



FCC RADIO TEST REPORT

FCC ID : QYLAX201NG
Equipment : WLAN Module
Brand Name : Getac
Model Name : AX201NGW
Applicant : Getac Technology Corporation.
5F., Building A, No. 209, Sec.1,
Nangang Rd., Nangang Dist., Taipei
City 11568, Taiwan, R.O.C.
Standard : FCC Part 15 Subpart C §15.247

The product was received on Jan. 13, 2021 and testing was started from Jan. 27, 2021 and completed on Mar. 09, 2021. 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 partial report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR111325B	01	Initial issue of report	Apr. 01, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.247(a)(2)	6dB Bandwidth	-	See Note
-	2.1049	99% Occupied Bandwidth	-	See Note
3.1	15.247(b)(3)	Output Power	Pass	-
-	15.247(e)	Power Spectral Density	-	See Note
-	15.247(d)	Conducted Band Edges and Spurious Emission	-	See Note
3.2	15.247(d)	Radiated Band Edges and Spurious Emission	Pass	-
3.3	15.207	AC Conducted Emission	Pass	-
3.4	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Note: The module (Model: AX201NGW) makes no difference after verifying output power, this report reuses test data from the module 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: Lucy Wu

1 General Description

1.1 Product Feature of Equipment Under Test

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

Product Specification subjective to this standard	
Sample 1	EUT with Host 1
Sample 2	EUT with Host 2
Sample 3	EUT with Host 3
Antenna Type	WLAN <Main>: PIFA Antenna <Aux.>: PIFA Antenna Bluetooth: PIFA Antenna

Antenna information		
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	1.3

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

The product was installed into Tablet (Brand Name: Getac, Model Name: F110, F110G6, F110-Ex, F110-621, F110-601) during test, and the host information was recorded in the following table.

Host Information	
Host 1	Host with SKU A
Host 2	Host with SKU B
Host 3	Host with SKU C

SKU	SKU A	SKU B	SKU C
CPU	i3-1115G7 (Non Vpro)	i5-1135G7 (Non Vpro)	i7-1165G7 (Vpro)
DDR	Kingston DDR4-3200 8GB	Kingston DDR4-3200 16GB	Kingston DDR4-3200 32GB
SSD	256GB	512GB	1TB
PANEL	Full HD AUO	Full HD AUO	Full HD AUO
DIGITIZER	EMRight Digitizer	N/A	EMRight Digitizer
OPTION BAY	Micro SD	2D Barcode Reader	RS232 + LAN
Expansion Bay	N/A	Smart Card	Smart Card
Right side option	Finger Print	NXP RFID(PN7462)	Finger Print
WLAN/BT	Intel AX201	Intel AX201	Intel AX201
WWAN(4G)	NA	EM7511	EM7511
GPS/GNS	GPS/GNSS (MC-1010- V2b)	EM7511	EM7511
Rear 8M Camera	Support	Support	Support
Webcam FHD	Support	Not Support	Not Support
IR Webcam	Not Support	Support	Support
USB3.2 Gen2 x 1 Type-A	Support	Support	Support
Type-C (thunder bolt)	Support	Support	Support
Audio/MIC	Support	Support	Support

1.2 Modification of EUT

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

1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, 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. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH15-HY (TAF Code: 3786)
Remark	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory.

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

FCC designation No.: TW1190 and TW0007

1.4 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01
- ♦ 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

2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	0	2402	21	2444
	1	2404	22	2446
	2	2406	23	2448
	3	2408	24	2450
	4	2410	25	2452
	5	2412	26	2454
	6	2414	27	2456
	7	2416	28	2458
	8	2418	29	2460
	9	2420	30	2462
	10	2422	31	2464
	11	2424	32	2466
	12	2426	33	2468
	13	2428	34	2470
	14	2430	35	2472
	15	2432	36	2474
	16	2434	37	2476
	17	2436	38	2478
	18	2438	39	2480
	19	2440	-	-
	20	2442	-	-

