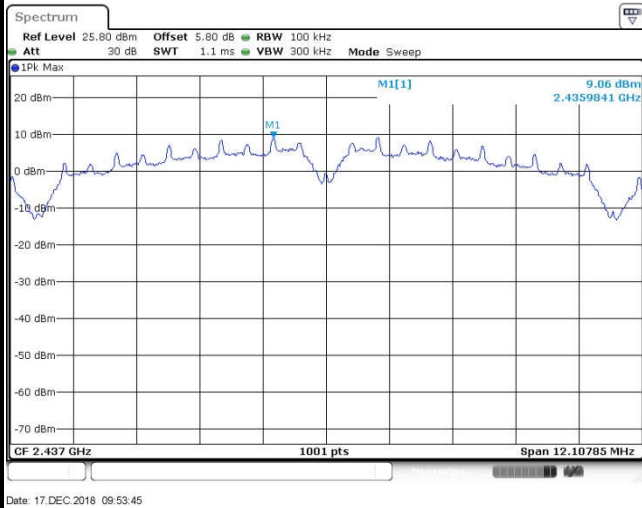


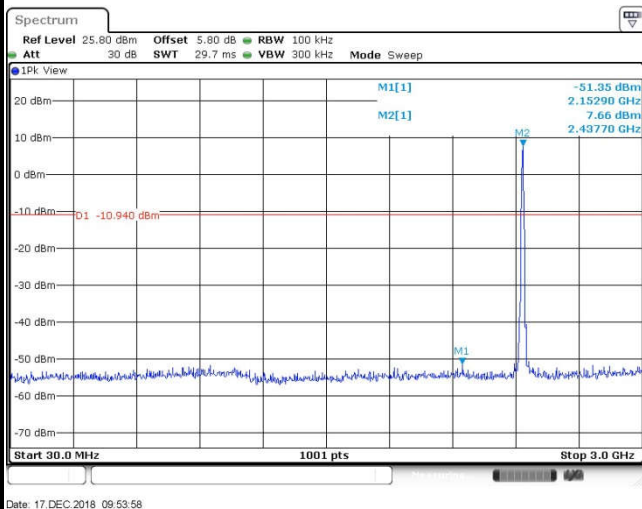


Test Mode :	802.11b	Test Channel :	06
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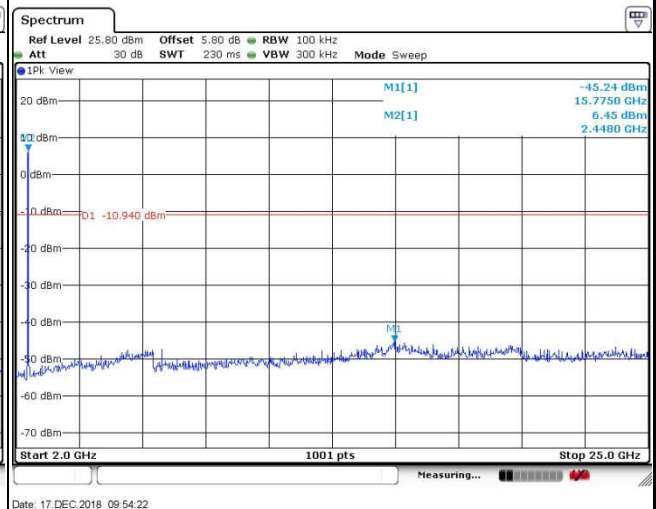
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

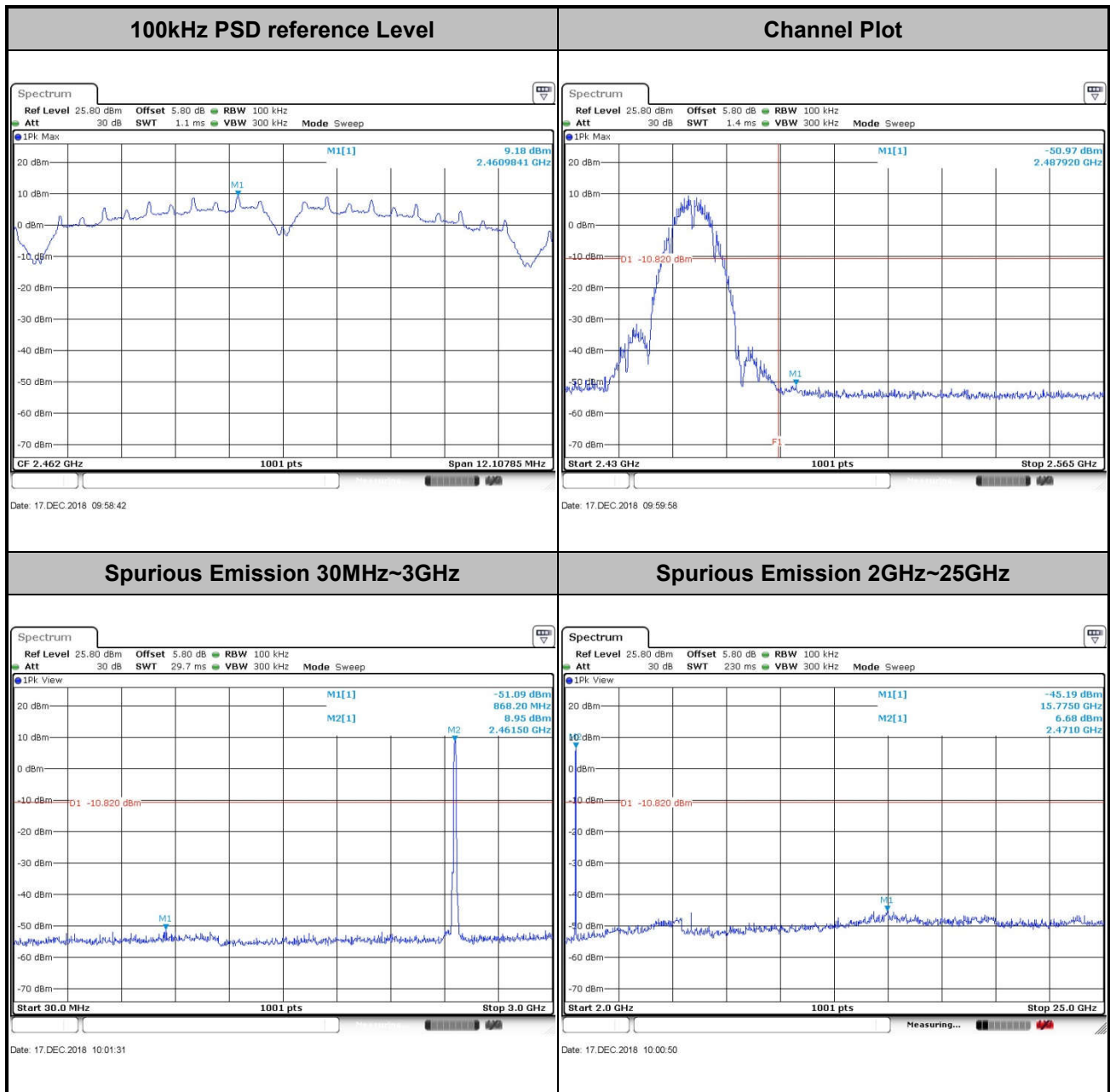


Spurious Emission 2GHz~25GHz





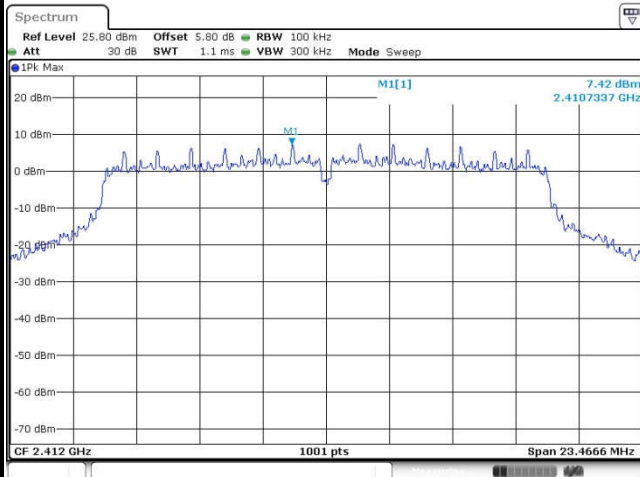
Test Mode :	802.11b	Test Channel :	11
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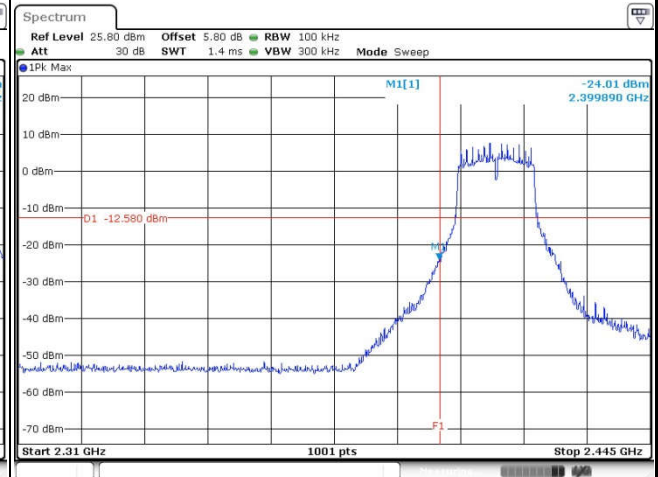


