



FCC RADIO TEST REPORT

FCC ID : O57TB8705F
Equipment : Portable Tablet Computer
Brand Name : Lenovo
Model name : Lenovo TB-8705F
Applicant : Lenovo(Shanghai) Electronics Technology Co., Ltd.
Section 304-305, Building No. 4, # 222, Meiyue Road,
China (Shanghai) Pilot Free Trade Zone
Manufacturer : Lenovo PC HK Limited
23/F, Lincoln House, Taikoo Place
979 King's Road, Quarry Bay, Hong Kong, P.R.CHINA
Standard : FCC Part 15 Subpart E §15.407

The product was received on Aug. 28, 2019 and testing was started from Aug. 28, 2019 and completed on Nov. 05, 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)



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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 8.82 dB at 37.760 MHz
3.5	15.207	AC Conducted Emission	Pass	Under limit 4.97 dB at 26.000 MHz
3.6	15.407 (c)	Automatically Discontinue Transmission	Pass	-
3.7	15.203 & 15.407 (a)	Antenna Requirement	Pass	-

Remark: The test result of AC conducted emission was performed in this test report, and the other test results reuse test data from Sporton Report No. TR982030E.

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: Tina Chuang



1 General Description

1.1 Product Feature of Equipment Under Test

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

Product Specification subjective to this standard	
Sample 1	1st sample (refer to sample list)
Sample 2	2nd sample (refer to sample list)
Antenna Type	WLAN: Monopole Antenna Bluetooth: Monopole Antenna GPS / Glonass / BDS: Monopole Antenna FM: Using Earphone as 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: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	03CH11-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 three orthogonal panels, X, Y, Z. The worst cases (Z plane) 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 "#n" were 802.11ac VHT80.



2.2 Test Mode

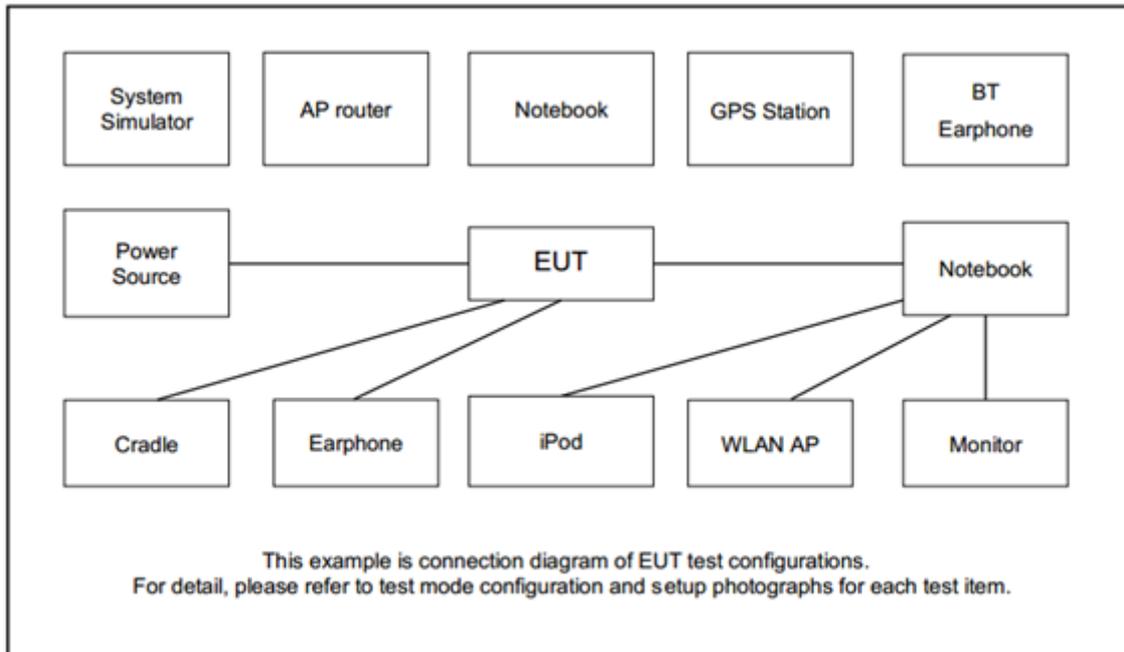
Final test modes are considering the modulation and worse data rates as below table.

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

Test Cases	
AC Conducted Emission	Mode 1 : Bluetooth Link + WLAN (2.4GHz) Link + Video Record (Front Camera) + Earphone + SD Card + USB Cable 1 (Charging from Adapter 1) for Sample 1
	Mode 2 : Bluetooth Link + WLAN (5GHz) Link + Video Record (Rear Camera) + Earphone + SD Card + USB Cable 2 (Charging from Adapter 2) for Sample 1
	Mode 3 : Bluetooth Link + WLAN (2.4GHz) Link + FM Rx + Earphone + SD Card + USB Cable 1 (Charging from Adapter 2) for Sample 1
	Mode 4 : Bluetooth Link + WLAN (5GHz) Link + MPEG4 + Earphone + SD Card + USB Cable 2 (Charging from Adapter 1) for Sample 1
	Mode 5 : Bluetooth Idle + WLAN (2.4GHz) Idle + H-Patten + Earphone + SD Card + USB Cable 2 (Data Link with Notebook) (Read) for Sample 1
	Mode 6 : Bluetooth Idle + WLAN (5GHz) Idle + GPS Rx + Earphone + SD Card + USB Cable 2 (Data Link with Notebook) (Write) for Sample 1
	Mode 7 : Bluetooth Link + WLAN (5GHz) Link + MPEG4 + Earphone + SD Card + USB Cable 2 (Charging from Adapter 1) for Sample 2
	Remark:
<ol style="list-style-type: none"> The worst case of conducted emission is mode 4; only the test data of it was reported. For Radiated Test Cases, the tests were performed with Adapter 1 and USB Cable 1 	

Ch. #	Band IV : 5725-5850 MHz			
	802.11a	802.11n HT20	802.11n HT40	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.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
5.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
6.	iPod Earphone	Apple	A1285	FCC DoC	Unshielded, 1.2 m	N/A
7.	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
8.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A



2.5 EUT Operation Test Setup

The RF test items, 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.

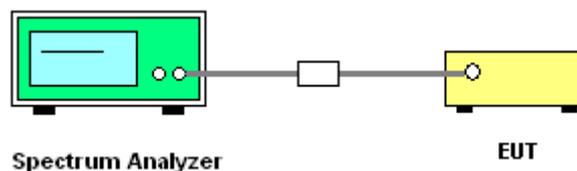
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

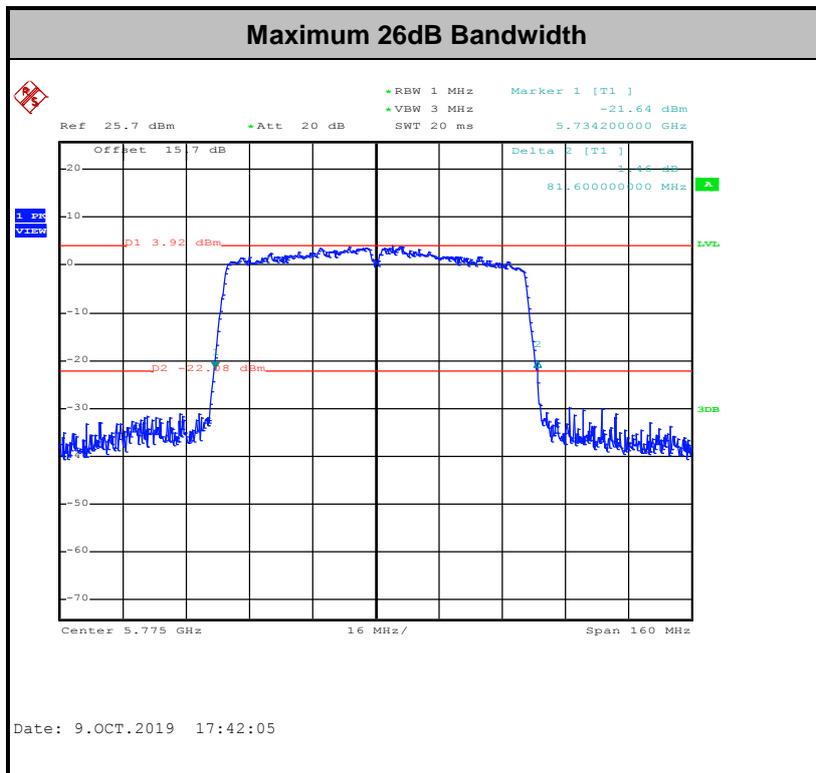
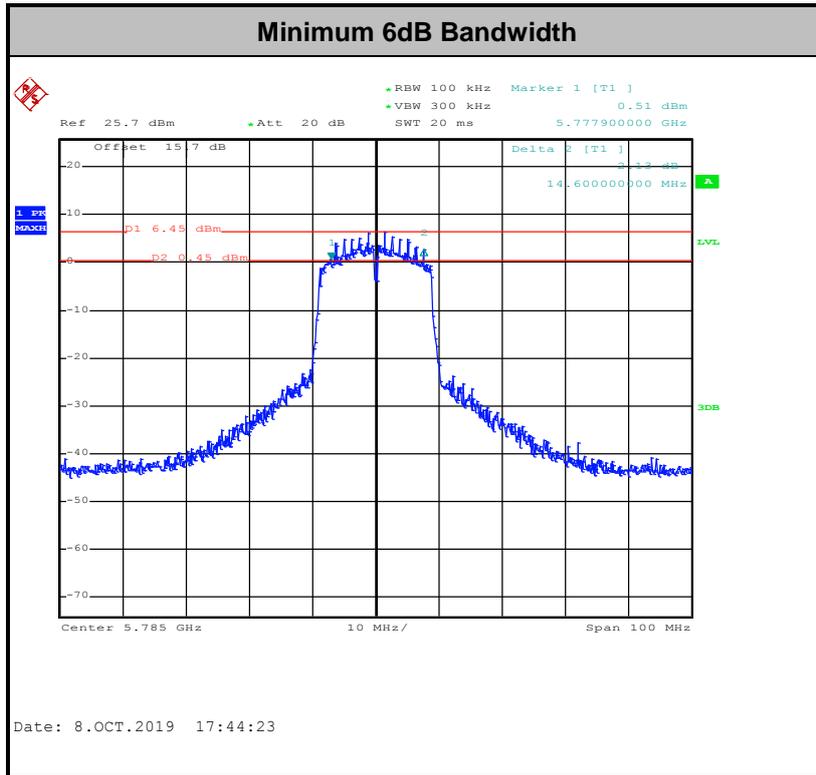
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section C) Emission bandwidth for the band 5.725-5.85GHz
2. Set RBW = 100kHz.
3. Set the VBW $\geq 3 \times$ RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is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

