



JAPAN QUALITY ASSURANCE ORGANIZATION

21-25, KINUTA 1-CHOME, SETAGAYA-KU, TOKYO 157-8573 JAPAN
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JQA APPLICATION NO.: 400-00003

Issue Date : April 18, 2000

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EMI TEST REPORT

JQA APPLICATION NO. : 400-00003

Model No. : RC-8000

Type of Equipment : Remote Transmitter

Regulations Applied : CFR 47 FCC Rules and Regulations Part 15

FCC ID : GT3CSC001

Applicant : SMK Corporation

Address : 5-5, Togoshi 6-chome, Shinagawa-ku,
Tokyo 142-8511, Japan

Manufacture : SMK Corporation

Address : 5-5, Togoshi 6-chome, Shinagawa-ku,
Tokyo 142-8511, Japan

Received date of EUT : April 3, 2000

Final Judgment : Passed

TEST RESULTS IN THIS REPORT are obtained in use of equipment that is traceable to Electrotechnical Lab. of MITI Japan and Communications Research Lab. of MPT Japan.

The test results only respond to the tested sample. It is not allowed to copy this report even partly without the allowance of the JQA EMC Engineering Dept. Testing Div.

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1 DOCUMENTATION

1.1 TEST REGULATION

FCC Rules and Regulations Part 15 Subpart A and C (June 23, 1989) Intentional Radiators

Test procedure :

AC power line conducted emission, radiated emission, frequency stability and occupied bandwidth tests were performed according to the procedures in ANSI C63.4-1992.

1.2 GENERAL INFORMATION

1.2.1 Test facility :

- 1) Test Facility located at EMC Engineering Dept. Testing Div. : No.2 and 3 Anechoic Chambers(3 meters Site)
FCC filing No. : 31040/SIT 1300F2
- 2) EMC Engineering Dept. Testing Div. is recognized under the National Voluntary Laboratory accreditation Program for satisfactory compliance established in title 15, Part 285 Code of Federal Regulations.
NVLAP Lab Code : 200189-0 (Effective through : June 30, 2000)

1.2.2 Description of the Equipment Under Test (EUT) :

- | | |
|--------------------------------------|---------------------------------------|
| 1) Type of Equipment | : Remote Transmitter |
| 2) Product Type | : Pre-Prototype |
| 3) Category | : Security/Remote Control Transmitter |
| 4) EUT Authorization | : Certification |
| 5) FCC ID | : GT3CSC001 |
| 6) Trade Name | : DENON |
| 7) Model No. | : RC-8000 |
| 8) Operating Frequency Range | : 304.3 MHz to 315 MHz |
| 9) Highest Frequency Used in the EUT | : 315 MHz |
| 10) Serial No. | : None |
| 11) Date of Manufacture | : None |
| 12) Power Rating | : DC 6.0(Battery) |
| 13) EUT Grounding | : None |

1.2.3 Definitions for symbols used in this test report :

- x - indicates that the listed condition, standard or equipment is applicable for this report.
- indicates that the listed condition, standard or equipment is not applicable for this report.

1.3 TEST CONDITION

1.3.1 The measurement of the AC Power Line Conducted Emission

___ - was performed in the following test site.

x - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Testing Div.
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

___ - Shielded Enclosure

___ - Anechoic Chamber No. 2 (portable Type)

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ - Test Receiver	ESH-2	Rohde & Schwarz	880370/016	Sep. 1999	1 Year
___ - Test Receiver	ESH-3	Rohde & Schwarz	881460/035	May 1999	1 Year
___ - Test Receiver	ESH-3	Rohde & Schwarz	881460/030	Jun. 1999	1 Year
___ - LISN(for Peripheral)	KNW-407	Kyoritsu Electrical	8-833-6	Apr. 1999	1 Year
___ - LISN(for EUT)	KNW-407	Kyoritsu Electrical	8-855-2	Apr. 1999	1 Year
___ - LISN	KNW-407	Kyoritsu Electrical	8-757-1	Apr. 1999	1 Year
___ - RF Cable	3D-2W	Fujikura	155-21-005E0	Apr. 1999	1 Year
___ - RF Cable	3D-2W	Fujikura	155-21-006E0	Apr. 1999	1 Year
___ - 50ohm Termination	-	SUHNER	154-06-501E0	Jan. 2000	1 Year
___ - 50ohm Termination	-	SUHNER	154-06-502E0	Jan. 2000	1 Year

1.3.2 The measurement of the Radiated Emission(30 MHz - 1000 MHz)

 x - was performed in the following test site.

 - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Testing Div.
21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

 x - Anechoic Chamber No. 2 (3 meters)

 - Anechoic Chamber No. 3 (3 meters)

Validation of Site Attenuation :

1) Last Confirmed Date :March, 2000

2) Interval :1 year

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> </u> - Test Receiver	ESV	Rohde & Schwarz	872148/039	May 1999	1 Year
<u> </u> - Test Receiver	ESVS10	Rohde & Schwarz	826148/002	Jun. 1999	1 Year
<u> x </u> - Test Receiver	ESVP	Rohde & Schwarz	881487/004	May 1999	1 Year
<u> </u> - Test Receiver	ESVP	Rohde & Schwarz	881487/005	Dec. 1999	1 Year
<u> x </u> - Antenna	KBA-511A	Kyoritsu Electrical	0-170-1	Nov. 1999	1 Year
<u> </u> - Antenna	KBA-511A	Kyoritsu Electrical	0-201-13	Nov. 1999	1 Year
<u> x </u> - Antenna	KBA-611	Kyoritsu Electrical	0-147-14	Nov. 1999	1 Year
<u> </u> - Antenna	KBA-611	Kyoritsu Electrical	0-210-5	Nov. 1999	1 Year
<u> x </u> - RF Cable	5D-2W	Fujikura	155-21-001E0	Feb. 2000	1 Year
<u> </u> - RF Cable	5D-2W	Fujikura	155-21-002E0	Feb. 2000	1 Year

1.3.3 The measurement of the Radiated Emission(Above 1000 MHz) x - was performed in the following test site. - was not applicable.**Test location :**

Safety Testing Center EMC Engineering Dept. Testing Div.
 21-25, Kinuta 1-chome, Setagaya-ku, Tokyo 157-8573, Japan

 x - No. 2 site (3 meters) - No. 3 site (3 meters)**Validation of Site Attenuation :**

1) Last Confirmed Date : N/A

2) Interval : N/A

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> </u> - Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	May 1999	1 Year
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	May 1999	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 1999	1 Year
<u> </u> - RF Pre-selector	85685A	Hewlett Packard	2648A00522	Apr. 1999	1 Year
<u> x </u> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May 1999	1 Year
<u> x </u> - RF Pre-selector	85685A	Hewlett Packard	2091A00933	May 1999	1 Year
<u> x </u> - Log-Periodic Antenna	HL 025	Rohde & Schwarz	340182/015	Nov. 1999	1 Year
<u> </u> - RF Amplifier	DBP-0102N5334272B	DBS Microwave Inc.	012	Jun. 1999	1 Year
<u> x </u> - RF Amplifier	WJ-6882-814	Watkins-Johnson	0414	Jun. 1999	1 Year
<u> </u> - RF Amplifier	WJ-5315-556	Watkins-Johnson	106	Jun. 1999	1 Year
<u> </u> - RF Amplifier	WJ-5320-307	Watkins-Johnson	645	Jun. 1999	1 Year
<u> x </u> - RF Cable(10m)	S 04272B	Suhner	155-21-011E0	May 1999	1 Year
<u> </u> - RF Cable(2m)	SUCOFLEX 104	Suhner	155-21-012E0	May 1999	1 Year
<u> x </u> - RF Cable(1m)	SUCOFLEX 104	Suhner	155-21-013E0	May 1999	1 Year

1.3.4 The measurement of the Frequency Stability☐ - was performed.☒ - was not applicable.**Used test instruments :**

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Frequency Counter	53131A	Hewlett Packard	3546A11807	June 1999	1 Year
☐ - Oven	-	Ohnishi Co. Ltd.	-	Aug. 1999	1 Year
☐ - DC Power Supply	6628A	Hewlett Packard	3224A00284	July 1999	1 Year

1.3.5 The measurement of the Occupied Bandwidth☒ - was performed.☐ - was not applicable.**Used test instruments :**

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
☐ - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 1999	1 Year
☒ - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May 1999	1 Year
☐ - Function Generator	3325A	Hewlett Packard	2512A21776	June 1999	1 Year
☐ - FM Linear Detector	MS61A	Anritsu Corp.	M77486	Sep. 1999	1 Year
☐ - Level Meter	ML422C	Anritsu Corp.	M87571	June 1999	1 Year



1.4 EUT MODIFICATION / Deviation from Standard

1.4.1 EUT MODIFICATION

- ☒ - No modifications were conducted by JQA to achieve compliance to Class B levels.
☐ - To achieve compliance to Class B levels, the following changes were made by JQA during the compliance test.