Test Mode :	802.11g	Test Channel :	01
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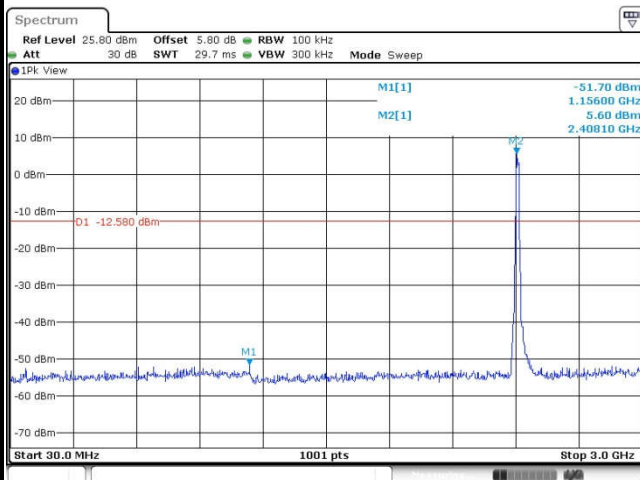
100kHz PSD reference Level



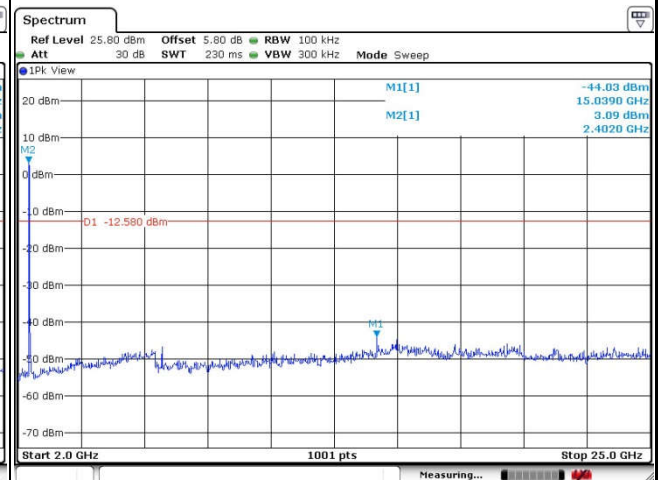
Channel Plot



Spurious Emission 30MHz~3GHz



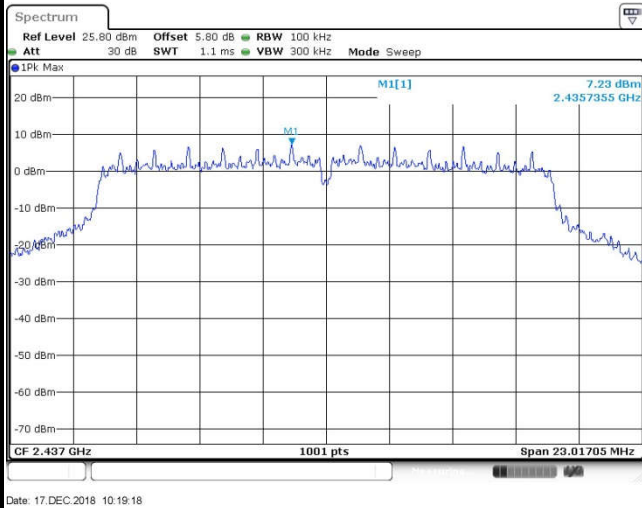
Spurious Emission 2GHz~25GHz



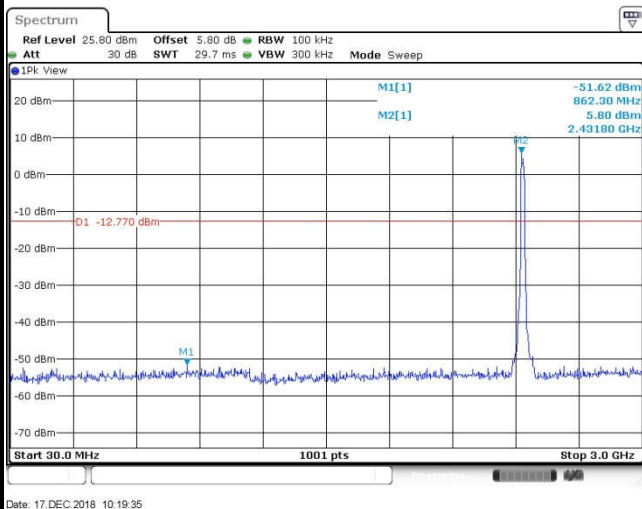


Test Mode :	802.11g	Test Channel :	06
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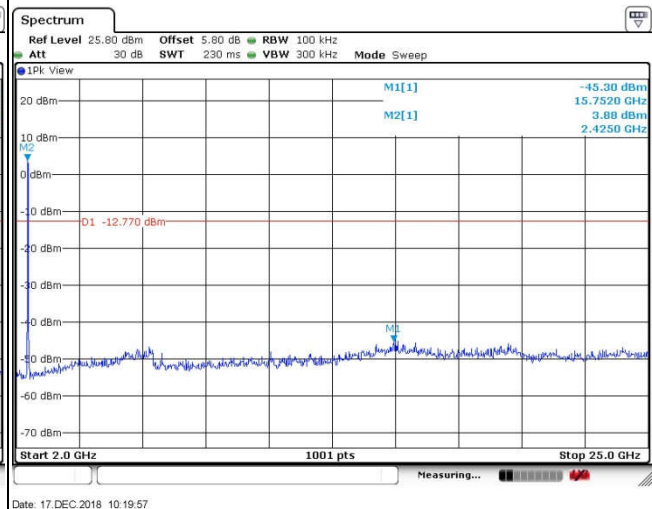
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

