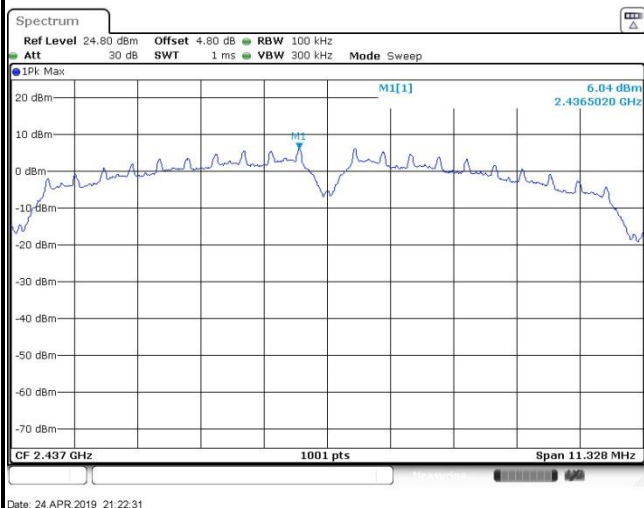


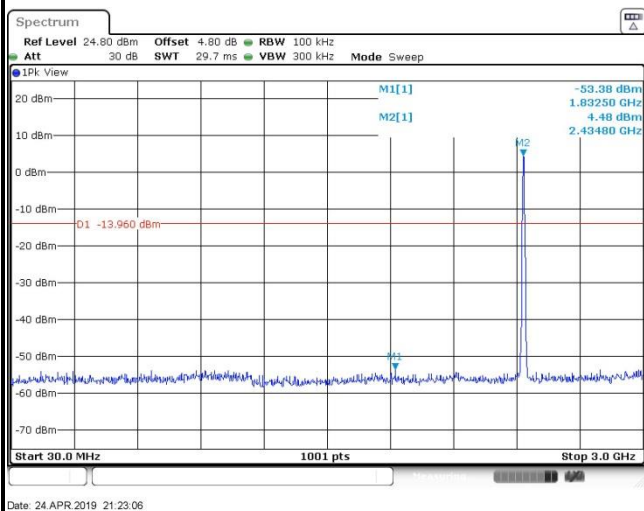


Test Mode :	802.11b	Test Channel :	06
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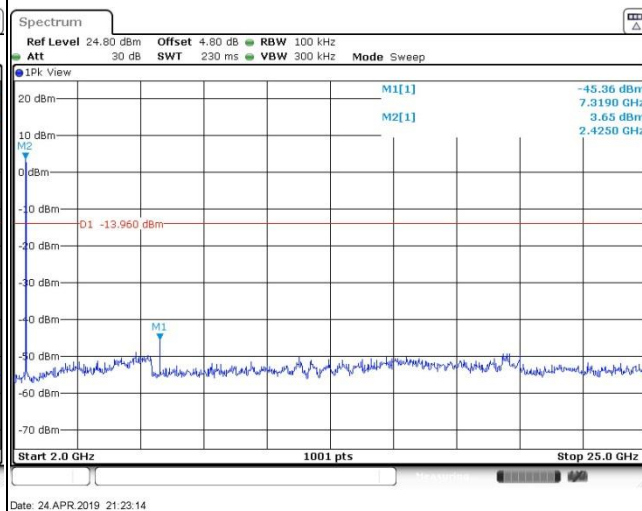
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

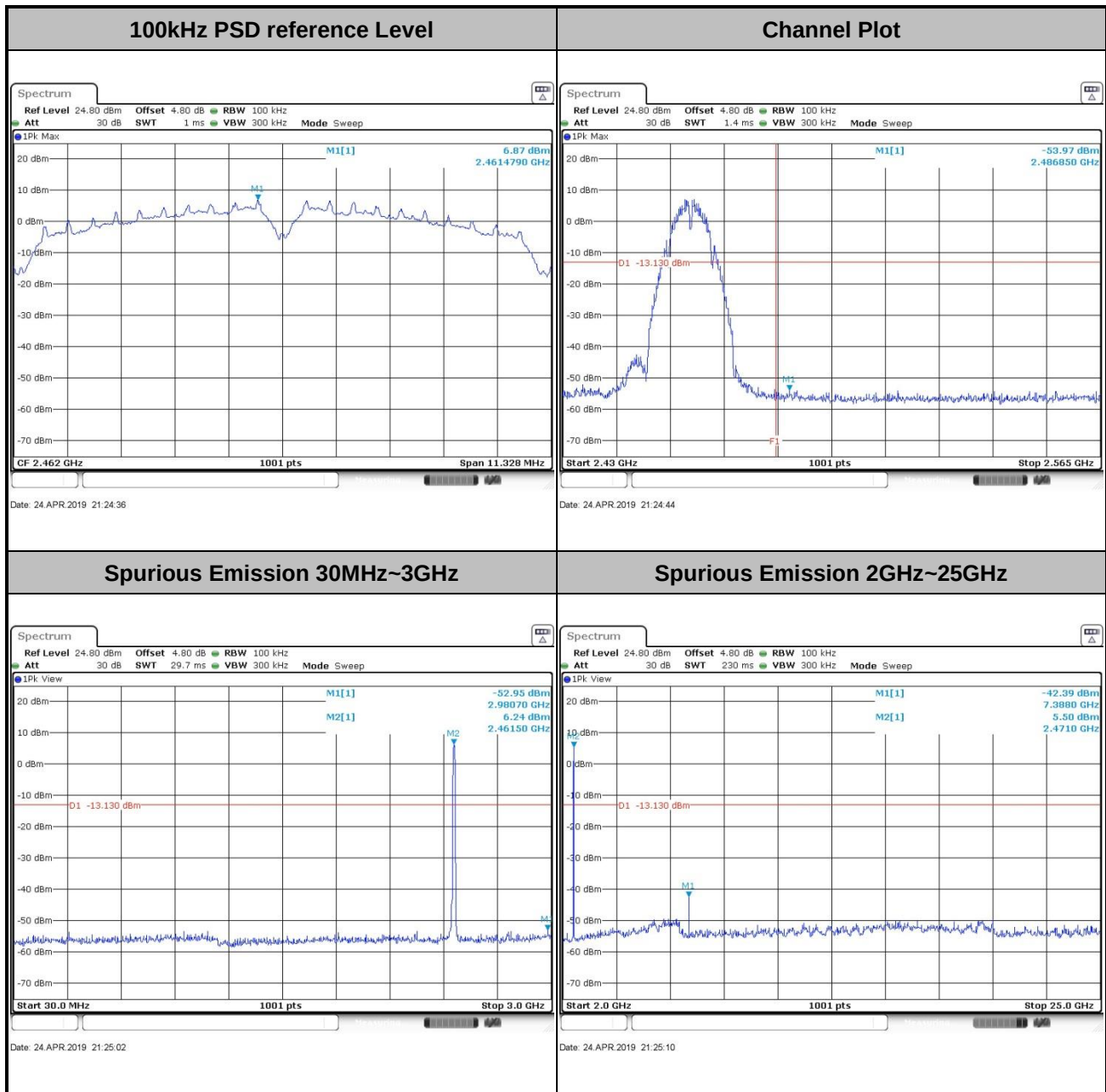


Spurious Emission 2GHz~25GHz





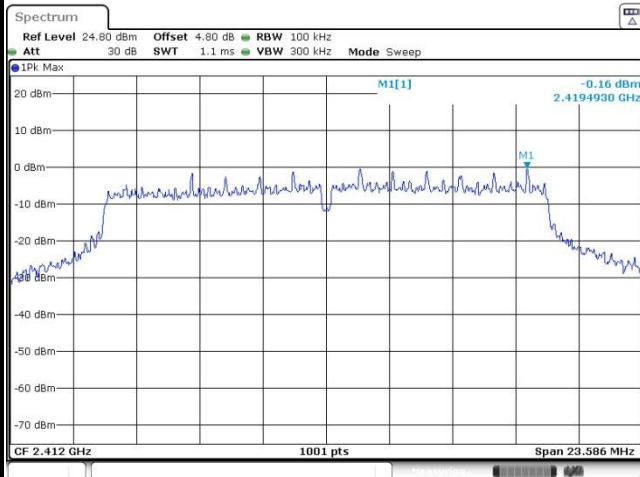
Test Mode :	802.11b	Test Channel :	11
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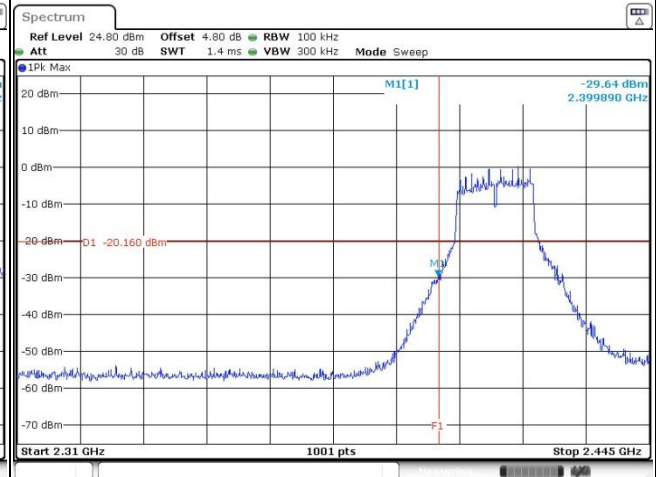


Test Mode :	802.11g	Test Channel :	01
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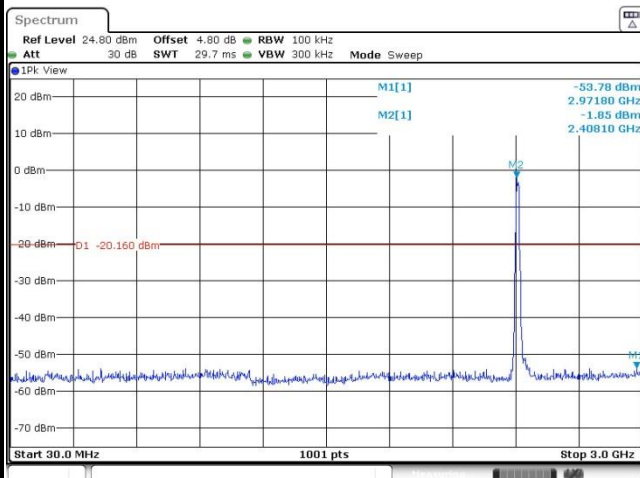
100kHz PSD reference Level



