



EMI TEST REPORT

Test Report No. : 27BE0158-YK

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 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.
4. The test results in this test report are traceable to the national or international standards.

Date of test: September 26 and 27, 2006

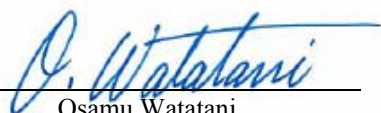
Tested by:


Akira Sato

&


Takahiro Suzuki

Approved by:


Osamu Watatani

Site Manager of Yamakita EMC Lab.

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YAMAKITA EMC LAB.

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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 : Tatsuo Yoshida

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 : September 26, 2006
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

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.

*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	3.6dB (13.5596MHz, 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	67.2dB (Vertical, with V680-HS63)	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	45.30dB (14.010MHz, Vertical, with V680-HS52 and 13.110MHz, Vertical, with V680-HS63)	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	7.2dB (67.80MHz, Vertical with V680-HS63)	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

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

* No addition, exclusion nor deviation has been made from the standard.

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3.3 Uncertainty

Conducted emission

The measurement uncertainty (with 95% confidence level) for this test is ± 2.7 dB.

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

Radiated emission

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is ± 2.3 dB.

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 4.3 dB.

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

UL Apex Co., Ltd. Yamakita EMC Lab.

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Telephone number : +81 465 77 1011

Facsimile number : +81 465 77 2112

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. : IC3489A

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. : IC3489A-2

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. : IC3489A-B

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 EMS lab. (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		

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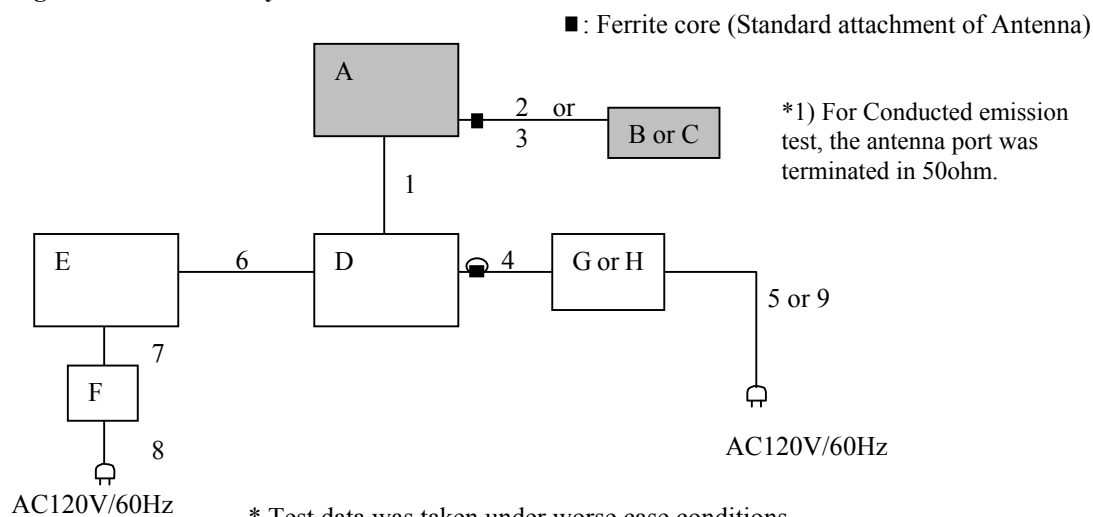
4 System Test Configuration

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-HS52	-	Omron	(EUT)
C	Antenna	V680-HS63	-	Omron	(EUT)
D	ID Controller	V680-CA5D01	7	Omron	-
E	Personal Computer	PS186N-09KX7	230568843	Toshiba	-
F	AC Adaptor	PA3092U-1ACA	0121J0038955	Toshiba	-
G	Power Supply	S8VS-03024	2	Omron	for other test
H	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-HS52
3	Antenna cable	2.0	Shielded	Shielded	for V680-HS63
4	DC power cable	0.3	Unshielded	Unshielded	-
5	AC power cable	1.9	Unshielded	Unshielded	for S8VS-0324
6	RS232C cable	3.0	Shielded	Shielded	-
7	DC power cable	1.9	Unshielded	Unshielded	-
8	AC power cable	2.0	Unshielded	Unshielded	-
9	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.3 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: 10kHz

5.5 Results

Summary of the test results : Pass

Date : September 26, 2006 Test engineer : Akira Sato

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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 (30-299MHz) 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 : September 26, 2006

Test engineer : Takahiro Suzuki

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7 20dB Bandwidth

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 : September 27, 2006

Test engineer : Akira Sato

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 : September 27, 2006

Test engineer : Akira Sato

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APPENDIX 1: Photographs of test setup

Page 11	:	Conducted emission
Page 12 - 15	:	Radiated emission
Page 16 - 18	:	Pre-check of the worst position

APPENDIX 2: Test Data

Page 19 - 21	:	Conducted Emission
Page 22 - 27	:	Radiated Emission
22-23	:	Fundamental and Outside the Allocated bands
24-27	:	Spurious emission
Page 28	:	Bandwidth
Page 29 - 34	:	Frequency Tolerance

APPENDIX 3: Test instruments

Page 35	:	Test instruments
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Conducted emission



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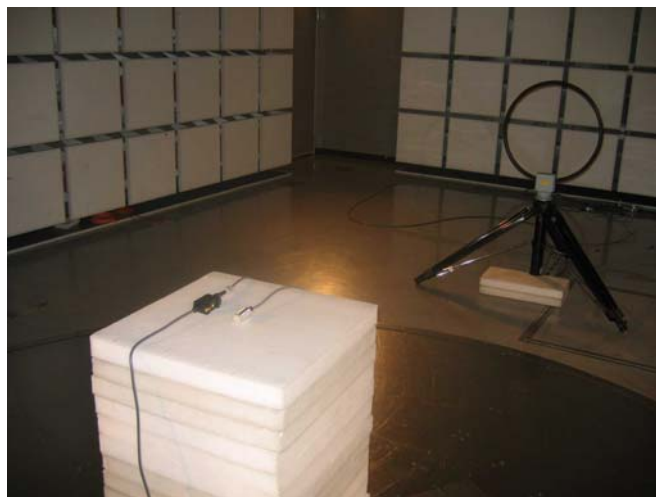
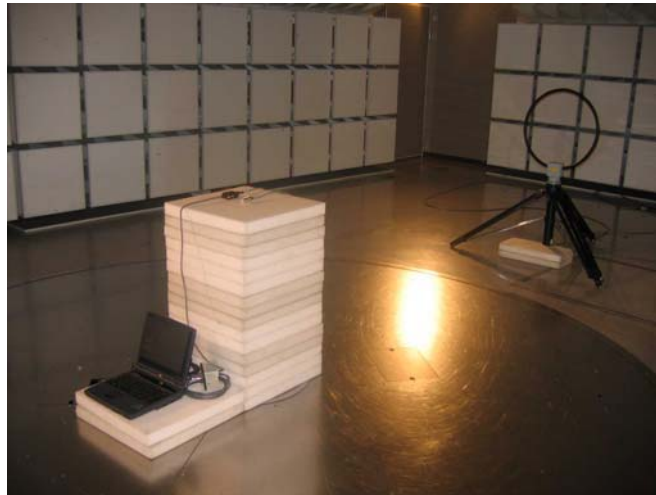
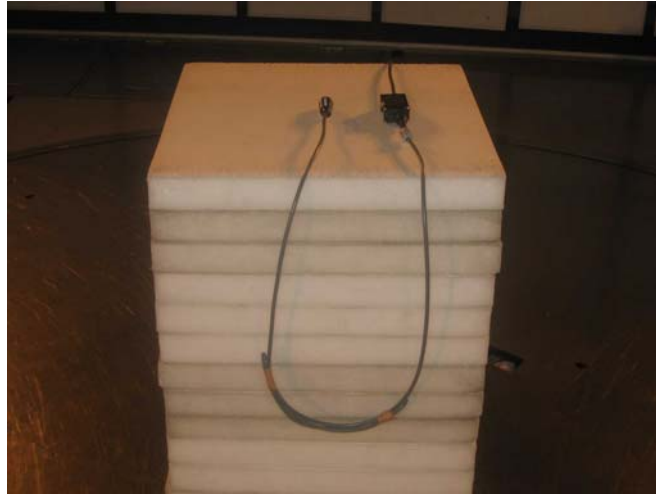
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Radiated emission (9kHz-30MHz, with Antenna: V680-HS52)