The modifications will be implemented in all production models of this equipment.

Applicant :

Date :

Typed Name :

Position :

1.4.2 Deviation from Standard:

- ☒ - No deviations from the standard described in clause 1.1.
☐ - The following deviations were employed from the standard described in clause 1.1:



1.5 TEST RESULTS

AC Power Line Conducted Emission

☐ - Applicable ☒ - NOT Applicable

The requirements are

☐ - PASSED ☐ - NOT PASSED

Remarks :

Radiated Emission [§15.231(b)]

☒ - Applicable ☐ - NOT Applicable

The requirements are

☒ - PASSED ☐ - NOT PASSED

Remarks:

Frequency Stability

☐ - Applicable ☒ - NOT Applicable

The requirements are

☐ - PASSED ☐ - NOT PASSED

Remarks:

Occupied Bandwidth [§15.231(c)]

☒ - Applicable ☐ - NOT Applicable

The requirements are

☒ - PASSED ☐ - NOT PASSED

Remarks:

1.6 SUMMARY

General Remarks :

The EUT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and C (June 23, 1989) under the test configuration, as shown in clause 1.7 to 1.10.

The conclusion for the test items of which are required by the applied regulation is indicated under the final judgment.

Final Judgment :

The "as received" sample;

- x - fulfill the test requirements of the regulation mentioned on clause 1.1.
- fulfill the test requirements of the regulation mentioned on clause 1.1, but with certain qualifications.
- doesn't fulfill the test regulation mentioned on clause 1.1.

Begin of testing : April 3, 2000

End of testing : April 3, 2000

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by:

Issued by:



Masaaki Takahashi
Manager
JQA EMC Engineering Dept.



Shigeru Osawa
Assistant Manager
JQA EMC Engineering Dept.

1.7 TEST CONFIGURATION / OPERATION OF EUT

1.7.1 Test Configuration

The equipment under test (EUT) consists of :

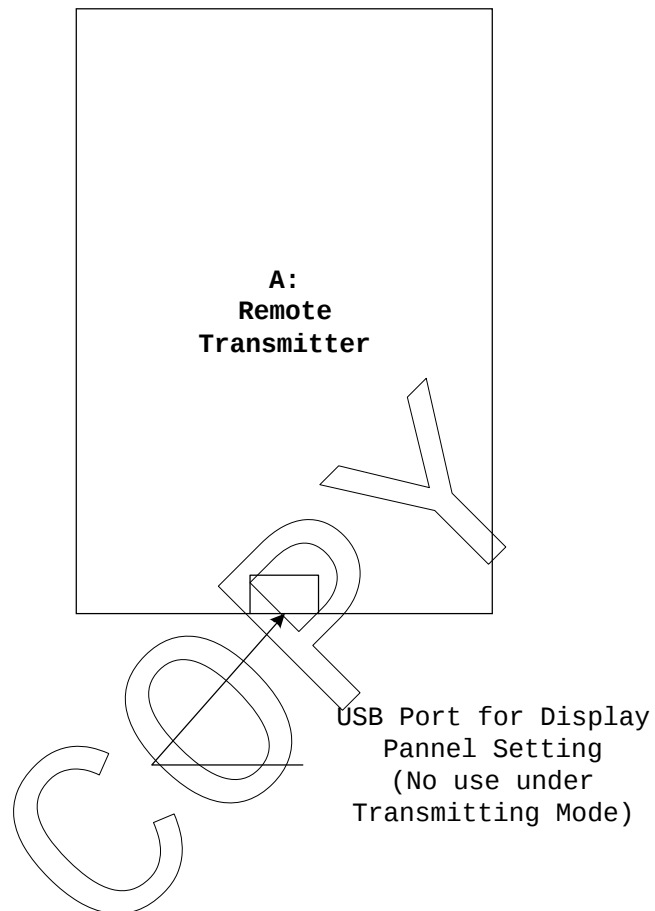
Symbol	Item	Manufacturer	Model No.	FCC ID	Serial No.
A	Remote Transmitter	SMK Corporation	RC-8000	GT3CSC001	None

1.7.2 Operating condition

Power supply Voltage : 6.0 VDC(Battery)

The tests have been carried out under the transmitting condition.

COPY

1.8 EUT ARRANGEMENT (DRAWINGS)

1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

1.9.1 AC Power Line Conducted Emission (450 kHz - 30 MHz) :

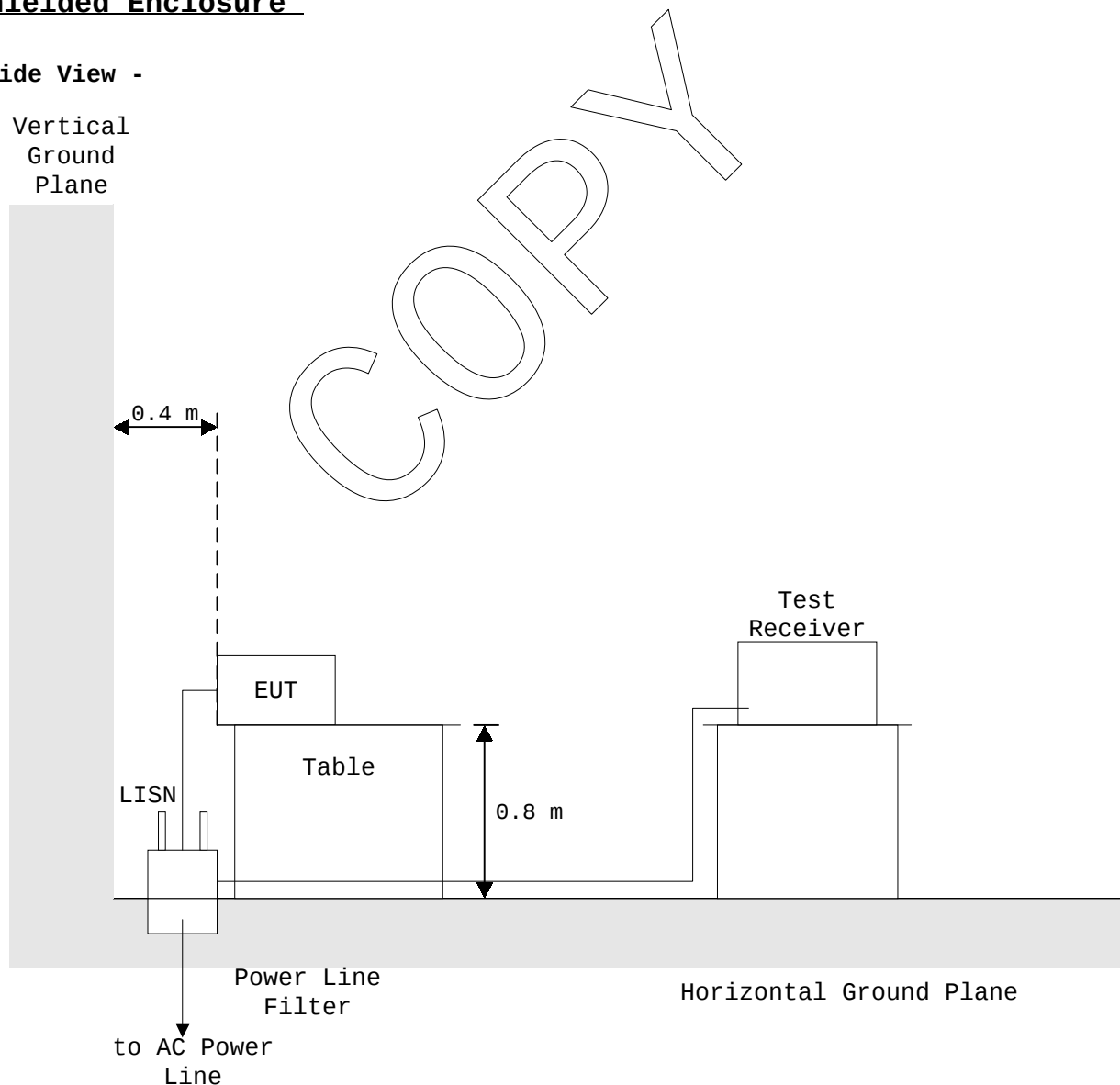
According to description of ANSI C63.4-1992 sec.13.1.3.1, the AC power line preliminary conducted emissions measurements were carried out.

