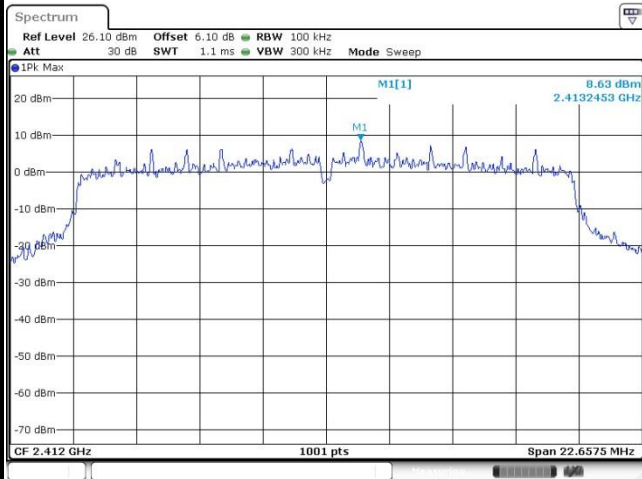




Test Mode : 802.11n HT20

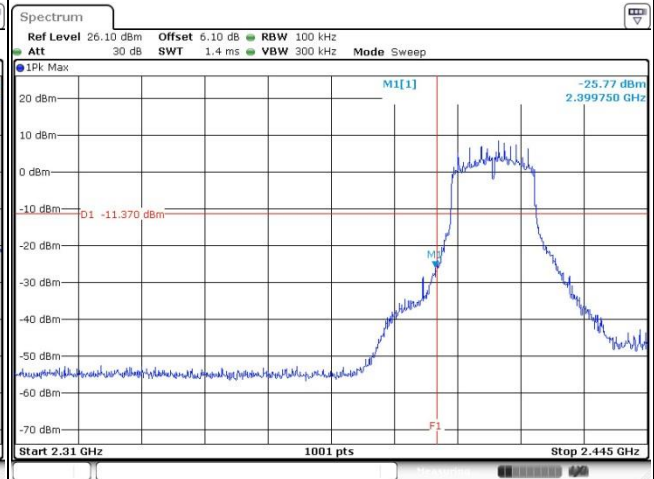
Test Channel : 01

100kHz PSD reference Level



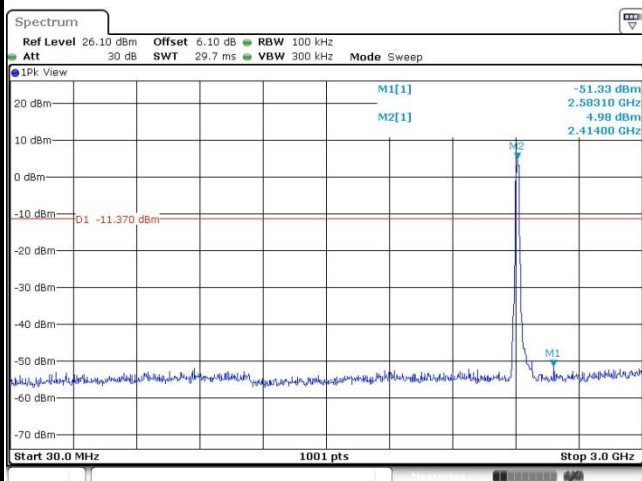
Date: 8 FEB 2019 17:05:09

Channel Plot



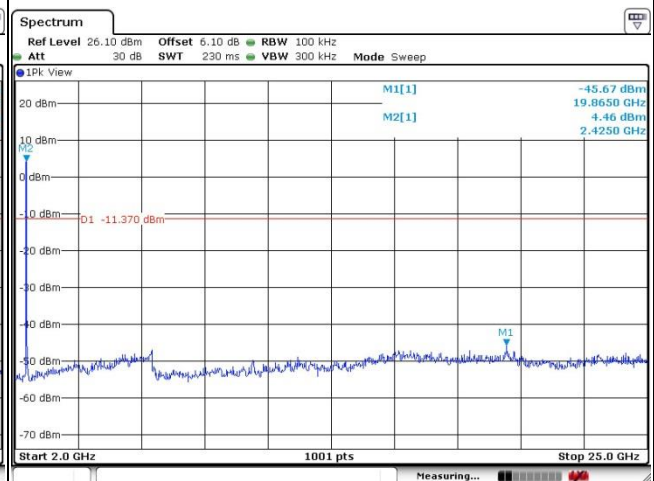
Date: 8 FEB 2019 17:05:17

Spurious Emission 30MHz~3GHz



Date: 8 FEB 2019 17:05:53

Spurious Emission 2GHz~25GHz

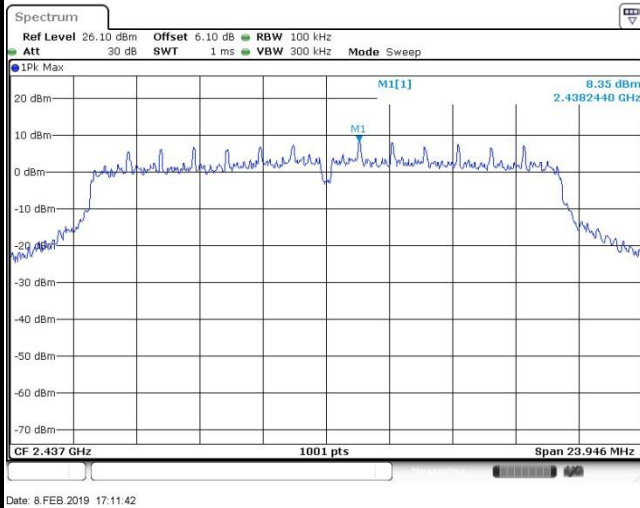


Date: 8 FEB 2019 17:06:38

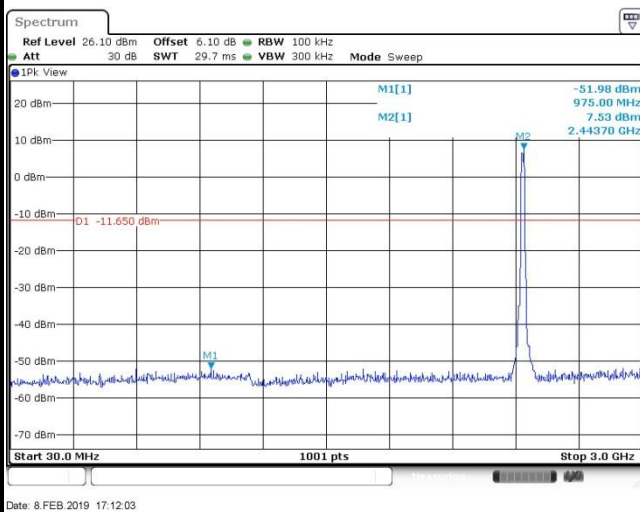


Test Mode :	802.11n HT20	Test Channel :	06
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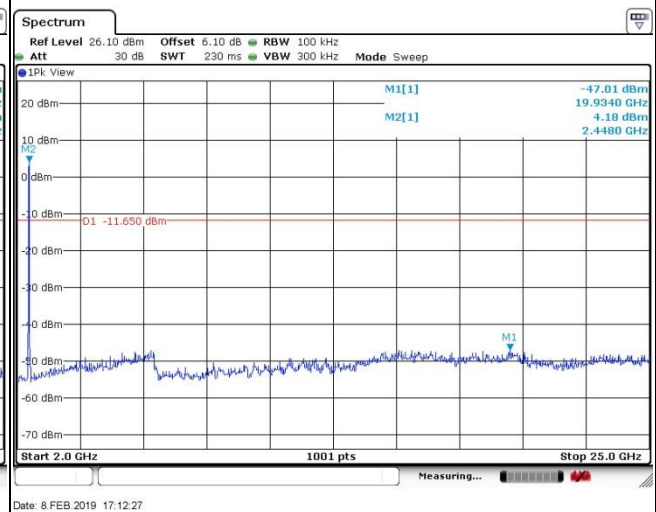
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

