FCC EMI TEST REPORT

FCC ID	:	**APYHRO00276**
Equipment	:	**Smart phone**
Brand Name	:	**SHARP**
Applicant	:	**SHARP CORPORATION** **2-13-1, Hachihonmatsu-Iida, Higashi-hiroshima-shi,Hiroshima pref. 739-0192, Japan**
Manufacturer	:	**SHARP CORPORATION** **1 Takumi-Cho, Sakai-Ku, Sakai-Shi, Osaka 590-8522, Japan**
Standard	:	**FCC 47 CFR FCC Part 15 Subpart B**

The product was received on Jul. 16, 2019 and testing was started from Jul. 27, 2019 and completed on Jul. 31, 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.)

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History of this test report

Report No.	Version	Description	Issued Date
FC971613	01	Initial issue of report	Aug. 20, 2019

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 11.55 dB at 2.479 MHz
3.2	15.109	Radiated Emission	Pass	Under limit 3.58 dB at 56.190 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: Jessie Ho

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	1st vender parts
Sample 2	2nd vender parts
Antenna Type	WWAN: PIFA Antenna WLAN: ILA Antenna Bluetooth: ILA Antenna GPS / Glonass / BDS / Galileo: ILA 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
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

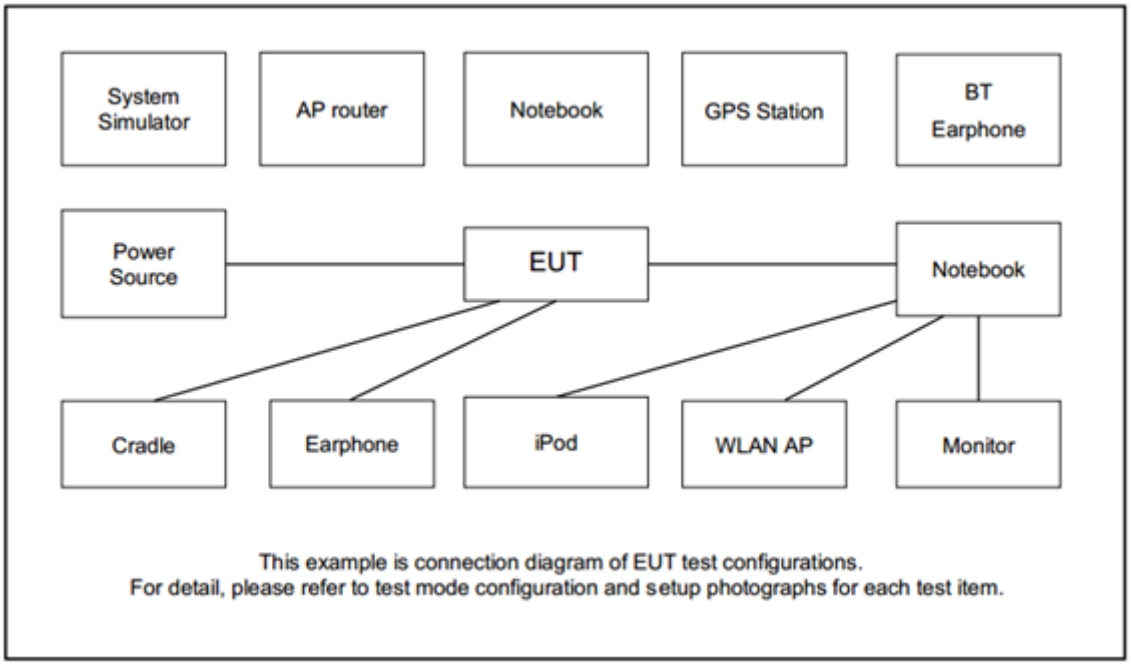
2. Test Configuration of Equipment Under Test