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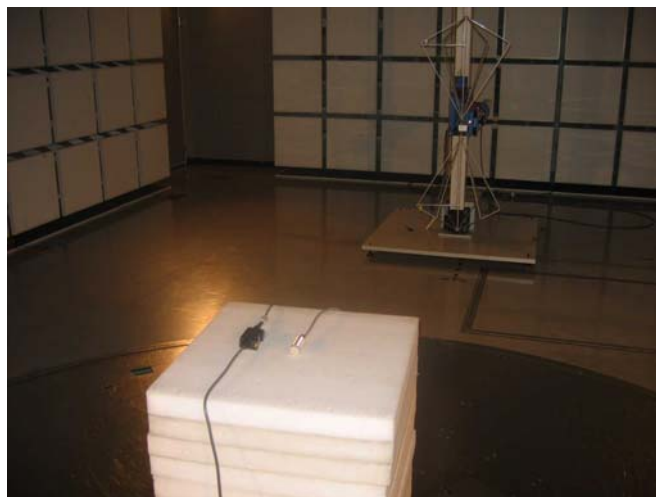
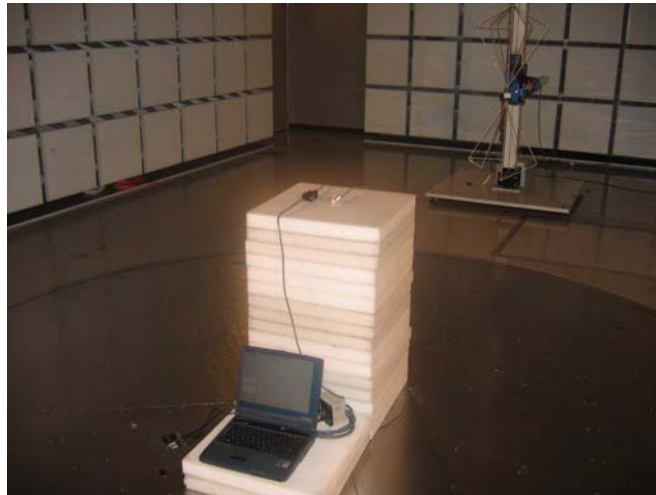
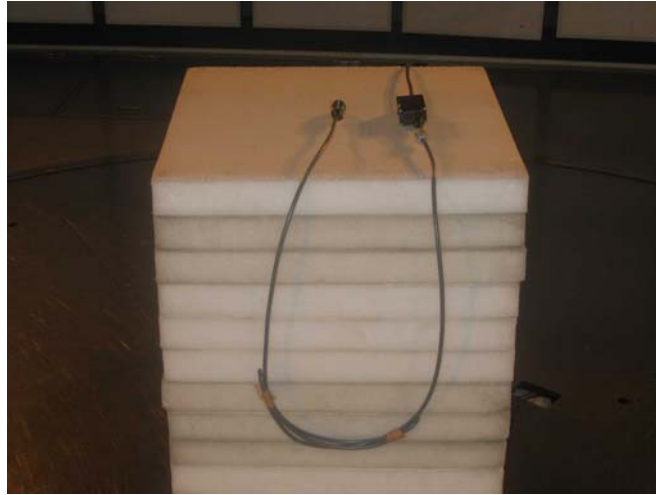
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Radiated emission (30-1000MHz, with Antenna: V680-HS52)



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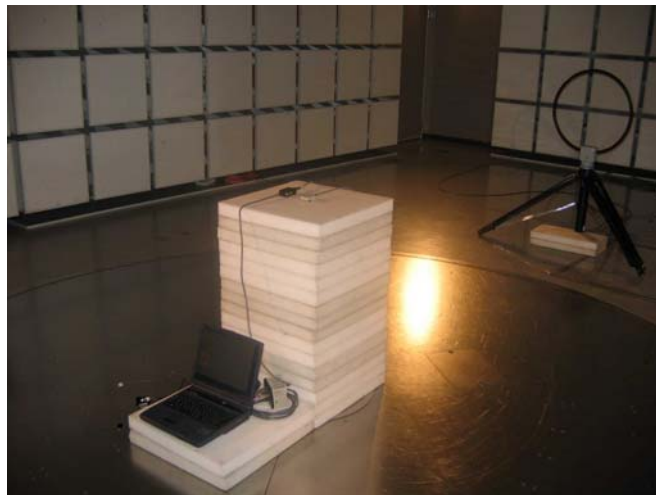
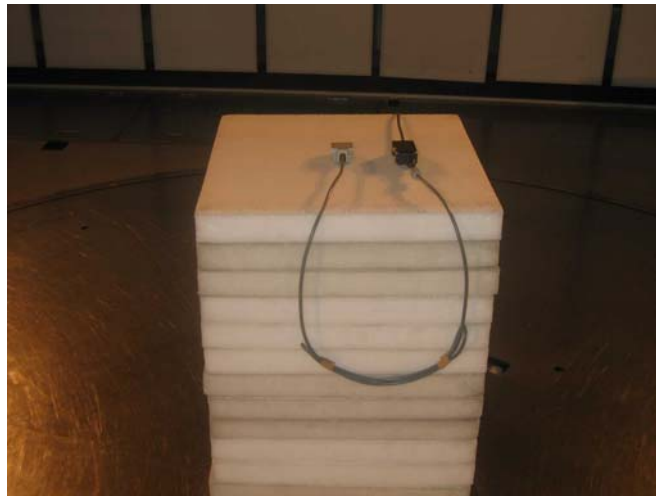
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Radiated emission (9kHz-30MHz, with Antenna: V680-HS63)