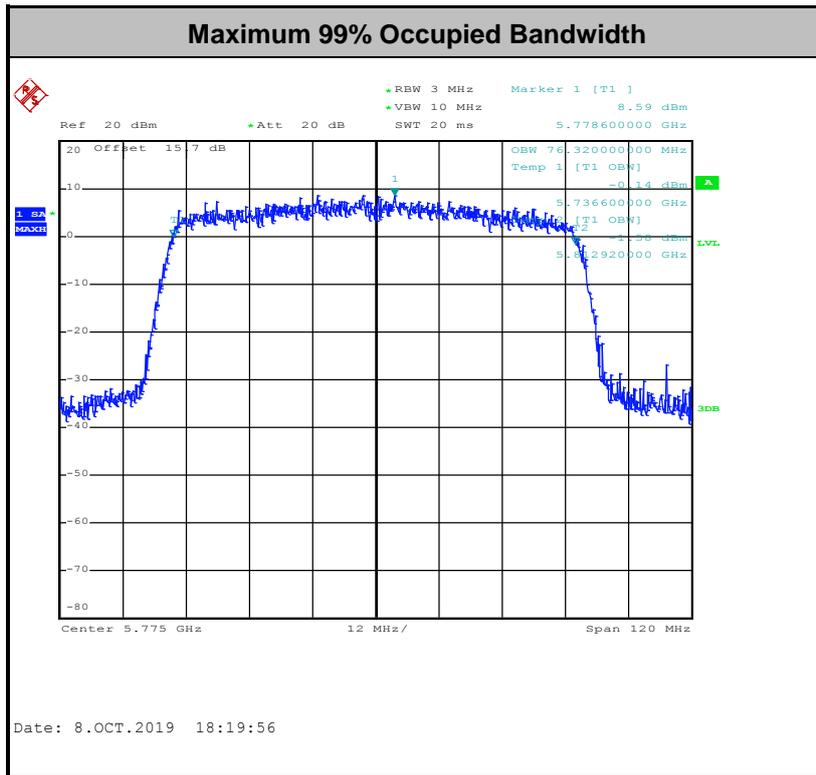
3.1.4 Test Setup



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

Please refer to Appendix A.





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.

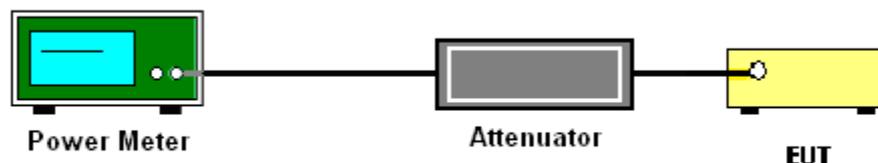
3.2.3 Test Procedures

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

Method PM-G (Measurement using an 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

(power averaging (rms) detection with max hold):

- 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 \leq (number of points in sweep) \times 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.
 - Detector = power averaging (rms).
 - Trace mode = max hold.
 - Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
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.



3.4 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.

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



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 ≥ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

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

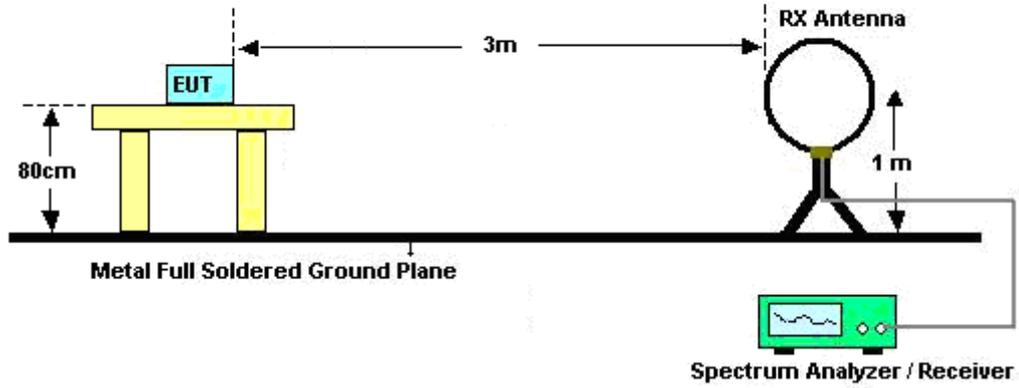
- RBW = 1 MHz
- VBW = 10 Hz, when duty cycle is no less than 98 percent.
- VBW ≥ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.



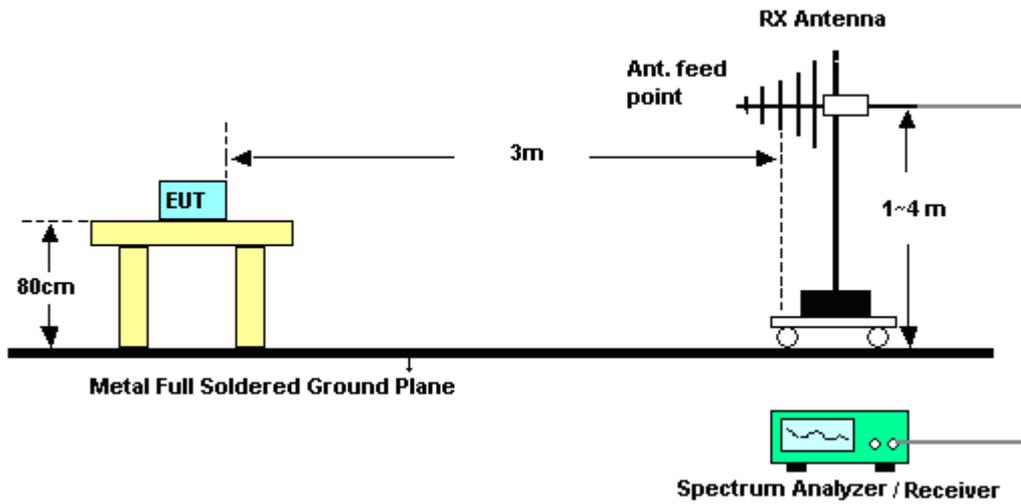
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband 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

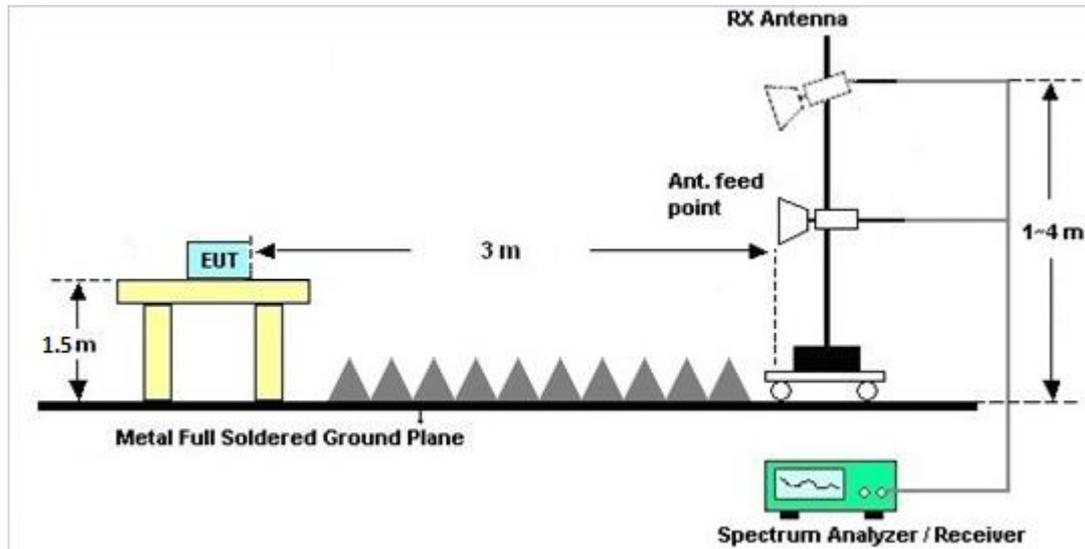
For radiated emissions below 30MHz



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.