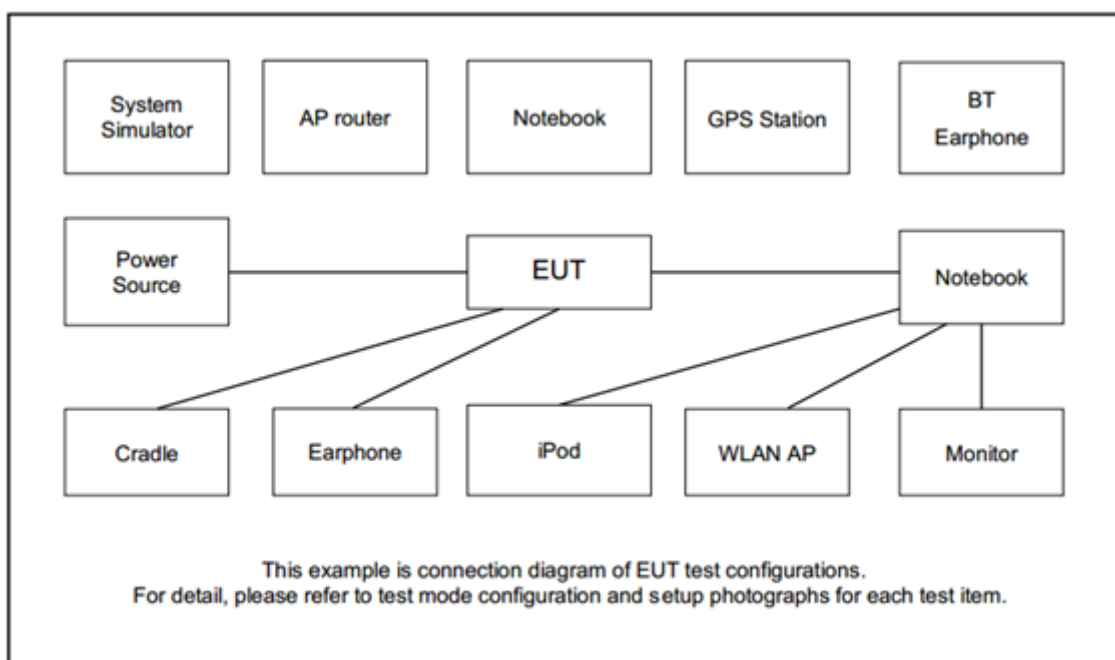
2.2 Test Mode

- 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 (X plane) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

The following summary table is showing all test modes to demonstrate in compliance with the standard.

Summary table of Test Cases	
Test Item	Data Rate / Modulation
	Bluetooth – LE / GFSK
Radiated Test Cases	Mode 1: Bluetooth Tx CH19_2440 MHz_1Mbps
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + H-Pattern + Earphone + Adapter for Sample 1
	Mode 2: WLAN (2.4GHz) Link + Bluetooth Link + H-Pattern + Earphone + Adapter for Sample 2
	Mode 3: WLAN (2.4GHz) Link + Bluetooth Link + H-Pattern + Earphone + Adapter for Sample 3
Remark: 1. The worst case of conducted emission is mode 2; only the test data of it was reported. 2. For Radiated Test Cases, the tests were performed with Adapter 1, Battery 2, and Sample 2.	

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
3.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A
4.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

2.5 EUT Operation Test Setup

The RF test items, utility “DRTU_Version 12.1947.0-10428” was installed in Tablet which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

3 Test Result

3.1 Output Power Measurement

3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna of directional gain greater than 6 dBi is used, the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

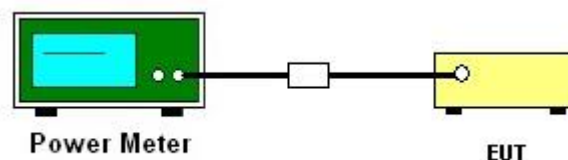
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1.
2. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
3. The RF output of EUT was connected to the power meter by RF cable and attenuator.
4. The path loss was compensated to the results for each measurement.
5. Set the maximum power setting and enable the EUT to transmit continuously.
6. Measure the conducted output power and record the results in the test report.

3.1.4 Test Setup



3.1.5 Test Result of Peak Output Power

Please refer to Appendix A.

3.1.6 Test Result of Average Output Power (Reporting Only)

Please refer to Appendix A.

3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2 Measuring Instruments

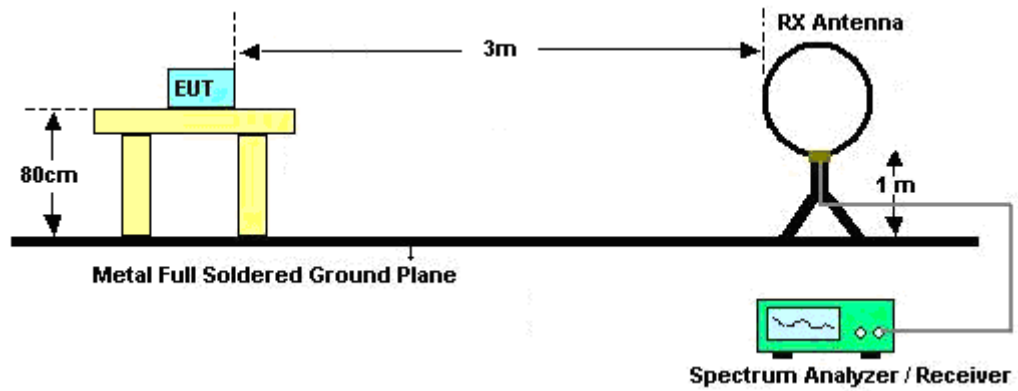
See list of measuring equipment of this test report.

3.2.3 Test Procedures

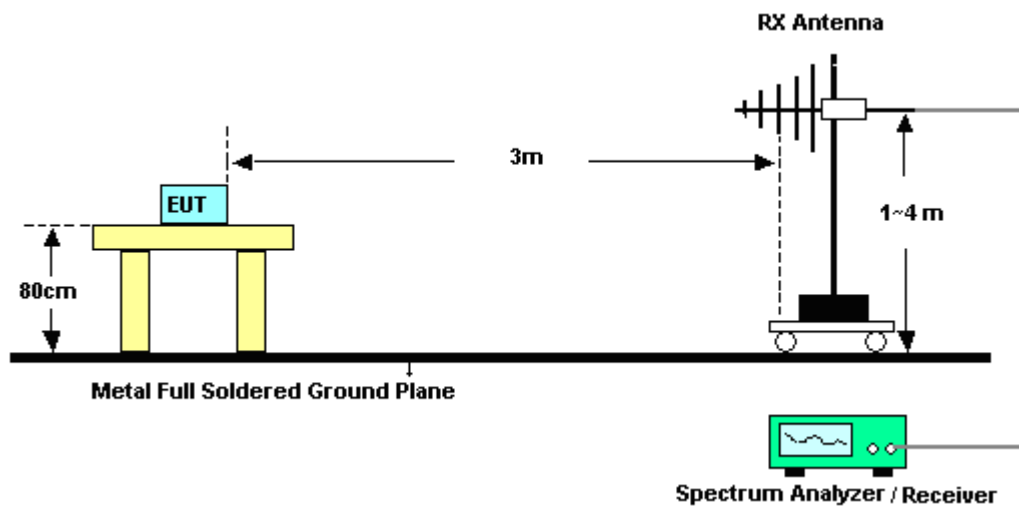
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1 GHz and 1.5 meter for frequency above 1 GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1 GHz, 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 be reported.
7. For testing above 1 GHz, the emission level of the EUT in peak mode was 20 dB 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 be reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW = 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW = 3 MHz for $f \geq 1$ GHz for peak measurement.
For average measurement:
 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

