



EMI TEST REPORT

Test Report No. : 32LE0278-YW-01-B

Applicant: Hitachi, Ltd.,
Information & Telecommunication Systems Company

Type of Equipment: USB Finger Vein Biometric Scanner

Model No.: PC-KCA110

FCC ID: ZQDPCKCA110

Test regulation: FCC Part 15 Subpart B:2012 Class B
ICES-003 Issue No. 4 Class B

Test result: Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
7. The test was performed in accordance with FCC regulation, as an alternative arrangement of ICES-003.

Date of test:

July 27, 2012

**Representative
test engineer:**

Makoto Toyoda
Engineer of WiSE Japan,
UL Verification Service

Approved by:

Tomoyuki Yamashita
Manager of WiSE Japan,
UL Verification Service

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan
☒ There is no testing item of "Non-accreditation"



UL Japan, Inc.

Yokowa EMC Lab.

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

13-EM-F0429

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Section 1 : Customer information

Company Name : Hitachi, Ltd., Information & Telecommunication Systems Company
Brand Name : Hitachi, Ltd.
Address : Hitachi Systemplaza Shinkawasaki 890 Kashimada, Saiwai, Kawasaki,
Kanagawa, 212-8567 JAPAN
Telephone Number : +81 44 549 1728
Facsimile Number : +81 44 549 1127
Contact Person : Takashi Maruyama

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

2.1 Identification of E.U.T.

Type of equipment : USB Finger Vein Biometric Scanner
Trade name : Hitachi, Ltd.
Model No. : PC-KCA110
Serial No. : HOG20Z000001
Rating : DC 5.0 V / 0.5 A
Country of Mass-production : Japan
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Size : 52 x 64 x 17 (Width x Length x Height (mm))
Modification of EUT : No modification by the test lab.
Receipt Date of Sample : July 27, 2012

2.2 Product description

Model: PC-KCA110 (referred to as the EUT in this report) is a USB Finger Vein Biometric Scanner.
The clock frequencies used in the EUT: 48 MHz (Xtal), 144 MHz

Section 3 : Test specification, procedures and results

3.1 Test Specification

Test Specification : Test specification: FCC Part 15 Subpart B: 2012, final revised on May 17, 2012 and effective June 18, 2012
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

Test Specification : * ICES-003 Issue No. 4
Title : Spectrum Management
Interference-Causing Equipment Standard

Digital Apparatus
* The test was performed in accordance with FCC regulation, as an alternative arrangement.

3.2 Procedures & results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Class B	N/A	9.1 dB (1.3680 MHz, AV, L1)	Complied
Radiated emission	ANSI C63.4:2003 8. Radiated emission measurements	Class B	N/A *1)	7.2 dB (275.10 MHz, Vertical)	Complied
*1) Measurements were limited up to 2 GHz since the highest frequency of internal source of the EUT is between 108 MHz and 500 MHz. Note: UL Japan's EMI Work Procedures No. 13-EM-W0420					

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Confirmation

UL Japan, Inc. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B:2012 Class B and ICES-003 Issue No. 4 Class B.

3.5 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

	Open area test site			Shielded room			
	No.1	No.2	No.3	No.1	No.2	No.3	No.7
	(±)	(±)	(±)	(±)	(±)	(±)	(±)
Conducted disturbance							
LISN (AMN) 9 kHz - 150 kHz	4.0 dB	-	-	4.0 dB	3.9 dB	3.9 dB	-
150 kHz - 30 MHz	3.6 dB	-	-	3.6 dB	3.6 dB	3.6 dB	3.6 dB
Radiated disturbance							
3 m 9 kHz - 30 MHz	3.4 dB	3.8 dB	3.6 dB	-	-	-	-
30 MHz - 300 MHz	4.9 dB	5.0 dB	4.9 dB	-	-	-	-
300 MHz - 1000 MHz	5.0 dB	5.1 dB	5.0 dB	-	-	-	-
1 GHz - 18 GHz	5.6 dB	5.8 dB	5.5 dB	-	-	-	-

Conducted emission test

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

Radiated emission test

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

3.6 Test Location

UL Japan, Inc. Yokowa EMC Lab.

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

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	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 open area test site	90412	2973A-1	-	40 x 18	-
No.2 open area test site	90411	2973A-2	-	20 x 18	-
No.3 open area test site	90412	2973A-3	-	20 x 18	-
No.1 shielded room	-	-	5.5 x 6.4 x 2.7	5.5 x 6.4	-
No.2 shielded room	-	-	4.5 x 3.6 x 2.7	4.5 x 3.6	-
No.3 shielded room	-	-	3.6 x 7.2 x 2.4	3.6 x 7.2	-
No.4 shielded room	-	-	5.5 x 5.0 x 2.4	4.35 x 3.35	-
No.5 shielded room	-	-	5.5 x 4.3 x 2.5	5.54 x 3.0	-
No.6 shielded room	-	-	5.2 x 3.2 x 2.9	5.2 x 3.2	-
No.7 shielded room	-	-	9.3 x 3.4 x 2.7	9.3 x 3.4	-
No.1 EMS lab. (Full-anechoic chamber)	-	-	5.0 x 8.0 x 3.5	-	-
No.2 EMS lab. (Full-anechoic chamber)	-	-	4.0 x 7.0 x 3.5	-	-

