FCC RADIO TEST REPORT

FCC ID	**:**	**QYL9260NG**
Equipment	**:**	**WLAN module**
Brand Name	**:**	**Getac**
Model Name	**:**	**9260NGW**
Applicant	**:**	**Getac Technology Corporation.** **5F., Building A, No. 209, Sec. 1, Nangang Rd.,** **Nangang Dist., Taipei City 11568, Taiwan, R.O.C.**
Standard	**:**	**FCC Part 15 Subpart C §15.247**

The product was received on Apr. 09, 2019 and testing was started from Apr. 19, 2019 and completed on May 06, 2019. 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.

Approved by: Jones Tsai

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
FR391803-53C	01	Initial issue of report	May 29, 2019

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.247(b)	Power Output Measurement	Pass
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass
3.3	15.203 & 15.247(b)	Antenna Requirement	Pass

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: Natasha Hsieh

1 General Description

1.1 Product Feature of Equipment Under Test

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

Product Specification subjective to this standard	
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna

The product was installed into Tablet (Brand Name: Getac, HVIN: F110, F110_G5, F110-Ex) during test, which can be referred the following information:

Report Sample	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
F110 SKU	**SKU D**	**SKU E**	**SKU F**	**SKU G**	**SKU F**
CPU	I5-8265U	i7-8565U	i7-8565U	I5-8365U	i7-8565U
DDR	4G	8G	16G	16G	16G
SSD	128GB	256GB	512GB	1TB	512GB
Panel	AUO HD B116XAN05	FHD,KD116N11-30 NP-A9	FHD,KD116N11-30 NP-A9	FHD,KD116N11-30 NP-A9	FHD,KD116N11-30 NP-A9
Digitizer	Getac	Getac	Getac	not Support	Getac
Option Bay	RS232+LAN	LAN	BCR	LAN	BCR
Expansion Bay	SMART CARD or SSD Easily removable + Smart Card	HID RFID	Finger print	not Support	HID RFID
WLAN/BT	Support(9260NGW)	Support(9260NGW)	Support(9260NGW)	Support(9260NGW)	Support(9260NGW)
WWAN	not Support	Support(EM7455)	Support(EM7511)	not Support	Support(EM7455)
GPS	GPS(MC-1010)	GPS(MC-1010)	GPS(MC-1010)	GPS(MC-1010)	GPS(MC-1010)
Webcam FHD	Support	not Support	not Support	Support	not Support
Rear 8M Camera	Support	Support	Support	Support	Support
IR Webcam	not Support	Support	Support	not Support	Support
RFID	not Support	Support(OMNIKEY 5127 CK MINI)	not Support	not Support	Support(OMNIKEY 5127 CK MINI)
Default IO (USB 3.0 port)	Support	Support	Support	Support	Support
Default IO (HDMI)	Support	Support	Support	not Support	Support
Default IO (Audio)	Support	Support	Support	Support	Support
Default IO (USB3.1 Type-C Gen 1)	not Support	not Support	not Support	Support	not Support
Explosion-proof cover	not Support	not Support	not Support	not Support	Support

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.
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

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

Test Site	SPORTON INTERNATIONAL INC.
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 414788 D01 Radiated Test Site v01r01.
- 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. 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 three orthogonal panels, X, Y, Z. The worst cases (Z plane) 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	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.

