


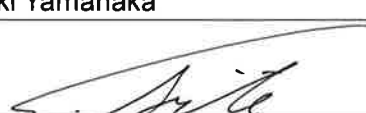

EMC Test Report



Test report file No. : S18031-F **Date of issue:** 16 October, 2018
Type : Commercial Microwave Oven
Model : NE-SCV2N
Serial No. : ES-006
EUT received : 21 August, 2018
Applicant : Panasonic Appliance Company of America
 Kitchen Appliances Certification Liaison
Address : 1701 Golf Road Suite 3-106, Rolling Meadows, IL 60008
Manufacturer : Panasonic Corporation Appliances Company
 Kitchen Appliances Business Division
Address : 2-3-1-3 Noji-higashi, Kusatsu City, Shiga 525-0058, Japan

Test results according to the **Compliance** **Non-compliance** standard(s) at page 4 :

This test report with appendix consists of 27 pages.
 This test result only responds to the tested sample.
 It is not allowed to copy this test report even partly without the allowance of the test laboratory.

	Title	Signer
Tested by :	Test engineer	 Masaki Yamanaka
Reviewed :	Manager, Quality System Representative and Responsible engineer	 Satoshi Arita
Approved by :	Laboratory Director, EMC Test Laboratory	 Ryoji Watanabe

DIRECTORY

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This test report contains only the results of a single investigation carried out on the product submitted. It is not a generally valid judgement by the EMC Test Laboratory of Panasonic Corporation Product Analysis Center regarding the properties of similar products taken from current production. It does not apply to all the EMC Test Laboratory of Panasonic Corporation Product Analysis Center specifications applicable to the tested products.

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1.0 ENGINEERING TEST REPORT

This is to certify that the Commercial Microwave Oven/Model NE-SCV2N, from which the following data has been derived properly complies with the requirements of "FCC Rules and Regulations Part 18 Subpart C" as of the date the measurements were made. Any modification to the unit as tested may invalidate the data and void this certification.

- 1) Applicant : Panasonic Appliance Company of America
Kitchen Appliances Certification Liaison

Address : 1701 Golf Road Suite 3-106, Rolling Meadows, IL 60008

- 2) Manufacturer: Panasonic Corporation Appliances Company
Kitchen Appliances Business Division

Address : 2-3-1-3 Noji-higashi, Kusatsu City, Shiga 525-0058, Japan

- 3) Description of Appliance
 - a. Name of Appliance : Commercial Microwave Oven
 - b. Equipment authorization : Certification
 - c. FCC ID. : ACLAP3G81
 - d. Model No. : NE-SCV2N
 - e. Serial No. : ES-006
 - f. Date of Manufacture : August 2018
 - g. Oscillating Frequency : Microcomputer AU: 20 MHz
Microcomputer BU: 32 MHz
Microcomputer FU: 24 MHz
SMPS (for 12 V): 100 kHz
SMPS (for 24 V): 60 kHz and 130 kHz
DC/DC Converter: 350 kHz
Inverter: 20 kHz to 50 kHz
 - h. Operating Frequency : 2450 MHz
 - i. Highest Frequency : 2450 MHz
 - j. Power Supply : 208 V, 240 V AC 60Hz

- 4) Measurement Site : EMC Test Laboratory, Product Analysis Center,
Panasonic Corporation

- 5) Date of Measurement : August 22 to September 28, 2018

- 6) Summary of Measurement Results
 - a. Radiated Emission : minimum Limit Margin 30.80 $\mu\text{V}/\text{m}$ (Ave.)
at 4916.00 MHz
 - b. Safety Check of Leakage : minimum Limit Margin 0.98 mW/cm^2

These test results are traceable to the National and International Standards.

Measurement Uncertainty, at time of test, and at least 95 % confidence, was estimated to be as follows:

Radiated Emission Measurement (9 kHz to 30 MHz)	:	2.31 dB
Radiated Emission Measurement (30 MHz to 1 GHz)	:	4.58 dB
Radiated Emission Measurement (1 GHz to 26.5 GHz)	:	4.80 dB

2.0 INTRODUCTION

2.1 Test Standard(s)

The tests were performed according to the following standard(s):

- FCC Rules and Regulations Part 18 Subpart C - Technical Standards
- FCC / OST MP-5 (1986) - Test Procedure.

Deviations from, additions to the test method from the standard: No deviation

2.2 Purpose

The purpose of this report is to show compliance of the Commercial Microwave Oven/Model NE-SCV2N to the requirement of Part 18 of the FCC Rules and Regulations (47 CFR, PART 18, Subpart C).

2.3 Requirement

The test requirements are as follows.

Radiation Hazard Test

Safety Check for Radiation Hazard.

Radiation leakage should be measured in accordance with the current Bureau of Radiological Health standard.

Applicable limit for this product is 1.0 mW/cm².

Field strength limits (FCC Part 18, 18.305)

The measured output power was found to be less than 500 W (see 6.3). Therefore, in accordance with Section 18.305 of Subpart C, the measured out-of-band emissions were compared with the limit calculated as following:

$$\text{LFS} = 25 * \text{SQRT} (\text{RF Power Output [W]}/500)$$

$$\text{LFS} = 25 * \text{SQRT} (1065.45 / 500)$$

$$\text{LFS} \doteq 36.49 \text{ } \mu\text{V}/\text{m}$$

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

Limit @300 m [$\mu\text{V}/\text{m}$]	Limit @300 m [$\text{dB}\mu\text{V}/\text{m}$]	Limit @3 m [$\text{dB}\mu\text{V}/\text{m}$]
36.49	31.24	71.24

Power output measurement for micro wave oven (OST MP-5, Sec. 4.3)

The power output is measured by the calorimetric method, using the load specified in Section 4.1(MP-5), computing the power output from the observed temperature rise of the load over a period of time. The measured value of power output is used to determine the allowable out-of-band field strength under the terms specified in Section 18.305 of the Rules.

The AC power input to the oven is also measured to determine if the oven is operating in accordance with the manufacture's specifications.

Frequency measurements (OST MP-5, Sec. 4.5)

Measurements are made of:

(a) The variation of frequency with time, using the load specified in Section 4.1 (OST MP-5), starting with the EUT and load at room temperature and continuing until the load quantity has been reduced by evaporation to approximately 20% of the original quantity.
This test is made with nominal rated AC supply voltage.

(b) The variation of frequency for line voltage variation from 80 % to 125 % of nominal rated voltage, starting with the EUT warm from at least 10 minutes use, with a load as specified in Section 4.1 (OST MP-5), and with this load at room temperature at the beginning of the test.

2.4 Short Description of the EUT

This EUT is microwave oven.

- a. Type of Equipment : Commercial Microwave Oven
- b. Model No. : NE-SCV2N
- c. Serial No. : ES-006
- d. Rating : AC 208/240V, 60Hz RF Power Output 1200W (by IEC 60705)
- e. Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
- f. Type of Magnetron : 2M216-M32
- g. Operating Frequency : 2450MHz \pm 50MHz
- h. Door Seal Type : Choke
- i. Employed mode : Rotating antenna

2.5 Equipment Under Test

Operation - mode of the E.U.T.:

The equipment under test was operated during the measurement under following conditions:
"High Power mode (P8)"

- Set up : EUT is used on a table, no any special shelf or support.
- Load : Required quantity, Specified OST MP-5 of tap water with a glass beaker is used as load depend to the output wattage.

2.6 Environmental Conditions

This test effort was performed August 22 to September 28, 2018.

