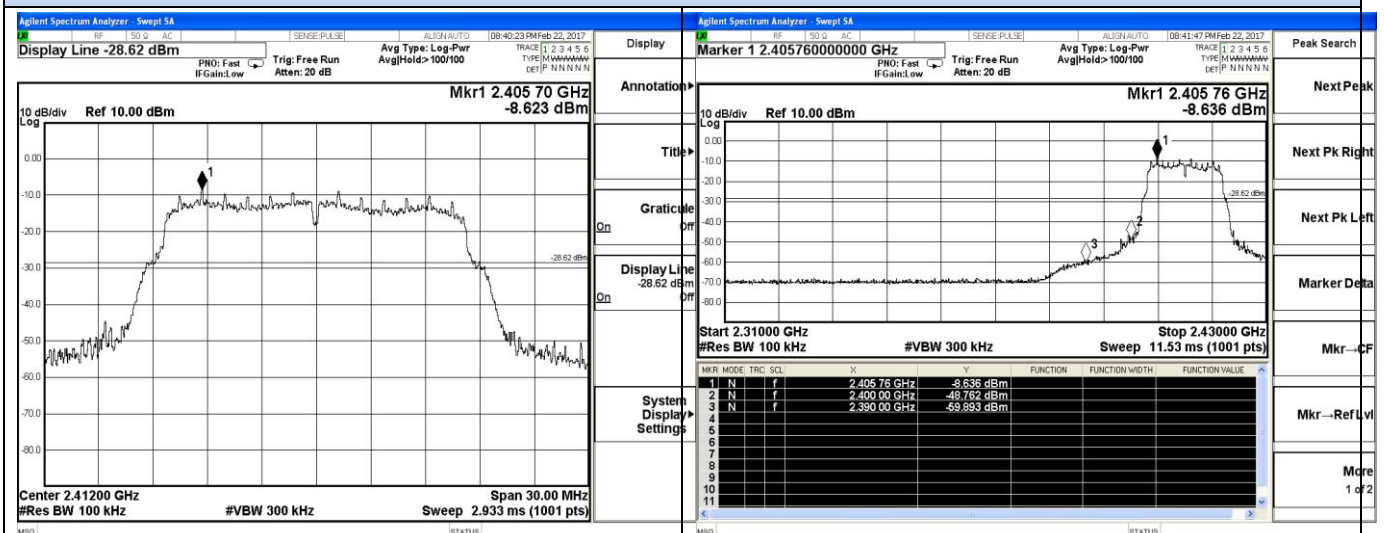
IEEE 802.11g



2447 MHz – 2477 MHz

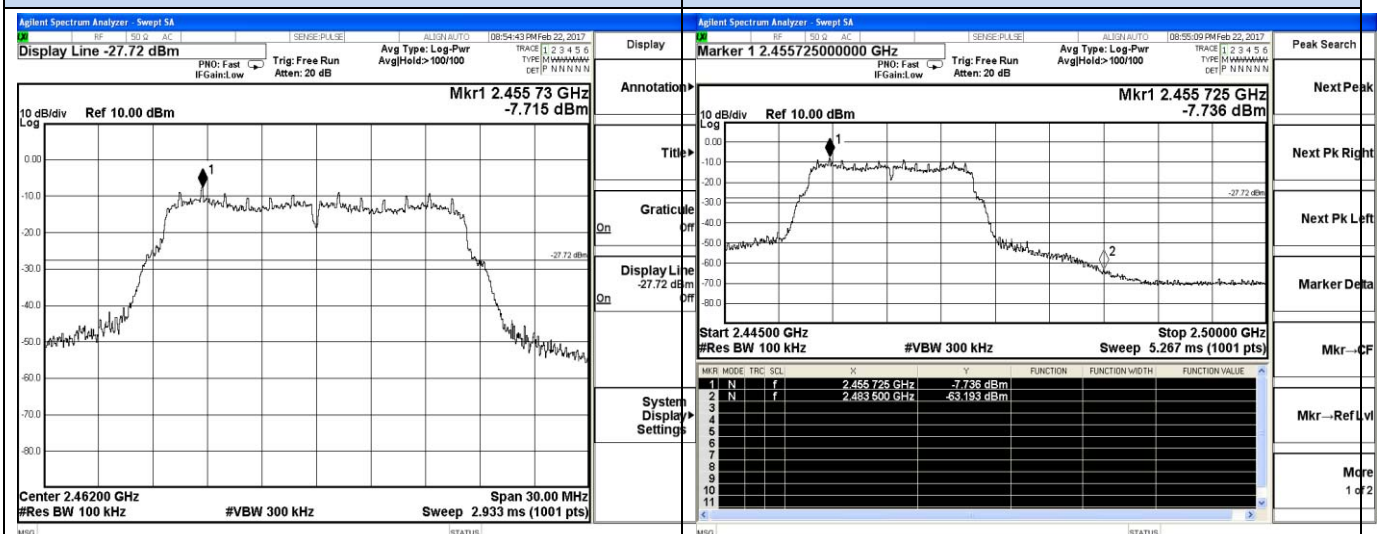
Channel 11 / 2462 MHz

IEEE 802.11n HT20



2397 MHz – 2427 MHz

Channel 1 / 2412 MHz

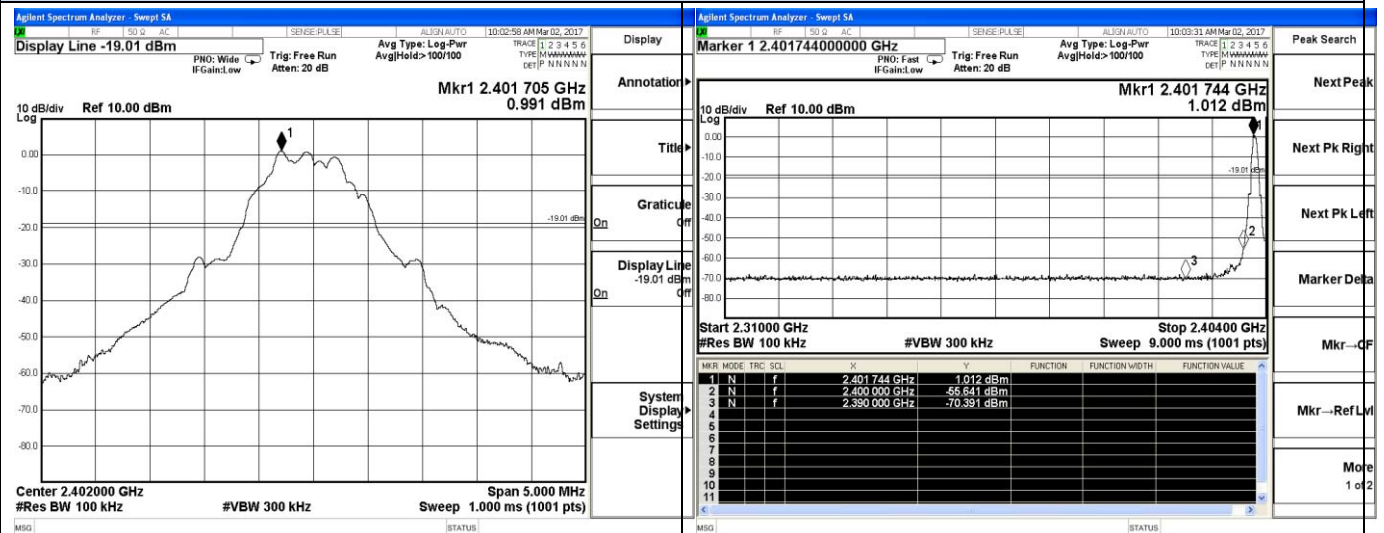


2447 MHz – 2477 MHz

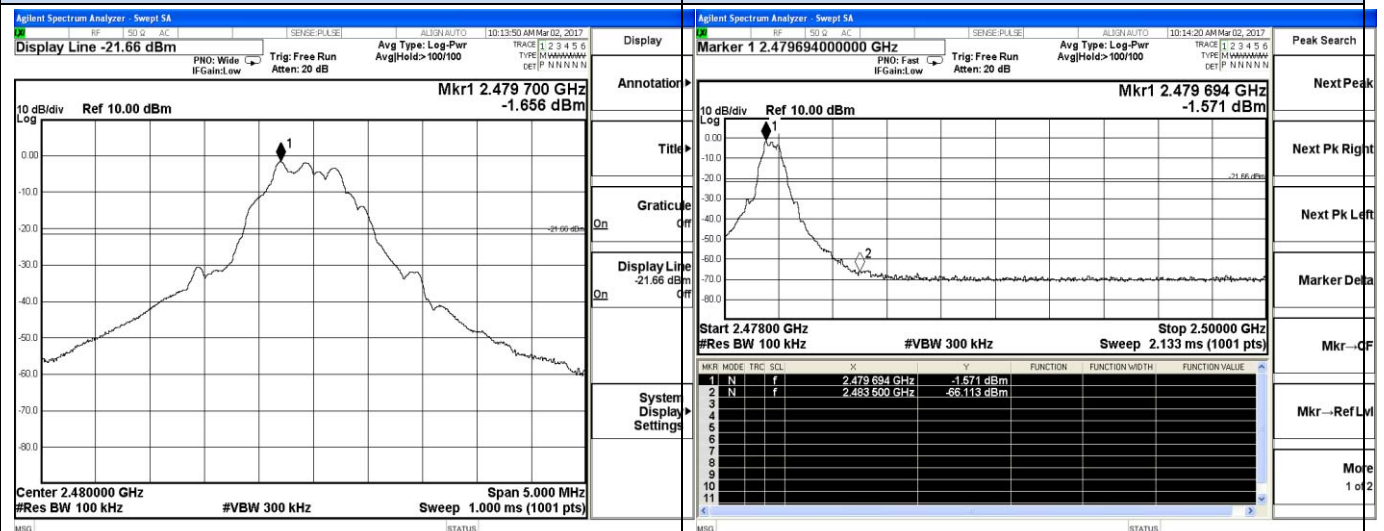
Channel 11 / 2462 MHz

Band-edge measurements for conducted emissions

BT – LE

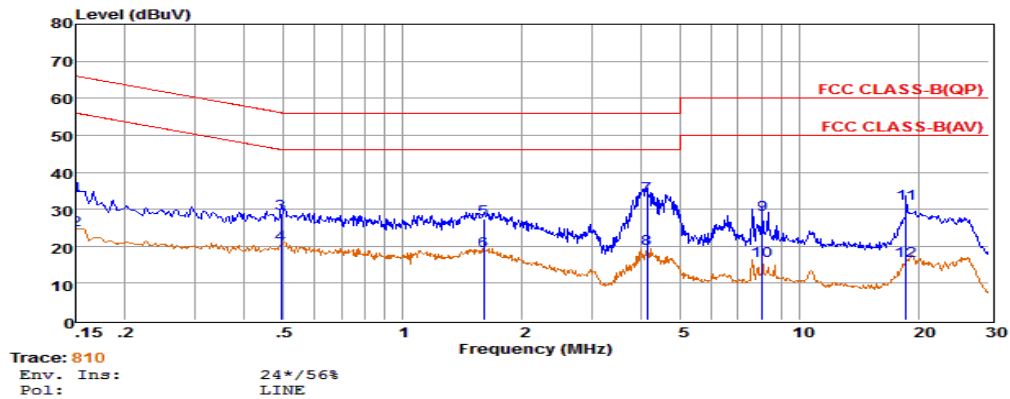


2399.5 MHz – 2404.5 MHz



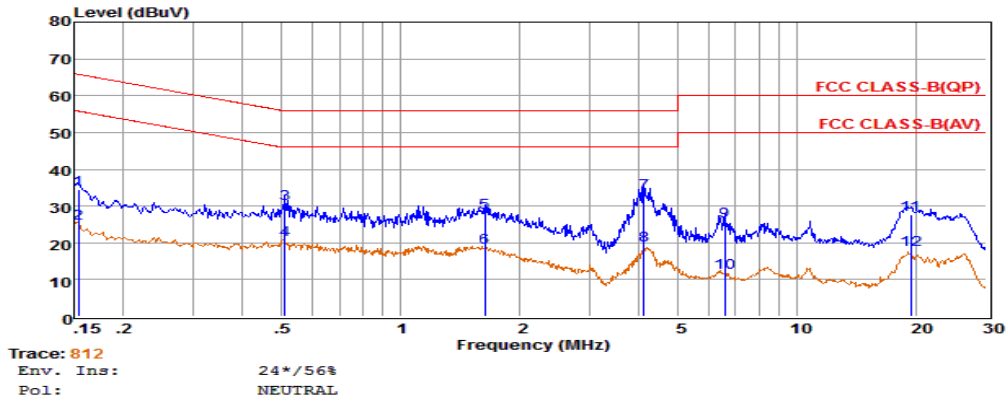
2477.5 MHz - 2482.5 MHz

Channel 39 / 2480 MHz

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

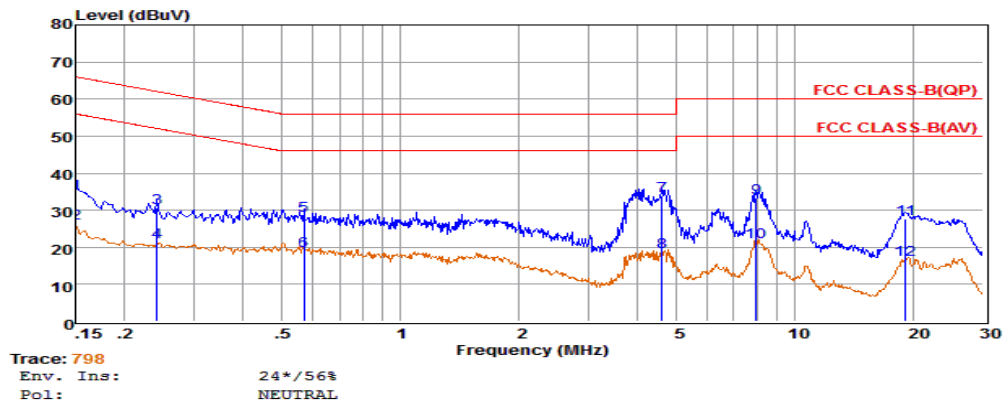
	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	14.09	9.57	0.02	10.00	33.68	66.00	-32.32	QP
2	0.15	4.82	9.57	0.02	10.00	24.41	55.99	-31.58	Average
3	0.49	9.24	9.62	0.04	10.00	28.90	56.10	-27.20	QP
4	0.49	0.78	9.62	0.04	10.00	20.44	46.10	-25.66	Average
5	1.60	7.60	9.64	0.05	10.00	27.29	56.00	-28.71	QP
6	1.60	-0.83	9.64	0.05	10.00	18.86	46.00	-27.14	Average
