

FCC Test Report

Report No.: 2405U20799EA-A2

Applicant: Whirlpool Microwave Products Development Limited.

Address: 17th Fl, Elite Centre, 22 Hung To Rd, Kwun Tong, Hong Kong

Product Name: Household microwave oven

Product Model: YWMMS3130R

Multiple Models: YWMH31017

Trade Mark: Whirlpool

FCC ID: PR4RED199Y1

Standards: FCC CFR Title 47 Part 18

Test Date: 2024-07-08 to 2024-07-12

Test Result: Complied

Report Date: 2024-07-15

Reviewed by:

Approved by:

Abel Chen

Jacob Kong

Abel Chen
Project Engineer

Jacob Kong
Manager

Prepared by:

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Revision History

Version No.	Issued Date	Description
00	2024-07-15	Original

Contents

1	General Information	4
1.1	Client Information	4
1.2	Product Description of EUT	4
1.3	Related Submittal(s)/Grant(s).....	4
1.4	Measurement Uncertainty	4
1.5	Laboratory Location.....	5
1.6	Test Methodology	5
2	Description of Measurement.....	6
2.1	Test Configuration.....	6
2.2	Test Auxiliary Equipment	6
2.3	Test Setup.....	6
2.4	Test Procedure	8
2.5	Measurement Method.....	9
2.6	Measurement Equipment	10
3	Test Results	12
3.1	Test Summary.....	12
3.2	Limit	13
3.3	Operating frequencies	14
3.4	Power Output Measurement	15
3.5	AC Line Conducted Emissions Test Data.....	16
3.6	Radiated emission Test Data.....	18
3.7	Radio frequency exposure	22
4	Test Setup Photo.....	23
5	E.U.T Photo	24

1 General Information

1.1 Client Information

Applicant:	Whirlpool Microwave Products Development Limited.
Address:	17th Fl, Elite Centre, 22 Hung To Rd, Kwun Tong, Hong Kong
Manufacturer:	Whirlpool Microwave Products Development Limited.
Address:	17th Fl, Elite Centre, 22 Hung To Rd, Kwun Tong, Hong Kong

1.2 Product Description of EUT

The EUT is Microwave Oven operate on 2450MHz ISM frequency Band.

Sample Serial Number	200Y-1 (assigned by WATC)
Sample Received Date	2024-07-04
Sample Status	Good Condition
Operating Frequency Range	2450MHz±50.0 MHz
Power Supply	AC 120V/60Hz
Microwave Rated Input Power [#]	1500W
Microwave Rated Output Power [#]	900W
Modification	Sample No Modification by the test lab

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s)/Grant(s)

1.4 Measurement Uncertainty

Parameter		Expanded Uncertainty (Confidence of 95%(U = 2Uc(y)))
AC Power Lines Conducted Emissions		±3.14dB
Radiated emission	Below 1GHz	±4.84dB
	Above 1GHz	±5.44dB
Frequency Error		150Hz
Note 1: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. Note 2: The Decision Rule is based on simple acceptance with ISO Guide 98-4:2012 Clause 8.2 (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)		

1.5 Laboratory Location

World Alliance Testing & Certification (Shenzhen) Co., Ltd

No. 1002, East Block, Laobing Building, Xingye Road 3012, Xixiang street, Bao'an District, Shenzhen, Guangdong, People's Republic of China

Tel: +86-755-29691511, Email: ga@watc.com.cn

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 463912, the FCC Designation No. : CN5040.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0160.

1.6 Test Methodology

FCC CFR 47 Part 18

FCC OST MP-5-1986

2 Description of Measurement

2.1 Test Configuration

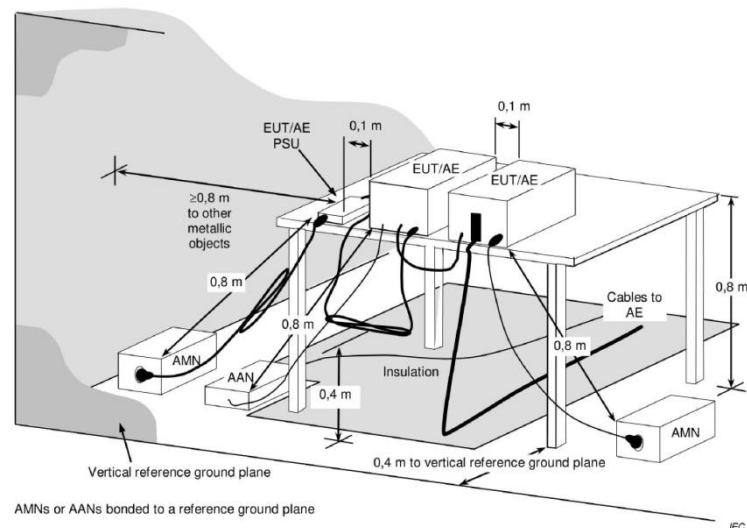
Test Mode:	
Microwave	The EUT was operate at the maximum microwave output power, according to FCC OST MP-5-1986 section 4.1, a quantity of water in a beaker was put in the oven cooking cavity during test

2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
Xiangbo	Glass Beaker	unknown	unknown

