

## TEST REPORT

**APPLICANT** : Hitachi High-Tech Materials Corporation

**ADDRESS** : 1-24-14 Nishi-Shinbashi, Minato-ku, Tokyo 105-0003, Japan

**PRODUCTS** : IC Card Reader/Writer Module

**MODEL No.** : ARW13T-KNM-HMF

**SERIAL No.** : -

**FCC ID** : VZQARW13TKNM01

**TEST STANDARD** : CFR 47 FCC Rules and Regulations Part 15 Subpart A and C

**TEST LOCATION** : Japan Quality Assurance Organization  
Safety & EMC Center  
EMC Engineering Department, TSURU EMC Branch  
2096, Ohata, Tsuru-shi, Yamanashi-ken 402-0045, Japan

**TEST RESULTS** : **Passed**

**DATE OF TEST** : January 28, 2009 – February 6, 2009

This report must not be used by the client to claim product endorsement by NVLAP or NIST or any agency of the U.S. Government.



NVLAP LAB CODE 200192-0

A handwritten signature in black ink, reading "M. Takahashi".

Masanori Takahashi  
Manager  
Japan Quality Assurance Organization  
Safety & EMC Center  
EMC Engineering Department, TSURU EMC Branch  
2096, Ohata, Tsuru-shi, Yamanashi-ken 402-0045, Japan

- The measurement values stated in Test Report was made with 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 applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The test results presented in this report relate only to the offered test sample.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.

**Table of Contents**

<b>Documentation</b>	<b>Page</b>
1 Test Regulation	3
2 Test Location	3
3 Recognition of Test Laboratory	3
4 Description of the Equipment Under Test	4
5 Test Condition	5-7
6 Preliminary Test and Test-Setup	8-13
7 Equipment Under Test Modification	14
8 Responsible Party	14
9 Deviation from Standard	14
10 Test Results	15-16
11 Summary	17
12 Operating Condition	18
13 Test Configuration	18
14 Equipment Under Test Arrangement (Drawings)	19
<b>Appendix A : Test Data</b>	<b>20-25</b>
<b>Appendix B : Test Arrangement (Photographs)</b>	<b>26-27</b>
<b>Appendix C : Test Instruments</b>	<b>28-29</b>

**Definitions for Abbreviation and Symbols Used In This Test Report**

“EUT” means Equipment Under the Test.

“AE” means Associated Equipment.

“N/A” means that Not Applicable.

“N/T” means that Not Tested.

☒-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.

## Documentation

### 1 Test Regulation

Applied Standard : CFR 47 FCC Rules and Regulations Part 15 Subpart A and C

Test procedure : ANSI C63.4-2003

### 2 Test Location

Japan Quality Assurance Organization  
Safety & EMC Center  
EMC Engineering Department, TSURU EMC Branch  
2096, Ohata, Tsuru-shi, Yamanashi-ken 402-0045, JAPAN

### 3 Recognition of Test Laboratory

Japan Quality Assurance Organization, Safety & EMC Center  
EMC Engineering Department, TSURU EMC Branch is accredited  
under ISO/IEC 17025 by following accreditation bodies and the test facility of Testing  
Division is accredited by the following bodies .

VLAC Code: VLAC-001-4 (Effective through : April 3, 2010)

NVLAP Lab Code:200192-0 (Effective through : June 30, 2009)

BSMI Recognition Number:

SL2-IN-E-6004, SL2-IS-E-6004, SL2-A1-E-6004 (Effective through : September 14, 2010)

VCCI Registration Number:

R-004, R-824, R-828, C-003, C-005, C-859, C-860, C-864, C-3085,

T-1420, T-1421, T-1422, T-1423, T-1424, T-1425 (Effective through : April 3, 2010)

FCC Registration Number : 444763 (Effective through : April 1, 2010)

IC Registration Number : 4126-1, 4126-2, 4126-3 (Effective through : December 10, 2010)

Accredited as conformity assessment body for Japan electrical appliances and material law  
by METI. (Effective through : February 22, 2010)

#### 4 Description of the Equipment Under Test

- |    |   |   |  |
|----|---|---|--|
| 1  | Manufacturer                            | : | Hitachi High-Tech Materials Corporation<br>1-24-14 Nishi-Shinbashi, Minato-ku, Tokyo 105-0003, Japan |
| 2  | Products                                | : | IC Card Reader/Writer Module   |
| 3  | Model No.                               | : | ARW13T-KNM-HMF   |
| 4  | Serial No.                              | : | -  |
| 5  | Product Type                            | : | Prototype  |
| 6  | Date of Manufacture                     | : | -  |
| 7  | Power Rating                            | : | 12VDC $\pm$ 5%   |
| 8  | EUT Grounding                           | : | None   |
| 10 | EUT Authorization                       | : | Certification  |
| 11 | EUT Highest Frequency<br>Used/Generated | : | 13.56 MHz  |
| 12 | Modulation                              | : | FSK  |
| 13 | Antenna type                            | : | Loop antenna   |
| 14 | Temperature Range                       | : | 0 – 55 degree  |

Note : ARW13T-KNM-HMF is a RFID card reader and writer module, intended for the data used in game machine, for entertainment use. The RFID radio intended purpose is to transform the information of RFID tag.

## 5 Test Condition

### 5.1 AC Powerline Conducted Emission

The requirements are ☒-Applicable [☒-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

Test site & instruments :

Type	Number of test site & instruments (Refer to Appendix C)						
Test Site	<input type="checkbox"/> OS-1	<input type="checkbox"/> OS-2	<input type="checkbox"/> AC-1	<input checked="" type="checkbox"/> SR-A	<input type="checkbox"/> SR-B	<input type="checkbox"/> SR-C	
Test Receiver	<input type="checkbox"/> R-3	<input type="checkbox"/> R-4	<input checked="" type="checkbox"/> R-5				
Cable	<input type="checkbox"/> CB-3	<input checked="" type="checkbox"/> CB-4	<input type="checkbox"/> CB-5				
Network (for EUT)	<input type="checkbox"/> L-1	<input type="checkbox"/> L-2	<input checked="" type="checkbox"/> L-3	<input type="checkbox"/> L-4	<input type="checkbox"/> L-5	<input type="checkbox"/> L-6	
	<input type="checkbox"/> L-7	<input type="checkbox"/> L-8	<input type="checkbox"/> L-9	<input type="checkbox"/> L-10	<input type="checkbox"/> L-11	<input type="checkbox"/> L-12	
	<input type="checkbox"/> L-13						
Network (for AE)	<input type="checkbox"/> L-1	<input type="checkbox"/> L-2	<input type="checkbox"/> L-3	<input checked="" type="checkbox"/> L-4	<input type="checkbox"/> L-5	<input type="checkbox"/> L-6	
	<input type="checkbox"/> L-7	<input type="checkbox"/> L-8	<input type="checkbox"/> L-9				
Pulse Limiter	<input type="checkbox"/> PL-3	<input type="checkbox"/> PL-4	<input checked="" type="checkbox"/> PL-5				
Termination	<input checked="" type="checkbox"/> TM-1	<input type="checkbox"/> TM-2					

## 5.2 Radiated Emission

### 5.2.1 Radiated Emission 0.009 MHz - 30 MHz

The requirements are ☒-Applicable ☐-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

Test site & instruments :

Type	Number of test site & instruments (Refer to Appendix C)
Test Site	<input type="checkbox"/> OS-1 <input type="checkbox"/> OS-2 <input checked="" type="checkbox"/> AC-1
Test Receiver	<input checked="" type="checkbox"/> R-3 <input type="checkbox"/> R-4 <input type="checkbox"/> R-5
Antenna	<input checked="" type="checkbox"/> AL-0

### 5.2.2 Radiated Emission 30 MHz - 1000 MHz

The requirements are ☒-Applicable ☐-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

Test site & instruments :

Type	Number of test site & instruments (Refer to Appendix C)
Test Site	<input type="checkbox"/> OS-1 <input type="checkbox"/> OS-2 <input checked="" type="checkbox"/> AC-1
Test Receiver	<input type="checkbox"/> R-1 <input type="checkbox"/> R-2 <input checked="" type="checkbox"/> R-3 <input type="checkbox"/> R-5 <input type="checkbox"/> S-1 <input type="checkbox"/> S-4
Cable	<input type="checkbox"/> CN-1 <input type="checkbox"/> CN-2 <input checked="" type="checkbox"/> CN-3
Antenna	<input type="checkbox"/> AB-1 <input type="checkbox"/> AB-2 <input checked="" type="checkbox"/> AB-3 <input type="checkbox"/> AD-1 <input type="checkbox"/> AD-2 <input type="checkbox"/> AD-3 <input type="checkbox"/> AL-1 <input type="checkbox"/> AL-2 <input checked="" type="checkbox"/> AL-3 <input type="checkbox"/> AL-4 <input type="checkbox"/> AL-5 <input type="checkbox"/> AD-4

