



# FCC EMI TEST REPORT

**FCC ID** : APYHRO00297  
**Equipment** : Mobile Router  
**Brand Name** : Sharp Mobile Router  
**Applicant** : SHARP CORPORATION  
1 Takumi-cho, Sakai-ku, Sakai City, Osaka  
590-8522, Japan  
**Manufacturer** : SHARP CORPORATION  
1 Takumi-cho, Sakai-ku, Sakai City, Osaka  
590-8522, Japan  
**Standard** : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on May 20, 2021 and testing was started from May 24, 2021 and completed on May 25, 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 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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### 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 13.85 dB at 0.501 MHz
3.2	15.109	Radiated Emission	Pass	Under limit 8.76 dB at 53.280 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: Avis Chuang**

**Report Producer: Celery Wei**



# 1. General Description

## 1.1. Product Feature of Equipment Under Test

WCDMA/LTE and Wi-Fi 2.4GHz 802.11b/g/n/ac/ax

Product Specification subjective to this standard	
Sample 1	Non-Shielding
Sample 2	Shielding
Antenna Type	WWAN: PIFA Antenna WLAN <Ant. 1>: PIFA Antenna <Ant. 2>: PIFA Antenna

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

## 1.2. Modification of EUT

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



### 1.3. Test Location

<b>Test Site</b>	Sporton International Inc. EMC & Wireless Communications Laboratory
<b>Test Site Location</b>	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
<b>Test Site No.</b>	<b>Sporton Site No.</b> CO05-HY

<b>Test Site</b>	Sporton International Inc. Wensan Laboratory
<b>Test Site Location</b>	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
<b>Test Site No.</b>	<b>Sporton Site No.</b> 03CH10-HY (TAF Code: 3786)
<b>Remark:</b>	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

