



EMI TEST REPORT

JQA File No. : 441-50434

Model No. : 045-50007

Type of Equipment : RF-Module (RFID Tag Reader/Writer)

Regulations Applied : CFR 47 FCC Rules and Regulations Part 15

FCC ID : RPARFA3

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 : July 23, 2005

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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TABLE OF CONTENTS

	Page
1 Documentation	
1.1 Test Regulation	<u>3</u>
1.2 General Information	<u>3</u>
1.3 Test Condition	<u>4 - 8</u>
1.4 EUT Modifications / Deviation from Standard	<u>9</u>
1.5 Test results	<u>10</u>
1.6 Summary	<u>11</u>
1.7 Test Configuration / Operation of EUT	<u>12</u>
1.8 EUT Arrangement(Drawing)	<u>13</u>
1.9 Preliminary Test and Test-setup (Drawings)	<u>14 - 18</u>
1.10 EUT Arrangement (Photographs)	<u>19 - 21</u>
2 Test Data	
2.1 AC Power Line Conducted Emission 0.45 MHz - 30 MHz	<u>22 - 23</u>
2.2 Radiated Emission (Electric Field)9 kHz - 30 MHz	<u>24</u>
2.3 Radiated Emission (Electric Field)30 MHz - 1000 MHz	<u>25 - 26</u>
2.4 Radiated Emission (Electric Field) Above 1 GHz	<u>N/A</u>
2.5 Frequency Stability	<u>27</u>
2.6 Occupied Bandwidth	<u>28</u>
2.7 AC Power Line Conducted Emissions for Receiver	<u>N/A</u>
2.8 Spurious Emissions for Receiver (Radiation)	<u>N/A</u>

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 C63.4-2003.

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: 342182 (Date of Listing : March 30, 2005)

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, 2006)

1.2.2 Description of the Equipment Under Test (EUT) :

1) Type of Equipment	: RF-Module (RFID Tag Reader/Writer)
2) Product Type	: Prototype
3) Category	: Low Power Communication Device
4) EUT Authorization	: Certification
5) FCC ID	: RPARFA3
6) Trade Name	: RISO
7) Model No.	: 045-50007
8) Operating Frequency Range	: 13.56 MHz
9) Highest Frequency Used in the EUT	: 13.56 MHz
10) Serial No.	: FL12
11) Date of Manufacture	: -
12) Power Rating	: 5.0VDC(*)
13) EUT Grounding	: None

*The EUT was operated with the host 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

- ☒ - 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
☐ - Open Site No.2

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<input checked="" type="checkbox"/>	Test Receiver (R-3)	ESI7	Rohde & Schwarz	100059	2004/11	1 Year
<input type="checkbox"/>	Test Receiver (R-4)	ESHS30	Rohde & Schwarz	842053/001	2005/2	1 Year
<input type="checkbox"/>	Test Receiver (R-5)	ESCS30	Rohde & Schwarz	100203	2005/2	1 Year
<input type="checkbox"/>	AMN (L-1)	KNW-407	Kyoritsu Electrical	8-833-5	2004/10	1 Year
<input type="checkbox"/>	AMN (L-2)	KNW-407	Kyoritsu Electrical	8-680-14	2004/10	1 Year
<input checked="" type="checkbox"/>	AMN (L-3)	KNW-407	Kyoritsu Electrical	8-757-1	2005/6	1 Year
<input type="checkbox"/>	AMN (L-4)	KNW-242	Kyoritsu Electrical	8-755-1	2005/6	1 Year
<input type="checkbox"/>	AMN (L-5)	KNW-242C	Kyoritsu Electrical	8-837-14	2005/6	1 Year
<input type="checkbox"/>	AMN (L-6)	KNW-243C	Kyoritsu Electrical	8-692-5	2004/9	1 Year
<input type="checkbox"/>	AMN (L-7)	KNW-243C	Kyoritsu Electrical	8-831-3	2005/6	1 Year
<input type="checkbox"/>	AMN (L-8)	KNW-243C	Kyoritsu Electrical	8-831-4	2005/6	1 Year
<input type="checkbox"/>	AMN (L-9)	KNW-243C	Kyoritsu Electrical	8-831-2	2004/9	1 Year
<input type="checkbox"/>	ISN (L-10)	ENY41	Rohde & Schwarz	0830663/046	2005/2	1 Year
<input type="checkbox"/>	ISN (L-11)	ENY22	Rohde & Schwarz	0830661/029	2005/2	1 Year
<input checked="" type="checkbox"/>	RF Cable (CB-3)	3D-2W	Fujikura	-	2005/5	1 Year
<input type="checkbox"/>	RF Cable (CB-4)	3D-2W	Fujikura	-	2005/5	1 Year
<input type="checkbox"/>	RF Cable (CB-5)	3D-2W	Fujikura	-	2005/5	1 Year
<input checked="" type="checkbox"/>	Pulse Limiter (PL-3)	ESH3-Z2	Rohde & Schwarz	-	2004/11	1 Year
<input type="checkbox"/>	Pulse Limiter (PL-4)	ESH3-Z2	Rohde & Schwarz	-	2005/2	1 Year
<input type="checkbox"/>	Pulse Limiter (PL-5)	ESH3-Z2	Rohde & Schwarz	-	2005/2	1 Year
<input type="checkbox"/>	50ohm Termination(TM-1)	BNC-P-1.5	TDC	-	2005/3	1 Year
<input type="checkbox"/>	50ohm Termination(TM-2)	-	Y&R	-	2005/3	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-3)	ESI7	Rohde & Schwarz	100059	2004/11	1 Year
___ -	Test Receiver (R-4)	ESHS30	Rohde & Schwarz	842053/001	2005/2	1 Year
___ -	Test Receiver (R-5)	ESCS30	Rohde & Schwarz	100203	2005/2	1 Year
<u>X</u> -	Loop Antenna (AL-0)	HFH2-Z2	Rohde & Schwarz	879284/14	2005/6	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 : 2005/5

