



Test report No. : 32HE0037-HO-C
Page : 1 of 22
Issued date : May 28, 2012
FCC ID : ACLAQ3E81

EMI TEST REPORT

Test Report No. : 32HE0037-HO-C

Customer : **Panasonic Corporation Appliances Company**
Kitchen Appliances Business Unit
2-3-1-3 Noji-higashi, Kusatsu City, Shiga
525-0058 Japan

Type of Equipment : **Commercial Microwave Oven**

Model No. : **NE-17723**

FCC ID : **ACLAQ3E81**

Test regulation : **FCC Part 18 : 2002**

Test Result : **Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test: March 28 to May 17, 2012

Representative test engineer:

T. Shimada

Takumi Shimada
Engineer of WiSE Japan,
UL Verification Service

Approved by:

T. Hataheda

Takahiro Hataheda
Leader of WiSE Japan,
UL Verification Service

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Head Office EMC Lab.

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SECTION 1: Manufacturer information

Company Name : Panasonic Corporation Appliances Company
Kitchen Appliances Business Unit
Address : 1-5-1 Takatsukadai, Nishi-ku, Kobe City 651-2271, Japan
Telephone Number : +81-77-561-3199
Facsimile Number : +81-77-561-4312
Contact Person : Koji Kanzaki

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Commercial Microwave Oven
Model No. : NE-17723
Serial No. : Refer to Clause 4.2
Rating : AC 208 / 230V, 60Hz Output 1700W (By IEC 705)
Receipt Date of Sample : March 22, 2012
Country of Mass-production : Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Clock frequency in the system : 8MHz
Operating frequency : 2450MHz
Feature of EUT : The commercial microwave oven using magnetron.
Type of Magnetron : 2M210
Door Seal Type : Choke
Employed mode : Stirrer

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 18 2002, final revised on July 10, 2002
Title : FCC 47CFR Part18 Industrial, scientific, and medical equipment

3.2 Procedures and results

Item	Test Procedure & Limits	Deviation	Worst margin	Result
Radiation Hazard Measurement	Section 18.305 FCC/OST MP-5	N/A	-	Complied
Radiated emission	Section 18.305 FCC/OST MP-5 *1)	N/A	7.2dB 4909.920MHz, Vertical, AV	Complied
*Note: UL Japan, Inc.'s EMI Work Procedure 13-EM-W0420 and 13-EM-W0424. *Radiated emission test was only performed according to the customer's request. *1) The limit is decided by the power. Refer to Appendix 4.				

3.3 Addition to standard

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission test(3m)

The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

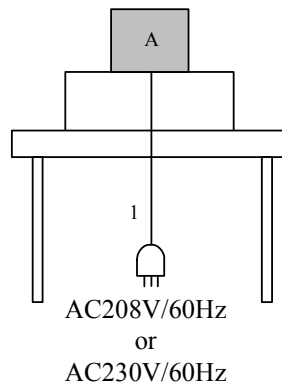
Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating mode(s)

The mode is used : High Power mode (P10)

4.2 Configuration and peripherals



*Cabling and setup were taken into consideration and test data was taken under worse case conditions.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Commercial Microwave Oven	NE-17723	001	Panasonic Corporation Appliances Company Kitchen Appliances Business Unit	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	AC Cable	1.5	Unshielded	Unshielded	-

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SECTION 5: Radiation Hazard Measurement (Safety check)

5.1 Radiation Hazard Measurement

Radiation leakage was measured in the as-received condition with the oven door closed using a microwave leakage meter.

A 2000ml water load was placed in the center of the oven and the oven was operated at maximum output power.

☒ There was no microwave leakage exceeding a power level of 0.08mW/cm² (AC208V), 0.1mW/cm² (AC230V) observed at any point 5cm or more from the external surface of the oven.

A maximum of 1.0mW/cm² is allowed in accordance with the applicable Federal Standards. Hence, microwave leakage in the as-received condition with the oven door closed was below the maximum allowed.

5.2 Input power

208V/60Hz AC 2624.05W (Input Power) 2650W (Rated Input Power)
230V/60Hz AC 2658.42W (Input Power) 2650W (Rated Input Power)

5.3 RF Output power Measurement

The Caloric method was used to determine maximum RF output power. The initial temperature of the water load was measured. The water load was placed in the center of the oven. The oven was operated at maximum output power for 200 seconds, the temperature of the water was re-measured.

Power development in dummy load

Model	Power	Load[l]	time[min]	start temp.[deg. C]	stop temp.[deg. C]	Power[W]
NE-17723	208V	2	3	14.8	44.6	1382.72
NE-17723	230V	2	3	14.9	43.4	1322.4

$$\text{Power[W]} = 1.16 \times 60 \times C \times d \times V \times (\text{stop temp.} - \text{start temp.}) / \text{time[min]}$$

C: Specific heat kcal/(kg·deg. C)

V: Volume l

d: Density kg/l

1cal=1.163*10⁻⁶ kWh

The measured output power was found to be less than 500watts. Therefore, in accordance with Section 18.305 of Subpart-C, the measured out-of-band emissions were compared with the limit calculated as following:

$$\text{LFS} = 25 \times \text{SQRT} (\text{Power output}/500)$$

$$\text{LFS} = 25 \times \text{SQRT} (911.4/500)$$

$$\text{LFS} \approx 33.75$$

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Where: LFS is the maximum allowable field strength for out-of-band emissions in $\mu\text{V}/\text{meter}$ at a 300meter measurement distance. Power Output is the measured output power in watts.

