



FCC RADIO TEST REPORT

FCC ID : TVE-121757B

Equipment : Network Security Gateway

Brand Name : FORTINET **FORTINET.**

Model Name : FWF-41Fxxxxxx, FortiWiFi 41Fxxxxxx, FORTIWIFI-41Fxxxxxx
FWF-40Fxxxxxx, FortiWiFi 40Fxxxxxx, FORTIWIFI-40Fxxxxxx
FWF-41F-3G4Gxxxxxx, FortiWiFi 41F-3G4Gxxxxxx,
FORTIWIFI-41F-3G4Gxxxxxx
FWF-40F-3G4Gxxxxxx, FortiWiFi 40F-3G4Gxxxxxx,
FORTIWIFI-40F-3G4Gxxxxxx
(Where "x" can be used as "A-Z", or "0-9", or "-", or blank for software purposes or marketing purposes only)

Marketing Name : FortiWiFi 41F, FortiWiFi 40F, FortiWiFi 41F-3G4G, FortiWiFi 40F-3G4G

Applicant : Fortinet Inc.
899 KIFER RD
SUNNYVALE CA 94086-5301
UNITED STATES

Manufacturer : Fortinet Inc.
899 KIFER RD
SUNNYVALE CA 94086-5301
UNITED STATES

Standard : FCC Part 15 Subpart E §15.407

The product was received on Oct. 16, 2019 and testing was started from Oct. 22, 2019 and completed on Nov. 27, 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 report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Louis Wu

Approved by: Louis Wu

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



Table of Contents

History of this test report.....	4
Summary of Test Result.....	5
1 General Description	6
1.1 Product Feature of Equipment Under Test.....	6
1.2 Modification of EUT	6
1.3 Testing Location	7
1.4 Applicable Standards.....	7
2 Test Configuration of Equipment Under Test	8
2.1 Carrier Frequency and Channel	8
2.2 Test Mode.....	9
2.3 Connection Diagram of Test System.....	10
2.4 Support Unit used in test configuration and system	10
2.5 EUT Operation Test Setup	11
2.6 Measurement Results Explanation Example.....	11
3 Test Result	12
3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement	12
3.2 Maximum Conducted Output Power Measurement	15
3.3 Power Spectral Density Measurement	16
3.4 Unwanted Emissions Measurement.....	20
3.5 AC Conducted Emission Measurement.....	25
3.6 Automatically Discontinue Transmission	27
3.7 Antenna Requirements.....	28
4 List of Measuring Equipment.....	29
5 Uncertainty of Evaluation	31
Appendix A. Conducted Test Results	
Appendix B. AC Conducted Emission Test Result	
Appendix C. Radiated Spurious Emission	
Appendix D. Radiated Spurious Emission Plots	
Appendix E. Duty Cycle Plots	
Appendix F. Setup Photographs	



History of this test report

Report No.	Version	Description	Issued Date
FR992436-01C	01	Initial issue of report	Jan. 17, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.403 (i)	6dB & 26dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.407 (a)	Maximum Conducted Output Power	Pass	-
3.3	15.407 (a)	Power Spectral Density	Pass	-
3.4	15.407(b)	Unwanted Emissions	Pass	Under limit 0.43 dB at 5645.800 MHz
3.5	15.207	AC Conducted Emission	Pass	Under limit 12.56 dB at 0.320 MHz
3.6	15.407 (c)	Automatically Discontinue Transmission	Pass	-
3.7	15.203 & 15.407 (a)	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: Lucy Wu



1 General Description

1.1 Product Feature of Equipment Under Test

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

Product Specification subjective to this standard	
WLAN Antenna	Model Number: 5000846
Antenna Type	WLAN <Ant. 0>: Dipole Antenna <Ant. 1>: Dipole Antenna <Ant. 2>: Dipole Antenna

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	TH05-HY	CO05-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 (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 E
- ♦ FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ 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: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in two type antenna degrees, 0° and 90°. The worst cases (Ant. 90°) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5725-5850 MHz Band 4 (U-NII-3)	149	5745	157	5785
	151*	5755	159*	5795
	153	5765	161	5805
	155 [#]	5775	165	5825

Note:

1. The above Frequency and Channel in "*" were 802.11n HT40 and 802.11ac VHT40.
2. The above Frequency and Channel in "[#]" were 802.11ac VHT80.

2.2 Test Mode

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

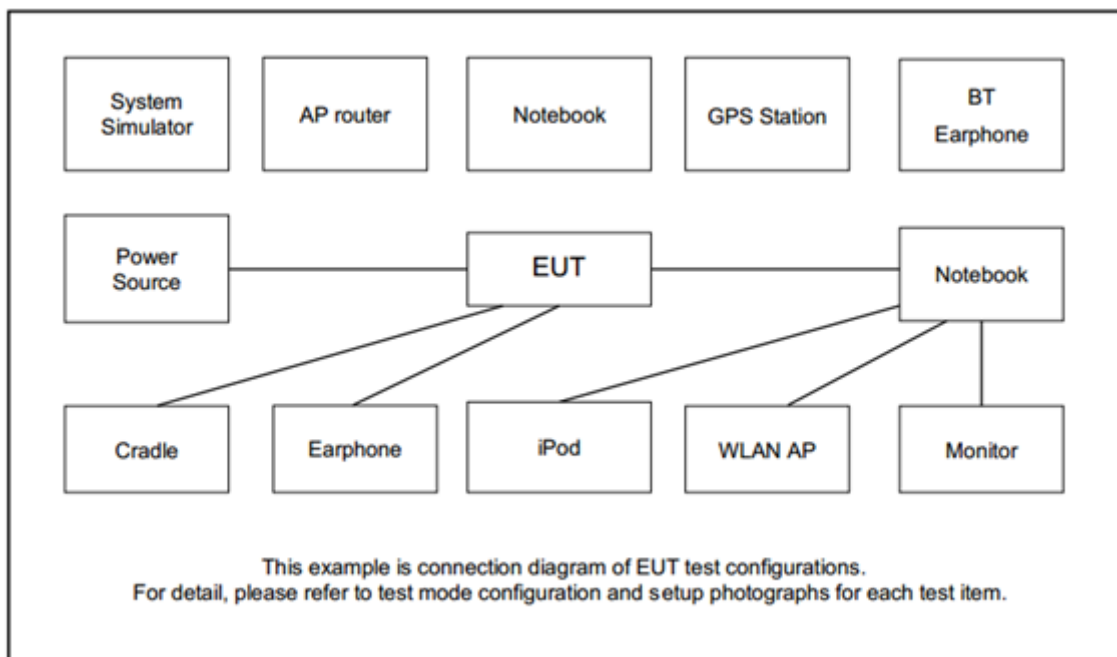
Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20 (Covered by VHT20)	MCS0
802.11n HT40 (Covered by VHT40)	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0

Remark: The manufacturer defines worst case were Non Beamforming, other test items only test worst case and documented.

Test Cases	
AC Conducted Emission	Mode 1 : WLAN (5GHz) Link + WAN Link + LAN (1) Link + LAN (2) Link + LAN (3) Link + LAN (A) Load + Adapter

Ch. #		Band IV : 5725-5850 MHz			
		802.11a	802.11ac VHT20	802.11ac VHT40	802.11ac VHT80
L	Low	149	149	151	-
M	Middle	157	157	-	155
H	High	165	165	159	-

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.	Notebook	DELL	Latitude E3340	FCC DoC/ Contains FCC ID: PD97260NGU	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	Dell	Latitude E3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	Dell	Latitude E5480	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	ASUS	8260NGW	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	Notebook	Lenovo	L570	N/A	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m



2.5 EUT Operation Test Setup

The RF test items, utility “QSPR V5.0-00188” 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.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example :

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

3 Test Result

3.1 6dB and 26dB and 99% Occupied Bandwidth Measurement

3.1.1 Description of 6dB and 26dB and 99% Occupied Bandwidth

The minimum 6 dB bandwidth shall be at least 500 kHz.

26dB and 99% Occupied bandwidth are reporting only.

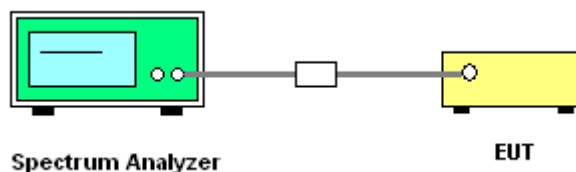
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.
7. Measure and record the results in the test report.

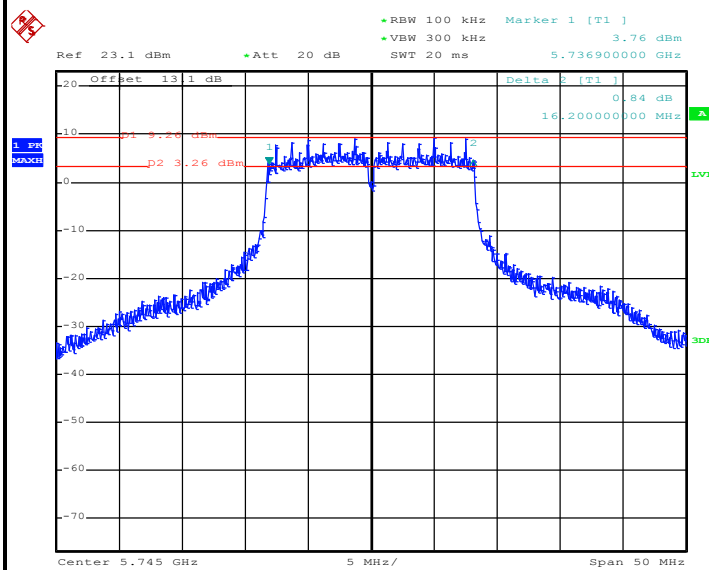
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 26dB and 99% Occupied Bandwidth

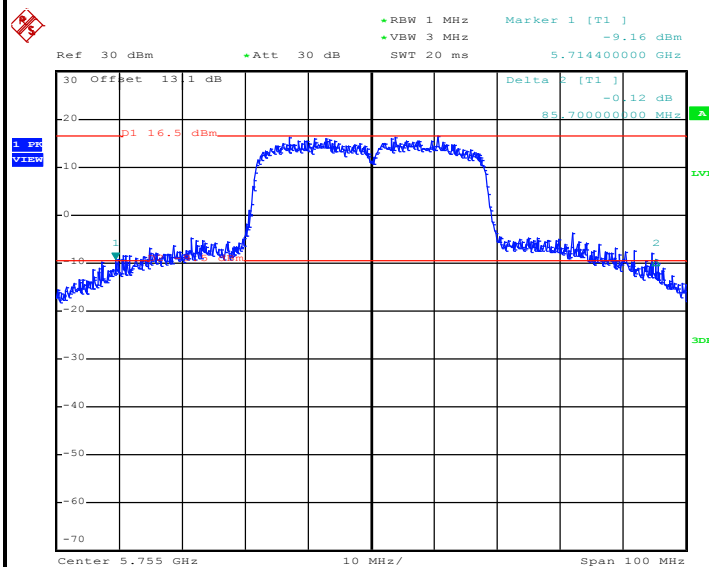
Please refer to Appendix A.

Minimum 6dB Bandwidth

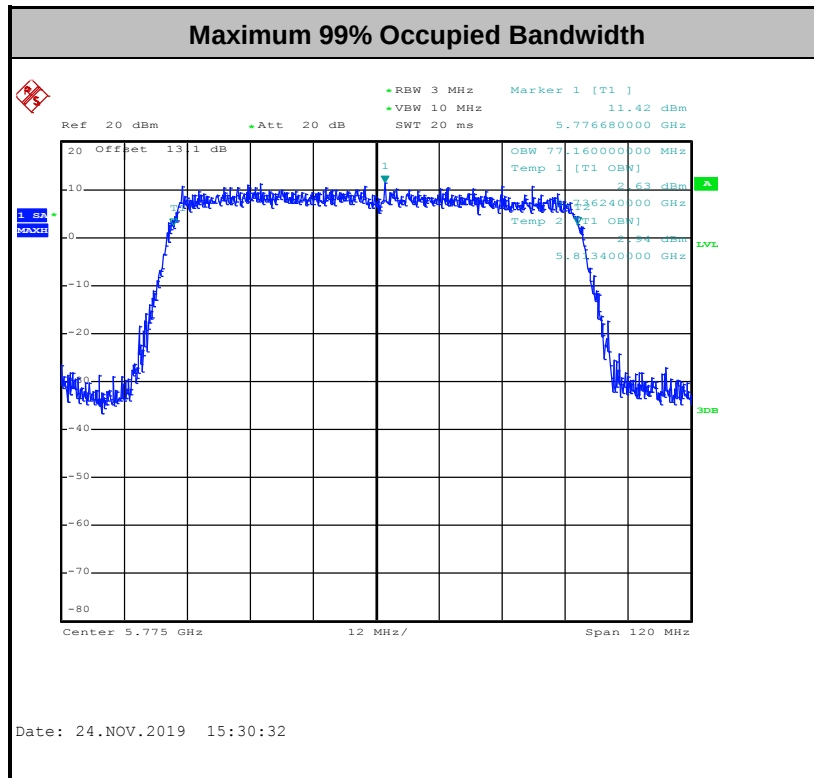


Date: 24.NOV.2019 12:36:51

Maximum 26dB Bandwidth



Date: 27.NOV.2019 09:17:01



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

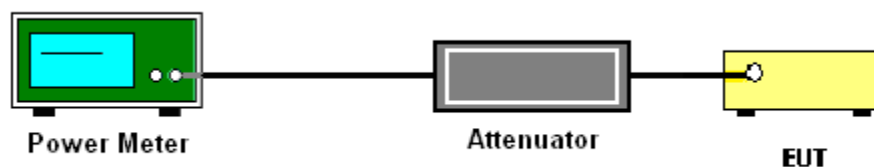
3.2.3 Test Procedures

The testing follows Method PM-G of FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Method PM-G (Measurement using a gated RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit at its maximum power control level.
3. Measure the average power of the transmitter
4. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.



3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5.725–5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6 dBi are used, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
Section F) Maximum power spectral density.

