TEST REPORT

Product Name:	Wireless Speaker
Trade Mark:	or PHILIPS
Model No./HVIN:	TAS1509
Add. Model No.:	TAS1509BK/37,TAS1509/37,TAS1509xx/yy (x=A-Z or nil,yy=00-99 or nil, for the country code)
Report Number:	24041610800EMC-1
Test Standards:	FCC 47 CFR Part 15 Subpart B ICES-003 Issue 7
FCC ID:	2AR2STAS1509
Test Result:	PASS
Date of Issue:	June 26, 2024

Prepared for:

MMD Hong Kong Holding Limited
Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

Prepared by:

Shenzhen UnionTrust Quality and Technology Co., Ltd.
Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
TEL: +86-755-2823 0888
FAX: +86-755-2823 0886

Prepared by:	David Chen	Reviewed by:	Henry Lu
	David Chen Senior Project Engineer		Team Leader
Approved by:	Robben Chen	Date:	June 26, 2024
	Robben Chen Assistant Manager		

Version

Version No.	Date	Description
V1.0	June 26, 2024	Original

CONTENTS

1. GENERAL INFORMATION

1.1 CLIENT INFORMATION

Applicant:	MMD Hong Kong Holding Limited
Address of Applicant:	Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong
Manufacturer:	MMD Hong Kong Holding Limited
Address of Manufacturer:	Units 1208-11,12th Floor,C-Bons International Center, 108 Wai Yip Street, Kwun Tong, Kowloon, Hong Kong

1.2 EUT INFORMATION

1.2.1 General Description of EUT

Product Name:	Wireless Speaker
Model No. / HVIN:	TAS1509
Add. Model No.:	TAS1509BK/37,TAS1509/37,TAS1509xx/yy (x=A-Z or nil,yy=00-99 or nil, for the country code)
Trade Mark:	or PHILIPS
DUT Stage:	Identical Prototype
Rated Voltage:	5.0 V ⎓ 1.0 A supplied by adapter 3.7V supplied by battery
Classification of digital devices:	Class B
Highest Internal Frequency:	2480 MHz
Sample Received Date:	April 16, 2024
Sample Tested Date:	April 19, 2024 to May 31, 2024
Note: 1. The additional model TAS1509BK/37,TAS1509/37,TAS1509xx/yy (x=A-Z or nil,yy=00-99 or nil, for the country code) is identical with the test model TAS1509 except the model number for marketing purpose. 2. The ISED certification is only for the main model.	

Remark: The above EUT's information was provided by customer. Please refer to the specifications or user's manual for more detailed description.

1.2.2 Description of Accessories

Cable	
Description:	USB Type-C Plug Cable
Cable Type:	Unshielded without ferrite
Length:	0.3 Meter

Battery 1	
Model No.:	18650 1200mAh
Battery Type:	Li-ion Battery
Rated Voltage:	3.7 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	1200 mAh

Battery 2	
Model No.:	18650-1500mAh
Battery Type:	Li-ion Battery

Rated Voltage:	3.7 Vdc
Limited Charge Voltage:	4.2 Vdc
Rated Capacity:	1500 mAh

1.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested with associated equipment below.

1) Support Equipment

Description	Manufacturer	Model No.	Serial Number	Supplied by
Notebook	Lenovo	Lenovo B40-80	MP12NEQ6	UnionTrust
Adapter	HUAWEI	HW-050200C01	B78578GBT02395	UnionTrust

1.4 TEST LOCATION

Shenzhen UnionTrust Quality and Technology Co., Ltd.

Address: Unit D/E of 9/F and 16/F, Block A, Building 6, Baoneng science and technology park, Longhua district, Shenzhen, China
Telephone: +86 (0) 755 2823 0888
Fax: +86 (0) 755 2823 0886

1.5 TEST FACILITY

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L9069
The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

A2LA-Lab Certificate No.: 4312.01
Shenzhen UnionTrust Quality and Technology Co., Ltd. has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

ISED Wireless Device Testing Laboratories
CAB identifier: CN0032

FCC Accredited Lab.
Designation Number: CN1194
Test Firm Registration Number: 259480

1.6 DEVIATION FROM STANDARDS

None.

1.7 ABNORMALITIES FROM STANDARD CONDITIONS

None.

1.8 OTHER INFORMATION REQUESTED BY THE CUSTOMER

None.

1.9 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

No.	Item	Measurement Uncertainty
1	Conducted emission 9kHz-150kHz	±3.2 dB
2	Conducted emission 150kHz-30MHz	±2.7 dB
3	Radiated emission 9kHz-30MHz	± 4.7 dB
4	Radiated emission 30MHz-1GHz	± 4.6 dB
5	Radiated emission 1GHz-18GHz	± 4.4 dB
6	Radiated emission 18GHz-26GHz	± 4.6 dB
7	Radiated emission 26GHz-40GHz	± 4.6 dB

2. TEST SUMMARY

FCC 47 CFR Part 15 Subpart B Test Cases			
Test Item	**Test Requirement**	**Test Method**	**Result**
Conducted Emission	FCC 47 CFR Part 15.107 ICES-003 Issue 7 Section 3.2.1	ANSI C63.4-2014	PASS
Radiated Emission	FCC 47 CFR Part 15.109 ICES-003 Issue 7 Section 3.2.2	ANSI C63.4-2014	PASS

