

# COMPLIANCE REPORT

## Report No. 10-EMUS-0191 B / C

Equipment: Microwave Oven(120 V / 60 Hz, 700 W Output)  
Type / model: MFM-7TPS (Micom type)  
Manufacturer: 1. Nisshin Industry Co., Ltd.  
3-2-11, Shibukawa-cho, Higashi-Osaka 5770-836, JAPAN  
  
Magnetron: LG Electronics Inc., Type 2M213-21GZH  
Date of issue: November 11, 2010  
Date of the receipt of test sample: December 2, 2009

### SUMMARY

The appliance complies with the requirements according to the following standards:

FCC PART 18 - ISM Consumer Device

Attached: EMI Test Report ----- 1 Volume.

Note: It is not allowed to copy this report even partly without the written permission of the Test Laboratory.

Approved by:



Dae-Woong Kim / Chief Research Engineer

Home Appliance Company,  
EMC Center  
LG Electronics Inc.

# EMI TEST REPORT

**Report No. 10-EMUS-0191 B / I**

## **Emission of electromagnetic disturbance**

### **EQUIPMENT UNDER TEST**

Equipment: Microwave Oven(120 V / 60 Hz, 700 W Output)  
Type / model: MFM-7TPS (Micom type)  
Manufacturer: 1. Nisshin Industry Co., Ltd.  
3-2-11, Shibukawa-cho, Higashi-Osaka 5770-836, JAPAN  
  
Magnetron: LG Electronics Inc., Type 2M213-21GZH  
Date of issue: November 1, 2010  
Date of the receipt of test sample: September 10, 2010

### **SUMMARY**

The equipment complies with the requirements according to the following standards:

FCC PART 18 - ISM Consumer Device

Note: The results in this test report apply only to sample tested.

It is not allowed to copy this report even partly without the written permission of the Test Laboratory.

Tested by:



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Seung Ho Shin / Research Engineer  
Home Appliance Company,  
EMC Center  
LG Electronics Inc.

Reviewed by:



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Kwang-Mu Son / Senior Research Engineer  
Home Appliance Company,  
EMC Center  
LG Electronics Inc.

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## 1. TEST SPECIFICATIONS

### 1.1 Standards

FCC PART 18 : Industrial, Scientific, and Medical equipment

### 1.2 Additions, deviations and exclusions from standards

No addition, deviation or exclusion from standards.

### 1.3 Purpose of the test

The purpose of test is to determine whether the equipment under test fulfils the requirements of the standards stated in section 1.1

## 2. TEST SUMMARY

The results in this report apply only to sample tested:

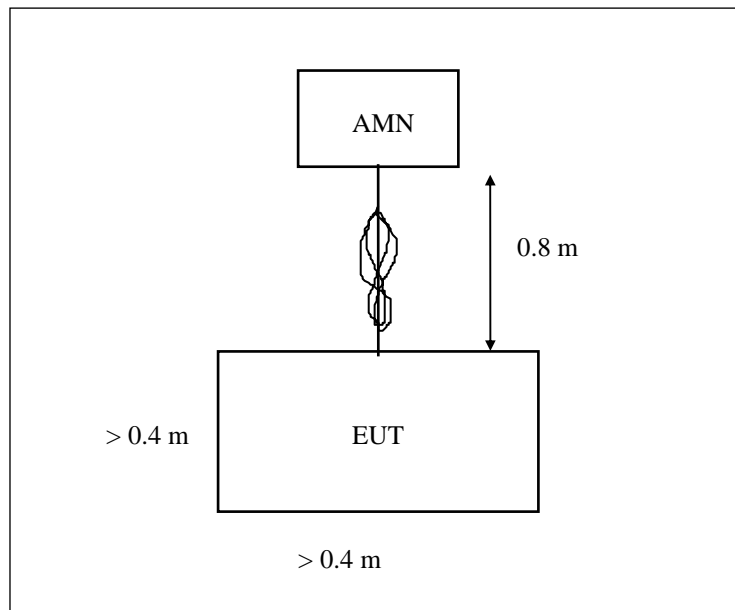
Test items	Result	Note
Continuous disturbance, mains terminal voltages	<b>PASS</b>	
Electromagnetic radiation disturbance of 1 GHz – 18 GHz	<b>PASS</b>	
Fundamental frequency	<b>PASS</b>	

### 3. CONTINUOUS DISTURBANCE, MAINS TERMINAL VOLTAGES : Frequency range 0.15 MHz to 30 MHz

#### 3.1 Operating environment

Temperature: 25 °C  
Relative Humidity: 46 %

#### 3.2 Test set-up and test procedure



The mains terminal disturbance voltage was measured with the equipment under test (EUT) in a shielded room. The EUT was connected to an artificial mains network (AMN) placed on the floor. The EUT was placed on a non-metallic table 0.4 m above the metallic, grounded floor. The EUT was placed also at the distance of 0.8 m from other metallic surfaces and the 0.4 m from the enclosure walls.