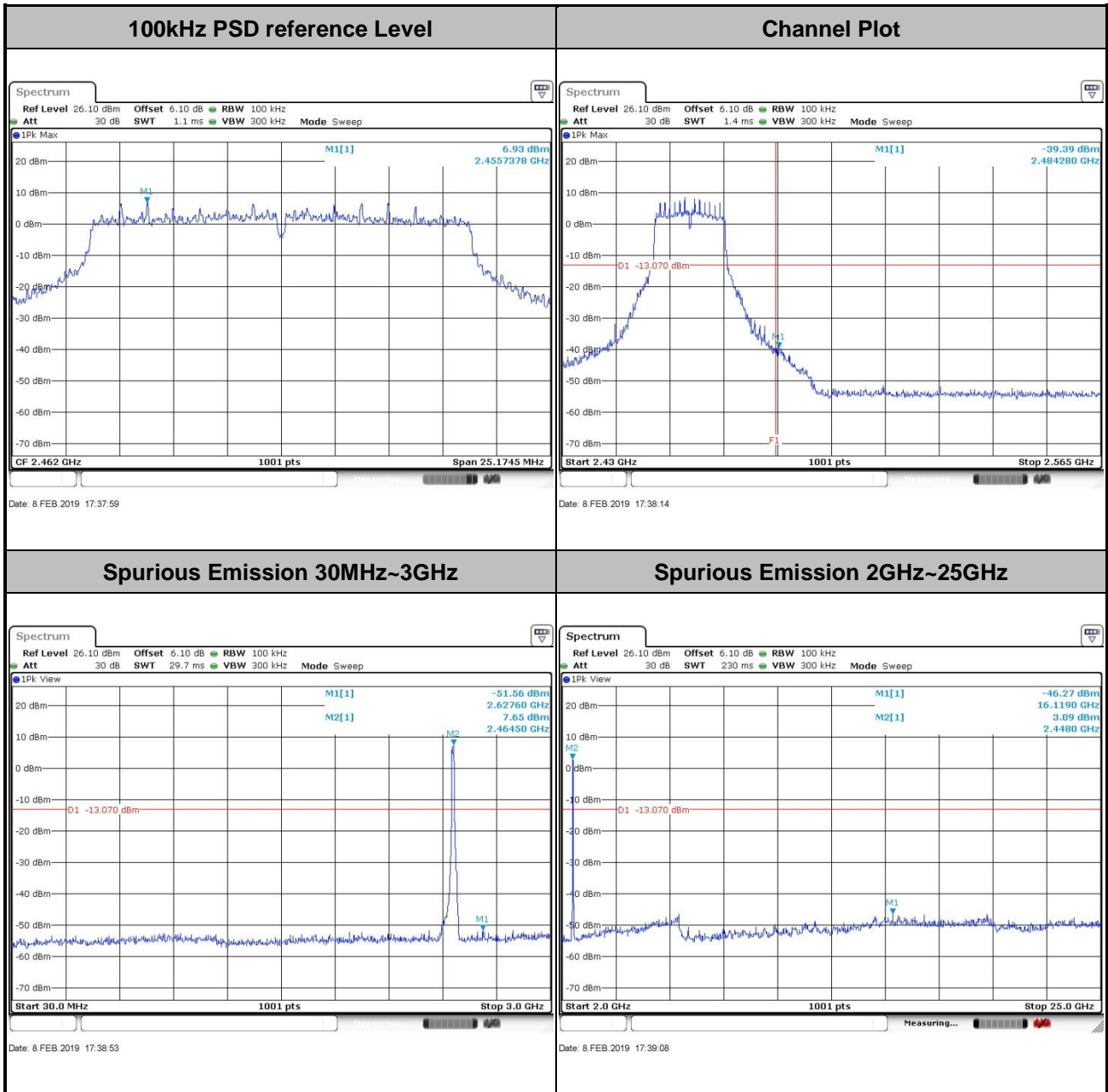


Spurious Emission 2GHz~25GHz



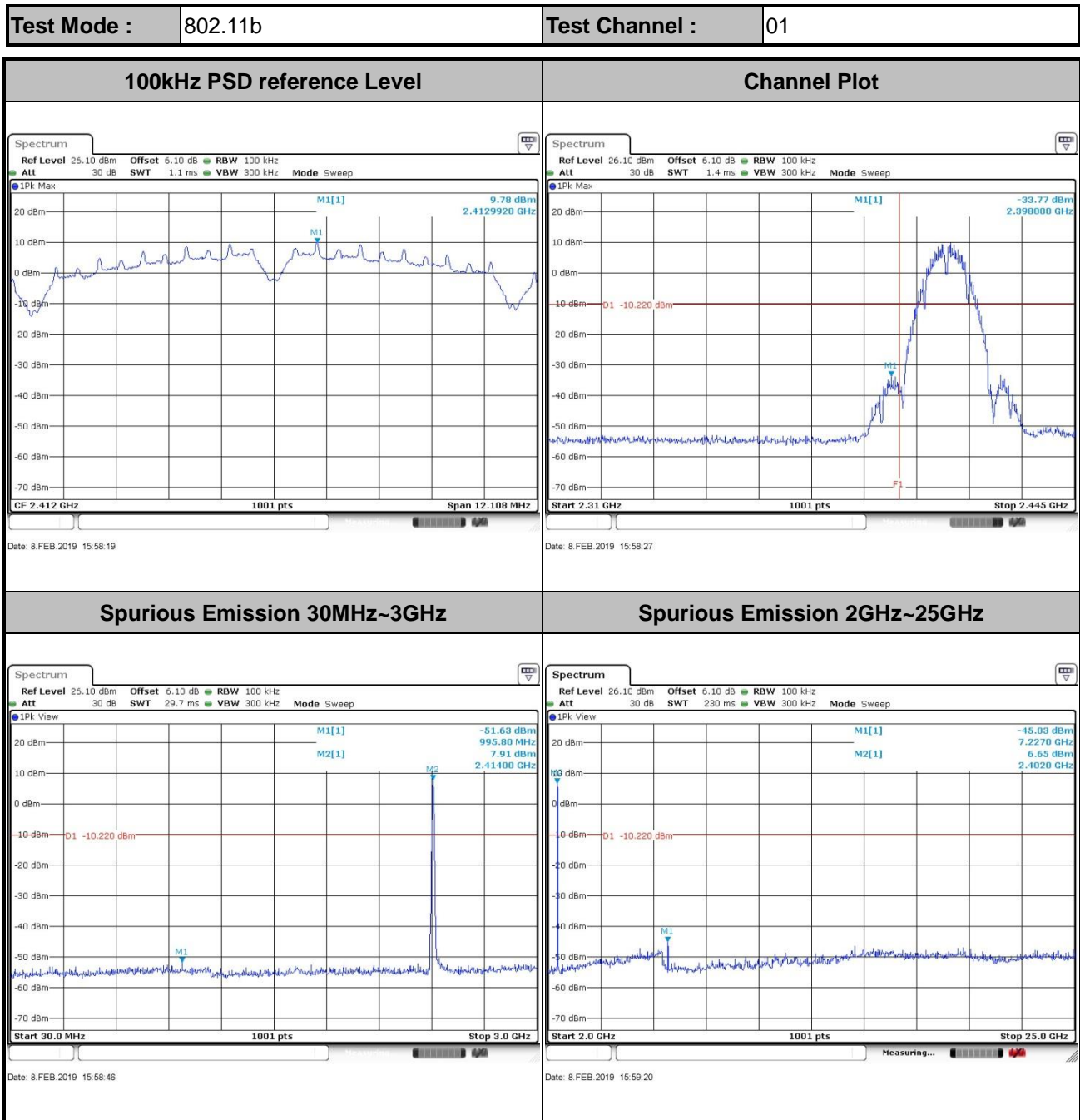


Test Mode :	802.11n HT20	Test Channel :	11
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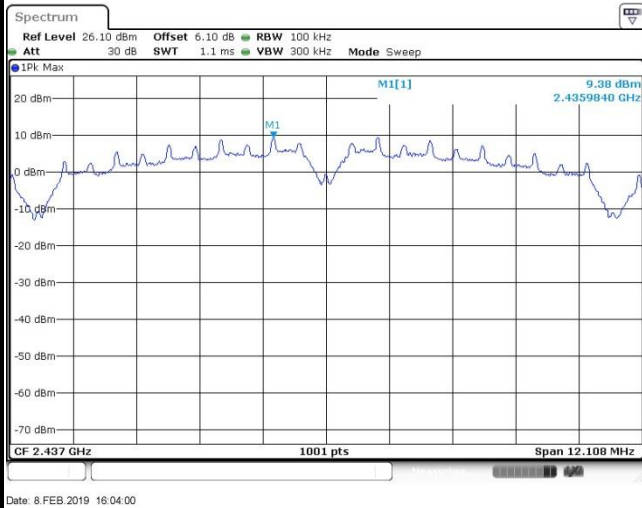
Number of TX = 2, Ant. 2 (Measured)



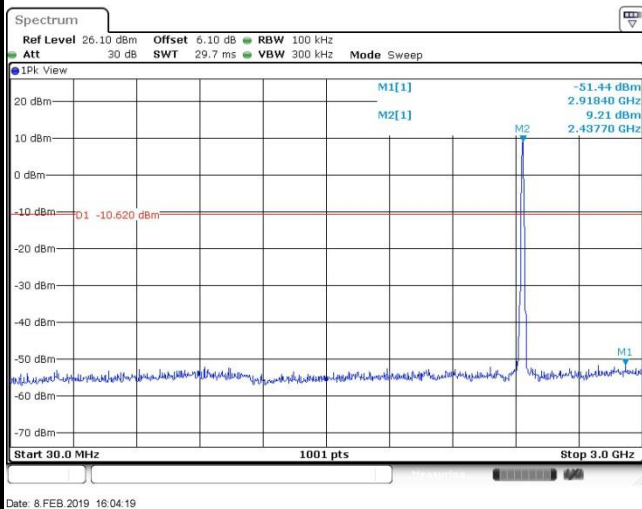


Test Mode :	802.11b	Test Channel :	06
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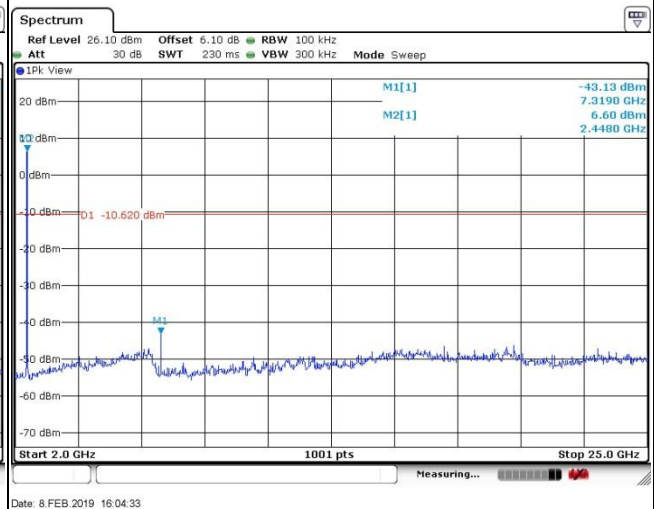
100kHz PSD reference Level

