



EMI TEST REPORT

Test Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
Type of Equipment : RF Antenna
Model No. : AN-M1000
FCC ID : AK8ANM1000
Test standard : FCC Part15 Subpart C, Section 15.249: 2003
Test Result : Complied

1. This test report shall not be reproduced except in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.

Date of test: February 2 and 3, 2004

Tested by: 
Toyokazu Imamura

Approved by: 
Osamu Watatani
Site Manager of Yamakita EMC Lab.

UL Apex Co., Ltd.

YAMAKITA EMC LAB.

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MF060b(23.04.02)

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1 GENERAL INFORMATION

Applicant

Company Name : Sony EMCS Corporation Kisarazu TEC
Brand Name : SONY
Address : 8-4 Shiomi, Kisarazu-shi, Chiba-ken, 292-0834 Japan
Telephone Number : +81 438 37 3982
Facsimile Number : +81 438 37 4069
Contact Person : Shunichi Yamamoto (Shunichi@skz.sony.co.jp)
Type of Equipment : RF Antenna
Model No. : AN-M1000
Serial No. : S1
Rating : DC 3.3V
Receipt Date of Sample : January 23, 2004
Condition of EUT : Production prototype
Regulation(s) : FCC Part15 Subpart C, Section 15.249
Test Site : UL Apex No.1 Anechoic Chamber

1.1 Tested Methodology

The measurements were performed according to the procedures in ANSI C63.4 (2001).

1.2 Test Facility

This site has been fully described in a report submitted to FCC office, and accepted on November 8, 2002 (Registration No.: 95967).

NVLAP Lab. code : 200441-0

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2 PRODUCT DESCRIPTION

Model: AN-M1000 (referred to as the EUT in this report) is a RF Antenna.
The clock frequency used in EUT : 916.5MHz

Frequency characteristics	:	916.5MHz
Number of channels	:	Single
Modulation	:	OOK (On-Off Keyed)
Antenna type	:	Monopole
Antenna Gain	:	2.1dBi
Operating Voltage	:	DC3.3V
Operating temperature	:	0 - 40 deg. C.

*FCC Part15.31 (e)

The host device CAV-M1000ES provides the RF Antenna with stable power supply (DC3.3V), and the power is not changed when voltage of the Custom Integrated AV System is varied. Therefore, the RF Antenna complies power supply regulation.

*FCC Part15.203

The RF antenna unit and its antenna comply with this requirement since this antenna is soldered in RF module directly and it cannot be dismounted by end users.

