



JAPAN QUALITY ASSURANCE ORGANIZATION

2096, OHATA, TSURU-SHI, YAMANASHI 402-0045, JAPAN

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JQA APPLICATION NO.: 441-40071

Issue Date : April 26, 2004

Page 1 of 31

EMI TEST REPORT

JQA APPLICATION NO. : 441-40071

Model No. : 444-59005

Type of Equipment : RF-MODULE (RFID TAG Reader/Writer)

Regulations Applied : CFR 47 FCC Rules and Regulations Part 15

FCC ID : RPARFMHL00

Applicant : RISO KAGAKU CORPORATION

Address : 127-7, Taninosawa, Fukuda, Ami-machi, Inashiki-gun,
Ibaraki-ken 300-1156, Japan

Manufacture : RISO KAGAKU CORPORATION

Address : 127-7, Taninosawa, Fukuda, Ami-machi, Inashiki-gun,
Ibaraki-ken 300-1156, Japan

Received date of EUT : April 21, 2004

Final Judgment : Passed

TEST RESULTS IN THIS REPORT are obtained in use of equipment that is traceable to National Institute of Advanced Industrial Science and Technology (AIST) of Japan and National Institute of Information and Communications Technology (NICT) of Japan.

The test results only responds to the tested sample.

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1 DOCUMENTATION

1.1 TEST REGULATION

FCC Rules and Regulations Part 15 Subpart A and C (January 8, 2004) 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 C63.4-2001.

1.2 GENERAL INFORMATION

1.2.1 Test facility :

- 1) Test Facility located at JQA Safety & EMC Center EMC Engineering Department TSURU EMC Branch:
Open Site No.1, No.2, An Anechoic Chamber (3 m and 10 m, on common plane) and a Shielded Room

FCC Registration Number: 90728 (Date of Listing : April 2, 2002)

- 2) JQA Safety & EMC Center EMC Engineering Department TSURU EMC Branch 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 : 200192-0 (Effective through : June 30, 2004)

1.2.2 Description of the Equipment Under Test (EUT) :

- | | |
|--------------------------------------|---|
| 1) Type of Equipment | : RF-MODULE
(RFID TAG Reader/Writer) |
| 2) Product Type | : Pre-production |
| 3) Category | : Low Power Communication Device |
| 4) EUT Authorization | : Certification |
| 5) FCC ID | : RPARFMHL00 |
| 6) Trade Name | : RISO |
| 7) Model No. | : 444-59005 |
| 8) Operating Frequency Range | : 13.56 MHz |
| 9) Highest Frequency Used in the EUT | : 13.56 MHz |
| 10) Serial No. | : - |
| 11) Date of Manufacture | : - |
| 12) Power Rating | : 5.0VDC* |
| 13) EUT Grounding | : None |

*:The EUT was operated with the printer.(Input: 120Vac 60Hz, Output: 5.0Vdc)

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

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

Test location :

JQA Safety & EMC Center EMC Engineering Department TSURU EMC Branch
 2096 Ohata, Tsuru-shi Yamanashi-ken 402-0045, JAPAN

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

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___	- Test Receiver(R-7)	ESI7	Rohde & Schwarz	100059	2003/10	1 Year
___	- Test Receiver(R-8)	ESCS30	Rohde & Schwarz	100203	2004/2	1 Year
<u>x</u>	- Test Receiver(R-1)	ESHS30	Rohde & Schwarz	842053/001	2003/11	1 Year
___	- Test Receiver(R-3)	ESH3	Rohde & Schwarz	881460/016	2003/5	1 Year
<u>x</u>	- LISN(L-1)	KNW-407	Kyoritsu Electrical	8-833-5	2003/8	1 Year
___	- LISN(L-2)	KNW-407	Kyoritsu Electrical	8-680-14	2003/8	1 Year
___	- LISN(L-3)	KNW-407	Kyoritsu Electrical	8-757-1	2003/6	1 Year
___	- LISN(L-4)	KNW-242	Kyoritsu Electrical	8-755-1	2003/6	1 Year
___	- LISN(L-5)	KNW-242C	Kyoritsu Electrical	8-837-14	2003/6	1 Year
___	- LISN(L-9)	KNW-243C	Kyoritsu Electrical	8-831-2	2003/6	1 Year
___	- LISN(L-7)	KNW-243C	Kyoritsu Electrical	8-831-3	2003/6	1 Year
___	- LISN(L-8)	KNW-243C	Kyoritsu Electrical	8-831-4	2003/6	1 Year
___	- LISN(L-6)	KNW-243C	Kyoritsu Electrical	8-692-5	2003/7	1 Year
<u>x</u>	- RF Cable(C-9)	3D-2W	Fujikura	No.1	2003/5	1 Year
___	- RF Cable(C-10)	3D-2W	Fujikura	No.2	2003/5	1 Year
___	- RF Cable(C-11)	3D-2W	Fujikura	No.3	2003/5	1 Year
___	- 50ohm Termination(TM-1) -	TDC		15406501E1	2004/3	1 Year
___	- 50ohm Termination(TM-2) -	-		15406502E1	2004/3	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 :

JQA Safety & EMC Center EMC Engineering Department TSURU EMC Branch
2096 Ohata, Tsuru-shi Yamanashi-ken 402-0045, JAPAN

 - Open Site No. 1 (3, 10 or 30 meters)

 - Open Site No. 2 (3 or 10 meters)

 x - Anechoic Chamber(3 or 10 meters)

Validation of Site Attenuation :

1) Last Confirmed Date : N/A

2) Interval : N/A

Used test instruments :

	<u>Type</u>	<u>Model No.</u>	<u>Manufacturer</u>	<u>Serial No.</u>	<u>Last Cal.</u>	<u>Interval</u>
<u> X </u> -	Test Receiver(R-7)	ESI7	Rohde & Schwarz	100059	2003/10	1 Year
<u> </u> -	Test Receiver(R-8)	ESCS30	Rohde & Schwarz	100203	2004/2	1 Year
<u> </u> -	Test Receiver(R-1)	ESHS30	Rohde & Schwarz	842053/001	2003/11	1 Year
<u> X </u> -	Loop Antenna(A-17)	HFH2-Z2	Rohde & Schwarz	879284/14	2003/5	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 :

JQA Safety & EMC Center EMC Engineering Department TSURU EMC Branch
2096 Ohata, Tsuru-shi Yamanashi-ken 402-0045, JAPAN

 - Open Site No. 1 (3, 10 or 30 meters)

 - Open Site No. 2 (3 or 10 meters)

 x - Anechoic Chamber(3 or 10 meters)

Validation of Site Attenuation :

1) Last Confirmed Date :May. 2003

2) Interval :1 year

Used test instruments :

