



Issue Date : June 2 1998

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EMI TEST REPORT

JQA APPLICATION NO. : 80-80139

Applicant : Wacom Co., Ltd.
: 2-510-1 Toyonodai, Otone-machi, Kitasaitama-gun
Saitama 349-1148, Japan

Manufacturer : Wacom Co., Ltd.
: 2-510-1 Toyonodai, Otone-machi, Kitasaitama-gun
Saitama 349-1148, Japan

Description of Equipment : Digitizer

Model No. : CT 0405-U

FCC ID : HV4CT0405U

Regulations Applied : FCC Rules and Regulations Part 15 Subpart C

Total Pages of this Report : 22 Pages (including this page)

Place of Measurement : JQA EMC Engineering Dept. Testing Div.

NVLAP Lab. Code : 200189-0 (Effective through : June 30, 1998)

TEST FACILITY : This test facility have been fully described in report dated May 8, 1996
Submitted to FCC office, and accepted in a letter dated June 7, 1996(31040/SIT).

TEST RESULTS IN THIS REPORT are obtained in use of equipment that is traceable to
Electrotechnical Lab. of MITI Japan and Communications Research Lab. of PTT Japan.

The test results only responds to the tested sample.

It is not allowed to copy this report even partly without the allowance
of the JQA EMC Engineering Dept. Testing Div.

Signed:

Takaharu Hada, Manager
JQA EMC Engineering Dept.

GENERAL EQUIPMENT INFORMATION :**DESCRIPTION OF EQUIPMENT:**

- 1) Type of Equipment tested : Pre-Production
 2) Category : Intentional Radiator
 3) Equipment Authorization : Certification
 4) FCC ID : HV4CT0405U
 5) Trade Name : WACOM
 6) Model No. : CT-0405-U
 7) Fundamental Frequency
 Operated in the Equipment : 593.75 kHz, 562.5 kHz, 531.25 kHz, 6 MHz, 8 MHz
 8) Highest Frequency Used
 in the Equipment : 8 MHz
 9) Serial No. :
 10) Date of Manufacture :
 11) Power Rating : DC 5.0V
 The EUT was controlled by the personal computer
 (Model: DESKPRO 2000 by Compaq Computer Corp.).
 12) Equipment Grounding : None

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JQA Application No. : 80-80139
Model No. : CT 0405 U
FCC ID : HV4CT0405U

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CONCLUSIONS OF THE TEST RESULTS:

The data shown in this report were made in accordance with the procedures given in ANSI C63.4-1992. And the Equipment Under Test complied with the requirements of FCC Rules Part15 subpart C sec. 207 and 209 as detailed from page 3 to page 22.

	Results	Page
AC Powerline Conducted Emissions Measurement Minimum margin with respect to the Limits Measurement Uncertainty	: PASSED : 14.7 dB at 20.07 MHz : \pm 2.3 dB	7
Tested by: <u>Y. Nakajima</u> Yoichi Nakajima Testing Engineer	Date: <u>May 13, 1998</u> Temp: <u>22°C</u> Humi: <u>50%</u>	
Radiated Emissions Measurement Minimum margin with respect to the Limits Measurement Uncertainty	: PASSED : 7.2 dB at 527.1 MHz : + 3.2 dB	13, 14
Tested by: <u>Y. Nakajima</u> Yoichi Nakajima Testing Engineer	Date: <u>May 13, 1998</u> Temp: <u>24°C</u> Humi: <u>72%</u>	



JQA Application No. : 80-80139
Model No. : CT-0405-U
FCC ID : HV4CT0405U

Standard : FCC15 Sub. C
Issue Date : June 2 1998
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EQUIPMENT(EUT) MODIFICATION:

No modifications were conducted by JQA to achieve compliance to Class B levels.

I HEREBY CERTIFY THAT : The data shown in this report were made in accordance with the procedures given in ANSI C63.4-1992 and the energy emitted by the equipment was found to be within the limits applicable.

I assume full responsibility for accuracy and completeness of these data.

Approved Signatory : Y. Nakajima
Yoichi Nakajima
Assistant Manager

TEST CONDITIONS AND CONFIGURATION OF EUT

1. The equipment under test (EUT) consists of:

	<u>Item</u>	<u>Manufacturer</u>	<u>Model No.</u>	<u>FCC ID</u>	<u>Serial No.</u>
A(*1)	Digitizer	Wacom Co., Ltd.	CT 0405 U	HV4CT0405U	8FJS00001
B	Stylus Pen	Wacom Co., Ltd.	UP-801E	N/A	

Note 1. The EUT was controlled by the personal computer (Model: DESKPRO 2000 by Compaq Computer Corp.).