The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for final AC power line conducted emissions measurements.

Shielded Enclosure

- Side View -



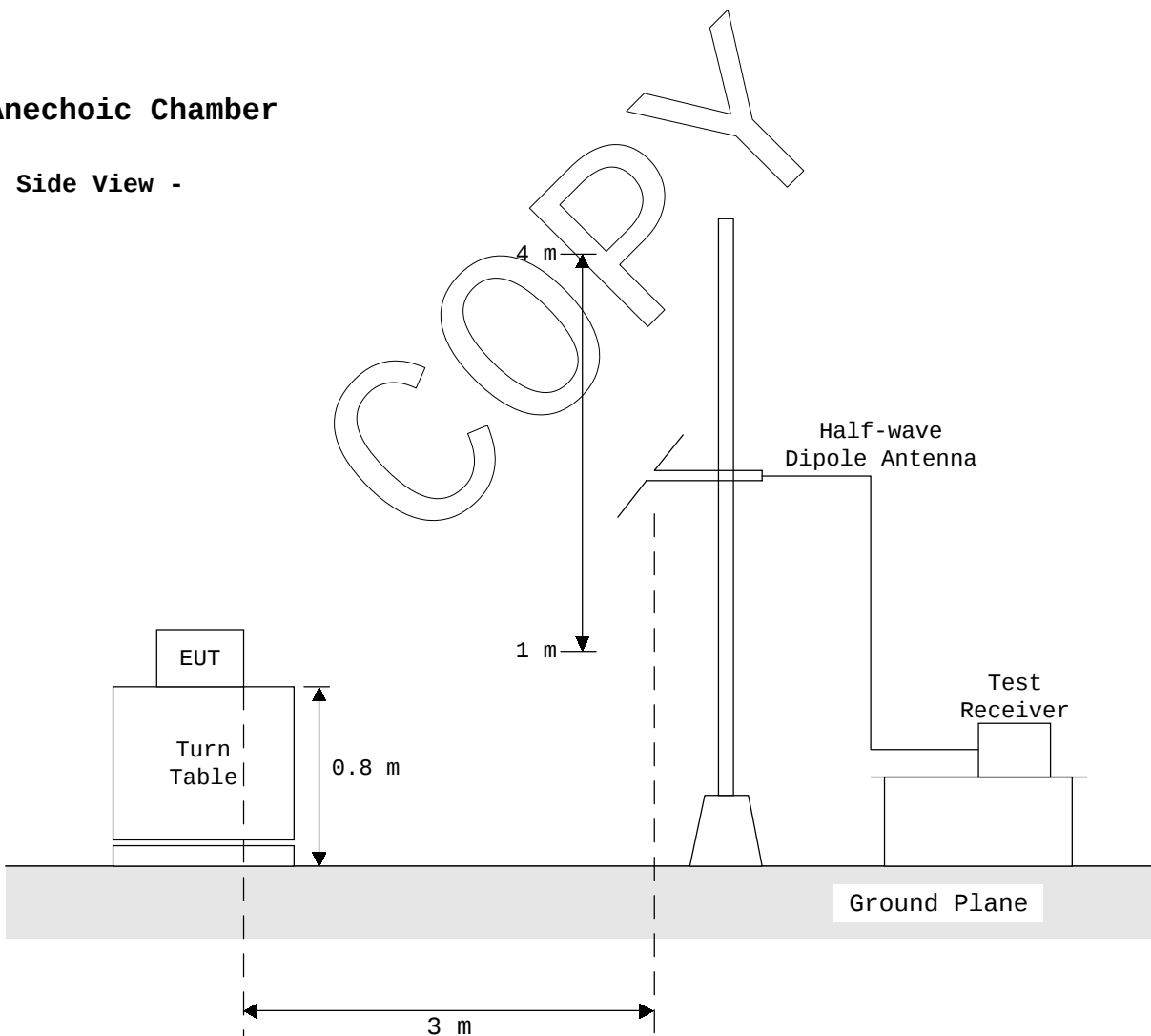
1.9.2 Radiated Emission (30 MHz - 1000 MHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

- Side View -



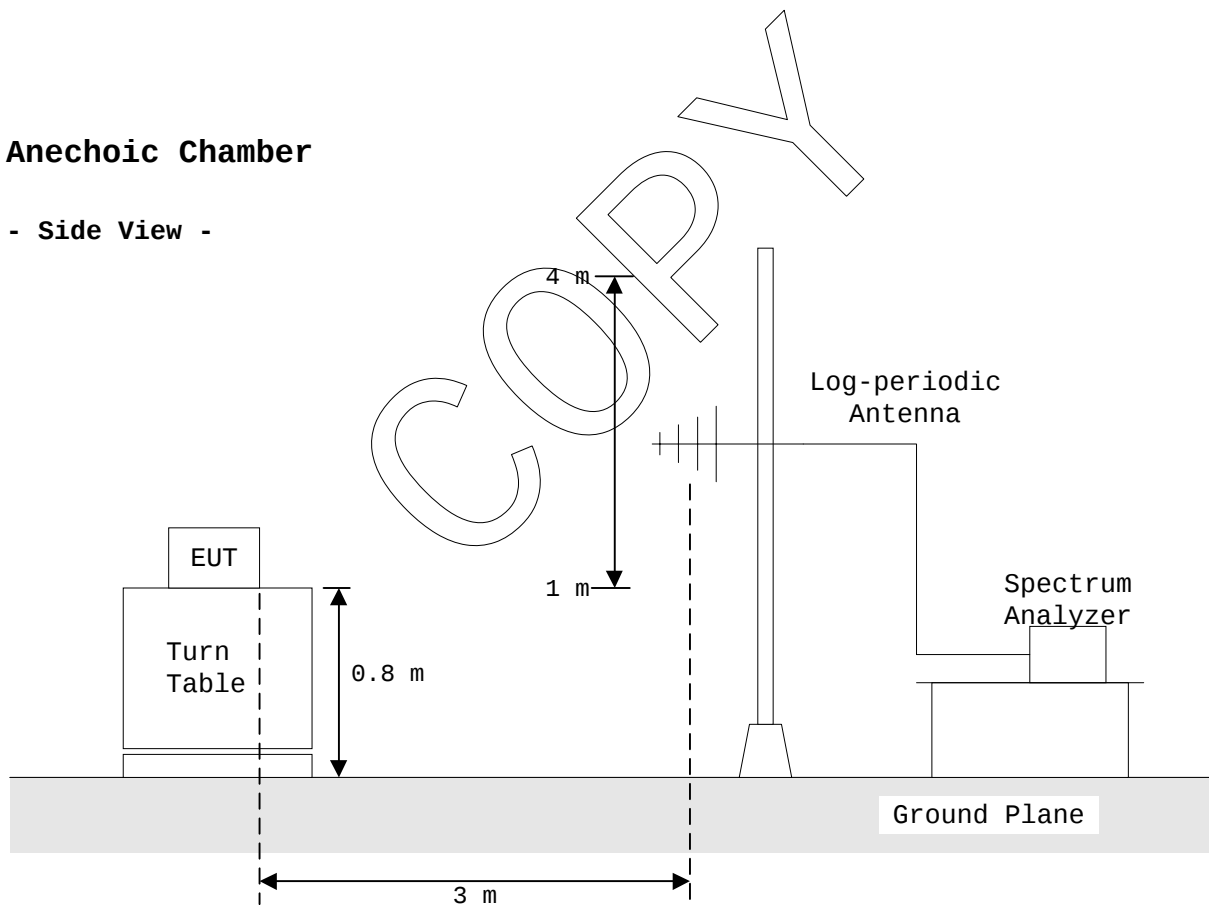
1.9.3 Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4-1992 sec.13.1.4.1, the preliminary radiated emissions measurements were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

