

EMC TEST REPORT
- FOR CERTIFICATION -

for

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

1006, Oaza Kadoma, Kadoma-city Osaka 571-0050

Equipment Under Test: IH Rice Cooker
(model name : IH-MS2000)

FCC ID : **ACJRCDSR-IHFA54**

Category: FCC Part 18 Induction Cooking Ranges

Tokin Report No.: T3K997101

Date of Issue: July 12, 1999

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Tokin EMC Engineering Co., Ltd.

- ATTENTION -

The test results in this report relate only to the following EUTs, and this report shall not be reproduced except in full, without the written approval of the laboratory.

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1 DESCRIPTION OF DEVICE

A) Kind of Equipment :	IH Rice Cooker
B) FCC ID :	ACJRCDSR-IHFA54
C) Model Name :	IH-MS2000
D) Serial No. :	None
E) Type of Sample Tested :	Pre-production
F) High Frequency Used :	21kHz (Cooking) 30kHz (Warming) 32.195MHz (Crystal)
G) Rating Power Supply :	1phase AC208V, 18A, 60Hz
H) Tested Power Supply :	1phase AC208V, 60Hz
I) Date of Manufacture :	June 1999
J) Manufacturer :	Matsushita Electric Industrial Co., Ltd. 5, Saho, Yashiro-cho, Kato-gun, Hyogo 673-14, Japan
K) Description of Operating :	Cooking mode Warming mode
L) Date of Sample Received :	July 05, 1999
M) Test Engineer :	Masayuki Kuramochi

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2 TEST FACILITY

The open field test site and conducted measurement facility are used for this measurement, where is located following address. This site was fully described in a report dated Jan.31,1994, that was submitted to the FCC. And we had accepted in a letter dated Apr.8,1994 (31040/SIT). This laboratory is accredited by NVLAP for NVLAP Lab. Code : 200221-0.

Tokin EMC Engineering Co., Ltd.

Tsukuba Testing Laboratory, Open Field Test Site No.3 and Shielded Room No.2

Address ; 28-1, Kitahara-aza, Hanashimashinden-ohaza, Tsukuba-city, Ibaragi 305-0875, Japan

3 SUMMARY OF RESULTS

3.1 Electromagnetic Emission

RFI Voltage Measurement **PASS**

RFI Field Strength Measurement **PASS**

Although the measured emissions indicate that the EUT complies with the required limits, some measurements are close to these limits. When the uncertainty of measurement is considered, there is some possibility that the EUT may not be compliant.

Test results are traceable to JQA, MKK and NIST.

3.2 Modifications to the EUT

This EUT was taken countermeasures.

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4 TESTED SYSTEM DETAILS

4.1 Peripherals and Others : None

4.2 Type of Used Cables :

Description	Length	Type of shield	Model name	Manufacturer
AC power cable	1.2m	Non-shielded	None	SHINAGAWA
AC power cable	0.5m	Non-shielded	None	SHINAGAWA

5 TECHNICAL COUNTERMEASURE

5-1 Addition to flicker circuit for IH Rice Cooker.

Detail of filter circuit :
Common coil : $1300\mu\text{H} \times 1\text{pcs}$
Normal coil : $210\mu\text{H} \times 4\text{pcs}$
Across the capacitor : $3.3\mu\text{H} \times 6\text{pcs}$
Earth Inductor : $460\mu\text{H} \times 1\text{pcs}$

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6 TEST RESULTS

6.1 RFI Voltage Measurement

6.1.1 Measurement Instrumentation Used

(model/serial no./manufacturer/Tokin control no./last calibration/next calibration)

Field strength meter (FCKL1528/1528124/Schwarzbeck/RE039/02 Oct.'98/Oct.'99)

L.I.S.N. (9117-5-TS-50-N/962131/SOLAR/LI053/13 Oct.'98/Oct.'99)

L.I.S.N. (9117-5-TS-50-N/962132/SOLAR/LI054/13 Oct.'98/Oct.'99)

Spectrum analyzer (TR4135/67800068/Advantest/SP004/11 Dec.'98/Dec.'99)

Coaxial cable (---/---/---/DK125/02 Mar.'99/Mar.'00)

Shielded room..... (Tsukuba No.2-S/---/Tokin/SA017/---/---)

6.1.2 Measurement Procedure

The power line conducted interference measurements were performed according to MP-5 in a shielded enclosure No.2 placed on a table, 0.4m high over a metal floor. It was located more than required distance away from the shielded enclosure wall. Deviations from the standard was none.

The EUT was plugged into the LISN and the frequency range of interest scanned. Reported are maximized emission levels.

6.1.3 Measurement Uncertainty

Measurement uncertainty of RFI Voltage Measurement test was estimated at ± 3.1 dB.