- Temperature : 20 – 23 °C
- Humidity : 50 – 73 %
- Barometer : 991 – 1003 hPa

3.0 TEST SITE DESCRIPTION

This testing was performed at:

Laboratory Name : Panasonic Corporation Product Analysis Center EMC Test Laboratory
Corporation : Panasonic Corporation
JAB Code : RTL02730
Sasayama Site
Address : 231-1, Yashiro Sasayama-shi Hyogo 669-2356 JAPAN
TEL : +81(79) 552-5681
FAX : +81(79) 552-5682
E-mail : watanabe.ryoji@jp.panasonic.com

4.0 TEST INSTRUMENTATION

Table 4-1 Test equipment list used to perform the radiated emissions (electric field 9 kHz to 30 MHz)

Device	Model No.	Serial. No.	Reg. No.	Freq. range	Last Cal.	Next Cal.
EMI test receiver	Agilent Technologies N9038A	MY51210144	RCV1001	9 kHz - 26.5 GHz	11 November, 2017	30 November, 2018
Loop antenna	Rohde & Schwarz HFH2-Z2	871398/33	ANT0851	9 kHz - 30 MHz	5 September, 2018	30 September, 2019

Device	Model No.	Version	Reg. No.
Software	VITEC Co., Ltd. EMI96	E26	S-SW003-1

Table 4-2 Test equipment list used to perform the radiated emissions (electric field 30 MHz to 1 GHz).

Device	Model No.	Serial. No.	Reg. No.	Freq. range	Last Cal.	Next Cal.
EMI test receiver	Agilent Technologies N9038A	MY51210144	RCV1001	9 kHz - 26.5 GHz	11 November, 2017	30 November, 2018
Biconical antenna	Schwarzbeck VHA 9103 & BBA 9106	None.	ANT0329	30 MHz - 300 MHz	16 August, 2017	31 August, 2018
Logperiodic antenna	Schwarzbeck UHALP 9108-A	0314	ANT507-02	300 MHz - 1 GHz	16 August, 2017	31 August, 2018
Preamplifier	HEWLETT PACKARD 8447D	2944A09851	AMP1002	100 kHz - 1 GHz	11 May, 2018	31 May, 2020

Device	Model No.	Version	Reg. No.
Software	VITEC Co., Ltd. EMI96	E26	S-SW003-1

Table 4-3 Test equipment list used to perform the radiated emissions (electric field 1 GHz to 26.5 GHz).

Device	Model No.	Serial. No.	Reg. No.	Freq. range	Last Cal.	Next Cal.
EMI test receiver	Agilent Technologies N9038A	MY51210144	RCV1001	9 kHz - 26.5 GHz	11 November, 2017	30 November, 2018
Horn antenna	Schwarzbeck BBHA 9120D	9120D-938	ANT1006	1 GHz - 18 GHz	19 February, 2018	28 February, 2019
Preamplifier	HEWLETT PACKARD 8449B	3008A01410	AMP1003	1 GHz - 18 GHz	18 May, 2018	31 May, 2020
Horn antenna	Schwarzbeck HAP06-18A	-	ANT5059	6 GHz - 18 GHz	4 July 2018	31 July 2019
Preamplifier	TOYO Corporation HAP06-18A (Preamplifier)	-	AMP5032	6 GHz - 18 GHz	4 July 2018	31 July 2019
Horn antenna	ETS-LINDGREN 3116C	00200182	ANT1010	15 GHz - 40 GHz	22 December, 2017	31 December, 2018
Preamplifier	L3 Narda-MITEQ JS44-18004000-45-8P	8293293	AMP1010	15 GHz - 40 GHz	22 December, 2017	31 December, 2018

Device	Model No.	Version	Reg. No.
Software	VITEC Co., Ltd. EMI96	E26	S-SW003-1

Table 4-4 Test equipment list used to perform the Radiation Hazard Measurement.

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

Model No.	Serial. No.	Reg. No.	Last Cal.	Next Cal.
Holiday HI-1710A	00118296(Meter) 00102710(Probe)	H70028-KAH	March, 2018	March, 2019

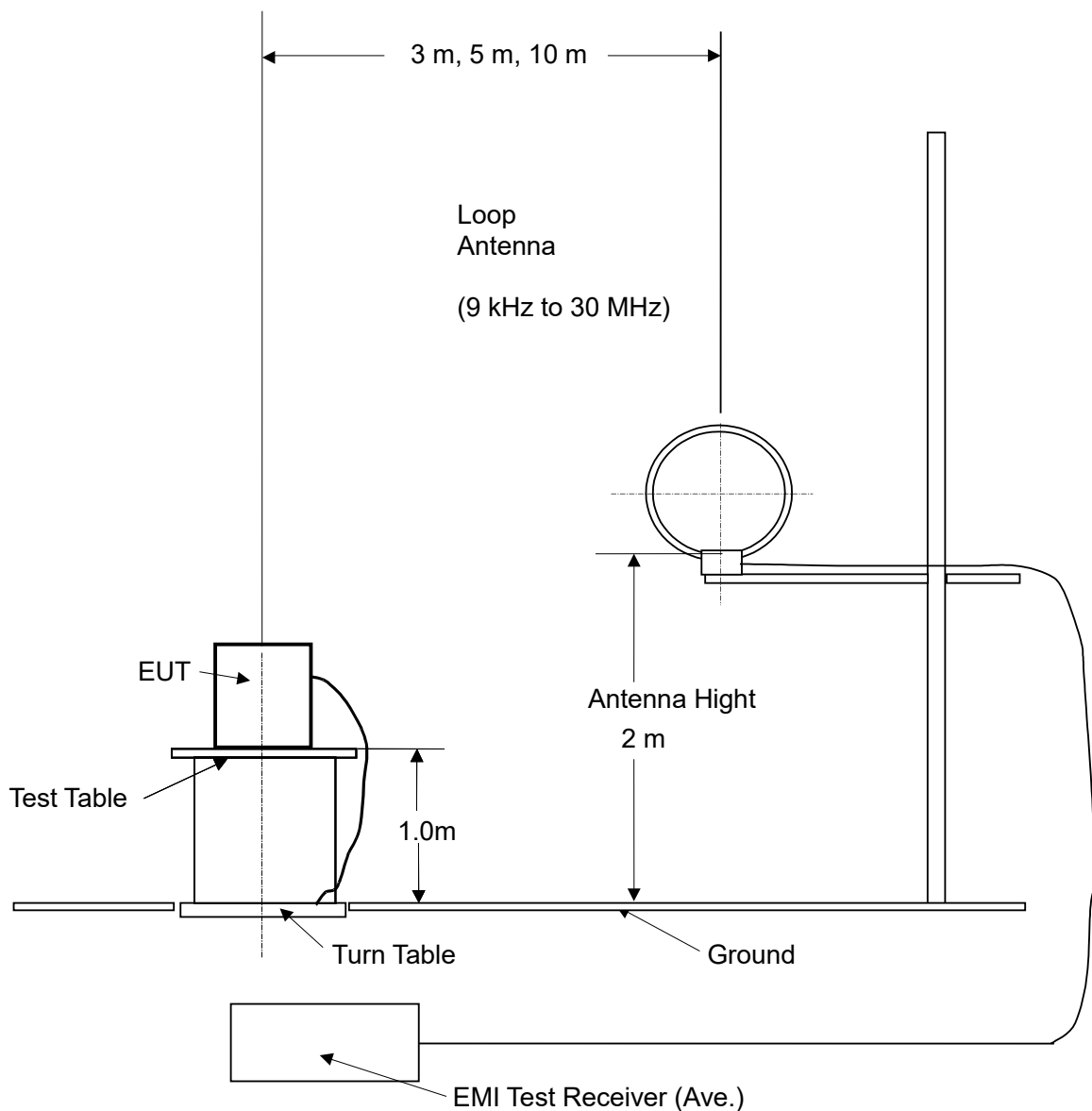
5.0 TEST EUT SETUP AND CONFIGURATIONS

5.1 Radiated

The EUT was placed on a 1.0 m height nonconductive turn table along with the peripherals. The turn table was separated from the antenna distance 3 meters (30 MHz to 1 GHz, 1 GHz to 26.5 GHz), 3 to 10 meters (9 kHz to 30 MHz). Cables for peripherals were placed in a position to produce maximum emissions as determined by experimentation, and operation mode was selected for maximum emission.