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 : GSM850 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Camera (Front) + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 2 : WCDMA Band V Idle + Bluetooth Link + WLAN (5GHz) Link + Camera (Rear) + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 3 : LTE Band 5 Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + MPEG4 + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 4 : LTE Band 12 Idle + Bluetooth Idle + WLAN (5GHz) Idle + GPS Rx + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 5 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + NFC On + Earphone + USB Cable (Data Link with Notebook) for Sample 1 Mode 6 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + NFC On + Earphone + USB Cable (Data Link with Notebook) for Sample 2
Radiated Emissions	Mode 1 : GSM850 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Camera (Front) + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 2 **:** WCDMA Band V Idle + Bluetooth Link + WLAN (5GHz) Link + Camera (Rear) + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 3 : LTE Band 5 Idle + Bluetooth Idle + WLAN (2.4GHz) Idle + MPEG4 + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 4 : LTE Band 12 Idle + Bluetooth Idle + WLAN (5GHz) Idle + GPS Rx + Earphone + USB Cable (Charging from AC Adapter) for Sample 1 Mode 5 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + NFC On + Earphone + USB Cable (Data Link with Notebook) for Sample 1 Mode 6 : LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + NFC On + Earphone + USB Cable (Data Link with Notebook) for Sample 2
Remark: **1.** The worst case of AC is mode 5; only the test data of this mode was reported. **2.** The worst case of RE is mode 5; only the test data of this mode was reported. **3.** Data Linking 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.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	Earphone	SHARP	RPHOEA007AFZZ	N/A	N/A	N/A
6.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
7.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
8.	Notebook	DELL	Latitude E3340	FCC DoC/ Contains FCC ID: PD97260NGU	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
9.	Notebook	ASUS	P2430U	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
10.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.4. EUT Operation Test Setup

The EUT was in GSM or WCDMA 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 “Video player” to play MPEG4 files.
4. Turn on camera to capture images.
5. 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.

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.