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3 SYSTEM TEST CONFIGURATION

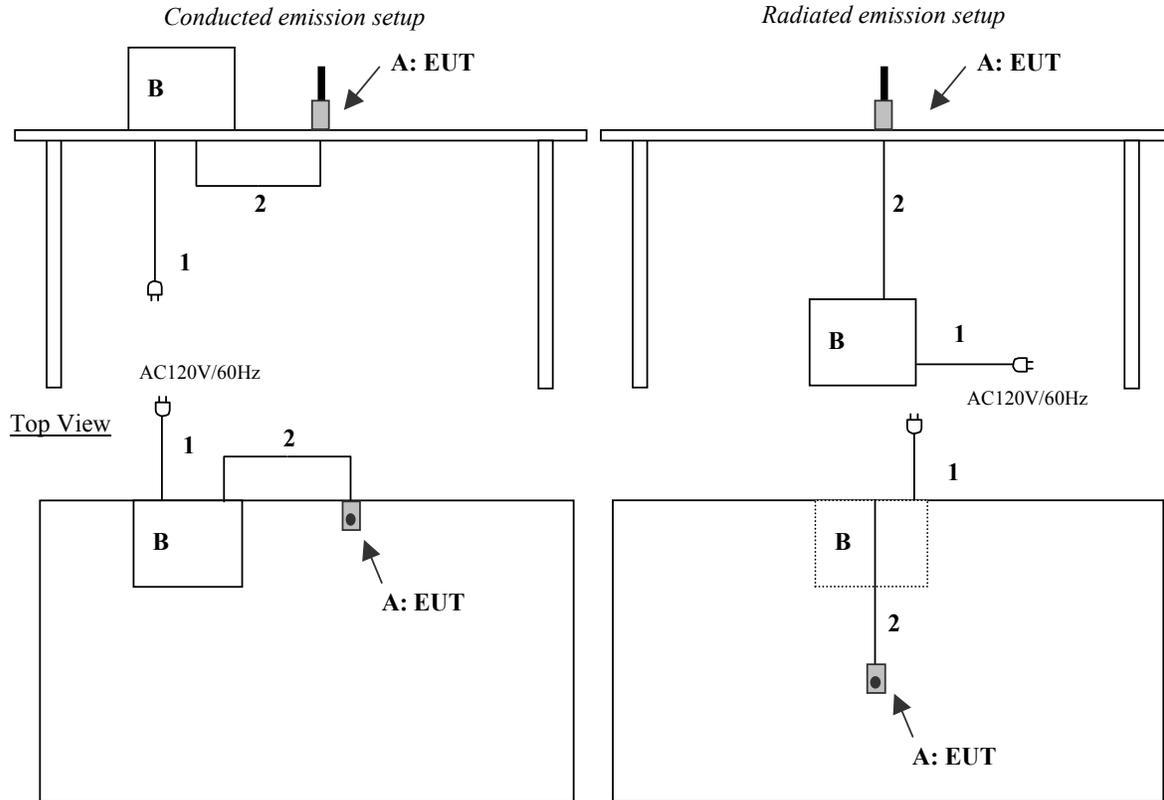
3.1 Justification

The system was configured in typical fashion (as a customer would normally use it) for testing.

Test mode: Transmitting mode

3.2 Configuration of Tested System

Front View



*Cabling was taken into consideration and test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacture	FCC ID	Remarks
A	RF Antenna	AN-M1000	S1	SONY	AK8ANM1000	EUT
B	Custom Integrated AV System	CAV-M1000ES	12545	SONY	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell material
1	AC Cable	1.9	Unshielded	Polyvinyl chloride
2	Antenna Cable	1.45	Shielded	Polyvinyl chloride

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4 MEASUREMENT UNCERTAINTY

Conducted emission test

The measurement uncertainty (with a 95% confidence level) for this test was ± 1.3 dB.

The data listed in this test report has enough margin, more than site margin.

Radiated emission test

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.8 dB.

The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

The data listed in this test report has enough margin, more than site margin.

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5 SUMMARY OF TESTS

5.1 §15.207 Conducted Emissions (Limits by CISPR Pub.22 Class B)

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane.

The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripheral was aligned and flushed with rear of tabletop.

All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80cm from LISN, and excess AC cable was bundled in center. It was folded back and forth forming a bundle 30cm to 40cm long. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a shielded room.

The EUT was connected to a Line Impedance Stabilization Network (LISN).

An overview sweep with peak detection has been performed.

The measurements have been performed with CISPR quasi-peak detector and average detector (IF BW 10kHz).

(Measurement range: 150kHz to 30MHz)

Test data : APPENDIX Page 13 to 15
Photographs of test setup : Page 10
Test result : Pass
Test instruments : KCC- 33/34, KLS-01, KSA-04, KTR-01

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5.2 § 15.249(a)&(d) Field Strength (Radiated Emissions)

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. The Radiated Electric Field Strength intensity has been measured in an anechoic chamber with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

EUT emission levels were compared when the EUT antenna position was vertical polarization and horizontal polarization.

The equipment was also previously checked at each position of two axis X and Y.

Y was worst under the horizontal antenna polarization and X was worst under the vertical antenna polarization.

The position in which the maximum noise occurred was chosen to put into measurement.

See the photographs in page 12.

Maximum Filed Strength of Fundamental by §15.249 (a)

Measurement range : CISPR QP Detector, IF BW 120kHz

Test data : APPENDIX Page 16
Test result : Pass
Test instruments : KAF-05, KAT6-01, KTR-01, KCC-30/31/32/34, KLA-03, KAEC-01

Maximum Filed Strength of Spurious emission by §15.249 (d)

Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz
: 1GHz to 10GHz PK and AV Detector, IF BW 1MHz

Test data : APPENDIX Page 17 (30 - 1000MHz)
: APPENDIX Page 18 to 19 (1 - 10GHz)
Photographs of test setup : Page 11
Test result : Pass
Test instruments : KAF-02, KAF-05, KAT6-01, KBA-03, KTR-01, KFL-01, KHA-01
KCC-30/31/32/34, KLA-03, KAEC-01, KSA-04

5.3 26dB Bandwidth

Test Procedure

The minimum 26dB bandwidth was measured with a radiated condition.