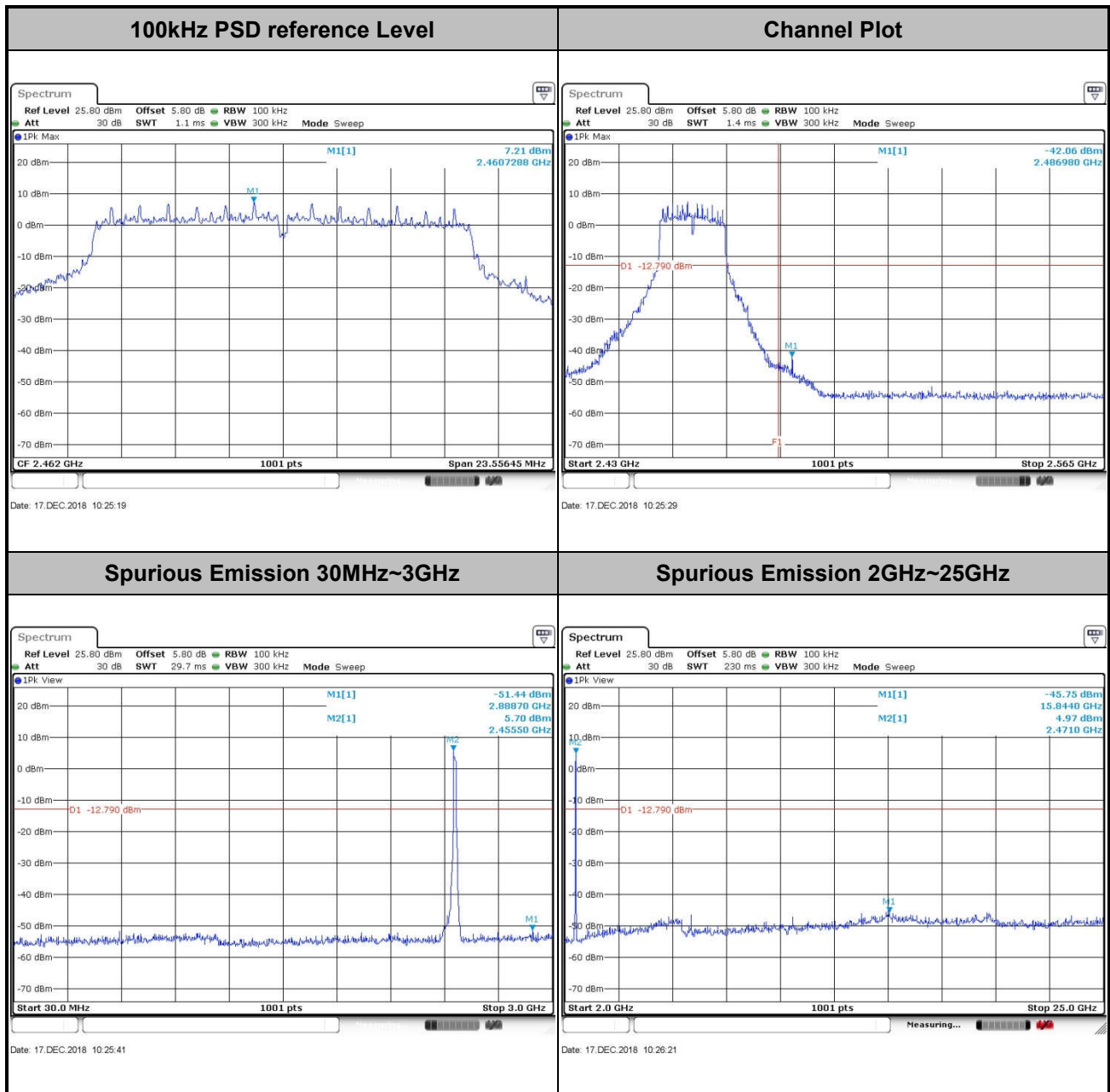


Spurious Emission 2GHz~25GHz





Test Mode :	802.11g	Test Channel :	11
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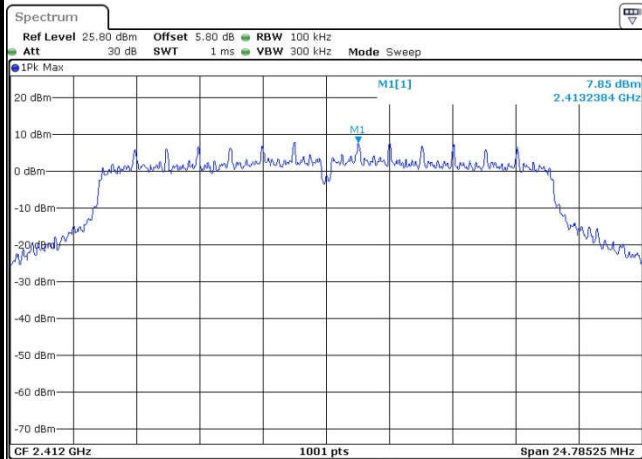




