EMISSION TEST REPORT

Test Report No. : 17A0046-02I-1
OMRON Corporation, model: V700-H01
FCC Part 15 Subpart C

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2. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

3. This equipment is in compliance with above regulation. We hereby certify that the data are contain a true representation of the emission profile.

4. The results in this report apply only to the sample tested.

5. This test report clearly shows that EUT, V700-H01, Antenna is in compliance with FCC Part 15 Subpart C, specification.

Date of test: January 29, 1998 **Issued date:** February 12, 1998

Tested by: O. Watatani
Osamu Watatani
Engineer, EMC Dept.

Approved by: T. Hashimoto
Tetsuya Hashimoto
Group Leader of EMC section

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Table of Contents

1 GENERAL INFORMATION

APPLICANT	: OMRON Corporation
REGULATION(S)	: FCC Part 15 Subpart C
MODEL NUMBER	: V700-H01
SERIAL NUMBER	: 504
KIND OF EQUIPMENT	: Antenna
TESTED DATE	: January 29, 1998.
REPORT FILE NUMBER	: 17A0046-02I-1
TEST SITE	: A-PEX Yokowa NO.1 Open Test Site

1.1 Tested Methodology

Radiated testing were performed according to the procedures in FCC/ANSI C63.4(1992).
Radiated testing was performed at a distance of 3 meters from the antenna to EUT .

1.2 Test Facility

The open area site measurement facility used to collect the radiated data is located on 108, Yokowa-cho, Ise-shi, Mie-ken, 516-11 Japan.
This site has been fully described in a report dated Aug. 1, 1997 submitted to FCC office, and accepted in a letter dated Sep. 16, 1997 (31040/SIT 1300F2).

2 Product Description

The device is a Radio Frequency. Identification System (called ID system) operated at DC 24V.
It is consisted of a Controller (V700-CD1D) and a Read Write Antenna (V700-H01 or H02, abbr. : ANT) AND and communicates with ID tag (e.g. V700-D13P31) via contactless.

The technical description is as follows:

1. Turns on the power of a test device. Then, the operation of the Controller and the oscillation of the ANT start.
2. Connects to a PC and turns on the power of the PC.
3. Starts a test program, "UCOMH" on the PC.
4. Inputs "OORDSRH10010" at the end after inputting "9600, 0, 1, 2" as setting values. Then, communication between the ANT and a tag starts.
5. Turns off the power of the PC and remoues it. The communication continues.

The clock frequency used in the EUT
FPGA : 1MHz
Carrier Frequency : 125kHz

3 Tested System Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Model	FCC ID	Description	Cable description	Backshell Material
(1) OMRON M/N: V700-H01 S/N: 504 (EUT)		Antenna	—	—
(2) OMRON M/N: V700-CD1D S/N: 306		ID Controller	RWH/ID System Cable/ Shielded	—
(3) OMRON M/N: S82K-05024 S/N: 188401		Power Supply	—	—
(4) OMRON M/N: V700-D13P31 S/N: 333		Tag	DC Cable / Unshielded FG Cable 1/ Unshielded	—

4 SYSTEM TEST CONFIGURATION

4.1 Justification

The measurement was performed with the system configuration shown in Figure 3.2.
Running mode was taken for the EUT operation mode.

