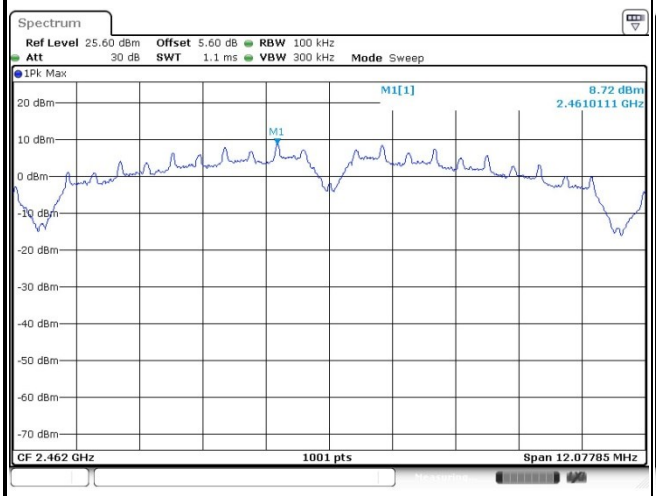
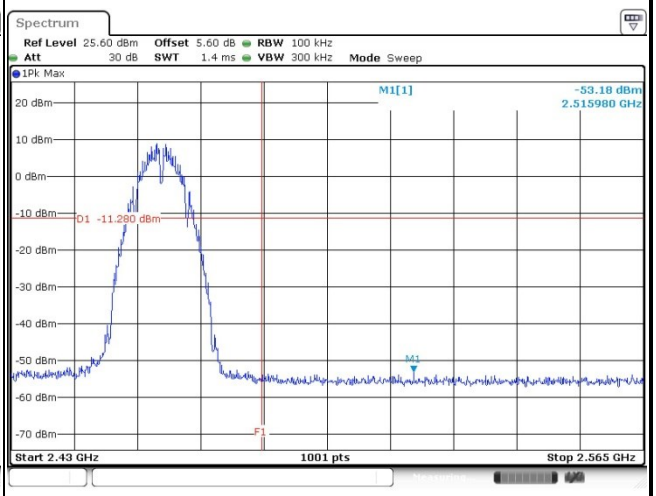
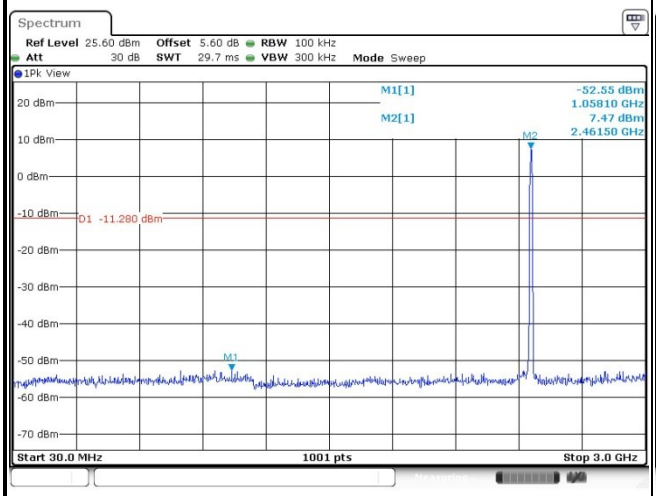
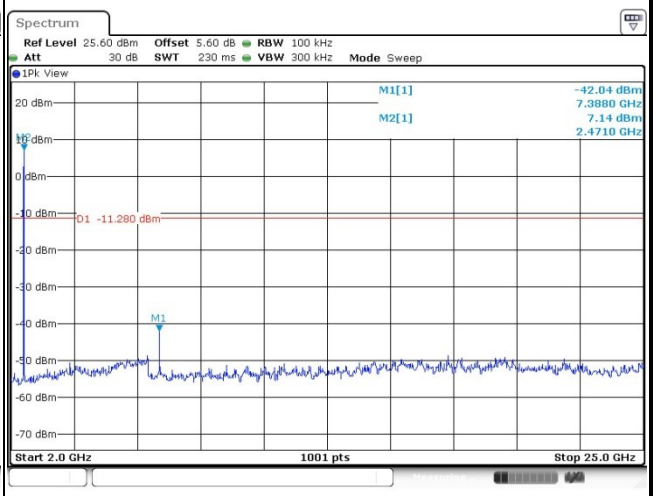
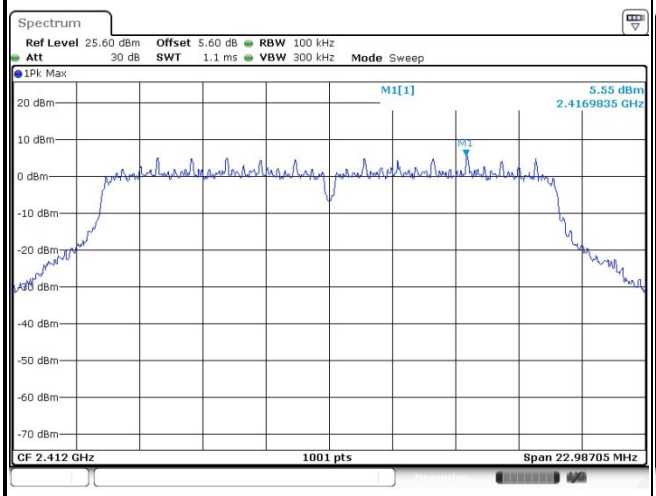
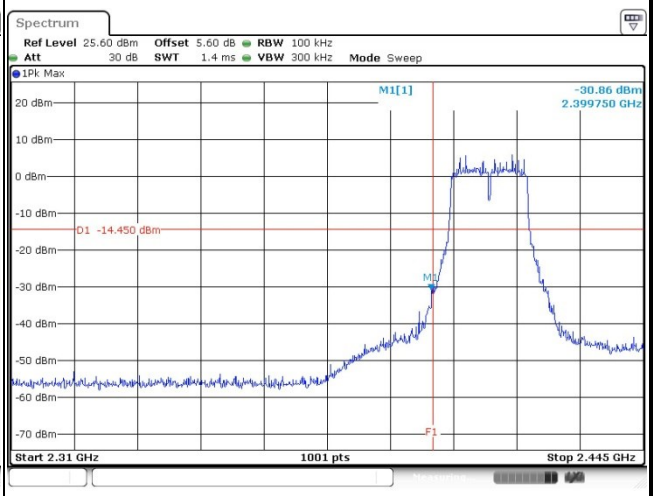
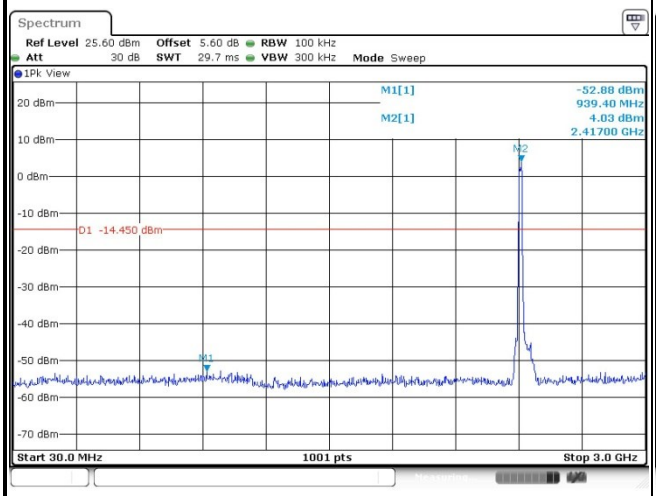
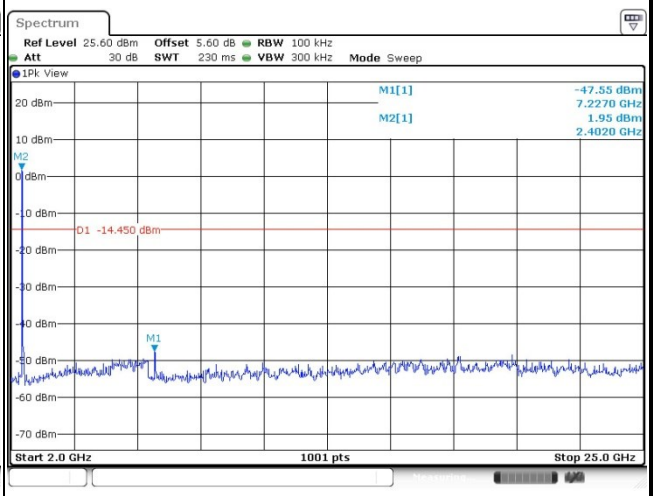
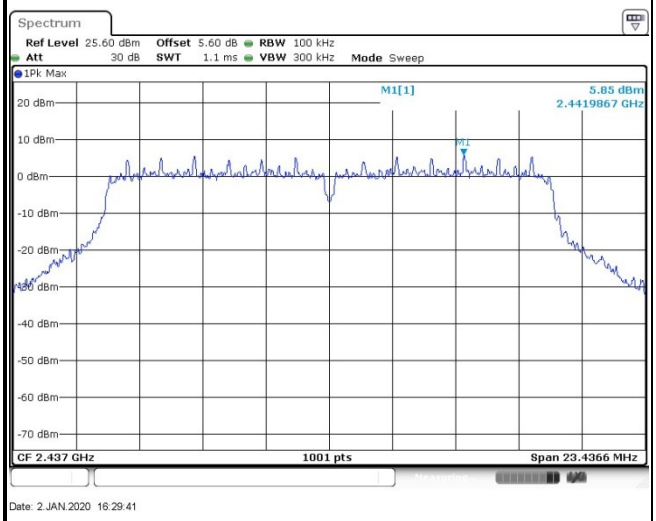
Test Mode :	802.11b	Test Channel :	11

