



**FCC CFR47 PART 18 SUBPART C
ISM EQUIPMENT**

TEST REPORT

FOR

700W OUTPUT MICROWAVE OVENS

MODEL: MS171EWIAN

FCC ID: PKAHR6701M02T

BRAND NAME: HAIER

REPORT NUMBER: 01C0835-1

ISSUE DATE: JULY 16, 2001

Prepared for

**QINGDAO HAIER MICROWAVE PRODUCTION CO., LTD.
HAIER INDUSTRY PARK, QINGDAO DEVELOPMENT DISTRICT
QINGDAO, SHANDONG 266510
PRC**

Prepared by

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- VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS
- VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS
- VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS
- PROPOSED FCC ID LABEL
- USER MANUAL AND SCHEMATICS
- EUT PHOTOGRAPHS

REPORT NO: 01C0835-1
EUT: 700W OUTPUT MICROWAVE OVEN

FCC ID: PKAHR6701M02T
DATE: JULY 16, 2001

1. VERIFICATION OF COMPLIANCE

COMPANY NAME : QINGDAO HAIER MICROWAVE PRODUCTION CO., LTD.

CONTACT PERSON : LI ZHANG / ENGINEER

TELEPHONE NO : 532-893-9680

EUT DESCRIPTION: 700W MICROWAVE OVENS

MODEL NO/NAME : MS171EWIAN SERIES

DATE TESTED : JUNE 06, 2001

TYPE OF EQUIPMENT:	CONSUMER ISM EQUIPMENT	
TECHNICAL LIMIT:	SUBPART C	
FCC RULES:	PART 18	
MEASUREMENT PROCEDURE	FCC/MP-5/1986	
EQUIPMENT AUTHORIZATION PROCEDURE	CERTIFICATION	
MODIFICATIONS MADE ON EUT	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO

The above equipment was tested by Compliance Certification Services for compliance with the requirements set forth in the FCC CFR 47, PART 18. This said equipment in this configuration described in this report shows that maximum emission levels.

WARNING: This report documents conditions under which testing was conducted and the results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document emanating from equipment are within the compliance requirements.

Tested and Reviewed By:

PETE KREBILL
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

RELEASED FOR CCS BY:

STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

The equipment under test is a microwave oven sold for consumer use. Model: MS171EWIAN, etc. Please refer to the following for model differences. Magnetron, SAMSUNG, Model: OM75S(31).

Model Differences:

Model Name	Brand Name	Differences	Tested
MS171EWIAN	HAIER	ORIGINAL MODEL, WITH DIGITAL CONTROL PANEL	<input checked="" type="checkbox"/>
MS171EWIAR	HAIER	DIGITAL CONTROL, WITH OVEN-FRIDGE CONVERSION PLUG	<input type="checkbox"/>
MS171TWIAN	HAIER	MECHANICAL CONTROL	<input type="checkbox"/>
MS171TWIAR	HAIER	MECHANICAL CONTROL, WITH OVEN-FRIDGE CONVERSION PLUG	<input type="checkbox"/>
MHMK-6WTPA	MICROFRIDGE	IDENTICAL TO MS171EWIAN, DIGITAL CONTROL, WHITE ENCLOSURE	<input type="checkbox"/>
MHMK-6TPA	MICROFRIDGE	IDENTICAL TO MS171EWIAN, DIGITAL CONTROL, BLACK ENCLOSURE	<input type="checkbox"/>
MHM-6WTP	MICROFRIDGE	IDENTICAL TO MS171EWIAR, DIGITAL CONTROL, WHITE ENCLOSURE	<input type="checkbox"/>
MHM-6TP	MICROFRIDGE	IDENTICAL TO MS171EWIAR, DIGITAL CONTROL, BLACK ENCLOSURE	<input type="checkbox"/>
MHMK-6A	MICROFRIDGE	IDENTICAL TO MS171TWIAN, MECHANICAL CONTROL, BLACK ENCLOSURE	<input type="checkbox"/>
MHMK-6WA	MICROFRIDGE	IDENTICAL TO MS171TWIAN, MECHANICAL CONTROL, WHITE ENCLOSURE	<input type="checkbox"/>
MHM-6W	MICROFRIDGE	IDENTICAL TO MS171TWIAR, WHITE ENCLOSURE	<input type="checkbox"/>
MHM-6	MICROFRIDGE	IDENTICAL TO MS171TWIAR, BLCK ENCLOSURE	<input type="checkbox"/>