2. The measurement was carried out with the following equipment and accessories connected:

	<u>Item</u>	<u>Manufacturer</u>	<u>Model No.</u>	<u>FCC ID</u>	<u>Serial No.</u>
C	Personal Computer	Compaq Computer Corp.	DESKPRO 2000	N/A(DoC)	7725BK520586
D	CRT Display	NANA0 Corp.	9060S	GCJ9060	56475129S-US
E	Printer	Star Micronics	Star XR 1000	B6D8MFJ250	430091101326
F	MODEM	OmniTel Inc.	T1200-SD2	D786JCT1200-SD2	S87309509
G	Keyboard	Compaq Computer Corp.	Enhanced II Keyboard	ACJ8D7109232	108195730790
H	Mouse	Compaq Computer Corp.	M-S34	DZL211029	141189-401

3. Configuration of the equipment under test

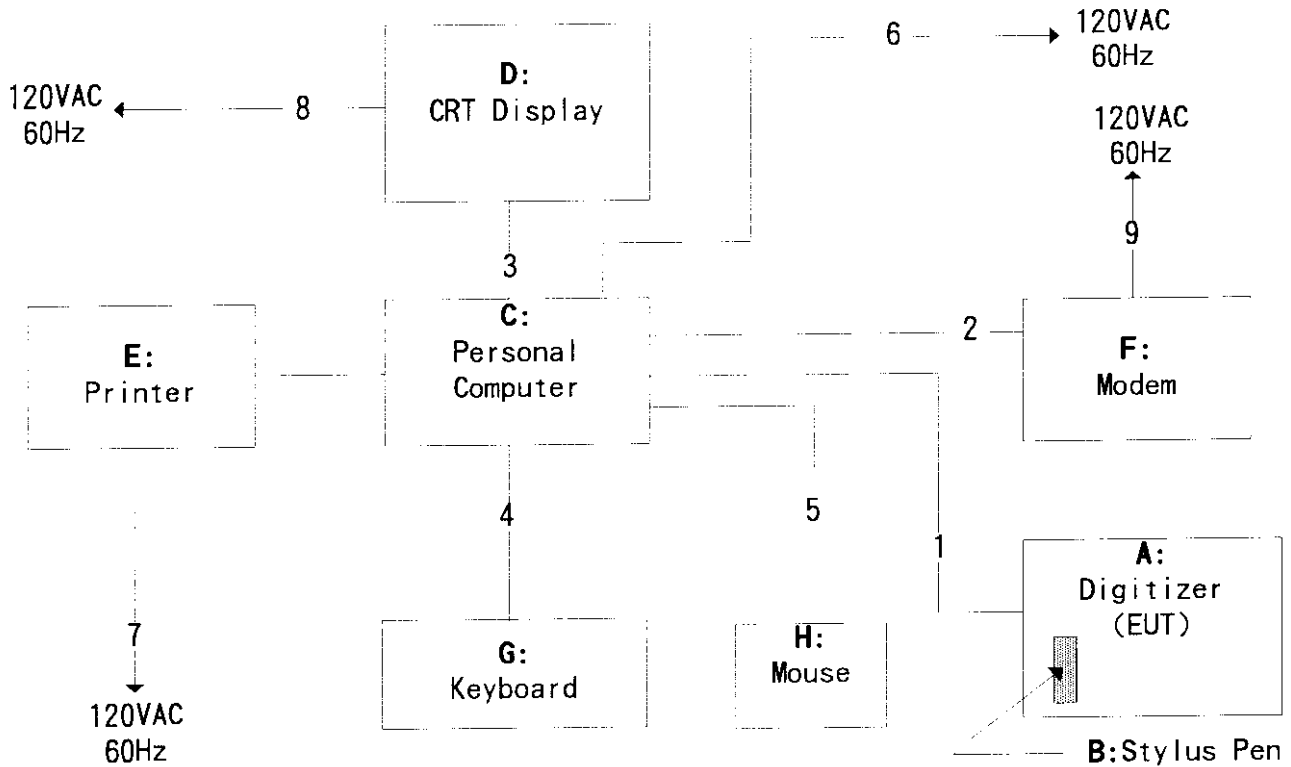
AC Power Line Conducted Emissions Measurement : Refer to page 5, 6, 9, 10, 11, 12
 Radiated Emissions Measurement : Refer to page 5, 6, 16, 17, 18, 19, 20

4. Operating Condition

Running with the program prepared by the applicant.