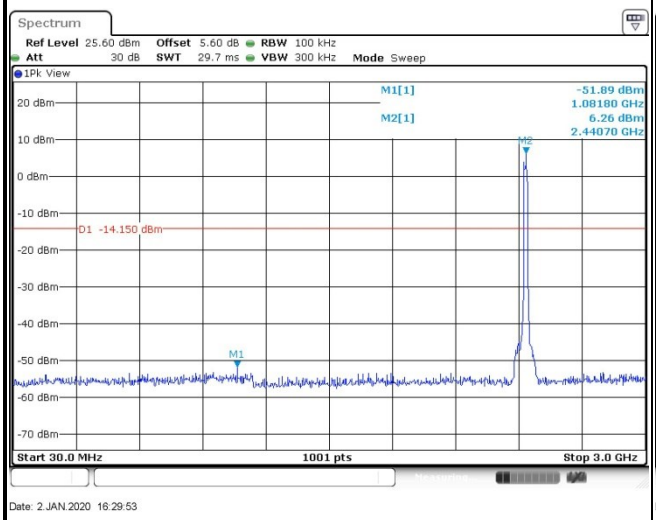
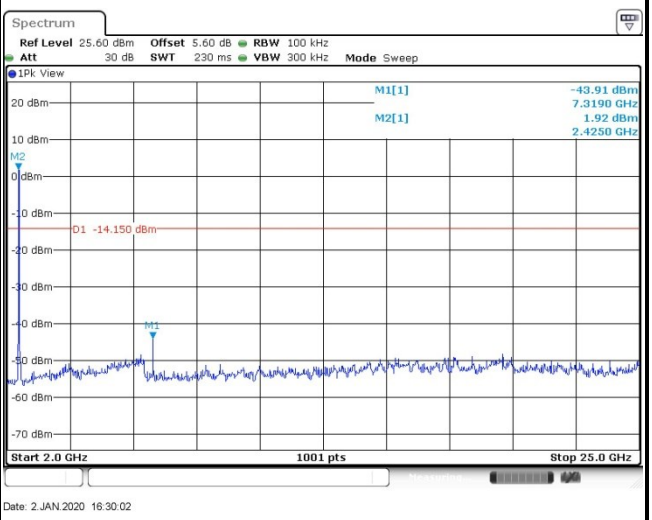
100kHz PSD reference Level	Channel Plot
	
Date: 2.JAN.2020 16:24:56	Date: 2.JAN.2020 16:25:07
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JAN.2020 16:25:17	Date: 2.JAN.2020 16:25:26

Test Mode :	802.11g	Test Channel :	01

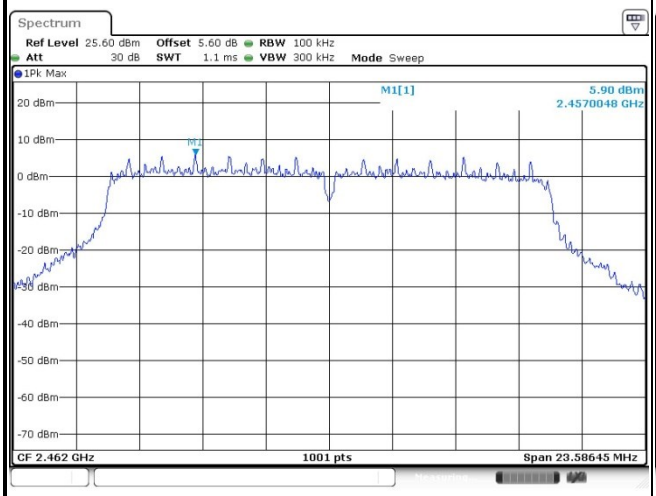
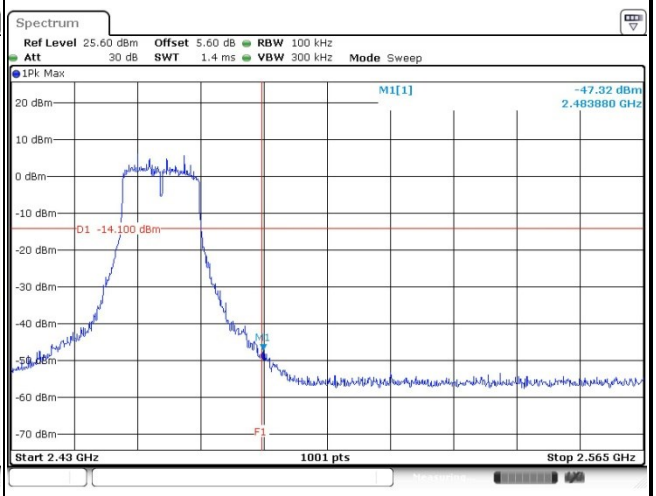
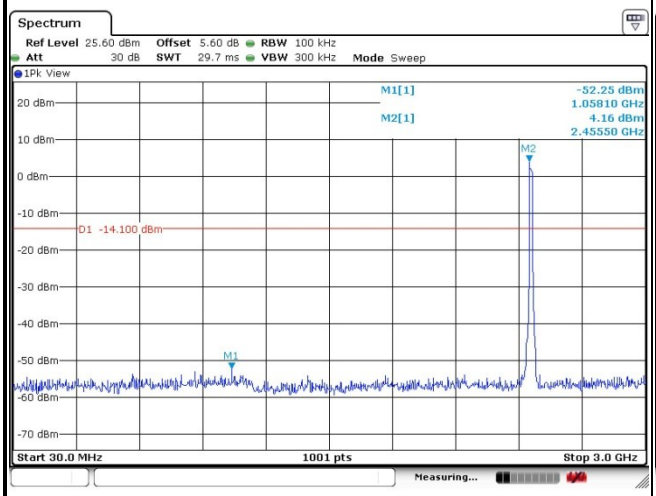
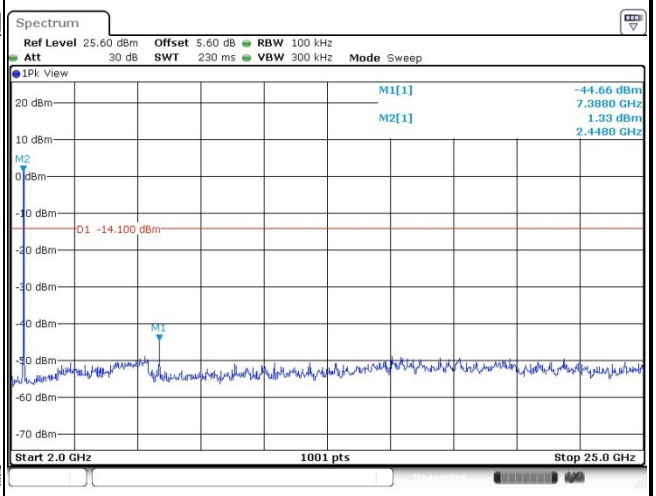
100kHz PSD reference Level	Channel Plot
	
Date: 2.JAN.2020 16:27:12	Date: 2.JAN.2020 16:27:22
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JAN.2020 16:27:33	Date: 2.JAN.2020 16:27:41

Test Mode :	802.11g	Test Channel :	06

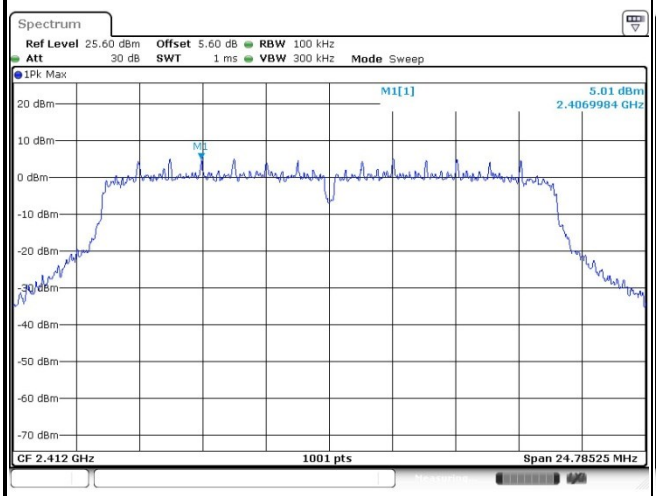
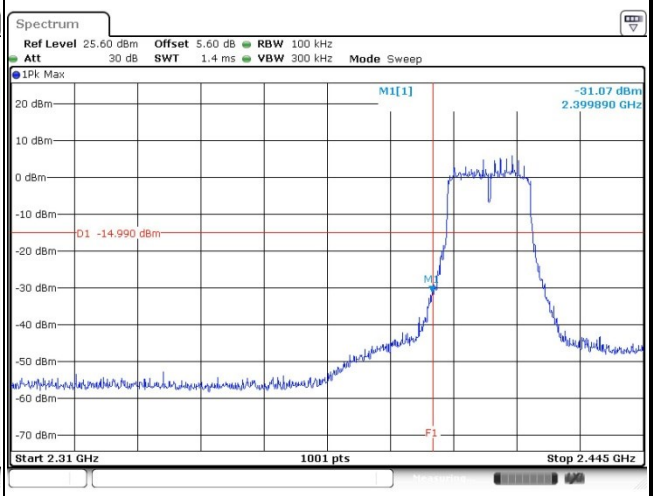
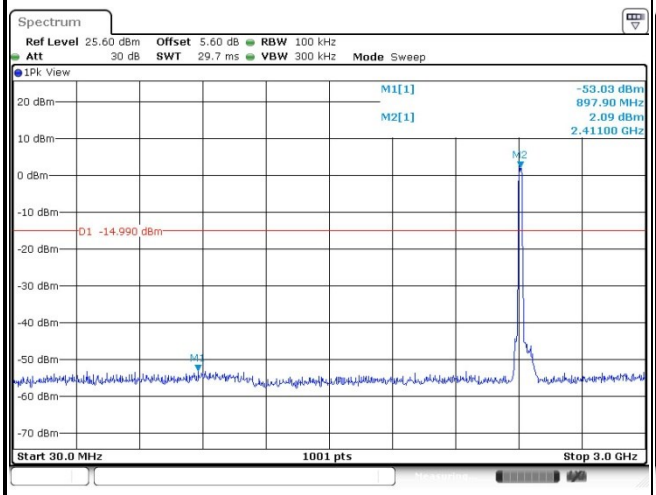
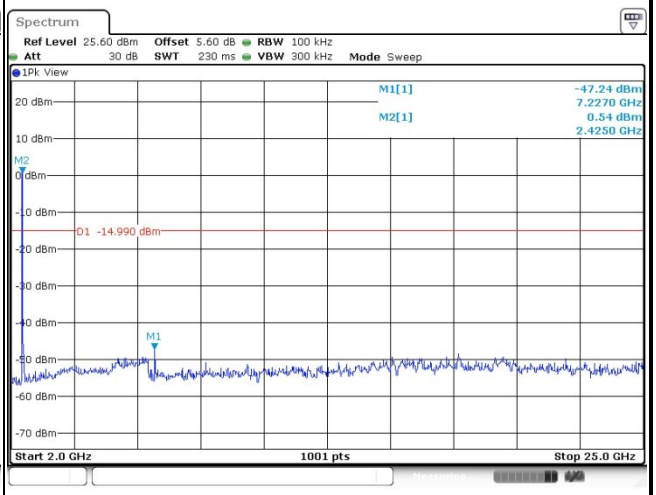
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