26dB Bandwidth: 148.798kHz

Test data : APPENDIX Page 20
Test result : Pass
Test instruments : KAF-05, KAT6-01, KTR-01, KCC-30/31/32/34, KLA-03, KAEC-01

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APPENDIX 1: Photographs of test setup

- 1. Page 10 : Conducted emission
- 2. Page 11 : Radiated emission
- 3. Page 12 : Pre check of worse-case position

APPENDIX 2: Test Data

- 1. Page 13 - 15 : Conducted emission
- 2. Page 16 : Field strength of Fundamental(Radiated)
- 3. Page 17 - 19 : Field strength of Spurious emission(Radiated)
- 4. Page 20 : 26dB Bandwidth

APPENDIX 3: Test instruments

- Page 21 : Test instruments

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Conducted emission



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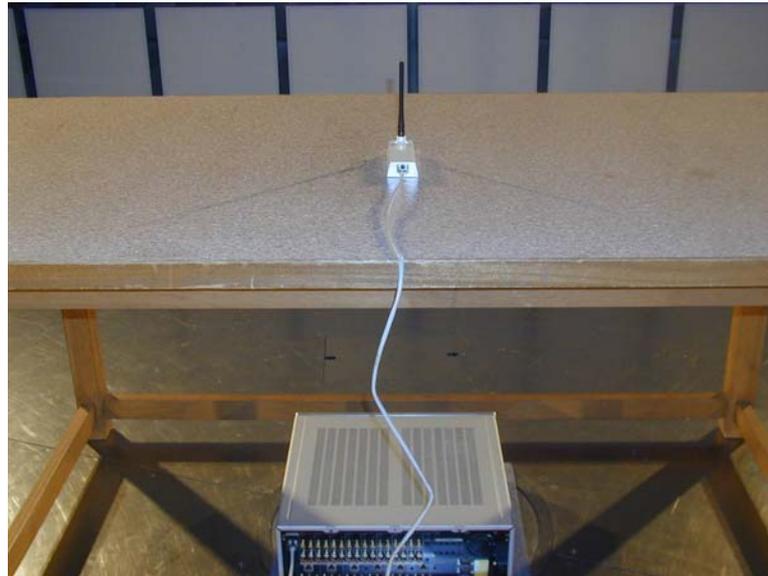
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Radiated emission



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Pre check of worse-case position



DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
Yamakita No.2 Shielded Room
Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : RF Antenna
 Model No. : AN-M1000
 Serial No. : S1
 Power : DC3.3V
 Mode : Transmitting
 Remarks : Custom Integrated AV System Input Power:AC120V/60Hz
 Date : 2/3/2004
 Phase : Single Phase
 Temperature : 23 °C Engineer : Toyokazu Imamura
 Humidity : 37 %
 Regulation : FCC Part15C § 15.207. (CISPR Pub. 22)

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dBuV]	AV	QP [dBuV]	AV				QP [dBuV]	AV	QP [dBuV]	AV	QP [dB]	AV
1.	0.1500	33.5	6.0	32.6	5.5	0.1	0.2	0.0	33.8	6.3	66.0	56.0	32.2	49.7
2.	0.1565	31.1	4.1	30.5	3.6	0.1	0.2	0.0	31.4	4.4	65.6	55.6	34.2	51.2
3.	0.1665	27.4	3.4	26.6	3.1	0.1	0.2	0.0	27.7	3.7	65.1	55.1	37.4	51.4
4.	17.1156	14.7	8.4	15.1	8.9	0.8	0.6	0.0	16.5	10.3	60.0	50.0	43.5	39.7
5.	18.1393	14.4	5.8	14.2	5.4	0.8	0.6	0.0	15.8	7.2	60.0	50.0	44.2	42.8
6.	18.8370	21.6	14.7	21.4	14.4	0.9	0.6	0.0	23.1	16.2	60.0	50.0	36.9	33.8
7.	19.0707	20.5	13.1	20.9	13.1	0.9	0.6	0.0	22.4	14.6	60.0	50.0	37.6	35.4
8.	19.3857	23.4	17.1	23.4	17.4	0.9	0.6	0.0	24.9	18.9	60.0	50.0	35.1	31.1
9.	19.6156	16.7	8.7	16.5	8.8	0.9	0.6	0.0	18.2	10.3	60.0	50.0	41.8	39.7