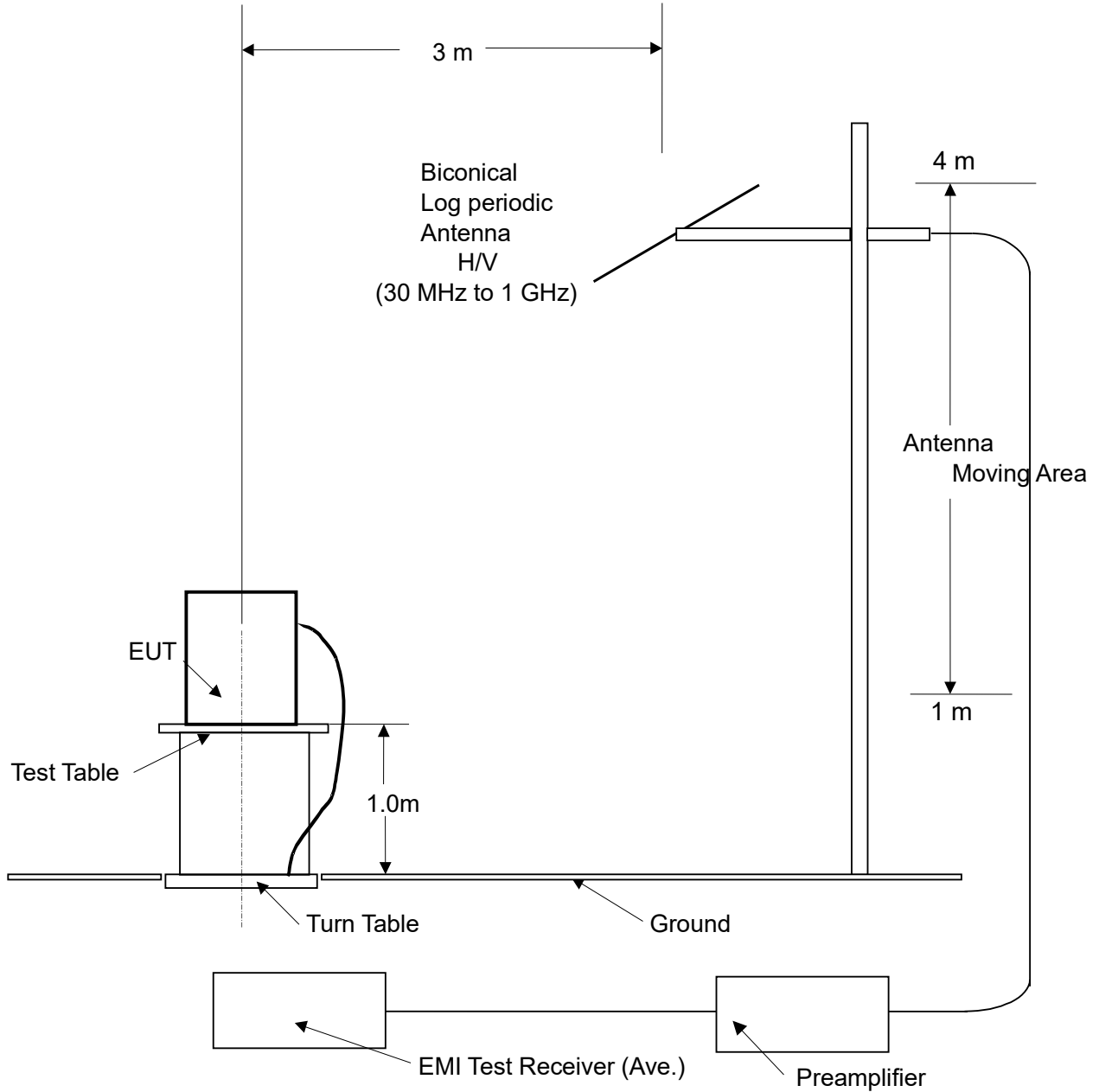
Radiated Emissions (9 kHz to 30 MHz)

- Measurement Methods and test Procedure: FCC / OST MP-5 (1986)
- Classification of EUT: FCC Part 18, Subpart C
- Test Arrangement



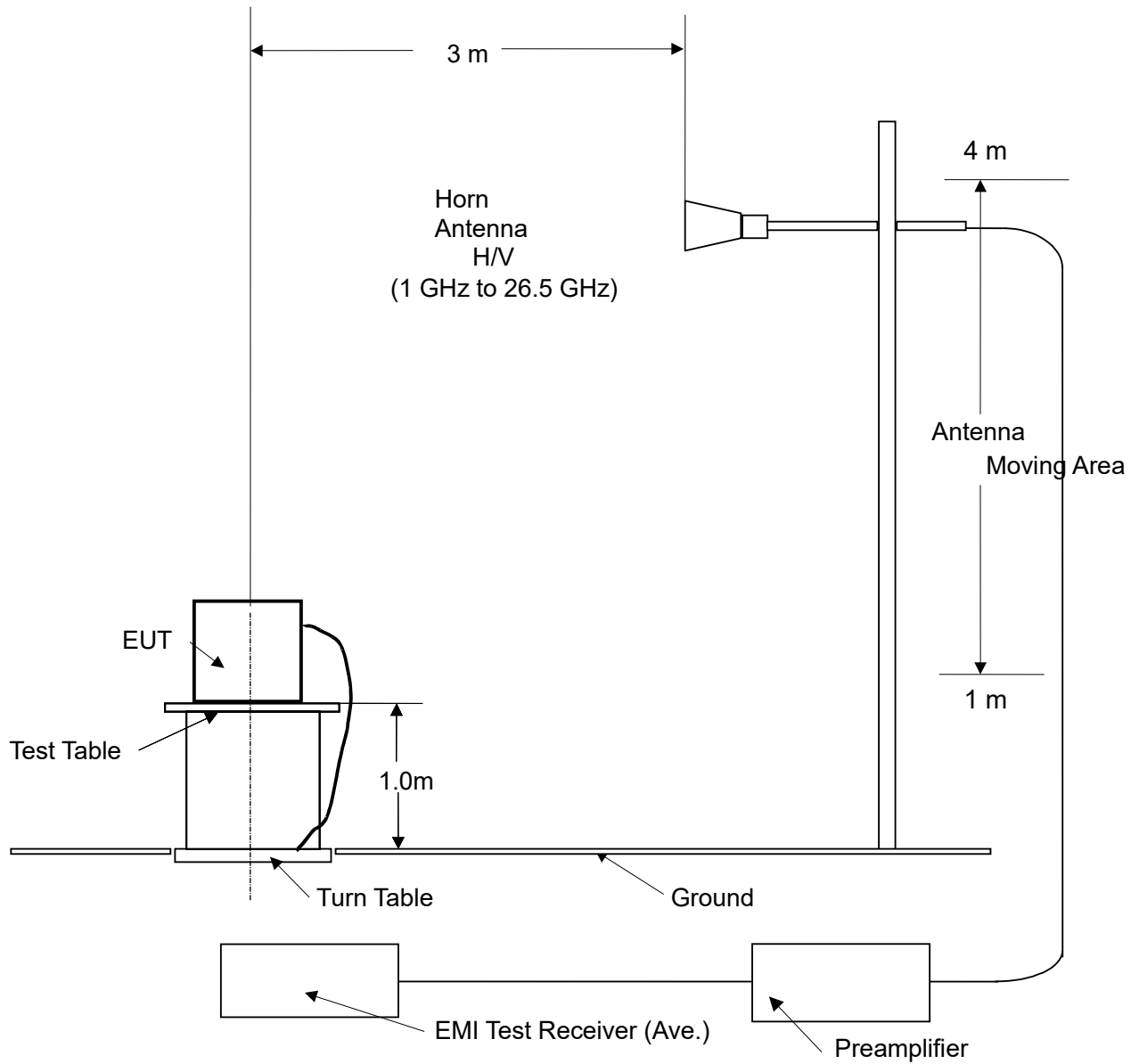
Radiated Emissions (30 MHz to 1 GHz)

- a. Measurement Methods and test Procedure : FCC / OST MP-5 (1986)
- b. Classification of EUT: FCC Part 18, Subpart C
- c. Test Arrangement



Radiated Emissions (1 GHz to 26.5 GHz)

- a. Measurement Methods and test Procedure FCC / OST MP-5 (1986)
- b. Classification of EUT: FCC Part 18, Subpart C
- c. Test Arrangement



5.2 Test System Details

Modification of the EUT: The test laboratory did not modify the EUT during the test.