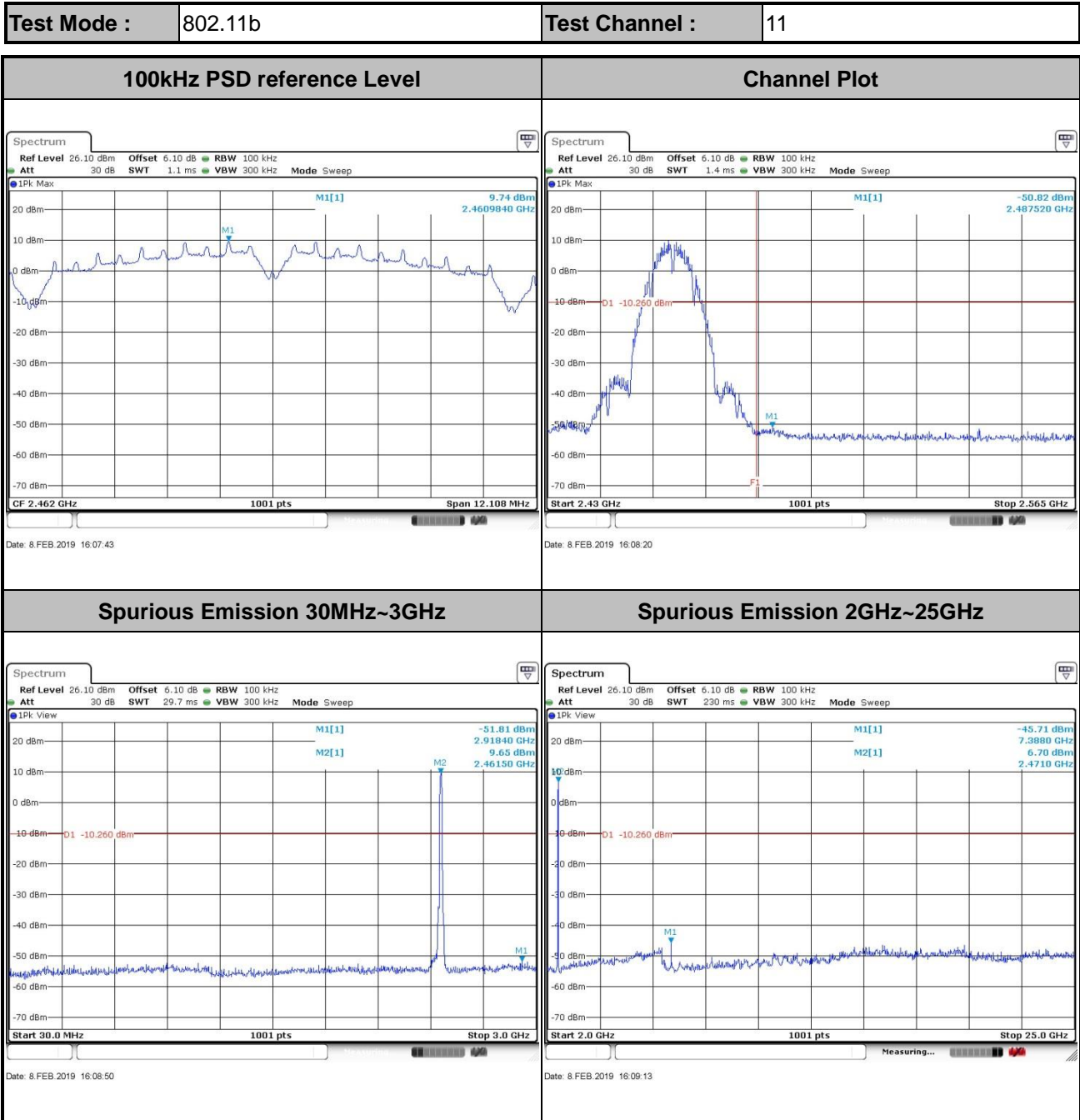


Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

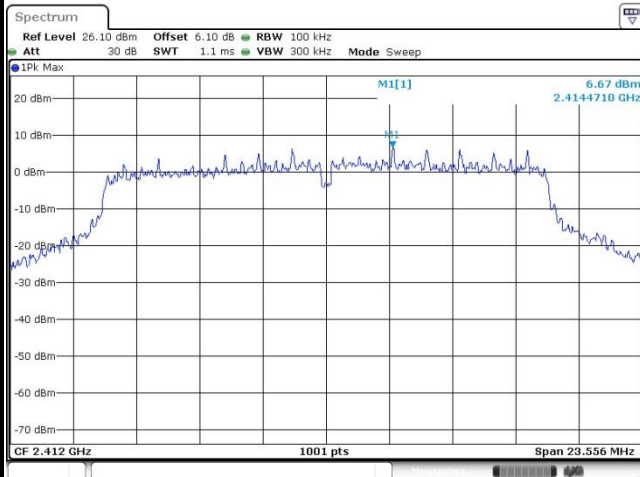




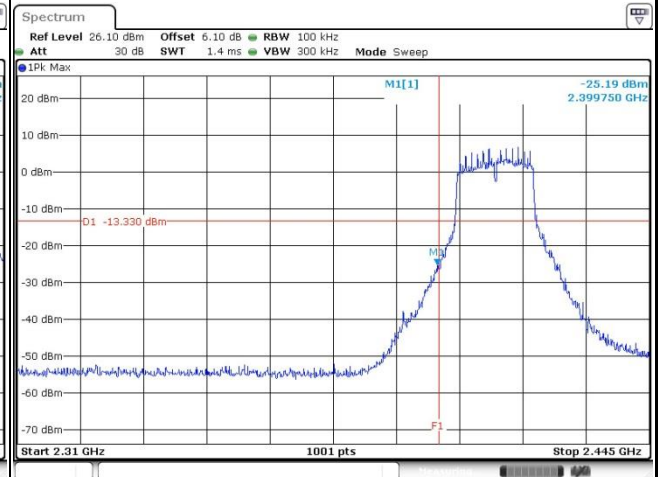


Test Mode :	802.11g	Test Channel :	01
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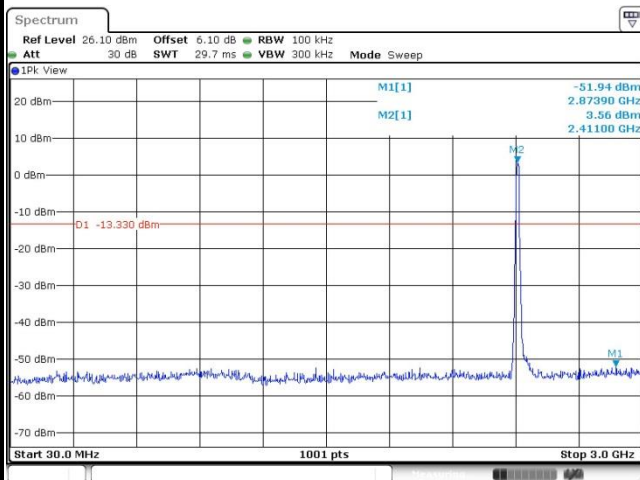
100kHz PSD reference Level



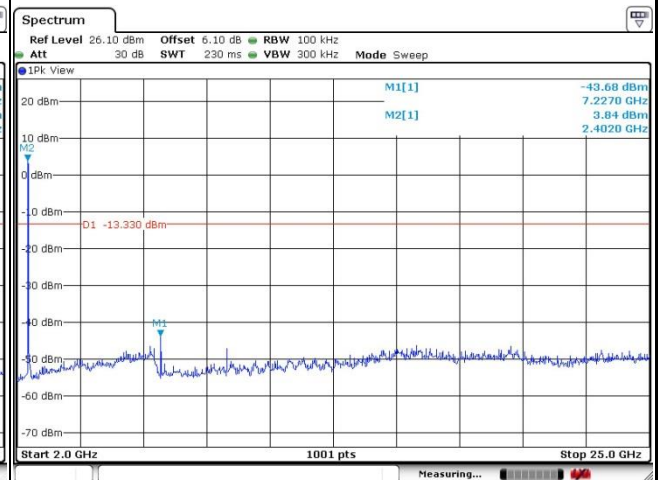
Channel Plot



Spurious Emission 30MHz~3GHz



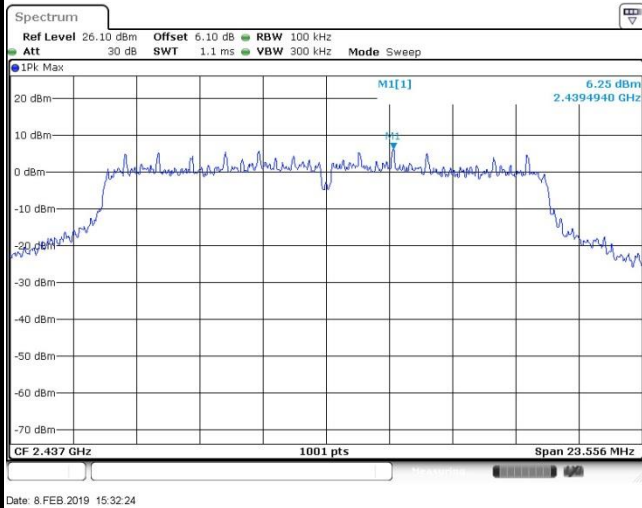
Spurious Emission 2GHz~25GHz



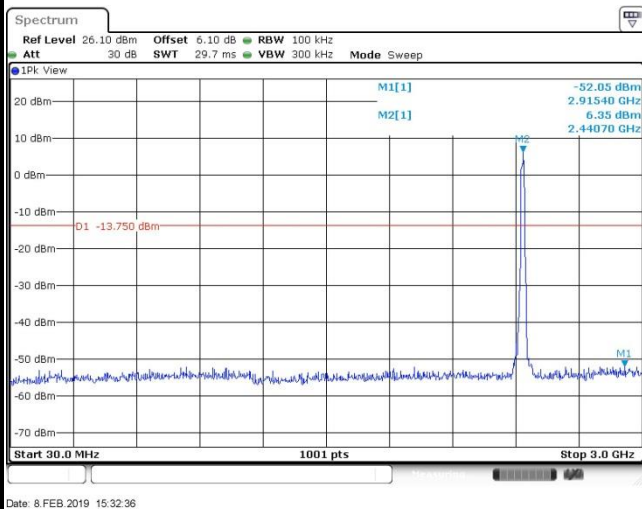


Test Mode :	802.11g	Test Channel :	06
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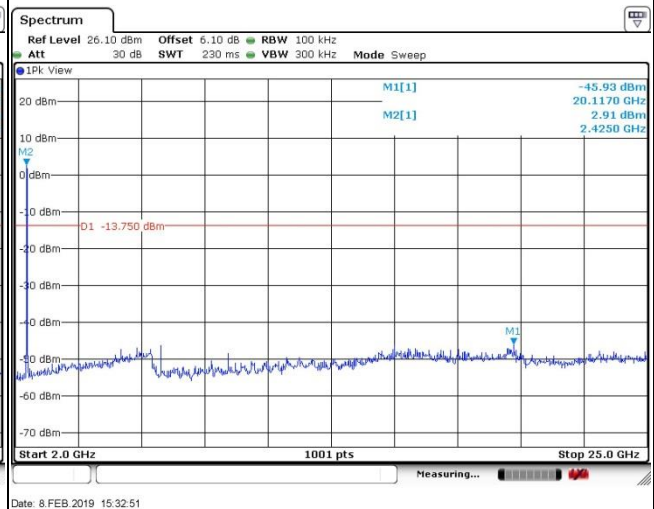
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz

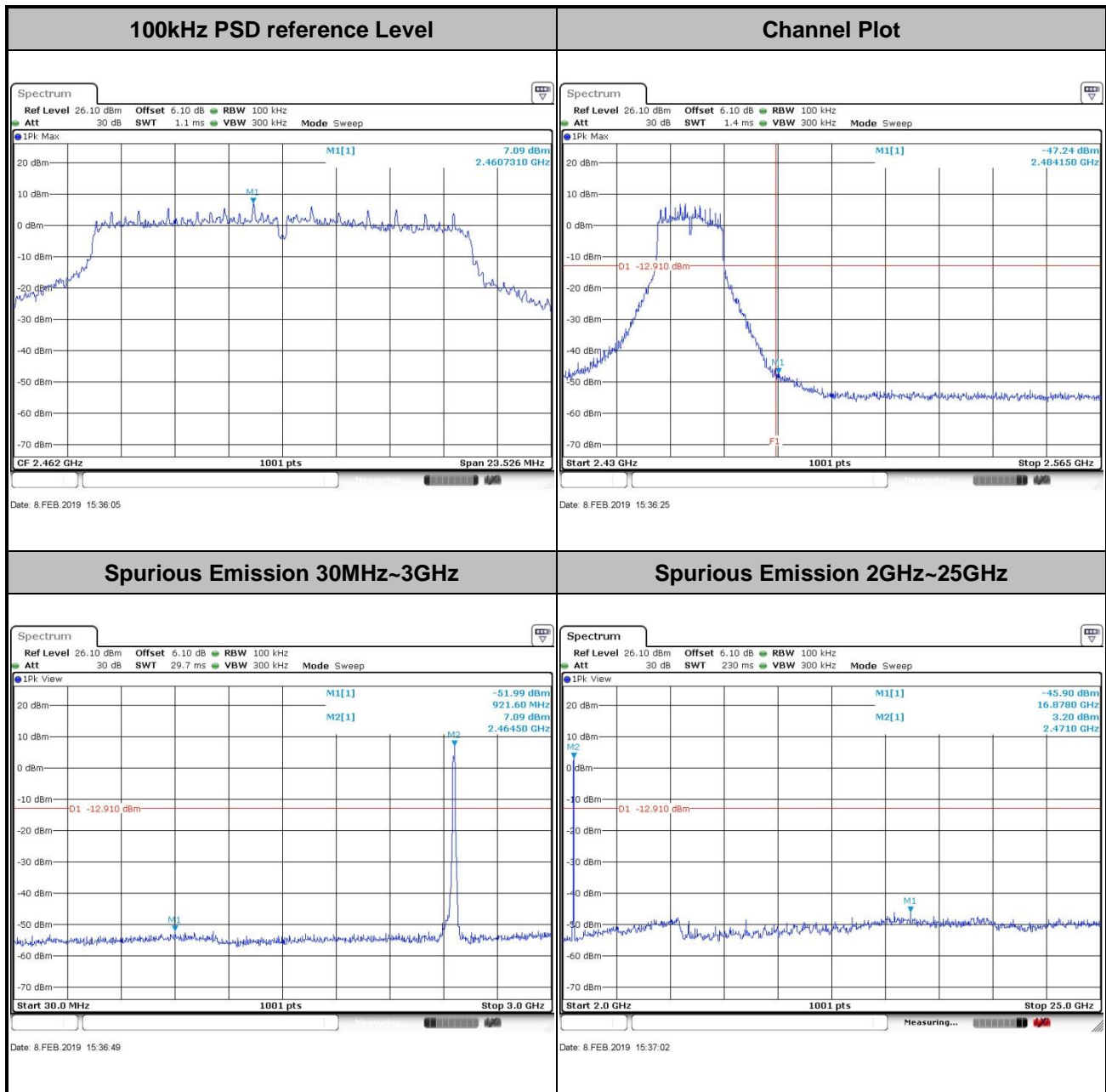


Spurious Emission 2GHz~25GHz



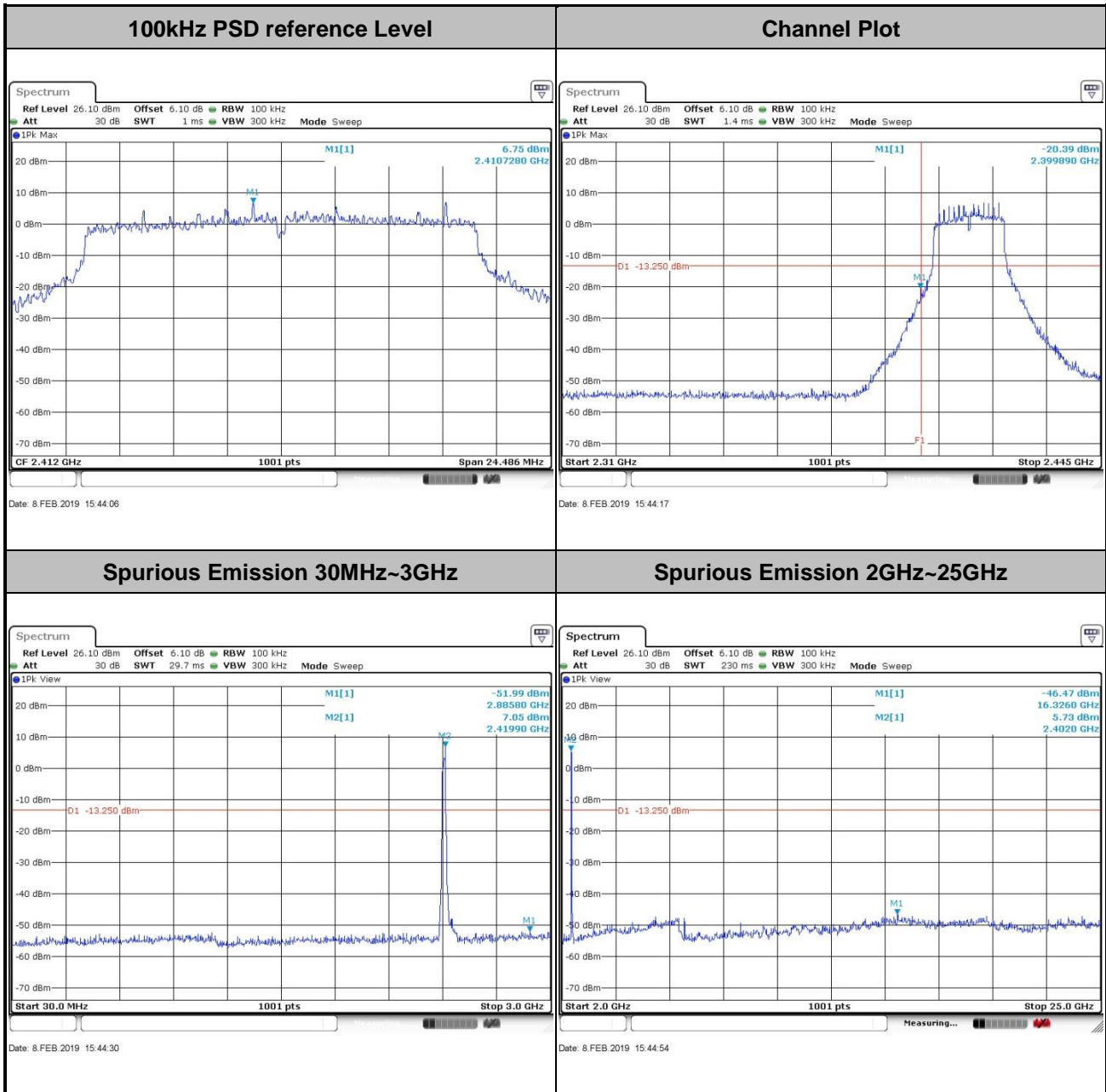


Test Mode :	802.11g	Test Channel :	11
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Test Mode :	802.11n HT20	Test Channel :	01
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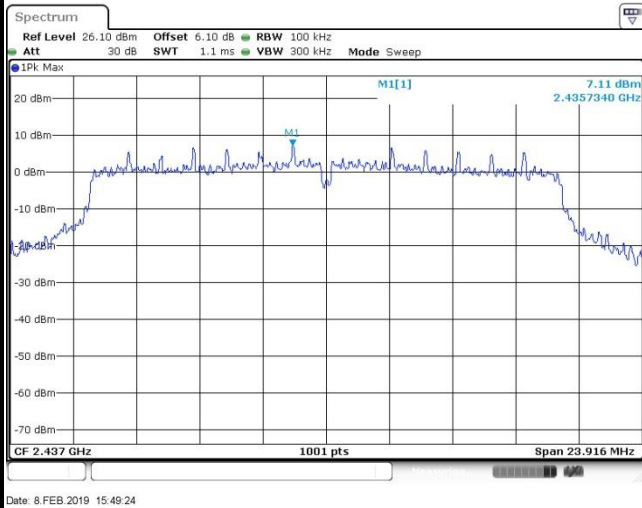




