FCC RADIO TEST REPORT

FCC ID	:	**PY7-77310Z**
Equipment	:	**GSM/WCDMA/LTE Phone with BT, DTS/UNII a/b/g/n/ac/ax, GPS, and NFC**
Brand Name	:	**Sony**
Applicant	:	**Sony Mobile Communications Inc. 4-12-3 Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan**
Manufacturer	:	**Sony Mobile Communications Inc. 4-12-3 Higashi-Shinagawa, Shinagawa-ku, Tokyo, 140-0002, Japan**
Standard	:	**FCC Part 15 Subpart E §15.407**

The product was received on Jul. 07, 2020 and testing was started from Jul. 25, 2020 and completed on Aug. 13, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this spot check data 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 **3**
Summary of Test Result **4**
1 General Description **5**
1.1 Product Feature of Equipment Under Test 5
1.2 Modification of EUT 5
1.3 Testing Location 6
1.4 Applicable Standards 6
2 Test Configuration of Equipment Under Test **7**
2.1 Carrier Frequency and Channel 7
2.2 Test Mode 8
2.3 Connection Diagram of Test System 9
2.4 EUT Operation Test Setup 9
3 Test Result **10**
3.1 Maximum Conducted Output Power Measurement 10
3.2 Unwanted Emissions Measurement 11
3.3 Automatically Discontinue Transmission 16
3.4 Antenna Requirements 18
4 List of Measuring Equipment **19**
5 Uncertainty of Evaluation **20**
Appendix A. Conducted Test Results
Appendix B. Radiated Spurious Emission
Appendix C. Radiated Spurious Emission Plots
Appendix D. Duty Cycle Plots

History of this test report

Report No.	Version	Description	Issued Date
FR042237-02F	01	Initial issue of report	Aug. 18, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.403 (i)	6dB & 26dB Bandwidth	-	See Note
-	2.1049	99% Occupied Bandwidth	-	See Note
3.1	15.407 (a)	Maximum Conducted Output Power	Pass	-
-	15.407 (a)	Power Spectral Density	-	See Note
3.2	15.407(b)	Unwanted Emissions	Pass	Under limit 6.72 dB at 42.610 MHz
-	15.207	AC Conducted Emission	-	See Note
3.3	15.407 (c)	Automatically Discontinue Transmission	Pass	-
3.4	15.203 & 15.407 (a)	Antenna Requirement	Pass	-

Note: The RF circuit, output power level and antenna performance is the same in WLAN function across all two FCC ID PY7-77310Z and PY7-08372L, since the change, only verify RF output power and radiated spurious emission test data the worst mode was reported in this report.

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: Celery Wei

1 General Description

1.1 Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, DTS/UNII a/b/g/n/ac/ax, NFC and GNSS.

Product Feature	
Antenna Type / Gain	**<Ant. 0>:** Loop Antenna with gain -3.20 dBi **<Ant. 1>:** Loop Antenna with gain -5.20 dBi

EUT Information List			
HW Version	**SW Version**	**S/N**	**Performed Test Item**
A	5.66	BH950020JV	RF conducted measurement
	5.80	QV71004N3Y	Radiated Spurious Emission

Accessory List	
AC Adapter	Model Name : UCH32
	S/N: 6218W30200005
Earphone	Model Name: MH750
	S/N : N/A
USB Cable	Model Name : UCB24
	S/N : N/A

Note:

1. Above EUT list used are electrically identical per declared by manufacturer.
2. Above the accessories list are used to exercise the EUT during test, and the serial number of each type of accessories is listed in each section of this report.
3. For other wireless features of this EUT, test report will be issued separately.

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	DFS02-HY

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH12-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:

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

2 Test Configuration of Equipment Under Test

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

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, 802.11ac VHT40, and 802.11ax HE40.
2. The above Frequency and Channel in "#" were 802.11ac VHT80 and 802.11ax HE80.

2.2 Test Mode

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

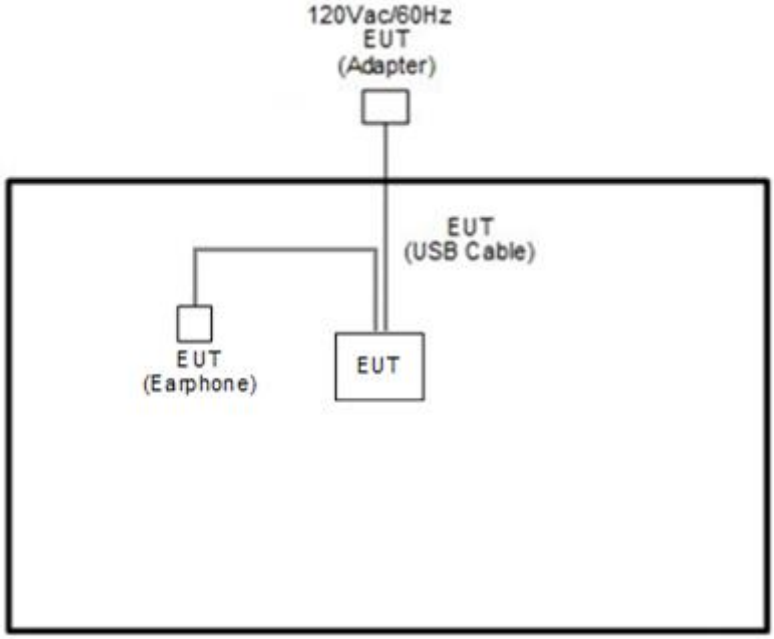
Modulation	Data Rate
802.11a	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0
802.11ac VHT80	MCS0
802.11ax HE20	MCS0
802.11ax HE40	MCS0
802.11ax HE80	MCS0

Ch. #		Band IV：5725-5850 MHz	
		802.11ac VHT80	802.11ax HE40
L	Low	-	151
M	Middle	155	-
H	High	-	-

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

2.3 Connection Diagram of Test System

<WLAN Tx Mode >



2.4 EUT Operation Test Setup

The RF test items, utility “FTMC_bridge V.0.39” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

3 Test Result

3.1 Maximum Conducted Output Power Measurement

3.1.1 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.

3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

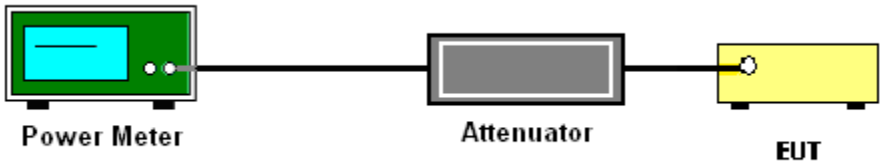
3.1.3 Test Procedures

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

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.1.4 Test Setup



3.1.5 Test Result of Maximum Conducted Output Power

Please refer to Appendix A.

