

RADIO TEST REPORT

Test Report No.: 26IE0050-HO-A

Applicant : OMRON Corporation
Type of Equipment : Kanban Reader (RFID System)
Model No. : 4S2VR-V720-KR11B
Test standard : FCC Part 15 Subpart C : 2006
Section 15.207 and 15.225
FCC ID : E4E6CYSID4S2V0106
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.
4. The test results in this report are traceable to the national or international standards.

Date of test:

April 13 and 24, 2006

Tested by:



Makoto Kosaka
EMC Services

Approved by :



Naoki Sakamoto
Group Leader of
EMC Services

UL Apex Co., Ltd.

Head Office EMC Lab.

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MF060b(19.04.06)

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SECTION 1: Client information

Company Name : OMRON Corporation
Brand or Trade name : OMRON
Address : Gatecity Ohsaki, West tower 14F, 1-11-1, Ohsaki, Shinagawa-ku, Tokyo, 141-0032
Japan
Telephone Number : +81-3-5435-2063
Facsimile Number : +81-3-5435-9415
Contact Person : Hiroshi Otsuka

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

2.1 Identification of E.U.T.

Type of Equipment : Kanban Reader (RFID System)
Model No. : 4S2VR-V720-KR11B
Serial No. : B0254
Country of Manufacture : Japan
Receipt Date of Sample : March 14, 2006
Condition of EUT : Production model
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab

2.2 Product Description

Model No: 4S2VR-V720-KR11B is the Kanban Reader (RFID System).
The clock frequency of EUT is 25MHz (CPU).

Equipment Type : Transceiver
Frequency band : 13.553-13.567 MHz
Frequency of Operation : 13.56 MHz
Type of modulation : ASK (Bit rate:26.4803KBPS)
Power control : No
Mode of operation : Simplex
Antenna Type : PWB Pattern Antenna
Method of Frequency Generation : Crystal
Operating voltage : DC5.0V +/-0.25

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part15 Subpart C : 2006
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)

Testing of the variation of the input power (85% and 115% of DC5.0V) was performed. Please refer to the Page 22 for details.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. 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	Results
1	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A	8.1dB 0.25638MHz N, AV	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	Radiated	N/A	74.9dB 13.56000MHz	Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	Radiated	N/A	42.8dB 12.71100MHz, QP	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	10.0dB 40.680MHz, Vert., QP	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	RSS-Gen 4.4.1	Radiated	N/A	N/A	Complied

3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ± 2.6 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 ± 4.1 dB(3m)/ ± 4.39 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.59 dB(3m)/ ± 4.58 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 4.62 dB(3m)/ ± 4.60 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 5.27 dB.

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

Other test except Conducted Emission and Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test is ± 3.0 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: 2006 Section 15.225.

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3.6 Test Location

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

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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 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	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247A-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 shielded room	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	N/A	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	N/A	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 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.7 shielded room.

3.7 Test set up, Test instruments and Data of EMI

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 was operated in a manner similar to typical use during the tests.

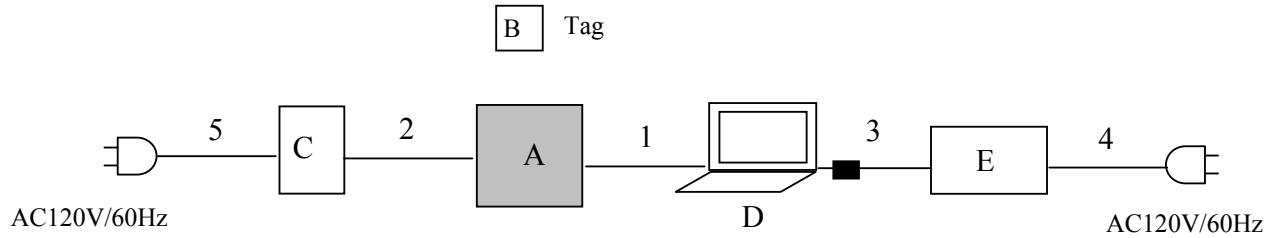
The mode is used : Communication mode (Transmitting) with Tag

Frequency Tolerance:

- Temperature for the extreme tests : -20 deg.C.(minimum) to + 50deg.C.(maximum)
- Voltage for the extreme tests : DC 5.0V +/-15%

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

4.2 Configuration and peripherals



■ : Ferrite Core (Standard attachment)

- *Cabling and setup were taken into consideration and test data was taken under worse case conditions.
- *The EUT is supplied with the power from C (DC Power Supply).

