FCC EMI TEST REPORT

FCC ID	:	**AK8XT0011**
Equipment	:	**IoT Network device**
Brand Name	:	**Sony**
Applicant	:	**Sony Corporation** **1-7-1 Konan Minato-ku, Tokyo, 108-0075 Japan**
Manufacturer	:	**Sony Corporation** **1-7-1 Konan Minato-ku Tokyo, 108-0075 Japan**
Standard	:	**FCC 47 CFR FCC Part 15 Subpart B Class B**

The product was received on Apr. 15, 2021 and testing was started from May 26, 2021 and completed on May 27, 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 given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this variant 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.)

Table of Contents

History of this test report

Report No.	Version	Description	Issued Date
FC971044-04	01	Initial issue of report	Jun. 18, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.107	AC Conducted Emission	Pass	Under limit 14.63 dB at 0.569 MHz
3.2	15.109	Radiated Emission	Pass	Under limit 13.89 dB at 947.620 MHz

Note: This is a variant report by adding support band via SW version. All the test cases were performed on original report which can be referred to original grant.

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: Keven Cheng

Report Producer: Ruby Zou

1. General Description

1.1. Product Feature of Equipment Under Test

LTE Cat. M1, Bluetooth-LE, NFC, and GNSS.

Product Specification subjective to this standard	
Antenna Type	WWAN: PIFA Antenna Bluetooth: PIFA Antenna GPS/Glonass: PIFA Antenna NFC: Loop Antenna

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

EUT Information List			
HW Version	**SW Version**	**IMEI**	**Performed Test Item**
A	00.149/0.1.24	351521100105113	Conducted Emission Radiated Emission

Accessory List	
Battery	Model Name: AHB482331HPC
	S/N: N/A
USB Cable	Model Name: W1001-ZZ-0107
	S/N: N/A
Cradle	Model Name: CB403D-0000-202
	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. Test 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.**
	CO05-HY

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.**
	03CH10-HY (TAF Code: 3786)
Remark	The Radiated Emission test item subcontracted to Sporton International Inc. Wensan Laboratory

FCC designation No.: TW1093 and TW1132

1.4. Applicable Standards

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

- FCC 47 CFR FCC Part 15 Subpart B Class B
- ANSI C63.4-2014

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

2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

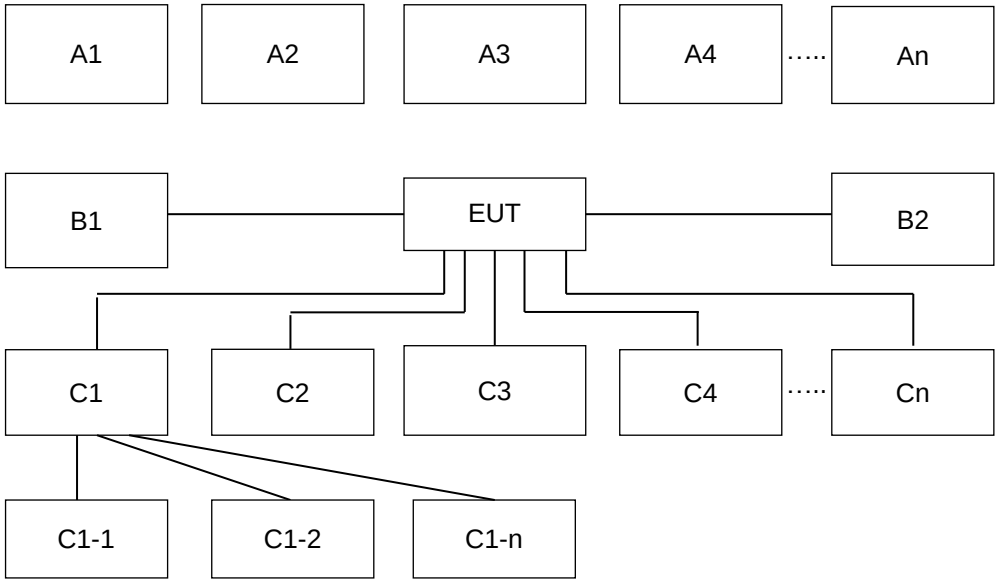
Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
AC Conducted Emission	Mode 1 : LTE Cat. M1 Band 17 Link + Bluetooth-LE Idle + NFC On + Cradle + USB Cable (Charging from Adapter)
Radiated Emissions	Mode 2 : LTE Cat. M1 Band 17 Link + Bluetooth-LE Idle + NFC On + Cradle + USB Cable (Charging from Adapter)

