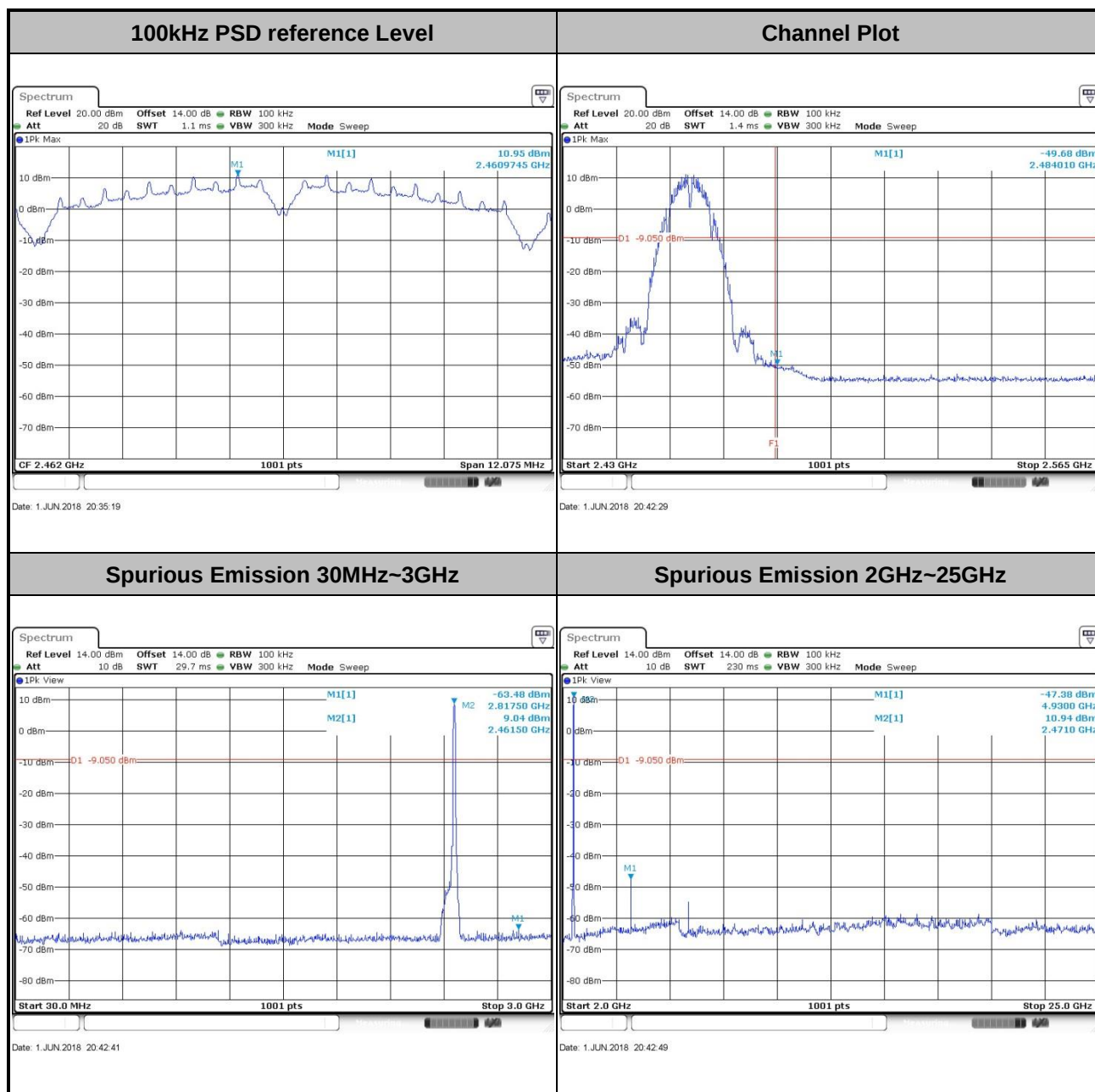




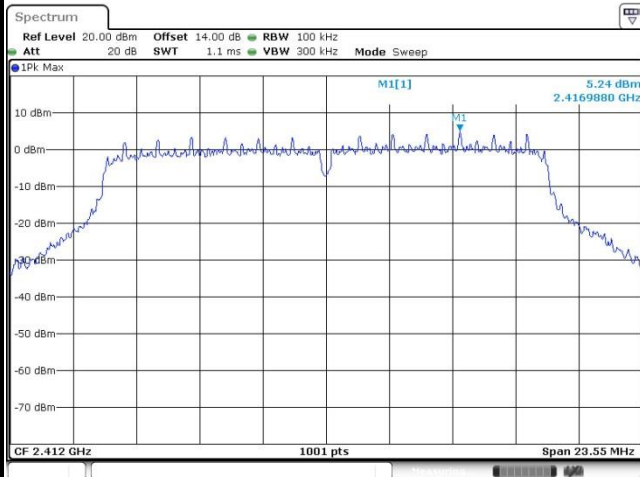
Test Mode :	802.11b	Test Channel :	11
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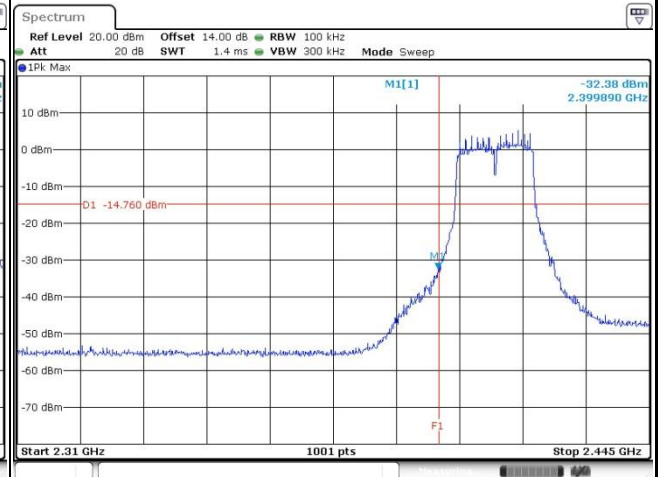


Test Mode :	802.11g	Test Channel :	01
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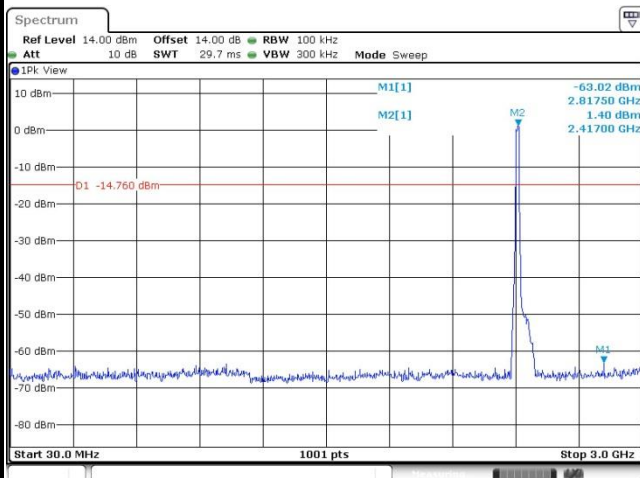
100kHz PSD reference Level



