



EMI TEST REPORT

Test Report No. : 25EE0130-HO-1

Applicant : **OMRON Corporation**
Type of Equipment : **RFID System(Reader/Writer and Antenna)**
Model No. : **V740-BA50C22-US and V740-HS02C**
Test standard : **FCC Part 15 Subpart C**
Section 15.207, Section 15.247 : 2004
FCC ID : **OZGV740-BA50CX2**
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:

December 20 and 21, 2004

Tested by:

Makoto Kosaka
EMC Service

Approved by :

Naoki Sakamoto
Group Leader of
EMC Service

UL Apex Co., Ltd.

Head Office EMC Lab.

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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	:	Toshiya Kitagawa

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.	:	READER/WRITER : V740-BA50C22-US ANTENNA : V740-HS02C
Serial No.	:	READER/WRITER : RFP-DS-04028 ANTENNA : RFP-DS-04029
Rating	:	AC100 to 240V,2.3A 50/60Hz(with attached AC Adaptor) DC OUT 24V
Country of Manufacture	:	JAPAN
Receipt Date of Sample	:	December 20, 2004
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)

Remarks:

V740-BA50C02-US is a variant model. The differences is as follows;

The test was made with V740-BA50C22-US which are in utmost connections of antennas and analog boards.

	V740-BA50C22-US (test model)	V740-BA50C02-US(variant)
connected antennas	V740-HS02C (antenna designated only by manufacturer)	
The number of connected antennas	4 antennas	2 antennas
The number of (installation for) Analog board in RF part. (same analog board)	2 pieces	1 piece
The connection between antenna and Reader/Writer	Cables designated by manufacturer	
The method of EUT installation	Installed only by professionals	

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2.2 Product Description

Model No: V740-BA50C22-US, V740-HS02C (referred to as the EUT in this report) is the Radio Identification System (Reader/Writer and Antenna).

	Frequency Hopping System (RF-ID)
Equipment Type	Transceiver
Frequency Range	902.726MHz – 927.322MHz
Number of RF Channel And Channel specing	50channel 502kHz
Antenna Type	Dual Patch Antenna
Antenna Connector Type	Reverse-TNC(Reader/Writer) N-type(Antenna)
Antenna Gain	6.0 dBi max
Transmit Power	30 dBm max
ITU Code	A1D
Type of Modulation	ASK (Frequency Hopping)
Frequency of Operation	CPU:266MHz(33.333MHz), PLL:8.0MHz, 25MHZ,33MHz,54.24MHz
Power Supply	AC100 to 240V,2.3A 50/60Hz (with attached AC Adaptor) DC OUT 24V
Feature of EUT	The V740 Reader/Writer is a modulated frequency hopping RFID reader. It contains two radios with two transmit and receive ports on each radio to allow multiple antennas to be connected to enhance the coverage area of the RFID reader. Only one antenna can be utilized at any moment.

FCC 15.31 (e)

The supply voltage of AC Adapter as the ancillary equipment 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 with the particular cable 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 : 2004

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits : 2004
Section 15.247 Operation within the bands 902-928MHz,
2400-2483.5MHz, and 5725-5850MHz : 2004

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	0.5dB 16.8319MHz, AV N	Complied
2	Carrier Frequency Separation	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)	Conducted	N/A	*See data.	Complied
3	20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)(i)	Conducted	N/A		Complied
4	Number of Hopping Frequency	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(a)(1)(i)	Conducted	N/A		Complied
5	Dwell time	ANSI C63.4:2003 13.Measurement of intentional radiators	Section15.247(a)(1)(i)	Conducted	N/A		Complied
6	Maximum Peak Output Power	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(b)(2)	Conducted	N/A		Complied
7	Band Edge Compliance	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(d)	Conducted	N/A		Complied
8	Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section15.247(d)	Conducted/ Radiated	N/A	0.1dB 1.805452GHz	Complied

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

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

Uncertainty:

*In case of the margin below the EMC Head Office's uncertainty.

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test is ± 1.3 dB.

Spurious Emission (Radiated)

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB(3m)/ ± 4.7 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB(3m)/ ± 3.8 dB(10m).

The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ± 6.6 dB.

Other test except Conducted Emission and Spurious Emission (Radiated)

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

*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-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4: 2004	RSS-210(issue 5): 2001 + Amendment:2002 + Amendment2:2003 + Amendment3:2004 + Amendment4: 2004	Conducted	N/A	N/A	N/A

3.4 Test Location

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

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	Listed date (for FCC)	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	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	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.

3.5 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

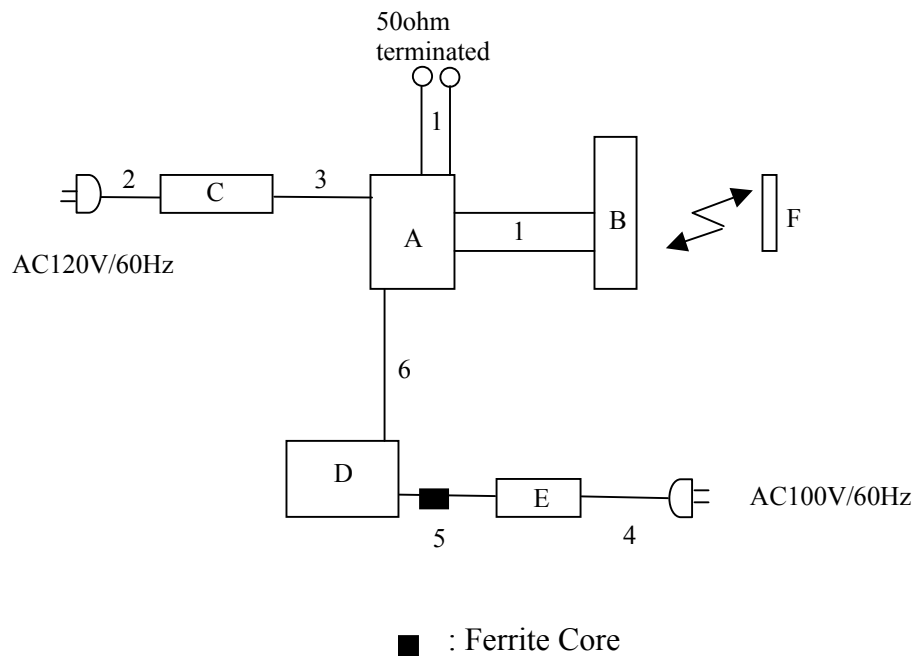
The mode is used :

Transmitting mode	
Low Channel(ch1)	:902.726MHz
Mid Channel(ch25)	:914.773MHz
High channel(ch50)	:927.322MHz
Max output mode (30dBm)	

*This equipment can be set up to maximum output power by software according to user manual.
But this sample could only set up 29.2dBm for the maximum power.
This value can be accepted for FCC tolerance.

4.2 Configuration and peripherals

*Cabling was taken into consideration and test data was taken under worse case conditions.
*According to the specification, there is no simultaneous transmitting and receiving mode even if all ports(4 ports) are filled(for transmitting and receiving from time division). Therefore, the test was made with one antenna, and others ports were connected to cables or terminated in 50 ohm.
*As for the noise level for the channel of middle and high in Radiated Spurious emission, they are equal level to the one of channel low. Therefore, the test was made with the point that has small margin.



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Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	READER/WRITER	V740-BA50C22-US	RFP-DS-04028	OMRON	OZGV740-BA50CX2
B	ANTENNA	V740-HS02C	RFP-DS-04029	OMRON	OZGV740-BA50CX2
C	AC ADAPTER	V740-A02	-	EDAC	-
D	Note PC	2672-C2J	99-PPBWP	IBM	DoC
E	AC Adapter	02K6808	-	IBM	-
F	Tag	X1020-LBL	-	Matrics	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	Antenna Cable: V740-A01-3.0M	3.0	Y	Polyvinyl chloride
2	AC adapter cable(AC line)	1.8	N	Polyvinyl chloride
3	AC adapter cable(DC line)	1.2	N	Polyvinyl chloride
4	AC adapter cable(AC line)	1.7	N	Polyvinyl chloride
5	AC adapter cable(DC line)	1.2	N	Polyvinyl chloride
6	LAN Cable	5.0	N	Polyvinyl chloride

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a 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, 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 3
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 3

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(Below 10GHz).

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.

Test data : APPENDIX 3

Test result : Pass

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.

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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 3
Test result	: Pass

SECTION 8: Maximum Peak Output Power

Test Procedure

The Maximum Peak Output Power was measured with a spectrum analyzer connected to the antenna port.

