

EMI TEST REPORT

Test Report No. : 23EE0036-HO-1

Applicant : Sony Corporation

Type of Equipment : Personal Entertainment Organizer

Model No. : PEG-TG50/U

Test standard : FCCPart15 Subpart C
Section15.207, Section 15.247

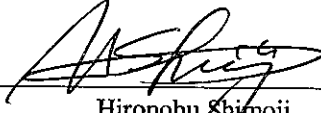
FCC ID : AK8PEGTG50

Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of A-Pex International Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : December 26 and 27, 2002

Tested by : 
Hiroka Umeyama
EMC Head Office Division

Approved by : 
Hironobu Shinogi
Group Leader of EMC Head Office Division

A-Pex International Co., Ltd.
EMC Head Office Division.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116
Facsimile : +81 596 24 8124

CONTENTS

PAGE

SECTION 1:	Client information	3
SECTION 2:	Equipment under test (E.U.T.)	3
SECTION 3:	Test specification, procedures and results	5
SECTION 4:	Operation of E.U.T. during testing	7
SECTION 5:	Conducted Emission, Section 15.207	10
SECTION 6:	Carrier Frequency Separation , Section 15.247(a)(1)	10
SECTION 7:	20dB Bandwidth, Section 15.247(a)(1)	10
SECTION 8:	Number of Hopping Frequency, Section 15.247(a)(1)(iii)	11
SECTION 9:	Dwell time, Section 15.247(a)(1)(iii)	11
SECTION 10:	Maximum Peak Output Power, Section 15.247(b)(1)	11
SECTION 11:	Band Edge compliance, Section 15.247(c)	11
SECTION 12:	Spurious Emission, Section 15.247(c)	12
APPENDIX 1:	Photographs of test setup	13
APPENDIX 2:	Data of EMI test	13
APPENDIX 3:	Test instruments	13

SECTION 1: Client information

Company name : Sony Corporation
Address : 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo, 141-0001 Japan
Telephone Number : +81-3-6409-3672
Facsimile Number : +81-3-6409-3490
Contact Person : Mitsuru Kondoh

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Personal Entertainment Organizer
Model No. : PEG-TG50/U
Serial No. : PVT28, PVT31
Rating : DC 5.2V
AC Adaptor AC 100-240V, 50/60Hz
Country of Manufacture : Japan
Receipt Date of Sample : December 26, 2002
Condition of EUT : Engineering prototype

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

2.2 Product Description

Model: PEG-TG50/U which was referred to as the EUT in this report is a Personal Entertainment Organizer. The specification is as following;

Equipment Type	:	Transceiver
Clock frequency used in EUT	:	16.0MHz, 32.768kHz, 29.5385MHz, 11.2896MHz
Frequency characteristics	:	from 2400MHz to 2483.5MHz, 1MHz
Type of modulation	:	GFSK & Frequency Hopping
Bandwidth & Channel spacing	:	2402MHz-2480MHz
Emission Designation (ITU Code)	:	F1D
Antenna Type	:	Internal $\lambda / 4$ monopole chip antenna
Antenna Gain	:	2.14dBi

***FCC Part 15.31 (e)**

The host device PEG-TG50/U provide the stable power supply (DC: 5.2V), and Personal Entertainment Organizer complies power supply regulation.

***FCC Part 15.203 Antenna requirement**

Personal Entertainment Organizer and its antenna comply with this requirement since they are built in host device PEG-TG50/U when they are put up for sale and they are used with a particular antenna connector.

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 3: Test specification, procedures and results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted Emissions
Section 15.247 Operation within the Band 902-928MHz, 2400-2483.5MHz, and
5725-5850MHz

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	ANSI C63.4:2001	Section 15.207	N/A	N/A	18.5dB 0.1723MHz, N	Complied
2	Carrier Frequency Separation	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
3	20dB Bandwidth	ANSI C63.4:2001	Section15.247(a)(1)	Conducted	N/A	N/A	Complied
4	Number of Hopping Frequency	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	N/A	Complied
5	Dwell time	ANSI C63.4:2001	Section15.247(a)(1)(iii)	Conducted	N/A	N/A	Complied
6	Maximum Peak Output Power	ANSI C63.4:2001	Section15.247(b)(1)	Conducted	N/A	N/A	Complied
7	Band Edge Compliance	ANSI C63.4:2001	Section15.247(c)	Conducted	N/A	N/A	Complied
8	Spurious Emission	ANSI C63.4:2001	Section15.247(c)	Conducted/ Radiated	N/A	6.3dB 80.0MHz Horizontal	Complied

These tests were also referred to FCC Public Notice DA 00-705 "filing and measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3 Additions to Standards

No addition, deviation or exclusion has been made from standards.