2.3 Test Setup

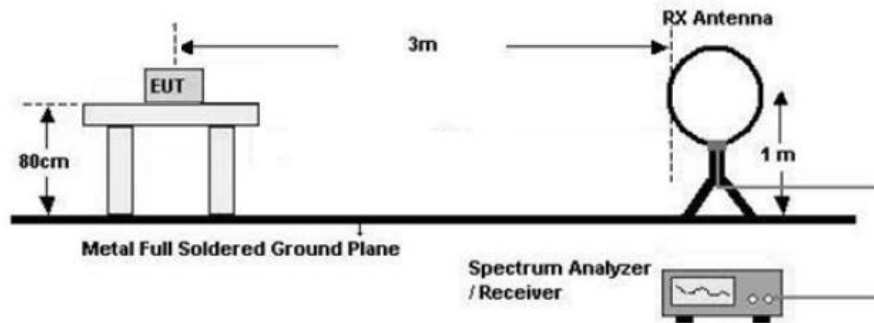
1) Conducted emission measurement:



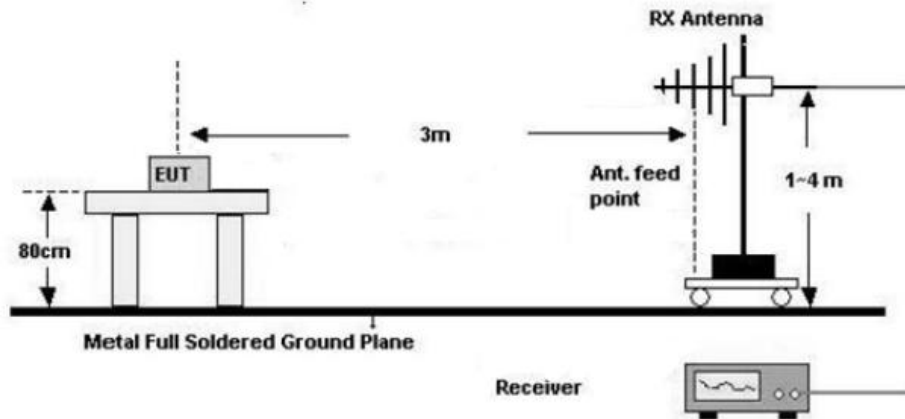
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

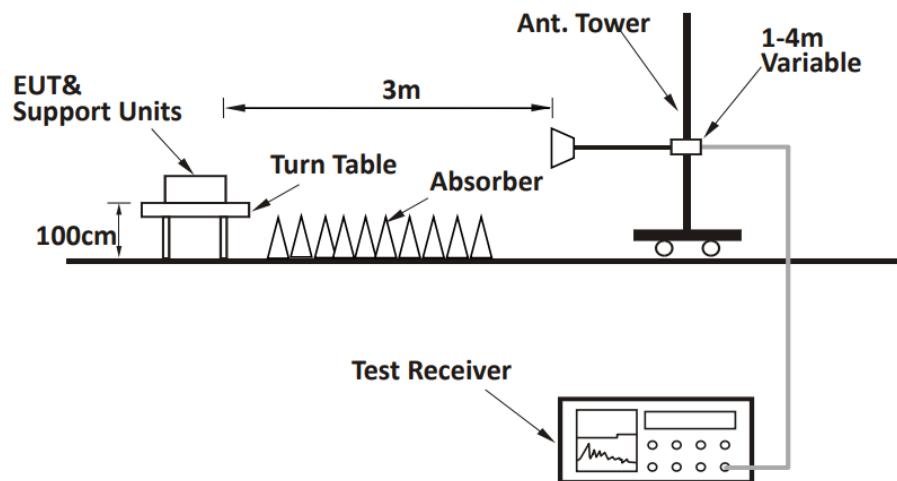
Below 30MHz (3m SAC)