- (1) CRT display displays "ll" characters.
 - (2) Printer prints "ll" characters.
 - (3) Digitizer reads data.
- Return to step (1)

CONFIGURATION OF TESTED SYSTEM



Port Description:

<u>Equipment</u>	<u>Port Connection</u>
(A)EUT(Digitizer) / (C)Personal Computer	USU Port / -
(C)Personal Computer / (D)CRT Display	Display Port / -
(C)Personal Computer / (E)Printer	Prallel Port / -
(C)Personal Computer / (F)MODEM	Serial Port / -
(C)Personal Computer / (G)Keyboard	Keyboard Port / -
(C)Personal Computer / (H)Mouse	Mouse Port / -

Cable Description:

<u>Cable No.</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Shielded</u>	<u>Ferrite</u>	<u>Length</u>	<u>Connector</u>
1	USB Cable		YES	NO	2.0	Non-metallic
2	RS232C Cable	ELECOM	YES	NO	1.5	Non-metallic
3	Display Cable	KAWASAKI M	YES	NO	1.8	Metallic
4	Keybord Cable	Compaq Computer Corp.	YES	NO	1.1	Non-metallic
5	Mouse Cable	Compaq Computer Corp.	YES	NO	1.9	Non-metallic
6	AC Power Cable(for PC)	FUJIKURA-T	NO	NO	2.0	Non-metallic
7	AC Power Cable(for Printer)	KAWASAKI S	NO	NO	1.9	Non-metallic
8	AC Power Cable(for Display)	KAWASAKI S	NO	NO	2.0	Non-metallic
9	AC Power Cable(for Modem)	-	NO	NO	2.0	Non metallic

AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT :

According to description of ANSI C63.4-1992 sec.7.2.3, the AC power line preliminary conducted emissions measurement 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.

Frequency (MHz)	LISN Factor (dB)	Meter Reading		Limits (dB/uV)	Emission Levels		Margins	
		V-A (dB/uV)	V-B (dB/uV)		V-A (dB/uV)	V-B (dB/uV)	V-A (dB)	V-B (dB)
0.46	0.2	27.0	28.5	48.0	27.2	28.7	20.8	19.3
0.59	0.2	29.5	30.4	48.0	29.7	30.6	18.3	17.4
0.71	0.2	26.7	28.5	48.0	26.9	28.7	21.1	19.3
0.89	0.2	24.4	26.4	48.0	24.6	26.6	23.4	21.4
1.02	0.2	20.2	24.0	48.0	20.4	24.2	27.6	23.8
1.20	0.2	19.9	23.3	48.0	20.1	23.5	27.9	24.5
1.63	0.2	14.8	19.4	48.0	15.0	19.6	33.0	28.4
2.04	0.2	20.6	12.7	48.0	20.8	12.9	27.2	35.1
2.93	0.2	21.5	27.0	48.0	21.7	27.2	26.3	20.8
3.45	0.2	14.6	15.6	48.0	14.8	15.8	33.2	32.2
4.28	0.2	12.9	16.1	48.0	13.1	16.3	34.9	31.7
5.18	0.2	17.2	13.5	48.0	17.4	13.7	30.6	34.3
6.26	0.2	16.2	15.7	48.0	16.4	15.9	31.6	32.1
8.57	0.2	15.4	16.9	48.0	15.6	17.1	32.4	30.9
10.40	0.2	23.1	23.2	48.0	23.3	23.4	24.7	24.6
13.50	0.3	21.7	21.2	48.0	22.0	21.5	26.0	26.5
15.50	0.3	28.9	28.9	48.0	29.2	29.2	18.8	18.8
18.00	0.4	32.1	32.1	48.0	32.5	32.5	15.5	15.5
20.07	0.4	32.5	32.9	48.0	32.9	33.3	15.1	14.7
21.50	0.4	26.9	26.7	48.0	27.3	27.1	20.7	20.9
23.96	0.5	30.0	30.0	48.0	30.5	30.5	17.5	17.5
26.27	0.5	20.4	20.4	48.0	20.9	20.9	27.1	27.1
30.00	0.6	18.5	18.5	48.0	19.1	19.1	28.9	28.9

- Notes: 1). The spectrum was checked from 0.45 MHz to 30 MHz.
 2). V-A : One end & Ground ; V-B : The other end & Ground
 3). The symbol of '<' means 'or less'.
 4). The symbol of '>' means 'or greater'.
 5). The cable(2.0 m length) loss is included in the LISN factor.
 6). See sec.11.5.2 in ANSI C63.4-1992 for the symbol '*'
 7). A sample calculation was made at 0.46 MHz.

