

EMI TEST REPORT

Test Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
Type of Equipment : Remote Commander
Model No. : RM-TP100
FCC ID : AK8RMTP100
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: April 30, 2004

Tested by: M. Hosaka
Makoto Hosaka

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

UL Apex Co., Ltd.

YAMAKITA EMC LAB.

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MF060b (10.04.03)

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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 : Remote Commander
Model No. : RM-TP100
Serial No. : 0000013
Rating : DC 3.3V
Receipt Date of Sample : April 27, 2004
Condition of EUT : Production model
Regulation(s) : FCC Part15 Subpart C, Section 15.249
Test Site : UL Apex No.2 Open Test Site

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 December 8, 2000 (Registration No.: 99354).

NVLAP Lab. code : 200441-0

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2 PRODUCT DESCRIPTION

Model: RM-TP100 (referred to as the EUT in this report) is a Remote Commander.
The clock frequency used in EUT : 20MHz

Frequency characteristics	:	916.5MHz
Number of channels	:	Single
Modulation	:	OOK (On-Off Keyed)
Antenna type	:	Loop
Antenna Gain	:	2.0dBi
Operating Voltage	:	DC 3.3V
Operating temperature	:	0 - 40 deg. C.

***FCC Part15.31 (e)**

The remote commander provides RF module with stable power supply (DC3.3V), and the power is not changed when voltage of the remote commander is varied. Therefore, the Remote Commander complies power supply regulation.

***FCC Part15.203**

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

This is a report of remeasurement that was performed after the remote commander base unit was modified. (The report of previous measurement: 24FE0244-YK-2)

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3 SYSTEM TEST CONFIGURATION

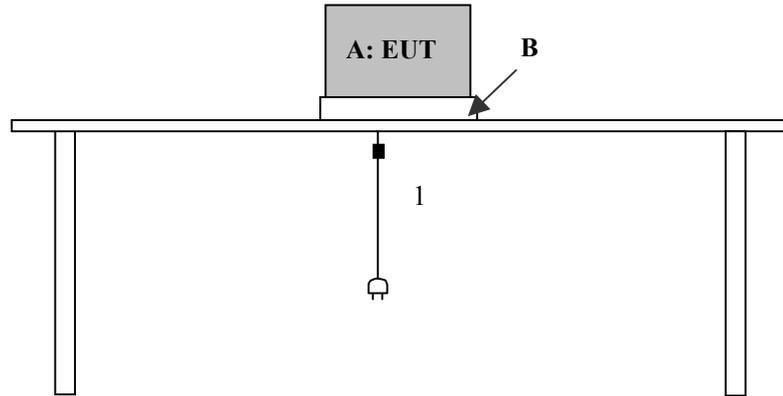
3.1 Justification

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

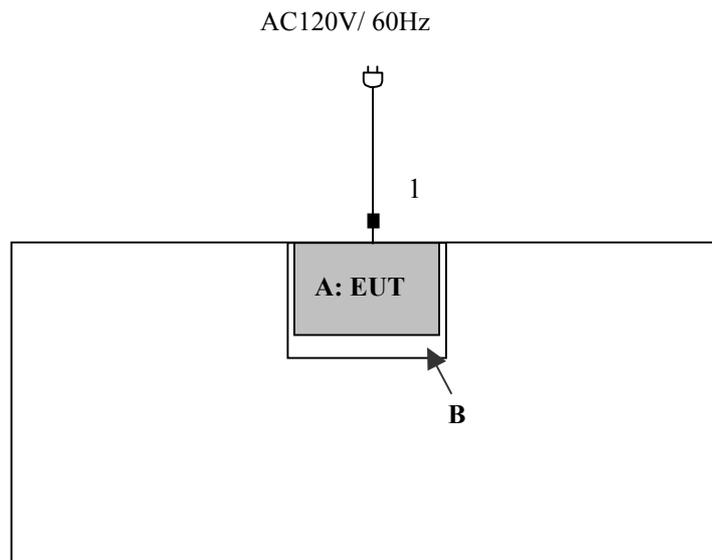
Test mode: Transmitting mode
 * Charging operation

3.2 Configuration of Tested System

Front View



Top View



■: Ferrite core

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacture	FCC ID	Remarks
A	Remote Commander	RM-TP100	0000013	SONY	AK8RMTP100	EUT
B	Remote Commander Base Unit	RMB-TP100	7	SONY	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell material
1	AC Power Cable	1.8	Unshielded	Polyvinyl chloride

* RS232C port is used only when dealers check operation or customize the equipment.

