

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 based on the use of RMS averaging over a time interval, 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

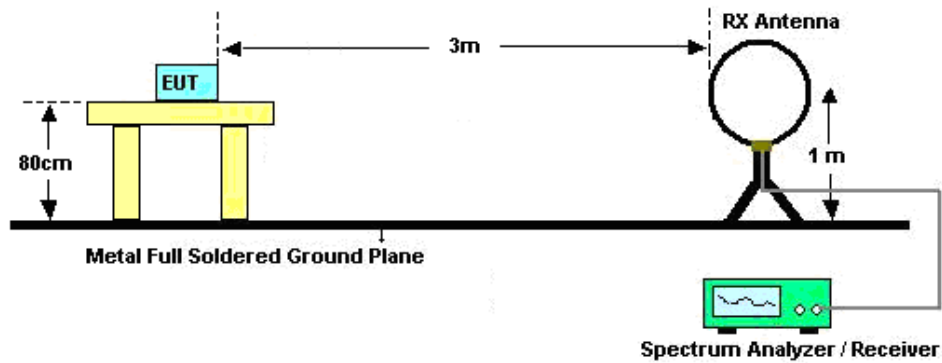
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

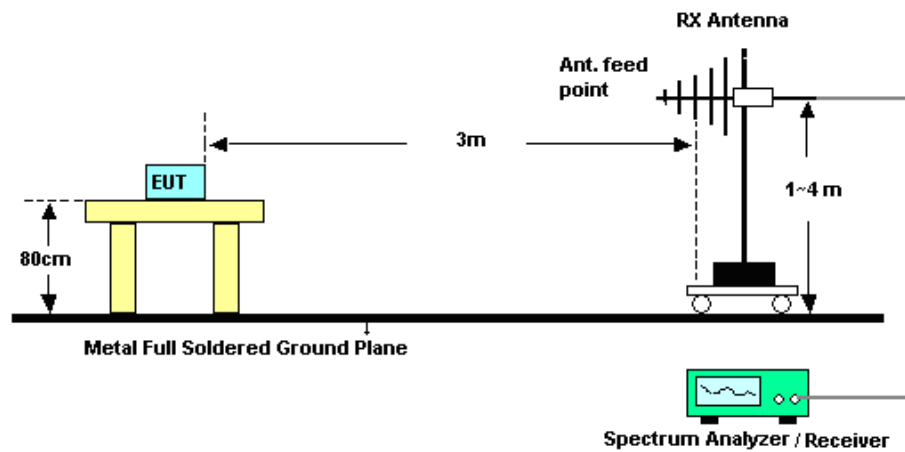
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

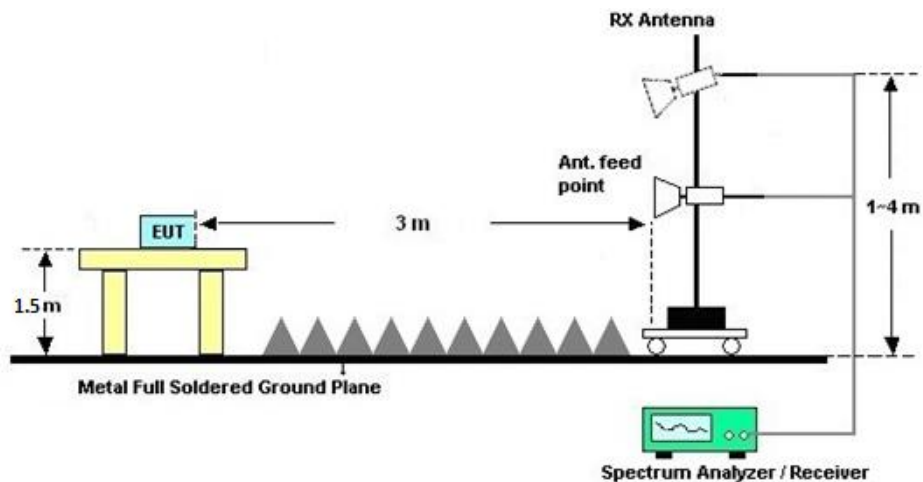
For radiated emissions below 30MHz



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 B.