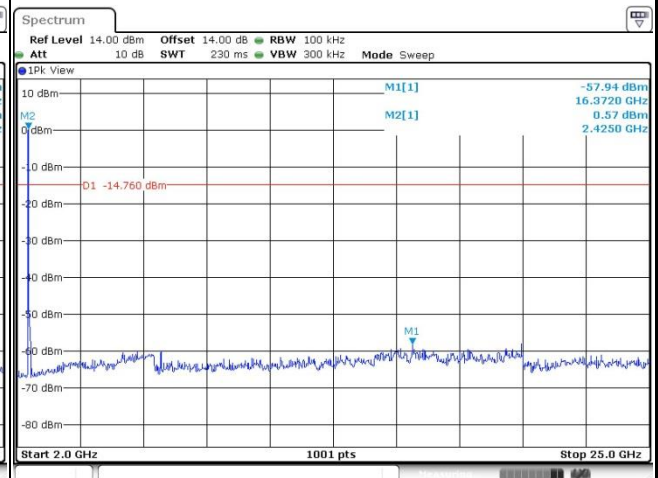
Channel Plot

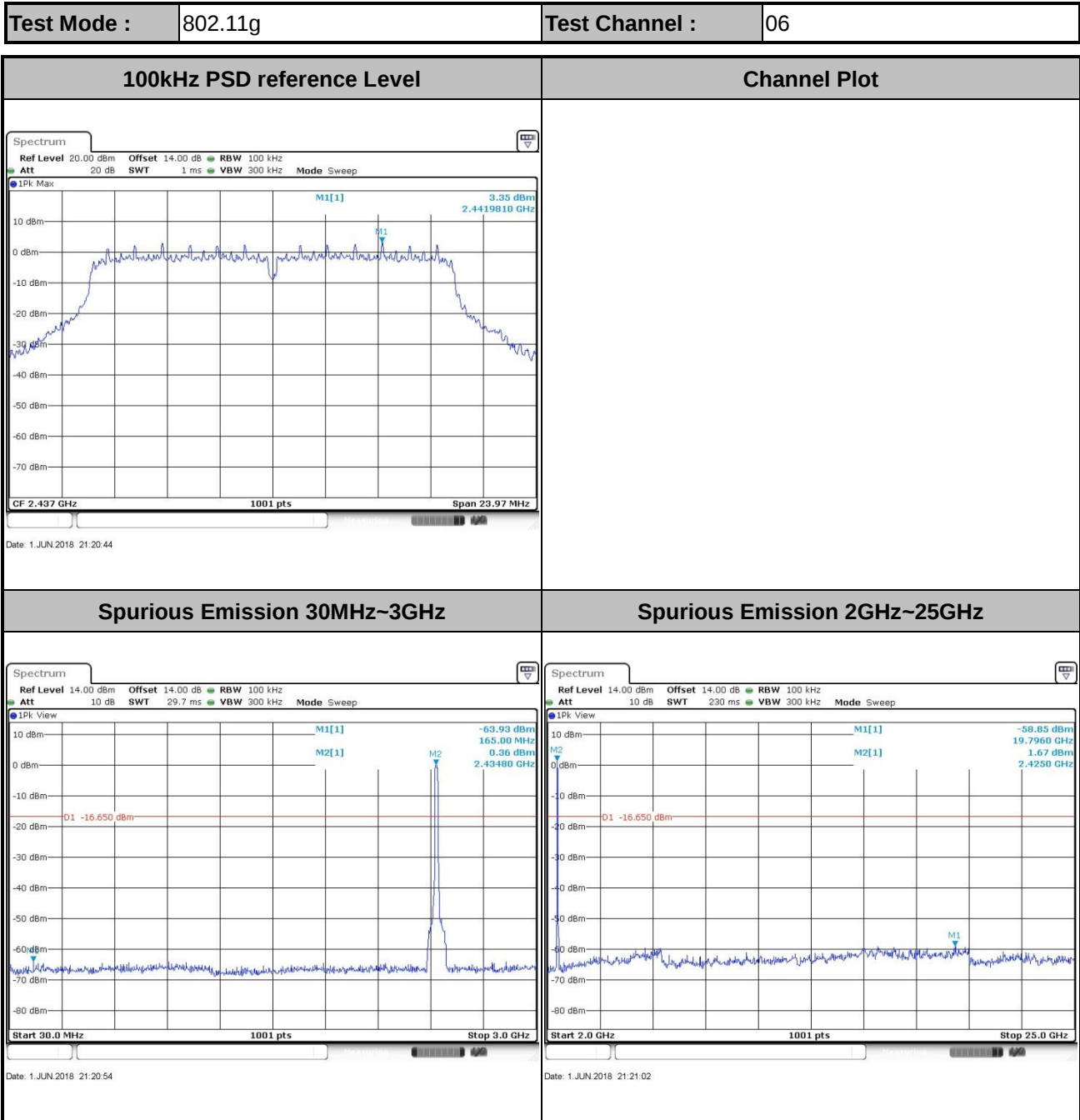


Spurious Emission 30MHz~3GHz



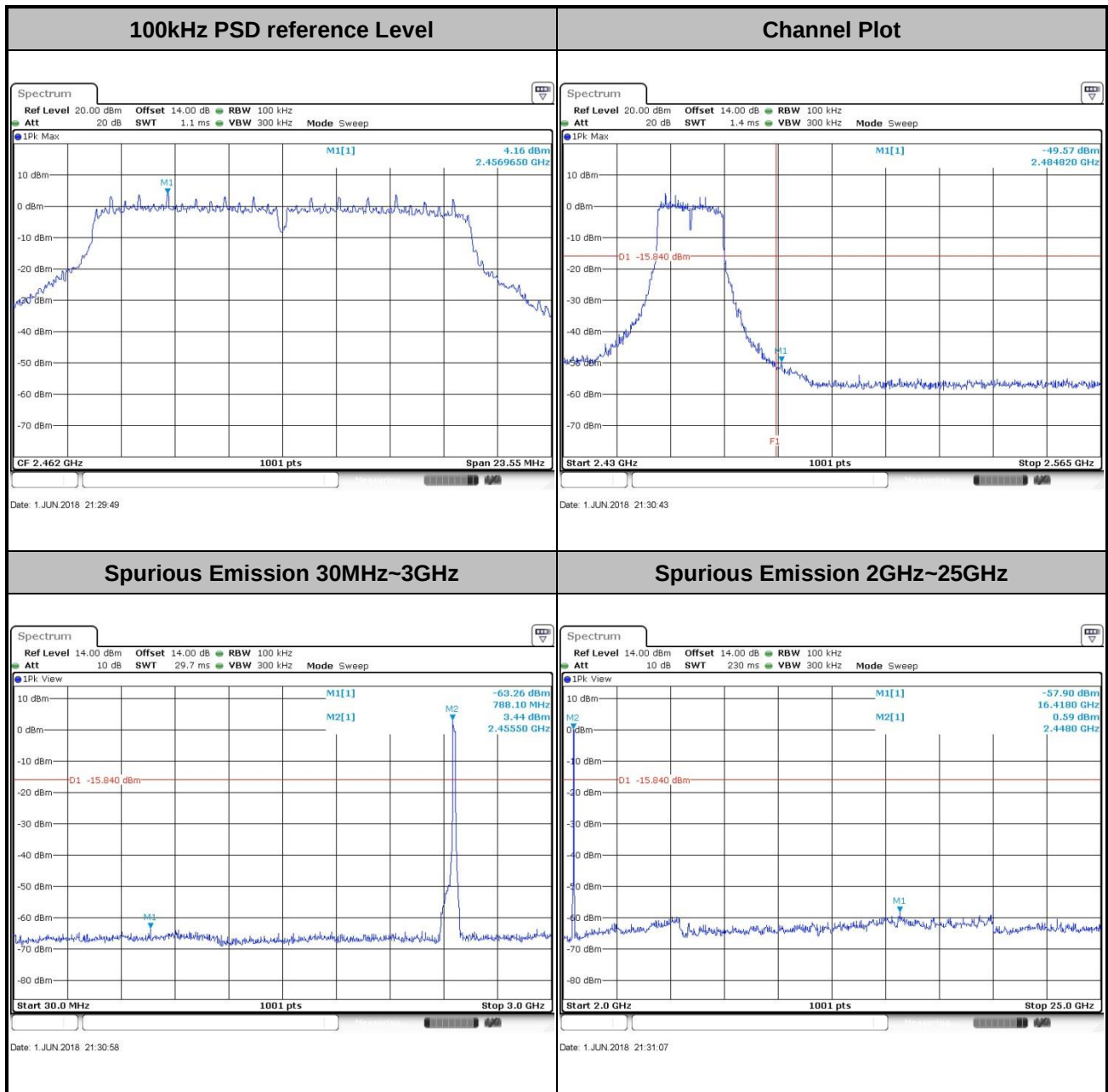
Spurious Emission 2GHz~25GHz







Test Mode :	802.11g	Test Channel :	11
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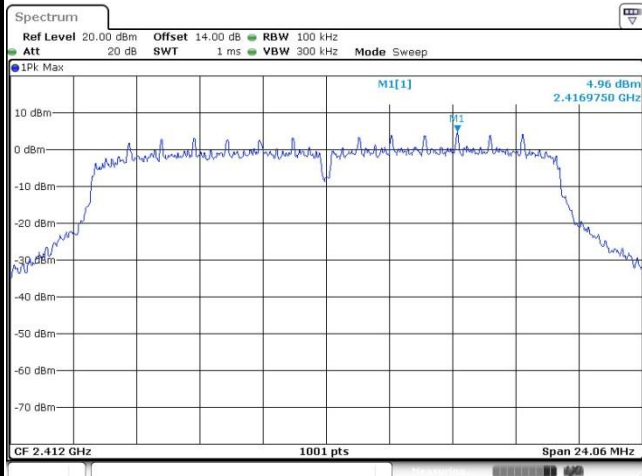