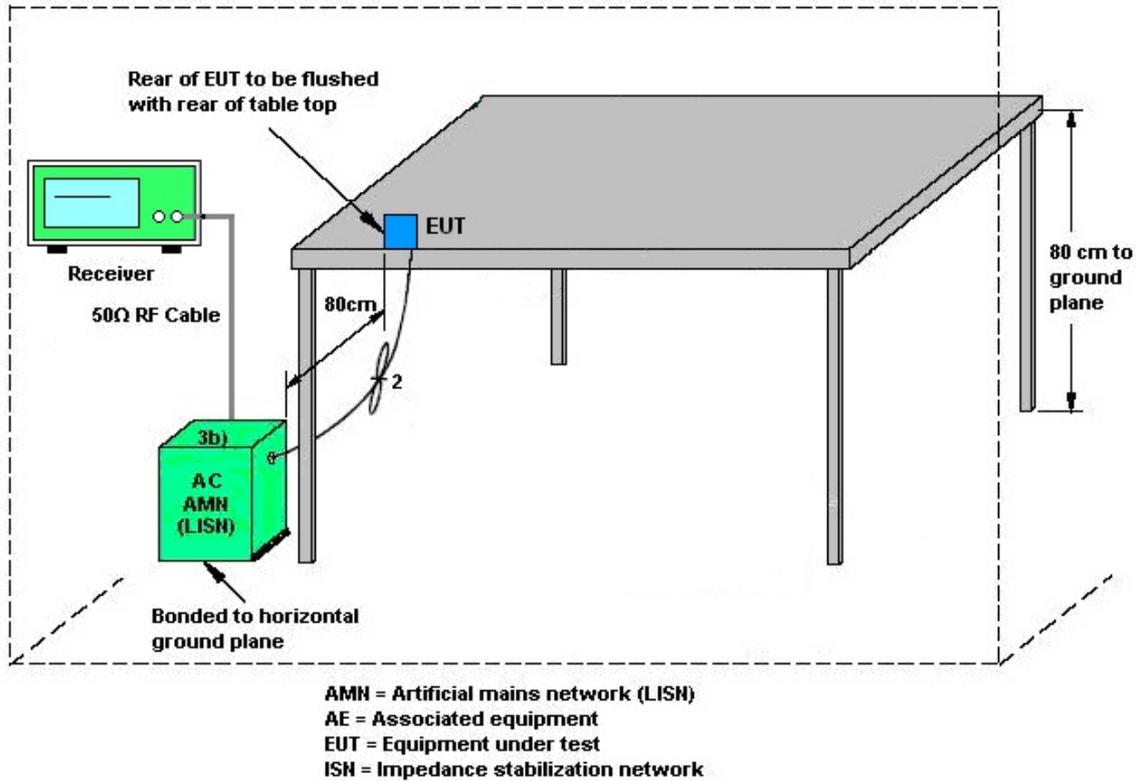
3.5.2 Measuring Instruments

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

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



4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Sensor	DARE	RPR3006W	13100030S NO32	9kHz~6GHz	Dec. 03, 2018	Aug. 28, 2019~ Oct. 14,2019	Dec. 02, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 13, 2018	Aug. 28, 2019~ Oct. 14,2019	Nov. 12, 2019	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 21, 2018	Aug. 28, 2019~ Oct. 14,2019	Nov. 20, 2019	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC120838 2	N/A	Mar. 27, 2019	Aug. 28, 2019~ Oct. 14,2019	Mar. 26, 2020	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Nov. 05, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Nov. 05, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Nov. 05, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	Nov. 05, 2019	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Nov. 05, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Nov. 05, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Nov. 05, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 06, 2018	Sep. 01, 2019~ Oct. 07, 2019	Dec. 05, 2019	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 04, 2018	Sep. 01, 2019~ Oct. 07, 2019	Dec. 03, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6-0 6	35414&AT- NO602	30MHz~1GHz	Oct. 13, 2018	Sep. 01, 2019~ Oct. 07, 2019	Oct. 12, 2019	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-132 6	1GHz ~ 18GHz	Oct. 30, 2018	Sep. 01, 2019~ Oct. 07, 2019	Oct. 29, 2019	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY532700 80	1GHz~26.5GHz	Nov. 14, 2018	Sep. 01, 2019~ Oct. 07, 2019	Nov. 13, 2020	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY542004 86	10Hz ~ 44GHz	Oct. 19, 2018	Sep. 01, 2019~ Oct. 07, 2019	Oct. 18, 2019	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500- B	N/A	1~4m	N/A	Sep. 01, 2019~ Oct. 07, 2019	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Sep. 01, 2019~ Oct. 07, 2019	N/A	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03K	171000180 0054002	1GHz~18GHz	Aug. 06, 2019	Sep. 01, 2019~ Oct. 07, 2019	Aug. 05, 2020	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 584	18GHz- 40GHz	Dec. 05, 2018	Sep. 01, 2019~ Oct. 07, 2019	Dec. 04, 2019	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-00104 2	N/A	N/A	Sep. 01, 2019~ Oct. 07, 2019	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	9kHz-30MHz	Mar. 13, 2019	Sep. 01, 2019~ Oct. 07, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 13, 2019	Sep. 01, 2019~ Oct. 07, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4 PE	30M-18G	Mar. 13, 2019	Sep. 01, 2019~ Oct. 07, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 13, 2019	Sep. 01, 2019~ Oct. 07, 2019	Mar. 12, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WLKS1200-1 2SS	SN2	1.2GHz Low Pass Filter	Mar. 22, 2019	Sep. 01, 2019~ Oct. 07, 2019	Mar. 21, 2020	Radiation (03CH11-HY)
Filter	Wainwright	WHKX8-5872. 5-6750-18000 -40ST	SN5	6.75GHz High Pass	Mar. 13, 2019	Sep. 01, 2019~ Oct. 07, 2019	Mar. 12, 2020	Radiation (03CH11-HY)



5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.20
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.50
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Owen Yang	Temperature:	21~25	°C
Test Date:	2019/8/28 ~ 2019/10/15	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 26dB EBW and 99% OBW

Band IV												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Bandwidth (MHz)		26dB Bandwidth (MHz)		6 dB Bandwidth (MHz)		6 dB Bandwidth Min. Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2		
11a	6Mbps	1	149	5745	16.60	-	30.45	-	15.00	-	0.5	Pass
11a	6Mbps	1	157	5785	16.70	-	32.55	-	15.10	-	0.5	Pass
11a	6Mbps	1	165	5825	16.70	-	30.45	-	15.00	-	0.5	Pass
HT20	MCS0	1	149	5745	17.70	-	31.60	-	15.00	-	0.5	Pass
HT20	MCS0	1	157	5785	17.70	-	29.20	-	14.60	-	0.5	Pass
HT20	MCS0	1	165	5825	17.80	-	30.50	-	15.00	-	0.5	Pass
HT40	MCS0	1	151	5755	36.40	-	68.94	-	35.00	-	0.5	Pass
HT40	MCS0	1	159	5795	36.30	-	55.71	-	35.05	-	0.5	Pass
VHT80	MCS0	1	155	5775	76.32	-	81.60	-	75.04	-	0.5	Pass

TEST RESULTS DATA
Average Power Table

Band IV												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	17.10	-		30.00	-	0.49	-	Pass
11a	6Mbps	1	157	5785	17.00	-		30.00	-	0.49	-	Pass
11a	6Mbps	1	165	5825	17.10	-		30.00	-	0.49	-	Pass
HT20	MCS0	1	149	5745	16.70	-		30.00	-	0.49	-	Pass
HT20	MCS0	1	157	5785	16.60	-		30.00	-	0.49	-	Pass
HT20	MCS0	1	165	5825	16.80	-		30.00	-	0.49	-	Pass
HT40	MCS0	1	151	5755	15.30	-		30.00	-	0.49	-	Pass
HT40	MCS0	1	159	5795	15.40	-		30.00	-	0.49	-	Pass
VHT20	MCS0	1	149	5745	15.30	-		30.00	-	0.49	-	Pass
VHT20	MCS0	1	157	5785	15.90	-		30.00	-	0.49	-	Pass
VHT20	MCS0	1	165	5825	15.80	-		30.00	-	0.49	-	Pass
VHT40	MCS0	1	151	5755	14.90	-		30.00	-	0.49	-	Pass
VHT40	MCS0	1	159	5795	15.30	-		30.00	-	0.49	-	Pass
VHT80	MCS0	1	155	5775	12.50	-		30.00	-	0.49	-	Pass