Test Mode : 802.11n HT20

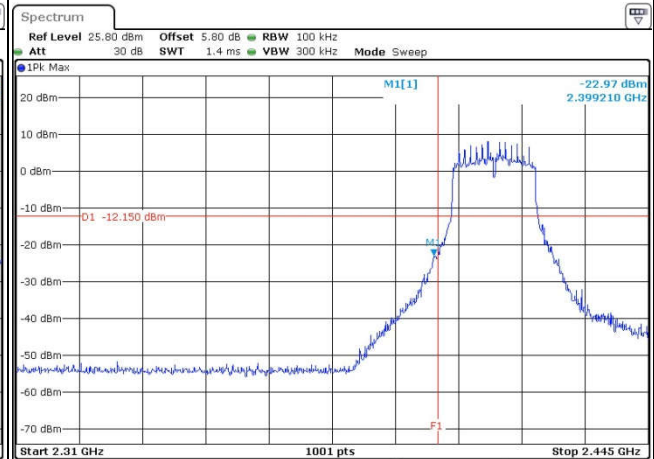
Test Channel : 01

100kHz PSD reference Level



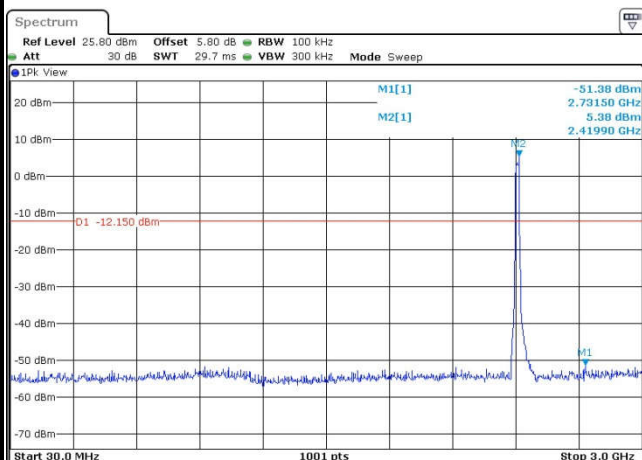
Date: 17 DEC 2018 10:32:40

Channel Plot



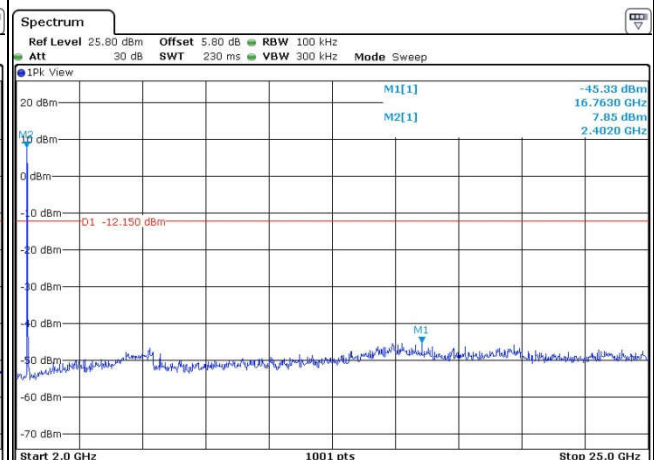
Date: 17 DEC 2018 10:32:54

Spurious Emission 30MHz~3GHz



Date: 17 DEC 2018 10:34:14

Spurious Emission 2GHz~25GHz



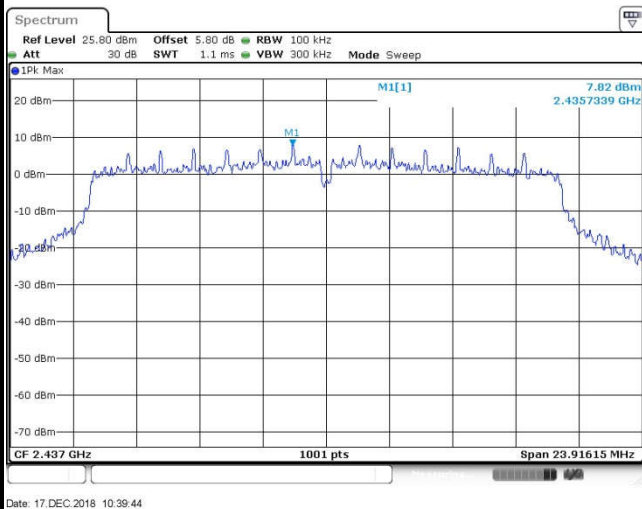
Date: 17 DEC 2018 10:34:45



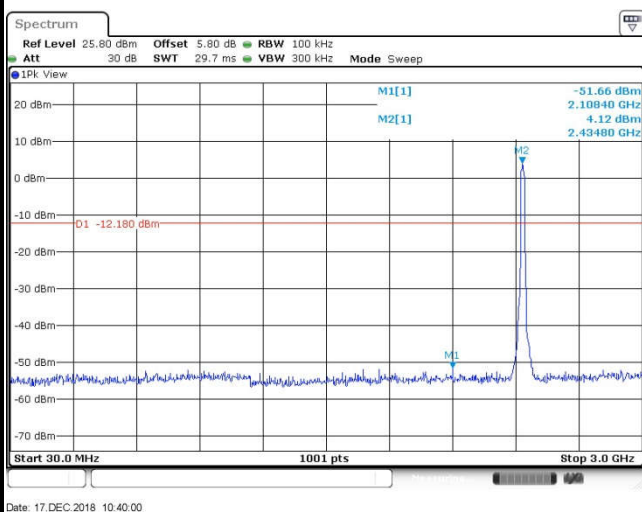
Test Mode : 802.11n HT20

Test Channel : 06

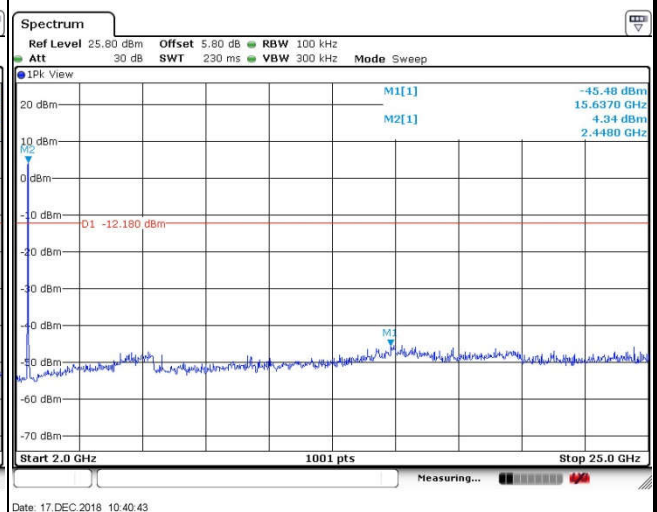
100kHz PSD reference Level

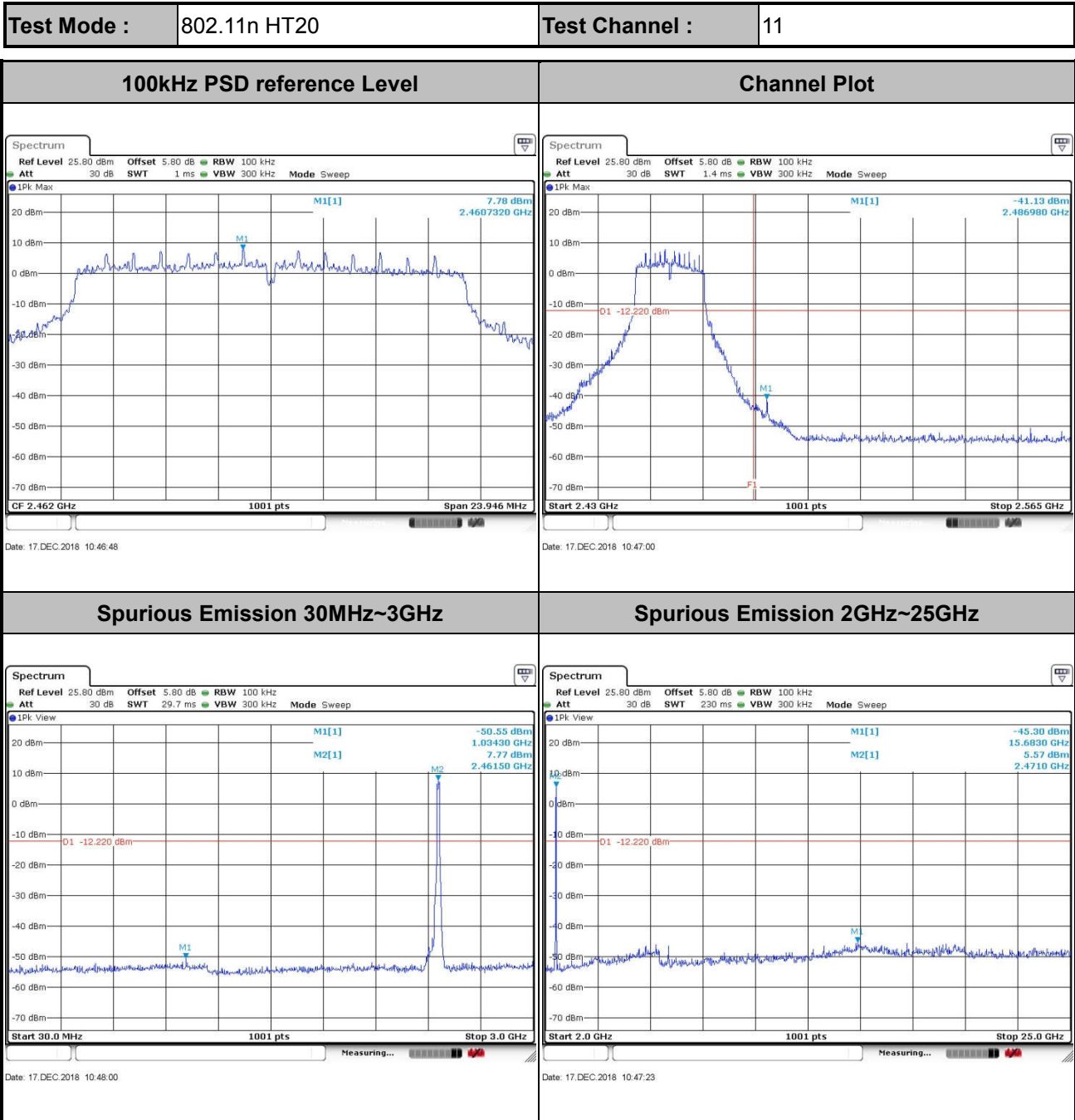


Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz





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

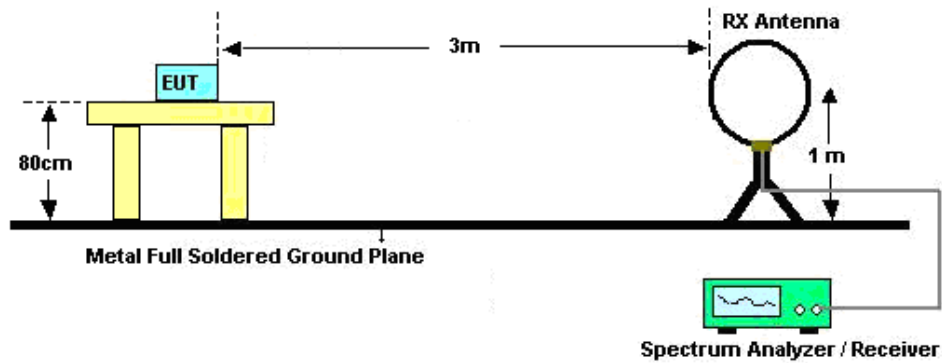
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

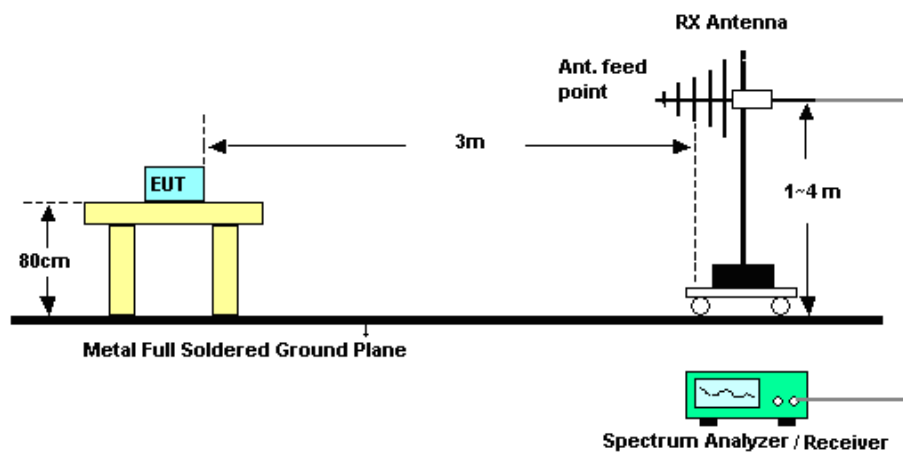
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

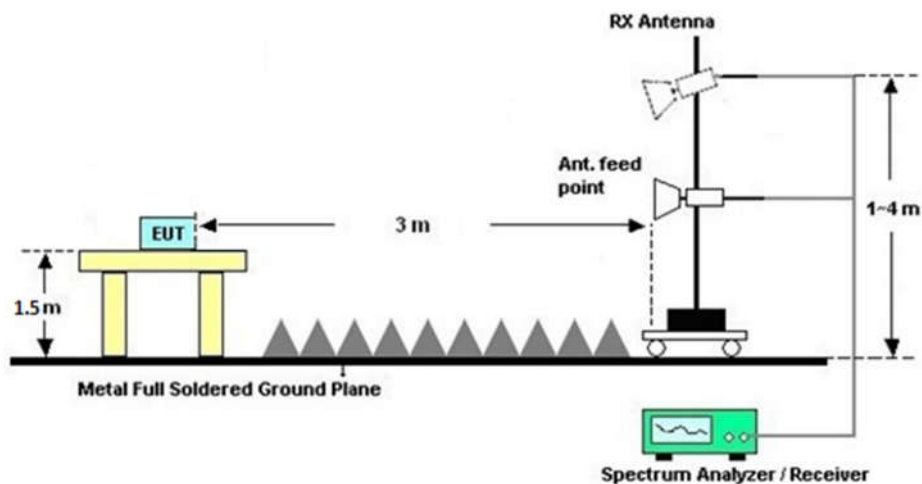
For radiated emissions below 30MHz



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.

