FCC Test Report

Report No.:	RWAZ202300058A
Applicant:	Guangdong Midea Kitchen Appliances Manufacturing Co.,Ltd
Address:	No.6, Yong An Road, Beijiao, Shunde, Foshan ,Guangdong,China
Product Name:	Microwave Oven
Product Model:	EC9P04-S00K00
Multiple Models:	TMC10A14ASTC
Trade Mark:	Midea, TOSHIBA
FCC ID:	VG8XC9P04YYKE
Standards:	FCC CFR Title 47 Part 18
Test Date:	2023-12-07 to 2023-12-09
Test Result:	Complied
Report Date:	2023-12-15

Reviewed by: **Approved by:**

Frank Yin
Project Engineer

Jacob Kong
Manager

Prepared by:

World Alliance Testing and 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

NVLAP TESTING
NVLAP LAB CODE 600335-0

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Revision History

Version No.	Issued Date	Description
00	2023-12-15	*Original*

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1 General Information

1.1 Client Information

Applicant:	Guangdong Midea Kitchen Appliances Manufacturing Co.,Ltd
Address:	No.6, Yong An Road, Beijiao, Shunde, Foshan ,Guangdong,China
Manufacturer:	Guangdong Midea Kitchen Appliances Manufacturing Co.,Ltd
Address:	No.6, Yong An Road, Beijiao, Shunde, Foshan ,Guangdong,China

1.2 Product Description of EUT

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

Sample Serial Number	10-1(assigned by WATC)
Sample Received Date	2023-12-01
Sample Status	Good Condition
Operating Frequency Range	2450MHz±50.0 MHz
Power Supply	AC 120V/60Hz
Microwave Rated Input Power#	1450W
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 and 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: qa@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

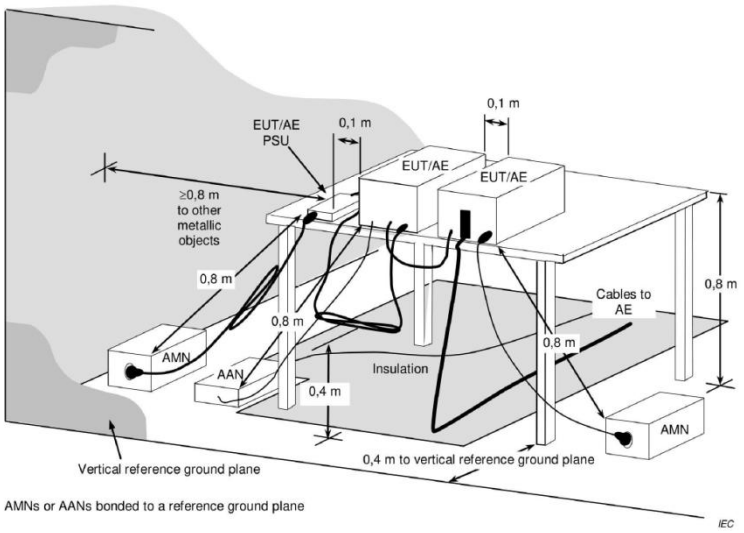
Test Mode:	
Microwave	The EUT was operate at the maximum microwave output power, according to FCC OST MP-5-1986 section 4.1, a quantity of water in a beaker was put in the oven cooking cavity during test

2.2 Test Auxiliary Equipment

Manufacturer	Description	Model	Serial Number
Xiangbo	Glass Beaker	unknown	unknown

2.3 Test Setup

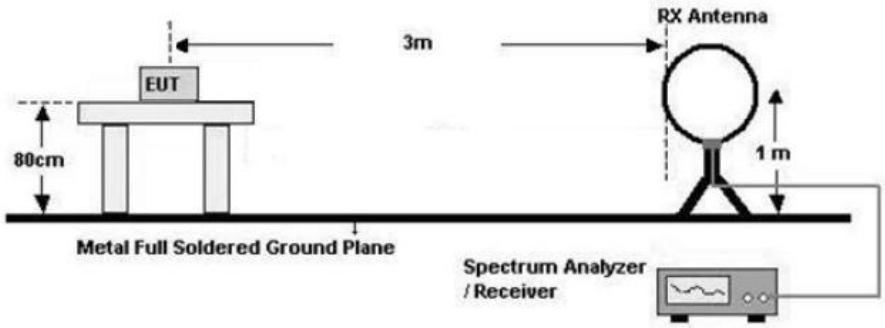
1) Conducted emission measurement:



