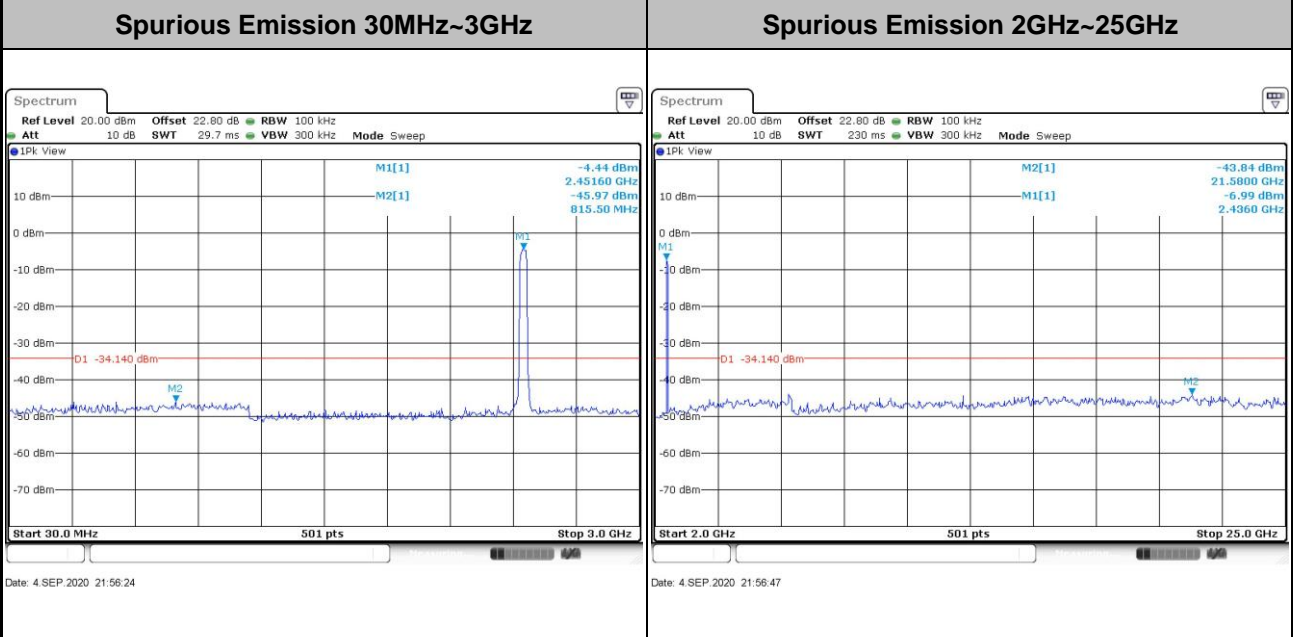
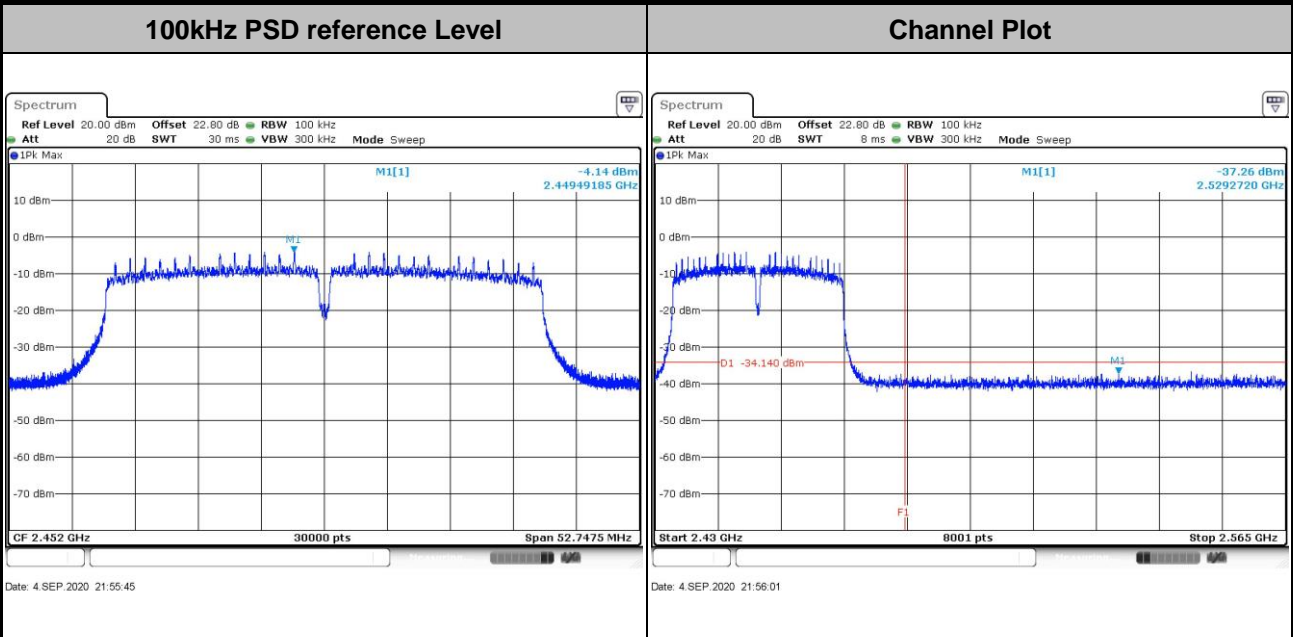




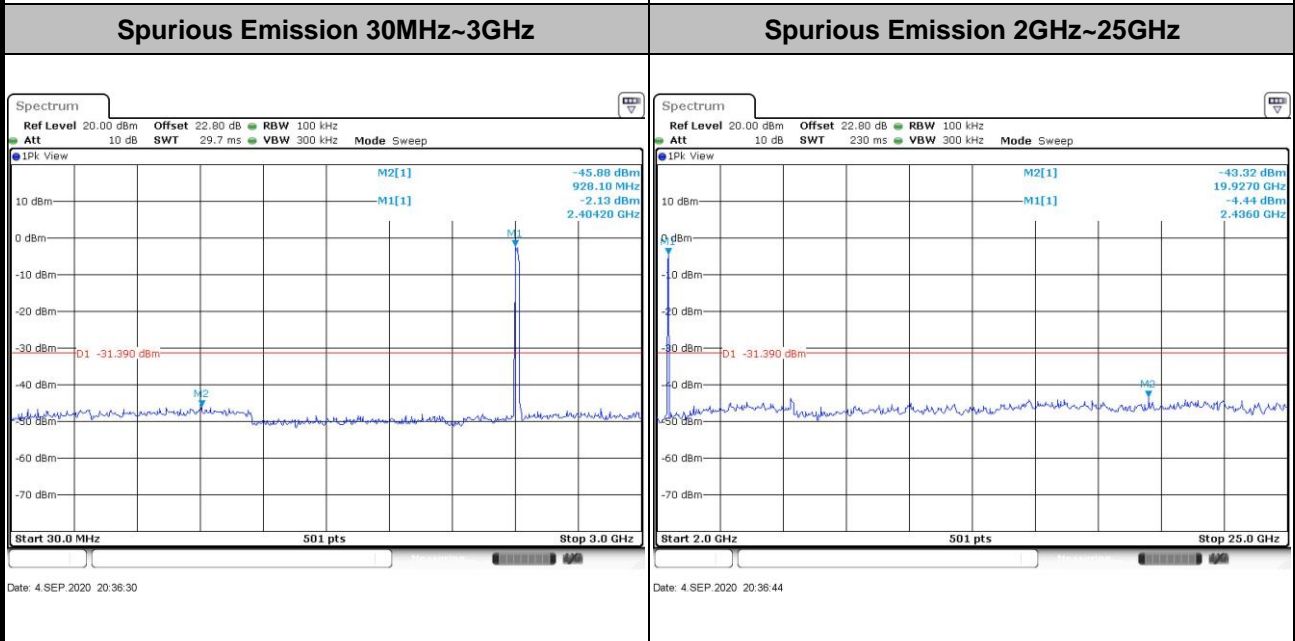
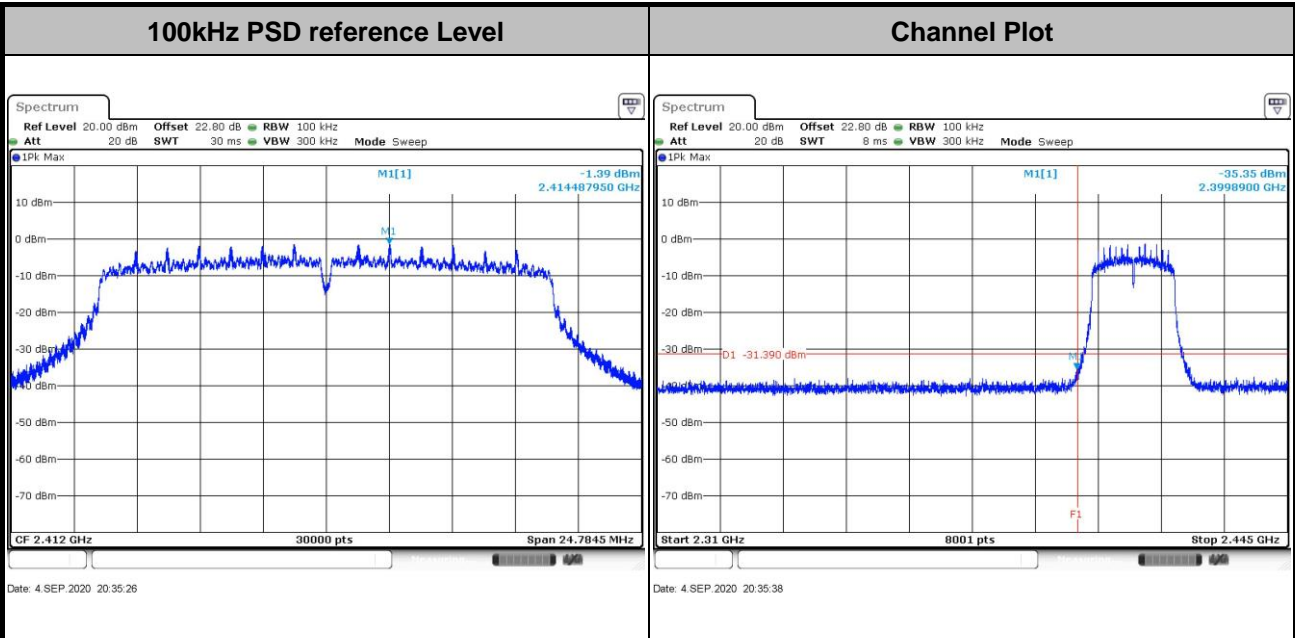
Test Mode : 802.11n HT40 Test Channel : 09