### 5.2.3 Radiated Emission above 1 GHz

The requirements are ☐-Applicable ☐-Tested ☐-Not tested by applicant request.]  
☒-Not Applicable

Test site & instruments :

Type	Number of test site & instruments (Refer to Appendix C)
Test Site	<input type="checkbox"/> OS-1 <input type="checkbox"/> OS-2 <input type="checkbox"/> AC-1
Test Receiver	<input type="checkbox"/> R-3 <input type="checkbox"/> R-5 <input type="checkbox"/> S-1 <input type="checkbox"/> S-3 <input type="checkbox"/> S-4
Cable	<input type="checkbox"/> CS-1 <input type="checkbox"/> CS-2
Antenna	<input type="checkbox"/> AL-1 <input type="checkbox"/> AL-2 <input type="checkbox"/> AL-3 <input type="checkbox"/> AL-4 <input type="checkbox"/> AL-5
Pre-Amplifier	<input type="checkbox"/> PA-1 <input type="checkbox"/> PA-2 <input type="checkbox"/> PA-3 <input type="checkbox"/> PA-5

#### 5.4 Frequency Stability

The requirements are ☒-Applicable ☐-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

Instruments :

Type	Number of test site & instruments (Refer to Appendix B)
Cable	<input checked="" type="checkbox"/> CB-3 <input type="checkbox"/> CB-4 <input type="checkbox"/> CB-5
Oven	<input checked="" type="checkbox"/> OV-1
Frequency Counter	<input checked="" type="checkbox"/> FC-1

#### 5.5 Occupied Bandwidth

The requirements are ☒-Applicable ☐-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

Test site & instruments :

Type	Number of test site & instruments (Refer to Appendix B)
Oven	<input checked="" type="checkbox"/> OV-1
Test Receiver	<input type="checkbox"/> R-1 <input type="checkbox"/> R-2 <input type="checkbox"/> R-3 <input type="checkbox"/> R-4 <input type="checkbox"/> R-5 <input type="checkbox"/> S-1 <input type="checkbox"/> S-3 <input checked="" type="checkbox"/> 13
Cable	<input checked="" type="checkbox"/> CB-3 <input type="checkbox"/> CB-4 <input type="checkbox"/> CB-5 <input type="checkbox"/> CS-1 <input type="checkbox"/> CS-2

## 6 Preliminary Test and Test Setup

### 6.1 AC Powerline Conducted Emission

The test was based on ANSI C63.4-2003.

The preliminary conducted disturbance at the mains ports measurements were carried out.

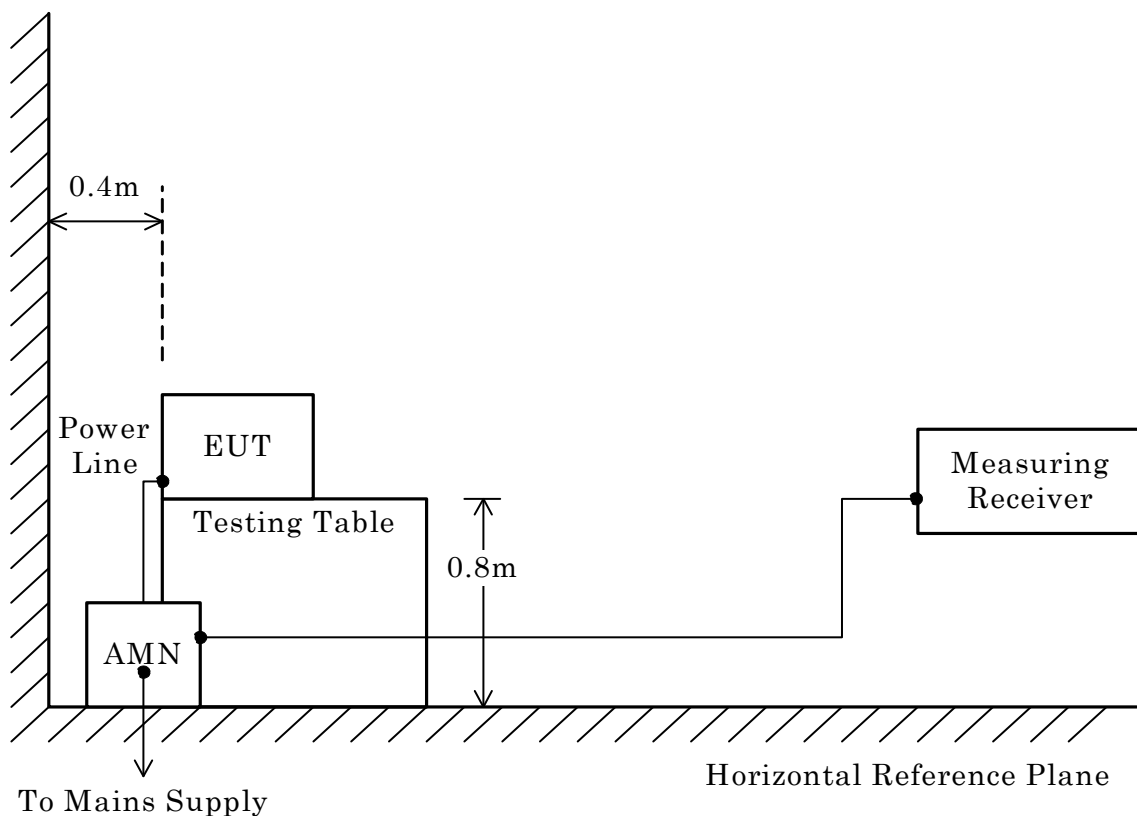
The preliminary conducted disturbance at the mains ports were performed using the spectrum analyzer to observe the emissions characteristics of the EUT.

The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.

This configurations was used for final conducted disturbance at the mains ports measurements.

- Side View -

Vertical  
Reference Plane



\* AMN : Artificial Mains Network



## 6.2 Radiated Emission

### 6.2.1 Radiated Emission 0.009 MHz - 30 MHz

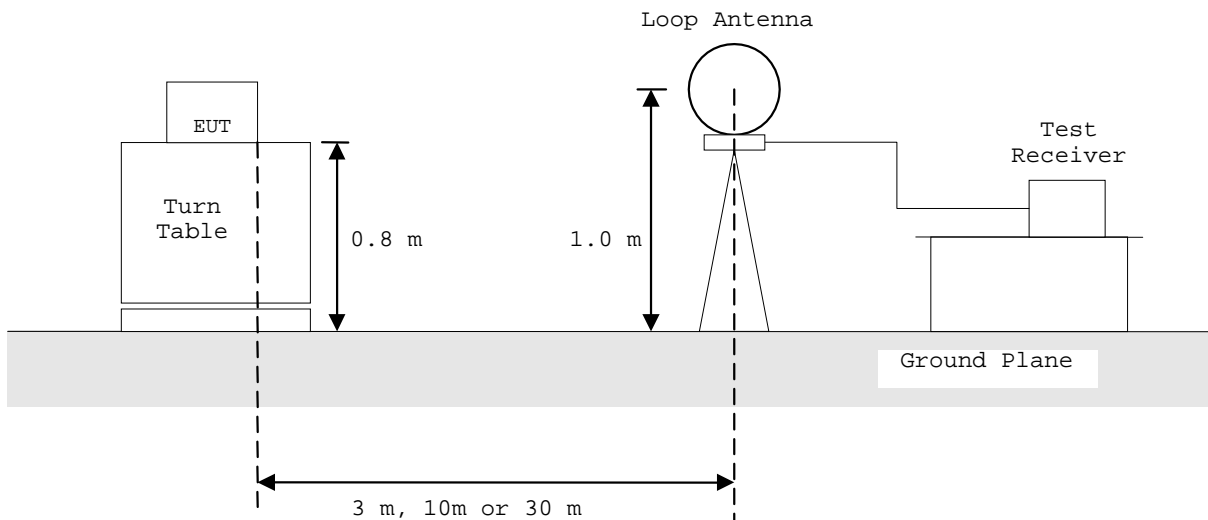
The test was based on ANSI C63.4-2003.

The preliminary radiated disturbance measurements were carried out.

The preliminary radiated disturbance 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.

This configurations was used for the final radiated disturbance measurements.



## 6.2.2 Radiated Emission 30 MHz - 1000 MHz

The test was based on ANSI C63.4-2003.

