



## EMI TEST REPORT

**Sony Test Report Number : AF04049-1**

**Applicant** : Sony EMCS Corporation Kisarazu TEC  
**Type of Equipment** : RF Transmitter  
**Model No.** : TMR-HT1  
**FCC ID** : AK8HT1  
**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 23 and 26, 2004

**Tested by:**

A. Sato  
Akira Sato

&

I. Isozaki  
Ichiro Isozaki

T. Imamura  
Toyokazu Imamura

**Approved by:**

O. Watatani  
Osamu Watatani  
Site Manager of 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 : RF Transmitter  
Model No. : TMR-HT1  
Serial No. : 8  
Rating : DC8.5-10.0V (AC Adaptor: 120V/60Hz)  
Receipt Date of Sample : February 13, 2004  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Country of manufacture : China  
Regulation(s) : FCC Part15 Subpart C, Section 15.249: 2003  
Test Site : UL Apex No.2 Open 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: TMR-HT1 (referred to as the EUT in this report) is a RF Transmitter.  
The clock frequencies used in EUT: 412.7MHz, 7.6MHz

Frequency band	:	913.6 – 914.4MHz
Number of channels	:	3
Modulation	:	FM
Antenna type	:	1/4 $\lambda$ Monopole
Antenna Gain	:	$\leq$ 2.14 dBi
Operating Voltage	:	DC8.5-10.0V (RF module: DC5V)
Operating temperature	:	0 - 40 deg. C.
ITU code	:	F3E

\*FCC Part15.31 (e)

The RF Transmitter provides RF module with stable power supply (DC5V), and the power is not changed when voltage of the RF Transmitter is varied. Therefore, the RF Transmitter complies power supply regulation.

\*FCC Part15.203

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

\*The RF Transmitter has ports of pin jack and mini-plug. Measurement was performed with pin jack input, because these ports have the same shield characteristic and it is assured they would have the same result. These ports are not used for connection at the same time.

\*The noise filter of RF Transmitter has no influence on emission test.

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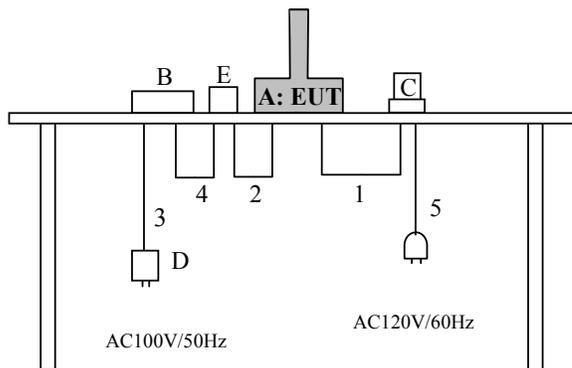
### 3 SYSTEM TEST CONFIGURATION

#### 3.1 Justification

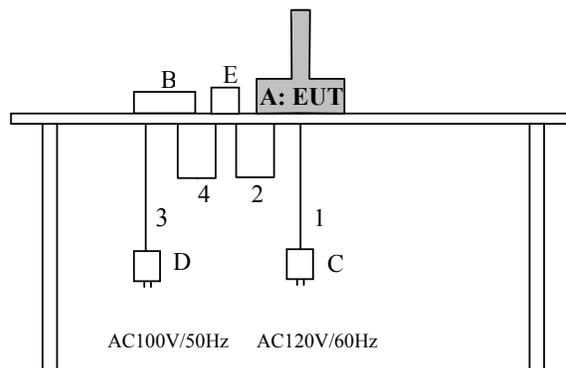
The system was configured in typical fashion (as a customer would normally use it) for testing.  
 Test mode: Transmitting mode (CH 1: 913.6MHz, CH 2: 914.0MHz, CH3: 914.4MHz)