3.7 Test setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

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

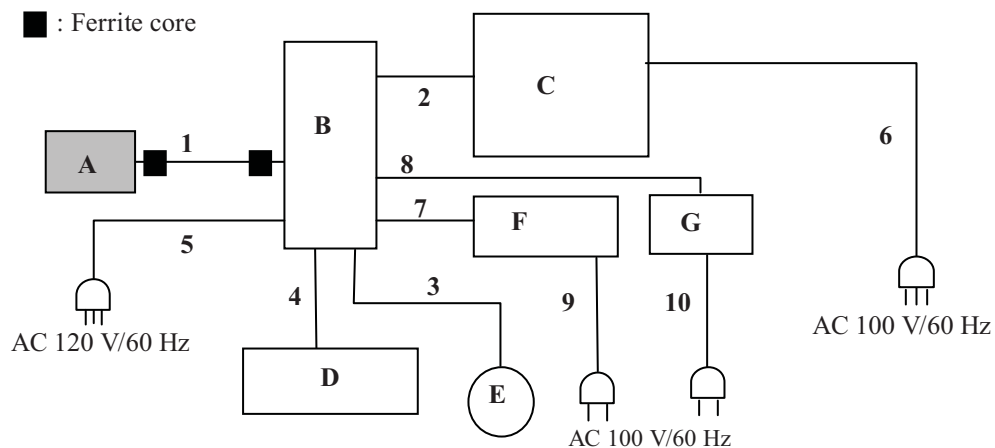
4.1 Operating modes

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

Test sequence is used: 1. Running Mode

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

4.2 Configuration and peripherals



*Cabling and setup were 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	Remark
A	USB Finger Vein Biometric Scanner	PC-KCA110	HOG20Z000001	Hitachi, Ltd., Information & Telecommunication Systems Company	ZQDPCK CA110	EUT
B	Desktop PC	HP Compaq 8000 Elite CMT	JPA03509D0	Hewlett Packard	DoC	CE only*
		Compaq6000	JPA94609GZ	Hewlett Packard	DoC	RE only*
C	21.5Inch LCD Monitor	HSTND-2571-T	CNT052F12X	Hewlett Packard	DoC	-
D	Mouse	M-UAE96	265986-011	Hewlett Packard	DoC	-
E	Keyboard	SK-8115	CN-0DJ319-71616- GEG	DELL	DoC	-
F	Printer	PIXUS560i	-	Canon	DoC	-
G	Modem	TO-703B	4C04302	Panasonic	N/A	-

List of cables used

No.	Name	Length (m)	Cable Shield	Connector Shield	Remark
1	USB Cable	1.8	Shielded	Shielded	*1)
2	RGB Cable	1.5	Shielded	Shielded	-
3	Mouse Cable	1.8	Shielded	Shielded	-
4	Keyboard Cable	1.8	Shielded	Shielded	-
5	AC Power Cable	1.9	Unshielded	Unshielded	3 wire
6	AC Power Cable	1.8	Unshielded	Unshielded	3 wire
7	Printer Cable	2.0	Shielded	Shielded	-
8	RS-232C Cable	2.0	Shielded	Shielded	-
9	AC Power Cable	1.6	Unshielded	Unshielded	2 wire
10	AC Power Cable	1.8	Unshielded	Unshielded	2 wire

*1) This cable is supplied with EUT.

*CE: Conducted emission

*RE: Radiated emission

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Section 5 : Conducted emission

5.1 Operating environment

The test was carried out in shielded room.

Temperature : See data

Humidity : See data

5.2 Test configuration

EUT was placed on a wooden 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 and its peripherals 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 the LISN and excess AC cable was bundled in center. I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 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 50 ohm when not connected to the measuring equipment.

Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30 MHz

EUT position : Table top

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in shielded room.

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

An overview sweep with peak detection has been performed.

The measurements had been performed with a quasi-peak detector and if required, with an average detector.

The conducted emission measurements were made with the following detector function of the test receiver.

Detector Type : QP / AV

IF Band width : 9 kHz / 9 kHz

5.5 Results

Summary of the test results: Pass

UL Japan, Inc.

Yokowa EMC Lab.

108 Yokowa-cho, Ise-shi, Mie-ken, 516-1106 JAPAN

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Section 6 : Radiated emission

6.1 Operating environment

This test was carried out in open area test site.

Temperature : See data

Humidity : See data

6.2 Test configuration

EUT was placed on a table which was consisted by wooden, polyethylene foam and polycarbonate of nominal size, 1m by 2.33m raised 80cm above the conducting ground plane.

The rear of EUT and its peripherals was aligned and flushed with rear of tabletop.

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle and were hanged 40cm height to the ground plane. The measurements were performed for vertical or horizontal antenna polarization or both as necessary. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

Photographs of the set up are shown in Appendix 1.

6.3 Test conditions

Frequency range : 30 - 2000 MHz

Test distance : 3m

EUT position : Table top

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane at a distance of 3m. Pre check measurements were performed in shielded room with a search coil at 30-2000MHz to distinguish disturbances of EUT from the ambient noise.

Measurements were performed with quasi-peak detector.

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 vertical or horizontal antenna polarization or both as necessary.

