



FCC RADIO TEST REPORT

FCC ID : PPD-QCNFA344AH
Equipment : 802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand Name : Qualcomm Atheros
Model Name : QCNFA344A
Applicant : Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA 95110
Manufacturer : Qualcomm Atheros, Inc.
1700 Technology Drive, San Jose, CA 95110
Standard : FCC Part 15 Subpart C §15.247

Equipment: Qualcomm Atheros QCNFA344A tested inside of Lenovo Notebook Computer.

The product was received on Jan. 09, 2020 and testing was started from Jan. 28, 2020 and completed on Mar. 31, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this partial 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



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History of this test report

Report No.	Version	Description	Issued Date
FR010908-05C	01	Initial issue of report	Mar. 31, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(b)	Power Output Measurement	Pass	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 1.15 dB at 2483.520 MHz
3.3	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Note: The test plan for power and Radiated Spurious Emission measurement are designated by manufacturer as worst case for Test Lab. measurement. Then, all test cases are performed, based on the worst power measured by Test Lab, and reported accordingly.

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: Cindy Liu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	802.11a/b/g/n/ac + BT 4.1 M.2 2230 Type Card
Brand Name	Qualcomm Atheros
Model Name	QCNFA344A
FCC ID	PPD-QCNFA344AH
Sample 1	EUT with Host 1
Sample 2	EUT with Host 2
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
EUT Stage	Production Unit

Remark:

- The above EUT's information was declared by manufacturer.
- Equipment: Qualcomm Atheros QCNFA344A tested inside of Lenovo Notebook Computer.

The product was installed into Notebook Computer (Brand Name: Lenovo, Model Name: IdeaPad Flex 5 14ARE05) during test, and the host information was recorded in the following table.

Host Information	
Host 1	Host with AWAN Antenna
Host 2	Host with High-Tek Antenna

Antenna Information													
Antenna 1	Manufacturer			AWAN			Antenna 2	Manufacturer			AWAN		
	Ant. Type			PIFA				Ant. Type			PIFA		
	Part Number			025.901MZ.0001				Part Number			025.901N0.0001		
	Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)		Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)
	2400 MHz	2483.5MHz	1.23	5470 MHz	5725 MHz	-3.97		2400 MHz	2483.5MHz	0.73	5470 MHz	5725 MHz	-2.16
	5150 MHz	5250 MHz	-0.12	5725 MHz	5850 MHz	-3.33		5150 MHz	5250 MHz	-0.88	5725 MHz	5850 MHz	-0.77
	5250 MHz	5350 MHz	-1.47					5250 MHz	5350 MHz	-0.9			
Antenna 1	Manufacturer			High-tek			Antenna 2	Manufacturer			High-tek		
	Ant. Type			PIFA				Ant. Type			PIFA		
	Part Number			025.901N3.0001				Part Number			025.901N4.0001		
	Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)		Min Freq.	Max Freq.	Peak Gain (dBi)	Min Freq.	Max Freq.	Peak Gain (dBi)
	2400 MHz	2483.5MHz	2.95	5470 MHz	5725 MHz	2.03		2400 MHz	2483.5 MHz	1.27	5470 MHz	5725 MHz	-0.76
	5150 MHz	5250 MHz	1.24	5725 MHz	5850 MHz	2.54		5150 MHz	5250 MHz	0.83	5725 MHz	5850 MHz	-0.06
	5250 MHz	5350 MHz	0.5				5250 MHz	5350 MHz	0.83				
Remark: All the tests were performed with “High-Tek Antenna” as representative.													

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification			
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz		
Average Output Power to antenna	MIMO<Ant. 1+2> 802.11b : 18.27 dBm (0.0671 W) 802.11g : 17.91 dBm (0.0618 W) 802.11n HT20 : 18.04 dBm (0.0637 W) 802.11n HT40 : 18.04 dBm (0.0637 W) 802.11ac VHT20 : 17.91 dBm (0.0618 W) 802.11ac VHT40 : 17.94 dBm (0.0622 W)		
Type of Modulation	802.11b : DSSS (DBPSK/DQPSK/CCK) 802.11g/n: OFDM (BPSK/QPSK/16QAM/64QAM) 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)		
Antenna Function Description		Ant. 1	Ant. 2
	802.11 b/g/n/ac MIMO	V	V

Note:

- For other wireless features of this EUT, test report will be issued separately.
- MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

1.3 Modification of EUT

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

1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan
Test Site No.	Sporton Site No.
	TH05-HY

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

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
Test Site No.	Sporton Site No.
	03CH13-HY

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

FCC designation No.: TW1190 and TW0007

1.5 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: All test items were verified and recorded according to the standards and without any deviation during the test.

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).

2.1 Carrier Frequency and Channel

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

2.2 Test Mode

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

MIMO Antenna

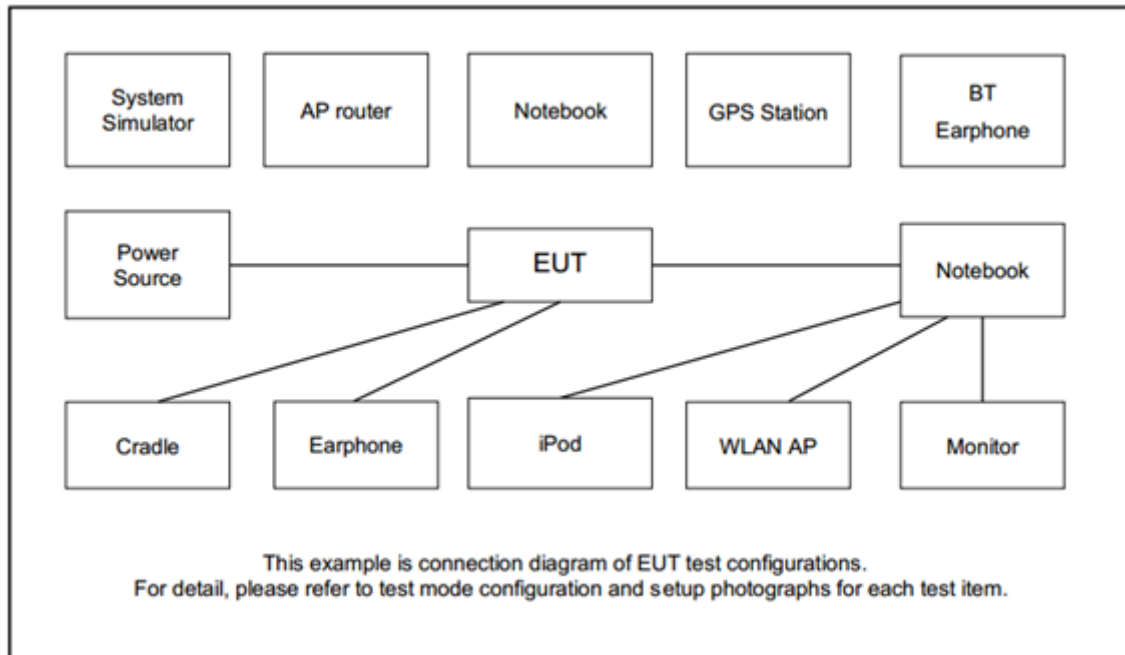
Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0

Ch. #	2400-2483.5 MHz			
	802.11b	802.11g	802.11n HT20	802.11n HT40
Low	-	-	01	03
Middle	06	-	-	-
High	-	11	12	9
	-	13	-	10
	-	-	-	11

Remark:

1. The test plans were by manufacturer definition.
2. For Radiated Test Cases, the tests were performed with Adapter 2 and Sample 2.
3. 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	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

The RF test items, utility "QCARCT_V3.0 169.0" 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 average output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the average 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.

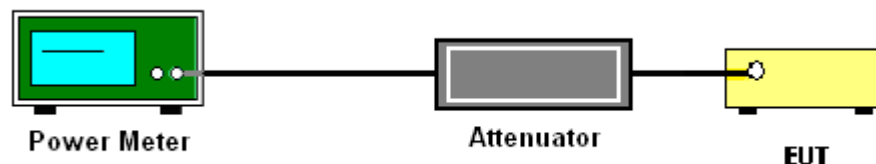
3.1.2 Measuring Instruments

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

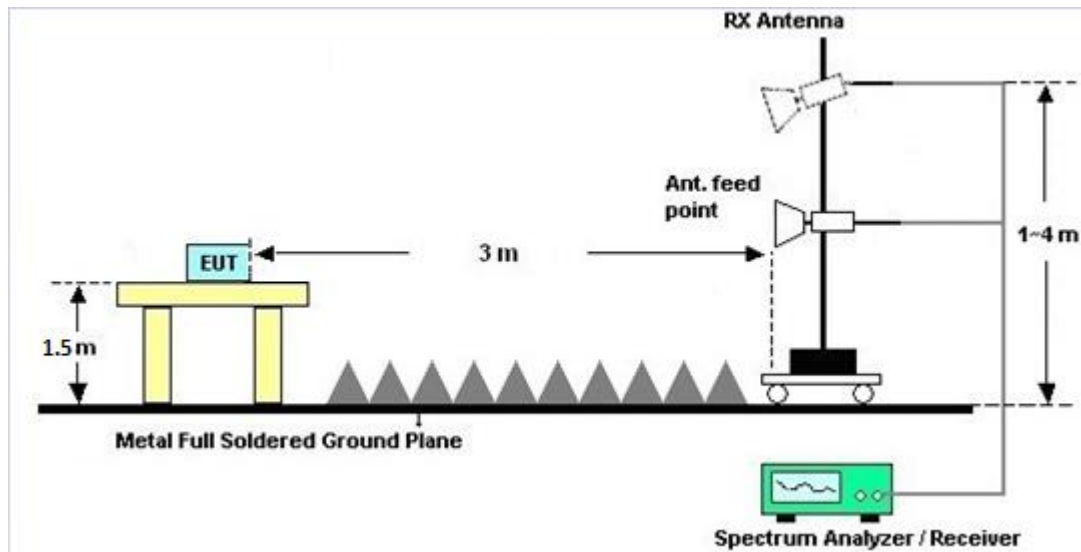
See list of measuring equipment of this test report.