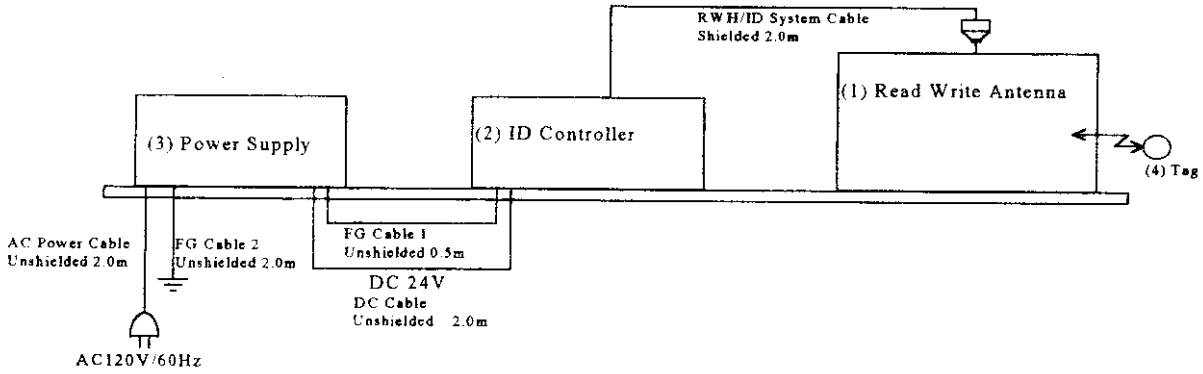
4.2 Test Procedure

Tabletop Equipment Radiated Emissions

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 measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.

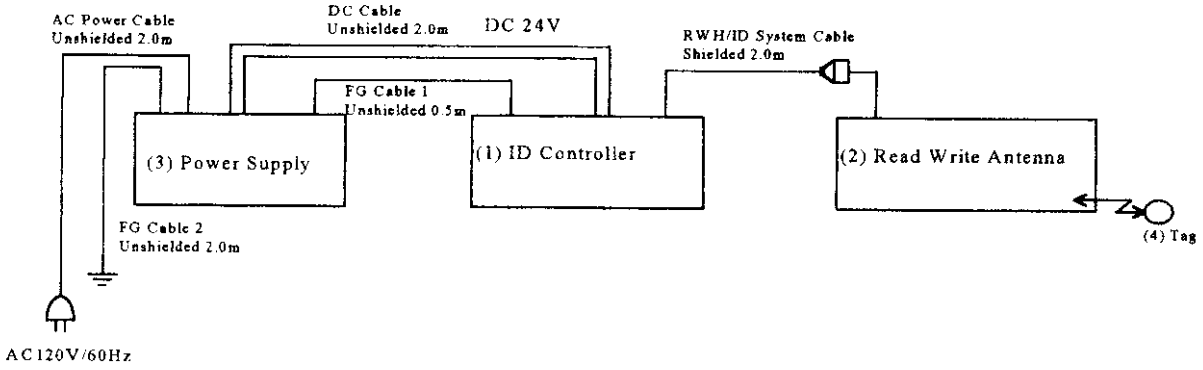
Figure 4.2 Configuration of Tested System

