JAPAN QUALITY ASSURANCE ORGANIZATION
21-25, KINUTA 1-CHOME, SETAGAYA-KU, TOKYO 157-8573 JAPAN
PHONE (03) 3416-0111, FAX (03) 3416-9691

EMI TEST REPORT

JQA APPLICATION NO.	: 400-20681
Model No.	: BS-R
Type of Equipment	: Wireless Information System (Receiver)
Regulations Applied	: CFR 47 FCC Rules and Regulations Part 15
FCC ID	: QULBSR3
Applicant	: Mitsui & Co., Ltd. Nagoya Office Machinery Division
Address	: 16-21, Meieki Minami 1-chome, Nakamura-ku, Nagoya-city, Aichi-prefecture 450-8677, Japan
Manufacture	: Harmony Co., Ltd.
Address	: 3-62 Sameganji, Jushiyama-mura, Ama-gun, Aichi-prefecture, Japan
Received date of EUT	: December 26, 2002
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 Communication Research Laboratory (CRL) of Japan.

TABLE OF CONTENTS

1 DOCUMENTATION

1.1 TEST REGULATION

FCC Rules and Regulations Part 15 Subpart A and B (June 23, 1989) All other receivers subject to part 15

Test procedure :

AC power line conducted emission, radiated emission and antenna conducted power 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 : May 27, 2005

2) EMC Engineering Dept. Testing Div. is recognized under the National Voluntary Laboratory accreditation Program for satisfactory compliance established in title 15, Part 285 Code of Federal Regulations.
   NVLAP Lab Code : 200189-0 (Effective through : June 30, 2003)

1.2.2 Description of the Equipment Under Test (EUT) :

1)	Type of Equipment	: Wireless Information System (Receiver)
2)	Product Type	: Production
3)	Category	: All other receivers subject to part 15
4)	EUT Authorization	: Certification
5)	FCC ID	: QULBSR3
6)	Trade Name	: BELSTAR
7)	Model No.	: BS-R
8)	Tuning Frequency Range	: 298.8 MHz
9)	Highest Frequency Used in the EUT	: 309.5 MHz
10)	Serial No.	: 02050071
11)	Date of Manufacture	: None
12)	Power Rating	: 120 VAC 60 Hz
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

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

Test location :

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

_x_ - Shielded Enclosure
___ - Anechoic Chamber No. 2 (portable Type)

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
x	Test Receiver	ESH-2	Rohde & Schwarz	880370/016	May 2002	1 Year
___	Test Receiver	ESH-3	Rohde & Schwarz	881460/030	May 2002	1 Year
___	Test Receiver	ESHS10	Rohde & Schwarz	835871/004	May 2002	1 Year
___	LISN(for Peripheral)	KNW-407	Kyoritsu Electrical	8-833-6	Apr. 2002	1 Year
x	LISN(for EUT)	KNW-407	Kyoritsu Electrical	8-855-2	Apr. 2002	1 Year
___	LISN	KNW-407	Kyoritsu Electrical	8-757-1	Apr. 2002	1 Year
x	RF Cable	3D-2W	Fujikura	155-21-006E0	Apr. 2002	1 Year
___	RF Cable	3D-2W	Fujikura	155-21-007E0	Apr. 2002	1 Year
___	50ohm Termination	-	SUHNER	154-06-501E0	Jan. 2003	1 Year
___	50ohm Termination	-	SUHNER	154-06-502E0	Jan. 2003	1 Year

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

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

Test location :

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

_x_ - Anechoic Chamber No. 2 (3 meters)
___ - Anechoic Chamber No. 3 (3 meters)

Validation of Site Attenuation :

1) Last Confirmed Date :March, 2002
2) Interval :1 year

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___	Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Oct. 2002	1 Year
___	Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Oct. 2002	1 Year
___	RF Pre-selector	85685A	Hewlett Packard	2648A00522	Oct. 2002	1 Year
___	Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
___	RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
___	Test Receiver	ESV	Rohde & Schwarz	872148/039	May 2002	1 Year
_x_	Test Receiver	ESVS10	Rohde & Schwarz	826148/002	May 2002	1 Year
___	Test Receiver	ESVS10	Rohde & Schwarz	832699/001	May 2002	1 Year
___	Antenna	KBA-511	Kyoritsu Electrical	0-170-1	Nov. 2002	1 Year
___	Antenna	KBA-511A	Kyoritsu Electrical	0-201-13	Nov. 2002	1 Year
___	Antenna	KBA-611	Kyoritsu Electrical	0-147-14	Nov. 2002	1 Year
___	Antenna	KBA-611	Kyoritsu Electrical	0-210-5	Nov. 2002	1 Year
_x_	Biconical Antenna	BBA9106	Schwarzbeck	VHA91031150	Nov. 2002	1 Year
___	Biconical Antenna	BBA9106	Schwarzbeck	11905078E0	Nov. 2002	1 Year
_x_	Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905079E0	Nov. 2002	1 Year
___	Log-Periodic Antenna	UHALP9107	Schwarzbeck	11905110	Nov. 2002	1 Year
_x_	RF Cable	5D-2W	Fujikura	155-21-001E0	Feb. 2002	1 Year
___	RF Cable	5D-2W	Fujikura	155-21-002E0	Feb. 2002	1 Year

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

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

Test location :

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

___ - No. 2 site (3 meters)
___ - No. 3 site (3 meters)

Validation of Site Attenuation :

1) Last Confirmed Date :N/A
2) Interval :N/A

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___ -	Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Oct. 2002	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Oct. 2002	1 Year
___ -	RF Pre-selector	85685A	Hewlett Packard	2648A00522	Oct. 2002	1 Year
___ -	Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
___ -	RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
___ -	Log-Periodic Antenna	HL 025	Rohde & Schwarz	340182/015	Jan. 2003	1 Year
___ -	RF Amplifier	DBP-0102N5334272B	DBS Microwave Inc.	012	June 2002	1 Year
___ -	RF Amplifier	WJ-6882-814	Watkins-Johnson	0414	June 2002	1 Year
___ -	RF Amplifier	WJ-5315-556	Watkins-Johnson	106	June 2002	1 Year
___ -	RF Amplifier	WJ-5320-307	Watkins-Johnson	645	June 2002	1 Year
___ -	RF Cable(10m)	S 04272B	Suhner	155-21-011E0	May 2002	1 Year
___ -	RF Cable(2m)	SUCOFLEX 104	Suhner	155-21-012E0	May 2002	1 Year
___ -	RF Cable(1m)	SUCOFLEX 104	Suhner	155-21-013E0	May 2002	1 Year
___ -	RF Cable(1m)	S 04272B	Suhner	155-21-015E0	June 2002	1 Year
___	Test Receiver	ESI26	Rohde & Schwarz	100043	Aug. 2002	1 Year