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 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 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=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.

3.2.4 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

<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>						
			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant. 1	Ant. 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	2.95	1.27	2.95	5.16	0.00	0.00

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

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H2	41410069	N/A	Jun. 17, 2019	Jan. 28, 2020 ~ Mar. 31, 2020	Jun. 16, 2020	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SN O10	10MHz~6GHz	Dec. 23, 2019	Jan. 28, 2020 ~ Mar. 31, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Aug. 14, 2019	Jan. 28, 2020 ~ Mar. 31, 2020	Aug. 13, 2020	Conducted (TH05-HY)
Switch Control Manframe	E-IUSTRUMENT	ETF-1405-0	EC1900067	N/A	Aug. 15, 2019	Jan. 28, 2020 ~ Mar. 31, 2020	Aug. 14, 2020	Conducted (TH05-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1241	1GHz ~ 18GHz	Jul. 02, 2019	Feb. 13, 2020 ~ Mar. 18, 2020	Jul. 01, 2020	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA91705 76	18GHz- 40GHz	May 14, 2019	Feb. 13, 2020 ~ Mar. 18, 2020	May 13, 2020	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY5327014 7	1GHz~26.5GHz	Oct. 28, 2019	Feb. 13, 2020 ~ Feb. 14, 2020	Oct. 27, 2020	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-001 01800-30-10 P	1590074	1GHz~18GHz	May 20, 2019	Feb. 13, 2020 ~ Mar. 18, 2020	May 19, 2020	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Feb. 13, 2020 ~ Mar. 18, 2020	Dec. 12, 2020	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY5537052 6	10Hz~44GHz	Mar. 19, 2019	Feb. 13, 2020 ~ Feb. 14, 2020	Mar. 18, 2020	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY5420048 6	10Hz~44GHz	Oct. 28, 2019	Mar. 18, 2020	Oct. 27, 2020	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Feb. 13, 2020 ~ Mar. 18, 2020	N/A	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500 -B	N/A	1m~4m	N/A	Feb. 13, 2020 ~ Mar. 18, 2020	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Feb. 13, 2020 ~ Mar. 18, 2020	N/A	Radiation (03CH13-HY)
Software	AUDIX	E3 6.2009-8-24 c	RK-001124	N/A	N/A	Feb. 13, 2020 ~ Mar. 18, 2020	N/A	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-27 00-3000-180 00-60SS	SN2	3GHz High Pass Filter	Jul. 14, 2019	Feb. 13, 2020 ~ Mar. 18, 2020	Jul. 13, 2020	Radiation (03CH13-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.5
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.8
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Rebecca Li	Temperature:	21~25	°C
Test Date:	2020/1/28~2020/03/31	Relative Humidity:	51~54	%

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO																
Mod.	Data Rate	N _{TX}	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant1	Ant2	SUM	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	Ant1	Ant2	
11b	1Mbps	2	1	2412	15.50	14.80	18.17	30.00		2.95		21.12		36.00		Pass
11b	1Mbps	2	6	2437	15.50	14.60	18.08	30.00		2.95		21.03		36.00		Pass
11b	1Mbps	2	11	2462	15.50	15.00	18.27	30.00		2.95		21.22		36.00		Pass
11b	1Mbps	2	12	2467	10.00	9.20	12.63	30.00		2.95		15.58		36.00		Pass
11b	1Mbps	2	13	2472	9.00	8.30	11.67	30.00		2.95		14.62		36.00		Pass
11g	6Mbps	2	1	2412	15.00	14.10	17.58	30.00		2.95		20.53		36.00		Pass
11g	6Mbps	2	6	2437	15.50	14.20	17.91	30.00		2.95		20.86		36.00		Pass
11g	6Mbps	2	11	2462	14.60	14.40	17.51	30.00		2.95		20.46		36.00		Pass
11g	6Mbps	2	12	2467	1.50	1.00	4.27	30.00		2.95		7.22		36.00		Pass
11g	6Mbps	2	13	2472	1.50	1.00	4.27	30.00		2.95		7.22		36.00		Pass
HT20	MCS0	2	1	2412	15.00	14.30	17.67	30.00		2.95		20.62		36.00		Pass
HT20	MCS0	2	6	2437	15.50	14.50	18.04	30.00		2.95		20.99		36.00		Pass
HT20	MCS0	2	11	2462	14.50	14.00	17.27	30.00		2.95		20.22		36.00		Pass
HT20	MCS0	2	12	2467	0.40	-0.30	3.07	30.00		2.95		6.02		36.00		Pass
HT20	MCS0	2	13	2472	0.40	-0.30	3.07	30.00		2.95		6.02		36.00		Pass
HT40	MCS0	2	3	2422	10.50	10.50	13.51	30.00		2.95		16.46		36.00		Pass
HT40	MCS0	2	6	2437	15.50	14.50	18.04	30.00		2.95		20.99		36.00		Pass
HT40	MCS0	2	9	2452	9.00	8.50	11.77	30.00		2.95		14.72		36.00		Pass
HT40	MCS0	2	10	2457	8.90	8.30	11.62	30.00		2.95		14.57		36.00		Pass
HT40	MCS0	2	11	2462	0.50	0.30	3.41	30.00		2.95		6.36		36.00		Pass
VHT20	MCS0	2	1	2412	15.00	14.10	17.58	30.00		2.95		20.53		36.00		Pass
VHT20	MCS0	2	6	2437	15.50	14.20	17.91	30.00		2.95		20.86		36.00		Pass
VHT20	MCS0	2	11	2462	14.30	13.90	17.11	30.00		2.95		20.06		36.00		Pass
VHT20	MCS0	2	12	2467	0.30	-0.40	2.97	30.00		2.95		5.92		36.00		Pass
VHT20	MCS0	2	13	2472	0.30	-0.40	2.97	30.00		2.95		5.92		36.00		Pass
VHT40	MCS0	2	3	2422	10.30	9.30	12.84	30.00		2.95		15.79		36.00		Pass
VHT40	MCS0	2	6	2437	15.40	14.40	17.94	30.00		2.95		20.89		36.00		Pass
VHT40	MCS0	2	9	2452	8.80	8.10	11.47	30.00		2.95		14.42		36.00		Pass
VHT40	MCS0	2	10	2457	8.80	8.10	11.47	30.00		2.95		14.42		36.00		Pass
VHT40	MCS0	2	11	2462	0.40	0.10	3.26	30.00		2.95		6.21		36.00		Pass

