

TOSHIBA

TOSHIBA HOKUTO ELECTRONICS CORPORATION
MAGNETRON ENGINEERING GROUP, MAGNETRON DIVISION
1975, 23-CHOME MINAMI 5-JODORI, ASAHIKAWA, HOKKAIDO 078-8335, JAPAN
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Crystal Electric Co., Ltd.
3-22-5, Higashinakamoto,
Higashinari-ku,
Osaka 537-0021, Japan

Report No. : 08-048
Issued date : July 23, 2008

Re : EMC test result in your model MFM-9TP microwave oven with Toshiba magnetron 2M240H(IF)-C

Dear Sirs,

We are enclosing the above mentioned test results based on CISPR11:2003+A2:2006 in our measuring facility.

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

Sincerely yours,



Toshiki Azuma
Manager
Magnetron Engineering Group
Magnetron Division

AZ/sw

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 Group
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-9TP
Line voltage : 120V/60Hz
Output power : 850W
Magnetron : TOSHIBA 2M240H(IF)-C

3. Test specification

Test specification : CISPR11:2003+A2:2006
Equipment classification : Group 2, Class B

4. Test result

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

Test specification : CISPR11:2003+A2:2006
Limit : Table 2b, Group 2, Class B (Clause 5.1.2.1)
Frequency range : 0.15MHz to 30MHz
Result : Pass
Tested date : July 22, 2008
Test engineer : Y.Sawada
Data of test results : Refer to Page 4

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

Test specification : CISPR11:2003+A2:2006
Limit : Table 4, Group 2, Class B (Clause 5.2.2)
Frequency range : 30MHz to 1000MHz
Result : (Pass) See also the note ;
Tested date : July 23, 2008
Test engineer : Y.Sawada
Data of test results : Refer to Page 5

Note ; This test result is a reference data.
Although CISPR11:2003+A2:2006 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 test (Frequency range : 1GHz to 18GHz)

Test specification : CISPR11:2003+A2:2006
Limit : Table 7, Group 2, Class B (Clause 5.2.3) ; Peak
Table 8, Group 2, Class B (Clause 5.2.3) ; Weighted
Frequency range : 1GHz to 18GHz
Result : Pass
Tested date : July 23, 2008
Test engineer : Y.Sawada
Data of test results : Refer to Page 6,7

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 2008 (Annually)
	LISN	KNW-242 (8-607-6)	Kyoritsu Electrical Works	March 2008 (Annually)
	Coaxial cable	3D-2W	Fujikura	March 2008 (Annually)
Electromagnetic radiation disturbance test (30MHz to 1000MHz)	EMI test receiver	ESVS30 (827957/010)	Rohde & Schwarz	March 2008 (Annually)
	Bilog antenna	CBL6111 (1350)	Chase	
	Coaxial cable	SUCOFLEX100-SF104 (109587/4)		March 2008 (Annually)
Electromagnetic radiation disturbance test (1GHz to 18GHz)	Spectrum analyzer	8592L (3624A00578)	Hewlett Packard	March 2008 (Annually)
	Double ridget antenna	3115 (6863)	EMC test systems	
	Pre-amplifier	8449B (3008A01826)	Agilent	March 2008 (Annually)
	High pass filter	F-100-3500-3-R (0243)	RLC Electronics	March 2008 (Annually)
	High pass filter	F-100-3500-4-R (0241)	RLC Electronics	March 2008 (Annually)
	Coaxial cable	SUCOFLEX100-SF104 (134223/4)	Suhner	March 2008 (Annually)
	Coaxial cable	SUCOFLEX100-SF104 (144786/4)	Suhner	March 2008 (Annually)

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

Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: July 22, 2008
Equipment	: Microwave oven	Temperature, Humidity	: 24°C, 55%
Model No.	: MFM-9TP	Test site	: Shielded room
Test specification	: CISPR11:2003+A2:2006	Result	: Pass
Equipment classification	: Group 2, Class B	Test engineer	: Y.Sawada
Frequency range	: Table 2b (Clause 5.1.2.1)		
Load condition	: 1000ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking / 850W		
Magnetron	: TOSHIBA 2M240H(IF)-C		