1.3.4 The measurement of the Antenna Conducted Power

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

Test location :

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

_x_ - Shielded Enclosure
___ - Anechoic Chamber No. 2 (portable Type)

Used test instruments :

	Type	Model No.	Manufacturer	Serial No.	Last Cal.	Interval
___	- Test Receiver	ESV	Rohde & Schwarz	872148/039	May 2002	1 Year
_x_	- Test Receiver	ESVS10	Rohde & Schwarz	826148/002	May 2002	1 Year
___	- Test Receiver	ESVS10	Rohde & Schwarz	832699/001	May 2002	1 Year
___	- Spectrum Analyzer	8560E	Hewlett Packard	3240A00189	Oct. 2002	1 Year
___	- Spectrum Analyzer	8566B	Hewlett Packard	2140A01091	Oct. 2002	1 Year
___	- RF Pre-selector	85685A	Hewlett Packard	2648A00522	Oct. 2002	1 Year
___	- Spectrum Analyzer	8566B	Hewlett Packard	2747A05855	Apr. 2002	1 Year
___	- RF Pre-selector	85685A	Hewlett Packard	2091A00933	Apr. 2002	1 Year
___	- RF Cable(2m)	SUCOFLEX 104	Suhner	155-21-012E0	May 2002	1 Year
___	- RF Cable(1m)	SUCOFLEX 104	Suhner	155-21-013E0	May 2002	1 Year
___	Test Receiver	ESI26	Rohde & Schwarz	100043	Aug. 2002	1 Year
_x_	- RF Cable(1m)	SUCOFLEX 104	Suhner	182811/4	Dec. 2002	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 / UNCERTAINTY

AC Power Line Conducted Emission x **- Applicable** ___ **- NOT Applicable**

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

Min. Limit Margin 19.2 dB at 0.20 MHz
Max. Limit Exceeding dB at MHz

Uncertainty of Measurement Results +/- 2.4 dB (level of confidence:95%)

Remarks :

Radiated Emission [§15.109(a)] x **- Applicable** ___ **- NOT Applicable**

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

Min. Limit Margin 9.3 dB at 30.0 MHz
Max. Limit Exceeding dB at MHz

Uncertainty of Measurement Results
Biconical Antenna +/- 3.8 dB (level of confidence:95%)
Log-Periodic Antenna +/- 4.7 dB (level of confidence:95%)
Half Wave Dipole Antenna +/- 3.4 dB (level of confidence:95%)

Remarks:

Antenna Conducted Power [§15.111] x **- Applicable** ___ **- NOT Applicable**

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

Min. Limit Margin 15.4 dB at 309.500 MHz
Max. Limit Exceeding dB at MHz

Uncertainty of Measurement Results +/- 2.1 dB (level of confidence:95%)

Remarks:

1.6 SUMMARY

General Remarks :

The EUT was tested according to the requirements of FCC Rules and Regulations Part 15 Subpart A and B (June 23, 1989) under the test configuration, as shown in clause 1.7 to 1.10.
The conclusion for the test items 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 : January 8, 2003
End of testing : January 10, 2003

- JAPAN QUALITY ASSURANCE ORGANIZATION -

Approved by:

M. Takahashi

Masaaki Takahashi
Senior Manager
JQA EMC Engineering Dept.

Signatories:
Issued by:

Shigeru Osawa

Shigeru Osawa
Assistant Manager
JQA EMC Engineering Dept.

1.7 TEST CONFIGURATION / OPERATION OF EUT

1.7.1 Test Configuration

The equipment under test (EUT) consists of :

Symbol	Item	Manufacturer	Model No.	FCC ID	Serial No.
A	Wireless Information System (Receiver)	Harmony Co., Ltd.	BS-R	QULBSR3	02050071

Type of Cable :

Symbol	Description	Identification (Manufacturer etc.)	Shielded YES/NO	Ferrite Core	Connector type Shielded YES / NO	Length (m)
1	AC Power Cable	Million	NO	NO	NO	2.3