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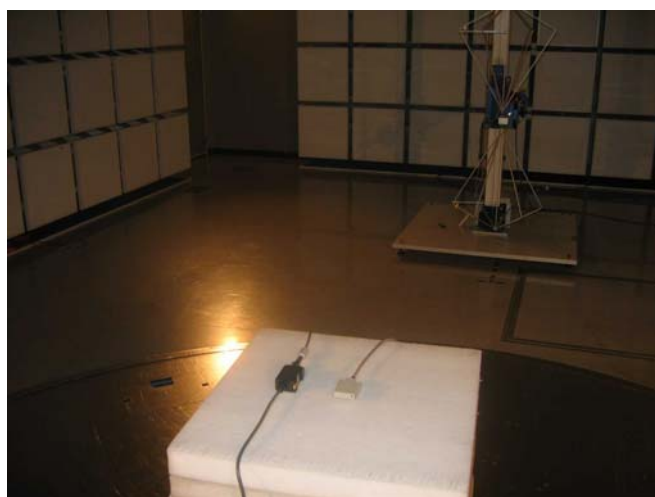
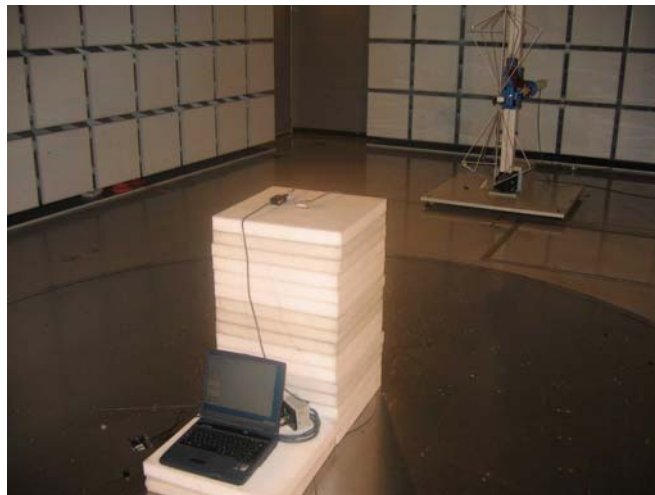
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Radiated emission (30-1000MHz, with Antenna: V680-HS63)



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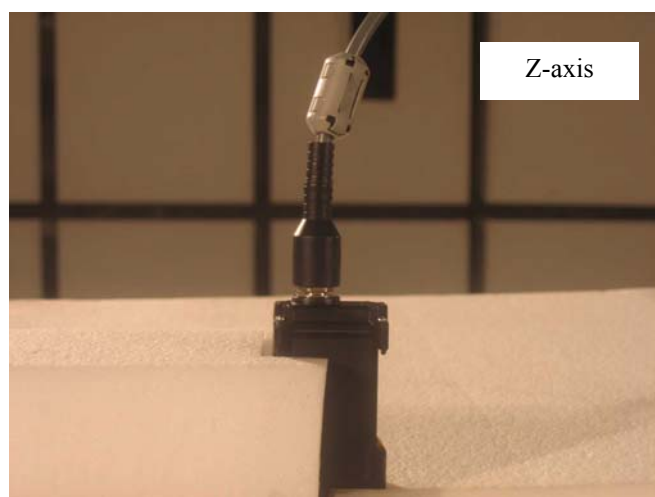
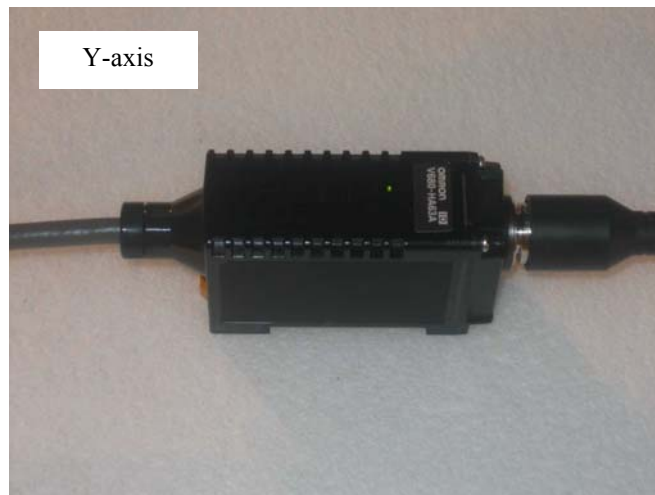
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Pre-check of the worst position (Amplifier)



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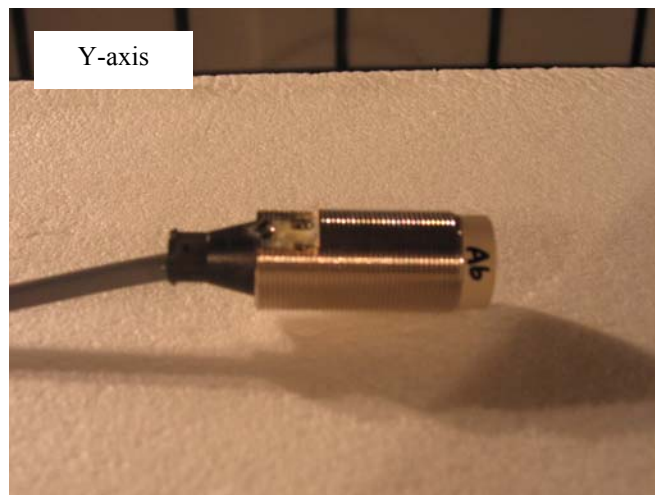
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Pre-check of the worst position (Antenna: V680-HS52)



Worst-case combination

	Amplifier		Antenna	
	Horizontal	Vertical	Horizontal	Vertical
with V680-HS52	X	X	X	X
with V680-HS63	X	X	Y	Y

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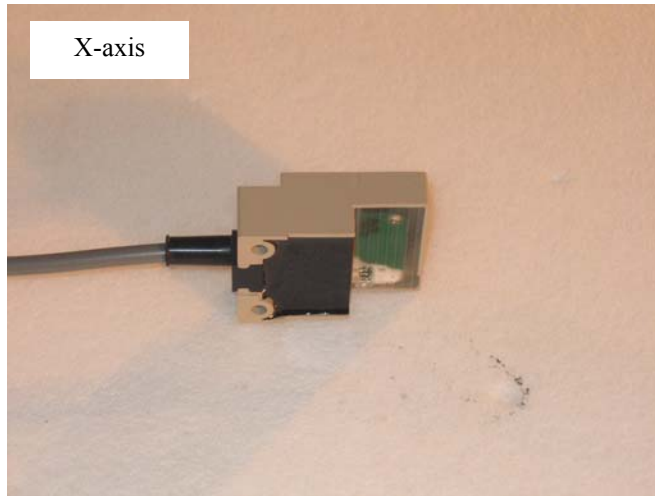
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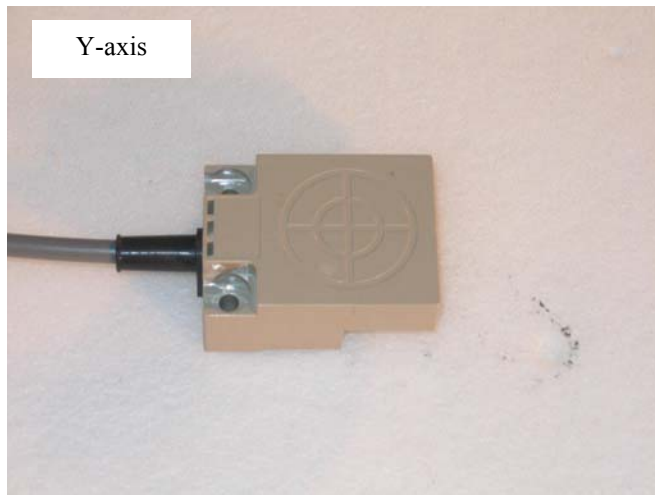
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Pre-check of the worst position (Antenna: V680-HS63)

