



FCC EMI TEST REPORT

FCC ID : 2A3DW-MZ1000
Equipment : Head-mounted tablet
Brand Name : Moziware
Model Name : MZ1000
Marketing Name : cimo
Applicant : RealWear (Shanghai) Intelligent Technology Co., Ltd.
2F,Block21, No.55 Chuanhe Road, Pudong New
District, Shanghai, China
Manufacturer : RealWear (Shanghai) Intelligent Technology Co., Ltd.
2F,Block21, No.55 Chuanhe Road, Pudong New
District, Shanghai, China
Standard : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on Oct. 01, 2021 and testing was performed from Oct. 27, 2021 to Dec. 08, 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 from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Approved by: Louis Wu

Sportun International Inc. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)



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Appendix A. AC Conducted Emission Test Result

Appendix B. Radiated Emission Test Result

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History of this test report



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.107	AC Conducted Emission	Pass	9.13 dB under the limit at 0.188 MHz
3.2	15.109	Radiated Emission	Pass	6.61 dB under the limit at 499.480 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 product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Sheng Kuo

Report Producer: Clio Lo



1. General Description

1.1. Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n, Wi-Fi 5GHz 802.11a/n/ac.

Product Feature	
Antenna Type	WLAN: PIFA Antenna Bluetooth: PIFA Antenna

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

1.2. Modification of EUT

No modifications made to the EUT during the testing.

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 declared by 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.



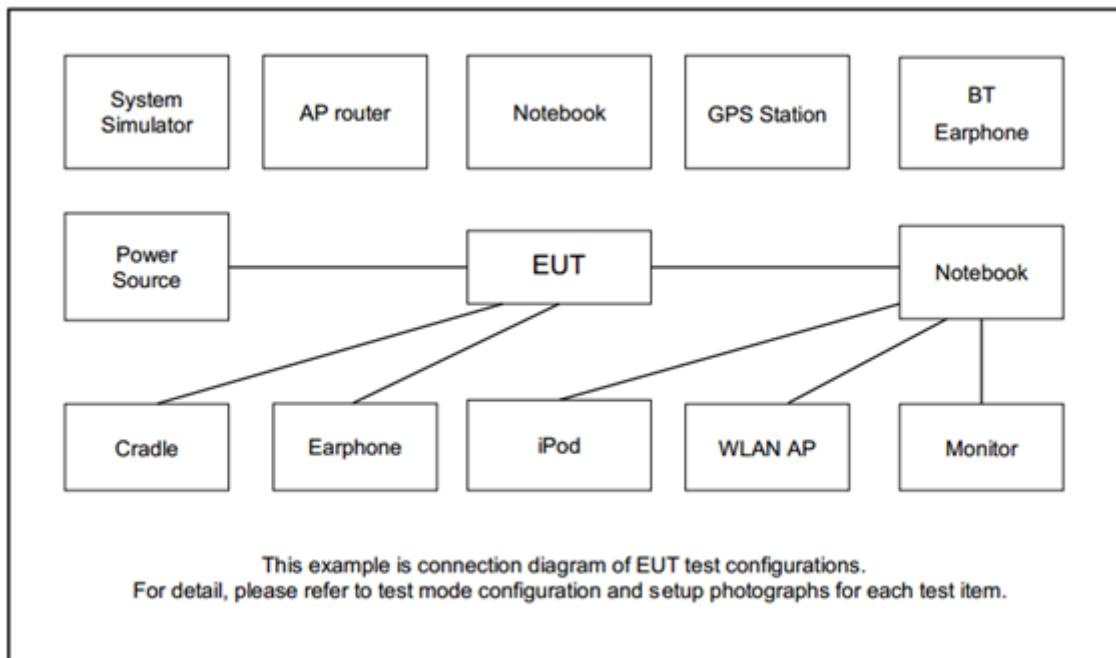
2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT is tested along with the peripherals, operating under possible configurations in compliant with normal operation. The maximum emissions can be identified by a pre-scan carried out in different orientations of placement pursuant to ANSI C63.4-2014. Frequency range covered: Conduction Emission (150 kHz to 30 MHz), Radiation Emission (30 MHz to the 5th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Functions Enabled
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + Main Camera, LED Light on, Laser Light on + Earphone + USB Cable (Charging from AC Adapter) Mode 2: WLAN (5GHz) Link + Bluetooth Link + Front Camera + Earphone + USB Cable (Charging from AC Adapter) Mode 3: WLAN (5GHz) Link + Bluetooth Link + MPEG 4 (Color Bars), Play white noise audio file + Earphone + USB Cable (Charging from AC Adapter) Mode 4: WLAN Idle + Bluetooth Idle + Scanner + Earphone + USB Cable (USB File transfer with Notebook)
Radiated Emissions	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + Main Camera, LED light on, Laser Light on + Earphone + USB Cable (Charging from AC Adapter) Mode 2: WLAN (5GHz) Link + Bluetooth Link + Front camera + Earphone + USB Cable (Charging from AC Adapter) Mode 3: WLAN (5GHz) Link + Bluetooth Link + USB Cable (Charging from AC Adapter) + MPEG 4 (Color bars), play white noise audio file + Earphone Mode 4: WLAN Idle + Bluetooth Idle + Scanner + Earphone + USB Cable (USB File transfer with Notebook)
Remark:	
1. The worst case of AC is mode 4; 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. USB File transfer 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	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY700A2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
3.	Notebook	Dell	Latitude5480	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Notebook	Dell	Latitude3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
5.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0m	N/A
6.	iPod	Apple	A1199	FCC DoC	Shielded, 1.0m	N/A
7.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0m	N/A
8.	AC Adapter	ASUS	A172-050200U-US	N/A	N/A	N/A
9.	AC Adapter	DVE	DSA-5PFM-05 FUS 050100	FCC DoC	N/A	N/A