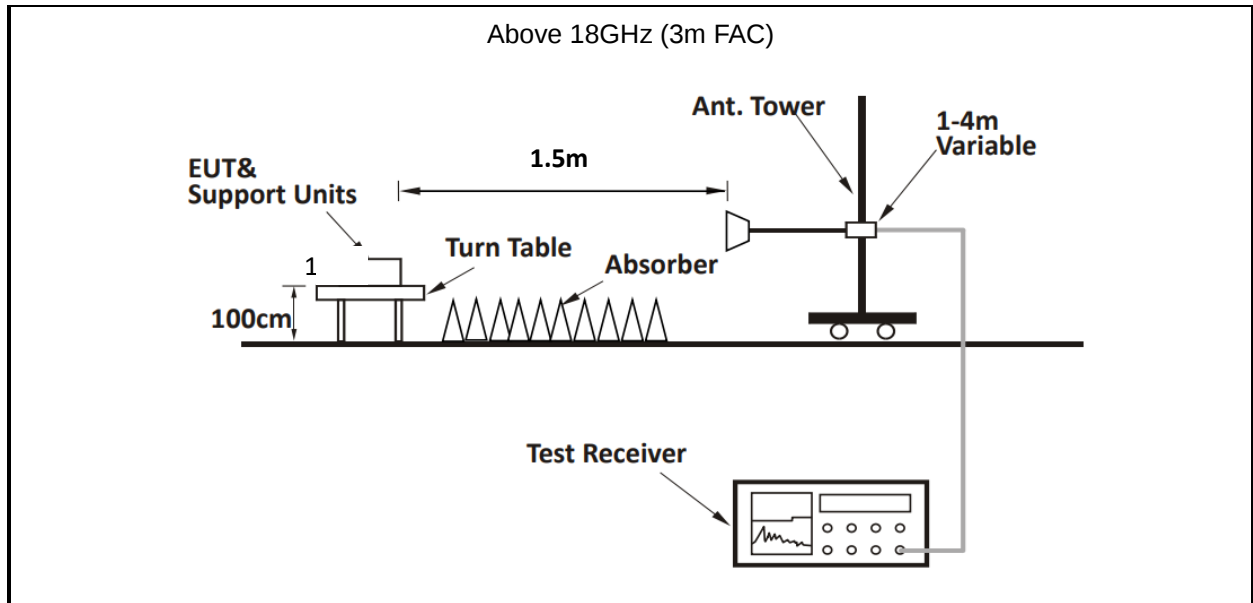


30MHz-1GHz (3m SAC)



Above 1-18GHz(3m FAC)





2.4 Test Procedure

Conducted emission:

1. The E.U.T is placed on a non-conducting table 40cm from the vertical ground plane and 80cm above the horizontal ground plane (Please refer to the block diagram of the test setup and photographs).
2. Both sides of A.C. line are checked for maximum conducted interference.
3. Line conducted data is recorded for both Line and Neutral

Radiated Emission Procedure:

a) For 30MHz-1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m semi anechoic chamber. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.

b) For above 1GHz:

1. The EUT was placed on the tabletop of a rotating table 0.8 m the ground at a 3 m fully anechoic room. The measurement distance from the EUT to the receiving antenna is 3 m.
2. EUT works in each mode of operation that needs to be tested, and having the EUT continuously working. The highest signal levels relative to the limit shall be determined by rotating the EUT from 0° to 360° and with varying the measurement antenna height between 1 m and 4 m in vertical and horizontal polarizations.
3. Open the test software to control the test antenna and test turntable. Perform the test, save the test results, and export the test data.

2.5 Measurement Method

Description of Test	Measurement Method
AC Line Conducted Emissions	FCC OST MP-5-1986 Section 7
Radiated emission	FCC OST MP-5-1986 Section 5
Operating frequencies	FCC OST MP-5-1986 Section 4.5
Power Output Measurement	FCC OST MP-5-1986 Section 4.3
Radio frequency exposure requirements	FCC OST MP-5-1986 Section 3.1

2.6 Measurement Equipment

Manufacturer	Description	Model	Management No.	Calibration Date	Calibration Due Date
AC Line Conducted Emission Test					
ROHDE& SCHWARZ	EMI TEST RECEIVER	ESR	101817	2024/6/4	2025/6/3
R&S	LISN	ENV216	101748	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.12	N/A	2024/6/4	2025/6/3
Farad	Test Software	EZ-EMC	Ver. EMEC-3A1	/	/
Radiated Emission Test					
R&S	EMI test receiver	ESR3	102758	2024/6/4	2025/6/3
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2024/6/4	2025/6/3
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2024/6/4	2025/6/3
COM-POWER	preamplifier	PAM-118A	18040152	2024/6/4	2025/6/3
COM-POWER	Amplifier	PAM-840A	461306	2023/8/8	2024/8/7
BACL	Loop Antenna	1313-1A	4010611	2024-2-7	2027-2-6
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2026/7/6
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2026/7/5
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2023/7/10	2026/7/9
Oulitong	Band Reject Filter	OBSF-2400-248 3.5-50N	OE02103119	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.9	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.14	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.15	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.16	N/A	2024/6/4	2025/6/3
N/A	Coaxial Cable	NO.17	N/A	2024/6/4	2025/6/3
Audix	Test Software	E3	191218 V9	/	/
Operating frequencies					
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2024/6/4	2025/6/3
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2026/7/5
N/A	Coaxial Cable	N/A	NO.9	2024/6/4	2025/6/3

N/A	Coaxial Cable	N/A	NO.10	2024/6/4	2025/6/3
N/A	Coaxial Cable	N/A	NO.11	2024/6/4	2025/6/3
Audix	Test Software	E3	191218 V9	/	/
Power Output					
YOKOGAWA	Digital Power Meter	253503	25BW3075	2023/8/24	2024/8/23
Victor	Digital Thermometer	6801	100730669	2023/12/1	2024/11/30
Radio frequency exposure					
ETS	Microwave Survery Meter	1501	3640274	2023/10/11	2024/10/10

Note: All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or International standards.