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



Appendix B. Radiated Spurious Emission

Test Engineer :	Jimmy Chung, Karl Hou and Wilson Wu	Temperature :	23~26°C
		Relative Humidity :	50~65%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	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 06 2437MHz		4874	52.51	-21.49	74	72.18	31.2	6.58	57.45	392	205	P	H
		4874	50.47	-3.53	54	70.14	31.2	6.58	57.45	392	205	A	H
		7311	43.18	-30.82	74	55.42	36.78	8.25	57.27	100	0	P	H
													H
		4874	53.87	-20.13	74	73.54	31.2	6.58	57.45	268	168	P	V
		4874	52.05	-1.95	54	71.72	31.2	6.58	57.45	268	168	A	V
		7311	43.63	-30.37	74	55.87	36.78	8.25	57.27	100	0	P	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 802.11g (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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 11 2462MHz	*	2462	112.11	-	-	97.91	27.5	13.98	27.28	126	245	P	H
	*	2462	104.2	-	-	90	27.5	13.98	27.28	126	245	A	H
		2483.68	62.41	-11.59	74	48.18	27.5	14	27.27	126	245	P	H
		2483.6	52.21	-1.79	54	37.98	27.5	14	27.27	126	245	A	H
													H
													H
	*	2462	111.14	-	-	96.94	27.5	13.98	27.28	351	85	P	V
	*	2462	103.26	-	-	89.06	27.5	13.98	27.28	351	85	A	V
		2483.52	63.36	-10.64	74	49.13	27.5	14	27.27	351	85	P	V
		2483.52	52.85	-1.15	54	38.62	27.5	14	27.27	351	85	A	V
													V
													V
802.11g CH 13 2472MHz	*	2472	98.88	-	-	84.66	27.5	13.99	27.27	127	245	P	H
	*	2472	90.97	-	-	76.75	27.5	13.99	27.27	127	245	A	H
		2483.64	63.42	-10.58	74	49.19	27.5	14	27.27	127	245	P	H
		2483.52	52.47	-1.53	54	38.24	27.5	14	27.27	127	245	A	H
													H
													H
	*	2472	97.84	-	-	83.62	27.5	13.99	27.27	350	83	P	V
	*	2472	89.75	-	-	75.53	27.5	13.99	27.27	350	83	A	V
		2483.84	62.82	-11.18	74	48.59	27.5	14	27.27	350	83	P	V
		2483.52	51.63	-2.37	54	37.4	27.5	14	27.27	350	83	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 (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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2390	59.52	-14.48	74	45.25	27.64	13.92	27.29	114	253	P	H
		2389.8	49.69	-4.31	54	35.42	27.64	13.92	27.29	114	253	A	H
	*	2412	112.39	-	-	98.15	27.58	13.94	27.28	114	253	P	H
	*	2412	104.95	-	-	90.71	27.58	13.94	27.28	114	253	A	H
													H
													H
		2390	58.28	-15.72	74	44.01	27.64	13.92	27.29	365	87	P	V
		2390	48.62	-5.38	54	34.35	27.64	13.92	27.29	365	87	A	V
	*	2412	110.76	-	-	96.52	27.58	13.94	27.28	365	87	P	V
	*	2412	102.61	-	-	88.37	27.58	13.94	27.28	365	87	A	V
													V
													V
802.11n HT20 CH 12 2467MHz	*	2467	97.7	-	-	83.42	27.5	4.13	27.28	100	245	P	H
	*	2467	90.14	-	-	75.86	27.5	4.13	27.28	100	245	A	H
		2498.96	56.26	-17.74	74	41.94	27.5	4.16	27.27	100	245	P	H
		2483.6	46.66	-7.34	54	32.35	27.5	4.15	27.27	100	245	A	H
													H
													H
	*	2467	96.86	-	-	82.57	27.5	4.13	27.27	351	75	P	V
	*	2467	88.88	-	-	74.59	27.5	4.13	27.27	351	75	A	V
		2484.04	56.89	-17.11	74	42.57	27.5	4.16	27.27	351	75	P	V
		2483.56	46.14	-7.86	54	31.83	27.5	4.15	27.27	351	75	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 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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2389.8	63.91	-10.09	74	49.64	27.64	13.92	27.29	100	255	P	H
		2389.17	50.54	-3.46	54	36.27	27.64	13.92	27.29	100	255	A	H
	*	2422	105.11	-	-	90.88	27.56	13.95	27.28	100	255	P	H
	*	2422	97.28	-	-	83.05	27.56	13.95	27.28	100	255	A	H
		2485.86	59.86	-14.14	74	45.63	27.5	4.07	27.27	100	255	P	H
		2483.9	48.31	-5.69	54	34.08	27.5	4.07	27.27	100	255	A	H
		2373.525	62.81	-11.19	74	48.48	27.71	13.91	27.29	365	85	P	V
		2388.75	48.5	-5.5	54	34.22	27.65	13.92	27.29	365	85	A	V
	*	2422	102.61	-	-	88.38	27.56	13.95	27.28	365	85	P	V
	*	2422	95.45	-	-	81.22	27.56	13.95	27.28	365	85	A	V
		2490.83	58.76	-15.24	74	44.52	27.5	4.08	27.27	365	85	P	V
		2483.5	47.41	-6.59	54	33.18	27.5	4.07	27.27	365	85	A	V
802.11n HT40 CH 09 2452MHz		2384.2	59.68	-14.32	74	45.39	27.66	3.99	27.29	140	243	P	H
		2386.16	47.18	-6.82	54	32.89	27.66	3.99	27.29	140	243	A	H
	*	2452	103.31	-	-	89.12	27.5	13.97	27.28	140	243	P	H
	*	2452	95.96	-	-	81.77	27.5	13.97	27.28	140	243	A	H
		2485.48	66.31	-7.69	74	52.08	27.5	14	27.27	140	243	P	H
		2483.88	49.86	-4.14	54	35.63	27.5	14	27.27	140	243	A	H
		2386.02	58.21	-15.79	74	43.92	27.66	3.99	27.29	349	84	P	V
		2384.48	46.56	-7.44	54	32.27	27.66	3.99	27.29	349	84	A	V
	*	2452	102.97	-	-	88.78	27.5	13.97	27.28	349	84	P	V
	*	2452	95.32	-	-	81.13	27.5	13.97	27.28	349	84	A	V
		2485.6	62.41	-11.59	74	48.18	27.5	14	27.27	349	84	P	V
		2484.08	49.62	-4.38	54	35.39	27.5	14	27.27	349	84	A	V



802.11n HT40 CH 10 2457MHz		2365.58	58.24	-15.76	74	43.89	27.74	3.97	27.29	110	240	P	H
		2387.84	46.52	-7.48	54	32.24	27.65	3.99	27.29	110	240	A	H
	*	2457	102.46	-	-	88.26	27.5	13.98	27.28	110	240	P	H
	*	2457	95.39	-	-	81.19	27.5	13.98	27.28	110	240	A	H
		2485	67.36	-6.64	74	53.13	27.5	14	27.27	110	240	P	H
		2483.64	51.57	-2.43	54	37.34	27.5	14	27.27	110	240	A	H
		2386.72	58.98	-15.02	74	44.7	27.65	3.99	27.29	350	83	P	V
		2358.58	46.12	-7.88	54	31.74	27.77	3.97	27.29	350	83	A	V
	*	2457	102.85	-	-	88.65	27.5	13.98	27.28	350	83	P	V
	*	2457	94.89	-	-	80.69	27.5	13.98	27.28	350	83	A	V
		2484.88	65.19	-8.81	74	50.96	27.5	14	27.27	350	83	P	V
		2483.56	51.08	-2.92	54	36.85	27.5	14	27.27	350	83	A	V
802.11n HT40 CH 11 2462MHz		2343.18	55.69	-18.31	74	41.3	27.81	3.95	27.3	107	245	P	H
		2384.76	46.57	-7.43	54	32.28	27.66	3.99	27.29	107	245	A	H
	*	2462	94.99	-	-	80.79	27.5	13.98	27.28	107	245	P	H
	*	2462	87.48	-	-	73.28	27.5	13.98	27.28	107	245	A	H
		2483.8	62.57	-11.43	74	48.34	27.5	14	27.27	107	245	P	H
		2483.56	52.44	-1.56	54	38.21	27.5	14	27.27	107	245	A	H
		2373	55.21	-18.79	74	40.88	27.71	3.98	27.29	351	82	P	V
		2360.68	46.13	-7.87	54	31.76	27.76	3.97	27.29	351	82	A	V
	*	2462	94.94	-	-	80.74	27.5	13.98	27.28	351	82	P	V
	*	2462	87.4	-	-	73.2	27.5	13.98	27.28	351	82	A	V
		2483.6	62.45	-11.55	74	48.22	27.5	14	27.27	351	82	P	V
		2483.52	51.96	-2.04	54	37.73	27.5	14	27.27	351	82	A	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	Peak or Average
H/V	Horizontal or Vertical

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.	
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. 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”.



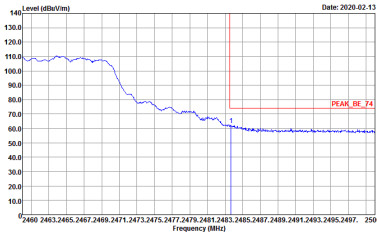
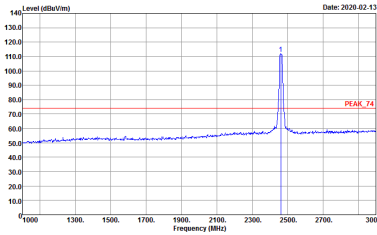
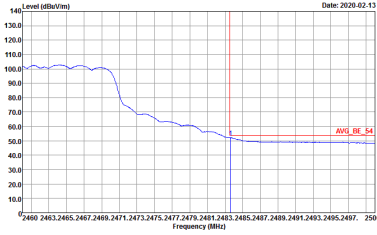
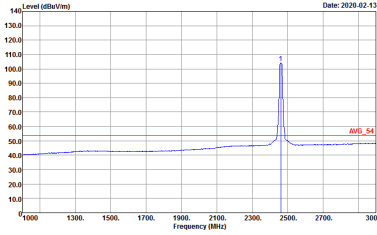
Appendix C. Radiated Spurious Emission Plots

Test Engineer :	Jimmy Chung, Karl Hou and Wilson Wu	Temperature :	23~26°C
		Relative Humidity :	50~65%