The radiated emission measurements were made with the following detector function of the test receiver and spectrum analyzer.

	<u>30-1000 MHz (Test receiver)</u>	<u>1000-2000 MHz (Spectrum analyzer) *2)</u>
Detector Type:	: QP	AV *1) PK
IF Band width:	: 120 kHz	RBW 1MHz/ VBW 10 Hz RBW 1MHz/ VBW 3 MHz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

*2) The measurement was conducted at 3 dB bandwidth.

6.5 Results

Summary of the test results: Pass

UL Japan, Inc.

Yokowa EMC Lab.

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Data of Conducted Disturbance Test

UL Japan, Inc.

YOKOWA No.3 Shielded room

Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A (PC: AC120V/60Hz)
 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Phase : Single Phase
 Temperature : 28 °C
 Humidity : 35 %
 Limit : FCC Part15B CLASS B

Engineer : Makoto Toyoda

No.	FREQ. [MHz]	READING (N)		READING (L1)		LISN FACTOR [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
		QP [dB μ V]	AV [dB μ V]	QP [dB μ V]	AV [dB μ V]				QP [dB]	AV [dB μ V]	QP [dB μ V]	AV [dB μ V]	QP [dB]	AV [dB]
1.	0.1500	16.4	—	16.7	—	10.1	0.1	0.0	26.9	—	66.0	56.0	39.1	—
2.	0.2656	21.5	—	21.9	—	10.1	0.1	0.0	32.1	—	61.3	51.3	29.2	—
3.	1.3680	24.3	21.0	27.3	26.6	10.1	0.2	0.0	37.6	36.9	56.0	46.0	18.4	9.1
4.	1.5496	16.1	—	19.6	—	10.1	0.2	0.0	29.9	—	56.0	46.0	26.1	—
5.	5.2806	23.2	—	23.1	—	10.1	0.3	0.0	33.6	—	60.0	50.0	26.4	—
6.	18.3206	24.0	—	23.7	—	10.2	0.5	0.0	34.7	—	60.0	50.0	25.3	—

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

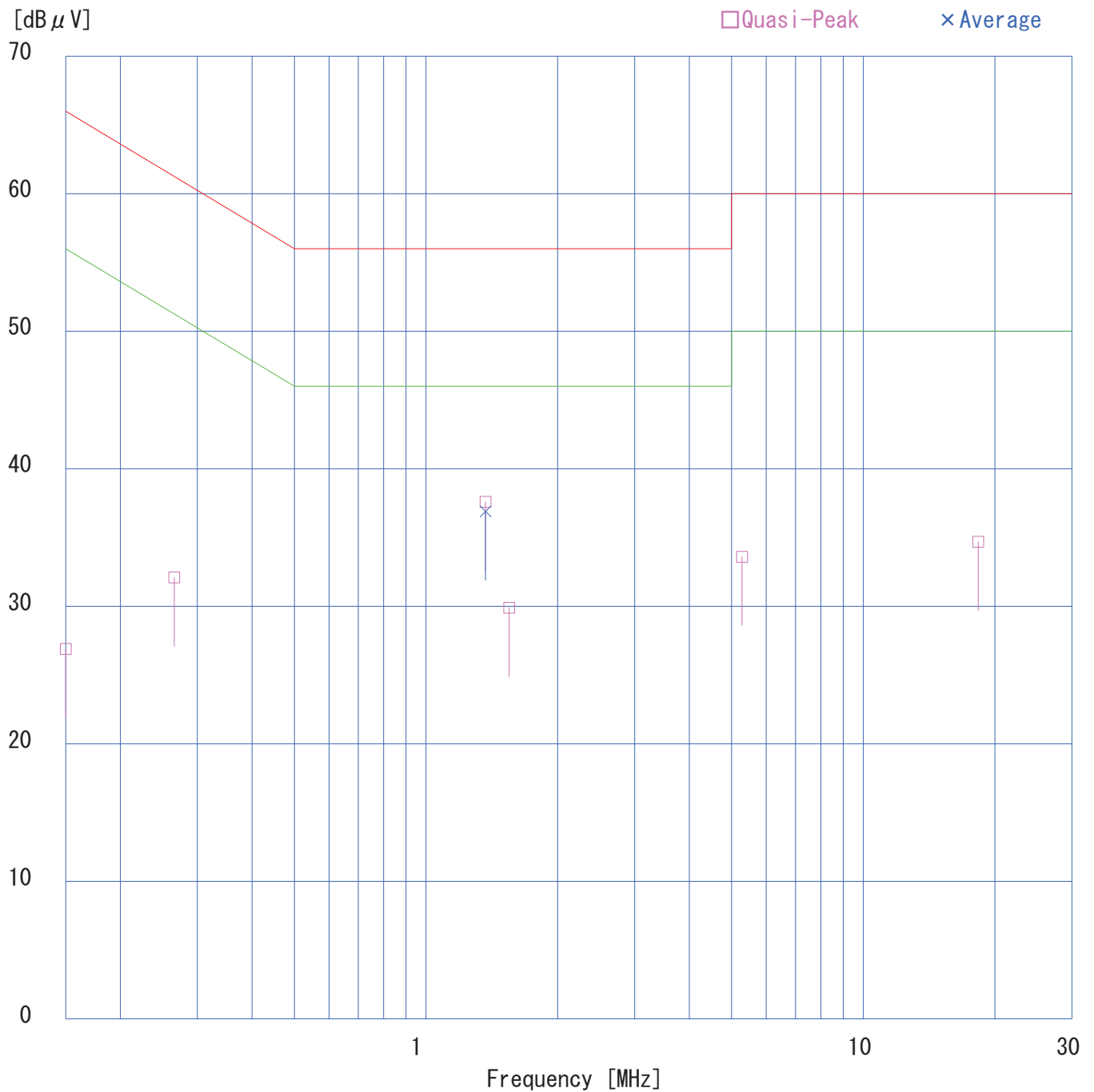
Except for the above table: adequate margin data below the limits.
 LS-13 LISN N Phase with Adapter_HP OFF (2011-11-4).LIS