3 Test Results

3.1 Test Summary

FCC Rules	Description of Test	Result
FCC §18.307	AC Line Conducted Emissions	Compliance
FCC §18.305	Radiated emission	Compliance
FCC §18.301 FCC OST MP-5 §3.2	Operating frequencies	Compliance
FCC OST MP-5 §4.3	Power Output Measurement	Reporting only
FCC §18.313, §2.1091; §1.1310	Radio frequency exposure requirements	Compliance

Note: This is a Class II Permissive Change test report. The applicant declared the difference between EUT and original device (Granted on 2022/06/10) as below:

1. Change the test model
2. Change the magnetron
3. Change the transformer
4. Change the H.V. capacitor

3.2 Limit

Test items	Limit				
AC Line Conducted Emissions	Frequency of emission (MHz)		Conducted limit (dBµV)		
			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.					
Radiated emission	Equipment	Operating frequency	RF Power generated by equipment (watts)	Field strength limit (uV/m)	Distance (meters)
	Any type unless otherwise specified (miscellaneous)	Any ISM frequency	Below 500 500 or more	25 25 × SQRT(power/500)	300 1300
Operating frequencies	§18.301 Within ISM frequency band 2400-2500MHz				
Radio frequency exposure requirements	§1.1310				
	Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)
	(ii) Limits for General Population/Uncontrolled Exposure				
	0.3–1.34	614	1.63	*(100)	<30
	1.34–30	824/f	2.19/f	*(180/f²)	<30
	30–300	27.5	0.073	0.2	<30
	300–1,500			f/1500	<30
1,500–100,000			1.0	<30	
f = frequency in MHz. * = Plane-wave equivalent power density.					

3.3 Operating frequencies

Test Date:	2024-07-12	Test By:	Bard Huang
Environment condition:	Temperature: 23.2°C; Relative Humidity:70%; ATM Pressure: 100kPa		

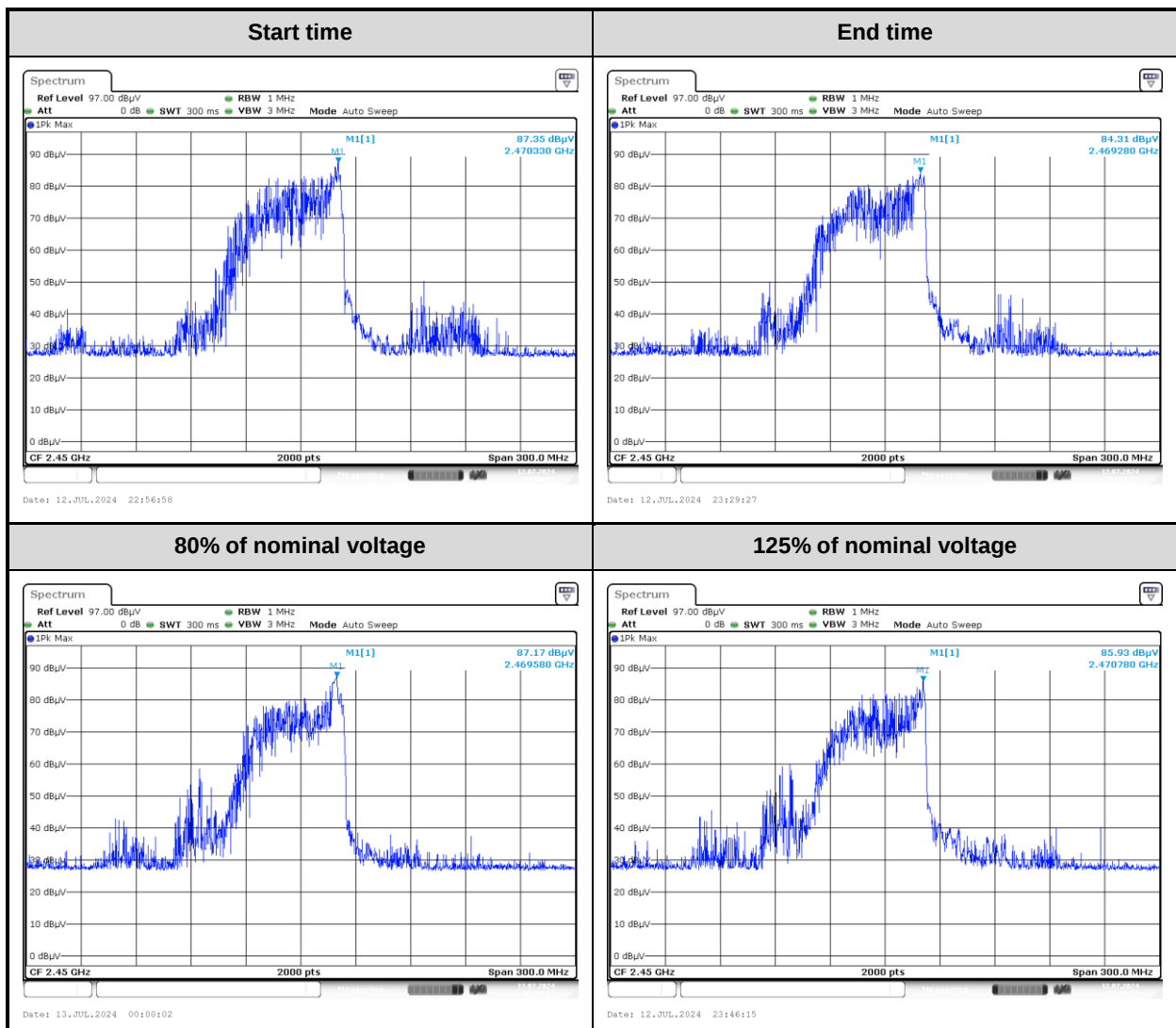
Variation in Operating Frequency with Time