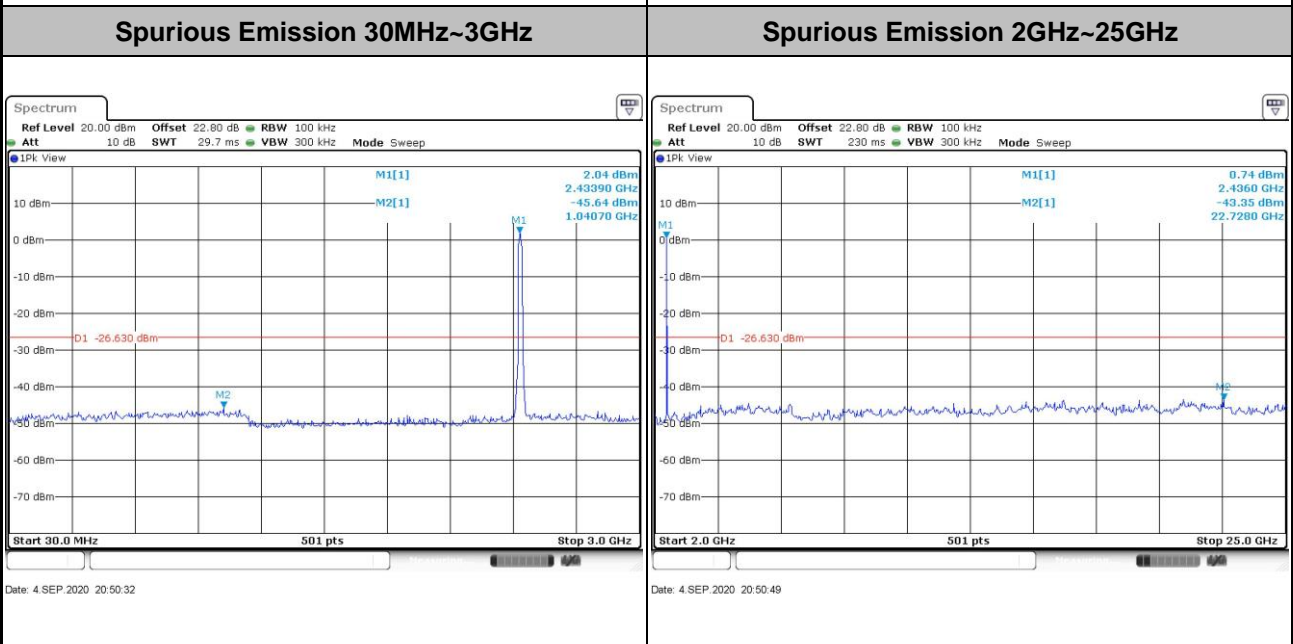
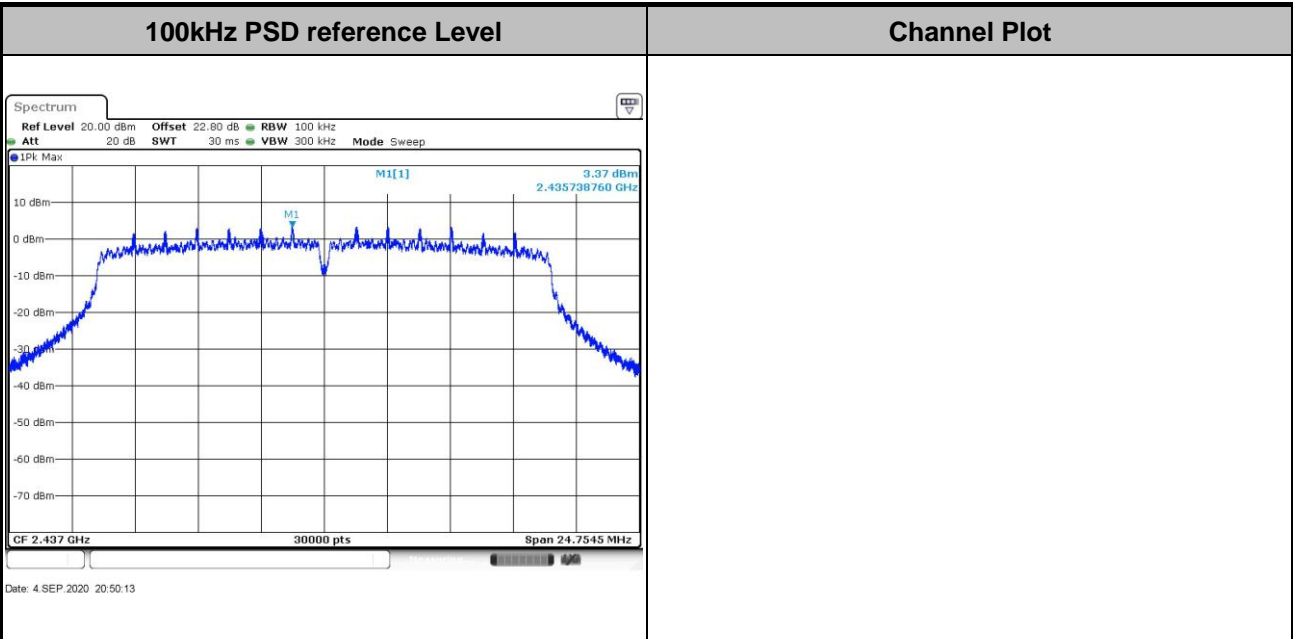
Number of TX = 2, Ant. 2 (Measured)

Test Mode :	802.11n HT20	Test Channel :	01
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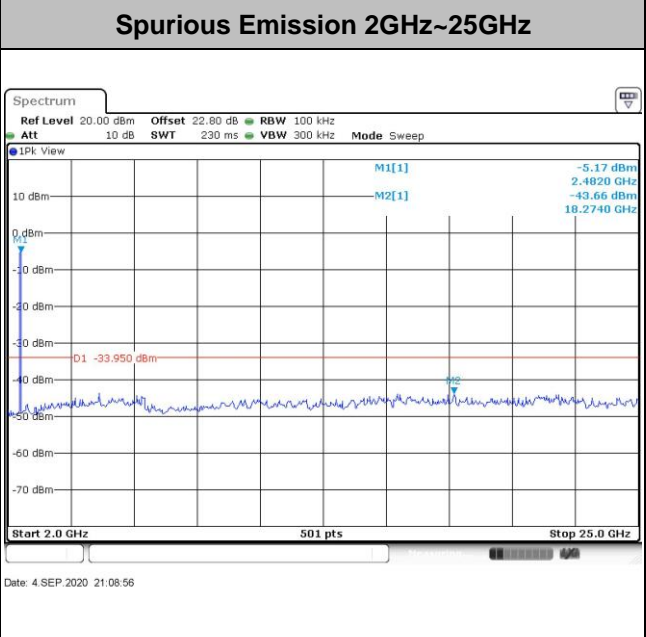
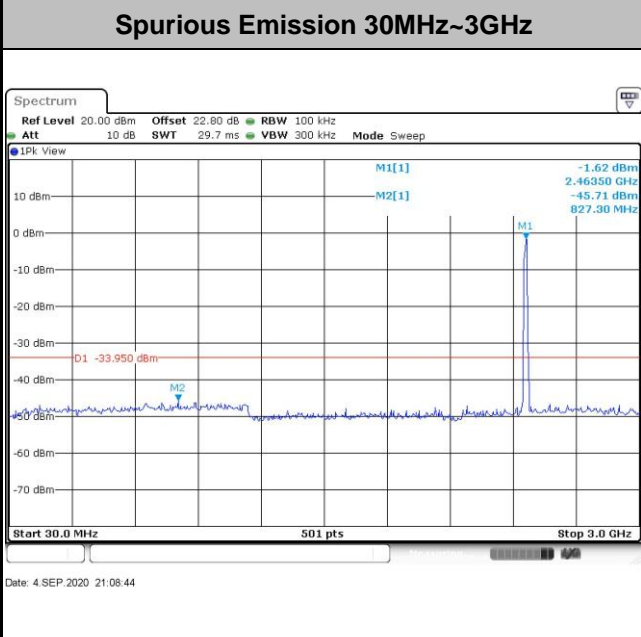
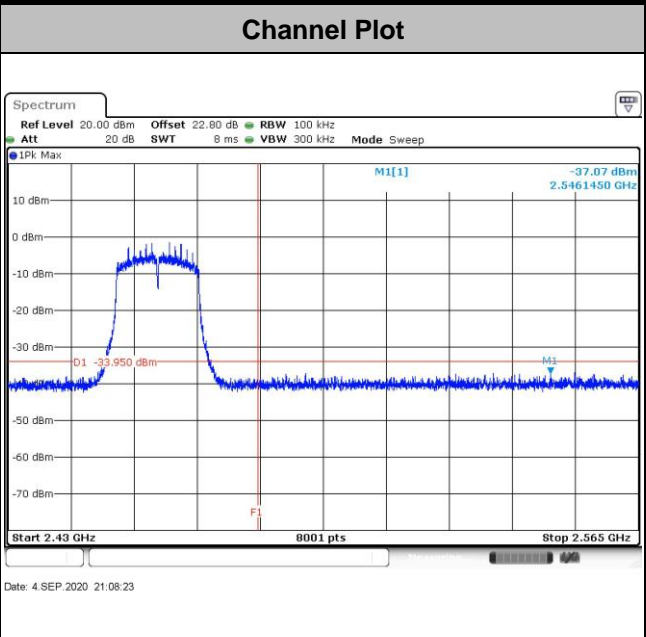
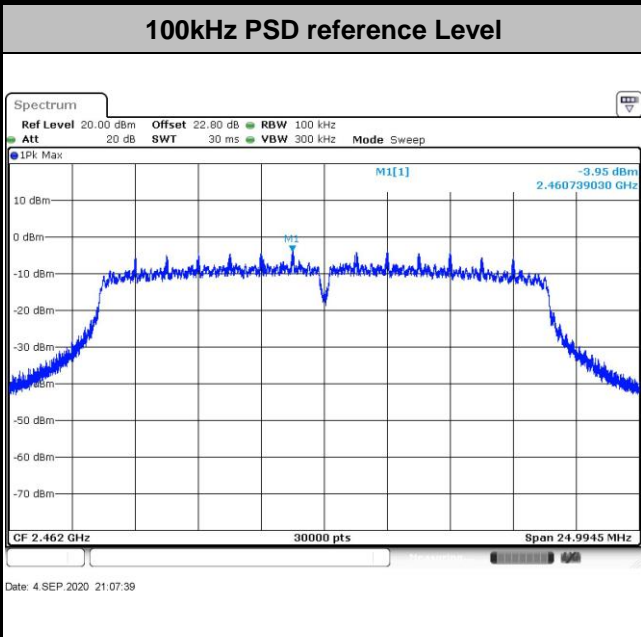