Front View



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

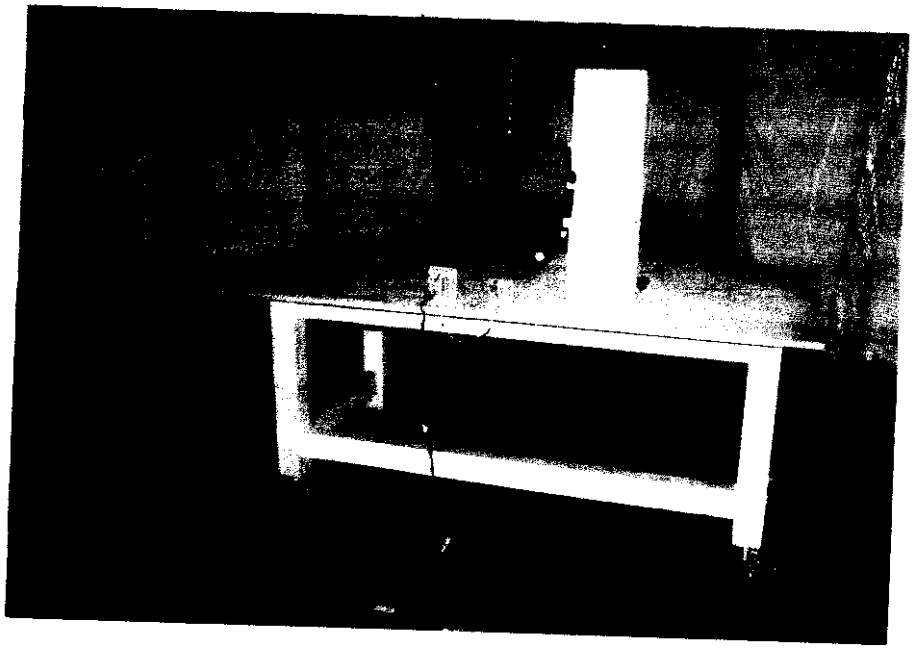
Top View



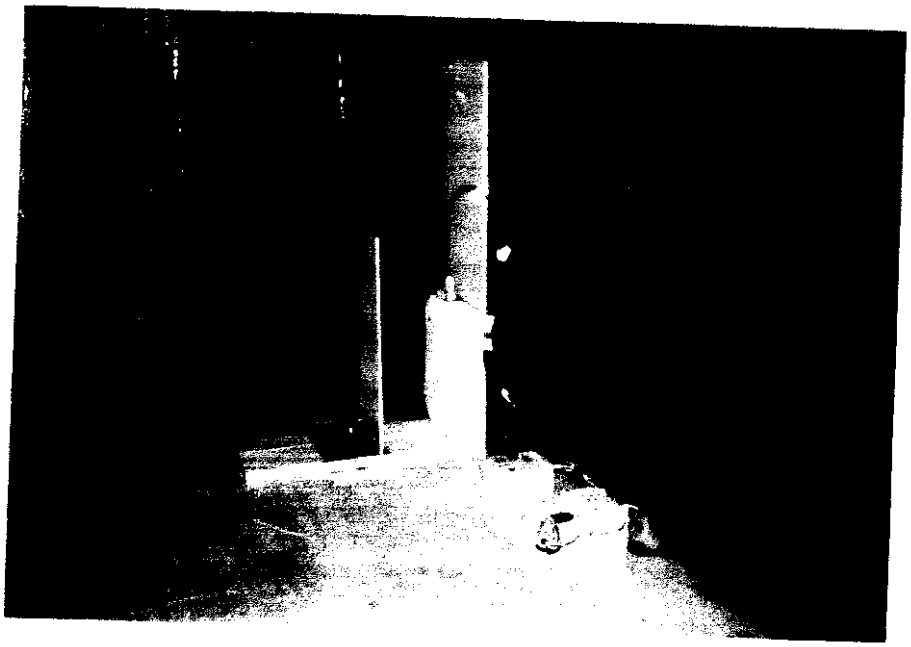
* Cabling was taken into consideration and test data was taken under worst case conditions.

5 RADIATED MEASUREMENT PHOTOS

Figure 5.1 Radiated Measurement Photos



Front View



Rear View

5.2 Measurement Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was ±3.3dB.

☐ The data listed in this test report may exceed the test limit because it does not have enough margin (more that 3.3dB).

■ The data listed in this test report has enough margin, more that 3.3dB.

6 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range(30MHz-1,000MHz).
The final data was reported in the worst-case emissions.
The minimum margin to the limit is as follows :

*** 10KHz ~ 30MHz**

Frequency (MHz)	Receiver Reading (dBμV)	Correction Factor (dBμV)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dBμV)
0.6246	54.8	-28.7	26.1	31.6	5.5

*** 30MHz ~ 1GHz**

Frequency (MHz)	Receiver Reading (dBμV)	Correction Factor (dBμV)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dBμV)
75.95	52.0	-15.5	36.5	40.0	3.5

* All readings are QP mode. (except 110~490 KHz, the data for this band is taken by AV mode)
* The spurious was not preceibved regarding to the frequency above 1GHz.

6.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

*** 110KHz ~ 490KHz**

FS = RA + AF + CF - AG - EX

where FS = Field Strength
RA = Receiver Reading
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain
EX = Proper Extrapolation Factor

Assume a receiver reading of 54.8 dB μ V is obtained. The antenna Factor of 20.0 dB is added. The Amplifier Gain of 20.0 dB is subtracted, giving a field strength of 6.4 dB μ V/m.

FS = 95.4 + 20.0 - 20.0 - 89.0 = 6.4 dB μ V/m

*** 490KHz ~ 30MHz**

FS = RA + AF + CF - AG - EX

where FS = Field Strength
RA = Receiver Reading
AF = Antenna Factor
CF = Cable Factor
AG = Amplifier Gain
EX = Proper Extrapolation Factor

Assume a receiver reading of 54.8 dB μ V is obtained. The antenna Factor of 20.0 dB is added. The Amplifier Gain of 20.0 dB is subtracted, giving a field strength of 26.1 dB μ V/m.