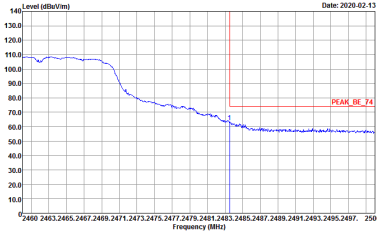
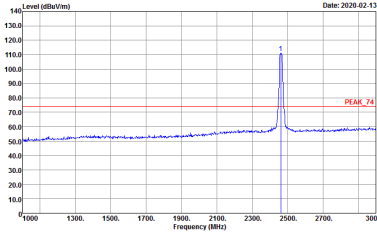
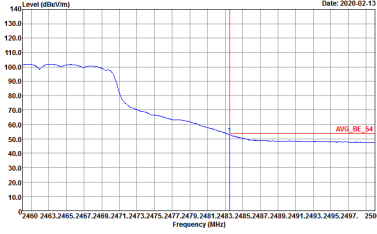
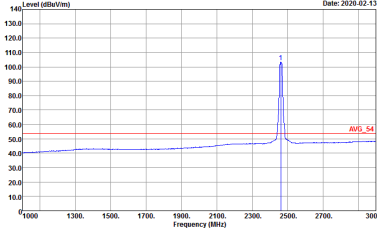
Note symbol

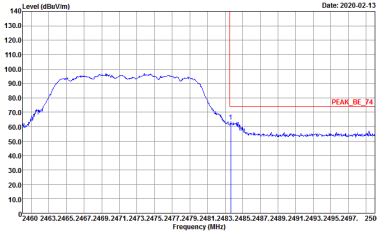
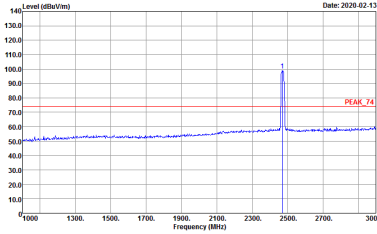
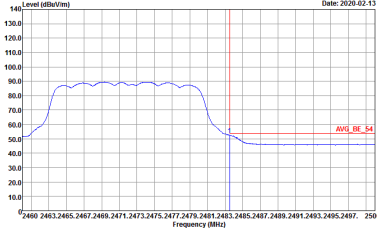
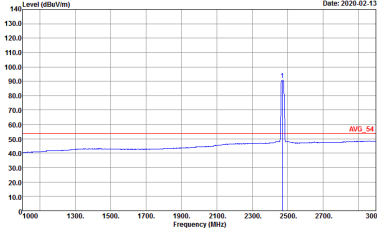
-L	Low channel location
-R	High channel location

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

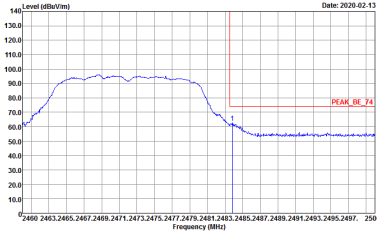
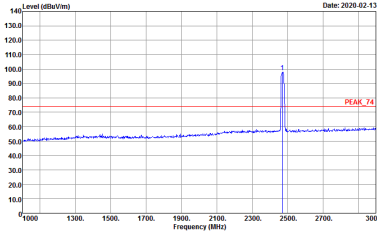
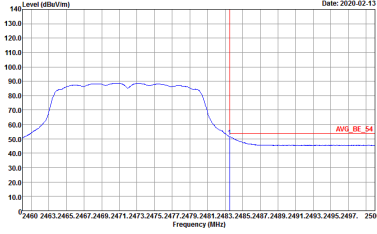
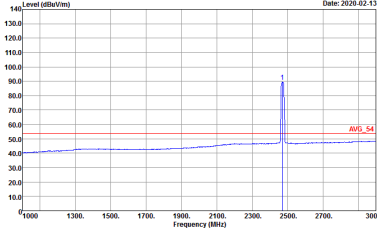
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_9120D_1241 HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_9120D_1241 HORIZONTAL RBW:1000.000KHz VBW:1000KHz SWT:Auto Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5



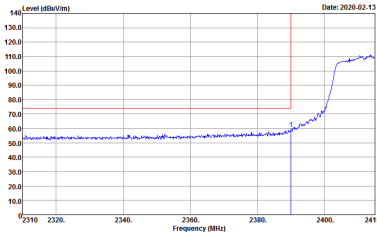
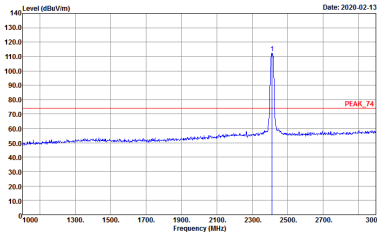
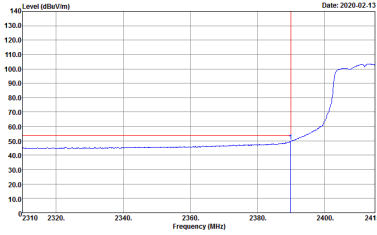
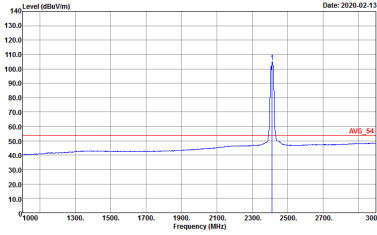
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH11 2462MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 3 Power : 14.5

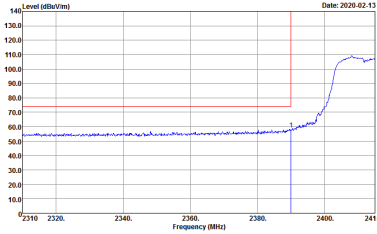
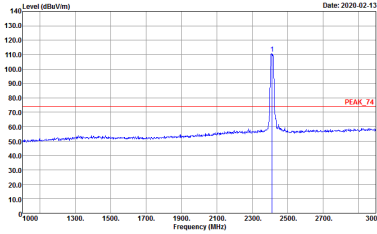
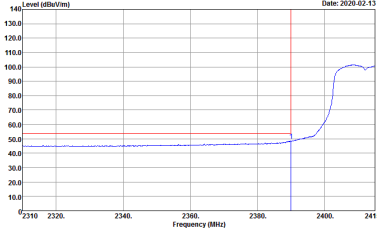
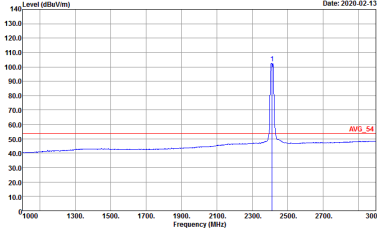
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH13 2472MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1	 Site : 03CH13-HV Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1
	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1	 Site : 03CH13-HV Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1
Avg.		

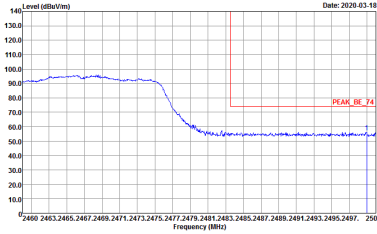
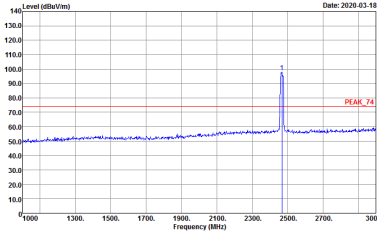
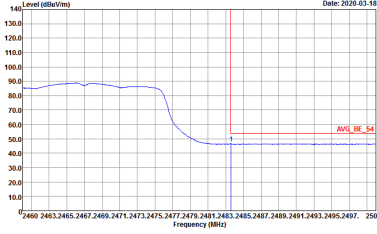
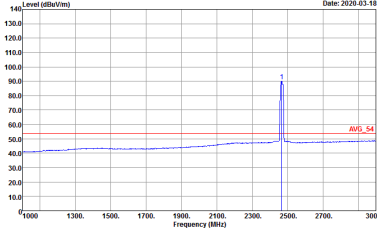


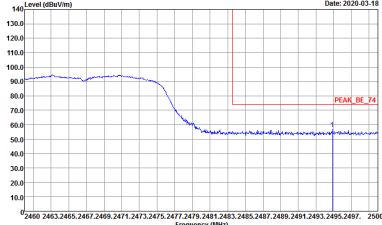
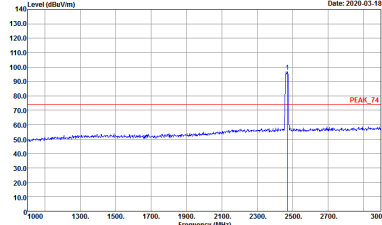
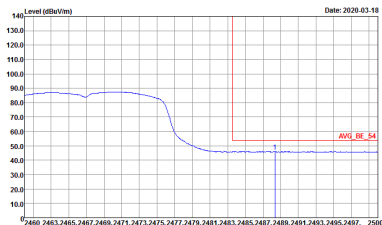
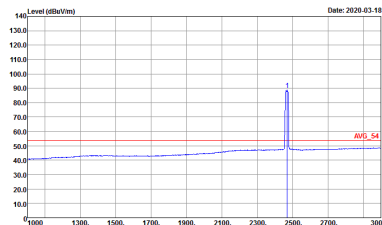
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11g CH13 2472MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 5 Power : 1