Test data	: APPENDIX 3
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 3
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 3
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 3
Test result	: Pass

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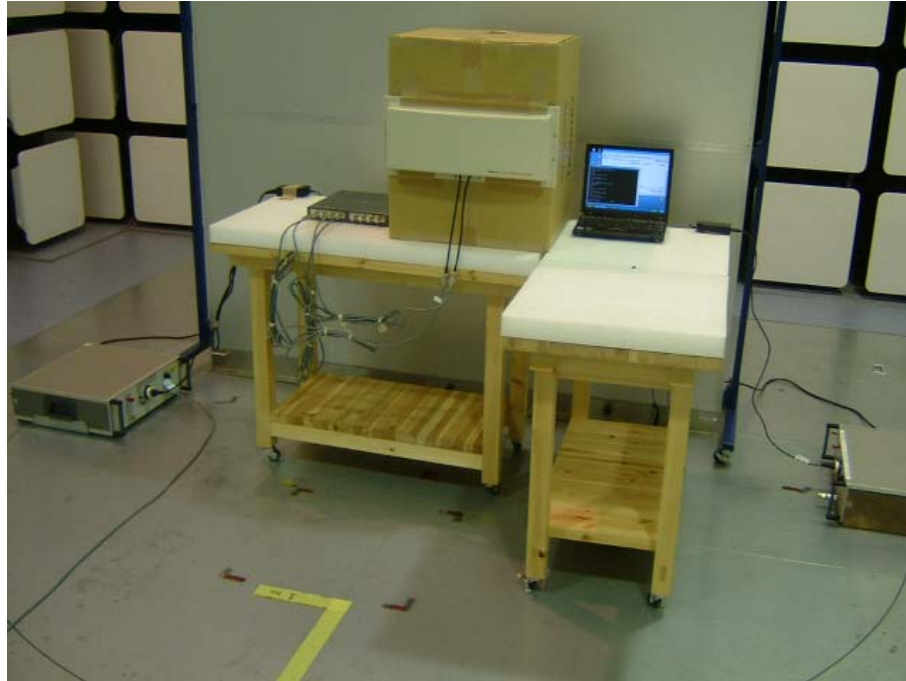
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APPENDIX 1: Photographs of test setup

Conducted Emission **Front**

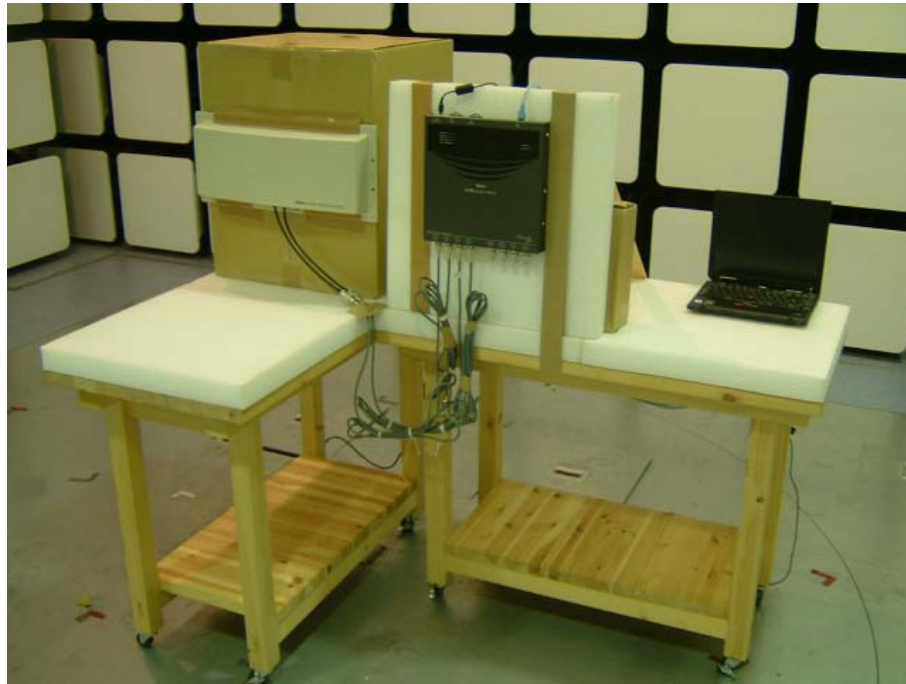


Rear

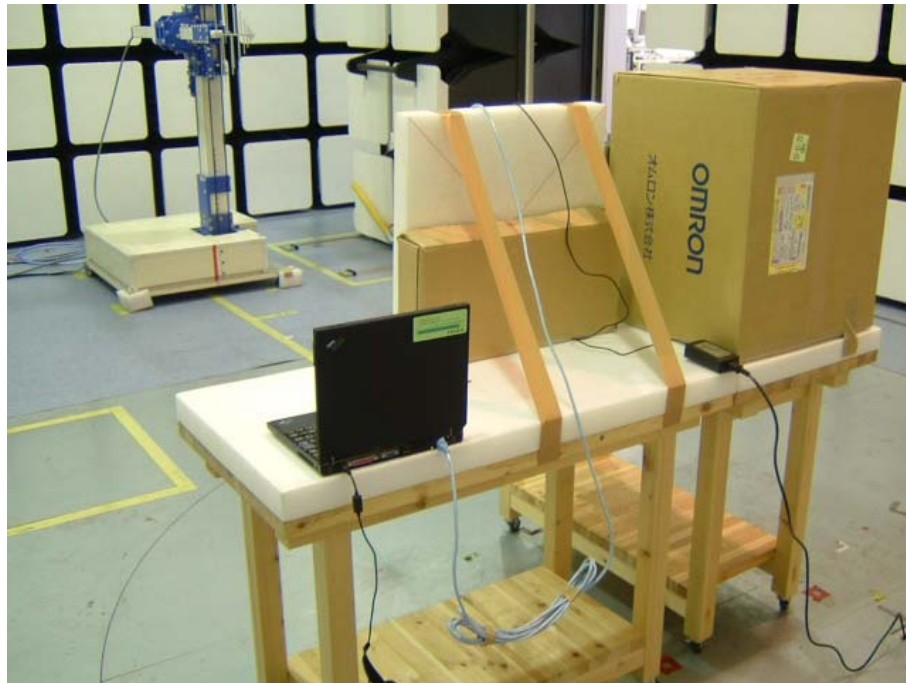


Spurious Emission (Radiated)

Front



Rear



APPENDIX 2:Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	1 to 10	2004/04/12 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	9	2004/10/14 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	9	2004/10/14 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	9	2004/01/10 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	9	2004/12/16 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	9	2004/08/29 * 12
MPA-01	Pre Amplifier	Agilent	8449B	9	2004/02/06 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	9	2004/02/24 * 12
MCC-04	Microwave Cable 1-40G	Storm	421-011	9	2004/01/06 * 12
MCC-10	Coaxial cable	Storm	90-195-394	9	2004/03/25 * 12
MCC-25	Microwave Cable	Suhner	SUCOFLEX104	9	2004/08/26 * 12
MHF-03	High pass Filter	Mini-Circuit	VHF-1320	9	2004/12/09 * 12
MHF-04	High Pass Filter	Mini-Circuit	VHF-1200	9	2004/12/09 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	1 to 9	2004/02/18 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	1,9	2004/02/03 * 12
MLS-02	LISN(AMN)	Schwarzbeck	NSLK8127	1	2004/11/10 * 12
MLS-07	LISN(AMN)	Schwarzbeck	NSLK8127	1	2004/02/17 * 12
MTA-04	Termination	MCL	NTRM-50	1	2004/02/16 * 12
MCC-13	Coaxial Cable	Fujikura/Agilent	-	1	2004/02/24 * 12
MAT-16	Attenuator(40dB)	Weinschel Corp	93459	2 to 8,10	2004/01/29 * 12

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

- 1: AC Main Conducted Emission
- 2: Carrier Frequency Separation
- 3: 20dB Bandwidth
- 4: Number of Hopping Frequency
- 5: Dwell time
- 6: Maximum Peak Output Power
- 7: Band Edge Compliance
- 8: Antenna Terminal Conducted Spurious Emission
- 9: Radiated Spurious Emission
- 10: 99% Occupied Bandwidth (RSS-210 Canada)

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APPENDIX 3: Data of EMI test

Conducted Emission

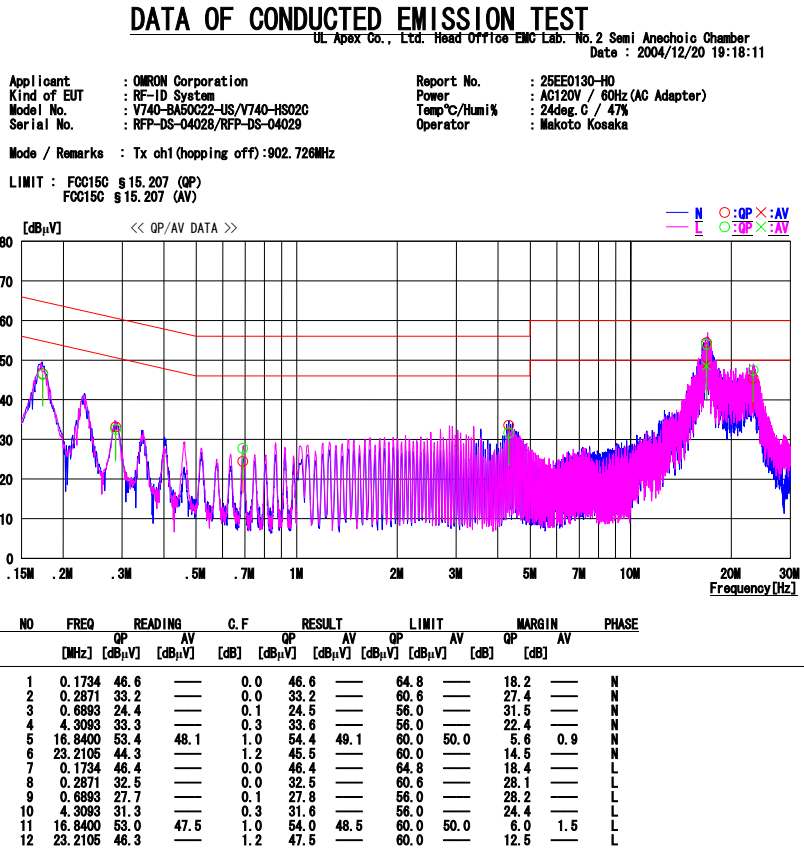


CHART:WITH FACTOR, Peak hold data. Data is uncorrected. CALCURATION: RESULT=READING+C. F (LISN LOSS+CABLE LOSS)
Except for the above table : adequate margin data below the limits.

