

EMI TEST REPORT

Test Report No. : 24AE0027-HO-1

Applicant: OMRON Corporation Industrial Automation
Business Company

Type of Equipment: Radio Frequency Identification System

Model No.: V600-CH1D

FCC ID: E4E6CYCIDV6000203

Test standard: FCC Part 15 Subpart C
Section 15.207 and 15.209

Test Result: Complied

1. This test report shall not be reproduced 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.
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: August 20 and 21, 2003 **Issued date:** September 1, 2003

Tested by: _____



Naoki Sakamoto
leader of EMC section

Approved by: _____



Shimoji Hironobu
Group leader of EMC section

UL Apex Co., Ltd.
Head Office EMC Lab.

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MF060b(10.04.03)

CONTENTS

	PAGE
SECTION 1 : Client information	3
SECTION 2 : Equipment under test (E.U.T.)	3
SECTION 3 : Test specification, methods & procedures	4
SECTION 4 : Operation of E.U.T. during testing	5
SECTION 5 : Summary of test results	7
SECTION 6 : Conducted emission	9
SECTION 7 : Radiated emission	10
APPENDIX 1: Photographs of test setup	11
APPENDIX 2: Test equipment used	15
APPENDIX 3: Data of EMI test	15

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SECTION 1: Client information

Company Name : OMRON Corporation Industrial Automation Business Company
Company Trade Name : OMRON
Address : Shiokoji-hirokawa, Shimogyo-ku, Kyoto 600-8530 JAPAN
Telephone Number : +81-75-344-7069
Facsimile Number : +81-75-344-7107
Contact Person : Hiroshi Yamazaki

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

2.1 Identification of E.U.T.

Type of Equipment : Radio Frequency Identification System
Model No. : V600-CH1D
Serial No. : -
Rating : DC5V
Country of Manufacture : Japan
Receipt Date of Sample : August,20,2003
Condition of EUT : Production model

2.2 Product Description

Model:V600-CH1D , which is referred to as the EUT in this report, is a Radio Frequency Identification System.
Data can be read and written from the ID Tag simply by placing the Handy Reader
Witter within range or by touching the ID Tag.

Carrier Frequency :530kHz
Clock Frequency :4.19MHz(CPU) / 2.12MHz(ASIC)
Antenna Type :Loop Antenna
Antenna connector :Fixation
ITU Code :20K0A2D
Operation Voltage :DC5V
Modulation :Amplitude Shift Keying

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SECTION 3: Test specification, method & procedure

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 limits
Section 15.209 Radiated emission limits, general requirements.

3.2 Methods & Procedures

No.	Item	Test Procedure	Specification	Remarks
1	Conducted emission	FCC/ANSI C63.4:2001	15.207(a)	LISN
2	Radiated emission	FCC/ANSI C63.4:2001	15.209(a)	Test distance: 3m or 10m

3.3 Additions or deviations to standards

No addition, deviation nor exclusion have been made from standards.

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

4.1 Operating Modes

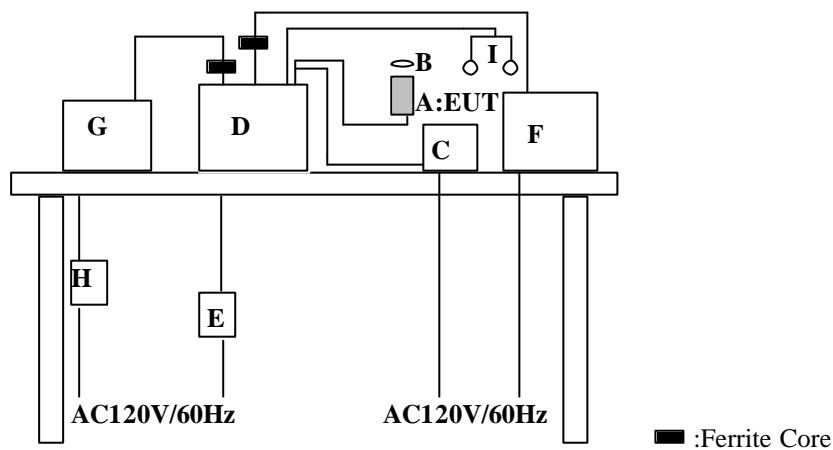
The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used: Communication(Transmitting) mode

To Access the data of tags, the user transmits the instruction from the host device to the controller in the form of the command frame. According to the contents of the Received frame, the controller communicates with tags through the antenna.