X-axis



Y-axis



Z-axis



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DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
YAMAKITA No.3 SHIELD ROOM
Report No. : 27BE0158-YK

Applicant : OMRON Corporation
Kind of Equipment : AMP
Model No. : V680-HA63A
Serial No. : 5
Power : DC7.5V (AC120V/60Hz)
Mode : Transmitting Mode (13.56MHz)
Remarks : Antenna Port:50ohm Terminate
Date : 9/26/2006
Phase : Single Phase
Temperature : 23 °C Engineer : Akira Sato
Humidity : 64 %
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.	0.1924	50.8	40.8	44.3	33.9	0.1	0.1	0.0	51.0	41.0	63.9	53.9	12.9	12.9
2.	0.3562	47.7	42.2	47.4	42.1	0.1	0.2	0.0	48.0	42.5	58.8	48.8	10.8	6.3
3.	1.7111	31.1	-	30.8	-	0.1	0.3	0.0	31.5	-	56.0	46.0	24.5	-
4.	2.1431	30.8	-	30.3	-	0.1	0.4	0.0	31.3	-	56.0	46.0	24.7	-
5.	7.6911	40.5	32.0	39.1	30.8	0.4	1.0	0.0	41.9	33.4	60.0	50.0	18.1	16.6
6.	13.5596	49.2	44.1	49.0	44.0	0.8	1.5	0.0	51.5	46.4	60.0	50.0	8.5	3.6
7.	14.0852	34.7	-	33.8	-	0.8	1.5	0.0	37.0	-	60.0	50.0	23.0	-
8.	16.1235	38.2	34.6	38.1	34.6	1.0	1.6	0.0	40.8	37.2	60.0	50.0	19.2	12.8

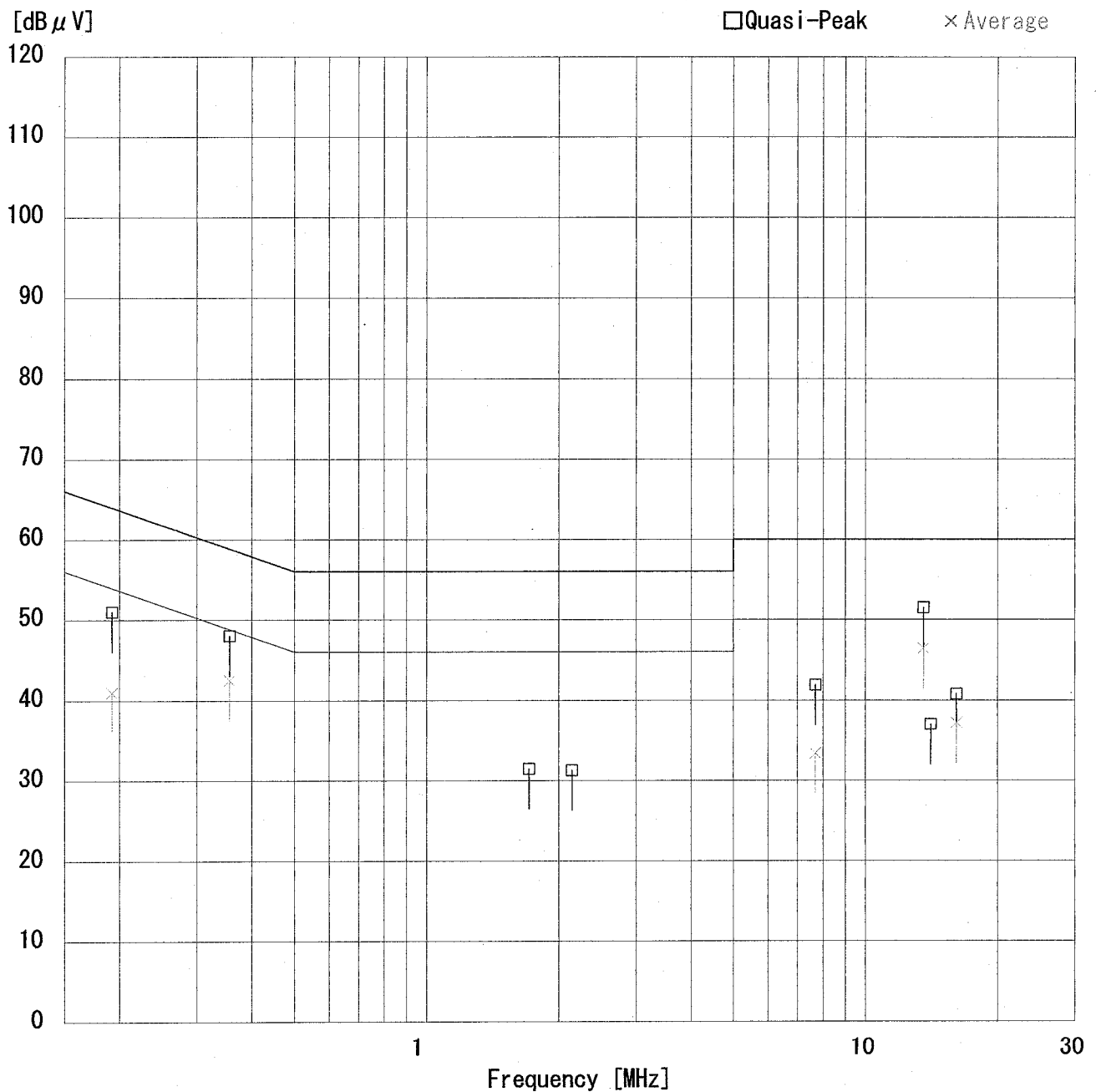
CALCULATION: READING + LISN FACTOR + CABLE LOSS + ATTEN.

■ LISN: KLS-05 (NSLK8126) ■ COAXIAL CABLE: KCC-24/25/26/28
■ PULSE LIMITER: KPL-02 ■ EMI RECEIVER: KTR-03 (ESHS10)

DATA OF CONDUCTION TEST

UL Apex Co.,Ltd.
YAMAKITA No.3 SHIELD ROOM
Report No. : 27BE0158-YK

Applicant : OMRON Corporation
Kind of Equipment : AMP
Model No. : V680-HA63A
Serial No. : 5
Power : DC7.5V (AC120V/60Hz)
Mode : Transmitting Mode (13.56MHz)
Remarks : Antenna Port:50ohm Terminate
Date : 9/26/2006
Phase : Single Phase
Temperature : 23 °C Engineer : Akira Sato
Humidity : 64 %
Regulation : FCC Part15C § 15.207. (CISPR Pub.22)



DATA OF CONDUCTION TEST CHART

UL Apex Co.,Ltd.

