RADIO TEST REPORT

Test Report No. : 26KE0261-HO-A

Applicant	:	**OMRON Corporation**
Type of Equipment	:	**Long-Range RFID Reader/Writer Antenna**
Model No.	:	**Reader/Writer : V720S-BC5D4A-US Antenna: V720-HS04**
Test standard	:	**FCC Part 15 Subpart C : 2006 Section 15.207 and 15.225**
FCC ID	:	**OZGV720SBC5D4A-US**
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: July 19 to August 1, 2006

Tested by:

Hiroka Umeyama	Yutaka Yoshida	Yasuyuki Fukui
EMC Services	EMC Services	EMC Services

Approved by :

Naoki Sakamoto
Group Leader of
EMC Services

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address, http://ulapex.jp/emc/nvlap.htm

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CONTENTS **PAGE**

SECTION 1: Client information

Company Name	:	OMRON Corporation
Address	:	2-2-1 Nishikusatsu Kusatsu-shi, Shiga-ken, 525-0035 Japan
Telephone Number	:	+81-77-565-5202
Facsimile Number	:	+81-77-565-5553
Contact Person	:	YUKIO OGAWA

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

2.1 Identification of E.U.T.

Type of Equipment	:	Long-Range RFID Reader/Writer Antenna
Model No.	:	Reader/Writer: V720S-BC5D4A-US Antenna: V720-HS04
Serial No.	:	Reader/Writer: SR060501 Antenna: SA060501
Country of Manufacture	:	Japan
Receipt Date of Sample	:	July 6, 2006
Condition of EUT	:	Production prototype (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: V720S-BC5D4A-US is the Long-Range RFID Reader/Writer.
V720-HS04 is the Antenna.
The clock frequency of EUT is 16MHz, 1.8432MHz and 13.56MHz.

Equipment Type	:	Transceiver
Frequency of operation	:	13.56MHz
Frequency band	:	13.553 – 13.567MHz
Type of modulation	:	ASK
Bandwidth	:	188kHz
Antenna Type	:	Loop Antenna
Antenna Connector Type	:	Reverse BNC
Method of Frequency Generation	:	Crystal
Operating voltage (inner)	:	DC24V +/-10%, DC18V, 15V, 5V (RF module)
Operating Temperature	:	-10 deg. C. to +50 deg. C. (V720S-BC5D4A-US) -10 deg. C. to +55 deg. C. (V720-HS04)

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)
This EUT provides stable voltage(DC18V, 15V, 5V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement
The EUT has a unique coupling/antenna connector (Reverse BNC). Therefore the equipment complies with requirement of 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	2.8dB 13.55985MHz AV, L	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(a)	Radiated	N/A	15.3dB 13.55993MHz 90deg, QP	Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.225(b)(c)	Radiated	N/A	20.0dB 13.41000MHz 90deg, PK	Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.215(c)	Conducted	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	1.0dB 298.319MHz Horizontal, QP	Complied
6	Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.225(e)	Conducted	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.

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 ±2.6dB.
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 ±4.41dB(3m)/ ±4.39dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.59dB(3m)/ ±4.58dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±4.62dB(3m)/ ±4.60dB(10m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±5.27dB.
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 ±3.0dB.

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.

3.6 Test Location

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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 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	2.0 x 2.0 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 5.4 m	-
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, No.2, No.3 and No.4 semi-anechoic chambers and No.7 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

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

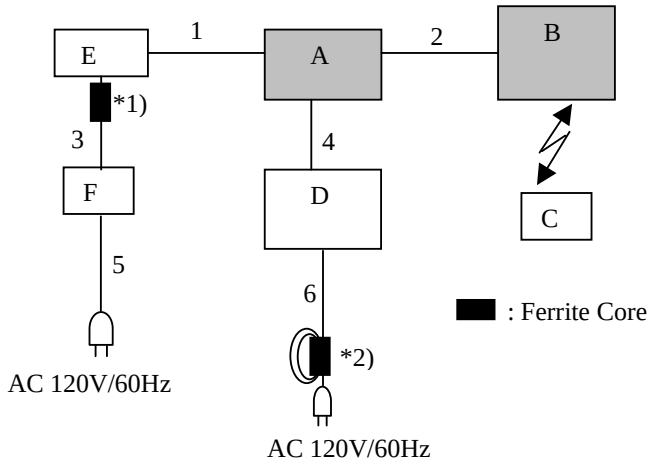
The mode is used : 13.56MHz Transmitting mode with Tag.

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

Frequency Tolerance:

Temperature for the extreme tests	:	-20 deg.C.(minimum) to + 50deg.C.(maximum)
Voltage for the extreme tests	:	AC102V, AC120V, AC138V

4.2 Configuration and peripherals



* Cabling and setup were taken into consideration and test data was taken under worse case conditions.
*1) Standard attachment of E. PC
*2) The ferrite core (model:ZCAT3035-1330, manufacturer:TDK) is attached to the cable of DC power supply (at the side of AC Mains) recommended by the manufacturer, OMRON Corporation.
The ferrite core is included in the same packge of EUT when it is placed on the market.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Long- Range RFID Reader/Writer	V720S-BC5D4A	SR060501	OMRON	EUT
B	Antenna	V720-HS04	SA060501	OMRON	EUT
C	Tag	V720S-D13P01	-	OMRON	-
D	DC Power Supply	S82K-05024	17Z2P2	OMRON	-
E	PC	2640-40J	97-0938D	IBM	-
F	AC Adapter	85G6706	1M9DA014404	IBM	-

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	RS-232C Cable	3.0	Shielded	Shielded
2	Antenna Cable	3.35	Shielded	Shielded
3	DC Cable	1.8	Unshielded	Unshielded
4	DC Cable	3.0	Unshielded	Unshielded
5	AC Cable	1.1	Unshielded	Unshielded
6	AC Cable	1.4	Unshielded	Unshielded

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 urethane 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 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 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

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

6.2 Test Procedure

The Radiated Electric Field Strength intensity has been measured in a semi anechoic chamber with a ground plane and at the distance of 10 and 3m.

Frequency : From 9kHz to 30MHz at distance 10m
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 test was made on EUT at the normal use 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])

6.3 Test result

Summary of the test results : Pass

SECTION 7: -20dB Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : **APPENDIX 2**
Test result : **Pass**

SECTION 8: 99% Occupied Bandwidth

Test Procedure

The bandwidth was measured with a spectrum analyzer connected to the antenna port.

Test data : **APPENDIX 2**
Test result : **Pass**

SECTION 9: Frequency Tolerance

Test Procedure

The Frequency Tolerance was measured with a spectrum analyzer connected to the antenna port.

Test data : **APPENDIX 2**
Test result : **Pass**