	<u>Type</u>	<u>Model No.</u>	<u>Manufacturer</u>	<u>Serial No.</u>	<u>Last Cal.</u>	<u>Interval</u>
<u> X </u> -	Test Receiver(R-7)	ESI7	Rohde & Schwarz	100059	2003/10	1 Year
<u> </u> -	Test Receiver(R-8)	ESCS30	Rohde & Schwarz	100203	2004/2	1 Year
<u> </u> -	Test Receiver(R-6)	ESVS10	Rohde & Schwarz	84231/004	2004/3	1 Year
<u> </u> -	Test Receiver(R-5)	ESVS10	Rohde & Schwarz	843744/018	2004/4	1 Year
<u> </u> -	Biconical Antenna(A-4)	BBA9106	Schwarzbeck	91031741	2003/5	1 Year
<u> </u> -	Biconical Antenna(A-2)	BBA9106	Schwarzbeck	91031516	2003/5	1 Year
<u> X </u> -	Biconical Antenna(A-3)	BBA9106	Schwarzbeck	11905516	2003/5	1 Year
<u> </u> -	Log-Periodic Antenna(A-6)	UHALP9107	Schwarzbeck	9107915	2003/5	1 Year
<u> </u> -	Log-Periodic Antenna(A-8)	UHALP9107	Schwarzbeck	1357	2003/5	1 Year
<u> X </u> -	Log-Periodic Antenna(A-9)	UHALP9108	Schwarzbeck	0278	2003/5	1 Year
<u> </u> -	Dipole Antenna(A-11)	KBA-511A	Kyoritsu Electrical	0-195-5	2003/8	1 Year
<u> </u> -	Dipole Antenna(A-12)	KBA-611	Kyoritsu Electrical	0-196-8	2003/8	1 Year
<u> </u> -	Dipole Antenna(A-13)	KBA-511A	Kyoritsu Electrical	0-228-13	2003/8	1 Year
<u> </u> -	Dipole Antenna(A-14)	KBA-611	Kyoritsu Electrical	0-230-6	2003/8	1 Year
<u> </u> -	RF Cable(C-1)	20D/5D-2W	Fujikura	No.1	2003/5	1 Year
<u> </u> -	RF Cable(C-2)	20D/5D-2W	Fujikura	No.2	2003/5	1 Year
<u> X </u> -	RF Cable(C-3)	20D/5D-2W	Fujikura	No.3	2003/5	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 :

JQA Safety & EMC Center EMC Engineering Department TSURU EMC Branch
2096 Ohata, Tsuru-shi Yamanashi-ken 402-0045, JAPAN

___ - Open Site No. 1 (3, 10 or 30 meters)

___ - Open Site No. 2 (3 or 10 meters)

___ - Anechoic Chamber(3 or 10 meters)

Validation of Site Attenuation :

1) Last Confirmed Date : N/A

2) Interval : N/A

Used test instruments :

	<u>Type</u>	<u>Model No.</u>	<u>Manufacturer</u>	<u>Serial No.</u>	<u>Last Cal.</u>	<u>Interval</u>
___ -	Spectrum Analyzer(S-1)	8563E	Hewlett Packard	3438A00756	2004/4	1 Year
___ -	Spectrum Analyzer(S-3)	R3361C	Advantest	71720774	2003/5	1 Year
___ -	Log-Periodic Antenna(A-9)	UHALP9108	Schwarzbeck	0278	2003/5	1 Year
___ -	Log-Periodic Antenna(A-20)	USLP9143	Schwarzbeck	140	2003/5	1 Year
___ -	Log-Periodic Antenna(A-15)	94612-1	Eaton	-	2003/5	1 Year
___ -	Pre-Amplifier(PA-5)	WJ-6611-513	Watkins Johnson	0288	2003/5	1 Year
___ -	Pre-Amplifier(PA-6)	WJ-6682-834	Watkins Johnson	0052	2003/5	1 Year
___ -	Pre-Amplifier(PA-7)	WJ-6870-506	Watkins Johnson	0018	2003/5	1 Year
___ -	RF Cable(7m)(C-4)	SUCOFLEX 104	Suhner	52146/4	2003/5	1 Year
___ -	RF Cable(3m)(C-5)	SUCOFLEX 104	Suhner	52053/4	2003/5	1 Year
___ -	RF Cable(2m)(C-6)	SUCOFLEX 104	Suhner	39934/4	2003/5	1 Year
___ -	RF Cable(1m)(C-7)	SUCOFLEX 104	Suhner	35687/4	2003/5	1 Year

1.3.5 The measurement of the Frequency Stability x - was performed. - was not applicable.**Used test instruments :**

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> x </u> - Frequency Counter	53131A	Hewlett Packard	3546A11807	2003/05	1 Year
<u> x </u> - Oven	-	Ohnishi Co. Ltd.	-	2003/08	1 Year
<u> </u> - DC Power Supply	6628A	Hewlett Packard	3224A00284	2003/07	1 Year

1.3.6 The measurement of the Occupied Bandwidth x - was performed. - was not applicable.**Used test instruments :**

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> x </u> - Test Receiver	ESI7	Rohde & Schwarz	100059	2003/10	1 Year
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	2003/9	1 Year
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	2003/9	1 Year
<u> </u> - Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	2003/5	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	2004/4	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	2003/5	1 Year
<u> </u> - Function Generator	3325A	Hewlett Packard	2512A21776	2003/5	1 Year
<u> </u> - FM Linear Detector	MS61A	Anritsu Corp.	M77486	2003/9	1 Year
<u> </u> - Level Meter	ML422C	Anritsu Corp.	M87571	2003/6	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 x - Applicable - NOT Applicable
[\$15.207(a)]

The requirements are x - PASSED - NOT PASSED

Remarks :

Radiated Emission [\$15.225(a)(b)] x - Applicable - NOT Applicable

The requirements are x - PASSED - NOT PASSED

Remarks:

Frequency Stability[\$15.225(e)] x - Applicable - NOT Applicable

The requirements are x - PASSED - NOT PASSED

Remarks:

Occupied Bandwidth[\$15.225(d)] x - Applicable - NOT Applicable

The requirements are x - PASSED - NOT PASSED

Remarks:

AC Power Line Conducted Emission x - Applicable - NOT Applicable
for Receiver [\$15.107(a)]

The requirements are x - PASSED - NOT PASSED

Remarks :

Radiated Emission for Receiver x - Applicable - NOT Applicable
[\$15.109(a)]

The requirements are x - 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 (January 8, 2004) 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 : February 3, 2004

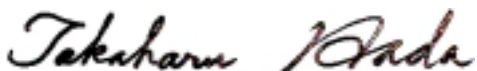
End of testing : April 22, 2004

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Signatories:

Approved by:

Issued by:



Takaharu Hada
Director
TSURU EMC Branch
JQA EMC Engineering Dept.



Kazuya Hayashi
Assistant 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.	Serial No.
A	RFID reader/writer	RISO KAGAKU CORPORATION	444-59005	-
B	O-Shape Antenna * 4	RISO KAGAKU CORPORATION	444-59006	-

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

Symbol	Item	Manufacturer	Model No.	Serial No.
C	Inkjet Printer	-	HC5000T	Y54
C-1	Printer Unit	Olympus Co., Ltd.	HC5000	-
C-2	Multi Tray Paper Feeder	RISO KAGAKU CORPORATION	HC Multi Tray Paper Feeder	-
D	Auto Control Staking Tray	RISO KAGAKU CORPORATION	Auto Control Staking Tray	97533180
E	Printer Controller	RISO KAGAKU CORPORATION	PS7R	3800011

Type of Cable :

Symbol	Description	Identification (Manufacturer etc.)	Shielded YES / NO	Ferrite Core	Connector type Shielded YES / NO	Length (m)
1	AC Cable	-	NO	NO	NO	3.3
2	Signal Cable	-	NO	NO	NO	1.0
3	Antenna Cable	-	YES	NO	YES	0.5