Test Mode :	802.11n HT20	Test Channel :	06
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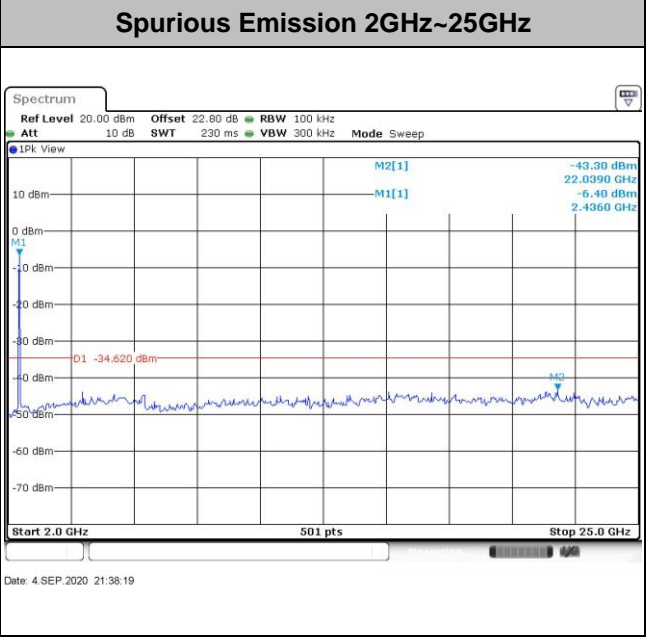
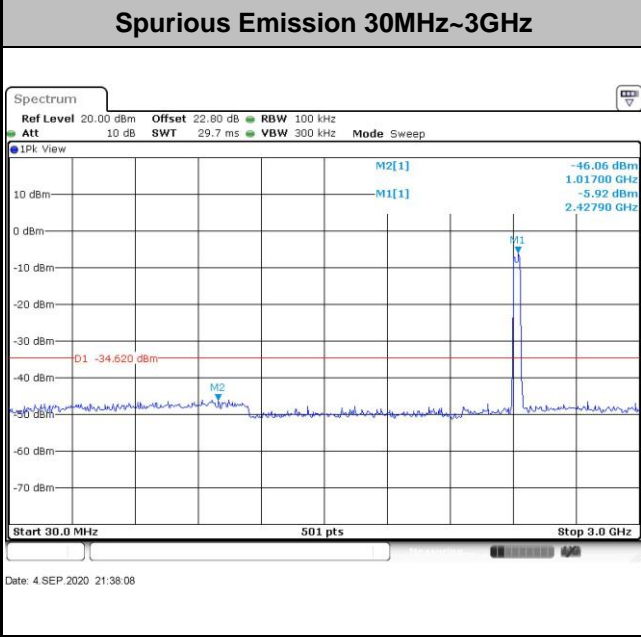
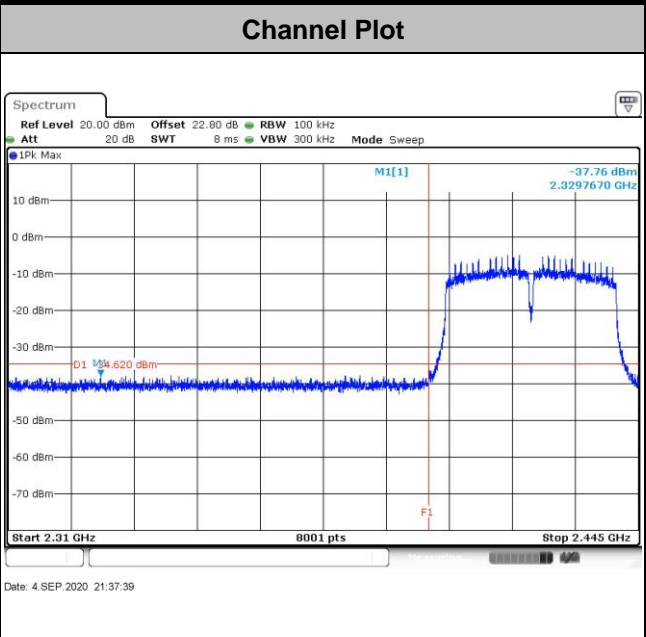
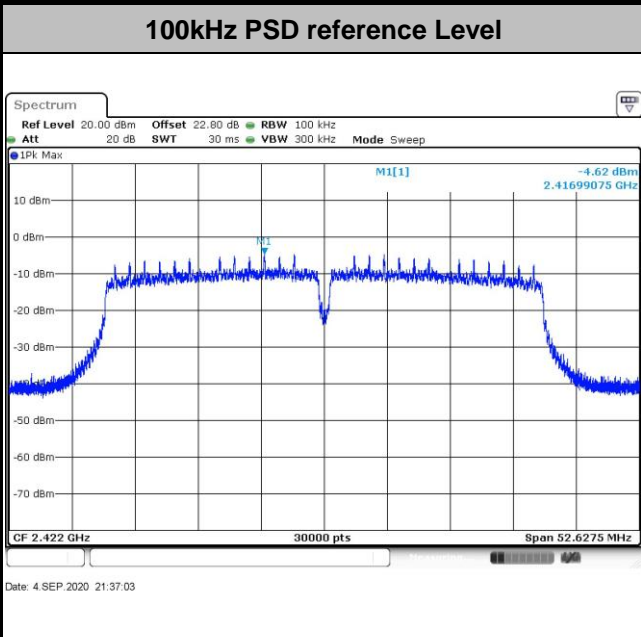