3.2.4 Test Setup

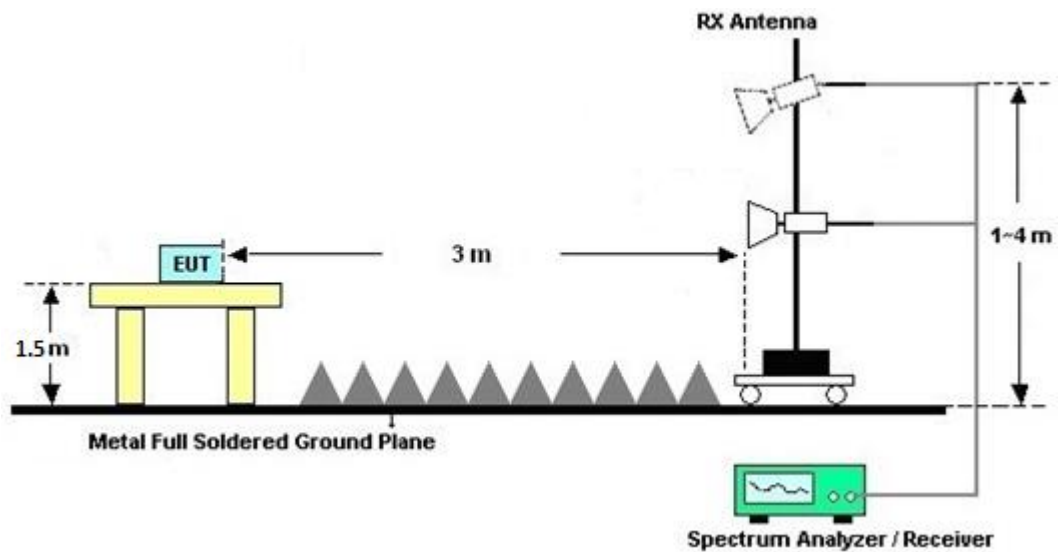
For radiated test below 30MHz



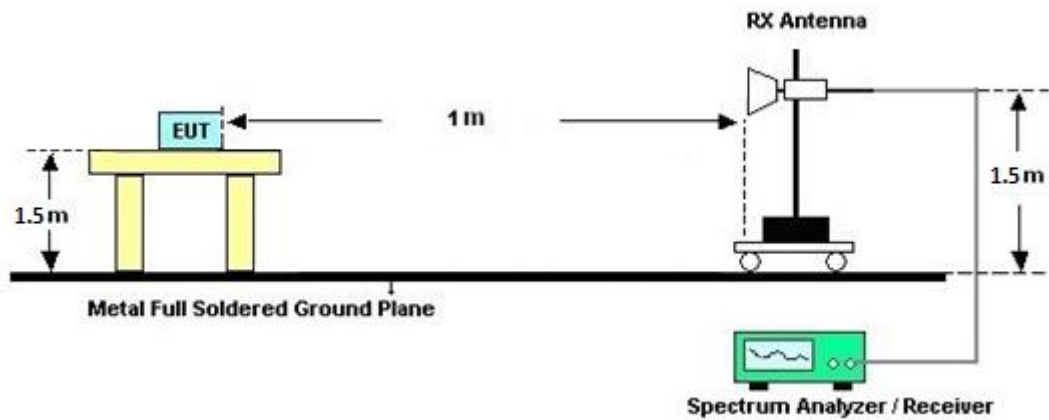
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



3.2.5 Test Results of Radiated Spurious 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 Spurious at Band Edges

Please refer to Appendix C and D.

3.2.7 Duty Cycle

Please refer to Appendix E.

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

Please refer to Appendix C and D.

3.3 AC Conducted Emission Measurement

3.3.1 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.