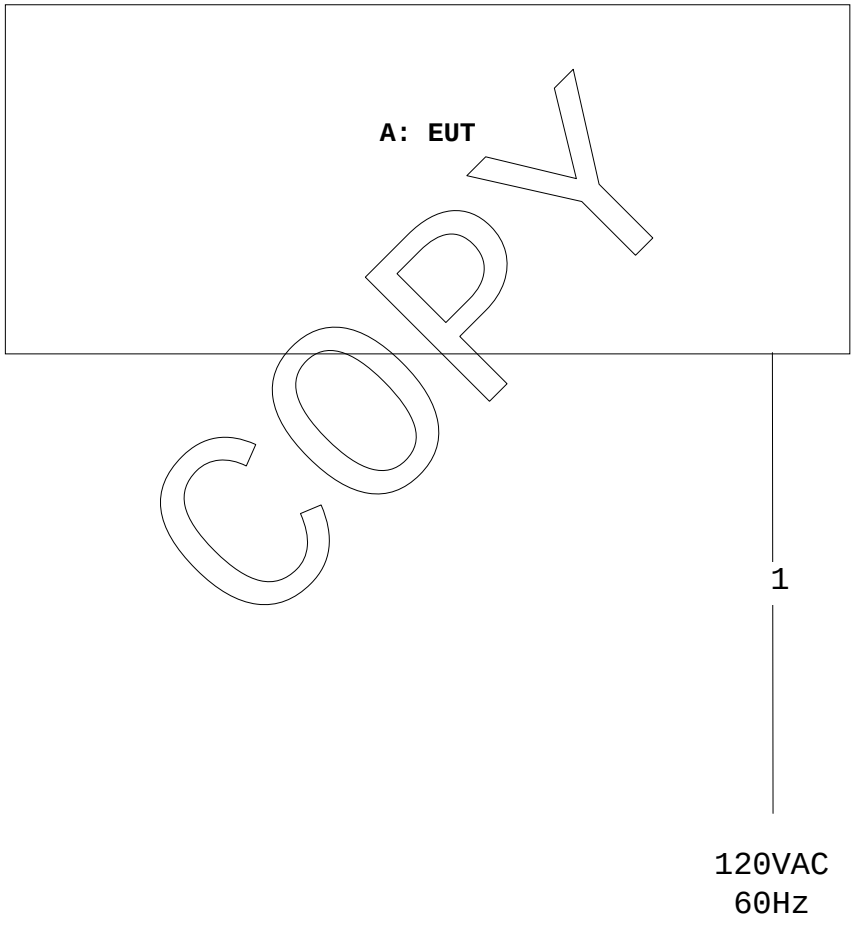
1.7.2 Operating condition

Power supply Voltage : 120VAC, 60Hz
The tests have been carried out under the receiving condition.

1.7.3 Generating and Operating frequency of EUT

77.375 MHz, 10.245 MHz, 10 MHz , 4 MHz and 309.5 MHz

1.8 EUT ARRANGEMENT (DRAWINGS)



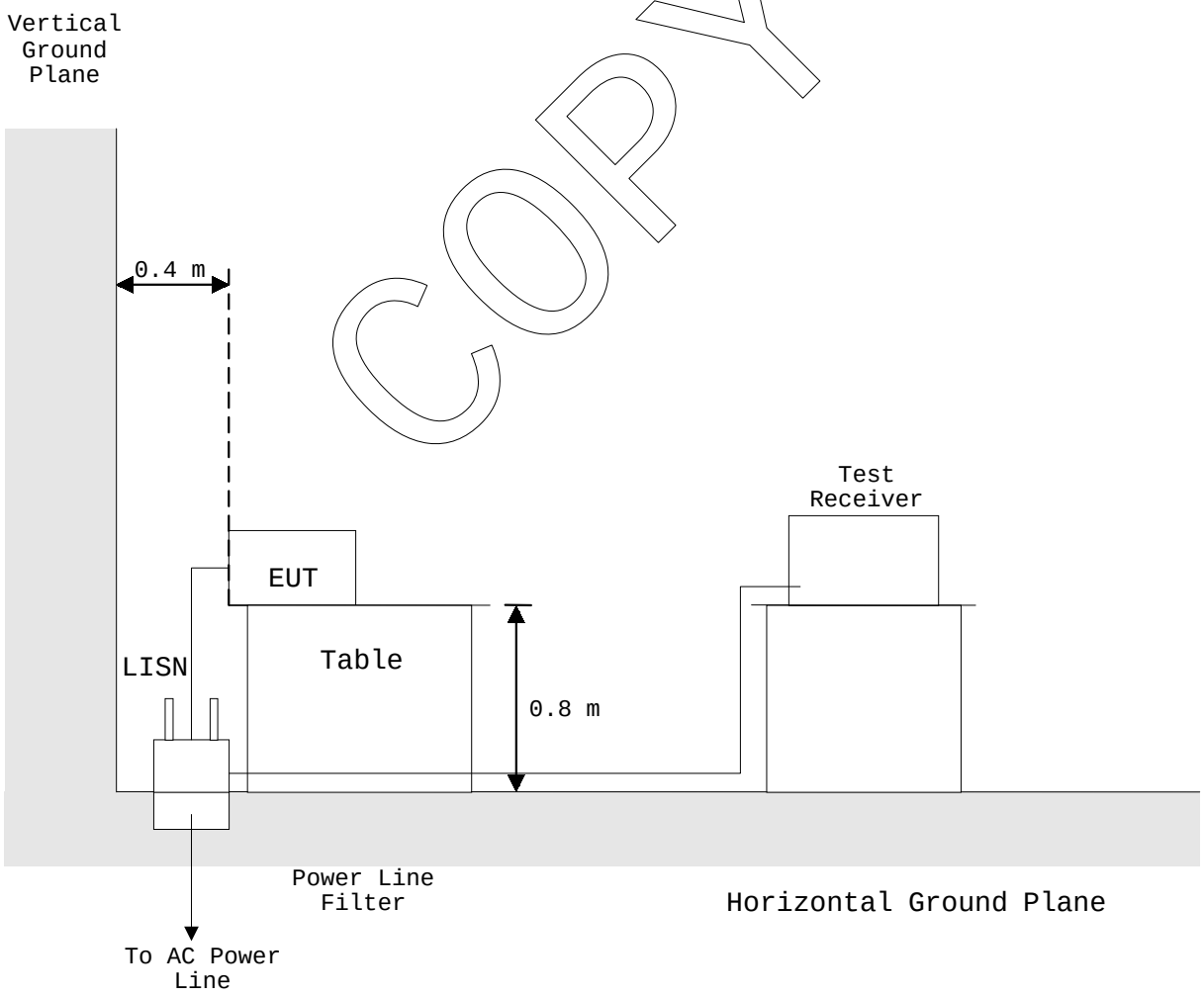
1.9 PRELIMINARY TEST AND TEST-SETUP (DRAWINGS)

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

According to description of ANSI C63.4-1992 sec.7.2.3, 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 -

