JAPAN QUALITY ASSURANCE ORGANIZATION
2096, OHHATA, TSURU-SHI, YAMANASHI 402-0045, JAPAN
PHONE (0554) 43-5517, FAX (0554) 43-6316

EMI TEST REPORT

JQA APPLICATION NO.	: 400-00249
Model No.	: RI-14BTY
Type of Equipment	: Immobilizer
Regulations Applied	: CFR 47 FCC Rules and Regulations Part 15
FCC ID	: MOZRI-14BTY
Applicant	: TOKAI RIKA CO., LTD.
Address	: 260, Toyota 3-chome, Oguchi-cho, Niwa-gun, Aichi-ken 480-0195, Japan
Manufacture	: TOKAI RIKA CO., LTD.
Address	: 260, Toyota 3-chome, Oguchi-cho, Niwa-gun, Aichi-ken 480-0195, Japan
Received date of EUT	: July 4, 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.

TABLE OF CONTENTS

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).
   - Shielded Enclosure.

   Expiration date of FCC test facility filing : June 4, 2002

   TSURU EMC Branch: Open Site No.1, No.2, An Anechoic Chamber (3 m and 10 m, on common plane) and a Shielded Room (Date of Listing: March 30,1999)
2) EMC Engineering Dept. Testing Div. and TSURU EMC Branch are 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, 2001)

   NVLAP Lab Code : 200192-0 (Effective through : June 30, 2001)

1.2.2 Description of the Equipment Under Test (EUT) :

1)	Type of Equipment	: Immobilizer
2)	Product Type	: Production
3)	Category	: Low Power Communication Device Transmitter
4)	EUT Authorization	: Certification
5)	FCC ID	: MOZRI-14BTY
6)	Trade Name	: -
7)	Model No.	: RI-14BTY
8)	Operating Frequency Range	: 134.0 kHz
9)	Highest Frequency Used in the EUT	: 134.0 kHz
10)	Serial No.	: -
11)	Date of Manufacture	: -
12)	Power Rating	: 12.0 VDC
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. Tsuru EMC Branch
2096 Ohhata, Tanbozawa, Tsuru-shi Yamanashi-ken 402-0045, JAPAN

___ - Shielded Room No.1
___ - Shielded Room No.2
___ - Anechoic Chamber
___ - Open Site No.1
___ - Open Site No.2

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Test Receiver	ESH-3	Rohde & Schwarz	872992/047	May. 2000	1 Year
___ -	Test Receiver	ESH-3	Rohde & Schwarz	881460/016	May. 2000	1 Year
___ -	LISN(for Peripheral)	KNW-407	Kyoritsu Electrical	8-833-5	May. 2000	1 Year
___ -	LISN(for EUT)	KNW-407	Kyoritsu Electrical	8-680-14	May. 2000	1 Year
___ -	LISN	KNW-243C	Kyoritsu Electrical	8-831-1	May. 2000	1 Year
___ -	LISN	KNW-243C	Kyoritsu Electrical	8-831-2	May. 2000	1 Year
___ -	LISN	KNW-243C	Kyoritsu Electrical	8-831-3	May. 2000	1 Year
___ -	LISN	KNW-243C	Kyoritsu Electrical	8-831-4	May. 2000	1 Year
___ -	LISN	ESH 2-Z5	Rohde & Schwarz	879341/007	May. 2000	1 Year
___ -	RF Cable	3D-2W	Fujikura	No.1	May. 2000	1 Year
___ -	RF Cable	3D-2W	Fujikura	No.2	May. 2000	1 Year
___ -	RF Cable	3D-2W	Fujikura	No.3	May. 2000	1 Year
___ -	50ohm Termination	-	TDC	15406501E1	Feb. 2000	1 Year
___ -	50ohm Termination	-	-	15406502E1	Feb. 2000	1 Year

1.3.2 The measurement of the Radiated Emission(9 kHz – 30 MHz)

_x_ - was performed in the following test site.
___ - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Tsuru EMC Branch
2096 Ohhata, Tsuru-shi, Yamanashi-ken 402-0045, JAPAN

___ - Open Site No. 1 (3, 10 or 30 meters)
_x_ - Open Site No. 2 (3, 10 or 30 meters)
___ - Anechoic Chamber(3 or 10 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
_x_	Test Receiver	ESH-3	Rohde & Schwarz	872992/047	May. 2000	1 Year
___	Test Receiver	ESH-3	Rohde & Schwarz	881460/016	May. 2000	1 Year
_x_	Loop Antenna	HFH2-Z2	Rohde & Schwarz	872994/043	May. 2000	1 Year
___	Loop Antenna	6502	EMCO	8905-2347	May. 2000	1 Year
_x_	RF Cable	5D-2W	Fujikura	155-21-002E0	Feb. 2000	1 Year

1.3.3 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. Tsuru EMC Branch
2096 Ohhata, Tsuru-shi, Yamanashi-ken 402-0045, JAPAN

_x_ - Open Site No. 1 (3, 10 or 30 meters)
___ - Open Site No. 2 (3, 10 or 30 meters)
___ - Anechoic Chamber(3 or 10 meters)

Validation of Site Attenuation :
1) Last Confirmed Date :May, 2000
2) Interval :1 year