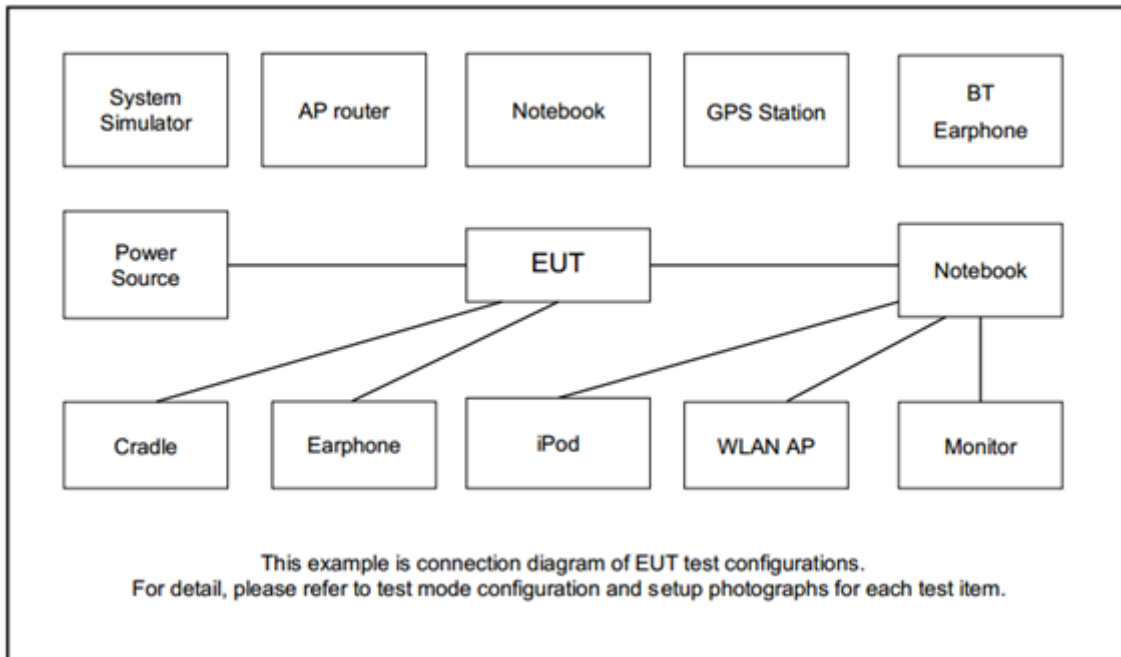
### 2.1. Test Mode

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
<b>AC Conducted Emission</b>	Mode 1: WCDMA Band V Idle + WLAN (2.4GHz) Link + AC Adapter for Sample 1
	Mode 2: LTE Band 5 Idle + WLAN (2.4GHz) Idle + Cradle (Charging from AC Adapter) + LAN Link for Sample 1
	Mode 3: LTE Band 5 Idle + WLAN (2.4GHz) Idle + Cradle (Charging from AC Adapter) + LAN Link for Sample 2
<b>Radiated Emissions</b>	Mode 1: WCDMA Band V Idle + WLAN (2.4GHz) Link + AC Adapter for Sample 1
	Mode 2: LTE Band 5 Idle + WLAN (2.4GHz) Idle + Cradle (Charging from AC Adapter) + LAN Link for Sample 1
	Mode 3: LTE Band 12 Link + WLAN (2.4GHz) Link for Sample 1
	Mode 4: LTE Band 5 Idle + WLAN (2.4GHz) Idle + Cradle (Charging from AC Adapter) + LAN Link for Sample 2
<b>Remark:</b>	
1. The worst case of AC is mode 2; only the test data of this mode was reported.	
2. The worst case of RE is mode 4; only the test data of this mode was reported.	
3. For radiation emission after pre-scanned the cellular band between 30MHz ~ 960MHz (WCDMA Band V/LTE Band 5/12); only the worst case for cellular band test data of this mode was reported.	

## 2.2. Connection Diagram of Test System



## 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.	Notebook	DELL	Latitude 5480	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