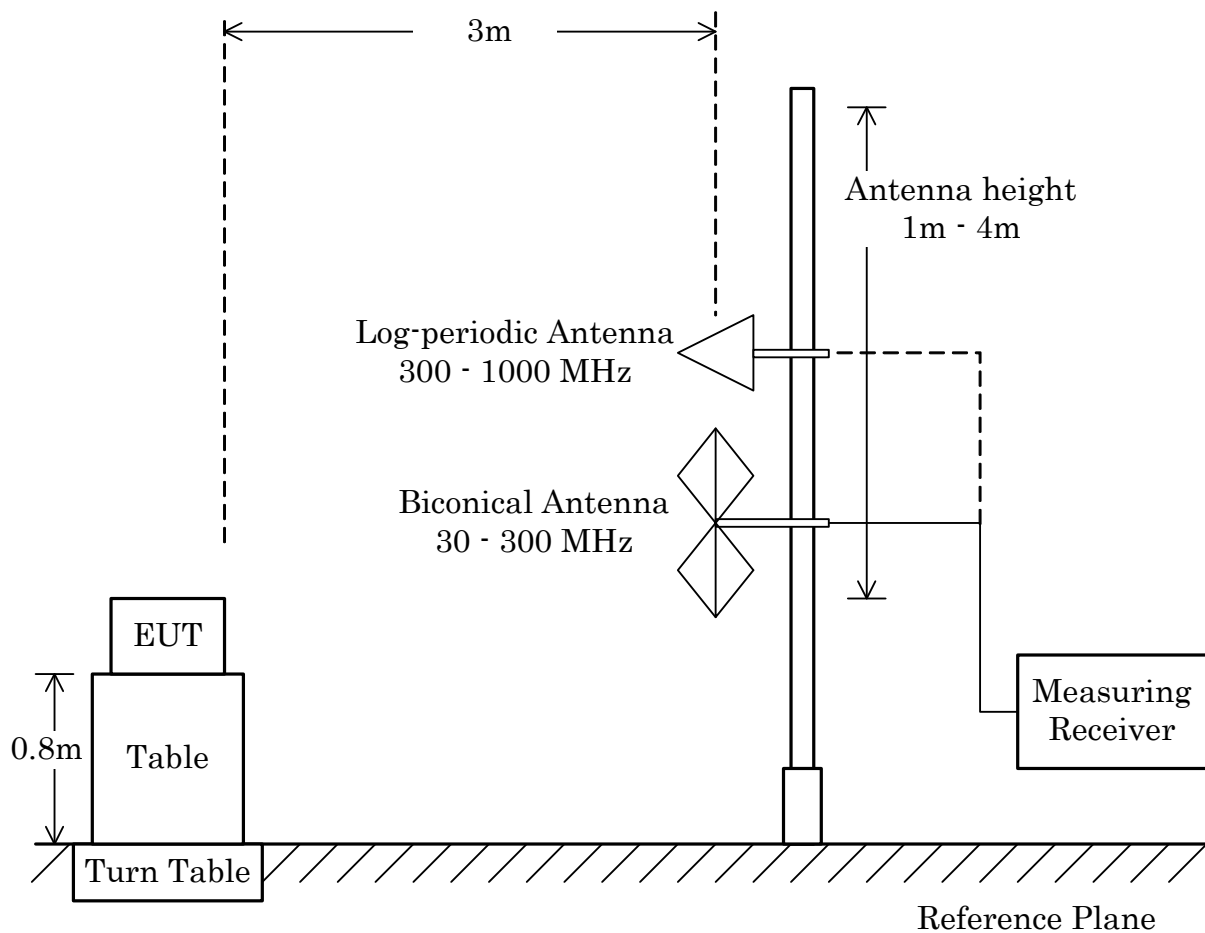
The preliminary radiated disturbance measurements were carried out.

The preliminary radiated disturbance 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.

This configurations was used for the final radiated disturbance measurements.

- Side View -



### 6.2.3 Radiated Emission above 1 GHz

The test was based on ANSI C63.4-2003.

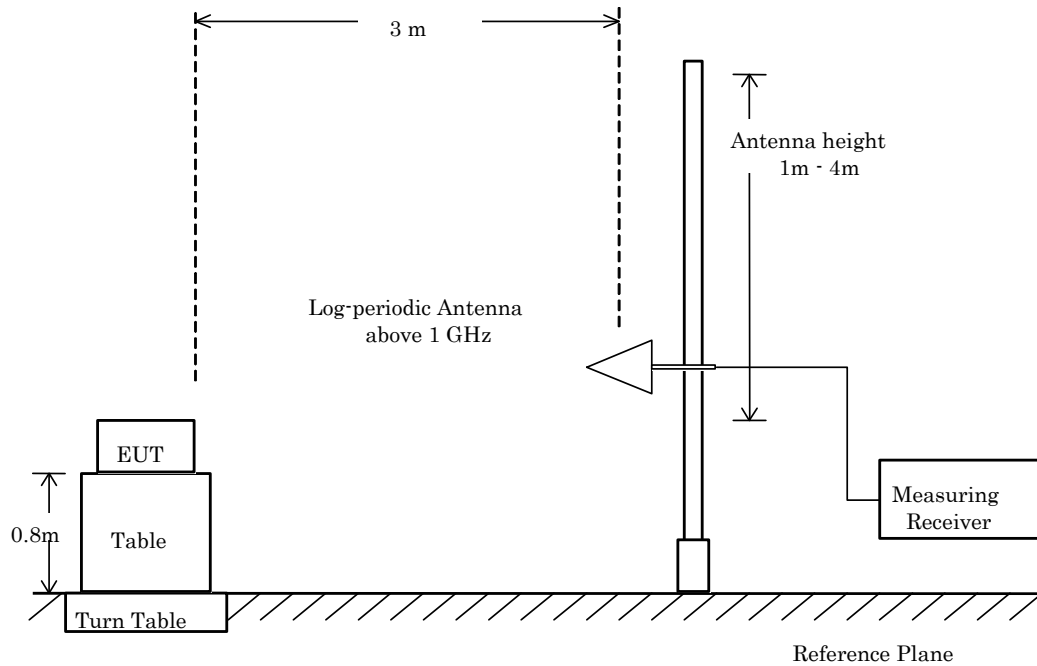
The preliminary radiated emissions measurements were carried out.

The preliminary radiated emissions 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.

This configurations was used for the final radiated emissions measurements.

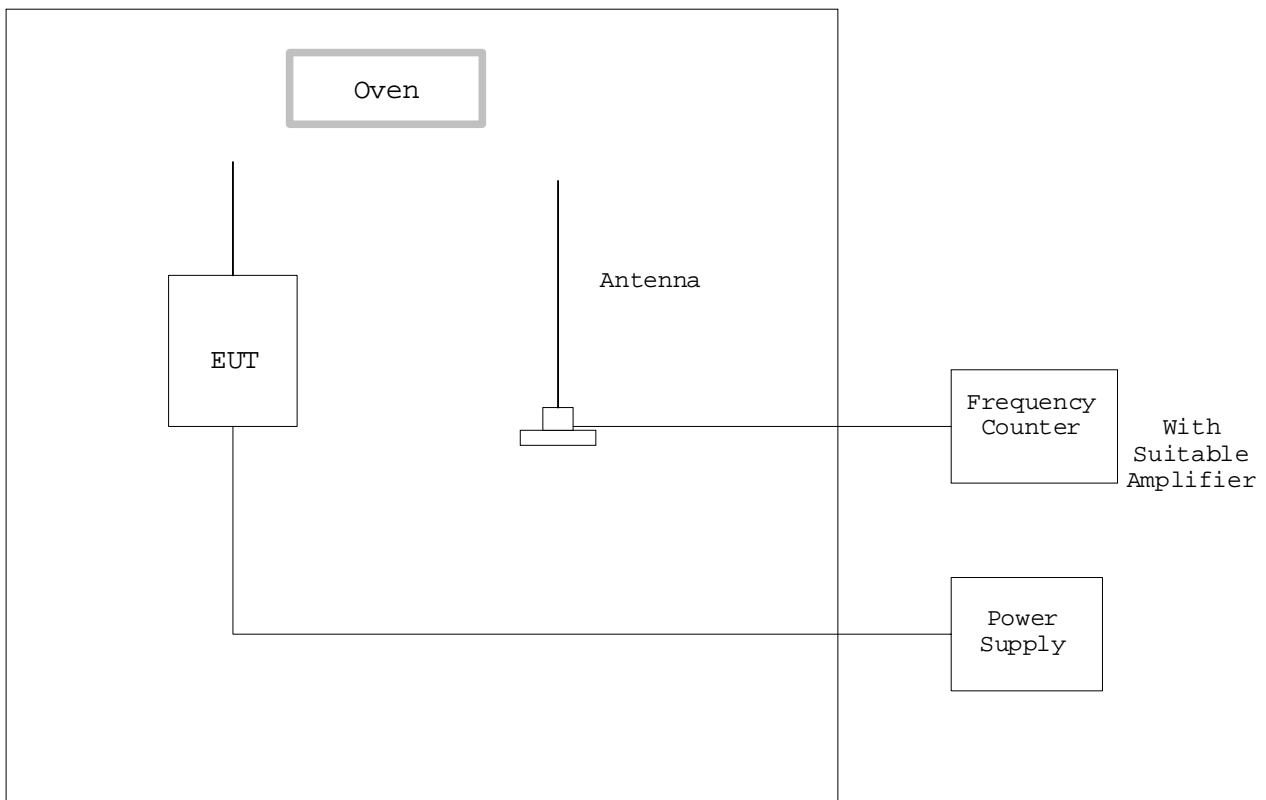
- Side View -



## 6.5 Frequency Stability

The test was based on ANSI C63.4-2003.