Remark:

1. For radiation emission after pre-scanned the cellular band between 30MHz ~ 960MHz (LTE Cat. M1 Band 17); only the worst case for cellular band test data of this mode was reported.
2. For radiated emission test, pre-scanned tests X, Y, Z, and Accessory in three orthogonal panels to determine the final configuration (Accessory mode) from all possible combinations.

2.2. Connection Diagram of Test System



Conduction Test Setup									
No.	**Wireless Station**	**Connection Type**	**Test Mode**						
			1	**-**	**-**	**-**	**-**	**-**	**-**
A1	Phone	Bluetooth	**X**						
A2	System Simulator	LTE Cat. M1	**X**						
No.	**Power Source**	**Connection Type**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
C1-1	AC : 120V/60Hz	AC Power Cable	**X**						
No.	**Setup Peripherals**	**Connection Type**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
C1	Cradle	EUT I/O interface without Cable	**X**						

Radiation Test Setup									
No.	**Wireless Station**	**Connection Type**	**Test Mode**						
			1	**-**	**-**	**-**	**-**	**-**	**-**
A1	Smart Phone	Bluetooth	**X**						
A2	System Simulator	LTE Cat. M1	**X**						
No.	**Power Source**	**Connection Type**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
C1-1	AC : 120V/60Hz	AC Power Cable	**X**						
No.	**Setup Peripherals**	**Connection Type**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
C1	Cradle	EUT I/O interface without Cable	**X**						

2.3. Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
3.	Phone	Sony	Skywalker	N/A	N/A	N/A
4.	Adapter	Sony	UCH20	N/A	N/A	N/A

2.4. EUT Operation Test Setup

The EUT was in LTE link mode during the testing. The EUT was synchronized with the BCCH, and had been continuous receiving mode by setting paging reorganization of the system simulator.

At the same time, the EUT was attached to the Phone, and the following programs installed in the EUT were programmed during the test:

1. Turn on NFC function

3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1. Limits 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.

<Class B>

Frequency of emission (MHz)	Conducted limit (dBuV)	
	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.