TEST RESULTS DATA
Power Spectral Density

Band IV														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	10log (500kHz /RBW) Factor (dB)		Average Power Density (dBm/500kHz)			Average PSD Limit (dBm/500kHz)		DG (dBi)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	
11a	6Mbps	1	149	5745	2.22	-	7.41	-		30.00	-	0.49	-	Pass
11a	6Mbps	1	157	5785	2.22	-	7.53	-		30.00	-	0.49	-	Pass
11a	6Mbps	1	165	5825	2.22	-	7.17	-		30.00	-	0.49	-	Pass
HT20	MCS0	1	149	5745	2.22	-	6.95	-		30.00	-	0.49	-	Pass
HT20	MCS0	1	157	5785	2.22	-	6.96	-		30.00	-	0.49	-	Pass
HT20	MCS0	1	165	5825	2.22	-	7.39	-		30.00	-	0.49	-	Pass
HT40	MCS0	1	151	5755	2.22	-	2.51	-		30.00	-	0.49	-	Pass
HT40	MCS0	1	159	5795	2.22	-	2.61	-		30.00	-	0.49	-	Pass
VHT80	MCS0	1	155	5775	2.22	-	-2.94	-		30.00	-	0.49	-	Pass



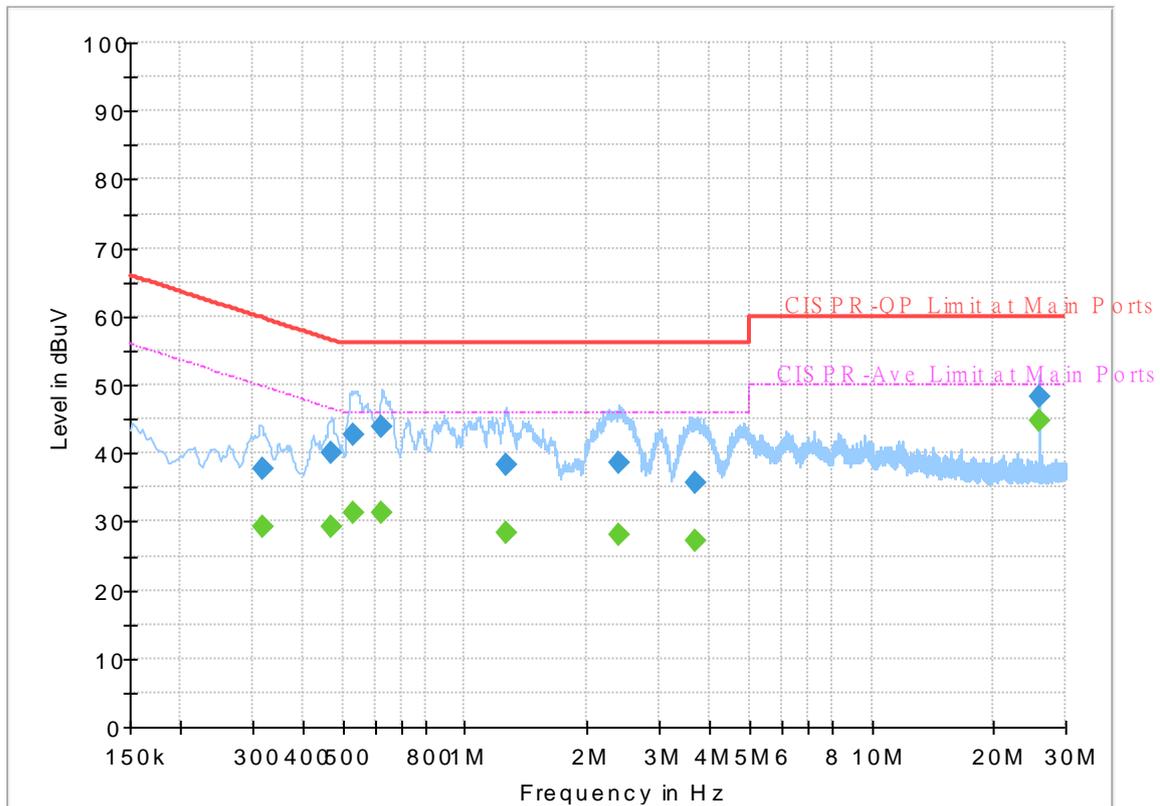
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Howard Huang & Tom Lee	Temperature :	24.2~25.6°C
		Relative Humidity :	45.6~52.3%

EUT Information

Report NO : 9O2401
 Test Mode : Mode 4
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



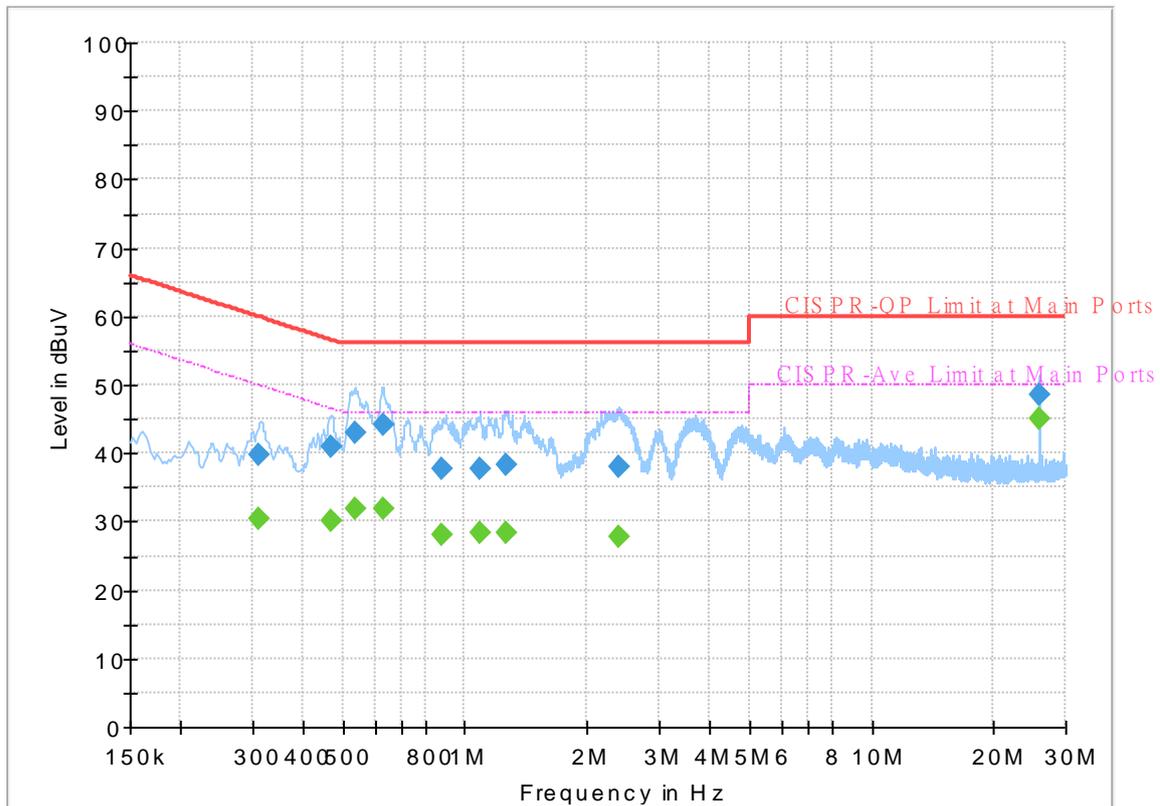
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.316500	---	29.32	49.80	20.48	L1	OFF	19.4
0.316500	37.84	---	59.80	21.96	L1	OFF	19.4
0.469500	---	29.22	46.52	17.30	L1	OFF	19.4
0.469500	40.09	---	56.52	16.43	L1	OFF	19.4
0.532500	---	31.29	46.00	14.71	L1	OFF	19.4
0.532500	42.57	---	56.00	13.43	L1	OFF	19.4
0.624750	---	31.24	46.00	14.76	L1	OFF	19.4
0.624750	43.78	---	56.00	12.22	L1	OFF	19.4
1.261500	---	28.29	46.00	17.71	L1	OFF	19.5
1.261500	38.32	---	56.00	17.68	L1	OFF	19.5
2.386500	---	27.96	46.00	18.04	L1	OFF	19.5
2.386500	38.51	---	56.00	17.49	L1	OFF	19.5
3.707250	---	27.26	46.00	18.74	L1	OFF	19.6
3.707250	35.78	---	56.00	20.22	L1	OFF	19.6
26.000250	---	44.75	50.00	5.25	L1	OFF	20.3
26.000250	48.24	---	60.00	11.76	L1	OFF	20.3

