FCC RADIO TEST REPORT

FCC ID	:	**J9CQSIP7180**
Equipment	:	**7c Modular Platform**
Brand Name	:	**Qualcomm**
Model Name	:	**QSIP7180**
Applicant	:	**Qualcomm Technologies, Inc. 5775 Morehouse Dr.San Diego, CA 92121-1714 (USA)**
Manufacturer	:	**Qualcomm Technologies, Inc. 5775 Morehouse Dr.San Diego, CA 92121-1714 (USA)**
Standard	:	**FCC Part 15 Subpart C §15.247**

The product was received on Jun. 08, 2020 and testing was started from Aug. 17, 2020 and completed on Aug. 27, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FR042002C	01	Initial issue of report	Sep. 17, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.247(a)(2)	6dB Bandwidth	Not Required	-
-	2.1049	99% Occupied Bandwidth	Not Required	-
3.1	15.247(b)	Power Output Measurement	Pass	-
-	15.247(e)	Power Spectral Density	Not Required	-
-	15.247(d)	Conducted Band Edges	Not Required	-
		Conducted Spurious Emission	Not Required	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 3.99 dB at 2483.520 MHz
-	15.207	AC Conducted Emission	Not Required	-
3.3	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Note:

1. Not required means after assessing, test items are not necessary to carry out.
2. QSIP7180 is an initial module including WCDMA, LTE, Wi-Fi and BT wireless communication technology. QSIP7180P is a variant module of QSIP7180, the design architecture of the two is the same, but QSIP7180P removes the WWAN functional blocks such as LTE and WCDMA.
   So, QSIP7180P keeps its' Wi-Fi and BT functional block with the same design and electrical characteristics as QSIP7180.
   Therefore, we run spot check verification approach to confirm and certify the QSIP7180P's EMC and RF performance which is theoretically equivalent to QSIP7180.
   As presented in this report which is the result of spot check verification for QSIP7180P.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Amy Chen

1 General Description

1.1 Product Feature of Equipment Under Test

WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac, Wi-Fi 5GHz 802.11a/n/ac and GNSS

Antenna Information								
Antenna No.	Brand	Model	Antenna Net gain	Frequency Range (MHz)	Cable Loss (dBi)	Ant. Type	Connector Type	Cable Length (mm)
1	WNC	81.EBJ15.005	3.00	2400-2500 MHz	1.15	PIFA	IPEX	300
			2.56	5150-5350 MHz	1.7			
			4.76	5470-5725MHz	1.74			
			4.76	5725-5825 MHz	1.79			
2	WNC	81.EBJ15.005	3.62	2400-2500 MHz	1.15	PIFA	IPEX	300
			3.08	5150-5350 MHz	1.7			
			3.31	5470-5725MHz	1.74			
			2.42	5725-5825 MHz	1.79			

Remark:

1. Above antenna gains of antenna are Total (H+V).
2. For Bluetooth mode was fixed transmission on Chain (0)
3. The maximum gain was chosen for test.

1.2 Modification of EUT

No modifications are made to the EUT during all test items.

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH15-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: TW1190 and TW0007

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in two degrees (0 and 90). The worst cases (Degree 0) were recorded in this report.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		

