



RADIO TEST REPORT

Test Report No. : 26DE0183-HO

Applicant : OMRON Corporation
Type of Equipment : Radio Frequency Identification System
Model No. : V670-CD1D-V1 (ID Controller)
V670-H11, V670-H51, V670-H51Q(Antenna)
Test standard : FCC Part 15 Subpart C : 2005
Section 15.207 and 15.225
FCC ID : E4E6CYCIDV6700206
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.

Date of test:

January 10 to 27, 2006

Tested by:

Hiroka Umeyama
EMC Services

Approved by :

Hironobu Shimoji
Group Leader of
EMC Services

UL Apex Co., Ltd.

Head Office EMC Lab.

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

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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SECTION 1: Client information

Company Name : OMRON Corporation
Address : 20, Shimokaiinji, Nagaokakyou-shi, Kyoto 617-8510 Japan
Telephone Number : +81-75-957-9849
Facsimile Number : +81-75-951-5124
Contact Person : Tetsuo Yoshida

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

2.1 Identification of E.U.T.

Type of Equipment : Radio Frequency Identification System
Model No. : V670-CD1D-V1 (ID Controller)
V670-H11 (Antenna)
V670-H51 (Antenna)*
V670-H51Q (Antenna)*
*The antennas, V670-H51 and V670-H51Q, are electrically same, and the difference between them is only the material of the antenna case, and thus, V670-H51 has been tested as a representative.
Serial No : 12 (V670-CD1D-V1)
: 1 (V670-H11)
: 2 (V670-H51)
Rating : DC24V $\pm$ 10%
Country of Manufacture : Japan
Receipt Date of Sample : January 10, 2006
Condition of EUT : Engineering type
(Not for sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Equipment Type : Transceiver
Number of Channel : 1
Frequency Characteristics : 13.56MHz
Modulation : Amplitude Shift Keying
Bit rate : 212kbps
Information antenna : Loop Antenna

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2005
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207: Conducted limits
Section 15.225: Operation within the band 13.110-14.010MHz

FCC 15.31 (e)

This EUT provides stable voltage (DC9.0V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The EUT has the external antenna connector, but it is installed by the professionals. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin*0)	Results
1	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A	10.1dB 0.36884MHz, AV, N	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	Radiated	N/A	47.1dB QP	Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	Radiated	N/A	See data	Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.215(c)	Radiated	N/A	See data	Complied
5	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.209, Section 15.225 (d)	Radiated	N/A	0.2dB 488.120MHz QP, Horizontal	Complied
6	Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	Radiated	N/A	See data	Complied

Note: UL Apex's EMI Work Procedures No.QPM05 and QPM15.

*These tests were performed without any deviations from test procedure except for additions or exclusions.

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3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	-	Conducted	N/A	N/A	N/A

3.4 Addition to standards

Uncertainty:

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is $\pm 1.3\text{dB}$.
The data listed in this test report has enough margin, more than the site margin.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is $\pm 1.9\text{dB}(3\text{m})/\pm 1.8\text{dB}(10\text{m})$.
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}(3\text{m})/\pm 4.7\text{dB}(10\text{m})$.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}(3\text{m})/\pm 3.8\text{dB}(10\text{m})$.
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 report meets the limits unless the uncertainty is taken into consideration.

Other test except Conducted Emission and Spurious Emission (Radiated)

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

3.5 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications
FCC Part 15 Subpart C: 2005 Section 15.225.

3.6 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. *NVLAP Lab. code: 200572-0

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

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

	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 semi-anechoic chamber	313583	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	846015	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1 and No.2 semi-anechoic and No.3 shielded room.

3.7 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

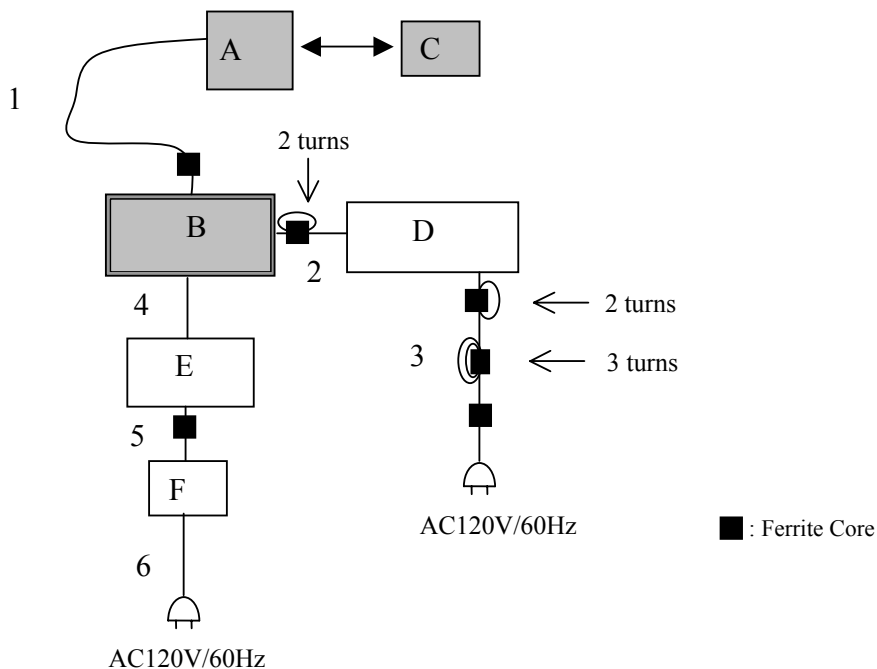
SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

Operation mode: Transmitting 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.

*Ferrite cores on the cable 1 and 2 are contained in the package of the EUT.

Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remark
A	Antenna	V670-H11	1	OMRON Corp.	EUT
		V670-H51	2		
B	ID Controller	V670-CD1D-V1	12	OMRON Corp.	EUT
C	ID Tag	V670-D13F03	N/A (for V670-H11)	OMRON Corp.	EUT
		V670-D13F01H	N/A (for V670-H51)		
D	DC Power Supply	S82K-03024	N/A	OMRON Corp.	-
E	Personal Computer	A22e	97-630XT	IBM	*1)
		Satellite 1860	PS186N-09KX7	Toshiba	*2)
F	AC Adaptor	02KK6665	11S02K6665Z1Z2V8192W45	IBM	*1)
		PA3201V-1ACA	031H4780	Toshiba	*2)

*1) Used at Radiated Emission test (above 30MHz)

*2) Used at all the tests other than Radiated Emission test (above 30MHz)

List of cables used

No.	Name	Length (m)	Shield Y/N	Remark
1	Antenna Cable	2.0	Y	-
2	DC Power Cable	0.2	N	-
3	AC Power Cable	1.6	N	-
4	RS232C Cable	2.0	Y	-
5	DC Power Cable	1.8	N	IBM *1)
		1.7	N	Toshiba *2)
6	AC Power Cable	1.8	N	IBM *1)
		2.0	N	Toshiba *2)

*1) Used at Radiated Emission test (above 30MHz)

*2) Used at all the tests other than Radiated Emission test (above 30MHz)

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Head Office EMC Lab.

