



FCC EMI TEST REPORT

FCC ID : APYHRO00277
Equipment : Smart phone
Brand Name : SHARP
Applicant : SHARP CORPORATION
2-13-1, Hachihonmatsu-lida,
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 Class B

The product was received on Sep. 02, 2019 and testing was started from Sep. 09, 2019 and completed on Sep. 13, 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.

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
FC990231	01	Initial issue of report	Sep. 27, 2019
FC990231	02	Add the description of Sample difference	Oct. 09, 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 11.09 dB at 0.152 MHz
3.2	15.109	Radiated Emission	Pass	Under limit 8.40 dB at 41.340 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: Yvonne Cheng



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, and GNSS.

Product Specification subjective to this standard	
Sample 1	1st vender parts
Sample 2	2nd vender parts
Antenna Type	WWAN: ILA & IFA Antenna WLAN: IFA Antenna Bluetooth: IFA Antenna GPS / Glonass / BDS / Galileo: ILA Antenna

Remark:

1. All test items were performed with Sample 1.
2. The difference between Sample 1 & Sample 2 is their suppliers of memory, battery, vibe motor components.

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

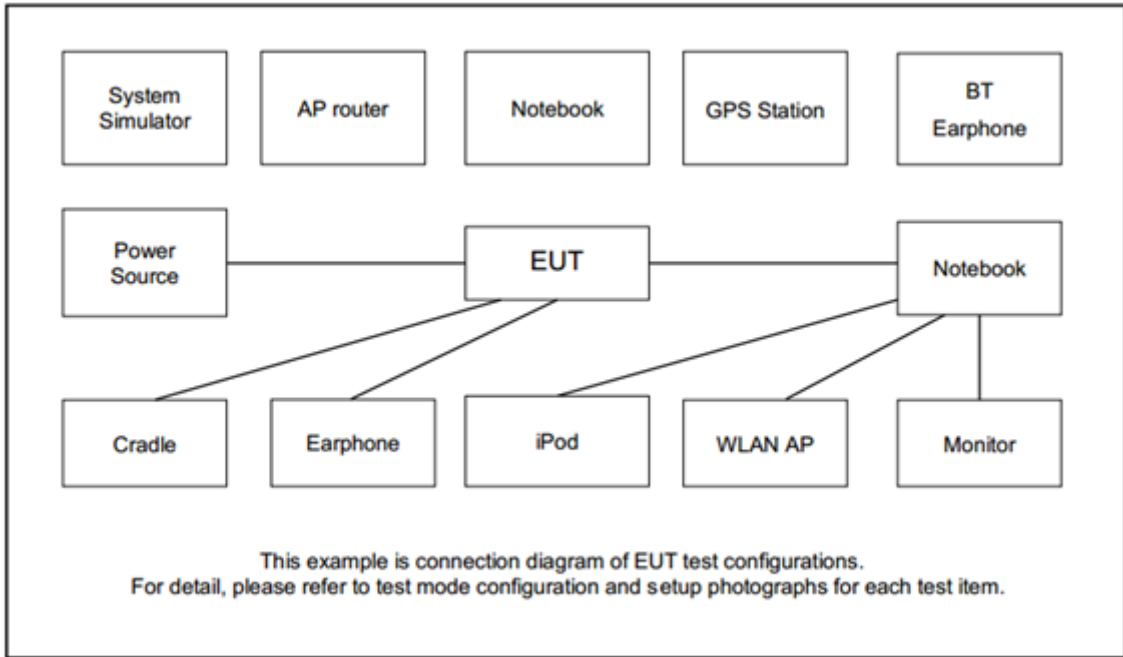
2.1. Test Mode

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 + GPS Rx + Earphone + USB Cable (Data Link with Notebook) for Sample 1 Mode 6: LTE Band 17 Idle + Bluetooth Idle + WLAN (5GHz) Idle + GPS Rx + 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 + GPS Rx + Earphone + USB Cable (Data Link with Notebook) for Sample 1 Mode 6: GSM850 Idle + Bluetooth Link + WLAN (2.4GHz) Link + Camera (Front) + Earphone + USB Cable (Charging from AC Adapter) 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 1; 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 5/12/17); 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.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
6.	iPod Earphone	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
8.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
9.	Earphone	Sharp	N/A	N/A	Unshielded, 1.1m	N/A
10.	Adapter	Sharp	XN-2QC25	N/A	N/A	N/A
11.	USB Cable	Sharp	N/A	N/A	Unshielded, 1m	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. EUT links with Notebook and executes 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.