Method SA-3

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

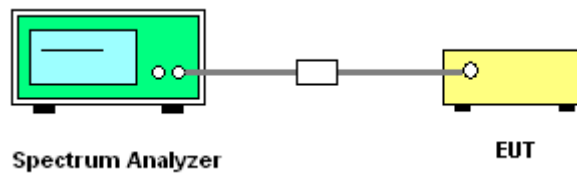
- Measure the duty cycle.
- Set span to encompass the entire emission bandwidth (EBW) of the signal.
- Set RBW = 300 kHz.
- Set VBW $\geq$ 1 MHz.
- Number of points in sweep $\geq$ 2 Span / RBW.
- Sweep time = auto.
- Detector = RMS
- Trace average at least 100 traces in power averaging mode.
- Add $10 \log(500\text{kHz}/\text{RBW})$ to the test result.
- Add $10 \log(1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add $10 \log(1/0.25) = 6$ dB if the duty cycle is 25 percent.

1. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
2. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.
3. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (c): Measure and add $10 \log(N_{\text{ANT}})$ dB.

With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity $10 \log(N_{\text{ANT}})$ dB is added to each spectrum value before comparing to the emission limit. The addition of $10 \log(N_{\text{ANT}})$ dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{\text{ANT}}^{\text{th}}$ of the PSD limit.

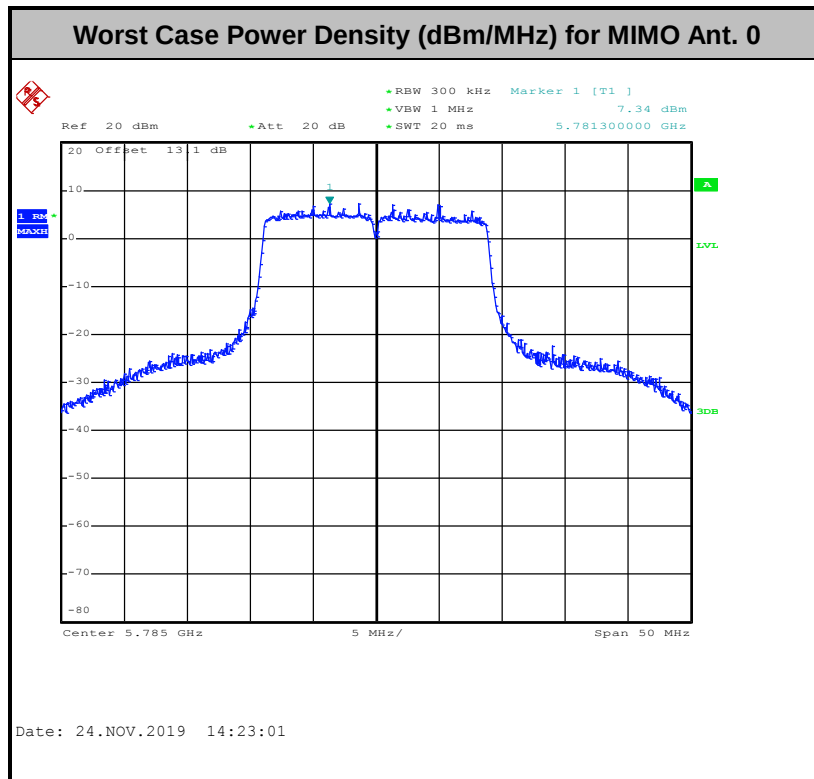
3.3.4 Test Setup

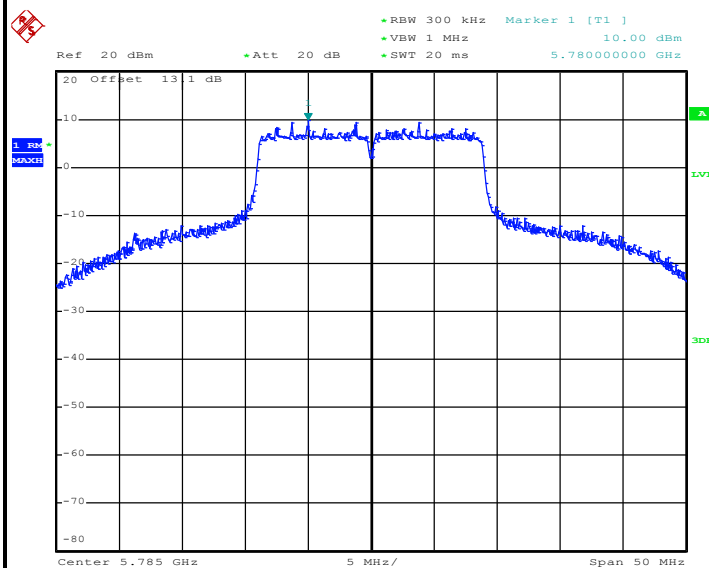




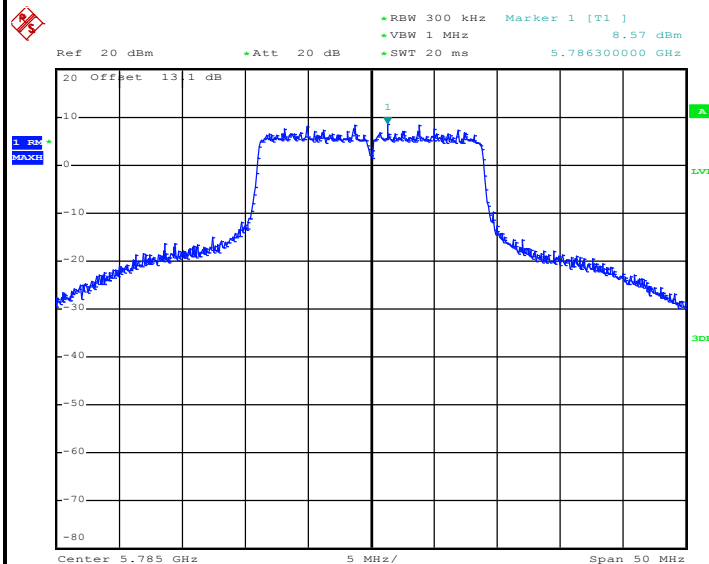
3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



Worst Case Power Density (dBm/MHz) for MIMO Ant. 1


Date: 24.NOV.2019 14:25:47

Worst Case Power Density (dBm/MHz) for MIMO Ant. 2


Date: 24.NOV.2019 14:30:13

3.4 Unwanted Emissions Measurement

This section is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement.

3.4.1 Limit of Unwanted Emissions

- (1) For transmitters operating in the 5.725-5.85 GHz band:

15.407(b)(4)(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

- (2) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

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

Note: The following formula is used to convert the EIRP to field strength.

$$E = \frac{1000000\sqrt{30P}}{3} \quad \mu\text{V/m, where P is the eirp (Watts)}$$

EIRP (dBm)	Field Strength at 3m (dBμV/m)
- 27	68.3

- (3) KDB789033 D02 v02r01 G)2)c)

- (i) Sections 15.407(b)(1-3) specifies the unwanted emissions limit for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.
- (ii) Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are based on the use of a peak detector.



3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01.

Section G) Unwanted emissions measurement.

(1) Procedure for Unwanted Emissions Measurements Below 1000MHz

- RBW = 120 kHz
- VBW = 300 kHz
- Detector = Peak
- Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW $\geq$ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

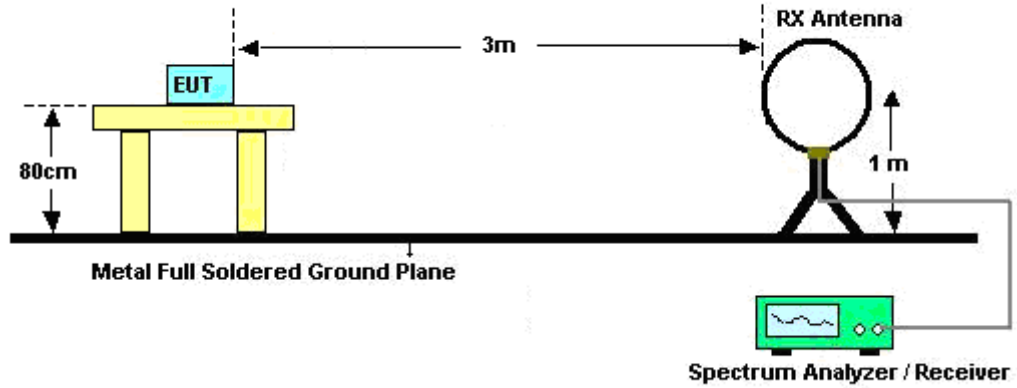
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW $\geq$ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



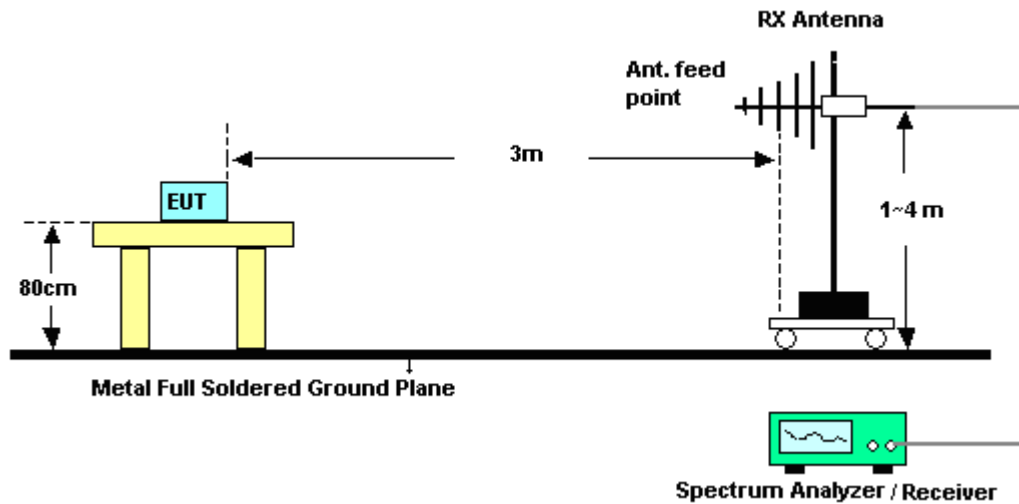
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
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.

3.4.4 Test Setup

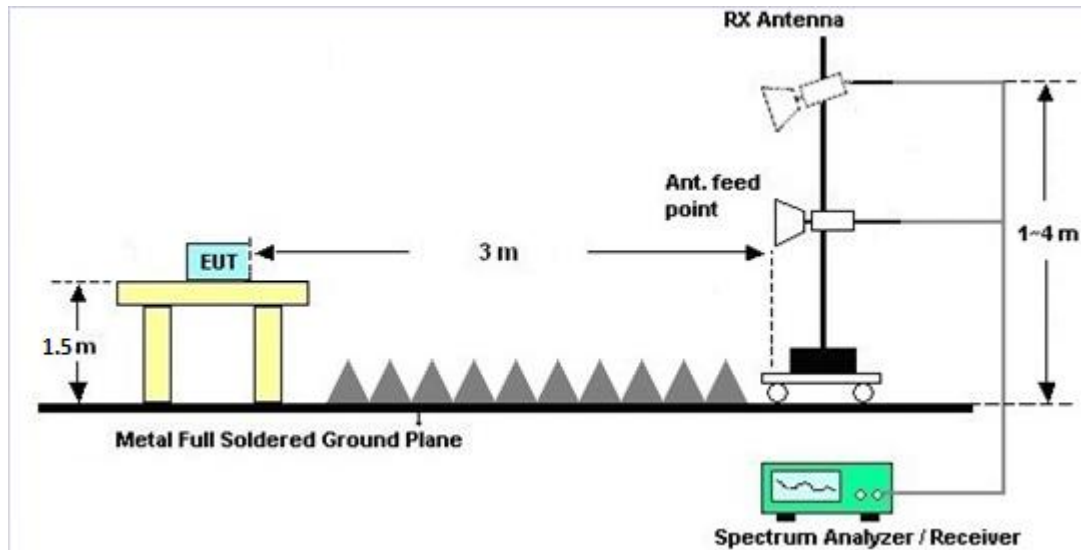
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

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.

3.4.6 Test Result of Radiated Band Edges

Please refer to Appendix C and D.

3.4.7 Duty Cycle

Please refer to Appendix E.

3.4.8 Test Result of Unwanted Radiated Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix C and D.

3.5 AC Conducted Emission Measurement

3.5.1 Limit of AC Conducted Emission

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

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

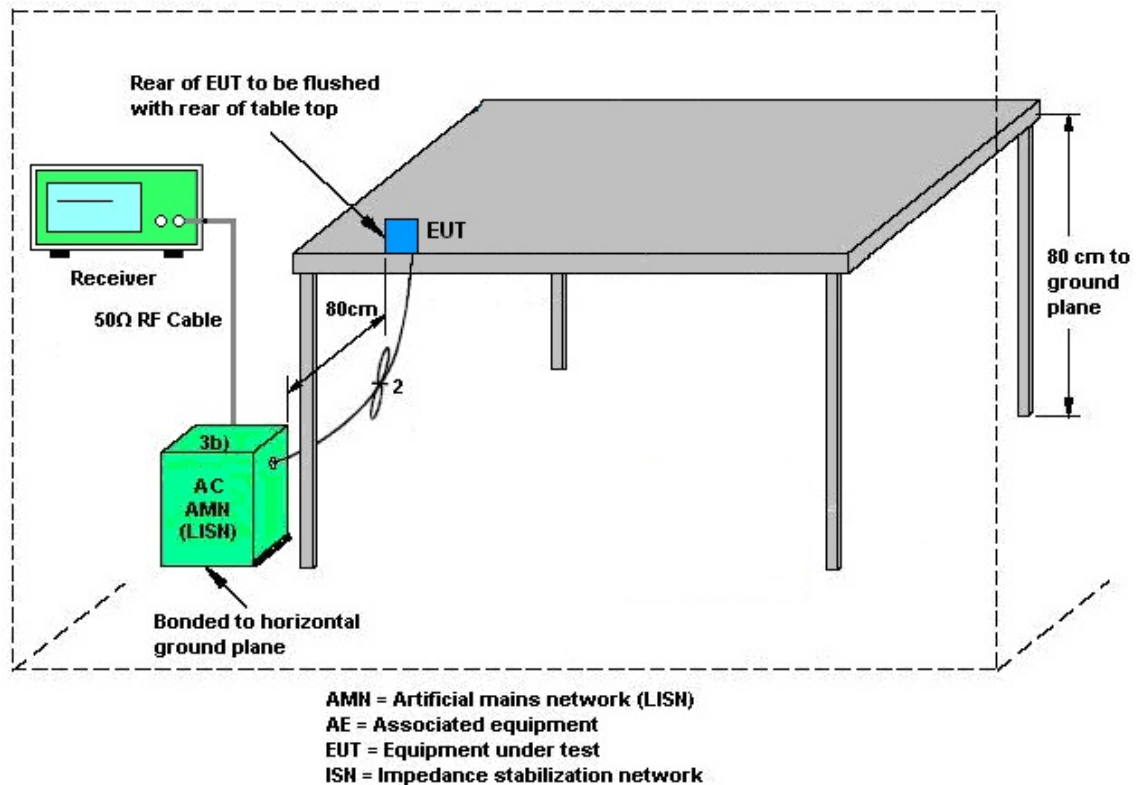
3.5.2 Measuring Instruments

See list of measuring equipment of this test report.

