



# EMI TEST REPORT

Test Report No. : 28AE0205-HO-C-R1

Applicant : OMRON Corporation  
Type of Equipment : Tire Pressure Monitoring System (TPMS)  
Model No. : G8D-366H  
Test standard : FCC Part 15 Subpart C  
Section 15.207 and 15.209: 2007  
FCC Part 15 Subpart B 2007 Class B  
FCC ID : OUCG8D-366H-SYS  
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
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6. Original test report number of this report is 28AE0205-HO-C.


Date of test: September 21 and 23, 2007

Tested by:

  
Kenichi Adachi  
EMC Services

  
Hidekazu Tanaka  
EMC Services

Approved by :

  
Mitsuru Fujimura  
EMC Services



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UL Japan, Inc.

Head Office EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

MF060b (18.06.07)

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### **LF Initiators**

G8D-366H-ANT-D was used for the test since this model had a maximum output power level.

G8D-366H-ANT-C was used for Receiving mode.

G8D-366H-ANT-C had lower output power level compared with G8D-366H-ANT-D in Transmitting mode.

There was no difference in operating state of Receiving mode for both G8D-366H-ANT-C and G8D-366H-ANT-D.

For the client's reason, the client provided G8D-366H-ANT-C for Receiving mode measurement.

<The difference between G8D-366H-ANT-C and G8D-366H-ANT-D>

These equipment have different size of the LF antenna.

\*The inner diameters of antennas

G8D-366H-ANT-C : 5mm x 8mm

G8D-366H-ANT-D : 8mm x 10mm

### **[Specification]**

Equipment type : Transceiver  
Operation voltage : DC12V (ECU)  
DC6.5V (LF initiator)  
Temperature of operation : -40 deg. C. - +85 deg. C.

#### **LF Transmitter part**

Frequency bands : 124.9-125.1kHz  
Operating frequency : 125kHz  
Type of Modulation : ASK  
Antenna type : Integrated (LF Antenna)

#### **UHF Receiver part**

Receiving frequency : 314.98MHz  
Intermediate frequency : 10.7MHz  
Type of Modulation : FSK  
Antenna type : Integrated (Inverted-F Antenna)  
Other Clock Frequency : 16MHz (CPU Clock), 10.178125MHz (Receiving part of ECU)  
Power supply : DC12.0V (ECU: Inner DC5.0V)

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**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

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

### **3.1 Test specification**

Test Specification : FCC Part15 Subpart C: 2007  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted Emission  
Section 15.209 Radiated emission limits, general requirements

Test Specification : FCC Part 15 Subpart B 2007  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

#### **FCC 15.31 (e)**

This EUT provides stable voltage (ECU: DC5.0V, LFI: DC6.5V) via regulator constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC 15.111(b)**

The receiving antenna of the EUT is installed inside TPMS ECU, and it cannot be removed. Therefore, the EUT complies with the requirement in section 15.111(b).

#### **FCC Part 15.203 Antenna requirement**

It is impossible for end users to access the antennas, because they are mounted inside of the vehicle as the final product. Therefore, the equipment complies with the antenna requirement of Section 15.203.

### **3.2 Procedures and results**

#### **[FCC Part 15 Subpart C]**

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	Conducted Emission	<FCC> ANSI C63.4:2003 7. AC powerline conducted emission measurements <IC> RSS-Gen 7.2.2	<FCC> Section 15.207 <IC> RSS-Gen 7.2.2	-	N/A	N/A *1)	N/A
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	19.1dB 124.99kHz 0 deg. PK	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.9, 4.11	<FCC> Section 15.209 <IC> RSS-210 2.6, 2.7	Radiated	N/A	20.3dB 800.00MHz, Horizontal/ Vertical, QP	Complied

Note: UL Japan, Inc.'s EMI Work Procedures No.QPM05 and QPM15.

\*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.

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**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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**[FCC Part 15 Subpart B]**

Item	Test Procedure	Specification	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	<FCC> Section 15.107 <IC> RSS-Gen 7.2.2	N/A	N/A *1)	N/A
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	<FCC> Section 15.109 <IC> RSS-210 2.6, 2.7	N/A	24.2dB, 651.36MHz, Horizontal/Vertical, QP	Complied

\*Note: UL Japan, Inc.'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.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	-26dB Bandwidth	ANSI C63.4:2003 13.1.7 and Annex H.6 Occupied bandwidth measurements	Reference data	Radiated	N/A	N/A	N/A
2	99% Occupied Band Width	RSS-Gen 4.6.1	RSS-Gen 4.6.1	Radiated	N/A	N/A	N/A

**3.4 Uncertainty**

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

Spurious Emission (Radiated)

The measurement uncertainty for this test using Loop antenna is  $\pm 3.22\text{dB}(3\text{m})$ .

The measurement uncertainty for this test using Biconical antenna is  $\pm 4.88\text{dB}(3\text{m})$ .

The measurement uncertainty for this test using Logperiodic antenna is  $\pm 4.86\text{dB}(3\text{m})$ .

The measurement uncertainty for this test using Horn antenna is  $\pm 5.77\text{dB}$ .

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

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4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124

### 3.5 Test Location

UL Japan, Inc. 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

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	IC4247-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	IC4247-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 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, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

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

Refer to APPENDIX 1 to 3.