7	4.14	13.99	9.65	0.06	10.00	33.70	56.00	-22.30	QP
8	4.14	-0.27	9.65	0.06	10.00	19.44	46.00	-26.56	Average
9	8.06	8.79	9.68	0.07	10.00	28.54	60.00	-31.46	QP
10	8.06	-3.81	9.68	0.07	10.00	15.94	50.00	-34.06	Average
11	18.52	11.70	9.75	0.11	10.00	31.56	60.00	-28.44	QP
12	18.52	-3.78	9.75	0.11	10.00	16.08	50.00	-33.92	Average

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



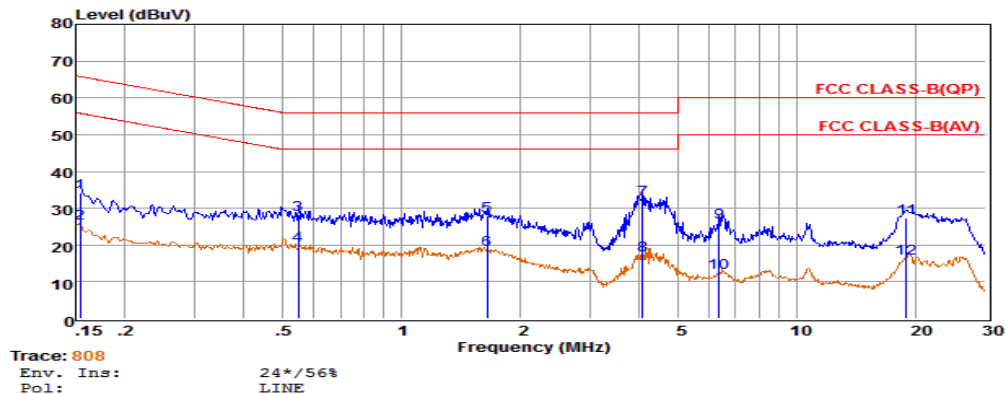
	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	14.70	9.69	0.02	10.00	34.41	65.78	-31.37	QP
2	0.15	5.47	9.69	0.02	10.00	25.18	55.77	-30.59	Average
3	0.51	11.01	9.62	0.04	10.00	30.67	56.00	-25.33	QP
4	0.51	1.23	9.62	0.04	10.00	20.89	46.00	-25.11	Average
5	1.63	8.59	9.63	0.05	10.00	28.27	56.00	-27.73	QP
6	1.63	-1.00	9.63	0.05	10.00	18.68	46.00	-27.32	Average
7	4.11	13.81	9.65	0.06	10.00	33.52	56.00	-22.48	QP
8	4.11	-0.45	9.65	0.06	10.00	19.26	46.00	-26.74	Average
9	6.56	6.11	9.68	0.07	10.00	25.86	60.00	-34.14	QP
10	6.56	-7.80	9.68	0.07	10.00	11.95	50.00	-38.05	Average
