



EMI TEST REPORT

Test Report No. : 32BE0280-HO-01-A-R1

Applicant : DENSO CORPORATION
Type of Equipment : Remote Keyless Entry System (Receiver)
Model No. : 13BDP
FCC ID : HYQ13BDP
Test standard : FCC Part 15 Subpart B: 2012
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.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
6. This report is a revised version of 32BE0280-HO-01-A. 32BE0280-HO-01-A is replaced with this report.

Date of test: October 18, 2011

Representative test engineer:

K. Okai

Katsunori Okai
Engineer of WiSE Japan,
UL Verification Service

Approved by:

S. Watanabe

Shinya Watanabe
Leader of WiSE Japan,
UL Verification Service

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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

13-EM-F0429

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SECTION 1: Customer information

Company Name : DENSO CORPORATION
Address : 1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan
Telephone Number : +81-566-61-7252
Facsimile Number : +81-566-25-4837
Contact Person : HIROMICHI HANAI

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

2.1 Identification of E.U.T.

Type of Equipment : Remote Keyless Entry System (Receiver)
Model No. : 13BDP
Serial No. : Refer to Section 4, Clause 4.2
Receipt Date of Sample : October 6, 2011
Country of Mass-production : Japan
Condition of EUT : Production model
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model No: 13BDP (referred to as the EUT in this report) is the Remote Keyless Entry System (Receiver).

Feature of EUT : This system is mainly used for locking or unlocking the doors of the vehicle.
The transmitter sends a radio wave signal while the button is pushed.
The receiver becomes active in response to the signal from the transmitter.

Frequency of Operation : 314.35MHz
Oscillator Frequency : 21.948717MHz (Crystal)
Type of modulation : ASK (A1D)
Type of receiver : Super-heterodyne
Intermediate frequency : 10.7MHz
Operating voltage (inner) : DC 12.0V
Antenna type : Internal antenna (Loop antenna)

FCC15.111(b)

The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed (permanently attached). Therefore, Radiated emission test was performed.

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : Test specification: FCC Part 15 Subpart B: 2012, final revised on February 1, 2012
Title : FCC 47CFR Part15 Radio Frequency Device Subpart B Unintentional Radiators

*The revision on February 1, 2012 does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Receiver	N/A *1)	N/A	N/A
Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	Receiver	N/A	23.8dB 650.100MHz Vertical/Horiaontal, QP	Complied

*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420.

*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.

3.3 Addition to standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

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

Test room (semi- anechoic chamber)	Radiated emission						
	(3m*)(+dB)				(1m*)(+dB)		(0.5m*)(+dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	5.6dB	5.9dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	5.7dB	5.8dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	5.7dB	5.8dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	5.7dB	5.8dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission test(3m)

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

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

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	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-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	2973C-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	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* 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.

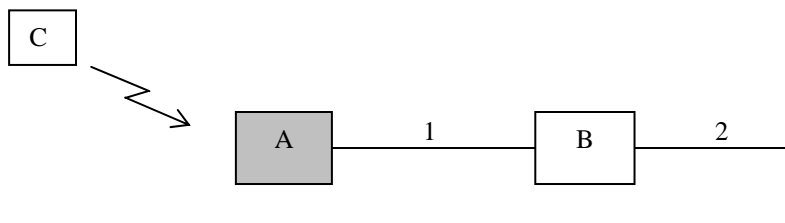
SECTION 4: Operation of E.U.T. during testing

4.1 Operating modes

The mode is used : Receiving (Rx) mode

* Electronic Key was operated manually by a test engineer and the test was performed with the EUT receiving 314.35MHz.

4.2 Configuration and peripherals



DC 12 V

*Cabling and setup were 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	Remark
A	Remote Keyless Entry System (Receiver)	13BDP	001	DENSO CORPORATION	EUT
B	Checker Bench	-	-	DENSO CORPORATION	-
C	Electronic Key	-	-	DENSO CORPORATION	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal and DC Cable	2.0	Unshielded	Unshielded	-
2	DC Cable	2.0	Unshielded	Unshielded	-

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SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No. 3 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m above the conducting ground plane. The EUT was set on the edge 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. Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 30MHz-300MHz (Biconical antenna) / 300MHz-1000MHz (Logperiodic antenna)
1000MHz - 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 antenna 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. The radiated emission measurements were made with the following detector function of the test receiver and the Spectrum analyzer.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 3MHz AV *1): RBW:1MHz/VBW:10Hz

*1) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at representative X-axis since no difference was found among each position.

5.5 Test result

Summary of the test results: Pass

Date: October 18, 2011

Test engineer: Satofumi Matsuyama

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

APPENDIX 1: Data of EMI test

Radiated Emission

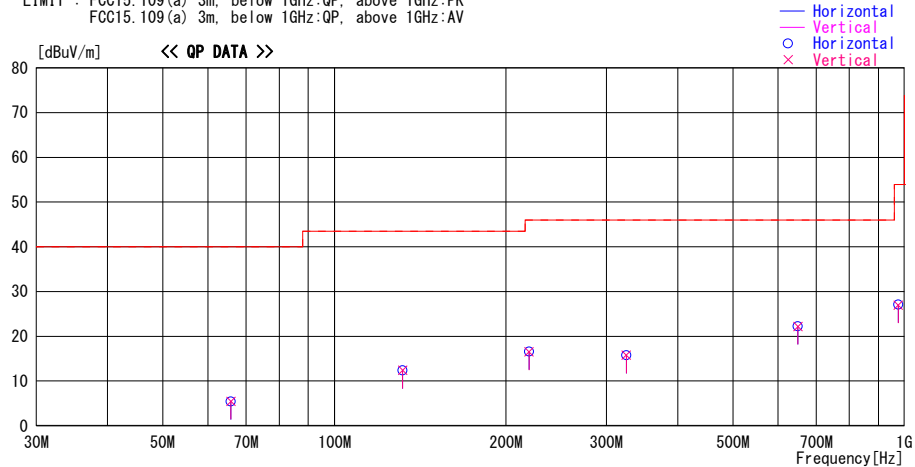
DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Head Office EMC Lab. No. 3 Semi Anechoic Chamber
Date : 2011/10/18