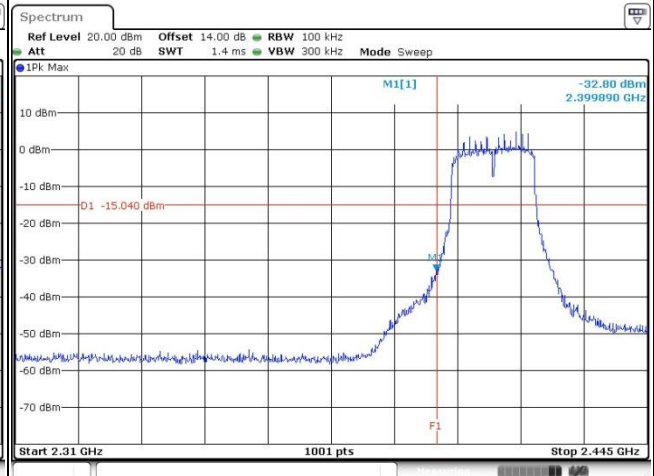
Test Mode : 802.11n HT20

Test Channel : 01

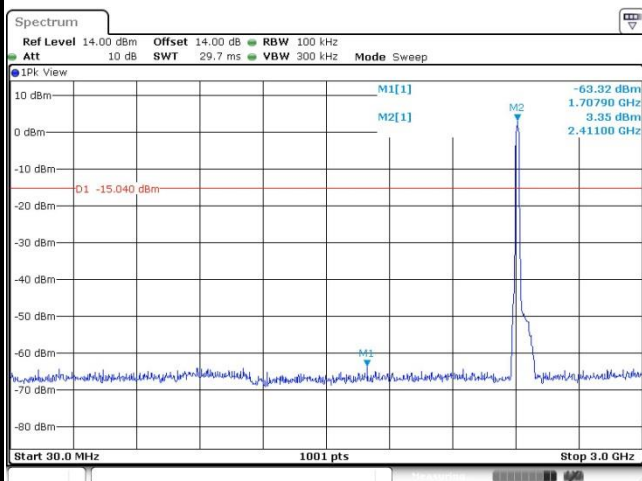
100kHz PSD reference Level



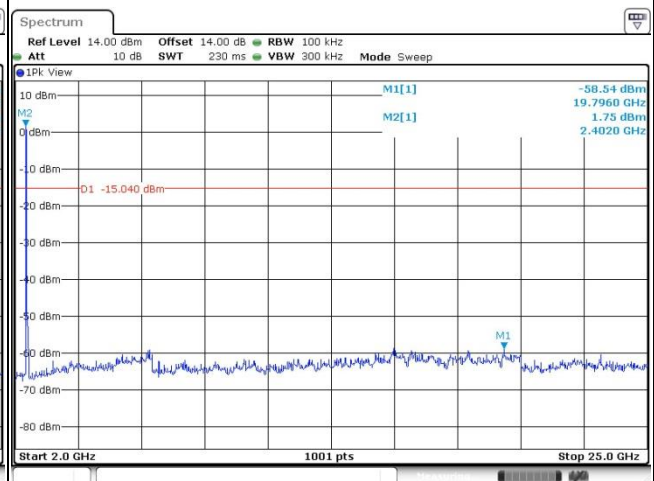
Channel Plot

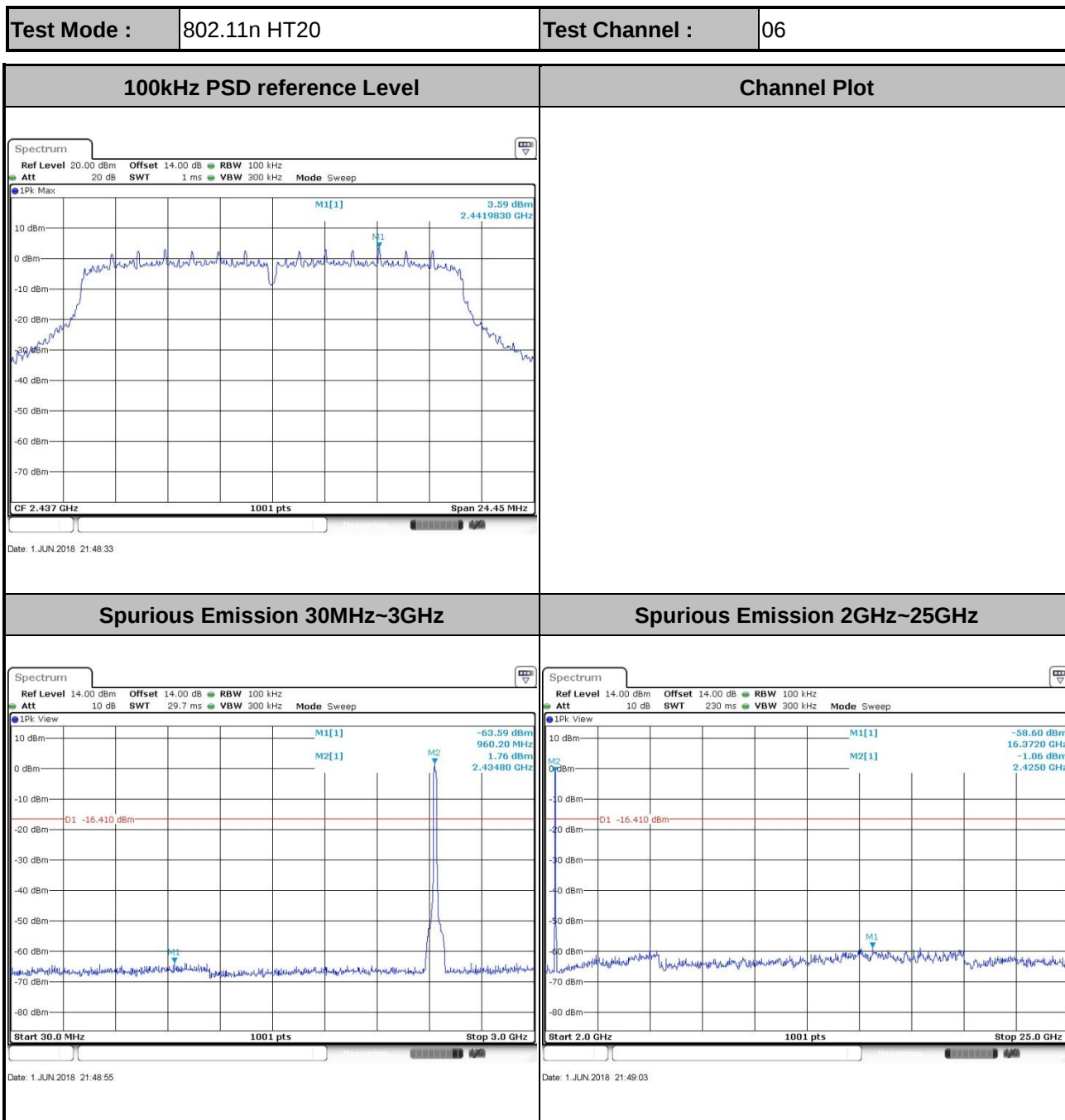


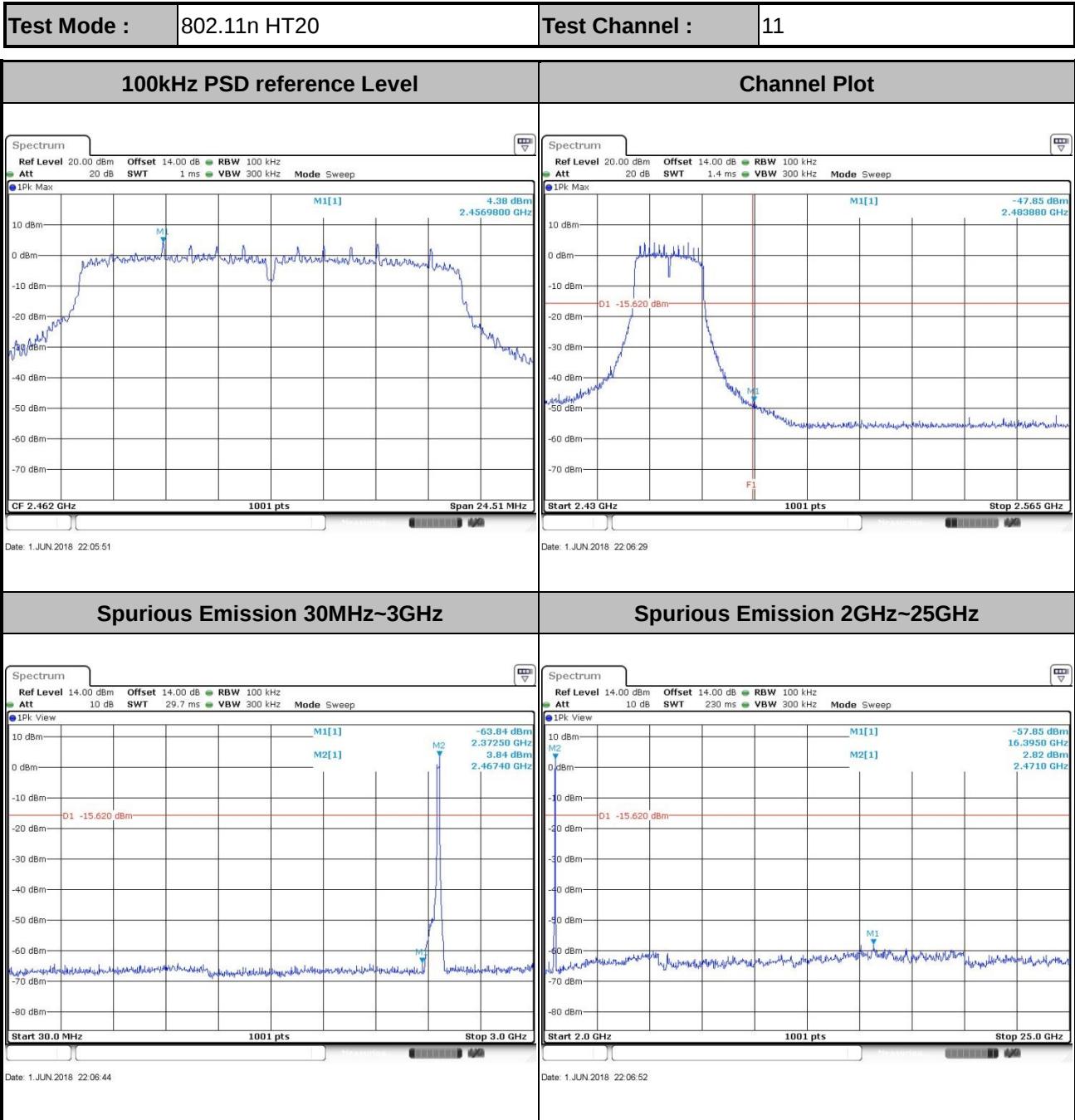
Spurious Emission 30MHz~3GHz

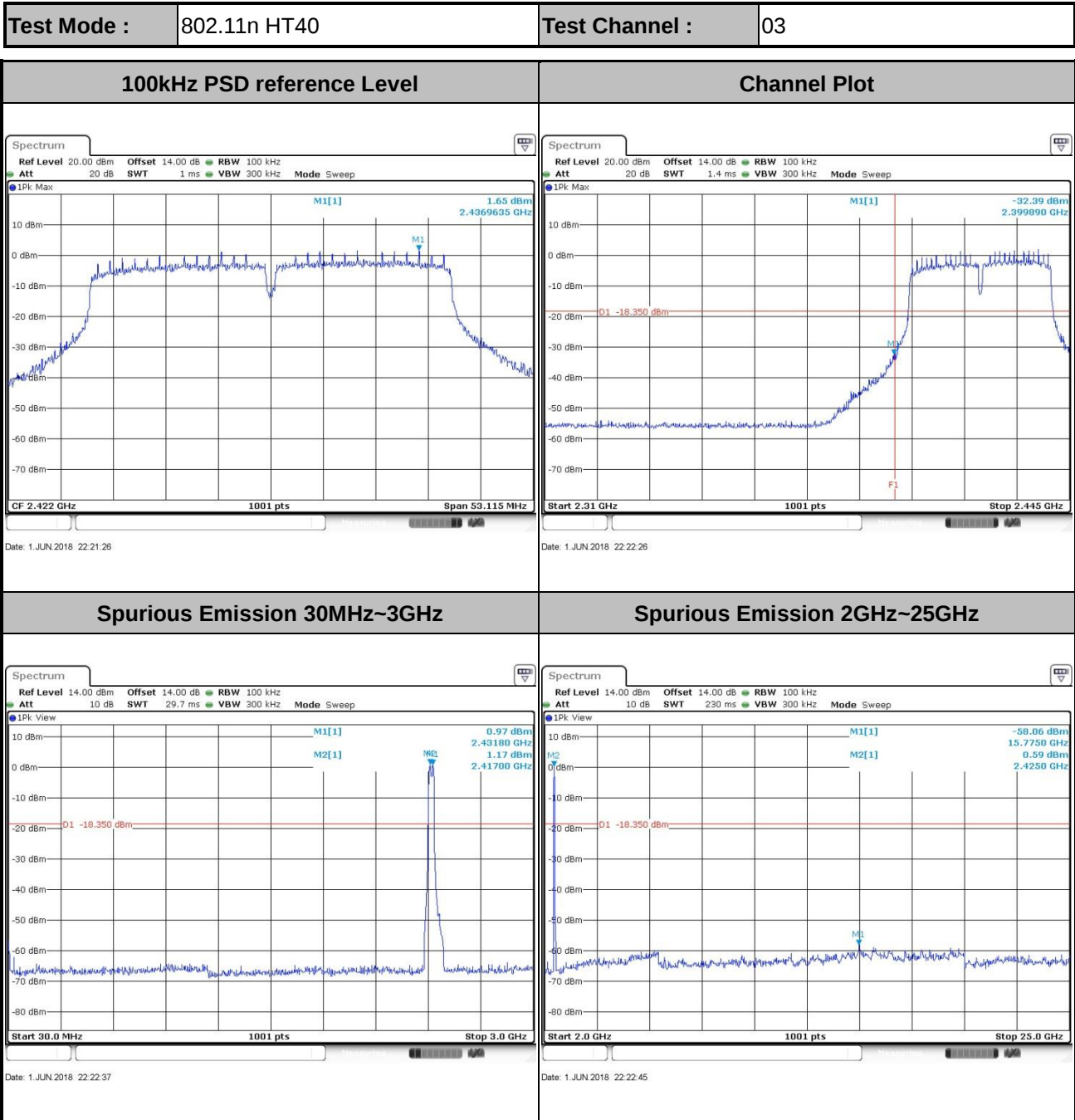


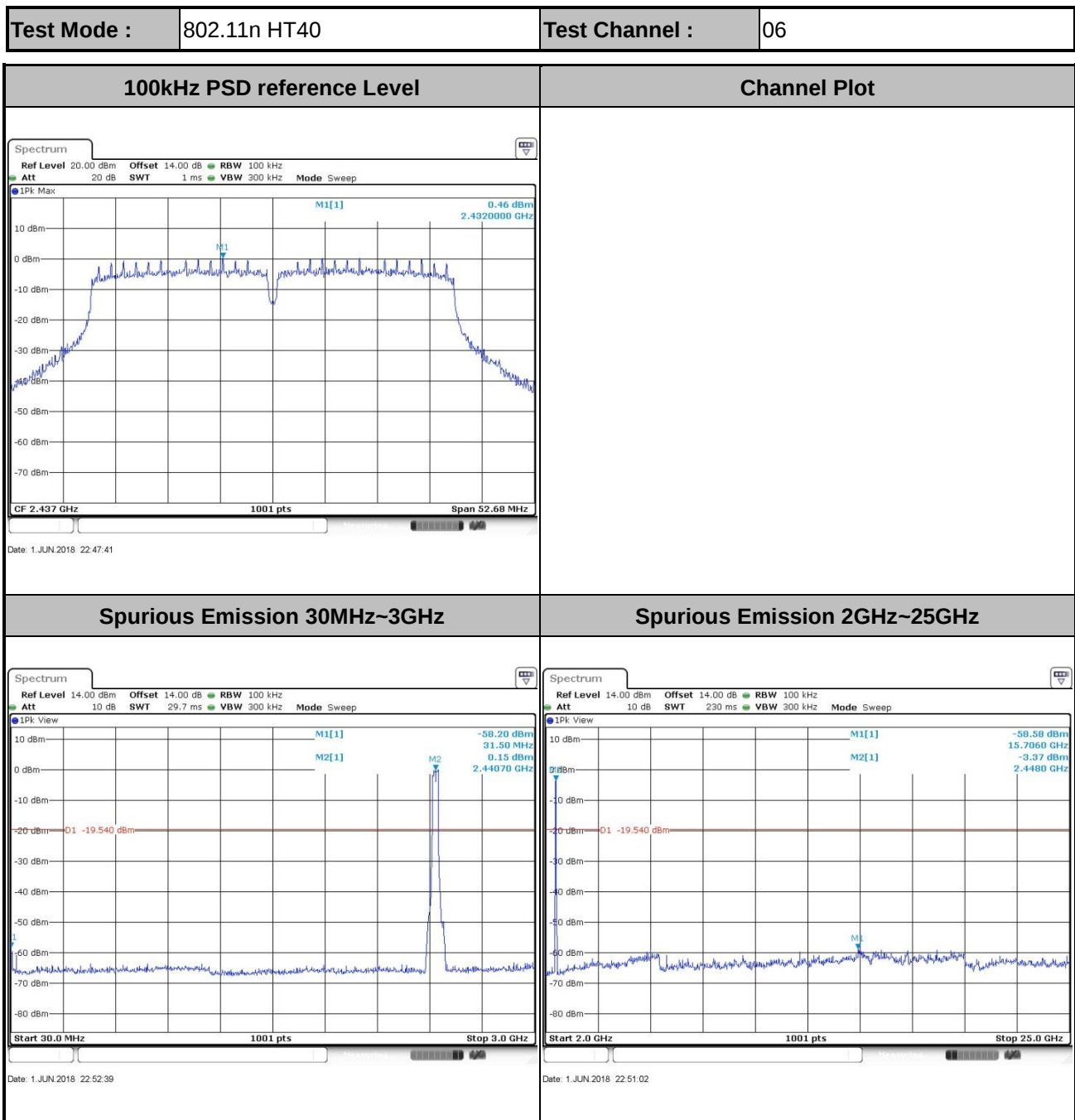
Spurious Emission 2GHz~25GHz

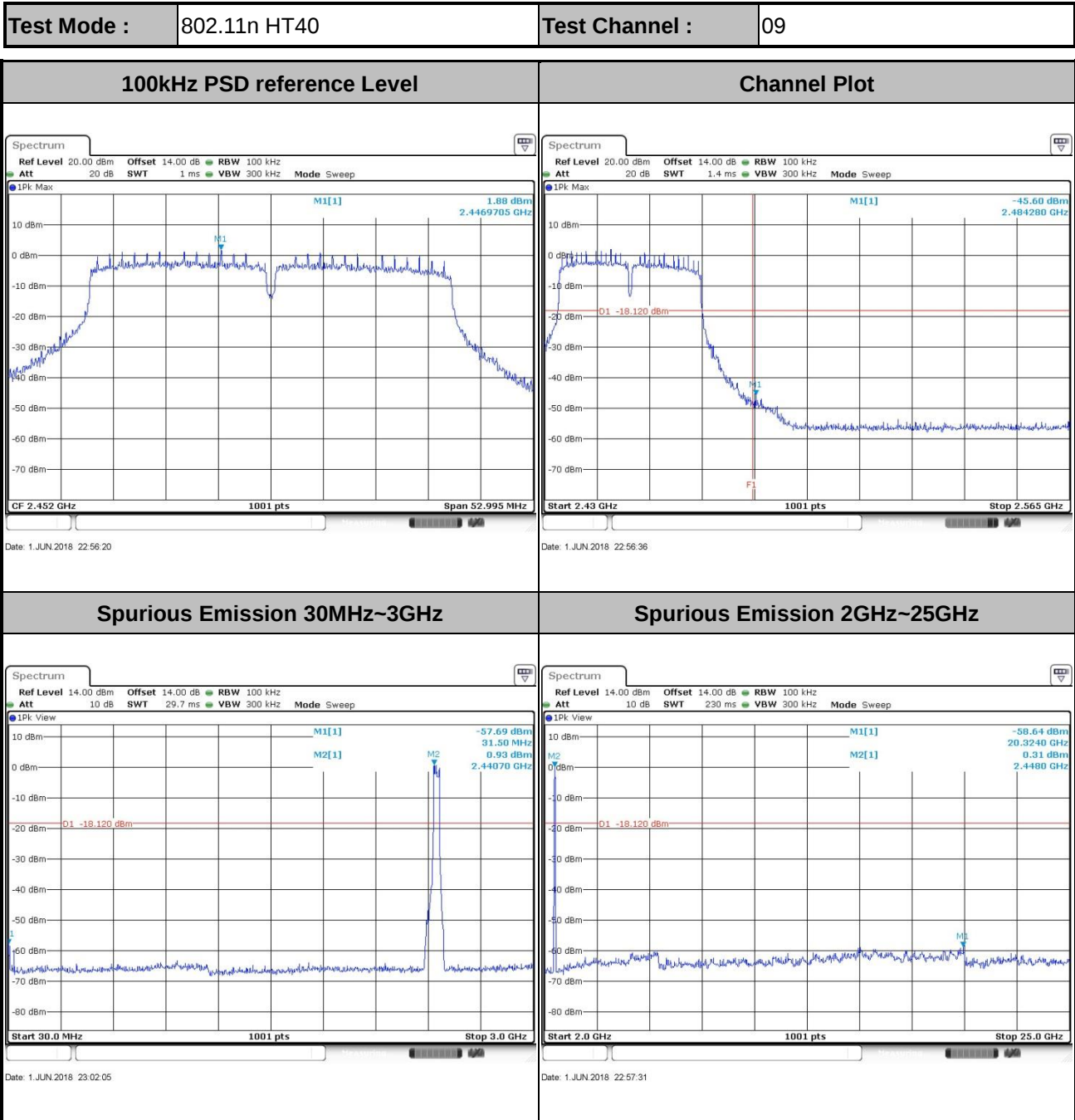












