FCC CFR47 PART 18 SUBPART C
ISM EQUIPMENT

TEST REPORT

FOR

MICROWAVE OVEN

MODEL NUMBER: ORJ

MAGNETRON MODEL: 2M268J(L)

FCC ID: APYDMR0161

REPORT NUMBER: 05U3347-1

ISSUE DATE: MAY 4, 2005

Prepared for
SHARP CORPORATION
22-22 NAGAIKE-CHO,
ABENO-KU RELIABILITY CONTROL GROUP
OSAKA, JAPAN, 545-8522

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
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LAB CODE:200065-0

Revision History

Rev.		Revisions		Revised By

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	SHARP ELECTRONIC CORP 22-22 NAGAIKE-CHO, ABENO-KU RELIABILITY CONTROL GROUP OSAKA, JAPAN, 545-8522
EUT DESCRIPTION:	MICROWAVE OVEN
MODEL NUMBER:	ORJ
SERIAL NUMBER:	112703 & 112704
MAGNETRON MODEL:	2M268J(L)
DATE TESTED:	APRIL 14, 2005

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 18 SUBPART C & FCC METHEROD OF MEASUREMENTS OF RADIO NOISE EMISSION FROM INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT FCC / OST MP-5	NO NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

YAN ZHENG
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

HITESH H. SOLANKI
EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. PRODUCT DESCRIPTION

The equipment under test is a microwave oven sold for consumer use. Model: ORJ is s 1200W microwave oven with digital controls panel.

Magnetron Model: 2M268J(L)

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. MEASUREMENT EQUIPMENT LIST

TEST EQUIPMENT LIST				
Name of Equipment	**Manufacturer**	**Model No.**	**Serial No.**	**Due Date**
Quasi-Peak Adaptor	HP	85650A	2811A01155	5/24/2005
SA Display Section 2	HP	85662A	2816A16696	5/24/2005
Site A Preamplifier, 1300MHz	HP	8447D	2944A06833	8/17/2005
SA RF Section, 1.5 GHz	HP	85680B	2814A04227	5/24/2005
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/12/2005
Spectrum Analyzer	HP	E4446A	US42510266	8/25/2005
EMI Test Receiver	R & S	ESHS 20	827129/006	10/22/2005
Site A Line Stabilizer / Conditioner	Tripplite	LC-1800a	A0051681	CNR
LISN, 10 kHz ~ 30 MHz	FCC	LISN-50/250-25-2	2023	8/30/2005
Digital Power Analyzer	Valhalla	2111A	NA	4/20/2005
Ajustable Power Supply	The Superior Electric Co.	Powerstat	NA	CNR
Microwave Leakage Tester	Simpson	380-2	6-115310	9/28/2005

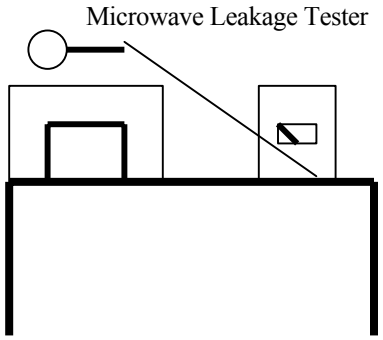
6. LIMITS AND RESULTS

6.1. RADIATION HAZARD MEASUREMENT

Limits:

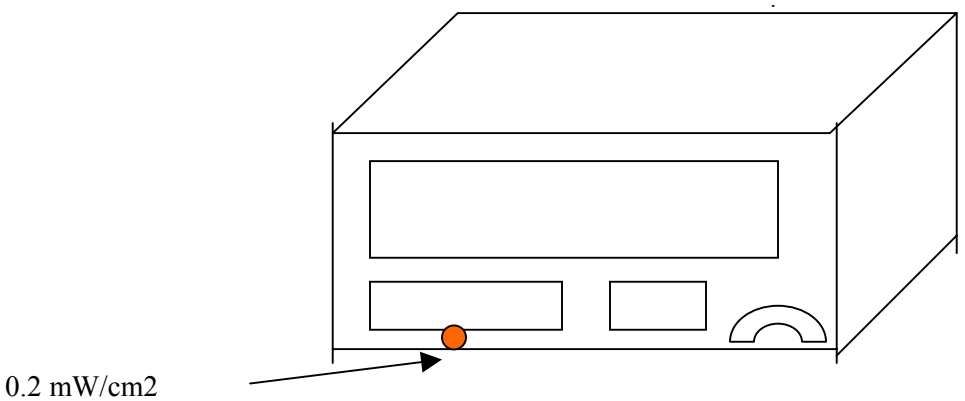
FCC METHEROD OF MEASUREMENTS OF RADIO NOISE EMISSION FROM INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT, FCC / OST MP-5. SECTION 3.1

Test Procedure:



A 700-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 STE probe was moved slowly around the door seams to check for leakage.

Test Result:



	Maximum Leakage (mW/cm2)	Limit (mW/cm2)
Figure shown above for the location of maximum leakage	**0.2**	**1.00**
All Others	**0.05**	**1.00**

6.2. INPUT POWER

Limit

FCC METHEROD OF MEASUREMENTS OF RADIO NOISE EMISSION FROM INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT, FCC / OST MP-5. SECTION 4.3

Test Procedure

Input power and current were measured using a wattmeter and an amp-meter. A 700 ml water load was placed in the center of the oven and the oven was set to10 (100%) maximum power. A 700-ml water load was chosen for its compatibility. Manufacturers to determine their input ratings commonly use this procedure.