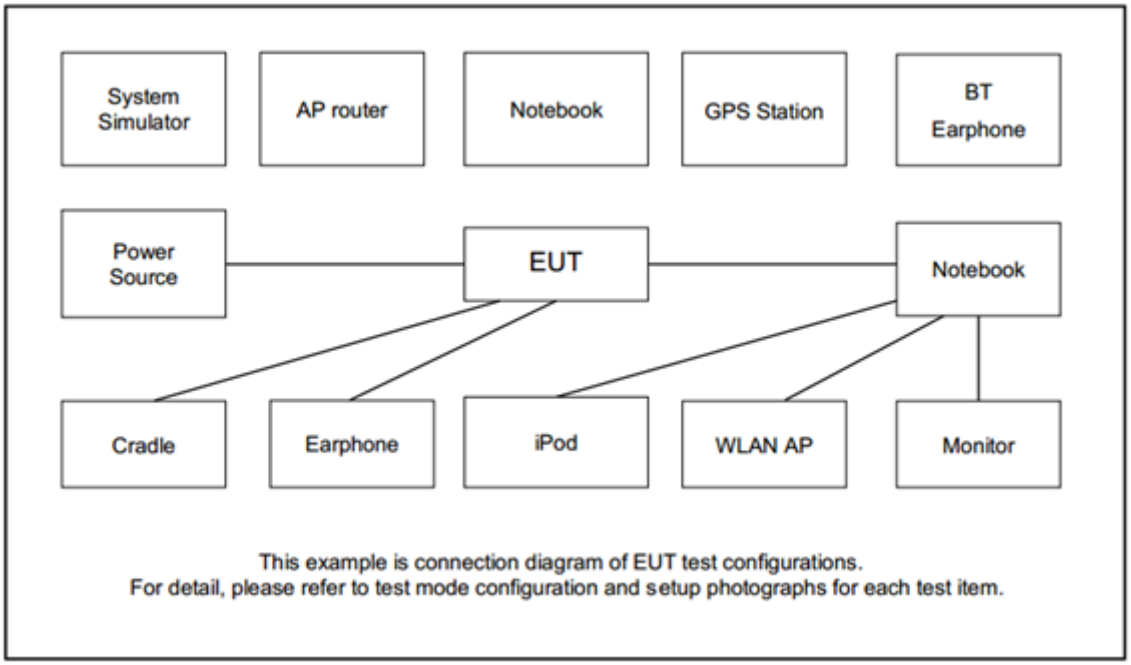
MIMO Mode

Modulation	Data Rate
802.11n HT40	**MCS0**

Remark:

1. For Radiated Test Cases, the tests were performed with Sample 3.
2. The tests were performed with Battery (Model: BP3S1P2290 A) and Adapter (Model: FSP065-RBBN3).

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 “DRTU” was installed in Tablet 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 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.

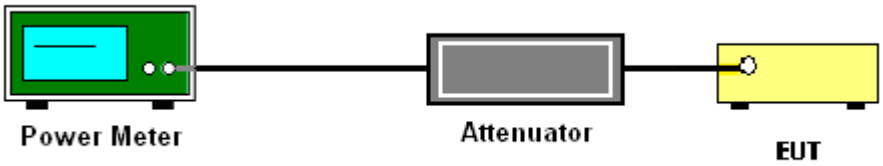
3.1.2 Measuring Instruments

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 11.9.2.3.1 Method AVGPM
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

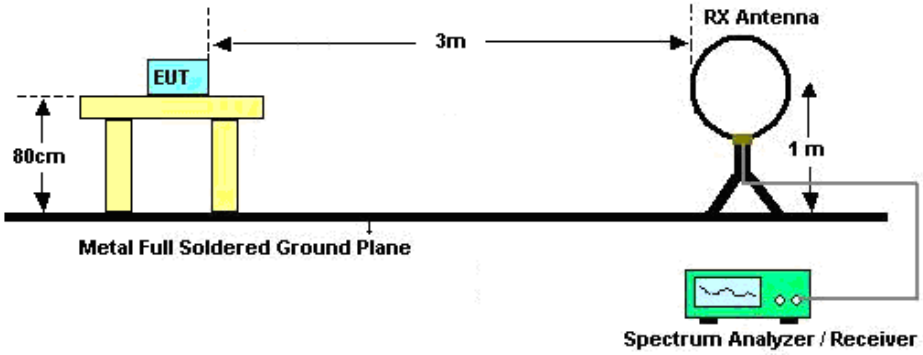
See list of measuring equipment of this test report.

