

Mr. R. Kanemitsu
Deputy General Manager
Research & Development Department
Crystal Electric Co., Ltd.
3-22-5, Higashinakamoto,
Higashinari-ku,
Osaka 537-0021, Japan

Report No. : 05-108
Issued date : September 20, 2005

Re : EMC test result in your model MFM-1NTPS microwave oven with Panasonic magnetron 2M211A-M2J

Dear R. Kanemitsu,

We are enclosing the above mentioned test results based on CISPR11:1990+A2:1996 in our measuring facility.

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

Sincerely yours,



Toshiki Azuma
Group Manager
Magnetron Engineering & Quality Assurance Group
Electron Tubes Division

AZ/HR

cc :

This report is made only to examine whether the magnetron operates properly as incorporated into the microwave oven that you provided to us, and based upon examinations under limited conditions.
This report is not to make any type of warranty on the quality, performance nor safety of any microwave oven manufactured by you.
Therefore, you should carry out thorough approval tests before and during manufacturing microwave ovens.
In case any claim or problem arises from any defect due to this report, our total liability shall be limited to replacement of the magnetrons in question or refunding the prices allocable to such magnetrons.

EMI test report

1. Test laboratory

Toshiba Hokuto Electronics Corporation
Magnetron Engineering & Quality Assurance Group, Electron Tubes Division
Laboratory for EMI measurements
1975-Banchi, 23-Chome, Minami 5-Jodori, Asahikawa 078-8335, Japan
Tel : +81-166-31-4728 Fax : +81-166-31-4739

2. Specification of EUT

Manufacturer	:	Crystal Electric Co., Ltd.
Equipment	:	Microwave Oven
Model No.	:	MFM-1NTPS
Line voltage	:	120V/60Hz
Output power	:	600W (IEC 60705)
Magnetron	:	PANASONIC 2M211A-M2J

3. Test specification

Test specification	:	CISPR11:1990+A2:1996
Equipment classification	:	Group 2, Class B

4. Test result

4.1 Mains terminal disturbance voltage (Frequency range : 0.15MHz to 30MHz)

Test specification	:	CISPR11:1990+A2:1996
Limit	:	Table 2b, Group 2, Class B (Clause 5.1.2.1)
Frequency range	:	0.15MHz to 30MHz
Result	:	Pass
Tested date	:	September 20, 2005
Test engineer	:	S.Hirotani
Data of test results	:	Refer to Page 4

4.2 Electromagnetic radiation disturbance test (Frequency range : 30MHz to 1000MHz)

Test specification	:	CISPR11:1990+A2:1996
Limit	:	Table 4, Group 2, Class B (Clause 5.2.2)
Frequency range	:	30MHz to 1000MHz
Result	:	(Pass) See also the note ;
Tested date	:	September 19, 2005
Test engineer	:	S.Hirotani
Data of test results	:	Refer to Page 5

Note ; This test result is a reference data.
Although CISPR11:1990+A2:1996 Table 4 regulations require measurements on the open site at measurement distance 10m, we measured in the anechoic chamber at measurement distance 3m.

4.3 Electromagnetic radiation disturbance power test (Frequency range : 1GHz to 18GHz)

Test specification	:	CISPR11:1990+A2:1996
Limit	:	57dBpW ; 11.7GHz to 12.7GHz, Group 2, Class B (Clause 5.2.3)
Frequency range	:	1GHz to 18GHz
Result	:	Pass
Tested date	:	September 19, 2005
Test engineer	:	S.Hirotani
Data of test results	:	Refer to Page 6