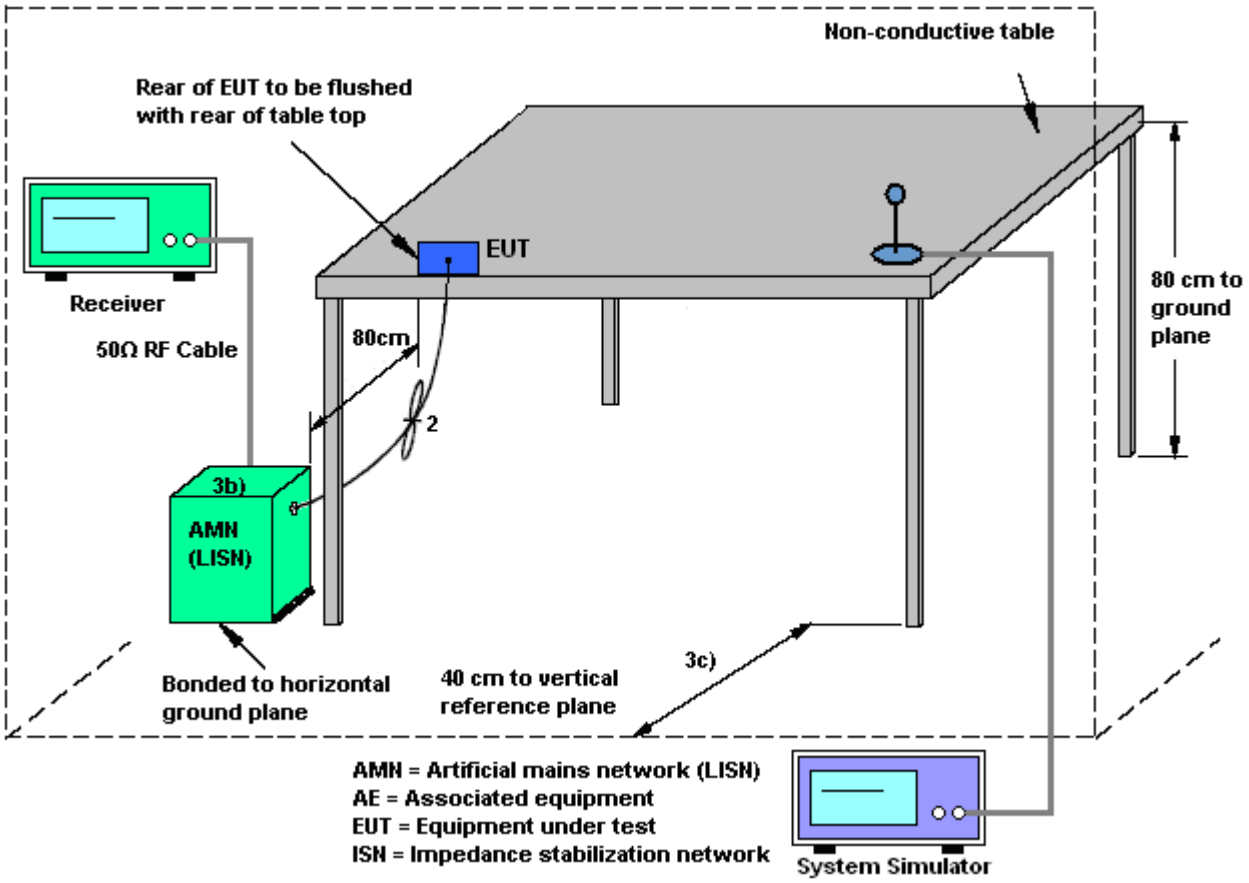
3.1.2 Measuring Instruments

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:

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

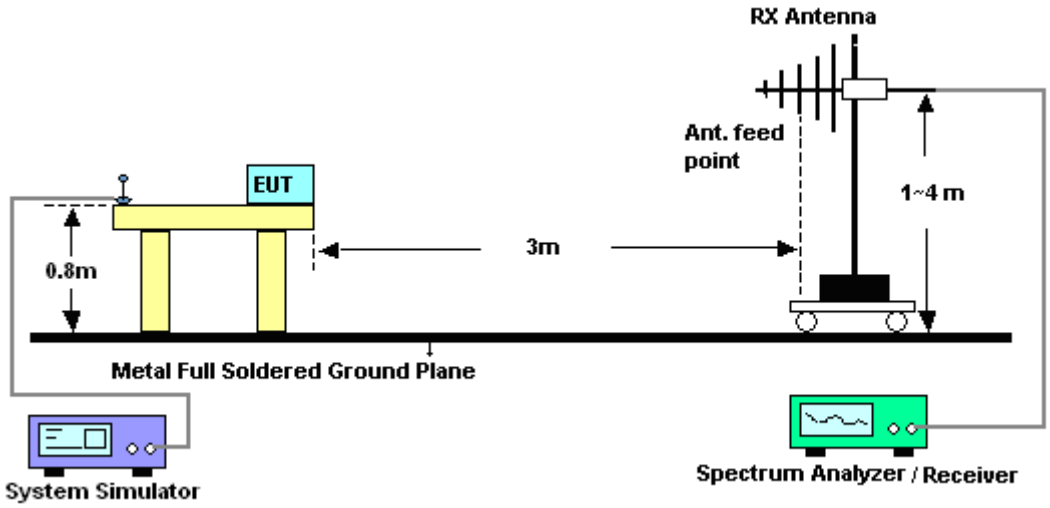
Refer a test equipment and calibration data table in this test report.