3.5.7 Duty Cycle

Please refer to Appendix C.

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

Please refer to Appendix B

3.6 Antenna Requirements

3.6.1 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.

3.6.2 Antenna Anti-Replacement Construction

Non-standard antenna connector is used.

3.6.3 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	DG for PSD	Power Limit Reduction	PSD Limit Reduction
	Ant. 1 (dBi)	Ant. 2 (dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	3.15	3.15	3.15	6.16	0.00	0.16



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. 19, 2018	Apr. 16, 2019~ Apr. 17, 2019	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 22, 2018	Apr. 16, 2019~ Apr. 17, 2019	Dec. 21, 2019	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 22, 2018	Apr. 16, 2019~ Apr. 17, 2019	Dec. 21, 2019	Conducted (TH01-SZ)
EMI Test Receiver&SA	Agilent	N9038A	MY522601 85	20Hz~26.5GHz	Aug. 30, 2018	Mar. 27, 2019	Aug. 29, 2019	Radiation (03CH01-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 29, 2018	Mar. 27, 2019	May 28, 2019	Radiation (03CH01-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	Jun. 05, 2018	Mar. 27, 2019	Jun. 04, 2019	Radiation (03CH01-SZ)
Double Ridge Horn Antenna	ETS Lindgren	3117	119436	1GHz~18GHz	Jun. 28, 2018	Mar. 27, 2019	Jun. 27, 2019	Radiation (03CH01-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18GHz~40GHz	Mar. 31, 2018	Mar. 27, 2019	Mar. 30, 2019	Radiation (03CH01-SZ)
LF Amplifier	Burgeon	BPA-530	102209	0.01~3000Mhz	Apr. 20, 2018	Mar. 27, 2019	Apr. 19, 2019	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1707137	1GHz~18GHz	Oct. 19, 2018	Mar. 27, 2019	Oct. 18, 2019	Radiation (03CH01-SZ)
HF Amplifier	KEYSIGHT	83017A	MY532701 04	0.5GHz~26.5GHz	Dec. 22, 2018	Mar. 27, 2019	Dec. 21, 2019	Radiation (03CH01-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 17, 2018	Mar. 27, 2019	Jul. 16, 2019	Radiation (03CH01-SZ)
AC Power Source	Chroma	61601	616010001 985	N/A	NCR	Mar. 27, 2019	NCR	Radiation (03CH01-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Mar. 27, 2019	NCR	Radiation (03CH01-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Mar. 27, 2019	NCR	Radiation (03CH01-SZ)

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 Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8dB
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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% ($U = 2Uc(y)$)	4.3dB
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Zhang Jiang	Temperature:	24~26	°C
Test Date:	2019/4/16~2019/4/17	Relative Humidity:	50~53	%