EUT Information

Report NO : 9O2401
 Test Mode : Mode 4
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.312000	---	30.51	49.92	19.41	N	OFF	19.5
0.312000	39.86	---	59.92	20.06	N	OFF	19.5
0.469500	---	30.25	46.52	16.27	N	OFF	19.5
0.469500	40.96	---	56.52	15.56	N	OFF	19.5
0.534750	---	31.91	46.00	14.09	N	OFF	19.5
0.534750	42.88	---	56.00	13.12	N	OFF	19.5
0.627000	---	31.76	46.00	14.24	N	OFF	19.5
0.627000	44.17	---	56.00	11.83	N	OFF	19.5
0.879000	---	27.93	46.00	18.07	N	OFF	19.5
0.879000	37.77	---	56.00	18.23	N	OFF	19.5
1.088250	---	28.27	46.00	17.73	N	OFF	19.5
1.088250	37.58	---	56.00	18.42	N	OFF	19.5
1.257000	---	28.35	46.00	17.65	N	OFF	19.5
1.257000	38.32	---	56.00	17.68	N	OFF	19.5
2.395500	---	27.81	46.00	18.19	N	OFF	19.6
2.395500	38.15	---	56.00	17.85	N	OFF	19.6
26.000250	---	45.03	50.00	4.97	N	OFF	20.5
26.000250	48.46	---	60.00	11.54	N	OFF	20.5



Appendix C. Radiated Spurious Emission

Test Engineer :	Bill Kuo / Troye Hsieh / FU Chen /Watt Tseng	Temperature :	20~26.5°C
		Relative Humidity :	50~69.3%

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

WIFI Ant.	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		5636.6	49.53	-18.67	68.2	40.47	31.73	10.48	33.15	232	67	P	H	
		5698.4	54.49	-49.53	104.02	45.16	31.99	10.51	33.17	232	67	P	H	
		5720	63.36	-47.44	110.8	53.97	32.04	10.53	33.18	232	67	P	H	
		5724.8	71.32	-50.42	121.74	61.92	32.05	10.53	33.18	232	67	P	H	
	*	5745	106.19	-	-	96.75	32.09	10.54	33.19	232	67	P	H	
	*	5745	98.82	-	-	89.38	32.09	10.54	33.19	232	67	A	H	
														H
														H
			5641.6	53.08	-15.12	68.2	44.04	31.72	10.48	33.16	100	239	P	V
			5699.8	59.08	-45.97	105.05	49.74	32	10.51	33.17	100	239	P	V
			5718.2	69.43	-40.87	110.3	60.04	32.04	10.53	33.18	100	239	P	V
			5723.6	73.71	-45.3	119.01	64.31	32.05	10.53	33.18	100	239	P	V
	*		5745	112.16	-	-	102.72	32.09	10.54	33.19	100	239	P	V
	*		5745	104.68	-	-	95.24	32.09	10.54	33.19	100	239	A	V
														V
														V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5644.75	48.81	-19.39	68.2	39.78	31.71	10.48	33.16	229	67	P	H
		5696.5	49.86	-52.76	102.62	40.54	31.98	10.51	33.17	229	67	P	H
		5710.75	49.9	-58.31	108.21	40.54	32.02	10.52	33.18	229	67	P	H
		5722.25	49.5	-66.43	115.93	40.11	32.04	10.53	33.18	229	67	P	H
	*	5785	106.18	-	-	96.65	32.17	10.56	33.2	229	67	P	H
	*	5785	98.87	-	-	89.34	32.17	10.56	33.2	229	67	A	H
		5854.75	50.3	-61.07	111.37	40.61	32.32	10.59	33.22	229	67	P	H
		5874	50.36	-55.12	105.48	40.59	32.4	10.6	33.23	229	67	P	H
		5908.5	50.54	-29.84	80.38	40.65	32.52	10.61	33.24	229	67	P	H
		5947.5	48.65	-19.55	68.2	38.68	32.59	10.63	33.25	229	67	P	H
													H
													H
802.11a													
CH 157													
5785MHz		5625.5	53.78	-14.42	68.2	44.71	31.75	10.47	33.15	100	236	P	V
		5697	53.21	-49.78	102.99	43.89	31.98	10.51	33.17	100	236	P	V
		5717.5	54.03	-56.07	110.1	44.66	32.03	10.52	33.18	100	236	P	V
		5724	54.28	-65.64	119.92	44.88	32.05	10.53	33.18	100	236	P	V
	*	5785	111.55	-	-	102.02	32.17	10.56	33.2	100	236	P	V
	*	5785	104.15	-	-	94.62	32.17	10.56	33.2	100	236	A	V
		5854.25	51.93	-60.58	112.51	42.24	32.32	10.59	33.22	100	236	P	V
		5860.25	52.79	-56.54	109.33	43.09	32.34	10.59	33.23	100	236	P	V
		5884	51.78	-46.74	98.52	41.97	32.44	10.6	33.23	100	236	P	V
		5927.5	51.36	-16.84	68.2	41.43	32.56	10.62	33.25	100	236	P	V
													V
													V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
802.11a CH 165 5825MHz	*	5825	106.63	-	-	97.01	32.25	10.58	33.21	231	65	P	H	
	*	5825	99.44	-	-	89.82	32.25	10.58	33.21	231	65	A	H	
		5851.2	64.06	-55.4	119.46	54.39	32.3	10.59	33.22	231	65	P	H	
		5856.4	60.89	-49.52	110.41	51.19	32.33	10.59	33.22	231	65	P	H	
		5877.8	50.82	-52.3	103.12	41.04	32.41	10.6	33.23	231	65	P	H	
		5930	50.52	-17.68	68.2	40.59	32.56	10.62	33.25	231	65	P	H	
														H
														H
	*	5825	112.22	-	-	102.6	32.25	10.58	33.21	100	236	P	V	
	*	5825	104.92	-	-	95.3	32.25	10.58	33.21	100	236	A	V	
		5852.6	68.06	-48.21	116.27	58.38	32.31	10.59	33.22	100	236	P	V	
		5857.2	64	-46.18	110.18	54.3	32.33	10.59	33.22	100	236	P	V	
		5880.8	54.5	-46.39	100.89	44.71	32.42	10.6	33.23	100	236	P	V	
		5948.6	52.27	-15.93	68.2	42.29	32.6	10.63	33.25	100	236	P	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. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11a CH 149 5745MHz		11490	49.06	-24.94	74	56.54	39.7	17.23	64.41	100	0	P	H
		17235	54.51	-13.69	68.2	52.76	40.51	22.06	60.82	100	0	P	H
													H
													H
		11490	48.02	-25.98	74	55.5	39.7	17.23	64.41	100	0	P	V
		17235	54.41	-13.79	68.2	52.66	40.51	22.06	60.82	100	0	P	V
													V
802.11a CH 157 5785MHz		11570	48.63	-25.37	74	56.19	39.49	17.34	64.39	100	0	P	H
		17355	52.67	-15.53	68.2	50.18	40.98	22.18	60.67	100	0	P	H
													H
													H
		11570	47.77	-26.23	74	55.33	39.49	17.34	64.39	100	0	P	V
		17355	50.17	-18.03	68.2	47.68	40.98	22.18	60.67	100	0	P	V
													V
802.11a CH 165 5825MHz		11650	48.26	-25.74	74	55.97	39.2	17.46	64.37	100	0	P	H
		17475	51.35	-16.85	68.2	48.01	41.58	22.29	60.53	100	0	P	H
													H
													H
		11650	48.01	-25.99	74	55.72	39.2	17.46	64.37	100	0	P	V
		17475	52.16	-16.04	68.2	48.82	41.58	22.29	60.53	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 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5647.5	51.26	-16.94	68.2	42.23	31.7	10.49	33.16	211	69	P	H
		5698.25	61.64	-42.27	103.91	52.31	31.99	10.51	33.17	211	69	P	H
		5720	69.85	-40.95	110.8	60.46	32.04	10.53	33.18	211	69	P	H
		5724	72.85	-47.07	119.92	63.45	32.05	10.53	33.18	211	69	P	H
	*	5755	100.87	-	-	91.4	32.11	10.55	33.19	211	69	P	H
	*	5755	93.79	-	-	84.32	32.11	10.55	33.19	211	69	A	H
		5853.25	49.91	-64.88	114.79	40.23	32.31	10.59	33.22	211	69	P	H
		5858.25	50.94	-58.95	109.89	41.24	32.33	10.59	33.22	211	69	P	H
		5897.25	51.07	-37.63	88.7	41.21	32.49	10.61	33.24	211	69	P	H
		5929.5	50.13	-18.07	68.2	40.2	32.56	10.62	33.25	211	69	P	H
802.11n													H
HT40													H
CH 151		5647.75	54.87	-13.33	68.2	45.84	31.7	10.49	33.16	100	236	P	V
5755MHz		5698.25	68.99	-34.92	103.91	59.66	31.99	10.51	33.17	100	236	P	V
		5719.5	76.75	-33.91	110.66	67.36	32.04	10.53	33.18	100	236	P	V
		5723	80.08	-37.56	117.64	70.68	32.05	10.53	33.18	100	236	P	V
	*	5755	107.33	-	-	97.86	32.11	10.55	33.19	100	236	P	V
	*	5755	100.15	-	-	90.68	32.11	10.55	33.19	100	236	A	V
		5851.75	52.23	-65.98	118.21	42.55	32.31	10.59	33.22	100	236	P	V
		5859.5	51.6	-57.94	109.54	41.9	32.34	10.59	33.23	100	236	P	V
		5875	51.21	-53.99	105.2	41.44	32.4	10.6	33.23	100	236	P	V
		5925.75	49.76	-18.44	68.2	39.84	32.55	10.62	33.25	100	236	P	V
													V
													V



WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5635	50.19	-18.01	68.2	41.13	31.73	10.48	33.15	226	72	P	H
		5697.5	51.75	-51.61	103.36	42.42	31.99	10.51	33.17	226	72	P	H
		5719.25	54.99	-55.6	110.59	45.6	32.04	10.53	33.18	226	72	P	H
		5724.25	55.73	-64.76	120.49	46.33	32.05	10.53	33.18	226	72	P	H
	*	5795	101.29	-	-	91.73	32.19	10.57	33.2	226	72	P	H
	*	5795	94.27	-	-	84.71	32.19	10.57	33.2	226	72	A	H
		5850.5	60.69	-60.37	121.06	51.02	32.3	10.59	33.22	226	72	P	H
		5862.75	55.72	-52.91	108.63	46	32.35	10.6	33.23	226	72	P	H
		5888.5	52.49	-42.69	95.18	42.66	32.45	10.61	33.23	226	72	P	H
		5943.75	51.28	-16.92	68.2	41.31	32.59	10.63	33.25	226	72	P	H
802.11n													H
HT40													H
CH 159		5647.5	52.31	-15.89	68.2	43.28	31.7	10.49	33.16	100	235	P	V
5795MHz		5696.75	57.73	-45.07	102.8	48.41	31.98	10.51	33.17	100	235	P	V
		5715.75	61.62	-47.99	109.61	52.25	32.03	10.52	33.18	100	235	P	V
		5724.25	61.16	-59.33	120.49	51.76	32.05	10.53	33.18	100	235	P	V
	*	5795	107.54	-	-	97.98	32.19	10.57	33.2	100	235	P	V
	*	5795	100.01	-	-	90.45	32.19	10.57	33.2	100	235	A	V
		5850.5	64.83	-56.23	121.06	55.16	32.3	10.59	33.22	100	235	P	V
		5870.5	58.63	-47.83	106.46	48.88	32.38	10.6	33.23	100	235	P	V
		5876.25	54.06	-50.21	104.27	44.29	32.4	10.6	33.23	100	235	P	V
		5947.75	52.05	-16.15	68.2	42.07	32.6	10.63	33.25	100	235	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 (Band Edge @ 3m)

WIFI Ant. 1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)	
		5642	51.02	-17.18	68.2	41.98	31.72	10.48	33.16	224	74	P	H	
		5692.5	60.18	-39.49	99.67	50.89	31.95	10.51	33.17	224	74	P	H	
		5715.5	62.44	-47.1	109.54	53.07	32.03	10.52	33.18	224	74	P	H	
		5722.5	64.66	-51.84	116.5	55.27	32.04	10.53	33.18	224	74	P	H	
	*	5775	97	-	-	87.49	32.15	10.56	33.2	224	74	P	H	
	*	5775	89.53	-	-	80.02	32.15	10.56	33.2	224	74	A	H	
		5850.75	60.04	-60.45	120.49	50.37	32.3	10.59	33.22	224	74	P	H	
		5869	58.96	-47.92	106.88	49.21	32.38	10.6	33.23	224	74	P	H	
		5878	53.87	-49.1	102.97	44.09	32.41	10.6	33.23	224	74	P	H	
		5939	51.5	-16.7	68.2	41.54	32.58	10.63	33.25	224	74	P	H	
802.11ac VHT80 CH 155 5775MHz													H	
													H	
			5645.25	58.21	-9.99	68.2	49.18	31.71	10.48	33.16	100	238	P	V
			5693.25	67.22	-33	100.22	57.92	31.96	10.51	33.17	100	238	P	V
			5713.75	69.21	-39.84	109.05	59.84	32.03	10.52	33.18	100	238	P	V
			5725	69.9	-52.3	122.2	60.5	32.05	10.53	33.18	100	238	P	V
		*	5775	102.12	-	-	92.61	32.15	10.56	33.2	100	238	P	V
		*	5775	94.72	-	-	85.21	32.15	10.56	33.2	100	238	A	V
			5850.75	63.57	-56.92	120.49	53.9	32.3	10.59	33.22	100	238	P	V
			5869	63.18	-43.7	106.88	53.43	32.38	10.6	33.23	100	238	P	V
			5883.25	54.7	-44.37	99.07	44.9	32.43	10.6	33.23	100	238	P	V
			5938.75	50.7	-17.5	68.2	40.74	32.58	10.63	33.25	100	238	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 VHT80 (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.		
1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)	
5GHz 802.11ac VHT80 LF		94.02	29.82	-13.68	43.5	45.77	15.04	1.34	32.33	-	-	P	H	
		208.48	33.38	-10.12	43.5	48.71	14.9	2	32.23	100	0	P	H	
		283.17	35.1	-10.9	46	46.24	18.73	2.32	32.19	-	-	P	H	
		779.81	30.11	-15.89	46	30.16	27.98	3.9	31.93	-	-	P	H	
		863.23	32.5	-13.5	46	30.62	29.29	4.13	31.54	-	-	P	H	
		949.56	33.57	-12.43	46	29.57	30.55	4.34	30.89	-	-	P	H	
														H
														H
														H
														H
														H
														H
														H
														H
														H
			37.76	31.18	-8.82	40	42.43	20.28	0.84	32.37	100	0	P	V
			93.05	27.88	-15.62	43.5	43.93	14.95	1.33	32.33	-	-	P	V
			206.54	25.19	-18.31	43.5	40.54	14.9	1.99	32.24	-	-	P	V
		795.33	31	-15	46	30.81	28.15	3.93	31.89	-	-	P	V	
		851.59	32.31	-13.69	46	30.66	29.16	4.1	31.61	-	-	P	V	
		953.44	33.54	-12.46	46	29.33	30.72	4.35	30.86	-	-	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	Peak or Average
H/V	Horizontal or Vertical



A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1		(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 :	Bill Kuo / Troye Hsieh / FU Chen /Watt Tseng	Temperature :	20~26.5°C
		Relative Humidity :	50~69.3%

Note symbol

-L	Low channel location
-R	High channel location



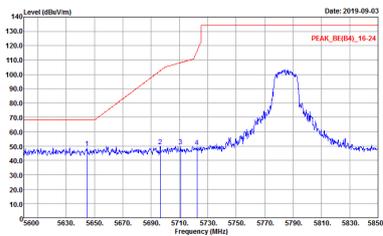
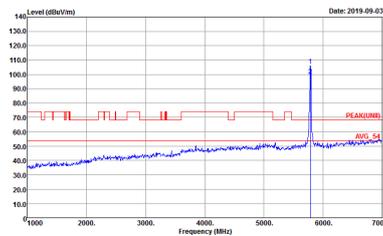
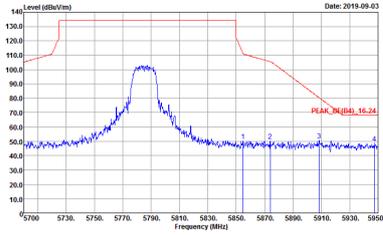
Band 4 - 5725~5850MHz
WIFI 802.11a (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 09SCH11-HY Condition : PEAK_8E(84)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 09SCH11-HY Condition : PEAK(LINE) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>

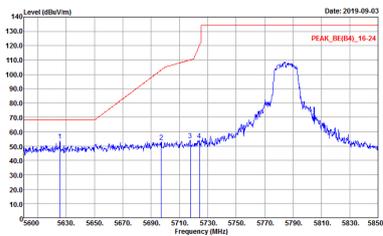
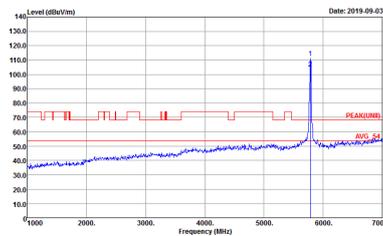
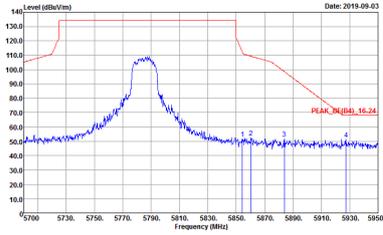