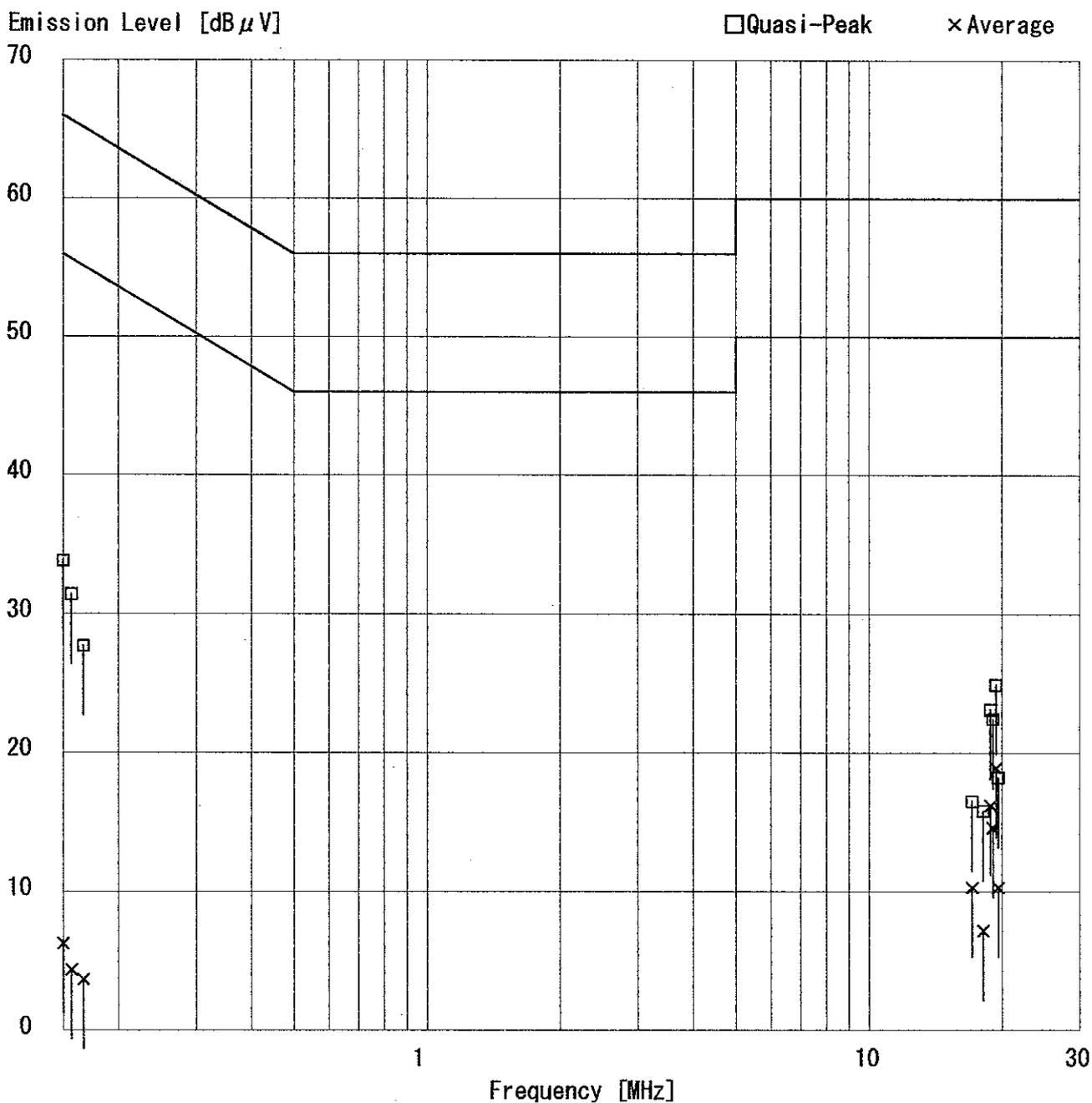
CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