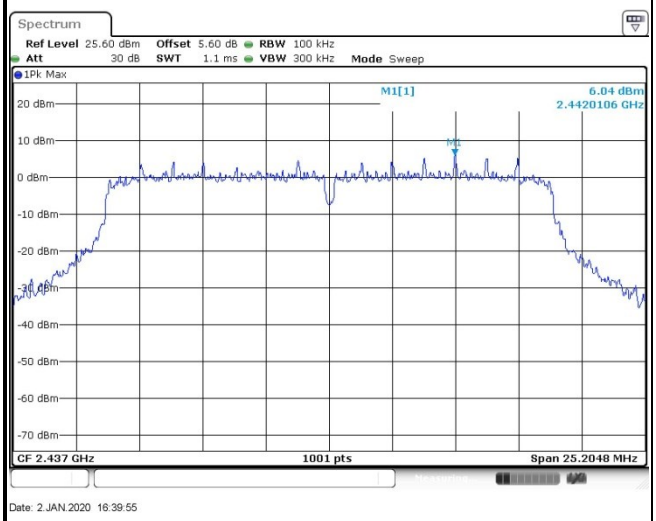
Test Mode :	802.11g	Test Channel :	11

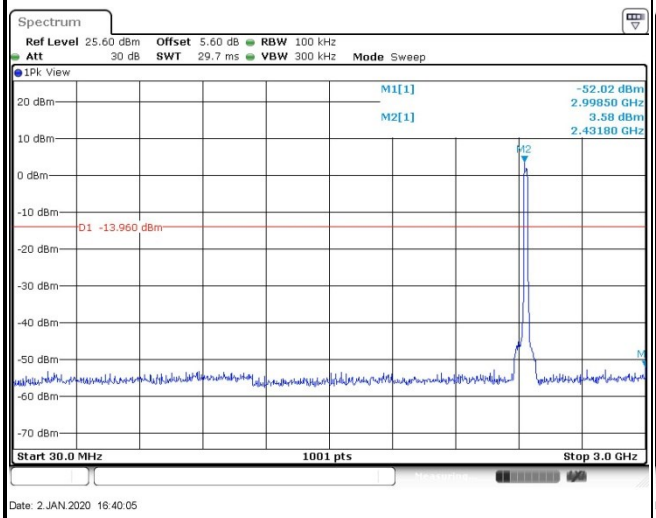
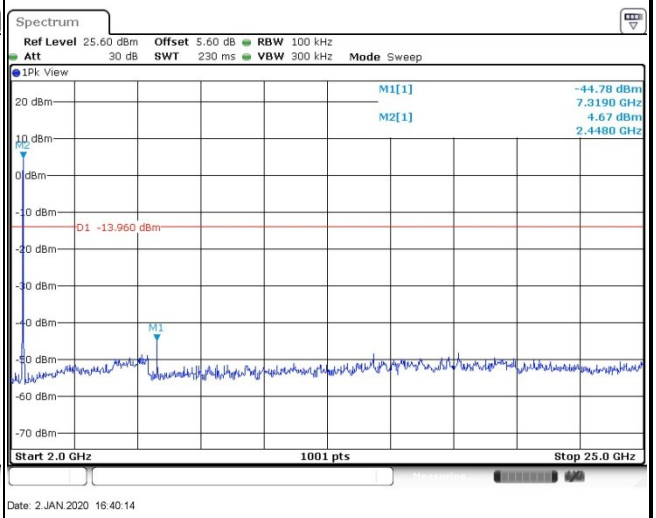
100kHz PSD reference Level	Channel Plot
	
Date: 2.JAN.2020 16:31:55	Date: 2.JAN.2020 16:32:02
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JAN.2020 16:32:39	Date: 2.JAN.2020 16:32:22

Test Mode :	802.11n HT20	Test Channel :	01

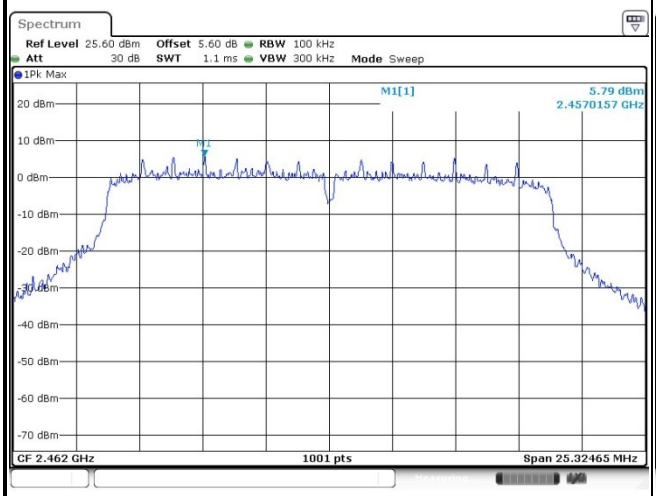
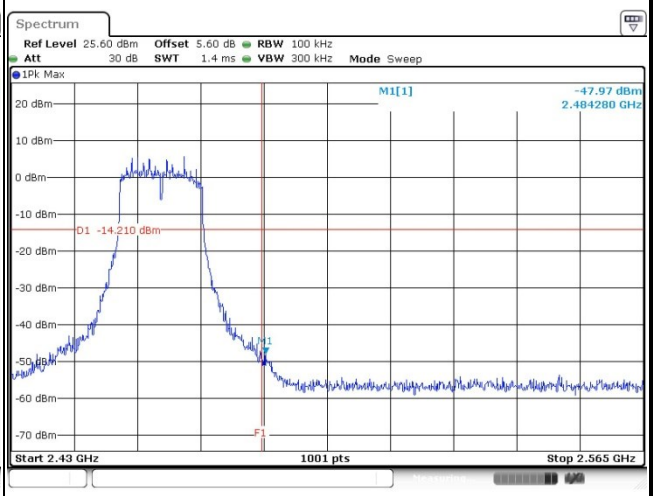
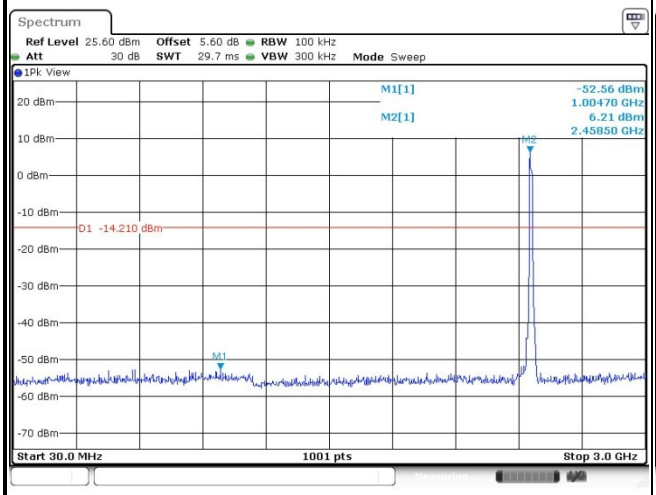
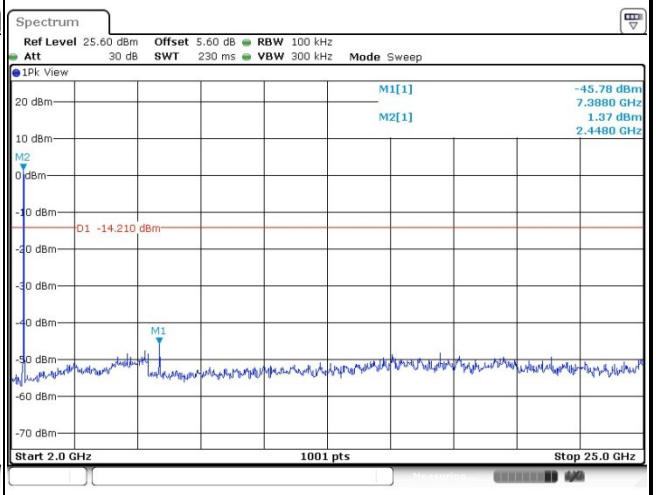
100kHz PSD reference Level	Channel Plot
	
Date: 2.JAN.2020 16:37:59	Date: 2.JAN.2020 16:38:06
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JAN.2020 16:38:16	Date: 2.JAN.2020 16:38:25

Test Mode :	802.11n HT20	Test Channel :	06

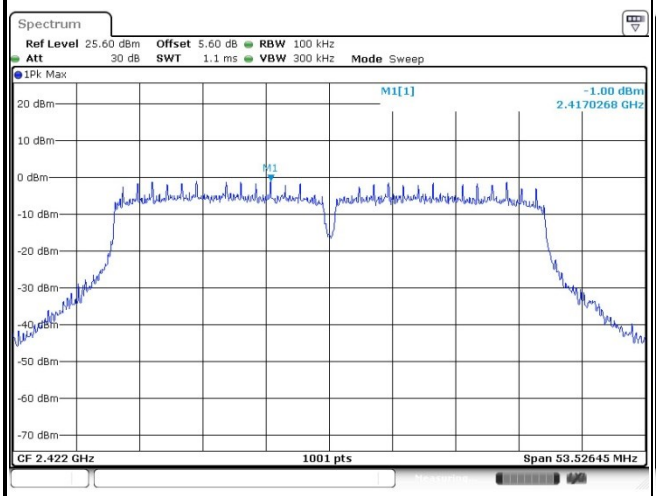
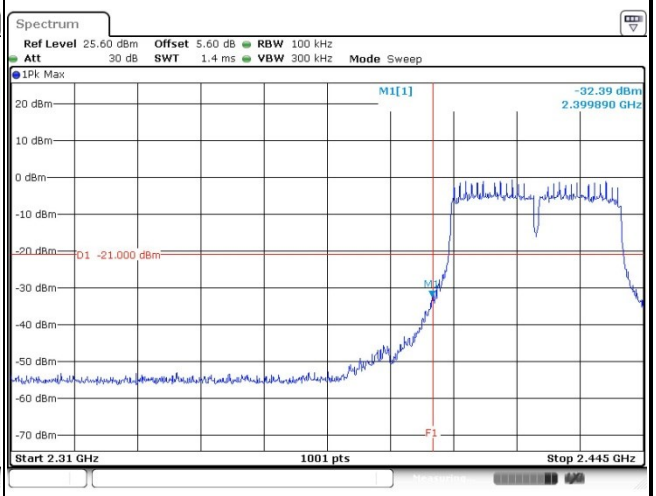
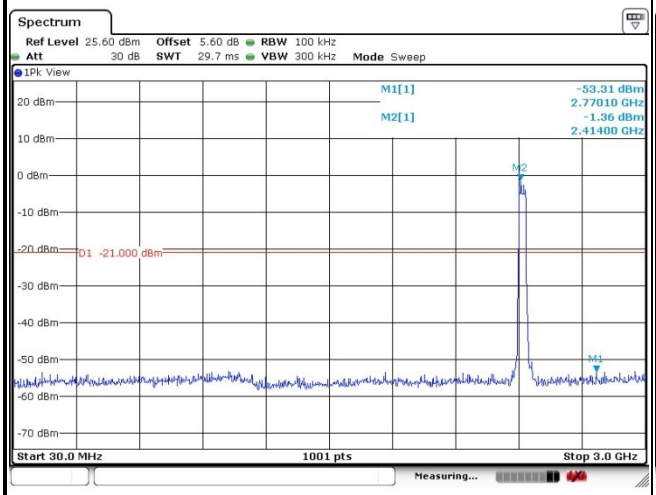
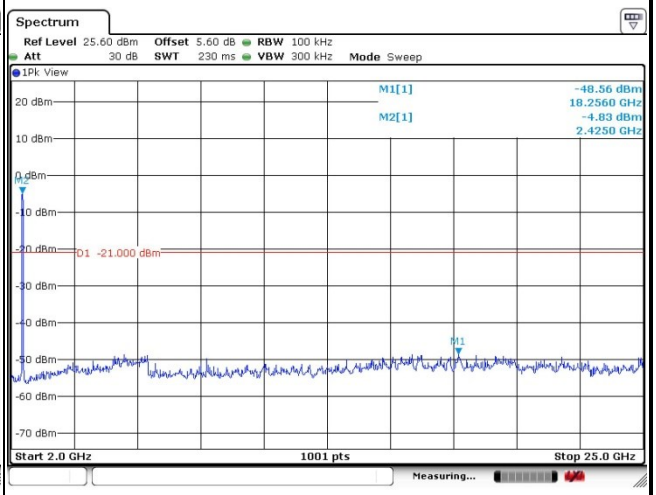
100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