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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 report meets the limits unless the uncertainty is taken into consideration.

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5 SUMMARY OF TESTS

5.1 §15.207 Conducted Emissions (Limit by CISPR 22)

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 a quasi-peak detector (IF BW 10kHz).

(Measurement range: 150kHz to 30MHz)

Test data : APPENDIX 2 Page 13 to 15
Test result : Pass
Test instruments : KCC- 24/25/26/28/KPL-02, KLS-05, KSA-02, KTR-04

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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 on an open test site 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 previously checked at each position of three axis X, Y and Z, and with base unit. The position in which the maximum noise occurred was chosen to put into measurement. See the photographs in page 12.

Fundamental

Z axis was worst under the horizontal antenna polarization and Y was worst under the vertical antenna polarization.

Spurious emission

Below 1GHz, Remote commander with base unit condition was worst under both vertical and horizontal antenna polarization. Above 1GHz, Z axis was worst under the horizontal antenna polarization and Y was worst under the vertical antenna polarization.

Maximum Filed Strength of Fundamental by §15.249 (a)

Measurement range : CISPR QP Detector, IF BW 120kHz

Test data : APPENDIX 2 Page 16
Test result : Pass
Test instruments : KAF-03, KAT6-03, KTR-01, KTR-03, KLA-02, KCC-20/21/22/23/29
KOTS-02

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 2 Page 17 (30 - 1000MHz)
: APPENDIX 2 Page 18 to 19 (1 - 10GHz)
Test result : Pass
Test instruments : KAF-03, KAF-04, KAT6-03, KBA-02, KTR-03, KFL-01, KHA-02
KCC-20/21/22/23/29, KCC-D8/D9/D10, KLA-02, KOTS-02, KSA-02

5.3 20dB Bandwidth

Test Procedure

The minimum 20dB bandwidth was measured with a radiated condition.

20dB Bandwidth: 72.645kHz

Test data : APPENDIX 2 Page 20
Test result : Pass
Test instruments : KCC-20/21/22/23/29, KAF-03, KAT6-03, KTR-01, KLA-02, KOTS-02

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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 : 20dB Bandwidth

APPENDIX 3: Test instruments

Page 21 : Test instruments

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Conducted emission



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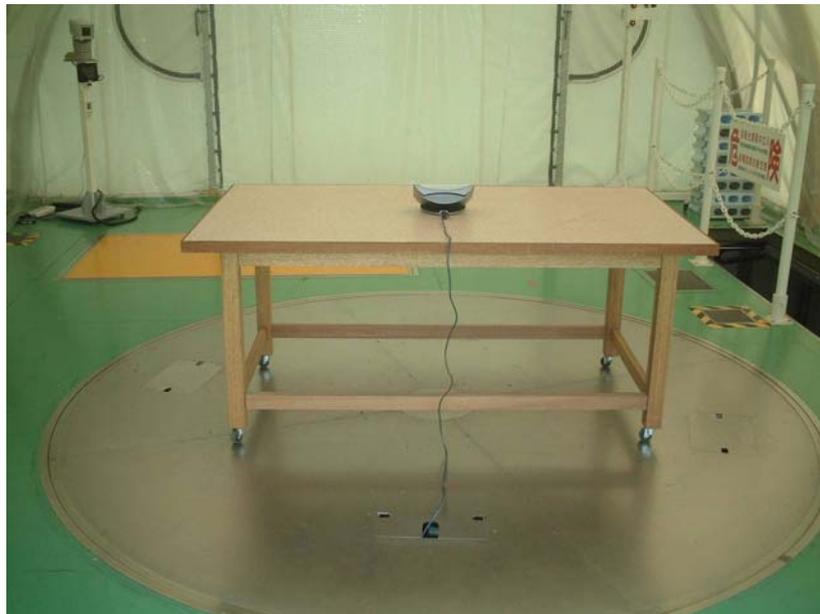
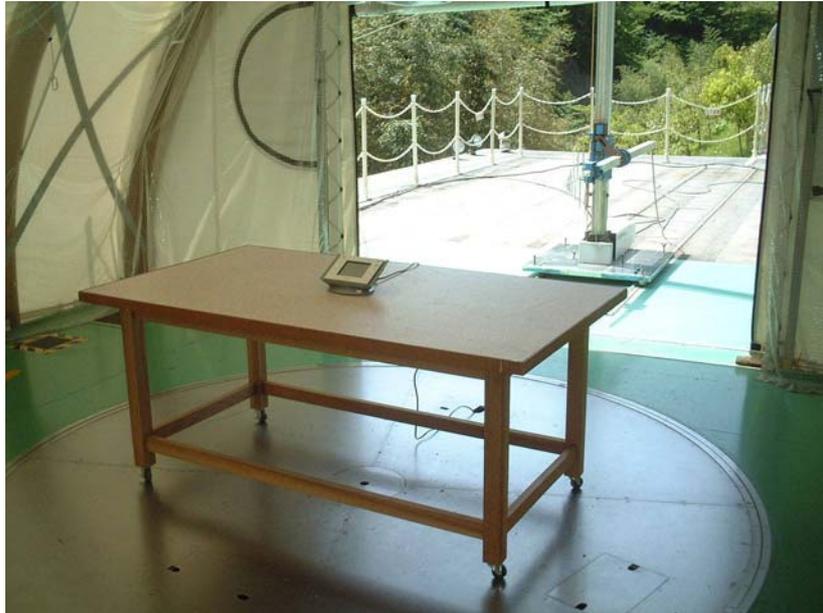
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Radiated emission