■ LISN : KLS-01 (NSLK8126) ■ COAXIAL CABLE : KCC-33/34
 ■ EMI RECEIVER : KTR-01 (ES140)

DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
Yamakita No.2 Shielded Room
Report No. : 24FE0244-YK-1

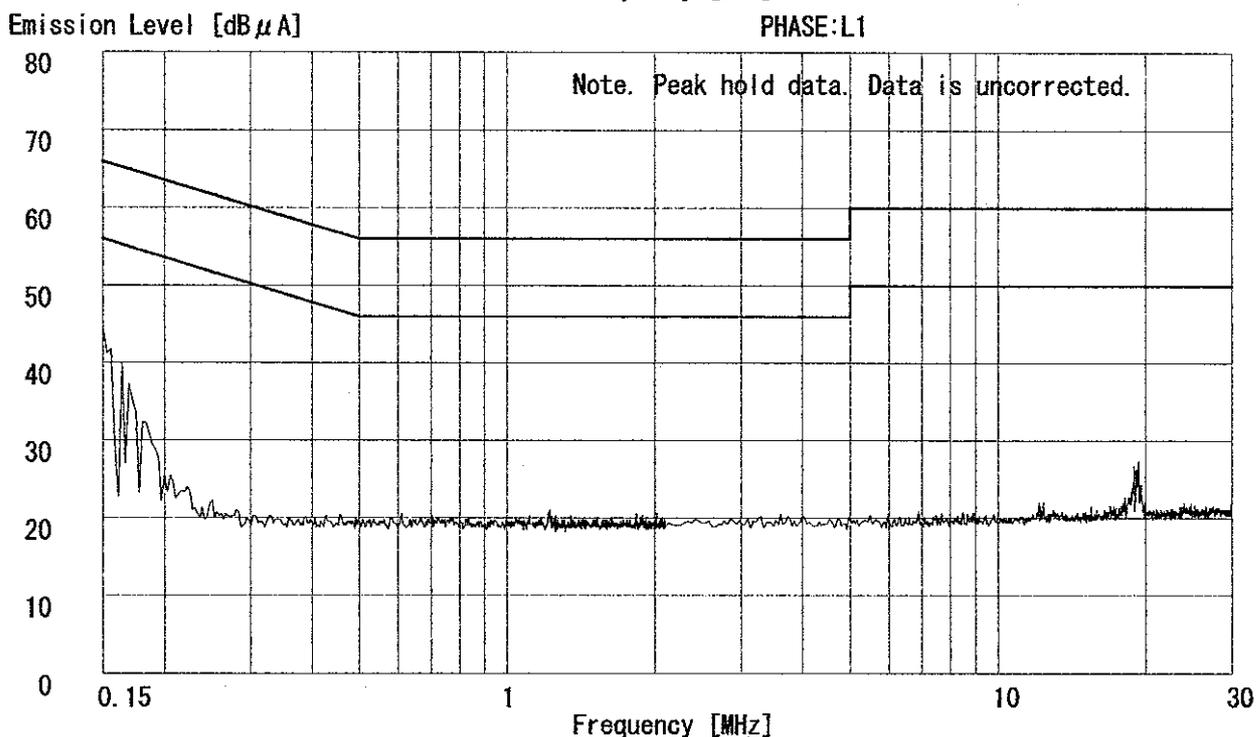
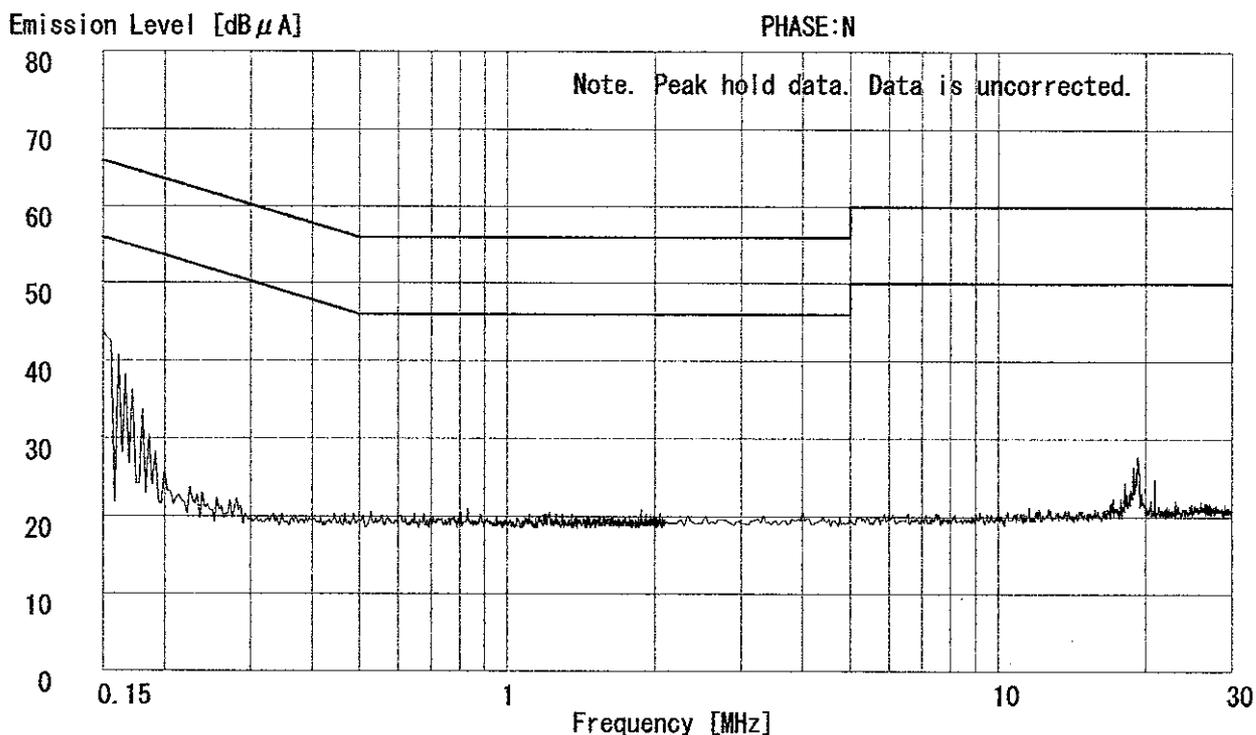
Applicant : Sony EMCS Corporation Kisarazu TEC
Kind of Equipment : RF Antenna
Model No. : AN-M1000
Serial No. : S1
Power : DC3.3V
Mode : Transmitting
Remarks : Custom Integrated AV System Input Power:AC120V/60Hz
Date : 2/3/2004
Phase : Single Phase
Temperature : 23 °C Engineer : Toyokazu Imamura
Humidity : 37 %
Regulation : FCC Part15C §15.207. (CISPR Pub. 22)