11	19.33	7.70	9.86	0.12	10.00	27.68	60.00	-32.32	QP
12	19.33	-1.72	9.86	0.12	10.00	18.26	50.00	-31.74	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/50Hz @ IEEE 802.11b-Low channel (worst case)

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	14.78	9.70	0.02	10.00	34.50	66.00	-31.50	QP
2	0.15	6.70	9.70	0.02	10.00	26.42	55.99	-29.57	Average
3	0.24	11.03	9.60	0.03	10.00	30.66	62.04	-31.38	QP
4	0.24	1.69	9.60	0.03	10.00	21.32	52.04	-30.72	Average
5	0.57	8.75	9.62	0.04	10.00	28.41	56.00	-27.59	QP
6	0.57	-0.48	9.62	0.04	10.00	19.18	46.00	-26.82	Average
7	4.60	14.28	9.66	0.06	10.00	34.00	56.00	-22.00	QP
8	4.60	-0.87	9.66	0.06	10.00	18.85	46.00	-27.15	Average
9	7.98	13.44	9.70	0.07	10.00	33.21	60.00	-26.79	QP
10	7.98	1.55	9.70	0.07	10.00	21.32	50.00	-28.68	Average
11	19.12	7.60	9.85	0.12	10.00	27.57	60.00	-32.43	QP
12	19.12	-3.43	9.85	0.12	10.00	16.54	50.00	-33.46	Average

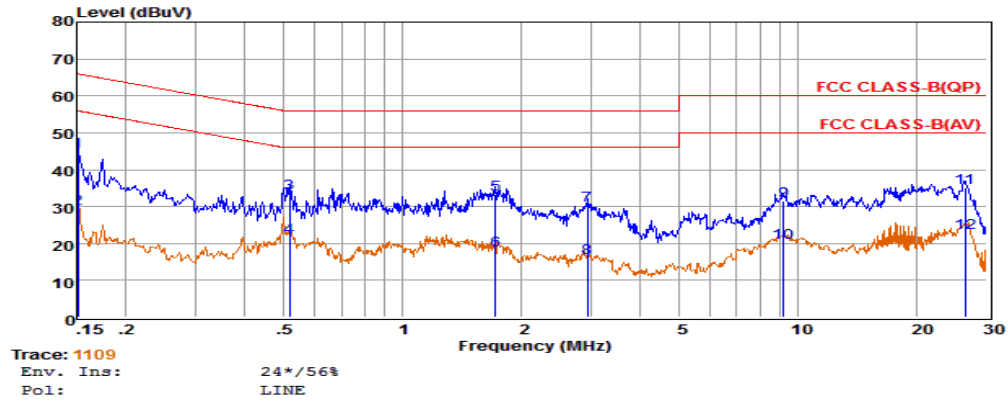
Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.