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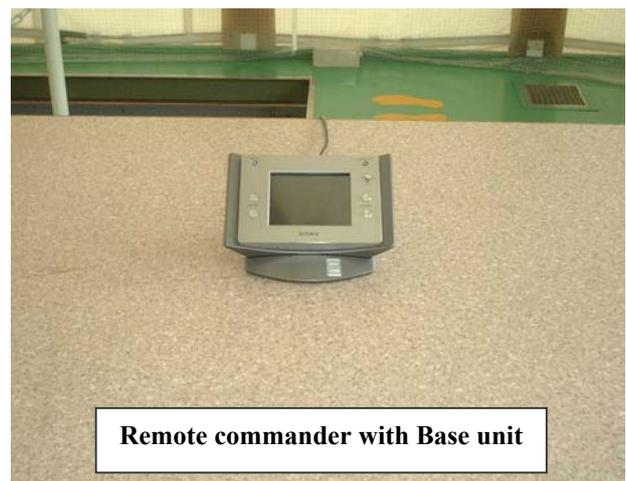
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Pre check of worse-case position



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DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
Yamakita No.3 Shielded Room
Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : Remote Commander
 Model No. : RM-TP100
 Serial No. : 0000013
 Power : DC3.3V
 Mode : Transmitting
 Remarks : Remote Commander Base Unit Input Power : AC120V/60Hz
 Date : 4/30/2004
 Phase : Single Phase
 Temperature : 22 °C Engineer : Makoto Hosaka
 Humidity : 43 %
 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 [dB μV]	AV	QP [dB μV]	AV				QP [dB]	AV [dB μV]	QP [dB μV]	AV [dB μV]	QP [dB]	AV [dB]
1.	0.1500	17.4	-	16.0	-	0.2	0.1	0.0	17.7	-	66.0	56.0	48.3	-
2.	0.2626	41.5	-	43.1	-	0.2	0.2	0.0	43.5	-	61.3	51.3	17.8	-
3.	0.3965	43.7	41.6	44.2	42.6	0.2	0.2	0.0	44.6	43.0	57.9	47.9	13.3	4.9
4.	0.5282	39.9	38.2	40.0	38.6	0.2	0.1	0.0	40.3	38.9	56.0	46.0	15.7	7.1
5.	0.6596	34.7	-	34.4	-	0.2	0.1	0.0	35.0	-	56.0	46.0	21.0	-
6.	1.9825	36.8	-	36.7	-	0.2	0.4	0.0	37.4	-	56.0	46.0	18.6	-