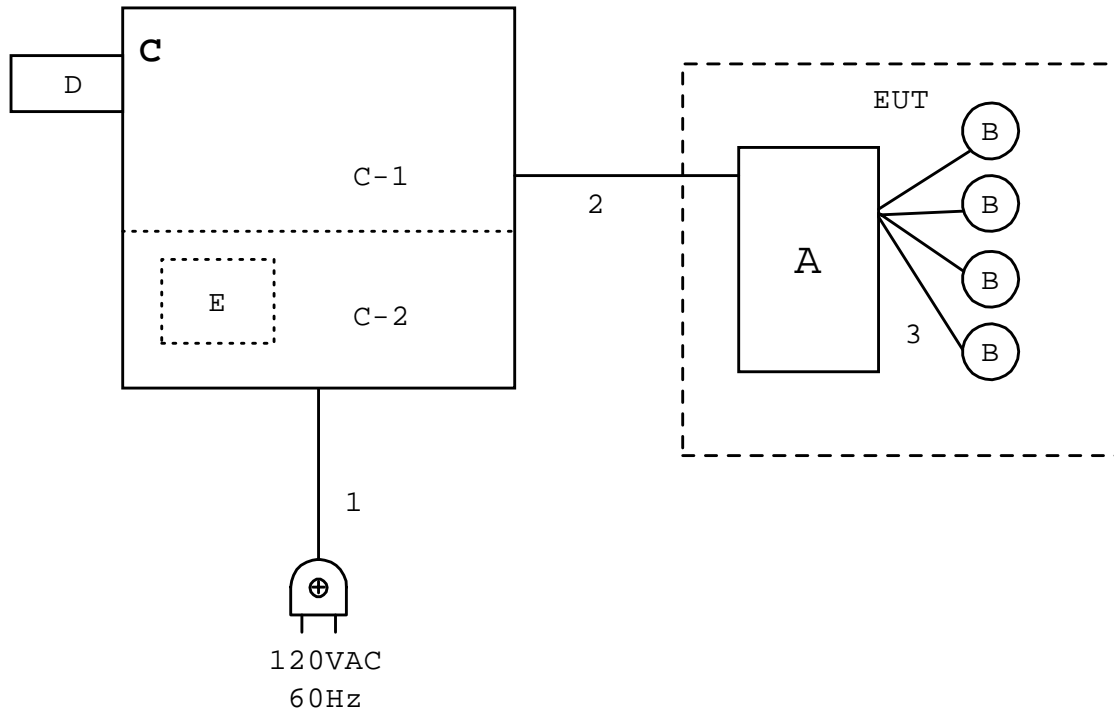
1.7.2 Operating condition

Power Supply Voltage : 5.0VDC*

*:The EUT was operated with the printer.(Input: 120Vac 60Hz, Output: 5.0Vdc)

The tests have been carried out under continuous transmission/ Reception Mode.

1.8 EUT ARRANGEMENT (DRAWINGS)



1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

1.9.1 AC Power Line Conducted Emission (150 kHz - 30 MHz) :

According to description of ANSI C63.4-2001 sec.13.1.3, the AC power line preliminary conducted emissions measurements were carried out.

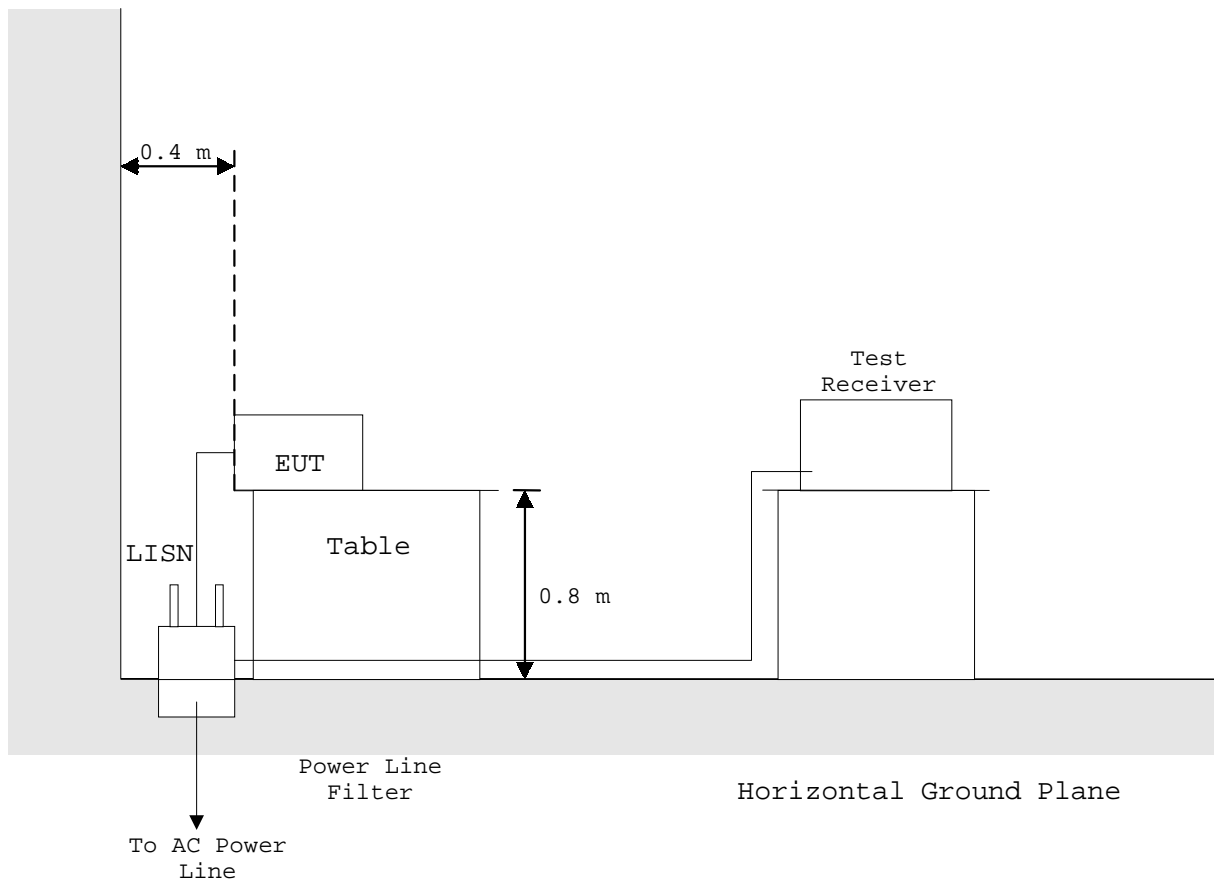
The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT.

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 -

Vertical
Ground
Plane

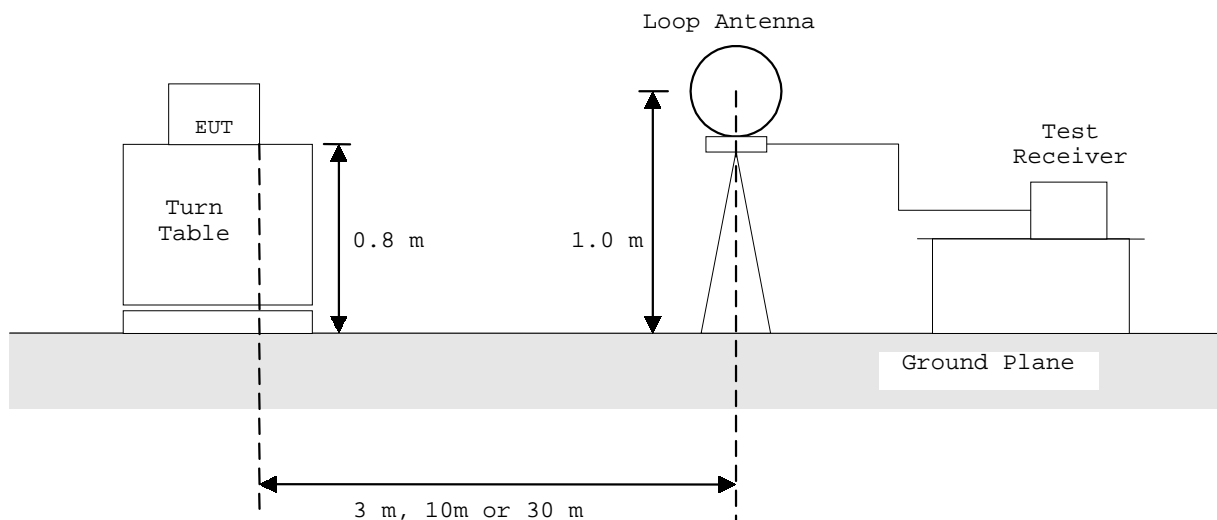


1.9.2 Radiated Emission (9 kHz - 30 MHz) :

According to description of ANSI C63.4-2001 sec.13.1.4, 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 -