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
_x_	Test Receiver	ESV	Rohde & Schwarz	863796/015	May. 2000	1 Year
___	Test Receiver	ESVS10	Rohde & Schwarz	843744/018	May. 2000	1 Year
___	Test Receiver	ESVS10	Rohde & Schwarz	84231/004	May. 2000	1 Year
_x_	Biconical Antenna	BBA9106	Schwarzbeck	11905065-2	May. 2000	1 Year
___	Biconical Antenna	BBA9106	Schwarzbeck	11905065-3	May. 2000	1 Year
___	Biconical Antenna	BBA9106	Schwarzbeck	G4397001	May. 2000	1 Year
_x_	Log-Periodic Antenna	UHALP9107	Schwarzbeck	91071212	May. 2000	1 Year
___	Log-Periodic Antenna	UHALP9107	Schwarzbeck	9107915	May. 2000	1 Year
___	Log-Periodic Antenna	UHALP9107	Schwarzbeck	G43597003	May. 2000	1 Year
___	Dipole Antenna	KBA-511A	Kyoritsu Electrical	0-195-5	May. 2000	1 Year
___	Dipole Antenna	KBA-511A	Kyoritsu Electrical	0-230-6	May. 2000	1 Year
___	Dipole Antenna	KBA-611	Kyoritsu Electrical	0-196-8	May. 2000	1 Year
___	Dipole Antenna	KBA-611	Kyoritsu Electrical	0-228-13	May. 2000	1 Year
_x_	RF Cable	20D/5D-2W	Fujikura	No.1	May. 2000	1 Year
___	RF Cable	20D/5D-2W	Fujikura	No.2	May. 2000	1 Year
___	RF Cable	20D/5D-2W	Fujikura	No.3	May. 2000	1 Year

1.3.4 The measurement of the Radiated Emission(Above 1000 MHz)

___ - was performed in the following test site.
_x_ - was not applicable.

Test location :

Safety Testing Center EMC Engineering Dept. Tsuru EMC Branch
2096 Ohhata, Tsuru-shi, Yamanashi-ken 402-0045, JAPAN

____- Open Site No. 1 (3, 10 or 30 meters)
____- Open Site No. 2 (3, 10 or 30 meters)
____- Anechoic Chamber(3 or 10 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
___ -	Spectrum Analyzer	8563E	Hewlett Packard	3438A00756	May. 2000	1 Year
___ -	Spectrum Analyzer	R4131C	Advantest	717201249	May. 2000	1 Year
___ -	Log-Periodic Antenna	94612-1	Rohde & Schwarz	97062301	May. 2000	1 Year
___ -	RF Amplifier	WJ-6611-513	Watkins-Johnson	0288	May. 2000	1 Year
___ -	RF Amplifier	WJ-6682-834	Watkins-Johnson	0052	May. 2000	1 Year
___ -	RF Amplifier	WJ-6870-506	Watkins-Johnson	0018	May. 2000	1 Year
___ -	RF Cable(7m)	SUCOFLEX 104	Suhner	52146/4	May. 2000	1 Year
___ -	RF Cable(3m)	SUCOFLEX 104	Suhner	52053/4	May. 2000	1 Year
___ -	RF Cable(2m)	SUCOFLEX 104	Suhner	39934/4	May. 2000	1 Year
___ -	RF Cable(1m)	SUCOFLEX 104	Suhner	35687/4	May. 2000	1 Year

1.3.5 The measurement of the Frequency Stability

___ - was performed.
_x_ - was not applicable.

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Frequency Counter	53131A	Hewlett Packard	3546A11807	May 2000	1 Year
___ -	Oven	-	Ohnishi Co. Ltd.	-	Aug. 1999	1 Year
___ -	DC Power Supply	6628A	Hewlett Packard	3224A00284	July 2000	1 Year

1.3.6 The measurement of the Occupied Bandwidth

___ - was performed.
_x_ - was not applicable.

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Sep. 1999	1 Year
___ -	Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	May. 2000	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Apr. 2000	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	May. 2000	1 Year
___ -	Function Generator	3325A	Hewlett Packard	2512A21776	May. 2000	1 Year
___ -	FM Linear Detector	MS61A	Anritsu Corp.	M77486	Sep. 1999	1 Year
___ -	Level Meter	ML422C	Anritsu Corp.	M87571	June 2000	1 Year

1.4 EUT MODIFICATION / Deviation from Standard

1.4.1 EUT MODIFICATION

_x_ - 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:

_x_ - 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** _x_ **- NOT Applicable**

The requirements are ___ **- PASSED** ___ **- NOT PASSED**

Remarks :

Radiated Emission [§15.209(a)(b)] _x_ **- Applicable** ___ **- NOT Applicable**

The requirements are _x_ **- PASSED** ___ **- NOT PASSED**

Remarks:

Frequency Stability ___ **- Applicable** _x_ **- NOT Applicable**

The requirements are ___ **- PASSED** ___ **- NOT PASSED**

Remarks:

Occupied Bandwidth ___ **- Applicable** _x_ **- 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 : July 12, 2000

End of testing : July 12, 2000

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by:

Takaharu Hada
Director
Tsuru EMC Branch
JQA EMC Engineering Dept.

Signatories:
Issued by:

Yuichi Fukumoto
Manager
Tsuru EMC Branch
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	Immobilizer	TOKAI RIKA CO., LTD.	RI-14BTY	MOZRI-14BTY	-

The measurement was carried out with the following support equipment connected :

Symbol	Item	Manufacturer	Model No.	FCC ID	Serial No.
B	DC Power Supply	KIKUSUI ELECTRONICS	PAB 18-2.5DU	N/A	30079912

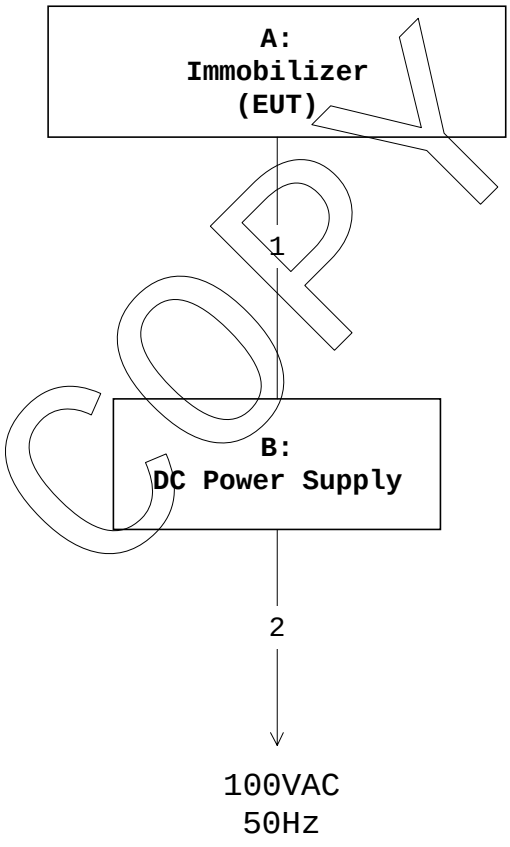
Type of Cable :