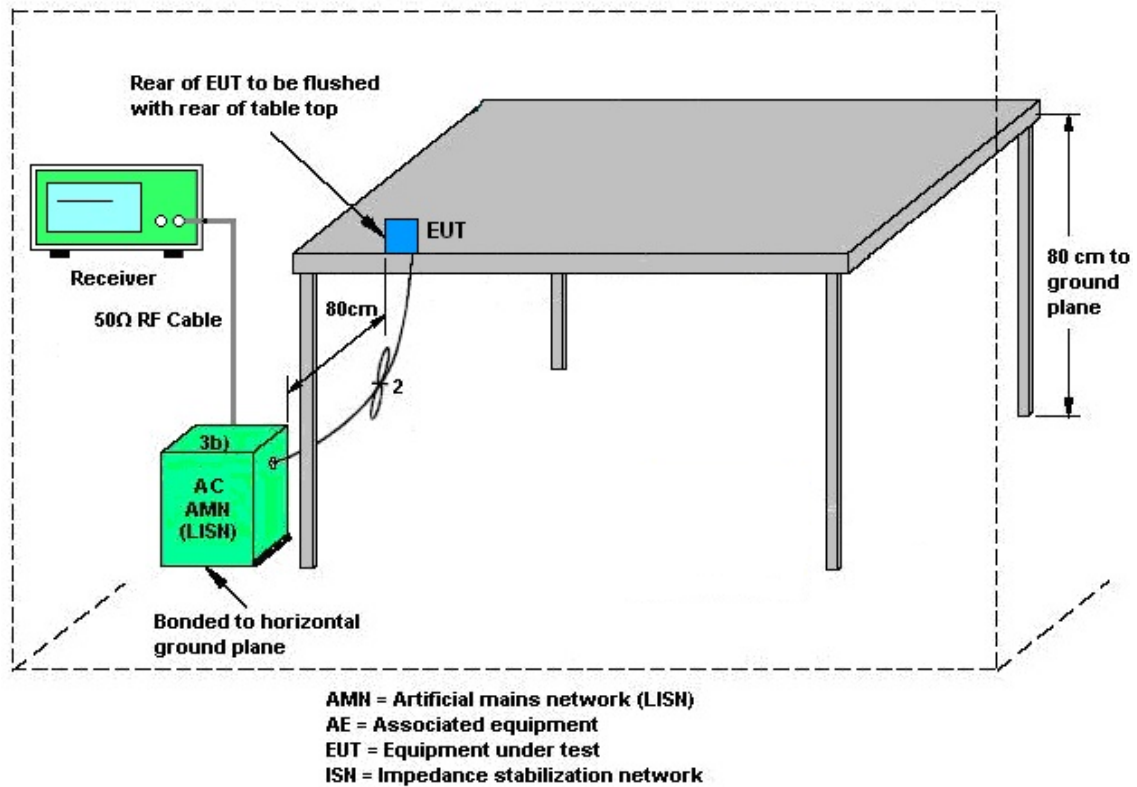
3.3.2 Measuring Instruments

See list of measuring equipment of this test report.

3.3.3 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 shall 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 (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

3.3.4 Test Setup



3.3.5 Test Result of AC Conducted Emission

Please refer to Appendix B.



3.4 Antenna Requirements

3.4.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the rule.

3.4.2 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	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jul. 14, 2020	Mar. 06, 2021~ Mar. 09, 2021	Jul. 13, 2021	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	41912 & 05	30MHz~1GHz	Feb. 08, 2021	Mar. 06, 2021~ Mar. 09, 2021	Feb. 07, 2022	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 28, 2020	Mar. 06, 2021~ Mar. 09, 2021	Dec. 27, 2021	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-016 20	1GHz~18GHz	Nov. 03, 2020	Mar. 06, 2021~ Mar. 09, 2021	Nov. 02, 2021	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA9170 251	18GHz~40GHz	Dec. 02, 2020	Mar. 06, 2021~ Mar. 09, 2021	Dec. 01, 2021	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	171000180 0055006	1GHz~18GHz	May 07, 2020	Mar. 06, 2021~ Mar. 09, 2021	May 06, 2021	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY532701 95	1GHz~26.5GHz	Aug. 21, 2020	Mar. 06, 2021~ Mar. 09, 2021	Aug. 20, 2021	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	0600789	18-40GHz	Oct. 27, 2020	Mar. 06, 2021~ Mar. 09, 2021	Oct. 26, 2021	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY541300 85	20MHz~8.4GHz	Nov. 02, 2020	Mar. 06, 2021~ Mar. 09, 2021	Nov. 01, 2021	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY501801 36	3Hz~44GHz	May 04, 2020	Mar. 06, 2021~ Mar. 09, 2021	May 03, 2021	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Mar. 06, 2021~ Mar. 09, 2021	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Mar. 06, 2021~ Mar. 09, 2021	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24(k 5)	RK-00045 1	N/A	N/A	Mar. 06, 2021~ Mar. 09, 2021	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104, 102E	MY36980/ 4, MY9838/4 PE,508405 /2E	30MHz~18G	Nov. 16, 2020	Mar. 06, 2021~ Mar. 09, 2021	Nov. 15, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 22, 2021	Mar. 06, 2021~ Mar. 09, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 22, 2021	Mar. 06, 2021~ Mar. 09, 2021	Feb. 21, 2022	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971- 4	9kHz to 18GHz	Feb. 24, 2021	Mar. 06, 2021~ Mar. 09, 2021	Feb. 23, 2022	Radiation (03CH15-HY)
Filter	Wainwright	WLJ4-1000-1 530-6000-40S T	SN4	1.53GHz Low Pass Filter	Jul. 03, 2020	Mar. 06, 2021~ Mar. 09, 2021	Jul. 02, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-270 0-3000-18000 -60ST	SN4	3GHz High Pass Filter	Sep. 16, 2020	Mar. 06, 2021~ Mar. 09, 2021	Sep. 15, 2021	Radiation (03CH15-HY)



Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Jan. 27, 2021~ Jan. 28, 2021	Mar. 01, 2021	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054S NO12	10MHz~6GHz	Dec. 16, 2020	Jan. 27, 2021~ Jan. 28, 2021	Dec. 15, 2021	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101566	10Hz ~ 40GHz	Jul. 22, 2020	Jan. 27, 2021~ Jan. 28, 2021	Jul. 21, 2021	Conducted (TH05-HY)
Switch Box & RF Cable	EM Electronics	EMSW18SE	SW200302	N/A	Mar. 17, 2020	Jan. 27, 2021~ Jan. 28, 2021	Mar. 16, 2021	Conducted (TH05-HY)
Power Meter	Anritsu	ML2495A	1218006	N/A	Oct. 18, 2020	Jan. 27, 2021~ Jan. 28, 2021	Oct. 17, 2021	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1207363	300MHz~40GHz	Oct. 18, 2020	Jan. 27, 2021~ Jan. 28, 2021	Oct. 17, 2021	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Feb. 02, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 11, 2020	Feb. 02, 2021	Sep. 10, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	Feb. 02, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2020	Feb. 02, 2021	Nov. 15, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Feb. 02, 2021	N/A	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Feb. 02, 2021	Dec. 30, 2021	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBE CK	ESHVTSD 9561-F N3-Z2	109561-F N0037308 51	9kHz-200MHz	Nov. 02, 2020	Feb. 02, 2021	Nov. 01, 2021	Conduction (CO05-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.3
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.3
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.9
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kai Liao	Temperature:	22.5	°C
Test Date:	2021/01/27~2021/01/28	Relative Humidity:	55.1	%

TEST RESULTS DATA**Peak Power Table**

Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Peak Conducted Power (dBm)	Conducted Power Limit (dBm)
BLE	1Mbps	1	0	2402	6.80	30.00
BLE	1Mbps	1	19	2440	7.18	30.00
BLE	1Mbps	1	39	2480	6.76	30.00

TEST RESULTS DATA**Average Power Table****(Reporting Only)**

Mod.	Data Rate	Ntx	CH.	Freq. (MHz)	Average Conducted Power (dBm)
BLE	1Mbps	1	0	2402	6.70
BLE	1Mbps	1	19	2440	7.10
BLE	1Mbps	1	39	2480	6.70



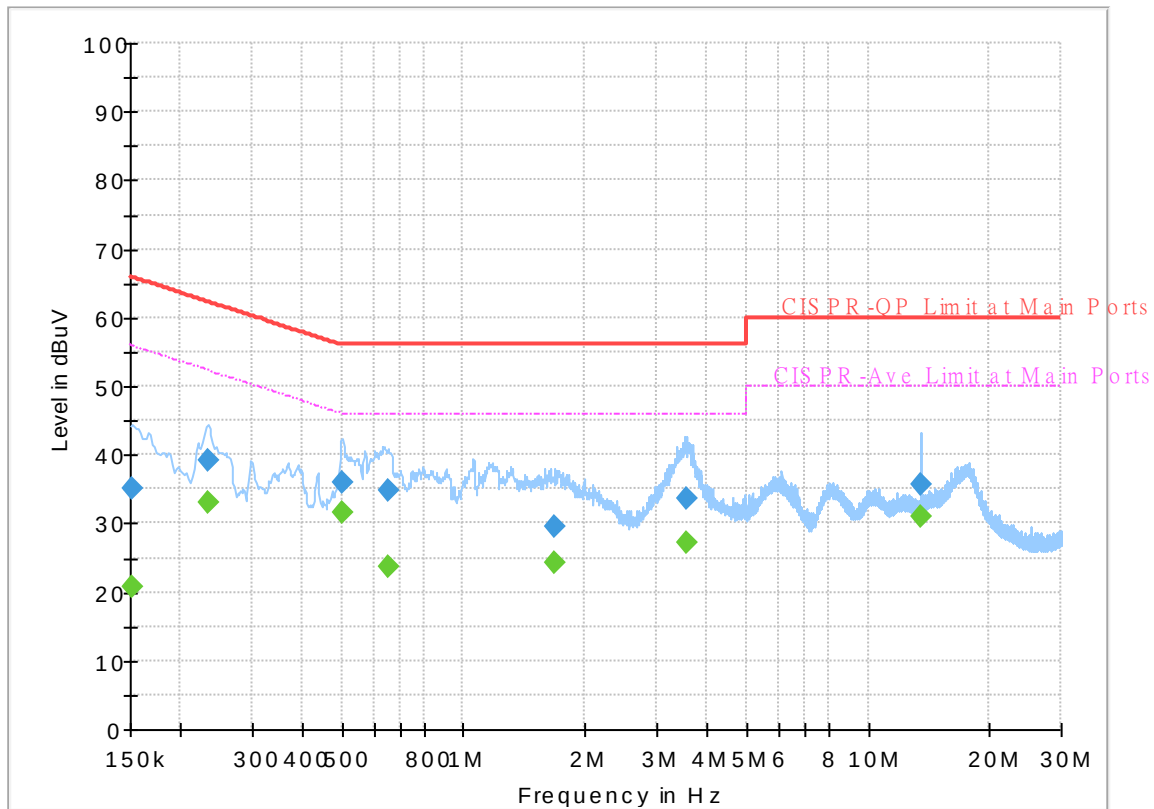
Appendix B. AC Conducted Emission Test Results