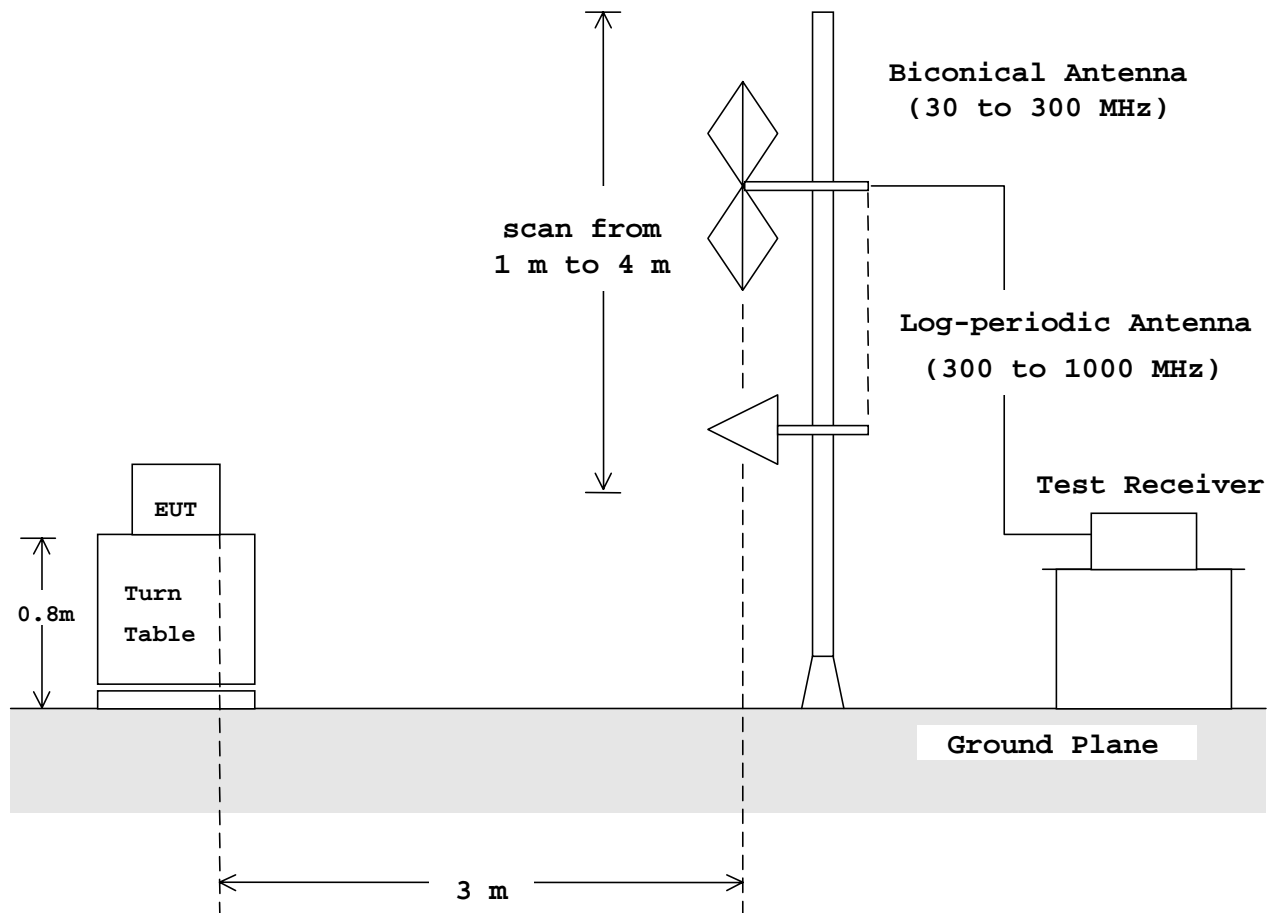
1.9.3 Radiated Emission (30 MHz - 1000 MHz) :

According to description of ANSI C63.4-2001 sec.13.1.4, 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 -



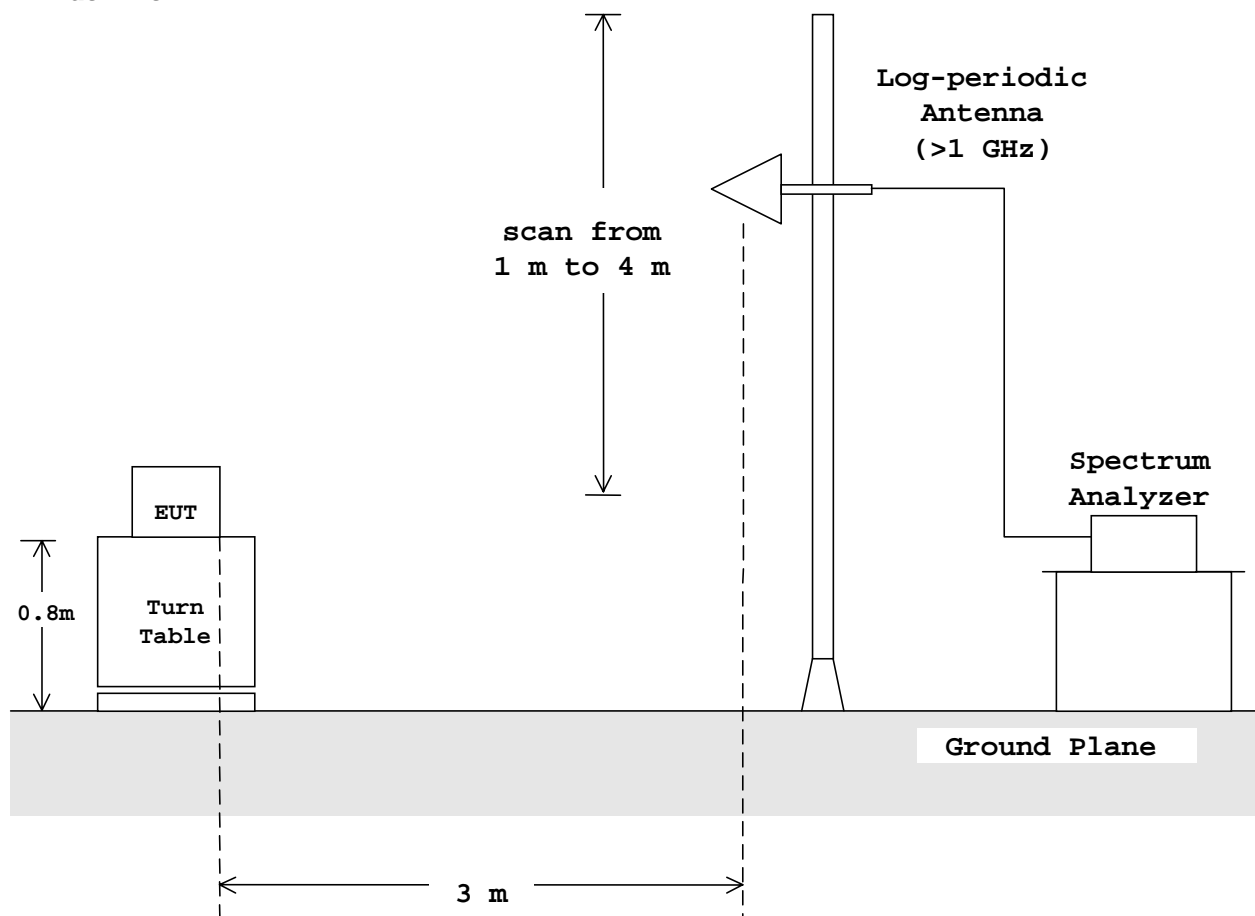
1.9.4 Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4-2001 sec.13.1.4, 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