Data of Conducted Disturbance Test

UL Japan, Inc.
YOKOWA No.3 Shielded room
Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A (PC: AC120V/60Hz)
Mode : 1. Running Mode
Remarks :
Date : 7/27/2012
Phase : Single Phase
Temperature : 28 °C
Humidity : 35 %
Limit : FCC Part15B CLASS B

Engineer : Makoto Toyoda



Data of Conducted Disturbance Test

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UL Japan, Inc.

YOKOWA No.3 Shielded room

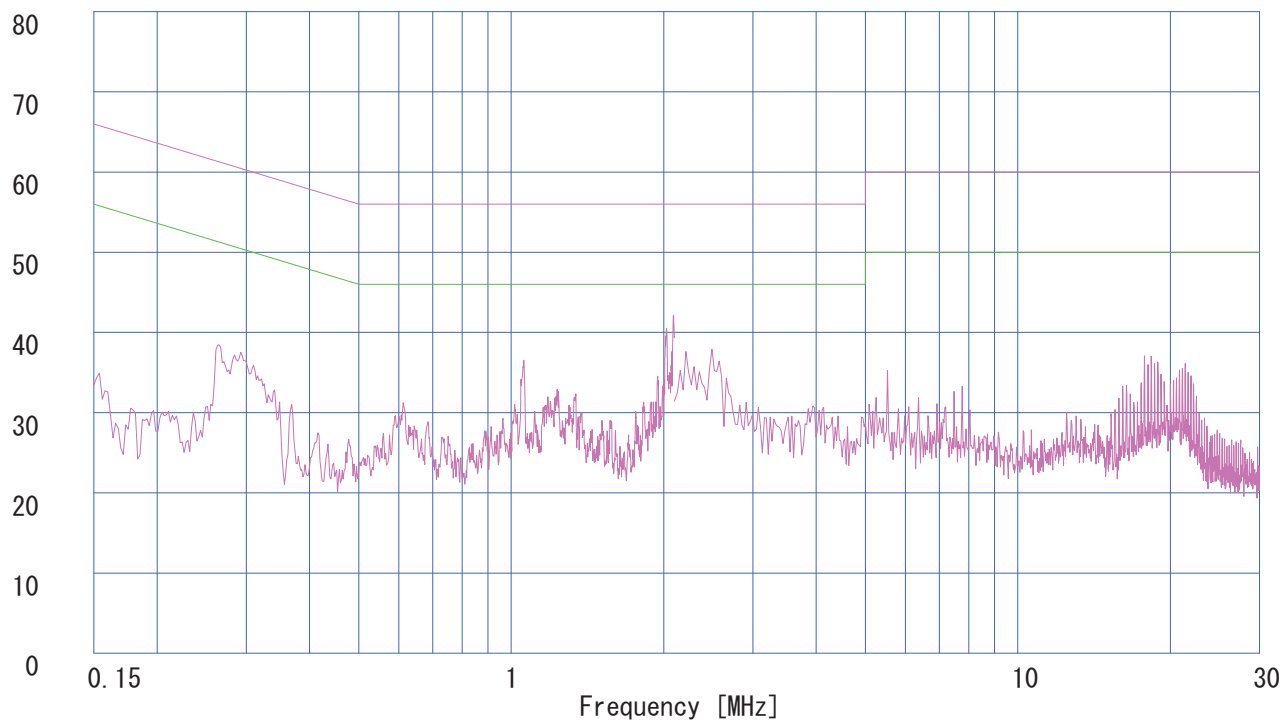
Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A(PC:AC120V/60Hz)
Mode : 1. Running Mode
Remarks :
Date : 7/27/2012
Phase : Single Phase
Temperature : 28 °C
Humidity : 35 %
Limit 1 : FCC Part15B CLASS B
Limit 2 : None