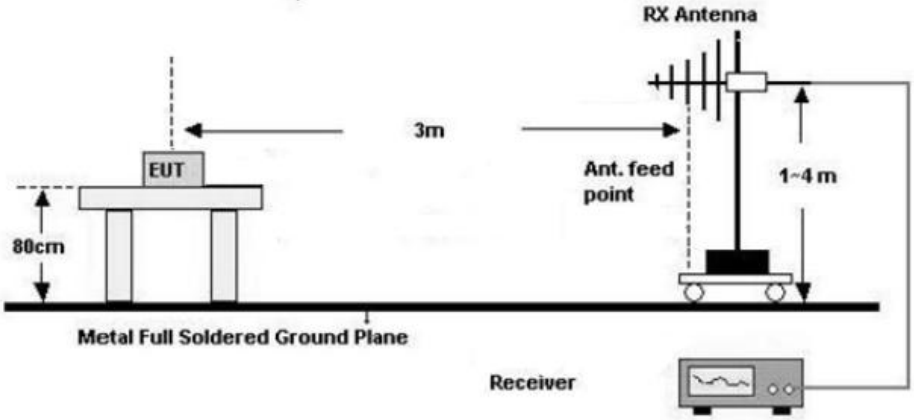
Note: The 0.8 m distance specified between EUT/AE/PSU and AMN/AAN, is applicable only to the EUT being measured. If the device is AE then it shall be >0.8 m.

2) Radiated emission measurement:

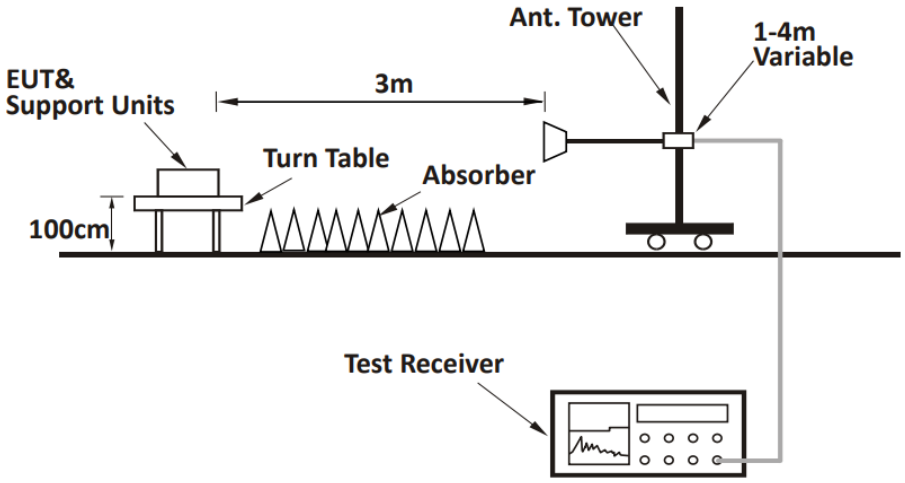
Below 30MHz (3m SAC)



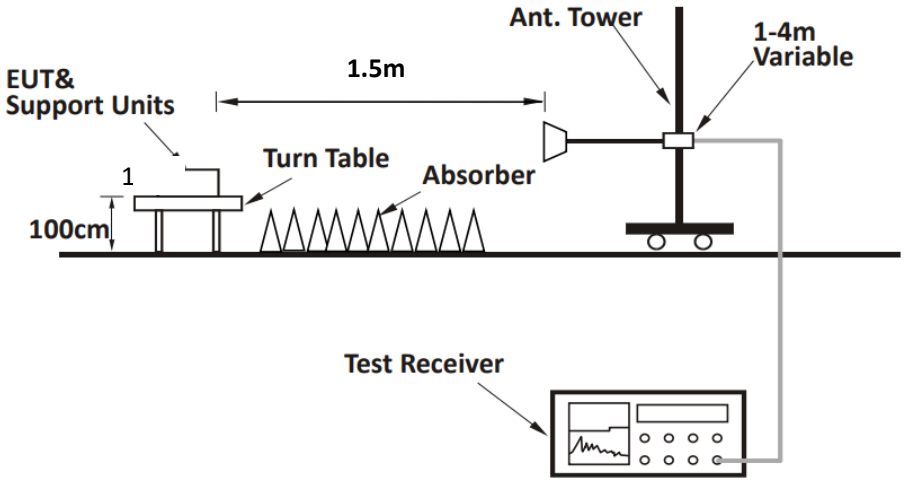
30MHz-1GHz (3m SAC)



