



# FCC PART 18 TEST REPORT

For

# Whirlpool Microwave Products Development Limited.

16/F, Paliburg Plaza 68 Yee Woo Street, Causeway Bay, Hong Kong

FCC ID: PR4 LPTKACUY

Report Type: **Product Type:** Class II Permissive Change Microwave Oven Report Number: RSZ200525550-00 **Report Date:** 2020-06-24 Joson Xiao Joson Xiao **Reviewed By:** EMC Engineer **Prepared By:** Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn

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#### **GENERAL INFORMATION**

#### **Product Description for Equipment under Test (EUT)**

Product	Microwave Oven
Tested Model	YWMT50011
Voltage Range	AC 120V/60Hz
Highest operating frequency	2450 MHz
Microwave output power	900 Watts
Input power	1500 Watts
Date of Test	2020-06-09 to 2020-06-11
Sample serial number	RSZ200525550-EM-S1( Assigned by Shenzhen BACL)
Received date	2020-05-25
Sample/EUT Status	Good condition

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#### **Objective**

This report is prepared on behalf of Whirlpool Microwave Products Development Limited. in accordance with Part 2-Subpart J, and Part 18-Subparts A, B and C of the Federal Communication Commissions rules and regulations.

The objective of the manufacturer is to determine compliance with FCC Part 18 limits.

This is a CIIPC application of the device, the difference between the original device and current one described as following:

- (1) Changing the Filter board.
- (2) Changing the appearance of EUT.
- (3) Changing the model name to "YWMT50011"

Based on the change made to the device, all the test items were performed.

#### Related Submittal(s)/Grant(s)

No related submittal(s).

#### **Test Methodology**

All measurements contained in this report were conducted with MP-5, FCC Methods of Measurements of Radio Noise Emissions from ISM Equipment, February 1986. All measurements were performed at Bay Area Compliance Laboratory Corporation. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

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#### **Measurement Uncertainty**

Parameter		uncertainty
Conducted Emissions		±1.95dB
Radiated	Below 1GHz	±4.75dB
Emissions	Above 1GHz	±4.88dB

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Note: 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.

#### **Test Facility**

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 342867, the FCC Designation No.: CN1221.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062B.

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## OPERATING CONDITION/TEST CONFIGURATION

#### **Justification**

The EUT was operated at maximum (continuous) RF output power. The loads consisted of water in a glass beaker in the amounts specified in the test procedure.

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#### **EUT Exercise Software**

No exercise software was used.

#### **Special Accessories**

No special accessory was used.

## **Equipment Modifications**

No modifications were made to the EUT tested.

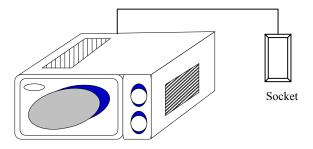
#### **Support Equipment List and Details**

Manufacturer	Device Name	Model	Serial Number
BULL	Socket	GN-606D	Unknown
Unknown	Glass beaker	Unknown	Unknown

#### **External Cable List and Details**

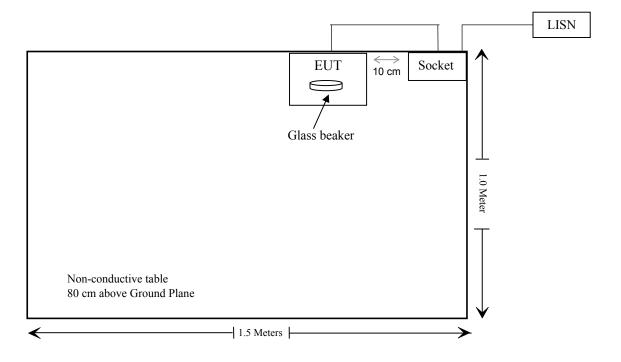
Cable Description	Length (m)	From/Port	То
Un-shielding Un-detachable AC Cable	1.0	Socket	EUT
Un-shielding Un-detachable AC Cable	1.0	LISN	Socket

## **Configuration of Test Setup**



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# **Block Diagram of Test Setup**



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# **SUMMARY OF TEST RESULT**

FCC Rules	Description of Test	Results
§18.307	AC Line Conducted Emissions	Compliance
FCC/OST MP-5 FCC §18.301	Radiation Hazard Measurement	Compliance
§18.305	Field Strength	Compliance