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>
___	Test Receiver(R-1)	ESVS10	Rohde & Schwarz	84231/004	2005/3	1 Year
___	Test Receiver(R-2)	ESVS10	Rohde & Schwarz	843744/018	2004/7	1 Year
<u>X</u> -	Test Receiver(R-3)	ESI7	Rohde & Schwarz	100059	2004/11	1 Year
___	Test Receiver(R-5)	ESCS30	Rohde & Schwarz	100203	2005/2	1 Year
___	Biconical Antenna(AB-1)	BBA9106	Schwarzbeck	VHA91031741	2005/5	1 Year
___	Biconical Antenna(AB-2)	BBA9106	Schwarzbeck	VHA91032349	2005/5	1 Year
<u>X</u> -	Biconical Antenna(AB-3)	BBA9106	Schwarzbeck	VHA11905516	2005/5	1 Year
___	Log-Periodic Antenna(AL-1)	UHALP9108A	Schwarzbeck	0678	2005/5	1 Year
___	Log-Periodic Antenna(AL-2)	UHALP9108A	Schwarzbeck	0679	2005/5	1 Year
<u>X</u> -	Log-Periodic Antenna(AL-3)	UHALP9108	Schwarzbeck	0278	2005/5	1 Year
___	Log-Periodic Antenna(AL-4)	USLP9143	Schwarzbeck	140	2005/6	1 Year
___	Dipole Antenna(AD-1)	KBA-511A	Kyoritsu Electrical	0-195-5	2004/9	1 Year
___	Dipole Antenna(AD-2)	KBA-511A	Kyoritsu Electrical	0-228-13	2004/9	1 Year
___	Dipole Antenna(AD-3)	KBA-611	Kyoritsu Electrical	0-196-8	2004/9	1 Year
___	Dipole Antenna(AD-4)	KBA-611	Kyoritsu Electrical	0-230-6	2004/9	1 Year
___	RF Cable(CN-1)	20D/5D-2W	Fujikura	-	2005/5	1 Year
___	RF Cable(CN-2)	20D/5D-2W	Fujikura	-	2005/5	1 Year
<u>X</u> -	RF Cable(CN-3)	20D/5D-2W	Fujikura	-	2005/5	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>
___ - Test Receiver (R-3)	ESI7	Rohde & Schwarz	100059	2004/11	1 Year
___ - Test Receiver (R-5)	ESCS30	Rohde & Schwarz	100203	2005/2	1 Year
___ - Spectrum Analyzer (S-1)	R3361C	Advantest	71720774	2005/4	1 Year
___ - Spectrum Analyzer (S-4)	8563E	Hewlett Packard	3221A00201	2005/4	1 Year
___ - Log-Periodic Antenna (AL-4)	USLP9143	Schwarzbeck	140	2005/6	1 Year
___ - Log-Periodic Antenna (AL-5)	94612-1	Eaton	97062301	2005/4	1 Year
___ - Horn Antenna (AH-5)	12-12	Scientific Atlanta	770	2005/5	1 Year
___ - RF Cable (CS-1)	SUCOFLEX 104	Suhner	121947/4	2005/5	1 Year
___ - RF Cable (CS-2)	SUCOFLEX 104	Suhner	35687/4	2005/5	1 Year
___ - RF Cable (CS-3)	SUCOFLEX 104	Suhner	39934/4	2005/5	1 Year
___ - RF Cable (CS-4)	SUCOFLEX 104	Suhner	52053/4	2005/5	1 Year
___ - RF Cable (CS-5)	SUCOFLEX 104	Suhner	52146/4	2005/5	1 Year
___ - Pre-Amplifier; (PA-1)	WJ-6811-513	Watkins Johnson	0288	2005/5	1 Year
___ - Pre-Amplifier; (PA-2)	WJ-6682-824	Watkins Johnson	0052	2005/5	1 Year
___ - Pre-Amplifier; (PA-3)	WJ-6870-506	Watkins Johnson	0018	2005/5	1 Year

1.3.5 The measurement of the Frequency Stability

 X - was performed.
 - was not applicable.

Test location :

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

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> X </u> - Frequency Counter	53131A	Hewlett Packard	3546A11807	2005/05	1 Year
<u> X </u> - Oven	-	Ohnishi Co. Ltd.	-	2004/08	1 Year
<u> </u> - DC Power Supply	6628A	Hewlett Packard	3224A00284	2005/07	1 Year
<u> </u> - Test Receiver	ESI26	Rohde & Schwarz	100043	2004/08	1 Year

1.3.6 The measurement of the Occupied Bandwidth

 X - was performed.
 - was not applicable.

Test location :

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

Used test instruments :

Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
<u> X </u> - Test Receiver	ESI7	Rohde & Schwarz	100059	2004/10	1 Year
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	2004/9	1 Year
<u> </u> - Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	2004/9	1 Year
<u> </u> - Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	2005/5	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	2005/4	1 Year
<u> </u> - Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	2005/5	1 Year
<u> </u> - Function Generator	3325A	Hewlett Packard	2512A21776	2005/5	1 Year
<u> </u> - FM Linear Detector	MS61A	Anritsu Corp.	M77486	2005/9	1 Year
<u> </u> - Level Meter	ML422C	Anritsu Corp.	M87571	2005/6	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 X - **Applicable** - **NOT Applicable**
[§15.225(a)(b)]

The requirements are X - **PASSED** - **NOT PASSED**

Remarks: _____

Frequency Stability X - **Applicable** - **NOT Applicable**
[§15.225(e)]

The requirements are X - **PASSED** - **NOT PASSED**

Remarks: _____

Occupied Bandwidth X - **Applicable** - **NOT Applicable**
[§15.225(d)]

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

Remarks: Reference data for RSS210 requirement.

AC Power Line Conducted Emission - **Applicable** X - **NOT Applicable**
for Receiver [§15.107(a)]

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

Remarks: The transceiver is used in combination with permanently co-located transmitter continuously transmitting, and it start to TX/RX at the time of the power is on simultaneously. Therefore this requirement could not be measured under RX or Standby mode.

Radiated Emission for Receiver - **Applicable** X - **NOT Applicable**
[§15.109(a)]

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

Remarks: The transceiver is used in combination with permanently co-located transmitter continuously transmitting, and it start to TX/RX at the time of the power is on simultaneously. Therefore this requirement could not be measured under RX or Standby mode.

1.6 SUMMARY**General Remarks :**

The EUT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and C 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 23, 2005

End of testing : July 29, 2005

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Tested by:



Yoichi Nakajima
Manager
TSURU EMC Branch
JQA EMC Engineering Dept.

