



## EMI TEST REPORT

Test Report No. : 25AE0090-HO-1

Applicant : OMRON Corporation  
Type of Equipment : Tire Pressure Monitoring System  
Model No. : G8D-364M  
Test standard : FCC Part 15 Subpart B Class B 2004  
FCC ID : OUCG8D-364M  
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation of the EMC profile.
4. The test results in this report are traceable to the national or international standards.

Date of test:

October 8, 2004

Tested by:

*K. Adachi*

Kenichi Adachi  
EMC Service

Approved by :

*Naoki Sakamoto*  
Naoki Sakamoto  
Group Leader of  
EMC Service

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## **SECTION 1: Client information**

Company Name : OMRON Corporation  
Address : 6368 NENJOZAKA,OKUSA,KOMAKI,AICHI,485-0802 JAPAN  
Telephone Number : +81-568-78-6394  
Facsimile Number : +81-568-78-6188  
Contact Person : Harumi Itatsu

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

Type of Equipment : Tire Pressure Monitoring System  
Model No. : G8D-364M  
Serial No. : 1  
Country of Manufacture : Japan  
Receipt Date of Sample : October 4, 2004  
Condition of EUT : Production prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)

### **2.2 Product Description**

Model No: G8D-364M is the Tire Pressure Monitoring System.

<b>Clock frequency</b>	16MHz/CPU Clock
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<b>Equipment Type</b>	Receiver (Super Heterodyne)
<b>Frequency of Operation</b>	315MHz
<b>Intermediate Frequency</b>	10.7MHz
<b>Antenna type</b>	Inverted-F antenna
<b>Antenna connector type</b>	No connector
<b>Power Supply</b>	DC5.0V at Battery DC12.0V

FCC Part 15.31 (e)

The power supply of this EUT is transformed to DC5.0V and provides stable voltage (DC5.0V) constantly to Radio part. Therefore, this EUT complies with the requirement.

FCC Part 15.111 (b)

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test specification**

Test Specification : FCC Part 15 Subpart B 2004  
Title : FCC 47CFR Part15 Radio Frequency Device  
Subpart B Unintentional Radiators

### **3.2 Procedures and results**

<b>Item</b>	<b>Test Procedure</b>	<b>Limits</b>	<b>Deviation</b>	<b>Worst margin</b>	<b>Result</b>
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Class B	N/A	N/A	N/A *1)
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	Class B	N/A	22.5dB, 32.0MHz, Vertical	Complied
*Note: UL Apex's EMI Work Procedure QPM05. *1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.					

\*These tests were performed without any deviations from test procedure except for additions or exclusions.

### **3.3 Additions or deviations to standards**

No addition, deviation, nor exclusion has been made from standards.

### **3.4 Confirmation**

**UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications, FCC Part15 Subpart B 2004.**

### **3.5 Uncertainty**

#### Conducted Emission

The measurement uncertainty (with a 95% confidence level) for this test was  $\pm 1.3$ dB.

#### Radiated Emission

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is  $\pm 4.5$ dB(3m).

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is  $\pm 5.2$ dB(3m).

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

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

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

### 3.6 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. \*NVLAP Lab. code: 200572-0  
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN  
Telephone : +81 596 24 8116  
Facsimile : +81 596 24 8124

	Listed date (for FCC)	FCC Registration Number	IC Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	-	3.1 x 5.0 x 2.7m	N/A	-

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1 and No.2 semi-anechoic and No.3 shielded room.