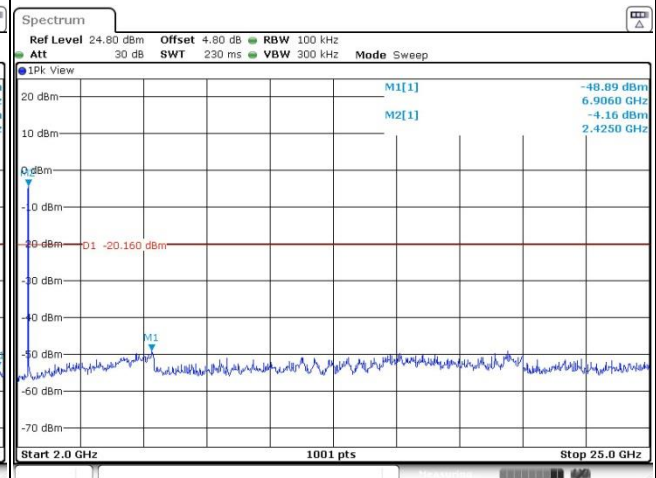
Channel Plot



Spurious Emission 30MHz~3GHz



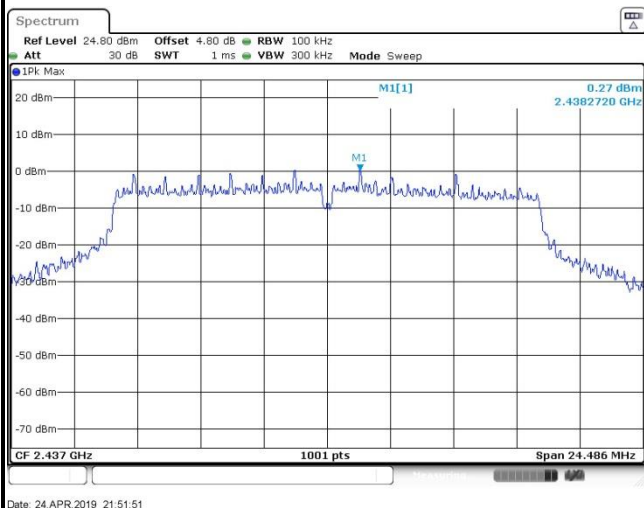
Spurious Emission 2GHz~25GHz



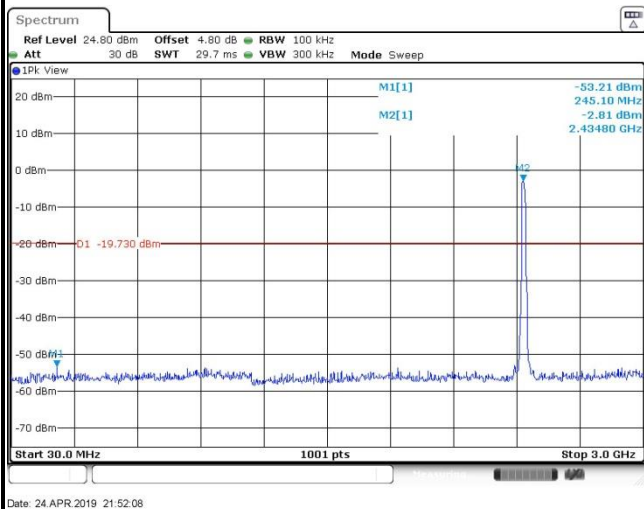


Test Mode :	802.11g	Test Channel :	06
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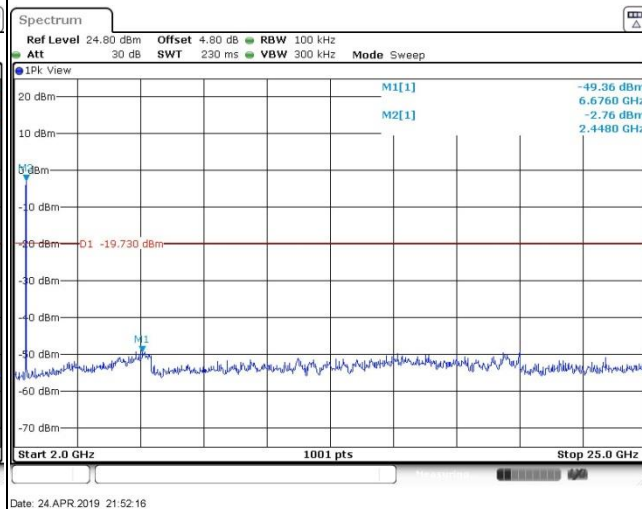
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

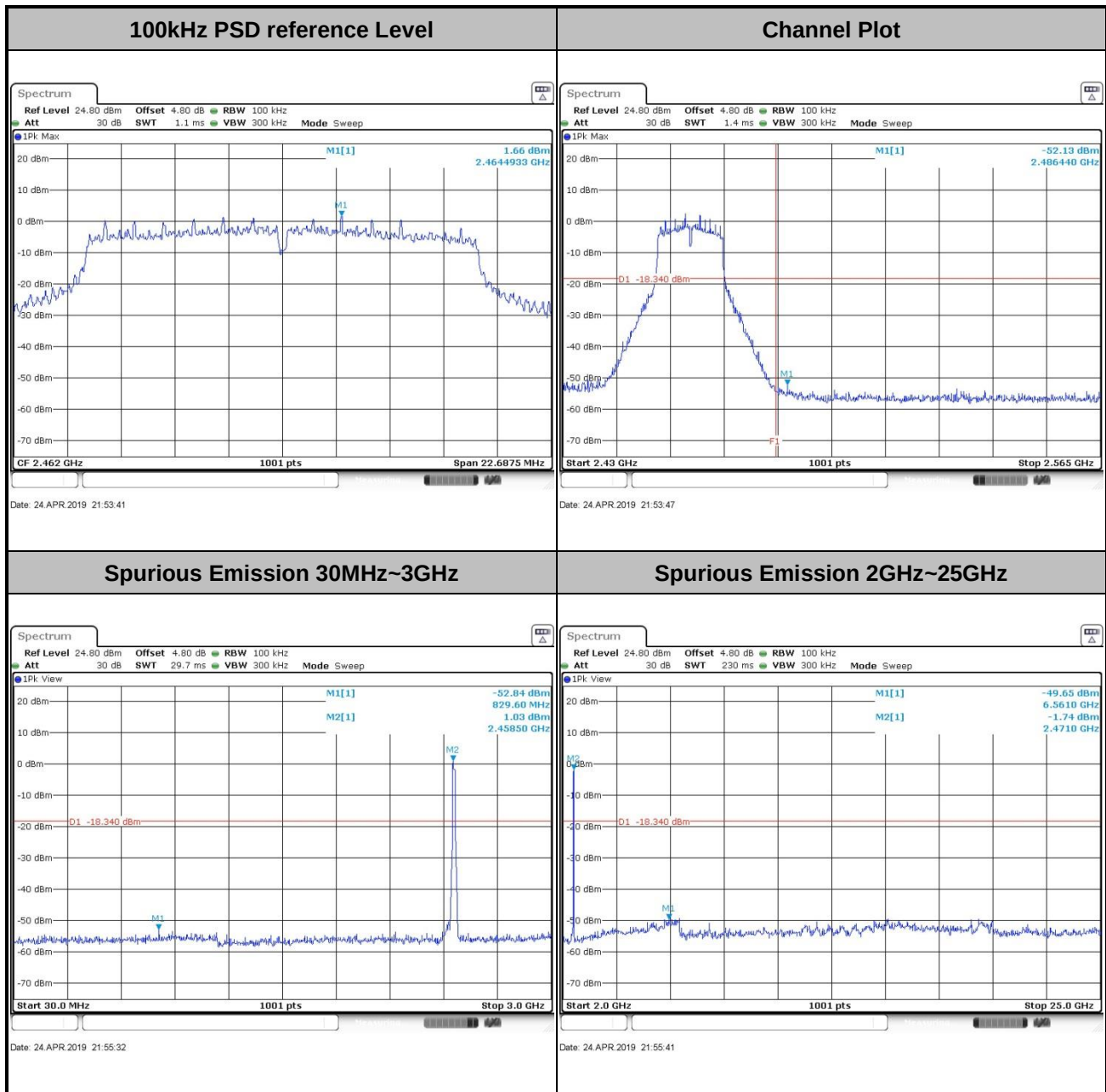


Spurious Emission 2GHz~25GHz





Test Mode :	802.11g	Test Channel :	11
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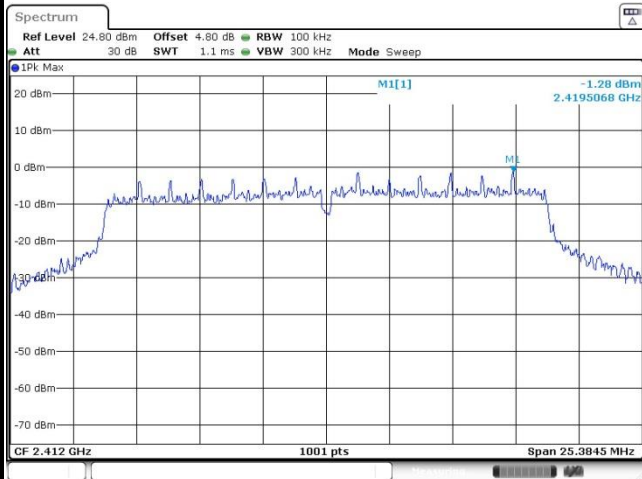