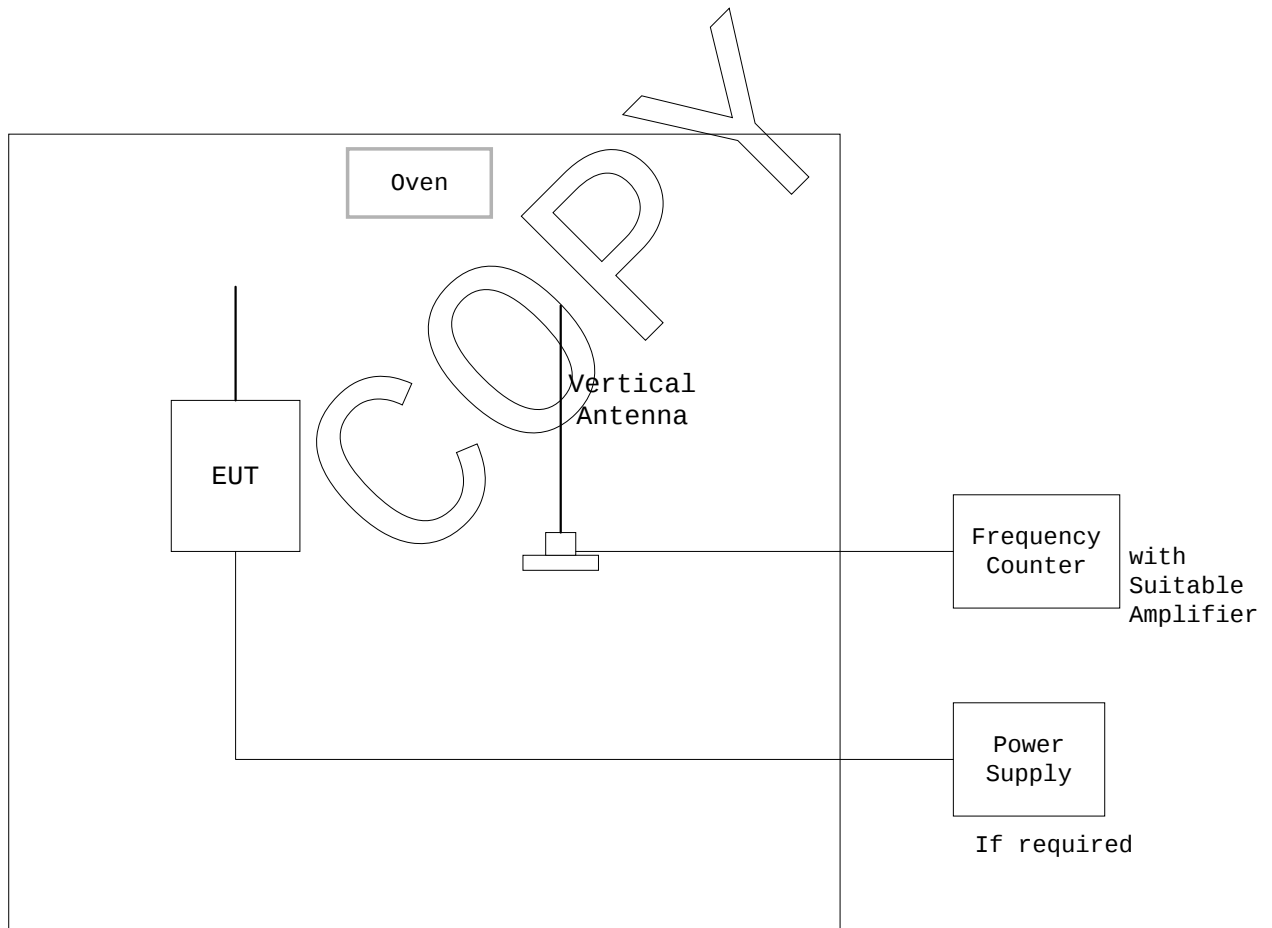
- Side View -



1.9.4 Frequency Stability :

According to description of ANSI C63.4-1992 sec.13.1.5 and sec.13.1.6, the frequency stability measurements were carried out. By using frequency counter with suitable RF amplifier, the carrier frequency of the transmitter under test was measured with a temperature variation of -20°C to $+50^{\circ}\text{C}$ at the normal supply voltage, and if required, with a variation in the primary voltage from 85 % to 115 % the rated supply voltage at the temperature of $+20^{\circ}\text{C}$.

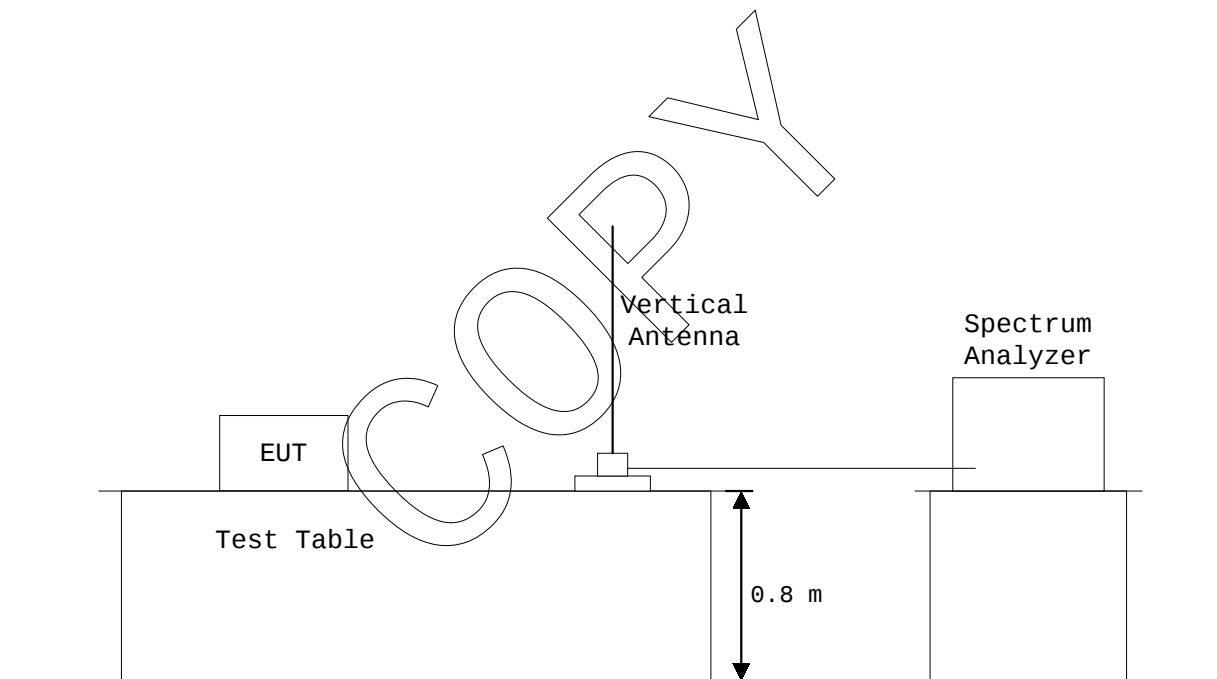
These measurements were carried out after allow sufficient time (approximately 1 hour) for the temperature of the chamber to stabilize.