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6.1.4 Test Data

Table 6.1-1 RFI Voltage Measurement Results

Operating mode: Cooking mode
Test procedure: MP-5

Date of measurement: July 08, 1999
Temperature: 23 degree C
Humidity: 66 %

	Frequency (MHz)	Level (dBm V)	Total Factor(dB)	Result (dBm V)	Result (mV)	Limit (mV)	Margin (dB)
L1-E	0.022	67.0	0.0	67.0	2.239	8.80	11.9
	0.044	68.5	0.0	68.5	2.661	6.60	7.9
	0.067	52.0	0.0	52.0	0.398	4.30	20.7
	0.089	34.0	0.0	34.0	0.050	2.10	32.4
	0.111	40.0	0.0	40.0	0.100	1.00	20.0
	0.133	26.0	0.0	26.0	0.020	1.00	34.0
	0.155	44.0	0.0	44.0	0.158	1.00	16.0
	0.200	41.5	0.0	41.5	0.119	1.00	18.5
	0.244	40.5	0.0	40.5	0.106	1.00	19.5
	0.289	39.0	0.0	39.0	0.089	1.00	21.0
	8.150	21.0	0.0	21.0	0.011	0.25	27.0
	17.130	35.0	0.2	35.2	0.058	0.25	12.8
	26.585	36.0	0.2	36.2	0.065	0.25	11.8
N-E	0.022	68.0	0.0	68.0	2.512	8.80	10.9
	0.044	70.0	0.0	70.0	3.162	6.60	6.4
	0.067	52.0	0.0	52.0	0.398	4.30	20.7
	0.088	36.0	0.0	36.0	0.063	2.10	30.4
	0.111	33.0	0.0	33.0	0.045	1.00	27.0
	0.133	32.0	0.0	32.0	0.040	1.00	28.0
	0.155	43.0	0.0	43.0	0.141	1.00	17.0
	0.200	41.0	0.0	41.0	0.112	1.00	19.0
	0.244	40.5	0.0	40.5	0.106	1.00	19.5
	0.289	38.5	0.0	38.5	0.084	1.00	21.5
	8.150	22.0	0.0	22.0	0.013	0.25	26.0
	17.130	36.5	0.2	36.7	0.068	0.25	11.3
	26.585	35.0	0.2	35.2	0.058	0.25	12.8

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Table 6.1-2 RFI Voltage Measurement Results

Operating mode: Warming mode

Date of measurement: July 08, 1999

Test procedure: MP-5

Temperature: 23 degree C

Humidity: 66 %

	Frequency (MHz)	Level (dB _m V)	Total Factor(dB)	Result (dB _m V)	Result (mV)	Limit (mV)	Margin (dB)
L1-E	0.031	68.0	0.0	68.0	2.512	7.90	10.0
	0.094	47.5	0.0	47.5	0.237	1.60	16.6
	0.156	45.5	0.0	45.5	0.188	1.00	14.5
	0.218	43.5	0.0	43.5	0.150	1.00	16.5
	0.282	42.5	0.0	42.5	0.133	1.00	17.5
	8.260	24.5	0.0	24.5	0.017	0.25	23.5
	17.030	36.0	0.2	36.2	0.065	0.25	11.8
	22.925	35.0	0.2	35.2	0.058	0.25	12.8
N-E	0.031	68.0	0.0	68.0	2.512	7.90	10.0
	0.094	47.5	0.0	47.5	0.237	1.60	16.6
	0.156	45.0	0.0	45.0	0.178	1.00	15.0
	0.218	43.5	0.0	43.5	0.150	1.00	16.5
	0.282	43.0	0.0	43.0	0.141	1.00	17.0
	8.260	24.0	0.0	24.0	0.016	0.25	24.0
	17.030	39.5	0.2	39.7	0.097	0.25	8.3
	22.925	37.0	0.2	37.2	0.072	0.25	10.8

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6.2 RFI Field Strength Measurement

6.2.1 Measurement Instrumentation Used

(model/serial no./manufacturer/Tokin control no./last calibration/next calibration)

< 10kHz to 30MHz >

Field strength meter (KNM-2402/4N-170-4/Kyoritsu/RE015/01 Sep.'98/Sep.'99)
 Loop antenna (HFH2-Z2/FNR879605-22/Rohde&Schwarz/AN005/19 Nov.'98/Nov.'99)
 Spectrum analyzer (TR4135/67800068/Advantest/SP004/11 Dec.'98/Dec.'99)
 Coaxial cable (RG-55U/---/---/DK074/02 Mar.'99/Mar.'00)
 Open field test site..... (Tsukuba No.3/---/Tokin/SA003/02 Jul.'99/Jul.'00)

< 30MHz to 400MHz >

Field strength meter (ESV/FNR879176-037/Rohde&Schwarz/RE008/20 Aug.'98/Aug.'99)
 Pre-amplifier (8447D/2432A03554/Hewlett Packard/AM003/09 Sep.'98/Sep.'99)
 Biconical antenna..... (BBA9106/---/Schwarzbeck/TB002/07 Jul.'98/Jul.'99)
 Logperiodic antenna (UHALP9108-A/0111/Schwarzbeck/TL019/06 Jul.'99/Jul.'00)
 Spectrum analyzer (TR4135/67800068/Advantest/SP004/11 Dec.'98/Dec.'99)
 Coaxial cable (---/CL330/---/DK088/01 Jul.'99/Jul.'00)
 Open field test site..... (Tsukuba No.3/---/Tokin/SA003/02 Jul.'99/Jul.'00)

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6.2.2 Measurement Procedure

(For RFI Field Strength from 10kHz to 30MHz)

Final test was performed according to MP-5 at the open field test site No.3. Deviations from the standard was none.

