



TEST REPORT

Reference No...... : WTF21F04041205R1E
FCC ID : 2A2RV-DK01
Applicant..... : ZHONGSHAN TURBOS TECHNOLOGY CO.,LTD
Address..... : 4th Floor, No.2, Zhiye Road, Dongfeng Town, Zhongshan City
Manufacturer : The same as above
Address..... : The same as above
Product Name..... : Desktop air purifier
Model No...... : DK 01, DK 02
Standards : 47 CFR PART 15 SUBPART B (Oct.,2019)
47 CFR PART 18 SUBPART C (Oct.,2019)
Date of Receipt sample : 2021-05-06
Date of Test : 2021-05-07 to 2021-05-28
Date of Issue..... : 2021-09-06
Test Report Form No. : WEO-FCC15A-01B
Test Result..... : Pass

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

Waltek Testing Group (Foshan) Co., Ltd.

Address: No.13-19, 2/F., 2nd Building, Sunlink International Machinery City,
Chencun, Shunde District, Foshan, Guangdong, China

Tel:+86-757-23811398

Fax:+86-757-23811381

E-mail:info@waltek.com.cn

Compiled by:

Kyrie Yun / Project Engineer

Approved by:

Danny Zhou / Manager



1 Test Summary

Test Item	Test Requirement	Class	Test Method	Test Result
Conducted Emission	47 CFR PART 15 SUBPART B (Oct.,2019) 47 CFR PART 18 SUBPART C (Oct.,2019)	Class B	ANSI C63.4: 2014 FCC/OST MP-5:1986	Pass
Magnetic Radiation Disturbance	47 CFR PART 18 SUBPART C (Oct.,2019)	Class B	FCC/OST MP-5:1986	Pass
Radiated Emission	47 CFR PART 15 SUBPART B (Oct.,2019) 47 CFR PART 18 SUBPART C (Oct.,2019)	Class B	ANSI C63.4: 2014 FCC/OST MP-5:1986	Pass

Remark:

Pass

Test item meets the requirement

N/A

Test case does not apply to the test object

WALTEK



2 Contents

	Page
1 TEST SUMMARY	2
2 CONTENTS	3
3 GENERAL INFORMATION.....	4
3.1 GENERAL DESCRIPTION OF E.U.T.	4
3.2 DETAILS OF E.U.T.....	4
3.3 DESCRIPTION OF SUPPORT UNITS.....	4
3.4 STANDARDS APPLICABLE FOR TESTING	4
3.5 TEST FACILITY.....	5
3.6 SUBCONTRACTED.....	5
3.7 ABNORMALITIES FROM STANDARD CONDITIONS	5
3.8 OTHER	5
4 EQUIPMENT USED DURING TEST	6
4.1 SOFTWARE LIST	6
4.2 MEASUREMENT UNCERTAINTY	7
4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	7
4.4 DECISION RULE.....	7
5 EMISSION TEST RESULTS.....	8
5.1 CONDUCTED EMISSION	8
5.1.1 E.U.T. Operation	8
5.1.2 Block Diagram of Test Setup	8
5.1.3 Measurement Data	8
5.1.4 Corrected Amplitude & Margin Calculation.....	9
5.1.5 Conducted Emission Test Data	9
5.2 MAGNETIC FIELD DISTURBANCE, 9KHZ TO 150KHZ, 150KHZ TO 30MHZ.....	11
5.2.1 E.U.T. Operation	11
5.2.2 Block Diagram of Test Setup	11
5.2.3 Measurement Data	11
5.2.4 Corrected Amplitude & Margin Calculation.....	12
5.2.5 Magnetic Field Disturbance Test Results of 9kHz to 150kHz.....	12
5.2.6 Magnetic Field Disturbance Test Results of 150kHz to 30MHz	14
5.3 RADIATED EMISSION, 30MHZ TO 1GHZ	16
5.3.1 E.U.T. Operation	16
5.3.2 Block Diagram of Test Setup	16
5.3.3 Measurement Data	16
5.3.4 Corrected Amplitude & Margin Calculation.....	17
5.3.5 Radiated Emission Test Data	17
5.4 RADIATED EMISSION, 1GHZ TO 12.75GHZ	19
5.4.1 E.U.T. Operation	19
5.4.2 Block Diagram of Test Setup	19
5.4.3 Measurement Data	19
5.4.4 Corrected Amplitude & Margin Calculation.....	20
5.4.5 Radiated Emission Test Data	20
6 PHOTOGRAPHS – TEST SETUP	22
6.1 PHOTOGRAPH – CONDUCTED EMISSION TEST SETUP.....	22
6.2 PHOTOGRAPH – MAGNETIC FIELD DISTURBANCE TEST SETUP	22
6.3 PHOTOGRAPH – RADIATED EMISSION TEST SETUP, 30MHZ TO 1GHZ.....	23
6.4 PHOTOGRAPH – RADIATED EMISSION TEST SETUP, 1GHZ TO 12.75GHZ.....	23
7 PHOTOGRAPHS – CONSTRUCTIONAL DETAILS	24
7.1 EUT – EXTERNAL VIEW	24



3 General Information

3.1 General Description of E.U.T.

Product Name : Desktop air purifier
Model No. : DK 01, DK 02
Remark : Two models are identical product only except for their model names.
Therefore the EMC tests were performed on model DK 01.

3.2 Details of E.U.T.

Technical Data : For Air Purifier: DC 12V, 2A, 24W;
For Adapter: INPUT: 100-240V~, 50/60Hz, 0.75A max;
OUTPUT: 12VDC, 2.5A
Frequency Range: 110-205kHz

3.3 Description of Support Units

The EUT has been tested as an independent unit. DK 01 is the test sample. Both tests were performed in the condition of AC 120V/60Hz input.

3.4 Standards Applicable for Testing

The tests were performed according to following standards:

47 CFR PART 15 SUBPART B (Oct.,2019)	Radio frequency devices
47 CFR PART 18 SUBPART C (Oct.,2019)	Industrial, Scientific, and Medical Equipment



3.5 Test Facility

The test facility has a test site registered with the following organizations:

- **ISED – Registration No.: 21895**

Waltek Testing Group (Foshan) Co., Ltd. has been registered and fully described in a report filed with the Innovation, Science and Economic Development Canada (ISED). The acceptance letter from the ISED is maintained in our files. Registration ISED number: 21895, March 12, 2019

- **FCC – Registration No.: 820106**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 820106, August 16, 2018

- **NVLAP – Lab Code: 600191-0**

Waltek Testing Group (Foshan) Co., Ltd. EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 600191-0.

This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

3.6 Subcontracted

Whether parts of tests for the product have been subcontracted to other labs:

☐ Yes ☒ No

If Yes, list the related test items and lab information:

Test items: --

Lab information: --

3.7 Abnormalities from Standard Conditions

None.

3.8 Other

This report is based on report No. WTF21F04041205E for adding the FCC ID. It does not affect the EMC test items. Therefore the EUT is deemed to fulfill all the requirements and no further test has been performed.