3.5.3 Test Procedures

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

3.5.4 Test Setup



3.5.5 Test Result of AC Conducted Emission

Please refer to Appendix B.

3.6 Automatically Discontinue Transmission

3.6.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.6.2 Measuring Instruments

See list of measuring equipment of this test report.

3.6.3 Test Result of Automatically Discontinue Transmission

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.7 Antenna Requirements

3.7.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.7.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.7.3 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>							
				DG	DG	Power	PSD
				for	for	Limit	Limit
	Ant. 1	Ant. 2	Ant. 3	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
Band IV	3.58	3.58	3.58	3.58	8.35	0.00	2.35

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
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 26, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 15, 2019	Nov. 26, 2019	Nov. 14, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Nov. 26, 2019	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Nov. 26, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Nov. 26, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Nov. 26, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 07, 2019	Nov. 21, 2019~ Nov. 25, 2019	Jan. 06, 2020	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Nov. 21, 2019~ Nov. 25, 2019	Dec. 05, 2019	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&0 0800N1D01N-06	41912&05	30MHz to 1GHz	Feb. 12, 2019	Nov. 21, 2019~ Nov. 25, 2019	Feb. 11, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-211 4	1-18GHz	Jul. 31, 2019	Nov. 21, 2019~ Nov. 25, 2019	Jul. 30, 2020	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Dec. 05, 2018	Nov. 21, 2019~ Nov. 25, 2019	Dec. 04, 2019	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2018	Nov. 21, 2019~ Nov. 25, 2019	Dec. 27, 2019	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0055007	1GHz~18GHz	Apr. 01, 2019	Nov. 21, 2019~ Nov. 25, 2019	May 31, 2020	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY532701 95	1GHz~26.5GHz	Aug. 23, 2019	Nov. 21, 2019~ Nov. 25, 2019	Aug. 22, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY541300 85	20MHz~8.4GHz	Nov. 01, 2019	Nov. 21, 2019~ Nov. 25, 2019	Oct. 31, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100390	20Hz~26.5GHz	Dec. 27, 2018	Nov. 21, 2019~ Nov. 25, 2019	Dec. 26, 2019	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Nov. 21, 2019~ Nov. 25, 2019	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Nov. 21, 2019~ Nov. 25, 2019	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(k 5)	RK-00045 1	N/A	N/A	Nov. 21, 2019~ Nov. 25, 2019	N/A	Radiation (03CH15-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 15, 2019	Nov. 21, 2019~ Nov. 25, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4 PE	30M-18G	Apr. 15, 2019	Nov. 21, 2019~ Nov. 25, 2019	Apr. 14, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY802430 /4	30M~18G	May 13, 2019	Nov. 21, 2019~ Nov. 25, 2019	May 12, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 26, 2019	Nov. 21, 2019~ Nov. 25, 2019	Feb. 25, 2020	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 26, 2019	Nov. 21, 2019~ Nov. 25, 2019	Feb. 25, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-1 530-8000-40S S	SN4	1.53G Low Pass	Jul. 04, 2019	Nov. 21, 2019~ Nov. 25, 2019	Jul. 03, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WHKX8-5872. 5-6750-18000 -40ST	SN6	6.75GHz High Pass Filter	Jul. 02, 2019	Nov. 21, 2019~ Nov. 25, 2019	Jul. 01, 2020	Radiation (03CH15-HY)
Power Sensor	DARE	RPR3006W	16I00054S NO10	10MHz~6GHz	Dec. 19, 2018	Oct. 22, 2019~ Nov. 27, 2019	Dec. 18 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Aug. 14, 2019	Oct. 22, 2019~ Nov. 27, 2019	Aug. 13, 2020	Conducted (TH05-HY)
Switch Control Manframe	E-IUSTRUMENT	ETF-1405-0	EC190006 7	N/A	Aug. 15, 2019	Oct. 22, 2019~ Nov. 27, 2019	Aug. 14, 2020	Conducted (TH05-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.2
--	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.2
--	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.5
--	-----

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	5.2
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Appendix A. Test Result of Conducted Test Items

Test Engineer	Hank Hsu	Temperature	21~25	°C
Test Date	2019/10/22~2019/11/27	Relative Humidity	51~54	%

<CDD Mode>

TEST RESULTS DATA
6dB and 99% OBW

Band IV MIMO 3Tx Mode Ant 0 + 1 + 2															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	26dB Bandwidth (MHz)			6 dB Bandwidth (MHz)			99% Bandwidth (MHz)			6 dB Min. Limit (MHz)	Pass /Fail
					Ant 0	Ant 1	Ant 2	Ant 0	Ant 1	Ant 2	Ant 0	Ant 1	Ant 2		
11a	6Mbps	3	149	5745	27.05	44.00	36.80	16.20	16.25	16.20	16.75	28.10	17.15	0.5	Pass
11a	6Mbps	3	157	5785	22.40	39.50	32.10	16.30	16.30	16.20	16.65	18.25	16.80	0.5	Pass
11a	6Mbps	3	165	5825	21.50	39.15	28.30	16.25	16.20	16.25	16.60	19.60	16.70	0.5	Pass
VHT20	MCS0	3	149	5745	24.30	43.05	36.05	17.25	17.55	17.55	17.80	22.85	18.05	0.5	Pass
VHT20	MCS0	3	157	5785	25.50	43.40	36.05	17.55	17.55	17.55	17.80	23.55	18.20	0.5	Pass
VHT20	MCS0	3	165	5825	22.75	43.40	29.30	17.55	17.55	16.95	17.80	24.15	18.00	0.5	Pass
VHT40	MCS0	3	151	5755	41.04	85.70	41.22	35.05	35.13	35.10	36.40	37.70	36.40	0.5	Pass
VHT40	MCS0	3	159	5795	41.22	84.90	69.50	35.10	32.45	34.90	36.40	37.50	36.60	0.5	Pass
VHT80	MCS0	3	155	5775	83.52	82.88	82.88	75.80	75.67	75.36	77.16	76.80	76.80	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV MIMO 3Tx Mode Ant 0 + 1 + 2												
Mod.	Data Rate	NTx	CH.	Freq. (MHz)	Average Conducted Power (dBm)				FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail	Setting
					Ant 0	Ant 1	Ant 2	SUM	Ant 0 + 1 + 2	Ant 0 + 1 + 2		
11a	6Mbps	3	149	5745	19.50	21.70	21.00	25.60	30.00	3.58	Pass	3Tx
11a	6Mbps	3	157	5785	19.10	20.80	20.10	24.83	30.00	3.58	Pass	21.5
11a	6Mbps	3	165	5825	18.90	20.30	19.90	24.51	30.00	3.58	Pass	21
HT20	MCS0	3	149	5745	19.10	21.30	20.60	25.20	30.00	3.58	Pass	21.5
HT20	MCS0	3	157	5785	19.20	21.10	20.40	25.07	30.00	3.58	Pass	21.5
HT20	MCS0	3	165	5825	19.10	20.60	20.20	24.78	30.00	3.58	Pass	21.5
HT40	MCS0	3	151	5755	18.70	20.80	20.10	24.72	30.00	3.58	Pass	21
HT40	MCS0	3	159	5795	18.90	20.50	20.00	24.62	30.00	3.58	Pass	21
VHT20	MCS0	3	149	5745	19.20	21.30	20.60	25.22	30.00	3.58	Pass	21.5
VHT20	MCS0	3	157	5785	19.30	21.10	20.40	25.10	30.00	3.58	Pass	21.5
VHT20	MCS0	3	165	5825	19.10	20.70	20.20	24.82	30.00	3.58	Pass	21.5
VHT40	MCS0	3	151	5755	18.70	20.80	20.20	24.76	30.00	3.58	Pass	21
VHT40	MCS0	3	159	5795	18.90	20.60	20.00	24.66	30.00	3.58	Pass	21
VHT80	MCS0	3	155	5775	14.80	16.60	16.10	20.67	30.00	3.58	Pass	17

TEST RESULTS DATA
Power Spectral Density

Band IV MIMO 3Tx Mode Ant 0 + 1 + 2											
Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Average Power Density (dBm/500kHz)				Average PSD Limit (dBm/500kHz)	DG (dBi)	Pass /Fail
					Ant 0	Ant 1	Ant 2	SUM			
11a	6Mbps	3	149	5745	9.44	11.97	10.99	16.74	27.65	8.35	Pass
11a	6Mbps	3	157	5785	8.90	11.08	10.63	15.85	27.65	8.35	Pass
11a	6Mbps	3	165	5825	9.32	11.15	10.23	15.92	27.65	8.35	Pass
VHT20	MCS0	3	149	5745	9.75	12.07	11.23	16.84	27.65	8.35	Pass
VHT20	MCS0	3	157	5785	9.56	12.22	10.79	16.99	27.65	8.35	Pass
VHT20	MCS0	3	165	5825	9.86	11.15	11.26	16.03	27.65	8.35	Pass
VHT40	MCS0	3	151	5755	5.78	7.59	5.42	12.36	27.65	8.35	Pass
VHT40	MCS0	3	159	5795	5.70	7.73	7.52	12.50	27.65	8.35	Pass
VHT80	MCS0	3	155	5775	-1.50	0.29	0.48	5.25	27.65	8.35	Pass

Note: PSD Sum = Max PSD(Ant. 1, Ant. 2) + 10 log (n)

<TXBF Mode>

TEST RESULTS DATA
Average Power Table
(Reporting Only)

Band IV MIMO 3Tx Mode Ant 0 + 1 + 2												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)					FCC Conducted Power Limit (dBm)	DG (dBi)	Pass/Fail
					Ant 0	Ant 1	Ant 2	Ant 3	SUM			
HT20	MCS0	3	149	5745	18.80	20.60	20.10		24.67	27.65	8.35	Pass
HT20	MCS0	3	157	5785	18.90	20.50	19.70		24.52	27.65	8.35	Pass
HT20	MCS0	3	165	5825	18.70	20.00	19.60		24.24	27.65	8.35	Pass
HT40	MCS0	3	151	5755	18.60	20.30	19.90		24.43	27.65	8.35	Pass
HT40	MCS0	3	159	5795	18.70	20.20	19.60		24.31	27.65	8.35	Pass
VHT20	MCS0	3	149	5745	18.90	20.70	20.10		24.73	27.65	8.35	Pass
VHT20	MCS0	3	157	5785	18.90	20.50	19.80		24.55	27.65	8.35	Pass
VHT20	MCS0	3	165	5825	18.80	20.10	19.60		24.30	27.65	8.35	Pass
VHT40	MCS0	3	151	5755	18.60	20.40	19.90		24.47	27.65	8.35	Pass
VHT40	MCS0	3	159	5795	18.70	20.30	19.60		24.35	27.65	8.35	Pass
VHT80	MCS0	3	155	5775	14.40	16.00	15.60		20.16	27.65	8.35	Pass

Setting
3Tx
21
21
21
20.5
20.5
21
21
21
20.5
20.5
16.5



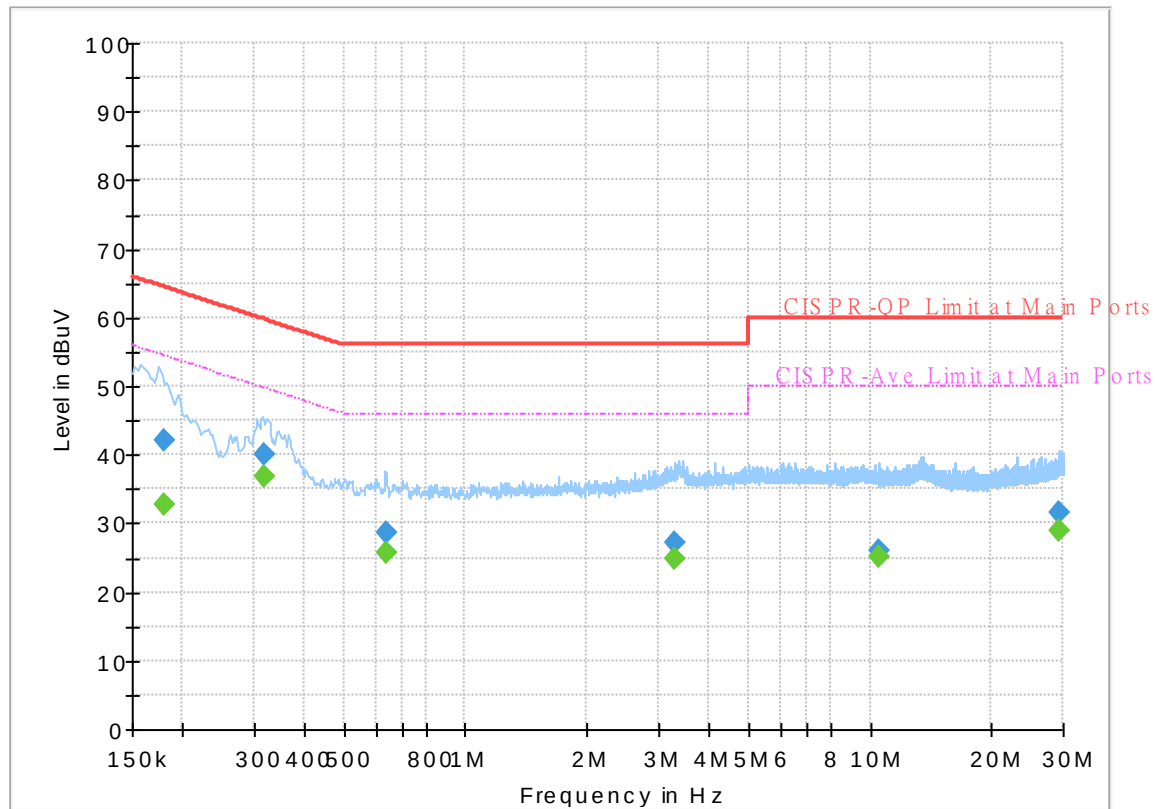
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	Temperature :	23~26℃
		Relative Humidity :	48~54%