2.2 Test Mode

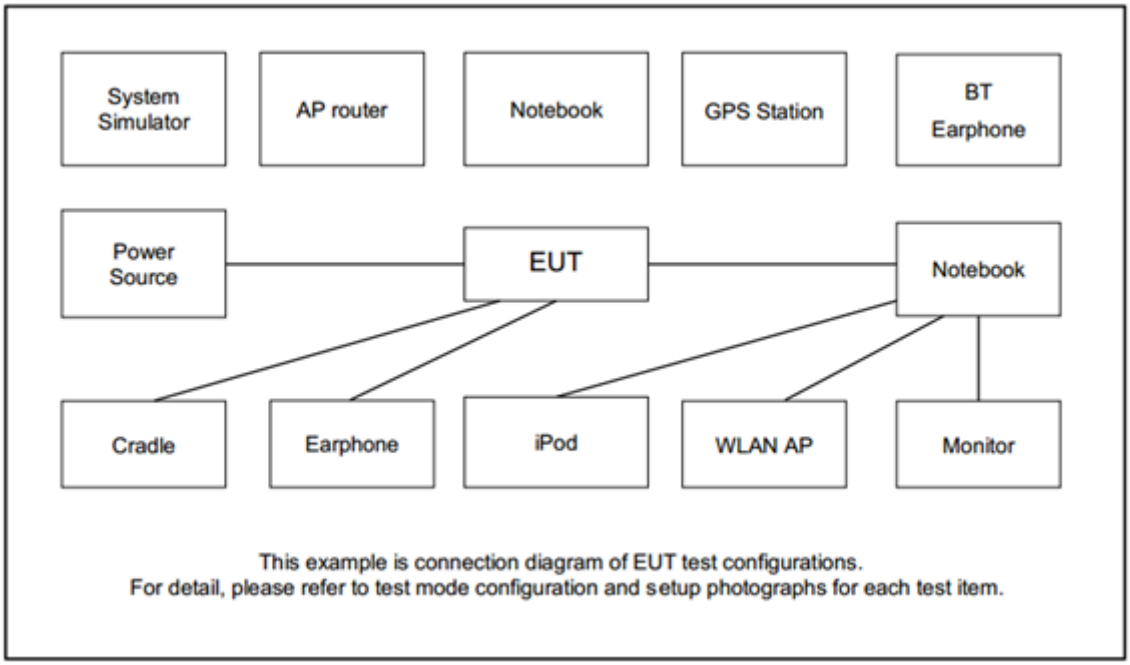
Final test modes are considering the modulation and worse data rates as below table.

Modulation	Data Rate
802.11b	**1 Mbps**
802.11g	**6 Mbps**
802.11n HT20	**MCS0**
802.11n HT40	**MCS0**
802.11ac VHT20	**MCS0**
802.11ac VHT40	**MCS0**

Ch. #	2400-2483.5 MHz
	802.11n HT20
High	13

Remark: For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Power Supply	GW Instek	GPE-2323	N/A	N/A	Unshielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility “QRCT4 V4.0.00156.0” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

3 Test Result

3.1 Output Power Measurement

3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

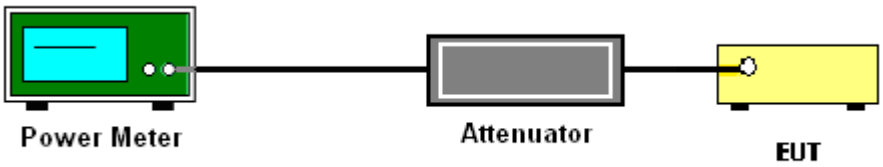
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.1.4 Test Setup



3.1.5 Test Result of Average Output Power

Please refer to Appendix A.

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 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

3.2.2 Measuring Instruments

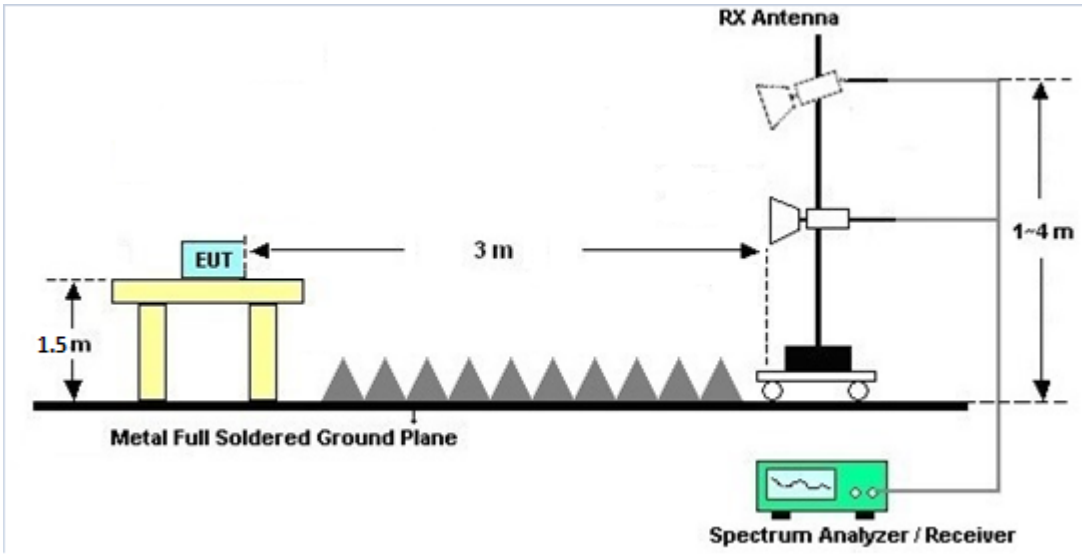
See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
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 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 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.
7. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) 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.