4 Equipment Used during Test

Mains Terminal Disturbance Voltage 1#(Conducted Emission)					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESR3	102423	Valid
2.	LISN	R&S	ENV216	101343	Valid
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	223NN624	Valid
4.	Switch	CD	RSU-A4 18G	RSUA4008	Valid
Mains Terminal Disturbance Voltage 2#(Conducted Emission)					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESCI	101178	Valid
2.	LISN	R&S	ENV216	101215	Valid
3.	Cable	HUBER+SUHNER	CBL2-NN-6M	6102701	Valid
4.	Switch	ESE	RSU/M2	---	Valid
Magnetic Radiation Disturbance					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	10m Semi-anechoic chamber	FRANKONIAGMBH	SAC10	F069042	Valid
2.	EMI Test Receiver (20Hz-40GHz)	R&S	ESU40	100298	Valid
3.	loop Antenna(ϕ 0.6m ,9kHz-30MHz)	TESEQ	HLA6120	25435	Valid
4.	Turntable And Antenna Controller	FRANKONIA	FC02	N/A	Valid
Radiated Emission					
Item	Equipment	Manufacturer	Model No.	Serial No.	Calibration Status
1.	EMI Test Receiver	R&S	ESR7	101566	Valid
2.	Active Loop Antenna	SCHWARZBECK	FMZB1519B	00004	Valid
3.	Trilog Broadband Antenna	SCHWARZBECK	VULB 9162	9162-117	Valid
4.	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	01561	Valid
5.	Preamplifier	Lunar E M	LNA1G18-40	20160501002	Valid

4.1 Software List

Description	Manufacturer	Model	Version
EMI Test Software (Conducted Emission1#)	FARATRONIC	EZ-EMC	EMEC-3A1
EMI Test Software (Conducted Emission2#)	FARATRONIC	EZ-EMC	CON-03A1
EMI Test Software (Radiated Emission)	FARATRONIC	EZ-EMC	RA-03A1-1



4.2 Measurement Uncertainty

Test Item	Frequency Range	Uncertainty	Note
Conducted Emission	150kHz~30MHz	$\pm 2.7\text{dB}$	(1)
Magnetic Radiation Disturbance	9kHz~30MHz	$\pm 4.9\text{dB}$	(1)
Radiated Emission	30MHz~1GHz	$\pm 4.1\text{dB}$	(1)
Radiated Emission	1GHz~6GHz	$\pm 5.0\text{dB}$	(1)
Radiated Emission	6GHz~18GHz	$\pm 5.0\text{dB}$	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

4.3 Special Accessories and Auxiliary Equipment

Item	Equipment	Technical Data	Manufacturer	Model No.	Serial No.
1.	/	/	/	/	/

4.4 Decision Rule

Compliance or non-compliance with a disturbance limit shall be determined in the following manner.

If U_{LAB} is less than or equal to U_{cispr} , then

- Compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- Non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

If U_{LAB} is greater than U_{cispr} , then

- Compliance is deemed to occur if no measured disturbance level, increased by $(U_{\text{LAB}} - U_{\text{cispr}})$, exceeds the disturbance limit;
- Non-compliance is deemed to occur if any measured disturbance level, increased by $(U_{\text{LAB}} - U_{\text{cispr}})$, exceeds the disturbance limit.



5 Emission Test Results

5.1 Conducted Emission

Test Requirement.....	: 47 CFR PART 15, SUBPART B; 47 CFR PART 18, SUBPART C
Test Method.....	: ANSI C63.4
Test Result.....	: Pass
Test Limit	: 47 CFR PART 15, SUBPART B Section 15.107; 47 CFR PART 18, SUBPART B Section 18.307
Frequency Range.....	: 150kHz to 30MHz
Class.....	: Class B

5.1.1 E.U.T. Operation

Operating Environment:

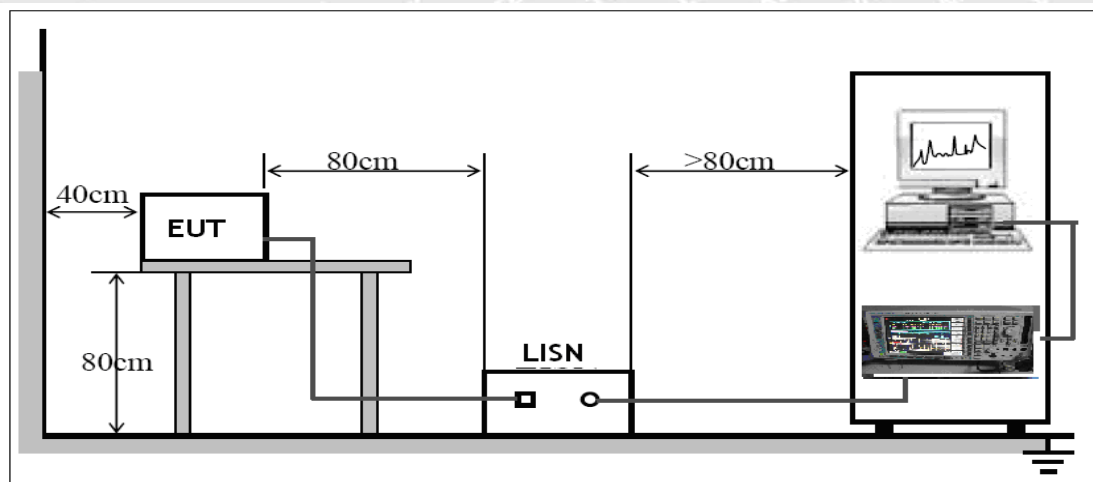
Temperature	: 26°C
Humidity.....	: 60%RH
Atmospheric Pressure	: 101.3 kPa

EUT Operation:

Input Voltage	: AC 120V/60Hz
Operating Mode.....	: Working + Wireless Charging Mode

5.1.2 Block Diagram of Test Setup

The Conducted Emission tests were performed in accordance with the ANSI C63.4, FCC/OST MP-5:1986.



5.1.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



5.1.4 Corrected Amplitude & Margin Calculation

The Corrected factor is calculated by adding LISN VDF(Voltage Division Facotr), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

$$\text{Measurement} = \text{Reading Level} + \text{Correct Factor}$$

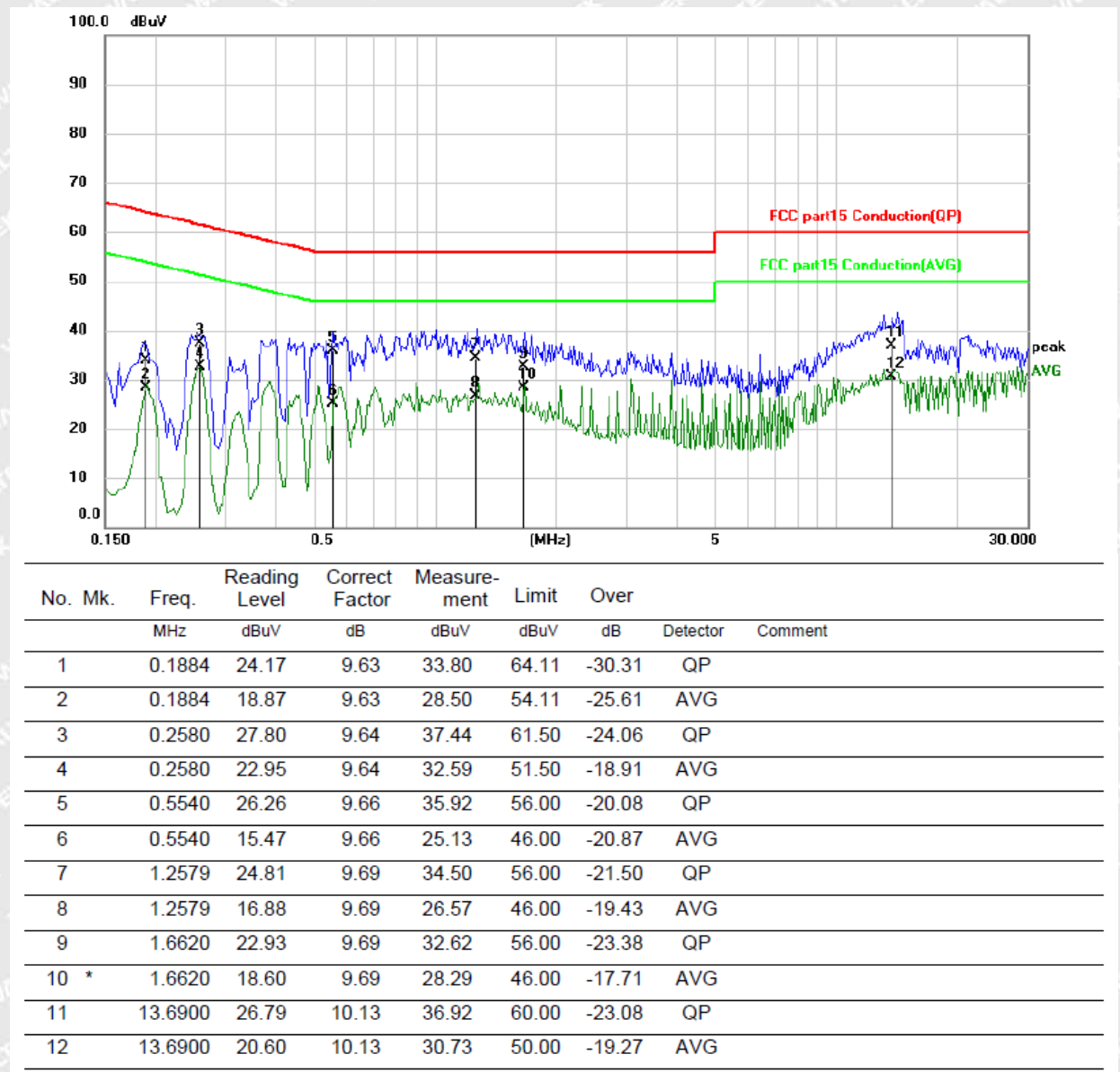
$$\text{Correct Facotor} = \text{LISN VDF} + \text{Cable Loss}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Measurement}$$