## 2.4. EUT Operation Test Setup

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

1. EUT links with Notebook via RJ-45 Cable and executed "Ping".





### 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.

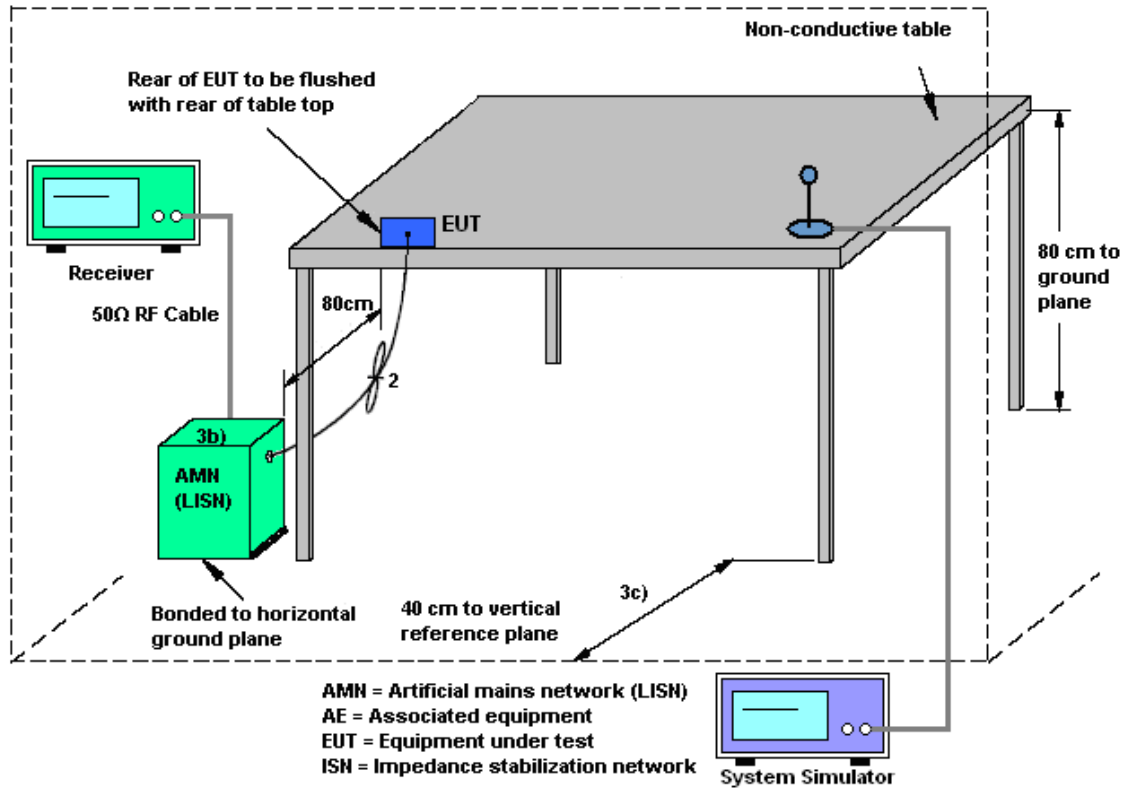
##### 3.1.2. Measuring Instruments

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

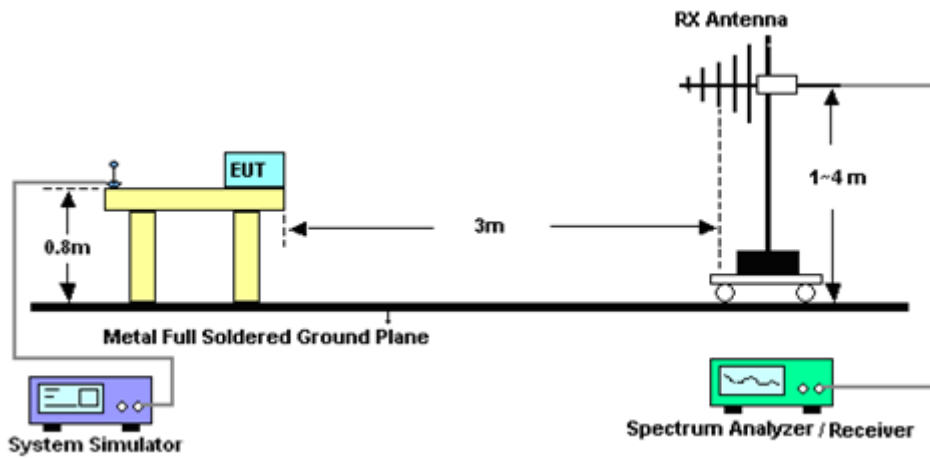
Refer a test equipment and calibration data table in this test report.