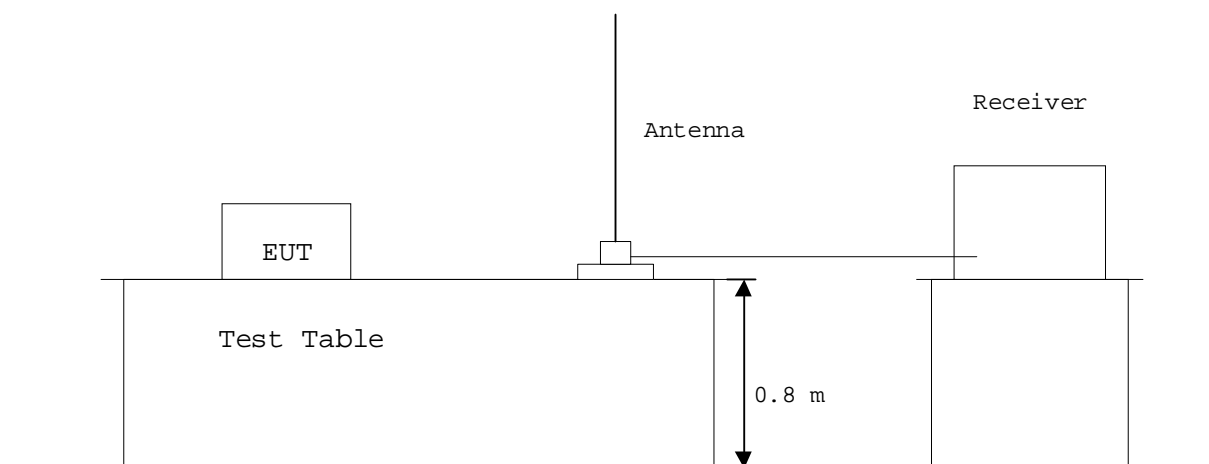
The frequency stability measurements were carried out. By using frequency counter with suitable RF amplifier, the carrier frequency of the transmitter under test was measured with a temperature variation of  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at the normal supply voltage, and if required, 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.



## 6.6 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.



**7 Equipment Under Test Modification**

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

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

Applicant : Not Applicable

Date : Not Applicable

Typed Name : Not Applicable

Position : Not Applicable

Signatory: Not Applicable

**8 Responsible Party****Responsible Party of Test Item (Product)**

Responsible Party :

Contact Person :

\_\_\_\_\_  
Signatory

**9 Deviation from Standard**

- ☒ No deviations from the standard described in clause 1.  
☐ The following deviations were employed from the standard described in clause 1.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## 10 Test Results

### 10.1 AC Powerline Conducted Emission

The requirements are ☒-Applicable ☒-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

☒-Passed ☐-Failed ☐-Not judged

Min. Limit Margin (QP)	<u>12.9</u>	dB	at	<u>27.12</u>	MHz
Min. Limit Margin (AVE)	<u>N/A</u>	dB	at	<u>N/A</u>	MHz
Max. Limit Exceeding	<u>N/A</u>	dB	at	<u>N/A</u>	MHz
Uncertainty of measurement results	<u>± 2.6</u>	dB(2σ)			

Remarks : The frequency range from 13.410 MHz to 13.710 MHz were excluded  
by the applicant requirements.

### 10.2 Radiated Emissions

The requirements are ☒-Applicable ☒-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

☒-Passed ☐-Failed ☐-Not judged

Min. Limit Margin	<u>4.2</u>	dB	at	<u>266.2</u>	MHz
Max. Limit Exceeding	<u>N/A</u>	dB	at	<u>N/A</u>	MHz
Uncertainty of measurement results	0.009-30	MHz	<u>± 1.9</u>	dB(2σ)	
	30- 300	MHz	<u>± 4.5</u>	dB(2σ)	
	300-1000	MHz	<u>± 4.6</u>	dB(2σ)	
	1 - 18	GHz	<u>± 3.7</u>	dB(2σ)	

Remarks : The measurement results is within the range of measurement uncertainty.

**10.4 Frequency Stability (Section 15.225(e))**

The requirements are ☒-Applicable [☒-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

☒-Passed ☐-Failed ☐-Not judged

Remarks : \_\_\_\_\_  
\_\_\_\_\_

**10.5 Occupied Bandwidth**

The requirements are ☒-Applicable [☒-Tested ☐-Not tested by applicant request.]  
☐-Not Applicable

☐-Passed ☐-Failed ☒-Not judged

Remarks : \_\_\_\_\_  
\_\_\_\_\_



## 11 Summary

### General Remarks :

The EUT was tested according to the requirements of  
CFR 47 FCC Rules and Regulations Part 15.

under the test configuration, as shown in clause 11 to 13.

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

Determining compliance with the limits in this report was based on the results of the  
compliance measurement, not taking into account measurement instrumentation uncertainty.

### Test Results :

The "as received" sample;

☒ - fulfill the test requirements of the regulation mentioned on clause 1.

☐ - doesn't fulfill the test requirements of the regulation mentioned on clause 1.

Reviewed by:



Masanori Takahashi  
Manager  
TSURU EMC Branch  
EMC Engineering Department

Tested by:



Kazuyuki Makimoto  
Assistant Manager  
TSURU EMC Branch  
EMC Engineering Department

## 12 Operating Condition

Power Supply Voltage : 12.0VDC

\* The EUT was operated with the DC Power Supply.

(Input: 100Vac 60Hz, Output: 12.0Vdc)

Operation Mode

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

## 13 Test Configuration

The equipment under test consists of :

Sign	Item	Manufacturer	Model No.	Serial No.	FCC ID
A	IC Card Reader/Writer Module	Hitachi High-Tech Materials Corporation	ARW13T-KNM- HMF	-	VZQARW13TKNM01

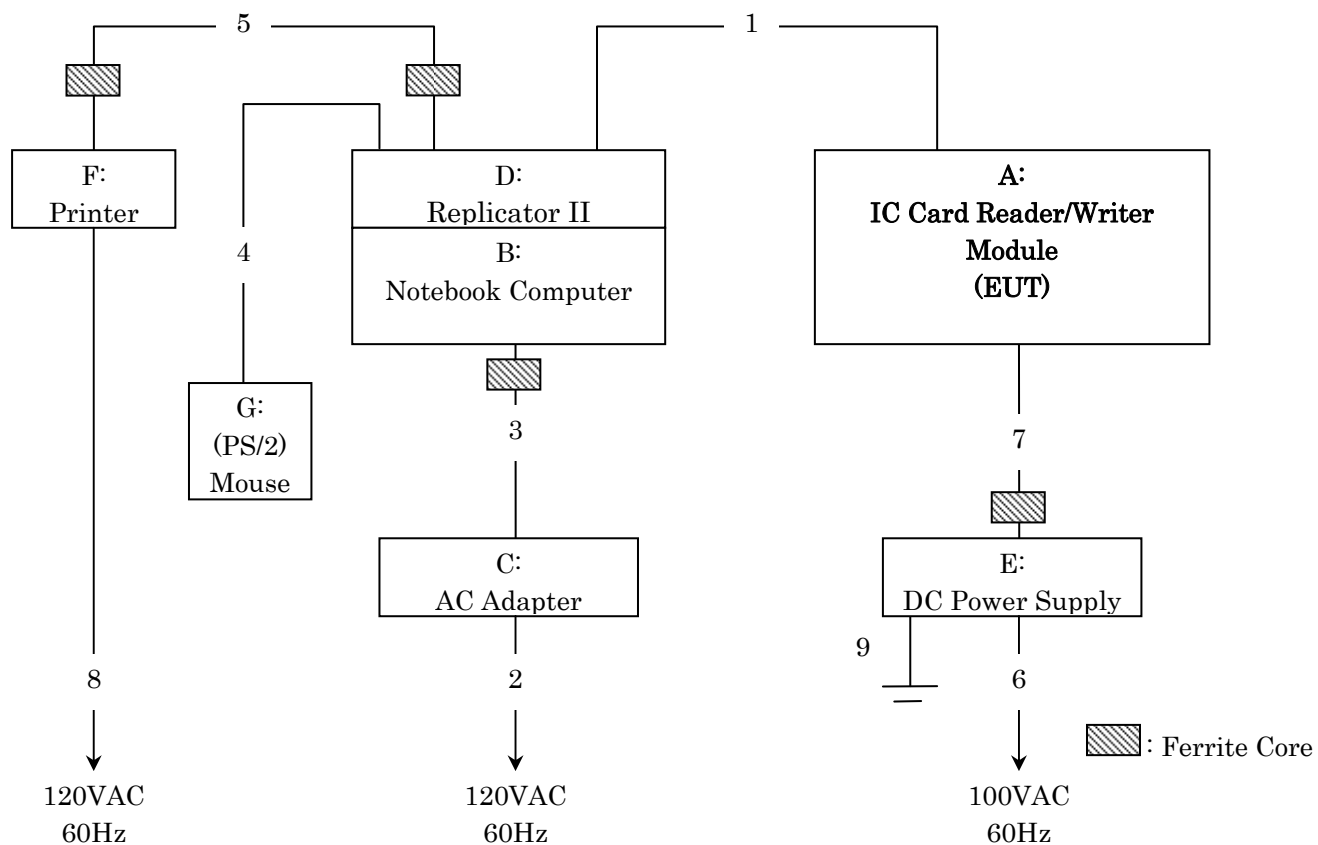
The auxiliary equipment used for testing :