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Kanban Reader	4S2VR-V720-KR11B	B0254	OMRON Corporation	EUT
B	RF tag	4S2VR-V720-D13P01ST	-	OMRON Corporation	-
C	DC Power supply	S82K-00705	-	OMRON Corporation	-
D	Note PC	CF-LIEA	0DKSB09673	Panasonic	-
E	AC Adapter	CF-AA1639	000451726A	Panasonic	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	RS-232C Cable	5.0	Shielded	Shielded	-
2	Power supply cable	3.0	Shielded	Shielded	-
3	AC Cable	1.8	Unshielded	Unshielded	With one ferrite core
4	AC Cable	1.8	Unshielded	Unshielded	-
5	AC Cable	3.0	Unshielded	Unshielded	-

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SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.2 semi anechoic chamber.
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1m by 0.5m, 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 : See clause 4.1

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 : April 24, 2006 Test engineer : Makoto Kosaka

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, Y and Z axis of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

* 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])

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

Front



Rear



Radiated emission
Front



Rear



Worst Case Position (Z-axis)

X-axis



Y-axis



Z-axis



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
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE	2005/12/06 * 12
MCC-31	Coaxial cable	ULApex	-	RE	2005/06/02 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/TSJ	-	RE	2005/12/18 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2005/05/24 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2005/11/10 * 12
MOS-01	Digital Humidity Indicator	N.T	NT-1800	RE	2004/11/25 * 24
MRENT-23	Spectrum Analyzer	Advantest	R3273	FT	2006/01/10 * 12
MCC-08	coaxial cable	-	-	FT	2005/09/07 * 12
MCC-30	coaxial cable	ULApex	-	FT	2005/06/02 * 12
MCH-01	Temperature and Humidity Chamber	Tabai Espec	PL-2KP	FT	2005/12/19 * 12
MOS-04	Digital Humidity Indicator	N.T	NT-1800	FT	2004/11/25 * 24
MAEC-04	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	CE	2006/03/06 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	CE (EUT)	2006/02/06 * 12
MLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE(AE)	2006/02/06 * 12
MTA-05	Terminator	MCL	NTRM-50	CE	2006/02/06 * 12
MCC-50	Coaxial cable	UL Apex	-	CE	2006/03/09 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	CE	2006/02/02 * 12
MSA-05	Spectrum Analyzer	Agilent	E4408B	CE	2006/03/25 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	CE	2006/01/19 * 24
MSTW-14	EMI Measurement software	TSJ	TEPTO-DV	CE / RE	-

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

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APPENDIX 3: Data of EMI test

Conducted emission

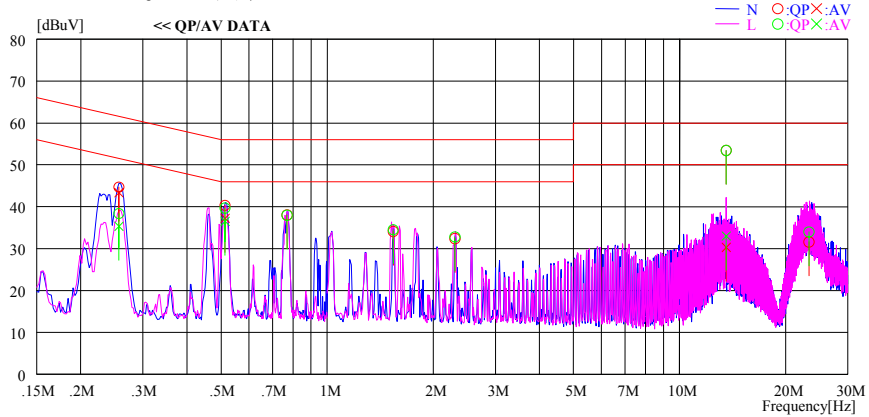
DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
 Date : 2006/04/24 13:30:20

Company : OMRON Corporation
 Kind of EUT : Kanban Reader (RFID System)
 Model No. : 4S2VR-V720-KR11B
 Serial No. : B0254
 Report No. : 26IE0050-HO
 Power : AC120V / 60Hz (EUT DC 5.0V)
 Temp./Humi. : 24deg. C / 41%
 Operator : Makoto Kosaka