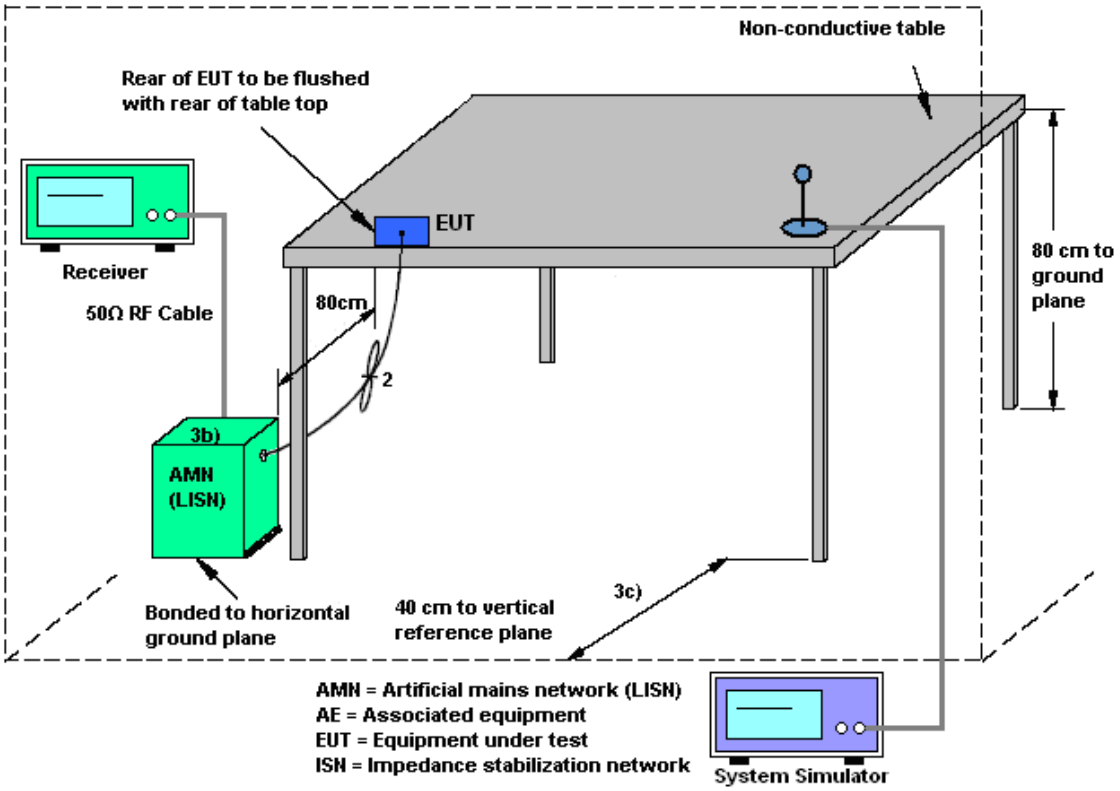
3.1.2. Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.1.3. Test Procedure

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.

3.1.4. Test Setup



3.1.5. Test Result of AC Conducted Emission

Please refer to Appendix A.

3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

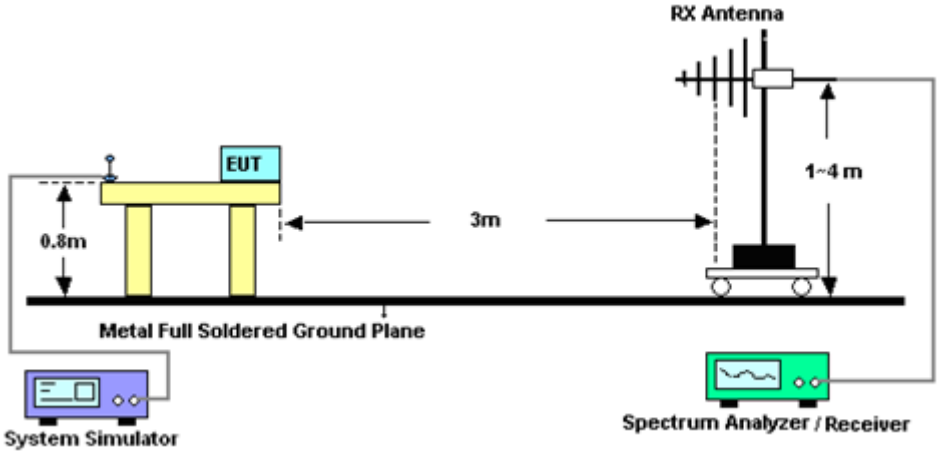
Refer a test equipment and calibration data table in this test report.

3.2.3. Test Procedures

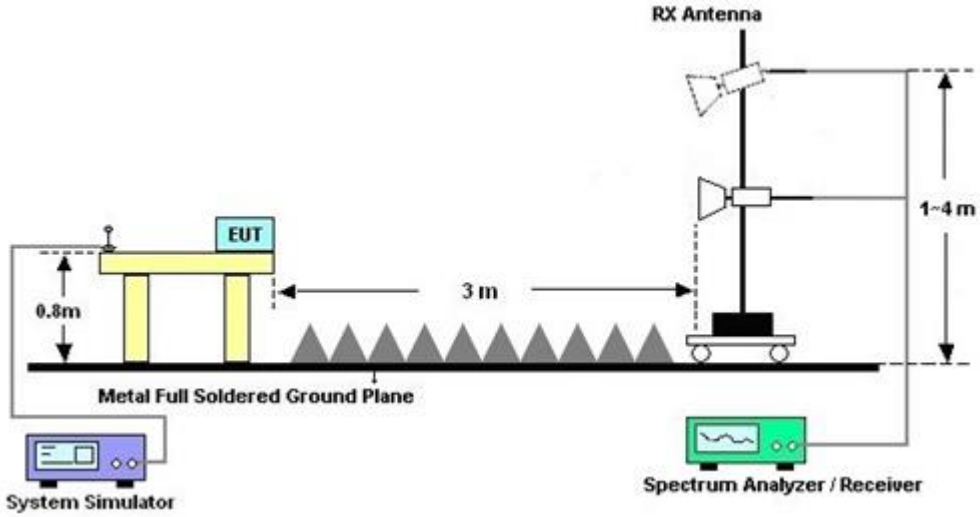
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to 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 tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120 kHz/VBW=300 kHz for frequency below 1 GHz; RBW=1 MHz VBW=3 MHz (Peak), RBW=1 MHz/VBW=10 Hz (Average) for frequency above 1 GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.2.5. Test Result of Radiated Emission

Please refer to Appendix B.

4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	May 27, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	May 27, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	May 27, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2020	May 27, 2021	Nov. 30, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	May 27, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Feb. 25, 2021	May 27, 2021	Feb. 24, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	May 27, 2021	Dec. 30, 2021	Conduction (CO05-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 21, 2020	May 26, 2021	Oct. 20, 2021	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	35413 & 02	30MHz~1GHz	Feb. 10, 2021	May 26, 2021	Feb. 09, 2022	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02114	1GHz~18GHz	Aug. 04, 2020	May 26, 2021	Aug. 03, 2021	Radiation (03CH10-HY)
Amplifier	E-INSTRUMENT TECH LTD.	ERA-10M-7000-MR	EC1900248	10MHz-7GHz	Nov. 19, 2020	May 26, 2021	Nov. 18, 2021	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	May 26, 2021	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	May 26, 2021	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	May 26, 2021	N/A	Radiation (03CH10-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	May 26, 2021	N/A	Radiation (03CH10-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290045	20MHz~8.4GHz	Jan. 13, 2021	May 26, 2021	Jan. 12, 2022	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE MY11693/4PE, MY2855/2	1GHz~18GHz	Nov. 06, 2020	May 26, 2021	Nov. 05, 2021	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	30MHz~1GHz	Nov. 06, 2020	May 26, 2021	Nov. 05, 2021	Radiation (03CH10-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**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.7**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1**

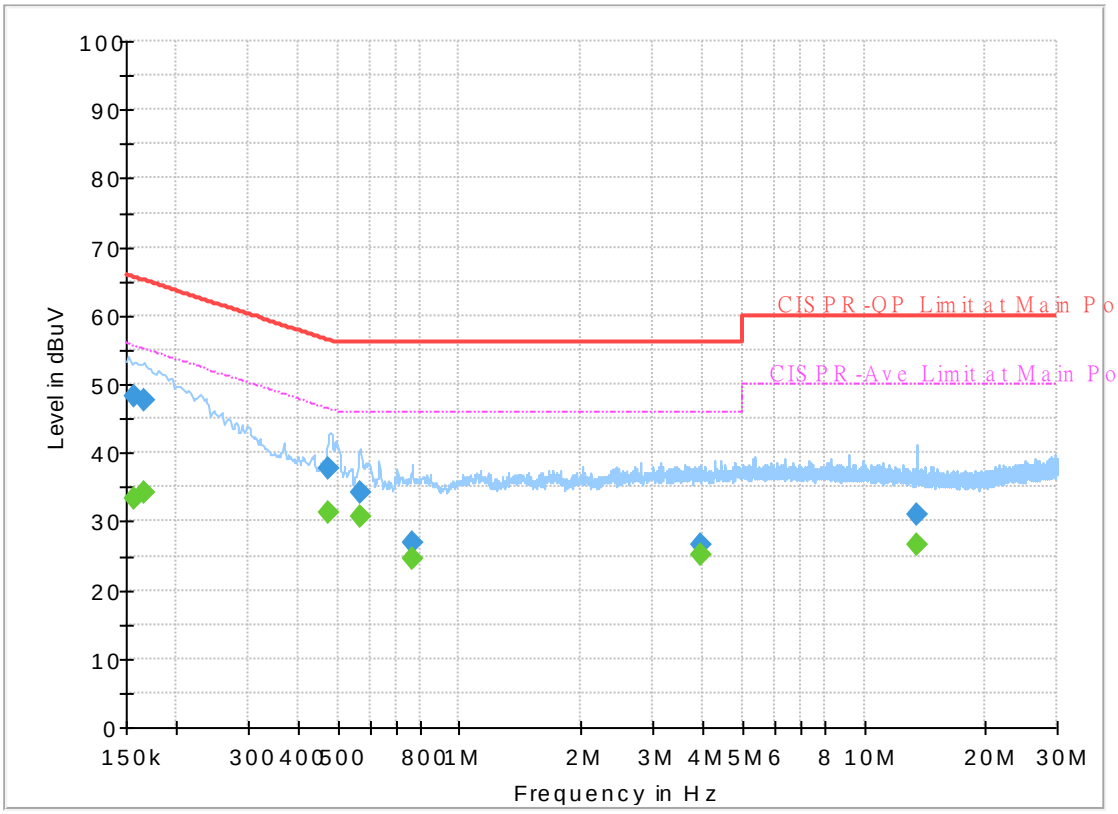
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	**Temperature :**	23~26℃
		Relative Humidity :	40~50%

EUT Information

Report NO :	971044-04
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



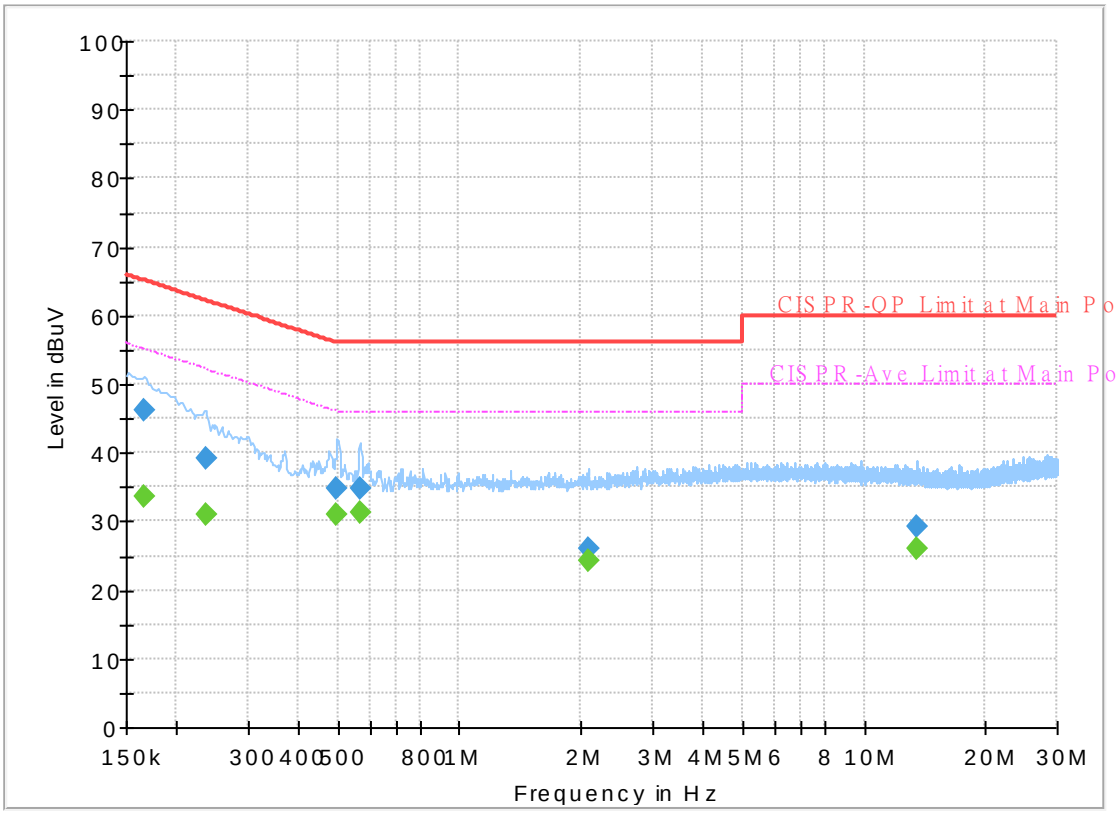
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	33.39	55.63	22.24	L1	OFF	19.5
0.156750	48.16	---	65.63	17.47	L1	OFF	19.5
0.165750	---	34.31	55.17	20.86	L1	OFF	19.5
0.165750	47.78	---	65.17	17.39	L1	OFF	19.5
0.476250	---	31.30	46.40	15.10	L1	OFF	19.6
0.476250	37.76	---	56.40	18.64	L1	OFF	19.6
0.568500	---	30.74	46.00	15.26	L1	OFF	19.7
0.568500	34.26	---	56.00	21.74	L1	OFF	19.7
0.764250	---	24.43	46.00	21.57	L1	OFF	19.9
0.764250	26.97	---	56.00	29.03	L1	OFF	19.9
3.950250	---	25.07	46.00	20.93	L1	OFF	19.9
3.950250	26.73	---	56.00	29.27	L1	OFF	19.9
13.560000	---	26.46	50.00	23.54	L1	OFF	20.1
13.560000	30.87	---	60.00	29.13	L1	OFF	20.1

EUT Information

Report NO :	971044-04
Test Mode :	Mode 1
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum

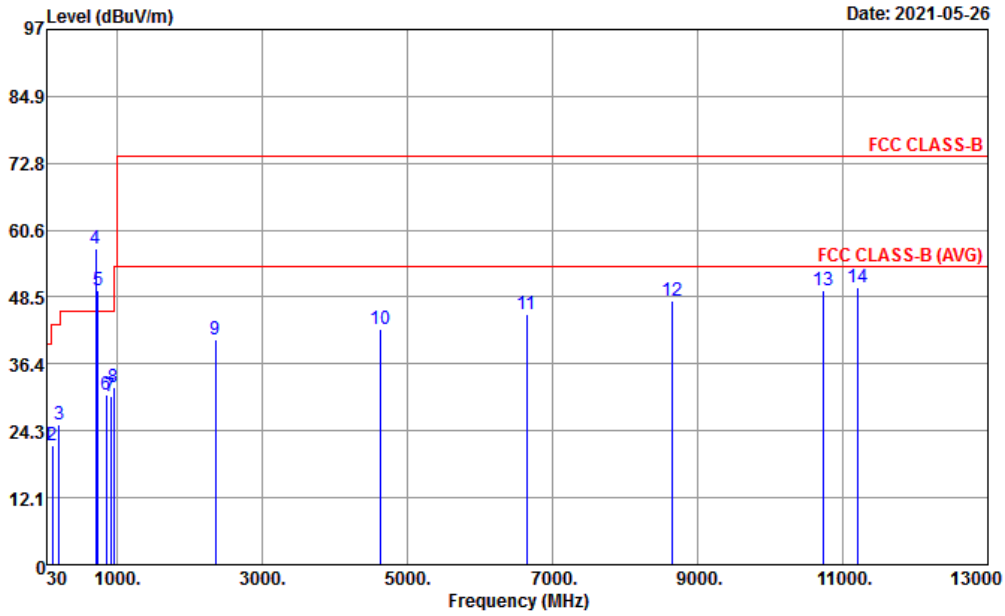


Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.165750	---	33.58	55.17	21.59	N	OFF	19.5
0.165750	46.09	---	65.17	19.08	N	OFF	19.5
0.237750	---	30.94	52.17	21.23	N	OFF	19.5
0.237750	39.30	---	62.17	22.87	N	OFF	19.5
0.498750	---	30.99	46.02	15.03	N	OFF	19.7
0.498750	34.78	---	56.02	21.24	N	OFF	19.7
0.568500	---	31.37	46.00	14.63	N	OFF	19.8
0.568500	34.81	---	56.00	21.19	N	OFF	19.8
2.076000	---	24.29	46.00	21.71	N	OFF	20.0
2.076000	25.90	---	56.00	30.10	N	OFF	20.0
13.560000	---	26.04	50.00	23.96	N	OFF	20.2
13.560000	29.24	---	60.00	30.76	N	OFF	20.2

Appendix B. Radiated Emission Test Result

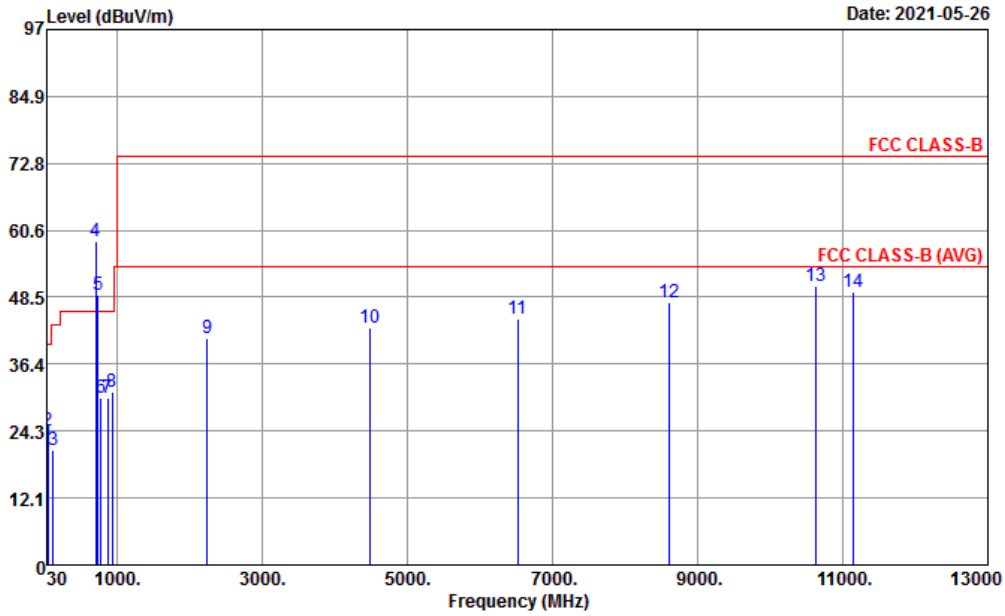
Test Engineer :	Donny Tang	**Temperature :**	23.4~24.1˚C
		Relative Humidity :	59.2~60.8%
Test Distance :	3m	**Polarization :**	Horizontal
Remark :	#4 is system simulator signal which can be ignored. #5 is base station signal which can be ignored.		



Site : 03CH10-HY
Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL
Project : 971044-04
Power : 120Vac/60Hz
Mode : 1

		Freq	Level	Over Limit	Limit Line	Antenna Factor	Read Level	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dBuV	dB	dB	cm	deg	
1		30.00	21.56	-18.44	40.00	24.38	29.20	0.63	32.65	---	---	Peak
2		109.54	21.55	-21.95	43.50	16.73	36.22	1.18	32.58	---	---	Peak
3		202.66	25.43	-18.07	43.50	14.99	41.34	1.60	32.50	---	---	Peak
4	*	710.00	57.35			26.95	59.90	2.98	32.48	---	---	Peak
5	*	740.00	49.60			28.39	50.58	3.06	32.43	---	---	Peak
6		845.77	30.68	-15.32	46.00	29.21	30.29	3.26	32.08	---	---	Peak
7		910.76	30.56	-15.44	46.00	28.98	29.83	3.39	31.64	---	---	Peak
8		947.62	32.11	-13.89	46.00	30.54	29.35	3.47	31.25	100	0	Peak
9		2350.00	40.79	-33.21	74.00	27.60	65.70	5.62	58.13	---	---	Peak
10		4634.00	42.82	-31.18	74.00	30.84	62.10	8.30	58.42	---	---	Peak
11		6640.00	45.26	-28.74	74.00	34.22	60.05	10.53	59.54	---	---	Peak
12		8650.00	47.76	-26.24	74.00	37.30	58.39	11.86	59.79	---	---	Peak
13		10742.00	49.80	-24.20	74.00	39.63	56.08	13.31	59.22	---	---	Peak
14		11196.00	50.34	-23.66	74.00	39.41	55.93	13.66	58.66	100	0	Peak

Test Engineer :	Donny Tang	**Temperature :**	23.4~24.1°C
		Relative Humidity :	59.2~60.8%
Test Distance :	3m	**Polarization :**	Vertical
Remark :	#4 is system simulator signal which can be ignored. #5 is base station signal which can be ignored.		



Site : 03CH10-HY
Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL
Project : 971044-04
Power : 120Vac/60Hz
Mode : 1

		Freq	Level	Over Limit	Limit Line	Antenna Factor	Read Level	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dB/m	dBuV	dB	dB	cm	deg	
1		30.00	21.76	-18.24	40.00	24.38	29.40	0.63	32.65	---	---	Peak
2		40.67	24.30	-15.70	40.00	19.19	37.02	0.73	32.64	---	---	Peak
3		113.42	20.74	-22.76	43.50	17.07	35.06	1.19	32.58	---	---	Peak
4	*	710.00	58.67			26.95	61.22	2.98	32.48	---	---	Peak
5	*	740.00	48.82			28.39	49.80	3.06	32.43	---	---	Peak
6		779.81	30.18	-15.82	46.00	28.59	30.81	3.16	32.38	---	---	Peak
7		872.93	30.36	-15.64	46.00	29.09	29.86	3.32	31.91	---	---	Peak
8		929.19	31.40	-14.60	46.00	29.59	29.83	3.43	31.45	100	0	Peak
9		2246.00	40.95	-33.05	74.00	27.81	65.80	5.52	58.18	---	---	Peak
10		4494.00	42.93	-31.07	74.00	30.38	62.73	8.21	58.39	---	---	Peak
11		6522.00	44.61	-29.39	74.00	34.14	59.62	10.35	59.50	---	---	Peak
12		8606.00	47.49	-26.51	74.00	37.21	58.15	11.86	59.73	---	---	Peak
13		10624.00	50.61	-23.39	74.00	39.50	57.36	13.21	59.46	100	0	Peak
14		11148.00	49.50	-24.50	74.00	39.50	55.04	13.63	58.67	---	---	Peak

———THE END———