YAMAKITA No.3 SHIELD ROOM

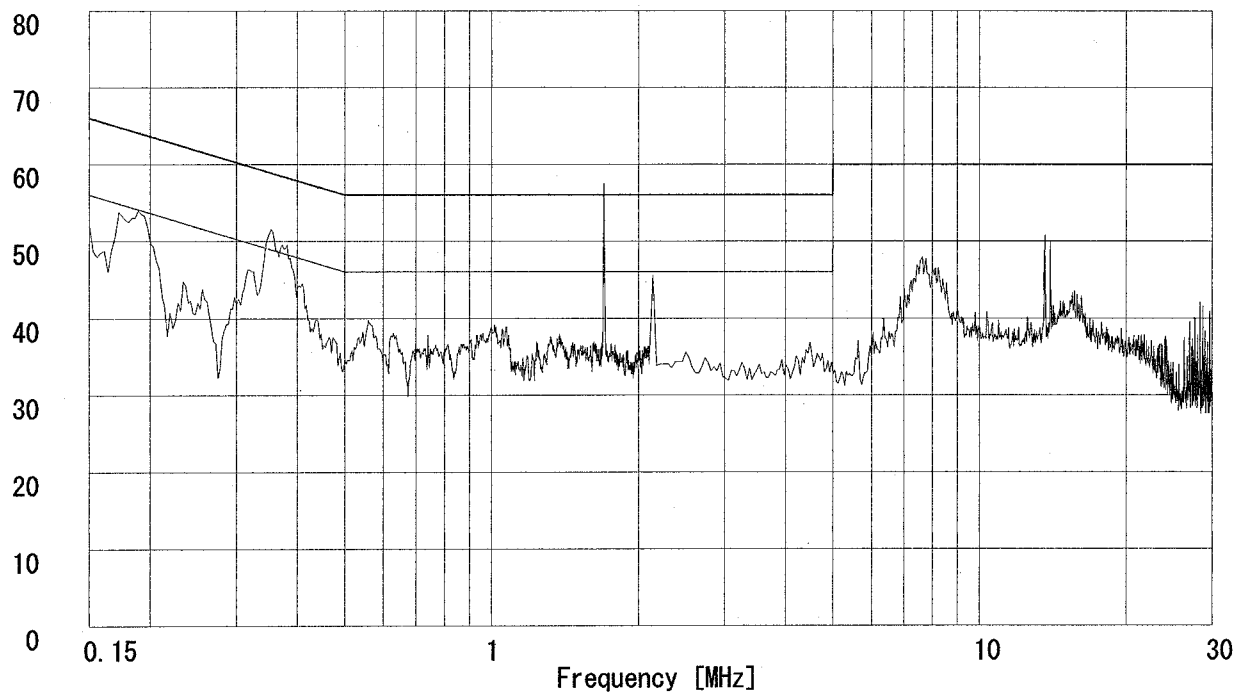
Report No. : 27BE0158-YK

Applicant : OMRON Corporation
Kind of Equipment : AMP
Model No. : V680-HA63A
Serial No. : 5
Power : DC7.5V (AC120V/60Hz)
Mode : Transmitting Mode (13.56MHz)
Remarks : Antenna Port: 50ohm Terminate
Date : 9/26/2006
Phase : Single Phase
Temperature : 23 °C
Humidity : 64 %
Regulation 1 : FCC Part15C § 15.207. (CISPR Pub.22)
Regulation 2 : None

Engineer : Akira Sato

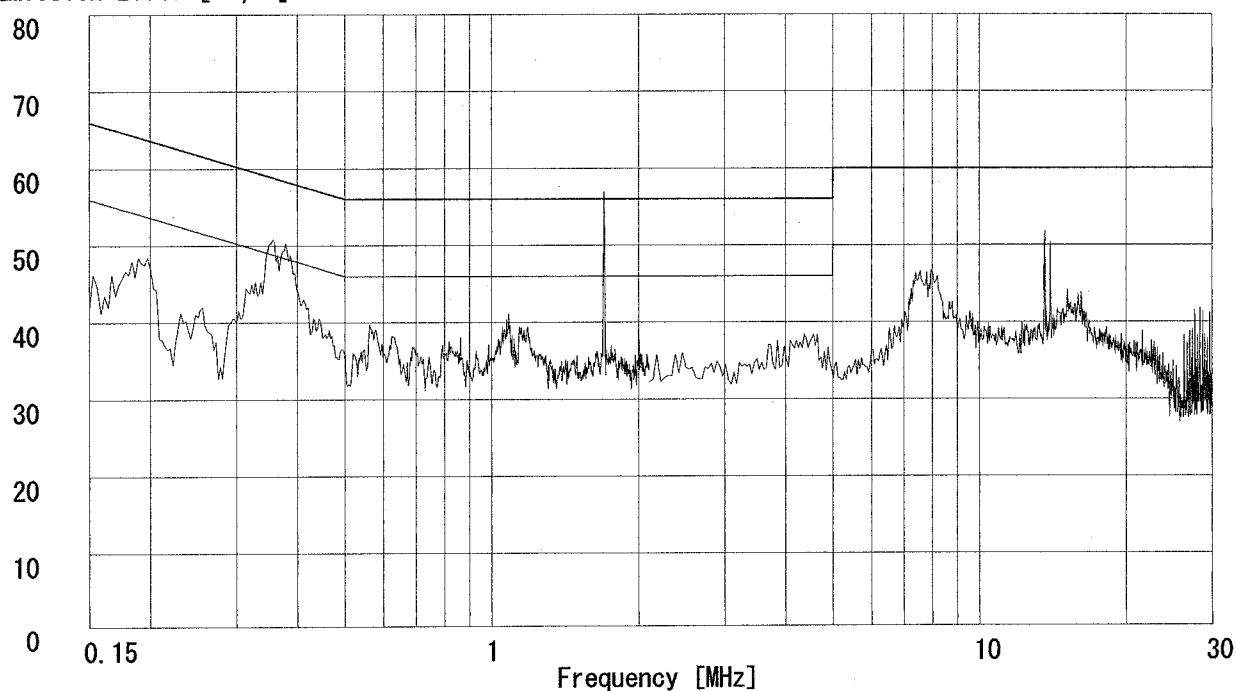
Emission Level [dB μ V]

PHASE:N



Emission Level [dB μ V]

PHASE:L1



Page:

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

UL Apex Co.,Ltd.
YAMAKITA No1 Anechoic Chamber

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225
Model	: V680-HA63A(Antenna:V680-HS52)	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/26
FCC ID	: E4E6CYSIDV6800406	Temperature	: 21deg.C
Power	: DC7.5V	Humidity	: 64%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Takahiro Suzuki

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	55.8	55.5	19.5	6.0	0.7	28.4	53.6	53.3	124.0	70.4	70.7

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	26.1	26.3	19.5	6.0	0.7	28.4	23.9	24.1	69.5	45.60	45.40
2	13.410	26.3	26.3	19.5	6.0	0.7	28.4	24.1	24.1	80.5	56.40	56.40
3	13.553	44.0	43.7	19.5	6.0	0.7	28.4	41.8	41.5	90.5	48.70	49.00
4	13.567	41.4	41.3	19.5	6.0	0.7	28.4	39.2	39.1	90.5	51.30	51.40
5	13.710	26.1	26.3	19.6	6.0	0.7	28.4	24.0	24.2	80.5	56.50	56.30
6	14.010	26.1	26.3	19.6	6.0	0.7	28.4	24.0	24.2	69.5	45.50	45.30

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) 0.15-30MHz

KCC-30/31/32/34(RE)

AMP: KAF-05(8447D)

Receiver: KTR-02

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

UL Apex Co.,Ltd.
YAMAKITA No1 Anechoic Chamber

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225
Model	: V680-HA63A(Antenna:V680-HS63)	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/26
FCC ID	: E4E6CYSIDV6800406	Temperature	: 21deg.C
Power	: DC7.5V	Humidity	: 64%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Takahiro Suzuki

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	54.2	59.0	19.5	6.0	0.7	28.4	52.0	56.8	124.0	72.0	67.2