Report No. : 32BE0280-HO-01
Temp./Humi. : 26deg. C / 47% RH
Engineer : Satofumi Matsuyama

Mode / Remarks : Receiving mode, Worst-axis(Hor:X Ver:X)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna	Loss&	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Gain [dB]							
65.846	22.6	QP	7.2	-24.4	5.4	0	300	Hori.	40.0	34.6	
65.846	22.7	QP	7.2	-24.4	5.5	0	100	Vert.	40.0	34.5	
131.692	22.2	QP	13.8	-23.6	12.4	0	300	Hori.	43.5	31.1	
131.692	22.2	QP	13.8	-23.6	12.4	0	100	Vert.	43.5	31.1	
219.487	22.3	QP	17.0	-22.7	16.6	0	300	Hori.	46.0	29.4	
219.487	22.2	QP	17.0	-22.7	16.5	0	100	Vert.	46.0	29.5	
325.050	21.9	QP	15.8	-21.9	15.8	0	100	Hori.	46.0	30.2	
325.050	21.9	QP	15.8	-21.9	15.8	0	100	Vert.	46.0	30.2	
650.100	22.1	QP	19.9	-19.8	22.2	0	100	Vert.	46.0	23.8	
650.100	22.1	QP	19.9	-19.8	22.2	0	100	Hori.	46.0	23.8	
975.150	21.0	QP	23.0	-16.9	27.1	0	100	Hori.	53.9	26.8	
975.150	20.9	QP	23.0	-16.9	27.0	0	100	Vert.	53.9	26.9	

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)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission

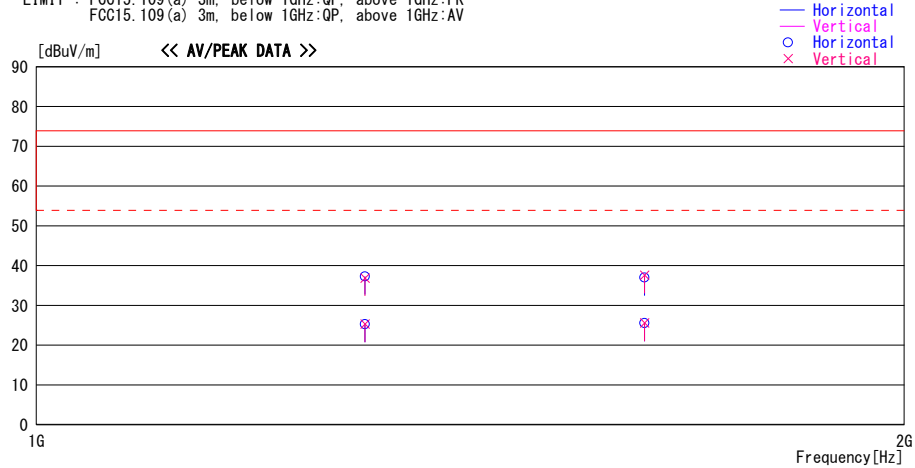
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UL Japan, Inc. Head Office EMC Lab. No.3 Semi Anechoic Chamber
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Engineer : Satofumi Matsuyama

Mode / Remarks : Receiving mode, Worst-axis(Hor:X VerX)

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna		Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
			Factor [dB/m]	Loss& Gain [dB]							
1300.200	45.3	PK	24.9	-32.9	37.3	0	100	Hori.	73.9	36.6	
1300.200	44.9	PK	24.9	-32.9	36.9	0	100	Vert.	73.9	37.0	
1300.200	33.3	AV	24.9	-32.9	25.3	0	100	Hori.	53.9	28.6	
1300.200	33.3	AV	24.9	-32.9	25.3	0	100	Vert.	53.9	28.6	
1625.250	43.2	PK	25.7	-31.9	37.0	0	100	Hori.	73.9	36.9	
1625.250	43.8	PK	25.7	-31.9	37.6	0	100	Vert.	73.9	36.3	
1625.250	31.8	AV	25.7	-31.9	25.6	0	100	Hori.	53.9	28.3	
1625.250	31.8	AV	25.7	-31.9	25.6	0	100	Vert.	53.9	28.3	

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)

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2011/02/22 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	-	RE	2011/02/23 * 12
MJM-06	Measure	PROMART	SEN1955	-	RE	
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	RE	2011/02/15 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2011/08/11 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2010/10/11 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2010/10/11 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2011/07/15 * 12
MAT-09	Attenuator(6dB)	Weinschel Corp	2	BK7973	RE	2010/11/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2011/03/04 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2011/05/23 * 12
MCC-133	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336164/4(1m) / 340640(5m)	RE	2011/09/07 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2011/03/10 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:

RE: Radiated emission

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