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# TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date		
CONDUCTED EMISSIONS							
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2019/7/9	2020/7/8		
Rohde & Schwarz	LISN	ENV216	101613	2020/1/22	2021/1/21		
Rohde & Schwarz	Transient Limitor	ESH3Z2	DE25985	2019/11/29	2020/11/28		
Unknown	CE Cable	CE Cable	UF A210B-1- 0720-504504	2019/11/29	2020/11/28		
Rohde & Schwarz	CE Test software	EMC 32	V8.53.0	NCR	NCR		
	RA	DIATED EMISSIC	ONS				
R&S	EMI Test Receiver	ESR3	102455	2019/7/9	2020/7/8		
Sonoma instrument	Pre-amplifier	310 N	186238	2020/4/20	2021/4/20		
Sunol Sciences	Broadband Antenna	ЈВ1	A040904-1	2017/12/22	2020/12/21		
Unknown	Cable 2	RF Cable 2	F-03-EM197	2019/11/29	2020/11/28		
Unknown	Cable	Chamber Cable 4	EC-007	2019/11/29	2020/11/28		
Rohde & Schwarz	Auto test software	EMC 32	V9.10	NCR	NCR		
Rohde & Schwarz	Spectrum Analyzer	FSV40-N	102259	2019/7/22	2020/7/21		
COM-POWER	Pre-amplifier	PA-122	181919	2019/11/29	2020/11/28		
COM-POWER	Amplifier	QLW-18405536- J0	15964001002	2019/11/29	2020/11/28		
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21		
the electro- Mechanics Co	Horn Antenna	3116	9510-2270	2019/10/13	2022/10/12		
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28		
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28		

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Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date		
RADIATION HAZARD MEASUREMENT							
Rohde & Schwarz Spectrum Analyzer FSV40-N 102259 2019/7/22							
Sunol Sciences	Horn Antenna	DRH-118	A052604	2017/12/22	2020/12/21		
GW Instek	Power Meter	GPM 8212	CL110034	2020/4/9	2021/4/9		
GW Instek	AC Power Meter	GPM 8212	CL110045	2020/5/3	2021/5/3		
MC	Thermometer	Unknown	Unknown	2019/11/1	2020/11/1		
ETS	Microwave Survery Meter	1501	F-03-EM166	2020/3/12	2021/3/11		
CAMRY	Electronic Weighed	EK3820	EK3820	2019/11/2	2020/11/2		
Insulted Wire Inc.	RF Cable	SPS-2503-3150	02222010	2019/11/29	2020/11/28		
Unknown	RF Cable	W1101-EQ1 OUT	F-19-EM005	2019/11/29	2020/11/28		

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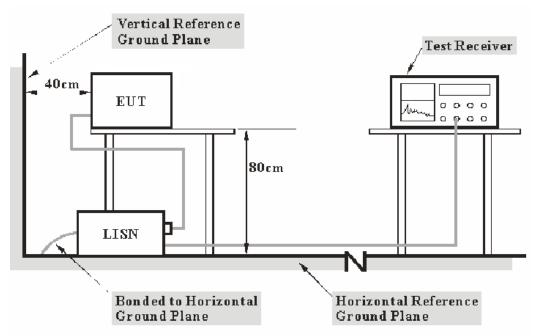
<sup>\*</sup> Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

## **CONDUCTED EMISSIONS**

#### **Applicable Standard**

FCC §18.307

#### **EUT Setup**



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Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with MP-5: 1986 measurement procedure. Specification used was with the FCC Part 18.

The socket was connected to a 120 VAC/ 60Hz power source.

#### **EMI Test Receiver Setup**

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

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#### **Test Procedure**

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

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All final data was recorded in the Quasi-peak and average detection mode.

#### **Test Data**

#### **Environmental Conditions**

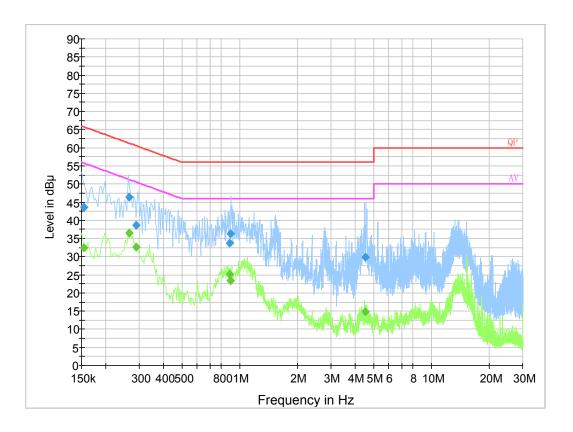
Temperature:	25 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Haiguo Li on 2020-06-11.

