

EMI TEST REPORT

Test Report No. : 26LE0001-HO-A

Applicant : **OMRON Corporation**

Type of Equipment : **Radio Identification System
RFID Reader/Writer, Antenna**

Model No. : **RFID Reader : V750-BA50C04-US
Antenna : V750-HS01CA, V750-HS01LA**

Test standard : **FCC Part 15 Subpart C
Section 15.207, Section 15.247: 2006**

FCC ID : **OZGV750-BA50C04**

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 the 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.

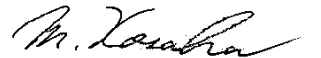
Date of test:

August 2 to 8, 2006

Tested by:



Yutaka Yoshida
EMC Services



Makoto Kosaka
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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SECTION 1: Client information

Company Name : OMRON Corporation
Address : 2-2-1, Nishikusatsu, Kusatsu-city, Shiga-pref., 525-0035 Japan
Telephone Number : +81-77-565-5287
Facsimile Number : +81-77-565-5553
Contact Person : Kazushi Yamasaki

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

2.1 Identification of E.U.T.

Type of Equipment : Radio Identification System(Reader/Writer and Antenna)
Model No. : RFID Reader/Writer: V750-BA50C04-US
ANTENNA: V750-HS01CA, V750-HS01LA
Serial No. : RFID Reader/Writer: RF-DS-06001
ANTENNA(V750-HS01CA): P6010047
ANTENNA(V750-HS01LA): P0605002
Rating : AC100 to 240V, 50/60Hz(with attached AC Adaptor)
DC OUT 12V
Country of Manufacture : JAPAN
Receipt Date of Sample : August 1, 2006
Condition of EUT : Engineering 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: V750-BA50C04-US (referred to as the EUT in this report) is the RFID Reader/Writer.
The antenna, Model No.: V750-HS01CA has a variant model: Model No.: V750-HS01LA.
Model No. V750-HS01CA (circularly-polarized wave)
Model No. V750-HS01LA (linearly-polarized wave)

Equipment Type	Transceiver
Frequency range	902-928MHz
Bandwidth and Channel spacing	24.68MHz (Hopping on), 1.66MHz (Hopping off) and 500kHz
Antenna Type	Patch Antenna
Antenna Connector Type	Reverse-TNC(Reader/Writer), N-type(Antenna)
Antenna Gain	+6.0 dBi max
Type of Modulation	FHSS
Clock Frequencies in the system	FPGA: 40MHz, CPU: 15.625MHz, PLL: 10MHz
Operating voltage (Inner)	DC1.2V - DC6.5V

FCC 15.31 (e)

The supply voltage of AC Adapter was varied between 85 % and 115% of the nominal rated supply voltage (AC 120V), however, there was no difference in power levels in fundamental emission.

FCC Part 15.203 Antenna requirement

This EUT has the external (particular) antenna connector, and the installation is to be done by the professionals. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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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 : 2006
Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz : 2006

3.2 Procedures and results

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin*0)	Results
1	Conducted Emission	<FCC>ANSI C63.4: 2003 7. AC powerline conducted emission measurements <IC>RSS-Gen 7.2.2	<FCC>Section 15.207 <IC>RSS-Gen 7.2.2	-	N/A	3.1dB 0.54012MHz, N, AV	Complied
2	Carrier Frequency Separation	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>-	<FCC>Section15.247 (a)(1) <IC>RSS-210 A8.1 (2)	Conducted	N/A	See data.	Complied
3	20dB Bandwidth	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>-	<FCC>Section15.247 (a)(1)(i) <IC>RSS-210 A8.1 (1)	Conducted	N/A		Complied
4	Number of Hopping Frequency	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>-	<FCC>Section15.247 (a)(1)(i) <IC>RSS-210 A8.1 (3)	Conducted	N/A		Complied
5	Dwell time	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>-	<FCC>Section15.247 (a)(1)(i) <IC>RSS-210 A8.1 (3)	Conducted	N/A		Complied
6	Maximum Peak Output Power	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.6	<FCC>Section15.247 (b)(2) <IC>RSS-210 A8.4 (4)	Conducted	N/A		Complied
7	Band Edge Compliance	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>-	<FCC>Section15.247 (d) <IC>RSS-210 A8.5	Conducted	N/A		Complied
8	Spurious Emission	<FCC>ANSI C63.4: 2003 13. Measurement of intentional radiators <IC>RSS-Gen 4.7	<FCC>Section15.247 (d) <IC>RSS-210 A8.5	Conducted/ Radiated	N/A		1.2dB, 1805.4MHz, VER, AV, 6403.3MHz, VER, AV,

