




EMI TEST REPORT


Test Report No. : 27JE0169-YK-A

Applicant : OMRON Corporation
Type of Equipment : Amplifier
Model No. : V680-HA63A
FCC ID : E4E6CYSIDV6800406
Test Standard : FCC Part15 Subpart C,
Section 15.207, 15.209, 15.215, 15.225: 2006
Test Result : Complied

1. This test report shall not be reproduced except in full, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: June 4 - 7, 2007

Tested by: 
Makoto Hosaka

Approved by: 
Osamu Watatani
Manager of Yamakita EMC Lab.

UL Japan, Inc.

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1 Applicant Information

Company Name : OMRON Corporation
Address : 3-2 Narutani, Nakayama-cho, Ayabe-shi, Kyoto-fu, 623-0105 JAPAN
Telephone Number : +81-773-42-6662
Facsimile Number : +81-773-42-6135
Contact Person : Shuichi Matsui

2 Product Description

Type of Equipment : Amplifier
Model No. : V680-HA63A
Serial No. : 5
Rating : DC7.5V
Country of Manufacture : Japan
Receipt Date of Sample : May 22, 2007
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.

Model: V680-HA63A (referred to as the EUT in this report) is an Amplifier.

Equipment type : Transceiver
Frequency of operation : 13.56 MHz
Type of modulation : ASK
Antenna type : Loop coil antenna
Antenna connector type : BNC
Mode of operation : Simplex
Other clock frequency : 12MHz (USB), 16MHz (CPU)
Emission Designation : A1D
Operation temperature range: -10 ~ +55 deg. C. (Amplifier)
-25 ~ +70 deg. C. (Antenna: V680-HS65)

*FCC Part15.31 (e)

The ID Controller provides the Amplifier with stable power supply and the equipment complies power supply regulation.

*FCC Part15.203

The EUT has an external and particular antenna connector, but it is installed by the professionals.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3 Test Specification, Procedures and 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 15.209: Radiated emission limits, general requirements
 Section 15.215: Additional provisions to the general radiated emission limitations
 Section 15.225: Operation within the band 13.110-14.010MHz

3.2 Procedures & Results

| Item | Test Procedure | Specification | Remarks | Deviation | Worst Margin | Results |
|--|---|-----------------------------------|----------|-----------|-----------------------------------|----------|
| Conducted Emission | ANSI C63.4: 2003 7. AC powerline conducted emission measurements | Section 15.207 | - | N/A | 10.2dB (0.3811MHz, N, AV) | Complied |
| Electric Field Strength of Fundamental Emission | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section 15.225 (a) | Radiated | N/A | 52.1dB (Horizontal) | Complied |
| Electric Field Strength of Outside the Allocated bands | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section 15.225 (b) (c) | Radiated | N/A | 30.3dB (13.553MHz, Horizontal) | Complied |
| Electric Field Strength of Spurious Emission | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section15.209, Section 15.225 (d) | Radiated | N/A | 6.7dB (34.69MHz, Vertical) | Complied |
| 20dB Bandwidth | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section15.215(c) | Radiated | N/A | - | Complied |
| Frequency Tolerance | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section15.225 (e) | Radiated | N/A | - | Complied |

* Other than mentioned in 3.3, no addition, exclusion nor deviation has been made from the standard.

3.3 Addition to standard

| Item | Test Procedure | Specification | Remarks | Worst Margin | Results |
|--------------------------|--|---------------|-------------|--------------|----------|
| Occupied Bandwidth (99%) | ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.4.1 | RSS-Gen 4.4.1 | Conducted - | | Complied |

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3.3 Uncertainty

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

| | No.1 open site | No.2 open site | No.1 anechoic chamber |
|--------------------------------|----------------|----------------|-----------------------|
| Conducted emission | | | |
| 150kHz-30MHz | 2.8 dB | 2.8 dB | 2.8 dB |
| Radiated emission (3m) | | | |
| 30-300MHz | 4.5 dB | 4.4 dB | 4.5 dB |
| 300-1000MHz | 4.3 dB | 4.3 dB | 4.3 dB |
| 1GHz< | 5.7 dB | 5.7 dB | 5.7 dB |
| Radiated emission (10m) | | | |
| 30-300MHz | 4.5 dB | 4.4 dB | - |
| 300-1000MHz | 4.1 dB | 4.1 dB | - |

Conducted Emission Test

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

Radiated Emission Test

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

Frequency tolerance

The measurement uncertainty (with 95% confidence level) for this test is 0.000014MHz.

3.4 Test Location

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NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).

IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on April 4, 2005 (Registration No.: 466226).

IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : 2973B-2

| Test room | Width x Depth x Height (m) | Test room | Width x Depth x Height (m) |
|--------------------|----------------------------|-------------------------------|----------------------------|
| No.1 shielded room | 8.0 x 5.0 x 2.5 | No.1 Semi-anechoic chamber | 10.0 x 7.5 x 5.7 |
| No.2 shielded room | 5.0 x 4.0 x 2.5 | | |
| No.3 shielded room | 4.0 x 5.0 x 2.7 | | |

3.7 Test Setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

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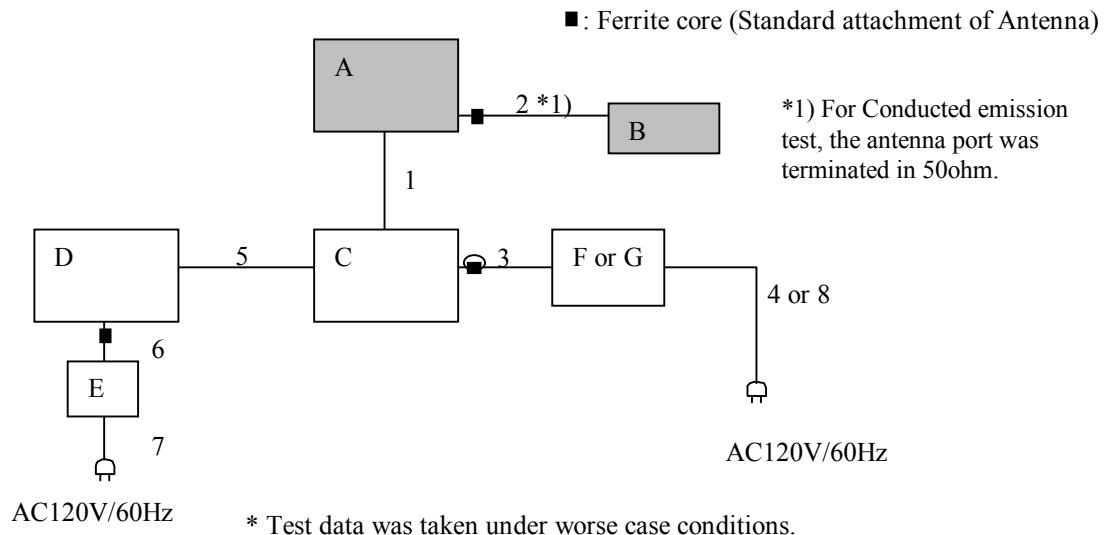
4 System Test Configuration

4.1 Justification

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

Operation: Transmitting (13.56MHz)