EUT operation mode: Maxpower Cooking

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# **AC 120V/60Hz, Line**

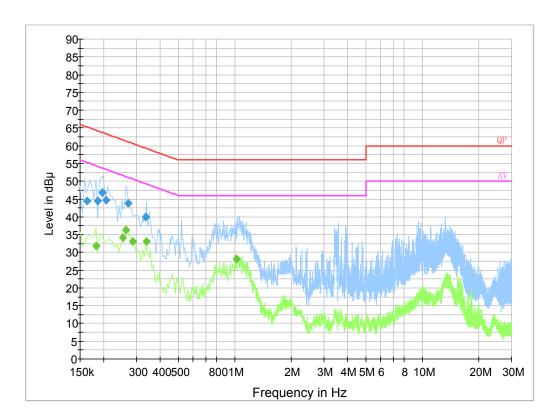


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Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.154000	43.7	19.8	65.8	22.1	QP
0.265500	46.3	19.8	61.3	15.0	QP
0.289500	38.7	19.7	60.5	21.8	QP
0.888470	33.7	19.8	56.0	22.3	QP
0.900290	36.3	19.8	56.0	19.7	QP
4.513270	29.9	19.9	56.0	26.1	QP
0.154000	32.5	19.8	55.8	23.3	Ave.
0.265500	36.6	19.8	51.3	14.7	Ave.
0.289500	32.7	19.7	50.5	17.8	Ave.
0.888470	25.2	19.8	46.0	20.8	Ave.
0.900290	23.5	19.8	46.0	22.5	Ave.
4.513270	14.9	19.9	46.0	31.1	Ave.

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## AC 120V/60Hz, Neutral



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Frequency (MHz)	Corrected Amplitude (dBµV)	Corrected Factor (dB)	Limit (dBµV)	Margin (dB)	Remark (PK/QP/Ave.)
0.162500	44.4	19.8	65.3	20.9	QP
0.185500	44.4	19.8	64.2	19.8	QP
0.197500	46.7	19.8	63.7	17.0	QP
0.205500	44.8	19.8	63.4	18.6	QP
0.270500	43.9	19.7	61.1	17.2	QP
0.336930	39.9	19.8	59.3	19.4	QP
0.182000	31.8	19.8	54.4	22.6	Ave.
0.254000	34.2	19.8	51.6	17.4	Ave.
0.262000	36.3	19.8	51.4	15.1	Ave.
0.286000	33.2	19.7	50.6	17.4	Ave.
0.338000	33.2	19.8	49.3	16.1	Ave.
1.022000	28.1	19.8	46.0	17.9	Ave.

#### Note:

- 1) Corrected Amplitude = Reading + Correction Factor
- 2) Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation
  3) Margin = Limit Corrected Amplitude

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#### RADIATION HAZARD MEASUREMENT

#### **Applicable Standard**

FCC §18.301 & FCC/OST MP-5

#### **Environmental Conditions**

Temperature:	23 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Leo Huang on 2020-06-09.

#### **Radiation Hazard Measurement**

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

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A 275 mL 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 0.2mW/cm<sup>2</sup> observed at any point 5 cm or more from the external surface of the oven.

A maximum of 1.0 mW/cm<sup>2</sup> 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.

#### **Input Power**

Input power and current was measured using a power analyzer. A 1000 mL water load was placed in the center of the oven and the oven was operated at maximum output power. A 1000mL water load was chosen for its compatibility with the procedure commonly used by manufacturers to determine their input ratings.

Input Voltage (V <sub>AC</sub> /Hz)	Input Current (Amps)	Measured Input Power (Watts)	Rated Input Power (Watts)
119.8	12.1	1449.58	1500

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

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#### **Load for Microwave Ovens**

For all measurements, the energy developed by the oven was absorbed by a dummy load consisting of a quantity of tap water in a beaker. If the oven was provided with a shelf or other utensil support, this support was in its initial normal position. For ovens rated at 1000 watts or less power output, the beaker contained quantities of water as listed in the following subparagraphs. For ovens rated at more than 1000 watts output, each quantity was increased by 50% for each 500watts or fraction thereof in excess of 1000 watts. Additional beakers were used if necessary.