Engineer : Makoto Toyoda

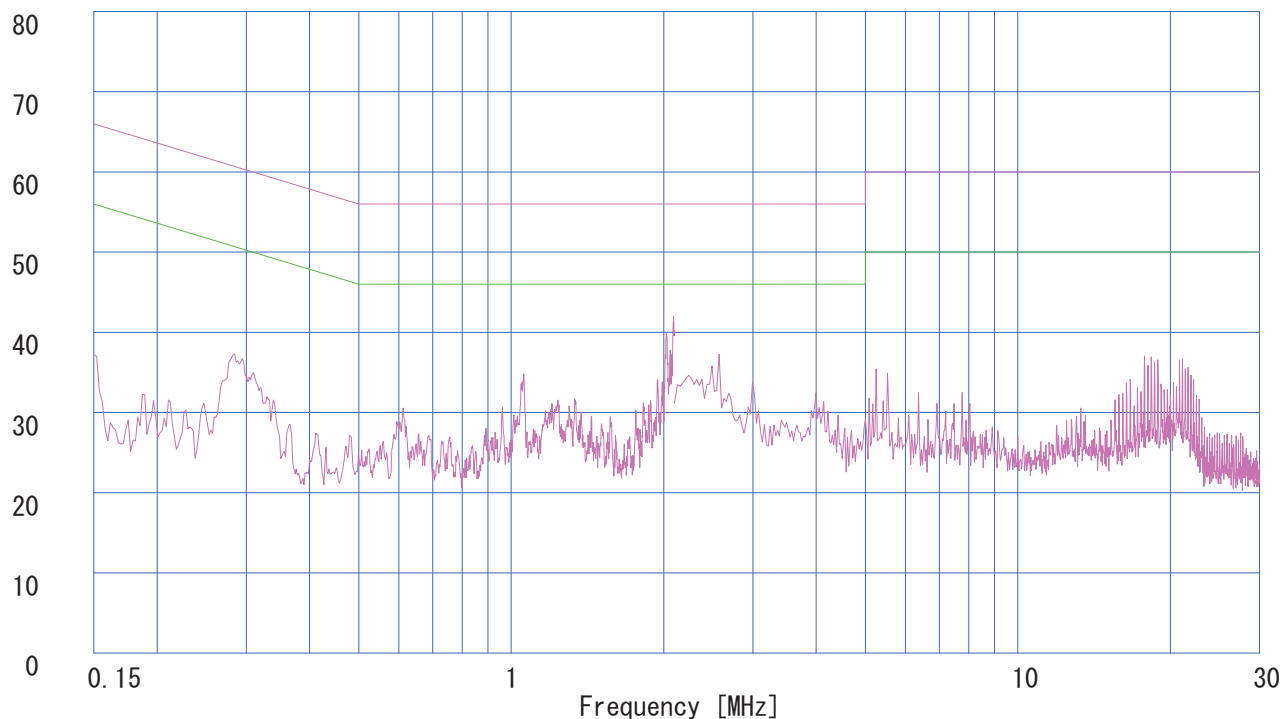
Emission Level [dB μ V]

PHASE:N



Emission Level [dB μ V]

PHASE:L1



Data of Radiated Disturbance Test

UL Japan, Inc.

YOKOWA No.3 Open area test site

Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A(PC:AC120V/50Hz)
 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Test Distance : 3 m
 Temperature : 29 °C
 Humidity : 40 %
 Limit : FCC Part15B CLASS B

Engineer : Makoto Toyoda

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 [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	30.86	BB	24.5	29.0	17.7	28.2	1.1	5.9	21.0	25.5	40.0	19.0	14.5
2.	89.25	BB	33.5	39.7	7.7	28.0	1.8	5.9	20.9	27.1	43.5	22.6	16.4
3.	275.10	BB	34.8	39.3	18.1	27.8	3.3	5.9	34.3	38.8	46.0	11.7	7.2
4.	480.00	BB	34.3	34.0	18.7	27.9	4.6	2.7	32.4	32.1	46.0	13.6	13.9
5.	521.87	BB	28.6	27.9	19.2	27.8	4.8	2.7	27.5	26.8	46.0	18.5	19.2
6.	720.00	BB	26.8	32.2	22.3	27.3	5.7	2.7	30.2	35.6	46.0	15.8	10.4
7.	960.00	BB	22.2	22.6	25.6	27.1	6.6	2.7	30.0	30.4	46.0	16.0	15.6

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

Except for the above table : adequate margin data below the limits.