3.5 Radiated Band Edges and Spurious Emission Measurement

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

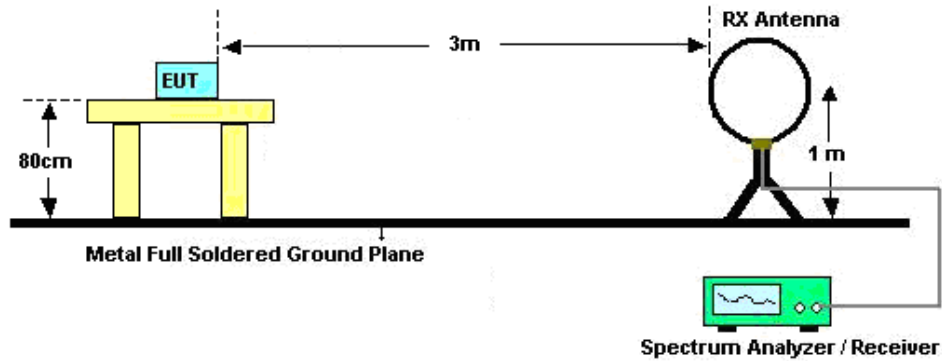
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test 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:

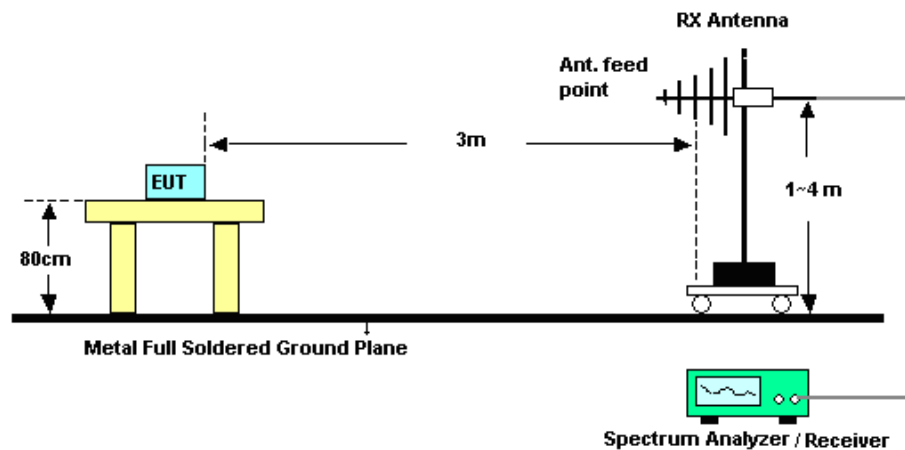
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.5.4 Test Setup

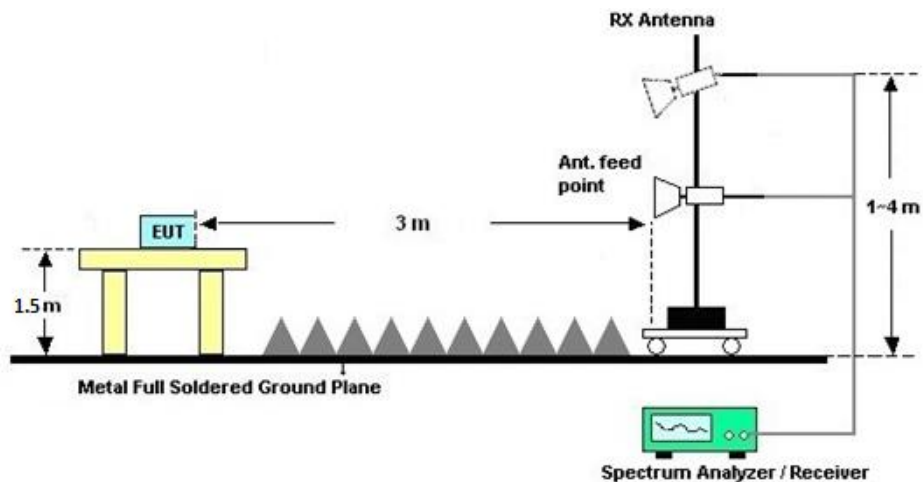
For radiated emissions below 30MHz



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.