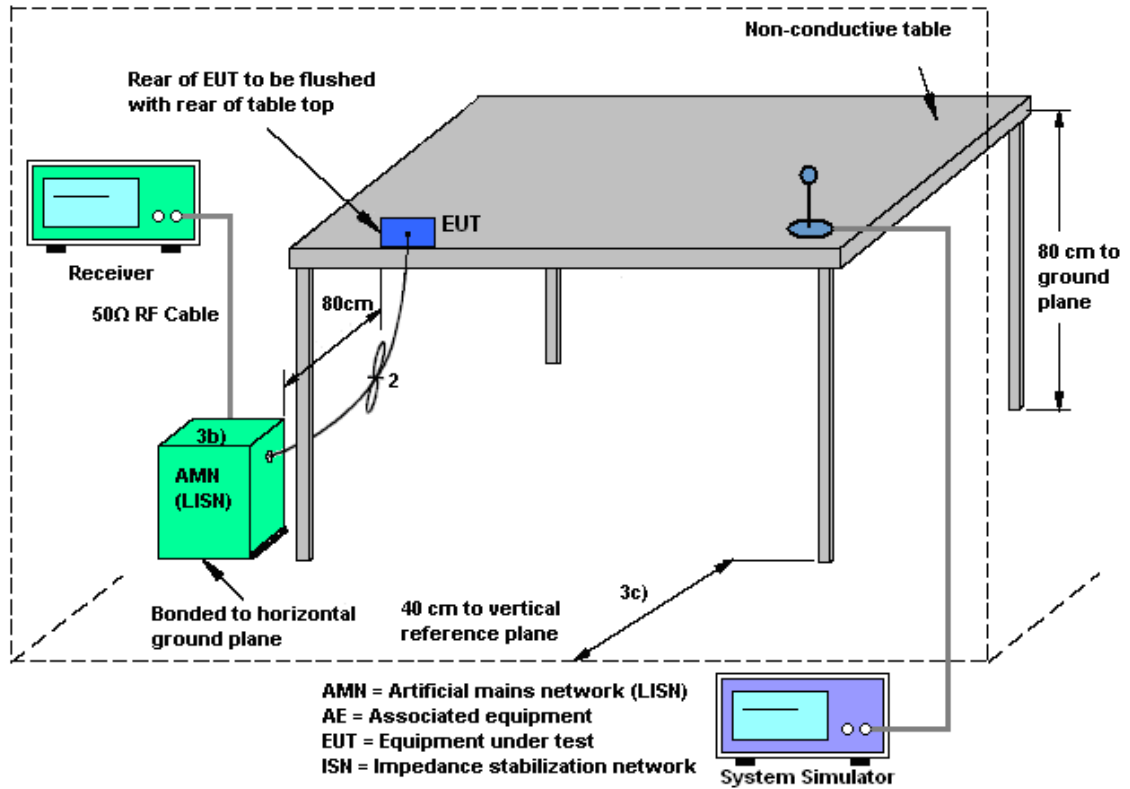
3.1.2. Measuring Instruments

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 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