Symbol	Description	Identification (Manufacturer etc.)	Shielded YES / NO	Ferrite Core	Connector type Shielded YES / NO	Length (m)
1	DC Power Cable(for EUT)	-	NO	NO	NO	1.0
2	AC Power Cable	-	NO	NO	NO	1.8

1.7.2 Operating condition

Power supply Voltage : 12.0 VDC(from DC Power Supply)
The tests have been carried out under the transmitting condition.

1.8 EUT ARRANGEMENT (DRAWINGS)



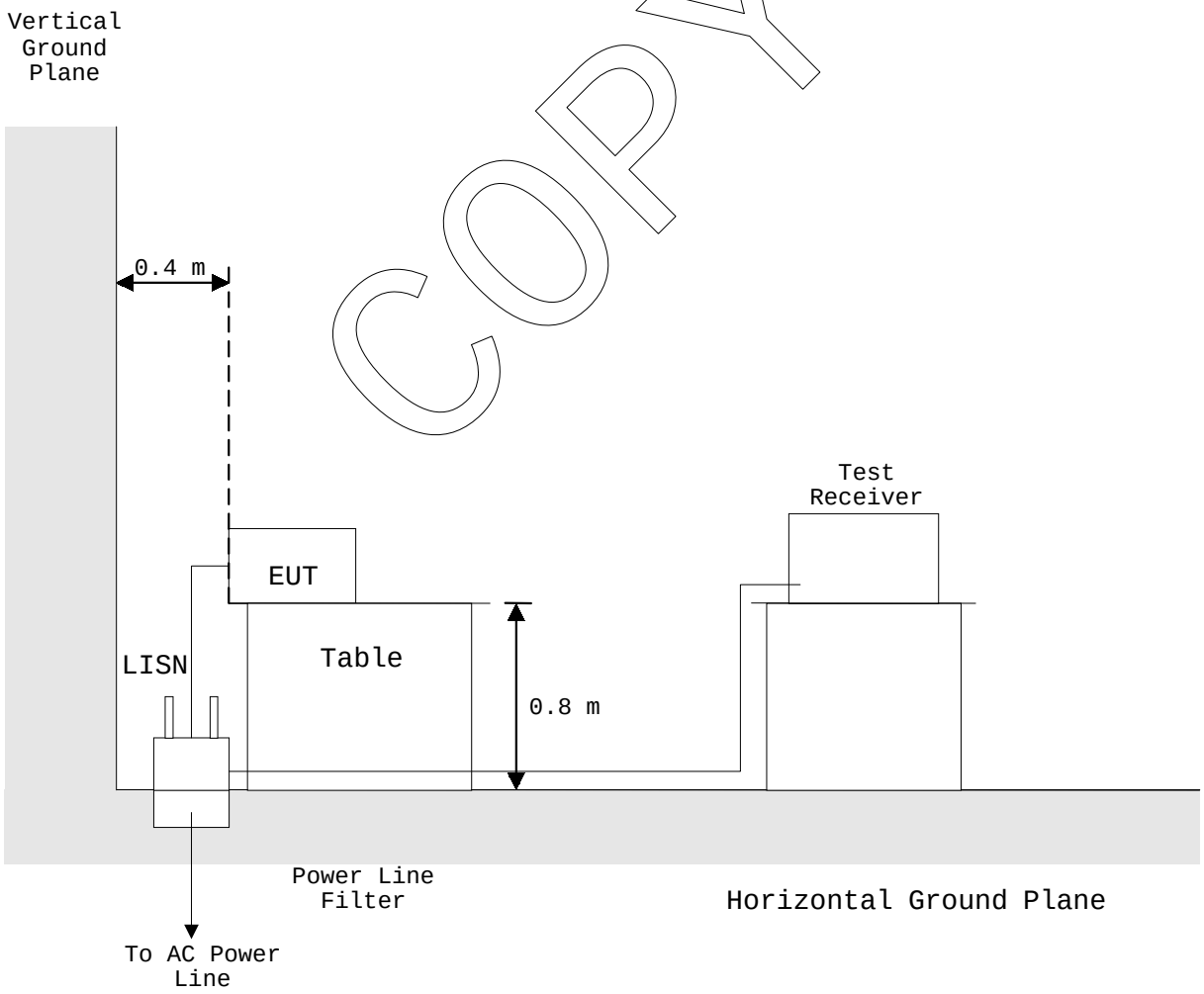
1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