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

4.2 Configuration and peripherals



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

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Description of EUT

No	Item	Model number	Serial number	Manufacturer	FCC ID
A	Handy Reader Writer	V600-CH1D	-	OMRON	E4E6CYCIDV6000203

Description of Support equipment

N	Item	Model number	Serial number	Manufacturer	FCC ID
B	Data Carrier	V600-D23P66N	-	OMRON	-
C	DC Power Supply	S82K-00305	29110K(lot No)	OMRON	-
D	Note PC	PAS259NW	20020113J	TOSHIBA	-(DOC)
E	AC Adaptor	PA2450U	S911C3795534	TOSHIBA	-
F	CRT	EV500A	15017F005953	Gateway	-(DOC)
G	Printer	C6414A	VN0B11C1H2	Hewlett Packard	-(DOC)
H	AC Adaptor	C6409-60014	0049R0D	Hewlett Packard	-
I	Head Phone	-	-	Panasonic	-

List of cables used

No	Name	Length (m)	Shield	Backshell Material
	I/F Cable	2.5	Y	PVC
	DC Cable	1.0	N	PVC
	AC Cable	1.0	N	PVC
	DC Cable	1.8	N	PVC
	AC Cable	2.0	N	PVC
	RGB Cable	1.8	Y	PVC
	AC Cable	2.0	N	PVC
	Printer Cable	1.9	Y	PVC
	DC Cable	1.9	N	PVC
	AC Cable	1.0	N	PVC
	Head Phone Cable	1.5	Y	PVC

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SECTION 5: Summary of test results

5.1 Test results

No.	Item	Test Procedure	Specification	Worst margin	Result
1	Conducted emission	FCC/ANSI C63.4:2001	15.207(a)	11.8dB AV (0.232MHz:L1)	Complied
2	Radiated emission 9kHz to 30MHz	FCC/ANSI C63.4:2001	15.209(a)	22.6dB (0.5291MHz X Axis, 0deg)	Complied
3	Radiated emission 30MHz to 1000MHz	FCC/ANSI C63.4:2001	15.209(a)	1.0dB (87.88MHz Hor)	Complied

FCC 15.31 (e)

This EUT provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

Since type of Equipment uses a transmitting antenna that is an integral part of the equipment. it is impossible for end Users to replace the antenna without use of a special tool.
Therefore the equipment complies with the requirement of 15.203.

UL Apex hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part15 Subpart C.

Remarks : The EUT was separately tested in accordance with FCC Part 15 Subpart B and Declaration of Conformity was applied.

5.2 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ± 1.3 dB.

The data listed in this test report has enough margin.

The result is within Head Office EMC lab's uncertainty.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 1.8 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB(3m).

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB(3m).

The data listed in this test report has enough margin.

The result is within Head Office EMC lab's uncertainty.

5.3 Test equipment used

See Appendix 2.

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Head Office EMC Lab.

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5.4 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.
No.1 and No.2 semi anechoic chamber.
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No.1 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on February 01, 2002. (Registration number: No.1:313583 Industry Canada: No.1: IC4247)
No.2 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.2:846015 Industry Canada: No.2: IC4247-2)
*NVLAP Lab. code: 200572-0

5.5 Test Configuration Photographs

See Appendix 1.

5.6 Data of EMI Test

See Appendix 3.

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SECTION 6: Conducted emission

6.1 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. EUT was located 80cm from LISN and excess AC cable was 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

6.2 Results

Summary of the test results: Pass

Date: 2003-08-21 Tested by : Naoki Sakamoto

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SECTION 7: Radiated emission

7.2 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 EUT, including peripherals was aligned and flush 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 30cm to 40cm long and were hanged 40cm height to the 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 No1(19.2x11.2x7.7m) and No.2(7.5x5.8x5.2m) semi anechoic chamber

With a ground plane and at a distance of 3m(30MHz - 1000MHz) and 10m(9kHz - 30MHz).

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 EUT was put into operation at Transmitting mode.

Measurement range : 9kHz-1000MHz

Measurement detector : IF BW 200Hz(9kHz-90kHz, 110kHz-490Hz), AV
: IF BW 9kHz(90kHz-110kHz, 490kHz-30MHz), QP
: IF BW 120kHz(30MHz-1000MHz), QP

7.3 Results

Summary of the test results: Pass

Date: 2003-08-20 and 21 Tested by : Naoki Sakamoto

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APPENDIX 1: Photographs of test setup

This section contains the following photographs:

Page 12: Conducted emission

Page 13 - 14: Radiated emission

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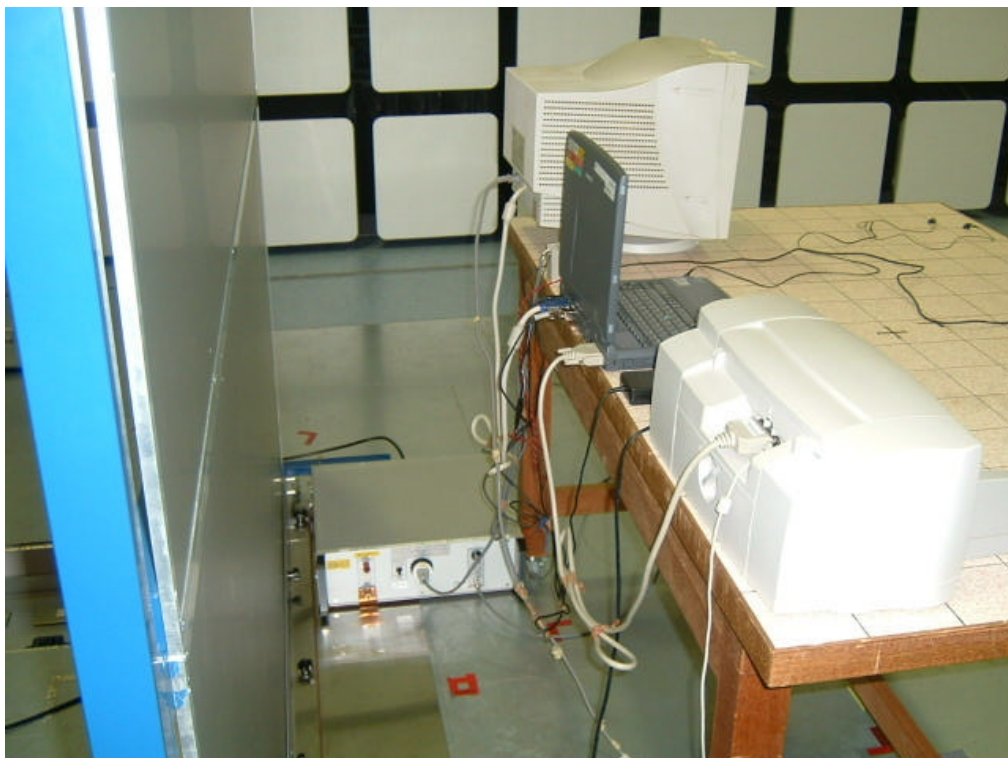
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Conducted emission



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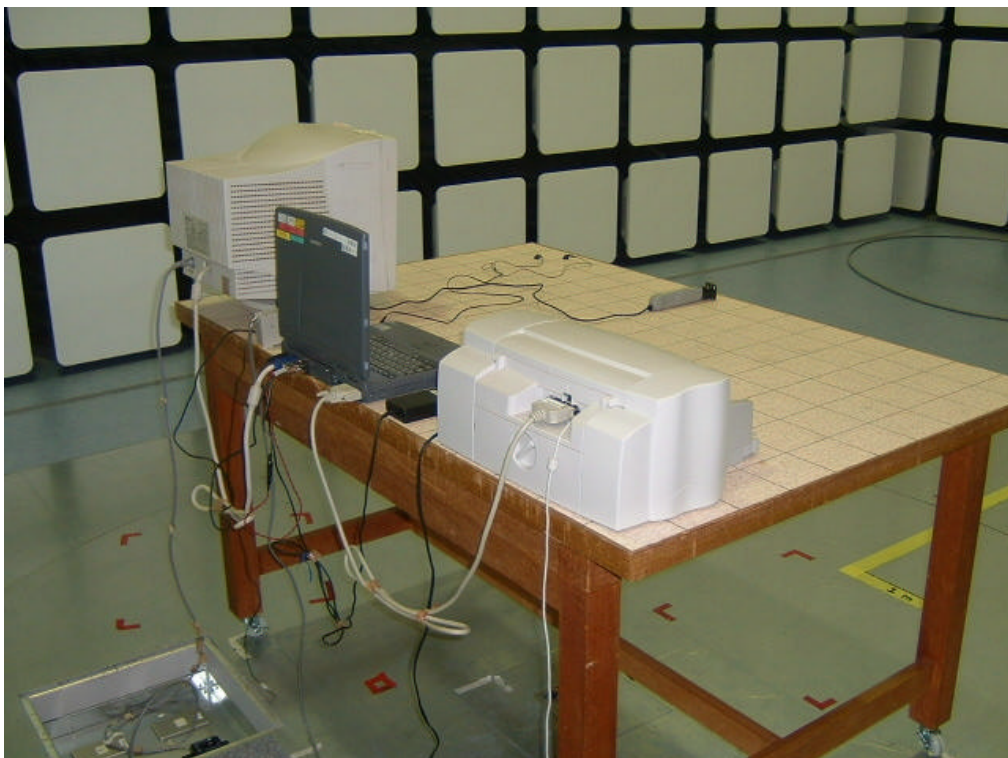
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Radiated emission



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Head Office EMC Lab.