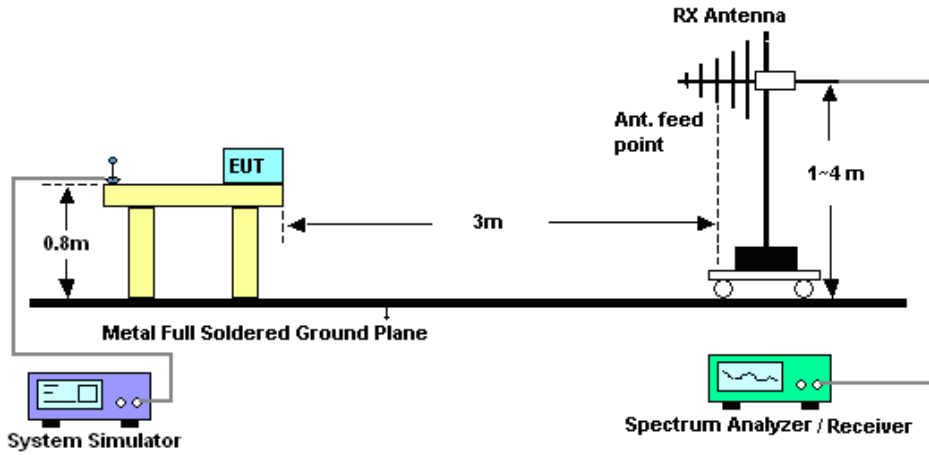
Refer a test equipment and calibration data table in this test report.