3.2.3. Test Procedures

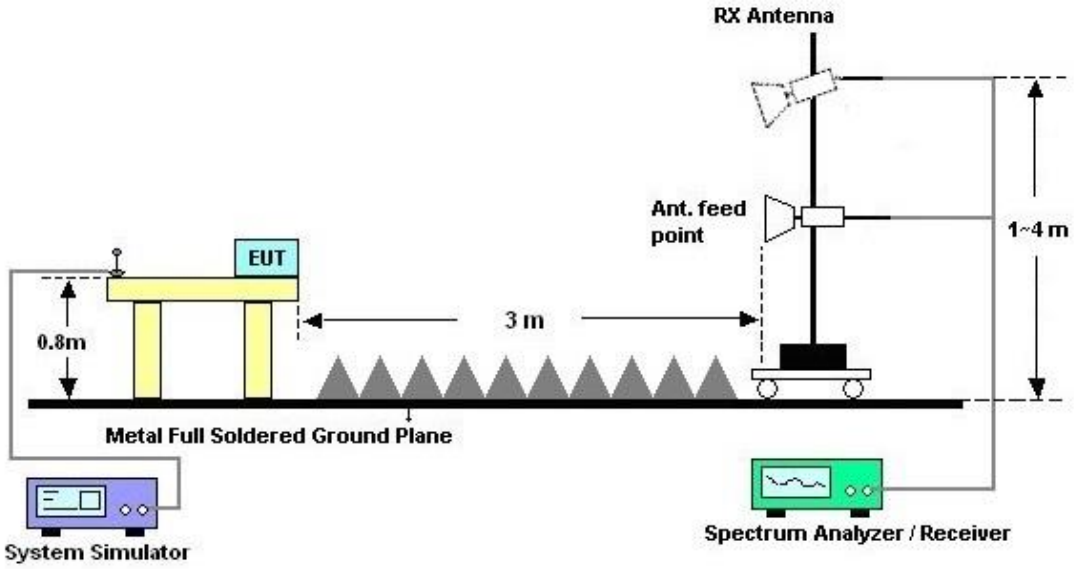
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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	Jul. 29, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Jul. 29, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Jul. 29, 2019	Nov. 13, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 09, 2018	Jul. 29, 2019	Nov. 08, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Jul. 29, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Jul. 29, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Jul. 29, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Jan. 10, 2019	Jul. 27, 2019~ Jul. 31, 2019	Jan. 09, 2020	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Jan. 08, 2019	Jul. 27, 2019~ Jul. 31, 2019	Jan. 07, 2020	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1156	1GHz~18GHz	Aug. 24, 2018	Jul. 27, 2019~ Jul. 31, 2019	Aug. 23, 2019	Radiation (03CH06-HY)
Preamplifier	SONOMA	310N	186713	9kHz~1GHz	May 01, 2019	Jul. 27, 2019~ Jul. 31, 2019	Apr. 30, 2020	Radiation (03CH06-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1850117	1GHz ~ 18GHz	May 23, 2019	Jul. 27, 2019~ Jul. 31, 2019	May 22, 2020	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Jul. 27, 2019~ Jul. 31, 2019	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Jul. 27, 2019~ Jul. 31, 2019	N/A	Radiation (03CH06-HY)
Test Software	AUDIX	e3	6.2009-8-24(k5)	N/A	N/A	Jul. 27, 2019~ Jul. 31, 2019	N/A	Radiation (03CH06-HY)
RF Cable	HUBER+SUHNER/WOKEN/HARBOUR INDUSTRIES	SUCOFLEX 104 /STORM/LL142	MY24966/4/00100A1O2A178T/CA3601-3601-1000	30MHz-26GHz	Nov. 22, 2018	Jul. 27, 2019~ Jul. 31, 2019	Nov. 21, 2019	Radiation (03CH06-HY)
Filter	Microwave	H1G013G1	SN477215	1.0G High Pass	Nov. 02, 2018	Jul. 27, 2019~ Jul. 31, 2019	Nov. 01, 2019	Radiation (03CH06-HY)
Filter	Wainwright	WLKS1200-8SS	SN3	1.2G Low Pass	Nov. 02, 2018	Jul. 27, 2019~ Jul. 31, 2019	Nov. 01, 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**