Above 1-18GHz(3m FAC)



Above 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	2023/7/3	2024/7/2
R&S	LISN	ENV216	101748	2023/8/1	2024/7/31
N/A	Coaxial Cable	NO.12	N/A	2023/7/3	2024/7/2
Farad	Test Software	EZ-EMC	Ver. EMEC-3A1	/	/
Radiated Emission Test					
R&S	EMI test receiver	ESR3	102758	2023/7/3	2024/7/2
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2023/7/3	2024/7/2
SONOMA INSTRUMENT	Low frequency amplifier	310	186014	2023/7/12	2024/7/11
COM-POWER	preamplifier	PAM-118A	18040152	2023/8/21	2024/8/20
COM-POWER	Amplifier	PAM-840A	461306	2023/8/8	2024/8/7
ETS	Passive Loop Antenna	6512	29604	2023/7/7	2024/7/6
SCHWARZBECK	Log - periodic wideband antenna	VULB 9163	9163-872	2023/7/7	2024/7/6
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2024/7/5
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2023/7/10	2024/7/9
Oulitong	Band Reject Filter	OBSF-2400-2483.5-50N	OE02103119	2023/9/15	2024/9/14
N/A	Coaxial Cable	N/A	NO.9	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.10	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.11	2023/8/8	2024/8/7
Audix	Test Software	E3	191218 V9	/	/
Operating frequencies Test					
ROHDE& SCHWARZ	SPECTRUM ANALYZER	FSV40-N	101608	2023/7/3	2024/7/2
Astro Antenna Ltd	Horn antenna	AHA-118S	3015	2023/7/6	2024/7/5
N/A	Coaxial Cable	N/A	NO.9	2023/8/8	2024/8/7
N/A	Coaxial Cable	N/A	NO.10	2023/8/8	2024/8/7
Power Output Test					
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

3.2 Limit

<table>
<tr><th>Test items</th><th>Limit</th></tr>
<tr><td>AC Line Conducted Emissions</td><td>
<table>
<tr><th rowspan="2">Frequency of emission (MHz)</th><th colspan="2">Conducted limit (dBµV)</th></tr>
<tr><th>Quasi-peak</th><th>Average</th></tr>
<tr><td>0.15–0.5</td><td>66 to 56 *</td><td>56 to 46 *</td></tr>
<tr><td>0.5–5</td><td>56</td><td>46</td></tr>
<tr><td>5–30</td><td>60</td><td>50</td></tr>
</table>
* Decreases with the logarithm of the frequency.
</td></tr>
<tr><td>Radiated emission</td><td>
<table>
<tr><th>Equipment</th><th>Operating frequency</th><th>RF Power generated by equipment (watts)</th><th>Field strength limit (uV/m)</th><th>Distance (meters)</th></tr>
<tr><td>Any type unless otherwise specified (miscellaneous)</td><td>Any ISM frequency</td><td>Below 500
500 or more</td><td>25
25 × SQRT(power/500)</td><td>300
[1]300</td></tr>
</table>
</td></tr>
<tr><td>Operating frequencies</td><td>§18.301
Within ISM frequency band 2400-2500MHz</td></tr>
<tr><td>Radio frequency exposure requirements</td><td>§1.1310
<table>
<tr><th>Frequency range (MHz)</th><th>Electric field strength (V/m)</th><th>Magnetic field strength (A/m)</th><th>Power density (mW/cm^2)</th><th>Averaging time (minutes)</th></tr>
<tr><td colspan="5">(ii) Limits for General Population/Uncontrolled Exposure</td></tr>
<tr><td>0.3–1.34</td><td>614</td><td>1.63</td><td>*(100)</td><td><30</td></tr>
<tr><td>1.34–30</td><td>824/f</td><td>2.19/f</td><td>*(180/f^2)</td><td><30</td></tr>
<tr><td>30–300</td><td>27.5</td><td>0.073</td><td>0.2</td><td><30</td></tr>
<tr><td>300–1,500</td><td></td><td></td><td>f/1500</td><td><30</td></tr>
<tr><td>1,500–100,000</td><td></td><td></td><td>1.0</td><td><30</td></tr>
</table>
f = frequency in MHz. * = Plane-wave equivalent power density.
</td></tr>
</table>