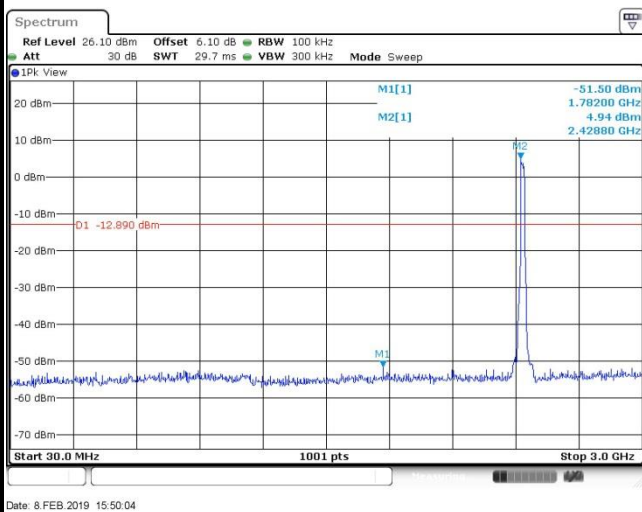
Test Mode : 802.11n HT20

Test Channel : 06

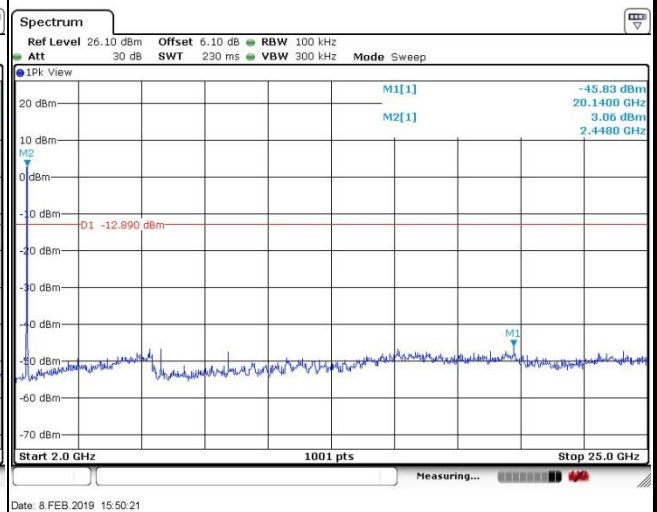
100kHz PSD reference Level



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

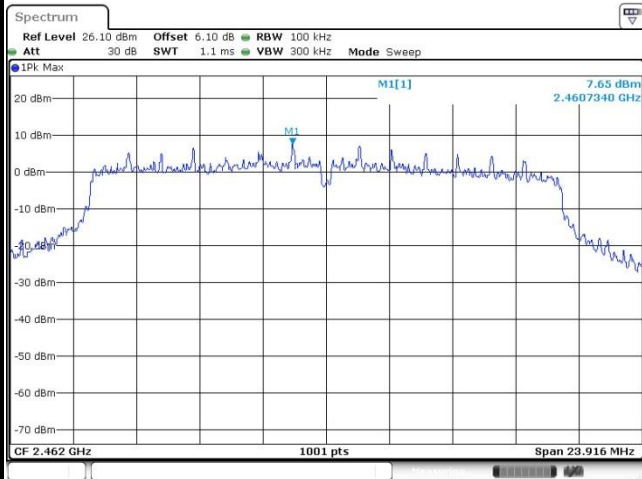




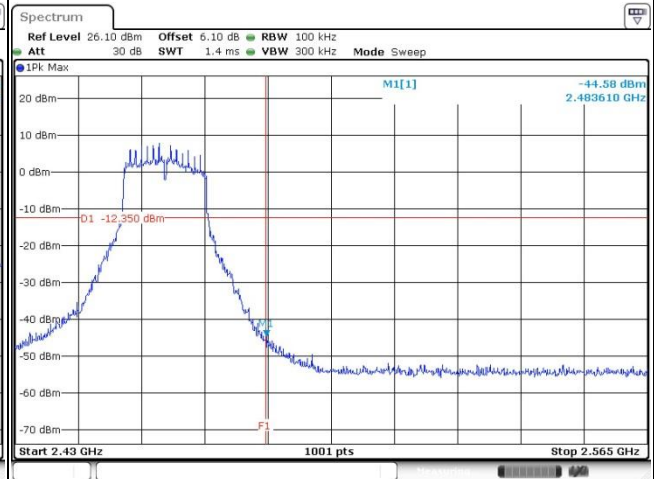
Test Mode : 802.11n HT20

Test Channel : 11

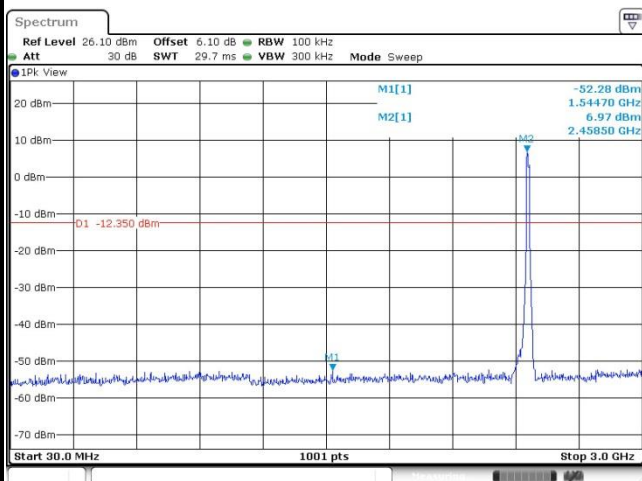
100kHz PSD reference Level



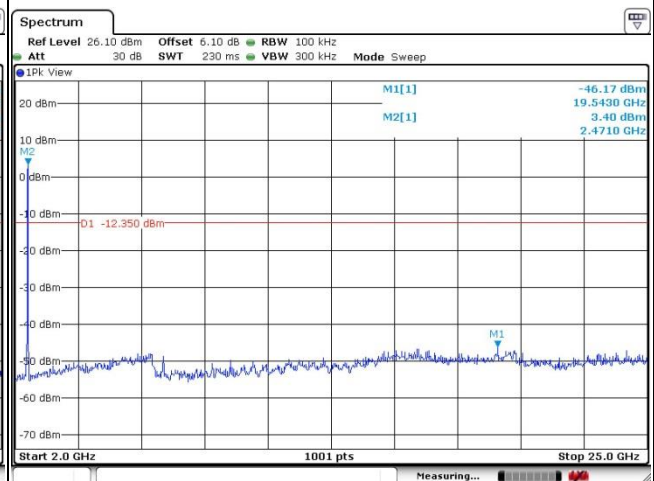
Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



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

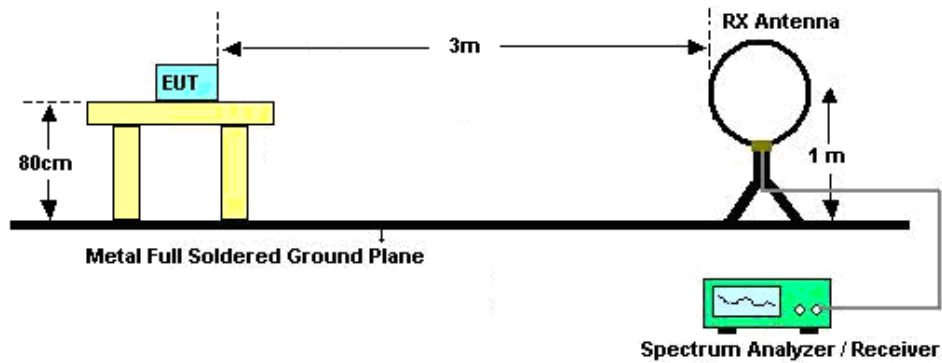
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

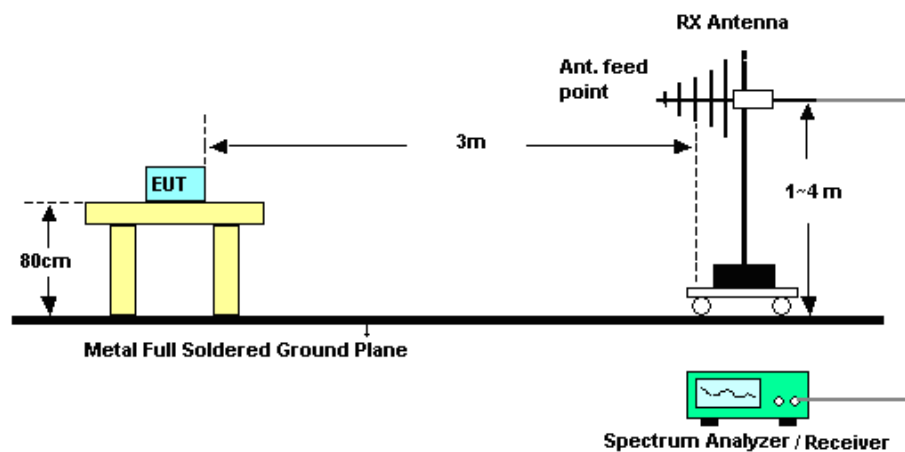
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

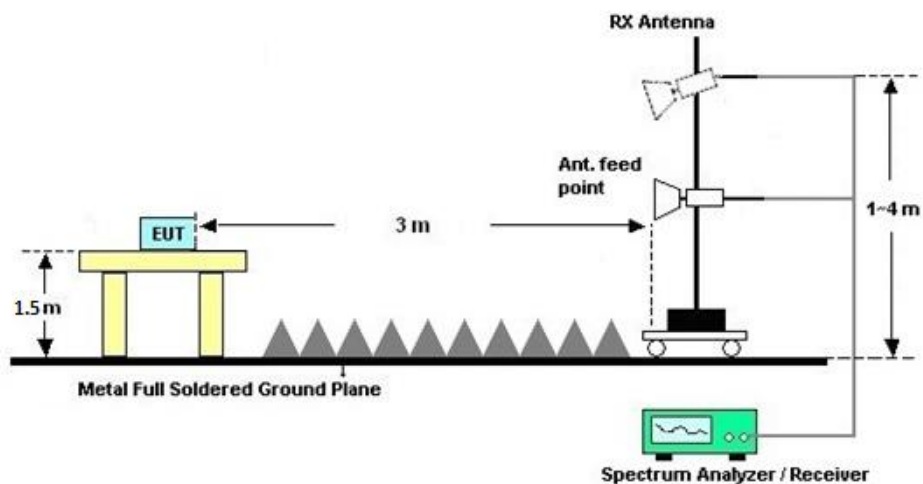
For radiated emissions below 30MHz



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.

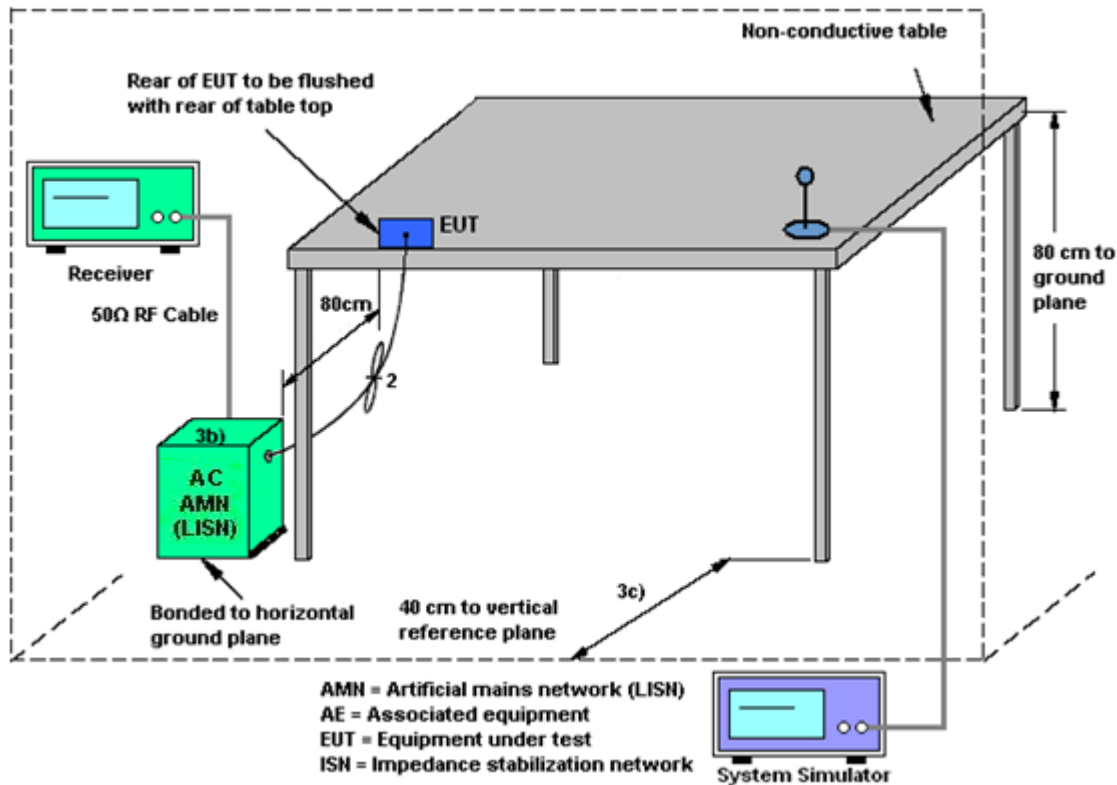
3.6.2 Measuring Instruments

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

An embedded-in antenna design is used.