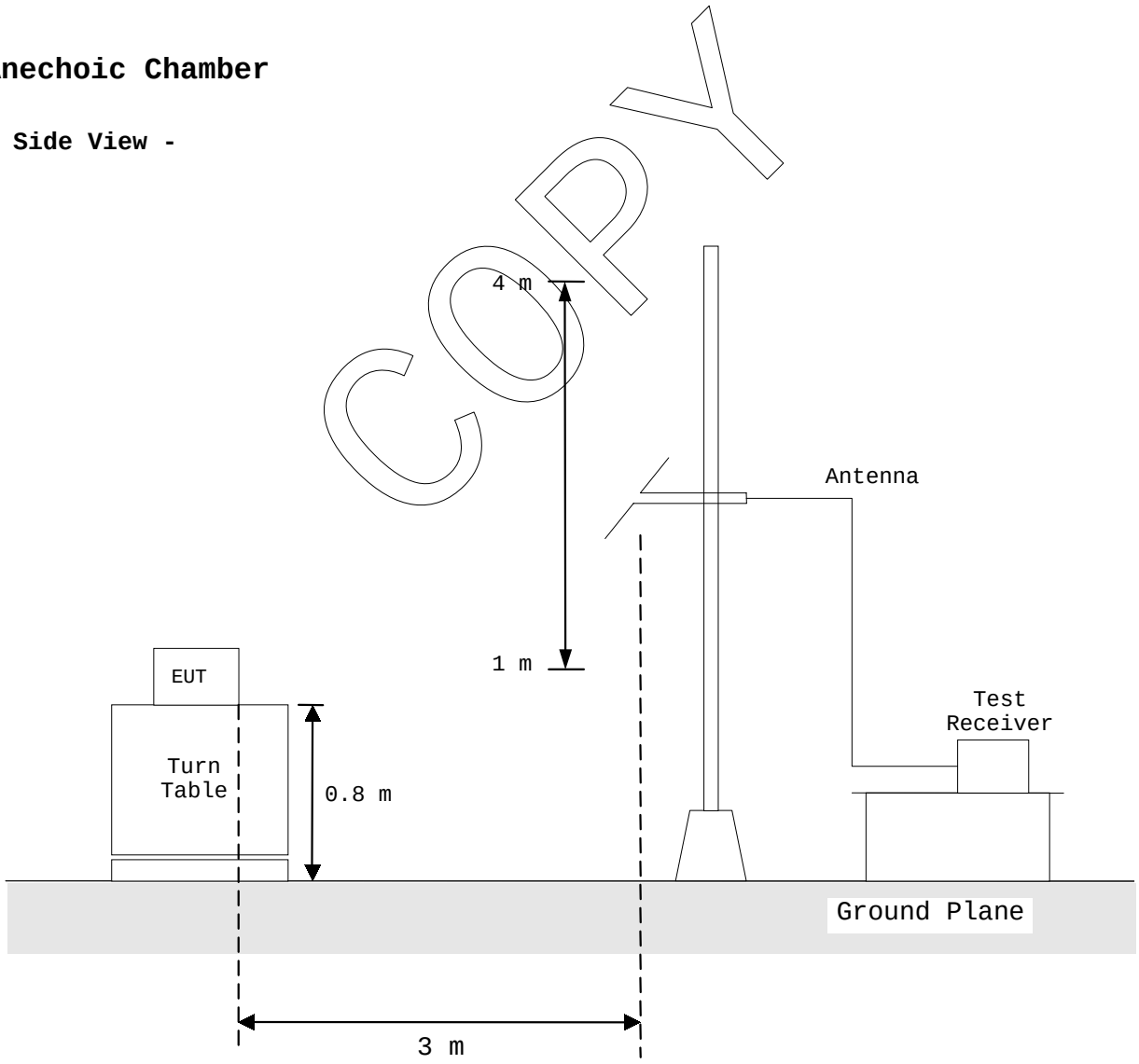


1.9.2 Radiated Emission (30 MHz – 1000 MHz) :

According to description of ANSI C63.4-1992 sec.8.3.1.1, 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 -