2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Band Edge @ 3m)

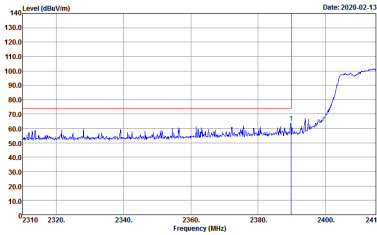
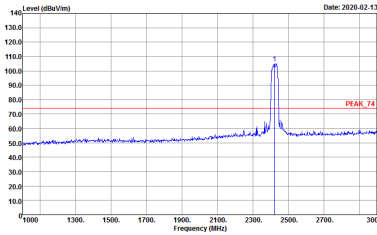
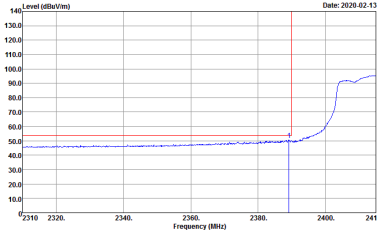
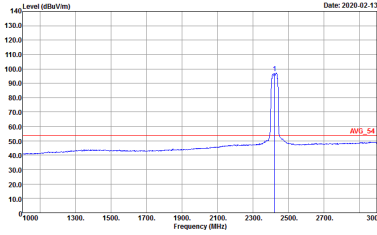
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5
	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH01 2412MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 1 Power : 15.5

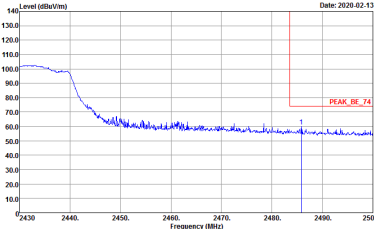
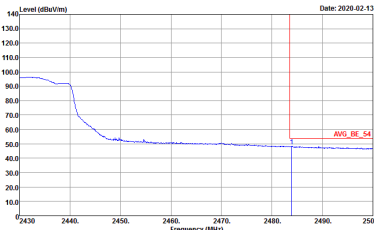
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH12 2467MHz	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0	 Site : 03CH13-HV Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0
	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0	 Site : 03CH13-HV Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT20 CH12 2467MHz	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0
	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 4 Power : n(20)_Tx_Ch12 : 0

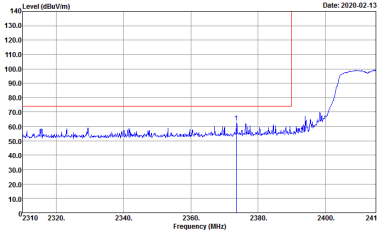
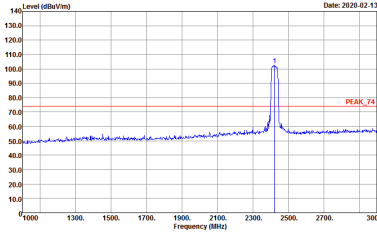
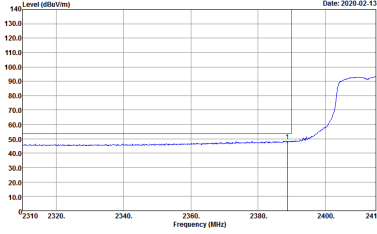
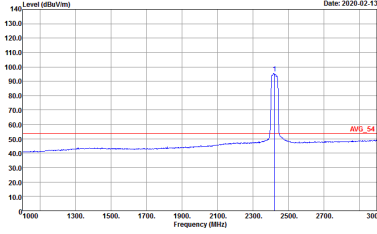
2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11
Avg.	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11

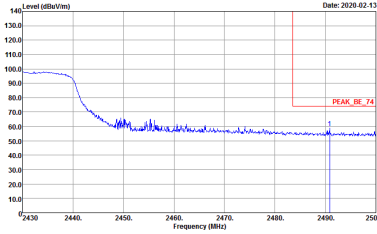
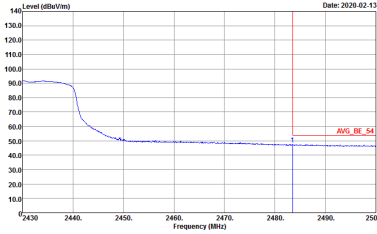


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	Left Blank
Avg.	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	Left Blank

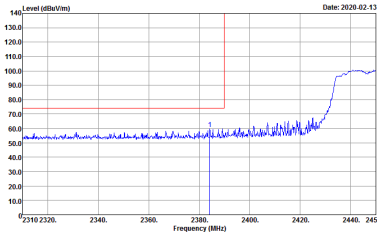
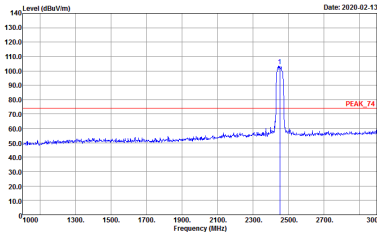
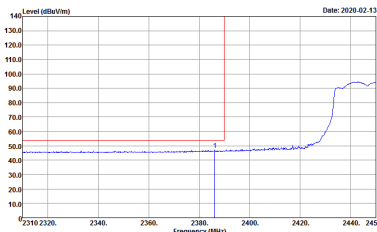
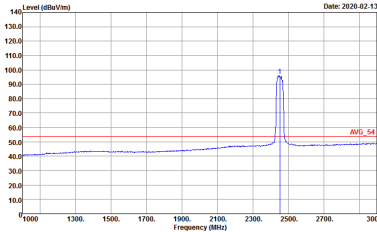


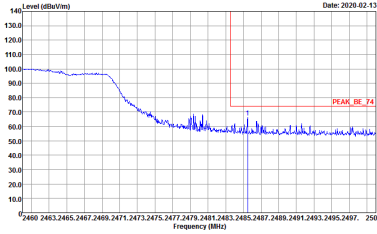
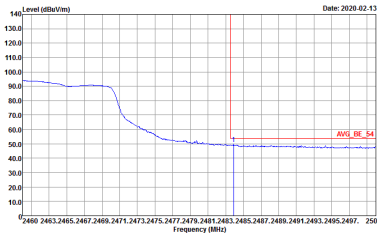
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11

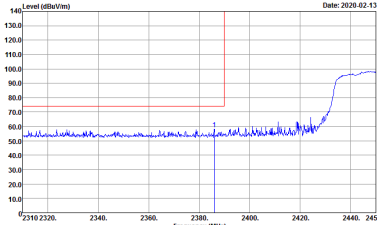
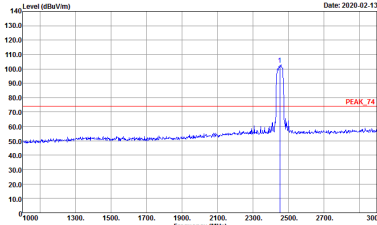
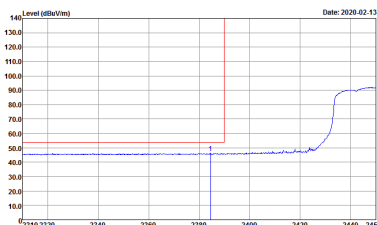
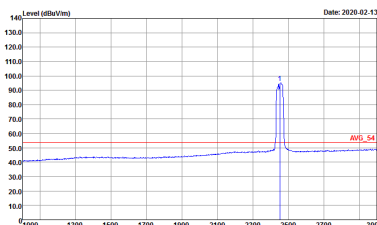


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH03 2422MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	Left blank
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 6 Power : 11	Left blank

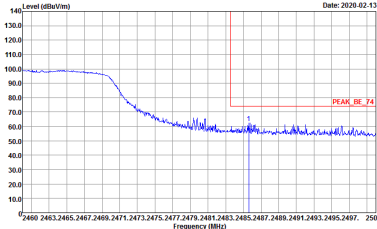
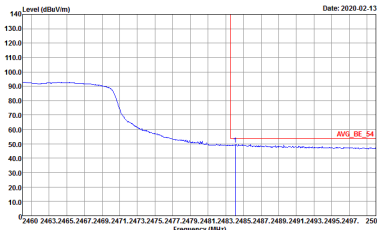