3.3 Operating frequencies

Test Date:	2023-12-09	Test By:	Luke Li
Environment condition:	Temperature: 24°C; Relative Humidity:51%; ATM Pressure: 101kPa		

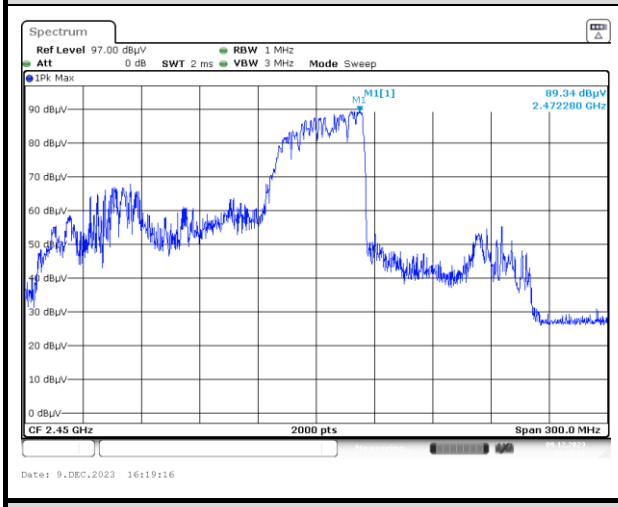
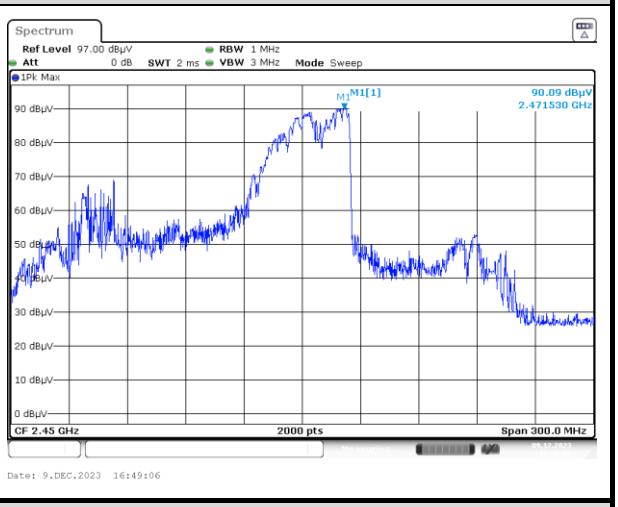
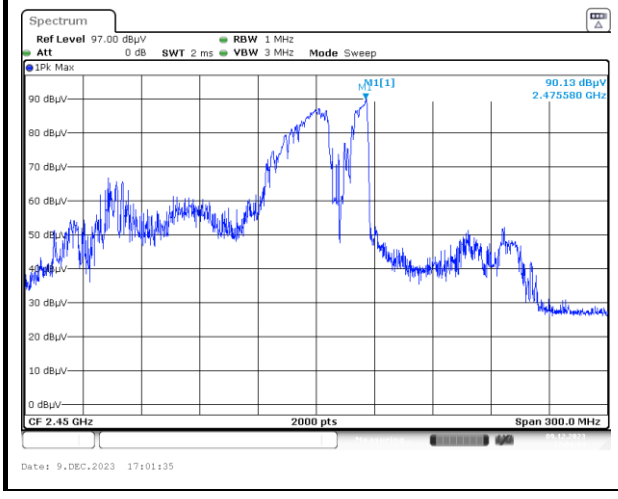
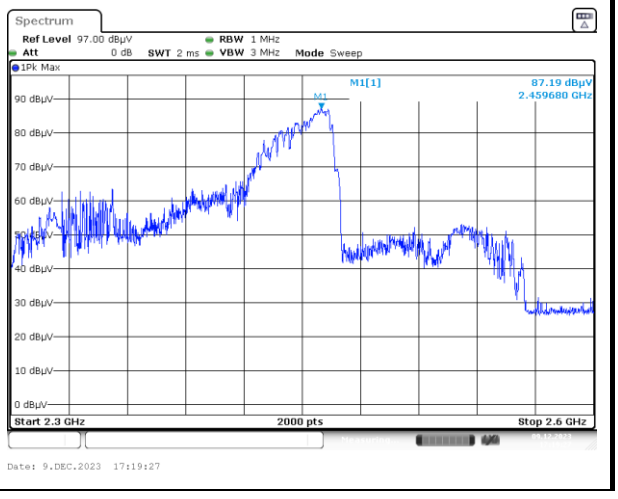
Variation in Operating Frequency with Time

