

EMISSION TEST REPORT

Test Report No. : **21GE0046YW-2**

Applicant: OMRON CORPORATION

Type of Equipment: Keyless Entry System (Receiver)

Model No.: G8C-224M-F / G8C-224M-C

FCC ID OUCG8C-224M

Test standard: FCC Part 15 Subpart B


Test Result: Complies

This report may not be reproduced in full, partial reproduction may only be made with the written consent of the laboratory.

The results in this report apply only to the sample tested.

Date of test: February 21, 2001

Tested by: 
Makoto Kosaka

Approved by:  Issued date: March 5, 2001
Kazuhiro Kitahara
Section Manager of EMC section

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

| Table of Contents | Page |
|---|-------------|
| 1 GENERAL INFORMATION | 3 |
| 1.1 Product Description | 4 |
| 1.2 Test Specification | 4 |
| 1.3 Methods & Procedures | 4 |
| 1.4 Test Location | 4 |
| 2 SYSTEM TEST CONFIGURATION | 5 |
| 2.1 Operation Environment | 5 |
| 2.2 Justification | 5 |
| 2.3 EUT Exercise Software | 5 |
| 2.4 Test Procedure | 5 |
| Figure 2.1 Configuration of Tested System | 6 |
| 3 RADIATED MEASUREMENT PHOTOS | 7 |
| Figure 3.1 Radiated Measurement Photos | 7 |
| 3.1 Measurement Uncertainty | 8 |
| 4 RADIATED EMISSION DATA | 9 |
| 4.1 Field Strength Calculation | 9 |
| 5 TEST EQUIPMENT USED | 11 |
| APPENDIX | 12 |
| A:Test Data | A1-A2 |

1 GENERAL INFORMATION

APPLICANT : OMRON CORPORATION

TRADE NAME : OMRON

ADDRESS : 6368 Nenjo-Zaka, Okusa, Komaki-City,
Aichi 485-0802 Japan
Tel: +81-568-78-6170
Fax: +81-568-78-6179

REGULATION(S) : FCC Part 15 Subpart B

MODEL NUMBER : G8C-224M-F / G8C-224M-C

FCC ID : OUCG8C-224M

SERIAL NUMBER : FCC sample

KIND OF EQUIPMENT : Keyless Entry System (Receiver)

TESTED DATE : February 21, 2001

RECEIPT DATE OF SAMPLE : February 21, 2001

REPORT FILE NUMBER : 21GE0046YW-2

TEST SITE : A-PEX Yokowa No.3 Open Test Site

Test report**Our reference** : 21GE0046YW-2**Page** : 4of 12**Issued date** : March 5, 2001**FCC ID** : OUCG8C-224M**1.1 Product Description**

Model: G8C-224M-F and G8C-224M-C (referred to as the EUT in this report) is a Keyless Entry System (Receiver). G8C-224M-F and G8C-224M-C are deemed to be equal about the level of EMC since they have few differences as remarked below, therefore, G8C224M-F which is a top-level model was measured as their representative.

| Model No | PWB | Parts on PWB | software |
|------------|--------------------|-----------------------|--------------------|
| G8C-224M-F | origin | origin | origin |
| G8C-224M-C | same as G8C-224M-F | Not loaded two relays | same as G8C-224M-F |

The specification is as following :

Type of receiver : Super Heterodyne
 Receiving Frequency : 313.85MHz
 Local Oscillator Frequency : 325.6 MHz
 Intermediate Frequency : 10.7MHz
 Other Clock Frequency : 8.18MHz
 Operation Voltage : DC 12V

1.2 Test Specification

Test Specification : FCC Part 15 Subpart B
 Title : FCC 47CFR Part15 Radio Frequency Device
 Subpart B Unintentional Radiators

1.3 Methods & Procedures

| No. | Item | Test Procedure | Specification | Remarks |
|-----|-------------------|---------------------|---------------|---------|
| 1 | Radiated emission | FCC/ANSI C63.4:1992 | Class B | 3m |

1.4 Test Location

A-PEX International Co.,Ltd. Yokowa No.3 test site
 108 Yokowa-cho, Ise-shi, Mie-ken 516-1106 Japan
 Telephone number : +81-596-39-1485
 Facsimile number : +81-596-39-0232

This site has been fully described in a report submitted to FCC office, and listed on September 12, 2000(Registration number: 90412).