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

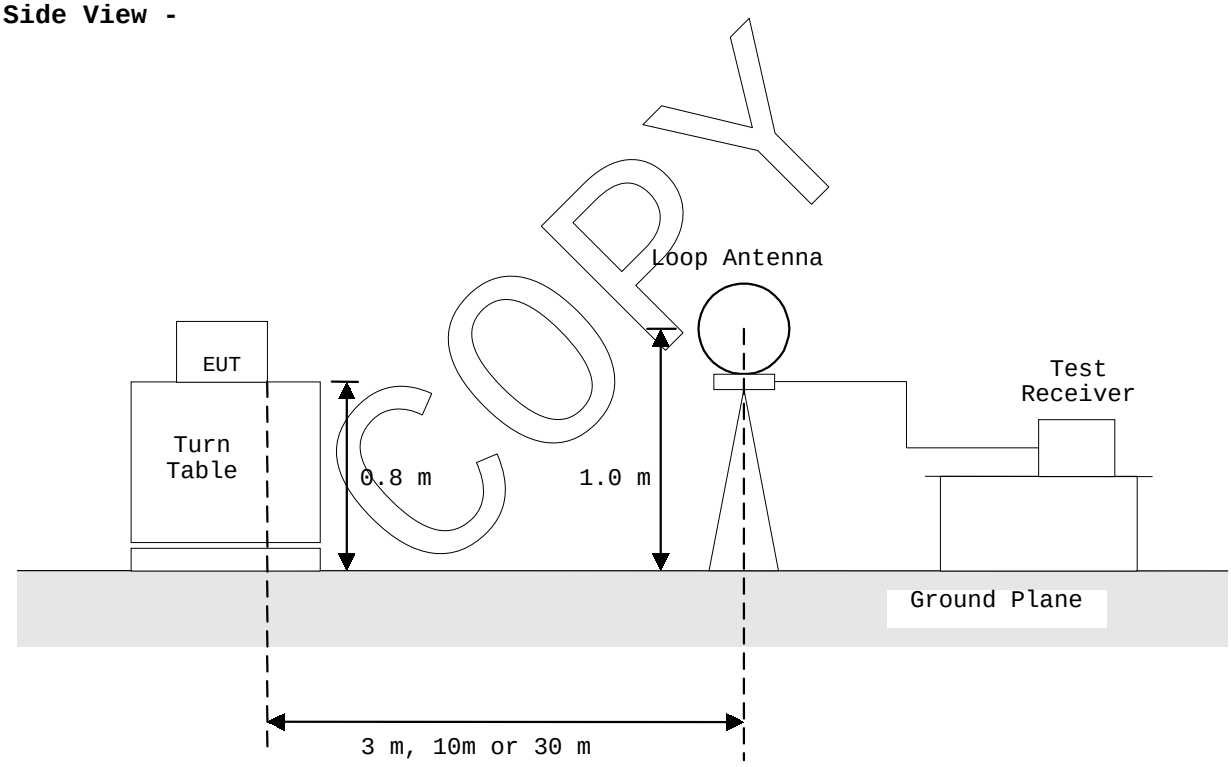
- Side View -



1.9.2 Radiated Emission (9 kHz – 30 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.

- Side View -

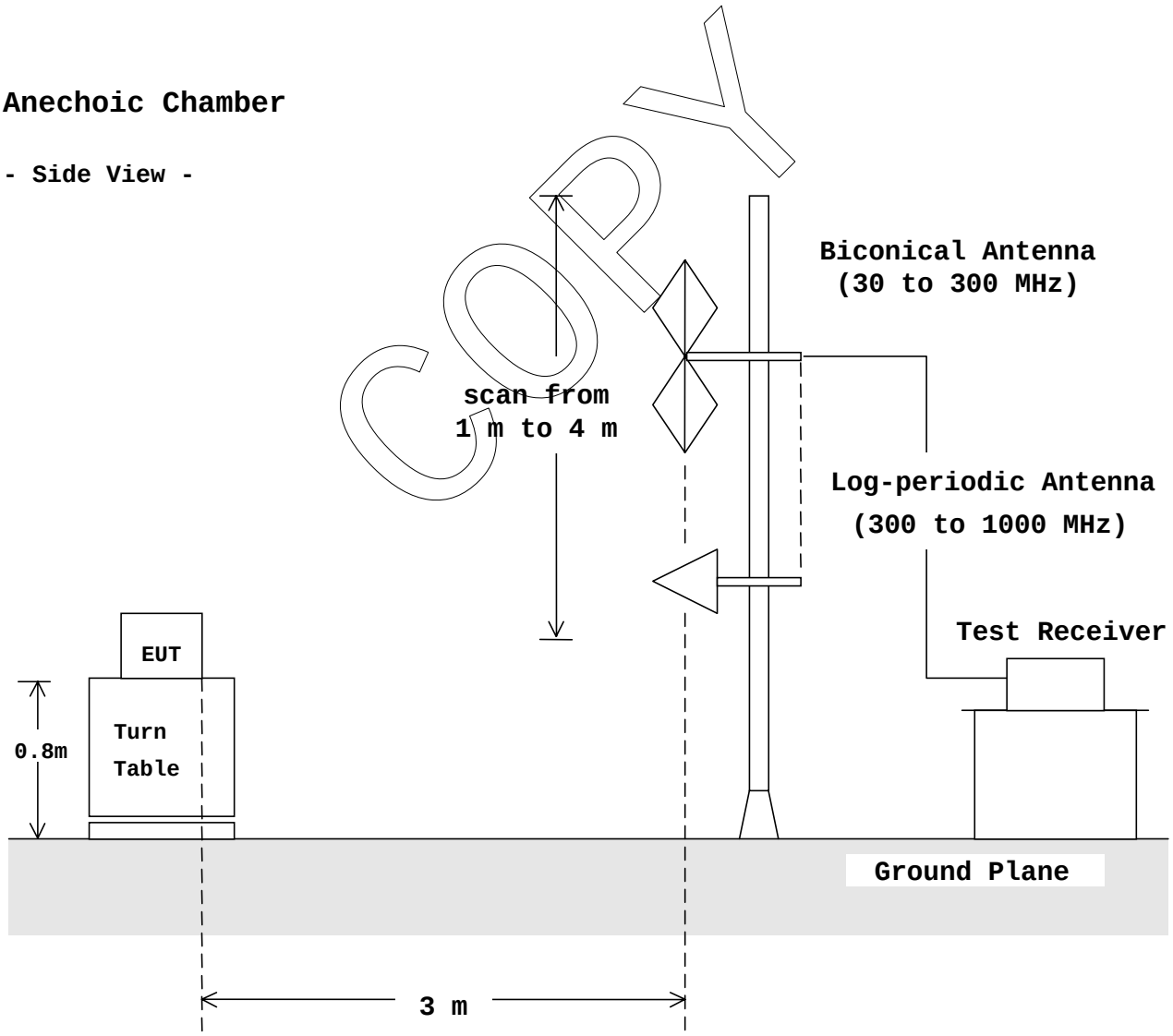