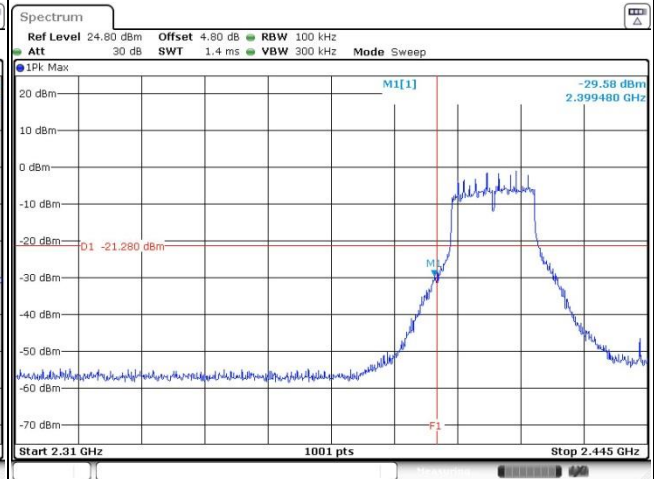
Test Mode : 802.11n HT20

Test Channel : 01

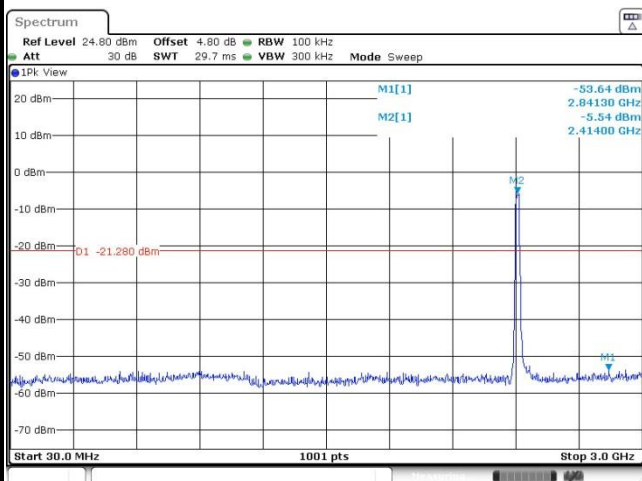
100kHz PSD reference Level



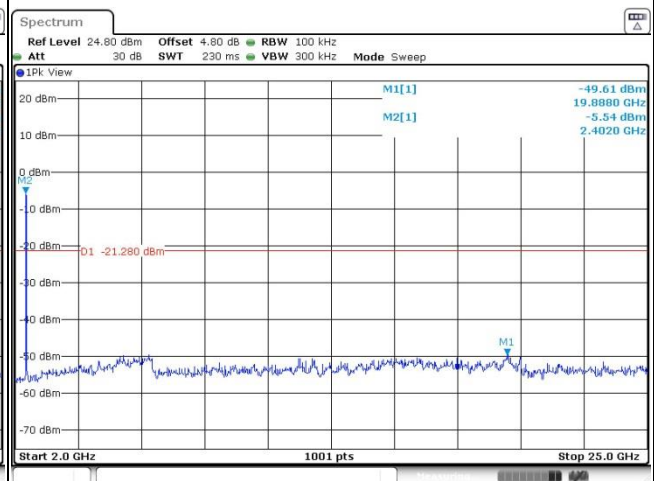
Channel Plot



Spurious Emission 30MHz~3GHz



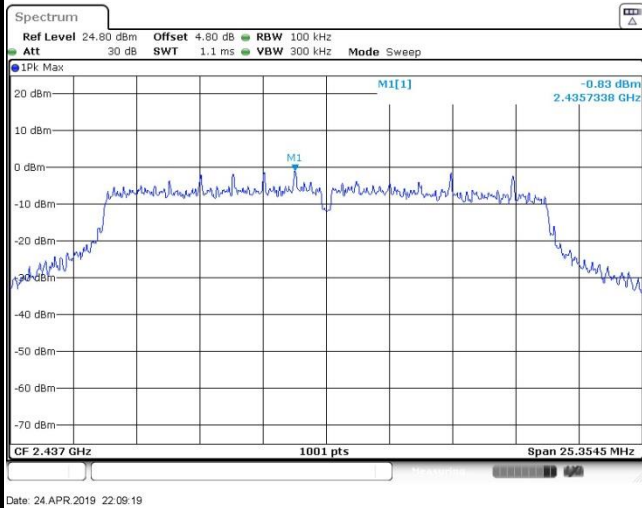
Spurious Emission 2GHz~25GHz



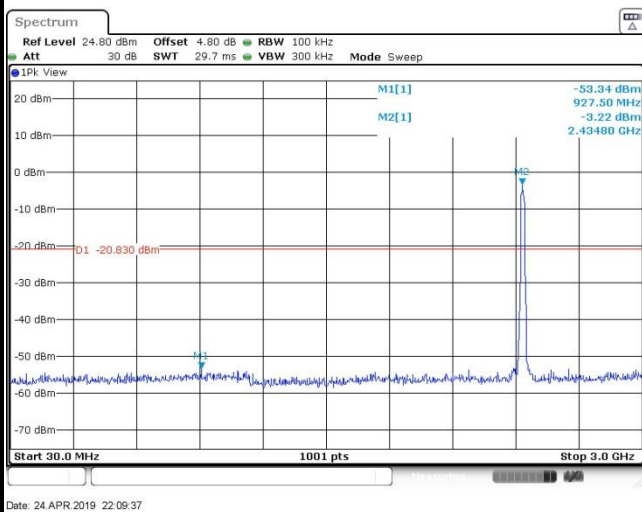


Test Mode :	802.11n HT20	Test Channel :	06
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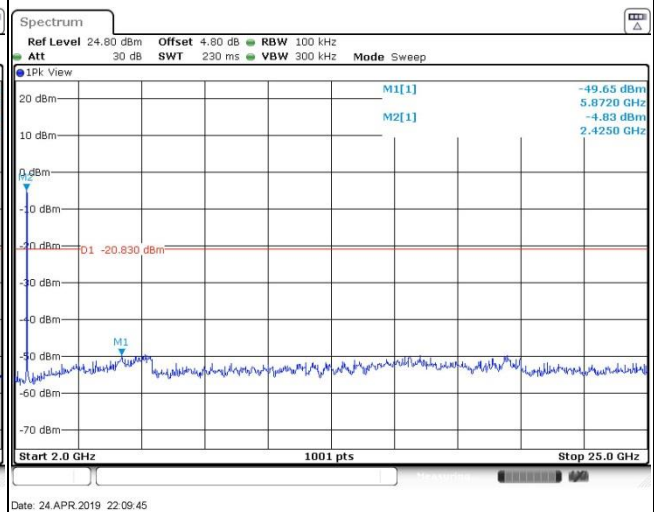
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

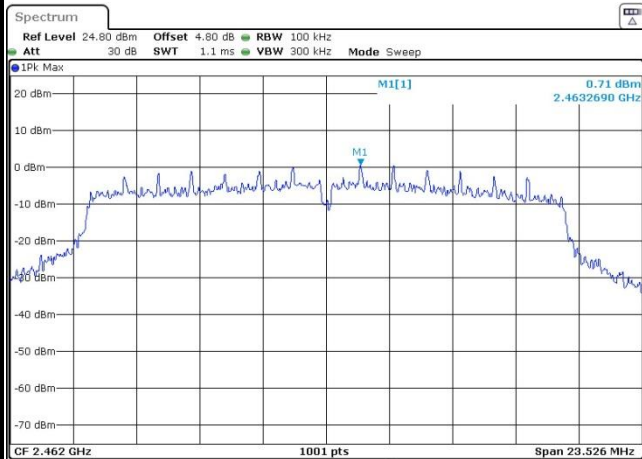




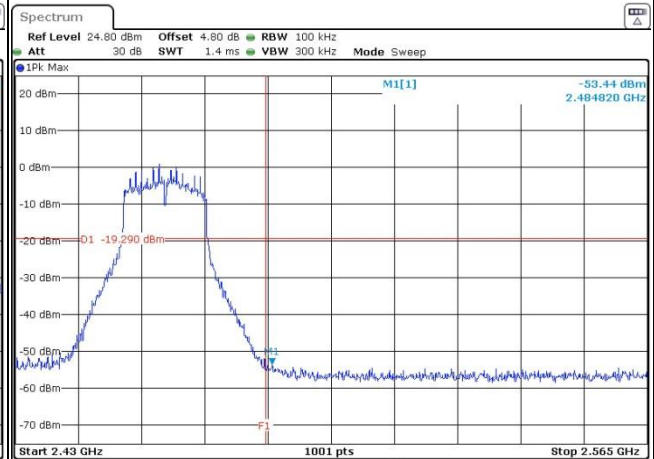
Test Mode : 802.11n HT20

Test Channel : 11

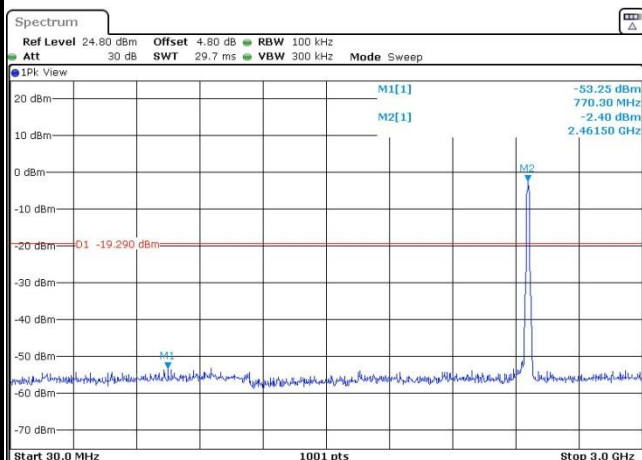
100kHz PSD reference Level



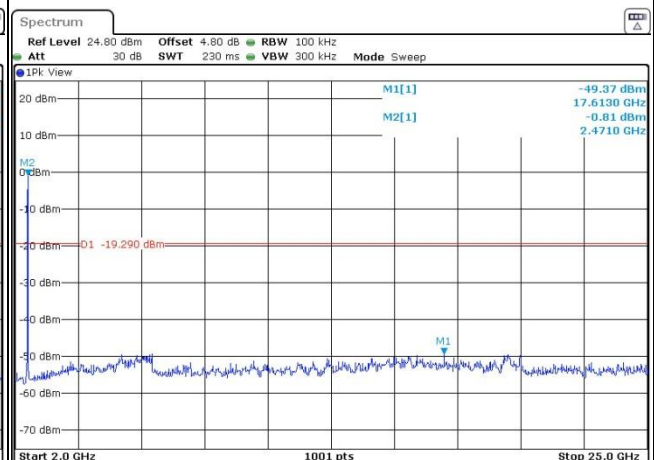
Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