3.2.3 Test Procedures

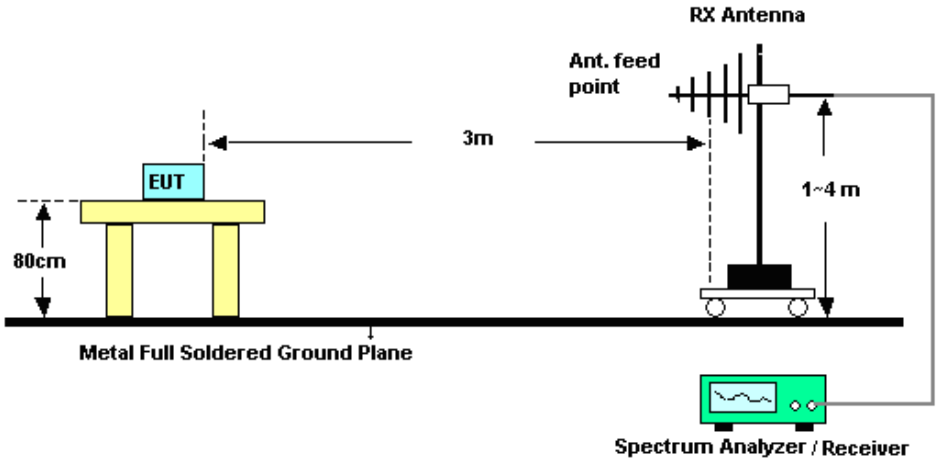
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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 below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
   (3) Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement.
   For average measurement:
   - VBW = 10 Hz, when duty cycle is no less than 98 percent.
   - VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.2.4 Test Setup

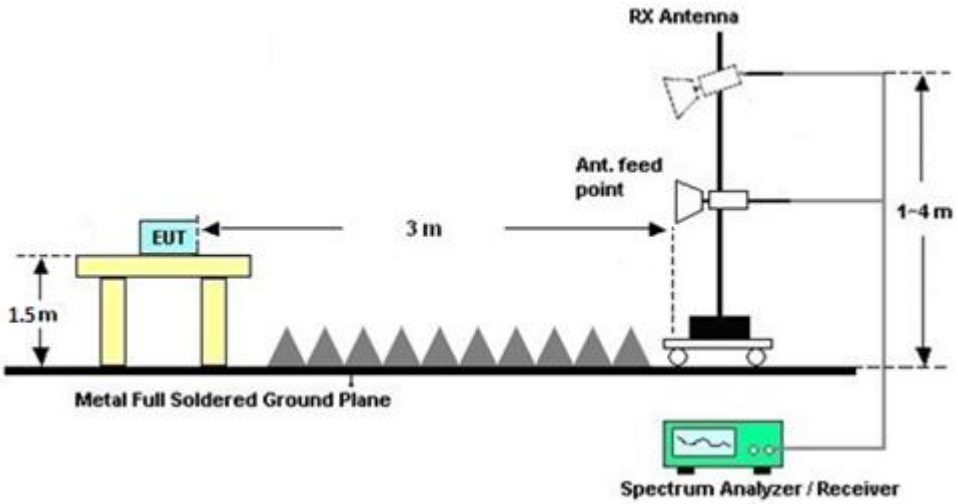
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5 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 alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.

3.2.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.2.7 Duty Cycle

Please refer to Appendix D.

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

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

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

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

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

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

For power measurements on IEEE 802.11 devices,

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

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

The EUT supports CDD mode.

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

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

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

The directional gain “DG” is calculated as following table.

<CDD Modes>

	Ant. 1 (dBi)	Ant. 2 (dBi)	DG for Power (dBi)	Power Limit Reduction (dB)
2.4 GHz	2.96	1.83	2.96	0.00