3.2.4 Test Setup

For radiated emissions above 1GHz



3.2.5 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.2.6 Duty Cycle

Please refer to Appendix D.

3.2.7 Test Result of Radiated Spurious Emission

Please refer to Appendix B and C.

3.3 Antenna Requirements

3.3.1 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.

3.3.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.3.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Aug. 17, 2020	Mar. 01, 2021	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SNO10	10MHz~6GHz	Dec. 23, 2019	Aug. 17, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Dec. 30, 2019	Aug. 17, 2020	Dec. 29, 2020	Conducted (TH05-HY)
Power Supply	GW Instek	SPS-606	GES842931	NA	Aug. 19, 2019	Aug. 17, 2020	Aug. 18, 2020	Conducted (TH05-HY)
Switch Control Manframe	Burgeon	ETF-058	EC1300484	N/A	Aug. 22, 2019	Aug. 17, 2020	Aug. 21, 2020	Conducted (TH05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1620	1-18GHz	Oct. 28, 2019	Aug. 25, 2020~ Aug. 27, 2020	Oct. 27, 2020	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Dec. 10, 2019	Aug. 25, 2020~ Aug. 27, 2020	Dec. 09, 2020	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-303	1710001800055006	1GHz~18GHz	May 07, 2020	Aug. 25, 2020~ Aug. 27, 2020	May 06, 2021	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 21, 2019	Aug. 25, 2020~ Aug. 27, 2020	Aug. 20, 2021	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Aug. 25, 2020~ Aug. 27, 2020	Dec. 12, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Nov. 01, 2019	Aug. 25, 2020~ Aug. 27, 2020	Oct. 31, 2020	Radiation (03CH15-HY
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	May 04, 2020	Aug. 25, 2020~ Aug. 27, 2020	May 03, 2021	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Aug. 25, 2020~ Aug. 27, 2020	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Aug. 25, 2020~ Aug. 27, 2020	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24 (k5)	RK-000451	N/A	N/A	Aug. 25, 2020~ Aug. 27, 2020	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 14, 2020	Aug. 25, 2020~ Aug. 27, 2020	Apr. 13, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4PE	30M-18G	Apr. 14, 2020	Aug. 25, 2020~ Aug. 27, 2020	Apr. 13, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY37710/4	30M-18G	Apr. 17, 2020	Aug. 25, 2020~ Aug. 27, 2020	Apr. 16, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 25, 2020	Aug. 25, 2020~ Aug. 27, 2020	Feb. 24, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 25, 2020	Aug. 25, 2020~ Aug. 27, 2020	Feb. 24, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN4	1.53G Low Pass	Jul. 03, 2020	Aug. 25, 2020~ Aug. 27, 2020	Jul. 02, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN4	3GHz High Pass Filter	Sep. 17, 2019	Aug. 25, 2020~ Aug. 27, 2020	Sep. 16, 2020	Radiation (03CH15-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.4**

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

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

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kathy Chen / Kai Liao	Temperature:	21~22	°C
Test Date:	2020/8/17	Relative Humidity:	51~52	%