3. EQUIPMENT LIST

Radiated Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	3m SAC	ETS-LINDGREN	3m	Euroshiedpn-CT001270-1317	11-Nov-2023	10-Nov-2026
☒	Receiver	R&S	ESIB26	100114	27-Oct-2023	26-Oct-2024
☒	Broadband Antenna	ETS-LINDGREN	3142E	00201566	30-Oct-2023	29-Oct-2024
☒	6dB Attenuator	Talent	RA6A5-N-18	18103001	30-Oct-2023	29-Oct-2024
☒	Preamplifier	HP	8447F	2805A02960	31-Oct-2023	30-Oct-2024
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3117-PA	00201541	16-Apr-2023	15-Apr-2025
☒	Pre-amplifier	ETS-Lindgren	00118385	00201874	31-Oct-2023	30-Oct-2024
☒	Double-Ridged Waveguide Horn Antenna (Pre-amplifier)	ETS-LINDGREN	3116C-PA	00202652	30-Oct-2023	29-Oct-2024
☒	Pre-amplifier	ETS-Lindgren	00118384	00202652	30-Oct-2023	29-Oct-2024
☒	Multi device Controller	ETS-LINDGREN	7006-001	00160105	N/A	N/A
☒	Test Software	Audix	e3	Software Version: 9.160323		

Conducted Emission Test Equipment List						
Used	**Equipment**	**Manufacturer**	**Model No.**	**Serial Number**	**Cal. date**	**Cal. Due date**
☒	Receiver	R&S	ESR7	101181	27-Oct-2023	26-Oct-2024
☒	Pulse Limiter	R&S	ESH3-Z2	0357.8810.54	27-Oct-2023	26-Oct-2024
☒	LISN	R&S	ESH2-Z5	860014/024	27-Oct-2023	26-Oct-2024
☒	LISN	ETS-Lindgren	3816/2SH	00201088	27-Oct-2023	26-Oct-2024
☒	Test Software	EZ-EMC	EZ-CON	Software Version: EMC-CON 3A1.1		

4. TEST CONFIGURATION

4.1 ENVIRONMENTAL CONDITIONS FOR TESTING

4.1.1 Normal or Extreme Test Conditions

Environment Parameter	Selected Values During Tests		
Test Condition	Ambient		
	Temperature (°C)	Voltage (V)	Relative Humidity (%)
NV/NT	+15 to +35	5.0 V ⎓ 1.0 A supplied by adapter 3.7V supplied by battery	20 to 75
Remark: 1) NV: Normal Voltage; NT: Normal Temperature			

4.1.2 Record of Normal Environment and Test sample

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)	Sample No.	Tested by
Conducted Emission	23.3	56.5	100.4	S202405063307-ZJA02/6 S202405153418-ZJB04/5	Linson Xie
Radiated Emission	24.5	65.6	100.1		Jackson Wu

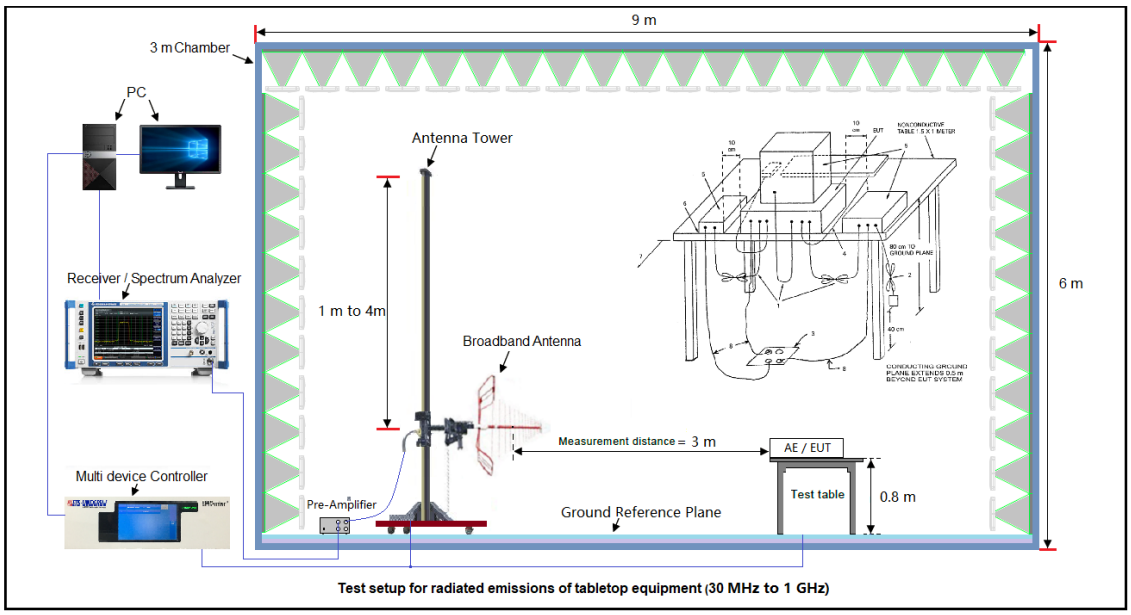
4.2 TEST MODES

Test Item	EMI Test Modes
Radiated Emission	**Test Mode 1: (Battery 1) Powered by USB port + BT playing** Test Mode 2: (Battery 1) Powered by Battery + BT playing Test Mode 3: (Battery 2) Alternative supplier battery sample + Worst from test mode 1~2
Conducted Emission	**Test Mode 1: (Battery 1)Powered by USB port + BT playing** Test Mode 2: (Battery 2) Powered by USB port + BT playing
Remark: The above test modes in boldface were the worst cases, only the test data of these modes were reported.	