Test Mode : 802.11n HT20 Test Channel : 11



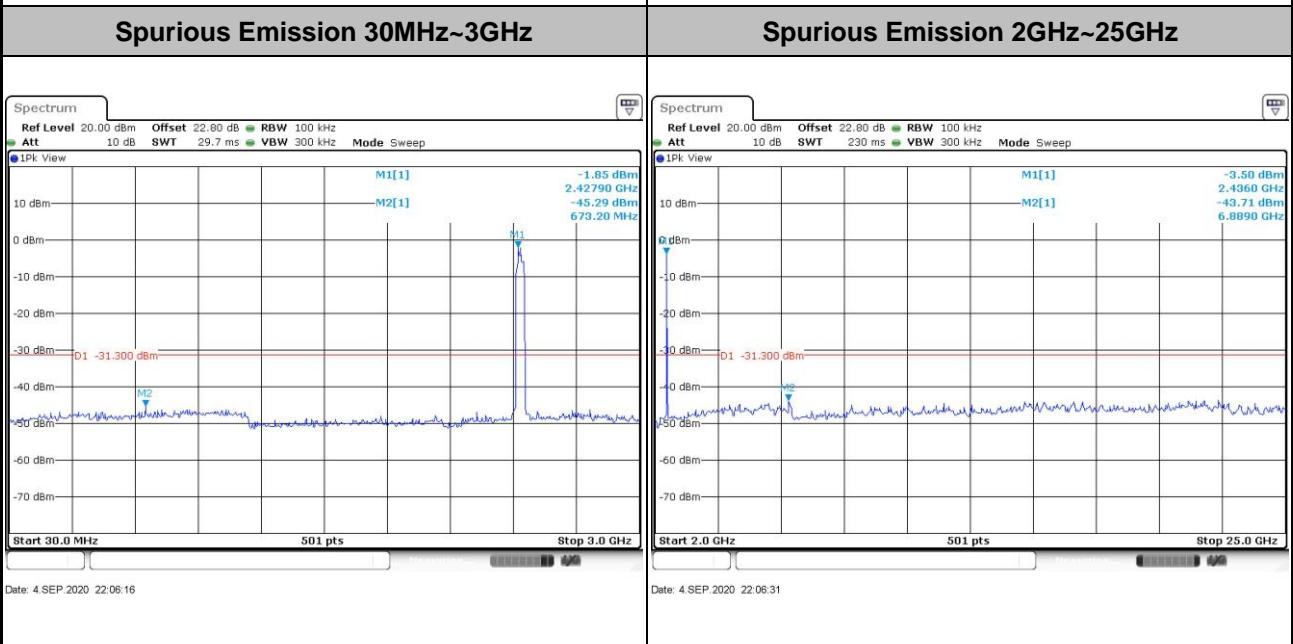
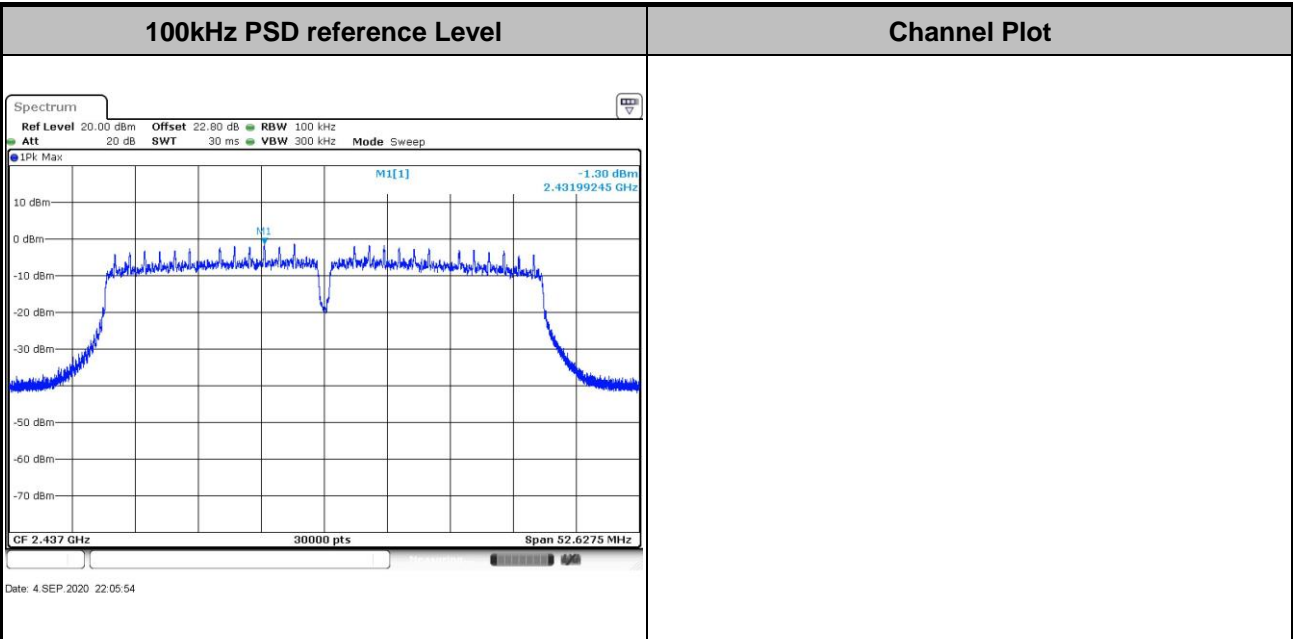


Test Mode : 802.11n HT40 Test Channel : 03



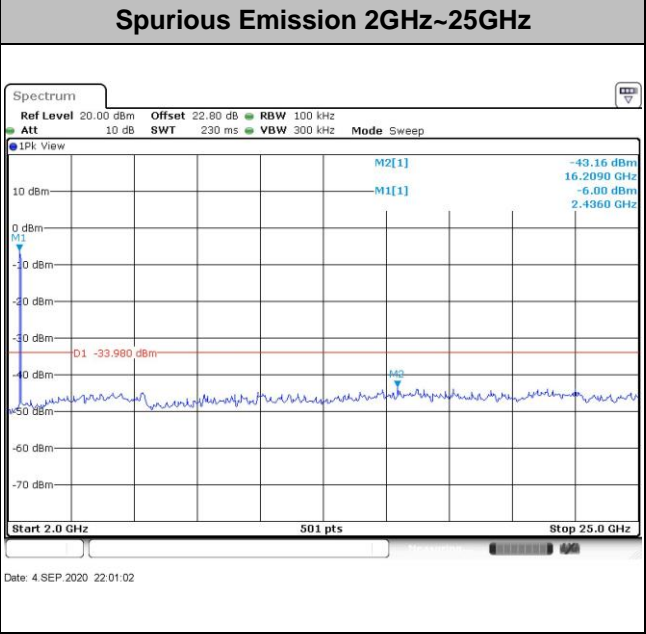
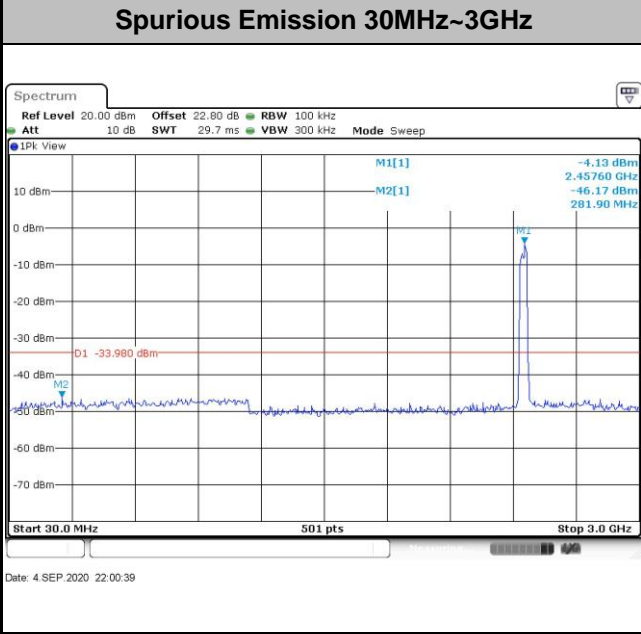
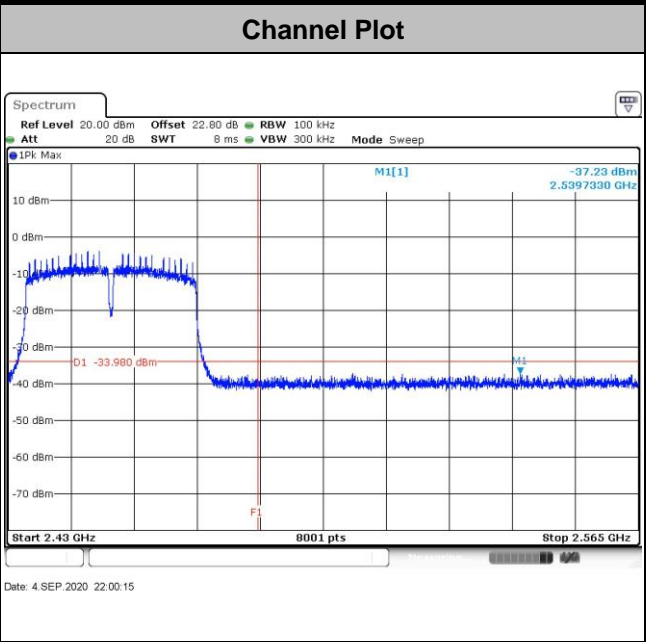
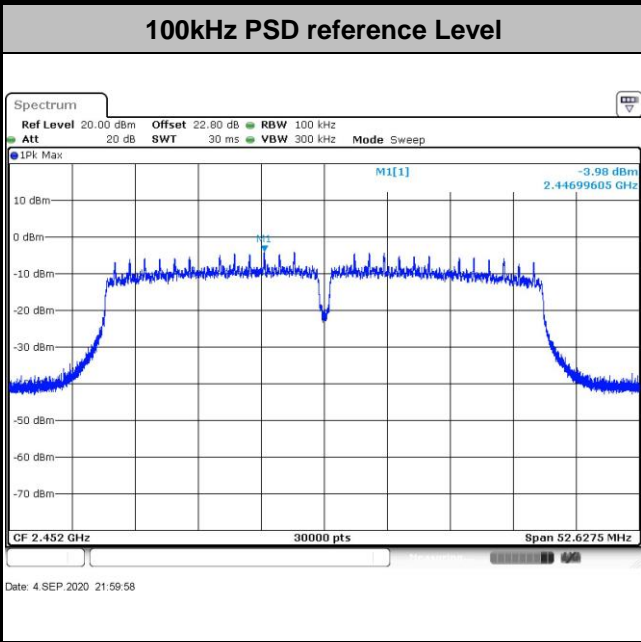


Test Mode :	802.11n HT40	Test Channel :	06
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Test Mode : 802.11n HT40 Test Channel : 09