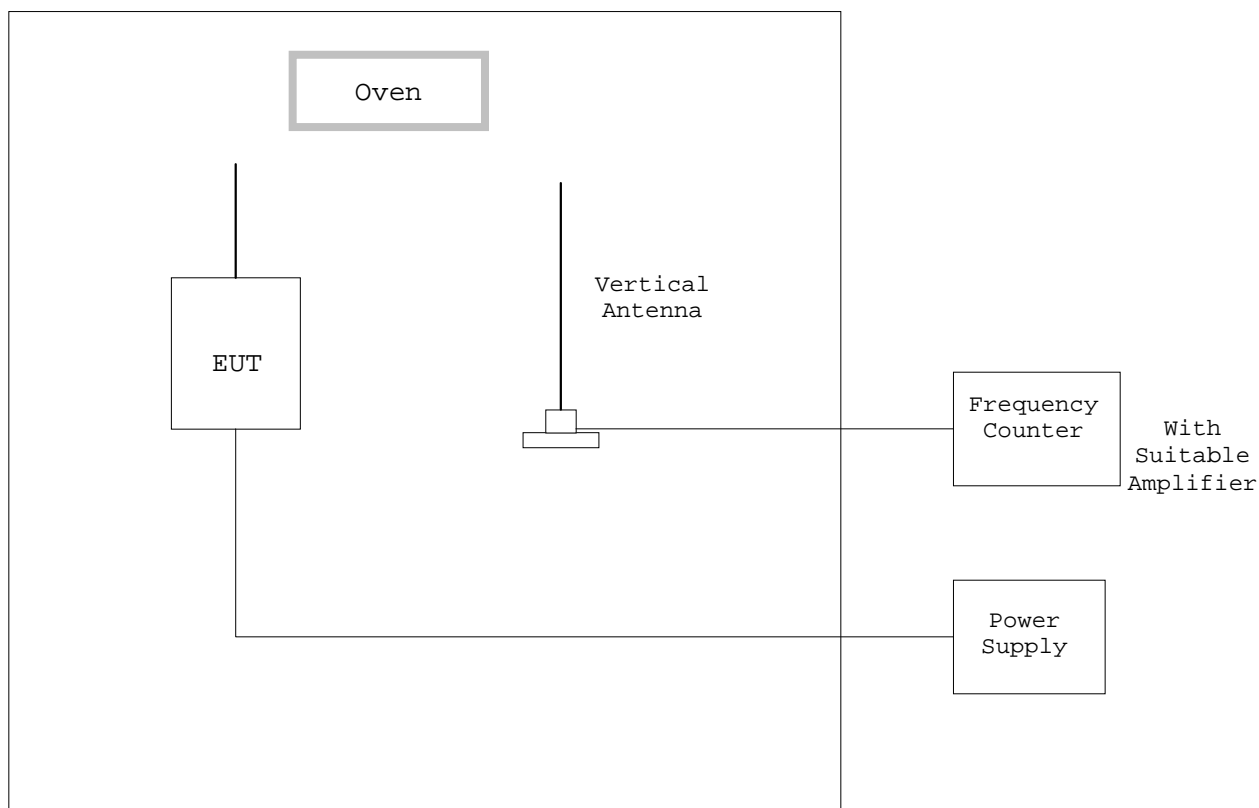
- Side View -



1.9.5 Frequency Stability :

According to description of ANSI C63.4-2001 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 $+20^{\circ}\text{C}$.

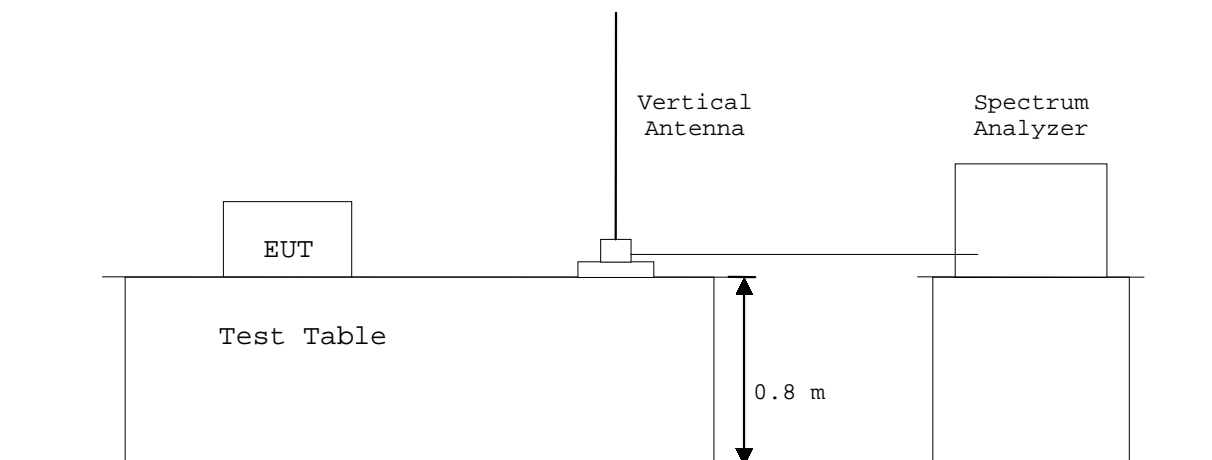
These measurements were carried out after allow sufficient time (approximately 1 hour) for the temperature of the chamber to stabilize.



