

EMI TEST REPORT

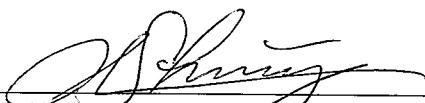
Test Report No. : 23GE0051-HO-1

Applicant : **DENSO CORPORATION**
Type of Equipment : **Tire Pressure Monitor System**
Model No. : **13BBY**
Test standard : **FCC Part 15 Subpart B Class B**
FCC ID : **HYQ13BBY**
Test Result : **Complied**

1. This test report shall not be reproduced except in full or partial, without the written approval of A-Pex International 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 test report are traceable to the national or international standards.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

Date of test : March 4, 2003

Tested by : 
Hiroka Umeyama
EMC Head Office Division

Approved by : 
Hironobu Shimoji
Group Leader of EMC Head Office Division

A-Pex International Co., Ltd.

EMC Head Office Division.

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SECTION 1: Client information

Company Name : DENSO CORPORATION
Brand Name : DENSO
Address : 1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number : +81-566-61-4783
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 Monitor System
Model No. : 13BBY
Serial No. : 001
Country of Manufacture : Japan
Receipt Date of Sample : February 26, 2003
Condition of EUT : Engineering prototype

2.2 Product description

DENSO CORPORATION, Model: 13BBY (referred to as the EUT in this report) is a Tire Pressure Monitor System. Model:13BBY Tire Pressure Monitor System is used for monitoring and indicating about information of air pressure in vehicle's tires.

Transmitter sends to receiver the data that are information of air pressure in vehicle's tire.

The data also include temperature and battery voltage and identity code of transmitter.

The receiver judges the data.

If data of air pressure and others are not normal condition and then the receiver send signal to a warning lamp through control ECU.

The warning lamp warns drivers.

Type of receiver : Super Heterodyne
Receiving frequency : 314.98MHz
Local Oscillator Frequency : 304.28MHz
Intermediate Frequency : 10.7MHz
Information Antenna : Internal Type (Fixed)
Operation Voltage : DC 5V (from ECU)

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SECTION 3: Test specification, procedures and results

3.1 Test specification

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

3.2 Procedures and results

Item	Test Procedure	Specification	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2001	Section 15.107(a)	Excluded *	N/A	N/A
Radiated emission	ANSI C63.4: 2001	Section 15.109(a)	N/A	13.7dB (304.28MHz: Horizontal)	Complied
*The test is not applicable since the EUT does not have AC Mains.					

3.3 Confirmation

A-Pex International Co., Ltd. hereby confirms that E.U.T. , in the configuration tested, complies with the specifications FCC Part 15 Subpart B Class B.

3.4 Uncertainty

Radiated emission test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

□The data listed in this test report may exceed the test limit because it does not have enough margin.

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

3.5 Test location

A-Pex International Co., Ltd. EMC Head Office Division.

No.2 semi anechoic chamber 7.5 x 5.8 x 5.2m

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This site has been fully described in a report submitted to FCC office, and listed on June 05, 2002

(Registration number: 846015).

Industry Canada number: IC4247-2

*NVLAP Lab. code: 200572-0

3.6 Test setup, Data of EMI and Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating modes

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

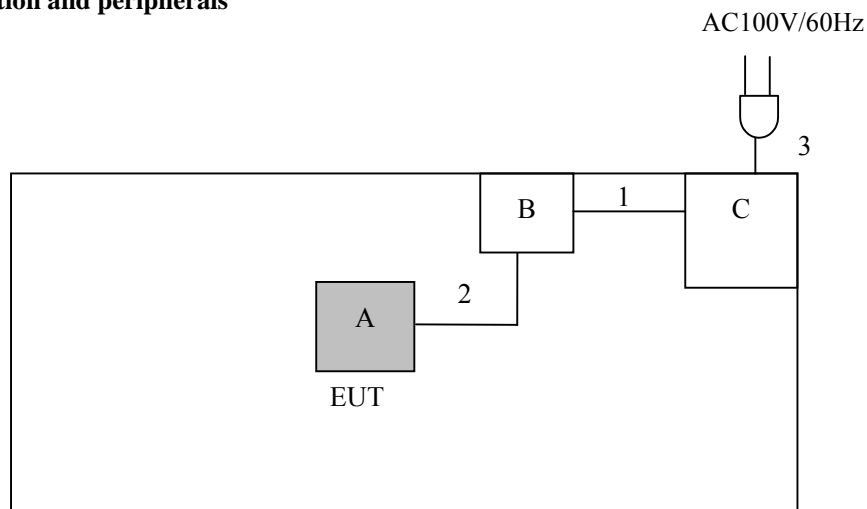
The operating mode/system was as follows:

Operation mode : Receiving

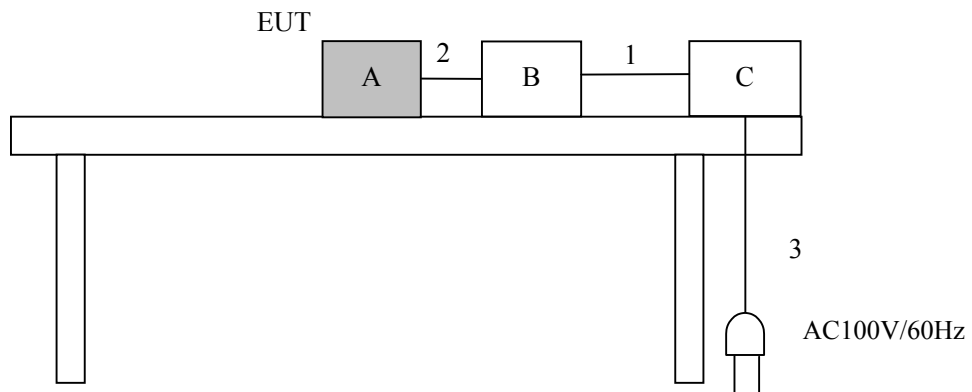
Justification : The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Top View