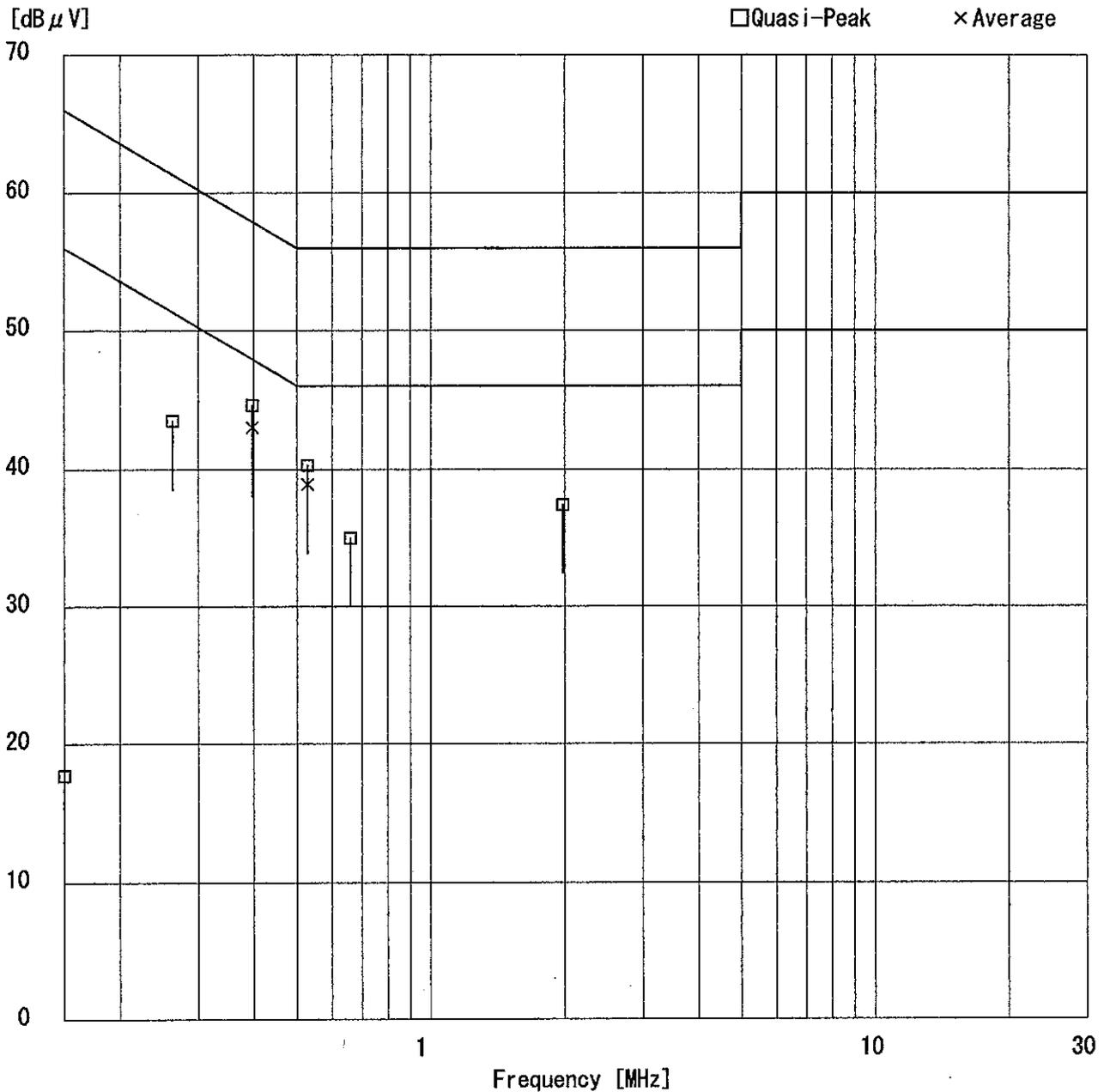
CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

■ LISN:KLS-05 (NSLK8126) ■ COAXIAL CABLE:KCC-24/25/26/28
 ■ PULSE LIMITTER:KPL-02 ■ EMI RECEIVER:KTR-03 (ESHS10)

DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
Yamakita No.3 Shielded Room
Report No. : 24HE0305-YK