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	1	1	2412	13.09	13.04	8.05	8.05	0.50	Pass
11b	1Mbps	1	6	2437	12.99	13.04	8.05	8.05	0.50	Pass
11b	1Mbps	1	11	2462	13.19	13.08	8.05	8.03	0.50	Pass
11g	6Mbps	1	1	2412	16.48	16.43	16.28	16.02	0.50	Pass
11g	6Mbps	1	6	2437	16.48	16.43	15.92	15.92	0.50	Pass
11g	6Mbps	1	11	2462	16.53	16.53	16.04	16.02	0.50	Pass
HT20	MCS0	2	1	2412	17.58	17.53	16.26	16.78	0.50	Pass
HT20	MCS0	2	6	2437	17.68	17.58	15.11	15.94	0.50	Pass
HT20	MCS0	2	11	2462	17.63	17.53	15.47	16.90	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	14.30	14.10	-	30.00	30.00	3.15	3.15	17.45	17.25	36.00	36.00	Pass
11b	1Mbps	1	6	2437	14.40	14.20		30.00	30.00	3.15	3.15	17.55	17.35	36.00	36.00	Pass
11b	1Mbps	1	11	2462	14.40	14.20		30.00	30.00	3.15	3.15	17.55	17.35	36.00	36.00	Pass
11g	6Mbps	1	1	2412	15.00	15.20		30.00	30.00	3.15	3.15	18.15	18.35	36.00	36.00	Pass
11g	6Mbps	1	6	2437	14.80	15.00		30.00	30.00	3.15	3.15	17.95	18.15	36.00	36.00	Pass
11g	6Mbps	1	11	2462	14.80	15.00		30.00	30.00	3.15	3.15	17.95	18.15	36.00	36.00	Pass
HT20	MCS0	1	1	2412	14.10	13.90		30.00	30.00	3.15	3.15	17.25	17.05	36.00	36.00	Pass
HT20	MCS0	1	6	2437	13.90	13.70		30.00	30.00	3.15	3.15	17.05	16.85	36.00	36.00	Pass
HT20	MCS0	1	11	2462	13.90	13.80		30.00	30.00	3.15	3.15	17.05	16.95	36.00	36.00	Pass
HT20	MCS0	2	1	2412	13.40	13.40	16.41	30.00		3.15		19.56		36.00		Pass
HT20	MCS0	2	6	2437	13.30	13.50	16.41	30.00		3.15		19.56		36.00		Pass
HT20	MCS0	2	11	2462	13.30	13.30	16.31	30.00		3.15		19.46		36.00		Pass

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

TEST RESULTS DATA
Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	N _{TX}	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	-13.56	-12.36	-	3.15	3.15	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-13.39	-15.06	-	3.15	3.15	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-13.72	-13.72	-	3.15	3.15	8.00	8.00	Pass
11g	6Mbps	1	1	2412	-13.37	-13.62	-	3.15	3.15	8.00	8.00	Pass
11g	6Mbps	1	6	2437	-13.13	-13.42	-	3.15	3.15	8.00	8.00	Pass
11g	6Mbps	1	11	2462	-13.21	-12.96	-	3.15	3.15	8.00	8.00	Pass
HT20	MCS0	2	1	2412	-13.03	-14.76	-10.02	6.16		7.84		Pass
HT20	MCS0	2	6	2437	-14.17	-14.71	-11.16	6.16		7.84		Pass
HT20	MCS0	2	11	2462	-12.46	-14.20	-9.45	6.16		7.84		Pass

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



Appendix B. 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	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2389.91	52.93	-21.07	74	45.29	31.5	9.14	33	143	277	P	H
		2390	41.75	-12.25	54	34.11	31.5	9.14	33	143	277	A	H
	*	2412	102.2	-	-	94.49	31.57	9.14	33	143	277	P	H
	*	2412	100.4	-	-	92.69	31.57	9.14	33	143	277	A	H
		2384.45	51.44	-22.56	74	43.88	31.52	9.04	33	310	345	P	V
		2390	40.97	-13.03	54	33.33	31.5	9.14	33	310	345	A	V
	*	2412	99.47	-	-	91.76	31.57	9.14	33	310	345	P	V
	*	2412	97.71	-	-	90	31.57	9.14	33	310	345	A	V
802.11b CH 06 2437MHz		2322.74	51.09	-22.91	74	43.58	31.57	8.94	33	195	270	P	H
		2389.52	40.95	-13.05	54	33.31	31.5	9.14	33	195	270	A	H
	*	2437	102.5	-	-	94.58	31.71	9.21	33	195	270	P	H
	*	2437	99.15	-	-	91.23	31.71	9.21	33	195	270	A	H
		2484.88	52.18	-21.82	74	44.04	31.86	9.28	33	195	270	P	H
		2483.5	41.93	-12.07	54	33.79	31.86	9.28	33	195	270	A	H
		2347.1	51.2	-22.8	74	43.61	31.55	9.04	33	307	355	P	V
		2388.96	40.47	-13.53	54	32.83	31.5	9.14	33	307	355	A	V
	*	2437	99.77	-	-	91.85	31.71	9.21	33	307	355	P	V
	*	2437	97.02	-	-	89.1	31.71	9.21	33	307	355	A	V
		2485.79	51.71	-22.29	74	75.43	0	9.28	33	307	355	P	V
		2483.5	41.12	-12.88	54	32.98	31.86	9.28	33	307	355	A	V