CISPR 11 Table 2b ; Mains terminal disturbance voltage test

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

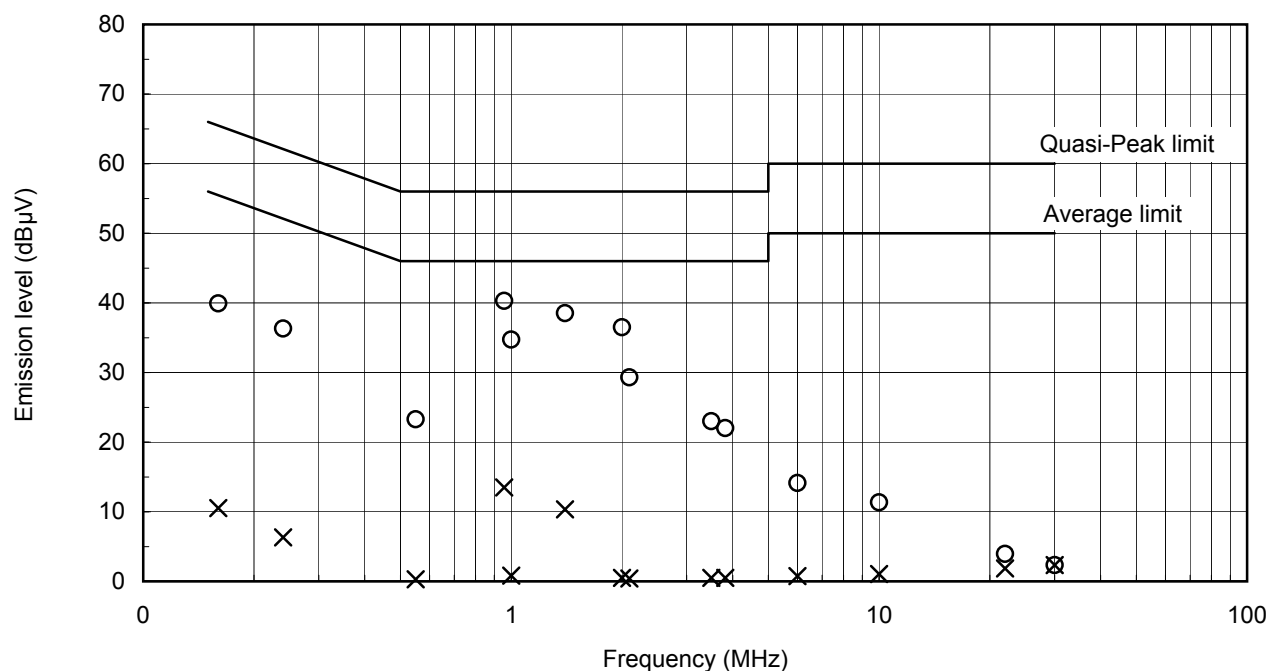
QP : Quasi-Peak, AV : Average

No.	Frequency (MHz)	Reading (dB μ V)		LISN factor (dB)	Cable loss (dB)	Atten. (dB)	Result (dB μ V)		Limit (dB μ V)		Margin (dB)	
		QP	AV				QP	AV	QP	AV	QP	AV
1	0.160	39.7	10.3	0.1	0.1	0.0	39.9	10.5	65.7	55.7	25.8	45.2
2	0.240	36.1	6.1	0.1	0.1	0.0	36.3	6.3	63.4	53.4	27.1	47.1
3	0.550	23.1	0.1	0.1	0.1	0.0	23.3	0.3	56.0	46.0	32.7	45.7
4	0.957	40.1	13.3	0.1	0.1	0.0	40.3	13.5	56.0	46.0	15.7	32.5
5	1.000	34.5	0.6	0.1	0.1	0.0	34.7	0.8	56.0	46.0	21.3	45.2
6	1.400	38.3	10.1	0.1	0.1	0.0	38.5	10.3	56.0	46.0	17.5	35.7
7	2.000	36.2	0.2	0.1	0.2	0.0	36.5	0.5	56.0	46.0	19.5	45.5
8	2.096	29.0	0.1	0.1	0.2	0.0	29.3	0.4	56.0	46.0	26.7	45.6
9	3.500	22.6	0.1	0.2	0.2	0.0	23.0	0.5	56.0	46.0	33.0	45.5
10	3.818	21.6	0.1	0.2	0.2	0.0	22.0	0.5	56.0	46.0	34.0	45.5
11	6.000	13.5	0.1	0.3	0.4	0.0	14.1	0.7	60.0	50.0	45.9	49.3
12	10.000	10.4	0.1	0.4	0.6	0.0	11.4	1.1	60.0	50.0	48.6	48.9
13	22.000	2.2	0.1	0.6	1.1	0.0	4.0	1.9	60.0	50.0	56.0	48.1
14	30.000	0.1	0.1	0.8	1.5	0.0	2.3	2.3	60.0	50.0	57.7	47.7