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SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.1 semi anechoic chamber.
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 0.5m by 1.0m, 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 LISN/AMN 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 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/ an AMN to the input power source. All unused 50ohm connectors of the LISN/ AMN 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 horizontal conducting plane 4.0 x 4.0m and a vertical conducting plane 2.0 x 2.0m in a No.2 semi Anechoic Chamber. A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 0.15MHz – 30MHz
EUT position : Table top
EUT operation mode : Continuous Transmitting

5.4 Test procedure

The AC Mains Terminal Continuous disturbance Voltage had been measured with the EUT in the semi Anechoic Chamber. The EUT was connected to a Line Impedance Stabilization Network (LISN)/ Artificial Mains Network (AMN). 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 and AV
IF Bandwidth : 9kHz

5.5 Test result

Summary of the test results : Pass

Date : January 11, 2006 Test engineer : Hiroka Umeyama

SECTION 6: Radiated emission (Fundamental , Spurious Emission and Spectrum Mask)

6.1 Operating environment

The test was carried out in a No.1 semi Anechoic Chamber

Temperature : See data
Humidity : See data

Test Procedure

The Radiated Electric Field Strength intensity has been measured on No.1 semi anechoic chamber with a ground plane and at a distance of 3m.

Frequency : From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for each antenna angle 0deg. , 45deg. and 90deg.

Frequency : From 30MHz to 1GHz at distance 3m

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 both vertical and horizontal antenna polarization.

Measurements were performed with a QP, PK, and AV detector.

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

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

- The carrier level and noise levels were confirmed at each position of X and Y axis of the antennas to see the position of maximum noise, and the test was made at the position that has the maximum noise. (ID Controller was set at the normal position.)

* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

9kHz – 490kHz [Limit at 3m]=[Limit at 300m]-40log (3[m]/300[m])

490kHz – 30MHz[Limit at 3m]=[Limit at 30m]-40log (3[m]/30[m])

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SECTION 7: -20dB Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data	: APPENDIX 3
Test result	: Pass

SECTION 8: 99% Occupied Bandwidth

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data	: APPENDIX 3
Test result	: Pass

SECTION 9: Frequency Tolerance

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Test data	: APPENDIX 3
Test result	: Pass

