EMI TEST REPORT

Test Report No. : 25IE0209-HO-1

Applicant	:	**DENSO CORPORATION**
Type of Equipment	:	**Tire Pressure Monitoring System (Receiver)**
Model No.	:	**13BCG**
Test standard	:	**FCC Part 15 Subpart B Class B 2005**
FCC ID	:	**HYQ13BCG**
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:

May 23, 2005

Tested by:

Norihisa Hashimoto
EMC Service

Approved by :

Naoki Sakamoto
Group Leader of
EMC Service

UL Apex Co., Ltd.
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

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SECTION 1: Client information

Company name	: DENSO CORPORATION
Address	: 1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone number	: +81-566-61-7934
Facsimile number	: +81-566-25-4915
Contact Person	: Ryozo Okumura

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

2.1 Identification of E.U.T.

Type of Equipment	: Tire Pressure Monitoring System (Receiver)
Model No.	: 13BCG
Serial No.	: 1
Rating	: 12V DC (Vehicle Battery)
Receipt Date of Sample	: May 20, 2005
Country of Manufacture	: Japan
Condition of EUT	: Engineering prototype (Not for Sale: this sample is equivalent to mass-produced items.)

2.2 Product Description

Model No. 13BCG (referred to as the EUT in this report) is Tire Pressure Monitoring System (Receiver).

Type of Receiver	: Super Heterodyne
Frequency of operation	: 314.98MHz
Oscillator frequency	: 38.035MHz (Crystal)
Antenna	: Internal Antenna

The receiving antenna (of this EUT) is installed on the Tire Pressure Monitoring System, which is unremovable. Therefore, this EUT complies with the requirement in section 15.111(b).

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 15 Subpart B 2005
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin *0)	Result
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Class B	N/A	N/A *1)	N/A
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	Class B	N/A	19.8dB 959.498MHz, Horizontal, QP	Complied

*Note: UL Apex's EMI Work Procedure QPM05.
*0) The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.
*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 Uncertainty

Radiated Emission
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.5dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±5.2dB(3m).
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±6.6dB.
The data listed in this test report has enough margin, more than the site margin.

3.4 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
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	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	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	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.

3.5 Test set up, Test instruments and Data of EMI

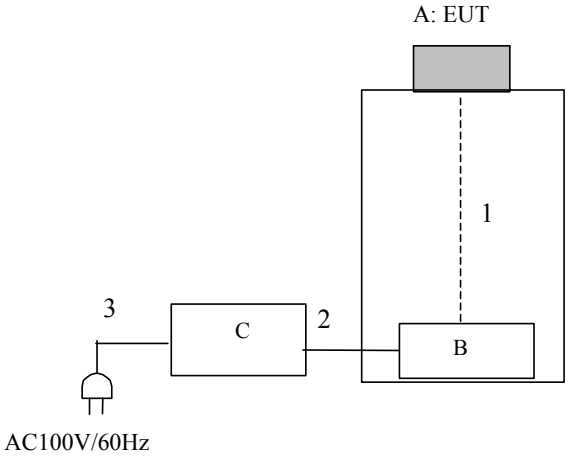
Refer to APPENDIX 1 to 3.

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

4.1 Operating modes

The mode is used : Receiving mode

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	Tire Pressure Monitoring System (Receiver)	13BCG	1	DENSO	HYQ13BCG	EUT
B	Test Bench	-	-	DENSO	-	-
C	DC Power Supply	PW8-3ATP	09067054	KENWOOD	-	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	DC Cable	1.0	N	Polyvinyl Chloride
2	DC Cable	0.8	N	Polyvinyl Chloride
3	AC Cable	1.8	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 0.5m, 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 : See Clause 4.1

5.4 Test procedure

The height of the measuring 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 with the Test Receiver, or the Spectrum Analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