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Sensor	DARE	RadiPower	15I00041SNO09	10MHz~6GHz	May 07, 2018	Apr. 19, 2019	May 06, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 21, 2018	Apr. 19, 2019	Nov. 20, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC1208382	N/A	Mar. 27, 2019	Apr. 19, 2019	Mar. 26, 2020	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	May 04, 2019~ May 06, 2019	Jan. 06, 2020	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	May 04, 2019~ May 06, 2019	Dec. 05, 2019	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00802N1D01N-06	47020&06	30MHz to 1GHz	Oct. 13, 2018	May 04, 2019~ May 06, 2019	Oct. 12, 2019	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1620	1G~18GHz	Oct. 17, 2018	May 04, 2019~ May 06, 2019	Oct. 16, 2019	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz ~ 40GHz	May 08, 2018	May 04, 2019~ May 06, 2019	May 07, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2018	May 04, 2019~ May 06, 2019	Dec. 27, 2019	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JAP00101800-30-10P	160118550004	1GHz~18GHz	Apr. 25, 2019	May 04, 2019~ May 06, 2019	Apr. 24, 2020	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2018	May 04, 2019~ May 06, 2019	Aug. 22, 2019	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	N9010A	MY53470118	10Hz~44GHz	Apr. 18, 2019	May 04, 2019~ May 06, 2019	Apr. 17, 2020	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	May 04, 2019~ May 06, 2019	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	May 04, 2019~ May 06, 2019	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24	RK-000451	N/A	N/A	May 04, 2019~ May 06, 2019	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 15, 2019	May 04, 2019~ May 06, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4	30M-18G	Apr. 15, 2019	May 04, 2019~ May 06, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	MTJ	000000-MT18A-100D3210	30M-18G	Apr. 15, 2019	May 04, 2019~ May 06, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 13, 2019	May 04, 2019~ May 06, 2019	Mar. 12, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 13, 2019	May 04, 2019~ May 06, 2019	Mar. 12, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN11	1G Low Pass	Sep. 16, 2018	May 04, 2019~ May 06, 2019	Sep. 15, 2019	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN1	3 GHz Highpass	Sep. 16, 2018	May 04, 2019~ May 06, 2019	Sep. 15, 2019	Radiation (03CH15-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.5**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Richard Qiu	Temperature:	21~25	°C
Test Date:	2019/4/19	Relative Humidity:	51~54	%