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

CISPR 11 Table 2b ; Mains terminal disturbance voltage test

○ : Quasi-Peak, × : Average



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

Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: July 23, 2008
Equipment	: Microwave oven	Temperature, Humidity	: 24°C, 54%
Model No.	: MFM-9TP	Test site	: Anechoic chamber
Test specification	: CISPR11:2003+A2:2006	Measurement distance	: 3m
Equipment classification	: Group 2, Class B	Result	: Pass
Frequency range	: Table 4 (Clause 5.2.2)	Test engineer	: Y.Sawada
Load condition	: 1000ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking / 850W		
Magnetron	: TOSHIBA 2M240H(IF)-C		

CISPR 11 Table 4 ; Electromagnetic radiation disturbance test

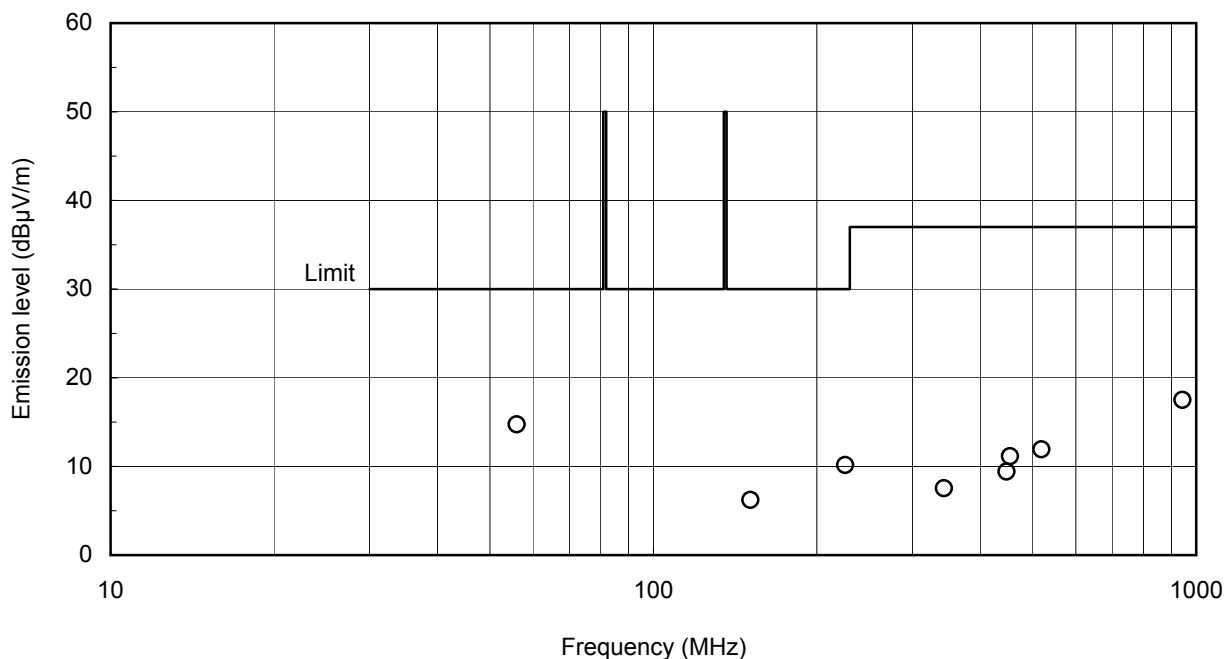
Detector type : Quasi-Peak, IF Bandwidth : 120kHz

H : Horizontal, V : Vertical

No.	Frequency (MHz)	Reading (dB μ V)	Ant. polar- ization	Ant. Factor (dB/m)	Cable loss (dB)	Atten. (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
1	56.000	18.6	H	6.5	0.1	0.0	14.7	30	15.3
2	150.868	5.4	H	11.1	0.2	0.0	6.2	30	23.8
3	225.600	9.7	H	10.7	0.2	0.0	10.2	30	19.8
4	342.860	3.3	H	14.4	0.3	0.0	7.5	37	29.5
5	447.276	2.7	H	16.8	0.4	0.0	9.4	37	27.6
6	453.892	4.1	V	17.1	0.4	0.0	11.2	37	25.8
7	518.500	3.7	V	18.2	0.5	0.0	11.9	37	25.1
8	943.250	3.7	H	23.5	0.8	0.0	17.5	37	19.5