Following peripheral devices and interface cables were connected during the measurement:

< EUT >

No.	Device	Model	Serial No.	Manufacturer	Date of manufacture	EUT condition
A	Commercial Microwave Oven	NE-SCV2N	ES-006	Panasonic	August, 2018	Pre

[Pre] = Pre Production, [Pro] = Production

No.	Device	Equipment authorization	FCC ID
A	Commercial Microwave Oven	Certification	ACLAP3G81

5.2.1 Type of Interface Cables

No.	Name of cable	Cable type	Pin	Length (m)	Shielded	Ferrite quantity	Ground line
	Manufacturer / Type						
1	AC Power Cable for EUT	a	3	1.5	Unshielded	None.	Yes
	TA HSHIG / SJTOW						

Note :

-Explanation of the abbreviations of the cable type and ferrite is shown in the table titled “characters of the cable type and ferrite”.

< Details of ports >

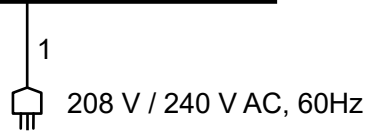
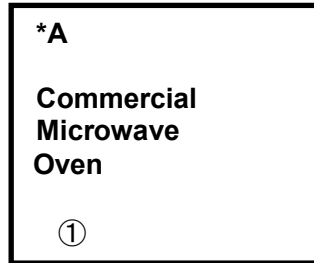
No.	Name of port	Connection	Status of lines	Analog / Digital	Remarks
①	AC IN	EUT / AC	passive	Analog	-

Note:

-The status of lines shows direction of signals on the EUT; “active“ is “OUT” and “passive“ is “IN”.

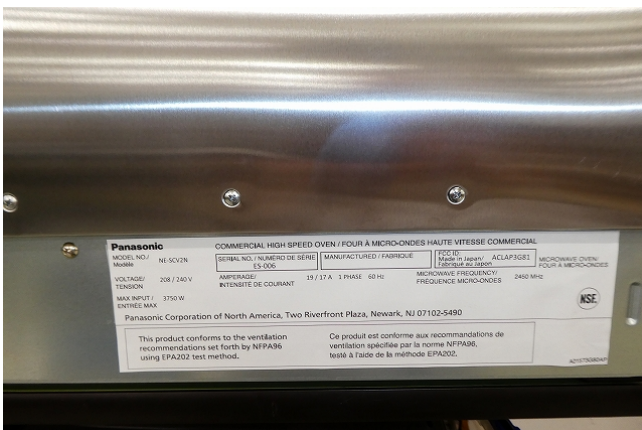
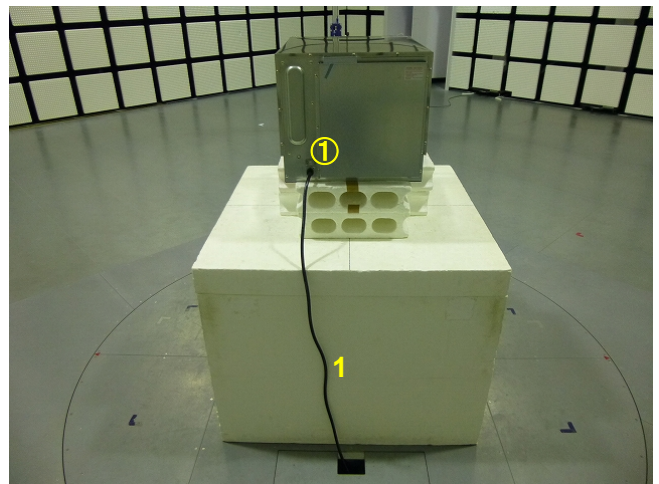
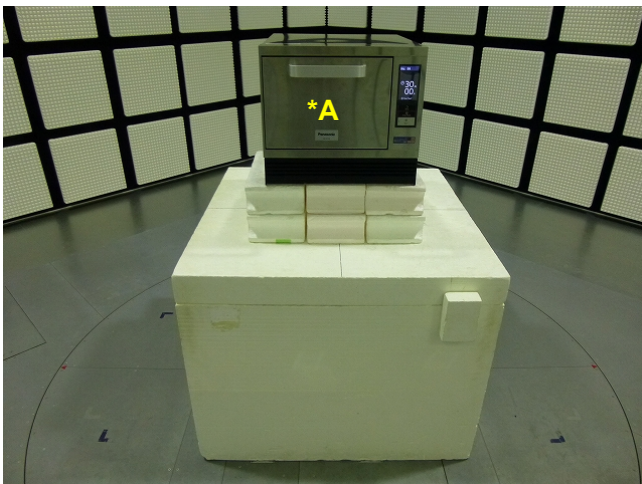
5.2.2 Configuration and Blockdiagram

Terntable is the course of the angle 0 deg. from antenna side



***: EUT**

■: Ferrite



6.0 TEST PROCEDURES AND RESULTS

6.1 Safety Check

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

Test Equipment use: Table 4-4 in this report.

A 1500 ml 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 0.016 mW/cm² observed at any point 5 cm or more from the external surface of the oven.

A maximum of 1.0 mW/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.

6.2 Radiated Field Strength

6.2.1 Test Data (9 kHz to 30 MHz)

Test Equipment use: Table 4-1 in this report.

Test Condition of Instrument

Resolution Bandwidth : 200 Hz (9 kHz to 150 kHz)
9 kHz (150 kHz to 30 MHz)

EUT Warm-up Time: 30 minutes

Date: September 28, 2018

Detector Function : Average
Test Mode : High Power mode (P8)