Front View



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

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Description of EUT

No.	Item	Model number	Serial number	Manufacturer	FCC ID/DoC/others
A	Receiver	13BBY	001	DENSO	HYQ13BBY

Support equipment

No	Item	Model number	Serial number	Manufacturer	FCC ID
B	Check bench	-	001	DENSO	N/A
C	DC Power Supply	PMC35-2A	13090501	KIKUSUI	N/A

List of cables used

No.	Name	Length (m)	Shield	Remark
1	DC Power Cable	0.5	N	Polyvinyl chloride
2	Extended harness	0.7	N	Polyvinyl chloride
3	AC Power Cable	1.8	N	Polyvinyl chloride

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SECTION 5: Radiated emission

5.1 Operating environment

The test was carried out in No.2 semi Anechoic Chamber, 7.5 x 5.8 x 5.2m.

Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The center of EUT was aligned and flushed with center of table top. 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 - 1000MHz
Test distance : 3m
EUT position : Table top
EUT operation mode : Receiving

5.4 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

Measurements were performed with a quasi-peak detector.

The measuring antenna height was varied between 1 to 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. The EUT was measured in the direction to be its worst level condition.

The radiated emission measurements were made with the following detector function of the test receiver.

Detector Type : Quasi-peak
IF Bandwidth : 120KHz

5.5 Results

Summary of the test results: Pass

Date: March 4, 2003

Test engineer: Hiroka Umeyama

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APPENDIX 1: Photographs of test setup

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APPENDIX 2: Test instruments

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APPENDIX 3: Data of EMI test

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APPENDIX 1: Photographs of test setup

Radiated emission



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APPENDIX 3 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	2002/04/12 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2002/12/24 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/05/02 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2002/05/09 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2002/05/02 * 12
MOS-02	Digital Humidity Indicator	N.T	NT-1800	RE	2002/12/10 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2002/03/13 * 12
MSA-02	Spectrum Analyzer	Advantest	R3265A	RE	2002/09/20 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2003/01/31 * 12
MDPS-03	DC Power Supply	Kikusui	PMC35-2A	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,

DATA OF RADIATION TEST

A-Pex International Co., Ltd.
No.2 SEMI ANECHOIC CHAMBER
Report No. : 23GE0051-H0 - 1

Applicant : DENSO CORPORATION
Kind of Equipment : Tire Pressure Monitor System
Model No. : 13BBY
Serial No. : 001
Power : DC5V
Mode : Receiving Mode
Remarks : MAX-AXIS DETECTOR:QP FCC ID:HYQ13BBY IC NUMBER:1551A-13BBY
Date : 3/4/2003
Test Distance : 3 m
Temperature : 23 °C
Humidity : 30 %
Regulation : FCC Part15B CLASS B


Engineer : Hiroka Umeyama

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μV/m]	MARGIN	
			HOR [dB μV]	VER [dB μV]					HOR [dB μV/m]	VER [dB μV/m]		HOR [dB]	VER [dB]
1.	121.72	BB	20.2	19.6	12.9	26.7	1.2	6.0	13.6	13.0	43.5	29.9	30.5
2.	182.57	BB	19.0	19.2	16.8	26.2	1.6	6.0	17.2	17.4	43.5	26.3	26.1
3.	243.43	BB	18.7	18.6	18.2	26.3	1.8	6.0	18.4	18.3	46.0	27.6	27.7
4.	304.28	BB	36.0	27.3	14.5	26.2	2.0	6.0	32.3	23.6	46.0	13.7	22.4
5.	365.14	BB	21.3	19.3	16.3	26.7	2.3	6.1	19.3	17.3	46.0	26.7	28.7
6.	425.97	BB	19.1	19.0	17.6	27.2	2.5	6.2	18.2	18.1	46.0	27.8	27.9

CALCULATION: $\text{READING}[\text{dB} \mu\text{V}] + \text{ANT. FACTOR}[\text{dB/m}] + \text{CABLE LOSS}[\text{dB}] - \text{AMP. GAIN}[\text{dB}] + \text{ATTEN}[\text{dB}]$.

All other spurious emissions were less than 20dB for the limit.

ANT. TYPE : 30-300MHz Biconical, 300-1000MHz Logperiodic, 1000MHz- Horn

DATA OF RADIATION TEST

A-Pex International Co., Ltd.
No.2 SEMI ANECHOIC CHAMBER
Report No. : 23GE0051-H0-1

Applicant : DENSO CORPORATION
Kind of Equipment : Tire Pressure Monitor System
Model No. : 13BBY
Serial No. : 001
Power : DC5V
Mode : Receiving Mode
Remarks : MAX-AXIS DETECTOR:QP FCC ID:HYQ13BBY IC NUMBER:1551A-13BBY
Date : 3/4/2003
Test Distance : 3 m
Temperature : 23 °C
Humidity : 30 %
Regulation : FCC Part15B CLASS B

Engineer : Hiroka Umeyama