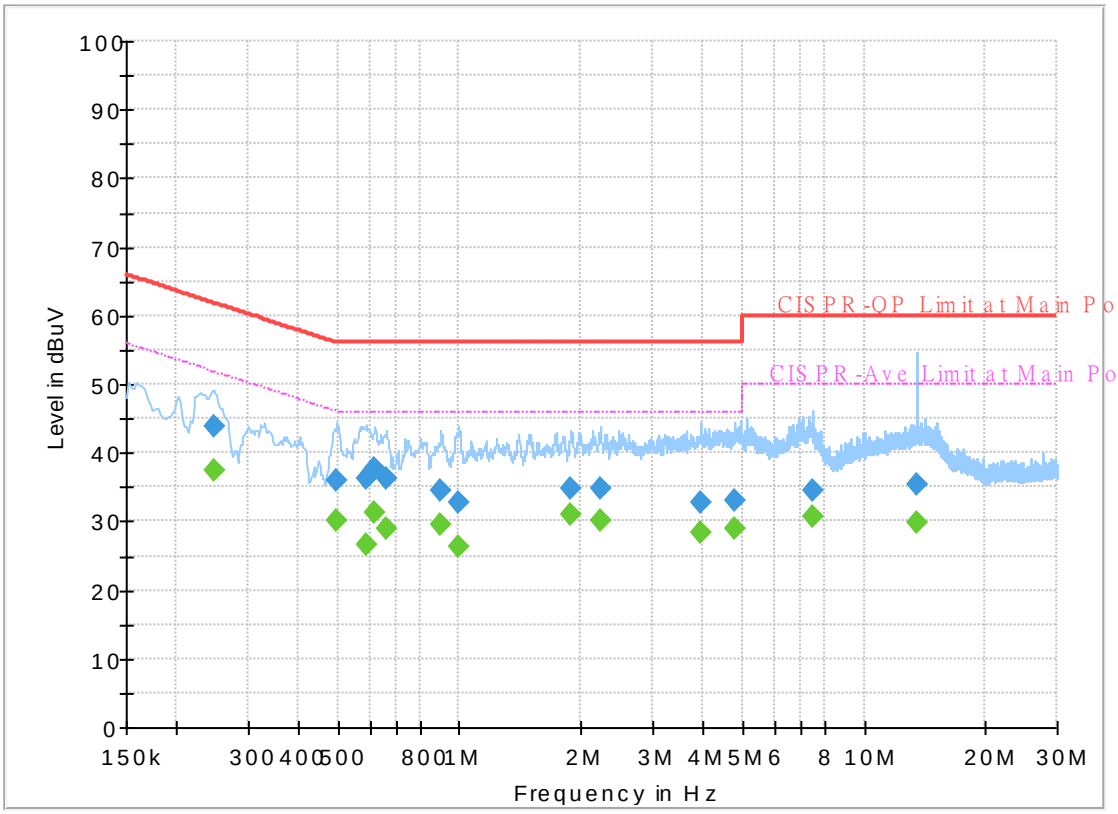
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Louis Chung	**Temperature :**	23~24.7℃
		Relative Humidity :	58.9~64.7%