3.7.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

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

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

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

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

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

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

<CDD Modes>						
	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	-1.85	-2.83	-1.85	0.68	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	Feb. 08, 2019	Aug. 06, 2019	Conducted (TH01-KS)
Pulse Power Sensor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Feb. 08, 2019	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Feb. 08, 2019	Jan. 13, 2020	Conducted (TH01-KS)
EMI Test Receiver	Keysight	N9038A	MY57290151	3Hz~8.5GHz; Max 30dBm	Jun. 25, 2018	Feb. 14, 2019~Feb. 22, 2019	Jun. 24, 2019	Radiation (03CH05-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY55150244	10Hz~44GHz	Apr. 17, 2018	Feb. 14, 2019~Feb. 22, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Oct. 19, 2018	Feb. 14, 2019~Feb. 22, 2019	Oct. 18, 2019	Radiation (03CH05-KS)
Bilog Antenna	TeseQ	CBL6111D	49922	30MHz~1GHz	Jun. 12, 2018	Feb. 14, 2019~Feb. 22, 2019	Jun. 11, 2019	Radiation (03CH05-KS)
Broad-Band Horn Antenna	Schwarzbeck MESS-ELEKTRONIK	BBHA9120D	01648	1GHz~18GHz	Jan. 27, 2019	Feb. 14, 2019~Feb. 22, 2019	Jan. 26, 2020	Radiation (03CH05-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 05, 2019	Feb. 14, 2019~Feb. 22, 2019	Jan. 04, 2020	Radiation (03CH05-KS)
Amplifier	com-power	PA-103A	161069	1MHz ~1000MHz / 32 dB	Apr. 17, 2018	Feb. 14, 2019~Feb. 22, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Jan. 14, 2019	Feb. 14, 2019~Feb. 22, 2019	Jan. 13, 2020	Radiation (03CH05-KS)
high gain Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	2025788	1Ghz-18Ghz	Apr. 17, 2018	Feb. 14, 2019~Feb. 22, 2019	Apr. 16, 2019	Radiation (03CH05-KS)
Amplifier	Keysight	83017A	MY57280106	500MHz~26.5GHz	Apr. 18, 2018	Feb. 14, 2019~Feb. 22, 2019	Apr. 17, 2019	Radiation (03CH05-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Feb. 14, 2019~Feb. 22, 2019	NCR	Radiation (03CH05-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Feb. 14, 2019~Feb. 22, 2019	NCR	Radiation (03CH05-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Feb. 14, 2019~Feb. 22, 2019	NCR	Radiation (03CH05-KS)
EMI Receiver	R&S	ESC17	100768	9kHz~7GHz;	Apr. 19, 2018	Mar. 06, 2019	Apr. 18, 2019	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 12, 2018	Mar. 06, 2019	Oct. 11, 2019	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 19, 2018	Mar. 06, 2019	Nov. 18, 2019	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	AC 0V~300V, 45Hz~1000Hz	Oct. 12, 2018	Mar. 06, 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
---	-------



Appendix A. Conducted Test Results

Report Number : FR911620C

Test Engineer:	King Huang	Temperature:	21~25	°C
Test Date:	2019/2/8	Relative Humidity:	51~55	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	13.69		8.05		0.50	Pass
11b	1Mbps	1	6	2437	14.09		8.07		0.50	Pass
11b	1Mbps	1	11	2462	14.19		8.07		0.50	Pass
11g	6Mbps	1	1	2412		17.63		15.45	0.50	Pass
11g	6Mbps	1	6	2437		17.58		15.33	0.50	Pass
11g	6Mbps	1	11	2462		17.33		15.33	0.50	Pass
HT20	MCS0	1	1	2412	18.38		15.11		0.50	Pass
HT20	MCS0	1	6	2437	18.63		15.94		0.50	Pass
HT20	MCS0	1	11	2462	18.88		16.52		0.50	Pass
11b	1Mbps	2	1	2412	13.94	13.89	8.05	8.07	0.50	Pass
11b	1Mbps	2	6	2437	14.24	14.04	8.07	8.07	0.50	Pass
11b	1Mbps	2	11	2462	14.34	13.84	8.09	8.07	0.50	Pass
11g	6Mbps	2	1	2412	17.18	17.43	15.11	15.70	0.50	Pass
11g	6Mbps	2	6	2437	17.48	17.58	15.45	15.70	0.50	Pass
11g	6Mbps	2	11	2462	17.58	17.38	15.54	15.68	0.50	Pass
HT20	MCS0	2	1	2412	18.38	18.58	15.11	16.32	0.50	Pass
HT20	MCS0	2	6	2437	18.68	18.83	15.96	15.94	0.50	Pass
HT20	MCS0	2	11	2462	18.83	18.48	16.78	15.94	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	NTX	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	21.54	21.25		30.00	30.00	-1.85	-2.83	19.69	18.42	36.00	36.00	Pass
11b	1Mbps	1	6	2437	21.40	21.08		30.00	30.00	-1.85	-2.83	19.55	18.25	36.00	36.00	Pass
11b	1Mbps	1	11	2462	21.31	21.04		30.00	30.00	-1.85	-2.83	19.46	18.21	36.00	36.00	Pass
11g	6Mbps	1	1	2412	22.85	22.89		30.00	30.00	-1.85	-2.83	21.00	20.06	36.00	36.00	Pass
11g	6Mbps	1	6	2437	22.78	22.72		30.00	30.00	-1.85	-2.83	20.93	19.89	36.00	36.00	Pass
11g	6Mbps	1	11	2462	22.73	22.69		30.00	30.00	-1.85	-2.83	20.88	19.86	36.00	36.00	Pass
HT20	MCS0	1	1	2412	23.39	23.07		30.00	30.00	-1.85	-2.83	21.54	20.24	36.00	36.00	Pass
HT20	MCS0	1	6	2437	23.20	22.83		30.00	30.00	-1.85	-2.83	21.35	20.00	36.00	36.00	Pass
HT20	MCS0	1	11	2462	23.33	22.82		30.00	30.00	-1.85	-2.83	21.48	19.99	36.00	36.00	Pass
11b	1Mbps	2	1	2412	21.36	20.70	24.05	30.00		-1.85		22.20		36.00		Pass
11b	1Mbps	2	6	2437	21.40	20.31	23.90	30.00		-1.85		22.05		36.00		Pass
11b	1Mbps	2	11	2462	21.23	20.59	23.93	30.00		-1.85		22.08		36.00		Pass
11g	6Mbps	2	1	2412	22.95	21.94	25.48	30.00		-1.85		23.63		36.00		Pass
11g	6Mbps	2	6	2437	22.68	21.69	25.22	30.00		-1.85		23.37		36.00		Pass
11g	6Mbps	2	11	2462	22.80	21.84	25.36	30.00		-1.85		23.51		36.00		Pass
HT20	MCS0	2	1	2412	23.28	22.31	25.83	30.00		-1.85		23.98		36.00		Pass
HT20	MCS0	2	6	2437	23.12	22.06	25.63	30.00		-1.85		23.78		36.00		Pass
HT20	MCS0	2	11	2462	23.24	22.33	25.82	30.00		-1.85		23.97		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	NTX	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	0.00	19.09	18.93	
11b	1Mbps	1	6	2437	0.00	0.00	19.02	18.76	
11b	1Mbps	1	11	2462	0.00	0.00	18.99	18.66	
11g	6Mbps	1	1	2412	0.08	0.08	17.97	18.07	
11g	6Mbps	1	6	2437	0.08	0.08	17.85	17.99	
11g	6Mbps	1	11	2462	0.08	0.08	17.88	17.92	
HT20	MCS0	1	1	2412	0.08	0.08	18.20	17.92	
HT20	MCS0	1	6	2437	0.08	0.08	18.16	17.83	
HT20	MCS0	1	11	2462	0.08	0.08	18.18	17.76	
11b	1Mbps	2	1	2412	0.00	0.00	19.01	18.22	21.64
11b	1Mbps	2	6	2437	0.00	0.00	19.08	18.13	21.64
11b	1Mbps	2	11	2462	0.00	0.00	18.99	18.18	21.61
11g	6Mbps	2	1	2412	0.08	0.08	18.01	17.01	20.54
11g	6Mbps	2	6	2437	0.08	0.08	17.82	16.96	20.42
11g	6Mbps	2	11	2462	0.08	0.08	17.40	16.61	20.03
HT20	MCS0	2	1	2412	0.08	0.08	18.16	17.34	20.78
HT20	MCS0	2	6	2437	0.08	0.08	18.11	17.27	20.72
HT20	MCS0	2	11	2462	0.08	0.08	17.10	16.25	19.71