3. TEST FACILITY

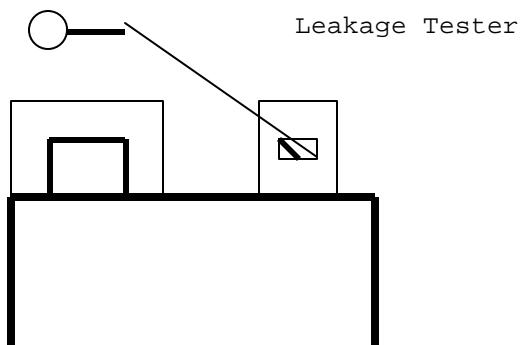
The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

4. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code:200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT(1300F2))

5. RADIO NOISE EMISSION MEASUREMENTS PROCEDURES/RESULTS

5.1 RADIATION HAZARD MEASUREMENT



Radiation Hazard Measurements

A 1000-ml water load was placed in the center of the oven. The power setting was set to 10(100%) maximum power. While the oven was operating, the Microwave leakage probe was moved slowly around the door seams to check for leakage.

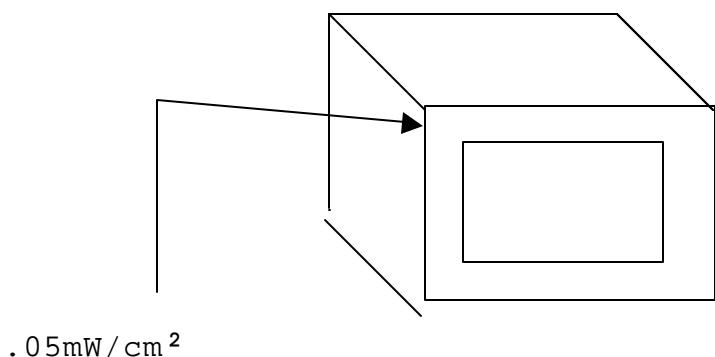


Fig.1

LOCATION	MAXIMUM LEAKAGE (mW/cm²)	LIMIT (mW/cm²)
Fig.1 shows the locations of maximum leakage	.05	1.0
All others	.01	1.0

5.2 INPUT POWER

Input power and current were measured using a voltmeter and a amp meter. A 1000 ml water load was placed in the center of the oven and the oven was set to 10(100%) maximum power.

<u>Input Voltage (Vac)</u>	<u>Input Current (amps)</u>	<u>Measured Input power (watts)</u>
700W: 120	9.267	1112

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

5.3 RF OUTPUT POWER MEASUREMENT

The Caloric Method was used to determine maximum output power. The initial temperature of a 1000-ml water load was measured.

The water load was placed in the center of the oven. The oven was operated at maximum output power for 120 seconds. Then the temperature of the water was re-measured.

Quantity of water (ml)	Starting Temperature (C°)	Final Temperature (C°)	Elapsed Time (seconds)	RF Power (watts)
1000	31.6	39.9	120	291
1000	22.8	32.2	120	329
1000	27.8	37.2	120	329

Average of 3 Trials: 316.33w

Power = $\frac{(4.2 \text{ Joules/Cal}) \times (\text{Volume in ml}) \times (\text{Temp. Rise})}{\text{Time in seconds}}$

The measured output 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 25uv/m @ 300M limit.