Sign	Item	Manufacturer	Model No.	Serial No.	FCC ID
B	Notebook Computer	IBM	2722-BJ11	FX-79710 03/11	N/A (DoC)
C	AC Adapter	IBM	08K8208	11S08K8208Z1Z9 MA5A61L4	N/A
D	Replicator II	IBM	74P6733	98-L5908	N/A (DoC)
E	DC Power Supply	KIKUSUI ELECTRONICS	PAN35-20A	NA000828	N/A
F	Printer	C6429A	MY04Q1F0 RB	3882H054	N/A (DoC)
G	(PS/2) Mouse	HP Compaq	M-S69	F6AB70SN3R02108	N/A (DoC)

Type of Cable:

No.	Description	Identification (Manu. etc.)	Connector Shielded	Cable Shielded	Ferrite Core	Length (m)
1	RS-232C Cable	None	No	No	No	1.6
2	AC Cable	None	No	No	No	1.0
3	DC Cable	None	No	No	Yes	1.8
4	Mouse Cable	None	Yes	Yes	No	1.8
5	Parallel Cable	None	Yes	Yes	Yes	2.0
6	AC Cable	None	No	No	No	3.0
7	DC Cable	None	No	No	Yes	1.0
8	AC Cable	None	No	No	No	1.8
9	Earth Cable	None	No	No	No	0.9

#### 14 Equipment Under Test Arrangement (Drawings)



## Appendix A: Test Data

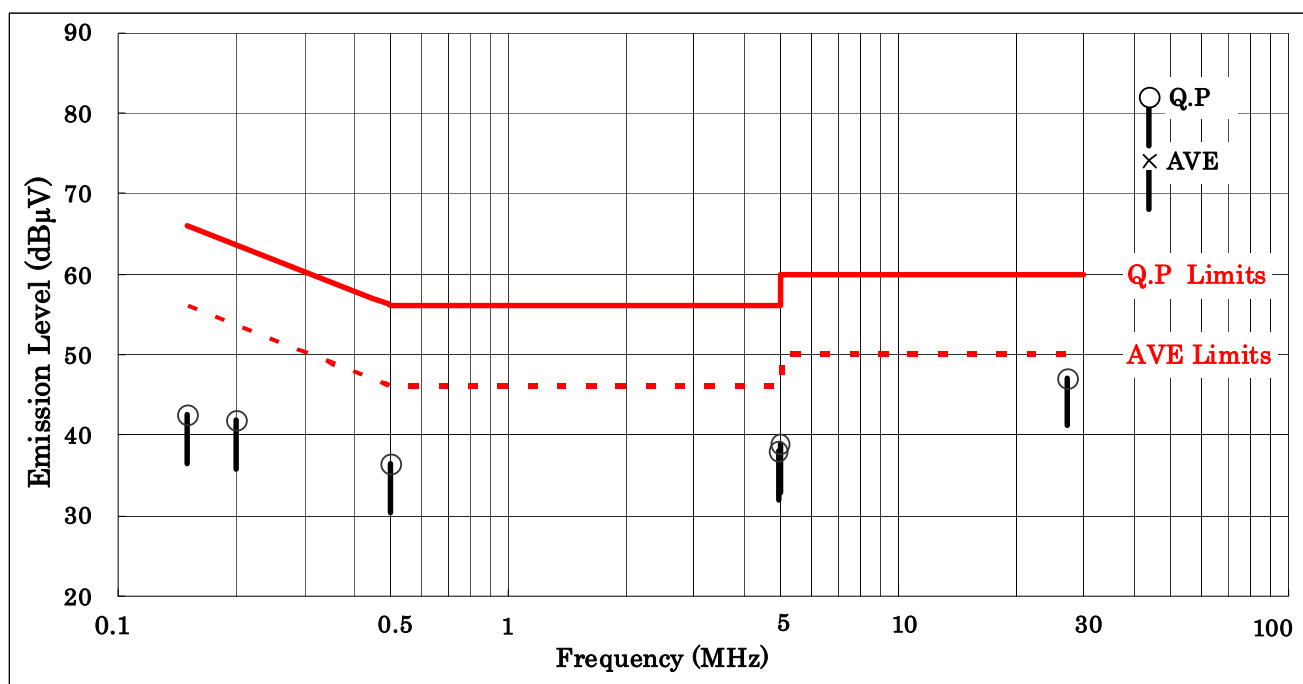
### A.1 AC Powerline Conducted Emission

Date : January 28, 2009

Temp : 22°C

Humi : 30% Atom : 968hPa

Frequency (MHz)	AMN Factor (dB)	Meter Reading (dBμV)				Limits (dBμV)		Max. Emission Level (dBμV)		Margin (dB)	
		V-A		V-B		Q.P	AVE	Q.P	AVE	Q.P	AVE
		Q.P	AVE	Q.P	AVE						
0.15	10.3	32.2	-	32.0	-	66.0	56.0	42.5	-	23.5	-
0.20	10.2	31.5	-	31.6	-	63.6	53.6	41.8	-	21.8	-
0.50	10.1	26.4	-	26.4	-	56.0	46.0	36.5	-	19.5	-
4.90	10.2	27.8	-	27.6	-	56.0	46.0	38.0	-	18.0	-
4.97	10.2	28.7	-	28.5	-	56.0	46.0	38.9	-	17.1	-
13.4100	10.4 < 20.0	-	< 20.0	-	< 20.0	60.0	50.0	< 30.4	-	> 29.6	-
13.7100	10.4 < 20.0	-	< 20.0	-	< 20.0	60.0	50.0	< 30.4	-	> 29.6	-
27.12	10.8	35.9	-	36.3	-	60.0	50.0	47.1	-	12.9	-



- Notes:
- 1) The testing location : Shielded Room A
  - 2) The spectrum was checked from 0.15 MHz to 30 MHz
  - 3) AMN(Artificial Mains Network) factor includes the cable loss.
  - 4) V-A : One end & Ground V-B : The other end & Ground
  - 5) Q.P : Quasi-Peak Detector AVE : Average Detector
  - 6) The symbol of "<" means "or less".
  - 7) The symbol of ">" means "more than".
  - 8) The symbol of "-" means "Not applicable".
  - 9) A sample calculation was made at 0.15 MHz  
 $(\text{AMN Factor}) + (\text{Meter Reading}) = 10.3 + 32.2 = 42.5 \text{ dB}\mu\text{V}$

## A.2 Radiated Emissions

### A.2.1 Radiated Emission (Section 15.225(a)(b)(C))

Date : February 3, 2009

Temp : 16°C Humi : 32% Atom : 956hPa

Frequency (MHz)	Antenna Factor (dB)	Meter Reading/ 10m (dBμV) Q.P	Limits/ 30m (dBμV) Q.P	Field Strength/ 30m (dBμV) Q.P	Margin (dB) Q.P
13.110	-	< 30.0	29.5	< 10.9	> 18.6
13.410	-	31.0	40.5	11.9	28.6
13.553	-	40.4	50.5	21.3	29.2
13.560	-	54.2	84.0	35.1	48.9
13.567	-	42.4	50.5	23.3	27.2
13.710	-	< 30.0	40.5	< 10.9	> 29.6
14.010	-	< 30.0	29.5	< 10.9	> 18.6

Notes: 1) The testing location : Anechoic Chamber No.1 Distance : 10 m

2) Q.P : Quasi-Peak Detector (IF Band width : 9 kHz)

3) The symbol of "<" means "or less".