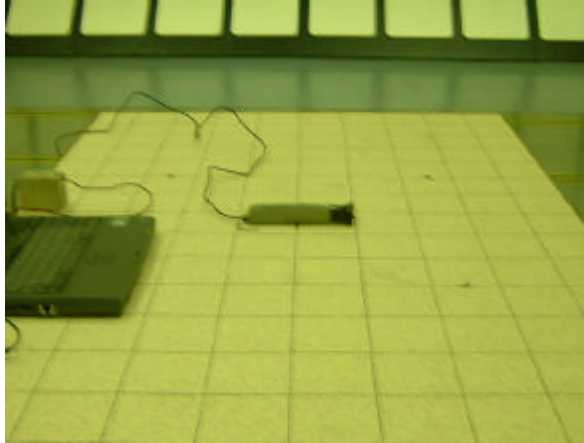
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Telephone: int +81 596 24 8116

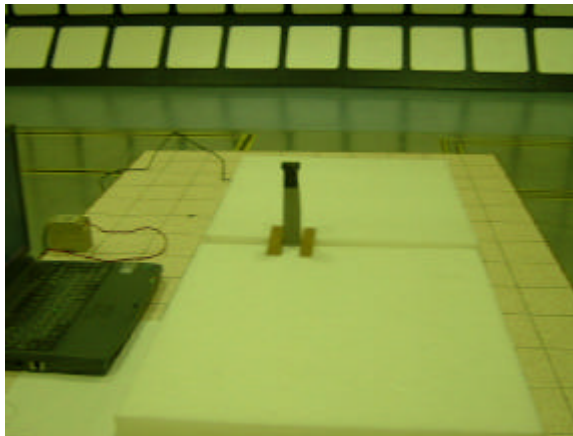
Facsimile: int +81 596 24 8124

Worst Case Position (X-axis / Antenna Position 0 deg)

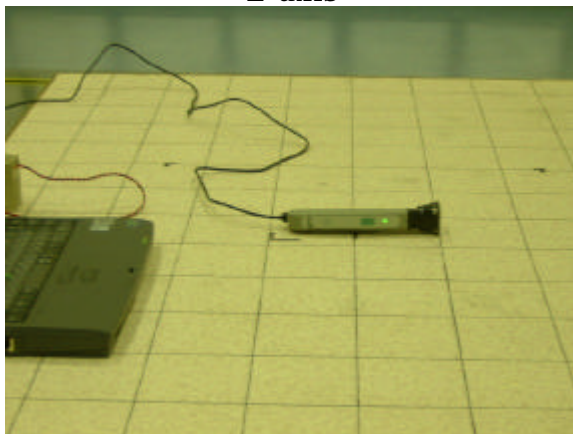
X-axis



Y-axis



Z-axis



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APPENDIX 2: Test equipment used

Page 16

APPENDIX 3: Data of EMI test

This section contains the following data

Conducted emission test : Page 17 to 18

Radiated emission test : Page 19 to 22

26dB Bandwidth : Page 23

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Test Report No : 24AE0027-HO-1

APPENDIX 2
Test Instruments
EMI test equipment

Control No	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE	2002/12/28 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2002/12/24 * 12
MOS-01	Digital Humidity Indicator	N.T	NT-1800	RE	2002/12/10 * 12
MPA-02	Pre Amplifier	Agilent	87405A	RE	2003/04/17 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ES140	RE	2002/11/01 * 12
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE / CE	2003/04/11 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2002/12/24 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/04/28 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2003/05/08 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	CE	2003/05/08 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/04/28 * 12
MOS-02	Digital Humidity Indicator	N.T	NT-1800	RE / CE	2002/12/10 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2003/03/13 * 12
MSA-02	Spectrum Analyzer	Advantest	R3265A	RE	2002/09/20 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE / CE	2003/01/31 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2002/12/13 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE	2003/03/18 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	CE	2003/03/18 * 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,
- H/F: Harmonics and voltage fluctuation
- RFI: RFI Power test,
- AT: Antenna terminal disturbance voltage

DATA OF CONDUCTION TEST

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No.: 24AE0027-HO-1

Applicant : OMRON Corporation
 Kind of Equipment : RF ID System
 Model No. : V600-CH1D
 Serial No. :
 Power : AC120V/60Hz(DC5V)
 Mode : Transmitting
 Remarks : FCC ID E4E6CYCIDV6000203
 Date : 8/21/2003
 Phase : Single Phase
 Temperature : 26
 Humidity : 64 %
 Regulation : FCC 15.207 (0.15-30MHz)