4.2 Configuration of Tested System



Description of EUT and support equipment

| No. | Item | Model number | Serial number | Manufacturer | FCC ID (Remarks) |
|-----|-------------------|--------------|----------------------------|--------------|------------------------------|
| A | Amplifier | V680-HA63A | 5 | Omron | E4E6CYSIDV6800406 (EUT) |
| B | Antenna | V680-HS65 | 35 | Omron | (EUT) |
| C | ID Controller | V680-CA5D01 | 5 | Omron | - |
| D | Personal Computer | 2655-86J | 97-630VG 07/01 | IBM | - |
| E | AC Adaptor | 02K6665 | 11S02K6665Z1 Z2U81409EF | IBM | - |
| F | Power Supply | S8VS-03024 | 07650M | Omron | for other test |
| G | DC Power Supply | PAN35-10A | DE001677 | Kikusui | for Frequency tolerance test |

List of cables used

| No. | Name | Length (m) | Shield | | Remark |
|-----|-----------------|------------|------------|------------|----------------|
| | | | Connector | Cable | |
| 1 | Amplifier cable | 5.0 | Shielded | Shielded | - |
| 2 | Antenna cable | 2.0 | Shielded | Shielded | for V680-HS65 |
| 3 | DC power cable | 1.5 | Unshielded | Unshielded | - |
| 4 | AC power cable | 1.0 | Unshielded | Unshielded | for S8VS-03024 |
| 5 | RS232C cable | 15.0 | Shielded | Shielded | - |
| 6 | DC power cable | 1.7 | Unshielded | Unshielded | - |
| 7 | AC power cable | 1.0 | Unshielded | Unshielded | - |
| 8 | AC power cable | 1.5 | Unshielded | Unshielded | for PAN35-10A |

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5 Conducted Emissions

5.1 Operating environment

The test was carried out in No.1 shielded room.

Temperature : See test data
Humidity : See test data

5.2 Test configuration

EUT was placed on a wooden platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting plane. EUT was located 80cm from LISN and excess AC cable was bundled in center. The rear of EUT, including peripherals was aligned and was flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. A drawing of the set up is shown in the photos of Appendix 1.

5.3 Test conditions

Frequency range : 0.15 - 30MHz
EUT position : Table top
EUT operation mode : Transmitting

5.4 Test procedure

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

The Conducted emission measurements were made with the following detector function of the test receiver.

Detector: QP/AV
IF Bandwidth: 9kHz

5.5 Results

Summary of the test results : Pass

Date : June 6, 2007 Test engineer : Makoto hosaka

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6 Radiated Emissions (Fundamental, Spurious and Outside the Allocated bands)

6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

Temperature : See test data
 Humidity : See test data

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

6.3 Test conditions

Frequency range : 9kHz - 1GHz
 EUT position : Table top
 EUT operation mode : Transmitting

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured 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 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 |
| Measuring antenna | Loop antenna | | | | Biconical (30-299.99MHz) Logperiodic (300MHz-1GHz) |

The EUT and its antennas were previously checked at each position of three or two axes. The position in which the maximum noise occurred was chosen to put into measurement. See the table and photographs in page 16 to 18. With the position, the noise levels of all the frequencies were measured.

* 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])

6.5 Results

Summary of the test results : Pass

Date : June 4 and 5, 2007

Test engineer : Makoto Hosaka

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7 20dB Bandwidth & Occupied Bandwidth (99%)

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

Summary of the test results: Pass

Date : June 5, 2007

Test engineer : Makoto Hosaka

8 Frequency Tolerance

Test Procedure

The measurement was performed in the antenna height to gain the maximum of Electric field strength.

The temperature test was started after the temperature stabilization time of 30 minutes.

Summary of the test results: Pass

Date : June 7, 2007

Test engineer : Makoto Hosaka

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APPENDIX 1: Photographs of test setup

| | | |
|--------------|---|---------------------------------|
| Page 11 | : | Conducted emission |
| Page 12 | : | Radiated emission |
| Page 13 - 14 | : | Pre-check of the worst position |

APPENDIX 2: Test Data

| | | |
|--------------|---|---|
| Page 15 - 17 | : | Conducted Emission |
| Page 18 - 20 | : | Radiated Emission |
| 18 | : | Fundamental and Outside the Allocated bands |
| 19-20 | : | Spurious emission |
| Page 21 | : | Bandwidth |
| Page 22 - 24 | : | Frequency Tolerance |

APPENDIX 3: Test instruments

| | | |
|---------|---|------------------|
| Page 25 | : | Test instruments |
|---------|---|------------------|

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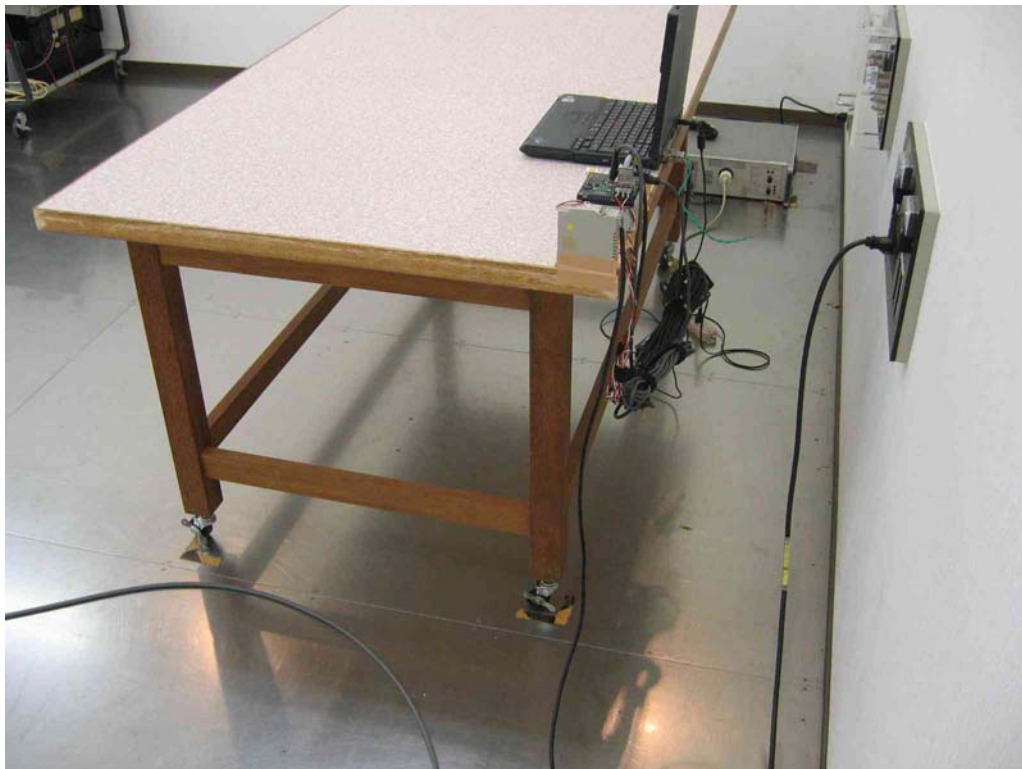
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Conducted emission