Conducted Emission

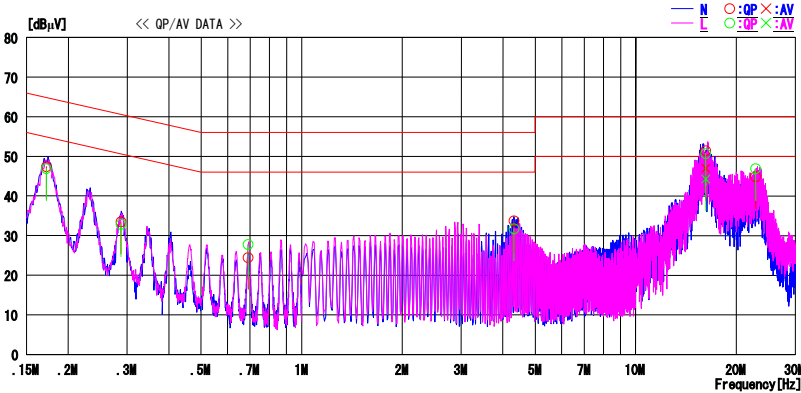
DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2004/12/20 18:52:29

Applicant : OMRON Corporation
Kind of EUT : RF-ID System
Model No. : V740-BA50C22-US/V740-HS02C
Serial No. : RFP-DS-04028/RFP-DS-04029
Report No. : 25EE0130-HO
Power : AC120V / 60Hz (AC Adapter)
Temp/C/Humi% : 24deg. C / 47%
Operator : Makoto Kosaka

Mode / Remarks : Tx ch25(hopping off):914.773MHz

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



NO	FREQ [MHz]	READING		C. F	RESULT		LIMIT		MARGIN		PHASE
		QP [dBμV]	AV [dBμV]		QP [dBμV]	AV [dBμV]	QP [dBμV]	AV [dBμV]	QP [dB]	AV [dB]	
1	0.1718	47.4	—	0.0	47.4	—	64.9	—	17.5	—	N
2	0.2876	33.5	—	0.0	33.5	—	60.6	—	27.1	—	N
3	0.6912	24.4	—	0.1	24.5	—	56.0	—	31.5	—	N
4	4.3210	33.4	—	0.3	33.7	—	56.0	—	22.3	—	N
5	16.1897	50.5	46.1	0.9	51.4	47.0	60.0	50.0	8.6	3.0	N
6	22.8407	43.7	—	1.2	44.9	—	60.0	—	15.1	—	N
7	0.1718	46.9	—	0.0	46.9	—	64.9	—	18.0	—	L
8	0.2876	32.8	—	0.0	32.8	—	60.6	—	27.8	—	L
9	0.6912	27.7	—	0.1	27.8	—	56.0	—	28.2	—	L
10	4.3210	31.4	—	0.3	31.7	—	56.0	—	24.3	—	L
11	16.1897	49.8	43.4	0.9	50.7	44.3	60.0	50.0	9.3	5.7	L
12	22.8407	45.7	—	1.2	46.9	—	60.0	—	13.1	—	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

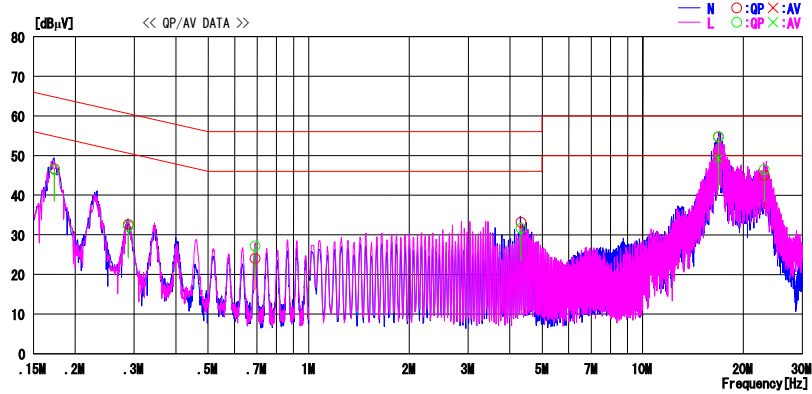
DATA OF CONDUCTED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2004/12/20 19:36:39

Applicant : OMRON Corporation
Kind of EUT : RF-ID System
Model No. : V740-BA50C22-US/V740-HS02C
Serial No. : RFP-DS-04028/RFP-DS-04029
Report No. : 25EE0130-HO
Power : AC120V / 60Hz (AC Adapter)
Temp/C/Humi% : 24deg. C / 47%
Operator : Makoto Kosaka

Mode / Remarks : Tx ch50 (hopping off) : 927.322MHz

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



NO	FREQ [MHz]	READING		C. F	RESULT		LIMIT		MARGIN		PHASE
		QP [dBμV]	AV [dBμV]		QP [dBμV]	AV [dBμV]	QP [dBμV]	AV [dBμV]	QP [dB]	AV [dB]	
1	0.1730	46.7	—	0.0	46.7	—	64.8	—	18.1	—	N
2	0.2880	32.6	—	0.0	32.6	—	60.6	—	28.0	—	N
3	0.6895	24.0	—	0.1	24.1	—	56.0	—	31.9	—	N
4	4.3100	32.9	—	0.3	33.2	—	56.0	—	22.8	—	N
5	16.8319	53.8	48.5	1.0	54.8	49.5	60.0	50.0	5.2	0.5	N
6	23.0930	43.9	—	1.2	45.1	—	60.0	—	14.9	—	N
7	0.1730	46.5	—	0.0	46.5	—	64.8	—	18.3	—	L
8	0.2880	32.2	—	0.0	32.2	—	60.6	—	28.4	—	L
9	0.6895	27.1	—	0.1	27.2	—	56.0	—	28.8	—	L
10	4.3100	31.3	—	0.3	31.6	—	56.0	—	24.4	—	L
11	16.8319	53.8	48.3	1.0	54.8	49.3	60.0	50.0	5.2	0.7	L
12	23.0930	45.3	—	1.2	46.5	—	60.0	—	13.5	—	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.

Carrier Frequency Separation

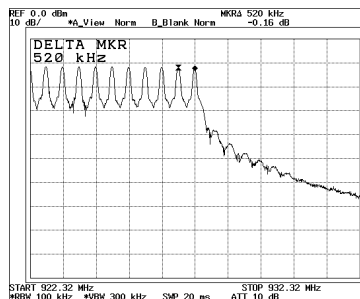
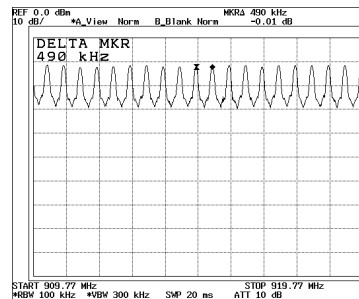
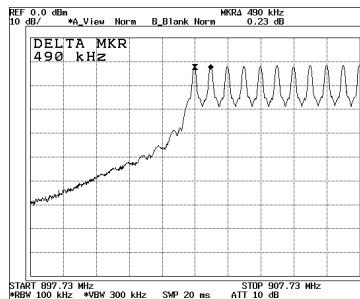
UL Apex Co., Ltd.
 Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation
 EQUIPMENT : RF-ID System
 MODEL : V740-BA50C22-US/V740-HS02C
 SAMPLE No. : RFP-DS-04028/RFP-DS-04029
 POWER : AC120V/60Hz
 MODE : Tx (Hopping on)

REPORT NO : 25EE0130-HO
 REGULATION : FCC Part15C 15.247(a)(1)
 DATE : 12/21/2004
 TEMPERATURE : 24deg.C
 HUMIDITY : 33%
 Engineer : Makoto Kosaka

(S/A :span 10MHz, RBW 100kHz, VBW 300kHz, sweep time AUTO)

CH	FREQ	Channel separation	Limit
	[MHz]	[MHz]	
Low	902.726	0.49	>20dB Bandwidth and 25[kHz]
Mid	914.773	0.49	>20dB Bandwidth and 25[kHz]
High	927.322	0.52	>20dB Bandwidth and 25[kHz]