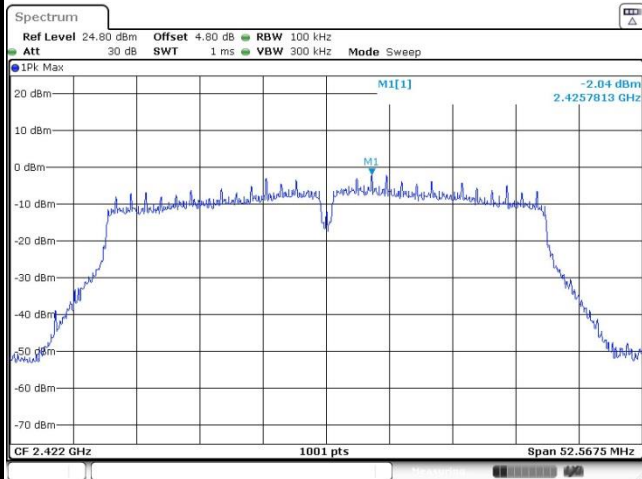




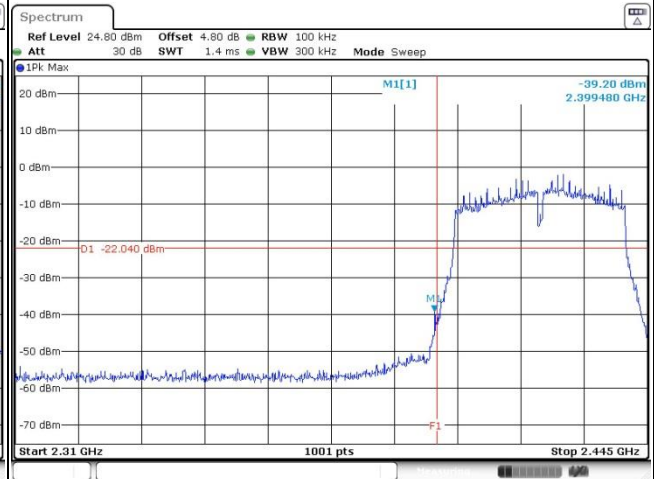
Test Mode : 802.11n HT40

Test Channel : 03

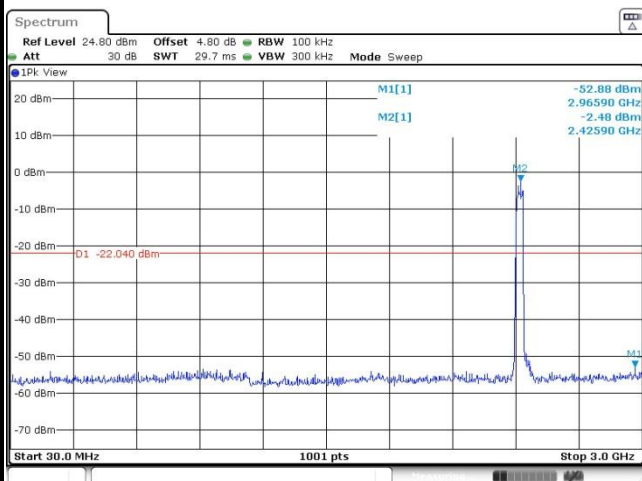
100kHz PSD reference Level



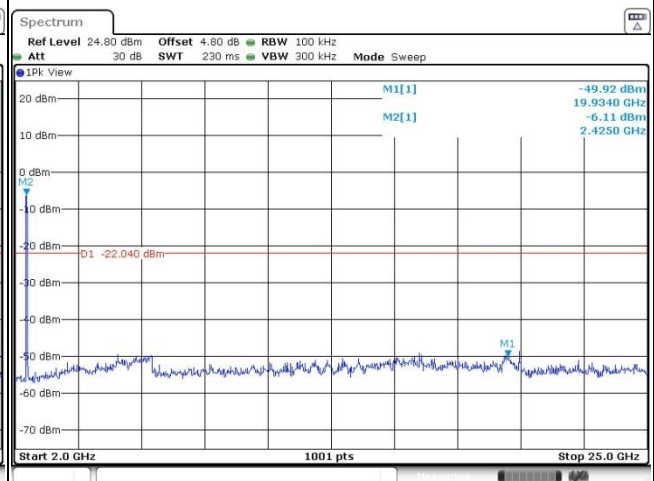
Channel Plot



Spurious Emission 30MHz~3GHz



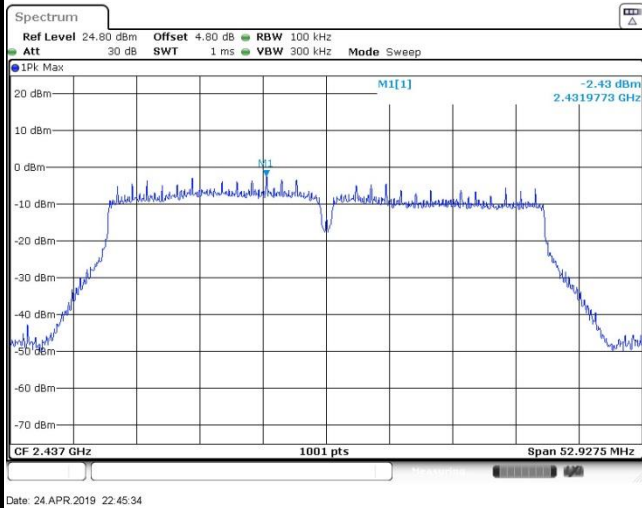
Spurious Emission 2GHz~25GHz



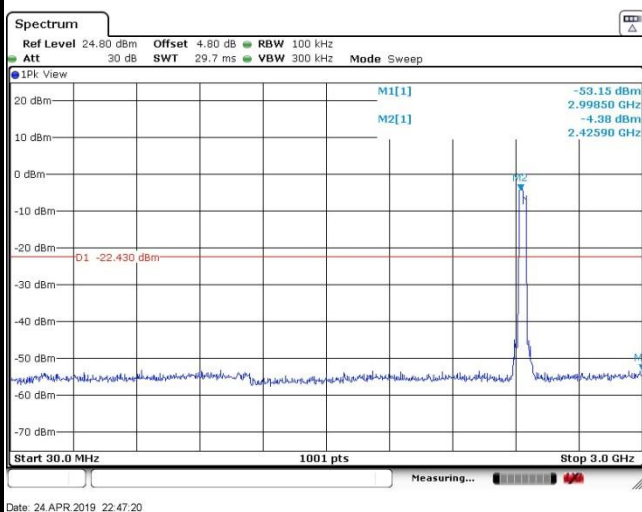


Test Mode :	802.11n HT40	Test Channel :	06
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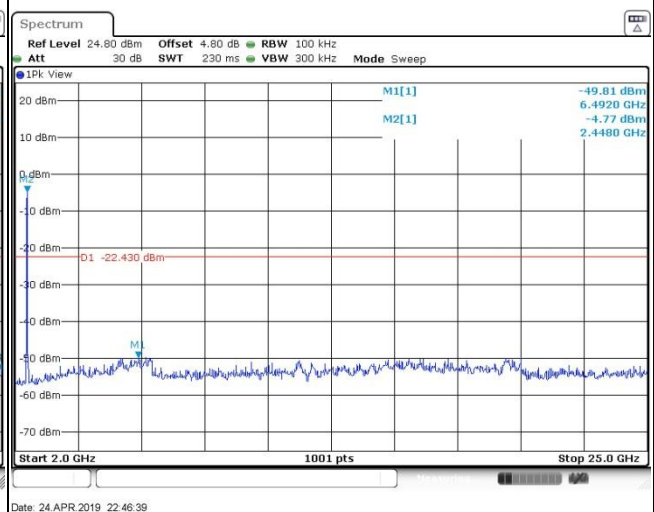
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