	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	14.56	9.58	0.02	10.00	34.16	65.78	-31.62	QP
2	0.15	6.14	9.58	0.02	10.00	25.74	55.77	-30.03	Average
3	0.55	8.62	9.63	0.04	10.00	28.29	56.00	-27.71	QP
4	0.55	0.26	9.63	0.04	10.00	19.93	46.00	-26.07	Average
5	1.64	8.22	9.64	0.05	10.00	27.91	56.00	-28.09	QP
6	1.65	-0.90	9.64	0.05	10.00	18.79	46.00	-27.21	Average
7	4.07	12.63	9.65	0.06	10.00	32.34	56.00	-23.66	QP
8	4.07	-2.51	9.65	0.06	10.00	17.20	46.00	-28.80	Average
9	6.35	6.56	9.67	0.07	10.00	26.30	60.00	-33.70	QP
10	6.35	-7.30	9.67	0.07	10.00	12.44	50.00	-37.56	Average
11	18.92	7.58	9.75	0.11	10.00	27.44	60.00	-32.56	QP
12	18.92	-3.44	9.75	0.11	10.00	16.42	50.00	-33.58	Average

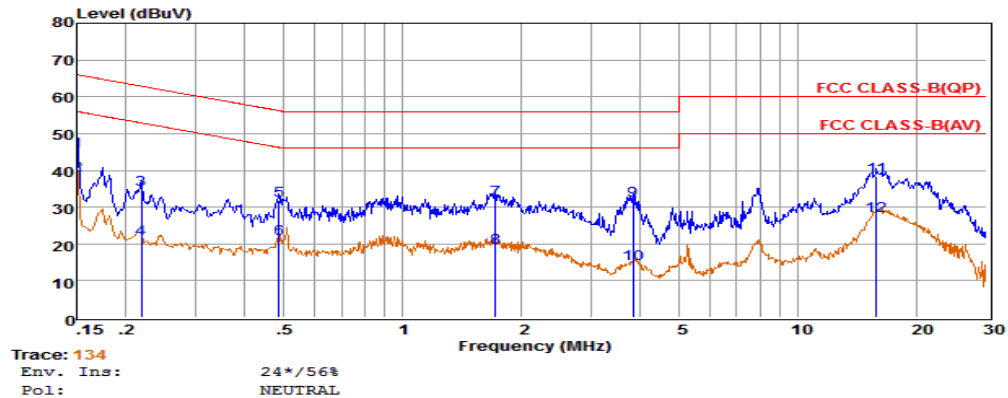
Remarks: 1. Measured = Reading +Cable Loss +Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

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

AC Conducted Emission of power adapter @ AC 120V/60Hz @ BT LE-Low channel (worst case)

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	25.31	9.57	0.02	10.00	44.90	65.96	-21.06	QP
2	0.15	9.92	9.57	0.02	10.00	29.51	55.95	-26.44	Average
3	0.52	13.89	9.62	0.04	10.00	33.55	56.00	-22.45	QP
4	0.52	2.16	9.62	0.04	10.00	21.82	46.00	-24.18	Average
5	1.72	13.66	9.64	0.05	10.00	33.35	56.00	-22.65	QP
6	1.72	-1.61	9.64	0.05	10.00	18.08	46.00	-27.92	Average
7	2.93	10.55	9.64	0.06	10.00	30.25	56.00	-25.75	QP
8	2.93	-3.69	9.64	0.06	10.00	16.01	46.00	-29.99	Average
9	9.20	11.80	9.69	0.08	10.00	31.57	60.00	-28.43	QP
10	9.21	0.37	9.69	0.08	10.00	20.14	50.00	-29.86	Average
11	26.42	15.10	9.71	0.13	10.00	34.94	60.00	-25.06	QP
12	26.42	3.18	9.71	0.13	10.00	23.02	50.00	-26.98	Average

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

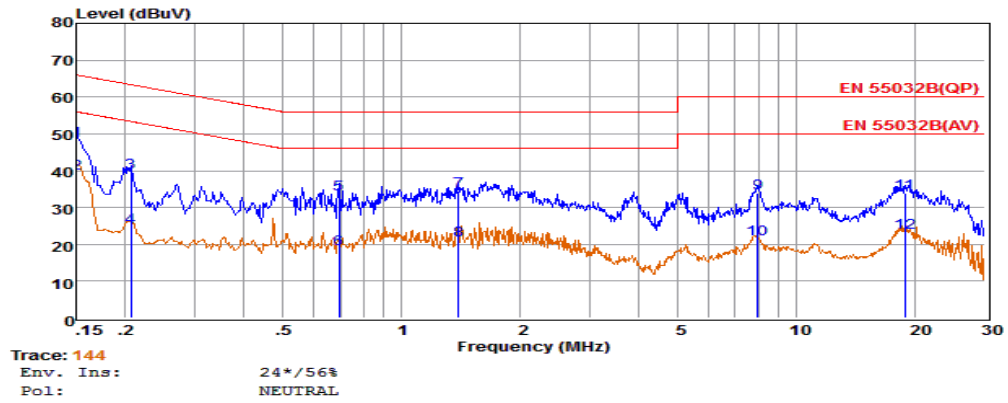


	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	25.49	9.70	0.02	10.00	45.21	66.00	-20.79	QP
2	0.15	19.09	9.70	0.02	10.00	38.81	55.99	-17.18	Average
3	0.22	15.25	9.59	0.03	10.00	34.87	62.88	-28.01	QP
4	0.22	1.79	9.59	0.03	10.00	21.41	52.87	-31.46	Average
5	0.49	12.05	9.62	0.04	10.00	31.71	56.23	-24.52	QP
6	0.49	1.84	9.62	0.04	10.00	21.50	46.23	-24.73	Average
7	1.72	12.44	9.63	0.05	10.00	32.12	56.00	-23.88	QP
8	1.72	-0.65	9.63	0.05	10.00	19.03	46.00	-26.97	Average
9	3.82	12.03	9.65	0.06	10.00	31.74	56.00	-24.26	QP
10	3.82	-5.19	9.65	0.06	10.00	14.52	46.00	-31.48	Average
11	15.80	18.46	9.75	0.10	10.00	38.31	60.00	-21.69	QP
12	15.80	7.87	9.75	0.10	10.00	27.72	50.00	-22.28	Average