20dB Bandwidth

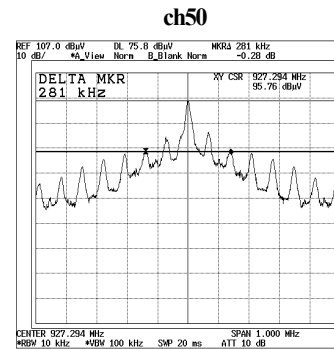
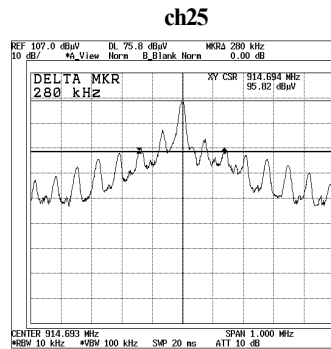
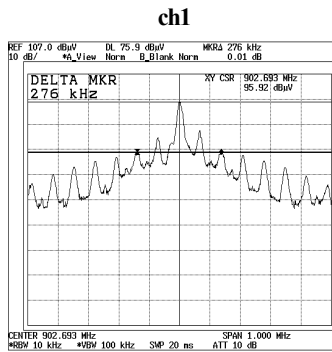
UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RF-ID System
MODEL : V740-BA50C22-US/V740-HS02C
SAMPLE No. : RFP-DS-04028/RFP-DS-04029
POWER : AC120V/60Hz
MODE : Tx (Hopping off)

REPORT NO : 25EE0130-HO
REGULATION : FCC Part15C 15.247(a)(1)(i)
DATE : 12/21/2004
TEMPERATURE : 24deg.C
HUMIDITY : 33%
Engineer : Makoto Kosaka

PK DETECT(S/A: span 1MHz, RBW 10kHz, VBW 100kHz, sweep time AUTO)

CH	FREQ	20dB Bandwidth	Limit
	[MHz]	[MHz]	[MHz]
Low	902.726	0.276	0.5
Mid	914.773	0.280	0.5
High	927.322	0.281	0.5



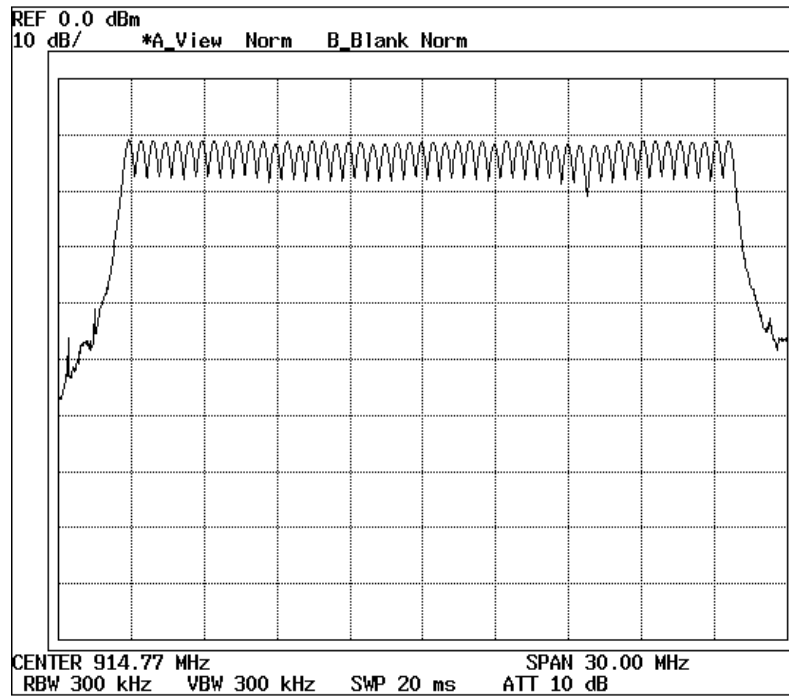
Number of Hopping Frequency

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation	REPORT NO : 25EE0130-HO
EQUIPMENT : RF-ID System	REGULATION : FCC Part15C 15.247(a)(1)(i)
MODEL : V740-BA50C22-US/V740-HS02C	DATE : 12/21/2004
SAMPLE No. : RFP-DS-04028/RFP-DS-04029	TEMPERATURE : 24deg.C
POWER : AC120V/60Hz	HUMIDITY : 33%
MODE : Tx (Hopping on)	Engineer : Makoto Kosaka

(S/A : RBW 300kHz ,VBW 300kHz, sweep time AUTO)

Mode	Number of channel	Limit
	[time]	[time]
tx(Hoppng on)	50	≥50



Dwell time

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY	: OMRON Corporation	REPORT NO	: 25EE0130-HO
EQUIPMENT	: RF-ID System	REGULATION	: FCC Part15C 15.247(a)(1)(i)
MODEL	: V740-BA50C22-US/V740-HS02C	DATE	: 12/21/2004
S/ N	: RFP-DS-04028/RFP-DS-04029	TEMPERATURE	: 24deg.C
POWER	: AC120V/60Hz	HUMIDITY	: 33%
MODE	: Ch25(914.773MHz) Tx (Hopping on)	Engineer	: Makoto Kosaka

times	Number of Hoppings	Length of transmission time [msec]	Dwell time [msec]	Result [msec]	Limit [msec]
1	3	143.0	2.6 * 143.0	371.80	400
2	3				
3	2				
4	2				
5	3				
Average	2.6				

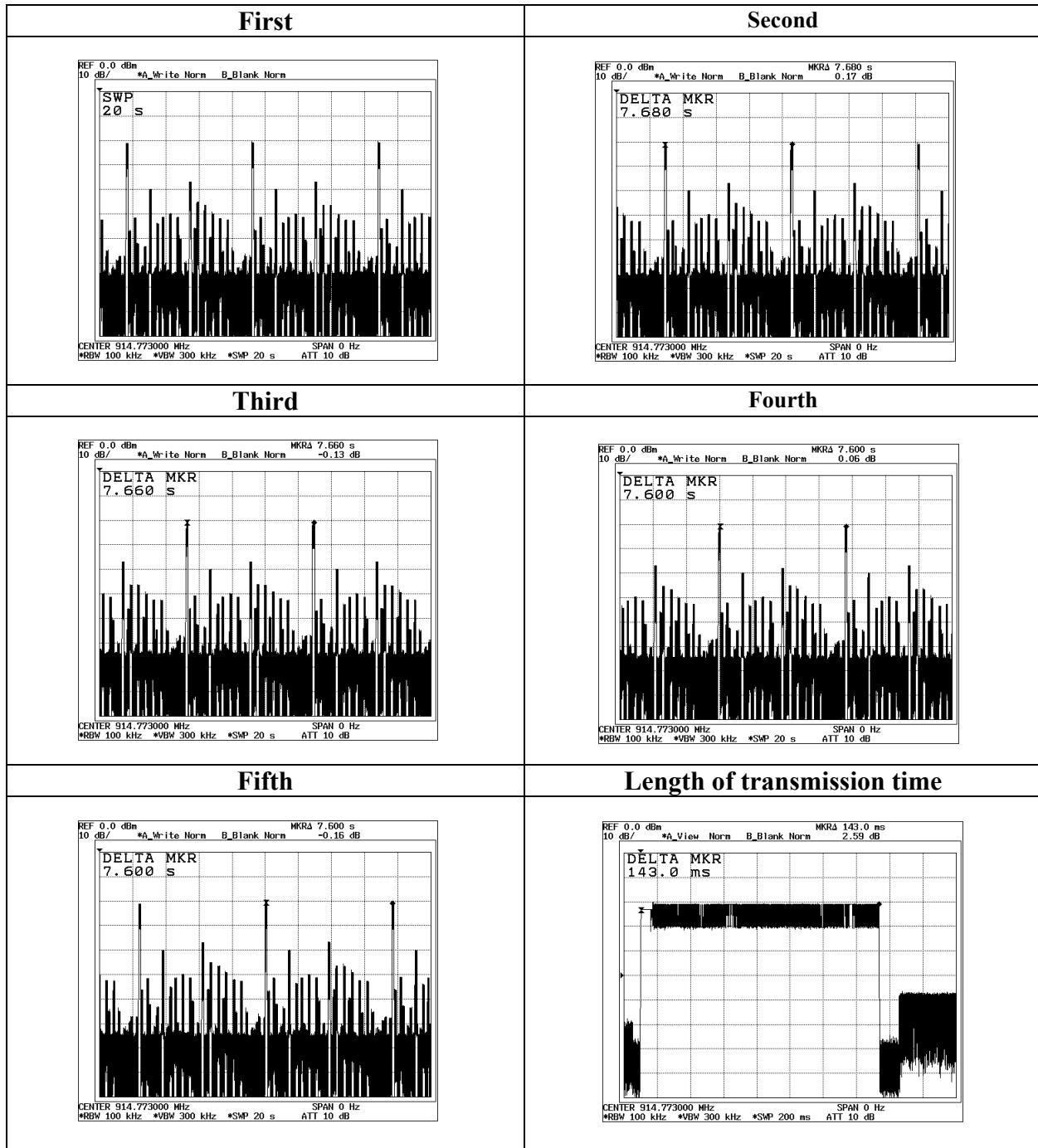
EUT has the pulse in around 7.6 seconds interval.

The average time within observation periods (20 seconds: 0.4 * 50ch) is 20 sec/ 7.6 sec = 2.6 times

One transmission time is around 143ms.