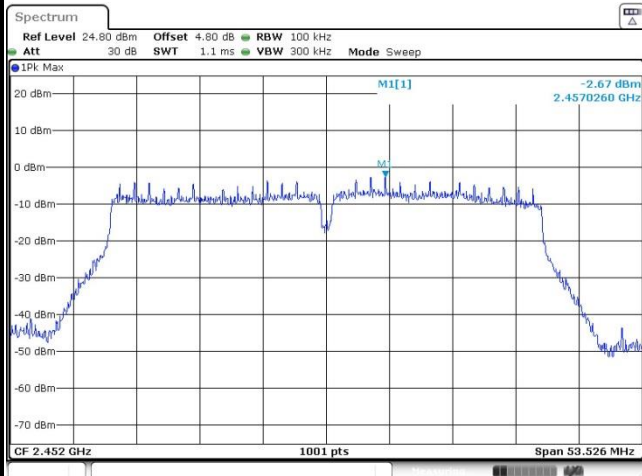




Test Mode : 802.11n HT40

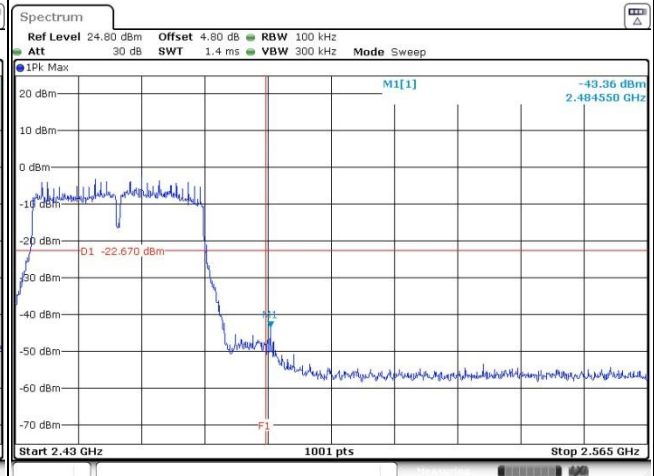
Test Channel : 09

100kHz PSD reference Level



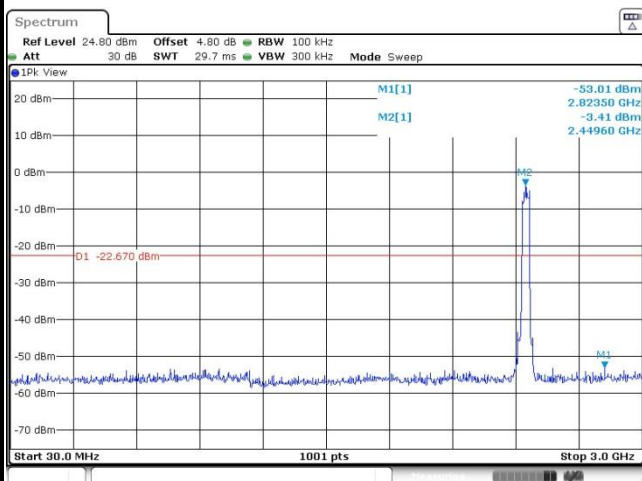
Date: 24 APR 2019 22:48:49

Channel Plot



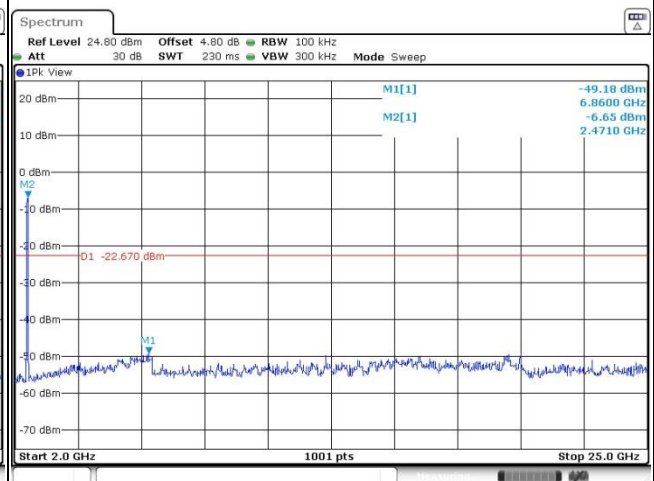
Date: 24 APR 2019 22:48:56

Spurious Emission 30MHz~3GHz



Date: 24 APR 2019 22:49:13

Spurious Emission 2GHz~25GHz



Date: 24 APR 2019 22:49:22

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

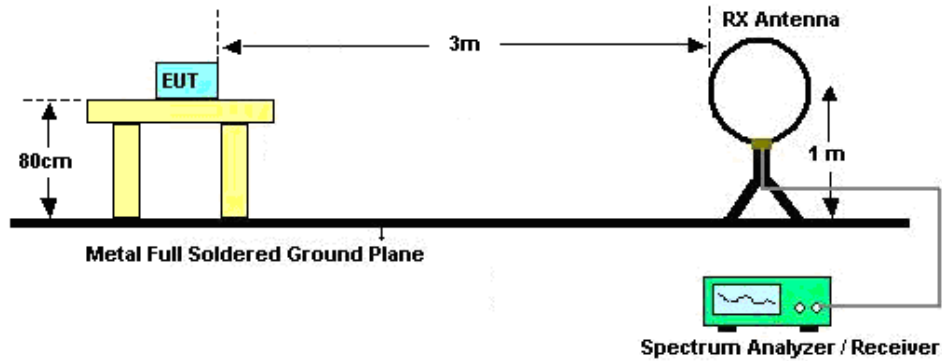
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

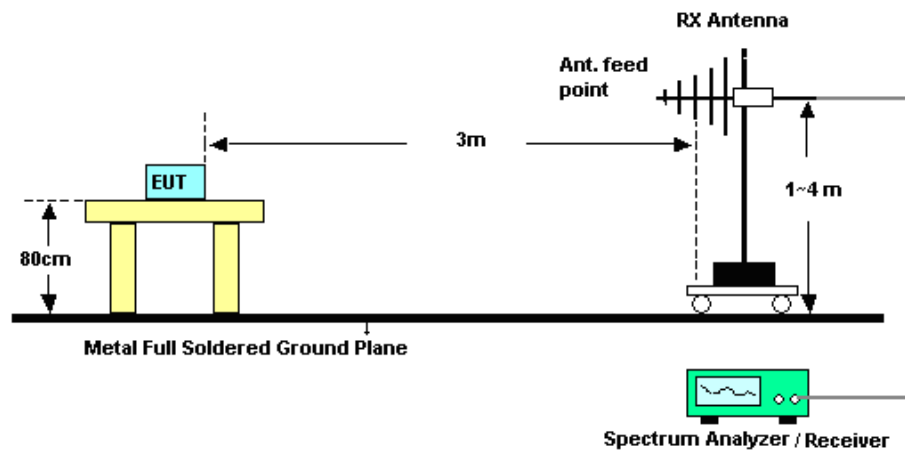
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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

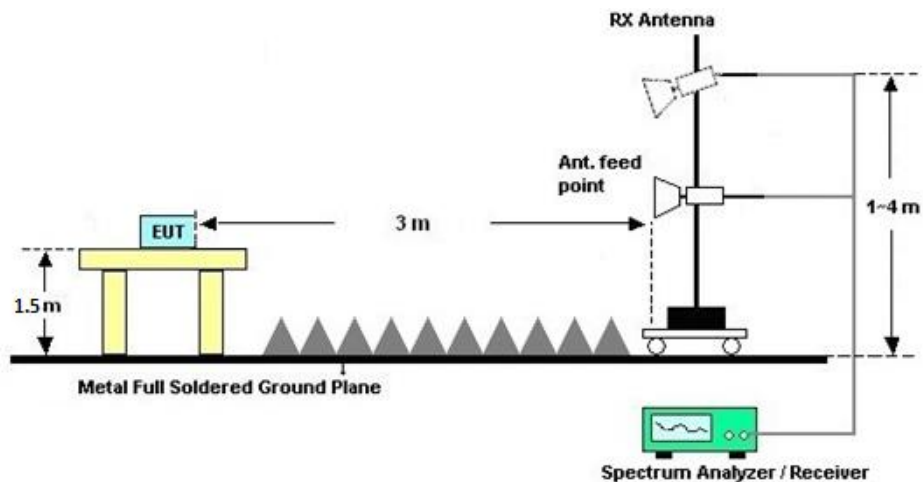
For radiated emissions below 30MHz



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 (dB μ V)	
	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.

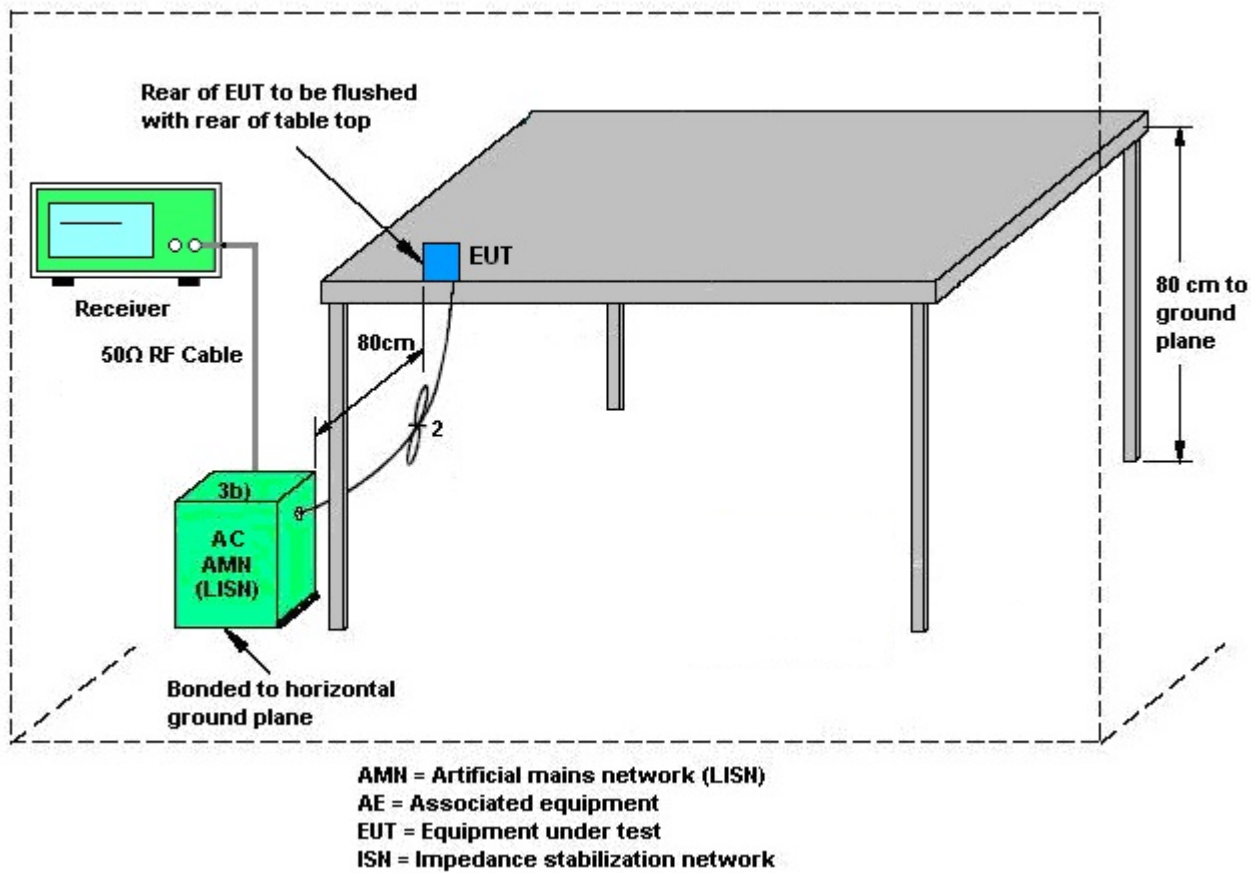
3.6.2 Measuring Instruments

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



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

Non-standard antenna connector 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>						
	Ant. 1	Ant. 2	DG for Power	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	5.38	5.38	5.38	8.39	0.00	2.39