Frequency at Start time(MHz)	Frequency at End time(MHz)	Limit(MHz)
2472.28	2471.53	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)
2475.58	2459.68	Within 2400~2500

Test Plot:

Start time	End time
	
80% of nominal voltage	**125% of nominal voltage**
	

3.4 Power Output Measurement

Test Date:	2023-12-8	Test By:	Lirou Li
Environment condition:	Temperature: 25.5°C; Relative Humidity:56%; ATM Pressure: 101.1kPa		

Power Input:

Input Voltage(V_{AC})	Input Current(A)	Input Power(W)	Rated Input Power(W)
117	12.9	1509	1450

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 (℃)	Initial temperature (℃)	Final temperature (℃)	Heating time (s)	Power output (W)
1000	487	25.5	23.3	36.8	60	993

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)

T_0 is the ambient temperature(℃)

T_1 is the initial temperature of water(℃)

T_2 is the final temperature of water(℃)

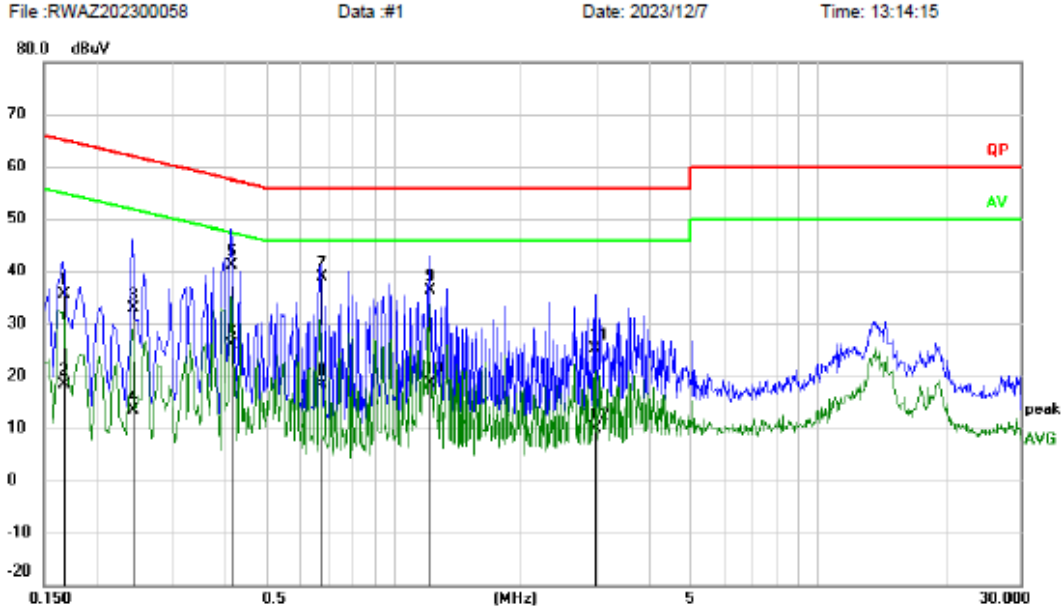
t is the water heating time(s), excluding the magnetron filament heating-up time

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

Limit=20lg(25*SQRT(Power/500))+20lg(300/3)
=20lg(25*SQRT(993/500))+20lg(300/3)
=70.9dBuV/m @3m distance

3.5 AC Line Conducted Emissions Test Data

Test Date:	2023-12-07	Test By:	Lirou Li
Environment condition:	Temperature: 26.1°C; Relative Humidity:36%; ATM Pressure: 100.1kPa		