3.2 Unwanted Emissions Measurement

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

3.2.1 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.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/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.

3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 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

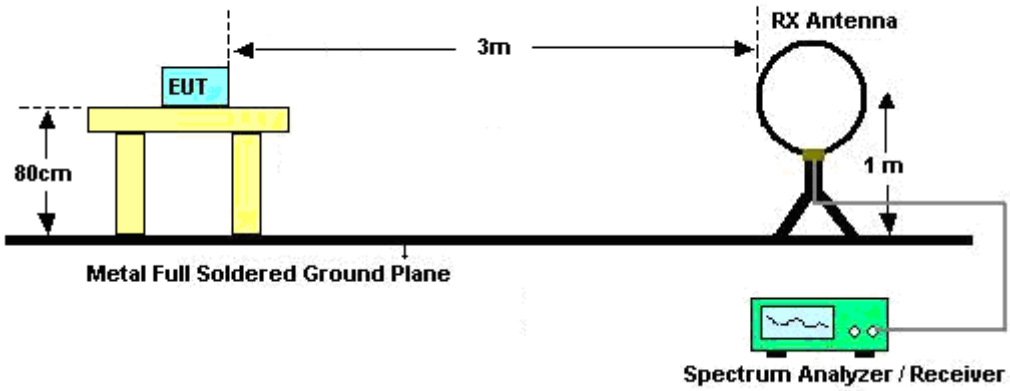
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- 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.

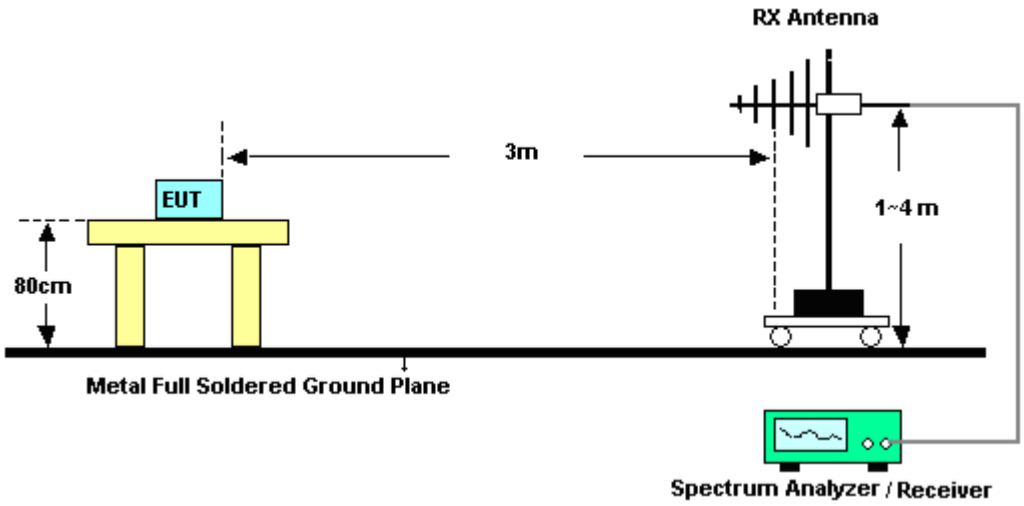
2. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband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

3.2.4 Test Setup

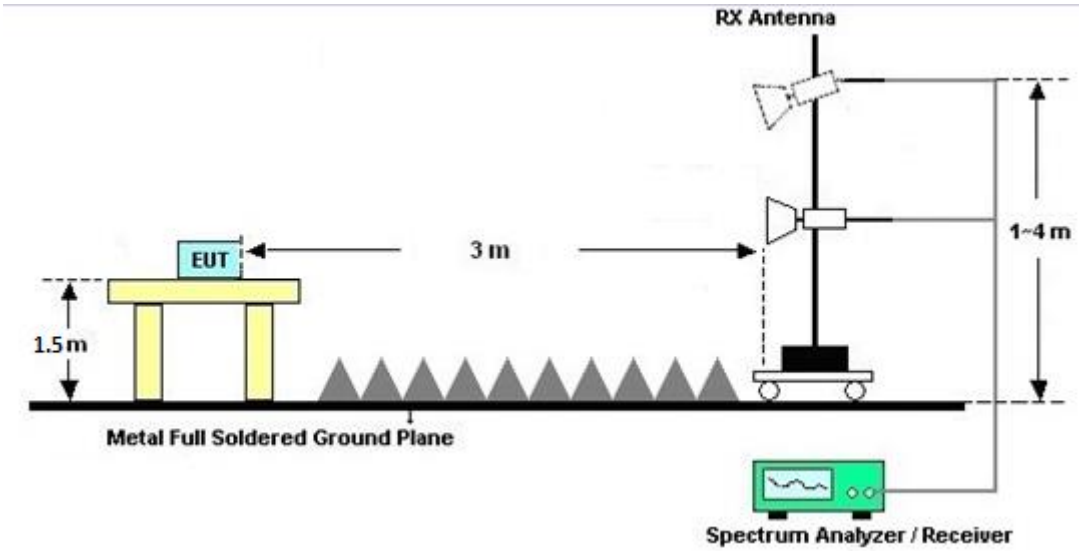
For radiated emissions below 30MHz



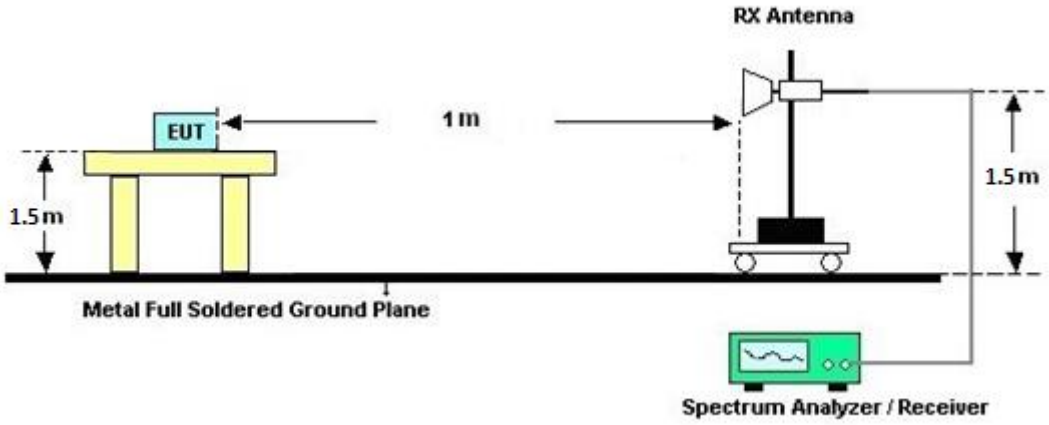
For radiated emissions from 30MHz to 1GHz



For radiated emissions from 1GHz to 18GHz



For radiated emissions above 18GHz



3.2.5 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.