### 3.7 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

## SECTION 4: Operation of E.U.T. during testing

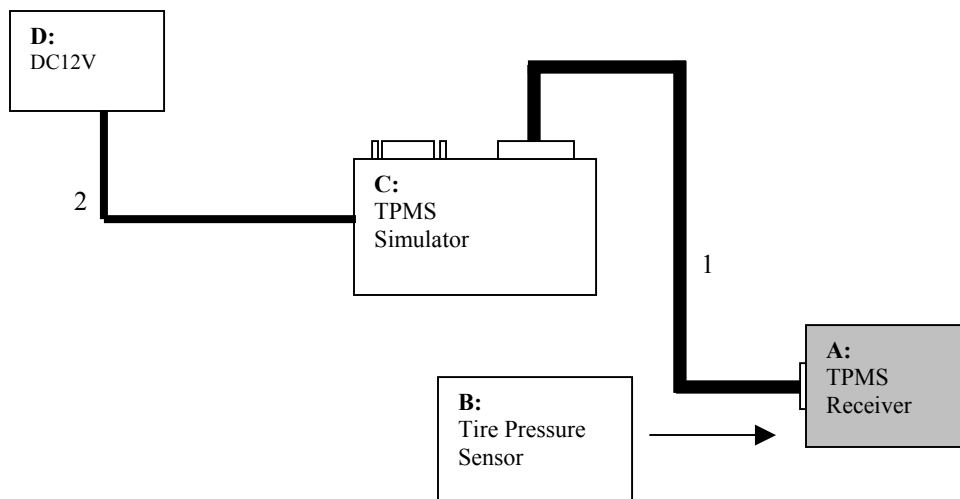
### 4.1 Operating modes

The EUT was operated in a manner similar to typical use during the tests.

The mode is used : Continuous Receiving of the conventional signals from the keyless transmitter.

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

### 4.2 Configuration and peripherals



\*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	FCC ID	Remark
A	TPMS Receiver	G8D-364M	1	OMRON Corporation	OUCG8D-364M	EUT
B	Tire Pressure Sensor	-	-	Schrader	-	-
C	TPMS Simulator	-	4	OMRON Corporation	-	-
D	Car Battery	40B19L	A030402	YUASA	-	-

#### List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	Signal cable	1.5	N	Polyvinyl chloride
2	DC cable	1.0	N	Polyvinyl chloride

## **SECTION 5: Radiated Emission**

### **5.1 Operating environment**

Test place : No.2 semi anechoic chamber.  
Temperature : See data  
Humidity : See data

### **5.2 Test configuration**

EUT was placed on a platform of nominal size, 0.5m by 1.0m, raised 80cm above the conducting ground plane. The EUT was set on the center of the tabletop. 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. A drawing of the set up is shown in the photos of APPENDIX 1.

### **5.3 Test conditions**

Frequency range : 30MHz – 300MHz (Biconical antenna) / 300MHz – 1000MHz (Logperiodic antenna)  
1000-2000MHz (Horn antenna)  
Test distance : 3m  
EUT position : Table top  
EUT operation mode : Receiving mode

### **5.4 Test procedure**

The measuring antenna height 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.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz

- The noise levels was (or were) confirmed at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

With the position, the noise levels of all the frequencies were measured.

### **5.5 Test result**

Summary of the test results: Pass

Date: October 8, 2004

Test engineer: Kenichi Adachi

Test report No. : 25AE0090-HO-1  
Page : 8 of 13  
Issued date : October 15, 2004  
FCC ID : OUCG8D-364M  
Revised date : October 25, 2004

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**APPENDIX 1: Photographs of test setup**

This Page has been submitted for a separate exhibit.



Test report No. : 25AE0090-HO-1  
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MF060b(10.04.03)

## **APPENDIX 2: Test instruments**

<b>Control No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Test Item</b>	<b>Calibration Date * Interval(month)</b>
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2004/04/12 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2004/02/03 * 12
MRENT-09	Spectrum Analyzer	Advantest	R3273	RE	2004/02/18 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MCB-02	Car Battery	YUASA	40B19L	RE	Pre Check