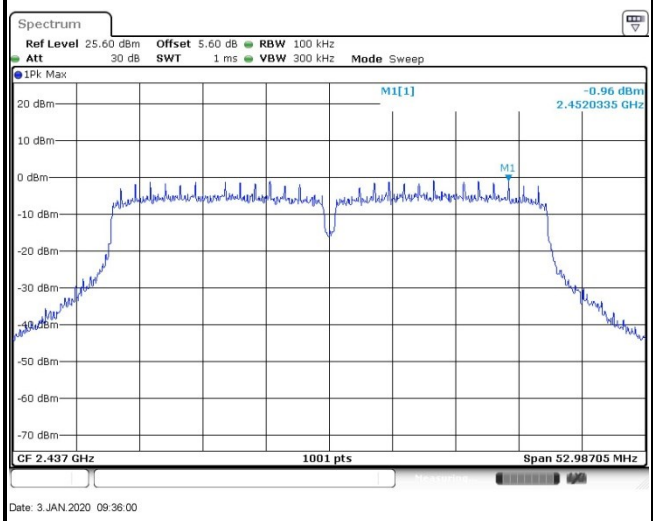
Test Mode :	802.11n HT20	Test Channel :	11

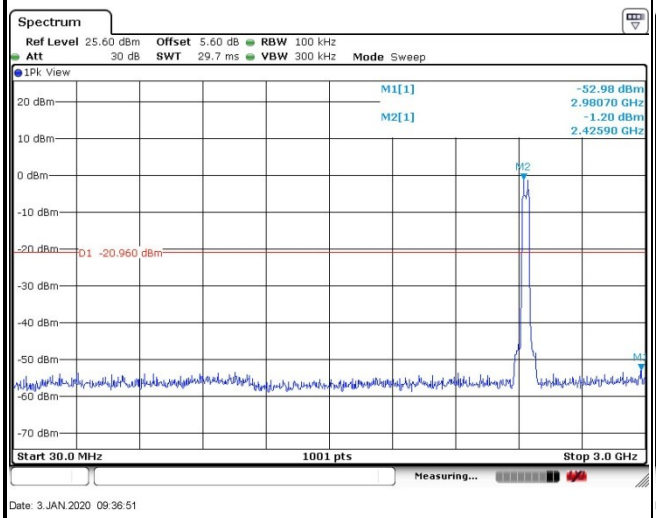
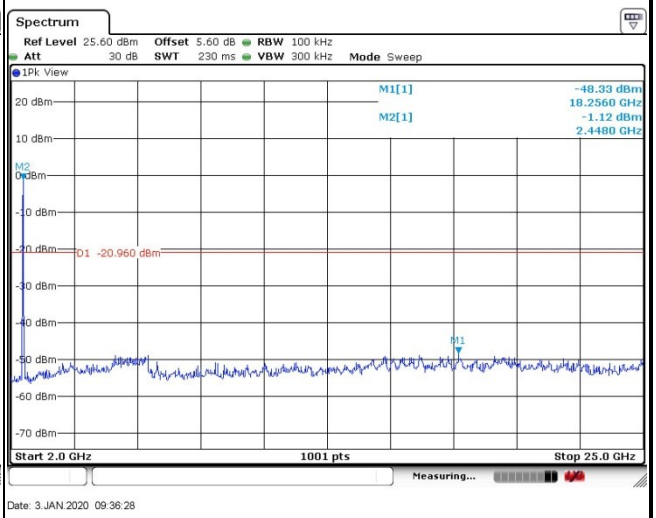
100kHz PSD reference Level	Channel Plot
	
Date: 2.JAN.2020 16:41:34	Date: 2.JAN.2020 16:41:48
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 2.JAN.2020 16:41:58	Date: 2.JAN.2020 16:42:07

Test Mode :	802.11n HT40	Test Channel :	03

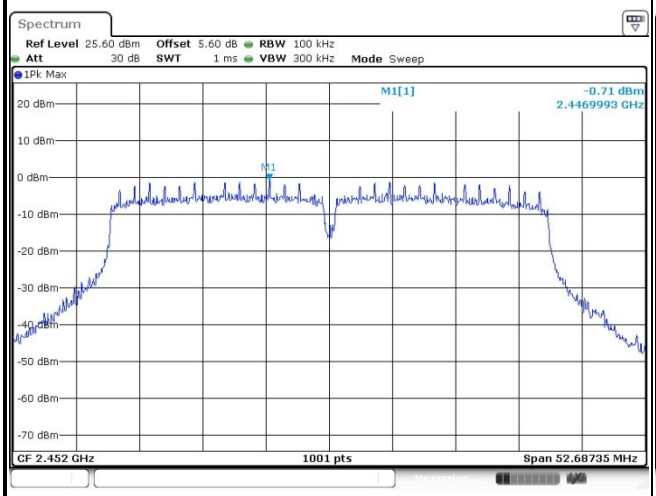
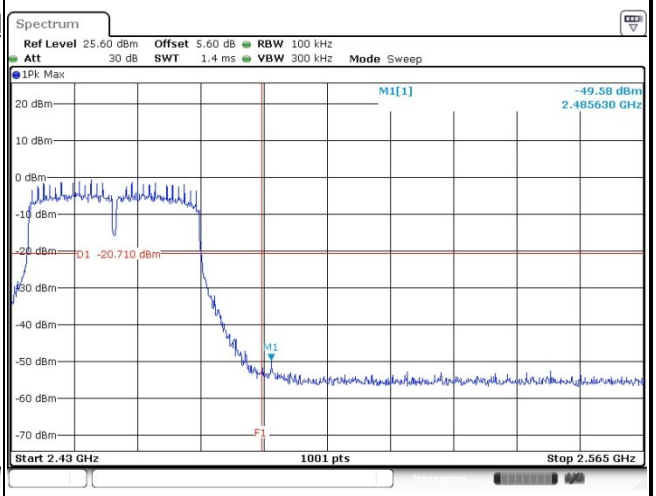
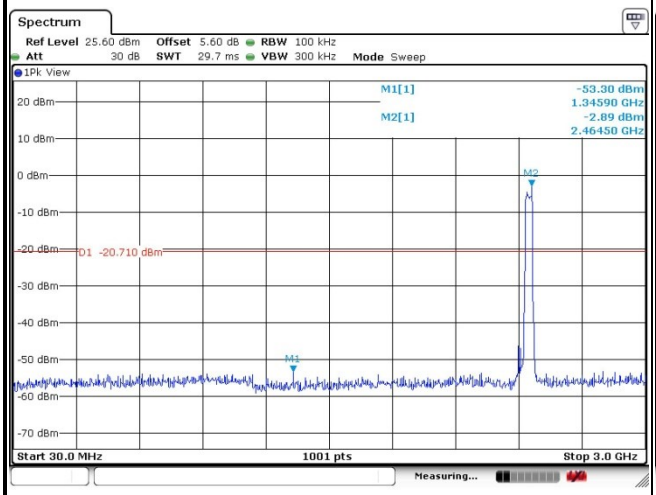
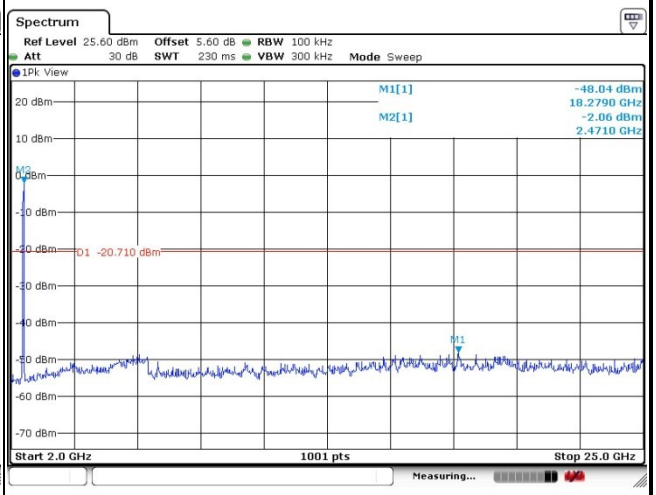
100kHz PSD reference Level	Channel Plot
	
Date: 3.JAN.2020 09:31:54	Date: 3.JAN.2020 09:32:12
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 3.JAN.2020 09:34:07	Date: 3.JAN.2020 09:33:12

Test Mode :	802.11n HT40	Test Channel :	06

100kHz PSD reference Level	Channel Plot
	

Spurious Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
	

Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Date: 3.JAN.2020 09:38:55	Date: 3.JAN.2020 09:39:05
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	
Date: 3.JAN.2020 09:40:07	Date: 3.JAN.2020 09:39:39