2.4. EUT Operation Test Setup

The EUT is attached to the Bluetooth earphone or WLAN AP, and the following programs installed in the EUT are programmed during the test:

1. Data application is transferred between Laptop and EUT via USB cable.
2. Execute "Color bars" to play MPEG4 files.
3. Turn on scanner to scan barcode continuously.
4. Turn on camera to capture images.
5. Turn on LED light.
6. Turn on Laser light.



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.

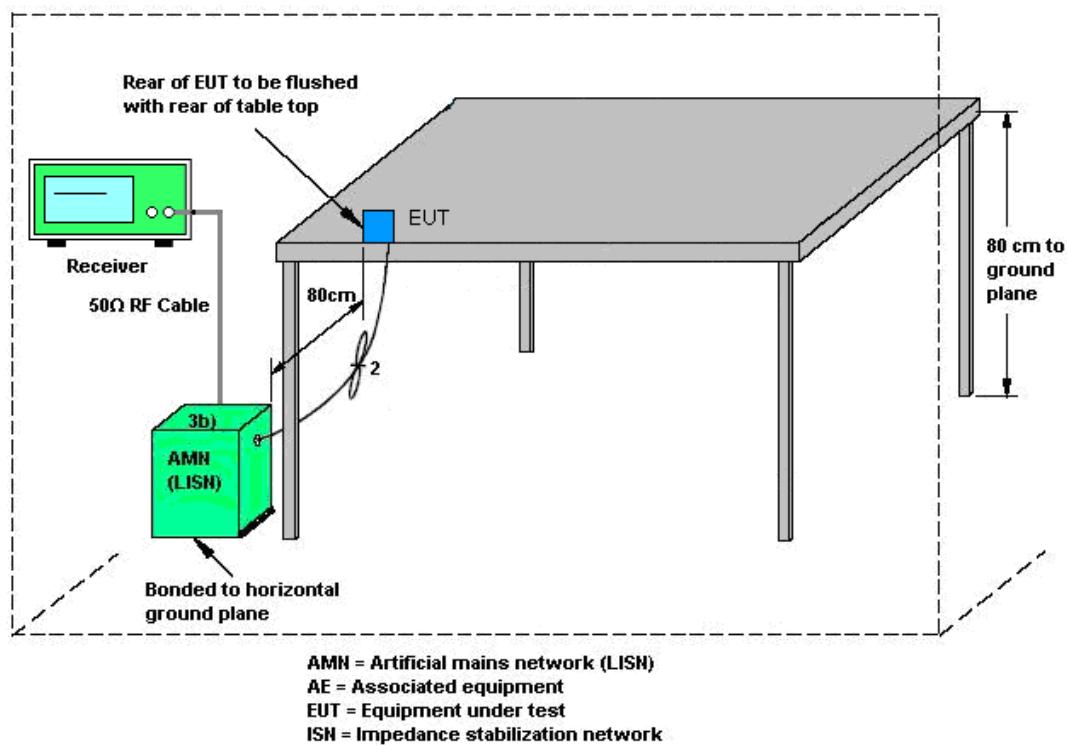
3.1.2. Measuring Instruments

Please refer to the measuring equipment list in this test report.

3.1.3. Test Procedure

1. The EUT is placed 0.4 meter away from the conducting wall of the shielding room, and is 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 Line and Neutral shall be tested in order to find out the maximum conducted emission.
7. The frequency range from 150 kHz to 30 MHz is scanned.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (If Bandwidth = 9 kHz) 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

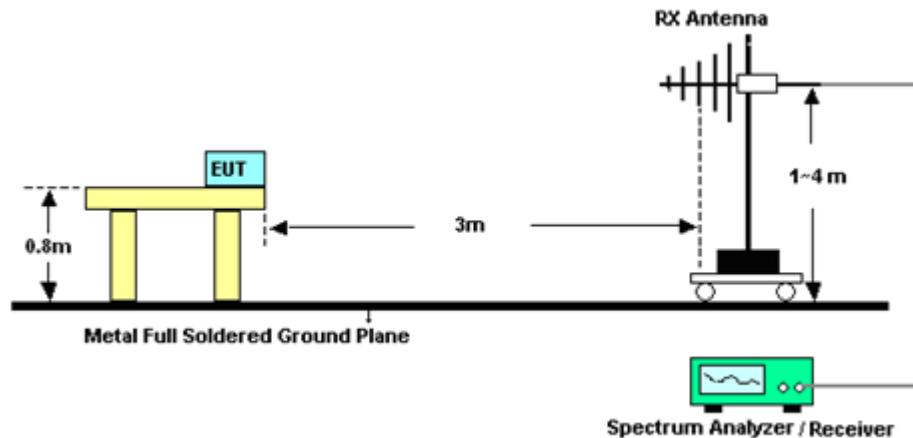
Please refer to the measuring equipment list in this test report.