Approved by:



Takaharu Hada
Director
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	RF-Module (RFID Tag Reader/Writer)	RISO KAGAKU CORPORATION	045-50007	FL12
B	D-Shape Antenna	RISO KAGAKU CORPORATION	444-59002	-
C	O-Shape Antenna	RISO KAGAKU CORPORATION	444-59006	-
D	Interconnecting PCB	RISO KAGAKU CORPORATION	024-17178	-
E	Interconnecting PCB	RISO KAGAKU CORPORATION	023-28218	-

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

Symbol	Item	Manufacturer	Model No.	Serial No.
F	Duplicator	RISO KAGAKU CORPORATION	RZ997U	-
G	Multi Tray Paper Feeder	RISO KAGAKU CORPORATION	Multi Tray Paper Feeder	-

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	3.0
2	Signal Cable	-	NO	NO	NO	1.0
3	Antenna Cable(Coaxial)	-	YES	Yes	YES	0.5
4	Antenna Cable(Twisted Wire)	-	No	NO	No	0.1
5	Antenna Cable(Coaxial)	-	YES	NO	YES	0.7
6	Antenna Cable(Coaxial)	-	YES	NO	YES	1.5
7	Antenna Cable(Coaxial)	-	YES	NO	YES	0.2
8	Antenna Cable(Coaxial)	-	YES	NO	YES	0.7

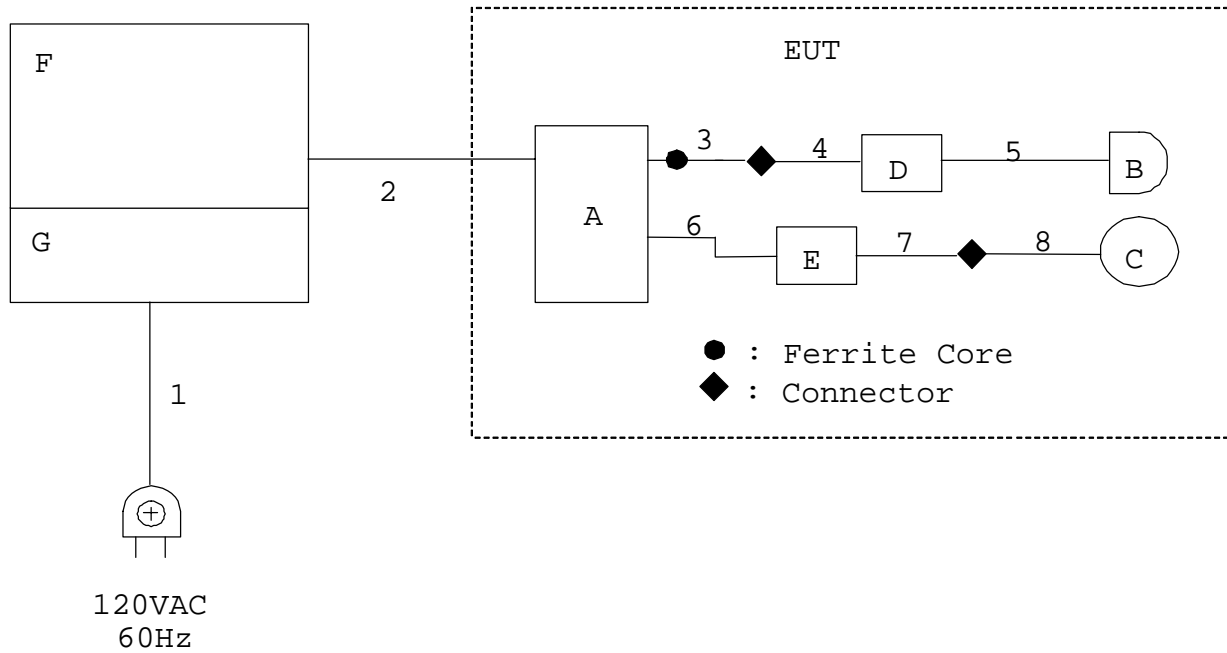
1.7.2 Operating condition

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) :

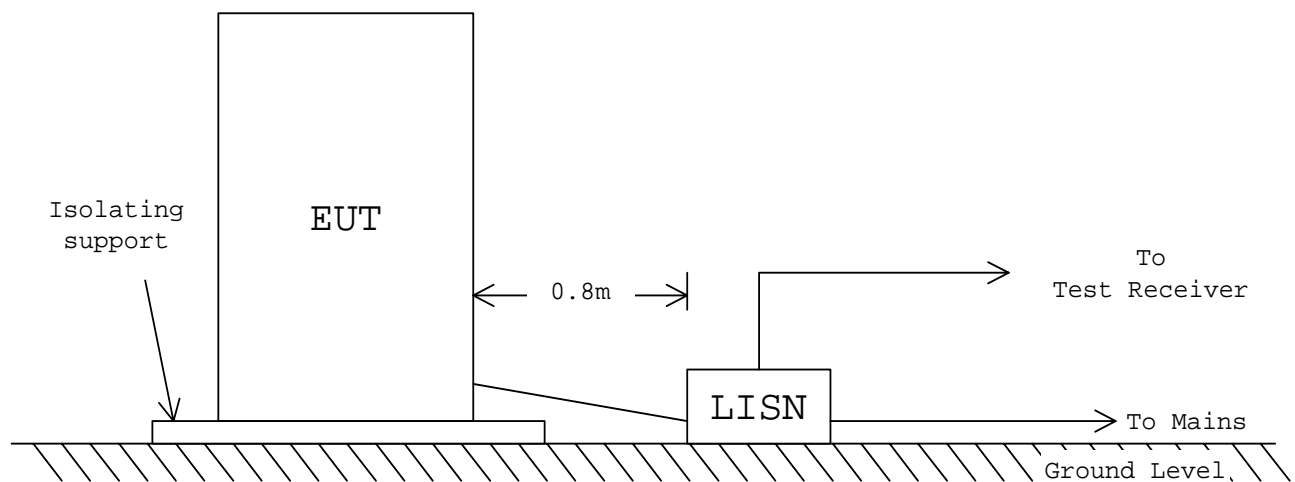
According to description of ANSI C63.4-2003 sec.13.1.3, the AC power line preliminary conducted emissions measurements were carried out.