Mode / Remarks : Tx 13.56MHz Tag Communication

LIMIT : FCC15C § 15.207 (QP) / RSS-Gen
 FCC15C § 15.207 (AV) / RSS-Gen



Frequency [MHz]	Reading Level		Corr. Factor	Results		Limit		Margin		Phase
	QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dB]	AV [dB]	
0.25638	44.6	43.3	0.1	44.7	43.4	61.5	51.5	16.8	8.1	N
0.51300	40.0	36.9	0.3	40.3	37.2	56.0	46.0	15.7	8.8	N
0.76925	37.8	---	0.3	38.1	---	56.0	---	17.9	---	N
1.53750	33.8	---	0.3	34.1	---	56.0	---	21.9	---	N
2.30600	32.1	---	0.3	32.4	---	56.0	---	23.6	---	N
23.26675	30.0	---	1.6	31.6	---	60.0	---	28.4	---	N
0.25638	38.3	35.2	0.1	38.4	35.3	61.5	51.5	23.1	16.2	L
0.51300	39.4	36.2	0.3	39.7	36.5	56.0	46.0	16.3	9.5	L
0.76925	37.7	---	0.3	38.0	---	56.0	---	18.0	---	L
1.53750	34.2	---	0.3	34.5	---	56.0	---	21.5	---	L
2.30600	32.5	---	0.3	32.8	---	56.0	---	23.2	---	L
23.26675	32.4	---	1.6	34.0	---	60.0	---	26.0	---	L

CHART: WITH FACTOR, Peak hold data. Data is uncorrected. CALCULATION: RESULT=READING+C.F (L1SN LOSS+CABLE LOSS)
 Except for the above table : adequate margin data below the limits.

Radiated emission(Fundamental emission and Spectrum Mask)

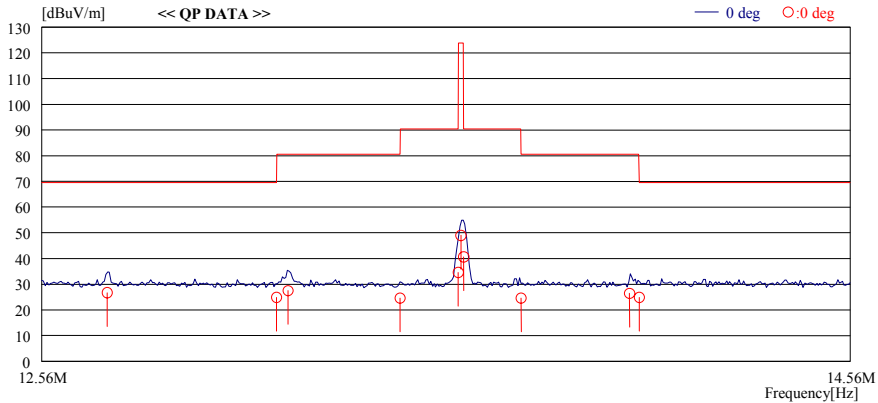
DATA OF MAGNETIC RADIATED EMISSION TEST

UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2006/04/13 16:33:34

Applicant : OMRON Corporation
Kind of EUT : Kanban Reader (RFID System)
Model No. : 4S2VR-V720-KR11B
Serial No. : B0254
Report No. : 261E0050-HO
Power : AC120V/60Hz (EUT DC 5.0V)
Temp./Humi. : 20deg.C. / 58%
Operator : Makoto Kosaka

Mode / Remarks : Tx 13.56MHz Tag Communications Z-axis(worst)

LIMIT : FCC15C §15.225, 3m
Except for the data below : adequate margin data below the limits.



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[deg]	[deg]
12.71100	33.0	QP	20.4	1.2	27.9	26.7	69.5	42.8	0deg	167
13.11000	31.2	QP	20.4	1.2	27.9	24.9	69.5	44.6	0deg	167
13.13795	33.7	QP	20.4	1.2	27.9	27.4	80.5	53.1	0deg	167
13.41000	30.9	QP	20.4	1.2	27.9	24.6	80.5	55.9	0deg	167
13.55300	40.7	QP	20.5	1.2	27.9	34.5	90.4	55.9	0deg	167
13.56000	55.1	QP	20.5	1.3	27.9	49.0	123.9	74.9	0deg	167
13.56700	46.7	QP	20.5	1.3	27.9	40.6	90.4	49.8	0deg	167
13.71000	30.7	QP	20.5	1.3	27.9	24.6	80.5	55.9	0deg	167
13.98454	32.5	QP	20.5	1.3	27.9	26.4	80.5	54.1	0deg	167
14.01000	30.9	QP	20.5	1.3	27.9	24.8	69.5	44.7	0deg	167

CHART : WITH FACTOR ANT TYPE : LOOP
CALCULATION : READING + ANT FACTOR + LOSS (CABLE + ATTEN. -AMP.)