Engineer : Naoki Sakamoto

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.	0.2320	37.4	34.0	41.3	40.5	0.0	0.1	0.0	41.4	40.6	62.4	52.4	21.0	11.8
2.	0.4700	33.8	28.3	32.3	28.3	0.1	0.1	0.0	34.0	28.5	56.5	46.5	22.5	18.0
3.	0.5810	33.5	30.4	33.9	30.9	0.1	0.1	0.0	34.1	31.1	56.0	46.0	21.9	14.9
4.	1.0480	24.8	-	25.2	-	0.1	0.2	0.0	25.5	-	56.0	46.0	30.5	-
5.	7.7922	28.3	-	29.0	-	0.3	0.7	0.0	30.0	-	60.0	50.0	30.0	-
6.	29.8023	28.3	-	29.4	-	1.0	1.5	0.0	31.9	-	60.0	50.0	28.1	-

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

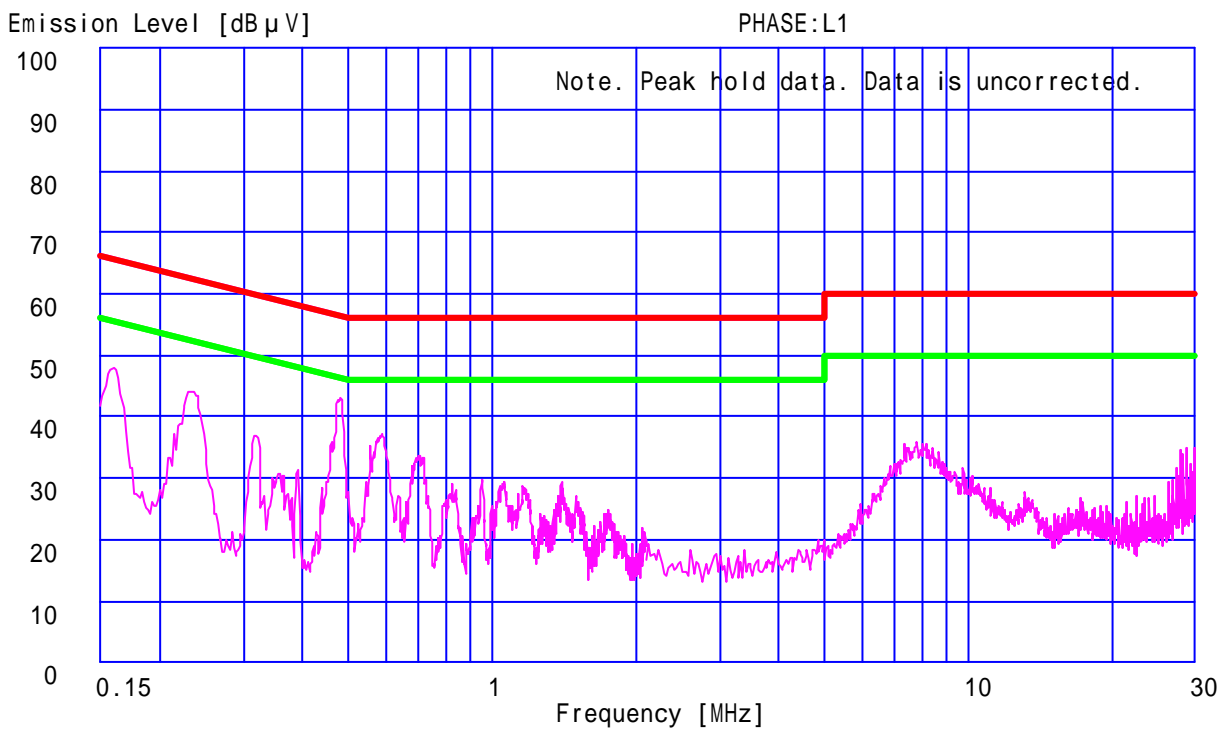
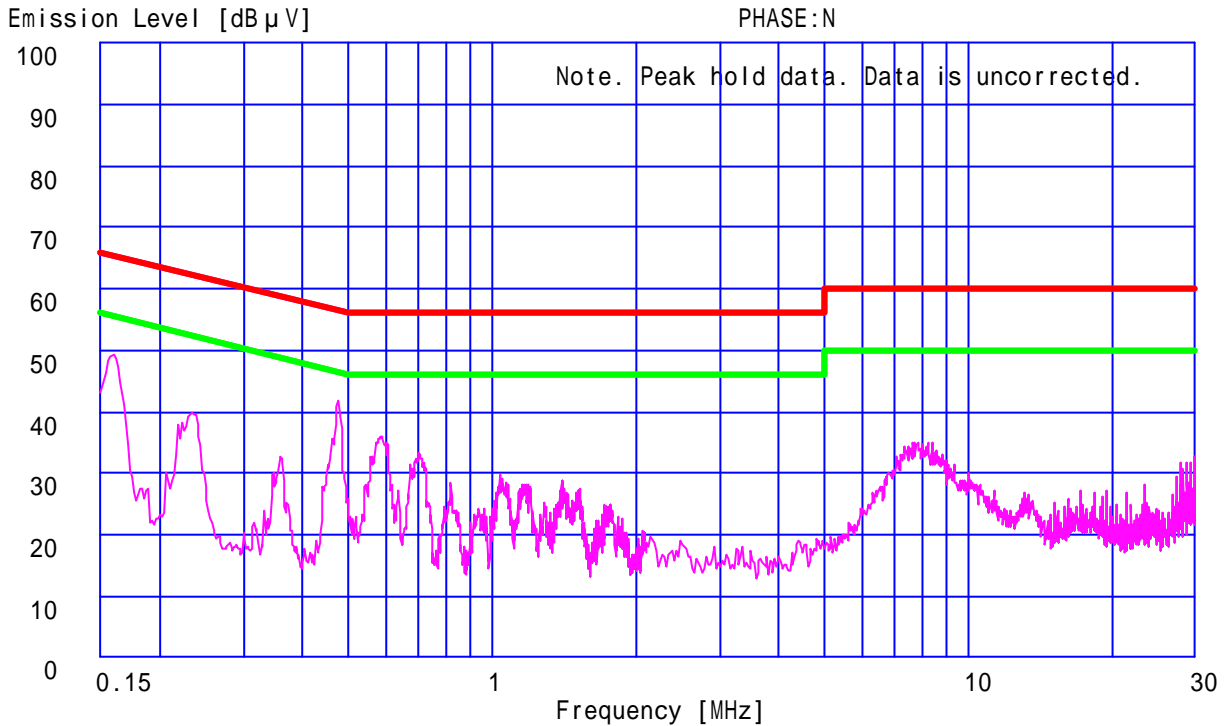
All other spurious emissions were less than 20dB for the limit.