Report Number : FR042002C

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	
11b	1Mbps	2	1	2412	18.40	18.40	21.41	29.37		6.63		28.04		36.00		Pass
11b	1Mbps	2	2	2417	18.20	18.40	21.31	29.37		6.63		27.94		36.00		Pass
11b	1Mbps	2	6	2437	18.40	18.20	21.31	29.37		6.63		27.94		36.00		Pass
11b	1Mbps	2	10	2457	18.20	18.50	21.36	29.37		6.63		27.99		36.00		Pass
11b	1Mbps	2	11	2462	16.60	16.90	19.76	29.37		6.63		26.39		36.00		Pass
11b	1Mbps	2	12	2467	16.50	17.00	19.77	29.37		6.63		26.40		36.00		Pass
11b	1Mbps	2	13	2472	14.90	15.50	18.22	29.37		6.63		24.85		36.00		Pass
11g	6Mbps	2	1	2412	16.10	16.90	19.53	29.37		6.63		26.16		36.00		Pass
11g	6Mbps	2	2	2417	17.80	18.50	21.17	29.37		6.63		27.80		36.00		Pass
11g	6Mbps	2	6	2437	18.40	18.20	21.31	29.37		6.63		27.94		36.00		Pass
11g	6Mbps	2	10	2457	17.20	17.70	20.47	29.37		6.63		27.10		36.00		Pass
11g	6Mbps	2	11	2462	15.00	15.90	18.48	29.37		6.63		25.11		36.00		Pass
11g	6Mbps	2	12	2467	13.80	14.70	17.28	29.37		6.63		23.91		36.00		Pass
11g	6Mbps	2	13	2472	2.60	3.50	6.08	29.37		6.63		12.71		36.00		Pass
HT20	MCS0	2	1	2412	14.80	15.60	18.23	29.37		6.63		24.86		36.00		Pass
HT20	MCS0	2	2	2417	17.60	18.50	21.08	29.37		6.63		27.71		36.00		Pass
HT20	MCS0	2	6	2437	18.10	18.10	21.11	29.37		6.63		27.74		36.00		Pass
HT20	MCS0	2	10	2457	17.00	17.80	20.43	29.37		6.63		27.06		36.00		Pass
HT20	MCS0	2	11	2462	14.90	15.80	18.38	29.37		6.63		25.01		36.00		Pass
HT20	MCS0	2	12	2467	12.30	12.90	15.62	29.37		6.63		22.25		36.00		Pass
HT20	MCS0	2	13	2472	3.70	4.60	7.18	29.37		6.63		13.81		36.00		Pass
HT40	MCS0	2	3	2422	14.30	14.30	17.31	29.37		6.63		23.94		36.00		Pass
HT40	MCS0	2	4	2427	16.60	16.80	19.71	29.37		6.63		26.34		36.00		Pass
HT40	MCS0	2	6	2437	16.60	16.90	19.76	29.37		6.63		26.39		36.00		Pass
HT40	MCS0	2	8	2447	14.20	14.70	17.47	29.37		6.63		24.10		36.00		Pass
HT40	MCS0	2	9	2452	13.50	13.70	16.61	29.37		6.63		23.24		36.00		Pass
HT40	MCS0	2	10	2457	8.10	8.10	11.11	29.37		6.63		17.74		36.00		Pass
HT40	MCS0	2	11	2462	0.40	0.20	3.31	29.37		6.63		9.94		36.00		Pass
VHT20	MCS0	2	1	2412	14.70	15.60	18.18	29.37		6.63		24.81		36.00		Pass
VHT20	MCS0	2	2	2417	16.70	18.40	20.64	29.37		6.63		27.27		36.00		Pass
VHT20	MCS0	2	6	2437	17.60	17.70	20.66	29.37		6.63		27.29		36.00		Pass
VHT20	MCS0	2	10	2457	16.90	17.70	20.33	29.37		6.63		26.96		36.00		Pass
VHT20	MCS0	2	11	2462	14.80	15.70	18.28	29.37		6.63		24.91		36.00		Pass
VHT20	MCS0	2	12	2467	12.20	12.90	15.57	29.37		6.63		22.20		36.00		Pass
VHT20	MCS0	2	13	2472	3.60	4.60	7.14	29.37		6.63		13.77		36.00		Pass
VHT40	MCS0	2	3	2422	14.20	14.20	17.21	29.37		6.63		23.84		36.00		Pass
VHT40	MCS0	2	4	2427	16.50	16.80	19.66	29.37		6.63		26.29		36.00		Pass
VHT40	MCS0	2	6	2437	16.50	16.80	19.66	29.37		6.63		26.29		36.00		Pass
VHT40	MCS0	2	8	2447	14.10	14.60	17.37	29.37		6.63		24.00		36.00		Pass
VHT40	MCS0	2	9	2452	13.40	13.70	16.56	29.37		6.63		23.19		36.00		Pass
VHT40	MCS0	2	10	2457	6.90	7.10	10.01	29.37		6.63		16.64		36.00		Pass
VHT40	MCS0	2	11	2462	-0.70	-0.50	2.41	29.37		6.63		9.04		36.00		Pass