5.4 OPERATING FREQUENCY MEASUREMENTS

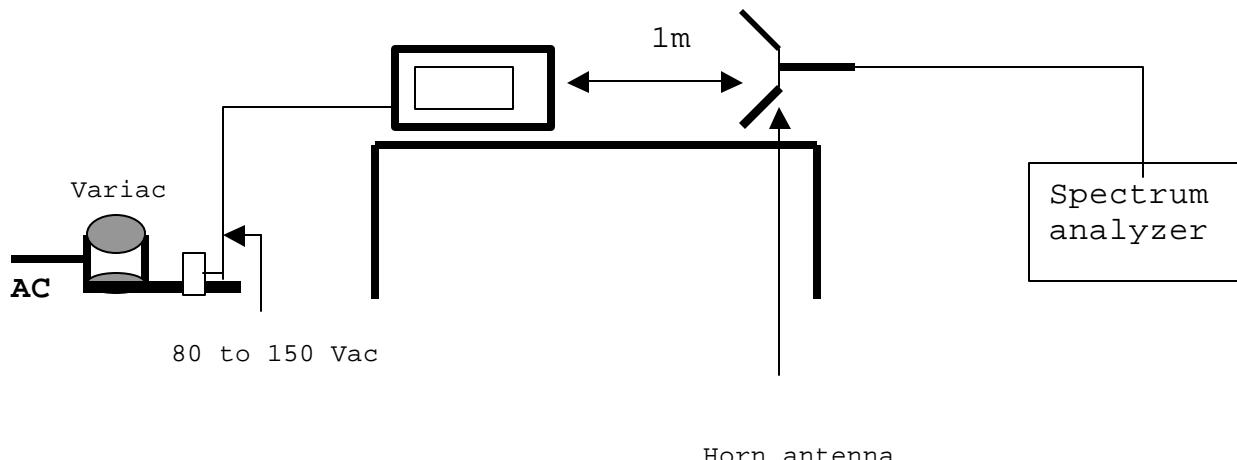


Figure 1. Operating Frequency Measurement Set-up

5.5 VARIATION IN OPERATING FREQUENCY WITH TIME

The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 1000-ml 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% of the original load.

The results of this test are as follows.

Initial load: 1000 ml

Load at completion of test: 200 ml

Maximum frequency observed: 2467 MHz

Maximum frequency allowed: 2500 MHz

Minimum frequency observed: 2434 MHz

Minimum frequency allowed: 2400 MHz

Refer to spectrum analyzer plot under ATTACHMENTS: **VARIATION IN OPERATING FREQUENCY WITH TIME PLOT** for details of frequency variation with operating time.

5.6 VARIATION IN OPERATING FREQUENCY WITH VOLTAGE

Following the above test, after operating the oven long enough to assure that stable operating temperature were obtained, the operating frequency was monitored as the input voltage was varied between 80 to 125 percent of the nominal rating.

The water load was maintained at 200 ml for the duration of the test.

The results of this test are as follows:

Line voltage varied from 92Vac to 150Vac.

Maximum frequency observed: 2466 MHz

Maximum frequency allowed: 2500 MHz

Minimum frequency observed: 2427 MHz

Minimum frequency allowed: 2400 MHz

Refer to spectrum analyzer plots under ATTACHMENTS: **VARIATION IN OPERATING FREQUENCY WITH VOLTAGE PLOTS** for details of Frequency variation with operating voltage.

5.7 RADIATED EMISSIONS

Radiated emissions were measured over an inclusive frequency range to 30MHz through the tenth harmonic of the operating frequency. For this test, a 1-meter high wooden table in an open laboratory area supported the device under test. The table was placed on a turntable.

The measurement antenna was placed 3 meters for measurements from 30 - 1000MHz and 1 meter for measurements from 1000 - 25,000MHz, respectively, for the device under test. The indicated frequency range was swept as the device under test was rotated along its vertical axis in 90° increments.

During the preliminary tests, the load consisted of 700-ml tap water placed in the center of the oven. The emissions were observed while the device under test was operated at maximum output power.

The level of the emissions near the edge of the designated ISM frequency band was measured. For this test, the load consisted of 700-ml water load located in the center of the oven.

The levels of the second and third harmonic were measured inclusively with a 300 ml and 700 ml water load alternately placed in the center and right front corner of the oven. Harmonics beyond the third were measured with a 700-ml load placed in the center of the oven. The data obtained during these tests is contained on the attached spreadsheet.

The maximum of all other out-of-band emissions were measured while a 700-ml load was placed in the center of the oven. Maximum readings were recorded after variations in antenna polarizations, height, device orientation, load position, and size.

For all emissions the equivalent 300 meters intensity was calculated assuming a linear decrease in the intensity of the RFI field with increased distance. In the operating modes and conditions described, there were no over-limit emissions discovered.