802.11b CH 11 2462MHz	*	2462	101.31	-	-	93.31	31.79	9.21	33	189	270	P	H
	*	2462	99.4	-	-	91.4	31.79	9.21	33	189	270	A	H
		2485.4	53.24	-20.76	74	45.1	31.86	9.28	33	189	270	P	H
		2483.52	42.65	-11.35	54	34.51	31.86	9.28	33	189	270	A	H
	*	2462	99.95	-	-	601.16	31.79	-500	33	345	352	P	V
	*	2462	98.19	-	-	90.19	31.79	9.21	33	345	352	A	V
		2486.72	52.47	-21.53	74	44.33	31.86	9.28	33	345	352	P	V
		2483.56	41.45	-12.55	54	33.31	31.86	9.28	33	345	352	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	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	44.55	-29.45	74	55.36	33.77	12.9	57.48	185	255	P	H
		4824	44.17	-29.83	74	54.98	33.77	12.9	57.48	185	255	P	V
802.11b CH 06 2437MHz		4874	44.56	-29.44	74	55.32	33.75	13.01	57.52	165	106	P	H
		7311	49.21	-24.79	74	56.16	35.46	16.51	58.92	174	100	P	H
		4874	44.93	-29.07	74	55.69	33.75	13.01	57.52	165	106	P	V
		7311	49.34	-24.66	74	56.29	35.46	16.51	58.92	174	100	P	V
802.11b CH 11 2462MHz		4924	44.82	-29.18	74	55.43	33.73	13.21	57.55	150	285	P	H
		7386	49.07	-24.93	74	55.82	35.61	16.6	58.96	155	274	P	H
		4924	44.63	-29.37	74	55.24	33.73	13.21	57.55	150	285	P	V
		7386	49.31	-24.69	74	56.06	35.61	16.6	58.96	155	274	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. 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		2345.28	50.92	-23.08	74	43.43	31.55	8.94	33	229	273	P	H
		2388.75	42.25	-11.75	54	34.61	31.5	9.14	33	229	273	A	H
	*	2412	102.27	-	-	94.56	31.57	9.14	33	229	273	P	H
	*	2412	95.39	-	-	87.68	31.57	9.14	33	229	273	A	H
		2364.92	51.48	-22.52	74	43.9	31.54	9.04	33	351	360	P	V
		2389.28	41.6	-12.4	54	33.96	31.5	9.14	33	351	360	A	V
	*	2412	99.85	-	-	92.14	31.57	9.14	33	351	360	P	V
	*	2412	92.95	-	-	85.24	31.57	9.14	33	351	360	A	V
802.11g CH 06 2437MHz		2325.68	51.69	-22.31	74	44.18	31.57	8.94	33	258	276	P	H
		2389.52	41.53	-12.47	54	33.89	31.5	9.14	33	258	276	A	H
	*	2437	102.1	-	-	94.18	31.71	9.21	33	258	276	P	H
	*	2437	95.31	-	-	87.39	31.71	9.21	33	258	276	A	H
		2490.06	51.72	-22.28	74	43.51	31.93	9.28	33	258	276	P	H
		2489.92	41.95	-12.05	54	33.74	31.93	9.28	33	258	276	A	H
		2357.46	51.67	-22.33	74	44.09	31.54	9.04	33	341	360	P	V
		2389.94	41.45	-12.55	54	33.81	31.5	9.14	33	341	360	A	V
	*	2437	100.81	-	-	92.89	31.71	9.21	33	341	360	P	V
	*	2437	93.38	-	-	85.46	31.71	9.21	33	341	360	A	V
		2483.55	52.43	-21.57	74	44.29	31.86	9.28	33	341	360	P	V
		2484.32	42.48	-11.52	54	34.34	31.86	9.28	33	341	360	A	V