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- Load for power output measurement: 1000 milliliters of water in the beaker located in the center of the oven.
- Load for frequency measurement: 1000 milliliters of water in the beaker located in the center of the oven.
- Load for measurement of radiation on second and third harmonic: Two loads, one of 700 and the other of 300 milliliters, of water are used. Each load is tested both with the beaker located in the center of the oven and with it in the right front corner.

#### **RF Output Power Measurement**

A cylindrical container of borosilicate glass is used for the test. It has a maximum thickness of 3 mm, an external diameter of approximately 190 mm and a height of approximately 90 mm. The mass of the container is determined.

At the start of the test, the oven and the empty container are at ambient temperature. Water having an initial temperature of  $10 \, ^{\circ}\text{C} \pm 1 \, ^{\circ}\text{C}$  is used for the test. The water temperature is measured immediately before it is poured into the container.

A quantity of  $1000 \text{ g} \pm 5 \text{ g}$  of water is added to the container and its actual mass obtained. The container is then immediately placed in the centre of the oven shelf, which is in its lowest normal position. The oven is operated and the time for the water temperature to attain  $20 \,^{\circ}\text{C} \pm 2 \,^{\circ}\text{C}$  is measured. The oven is then switched off and the final water temperature is measured within  $60 \, \text{s}$ .

m <sub>w</sub> (g)	m <sub>c</sub> (g)	T <sub>0</sub> (°C)	T <sub>1</sub> (°C)	T <sub>2</sub> (°C)	t (s)
1000	377.0	24.0	9.6	19.1	45

RF Output Power =  $(4.187 \times 1000 \times (19.1-9.6) + 0.55 \times 377.0 \times (19.1-24.0)) / 45 = 861.34$  Watts

- P is the microwave power output, in watts:
- m<sub>w</sub> is the mass of the water, in grams;
- m<sub>c</sub> is the mass of the container, in grams;
- $T_0$  is the ambient temperature, in degrees Celsius;
- $T_1$  is the initial temperature of the water, in degrees Celsius;
- T<sub>2</sub> is the final temperature of the water, in degrees Celsius;
- is the heating time, in seconds, excluding the magnetron filament heating-up time.

The measurement output power was found to be less than 500 watts. Therefore, in accordance with
Section 18.305 of Subpart-C, the measured out-of-band emissions were compared to the limit of
25μV/meter at a 300-meter measurement distance.

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The measured output power was found to exceed 500 watts. Therefore, in accordance with Section 18.305 of Subpart-C, the measured out-of-band emissions were compared with the limit calculated as following:

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LFS = 25\*SQRT (Power Output/500)

LFS = 25\*SQRT (861.34/500)

LFS = 32.81

Where: LFS is the maximum allowable field strength for out-of-band emissions in  $\mu V/meter$  at a 300-meter measurement distance. Power Output is the measured output power in watts.

LFS μV/m@300m	dBμV/m@300m	dBμV/m@3m			
32.81	30.32	70.32			

Note: Limit  $(dB\mu V/m@3m) = Limit (dB\mu V/m@300m) + 40(dB)$ 

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#### **Operating Frequency Measurement**

# Variation in Operating Frequency with Time

The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 1000mL water load was placed in the center of the oven and the oven was operated at maximum output power. The fundamental operating frequency was monitored until the water load was reduced to 20 percent of the original load.

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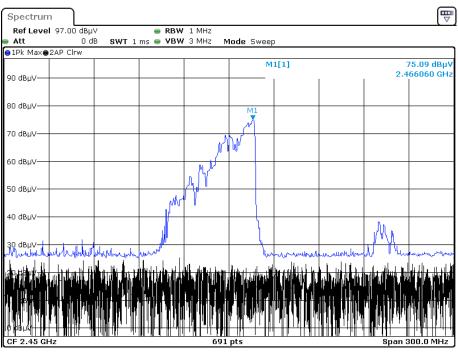
The results of this test are as follows:

Frequency at Start time	Frequency at End time			
(MHz)	(MHz)			
2466.06	2460.85			

Refer to data pages for details of the variation in operating frequency with time measurement.