APPENDIX 1: Photographs of test setup

Conducted emission

Antenna:V670-H51 and ID Tag:V670-D13F01H

Front



Rear



Conducted emission
Antenna:V670-H11 and ID Tag:V670-D13F03

Front



Rear

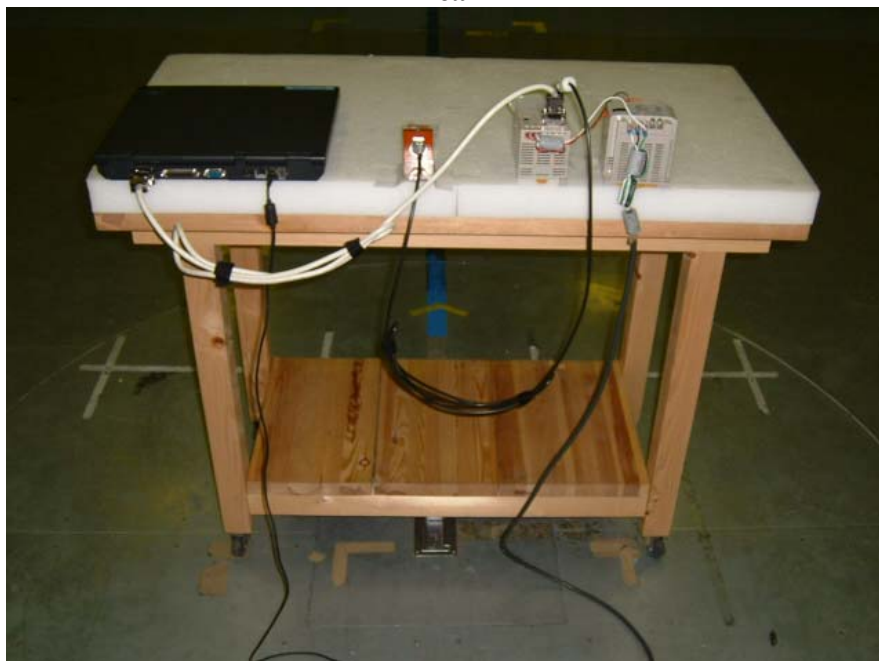


Radiated emission
Antenna:V670-H51 and ID Tag:V670-D13F01H

Front



Rear

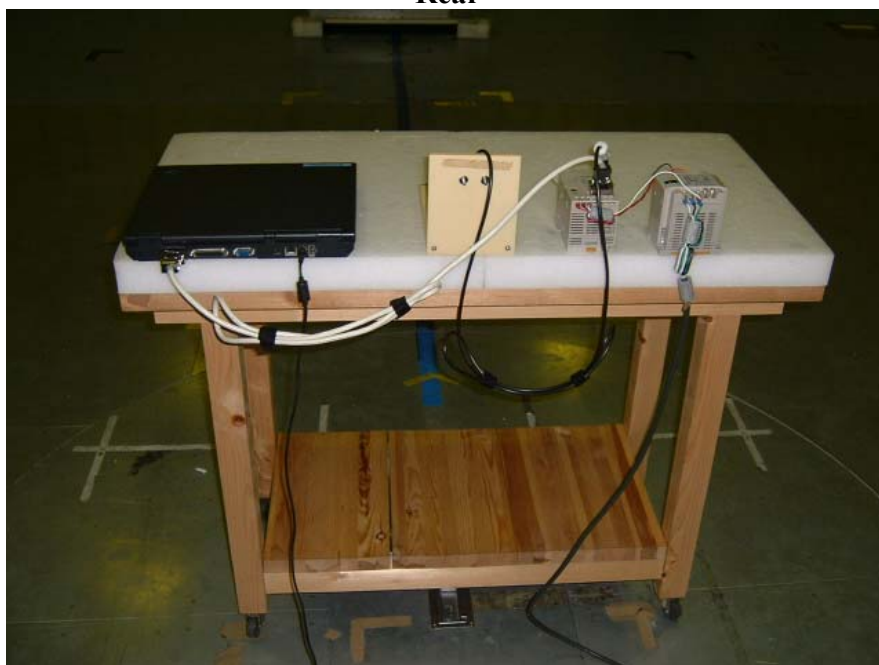


Radiated emission
Antenna:V670-H11 and ID Tag:V670-D13F03

Front



Rear



Worst Case Position (Y-axis)
Antenna:V670-H51

X-axis

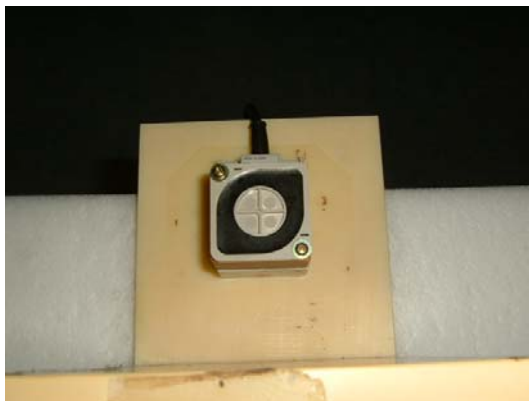


Y-axis



Worst Case Position (Y-axis)
Antenna:V670-H11

X-axis



Y-axis



Worst Case Position (Nomal)
ID Controller:V670-CD1D-V1



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	2005/11/14 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2005/11/10 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2005/10/10 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2005/10/14 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2005/05/24 * 12
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/TSJ	-	RE	2005/12/18 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2005/12/16 * 12
LP-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2005/10/31 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/TSJ	-	RE	2005/12/18 * 12
MCC-31	coaxial cable	ULApex	-	RE	2005/06/02 * 12
MCH-01	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	FT	2005/12/19 * 12
MSA-03	Spectrum Analyzer	Agilent	E4448A	FT	2005/09/16 * 12
MCC-22	Microwave Cable 1G-50GHz	Storm	421-011 (90-011-080)	FT	2005/04/29 * 12
MLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	CE(EUT)	2005/11/09 * 12
MLS-03	LISN(AMN)	Schwarzbeck	NSLK8127	CE(AE)	2005/11/09 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/TSJ	-	CE	2005/12/18 * 12
MTA-01	Termination	TME	CT-01	CE	2005/02/03 * 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,
FT: Frequency Tolerance

UL Apex Co., Ltd.

Head Office EMC Lab.

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

Telephone : +81 596 24 8116

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APPENDIX 3: Data of EMI test

Conducted emission

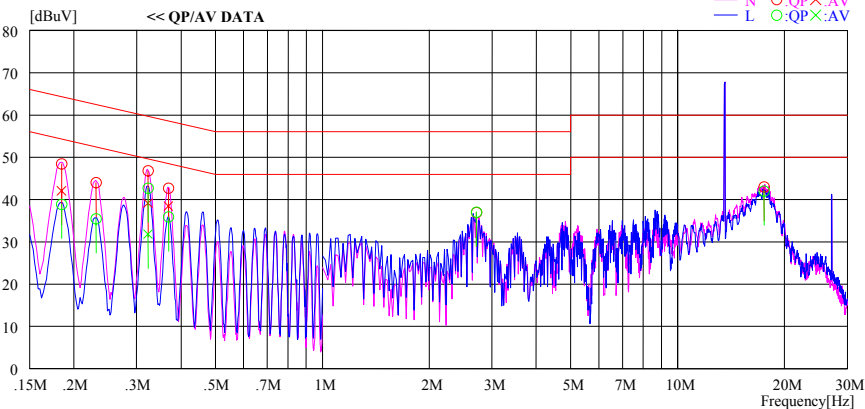
DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2006/01/11 13:27:58

Applicant : OMRON Corporation
Kind of EUT : RFID System
Model No. : V670-CD1D-V1+V670-H11
Serial No. : 12 (V670-CD1D), 1 (V670-H11)
Report No. : 26DE0183-HO
Power : DC24V (DC Power Supply: AC120V/60Hz)
Temp/C/Humi% : 21deg. C / 30%
Operator : Hiroka Umeyama

Mode / Remarks : Transmitting (13.56MHz)

LIMIT : FCC15C § 15.207 (QP)
FCC15C § 15.207 (AV)



Frequency	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP	AV		QP	AV	QP	AV	QP	AV	
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
0.18436	48.2	41.9	0.2	48.4	42.1	64.3	54.3	15.9	12.2	N
0.23049	43.8	---	0.2	44.0	---	62.4	---	18.4	---	N
0.32303	46.6	39.0	0.2	46.8	39.2	59.6	49.6	12.8	10.4	N
0.36884	42.5	38.2	0.2	42.7	38.4	58.5	48.5	15.8	10.1	N
2.71490	36.2	---	0.7	36.9	---	56.0	---	19.1	---	N
17.49000	41.0	---	2.0	43.0	---	60.0	---	17.0	---	N
0.18436	38.7	---	0.2	38.9	---	64.3	---	25.4	---	L
0.23049	35.3	---	0.2	35.5	---	62.4	---	26.9	---	L
0.32303	42.5	31.6	0.2	42.7	31.8	59.6	49.6	16.9	17.8	L
0.36884	35.7	---	0.2	35.9	---	58.5	---	22.6	---	L
2.71490	36.3	---	0.7	37.0	---	56.0	---	19.0	---	L
17.49000	40.0	---	2.0	42.0	---	60.0	---	18.0	---	L

CHART: WITH FACTOR, Peak hold data. Data is uncorrected. CALCULATION: RESULT=READING+C.F (LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted emission

DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2006/01/11 13:52:11

Applicant

Kind of EUT

Model No.

Serial No.

: OMRON Corporation

: RFID System

: V670-CD1D-V1+V670-H51

: 12 (V670-CD1D), 2 (V670-H51)

Report No.