ANT TYPE : 30-299.99MHz Biconical, 300.00-1000MHz Logperiodic

Data of Radiated Disturbance Test

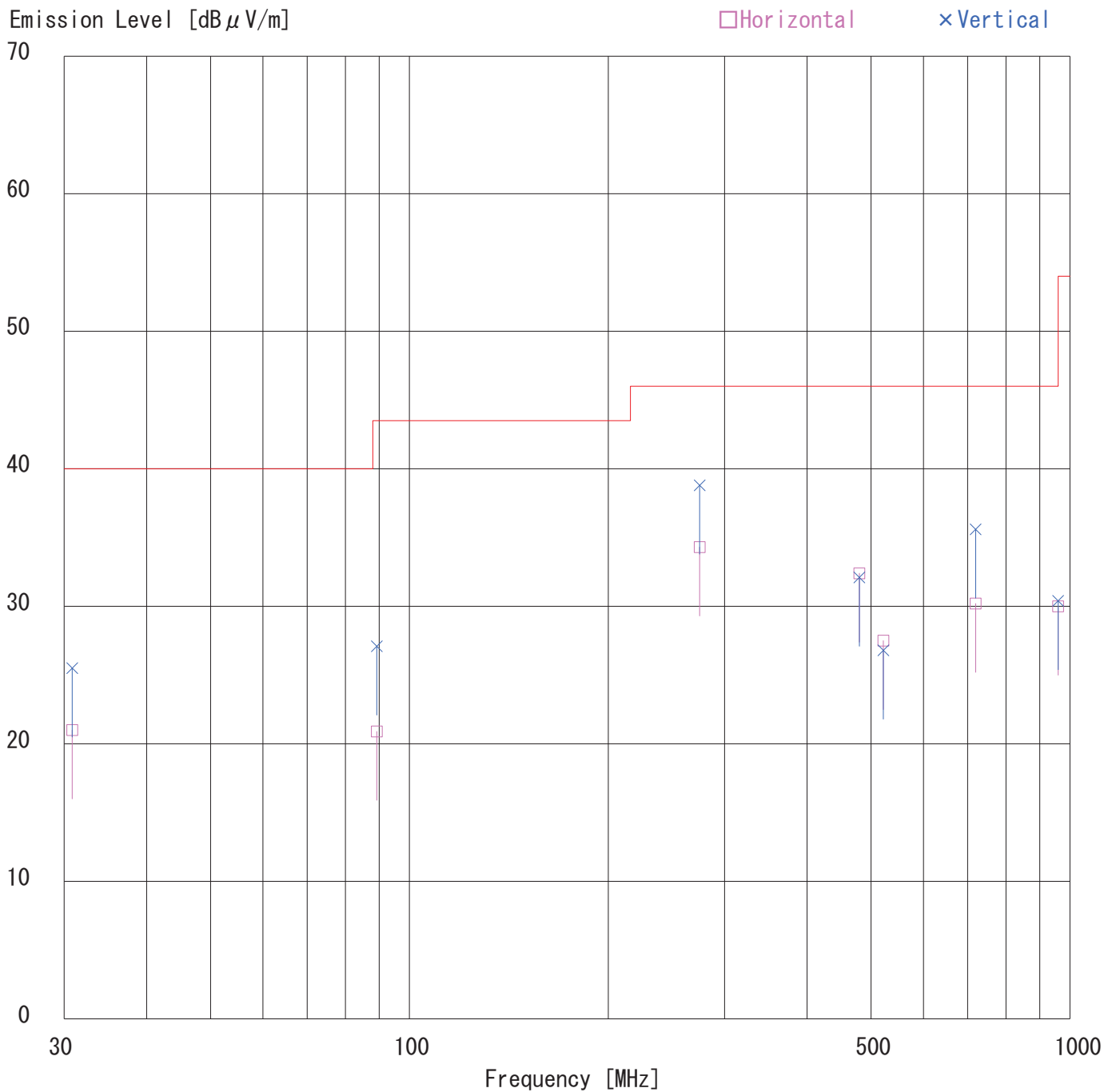
UL Japan, Inc.

YOKOWA No.3 Open area test site

Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A (PC: AC120V/50Hz)
 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Test Distance : 3 m
 Temperature : 29 °C
 Humidity : 40 %
 Limit : FCC Part15B CLASS B

Engineer : Makoto Toyoda



Data of Radiated Disturbance Test

UL Japan, Inc.

YOKOWA No.3 Open area test site

Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A (AC120V/60Hz)
 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 56 %
 Limit : FCC Part15B CLASS B (Average Limit / Upper 1GHz)

Engineer : Yuichi Kaneyama

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 [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	1069.80	BB	32.9	34.3	23.3	39.3	3.6	0.0	20.5	21.9	54.0	33.5	32.1
2.	1440.00	BB	35.9	35.4	24.1	38.9	4.3	0.0	25.4	24.9	54.0	28.6	29.1
3.	1821.62	BB	35.9	35.8	25.1	38.5	5.0	0.0	27.5	27.4	54.0	26.5	26.6

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

Except for the above table : adequate margin data below the limits.