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 -

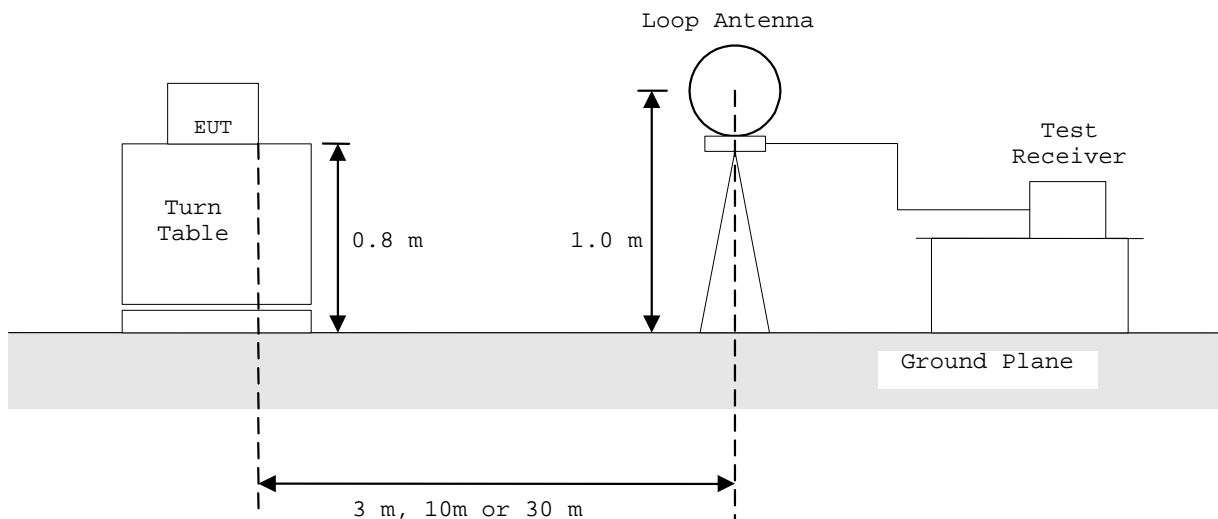


1.9.2 Radiated Emission (9 kHz - 30 MHz) :

According to description of ANSI C63.4-2003 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 -

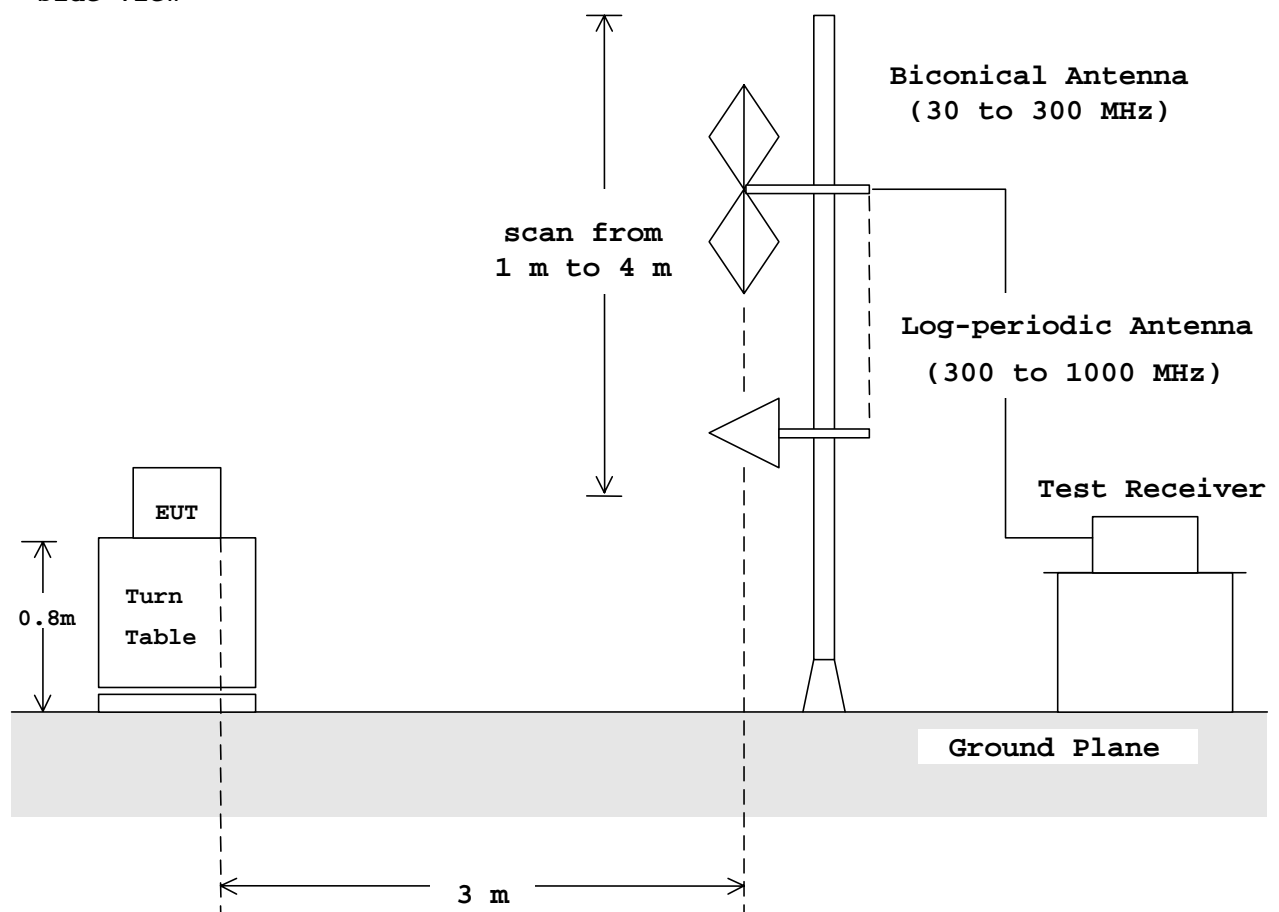


1.9.3 Radiated Emission (30 MHz - 1000 MHz) :

According to description of ANSI C63.4-2003 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.