Frequency at Start time(MHz)	Frequency at End time(MHz)	Limit(MHz)
2470.33	2469.28	Within 2400~2500

Variation in Operating Frequency with Line Voltage

Frequency at 80% of nominal voltage(MHz)	Frequency at 125% of nominal voltage(MHz)	Limit(MHz)
2469.58	2470.78	Within 2400~2500

Test Plot:



3.4 Power Output Measurement

Test Date:	2024-07-08	Test By:	Lirou Li
Environment condition:	Temperature: 23.8°C; Relative Humidity:60%; ATM Pressure: 101.1kPa		

Power Input:

Input Voltage(V _{AC})	Input Current(A)	Input Power(W)	Rated Input Power(W)
116.4	13.2	1536.5	1500

Note:

Based on the measured input power, the EUT was found to be operating within the intended specifications.

Power Output:

Quantity of Water (ml)	Mass of the container (g)	Ambient temperature (°C)	Initial temperature (°C)	Final temperature (°C)	Heating time (s)	Power output (W)
487	1000	23.8	23.6	36.2	60	935

Formula:

$$P = \frac{4,187 \cdot m_w (T_2 - T_1) + 0,55 \cdot m_c (T_2 - T_0)}{t}$$

Note:

P is the microwave power output(W)

m_w is the mass of the water(ml)

m_c is the mass of the container(g)

T₀ is the ambient temperature(°C)

T₁ is the initial temperature of water(°C)

T₂ is the final temperature of water(°C)

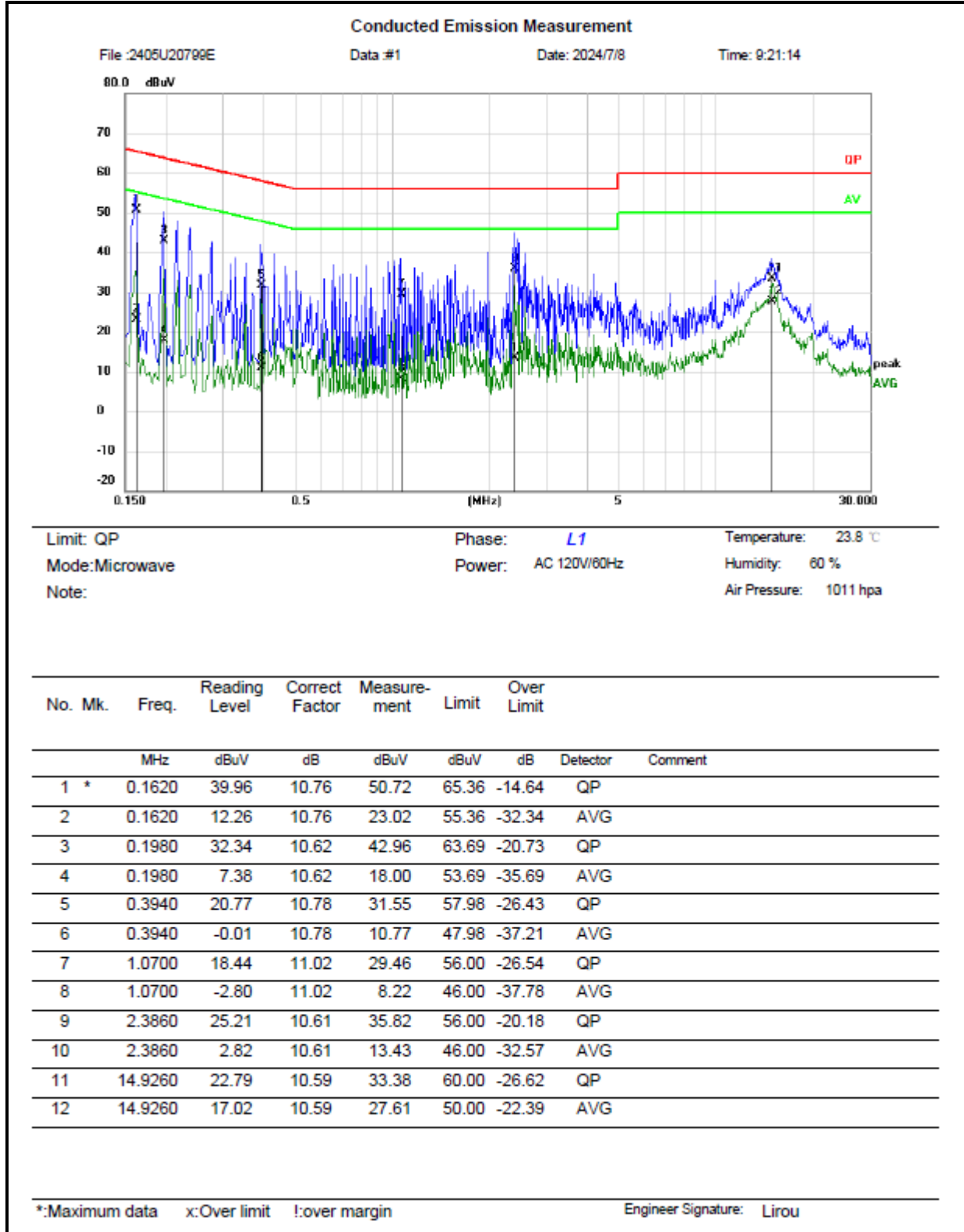
t is the water heating time(s), excluding the magnetron filament heating-up time