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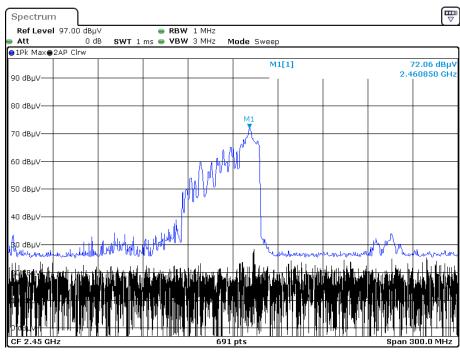
#### **Start time:**



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#### Date: 9.JUN.2020 13:28:25

#### **End time:**



Date: 9.JUN.2020 13:41:21

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#### Variation in Operating Frequency with Line Voltage

The EUT was operated / warmed by at least 10 minutes of use with a 1000 mL water load at room temperature at the beginning of the test. Then the operating frequency was monitored as the input voltage was varied between 80 and 125 percent of the nominal rating.

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The results of this test are as follows:

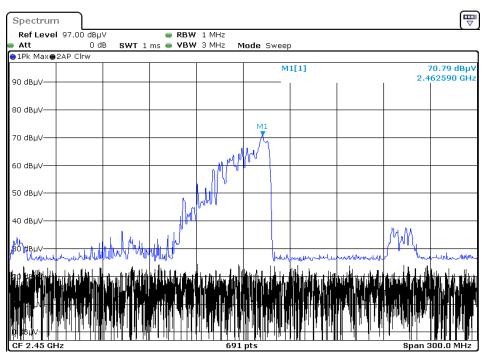
Line voltage varied from 96 V<sub>AC</sub> to 150 V<sub>AC</sub>.

(Low voltage) Frequency	(High voltage) Frequency
(MHz)	(MHz)
2462.59	2469.10

Please refer to following pages for details of the variation in operating frequency with line voltage measurement.

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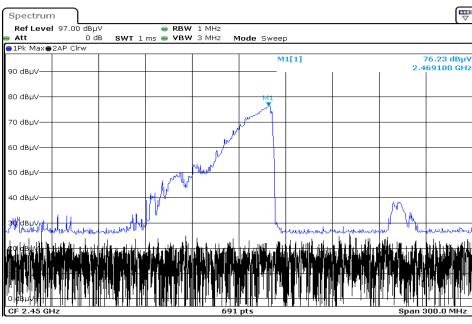
#### Low Voltage:



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#### Date: 9.JUN.2020 13:53:27

## **High Voltage:**



Date: 9.JUN.2020 14:09:29

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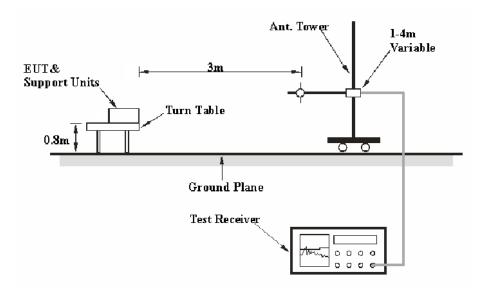
## **RADIATED EMISSIONS**

#### **Applicable Standard**

FCC §18.305 and FCC §18.309

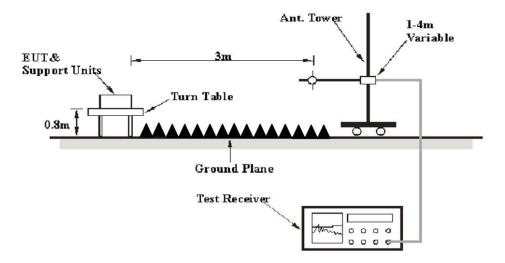
## **EUT Setup**

#### **Below 1GHz:**



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#### Above 1GHz:



The radiated emission tests were performed in the 3 meters chamber test site, using the setup accordance with the FCC MP - 5. The specification used was the FCC part 18 limits.

The socket was connected to 120 VAC/60 Hz power source.

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#### **EMI Test Receiver Setup and Spectrum Analyzer Setup**

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver and Spectrum Analyzer were set with the following configurations:

Frequency Range	RBW	RBW Video B/W		Measurement
30MHz – 1000 MHz	100 kHz	300 kHz	120kHz	QP
Above 1 CHz	1MHz	3 MHz	/	PK.
Above 1 GHz	1MHz	10 Hz	/	Ave.

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#### **Test Procedure**

Maximizing procedure was performed on the six (6) highest emissions to ensure that the EUT complied with all installation combinations.

The EUT was in the normal (naïve) operating mode during the final qualification test to represent the worst results.