4) The symbol of ">" means "more than".

5) The symbol of "-" means "Zero", because the used test receiver calculated and displayed in the Meter Reading including the Correction Factor(Antenna and cable loss) directly .

6) The testing loop antenna was rotated at the vertical and horizontal axis to maximize received emissions. The above Meter Reading was maximum emissions level.

7) Calculation :

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).

Fundamental(13.560MHz):  $54.2 \text{ dB}\mu\text{V/m} - 20\log_{10}((30/10)^2) = 54.2 - 19.1 = 35.1 \text{ dB}\mu\text{V/m}$  at 30 meters

Limits for 13.553-13.567MHz (§15.225(a)) =  $20\log_{10}(15848) = 84.0 \text{ dB}\mu\text{V/m}$

Limits for 13.410-13.553, 13.567-13.710 MHz (§15.225(b)) =  $20\log_{10}(334) = 50.5 \text{ dB}\mu\text{V/m}$

Limits for 13.110-13.410, 13.710-14.010MHz (§15.225(c)) =  $20\log_{10}(106) = 40.5 \text{ dB}\mu\text{V/m}$

Limits for except for 13.110-14.010MHz (§15.225(d)) =  $20\log_{10}(30) = 29.5 \text{ dB}\mu\text{V/m}$

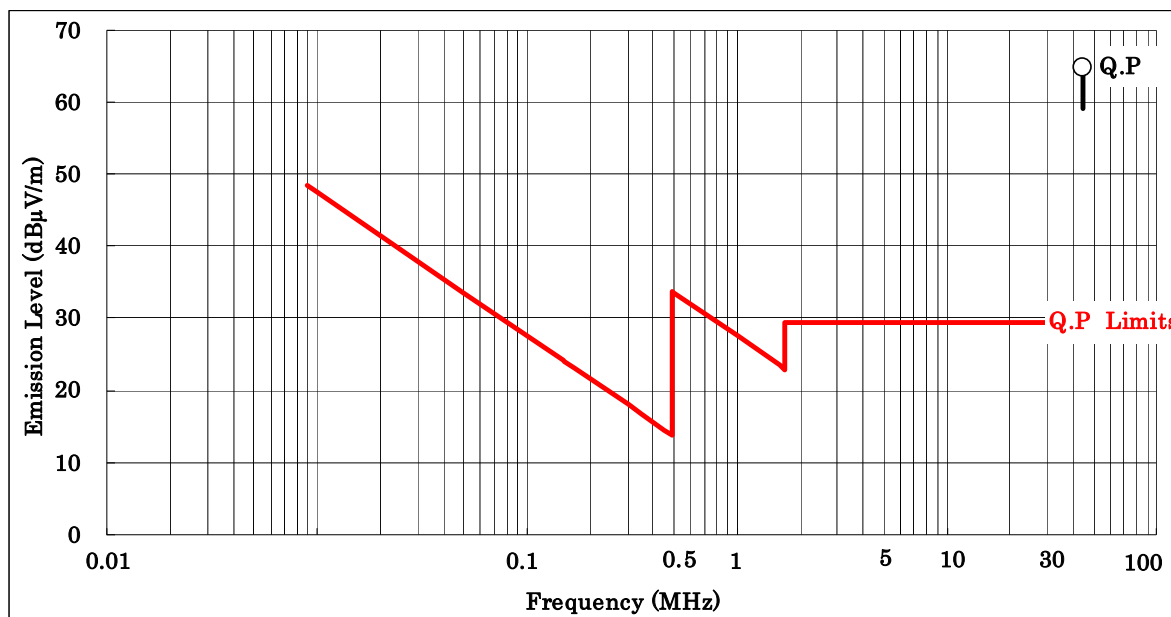
### A.3. Radiated Emission

#### A.3.1 Radiated Emission (0.009 MHz - 30 MHz)

Date : February 3, 2009

Temp : 16°C Humi : 32% Atom : 956hPa

Frequency (MHz)	Antenna Factor (dB)	Meter Reading (dBμV) Q.P	Limits (dBμV) Q.P	Specified Distance (m)	Extrapolated Emission Level (dBμV) Q.P	Margin (dB) Q.P
0.009	-	< 60.0	48.5	300.0	< 0.9	> 47.6
0.01	-	< 60.0	47.6	300.0	< 0.9	> 46.7
0.02	-	< 60.0	41.6	300.0	< 0.9	> 40.7
0.03	-	< 60.0	38.1	300.0	< 0.9	> 37.1
0.05	-	< 60.0	33.6	300.0	< 0.9	> 32.7
0.07	-	< 60.0	30.7	300.0	< 0.9	> 29.8
0.10	-	< 60.0	27.6	300.0	< 0.9	> 26.7
0.20	-	< 60.0	21.6	300.0	< 0.9	> 20.7
0.30	-	< 60.0	18.1	300.0	< 0.9	> 17.1
0.50	-	< 35.0	33.6	30.0	< 15.9	> 17.7
1.00	-	< 35.0	27.6	30.0	< 15.9	> 11.7
2.00	-	< 35.0	29.5	30.0	< 15.9	> 13.6
3.00	-	< 35.0	29.5	30.0	< 15.9	> 13.6
5.00	-	< 35.0	29.5	30.0	< 15.9	> 13.6
10.00	-	< 35.0	29.5	30.0	< 15.9	> 13.6
27.12	-	40.3	29.5	30.0	21.2	8.3
30.00	-	< 35.0	29.5	30.0	< 15.9	> 13.6



Notes: 1) The testing location : Anechoic Chamber No.1 Distance : 10 m

2) The symbol of "&lt;" means "or less".

3) The symbol of "&gt;" means "more than".

4) The symbol of "-" means "Zero", because the used test receiver calculated and displayed in the Meter Reading including the Correction Factor(Antenna and cable loss) directly

5) A sample calculation was made at 0.009 MHz

$$60 \text{ dB}\mu\text{V/m (at 10m distance)} \Rightarrow 60 - 20\log_{10}((300/10)^2) = 0.9 \text{ dB}\mu\text{V/m (at 300m distance)}$$

6) Setting of measuring instrument :

Quasi-Peak Detector, IF Bandwidth: 9 kHz or 200Hz (9 kHz - 90 kHz, 110-490kHz)

Average Detector, IF Bandwidth: 9 kHz or 200Hz (except for 9 kHz - 90 kHz, 110-490kHz)

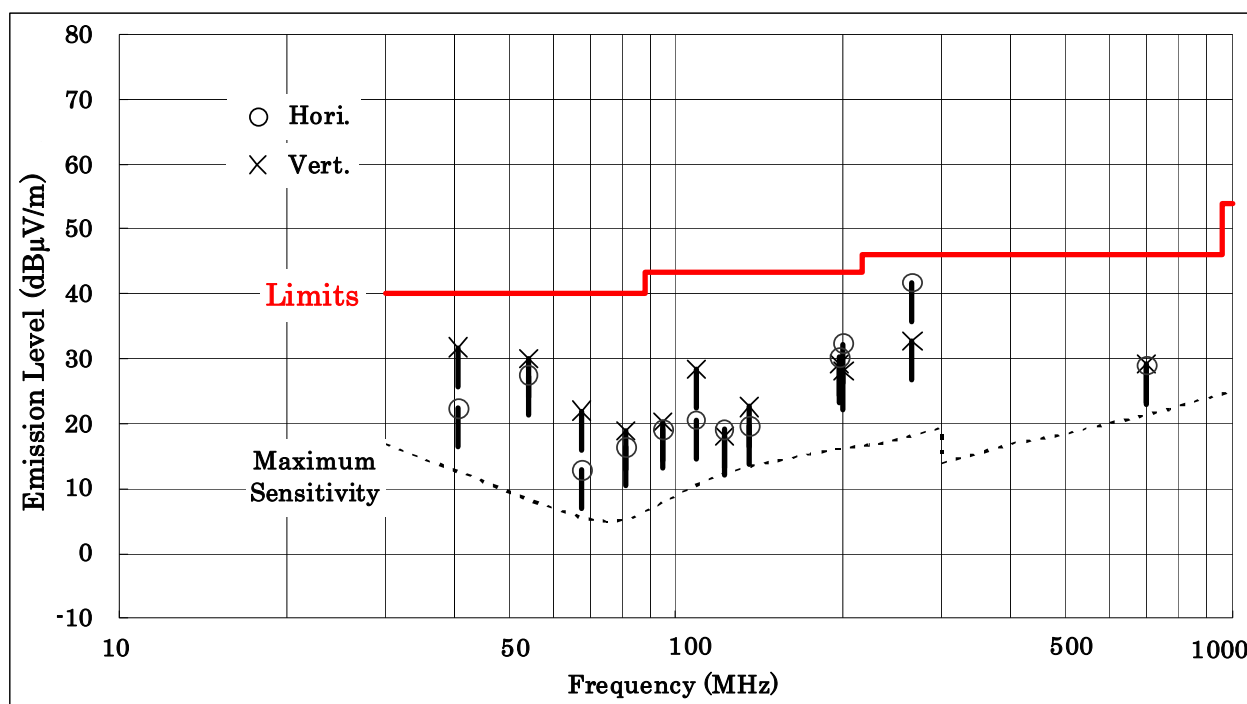
7) The spectrum was checked from 0.009 MHz to 30 MHz.