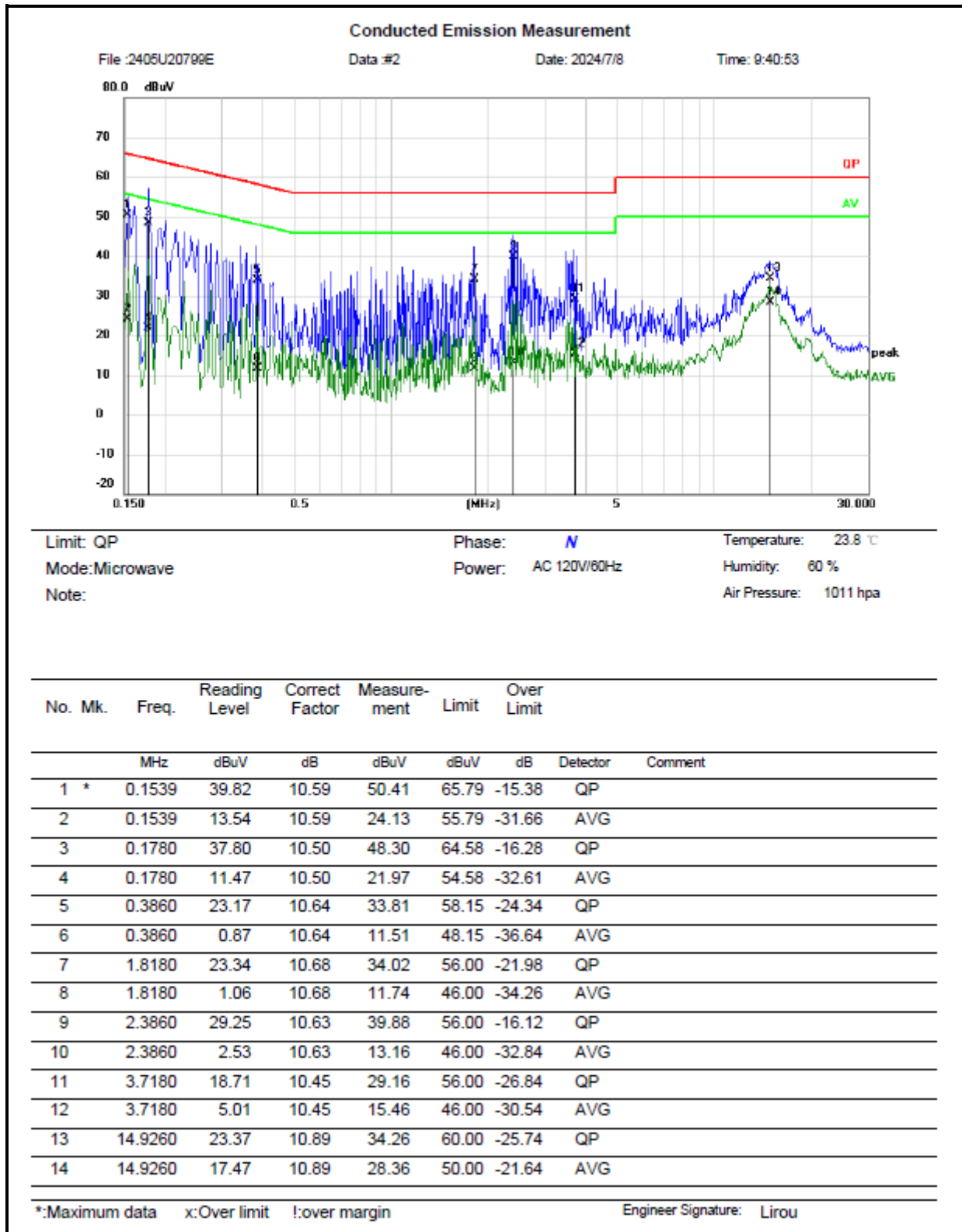
According to FCC § 18.305, the field strength limit of the outside band emissions is:

$$\begin{aligned} \text{Limit} &= 20\lg(25 \cdot \text{SQRT}(\text{Power}/500)) + 20\lg(300/3) \\ &= 20\lg(25 \cdot \text{SQRT}(935/500)) + 20\lg(300/3) \\ &= 70.7\text{dBuV/m @3m distance} \end{aligned}$$

3.5 AC Line Conducted Emissions Test Data

Test Date:	2024-07-08	Test By:	Lirou Li
Environment condition:	Temperature: 23.8°C; Relative Humidity:60%; ATM Pressure: 101.1kPa		