1.9.6 Occupied Bandwidth :

According to description of ANSI C63.4-2001 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 CONDUCTED EMISSION MEASUREMENT - Rear View -



- Side View -



PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission

- Front View -



- Rear View -



2. TEST DATA

2.1 AC Power Line Conducted Emission Measurement (0.15 MHz - 30 MHz)

Date : April 21, 2004

Temp.: 24 °C Humi.: 35 %

Operating Condition : TX/ RX
 Operating Frequency : 13.56 MHz

Frequency (MHz)	AMN	Meter Reading (dBμV)				Limits		Emission Level		Margin		Comment
	Factor	V-A		V-B		(dBμV)		(dBμV)		(dB)		
	(dB)	Q.P	AVE	Q.P	AVE	Q.P	AVE	Q.P	AVE	Q.P	AVE	
0.15	0.1	33.4	-	33.4	-	66.0	56.0	33.5	-	32.5	-	
0.17	0.1	37.1	-	37.0	-	65.0	55.0	37.2	-	27.8	-	
0.25	0.1	25.7	-	26.4	-	61.8	51.8	26.5	-	35.3	-	
0.39	0.1	18.8	-	18.4	-	58.1	48.1	18.9	-	39.2	-	
0.53	0.1	< 10.0	-	< 10.0	-	56.0	46.0	< 10.1	-	> 45.9	-	
1.00	0.1	< 10.0	-	< 10.0	-	56.0	46.0	< 10.1	-	> 45.9	-	
3.38	0.1	17.4	-	17.3	-	56.0	46.0	17.5	-	38.5	-	
4.06	0.1	19.5	-	19.5	-	56.0	46.0	19.6	-	36.4	-	
7.30	0.1	32.0	-	32.0	-	60.0	50.0	32.1	-	27.9	-	
10.79	0.2	28.4	-	28.4	-	60.0	50.0	28.6	-	31.4	-	
14.03	0.3	29.3	-	29.3	-	60.0	50.0	29.6	-	30.4	-	
16.22	0.3	27.1	-	27.0	-	60.0	50.0	27.4	-	32.6	-	
20.26	0.4	17.8	-	17.6	-	60.0	50.0	18.2	-	41.8	-	
23.13	0.5	19.6	-	19.3	-	60.0	50.0	20.1	-	39.9	-	
30.00	0.6	< 10.0	-	< 10.0	-	60.0	50.0	< 10.6	-	> 49.4	-	

- Notes: 1) Test Location : Open Site No.2
 2) The spectrum was checked from 0.15 MHz to 30 MHz
 3) AMN(Artificial Mains Network) factor includes the cable loss for 5 meter.
 4) The symbol of "<" means "or less".
 5) The symbol of ">" means "more than".
 6) The symbol of "-" means "Not applicable".
 7) V-A : One end & Ground V-B : The other end & Ground
 8) Q.P : Quasi-Peak Detector AVE : Average Detector
 9) A sample calculation was made at 0.15 MHz

$$\text{Amn} + \text{Mr} = 0.1 + 33.4 = 33.5 \text{ dB}\mu\text{V}$$

$$\text{Amn} : \text{AMN Factor} \quad \text{Mr} : \text{Meter Reading}$$

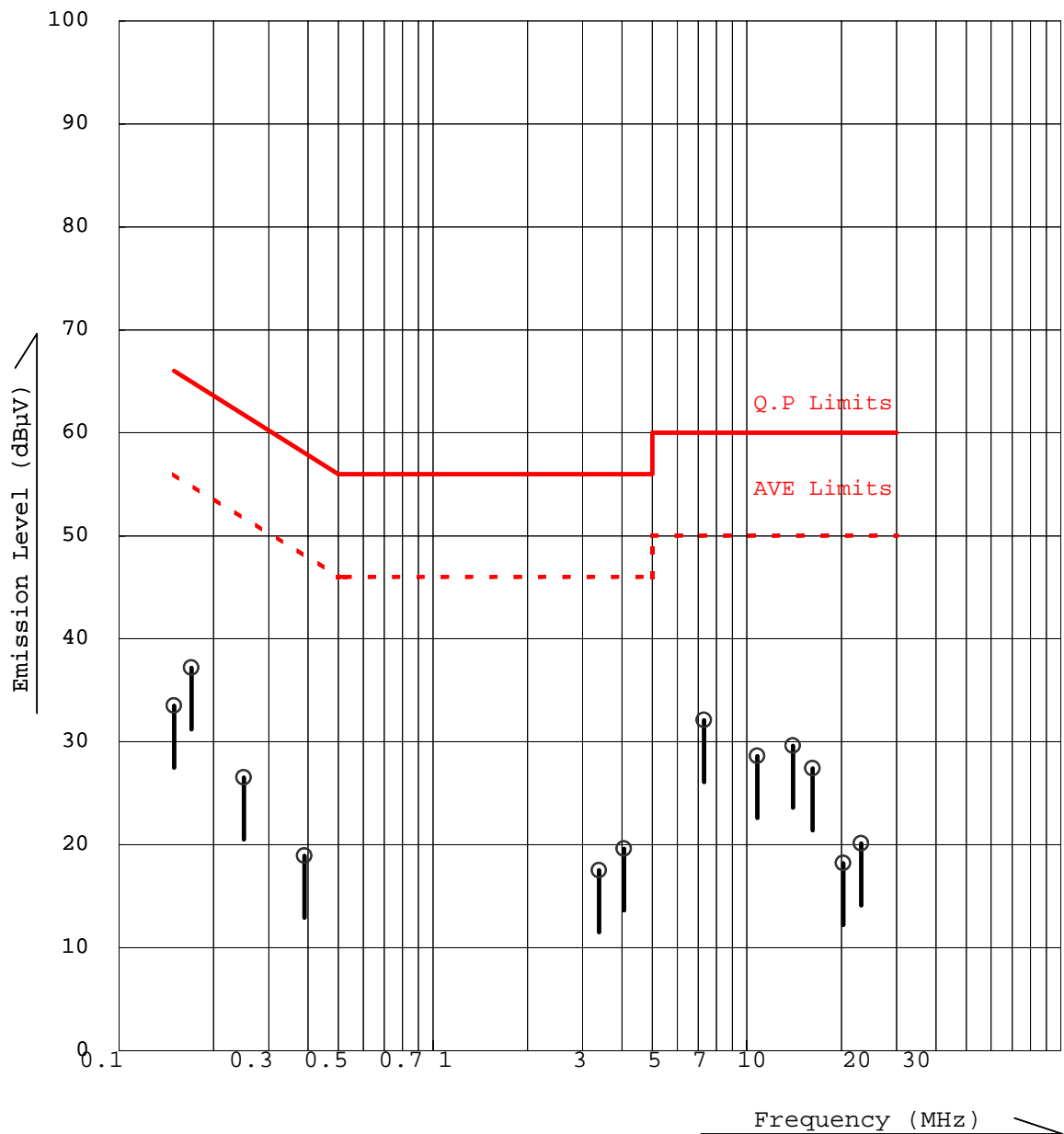
 10) Setting of measuring instrument :
 Detector Function : CISPR Quasi-Peak / Average
 IF Bandwidth : 9 kHz / 10 kHz (0.15 MHz - 30 MHz)

Tested by Y. Nakajima
 Yoichi Nakajima

AC Powerline Conducted Emissions Measurements (0.15 MHz - 30 MHz)

Operating Condition : TX/ RX

Classifications	: B	○	Q.P Mode
		×	AVE Mode



2.2 Radiated Emissions Measurement(9 kHz - 30 MHz)

Date : April 22, 2004
Temp.: 22 °C Humi.: 54 %

Operating Frequency : 13.56 MHz
Distance of Measurement : 3 meters

Frequency (MHz)	Meter Reading (dBμV/m)	Field Strength (dBμV/m)
Fundamental		
13.56	40.6	0.6
Harmonic Frequency		
27.13	< 27.0	< -13.0

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:
Detector Function : CISPR Quasi-peak Peak
IF Band width : 9 kHz

For fundamental, the measured field strength was extrapolated to distance 30 meters, using the formula that field strength varies as the inverse distance square(40 dB per decade of distance).