1.9.3 Radiated Emission (30 MHz – 1000 MHz) :

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 -

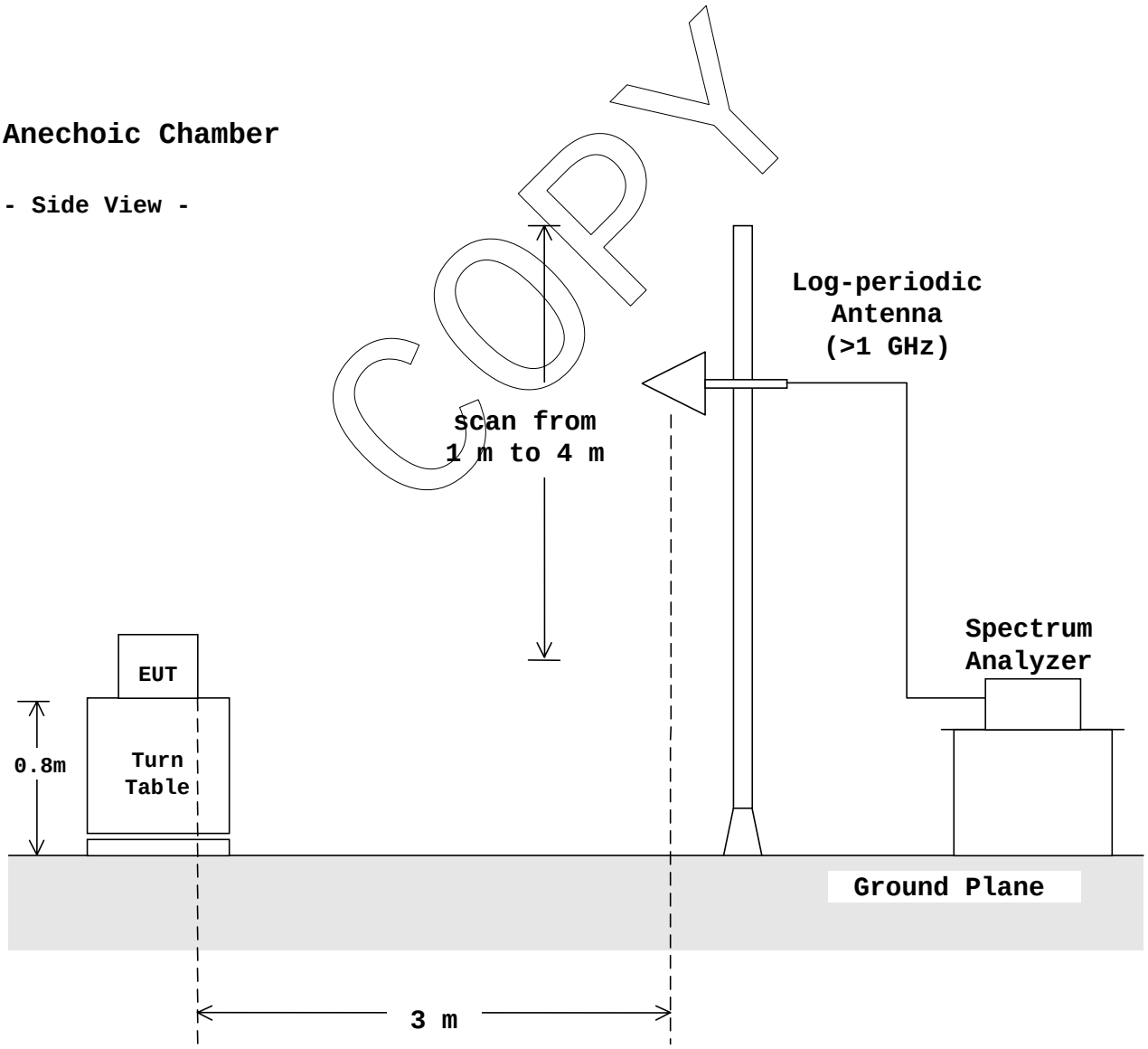


1.9.4 Radiated Emission (Above 1 GHz) :

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.