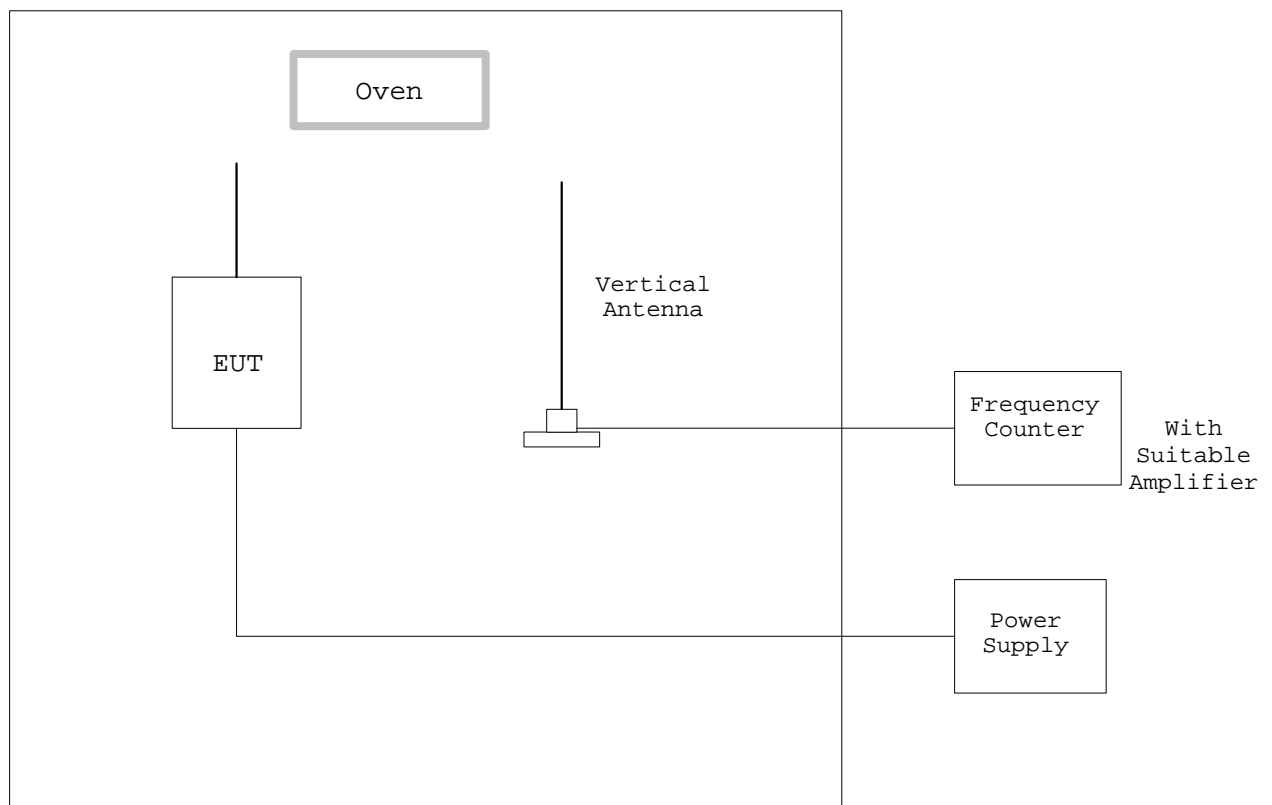
- Side View -



1.9.4 Frequency Stability :

According to description of ANSI C63.4-2003 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 $+20^{\circ}\text{C}$.

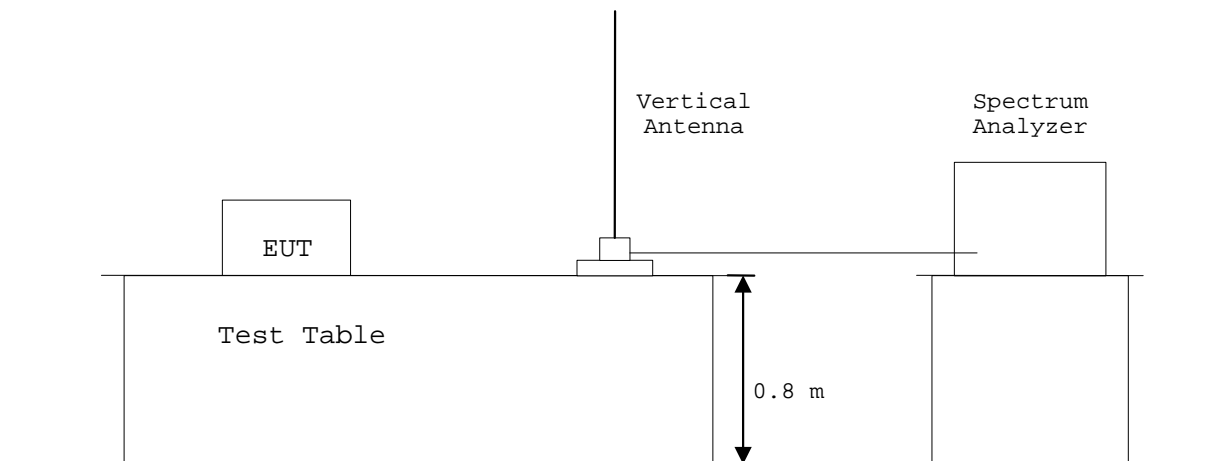
These measurements were carried out after allow sufficient time (approximately 1 hour) for the temperature of the chamber to stabilize.



1.9.6 Occupied Bandwidth :

According to description of ANSI C63.4-2003 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 -