Test Result:

Input Voltage (Vac)	Input Current (Amps)	Measured Input Power (Watts)
115	**17.05**	**1813**

6.3. RF OUTPUT POWER MEASUREMENT

Limit

FCC METHEROD OF MEASUREMENTS OF RADIO NOISE EMISSION FROM INDUSTRIAL, SCIENTIFIC, AND MEDICAL EQUIPMENT, FCC / OST MP-5. SECTION 4.3

Test Procedure

The Caloric Method was used to determine maximum output power. The initial temperature of a 1200-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.

Test Result:

Start Temp (°C)	Final Temp (°C)	Elapsed Time (120 sec)	RF Power (Watts)
18.10	**40.00**	**120**	**919.80**
18.00	**39.9**	**120**	**919.80**
18.20	**40.1**	**120**	**919.80**

Average of 3 Trials : 919.80 W

Power = (4.2 Joules/Cal) x (Volume in ml) x (Temp. Rise) / (Time in seconds)

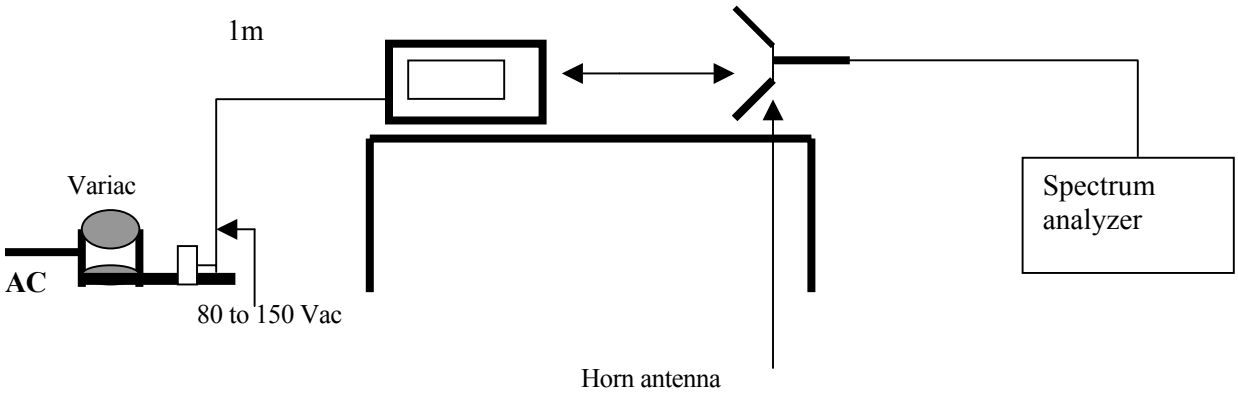
The measured output was found to be OVER 500Watts. Therefore, in accordance with section 18.305 of Subpart B, the measured out-of-band emissions were compared to the 25 √Power/500 @ 300m limit.

6.4. OPERATING FREQUENCY MEASUREMENTS

Limit

FCC PART 18 SUBPART C, § 18.301

Test Procedure



Operating Frequency Measurement Set-up

Test Result:

6.4.1. VARIATION IN OPERATING FREQUENCY WITH TIME

The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 1200-ml water load was placed in the center of the oven and the oven was operated at maximum output power.

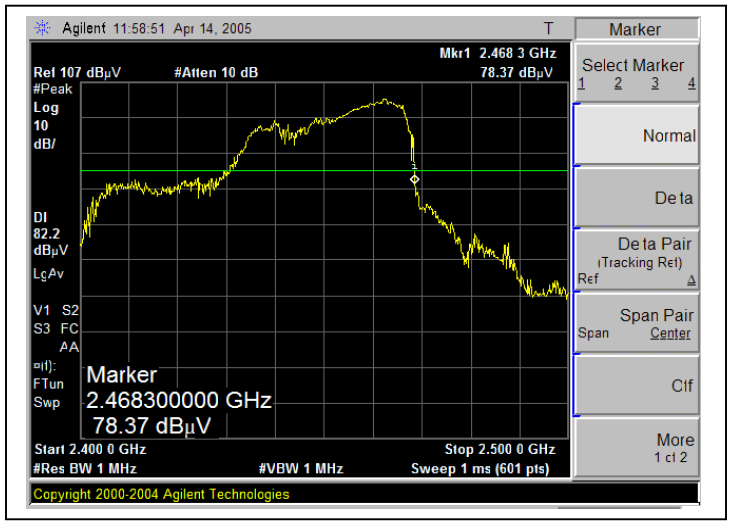
The fundamental operating frequency was monitor until the water load was reduced to 20% of the original load.

The results of this test are as follows.