Power

Temp°C/Humi%

Operator

: 26DE0183-H0

: DC24V (DC Power Supply:AC120V/60Hz)

: 21deg. C / 30%

: Hiroka Umeyama

Mode / Remarks : Transmitting(13.56MHz)

LIMIT : FCC15C §15.207 (QP)
FCC15C §15.207 (AV)

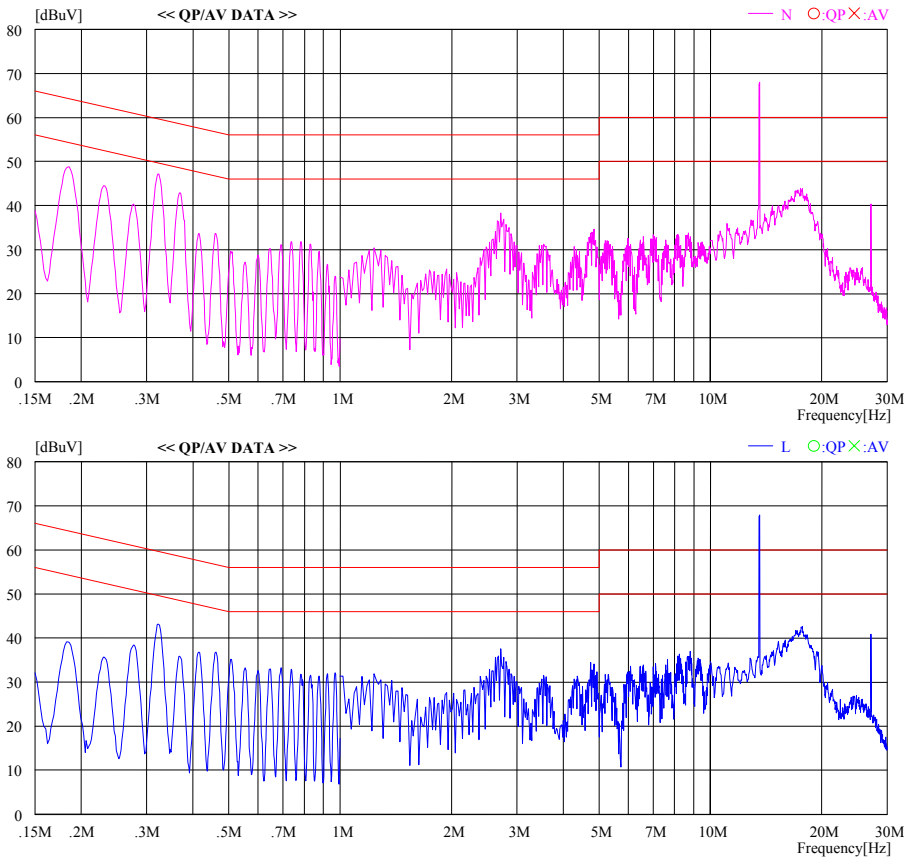


CHART:WITH FACTOR,Peak hold data.Data is uncorrected. CALCURATION:RESULT=READING+C.F (LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Radiated emission(Fundamental emission Spectrum Mask and Spurious emission : below 30MHz)

DATA OF MAGNETIC RADIATED EMISSION TEST

UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant : OMRON Corporation
Kind of EUT : RFID System
Model No. : V670-CD1D-V1+V670-H51
Serial No. : 12(V670-CD1D), 2(V670-H51)
Report No. : 26DE0183-HO
Power : DC24V
Temp./ Humi. : 22deg.C / 30%
Operator : Hiroka Umeyama

Mode / Remarks : Transmitting (13.56MHz), MAX-Axis:Y

LIMIT : FCC15C §15.225, 3m
All other spurious emissions were less than 20dB for the limit.

Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]
13.11000	24.0	QP	20.0	7.0	27.9	23.1	69.5	46.4
13.41000	25.6	QP	20.0	7.0	27.9	24.7	80.5	55.8
13.45000	34.9	QP	20.0	7.0	27.9	34.0	90.4	56.4
13.55300	66.5	QP	20.0	7.0	27.9	65.6	90.4	24.8
13.56000	77.6	QP	20.0	7.1	27.9	76.8	123.9	47.1
13.56700	65.2	QP	20.0	7.1	27.9	64.4	90.4	26.0
13.60200	28.4	QP	20.0	7.1	27.9	27.6	90.4	62.8
13.66900	33.1	QP	20.0	7.1	27.9	32.3	90.4	58.1
13.71000	24.5	QP	20.0	7.1	27.9	23.7	80.5	56.8
14.01000	24.5	QP	20.0	7.1	27.9	23.7	69.5	45.8
27.12000	35.9	QP	19.9	7.8	28.0	35.6	69.5	33.9

CHART : WITH FACTOR , ANT TYPE : LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : READING + ANT FACTOR + LOSS (CABLE + ATTEN. -AMP.)

Radiated emission(Fundamental emission Spectrum Mask and Spurious emission : below 30MHz)

DATA OF MAGNETIC RADIATED EMISSION TEST

UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant

Kind of EUT

Model No.

Serial No.

: OMRON Corporation

: RFID System

: V670-CD1D-V1+V670-H11

: 12 (V670-CD1D), 1 (V670-H11)

Report No.

Power

Temp. / Humi.

Operator

: 26DE0183-HO

: DC24V

: 22deg. C / 30%

: Hiroka Umeyama

Mode / Remarks : Transmitting (13.56MHz), MAX-Axis:Y

LIMIT : FCC15C §15.225 , 3m

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

Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]
13.11000	25.0	QP	20.0	7.0	27.9	24.1	69.5	45.4
13.41000	25.2	QP	20.0	7.0	27.9	24.3	80.5	56.2
13.46400	26.8	QP	20.0	7.0	27.9	25.9	90.5	64.6
13.55300	63.2	QP	20.0	7.0	27.9	62.3	90.5	28.2
13.56000	74.3	QP	20.0	7.1	27.9	73.5	124.0	50.5
13.56700	62.3	QP	20.0	7.1	27.9	61.5	90.5	29.0
13.62000	26.3	QP	20.0	7.1	27.9	25.5	90.5	65.0
13.70500	25.1	QP	20.0	7.1	27.9	24.3	90.5	66.2
13.71000	25.1	QP	20.0	7.1	27.9	24.3	80.5	56.2
14.01000	24.7	QP	20.0	7.1	27.9	23.9	69.5	45.6
27.12000	37.7	QP	19.9	7.8	28.0	37.4	69.5	32.1

CHART : WITH FACTOR , ANT TYPE : LOOP , Except for the data below : adequate margin data below the limits.
CALCULATION : READING + ANT FACTOR + LOSS (CABLE + ATTN. -AMP.)