$$L_f + M_r = 0.2 + 27.0 = 27.2 \text{ dB/uV}$$

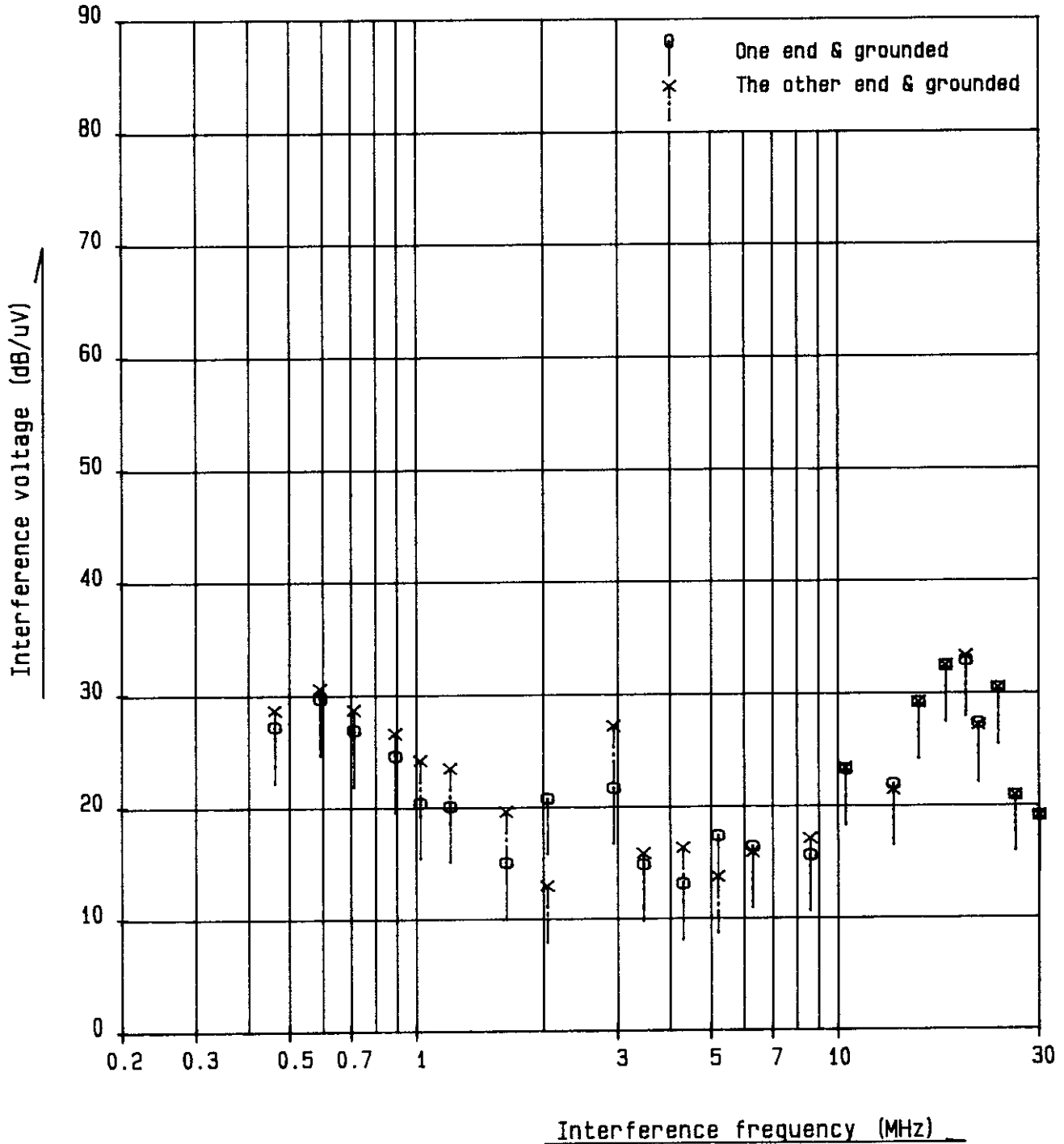
Where,

L_f : LISN Factor

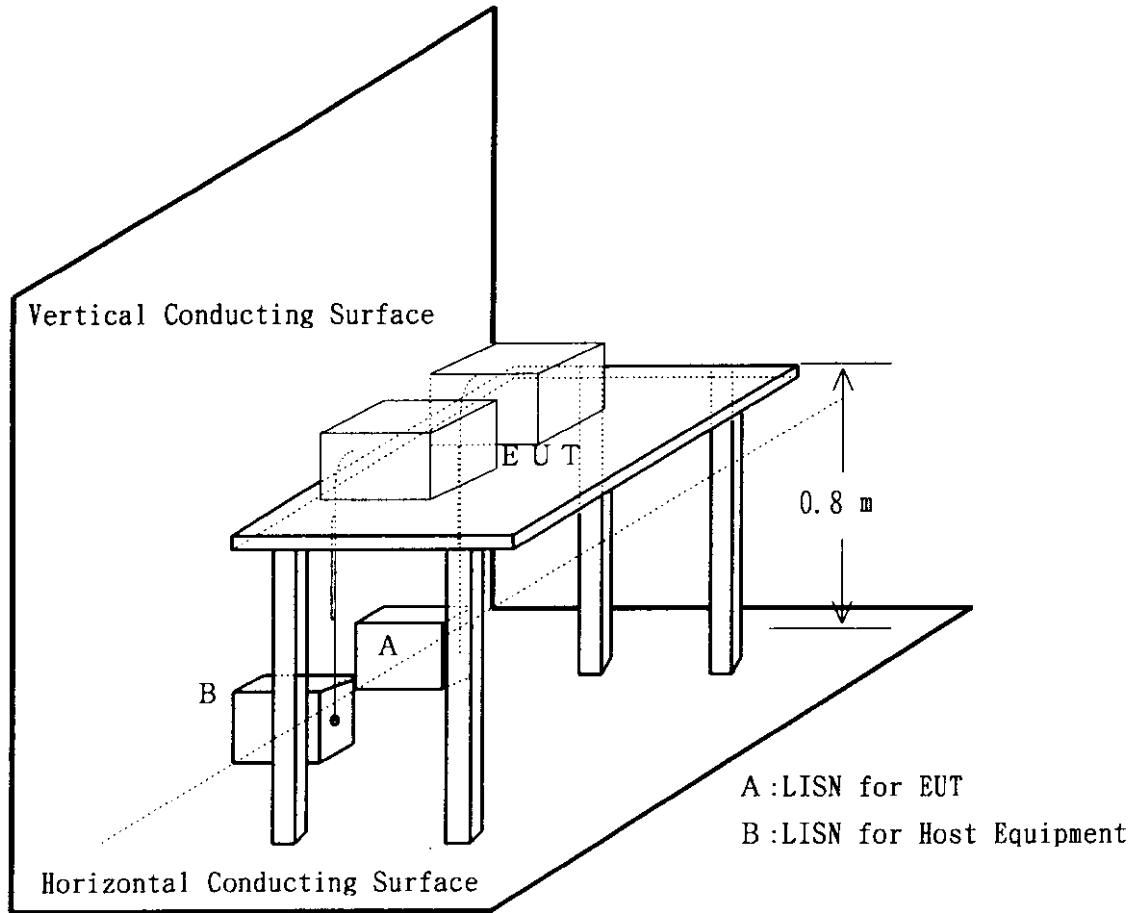
M_r : Meter Reading

AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT

MODEL NO.: CT-0405-U



TEST SET-UP SKETCH FOR AC POWER LINE CONDUCTED EMISSIONS MEASUREMENT



RADIATED EMISSIONS MEASUREMENT :

(1) Below 30 MHz

The radiated emission measurement of fundamental and spurious radiation under test was made at the distance of 3 m away from the device which was placed on wooden turntable 0.8 m height above the ground. The receiving loop antenna was rotated through 360 degrees. The center of loop antenna was set to 1 m above the ground. The wooden turntable was rotated 360 degrees to obtain the highest reading on the field strength meter.

Measurement Results:

Operating Frequency : 562.5 kHz
 Distance of Measurement : 3.0 meters