3.2.3. Test Procedures

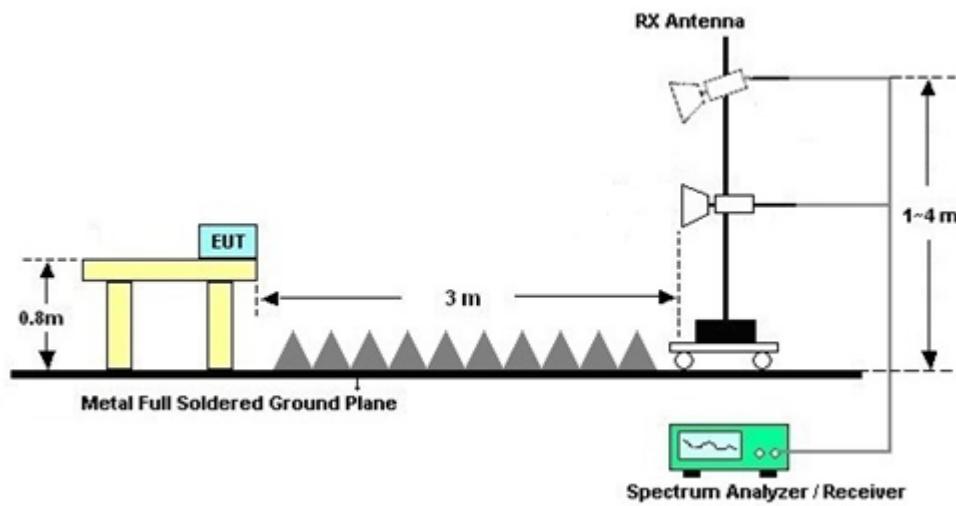
1. The EUT is placed on a turntable with 0.8 meter above ground.
2. The EUT is set 3 meters from the interference receiving antenna, which is mounted on the top of a variable height antenna tower.
3. The table is rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is 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 is 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 is 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 (dB μ V/m) = 20 log Emission level (μ V/m)
9. Distance extrapolation factor = 20 log (specific distance / test distance) (dB)
10. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor - Distance extrapolation factor = Level