Radiated emission (Spurious emission : above 30MHz)

DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant

Kind of EUT

Model No.

Serial No.

: OMRON Corporation

: RFID System

: V670-CD1D-V1+V670-H51

: 12 (V670-CD1D), 2 (V670-H51)

Report No.

Power

Temp./Humi.

Operator

: 26DE0183-HO

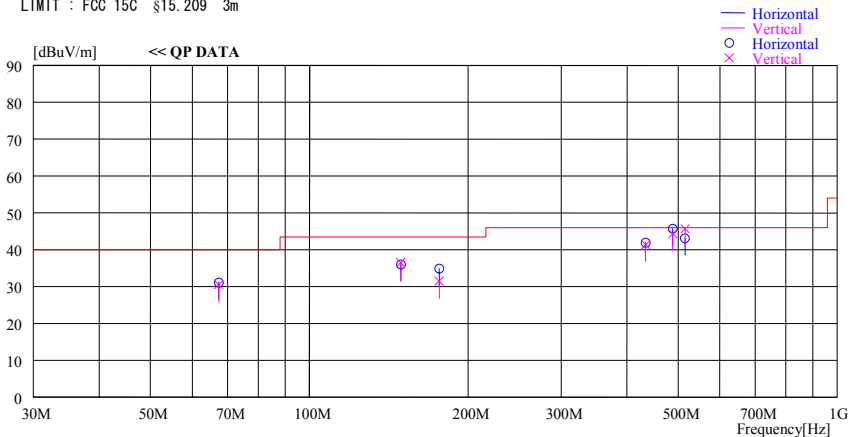
: DC24V

: 25deg.c / 30%

: Hiroka Umeyama

Mode / Remarks : Transmitting(13.56MHz)

LIMIT : FCC 15C §15.209 3m



Frequency	Reading	DET	Antenna		Level	Angle	Height	Polar.	Limit	Margin
			Factor	Gain						
[MHz]	[dBuV]		[dB/m]	[dBi]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
67.335	43.8	QP	7.4	-20.1	31.1	157	288	Hori.	40.0	8.9
67.335	43.2	QP	7.4	-20.1	30.5	103	100	Vert.	40.0	9.5
149.038	39.5	QP	15.3	-18.8	36.0	230	120	Hori.	43.5	7.5
149.038	40.0	QP	15.3	-18.8	36.5	193	100	Vert.	43.5	7.0
176.250	36.7	QP	16.5	-18.3	34.9	360	244	Hori.	43.5	8.6
176.250	33.3	QP	16.5	-18.3	31.5	193	100	Vert.	43.5	12.0
433.890	40.8	QP	17.7	-17.2	41.3	351	135	Vert.	46.0	4.7
433.890	41.4	QP	17.7	-17.2	41.9	11	100	Hori.	46.0	4.1
488.130	43.6	QP	17.8	-17.1	44.3	354	145	Vert.	46.0	1.7
488.130	45.0	QP	17.8	-17.1	45.7	107	100	Hori.	46.0	0.3
515.250	42.2	QP	18.0	-17.1	43.1	153	245	Hori.	46.0	2.9
515.250	44.8	QP	18.0	-17.1	45.7	346	100	Vert.	46.0	0.3

CHART:WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN

Radiated emission (Spurious emission: above 30MHz)

DATA OF RADIATED EMISSION TEST

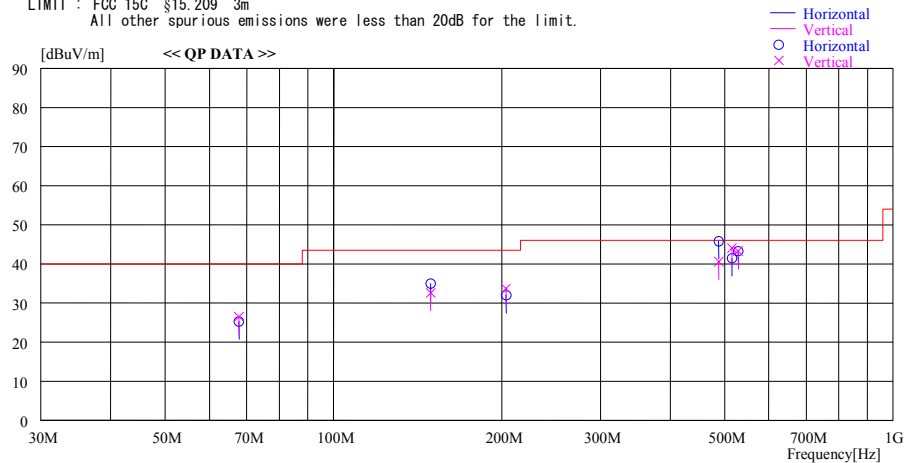
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant : OMRON Corporation
Kind of EUT : RFID System
Model No. : V670-CD1D-V1+V670-H11
Serial No. : 12 (V670-CD1D), 1 (V670-H11)

Report No. : 26DE0183-HO
Power : DC24V
Temp./Humi. : 25deg. c / 30%
Operator : Hiroka Umeyama

Mode / Remarks : Transmitting (13.56MHz)

LIMIT : FCC 15C §15.209 3m
All other spurious emissions were less than 20dB for the limit.



Frequency	Reading	DET	Antenna Factor	Loss& Gain	Level	Angle	Height	Polar.	Limit	Margin
[MHz]	[dBuV]		[dB/m]	[dB]	[dBuV/m]	[Deg]	[cm]		[dBuV/m]	[dB]
67.770	38.0	QP	7.3	-20.0	25.3	318	255	Hori.	40.0	14.7
67.770	39.2	QP	7.3	-20.0	26.5	196	100	Vert.	40.0	13.5
149.150	38.5	QP	15.3	-18.8	35.0	255	190	Hori.	43.5	8.5
149.150	36.1	QP	15.3	-18.8	32.6	358	100	Vert.	43.5	10.9
203.380	32.9	QP	17.1	-18.0	32.0	56	275	Hori.	43.5	11.5
203.380	34.6	QP	17.1	-18.0	33.7	335	100	Vert.	43.5	9.8
488.120	45.1	QP	17.8	-17.1	45.8	155	223	Hori.	46.0	0.2
488.120	39.9	QP	17.8	-17.1	40.6	165	100	Vert.	46.0	5.4
515.250	43.2	QP	18.0	-17.1	44.1	359	100	Vert.	46.0	1.9
515.250	40.6	QP	18.0	-17.1	41.5	315	165	Hori.	46.0	4.5
528.800	42.1	QP	18.2	-17.0	43.3	356	122	Vert.	46.0	2.7
528.820	42.1	QP	18.2	-17.0	43.3	160	100	Hori.	46.0	2.7