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	26.2	26.4	19.5	6.0	0.7	28.4	24.0	24.2	69.5	45.50	45.30
2	13.410	26.2	26.4	19.5	6.0	0.7	28.4	24.0	24.2	80.5	56.50	56.30
3	13.553	42.4	46.1	19.5	6.0	0.7	28.4	40.2	43.9	90.5	50.30	46.60
4	13.567	40.2	43.6	19.5	6.0	0.7	28.4	38.0	41.4	90.5	52.50	49.10
5	13.710	26.3	26.3	19.6	6.0	0.7	28.4	24.2	24.2	80.5	56.30	56.30
6	14.010	26.2	26.2	19.6	6.0	0.7	28.4	24.1	24.1	69.5	45.40	45.40

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) 0.15-30MHz

KCC-30/31/32/34(RE)

AMP: KAF-05(8447D)

Receiver: KTR-02

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 27BE0158-YK

Applicant : OMRON Corporation
Kind of Equipment : AMP
Model No. : V680-HA63A/V680-HS52
Serial No. : 5
Power : DC7.5V
Mode : Transmitting Mode(13.56MHz)
Remarks : AMP:X Antenna:X
Date : 9/26/2006
Test Distance : 3 m
Temperature : 21 °C Engineer : Takahiro Suzuki
Humidity : 64 %
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	28.9	32.4	21.2	28.4	1.0	6.0	28.7	32.2	69.5	40.8	37.3

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

■ ANTENNA: KLP-01 (HFH2-Z2) 0.15-30MHz

■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8449D) ■ EMI RECEIVER: KTR-02 (ESCS30)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 27BE0158-YK

Applicant : OMRON Corporation
 Kind of Equipment : AMP
 Model No. : V680-HA63A/V680-HS52
 Serial No. : 5
 Power : DC7.5V
 Mode : Transmitting Mode(13.56MHz)
 Remarks : AMP:X Antenna:X
 Date : 9/26/2006
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 64 %
 Regulation : FCC Part15C § 15.209

Engineer : Takahiro Suzuki

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	40.68	BB	24.2	30.3	14.2	28.5	1.3	6.0	17.2	23.3	40.0	22.8	16.7
2.	54.24	BB	30.8	38.7	10.4	28.5	1.5	6.0	20.2	28.1	40.0	19.8	11.9
3.	59.71	BB	31.2	40.3	9.2	28.5	1.5	6.0	19.4	28.5	40.0	20.6	11.5
4.	67.80	BB	34.9	44.2	7.8	28.5	1.6	6.0	21.8	31.1	40.0	18.2	8.9
5.	81.36	BB	37.3	45.3	7.4	28.5	1.8	6.0	24.0	32.0	40.0	16.0	8.0
6.	94.92	BB	29.7	36.9	10.0	28.6	2.0	6.1	19.2	26.4	43.5	24.3	17.1
7.	108.48	BB	33.2	37.3	12.1	28.4	2.1	6.1	25.1	29.2	43.5	18.4	14.3
8.	122.04	BB	35.6	41.5	13.6	28.3	2.3	6.1	29.3	35.2	43.5	14.2	8.3
9.	135.60	BB	31.7	36.6	14.3	28.2	2.4	6.1	26.3	31.2	43.5	17.2	12.3
10.	902.04	BB	29.9	29.3	22.4	28.8	6.7	6.1	36.3	35.7	46.0	9.7	10.3

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

■ ANTENNA: KBA-03 (BBA9106) 30-299MHz/KLA-03 (USLP9143) 300-1000MHz

■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8449D) ■ EMI RECEIVER: KTR-02 (ESCS30)

Page:

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 27BE0158-YK

Applicant : OMRON Corporation
Kind of Equipment : AMP
Model No. : V680-HA63A/V680-HS63
Serial No. : 5
Power : DC7.5V
Mode : Transmitting Mode(13.56MHz)
Remarks : AMP:X Antenna:Y
Date : 9/26/2006
Test Distance : 3 m
Temperature : 21 °C Engineer : Takahiro Suzuki
Humidity : 64 %
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	27.8	29.2	21.2	28.4	1.0	6.0	27.6	29.0	69.5	41.9	40.5

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

■ ANTENNA: KLP-01 (HFH2-Z2) 0.15-30MHz

■ CABLE: KCC-30/31/32/34 ■ PREAMP: KAF-05 (8449D) ■ EMI RECEIVER: KTR-02 (ESCS30)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.

YAMAKITA No.1 ANECHOIC CHAMBER

Report No. : 27BE0158-YK

Applicant : OMRON Corporation
 Kind of Equipment : AMP
 Model No. : V680-HA63A/V680-HS63
 Serial No. : 5
 Power : DC7.5V
 Mode : Transmitting Mode(13.56MHz)
 Remarks : AMP:X Antenna:Y
 Date : 9/26/2006
 Test Distance : 3 m
 Temperature : 21 °C
 Humidity : 64 %
 Regulation : FCC Part15C § 15.209

Engineer : Takahiro Suzuki

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	40.68	BB	24.7	32.1	14.2	28.5	1.3	6.0	17.7	25.1	40.0	22.3	14.9
2.	54.24	BB	31.2	38.3	10.4	28.5	1.5	6.0	20.6	27.7	40.0	19.4	12.3
3.	59.71	BB	31.0	40.1	9.2	28.5	1.5	6.0	19.2	28.3	40.0	20.8	11.7
4.	67.80	BB	37.8	45.9	7.8	28.5	1.6	6.0	24.7	32.8	40.0	15.3	7.2
5.	81.36	BB	36.6	44.3	7.4	28.5	1.8	6.0	23.3	31.0	40.0	16.7	9.0
6.	94.92	BB	31.4	37.2	10.0	28.6	2.0	6.1	20.9	26.7	43.5	22.6	16.8
7.	108.48	BB	30.6	37.4	12.1	28.4	2.1	6.1	22.5	29.3	43.5	21.0	14.2
8.	122.04	BB	36.1	38.3	13.6	28.3	2.3	6.1	29.8	32.0	43.5	13.7	11.5
9.	135.60	BB	32.9	36.2	14.3	28.2	2.4	6.1	27.5	30.8	43.5	16.0	12.7
10.	902.04	BB	29.0	28.9	22.4	28.8	6.7	6.1	35.4	35.3	46.0	10.6	10.7

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

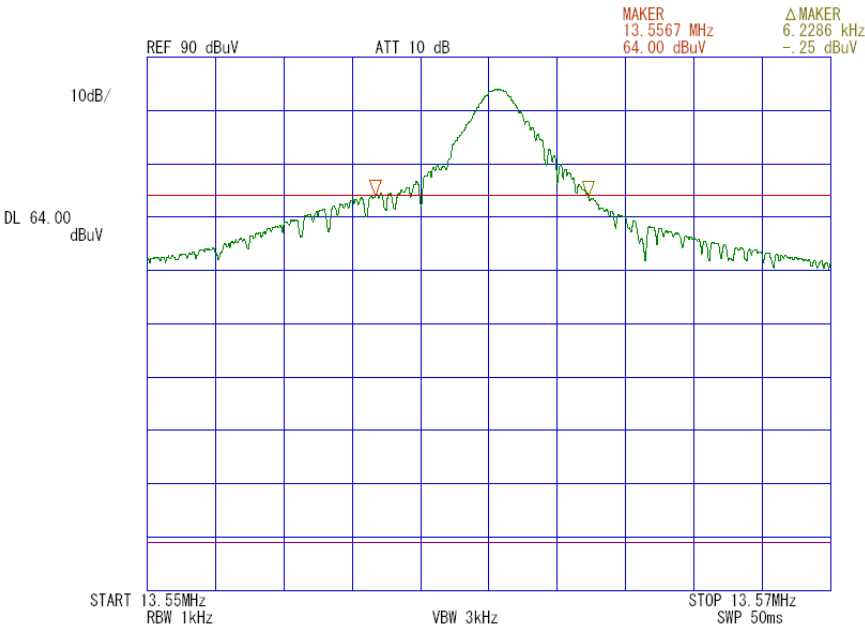
■ANTENNA:KBA-03(BBA9106) 30-299MHz/KLA-03(USLP9143) 300-1000MHz

