

TOSHIBA

TOSHIBA HOKUTO ELECTRONICS CORPORATION

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Sharp Manufacturing Company of America

June 6, 2001
(Ref. No. : 01-056)

RE : Electromagnetic radiation from microwave oven R-1500 with Toshiba magnetron 2M253H(L)

Dear sir

We are enclosing herewith the above mentioned test results based on FCC measuring method in our measuring facility of FCC file number 430A.

We confirmed test results are satisfied with FCC limit.

Please feel free to contact us, if you have any question or request.

Sincerely yours,



Hideaki Imada
Manager
Magnetron Engineering Group

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cc: Mr. Azuma TOSHIBA HOKUTO TOKYO

Electromagnetic radiation test of microwave oven

The following measurements were conducted in Toshiba Hokuto Electronics Corporation measurement facility of FCC file number 430A.

1. Description of oven

Manufacturer of oven : Sharp Manufacturing Company of America
 Model name : R-1500
 Line voltage : 120V/60Hz
 Output RF power : 1000W/2450MHz
 Magnetron type : Toshiba 2M253H(L)

2. Equipment class : Part 18 Consumer Device

3. Test procedure : FCC/OST MP-5

4. Date of measurement : June 2, 2001 ~ June 6, 2001

5. Measurement data

5-1. Output power (Load : 1000ml water / center)

Input power : 1438W
 Output power : 770W
 Permissible FIS @300m : 31 μ V/m = $25\sqrt{\text{Output power} / 500}$
 FIS : Field Intensity Strength

5-2. Power leak (Load : 275ml water / center)

Po leak : 0.2 mW/cm²

5-3. FIS measurements

Band	Frequency (MHz)	FIS @300m (μ V/m)	Permissible FIS @300m (μ V/m)	Load
Side band	2385	10.9	31	700ml/ center
Side band	2500	7.5		700ml/ center
2nd harmonic	4907	21.9		300ml/ side
3rd harmonic	6893	17.7		300ml/ side
4th harmonic	10300	10.8		700ml/ center

Note 2nd and 3rd harmonics : The maximum value with the load condition such as 300ml or 700ml water in the center or side position.

5-4. Frequency sweeping

None of higher FIS value than those shown in the above table existed in the following frequency band.

Frequency (MHz)	Load condition
2000 - 2400	700ml / center
2500 - 4100	
4100 - 7700	300ml or 700ml / center or side
7700 - 10000	700ml / center

5-5. Frequency measurements

The variation of frequency for load variation

Volume of water (ml)	Frequency (MHz)
1000	2464
800	2462
600	2464
400	2467
200	2467

The variation of frequency for line voltage variation (Load : 1000ml water center)

Line voltage (V)	Frequency (MHz)
96	2448
108	2449
120	2447
132	2444
150	2443

6. Description of instrumentation and calculation

6-1. Measurement equipment (Refer Page-4)

Interference analyzer : EMC-60 MK-IV (Bandwidth : 5MHz, Detector function : Linear average)
 Antenna : CA-S, CA-M and CA-X

6-2. Test condition

Distance of antenna to oven : 3.0m
 Antenna height range : 0.5m - 1.8m
 Turn table height : 0.8m (360 degree movable)

6-3. Calculation formula

$FIS_{@3m} (dB \mu v/m)$ = Analyzer reading(dB μv) + Antenna factor(dB/m) + Cable loss(dB)
 $FIS_{@300m} (\mu v/m)$ = $K \times 10^{((FIS_{@3m} / 20))}$

K : Conversion factor for 3m to 300m

Antenna factor and Cable loss for our equipment are as follows :

Band	Frequency (MHz)	Antenna	Antenna factor (dB/m)	Cable loss (dB)	K
Fundamental	2450	CA-S	21.8	1.174	0.0062
2nd harmonic	4900	CA-M	39.1	1.288	0.01
3rd harmonic	7350	CA-M	39.2	1.397	0.01
4th harmonic	9800	CA-X	42.5	1.679	0.01

Example : 2nd harmonics

Analyzer reading = 22(dB μv)
 $FIS_{@300m}$ = $0.01 \times 10^{((22 + 39.1 + 1.288) / 20)}$ = 13.1 ($\mu v/m$)

7. Measurement equipment : Attached please find "Measurement equipment"(Refer Page-4).

Table 1 Measurement equipment

No.	Equipment name	Model name & manufacturer	Specification	Last calibration date	Calibration frequency
1	Interference analyzer	EMC-60 MK-IV Ser. : 44116 Electro-metrics	0.5 to 18 GHz	March 2000	once two year
2	Antenna	(1) CA-S Ser : 22-1 Polarad	2.1 to 4.34 GHz		
		(2) CA-M Ser : 20-15 Polarad	4.19 to 7.74 GHz		
		(3) CA-X Ser : 20-10 Polarad	7.36 to 10 GHz		
3	Signal generator	8671B Ser : 2545A00106 Hewlett packard	2.0 to 18 GHz	March 2000	once two year
4	Frequency counter	85340A Ser : 134A01280 Hewlett packard		March 2001	Annually
5	Power meter	435A Ser : 1312J00144 Hewlett packard	0 to 1 mW	March 2001	Annually
6	Power sensor	8481A Ser : 1234A871 Hewlett packard		March 2000	once two year
7	Spectrum analyzer	8562A SER : 2923A03932 Hewlett packard	1 kHz to 22 GHz	March 2000	once two year