Initial load: 1200 ml
Load at completion of test: 200 ml

	Freq. (MHz)
Minimum Frequency (2400 MHz)	**2429.50**
Maximum Frequency (2500 MHz)	**2468.30**

Minimum Frequency @ 115Vac



Maximum Frequency @ 115Vac

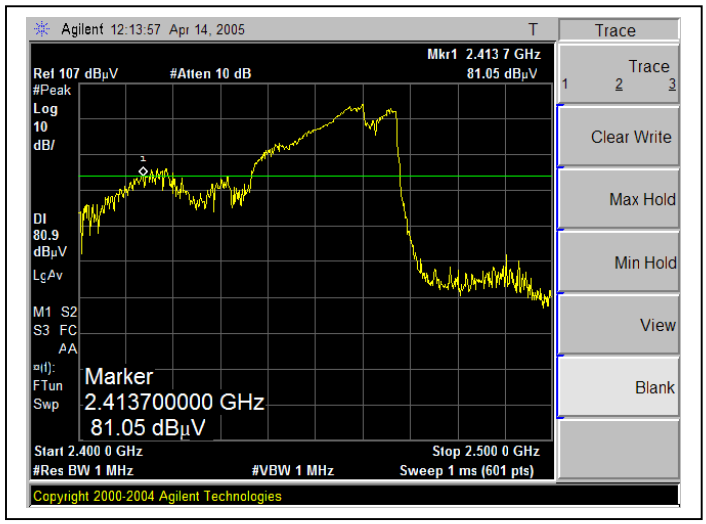
6.4.2. VARIATION IN OPERATING FREQUENCY WITH VOLTAGE

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.

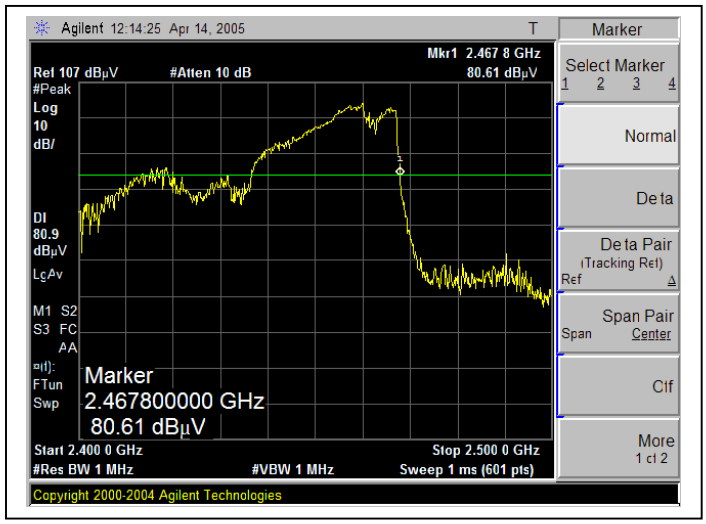
The water load was maintained at 200 ml for the duration of the test.

The results of this test are as follows:

	96Vac (MHz)	**115Vac (MHz)**	**150Vac (MHz)**
Minimum Frequency (2400 MHz)	**2413.70**	**2429.50**	**2438**
Maximum Frequency (2500 MHz)	**2467.80**	**2468.30**	**2466.80**

