



EMI TEST REPORT

Test Report No. : 25BE0315-HO-2

Applicant : DENSO CORPORATION

Type of Equipment : Wireless Remote Control Receiver

Model No. : 13BBZ

Test standard : FCC Part 15 Subpart B 2004 Class B

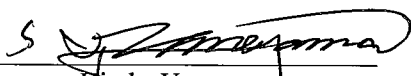
FCC ID : HYQ13BBZ

Test Result : Complied

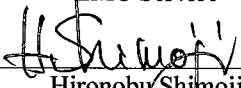
1. This test report shall not be reproduced except in full or partial, without the written approval of UL Apex Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contain a true representation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

Date of test : October 4, 2004

Tested by :


Hiroka Umeyama
EMC Service

Approved by :


Hironobu Shimoji
Group Leader of
EMC Service

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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 : +81-566-61-2523
Facsimile Number : +81-566-25-4915
Contact Person : Tomokazu Miyashita

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Remote Control Receiver
Model No. : 13BBZ
Serial No. : 1-1
Rating : DC12V
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

DENSO CORPORATION, Model No: 13BBZ is the Wireless Remote Control Receiver.
The system is mainly used as a Remote Keyless Entry.

Type of Receiver : Super Heterodyne
Frequency of operation : 314.35MHz
Intermediate frequency : 10.7MHz
Method of Frequency Generation : Crystal
Operating Temperature : -30 deg. C. -+65 deg. C.

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement.

SECTION 3: Test specification, procedures and results

3.1 Test specification

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

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2003 7. AC power line 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	16.6dB (1260.0MHz: Horizontal)	Complied
*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. Note: UL Apex's EMI Work procedures No. QPM05					

3.3 Uncertainty

Radiated Emission

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}(3\text{m})$.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}(3\text{m})$.
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is $\pm 6.6\text{dB}$.
The data listed in this test report has enough margin.

3.4 Test location

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

No.1 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on February 01, 2002. (Registration number: No.1:313583 Industry Canada: No.1: IC4247)

No.2 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.2:846015 Industry Canada: No.2: IC4247-2)

*NVLAP Lab. code: 200572-0

Test room	Width x Depth x Height (m)	Size of reference ground plane(m)	Other rooms
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	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	-

3.5 Photographs of test setup, Test instruments and Data of EMI Test

Refer to APPENDIX 1 to 3

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

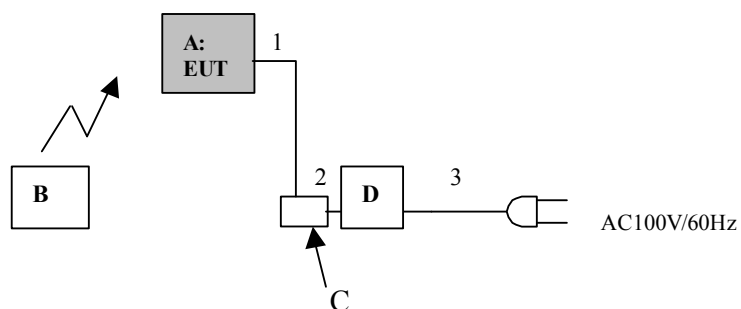
4.1 Operating Modes

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

Test sequence is used : Receiving
*The test was performed under the signal from the transmitter

Justification : The system was configured in a 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	Wireless Remote Control Receiver	13BBZ	1-1	DENSO CORPORATION	HYQ13BBZ	EUT
B	Transmitter	12BBY	-	DENSO CORPORATION	HYQ12BBY	-
C	Checker	-	-	-	-	-
D	DC Power Supply	PMC35-2A	13090501	KIKUSUI		-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	DC Cable	2.0	N	Polyvinyl chloride
2	DC Cable	0.3	N	Polyvinyl chloride
3	AC Cable	2.0	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.

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 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 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 : Continuous Receiving mode

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.

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 the following detectors.

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

-The noise was measured at each position of all three axes X, Y and Z to compare the level, and the maximum noise level was recorded.

5.5 Results

Summary of the test results: Pass

Date: October 4, 2004

Test engineer: Hiroka Umeyama

UL Apex Co., Ltd.

Head Office EMC Lab.