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

PSD Limit Reduction = $DG(\text{PSD}) - 6\text{dBi}$, (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	101040	10Hz~40GHz	Aug. 07, 2018	Apr. 24, 2019~ Apr. 25, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Apr. 24, 2019~ Apr. 25, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Apr. 24, 2019~ Apr. 25, 2019	Jan. 13, 2020	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400023	3Hz~8.5GHz; Max 30dBm	Oct. 12, 2018	Apr. 15, 2019	Oct. 11, 2019	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471084	10Hz~44GHz	Jun. 25, 2018	Apr. 15, 2019	Jun. 24, 2019	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Apr. 15, 2019	Oct. 18, 2019	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz~1GHz	Dec. 28, 2018	Apr. 15, 2019	Dec. 27, 2019	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 20, 2018	Apr. 15, 2019	Oct. 19, 2019	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Apr. 15, 2019	Jan. 04, 2020	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	187289	9KHz ~1GHZ	Aug. 06, 2018	Apr. 15, 2019	Aug. 05, 2019	Radiation (03CH06-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Jan. 14, 2019	Apr. 15, 2019	Jan. 13, 2020	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Apr. 15, 2019	Apr. 16, 2019	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY53270203	500MHz~26.5GHz	Apr. 18, 2018	Apr. 15, 2019	Apr. 17, 2019	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Apr. 15, 2019	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Apr. 15, 2019	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Apr. 15, 2019	NCR	Radiation (03CH06-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 16, 2019	Apr. 24, 2019	Apr. 15, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Apr. 24, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Apr. 24, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Apr. 24, 2019	Oct. 11, 2019	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 (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.9dB
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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:	Weller Liu	Temperature:	21~25	°C
Test Date:	2019/4/24~2019/4/25	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	N _{TX}	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	2	1	2412	12.89	12.69	8.03	7.57	0.50	Pass
11b	1Mbps	2	6	2437	13.29	12.84	8.05	7.55	0.50	Pass
11b	1Mbps	2	11	2462	12.44	12.54	7.53	7.55	0.50	Pass
11g	6Mbps	2	1	2412	18.18	17.98	15.74	15.72	0.50	Pass
11g	6Mbps	2	6	2437	18.23	17.68	15.72	16.32	0.50	Pass
11g	6Mbps	2	11	2462	17.33	17.38	15.29	15.13	0.50	Pass
HT20	MCS0	2	1	2412	19.08	19.18	16.32	16.92	0.50	Pass
HT20	MCS0	2	6	2437	19.23	18.93	16.90	16.90	0.50	Pass
HT20	MCS0	2	11	2462	18.23	18.53	15.07	18.68	0.50	Pass
HT40	MCS0	2	3	2422	35.66	36.16	26.29	35.05	0.50	Pass
HT40	MCS0	2	6	2437	36.86	36.56	35.72	35.29	0.50	Pass
HT40	MCS0	2	9	2452	36.36	36.46	35.09	35.68	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak 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	2	1	2412	16.78	16.55	19.68	30.00		5.38		25.06		36.00		Pass
11b	1Mbps	2	6	2437	16.70	16.32	19.53	30.00		5.38		24.91		36.00		Pass
11b	1Mbps	2	11	2462	17.40	17.19	20.31	30.00		5.38		25.69		36.00		Pass
11g	6Mbps	2	1	2412	15.98	14.95	18.51	30.00		5.38		23.89		36.00		Pass
11g	6Mbps	2	6	2437	15.62	14.95	18.31	30.00		5.38		23.69		36.00		Pass
11g	6Mbps	2	11	2462	16.64	16.22	19.45	30.00		5.38		24.83		36.00		Pass
HT20	MCS0	2	1	2412	14.82	13.95	17.42	30.00		5.38		22.80		36.00		Pass
HT20	MCS0	2	6	2437	14.47	13.85	17.18	30.00		5.38		22.56		36.00		Pass
HT20	MCS0	2	11	2462	15.46	15.04	18.27	30.00		5.38		23.65		36.00		Pass
HT40	MCS0	2	3	2422	17.03	16.02	19.56	30.00		5.38		24.94		36.00		Pass
HT40	MCS0	2	6	2437	17.31	15.93	19.68	30.00		5.38		25.06		36.00		Pass
HT40	MCS0	2	9	2452	16.69	16.53	19.62	30.00		5.38		25.00		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	2	1	2412	0.00	0.00	13.69	13.24	16.48
11b	1Mbps	2	6	2437	0.00	0.00	13.81	12.92	16.40
11b	1Mbps	2	11	2462	0.00	0.00	14.11	14.04	17.09
11g	6Mbps	2	1	2412	0.21	0.19	11.06	10.21	13.67
11g	6Mbps	2	6	2437	0.21	0.19	10.98	10.06	13.56
11g	6Mbps	2	11	2462	0.21	0.19	11.38	11.08	14.24
HT20	MCS0	2	1	2412	0.21	0.21	9.79	9.09	12.46
HT20	MCS0	2	6	2437	0.21	0.21	9.82	8.92	12.40
HT20	MCS0	2	11	2462	0.21	0.21	10.13	9.83	12.99
HT40	MCS0	2	3	2422	0.38	0.38	10.40	9.42	12.95
HT40	MCS0	2	6	2437	0.38	0.38	10.02	9.36	12.71
HT40	MCS0	2	9	2452	0.38	0.38	10.27	9.79	13.05

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

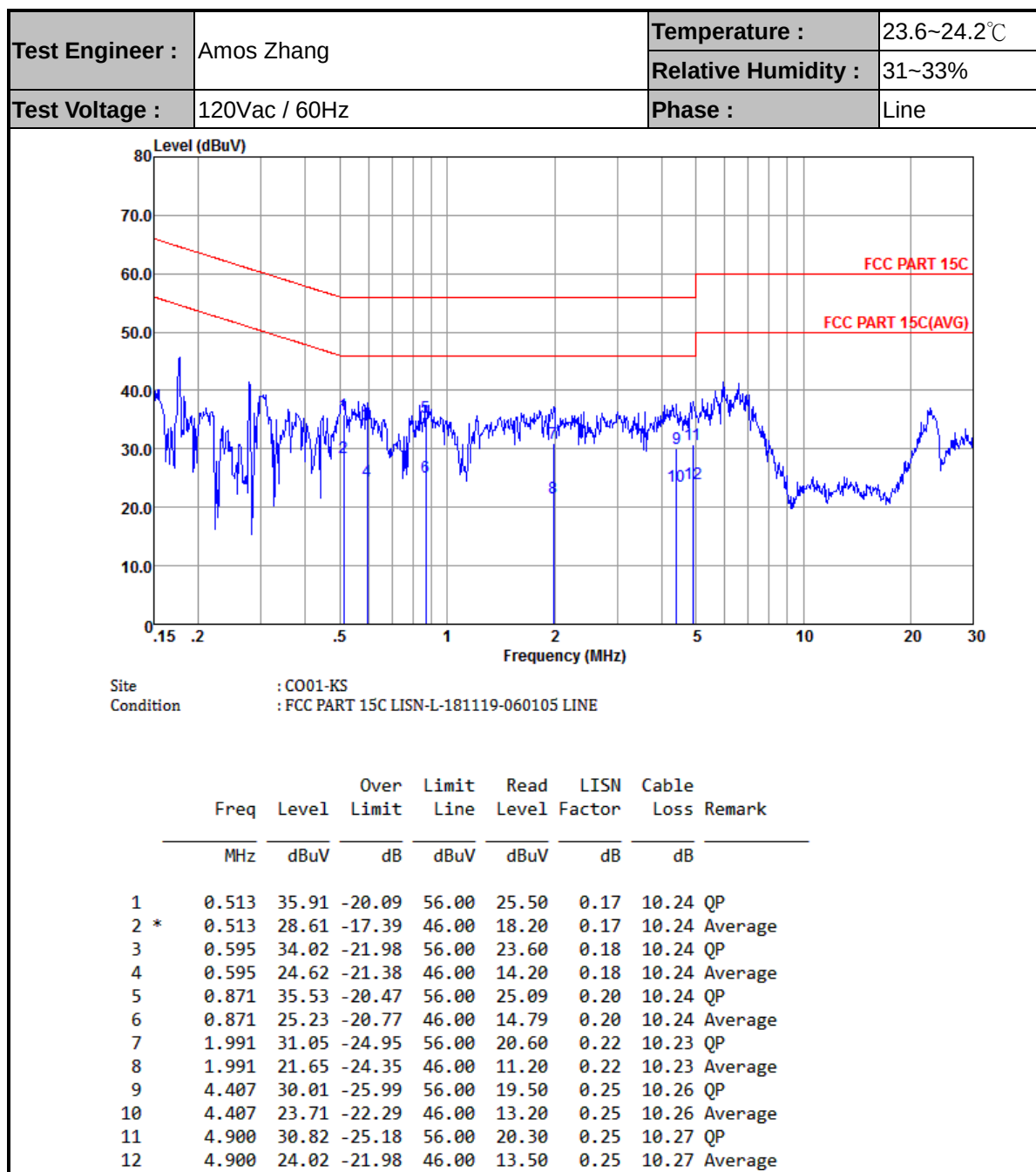
TEST RESULTS DATA
Peak Power Spectral Density