5. Measuring instruments

Test item	Instruments	Model No. (Serial No.)	Manufacturer	Calibration date (interval)
Mains terminal disturbance voltage test (0.15MHz to 30MHz)	EMI test receiver	ESHS30 (828144/044)	Rohde & Schwarz	March 2005 (Annually)
	LISN	KNW-242 (8-607-6)	Kyoritsu Electrical Works	March 2005 (Annually)
	Coaxial cable	3D-2W	Fujikura	March 2005 (Annually)
Electromagnetic radiation disturbance test (30MHz to 1000MHz)	EMI test receiver	ESVS30 (827957/010)	Rohde & Schwarz	March 2005 (Annually)
	Bilog antenna	CBL6111 (1350)	Chase	
	Coaxial cable	SUCOFLEX100-SF104 (109587/4)		March 2005 (Annually)
Electromagnetic radiation disturbance power test (1GHz to 18GHz)	Spectrum analyzer	8592L (3624A00578)	Hewlett Packard	March 2005 (Annually)
	Horn antenna	5C401A (B176126)	SPC Electronics	
	Pre-amplifier	8449B (3008A01826)	Agilent	March 2005 (Annually)
	Coaxial cable	SUCOFLEX100-SF104 (134223/4)	Suhner	March 2005 (Annually)
	Coaxial cable	SUCOFLEX100-SF104 (144786/4)	Suhner	March 2005 (Annually)

Mains terminal disturbance voltage test (Frequency range : 0.15MHz to 30MHz)

Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: September 20, 2005
Equipment	: Microwave Oven	Temperature, Humidity	: 25°C, 53%
Model No.	: MFM-1NTPS	Test site	: Shielded room
Test specification	: CISPR11:1990+A2:1996	Result	: Pass
Equipment classification	: Group 2, Class B	Test engineer	: S.Hirotani
Frequency range	: Table 2b (Clause 5.1.2.1)		
Load condition	: 250ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking/600W(Max power)		
Magnetron	: PANASONIC 2M211A-M2J		