1st Limit

Model	Power	Limit[uV/m]@300m	Limit[dBu V/m]@300m	Limit[dBu V/m]@3m
NE-17723	208V	41.57	32.38	72.38
NE-17723	230V	40.66	32.18	72.18

$$\text{Limit[uV/m]@300m} = 25 \times (\text{Power}/500)^{1/2}$$

2nd Limit

Limit[uV/m]@1600m	Limit[dBu V/m]@1600m	Limit[dBu V/m]@3m
10.00	20.00	74.54

5.4 Operating Frequency Measurement

The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 2000ml water load was placed in the center of the oven and the oven was operated at maximum output power. The fundamental operating frequency was monitored until the water load was reduced to 20 percent of the original load.

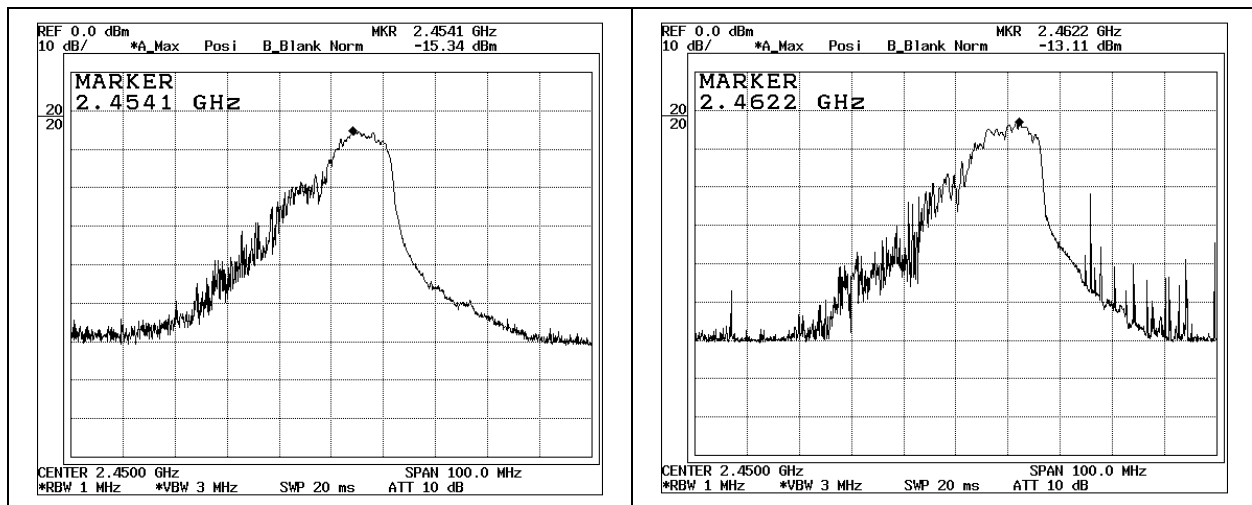
[AC208V]

Maximum frequency variation

Variation of frequency with time, using the Load

2454.1MHz - 2462.2 MHz

(2000cc - 400cc / Load)



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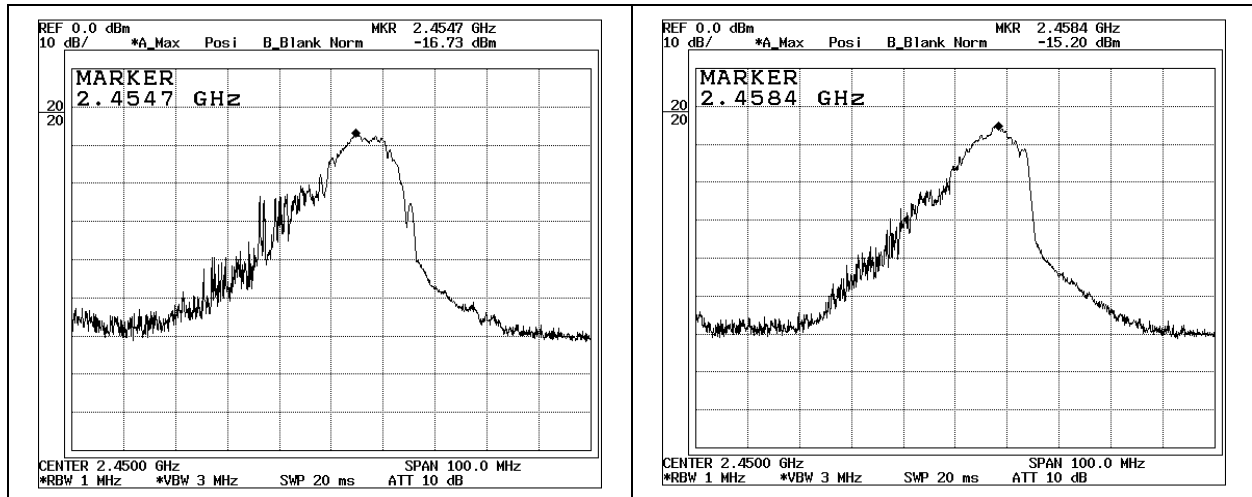
[AC230V]

Maximum frequency variation

Variation of frequency with time, using the Load

2454.7MHz - 2458.4MHz

(2000cc - 400cc / Load)