Test Engineer :	Howard Huang	Temperature :	23~26℃
		Relative Humidity :	40~50%

EUT Information

Report NO : 111325
Test Mode : Mode 2
Test Voltage : 120Vac/60Hz
Phase : Line

Full Spectrum



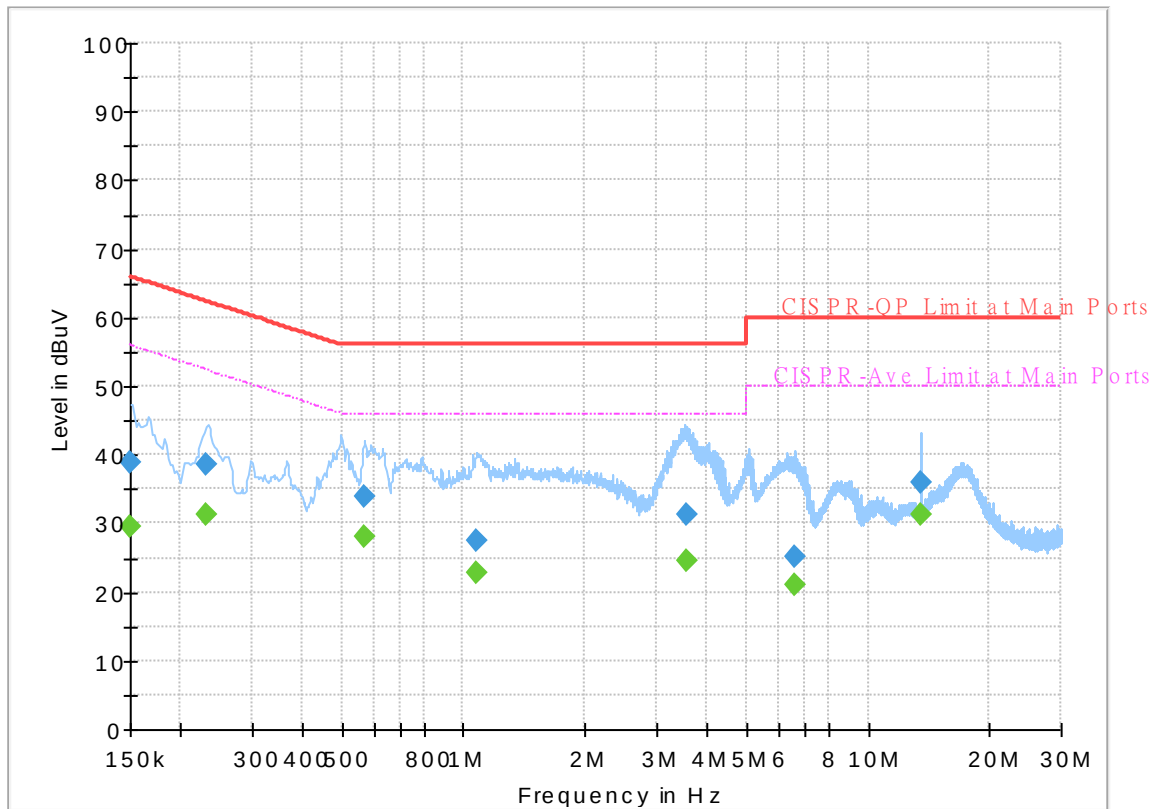
Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	20.72	55.88	35.16	L1	OFF	19.7
0.152250	35.12	---	65.88	30.76	L1	OFF	19.7
0.233250	---	33.09	52.33	19.24	L1	OFF	19.7
0.233250	39.05	---	62.33	23.28	L1	OFF	19.7
0.501000	---	31.68	46.00	14.32	L1	OFF	19.9
0.501000	35.85	---	56.00	20.15	L1	OFF	19.9
0.649500	---	23.76	46.00	22.24	L1	OFF	20.0
0.649500	34.91	---	56.00	21.09	L1	OFF	20.0
1.684500	---	24.19	46.00	21.81	L1	OFF	20.2
1.684500	29.44	---	56.00	26.56	L1	OFF	20.2
3.545250	---	27.08	46.00	18.92	L1	OFF	20.0
3.545250	33.51	---	56.00	22.49	L1	OFF	20.0
13.560000	---	31.12	50.00	18.88	L1	OFF	20.0
13.560000	35.79	---	60.00	24.21	L1	OFF	20.0

EUT Information

Report NO : 111325
Test Mode : Mode 2
Test Voltage : 120Vac/60Hz
Phase : Neutral

Full Spectrum



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.150000	---	29.60	56.00	26.40	N	OFF	19.7
0.150000	38.95	---	66.00	27.05	N	OFF	19.7
0.231000	---	31.19	52.41	21.22	N	OFF	19.7
0.231000	38.62	---	62.41	23.79	N	OFF	19.7
0.568500	---	27.99	46.00	18.01	N	OFF	19.9
0.568500	33.83	---	56.00	22.17	N	OFF	19.9
1.079250	---	22.71	46.00	23.29	N	OFF	20.2
1.079250	27.57	---	56.00	28.43	N	OFF	20.2
3.545250	---	24.43	46.00	21.57	N	OFF	20.0
3.545250	31.24	---	56.00	24.76	N	OFF	20.0
6.614250	---	20.93	50.00	29.07	N	OFF	20.0
6.614250	25.16	---	60.00	34.84	N	OFF	20.0
13.560000	---	31.22	50.00	18.78	N	OFF	20.0
13.560000	35.94	---	60.00	24.06	N	OFF	20.0



Appendix C. Radiated Spurious Emission

Test Engineer :	Leo Lee, Mancy Chou and Bigshow Wang	Temperature :	22.8~23.2°C
		Relative Humidity :	44~50%

2.4GHz 2400~2483.5MHz

BLE (Band Edge @ 3m)