Amplitude measurements were performed with a quasi-peak detector and, if required, with an average detector.

#### 3.3 Mode of operation during the test

See “3.4 Mode of operation during the test” in the page 5.

#### 3.4 Measurement uncertainty

Continuous disturbance, mains terminal voltages, quasi-peak detection:  $\pm 2.1$  dB  
Continuous disturbance, mains terminal voltages, average detection:  $\pm 2.1$  dB

The measurement uncertainty describes the overall uncertainty of the given measured value during the operation of the EUT in the above-mentioned way.

Measurement uncertainty is calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”. The measurement uncertainty is given with a confidence of 95 %.

### 3.5 Test instrumentation

Equipment	Shielded room	Measurement receiver	Artificial mains network
Maker	YES, INC	R&S	R&S
Serial No.	N/A	100090	825640/003
Type	RFD-100	ESIB7	ESH2-Z5
Control No.	99-CFA-02	02-IRE-32	99-ICE-02
Calibration Date	N/A	2010-06-15	2010-06-15
Frequency	N/A	20 Hz ~ 7 GHz	9 kHz ~ 30 MHz

R&S = Rohde & Schwarz

### 3.6 Test result

Date of test: November 2, 2009

Operating mode: 1000-ml water, 100 % power

An overview sweep performed with peak detector is included in the test report as chart A1.

Frequency [MHz]	Quasi-Peak			Average			Phase
	Disturbance Level [dBuV]	Permitted Limit [dBuV]	Margin	Disturbance Level [dBuV]	Permitted Limit [dBuV]	Margin	
0.162	29.4	65.4	-36.0	11.0	55.4	-44.4	N
2.878	29.4	56.0	-26.6	7.2	46.0	-38.8	
16.114	32.8	60.0	-27.2	30.6	50.0	-19.4	
0.382	24.9	58.2	-33.3	3.2	48.2	-45.0	L1
2.750	30.7	56.0	-25.3	7.7	46.0	-38.3	
16.118	30.2	60.0	-29.8	26.5	50.0	-23.5	

Remark: “<<” means that disturbance level is lower than 20 dB below the limit.

#### 4. RADIATED ELECTROMAGNETIC FIELD IN THE FREQUENCY RANGE 0.15 MHz TO 1000 MHz

##### 4.1 Operating environment

Temperature: 22 °C  
Relative Humidity: 49 %

##### 4.2 Test set-up and test procedure

###### For electric field

The radiated disturbance electric field intensity was measured in an anechoic chamber at a distance of 10 m. The EUT was placed on a non-metallic turntable, 0.8 m above the RGP.

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization and the maximum value is presented in the report.

##### 4.3 Mode of operation during the test

See “3.4 Mode of operation during the test” in the page 5.

##### 4.4 Measurement uncertainty

Radiated disturbance electric field intensity, 30 – 1000 MHz:  $\pm 4.7$  dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT in the above-mentioned way.

Measurement uncertainty is calculated in accordance with ISO “Guide to the Expression of Uncertainty in measurement”.

The measurement uncertainty is given with a confidence of 95 %.

##### 4.5 Test instrumentation

Equipment	Anechoic Chamber	Measurement receiver	Log Periodic Ant.	Biconical Ant.
Maker	YES. INC	R&S	Schwarzbeck	Schwarzbeck
Serial No.	N/A	835336/008	0347	1876
Type	RFSD-F/A-100	ESI26	9108-A	VHA9103
Control No.	99-CFA-01	00-IRE-30	00-CSV-10	00-CSV-08
Calibration Date	N/A	2010-10-19	2010-09-07	2010-09-07
Frequency	N/A	20 Hz ~ 26.5 GHz	300 MHz ~ 1 GHz	25 MHz ~ 300 MHz

##### 4.6 Test result

Date of test: November 2, 2009

###### Operating mode: 100 % power with 1000-ml water

An overview sweep performed with peak detector is included in the test report as chart A2.