Calculation :

Fundamental: $40.6 \text{ dB}\mu\text{V/m} - 20\log_{10}((30/3)^2) = 40.6 - 40.0 = 0.6 \text{ dB}\mu\text{V/m}$ at 30 meters
Limits for fundamental (§15.225(a)) = $20\log_{10}(15848) = 84.0 \text{ dB}\mu\text{V/m}$
Harmonic : $27.0 \text{ dB}\mu\text{V/m} - 20\log_{10}((30/3)^2) = 27.0 - 40.0 = -13.0 \text{ dB}\mu\text{V/m}$ at 30 meters
Limits for (§15.225(d)) = $20\log_{10}(30) = 29.5 \text{ dB}\mu\text{V/m}$

Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer

2.3 Radiated Emissions Measurement(30 MHz - 1 GHz)

Date : April 22, 2004

Temp.: 22 °C Humi.: 54 %

Operating Frequency : 13.56 MHz

Distance of Measurement : 3 meters

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading (dBuV)		Limits (dBuV/m)	Emission Level (dBuV/m)		Margin (dB)		Comment
		Horiz.	Ver.		Horiz.	Ver.	Horiz.	Ver.	
40.7	15.7	4.2	8.4	40.0	19.9	24.1	20.1	15.9	
54.2	11.2	6.5	13.0	40.0	17.7	24.2	22.3	15.8	
67.8	8.1	16.9	15.8	40.0	25.0	23.9	15.0	16.1	
81.4	7.7	19.8	18.2	40.0	27.5	25.9	12.5	14.1	
94.9	10.5	6.8	11.8	43.5	17.3	22.3	26.2	21.2	
108.5	12.6	13.2	15.3	43.5	25.8	27.9	17.7	15.6	
122.0	14.0	20.6	16.3	43.5	34.6	30.3	8.9	13.2	
135.6	15.2	16.0	9.7	43.5	31.2	24.9	12.3	18.6	
149.2	16.0	14.1	8.0	43.5	30.1	24.0	13.4	19.5	
162.7	16.7	18.3	6.5	43.5	35.0	23.2	8.5	20.3	
176.3	17.7	16.3	10.1	43.5	34.0	27.8	9.5	15.7	
189.8	17.8	17.6	8.7	43.5	35.4	26.5	8.1	17.0	
203.4	17.9	14.4	5.0	43.5	32.3	22.9	11.2	20.6	
217.0	18.3	14.4	9.6	46.0	32.7	27.9	13.3	18.1	
230.5	18.8	10.8	6.8	46.0	29.6	25.6	16.4	20.4	
244.1	19.2	12.4	2.5	46.0	31.6	21.7	14.4	24.3	
257.6	19.7	13.9	3.3	46.0	33.6	23.0	12.4	23.0	
271.2	20.3	18.7	8.0	46.0	39.0	28.3	7.0	17.7	
284.8	21.0	4.6	0.4	46.0	25.6	21.4	20.4	24.6	
298.3	21.5	6.2	< -2.0	46.0	27.7	< 19.5	18.3	> 26.5	
311.9	16.9	< -2.0	< -2.0	46.0	< 14.9	< 14.9	> 31.1	> 31.1	
1000.0	28.5	< -2.0	< -2.0	54.0	< 26.5	< 26.5	> 27.5	> 27.5	

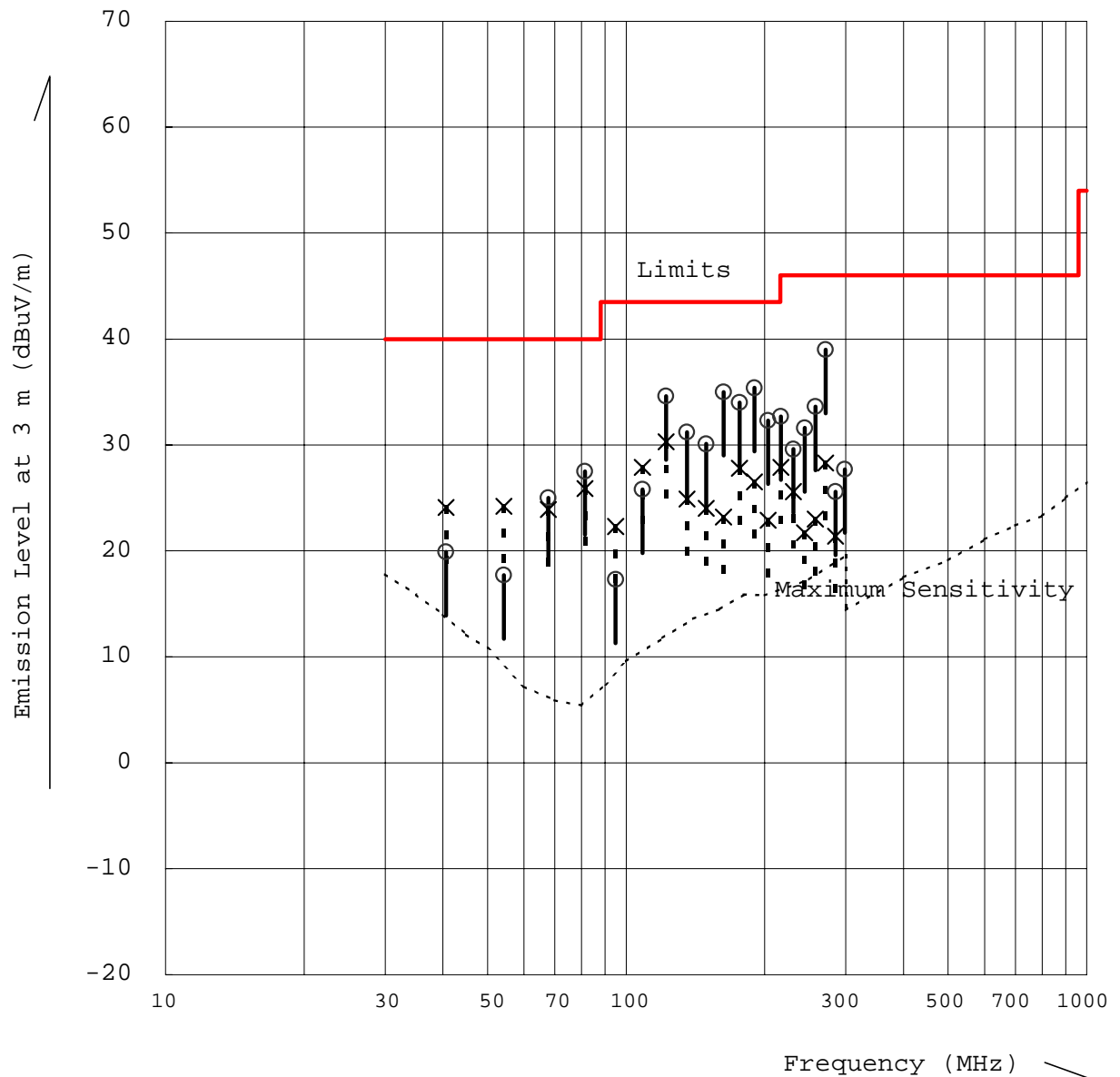
- Notes:
- 1) Test Location : Anechoic Chamber
 - 2) Test Distance : 3 m
 - 3) The spectrum was checked from 30 MHz to 1000 MHz.
 - 4) Antenna factor includes the cable loss for 33 meter.
 - 5) The symbol of "<" means "or less".
 - 6) The symbol of ">" means "more than".
 - 7) A sample calculation was made at 40.7 MHz
 $Af + Mr = 15.7 + 8.4 = 24.1 \text{ dBuV/m}$
 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

Radiated Emissions Measurements (30 MHz - 1000 MHz)

Operating Condition : TX/RX Mode

Measuring Distance : 3 m	○	Horizontal
Classifications : B	×	Vertical



2.4 Radiated Emissions Measurement(Above 1 GHz)

Note : This test was not applicable.