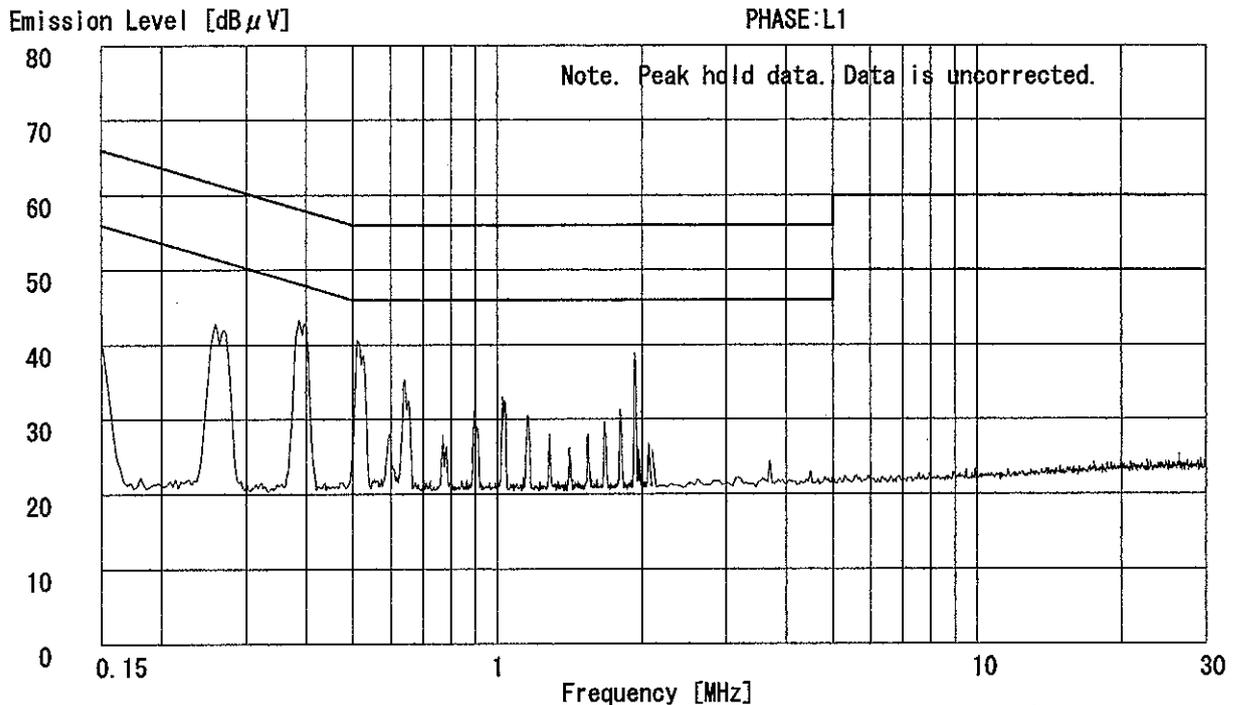
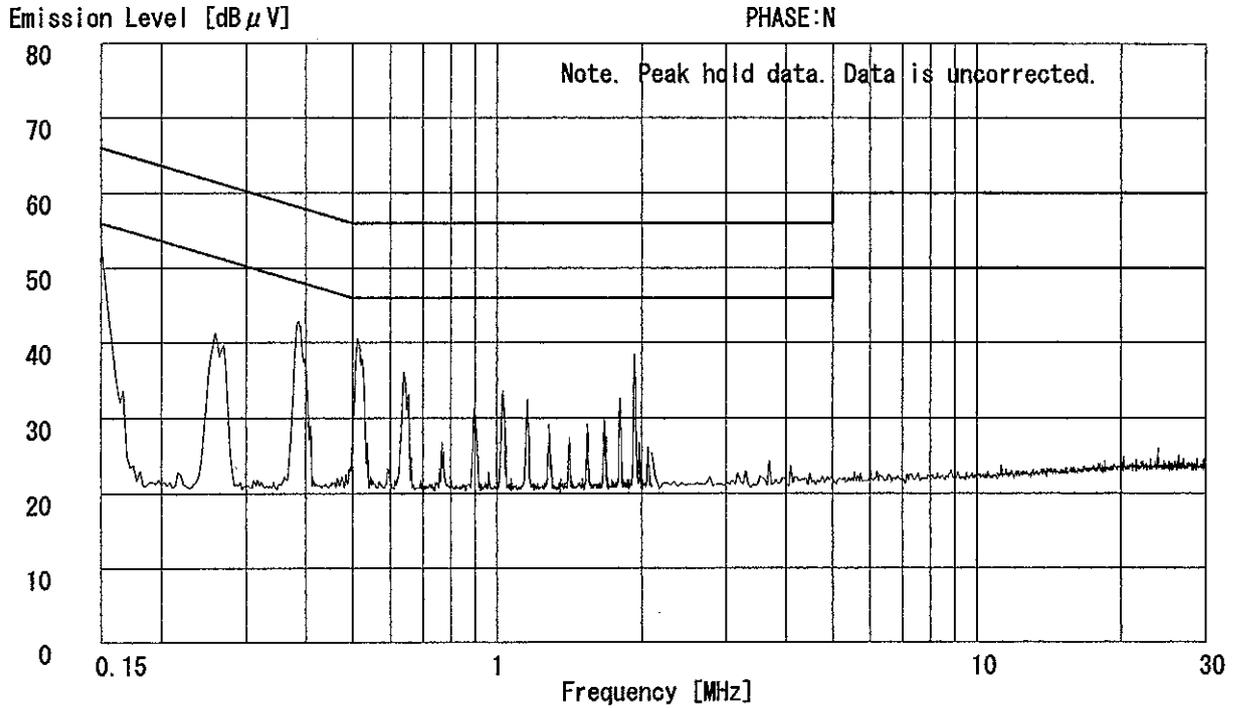
Applicant : Sony EMCS Corporation Kisarazu TEC
Kind of Equipment : Remote Commander
Model No. : RM-TP100
Serial No. : 0000013
Power : DC3.3V
Mode : Transmitting
Remarks : Remote Commander Base Unit Input Power : AC120V/60Hz
Date : 4/30/2004
Phase : Single Phase
Temperature : 22 °C Engineer : Makoto Hosaka
Humidity : 43 %
Regulation : FCC Part15C § 15.207. (CISPR Pub.22)