Dwell time 2.6time * 143msec = 371.8msec

Dwell time



Maximum Peak Output Power & Variation of Input AC Power

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation	REPORT NO : 25EE0130-HO
EQUIPMENT : RF-ID System	REGULATION : FCC Part15C 15.247(b)(2)
MODEL : V740-BA50C22-US/V740-HS02C	DATE : 2004/12/20
SAMPLE No. : RFP-DS-04028/RFP-DS-04029	TEMPERATURE : 21deg.C
POWER : AC120V/60Hz	HUMIDITY : 37%
MODE : Tx (Hopping off)	Engineer : Makoto Kosaka

AC102V/60Hz 85% (S/A: Span 2MHz, RBW 3MHz, VBW 5MHz, sweep time AUTO)

CH	FREQ [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Attn [dB]	Result [dBm]	Limit [1.0W] [dBm]
Low	902.726	-11.16	0.31	40.00	29.2	30.0
Mid	914.773	-11.14	0.34	40.00	29.2	30.0
High	927.322	-11.22	0.36	40.00	29.1	30.0

AC120V/60Hz 100% (S/A: Span 2MHz, RBW 3MHz, VBW 5MHz, sweep time AUTO)

CH	FREQ [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Attn [dB]	Result [dBm]	Limit [1.0W] [dBm]
Low	902.726	-11.19	0.31	40.00	29.1	30.0
Mid	914.773	-11.17	0.34	40.00	29.2	30.0
High	927.322	-11.23	0.36	40.00	29.1	30.0

AC138V/60Hz 115% (S/A: Span 2MHz, RBW 3MHz, VBW 5MHz, sweep time AUTO)

CH	FREQ [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Attn [dB]	Result [dBm]	Limit [1.0W] [dBm]
Low	902.726	-11.09	0.31	40.00	29.2	30.0
Mid	914.773	-11.16	0.34	40.00	29.2	30.0
High	927.322	-11.24	0.36	40.00	29.1	30.0

Sample Calculation:

Result = S/A Reading + Cable loss + Attenuator

Used Equipment: MCC-31, MAT-16, MRENT-09

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MF060b(10.04.03)

Radiated Spurious Emission

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

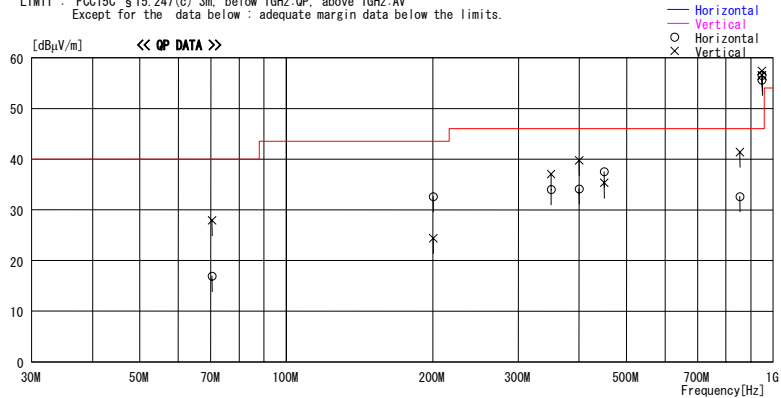
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2004/12/20 14:44:37

Applicant : OMRON Corporation
Kind of EUT : RF-ID System
Model No. : V740-BA50C22-US/V740-HS02C
Serial No. : RFP-DS-04028/RFP-DS-04029
Report No. : 25EE0130-HO
Power : AC120V / 60Hz
Temp/C/Humi% : 24deg. C / 47%
Operator : Makoto Kosaka

Mode / Remarks : Tx chl(hopping off):902.726MHz

LIMIT : FCC15C §15.247(c) 3m, below 1GHz:QP, above 1GHz:AV
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]	Remarks
----- Horizontal -----											
1	70.440	30.8	6.9	6.9	27.7	16.9	40.0	23.1	231	0	
2	200.365	34.8	17.1	7.8	27.1	32.6	43.5	10.9	149	92	
3	350.000	35.9	16.7	8.5	27.1	34.0	46.0	12.0	100	190	
4	400.000	34.1	18.6	8.9	27.5	34.1	46.0	11.9	228	84	
5	450.011	37.4	18.8	9.2	27.9	37.5	46.0	8.5	181	142	
6	855.399	28.1	21.9	10.4	27.8	32.6	46.0	13.4	150	329	
7	902.695	102.1	21.9	10.9	27.7	107.2	-	-	150	0	Fund RBW 100kHz VBW 300kHz
8	949.990	50.6	22.6	11.0	27.7	56.5	-	-	150	0	RBW 100kHz VBW 300kHz
----- Vertical -----											
9	70.440	41.8	6.9	6.9	27.7	27.9	40.0	12.1	100	359	
10	200.365	26.6	17.1	7.8	27.1	24.4	43.5	19.1	100	79	
11	350.000	38.9	16.7	8.5	27.1	37.0	46.0	9.0	110	124	
12	400.000	39.8	18.6	8.9	27.5	39.8	46.0	6.2	105	136	
13	450.011	35.2	18.8	9.2	27.9	35.3	46.0	10.7	100	168	
14	855.399	36.9	21.9	10.4	27.8	41.4	46.0	4.6	100	31	
15	902.695	106.4	21.9	10.9	27.7	111.5	-	-	100	15	Fund RBW 100kHz VBW 300kHz
16	949.990	51.5	22.6	11.0	27.7	57.4	-	-	100	33	RBW 100kHz VBW 300kHz

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

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

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/12/20 16:08:22

Mode / Remarks : Tx ch25(hopping off):914.773MHz

— Horizontal
— Vertical
○ Horizontal
× Vertical

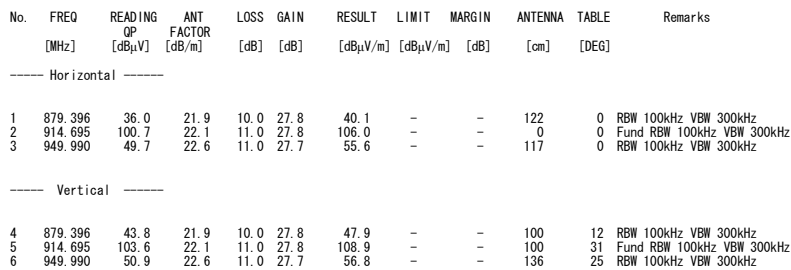


CHART: WITHOUT FACTOR ANT TYPE: -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP GAIN Page:

MF060b(10.04.03)

Radiated Spurious Emission

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

DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2004/12/20 16:52:21

Applicant : OMRON Corporation
Kind of EUT : RF-ID System
Model No. : V740-BA50C22-US/V740-HS02C
Serial No. : RFP-DS-04028/RFP-DS-04029
Report No. : 25EE0130-HO
Power : AC120V / 60Hz
Temp/C/Humi% : 24deg. C / 47%
Operator : Makoto Kosaka

Mode / Remarks : Tx ch50(hopping off):927.322MHz

LIMIT : FCC15C §15.247(c) 3m, below 1GHz:QP, above 1GHz:AV
Except for the data below : adequate margin data below the limits.

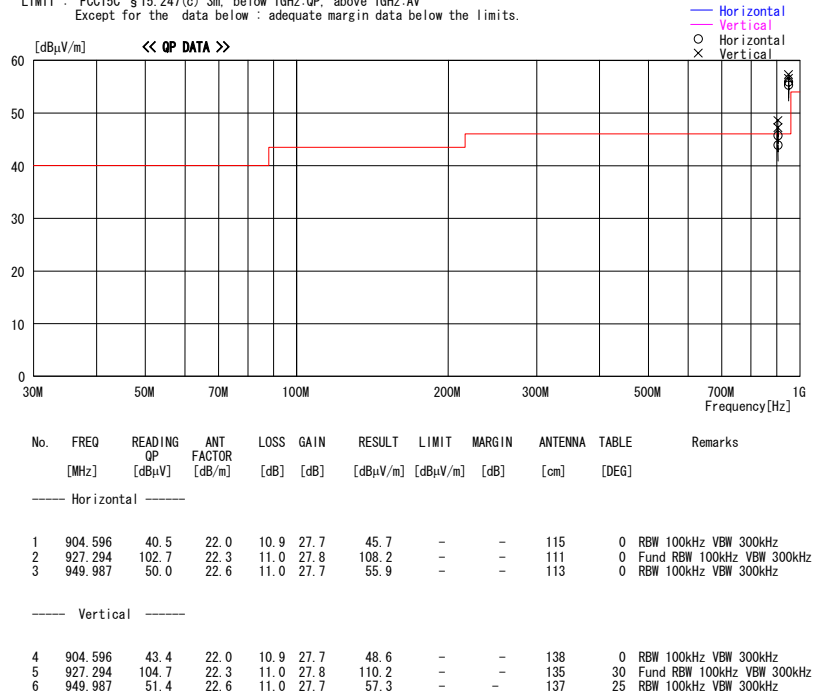


CHART:WITHOUT FACTOR ANT TYPE:-30MHz LOOP,30-300MHz BICONICAL,300MHz-1000MHz LOGPERIODIC,1000MHz- HORN
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

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

Radiated Spurious Emission

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RF-ID System
MODEL : V740-BA50C22-US/V740-HS02C
SAMPLE No. : RFP-DS-04028/RFP-DS-04029
POWER : AC120V/60Hz
Mode : Transmitting (ch 1: 902.726MHz)

REPORT NO : 25EE0130-HO
REGULATION : FCC Part 15C 15.247(d)
TEST DISTANCE : 3m
DATE : 2004/12/20
Temperature : 22deg.C
Humidity : 52%

ENGINEER : Makoto Kosaka

PK DETECT(S/A : RBW 1MHz and VBW 1MHz)