EUT Information

Report NO :	971316
Test Mode :	Mode 5
Test Voltage :	120Vac/60Hz
Phase :	Line

Full Spectrum



Final_Result

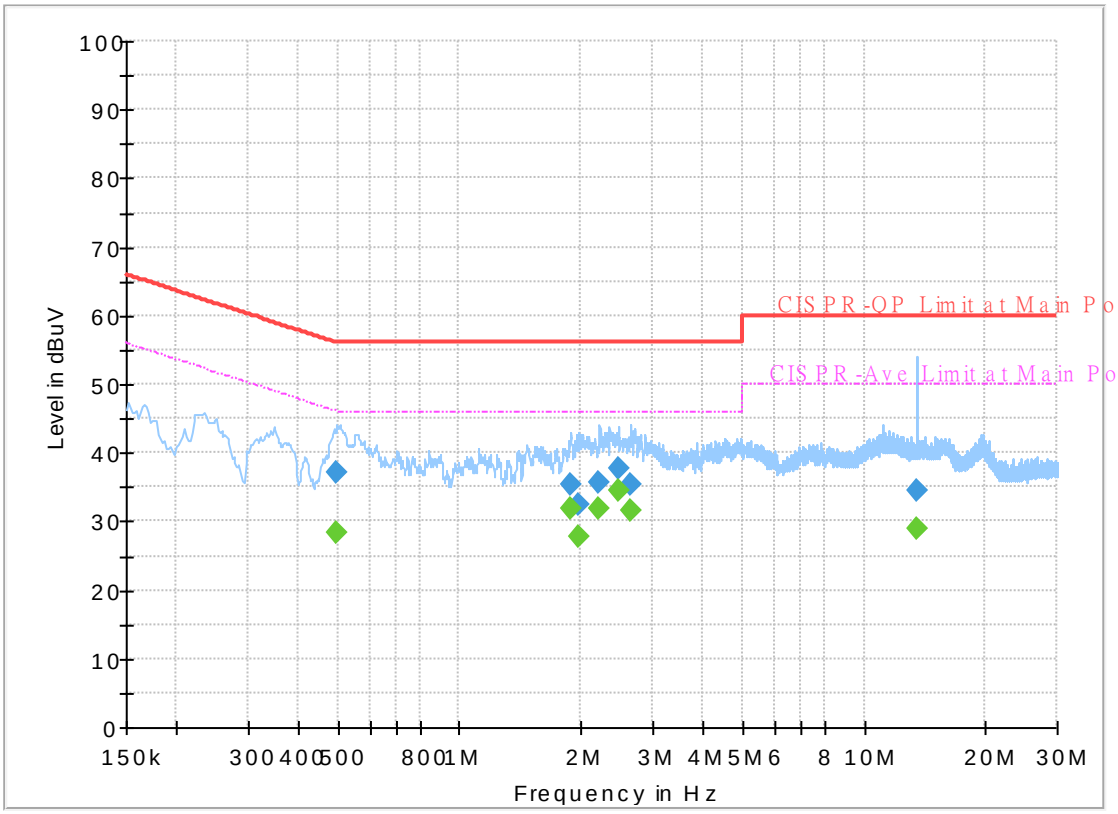
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.246750	---	37.53	51.87	14.34	L1	OFF	19.4
0.246750	43.91	---	61.87	17.96	L1	OFF	19.4
0.498750	---	30.14	46.02	15.88	L1	OFF	19.4
0.498750	36.01	---	56.02	20.01	L1	OFF	19.4
0.586500	---	26.61	46.00	19.39	L1	OFF	19.4
0.586500	36.13	---	56.00	19.87	L1	OFF	19.4
0.618000	---	31.35	46.00	14.65	L1	OFF	19.4
0.618000	37.79	---	56.00	18.21	L1	OFF	19.4
0.660750	---	28.97	46.00	17.03	L1	OFF	19.4
0.660750	36.14	---	56.00	19.86	L1	OFF	19.4
0.899250	---	29.57	46.00	16.43	L1	OFF	19.5
0.899250	34.52	---	56.00	21.48	L1	OFF	19.5
0.996000	---	26.25	46.00	19.75	L1	OFF	19.5
0.996000	32.67	---	56.00	23.33	L1	OFF	19.5
1.884750	---	30.88	46.00	15.12	L1	OFF	19.5
1.884750	34.91	---	56.00	21.09	L1	OFF	19.5
2.224500	---	30.17	46.00	15.83	L1	OFF	19.5
2.224500	34.83	---	56.00	21.17	L1	OFF	19.5
3.957000	---	28.35	46.00	17.65	L1	OFF	19.6
3.957000	32.62	---	56.00	23.38	L1	OFF	19.6
4.791750	---	29.03	46.00	16.97	L1	OFF	19.6

4.791750	**32.99**	**---**	**56.00**	**23.01**	**L1**	**OFF**	**19.6**
7.451250	**---**	**30.69**	**50.00**	**19.31**	**L1**	**OFF**	**19.7**
7.451250	**34.37**	**---**	**60.00**	**25.63**	**L1**	**OFF**	**19.7**
13.560000	**---**	**29.81**	**50.00**	**20.19**	**L1**	**OFF**	**19.9**
13.560000	**35.36**	**---**	**60.00**	**24.64**	**L1**	**OFF**	**19.9**