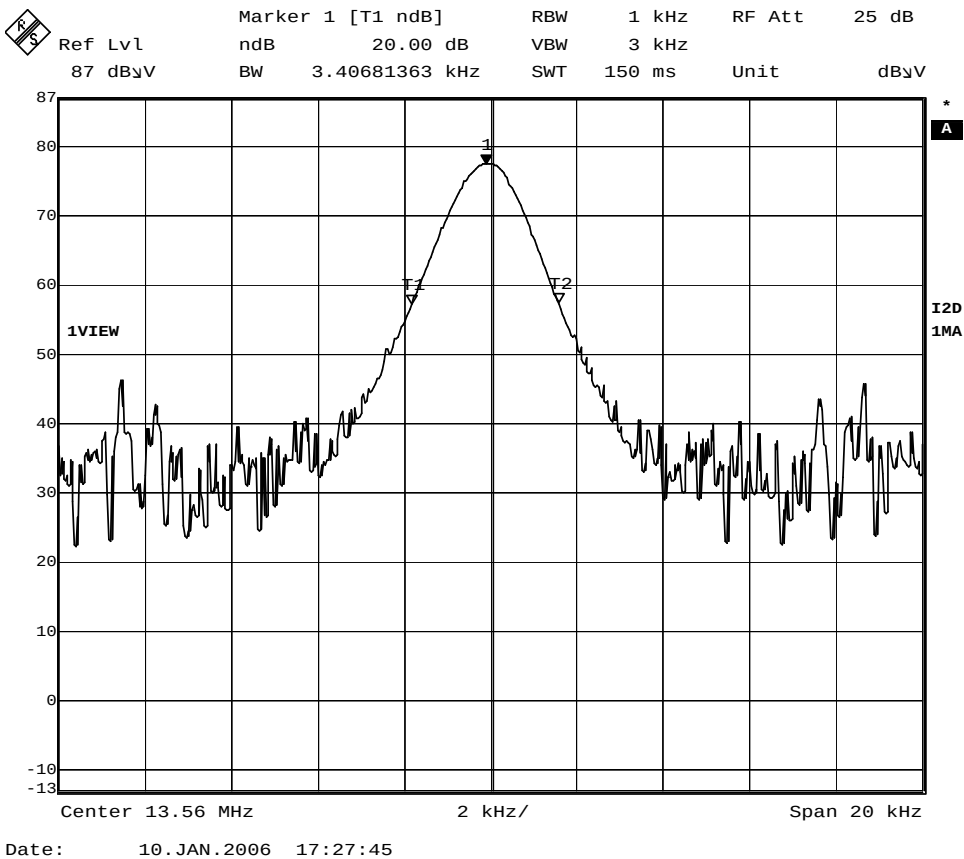
CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN

-20dB Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. No1 Semi Anechoic Chamber

COMPANY	: OMRON Corporation	REPORT NO.	: 26DE0183-HO
EQUIPMENT	: RFID System	REGULATION	: FCC 15.225
MODEL	: V670-CD1D-V1+V670-H51	TEST DISTANCE	: 3m
S/ N	: 12(V670-CD1D), 2(V670-H51)	DATE	: 01/10/2005
POWER	: DC24V	TEMPERATURE	: 22 deg.C.
MODE	: Transmitting	HUMIDITY	: 30 %
		ENGINEER	: Hiroka Umeyama

FREQ [MHz]	-20dB Bandwidth [kHz]
13.56	3.41



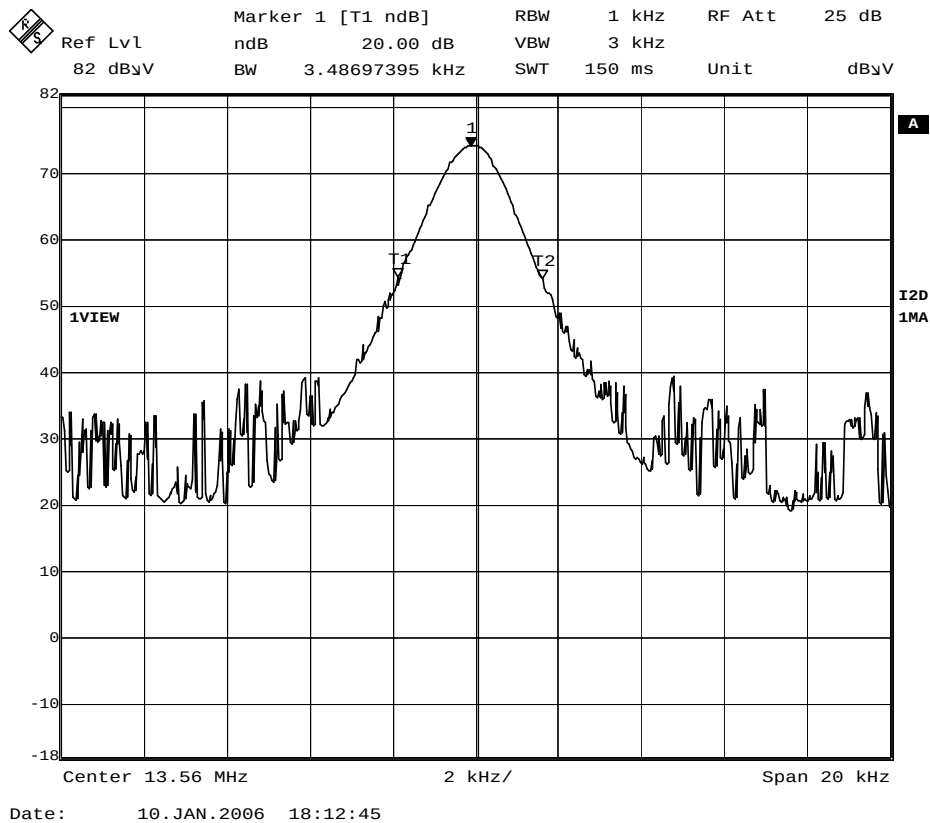
-20dB Bandwidth

UL Apex Co., Ltd.
Head Office EMC Lab. No1 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RFID System
MODEL : V670-CD1D-V1+V670-H11
S/ N : 12(V670-CD1D), 1(V670-H11)
POWER : DC24V
MODE : Transmitting