3.2.4. Test Setup of Radiated Emission

For Radiated Emissions from 30 MHz to 1 GHz



For Radiated Emissions above 1 GHz



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
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 20, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Oct. 19, 2022	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35413 & 02	30MHz~1GHz	Nov. 18, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Nov. 17, 2022	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02038	1GHz~18GHz	Aug. 04, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Aug. 03, 2022	Radiation (03CH10-HY)
Preamplifier	Jet-Power	JAP00101800-30-10P	160118550004	1GHz~18GHz	Mar. 01, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Feb. 28, 2022	Radiation (03CH10-HY)
Signal Analyzer	Keysight	N9010B	MY60241055	10Hz~44GHz	Jul. 12, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Jul. 11, 2022	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Dec. 02, 2021 ~ Dec. 08, 2021	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Dec. 02, 2021 ~ Dec. 08, 2021	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Dec. 02, 2021 ~ Dec. 08, 2021	N/A	Radiation (03CH10-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Dec. 02, 2021 ~ Dec. 08, 2021	N/A	Radiation (03CH10-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290045	20MHz~8.4GHz	Jan. 14, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Jan. 13, 2022	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	30MHz~1GHz	Nov. 04, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Nov. 03, 2022	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	1GHz~18GHz	Nov. 04, 2021	Dec. 02, 