No.	FREQ [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]	dwell Factor [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR	VER							HOR	VER		HOR	VER
2	1.805452	58.1	60.8	27.8	36.4	4.4	0.0	1.2	-	55.1	57.8	74.0	19.0	16.3
3	2.708178	44.1	45.9	31.6	36.3	5.2	0.0	1.3	-	45.9	47.7	74.0	28.1	26.3
4	3.610904	46.4	46.0	31.5	36.2	6.4	0.0	1.4	-	49.5	49.1	74.0	24.5	24.9
5	4.513630	47.5	47.2	33.8	36.1	7.0	0.0	3.1	-	55.3	55.0	74.0	18.7	19.0
6	5.416356	40.1	40.0	36.2	35.7	7.6	0.0	4.1	-	52.3	52.2	74.0	21.7	21.8
7	6.319082	39.3	38.7	37.5	35.7	8.6	0.0	6.6	-	56.3	55.7	74.0	17.8	18.4
8	7.221808	30.2	39.2	37.9	35.6	9.7	0.0	0.0	-	42.2	51.2	74.0	31.8	22.8
9	8.124534	40.3	39.8	37.5	35.9	10.4	0.0	0.0	-	52.3	51.8	74.0	21.7	22.2
10	9.027260	39.6	39.3	37.2	36.0	10.5	0.0	0.0	-	51.3	51.0	74.0	22.7	23.0

AV DETECT(S/A : RBW 1MHz and VBW 10Hz)

No.	FREQ [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]	dwell Factor [dB]	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR	VER							HOR	VER		HOR	VER
2	1.805452	56.9	-	27.8	36.4	4.4	0.0	1.2	-	53.9	-	54.0	0.1	-
3	2.708178	35.8	38.6	31.6	36.3	5.2	0.0	1.3	-	37.6	40.4	54.0	16.4	13.6
4	3.610904	41.7	40.0	31.5	36.2	6.4	0.0	1.4	-	44.8	43.1	54.0	9.2	10.9
5	4.513630	43.4	41.6	33.8	36.1	7.0	0.0	3.1	-	51.2	49.4	54.0	2.8	4.6
6	5.416356	30.4	29.7	36.2	35.7	7.6	0.0	4.1	-	42.6	41.9	54.0	11.4	12.1
7	6.319082	29.1	29.4	37.5	35.7	8.6	0.0	6.6	-	46.1	46.4	54.0	8.0	7.7
8	7.221808	29.3	29.2	37.9	35.6	9.7	0.0	0.0	-	41.3	41.2	54.0	12.7	12.8
9	8.124534	29.6	29.5	37.5	35.9	10.4	0.0	0.0	-	41.6	41.5	54.0	12.4	12.5
10	9.027260	29.0	29.1	37.2	36.0	10.5	0.0	0.0	-	40.7	40.8	54.0	13.3	13.2

(S/A : RBW 100kHz and VBW 300kHz)

No.	FREQ [MHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]		RESULT			dBc	
		HOR	VER							HOR	VER		HOR	VER
1	902.695	102.1	106.4	21.9	27.7	5.0	5.9	-	-	107.2	111.5			
2	1829.546	-	60.6	28.1	36.4	4.4	0.0	1.2	-	-	57.9		-	53.6

Sample Calculation :

RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + High Pass Filter (or Att)

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

Used Equipment: MHA-06, MCC-04, MCC-10, MCC-25, MPA-01, MHF-03, MHF-04, MRENT-09

Restricted bands

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

* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

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

UL Apex Co., Ltd.

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MF060b(10.04.03)

Radiated Spurious Emission

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RF-ID System
MODEL : V740-BA50C22-US/V740-HS02C
SAMPLE No. : RFP-DS-04028/RFP-DS-04029
POWER : AC120V/60Hz
Mode : Transmitting (ch25: 914.773MHz)

REPORT NO : 25EE0130-HO
REGULATION : FCC Part 15C 15.247(d)
TEST DISTANCE : 3m
DATE : 2004/12/20
Temperature : 22deg.C
Humidity : 52%

ENGINEER : Makoto Kosaka

PK DETECT(S/A : RBW 1MHz and VBW 1MHz)

No.	FREQ [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]	dwell Factor [dB]	RESULT		Limit PK [dBuV/m]	MARGIN	
		HOR	VER							HOR	VER		HOR	VER
2	1.829546	58.4	55.8	28.1	36.4	4.4	0.0	1.2	0.0	55.7	53.1	74.0	18.4	21.0
3	2.744319	44.8	46.7	31.7	36.4	5.3	0.0	0.7	0.0	46.1	48.0	74.0	27.9	26.0
4	3.659092	41.5	45.9	31.8	36.2	6.4	0.0	1.7	0.0	45.2	49.6	74.0	28.8	24.4
5	4.573865	46.0	45.9	34.1	36.1	7.0	0.0	3.0	0.0	54.0	53.9	74.0	20.0	20.1
6	5.488638	41.1	40.1	36.2	35.6	7.7	0.0	5.3	0.0	54.7	53.7	74.0	19.3	20.3
7	6.403411	40.5	40.9	37.6	35.7	8.8	0.0	7.5	0.0	58.7	59.1	74.0	15.4	15.0
8	7.318184	41.1	40.6	38.2	35.7	9.9	0.0	0.0	0.0	53.5	53.0	74.0	20.5	21.0
9	8.232957	41.2	39.6	37.6	35.9	10.4	0.0	0.0	0.0	53.3	51.7	74.0	20.7	22.3
10	9.147730	39.9	40.9	37.4	36.1	10.6	0.0	0.0	0.0	51.8	52.8	74.0	22.2	21.2

AV DETECT(S/A : RBW 1MHz and VBW 10Hz)

No.	FREQ [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]	dwell Factor [dB]	RESULT		Limit AV [dBuV/m]	MARGIN	
		HOR	VER							HOR	VER		HOR	VER
2	1.829546	-	54.5	28.1	36.4	4.4	0.0	1.2	0.0	-	51.8	54.0	-	2.3
3	2.744319	37.7	40.7	31.7	36.4	5.3	0.0	0.7	0.0	39.0	42.0	54.0	15.0	12.0
4	3.659092	41.5	40.1	31.8	36.2	6.4	0.0	1.7	0.0	45.2	43.8	54.0	8.8	10.2
5	4.573865	40.2	40.8	34.1	36.1	7.0	0.0	3.0	0.0	48.2	48.8	54.0	5.8	5.2
6	5.488638	31.4	29.1	36.2	35.6	7.7	0.0	5.3	0.0	45.0	42.7	54.0	9.0	11.3
7	6.403411	29.3	29.8	37.6	35.7	8.8	0.0	7.5	0.0	47.5	48.0	54.0	6.6	6.1
8	7.318184	29.0	29.2	38.2	35.7	9.9	0.0	0.0	0.0	41.4	41.6	54.0	12.6	12.4
9	8.232957	29.8	29.7	37.6	35.9	10.4	0.0	0.0	0.0	41.9	41.8	54.0	12.1	12.2
10	9.147730	29.4	29.3	37.4	36.1	10.6	0.0	0.0	0.0	41.3	41.2	54.0	12.7	12.8

(S/A : RBW 100kHz and VBW 300kHz)

No.	FREQ [MHz] [GHz]	S/A READING		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]			RESULT			dBc	
		HOR	VER							HOR	VER		HOR	VER
1	914.695	100.7	103.6	22.1	27.8	5.1	5.9	-	-	106.0	108.9			
2	1.829546	57.7		28.1	36.4	4.4	0.0	-	-	53.8			52.2	

Sample Calculation :

RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + High Pass Filter (or Att)

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

Used Equipment: MHA-06, MCC-04, MCC-10, MCC-25, MPA-01, MHF-03, MHF-04, MRENT-09

Restricted bands

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

* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

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

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MF060b(10.04.03)

Radiated Spurious Emission DATA OF SUPURIOUS EMISSIONS(1GHz to 10GHz)

UL Apex Co., Ltd.
Head Office EMC Lab. No.2 Semi Anechoic Chamber

COMPANY : OMRON Corporation
EQUIPMENT : RF-ID System
MODEL : V740-BA50C22-US/V740-HS02C
SAMPLE No. : RFP-DS-04028/RFP-DS-04029
POWER : AC120V/60Hz
Mode : Transmitting (ch50: 927.322MHz)

REPORT NO : 25EE0130-HO
REGULATION : FCC Part 15C 15.247(d)
TEST DISTANCE : 3m
DATE : 2004/12/20
Temperature : 22deg.C
Humidity : 52%

ENGINEER : Makoto Kosaka

PK DETECT(S/A : RBW 1MHz and VBW 1MHz)