#### 3.2 Configuration of Tested System

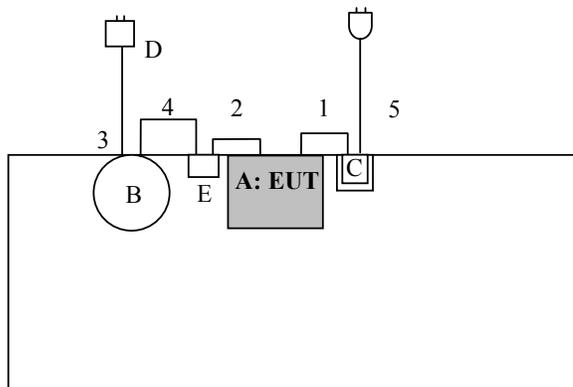
*Front View (Conducted emission)*



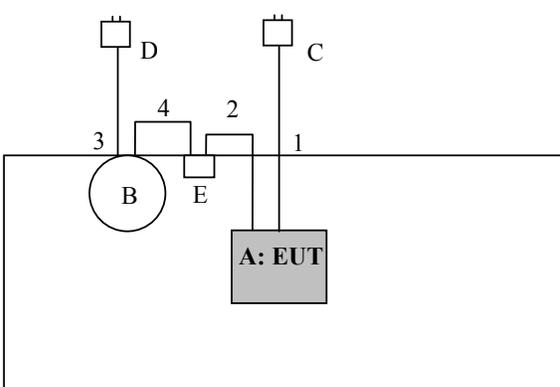
*Front View (Radiated emission)*



*Top View (Conducted emission)*



*Top View (Radiated emission)*



\*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	Manufacturer	FCC ID	Remarks
A	RF Transmitter	TMR-HT1	8	SONY	AK8HT1	EUT
B	CD Player	D-EJ2000	-	SONY	-	-
C	AC Adapter	AC-GSX100	-	SONY	-	-
D	AC Adapter	AC-ES305K	-	SONY	-	-
E	Remote Controller	RM-MC32EL	-	SONY	-	-

#### List of cables used

No.	Name	Length (m)	Shield	Backshell material
1	DC Cable	2.0	Unshielded	Polyvinyl chloride
2	Audio Cable	1.0	Shielded	Polyvinyl chloride
3	DC Cable	1.8	Unshielded	Polyvinyl chloride
4	Audio Cable	0.8	Unshielded	Polyvinyl chloride
5	AC Cable	3.0	Unshielded	Polyvinyl chloride

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## 4 MEASUREMENT UNCERTAINTY

### Conducted emission test

The measurement uncertainty (with a 95% confidence level) for this test was  $\pm 1.3$ 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  $\pm 4.8$ dB.

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

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

Although the data is unable to be considered the measurement uncertainty, EUT passed this test.

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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 12 to 16  
**Test result** : Pass  
**Test instruments** : KCC- 24/25/26/28/KPL-02, KLS-05 (EUT), KLS-07 (AE),  
KTM-07, KSA-02, KTR-03

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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 on an open 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.

### **Maximum Filed Strength of Fundamental by §15.249 (a)**

Measurement range : CISPR QP Detector, IF BW 120kHz

**Test data** : APPENDIX Page 17 to 19  
**Test result** : Pass  
**Test instruments** : KCC-20/21/22/23/29, KAF-03, KAT6-03, KLA-02, KOTS-02  
KSA-02, KTR-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 20 to 22 (30 - 1000MHz)  
: APPENDIX Page 23 to 28 (1 - 10GHz)  
**Test result** : Pass  
**Test instruments** : KAF-03, KAF-04, KAT6-03, KBA-02, KTR-01, KLA-02, KSA-02  
KCC-20/21/22/23/29, KCC-D8/D9/D10, KOTS-02, KHA-02

## **5.3 26dB Bandwidth**

### **Test Procedure**

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

**26dB Bandwidth:** CH 1: 206.814kHz  
CH 2: 208.417kHz  
CH 3: 208.417kHz

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

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### **APPENDIX 1: Photographs of test setup**

- 1. Page 10 : Conducted emission
- 2. Page 11 : Radiated emission

### **APPENDIX 2: Test Data**

- 1. Page 12 - 16 : Conducted emission
- 2. Page 17 - 19 : Field strength of Fundamental (Radiated)
- 3. Page 20 - 28 : Field strength of Spurious emission (Radiated)
- 4. Page 29 : 26dB Bandwidth

### **APPENDIX 3: Test instruments**

- Page 30 : Test instruments

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**Conducted emission**



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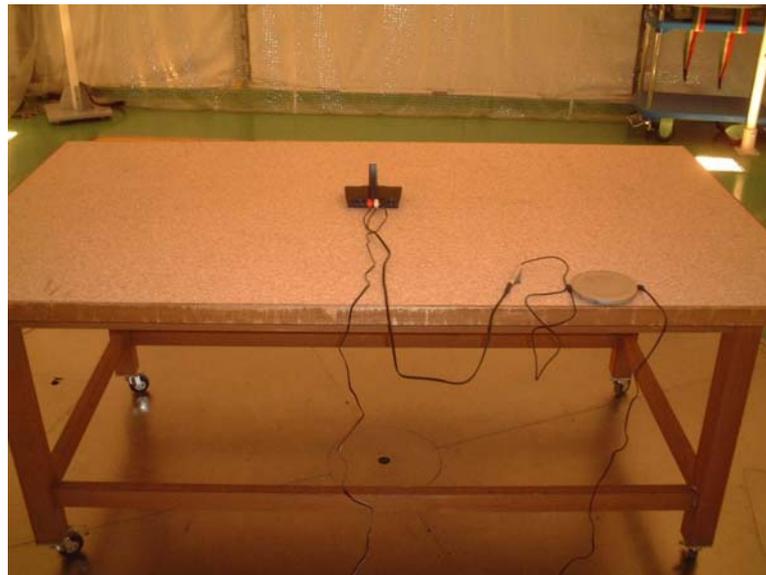
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**Radiated emission**