802.11g CH 11 2462MHz	*	2462	102.24	-	-	94.24	31.79	9.21	33	108	276	P	H
	*	2462	95.99	-	-	87.99	31.79	9.21	33	108	276	A	H
		2487.92	53.6	-20.4	74	45.39	31.93	9.28	33	108	276	P	H
		2483.6	44.42	-9.58	54	36.28	31.86	9.28	33	108	276	A	H
	*	2462	100.45	-	-	92.45	31.79	9.21	33	344	353	P	V
	*	2462	93.77	-	-	85.77	31.79	9.21	33	344	353	A	V
		2484.08	51.98	-22.02	74	43.84	31.86	9.28	33	344	353	P	V
		2483.72	43.12	-10.88	54	34.98	31.86	9.28	33	344	353	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)	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	46.93	-27.07	74	57.74	33.77	12.9	57.48	172	255	P	H
		4824	47.31	-26.69	74	58.12	33.77	12.9	57.48	185	255	P	V
802.11g CH 06 2437MHz		4874	43.65	-30.35	74	54.41	33.75	13.01	57.52	165	106	P	H
		7311	48.37	-25.63	74	55.32	35.46	16.51	58.92	169	100	P	H
		4874	43.42	-30.58	74	54.18	33.75	13.01	57.52	165	106	P	V
		7311	48.55	-25.45	74	55.5	35.46	16.51	58.92	174	178	P	V
802.11g CH 11 2462MHz		4924	46.33	-27.67	74	56.94	33.73	13.21	57.55	175	285	P	H
		7386	47.15	-26.85	74	53.9	35.61	16.6	58.96	155	274	P	H
		4924	45.71	-28.29	74	56.32	33.73	13.21	57.55	150	285	P	V
		7386	49.04	-24.96	74	55.79	35.61	16.6	58.96	155	357	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		2326.07	51.64	-22.36	74	44.13	31.57	8.94	33	124	276	P	H
		2389.8	42.7	-11.3	54	35.06	31.5	9.14	33	124	276	A	H
	*	2412	104.36	-	-	96.65	31.57	9.14	33	124	276	P	H
	*	2412	97.88	-	-	90.17	31.57	9.14	33	124	276	A	H
		2319.56	51	-23	74	43.49	31.57	8.94	33	314	353	P	V
		2387.39	41.41	-12.59	54	33.77	31.5	9.14	33	314	353	A	V
	*	2412	101	-	-	93.29	31.57	9.14	33	314	353	P	V
	*	2412	94.41	-	-	86.7	31.57	9.14	33	314	353	A	V
802.11n HT20 CH 06 2437MHz		2312.38	51.06	-22.94	74	43.53	31.59	8.94	33	141	280	P	H
		2389.1	41.49	-12.51	54	33.85	31.5	9.14	33	141	280	A	H
	*	2437	104.03	-	-	96.11	31.71	9.21	33	141	280	P	H
	*	2437	97.53	-	-	89.61	31.71	9.21	33	141	280	A	H
		2484.67	51.65	-22.35	74	43.51	31.86	9.28	33	141	280	P	H
		2486.14	42.55	-11.45	54	34.41	31.86	9.28	33	141	280	A	H
		2338.7	50.99	-23.01	74	43.5	31.55	8.94	33	316	345	P	V
		2389.52	41.22	-12.78	54	33.58	31.5	9.14	33	316	345	A	V
	*	2437	100.02	-	-	92.1	31.71	9.21	33	316	345	P	V
	*	2437	93	-	-	85.08	31.71	9.21	33	316	345	A	V
		2484.32	51.13	-22.87	74	45.36	31.86	6.91	33	316	345	P	V
		2485.65	41.68	-12.32	54	35.91	31.86	6.91	33	316	345	A	V