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH149 5745MHz	
1	Vertical	Fundamental
Peak	<p>Site : 03CHE114Y Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 962030</p>	<p>Site : 03CHE114Y Condition : PEAKUNIB 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 962030</p>

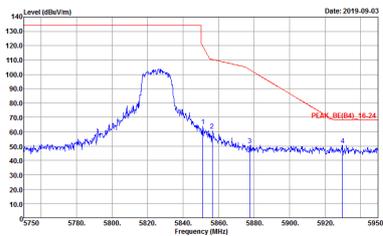
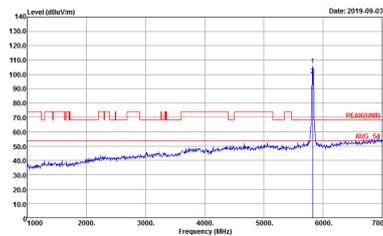


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>	 <p>Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>	Left blank



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH157 5785MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 982030</p>	 <p>Site : 03CH11-HY Condition : PEAK(FUNB) 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>
Peak	 <p>Site : 03CH11-HY Condition : PEAK_V(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>	Left blank



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Fundamental
Peak	 <p>Site : 03CH114Y Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 962030</p>	 <p>Site : 03CH114Y Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 962030</p>



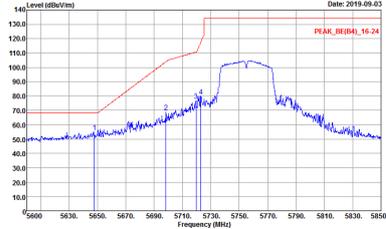
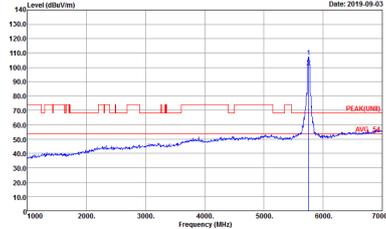
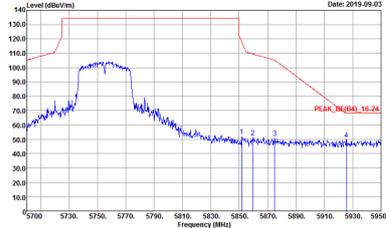
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11a CH165 5825MHz	
1	Vertical	Fundamental
Peak		



Band 4 5725~5850MHz
WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Horizontal	Fundamental
<p>Peak</p>		
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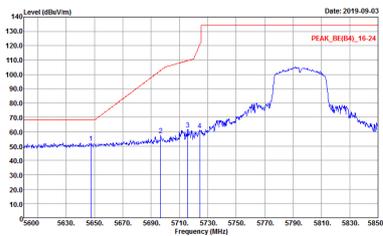
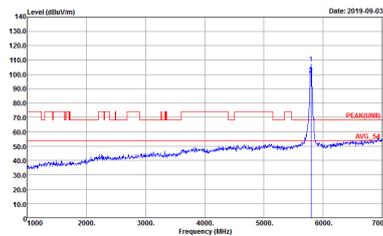
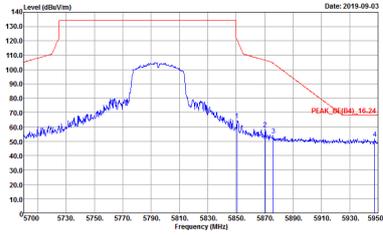


WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH151 5755MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 982030</p>	 <p>Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>	Left blank



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Horizontal	Fundamental
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 03CH11-HY Condition : PEAK(UNII) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>
Peak	<p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>	Left blank



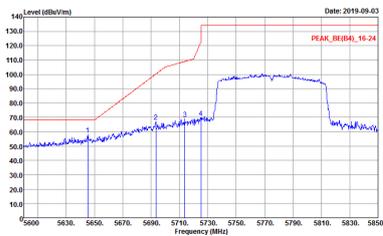
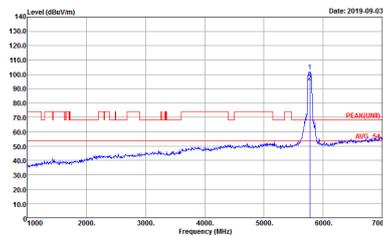
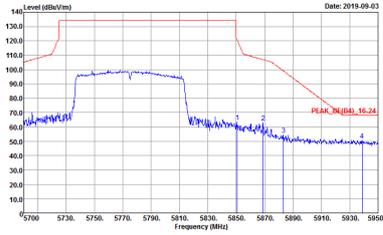
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11n HT40 CH159 5795MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>	 <p>Site : 03CH11-HY Condition : PEAK_UN(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>
Peak	 <p>Site : 03CH11-HY Condition : PEAK_UN(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>	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	
1	Horizontal	Fundamental
Peak	<p>Site : 03CHI1-HY Condition : PEAK_BE(B4)_16-24 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 03CHI1-HY Condition : PEAK(UNIT) 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 982030</p>
Peak	<p>Site : 03CHI1-HY Condition : PEAK_BE(B4)_16-24 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 982030</p>	Left blank



WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
1	Vertical	Fundamental
Peak	 <p>Site : 03CH11-HY Condition : PEAK_BE(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 982030</p>	 <p>Site : 03CH11-HY Condition : PEAK(FUNB) 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 982030</p>
Peak	 <p>Site : 03CH11-HY Condition : PEAK_N(B4)_16-24 3m HORN 9120D-HF VERTICAL Detector : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Project : 982030</p>	Left blank



Band 4 - 5725~5850MHz

WIFI 802.11a (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH149 5745MHz	
1	Horizontal	Vertical
<p>Peak</p> <p>Avg.</p>	<p>Site : 03CH11-HY Condition : PEAR(LINE1) 3m HORN 9120D-HF HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 03CH11-HY Condition : PEAR(LINE1) 3m HORN 9120D-HF VERTICAL Detector : Peak Project : 982030</p>



WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH157 5785MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CHEL14Y Condition : PEAK(UNII) 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 03CHEL14Y Condition : PEAK(UNII) 3m HORN 91200-HF VERTICAL Detector : Peak Project : 982030</p>



WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11a CH165 5825MHz	
1	Horizontal	Vertical
Peak Avg.	<p>Site : 03CHEL14Y Condition : PEAK(UNII) 3m HORN 91200-HF HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 03CHEL14Y Condition : PEAK(UNII) 3m HORN 91200-HF VERTICAL Detector : Peak Project : 982030</p>



Emission below 1GHz
5GHz WIFI 802.11ac VHT80 (LF)

WIFI	5GHz 5725-5850MHz	
ANT	802.11ac VHT80 LF	
1	Horizontal	Vertical
QP / Peak	<p>Site : 03CH11-HY Condition : QP 3m BE-LOG 6111D-LF_ETC HORIZONTAL Detector : Peak Project : 982030</p>	<p>Site : 03CH11-HY Condition : QP 3m BE-LOG 6111D-LF_ETC VERTICAL Detector : Peak Project : 982030</p>

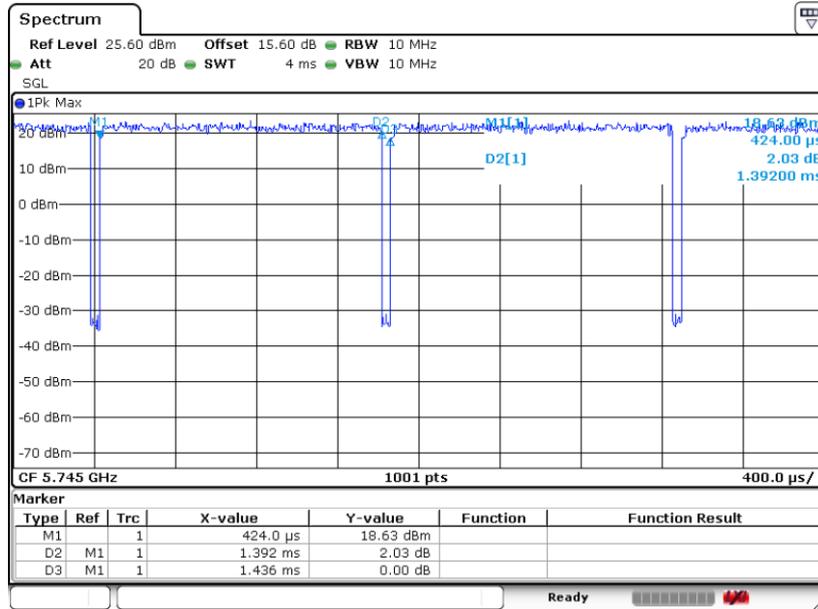


Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
802.11a	96.94	1392	0.72	1kHz	0.13
5GHz 802.11n HT20	96.44	1300	0.77	1kHz	0.16
5GHz 802.11n HT40	96.73	648	1.54	3kHz	0.14
5GHz 802.11ac VHT20	96.68	1310	0.76	1kHz	0.15
5GHz 802.11ac VHT40	93.68	652	1.53	3kHz	0.28
5GHz 802.11ac VHT80	88.04	324	3.09	10kHz	0.55