Frequency [MHz]	Average			
	Disturbance Level [dBuV/m]	Permitted Limit [dBuV/m]	Margin	Ant. Polarization
Fundamental frequencies:				
30.72	8.9	59.4	-50.5	Hor.
695.36	14.7	59.4	-44.7	Hor.
32.00	<b>16.5</b>	59.4	<b>-42.9</b>	Ver.
698.96	14.7	59.4	-44.7	Ver.

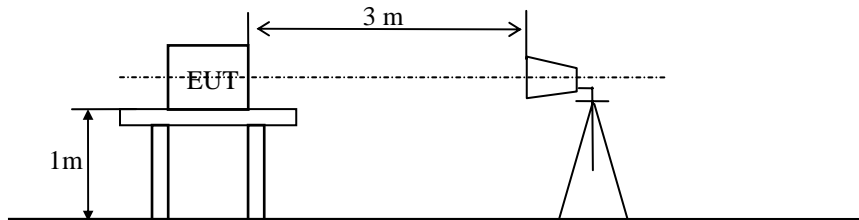
Remark: “<<” means that the Radiated emission level is lower than 20 dB below the limit.

## 5. ELECTROMAGNETIC RADIATION DISTURBANCE IN THE FREQUENCY RANGE 1 GHz to 18 GHz

### 5.1 Operating environment

Temperature: 25 °C  
Relative Humidity: 48 %

### 5.2 Test set-up and test procedure



The electromagnetic radiation disturbance was measured in an anechoic chamber (A/C) at a distance of 3 m. The A/C was equipped with a reference ground plane (RGP) and absorbing material on the floor.

The EUT was placed on a non-metallic turntable 1.0 m above the RGP. And the load of 1 liter of tap water initially at 20°C +/- 5°C was placed at the center of the load-carrying surface.

The water container was made of electrically non-conductive glass vessel with diameter 190 mm defined in the clause 8 of IEC 60705.

The measuring antenna was placed with its center in the same height as the center of the radiating source and the measurement was made in both the vertical and horizontal polarization. The turntable was rotated varying every 30° (starting position perpendicular to the front door) and then at each of these 12 points, a maximum hold shall be made for a period of 20 s.

At the position where the maximum occurred, a maximum hold for a period of 2 min was made in the spectrum analyzer mode.

If the result compared to the relevant limit was not satisfied with limit of table 6, then the weighted measurement (Resolution bandwidth: 1 MHz, Video bandwidth: 10 Hz) was performed with the spectrum analyzer in logarithmic mode at the position where the maximum occurred.

That result was presented in the report.

Measurements were performed with a peak detector.

### 5.3 Mode of operation during the test

See “3.4 Mode of operation during the test” in the page 5.

### 5.4 Measurement uncertainty

Radiated electromagnetic power:  $\pm 3.4$  dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT in the above-mentioned way.

Measurement uncertainty is calculated in accordance with ISO “Guide to the Expression of Uncertainty in measurement”.

The measurement uncertainty is given with a confidence of 95 %.



## 5.5 Test instrumentation

Equipment	Measurement receiver	Horn Ant.	High pass filter	Amplifier	Anechoic Chamber
Maker	R&S	Electro-metrics	K&L	HP	YES.INC
Serial No.	835336/008	2517	2	3950M00118	N/A
Type	ESU26	RGA180	11SH10-4500 /X18000-0/0	83006A	RFSD-F/A-100
Control No.	08-IRE-36	99-IRE-22	99-IRE-07	00-IRE-31	99-CFA-01
Calibration Date	2010-10-19	2010-09-20	2010-10-21	2010-10-21	N/A
Frequency	20 Hz ~ 26.5 GHz	1 ~ 18 GHz	Below 4.5 GHz	10 ~ 26.5 MHz	N/A

R&S = Rohde & Schwarz, HP = Hewlett Packard

## 5.6 Test result

Date of test: November 2, 2009

Operating mode: 700 and 300 -ml water, 100 % power

An overview sweep performed with peak detector is included in the test report as chart A3.