REPORT NO. : 26DE0183-HO
REGULATION : FCC 15.225
TEST DISTANCE : 3m
DATE : 01/10/2005
TEMPERATURE : 22 deg.C.
HUMIDITY : 30 %
ENGINEER : Hiroka Umeyama

FREQ [MHz]	-20dB Bandwidth [kHz]
13.56	3.49



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

MF060b(01.06.05)

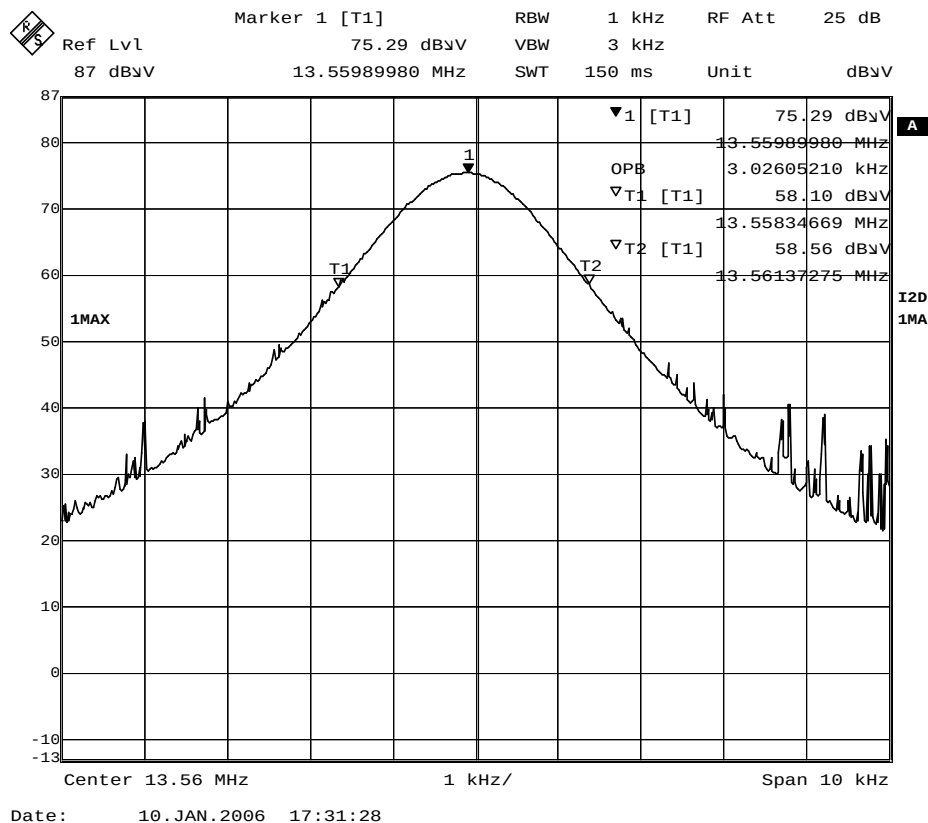
99% Occupied Bandwidth(Reference Data)

UL Apex Co., Ltd.
Head Office EMC Lab. No1 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RFID System
MODEL : V670-CD1D-V1+V670-H51
S/ N : 12(V670-CD1D), 2(V670-H51)
POWER : DC24V
MODE : Transmitting

REPORT NO. : 26DE0183-HO
REGULATION : RSS-Gen
TEST DISTANCE : 3m
DATE : 01/10/2005
TEMPERATURE : 22 deg.C.
HUMIDITY : 30 %
ENGINEER : Hiroka Umeyama

FREQ [MHz]	99% Occpied Bandwidth [kHz]
13.56	3.03



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

MF060b(01.06.05)

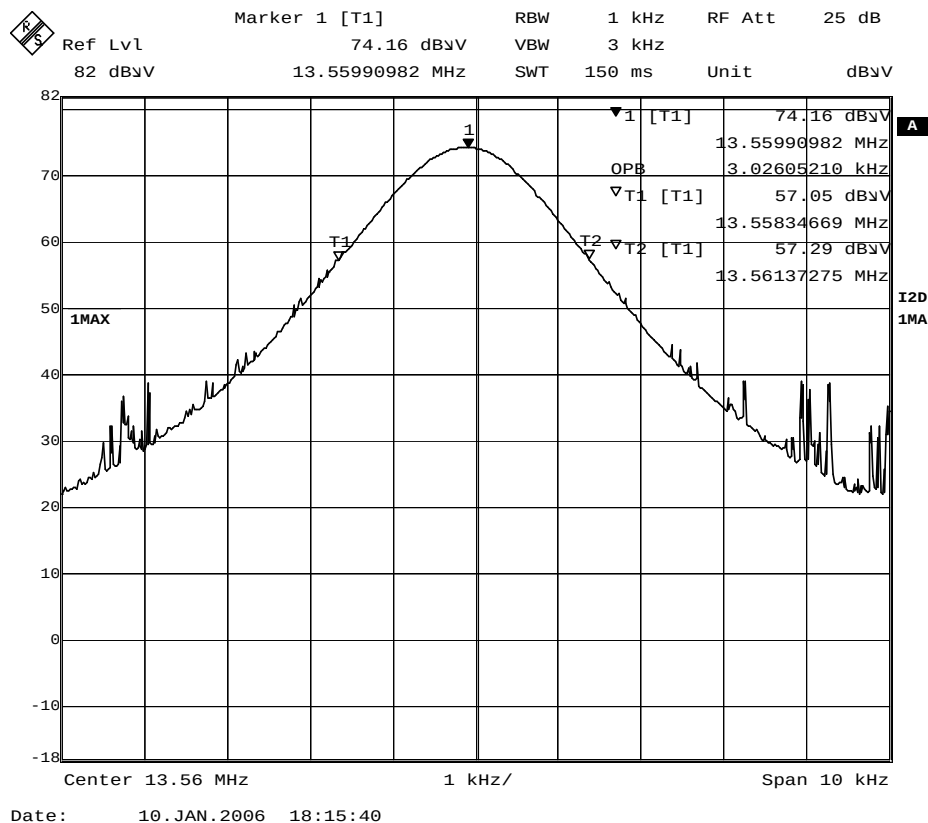
99% Occupied Bandwidth(Reference Data)