EUT Information

Report NO : 992436-01
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Line

Full Spectrum



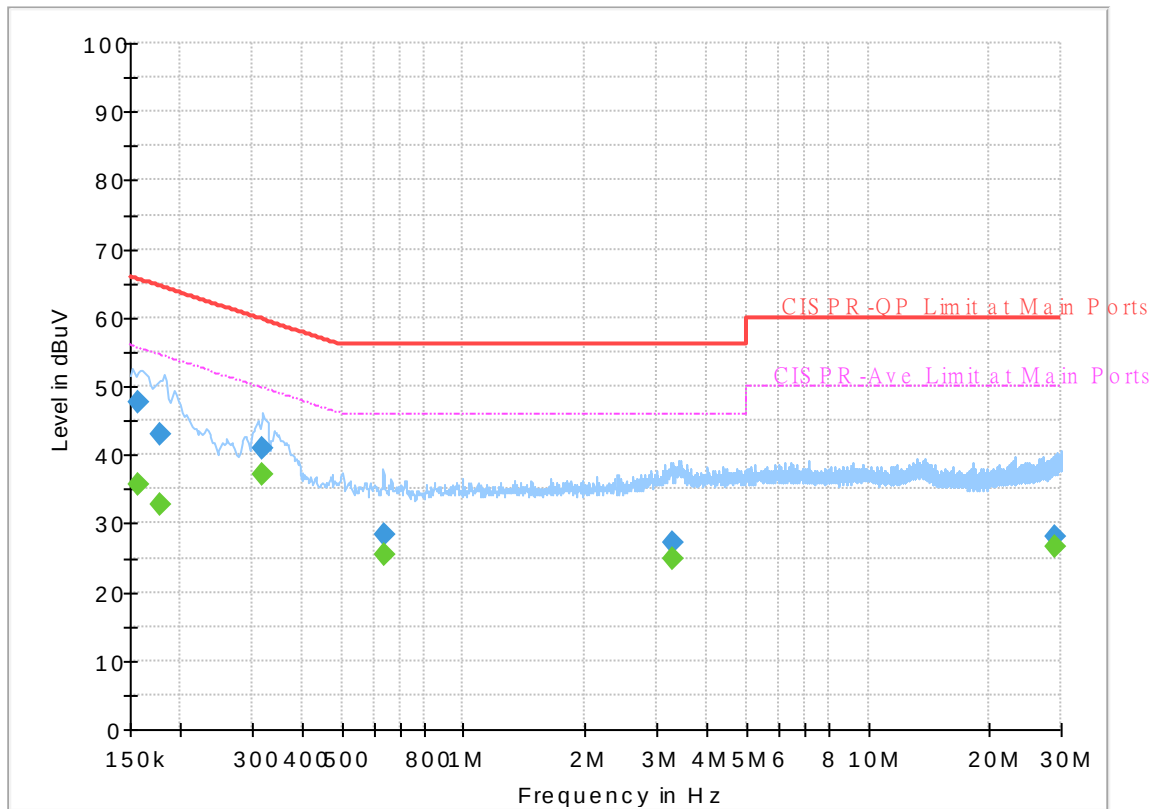
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.179250	---	32.64	54.52	21.88	L1	OFF	19.5
0.179250	42.19	---	64.52	22.33	L1	OFF	19.5
0.318750	---	36.90	49.74	12.84	L1	OFF	19.5
0.318750	40.18	---	59.74	19.56	L1	OFF	19.5
0.634020	---	25.67	46.00	20.33	L1	OFF	19.5
0.634020	28.52	---	56.00	27.48	L1	OFF	19.5
3.293880	---	24.96	46.00	21.04	L1	OFF	19.6
3.293880	27.14	---	56.00	28.86	L1	OFF	19.6
10.484790	---	25.12	50.00	24.88	L1	OFF	19.9
10.484790	26.10	---	60.00	33.90	L1	OFF	19.9
29.233950	---	28.94	50.00	21.06	L1	OFF	20.4
29.233950	31.52	---	60.00	28.48	L1	OFF	20.4

EUT Information

Report NO : 992436-01
Test Mode : Mode 1
Test Voltage : 120Vac/60Hz
Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	35.63	55.63	20.00	N	OFF	19.5
0.156750	47.53	---	65.63	18.10	N	OFF	19.5
0.177270	---	32.73	54.61	21.88	N	OFF	19.5
0.177270	42.98	---	64.61	21.63	N	OFF	19.5
0.319650	---	37.16	49.72	12.56	N	OFF	19.5
0.319650	40.85	---	59.72	18.87	N	OFF	19.5
0.635100	---	25.53	46.00	20.47	N	OFF	19.6
0.635100	28.28	---	56.00	27.72	N	OFF	19.6
3.301890	---	24.91	46.00	21.09	N	OFF	19.6
3.301890	27.07	---	56.00	28.93	N	OFF	19.6
28.923630	---	26.54	50.00	23.46	N	OFF	20.6
28.923630	27.93	---	60.00	32.07	N	OFF	20.6



Appendix C. Radiated Spurious Emission

Test Engineer :	Leo Li , Karl Hou , Bigshow Wang	Temperature :	24.2~25.1°C
		Relative Humidity :	55~64%

Band 4 - 5725~5850MHz

WIFI 802.11a (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.	
0+1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11a CH 149 5745MHz		5630.2	51.59	-16.61	68.2	40.35	31.9	9.85	30.51	316	68	P	H
		5699.8	68.47	-36.58	105.05	56.96	32.2	9.86	30.55	316	68	P	H
		5714.6	77.25	-32.04	109.29	65.69	32.26	9.86	30.56	316	68	P	H
		5725	85.31	-36.89	122.2	73.72	32.3	9.86	30.57	316	68	P	H
	*	5745	115.79	-	-	104.13	32.38	9.86	30.58	316	68	P	H
	*	5745	107.42	-	-	95.76	32.38	9.86	30.58	316	68	A	H
													H
													H
		5650	58	-10.2	68.2	46.76	31.9	9.86	30.52	202	180	P	V
		5699.8	78.22	-26.83	105.05	66.71	32.2	9.86	30.55	202	180	P	V
		5719.8	89.13	-21.61	110.74	77.56	32.28	9.86	30.57	202	180	P	V
		5724.8	96.43	-25.31	121.74	84.84	32.3	9.86	30.57	202	180	P	V
	*	5745	124.89	-	-	113.23	32.38	9.86	30.58	202	180	P	V
	*	5745	116.53	-	-	104.87	32.38	9.86	30.58	202	180	A	V
													V
													V



WIFI Ant. 0+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)
802.11a CH 157 5785MHz		5639	51.15	-17.05	68.2	39.92	31.9	9.85	30.52	329	62	P	H
		5697.6	50.98	-52.45	103.43	39.48	32.19	9.86	30.55	329	62	P	H
		5714	53.56	-55.56	109.12	42	32.26	9.86	30.56	329	62	P	H
		5724.6	55.96	-65.33	121.29	44.37	32.3	9.86	30.57	329	62	P	H
	*	5785	115.07	-	-	103.41	32.4	9.87	30.61	329	62	P	H
	*	5785	107.04	-	-	95.38	32.4	9.87	30.61	329	62	A	H
		5854.2	58.77	-53.85	112.62	47.07	32.41	9.94	30.65	329	62	P	H
		5857.6	59.09	-50.98	110.07	47.38	32.42	9.94	30.65	329	62	P	H
		5876	52.73	-51.73	104.46	40.97	32.45	9.97	30.66	329	62	P	H
		5936	51.69	-16.51	68.2	39.71	32.64	10.04	30.7	329	62	P	H
													H
													H
		5644.6	55.49	-12.71	68.2	44.26	31.9	9.85	30.52	202	180	P	V
		5691.2	55.96	-42.75	98.71	44.5	32.15	9.86	30.55	202	180	P	V
		5720	59.93	-50.87	110.8	48.36	32.28	9.86	30.57	202	180	P	V
		5724.4	62.82	-58.01	120.83	51.23	32.3	9.86	30.57	202	180	P	V
	*	5785	123.65	-	-	111.99	32.4	9.87	30.61	202	180	P	V
	*	5785	115.55	-	-	103.89	32.4	9.87	30.61	202	180	A	V
		5851.8	68.5	-49.6	118.1	56.82	32.4	9.93	30.65	202	180	P	V
		5863	64.22	-44.34	108.56	52.5	32.43	9.95	30.66	202	180	P	V
		5881.8	57.71	-42.44	100.15	45.95	32.46	9.97	30.67	202	180	P	V
		5932.6	55.18	-13.02	68.2	43.21	32.63	10.04	30.7	202	180	P	V
													V
													V



WIFI Ant. 0+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)
802.11a CH 165 5825MHz	*	5825	113.01	-	-	101.34	32.4	9.9	30.63	303	303	P	H
	*	5825	104.67	-	-	93	32.4	9.9	30.63	303	303	A	H
		5851.6	73.1	-45.45	118.55	61.42	32.4	9.93	30.65	303	303	P	H
		5856.2	72.19	-38.27	110.46	60.49	32.41	9.94	30.65	303	303	P	H
		5875.2	64.47	-40.58	105.05	52.72	32.45	9.96	30.66	303	303	P	H
		5931.4	52.26	-15.94	68.2	40.3	32.63	10.03	30.7	303	303	P	H
													H
													H
	*	5825	124.16	-	-	112.49	32.4	9.9	30.63	211	190	P	V
	*	5825	115.4	-	-	103.73	32.4	9.9	30.63	211	190	A	V
		5850.4	84.85	-36.44	121.29	73.17	32.4	9.93	30.65	211	190	P	V
		5855.2	82.06	-28.68	110.74	70.36	32.41	9.94	30.65	211	190	P	V
		5875.4	73.19	-31.71	104.9	61.44	32.45	9.96	30.66	211	190	P	V
		5930.2	54.5	-13.7	68.2	42.55	32.62	10.03	30.7	211	190	P	V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI Ant. 0+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)
802.11a CH 149 5745MHz		11490	48.35	-25.65	74	55.75	40.29	14.5	62.19	100	0	P	H
		17235	50.7	-17.5	68.2	51.07	40.2	18.51	59.08	100	0	P	H
													H
													H
		11490	62.48	-11.52	74	69.88	40.29	14.5	62.19	207	298	P	V
		11490	50.36	-3.64	54	57.76	40.29	14.5	62.19	207	298	A	V
		17235	51.52	-16.68	68.2	51.89	40.2	18.51	59.08	100	0	P	V
													V
802.11a CH 157 5785MHz		11570	48.54	-25.46	74	56.08	40.16	14.56	62.26	100	0	P	H
		17355	50.34	-17.86	68.2	49.6	40.84	18.72	58.82	100	0	P	H
													H
													H
		11570	62.58	-11.42	74	70.12	40.16	14.56	62.26	254	352	P	V
		11570	50.18	-3.82	54	57.72	40.16	14.56	62.26	254	352	A	V
		17355	50.29	-17.91	68.2	49.55	40.84	18.72	58.82	100	0	P	V
													V
802.11a CH 165 5825MHz		11650	48.85	-25.15	74	56.7	39.85	14.62	62.32	100	0	P	H
		17475	50.88	-17.32	68.2	48.83	41.73	18.88	58.56	100	0	P	H
													H
													H
		11650	62.21	-11.79	74	70.06	39.85	14.62	62.32	200	331	P	V
		11650	49.01	-4.99	54	56.86	39.85	14.62	62.32	200	331	A	V
		17475	50.8	-17.4	68.2	48.75	41.73	18.88	58.56	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI Ant. 0+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)
802.11ac VHT20 CH 149 5745MHz		5628.2	51.63	-16.57	68.2	40.39	31.9	9.85	30.51	302	49	P	H
		5692.6	66.42	-33.32	99.74	54.95	32.16	9.86	30.55	302	49	P	H
		5719.2	76.82	-33.76	110.58	65.25	32.28	9.86	30.57	302	49	P	H
		5724.2	87.68	-32.7	120.38	76.09	32.3	9.86	30.57	302	49	P	H
	*	5745	115.17	-	-	103.51	32.38	9.86	30.58	302	49	P	H
	*	5745	106.66	-	-	95	32.38	9.86	30.58	302	49	A	H
													H
													H
		5603.8	55.84	-12.36	68.2	44.58	31.9	9.85	30.49	199	178	P	V
		5697.4	76.94	-26.34	103.28	65.45	32.18	9.86	30.55	199	178	P	V
		5716.4	86.25	-23.54	109.79	74.68	32.27	9.86	30.56	199	178	P	V
		5725	96.72	-25.48	122.2	85.13	32.3	9.86	30.57	199	178	P	V
	*	5745	124.56	-	-	112.9	32.38	9.86	30.58	199	178	P	V
	*	5745	115.6	-	-	103.94	32.38	9.86	30.58	199	178	A	V
													V
													V



WIFI Ant. 0+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)
802.11ac VHT20 CH 157 5785MHz		5644.8	52.2	-16	68.2	40.97	31.9	9.85	30.52	303	302	P	H
		5697.4	52.37	-50.91	103.28	40.88	32.18	9.86	30.55	303	302	P	H
		5719.8	57.85	-52.89	110.74	46.28	32.28	9.86	30.57	303	302	P	H
		5723.6	62.91	-56.1	119.01	51.33	32.29	9.86	30.57	303	302	P	H
	*	5785	114.79	-	-	103.13	32.4	9.87	30.61	303	302	P	H
	*	5785	106.48	-	-	94.82	32.4	9.87	30.61	303	302	A	H
		5850	62.24	-59.96	122.2	50.56	32.4	9.93	30.65	303	302	P	H
		5856.4	60.92	-49.49	110.41	49.22	32.41	9.94	30.65	303	302	P	H
		5876.2	55.56	-48.75	104.31	43.8	32.45	9.97	30.66	303	302	P	H
		5928.2	51.51	-16.69	68.2	39.57	32.61	10.03	30.7	303	302	P	H
													H
													H
		5646.4	54.79	-13.41	68.2	43.56	31.9	9.85	30.52	209	184	P	V
		5695.2	57.63	-44.03	101.66	46.15	32.17	9.86	30.55	209	184	P	V
		5719.6	65.44	-45.25	110.69	53.87	32.28	9.86	30.57	209	184	P	V
		5724.6	67.86	-53.43	121.29	56.27	32.3	9.86	30.57	209	184	P	V
	*	5785	124.37	-	-	112.71	32.4	9.87	30.61	209	184	P	V
	*	5785	115.49	-	-	103.83	32.4	9.87	30.61	209	184	A	V
		5854.4	70.69	-41.48	112.17	58.99	32.41	9.94	30.65	209	184	P	V
		5857.4	69.58	-40.55	110.13	57.88	32.41	9.94	30.65	209	184	P	V
		5875	62.05	-43.15	105.2	50.3	32.45	9.96	30.66	209	184	P	V
		5930.4	54.49	-13.71	68.2	42.54	32.62	10.03	30.7	209	184	P	V
													V
													V