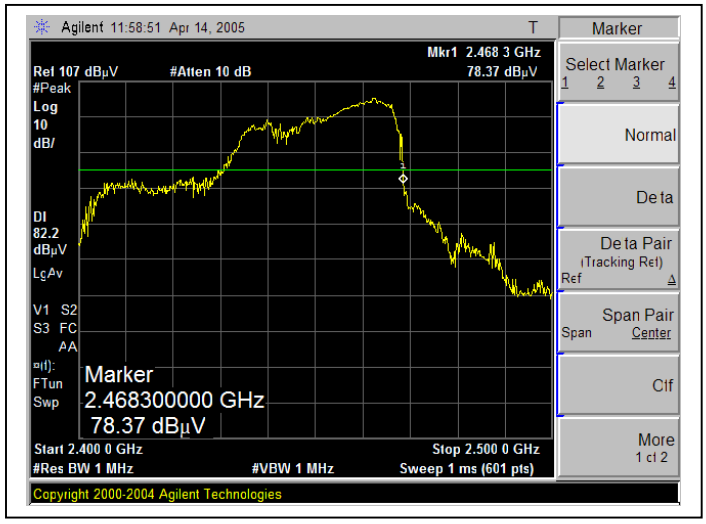


Minimum Frequency @ 96Vac

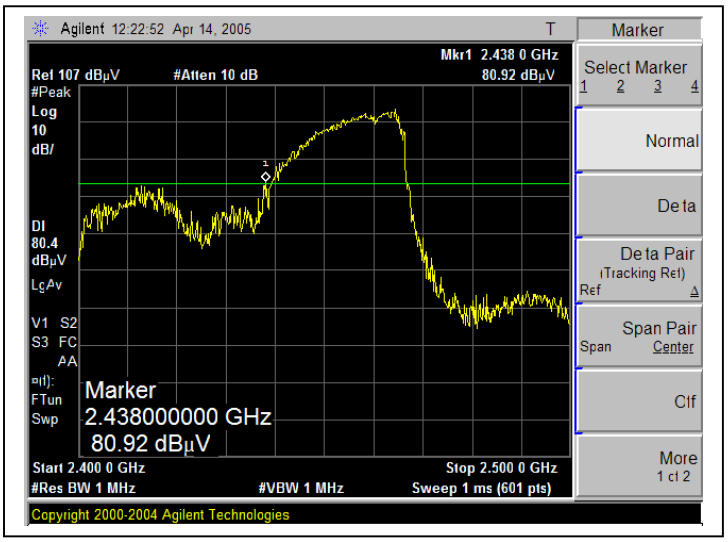


Maximum Frequency @ 96Vac

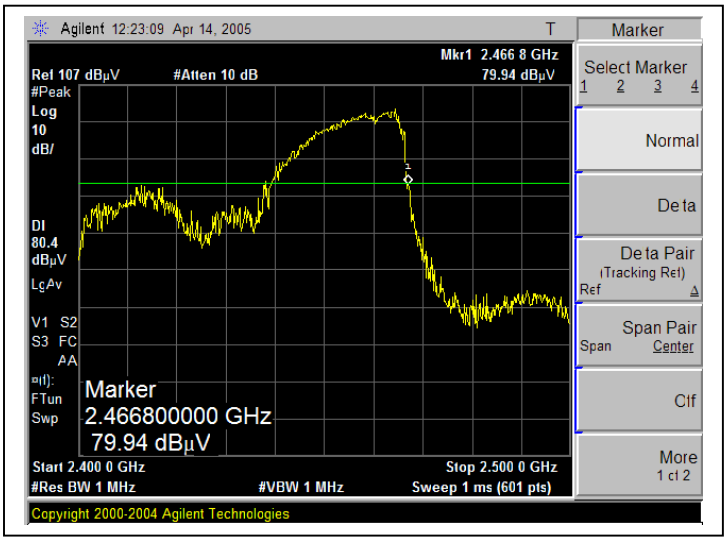
Minimum Frequency @ 115Vac



Maximum Frequency @ 115Vac



Minimum Frequency @ 150Vac



Maximum Frequency @ 150Vac

6.5. RADIATED EMISSIONS

Limit

FCC PART 18 SUBPART C, § 18.305

Test Procedure

Radiated emissions were measured over an inclusive frequency range to 100MHz through the tenth harmonic of the operating frequency. For this test, an 80cm 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 - 14,000MHz, 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.

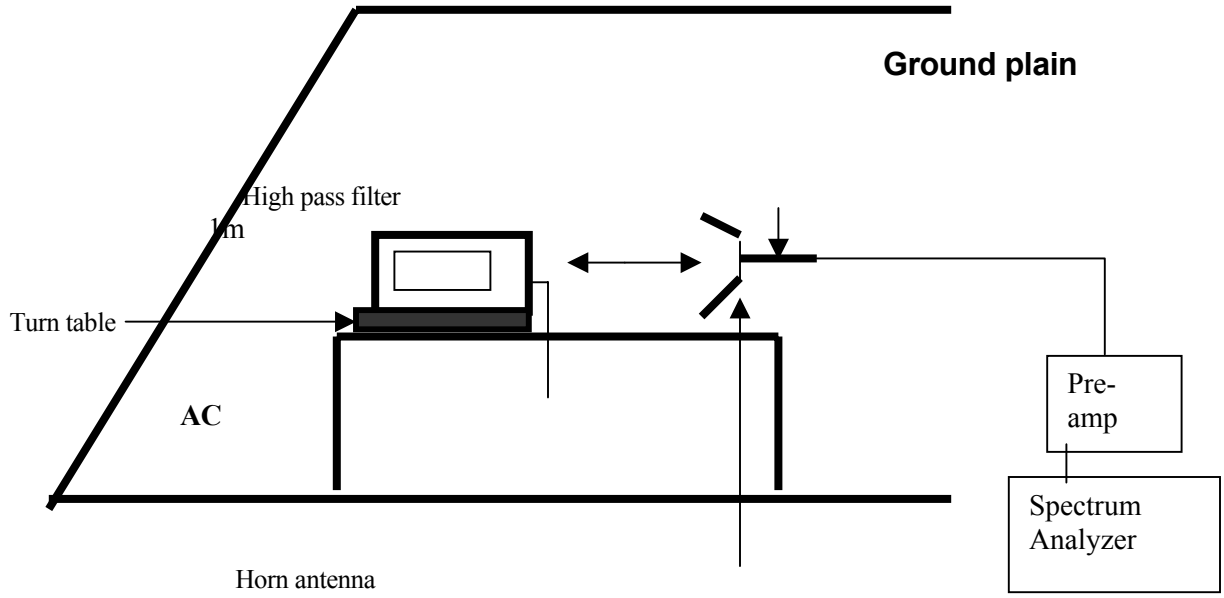
During the preliminary tests, the load consisted of 700-ml tap water placed in the center of the oven. The emissions were observed while the device under test was operated at maximum output power.

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 frequencies above 1 GHz, the video bandwidth of the spectrum analyzer was set to simulate a linear average detection mode (10Hz).

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.