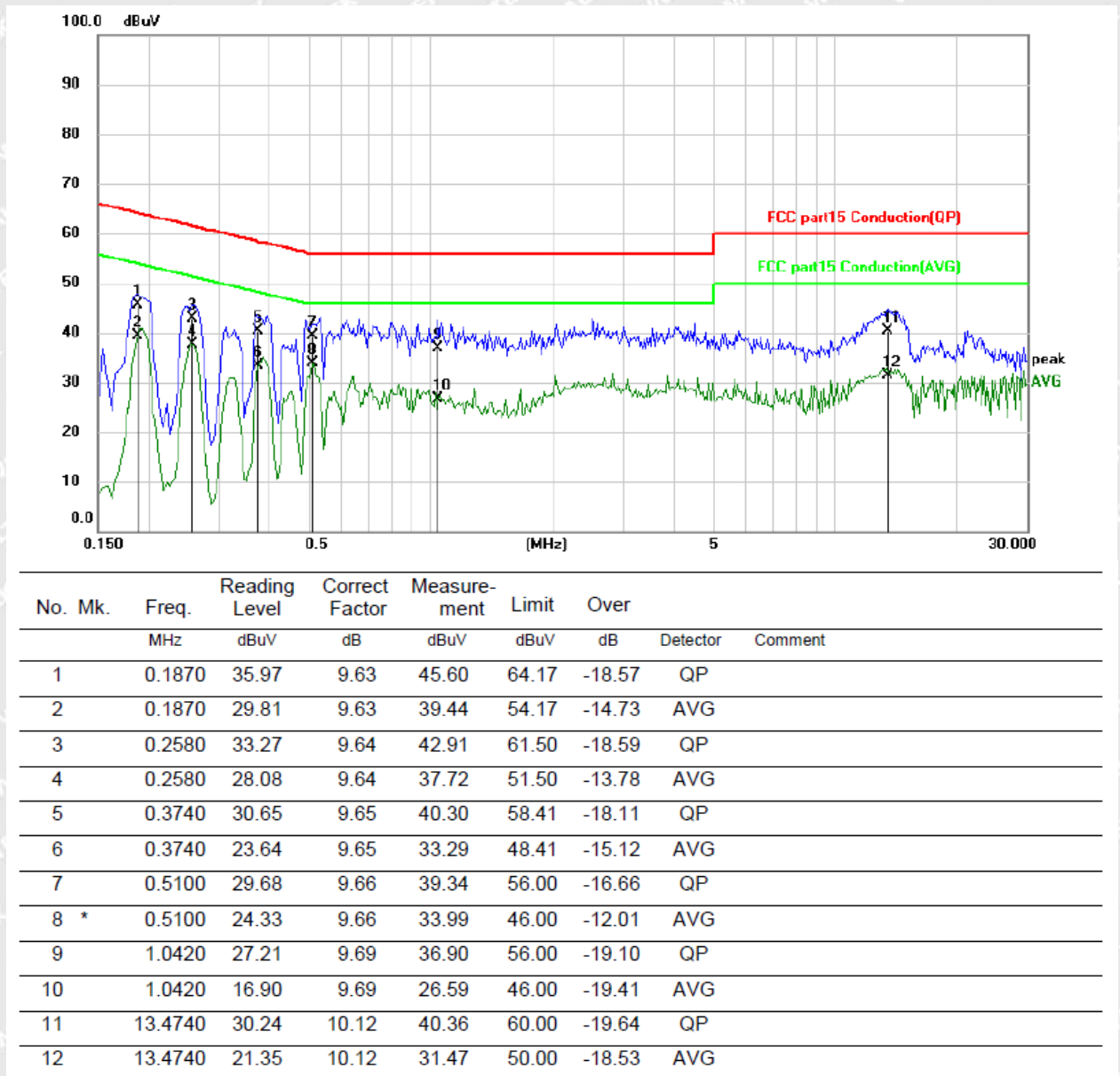
5.1.5 Conducted Emission Test Data

Live Line





Neutral Line





5.2 Magnetic Field Disturbance, 9kHz to 150kHz, 150kHz to 30MHz

Test Requirement..... : 47 CFR PART 18, SUBPART C
Test Method..... : FCC/OST MP-5:1986
Test Result..... : Pass
Frequency Range..... : 9kHz to 150kHz, 150kHz to 30MHz
Class..... : Class B

5.2.1 E.U.T. Operation

Operating Environment:

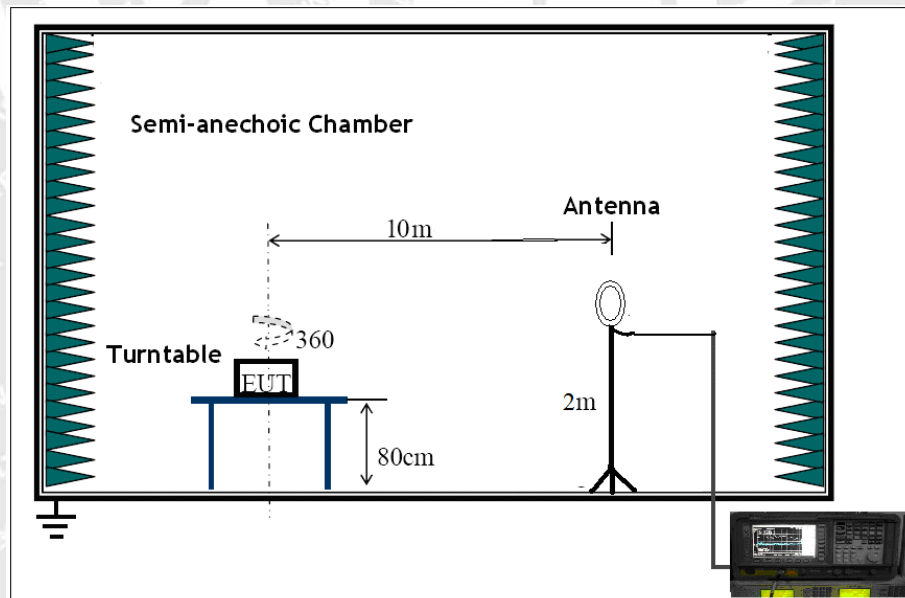
Temperature : 24.0°C
Humidity..... : 51.0%RH
Barometric Pressure..... : 101.2kPa

EUT Operation:

Input Voltage : AC 220V/60Hz
Operating Mode..... : Max Power Mode

5.2.2 Block Diagram of Test Setup

The radiated emission tests were performed in the 10m Semi- Anechoic Chamber test site, using the setup accordance with the FCC/OST MP-5:1986



5.2.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for EUT 0°-360°. Quasi-peak measurements were performed if peak emissions were within 6dB of the limit line.