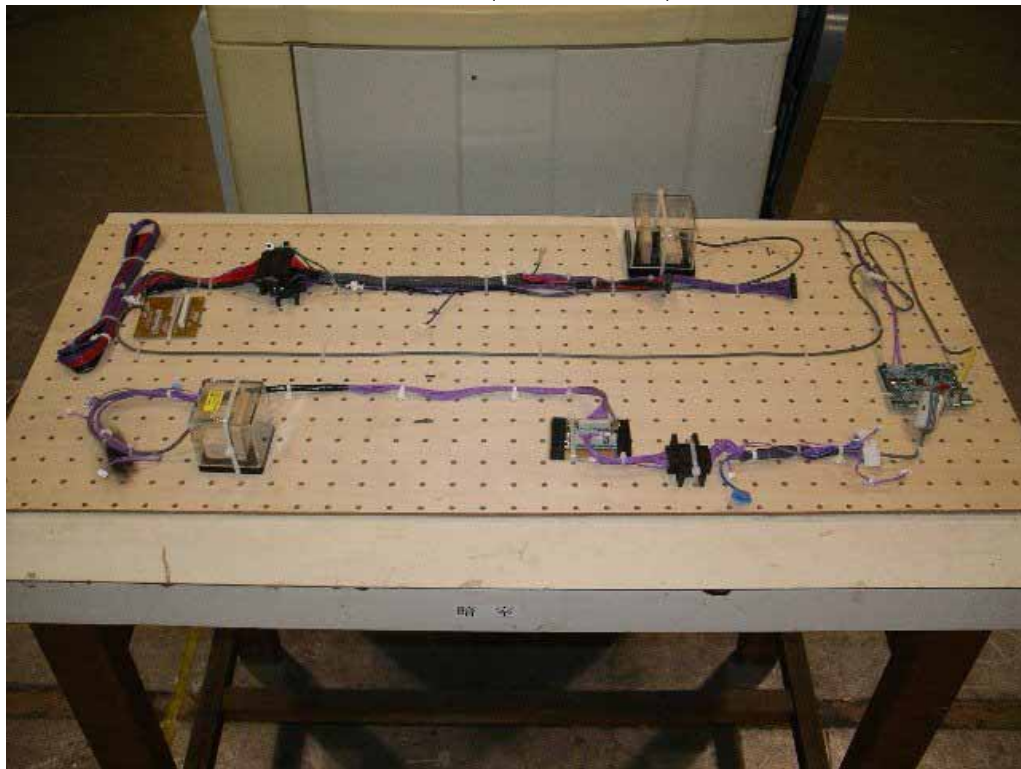
- Rear View -



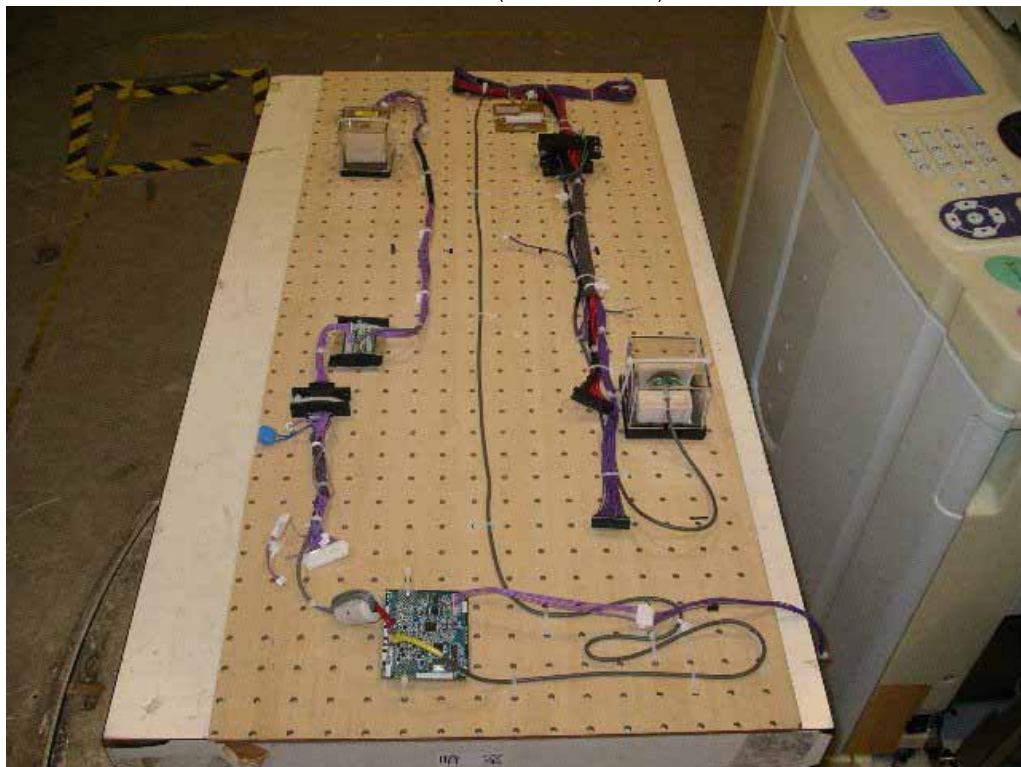
PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission

- EUT Zoom(Front View) -



- EUT Zoom(Side View) -



2. TEST DATA

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

Date : July 23, 2005
 Temp.: 22 °C Humi.: 66 %

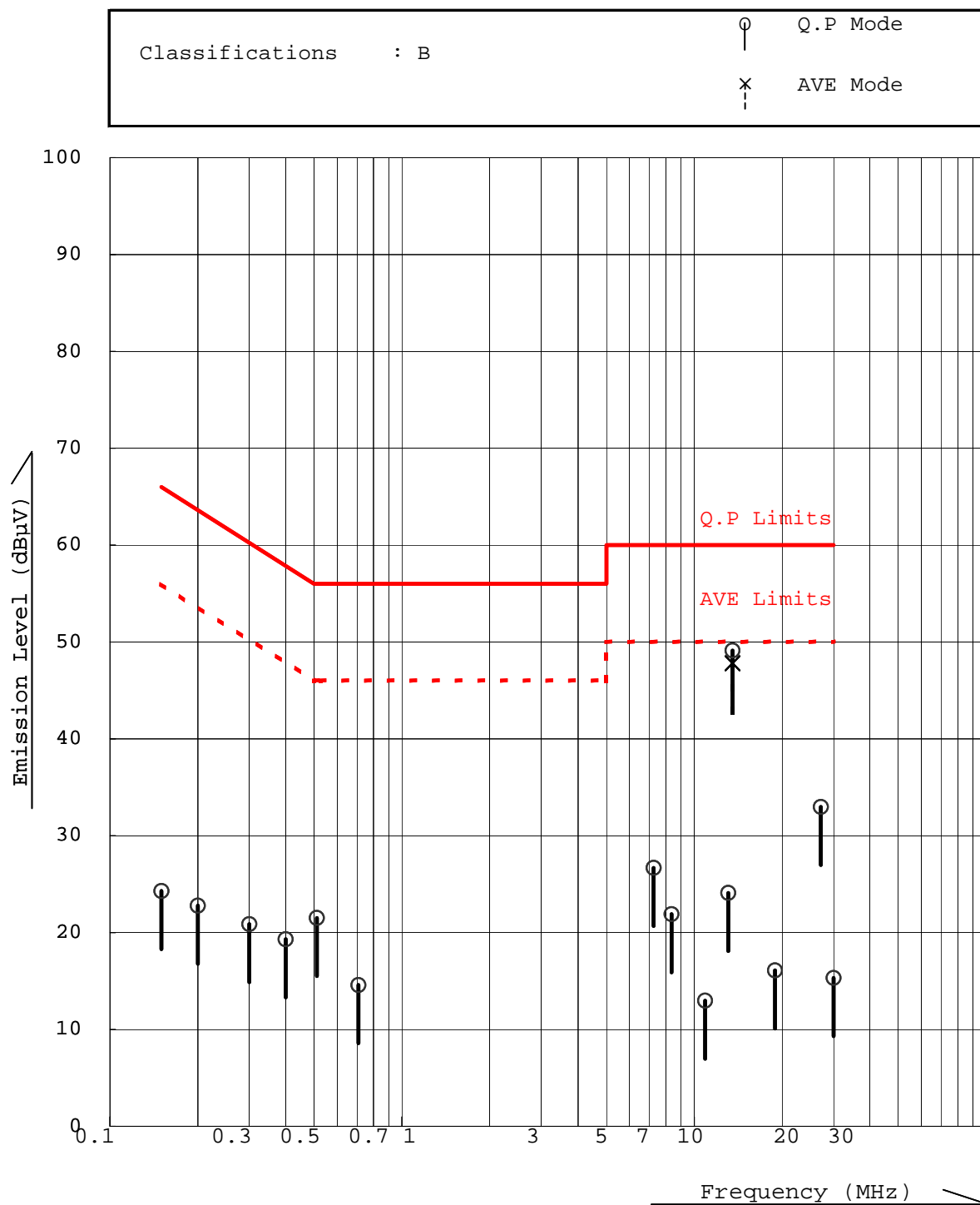
Operating Condition : TX/ RX
 Operating Frequency : 13.56 MHz