<u>Frequency</u> (MHz)	<u>Extrapolation Factor</u> (dB)	<u>Meter Reading</u> (dB/uV)	<u>Field Strength at 30 m</u> (dB/uV/m)	<u>Limits</u> (dB/uV/m)
0.5625	40.0	39.8	-0.2	32.6
1.1250	40.0	34.3	-5.7	26.6
1.6875	40.0	29.2	-10.8	23.1
2.2500	40.0	26.3	-13.7	29.5
2.8125	40.0	28.9	-11.1	29.5
3.3750	40.0	26.0	-14.0	29.5
3.9375	40.0	< 25.0	< -15.0	29.5
4.5000	40.0	< 25.0	< -15.0	29.5
5.0625	40.0	< 25.0	< -15.0	29.5
5.6250	40.0	< 25.0	< -15.0	29.5

Note: 1. The spectrum was checked from 0.5625 MHz to 5.6250 MHz.

2. The symbol of < means or less .

3. Sample calculation : at 0.5265 MHz

$$Mr - Ef - 39.8 - 40.0 = -0.2 \text{ (dB/uV/m)}$$

Where, Mr = Meter Reading, Ef = Extrapolation Factor(Refer FCC15 clause15.31(f)(2)).

4. Measuring Instrument Setting:

Detector function : CISPR quasi-peak
 IF Bandwidth : 10 kHz

(2) Frequency Range 30 MHz – 1000 MHz

RADIATED EMISSIONS MEASUREMENT :

According to description of ANSI C63.4-1992 sec.8.3.1.1, the preliminary radiated emissions measurement 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.