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

5.5 Test result

Summary of the test results: Pass

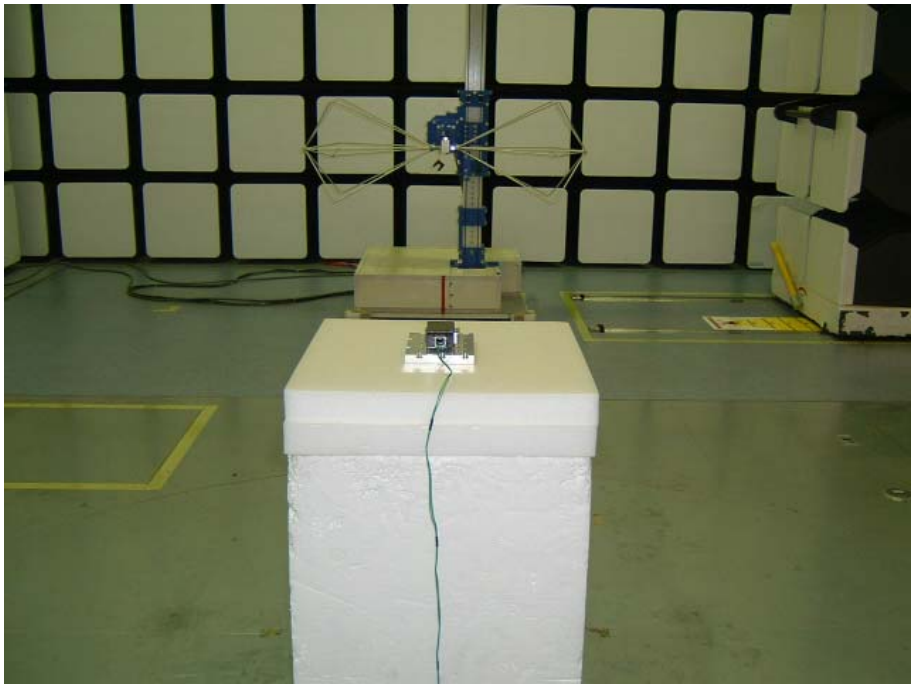
Date: May 23, 2005 Test engineer: Norihisa Hashimoto

APPENDIX 1: Photographs of test setup

Radiated Emission

Front

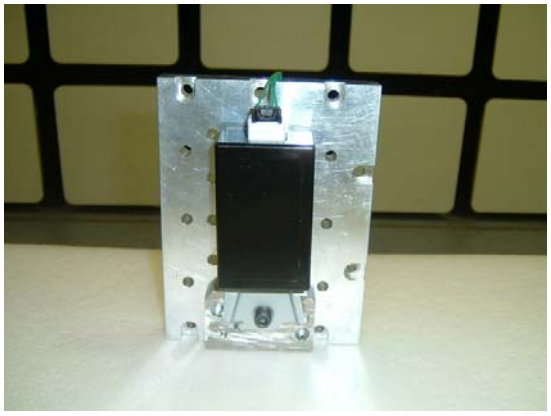
Rear



Worst Case Position (X-axis:Horizontal / X-axis:Vertical)

X-axis

Y-axis



Z-axis

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2005/04/11 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2005/02/02 * 12
MRENT-14	Spectrum Analyzer	Advantest	R3273	RE	2005/02/21 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MCC-19	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	RE	2005/02/03 * 12
MCC-04	Microwave Cable 1G-50GHz	Storm	421-011 (90-1394-079)	RE	2005/01/05 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2005/02/24 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2005/02/05 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2004/12/16 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2005/01/10 * 12

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

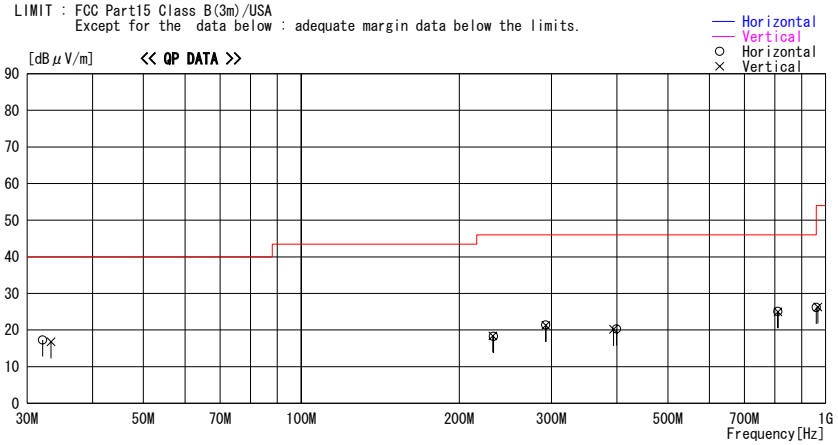
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber

Applicant : DENSO CORPORATION
Kind of EUT : Tire Pressure Monitoring System
Model No. : 13BCG
Serial No. : 1

Report No. : 25IE0209-HO
Power : DC5.0V
Temp℃/Humi% : 24deg.C / 42%
Operator : Norihisa Hashimoto

Mode / Remarks : Receivig / X-axis

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



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal ------										
1	32.122	21.3	18.0	5.9	27.9	17.3	40.0	22.7	310	0
2	232.466	20.5	17.1	7.6	26.9	18.3	46.0	27.7	160	298
3	292.378	20.5	19.9	7.8	26.8	21.4	46.0	24.6	115	112
4	399.275	20.9	18.6	8.3	27.5	20.3	46.0	25.7	224	163
5	810.847	21.1	22.0	9.9	27.9	25.1	46.0	20.9	107	349
6	959.498	20.8	22.8	10.3	27.7	26.2	46.0	19.8	100	219
----- Vertical ------										
7	33.333	21.3	17.3	6.0	27.8	16.8	40.0	23.2	138	129
8	231.784	20.6	17.1	7.6	26.9	18.4	46.0	27.6	100	244
9	292.643	20.4	19.9	7.8	26.8	21.3	46.0	24.7	100	38
10	393.997	21.0	18.4	8.3	27.5	20.2	46.0	25.8	100	352
11	810.847	21.0	22.0	9.9	27.9	25.0	46.0	21.0	100	281
12	966.390	20.6	22.9	10.4	27.6	26.3	54.0	27.7	100	297

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

Applicant : DENSO CORPORATION
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Model No. : 13BCG
Serial No. : 1

Report No. : 25IE0209-HO
Power : DC5.0V
Temp℃/Humi% : 24deg.C / 42%
Operator : Norihisa Hashimoto

Mode / Remarks: Receivig / X-axis

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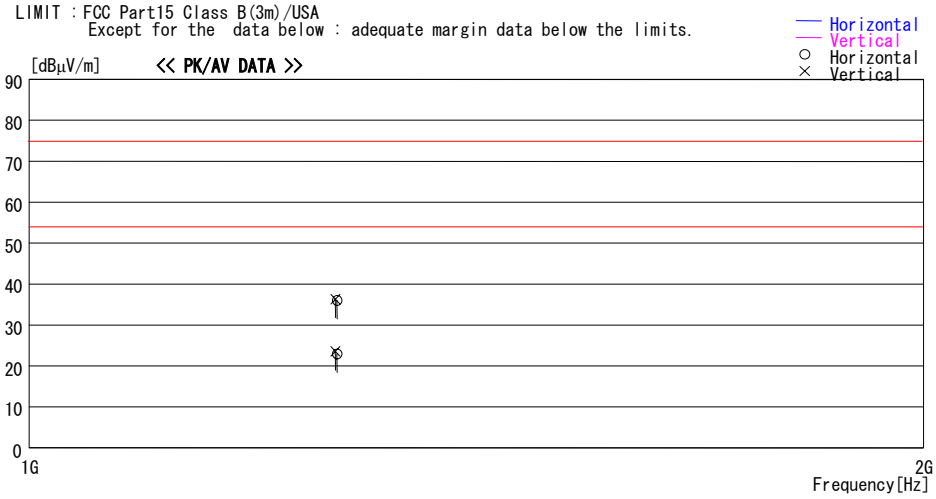

No.	FREQ [MHz]	READING PK/AV [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]	
----- Horizontal ------											
1	1269.440	46.8	23.5	2.7	37.0	36.0	74.0	38.0	100	243	PK
2	1269.440	33.7	23.5	2.7	37.0	22.9	54.0	31.1	100	243	AV
----- Vertical ------											
3	1267.900	47.1	23.5	2.7	37.0	36.3	74.0	37.7	100	192	PK
4	1267.900	34.3	23.5	2.7	37.0	23.5	54.0	30.5	100	192	AV

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

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Head Office EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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