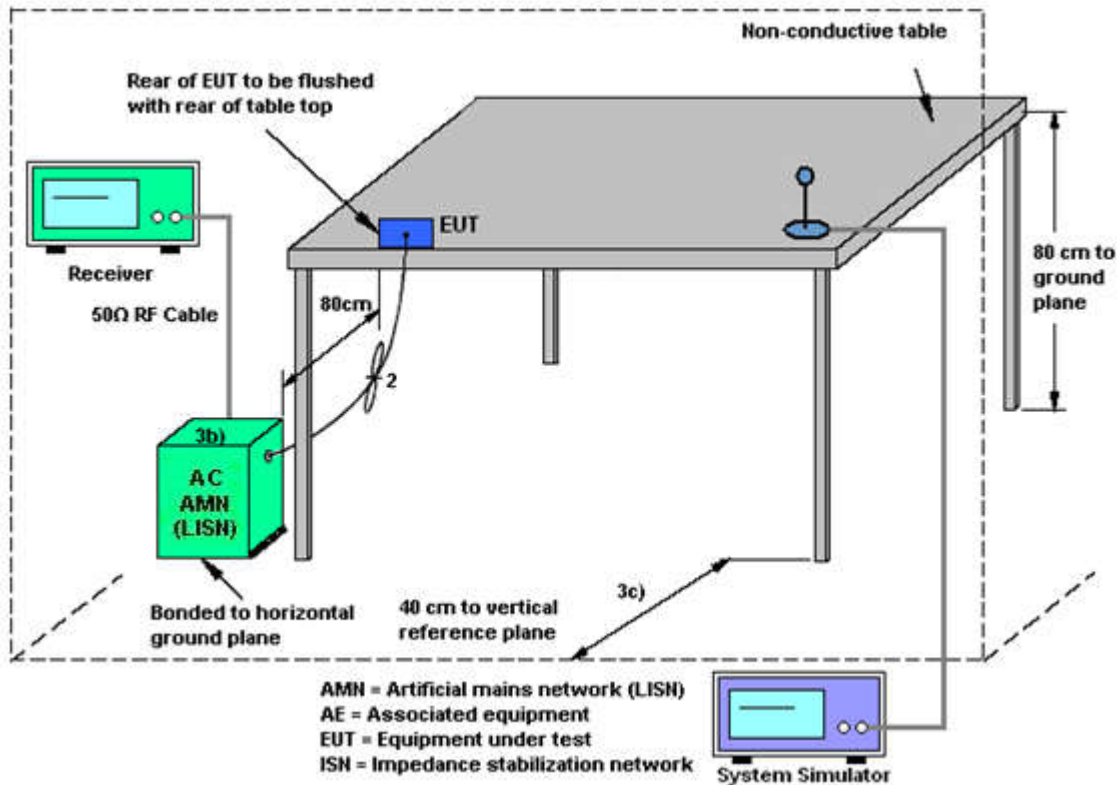
3.6.2 Measuring Instruments

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. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the Antenna exceeds 6 dBi. 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.

			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	-2.77	-2.82	0.22	0.22	0.00	0.00

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

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Aug. 07, 2018	Dec. 14, 2018~ Dec. 25, 2018	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 18, 2018	Dec. 14, 2018~ Dec. 25, 2018	Jan. 17, 2019	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 18, 2018	Dec. 14, 2018~ Dec. 25, 2018	Jan. 17, 2019	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY56400004	3Hz~8.5GHz; Max 30dBm	Oct. 12, 2018	Dec. 30, 2018	Oct. 11, 2019	Radiation (03CH04-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150208	10Hz~44GHz	Apr. 17, 2018	Dec. 30, 2018	Apr. 16, 2019	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Dec. 30, 2018	Oct. 18, 2019	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz~1GHz	Jan. 29, 2018	Dec. 30, 2018	Jan. 28, 2019	Radiation (03CH04-KS)
Horn Antenna	Schwarzbeck	BBHA9120D	1648	1GHz~18GHz	Jan. 27, 2018	Dec. 30, 2018	Jan. 26, 2019	Radiation (03CH04-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	BBHA170249	15GHz~40GHz	Feb. 07, 2018	Dec. 30, 2018	Feb. 06, 2019	Radiation (03CH04-KS)
Amplifier	Burgeon	BPA-530	102219	0.01MHz~3000MHz	Nov. 19, 2018	Dec. 30, 2018	Nov. 18, 2019	Radiation (03CH04-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Feb. 08, 2018	Dec. 30, 2018	Feb. 07, 2019	Radiation (03CH04-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Dec. 30, 2018	Apr. 16, 2019	Radiation (03CH04-KS)
Amplifier	Keysight	83017A	MY53270319	500MHz~26.5GHz	Oct. 12, 2018	Dec. 30, 2018	Oct. 11, 2019	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Dec. 30, 2018	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Dec. 30, 2018	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Dec. 30, 2018	NCR	Radiation (03CH04-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 19, 2018	Dec. 24, 2018	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Dec. 24, 2018	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Dec. 24, 2018	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Dec. 24, 2018	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 (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.9 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.9 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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

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

Test Engineer:	Ivan Zhang	Temperature:	21~24	°C
Test Date:	2018/12/14~2018/12/25	Relative Humidity:	49~51	%