3.2.6 Test Result of Radiated Band Edges

Please refer to Appendix B and C.

3.2.7 Duty Cycle

Please refer to Appendix D.

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

Please refer to Appendix B and C.

3.3 Automatically Discontinue Transmission

3.3.1 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.

3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 Test Result of Automatically Discontinue Transmission

EUT is verified this characteristic during the function check of normal sample associated with an access point:

A. Information start: make EUT supply information to the access point.

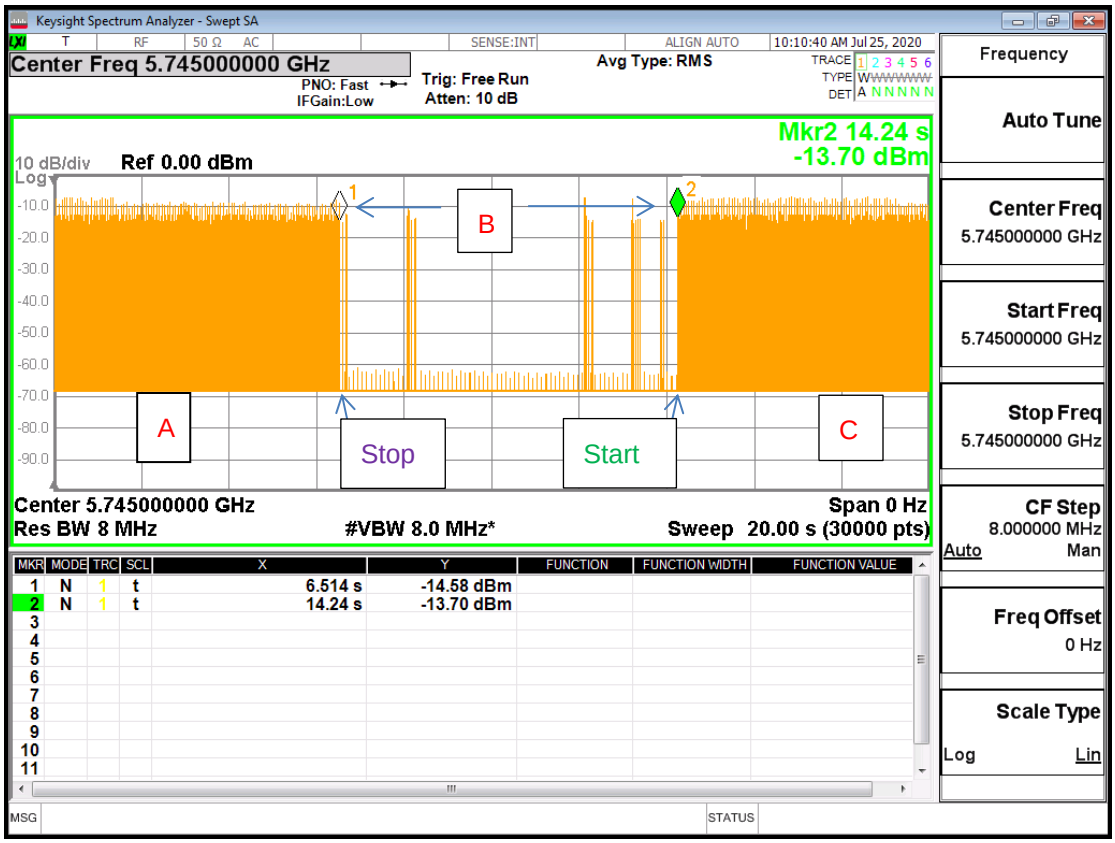
B. Information stop: stop supplying information to the access point.

While the EUT is not transmitting any information, the EUT can automatically discontinue transmission and become standby mode for power saving.

C. Information start: make EUT supply information to the access point again.

The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

5745MHz



Note: The control / signalling information during the period B is precluded.

3.4 Antenna Requirements

3.4.1 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.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 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
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Aug. 10, 2020~ Aug. 13, 2020	Dec. 25, 2020	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	37059 & 01	30MHz~1GHz	Oct. 12, 2019	Aug. 10, 2020~ Aug. 13, 2020	Oct. 11, 2020	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-132 8	1GHz~18GHz	Nov. 14, 2019	Aug. 10, 2020~ Aug. 13, 2020	Nov. 13, 2020	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 584	18GHz~40GHz	Dec. 10, 2019	Aug. 10, 2020~ Aug. 13, 2020	Dec. 09, 2020	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 25, 2020	Aug. 10, 2020~ Aug. 13, 2020	Mar. 24, 2021	Radiation (03CH12-HY)
Preamplifier	Agilent	8449B	3008A023 75	1GHz~26.5GHz	Mar. 26, 2020	Aug. 10, 2020~ Aug. 13, 2020	Mar. 25, 2021	Radiation (03CH12-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03K	171000180 0054002	1GHz~18GHz	Feb. 07, 2020	Aug. 10, 2020~ Aug. 13, 2020	Feb. 06, 2021	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 13, 2019	Aug. 10, 2020~ Aug. 13, 2020	Dec. 12, 2020	Radiation (03CH12-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101756	10Hz~40GHz	Dec. 24, 2019	Aug. 10, 2020~ Aug. 13, 2020	Dec. 23, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 12, 2019	Aug. 10, 2020~ Aug. 13, 2020	Dec. 11, 2020	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Feb. 25, 2020	Aug. 10, 2020~ Aug. 13, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz~40GHz	Feb. 25, 2020	Aug. 10, 2020~ Aug. 13, 2020	Feb. 24, 2021	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP140349	N/A	Oct. 25, 2019	Aug. 10, 2020~ Aug. 13, 2020	Oct. 24, 2020	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Aug. 10, 2020~ Aug. 13, 2020	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Aug. 10, 2020~ Aug. 13, 2020	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Aug. 10, 2020~ Aug. 13, 2020	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-00098 9	N/A	N/A	Aug. 10, 2020~ Aug. 13, 2020	N/A	Radiation (03CH12-HY)
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Aug. 06, 2020~ Aug. 07, 2020	Mar. 01, 2021	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054S NO10	10MHz~6GHz	Dec. 23, 2019	Aug. 06, 2020~ Aug. 07, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 15, 2019	Aug. 06, 2020~ Aug. 07, 2020	Nov. 14, 2020	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC130048 4	N/A	Aug. 22, 2019	Aug. 06, 2020~ Aug. 07, 2020	Aug. 21, 2020	Conducted (TH05-HY)
DC Power Supply	GW Instek	GPE2323	GEU81096 8	N/A	Jul. 30, 2020	Aug. 06, 2020~ Aug. 07, 2020	Jul. 29, 2021	Conducted (TH05-HY)
Spectrum Analyzer	Keysight	N9010A	MY560704 12	10Hz~7GHz	Aug. 27, 2019	Jul. 25, 2020	Aug. 26, 2020	DFS (DFS02-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.9