Frequency (MHz)	AMN	Meter Reading (dBμV)				Limits		Emission Level		Margin		Comment
	Factor (dB)	V-A		V-B		(dBμV)		(dBμV)		(dB)		
		Q.P	AVE	Q.P	AVE	Q.P	AVE	Q.P	AVE	Q.P	AVE	
0.15	0.1	22.1	-	24.2	-	66.0	56.0	24.3	-	41.7	-	
0.20	0.1	22.7	-	12.4	-	63.6	53.6	22.8	-	40.8	-	
0.30	0.1	20.8	-	< 10.0	-	60.2	50.2	20.9	-	39.3	-	
0.40	0.1	19.2	-	18.5	-	57.9	47.9	19.3	-	38.6	-	
0.51	0.1	16.9	-	21.4	-	56.0	46.0	21.5	-	34.5	-	
0.71	0.1	< 10.0	-	14.5	-	56.0	46.0	14.6	-	41.4	-	
1.01	0.1	< 10.0	-	< 10.0	-	56.0	46.0	< 10.1	-	> 45.9	-	
3.00	0.1	< 10.0	-	< 10.0	-	56.0	46.0	< 10.1	-	> 45.9	-	
5.00	0.1	< 10.0	-	< 10.0	-	56.0	46.0	< 10.1	-	> 45.9	-	
7.26	0.1	26.2	-	26.6	-	60.0	50.0	26.7	-	33.3	-	
8.36	0.1	21.3	-	21.8	-	60.0	50.0	21.9	-	38.1	-	
10.89	0.2	12.3	-	12.8	-	60.0	50.0	13.0	-	47.0	-	
13.11	0.3	23.8	-	23.1	-	60.0	50.0	24.1	-	35.9	-	
13.56	0.3	48.1	47.0	48.8	47.5	60.0	50.0	49.1	47.8	10.9	2.2	
18.94	0.4	15.5	-	15.7	-	60.0	50.0	16.1	-	43.9	-	
27.12	0.5	32.2	-	32.5	-	60.0	50.0	33.0	-	27.0	-	
30.00	0.6	14.7	-	14.7	-	60.0	50.0	15.3	-	44.7	-	

- Notes: 1) Test Location : Anechoic Chamber
 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

$$\text{Amn} + \text{Mr} = 0.1 + 24.2 = 24.3 \text{ dB}\mu\text{V}$$
 Amn : AMN Factor Mr : Meter Reading
 10) Setting of measuring instrument :
 Detector Function : CISPR Quasi-Peak / Average
 IF Bandwidth : 9 kHz / 10 kHz (0.15 MHz - 30 MHz)

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



2.2 Radiated Emissions Measurement(9 kHz - 30 MHz)

Date : July 23, 2005
 Temp.: 22 °C Humi.: 66 %

Operating Frequency : 13.56 MHz
 Distance of Measurement : 10 meters

Frequency (MHz)	Meter Reading (dBμV/m)	Field Strength (dBμV/m)
Fundamental		
13.56	33.3	13.3
Harmonic Frequency		
27.13	< 27.0	< 7.0

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: $33.3 \text{ dB}\mu\text{V/m} - 20\log_{10}((30/10)^2) = 33.3 - 20.0 = 13.3 \text{ dB}\mu\text{V/m}$ at 30 meters
 Limits for fundamental (§15.225(a)) = $20\log_{10}(15848) = 84.0 \text{ dB}\mu\text{V/m}$
 Harmonic : $27.0 \text{ dB}\mu\text{V/m} - 20\log_{10}((30/10)^2) = 27.0 - 20.0 = 7.0 \text{ dB}\mu\text{V/m}$ at 30 meters
 Limits for (§15.225(d)) = $20\log_{10}(30) = 29.5 \text{ dB}\mu\text{V/m}$