3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

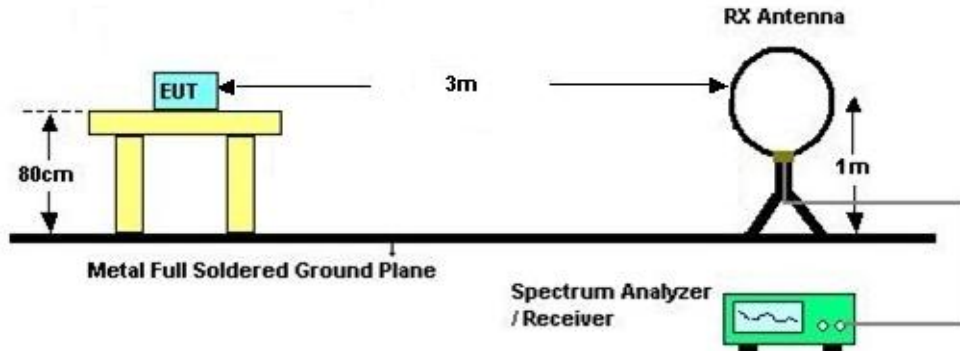


3.5.3 Test Procedures

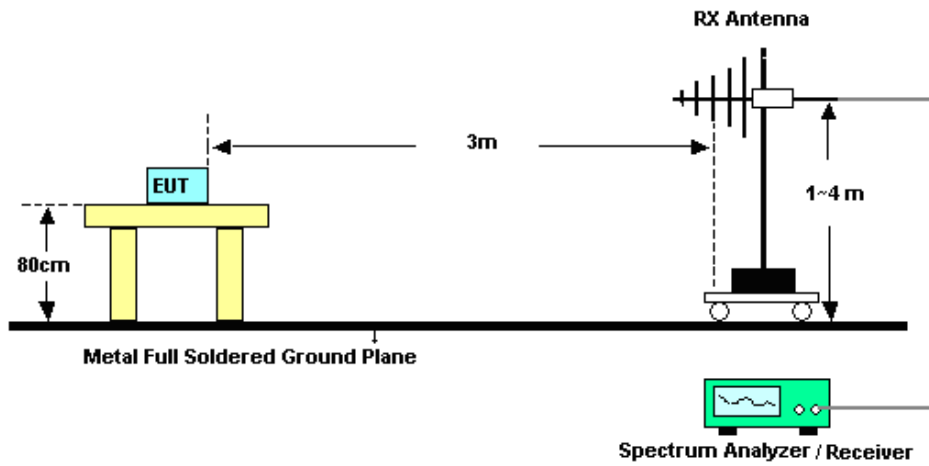
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; $VBW \geq RBW$; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - $VBW = 10$ Hz, when duty cycle is no less than 98 percent.
 - $VBW \geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

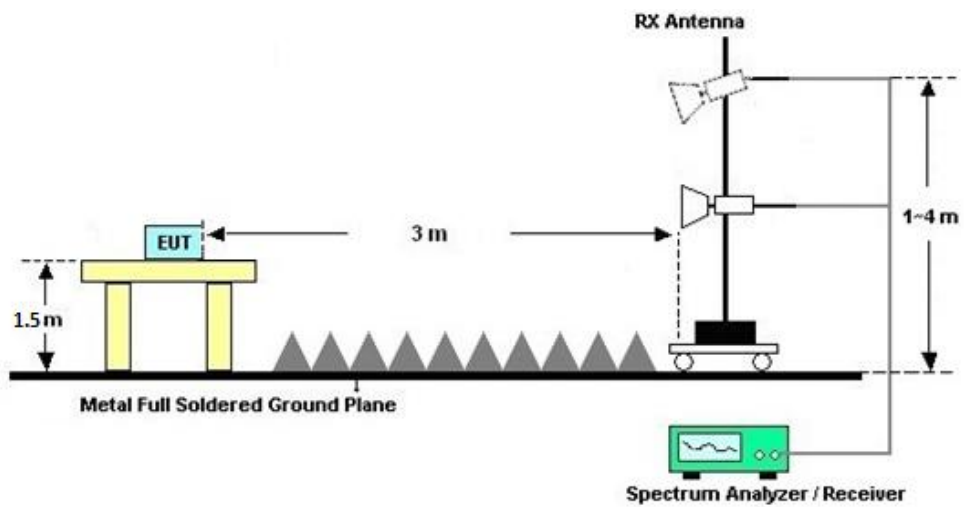
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz





3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C.



3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that 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 the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

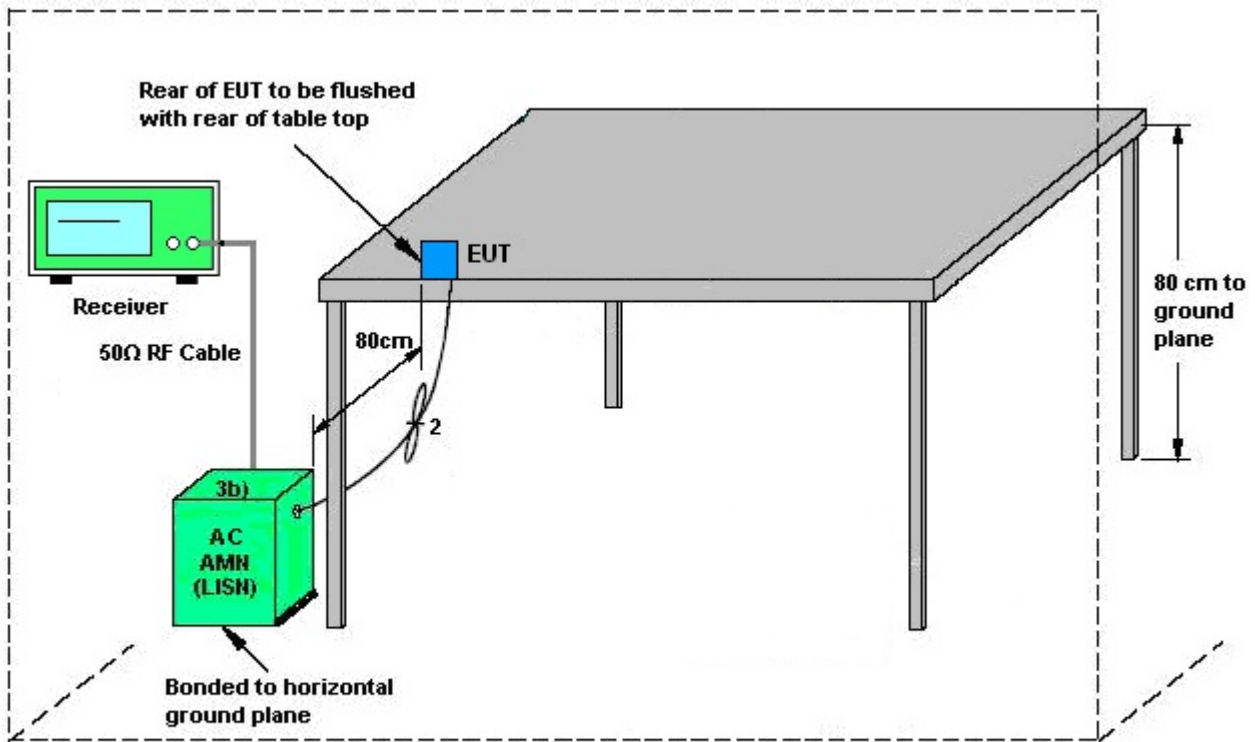
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.6.4 Test Setup



AMN = Artificial mains network (LISN)
 AE = Associated equipment
 EUT = Equipment under test
 ISN = Impedance stabilization network

3.6.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.7 Antenna Requirements

3.7.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. 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 rule.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with

G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain "DG" is calculated as following table.

<CDD Modes>						
			DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
	Ant. 1 (dBi)	Ant. 2 (dBi)				
2.4 GHz	2.00	3.90	3.90	6.01	0.00	0.01

$Power\ Limit\ Reduction = DG(Power) - 6dBi, (min = 0)$

$PSD\ Limit\ Reduction = DG(PSD) - 6dBi, (min = 0)$



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 17, 2020	Sep. 01, 2020~ Sep. 08, 2020	Apr. 16, 2021	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2019	Sep. 01, 2020~ Sep. 08, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2019	Sep. 01, 2020~ Sep. 08, 2020	Dec. 25, 2020	Conducted (TH01-SZ)
EMI Test Receiver	Keysight	N9038A	MY564000 04	3Hz~8.5GHz;M ax 30dBm	Oct. 18, 2019	Sep. 10, 2020	Oct. 17, 2020	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY551502 44	10Hz-44G,MAX 30dB	Apr. 15, 2020	Sep. 10, 2020	Apr. 14, 2021	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 10, 2019	Sep. 10, 2020	Nov. 09, 2020	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz-1GHz	May 30, 2020	Sep. 10, 2020	May 29, 2021	Radiation (03CH05-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	00218652	1GHz~18GHz	Apr. 26, 2020	Sep. 10, 2020	Apr. 25, 2021	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101115	18GHz~40GHz	Nov. 10, 2019	Sep. 10, 2020	Nov. 09, 2020	Radiation (03CH05-KS)
Amplifier	SONOMA	310N	187289	9KHz-1GHz	Apr. 14, 2020	Sep. 10, 2020	Apr. 13, 2021	Radiation (03CH05-KS)
Amplifier	MITEQ	EM18G40GG A	060728	18~40GHz	Jan. 08, 2020	Sep. 10, 2020	Jan. 07, 2021	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2012228	1Ghz-18Ghz	Oct. 18, 2019	Sep. 10, 2020	Oct. 17, 2020	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY532703 16	500MHz~26.5G Hz	Oct. 18, 2019	Sep. 10, 2020	Oct. 17, 2020	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Sep. 10, 2020	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Sep. 10, 2020	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Sep. 10, 2020	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 14, 2020	Sep. 10, 2020	Apr. 13, 2021	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060103	9kHz~30MHz	Oct. 18, 2019	Sep. 10, 2020	Oct. 17, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060105	9kHz~30MHz	Oct. 28, 2019	Sep. 10, 2020	Oct. 27, 2020	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 18, 2019	Sep. 10, 2020	Oct. 17, 2020	Conduction (CO01-KS)

NCR: No Calibration Required



5 Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.94dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.0dB
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Appendix A. Conducted Test Results