Test Voltage : 208 V / 60Hz
Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq. [MHz]	Factor [dB]	Result [dB μ V/m]			Emission Level [dB μ V/m]			Emission Level at 300 m [dB μ V/m]	Emission Level at 300 m [μ V/m]	Limit at 300 m [μ V/m]	Margin at 300 m [μ V/m]	Margin at 300 m [dB]	Angle [deg.]
			3 m	5 m	10 m	3 m	5 m	10 m						
Hori.	0.027	20.6	77.0	61.9	41.0	97.6	82.5	61.6	-40.1	0.01	36.49	36.48	71.3	272
Hori.	0.039	20.2	80.1	66.5	46.9	100.3	86.7	67.2	-26.3	0.05	36.49	36.44	57.5	272
Hori.	0.054	20.0	62.5	48.8	29.0	82.5	68.8	49.0	-45.7	0.01	36.49	36.48	76.9	272
Hori.	0.077	19.9	63.6	53.5	31.3	83.5	73.4	51.2	-40.1	0.01	36.49	36.48	71.3	272
Hori.	0.116	19.8	51.0	37.8	16.3	70.8	57.6	36.1	-61.9	0.00	36.49	36.49	93.1	272
Hori.	0.157	19.8	55.1	44.1	30.9	74.9	63.9	50.7	-17.7	0.13	36.49	36.36	48.9	272
135	0.026	20.6	74.0	64.5	48.7	94.6	85.1	69.3	-2.2	0.78	36.49	35.71	33.4	270
135	0.039	20.2	79.7	70.8	53.8	99.9	91.0	74.0	0.8	1.10	36.49	35.39	30.4	270
135	0.054	20.0	60.6	50.9	36.8	80.6	70.9	56.8	-10.4	0.30	36.49	36.19	41.6	270
135	0.078	19.9	63.7	57.5	39.5	83.6	77.4	59.4	-9.0	0.35	36.49	36.14	40.2	270
135	0.117	19.8	46.6	39.4	25.5	66.4	59.2	45.3	-14.3	0.19	36.49	36.30	45.5	270
135	0.155	19.8	53.3	46.0	32.9	73.1	65.8	52.7	-5.0	0.56	36.49	35.93	36.2	270
90	0.027	20.6	75.5	63.3	50.8	96.1	83.9	71.4	1.6	1.20	36.49	35.29	29.6	276
90	0.039	20.2	75.7	69.5	54.1	95.9	89.7	74.3	13.3	4.62	36.49	31.87	17.9	276
90	0.054	20.0	61.7	49.1	37.0	81.7	69.1	57.0	-12.8	0.23	36.49	36.26	44.0	276
90	0.079	19.9	61.6	55.7	40.1	81.5	75.6	60.0	-0.8	0.91	36.49	35.58	32.0	276
90	0.117	19.8	49.6	39.8	24.3	66.7	59.6	44.1	-19.8	0.10	36.49	36.39	51.0	276
90	0.159	19.8	51.9	45.4	33.9	71.7	65.2	53.7	2.8	1.38	36.49	35.11	28.4	276
45	0.027	20.6	74.3	65.3	48.6	94.9	85.9	69.2	-3.4	0.68	36.49	35.81	34.6	274
45	0.038	20.2	76.2	69.6	53.1	96.5	89.8	73.3	7.8	2.45	36.49	34.04	23.4	274
45	0.054	20.0	60.9	52.3	35.8	80.9	72.3	55.8	-15.1	0.18	36.49	36.31	46.3	274
45	0.078	19.9	61.2	54.8	41.2	81.1	74.7	61.1	4.6	1.70	36.49	34.79	26.6	274
45	0.116	19.8	49.0	39.0	22.6	68.8	58.8	42.4	-32.2	0.02	36.49	36.47	63.4	274
45	0.152	19.8	54.8	47.0	32.7	74.6	66.8	52.5	-10.0	0.32	36.49	36.17	41.2	274
0	0.027	20.6	73.0	66.6	50.2	93.6	87.2	70.8	6.4	2.09	36.49	34.40	24.8	271
0	0.039	20.2	78.7	71.5	54.9	98.9	91.7	75.1	7.9	2.48	36.49	34.01	23.3	271

0	0.053	20.0	62.6	51.6	36.9	82.6	71.6	56.9	-15.7	0.16	36.49	36.33	46.9	271
0	0.078	19.9	64.5	57.6	40.8	84.4	77.5	60.7	-6.3	0.48	36.49	36.01	37.5	271
0	0.118	19.8	48.7	41.0	25.8	68.5	60.8	45.6	-19.1	0.11	36.49	36.38	50.3	271
0	0.153	19.8	53.3	48.2	33.4	73.1	68.0	53.2	-3.0	0.71	36.49	35.78	34.2	271

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain

Result at 3 m, 5 m, 10 m [dB μ V/m] = Reading + Factor

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

Test Voltage : 240 V / 60Hz
 Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq. [MHz]	Factor [dB]	Result [dB μ V/m]			Emission Level [dB μ V/m]			Emission Level at 300 m [dB μ V/m]	Emission Level at 300 m [μ V/m]	Limit at 300 m [μ V/m]	Margin at 300 m [μ V/m]	Margin at 300 m [dB]	Angle [deg.]
			3 m	5 m	10 m	3 m	5 m	10 m						
Hori.	0.030	20.5	74.5	59.0	39.5	95.0	79.5	60.0	-38.9	0.01	36.49	36.48	70.1	269
Hori.	0.043	20.2	81.7	67.2	44.2	101.9	87.4	64.4	-41.5	0.01	36.49	36.48	72.7	269
Hori.	0.061	20.0	59.4	46.0	25.0	79.4	66.0	45.0	-52.2	0.00	36.49	36.49	83.4	269
Hori.	0.087	19.9	64.7	50.0	28.6	84.6	69.9	48.5	-53.5	0.00	36.49	36.49	84.7	269
Hori.	0.130	19.8	46.3	34.8	13.1	66.1	54.6	32.9	-60.9	0.00	36.49	36.49	92.1	269
Hori.	0.150	19.8	55.2	43.4	30.8	75.0	63.2	50.6	-18.4	0.12	36.49	36.37	49.6	269
135	0.030	20.5	69.6	64.8	49.5	90.1	85.3	70.0	13.2	4.57	36.49	31.92	18.0	270
135	0.043	20.2	77.2	71.9	54.2	97.4	92.1	74.4	9.4	2.95	36.49	33.54	21.8	270
135	0.060	20.0	59.9	50.2	33.6	79.9	70.2	53.6	-20.7	0.09	36.49	36.40	51.9	270
135	0.086	19.9	59.3	53.3	37.4	79.2	73.2	57.3	-4.6	0.59	36.49	35.90	35.8	270
135	0.130	19.8	43.6	37.1	24.2	63.4	56.9	44.0	-10.8	0.29	36.49	36.20	42.0	270
135	0.150	19.8	54.1	45.3	31.7	73.9	65.1	51.5	-11.8	0.26	36.49	36.23	43.0	270
90	0.029	20.5	74.7	63.3	48.3	95.2	83.8	68.8	-5.8	0.51	36.49	35.98	37.0	269
90	0.043	20.2	78.7	38.1	53.1	98.9	88.3	73.3	1.0	1.12	36.49	35.37	30.2	269
90	0.059	20.0	58.5	48.1	34.3	78.5	68.1	54.3	-14.1	0.20	36.49	36.29	45.3	269
90	0.085	19.9	62.3	51.2	37.2	82.2	71.1	57.1	-13.8	0.20	36.49	36.29	45.0	269
90	0.130	19.8	47.4	35.5	23.8	67.2	55.3	43.6	-23.0	0.07	36.49	36.42	54.2	269
90	0.165	19.8	52.2	44.8	32.8	72.0	64.6	52.6	-2.2	0.78	36.49	35.71	33.4	269
45	0.029	20.5	71.0	66.0	50.0	91.5	86.5	70.5	11.2	3.63	36.49	32.86	20.0	269
45	0.043	20.2	76.5	71.3	54.6	96.7	91.5	74.8	12.9	4.42	36.49	32.07	18.3	269
45	0.060	20.0	58.9	50.8	35.2	78.9	70.8	55.2	-11.8	0.26	36.49	36.23	43.0	269
45	0.086	19.9	61.1	53.0	38.9	81.0	72.9	58.8	-3.9	0.64	36.49	35.85	35.1	269
45	0.129	19.8	45.8	39.3	22.2	65.6	59.1	42.0	-24.7	0.06	36.49	36.43	55.9	269
45	0.150	19.8	53.2	47.0	33.8	73.0	66.8	53.6	-1.2	0.87	36.49	35.62	32.4	269
0	0.030	20.5	70.8	65.2	49.3	91.8	85.7	69.8	7.7	2.43	36.49	34.06	23.5	273
0	0.043	20.2	77.8	69.7	55.8	98.0	89.9	76.0	13.8	4.90	36.49	31.59	17.4	273
0	0.059	20.0	59.7	51.6	36.2	79.7	71.6	56.2	-10.2	0.31	36.49	36.18	41.4	273
0	0.085	19.9	57.5	56.0	37.0	77.4	75.9	56.9	-1.1	0.88	36.49	35.61	32.3	273
0	0.128	19.8	48.7	41.7	23.7	68.5	61.5	43.5	-27.1	0.04	36.49	36.45	58.3	273
0	0.155	19.8	54.8	47.9	33.6	74.6	67.7	53.4	-6.5	0.47	36.49	36.02	37.7	273

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m, 5 m, 10 m [dB μ V/m] = Reading + Factor

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

6.2.2 Test Data (30 MHz to 1 GHz)

Test Equipment use: Table 4-2 in this report.