802.11n HT20 CH 11 2462MHz	*	2462	104.89	-	-	96.89	31.79	9.21	33	137	277	P	H
	*	2462	99.27	-	-	91.27	31.79	9.21	33	137	277	A	H
		2484.72	55.73	-18.27	74	47.59	31.86	9.28	33	137	277	P	H
		2484.44	45.44	-8.56	54	37.3	31.86	9.28	33	137	277	A	H
	*	2462	100.86	-	-	92.86	31.79	9.21	33	135	326	P	V
	*	2462	93.55	-	-	85.55	31.79	9.21	33	135	326	A	V
		2487.24	51.62	-22.38	74	43.48	31.86	9.28	33	135	326	P	V
		2484.92	41.93	-12.07	54	33.79	31.86	9.28	33	135	326	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	45.28	-28.72	74	56.09	33.77	12.9	57.48	185	255	P	H
		4824	44.48	-29.52	74	55.29	33.77	12.9	57.48	185	255	P	V
802.11n HT20 CH 06 2437MHz		4874	45.97	-28.03	74	56.73	33.75	13.01	57.52	156	78	P	H
		7311	48.04	-25.96	74	54.99	35.46	16.51	58.92	174	100	P	H
		4874	45.32	-28.68	74	56.08	33.75	13.01	57.52	165	106	P	V
		7311	48.71	-25.29	74	55.66	35.46	16.51	58.92	174	196	P	V
802.11n HT20 CH 11 2462MHz		4924	46.22	-27.78	74	56.83	33.73	13.21	57.55	178	96	P	H
		7386	48.66	-25.34	74	55.41	35.61	16.6	58.96	155	274	P	H
		4924	45.63	-28.37	74	56.24	33.73	13.21	57.55	150	285	P	V
		7386	48.88	-25.12	74	55.63	35.61	16.6	58.96	175	95	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 HT20 (LF)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp 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 HT20 LF		30	24.44	-15.56	40	31.11	24.4	0.23	31.3	-	-	P	H
		136.7	20.77	-22.73	43.5	33.54	17.49	1.19	31.45	-	-	P	H
		401.51	24.84	-21.16	46	32.21	21.63	2.4	31.4	-	-	P	H
		610.06	28.45	-17.55	46	32.43	24.54	3.04	31.56	-	-	P	H
		751.68	30.64	-15.36	46	32.71	25.57	3.47	31.11	142	285	P	H
		989.33	31.77	-22.23	54	31.54	27.3	4.15	31.22	-	-	P	H
		30.97	24.37	-15.63	40	31.6	23.82	0.25	31.3	106	263	P	V
		107.6	19.81	-23.69	43.5	33.27	17.2	0.92	31.58	-	-	P	V
		379.2	26.72	-19.28	46	34.65	21.11	2.32	31.36	-	-	P	V
		624.61	28.71	-17.29	46	32.54	24.6	3.08	31.51	-	-	P	V
		765.26	29.73	-16.27	46	31.64	25.75	3.51	31.17	-	-	P	V
		986.42	30	-24	54	29.81	27.28	4.14	31.23	-	-	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.	
1		(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)