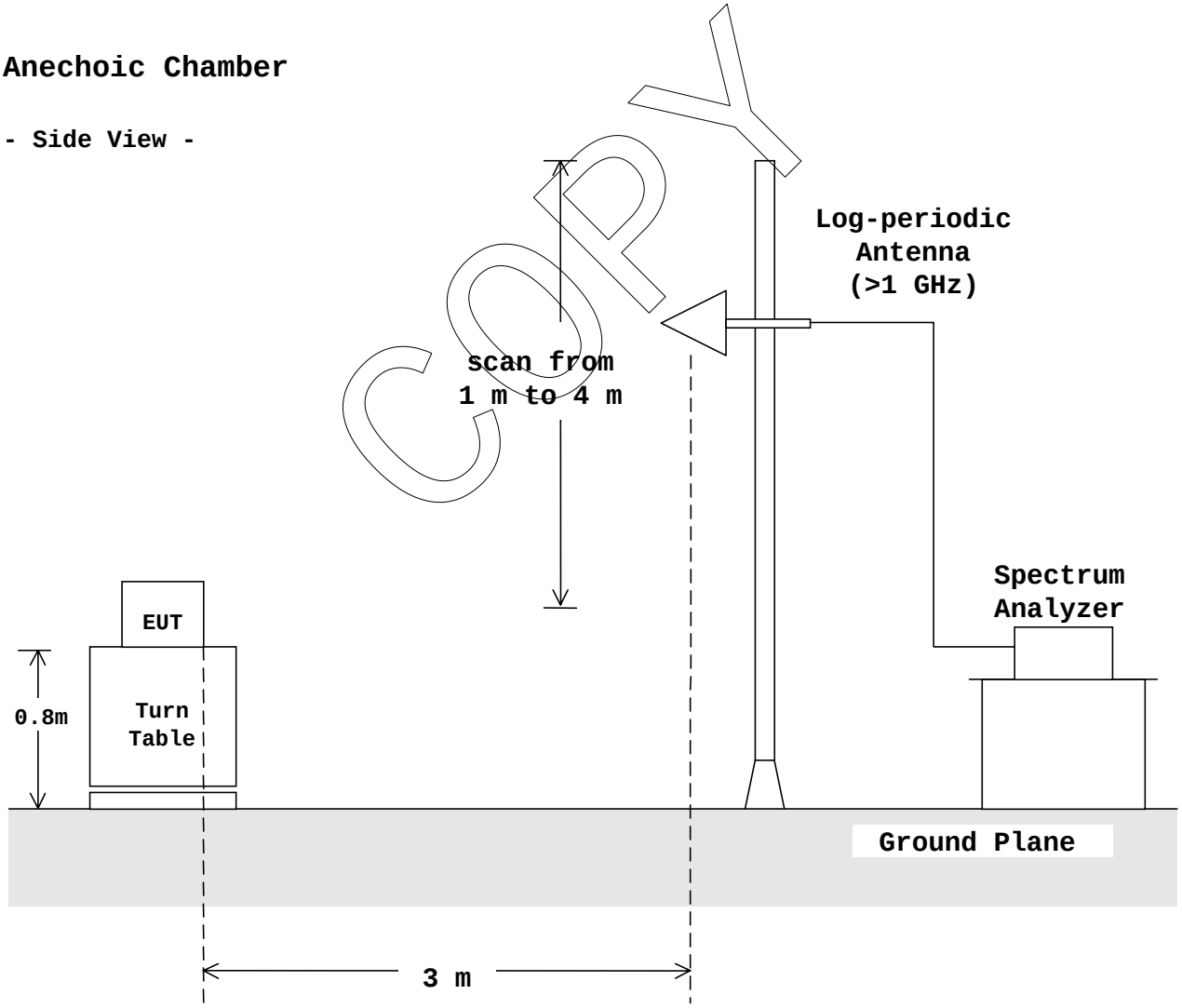


1.9.3 Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4-1992 sec.8.3.1.1, the preliminary radiated emissions measurements were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT.
The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements.

Anechoic Chamber

- Side View -

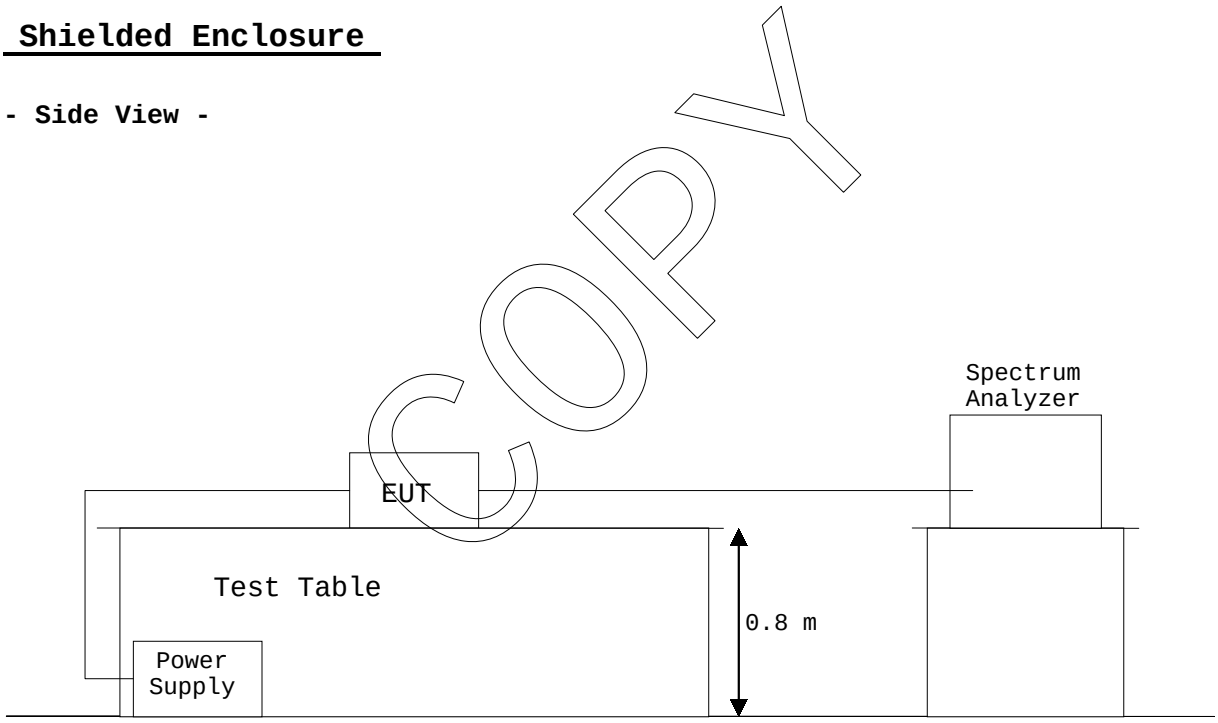


1.9.4 Antenna Conducted Power :

According to description of ANSI C63.4-1992 sec.12.1.5, the antenna conducted power measurements were carried out.
Antenna-conducted power measurements shall be performed with the EUT antenna terminals connected directly to either a spectrum analyzer or another measuring instrument, if the antenna impedance matches the impedance of the measuring instrument. Otherwise, use a balun or impedance-matching network to connect the measuring instrument to antenna terminals of the EUT. Losses in decibels in any balun or impedance-matching network used shall be added to the measured value in dBμV.

Shielded Enclosure

- Side View -



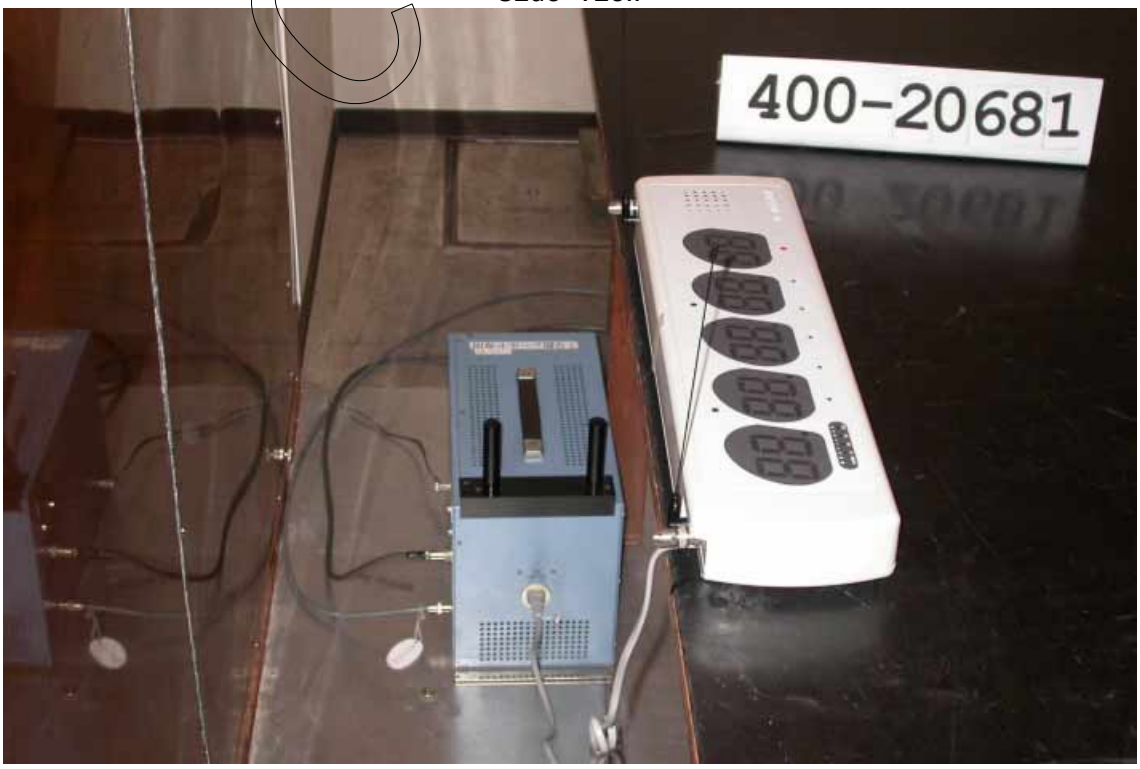
1.10 TEST ARRANGEMENT (PHOTOGRAPHS)