Freq. [GHz]	Load [ml]	Load Location	Field Strength @ 3 m [dBuV/m]	Limit	Margin
2.185	1000	Center	42.8	70.0	-27.2
2.399	1000	Center	45.4	70.0	-24.6
2.505	1000	Center	43.4	70.0	-26.6
2.733	1000	Center	49.2	70.0	-20.8
4.913	700	Center	57.7	70.0	-12.3
4.903	700	Rt. Front	45.9	70.0	-24.1
4.874	300	Center	56.9	70.0	-13.1
4.892	300	Rt. Front	54.1	70.0	-15.9
7.324	700	Center	35.6	70.0	-34.4
7.338	700	Rt. Front	39.5	70.0	-30.5
7.317	300	Center	41.6	70.0	-28.4
7.359	300	Rt. Front	41.1	70.0	-28.9
9.103	700	Center	37.1	70.0	-32.9
8.588	700	Center	47.1	70.0	-22.9
11.031	700	Center	39.7	70.0	-30.3
14.733	700	Center	47.3	70.0	-22.7
17.190	700	Center	48.0	70.0	-22.0

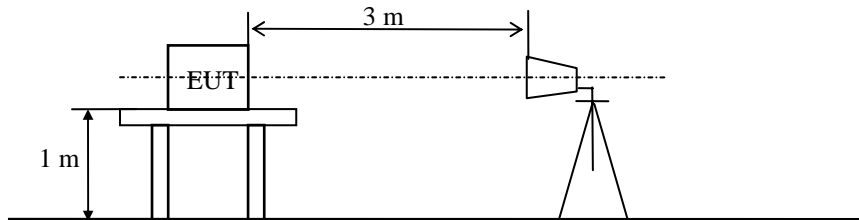
Remark: "<<" means that the Radiated emission level is lower than 20 dB below the limit.

## 6. FUNDAMENTAL FREQUENCY OF THE MICROWAVE OVEN ( $2,450 \pm 50$ MHz)

### 6.1 Operating environment

Temperature: 25 °C  
Relative Humidity: 48 %

### 6.2 Test set-up and test procedure



The fundamental frequency was measured in an anechoic chamber (A/C) at a distance of 3 m. The A/C was equipped with a reference ground plane (RGP). The EUT was placed on a non-metallic turntable 1.0 m above the RGP.

The measuring antenna was placed with its center in the same height as the center of the radiating source. The measurement was made in vertical polarization, with the measurement receiver in max-hold.

Measurements were performed with a peak detector.

### 6.3 Mode of operation during the test

See “3.4 Mode of operation during the test” in the page 5.

### 6.4 Measurement uncertainty

Fundamental frequency,  $2,450 \pm 50$  MHz:  $\pm 3.1$  dB

The measurement uncertainty describes the overall uncertainty of the given measured value during operation of the EUT in the above-mentioned way.

Measurement uncertainty is calculated in accordance with ISO “Guide to the Expression of Uncertainty in measurement”.

The measurement uncertainty is given with a confidence of 95 %.

### 6.5 Test instrumentation

Equipment	Measurement receiver	Horn Ant.	Anechoic Chamber
Maker	R&S	Electro-metrics	YES.INC
Serial No.	835336/008	2517	N/A
Type	ESU26	RGA180	RFSD-F/A-100
Control No.	08-IRE-36	99-IRE-22	99-CFA-01
Calibration Date	2010-10-19	2010-09-20	N/A
Frequency	20 Hz ~ 26.5 GHz	1 ~ 18 GHz	N/A