TEST RESULTS DATA
Average Output Power

2.4GHz Band																
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
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	17.40	17.40		30.00	30.00	2.96	1.83	20.36	19.23	36.00	36.00	Pass
11b	1Mbps	1	6	2437	17.40	17.40		30.00	30.00	2.96	1.83	20.36	19.23	36.00	36.00	Pass
11b	1Mbps	1	11	2462	17.40	17.30		30.00	30.00	2.96	1.83	20.36	19.13	36.00	36.00	Pass
11b	1Mbps	1	12	2467	17.40	17.40		30.00	30.00	2.96	1.83	20.36	19.23	36.00	36.00	Pass
11b	1Mbps	1	13	2472	14.40	14.80		30.00	30.00	2.96	1.83	17.36	16.63	36.00	36.00	Pass
11g	6Mbps	1	1	2412	16.80	16.30		30.00	30.00	2.96	1.83	19.76	18.13	36.00	36.00	Pass
11g	6Mbps	1	6	2437	17.30	17.40		30.00	30.00	2.96	1.83	20.26	19.23	36.00	36.00	Pass
11g	6Mbps	1	11	2462	16.40	16.90		30.00	30.00	2.96	1.83	19.36	18.73	36.00	36.00	Pass
11g	6Mbps	1	12	2467	13.40	13.30		30.00	30.00	2.96	1.83	16.36	15.13	36.00	36.00	Pass
11g	6Mbps	1	13	2472	-5.70	-5.60		30.00	30.00	2.96	1.83	-2.74	-3.77	36.00	36.00	Pass
HT20	MCS0	1	1	2412	16.30	15.90	-	30.00	30.00	2.96	1.83	19.26	17.73	36.00	36.00	Pass
HT20	MCS0	1	6	2437	17.30	17.30		30.00	30.00	2.96	1.83	20.26	19.13	36.00	36.00	Pass
HT20	MCS0	1	11	2462	16.30	15.90		30.00	30.00	2.96	1.83	19.26	17.73	36.00	36.00	Pass
HT20	MCS0	1	12	2467	13.40	13.40		30.00	30.00	2.96	1.83	16.36	15.23	36.00	36.00	Pass
HT20	MCS0	1	13	2472	-6.10	-6.20		30.00	30.00	2.96	1.83	-3.14	-4.37	36.00	36.00	Pass
HT40	MCS0	1	3	2422	13.40	13.90		30.00	30.00	2.96	1.83	16.36	15.73	36.00	36.00	Pass
HT40	MCS0	1	6	2437	15.90	15.90		30.00	30.00	2.96	1.83	18.86	17.73	36.00	36.00	Pass
HT40	MCS0	1	9	2452	14.30	14.40		30.00	30.00	2.96	1.83	17.26	16.23	36.00	36.00	Pass
HT40	MCS0	1	10	2457	10.90	10.80		30.00	30.00	2.96	1.83	13.86	12.63	36.00	36.00	Pass
HT40	MCS0	1	11	2462	3.40	2.80		30.00	30.00	2.96	1.83	6.36	4.63	36.00	36.00	Pass
HT20	MCS0	2	1	2412	13.00	12.80	15.91	30.00		2.96		18.87		36.00		Pass
HT20	MCS0	2	6	2437	14.30	14.50	17.41	30.00		2.96		20.37		36.00		Pass
HT20	MCS0	2	11	2462	12.70	13.00	15.86	30.00		2.96		18.82		36.00		Pass
HT20	MCS0	2	12	2467	11.90	11.90	14.91	30.00		2.96		17.87		36.00		Pass
HT20	MCS0	2	13	2472	-8.90	-8.80	-5.84	30.00		2.96		-2.88		36.00		Pass
HT40	MCS0	2	3	2422	10.50	10.40	13.46	30.00		2.96		16.42		36.00		Pass
HT40	MCS0	2	6	2437	12.90	13.00	15.96	30.00		2.96		18.92		36.00		Pass
HT40	MCS0	2	9	2452	11.30	11.50	14.41	30.00		2.96		17.37		36.00		Pass
HT40	MCS0	2	10	2457	10.10	10.00	13.06	30.00		2.96		16.02		36.00		Pass
HT40	MCS0	2	11	2462	2.20	1.60	4.92	30.00		2.96		7.88		36.00		Pass

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

Appendix B. Radiated Spurious Emission

Test Engineer :	Watt Tseng	Temperature :	23~26°C
		Relative Humidity :	50~57%

2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 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)
		2358.02	54.09	-19.91	74	41.02	27.67	16.28	30.88	317	120	P	H
		2384.9	44.93	-9.07	54	31.84	27.63	16.32	30.86	317	120	A	H
	*	2452	104.15	-	-	90.99	27.6	16.39	30.83	317	120	P	H
	*	2452	95.77	-	-	82.61	27.6	16.39	30.83	317	120	A	H
802.11n		2487.75	59.41	-14.59	74	46.41	27.4	16.42	30.82	317	120	P	H
HT40		2484.39	52.85	-1.15	54	39.78	27.47	16.42	30.82	317	120	A	H
CH 09		2340.66	53.29	-20.71	74	40.22	27.7	16.25	30.88	100	91	P	V
2452MHz		2342.06	44.7	-9.3	54	31.62	27.7	16.26	30.88	100	91	A	V
	*	2452	101.57	-	-	88.41	27.6	16.39	30.83	100	91	P	V
	*	2452	93.1	-	-	79.94	27.6	16.39	30.83	100	91	A	V
		2484.53	58.23	-15.77	74	45.16	27.47	16.42	30.82	100	91	P	V
		2484.39	50.09	-3.91	54	37.02	27.47	16.42	30.82	100	91	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)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		4904	40.36	-33.64	74	61.42	31.33	9.72	62.11	100	0	P	H
		7356	45.13	-28.87	74	60.08	36.3	11.78	63.03	100	0	P	H
802.11n													H
HT40													H
CH 09		4904	39.6	-34.4	74	60.66	31.33	9.72	62.11	100	0	P	V
2452MHz		7356	45.55	-28.45	74	60.5	36.3	11.78	63.03	100	0	P	V
													V
													V