1.9.5 Occupied Bandwidth :

According to description of ANSI C63.4-1992 sec.13.1.7, the occupied bandwidth measurements were carried out. By using a spectrum analyzer with a vertical antenna for picking up the signal, the measurements of the emission were made under the transmitting modes of the EUT.

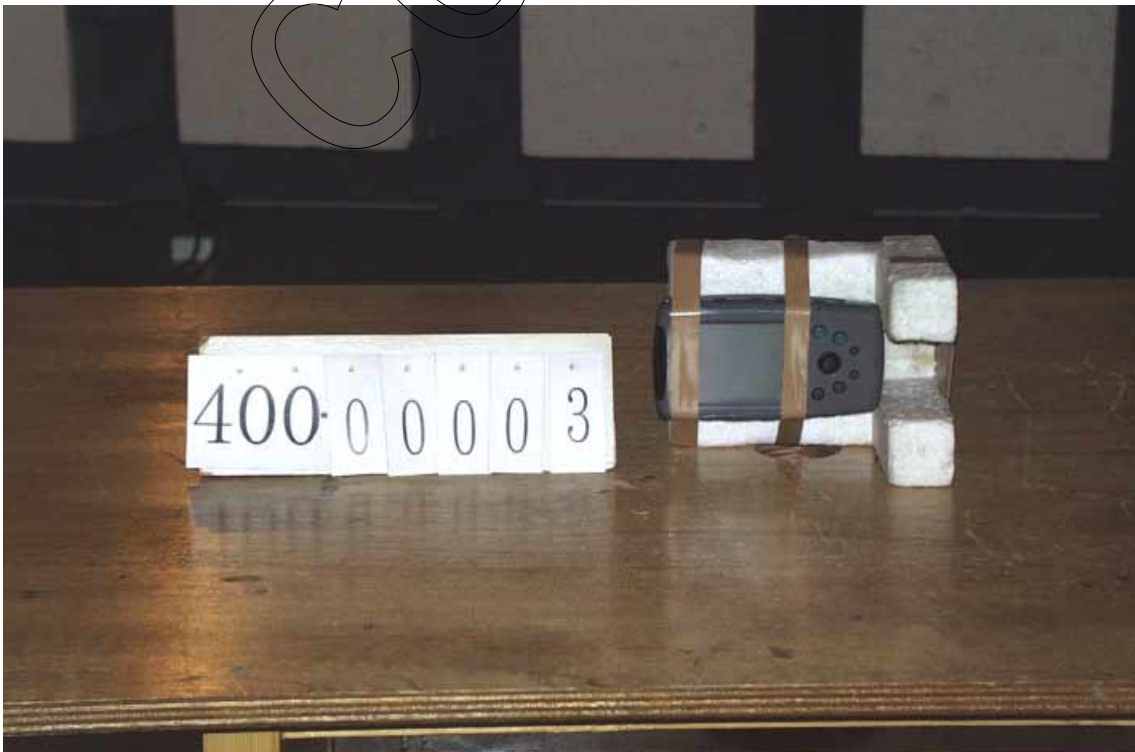
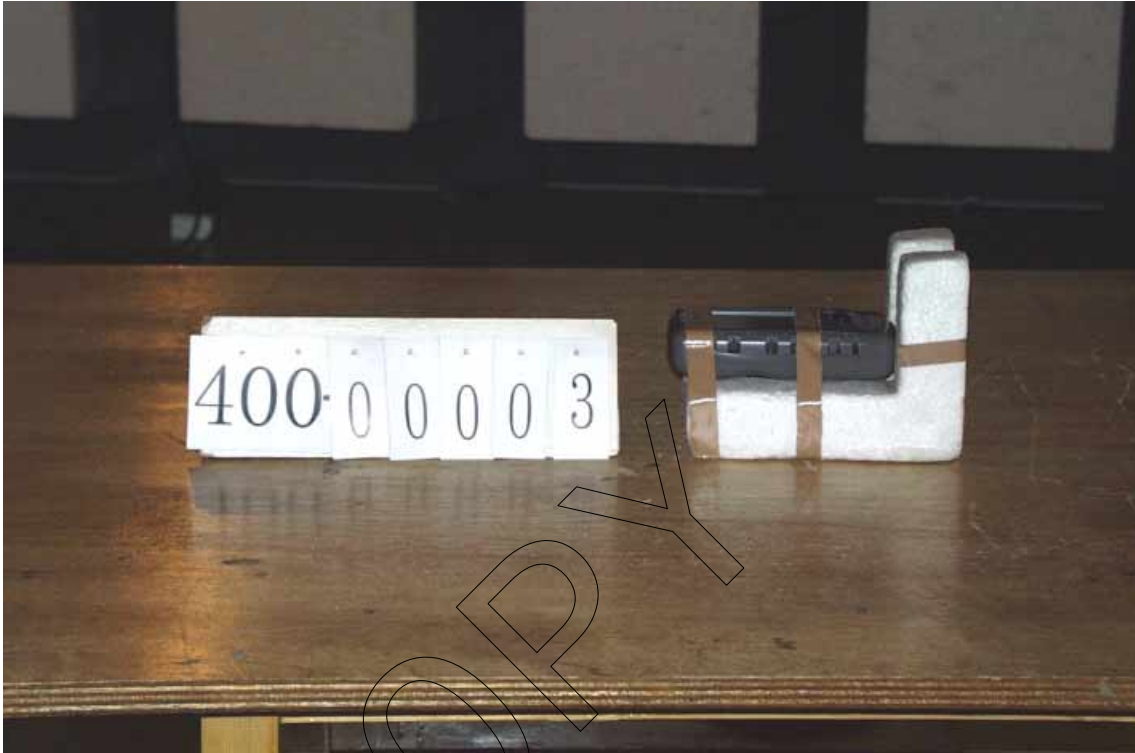
The resolution bandwidth of spectrum analyzer was set to the value specified in sec.13.1.7.