WIFI Ant. 0+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)
802.11ac VHT20 CH 165 5825MHz	*	5825	114.91	-	-	103.24	32.4	9.9	30.63	314	58	P	H
	*	5825	106.2	-	-	94.53	32.4	9.9	30.63	314	58	A	H
		5850	74.58	-47.62	122.2	62.9	32.4	9.93	30.65	314	58	P	H
		5858	71.42	-38.54	109.96	59.71	32.42	9.94	30.65	314	58	P	H
		5876	61.12	-43.34	104.46	49.36	32.45	9.97	30.66	314	58	P	H
		5948	50.89	-17.31	68.2	38.85	32.69	10.06	30.71	314	58	P	H
													H
													H
	*	5825	123.09	-	-	111.42	32.4	9.9	30.63	212	185	P	V
	*	5825	114.75	-	-	103.08	32.4	9.9	30.63	212	185	A	V
		5850.2	83.73	-38.01	121.74	72.05	32.4	9.93	30.65	212	185	P	V
		5857.6	79.97	-30.1	110.07	68.26	32.42	9.94	30.65	212	185	P	V
		5878.2	70.92	-31.9	102.82	59.15	32.46	9.97	30.66	212	185	P	V
		5931.8	54.91	-13.29	68.2	42.95	32.63	10.03	30.7	212	185	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT20 (Harmonic @ 3m)

WIFI Ant. 0+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)
802.11ac VHT20 CH 149 5745MHz		11490	48.52	-25.48	74	55.92	40.29	14.5	62.19	100	0	P	H
		17235	50.49	-17.71	68.2	50.89	40.19	18.5	59.09	100	0	P	H
													H
													H
		11490	62.17	-11.83	74	69.57	40.29	14.5	62.19	200	304	P	V
		11490	49.93	-4.07	54	57.33	40.29	14.5	62.19	200	304	A	V
		17235	50.02	-18.18	68.2	50.42	40.19	18.5	59.09	100	0	P	V
													V
802.11ac VHT20 CH 157 5785MHz		11570	48.86	-25.14	74	56.4	40.16	14.56	62.26	100	0	P	H
		17355	50.72	-17.48	68.2	49.98	40.84	18.72	58.82	100	0	P	H
													H
													H
		11570	63.42	-10.58	74	70.96	40.16	14.56	62.26	200	301	P	V
		11570	50.38	-3.62	54	57.92	40.16	14.56	62.26	200	301	A	V
		17355	50.55	-17.65	68.2	49.81	40.84	18.72	58.82	100	0	P	V
													V
802.11ac VHT20 CH 165 5825MHz		11650	48.39	-25.61	74	56.24	39.85	14.62	62.32	100	0	P	H
		17475	50.86	-17.34	68.2	48.81	41.73	18.88	58.56	100	0	P	H
													H
													H
		11650	61.38	-12.62	74	69.23	39.85	14.62	62.32	203	303	P	V
		11650	48.6	-5.4	54	56.45	39.85	14.62	62.32	203	303	A	V
		17475	50.51	-17.69	68.2	48.46	41.73	18.88	58.56	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT40 (Band Edge @ 3m)

WIFI Ant. 0+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)
802.11ac VHT40 CH 151 5755MHz		5649.4	58.03	-10.17	68.2	46.8	31.9	9.85	30.52	301	59	P	H
		5691.2	67.7	-31.01	98.71	56.24	32.15	9.86	30.55	301	59	P	H
		5716.6	70.51	-39.34	109.85	58.94	32.27	9.86	30.56	301	59	P	H
		5724.6	74.23	-47.06	121.29	62.64	32.3	9.86	30.57	301	59	P	H
	*	5770	111.91	-	-	100.24	32.4	9.87	30.6	301	59	P	H
		5851.2	68.46	-51	119.46	56.78	32.4	9.93	30.65	301	59	P	H
		5857.8	67.73	-42.28	110.01	56.02	32.42	9.94	30.65	301	59	P	H
		5878.4	64.42	-38.25	102.67	52.65	32.46	9.97	30.66	301	59	P	H
		5937	53.71	-14.49	68.2	41.72	32.65	10.04	30.7	301	59	P	H
													H
													H
													H
		5645.8	67.77	-0.43	68.2	56.54	31.9	9.85	30.52	222	188	P	V
		5699.6	78.98	-25.93	104.91	67.47	32.2	9.86	30.55	222	188	P	V
		5720	81.16	-29.64	110.8	69.59	32.28	9.86	30.57	222	188	P	V
		5724	84.58	-35.34	119.92	72.99	32.3	9.86	30.57	222	188	P	V
	*	5775	120.94	-	-	109.27	32.4	9.87	30.6	222	188	P	V
	*	5775	112.53	-	-	100.86	32.4	9.87	30.6	222	188	A	V
		5850	78.17	-44.03	122.2	66.49	32.4	9.93	30.65	222	188	P	V
		5864.8	78.22	-29.83	108.05	66.5	32.43	9.95	30.66	222	188	P	V
		5882.4	73.15	-26.55	99.7	61.39	32.46	9.97	30.67	222	188	P	V
		5930.6	63.59	-4.61	68.2	51.64	32.62	10.03	30.7	222	188	P	V
													V
													V



WIFI Ant. 0+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)
802.11ac VHT40 CH 159 5795MHz		5633.4	52.82	-15.38	68.2	41.58	31.9	9.85	30.51	343	56	P	H
		5695.8	62.66	-39.44	102.1	51.18	32.17	9.86	30.55	343	56	P	H
		5719.2	65.59	-44.99	110.58	54.02	32.28	9.86	30.57	343	56	P	H
		5722.6	66.28	-50.45	116.73	54.7	32.29	9.86	30.57	343	56	P	H
	*	5795	112.19	-	-	100.53	32.4	9.87	30.61	343	56	P	H
	*	5795	104.16	-	-	92.5	32.4	9.87	30.61	343	56	A	H
		5851.6	71.61	-46.94	118.55	59.93	32.4	9.93	30.65	343	56	P	H
		5855.2	69.61	-41.13	110.74	57.91	32.41	9.94	30.65	343	56	P	H
		5888.8	63.24	-31.72	94.96	51.45	32.48	9.98	30.67	343	56	P	H
		5936.2	54.63	-13.57	68.2	42.65	32.64	10.04	30.7	343	56	P	H
													H
													H
		5649.2	61.54	-6.66	68.2	50.31	31.9	9.85	30.52	211	189	P	V
		5688	70.46	-25.89	96.35	59.02	32.13	9.86	30.55	211	189	P	V
		5719.4	73.76	-36.87	110.63	62.19	32.28	9.86	30.57	211	189	P	V
		5721.6	77.16	-37.29	114.45	65.58	32.29	9.86	30.57	211	189	P	V
	*	5795	121.7	-	-	110.04	32.4	9.87	30.61	211	189	P	V
	*	5795	113.65	-	-	101.99	32.4	9.87	30.61	211	189	A	V
		5850.8	81.74	-38.64	120.38	70.06	32.4	9.93	30.65	211	189	P	V
		5863.4	79.69	-28.76	108.45	67.97	32.43	9.95	30.66	211	189	P	V
		5885.8	75.36	-21.82	97.18	63.58	32.47	9.98	30.67	211	189	P	V
		5932	65.62	-2.58	68.2	53.66	32.63	10.03	30.7	211	189	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT40 (Harmonic @ 3m)

WIFI Ant. 0+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)
802.11ac VHT40 CH 151 5755MHz		11510	49.94	-24.06	74	57.35	40.28	14.52	62.21	100	0	P	H
		17265	50.68	-17.52	68.2	50.84	40.3	18.56	59.02	100	0	P	H
													H
													H
		11510	62.76	-11.24	74	70.17	40.28	14.52	62.21	202	306	P	V
		11510	49.69	-4.31	54	57.1	40.28	14.52	62.21	202	306	A	V
		17265	49.89	-18.31	68.2	50.05	40.3	18.56	59.02	100	0	P	V
													V
802.11ac VHT40 CH 159 5795MHz		11590	48.83	-25.17	74	56.41	40.12	14.57	62.27	100	0	P	H
		17385	50.25	-17.95	68.2	49.17	41.08	18.75	58.75	100	0	P	H
													H
													H
		11590	61.8	-12.2	74	69.38	40.12	14.57	62.27	190	303	P	V
		11590	49.26	-4.74	54	56.84	40.12	14.57	62.27	190	303	A	V
		17385	50.07	-18.13	68.2	48.99	41.08	18.75	58.75	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Band 4 5725~5850MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant. 0+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)
802.11ac VHT80 CH 155 5775MHz		5647.2	55.8	-12.4	68.2	44.57	31.9	9.85	30.52	327	55	P	H
		5688.8	63.36	-33.58	96.94	51.92	32.13	9.86	30.55	327	55	P	H
		5707.2	63.9	-43.32	107.22	52.37	32.23	9.86	30.56	327	55	P	H
		5725	64.99	-57.21	122.2	53.4	32.3	9.86	30.57	327	55	P	H
	*	5775	104.23	-	-	92.56	32.4	9.87	30.6	327	55	P	H
	*	5775	96.15	-	-	84.48	32.4	9.87	30.6	327	55	A	H
		5850	63.31	-58.89	122.2	51.63	32.4	9.93	30.65	327	55	P	H
		5871.6	64.33	-41.82	106.15	52.59	32.44	9.96	30.66	327	55	P	H
		5875.2	59.13	-45.92	105.05	47.38	32.45	9.96	30.66	327	55	P	H
		5928.8	52.58	-15.62	68.2	40.63	32.62	10.03	30.7	327	55	P	H
													H
													H
		5645.8	62.77	-5.43	68.2	51.54	31.9	9.85	30.52	219	189	P	V
		5683	72.78	-19.88	92.66	61.36	32.1	9.86	30.54	219	189	P	V
		5703.2	74.83	-31.27	106.1	63.32	32.21	9.86	30.56	219	189	P	V
		5720	74.28	-36.52	110.8	62.71	32.28	9.86	30.57	219	189	P	V
	*	5775	113.62	-	-	101.95	32.4	9.87	30.6	219	189	P	V
	*	5775	105.92	-	-	94.25	32.4	9.87	30.6	219	189	A	V
		5854	70.08	-43	113.08	58.38	32.41	9.94	30.65	219	189	P	V
		5865.8	72.82	-34.95	107.77	61.1	32.43	9.95	30.66	219	189	P	V
		5885.8	70.09	-27.09	97.18	58.31	32.47	9.98	30.67	219	189	P	V
		5926.4	60.18	-8.02	68.2	48.23	32.61	10.03	30.69	219	189	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**Band 4 5725~5850MHz****WIFI 802.11ac VHT80 (Harmonic @ 3m)**

WIFI Ant. 0+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)
802.11ac VHT80 CH 155 5775MHz		11550	49.68	-24.32	74	57.17	40.2	14.55	62.24	100	0	P	H
		17325	51.36	-16.84	68.2	50.97	40.6	18.67	58.88	100	0	P	H
													H
													H
		11550	49.96	-24.04	74	57.45	40.2	14.55	62.24	100	0	P	V
		17325	50.79	-17.41	68.2	50.4	40.6	18.67	58.88	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

5GHz WIFI 802.11ac VHT40 (LF @ 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.	
0+1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
5GHz 802.11ac VHT40 LF		58.13	26.47	-13.53	40	46.03	11.99	1.03	32.58	-	-	P	H
		199.75	29.99	-13.51	43.5	45.56	14.98	1.94	32.49	-	-	P	H
		320.03	38.04	-7.96	46	48.74	19.5	2.34	32.54	100	0	P	H
		381.14	36.21	-9.79	46	45.09	21.15	2.52	32.55	-	-	P	H
		450.01	30.27	-15.73	46	37.02	23.1	2.71	32.56	-	-	P	H
		874.87	36.24	-9.76	46	35.13	29	3.9	31.79	-	-	P	H
													H
													H
													H
													H
													H
													H
		35.82	32.91	-7.09	40	42.62	22.13	0.77	32.61	100	0	P	V
		210.42	28.94	-14.56	43.5	44.29	15.17	1.98	32.5	-	-	P	V
		330.7	33.75	-12.25	46	44.1	19.83	2.36	32.54	-	-	P	V
		374.35	32.68	-13.32	46	41.73	20.99	2.51	32.55	-	-	P	V
		450.01	30.64	-15.36	46	37.39	23.1	2.71	32.56	-	-	P	V
		721.61	32.32	-13.68	46	33.95	27.26	3.47	32.36	-	-	P	V
													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	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.	
0+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 D. Radiated Spurious Emission Plots

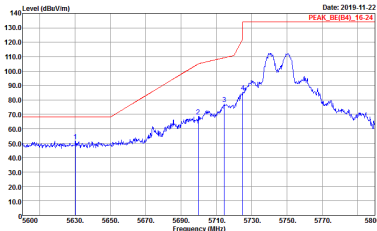
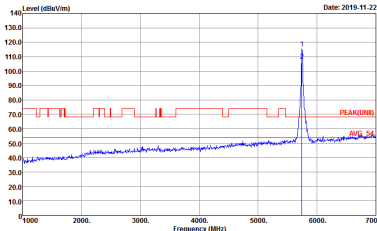
Test Engineer :	Leo Li , Karl Hou , Bigshow Wang	Temperature :	24.2~25.1°C
		Relative Humidity :	55~64%

Note symbol

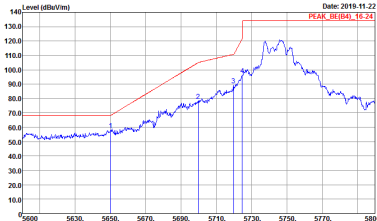
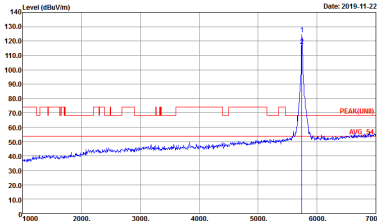
-L	Low channel location
-R	High channel location