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

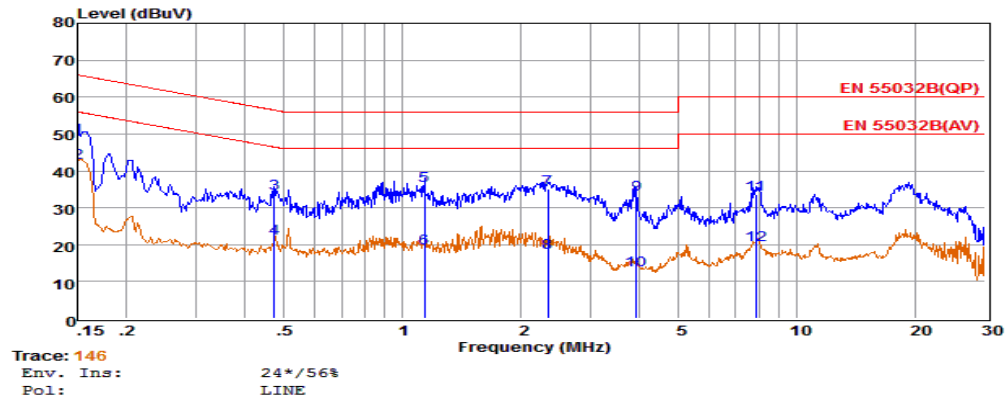
AC Conducted Emission of power adapter @ AC 240V/50Hz @ BT LE-Low channel (worst case)

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	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.15	28.61	9.70	0.02	10.00	48.33	66.00	-17.67	QP
2	0.15	19.61	9.70	0.02	10.00	39.33	55.99	-16.66	Average
3	0.21	19.85	9.59	0.03	10.00	39.47	63.36	-23.89	QP
4	0.21	5.04	9.59	0.03	10.00	24.66	53.36	-28.70	Average
5	0.69	13.94	9.63	0.04	10.00	33.61	56.00	-22.39	QP
6	0.69	-0.95	9.63	0.04	10.00	18.72	46.00	-27.28	Average
7	1.40	14.67	9.63	0.05	10.00	34.35	56.00	-21.65	QP
8	1.40	1.37	9.63	0.05	10.00	21.05	46.00	-24.95	Average
9	7.98	14.26	9.70	0.07	10.00	34.03	60.00	-25.97	QP
10	7.98	1.61	9.70	0.07	10.00	21.38	50.00	-28.62	Average
11	18.82	13.98	9.84	0.11	10.00	33.93	60.00	-26.07	QP
12	18.82	3.35	9.84	0.11	10.00	23.30	50.00	-26.70	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	dB	dBuV	dBuV	dB
1	0.15	29.50	9.57	0.02	10.00	49.09	66.00	-16.91	QP
2	0.15	22.65	9.57	0.02	10.00	42.24	55.99	-13.75	Average
3	0.47	14.11	9.62	0.04	10.00	33.77	56.45	-22.68	QP
4	0.47	2.05	9.62	0.04	10.00	21.71	46.45	-24.74	Average
5	1.14	16.35	9.63	0.05	10.00	36.03	56.00	-19.97	QP
6	1.14	-0.68	9.63	0.05	10.00	19.00	46.00	-27.00	Average
7	2.33	15.26	9.64	0.05	10.00	34.95	56.00	-21.05	QP
8	2.33	-1.78	9.64	0.05	10.00	17.91	46.00	-28.09	Average
9	3.92	13.95	9.65	0.06	10.00	33.66	56.00	-22.34	QP
10	3.92	-6.53	9.65	0.06	10.00	13.18	46.00	-32.82	Average
11	7.85	13.82	9.68	0.07	10.00	33.57	60.00	-26.43	QP
12	7.85	0.06	9.68	0.07	10.00	19.81	50.00	-30.19	Average

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

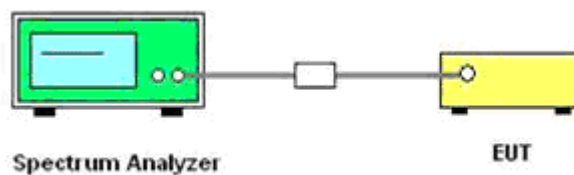
***Note: Pre-scan all modes and recorded the worst case results in this report (BT LE-Low channel).

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:

$$E = \text{EIRP} - 20\log D + 104.8$$

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

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	-59.319	1.5	0.00	37.941	Peak	74.00	PASS
2310.000	-70.178	1.5	0.00	27.082	AV	54.00	PASS
2390.000	-53.628	1.5	0.00	43.632	Peak	74.00	PASS
2390.000	-62.347	1.5	0.00	34.913	AV	54.00	PASS
2483.500	-56.261	1.5	0.00	40.999	Peak	74.00	PASS
2483.500	-65.969	1.5	0.00	31.291	AV	54.00	PASS
2500.000	-59.361	1.5	0.00	37.899	Peak	74.00	PASS
2500.000	-69.851	1.5	0.00	27.409	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	-59.885	1.5	0.00	37.375	Peak	74.00	PASS
2310.000	-70.396	1.5	0.00	26.864	AV	54.00	PASS
2390.000	-34.419	1.5	0.00	62.841	Peak	74.00	PASS
2390.000	-58.403	1.5	0.00	38.857	AV	54.00	PASS
2483.500	-38.200	1.5	0.00	59.060	Peak	74.00	PASS
2483.500	-63.886	1.5	0.00	33.374	AV	54.00	PASS
2500.000	-58.872	1.5	0.00	38.388	Peak	74.00	PASS
2500.000	-69.453	1.5	0.00	27.807	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	-58.695	1.5	0.00	38.565	Peak	74.00	PASS
2310.000	-69.941	1.5	0.00	27.319	AV	54.00	PASS
2390.000	-44.753	1.5	0.00	52.507	Peak	74.00	PASS
2390.000	-61.374	1.5	0.00	35.886	AV	54.00	PASS
2483.500	-48.313	1.5	0.00	48.947	Peak	74.00	PASS
2483.500	-64.124	1.5	0.00	33.136	AV	54.00	PASS
2500.000	-59.092	1.5	0.00	38.168	Peak	74.00	PASS
2500.000	-69.535	1.5	0.00	27.725	AV	54.00	PASS