PHOTOGRAPHS OF EUT CONFIGURATION FOR AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission

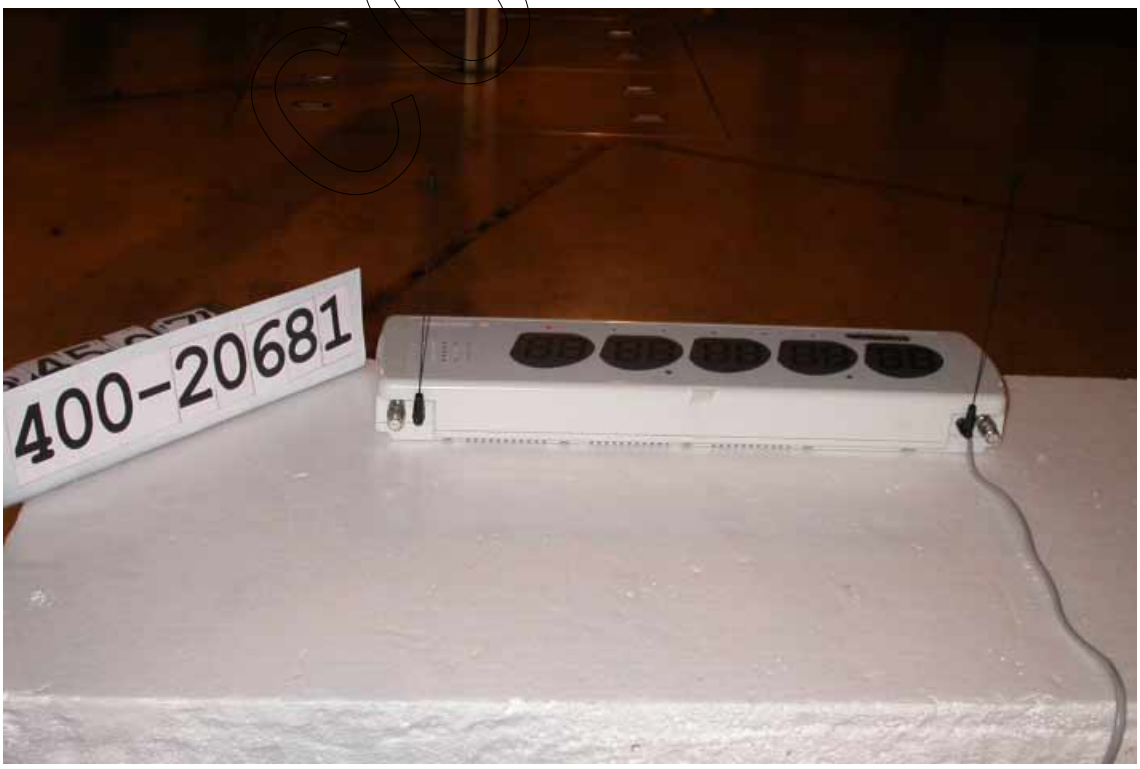
- Front View –

- Side View –



PHOTOGRAPHS OF EUT CONFIGURATION FOR RADIATED EMISSIONS MEASUREMENT

Photograph present configuration with maximum emission



TEST DATA

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

Date January 8, 2003
Temp. 20 °C Humi. 32 %

Frequency (MHz)	LISN Factor (dB)	Meter Reading (dBuV) V-A Q.P	V-A AVE	V-B Q.P	V-B AVE	Limits (dBuV) Q.P	Limits (dBuV) AVE	Emission Level (dBuV) Q.P	Emission Level (dBuV) AVE	Margins (dB) Q.P	Margins (dB) AVE
0.15	0.2	25.2	-	25.1	-	66.0	56.0	25.4	-	40.6	-
0.20	0.2	44.2	-	42.5	-	63.6	53.6	44.4	-	19.2	-
0.30	0.2	37.5	-	30.5	-	60.2	50.2	37.7	-	22.5	-
0.40	0.2	31.2	-	31.5	-	57.9	47.9	31.7	-	26.2	-
0.59	0.2	27.0	-	33.6	-	56.0	46.0	33.8	-	22.2	-
0.69	0.2	24.5	-	31.0	-	56.0	46.0	31.2	-	24.8	-
1.08	0.2	20.8	-	29.0	-	56.0	46.0	29.2	-	26.8	-
2.06	0.2	22.5	-	31.0	-	56.0	46.0	31.2	-	24.8	-
3.54	0.2	25.5	-	30.5	-	56.0	46.0	30.7	-	25.3	-
5.02	0.2	30.0	-	27.2	-	60.0	50.0	30.2	-	29.8	-
7.09	0.2	20.5	-	18.2	-	60.0	50.0	20.7	-	39.3	-
10.54	0.2	32.5	-	31.0	-	60.0	50.0	32.7	-	27.3	-
13.00	0.3	29.0	-	26.0	-	60.0	50.0	29.3	-	30.7	-
17.07	0.3	30.8	-	31.0	-	60.0	50.0	31.3	-	28.7	-
20.02	0.4	19.8	-	20.0	-	60.0	50.0	20.4	-	39.6	-
23.68	0.5	24.7	-	25.5	-	60.0	50.0	26.0	-	34.0	-
27.09	0.5	29.5	-	30.1	-	60.0	50.0	30.6	-	29.4	-
29.70	0.6	40.0	-	40.0	-	60.0	50.0	40.6	-	19.4	-