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

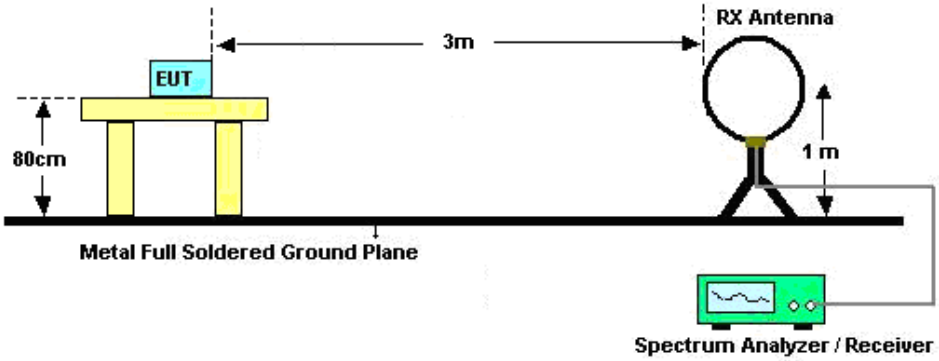
The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

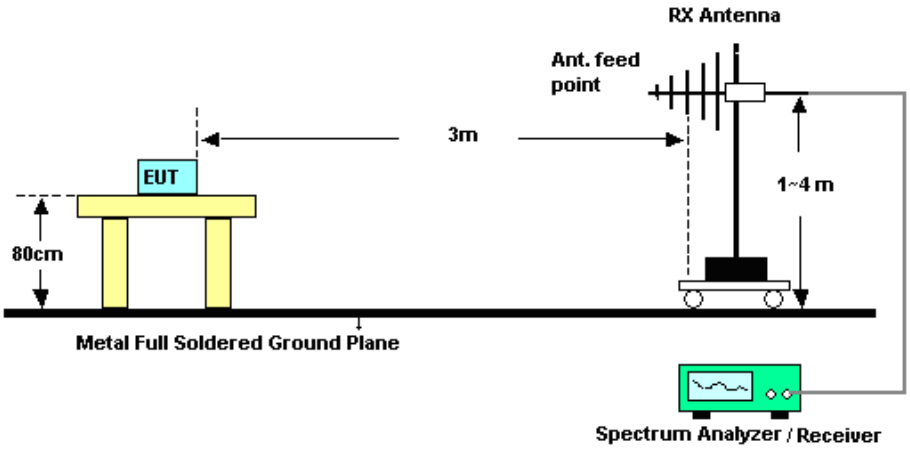
1. The testing follows ANSI C63.10-2013 clause 11.11 & 11.12
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better 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 ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

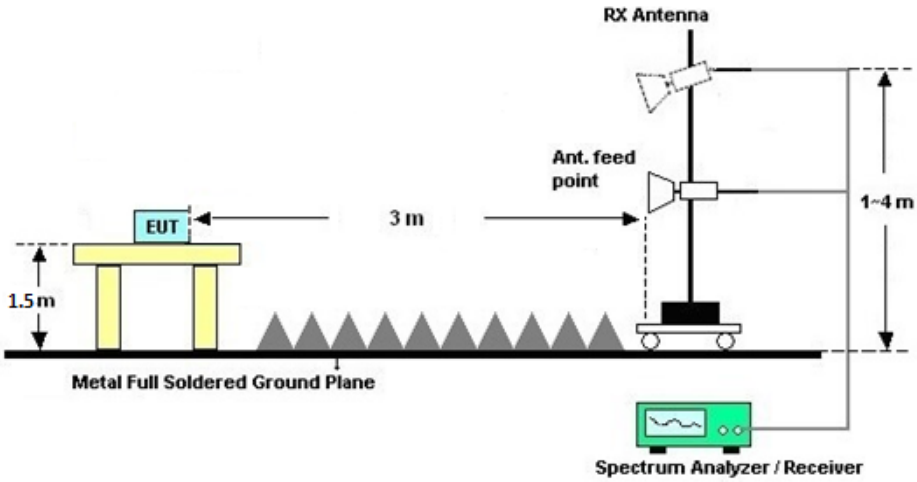
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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

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

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix C.

3.5.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix C.

3.6 AC Conducted Emission Measurement

3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

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

*Decreases with the logarithm of the frequency.

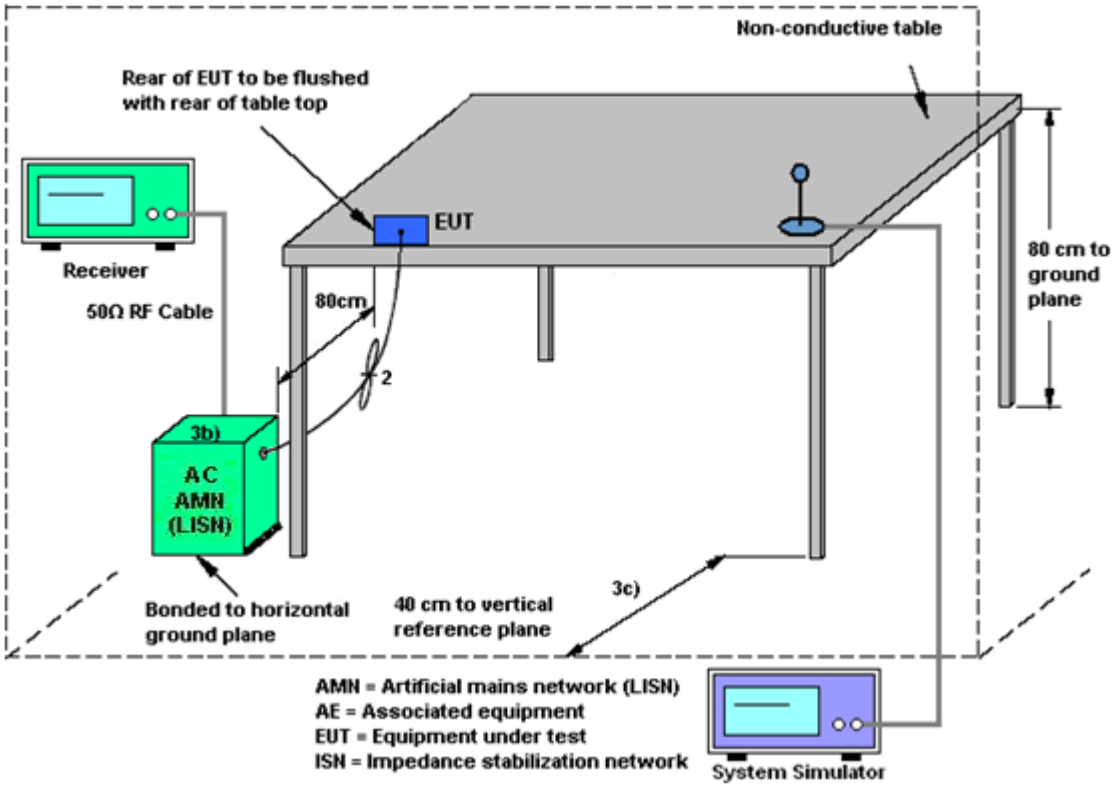
3.6.2 Measuring Instruments

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

3.6.3 Test Procedures

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

3.6.4 Test Setup



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 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
2.4 GHz	1.20	1.50	1.50	4.36	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. 06, 2019	Jan. 02, 2020~ Jan. 03, 2020	Aug. 05, 2020	Conducted (TH01-KS)
Pulse Power Senor	Anritsu	MA2411B	0917070	300MHz~40GHz	Jan. 14, 2019	Jan. 02, 2020~ Jan. 03, 2020	Jan. 13, 2020	Conducted (TH01-KS)
Power Meter	Anritsu	ML2495A	1005002	50MHz Bandwidth	Jan. 14, 2019	Jan. 02, 2020~ Jan. 03, 2020	Jan. 13, 2020	Conducted (TH01-KS)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz;	Apr. 16, 2019	Nov. 25, 2019	Apr. 15, 2020	Conduction (CO01-KS)
AC LISN	MessTec	AN3016	060103	9kHz~30MHz	Oct. 11, 2019	Nov. 25, 2019	Oct. 10, 2020	Conduction (CO01-KS)
AC LISN (for auxiliary equipment)	MessTec	AN3016	060105	9kHz~30MHz	Nov. 18, 2019	Nov. 25, 2019	Nov. 17, 2020	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP00000 0811	AC 0V~300V, 45Hz~1000Hz	Oct. 11, 2019	Nov. 25, 2019	Oct. 10, 2020	Conduction (CO01-KS)
EMI Test Receiver	Keysight	N9038A	MY572901 57	3Hz~8.5GHz;Max 30dBm	Jul. 18, 2019	Jan. 08, 2020	Jul. 17, 2020	Radiation (03CH06-KS)
EXA Spectrum Analyzer	Keysight	N9010A	MY551502 08	10Hz-44GHz	Apr. 16, 2019	Jan. 08, 2020	Apr.18, 2020	Radiation (03CH06-KS)
Loop Antenna	R&S	HFH2-Z2	100321	9kHz~30MHz	Nov. 10, 2019	Jan. 08, 2020	Nov. 9, 2020	Radiation (03CH06-KS)
Bilog Antenna	TeseQ	CBL6111D	49921	30MHz-1GHz	May. 30, 2019	Jan. 08, 2020	May. 29, 2020	Radiation (03CH06-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75959	1GHz~18GHz	Jan. 27, 2019	Jan. 08, 2020	Jan. 26, 2020	Radiation (03CH06-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 08, 2020	Jan. 08, 2020	Jan. 07, 2021	Radiation (03CH06-KS)
Amplifier	SONOMA	310N	187289	9KHz ~1GHZ	Aug. 06, 2019	Jan. 08, 2020	Aug. 05, 2020	Radiation (03CH06-KS)
Amplifier	MITEQ	TTA1840-35-HG	2014749	18~40GHz	Jan. 14, 2019	Jan. 08, 2020	Jan.13, 2020	Radiation (03CH06-KS)
high gain Amplifier	MITEQ	AMF-7D-00101800-30-10P	2025788	1Ghz-18Ghz	Aug.16.2019	Jan. 08, 2020	Aug.15,2020	Radiation (03CH06-KS)
Amplifier	Keysight	83017A	MY532702 03	500MHz~26.5GHz	Apr. 15, 2019	Jan. 08, 2020	Apr. 14, 2020	Radiation (03CH06-KS)
AC Power Source	Chroma	61601	F1040900 04	N/A	NCR	Jan. 08, 2020	NCR	Radiation (03CH06-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jan. 08, 2020	NCR	Radiation (03CH06-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jan. 08, 2020	NCR	Radiation (03CH06-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))	**2.9dB**