DATA OF CONDUCTION TEST CHART

UL Apex Co.,Ltd.
Yamakita No.2 Shielded Room
Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
Kind of Equipment : RF Antenna
Model No. : AN-M1000
Serial No. : S1
Power : DC3.3V
Mode : Transmitting
Remarks : Custom Integrated AV System Input Power:AC120V/60Hz
Date : 2/3/2004
Temperature : 23 °C
Humidity : 37 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None
Engineer : Toyokazu Imamura



DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.1 Anechoic Chamber
Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : RF Antenna
 Model No. : AN-M1000
 Serial No. : S1
 Power : DC3.3V
 Mode : Transmitting
 Remarks : Integrated AV System Input Power:AC120V/60Hz
 Date : 2/2/2004
 Test Distance : 3 m
 Temperature : 19 °C
 Humidity : 35 %
 Regulation : FCC Part15C § 15.249 (a) Fundamental (D:3m)

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER					HOR [dB μ V/m]	VER		HOR [dB]	VER
1.	916.65	BB	80.8	79.0	22.5	28.8	6.4	6.1	87.0	85.2	93.9	6.9	8.7

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-03 (USLP9143) 300-1000MHz
 ■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8447D) ■ EMI RECEIVER: KTR-01 (ES140)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.1 Anechoic Chamber
Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : RF Antenna
 Model No. : AN-M1000
 Serial No. : S1
 Power : DC3.3V
 Mode : Transmitting
 Remarks : Integrated AV System Input Power:AC120V/60Hz
 Date : 2/2/2004
 Test Distance : 3 m
 Temperature : 19 °C
 Humidity : 35 %
 Regulation : FCC Part15C §15.209

Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]	HOR [dB]	VER [dB]		
1.	66.24	BB	31.2	36.4	7.4	28.4	1.5	6.0	17.7	22.9	40.0	22.3	17.1	
2.	99.37	BB	28.0	31.8	10.1	28.4	1.9	6.0	17.6	21.4	43.5	25.9	22.1	
3.	198.71	BB	28.1	25.2	16.4	27.9	2.8	6.1	25.5	22.6	43.5	18.0	20.9	
4.	298.08	BB	31.9	29.3	19.9	27.6	3.5	6.1	33.8	31.2	46.0	12.2	14.8	
5.	364.30	BB	32.4	29.0	16.1	28.1	3.8	6.1	30.3	26.9	46.0	15.7	19.1	
6.	496.78	BB	27.5	27.6	18.6	29.0	4.5	6.1	27.7	27.8	46.0	18.3	18.2	

CALCULATION: READING[dB μV] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-03 (USLP9143) 300-1000MHz
 ■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8447D) ■ EMI RECEIVER: KTR-01 (ES140)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.1 Anechoic Chamber
Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : RF Antenna
 Model No. : AN-M1000
 Serial No. : S1
 Power : DC3.3V
 Mode : Transmitting
 Remarks : Custom Integrated AV System Input Power:AC120V/60Hz
 Date : 2/3/2004
 Test Distance : 3 m
 Temperature : 19 °C Engineer : Toyokazu Imamura
 Humidity : 36 %
 Regulation : FCC Part15C §15.209(PK Detection)

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER					HOR [dB μ V/m]	VER		HOR [dB]	VER
1.	1833.33	BB	54.9	53.9	29.2	37.1	3.6	0.0	50.6	49.6	74.0	23.4	24.4
2.	2749.95	BB	46.0	46.3	30.7	37.0	4.6	0.0	44.3	44.6	74.0	29.7	29.4
3.	3666.60	BB	44.5	44.9	32.4	36.7	5.3	0.0	45.5	45.9	74.0	28.5	28.1
4.	4583.25	BB	45.1	44.3	34.1	35.2	5.9	0.0	49.9	49.1	74.0	24.1	24.9
5.	5499.90	BB	44.9	44.8	35.9	36.3	6.4	0.0	50.9	50.8	74.0	23.1	23.2
6.	6416.55	BB	45.8	45.8	37.3	36.5	7.0	0.0	53.6	53.6	74.0	20.4	20.4
7.	7333.20	BB	45.1	45.6	38.5	36.8	7.6	0.0	54.4	54.9	74.0	19.6	19.1
8.	8249.85	BB	45.3	45.2	38.0	37.0	8.2	0.0	54.5	54.4	74.0	19.5	19.6
9.	9166.50	BB	45.2	45.6	39.3	37.0	8.6	0.0	56.1	56.5	74.0	17.9	17.5

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz

■CABLE:KCC-D7/D13 ■PREAMP:KAF-02(8449B) ■EMI RECEIVER:KTR-01(ES140)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.1 Anechoic Chamber
Report No. : 24FE0244-YK-1

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : RF Antenna
 Model No. : AN-M1000
 Serial No. : S1
 Power : DC3.3V
 Mode : Transmitting
 Remarks : Custom Integrated AV System Input Power:AC120V/60Hz
 Date : 2/3/2004
 Test Distance : 3 m
 Temperature : 19 °C
 Humidity : 36 %
 Regulation : FCC Part15C § 15.209 (AV Detection)