Remark	
	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

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)
		30	23.07	-16.93	40	29.74	25.2	0.75	32.62	-	-	P	H
		99.84	22.09	-21.41	43.5	37.22	15.97	1.41	32.51	-	-	P	H
		205.57	18.33	-25.17	43.5	33.59	15.2	2.03	32.49	-	-	P	H
		312.27	32.03	-13.97	46	42.84	19.35	2.38	32.54	-	-	P	H
		744.89	31.66	-14.34	46	32.13	28.2	3.64	32.31	-	-	P	H
		943.74	33.42	-12.58	46	29.99	30.52	4.18	31.27	100	0	P	H
													H
													H
													H
													H
2.4GHz													H
802.11n													H
HT40		30	23.02	-16.98	40	29.69	25.2	0.75	32.62	-	-	P	V
LF		97.9	26.04	-17.46	43.5	41.45	15.7	1.4	32.51	-	-	P	V
		312.27	27.47	-18.53	46	38.28	19.35	2.38	32.54	-	-	P	V
		449.04	30.11	-15.89	46	36.8	23.08	2.79	32.56	-	-	P	V
		836.07	32.04	-13.96	46	31.38	28.76	3.9	32	-	-	P	V
		890.39	38.74	-7.26	46	37.48	28.89	4.07	31.7	100	0	P	V
													V
													V
													V
													V
													V
													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	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
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

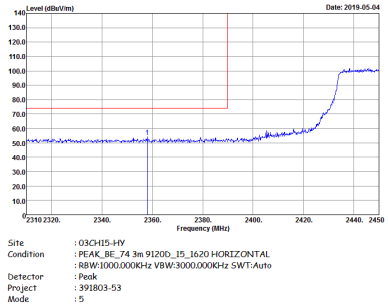
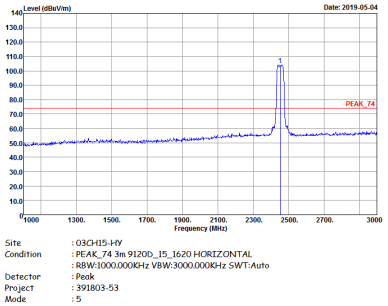
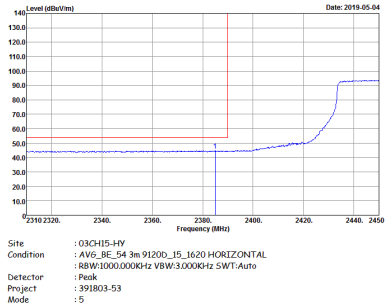
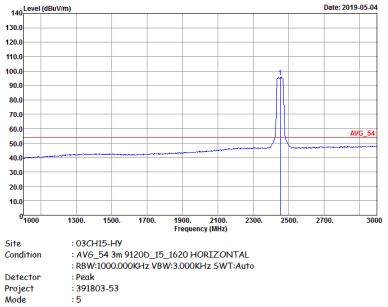
Test Engineer :	Watt Tseng	**Temperature :**	23~26°C
		Relative Humidity :	50~57%

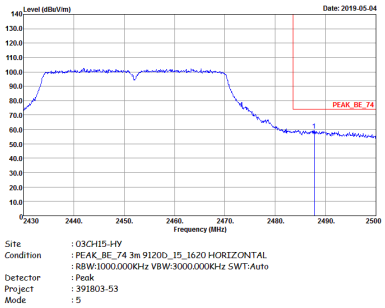
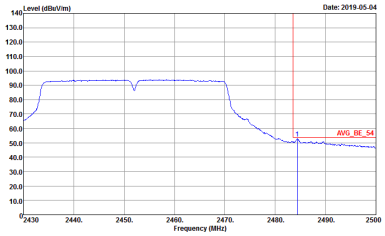
Note symbol