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

Appendix B. Radiated Spurious Emission

Test Engineer :	Leo Lee, Mancy Chou, and Bigshow Wang	Temperature :	21.4~22.9°C
		Relative Humidity :	52~61%

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
0+1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
	*	2472	92.48	-	-	78.3	27.56	17.5	30.88	198	226	P	H
	*	2472	84.91	-	-	70.73	27.56	17.5	30.88	198	226	A	H
		2483.6	57.72	-16.28	74	43.55	27.53	17.52	30.88	198	226	P	H
		2483.52	46.95	-7.05	54	32.78	27.53	17.52	30.88	198	226	A	H
802.11n													H
HT20													H
CH 13	*	2472	93.45	-	-	79.27	27.56	17.5	30.88	321	202	P	V
2472MHz	*	2472	85.66	-	-	71.48	27.56	17.5	30.88	321	202	A	V
		2483.56	60.12	-13.88	74	45.95	27.53	17.52	30.88	321	202	P	V
		2483.52	50.01	-3.99	54	35.84	27.53	17.52	30.88	321	202	A	V
													V
													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. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		4944	40.69	-33.31	74	57.61	31.46	10.79	59.17	100	0	P	H
		7416	45.55	-28.45	74	54.81	36.46	12.7	58.42	100	0	P	H
802.11n													H
HT20													H
CH 13		4944	40.38	-33.62	74	57.3	31.46	10.79	59.17	100	0	P	V
2472MHz		7416	45.77	-28.23	74	55.03	36.46	12.7	58.42	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average 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	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
0+1		(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. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =

Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Path 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) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

Appendix C. Radiated Spurious Emission Plots

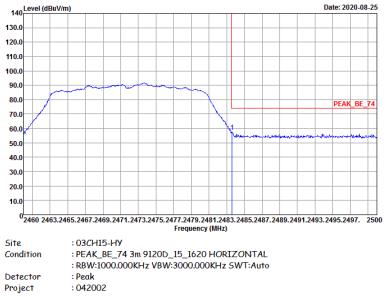
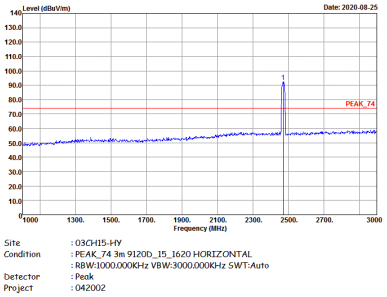
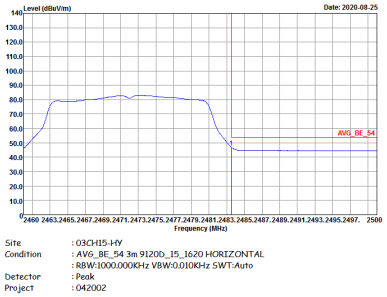
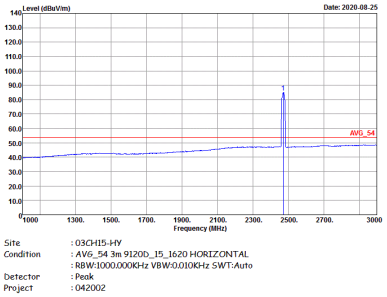
Test Engineer :	Leo Lee, Mancy Chou, and Bigshow Wang	**Temperature :**	21.4~22.9°C
		Relative Humidity :	52~61%

