RADIO TEST REPORT

Test Report No. : 28CE0226-HO-01-A

Applicant	:	**OMRON Corporation**
Type of Equipment	:	**Reader/Writer**
Model No.	:	**V720S-HMU01**
Test standard	:	**FCC Part 15 Subpart C : 2007 Section 15.207 and 15.225**
FCC ID	:	**OZGV720SHMU01**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with above regulation.
4. The test results in this report are traceable to the national or international standards.

Date of test: November 20 and 21, 2007

Tested by: T. Hatakeda
Takahiro Hatakeda
EMC Services

Approved by : M. Fujimura
Mitsuru Fujimura
EMC Services

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SECTION 1: Client information

Company Name	:	OMRON Corporation
Address	:	2-2-1, NISHIKUSATSU, KUSATSU-CITY, SHIGA-PREF., 569-1132 Japan
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Contact Person	:	Jun Shishido

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

2.1 Identification of E.U.T.

Type of Equipment	:	Reader/Writer
Model No.	:	V720S-HMU01
Serial No.	:	26X6RB
Country of Manufacture	:	Japan
Receipt Date of Sample	:	November 15, 2007
Condition of EUT	:	Production model
Modification of EUT	:	No modification by the test lab.

2.2 Product Description

Model No: V720S-HMU01 is the Reader/Writer.
Clock frequency in the system is 13.56MHz (CPU).

Equipment Type	:	Transceiver
Frequency of Operation	:	13.56MHz
Frequency Band	:	13.553MHz to 13.567MHz
Type of Modulation	:	ASK
Antenna Type	:	Loop antenna
Antenna Gain	:	-64 dBi
Power Supply	:	DC 5.0V (Supplied by USB I/F)

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part15 Subpart C : 2007
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(DC5.0V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

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 <IC>RSS-Gen 7.2.2	Section 15.207 <IC>RSS-Gen 7.2.2	-	N/A	9.7dB 27.12000MHz AV, L	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8, 4.11	Section 15.225(a) <IC>RSS-210 A2.6	Radiated	N/A	67.7dB 13.56270MHz QP, 0deg.	Complied
3	Spectrum Mask	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.9, 4.11	Section 15.225(b)(c) <IC> RSS-210 A2.6	Radiated	N/A	37.9dB 13.11000MHz QP, 0deg.	Complied
4	20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	Section15.215(c) <IC> -	Radiated	N/A	See data	Complied
5	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.9, 4.11	Section15.209, Section 15.225 (d) <IC>RSS-210 A2.6	Radiated	N/A	3.2dB 366.114MHz/ 271.205MHz QP, Horizontal	Complied
6	Frequency Tolerance	ANSI C63.4:2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.7	Section15.225(e) <IC> RSS-210 A2.6	Radiated	N/A	See data	Complied
Note: UL Japan, Inc.'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 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	Complied

3.4 Uncertainty

The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz <
No.1 semi-anechoic chamber	±3.7dB	±3.1dB	±4.7dB	±4.4dB	±3.2dB	±3.7dB	±4.4dB	±5.9dB
No.2 semi-anechoic chamber	±3.7dB	-	-	-	±3.2dB	±4.3dB	±3.9dB	±5.9dB
No.3 semi-anechoic chamber	±3.7dB	-	-	-	±3.2dB	±4.2dB	±4.4dB	±5.9dB
No.4 semi-anechoic chamber	±3.7dB	-	-	-	±3.2dB	±4.2dB	±4.4dB	±5.9dB

*10m/3m = Measurement distance

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

Radiated emission test(3m and/or 10m)
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 for this test is ±3.0dB.

3.5 Test Location

UL Japan, Inc. 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	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
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	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 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	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	N/A	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* 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.3 and No.4 shielded rooms.

3.6 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

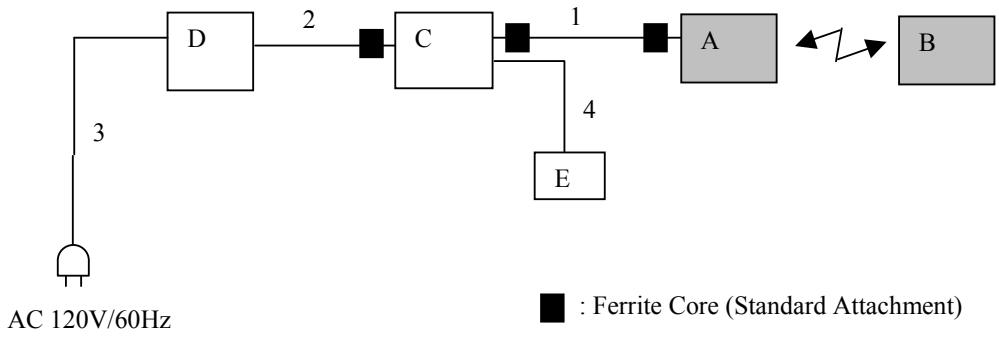
4.1 Operating Modes

The mode is used : (1) Transmitting with Tag
(2) Transmitting without Tag
(3) Standby (Used for Conducted emission test only)

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

Frequency Tolerance:
Temperature for the extreme tests : -30 deg.C.(minimum) to + 50deg.C.(maximum)
(-30deg.C.: Reference, Step 10deg.C.)
Voltage for the extreme tests : DC 5.0V
*This EUT provides stable voltage(DC5.0V) constantly to RF Module regardless of input voltage.

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Reader/Writer	V720S-HMU01	26X6RB	OMRON Corporation	EUT
B	Tag	V720S-D13P30	-	OMRON Corporation	EUT
C	Personal Computer	Type 2388	KM-09212 0305	IBM	-
D	AC adapter	02K7089	11S02K7089Z1Z6C4 4CX5FU	IBM	-
E	USB Mouse	M-UB48	LZE02650788	Logitech	-

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	USB cable	1.0	Shielded	Shielded
2	DC cable	1.8	Unshielded	Unshielded
3	AC cable	1.0	Unshielded	Unshielded
4	USB cable	0.8	Shielded	Shielded

SECTION 5: Conducted emission

5.1 Operating environment

Test place : No.4 semi anechoic chamber.
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m 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 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.4 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 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 axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

* FCC Part 15 Section 15.31 (f)(2) / IC RSS-Gen 4.11 (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 measurement was performed under the condition which has the maximum Electric field strength.

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

SECTION 8: Frequency Tolerance

Test Procedure

The measurement was performed with Electric field strength using a spectrum analyzer.

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

SECTION 9: 99% Occupied Bandwidth

Test Procedure

The measurement was performed under the condition which has the maximum Electric field strength.

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