DATA OF CONDUCTION TEST CHART

UL Apex Co., Ltd. Head Office EMC Lab.
 No.2 Semi Anechoic Chamber
 Report No.: 24AE0027-H0-1

Applicant : OMRON Corporation
 Kind of Equipment : RF ID System
 Model No. : V600-CH1D
 Serial No. :
 Power : AC120V/60Hz(DC5V)
 Mode : Transmitting
 Remarks : FCC ID E4E6CYCIDV6000203
 Date : 8/21/2003
 Phase : Single Phase
 Temperature : 26
 Humidity : 64 %
 Regulation 1 : FCC 15.207 (0.15-30MHz)
 Regulation 2 : FCC 15.207 (0.15-30MHz)

Engineer : Naoki Sakamoto



Field Strength(9kHz to 30MHz)

UL Apex Co., Ltd.
No1 SEMI ANECHOIC CHAMBER

COMPANY : OMRON Corporation
EQUIPMENT : RF ID SYSTEM
MODEL : V600-CH1D
S/ N : -
POWER : AC120V / 60Hz(DC5V)
MODE : TRANSMITTING
REMARKS : EUT Position X Axis

REPORT NO : 24AE0027-HO-1
REGULATION : FCC Part 15.209(a)
TEST DISTANCE : 10m
DATE : 08/20/2003
TEMPERATURE : 26 deg. C
HUMIDITY : 46 %


ENGINEER : Naoki Sakamoto

No.	FREQ [MHz]	T/R READING			C.F [dB]	RESULT			Limit*2 [dBuV/m]	MARGIN		
		0deg [dBuV/m]	45deg [dBuV/m]	90deg*1		0deg [dBuV/m]	45deg [dBuV/m]	90deg*1		0deg [dB]	45deg [dB]	90deg*1
1	0.5291	31.2	30.3	30.0	-1.7	29.5	28.6	28.3	52.1	22.6	23.5	23.8
2	1.0581	21.2	21.0	20.9	-2.1	19.1	18.9	18.8	46.1	27.0	27.2	27.3
3	1.5872	17.1	17.1	17.2	-1.9	15.2	15.2	15.3	42.5	27.3	27.3	27.2
4	2.1160	17.0	16.9	16.8	-1.9	15.1	15.0	14.9	48.5	33.4	33.5	33.6
5	2.6450	16.8	16.8	16.8	-1.7	15.1	15.1	15.1	48.5	33.4	33.4	33.4
6	3.1740	16.6	16.7	16.8	-1.7	14.9	15.0	15.1	48.5	33.6	33.5	33.4
7	3.7030	16.4	16.6	16.5	-1.7	14.7	14.9	14.8	48.5	33.8	33.6	33.7
8	4.2320	16.5	16.4	16.5	-1.7	14.8	14.7	14.8	48.5	33.7	33.8	33.7
9	4.7610	16.3	16.5	16.3	-1.5	14.8	15.0	14.8	48.5	33.7	33.5	33.7
10	5.2910	16.1	16.1	16.2	-1.0	15.1	15.1	15.2	48.5	33.4	33.4	33.3

Calculation : Reading + C.F(Ant. Factor + Cable loss - AMP.Gain + Atten).