No.	FREQ [GHz]	S/A READING HOR VER [dBuV]		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]	dwell Factor [dB]	RESULT HOR VER [dBuV/m]		Limit PK [dBuV/m]	MARGIN HOR VER [dB]	
2	1.854644	56.0	55.0	28.4	36.4	4.4	0.0	1.3	0.0	53.7	52.7	74.0	20.3	21.3
3	2.781966	46.3	46.9	31.8	36.4	5.4	0.0	0.9	0.0	48.0	48.6	74.0	26.0	25.4
4	3.709288	45.1	44.8	32.0	36.1	6.6	0.0	1.8	0.0	49.4	49.1	74.0	24.6	24.9
5	4.636610	48.2	45.0	34.4	36.1	7.1	0.0	2.9	0.0	56.5	53.3	74.0	17.5	20.7
6	5.563932	41.2	39.5	36.3	35.6	7.8	0.0	6.5	0.0	56.2	54.5	74.0	17.8	19.5
7	6.491254	40.0	39.2	37.7	35.7	8.9	0.0	7.4	0.0	58.3	57.5	74.0	15.7	16.5
8	7.418576	39.1	40.8	38.4	35.7	9.9	0.0	0.0	0.0	51.7	53.4	74.0	22.3	20.6
9	8.345898	40.8	40.5	37.7	35.9	10.4	0.0	0.0	0.0	53.0	52.7	74.0	21.0	21.3
10	9.273220	41.1	40.9	37.5	36.2	10.7	0.0	0.0	0.0	53.1	52.9	74.0	20.9	21.1

AV DETECT(S/A : RBW 1MHz and VBW 10Hz)

No.	FREQ [GHz]	S/A READING HOR VER [dBuV]		ANT Factor [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATT [dB]	Hi-Pass Filter [dB]	dwell Factor [dB]	RESULT HOR VER [dBuV/m]		Limit AV [dBuV/m]	MARGIN HOR VER [dB]	
2	1.854644	54.5	53.2	28.4	36.4	4.4	0.0	1.3	0.0	52.2	50.9	54.0	1.8	3.1
3	2.781966	41.0	40.7	31.8	36.4	5.4	0.0	0.9	0.0	42.7	42.4	54.0	11.3	11.6
4	3.709288	39.0	38.4	32.0	36.1	6.6	0.0	1.8	0.0	43.3	42.7	54.0	10.7	11.3
5	4.636610	44.6	39.4	34.4	36.1	7.1	0.0	2.9	0.0	52.9	47.7	54.0	1.1	6.3
6	5.563932	31.1	29.5	36.3	35.6	7.8	0.0	6.5	0.0	46.1	44.5	54.0	7.9	9.5
7	6.491254	29.1	29.1	37.7	35.7	8.9	0.0	7.4	0.0	47.4	47.4	54.0	6.6	6.6
8	7.418576	29.2	29.1	38.4	35.7	9.9	0.0	0.0	0.0	41.8	41.7	54.0	12.2	12.3
9	8.345898	29.8	29.4	37.7	35.9	10.4	0.0	0.0	0.0	42.0	41.6	54.0	12.0	12.4
10	9.273220	30.2	30.1	37.5	36.2	10.7	0.0	0.0	0.0	42.2	42.1	54.0	11.8	11.9

Sample Calculation :

RESULT=Reading + ANT Factor - Amp Gain + Cable Loss + High Pass Filter (or Att)

*Except for the above table : All other spurious emissions were less than 20dB for the limit.

Used Equipment: MHA-06, MCC-04, MCC-10, MCC-25, MPA-01, MHF-03, MHF-04, MRENT-09

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

* In the above table, factor 0.0dB represents no use of Atten. and/or Filter.

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

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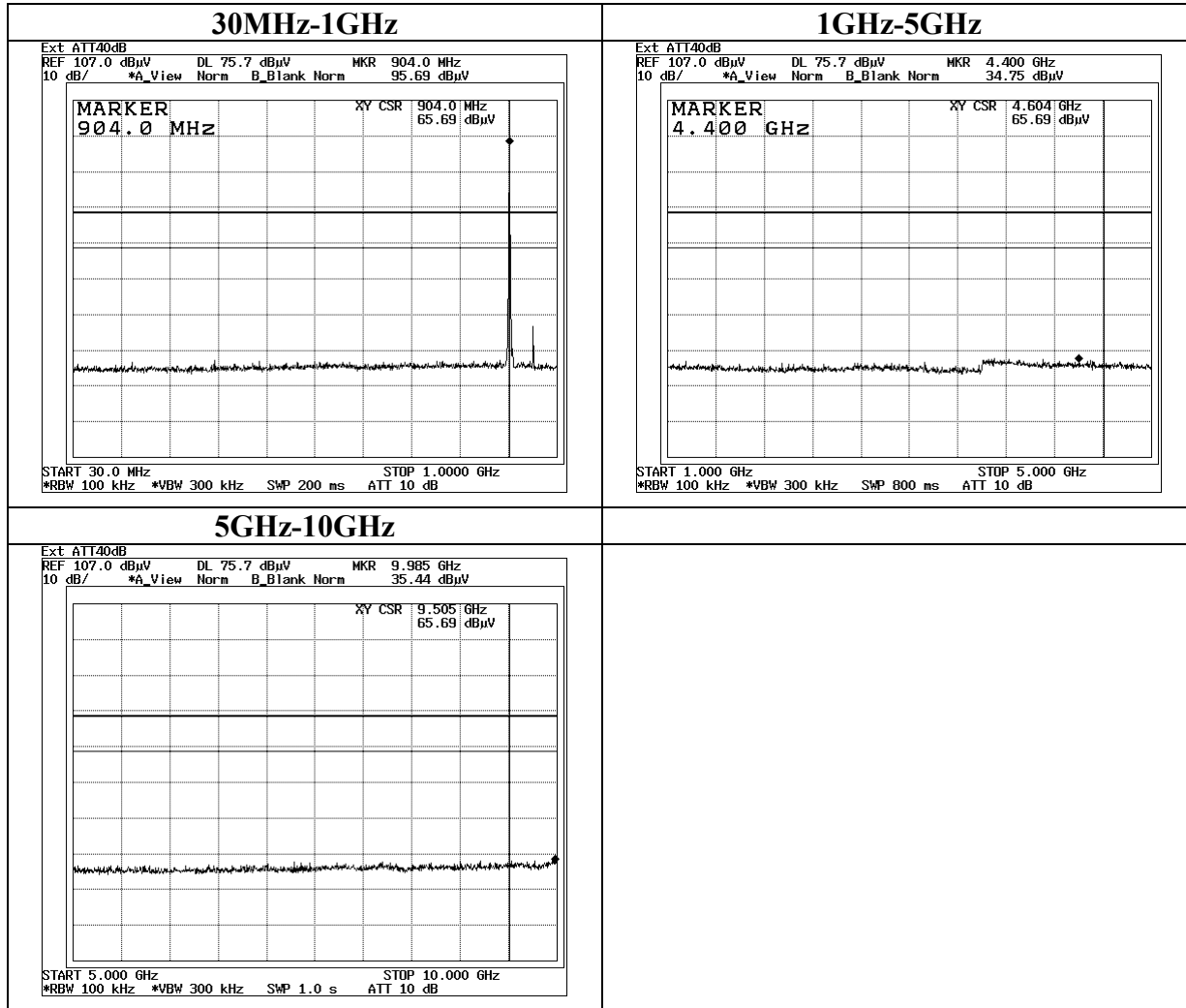
Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

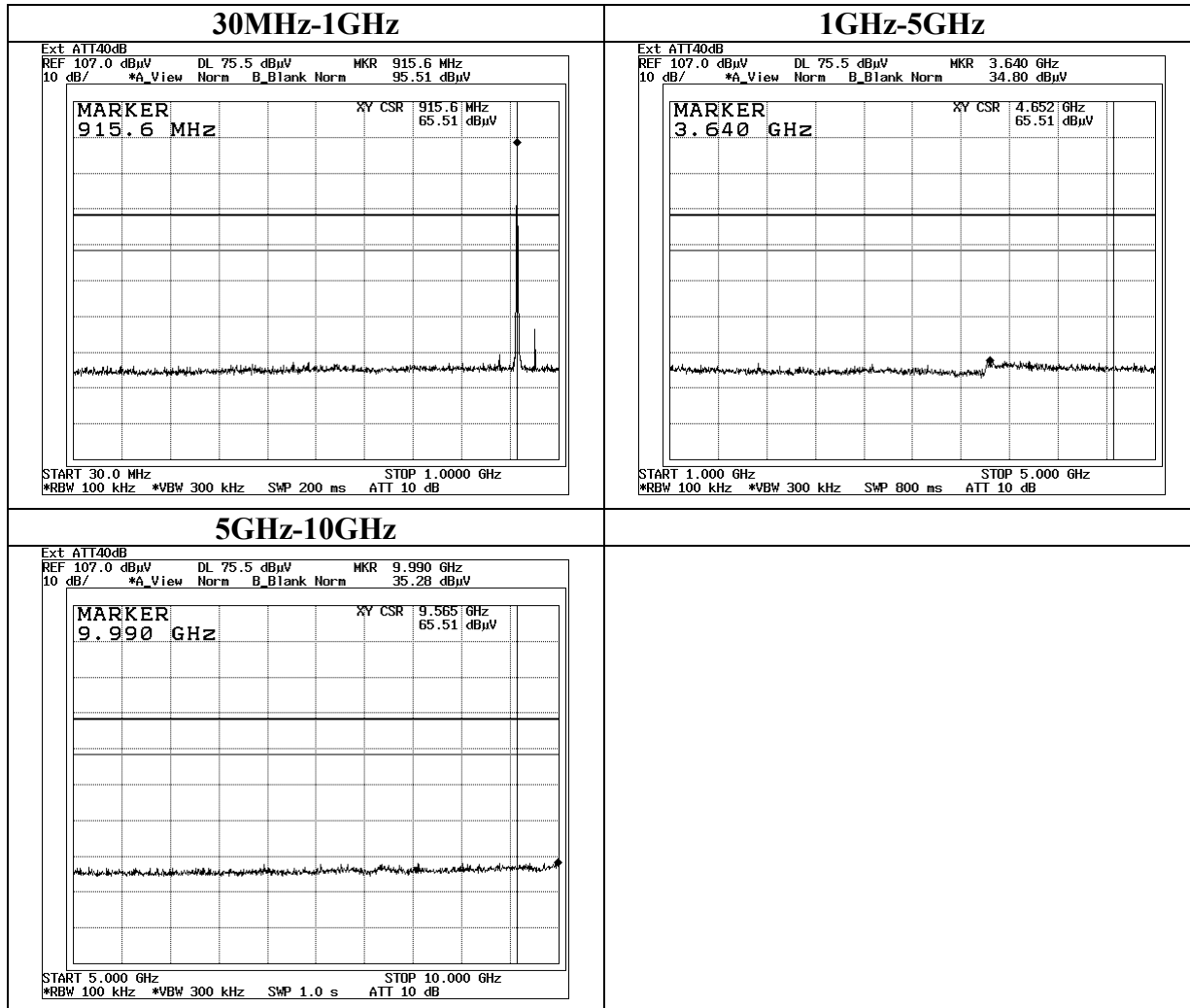
MF060b(10.04.03)