4.3 TEST SETUP

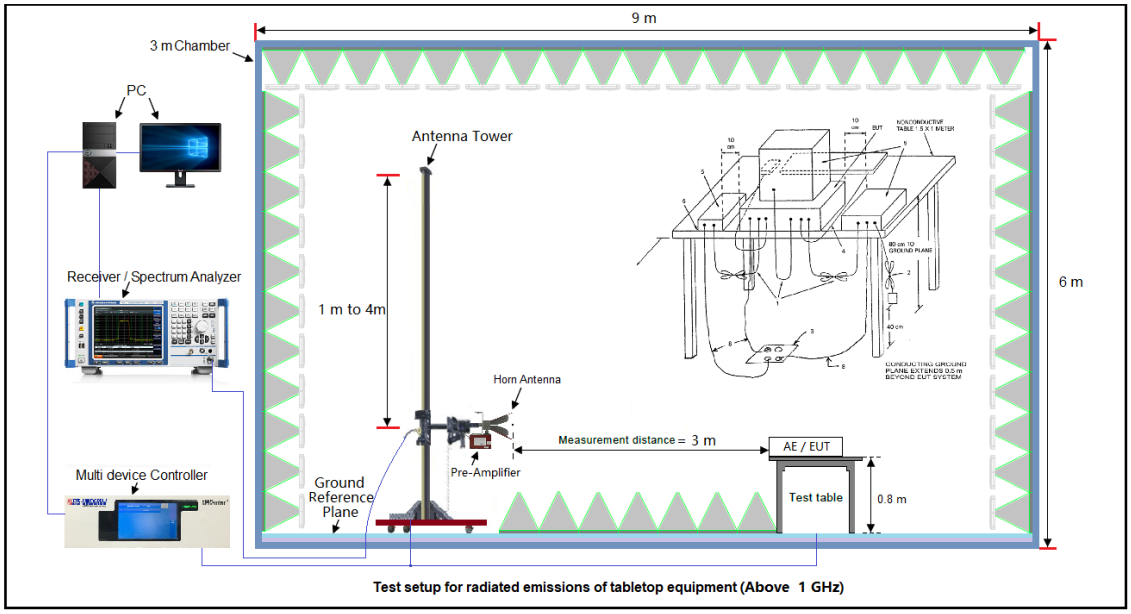
4.3.1 For Radiated Emissions test setup

Figure 1. 30MHz to 1GHz



Test setup for radiated emissions of tabletop equipment (30 MHz to 1 GHz)

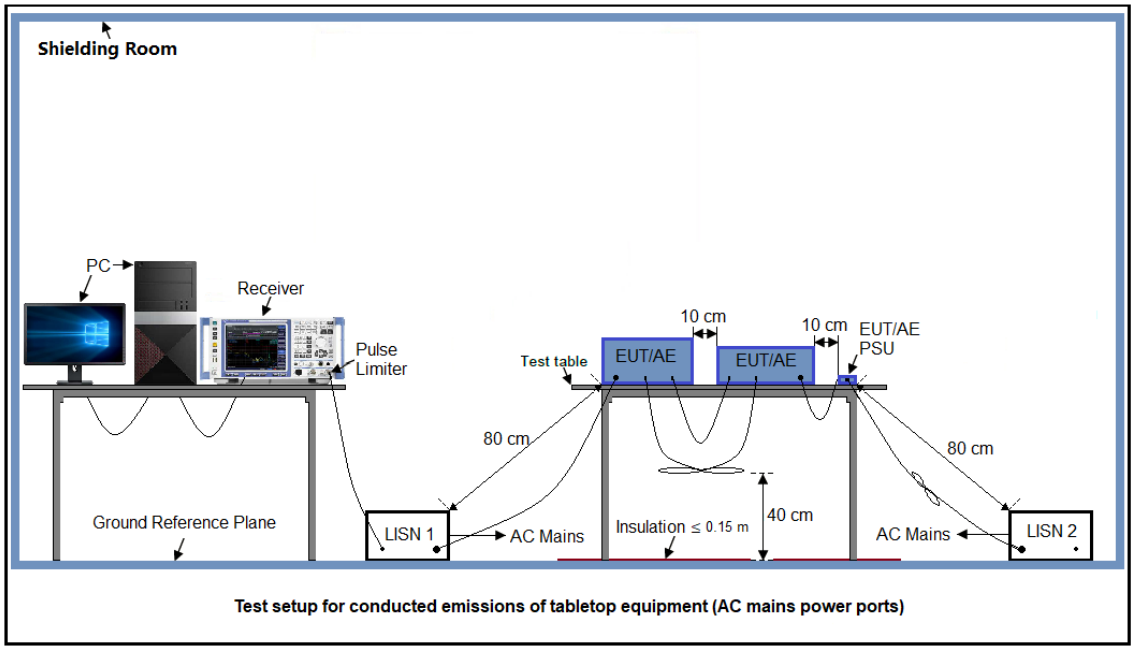
Figure 2. Above 1GHz



Test setup for radiated emissions of tabletop equipment (Above 1 GHz)