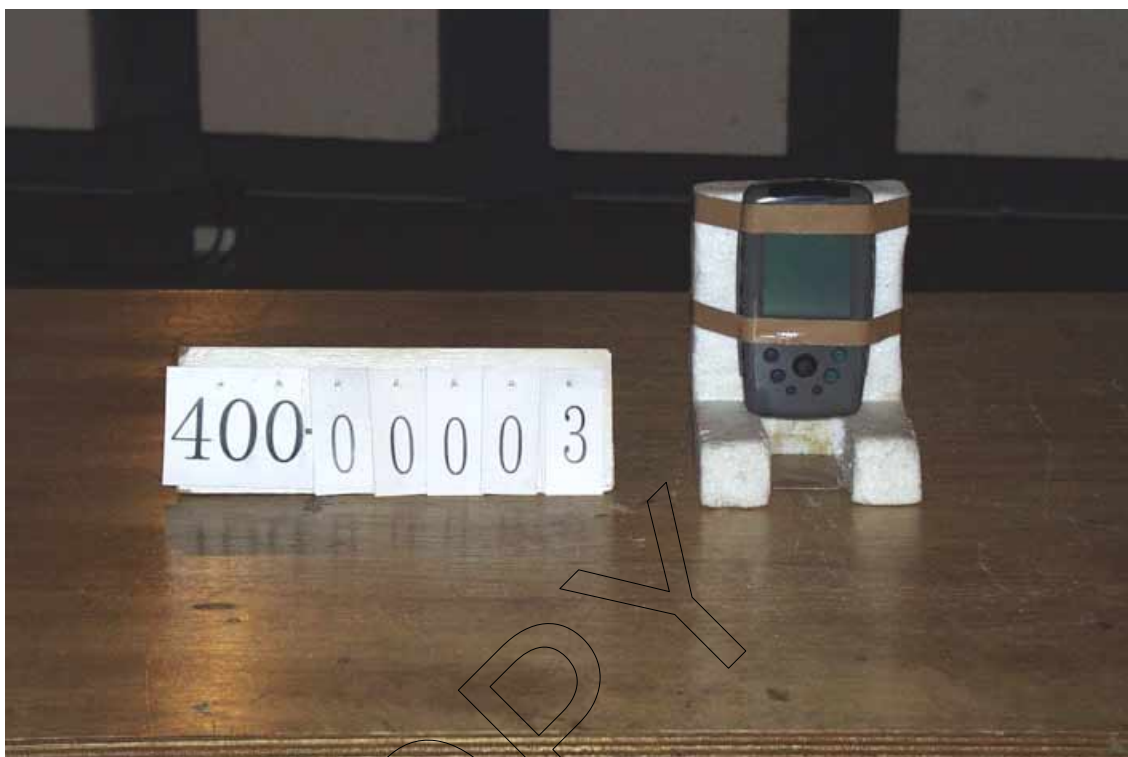


1.9 TEST ARRANGEMENT (PHOTOGRAPHS)

PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission





TEST DATA

2.2 Radiated Emissions Measurement

Date : April 3, 2000

Temp.: 21 °C Humi.: 53 %

Operating Frequency : 304.3 MHz

Distance of Measurement : 3.0 meters

Correction		Meter Reading		Field Strength at 3 m			
Frequency	Factor	Horiz.	Vert.	Factor*	Limits	Horiz.	Vert.
(MHz)	(dB/m)	(dBμV)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dBμV/m)
Fundamental							
304.300	20.5	63.6	61.2	-12.7	75.0	71.4	69.0
Harmonics & other Frequency components							
608.600	27.4	33.9	34.5	-12.7	55.0	48.6	49.2
912.900	32.4	25.2	27.7	-12.7	55.0	44.9	47.4
1217.200	26.3	26.9	25.2	-12.7	55.0	40.5	38.8
1521.500	29.1	24.4	26.3	-12.7	55.0	40.8	42.7
1825.800	30.7	19.4	22.6	-12.7	55.0	37.4	40.6
2130.100	-13.6	62.6	62.9	-12.7	55.0	36.2	36.5
2434.400	-12.5	61.5	63.0	-12.7	55.0	36.3	37.8
2738.700	-11.2	55.1	56.8	-12.7	55.0	31.1	32.8
3043.000	-9.9	< 47.0	< 47.0	-12.7	55.0	< 24.3	< 24.3

Operating Frequency : 315 MHz

Distance of Measurement : 3.0 meters

Correction		Meter Reading		Field Strength at 3 m			
Frequency	Factor	Horiz.	Vert.	Factor*	Limits	Horiz.	Vert.
(MHz)	(dB/m)	(dBμV)	(dBμV)	(dB/m)	(dBμV/m)	(dBμV/m)	(dBμV/m)
Fundamental							
315.000	20.8	61.7	58.5	-12.9	75.6	69.6	66.4
Harmonics & other Frequency components							
630.000	27.8	31.0	32.5	-12.9	55.6	45.9	47.4
945.000	32.9	24.0	25.6	-12.9	55.6	44.0	45.6
1260.000	26.7	24.2	24.9	-12.9	55.6	38.0	38.7
1575.000	29.5	23.7	22.2	-12.9	55.6	40.3	38.8
1890.000	31.1	17.6	19.2	-12.9	55.6	35.8	37.4
2205.000	-13.2	67.2	66.2	-12.9	55.6	41.1	40.1
2520.000	-12.3	64.1	65.6	-12.9	55.6	38.9	40.4
2835.000	-10.8	53.1	52.5	-12.9	55.6	29.4	28.8
3150.000	-9.5	48.0	49.6	-12.9	55.6	25.6	27.2

Note: 1. The spectrum was checked from 30 MHz to tenth harmonics.

All emissions not listed were found to be more than 20 dB below the limits.

2. The symbol of "<" means "or less".

3. The cable loss and amplifier gain were included in the correction factor.

4. Sample calculation :

at 304.300 MHz

$$Cf + Mr + F = 20.5 + 63.6 - 12.7 = 71.4 \text{ dB}\mu\text{V/m}$$

Where,

Cf = Correction Factor

Mr = Meter Reading

F = Peak to Average Factor

5. "**": The factor due to the pulsed waveform as shown in the attached sheet.

6. Measuring Instrument Setting:

Less than 1000 MHz

Detector function : Peak

IF Bandwidth : 1 MHz

Above 1000 MHz

Resolution Bandwidth : 1 MHz

Tested by :