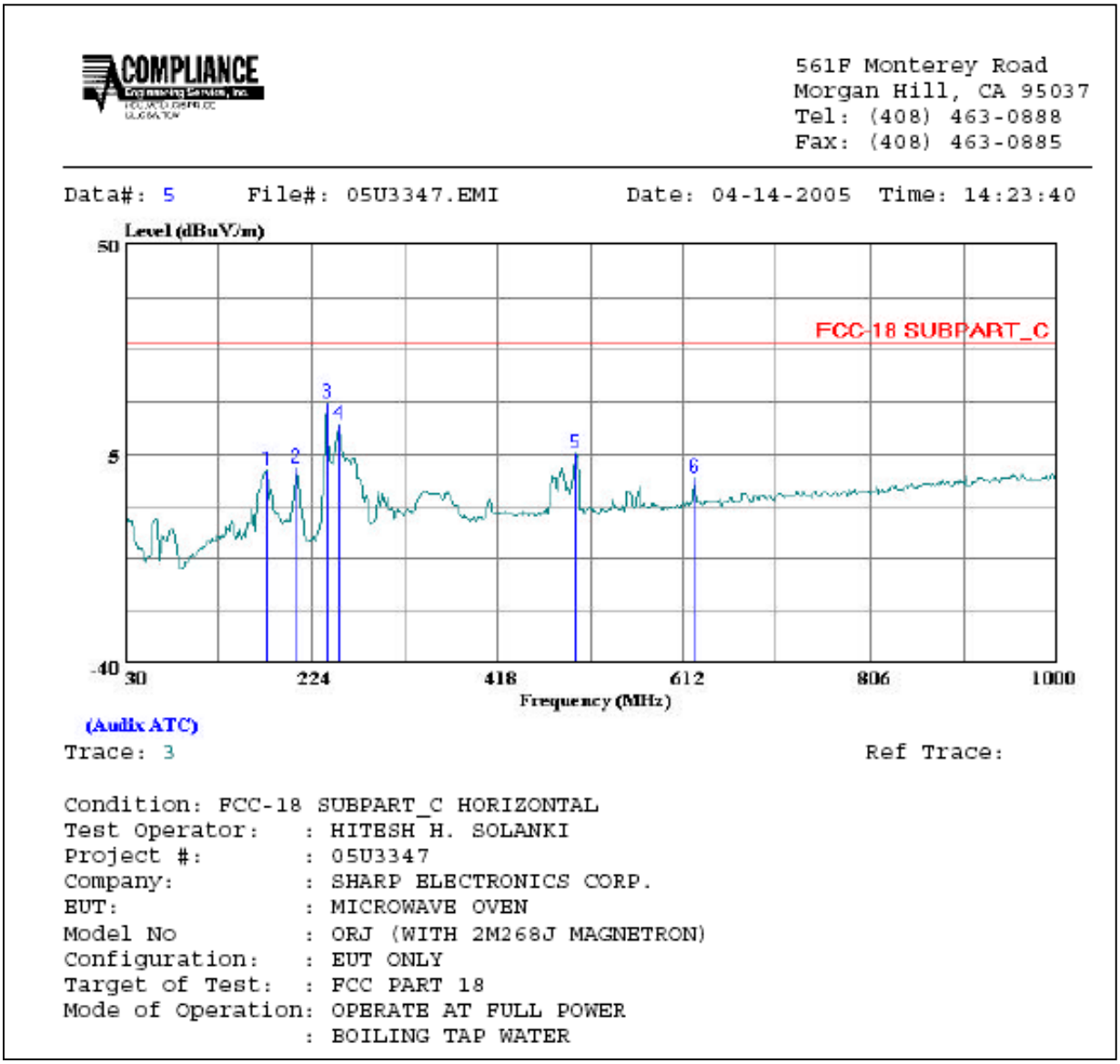


Radiated Emissions Configuration

6.5.1. RADIATED EMISSIONS – BELOW 1GHz

An offset of 40.00 dB has been given for distance correction.

HORIZONTAL PLOT



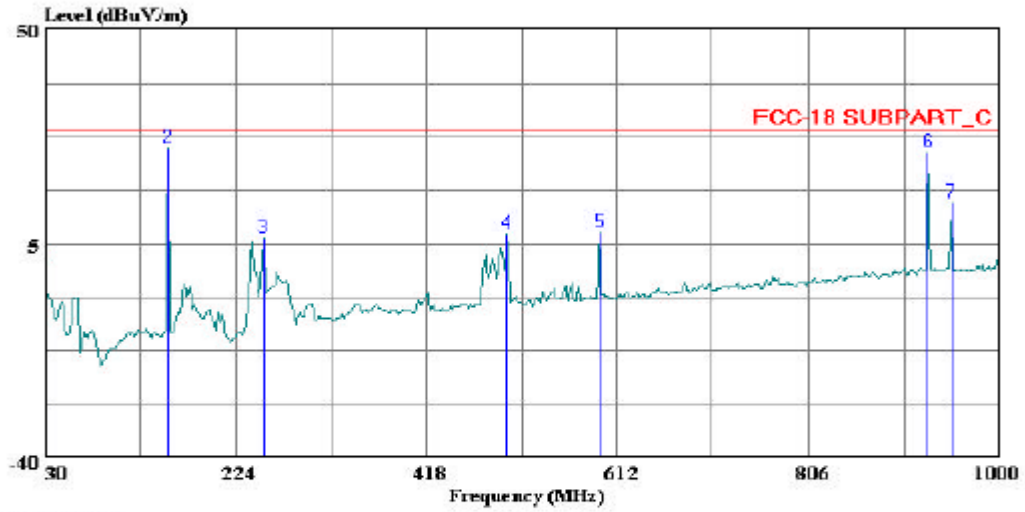
HORIZONTAL DATA,

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	177.440	-11.80	13.11	1.31	30.60	-29.29	Peak
2	208.480	-11.36	13.30	1.94	30.60	-28.66	Peak
3	240.490	2.52	13.54	16.06	30.60	-14.54	Peak
4	252.130	-2.55	13.96	11.41	30.60	-19.19	Peak
5	499.480	-15.13	20.22	5.09	30.60	-25.51	Peak
6	623.640	-22.12	21.90	-0.22	30.60	-30.82	Peak

VERTICAL PLOT

561F Monterey Road
Morgan Hill, CA 95037
Tel: (408) 463-0888
Fax: (408) 463-0885

Data#: 4 File#: 05U3347.EMI Date: 04-14-2005 Time: 14:22:30



(Audix ATC)
Trace: 2 Ref Trace:

Condition: FCC-18 SUBPART_C VERTICAL
Test Operator: : HITESH H. SOLANKI
Project #: : 05U3347
Company: : SHARP ELECTRONICS CORP.
EUT: : MICROWAVE OVEN
Model No : ORJ (WITH 2M268J MAGNETRON)
Configuration: : EUT ONLY
Target of Test: : FCC PART 18
Mode of Operation: OPERATE AT FULL POWER
: BOILING TAP WATER

VERTICAL DATA

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	30.000	-16.51	20.45	3.94	30.60	-26.66	Peak
2	155.130	11.26	13.95	25.21	30.60	-5.39	Peak
3	252.130	-8.00	13.96	5.96	30.60	-24.64	Peak
4	499.480	-13.16	20.22	7.06	30.60	-23.54	Peak
5	594.540	-14.10	21.41	7.31	30.60	-23.29	Peak
6	926.280	-2.05	26.23	24.18	30.60	-6.42	Peak
7	950.530	-12.88	26.48	13.60	30.60	-17.00	Peak

6.5.2. RADIATED EMISSIONS – ABOVE 1GHz

3/25/2005 1 **High Frequency Measurement**
Compliance Certification Services, Morgan Hill Open Field Site

Test Engr: HITESH H. SOLANKI
Project #: 05U3347
Company: SHARP ELECTRONICS CORP.
EUT Descrip.: MICROWAVE OVEN
EUT M/N: ORJ (MAGNETRON - 2M268J)
Test Target: FCC PART 18 SUBPART C
Mode Oper: OPERATE AT FULL POWER, BOILING TAP WATER - 1000 mL

Test Equipment:

EMCO Horn 1-18GHz: T60; S/N: 2238 @3m
Pre-amplifer 1-26GHz: T86 Miteq 924341
Pre-amplifer 26-40GHz:
Horn > 18GHz:
Hi Frequency Cables: 2 foot cable; 3 foot cable: 3_Vien; 4 foot cable; 12 foot cable: 12_Hitesh
HPF: HPF_4.0GHz
Reject Filter:

Peak Measurements
RBW=VBW=1MHz

Average Measurements
RBW=1MHz ; VBW=10Hz

f GHz	Dist (m)	Read Pk dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	Fltr dB	Peak dBuV/m	Avg dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Notes (V/H)
4.239	3.0	82.5	45.3	32.8	3.5	-43.4	-40.0	0.5	35.8	-1.4	50.6	30.6	-14.8	-32.0	V
4.700	3.0	71.2	40.3	32.9	3.8	-43.9	-40.0	0.6	24.6	-6.3	50.6	30.6	-26.0	-36.9	V
4.917	3.0	74.3	43.5	33.0	3.9	-44.1	-40.0	0.6	27.7	-3.1	50.6	30.6	-22.9	-33.7	V
5.181	3.0	75.1	41.1	33.5	4.1	-44.3	-40.0	0.7	29.0	-5.0	50.6	30.6	-21.6	-35.6	V
6.151	3.0	69.6	41.6	34.5	4.7	-45.1	-40.0	0.5	24.2	-3.8	50.6	30.6	-26.4	-34.4	V
6.906	3.0	78.7	44.1	35.4	5.1	-44.8	-40.0	0.6	34.9	0.3	50.6	30.6	-15.7	-30.3	V
7.388	3.0	69.4	41.8	36.0	5.3	-44.7	-40.0	0.6	26.7	-0.9	50.6	30.6	-23.9	-31.5	V
8.623	3.0	88.4	43.3	37.4	5.9	-44.0	-40.0	0.8	48.4	3.3	50.6	30.6	-2.2	-27.3	V
14.693	3.0	76.0	43.2	40.0	9.1	-44.6	-40.0	0.9	41.4	8.6	50.6	30.6	-9.2	-22.0	V
4.239	3.0	72.8	40.7	32.8	3.5	-43.4	-40.0	0.5	26.1	-6.0	50.6	30.6	-24.5	-36.6	H
4.700	3.0	67.1	38.3	32.9	3.8	-43.9	-40.0	0.6	20.5	-8.3	50.6	30.6	-30.1	-38.9	H
4.917	3.0	74.7	43.9	33.0	3.9	-44.1	-40.0	0.6	28.1	-2.7	50.6	30.6	-22.5	-33.3	H
5.181	3.0	75.1	41.1	33.5	4.1	-44.3	-40.0	0.7	29.0	-5.0	50.6	30.6	-21.6	-35.6	H
6.151	3.0	64.9	40.7	34.5	4.7	-45.1	-40.0	0.5	19.5	-4.7	50.6	30.6	-31.1	-35.3	H
6.906	3.0	76.6	43.9	35.4	5.1	-44.8	-40.0	0.6	32.8	0.1	50.6	30.6	-17.8	-30.5	H
7.388	3.0	58.1	40.2	36.0	5.3	-44.7	-40.0	0.6	15.4	-2.5	50.6	30.6	-35.2	-33.1	H
8.623	3.0	83.4	42.7	37.4	5.9	-44.0	-40.0	0.8	43.4	2.7	50.6	30.6	-7.2	-27.9	H
14.693	3.0	75.5	41.4	40.0	9.1	-44.6	-40.0	0.9	40.9	6.8	50.6	30.6	-9.7	-23.8	H

f	Measurement Frequency	Amp	Preamp Gain	Avg Lim	Average Field Strength Limit
Dist	Distance to Antenna	D Corr	Distance Correct to 3 meters	Pk Lim	Peak Field Strength Limit
Read	Analyzer Reading	Avg	Average Field Strength @ 3 m	Avg Mar	Margin vs. Average Limit
AF	Antenna Factor	Peak	Calculated Peak Field Strength	Pk Mar	Margin vs. Peak Limit
CL	Cable Loss	HPF	High Pass Filter		

Note: No other emissions were found up to 10th harmonic.