3.4 Confirmation

A-Pex International hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C Section 15.207 and 15.247.

3.5 Uncertainty

Conducted Emission

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

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}$.

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

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

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test was $\pm 3.0\text{dB}$.

- ☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
☒ The data listed in this test report has enough margin.

3.6 Test Location

A-Pex International Co., Ltd. EMC Head Office Division. No.2 semi anechoic chamber.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8116 Facsimile: +81 596 24 8124

This semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.1: 846015, Industry Canada: No.1: IC4247-2)

*NVLAP Lab. code: 200572-0

3.7 Test set up, Data of EMI and Test instruments

Refer to APPENDIX 1 to 3.

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used :

1. Transmitting mode (2402MHz)
2. Transmitting mode (2441MHz)
3. Transmitting mode (2480MHz)
4. Transmitting (Hopping on)
5. Inquiry

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

A-Pex International Co., Ltd.

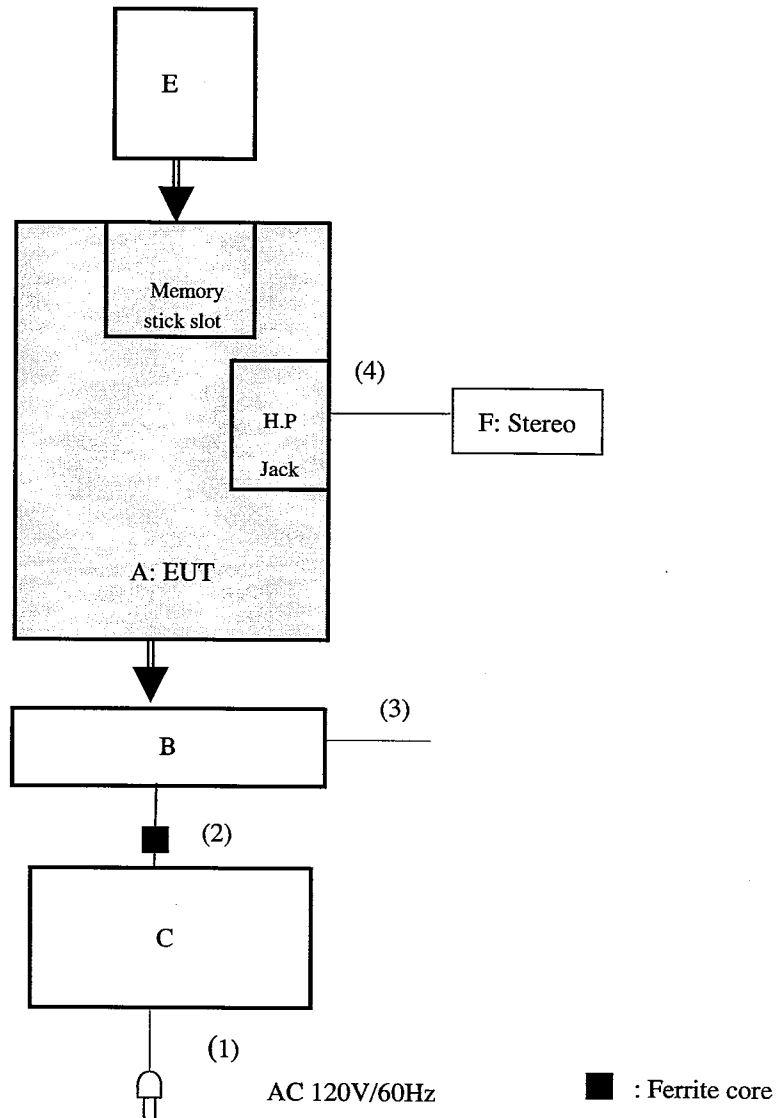
EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID	Remark
A	Personal Entertainment Organizer	PEG-TG50/U	PVT28, PVT31	Sony Corp	AK8PEGTG50	EUT
B	CRADLE	PEGA-UC50/S	Z000132	Sony Corp	-	-
C	AC Adapter	PEGA-AC10	M000000	Sony EMCS Corp	-	-
E	Memory Stick	MSG-128A	-	Sony Corp	-	-
F	Stereo Headphone	MDR-E808V/K	-	Sony Corp	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	AC Power Cable	0.75	N	Polyvinyl chloride
2	DC Power Cable	1.83	N	Polyvinyl chloride
3	USB Cable	2.0	Y	Polyvinyl chloride
4	Stereo Headphone Cable	1.2	N	Polyvinyl chloride