FS = 54.8 + 20.0 - 20.0 - 28.7 = 26.1 dB μ V/m

*** 30MHz ~ 1GHz**

FS = RA + AF + CF + AT - AG

where FS = Field Strength
RA = Receiver Reading
AF = Antenna Factor
CF = Cable Factor
AT = Antenna Pad
AG = Amplifier Gain

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna Factor of 5.35 dB, Cable Factor of 1.77 dB and Antenna Pad of 6.0 dB is added. The Amplifier Gain of 27.34 dB is subtracted, giving a field strength of 37.78 dB μ V/m.

FS = 52.0 + 5.35 + 1.77 + 6.0 - 27.34 = 37.78 dB μ V/m

7 TEST EQUIPMENT USED

	NAME	MANUFACTURER	MODEL	Control No.	Calibrated Until
☐	Pre Amplifier	Hewlett Packard	8447D	AP1	February 18, 1998
■	Pre Amplifier	Anritsu	MH648A	AP2	February 18, 1998
☐	Pre Amplifier	Anritsu	MH648A	AP3	July 6, 1998
■	Biconical Antenna	Schwarzbeck	BBA9106	BA1	April 23, 1998
☐	Biconical Antenna	Schwarzbeck	BBA9106	BA2	July 19, 1998
☐	Biconical Antenna	Schwarzbeck	BBA9106	BA3	May 10, 1998
☐	Bilog Antenna	Chase	CBL6111	BL1	July 19, 1998
☐	Dipole Antenna	Schwarzbeck	VHA9103	DA5	April 23, 1998
■	Logperiodic Antenna	Schwarzbeck	UHALP9108A	LA5	July 19, 1998
☐	Logperiodic Antenna	Schwarzbeck	UKLP9104- A	LA7	May 3, 1998
■	Loop Antenna	Rohde & Schwarz	HFH2-Z2	LP1	September 3, 1998
☐	LISN	Rohde & Schwarz	ESH2-Z5	LS1	July 6, 1998
☐	LISN	Rohde & Schwarz	ESH3-Z5	LS2	July 6, 1998
☐	LISN	Schwarzbeck	NSLK8127	LS3	July 6, 1998
☐	LISN	Rohde & Schwarz	ESH3-Z5	LS4	July 6, 1998
☐	LISN	Schwarzbeck	NNLK8121	LS5	July 6, 1998
☐	LISN	Rolf Heine	NNB-4/200	LS6	July 6, 1998
☐	LISN	Schwarzbeck	NSLK8127	LS7	July 6, 1998
■	Spectrum Analyzer	Hewlett Packard	8567A	SA1	February 19, 1998
☐	Spectrum Analyzer	Hewlett Packard	8567A	SA3	February 19, 1998
☐	Spectrum Analyzer	Hewlett Packard	8567A	SA4	February 19, 1998
■	Test Receiver	Rohde & Schwarz	ESHS-20	TR1	April 24, 1998
■	Test Receiver	Rohde & Schwarz	ESVS-30	TR2	July 8, 1998
☐	Test Receiver	Rohde & Schwarz	ESHS-30	TR3	July 27, 1998
☐	Test Receiver	Rohde & Schwarz	ESVS-10	TR4	July 17, 1998
☐	Test Receiver	Rohde & Schwarz	ESHS-10	TR5	October 14, 1998
☐	Test Receiver	Rohde & Schwarz	ESVS-10	TR6	October 14, 1998
☐	Horn Antenna	AH System, Inc.	SAS-200/571	YTHA2	—

■ indicates EMI Test Equipment used.

■ All measurement equipment is traceable to national standard

APPENDIX

Test Data

Radiated emissions A 1 - A 3

DATA OF RADIATION TEST

A－P E X INTERNATIONAL CO., LTD.
YOKOWA NO.1 SITE

COMPANY	: OMRON CORPORATION	REPORT NO.	: 17A0046-02I-1
TRADE NAME	: OMRON	REGULATION	: FCC Part 15 Subpart C
EQUIPMENT	: ID System	CLASS	: NONE
MODEL	: V700-H01	TEST DISTANCE	: 3m
POWER	: DC24V	ATTENUATOR	: 6dB
DESCRIPTION	: RUNNING	FCC ID	:
REMARKS	:		
DATE	: 01/29/1998		