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	13.59		8.05		0.50	Pass
11b	1Mbps	1	6	2437	13.89		8.07		0.50	Pass
11b	1Mbps	1	11	2462	13.89		8.07		0.50	Pass
11g	6Mbps	1	1	2412	17.33		15.12		0.50	Pass
11g	6Mbps	1	6	2437	17.58		15.50		0.50	Pass
11g	6Mbps	1	11	2462	17.53		15.50		0.50	Pass
HT20	MCS0	1	1	2412	18.53		15.12		0.50	Pass
HT20	MCS0	1	6	2437	18.78		15.96		0.50	Pass
HT20	MCS0	1	11	2462	18.68		15.96		0.50	Pass
11b	1Mbps	2	1	2412	13.64	14.09	8.05	8.05	0.50	Pass
11b	1Mbps	2	6	2437	13.94	13.84	8.07	8.07	0.50	Pass
11b	1Mbps	2	11	2462	13.99	13.94	8.53	8.07	0.50	Pass
11g	6Mbps	2	1	2412	17.28	17.48	15.11	15.64	0.50	Pass
11g	6Mbps	2	6	2437	17.48	17.43	15.33	15.34	0.50	Pass
11g	6Mbps	2	11	2462	17.53	17.63	15.33	15.70	0.50	Pass
HT20	MCS0	2	1	2412	18.48	18.73	15.10	16.52	0.50	Pass
HT20	MCS0	2	6	2437	18.78	18.68	15.94	15.94	0.50	Pass
HT20	MCS0	2	11	2462	18.78	18.83	15.94	15.96	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	1	1	2412	21.31			30.00	30.00	-2.77	-2.82	18.54		36.00	36.00	Pass
11b	1Mbps	1	6	2437	21.12			30.00	30.00	-2.77	-2.82	18.35		36.00	36.00	Pass
11b	1Mbps	1	11	2462	20.96			30.00	30.00	-2.77	-2.82	18.19		36.00	36.00	Pass
11g	6Mbps	1	1	2412	23.03			30.00	30.00	-2.77	-2.82	20.26		36.00	36.00	Pass
11g	6Mbps	1	6	2437	22.53			30.00	30.00	-2.77	-2.82	19.76		36.00	36.00	Pass
11g	6Mbps	1	11	2462	22.89			30.00	30.00	-2.77	-2.82	20.12		36.00	36.00	Pass
HT20	MCS0	1	1	2412	23.16			30.00	30.00	-2.77	-2.82	20.39		36.00	36.00	Pass
HT20	MCS0	1	6	2437	22.68			30.00	30.00	-2.77	-2.82	19.91		36.00	36.00	Pass
HT20	MCS0	1	11	2462	22.91			30.00	30.00	-2.77	-2.82	20.14		36.00	36.00	Pass
11b	1Mbps	2	1	2412	19.64	19.68	22.67	30.00		-2.77		19.90		36.00		Pass
11b	1Mbps	2	6	2437	19.05	19.42	22.25	30.00		-2.77		19.48		36.00		Pass
11b	1Mbps	2	11	2462	19.35	19.48	22.43	30.00		-2.77		19.66		36.00		Pass
11g	6Mbps	2	1	2412	21.74	21.98	24.87	30.00		-2.77		22.10		36.00		Pass
11g	6Mbps	2	6	2437	21.45	21.82	24.65	30.00		-2.77		21.88		36.00		Pass
11g	6Mbps	2	11	2462	21.62	21.76	24.70	30.00		-2.77		21.93		36.00		Pass
HT20	MCS0	2	1	2412	22.15	22.45	25.31	30.00		-2.77		22.54		36.00		Pass
HT20	MCS0	2	6	2437	22.09	22.37	25.24	30.00		-2.77		22.47		36.00		Pass
HT20	MCS0	2	11	2462	22.02	22.44	25.25	30.00		-2.77		22.48		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	1	1	2412	0.00		18.89		
11b	1Mbps	1	6	2437	0.00		18.81		
11b	1Mbps	1	11	2462	0.00		18.76		
11g	6Mbps	1	1	2412	0.08		18.16		
11g	6Mbps	1	6	2437	0.08		17.84		
11g	6Mbps	1	11	2462	0.08		18.04		
HT20	MCS0	1	1	2412	0.08		17.94		
HT20	MCS0	1	6	2437	0.08		17.71		
HT20	MCS0	1	11	2462	0.08		17.85		
11b	1Mbps	2	1	2412	0.00	0.00	17.08	17.13	20.12
11b	1Mbps	2	6	2437	0.00	0.00	16.78	16.85	19.83
11b	1Mbps	2	11	2462	0.00	0.00	16.88	17.02	19.96
11g	6Mbps	2	1	2412	0.08	0.08	16.81	17.07	19.95
11g	6Mbps	2	6	2437	0.08	0.08	16.57	16.76	19.67
11g	6Mbps	2	11	2462	0.08	0.08	16.69	16.79	19.75
HT20	MCS0	2	1	2412	0.08	0.08	16.93	17.13	20.04
HT20	MCS0	2	6	2437	0.08	0.08	16.83	16.94	19.90
HT20	MCS0	2	11	2462	0.08	0.08	16.96	16.99	19.99

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

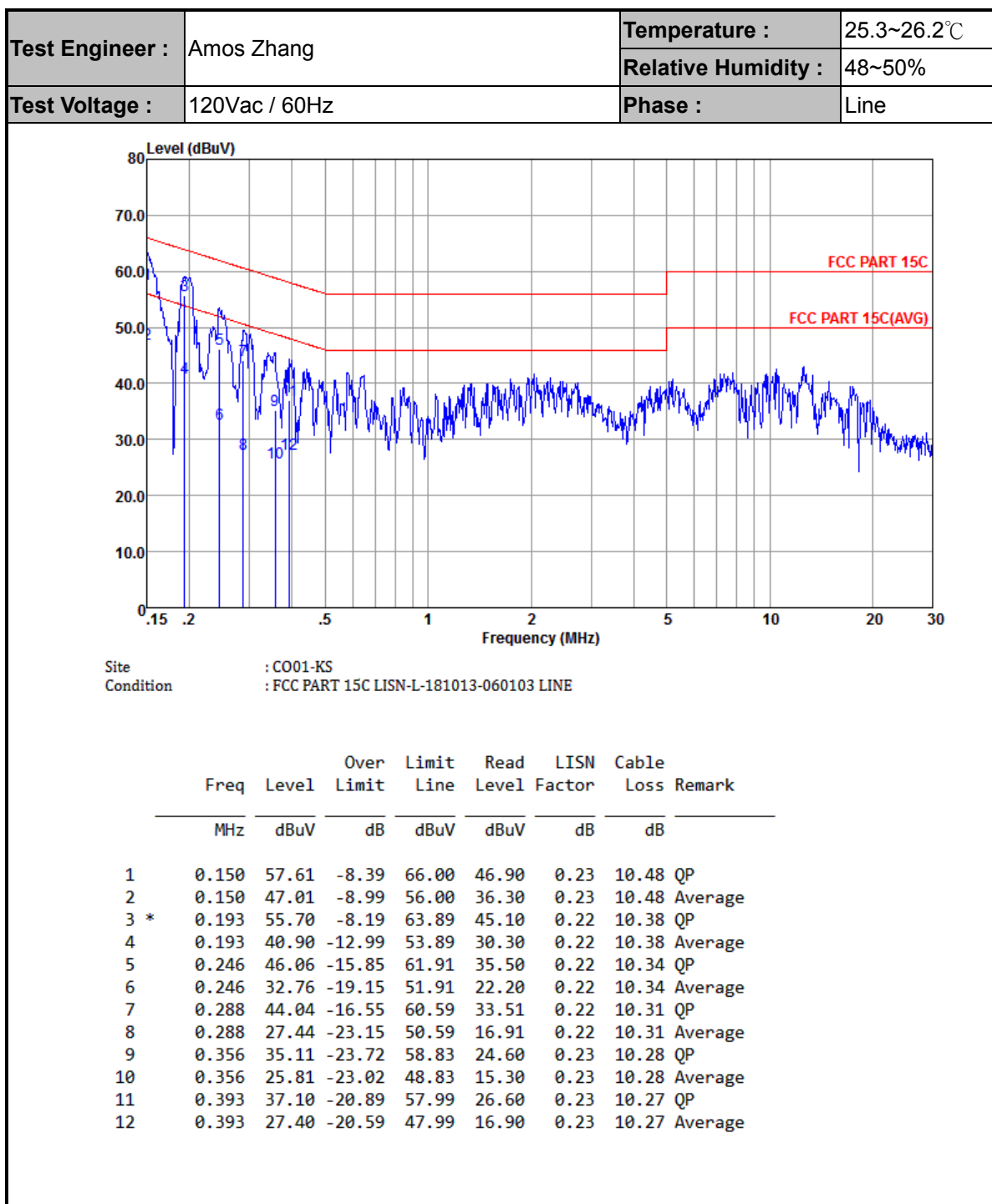
TEST RESULTS DATA
Peak Power Spectral Density

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	-8.58		-	-2.77	-2.82	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-7.91			-2.77	-2.82	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-7.39			-2.77	-2.82	8.00	8.00	Pass
11g	6Mbps	1	1	2412	-7.88			-2.77	-2.82	8.00	8.00	Pass
11g	6Mbps	1	6	2437	-7.36			-2.77	-2.82	8.00	8.00	Pass
11g	6Mbps	1	11	2462	-9.24			-2.77	-2.82	8.00	8.00	Pass
HT20	MCS0	1	1	2412	-8.31			-2.77	-2.82	8.00	8.00	Pass
HT20	MCS0	1	6	2437	-8.05			-2.77	-2.82	8.00	8.00	Pass
HT20	MCS0	1	11	2462	-8.34			-2.77	-2.82	8.00	8.00	Pass
11b	1Mbps	2	1	2412	-8.24	-7.55	-4.54	0.22		8.00		Pass
11b	1Mbps	2	6	2437	-9.40	-8.63	-5.62	0.22		8.00		Pass
11b	1Mbps	2	11	2462	-10.11	-7.63	-4.62	0.22		8.00		Pass
11g	6Mbps	2	1	2412	-8.06	-8.12	-5.05	0.22		8.00		Pass
11g	6Mbps	2	6	2437	-8.58	-8.80	-5.57	0.22		8.00		Pass
11g	6Mbps	2	11	2462	-9.32	-9.43	-6.31	0.22		8.00		Pass
HT20	MCS0	2	1	2412	-7.57	-7.57	-4.56	0.22		8.00		Pass
HT20	MCS0	2	6	2437	-8.38	-6.77	-3.76	0.22		8.00		Pass
HT20	MCS0	2	11	2462	-8.20	-8.75	-5.19	0.22		8.00		Pass