A-Pex International Co., Ltd.
EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 5: Conducted Emission, Section 15.207

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. I/O cables and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane. Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN to the input power source. All unused 50ohm connectors of the LISN were resistively terminated in 50ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT on a reference ground plane 4.0 x 4.0m in a No.2 semi Anechoic Chamber.

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 CISPR quasi-peak detector (IF BW 9 kHz).

Measurement range: 0.15-30MHz

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-02, MRENT-02, MCC-13, MLS-06

SECTION 6: Carrier Frequency Separation , Section 15.247(a)(1)

Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

SECTION 7: 20dB Bandwidth , Section 15.247(a)(1)

Test Procedure

The 20dB bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 8: Number of Hopping Frequency, Section 15.247(a)(1)(iii)

Test Procedure

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

SECTION 9: Dwell time, Section 15.247(a)(1)(iii)

Test Procedure

The Dwell time was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

SECTION 10: Maximum Peak Output Power, Section 15.247(b)(1)

Test Procedure

The Maximum Peak Output Power was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

SECTION 11: Band Edge Compliance, Section 15.247(c)

Test Procedure

The Band Edge Compliance was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

SECTION 12: Spurious Emission , Section 15.247(c)

[Conducted]

Test Procedure

The Spurious Emission (Conducted) was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MBTR10, MCC-05

[Radiated]

Test Procedure

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The Radiated Electric Field Strength intensity has been measured in No.2 semi anechoic chamber (7.5x5.8x5.2m) with a ground plane and at a distance of 3m.

The measuring antenna height was varied between 1 to 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.

The maximum output power of EUT was confirmed as the worst case condition in the photo of APPENDIX.

Test data : APPENDIX 2
Test result : Pass
Test instruments : MTR-01, MCC-12, MCC-05, MCC-06, MHA-05, MPA-01
MBA-03, MLA-03, MPA-04, MAT-07, MCC-11
MBF-01, MHA-01, MRENT-02, MTR-02

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

APPENDIX 1: Photographs of test setup

Page 14 : Conducted Emission
Page 15 : Spurious Emission (Radiated)
Page 16 : Other test except Conducted Emission and Spurious Emission(Radiated)