5.5 Variation in Operating Frequency with Line Voltage

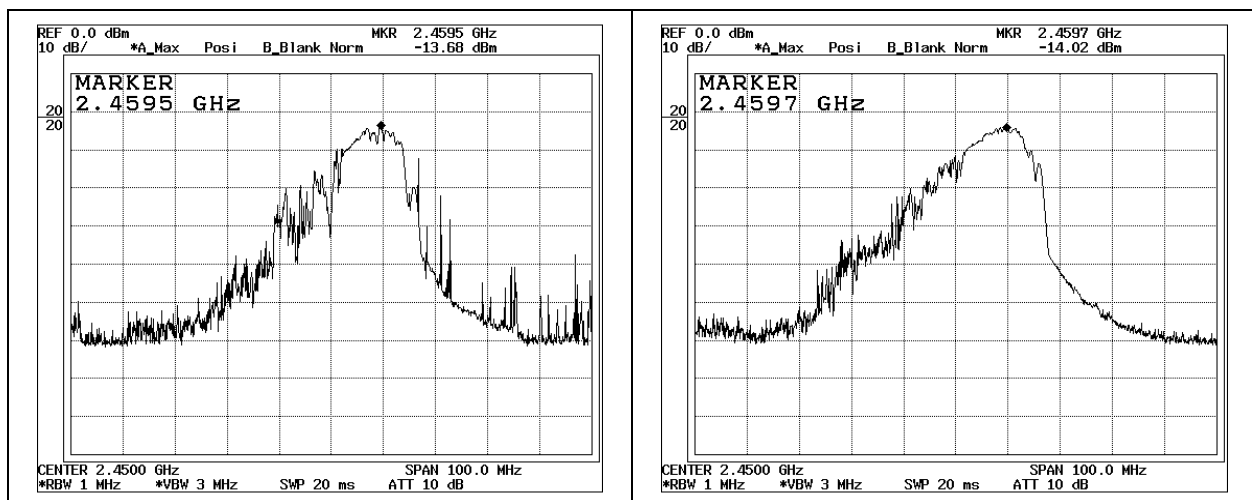
The EUT was operated / warmed by at least 10 minutes of use with a 2000ml water load at room temperature at the beginning of the test. Then the operating frequency was monitored as the input voltage was varied between 80 and 125 percent of the nominal rating.

[AC208V]

Variation of frequency for line voltage variation

2459.5MHz - 2459.7MHz

(166V - 260V / 2000cc Load)



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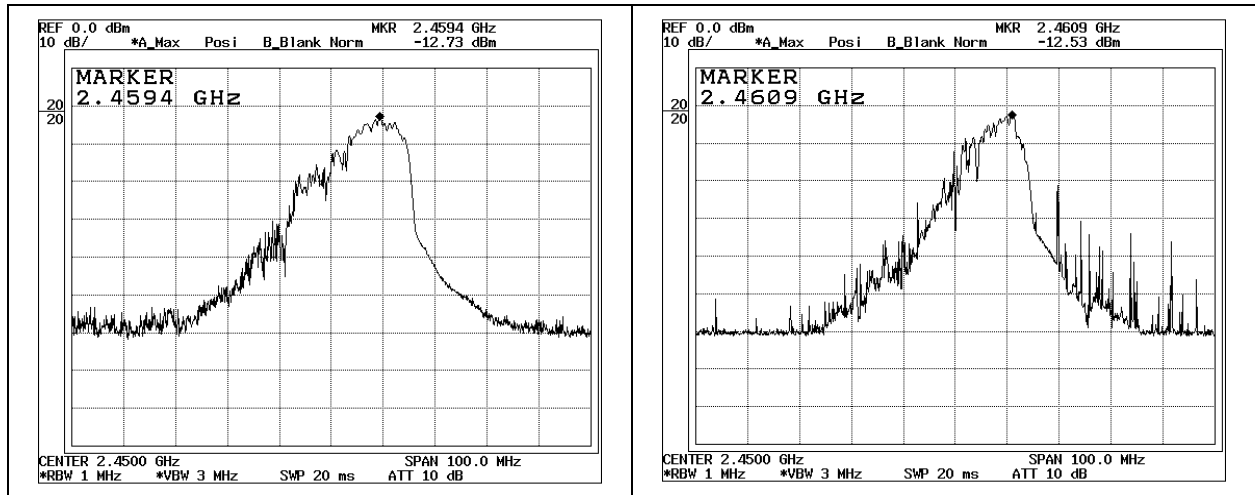
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[AC230V]

Variation of frequency for line voltage variation
2459.4MHz - 2460.9MHz
(166V - 260V / 2000cc Load)



Date : May 17, 2012

Test engineer: Tomohisa Nakagawa

SECTION 6: Radiated Emission

6.1 Operating environment

Test place : See data
Temperature : See data
Humidity : See data

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m by 1.0m, raised 1.0m above the conducting ground plane. The EUT was set on the center of the tabletop. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. Photographs of the set up are shown in Appendix 3.

6.3 Test conditions

Frequency range : 5MHz-30MHz(Loop antenna) / 30MHz-300MHz (Biconical antenna) / 300MHz-1000MHz (Logperiodic antenna) / 1000MHz - 25000MHz (Horn antenna)
Test distance : 3m
EUT position : Table top
EUT operation mode : See Clause 4.1

6.4 Test procedure

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

Frequency : From 5MHz to 30MHz at distance 3m

The height of antenna was fixed in 2m.

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for vertical polarization (antenna angle: 0deg., 45deg., 90deg., and 135 deg.) and horizontal polarization.

*Refer to Figure 1 about Direction of the Loop Antenna.

Frequency : From 30MHz to 25GHz at distance 3m

The measuring antenna height varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The typical test procedure of microwave was based on the regulation FCC/OST MP-5.

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The test was made with the detector (RBW/VBW) in the following table.

Frequency	Below 30MHz	30-1000MHz	Above 1GHz
Instrument used	Test Receiver	Test Receiver	Spectrum Analyzer *1)
Detector	AV	AV	PK
IF Bandwidth	BW 9kHz(T/R)	BW 120kHz(T/R)	RBW: 1MHz VBW: 10Hz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Distance factor was used the following:

Frequency : From 5MHz to 30MHz

Distance factor = $\text{Result}@3\text{m} + 40 \cdot \log(3/300)$ [dBuV/m]

Frequency : From 30MHz to 1000MHz

Distance factor = $\text{Result}@3\text{m} + 20 \cdot \log(3/300)$ [dBuV/m]

Frequency : From 1GHz to 26GHz

Frequency	Distance factor
1.830GHz	0.0046
2.745GHz	0.0070
3.660GHz	0.0090
4.575GHz	0.0100

For frequencies between those given in the table, the value of Distance factor is determined by linear interpolation.