Test Engineer:	Chen Hong	Temperature:	21~25	°C
Test Date:	2020/9/1~2020/9/8	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	14.69	14.79	10.07	10.07	0.50	Pass
11b	1Mbps	1	6	2437	14.84	14.79	10.07	10.07	0.50	Pass
11b	1Mbps	1	11	2462	14.84	14.79	10.07	10.07	0.50	Pass
11g	6Mbps	1	1	2412	16.53	16.68	15.70	15.78	0.50	Pass
11g	6Mbps	1	6	2437	16.53	16.63	15.64	16.00	0.50	Pass
11g	6Mbps	1	11	2462	16.68	16.63	15.66	15.80	0.50	Pass
HT20	MCS0	1	1	2412	17.83	17.78	16.14	16.26	0.50	Pass
HT20	MCS0	1	6	2437	17.78	17.78	16.64	16.40	0.50	Pass
HT20	MCS0	1	11	2462	17.78	17.73	16.64	16.42	0.50	Pass
HT40	MCS0	1	3	2422	36.46	36.36	35.12	35.12	0.50	Pass
HT40	MCS0	1	6	2437	36.56	36.56	35.12	35.12	0.50	Pass
HT40	MCS0	1	9	2452	36.76	36.56	35.12	35.16	0.50	Pass
HT20	MCS0	2	1	2412	17.78	17.78	16.30	16.52	0.50	Pass
HT20	MCS0	2	6	2437	17.68	17.68	16.26	16.50	0.50	Pass
HT20	MCS0	2	11	2462	17.88	17.78	16.30	16.66	0.50	Pass
HT40	MCS0	2	3	2422	36.46	36.76	35.12	35.08	0.50	Pass
HT40	MCS0	2	6	2437	36.36	36.46	35.12	35.08	0.50	Pass
HT40	MCS0	2	9	2452	36.46	36.56	35.16	35.08	0.50	Pass

TEST RESULTS DATA
Average Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	16.40	16.00		30.00	30.00	2.00	3.90	18.40	19.90	36.00	36.00	Pass
11b	1Mbps	1	6	2437	16.80	16.60		30.00	30.00	2.00	3.90	18.80	20.50	36.00	36.00	Pass
11b	1Mbps	1	11	2462	16.00	16.00		30.00	30.00	2.00	3.90	18.00	19.90	36.00	36.00	Pass
11g	6Mbps	1	1	2412	10.20	11.00		30.00	30.00	2.00	3.90	12.20	14.90	36.00	36.00	Pass
11g	6Mbps	1	6	2437	15.90	16.20		30.00	30.00	2.00	3.90	17.90	20.10	36.00	36.00	Pass
11g	6Mbps	1	11	2462	9.30	10.90		30.00	30.00	2.00	3.90	11.30	14.80	36.00	36.00	Pass
HT20	MCS0	1	1	2412	11.40	11.20		30.00	30.00	2.00	3.90	13.40	15.10	36.00	36.00	Pass
HT20	MCS0	1	6	2437	16.80	16.40		30.00	30.00	2.00	3.90	18.80	20.30	36.00	36.00	Pass
HT20	MCS0	1	11	2462	10.70	11.00		30.00	30.00	2.00	3.90	12.70	14.90	36.00	36.00	Pass
HT40	MCS0	1	3	2422	10.60	10.70		30.00	30.00	2.00	3.90	12.60	14.60	36.00	36.00	Pass
HT40	MCS0	1	6	2437	14.40	13.70		30.00	30.00	2.00	3.90	16.40	17.60	36.00	36.00	Pass
HT40	MCS0	1	9	2452	10.70	11.00		30.00	30.00	2.00	3.90	12.70	14.90	36.00	36.00	Pass
HT20	MCS0	2	1	2412	10.60	10.10	13.37	30.00		3.90		17.27		36.00		Pass
HT20	MCS0	2	6	2437	15.80	15.60	18.71	30.00		3.90		22.61		36.00		Pass
HT20	MCS0	2	11	2462	10.00	9.90	12.96	30.00		3.90		16.86		36.00		Pass
HT40	MCS0	2	3	2422	8.80	8.90	11.86	30.00		3.90		15.76		36.00		Pass
HT40	MCS0	2	6	2437	13.40	12.60	16.03	30.00		3.90		19.93		36.00		Pass
HT40	MCS0	2	9	2452	9.70	10.10	12.91	30.00		3.90		16.81		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Peak Power Spectral Density

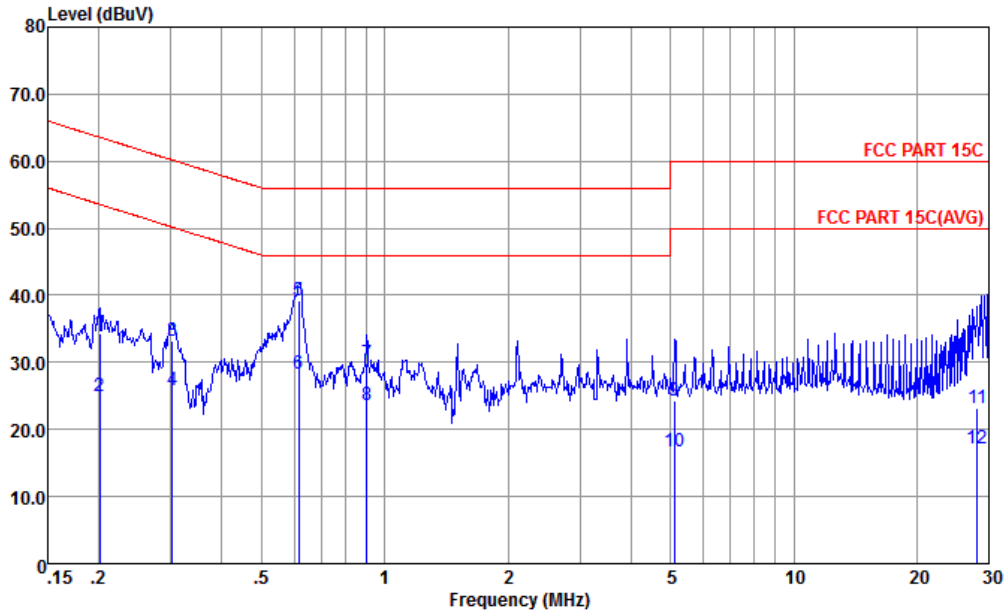
2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	-8.09	-8.80	-	2.00	3.90	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-7.99	-8.25	-	2.00	3.90	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-8.90	-8.98	-	2.00	3.90	8.00	8.00	Pass
11g	6Mbps	1	1	2412	-17.13	-15.98	-	2.00	3.90	8.00	8.00	Pass
11g	6Mbps	1	6	2437	-11.30	-11.50	-	2.00	3.90	8.00	8.00	Pass
11g	6Mbps	1	11	2462	-14.72	-14.89	-	2.00	3.90	8.00	8.00	Pass
HT20	MCS0	1	1	2412	-14.50	-14.67	-	2.00	3.90	8.00	8.00	Pass
HT20	MCS0	1	6	2437	-8.95	-8.06	-	2.00	3.90	8.00	8.00	Pass
HT20	MCS0	1	11	2462	-15.22	-14.49	-	2.00	3.90	8.00	8.00	Pass
HT40	MCS0	1	3	2422	-17.05	-17.04	-	2.00	3.90	8.00	8.00	Pass
HT40	MCS0	1	6	2437	-15.37	-14.48	-	2.00	3.90	8.00	8.00	Pass
HT40	MCS0	1	9	2452	-18.37	-18.01	-	2.00	3.90	8.00	8.00	Pass
HT20	MCS0	2	1	2412	-13.42	-13.54	-10.41	6.01		7.99		Pass
HT20	MCS0	2	6	2437	-9.39	-10.48	-6.38	6.01		7.99		Pass
HT20	MCS0	2	11	2462	-17.93	-17.36	-14.35	6.01		7.99		Pass
HT40	MCS0	2	3	2422	-18.57	-19.90	-15.56	6.01		7.99		Pass
HT40	MCS0	2	6	2437	-14.72	-15.28	-11.71	6.01		7.99		Pass
HT40	MCS0	2	9	2452	-18.80	-19.29	-15.79	6.01		7.99		Pass

Measured power density (dBm) has offset with cable loss.