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

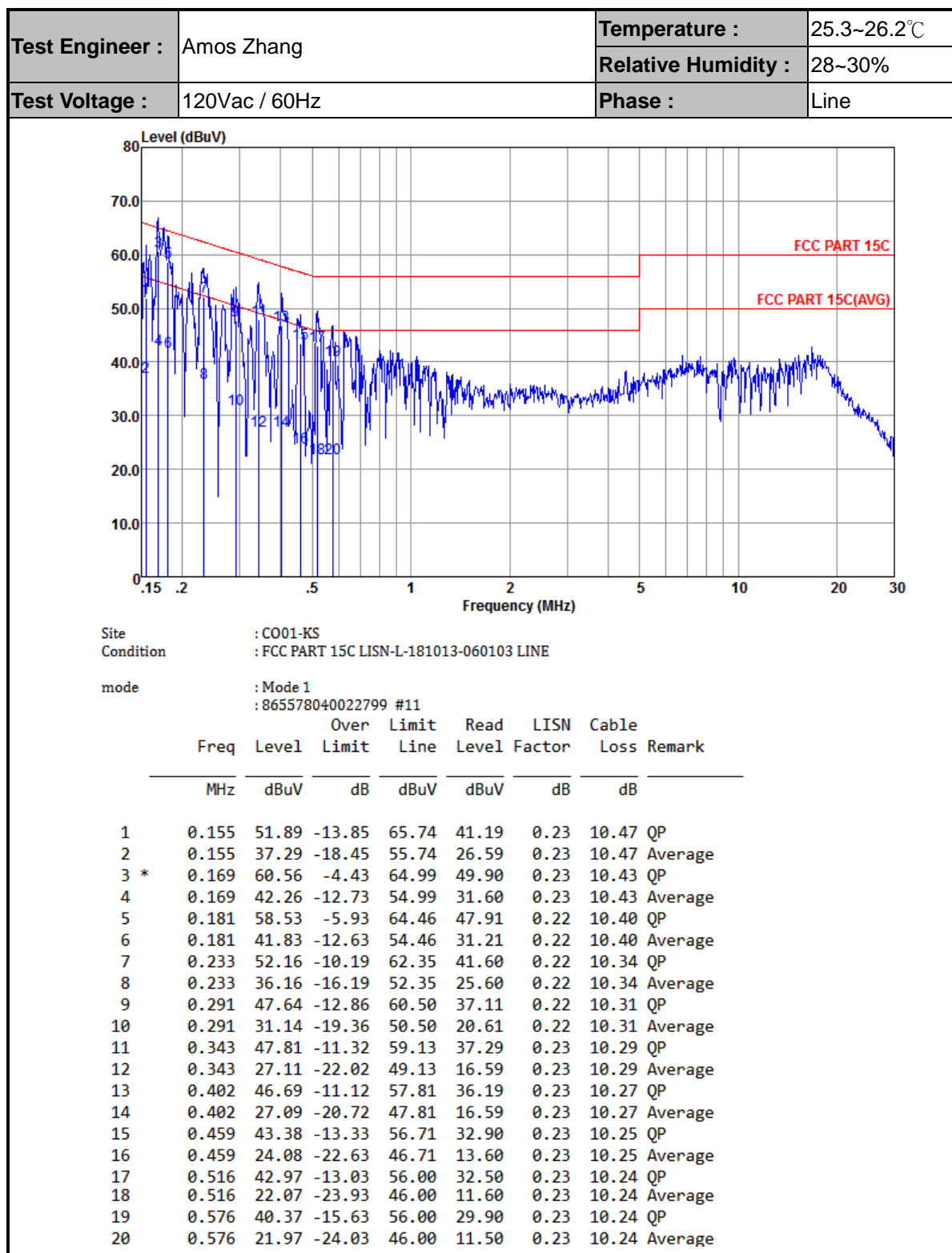
TEST RESULTS DATA
Peak Power Spectral Density

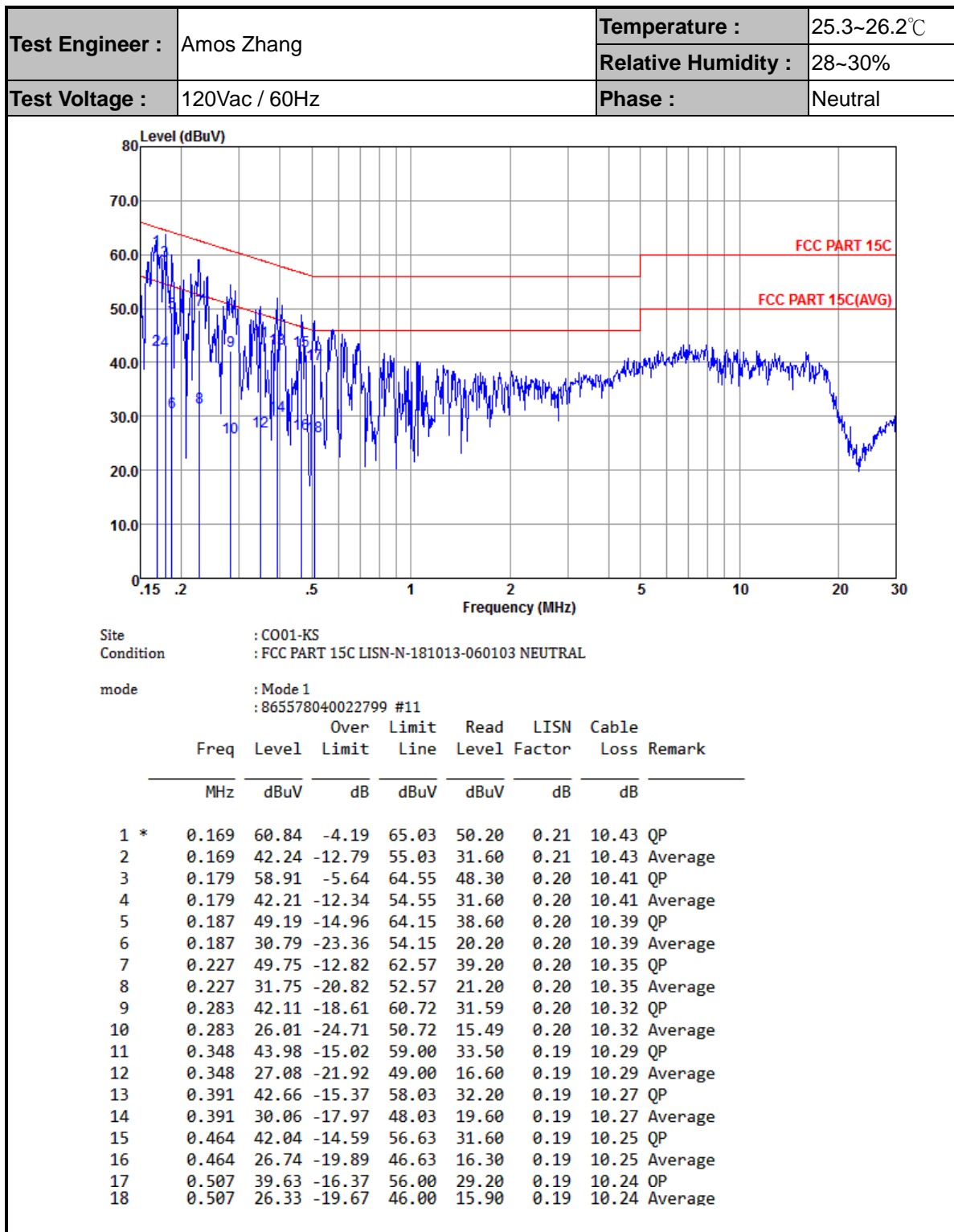
2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	-8.71		-	-1.85	-2.83	8.00	8.00	Pass
11b	1Mbps	1	6	2437	-8.63			-1.85	-2.83	8.00	8.00	Pass
11b	1Mbps	1	11	2462	-7.39			-1.85	-2.83	8.00	8.00	Pass
11g	6Mbps	1	1	2412		-9.40		-1.85	-2.83	8.00	8.00	Pass
11g	6Mbps	1	6	2437		-9.97		-1.85	-2.83	8.00	8.00	Pass
11g	6Mbps	1	11	2462		-8.68		-1.85	-2.83	8.00	8.00	Pass
HT20	MCS0	1	1	2412	-8.83			-1.85	-2.83	8.00	8.00	Pass
HT20	MCS0	1	6	2437	-7.96			-1.85	-2.83	8.00	8.00	Pass
HT20	MCS0	1	11	2462	-8.85			-1.85	-2.83	8.00	8.00	Pass
11b	1Mbps	2	1	2412	-6.07	-8.87	-3.06	0.68		8.00		Pass
11b	1Mbps	2	6	2437	-8.29	-9.00	-5.28	0.68		8.00		Pass
11b	1Mbps	2	11	2462	-8.32	-9.42	-5.31	0.68		8.00		Pass
11g	6Mbps	2	1	2412	-9.20	-9.29	-6.19	0.68		8.00		Pass
11g	6Mbps	2	6	2437	-8.89	-10.38	-5.88	0.68		8.00		Pass
11g	6Mbps	2	11	2462	-9.21	-9.91	-6.20	0.68		8.00		Pass
HT20	MCS0	2	1	2412	-8.97	-8.94	-5.93	0.68		8.00		Pass
HT20	MCS0	2	6	2437	-7.12	-8.76	-4.11	0.68		8.00		Pass
HT20	MCS0	2	11	2462	-8.39	-8.60	-5.38	0.68		8.00		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	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)
802.11b CH 01 2412MHz		2331.19	53.96	-20.04	74	51.2	31.97	5.38	34.59	150	57	P	H
		2389.95	42.84	-11.16	54	39.87	32	5.48	34.51	150	57	A	H
	*	2412	106.96	-	-	103.86	32.13	5.48	34.51	150	57	P	H
	*	2414	103.55	-	-	100.45	32.13	5.48	34.51	150	57	A	H
		2386.31	53.93	-20.07	74	50.99	32	5.48	34.54	100	96	P	V
		2389.82	42.41	-11.59	54	39.44	32	5.48	34.51	100	96	A	V
	*	2412	102.83	-	-	99.73	32.13	5.48	34.51	100	96	P	V
	*	2412	99.29	-	-	96.19	32.13	5.48	34.51	100	96	A	V
802.11b CH 11 2462MHz	*	2464	106.67	-	-	103.17	32.33	5.55	34.38	100	259	P	H
	*	2464	103.53	-	-	100.03	32.33	5.55	34.38	100	259	A	H
		2485.18	53.98	-20.02	74	50.48	32.27	5.55	34.32	100	259	P	H
		2484.76	43.35	-10.65	54	39.85	32.27	5.55	34.32	100	259	A	H
	*	2464	100.84	-	-	97.34	32.33	5.55	34.38	278	103	P	V
	*	2464	97.69	-	-	94.19	32.33	5.55	34.38	278	103	A	V
		2487.76	54.22	-19.78	74	50.79	32.2	5.55	34.32	278	103	P	V
		2484.7	42.81	-11.19	54	39.31	32.27	5.55	34.32	278	103	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	41.25	-32.75	74	61.07	34.2	8.1	62.12	150	360	P	H
		4824	39.2	-34.8	74	59.02	34.2	8.1	62.12	150	0	P	V
802.11b CH 06 2437MHz		4872	40.56	-33.44	74	60.45	34.13	8.09	62.11	150	360	P	H
		7311	42.41	-31.59	74	58.83	36.6	9.75	62.77	150	360	P	H
		4874	38.87	-35.13	74	58.76	34.13	8.09	62.11	150	0	P	V
		7308	42.04	-31.96	74	58.46	36.6	9.75	62.77	150	0	P	V
802.11b CH 11 2462MHz		4926	38.53	-35.47	74	58.46	34.1	8.06	62.09	150	360	P	H
		7386	41.66	-32.34	74	58.13	36.5	9.81	62.78	150	360	P	H
		4924	38.4	-35.6	74	58.33	34.1	8.06	62.09	150	0	P	V
		7386	41.53	-32.47	74	58	36.5	9.81	62.78	150	0	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		2389.82	57.68	-16.32	74	54.71	32	5.48	34.51	157	34	P	H
		2389.95	46.22	-7.78	54	43.25	32	5.48	34.51	157	34	A	H
	*	2414	108.71	-	-	105.61	32.13	5.48	34.51	157	34	P	H
	*	2412	100.8	-	-	97.7	32.13	5.48	34.51	157	34	A	H
		2339.51	53.78	-20.22	74	50.87	32.1	5.38	34.57	288	17	P	V
		2389.95	42.79	-11.21	54	39.82	32	5.48	34.51	288	17	A	V
	*	2412	100.69	-	-	97.59	32.13	5.48	34.51	288	17	P	V
	*	2410	92.95	-	-	89.85	32.13	5.48	34.51	288	17	A	V
802.11g CH 11 2462MHz	*	2466	108.06	-	-	104.56	32.33	5.55	34.38	100	260	P	H
	*	2466	99.53	-	-	96.03	32.33	5.55	34.38	100	260	A	H
		2483.74	61.43	-12.57	74	57.93	32.27	5.55	34.32	100	260	P	H
		2483.5	50.15	-3.85	54	46.65	32.27	5.55	34.32	100	260	A	H
	*	2462	101.43	-	-	97.97	32.33	5.51	34.38	176	340	P	V
	*	2460	92.7	-	-	89.24	32.33	5.51	34.38	176	340	A	V
		2484.94	54.06	-19.94	74	50.56	32.27	5.55	34.32	176	340	P	V
		2483.5	43.09	-10.91	54	39.59	32.27	5.55	34.32	176	340	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	40.15	-33.85	74	59.97	34.2	8.1	62.12	150	360	P	H
		4824	39.02	-34.98	74	58.84	34.2	8.1	62.12	100	0	P	V
802.11g CH 06 2437MHz		4874	40.64	-33.36	74	60.53	34.13	8.09	62.11	150	360	P	H
		7308	42.67	-31.33	74	59.09	36.6	9.75	62.77	150	360	P	H
		4872	38.91	-35.09	74	58.8	34.13	8.09	62.11	150	360	P	V
		7311	41.88	-32.12	74	58.3	36.6	9.75	62.77	150	360	P	V
802.11g CH 11 2462MHz		4926	39.11	-34.89	74	59.04	34.1	8.06	62.09	150	360	P	H
		7386	40.94	-33.06	74	57.41	36.5	9.81	62.78	150	360	P	H
		4924	39.11	-34.89	74	59.04	34.1	8.06	62.09	150	0	P	V
		7386	41.2	-32.8	74	57.67	36.5	9.81	62.78	150	0	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	61.47	-12.53	74	58.53	32	5.48	34.54	179	63	P	H
		2389.95	49.23	-4.77	54	46.26	32	5.48	34.51	179	63	A	H
	*	2414	107.53	-	-	104.43	32.13	5.48	34.51	179	63	P	H
	*	2414	99.5	-	-	96.4	32.13	5.48	34.51	179	63	A	H
		2389.69	58.02	-15.98	74	55.08	32	5.48	34.54	334	95	P	V
		2389.95	46.86	-7.14	54	43.89	32	5.48	34.51	334	95	A	V
	*	2412	103.05	-	-	99.95	32.13	5.48	34.51	334	95	P	V
	*	2410	94.85	-	-	91.75	32.13	5.48	34.51	334	95	A	V
802.11n HT20 CH 11 2462MHz	*	2456	106.51	-	-	103.05	32.33	5.51	34.38	123	37	P	H
	*	2454	98.77	-	-	95.31	32.33	5.51	34.38	123	37	A	H
		2484.28	61.52	-12.48	74	58.02	32.27	5.55	34.32	123	37	P	H
		2483.5	50.25	-3.75	54	46.75	32.27	5.55	34.32	123	37	A	H
	*	2456	101.5	-	-	98.04	32.33	5.51	34.38	101	110	P	V
	*	2454	93.72	-	-	90.26	32.33	5.51	34.38	101	110	A	V
		2484.04	56.66	-17.34	74	53.16	32.27	5.55	34.32	101	110	P	V
		2483.68	43.87	-10.13	54	40.37	32.27	5.55	34.32	101	110	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	41.3	-32.7	74	61.12	34.2	8.1	62.12	100	360	P	H
		4824	40.41	-33.59	74	60.23	34.2	8.1	62.12	100	360	P	V
802.11n HT20 CH 06 2437MHz		4872	39.22	-34.78	74	59.11	34.13	8.09	62.11	100	360	P	H
		7311	42.03	-31.97	74	58.45	36.6	9.75	62.77	100	360	P	H
		4874	38.94	-35.06	74	58.83	34.13	8.09	62.11	100	0	P	V
		7308	42.84	-31.16	74	59.26	36.6	9.75	62.77	100	0	P	V
802.11n HT20 CH 11 2462MHz		4926	38.4	-35.6	74	58.33	34.1	8.06	62.09	100	360	P	H
		7386	41.7	-32.3	74	58.17	36.5	9.81	62.78	100	360	P	H
		4927	39.26	-34.74	74	59.19	34.1	8.06	62.09	100	0	P	V
		7386	41.31	-32.69	74	57.78	36.5	9.81	62.78	100	0	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	19.66	-20.34	40	26.53	24.5	0.61	31.98	-	-	P	H
		106.63	17.5	-26	43.5	31	17.37	1.06	31.93	-	-	P	H
		177.44	22.55	-20.95	43.5	37.83	15.29	1.35	31.92	-	-	P	H
		199.75	25.87	-17.63	43.5	41.02	15.3	1.45	31.9	100	0	P	H
		287.05	22.21	-23.79	46	33.65	18.81	1.8	32.05	-	-	P	H
		430.61	21.32	-24.68	46	29.32	22.09	2.09	32.18	-	-	P	H
		54.25	30.1	-9.9	40	48.02	13.24	0.79	31.95	100	0	P	V
		94.99	24.29	-19.21	43.5	39.16	16.05	1.01	31.93	-	-	P	V
		134.76	21.27	-22.23	43.5	34.6	17.43	1.18	31.94	-	-	P	V
		174.53	21.79	-21.71	43.5	37	15.37	1.34	31.92	-	-	P	V
		198.78	27.51	-15.99	43.5	42.67	15.3	1.44	31.9	-	-	P	V
		254.07	17.5	-28.5	46	29	18.73	1.74	31.97	-	-	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+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)