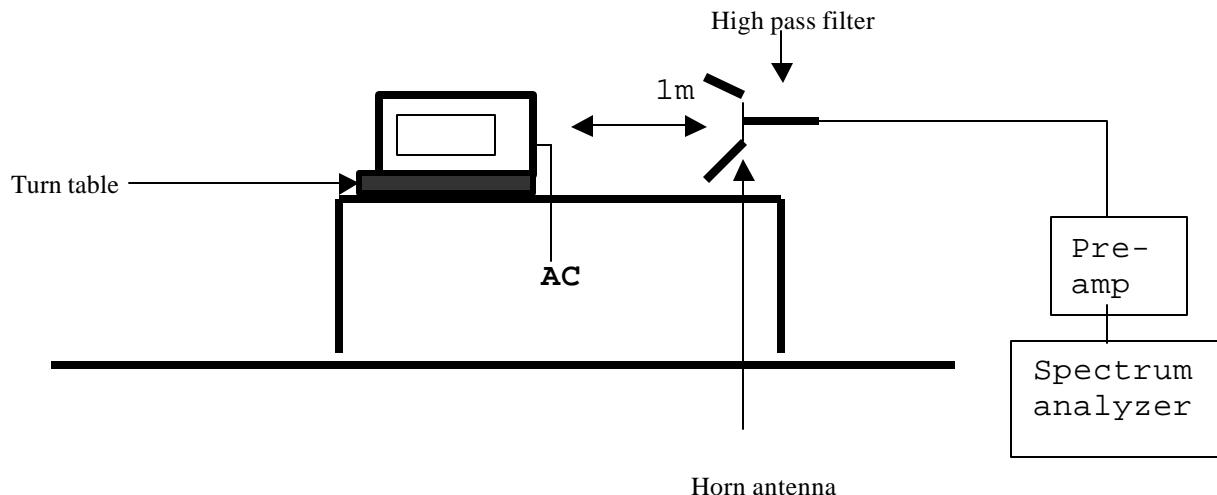


Figure 2. Radiated Emissions Configuration

There were no emissions detected from the EUT in the 30 - 1000 MHz region. Emissions detected in the 1000 - 25,000 MHz region are reported in a spreadsheet under ATTACHMENTS: **RADIATION EMISSION DATA**.

6. MEASUREMENT EQUIPMENT LIST

Equipment	Manufacturer	Model No.	Serial No.	Site	Cal Date	Due Date
Spectrum Analyzer	H.P.	8566B	3014A06685	F	08/00	08/01
Spectrum Display	H.P.	85662A	3026A19146	F	08/00	08/01
Quasi-peak Detector	H.P.	85650A	3145A01654	F	07/00	08/01
Pre-Amp	H.P. (P2)	8447D	2944A06265	F	09/00	09/01
Antenna	EMCO	3110	8908-1079	F	10/00	10/01
Antenna	EMCO	3146	NSN=X100	F	10/00	10/01
Spectrum Analyzer	H.P.	8593EM	3710A00205	N/A	05/00	06/02
Pre-Amp	H.P. (1-26.5GHz)	8449B	3008A00369	N/A	04/00	05/02
Horn Antenna	EMCO	3115	9001-3245	N/A	12/00	12/01
Digital Multimeter	Fluke	87	4035173	N/A	11/00	11/01
Wattmeter	Valhalla	2111A	33-386	N/A	10/00	10/01
Variac(0 - 280Vac)	Powerstat	N/A	N/A	N/A	N/A	N/A
Horn Antenna	Antenna Research Associate	1826/B	1013	N/A	N/A	07/02

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7. EUT SETUP PHOTOS

FREQUENCY VS. TIME & VOLTAGE SET UP



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FREQUENCY VS. VOLTAGE SETUP (ONLY)



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RADIATION HAZARD TEST



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INPUT POWER TEST



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RF POWER OUTPUT TEST



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RADIATED EMISSION TEST SETUP (FRONT SIDE)



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RADIATED EMISSION TEST SETUP (BACK SIDE)