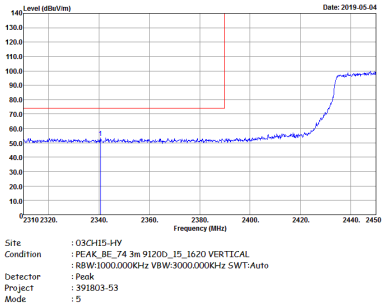
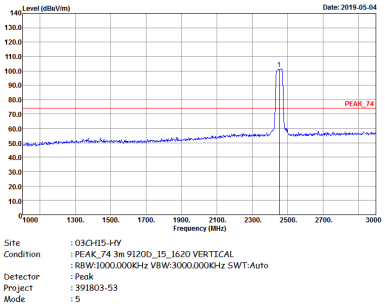
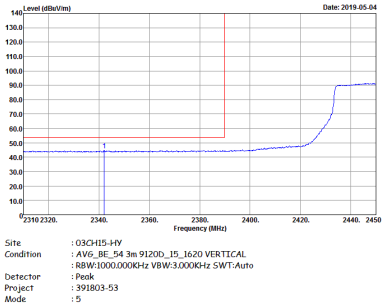
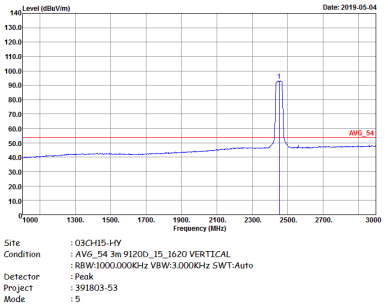
-L	**Low channel location**
-R	**High channel location**

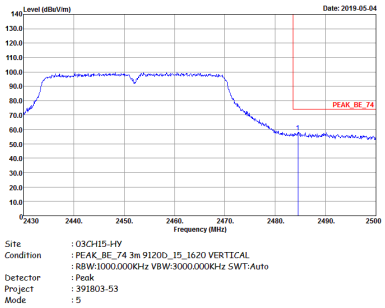
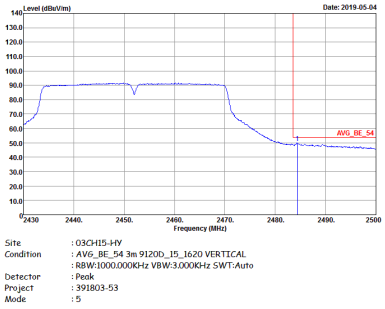
2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - L	
1+2	Horizontal	Fundamental
Peak		
Avg.		

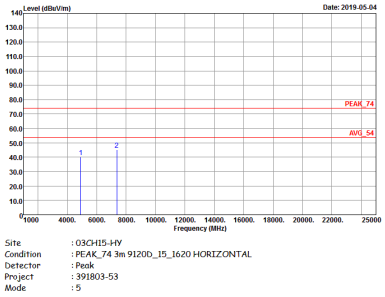
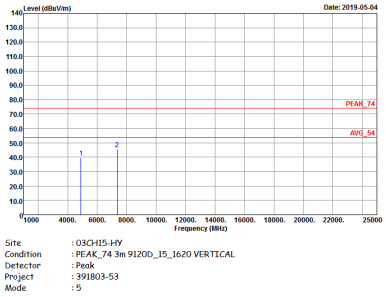
WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 9120D_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 391803-53 Mode : 5	Left blank
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 9120D_15_1620 HORIZONTAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 391803-53 Mode : 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 : 03CH15-HY Condition : PEAK_BE_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 391803-53 Mode : 5	 Site : 03CH15-HY Condition : PEAK_74 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 391803-53 Mode : 5
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 391803-53 Mode : 5	 Site : 03CH15-HY Condition : AVG_54 3m 9120D_15_1620 VERTICAL : RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 391803-53 Mode : 5

WIFI	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	802.11n HT40 CH09 2452MHz - R	
1+2	Vertical	Fundamental
Peak		Left Blank
Avg.		Left Blank