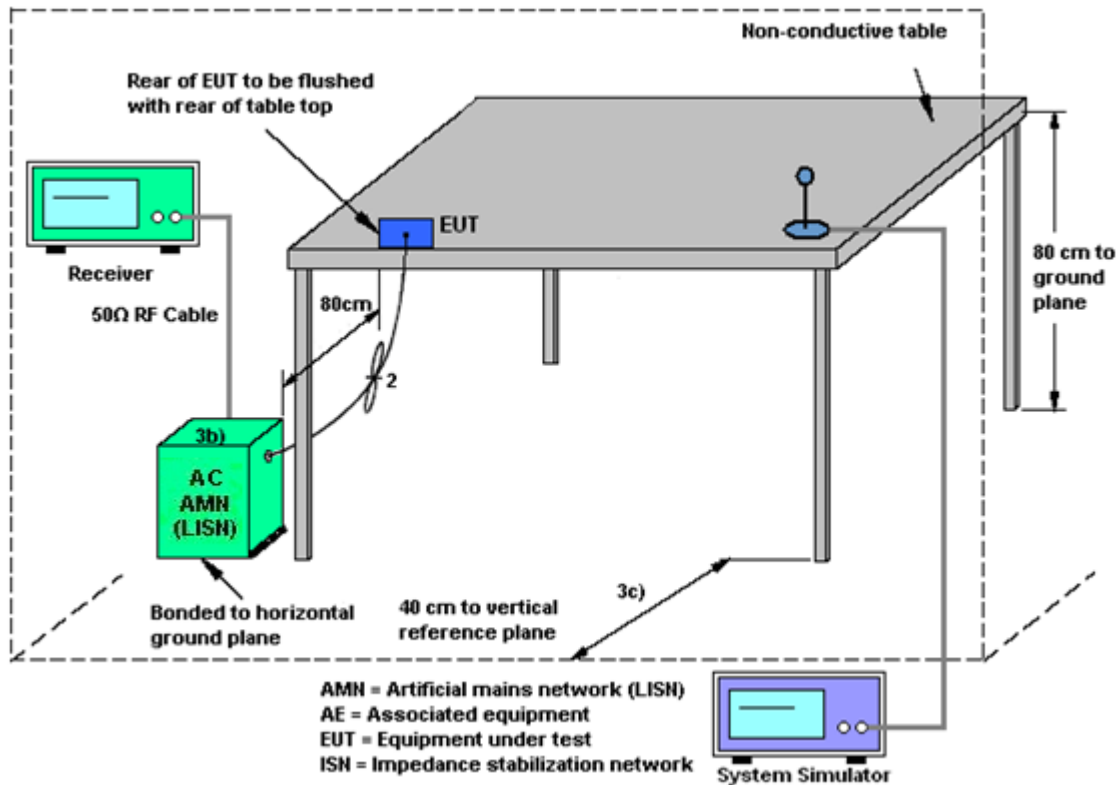
3.6.2 Measuring Instruments

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. (For Internal PCB Antenna)

A non-standard SMA connector antenna is used. (For External PCB Antenna)

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	4.40	4.40	4.40	7.41	0.00	1.41

$PSD \text{ Limit Reduction} = DG(PSD) - 6dBi = 1.41dB$



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	9kHz~40GHz	Apr. 19, 2018	May 31, 2018~Jun. 01, 2018	Apr. 18, 2019	Conducted (TH01-SZ)
Pulse Power Sensor	Anritsu	MA2411B	1207253	30MHz~40GHz	Dec. 26, 2017	May 31, 2018~Jun. 01, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Power Meter	Anritsu	ML2495A	1218010	50MHz Bandwidth	Dec. 26, 2017	May 31, 2018~Jun. 01, 2018	Dec. 25, 2018	Conducted (TH01-SZ)
Spectrum Analyzer	R&S	FSV40	101041	10kHz~40GHz; Max 30dBm	Oct. 19, 2017	May 29, 2018	Oct. 18, 2018	Radiation (03CH02-SZ)
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	May 14, 2018	May 29, 2018	May 13, 2019	Radiation (03CH02-SZ)
Bilog Antenna	TeseQ	CBL6112D	35407	30MHz~2GHz	May 10, 2018	May 29, 2018	May 09, 2019	Radiation (03CH02-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1285	1GHz~18GHz	Dec. 13, 2017	May 29, 2018	Dec. 12, 2018	Radiation (03CH02-SZ)
SHF-EHF Horn	com-power	AH-840	101071	18Ghz~40GHz	Jun. 16, 2017	May 29, 2018	Jun. 15, 2018	Radiation (03CH02-SZ)
LF Amplifier	Burgeon	BPA-530	102211	0.01~3000Mhz	Oct.19, 2017	May 29, 2018	Oct 18, 2018	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	AMF-7D-0010 1800-30-10P-R	1707137	1GHz~18GHz	Oct.19, 2017	May 29, 2018	Oct 18, 2018	Radiation (03CH02-SZ)
Amplifier	Agilent	8449B	3008A01023	1GHz~26.5GHz	Oct.19, 2017	May 29, 2018	Oct 18, 2018	Radiation (03CH02-SZ)
HF Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz	Jul. 21, 2017	May 29, 2018	Jul. 20, 2018	Radiation (03CH02-SZ)
AC Power Source	Chroma	61601	616010002470	N/A	NCR	May 29, 2018	NCR	Radiation (03CH02-SZ)
Turn Table	Chaintek	T-200	N/A	0~360 degree	NCR	May 29, 2018	NCR	Radiation (03CH02-SZ)
Antenna Mast	Chaintek	MBS-400	N/A	1 m~4 m	NCR	May 29, 2018	NCR	Radiation (03CH02-SZ)
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Dec. 26, 2017	May 30, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN	EMCO	3816/2SH	00103912	9kHz~30MHz	Dec. 26, 2017	May 30, 2018	Dec. 25, 2018	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	MessTec	3816/2SH	00103892	9kHz~30MHz	Nov. 01, 2017	May 30, 2018	Oct. 31, 2018	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	616020000891	100Vac~250Vac	Jul. 19, 2017	May 30, 2018	Jul. 18, 2018	Conduction (CO01-SZ)



5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150kHz ~ 30MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.6dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.4dB
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Appendix A. Conducted test results

Report Number : FR852504A

Test Engineer:	Wilson Chen	Temperature:	24~26	°C
Test Date:	2018/5/31~2018/6/1	Relative Humidity:	51~53	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band										
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	2	1	2412	13.34	13.34	8.05	8.05	0.50	Pass
11b	1Mbps	2	6	2437	13.54	13.29	8.07	8.07	0.50	Pass
11b	1Mbps	2	11	2462	13.39	13.84	8.05	8.05	0.50	Pass
11g	6Mbps	2	1	2412	17.08	17.18	15.62	15.70	0.50	Pass
11g	6Mbps	2	6	2437	17.18	17.13	16.02	15.98	0.50	Pass
11g	6Mbps	2	11	2462	17.18	17.13	15.92	15.70	0.50	Pass
HT20	MCS0	2	1	2412	17.93	18.13	16.30	16.04	0.50	Pass
HT20	MCS0	2	6	2437	17.98	18.18	16.50	16.30	0.50	Pass
HT20	MCS0	2	11	2462	18.08	18.18	15.98	16.34	0.50	Pass
HT40	MCS0	2	3	2422	36.36	36.36	35.05	35.41	0.50	Pass
HT40	MCS0	2	6	2437	36.36	36.26	35.13	35.13	0.50	Pass
HT40	MCS0	2	9	2452	36.46	36.26	35.33	35.33	0.50	Pass

TEST RESULTS DATA
Peak Output Power

2.4GHz Band																
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2	1	2412	20.23	21.10	23.70	30.00		4.20		27.90		36.00		Pass
11b	1Mbps	2	6	2437	18.04	19.00	21.56	30.00		4.20		25.76		36.00		Pass
11b	1Mbps	2	11	2462	19.68	20.81	23.29	30.00		4.20		27.49		36.00		Pass
11g	6Mbps	2	1	2412	19.58	20.78	23.23	30.00		4.20		27.43		36.00		Pass
11g	6Mbps	2	6	2437	18.42	19.70	22.12	30.00		4.20		26.32		36.00		Pass
11g	6Mbps	2	11	2462	19.30	20.58	23.00	30.00		4.20		27.20		36.00		Pass
HT20	MCS0	2	1	2412	19.88	20.72	23.33	30.00		4.20		27.53		36.00		Pass
HT20	MCS0	2	6	2437	18.98	19.53	22.27	30.00		4.20		26.47		36.00		Pass
HT20	MCS0	2	11	2462	19.40	20.69	23.10	30.00		4.20		27.30		36.00		Pass
HT40	MCS0	2	3	2422	20.66	21.50	24.11	30.00		4.20		28.31		36.00		Pass
HT40	MCS0	2	6	2437	19.56	20.53	23.08	30.00		4.20		27.28		36.00		Pass
HT40	MCS0	2	9	2452	20.41	21.52	24.01	30.00		4.20		28.21		36.00		Pass

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

TEST RESULTS DATA
Average Output Power

2.4GHz Band									
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)		
					Ant 1	Ant 2	Ant 1	Ant 2	SUM
11b	1Mbps	2	1	2412	0.03	0.03	17.62	18.63	21.16
11b	1Mbps	2	6	2437	0.03	0.03	15.46	16.43	18.98
11b	1Mbps	2	11	2462	0.03	0.03	17.20	18.41	20.86
11g	6Mbps	2	1	2412	0.22	0.22	13.44	14.67	17.11
11g	6Mbps	2	6	2437	0.22	0.22	12.32	13.44	15.93
11g	6Mbps	2	11	2462	0.22	0.22	13.15	14.42	16.84
HT20	MCS0	2	1	2412	0.24	0.24	13.40	14.52	17.00
HT20	MCS0	2	6	2437	0.24	0.24	12.39	13.32	15.89
HT20	MCS0	2	11	2462	0.24	0.24	12.94	14.30	16.68
HT40	MCS0	2	3	2422	0.42	0.43	13.77	14.78	17.32
HT40	MCS0	2	6	2437	0.42	0.43	12.64	13.78	16.26
HT40	MCS0	2	9	2452	0.42	0.43	13.55	14.81	17.24