■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8449D)■EMI RECEIVER:KTR-02(ESCS30)

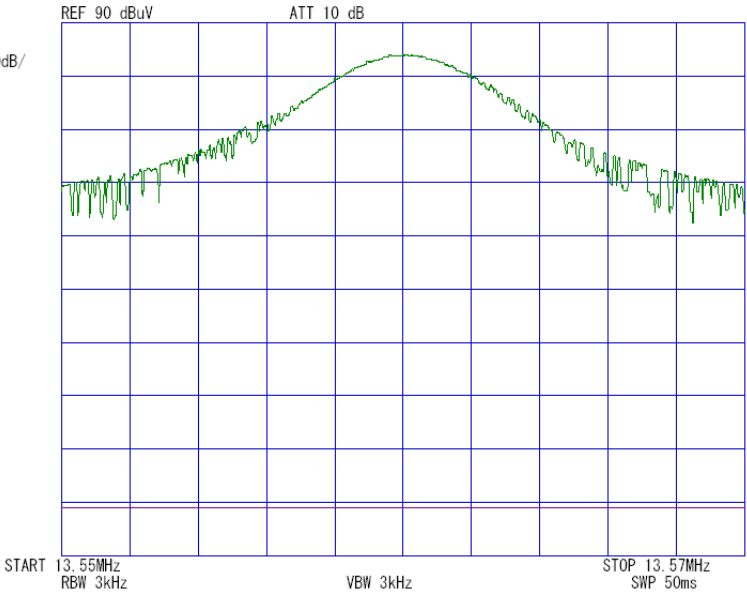
Bandwidth: FCC 15.215(c)

COMPANY	: OMRON Corporation	UL Apex Co.,Ltd.Yamakita No.4 Shielded room
Equipment	: AMP	REPORT No. : 27BE0158-YK
MODEL NUMBER:	V680-HA63A/V680-HS63	REGULATION : FCC Part15SubpartC 215(c)
SERIAL NUMBER:	5	DATE : 2006/09/27
FCC ID	: E4E6CYSIDV6800406	TEMP./HUMI : 23°C/68%
POWER	: DC7.5V	TEST MODE : Transmitting
Remarks	: -	ENGINEER : Akira Sato

20dB Bandwidth:6.23kHz



OBW(99%):12.42kHz



Data of Frequency Tolerance: FCC 15.225(e)

UL Apex Co.,Ltd.
YAMAKITA No4 Shield room

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225 (e)
Model	: AMP:V680-HA63A/ANT:V680-HS52	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/27
FCC ID	: E4E6CYSIDV6800406	Temperature	: 23deg.C
Power	: DC7.5V	Humidity	: 68%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Akira Sato

Temperature Variation: -30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559901	-0.0000990	-0.00073	0.01
after 2minutes	13.56	13.559906	-0.0000940	-0.00069	0.01
after 5minutes	13.56	13.559934	-0.0000660	-0.00049	0.01
after 10minutes	13.56	13.559943	-0.0000570	-0.00042	0.01

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559906	-0.0000940	-0.00069	0.01
after 2minutes	13.56	13.559915	-0.0000850	-0.00063	0.01
after 5minutes	13.56	13.559830	-0.0001700	-0.00125	0.01
after 10minutes	13.56	13.559941	-0.0000590	-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	13.559894	-0.0001060	-0.00078	0.01
after 2minutes	13.56	13.559902	-0.0000980	-0.00072	0.01
after 5minutes	13.56	13.559919	-0.0000810	-0.00060	0.01
after 10minutes	13.56	13.559932	-0.0000680	-0.00050	0.01

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559904	-0.0000960	-0.00071	0.01
after 2minutes	13.56	13.559905	-0.0000950	-0.00070	0.01
after 5minutes	13.56	13.559906	-0.0000940	-0.00069	0.01
after 10minutes	13.56	13.559908	-0.0000920	-0.00068	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Apex Co.,Ltd.
YAMAKITA No4 Shield room

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225 (e)
Model	: AMP:V680-HA63A/ANT:V680-HS52	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/27
FCC ID	: E4E6CYSIDV6800406	Temperature	: 23deg.C
Power	: DC7.5V	Humidity	: 68%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Akira Sato

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559895	-0.0001050	-0.00077	0.01
after 2minutes	13.56	13.559882	-0.0001180	-0.00087	0.01
after 5minutes	13.56	13.559880	-0.0001200	-0.00088	0.01
after 10minutes	13.56	13.559879	-0.0001210	-0.00089	0.01

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559887	-0.0001130	-0.00083	0.01
after 2minutes	13.56	13.559870	-0.0001300	-0.00096	0.01
after 5minutes	13.56	13.559873	-0.0001270	-0.00094	0.01
after 10minutes	13.56	13.559875	-0.0001250	-0.00092	0.01

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559876	-0.0001240	-0.00091	0.01
after 2minutes	13.56	13.559878	-0.0001220	-0.00090	0.01
after 5minutes	13.56	13.559870	-0.0001300	-0.00096	0.01
after 10minutes	13.56	13.559866	-0.0001340	-0.00099	0.01

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559877	-0.0001230	-0.00091	0.01
after 2minutes	13.56	13.559865	-0.0001350	-0.00100	0.01
after 5minutes	13.56	13.559857	-0.0001430	-0.00105	0.01
after 10minutes	13.56	13.559852	-0.0001480	-0.00109	0.01

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Mesure Frequency (MHz)	Frequency Error (kHz)	Frequency tolerance (%)	Limit (%)
startup	13.56	13.559871	-0.0001290	-0.00095	0.01
after 2minutes	13.56	13.559856	-0.0001440	-0.00106	0.01
after 5minutes	13.56	13.559851	-0.0001490	-0.00110	0.01
after 10minutes	13.56	13.559850	-0.0001500	-0.00111	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Apex Co.,Ltd.
YAMAKITA No4 Shield room

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225 (e)
Model	: AMP:V680-HA63A/ANT:V680-HS52	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/27
FCC ID	: E4E6CYSIDV6800406	Temperature	: 23deg.C
Power	: AC120V/60Hz	Humidity	: 68%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Akira Sato

Input Voltage:DC20.4V (85%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559875	-0.0001250	-0.00092	0.01
after 2minutes	13.56	13.559872	-0.0001280	-0.00094	0.01
after 5minutes	13.56	13.559869	-0.0001310	-0.00097	0.01
after 10minutes	13.56	13.559865	-0.0001350	-0.00100	0.01

Input Voltage:DC27.6V(115%)

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559866	-0.0001340	-0.00099	0.01
after 2minutes	13.56	13.559863	-0.0001370	-0.00101	0.01
after 5minutes	13.56	13.559864	-0.0001360	-0.00100	0.01
after 10minutes	13.56	13.559862	-0.0001380	-0.00102	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Apex Co.,Ltd.
YAMAKITA No4 Shield room