2021 ~ Dec. 08, 2021	Nov. 03, 2022	Radiation (03CH10-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz~40GHz	May 21, 2021	Dec. 08, 2021	May 20, 2022	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804011/2,804012/2	18-40G	Jan. 04, 2021	Dec. 08, 2021	Jan. 03, 2022	Radiation (03CH10-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Oct. 27, 2021	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9kHz~3.6GHz	Nov. 30, 2020	Oct. 27, 2021	Nov. 29, 2021	Conduction (CO05-HY)
Hygrometer	Testo	608-H1	34913912	N/A	Nov. 18, 2020	Oct. 27, 2021	Nov. 17, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Dec. 01, 2020	Oct. 27, 2021	Nov. 30, 2021	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100081	9kHz~30MHz	Nov. 16, 2021	Oct. 27, 2021	Nov. 15, 2022	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Oct. 27, 2021	N/A	Conduction (CO05-HY)
Pulse Limiter	SCHWARZBECK	VTSD 9561-FN	00691	N/A	Jul. 28, 2021	Oct. 27, 2021	Jul. 27, 2022	Conduction (CO05-HY)
LISN Cable	MVE	RG-400	260260	N/A	Dec. 31, 2020	Oct. 27, 2021	Dec. 30, 2021	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% ($U = 2U_{c(y)}$)	3.1 dB
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_{c(y)}$)	5.7 dB
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_{c(y)}$)	5.1 dB
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_{c(y)}$)	5.7 dB
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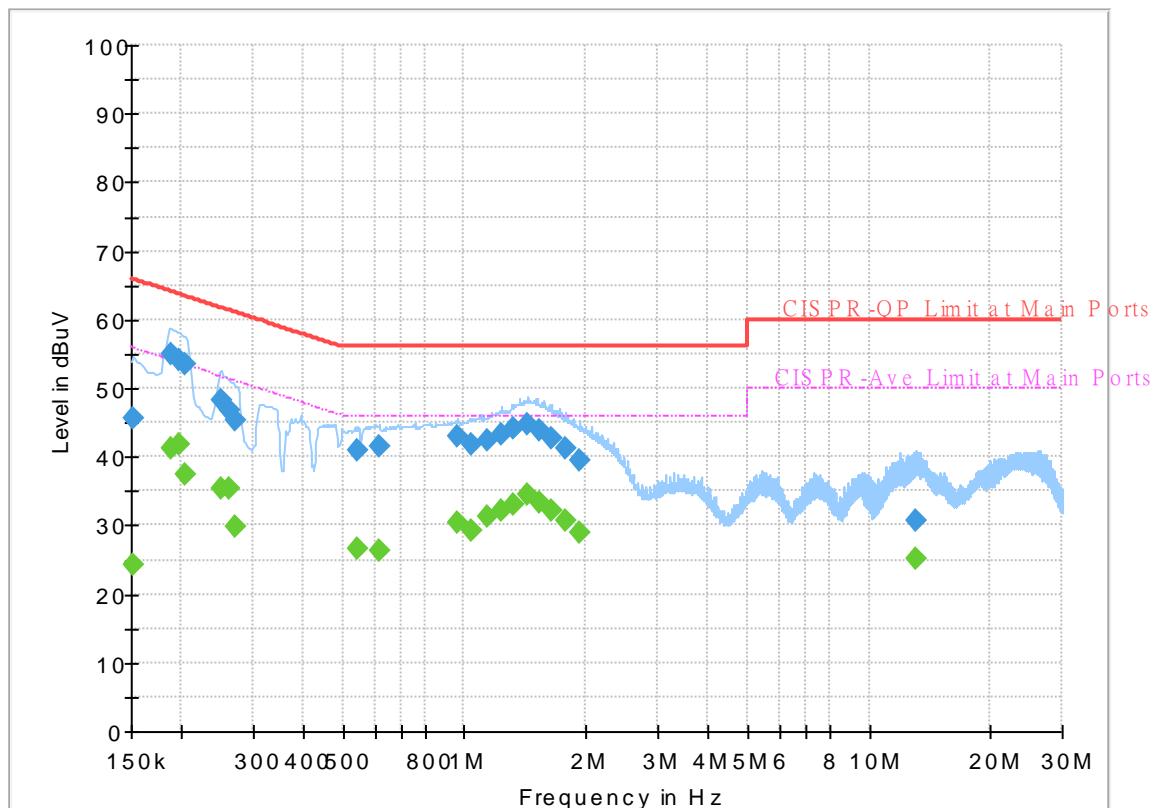
Appendix A. AC Conducted Emission Test Results

Test Engineer :	Calvin Wang	Temperature :	23~26°C
		Relative Humidity :	45~55%

EUT Information

Report NO : 193007
 Test Mode : Mode 4
 Test Voltage : Power From System
 Phase : Line