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

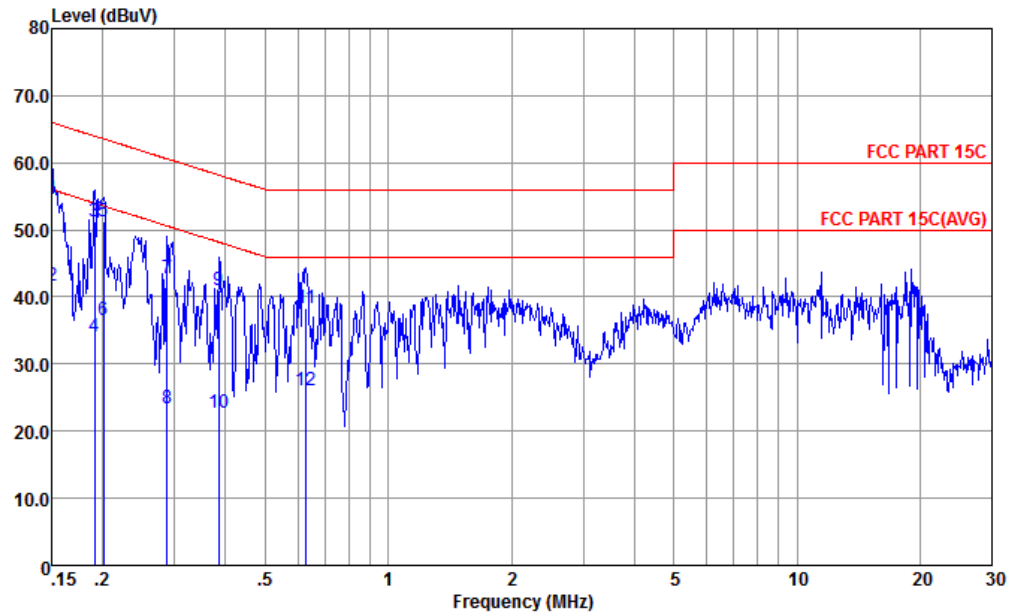


Appendix B. AC Conducted Emission Test Results





Test Engineer :	Amos Zhang	Temperature :	25.3~26.2℃
		Relative Humidity :	48~50%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-KS
Condition : FCC PART 15C LISN-N-181013-060103 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.150	54.49	-11.51	66.00	43.80	0.21	10.48	QP
2	0.150	41.59	-14.41	56.00	30.90	0.21	10.48	Average
3	0.191	51.18	-12.80	63.98	40.60	0.20	10.38	QP
4	0.191	34.18	-19.80	53.98	23.60	0.20	10.38	Average
5	0.201	51.16	-12.42	63.58	40.60	0.20	10.36	QP
6	0.201	36.46	-17.12	53.58	25.90	0.20	10.36	Average
7	0.288	42.71	-17.88	60.59	32.20	0.20	10.31	QP
8	0.288	23.41	-27.18	50.59	12.90	0.20	10.31	Average
9	0.385	40.96	-17.21	58.17	30.50	0.19	10.27	QP
10	0.385	22.76	-25.41	48.17	12.30	0.19	10.27	Average
11	0.630	38.23	-17.77	56.00	27.79	0.20	10.24	QP
12	0.630	26.03	-19.97	46.00	15.59	0.20	10.24	Average



Appendix C. Radiated Spurious Emission

15C 2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2360.18	47.13	-26.87	74	49.02	25.49	5.59	32.97	115	303	P	H
		2389.95	35.5	-18.5	54	37.3	25.6	5.63	33.03	115	303	A	H
	*	2414	101.61	-	-	103.2	25.79	5.65	33.03	115	303	P	H
	*	2414	98.31	-	-	99.9	25.79	5.65	33.03	115	303	A	H
		2365.77	45.8	-28.2	74	47.72	25.49	5.59	33	314	10	P	V
		2389.95	35.28	-18.72	54	37.08	25.6	5.63	33.03	314	10	A	V
	*	2412	101.88	-	-	103.47	25.79	5.65	33.03	314	10	P	V
	*	2412	98.56	-	-	100.15	25.79	5.65	33.03	314	10	A	V
802.11b CH 11 2462MHz	*	2462	103.57	-	-	104.2	26.34	5.7	32.67	112	303	P	H
	*	2460	100.22	-	-	100.85	26.34	5.7	32.67	112	303	A	H
		2489.38	53.26	-20.74	74	53.3	26.71	5.74	32.49	112	303	P	H
		2488.84	38.25	-15.75	54	38.29	26.71	5.74	32.49	112	303	A	H
	*	2462	102.78	-	-	103.41	26.34	5.7	32.67	209	152	P	V
	*	2462	99.51	-	-	100.14	26.34	5.7	32.67	209	152	A	V
		2485.36	50.31	-23.69	74	50.55	26.53	5.72	32.49	209	152	P	V
		2487.46	37.46	-16.54	54	37.7	26.53	5.72	32.49	209	152	A	V



15C 2.4GHz 2400~2483.5MHz
WIFI 802.11b (Harmonic @ 3m)

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		4824	36.73	-37.27	74	61.13	30.92	8.43	63.75	100	0	P	H
		4824	38.33	-35.67	74	62.73	30.92	8.43	63.75	100	0	P	V
802.11b CH 06 2437MHz		4872	37.11	-36.89	74	61.36	31.05	8.43	63.73	100	0	P	H
		7311	41.35	-32.65	74	60.13	35.52	10.07	64.37	100	0	P	H
		4872	37.85	-36.15	74	62.1	31.05	8.43	63.73	100	0	P	V
		7311	40.54	-33.46	74	59.32	35.52	10.07	64.37	100	0	P	V
802.11b CH 11 2462MHz		4926	37.65	-36.35	74	61.74	31.18	8.44	63.71	100	0	P	H
		7386	42.7	-31.3	74	61.24	35.69	10.15	64.38	100	0	P	H
		4926	35.76	-38.24	74	59.85	31.18	8.44	63.71	100	0	P	V
		7386	41.42	-32.58	74	59.96	35.69	10.15	64.38	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15C 2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		2389.95	55.79	-18.21	74	57.59	25.6	5.63	33.03	122	299	P	H
		2389.95	44.7	-9.3	54	46.5	25.6	5.63	33.03	122	299	A	H
	*	2412	104.16	-	-	105.75	25.79	5.65	33.03	122	299	P	H
	*	2412	96.23	-	-	97.82	25.79	5.65	33.03	122	299	A	H
		2389.04	50	-24	74	51.77	25.6	5.63	33	173	20	P	V
		2389.95	40.02	-13.98	54	41.82	25.6	5.63	33.03	173	20	A	V
	*	2414	103.43	-	-	105.02	25.79	5.65	33.03	173	20	P	V
	*	2414	95.21	-	-	96.8	25.79	5.65	33.03	173	20	A	V
802.11g CH 11 2462MHz	*	2458	104.7	-	-	105.33	26.34	5.7	32.67	171	309	P	H
	*	2460	96.51	-	-	97.14	26.34	5.7	32.67	171	309	A	H
		2489.74	56.68	-17.32	74	56.72	26.71	5.74	32.49	171	309	P	H
		2483.68	44.44	-9.56	54	44.68	26.53	5.72	32.49	171	309	A	H
	*	2464	104.25	-	-	104.88	26.34	5.7	32.67	300	358	P	V
	*	2464	96.65	-	-	97.28	26.34	5.7	32.67	300	358	A	V
		2483.51	53.34	-20.66	74	53.58	26.53	5.72	32.49	300	358	P	V
		2483.51	43.53	-10.47	54	43.77	26.53	5.72	32.49	300	358	A	V



15C 2.4GHz 2400~2483.5MHz
WIFI 802.11g (Harmonic @ 3m)