Frequency (MHz)	Antenna Factor (dB/m)	Meter Reading at 3 m		Limits (dB/uV/m)	Emission Levels at 3 m		Margins	
		Horiz. (dB/uV)	Vert. (dB/uV)		Horiz. (dB/uV/m)	Vert. (dB/uV/m)	Horiz. (dB)	Vert. (dB)
30.1	-0.5	15.0	27.4	40.0	14.5	26.9	25.5	13.1
37.6	1.6	16.6	20.0	40.0	18.2	21.6	21.8	18.4
48.0	3.8	24.0	23.6	40.0	27.8	27.4	12.2	12.6
56.4	5.3	11.2	9.6	40.0	16.5	14.9	23.5	25.1
71.9	7.7	17.9	8.9	40.0	25.6	16.6	14.4	23.4
96.0	10.5	25.3	22.4	43.5	35.8	32.9	7.7	10.6
105.4	11.4	9.3	5.4	43.5	20.7	16.8	22.8	26.7
128.8	13.5	16.8	9.4	43.5	30.3	22.9	13.2	20.6
143.0	14.5	11.7	7.2	43.5	26.2	21.7	17.3	21.8
163.1	15.9	12.1	5.0	43.5	28.0	20.9	15.5	22.6
178.1	16.8	9.7	4.6	43.5	26.5	21.4	17.0	22.1
198.2	18.0	11.4	5.4	43.5	29.4	23.4	14.1	20.1
223.3	19.2	9.8	5.8	46.0	29.0	25.0	17.0	21.0
240.9	20.0	9.9	5.8	46.0	29.9	25.8	16.1	20.2
258.4	20.8	9.0	6.4	46.0	29.8	27.2	16.2	18.8
276.0	21.5	8.4	4.5	46.0	29.9	26.0	16.1	20.0
307.5	22.7	5.3	1.2	46.0	28.0	23.9	18.0	22.1
332.8	23.6	10.5	11.0	46.0	34.1	34.6	11.9	11.4
383.9	25.2	3.5	< 0.0	46.0	28.7	< 25.2	17.3	> 20.8
431.5	26.5	1.1	< 0.0	46.0	27.6	< 26.5	18.4	> 19.5
527.1	28.8	< 0.0	10.0	46.0	< 28.8	38.8	> 17.2	7.2
571.0	29.9	< 0.0	6.1	46.0	< 29.9	36.0	> 16.1	10.0
998.5	37.4	2.4	8.9	54.0	39.8	46.3	14.2	7.7

- Notes: 1). The spectrum was checked from 30 MHz to 1000 MHz.
 2). The symbol of '<' means 'or less'.
 3). The symbol of '>' means 'or greater'.
 4). The cable(14.0 m length) loss is included in the antenna factor.
 5). A sample calculation was made at 30.1 MHz.