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

**Test Item :**

**RE: Radiated emission**

**APPENDIX 3: Data of EMI test**

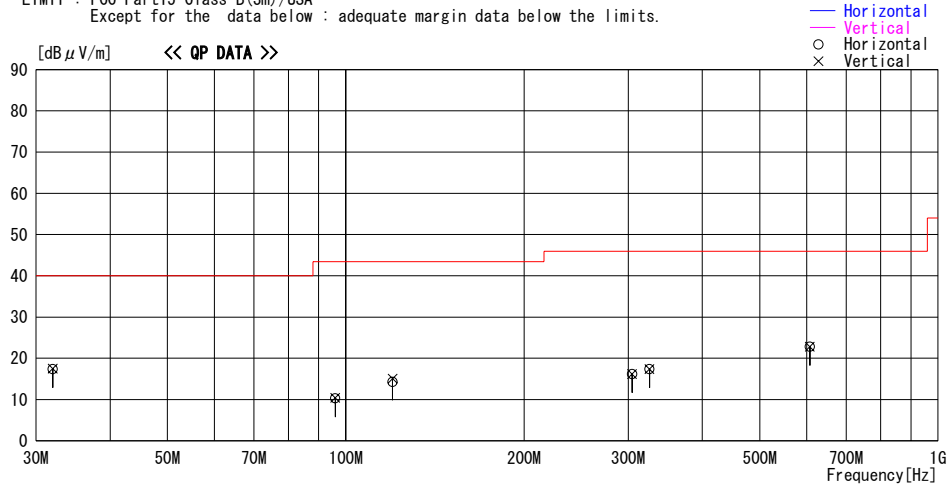
**Radiated Emission**  
**DATA OF RADIATED EMISSION TEST**

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/10/08 02:00:21

Applicant : OMRON CORPORATION  
Kind of EUT : Tire Pressure Monitoring System  
Model No. : G8D-364M  
Serial No. : 1  
Report No. : 25AE0090-HO  
Power : DC 12.0V  
Temp./Humi. : 24 deg.C. / 60 %  
Operator : Kenichi Adachi

Mode / Remarks : Receiving, / EUT Max-axis (X-axis)

LIMIT : FCC Part15 Class B(3m)/USA  
Except for the data below : adequate margin data below the limits.



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]						
32.000	21.1	QP	17.7	-21.4	17.4	0	300	Hori.	40.0	22.6
32.000	21.2	QP	17.7	-21.4	17.5	0	100	Vert.	40.0	22.5
96.000	21.5	QP	9.3	-20.4	10.4	0	100	Vert.	43.5	33.1
96.000	21.4	QP	9.3	-20.4	10.3	0	300	Hori.	43.5	33.2
120.000	22.2	QP	13.0	-20.1	15.1	0	144	Vert.	43.5	28.4
120.000	21.4	QP	13.0	-20.1	14.3	0	300	Hori.	43.5	29.2
304.300	20.5	QP	14.2	-18.5	16.2	0	100	Vert.	46.0	29.8
304.300	20.5	QP	14.2	-18.5	16.2	0	100	Hori.	46.0	29.8
325.700	20.7	QP	15.2	-18.5	17.4	0	100	Hori.	46.0	28.6
325.700	20.7	QP	15.2	-18.5	17.4	0	100	Vert.	46.0	28.6
607.305	21.7	QP	19.6	-18.5	22.8	0	100	Hori.	46.0	23.2
607.305	21.7	QP	19.6	-18.5	22.8	0	100	Vert.	46.0	23.2

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN Page:

## DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/10/08 01:17:32

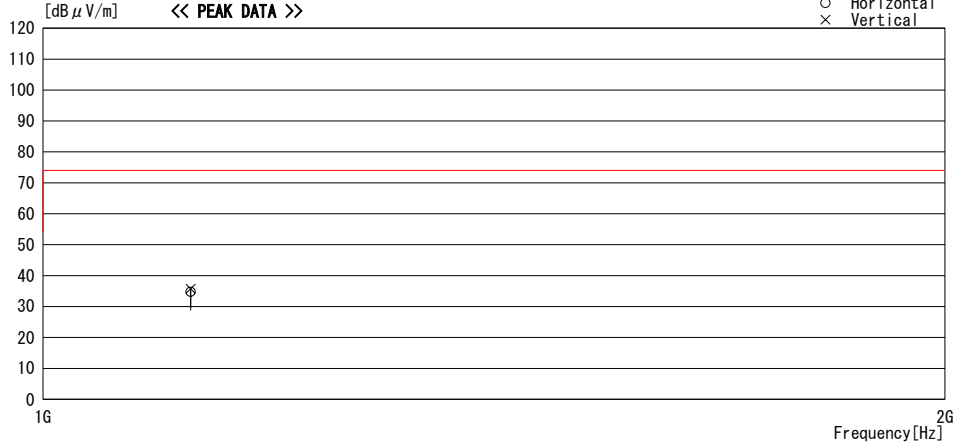
Applicant : OMRON CORPORATION  
Kind of EUT : Tire Pressure Monitoring System  
Model No. : G8D-364M  
Serial No. : 1