APPENDIX 2: Data of EMI test

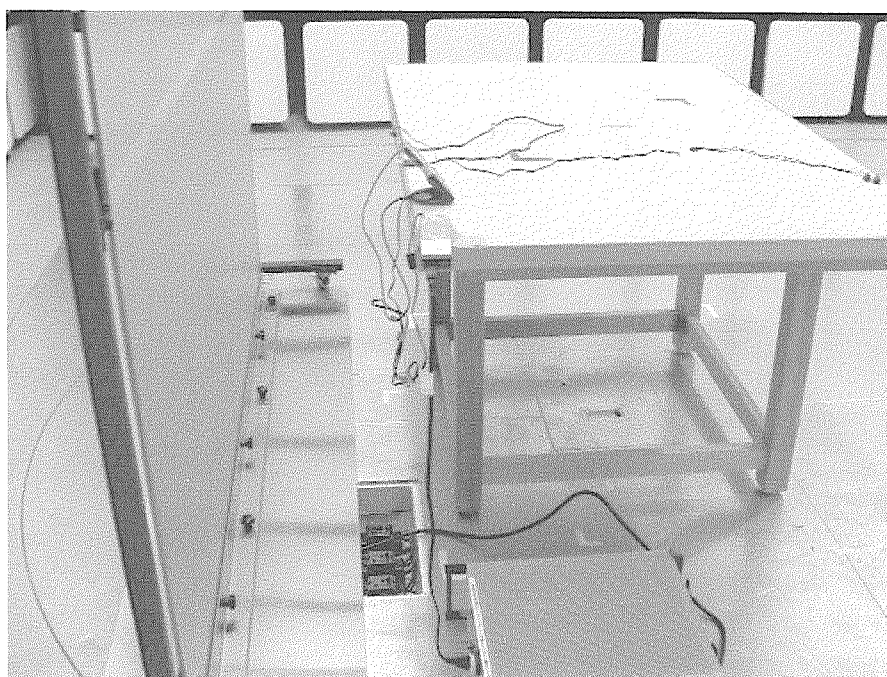
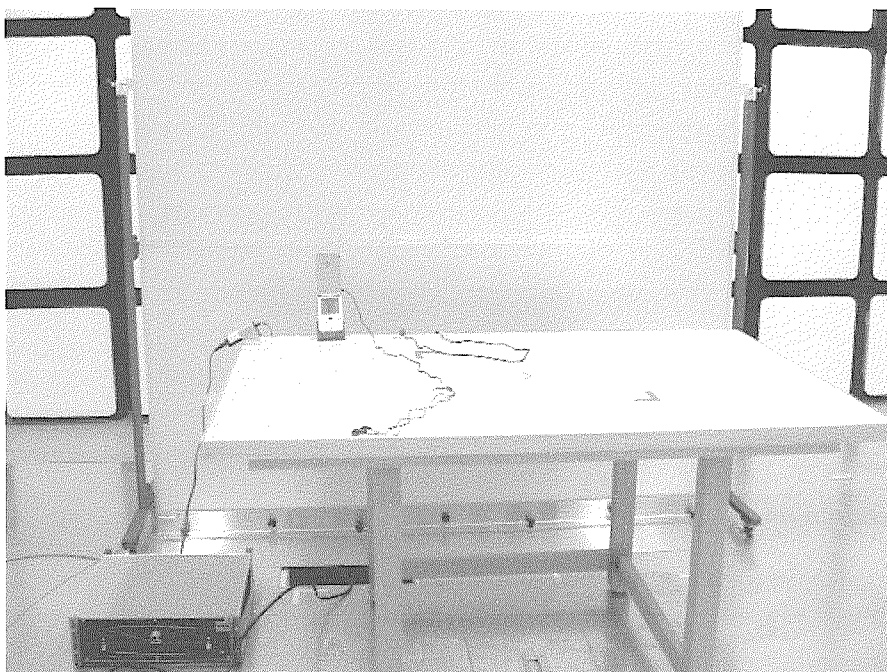
Page 17-22 : Conducted Emission
Page 23-25 : Carrier Frequency Separation
Page 26-28 : 20dB Bandwidth
Page 29-32 : Number of Hopping Frequency
Page 33-37 : Dwell time
Page 38-40 : Maximum Peak Output Power
Page 41-43 : Band Edge Compliance
Page 44-58 : Spurious Emission

APPENDIX 3: Test instruments

Page 59 : Test instruments

APPENDIX 1: Photographs of test setup

Conducted Emission



A-Pex International Co., Ltd.