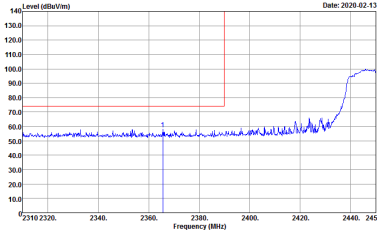
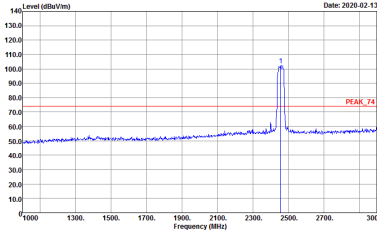
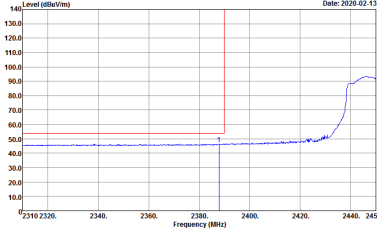
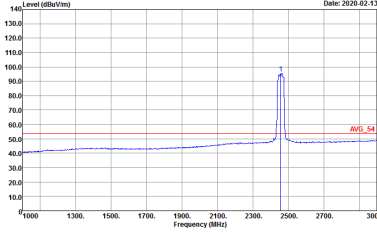
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	Left blank
Avg.	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	Left blank

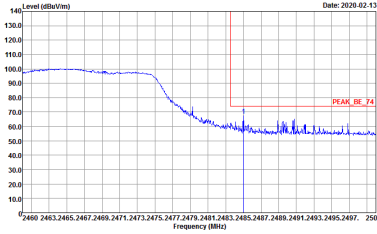
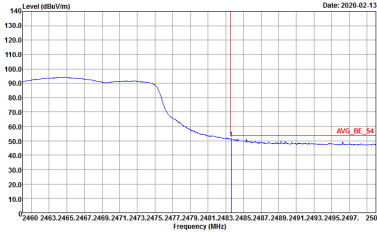
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5

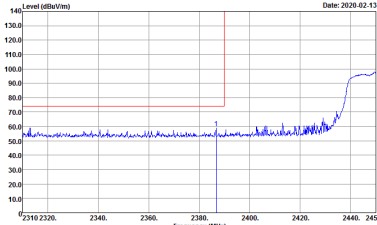
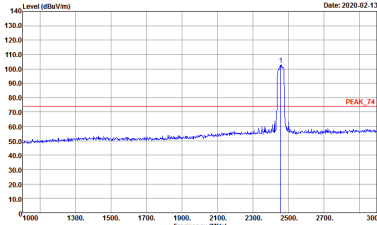
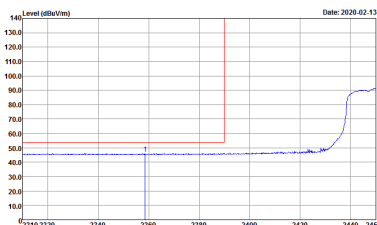
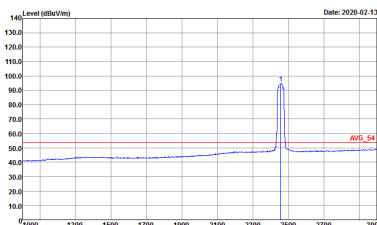


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	Left blank
Avg.	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 7 Power : 9.5	Left blank

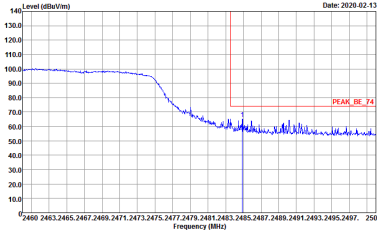
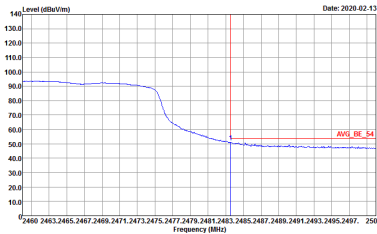
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH10 2457MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9

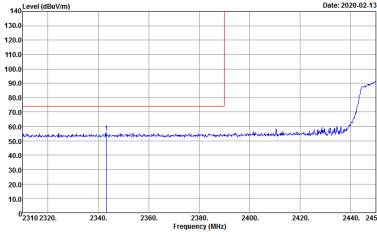
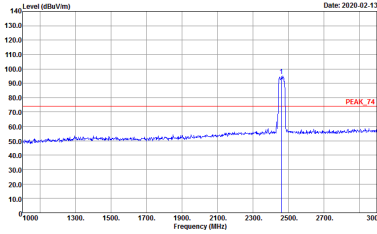
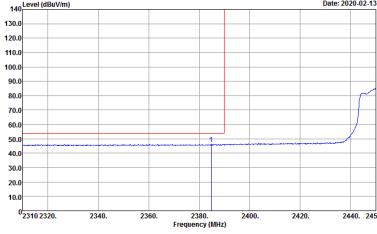
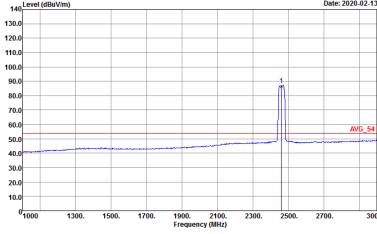


WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH10 2457MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : B Power : 9	Left blank
Avg.	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : B Power : 9	Left blank

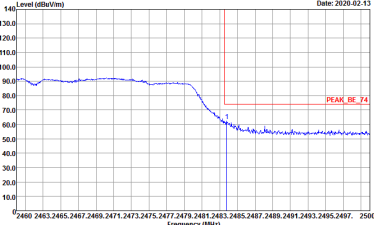
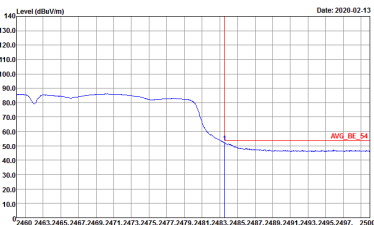
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH10 2457MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 8 Power : 9

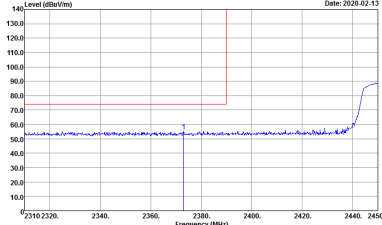
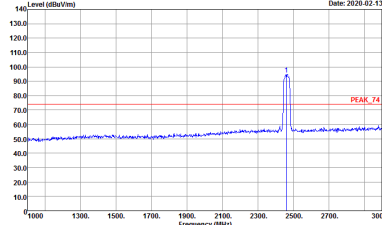
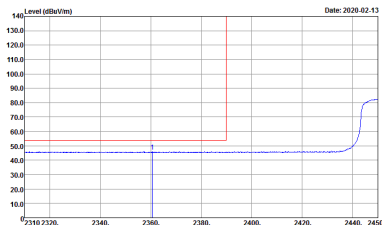
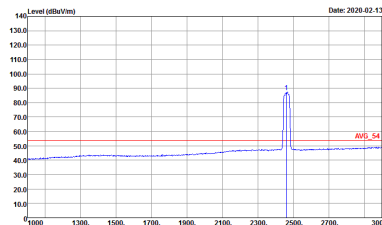


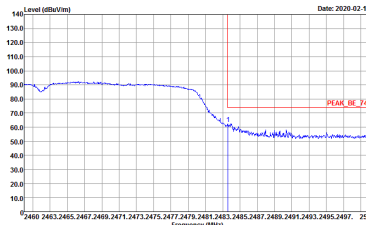
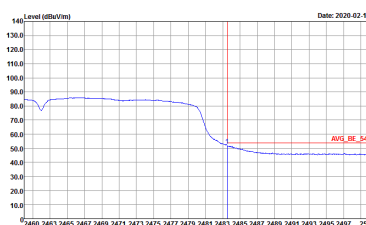
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH10 2457MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : B Power : 9	Left blank
Avg.	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : B Power : 9	Left blank

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH11 2462MHz - L	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1
	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1
Avg.		



WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH11 2462MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH13-HV Condition : PEAK_BE_74 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	Left blank
Avg.	 Site : 03CH13-HV Condition : AVG_BE_54 3m HORN_91200_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	Left blank

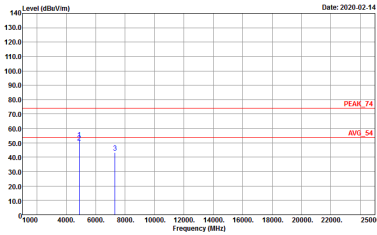
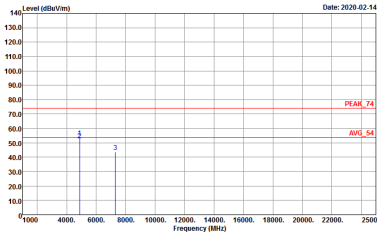
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH11 2462MHz - L	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	 Site : 03CH13-HY Condition : AVG_54 3m HORN_91200_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH11 2462MHz - R	
1+2	Vertical	Fundamental
Peak	 Site : 03CH13-HY Condition : PEAK_BE_74 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	Left blank
Avg.	 Site : 03CH13-HY Condition : AVG_BE_54 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 9 Power : 1	Left blank