Remark:

Measurement (dBuV)= Reading Level (dBuV) + Correct Factor(dB)

Correct Factor (dB)= LISN Voltage Division Factor (dB)+ Cable loss(dB)

Over Limit = Measurement – Limit

3.6 Radiated emission Test Data

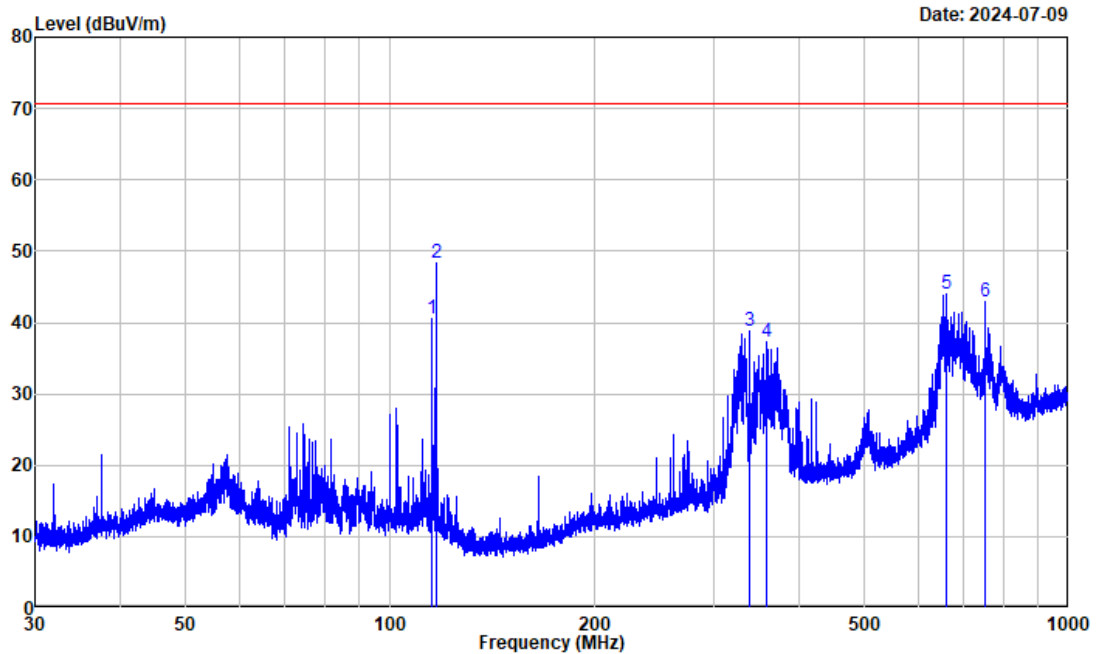
9 kHz-30MHz:

Test Date:	2024-07-09	Test By:	Bard Huang
Environment condition:	Temperature: 22.8°C; Relative Humidity:64%; ATM Pressure: 100.1kPa		

For radiated emissions below 30MHz, there were no emissions found within 20dB of limit.

30MHz-1GHz:

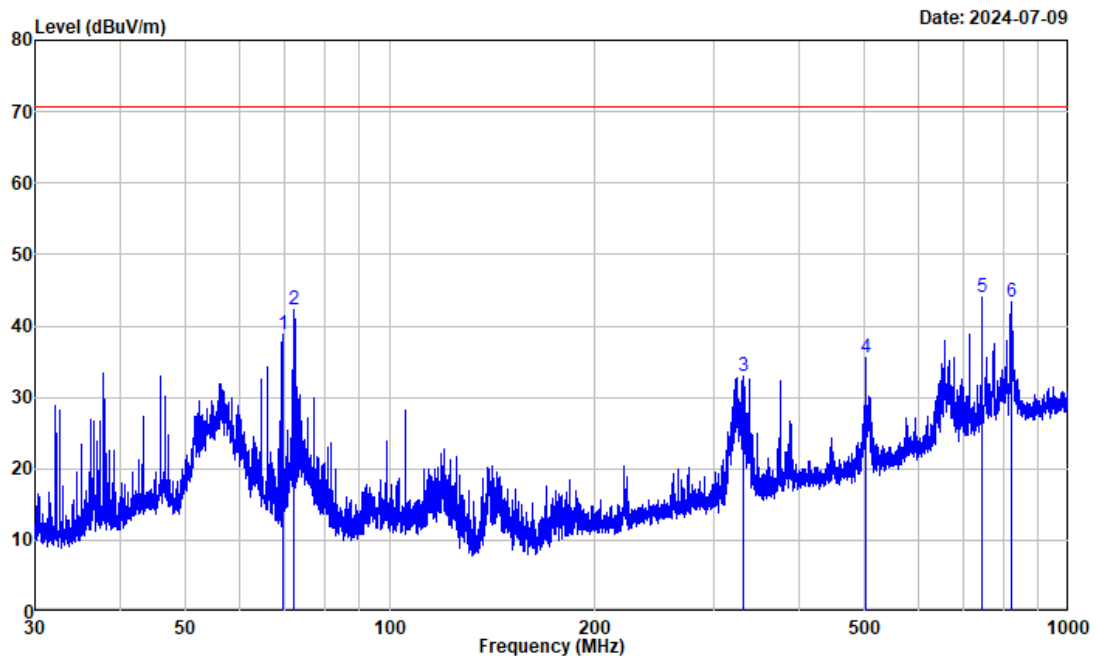
Test Date:	2024-07-09	Test By:	Bard Huang
Environment condition:	Temperature: 22.8°C; Relative Humidity:64%; ATM Pressure: 100.1kPa		