5.2.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Corr. Factor

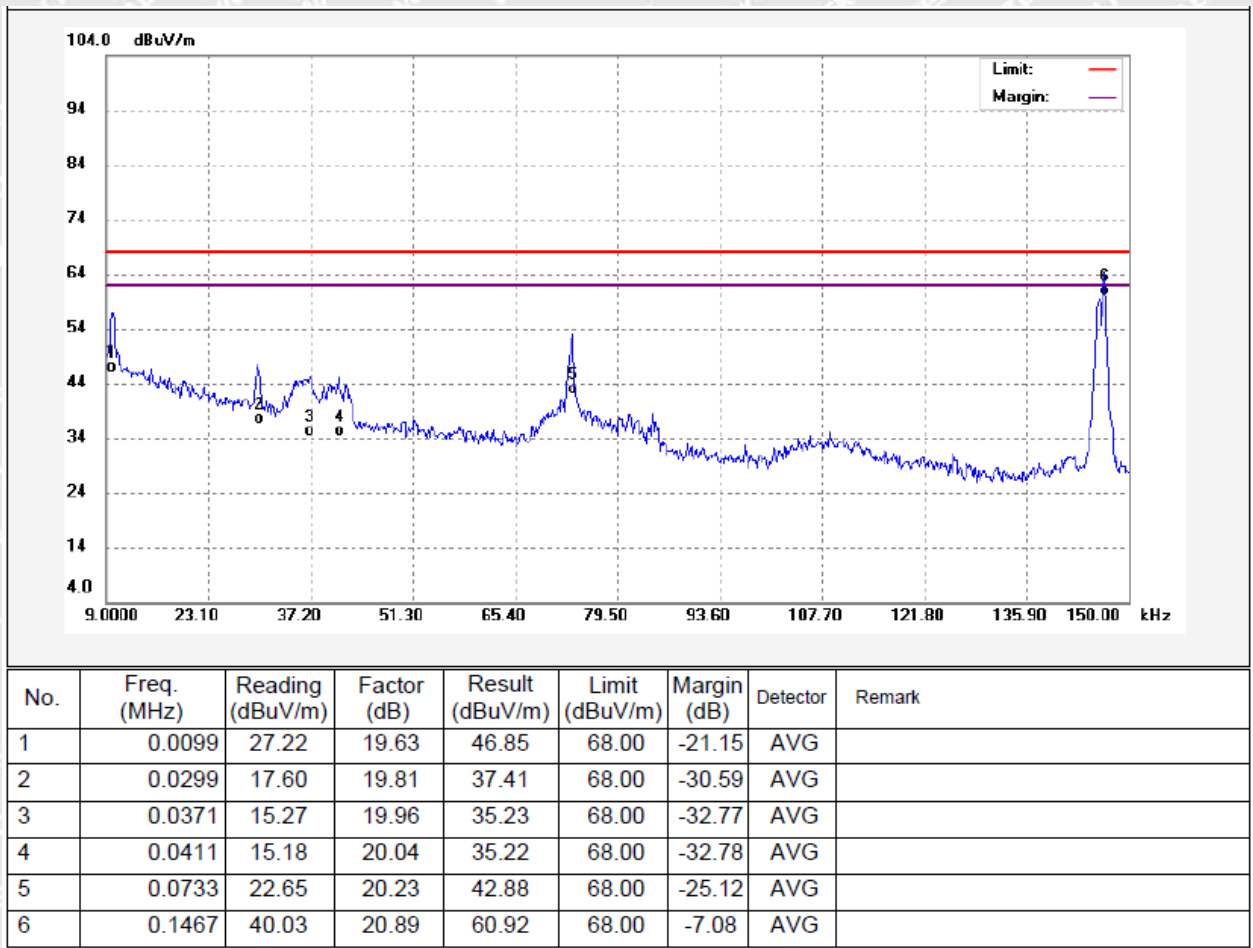
Corr.Factor=Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

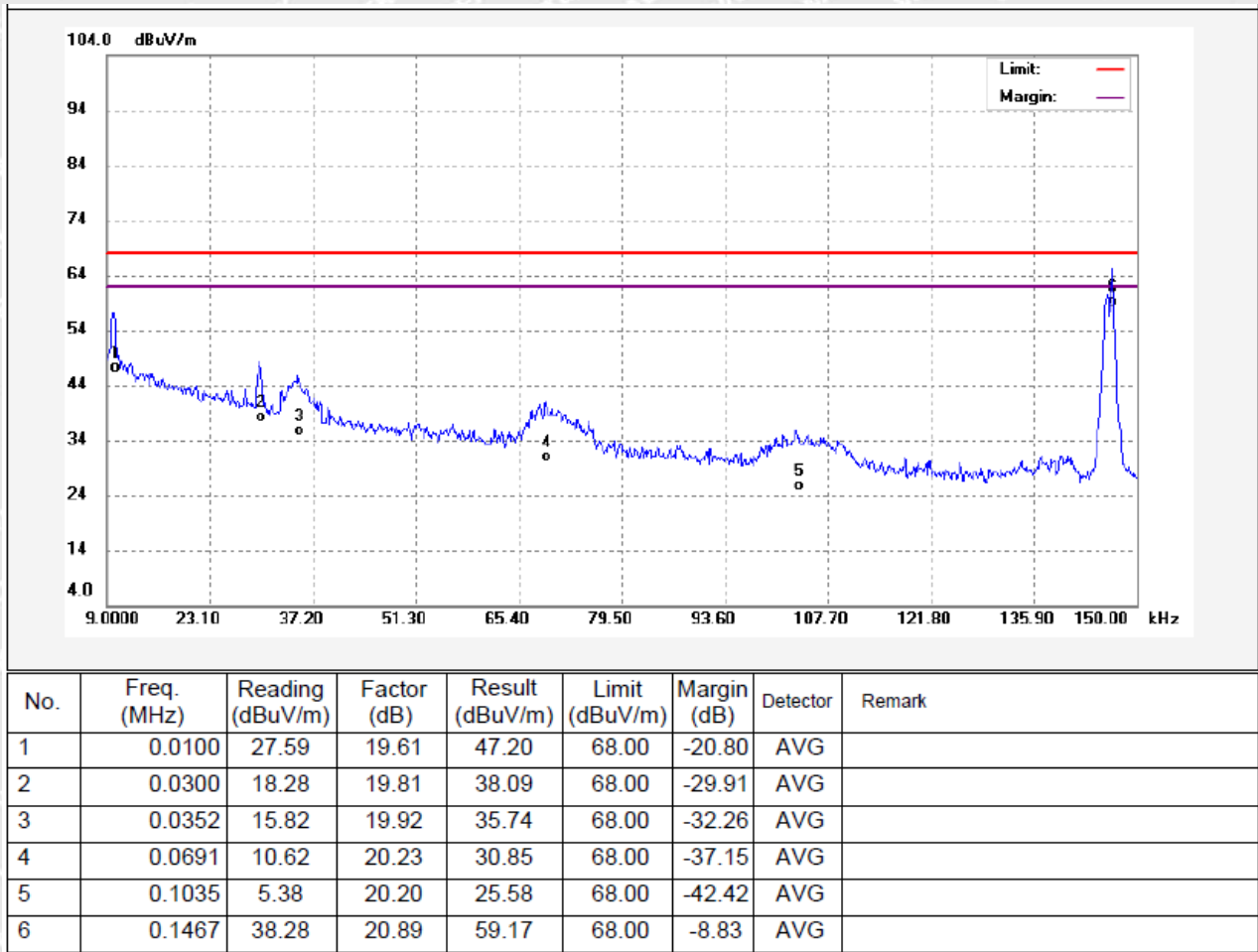
5.2.5 Magnetic Field Disturbance Test Results of 9kHz to 150kHz