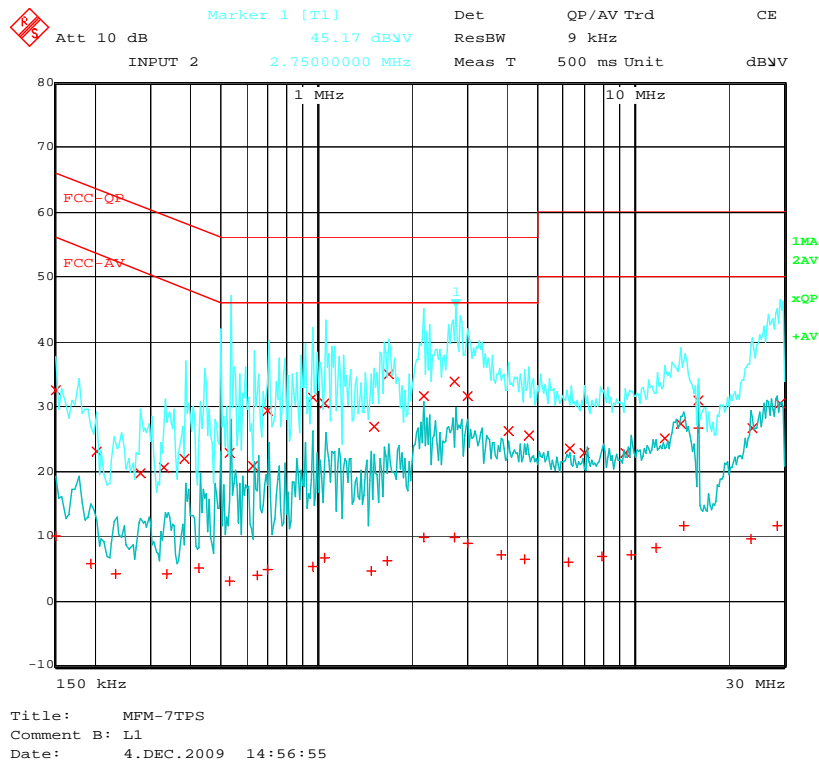
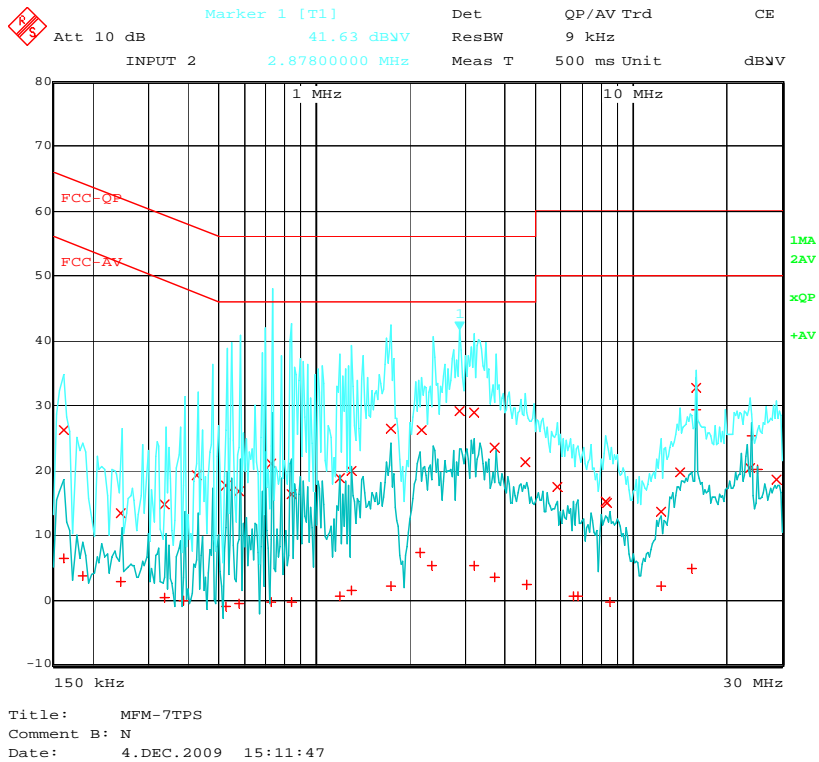
R&S = Rohde & Schwarz, HP = Hewlett Packard