Appendix B. AC Conducted Emission Test Results

Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



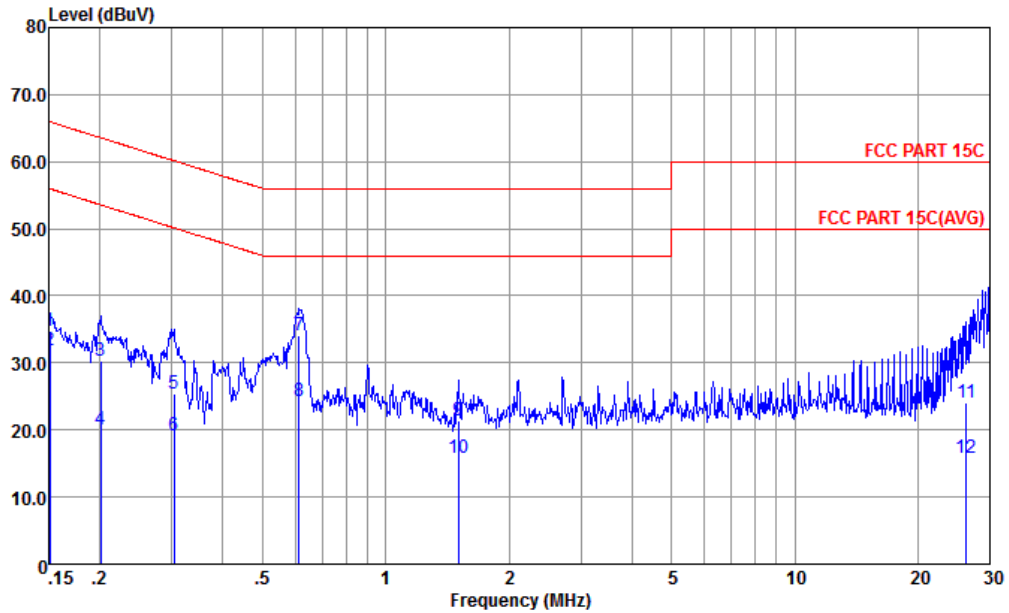
Site : CO01-KS
 Condition : FCC PART 15C LISN-L-191028-060105 LINE

Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.201	34.30	-29.28	63.58	23.90	0.04	10.36	QP
2	0.201	25.00	-28.58	53.58	14.60	0.04	10.36	Average
3	0.302	33.16	-27.03	60.19	22.80	0.05	10.31	QP
4	0.302	25.96	-24.23	50.19	15.60	0.05	10.31	Average
5 *	0.617	39.20	-16.80	56.00	28.89	0.07	10.24	QP
6	0.617	28.20	-17.80	46.00	17.89	0.07	10.24	Average
7	0.904	29.81	-26.19	56.00	19.49	0.08	10.24	QP
8	0.904	23.51	-22.49	46.00	13.19	0.08	10.24	Average
9	5.112	24.22	-35.78	60.00	13.81	0.14	10.27	QP
10	5.112	16.82	-33.18	50.00	6.41	0.14	10.27	Average
11	28.152	23.25	-36.75	60.00	12.00	0.65	10.60	QP
12	28.152	17.25	-32.75	50.00	6.00	0.65	10.60	Average



Test Engineer :	Amos Zhang	Temperature :	25.3~26.2°C
		Relative Humidity :	38~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
 Condition : FCC PART 15C LISN-N-191028-060105 NEUTRAL

Mode : Mode 1

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.151	34.86	-31.10	65.96	24.30	0.08	10.48	QP
2	0.151	31.86	-24.10	55.96	21.30	0.08	10.48	Average
3	0.201	30.34	-33.24	63.58	19.90	0.08	10.36	QP
4	0.201	20.14	-33.44	53.58	9.70	0.08	10.36	Average
5	0.303	25.29	-34.86	60.15	14.89	0.09	10.31	QP
6	0.303	19.09	-31.06	50.15	8.69	0.09	10.31	Average
7	0.614	34.14	-21.86	56.00	23.80	0.10	10.24	QP
8 *	0.614	24.34	-21.66	46.00	14.00	0.10	10.24	Average
9	1.503	21.45	-34.55	56.00	11.10	0.12	10.23	QP
10	1.503	15.85	-30.15	46.00	5.50	0.12	10.23	Average
11	26.278	24.12	-35.88	60.00	12.90	0.64	10.58	QP
12	26.278	15.82	-34.18	50.00	4.60	0.64	10.58	Average

Note:

- Level(dBμV) = Read Level(dBμV) + LISN Factor(dB) + Cable Loss(dB)
- Over Limit(dB) = Level(dBμV) – Limit Line(dBμV)



Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2386.05	56.82	-17.18	74	49.77	31.2	7.5	31.65	100	2	P	H
		2386.18	46.99	-7.01	54	39.94	31.2	7.5	31.65	100	2	A	H
	*	2410	104.42	-	-	97.23	31.31	7.53	31.65	100	2	P	H
	*	2410	101.04	-	-	93.85	31.31	7.53	31.65	100	2	A	H
		2352.64	55.81	-18.19	74	48.86	31.18	7.44	31.67	100	68	P	V
		2386.31	45.11	-8.89	54	38.06	31.2	7.5	31.65	100	68	A	V
	*	2412	98.47	-	-	91.28	31.31	7.53	31.65	100	68	P	V
	*	2414	95.27	-	-	88.08	31.31	7.53	31.65	100	68	A	V
802.11b CH 06 2437MHz		2321.57	55.53	-18.47	74	48.66	31.16	7.38	31.67	244	10	P	H
		2389.95	44.36	-9.64	54	37.31	31.2	7.5	31.65	244	10	A	H
	*	2436	104.89	-	-	97.51	31.43	7.56	31.61	244	10	P	H
	*	2436	101.61	-	-	94.23	31.43	7.56	31.61	244	10	A	H
		2484.88	56.99	-17.01	74	49.16	31.77	7.64	31.58	244	10	P	H
		2483.5	45.19	-8.81	54	37.36	31.77	7.64	31.58	244	10	A	H
		2352.51	55.43	-18.57	74	48.48	31.18	7.44	31.67	120	67	P	V
		2357.19	44.08	-9.92	54	37.13	31.18	7.44	31.67	120	67	A	V
	*	2438	97.08	-	-	89.57	31.54	7.58	31.61	120	67	P	V
	*	2438	93.83	-	-	86.32	31.54	7.58	31.61	120	67	A	V
		2497.06	56.34	-17.66	74	48.34	31.89	7.67	31.56	120	67	P	V
	2498.26	44.83	-9.17	54	36.83	31.89	7.67	31.56	120	67	A	V	



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 11 2462MHz	*	2464	105.04	-	-	97.37	31.66	7.61	31.6	116	360	P	H
	*	2464	101.87	-	-	94.2	31.66	7.61	31.6	116	360	A	H
		2486.14	56.83	-17.17	74	49	31.77	7.64	31.58	116	360	P	H
		2483.5	46.08	-7.92	54	38.25	31.77	7.64	31.58	116	360	A	H
	*	2464	97.42	-	-	89.75	31.66	7.61	31.6	100	76	P	V
	*	2464	94.27	-	-	86.6	31.66	7.61	31.6	100	76	A	V
		2492.98	56.89	-17.11	74	48.89	31.89	7.67	31.56	100	76	P	V
		2488.42	45.19	-8.81	54	37.21	31.89	7.67	31.58	100	76	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11b (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for CH 01 (2412MHz) and CH 06 (2437MHz) at various frequencies and positions.

Remark

- 1. No other spurious found.
2. All results are PASS against Peak and Average limit line.



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for 802.11g CH 01 (2412MHz) and 802.11g CH 06 (2437MHz).



WIFI Ant. 2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 11 2462MHz	*	2464	106.41	-	-	98.74	31.66	7.61	31.6	236	275	P	H
	*	2464	98.41	-	-	90.74	31.66	7.61	31.6	236	275	A	H
		2483.62	63.79	-10.21	74	55.96	31.77	7.64	31.58	236	275	P	H
		2484.04	46.57	-7.43	54	38.74	31.77	7.64	31.58	236	275	A	H
	*	2460	95.67	-	-	88	31.66	7.61	31.6	322	311	P	V
	*	2460	87.65	-	-	79.98	31.66	7.61	31.6	322	311	A	V
		2492.62	55.76	-18.24	74	47.76	31.89	7.67	31.56	322	311	P	V
		2499.28	45.28	-8.72	54	37.28	31.89	7.67	31.56	322	311	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



**2.4GHz 2400~2483.5MHz
WIFI 802.11g (Harmonic @ 3m)**

WIFI Ant. 2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	39.84	-34.16	74	55.36	33.72	10.8	60.04	100	360	P	H
		4824	39.81	-34.19	74	55.33	33.72	10.8	60.04	100	360	P	V
802.11g CH 06 2437MHz		4872	41.78	-32.22	74	57.17	33.77	10.87	60.03	300	0	P	H
		7311	42.85	-31.15	74	54.12	35.86	13.38	60.51	300	0	P	H
		4872	41.66	-32.34	74	57.05	33.77	10.87	60.03	300	360	P	V
		7311	43.81	-30.19	74	55.08	35.86	13.38	60.51	300	360	P	V
802.11g CH 11 2462MHz		4926	40.16	-33.84	74	55.42	33.82	10.94	60.02	100	360	P	H
		7386	43.49	-30.51	74	54.55	36.01	13.46	60.53	100	360	P	H
		4926	40.99	-33.01	74	56.25	33.82	10.94	60.02	100	360	P	V
		7386	42.08	-31.92	74	53.14	36.01	13.46	60.53	100	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test data for 802.11n HT20 CH 01 (2412MHz) and CH 06 (2437MHz).



WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 11 2462MHz		2486.98	63.71	-10.29	74	55.88	31.77	7.64	31.58	285	249	P	H
		2483.56	46.39	-7.61	54	38.56	31.77	7.64	31.58	285	249	A	H
	*	2460	106.6	-	-	98.93	31.66	7.61	31.6	285	249	P	H
	*	2464	98.59	-	-	90.92	31.66	7.61	31.6	285	249	A	H
		2489.44	56.08	-17.92	74	48.1	31.89	7.67	31.58	229	360	P	V
		2492.74	45.35	-8.65	54	37.35	31.89	7.67	31.56	229	360	A	V
	*	2460	95.1	-	-	87.43	31.66	7.61	31.6	229	360	P	V
	*	2460	87.11	-	-	79.44	31.66	7.61	31.6	229	360	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include test results for 802.11n HT20 CH 01, CH 06, and CH 11 at various frequencies.

Remark

- 1. No other spurious found.
2. All results are PASS against Peak and Average limit line.