Result (dB μ V) = Reading(dB μ V) + Ant. factor(dB/m) + Cable loss(dB) + Atten.(dB) + 20 $\times$ Log₁₀(3/10)

CISPR 11 Table 4 ; Electromagnetic radiation disturbance test



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

Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: July 23, 2008
Equipment	: Microwave oven	Temperature, Humidity	: 24°C, 54%
Model No.	: MFM-9TP	Test site	: Anechoic chamber
Test specification	: CISPR11:2003+A2:2006	Measurement distance	: 3m
Equipment classification	: Group 2, Class B	Result	: Pass
Frequency range	: Table 7 (Clause 5.2.3)	Test engineer	: Y.Sawada
Load condition	: 1000ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking / 850W		
Magnetron	: TOSHIBA 2M240H(IF)-C		

CISPR 11 Table 7 ; Electromagnetic radiation disturbance peak test

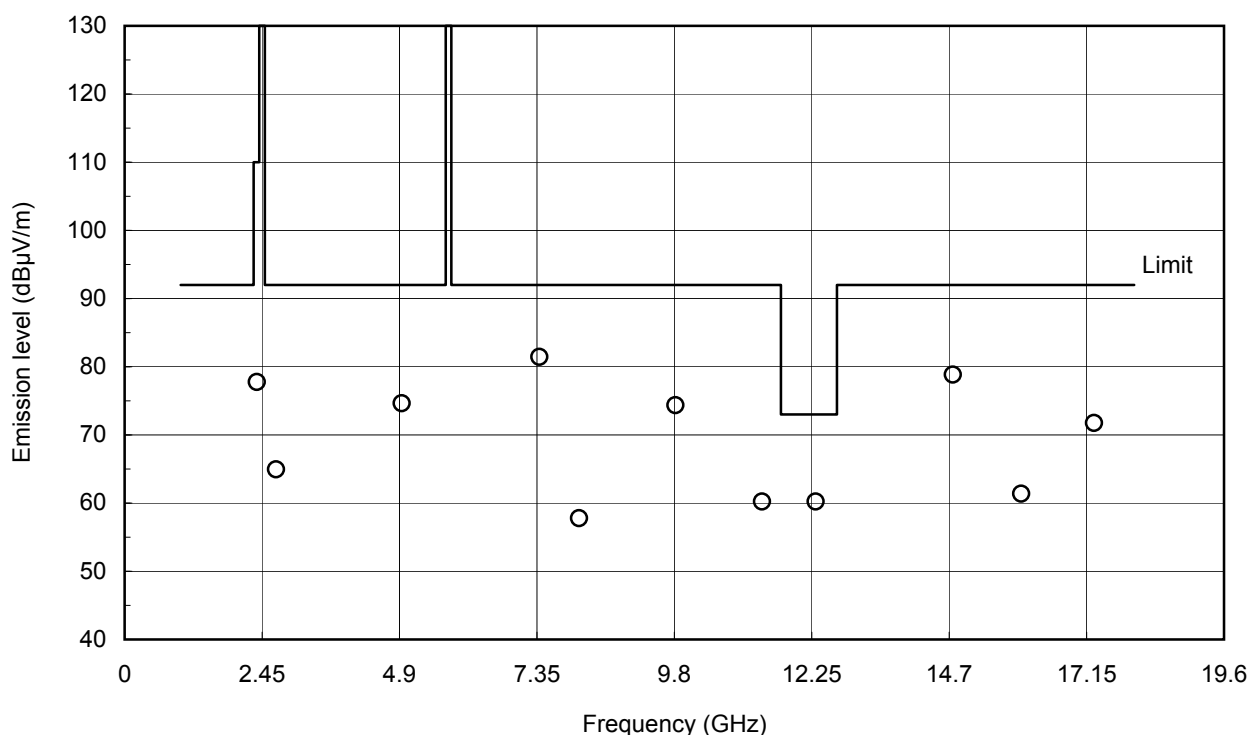
Detector type : Peak, RBW : 1MHz, VBW : 1MHz