Page:

Radiated emission (Spurious emission : below 30MHz)

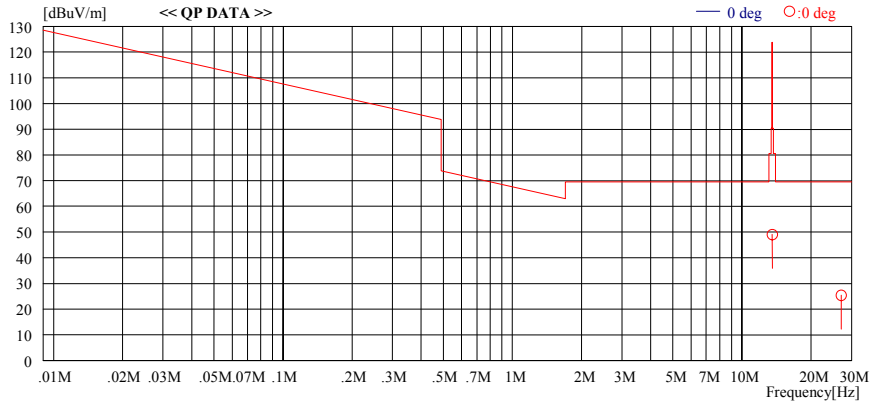
DATA OF MAGNETIC RADIATED EMISSION TEST

UL Apex Co., LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2006/04/13 16:29:57

Applicant : OMRON Corporation Report No. : 261E0050-HO
Kind of EUT : Kanban Reader (RFID System) Power : AC120V/60Hz (EUT DC 5.0V)
Model No. : AS2VR-V720-KR11B Temp./Humi. : 20deg.C / 58%
Serial No. : B0254 Operator : Makoto Kosaka

Mode / Remarks : Tx 13.56MHz Tag Communications Z-axis(worst)

LIMIT : FCC15C §15.225, 3m
Except for the data below : adequate margin data below the limits.



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table
[MHz]	[dBuV]		[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]		[deg]
13.56000	55.1	QP	20.5	1.3	27.9	49.0	123.9	74.9	0deg	167
27.12000	30.1	QP	21.3	1.9	28.0	25.3	69.5	44.2	0deg	167

CHART : WITH FACTOR ANT TYPE : LOOP
CALCULATION : READING + ANT FACTOR + LOSS (CABLE + ATTEN. -AMP.)

Page:

Radiated emission (Spurious emission: above 30MHz)

DATA OF RADIATED EMISSION TEST

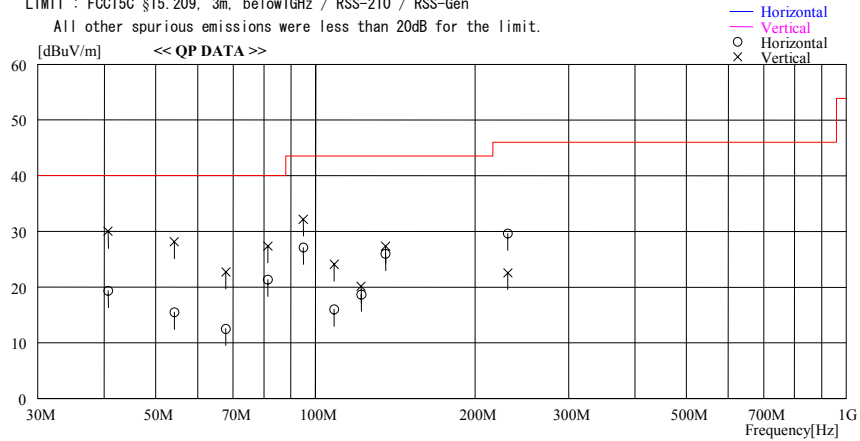
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2006/04/13 19:19:04

Company : OMRON Corporation Report No. : 26IE0050-HO
Kind of EUT : Kanban Reader (RFID System) Power : AC120V/60Hz (EUT DC 5.0V)
Model No. : 4S2VR-V720-KR11B Temp./Humi. : 20deg.C / 58%
Serial No. : B0254 Operator : MakoTo Kosaka

Mode / Remarks : Tx 13.56MHz Tag Communications Z-axis(worst)