Vertical Polarization



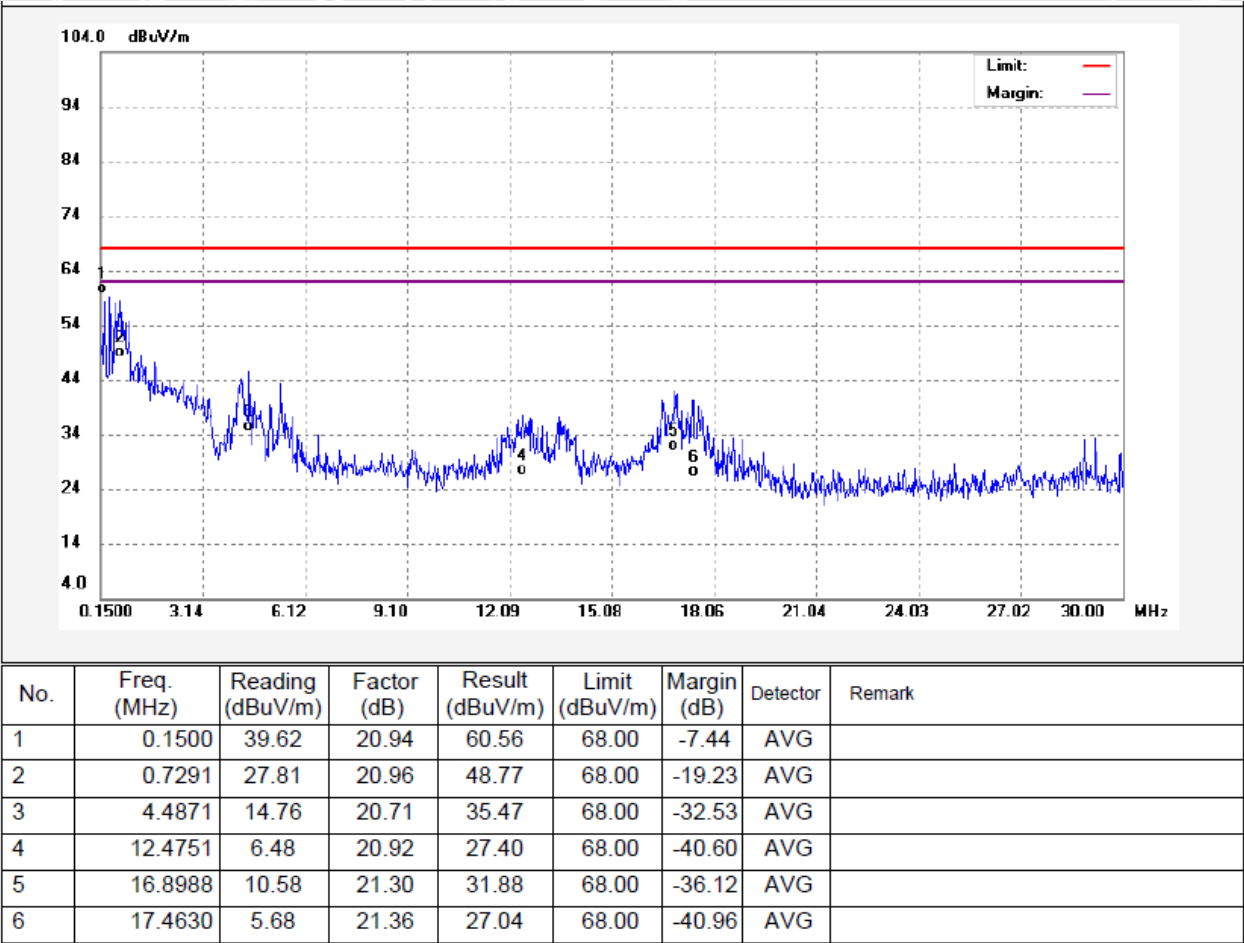


Horizontal Polarization



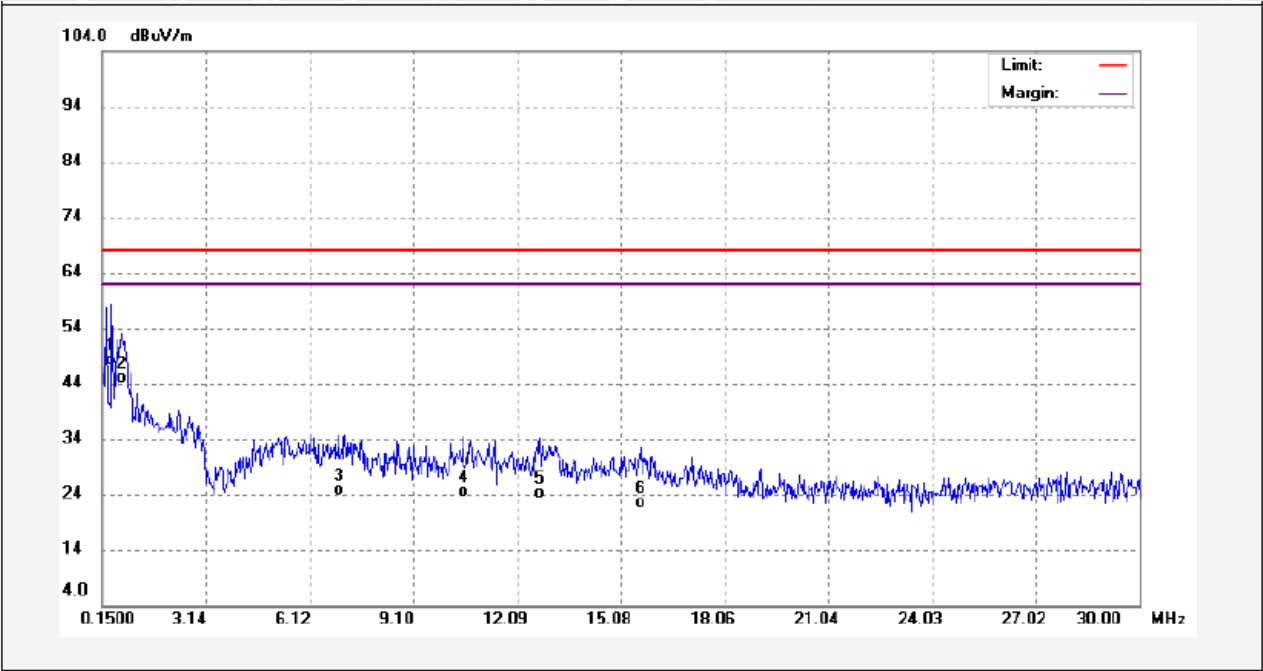


5.2.6 Magnetic Field Disturbance Test Results of 150kHz to 30MHz
Vertical Polarization





Horizontal Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	0.4395	28.11	20.09	48.20	68.00	-19.80	AVG	
2	0.7320	23.92	20.97	44.89	68.00	-23.11	AVG	
3	6.9677	3.77	20.97	24.74	68.00	-43.26	AVG	
4	10.5467	3.71	20.77	24.48	68.00	-43.52	AVG	
5	12.7467	3.15	20.94	24.09	68.00	-43.91	AVG	
6	15.6511	1.17	21.18	22.35	68.00	-45.65	AVG	



5.3 Radiated Emission, 30MHz to 1GHz

Test Requirement	: 47 CFR PART 15, SUBPART B; 47 CFR PART 18, SUBPART C
Test Method	: ANSI C63.4, FCC/OST MP-5:1986
Test Limit	: 47 CFR PART 15, SUBPART B Section 15.109; 47 CFR PART 18, SUBPART C Section 18.309
Test Result	: Pass
Frequency Range	: 30MHz to 1000MHz
Class	: Class B

5.3.1 E.U.T. Operation

Operating Environment:

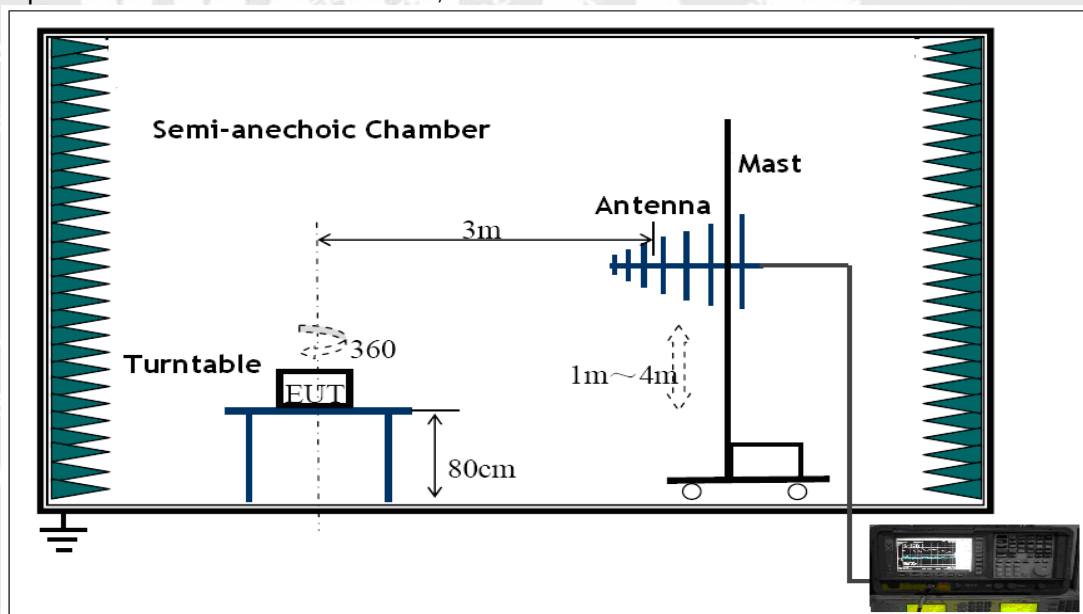
Temperature	: 23.8°C
Humidity	: 49.5%RH
Atmospheric Pressure	: 101.2 kPa

EUT Operation:

Input Voltage	: AC 120V/60Hz
Operating Mode	: Working + Wireless Charging Mode

5.3.2 Block Diagram of Test Setup

The Radiated Emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4, FCC/OST MP-5:1986.



5.3.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



5.3.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Corr. Factor}$$

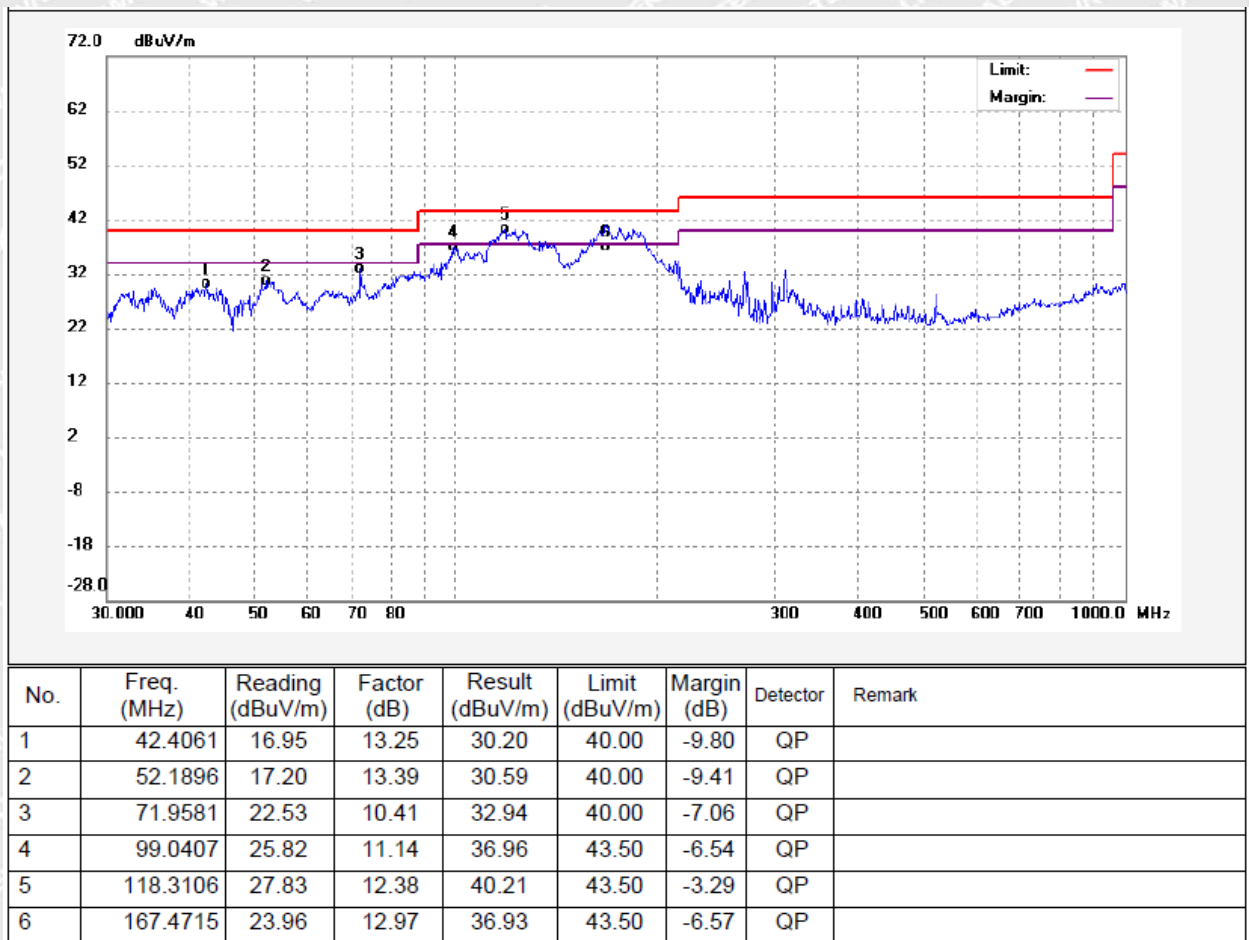
$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "Margin" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

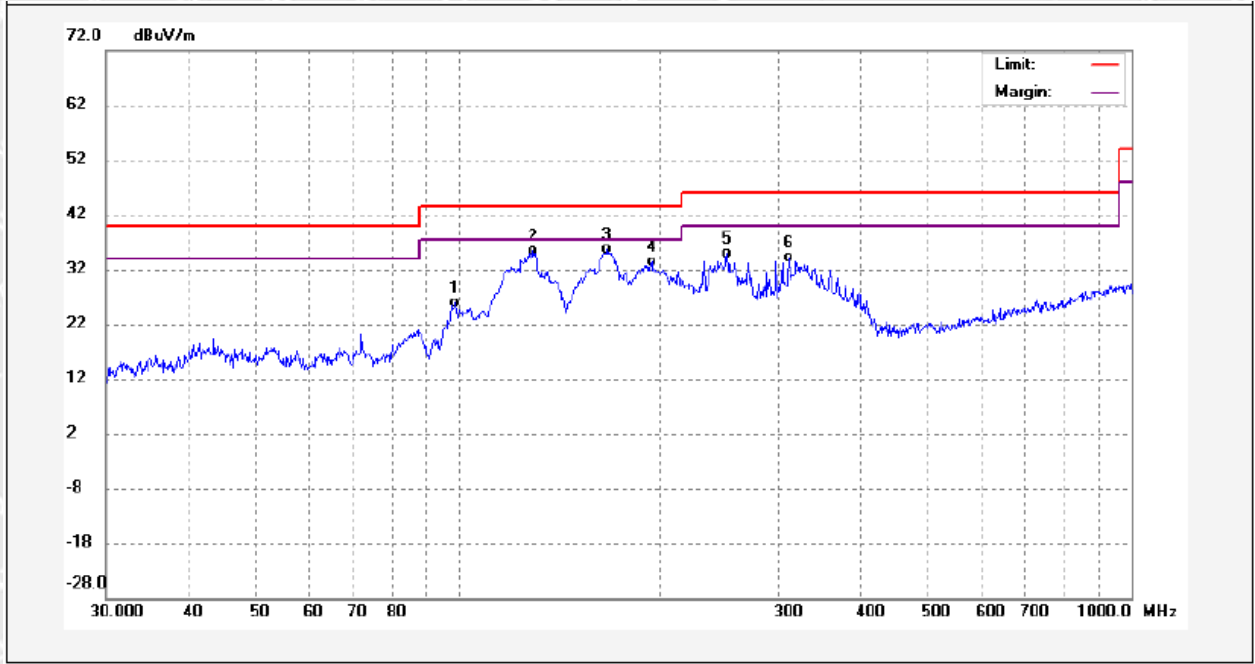
5.3.5 Radiated Emission Test Data

Vertical Polarization





Horizontal Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	99.2841	13.62	12.19	25.81	43.50	-17.69	QP	
2	129.5586	25.12	10.35	35.47	43.50	-8.03	QP	
3	166.8267	24.80	10.79	35.59	43.50	-7.91	QP	
4	194.1128	20.49	12.80	33.29	43.50	-10.21	QP	
5	251.3566	19.22	15.57	34.79	46.00	-11.21	QP	
6	310.3240	17.75	16.26	34.01	46.00	-11.99	QP	