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# DATA OF CONDUCTION TEST

UL Apex Co., Ltd.  
Yamakita No.3 Shielded Room  
Report No. : AF04049 - 1

Applicant : Sony EMCS Corporation Kisarazu TEC  
Kind of Equipment : RF TRANSMITTER  
Model No. : TMR-HT1  
Serial No. : 8  
Power : AC120V/60Hz  
Mode : Transmitting (CH1)  
Remarks :  
Date : 2/26/2004  
Phase : Single Phase  
Temperature : 22 °C  
Humidity : 39 %  
Regulation : FCC Part15C § 15. 207. (CISPR Pub. 22 )

*A. Sato*

Engineer : Akira Sato

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	33.1	-	32.9	-	0.2	0.1	0.0	33.4	-	66.0	56.0	32.6	-
2.	0.2087	30.1	-	32.6	-	0.2	0.2	0.0	33.0	-	63.3	53.3	30.3	-
3.	0.3082	28.8	-	34.2	-	0.2	0.2	0.0	34.6	-	60.0	50.0	25.4	-
4.	0.3852	29.3	-	33.9	-	0.2	0.2	0.0	34.3	-	58.2	48.2	23.9	-
5.	0.5102	23.4	-	27.2	-	0.2	0.1	0.0	27.5	-	56.0	46.0	28.5	-
6.	1.5330	18.9	-	20.2	-	0.2	0.3	0.0	20.7	-	56.0	46.0	35.3	-
7.	17.4858	34.9	29.3	35.7	30.5	1.0	1.7	0.0	38.4	33.2	60.0	50.0	21.6	16.8

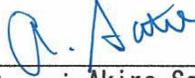
CALCULATION: READING[dBμV] + LISN FACTOR[dB] + CABLE LOSS[dB] + ATTEN[dB].

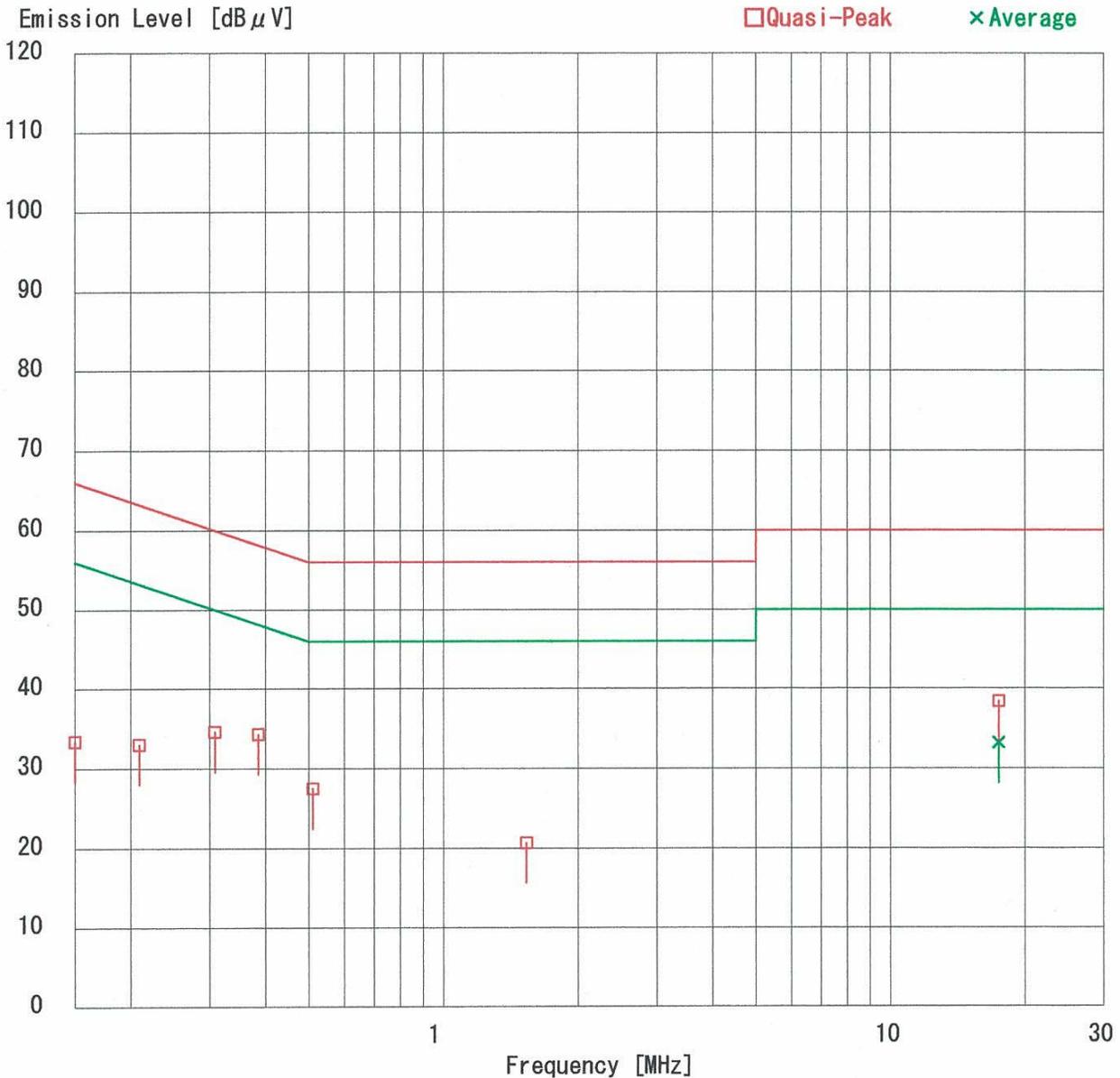
■ LISN: KLS-05 (NSLK8126) ■ COAXIAL CABLE: KCC-24/25/26/28  
■ PULSE LIMITER: KPL-02 ■ EMI RECEIVER: KTR-03 (ESHS10)