LIMIT : FCC15C §15.209, 3m, below1GHz / RSS-210 / RSS-Gen

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



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss& Gain [dB]							
40.680	26.2	QP	13.7	-20.5	19.4	183	308	Hori.	40.0	20.6	
40.680	36.8	QP	13.7	-20.5	30.0	115	100	Vert.	40.0	10.0	
54.240	25.9	QP	9.7	-20.1	15.5	1	291	Hori.	40.0	24.5	
54.240	38.5	QP	9.7	-20.1	28.1	0	100	Vert.	40.0	11.9	
67.800	25.0	QP	7.3	-19.8	12.5	218	291	Hori.	40.0	27.5	
67.800	35.2	QP	7.3	-19.8	22.7	113	100	Vert.	40.0	17.3	
81.360	33.8	QP	7.1	-19.6	21.3	166	291	Hori.	40.0	18.7	
81.360	39.9	QP	7.1	-19.6	27.4	111	100	Vert.	40.0	12.6	
94.920	36.7	QP	9.6	-19.2	27.1	280	303	Hori.	43.5	16.4	
94.920	41.8	QP	9.6	-19.2	32.2	117	100	Vert.	43.5	11.3	
108.480	23.4	QP	11.7	-19.1	16.0	280	303	Hori.	43.5	27.5	
108.480	31.5	QP	11.7	-19.1	24.1	163	100	Vert.	43.5	19.4	
122.040	24.2	QP	13.3	-18.8	18.7	280	303	Hori.	43.5	24.8	
122.040	25.7	QP	13.3	-18.8	20.2	149	100	Vert.	43.5	23.4	
135.600	30.2	QP	14.4	-18.6	26.0	280	303	Hori.	43.5	17.5	
135.600	31.6	QP	14.4	-18.6	27.4	353	100	Vert.	43.5	16.1	
230.520	29.6	QP	17.2	-17.2	29.6	253	189	Hori.	46.0	16.4	
230.520	22.6	QP	17.2	-17.2	22.6	163	100	Vert.	46.0	23.4	

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION: RESULT = READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - GAIN (AMP)

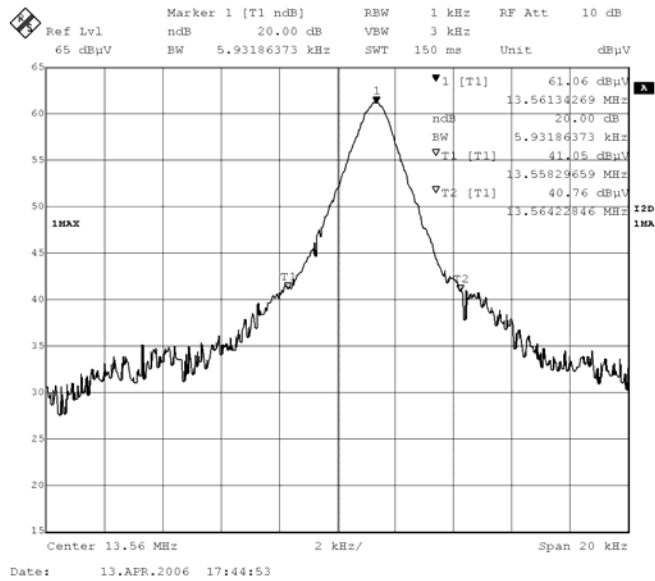
-20dB Bandwidth

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

COMPANY : OMRON Corporation
EQUIPMENT : Kanban Reader(RFID System)
MODEL : 4S2VR-V720-KR11B
S/ N : B0254
POWER : DC5V(AC120V/60Hz)
MODE : Tx 13.56MHz Tag Communications

REPORT NO. : 26IE0050-HO
REGULATION : FCC 15.225
TEST DISTANCE : 3m
DATE : 04/13/2006
TEMPERATURE : 20 deg.C.
HUMIDITY : 58 %
ENGINEER : Makoto Kosaka