5.4 Radiated Emission, 1GHz to 12.75GHz

Test Requirement	: 47 CFR PART 15, SUBPART B
Test Method	: ANSI C63.4
Test Limit	: 47 CFR PART 15, SUBPART B Section 15.109
Test Result	: Pass
Frequency Range	: 1GHz to 12.75GHz
Class	: Class B

5.4.1 E.U.T. Operation

Operating Environment:

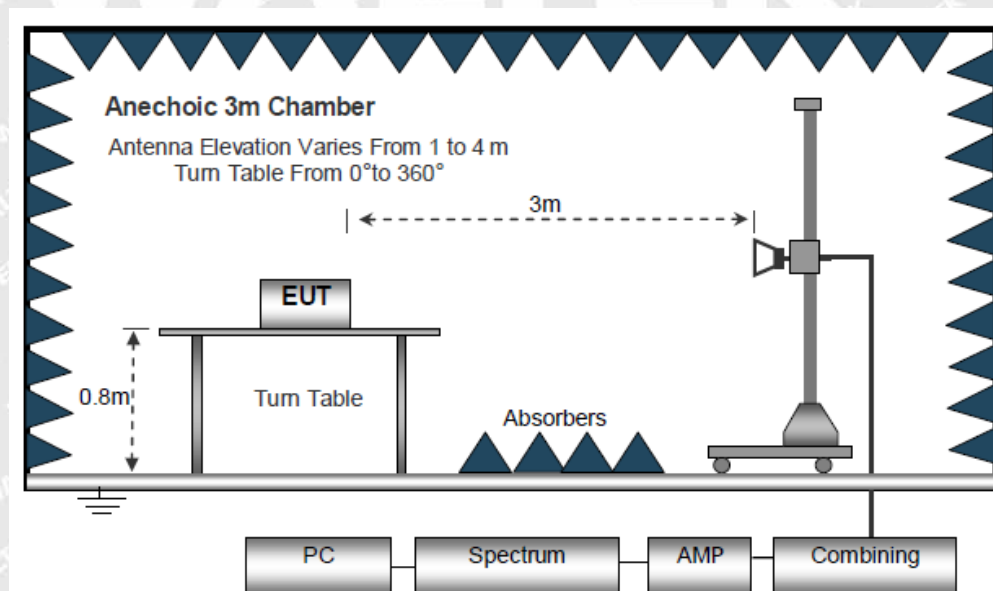
Temperature	: 23.6°C
Humidity	: 48.6%RH
Atmospheric Pressure	: 101.1 kPa

EUT Operation:

Input Voltage	: AC 120V/60Hz
Operating Mode	: Working + Wireless Charging Mode

5.4.2 Block Diagram of Test Setup

The Radiated Emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4.



5.4.3 Measurement Data

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.



5.4.4 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Corr. Factor}$$

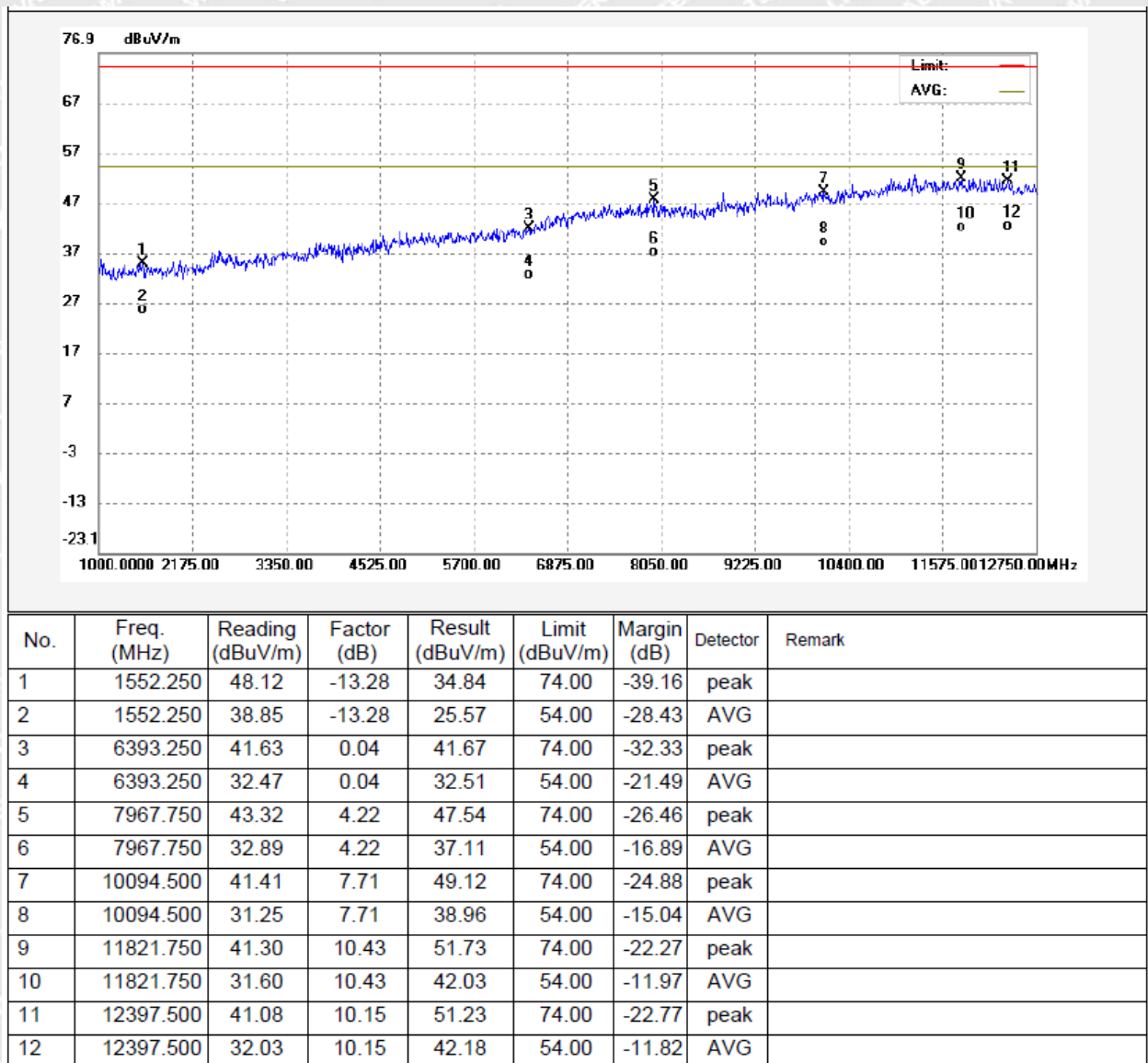
$$\text{Corr. Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Limit}$$