DATA OF CONDUCTION TEST CHART

UL Apex Co.,Ltd.
Yamakita No.3 Shielded Room
Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
Kind of Equipment : Remote Commander
Model No. : RM-TP100
Serial No. : 0000013
Power : DC3.3V
Mode : Transmitting
Remarks : Remote Commander Base Unit Input Power : AC120V/60Hz
Date : 4/30/2004
Temperature : 22 °C
Humidity : 43 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)
Regulation 2 : None
Engineer : Makoto Hosaka



DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.2 Open Test Site
Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
Kind of Equipment : Remote Commander
Model No. : RM-TP100
Serial No. : 0000013
Power : DC3.3V
Mode : Transmitting
Remarks :
Date : 4/30/2004
Test Distance : 3 m
Temperature : 24 °C Engineer : Makoto Hosaka
Humidity : 38 %
Regulation : FCC Part15C § 15.249(a) Fundamental (D:3m)

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	VER		HOR	VER
1.	916.52	BB	80.8	78.2	22.6	28.7	7.0	5.8	87.5	84.9	93.9	6.4	9.0

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KBA-02 (BBA9106) 30-299MHz/KLA-02 (USLP9143) 300-1000MHz
■ AMP: KAF-03 (8447D) ■ RECEIVER: KTR-04 (ESVS10) ■ CABLE: KCC-20/21/22/23/29

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.2 Open Test Site
Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : Remote Commander
 Model No. : RM-TP100
 Serial No. : 0000013
 Power : DC3.3V
 Mode : Transmitting
 Remarks :
 Date : 4/30/2004
 Test Distance : 3 m
 Temperature : 24 °C
 Humidity : 38 %
 Regulation : FCC Part15C § 15.209

Engineer : Makoto Hosaka

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.	33.78	BB	25.8	28.5	17.1	27.9	1.1	5.7	21.8	24.5	40.0	18.2	15.5
2.	36.29	BB	23.6	30.6	16.2	27.9	1.2	5.7	18.8	25.8	40.0	21.2	14.2
3.	43.83	BB	25.2	26.8	13.6	28.0	1.3	5.7	17.8	19.4	40.0	22.2	20.6
4.	53.83	BB	29.1	39.7	10.2	28.0	1.4	5.7	18.4	29.0	40.0	21.6	11.0
5.	56.33	BB	28.5	38.0	9.2	28.0	1.5	5.7	16.9	26.4	40.0	23.1	13.6
6.	60.10	BB	26.3	32.5	7.7	28.0	1.5	5.7	13.2	19.4	40.0	26.8	20.6
7.	96.38	BB	28.4	28.1	8.5	28.0	2.0	5.8	16.7	16.4	43.5	26.8	27.1
8.	160.23	BB	26.7	27.1	14.9	27.7	2.6	5.8	22.3	22.7	43.5	21.2	20.8
9.	320.58	BB	21.3	19.8	16.2	27.5	4.0	5.8	19.8	18.3	46.0	26.2	27.7