Limit: QP
Mode:Microwave maximum power
Note:

Phase: L1
Power: AC 120V/60Hz

Temperature: 26.1
Humidity: 36 %
Air Pressure: 1001 hpa

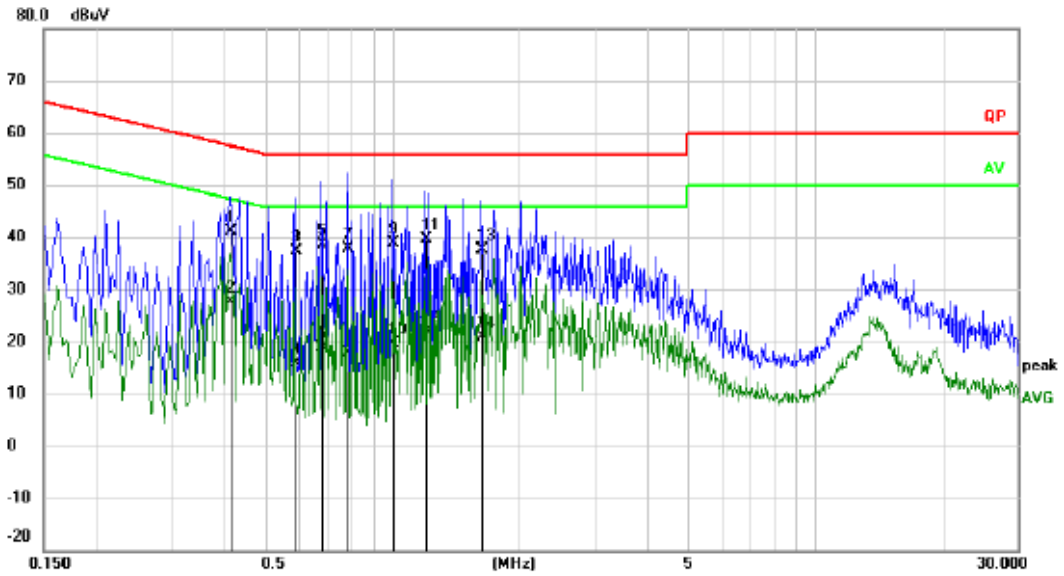
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1660	24.76	10.75	35.51	65.16	-29.65	QP	
2		0.1660	7.64	10.75	18.39	55.16	-36.77	AVG	
3		0.2420	22.21	10.65	32.86	62.03	-29.17	QP	
4		0.2420	2.66	10.65	13.31	52.03	-38.72	AVG	
5	*	0.4140	30.45	10.78	41.23	57.57	-16.34	QP	
6		0.4140	15.05	10.78	25.83	47.57	-21.74	AVG	
7		0.6740	28.13	10.85	38.98	56.00	-17.02	QP	
8		0.6740	7.57	10.85	18.42	46.00	-27.58	AVG	
9		1.2140	25.43	10.94	36.37	56.00	-19.63	QP	
10		1.2140	7.76	10.94	18.70	46.00	-27.30	AVG	
11		2.9780	14.41	10.79	25.20	56.00	-30.80	QP	
12		2.9780	-0.94	10.79	9.85	46.00	-36.15	AVG	

*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

Conducted Emission Measurement

File :RWAZ202300058 Data :#2 Date: 2023/12/7 Time: 13:16:52



Limit: QP
Mode: Microwave maximum power
Note:

Phase: N
Power: AC 120V/60Hz

Temperature: 26.1
Humidity: 36 %
Air Pressure: 1001 hpa

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over Limit		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4140	30.38	10.65	41.03	57.57	-16.54	QP	
2		0.4140	16.90	10.65	27.55	47.57	-20.02	AVG	
3		0.5899	26.68	10.65	37.33	56.00	-18.67	QP	
4		0.5899	5.32	10.65	15.97	46.00	-30.03	AVG	
5		0.6820	28.02	10.57	38.59	56.00	-17.41	QP	
6		0.6820	8.40	10.57	18.97	46.00	-27.03	AVG	
7		0.7860	27.33	10.60	37.93	56.00	-18.07	QP	
8		0.7860	7.38	10.60	17.98	46.00	-28.02	AVG	
9		1.0020	28.29	10.66	38.95	56.00	-17.05	QP	
10		1.0020	8.96	10.66	19.62	46.00	-26.38	AVG	
11	*	1.1940	29.05	10.67	39.72	56.00	-16.28	QP	
12		1.1940	11.20	10.67	21.87	46.00	-24.13	AVG	
13		1.6260	26.93	10.68	37.61	56.00	-18.39	QP	
14		1.6260	10.14	10.68	20.82	46.00	-25.18	AVG	