ENGINEER : OSAMU.WATATANI

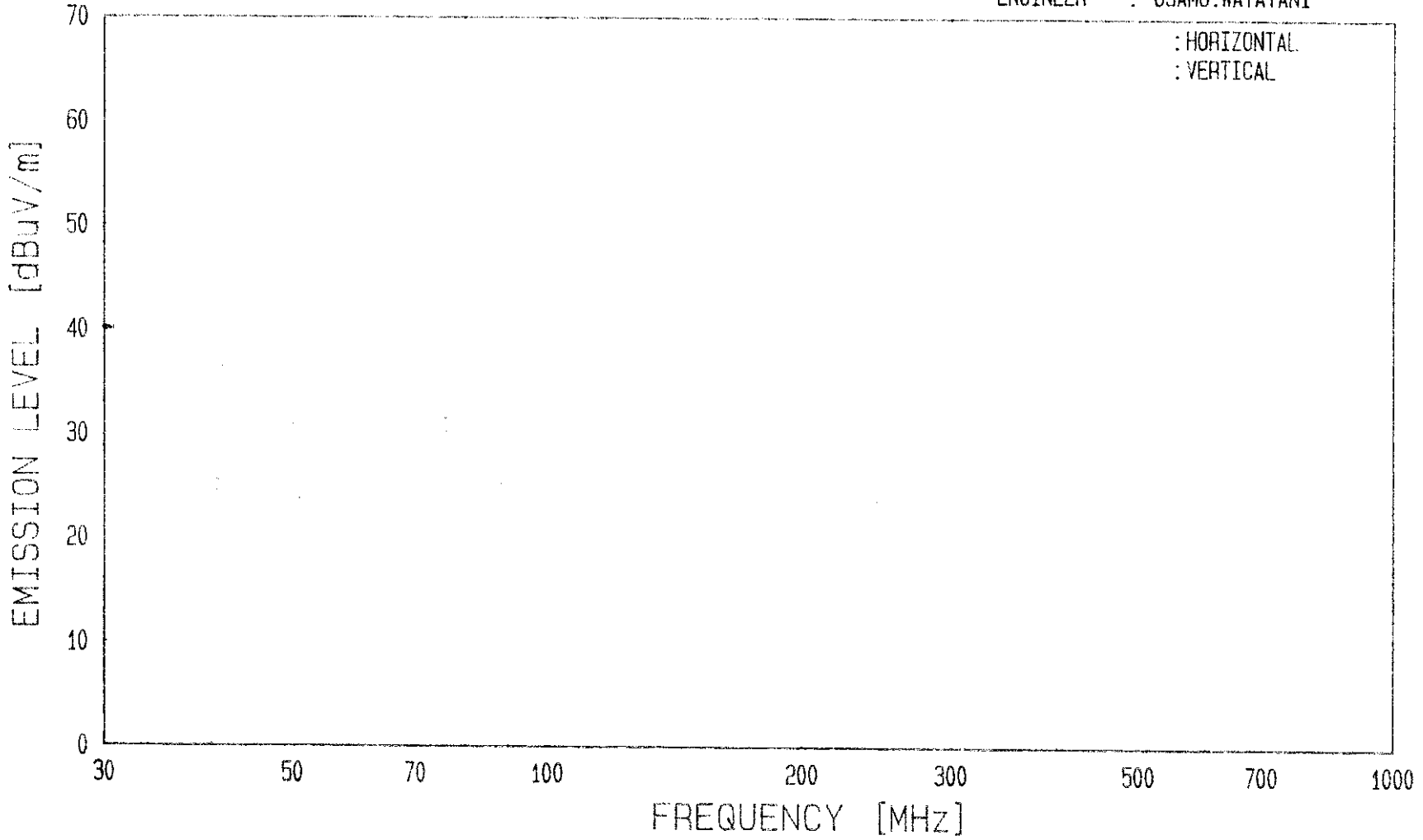
No	FREQ	ANT	READING		ANT	CABLE	AMP	RESULT		FCC	MARGIN	
			HOR	VER	FACTOR	LOSS	GAIN	HOR	VER	LIMITS	HOR	VER
	[MHz]	TYPE	[dBμV] 3m		[dB]	[dB]	[dB]	[dBμV/m] 3m		[dBμV/m] 3m	[dB]	
1	40.75	BC	32.9	43.5	13.7	2.0	29.8	24.8	35.4	40.0	15.2	4.6
2	50.83	BC	39.9	41.1	10.5	2.1	29.8	28.7	29.9	40.0	11.3	10.1
3	64.65	BC	40.2	48.7	6.4	2.5	29.8	25.3	33.8	40.0	14.7	6.2
4	75.95	BC	46.3	52.0	5.5	2.8	29.8	30.8	36.5	40.0	9.2	3.5
5	88.00	BC	44.8	43.4	7.5	2.9	29.8	31.4	30.0	40.0	8.6	10.0
6	124.95	BC	33.3	38.1	12.3	3.5	29.8	25.3	30.1	43.5	18.2	13.4
7	140.00	BC	34.7	41.4	13.6	3.7	29.8	28.2	34.9	43.5	15.3	8.6
8	150.00	BC	30.5	41.5	14.5	3.8	29.8	25.0	36.0	43.5	18.5	7.5
9	170.00	BC	35.3	36.4	15.6	4.2	29.8	31.3	32.4	43.5	12.2	11.1
10	176.00	BC	34.2	36.9	16.0	4.1	29.8	30.5	33.2	43.5	13.0	10.3
11	244.96	BC	29.4	31.2	17.4	4.9	29.8	27.9	29.7	46.0	18.1	16.3
12	379.99	LP	28.6	29.4	14.8	5.9	30.0	25.3	26.1	46.0	20.7	19.9
13	400.00	LP	29.0	29.9	15.3	6.2	30.0	26.5	27.4	46.0	19.5	18.6
14	450.00	LP	31.6	32.0	16.4	6.5	30.0	30.5	30.9	46.0	15.5	15.1
15	480.00	LP	29.8	27.3	16.8	7.0	29.9	29.7	27.2	55.6	25.9	28.4