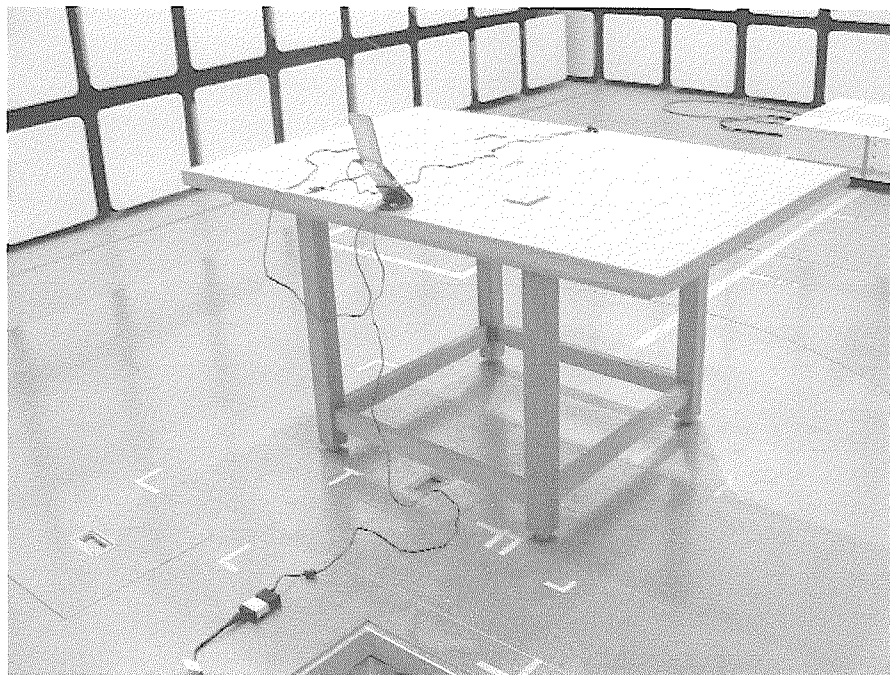
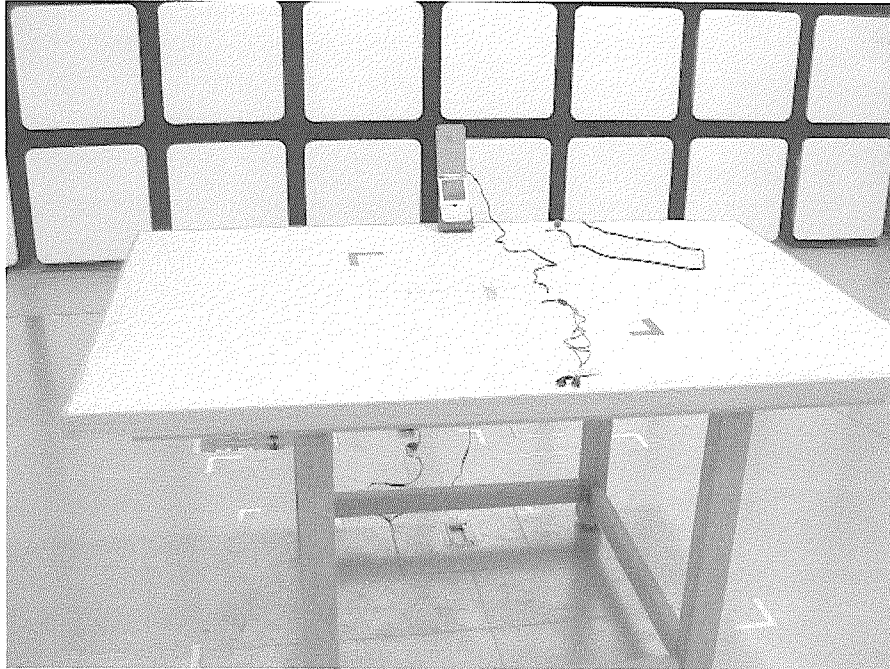
EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

Spurious Emission (Radiated)



A-Pex International Co., Ltd.

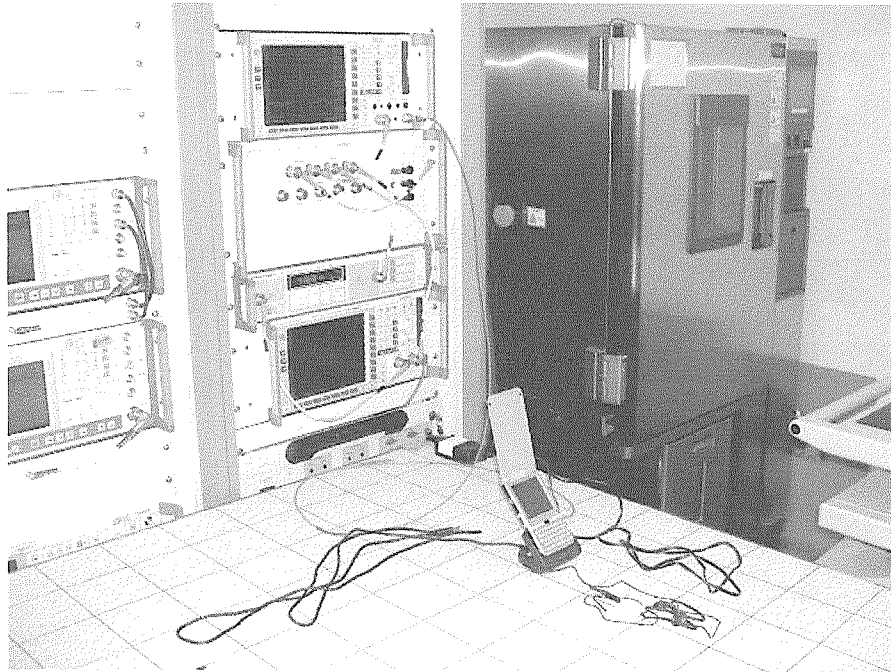
EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

Other test except Conducted Emission and Spurious Emission (Radiated)



A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124