EUT Information

Report NO :	971316
Test Mode :	Mode 5
Test Voltage :	120Vac/60Hz
Phase :	Neutral

Full Spectrum

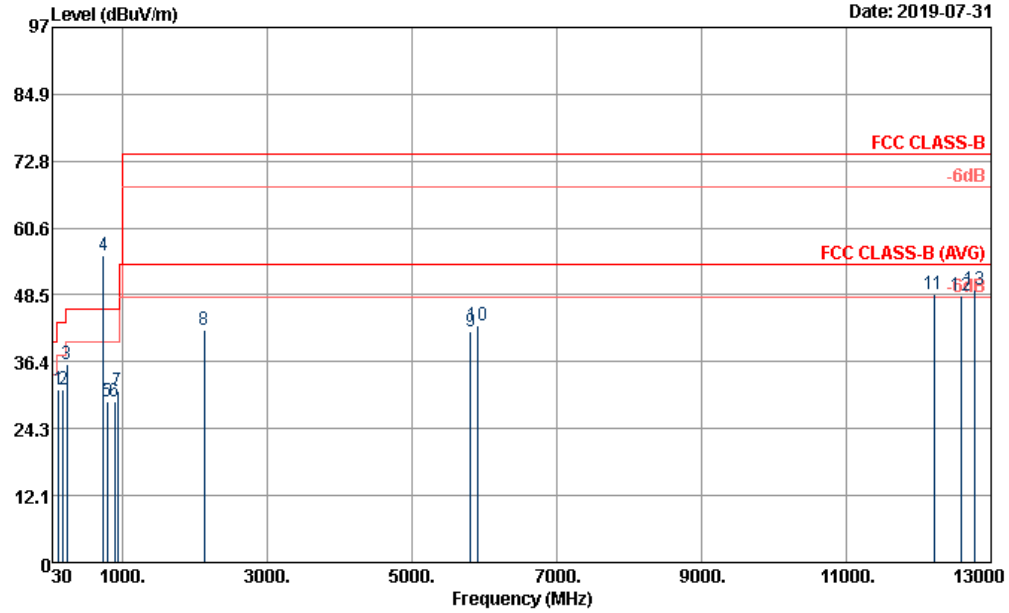


Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.498750	---	28.24	46.02	17.78	N	OFF	19.5
0.498750	37.06	---	56.02	18.96	N	OFF	19.5
1.875750	---	31.78	46.00	14.22	N	OFF	19.6
1.875750	35.47	---	56.00	20.53	N	OFF	19.6
1.974750	---	27.83	46.00	18.17	N	OFF	19.6
1.974750	32.47	---	56.00	23.53	N	OFF	19.6
2.220000	---	31.84	46.00	14.16	N	OFF	19.6
2.220000	35.81	---	56.00	20.19	N	OFF	19.6
2.478750	---	34.45	46.00	11.55	N	OFF	19.6
2.478750	37.77	---	56.00	18.23	N	OFF	19.6
2.647500	---	31.63	46.00	14.37	N	OFF	19.6
2.647500	35.47	---	56.00	20.53	N	OFF	19.6
13.560000	---	28.90	50.00	21.10	N	OFF	20.0
13.560000	34.46	---	60.00	25.54	N	OFF	20.0

Appendix B. Radiated Emission Test Result

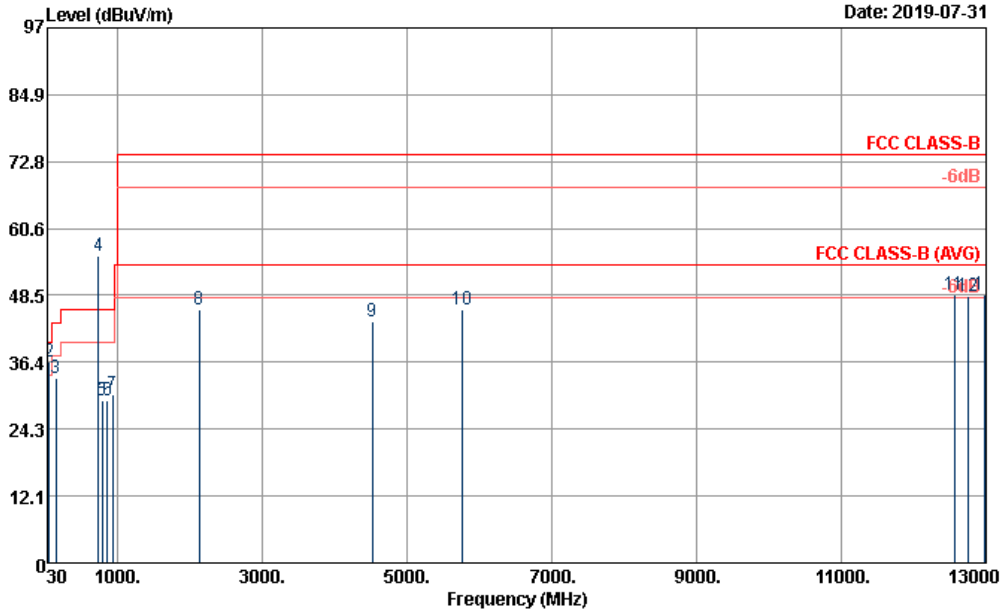
Test Engineer :	You Xian Chen	**Temperature :**	26~29˚C
		Relative Humidity :	38~45%
Test Distance :	3m	**Polarization :**	Horizontal
Remark :	#4 is system simulator signal which can be ignored.		