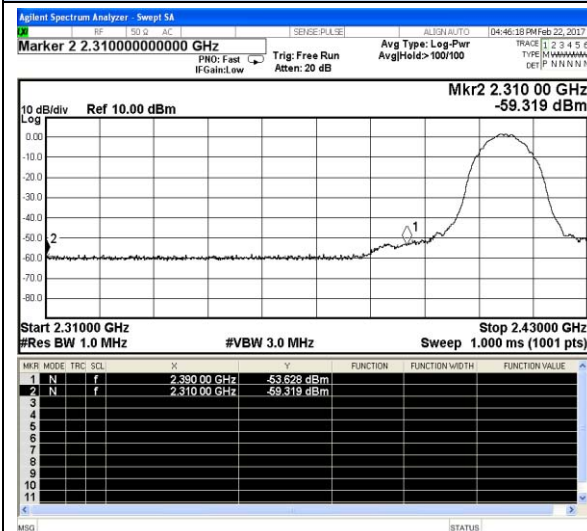
BT – LE							
Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	Ground Reflection Factor (dB)	Covert Radiated E Level At 3m (dBuV/m)	Detector	Limit (dBuV/m)	Verdict
2310.000	-60.699	1.5	0.00	36.561	Peak	74.00	PASS
2310.000	-70.723	1.5	0.00	26.537	AV	54.00	PASS
2390.000	-59.810	1.5	0.00	37.450	Peak	74.00	PASS
2390.000	-69.925	1.5	0.00	27.335	AV	54.00	PASS
2483.500	-49.232	1.5	0.00	48.028	Peak	74.00	PASS
2483.500	-67.931	1.5	0.00	29.329	AV	54.00	PASS
2500.000	-59.645	1.5	0.00	37.615	Peak	74.00	PASS
2500.000	-69.299	1.5	0.00	27.961	AV	54.00	PASS

Remark:

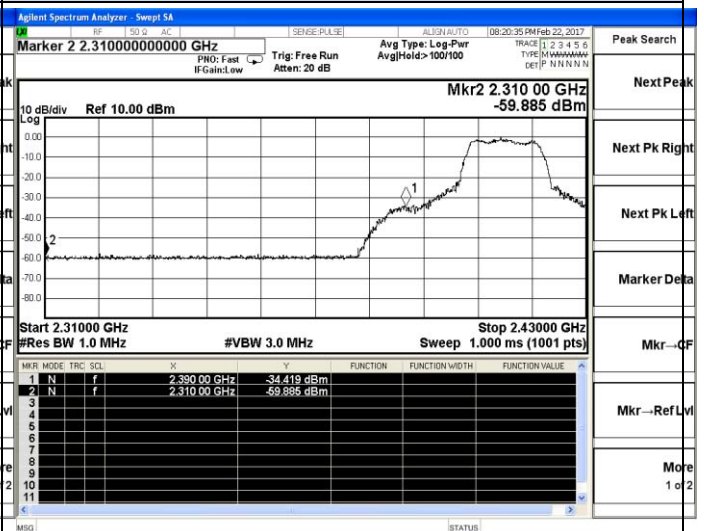
1. Measured Band edge measurement for radiated emission at difference data rate for each mode and recorded worst case for each mode.
2. Test results including cable loss;
3. Worst case data at 1Mbps at IEEE 802.11b; 6Mbps at IEEE 802.11g; 6.5Mbps at IEEE 802.11n HT20;
4. “---“means that the fundamental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