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ATTACHMENTS

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RADIATED EMISSION DATA

COMPLIANCE Certification Services		Project #: <u>01C0835</u> Report #: <u>010606c1</u> Date & Time: <u>06/06/01 3:09 PM</u> Test Engr: <u>Pete Krebill</u>									
FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP											
561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888											
Company: <u>Quingdao Haier</u>											
EUT Description: <u>Microwave Oven</u>											
Test Configuration: <u>EUT only</u>											
Type of Test: <u>FCC 15 B</u>											
Mode of Operation: <u>Max output</u>											
<input type="radio"/> A-Site		<input type="radio"/> B-Site	<input checked="" type="radio"/> C-Site	<input type="radio"/> F-Site	<input type="radio"/> 6 Worst Data	Descending					
Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
40.00	29.50	11.77	0.88	27.33	14.82	40.00	-25.18	3mV	0.00	1.00	P
50.00	26.90	10.16	0.98	27.26	10.78	40.00	-29.22	3mV	0.00	1.00	P
60.00	28.20	7.27	1.07	27.25	9.29	40.00	-30.71	3mV	0.00	1.00	P
70.00	29.30	6.04	1.15	27.25	9.24	40.00	-30.76	3mV	0.00	1.00	P
80.00	30.00	8.73	1.21	27.23	12.71	40.00	-27.29	3mV	0.00	1.00	P
120.00	32.10	10.58	1.55	27.09	17.14	43.50	-26.36	3mV	0.00	1.00	P
Total data #: 6											
V.2c											

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COMPLIANCE ENGINEERING SERVICES, INC.													
F(MHz)	READING	AF	CL	AMP	DIST	HPF	TOTAL	LIMIT	MARGIN				
(dBuV)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dBuV/m)	(dB)	(dB)				
	Avg						Avg		Avg				
4943	34.3	34.3	5.1	-35.5	-49.5	1	-10.3	27.95	-38.3				
7373	37.53	36.4	6.12	-35.5	-49.5	1	-3.95	27.95	-31.9				
9853	37.93	38.2	7.82	-35.5	-49.5	1	-0.05	27.95	-28				
12304	39.3	39.2	8.5	-35.5	-49.5	1	3	27.95	-25				
14753	40.2	40.4	9.86	-35.5	-49.5	1	6.46	27.95	-21.5				
17203	40.12	44	11.22	-35.5	-49.5	1	11.34	27.95	-16.6				
19600	42.5	32.2	12.24	-35.5	-49.5	1	2.94	27.95	-25				
22050	44.9	32.5	13.6	-35.5	-49.5	1	7	27.95	-21				
24500	45.1	32.5	14.45	-35.5	-49.5	1	8.05	27.95	-19.9				
NOTE: ALL READINGS MEASURED AT 1 METER.													
DIST: Correction to extrapolate reading to 300m specification distance													
ANALYZER SETTINGS													
AF: Antenna Factor					PEAK(Pk):		Res bw	Avg. bw					
AMP: Pre-amp gain					Above 1GHz		1MHz	1MHz					
CL: Cable loss													
HPF: High pass filter insertion loss													