## A.3.2 Radiated Emission 30 MHz - 1000 MHz

Date : February 3, 2009

Temp : 16°C Humi : 32% Atom : 956hPa

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading (dBμV)		Limits (dBμV) Q.P	Emission Level (dBμV/m)		Margin (dB)	
		Hori.	Vert.		Hori.	Vert.	Hori.	Vert.
40.68	14.7	7.7	17.1	40.0	22.4	31.8	17.6	8.2
54.24	10.2	17.3	19.8	40.0	27.5	30.0	12.5	10.0
67.80	7.4	5.5	14.6	40.0	12.9	22.0	27.1	18.0
81.36	7.1	9.3	11.7	40.0	16.4	18.8	23.6	21.2
94.92	9.7	9.4	10.6	43.5	19.1	20.3	24.4	23.2
108.48	12.4	8.3	16.0	43.5	20.7	28.4	22.8	15.1
122.04	14.1	4.9	3.8	43.5	19.0	17.9	24.5	25.6
135.60	15.2	4.5	7.3	43.5	19.7	22.5	23.8	21.0
196.64	17.8	12.4	11.4	43.5	30.2	29.2	13.3	14.3
200.00	17.9	14.4	10.2	43.5	32.3	28.1	11.2	15.4
266.20	18.8	23.0	14.0	46.0	41.8	32.8	4.2	13.2
700.00	23.1	5.9	6.0	46.0	29.0	29.1	17.0	16.9



- Notes:
- 1) The testing location : Anechoic Chamber No.1 Distance : 3 m
  - 2) The spectrum was checked from 30 MHz to 1000 MHz.
  - 3) Antenna factor includes the cable loss.
  - 4) Hori. : Horizontal polarization Vert. : Vertical polarization
  - 5) Q.P: Quasi-Peak Detector
  - 6) The symbol of "<" means "or less", ">" means "more than".
  - 7) A sample calculation was made at 40.7 MHz  
 $(\text{Antenna Factor}) + (\text{Meter Reading}) = 14.7 + 17.1 = 31.8 \text{ dB}\mu\text{V}$

## A.3.3 Radiated Emission above 1 GHz

Not applicable

## A.4 Frequency Stability

Testing Date : February 5, 2009

Ambient Temperature / Humidity : 23° / 30%

Temperature (°C)	Primary Supply Voltage (V)	Frequency (MHz)			
		0 minute later	2 minutes later	5 minutes later	10 minutes later
-20	10.2	13.56036296	13.56035161	13.56038208	13.56040022
	12.0	13.56042672	13.56039535	13.560369	13.56035203
	13.8	13.5603838	13.5603887	13.56036354	13.56032195
20	10.2	13.5604265	13.56041603	13.56041563	13.56042082
	12.0	13.56044885	13.56041616	13.56041704	13.56041678
	13.8	13.56041818	13.56042576	13.56043175	13.56040974
50	10.2	13.56014856	13.56086167	13.56081574	13.56040043
	12.0	13.560646	13.56054672	13.56054013	13.5606774
	13.8	13.56071394	13.56053191	13.56056661	13.56074688

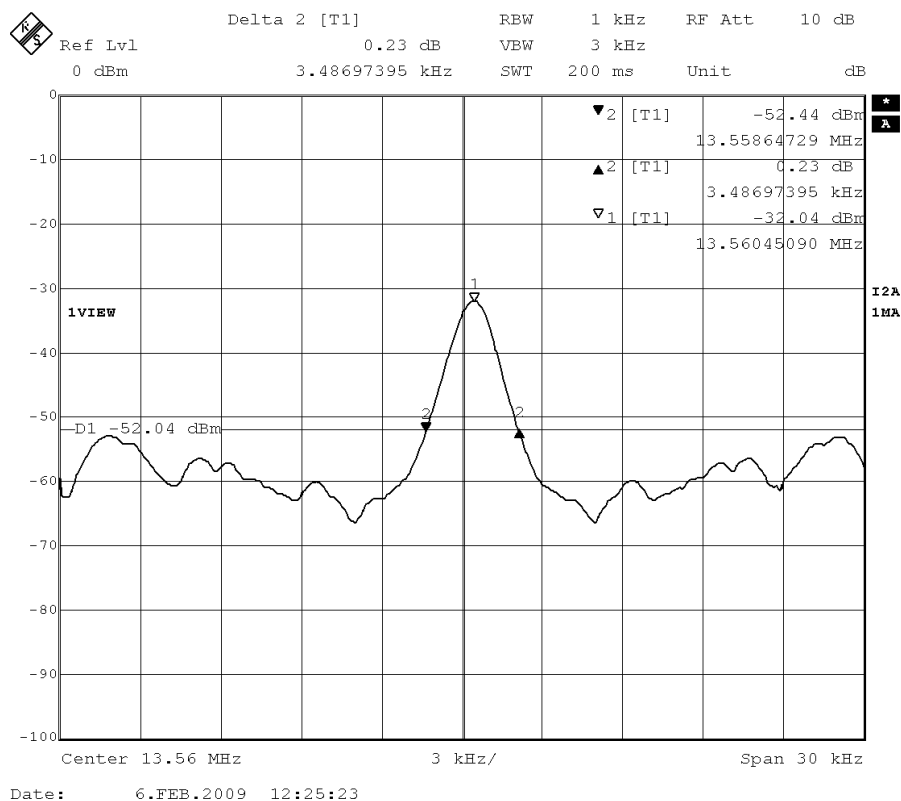
Basic Frequency: Corrected value by using 13.56 MHz as nominal frequency.

Temperature (°C)	Primary Supply Voltage (V)	Frequency with time elapse (%)			
		0 minute later	2 minutes later	5 minutes later	10 minutes later
-20	102	0.0026767	0.002593	0.002818	0.002951
	120	0.0031469	0.002916	0.002721	0.002596
	138	0.00283038	0.002867	0.002681	0.002374
20	102	0.00314528	0.003068	0.003065	0.003103
	120	0.0033101	0.003069	0.003076	0.003074
	138	0.00308392	0.00314	0.003184	0.003022
50	102	0.00109558	0.006354	0.006016	0.002953
	120	0.00476401	0.004032	0.003983	0.004996
	138	0.00526504	0.003923	0.004179	0.005508

Specified Limit : The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$



## A.5 Occupied Bandwidth



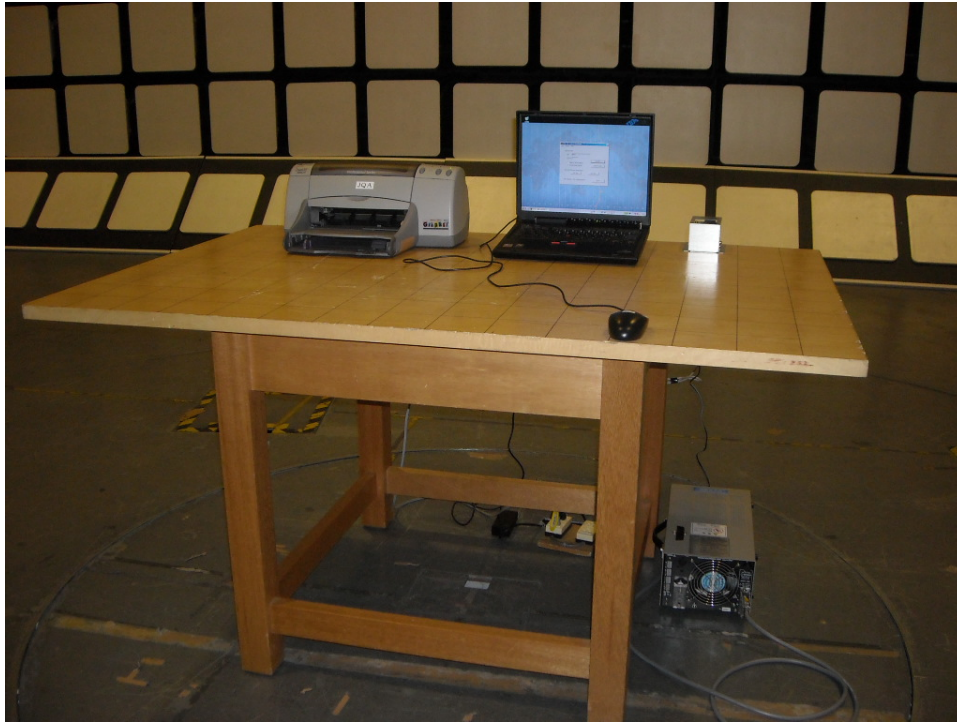
**Appendix B : Test Arrangement (Photographs)****B.1 AC Powerline Conducted Emission**