3.2.3. Test Procedures

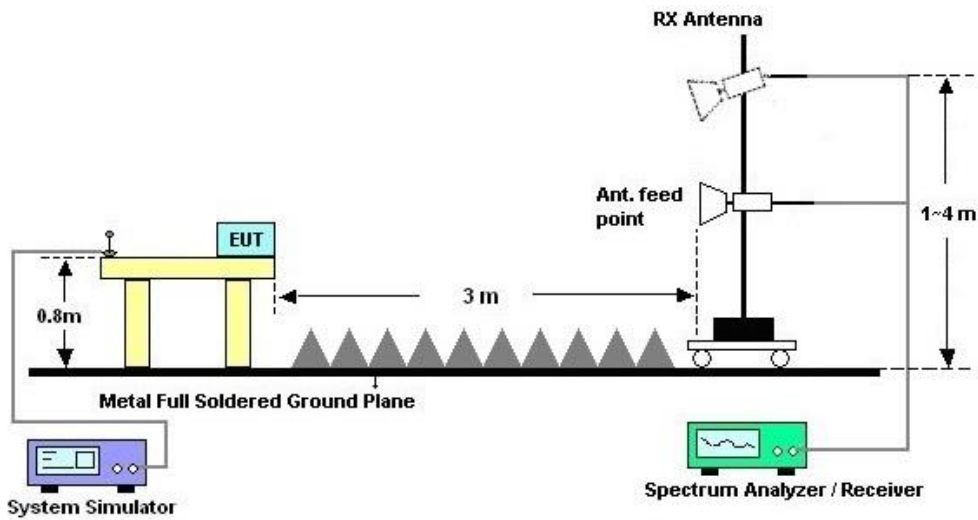
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna 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
Amplifier	SONOMA	310N	186713	9kHz~1GHz	May 01, 2019	Sep. 09, 2019~ Sep. 13, 2019	Apr. 30, 2020	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Jan. 10, 2019	Sep. 09, 2019~ Sep. 13, 2019	Jan. 09, 2020	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Jan. 08, 2019	Sep. 09, 2019~ Sep. 13, 2019	Jan. 07, 2020	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1156	1GHz~18GHz	Aug. 30, 2019	Sep. 09, 2019~ Sep. 13, 2019	Aug. 29, 2020	Radiation (03CH06-HY)
Preamplifier	Agilent	8449B	3008A01917	1GHz~26.5GHz	Apr. 25, 2019	Sep. 09, 2019~ Sep. 13, 2019	Apr. 24, 2020	Radiation (03CH06-HY)
Preamplifier	MITEQ	AMF-7D-001 01800-30-10 P	1850117	1GHz~18GHz	May 23, 2019	Sep. 09, 2019~ Sep. 13, 2019	May 22, 2020	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF7802082 12	1m~4m	N/A	Sep. 09, 2019~ Sep. 13, 2019	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Sep. 09, 2019~ Sep. 13, 2019	N/A	Radiation (03CH06-HY)
RF Cable	HUBER+SUH NER/WOKEN/ HARBOUR INDUSTRIES	SUCOFLEX 104 /STORM/LL1 42	MY24966/4/ 00100A1O2 A178T/ CA3601-360 1-1000	30MHz-26GHz	Nov. 22, 2018	Sep. 09, 2019~ Sep. 13, 2019	Nov. 21, 2019	Radiation (03CH06-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Sep. 09, 2019	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 12, 2018	Sep. 09, 2019	Nov. 11, 2019	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 14, 2018	Sep. 09, 2019	Nov. 13, 2019	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Sep. 09, 2019	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Dec. 31, 2018	Sep. 09, 2019	Dec. 30, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Dec. 31, 2018	Sep. 09, 2019	Dec. 30, 2019	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% ($U = 2Uc(y)$)	2.2
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.9
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7
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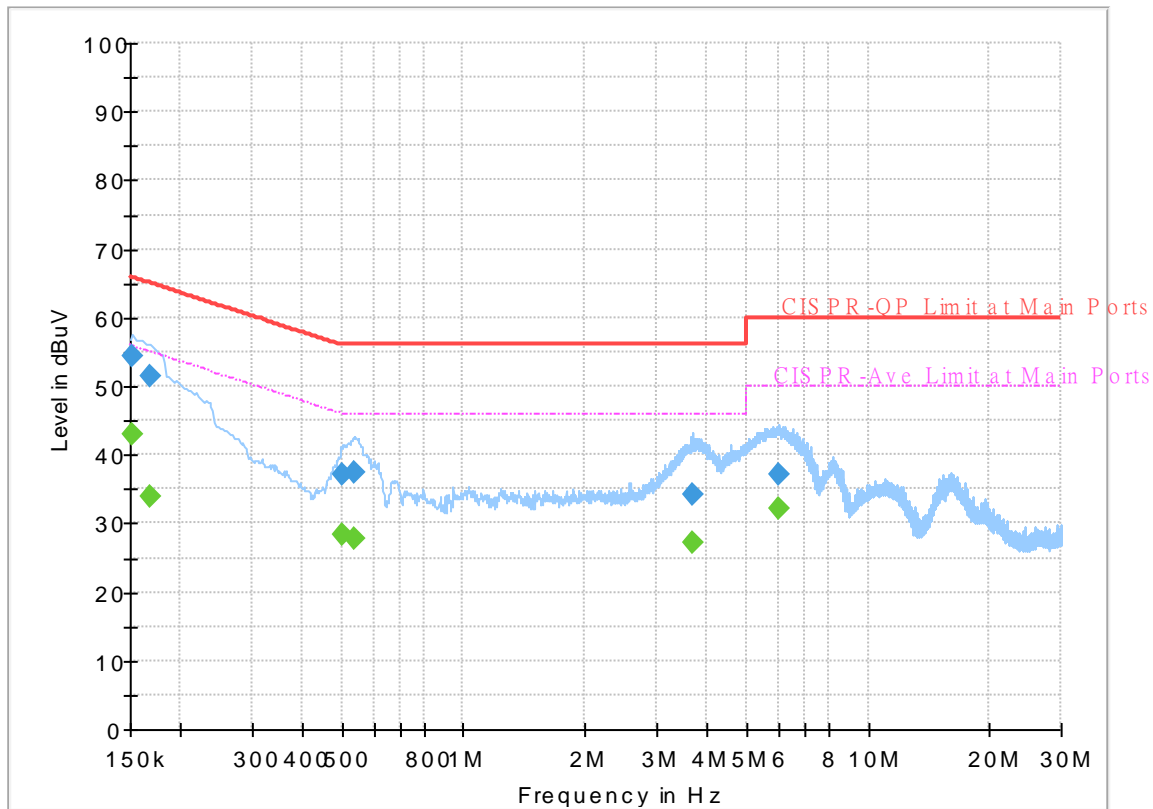
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Louis Chung	Temperature :	26.5~27°C
		Relative Humidity :	46~48.3%