2.3 Radiated Emissions Measurement(30 MHz - 1 GHz)

Date : July 23, 2005

Temp.: 22 °C Humi.: 66 %

Operating Frequency : 13.56 MHz

Distance of Measurement : 3 meters

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading (dBμV)		Limits (dBμV/m)	Emission Level (dBμV/m)		Margin (dB)		Comment
		Horiz.	Ver.		Horiz.	Ver.	Horiz.	Ver.	
40.7	15.3	7.4	15.5	40.0	22.7	30.8	17.3	9.2	
54.2	10.5	16.5	24.0	40.0	27.0	34.5	13.0	5.5	
67.8	7.6	12.0	12.6	40.0	19.6	20.2	20.4	19.8	
80.0	7.3	18.0	25.5	40.0	25.3	32.8	14.7	7.2	
81.4	7.4	12.6	17.0	40.0	20.0	24.4	20.0	15.6	
94.9	10.0	11.5	10.6	43.5	21.5	20.6	22.0	22.9	
108.5	12.5	13.2	6.2	43.5	25.7	18.7	17.8	24.8	
122.0	14.2	11.4	4.8	43.5	25.6	19.0	17.9	24.5	
135.6	15.4	10.6	8.0	43.5	26.0	23.4	17.5	20.1	
149.2	16.4	8.2	5.2	43.5	24.6	21.6	18.9	21.9	
160.0	16.9	5.5	6.2	43.5	22.4	23.1	21.1	20.4	
189.8	17.9	6.6	3.3	43.5	24.5	21.2	19.0	22.3	
199.8	18.1	10.2	4.5	43.5	28.3	22.6	15.2	20.9	
203.4	18.2	6.0	2.1	43.5	24.2	20.3	19.3	23.2	
257.6	19.6	9.0	8.2	46.0	28.6	27.8	17.4	18.2	
284.8	20.5	5.8	3.5	46.0	26.3	24.0	19.7	22.0	
314.8	16.2	12.1	16.3	46.0	28.3	32.5	17.7	13.5	
400.0	19.0	11.4	7.3	46.0	30.4	26.3	15.6	19.7	
514.6	20.7	6.0	6.2	46.0	26.7	26.9	19.3	19.1	
720.0	23.8	10.3	6.2	46.0	34.1	30.0	11.9	16.0	
960.0	27.2	10.1	5.5	46.0	37.3	32.7	8.7	13.3	
1000.0	27.7	< -2.0	< -2.0	54.0	< 25.7	< 25.7	> 28.3	> 28.3	

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 = 15.3 + 15.5 = 30.8 dBμV/m

Af : Antenna Factor Mr : Meter Reading

8) Setting of measuring instrument :

Detector Function : CISPR Quasi-Peak

IF Bandwidth : 120 kHz

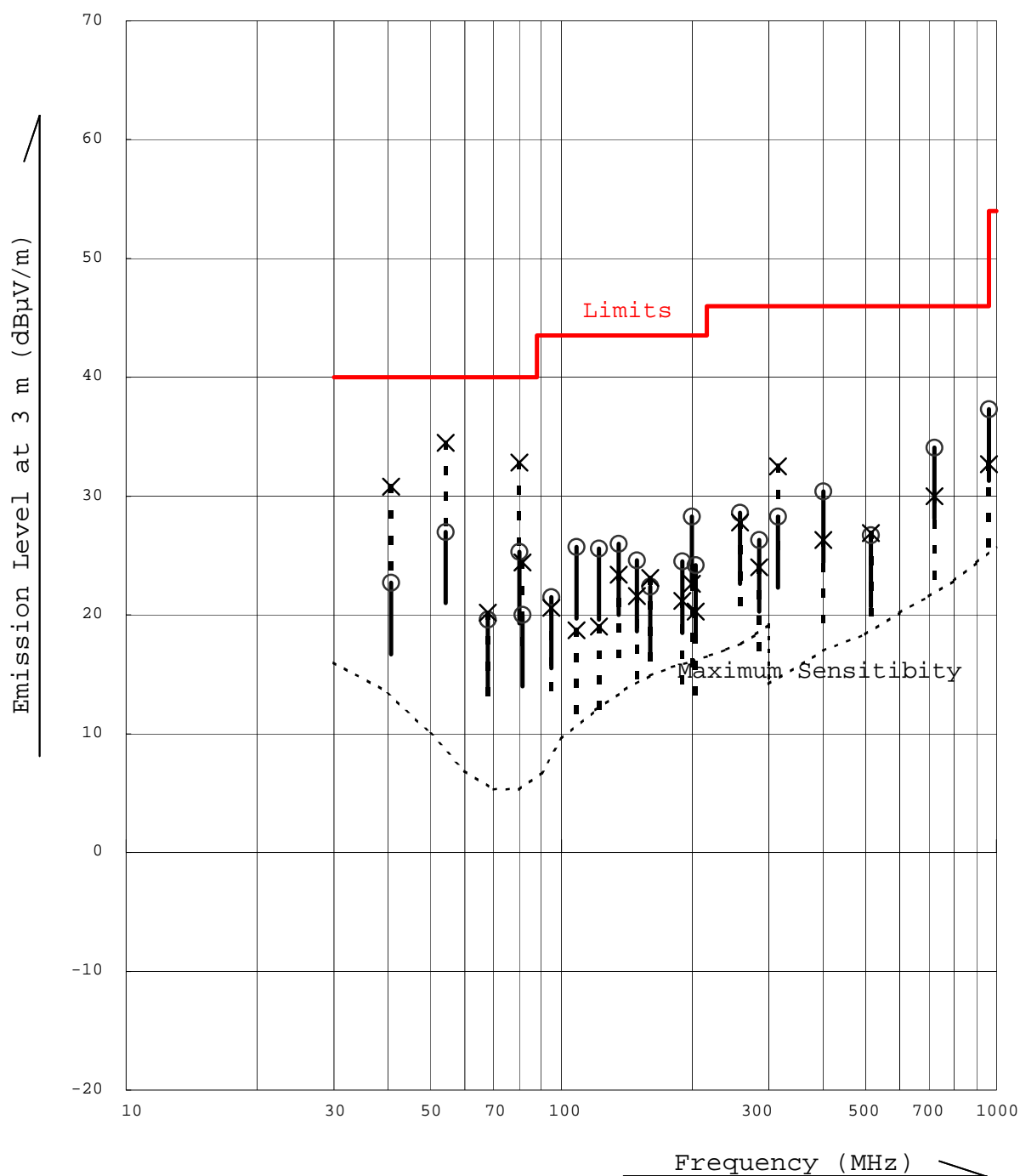
Radiated Emissions Measurement(30 MHz - 1 GHz)

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 : July 29, 2005

Temp.: 25 °C Humi.: 60 %

OPERATING FREQUENCY : 13.56 MHz

Ambient Temperature	Frequency with time elapse(MHz)			
()	0 minute	2 minutes	5 minutes	10 minutes
-20	+0.00897	+0.00892	+0.00891	+0.00892
50	+0.00841	+0.00842	+0.00842	+0.00842

Primary Supply Voltage	Frequency with time elapse(MHz)			
at 20 (V)	0 minute	2 minutes	5 minutes	10 minutes
102	+0.00857	+0.00858	+0.00858	+0.00858
120	+0.00858	+0.00858	+0.00858	+0.00858
138	+0.00858	+0.00858	+0.00858	+0.00858

Specified Limit $\pm 0.01\%$

2.6 Occupied Bandwidth Measurement

Date : July 29, 2005
 Temp.: 25 °C Humi.: 60 %

20dB Band width measurement result: 3.25 kHz