FREQ [MHz]	-20dB Bandwidth [kHz]
13.56	3.55



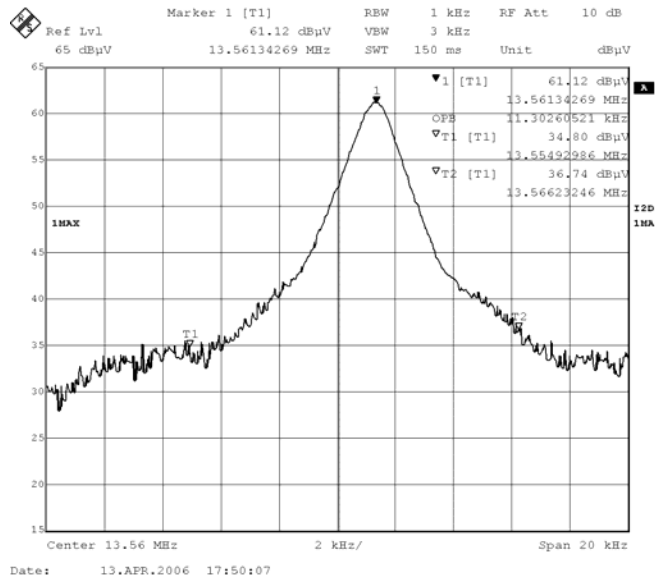
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99% Occpied Bandwidth

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

COMPANY : OMRON Corporation	REPORT NO. : 26IE0050-HO
EQUIPMENT : Kanban Reader(RFID System)	REGULATION : RSS-Gen 4.4.1
MODEL : 4S2VR-V720-KR11B	TEST DISTANCE : 3m
S/ N : B0254	DATE : 04/13/2006
POWER : DC5V(AC120V/60Hz)	TEMPERATURE : 20 deg.C.
MODE : Tx 13.56MHz Tag Communications	HUMIDITY : 58 %
	ENGINEER : Makoto Kosaka

FREQ [MHz]	99% Occpied Bandwidth [kHz]
13.56	7.69



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Frequency Tolerance

UL Apex Co., Ltd.
No.7 Measurement room

COMPANY : OMRON Corporation
EQUIPMENT : Kanban Reader(RFID System)
MODEL : 4S2VR-V720-KR11B
S/N : B0254
POWER : DC5V(AC120V/60Hz)
MODE : Tx 13.56MHz Tag Communications

REPORT NO : 26IE0050-HO
REGULATION : FCC 15.225 (e)
TEST DISTANCE : -
DATE : 04/18/2006
TEMPERATURE : 20 deg.C.
HUMIDITY : 58 %
ENGINEER : Makoto Kosaka

Test Condition	Test Timing	Measured freq [MHz]	Freq error [MHz]	Result [ppm]	Limit (+/- 0.01%) [+/- ppm]	Margin [ppm]
T nom 20deg.C Vmax DC5.75V (115%)	Power on	13.56127900	0.00127900	94.32	100.00	5.68
	on 2min.	13.56126800	0.00126800	93.51	100.00	6.49
	on 5min.	13.56126400	0.00126400	93.22	100.00	6.78
	on 10min.	13.56126200	0.00126200	93.07	100.00	6.93
T nom 20deg.C Vnom DC5.0V (100%)	Power on	13.56125200	0.00125200	92.33	100.00	7.67
	on 2min.	13.56125300	0.00125300	92.40	100.00	7.60
	on 5min.	13.56125400	0.00125400	92.48	100.00	7.52
	on 10min.	13.56125400	0.00125400	92.48	100.00	7.52
T nom 20deg.C Vmin DC4.25V (85%)	Power on	13.56123800	0.00123800	91.30	100.00	8.70
	on 2min.	13.56124200	0.00124200	91.59	100.00	8.41
	on 5min.	13.56124300	0.00124300	91.67	100.00	8.33
	on 10min.	13.56124400	0.00124400	91.74	100.00	8.26
T max 50°C Vnom DC5.0V (100%)	Power on	13.56115900	0.00115900	85.47	100.00	14.53
	on 2min.	13.56116000	0.00116000	85.55	100.00	14.45
	on 5min.	13.56115900	0.00115900	85.47	100.00	14.53
	on 10min.	13.56115700	0.00115700	85.32	100.00	14.68
T min -20deg.C Vnom DC5.0V (100%)	Power on	13.56130200	0.00130200	96.02	100.00	3.98
	on 2min.	13.56130200	0.00130200	96.02	100.00	3.98
	on 5min.	13.56130100	0.00130100	95.94	100.00	4.06
	on 10min.	13.56130200	0.00130200	96.02	100.00	3.98
T min -30deg.C Vnom DC5.0V (100%)	Power on	13.56130100	0.00130100	95.94	100.00	4.06
	on 2min.	13.56129300	0.00129300	95.35	100.00	4.65
	on 5min.	13.56128400	0.00128400	94.69	100.00	5.31
	on 10min.	13.56126700	0.00126700	93.44	100.00	6.56

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