# DATA OF CONDUCTION TEST

UL Apex Co., Ltd.  
Yamakita No.3 Shielded Room  
Report No. : AF04049 - 1

Applicant : Sony EMCS Corporation Kisarazu TEC  
Kind of Equipment : RF TRANSMITTER  
Model No. : TMR-HT1  
Serial No. : 8  
Power : AC120V/60Hz  
Mode : Transmitting (CH1)  
Remarks :  
Date : 2/26/2004  
Phase : Single Phase  
Temperature : 22 °C  
Humidity : 39 %  
Regulation : FCC Part15C § 15. 207. (CISPR Pub. 22 )

  
Engineer : Akira Sato

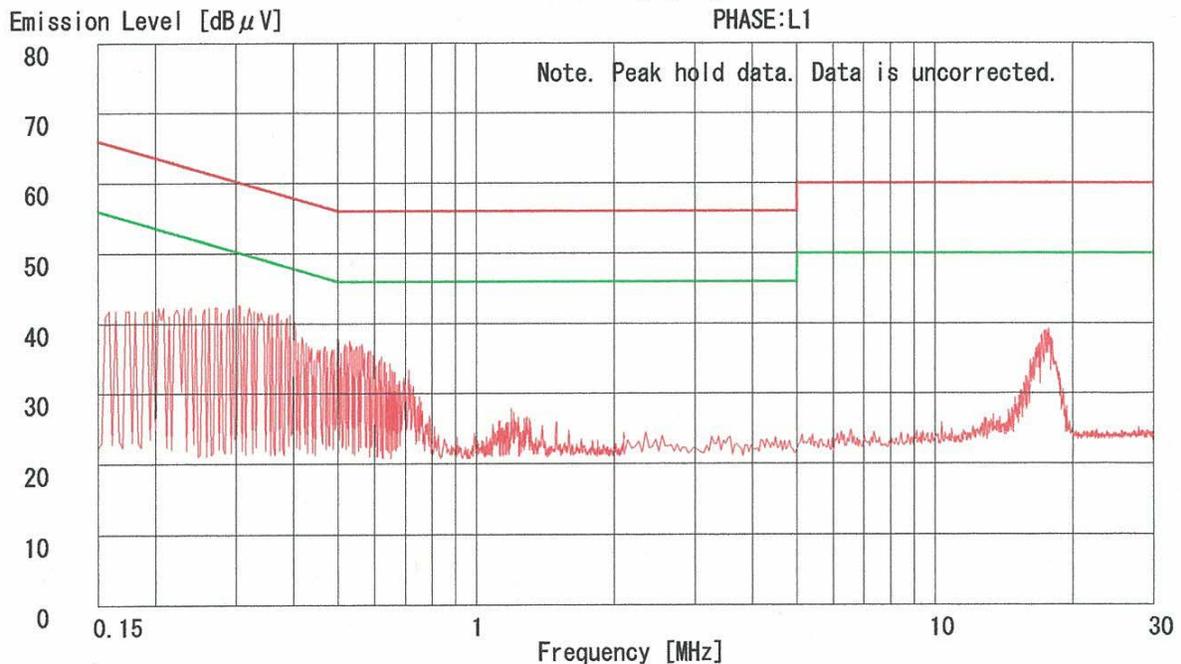
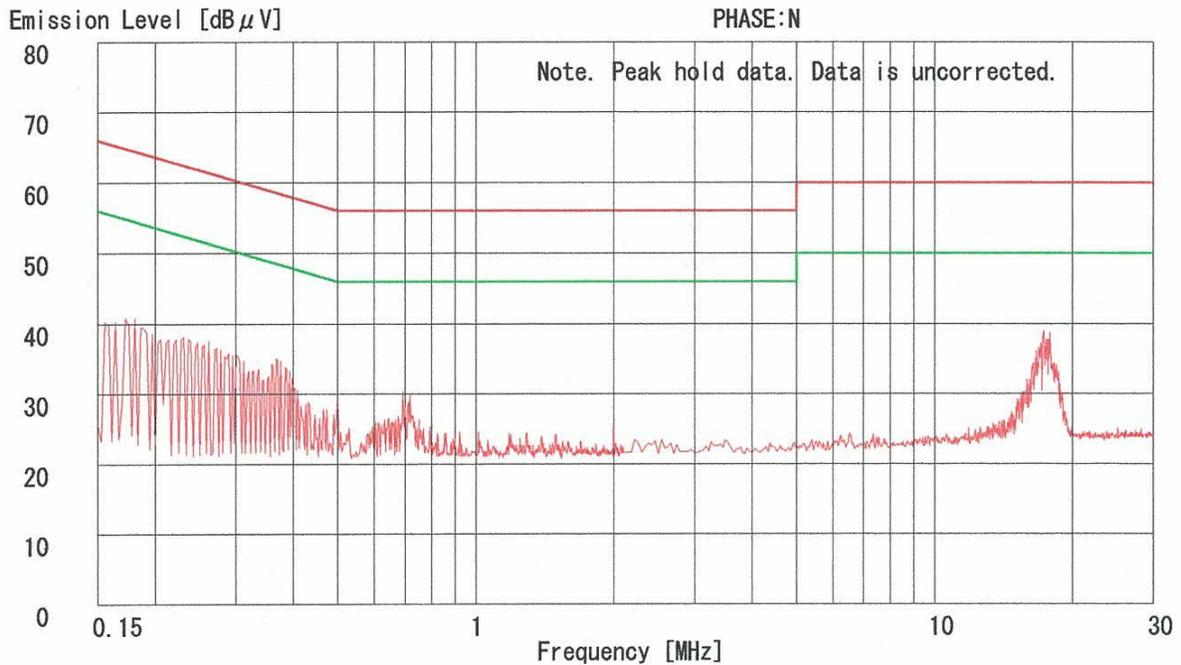


# DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd.  
Yamakita No.3 Shielded Room  
Report No.: AF04049 - 1

Applicant : Sony EMCS Corporation Kisarazu TEC  
Kind of Equipment : RF TRANSMITTER  
Model No. : TMR-HT1  
Serial No. : 8  
Power : AC120V/60Hz  
Mode : Transmitting (CH1)  
Remarks :  
Date : 2/26/2004  
Phase : Single Phase  
Temperature : 22 °C  
Humidity : 39 %  
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub.22 )  
Regulation 2 : None

*A. Sato*  
Engineer : Akira Sato



# DATA OF CONDUCTION TEST CHART

UL Apex Co.,Ltd.  
Yamakita No.3 Shielded Room  
Report No. : AF04049 - 1

Applicant : Sony EMCS Corporation Kisarazu TEC  
Kind of Equipment : RF TRANSMITTER  
Model No. : TMR-HT1  
Serial No. : 8  
Power : AC120V/60Hz  
Mode : Transmitting (CH2)  
Remarks :  
Date : 2/26/2004  
Temperature : 22 °C  
Humidity : 39 %  
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22 )  
Regulation 2 : None

*A. Sato*  
Engineer : Akira Sato