6.5 Test result

Summary of the test results: Pass

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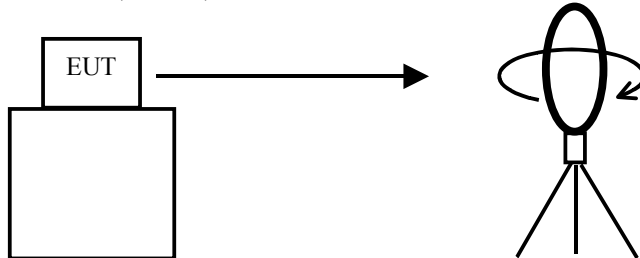
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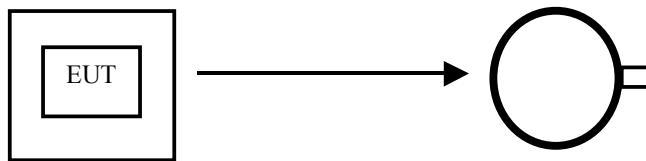
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Figure 1: Direction of the Loop Antenna

Side View (Vertical)



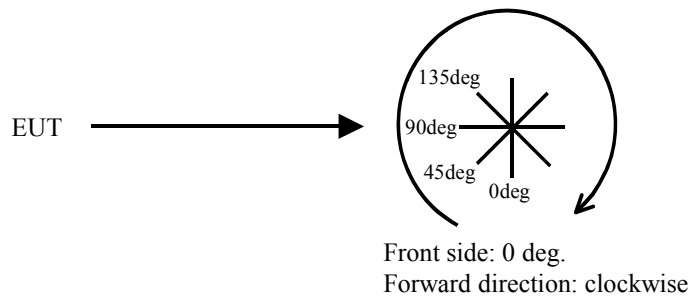
.....
Top View (Horizontal)



Antenna was not rotated.

.....

Top View (Vertical)



APPENDIX 1: Data of EMI test

Radiated Emission

NE-17723 (AC208V/60Hz) below 30MHz

Test place : Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 32HE0037-HO
Date : 04/05/2012
Temperature/ Humidity : 24 deg.C / 38% RH
Engineer : Takumi Shimada
Mode : High Power mode (P10)

Loop Antenna [deg.]	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss & Gain [dB]	Result [dBuV/m] at 3m	Result [uV/m] at 3m	Result [uV/m] at 300m	Limit [uV/m] at 300m	Margin [uV/m] at 300m	Margin [dB] at 300m	Angle [deg.]	Remark
0	20.000	AV	23.3	19.4	-24.7	18.0	8.0	0.00	33.69	33.7	123.1	0	*1)
45	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)
90	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)
135	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)
Hori	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)

Result[dBuV/m] at 3m = Reading + Ant Factor + Loss (Cable+Attenuator) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The test result is rounded off to one or two decimal places, so some differences might be observed.

*1) The Result was below 0.01.

Radiated Emission
NE-17723 (AC208V/60Hz) 30MHz-1GHz

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 32HE0037-HO
Date : 03/28/2012
Temperature/ Humidity : 20 deg.C / 30% RH
Engineer : Shinya Watanabe
Mode : High Power mode (P10)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss & Gain [dB]	Result [dBuV/m] at 3m	Result [uV/m] at 3m	Result [uV/m] at 300m	Limit [uV/m] at 300m	Margin [uV/m] at 300m	Margin [dB] at 300m	Height [cm]	Angle [deg.]	Remark
Hori	43.830	AV	31.5	13.4	-24.8	20.1	10.2	0.10	41.57	41.5	52.3	105	225	
Hori	59.979	AV	27.1	8.0	-24.6	10.5	3.4	0.03	41.57	41.5	61.9	158	218	
Hori	107.850	AV	25.5	11.2	-24.1	12.6	4.3	0.04	41.57	41.5	59.8	139	67	
Hori	336.300	AV	46.3	15.6	-21.9	40.0	100.0	1.00	41.57	40.6	32.4	100	354	
Hori	910.620	AV	22.8	22.5	-17.4	27.9	24.9	0.25	41.57	41.3	44.5	100	357	
Hori	969.673	AV	22.8	23.1	-16.9	29.0	28.2	0.28	41.57	41.3	43.4	100	338	
Vert	45.300	AV	29.1	12.8	-24.8	17.1	7.2	0.07	41.57	41.5	55.3	100	174	
Vert	59.979	AV	31.8	8.0	-24.6	15.2	5.8	0.06	41.57	41.5	57.2	100	292	
Vert	105.320	AV	30.5	10.9	-24.1	17.3	7.4	0.07	41.57	41.5	55.1	100	134	
Vert	351.160	AV	47.2	16.1	-21.8	41.5	118.9	1.19	41.57	40.4	30.9	100	243	
Vert	912.220	AV	21.5	22.6	-17.4	26.7	21.7	0.22	41.57	41.4	45.7	100	351	
Vert	968.506	AV	23.4	23.1	-16.9	29.6	30.2	0.30	41.57	41.3	42.8	100	249	

Result[dBuV/m] at 3m = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission

NE-17723 (AC208V/60Hz) 1GHz-25GHz

Test place Head Office EMC Lab. No.3 and 1 Semi Anechoic Chamber
Report No. 32HE0037-HO
Date 03/28/2012 04/05/2012
Temperature/ Humidity 20 deg.C / 30% RH 24 deg.C / 38% RH
Engineer Shinya Watanabe Takumi Shiada
(1-10GHz) (10-25GHz)
Mode High Power mode (P10)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m] at 3m	Result [uV/m] at 3m	Distance factor K	Result [uV/m] at 300m	Limit [uV/m] at 300m	Margin [uVm] at 300m	Margin [dB] at 300m	Height [cm]	Angle [deg.]	Remark
Hori	2209.119	AV	25.1	26.2	2.1	0.0	53.4	467.8	0.0056	2.62	41.57	39.0	24.0	180	242	
Hori	2400.000	AV	23.6	26.4	2.2	0.0	52.2	407.4	0.0061	2.49	41.57	39.1	24.5	100	0	
Hori	2500.000	AV	23.5	26.5	2.3	0.0	52.3	412.1	0.0064	2.64	41.57	38.9	24.0	100	0	
Hori	2741.664	AV	23.9	27.1	2.4	0.0	53.4	467.8	0.0070	3.27	41.57	38.3	22.1	100	118	
Hori	4903.990	AV	40.9	30.5	4.6	31.9	44.1	160.4	0.0100	1.60	41.57	40.0	28.3	146	290	600ml Load Right Front
Hori	4909.398	AV	38.6	30.5	4.7	31.9	41.9	124.5	0.0100	1.25	41.57	40.3	30.5	158	312	600ml Load Center
Hori	4912.665	AV	35.1	30.5	4.7	31.9	38.4	83.2	0.0100	0.83	41.57	40.7	34.0	158	58	1400ml Load Right Front
Hori	4919.918	AV	40.0	30.5	4.7	31.9	43.3	146.3	0.0100	1.46	41.57	40.1	29.1	174	68	1400ml Load Center
Hori	7080.103	AV	33.1	35.3	5.5	32.3	41.6	120.3	0.0100	1.20	41.57	40.4	30.8	169	335	
Hori	7360.820	AV	33.0	35.2	5.6	32.4	41.4	117.5	0.0100	1.18	41.57	40.4	31.0	144	154	600ml Load Right Front
Hori	7363.350	AV	36.4	35.2	5.6	32.4	44.8	173.8	0.0100	1.74	41.57	39.8	27.6	100	0	600ml Load Center
Hori	7363.452	AV	33.9	35.2	5.6	32.4	42.3	130.4	0.0100	1.30	41.57	40.3	30.1	110	97	1400ml Load Right Front
Hori	7380.220	AV	36.9	35.2	5.6	32.4	45.3	184.1	0.0100	1.84	41.57	39.7	27.1	100	0	1400ml Load Center
Hori	9828.159	AV	30.9	38.4	6.5	32.9	42.9	139.7	0.0100	1.40	41.57	40.2	29.5	100	137	
Hori	11125.950	AV	31.6	40.2	-3.8	33.9	34.1	50.7	0.0100	0.51	41.57	41.1	38.3	100	170	
Hori	14743.900	AV	35.2	40.7	-2.8	32.5	40.6	107.2	0.0100	1.07	41.57	40.5	31.8	100	135	
Hori	17174.870	AV	33.8	41.7	-2.2	32.6	40.7	108.4	0.0100	1.08	41.57	40.5	31.7	100	175	
Hori	19642.280	AV	36.4	40.5	-2.4	32.6	41.9	124.5	0.0100	1.25	41.57	40.3	30.5	100	180	
Hori	24500.000	AV	33.7	40.7	-1.7	32.3	40.4	104.8	0.0100	1.05	41.57	40.5	32.0	100	180	
Vert	2209.406	AV	25.9	26.2	2.1	0.0	54.2	512.9	0.0056	2.87	41.57	38.7	23.2	125	322	
Vert	2400.000	AV	23.4	26.4	2.2	0.0	52.0	398.2	0.0061	2.43	41.57	39.1	24.7	100	0	
Vert	2500.000	AV	23.7	26.5	2.3	0.0	52.5	421.7	0.0064	2.70	41.57	38.9	23.8	100	0	
Vert	2735.011	AV	24.0	27.1	2.4	0.0	53.5	473.2	0.0070	3.31	41.57	38.3	22.0	140	221	
Vert	4900.190	AV	41.1	30.5	4.6	31.9	44.3	164.1	0.0100	1.64	41.57	39.9	28.1	171	10	600ml Load Right Front
Vert	4906.870	AV	38.5	30.5	4.6	31.9	41.7	121.7	0.0100	1.22	41.57	40.4	30.7	175	359	600ml Load Center
Vert	4912.665	AV	35.9	30.5	4.7	31.9	39.2	91.3	0.0100	0.91	41.57	40.7	33.2	143	300	1400ml Load Center
Vert	4912.665	AV	39.5	30.5	4.7	31.9	42.8	138.1	0.0100	1.38	41.57	40.2	29.6	100	0	1400ml Load Right Front
Vert	7079.989	AV	40.8	35.3	5.5	32.3	49.3	291.8	0.0100	2.92	41.57	38.7	23.1	138	146	
Vert	7355.050	AV	36.0	35.2	5.6	32.4	44.4	166.0	0.0100	1.66	41.57	39.9	28.0	141	237	600ml Load Right Front
Vert	7356.950	AV	37.4	35.2	5.6	32.4	45.8	195.0	0.0100	1.95	41.57	39.6	26.6	141	359	600ml Load Center
Vert	7365.035	AV	35.1	35.2	5.6	32.4	43.5	149.7	0.0100	1.50	41.57	40.1	28.9	137	16	1400ml Load Right Front
Vert	7375.090	AV	43.6	35.2	5.6	32.4	52.0	398.2	0.0100	3.98	41.57	37.6	20.4	100	0	1400ml Load Center
Vert	9828.019	AV	31.3	38.4	6.5	32.9	43.3	146.3	0.0100	1.46	41.57	40.1	29.1	119	351	
Vert	11115.330	AV	34.4	40.2	-3.8	33.9	36.9	70.0	0.0100	0.70	41.57	40.9	35.5	100	180	
Vert	14744.230	AV	35.6	40.7	-2.8	32.5	41.0	112.3	0.0100	1.12	41.57	40.5	31.4	100	180	
Vert	17181.670	AV	33.4	41.8	-2.2	32.6	40.4	104.8	0.0100	1.05	41.57	40.5	32.0	100	110	
Vert	19643.340	AV	35.8	40.5	-2.4	32.6	41.3	116.2	0.0100	1.16	41.57	40.4	31.1	100	180	
Vert	24500.000	AV	33.7	40.7	-1.7	32.3	40.4	104.8	0.0100	1.05	41.57	40.5	32.0	100	180	