Project No. : 2405U20799E
 Test Mode : Microwave
 Test Voltage : AC 120V/60Hz
 Environment : 22.8°C/64%R.H./100.1kPa
 Tested by : Bard Huang
 Polarization : horizontal
 Remark : maximum microwave output power

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector
1	115.492	55.13	-14.50	40.63	70.70	-30.07	Peak
2	116.816	63.10	-14.74	48.36	70.70	-22.34	Peak
3	338.503	47.86	-8.99	38.87	70.70	-31.83	Peak
4	359.613	45.74	-8.46	37.28	70.70	-33.42	Peak
5	659.958	46.45	-2.38	44.07	70.70	-26.63	Peak
6	752.716	43.42	-0.51	42.91	70.70	-27.79	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain



Project No. : 2405U20799E
 Test Mode : Microwave
 Test Voltage : AC 120V/60Hz
 Environment : 22.8°C/64%R.H./100.1kPa
 Tested by : Bard Huang
 Polarization : vertical
 Remark : maximum microwave output power

--No.	Frequency (MHz)	Reading (dBμV)	Factor (dB/m)	Result (dBμV/m)	Limit (dBμV/m)	Over Limit (dB)	Detector

1	69.486	54.62	-15.74	38.88	70.70	-31.82	Peak
2	72.029	59.11	-16.76	42.35	70.70	-28.35	Peak
3	332.327	42.23	-9.28	32.95	70.70	-37.75	Peak
4	501.795	41.37	-5.79	35.58	70.70	-35.12	Peak
5	743.860	44.69	-0.77	43.92	70.70	-26.78	Peak
6	821.330	43.05	0.25	43.30	70.70	-27.40	Peak

Remarks: Factor = Antenna factor + Cable loss - Preamp gain

Remark:

Result = Reading + Factor

Factor = Antenna factor + Cable loss – Amplifier gain

Over Limit = Result – Limit

Above 1GHz:

Test Date:	2024-07-12	Test By:	Bard Huang
Environment condition:	Temperature: 23.2°C; Relative Humidity:70%; ATM Pressure: 100kPa		

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
2369.185	40.10	horizontal	-1.75	38.35	70.70	-32.35	Average
2590.295	40.73	horizontal	-1.73	39.00	70.70	-31.70	Average
9886.943	44.35	horizontal	4.19	48.54	70.70	-22.16	Average
2335.167	41.37	vertical	-1.78	39.59	70.70	-31.11	Average
2505.253	38.35	vertical	-1.73	36.62	70.70	-34.08	Average
9878.439	39.12	vertical	4.15	43.27	70.70	-27.43	Average
Second and third harmonic							
700ml Water							
4937.469	38.96	horizontal	0.78	39.74	70.70	-30.96	Average
7403.702	39.97	horizontal	3.10	43.07	70.70	-27.63	Average
4945.973	40.02	vertical	0.84	40.86	70.70	-29.84	Average
7395.198	39.11	vertical	3.10	42.21	70.70	-28.49	Average
300ml Water							
4936.418	39.91	horizontal	0.77	40.68	70.70	-30.02	Average
7385.192	40.22	horizontal	3.09	43.31	70.70	-27.39	Average
4925.613	40.76	vertical	0.70	41.46	70.70	-29.24	Average
7401.401	39.84	vertical	3.10	42.94	70.70	-27.76	Average

Remark:

Corrected Amplitude= Reading level + corrected Factor

Corrected Factor = Antenna factor + Cable loss – Amplifier gain

Margin = Corrected Amplitude – Limit

The emission levels of other frequencies that were lower than the limit 20dB not show in test report.

For emissions in 18GHz-25GHz range, all emissions were investigated and in the noise floor level.

3.7 Radio frequency exposure

Test Date:	2024-07-08	Test By:	Lirou Li
Environment condition:	Temperature: 23.8°C; Relative Humidity:60%; ATM Pressure: 101.1kPa		

Radiation leakage was measured in the as-received condition with the oven door closed using a microwave leakage meter.

A 275mL water load was placed in the center of the oven and the oven was operated at maximum output power.

There was no microwave leakage exceeding a power level of 0.1mW/cm² observed at any point 5 cm or more from the external surface of the oven.

A maximum of 1.0mW/cm² is allowed in accordance with the applicable Federal Standards. Hence, microwave leakage in the as-received condition with the oven door closed was below the maximum allowed.

4 Test Setup Photo

Please refer to the attachment 2405U20799E-A2 Test Setup photo.

5 E.U.T Photo

Please refer to the attachment 2405U20799E-A2 External photo and 2405U20799E-A2 Internal photo.

---End of Report---