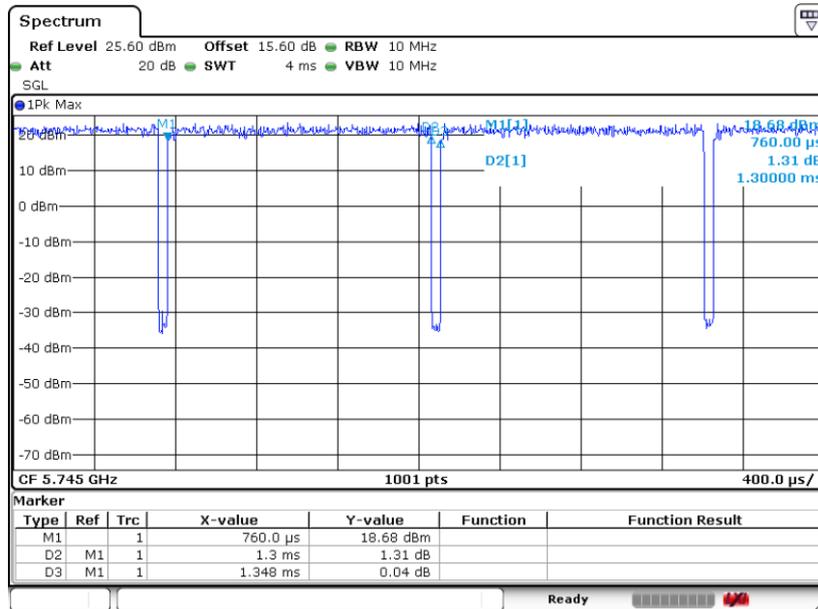


802.11a



Date: 29.AUG.2019 11:27:44

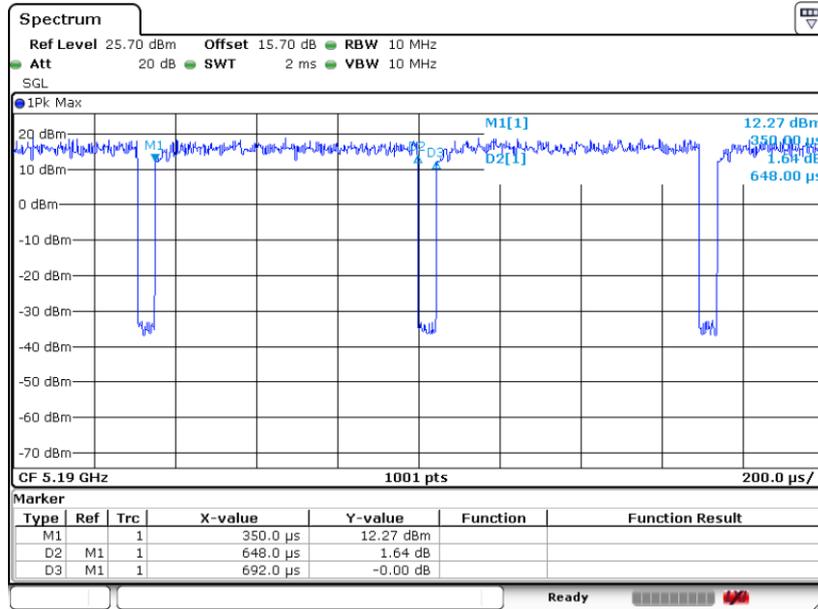
802.11n HT20



Date: 29.AUG.2019 11:26:03

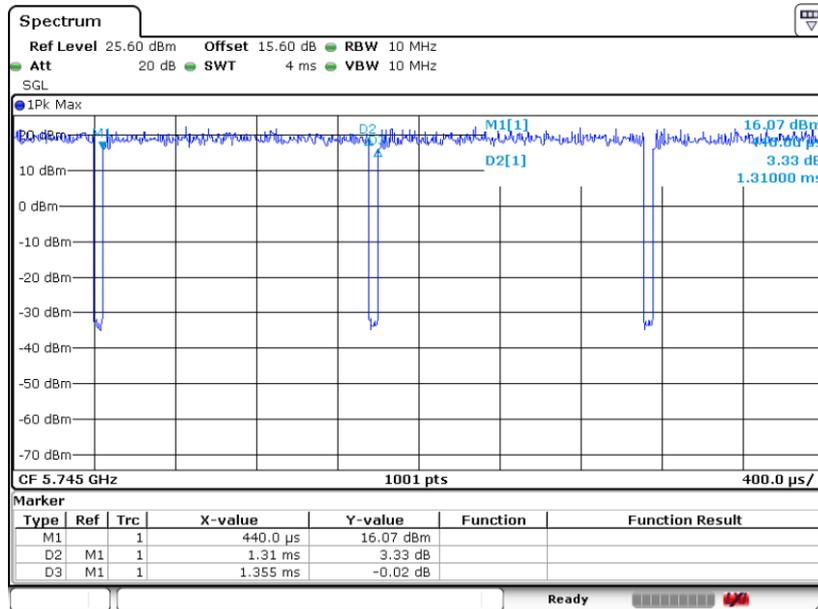


802.11n HT40



Date: 29.AUG.2019 11:34:33

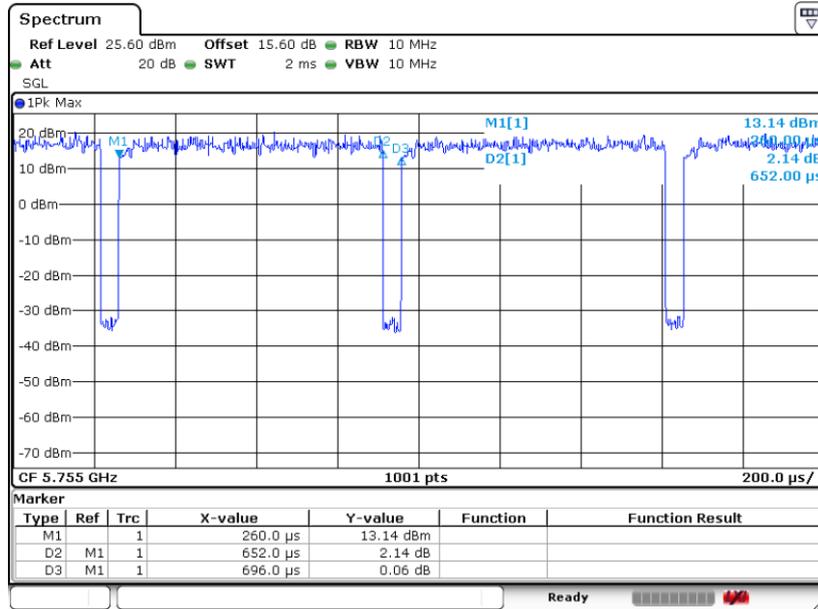
802.11ac VHT20



Date: 29.AUG.2019 11:22:33

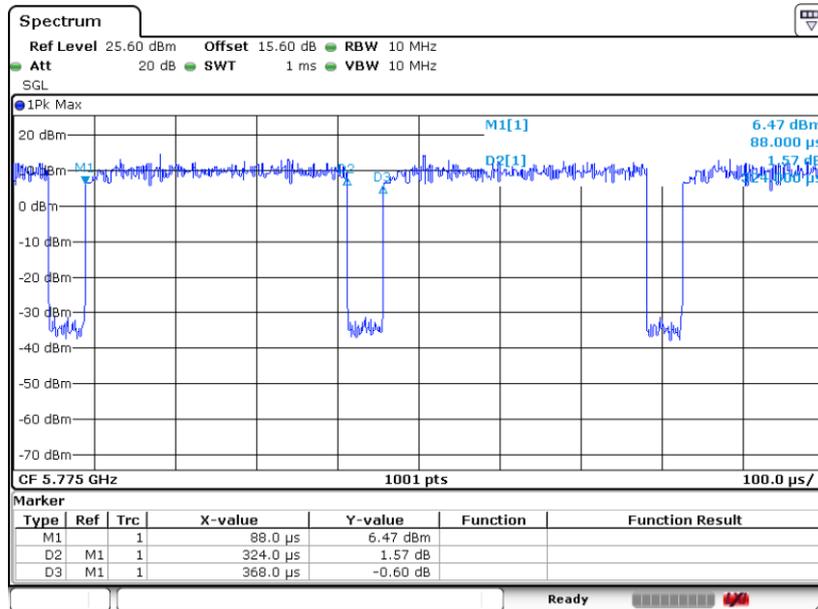


802.11ac VHT40



Date: 29.AUG.2019 11:18:40

802.11ac VHT80



Date: 29.AUG.2019 11:16:12