Notes : 1) The spectrum was checked from 0.15 MHz to 30 MHz.
2) The cable loss is included in the LISN factor.
3) The symbol of "<"means "or less".
4) The symbol of ">"means "or greater".
5) The symbol of "-"means "Not applicable".
6) V-A : One end & Ground V-B : The other end & Ground
7) Q.P : Quasi-peak AVE : Average
8) Asample calculation was made at 0.15 (MHz).
Lf + Mr =0.2 + 25.2 = 25.4(dBuV)
Lf = LISN Factor
Mr = Meter Reading

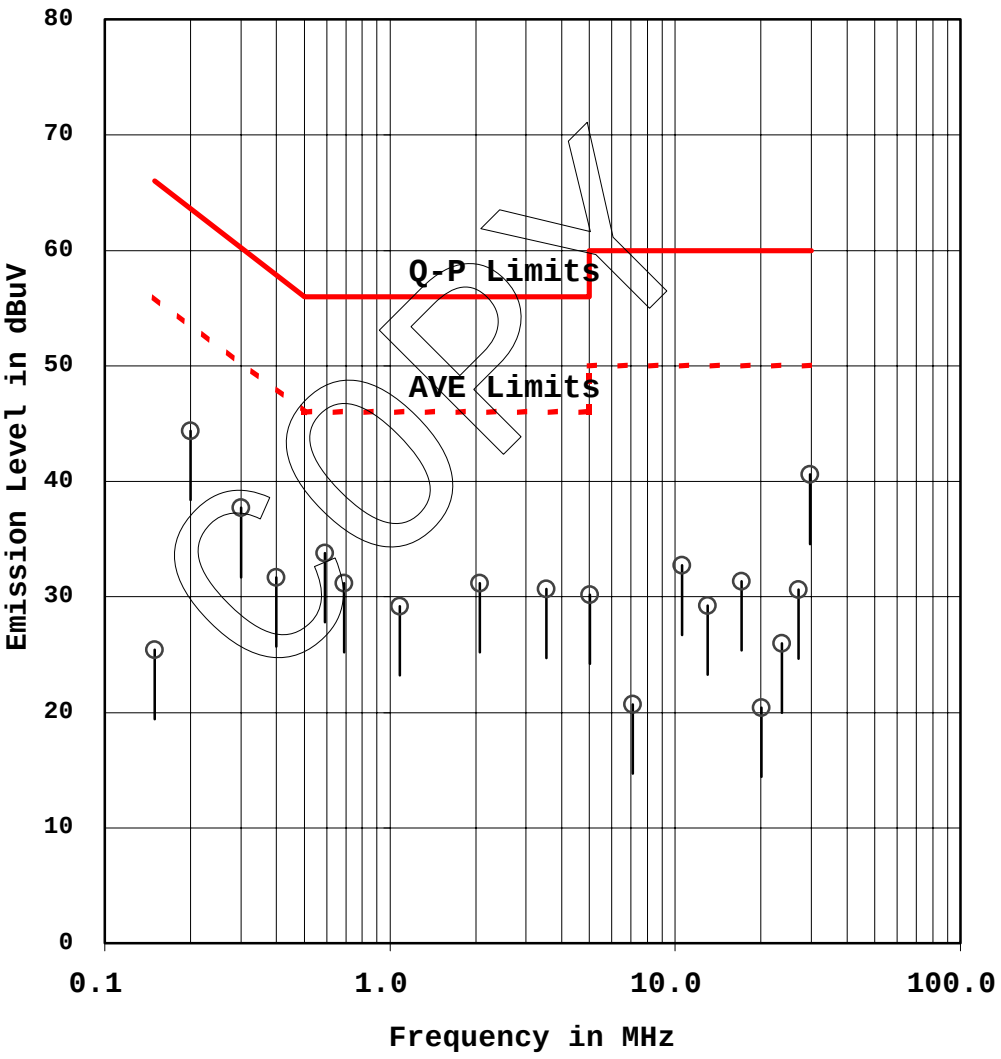
Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer

AC POWER LINE CONDUCTED EMISSION MEASUREMENT

Model No. : BS-R

Standard : CFR 47 FCC Rules Part 15
Category : Class B

o Quasi-peak
× Average



2.2 Radiated Emissions Measurement

Tuning Frequency : 298.8 MHz
Distance of Measurement :3.0 meters

Date : January 8, 2003
Temp. : 21 °C Humi. : 42 %

Frequency (MHz)	P-A Factor (dB)	Antenna Factor (dB)	Polarization	Meter Reading (dBuV) QP	AV	Peak	Limits (dBuV/m) QP/AV	Peak	Emission Levels (dBuV/m) QP/AV	Peak	Margins (dB) QP/AV	Peak
30.0	0.0	15.4	V	15.3	-	-	40.0	-	30.7	-	9.3	-
59.2	0.0	8.3	V	5.1	-	-	40.0	-	13.4	-	26.6	-
75.6	0.0	6.8	V	17.0	-	-	40.0	-	23.8	-	16.2	-
112.7	0.0	12.8	H	1.0	-	-	43.5	-	13.8	-	29.7	-
309.5	0.0	18.2	H	10.0	-	-	46.0	-	28.2	-	17.8	-
619.0	0.0	23.6	H	11.2	-	-	46.0	-	34.8	-	11.2	-
928.5	0.0	27.2	H	3.6	-	-	46.0	-	30.8	-	15.2	-