BLE	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 19 2440MHz		2379.92	56.01	-17.99	74	42.8	27.58	16.55	30.92	350	327	P	H
		2380.08	46.97	-7.03	54	33.76	27.58	16.55	30.92	350	327	A	H
	*	2440	101.2	-	-	87.96	27.5	16.64	30.9	350	327	P	H
	*	2440	100.68	-	-	87.44	27.5	16.64	30.9	350	327	A	H
		2487.49	55.91	-18.09	74	42.64	27.43	16.72	30.88	350	327	P	H
		2499.55	45.87	-8.13	54	32.61	27.4	16.73	30.87	350	327	A	H
		2330.8	55.18	-18.82	74	41.91	27.74	16.47	30.94	339	32	P	V
		2380.08	46.79	-7.21	54	33.58	27.58	16.55	30.92	339	32	A	V
	*	2440	98.67	-	-	85.43	27.5	16.64	30.9	339	32	P	V
	*	2440	98.22	-	-	84.98	27.5	16.64	30.9	339	32	A	V
		2484.97	54.78	-19.22	74	41.52	27.43	16.71	30.88	339	32	P	V
		2495.14	45.82	-8.18	54	32.55	27.41	16.73	30.87	339	32	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**2.4GHz 2400~2483.5MHz****BLE (Harmonic @ 3m)**

BLE	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)
BLE CH 19 2440MHz		4880	38.61	-35.39	74	56.59	31.04	10.11	59.13	100	0	P	H
		7320	43.97	-30.03	74	53.9	36.3	12.32	58.55	100	0	P	H
		17985	58.98	-15.02	74	49.29	48.73	18.88	57.92	150	132	P	H
		17985	49.9	-4.1	54	40.21	48.73	18.88	57.92	150	132	A	H
		4880	39.52	-34.48	74	57.5	31.04	10.11	59.13	100	0	P	V
		7320	44.22	-29.78	74	54.15	36.3	12.32	58.55	100	0	P	V
		18000	58.82	-15.18	74	48.83	49	18.89	57.9	100	218	P	V
		18000	49.96	-4.04	54	39.97	49	18.89	57.9	100	218	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission above 18GHz

2.4GHz BLE (SHF)

[illegible]

Emission below 1GHz

2.4GHz BLE (LF)

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BLE LF		56.19	25.82	-14.18	40	45.13	12.24	1.01	32.56	-	-	P	H
		198.78	23.27	-20.23	43.5	38.82	14.85	2.04	32.44	-	-	P	H
		299.66	27.8	-18.2	46	38.76	19.13	2.4	32.49	-	-	P	H
		507.24	31.93	-14.07	46	37.48	23.94	3.1	32.59	-	-	P	H
		740.04	37.86	-8.14	46	38.85	27.76	3.7	32.45	100	0	P	H
		896.21	37.77	-8.23	46	36.4	28.87	4.15	31.65	-	-	P	H
													H
													H
													H
													H
													H
													H
													H
		54.25	25.6	-14.4	40	44.62	12.56	0.99	32.57	-	-	P	V
		105.66	24.06	-19.44	43.5	38.62	16.48	1.47	32.51	-	-	P	V
		586.78	29.74	-16.26	46	33.23	25.67	3.34	32.5	-	-	P	V
		717.73	36.31	-9.69	46	38.37	26.76	3.63	32.45	-	-	P	V
		743.92	36.02	-9.98	46	36.91	27.85	3.71	32.45	-	-	P	V
		899.12	37.55	-8.45	46	36.12	28.9	4.16	31.63	100	0	P	V
													V
													V
													V
													V
													V
												V	
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

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



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

BLE	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BLE CH 00 2402MHz		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”.



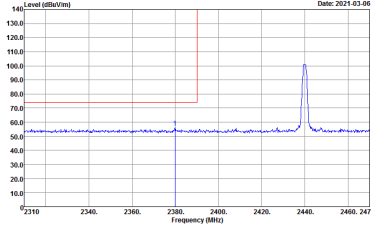
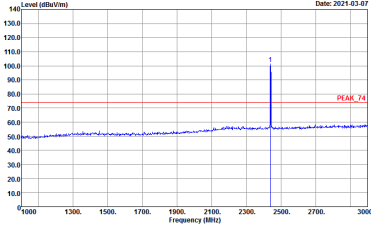
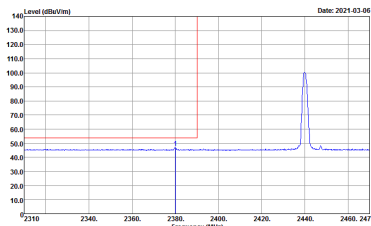
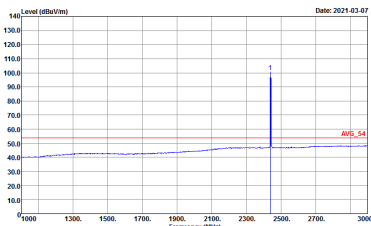
Appendix D. Radiated Spurious Emission Plots

Test Engineer :	Leo Lee, Mancy Chou and Bigshow Wang	Temperature :	22.8~23.2°C
		Relative Humidity :	44~50%

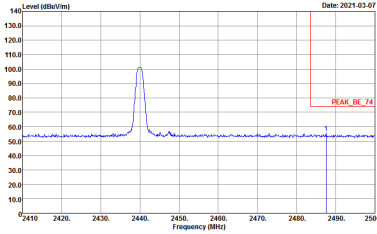
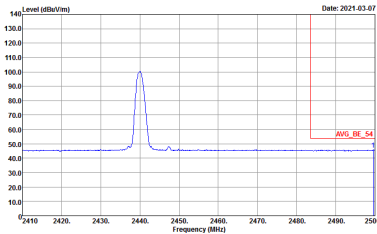
Note symbol