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225 (e)
Model	: AMP:V680-HA63A/ANT:V680-HS63	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/27
FCC ID	: E4E6CYSIDV6800406	Temperature	: 23deg.C
Power	: DC7.5V	Humidity	: 68%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Akira Sato

Temperature Variation: -30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559906	-0.0000940	-0.00069	0.01
after 2minutes	13.56	13.559937	-0.0000630	-0.00046	0.01
after 5minutes	13.56	13.559940	-0.0000600	-0.00044	0.01
after 10minutes	13.56	13.559943	-0.0000570	-0.00042	0.01

Temperature Variation: -20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559906	-0.0000940	-0.00069	0.01
after 2minutes	13.56	13.559916	-0.0000840	-0.00062	0.01
after 5minutes	13.56	13.559925	-0.0000750	-0.00055	0.01
after 10minutes	13.56	13.559938	-0.0000620	-0.00046	0.01

Temperature Variation: -10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559906	-0.0000940	-0.00069	0.01
after 2minutes	13.56	13.559914	-0.0000860	-0.00063	0.01
after 5minutes	13.56	13.559921	-0.0000790	-0.00058	0.01
after 10minutes	13.56	13.559927	-0.0000730	-0.00054	0.01

Temperature Variation: 0deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559909	-0.0000910	-0.00067	0.01
after 2minutes	13.56	13.559905	-0.0000950	-0.00070	0.01
after 5minutes	13.56	13.559904	-0.0000960	-0.00071	0.01
after 10minutes	13.56	13.559905	-0.0000950	-0.00070	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Apex Co.,Ltd.
YAMAKITA No4 Shield room

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225 (e)
Model	: AMP:V680-HA63A/ANT:V680-HS63	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/27
FCC ID	: E4E6CYSIDV6800406	Temperature	: 23deg.C
Power	: DC7.5V	Humidity	: 68%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Akira Sato

Temperature Variation: 10deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559886	-0.0001140	-0.00084	0.01
after 2minutes	13.56	13.559876	-0.0001240	-0.00091	0.01
after 5minutes	13.56	13.559875	-0.0001250	-0.00092	0.01
after 10minutes	13.56	13.559876	-0.0001240	-0.00091	0.01

Temperature Variation: 20deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559884	-0.0001160	-0.00086	0.01
after 2minutes	13.56	13.559780	-0.0002200	-0.00162	0.01
after 5minutes	13.56	13.559869	-0.0001310	-0.00097	0.01
after 10minutes	13.56	13.559873	-0.0001270	-0.00094	0.01

Temperature Variation: 30deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559874	-0.0001260	-0.00093	0.01
after 2minutes	13.56	13.559878	-0.0001220	-0.00090	0.01
after 5minutes	13.56	13.559874	-0.0001260	-0.00093	0.01
after 10minutes	13.56	13.559867	-0.0001330	-0.00098	0.01

Temperature Variation: 40deg.C

Test Conditions	Original Frequency (MHz)	Measure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559868	-0.0001320	-0.00097	0.01
after 2minutes	13.56	13.559871	-0.0001290	-0.00095	0.01
after 5minutes	13.56	13.559858	-0.0001420	-0.00105	0.01
after 10minutes	13.56	13.559852	-0.0001480	-0.00109	0.01

Temperature Variation: 50deg.C

Test Conditions	Original Frequency (MHz)	Mesure Frequency (MHz)	Frequency Error (kHz)	Frequency torerance (%)	Limit (%)
startup	13.56	13.559875	-0.0001250	-0.00092	0.01
after 2minutes	13.56	13.559858	-0.0001420	-0.00105	0.01
after 5minutes	13.56	13.559850	-0.0001500	-0.00111	0.01
after 10minutes	13.56	13.559850	-0.0001500	-0.00111	0.01

Data of Frequency Tolerance: FCC 15.225(e)

UL Apex Co.,Ltd.
YAMAKITA No4 Shield room

Company	: OMRON Corporation	Report No.	: 27BE0158-YK
Equipment	: AMP	Regulation	: FCC Part15 SupartC 15.225 (e)
Model	: AMP:V680-HA63A/ANT:V680-HS63	Test Distance	: 3m
Sample No.	: 5	Date	: 2006/09/27
FCC ID	: E4E6CYSIDV6800406	Temperature	: 23deg.C
Power	: AC120V/60Hz	Humidity	: 68%
Mode	: Transmitting (13.56MHz)		

ENGINEER : Akira Sato

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	13.559862	-0.0001380	-0.00102	0.01
after 2minutes	13.56	13.559861	-0.0001390	-0.00103	0.01
after 5minutes	13.56	13.559860	-0.0001400	-0.00103	0.01
after 10minutes	13.56	13.559860	-0.0001400	-0.00103	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	13.559875	-0.0001250	-0.00092	0.01
after 2minutes	13.56	13.559869	-0.0001310	-0.00097	0.01
after 5minutes	13.56	13.559866	-0.0001340	-0.00099	0.01
after 10minutes	13.56	13.559862	-0.0001380	-0.00102	0.01

Test Report No : 27BE0158-YK

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-Apex	CE(Ver.1.6)	CE	—
YA-RE	Radiated emission(software)	UL-Apex	RE(Ver.1.5)	RE	—
KCC-24/25/26 /28/KPL-02/K RM-02	Coaxial Cable/Pulse Limiter/RF Relay Matrix	Fujikura/Suhner/PMM/ TSJ	5D-2W/5D-2W/S04272 B/S04272B/PL01/RFM -E321	CE	2006/09/22 * 12
KLS-05	LISN(AMN)	Schwarzbeck	NSLK8126	CE (EUT)	2006/09/22 * 12
KLS-06	LISN(AMN)	Schwarzbeck	NSLK8127	CE	2006/09/22 * 12
KSA-02	Spectrum Analyzer	Advantest	R3265A	CE	2005/11/10 * 12
KTM-05	Terminator	TME	CT-01BP	CE	2006/03/24 * 12
KTM-06	Terminator	TME	CT-01BP	CE	2006/03/24 * 12
KTR-03	Test Receiver	Rohde & Schwarz	ESHS10	CE	2006/02/02 * 12
KOS-10	Digital Humidity Indicator	Custom	CTH-190	CE	2006/07/10 * 24
KAEC-01(NSA)	Anechoic Chamber	JSE	Semi 3m	RE	2006/08/31 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE	2006/04/21 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE	2006/03/24 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2006/01/17 * 12
KCC-30/31/32 /34/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/S04272B/RFM- E421	RE	2005/12/22 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2006/01/17 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE/BW	2006/09/05 * 12
KOS-02	Digital Humidity Indicator	Custom	CTH-190	RE	2006/07/10 * 24
KTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2005/11/10 * 12
KCH-01	Temperature and Humidity Chamber	Tabai Espec	PL-1KT	FT	2005/12/26 * 12
KSCA-01	Search coil	TSJ	SC01	FT/BW	Pre Check
KCC-B1	Coaxial Cable/Pulse Limiter/RF Relay Matrix	Fujikura/Suhner/PMM/ TSJ	5D-2W/S04272B/12D- SFA/S04272B/PL01/-	FT/BW	2006/05/16 * 12

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: 20dB bandwidth

FT: Frequency tolerance