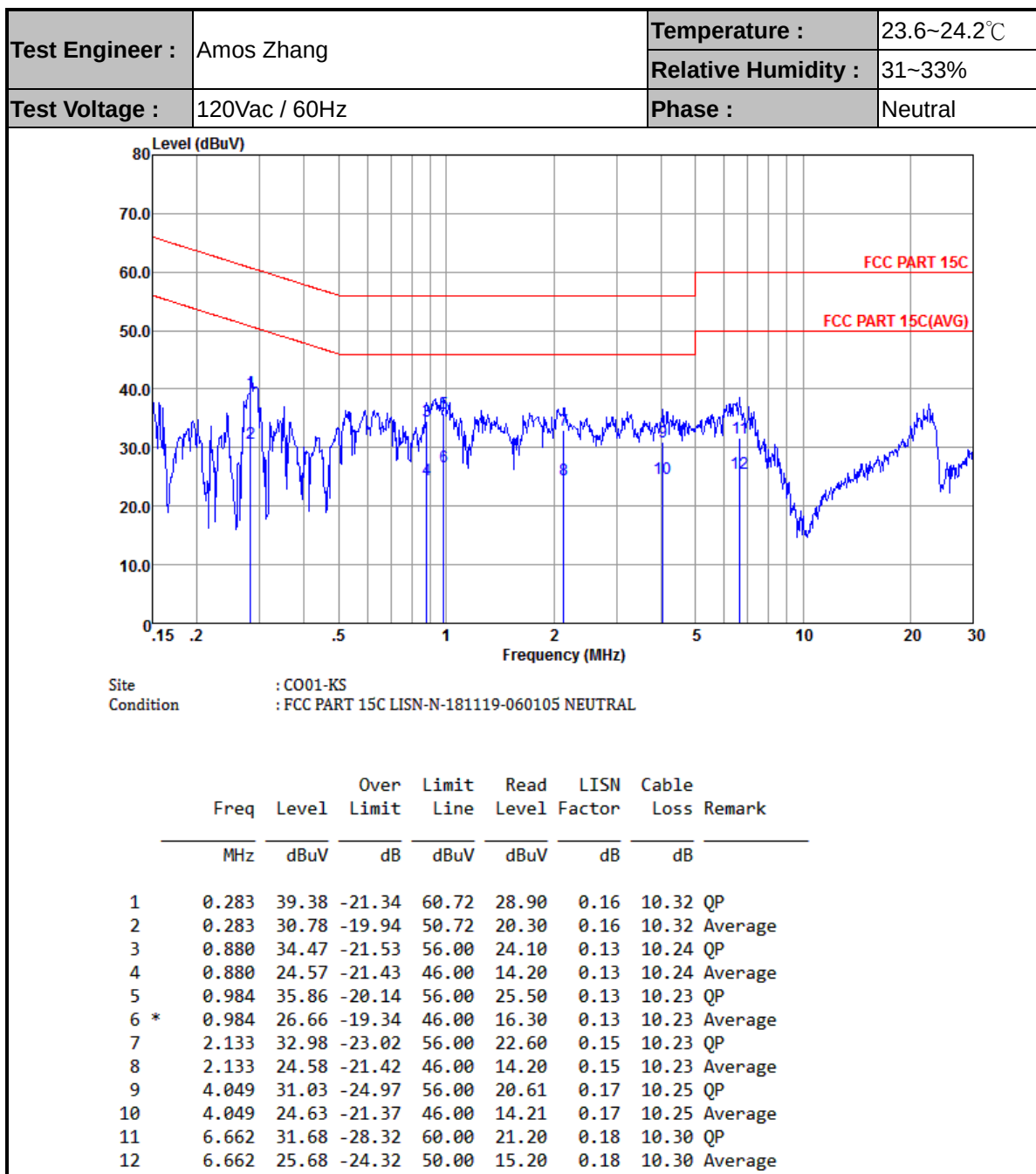
2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2	1	2412	-8.21	-8.66	-5.20	8.39		5.61		Pass
11b	1Mbps	2	6	2437	-7.32	-8.91	-4.31	8.39		5.61		Pass
11b	1Mbps	2	11	2462	-6.87	-7.43	-3.86	8.39		5.61		Pass
11g	6Mbps	2	1	2412	-13.99	-16.17	-10.98	8.39		5.61		Pass
11g	6Mbps	2	6	2437	-12.79	-15.38	-9.78	8.39		5.61		Pass
11g	6Mbps	2	11	2462	-12.90	-12.88	-9.87	8.39		5.61		Pass
HT20	MCS0	2	1	2412	-14.12	-16.84	-11.11	8.39		5.61		Pass
HT20	MCS0	2	6	2437	-15.60	-16.14	-12.59	8.39		5.61		Pass
HT20	MCS0	2	11	2462	-13.80	-14.92	-10.79	8.39		5.61		Pass
HT40	MCS0	2	3	2422	-15.94	-18.11	-12.93	8.39		5.61		Pass
HT40	MCS0	2	6	2437	-17.48	-18.17	-14.47	8.39		5.61		Pass
HT40	MCS0	2	9	2452	-16.65	-17.58	-13.64	8.39		5.61		Pass

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



Appendix B. AC Conducted Emission Test Results







Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz	*	2414	101.19	-	-	95.52	31.33	6.14	31.8	137	266	P	H
	*	2414	98.05	-	-	92.38	31.33	6.14	31.8	137	266	A	H
		2310	52.84	-21.16	74	47.45	31.16	6.03	31.8	137	266	P	H
		2389.56	41.76	-12.24	54	36.12	31.3	6.14	31.8	137	266	A	H
	*	2414	112.42	-	-	106.75	31.33	6.14	31.8	159	358	P	V
	*	2414	109.35	-	-	103.68	31.33	6.14	31.8	159	358	A	V
		2389.82	61	-13	74	55.36	31.3	6.14	31.8	159	358	P	V
		2389.43	43.69	-10.31	54	38.05	31.3	6.14	31.8	159	358	A	V
802.11b CH 11 2462MHz	*	2460	95.96	-	-	90.2	31.41	6.15	31.8	146	160	P	H
	*	2460	92.84	-	-	87.08	31.41	6.15	31.8	146	160	A	H
		2483.92	53.09	-20.91	74	47.29	31.44	6.16	31.8	146	160	P	H
		2484.1	42.06	-11.94	54	36.26	31.44	6.16	31.8	146	160	A	H
	*	2462	112.75	-	-	106.99	31.41	6.15	31.8	121	262	P	V
	*	2464	109.43	-	-	103.67	31.41	6.15	31.8	121	262	A	V
		2483.68	61.47	-12.53	74	55.67	31.44	6.16	31.8	121	262	P	V
		2483.5	42.95	-11.05	54	37.15	31.44	6.16	31.8	121	262	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)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	38.89	-35.11	74	54.78	35.65	8.41	59.95	100	360	P	H
		4824	42.15	-31.85	74	58.04	35.65	8.41	59.95	100	360	P	V
802.11b CH 06 2437MHz		4872	38.06	-35.94	74	53.86	35.61	8.53	59.94	100	360	P	H
		7308	41.62	-32.38	74	56.2	35.89	10.4	60.87	100	360	P	H
		4872	38.17	-35.83	74	53.97	35.61	8.53	59.94	100	360	P	V
		7308	40.52	-33.48	74	55.1	35.89	10.4	60.87	100	360	P	V
802.11b CH 11 2462MHz		4926	38.7	-35.3	74	54.35	35.57	8.71	59.93	100	360	P	H
		7386	40.35	-33.65	74	54.98	35.94	10.39	60.96	100	360	P	H
		4926	40.67	-33.33	74	56.32	35.57	8.71	59.93	100	360	P	V
		7386	38.82	-35.18	74	53.45	35.94	10.39	60.96	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 802.11g (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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.69	57.57	-16.43	74	51.93	31.3	6.14	31.8	137	267	P	H
		2389.95	43.39	-10.61	54	37.75	31.3	6.14	31.8	137	267	A	H
	*	2412	100.58	-	-	94.91	31.33	6.14	31.8	137	267	P	H
	*	2410	92	-	-	86.33	31.33	6.14	31.8	137	267	A	H
		2389.04	70.67	-3.33	74	65.03	31.3	6.14	31.8	126	359	P	V
		2388.65	50.9	-3.1	54	45.26	31.3	6.14	31.8	126	359	A	V
	*	2418	112.06	-	-	106.39	31.33	6.14	31.8	126	359	P	V
	*	2418	104.31	-	-	98.64	31.33	6.14	31.8	126	359	A	V
802.11g CH 11 2462MHz	*	2464	98.54	-	-	92.78	31.41	6.15	31.8	100	265	P	H
	*	2464	90.74	-	-	84.98	31.41	6.15	31.8	100	265	A	H
		2485.06	53.64	-20.36	74	47.84	31.44	6.16	31.8	100	265	P	H
		2484.16	42.6	-11.4	54	36.8	31.44	6.16	31.8	100	265	A	H
		2483.5	66.7	-7.3	74	60.9	31.44	6.16	31.8	116	346	P	V
		2483.5	50.22	-3.78	54	44.42	31.44	6.16	31.8	116	346	A	V
	*	2462	112.01	-	-	106.25	31.41	6.15	31.8	116	346	P	V
	*	2462	104.62	-	-	98.86	31.41	6.15	31.8	116	346	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. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	38.35	-35.65	74	54.24	35.65	8.41	59.95	100	360	P	H
		4824	39.59	-34.41	74	55.48	35.65	8.41	59.95	100	360	P	V
802.11g CH 06 2437MHz		4872	38.66	-35.34	74	54.46	35.61	8.53	59.94	100	360	P	H
		7308	40.38	-33.62	74	54.96	35.89	10.4	60.87	100	360	P	H
		4872	38.41	-35.59	74	54.21	35.61	8.53	59.94	100	360	P	V
		7308	41.31	-32.69	74	55.89	35.89	10.4	60.87	100	360	P	V
802.11g CH 11 2462MHz		4926	39.95	-34.05	74	55.6	35.57	8.71	59.93	100	360	P	H
		7386	40.22	-33.78	74	54.85	35.94	10.39	60.96	100	360	P	H
		4926	38.91	-35.09	74	54.56	35.57	8.71	59.93	100	360	P	V
		7386	41.06	-32.94	74	55.69	35.94	10.39	60.96	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)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.69	56.63	-17.37	74	50.99	31.3	6.14	31.8	107	270	P	H
		2389.95	43.25	-10.75	54	37.61	31.3	6.14	31.8	107	270	A	H
	*	2414	98.5	-	-	92.83	31.33	6.14	31.8	107	270	P	H
	*	2416	90.12	-	-	84.45	31.33	6.14	31.8	107	270	A	H
		2388.91	61.21	-12.79	74	55.57	31.3	6.14	31.8	116	346	P	V
		2389.95	49.99	-4.01	54	44.35	31.3	6.14	31.8	116	346	A	V
	*	2418	110.48	-	-	104.81	31.33	6.14	31.8	116	346	P	V
	*	2420	102.49	-	-	96.79	31.36	6.14	31.8	116	346	A	V
802.11n HT20 CH 11 2462MHz		2492.38	53.58	-20.42	74	47.75	31.47	6.16	31.8	104	287	P	H
		2486.08	42.61	-11.39	54	36.81	31.44	6.16	31.8	104	287	A	H
	*	2460	97.45	-	-	91.69	31.41	6.15	31.8	104	287	P	H
	*	2460	89.34	-	-	83.58	31.41	6.15	31.8	104	287	A	H
		2484.76	65.23	-8.77	74	59.43	31.44	6.16	31.8	116	351	P	V
		2483.5	50.63	-3.37	54	44.83	31.44	6.16	31.8	116	351	A	V
	*	2460	111.29	-	-	105.53	31.41	6.15	31.8	116	351	P	V
	*	2462	103.44	-	-	97.68	31.41	6.15	31.8	116	351	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)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	40.08	-33.92	74	55.97	35.65	8.41	59.95	100	360	P	H
		4824	39.11	-34.89	74	55	35.65	8.41	59.95	100	360	P	V
802.11n HT20 CH 06 2437MHz		4872	39.43	-34.57	74	55.23	35.61	8.53	59.94	100	360	P	H
		7308	40.62	-33.38	74	55.2	35.89	10.4	60.87	100	360	P	H
		4872	38.75	-35.25	74	54.55	35.61	8.53	59.94	100	360	P	V
		7308	40.96	-33.04	74	55.54	35.89	10.4	60.87	100	360	P	V
802.11n HT20 CH 11 2462MHz		4926	38.58	-35.42	74	54.23	35.57	8.71	59.93	100	360	P	H
		7386	39.66	-34.34	74	54.29	35.94	10.39	60.96	100	360	P	H
		4926	38.91	-35.09	74	54.56	35.57	8.71	59.93	100	360	P	V
		7386	39.86	-34.14	74	54.49	35.94	10.39	60.96	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 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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.95	53.9	-20.1	74	48.26	31.3	6.14	31.8	129	266	P	H
		2389.95	44.38	-9.62	54	38.74	31.3	6.14	31.8	129	266	A	H
	*	2420	95.95	-	-	90.25	31.36	6.14	31.8	129	266	P	H
	*	2418	88.18	-	-	82.51	31.33	6.14	31.8	129	266	A	H
		2497.72	53.15	-20.85	74	47.32	31.47	6.16	31.8	129	266	P	H
		2486.8	42.83	-11.17	54	37.03	31.44	6.16	31.8	129	266	A	H
		2389.95	60.65	-13.35	74	55.01	31.3	6.14	31.8	100	50	P	V
		2389.95	50.48	-3.52	54	44.84	31.3	6.14	31.8	100	50	A	V
	*	2426	109.45	-	-	103.75	31.36	6.14	31.8	100	50	P	V
	*	2424	101.4	-	-	95.7	31.36	6.14	31.8	100	50	A	V
		2483.62	64.29	-9.71	74	58.49	31.44	6.16	31.8	100	50	P	V
		2483.74	45.55	-8.45	54	39.75	31.44	6.16	31.8	100	50	A	V
802.11n HT40 CH 06 2437MHz		2366.81	53.59	-20.41	74	48.04	31.25	6.1	31.8	100	268	P	H
		2388.78	43.06	-10.94	54	37.42	31.3	6.14	31.8	100	268	A	H
	*	2424	93.26	-	-	87.56	31.36	6.14	31.8	100	268	P	H
	*	2424	84.98	-	-	79.28	31.36	6.14	31.8	100	268	A	H
		2487.88	54.18	-19.82	74	48.35	31.47	6.16	31.8	100	268	P	H
		2483.56	43.88	-10.12	54	38.08	31.44	6.16	31.8	100	268	A	H
		2389.95	61.21	-12.79	74	55.57	31.3	6.14	31.8	116	351	P	V
		2389.95	49.83	-4.17	54	44.19	31.3	6.14	31.8	116	351	A	V
	*	2434	106.3	-	-	100.59	31.36	6.15	31.8	116	351	P	V
	*	2434	98.16	-	-	92.45	31.36	6.15	31.8	116	351	A	V
		2484.28	61.9	-12.1	74	56.1	31.44	6.16	31.8	116	351	P	V
		2483.5	50.97	-3.03	54	45.17	31.44	6.16	31.8	116	351	A	V