Band 4 - 5725~5850MHz
WIFI 802.11a (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE(84)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	 Site : 03CH15-HY Condition : PEAK(UNIT) 3m HORN_91200_2114 HORIZONTAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto

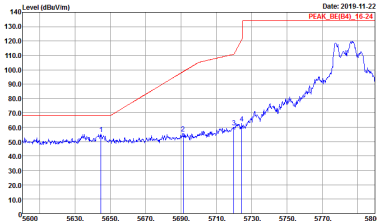
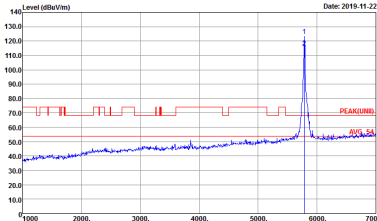
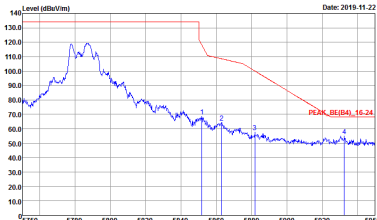


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
0+1+2	Vertical	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(84)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNIT) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

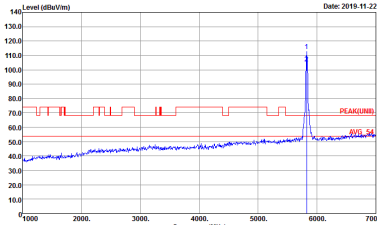


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
0+1+2	Horizontal	Fundamental
Peak	Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site Condition : 03CH15-HY : PEAK(UNII) 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

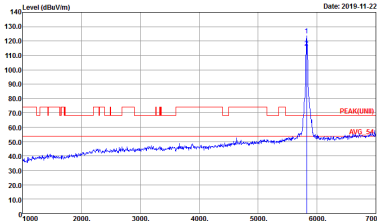


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
0+1+2	Vertical	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(84)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNIT) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site Condition : 03CH15-HY : PEAK_BE(84)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

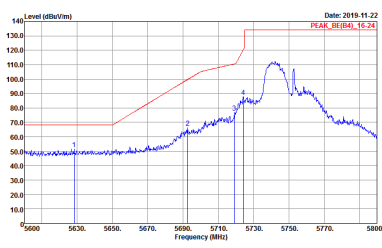
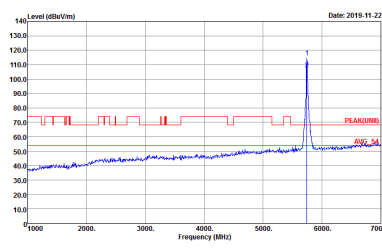


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE(164)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH15-HY Condition : PEAK(UNII)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
0+1+2	Vertical	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(84)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNIT) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

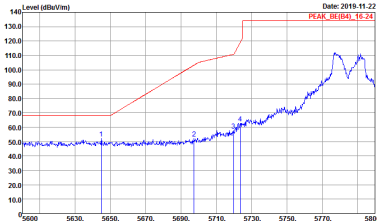
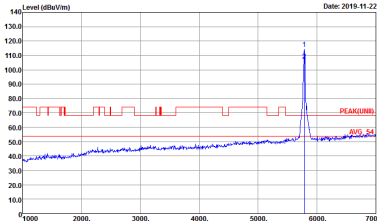
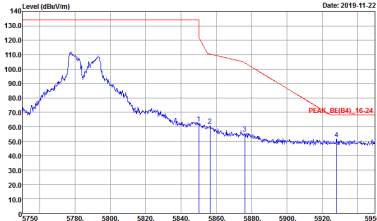
Band 4 5725~5850MHz
WIFI 802.11ac VHT20 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH149 5745MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-14Y Condition : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto	 Site : 03CH15-14Y Condition : PEAK(UNIT) 3m HORN_91200_2114 HORIZONTAL : RBW:1000.0000Hz VBW:3000.0000Hz SWT:Auto

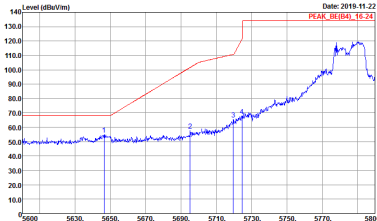
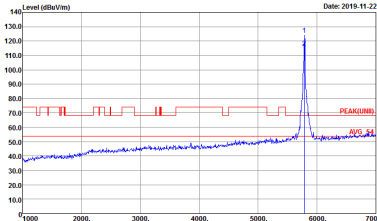
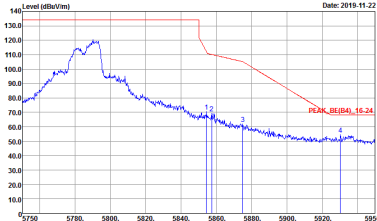


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH149 5745MHz	
0+1+2	Vertical	Fundamental
Peak Avg.	Site Condition : 03CH15-HY : PEAK_BE(04)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site Condition : 03CH15-HY : PEAK(UNII) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto

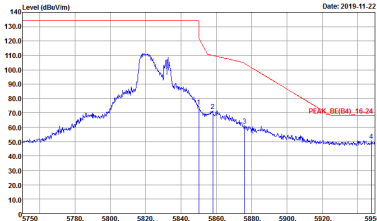
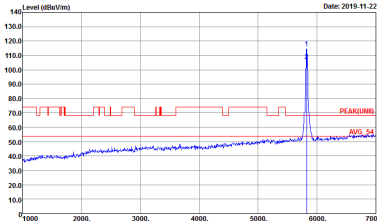


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH157 5785MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK_UNB 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

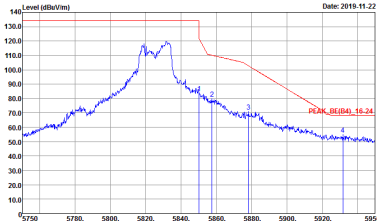
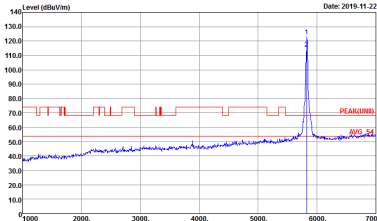


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH157 5785MHz	
0+1+2	Vertical	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNB) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



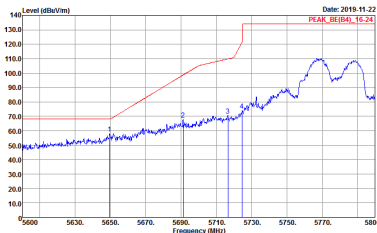
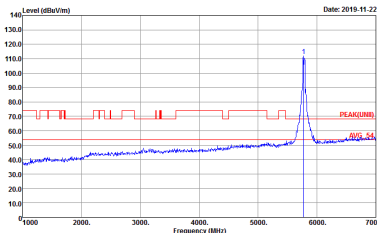
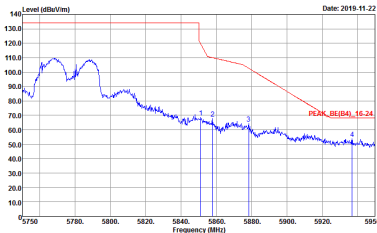
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH165 5825MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE(84)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT20 CH165 5825MHz	
0+1+2	Vertical	Fundamental
Peak Avg.	 Site Condition : 03CH15-HY : PEAK_BE(164)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNB) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto



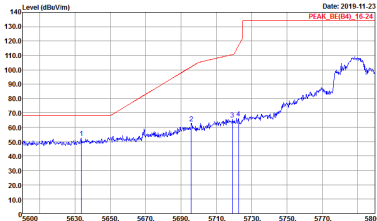
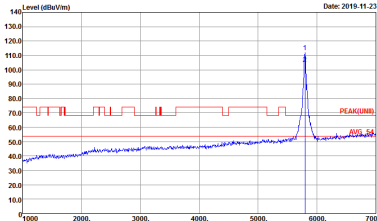
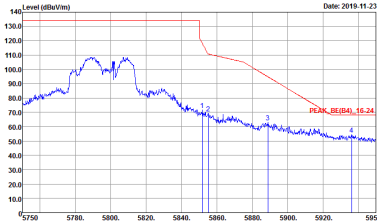
Band 4 5725~5850MHz
WIFI 802.11ac VHT40 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT40 CH151 5755MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH15-HY Condition : PEAK(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH15-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank

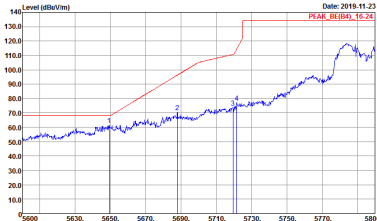
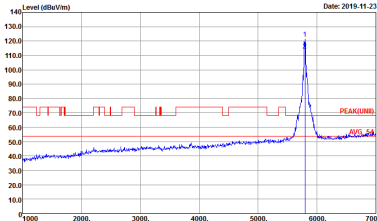
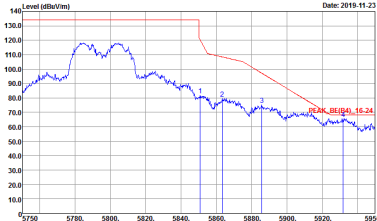


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT40 CH151 5755MHz	
0+1+2	Vertical	Fundamental
Peak	Site Condition : 03CH15-HY : PEAK_BE(04)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Site Condition : 03CH15-HY : PEAK(UNB) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	Site Condition : 03CH15-HY : PEAK_BE(04)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



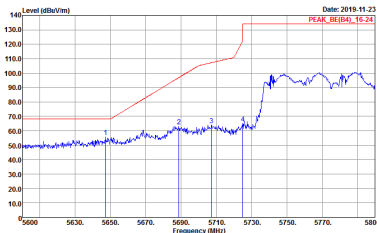
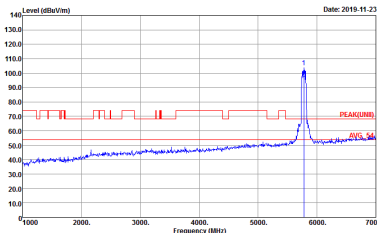
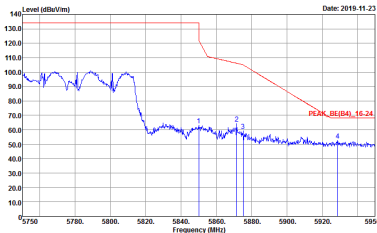
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT40 CH159 5795MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK_UNI(B) 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



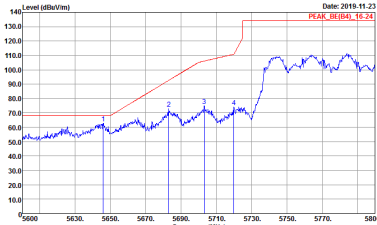
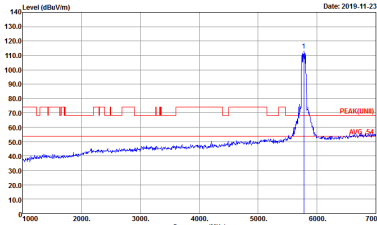
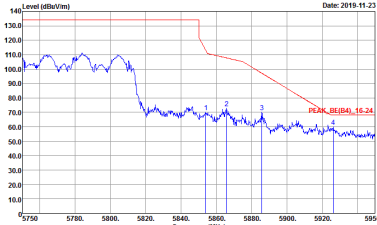
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT40 CH159 5795MHz	
0+1+2	Vertical	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(84)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNIT) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site Condition : 03CH15-HY : PEAK_BE(84)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



Band 4 5725~5850MHz
WIFI 802.11ac VHT80 (Band Edge @ 3m)

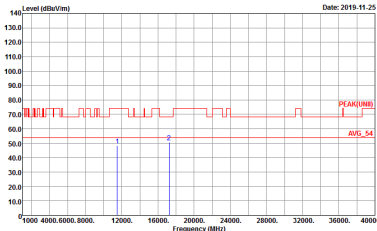
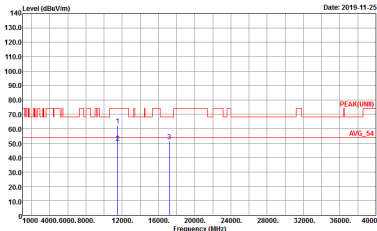
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
0+1+2	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site : 03CH15-HY Condition : PEAK(UNIT) 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site : 03CH15-HY Condition : PEAK_BE(B4)_16-24 3m HORN_91200_2114 HORIZONTAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



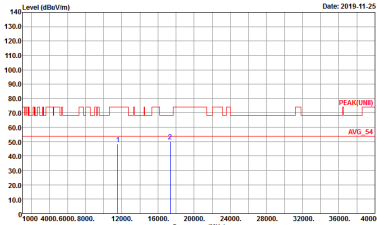
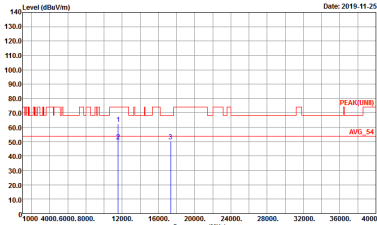
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
0+1+2	Vertical	Fundamental
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	 Site Condition : 03CH15-HY : PEAK(UNIT) 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto
Peak	 Site Condition : 03CH15-HY : PEAK_BE(B4)_16-24 3m HORN_9120D_2114 VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto	Left blank



Band 4 - 5725~5850MHz
WIFI 802.11a (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-HY Condition : PEAK(UNIT) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-HY Condition : PEAK(UNIT) 3m HORN_9120D_2114 VERTICAL Detector : Peak



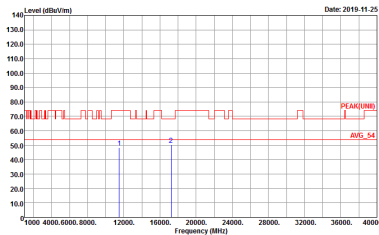
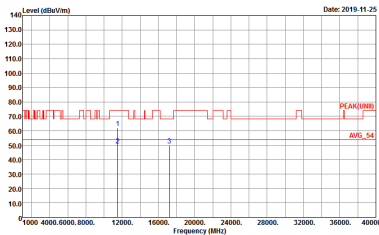
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 VERTICAL Detector : Peak