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APPENDIX 1: Photographs of test setup

Radiated Emission

Front



Rear



Worst Case Position (Horizontal : Z-axis/ Vertical: Y-axis)

X-axis



Y-axis



Z-axis



APPENDIX 2: Test Instruments

EMI Test Instruments

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
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
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MPA-06	Pre Amplifier	Hewlett Packard	8447D	RE	2004/08/29 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 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

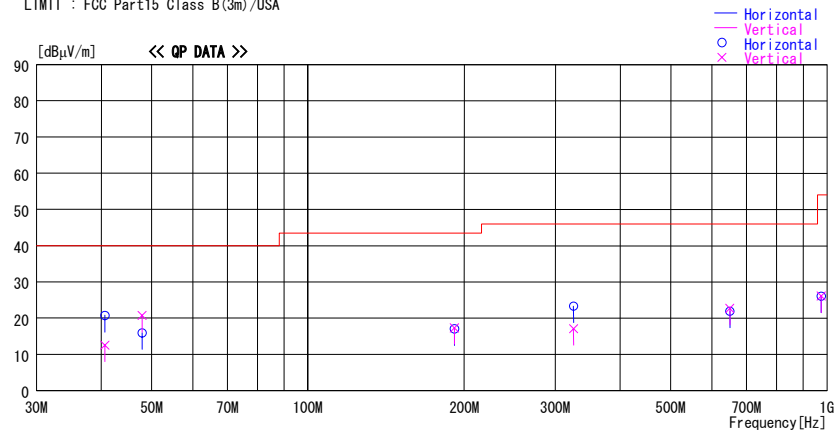
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber
Date : 2004/10/04 13:22:34

Applicant : DENSO CORPORATION
Kind of EUT : Wireless Remote Control Receiver
Model No. : 13BBZ
Serial No. : 1-1
Report No. : 25BE0315-HO
Power : DC12.0V
Temp°C/Humi% : 25 / 60%
Operator : Hiroka Umeyama

Mode / Remarks : Receiving HOR:Z-Axis, VER:Y-Axis (MAX)

LIMIT : FCC Part15 Class B (3m) / USA



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	40.630	28.5	13.4	6.6	27.8	20.7	40.0	19.3	100	215
2	47.930	26.1	10.8	6.7	27.7	15.9	40.0	24.1	0	224
3	191.720	19.8	16.6	7.8	27.2	17.0	43.5	26.5	300	0
4	325.050	26.7	15.1	8.4	26.9	23.3	46.0	22.7	100	243
5	650.100	20.3	19.9	10.0	28.3	21.9	46.0	24.1	100	0
6	975.150	19.8	22.8	11.1	27.6	26.1	54.0	27.9	100	0
----- Vertical -----										
7	40.630	20.3	13.4	6.6	27.8	12.5	40.0	27.5	300	0
8	47.930	30.9	10.8	6.7	27.7	20.7	40.0	19.3	100	220
9	191.720	20.1	16.6	7.8	27.2	17.3	43.5	26.2	100	0
10	325.050	20.5	15.1	8.4	26.9	17.1	46.0	28.9	175	200
11	650.100	21.1	19.9	10.0	28.3	22.7	46.0	23.3	100	0
12	975.150	19.8	22.8	11.1	27.6	26.1	54.0	27.9	100	0

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

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

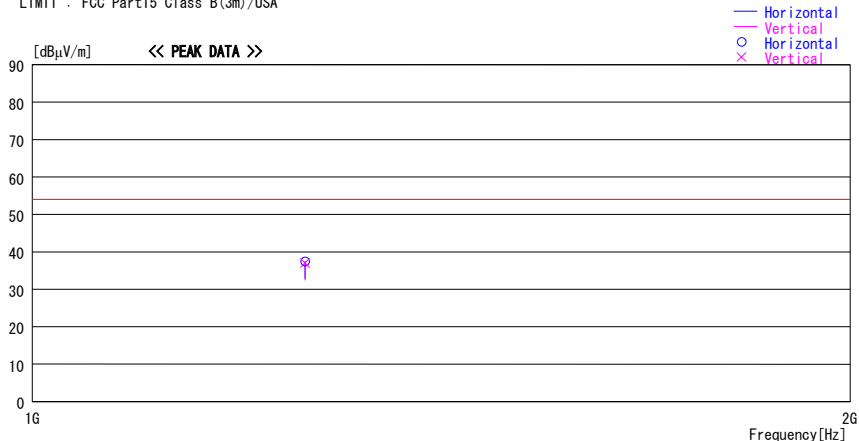
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber
Date : 2004/10/04 14:40:40

Applicant : DENSO CORPORATION
Kind of EUT : Wireless Remote Control Receiver
Model No. : 13BBZ
Serial No. : 1-1
Report No. : 25BE0315-HO
Power : DC12.0V
Temp°C/Humi% : 25 / 60%
Operator : Hiroka Umeyama

Mode / Remarks : Receiving HOR:Z-Axis, VER:Y-Axis (MAX)

LIMIT : FCC Part15 Class B(3m)/USA



No.	FREQ [MHz]	READING PK [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	1260.000	46.5	23.2	4.5	36.8	37.4	54.0	16.6	100	0
----- Vertical -----										
2	1260.000	46.1	23.2	4.5	36.8	37.0	54.0	17.0	100	0

* The result is rounded off to the second decimal place. Therefore, there may be 0.1 difference for the result.

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

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