Band-edge measurements for radiated emissions

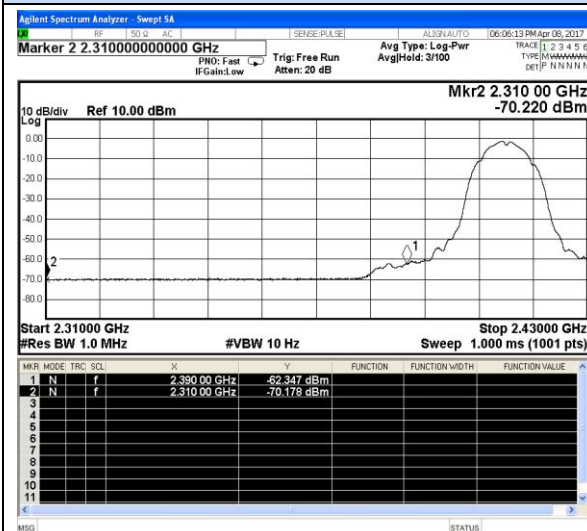
IEEE 802.11b



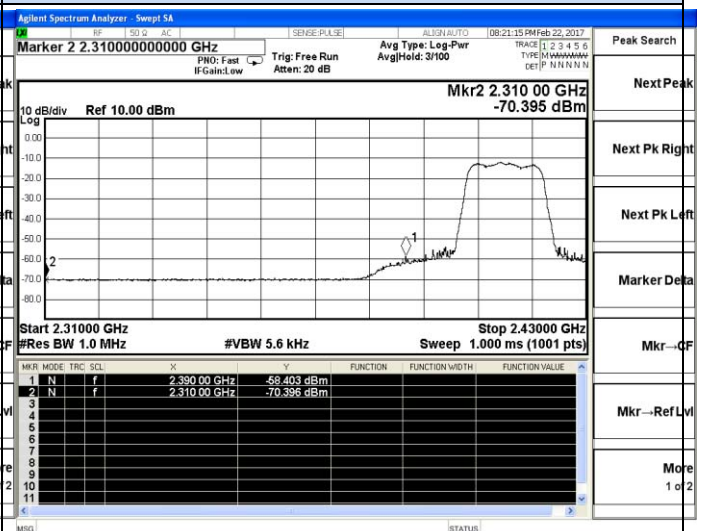
IEEE 802.11g



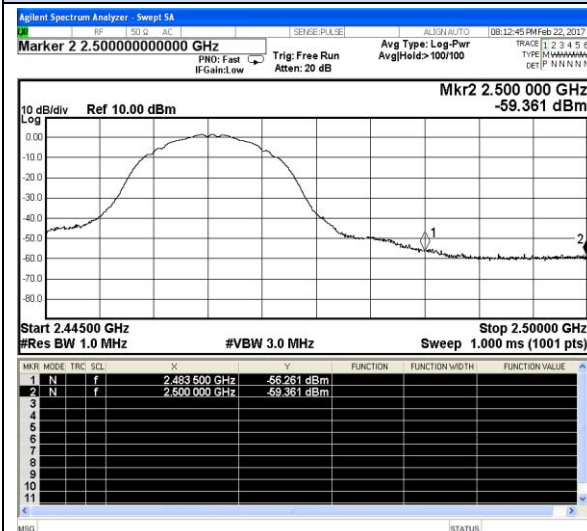
Channel 1 / 2412 MHz – Peak



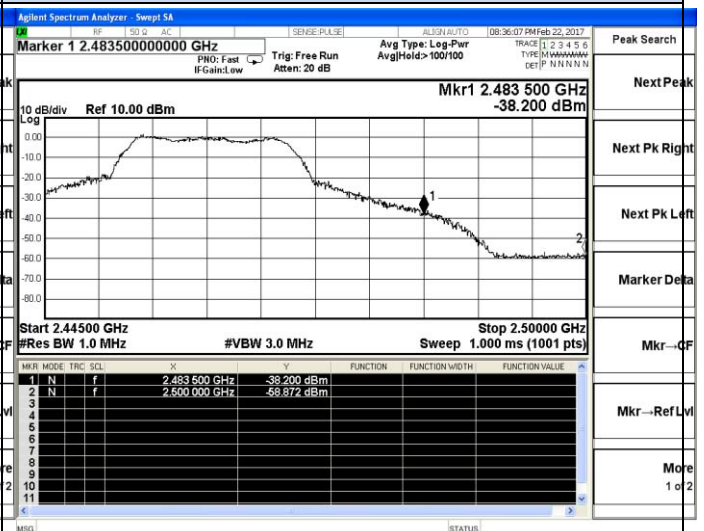
Channel 1 / 2412 MHz – Peak



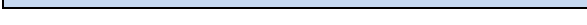
Channel 1 / 2412 MHz – Average



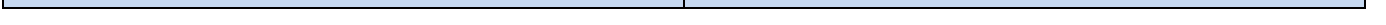
Channel 1 / 2412 MHz – Average



Channel 11 / 2462 MHz – Peak

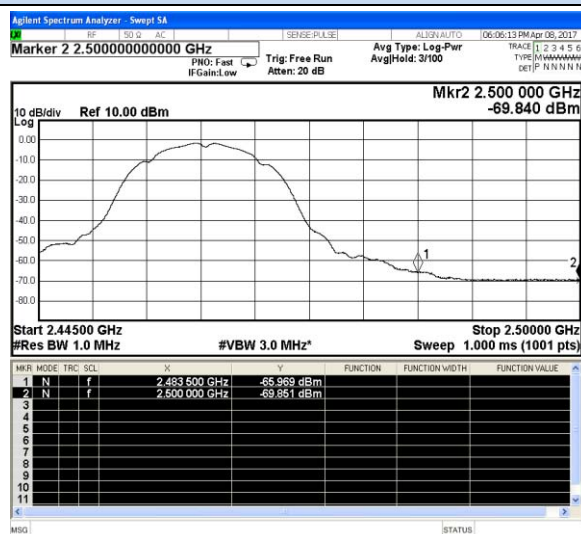


Channel 11 / 2462 MHz – Peak

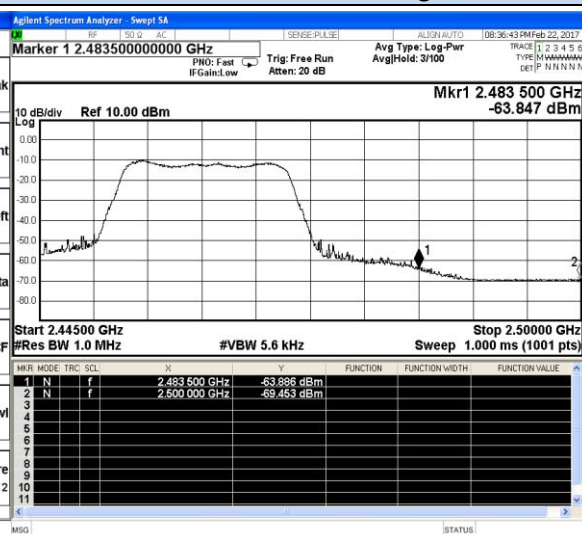


Band-edge measurements for radiated emissions

IEEE 802.11b

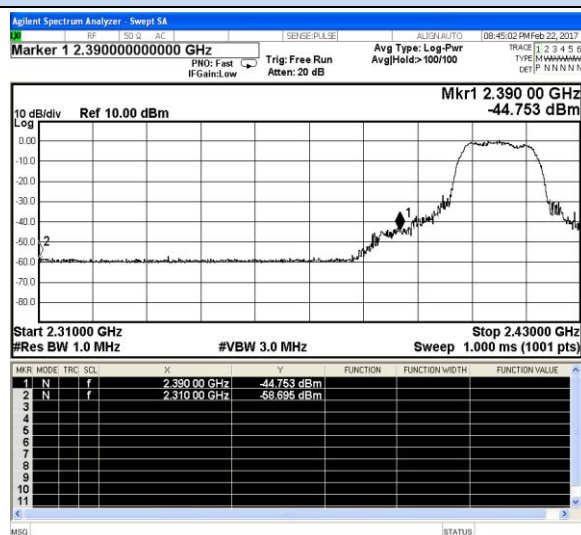


IEEE 802.11g



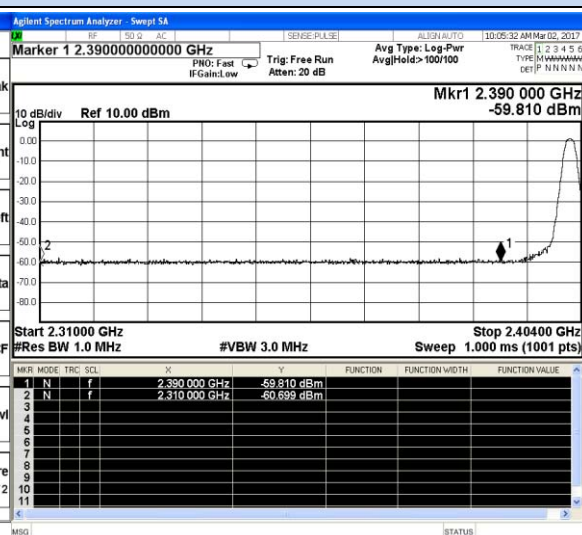
Channel 11 / 2462 MHz – Average

IEEE 802.11n HT20

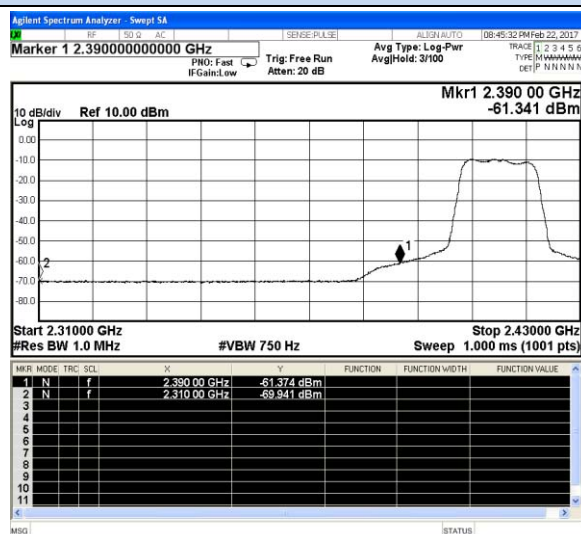


Channel 11 / 2462 MHz – Average

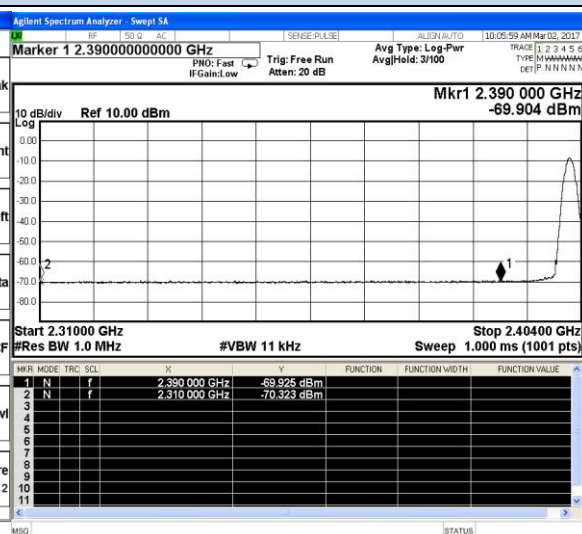
BT LE



Channel 1 / 2412 MHz – Peak



Channel 0 / 2402 MHz – Peak



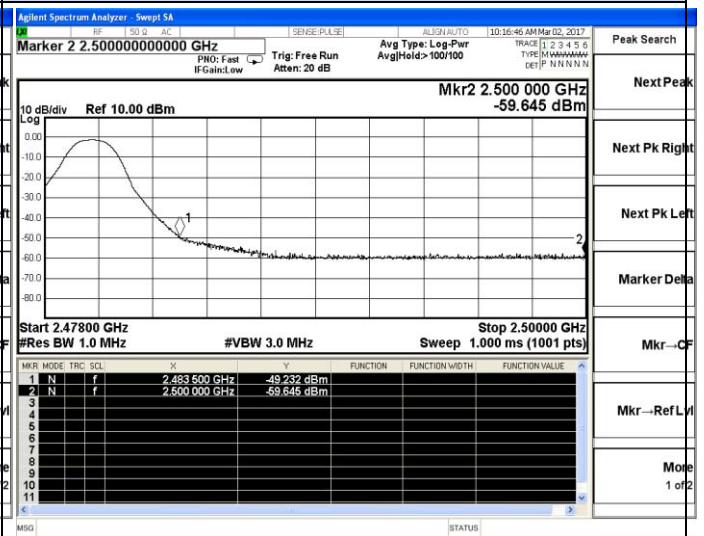
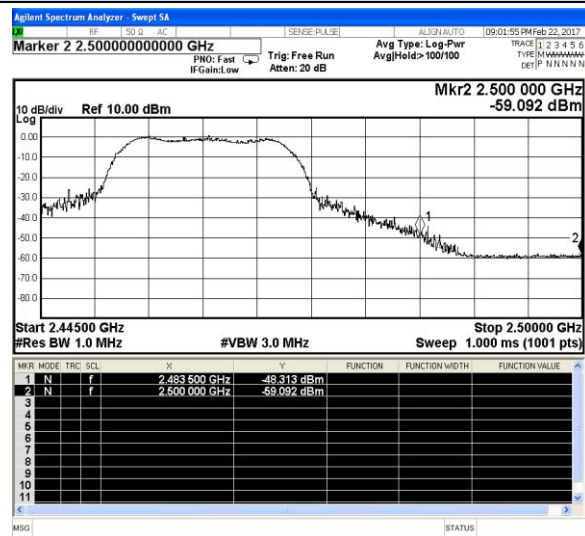
Channel 1 / 2412 MHz – Average