#### 3.2.3. Test Procedures

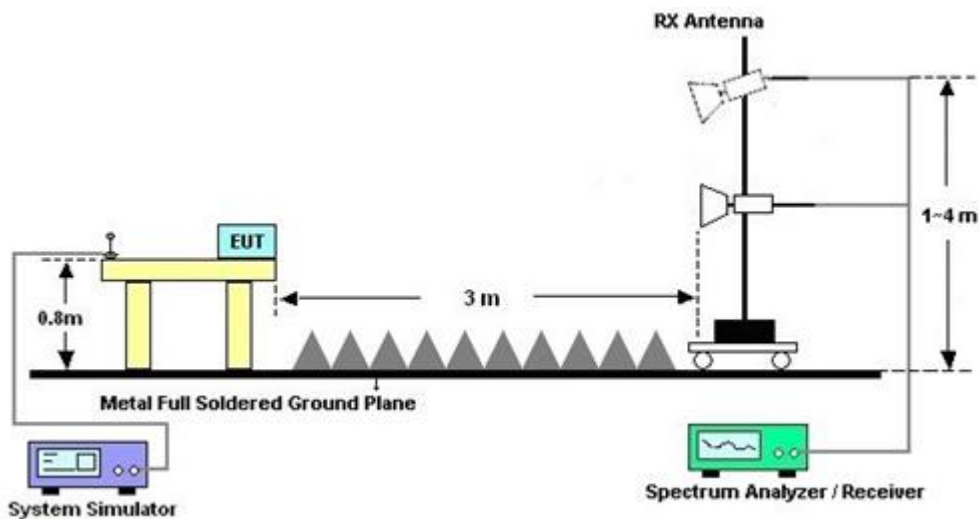
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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 24, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	May 24, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	May 24, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2020	May 24, 2021	Nov. 15, 2021	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	May 24, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Feb. 25, 2021	May 24, 2021	Feb. 24, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	May 24, 2021	Dec. 30, 2021	Conduction (CO05-HY)
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 21, 2020	May 25, 2021	Oct. 20, 2021	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35413 & 02	30MHz~1GHz	Feb. 10, 2021	May 25, 2021	Feb. 09, 2022	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02114	1GHz~18GHz	Aug. 04, 2020	May 25, 2021	Aug. 03, 2021	Radiation (03CH10-HY)
Preamplifier	Jet-Power	JAP00101800-30-10P	160118550004	1GHz~18GHz	Mar. 01, 2021	May 25, 2021	Feb. 28, 2022	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY53470118	10Hz~44GHz	Jan. 15, 2021	May 25, 2021	Jan. 14, 2022	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	May 25, 2021	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	May 25, 2021	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	May 25, 2021	N/A	Radiation (03CH10-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	May 25, 2021	N/A	Radiation (03CH10-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290045	20MHz~8.4GHz	Jan. 13, 2021	May 25, 2021	Jan. 12, 2022	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	30MHz~1GHz	Nov. 06, 2020	May 25, 2021	Nov. 05, 2021	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	1GHz~18GHz	Nov. 06, 2020	May 25, 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
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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% ( $U = 2Uc(y)$ )	5.1
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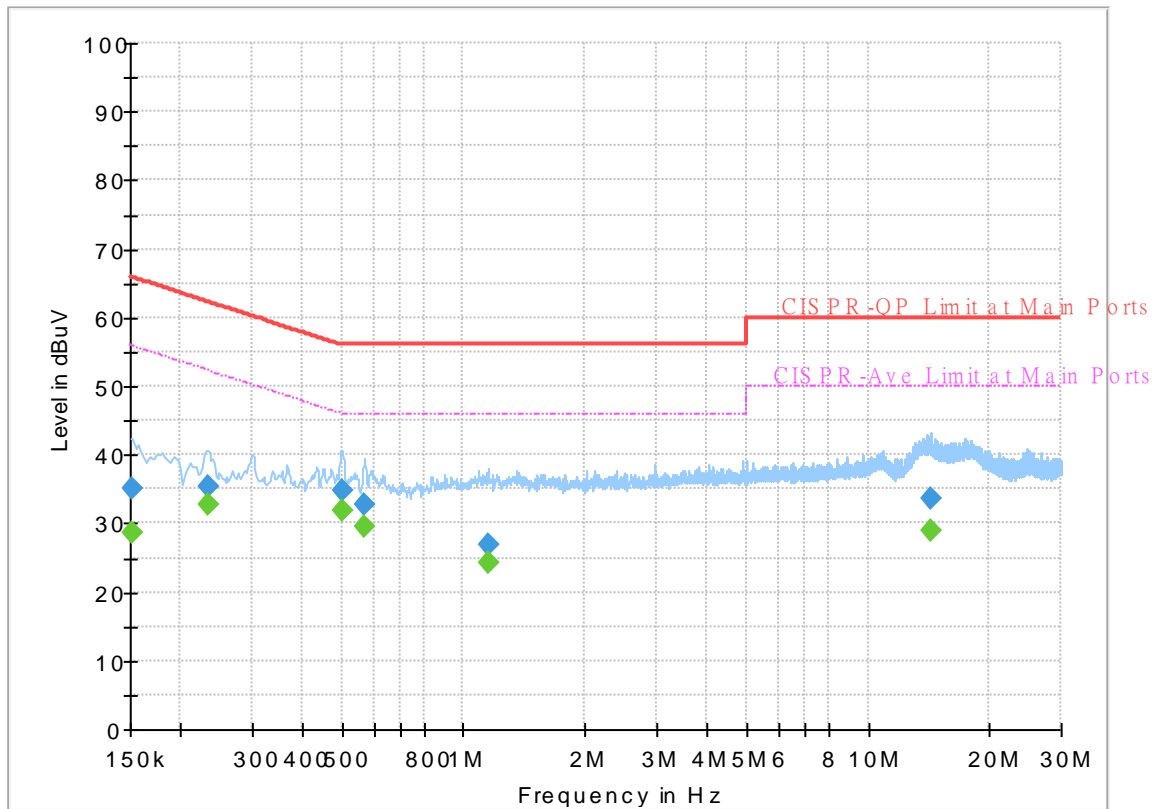
## Appendix A. AC Conducted Emission Test Results