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KBA-02 (BBA9106) 30-299MHz/KLA-02 (USLP9143) 300-1000MHz
 ■ AMP: KAF-03 (8447D) ■ RECEIVER: KTR-04 (ESVS10) ■ CABLE: KCC-20/21/22/23/29

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.2 Open Test Site
Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : Remote Commander
 Model No. : RM-TP100
 Serial No. : 0000013
 Power : DC3.3V
 Mode : Transmitting
 Remarks : PK RBW:1MHz, VBW:1MHz
 Date : 4/30/2004
 Test Distance : 3 m
 Temperature : 24 °C Engineer : Makoto Hosaka
 Humidity : 38 %
 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.	1833.13	BB	44.4	46.7	27.5	35.0	5.7	0.0	42.6	44.9	74.0	31.4	29.1
2.	2749.55	BB	43.5	41.7	29.4	34.7	6.2	0.0	44.4	42.6	74.0	29.6	31.4
3.	3666.60	BB	41.2	40.8	30.6	34.1	7.2	0.0	44.9	44.5	74.0	29.1	29.5
4.	4583.25	BB	41.5	40.8	32.1	34.2	8.3	0.0	47.7	47.0	74.0	26.3	27.0
5.	5499.90	BB	42.0	41.6	33.5	34.0	8.4	0.0	49.9	49.5	74.0	24.1	24.5
6.	6416.55	BB	42.1	41.9	35.7	34.0	9.1	0.0	52.9	52.7	74.0	21.1	21.3
7.	7333.20	BB	42.4	42.0	37.9	34.2	10.5	0.0	56.6	56.2	74.0	17.4	17.8
8.	8249.85	BB	42.2	42.4	37.8	34.4	11.4	0.0	57.0	57.2	74.0	17.0	16.8
9.	9166.50	BB	42.6	42.2	39.5	34.4	11.8	0.0	59.5	59.1	74.0	14.5	14.9

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KHA-02 (1-18GHz)
 ■ AMP: KAF-04 (8449B) ■ SPECTRUN ANALYZER: KSA-02 ■ CABLE: KCC-D8/D9/D10

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
Yamakita No.2 Open Test Site
Report No. : 24HE0305-YK

Applicant : Sony EMCS Corporation Kisarazu TEC
 Kind of Equipment : Remote Commander
 Model No. : RM-TP100
 Serial No. : 0000013
 Power : DC3.3V
 Mode : Transmitting
 Remarks : AV RBW:1MHz, VBW:10Hz
 Date : 4/30/2004
 Test Distance : 3 m
 Temperature : 24 °C Engineer : Makoto Hosaka
 Humidity : 38 %
 Regulation : FCC Part15C § 15.209 (AV 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.	1833.13	BB	33.8	37.0	27.5	35.0	5.7	0.0	32.0	35.2	54.0	22.0	18.8
2.	2749.55	BB	34.1	32.1	29.4	34.7	6.2	0.0	35.0	33.0	54.0	19.0	21.0
3.	3666.60	BB	29.3	29.4	30.6	34.1	7.2	0.0	33.0	33.1	54.0	21.0	20.9
4.	4583.25	BB	29.5	29.5	32.1	34.2	8.3	0.0	35.7	35.7	54.0	18.3	18.3
5.	5499.90	BB	29.7	29.7	33.5	34.0	8.4	0.0	37.6	37.6	54.0	16.4	16.4
6.	6416.55	BB	30.0	30.0	35.7	34.0	9.1	0.0	40.8	40.8	54.0	13.2	13.2
7.	7333.20	BB	30.5	30.5	37.9	34.2	10.5	0.0	44.7	44.7	54.0	9.3	9.3
8.	8249.85	BB	30.6	30.6	37.8	34.4	11.4	0.0	45.4	45.4	54.0	8.6	8.6
9.	9166.50	BB	30.6	30.6	39.5	34.4	11.8	0.0	47.5	47.5	54.0	6.5	6.5