*NVLAP Lab. code : 200109-0

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

2 SYSTEM TEST CONFIGURATION

2.1 Operation Environment

Temperature : 29
Humidity : 23%
Power supply : DC 12V

2.2 Justification

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

2.3 EUT Exercise Software

The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used:

Operation Mode : Receiving

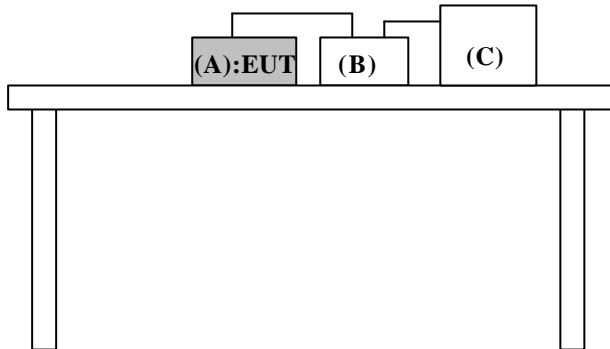
2.4 Test Procedure

Tabletop Equipment Radiated Emissions

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength. The measurement distance was 3m.

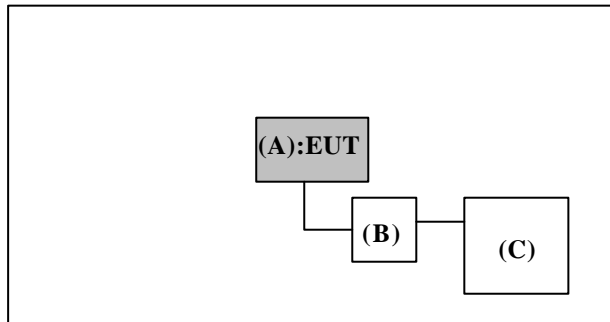
Figure2.1 Configuration of Tested System

Front View



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

Top View



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

Description of EUT and Support Equipment

| No. | Item | Model number | Serial number | Manufacturer | Remark |
|-----|---------------------------------|--------------|---------------|-------------------|--------|
| A | Keyless Entry System (Receiver) | G8C-224M-F | FCC sample | OMRON Corporation | EUT |
| B | Checker Box | N/A | N/A | OMRON Corporation | - |
| C | Car Battery | 50B24L | N/A | YUASA | - |

List of cables used

| No. | Name | Length (m) | Shield | Remark |
|-----|-------------------------|------------|--------|--------|
| | Signal & DC Power Cable | 1.0 | N | - |
| | DC Power Cable | 0.3 | N | - |

3 RADIATED MEASUREMENT PHOTOS

Figure 3.1 Radiated Measurement Photos



Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

3.1 Measurement Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was $\pm 3.3\text{dB}$.

The data listed in this test report may exceed the test limit because it does not have enough margin (more than 3.3dB).

The data listed in this test report has enough margin, more than 3.3d

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

Test report

Our reference : 21GE0046YW-2

Page : 9 of 12

Issued date : March 5, 2001

FCC ID : OUCG8C-224M

4 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (30MHz-2000MHz).

The final data was reported in the worst-case emissions.

The minimum margin to the limit is as follows :

| Frequency (MHz) | Ant Pol | Receiver Reading (dB μ V) | Correction Factor (dB) | Field Strength (dB μ V/m) | Limit (dB μ V/m) | Margin (dB) |
|--------------------|------------|-------------------------------------|------------------------------|-------------------------------------|-------------------------|----------------|
| 324.56 | H | 32.1 | -3.3 | 28.8 | 46.0 | 17.2 |

* quasi-peak mod

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

Test report

Our reference : 21GE0046YW-2

Page : 10 of 12

Issued date : March 5, 2001

FCC ID : OUCG8C-224M

5.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

$$FS = RA + AF + CF + AT - AG$$

where FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Factor

AT = Antenna Pad

AG = Amplifier Gain

Assume a receiver reading of 32.1 dB μ V is obtained. The antenna Factor of 14.6 dB, Cable Factor of 3.7 dB and Antenna Pad of 6.0 dB is added. The Amplifier Gain of 27.6 dB is subtracted, giving a field strength of 28.8 dB μ V/m.