4.3.2 For Conducted Emissions test setup

Figure 3. Conducted Emissions setup



Test setup for conducted emissions of tabletop equipment (AC mains power ports)

4.4 SYSTEM TEST CONFIGURATION

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000MHz. The resolution is 1 MHz or greater for frequencies above 1000MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

Radiated emission measurement were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic (according to KDB 896810 D02 SDoC FAQ v01r01) of the highest fundamental frequency or to 40 GHz, whichever is lower.

5. REFERENCE DOCUMENTS FOR TESTING

No.	Identity	Document Title
1	FCC 47 CFR Part15 Subpart B	Unintentional Radiators
2	ICES-003 Issue 7	Information Technology Equipment (Including Digital Apparatus)
3	ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
4	KDB 174176 D01 Line Conducted FAQ v01r01	AC power-line conducted emission frequency asked questions
5	KDB 896810 D02 SDoC FAQ v01r02	Supplier's Declaration of Conformity frequency asked questions

6. EMC REQUIREMENTS SPECIFICATION

6.1 RADIATED EMISSION

Test Requirement: FCC 47 CFR Part 15.109
ICES-003 Issue 7 Clause 3.2.2

Test Method: ANSI C63.4-2014

Receiver Setup:

Frequency: (f) (MHz)	Detector type	Measurement receiver bandwidth	
		RBW	VBW
30 ≤ f ≤ 1 000	Quasi Peak	120 kHz	300 kHz
f ≥1000	Peak	1 MHz	3 MHz
	Average	1 MHz	3 MHz

Measured frequency range

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Limits:

Limits for Class B devices

FCC 47 CFR Part 15 Subpart B

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30 – 88	40.0	--	--
88 – 216	43.5	--	--
216 – 960	46.0		
960 – 1000	54.0	--	--
Above 1000	--	74.0	54.0

ICES-003 Issue 7

Frequency (MHz)	limits at 3m (dBμV/m)		
	QP Detector	PK Detector	AV Detector
30 – 88	40.0	--	--
88 – 216	43.5	--	--
216 – 230	46.0		

230 – 960	47.0	--	--
960 – 1000	54.0	--	--
Above 1000	--	74.0	54.0

Remark:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBμV/m) = 20 log Emission level (μV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

Test Setup: Refer to section 4.3.1 for details.

Test Procedures:

1. From 30 MHz to 1GHz test procedure as below:

1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

2. Above 1GHz test procedure as below:

1) The Product was placed on the non-conductive turntable 0.8 m above the ground at a chamber.
2) Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
3) For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.

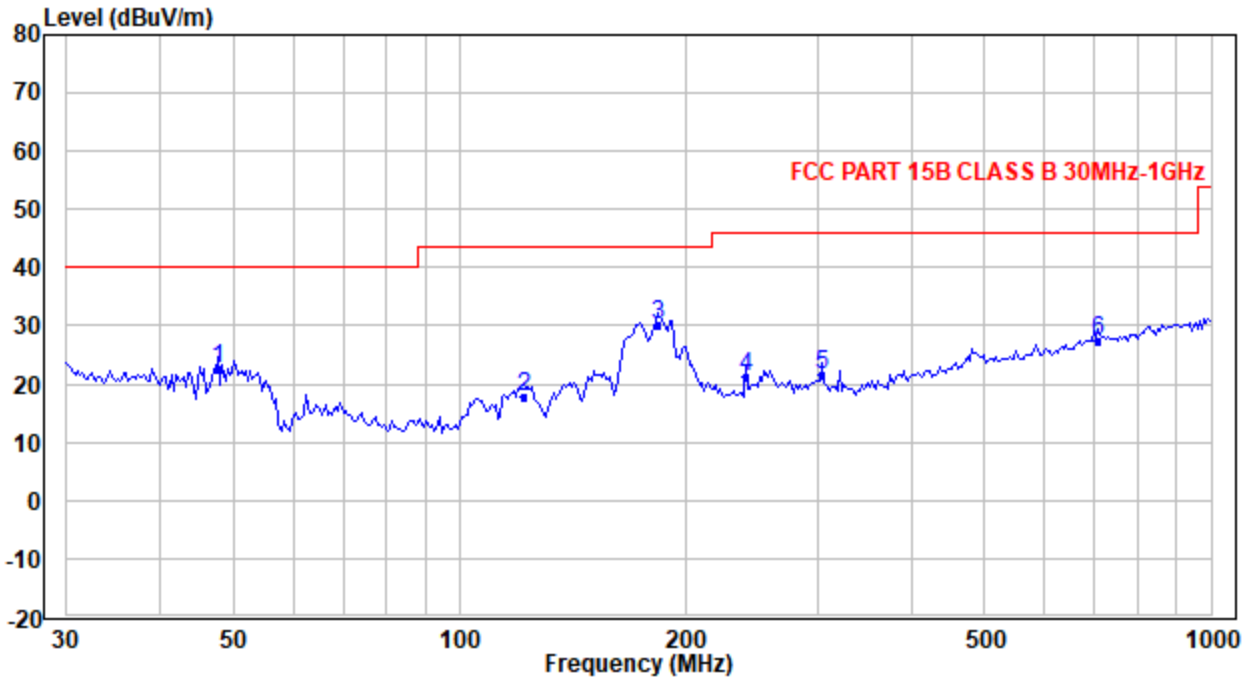
Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