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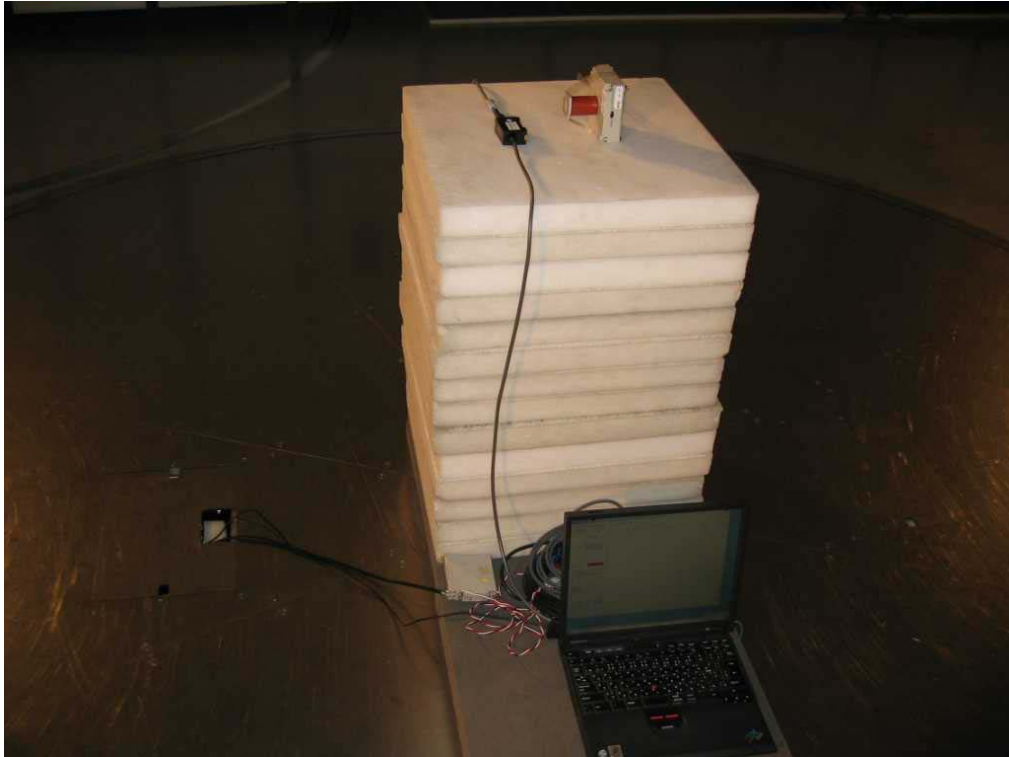
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Radiated emission



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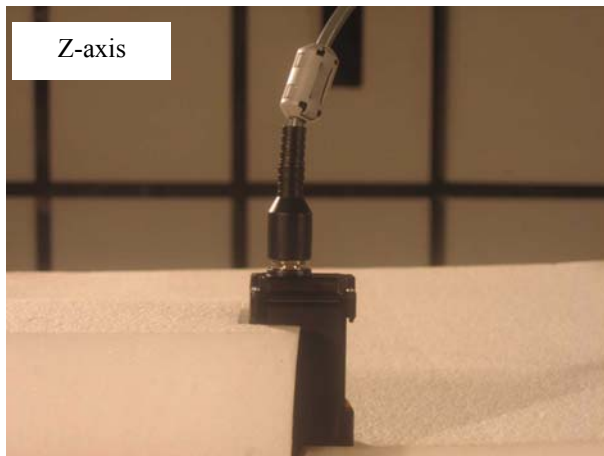
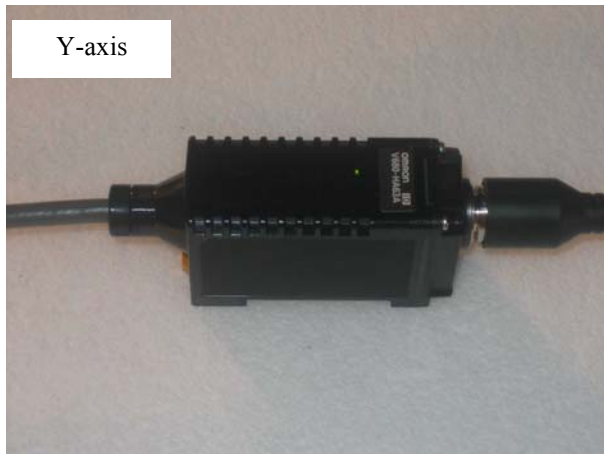
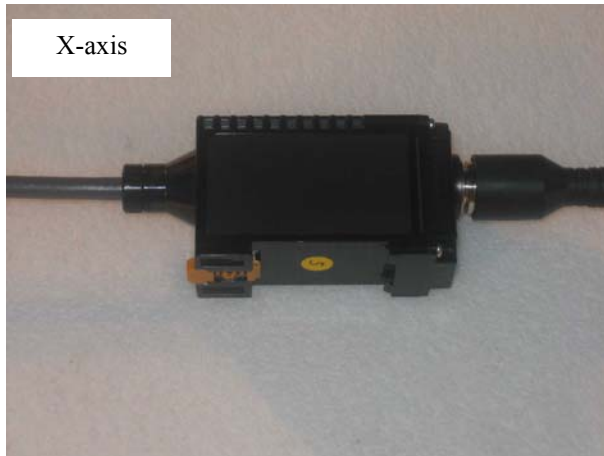
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Pre-check of the worst position (Amplifier)



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Pre-check of the worst position (Antenna)



Worst-case combination

| Amplifier | | Antenna | |
|------------|----------|------------|----------|
| Horizontal | Vertical | Horizontal | Vertical |
| X | X | Y | Y |

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DATA OF CONDUCTION TEST

UL Japan, Inc.

YAMAKITA No.1 SHIELD ROOM

Report No. : 27JE0169-YK-A

Applicant : OMRON Corporation
Kind of Equipment : Amplifier
Model No. : V680-HA63A
Serial No. : No. 5
Power : AC120V/60Hz (DC7.5V)
Mode : Transmitting Mode (13.56MHz)
Remarks : Antenna port: 50ohm terminate
Date : 6/6/2007
Phase : Single Phase
Temperature : 24 °C Engineer : Makoto Hosaka
Humidity : 51 %
Regulation : FCC Part15C § 15.207. (CISPR Pub.22)

| No. | FREQ. [MHz] | READING (N) | | READING (L1) | | LISN FACTOR [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT | | LIMITS | | MARGIN | |
|-----|----------------|---------------|---------------|---------------|---------------|------------------------|-----------------------|----------------|------------|---------------|---------------|---------------|------------|------------|
| | | QP [dB μV] | AV [dB μV] | QP [dB μV] | AV [dB μV] | | | | QP [dB] | AV [dB μV] | QP [dB μV] | AV [dB μV] | QP [dB] | AV [dB] |
| 1. | 0.1500 | 42.9 | 28.8 | 49.2 | 35.2 | 0.1 | 0.1 | 0.0 | 49.4 | 35.4 | 66.0 | 56.0 | 16.6 | 20.6 |
| 2. | 0.1916 | 43.7 | 28.4 | 50.0 | 35.2 | 0.1 | 0.1 | 0.0 | 50.2 | 35.4 | 64.0 | 54.0 | 13.8 | 18.6 |
| 3. | 0.3562 | 46.4 | 37.3 | 47.4 | 37.0 | 0.1 | 0.2 | 0.0 | 47.7 | 37.6 | 58.8 | 48.8 | 11.1 | 11.2 |
| 4. | 0.3811 | 47.0 | 37.8 | 46.9 | 37.0 | 0.1 | 0.2 | 0.0 | 47.3 | 38.1 | 58.3 | 48.3 | 11.0 | 10.2 |
| 5. | 7.5403 | 37.6 | - | 38.5 | - | 0.3 | 0.8 | 0.0 | 39.6 | - | 60.0 | 50.0 | 20.4 | - |
| 6. | 13.5601 | 38.9 | 34.3 | 38.3 | 33.8 | 0.6 | 1.3 | 0.0 | 40.8 | 36.2 | 60.0 | 50.0 | 19.2 | 13.8 |
| 7. | 22.2543 | 34.2 | - | 34.3 | - | 0.8 | 1.8 | 0.0 | 36.9 | - | 60.0 | 50.0 | 23.1 | - |

CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

■ LISN: KLS-01 (NSLK8126) ■ COAXIAL CABLE: KCC-14/15/16/18
■ PULSE LIMITTER: KPL-01 (PL01) ■ EMI RECEIVER: KTR-02 (ESCS30)

DATA OF CONDUCTION TEST

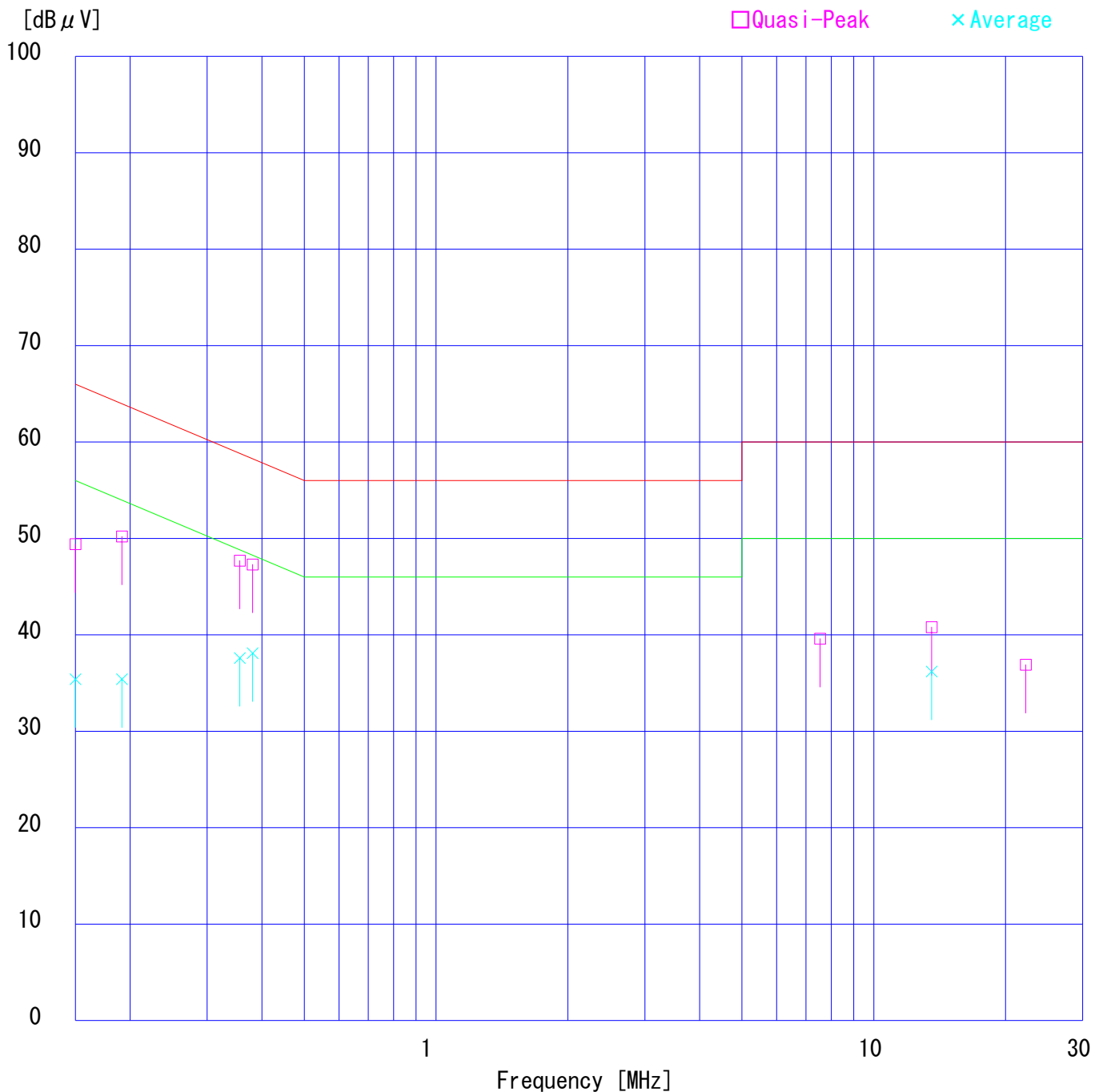
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YAMAKITA No.1 SHIELD ROOM

Report No. : 27JE0169-YK-A

Applicant : OMRON Corporation
Kind of Equipment : Amplifier
Model No. : V680-HA63A
Serial No. : No. 5
Power : AC120V/60Hz (DC7.5V)
Mode : Transmitting Mode (13.56MHz)
Remarks : Antenna port: 50ohm terminate
Date : 6/6/2007
Phase : Single Phase
Temperature : 24 °C
Humidity : 51 %
Regulation : FCC Part15C § 15.207. (CISPR Pub.22)

Engineer : Makoto Hosaka



DATA OF CONDUCTION TEST CHART

UL Japan, Inc.

YAMAKITA No.1 SHIELD ROOM

Report No. : 27JE0169-YK-A

Applicant : OMRON Corporation

Kind of Equipment : Amplifier

Model No. : V680-HA63A

Serial No. : No. 5

Power : AC120V/60Hz (DC7.5V)

Mode : Transmitting Mode(13.56MHz)