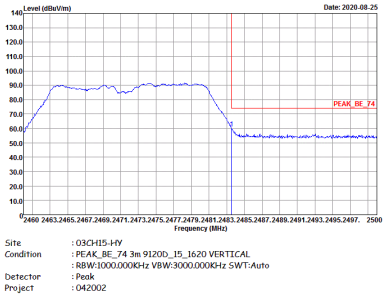
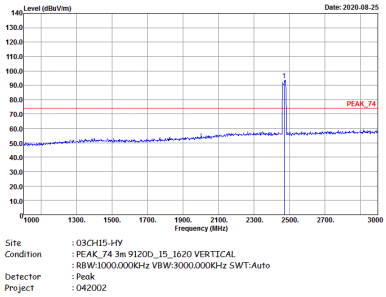
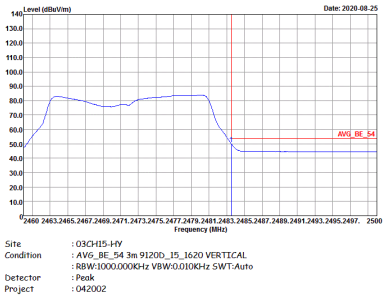
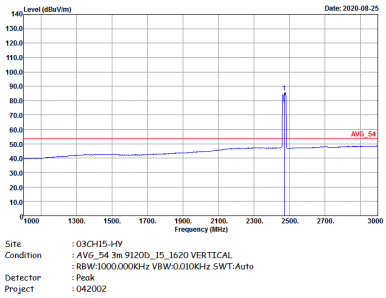
Note symbol

-L	**Low channel location**
-R	**High channel location**

2.4GHz 2400~2483.5MHz

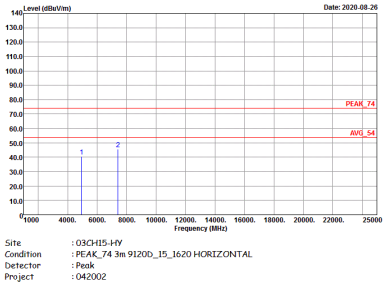
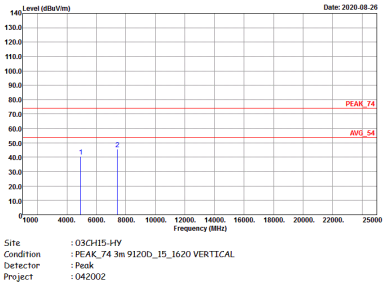
WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH13 2472MHz	
0+1	Horizontal	Fundamental
Peak		
Avg.		

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH13 2472MHz	
0+1	Vertical	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 042002	 Site : 03CH15-HY Condition : PEAK_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 042002
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Detector : Peak Project : 042002	 Site : 03CH15-HY Condition : AVG_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:0.010KHz SWT:Auto Detector : Peak Project : 042002

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Harmonic @ 3m)

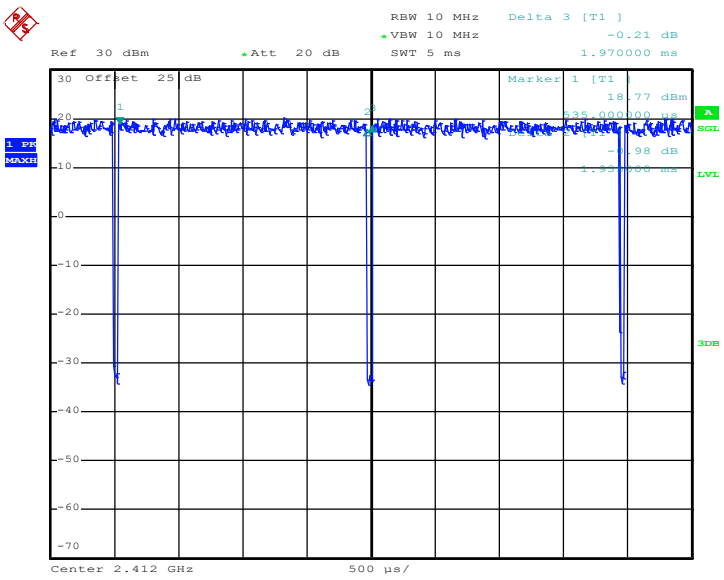
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT20 CH13 2472MHz	
0+1	Horizontal	Vertical
Peak Avg.		

Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
0+1	2.4GHz 802.11n HT20 for Ant 0	98.22	-	-	10Hz	0.08
0+1	2.4GHz 802.11n HT20 for Ant 1	98.22	-	-	10Hz	0.08

MIMO <Ant. 0>

802.11n HT20



MIMO <Ant. 1>

802.11n HT20