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

Except for the above table : more than 10dB below the limits.

RADIATION TEST

COMPANY	: OMRON CORPORATION	REPORT No.	: 17A0046-02I-1
TRADE NAME	: OMRON	DATE	: 01/29/1998
EQUIPMENT	: ID System	REGULATION	: FCC Part 15 Subpart C
MODEL	: V700-H01	CLASS	: NONE
POWER	: DC24V	DISTANCE	: 3m
DESCRIPTION	: RUNNING	FCC ID	:
REMARKS	:	ENGINEER	: OSAMU.WATATANI



DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
YOKOWA NO.1 SITE

COMPANY : OMRON CORPORATION
EQUIPMENT : ID System
MODEL No. : V700-H01
DESCRIPTION : RUNNING
TEST DISTANCE : 10/30m
DATE : 01/29/1998

REPORT No. : 17A0046-02I-1
REGULATION : FCC Part15 Subpart C

O. Watatani
ENGINEER : OSAMU.WATATANI

No	FREQ [MHz]	ANT TYPE	READING [dB μ V] 10m	READING [dB μ V] 30m	RESULTS [dB μ V/m]	LIMIT [dB μ V/m] 30m	LIMIT [dB μ V/m] 300m	MARGIN [dB]
1	0.1250	LA	95.4 (AV)	66.6 (AV)	6.4	-	25.6	19.2
2	0.2500	LA	53.6 (AV)	-	-35.4	-	19.6	55.0
3	0.3750	LA	47.2 (AV)	-	-41.8	-	16.1	57.9
4	0.5050	LA	52.5	-	23.8	33.6	-	9.8
5	0.6246	LA	54.8	-	26.1	31.6	-	5.5

SAMPLE CALCULATION :

RESULT=READING + ANT.FACTOR[20dB] − AMP.GAIN[20dB] − PROPER EXTRAPOLATION FACTOR

PROPER EXTRAPOLATION FACTOR :

(95.4-66.6)/log(30/10)=60.3[dB/decade]

300-10[m] FACTOR : 60.3 × log(300/10)=89.0[dB]

30-10[m] FACTOR : 60.3 × log(30/10)=28.7[dB]