

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

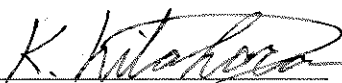
Test Result: Complies

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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.

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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 : 4 of 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

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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

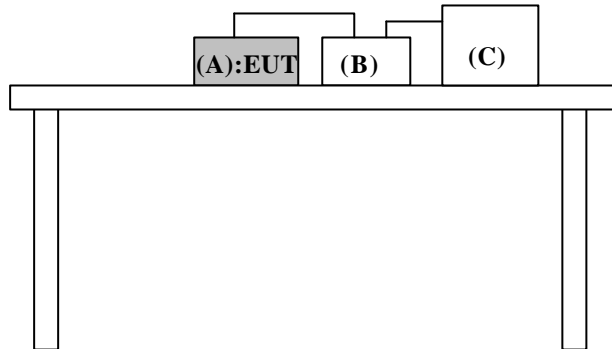
2.4 Test Procedure

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.

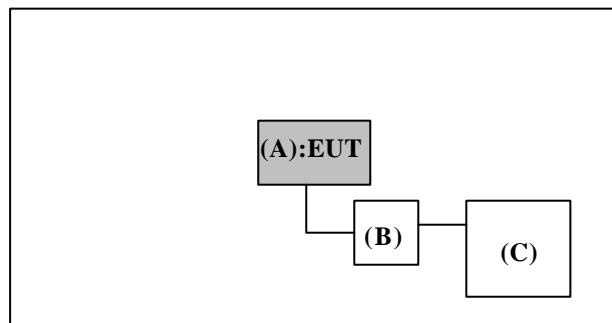
Figure2.1 Configuration of Tested System

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	—

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3 RADIATED MEASUREMENT PHOTOS

Figure 3.1 Radiated Measurement Photos



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

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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

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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.

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

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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.

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APPENDIX

A : Test Data

Radiated emissions

A1 – A2

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 [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.	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

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

Applicant : OMRON Corporation
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Model No. : G8C-224M-F (Receiver)
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Engineer :  Makoto Kosaka