EUT Information

Report NO : 990231
 Test Mode : Mode 6
 Test Voltage : 120Vac/60Hz
 Phase : Line

Full Spectrum



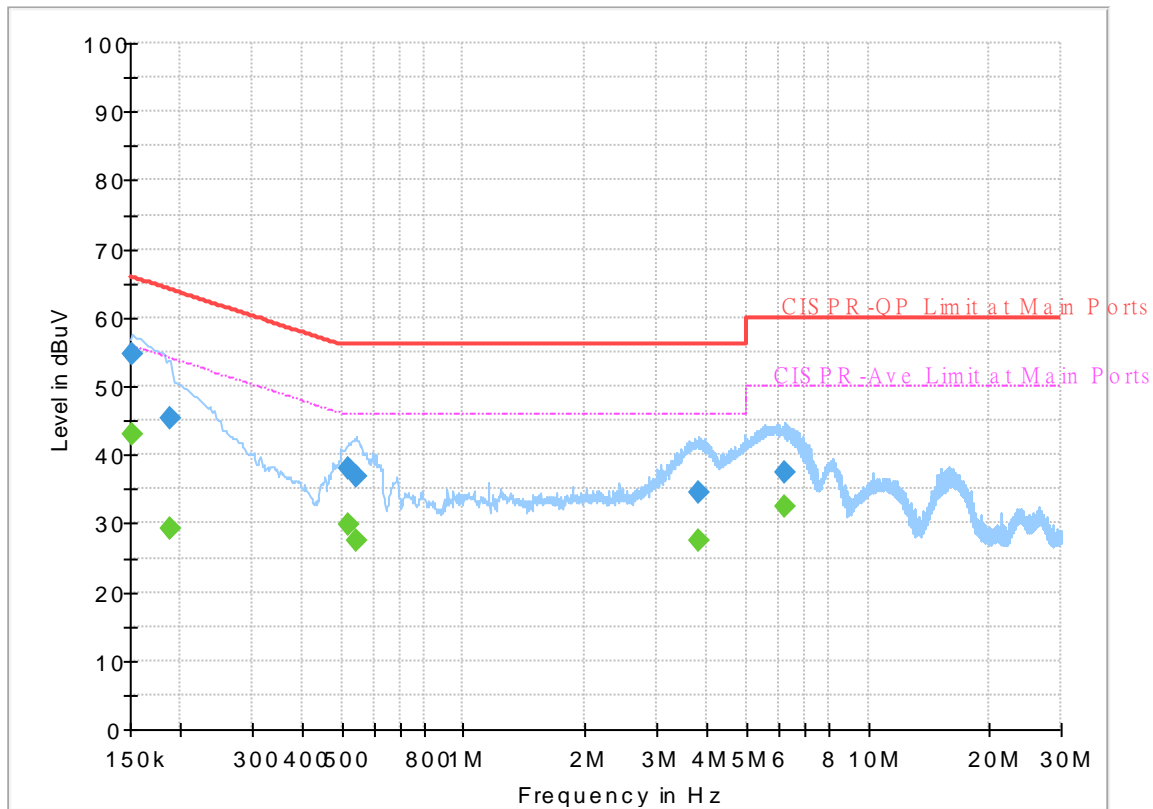
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	43.06	55.88	12.82	L1	OFF	19.4
0.152250	54.45	---	65.88	11.43	L1	OFF	19.4
0.168000	---	34.05	55.06	21.01	L1	OFF	19.4
0.168000	51.32	---	65.06	13.74	L1	OFF	19.4
0.503250	---	28.36	46.00	17.64	L1	OFF	19.4
0.503250	37.02	---	56.00	18.98	L1	OFF	19.4
0.534750	---	27.83	46.00	18.17	L1	OFF	19.4
0.534750	37.31	---	56.00	18.69	L1	OFF	19.4
3.687000	---	27.18	46.00	18.82	L1	OFF	19.5
3.687000	34.12	---	56.00	21.88	L1	OFF	19.5
6.011250	---	32.06	50.00	17.94	L1	OFF	19.5
6.011250	37.25	---	60.00	22.75	L1	OFF	19.5

EUT Information

Report NO : 990231
 Test Mode : Mode 6
 Test Voltage : 120Vac/60Hz
 Phase : Neutral