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

### **4.1 Operating Mode(s)**

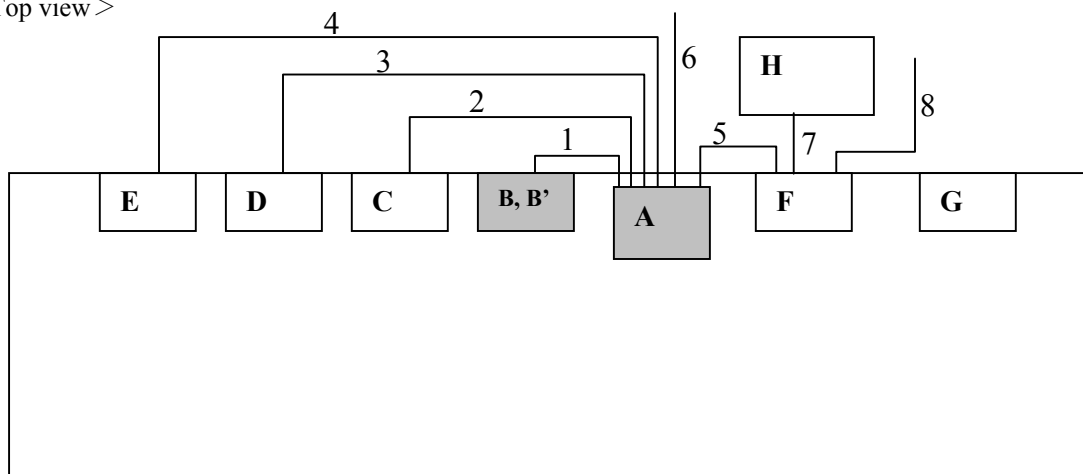
The mode used for test: 1) Transmitting 125kHz mode  
2) Receiving 314.98MHz mode

\*The test was performed with the antenna set with maximum output power.

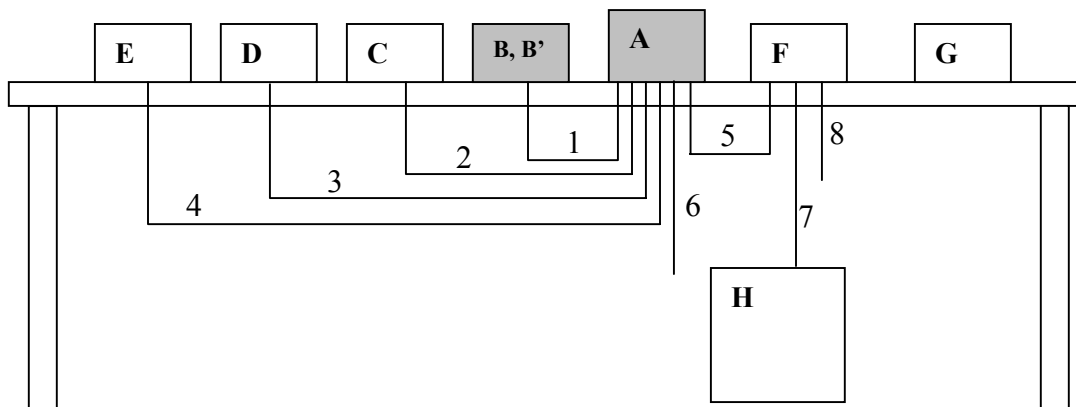
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

### **4.2 Configuration and peripherals**

<Top view>



<Side view>



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

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**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Facsimile : +81 596 24 8124



**Description of EUT and support equipment**

No.	Item	Model number	Serial No.	Manufacturer	Remarks
A	TPMS ECU	G8D-366H-ECU-E	99051 *1), 99001 *2)	OMRON	EUT
B	TPMS LF Initiator (LFI)	G8D-366H-ANT-D	99141 *1)	OMRON	EUT
B'	TPMS LF Initiator (LFI)	G8D-366H-ANT-C	99131 *2)	OMRON	EUT
C	TPMS LF Initiator (LFI)	G8D-366H-ANT-D	-	OMRON	-
D	TPMS LF Initiator (LFI)	G8D-366H-ANT-D	-	OMRON	-
E	TPMS LF Initiator (LFI)	G8D-366H-ANT-D	-	OMRON	-
F	SW Box	-	-	OMRON	-
G	TPMS sensor	42753-STK-A020-M1	1 *2)	Pacific Industrial Co., Ltd.	-
H	Car Battery	40B19L	A030402	YUASA	-

\*1) Used for Transmitting mode

\*2) Used for Receiving mode

**List of cables used**

No.	Name	Length (m)	Shield	
			Cable	Connector
1	Antenna cable	5.0	Unshielded	Unshielded
2	Antenna cable	1.0	Unshielded	Unshielded
3	Antenna cable	1.0	Unshielded	Unshielded
4	Antenna cable	1.0	Unshielded	Unshielded
5	Signal Cable	1.0	Unshielded	Unshielded
6	RS232C Cable	1.0	Unshielded	Unshielded
7	DC Cable	1.0	Unshielded	Unshielded
8	DC Power Cable	0.1	Unshielded	Unshielded

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**SECTION 5: Radiated emission (Fundamental and Spurious Emission and -26dB Bandwidth)**

**Test Procedure**

The Radiated Electric Field Strength intensity has been measured on a semi anechoic chamber 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 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 a QP, PK, and AV detector.

The radiated emission measurements were made with the following detector function of the test receiver (below 1GHz) and the spectrum analyzer (above 1GHz).

	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	From 1GHz to 2GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP	PK/AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	1MHz *

\*Spectrum analyzer: RBW&VBW=1MHz

- The carrier level (or, noise levels) was (or were) measured 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.

\* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

[Limit at 3m]=[Limit at 300m]-40 x log (3[m]/300[m])

[Limit at 3m]=[Limit at 30m]-40 x log (3[m]/30[m])

**Test data** : **APPENDIX 3**

**Test result** : **Pass**

Date: September 21 and 23, 2007

Test engineer: Kenichi Adachi and Hidekazu Tanaka

**UL Japan, Inc.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8116

Facsimile : +81 596 24 8124