*:Maximum data x:Over limit !:over margin

Engineer Signature: Lirou

Remark:

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

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

Over = Measurement – Limit

3.6 Radiated emission Test Data

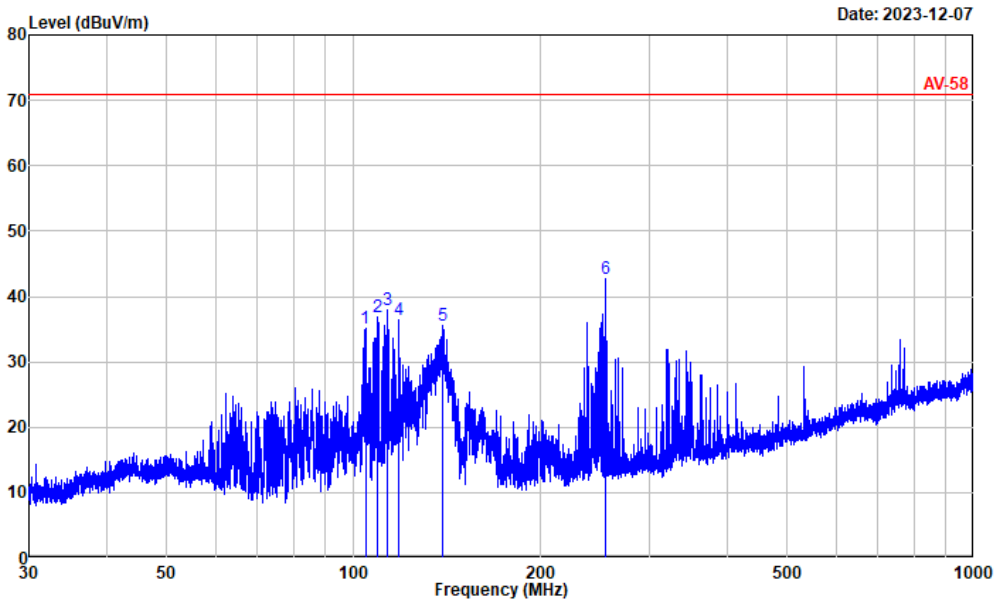
9 kHz-30MHz:

Test Date:	2023-12-07	**Test By:**	Luke Li
Environment condition:	Temperature: 24°C; Relative Humidity:44%; ATM Pressure: 101kPa		

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

30MHz-1GHz:

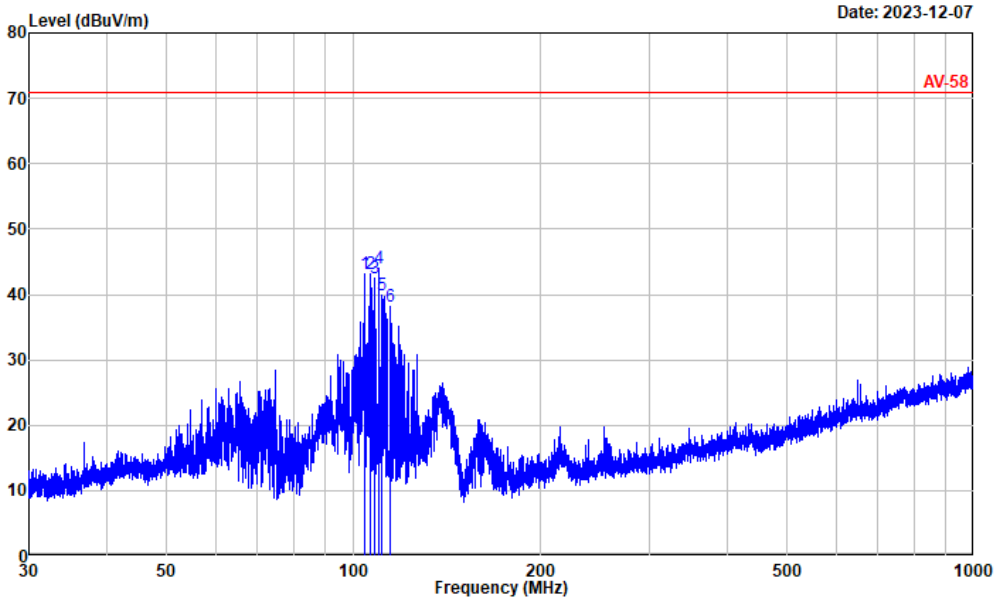
Test Date:	2023-12-07	Test By:	Luke Li
Environment condition:	Temperature: 24°C; Relative Humidity:44%; ATM Pressure: 101kPa		