Remarks : Antenna port: 50ohm terminate

Date : 6/6/2007

Phase : Single Phase

Temperature : 24 °C

Engineer : Makoto Hosaka

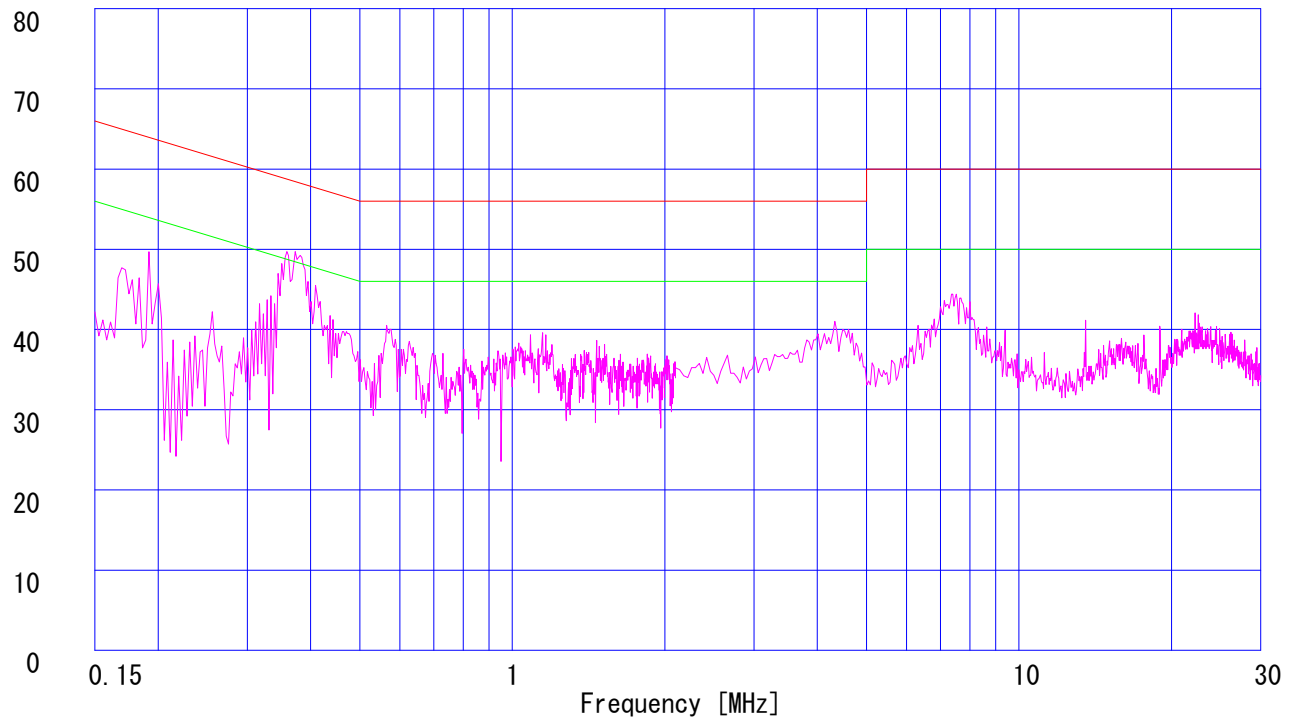
Humidity : 51 %

Regulation 1 : FCC Part15C § 15.207. (CISPR Pub. 22)

Regulation 2 : None

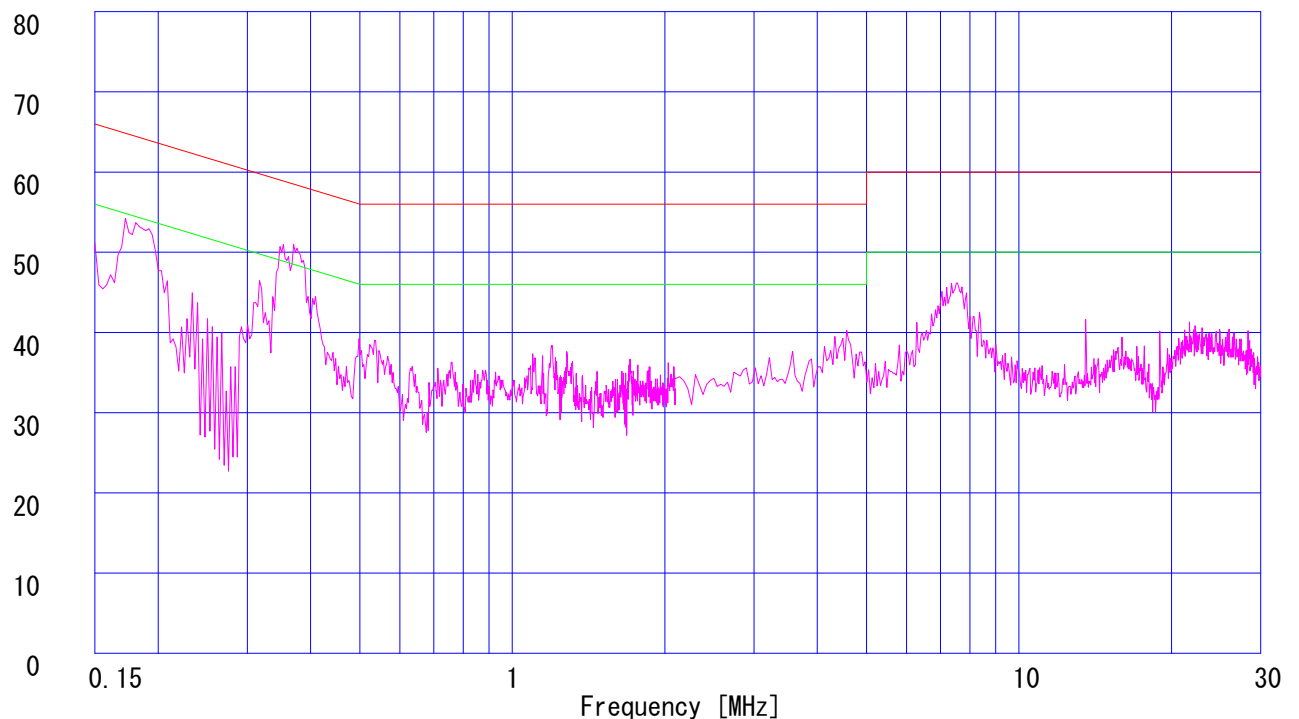
Emission Level [dB μ V]

PHASE:N



Emission Level [dB μ V]

PHASE:L1



Data of Field Strength and Outside Filed Strength: FCC15.225

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YAMAKITA No1 Anechoic Chamber

Company : OMRON Corporation
Equipment : Amplifier
Model : V680-HA63A
Sample No. : No.5
FCC ID : E4E6CYSIDV6800406
Power : DC7.5V
Mode : Transmitting (13.56MHz)
Remarks : AMP cable 5m, ANT cable 2m

Report No. : 27JE0169-YK-A
Regulation : FCC Part15 SupartC 15.225
Test Distance : 3m
Date : 2007/06/05
Temperature : 24deg.C
Humidity : 45%

ENGINEER : Makoto Hosaka

Field strength

| No. | FREQ [MHz] | T/R Reading | | ANT Factor [dB] | ATTEN [dB] | CABLE LOSS [dB] | AMP GAIN [dB] | RESULT | | LIMIT (3m) [dBuV/m] | MARGIN | |
|-----|---------------|---------------|---------------|-----------------------|---------------|-----------------------|---------------------|-----------------|-----------------|---------------------------|-------------|-------------|
| | | Hor [dBuV] | Ver [dBuV] | | | | | Hor [dBuV/m] | Ver [dBuV/m] | | Hor [dB] | Ver [dB] |
| 1 | 13.560 | 74.3 | 72.4 | 19.5 | 5.8 | 0.7 | 28.4 | 71.9 | 70.0 | 124.0 | 52.1 | 54.0 |

Field strength of 13.553MHz to 13.567MHz Limit(3m) = 84dBuV/m + 40log 30m/3m
= 124dBuV/m (FCC15.225(a))