CISPR 11 Table 2b : Mains terminal disturbance voltage test

Detector type : Quasi-Peak and Average, IF Bandwidth : 10kHz

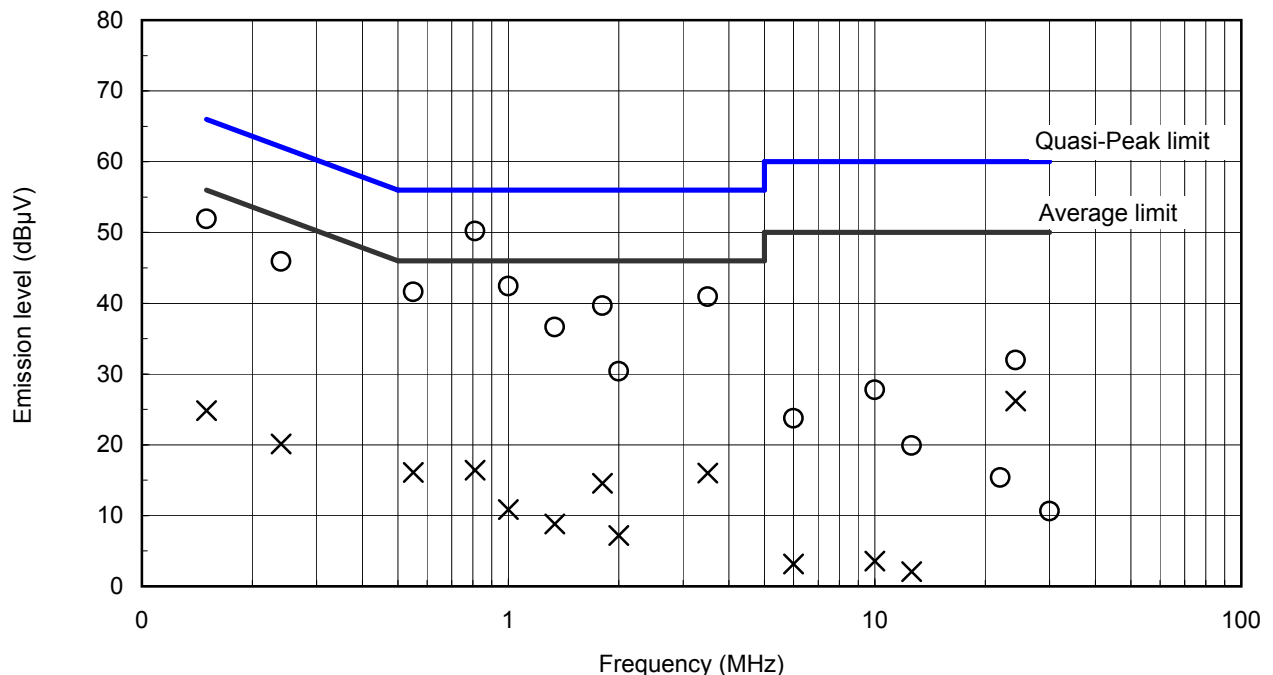
QP : Quasi-Peak, AV : Average

No.	Frequency (MHz)	Reading (dBμV)		LISN factor (dB)	Cable loss (dB)	Atten. (dB)	Result (dBμV)		Limit (dBμV)		Margin (dB)	
		QP	AV				QP	AV	QP	AV	QP	AV
1	0.150	51.7	24.6	0.1	0.1	0.0	51.9	24.8	66.0	56.0	14.1	31.2
2	0.240	45.7	19.9	0.1	0.1	0.0	45.9	20.1	63.4	53.4	17.5	33.3
3	0.550	41.4	15.9	0.1	0.1	0.0	41.6	16.1	56.0	46.0	14.4	29.9
4	0.811	50.0	16.2	0.1	0.1	0.0	50.2	16.4	56.0	46.0	5.8	29.6
5	1.000	42.2	10.6	0.1	0.1	0.0	42.4	10.8	56.0	46.0	13.6	35.2
6	1.338	36.4	8.6	0.1	0.1	0.0	36.6	8.8	56.0	46.0	19.4	37.2
7	1.806	39.4	14.3	0.1	0.1	0.0	39.6	14.5	56.0	46.0	16.4	31.5
8	2.000	30.1	6.9	0.1	0.2	0.0	30.4	7.2	56.0	46.0	25.6	38.8
9	3.500	40.5	15.6	0.2	0.2	0.0	40.9	16.0	56.0	46.0	15.1	30.0
10	6.000	23.1	2.5	0.3	0.4	0.0	23.7	3.1	60.0	50.0	36.3	46.9
11	10.000	26.8	2.6	0.4	0.6	0.0	27.8	3.6	60.0	50.0	32.2	46.4
12	12.612	18.8	1.0	0.4	0.7	0.0	19.9	2.1	60.0	50.0	40.1	47.9
13	22.000	13.6	-	0.6	1.1	0.0	15.4	-	60.0	-	44.6	-
14	24.224	30.1	24.3	0.7	1.2	0.0	32.0	26.2	60.0	50.0	28.0	23.8
15	30.000	8.4	-	0.8	1.5	0.0	10.6	-	60.0	-	49.4	-

Result(dBμV) = Reading(dBμV) + LISN factor(dB) + Cable loss(dB) + Atten.(dB)

CISPR 11 Table 2b : Mains terminal disturbance voltage test

O : Quasi-Peak, × : Average



Electromagnetic radiation disturbance test (Frequency range : 30MHz to 1000MHz)

Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: September 19, 2005
Equipment	: Microwave Oven	Temperature, Humidity	: 24°C, 75%
Model No.	: MFM-1NTPS	Test site	: Anechoic chamber
Test specification	: CISPR11:1990+A2:1996	Measurement distance	: 3m
Equipment classification	: Group 2, Class B	Result	: Pass
Frequency range	: Table 4 (Clause 5.2.2)	Test engineer	: S.Hirotani
Load condition	: 250ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking/600W(Max power)		
Magnetron	: PANASONIC 2M211A-M2J		