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

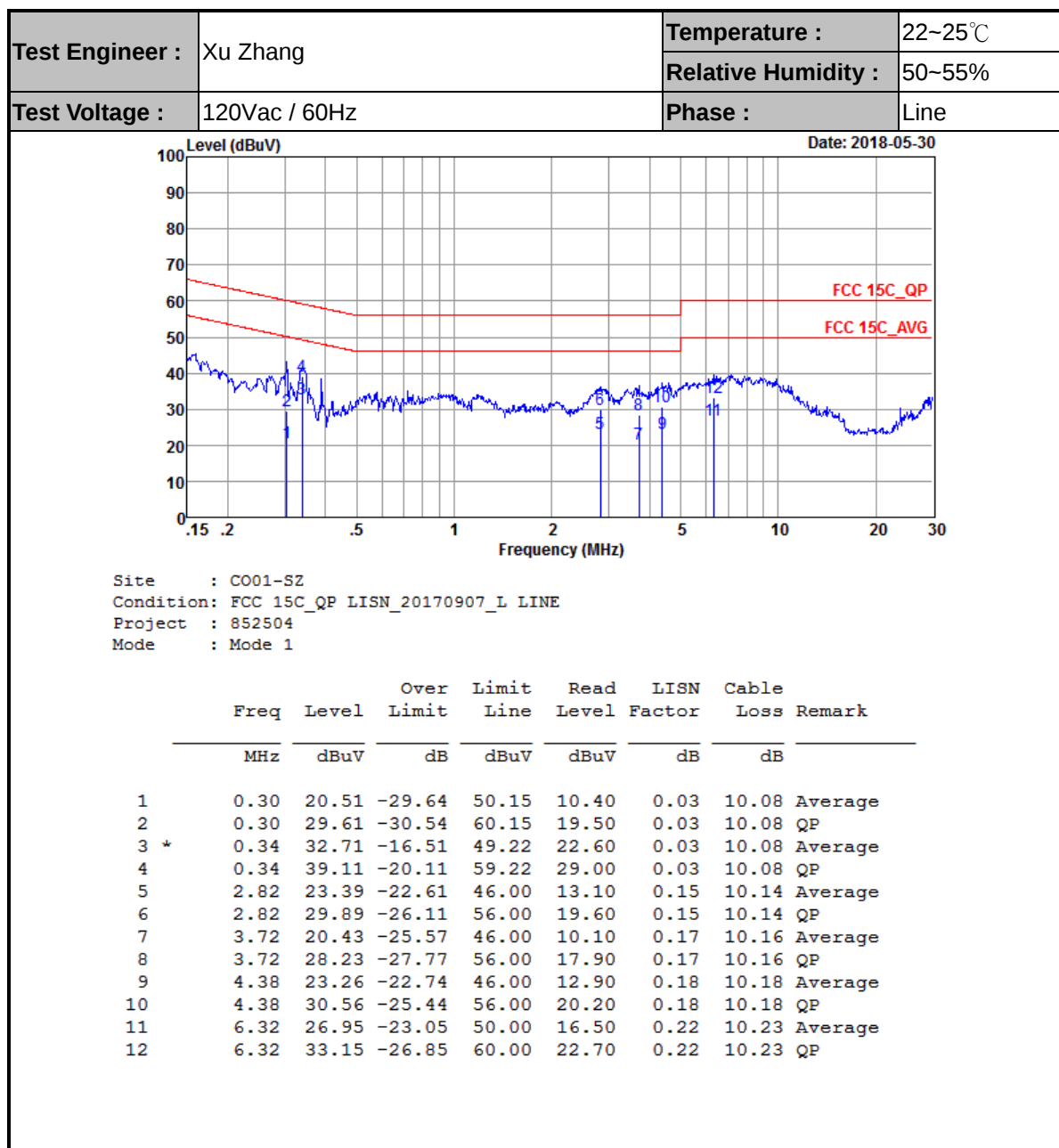
TEST RESULTS DATA
Peak Power Spectral Density

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	2	1	2412	-7.80	-6.91	-3.90	7.41		6.59		Pass
11b	1Mbps	2	6	2437	-9.62	-9.08	-6.07	7.41		6.59		Pass
11b	1Mbps	2	11	2462	-9.84	-7.08	-4.07	7.41		6.59		Pass
11g	6Mbps	2	1	2412	-14.72	-11.79	-8.78	7.41		6.59		Pass
11g	6Mbps	2	6	2437	-15.69	-13.66	-10.65	7.41		6.59		Pass
11g	6Mbps	2	11	2462	-15.46	-11.64	-8.63	7.41		6.59		Pass
HT20	MCS0	2	1	2412	-14.42	-11.62	-8.61	7.41		6.59		Pass
HT20	MCS0	2	6	2437	-15.80	-13.06	-10.05	7.41		6.59		Pass
HT20	MCS0	2	11	2462	-14.38	-11.44	-8.43	7.41		6.59		Pass
HT40	MCS0	2	3	2422	-17.21	-13.52	-10.51	7.41		6.59		Pass
HT40	MCS0	2	6	2437	-16.83	-16.09	-13.08	7.41		6.59		Pass
HT40	MCS0	2	9	2452	-17.14	-14.71	-11.70	7.41		6.59		Pass

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

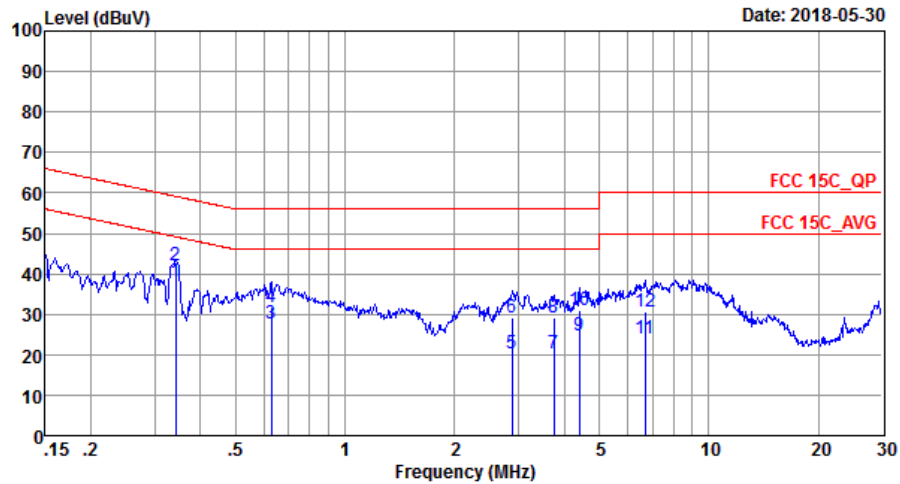


Appendix B. AC Conducted Emission Test Results





Test Engineer :	Xu Zhang	Temperature :	22~25℃
		Relative Humidity :	50~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral



Site : CO01-SZ
Condition: FCC 15C_QP LISN_20170907_N NEUTRAL
Project : 852504
Mode : Mode 1

	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1 *	0.34	37.91	-11.22	49.13	27.80	0.03	10.08	Average
2	0.34	42.01	-17.12	59.13	31.90	0.03	10.08	QP
3	0.63	27.50	-18.50	46.00	17.40	0.02	10.08	Average
4	0.63	31.60	-24.40	56.00	21.50	0.02	10.08	QP
5	2.88	20.47	-25.53	46.00	10.30	0.03	10.14	Average
6	2.88	28.97	-27.03	56.00	18.80	0.03	10.14	QP
7	3.76	20.21	-25.79	46.00	10.00	0.05	10.16	Average
8	3.76	29.01	-26.99	56.00	18.80	0.05	10.16	QP
9	4.41	24.64	-21.36	46.00	14.40	0.06	10.18	Average
10	4.41	30.94	-25.06	56.00	20.70	0.06	10.18	QP
11	6.70	23.91	-26.09	50.00	13.60	0.07	10.24	Average
12	6.70	30.81	-29.19	60.00	20.50	0.07	10.24	QP



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		2389.91	49.05	-24.95	74	46.59	27.09	6.65	31.28	150	28	P	H
		2389.91	36.92	-17.08	54	34.46	27.09	6.65	31.28	150	28	A	H
	*	2412	104.21	-	-	101.67	27.14	6.66	31.26	150	28	P	H
	*	2412	99.72	-	-	97.18	27.14	6.66	31.26	150	28	A	H
		2389.38	53.44	-20.56	74	50.98	27.09	6.65	31.28	160	30	P	V
		2390	41.57	-12.43	54	39.11	27.09	6.65	31.28	160	30	A	V
	*	2412	114.56	-	-	112.02	27.14	6.66	31.26	160	30	P	V
	*	2412	110.22	-	-	107.68	27.14	6.66	31.26	160	30	A	V
802.11b CH 06 2437MHz		2313.08	48.26	-25.74	74	46.27	26.83	6.51	31.35	150	28	P	H
		2389.24	35.77	-18.23	54	33.31	27.09	6.65	31.28	150	28	A	H
	*	2437	92.87	-	-	90.26	27.24	6.63	31.26	150	28	P	H
	*	2437	88.83	-	-	86.22	27.24	6.63	31.26	150	28	A	H
		2499.51	48.5	-25.5	74	45.72	27.4	6.58	31.2	150	28	P	H
		2488.94	36.2	-17.8	54	33.44	27.4	6.58	31.22	150	28	A	H
		2389.94	50.81	-23.19	74	48.35	27.09	6.65	31.28	150	108	P	V
		2389.1	39.9	-14.1	54	37.44	27.09	6.65	31.28	150	108	A	V
	*	2437	110.07	-	-	107.46	27.24	6.63	31.26	150	108	P	V
	*	2437	105.8	-	-	103.19	27.24	6.63	31.26	150	108	A	V
		2483.62	53.3	-20.7	74	50.59	27.35	6.58	31.22	150	108	P	V
		2483.55	41.53	-12.47	54	38.82	27.35	6.58	31.22	150	108	A	V



802.11b CH 11 2462MHz	*	2462	104.04	-	-	101.37	27.3	6.61	31.24	150	28	P	H
	*	2462	99.39	-	-	96.72	27.3	6.61	31.24	150	28	A	H
		2485.2	51.37	-22.63	74	48.66	27.35	6.58	31.22	150	28	P	H
		2483.52	37.74	-16.26	54	35.03	27.35	6.58	31.22	150	28	A	H
	*	2462	114.8	-	-	112.13	27.3	6.61	31.24	150	108	P	V
	*	2462	110.66	-	-	107.99	27.3	6.61	31.24	150	108	A	V
		2484.36	55.49	-18.51	74	52.78	27.35	6.58	31.22	150	108	P	V
		2483.52	43.65	-10.35	54	40.94	27.35	6.58	31.22	150	108	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	42.07	-31.93	74	59.4	31.42	9.44	58.19	185	255	P	H
		4824	44.03	-29.97	74	61.36	31.42	9.44	58.19	185	255	P	V
802.11b CH 06 2437MHz		4874	41.69	-32.31	74	58.88	31.51	9.4	58.1	165	106	P	H
		7311	48.42	-25.58	74	57.98	36.36	12	57.92	174	100	P	H
		4874	42.53	-31.47	74	59.72	31.51	9.4	58.1	165	106	P	V
		7311	49.4	-24.6	74	58.96	36.36	12	57.92	174	100	P	V
802.11b CH 11 2462MHz		4924	41.99	-32.01	74	58.99	31.59	9.43	58.02	150	285	P	H
		7386	49.11	-24.89	74	58.1	36.65	12.01	57.65	155	274	P	H
		4924	45.22	-28.78	74	62.22	31.59	9.43	58.02	150	285	P	V
		7386	48.78	-25.22	74	57.77	36.65	12.01	57.65	155	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