Full Spectrum



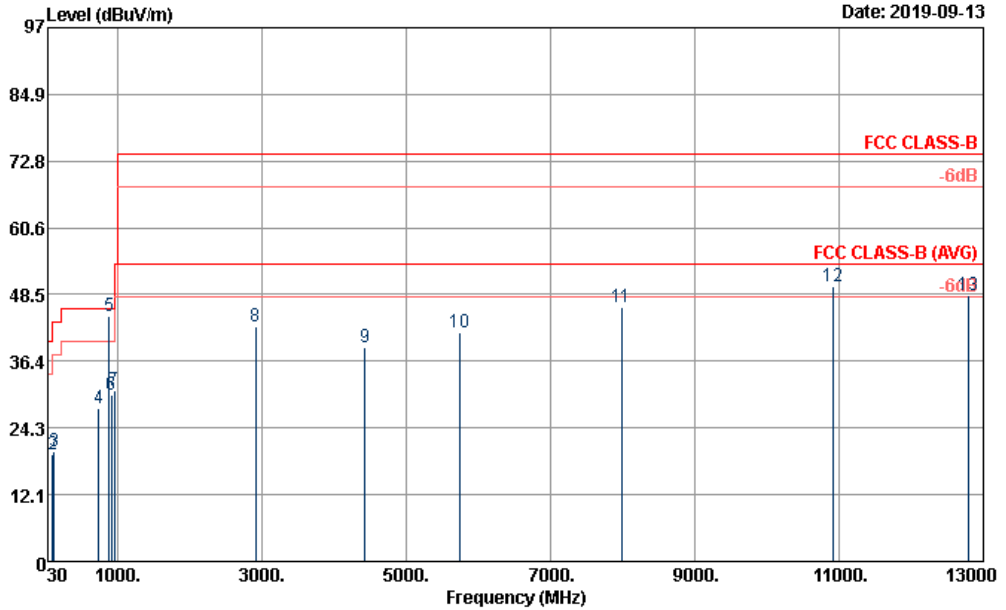
Final_Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	42.99	55.88	12.89	N	OFF	19.4
0.152250	54.79	---	65.88	11.09	N	OFF	19.4
0.188250	---	29.26	54.11	24.85	N	OFF	19.4
0.188250	45.29	---	64.11	18.82	N	OFF	19.4
0.521250	---	29.72	46.00	16.28	N	OFF	19.5
0.521250	38.14	---	56.00	17.86	N	OFF	19.5
0.543750	---	27.44	46.00	18.56	N	OFF	19.5
0.543750	36.91	---	56.00	19.09	N	OFF	19.5
3.806250	---	27.45	46.00	18.55	N	OFF	19.5
3.806250	34.49	---	56.00	21.51	N	OFF	19.5
6.243000	---	32.31	50.00	17.69	N	OFF	19.6
6.243000	37.51	---	60.00	22.49	N	OFF	19.6



Appendix B. Radiated Emission Test Result

Test Engineer :	Yuan Lee and You Xian Chen	Temperature :	27~28°C
		Relative Humidity :	38~39%
Test Distance :	3m	Polarization :	Horizontal
Remark :	#5 is system simulator signal which can be ignored.		