ANT TYPE : 1GHz-2GHz Horn

Data of Radiated Disturbance Test

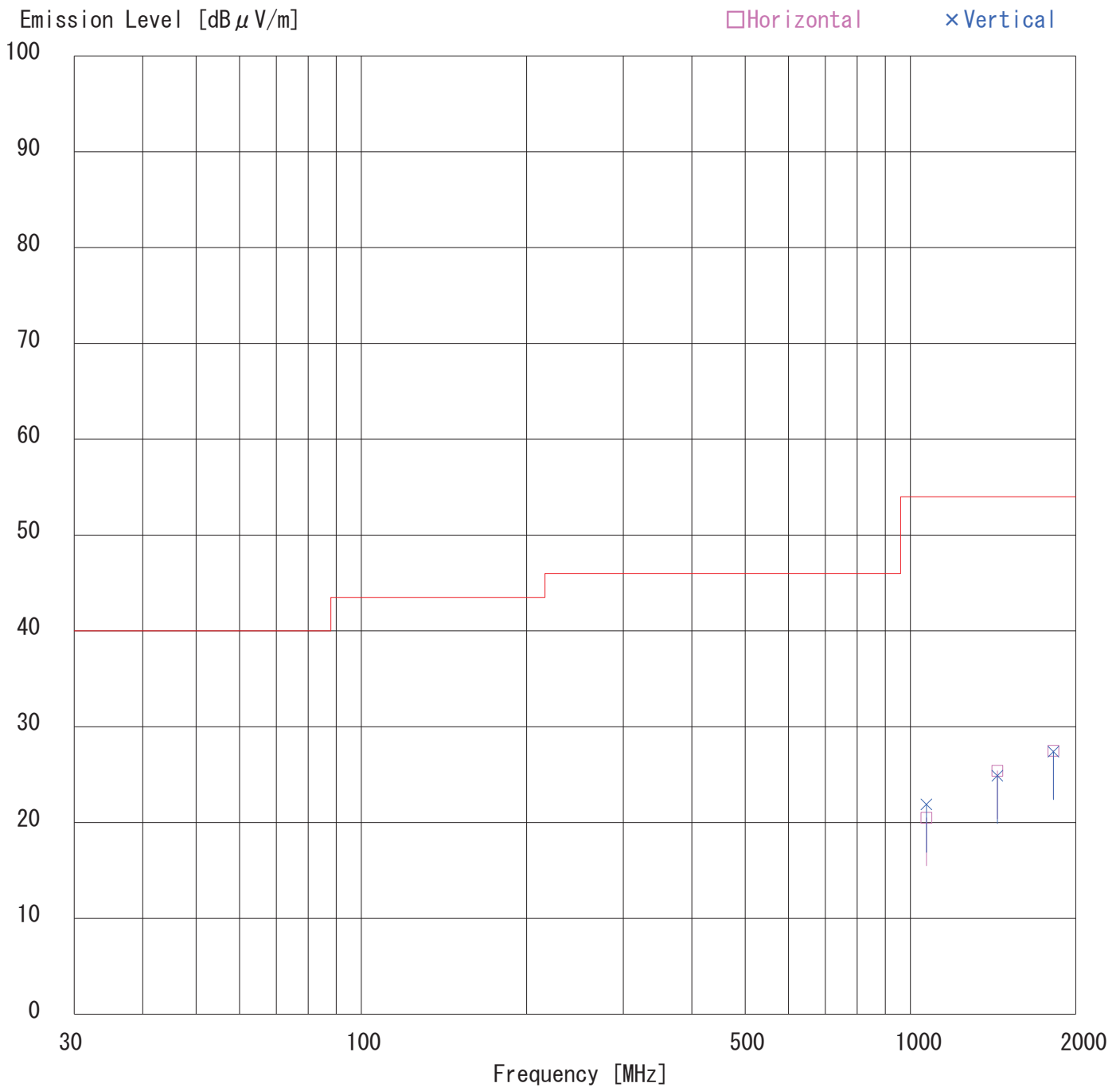
UL Japan, Inc.

YOKOWA No.3 Open area test site

Report No. : 32LE0278-YW-01-B

Power : DC5.0V/0.5A (AC120V/60Hz)
 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 56 %
 Limit : FCC Part15B CLASS B (Average Limit / Upper 1GHz)

Engineer : Yuichi Kaneyama



Data of Radiated Disturbance Test

UL Japan, Inc.

YOKOWA No.3 Open area test site

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Power : DC5.0V/0.5A (AC120V/60Hz)
 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 56 %
 Limit : FCC Part15B CLASS B (Peak Limit / Upper 1GHz)

Engineer : Yuichi Kaneyama

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 [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	1069.80	BB	46.6	50.0	23.3	39.3	3.6	0.0	34.2	37.6	74.0	39.8	36.4
2.	1440.00	BB	45.5	52.9	24.1	38.9	4.3	0.0	35.0	42.4	74.0	39.0	31.6
3.	1821.62	BB	48.7	46.6	25.1	38.5	5.0	0.0	40.3	38.2	74.0	33.7	35.8

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

Except for the above table : adequate margin data below the limits.