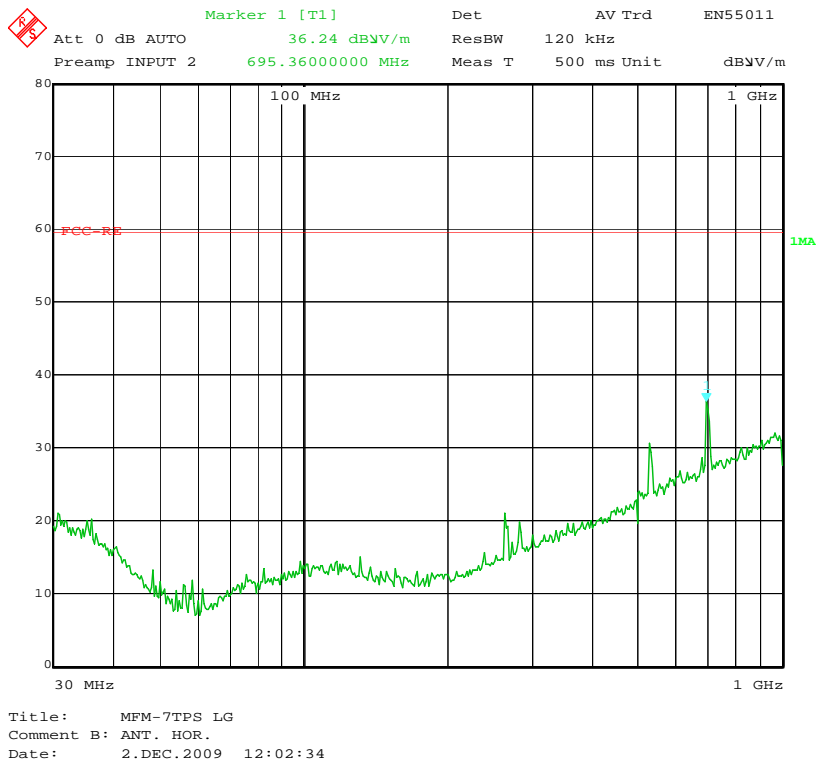
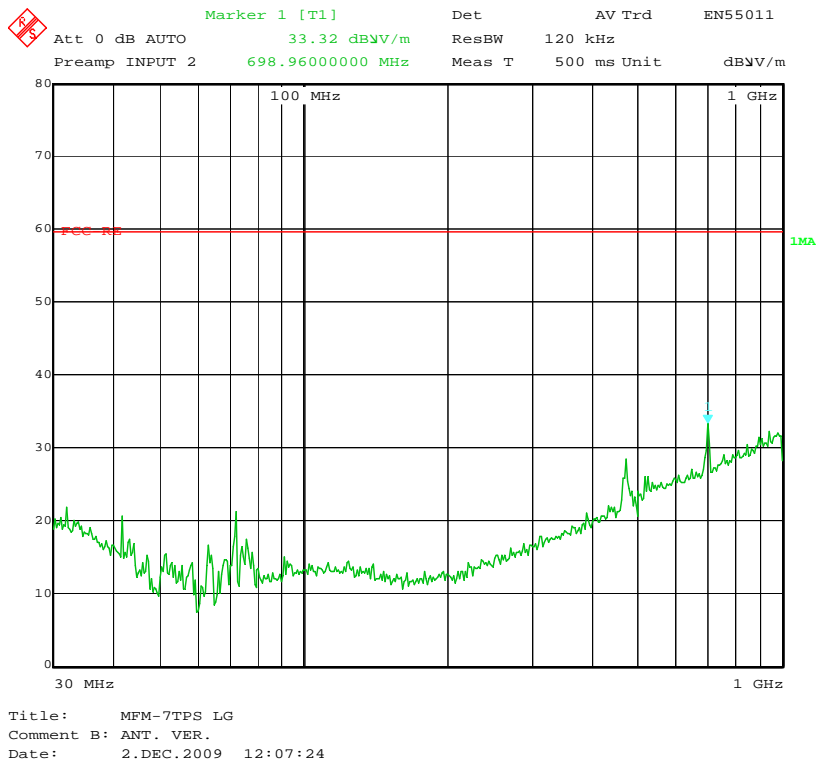
### 6.6 Test result

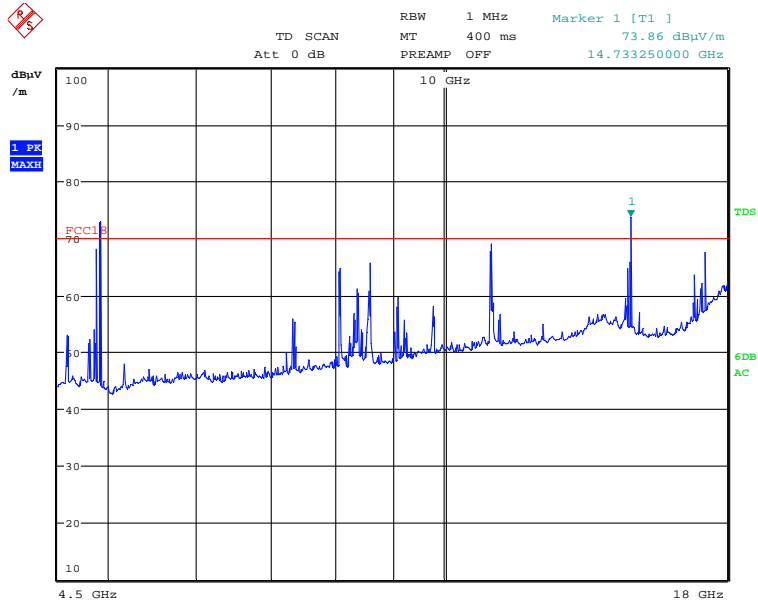
Date of test: November 2, 2009

Operating mode: 1000-ml water, 100 % power

An overview sweep performed with peak detector is included in the test report as chart A3.