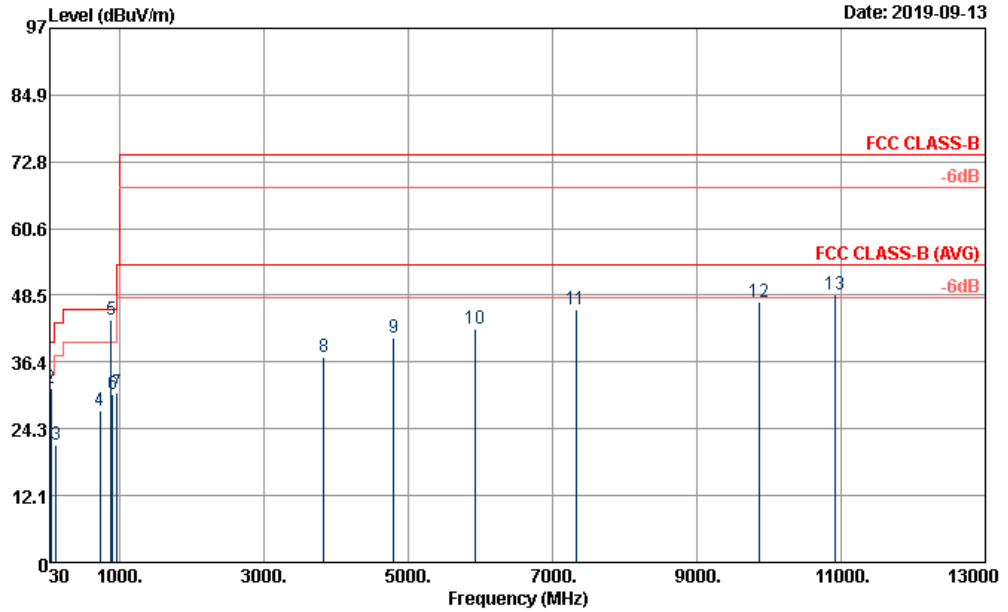


Site : 03CH06-HY
 Condition : FCC CLASS-B 3m 9120D_1156 HORIZONTAL
 Project : 990231
 Power : 120Vac/60Hz
 Memo : Mode 1
 : Y

	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	30.27	22.09	-17.91	40.00	27.30	25.80	0.62	31.64	---	---	Peak
2	101.01	19.58	-23.92	43.50	33.35	16.60	1.23	31.66	---	---	Peak
3	118.83	19.98	-23.52	43.50	32.33	18.00	1.23	31.64	---	---	Peak
4	732.60	27.86	-18.14	46.00	28.77	27.34	3.32	31.81	---	---	Peak
5 !	881.70	44.59			43.53	28.44	3.67	31.39	---	---	Peak
6	911.10	30.18	-15.82	46.00	28.30	29.02	3.74	31.23	---	---	Peak
7	956.60	31.08	-14.92	46.00	28.04	29.42	3.98	30.81	100	0	Peak
8	2910.00	42.72	-31.28	74.00	68.48	28.50	7.06	61.32	---	---	Peak
9	4430.00	39.03	-34.97	74.00	59.63	30.60	9.54	60.74	---	---	Peak
10	5735.00	41.69	-32.31	74.00	56.29	32.10	10.97	57.67	---	---	Peak
11	7988.00	46.16	-27.84	74.00	53.57	37.13	13.19	57.73	---	---	Peak
12	10914.00	49.93	-24.07	74.00	51.01	40.40	15.11	56.59	100	0	Peak
13	12797.00	48.42	-25.58	74.00	51.44	39.00	16.75	58.77	---	---	Peak



Test Engineer :	Yuan Lee and You Xian	Temperature :	27~28°C
	Chen	Relative Humidity :	38~39%
Test Distance :	3m	Polarization :	Vertical
Remark :	#5 is system simulator signal which can be ignored.		



Site : 03CH06-HY
 Condition : FCC CLASS-B 3m 9120B_1156 VERTICAL
 Project : 990231
 Power : 120Vac/60Hz
 Memo : Mode 1
 : Y

	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	cm	deg		
1	30.00	26.84	-13.16	40.00	32.05	25.80	0.62	31.64	---	---	Peak
2	41.34	31.60	-8.40	40.00	43.59	19.00	0.62	31.63	100	0	Peak
3	119.37	21.26	-22.24	43.50	33.61	18.00	1.23	31.64	---	---	Peak
4	723.50	27.47	-18.53	46.00	28.69	27.06	3.32	31.83	---	---	Peak
5	881.70	44.12			43.06	28.44	3.67	31.39	---	---	Peak
6	901.30	30.60	-15.40	46.00	29.20	28.64	3.74	31.32	---	---	Peak
7	958.00	30.68	-15.32	46.00	27.58	29.46	3.98	30.80	---	---	Peak
8	3830.00	37.20	-36.80	74.00	60.68	29.53	8.59	61.60	---	---	Peak
9	4795.00	40.73	-33.27	74.00	58.90	31.13	9.73	59.03	---	---	Peak
10	5925.00	42.41	-31.59	74.00	56.83	32.57	11.14	58.13	---	---	Peak
11	7323.00	46.06	-27.94	74.00	55.09	36.43	13.07	58.53	---	---	Peak
12	9871.00	47.24	-26.76	74.00	51.35	39.30	14.71	58.12	---	---	Peak
13	10921.00	48.75	-25.25	74.00	49.80	40.40	15.11	56.56	100	0	Peak