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VARIATION IN OPERATING FREQUENCY VS. TIME PLOTS

10:50:14 JUN 06, 2001

QINDAO HAIER 700W MICROWAVE FREQ/TIME 120VAC

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 2.4670 GHz

81.63 dB μ V

LOG REF 107.0 dB μ V

10

dB/

ATN

10 dB

DL

82.8

dB μ V

VA SB

SC LC

CORR

START 2.4000 GHz

#IF BW 1.0 MHz

#AVG BW 1 MHz

STOP 2.5000 GHz

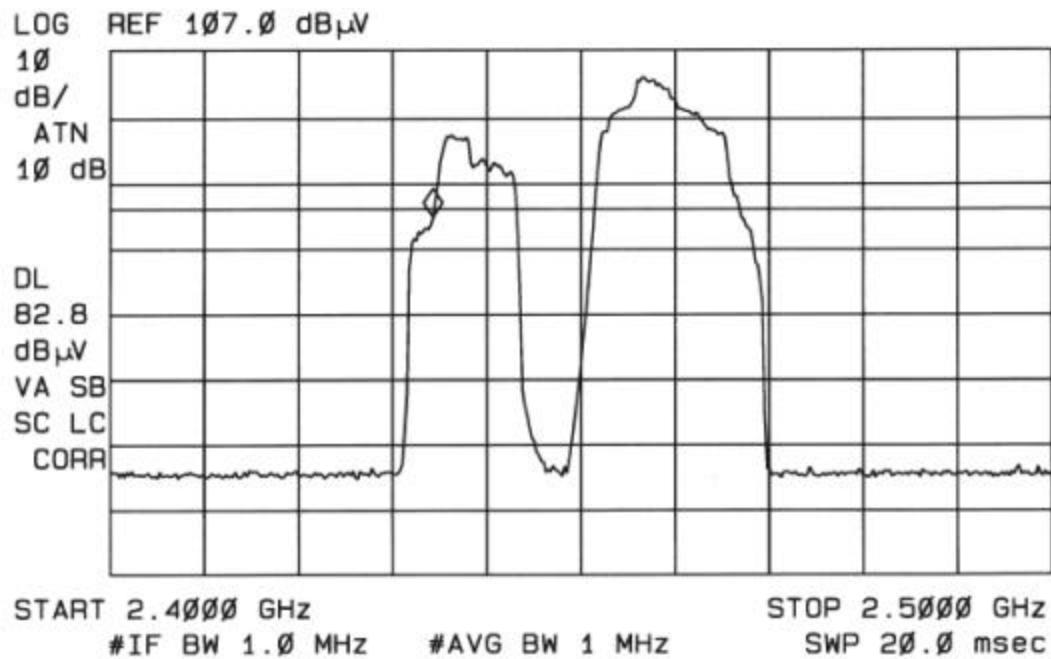
SWP 20.0 msec

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VARIATION IN OPERATING FREQUENCY VS. TIME PLOTS

10:49:25 JUN 06, 2001
QINDAO HAIER 700W MICROWAVE FREQ/TIME 120VAC
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4343 GHz
81.56 dB μ V



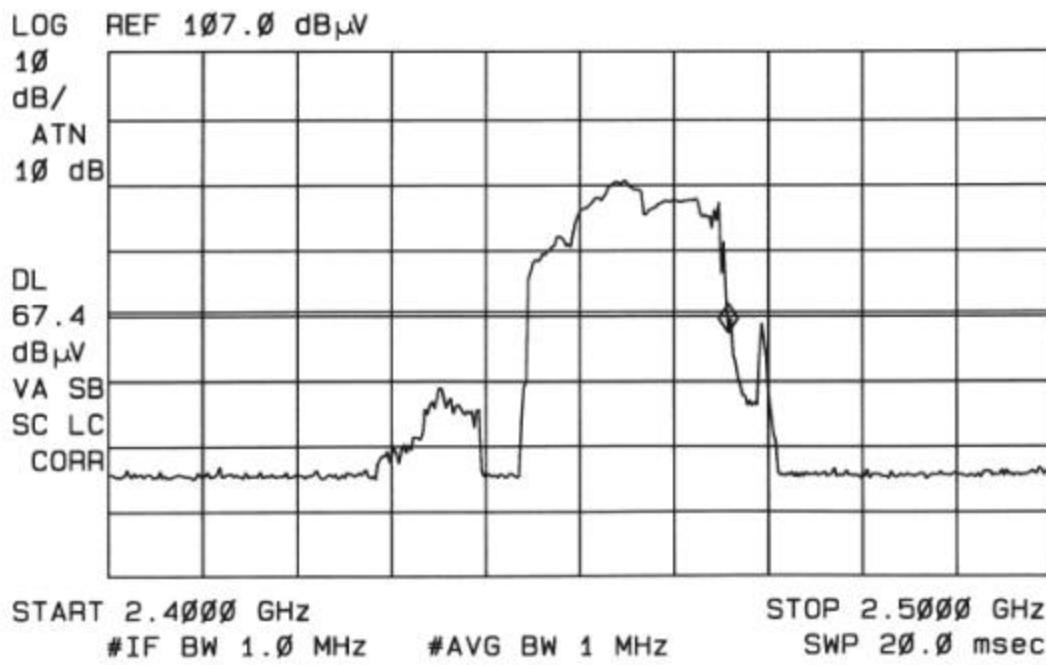
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VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS (92VAC)