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

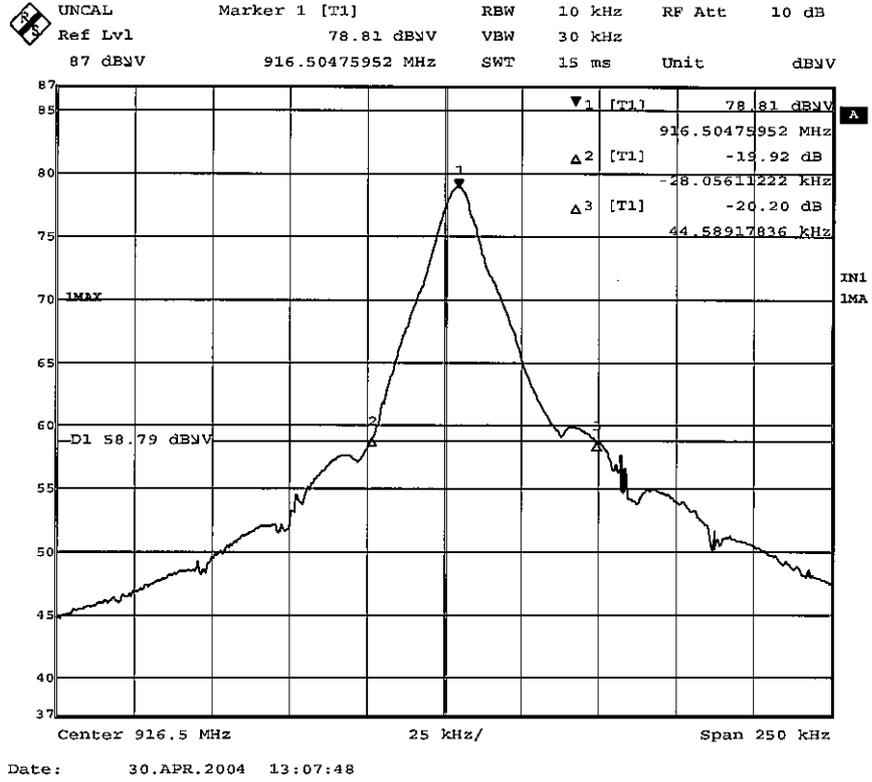
■ ANTENNA: KHA-02 (1-18GHz)
 ■ AMP: KAF-04 (8449B) ■ SPECTRUN ANALYZER: KSA-02 ■ CABLE: KCC-D8/D9/D10

20dB Bandwidth

Job No:24HE0305-YK

1.Transmittinng

20dB Bandwidth : 72.645kHz



Test Report No : 24HE0305-YK

APPENDIX 3
Test Instruments
EMI test equipment

Control No	Instrument	Manufacturer	Model No	Test Item	Calibration Date + Interval (month)
KAF-03	Pre Amplifier	Hewlett Packard	8447D	RE/BW	2003/09/17 * 12
KAF-04	Pre Amplifier	Agilent	8449B	RE	2004/05/06 * 12
KAT6-03	Attenuator	INMET	18N-6dB	RE/BW	2004/04/27 * 12
KBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/08/11 * 12
KCC-20/21/22 /23/29	Coaxial Cable	Fujikura/Suhner	8D-2W/12D-SFA/S0 4272B/S04272B	RE/BW	2003/09/19 * 12
KCC-24/25/26 /28/KPL-02	Coaxial Cable/Pulse Limiter	Fujikura/Suhner/PMM	5D-2W/5D-2W/S042 72B/S04272B/PL01	CE	2003/09/19 * 12
KCC-D8/D9/D 10	Coaxial Cable	Astrolab Inc.	32055-2-29080-8M/ 32055-2-29080-5M/ 32081-29094-29081 -40CM	RE	2003/08/12 * 12
KHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2003/08/11 * 12
KLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE/BW	2003/08/11 * 12
KLS-05	LISN(AMN)	Schwarzbeck	NSLK8126	CE	2003/09/19 * 12
KOTS-02	Open Test Site	JSE	10m	RE/BW	2003/08/12 * 12
KSA-02	Spectrum Analyzer	Advantest	R3265A	CE/RE	2003/11/26 * 12
KTR-01	Test Receiver	Rohde & Schwarz	ESI40	BW	2003/07/25 * 12
KTR-03	Test Receiver	Rohde & Schwarz	ESHS10	RE	2003/05/15 * 12
KTR-04	Test Receiver	Rohde & Schwarz	ESVS10	CE	2003/10/15 * 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: 20dB Bandwidth