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0 dB**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0 dB**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.0 dB**

Appendix A. Conducted Test Results

Report Number : FR9N0608A

Test Engineer:	Aly Cao	Temperature:	21-25	°C
Test Date:	2020/1/2~2020/01/03	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB Occupied Bandwidth

2.4GHz Band								
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2		
11b	1Mbps	2	1	2412	8.05	8.05	0.50	Pass
11b	1Mbps	2	6	2437	8.05	8.05	0.50	Pass
11b	1Mbps	2	11	2462	8.05	8.05	0.50	Pass
11g	6Mbps	2	1	2412	16.02	15.32	0.50	Pass
11g	6Mbps	2	6	2437	16.04	15.62	0.50	Pass
11g	6Mbps	2	11	2462	15.90	15.72	0.50	Pass
HT20	MCS0	2	1	2412	16.80	16.52	0.50	Pass
HT20	MCS0	2	6	2437	16.76	16.80	0.50	Pass
HT20	MCS0	2	11	2462	16.78	16.88	0.50	Pass
HT40	MCS0	2	3	2422	35.32	35.68	0.50	Pass
HT40	MCS0	2	6	2437	35.12	35.32	0.50	Pass
HT40	MCS0	2	9	2452	35.72	35.12	0.50	Pass

Report Number : FR9N0608A

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	2	1	2412	19.48	19.28	22.39	30.00		1.50		23.89		36.00		Pass
11b	1Mbps	2	6	2437	19.41	19.26	22.35	30.00		1.50		23.85		36.00		Pass
11b	1Mbps	2	11	2462	19.59	19.37	22.49	30.00		1.50		23.99		36.00		Pass
11g	6Mbps	2	1	2412	22.87	22.35	25.63	30.00		1.50		27.13		36.00		Pass
11g	6Mbps	2	6	2437	22.95	22.61	25.79	30.00		1.50		27.29		36.00		Pass
11g	6Mbps	2	11	2462	22.73	22.42	25.59	30.00		1.50		27.09		36.00		Pass
HT20	MCS0	2	1	2412	22.72	22.39	25.57	30.00		1.50		27.07		36.00		Pass
HT20	MCS0	2	6	2437	22.83	22.51	25.68	30.00		1.50		27.18		36.00		Pass
HT20	MCS0	2	11	2462	22.64	22.63	25.65	30.00		1.50		27.15		36.00		Pass
HT40	MCS0	2	3	2422	19.45	19.35	22.41	30.00		1.50		23.91		36.00		Pass
HT40	MCS0	2	6	2437	19.83	19.79	22.82	30.00		1.50		24.32		36.00		Pass
HT40	MCS0	2	9	2452	19.41	19.31	22.37	30.00		1.50		23.87		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	2	1	2412	0.00	0.00	16.86	16.62	19.75
11b	1Mbps	2	6	2437	0.00	0.00	16.88	16.79	19.85
11b	1Mbps	2	11	2462	0.00	0.00	16.86	16.78	19.83
11g	6Mbps	2	1	2412	0.21	0.18	16.56	16.30	19.44
11g	6Mbps	2	6	2437	0.21	0.18	16.62	16.50	19.57
11g	6Mbps	2	11	2462	0.21	0.18	16.68	16.45	19.57
HT20	MCS0	2	1	2412	0.22	0.21	16.44	16.19	19.33
HT20	MCS0	2	6	2437	0.22	0.21	16.49	16.38	19.45
HT20	MCS0	2	11	2462	0.22	0.21	16.48	16.30	19.40
HT40	MCS0	2	3	2422	0.41	0.41	12.74	12.48	15.62
HT40	MCS0	2	6	2437	0.41	0.41	12.78	12.72	15.76
HT40	MCS0	2	9	2452	0.41	0.41	12.70	12.42	15.57

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

Report Number : FR9N0608A

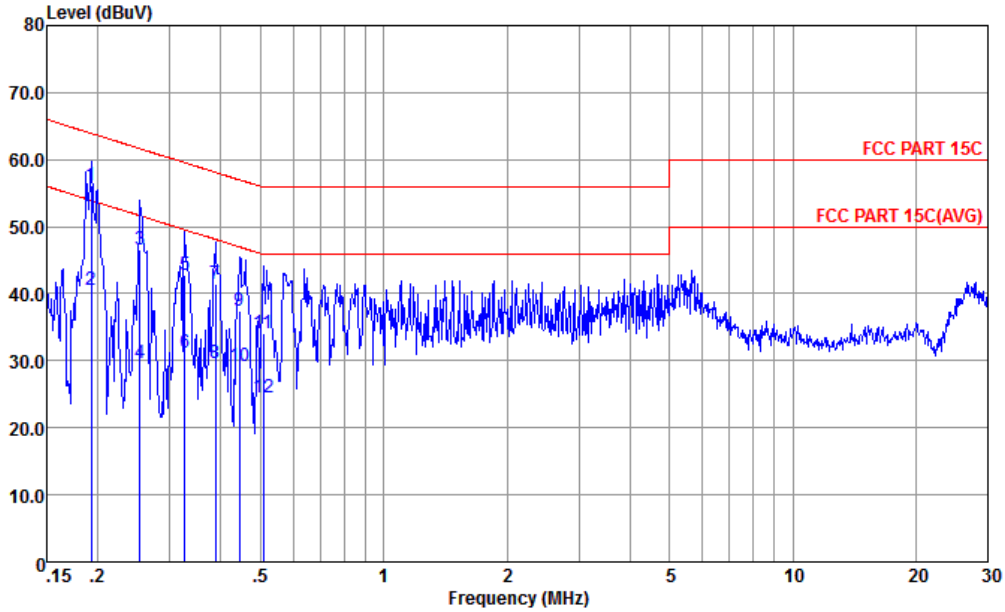
TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2	1	2412	-8.23	-9.14	-5.22	4.36		8.00		Pass
11b	1Mbps	2	6	2437	-8.62	-9.56	-5.61	4.36		8.00		Pass
11b	1Mbps	2	11	2462	-7.62	-8.37	-4.61	4.36		8.00		Pass
11g	6Mbps	2	1	2412	-11.36	-10.64	-7.63	4.36		8.00		Pass
11g	6Mbps	2	6	2437	-9.79	-10.43	-6.78	4.36		8.00		Pass
11g	6Mbps	2	11	2462	-11.80	-11.23	-8.22	4.36		8.00		Pass
HT20	MCS0	2	1	2412	-10.21	-11.30	-7.20	4.36		8.00		Pass
HT20	MCS0	2	6	2437	-11.09	-10.63	-7.62	4.36		8.00		Pass
HT20	MCS0	2	11	2462	-10.24	-10.89	-7.23	4.36		8.00		Pass
HT40	MCS0	2	3	2422	-17.15	-17.25	-14.14	4.36		8.00		Pass
HT40	MCS0	2	6	2437	-16.10	-17.21	-13.09	4.36		8.00		Pass
HT40	MCS0	2	9	2452	-17.10	-17.20	-14.09	4.36		8.00		Pass

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

Appendix B. AC Conducted Emission Test Results

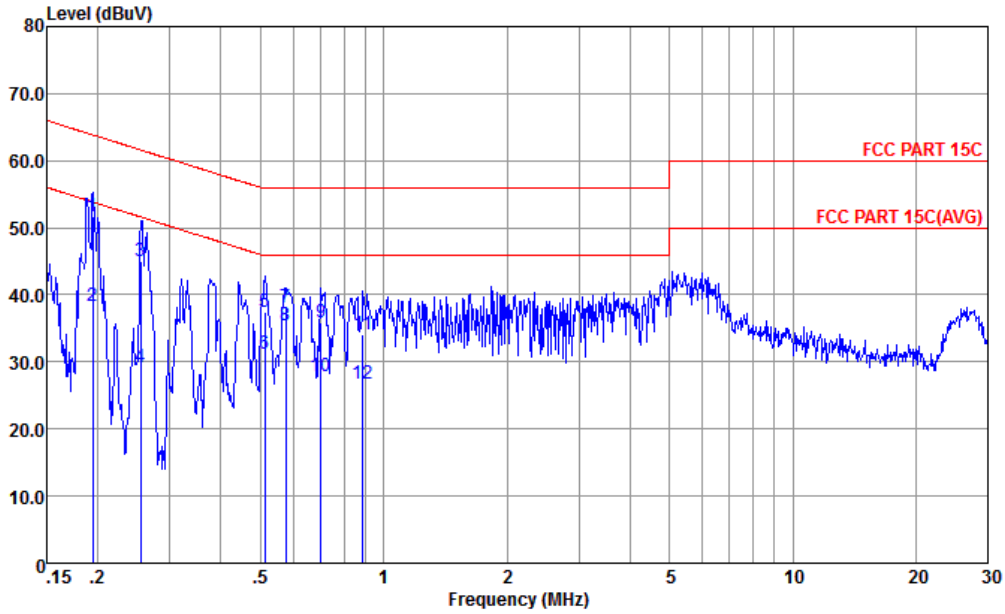
Test Engineer :	Amos Zhang	**Temperature :**	25.6~27.2℃
		Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15C LISN-L-191028-060105 LINE
Project : (FR) 9N0608
mode : Mode 1
: 351995110011554 #40

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 *	0.192	56.09	-7.84	63.93	45.09	0.12	10.88	QP
2	0.192	40.59	-13.34	53.93	29.59	0.12	10.88	Average
3	0.253	46.46	-15.18	61.64	35.50	0.13	10.83	QP
4	0.253	29.56	-22.08	51.64	18.60	0.13	10.83	Average
5	0.327	42.74	-16.79	59.53	31.80	0.15	10.79	QP
6	0.327	31.24	-18.29	49.53	20.30	0.15	10.79	Average
7	0.387	41.53	-16.59	58.12	30.60	0.16	10.77	QP
8	0.387	29.53	-18.59	48.12	18.60	0.16	10.77	Average
9	0.444	37.51	-19.47	56.98	26.60	0.16	10.75	QP
10	0.444	29.11	-17.87	46.98	18.20	0.16	10.75	Average
11	0.507	34.21	-21.79	56.00	23.30	0.17	10.74	QP
12	0.507	24.51	-21.49	46.00	13.60	0.17	10.74	Average

Test Engineer :	Amos Zhang	**Temperature :**	25.6~27.2℃
		Relative Humidity :	45~47%
Test Voltage :	120Vac / 60Hz	**Phase :**	Neutral
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition : FCC PART 15C LISN-N-191028-060105 NEUTRAL
Project : (FR) 9N0608
mode : Mode 1
: 351995110011554 #40