Except for the above table : All other spurious emissions were less than 20dB for the limit.

*1:Loop antenna Angle

*2:Distance Factor = $40\text{Log}(D1/D2)$

Field Strength(9kHz to 30MHz)

UL Apex Co., Ltd.
No1 SEMI ANECHOIC CHAMBER

COMPANY : OMRON Corporation
EQUIPMENT : RF ID SYSTEM
MODEL : V600-CH1D
S/ N : -
POWER : AC120V / 60Hz(DC5V)
MODE : TRANSMITTING
REMARKS : EUT Position Y Axis

REPORT NO : 24AE0027-HO-1
REGULATION : FCC Part 15.209(a)
TEST DISTANCE : 10m
DATE : 08/20/2003
TEMPERATURE : 26 deg. C
HUMIDITY : 46 %



ENGINEER : Naoki Sakamoto

No.	FREQ [MHz]	T/R READING			C.F [dB]	RESULT			Limit*2 [dBuV/m]	MARGIN		
		0deg [dBuV/m]	45deg [dBuV/m]	90deg*1		0deg [dBuV/m]	45deg [dBuV/m]	90deg*1		0deg [dB]	45deg [dB]	90deg*1
1	0.5291	22.3	20.5	19.4	-1.7	20.6	18.8	17.7	52.1	31.5	33.3	34.4
2	1.0581	17.9	17.7	17.8	-2.1	15.8	15.6	15.7	46.1	30.3	30.5	30.4
3	1.5872	17.2	17.2	17.1	-1.9	15.3	15.3	15.2	42.5	27.2	27.2	27.3
4	2.1160	17.1	17.2	17.0	-1.9	15.2	15.3	15.1	48.5	33.3	33.2	33.4
5	2.6450	16.9	16.8	16.7	-1.7	15.2	15.1	15.0	48.5	33.3	33.4	33.5
6	3.1740	16.7	16.7	16.6	-1.7	15.0	15.0	14.9	48.5	33.5	33.5	33.6
7	3.7030	16.6	16.3	16.4	-1.7	14.9	14.6	14.7	48.5	33.6	33.9	33.8
8	4.2320	16.4	16.4	16.4	-1.7	14.7	14.7	14.7	48.5	33.8	33.8	33.8
9	4.7610	16.3	16.3	16.3	-1.5	14.8	14.8	14.8	48.5	33.7	33.7	33.7
10	5.2910	16.2	16.1	16.2	-1.0	15.2	15.1	15.2	48.5	33.3	33.4	33.3

Calculation : Reading + C.F(Ant. Factor + Cable loss - AMP.Gain + Atten).

Except for the above table : All other spurious emissions were less than 20dB for the limit.

*1:Loop antenna Angle

*2:Distance Factor = 40Log(D1/D2)

Field Strength(9kHz to 30MHz)

UL Apex Co., Ltd.
No1 SEMI ANECHOIC CHAMBER

COMPANY : OMRON Corporation
EQUIPMENT : RF ID SYSTEM
MODEL : V600-CH1D
S/ N : -
POWER : AC120V / 60Hz(DC5V)
MODE : TRANSMITTING
REMARKS : EUT Position Z Axis

REPORT NO : 24AE0027-HO-1
REGULATION : FCC Part 15.209(a)
TEST DISTANCE : 10m
DATE : 08/20/2003
TEMPERATURE : 26 deg. C
HUMIDITY : 46 %


ENGINEER : Naoki Sakamoto

No.	FREQ [MHz]	T/R READING			C.F [dB]	RESULT			Limit*2 [dBuV/m]	MARGIN		
		0deg [dBuV/m]	45deg [dBuV/m]	90deg*1		0deg [dBuV/m]	45deg [dBuV/m]	90deg*1		0deg [dB]	45deg [dB]	90deg*1
1	0.5291	31.1	30.5	29.9	-1.7	29.4	28.8	28.2	52.1	22.7	23.3	23.9
2	1.0581	21.1	21.0	21.0	-2.1	19.0	18.9	18.9	46.1	27.1	27.2	27.2
3	1.5872	17.1	17.2	17.2	-1.9	15.2	15.3	15.3	42.5	27.3	27.2	27.2
4	2.1160	17.2	17.1	17.1	-1.9	15.3	15.2	15.2	48.5	33.2	33.3	33.3
5	2.6450	16.7	16.7	16.8	-1.7	15.0	15.0	15.1	48.5	33.5	33.5	33.4
6	3.1740	16.6	16.7	16.8	-1.7	14.9	15.0	15.1	48.5	33.6	33.5	33.4
7	3.7030	16.5	16.6	16.6	-1.7	14.8	14.9	14.9	48.5	33.7	33.6	33.6
8	4.2320	16.5	16.5	16.6	-1.7	14.8	14.8	14.9	48.5	33.7	33.7	33.6
9	4.7610	16.4	16.3	16.4	-1.5	14.9	14.8	14.9	48.5	33.6	33.7	33.6
10	5.2910	16.2	16.1	16.2	-1.0	15.2	15.1	15.2	48.5	33.3	33.4	33.3