Notes :
1) The spectrum was checked from 30 MHz to 1000 MHz.
2) The cable loss is included in the antenna factor.
3) The symbol of "<"means "or less".
4) The symbol of ">"means "or greater".
5) A sample calculation(QP/AV) was made at 30 (MHz).
PA + Af + Mr = 0 + 15.4 + 15.3 = 30.7 (dBuV/m)
PA = Peak to Average Factor(P-A Factor)
Af = Antenna Factor
Mr = Meter Reading
6) Measuring Instrument Setting :

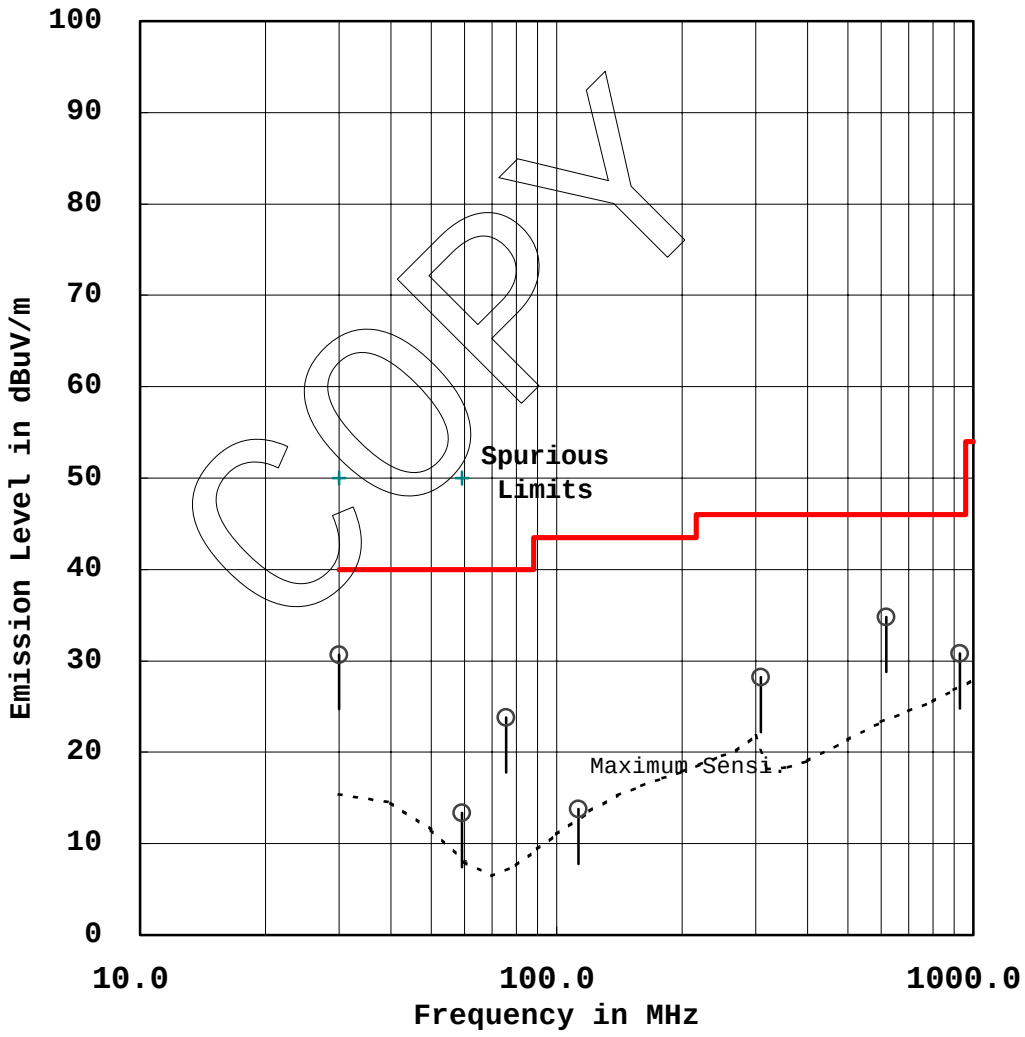
Detector function	Resolution Bandwidth	Video Bandwidth
Quasi-peak(QP)	120 kHz	-
Average(AV)	1 MHz	10 Hz
Peak	1 MHz	1 MHz

Tested by : Y. Nakajima
Yoichi Nakajima
Testing Engineer

RADIATED EMISSION MEASUREMENT

Model No. : BS-R

Standard : CFR 47 FCC Rules Part 15 O QP/AV
Tuning Frequency(MHz) : 298.8



2.3 Antenna Conducted Power Measurement

Date : January 10, 2003
Temp.: 24 °C Humi.: 30 %

Tuning Frequency : 298.8 MHz
Antenna Impedance : 50 ohms

Frequency (MHz)	Pad Loss (dB)	Meter Reading (dBμV)	Limits (dBμV)	Conducted Emission (dBμV)	Margins (dB)
50.000	0.0	22.5	50.0	22.5	27.5
77.375	0.0	29.6	50.0	29.6	20.4
154.750	0.0	21.7	50.0	21.7	28.3
232.125	0.0	30.4	50.0	30.4	19.6
309.500	0.0	34.6	50.0	34.6	15.4
619.000	0.0	30.9	50.0	30.9	19.1
928.500	0.0	20.7	50.0	20.7	29.3

Note: 1. The spectrum was checked from 30 MHz to 1000 MHz.
All emissions not listed were found to be more than 20 dB below the limits.
2. The symbol of "<" means "or less".
3. Sample calculation :
at 50.000 MHz
Pl + Mr = 0.0 + 22.5 = 22.5 dBμV
Where,
Pl = Pad Loss
Mr = Meter Reading
4. Specified Limit:
10log(2[nW]/1000000) + 107 = 50 dBμV
5. Measuring Instrument Setting:
Below 1000 MHz
Detector function : CISPR Quasi-peak
IF Bandwidth : 120 kHz
Above 1000 MHz
Detector function : Peak
IF Bandwidth : 1 MHz
Video Bandwidth : 10 Hz

Tested by : Shigeru Osawa
Shigeru Osawa
Testing Engineer

Conducted Spurious Emissions at Antenna Terminal

FCC ID : QULBSR3
Tuning Frequency : 298.8 MHz
Test Condition :