Outside Field strength

| No. | FREQ [MHz] | T/R Reading | | ANT Factor [dB] | ATTEN [dB] | CABLE LOSS [dB] | AMP GAIN [dB] | RESULT | | LIMIT (3m) [dBuV/m] | MARGIN | |
|-----|---------------|---------------|---------------|-----------------------|---------------|-----------------------|---------------------|-----------------|-----------------|---------------------------|-------------|-------------|
| | | Hor [dBuV] | Ver [dBuV] | | | | | Hor [dBuV/m] | Ver [dBuV/m] | | Hor [dB] | Ver [dB] |
| 1 | 13.110 | 28.0 | 27.4 | 19.5 | 5.8 | 0.7 | 28.4 | 25.6 | 25.0 | 69.5 | 43.9 | 44.5 |
| 2 | 13.410 | 33.0 | 31.1 | 19.5 | 5.8 | 0.7 | 28.4 | 30.6 | 28.7 | 80.5 | 49.9 | 51.8 |
| 3 | 13.553 | 62.6 | 60.6 | 19.5 | 5.8 | 0.7 | 28.4 | 60.2 | 58.2 | 90.5 | 30.3 | 32.3 |
| 4 | 13.567 | 61.2 | 59.2 | 19.5 | 5.8 | 0.7 | 28.4 | 58.8 | 56.8 | 90.5 | 31.7 | 33.7 |
| 5 | 13.710 | 32.8 | 30.9 | 19.6 | 5.8 | 0.7 | 28.4 | 30.5 | 28.6 | 80.5 | 50.0 | 51.9 |
| 6 | 14.010 | 28.2 | 27.5 | 19.6 | 5.8 | 0.7 | 28.5 | 25.8 | 25.1 | 69.5 | 43.7 | 44.4 |

Outside filed strength frequencies

- filed strength band $F_c \pm 7\text{kHz}$: 13.553MHz to 13.567MHz
 - Outside filde strength $F_c \pm 150\text{kHz}$: 13.410MHz to 13.710MHz
 - Outside filde strength $F_c \pm 450\text{kHz}$: 13.110MHz to 14.010MHz
- $F_c = 13.56\text{MHz}$

Limits (3m)

- 13.410MHz to 13.553MHz and 13.567MHz to 13.710MHz : $50.5\text{dBuV/m} + 40\log 30\text{m}/3\text{m} = 90.5\text{dBuV/m}$ (FCC15.225(b))
- 13.110MHz to 14.010MHz and 13.710MHz to 14.010MHz : $40.5\text{dBuV/m} + 40\log 30\text{m}/3\text{m} = 80.5\text{dBuV/m}$ (15.225(c))
- Below 13.110MHz and Above 14.010MHz : $29.5\text{dBuV/m} + 40\log 30\text{m}/3\text{m} = 69.5\text{dBuV/m}$ (FCC15.225(d)and FCC15.209)

Antenna: KLP-01(HFH2-Z2) 0.009-30MHz
KCC-30/31/32/34(RE)
AMP: KAF-05(8447D)
Receiver: KTR-01

DATA OF RADIATION TEST

UL Japan, Inc.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 27JE0169-YK-A

Applicant : OMRON Corporation
Kind of Equipment : Amplifier
Model No. : V680-HA63A
Serial No. : No. 5
Power : DC7.5V
Mode : Transmitting Mode (13.56MHz)
Remarks : AMP cable:5m, ANT cable:2m
Date : 6/5/2007
Test Distance : 3 m
Temperature : 24 °C Engineer : Makoto Hosaka
Humidity : 45 %
Regulation : FCC Part15C § 15.209 9KHz-30MHz (3m)

| No. | FREQ. [MHz] | ANT TYPE | READING | | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT | | LIMITS [dB μ V/m] | MARGIN | |
|-----|----------------|-------------|---------------------|---------------------|-------------------------|---------------------|-----------------------|----------------|-----------------------|-----------------------|--------------------------|-------------|-------------|
| | | | HOR [dB μ V] | VER [dB μ V] | | | | | HOR [dB μ V/m] | VER [dB μ V/m] | | HOR [dB] | VER [dB] |
| 1. | 27.12 | BB | 27.5 | 33.3 | 21.2 | 28.5 | 1.0 | 5.8 | 27.0 | 32.8 | 69.5 | 42.5 | 36.7 |

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

■ ANTENNA: KLP-01 (HFH2-Z2) 0.009-30MHz

■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8447D) ■ EMI RECEIVER: KTR-01 (ES140)

DATA OF RADIATION TEST

UL Japan, Inc.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 27JE0169-YK-A

Applicant : OMRON Corporation
 Kind of Equipment : Amplifier
 Model No. : V680-HA63A
 Serial No. : No. 5
 Power : DC7.5V
 Mode : Transmitting Mode (13.56MHz)
 Remarks : AMP cable:5m, ANT cable:2m
 Date : 6/4/2007
 Test Distance : 3 m
 Temperature : 25 °C
 Humidity : 51 %
 Regulation : FCC Part15C § 15.209

Engineer : Makoto Hosaka

| No. | FREQ. [MHz] | ANT TYPE | READING | | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT | | LIMITS [dB μ V/m] | MARGIN | |
|-----|----------------|-------------|-----------------|-----------------|-------------------------|---------------------|-----------------------|----------------|-------------------|-------------------|----------------------|-------------|-------------|
| | | | HOR [dB μ V] | VER [dB μ V] | | | | | HOR [dB μ V/m] | VER [dB μ V/m] | | HOR [dB] | VER [dB] |
| 1. | 34.69 | BB | 27.7 | 38.1 | 17.1 | 28.8 | 1.1 | 5.8 | 22.9 | 33.3 | 40.0 | 17.1 | 6.7 |
| 2. | 40.68 | BB | 28.0 | 40.1 | 13.7 | 28.8 | 1.2 | 5.8 | 19.9 | 32.0 | 40.0 | 20.1 | 8.0 |
| 3. | 44.51 | BB | 31.4 | 42.2 | 12.6 | 28.8 | 1.3 | 5.8 | 22.3 | 33.1 | 40.0 | 17.7 | 6.9 |
| 4. | 54.24 | BB | 27.3 | 39.5 | 9.6 | 28.6 | 1.4 | 5.8 | 15.5 | 27.7 | 40.0 | 24.5 | 12.3 |
| 5. | 67.80 | BB | 38.1 | 35.5 | 7.0 | 28.5 | 1.6 | 5.8 | 24.0 | 21.4 | 40.0 | 16.0 | 18.6 |
| 6. | 81.36 | BB | 35.0 | 40.2 | 6.9 | 28.6 | 1.8 | 5.8 | 20.9 | 26.1 | 40.0 | 19.1 | 13.9 |
| 7. | 94.92 | BB | 34.1 | 37.9 | 9.5 | 28.6 | 2.0 | 5.8 | 22.8 | 26.6 | 43.5 | 20.7 | 16.9 |
| 8. | 108.48 | BB | 23.8 | 32.5 | 11.7 | 28.4 | 2.1 | 5.8 | 15.0 | 23.7 | 43.5 | 28.5 | 19.8 |
| 9. | 122.05 | BB | 34.6 | 40.8 | 13.4 | 28.4 | 2.3 | 5.8 | 27.7 | 33.9 | 43.5 | 15.8 | 9.6 |
| 10. | 135.60 | BB | 34.9 | 36.8 | 14.2 | 28.4 | 2.4 | 5.8 | 28.9 | 30.8 | 43.5 | 14.6 | 12.7 |
| 11. | 216.96 | BB | 38.3 | 33.9 | 17.1 | 27.8 | 3.1 | 5.8 | 36.5 | 32.1 | 46.0 | 9.5 | 13.9 |
| 12. | 325.72 | BB | 30.2 | 40.8 | 15.0 | 27.6 | 4.0 | 5.9 | 27.5 | 38.1 | 46.0 | 18.5 | 7.9 |
| 13. | 401.04 | BB | 39.8 | 39.6 | 17.1 | 28.4 | 4.7 | 5.9 | 39.1 | 38.9 | 46.0 | 6.9 | 7.1 |
| 14. | 781.71 | BB | 33.9 | 30.7 | 21.0 | 28.9 | 6.3 | 5.9 | 38.2 | 35.0 | 46.0 | 7.8 | 11.0 |

CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

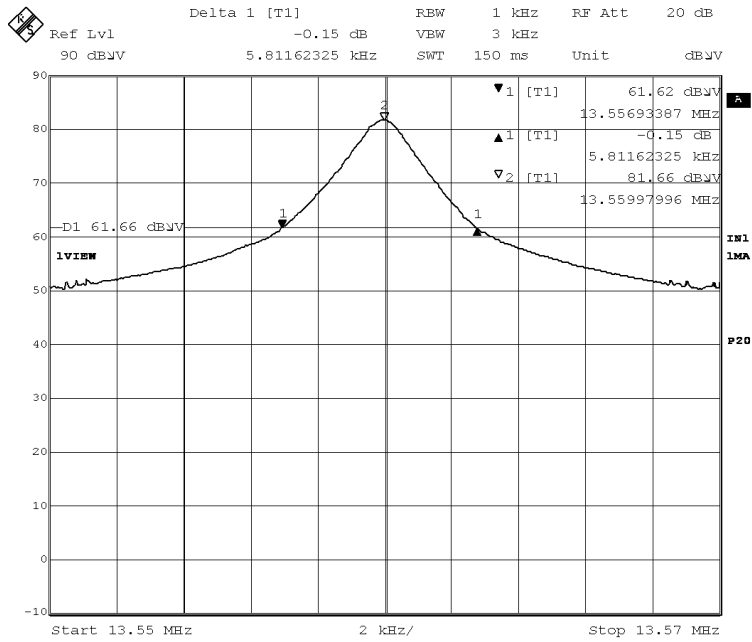
■ ANTENNA: KBA-03 (BBA9106) 30-299.99MHz/KLA-03 (USLP9143) 300-1000MHz

■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8447D) ■ EMI RECEIVER: KTR-02 (ESCS30)

20dB Bandwidth: FCC 15.215(c)

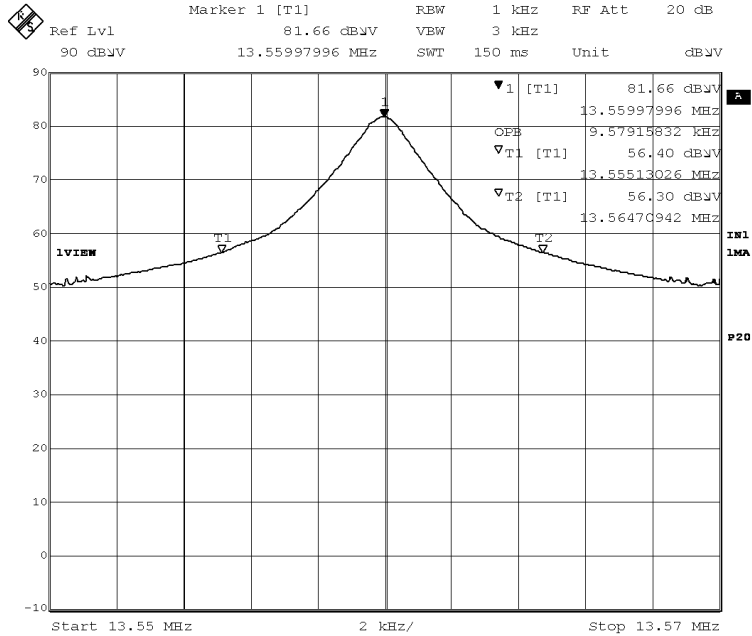
| | | |
|----------------|---------------------|---|
| COMPANY | : OMRON Corporation | UL Japan, Inc. Yamakita No.1 Anechoic chamber |
| Equipment | : Amplifier | REPORT No. : 27JE0169-YK-A |
| MODEL NUMBER: | V680-HA63A | REGULATION : FCC Part15SubpartC 215(c) |
| SERIAL NUMBER: | No.5 | DATE : 2007/06/05 |
| FCC ID | : E4E6CYSIDV6800406 | TEMP./HUMI : 24°C/45% |
| POWER | : DC7.5V | TEST MODE : Transmitting |
| | | ENGINEER : Makoto Hosaka |

20dB Bandwidth: 5.81kHz



Date: 5.JUN.2007 22:20:11

OBW(99%): 9.58kHz



Date: 5.JUN.2007 22:20:57

Data of Frequency Tolerance: FCC 15.225(e)

UL Japan, Inc.

YAMAKITA No.4 Shield room

Company : OMRON Corporation
Equipment : Amplifier
Model : V680-HA63A
Sample No. : No.5
FCC ID : E4E6CYSIDV6800406
Power : AC120V/60Hz
Mode : Transmitting (13.56MHz)

Report No. : 27JE0169-YK-A
Regulation : FCC Part15 SupartC 15.225 (e)

Date : 2007/06/07

Temperature : 23deg.C

Humidity : 62%

ENGINEER : Makoto Hosaka

Input Voltage:DC20.4V (85%)

Temperature Variation: 20deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------------|-------------------------------|-----------------------------|-------------------------------|--------------|
| startup | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |
| after 2minutes | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |
| after 5minutes | 13.56 | 13.55986 | -0.00014 | -0.00103 | 0.01 |
| after 10minutes | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |

Input Voltage:DC27.6V(115%)

Temperature Variation: 20deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------------|-------------------------------|-----------------------------|-------------------------------|--------------|
| startup | 13.56 | 13.55990 | -0.00010 | -0.00074 | 0.01 |
| after 2minutes | 13.56 | 13.55989 | -0.00011 | -0.00081 | 0.01 |
| after 5minutes | 13.56 | 13.55988 | -0.00012 | -0.00088 | 0.01 |
| after 10minutes | 13.56 | 13.56987 | 0.00987 | 0.07279 | 0.01 |

Data of Frequency Tolerance: FCC 15.225(e)

UL Japan, Inc.
YAMAKITA No.4 Shield room

Company : OMRON Corporation
Equipment : Amplifier
Model : V680-HA63A
Sample No. : No.5
FCC ID : E4E6CYSIDV6800406
Power : AC120V/60Hz
Mode : Transmitting (13.56MHz)

Report No. : 27JE0169-YK-A
Regulation : FCC Part15 SupartC 15.225 (e)

Date : 2007/06/07
Temperature : 23deg.C
Humidity : 62%

ENGINEER : Makoto Hosaka

Temperature Variation: -20deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency torerance (%) | Limit (%) |
|-----------------|--------------------------------|-------------------------------|-----------------------------|-------------------------------|--------------|
| startup | 13.56 | 13.55993 | -0.00007 | -0.00052 | 0.01 |
| after 2minutes | 13.56 | 13.55994 | -0.00006 | -0.00044 | 0.01 |
| after 5minutes | 13.56 | 13.55994 | -0.00006 | -0.00044 | 0.01 |
| after 10minutes | 13.56 | 13.55994 | -0.00006 | -0.00044 | 0.01 |