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

WIFI Ant. 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		2389.91	49.66	-24.34	74	47.2	27.09	6.65	31.28	150	28	P	H
		2389.91	38.07	-15.93	54	35.61	27.09	6.65	31.28	150	28	A	H
	*	2412	101.23	-	-	98.69	27.14	6.66	31.26	150	28	P	H
	*	2412	92.24	-	-	89.7	27.14	6.66	31.26	150	28	A	H
		2388.86	57.88	-16.12	74	55.42	27.09	6.65	31.28	150	247	P	V
		2389.59	44.01	-9.99	54	41.55	27.09	6.65	31.28	150	247	A	V
	*	2412	110.27	-	-	107.73	27.14	6.66	31.26	150	247	P	V
	*	2412	101.93	-	-	99.39	27.14	6.66	31.26	150	247	A	V
802.11g CH 06 2437MHz		2366	48.18	-25.82	74	45.89	26.99	6.61	31.31	150	28	P	H
		2365.44	36.25	-17.75	54	33.96	26.99	6.61	31.31	150	28	A	H
	*	2437	91.01	-	-	88.4	27.24	6.63	31.26	150	28	P	H
	*	2437	81.43	-	-	78.82	27.24	6.63	31.26	150	28	A	H
		2496.57	48.48	-25.52	74	45.7	27.4	6.58	31.2	150	28	P	H
		2489.01	36.74	-17.26	54	33.96	27.4	6.58	31.2	150	28	A	H
		2389.24	49.51	-24.49	74	47.05	27.09	6.65	31.28	150	42	P	V
		2389.24	38.69	-15.31	54	36.23	27.09	6.65	31.28	150	42	A	V
	*	2437	107.34	-	-	104.73	27.24	6.63	31.26	150	42	P	V
	*	2437	97.42	-	-	94.81	27.24	6.63	31.26	150	42	A	V
		2484.25	53.68	-20.32	74	50.97	27.35	6.58	31.22	150	42	P	V
		2483.97	42.52	-11.48	54	39.81	27.35	6.58	31.22	150	42	A	V



802.11g CH 11 2462MHz	*	2462	100.66	-	-	97.99	27.3	6.61	31.24	150	28	P	H
	*	2462	91.42	-	-	88.75	27.3	6.61	31.24	150	28	A	H
		2484.12	52.24	-21.76	74	49.53	27.35	6.58	31.22	150	28	P	H
		2483.56	39.33	-14.67	54	36.62	27.35	6.58	31.22	150	28	A	H
	*	2462	110.54	-	-	107.87	27.3	6.61	31.24	150	247	P	V
	*	2462	101.38	-	-	98.71	27.3	6.61	31.24	150	247	A	V
		2483.56	59.2	-14.8	74	56.49	27.35	6.58	31.22	150	247	P	V
		2483.52	46.05	-7.95	54	43.34	27.35	6.58	31.22	150	247	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	42.84	-31.16	74	60.17	31.42	9.44	58.19	185	255	P	H
		4824	42.18	-31.82	74	59.51	31.42	9.44	58.19	185	255	P	V
802.11g CH 06 2437MHz		4874	43.42	-30.58	74	60.61	31.51	9.4	58.1	165	106	P	H
		7311	49.23	-24.77	74	58.79	36.36	12	57.92	174	100	P	H
		4874	42.43	-31.57	74	59.62	31.51	9.4	58.1	165	106	P	V
		7311	49.39	-24.61	74	58.95	36.36	12	57.92	174	100	P	V
802.11g CH 11 2462MHz		4924	42.59	-31.41	74	59.59	31.59	9.43	58.02	150	285	P	H
		7386	49	-25	74	57.99	36.65	12.01	57.65	155	274	P	H
		4924	41.82	-32.18	74	58.82	31.59	9.43	58.02	150	285	P	V
		7386	49.05	-24.95	74	58.04	36.65	12.01	57.65	155	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n 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		2389.17	48.33	-25.67	74	45.87	27.09	6.65	31.28	150	237	P	H
		2389.59	37.69	-16.31	54	35.23	27.09	6.65	31.28	150	237	A	H
	*	2412	102.11	-	-	99.57	27.14	6.66	31.26	150	237	P	H
	*	2412	92.98	-	-	90.44	27.14	6.66	31.26	150	237	A	H
		2389.17	58.31	-15.69	74	55.85	27.09	6.65	31.28	150	109	P	V
		2389.91	44.67	-9.33	54	42.21	27.09	6.65	31.28	150	109	A	V
	*	2412	109.4	-	-	106.86	27.14	6.66	31.26	150	109	P	V
	*	2412	99.84	-	-	97.3	27.14	6.66	31.26	150	109	A	V
802.11n HT20 CH 06 2437MHz		2353.4	48.33	-25.67	74	46.09	26.99	6.58	31.33	150	237	P	H
		2389.38	36.63	-17.37	54	34.17	27.09	6.65	31.28	150	237	A	H
	*	2437	96.11	-	-	93.5	27.24	6.63	31.26	150	237	P	H
	*	2437	86.78	-	-	84.17	27.24	6.63	31.26	150	237	A	H
		2484.6	48.36	-25.64	74	45.65	27.35	6.58	31.22	150	237	P	H
		2483.9	37.23	-16.77	54	34.52	27.35	6.58	31.22	150	237	A	H
		2389.38	51.49	-22.51	74	49.03	27.09	6.65	31.28	150	109	P	V
		2389.1	40.02	-13.98	54	37.56	27.09	6.65	31.28	150	109	A	V
	*	2437	106.9	-	-	104.29	27.24	6.63	31.26	150	109	P	V
	*	2437	97	-	-	94.39	27.24	6.63	31.26	150	109	A	V
		2484.46	53.85	-20.15	74	51.14	27.35	6.58	31.22	150	109	P	V
		2483.5	41.93	-12.07	54	39.22	27.35	6.58	31.22	150	109	A	V



802.11n HT20 CH 11 2462MHz	*	2462	102.18	-	-	99.51	27.3	6.61	31.24	150	237	P	H
	*	2462	92.84	-	-	90.17	27.3	6.61	31.24	150	237	A	H
		2483.68	51.27	-22.73	74	48.56	27.35	6.58	31.22	150	237	P	H
		2483.52	39.89	-14.11	54	37.18	27.35	6.58	31.22	150	237	A	H
	*	2462	109.87	-	-	107.2	27.3	6.61	31.24	150	109	P	V
	*	2462	100.87	-	-	98.2	27.3	6.61	31.24	150	109	A	V
		2484.32	56.66	-17.34	74	53.95	27.35	6.58	31.22	150	109	P	V
		2483.88	43.98	-10.02	54	41.27	27.35	6.58	31.22	150	109	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	42.35	-31.65	74	59.68	31.42	9.44	58.19	185	255	P	H
		4824	42.05	-31.95	74	59.38	31.42	9.44	58.19	185	255	P	V
802.11n HT20 CH 06 2437MHz		4874	41.8	-32.2	74	58.99	31.51	9.4	58.1	165	106	P	H
		7311	48.9	-25.1	74	58.46	36.36	12	57.92	174	100	P	H
		4874	42.9	-31.1	74	60.09	31.51	9.4	58.1	165	106	P	V
		7311	48.79	-25.21	74	58.35	36.36	12	57.92	174	100	P	V
802.11n HT20 CH 11 2462MHz		4924	41.32	-32.68	74	58.32	31.59	9.43	58.02	150	285	P	H
		7386	48.72	-25.28	74	57.71	36.65	12.01	57.65	155	274	P	H
		4924	42.41	-31.59	74	59.41	31.59	9.43	58.02	150	285	P	V
		7386	48.29	-25.71	74	57.28	36.65	12.01	57.65	155	274	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1+2	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.66	53.76	-20.24	74	51.3	27.09	6.65	31.28	150	233	P	H
		2389.8	42.66	-11.34	54	40.2	27.09	6.65	31.28	150	233	A	H
	*	2422	100.8	-	-	98.21	27.19	6.66	31.26	150	233	P	H
	*	2422	90.75	-	-	88.16	27.19	6.66	31.26	150	233	A	H
		2485.79	53.96	-20.04	74	51.25	27.35	6.58	31.22	150	233	P	H
		2486	38.38	-15.62	54	35.67	27.35	6.58	31.22	150	233	A	H
		2388.54	65.4	-8.6	74	62.94	27.09	6.65	31.28	150	108	P	V
		2389.94	49.94	-4.06	54	47.48	27.09	6.65	31.28	150	108	A	V
	*	2422	110.21	-	-	107.62	27.19	6.66	31.26	150	108	P	V
	*	2422	100.09	-	-	97.5	27.19	6.66	31.26	150	108	A	V
		2484.88	62.91	-11.09	74	60.2	27.35	6.58	31.22	150	108	P	V
		2483.5	43	-11	54	40.29	27.35	6.58	31.22	150	108	A	V
802.11n HT40 CH 06 2437MHz		2353.4	49.19	-24.81	74	46.95	26.99	6.58	31.33	100	105	P	H
		2389.38	37.02	-16.98	54	34.56	27.09	6.65	31.28	100	105	A	H
	*	2437	101	-	-	98.39	27.24	6.63	31.26	100	105	P	H
	*	2437	91.61	-	-	89	27.24	6.63	31.26	100	105	A	H
		2483.5	53.3	-20.7	74	50.59	27.35	6.58	31.22	100	105	P	H
		2483.9	37.66	-16.34	54	34.95	27.35	6.58	31.22	100	105	A	H
		2389.8	61.41	-12.59	74	58.95	27.09	6.65	31.28	100	94	P	V
		2389.66	41.6	-12.4	54	39.14	27.09	6.65	31.28	100	94	A	V
	*	2437	108.49	-	-	105.88	27.24	6.63	31.26	100	94	P	V
	*	2437	100.96	-	-	98.35	27.24	6.63	31.26	100	94	P	V
		2483.69	63.7	-10.3	74	60.99	27.35	6.58	31.22	100	94	P	V
		2484.81	42.8	-11.2	54	40.09	27.35	6.58	31.22	100	94	A	V