- Front View -



- Side View -

Photograph present configuration with maximum emission

**B.2 Radiated Emissions**

- Front View -



- Rear View -

Photograph present configuration with maximum emission



### Appendix C: Test Instruments

Sign	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
OS-1	Open Site	-	Toshiba	-	2008/5	1 Year
OS-2	Open Site	-	Toshiba	-	2008/5	1 Year
AC-1	Anechoic Chamber (L)	-	TDK	-	2008/5	1 Year
AC-2	Anechoic Chamber (S)	-	TDK	-	2008/11	1 Year
SR-A	Shielded Room	-	TDK	-	-	-
SR-B	Shielded Room	-	TDK	-	-	-
SR-C	Shielded Room	-	TDK	-	-	-
TR-1	Tested Room	-	-	-	-	-
R-1	Test Receiver	ESVS10	Rohde & Schwarz	849231/004	2008/3	1 Year
R-2	Test Receiver	ESVS10	Rohde & Schwarz	843744/018	2008/6	1 Year
R-3	Test Receiver	ESI7	Rohde & Schwarz	100059/007	2008/10	1 Year
R-4	Test Receiver	ESHS30	Rohde & Schwarz	842053/001	2008/2	1 Year
R-5	Test Receiver	ESCS30	Rohde & Schwarz	100203	2008/5	1 Year
S-3	Spectrum Analyzer	U3751	Advantest	160100139	2008/3	1 Year
S-4	Spectrum Analyzer	8563E	Hewlett Packard	3221A00201	2008/4	1 Year
S-5	Spectrum Analyzer	U3751	Advantest	170500170	2008/5	1 Year
CB-3	RF Cable	3D-2W	Fujikura	-	2008/5	1 Year
CB-4	RF Cable	3D-2W	Fujikura	-	2008/5	1 Year
CB-5	RF Cable	3D-2W	Fujikura	-	2008/5	1 Year
CN-1	RF Cable	20D/5D-2W	Fujikura	-	2008/5	1 Year
CN-2	RF Cable	20D/5D-2W	Fujikura	-	2008/5	1 Year
CN-3	RF Cable	20D/5D-2W	Fujikura	-	2008/5	1 Year
CS-1	RF Cable	SUCOFLEX 104P	Huber+Suhner	27290/4P	2008/2	1 Year
CS-2	RF Cable	SUCOFLEX 104P	Huber+Suhner	27289/4P	2008/2	1 Year
L-1	AMN	KNW-407	Kyoritsu Corp.	8-833-5	2008/10	1 Year
L-2	AMN	KNW-407	Kyoritsu Corp.	8-680-14	2008/10	1 Year
L-3	AMN	KNW-407	Kyoritsu Corp.	8-757-1	2008/6	1 Year
L-4	AMN	KNW-242	Kyoritsu Corp.	8-755-1	2008/7	1 Year
L-5	AMN	KNW-242C	Kyoritsu Corp.	8-837-14	2008/7	1 Year
L-6	AMN	KNW-243C	Kyoritsu Corp.	8-692-5	2008/10	1 Year
L-7	AMN	KNW-243C	Kyoritsu Corp.	8-831-3	2008/6	1 Year
L-9	AMN	KNW-244C	Kyoritsu Corp.	8-1373-3	2008/8	1 Year
L-10	ISN	FCC-TLISN-T2-02	FCC	20234	2008/11	1 Year
L-11	ISN	FCC-TLISN-T4-02	FCC	20235	2008/11	1 Year
L-12	High Impedance Probe	KNW-410	Kyoritsu Corp.	8-876-3	2008/8	1 Year
L-13	Artificial Hand	K-9003	Kyoritsu Corp.	7-1639-4	2008/10	1 Year
L-14	Hi-pass Filter	KFL-009D	Kyoritsu Corp.	8-1996-8	2008/7	1 Year
L-15	ISN	F-070306-1057-1	FCC	20591	2008/7	1 Year
PL-3	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	2008/10	1 Year
PL-4	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	2008/2	1 Year
PL-5	Pulse Limiter	ESH3-Z2	Rohde & Schwarz	-	2008/5	1 Year
TM-1	50ohm Termination	BNC-P-1.5	TDC	-	2008/3	1 Year
TM-2	50ohm Termination	-	Y&R	-	2008/3	1 Year
AL-0	Loop Antenna	HFH2-Z2	Rohde & Schwarz	879284/14	2008/5	1 Year
AT-1	Triple Loop Antenna	HXYZ9170	Schwarzbeck	9170-138	2008/7	1 Year
AT-2	Trilog Broadband Antenna	VULB9160	Schwarzbeck	9160-3251	2008/9	1 Year
AB-1	Biconical Antenna	BBA9106	Schwarzbeck	91031741	2008/8	1 Year

AB-2	Biconical Antenna	BBA9106	Schwarzbeck	91032349	2008/9	1 Year
AB-3	Biconical Antenna	BBA9106	Schwarzbeck	VHA11905516	2008/9	1 Year
AL-1	Log-Periodic Antenna	UHALP9108-A	Schwarzbeck	0678	2008/8	1 Year
AL-2	Log-Periodic Antenna	UHALP9108-A	Schwarzbeck	0679	2008/9	1 Year
AL-3	Log-Periodic Antenna	UHALP9108-A	Schwarzbeck	0278	2008/9	1 Year
AL-4	Log-Periodic Antenna	USLP9143	Schwarzbeck	140	2008/6	1 Year
AL-5	Log-Periodic Antenna	94612-1	Eaton	97062301	2008/4	1 Year
AL-6	Log-Periodic Antenna	ESLP9145	Schwarzbeck	9145-216	2008/3	1 Year
AH-5	Horn Antenna	12-12	Scientific Atlanta	741	2008/5	1 Year
AD-1	Dipole Antenna	KBA-511A	Kyoritsu Corp.	0-195-5	2008/8	1 Year
AD-2	Dipole Antenna	KBA-511A	Kyoritsu Corp.	0-228-13	2008/9	1 Year
AD-3	Dipole Antenna	KBA-611	Kyoritsu Corp.	0-196-8	2008/8	1 Year
AD-4	Dipole Antenna	KBA-611	Kyoritsu Corp.	0-230-6	2008/9	1 Year
CL-1	Absorbing Clamp	MDS21	Rohde & Schwarz	894245/002	2008/5	1 Year
PA-1	Pre-Amplifier	WJ-6811-513	Watkins Johnson	0288	2008/2	1 Year
PA-2	Pre-Amplifier	WJ-6682-824	Watkins Johnson	0052	2008/2	1 Year
PA-3	Pre-Amplifier	WJ-6870-506	Watkins Johnson	0018	2008/2	1 Year
PA-5	Pre-Amplifier	AMF-4D-005080-18-13P	MITEQ, INC.	1218917	2008/11	1 Year
RN-1	Reference Impedance Network	4151	NF ELECTRONIC INSTRUMENTS	3168114151011	2008/5	1 Year
RN-2	Reference Impedance Network	ES4153	NF ELECTRONIC INSTRUMENTS	9099436	2008/10	1 Year
HF-1	Harmonic/Flicker Analyzer	KHA3000	KIKUSUI ELECTRONICS CORPORATION	NB001642	2008/5	1 Year
13	Test Receiver	ESI26	Rohde & Schwarz	100043	2008/9	1 Year
OV-1	Oven	-	Ohnishi	-	-	-
FC-1	Frequency Counter	53131A	Hewlett Packard	3546A11807	2008/5	1 Year
PM-1	Power Meter	436A	Hewlett Packard	1725A01930	2008/4	1 Year
PS-1	Power Sensor	8482A	Hewlett Packard	1551A01013	2008/4	1 Year
PS-2	Power Sensor	8485A	Hewlett Packard	2942A08969	2008/4	1 Year