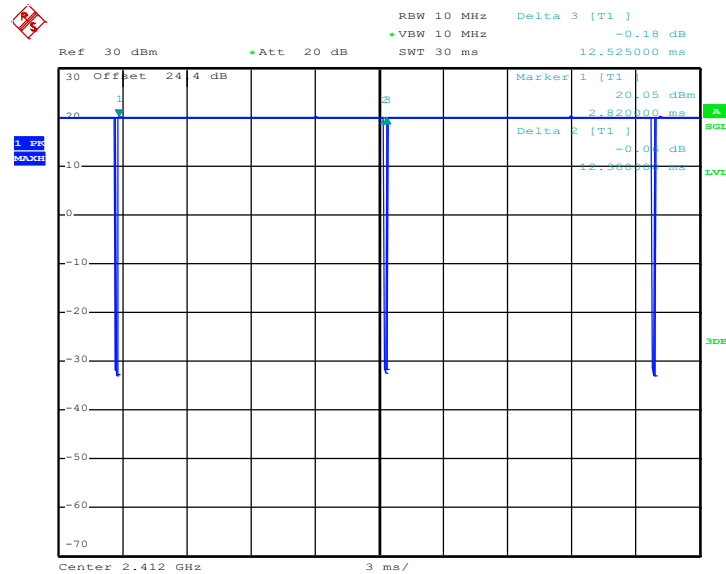
2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

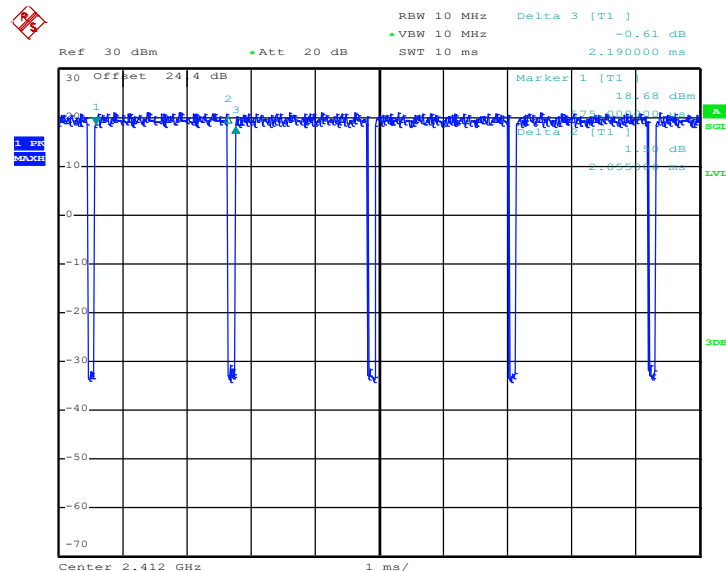
WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11b CH06 2437MHz	
1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 HORIZONTAL Detector : Peak Project : 010908-05 Mode : 2 Power : 14.5	 Site : 03CH13-HY Condition : PEAK_74 3m HORN_9120D_1241 VERTICAL Detector : Peak Project : 010908-05 Mode : 2 Power : 14.5

Appendix D. Duty Cycle Plots

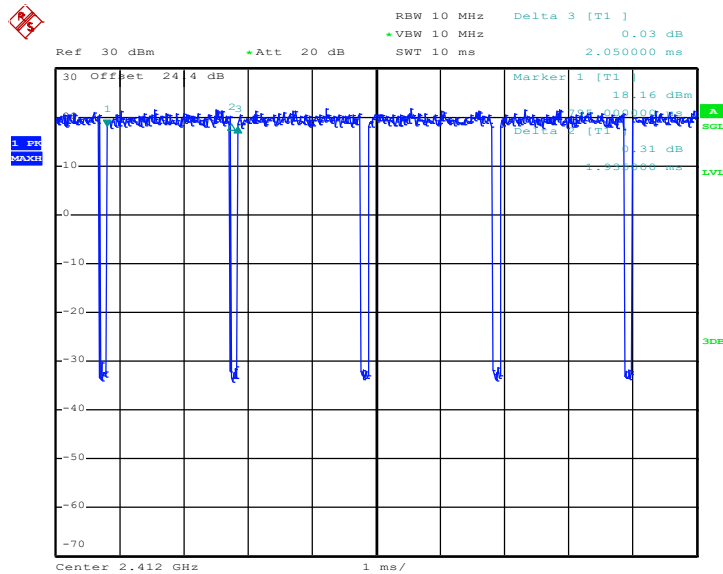
Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
1+2	802.11b for Ant. 1	98.84	-	-	10Hz	0.05
1+2	802.11b for Ant. 2	98.84	-	-	10Hz	0.05
1+2	802.11g for Ant. 1	93.84	2055	0.49	1kHz	0.28
1+2	802.11g for Ant. 2	93.85	2060	0.49	1kHz	0.28
1+2	2.4GHz 802.11n HT20 for Ant. 1	94.39	1935	0.52	1kHz	0.25
1+2	2.4GHz 802.11n HT20 for Ant. 2	94.33	1915	0.52	1kHz	0.25
1+2	2.4GHz 802.11n HT40 for Ant. 1	88.68	940	1.06	3kHz	0.52
1+2	2.4GHz 802.11n HT40 for Ant. 2	88.84	955	1.05	3kHz	0.51
1+2	2.4GHz 802.11ac20 for Ant. 1	94.39	1935	0.52	1kHz	0.25
1+2	2.4GHz 802.11ac20 for Ant. 2	94.65	1945	0.51	1kHz	0.24
1+2	2.4GHz 802.11ac40 for Ant. 1	88.48	960	1.04	3kHz	0.53
1+2	2.4GHz 802.11ac40 for Ant. 2	88.73	945	1.06	3kHz	0.52

MIMO <Ant. 1>
802.11b


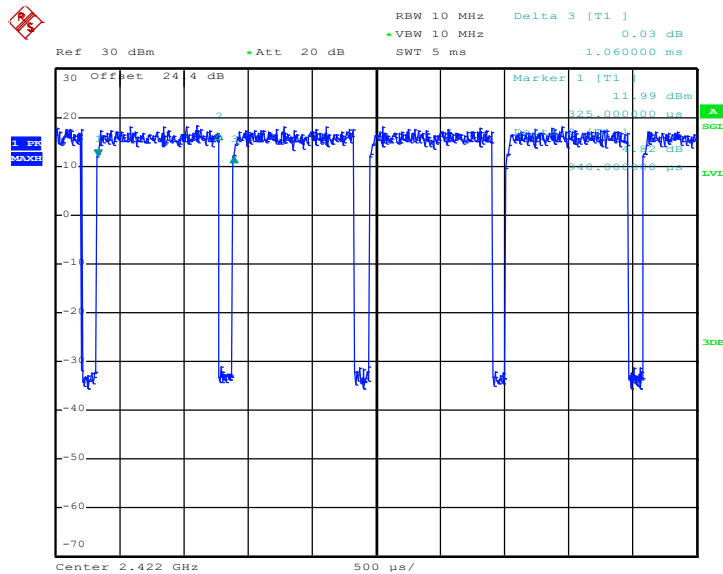
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802.11g


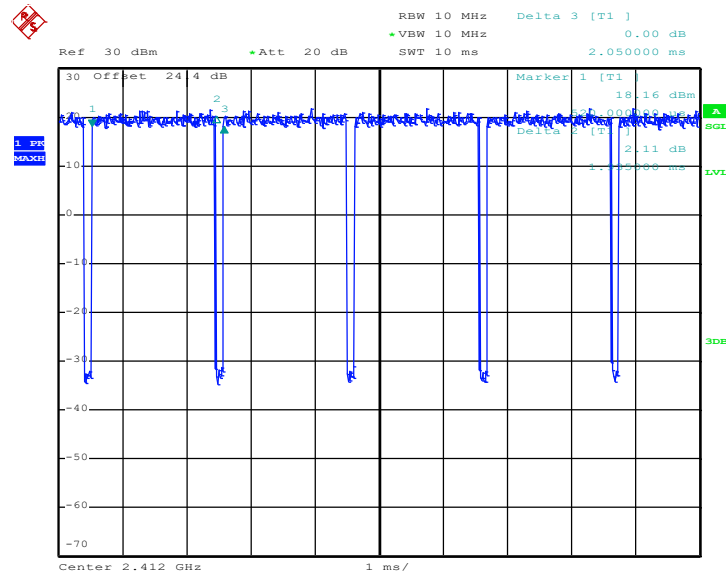
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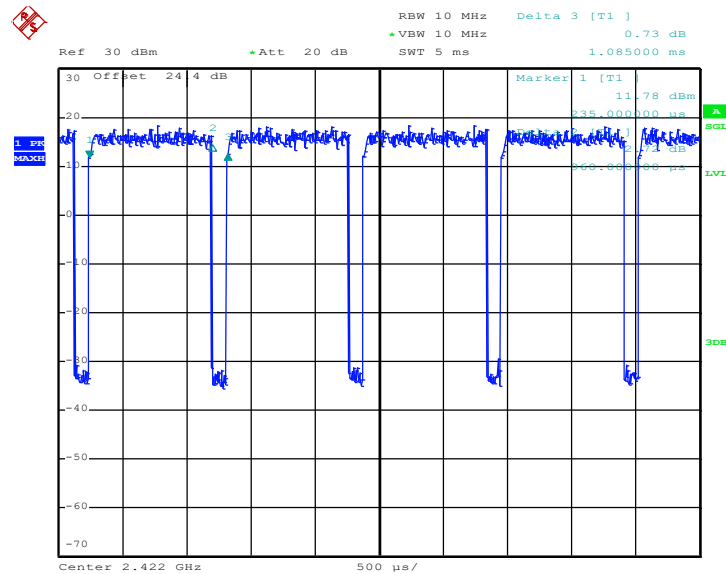
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802.11n HT40