H : Horizontal, V : Vertical

No.	Frequency (GHz)	Reading (dB μ V)	Ant. polari- zation	Ant. Factor (dB/m)	Cable loss (dB)	Filter loss (dB)	Amp. Gain (dB)	Atten. (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	
1	2.358	47.7	V	28.3	1.8	0.0	0.0	0.0	77.8	110.0	32.2	
2	2.700	34.3	H	28.8	1.9	0.0	0.0	0.0	65.0	92.0	27.1	
3	4.940	73.9	H	33.4	2.8	0.9	36.3	0.0	74.7	92.0	17.4	
4	7.395	76.4	V	36.7	3.3	1.1	36.0	0.0	81.5	92.0	10.5	
5	8.102	51.9	V	37.5	3.4	1.0	36.0	0.0	57.8	92.0	34.2	
6	9.820	67.7	V	38.2	3.9	1.2	36.6	0.0	74.4	92.0	17.6	
7	11.365	51.3	H	39.0	4.1	1.3	35.5	0.0	60.2	92.0	31.8	
8	12.320	51.2	V	39.2	4.3	1.0	35.5	0.0	60.2	73.0	12.8	
9	14.765	66.2	H	40.5	4.7	1.3	33.8	0.0	78.9	92.0	13.2	
10	15.985	50.9	V	39.1	5.0	1.3	34.9	0.0	61.4	92.0	30.6	
11	17.283	56.0	V	43.5	4.9	1.0	33.6	0.0	71.8	92.0	20.2	

Result (dB μ V/m) = Reading(dB μ V) + Ant. factor(dB/m) + Cable loss(dB) + Filter loss(dB) - Amp. gain(dB) + Atten.(dB)

CISPR 11 Table 7 ; Electromagnetic radiation disturbance peak test



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

Manufacturer	: Crystal Electric Co., Ltd.	Tested date	: July 23, 2008
Equipment	: Microwave oven	Temperature, Humidity	: 24°C, 54%
Model No.	: MFM-9TP	Test site	: Anechoic chamber
Test specification	: CISPR11:2003+A2:2006	Measurement distance	: 3m
Equipment classification	: Group 2, Class B	Result	: Pass
Frequency range	: Table 8 (Clause 5.2.3)	Test engineer	: Y.Sawada
Load condition	: 1000ml water (Clause 6.5.4)		
Line voltage	: 120V/60Hz		
Operation mode	: Cooking / 850W		
Magnetron	: TOSHIBA 2M240H(IF)-C		

CISPR 11 Table 8 - Electromagnetic radiation disturbance weighted test

Detector type : Peak, RBW : 1MHz, VBW : 10Hz

H : Horizontal, V : Vertical

No.	Frequency (GHz)	Reading (dB μ V)	Ant. polari- zation	Ant. Factor (dB/m)	Cable loss (dB)	Filter loss (dB)	Amp. Gain (dB)	Atten. (dB)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	
1	2.358	23.2	V	28.3	1.8	0.0	0.0	0.0	53.3	60.0	6.7	
2	2.700	23.1	H	28.8	1.9	0.0	0.0	0.0	53.8	60.0	6.2	
3	4.937	45.5	H	33.4	2.8	0.9	36.3	0.0	46.3	60.0	13.7	
4	7.400	38.8	V	36.7	3.3	1.1	36.0	0.0	43.9	60.0	16.1	
5	8.101	33.1	V	37.5	3.4	1.0	36.0	0.0	39.0	60.0	21.0	
6	9.815	33.3	V	38.2	3.9	1.2	36.6	0.0	40.0	60.0	20.0	
7	11.365	33.7	H	39.0	4.1	1.3	35.5	0.0	42.6	60.0	17.4	
8	12.324	34.8	V	39.2	4.3	1.0	35.5	0.0	43.8	60.0	16.2	
9	14.761	34.3	H	40.5	4.7	1.3	33.8	0.0	47.0	60.0	13.0	
10	15.954	35.0	V	39.1	5.0	1.3	34.9	0.0	45.5	60.0	14.5	
11	17.280	36.4	V	43.5	4.9	1.0	33.6	0.0	52.2	60.0	7.8	

Result (dB μ V/m) = Reading(dB μ V) + Ant. factor(dB/m) + Cable loss(dB) + Filter loss(dB) - Amp. gain(dB) + Atten.(dB)

CISPR 11 Table 8 - Electromagnetic radiation disturbance weighted test