Test Engineer :	Tom Lee	Temperature :	23~26°C
		Relative Humidity :	40~50%

## EUT Information

Report NO : 151401  
 Test Mode : Mode 2  
 Test Voltage : 120Vac/60Hz  
 Phase : Line

Full Spectrum



## Final\_Result

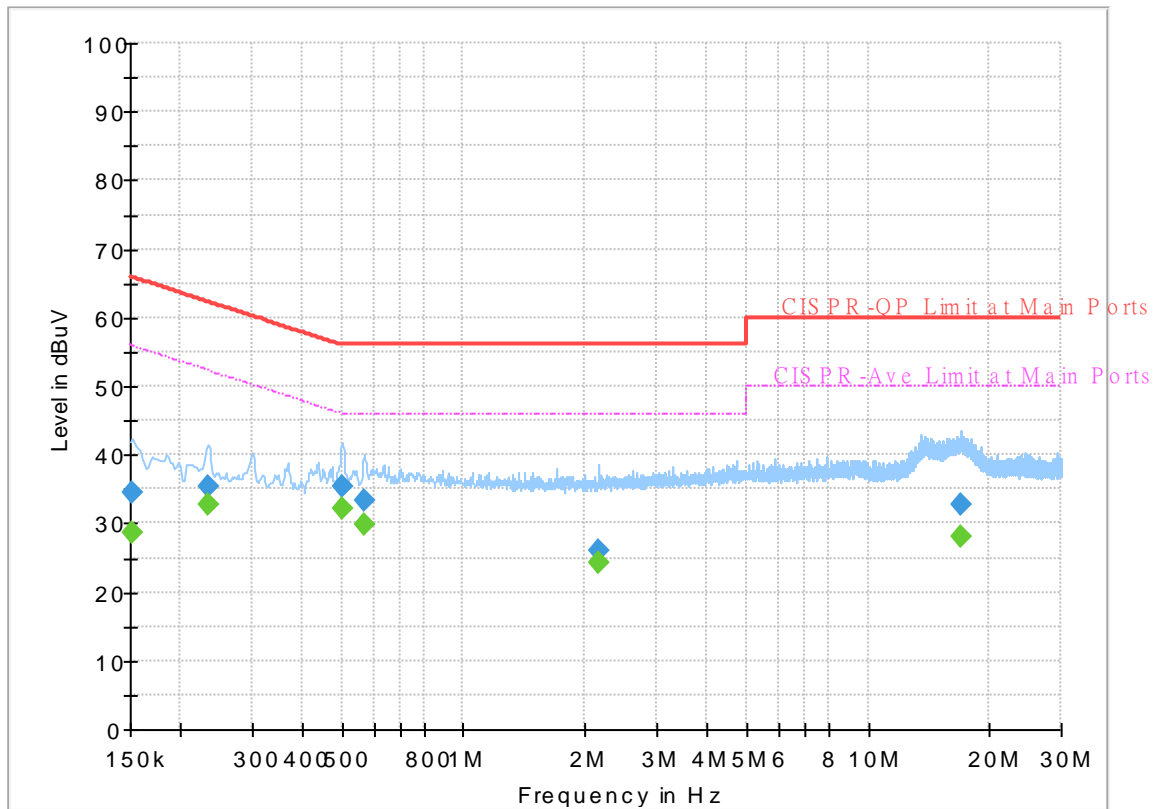
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	35.15	---	65.88	30.73	L1	OFF	19.5
0.152250	---	28.76	55.88	27.12	L1	OFF	19.5
0.233250	35.28	---	62.33	27.05	L1	OFF	19.5
0.233250	---	32.77	52.33	19.56	L1	OFF	19.5
0.501000	34.89	---	56.00	21.11	L1	OFF	19.7
0.501000	---	31.73	46.00	14.27	L1	OFF	19.7
0.568500	32.76	---	56.00	23.24	L1	OFF	19.7
0.568500	---	29.54	46.00	16.46	L1	OFF	19.7
1.149000	27.01	---	56.00	28.99	L1	OFF	20.0
1.149000	---	24.35	46.00	21.65	L1	OFF	20.0
14.241750	33.48	---	60.00	26.52	L1	OFF	20.1
14.241750	---	28.89	50.00	21.11	L1	OFF	20.1



## EUT Information

Report NO : 151401  
 Test Mode : Mode 2  
 Test Voltage : 120Vac/60Hz  
 Phase : Neutral

Full Spectrum



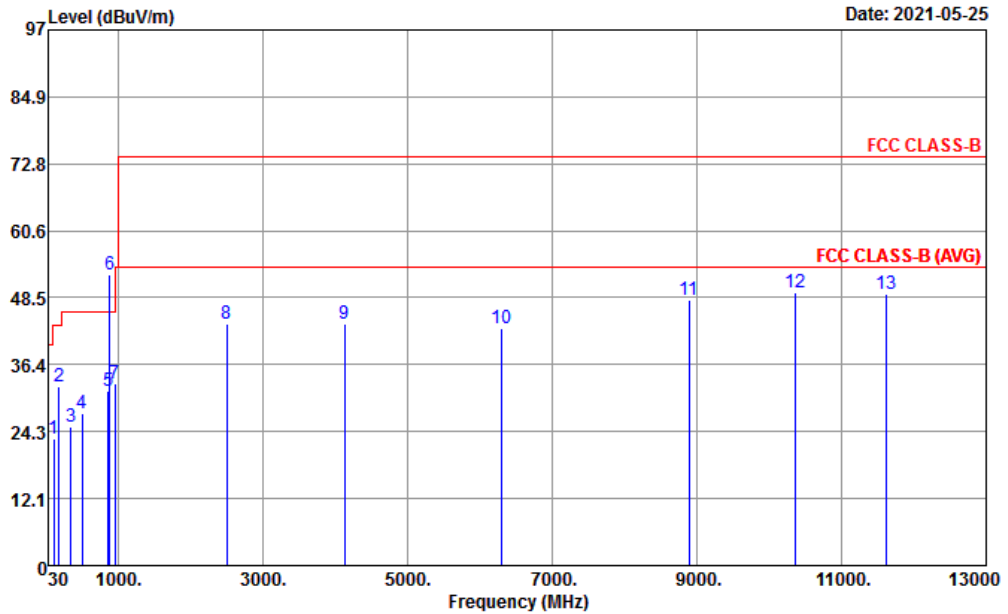
## Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	28.72	55.88	27.16	N	OFF	19.5
0.152250	34.64	---	65.88	31.24	N	OFF	19.5
0.233250	---	32.62	52.33	19.71	N	OFF	19.5
0.233250	35.26	---	62.33	27.07	N	OFF	19.5
0.501000	---	32.15	46.00	13.85	N	OFF	19.7
0.501000	35.52	---	56.00	20.48	N	OFF	19.7
0.568500	---	29.81	46.00	16.19	N	OFF	19.8
0.568500	33.32	---	56.00	22.68	N	OFF	19.8
2.161500	---	24.15	46.00	21.85	N	OFF	20.0
2.161500	25.90	---	56.00	30.10	N	OFF	20.0
17.043000	---	28.02	50.00	21.98	N	OFF	20.4
17.043000	32.87	---	60.00	27.13	N	OFF	20.4