UL Apex Co., Ltd.
Head Office EMC Lab. No1 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RFID System
MODEL : V670-CD1D-V1+V670-H11
S/ N : 12(V670-CD1D), 1(V670-H11)
POWER : DC24V
MODE : Transmitting

REPORT NO. : 26DE0183-HO
REGULATION : RSS-Gen
TEST DISTANCE : 3m
DATE : 01/10/2005
TEMPERATURE : 22 deg.C.
HUMIDITY : 30 %
ENGINEER : Hiroka Umeyama

FREQ [MHz]	99% Occpied Bandwidth [kHz]
13.56	3.03



Frequency Tolerance

UL Apex Co., Ltd.
Head Office EMC Lab. No3 Shielded Room

COMPANY : OMRON Corporation
EQUIPMENT : RFID System
MODEL : V670-CD1D-V1+V670-H51
S/ N : 12(V670-CD1D), 2(V670-H51)
POWER : DC24V
MODE : Transmitting

REPORT NO. : 26DE0183-HO
REGULATION : FCC 15.225
TEST DISTANCE : 3m
DATE : 01/27/2005
TEMPERATURE : 20 deg.C.
HUMIDITY : 30 %
ENGINEER : Hiroka Umeyama

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
T nom -30°C Vnom AC120V	Power on	13.55985917	0.00001002	-10.39	100.00	99.26
	on 2min.	13.55986449	0.00003006	-9.99	100.00	97.78
	on 5min.	13.55988035	0.00009018	-8.82	100.00	93.35
	on 10min.	13.55988878	0.00009018	-8.20	100.00	93.35
* Reference Data T min -20°C Vnom AC120V	Power on	13.55988445	0.00005010	-8.52	100.00	96.31
	on 2min.	13.55992486	0.00013026	-5.54	100.00	90.39
	on 5min.	13.55992488	0.00007014	-5.54	100.00	94.83
	on 10min.	13.55992676	0.00013026	-5.40	100.00	90.39
T max 50°C Vnom AC120V	Power on	13.55987979	0.00017034	-8.86	100.00	87.44
	on 2min.	13.55988149	0.00007014	-8.74	100.00	94.83
	on 5min.	13.55988925	-0.00003006	-8.17	100.00	97.78
	on 10min.	13.55985700	0.00013026	-10.55	100.00	90.39

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
T nom 20°C Vnom AC120V	Power on	13.55991855	0.00001002	-6.01	100.00	99.26
	on 2min.	13.55991451	0.00003006	-6.30	100.00	97.78
	on 5min.	13.55991082	0.00009018	-6.58	100.00	93.35
	on 10min.	13.55990571	0.00009018	-6.95	100.00	93.35
T nom 20°C Vmin AC102V	Power on	13.55991716	0.00005010	-6.11	100.00	96.31
	on 2min.	13.55991641	0.00013026	-6.16	100.00	90.39
	on 5min.	13.55990787	0.00007014	-6.79	100.00	94.83
	on 10min.	13.55990642	0.00013026	-6.90	100.00	90.39
T nom 20°C Vmax AC138V	Power on	13.55991096	0.00017034	-6.57	100.00	87.44
	on 2min.	13.55991036	0.00007014	-6.61	100.00	94.83
	on 5min.	13.55990679	-0.00003006	-6.87	100.00	97.78
	on 10min.	13.55990565	0.00013026	-6.96	100.00	90.39

Limit : 13.56 MHz +/-0.01 % (+/- 100ppm)
+/- 0.001356 MHz

Frequency Tolerance

UL Apex Co., Ltd.
Head Office EMC Lab. No3 Shielded Room

COMPANY : OMRON Corporation EQUIPMENT : RFID System MODEL : V670-CD1D-V1+V670-H11 S/N : 12(V670-CD1D), 1(V670-H11) POWER : DC24V MODE : Transmitting	REPORT NO. : 26DE0183-HO REGULATION : FCC 15.225 TEST DISTANCE : 3m DATE : 01/27/2005 TEMPERATURE : 20 deg.C. HUMIDITY : 30 % ENGINEER : Hiroka Umeyama
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Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
T nom -30°C Vnom AC120V	Power on	13.56023289	0.00001002	17.17	100.00	99.26
	on 2min.	13.56023072	0.00003006	17.01	100.00	97.78
	on 5min.	13.56022537	0.00009018	16.62	100.00	93.35
	on 10min.	13.56022481	0.00009018	16.58	100.00	93.35
* Reference Data						
T min -20°C Vnom AC120V	Power on	13.56021359	0.00005010	15.75	100.00	96.31
	on 2min.	13.56020877	0.00013026	15.40	100.00	90.39
	on 5min.	13.56019085	0.00007014	14.07	100.00	94.83
	on 10min.	13.56019035	0.00013026	14.04	100.00	90.39
T max 50°C Vnom AC120V	Power on	13.55962033	0.00017034	-28.00	100.00	87.44
	on 2min.	13.55988434	0.00007014	-8.53	100.00	94.83
	on 5min.	13.55988959	-0.00003006	-8.14	100.00	97.78
	on 10min.	13.55989266	0.00013026	-7.92	100.00	90.39

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
T nom 20°C Vnom AC120V	Power on	13.55990110	0.00001002	-7.29	100.00	99.26
	on 2min.	13.55986753	0.00003006	-9.77	100.00	97.78
	on 5min.	13.55986091	0.00009018	-10.26	100.00	93.35
	on 10min.	13.55984835	0.00009018	-11.18	100.00	93.35
T nom 20°C Vmin AC102V	Power on	13.55990229	0.00005010	-7.21	100.00	96.31
	on 2min.	13.55987899	0.00013026	-8.92	100.00	90.39
	on 5min.	13.55985280	0.00007014	-10.86	100.00	94.83
	on 10min.	13.55984740	0.00013026	-11.25	100.00	90.39
T nom 20°C Vmax AC138V	Power on	13.55987138	0.00017034	-9.49	100.00	87.44
	on 2min.	13.55986027	0.00007014	-10.30	100.00	94.83
	on 5min.	13.55984974	-0.00003006	-11.08	100.00	97.78
	on 10min.	13.55984509	0.00013026	-11.42	100.00	90.39

Limit : 13.56 MHz +/-0.01 % (+/- 100ppm)
+/- 0.001356 MHz