Temperature Variation: -10deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency torerance (%) | Limit (%) |
|-----------------|--------------------------------|-------------------------------|-----------------------------|-------------------------------|--------------|
| startup | 13.56 | 13.55993 | -0.00007 | -0.00052 | 0.01 |
| after 2minutes | 13.56 | 13.55995 | -0.00005 | -0.00037 | 0.01 |
| after 5minutes | 13.56 | 13.55994 | -0.00006 | -0.00044 | 0.01 |
| after 10minutes | 13.56 | 13.55993 | -0.00007 | -0.00052 | 0.01 |

Temperature Variation: 0deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency torerance (%) | Limit (%) |
|-----------------|--------------------------------|-------------------------------|-----------------------------|-------------------------------|--------------|
| startup | 13.56 | 13.55994 | -0.00006 | -0.00044 | 0.01 |
| after 2minutes | 13.56 | 13.55994 | -0.00006 | -0.00044 | 0.01 |
| after 5minutes | 13.56 | 13.55992 | -0.00008 | -0.00059 | 0.01 |
| after 10minutes | 13.56 | 13.55993 | -0.00007 | -0.00052 | 0.01 |

Data of Frequency Tolerance: FCC 15.225(e)

UL Japan, Inc.
YAMAKITA No.4 Shield room

Company : OMRON Corporation
Equipment : Amplifier
Model : V680-HA63A
Sample No. : No.5
FCC ID : E4E6CYSIDV6800406
Power : AC120V/60Hz
Mode : Transmitting (13.56MHz)

Report No. : 27JE0169-YK-A
Regulation : FCC Part15 SupartC 15.225 (e)

Date : 2007/06/07
Temperature : 23deg.C
Humidity : 62%

ENGINEER : Makoto Hosaka

Temperature Variation: 10deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------|-------------------------|-----------------------|-------------------------|-----------|
| startup | 13.56 | 13.55993 | -0.00007 | -0.00052 | 0.01 |
| after 2minutes | 13.56 | 13.55992 | -0.00008 | -0.00059 | 0.01 |
| after 5minutes | 13.56 | 13.55991 | -0.00009 | -0.00066 | 0.01 |
| after 10minutes | 13.56 | 13.55990 | -0.00010 | -0.00074 | 0.01 |

Temperature Variation: 20deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------|-------------------------|-----------------------|-------------------------|-----------|
| startup | 13.56 | 13.55992 | -0.00008 | -0.00059 | 0.01 |
| after 2minutes | 13.56 | 13.55990 | -0.00010 | -0.00074 | 0.01 |
| after 5minutes | 13.56 | 13.55989 | -0.00011 | -0.00081 | 0.01 |
| after 10minutes | 13.56 | 13.55988 | -0.00012 | -0.00088 | 0.01 |

Temperature Variation: 30deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------|-------------------------|-----------------------|-------------------------|-----------|
| startup | 13.56 | 13.55989 | -0.00011 | -0.00081 | 0.01 |
| after 2minutes | 13.56 | 13.55988 | -0.00012 | -0.00088 | 0.01 |
| after 5minutes | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |
| after 10minutes | 13.56 | 13.55986 | -0.00014 | -0.00103 | 0.01 |

Temperature Variation: 40deg.C

| Test Conditions | Original Frequency (MHz) | Measure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------|-------------------------|-----------------------|-------------------------|-----------|
| startup | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |
| after 2minutes | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |
| after 5minutes | 13.56 | 13.55988 | -0.00012 | -0.00088 | 0.01 |
| after 10minutes | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |

Temperature Variation: 50deg.C

| Test Conditions | Original Frequency (MHz) | Mesure Frequency (MHz) | Frequency Error (kHz) | Frequency tolerance (%) | Limit (%) |
|-----------------|--------------------------|------------------------|-----------------------|-------------------------|-----------|
| startup | 13.56 | 13.55988 | -0.00012 | -0.00088 | 0.01 |
| after 2minutes | 13.56 | 13.55987 | -0.00013 | -0.00096 | 0.01 |
| after 5minutes | 13.56 | 13.55988 | -0.00012 | -0.00088 | 0.01 |
| after 10minutes | 13.56 | 13.55989 | -0.00011 | -0.00081 | 0.01 |

APPENDIX 3

Test Instruments

EMI test equipment

| Control No. | Instrument | Manufacturer | Model No | Test Item | Calibration Date * Interval(month) |
|---------------------------------------|---|-----------------------------|--|-----------|---------------------------------------|
| YA-CE | Conducted emission(software) | UL Japan | CE(Ver.1.6) | CE | - |
| KCC-14/15/16 /18/KPL-01/K RM-01 | Coaxial Cable/Pulse Limiter/RF Relay Matrix | Fujikura/Suhner/PMM/ TSJ | 5D-2W/8D-2W/S04272 B/S04272B/PL01/- | CE | 2007/05/15 * 12 |
| KLS-01 | LISN(AMN) | Schwarzbeck | NSLK8126 | CE(EUT) | 2007/04/05 * 12 |
| KLS-02 | LISN(AMN) | Schwarzbeck | NSLK8127 | CE | 2006/09/25 * 12 |
| KTM-01 | Terminator | TME | CT-01BP | CE | 2007/03/13 * 12 |
| KTM-03 | Terminator | TME | CT-01BP | CE | 2007/03/13 * 12 |
| KOS-04 | Humidity Indicator | SATO | PC-5000TRH | CE | 2006/07/14 * 24 |
| KSA-01 | Spectrum Analyzer | Advantest | R3365 | CE/RE | 2006/07/01 * 12 |
| KTR-02 | Test Receiver | Rohde & Schwarz | ESCS30 | CE/RE | 2006/11/25 * 12 |
| KJM-03 | Measure | TAJIMA | GL19-55 | CE | - |
| YA-RE | Radiated emission(software) | UL Japan | RE(Ver.1.5) | RE | - |
| KAEC-01 | Anechoic Chamber | JSE | Semi 3m | RE/BW | 2006/08/31 * 12 |
| KAF-05 | Pre Amplifier | Agilent | 8447D | RE/BW | 2007/04/13 * 12 |
| KAT6-01 | Attenuator | INMET | 18N-6dB | RE/BW | 2007/03/28 * 12 |
| KBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | RE | 2007/01/06 * 12 |
| KCC-30/31/32 /34/KRM-03 | Coaxial Cable/RF Relay Matrix | Fujikura/Suhner/TSJ | 5D-2W/S04272B/RFM- E421 | RE/BW | 2006/11/27 * 12 |
| KLA-03 | Logperiodic Antenna | Schwarzbeck | USLP9143 | RE | 2007/01/06 * 12 |
| KLP-01 | Loop Antenna | Rohde & Schwarz | HFH2-Z2 | RE/BW | 2006/06/01 * 12 |
| KOS-02 | Humidity Indicator | Custom | CTH-190 | RE/BW | 2006/07/10 * 24 |
| KSA-04 | Spectrum Analyzer | Advantest | R3271A | RE/FT | 2006/09/05 * 12 |
| KTR-01 | Test Receiver | Rohde & Schwarz | ES140 | RE/BW | 2007/04/12 * 12 |
| KJM-01 | Measure | TAJIMA | GL19-55 | RE | - |
| KCH-01 | Temperature and Humidity Chamber | Tabai Espec | PL-1KT | FT | 2006/12/28 * 12 |
| KOS-07 | Humidity Indicator | Custom | CTH-190 | FT | 2006/10/06 * 24 |
| | | | | | |

The expiration date of the calibration is the end of the expired month .

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 ,
BW: Bandwidth
FT: Frequency Tolerance