802.11n HT40 CH 09 2452MHz		2367.2	54.15	-19.85	74	48.6	31.25	6.1	31.8	100	268	P	H
		2355.89	43.13	-10.87	54	37.61	31.25	6.07	31.8	100	268	A	H
	*	2448	88.04	-	-	82.3	31.39	6.15	31.8	100	268	P	H
	*	2448	80.13	-	-	74.39	31.39	6.15	31.8	100	268	A	H
		2484.16	54.19	-19.81	74	48.39	31.44	6.16	31.8	100	268	P	H
		2484.04	44.22	-9.78	54	38.42	31.44	6.16	31.8	100	268	A	H
		2359.92	53.92	-20.08	74	48.37	31.25	6.1	31.8	167	349	P	V
		2389.82	43.66	-10.34	54	38.02	31.3	6.14	31.8	167	349	A	V
	*	2462	103.56	-	-	97.8	31.41	6.15	31.8	167	349	P	V
	*	2462	95.69	-	-	89.93	31.41	6.15	31.8	167	349	A	V
		2483.8	62.42	-11.58	74	56.62	31.44	6.16	31.8	167	349	P	V
		2483.56	50.66	-3.34	54	44.86	31.44	6.16	31.8	167	349	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 HT40 (Harmonic @ 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)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4842	39.21	-34.79	74	55.06	35.63	8.47	59.95	100	360	P	H
HT40		7266	40.71	-33.29	74	55.26	35.87	10.41	60.83	100	360	P	H
CH 03		4842	38.39	-35.61	74	54.24	35.63	8.47	59.95	100	360	P	V
2422MHz		7368	40.4	-33.6	74	55.02	35.93	10.39	60.94	100	360	P	V
802.11n		4842	38.79	-35.21	74	54.64	35.63	8.47	59.95	100	360	P	H
HT40		7266	39.6	-34.4	74	54.15	35.87	10.41	60.83	100	360	P	H
CH 06		4842	38.72	-35.28	74	54.57	35.63	8.47	59.95	100	360	P	V
2437MHz		7368	40.58	-33.42	74	55.2	35.93	10.39	60.94	100	360	P	V
802.11n		4902	39.76	-34.24	74	55.47	35.58	8.65	59.94	100	360	P	H
HT40		7356	40.06	-33.94	74	54.67	35.92	10.39	60.92	100	360	P	H
CH 09		4902	38.82	-35.18	74	54.53	35.58	8.65	59.94	100	360	P	V
2452MHz		7356	39.94	-34.06	74	54.55	35.92	10.39	60.92	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

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
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		30.97	26.69	-13.31	40	33.2	24.65	0.66	31.82	100	0	P	H
		112.45	21.75	-21.75	43.5	35.58	16.68	1.15	31.66	-	-	P	H
		364.65	21.28	-24.72	46	29.55	20.76	2.42	31.45	-	-	P	H
		663.41	26.85	-19.15	46	29.1	26.1	3.14	31.49	-	-	P	H
		821.52	28.96	-17.04	46	28.71	28.45	3.38	31.58	-	-	P	H
		902.03	30.28	-15.72	46	29.29	29.02	3.54	31.57	-	-	P	H
		32.91	27.79	-12.21	40	35.41	23.55	0.66	31.83	100	0	P	V
		106.63	22.88	-20.62	43.5	37.1	16.37	1.09	31.68	-	-	P	V
		260.86	19.66	-26.34	46	29.25	19.94	1.91	31.44	-	-	P	V
		496.57	24.22	-21.78	46	29.26	23.72	2.62	31.38	-	-	P	V
		673.11	26.68	-19.32	46	28.74	26.18	3.25	31.49	-	-	P	V
		902.03	30.44	-15.56	46	29.45	29.02	3.54	31.57	-	-	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	P eak or A verage
H/V	H orizontal or V ertical



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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
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. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable 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) + Cable 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

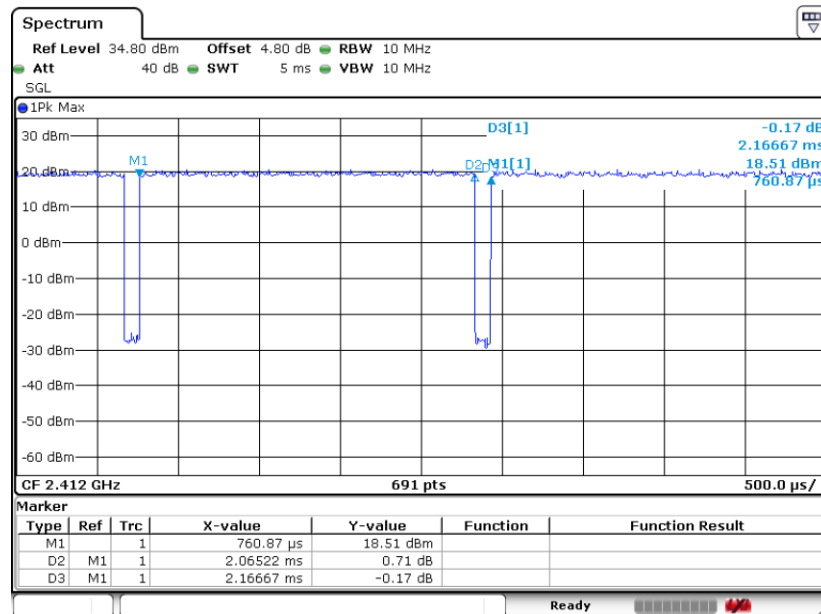
Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2(1)	802.11b	100	-	-	10Hz
1+2(1)	802.11g	95.32	2.065	0.484	0.51KHz
1+2(1)	802.11n HT20	95.34	1.928	0.519	0.56KHz
1+2(1)	802.11n HT40	91.61	0.949	1.053	1.1KHz

802.11b

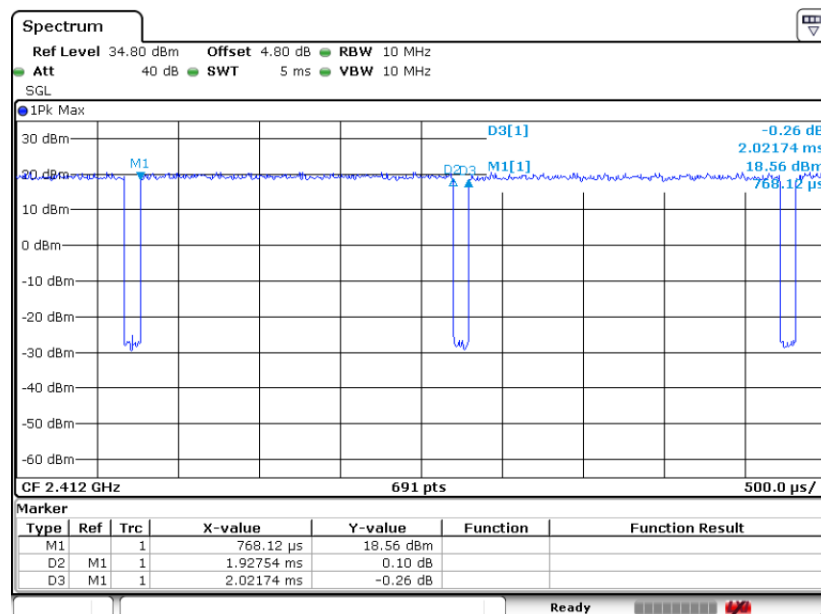




802.11g



802.11n HT20



802.11n HT40