Project No. : RWAZ202300058
Test Mode : Microwave
Test Voltage : AC 120V/60Hz
Environment : 24℃/44%R.H./101kPa
Tested by : Luke Li
Polarization : horizontal
Remark : Microwave Maximum output power

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	104.582	48.70	-13.67	35.03	70.90	-35.87	Peak
2	109.412	50.78	-13.89	36.89	70.90	-34.01	Peak
3	113.416	52.49	-14.46	38.03	70.90	-32.87	Peak
4	118.446	51.71	-15.34	36.37	70.90	-34.53	Peak
5	139.484	52.93	-17.39	35.54	70.90	-35.36	Peak
6	255.399	54.83	-12.09	42.74	70.90	-28.16	Peak

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



Project No. : RWAZ202300058
Test Mode : Microwave
Test Voltage : AC 120V/60Hz
Environment : 24℃/44%R.H./101kPa
Tested by : Luke Li
Polarization : vertical
Remark : Microwave Maximum output power

--No.	Frequency (MHz)	Reading (dBµV)	Factor (dB/m)	Result (dBµV/m)	Limit (dBµV/m)	Over Limit (dB)	Detector
1	104.125	56.80	-13.68	43.12	70.90	-27.78	Peak
2	106.759	56.87	-13.75	43.12	70.90	-27.78	Peak
3	108.124	56.27	-13.76	42.51	70.90	-28.39	Peak
4	109.940	58.00	-13.94	44.06	70.90	-26.84	Peak
5	111.201	53.96	-14.16	39.80	70.90	-31.10	Peak
6	114.464	52.71	-14.61	38.10	70.90	-32.80	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:	2023-12-09	Test By:	Luke Li
Environment condition:	Temperature: 24°C; Relative Humidity:51%; ATM Pressure: 101kPa		

Frequency (MHz)	Reading level (dBμV)	Polar	Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark
2336.018	41.19	horizontal	-1.78	39.41	70.90	-31.49	Average
2532.316	38.91	horizontal	-1.76	37.15	70.90	-33.75	Average
4299.650	39.17	horizontal	-2.65	36.52	70.90	-34.38	Average
2338.569	40.97	vertical	-1.77	39.20	70.90	-31.70	Average
2531.566	38.85	vertical	-1.76	37.09	70.90	-33.81	Average
4299.650	43.49	vertical	-2.65	40.84	70.90	-30.06	Average
Second and third harmonic							
700ml Water							
4928.964	45.27	horizontal	0.72	45.99	70.90	-24.91	Average
7378.189	39.94	horizontal	3.09	43.03	70.90	-27.87	Average
4903.452	44.45	vertical	0.55	45.00	70.90	-25.90	Average
7344.172	39.63	vertical	3.09	42.72	70.90	-28.18	Average
300ml Water							
4908.054	45.01	horizontal	0.58	45.59	70.90	-25.31	Average
7363.582	40.24	horizontal	3.10	43.34	70.90	-27.56	Average
4902.651	44.91	vertical	0.55	45.46	70.90	-25.44	Average
7368.984	38.86	vertical	3.10	41.96	70.90	-28.94	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:	2023-12-8	**Test By:**	Lirou Li
Environment condition:	Temperature: 25.5°C; Relative Humidity:56%; 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 **0.16**mW/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 RWAZ202300058 test setup photo

5 E.U.T Photo

Please refer to the attachment RWAZ202300058 external photo and RWAZ202300058 internal photo

---End of Report---