ANT TYPE : 1GHz-2GHz Horn

Data of Radiated Disturbance Test

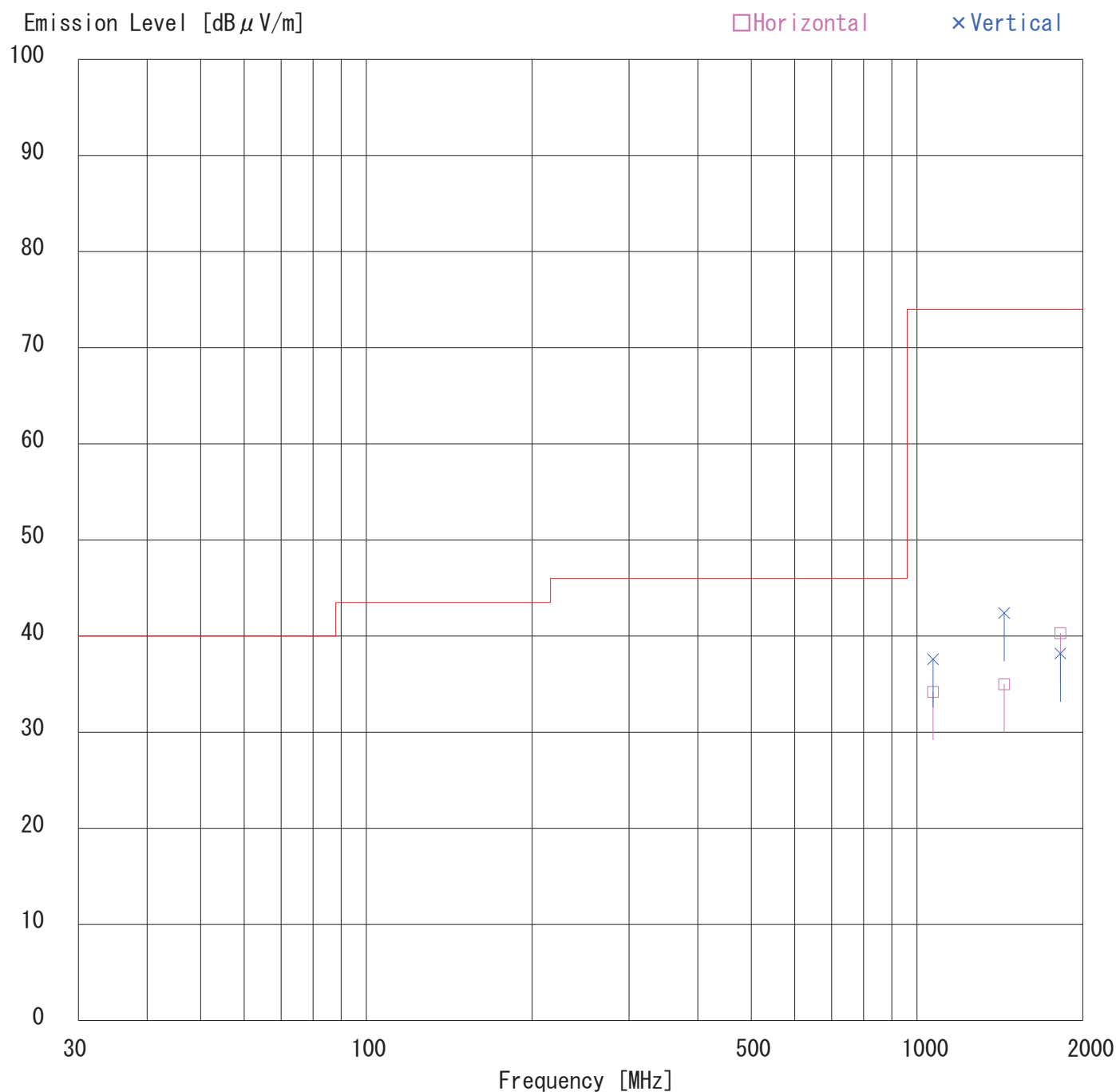
UL Japan, Inc.

YOKOWA No.3 Open area test site

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 Mode : 1. Running Mode
 Remarks :
 Date : 7/27/2012
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 56 %
 Limit : FCC Part15B CLASS B (Peak Limit / Upper 1GHz)

Engineer : Yuichi Kaneyama



APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SA-06	Spectrum Analyzer	Advantest	R3273	110501566	CE, RE	2011/12/06 * 12
AF-01	Pre Amplifier	Hewlett Packard	8447D	2443A04060	RE	2012/03/26 * 12
AT-26	Attenuator	Anritsu	MP721A	6200543689	RE	2012/07/13 * 12
AT-09	Attenuator	Anritsu	MP721B	M03235	RE	2011/08/18 * 12
BA-06	Biconical Antenna	Schwarzbeck	BBA9106	1523	RE	2011/10/23 * 12
LA-07	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2011/11/16 * 12
TR-10	Test Receiver	Rohde & Schwarz	ESCI	100768	CE, RE	2011/09/10 * 12
CC-30RC	Yokowa No.3 open coaxial(0.01-1000MHz)	Suhner	CC-31,CC-32,CC-34,CC-35,CC-36,C-37,SW-31,SW-32	YO0301	RE	2012/05/25 * 12
YOATS-03(NSA)	Open area test site	JSE	3m、10m	3	RE	2012/05/06 * 12
CUST-YW-RE	Software for Radiated Emission	ULJ	-	-	RE	-
LS-13	LISN (AMN)	Rohde & Schwarz	ENV216	101058	CE(EUT)	2011/11/04 * 12
CC-3S	Yokowa No.3 shield coaxial(0.01-1000MHz)	UL Japan	CC-34,CC-35,CC-37,CC-38,SW-31,SW-32	YS0301	CE	2012/03/26 * 12
CUST-YW-CE	Software for Conducted Emission	ULJ	-	-	CE	-
OS-07	Digital Humidity Indicator	SATO	PC-5000TRH- II	05A06	RE	2011/01/28 * 24
OS-11	Digital Humidity Indicator	SATO	PC-5000TRH	B-11	CE	2012/04/19 * 12
DM-03	Tester	SANWA	PC500	7019229	CE, RE	2012/06/07 * 12
YJM-05	Measure	PROMART	EN1955	-	CE, RE	-
SC-03	Search Coil	UL Japan	-	-	RE	-
LS-03	LISN(AMN)	Schwarzbeck	NSLK8127	8127305	CE	2012/01/06 * 12
TA-24	Terminator	Radiall	R404111000	-	CE	2012/06/20 * 12
HA-06	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9120 D	9120D-683	RE	2012/06/27 * 12
AF-07	Pre Amplifier	Agilent	HP8449B	3008A01673	RE	2012/03/26 * 12
CC-C2	Microwave Cable	Suhner/storm	-	-	RE	2011/10/19 * 12

The expiration date of the calibration is the end of the expired month .

As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item :

CE: Conducted emission ,

RE: Radiated emission ,