The EUT was placed on a 1.0m high table and loop antenna height was 2.0 meters from floor to lower edge of the loop. The EUT was separated from the loop antenna a distance of 30 meters. Reported are maximized emission levels.

(For RFI Field Strength from 30MHz to 400MHz)

Final test was performed according to MP-5 at the open field test site No.3. Deviations from the standard was none.

The was placed on a 1.0m high table. The turn table was separated from the antenna a distance 30meters. Cables were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum. Reported are maximized emission levels.

6.2.3 Measurement Uncertainty

Measurement uncertainty of RFI Field Strength Measurement test was estimated at $\pm 4.8\text{dB}$.

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6.2.4 Test Data

Table 6.2-1 RFI Field Strength Measurement Results (10kHz to 30MHz)

Operating mode: Cooking mode
Test procedure: MP-5

Date of measurement: July 07, 1999
Temperature: 22 degree C
Humidity: 61 %

Frequency (MHz)	Level (dB _m V)	Ant. Factor (dB/m)	Result (dB _m V/m)	Result (_m V/m)	30 Meter Limit (_m V/m)
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Test results were under the required limit with 20dB margin or more.

Table 6.2-2 RFI Field Strength Measurement Results (10kHz to 30MHz)

Operating mode: Warming mode
Test procedure: MP-5

Date of measurement: July 07, 1999
Temperature: 22 degree C
Humidity: 61 %

Frequency (MHz)	Level (dB _m V)	Ant. Factor (dB/m)	Result (dB _m V/m)	Result (_m V/m)	30 Meter Limit (_m V/m)
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Test results were under the required limit with 20dB margin or more.

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Table 6.2-3 RFI Field Strength Measurement Results (30MHz to 400MHz)

Operating mode: Cooking mode
Test procedure: MP-5

Date of measurement: July 07, 1999
Temperature: 22 degree C
Humidity: 61 %

Frequency (MHz)	Level		Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Result		Result		30 Meter Limit (m V/m)	Margin	
	Ver.	Hor.				Ver.	Hor.	Ver.	Hor.		Ver.	Hor.
	(dBm V)					(dBm V/m)		(m V/m)			(dB)	
30.00	28.5	-	17.3	3.3	27.6	21.5	-	11.89	-	1500	42.0	-
36.31	28.0	-	17.0	3.3	27.5	20.8	-	10.96	-	1500	42.7	-
37.04	-	27.5	17.1	3.3	27.7	-	20.2	-	10.23	1500	-	43.3
42.00	26.0	-	16.5	3.4	27.6	18.3	-	8.22	-	1500	45.2	-
46.00	27.5	-	15.0	3.4	27.6	18.3	-	8.22	-	1500	45.2	-
50.00	30.5	-	13.3	3.6	27.7	19.7	-	9.66	-	1500	43.8	-
52.00	30.5	-	12.2	3.7	27.6	18.8	-	8.71	-	1500	44.7	-

Table 6.2-4 RFI Field Strength Measurement Results (30MHz to 400MHz)

Operating mode: Warming mode
Test procedure: MP-5

Date of measurement: July 07, 1999
Temperature: 22 degree C
Humidity: 61 %

Frequency (MHz)	Level		Ant. Factor (dB/m)	Cable Loss (dB)	Amp. Gain (dB)	Result		Result		30 Meter Limit (m V/m)	Margin	
	Ver.	Hor.				Ver.	Hor.	Ver.	Hor.		Ver.	Hor.
	(dBm V)					(dBm V/m)		(m V/m)			(dB)	
30.00	28.5	-	17.3	3.3	27.6	21.5	-	11.89	-	1500	42.0	-
36.31	28.0	-	17.0	3.3	27.5	20.8	-	10.96	-	1500	42.7	-
37.04	-	27.5	17.1	3.3	27.7	-	20.2	-	10.23	1500	-	43.3
42.00	26.0	-	16.5	3.4	27.6	18.3	-	8.22	-	1500	45.2	-
46.00	27.5	-	15.0	3.4	27.6	18.3	-	8.22	-	1500	45.2	-
50.00	30.5	-	13.3	3.6	27.7	19.7	-	9.66	-	1500	43.8	-
52.00	30.5	-	12.2	3.7	27.6	18.8	-	8.71	-	1500	44.7	-

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