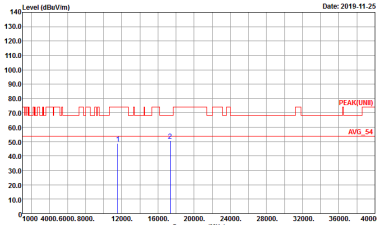
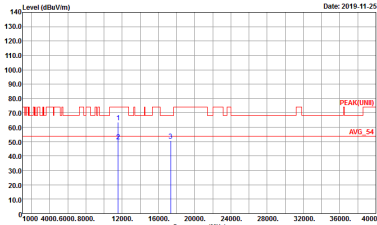
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH165 5825MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 VERTICAL Detector : Peak



Band 4 5725~5850MHz
WIFI 802.11ac VHT20 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH149 5745MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-14Y Condition : PEAK(LINE) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-14Y Condition : PEAK(LINE) 3m HORN_9120D_2114 VERTICAL Detector : Peak



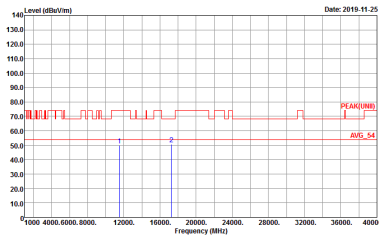
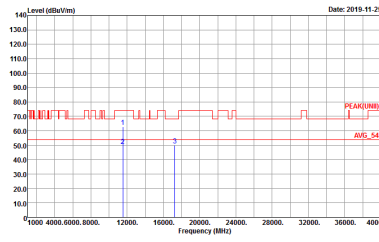
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH157 5785MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 VERTICAL Detector : Peak



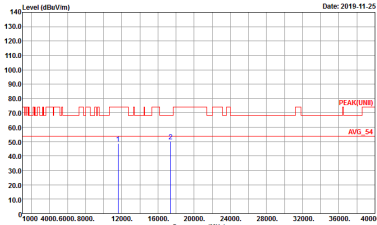
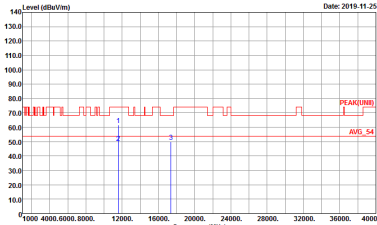
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT20 CH165 5825MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 VERTICAL Detector : Peak



Band 4 5725~5850MHz
WIFI 802.11ac VHT40 (Harmonic @ 3m)

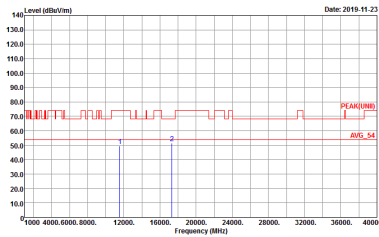
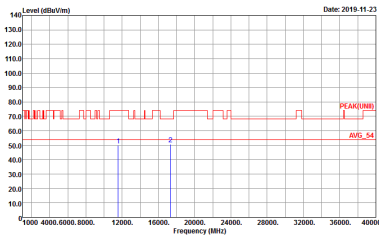
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT40 CH151 5755MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-14Y Condition : PEAK(LINE) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-14Y Condition : PEAK(LINE) 3m HORN_9120D_2114 VERTICAL Detector : Peak



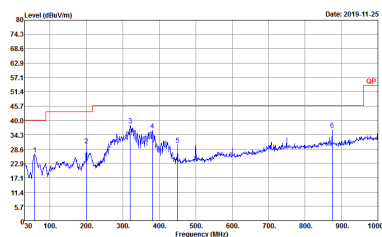
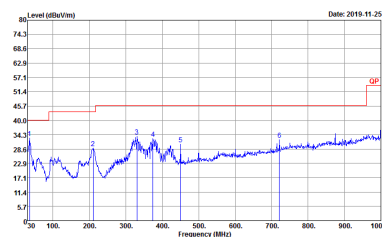
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT40 CH159 5795MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-HY Condition : PEAK(UNII) 3m HORN_9120D_2114 VERTICAL Detector : Peak



Band 4 5725~5850MHz
WIFI 802.11ac VHT80 (Harmonic @ 3m)

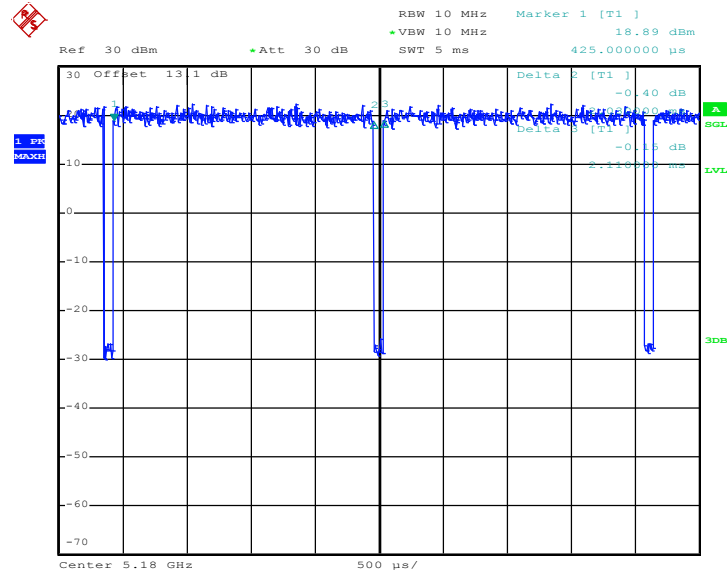
WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
0+1+2	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-14Y Condition : PEAK(LINE) 3m HORN_9120D_2114 HORIZONTAL Detector : Peak	 Site : 03CH15-14Y Condition : PEAK(LINE) 3m HORN_9120D_2114 VERTICAL Detector : Peak

Emission below 1GHz
5GHz WIFI 802.11ac VHT40 (LF)

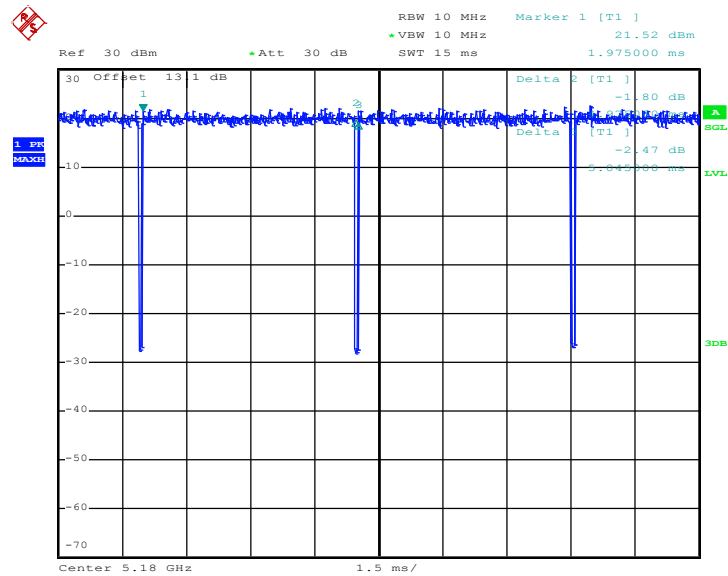
WIFI	5GHz 5725~5850MHz	
ANT	802.11ac VHT40 LF	
0+1+2	Horizontal	Vertical
QP / Peak	 Site : 03CH15-HY Condition : QP 3m BIL06_15_41912 HORIZONTAL Detector : Peak	 Site : 03CH15-HY Condition : QP 3m BIL06_15_41912 VERTICAL Detector : Peak

Appendix E. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
0+1+2	802.11a for Ant. 0	96.21	2030	0.49	1kHz	0.17
0+1+2	802.11a for Ant. 1	96.68	2040	0.49	1kHz	0.15
0+1+2	802.11a for Ant. 2	96.21	2030	0.49	1kHz	0.17
0+1+2	5GHz 802.11n HT20 for Ant. 0	98.61	-	-	10Hz	0.06
0+1+2	5GHz 802.11n HT20 for Ant. 1	98.02	-	-	10Hz	0.09
0+1+2	5GHz 802.11n HT20 for Ant. 2	98.31	-	-	10Hz	0.07
0+1+2	5GHz 802.11n HT40 for Ant. 0	95.80	2395	0.42	1kHz	0.19
0+1+2	5GHz 802.11n HT40 for Ant. 1	96.19	2400	0.42	1kHz	0.17
0+1+2	5GHz 802.11n HT40 for Ant. 2	96.41	2420	0.41	1kHz	0.16
0+1+2	5GHz 802.11ac VHT20 for Ant. 0	90.28	4970	0.20	300Hz	0.44
0+1+2	5GHz 802.11ac VHT20 for Ant. 1	90.45	4975	0.20	300Hz	0.44
0+1+2	5GHz 802.11ac VHT20 for Ant. 2	91.07	4995	0.20	300Hz	0.41
0+1+2	5GHz 802.11ac VHT40 for Ant. 0	82.39	2410	0.41	1kHz	0.84
0+1+2	5GHz 802.11ac VHT40 for Ant. 1	82.20	2425	0.41	1kHz	0.85
0+1+2	5GHz 802.11ac VHT40 for Ant. 2	82.31	2420	0.41	1kHz	0.85
0+1+2	5GHz 802.11ac VHT80 for Ant. 0	86.19	3340	0.30	300Hz	0.65
0+1+2	5GHz 802.11ac VHT80 for Ant. 1	86.69	3355	0.30	300Hz	0.62
0+1+2	5GHz 802.11ac VHT80 for Ant. 2	86.34	3350	0.30	300Hz	0.64

MIMO <Ant. 0>
802.11a


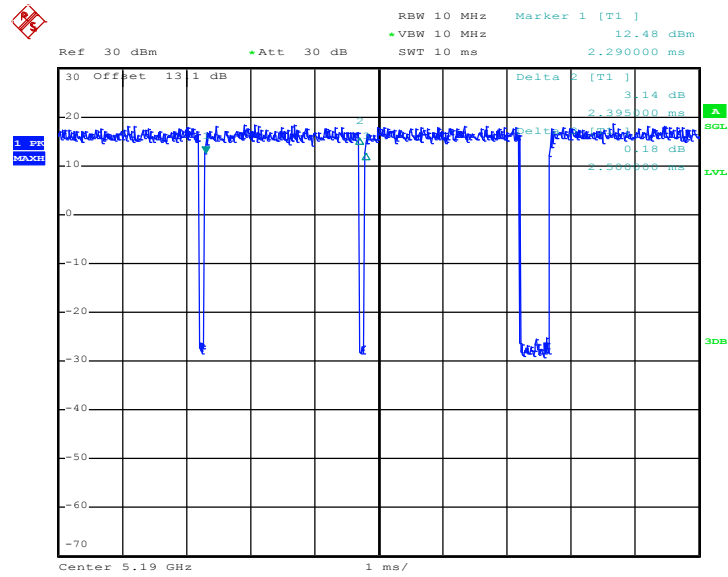
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802.11n HT20


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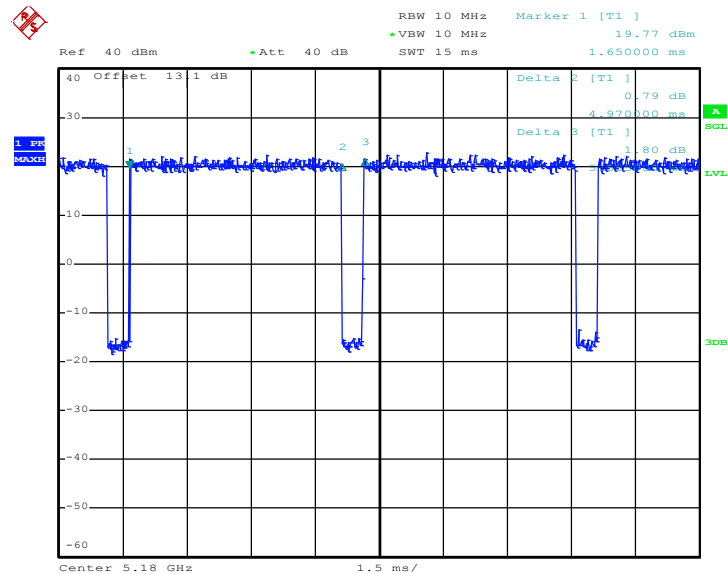


802.11n HT40



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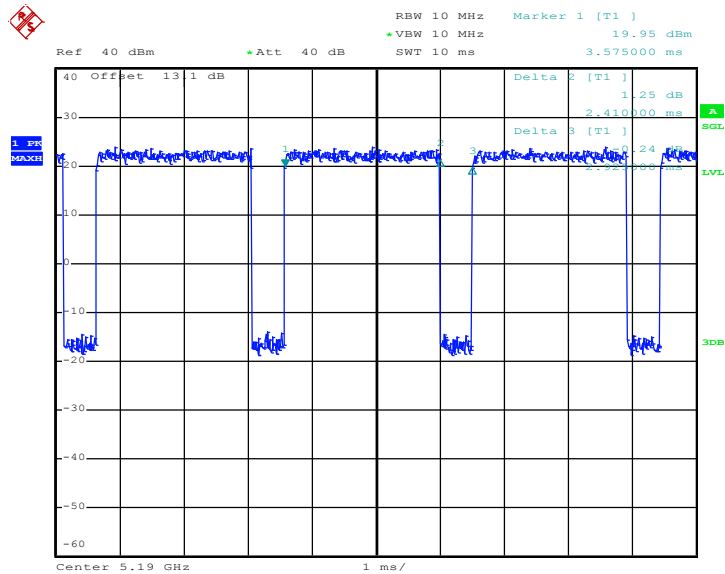
802.11ac VHT20



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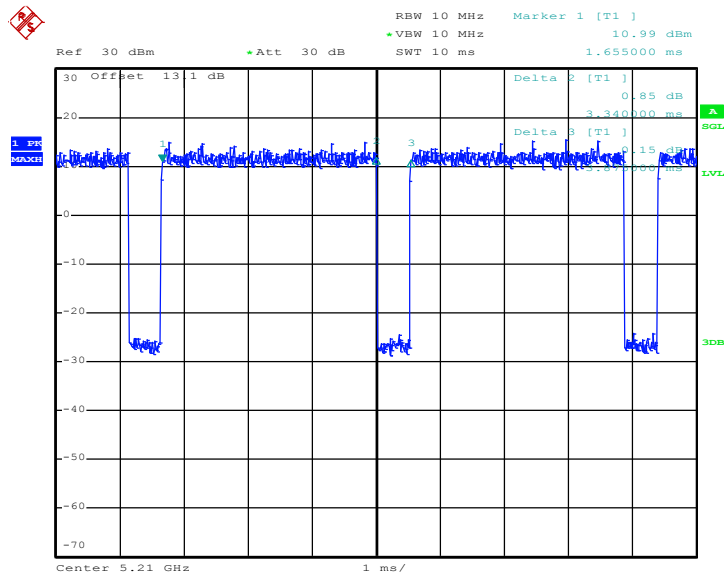