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11g CH 01 2412MHz		4824	36.98	-37.02	74	61.38	30.92	8.43	63.75	100	0	P	H
		4824	36.67	-37.33	74	61.07	30.92	8.43	63.75	100	0	P	V
802.11g CH 06 2437MHz		4872	38.08	-35.92	74	62.33	31.05	8.43	63.73	100	0	P	H
		7311	40.56	-33.44	74	59.34	35.52	10.07	64.37	100	0	P	H
		4872	37.49	-36.51	74	61.74	31.05	8.43	63.73	100	0	P	V
		7311	40.2	-33.8	74	58.98	35.52	10.07	64.37	100	0	P	V
802.11g CH 11 2462MHz		4926	36.76	-37.24	74	60.85	31.18	8.44	63.71	100	0	P	H
		7386	41.52	-32.48	74	60.06	35.69	10.15	64.38	100	0	P	H
		4926	36.12	-37.88	74	60.21	31.18	8.44	63.71	100	0	P	V
		7386	41.4	-32.6	74	59.94	35.69	10.15	64.38	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		2389.82	59.85	-14.15	74	61.65	25.6	5.63	33.03	120	319	P	H
		2389.95	48.83	-5.17	54	50.63	25.6	5.63	33.03	120	319	A	H
	*	2414	104.82	-	-	106.41	25.79	5.65	33.03	120	319	P	H
	*	2414	96.54	-	-	98.13	25.79	5.65	33.03	120	319	A	H
		2389.56	57.25	-16.75	74	59.02	25.6	5.63	33	309	12	P	V
		2389.95	46.72	-7.28	54	48.52	25.6	5.63	33.03	309	12	A	V
	*	2412	103.91	-	-	105.5	25.79	5.65	33.03	309	12	P	V
	*	2412	95.7	-	-	97.29	25.79	5.65	33.03	309	12	A	V
802.11n HT20 CH 11 2462MHz	*	2462	105.74	-	-	106.37	26.34	5.7	32.67	144	303	P	H
	*	2462	97.72	-	-	98.35	26.34	5.7	32.67	144	303	A	H
		2483.86	61.17	-12.83	74	61.41	26.53	5.72	32.49	144	303	P	H
		2483.51	46.19	-7.81	54	46.43	26.53	5.72	32.49	144	303	A	H
	*	2458	103.22	-	-	103.85	26.34	5.7	32.67	100	69	P	V
	*	2458	94.94	-	-	95.57	26.34	5.7	32.67	100	69	A	V
		2483.98	55.54	-18.46	74	55.78	26.53	5.72	32.49	100	69	P	V
		2483.51	41.15	-12.85	54	41.39	26.53	5.72	32.49	100	69	A	V



15C 2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

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+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11n HT20 CH 01 2412MHz		4824	38.18	-35.82	74	62.58	30.92	8.43	63.75	100	0	P	H
		4824	37.59	-36.41	74	61.99	30.92	8.43	63.75	100	0	P	V
802.11n HT20 CH 06 2437MHz		4872	38.03	-35.97	74	62.28	31.05	8.43	63.73	100	0	P	H
		7311	40.63	-33.37	74	59.41	35.52	10.07	64.37	100	0	P	H
		4872	37.07	-36.93	74	61.32	31.05	8.43	63.73	100	0	P	V
		7311	40.02	-33.98	74	58.8	35.52	10.07	64.37	100	0	P	V
802.11n HT20 CH 11 2462MHz		4924	37.21	-36.79	74	61.3	31.18	8.44	63.71	100	0	P	H
		7386	41.77	-32.23	74	60.31	35.69	10.15	64.38	100	0	P	H
		4926	36.29	-37.71	74	60.38	31.18	8.44	63.71	100	0	P	V
		7386	41	-33	74	59.54	35.69	10.15	64.38	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



15C Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

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+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	19.68	-20.32	40	28	24.2	0.46	32.98	-	-	P	H
		141.55	15.37	-28.13	43.5	29.95	17.17	1.2	32.95	-	-	P	H
		259.89	21.15	-24.85	46	32.38	20.1	1.67	33	-	-	P	H
		354.95	18.45	-27.55	46	29.03	20.53	1.98	33.09	-	-	P	H
		534.4	22.15	-23.85	46	29.19	23.81	2.44	33.29	-	-	P	H
		939.86	25.91	-20.09	46	27.45	26.86	3.43	31.83	100	0	P	H
		42.61	23.96	-16.04	40	38.99	17.37	0.57	32.97	100	0	P	V
		159.98	17.82	-25.68	43.5	33.58	15.9	1.29	32.95	-	-	P	V
		259.89	18.12	-27.88	46	29.35	20.1	1.67	33	-	-	P	V
		453.89	21.05	-24.95	46	29.47	22.57	2.24	33.23	-	-	P	V
		577.08	21.97	-24.03	46	28.44	24.32	2.54	33.33	-	-	P	V
		832.19	25.54	-20.46	46	28.81	26.23	3.23	32.73	-	-	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 per 15.209(c).
!	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+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)

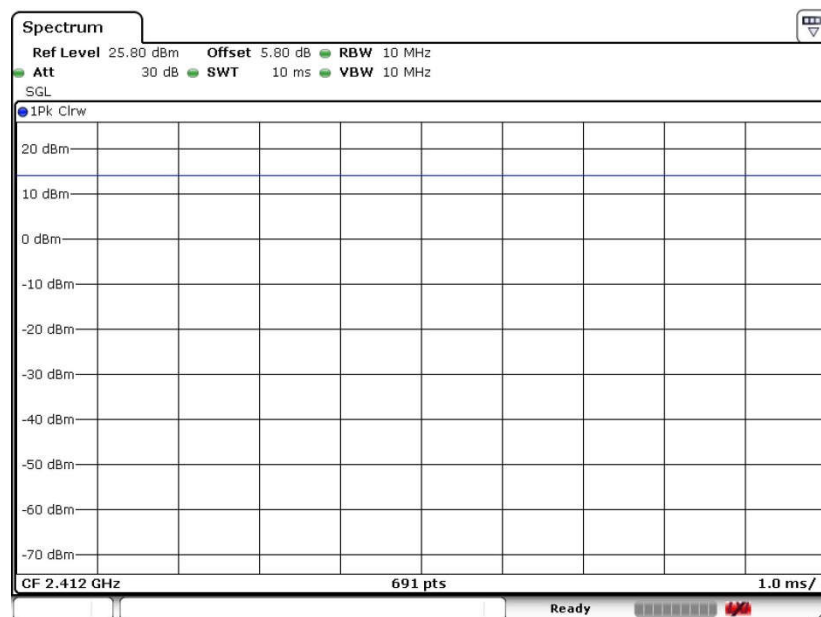
= -10.46(dB)

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

Appendix D. Duty Cycle Plots

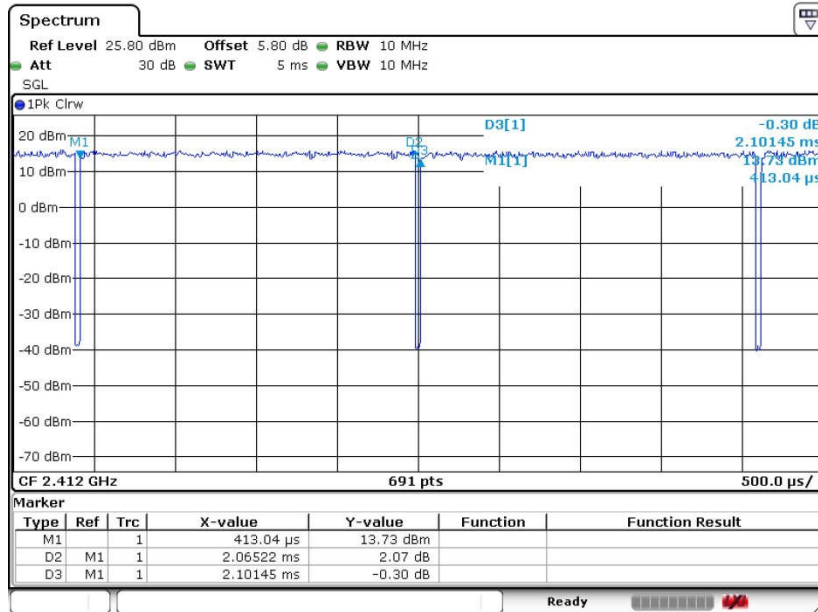
ANT	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2	802.11b	100	-	-	10Hz
1+2	802.11g	98.28	-	-	10Hz
1+2	802.11n HT20	98.16	-	-	10Hz

802.11b





802.11g



802.11n HT20