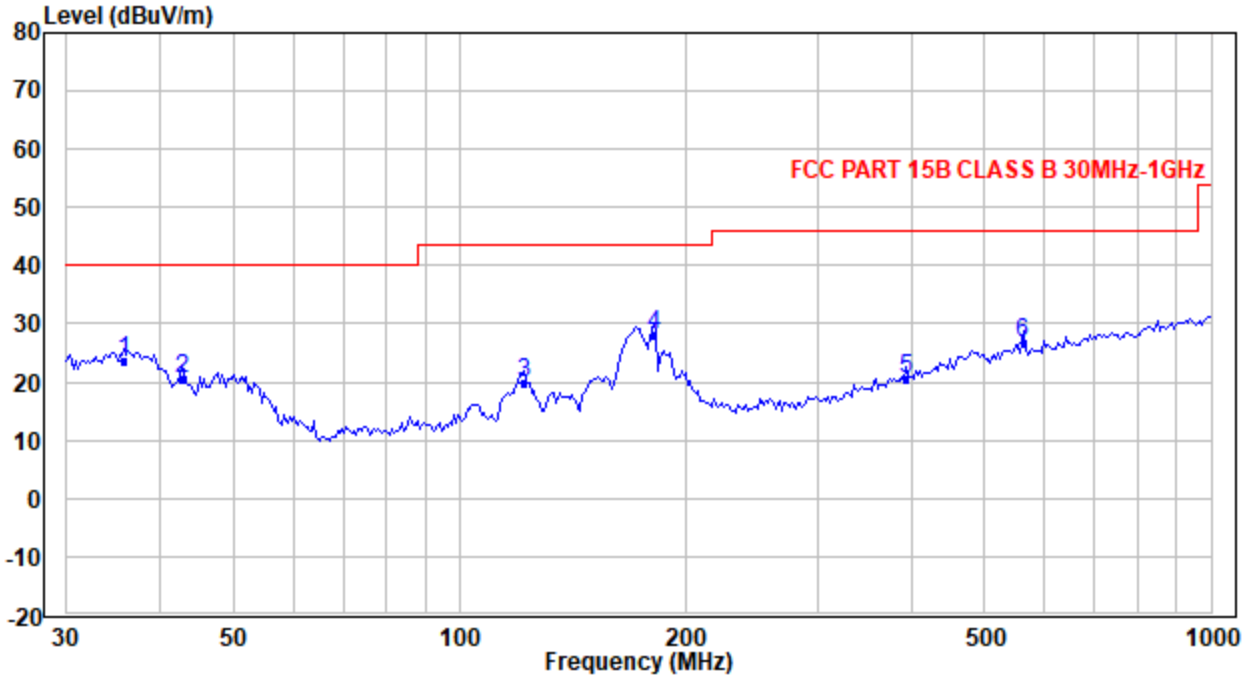
The worst measurement data for FCC 47 CFR Part 15 Subpart B as follows:

Below 1GHz(Quasi Peak):
Test Mode1
Horizontal



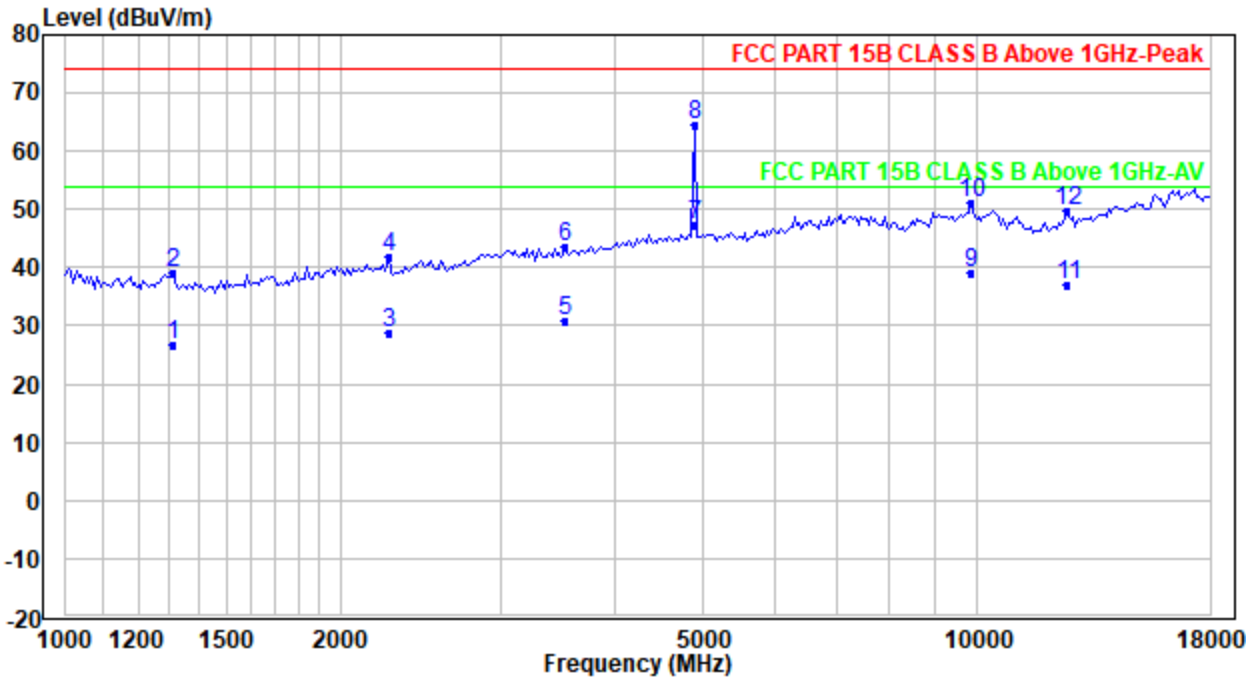
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	47.703	35.74	-13.10	22.64	40.00	-17.36	QP
2	121.462	33.31	-15.49	17.82	43.50	-25.68	QP
3	183.866	41.94	-11.72	30.22	43.50	-13.28	QP
4	240.144	31.91	-10.62	21.29	46.00	-24.71	QP
5	302.819	30.33	-8.77	21.56	46.00	-24.44	QP
6	708.694	25.65	1.85	27.50	46.00	-18.50	QP

Vertical



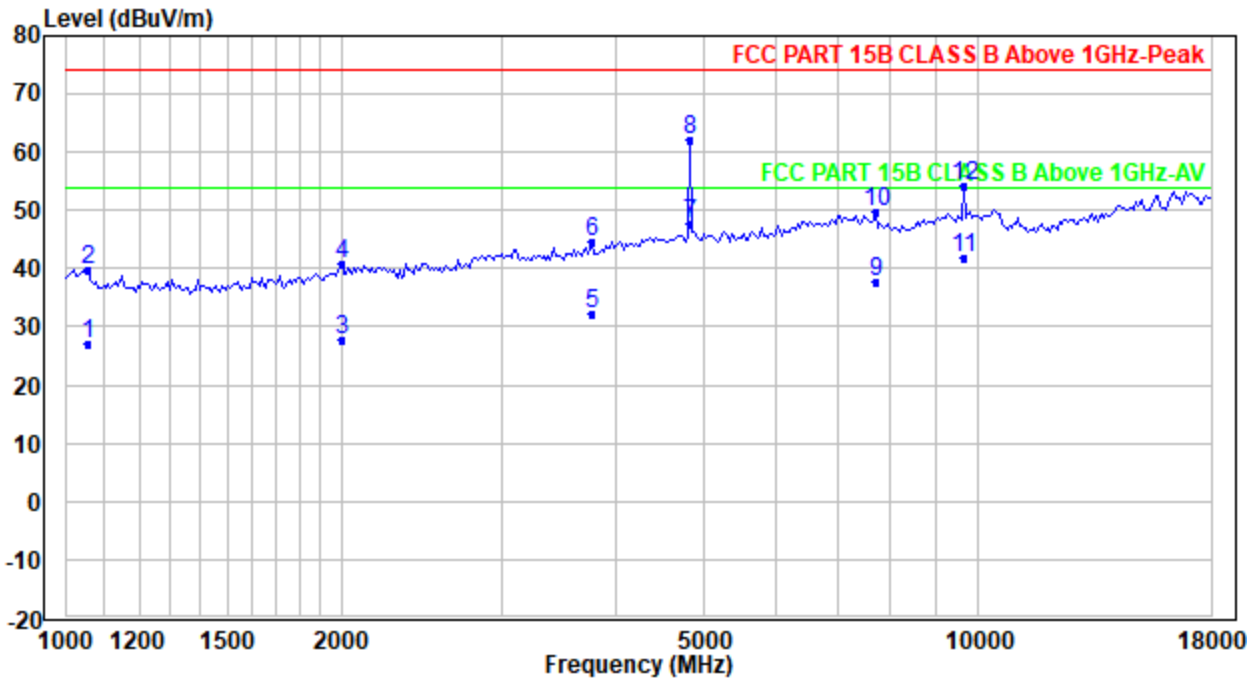
No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	35.762	30.35	-6.73	23.62	40.00	-16.38	QP
2	42.63	30.69	-10.01	20.68	40.00	-19.32	QP
3	121.462	35.42	-15.49	19.93	43.50	-23.57	QP
4	181.30	39.93	-11.82	28.11	43.50	-15.39	QP
5	392.738	25.76	-5.06	20.70	46.00	-25.30	QP
6	562.014	28.28	-1.55	26.73	46.00	-19.27	QP