802.11ac VHT40

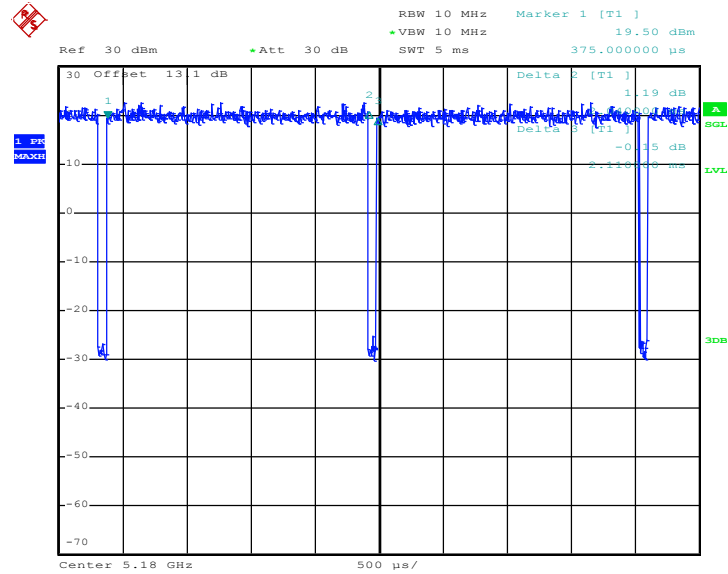


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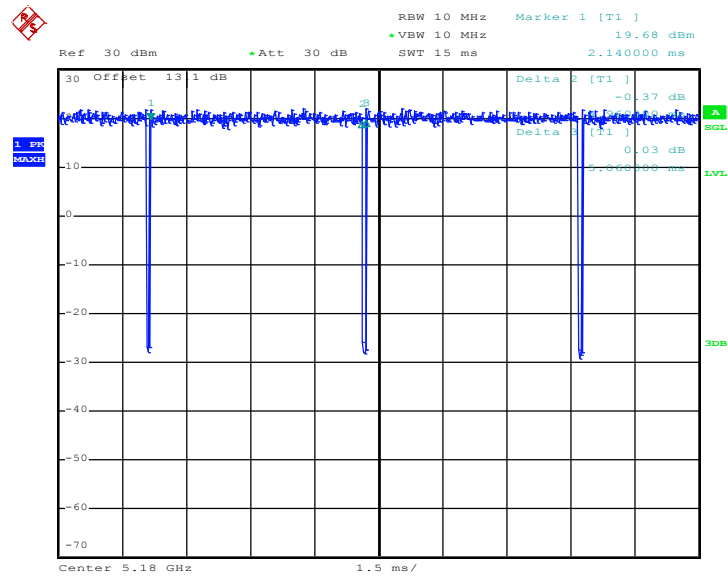
802.11ac VHT80



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MIMO <Ant. 1>
802.11a


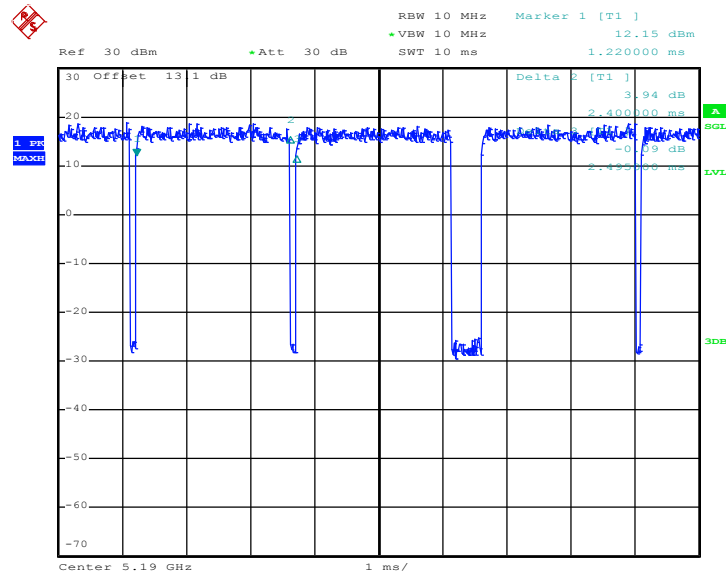
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802.11n HT20


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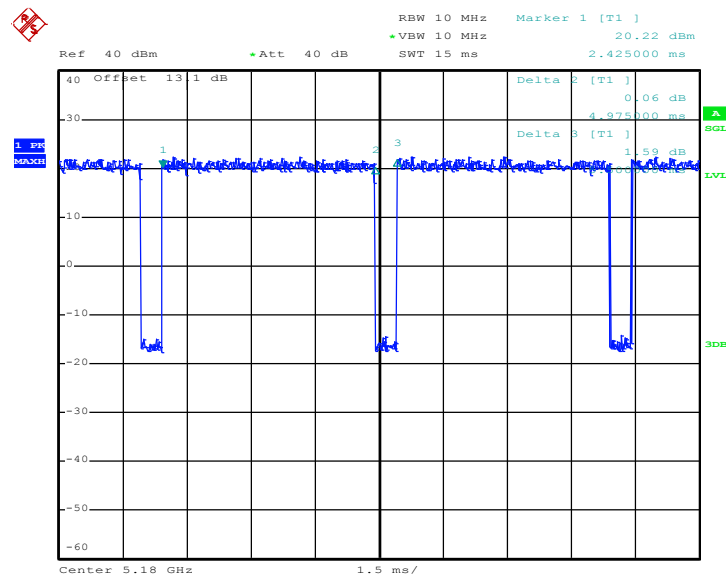


802.11n HT40



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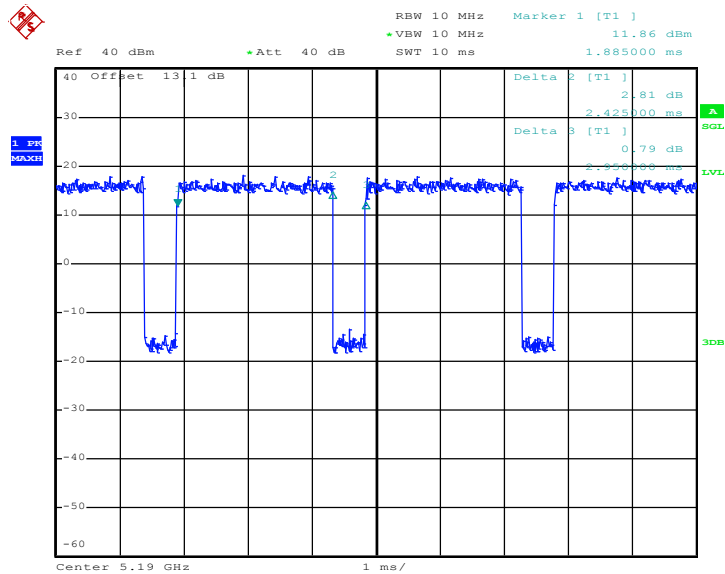
802.11ac VHT20



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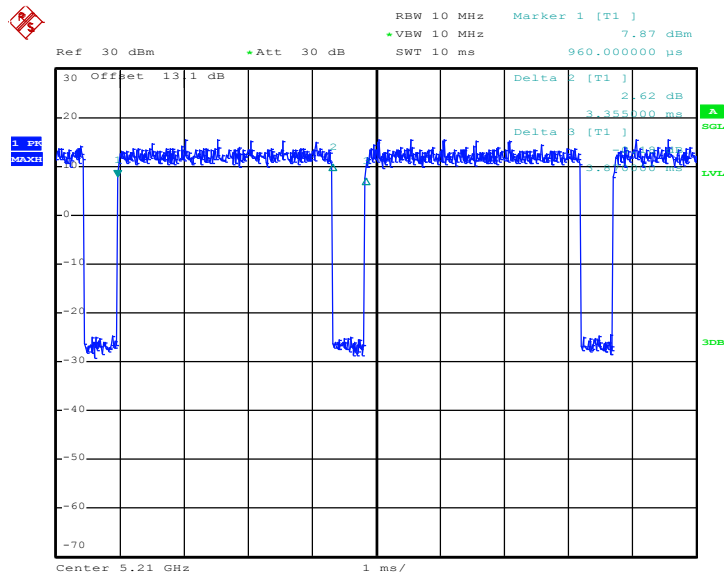


802.11ac VHT40

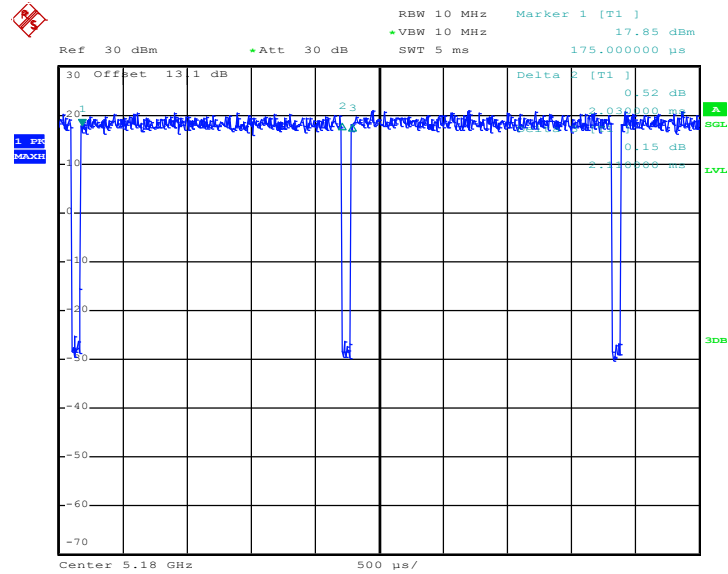


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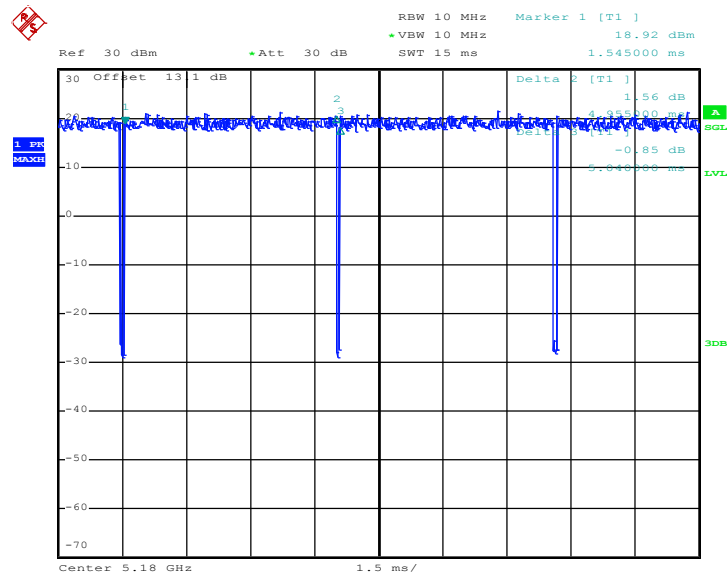
802.11ac VHT80



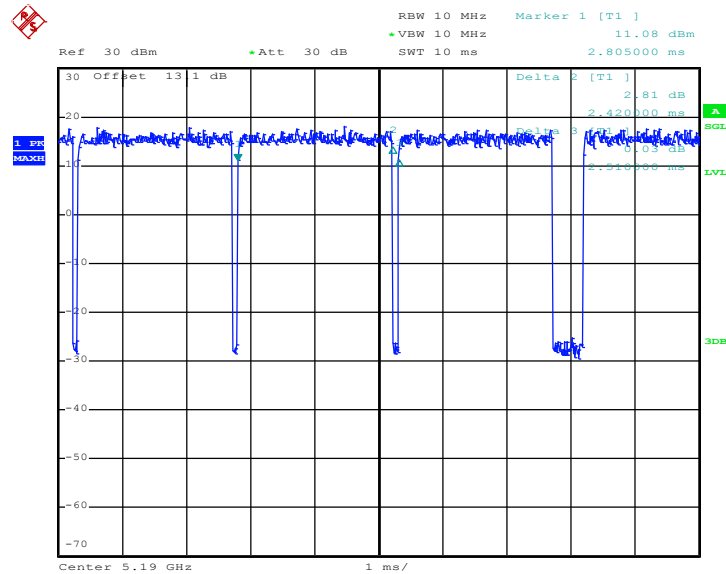
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MIMO <Ant. 2>
802.11a


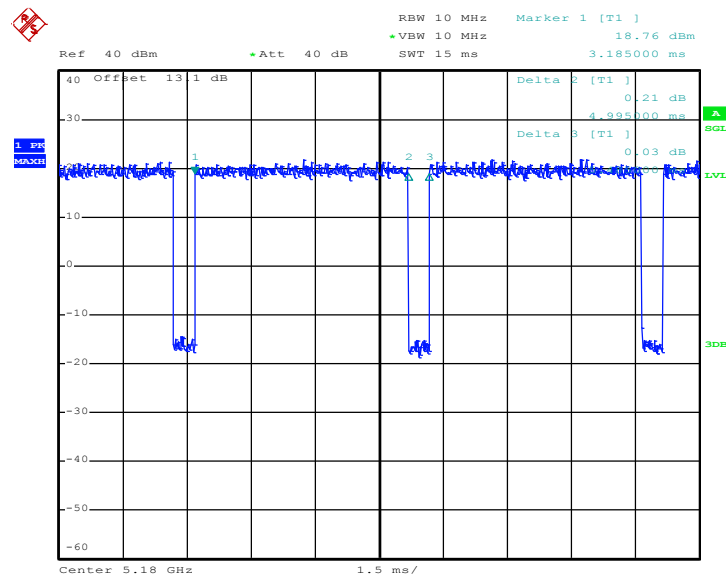
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802.11n HT20


Date: 22.OCT.2019 16:08:21

802.11n HT40


Date: 22.OCT.2019 16:11:54

802.11ac VHT20


Date: 23.OCT.2019 10:39:19