Channel 0 / 2402 MHz – Average

Band-edge measurements for radiated emissions

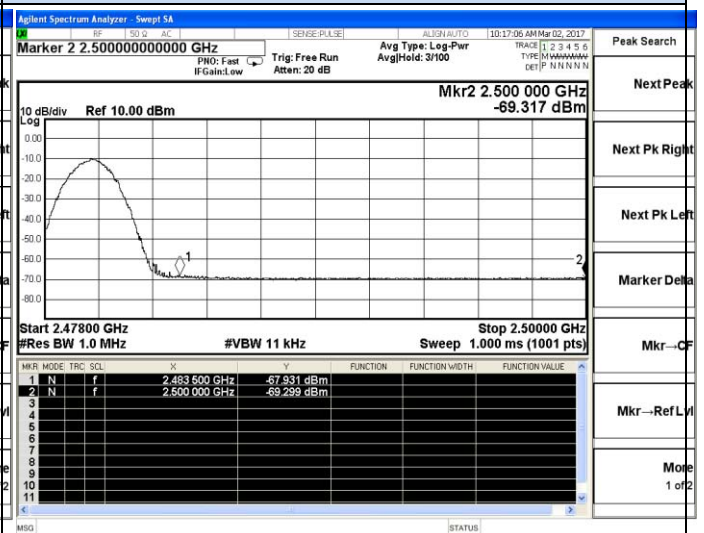
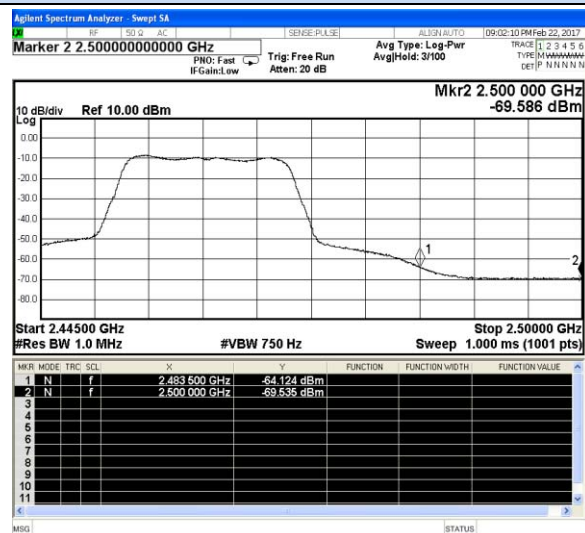
IEEE 802.11n HT20

BT – LE



Channel 11 / 2462 MHz – Peak

Channel 39 / 2480 MHz – Peak



Channel 11 / 2462 MHz – Average

Channel 39 / 2480 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 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 directional gains of antenna used for transmitting is 1.50dBi, and the antenna is an internal antenna connect to PCB board and no consideration of replacement. Please see EUT photo for details.
The WIFI and BT share same antenna;

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-LOW	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-260400	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 source	GW	GPC-6030D	C671845	DC 1V-60V	June 18, 2016	June 17, 2017
Temp. and Humidify 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
EMC Test Software	Audix	E3	N/A	N/A	N/A	N/A

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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