Full Spectrum



Final Result

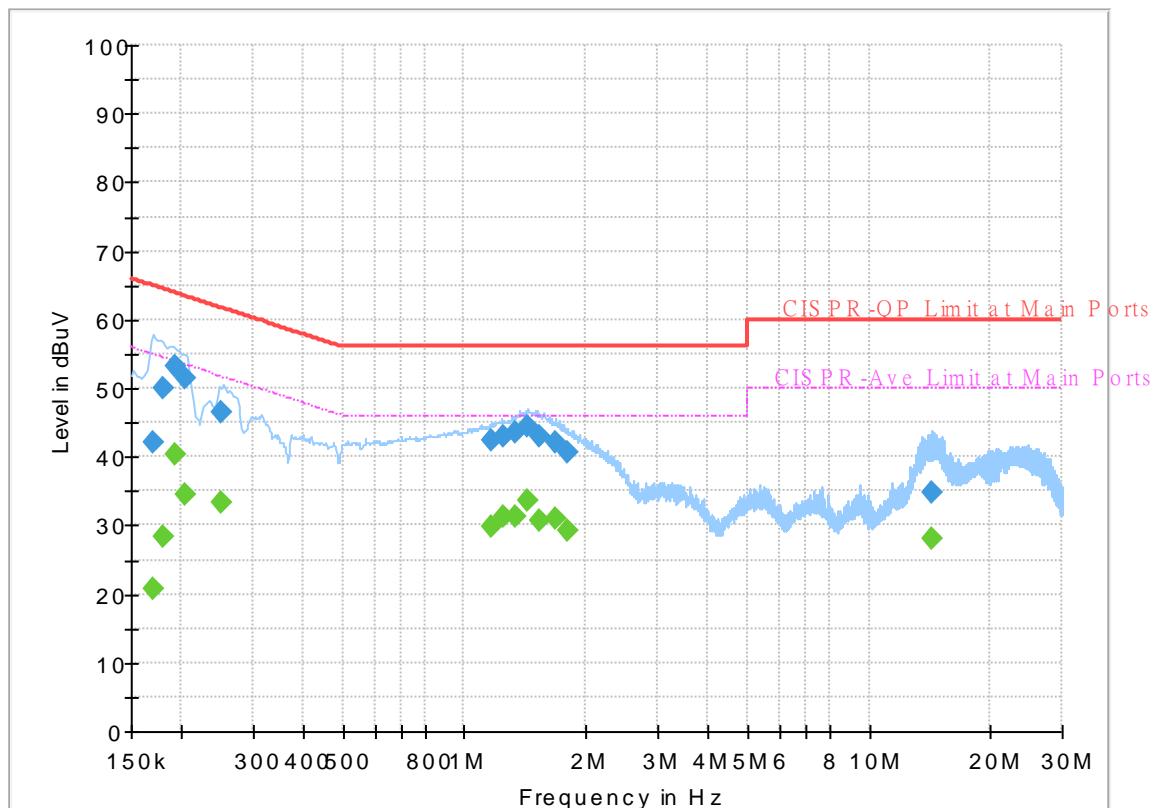
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152250	---	24.24	55.88	31.64	L1	OFF	19.6
0.152250	45.65	---	65.88	20.23	L1	OFF	19.6
0.188250	---	41.37	54.11	12.74	L1	OFF	19.6
0.188250	54.98	---	64.11	9.13	L1	OFF	19.6
0.197250	---	41.78	53.73	11.95	L1	OFF	19.6
0.197250	54.20	---	63.73	9.53	L1	OFF	19.6
0.204000	---	37.54	53.45	15.91	L1	OFF	19.6
0.204000	53.48	---	63.45	9.97	L1	OFF	19.6
0.251250	---	35.52	51.72	16.20	L1	OFF	19.6
0.251250	48.24	---	61.72	13.48	L1	OFF	19.6
0.262500	---	35.35	51.35	16.00	L1	OFF	19.6
0.262500	46.89	---	61.35	14.46	L1	OFF	19.6
0.271500	---	29.91	51.07	21.16	L1	OFF	19.6
0.271500	45.41	---	61.07	15.66	L1	OFF	19.6
0.541500	---	26.75	46.00	19.25	L1	OFF	19.8
0.541500	40.93	---	56.00	15.07	L1	OFF	19.8
0.615750	---	26.39	46.00	19.61	L1	OFF	19.9
0.615750	41.66	---	56.00	14.34	L1	OFF	19.9
0.957750	---	30.39	46.00	15.61	L1	OFF	20.1
0.957750	42.87	---	56.00	13.13	L1	OFF	20.1
1.043250	---	29.33	46.00	16.67	L1	OFF	20.2