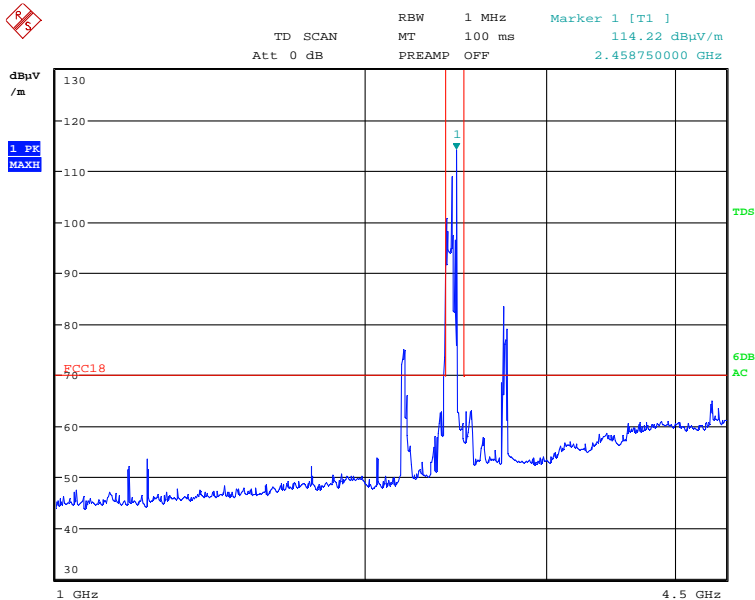
**CHART A1. CONTINUOUS DISTURBANCE VOLTAGE****1) A1-1 (Phase L1)****2) A1-2 (Phase N)**

**CHART A2. RADIATED ELECTRIC FIELD STRENGTH (30 MHZ ~ 1 GHZ)****1) Horizontal****2) Vertical**

**CHART A3. ELECTROMAGNETIC RADIATION DISTURBANCE (1 GHz – 18 GHz)****1) A3-1: 1 GHz – 4.5 GHz****- Load Location: 700 ml Center (4.5 ~ 18 GHz)**