Shigeru Osawa

Shigeru Osawa

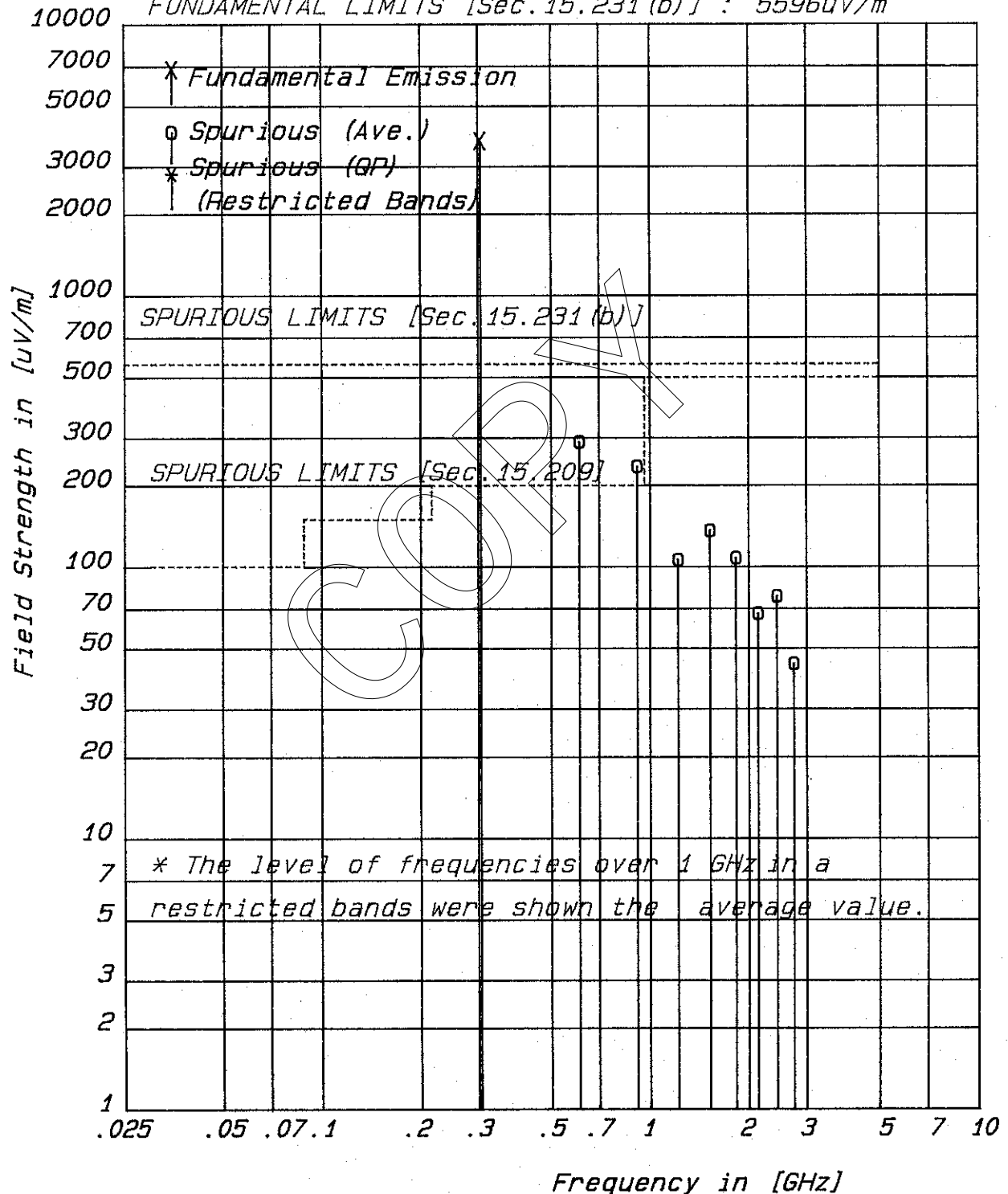
Testing Engineer

Radiated Fundamental & Spurious Emissions

FCC ID : GT3CSC001

Operating Frequency : 304.300 MHz

FUNDAMENTAL LIMITS [Sec.15.231(b)] : 5596uV/m

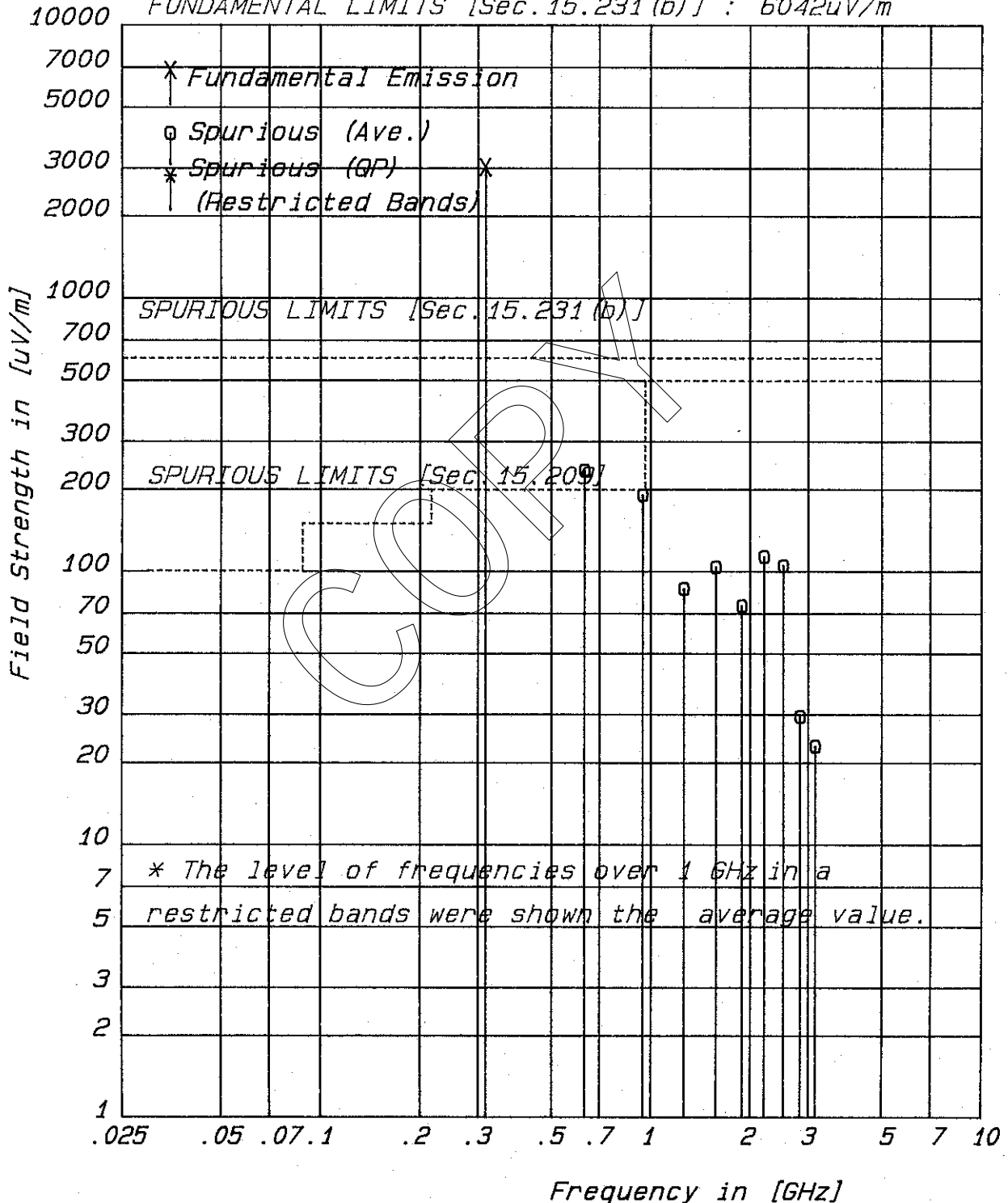


Radiated Fundamental & Spurious Emissions

FCC ID : GT3CSC001

Operating Frequency : 315.000 MHz

FUNDAMENTAL LIMITS [Sec.15.231(b)] : 6042uV/m

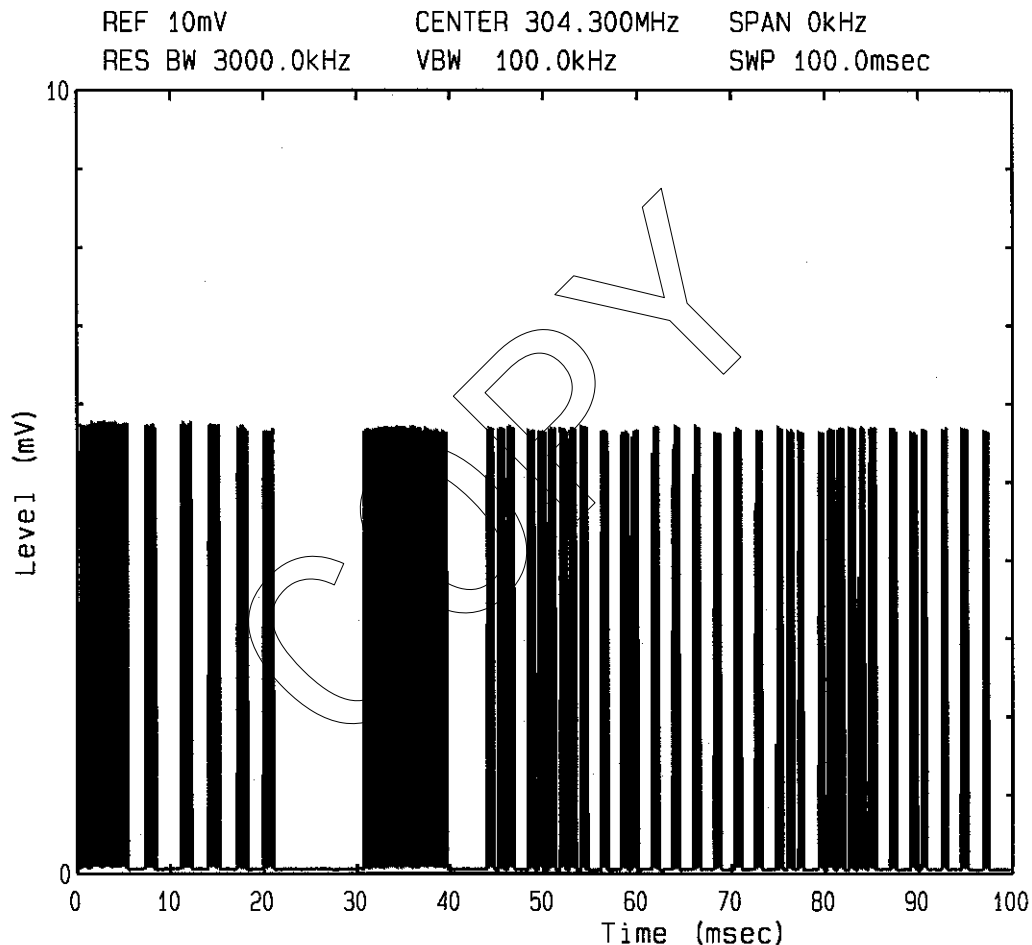


The encoded waveform in the time domain

FCC ID : GT3CSC001

Model : RC-8000

Mode of EUT : Transmit



The above waveform indicates the case when field strength averaged over 100 milliseconds was maximum value. In order to obtain the peak to average factor, calculation of the period of total on-time was computed by personal computer. Results was obtained by following.

$$\begin{aligned}\text{Duty cycle} &= (\text{Maximum total on-time} / 100 \text{ msec}) \times 100 \\ &= (23.1 \text{ msec} / 100 \text{ msec}) \times 100 = 23.1 \%\end{aligned}$$