Report No. : 25AE0090-HO  
Power : DC 12.0V  
Temp./Humi. : 24 deg.C. / 60 %  
Operator : Kenichi Adachi

Mode / Remarks : Receiving. / EUT Max-axis (X-axis)

LIMIT : FCC Part15 Class B(3m)/USA. ( above 1GHz: PK )  
Except for the data below : adequate margin data below the limits.

— Horizontal  
— Vertical  
○ Horizontal  
× Vertical



Frequency [MHz]	Reading [dB $\mu$ V]	DET	Antenna	Loss&	Level [dB $\mu$ V/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dB $\mu$ V/m]	Margin [dB]
			Factor [dB/m]	Gain [dB]						
1120.000	44.7	PK	22.8	-32.7	34.8	0	100	Hori.	74.0	39.2
1120.000	45.6	PK	22.8	-32.7	35.7	0	100	Vert.	74.0	38.3

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN    Page:

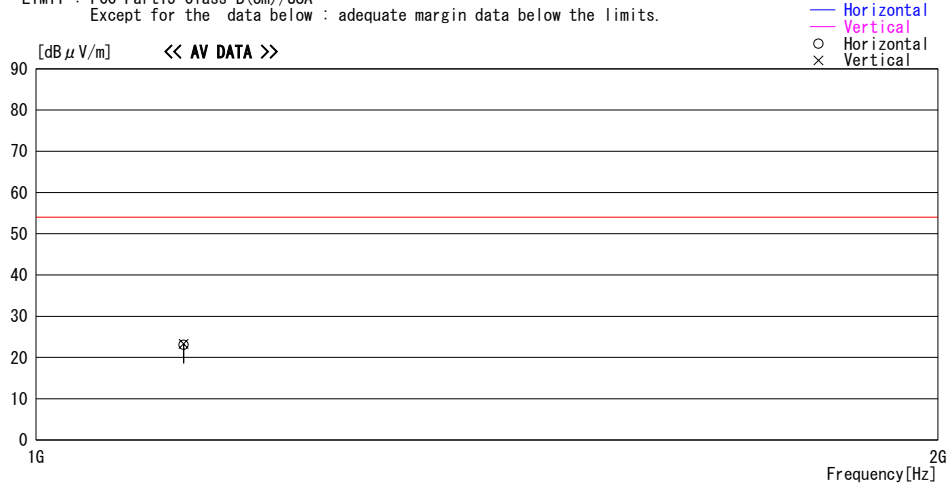
## DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
 Date : 2004/10/08 01:17:32

Applicant : OMRON CORPORATION  
 Kind of EUT : Tire Pressure Monitoring System  
 Model No. : G8D-364M  
 Serial No. : 1  
 Report No. : 25AE0090-HO  
 Power : DC 12.0V  
 Temp./Humi. : 24 deg.C. / 60 %  
 Operator : Kenichi Adachi

Mode / Remarks : Receiving. / EUT Max-axis (X-axis)

LIMIT : FCC Part15 Class B(3m)/USA  
 Except for the data below : adequate margin data below the limits.



Frequency	Reading	DET	Antenna	Loss&	Level	Angle	Height	Polar.	Limit	Margin
			Factor	Gain						
[MHz]	[dB $\mu$ V]		[dB/m]	[dB]	[dB $\mu$ V/m]	[Deg]	[cm]		[dB $\mu$ V/m]	[dB]
1120.000	33.0	AV	22.8	-32.7	23.1	0	100	Hori.	54.0	30.9
1120.000	33.2	AV	22.8	-32.7	23.3	0	100	Vert.	54.0	30.7

CHART WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
 CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN