



FCC EMI TEST REPORT

FCC ID : 2AUWUFAIRPHONE3
Equipment : Smart Phone
Brand Name : Fairphone
Model Name : Fairphone 3
Marketing Name : Fairphone 3
Applicant : FairPhone B.V.
Jollemanhof 17, 1019 GW, Amsterdam, the Netherlands
Manufacturer : FairPhone B.V.
Jollemanhof 17, 1019 GW, Amsterdam, the Netherlands
Standard : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on Oct. 23, 2019 and testing was started from Oct. 31, 2019 and completed on Nov. 16, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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



Table of Contents

History of this test report.....	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. Test Location	5
1.4. Applicable Standards	5
2. Test Configuration of Equipment Under Test	6
2.1. Test Mode	6
2.2. Connection Diagram of Test System	8
2.3. Support Unit used in test configuration and system	8
2.4. EUT Operation Test Setup	9
3. Test Result	10
3.1. Test of AC Conducted Emission Measurement	10
3.2. Test of Radiated Emission Measurement	12
4. List of Measuring Equipment.....	14
5. Uncertainty of Evaluation	15
Appendix A. AC Conducted Emission Test Result	
Appendix B. Radiated Emission Test Result	
Appendix C. Setup Photographs	



History of this test report

Report No.	Version	Description	Issued Date
FC902328	01	Initial issue of report	Feb. 14, 2020



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 6.68 dB at 0.161 MHz
3.2	15.109	Radiated Emission	Pass	Under limit 6.83 dB at 194.160 MHz

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: Dara Chiu

Report Producer: Amy Chen

1. General Description

1.1. Product Feature of Equipment Under Test

GSM/WCDMA/LTE, Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac, NFC, and GNSS.

Product Specification subjective to this standard	
Sample 1	EUT with 1st source
Sample 2	EUT with 2nd source (Camera/Memory/PMIC/Battery/OVP IC)
Antenna Type	WWAN: PIFA Antenna WLAN: Embedded Inverted-F Antenna Bluetooth: Embedded Inverted-F Antenna GPS / Glonass / BDS: PIFA Antenna NFC: Loop Antenna

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, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	Sporton Site No.	
	CO05-HY	03CH06-HY

FCC designation No.: TW1093

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

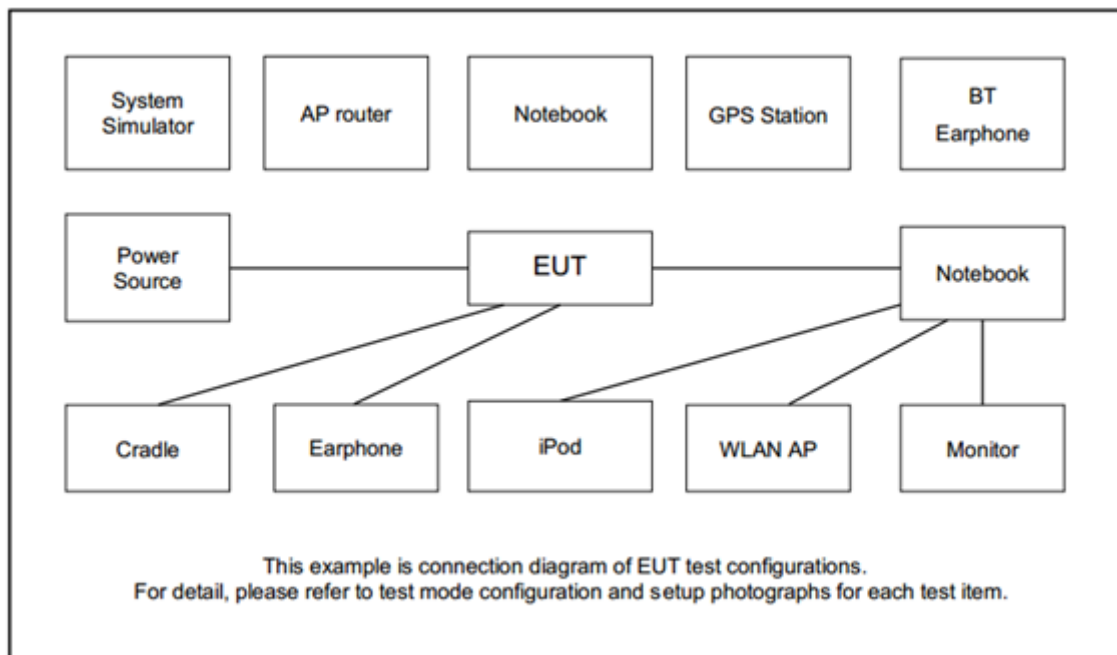
The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

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: GSM 850 Idle + Bluetooth Idle + WLAN (2.4GHz) Link + Camera (Front) + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 2: WCDMA Band V Idle + Bluetooth Idle + WLAN (5GHz) Link + Camera (Back) + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 3: LTE Band 5 Idle + Bluetooth Link + WLAN (2.4GHz) Link + NFC On + H-Pattern + MP3 + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 4: LTE Band 13 Idle + Bluetooth Idle + WLAN (5GHz) Link + GPS Rx + MP3 + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 5: LTE Band 26 Idle + Bluetooth Idle + WLAN Idle + MPEG4 (Color Bar) + NFC On + Speaker Mode + USB Cable (Charging from AC Adapter) + SIM 2 for Sample 1
	Mode 6: LTE Band 13 Idle + Bluetooth Idle + WLAN Idle + USB Data Link to Notebook +NFC On + Earphone + USB Cable (Charging from AC Adapter) SIM 1 for Sample 1
	Mode 7: LTE Band 13 Idle + Bluetooth Idle + WLAN Idle + USB Data Link to Notebook + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 2

Test Items	Function Type
Radiated Emissions	Mode 1: GSM 850 Idle + Bluetooth Idle + WLAN (2.4GHz) Link + Camera (Front) + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 2: WCDMA Band V Idle + Bluetooth Idle + WLAN (5GHz) Link + Camera (Back) + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 3: LTE Band 5 Idle + Bluetooth Link + WLAN (2.4GHz) Link + NFC On + H-Pattern + MP3 + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 4: LTE Band 13 Idle + Bluetooth Idle + WLAN (5GHz) Link + GPS Rx + MP3 + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 1
	Mode 5: LTE Band 26 Idle + Bluetooth Idle + WLAN Idle + MPEG4 (Color Bar) + NFC On + Speaker Mode + USB Cable (Charging from AC Adapter) + SIM 2 for Sample 1
	Mode 6: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + USB Data Link to Notebook + NFC On + Earphone + USB Cable (Charging from AC Adapter) SIM 1 for Sample 1
	Mode 7: WCDMA Band V Idle + Bluetooth Idle + WLAN Idle + USB Data Link to Notebook + NFC On + Earphone + USB Cable (Charging from AC Adapter) + SIM 1 for Sample 2
Remark: 1. The worst case of AC is mode 6; only the test data of this mode was reported. 2. The worst case of RE is mode 7; only the test data of this mode was reported. 3. For radiation emission after pre-scanned the cellular band between 30MHz ~ 960MHz (GSM850/WCDMA Band V/LTE Band 5/13/26); only the worst case for cellular band test data of this mode was reported. 4. Data Link with Notebook means data application transferred mode between EUT and Notebook.	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Trade 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	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
3.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
4.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
5.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
6.	Notebook	DELL	Latitude E3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
7.	Notebook	ASUS	P2430U	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
8.	Adapter	LG	MCS-04WT	FCC DoC	N/A	N/A
9.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A
10.	SD Card	Trancend	MicroSD HC	FCC DoC	N/A	N/A

2.4. EUT Operation Test Setup

The EUT was in GSM or WCDM or LTE idle 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 Bluetooth earphone or WLAN AP, and the following programs installed in the EUT were programmed during the test:

1. Data application is transferred between Laptop and EUT via USB cable.
2. Execute "GPS Test" to make the EUT receive continuous signals from GPS station.
3. Execute "Music Player" to play MP3 files.
4. Execute "Video Player" to play Color Bar files.
5. Turn on camera to capture images.
6. Execute "H Pattern" to show H Patterns via HDMI Cable on the Monitor.
7. EUT links with Notebook and executes ping.
8. Turn on the 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.

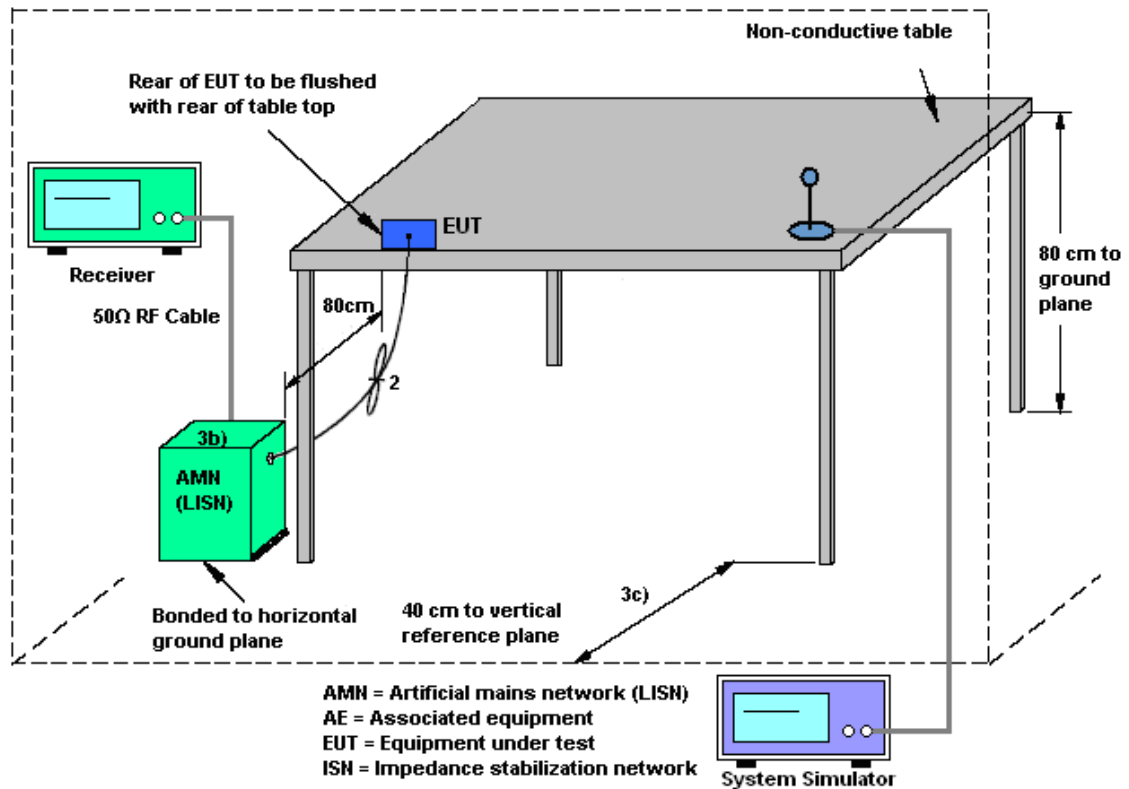
3.1.2. Measuring Instruments

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 should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (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

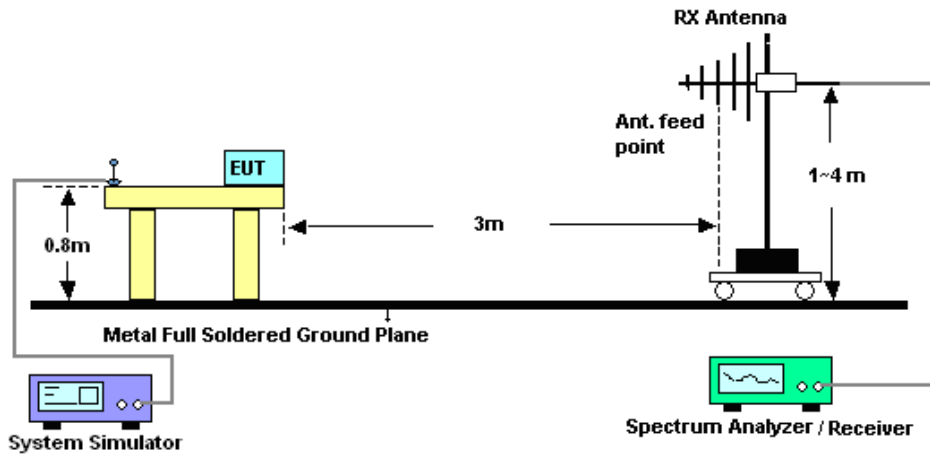
Refer a test equipment and calibration data table in this test report.

3.2.3. Test Procedures

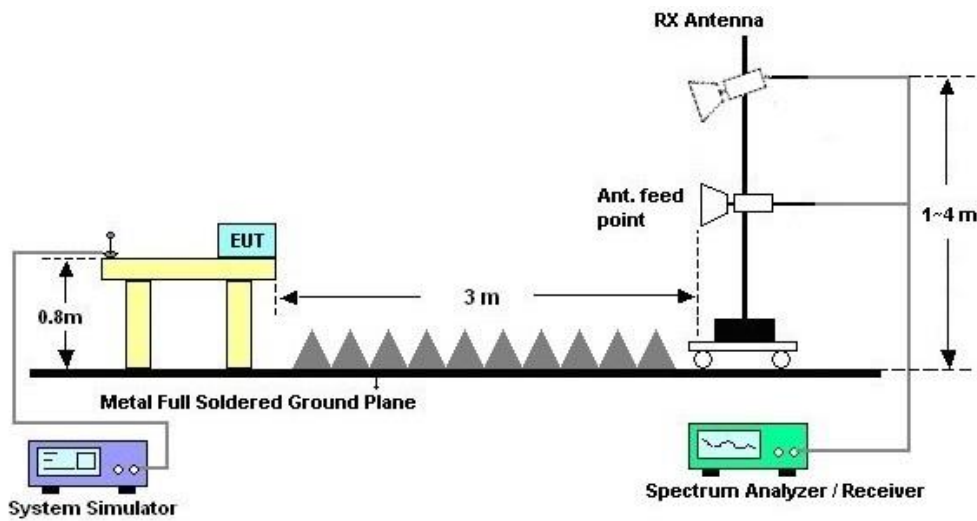
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
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	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Oct. 31, 2019~ Nov. 16, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102317	9kHz~3.6GHz	Sep. 05, 2019	Oct. 31, 2019~ Nov. 16, 2019	Sep. 04, 2020	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Oct. 31, 2019~ Nov. 11, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 15, 2019	Nov. 16, 2019	Nov. 14, 2020	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Oct. 31, 2019~ Nov. 16, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Oct. 31, 2019~ Nov. 16, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Oct. 31, 2019~ Nov. 16, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Amplifier	SONOMA	310N	186713	9kHz~1GHz	May 01, 2019	Nov. 01, 2019~ Nov. 16, 2019	Apr. 30, 2020	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Jan. 10, 2019	Nov. 01, 2019~ Nov. 16, 2019	Jan. 09, 2020	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Jan. 08, 2019	Nov. 01, 2019~ Nov. 16, 2019	Jan. 07, 2020	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1156	1GHz~18GHz	Aug. 30, 2019	Nov. 01, 2019~ Nov. 16, 2019	Aug. 29, 2020	Radiation (03CH06-HY)
Preamplifier	MITEQ	00101800-30- 10P	1850117	1GHz~18GHz	May 23, 2019	Nov. 01, 2019~ Nov. 16, 2019	May 22, 2020	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Nov. 01, 2019~ Nov. 16, 2019	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Nov. 01, 2019~ Nov. 16, 2019	N/A	Radiation (03CH06-HY)
Test Software	AUDIX	e3	6.2009-8-24(k5)	N/A	N/A	Nov. 01, 2019~ Nov. 16, 2019	N/A	Radiation (03CH06-HY)
RF Cable	HUBER+SUH NER/WOKEN/ HARBOUR INDUSTRIES	SUCOFLEX 104 /STORM/LL14 2	MY24966/4/ 00100A1O2A1 78T/ CA3601-3601- 1000	30MHz-26GHz	Nov. 22, 2018	Nov. 01, 2019~ Nov. 16, 2019	Nov. 21, 2019	Radiation (03CH06-HY)

5. Uncertainty of Evaluation

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

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

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.9
---	-----

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

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



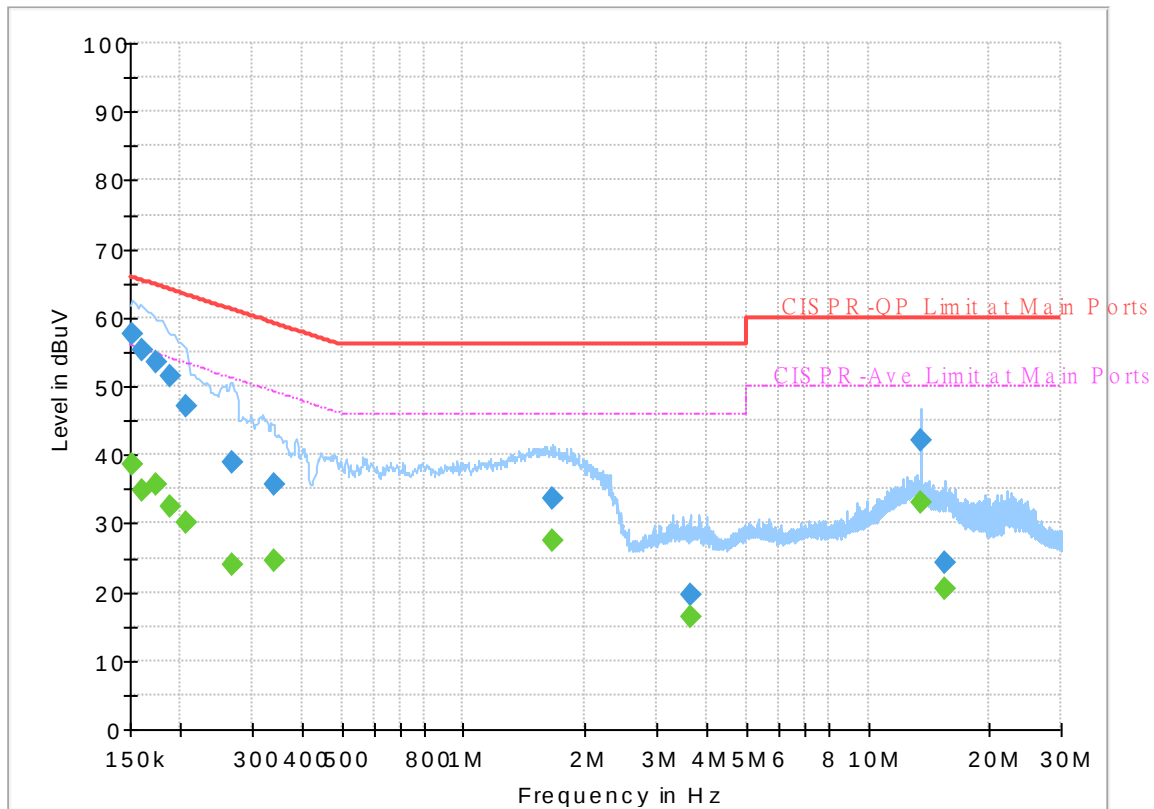
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	Temperature :	25.1~26.3℃
		Relative Humidity :	47.5~52.6%

EUT Information

Report NO : 9O2328
 Test Mode : Mode 6
 Test Voltage : Power From System
 Phase : Line

Full Spectrum



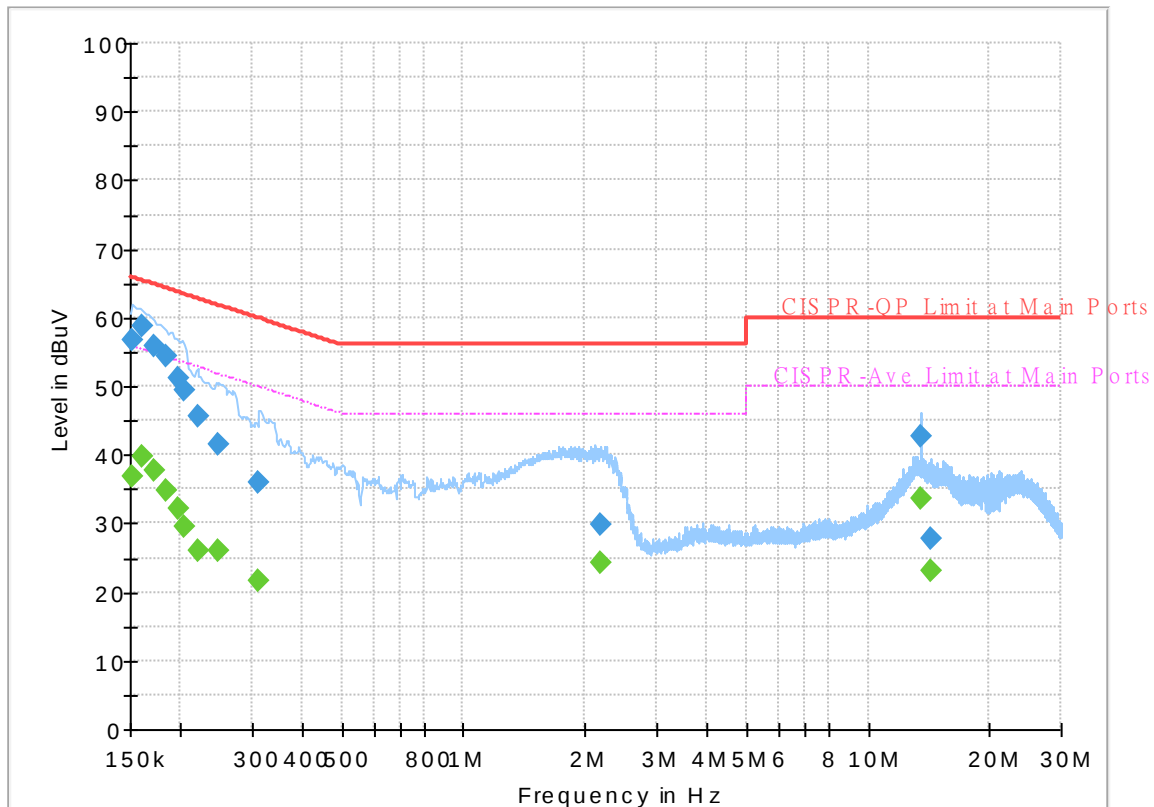
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	38.57	55.88	17.31	L1	OFF	19.4
0.152250	57.63	---	65.88	8.25	L1	OFF	19.4
0.161250	---	34.81	55.40	20.59	L1	OFF	19.4
0.161250	55.23	---	65.40	10.17	L1	OFF	19.4
0.174750	---	35.60	54.73	19.13	L1	OFF	19.4
0.174750	53.49	---	64.73	11.24	L1	OFF	19.4
0.188250	---	32.46	54.11	21.65	L1	OFF	19.4
0.188250	51.34	---	64.11	12.77	L1	OFF	19.4
0.206250	---	30.05	53.36	23.31	L1	OFF	19.4
0.206250	47.18	---	63.36	16.18	L1	OFF	19.4
0.267000	---	23.92	51.21	27.29	L1	OFF	19.4
0.267000	38.81	---	61.21	22.40	L1	OFF	19.4
0.339000	---	24.49	49.23	24.74	L1	OFF	19.4
0.339000	35.59	---	59.23	23.64	L1	OFF	19.4
1.657500	---	27.58	46.00	18.42	L1	OFF	19.5
1.657500	33.53	---	56.00	22.47	L1	OFF	19.5
3.626250	---	16.26	46.00	29.74	L1	OFF	19.5
3.626250	19.69	---	56.00	36.31	L1	OFF	19.5
13.560000	---	32.95	50.00	17.05	L1	OFF	19.6
13.560000	42.18	---	60.00	17.82	L1	OFF	19.6
15.468000	---	20.33	50.00	29.67	L1	OFF	19.7
15.468000	24.38	---	60.00	35.62	L1	OFF	19.7

EUT Information

Report NO : 9O2328
Test Mode : Mode 6
Test Voltage : Power From System
Phase : Neutral

Full Spectrum

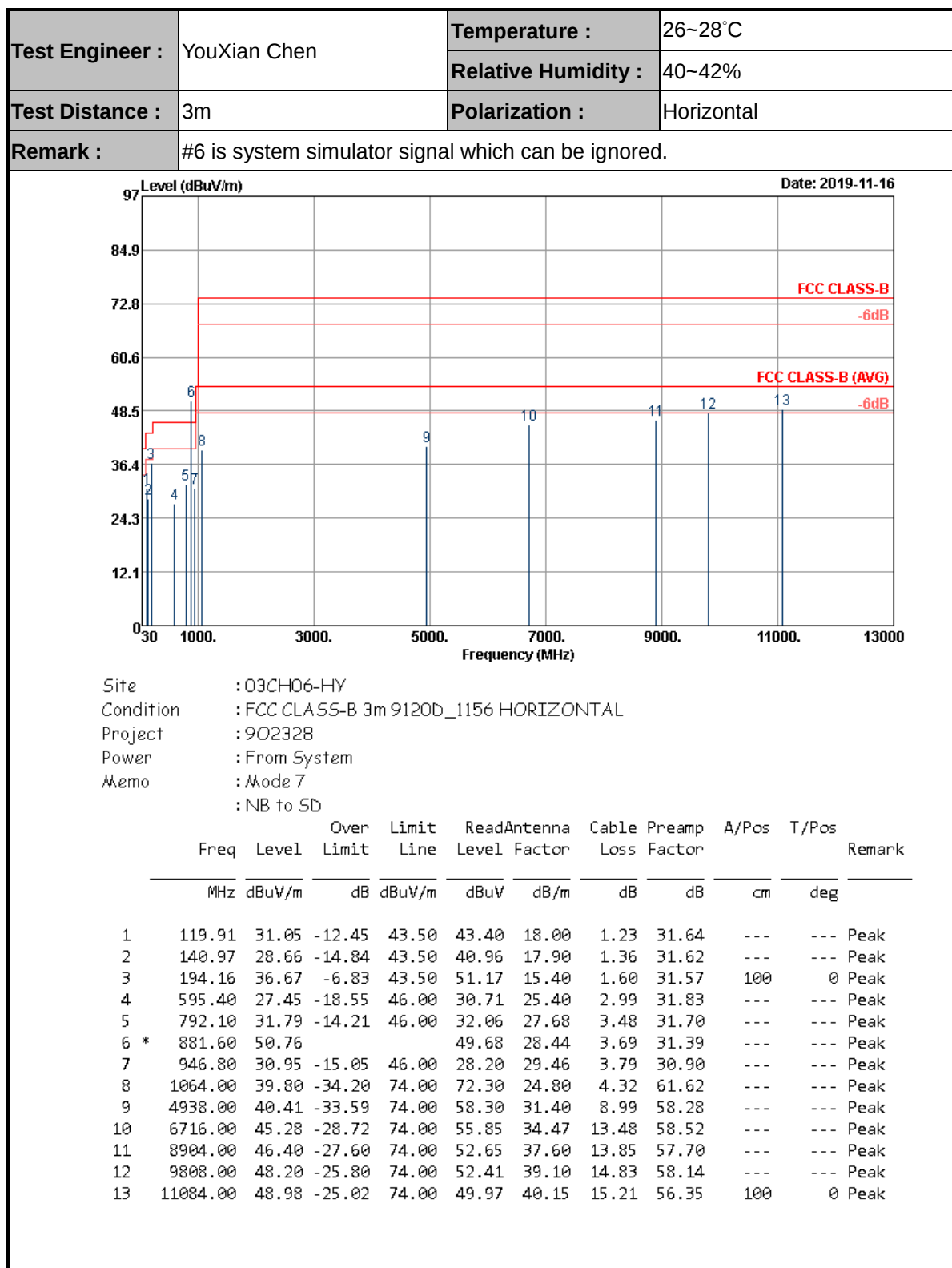


Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	36.89	55.88	18.99	N	OFF	19.4
0.152250	56.63	---	65.88	9.25	N	OFF	19.4
0.161250	---	39.90	55.40	15.50	N	OFF	19.4
0.161250	58.72	---	65.40	6.68	N	OFF	19.4
0.172500	---	37.80	54.84	17.04	N	OFF	19.4
0.172500	55.74	---	64.84	9.10	N	OFF	19.4
0.183750	---	34.88	54.31	19.43	N	OFF	19.4
0.183750	54.41	---	64.31	9.90	N	OFF	19.4
0.197250	---	32.13	53.73	21.60	N	OFF	19.4
0.197250	51.29	---	63.73	12.44	N	OFF	19.4
0.204000	---	29.47	53.45	23.98	N	OFF	19.4
0.204000	49.50	---	63.45	13.95	N	OFF	19.4
0.219750	---	26.06	52.83	26.77	N	OFF	19.4
0.219750	45.52	---	62.83	17.31	N	OFF	19.4
0.249000	---	26.16	51.79	25.63	N	OFF	19.4
0.249000	41.52	---	61.79	20.27	N	OFF	19.4
0.312000	---	21.54	49.92	28.38	N	OFF	19.4
0.312000	36.00	---	59.92	23.92	N	OFF	19.4
2.186250	---	24.25	46.00	21.75	N	OFF	19.5
2.186250	29.68	---	56.00	26.32	N	OFF	19.5
13.560000	---	33.54	50.00	16.46	N	OFF	19.7
13.560000	42.57	---	60.00	17.43	N	OFF	19.7
14.356500	---	23.20	50.00	26.80	N	OFF	19.7
14.356500	27.85	---	60.00	32.15	N	OFF	19.7

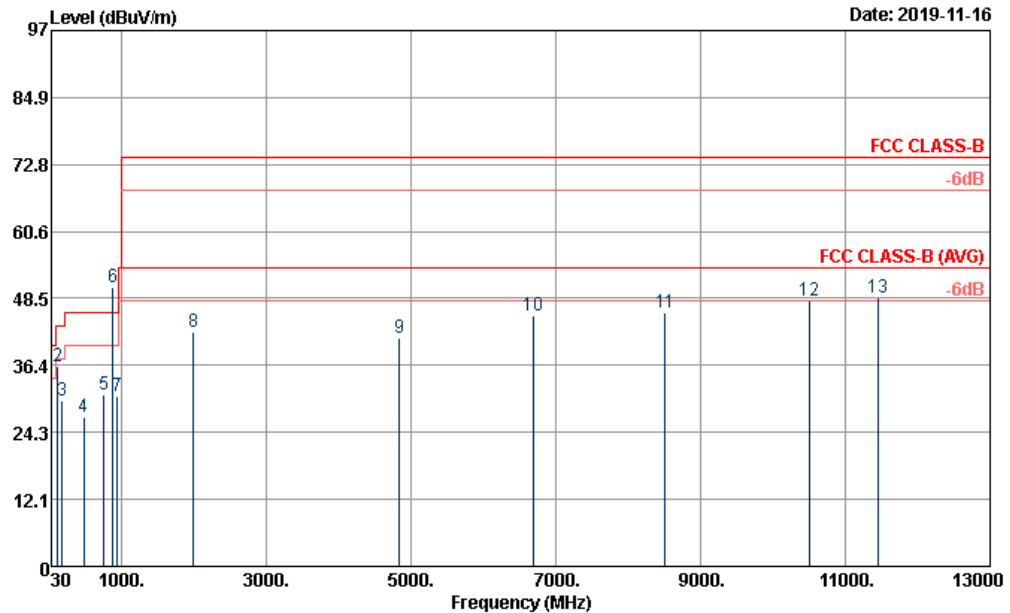


Appendix B. Radiated Emission Test Result





Test Engineer :	YouXian Chen	Temperature :	26~28°C
		Relative Humidity :	40~42%
Test Distance :	3m	Polarization :	Vertical
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH06-HY
Condition : FCC CLASS-B 3m 9120B_1156 VERTICAL
Project : 902328
Power : From System
Memo : Mode 7
: NB to SD

	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg
1	31.35	28.96	-11.04	40.00	34.69	25.30	0.60	31.64	---	---
2	119.91	36.29	-7.21	43.50	48.64	18.00	1.23	31.64	100	0
3	183.09	30.01	-13.49	43.50	44.88	15.10	1.55	31.58	---	---
4	475.70	27.00	-19.00	46.00	32.65	23.40	2.60	31.78	---	---
5	759.20	31.09	-14.91	46.00	31.77	27.42	3.39	31.76	---	---
6 *	881.60	50.54			49.46	28.44	3.69	31.39	---	---
7	943.30	30.93	-15.07	46.00	28.17	29.52	3.78	30.93	---	---
8	1990.00	42.49	-31.51	74.00	71.55	26.20	5.84	61.10	---	---
9	4842.00	41.26	-32.74	74.00	59.34	31.20	9.52	58.80	---	---
10	6680.00	45.34	-28.66	74.00	56.33	34.43	13.11	58.53	---	---
11	8506.00	45.85	-28.15	74.00	52.31	37.00	13.74	57.20	---	---
12	10500.00	48.02	-25.98	74.00	50.58	40.10	14.84	57.50	---	---
13	11456.00	48.61	-25.39	74.00	49.07	40.20	15.46	56.12	100	0