$$FS = 32.1 + 14.6 + 3.7 + 6.0 - 27.6 = 28.8 \text{ dB } \mu \text{ V/m}$$

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

Test report

Our reference : 21GE0046YW-2

Page : 11 of 12

Issued date : March 5, 2001

FCC ID : OUCG8C-224M

6 Test EQUIPMENT USED

| Instrument | Mfr. | Model No. | Control No. | Calibration Until // Interval |
|---------------------|-----------------|-------------|-------------|-------------------------------|
| Pre Amplifier | Hewlett Packard | 8447D | AF-01 | November 5, 2001 / 1 year |
| Pre Amplifier | Hewlett Packard | 8449B | AF-04 | November 4, 2001 / 1 year |
| Attenuator | Anritsu | MP721B | AT-06 | June 8, 2001 / 1 year |
| Biconical Antenna | Schwarzbeck | BBA9106 | BA-03 | April 28, 2001 / 1 year |
| Logperiodic Antenna | Schwarzbeck | UHALP9108-A | LA-06 | April 29, 2001 / 1 year |
| Horn Antenna | A.H. Systems | SAS200/571 | HA-01 | January 31, 2003 / 3 year |
| Spectrum Analyzer | Hewlett Packard | 8567A | SA-04 | May 5, 2001 / 6 months |
| Spectrum Analyzer | Advantest | R3271 | SA-05 | January 31, 2002 / 1 year |
| Test Receiver | Rohde & Schwarz | ESVS10 | TR-06 | August 9, 2001 / 1 year |
| Test Receiver | Rohde & Schwarz | ESCS30 | KTR-01 | August 7, 2001 / 1 year |

*All measurement equipment is traceable to national standard.

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

APPENDIX

A : Test Data

Radiated emissions

A1 – A2

Testing Laboratory

A-pex International Co., Ltd.

108 Yokowa-cho, Ise-shi Mie-ken 516-1106 JAPAN

Telephone: +81 596 39 1485

Facsimile: +81 596 39 0232

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
YOKOWA No.3 OPEN TEST SITE
Report No. : 21GE0046-YW-2

Applicant : OMRON Corporation
 Kind of Equipment : Keyless Entry System
 Model No. : G8C-224M-F (Receiver)
 Serial No. : FCC sample
 Power : DC 12V
 Mode : Receiving
 Remarks :
 Date : 2/21/2001
 Test Distance : 3 m
 Temperature : 29 °C
 Humidity : 23 %
 Regulation : FCC Part15B CLASS B



 Engineer : Makoto Kosaka

| No. | FREQ. [MHz] | ANT TYPE | READING | | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT | | LIMITS | | MARGIN | |
|-----|----------------|-------------|-----------------|------|-------------------------|---------------------|-----------------------|----------------|-------------------|------|-------------|------|--------|--|
| | | | HOR [dB μ V] | VER | | | | | HOR [dB μ V/m] | VER | HOR [dB] | VER | | |
| 1. | 32.72 | BB | 22.8 | 24.9 | 17.6 | 28.3 | 1.0 | 6.0 | 19.1 | 21.2 | 40.0 | 20.9 | 18.8 | |
| 2. | 40.91 | BB | 23.0 | 23.4 | 14.4 | 28.3 | 1.2 | 5.9 | 16.2 | 16.6 | 40.0 | 23.8 | 23.4 | |
| 3. | 49.09 | BB | 23.8 | 23.8 | 11.2 | 28.1 | 1.3 | 5.9 | 14.1 | 14.1 | 40.0 | 25.9 | 25.9 | |
| 4. | 324.56 | BB | 32.1 | 26.5 | 14.6 | 27.6 | 3.7 | 6.0 | 28.8 | 23.2 | 46.0 | 17.2 | 22.8 | |
| 5. | 649.12 | BB | 21.2 | 21.2 | 19.3 | 27.2 | 5.5 | 6.1 | 24.9 | 24.9 | 46.0 | 21.1 | 21.1 | |
| 6. | 973.68 | BB | 20.3 | 20.4 | 23.0 | 27.2 | 7.4 | 5.8 | 29.3 | 29.4 | 54.0 | 24.7 | 24.6 | |

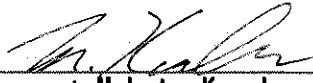
CALCULATION: READING + ANT. FACTOR + CABLE LOSS - AMP. GAIN + ATTEN.

Except for the above table: adequate margin data below the limits.
 ANT. TYPE: 30-300MHz Biconical, 300-1000MHz Logperiodic, 1-2GHz DRG Horn

DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
YOKOWA No.3 OPEN TEST SITE
Report No. : 21GE0046-YW-2

Applicant : OMRON Corporation
Kind of Equipment : Keyless Entry System
Model No. : G8C-224M-F (Receiver)
Serial No. : FCC sample
Power : DC 12V
Mode : Receiving
Remarks :
Date : 2/21/2001
Test Distance : 3 m
Temperature : 29 °C
Humidity : 23 %
Regulation : FCC Part15B CLASS B


Engineer : Makoto Kosaka