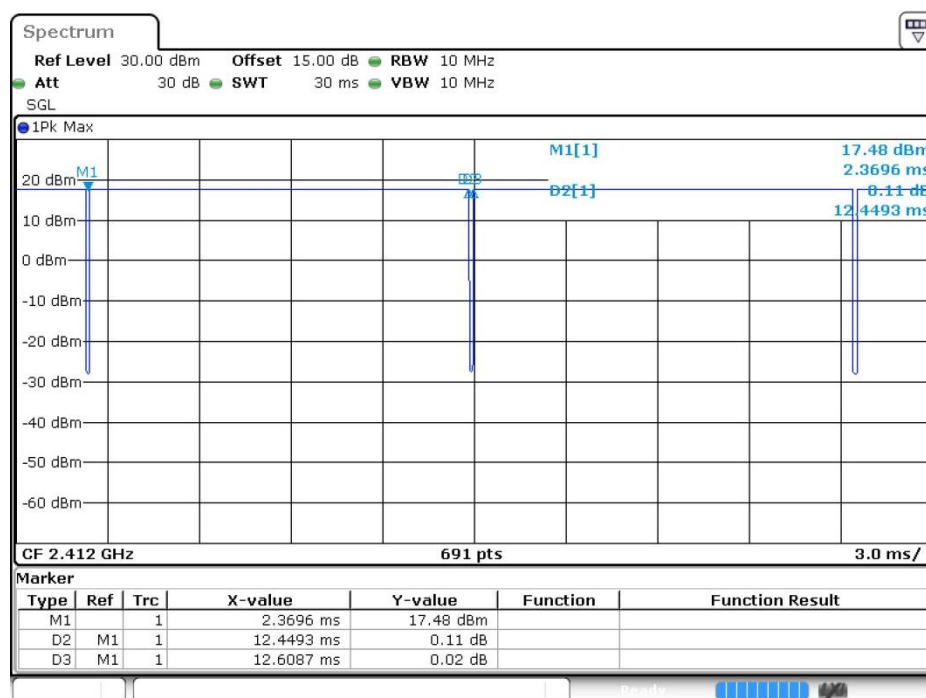
= -10.46(dB)

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

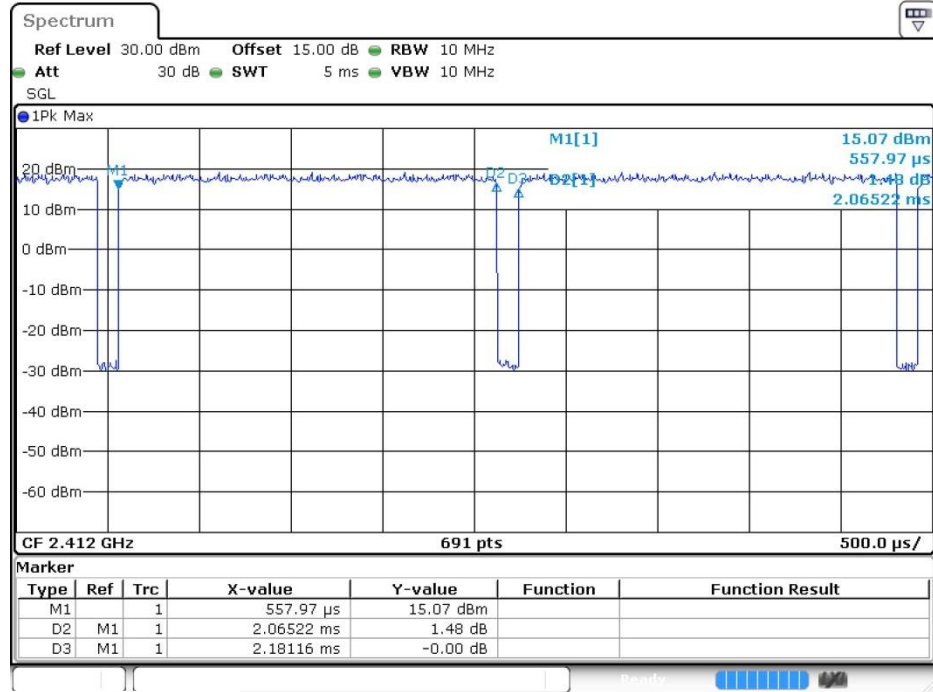
Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1	802.11b	98.74	-	-	10Hz
2	802.11g	94.68	2.065	0.484	1KHz
1+2	802.11n HT20	94.33	1.928	0.519	1KHz

802.11b



802.11g



802.11n HT20