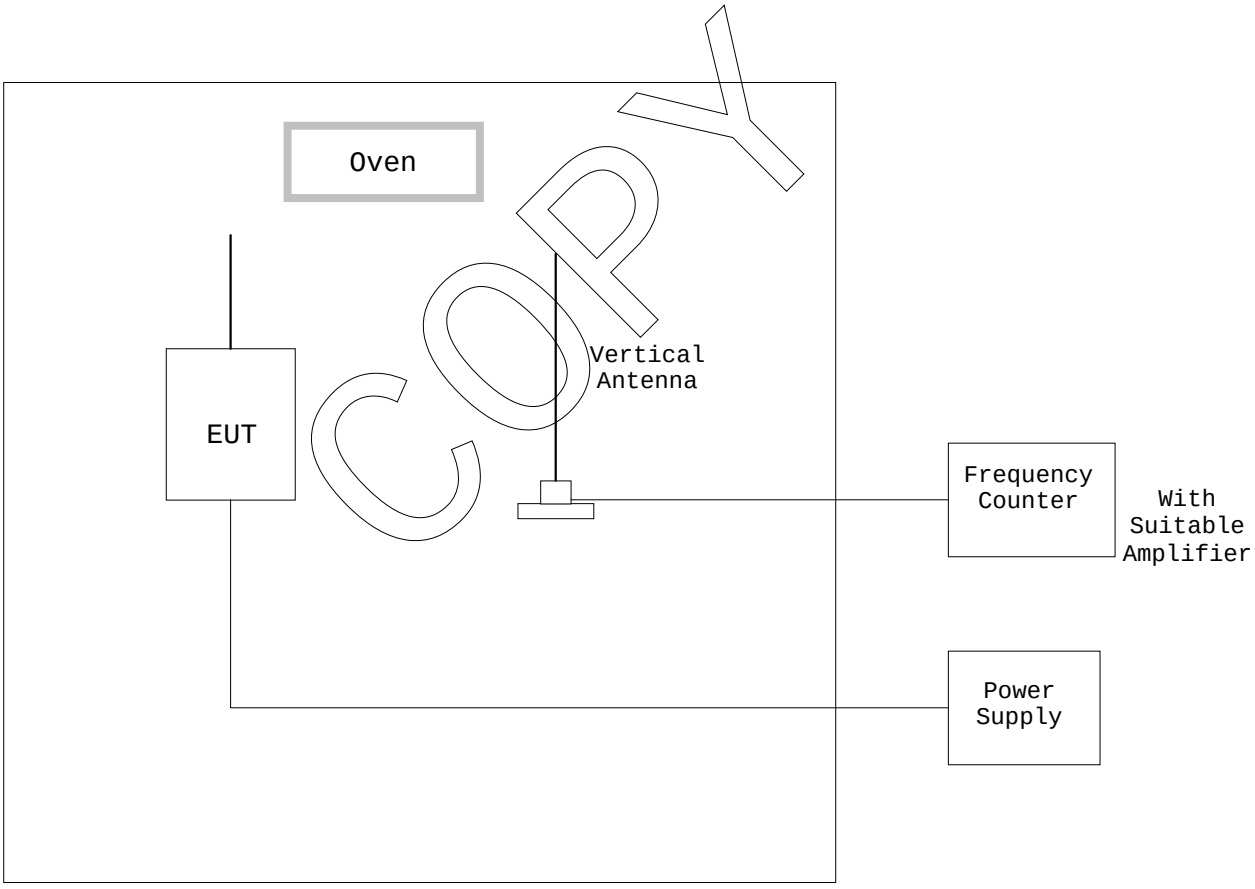
Anechoic Chamber

- Side View -



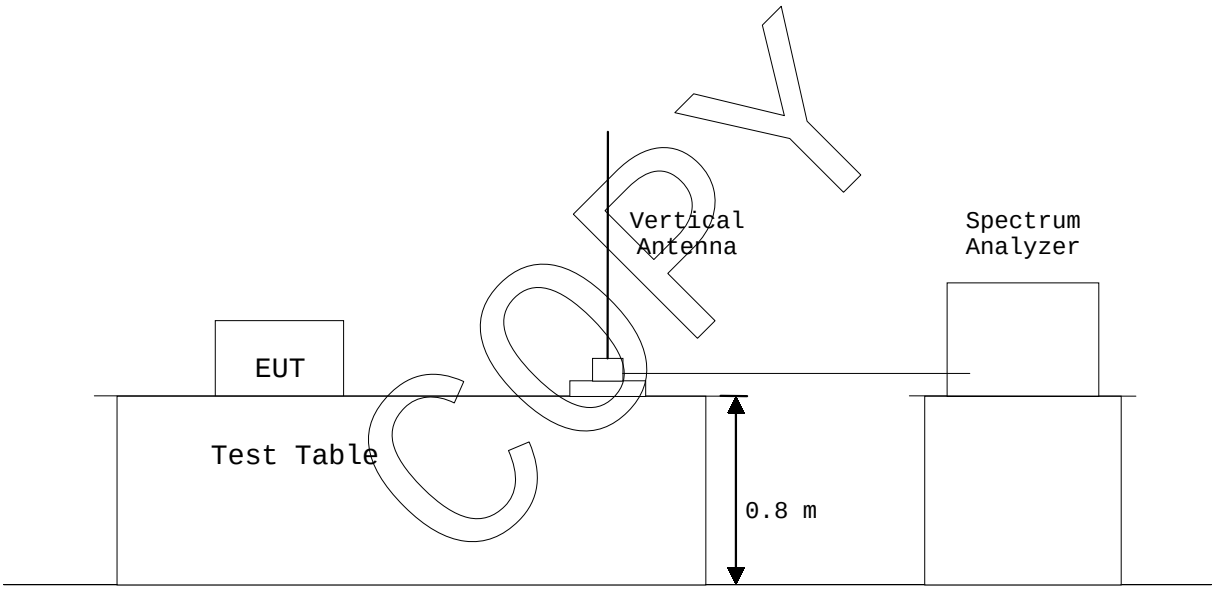
1.9.5 Frequency Stability :

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



1.9.6 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.