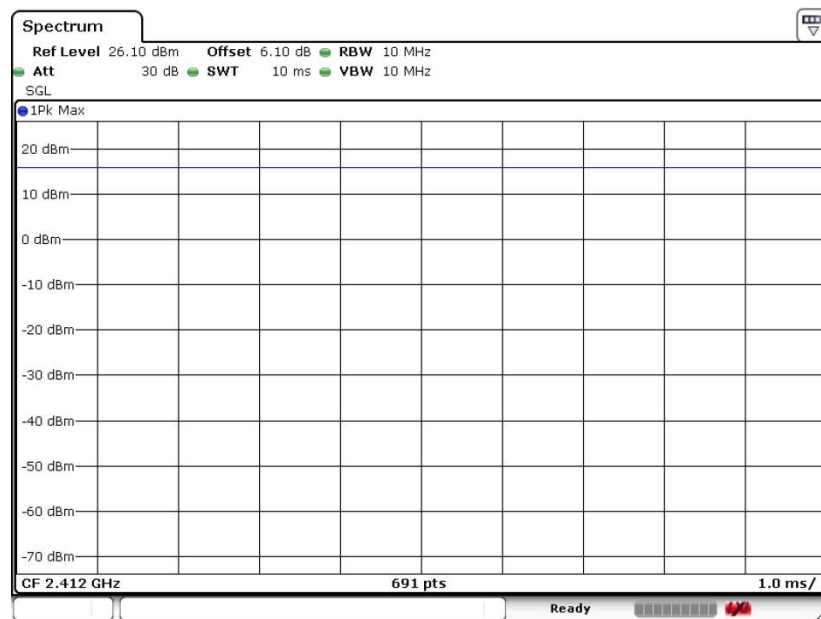
= -10.46(dB)

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

Appendix D. Duty Cycle Plots

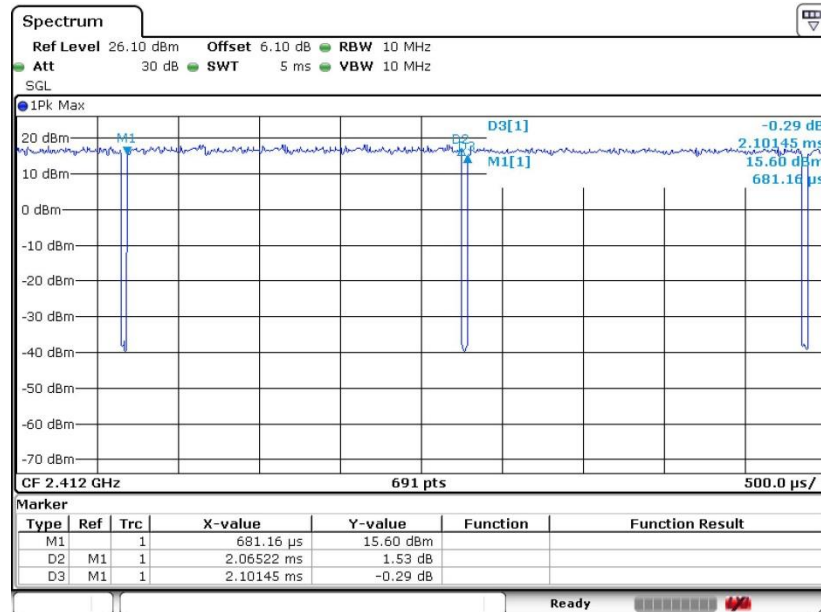
Antenna	Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
1+2	802.11b	100	-	-	10Hz
1+2	802.11g	98.28	-	-	10Hz
1+2	802.11n HT20	98.16	-	-	10Hz

802.11b





802.11g



802.11n HT20