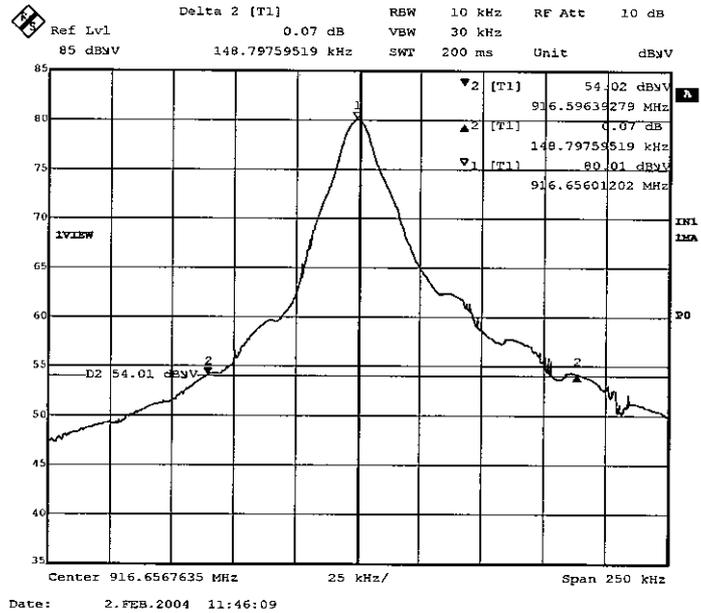
Engineer : Toyokazu Imamura

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER					HOR [dB μ V/m]	VER		HOR [dB]	VER
1.	1833.33	BB	35.8	35.6	29.2	37.1	3.6	0.0	31.5	31.3	54.0	22.5	22.7
2.	2749.95	BB	33.2	33.2	30.7	37.0	4.6	0.0	31.5	31.5	54.0	22.5	22.5
3.	3666.60	BB	32.3	32.3	32.4	36.7	5.3	0.0	33.3	33.3	54.0	20.7	20.7
4.	4583.25	BB	31.7	31.6	34.1	35.2	5.9	0.0	36.5	36.4	54.0	17.5	17.6
5.	5499.90	BB	32.2	32.2	35.9	36.3	6.4	0.0	38.2	38.2	54.0	15.8	15.8
6.	6416.55	BB	33.1	33.0	37.3	36.5	7.0	0.0	40.9	40.8	54.0	13.1	13.2
7.	7333.20	BB	32.5	32.5	38.5	36.8	7.6	0.0	41.8	41.8	54.0	12.2	12.2
8.	8249.85	BB	32.6	32.6	38.0	37.0	8.2	0.0	41.8	41.8	54.0	12.2	12.2
9.	9166.50	BB	32.8	32.8	39.3	37.0	8.6	0.0	43.7	43.7	54.0	10.3	10.3

CALCULATION: READING[dB μ V] + ANT. FACTOR[dB/m] + CABLE LOSS[dB] - AMP. GAIN[dB] + ATTEN[dB].

■ANTENNA:KHA-01(SAS-200 571)1-18GHz

■CABLE:KCC-D7/D13 ■PREAMP:KAF-02(8449B) ■EMI RECEIVER:KTR-01(ES140)



T. Amanna

Test Report No :24FE0244-YK-1

APPENDIX 3
Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
KCC-33/34	Coaxial Cable	Fujikura/Suhner	5D-2W/S04272B	CE	2004/01/29 * 12
KLS-01	LISN(AMN)	Schwarzbeck	NSLK8126	CE	2003/07/25 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	CE/RE	2003/09/17 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ES140	CE/RE/BW	2003/07/25 * 12
KAF-02	Pre Amplifier	Hewlett Packard	8449B	RE	2003/05/08 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE/BW	2003/06/12 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE/BW	2003/05/12 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/01/31 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2003/08/11 * 12
KCC-30/31/32 /34	Coaxial Cable	Fujikura/Suhner	5D-2W/S04272B	RE/BW	2004/01/29 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE/BW	2004/01/31 * 12
KAEC-01(NSA)	Anechoic Chamber	JSE	Semi 3m	RE/BW	2003/09/07 * 12
KCC-D7/D13	Coaxial cable	Advantest/Suhner	A01002/SUCOFLEX1 04	RE	2003/04/18 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

CE: Conducted emission,
 RE: Radiated emission,
 BW: 26dB Bandwidth