Site : 03CH06-HY
Condition : FCC CLASS-B 3m 9120D_1156_180824 HORIZONTAL
Project : 971613
Power : From System
Memo : Mode 5
: NB to SD

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1		119.37	31.37	-12.13	43.50	43.78	18.00	1.23	31.64	---	---	Peak
2		182.28	31.37	-12.13	43.50	46.41	15.00	1.54	31.58	---	---	Peak
3		228.99	35.88	-10.12	46.00	48.74	16.84	1.85	31.55	100	0	Peak
4	*	740.30	55.55			56.63	27.40	3.32	31.80	---	---	Peak
5		792.10	29.23	-16.77	46.00	29.82	27.68	3.43	31.70	---	---	Peak
6		885.90	29.30	-16.70	46.00	28.54	28.47	3.67	31.38	---	---	Peak
7		932.10	31.11	-14.89	46.00	28.82	29.54	3.79	31.04	---	---	Peak
8		2130.00	42.05	-31.95	74.00	67.94	27.40	6.11	59.40	---	---	Peak
9		5805.00	42.00	-32.00	74.00	55.18	32.17	10.93	56.28	---	---	Peak
10		5900.00	43.03	-30.97	74.00	55.63	32.40	11.10	56.10	---	---	Peak
11		12216.00	48.52	-25.48	74.00	50.61	38.88	16.05	57.02	---	---	Peak
12		12580.00	48.23	-25.77	74.00	50.49	38.57	16.48	57.31	---	---	Peak
13		12776.00	49.44	-24.56	74.00	51.39	39.03	16.72	57.70	100	0	Peak

Test Engineer :	You Xian Chen	**Temperature :**	26~29˚C
		Relative Humidity :	38~45%
Test Distance :	3m	**Polarization :**	Vertical
Remark :	#4 is system simulator signal which can be ignored.		



Site : 03CH06-HY
Condition : FCC CLASS-B 3m 9120D_1156_180824 VERTICAL
Project : 971613
Power : From System
Memo : Mode 5
: NB to SD

		Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
		MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1		41.61	33.01	-6.99	40.00	45.02	19.00	0.62	31.63	---	---	Peak
2	!	56.19	36.42	-3.58	40.00	54.30	12.90	0.84	31.62	100	0	Peak
3		147.45	33.50	-10.00	43.50	45.98	17.70	1.43	31.61	---	---	Peak
4	*	740.30	55.78			56.86	27.40	3.32	31.80	---	---	Peak
5		792.10	29.38	-16.62	46.00	29.97	27.68	3.43	31.70	---	---	Peak
6		864.90	29.40	-16.60	46.00	28.85	28.40	3.61	31.46	---	---	Peak
7		931.40	30.45	-15.55	46.00	28.18	29.52	3.79	31.04	---	---	Peak
8		2125.00	46.06	-27.94	74.00	71.95	27.40	6.11	59.40	---	---	Peak
9		4515.00	43.76	-30.24	74.00	63.46	30.57	9.43	59.70	---	---	Peak
10		5760.00	45.90	-28.10	74.00	59.37	31.97	10.95	56.39	---	---	Peak
11		12559.00	48.57	-25.43	74.00	50.86	38.53	16.45	57.27	---	---	Peak
12		12748.00	48.47	-25.53	74.00	50.52	38.90	16.69	57.64	---	---	Peak
13		12986.00	48.62	-25.38	74.00	50.56	39.20	16.96	58.10	100	0	Peak