Above 1GHz(Peak & Average)
Test Mode1
Horizontal



No.	Frequency (MHz)	Reading (dBµV)	Correction factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1	1312.901	39.69	-13.02	26.67	54.00	-27.33	Average
2	1312.901	52.20	-13.02	39.18	74.00	-34.82	Peak
3	2263.061	37.62	-8.84	28.78	54.00	-25.22	Average
4	2263.061	50.56	-8.84	41.72	74.00	-32.28	Peak
5	3535.05	35.98	-5.05	30.93	54.00	-23.07	Average
6	3535.05	48.49	-5.05	43.44	74.00	-30.56	Peak
7	4889.539	49.28	-2.04	47.24	54.00	-6.76	Average
8	4889.539	66.61	-2.04	64.57	74.00	-9.43	Peak
9	9854.908	35.72	3.24	38.96	54.00	-15.04	Average
10	9854.908	47.81	3.24	51.05	74.00	-22.95	Peak
11	12569.17	33.08	4.03	37.11	54.00	-16.89	Average
12	12569.17	45.76	4.03	49.79	74.00	-24.21	Peak

Vertical



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Detector
1	1053.514	40.05	-12.94	27.11	54.00	-26.89	Average
2	1053.514	52.61	-12.94	39.67	74.00	-34.33	Peak
3	2003.868	37.38	-9.54	27.84	54.00	-26.16	Average
4	2003.868	50.35	-9.54	40.81	74.00	-33.19	Peak
5	3767.619	36.25	-3.97	32.28	54.00	-21.72	Average
6	3767.619	48.51	-3.97	44.54	74.00	-29.46	Peak
7	4833.222	49.81	-2.07	47.74	54.00	-6.26	Average
8	4833.222	64.23	-2.07	62.16	74.00	-11.84	Peak
9	7726.777	36.34	1.26	37.60	54.00	-16.40	Average
10	7726.777	48.47	1.26	49.73	74.00	-24.27	Peak
11	9629.201	38.65	3.12	41.77	54.00	-12.23	Average
12	9629.201	51.13	3.12	54.25	74.00	-19.75	Peak

Remark:

1. Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result – Limit
4. For Radiated Emission above 18GHz, there was not any unwanted emission detected.
5. The limit of ICES-003 in the 230MHz to 960MHz band is higher than that of FCC Part 15B, so the radiation emission test data conform to the limit of ICES-003.

6.2 CONDUCTED EMISSION

Test Requirement: FCC 47 CFR Part 15.107
ICES-003 Issue 7 Section 3.2.1

Test Method: ANSI C63.4-2014

Limits:

Limits for Class B devices

Frequency range (MHz)	Limits (dB(μV))	
	Quasi-peak	Average
0,15 to 0,50	66 to 56	56 to 46
0,50 to 5	56	46
5 to 30	60	50

Remark:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

Test Setup: Refer to section 4.3.2 for details.

Test Procedures:

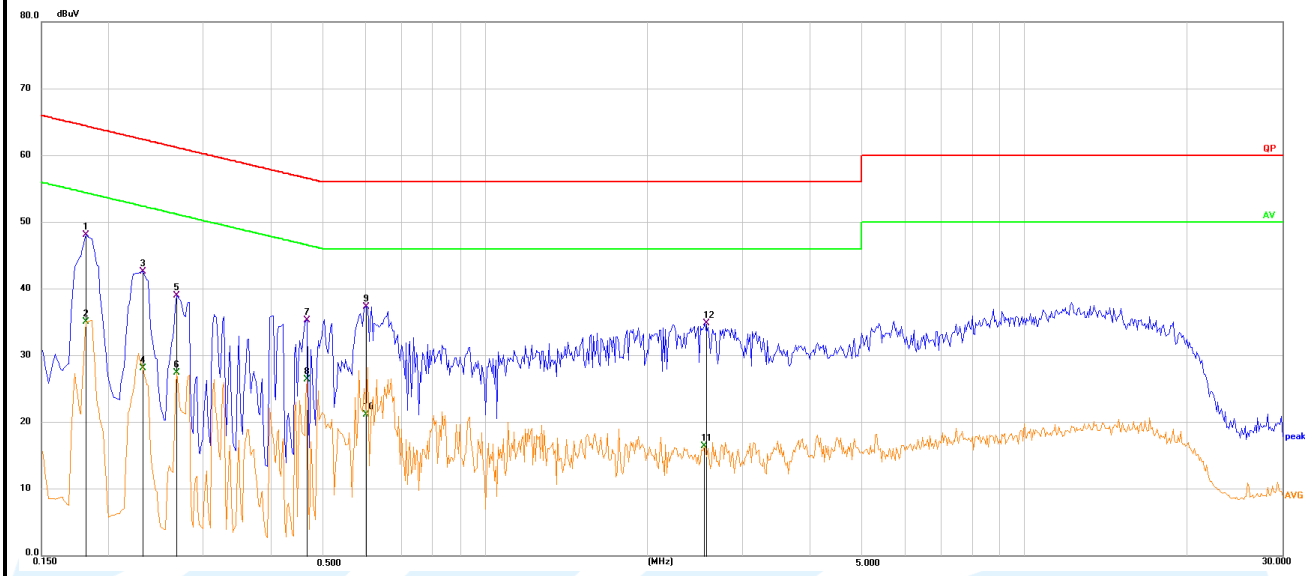
1) The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
2) The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
3) For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.