Test Condition of Instrument

Resolution Bandwidth : 120 kHz (30 MHz to 1 GHz)

EUT Warm-up Time: 30 minutes

Date: August 22, 2018

Detector Function : Average

Test Mode : High Power mode (P8)

Test Voltage : 208 V / 60Hz

Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Hori.	36.96	20.9	-5.1	15.8	6.2	0.06	36.49	36.43	55.4	100	254
Hori.	315.00	26.1	-11.1	15.0	5.6	0.06	36.49	36.43	56.2	100	121
Hori.	351.01	21.4	-10.4	11.0	3.5	0.04	36.49	36.45	60.2	100	329
Vert.	34.38	21.9	-4.1	17.8	7.8	0.08	36.49	36.41	53.4	100	214
Vert.	34.75	25.3	-4.2	21.1	11.4	0.11	36.49	36.38	50.1	100	214
Vert.	351.01	31.4	-10.4	21.0	11.2	0.11	36.49	36.38	50.2	100	329
Vert.	360.24	28.0	-10.1	17.9	7.9	0.08	36.49	36.41	53.3	100	11

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain

Result at 3 m [dB μ V/m] = Reading + Factor

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

Test Voltage : 240 V / 60Hz

Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Hori.	37.13	20.1	-5.1	15.0	5.6	0.06	36.49	36.43	56.2	100	274
Hori.	624.52	17.9	-5.8	12.1	4.0	0.04	36.49	36.45	59.1	100	269
Vert.	32.16	18.4	-3.3	15.1	5.7	0.06	36.49	36.43	56.1	100	167
Vert.	624.52	19.7	-5.8	13.9	5.0	0.05	36.49	36.44	57.3	100	191

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain

Result at 3 m [dB μ V/m] = Reading + Factor

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

6.2.3 Test Data (1 GHz to 26.5 GHz)

Test Equipment use: Table 4-3 in this report.

Test Condition of Instrument

Resolution Bandwidth : 1 MHz (1 GHz to 26.5 GHz)

EUT Warm-up Time: 30 minutes

Date: September 28, 2018

Detector Function : Average
 Test Mode : High Power mode (P8)

Test Voltage : 208 V / 60Hz
 Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dBμV]	[dB]	[dBμV/m]	[μV/m]	K	[μV/m]	[μV/m]	[μV/m]	[dB]	[cm]	[deg.]
Hori.	1236.36	11.1	27.2	38.3	82.2	0.0100	0.82	36.49	35.67	32.9	100	86
Hori.	2197.30	12.1	30.2	42.3	130.3	0.0100	1.30	36.49	35.19	28.9	100	285
Hori.	4953.84	47.9	-1.7	46.2	204.2	0.0100	2.04	36.49	34.45	25.0	100	10
Hori.	7039.00	45.7	-9.0	36.7	68.4	0.0100	0.68	36.49	35.81	34.5	100	302
Hori.	14860.80	46.3	-4.5	41.8	123.0	0.0100	1.23	36.49	35.26	29.4	100	71
Hori.	24580.80	39.4	2.0	41.4	117.5	0.0100	1.17	36.49	35.32	29.8	100	336
Vert.	2127.88	14.5	29.5	44.0	158.5	0.0100	1.58	36.49	34.91	27.2	100	48
Vert.	2400.00	21.1	30.0	51.1	358.9	0.0100	3.59	36.49	32.90	20.1	100	154
Vert.	2500.00	15.0	30.0	45.0	177.8	0.0100	1.78	36.49	34.71	26.2	100	225
Vert.	2725.62	12.4	30.3	42.7	136.5	0.0100	1.36	36.49	35.13	28.5	100	328
Vert.	4215.84	38.2	-3.6	34.6	53.7	0.0100	0.54	36.49	35.95	36.6	100	29
Vert.	4914.00	51.0	-1.8	49.2	288.4	0.0100	2.88	36.49	33.61	22.0	100	0
Vert.	7366.80	52.8	-9.3	43.5	149.6	0.0100	1.50	36.49	34.99	27.7	100	157
Vert.	9903.60	57.7	-6.6	51.1	358.9	0.0100	3.59	36.49	32.90	20.1	100	26
Vert.	19813.60	37.3	1.0	38.3	82.2	0.0100	0.82	36.49	35.67	32.9	100	13

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain

Result at 3 m [dBμV/m] = Reading + Factor

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

Test Voltage : 208 V / 60Hz
 Load : 450 ml Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	K	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Hori.	4916.00	56.8	-1.7	55.1	568.9	0.0100	5.69	36.49	30.80	16.1	100	296
Vert.	7370.80	37.5	4.0	41.5	118.9	0.0100	1.19	36.49	35.30	29.7	100	56

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m [dB μ V/m] = Reading + Factor

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

Test Voltage : 208 V / 60Hz
 Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	K	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Vert.	4918.40	42.3	-1.7	40.6	107.2	0.0100	1.07	36.49	35.42	30.6	100	292
Vert.	7372.00	40.2	4.0	44.2	162.2	0.0100	1.62	36.49	34.87	27.0	100	156

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m [dB μ V/m] = Reading + Factor

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

Test Voltage : 208 V / 60Hz
 Load : 450 ml Right Front

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	K	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Vert.	4914.80	47.6	-1.8	45.8	195.0	0.0100	1.95	36.49	34.54	25.4	100	15
Vert.	7362.00	32.2	4.0	36.2	64.6	0.0100	0.65	36.49	35.84	35.0	100	62

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m [dB μ V/m] = Reading + Factor

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

Test Voltage : 240 V / 60Hz
 Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dBμV]	[dB]	[dBμV/m]	[μV/m]	K	[μV/m]	[μV/m]	[μV/m]	[dB]	[cm]	[deg.]
Hori.	1229.32	15.6	27.1	42.7	136.5	0.0100	1.36	36.49	35.13	28.5	100	82
Hori.	14862.00	43.3	-4.5	38.8	87.1	0.0100	0.87	36.49	35.62	32.4	100	49
Hori.	24580.80	38.9	2.0	40.9	110.9	0.0100	1.11	36.49	35.38	30.3	100	106
Vert.	2126.58	13.7	29.5	43.2	144.5	0.0100	1.45	36.49	35.04	28.0	100	45
Vert.	2400.00	19.0	30.0	49.0	281.8	0.0100	2.82	36.49	33.67	22.2	100	358
Vert.	2500.00	19.0	30.0	49.0	281.8	0.0100	2.82	36.49	33.67	22.2	100	56
Vert.	4096.56	34.5	-3.8	30.7	34.3	0.0100	0.34	36.49	36.15	40.5	100	338
Vert.	4214.64	34.5	-3.7	30.8	34.7	0.0100	0.35	36.49	36.14	40.4	100	9
Vert.	4916.16	47.3	-1.8	45.5	188.4	0.0100	1.88	36.49	34.61	25.7	100	25
Vert.	7065.60	49.0	-9.1	39.9	98.9	0.0100	0.99	36.49	35.50	31.3	100	355
Vert.	7372.80	56.2	-9.3	46.9	221.3	0.0100	2.21	36.49	34.28	24.3	100	159
Vert.	9903.60	61.3	-6.6	54.7	543.3	0.0100	5.43	36.49	31.06	16.5	100	9
Vert.	19663.20	37.2	0.9	38.1	80.4	0.0100	0.80	36.49	35.69	33.1	100	357

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain

Result at 3 m [dBμV/m] = Reading + Factor

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

Test Voltage : 240 V / 60Hz
 Load : 450 ml Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	K	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Hori.	4911.60	51.4	-1.8	49.6	302.0	0.0100	3.02	36.49	33.47	21.6	100	311
Hori.	7371.60	39.5	4.0	43.5	149.6	0.0100	1.50	36.49	34.99	27.7	100	296

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m [dB μ V/m] = Reading + Factor