$$Af + Mr = -0.5 + 15.0 = 14.5 \text{ dB/uV/m}$$

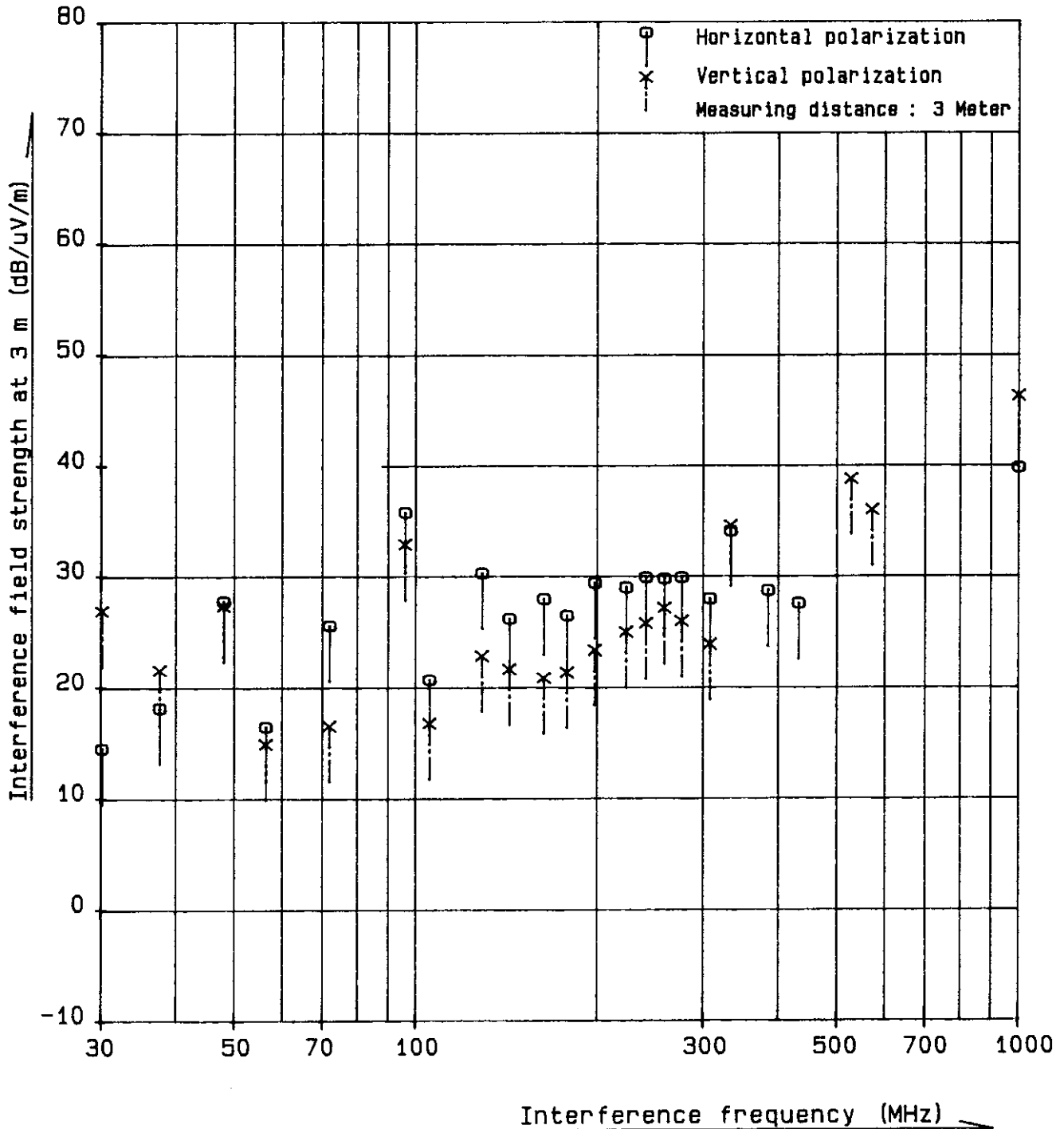
Where,

Af : Antenna Factor

Mr : Meter Reading

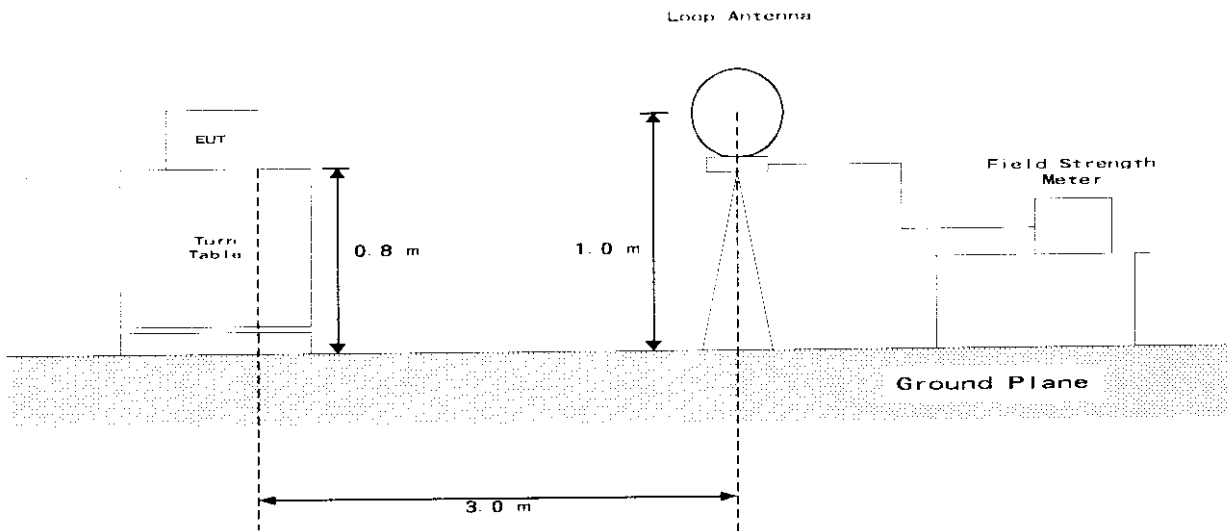
RADIATED EMISSIONS MEASUREMENT

MODEL NO.: CT-0405-U

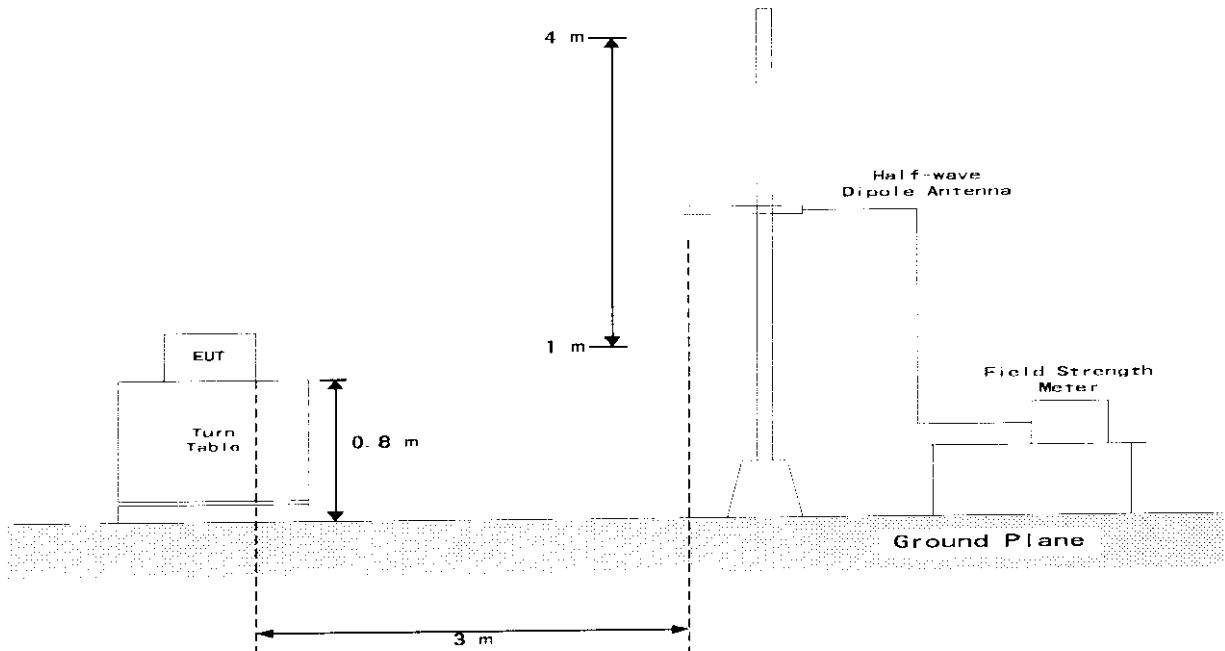


TEST SET-UP FOR RADIATED EMISSION MEASUREMENT

MEASUREMENT SET-UP FOR UP TO 30 MHz



MEASUREMENT SET-UP FOR RADIATED EMISSIONS 30 MHz - 1000 MHz



Test Instrumentation Used, Radiated Emissions Measurement:

Type	Manufacturer Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver(*1)	Rohde & Schwarz ESVP	881487/004	May 1998	1 year
Antenna	Kyoritsu Electrical KBA-511A	0 170 1	Nov 1997	1 year
Antenna	Kyoritsu Electrical KBA-611	0-147-14	Nov 1997	1 year
Site	TDK Co., Ltd. Anechoic Chamber	NO. 2	May 1998	1 year
RF Cable	Fujikura 5D2W	155-21 001	May 1998	1 year
Receiver(*2)	Rohde & Schwarz ESH 3	872994/035	May 1998	1 year
Loop Antenna	Rohde & Schwarz HFH2-Z2	879284/14	Nov 1997	1 year

(*1) Setting of measuring instrument:

Detector Function : CISPR Quasi-Peak
IF Bandwidth : 120 kHz (30 MHz 1000 MHz)

(*2) Setting of measuring instrument:

Detector function : CISPR quasi-peak
IF Bandwidth : 9 kHz

Test Instrumentation Used, AC Power Line Conducted Emissions Measurement:

Type	Manufacturer Model No.	Serial No.	Last Cal.	Cal. Interval
Receiver(*)	Rohde & Schwarz ESH 2	880370/016	May 1998	1 year
LISN	Kyoritsu Electrical KNW 407	8 855 2	Apr 1998	1 year
Shield Enclosure	TDK Co., Ltd.	7S	Sep 1997	1 year
RF CABLE	Fujikura 3D-2W	155 21-005	May 1998	1 year

(*) Setting of measuring instrument:

a) Quasi-Peak Mode

Detector Function : CISPR Quasi-Peak

IF Bandwidth : 9 kHz (0.15 MHz - 30 MHz)

b) Average Mode

Detector Function : Average

10 kHz (0.15 MHz - 30 MHz)