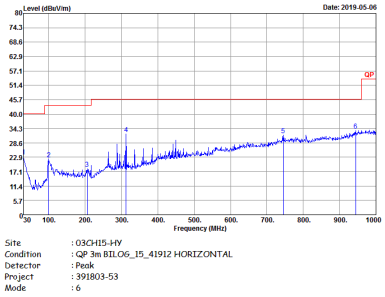
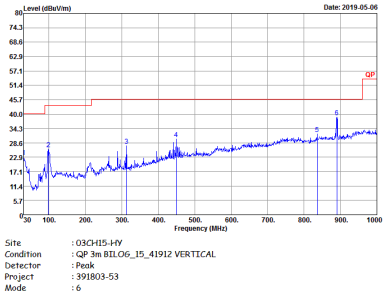
2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	802.11n HT40 CH09 2452MHz	
1+2	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

2.4GHz WIFI 802.11n HT40 (LF)

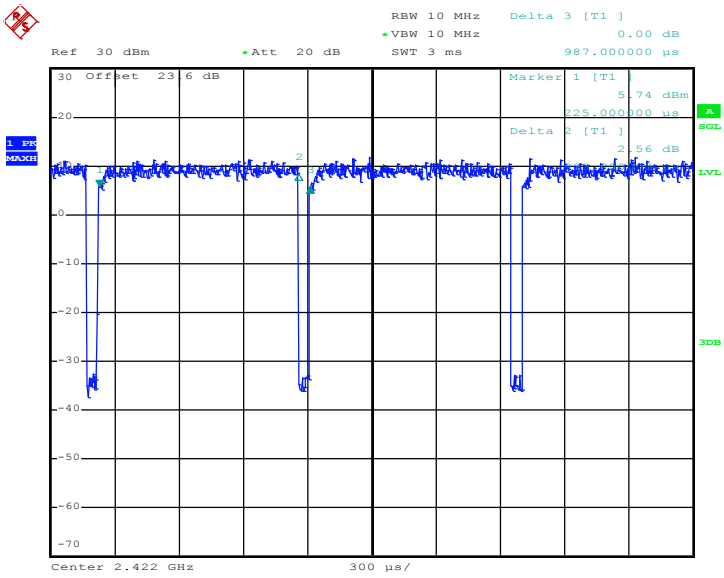
WIFI	2.4GHz 2400~2483.5MHz	
ANT	802.11n HT40 LF	
1+2	Horizontal	Vertical
QP / Peak		

Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle (%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor (dB)
1+2	2.4GHz 802.11n HT40 for Ant. 1	94.53	933.00	1.07	3kHz	0.24
1+2	2.4GHz 802.11n HT40 for Ant. 2	94.22	929.00	1.08	3kHz	0.26

MIMO <Ant. 1>

802.11n HT40



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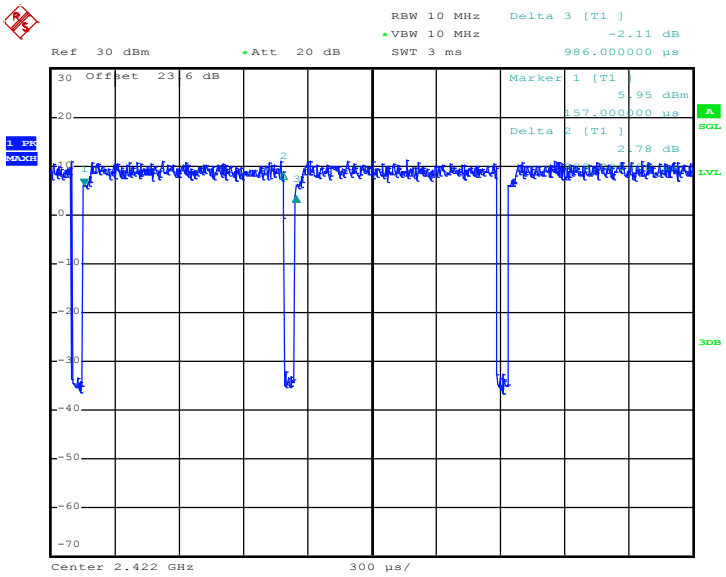
MIMO <Ant. 2>

802.11n HT40



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