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

Test Voltage : 240 V / 60Hz
 Load : 1050 ml (525 ml + 525 ml) Center

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	K	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Vert.	4917.20	46.7	-1.7	45.0	177.8	0.0100	1.78	36.49	34.71	26.2	100	314
Vert.	7373.20	39.2	4.0	43.2	144.5	0.0100	1.45	36.49	35.04	28.0	100	287

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m [dB μ V/m] = Reading + Factor

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

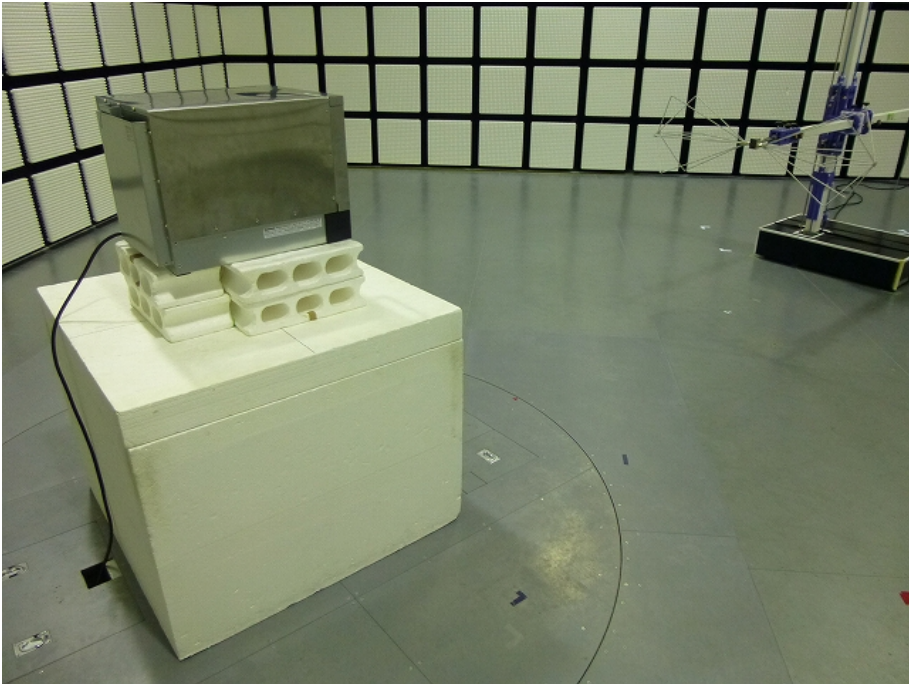
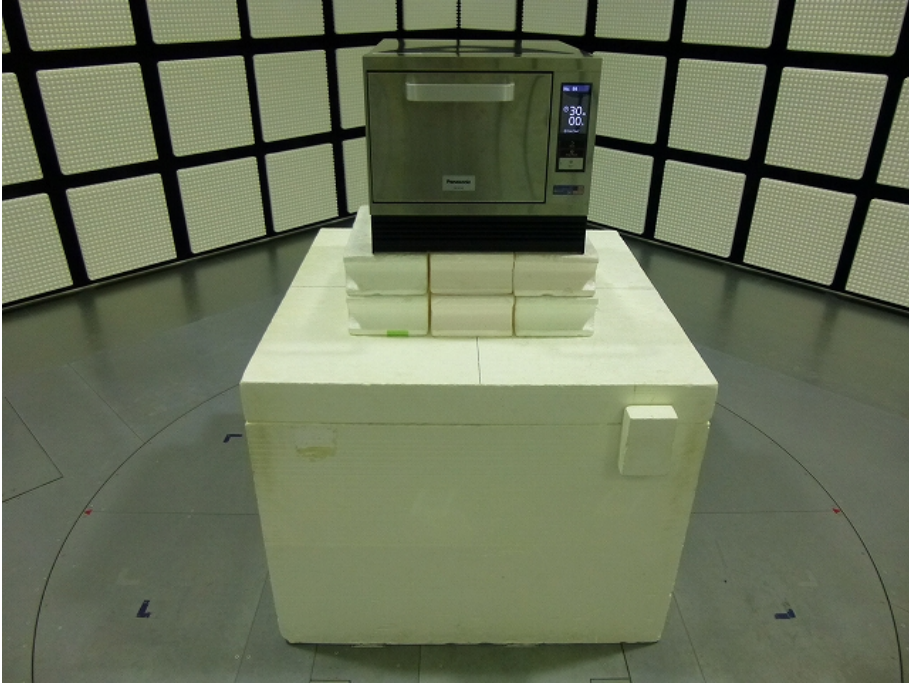
Test Voltage : 240 V / 60Hz
 Load : 450 ml Right Front

Polar.	Freq.	Reading at 3 m	Factor	Result at 3 m	Result at 3 m	Distance Factor	Result at 300 m	Limit at 300 m	Margin at 300 m	Margin at 300 m	Height	Angle
	[MHz]	[dB μ V]	[dB]	[dB μ V/m]	[μ V/m]	K	[μ V/m]	[μ V/m]	[μ V/m]	[dB]	[cm]	[deg.]
Vert.	4917.60	53.5	-1.7	51.8	389.0	0.0100	3.89	36.49	32.60	19.4	100	348
Vert.	7340.80	33.8	4.0	37.8	77.6	0.0100	0.78	36.49	35.71	33.4	100	339

Factor [dB] = Antenna Factor + Cable Loss + Amp. Gain
 Result at 3 m [dB μ V/m] = Reading + Factor

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

6.2.4 Photograph



6.3 Power output measurements (OST MP-5, 4.3)

Input Power

208 V / 60 Hz AC	2481.5 W	(Input Power)
	2240 W	(Rated Input Power at only microwave operation)
240 V / 60 Hz AC	2456.1 W	(Input Power)
	2240 W	(Rated Input Power at only microwave operation)

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 center of oven. The oven was operated at maximum output power for 120 seconds, the temperature of the water was re-measured.

Load [ml]	Time [sec]	Start temp. [°C]	Stop temp. [°C]	Power [W]
1500	120	19.75	40.20	1065.45

$$\text{Power [W]} = 52.1 * (\text{Stop temp.} - \text{Start temp.})$$

6.4 Operating Frequency measurements (OST MP-5, 4.5)

The operating frequency was measured using a spectrum analyzer. Starting with the EUT at room temperature, a 1500 ml water load was placed in the center of the oven was operated at maximum output power. The fundamental operating frequency was monitored until the water load was reduced to 20 % of the original load.

[AC 208 V]

Maximum frequency variation

Variation of frequency with time, using the Load

2460.0 MHz - 2458.8 MHz (1500 ml ~ 300 ml / Load)

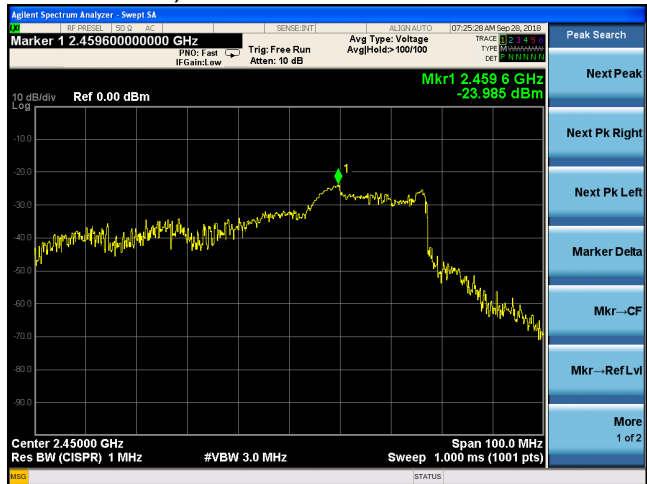
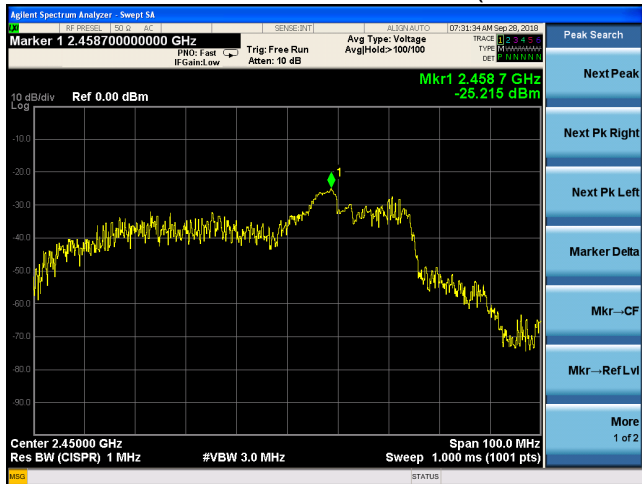