802.11n HT40 CH 09 2452MHz		2389.8	55.75	-18.25	74	53.29	27.09	6.65	31.28	155	244	P	H
		2389.66	36.93	-17.07	54	34.47	27.09	6.65	31.28	155	244	A	H
	*	2452	98.91	-	-	96.3	27.24	6.61	31.24	155	244	P	H
	*	2452	89.43	-	-	86.82	27.24	6.61	31.24	155	244	A	H
		2484.81	62.06	-11.94	74	59.35	27.35	6.58	31.22	155	244	P	H
		2483.69	41.05	-12.95	54	38.34	27.35	6.58	31.22	155	244	A	H
		2387.56	56.85	-17.15	74	54.39	27.09	6.65	31.28	150	42	P	V
		2389.66	39.74	-14.26	54	37.28	27.09	6.65	31.28	150	42	A	V
	*	2452	109.98	-	-	107.37	27.24	6.61	31.24	150	42	P	V
	*	2452	100.25	-	-	97.64	27.24	6.61	31.24	150	42	A	V
		2485.23	69.15	-4.85	74	66.44	27.35	6.58	31.22	150	42	P	V
		2483.55	51.6	-2.4	54	48.89	27.35	6.58	31.22	150	42	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		4844	42.19	-31.81	74	59.47	31.45	9.43	58.16	150	350	P	H
HT40		7266	48.6	-25.4	74	58.43	36.24	11.96	58.03	200	360	P	H
CH 03		4844	42.55	-31.45	74	59.83	31.45	9.43	58.16	150	350	P	V
2422MHz		7266	48.35	-25.65	74	58.18	36.24	11.96	58.03	200	360	P	V
802.11n		4874	42.22	-31.78	74	59.41	31.51	9.4	58.1	165	230	P	H
HT40		7311	48.91	-25.09	74	58.47	36.36	12	57.92	186	323	P	H
CH 06		4874	42.79	-31.21	74	59.98	31.51	9.4	58.1	165	230	P	V
2437MHz		7311	47.96	-26.04	74	57.52	36.36	12	57.92	186	323	P	V
802.11n		4904	41.97	-32.03	74	59.07	31.56	9.38	58.04	150	360	P	H
HT40		7356	48.45	-25.55	74	57.67	36.53	12.01	57.76	165	335	P	H
CH 09		4904	42.32	-31.68	74	59.42	31.56	9.38	58.04	150	360	P	V
2452MHz		7356	49.13	-24.87	74	58.35	36.53	12.01	57.76	165	335	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	24.68	-15.32	40	31.5	24.9	0.25	31.97	-	-	P	H
		127.97	22.59	-20.91	43.5	35.49	17.54	1.18	31.62	-	-	P	H
		305.48	22.52	-23.48	46	32.31	19.55	1.88	31.22	-	-	P	H
		475.23	27.17	-18.83	46	32.58	23.48	2.37	31.26	-	-	P	H
		646.92	30.08	-15.92	46	32.28	26.22	2.81	31.23	-	-	P	H
		820.55	34.02	-11.98	46	33.33	28.66	3.2	31.17	100	38	P	H
		30	28.16	-11.84	40	34.98	24.9	0.25	31.97	-	-	P	V
		59.1	29.37	-10.63	40	48.3	12.16	0.82	31.91	100	49	P	V
		150.28	22.58	-20.92	43.5	35.89	16.97	1.27	31.55	-	-	P	V
		317.12	25.11	-20.89	46	34.55	19.84	1.94	31.22	-	-	P	V
		768.17	31.92	-14.08	46	32.11	27.92	3.08	31.19	-	-	P	V
		944.71	34.27	-11.73	46	32.29	29.84	3.46	31.32	-	-	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”.

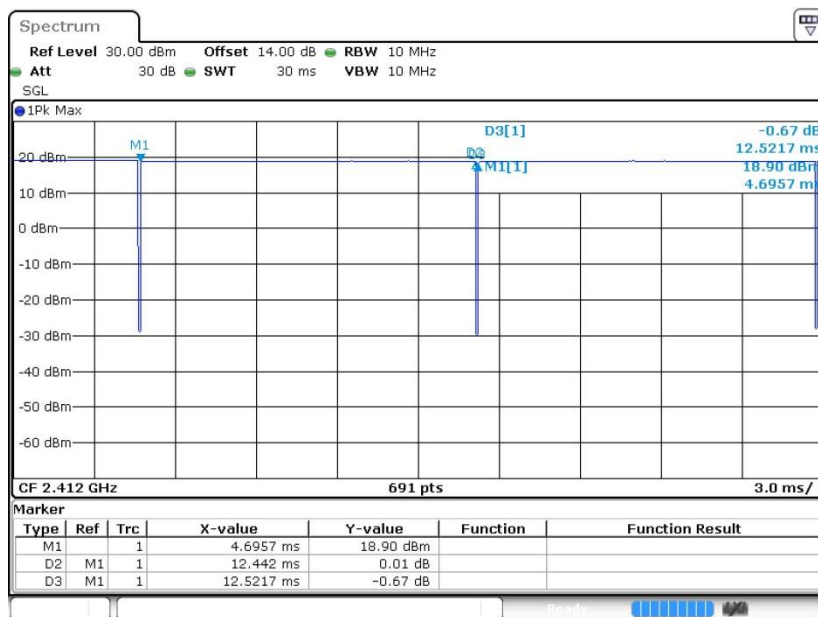


Appendix D. Duty Cycle Plots

Band	Duty Cycle(%)	T(ms)	1/T(kHz)	VBW Setting
11b	99.36	12.442	0.080	10Hz
11g	95.00	2.065	0.484	1KHz
11n HT20	94.66	1.928	0.519	1KHz
11n HT40	90.85	0.949	1.053	3KHz

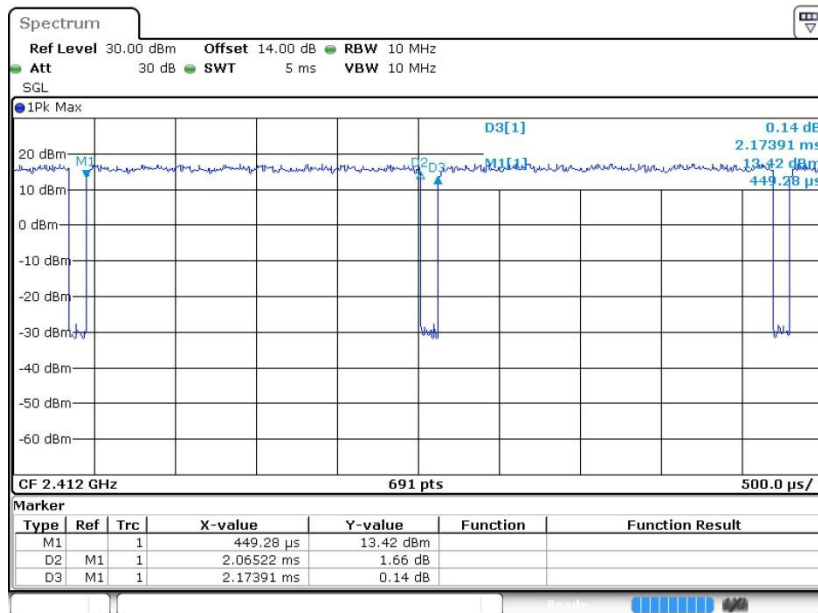


11b



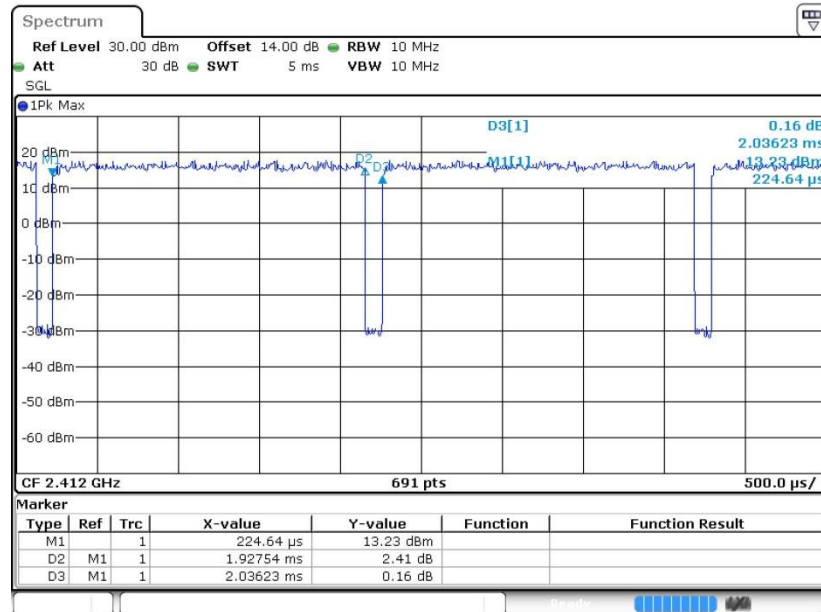
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11g



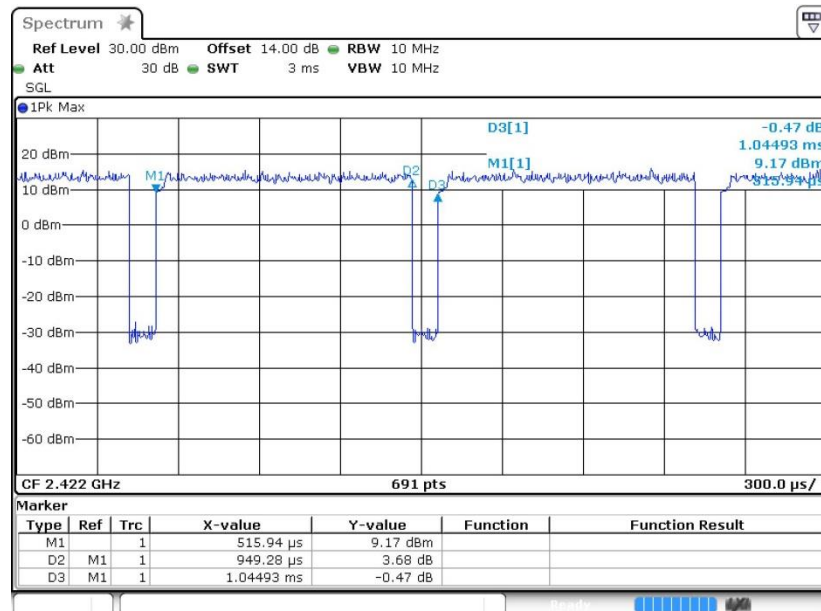
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11n HT20



Date: 29 MAY.2018 16:12:06

11n HT40



Date: 29 MAY.2018 16:16:54