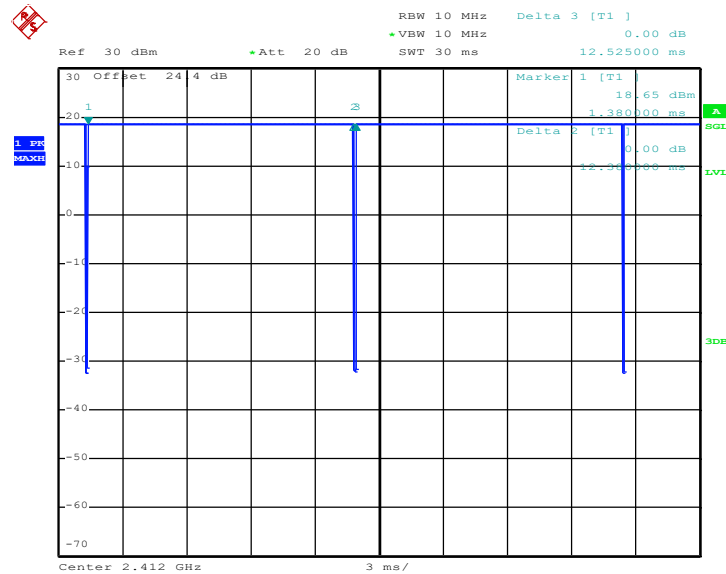
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802.11ac VHT20


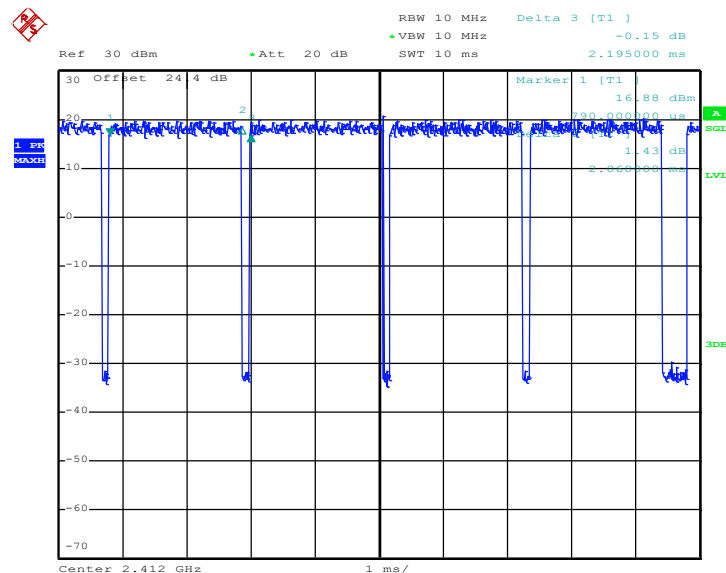
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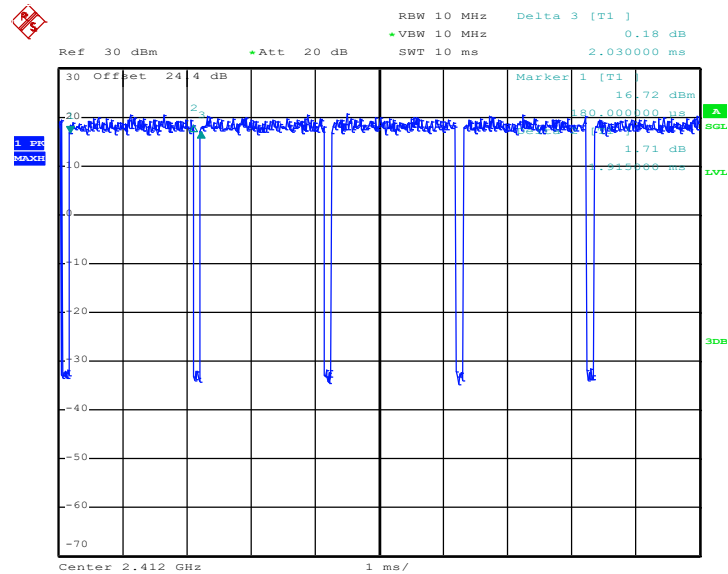
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MIMO <Ant. 2>
802.11b


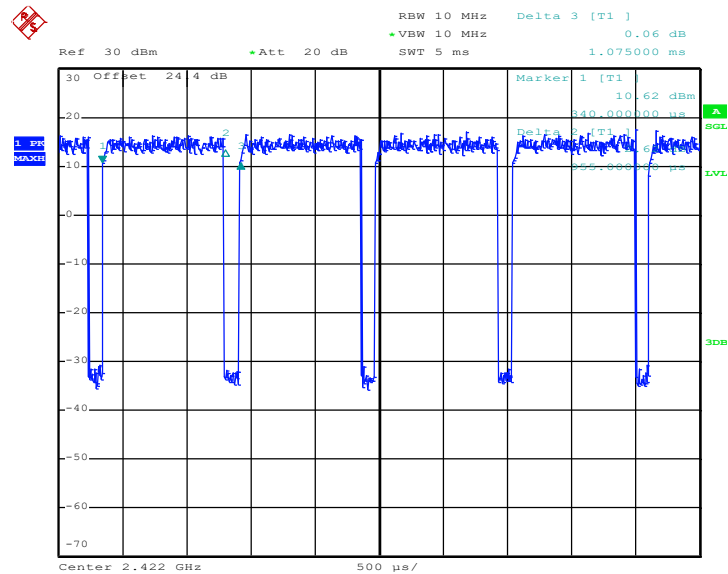
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802.11g


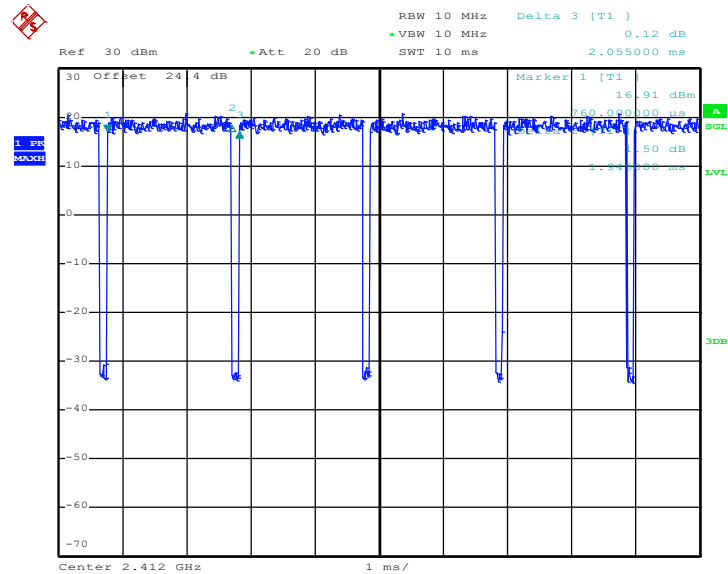
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802.11n HT20


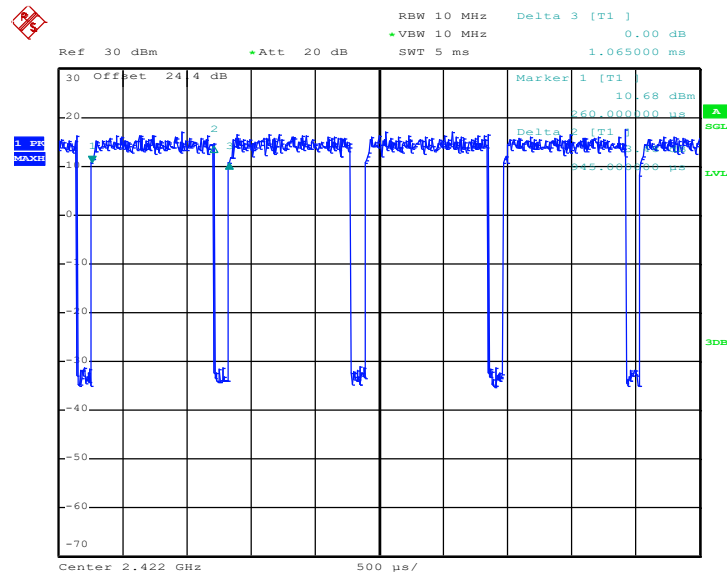
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802.11n HT40


Date: 28.JAN.2020 07:05:05

802.11ac VHT20


Date: 28.JAN.2020 07:01:23

802.11ac VHT40


Date: 28.JAN.2020 07:06:27