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.194	51.65	-12.19	63.84	40.61	0.17	10.87	QP
2	0.194	38.25	-15.59	53.84	27.21	0.17	10.87	Average
3	0.255	45.10	-16.50	61.60	34.10	0.17	10.83	QP
4	0.255	29.20	-22.40	51.60	18.20	0.17	10.83	Average
5	0.513	37.48	-18.52	56.00	26.59	0.15	10.74	QP
6	0.513	31.18	-14.82	46.00	20.29	0.15	10.74	Average
7	0.576	38.08	-17.92	56.00	27.20	0.14	10.74	QP
8 *	0.576	35.38	-10.62	46.00	24.50	0.14	10.74	Average
9	0.701	35.98	-20.02	56.00	25.10	0.14	10.74	QP
10	0.701	27.78	-18.22	46.00	16.90	0.14	10.74	Average
11	0.890	34.17	-21.83	56.00	23.30	0.13	10.74	QP
12	0.890	26.77	-19.23	46.00	15.90	0.13	10.74	Average

Note:

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

Appendix C. Radiated Spurious Emission

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI 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		2389.95	61.94	-12.06	74	54.05	32	7.3	31.41	134	267	P	H
		2389.69	50.81	-3.19	54	42.93	32	7.3	31.42	134	267	A	H
	*	2412	113.77	-	-	105.71	32.13	7.34	31.41	134	267	P	H
	*	2412	110.34	-	-	102.28	32.13	7.34	31.41	134	267	A	H
		2389.43	58.61	-15.39	74	50.73	32	7.3	31.42	383	302	P	V
		2389.95	47.6	-6.4	54	39.71	32	7.3	31.41	383	302	A	V
	*	2412	108.72	-	-	100.66	32.13	7.34	31.41	383	302	P	V
	*	2412	104.81	-	-	96.75	32.13	7.34	31.41	383	302	A	V
802.11b CH 11 2462MHz		2485.54	56.45	-17.55	74	48.09	32.27	7.48	31.39	137	275	P	H
		2484.04	45.56	-8.44	54	37.2	32.27	7.48	31.39	137	275	A	H
	*	2462	113.46	-	-	105.09	32.33	7.44	31.4	137	275	P	H
	*	2462	109.57	-	-	101.2	32.33	7.44	31.4	137	275	A	H
		2484.28	56.61	-17.39	74	48.25	32.27	7.48	31.39	369	66	P	V
		2483.5	45.53	-8.47	54	37.17	32.27	7.48	31.39	369	66	A	V
	*	2462	111.6	-	-	103.23	32.33	7.44	31.4	369	66	P	V
	*	2460	107.74	-	-	99.37	32.33	7.44	31.4	369	66	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	49.45	-24.55	74	66.33	34.2	10.52	61.6	115	158	P	H
		4824	44.74	-9.26	54	61.62	34.2	10.52	61.6	115	158	A	H
		4824	44.94	-29.06	74	61.82	34.2	10.52	61.6	300	360	P	V
802.11b CH 06 2437MHz		4872	41.71	-32.29	74	58.61	34.13	10.58	61.61	300	0	P	H
		7308	43.91	-30.09	74	56.02	36.6	13.62	62.33	300	0	P	H
		4872	41.41	-32.59	74	58.31	34.13	10.58	61.61	300	360	P	V
		7308	48.68	-25.32	74	60.79	36.6	13.62	62.33	300	360	P	V
802.11b CH 11 2462MHz		4926	45.47	-28.53	74	62.36	34.1	10.64	61.63	300	0	P	H
		7386	43.69	-30.31	74	55.98	36.5	13.58	62.37	300	0	P	H
		4926	41.31	-32.69	74	58.2	34.1	10.64	61.63	300	360	P	V
		7386	44.17	-29.83	74	56.46	36.5	13.58	62.37	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2386.31	57.95	-16.05	74	50.07	32	7.3	31.42	136	269	P	H
		2389.17	47.62	-6.38	54	39.74	32	7.3	31.42	136	269	A	H
	*	2416	110.8	-	-	102.73	32.13	7.34	31.4	136	269	P	H
	*	2418	102.62	-	-	94.55	32.13	7.34	31.4	136	269	A	H
		2314.81	56.22	-17.78	74	48.65	31.83	7.18	31.44	383	308	P	V
		2388.26	45.62	-8.38	54	37.74	32	7.3	31.42	383	308	A	V
	*	2416	107.08	-	-	99.01	32.13	7.34	31.4	383	308	P	V
	*	2418	99.26	-	-	91.19	32.13	7.34	31.4	383	308	A	V
802.11g CH 11 2462MHz		2483.74	58.87	-15.13	74	50.51	32.27	7.48	31.39	102	271	P	H
		2483.5	49.38	-4.62	54	41.02	32.27	7.48	31.39	102	271	A	H
	*	2458	114.07	-	-	105.7	32.33	7.44	31.4	102	271	P	H
	*	2458	106.3	-	-	97.93	32.33	7.44	31.4	102	271	A	H
		2483.92	57.5	-16.5	74	49.14	32.27	7.48	31.39	100	119	P	V
		2483.5	47.01	-6.99	54	38.65	32.27	7.48	31.39	100	119	A	V
	*	2464	108.81	-	-	100.44	32.33	7.44	31.4	100	119	P	V
	*	2458	101.04	-	-	92.67	32.33	7.44	31.4	100	119	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	42.36	-31.64	74	59.24	34.2	10.52	61.6	300	0	P	H
		4824	41.87	-32.13	74	58.75	34.2	10.52	61.6	300	360	P	V
802.11g CH 06 2437MHz		4872	41.16	-32.84	74	58.06	34.13	10.58	61.61	300	0	P	H
		7308	43.08	-30.92	74	55.19	36.6	13.62	62.33	300	0	P	H
		4872	41.35	-32.65	74	58.25	34.13	10.58	61.61	300	360	P	V
		7308	43.28	-30.72	74	55.39	36.6	13.62	62.33	300	360	P	V
802.11g CH 11 2462MHz		4926	41.24	-32.76	74	58.13	34.1	10.64	61.63	300	0	P	H
		7386	42.47	-31.53	74	54.76	36.5	13.58	62.37	300	0	P	H
		4926	40.49	-33.51	74	57.38	34.1	10.64	61.63	300	360	P	V
		7386	42.38	-31.62	74	54.67	36.5	13.58	62.37	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.95	61.58	-12.42	74	53.69	32	7.3	31.41	134	269	P	H
		2389.95	50.86	-3.14	54	42.97	32	7.3	31.41	134	269	A	H
	*	2416	113.09	-	-	105.02	32.13	7.34	31.4	134	269	P	H
	*	2414	105.25	-	-	97.19	32.13	7.34	31.41	134	269	A	H
		2389.95	60.19	-13.81	74	52.3	32	7.3	31.41	382	89	P	V
		2389.95	49.29	-4.71	54	41.4	32	7.3	31.41	382	89	A	V
	*	2410	110.19	-	-	102.13	32.13	7.34	31.41	382	89	P	V
	*	2412	102.61	-	-	94.55	32.13	7.34	31.41	382	89	A	V
802.11n HT20 CH 11 2462MHz		2483.68	59.22	-14.78	74	50.86	32.27	7.48	31.39	102	275	P	H
		2483.62	50.01	-3.99	54	41.65	32.27	7.48	31.39	102	275	A	H
	*	2456	113.32	-	-	104.95	32.33	7.44	31.4	102	275	P	H
	*	2456	105.26	-	-	96.89	32.33	7.44	31.4	102	275	A	H
		2483.92	56.96	-17.04	74	48.6	32.27	7.48	31.39	321	306	P	V
		2483.62	46.87	-7.13	54	38.51	32.27	7.48	31.39	321	306	A	V
	*	2460	109.67	-	-	101.3	32.33	7.44	31.4	321	306	P	V
	*	2458	101.77	-	-	93.4	32.33	7.44	31.4	321	306	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	47.13	-26.87	74	64.01	34.2	10.52	61.6	300	0	P	H
		4824	41.23	-32.77	74	58.11	34.2	10.52	61.6	300	360	P	V
802.11n HT20 CH 06 2437MHz		4872	40.66	-33.34	74	57.56	34.13	10.58	61.61	300	0	P	H
		7308	42.64	-31.36	74	54.75	36.6	13.62	62.33	300	0	P	H
		4872	40.28	-33.72	74	57.18	34.13	10.58	61.61	113	74	P	V
		7308	42.17	-31.83	74	54.28	36.6	13.62	62.33	113	74	P	V
802.11n HT20 CH 11 2462MHz		4926	39.93	-34.07	74	56.82	34.1	10.64	61.63	300	0	P	H
		7386	42.1	-31.9	74	54.39	36.5	13.58	62.37	300	0	P	H
		4926	40.76	-33.24	74	57.65	34.1	10.64	61.63	300	360	P	V
		7386	42.54	-31.46	74	54.83	36.5	13.58	62.37	300	360	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2388.13	69.61	-4.39	74	61.73	32	7.3	31.42	204	62	P	H
		2388.78	51.45	-2.55	54	43.57	32	7.3	31.42	204	62	A	H
		2485.48	56.57	-17.43	74	48.21	32.27	7.48	31.39	204	62	P	H
		2483.98	45.98	-8.02	54	37.62	32.27	7.48	31.39	204	62	A	H
	*	2410	106.83	-	-	98.77	32.13	7.34	31.41	204	62	P	H
	*	2412	99.78	-	-	91.72	32.13	7.34	31.41	204	62	A	H
		2389.3	66.65	-7.35	74	58.77	32	7.3	31.42	222	109	P	V
		2388.91	48.49	-5.51	54	40.61	32	7.3	31.42	222	109	A	V
		2484.46	57.12	-16.88	74	48.76	32.27	7.48	31.39	222	109	P	V
		2484.16	45.87	-8.13	54	37.51	32.27	7.48	31.39	222	109	A	V
	*	2432	104.8	-	-	96.56	32.27	7.37	31.4	222	109	P	V
	*	2430	96.54	-	-	88.3	32.27	7.37	31.4	222	109	A	V
802.11n HT40 CH 06 2437MHz		2385.66	65.99	-8.01	74	58.11	32	7.3	31.42	136	254	P	H
		2389.3	49.62	-4.38	54	41.74	32	7.3	31.42	136	254	A	H
		2483.86	60.18	-13.82	74	51.82	32.27	7.48	31.39	136	254	P	H
		2484.82	48.25	-5.75	54	39.89	32.27	7.48	31.39	136	254	A	H
	*	2444	107.05	-	-	98.64	32.4	7.41	31.4	136	254	P	H
	*	2444	99.32	-	-	90.91	32.4	7.41	31.4	136	254	A	H
		2388.13	56.09	-17.91	74	48.21	32	7.3	31.42	379	4	P	V
		2389.69	45.59	-8.41	54	37.71	32	7.3	31.42	379	4	A	V
		2499.58	56.16	-17.84	74	47.82	32.2	7.52	31.38	379	4	P	V
		2483.56	46.04	-7.96	54	37.68	32.27	7.48	31.39	379	4	A	V
	*	2442	102.37	-	-	93.96	32.4	7.41	31.4	379	4	P	V
	*	2444	94.88	-	-	86.47	32.4	7.41	31.4	379	4	A	V