## Appendix B. Radiated Emission Test Result

Test Engineer :	Donny Tang	Temperature :	22.3~23.4°C
		Relative Humidity :	60.5~61.3%
Test Distance :	3m	Polarization :	Horizontal
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH10-HY  
 Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL  
 Project : 151401  
 Power : 120Vac/60Hz  
 Mode : 4

	Freq	Level	Over Limit	Limit	Antenna Line 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	107.60	22.98	-20.52	43.50	16.75	37.64	1.17	32.58	---	---	Peak
2	184.23	32.38	-11.12	43.50	14.77	48.59	1.53	32.51	100	0	Peak
3	342.34	25.19	-20.81	46.00	20.16	35.36	2.07	32.40	---	---	Peak
4	499.48	27.54	-18.46	46.00	23.76	33.71	2.53	32.46	---	---	Peak
5	860.32	31.57	-14.43	46.00	29.24	31.03	3.29	31.99	---	---	Peak
6 *	881.50	52.64			28.90	52.27	3.33	31.86	---	---	Peak
7	949.56	32.88	-13.12	46.00	30.62	30.01	3.48	31.23	---	---	Peak
8	2496.00	43.82	-30.18	74.00	27.21	68.85	5.81	58.05	---	---	Peak
9	4132.00	43.67	-30.33	74.00	29.66	64.50	8.03	58.52	---	---	Peak
10	6296.00	43.03	-30.97	74.00	33.00	59.24	9.87	59.08	---	---	Peak
11	8888.00	48.02	-25.98	74.00	37.52	58.48	12.14	60.12	---	---	Peak
12	10362.00	49.32	-24.68	74.00	39.42	56.82	13.01	59.93	100	0	Peak
13	11612.00	49.12	-24.88	74.00	39.43	54.60	13.99	58.90	---	---	Peak



Test Engineer :	Donny Tang	Temperature :	22.3~23.4°C
		Relative Humidity :	60.5~61.3%
Test Distance :	3m	Polarization :	Vertical
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH10-HY  
 Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL  
 Project : 151401  
 Power : 120Vac/60Hz  
 Mode : 4

	Freq	Level	Over Limit	Limit	Antenna Line 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	53.28	31.24	-8.76	40.00	12.95	50.08	0.84	32.63	100	0	Peak
2	125.06	31.16	-12.34	43.50	17.40	45.08	1.25	32.57	---	---	Peak
3	165.80	31.53	-11.97	43.50	16.04	46.57	1.45	32.53	---	---	Peak
4	198.78	32.50	-11.00	43.50	14.89	48.52	1.59	32.50	---	---	Peak
5	835.10	30.55	-15.45	46.00	28.96	30.48	3.25	32.14	---	---	Peak
6 *	881.50	51.74			28.90	51.37	3.33	31.86	---	---	Peak
7	952.47	32.56	-13.44	46.00	30.78	29.50	3.48	31.20	---	---	Peak
8	2120.00	41.38	-32.62	74.00	27.12	67.16	5.35	58.25	---	---	Peak
9	4568.00	42.09	-31.91	74.00	30.57	61.70	8.23	58.41	---	---	Peak
10	6470.00	42.74	-31.26	74.00	33.92	58.01	10.24	59.43	---	---	Peak
11	8898.00	48.58	-25.42	74.00	37.50	59.05	12.17	60.14	---	---	Peak
12	10490.00	49.74	-24.26	74.00	39.50	56.86	13.11	59.73	100	0	Peak
13	11476.00	49.15	-24.85	74.00	39.68	54.20	13.89	58.62	---	---	Peak