1.043250	41.69	---	56.00	14.31	L1	OFF	20.2
1.135500	---	31.33	46.00	14.67	L1	OFF	20.1
1.135500	42.33	---	56.00	13.67	L1	OFF	20.1
1.232250	---	32.20	46.00	13.80	L1	OFF	20.1
1.232250	43.37	---	56.00	12.63	L1	OFF	20.1
1.326750	---	33.19	46.00	12.81	L1	OFF	20.1
1.326750	44.07	---	56.00	11.93	L1	OFF	20.1
1.432500	---	34.52	46.00	11.48	L1	OFF	20.1
1.432500	44.73	---	56.00	11.27	L1	OFF	20.1
1.536000	---	33.38	46.00	12.62	L1	OFF	20.1
1.536000	43.71	---	56.00	12.29	L1	OFF	20.1
1.644000	---	32.14	46.00	13.86	L1	OFF	20.1
1.644000	42.74	---	56.00	13.26	L1	OFF	20.1
1.781250	---	30.69	46.00	15.31	L1	OFF	20.1
1.781250	41.29	---	56.00	14.71	L1	OFF	20.1
1.918500	---	29.01	46.00	16.99	L1	OFF	20.1
1.918500	39.45	---	56.00	16.55	L1	OFF	20.1
13.089750	---	25.27	50.00	24.73	L1	OFF	19.9
13.089750	30.63	---	60.00	29.37	L1	OFF	19.9

EUT Information

Report NO : 193007
 Test Mode : Mode 4
 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)
0.170250	---	20.83	54.95	34.12	N	OFF	19.6
0.170250	42.08	---	64.95	22.87	N	OFF	19.6
0.179250	---	28.24	54.52	26.28	N	OFF	19.6
0.179250	49.86	---	64.52	14.66	N	OFF	19.6
0.192750	---	40.28	53.92	13.64	N	OFF	19.6
0.192750	53.15	---	63.92	10.77	N	OFF	19.6
0.204000	---	34.39	53.45	19.06	N	OFF	19.6
0.204000	51.60	---	63.45	11.85	N	OFF	19.6
0.251250	---	33.47	51.72	18.25	N	OFF	19.6
0.251250	46.41	---	61.72	15.31	N	OFF	19.6
1.164750	---	29.71	46.00	16.29	N	OFF	20.1
1.164750	42.54	---	56.00	13.46	N	OFF	20.1
1.254750	---	31.27	46.00	14.73	N	OFF	20.1
1.254750	42.88	---	56.00	13.12	N	OFF	20.1
1.342500	---	31.32	46.00	14.68	N	OFF	20.1
1.342500	43.45	---	56.00	12.55	N	OFF	20.1
1.439250	---	33.63	46.00	12.37	N	OFF	20.1
1.439250	44.44	---	56.00	11.56	N	OFF	20.1
1.538250	---	30.76	46.00	15.24	N	OFF	20.1
1.538250	43.01	---	56.00	12.99	N	OFF	20.1
1.677750	---	31.00	46.00	15.00	N	OFF	20.1

1.677750	42.14	---	56.00	13.86	N	OFF	20.1
1.801500	---	29.21	46.00	16.79	N	OFF	20.1
1.801500	40.60	---	56.00	15.40	N	OFF	20.1
14.325000	---	28.14	50.00	21.86	N	OFF	20.0
14.325000	34.88	---	60.00	25.12	N	OFF	20.0



Appendix B. Radiated Emission Test Result