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.6

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	4.9

Appendix A. Test Result of Conducted Test Items

Test Engineer:	Derek Hsu/Sylvia Li	Temperature:	24.2~24.3	°C
Test Date:	2020/08/06~2020/08/07	Relative Humidity:	53.7~53.9	%

TEST RESULTS DATA
Average Power Table

Band IV single antenna												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	
11a	6Mbps	1	149	5745	11.00	10.90		30.00	30.00	-3.20	-5.20	Pass
11a	6Mbps	1	157	5785	11.10	11.10		30.00	30.00	-3.20	-5.20	Pass
11a	6Mbps	1	165	5825	11.00	11.00		30.00	30.00	-3.20	-5.20	Pass
HT20	MCS0	1	149	5745	11.20	11.00		30.00	30.00	-3.20	-5.20	Pass
HT20	MCS0	1	157	5785	11.20	11.00		30.00	30.00	-3.20	-5.20	Pass
HT20	MCS0	1	165	5825	11.00	11.10		30.00	30.00	-3.20	-5.20	Pass
HT40	MCS0	1	151	5755	11.00	10.90		30.00	30.00	-3.20	-5.20	Pass
HT40	MCS0	1	159	5795	11.00	11.10		30.00	30.00	-3.20	-5.20	Pass
VHT20	MCS0	1	149	5745	11.10	10.90		30.00	30.00	-3.20	-5.20	Pass
VHT20	MCS0	1	157	5785	11.10	10.90		30.00	30.00	-3.20	-5.20	Pass
VHT20	MCS0	1	165	5825	10.90	11.00		30.00	30.00	-3.20	-5.20	Pass
VHT40	MCS0	1	151	5755	10.90	10.80		30.00	30.00	-3.20	-5.20	Pass
VHT40	MCS0	1	159	5795	10.90	11.00		30.00	30.00	-3.20	-5.20	Pass
VHT80	MCS0	1	155	5775	11.00	11.00		30.00	30.00	-3.20	-5.20	Pass

Band IV MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
					Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	
11a	6Mbps	2	149	5745	11.10	11.00	14.06	30.00		-3.20		Pass
11a	6Mbps	2	157	5785	11.10	11.20	14.16	30.00		-3.20		Pass
11a	6Mbps	2	165	5825	11.10	11.10	14.11	30.00		-3.20		Pass
HT20	MCS0	2	149	5745	11.20	11.10	14.16	30.00		-3.20		Pass
HT20	MCS0	2	157	5785	11.20	11.10	14.16	30.00		-3.20		Pass
HT20	MCS0	2	165	5825	11.00	11.20	14.11	30.00		-3.20		Pass
HT40	MCS0	2	151	5755	11.10	10.90	14.01	30.00		-3.20		Pass
HT40	MCS0	2	159	5795	11.00	11.10	14.06	30.00		-3.20		Pass
VHT20	MCS0	2	149	5745	11.00	10.90	13.96	30.00		-3.20		Pass
VHT20	MCS0	2	157	5785	11.10	11.00	14.06	30.00		-3.20		Pass
VHT20	MCS0	2	165	5825	10.90	11.10	14.01	30.00		-3.20		Pass
VHT40	MCS0	2	151	5755	11.00	10.80	13.91	30.00		-3.20		Pass
VHT40	MCS0	2	159	5795	10.90	11.00	13.96	30.00		-3.20		Pass
VHT80	MCS0	2	155	5775	11.10	11.00	14.06	30.00		-3.20		Pass

TEST RESULTS DATA
Average Power Table

Band IV single antenna													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	
HE20	MCS0	1	149	5745	Full	11.00	11.00		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	149	5745	26/0	8.40	8.20		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	149	5745	52/37	11.00	11.20		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	149	5745	106/53	11.20	10.80		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	157	5785	Full	11.10	11.10		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	165	5825	Full	11.00	10.90		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	165	5825	26/8	8.40	8.50		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	165	5825	52/40	11.10	11.10		30.00	30.00	-3.20	-5.20	Pass
HE20	MCS0	1	165	5825	106/54	10.90	11.10		30.00	30.00	-3.20	-5.20	Pass
HE40	MCS0	1	151	5755	Full	11.00	10.90		30.00	30.00	-3.20	-5.20	Pass
HE40	MCS0	1	151	5755	242/61	10.70	10.50		30.00	30.00	-3.20	-5.20	Pass
HE40	MCS0	1	159	5795	Full	11.00	11.10		30.00	30.00	-3.20	-5.20	Pass
HE40	MCS0	1	159	5795	242/62	10.50	10.40		30.00	30.00	-3.20	-5.20	Pass
HE80	MCS0	1	155	5775	Full	11.10	10.90		30.00	30.00	-3.20	-5.20	Pass
HE80	MCS0	1	155	5775	484/65	10.80	10.60		30.00	30.00	-3.20	-5.20	Pass
HE80	MCS0	1	155	5775	484/66	10.60	10.70		30.00	30.00	-3.20	-5.20	Pass