Result[dBuV/m] at 3m = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

Result[uV/m] at 300m = Result[uV/m] at 3m * Distance factor K

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
NE-17723 (AC230V/60Hz) below 30MHz

Test place : Head Office EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 32HE0037-HO
Date : 04/05/2012
Temperature/ Humidity : 24 deg.C / 38% RH
Engineer : Takumi Shimada
Mode : High Power mode (P10)

Loop Antenna [deg.]	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss & Gain [dB]	Result [dBuV/m] at 3m	Result [uV/m] at 3m	Result [uV/m] at 300m	Limit [uV/m] at 300m	Margin [uV/m] at 300m	Margin [dB] at 300m	Angle [deg.]	Result
0	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)
45	20.000	AV	23.3	19.4	-24.7	18.0	8.0	0.00	33.69	33.7	123.1	0	*1)
90	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)
135	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)
Hori	20.000	AV	23.2	19.4	-24.7	17.9	7.9	0.00	33.69	33.7	123.2	0	*1)

Result[dBuV/m] at 3m = Reading + Ant Factor + Loss (Cable+Attenuator) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The test result is rounded off to one or two decimal places, so some differences might be observed.

*1) The Result was below 0.01.

Radiated Emission
NE-17723 (AC230V/60Hz) 30MHz-1GHz

Test place : Head Office EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 32HE0037-HO
Date : 03/31/2012
Temperature/ Humidity : 22 deg.C / 36% RH
Engineer : Norihisa Hashimoto
Mode : High Power mode (P10)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss & Gain [dB]	Result [dBuV/m] at 3m	Result [uV/m] at 3m	Result [uV/m] at 300m	Limit [uV/m] at 300m	Margin [uV/m] at 300m	Margin [dB] at 300m	Height [cm]	Angle [deg.]	Remark
Hori	95.700	AV	30.2	9.4	-24.2	15.4	5.9	0.06	40.66	40.6	56.8	211	8	
Hori	297.950	AV	31.1	19.7	-22.2	28.6	27.0	0.27	40.66	40.4	43.6	178	16	
Hori	337.660	AV	44.7	15.7	-21.9	38.5	84.2	0.84	40.66	39.8	33.7	100	67	
Hori	505.330	AV	21.8	18.4	-20.7	19.5	9.5	0.09	40.66	40.6	52.7	100	178	
Hori	895.640	AV	22.6	22.4	-17.5	27.5	23.8	0.24	40.66	40.4	44.7	116	259	
Hori	960.250	AV	23.6	23.0	-16.9	29.7	30.6	0.31	40.66	40.4	42.5	107	182	
Vert	95.700	AV	37.2	9.4	-24.2	22.4	13.2	0.13	40.66	40.5	49.8	100	306	
Vert	295.630	AV	27.0	19.6	-22.2	24.4	16.6	0.17	40.66	40.5	47.8	100	283	
Vert	337.820	AV	47.2	15.7	-21.9	41.0	112.3	1.12	40.66	39.5	31.2	102	201	
Vert	502.998	AV	24.7	18.4	-20.7	22.4	13.2	0.13	40.66	40.5	49.8	100	238	
Vert	899.672	AV	24.3	22.4	-17.5	29.2	28.9	0.29	40.66	40.4	43.0	100	16	
Vert	956.720	AV	23.9	23.0	-16.9	30.0	31.7	0.32	40.66	40.3	42.2	103	37	

Result[dBuV/m] at 3m = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission

NE-17723(AC230V/60Hz) 1GHz-25GHz

Test place : Head Office EMC Lab. No.3 and 1 Semi Anechoic Chamber
Report No. : 32HE0037-HO
Date : 03/28/2012 04/05/2012
Temperature/ Humidity : 21 deg.C / 40% RH 24 deg.C / 38% RH
Engineer : Kazuya Yoshioka Takumi Shiada
 (1-10GHz) (10-25GHz)
Mode : High Power mode (P10)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m] at 3m	Result [uV/m] at 3m	Distance factor K	Result [uV/m] at 300m	Limit [uV/m] at 300m	Margin [uV/m] at 300m	Margin [dB] at 300m	Height [cm]	Angle [deg.]	Remark
Hori	2137.700	AV	22.9	26.1	2.1	0.0	51.1	359.0	0.0055	1.97	40.66	38.7	26.3	100	227	
Hori	2400.000	AV	23.1	26.4	2.2	0.0	51.7	384.6	0.0061	2.35	40.66	38.3	24.8	100	324	
Hori	2500.000	AV	23.2	26.5	2.3	0.0	52.0	398.2	0.0064	2.55	40.66	38.1	24.1	100	324	
Hori	2729.330	AV	23.9	27.1	2.4	0.0	53.4	467.8	0.0070	3.27	40.66	37.4	21.9	100	302	
Hori	4902.080	AV	54.4	30.5	3.8	31.9	56.8	691.9	0.0100	6.92	40.66	33.7	15.4	126	310	1400ml Load Center
Hori	4903.330	AV	51.9	30.5	3.8	31.9	54.3	518.9	0.0100	5.19	40.66	35.5	17.9	152	302	1400ml Load Right Front
Hori	4910.330	AV	51.1	30.5	3.9	31.9	53.6	478.7	0.0100	4.79	40.66	35.9	18.6	100	60	600ml Load Center
Hori	4918.250	AV	51.7	30.5	3.9	31.9	54.2	512.9	0.0100	5.13	40.66	35.5	18.0	192	289	600ml Load Right Front
Hori	7005.250	AV	39.5	35.3	4.4	32.3	46.9	221.4	0.0100	2.21	40.66	38.4	25.3	100	227	
Hori	7350.170	AV	47.3	35.2	4.6	32.4	54.7	543.3	0.0100	5.43	40.66	35.2	17.5	100	148	1400ml Load Center
Hori	7355.420	AV	47.3	35.2	4.6	32.4	54.7	543.3	0.0100	5.43	40.66	35.2	17.5	225	205	600ml Load Right Front
Hori	7365.170	AV	43.8	35.2	4.6	32.4	51.2	363.1	0.0100	3.63	40.66	37.0	21.0	225	207	1400ml Load Right Front
Hori	7366.420	AV	44.3	35.2	4.6	32.4	51.7	384.6	0.0100	3.85	40.66	36.8	20.5	100	212	600ml Load Center
Hori	9841.000	AV	32.8	38.5	5.3	32.9	43.7	153.2	0.0100	1.53	40.66	39.1	28.5	100	222	
Hori	10978.620	AV	33.3	40.3	-3.8	33.9	35.9	62.4	0.0100	0.62	40.66	40.0	36.3	100	170	
Hori	14744.320	AV	36.0	40.7	-2.8	32.5	41.4	117.5	0.0100	1.18	40.66	39.5	30.8	100	180	
Hori	17174.240	AV	34.3	41.7	-2.2	32.6	41.2	114.9	0.0100	1.15	40.66	39.5	31.0	100	175	
Hori	19643.850	AV	36.5	40.5	-2.4	32.6	42.0	125.9	0.0100	1.26	40.66	39.4	30.2	100	180	
Hori	24500.000	AV	33.6	40.7	-1.7	32.3	40.3	103.6	0.0100	1.04	40.66	39.6	31.9	100	180	
Vert	2208.700	AV	24.5	26.2	2.1	0.0	52.8	436.6	0.0056	2.44	40.66	38.2	24.4	100	309	
Vert	2400.000	AV	23.1	26.4	2.2	0.0	51.7	384.6	0.0061	2.35	40.66	38.3	24.8	100	0	
Vert	2500.000	AV	23.6	26.5	2.3	0.0	52.4	416.9	0.0064	2.67	40.66	38.0	23.7	100	0	
Vert	2730.080	AV	23.7	27.1	2.4	0.0	53.2	457.1	0.0070	3.20	40.66	37.5	22.1	100	324	
Vert	4902.250	AV	50.3	30.5	3.8	31.9	52.7	431.6	0.0100	4.32	40.66	36.3	19.5	140	299	1400ml Load Center
Vert	4905.580	AV	51.3	30.5	3.8	31.9	53.7	484.2	0.0100	4.84	40.66	35.8	18.5	191	330	600ml Load Center
Vert	4909.920	AV	62.5	30.5	3.9	31.9	65.0	1778.3	0.0100	17.78	40.66	22.9	7.2	176	0	600ml Load Right Front
Vert	4934.170	AV	53.7	30.5	3.9	31.9	56.2	645.7	0.0100	6.46	40.66	34.2	16.0	235	0	1400ml Load Right Front
Vert	7002.500	AV	44.2	35.3	4.4	32.3	51.6	380.2	0.0100	3.80	40.66	36.9	20.6	100	83	
Vert	7352.170	AV	50.0	35.2	4.6	32.4	57.4	741.4	0.0100	7.41	40.66	33.2	14.8	100	264	1400ml Load Center
Vert	7358.080	AV	50.6	35.2	4.6	32.4	58.0	794.4	0.0100	7.94	40.66	32.7	14.2	236	187	1400ml Load Right Front
Vert	7366.670	AV	50.2	35.2	4.6	32.4	57.6	758.6	0.0100	7.59	40.66	33.1	14.6	230	158	600ml Load Center
Vert	7367.000	AV	50.1	35.2	4.6	32.4	57.5	749.9	0.0100	7.50	40.66	33.2	14.7	103	73	600ml Load Right Front
Vert	9801.670	AV	36.5	38.4	5.3	32.9	47.3	231.8	0.0100	2.32	40.66	38.3	24.9	100	73	
Vert	10976.700	AV	34.1	40.2	40.3	-3.8	33.9	49.6	0.0100	0.50	40.66	40.2	38.3	100	180	
Vert	14743.450	AV	35.3	40.7	40.7	-2.8	32.5	42.2	0.0100	0.42	40.66	40.2	39.7	100	180	
Vert	17180.720	AV	35.0	41.8	41.8	-2.2	32.6	42.7	0.0100	0.43	40.66	40.2	39.6	100	120	
Vert	19644.910	AV	36.4	40.5	40.5	-2.4	32.6	42.7	0.0100	0.43	40.66	40.2	39.6	100	180	
Vert	24500.000	AV	33.7	40.7	40.7	-1.7	32.3	41.3	0.0100	0.41	40.66	40.2	39.9	100	180	

Result[dBuV/m] at 3m = Reading + Ant Factor + Loss (Cable+Attenuator+Filter) - Gain(Amplifier)

Result[uV/m] at 300m = Result[uV/m] at 3m * Distance factor K

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

*The test result is rounded off to one or two decimal places, so some differences might be observed.