Conducted Spurious Emission

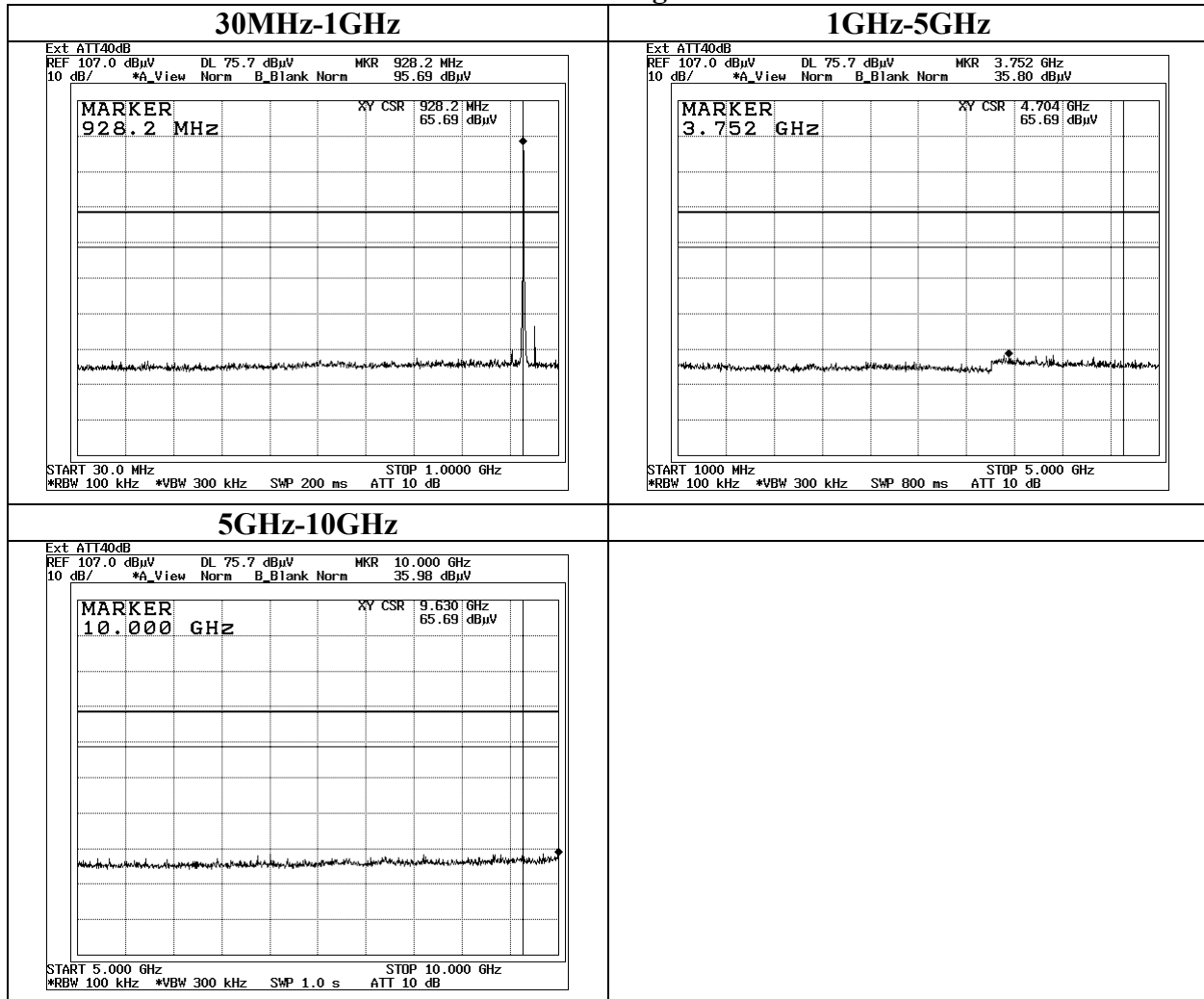
Ch:Low



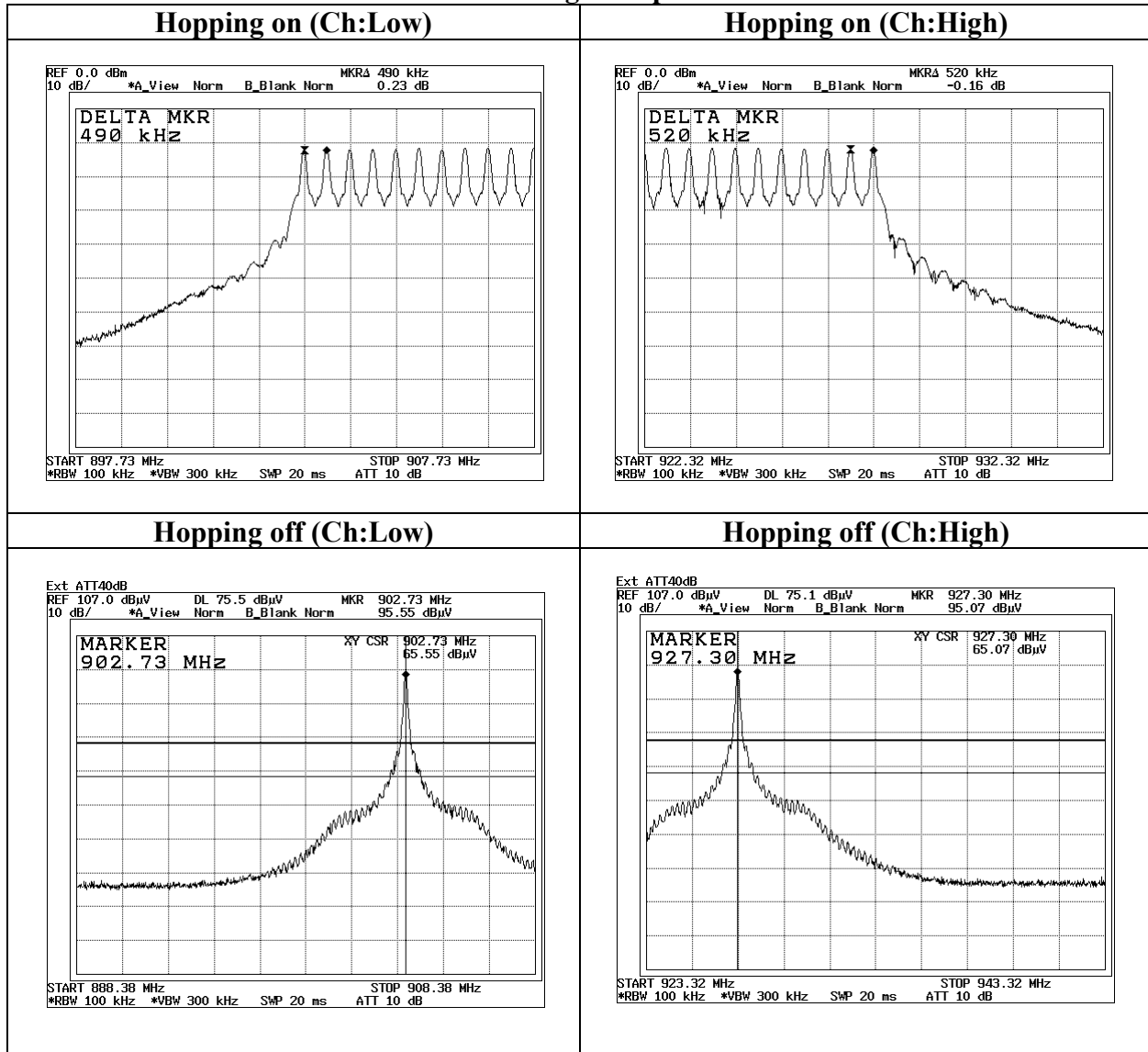
Conducted Spurious Emission
Ch:Mid



Conducted Spurious Emission
Ch:High



Conducted Spurious Emission Band Edge compliance



99% Occupied Bandwidth