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

*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

*These tests were also referred to FCC Public Notice DA 00-705 "Guidance on Measurement for Frequency Hopping Spread Spectrum Systems".

*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	Conducted	N/A	N/A	N/A

3.4 Uncertainty

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ± 2.66 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 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 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 ± 3.0 dB.

3.5 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 6.0 m	Preparation room
No.2 semi-anechoic chamber	655103	IC4247A-2	7.5 x 5.8 x 5.2m	4.0 x 4.0 m	-
No.3 semi-anechoic chamber	148738	IC4247A-3	12.0 x 8.5 x 5.9m	6.8 x 5.75 m	
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 5.75 m	-
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi anechoic cha	-	-	6.0 x 6.0 x 3.9m	N/A	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 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 7.5 m	-
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.

3.6 Test set up, Data of EMI, and Test instruments

Refer to APPENDIX 1 to 3.

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

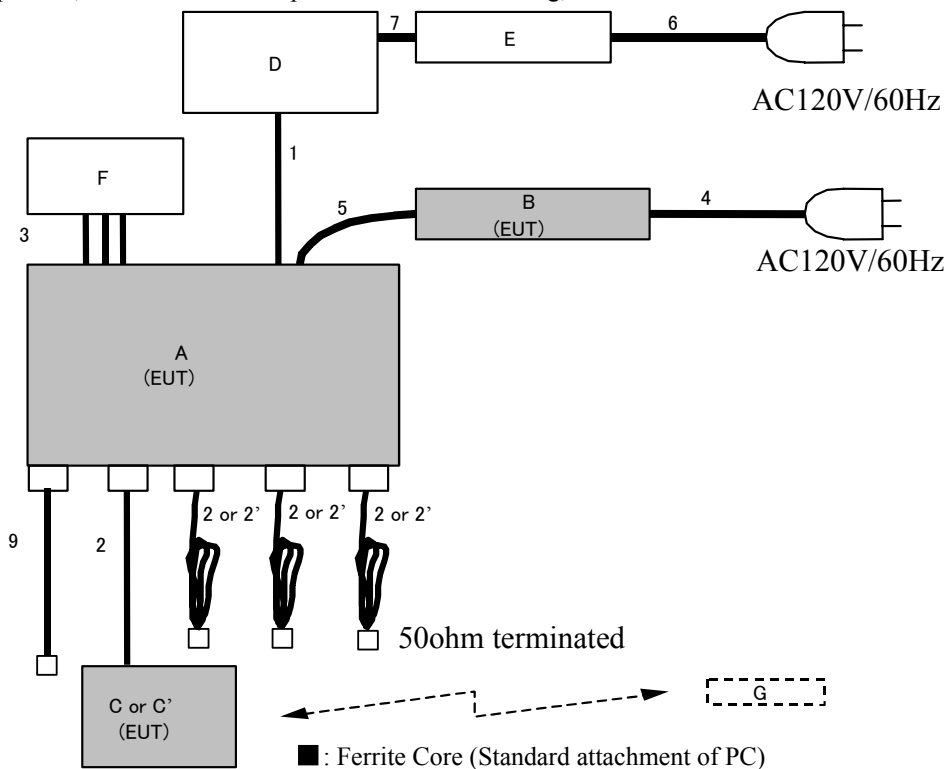
4.1 Operating Modes

The mode used for test: Transmitting mode
Low Channel (ch1) : 902.75MHz
Mid Channel (ch25) : 914.75MHz
High Channel (ch50) : 927.25MHz

4.2 Configuration and peripherals

According to the specification, there is no simultaneous transmitting and receiving mode even if all ports are filled (for transmitting and receiving from time division). Therefore, the test was made with one antenna, and others ports were terminated.