**2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Band Edge @ 3m)**

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.43	64.07	-9.93	74	57.02	31.2	7.5	31.65	123	244	P	H
		2389.82	46.38	-7.62	54	39.33	31.2	7.5	31.65	123	244	A	H
	*	2428	102.46	-	-	95.1	31.43	7.56	31.63	123	244	P	H
	*	2420	94.56	-	-	87.2	31.43	7.56	31.63	123	244	A	H
		2485.42	60.45	-13.55	74	52.62	31.77	7.64	31.58	123	244	P	H
		2496.46	45.98	-8.02	54	37.98	31.89	7.67	31.56	123	244	A	H
		2318.06	55.49	-18.51	74	48.63	31.16	7.38	31.68	386	9	P	V
		2386.44	44.74	-9.26	54	37.69	31.2	7.5	31.65	386	9	A	V
	*	2412	92.34	-	-	85.15	31.31	7.53	31.65	386	9	P	V
	*	2414	84.56	-	-	77.37	31.31	7.53	31.65	386	9	A	V
		2489.92	55.7	-18.3	74	47.72	31.89	7.67	31.58	386	9	P	V
		2499.94	45.7	-8.3	54	37.7	31.89	7.67	31.56	386	9	A	V
802.11n HT40 CH 06 2437MHz		2387.22	60.02	-13.98	74	52.97	31.2	7.5	31.65	111	250	P	H
		2389.82	47.37	-6.63	54	40.32	31.2	7.5	31.65	111	250	A	H
	*	2436	106.05	-	-	98.67	31.43	7.56	31.61	111	250	P	H
	*	2436	98.27	-	-	90.89	31.43	7.56	31.61	111	250	A	H
		2489.62	61.73	-12.27	74	53.75	31.89	7.67	31.58	111	250	P	H
		2484.16	47.61	-6.39	54	39.78	31.77	7.64	31.58	111	250	A	H
		2323.13	55.77	-18.23	74	48.9	31.16	7.38	31.67	302	10	P	V
		2386.83	44.74	-9.26	54	37.69	31.2	7.5	31.65	302	10	A	V
	*	2434	95.92	-	-	88.56	31.43	7.56	31.63	302	10	P	V
	*	2434	88.21	-	-	80.85	31.43	7.56	31.63	302	10	A	V
		2494.3	55.73	-18.27	74	47.73	31.89	7.67	31.56	302	10	P	V
		2486.98	45.71	-8.29	54	37.88	31.77	7.64	31.58	302	10	A	V



WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 09 2452MHz		2386.44	59.32	-14.68	74	52.27	31.2	7.5	31.65	118	248	P	H
		2388.65	45.2	-8.8	54	38.15	31.2	7.5	31.65	118	248	A	H
	*	2450	103.32	-	-	95.81	31.54	7.58	31.61	118	248	P	H
	*	2448	95.79	-	-	88.28	31.54	7.58	31.61	118	248	A	H
		2489.38	64.95	-9.05	74	56.97	31.89	7.67	31.58	118	248	P	H
		2483.56	48.85	-5.15	54	41.02	31.77	7.64	31.58	118	248	A	H
		2320.79	55.09	-18.91	74	48.22	31.16	7.38	31.67	377	16	P	V
		2389.95	44.75	-9.25	54	37.7	31.2	7.5	31.65	377	16	A	V
	*	2454	93.15	-	-	85.48	31.66	7.61	31.6	377	16	P	V
	*	2454	85.14	-	-	77.47	31.66	7.61	31.6	377	16	A	V
		2497.78	56.69	-17.31	74	48.69	31.89	7.67	31.56	377	16	P	V
		2483.68	45.53	-8.47	54	37.7	31.77	7.64	31.58	377	16	A	V
Remark	<ol style="list-style-type: none"> No other spurious found. All results are PASS against Peak and Average limit line. 												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

Table with 14 columns: WIFI Ant. 1+2, Note, Frequency (MHz), Level (dBµV/m), Over Limit (dB), Limit Line (dBµV/m), Read Level (dBµV), Antenna Factor (dB/m), Path Loss (dB), Preamp Factor (dB), Ant Pos (cm), Table Pos (deg), Peak Avg. (P/A), Pol. (H/V). Rows include data for 802.11n HT40 CH 03 (2422MHz) and 802.11n HT40 CH 06 (2437MHz).

Remark

- 1. No other spurious found.
2. All results are PASS against Peak and Average limit line.



2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT40 LF		30	17.79	-22.21	40	23.65	25.1	1.24	32.2	-	-	P	H
		76.56	30.02	-9.98	40	47.04	13.2	1.98	32.2	100	0	P	H
		157.07	21.49	-22.01	43.5	34.08	16.68	2.83	32.1	-	-	P	H
		291.9	24.6	-21.4	46	33.62	19.24	3.86	32.12	-	-	P	H
		359.8	20.36	-25.64	46	27.5	20.8	4.28	32.22	-	-	P	H
		908.82	28.87	-17.13	46	24.86	29.44	6.77	32.2	-	-	P	H
		30.97	21.65	-18.35	40	28.02	24.57	1.26	32.2	-	-	P	V
		79.47	23.44	-16.56	40	40.13	13.5	2.01	32.2	-	-	P	V
		83.35	23.57	-16.43	40	39.69	13.96	2.06	32.14	100	36	P	V
		101.78	23.66	-19.84	43.5	37.3	16.28	2.28	32.2	-	-	P	V
		199.75	16.22	-27.28	43.5	30.03	15.1	3.19	32.1	-	-	P	V
	551.86	23.69	-22.31	46	25.28	25.42	5.29	32.3	-	-	P	V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.

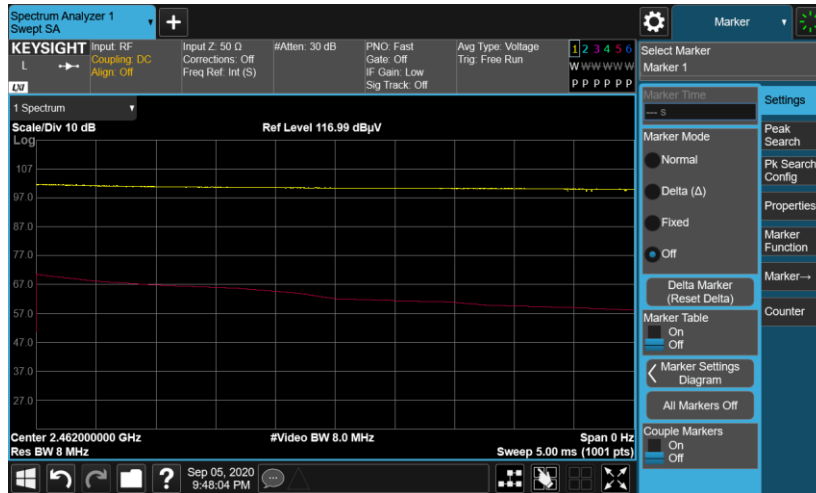


Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11b	100	-	-	10Hz
2	802.11g	93.47	2.064	0.484	0.51kHz
1+2	802.11n HT20	90.90	1.920	0.521	0.56kHz
1+2	802.11n HT40	82.89	0.945	1.058	1.1kHz

<Ant. 1>

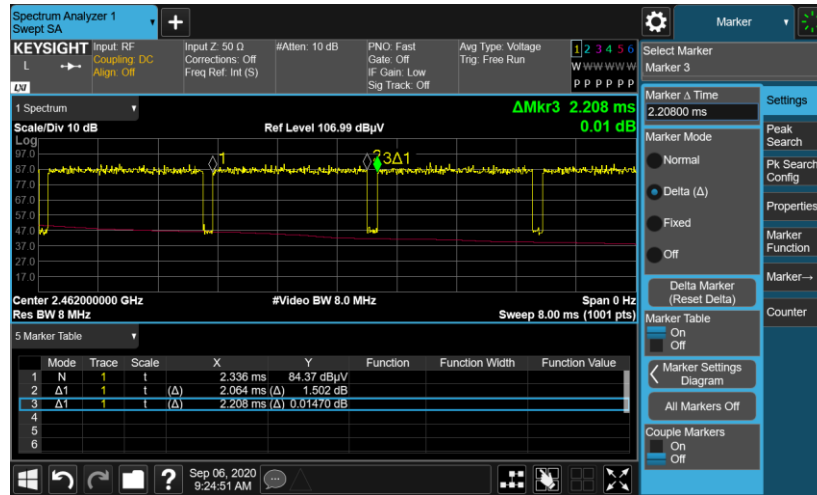
802.11b





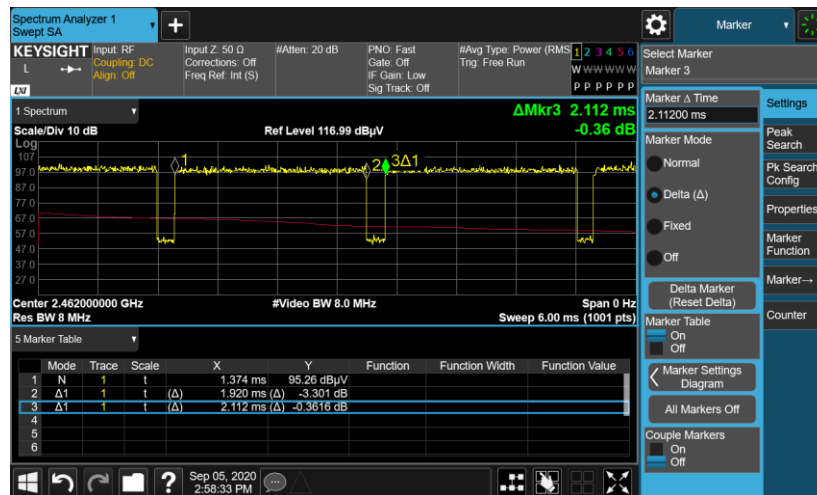
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802.11g



<MIMO Ant. 1+2>

802.11n HT20





802.11n HT40