APPENDIX 2: Test instruments

EMI Test Instruments[1/2]

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2012/02/24 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	-	RE	2012/02/06 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2011/04/08 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2011/05/23 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2012/03/29 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2011/05/16 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2011/08/11 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2012/03/16 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2011/11/02 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2011/10/15 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2011/10/15 * 12
MHF-19	High Pass Filter 3.5-18.0GHz	TOKIMEC	TF323DCA	602	RE	2011/09/07 * 12
MCC-76	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	278967/4	RE	2011/12/08 * 12
MTH-01	Thermometer	FLUKE	52II	89210031	Power	2011/07/29 * 12
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2011/07/10 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2012/02/08 * 12
MJM-01	Measure	KDS	ES19-55	-	RE	-
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2011/10/19 * 12
MCC-31	Coaxial cable	UL Japan	-	-	RE	2011/07/28 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m) /RFM-E421(Switcher)	- /01068(Switcher)	RE	2012/01/22 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2011/11/02 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2011/11/23 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2011/06/19 * 12
MHA-01	Horn Antenna 18-26.5GHz	EMCO	3160-09	1266	RE	2011/06/20 * 12
MPA-10	Pre Amplifier	Agilent	8449B	3008A02142	RE	2012/01/25 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2011/05/16 * 12

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EMI Test Instruments[2/2]

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-05	Spectrum Analyzer	Advantest	R3273	160400285	RE	2011/11/23 * 12
MOS-23	Thermo-Hygrometer	Custom	CTH-201	0004	RE	2011/12/09 * 12
MRIN-01	Reference Impedance Network	California Instruments	REF-IMP3S	S010	Power	2011/12/26 * 12
COTS-MHF-02	Harmonics / Voltage fluctuations and flicker test program	California Instruments	CTS30	-	Power	-

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Radiated emission

Power: Limit calculation table

<Reference>

*The following test instruments are used for Radiation Hazard Measurement (Safety check), and they are owned by the customer.

Model No.	Instrument	Manufacturer	Serial No	Expiration of Calibration
HI-1710A	Microwave Survey meter	ETS LINDGREN	00102488	N/A
HI-2623	Microwave leakage probe	ETS LINDGREN	00109098	2013/03

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APPENDIX 3: Photographs of test setup

Radiated Emission

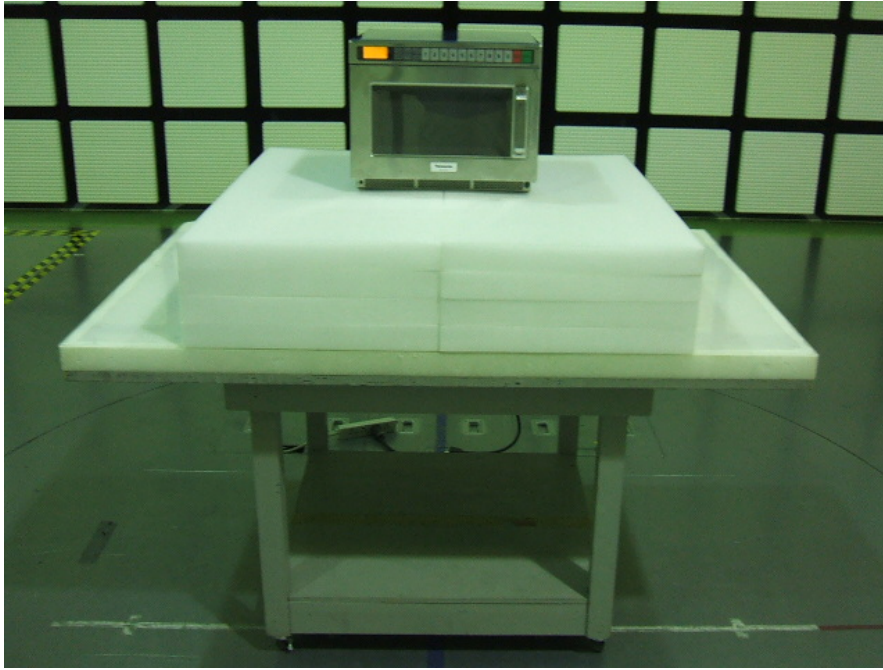


Photo 1

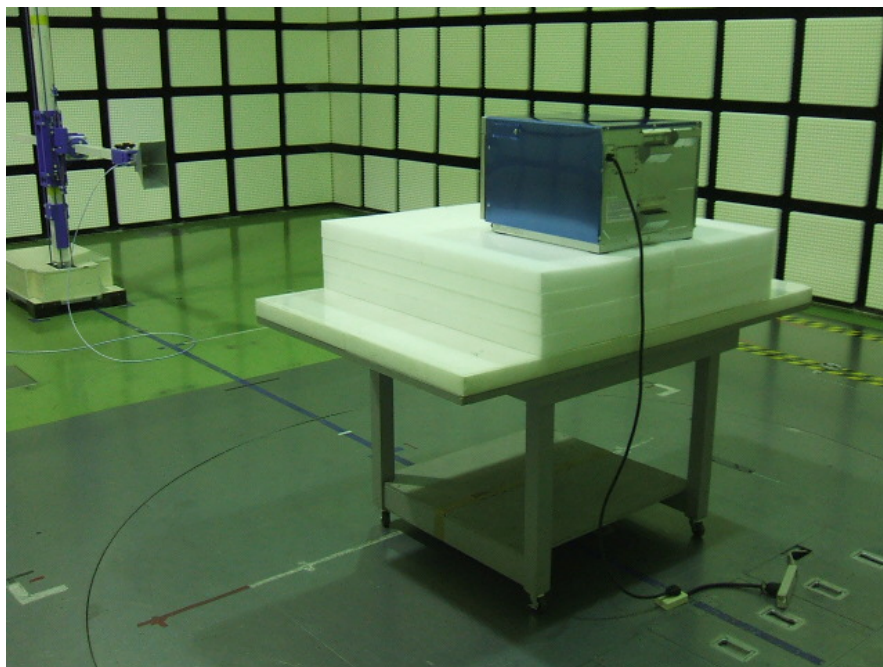


Photo 2