EUT is used with any tags manufactured by the applicant, OMRON Corporation.
Pre-test was performed with and without the tag (M/N: V741-D22M01-IM, Type: Passive).
As a result of pre-test, the formal test was performed without the tag, which was the worse condition.



*The test configuration is set up in the actual usage, which is in the worst conditions of the noise level.
*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	Remarks
A	RFID READER/WRITER	V750-BA50C04-US	RF-DS-06001	OMRON	EUT
B	AC ADAPTER	GFP651DA-1240	8	GME TECHNOLOGY	EUT
C	ANTENNA	V750-HS01CA	P6010047	OMRON	EUT
C'	ANTENNA	V750-HS01LA	P0605002	OMRON	EUT
D	Personal Computer	Compaq nx9040	CNF513050H	HP	
E	AC Adapter	PPP009L	5425934606	HP	
F	JIG for I/O terminal	-	-	OMRON	
G	RFID Tag	V741-D22M01-IM	-	OMRON	

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Ethernet Cable(Cross-over)	5.0	Shielded	Shielded
2	Antenna Cable: V740-A01-3.0M	3.0	Shielded	Shielded
2'	Antenna Cable: V740-A01-10M	10.0	Shielded	Shielded
3	I/O JIG Cable	3.0	Unshielded	Unshielded
4	AC adapter cable (AC line)	1.8	Unshielded	Unshielded
5	AC adapter cable (DC line)	1.2	Unshielded	Unshielded
6	AC adapter cable (AC line)	1.8	Unshielded	Unshielded
7	AC adapter cable (DC line)	1.8	Unshielded	Unshielded
8	RS232C Cable	1.0	Unshielded	Shielded
9	RS485 Cable	3.0	Unshielded	Shielded

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.5m by 2.0m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. The rear of EUT, including peripherals 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 a Line Impedance Stabilization Network (LISN)/ Artificial mains Network (AMN) and excess AC cable was bundled in center.

1) For the tests on EUT with other peripherals (as a whole system)

I/O cable and AC 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.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber or a Measurement Room.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Detector : CISPR quasi-peak detector (IF BW 9 kHz)
Measurement range : 0.15-30MHz
Test data : APPENDIX 2
Test result : Pass

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SECTION 6: Spurious Emission

[Conducted]

Test Procedure

The Out of Band Emission was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass

[Radiated]

Test Procedure

EUT was placed on a platform of nominal size, 1.0m by 0.5m, raised 80cm above the conducting ground plane. The Radiated Electric Field Strength intensity has been measured in a Semi Anechoic Chamber with a ground plane and at a distance of 3m.

The height of the measuring 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 with the Test Receiver or the Spectrum Analyzer.

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc was applied to the frequency over the limit of FCC 15.209 and outside the restricted band of 15.205.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver / Spectrum Analyzer	Spectrum Analyzer
Detector	QP: BW 120kHz(T/R)	PK: RBW:1MHz/VBW: 1MHz
IF Bandwidth	20dBc : RBW: 100kHz VBW: 300kHz (S/A)	AV: RBW:1MHz/VBW:10Hz 20dBc : RBW:100kHz/VBW:300kHz

The test was made on EUT in the normal use position.

Test data : APPENDIX 2
Test result : Pass

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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: Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a power meter connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass

SECTION 9: Carrier Frequency Separation

Test Procedure

The carrier frequency separation was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass

SECTION 10: Number of Hopping Frequency

Test Procedure

The Number of Hopping Frequency was measured with a spectrum analyzer connected to the antenna port.

Test data : APPENDIX 2
Test result : Pass

SECTION 11: Dwell time

Test Procedure

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

Test data : APPENDIX 2
Test result : Pass

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