Band IV MIMO													
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	RU Config.	Average Conducted Power (dBm)			FCC Conducted Power Limit (dBm)		DG (dBi)		Pass/Fail
						Ant 0	Ant 1	SUM	Ant 0	Ant 1	Ant 0	Ant 1	
HE20	MCS0	2	149	5745	Full	11.10	11.10	14.11	30.00		-3.20		Pass
HE20	MCS0	2	149	5745	26/0	8.70	8.30	11.51	30.00		-3.20		Pass
HE20	MCS0	2	149	5745	52/37	11.30	11.30	14.31	30.00		-3.20		Pass
HE20	MCS0	2	149	5745	106/53	11.40	10.90	14.17	30.00		-3.20		Pass
HE20	MCS0	2	157	5785	Full	11.10	11.20	14.16	30.00		-3.20		Pass
HE20	MCS0	2	165	5825	Full	11.00	11.00	14.01	30.00		-3.20		Pass
HE20	MCS0	2	165	5825	26/8	8.40	8.60	11.51	30.00		-3.20		Pass
HE20	MCS0	2	165	5825	52/40	11.20	11.10	14.16	30.00		-3.20		Pass
HE20	MCS0	2	165	5825	106/54	11.30	11.20	14.26	30.00		-3.20		Pass
HE40	MCS0	2	151	5755	Full	11.10	11.00	14.06	30.00		-3.20		Pass
HE40	MCS0	2	151	5755	242/61	10.80	10.50	13.66	30.00		-3.20		Pass
HE40	MCS0	2	159	5795	Full	11.00	11.10	14.06	30.00		-3.20		Pass
HE40	MCS0	2	159	5795	242/62	10.80	10.40	13.61	30.00		-3.20		Pass
HE80	MCS0	2	155	5775	Full	11.20	10.90	14.06	30.00		-3.20		Pass
HE80	MCS0	2	155	5775	484/65	10.90	10.70	13.81	30.00		-3.20		Pass
HE80	MCS0	2	155	5775	484/66	10.80	10.70	13.76	30.00		-3.20		Pass

Appendix B. Radiated Spurious Emission

Test Engineer :	Jack Cheng, Lance Chiang and Chuan Chu	Temperature :	23.8~26.2°C
		Relative Humidity :	56.5~68.6%

Band 4 - 5725~5850MHz

WIFI 802.11ac VHT80 (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
0+1		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11ac VHT80 CH 155 5775MHz		5617	53.08	-15.12	68.2	45.07	31.73	9.56	33.28	198	45	P	H
		5699.6	53.47	-51.44	104.91	45.32	31.8	9.66	33.31	198	45	P	H
		5720	58.51	-52.29	110.8	50.25	31.88	9.69	33.31	198	45	P	H
		5724.8	62.72	-59.02	121.74	54.44	31.9	9.7	33.32	198	45	P	H
	*	5775	99.05	-	-	90.57	32.05	9.76	33.33	198	45	P	H
	*	5775	87	-	-	78.52	32.05	9.76	33.33	198	45	A	H
		5852	53.68	-63.96	117.64	44.99	32.2	9.85	33.36	198	45	P	H
		5861	53.85	-55.27	109.12	45.13	32.22	9.86	33.36	198	45	P	H
		5914.2	55.14	-21.03	76.17	46.24	32.36	9.92	33.38	198	45	P	H
		5943	54.32	-13.88	68.2	45.29	32.47	9.95	33.39	198	45	P	H
		5625.2	52.51	-15.69	68.2	44.52	31.7	9.57	33.28	310	105	P	V
		5677.6	53	-35.66	88.66	44.95	31.71	9.64	33.3	310	105	P	V
		5720	53.12	-57.68	110.8	44.86	31.88	9.69	33.31	310	105	P	V
		5724.8	55.92	-65.82	121.74	47.64	31.9	9.7	33.32	310	105	P	V
	*	5775	89.11	-	-	80.63	32.05	9.76	33.33	310	105	P	V
	*	5775	78.08	-	-	69.6	32.05	9.76	33.33	310	105	A	V
		5851.2	52.93	-66.53	119.46	44.24	32.2	9.85	33.36	310	105	P	V
		5855.2	53.26	-57.48	110.74	44.56	32.21	9.85	33.36	310	105	P	V
		5919	53.87	-18.75	72.62	44.95	32.38	9.92	33.38	310	105	P	V
		5939.4	54.06	-14.14	68.2	45.05	32.46	9.94	33.39	310	105	P	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	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	48.78	-25.22	74	53.54	39.8	17.75	62.31	100	0	P	H
		17325	50.99	-17.21	68.2	46.86	41.17	21.28	58.32	100	0	P	H
													H
													H
		11550	49.44	-24.56	74	54.2	39.8	17.75	62.31	100	0	P	V
		17325	50.47	-17.73	68.2	46.34	41.17	21.28	58.32	100	0	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 802.11ax HE40_Partial 242 (Band Edge @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
		5634.8	53.2	-15	68.2	45.25	31.66	9.58	33.29	197	45	P	H
		5693.8	53.16	-47.47	100.63	45.03	31.78	9.66	33.31	197	45	P	H
		5717.2	53.09	-56.93	110.02	44.84	31.87	9.69	33.31	197	45	P	H
		5724.8	59.22	-62.52	121.74	50.94	31.9	9.7	33.32	197	45	P	H
	*	5755	107.93	-	-	99.52	32.01	9.73	33.33	197	45	P	H
	*	5755	93.35	-	-	84.94	32.01	9.73	33.33	197	45	A	H
		5851	53.46	-66.46	119.92	44.77	32.2	9.85	33.36	197	45	P	H
		5861.8	54.17	-54.72	108.89	45.45	32.22	9.86	33.36	197	45	P	H
		5889.8	54.96	-39.26	94.22	46.16	32.28	9.89	33.37	197	45	P	H
802.11ax		5938	54.76	-13.44	68.2	45.76	32.45	9.94	33.39	197	45	P	H
HE40													H
Partial													H
242/61		5647.6	52.4	-15.8	68.2	44.48	31.61	9.6	33.29	199	54	P	V
CH 151		5699.4	52.31	-52.45	104.76	44.16	31.8	9.66	33.31	199	54	P	V
5755MHz		5710.6	53.69	-54.48	108.17	45.48	31.84	9.68	33.31	199	54	P	V
		5725	53.39	-68.81	122.2	45.11	31.9	9.7	33.32	199	54	P	V
	*	5755	97.73	-	-	89.32	32.01	9.73	33.33	199	54	P	V
	*	5755	82.9	-	-	74.49	32.01	9.73	33.33	199	54	A	V
		5850.6	52.76	-68.07	120.83	44.07	32.2	9.85	33.36	199	54	P	V
		5868.8	53.54	-53.39	106.93	44.8	32.24	9.87	33.37	199	54	P	V
		5910.8	54.03	-24.65	78.68	45.16	32.34	9.91	33.38	199	54	P	V
		5934.2	54.81	-13.39	68.2	45.82	32.44	9.94	33.39	199	54	P	V
													V
													V