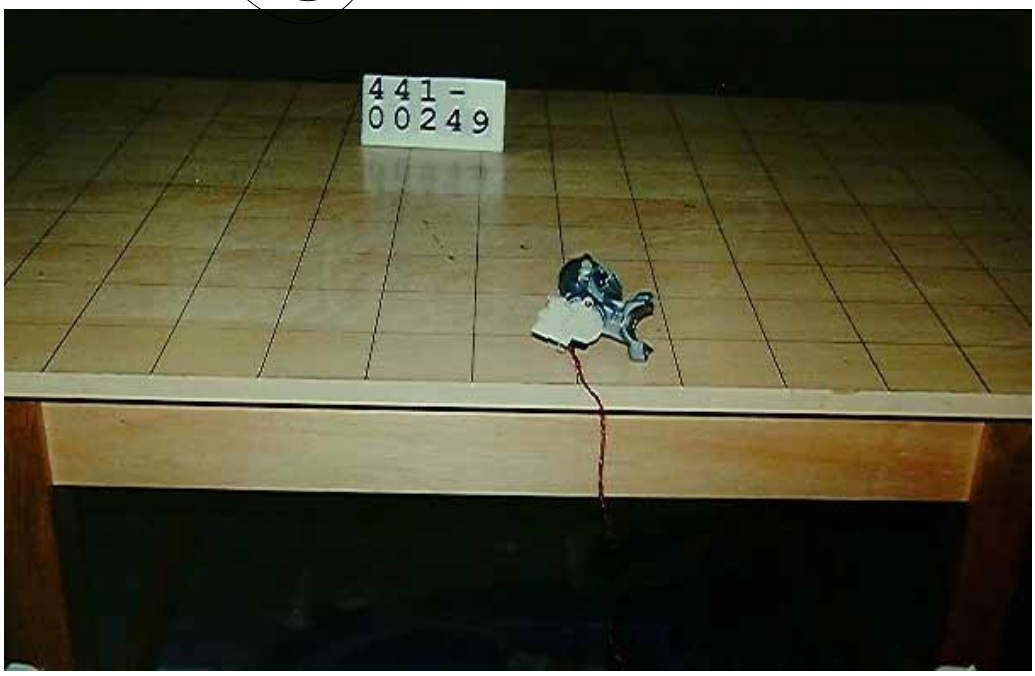
1.10 TEST ARRANGEMENT (PHOTOGRAPHS)

PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission

- Front View –

- Rear View –



TEST DATA

2.1 AC Power Line Conducted Emission Measurement(0.45 MHz – 30 MHz)

Note : This test was not applicable.

2.2 Radiated Emissions Measurement(9 kHz – 30 MHz)

Date : July 12, 2000
Temp.: 20 °C Humi.: 41 %

Operating Frequency : 134.0 kHz
Distance of Measurement : 30 meters

Frequency (MHz)	Meter Reading (dBμV/m)	Field Strength (dBμV/m)
Fundamental		
0.1340	< 30.0	< 30.0
Harmonic Frequency		
0.2680	< 33.2	< 33.2
0.4020	< 31.4	< 31.4
0.5360	< 30.1	< 30.1
0.6700	< 29.0	< 29.0
0.8040	< 28.1	< 28.1
0.9380	< 27.3	< 27.3
1.0720	< 27.0	< 27.0
1.2060	< 27.0	< 27.0
1.3400	< 27.0	< 27.0

Note : The fundamental field strength was found undetectable weak of the field strength meter.

Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer

The distance of measurements was reduced to 3 meters.

Date : July 12, 2000
Temp.: 20 °C Humi.: 41 %

Operating Frequency : 133.8 kHz
Distance of Measurement : 10 meters

Frequency (MHz)	Meter Reading (dBμV/m)	Field Strength (dBμV/m)
Fundamental		
0.1340	46.6	46.6
Harmonic Frequency		
0.2680	< 33.2	< 33.2
0.4020	< 31.4	< 31.4
0.5360	< 30.1	< 30.1
0.6700	< 29.0	< 29.0
0.8040	< 28.1	< 28.1
0.9380	< 27.3	< 27.3
1.0720	< 27.0	< 27.0
1.2060	< 27.0	< 27.0
1.3400	< 27.0	< 27.0

Note: 1. Meter reading value shows field strength, because the value includes antenna factor.
2. The symbol of "<" means "or less".
3. Measuring Instrument Setting:

Frequency Range : 110 kHz to 490 kHz
Detector Function : Average
IF Band width : 10 kHz

Frequency Range : 536.8 kHz to 1345 kHz
Detector Function : CISPR Quasi-peak Peak
IF Band width : 9 kHz

For fundamental, the measured field strength was extrapolated to distance 300 meters, using the formula that field strength varies as the inverse distance square(40 dB per decade of distance).

Calculation :

$46.6\ dB\mu V/m - 20\log_{10}((300/10)^2) = 46.6 - 59.1$
$= -12.5\ dB\mu V/m$ at 300 meters