MF7/TPS LG MGT

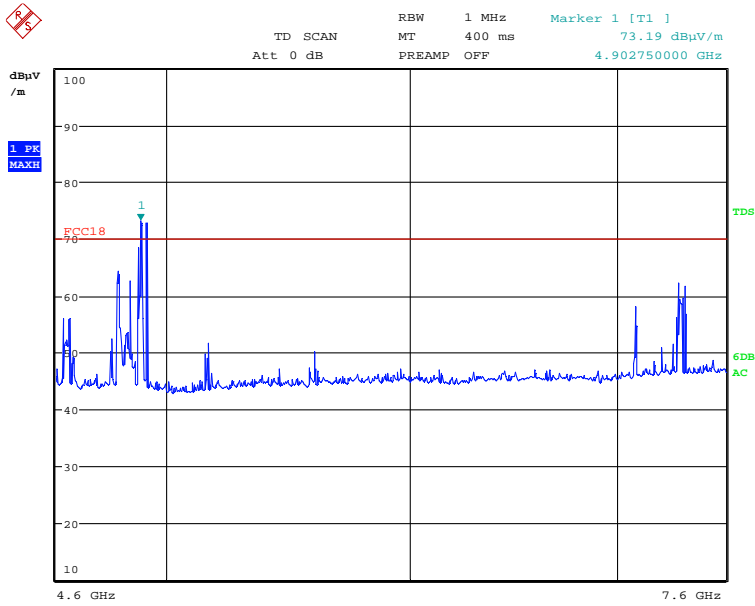
Date: 2.DEC.2009 13:46:55

**- Load location: 1000 ml Center (1 ~ 4.5 GHz)**

MF7/TPS LG MGT

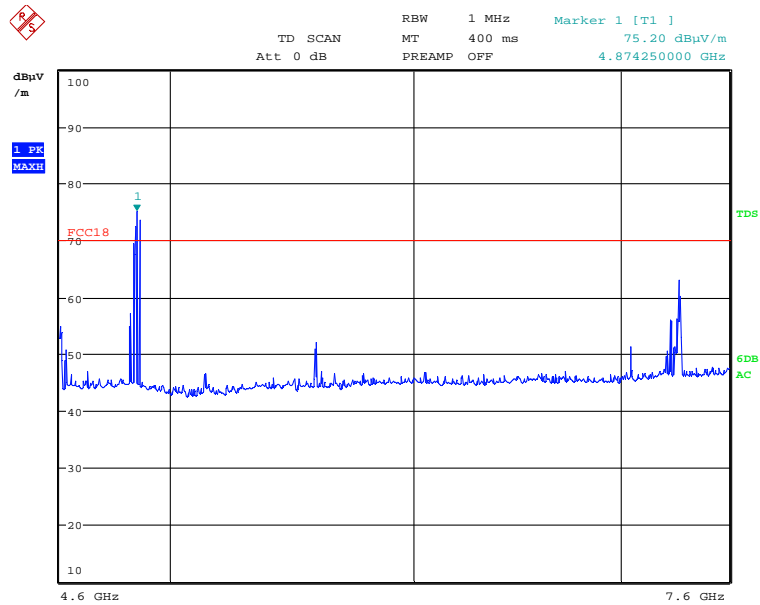
Date: 2.DEC.2009 13:30:05

- Load Location: 700 ml Right Front

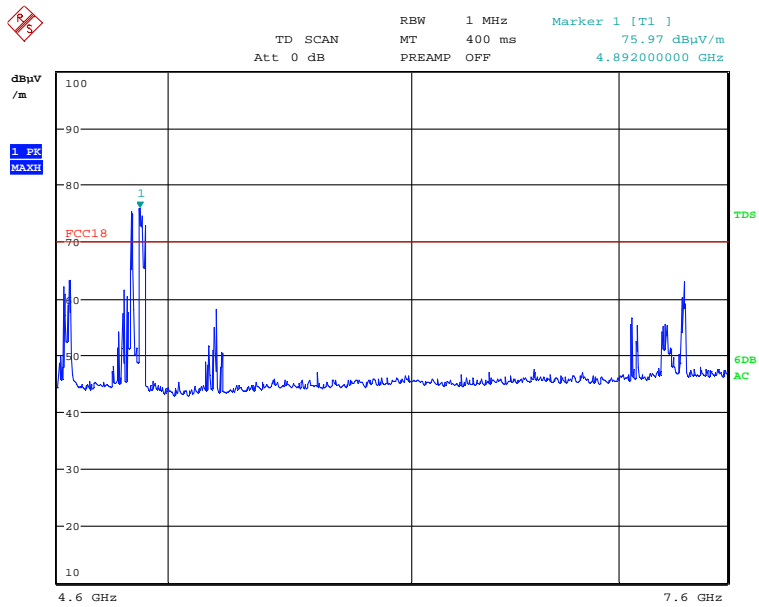


MPM7TPS LG MGT  
 Date: 2.DEC.2009 13:51:21

- Load location: 300 ml Center

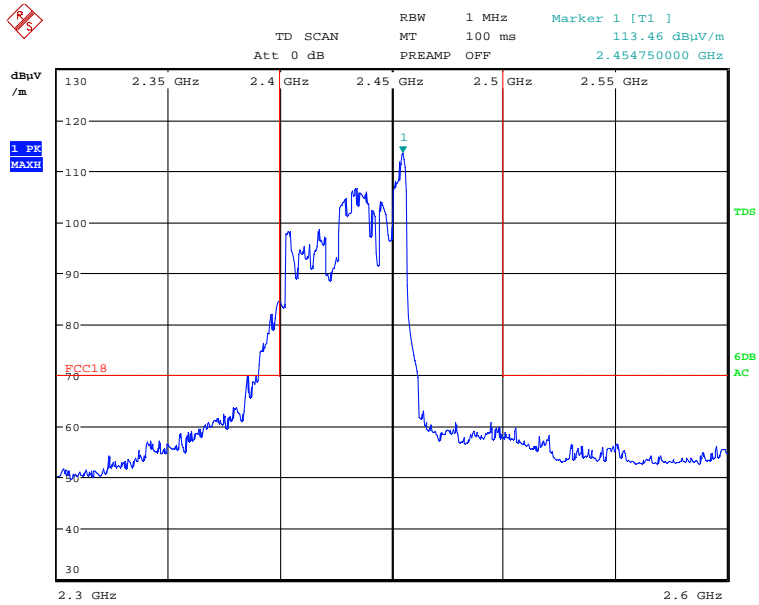


MPM7TPS LG MGT  
 Date: 2.DEC.2009 13:55:59

**- Load Location: 300 ml Right Front**

MFM7TPS LG MGT

Date: 2.DEC.2009 13:59:45

**- Fundamental freq.**

MFM7TPS LG MGT

Date: 2.DEC.2009 13:34:47