CISPR 11 Table 4 : Electromagnetic radiation disturbance test

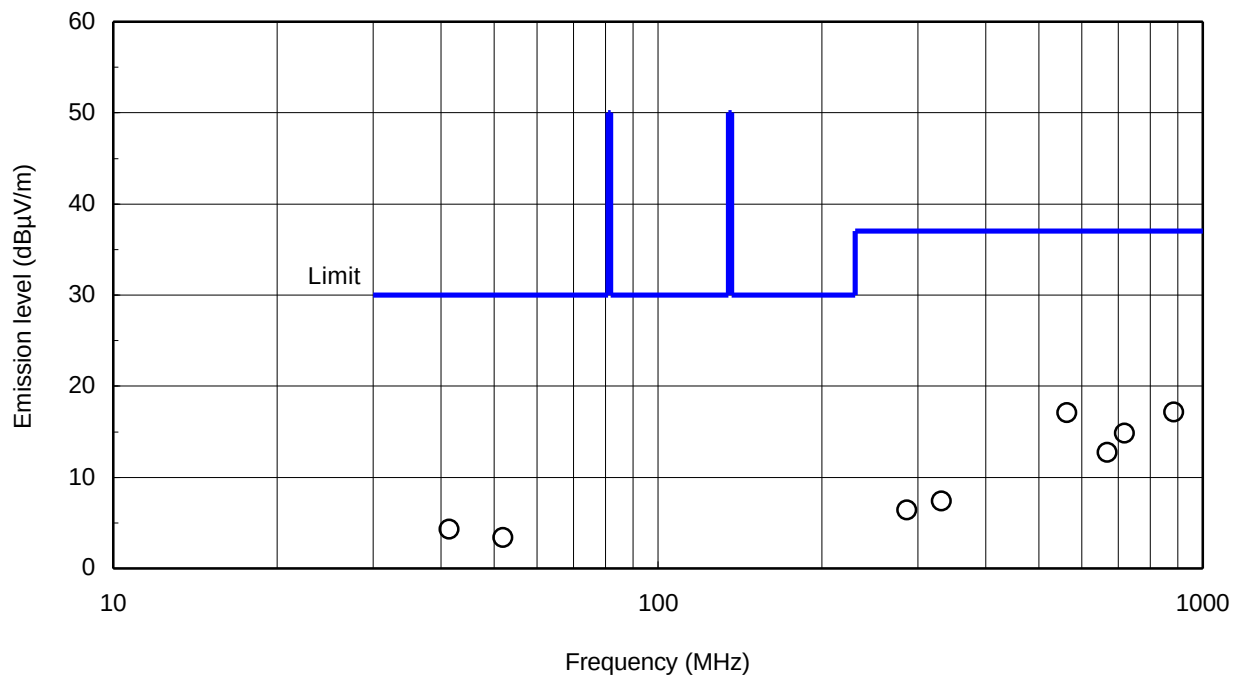
Detector type : Quasi-Peak, IF Bandwidth : 120kHz

H : Horizontal, V : Vertical

No.	Frequency (MHz)	Reading (dBμV)	Ant. polar- ization	Ant. Factor (dB/m)	Cable loss (dB)	Atten. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
1	41.356	2.1	V	12.5	0.1	0.0	4.3	30	25.7
2	52.000	6.3	V	7.4	0.1	0.0	3.3	30	26.7
3	286.288	3.3	V	13.3	0.3	0.0	6.4	37	30.6
4	331.788	3.1	H	14.4	0.3	0.0	7.3	37	29.7
5	563.828	7.4	V	19.6	0.5	0.0	17.0	37	20.0
6	668.392	2.3	V	20.3	0.6	0.0	12.7	37	24.3
7	717.948	3.6	H	21.1	0.6	0.0	14.9	37	22.1
8	886.428	3.8	V	23.1	0.7	0.0	17.2	37	19.8

Result (dBμV) = Reading(dBμV) + Ant. factor(dB/m) + Cable loss(dB) + Atten.(dB) + 20 × Log₁₀(3/10)

CISPR 11 Table 4 : Electromagnetic radiation disturbance test



Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: September 19, 2005
Equipment	: Microwave Oven	Temperature, Humidity	: 24°C, 75%
Model No.	: MFM-1NTPS	Test site	: Anechoic chamber
Test specification	: CISPR11:1990+A2:1996	Measurement distance	: 3m
Equipment classification	: Group 2, Class B	Result	: Pass
Frequency range	: 1GHz to 18GHz (Clause 5.2.3)	Test engineer	: S.Hirotani
Load condition	: 250ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking/600W(Max power)		
Magnetron	: PANASONIC 2M211A-M2J		

[illegible]

Frequency (GHz)	Emission level (dBpW)
12.25	43.5