Band 4 5725~5850MHz

WIFI 802.11ax HE40_Partial 242 (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Partial 242/61 CH 151 5755MHz		11510	48.83	-25.17	74	53.46	39.96	17.71	62.3	100	0	P	H
		17265	49.26	-18.94	68.2	45.57	40.9	21.21	58.42	100	0	P	H
													H
													H
		11510	48.73	-25.27	74	53.36	39.96	17.71	62.3	100	0	P	V
		17265	49.93	-18.27	68.2	46.24	40.9	21.21	58.42	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission above 18GHz

WIFI 802.11ax HE40_Partial 242 (SHF)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Partial 242/61 CH 151 5755MHz		27416	41.43	-26.77	68.2	49.24	39.3	5.97	53.08	150	0	P	H
		37184	46.26	-21.94	68.2	53.41	42.76	7.01	56.92	150	0	P	H
													H
													H
		26558	42.7	-25.5	68.2	49.87	40.1	5.73	53	150	0	P	V
		37470	46.75	-21.45	68.2	53.54	42.71	7.13	56.63	150	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

WIFI 802.11ax HE40_Partial 242 (LF @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11ax HE40 Partial 242/61 CH 151 5755MHz LF		42.61	26.59	-13.41	40	37.69	18.02	0.53	29.65	-	-		H
		167.74	26.25	-17.25	43.5	38.74	15.78	1.28	29.55	-	-		H
		259.89	23.82	-22.18	46	31.72	19.75	1.73	29.38	-	-		H
		718.7	31.23	-14.77	46	29.95	26.85	3	28.57	-	-		H
		876.81	35.64	-10.36	46	31.3	28.98	3.64	28.28	-	-		H
		953.44	36.63	-9.37	46	30.35	30.73	3.68	28.13	100	0	P	H
													H
													H
													H
													H
													H
													H
		42.61	33.28	-6.72	40	44.38	18.02	0.53	29.65	100	0	P	V
		107.6	26.06	-17.44	43.5	38.21	16.47	1	29.62	-	-		V
		220.12	22.65	-23.35	46	35.33	15.22	1.56	29.46	-	-		V
		776.9	33.43	-12.57	46	30.52	28.18	3.26	28.53	-	-		V
		872.93	35.57	-10.43	46	31.23	29.03	3.61	28.3	-	-		V
		954.41	36.33	-9.67	46	30.01	30.77	3.68	28.13	-	-		V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

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

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

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

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

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

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

= 43.54 (dBμV/m)

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

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

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

Appendix C. Radiated Spurious Emission Plots

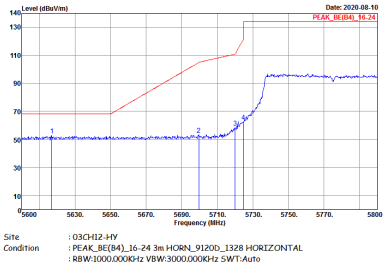
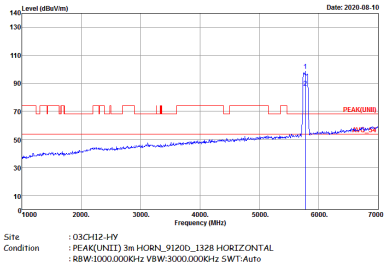
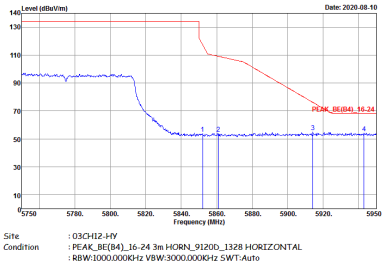
Test Engineer :	Jack Cheng, Lance Chiang and Chuan Chu	**Temperature :**	23.8~26.2°C
		Relative Humidity :	56.5~68.6%

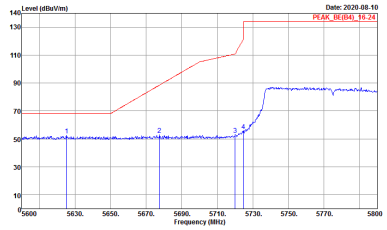
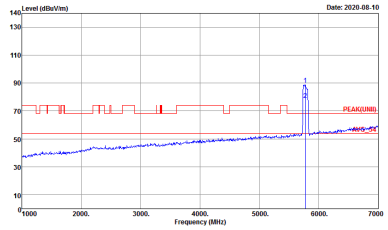
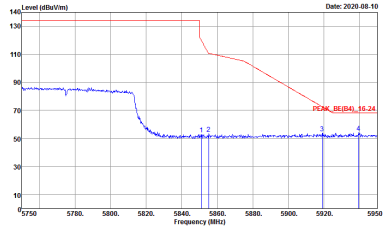
Note symbol

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

Band 4 - 5725~5850MHz

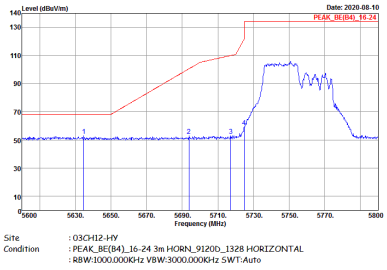
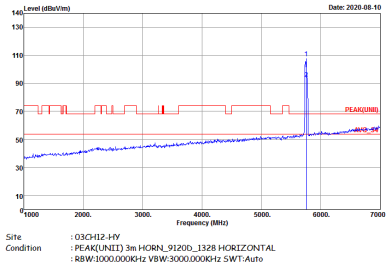
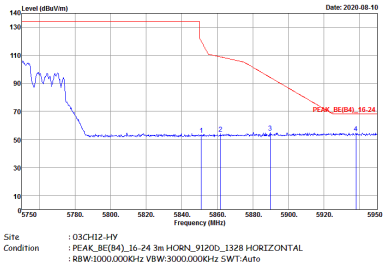
WIFI 802.11ac VHT80 (Band Edge @ 3m)