802.11n HT40 CH 09 2452MHz		2388.91	65.45	-8.55	74	57.57	32	7.3	31.42	160	243	P	H
		2386.05	46.39	-7.61	54	38.51	32	7.3	31.42	160	243	A	H
		2485.36	63.52	-10.48	74	55.16	32.27	7.48	31.39	160	243	P	H
		2483.68	48.57	-5.43	54	40.21	32.27	7.48	31.39	160	243	A	H
	*	2446	107.64	-	-	99.23	32.4	7.41	31.4	160	243	P	H
	*	2444	99.78	-	-	91.37	32.4	7.41	31.4	160	243	A	H
		2388.65	56.67	-17.33	74	48.79	32	7.3	31.42	369	45	P	V
		2342.37	45.42	-8.58	54	37.52	32.1	7.23	31.43	369	45	A	V
		2485.3	60.32	-13.68	74	51.96	32.27	7.48	31.39	369	45	P	V
		2483.68	47.03	-6.97	54	38.67	32.27	7.48	31.39	369	45	A	V
	*	2444	104.43	-	-	96.02	32.4	7.41	31.4	369	45	P	V
	*	2444	96.39	-	-	87.98	32.4	7.41	31.4	369	45	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n		4842	40.69	-33.31	74	57.55	34.2	10.54	61.6	300	0	P	H
HT40		7266	41.97	-32.03	74	54.12	36.53	13.64	62.32	300	0	P	H
CH 03		4842	40.3	-33.7	74	57.16	34.2	10.54	61.6	300	360	P	V
2422MHz		7266	41.84	-32.16	74	53.99	36.53	13.64	62.32	300	360	P	V
802.11n		4872	39.45	-34.55	74	56.35	34.13	10.58	61.61	300	140	P	H
HT40		7308	42.37	-31.63	74	54.48	36.6	13.62	62.33	300	140	P	H
CH 06		4872	39.31	-34.69	74	56.21	34.13	10.58	61.61	300	15	P	V
2437MHz		7308	42.03	-31.97	74	54.14	36.6	13.62	62.33	300	15	P	V
802.11n		4902	39.61	-34.39	74	56.51	34.1	10.62	61.62	300	0	P	H
HT40		7356	41.84	-32.16	74	54	36.6	13.6	62.36	300	0	P	H
CH 09		4902	39.21	-34.79	74	56.11	34.1	10.62	61.62	110	188	P	V
2452MHz		7356	41.24	-32.76	74	53.4	36.6	13.6	62.36	110	188	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	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 HT40 LF		30.97	22.15	-17.85	40	30.65	23.52	0.58	32.6	-	-	P	H
		63.95	18.42	-21.58	40	37.35	12.58	0.81	32.32	-	-	P	H
		78.5	24.68	-15.32	40	43.46	12.7	0.89	32.37	-	-	P	H
		115.36	30.75	-12.75	43.5	43.94	17.89	1.09	32.17	100	360	P	H
		220.12	23.1	-22.9	46	38.1	15.3	1.62	31.92	-	-	P	H
		256.98	24.5	-21.5	46	35.1	19.46	1.75	31.81	-	-	P	H
		42.61	27.04	-12.96	40	41.76	17.1	0.62	32.44	-	-	P	V
		75.59	26.87	-13.13	40	45.62	12.7	0.87	32.32	-	-	P	V
		115.36	22.21	-21.29	43.5	35.4	17.89	1.09	32.17	-	-	P	V
		195.87	28.31	-15.19	43.5	43.27	15.54	1.51	32.01	-	-	P	V
		221.09	30.56	-15.44	46	45.46	15.4	1.62	31.92	100	360	P	V
		256.98	29.88	-16.12	46	40.48	19.46	1.75	31.81	-	-	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 CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		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)

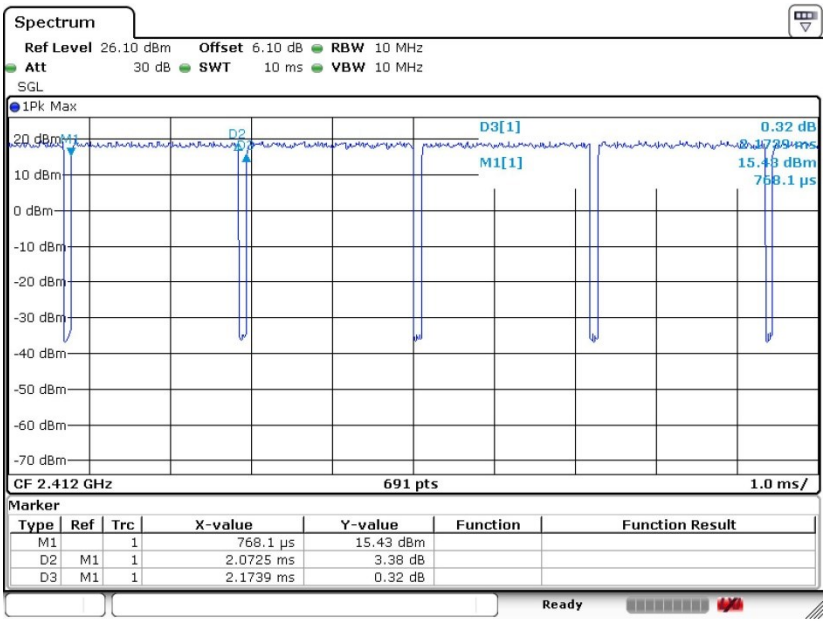
Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix D. Duty Cycle Plots

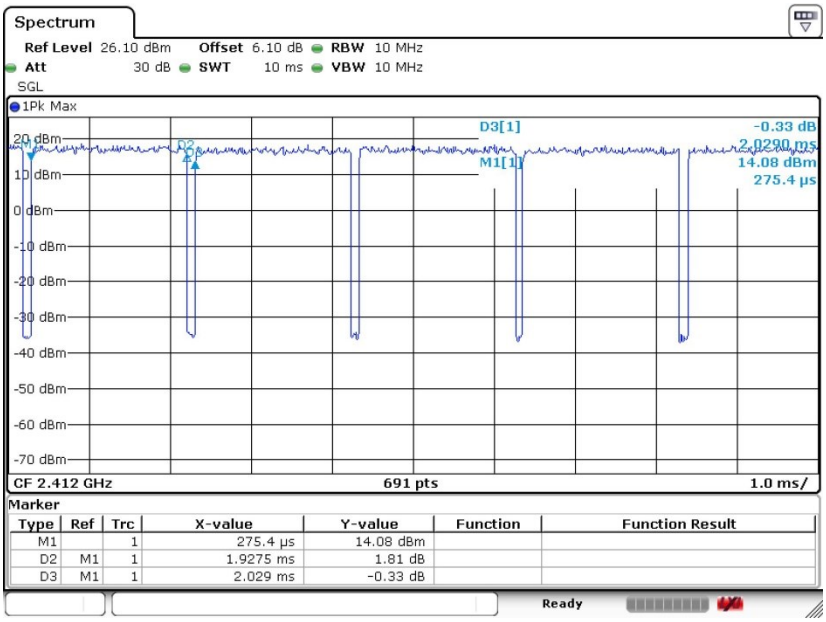
Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
802.11b	100	-	-	10Hz
802.11g	95.34	2.073	0.483	0.51kHz
802.11n HT20	95.00	1.928	0.519	0.56kHz
802.11n HT40	90.97	0.949	1.053	1.1KHz

802.11b

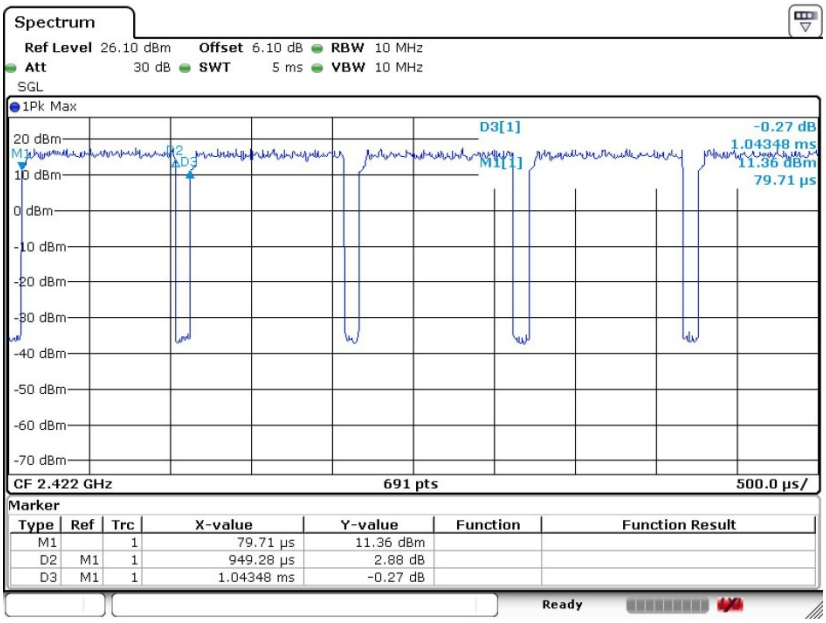
802.11g



802.11n HT20



802.11n HT40


Spectrum
Ref Level 26.10 dBm Offset 6.10 dB RBW 10 MHz
Att 30 dB SWT 5 ms VBW 10 MHz
SGL
1Pk Max
D3[1] -0.27 dB
1.04348 ms
M1[1] 11.36 dBm
79.71 µs
20 dBm
10 dBm
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
CF 2.422 GHz 691 pts 500.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 79.71 µs 11.36 dBm
D2 M1 1 949.28 µs 2.88 dB
D3 M1 1 1.04348 ms -0.27 dB
Ready