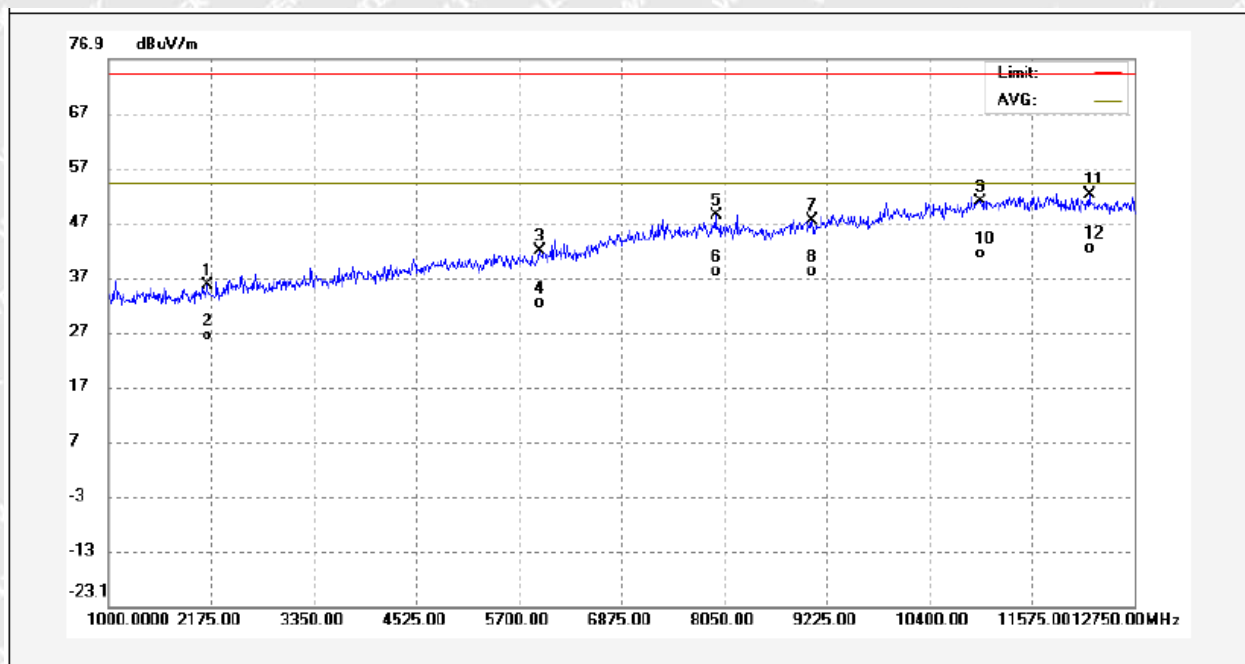
5.4.5 Radiated Emission Test Data

Vertical Polarization





Horizontal Polarization



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	2128.000	46.95	-11.47	35.48	74.00	-38.52	peak	
2	2128.000	37.84	-11.47	26.37	54.00	-27.63	AVG	
3	5935.000	43.11	-1.28	41.83	74.00	-32.17	peak	
4	5935.000	33.59	-1.28	32.31	54.00	-21.69	AVG	
5	7956.000	44.04	4.22	48.26	74.00	-25.74	peak	
6	7956.000	33.77	4.22	37.99	54.00	-16.01	AVG	
7	9060.500	41.58	5.81	47.39	74.00	-26.61	peak	
8	9060.500	32.21	5.81	38.02	54.00	-15.98	AVG	
9	10987.500	40.56	10.24	50.80	74.00	-23.20	peak	
10	10987.500	31.01	10.24	41.25	54.00	-12.75	AVG	
11	12233.000	41.81	10.22	52.03	74.00	-21.97	peak	
12	12233.000	32.14	10.22	42.36	54.00	-11.64	AVG	

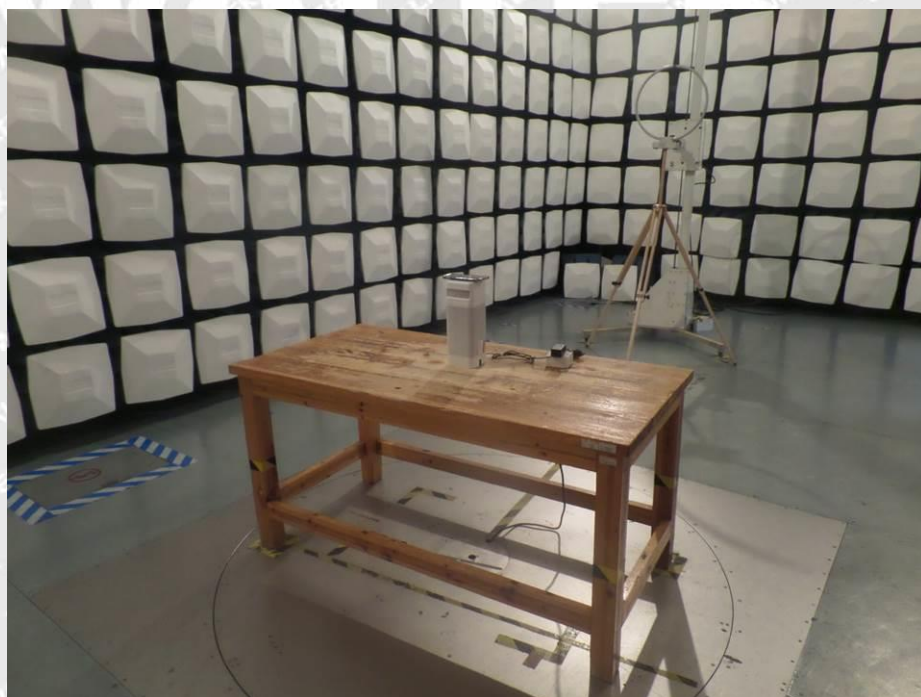


6 Photographs – Test Setup

6.1 Photograph – Conducted Emission Test Setup

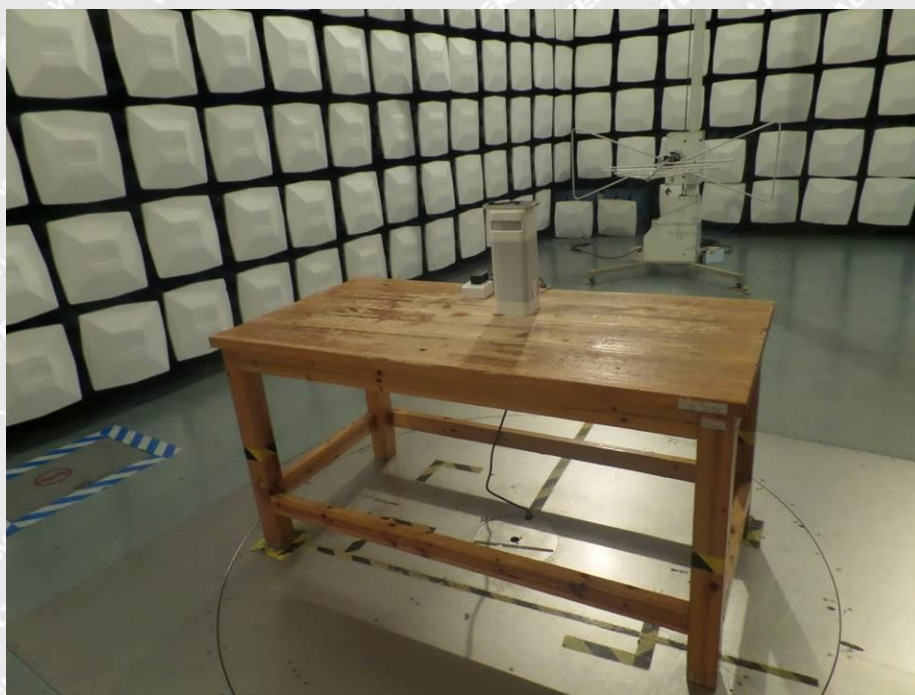


6.2 Photograph – Magnetic Field Disturbance Test Setup





6.3 Photograph – Radiated Emission Test Setup, 30MHz to 1GHz



6.4 Photograph – Radiated Emission Test Setup, 1GHz to 12.75GHz





7 Photographs – Constructional Details

7.1 EUT – External View





===== End of Report =====

WALTEK