6.6. CONDUCTED EMISSIONS

LIMIT

§18.307 For the following equipment, when designed to be connected to the public utility (AC) power line the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies shall not exceed the limits in the following tables. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal using a 50 µH/50 ohms line impedance stabilization network (LISN).

(b) All other part 18 consumer devices:

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.4.

The resolution bandwidth is set to 9 kHz for both peak detection and quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

Line conducted data is recorded for both NEUTRAL and HOT lines.

Preliminary Conducted Emission Tests were performed according to CCS test procedure no: CCSUE2004B and EN55011/CISPR11. The following preliminary tests were conducted to determine the worst mode of operation.

Preliminary Conducted Emission Test			
Frequency Range Investigated		150 kHz TO 30 MHz	
Mode of operation	Date	Data Report/Plot No.	Worst Mode
Boiling tap water	4/18/05	05U3347-1	☒

Final Conducted Emission Test was conducted by operating the worst mode as indicated above.

RESULTS

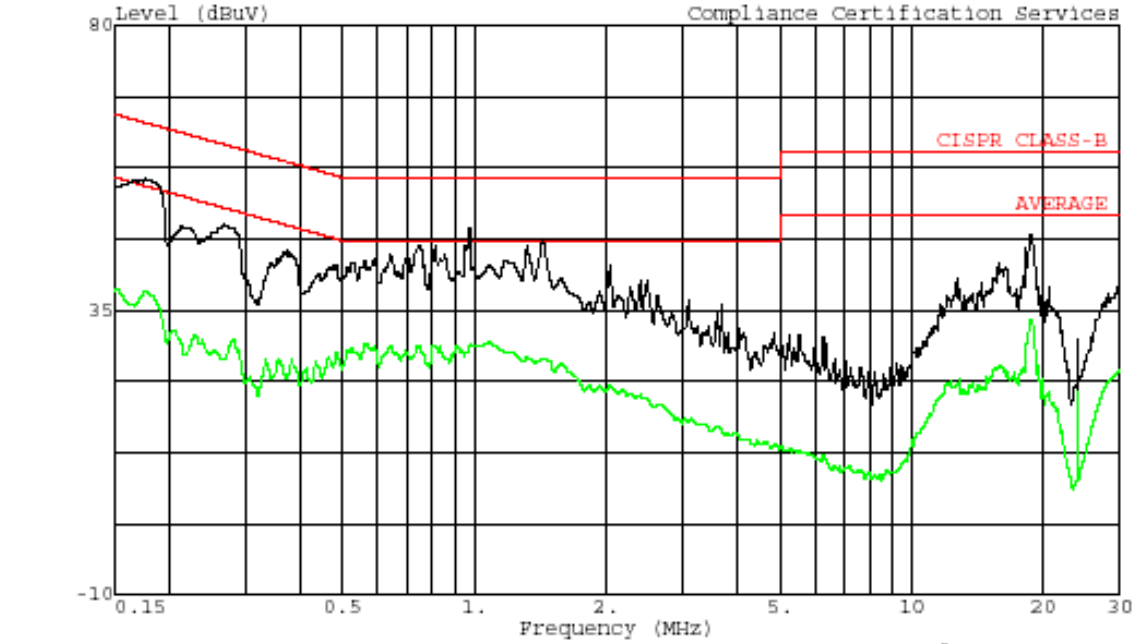
No non-compliance noted:

6 WORST EMISSIONS:

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	**Reading**			**Closs**	**Limit**	**FCC_B**	**Margin**		**Remark**
(MHz)	**PK (dBuV)**	**QP (dBuV)**	**AV (dBuV)**	**(dB)**	**QP**	**AV**	**QP (dB)**	**AV (dB)**	**L1 / L2**
0.18	55.48	--	37.38	0.00	64.39	54.39	-8.91	-17.01	L1
0.97	47.90	--	29.46	0.00	56.00	46.00	-8.10	-16.54	L1
18.72	46.94	--	33.47	0.00	60.00	50.00	-13.06	-16.53	L1
0.16	56.24	--	41.90	0.00	65.26	55.26	-9.02	-13.36	L2
0.89	52.36	--	32.33	0.00	56.00	46.00	-3.64	-13.67	L2
0.77	51.72	--	31.50	0.00	56.00	46.00	-4.28	-14.50	L2
6 Worst Data									

LINE 1

561F Monterey Road
Morgan Hill, CA 95037 USA
Tel: (408) 463-0888
Fax: (408) 463-0885