14:27:31 JUN 06, 2001
QINDAO HAIER 700W MICROWAVE FREQ/VOLTAGE 92VAC

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4658 GHz
64.17 dB μ V



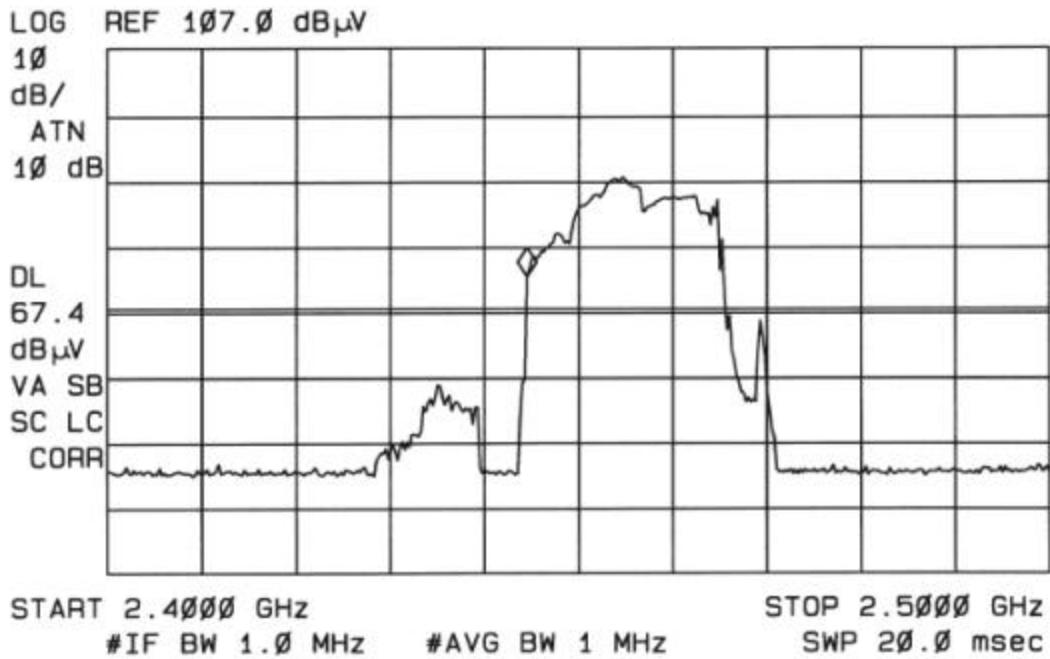
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VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS (92VAC)