Equipment Used: Refer to section 3 for details.

Test Result: Pass

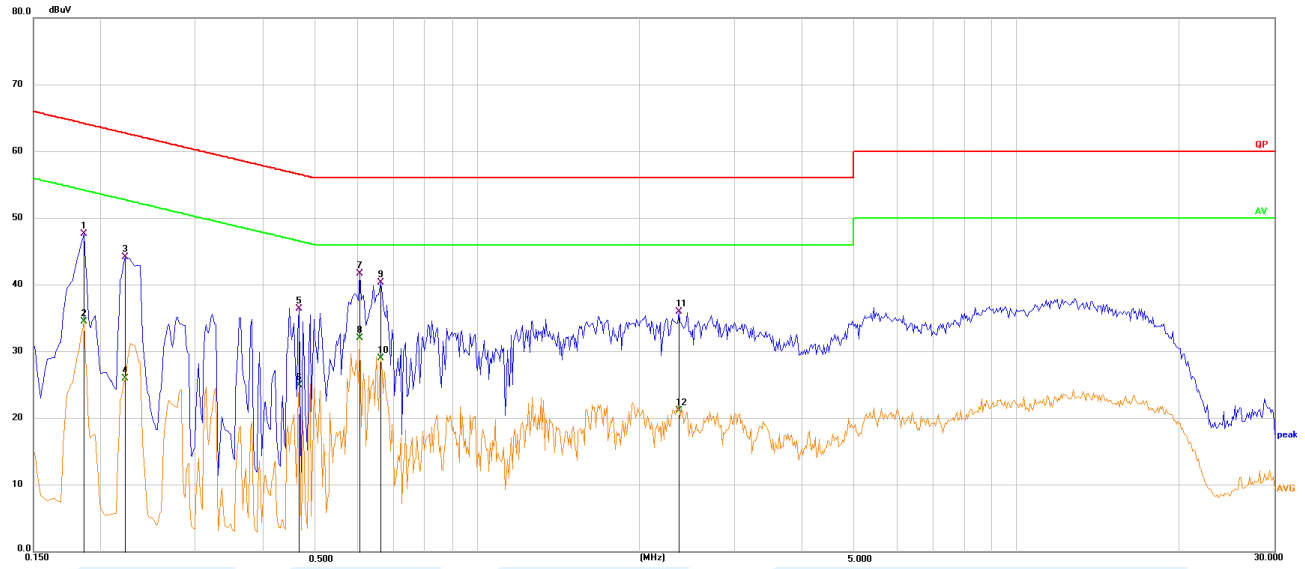
The worst measurement data as follows:
Quasi Peak and Average:
Test Mode1

Live Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1814	37.86	10.18	48.04	64.42	-16.38	QP
2	0.1814	24.85	10.18	35.03	54.42	-19.39	AVG
3	0.2310	32.40	10.17	42.57	62.41	-19.84	QP
4	0.2310	17.93	10.17	28.10	52.41	-24.31	AVG
5	0.2670	28.74	10.20	38.94	61.21	-22.27	QP
6	0.2670	17.25	10.20	27.45	51.21	-23.76	AVG
7	0.4650	25.15	10.18	35.33	56.60	-21.27	QP
8	0.4650	16.19	10.18	26.37	46.60	-20.23	AVG
9	0.6000	27.16	10.20	37.36	56.00	-18.64	QP
10	0.6000	10.93	10.20	21.13	46.00	-24.87	AVG
11	2.5440	6.17	10.24	16.41	46.00	-29.59	AVG
12	2.5574	24.62	10.24	34.86	56.00	-21.14	QP

Neutral Line



No.	Frequency (MHz)	Reading (dBμV)	Correction factor (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)	Detector
1	0.1860	37.56	10.08	47.64	64.21	-16.57	QP
2	0.1860	24.43	10.08	34.51	54.21	-19.70	AVG
3	0.2220	34.07	10.06	44.13	62.74	-18.61	QP
4	0.2220	15.94	10.06	26.00	52.74	-26.74	AVG
5	0.4650	26.21	10.25	36.46	56.60	-20.14	QP
6	0.4650	14.66	10.25	24.91	46.60	-21.69	AVG
7	0.6045	31.44	10.26	41.70	56.00	-14.30	QP
8	0.6045	21.77	10.26	32.03	46.00	-13.97	AVG
9	0.6630	30.04	10.25	40.29	56.00	-15.71	QP
10	0.6630	18.75	10.25	29.00	46.00	-17.00	AVG
11	2.3640	25.63	10.30	35.93	56.00	-20.07	QP
12	2.3640	10.87	10.30	21.17	46.00	-24.83	AVG

Remark:

1. Correct Factor = LISN Factor + Cable Loss + Pulse Limiter Factor, the value was added to Original Receiver Reading by the software automatically.
2. Result = Reading + Correct Factor.
3. Margin = Result - Limit
4. An initial pre-scan was performed on the Phase and neutral lines with peak detector. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected.

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

********** End of Report **********