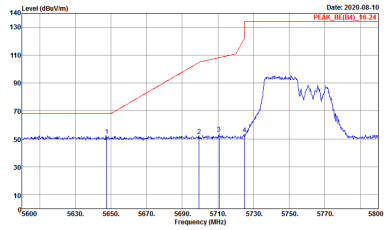
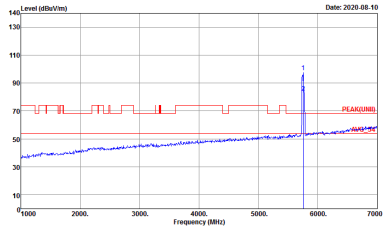
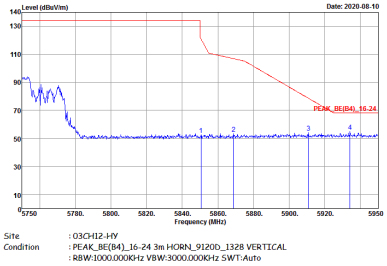
WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
0+1	Horizontal	Fundamental
Peak		
Peak		Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
0+1	Vertical	Fundamental
Peak		
Peak		Left blank

Band 4 - 5725~5850MHz

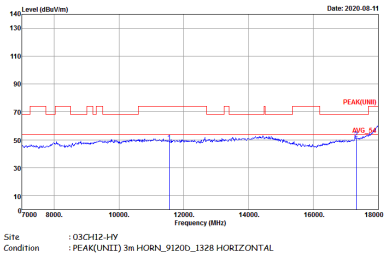
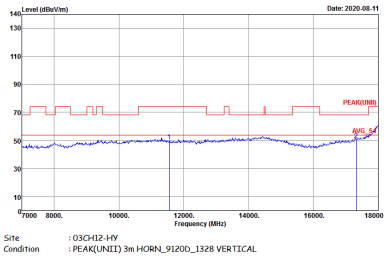
WIFI 802.11ax HE40 Partial 242 (Band Edge @ 3m)

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE40 Partial 242/61 CH151 5755MHz	
0+1	Horizontal	Fundamental
Peak		
Peak		Left blank

WIFI	Band 4 5725~5850MHz Band Edge @ 3m	
ANT	802.11ax HE40 Partial 242/61 CH151 5755MHz	
0+1	Vertical	Fundamental
Peak		
Peak		Left blank

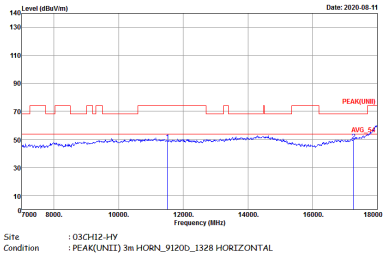
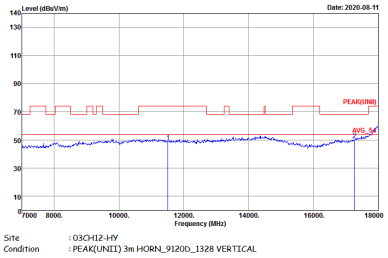
Band 4 - 5725~5850MHz

WIFI 802.11ac VHT80 (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ac VHT80 CH155 5775MHz	
0+1	Horizontal	Vertical
Peak Avg.		

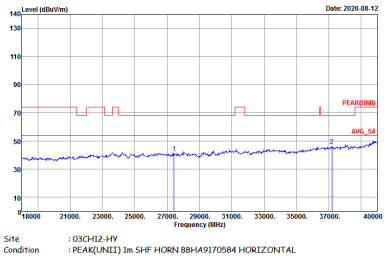
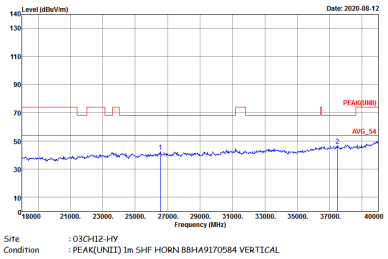
Band 4 - 5725~5850MHz

WIFI 802.11ax HE40 Full (Harmonic @ 3m)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax HE40 Full CH151 5755MHz	
0+1	Horizontal	Vertical
Peak Avg.		

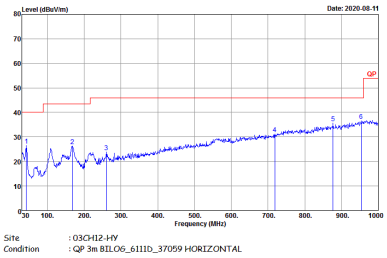
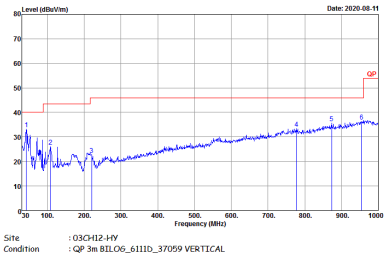
Emission above 18GHz

WIFI 802.11ax HE40_Partial 242 (SHF)

WIFI	Band 4 5725~5850MHz Harmonic @ 3m	
ANT	802.11ax 18~40G	
0+1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

5GHz WIFI 802.11ax HE40 (LF)

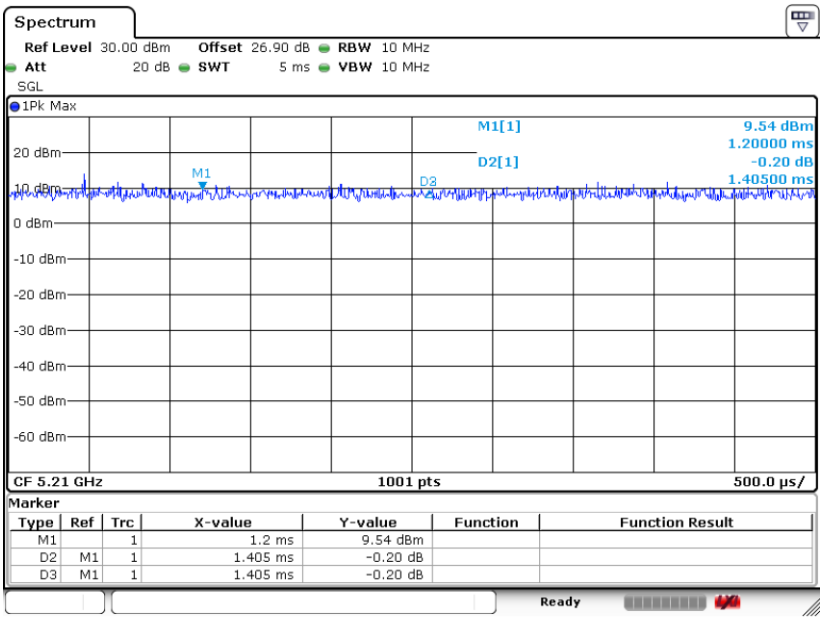
WIFI	5GHz WIFI	
ANT	802.11ax HE40 LF	
0+1	Horizontal	Vertical
QP / Peak		