14:26:57 JUN 06, 2001
QINDAO HAIER 700W MICROWAVE FREQ/VOLTAGE 92VAC

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4445 GHz
72.27 dB μ V

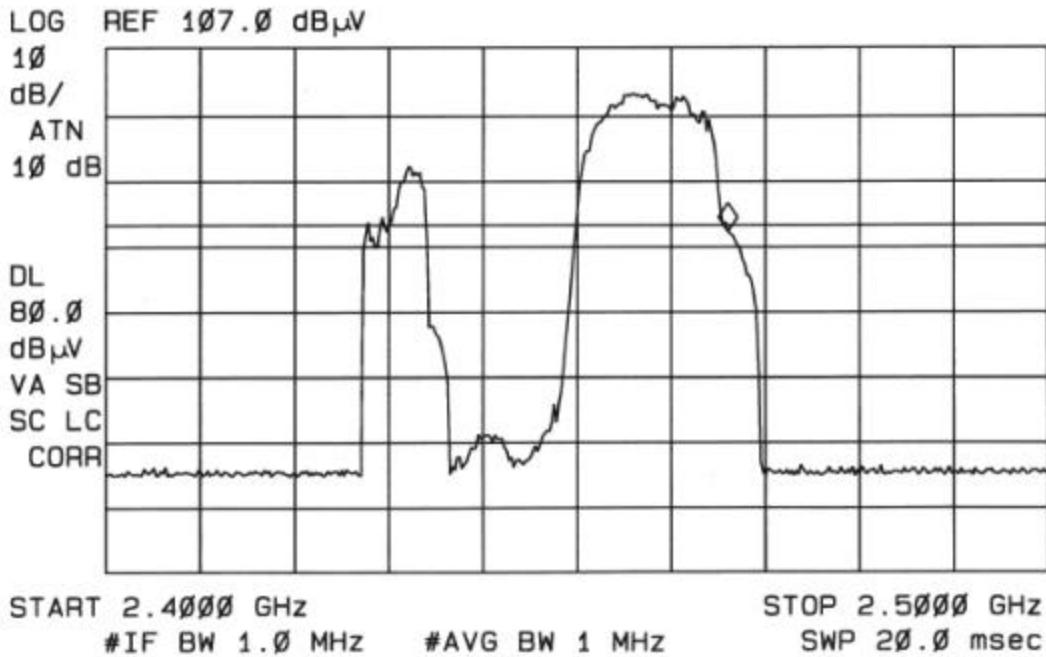


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VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS (150VAC)

12:02:47 JUN 06, 2001
QINDAO HAIER 700W MICROWAVE FREQ/VOLTAGE 150VAC
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4660 GHz
78.96 dB μ V



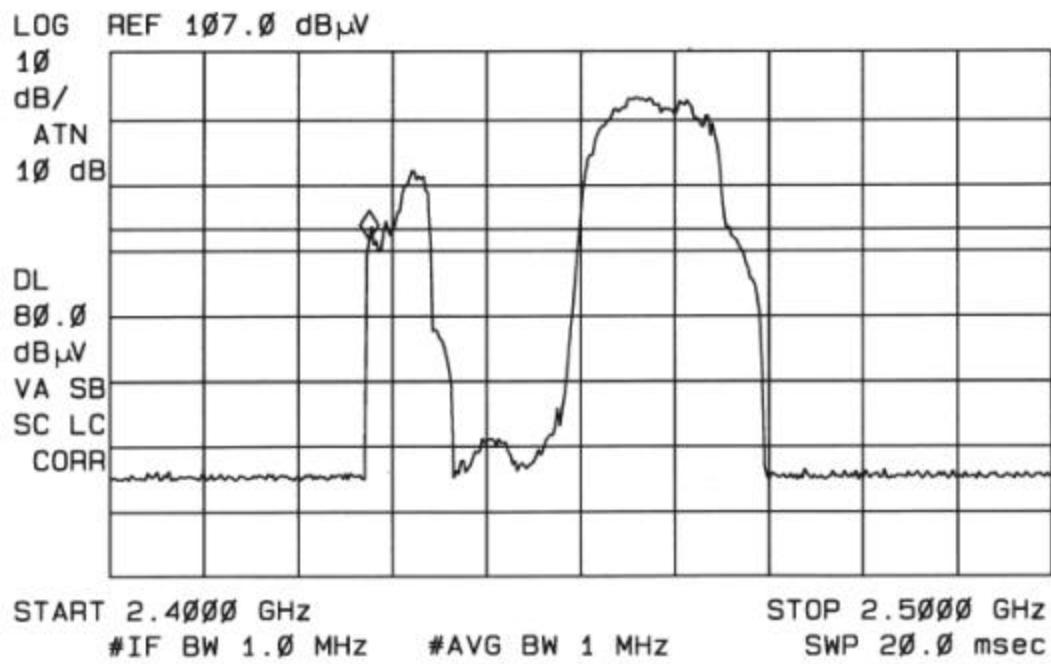
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VARIATION IN OPERATING FREQUENCY VS. VOLTAGE PLOTS (150VAC)

12:01:58 JUN 06, 2001
QINDAO HAIER 700W MICROWAVE FREQ/VOLTAGE 150VAC

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 2.4275 GHz
78.41 dB μ V



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PROPOSED FCC ID LABEL

**QINGDAO HAIER MICROWAVE
PRODUCTIONS CO., LTD.**

FCC ID: PKAHR6701M02T

This device complies with Part 18 of the FCC Rules.



FCC ID
LABEL

REPORT NO: 01C0835-1
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USER MANUAL AND SCHEMATICS

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EUT PHOTOGRAPHS