#### **Corrected Amplitude & Margin Calculation**

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

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - 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 limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

#### **Test Data and Plots**

#### **Environmental Conditions**

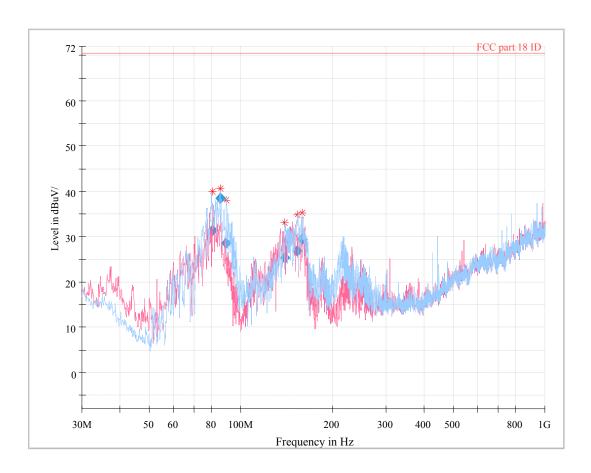
Temperature:	23 ℃
Relative Humidity:	65 %
ATM Pressure:	101.0 kPa

The testing was performed by Holland Yang on 2020-06-11 for below 1GHz and by Leo Huang on 2020-06-10 for above 1GHz.

EUT operation mode: Maxpower Cooking

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## 30 MHz – 1 GHz:



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Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna height (cm)	Antenna Polarity	Turntable position (degree)	Correction Factor (dB/m)	Limit (dBµV/m)	Margin (dB)
80.611625	31.39	266.0	Н	290.0	-19.9	70.32	38.93
85.549750	38.42	310.0	Н	26.0	-19.4	70.32	31.90
89.485875	28.62	318.0	Н	183.0	-19.1	70.32	41.70
139.712625	25.23	322.0	Н	181.0	-14.2	70.32	45.09
153.546500	26.88	339.0	Н	53.0	-14.3	70.32	43.44
158.570500	29.43	119.0	Н	66.0	-14.4	70.32	40.89

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#### 1 -25 GHz:

For Band edge and spurious emissions:

	Mea	surement		Rx An	itenna	Corrected	Corrected	FCC P	art 18
Frequency (MHz)	Reading (dBµV)	PK/QP/Ave.	Turntable Degree	Height		Factor	Amplitude (dBμV/m)	Limit (dBµV/m)	Margin (dB)
2388.13	13.79	Ave.	93	1.1	Н	31.87	45.66	70.32	24.66
2388.13	13.65	Ave.	360	2.4	V	31.87	45.52	70.32	24.80
2552.66	13.89	Ave.	110	2.3	Н	32.26	46.15	70.32	24.17
2552.66	13.82	Ave.	185	2.0	V	32.26	46.08	70.32	24.24

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For Second and Third Harmonics:

E	Measurement		T (11)		itenna	Corrected	Corrected	FCC Part 18	
Frequency (MHz)	Reading (dBµV)	PK/QP/Ave.	Turntable Degree	Height	Polar (H / V)	Factor (dB/m)	Amplitude (dBμV/m)	Limit (dBµV/m)	Margin (dB)
	•		700m	L water	r in cent	ter			
4926.83	31.29	Ave.	169	2.0	Н	6.76	38.05	70.32	32.27
4926.83	33.23	Ave.	114	2.3	V	6.76	39.99	70.32	30.33
7414.62	28.12	Ave.	127	2.2	Н	13.16	41.28	70.32	29.04
7414.62	29.26	Ave.	146	2.2	V	13.16	42.42	70.32	27.90
			300m	L water	r in cent	ter			
4931.85	31.62	Ave.	186	2.1	Н	6.76	38.38	70.32	31.94
4931.85	33.28	Ave.	136	1.1	V	6.76	40.04	70.32	30.28
7416.81	28.25	Ave.	154	2.2	Н	13.12	41.37	70.32	28.95
7416.81	29.16	Ave.	135	1.7	V	13.12	42.28	70.32	28.04

#### **Note:**

- 1) Corrected Amplitude = Meter Reading + Correction Factor
- 2) Correction Factor = Antenna Factor + Cable Loss Amplifier Gain
- 3) Margin = Limit Corrected Amplitude
- 4) The data below 20dB to the limit was not recorded.

\*\*\*\*\* END OF REPORT \*\*\*\*\*

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