Appendix D. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
0+1	5GHz 802.11ac VHT80 for Ant. 0	100.00	-	-	10Hz	0.00
0+1	5GHz 802.11ac VHT80 for Ant. 1	100.00	-	-	10Hz	0.00
0+1	5GHz 802.11ax HE40 242 RU for Ant. 0	100.00	-	-	10Hz	0.00
0+1	5GHz 802.11ax HE40 242 RU for Ant. 1	100.00	-	-	10Hz	0.00

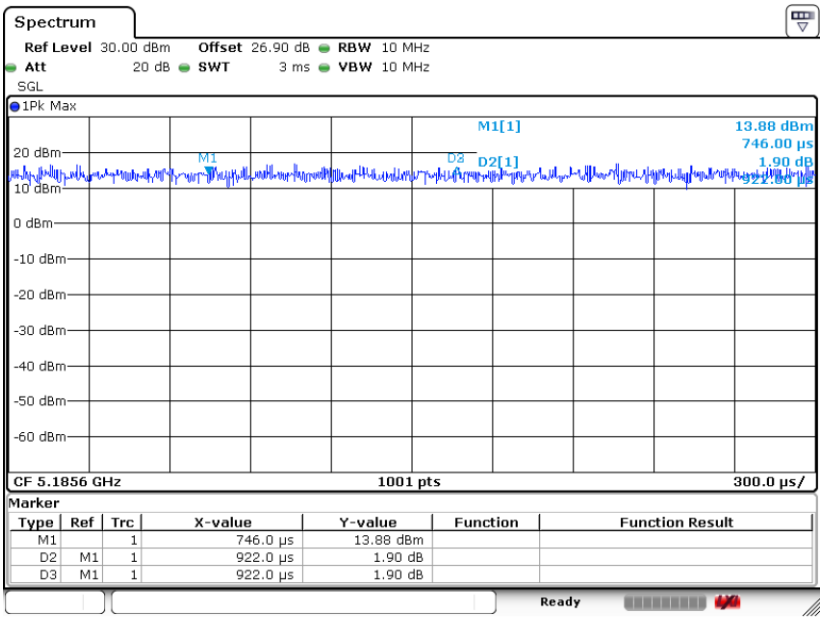
MIMO <Ant. 0>

802.11ac VHT80



Date: 6.AUG.2020 14:42:56

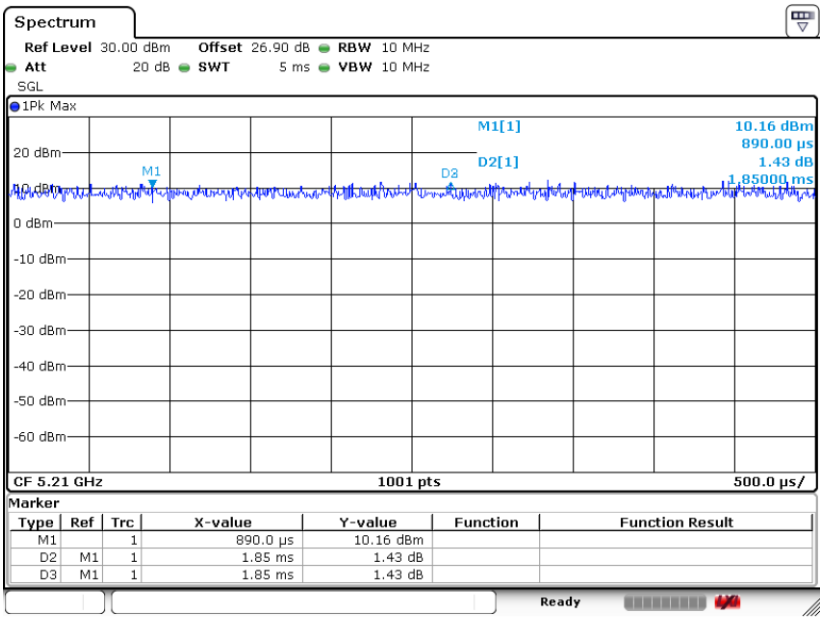
802.11ax HE40 242 RU



Date: 6.AUG.2020 21:25:36

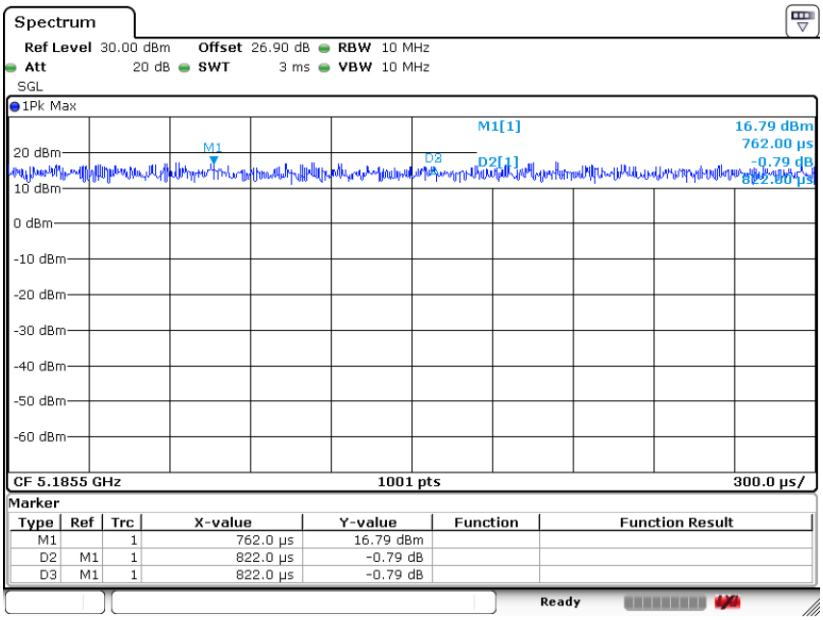
MIMO <Ant. 1>

802.11ac VHT80



Date: 6.AUG.2020 14:44:36

802.11ax HE40 242 RU



Date: 6.AUG.2020 21:27:19

———THE END———