[AC 240 V]

Maximum frequency variation

Variation of frequency with time, using the Load

2458.7 MHz - 2459.6 MHz (1500 ml ~ 300 ml / Load)



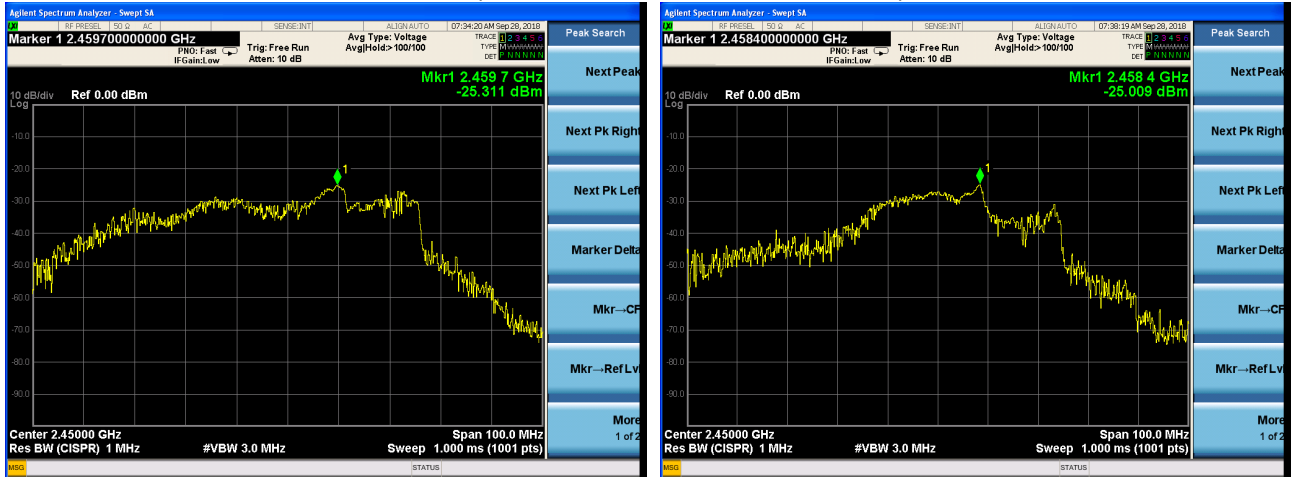
6.5 Variation in Operating Frequency with Line Voltage (OST MP-5, 4.5)

The EUT was operated / warmed by at least 10 minutes of use with a 1500 ml 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 % of the nominal rating.

[AC 208 V]

Variation of frequency for Line Voltage variation

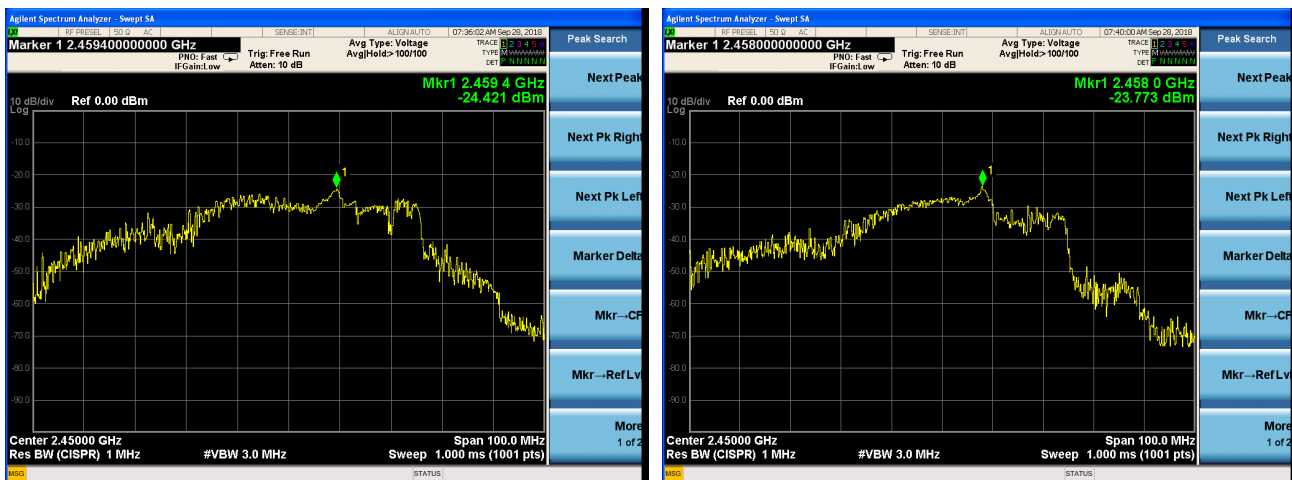
2459.7 MHz - 2458.4 MHz (166 V ~ 260 V / 1500 ml Load)



[AC 240 V]

Variation of frequency for Line Voltage variation

2459.4 MHz - 2458.0 MHz (192 V ~ 300 V / 1500 ml Load)



6.6 Description of calculation

6.6.1 9 kHz to 30 MHz

From the measurement results at 3 m, 5 m, and 10 m, an approximate expression is calculated to obtain electric field intensity at 300 m.

The approximate expression was calculated by Excel.

Example:	Frequency	0.043 MHz,
	Emission Level at 3 m	98.0 dB μ V/m
	Emission Level at 5 m	89.9 dB μ V/m
	Emission Level at 10 m	76.0 dB μ V/m

Approximate expression: $-18.38 * \text{LN}(D[\text{m}]) + 118.66$ (by Excel)

$$\begin{aligned} & \text{Emission Level at 300 m } [\mu\text{V/m}] \\ &= 10^{ \{ (-18.38 * \text{LN}(300) + 118.66) / 20 \} } \\ &= 4.90 \mu\text{V/m} \end{aligned}$$

6.6.2 30 MHz to 1 GHz

Calculation Formula to get field strength at 300 m from the measured at 3 m.

Calculation Formula:

$$\begin{aligned} & \text{Emission Level at 300 m } [\mu\text{V/m}] \\ &= 10^{ \{ (\text{Emission Level at 3 m } [\text{dB}\mu\text{V/m}]) / 20 \} * (3/300)} \end{aligned}$$

Example:	Frequency	34.75 MHz,
	Emission Level at 3 m	21.1 dB μ V/m

$$\begin{aligned} & \text{Emission Level at 300 m } [\mu\text{V/m}] \\ &= 10^{ (21.1 / 20) * (3/300)} \\ &= 0.11 \mu\text{V/m} \end{aligned}$$

6.6.3 1 GHz to 26.5 GHz

Calculation Formula to get field strength at 300 m from the measured at 3 m.

Calculation Formula:

$$\begin{aligned} & \text{Emission Level at 300 m } [\mu\text{V/m}] \\ &= K * 10^{ \{ (\text{Emission Level at 3 m } [\text{dB}\mu\text{V/m}]) / 20 \} } \\ & \quad K: \text{Conversion Factor for 3 m to 300 m} \end{aligned}$$

Example:	Frequency	4916.00 MHz,
	Emission Level at 3 m	55.1 dB μ V/m

$$\begin{aligned} & \text{Emission Level at 300 m } [\mu\text{V/m}] \\ &= 0.01 * 10^{ (55.1 / 20)} \\ &= 5.69 \mu\text{V/m} \end{aligned}$$