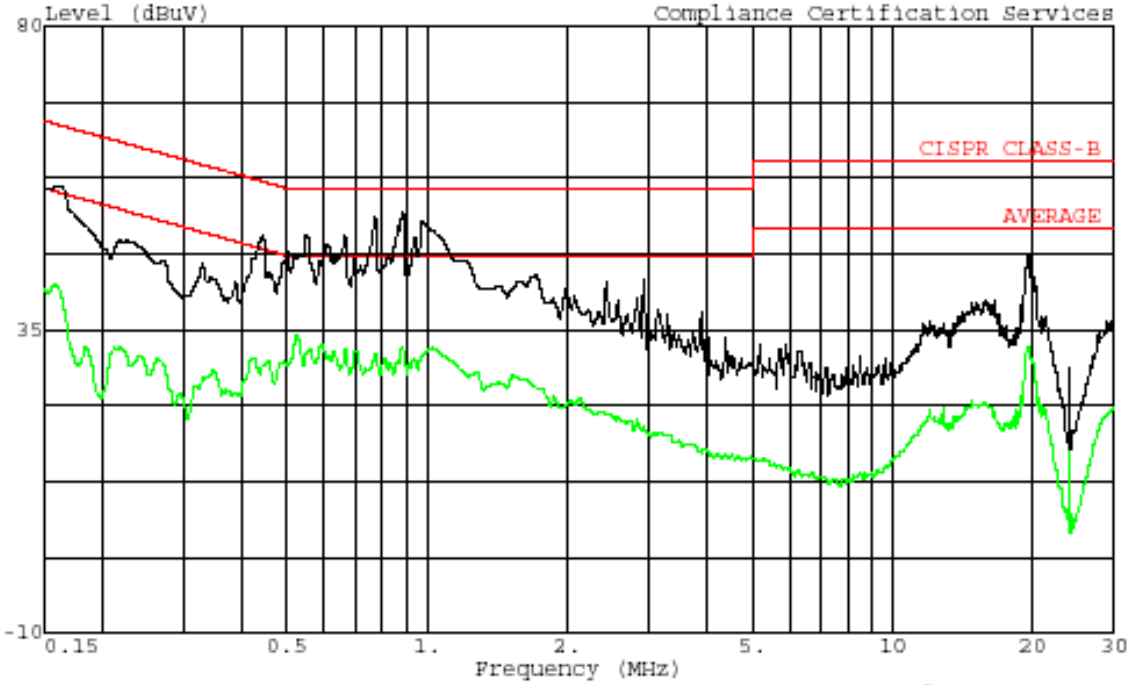


Trace: 33 Ref Trace:
Project No. : 05U3347
Test Engr : HITESH H. SOLANKI
Company : SHARP ELECTRONICS CORP.
EUT : MICROWAVE OWEN
Model No. : ORJ (S/N : 112704)
Test Config.: EUT ONLY
Mode of Op. : BOILING TAP WATER
Type of Test: FCC PART 18
Power Mains : 115VAC/60Hz
: L1: PEAK (Black), AVG. (Green)

LINE 2

561F Monterey Road
Morgan Hill, CA 95037 USA
Tel: (408) 463-0888
Fax: (408) 463-0885

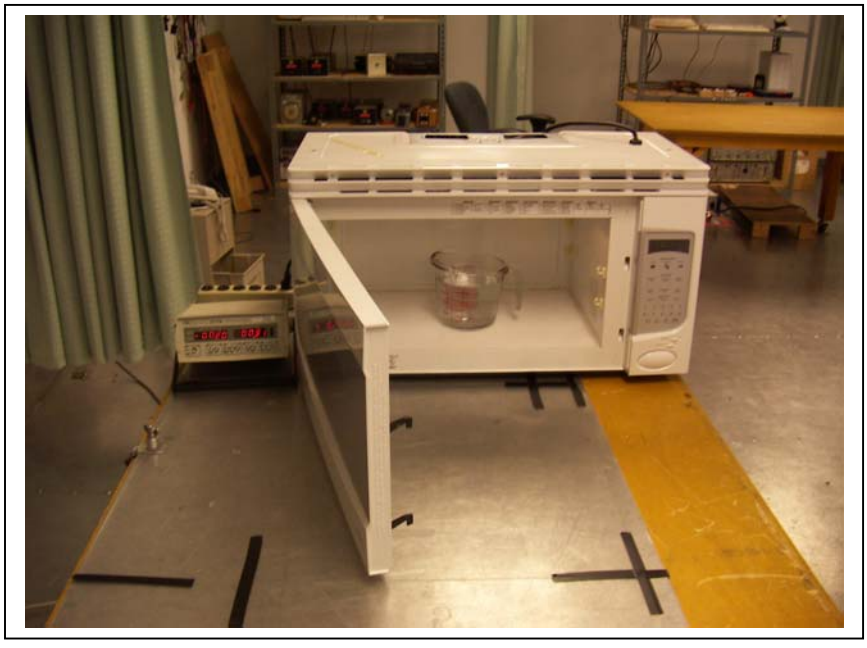
Data#: 42 File#: 05U3347.EMI Date: 04-18-2005 Time: 11:53:55



Trace: 40 Ref Trace:
Project No. : 05U3347
Test Engr : HITESH H. SOLANKI
Company : SHARP ELECTRONICS CORP.
EUT : MICROWAVE OWEN
Model No. : ORJ (S/N : 112704)
Test Config.: EUT ONLY
Mode of Op. : BOILING TAP WATER
Type of Test: FCC PART 18
Power Mains : 115VAC/60Hz
: L2: PEAK (Black), AVG. (Green)

7. SETUP PHOTO

Radiation Hazard Measurement



Operating Frequency Measurements

AC Line Conduction Front

AC Line Conduction back

Radiation Measurement front

Radiation Measurements back

END OF REPORT