Therefore

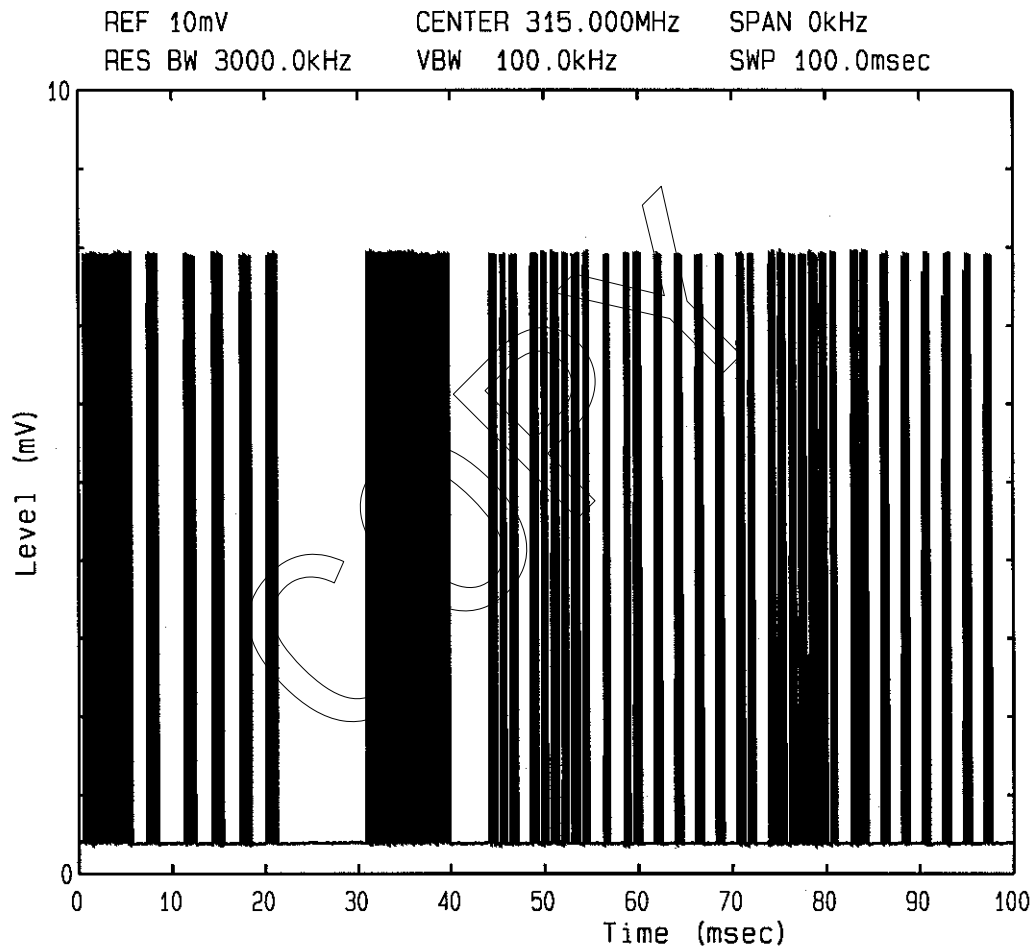
$$\text{Factor is } 20\log(0.2310) = -12.7 \text{ dB}$$

The encoded waveform in the time domain

FCC ID : GT3CSC001

Model : RC-8000

Mode of EUT : Transmit



The above waveform indicates the case when field strength averaged over 100 milliseconds was maximum value. In order to obtain the peak to average factor, calculation of the period of total on-time was computed by personal computer. Results was obtained by following.

$$\begin{aligned} \text{Duty cycle} &= (\text{Maximum total on-time} / 100 \text{ msec}) \times 100 \\ &= (22.7 \text{ msec} / 100 \text{ msec}) \times 100 = 22.7 \% \end{aligned}$$

Therefore

$$\text{Factor is } 20\log(0.2270) = -12.9 \text{ dB}$$



2.4 Occupied Bandwidth Measurement

Date : April 3, 2000

Temp.: 21°C Humi.: 53 %

Measurements Results :

Specified Limits : 0.25 % of the fundamental frequency

$$304.3 \text{ MHz} \times 0.0025 = 760.75 \text{ kHz}$$

$$315 \text{ MHz} \times 0.0025 = 787.5 \text{ kHz}$$

Refer to the attached graphs.

Tested by :

Shigeru Osawa

Shigeru Osawa

Testing Engineer

COPY

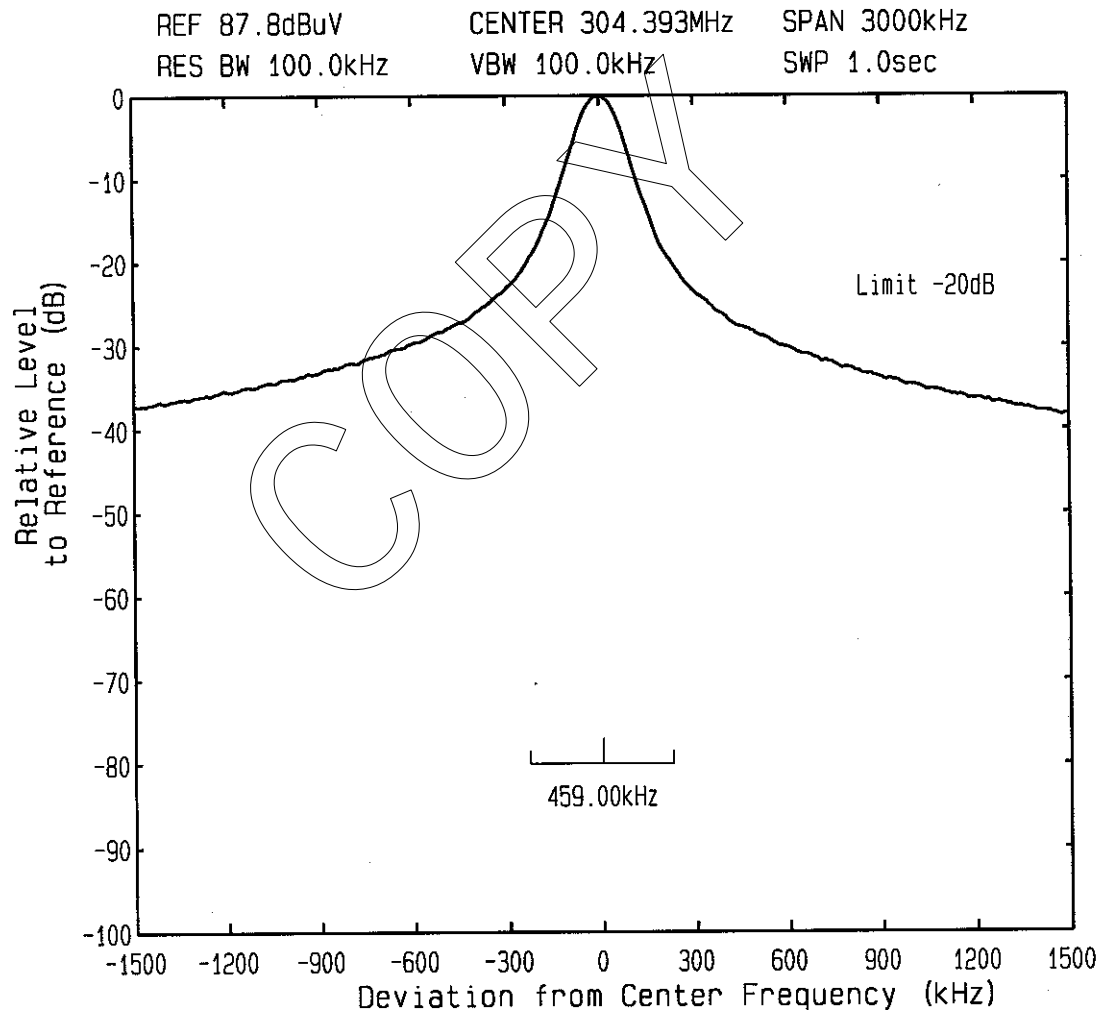


Emission Limitation

FCC ID : GT3CSC001

Model : RC-8000

Mode of EUT : Transmit





Emission Limitation

FCC ID : GT3CSC001

Model : RC-8000

Mode of EUT : Transmit