2.5 Frequency Stability Measurement

Date : February 3, 2004

Temp.: 23 °C Humi.: 45 %

OPERATING FREQUENCY : 13.56 MHz

Ambient Temperature	Frequency with time elapse(MHz)			
(°C)	0 minute	2 minutes	5 minutes	10 minutes
-20	+0.00675	+0.00679	+0.00680	+0.00681
50	+0.00645	+0.00644	+0.00643	+0.00642

Primary Supply Voltage	Frequency with time elapse(MHz)			
at 20°C (V)	0 minute	2 minutes	5 minutes	10 minutes
102	+0.00694	+0.00692	+0.00692	+0.00692
120	+0.00688	+0.00687	+0.00690	+0.00690
138	+0.00692	+0.00691	+0.00690	+0.00692

Specified Limit ±0.01%

Tested by :



Yoichi Nakajima

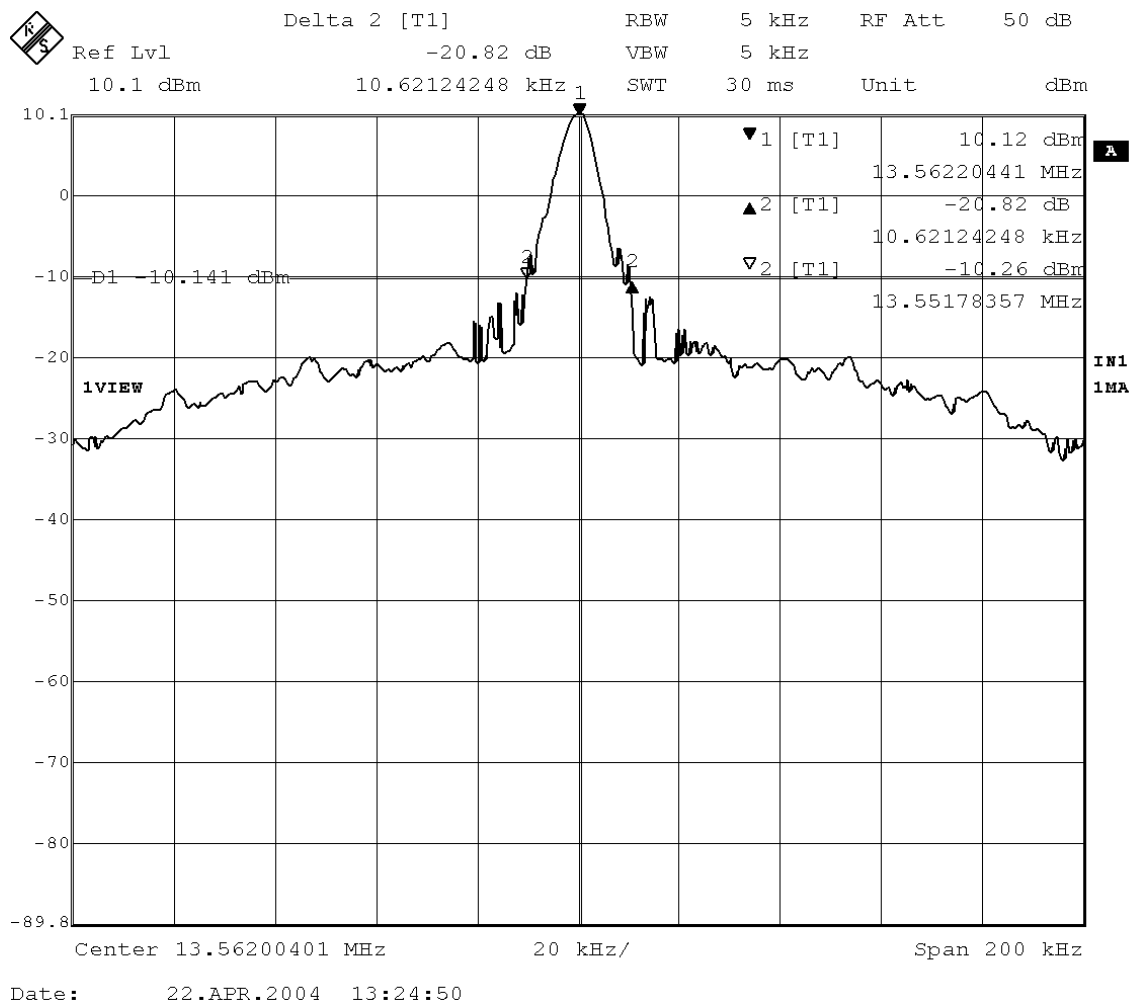
Testing Engineer

2.6 Occupied Bandwidth Measurement

Date : April 22, 2004

Temp.: 22 °C Humi.: 54 %

20dB Band width measurement result: 10.6 kHz



Tested by : Y. Nakajima
 Yoichi Nakajima
 Testing Engineer



2.7 AC Power Line Conducted Emissions for Receiver

It could not be achieved receiving only operation on the EUT so the measurement was carried out TX/ RX together. Therefore the test result is same as page 22 and 23.

2.8 Spurious Emissions for Receiver (Radiation)

Date : April 22, 2004

Temp.: 22 °C Humi.: 54 %

Mode of EUT : TX/RX

Test Port : Enclosure

It could not be achieved receiving only operation on the EUT so the measurement was carried out TX/ RX together. Therefore the test result is indicated the spurious emission other than transmitter harmonics.

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading (dBuV)		Limits (dBuV/m)	Emission Level (dBuV/m)		Margin (dB)		Comment
		Horiz.	Ver.		Horiz.	Ver.	Horiz.	Ver.	
34.2	18.2	1.0	8.9	40.0	19.2	27.1	20.8	12.9	
58.0	9.9	11.1	20.7	40.0	21.0	30.6	19.0	9.4	
64.2	8.6	28.5	27.2	40.0	37.1	35.8	2.9	4.2	
80.3	7.5	23.1	19.6	40.0	30.6	27.1	9.4	12.9	
97.2	11.0	6.0	13.9	43.5	17.0	24.9	26.5	18.6	
110.6	12.8	5.2	12.1	43.5	18.0	24.9	25.5	18.6	
147.6	15.9	9.2	14.1	43.5	25.1	30.0	18.4	13.5	
194.2	17.8	9.3	12.0	43.5	27.1	29.8	16.4	13.7	
213.6	18.3	8.1	15.1	43.5	26.4	33.4	17.1	10.1	
232.9	18.8	13.5	11.5	46.0	32.3	30.3	13.7	15.7	
252.4	19.4	17.8	14.5	46.0	37.2	33.9	8.8	12.1	
290.2	21.2	15.8	12.3	46.0	37.0	33.5	9.0	12.5	
310.5	16.8	10.7	8.9	46.0	27.5	25.7	18.5	20.3	
368.8	18.8	14.5	9.1	46.0	33.3	27.9	12.7	18.1	
543.7	22.1	14.3	13.8	46.0	36.4	35.9	9.6	10.1	
640.8	23.7	10.2	14.2	46.0	33.9	37.9	12.1	8.1	
718.8	24.5	4.8	10.9	46.0	29.3	35.4	16.7	10.6	
1000.0	28.5	< -2.0	< -2.0	54.0	< 26.5	< 26.5	> 27.5	> 27.5	

- Notes: 1) Test Location : Anechoic Chamber
 2) Test Distance : 3 m
 3) The spectrum 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 34.2 MHz
 $Af + Mr = 18.2 + 8.9 = 27.1 \text{ dBuV/m}$
 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)

Operating Condition : TX/ RX Mode

Measuring Distance : 3 m	○	Horizontal
Classifications : B	×	Vertical