Limits for fundamental(§15.209(a)) = $20\log_{10}(2400/134.0) = 25.1\ dB\mu V/m$

Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer

2.3 Radiated Emissions Measurement(30 MHz – 1000 MHz)

Date : July 12, 2000
Temp.: 20 °C Humi.: 41 %

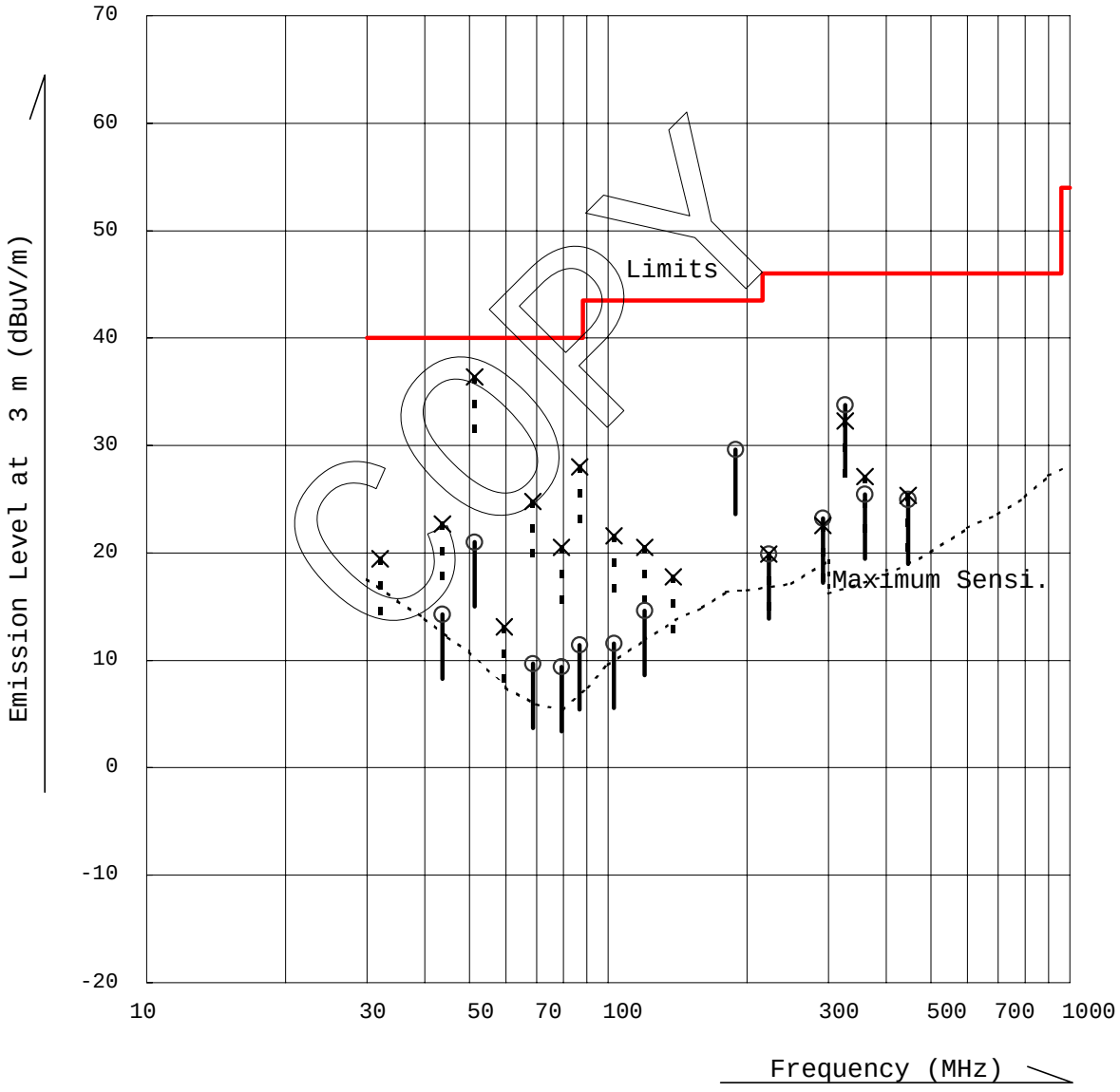
Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading (dBuV) Horiz.	Meter Reading (dBuV) Ver.	Limits (dBuV/m)	Emission Level (dBuV/m) Horiz.	Emission Level (dBuV/m) Ver.	Margin (dB) Horiz.	Margin (dB) Ver.	Comment
32.0	18.8	< -2.0	0.7	40.0	< 16.8	19.5	> 23.3	20.6	
43.7	14.6	-0.3	8.1	40.0	14.3	22.7	25.7	17.3	
51.4	12.3	8.7	24.1	40.0	21.0	36.4	19.0	3.6	
59.5	9.6	< -2.0	3.5	40.0	< 7.6	13.1	> 32.4	26.9	
68.6	8.1	1.6	16.7	40.0	9.7	24.8	30.3	15.2	
79.2	7.4	2.0	13.1	40.0	9.4	20.5	30.6	19.5	
86.6	8.8	2.6	19.2	40.0	11.4	28.0	28.6	12.0	
102.9	12.0	-0.4	9.6	43.5	11.6	21.6	31.9	21.9	
119.9	13.9	0.7	6.6	43.5	14.6	20.5	28.9	23.0	
138.4	15.6	< -2.0	2.2	43.5	< 13.6	17.8	> 29.9	25.7	
168.0	17.2	< -2.0	< -2.0	43.5	< 15.2	< 15.2	> 28.3	> 28.3	
188.7	18.4	11.2	< -2.0	43.5	29.6	< 16.4	13.9	> 27.1	
223.0	18.6	1.3	1.3	46.0	19.9	19.9	26.1	26.1	
291.5	21.0	2.3	1.6	46.0	23.3	22.6	22.8	23.5	
325.9	18.7	15.1	13.6	46.0	33.8	32.3	12.2	13.7	
360.2	19.3	6.2	7.8	46.0	25.5	27.1	20.5	18.9	
446.0	21.0	4.0	4.4	46.0	25.0	25.4	21.0	20.6	
500.0	22.1	< -2.0	< -2.0	46.0	< 20.1	< 20.1	> 25.9	> 25.9	
600.0	24.3	< -2.0	< -2.0	46.0	< 22.3	< 22.3	> 23.7	> 23.7	
800.0	27.2	< -2.0	< -2.0	46.0	< 25.2	< 25.2	> 20.8	> 20.8	
1000.0	30.1	< -2.0	< -2.0	54.0	< 28.1	< 28.1	> 25.9	> 25.9	

Notes: 1) Test Location : Anechoic Chamber
2) Test Distance : 3 m
3) Test spectram was checked from 30 MHz to 1000 MHz.
4) Antenna factor includes the cable loss for 33 meter.
5) The symbol of "<" means "or less".
6) The symbol of ">" means "more than".
7) A sample calculation was made at 32.0 MHz
Af + Mr = 18.8 + 0.7 = 19.5 dBuV/m
Af : Antenna Factor Mr : Meter Reading
8) Setting of measuring instrument :
Detector Function : CISPR Quasi-Peak
IF Bandwidth : 120 kHz

Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer

Radiated Emissions Measurements (30 MHz - 1000 MHz)

Measuring Distance : 3 m	O	Horizontal
Classifications : B	X	Vertical



2.4 Radiated Emissions Measurement(Above 1 GHz)

Note : This test was not applicable.

2.5 Frequency Stability Measurement

Note : This test was not applicable.

2.6 Occupied Bandwidth Measurement

Note : This test was not applicable.