Calculation : Reading + C.F(Ant. Factor + Cable loss - AMP.Gain + Atten).

Except for the above table : All other spurious emissions were less than 20dB for the limit.

*1:Loop antenna Angle

*2:Distance Factor = 40Log(D1/D2)

DATA OF RADIATION TEST

UL Apex Co., Ltd. Head Office EMC Lab.
No.2 Semi Anechoic Chamber
Report No.: 24AE0027-HO-1

Applicant : OMRON Corporation
Kind of Equipment : RF ID System
Model No. : V600-CH1D
Serial No. :
Power : DC5V
Mode : Transmitting
Remarks : X axis
Date : 8/21/2003
Test Distance : 3 m
Temperature : 26
Humidity : 64 %
Regulation : Fcc 15C § 15.209(a)

Engineer : Naoki Sakamoto

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]	HOR [dB]	VER [dB]		
1.	32.57	BB	17.6	28.5	17.8	23.7	0.5	6.0	18.2	29.1	40.0	21.8	10.9	
2.	41.41	BB	23.1	33.5	14.1	23.7	0.6	6.0	20.1	30.5	40.0	19.9	9.5	
3.	56.57	BB	31.2	39.9	9.3	23.6	0.9	6.0	23.8	32.5	40.0	16.2	7.5	
4.	78.79	BB	42.8	35.4	5.5	23.2	1.1	6.0	32.2	24.8	40.0	7.8	15.2	
5.	86.87	BB	47.5	41.1	6.3	23.4	1.1	6.0	37.5	31.1	40.0	2.5	8.9	
6.	87.38	BB	48.5	42.5	6.3	23.4	1.1	6.0	38.5	32.5	40.0	1.5	7.5	
7.	87.88	BB	48.9	42.0	6.4	23.4	1.1	6.0	39.0	32.1	40.0	1.0	7.9	
8.	88.39	BB	48.8	42.1	6.4	23.4	1.1	6.0	38.9	32.2	43.5	4.6	11.3	
9.	88.89	BB	49.0	42.8	6.5	23.3	1.1	6.0	39.3	33.1	43.5	4.2	10.4	
10.	89.40	BB	49.0	42.9	6.5	23.3	1.1	6.0	39.3	33.2	43.5	4.2	10.3	
11.	89.90	BB	50.7	43.0	6.6	23.3	1.1	6.0	41.1	33.4	43.5	2.4	10.1	
12.	90.40	BB	48.5	42.9	6.7	23.3	1.1	6.1	39.1	33.5	43.5	4.4	10.0	
13.	113.14	BB	41.4	39.0	11.6	23.3	1.4	6.0	37.1	34.7	43.5	6.4	8.8	
14.	189.47	BB	34.5	33.1	16.2	23.3	1.9	6.0	35.3	33.9	43.5	8.2	9.6	
15.	260.58	BB	37.7	30.0	17.6	23.2	2.1	6.0	40.2	32.5	46.0	5.8	13.5	
16.	338.16	BB	35.1	30.2	15.5	23.1	2.5	6.1	36.1	31.2	46.0	9.9	14.8	
17.	358.30	BB	32.2	34.2	16.1	23.1	2.5	6.1	33.8	35.8	46.0	12.2	10.2	
18.	456.02	BB	28.6	33.4	17.8	23.0	2.8	6.2	32.4	37.2	46.0	13.6	8.8	
19.	586.31	BB	22.9	31.3	19.4	23.1	3.3	6.1	28.6	37.0	46.0	17.4	9.0	
20.	651.46	BB	23.0	29.5	20.2	23.2	3.7	6.1	29.8	36.3	46.0	16.2	9.7	
21.	781.75	BB	26.1	27.9	21.3	23.2	4.0	6.1	34.3	36.1	46.0	11.7	9.9	
22.	912.05	BB	28.0	30.4	21.5	23.1	4.5	6.1	37.0	39.4	46.0	9.0	6.6	

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

All other spurious emissions were less than 20dB for the limit.
ANT.TYPE:30-300MHz Biconical Antenna, 300-1000MHz Logperiodic Antenna