-L	Low channel location
-R	High channel location

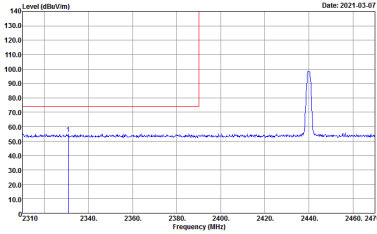
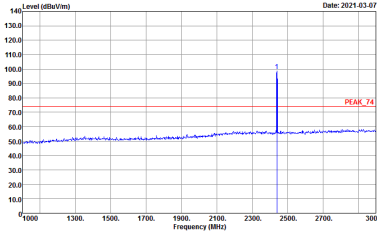
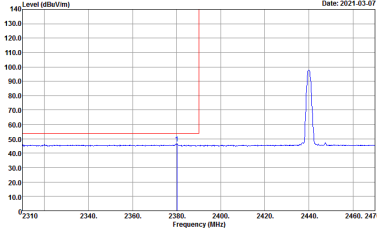
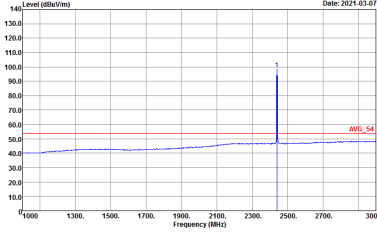
2.4GHz 2400~2483.5MHz
BLE (Band Edge @ 3m)

BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Project : 111325	 Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Project : 111325
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Project : 111325	 Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 HORIZONTAL Detector : RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Project : 111325

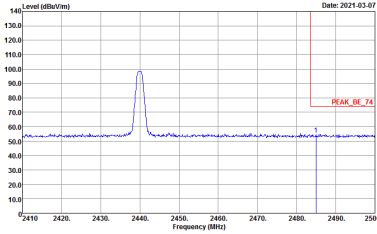
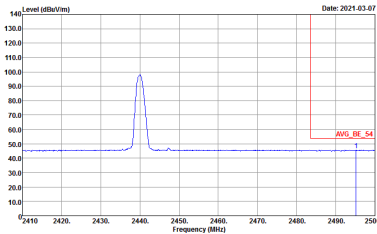


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Horizontal	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 111325	Left blank
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 HORIZONTAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 111325	Left blank



BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - L	
	Vertical	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL Detector : Peak Project : 111325	 Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL Detector : Peak Project : 111325
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL Detector : Peak Project : 111325	 Site : 03CH15-HY Condition : AVG_54 3m 91200_15_1620 VERTICAL Detector : Peak Project : 111325

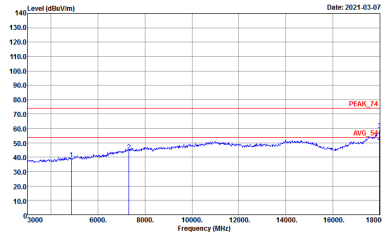
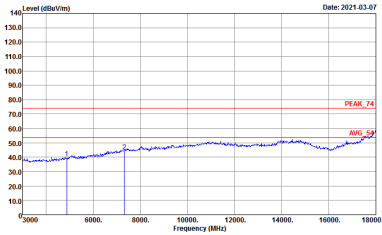


BLE	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
	BLE CH19 2440MHz - R	
	Vertical	Fundamental
Peak	 Site : 03CH15-HY Condition : PEAK_BE_74 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 111325	Left blank
Avg.	 Site : 03CH15-HY Condition : AVG_BE_54 3m 91200_15_1620 VERTICAL RBW:1000.000KHz VBW:3.000KHz SWT:Auto Detector : Peak Project : 111325	Left blank



2.4GHz 2400~2483.5MHz

BLE (Harmonic @ 3m)

BLE	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
	BLE CH19 2440MHz	
	Horizontal	Vertical
Peak Avg.	 Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 HORIZONTAL Detector : Peak Project : 111325	 Site : 03CH15-HY Condition : PEAK_74 3m 91200_15_1620 VERTICAL Detector : Peak Project : 111325



Emission above 18GHz

2.4GHz BLE (SHF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE SHF	
	Horizontal	Vertical
QP / Peak	Level (dBuV/m) Date: 2021-03-07 PEAK_74_18 AVG_54 Site : 03CH16-HY Condition : PEAK_74_1M SHF HORN BBH49170576 HORIZONTAL Detector : Peak Project : 111325	Level (dBuV/m) Date: 2021-03-07 PEAK_74_18 AVG_54 Site : 03CH16-HY Condition : PEAK_74_1M SHF HORN BBH49170576 VERTICAL Detector : Peak Project : 111325



Emission below 1GHz

2.4GHz BLE (LF)

BLE	2.4GHz 2400~2483.5MHz	
	BLE LF	
	Horizontal	Vertical
QP / Peak	Site : 03CH15-HY Condition : QP 3m BTL06_41912_20210208 HORIZONTAL Detector : Peak Project : 111325	Site : 03CH15-HY Condition : QP 3m BTL06_41912_20210208 VERTICAL Detector : Peak Project : 111325



Appendix E. Duty Cycle Plots

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
Bluetooth -LE	62.4	390	2.56	3kHz	2.05

