

# EMI TEST REPORT

Test Report No. : 22HE0022-HO-2

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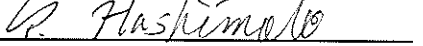
Applicant : DENSO CORPORATION  
Type of Equipment : Remote Keyless Entry System (Receiver)  
Model No. : 13BBT  
Test standard : FCC Part 15 Subpart B Section 15.109(a)  
FCC ID : HYQ13BBT  
Test Result : Complied

1. This test report shall not be reproduced 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 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 : April 19, 2002

Issued date : April 26, 2002

Tested by :   
Hiroka Umeyama

Approved by :   
Tetsuya Hashimoto  
Site Manager of Head Office EMC Division

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

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**SECTION 1: Client information**

Company name : DENSO CORPORATION  
Trade name : DENSO CORPORATION  
Address : 1-1 showa-cho, kariya-shi, Aichi-ken. 448-8661 Japan  
Telephone Number : +81-566-61-4720  
Facsimile Number : +81-566-25-4915  
Contact Person : KUNIHIRO MIYAUCHI

**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. : 13BBT  
Serial No. : 013  
Rating : 12V DC (Vehicle Battery)  
Country of Manufacture : JAPAN  
Receipt Date of Sample : April 19, 2002  
Condition of EUT : Engineering prototype

**2.2 Product Description**

Model: 13BBT Remote Keyless Entry System (Receiver) is mainly used for locking or unlocking the doors of the vehicle. They are referred to as the EUT in this report.

Type of receiver : Super Heterodyne  
Receiving Frequency : 314.35MHz  
Local Oscillator Frequency : 303.65MHz  
Intermediate Frequency : 10.7MHz  
Other Clock Frequency : 3.86MHz  
Information antenna : Built-in Type (Fixed)  
Operation Voltage : DC 12V

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

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart 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 C63.4:2000	Section 15.107(a)	Excluded *	N/A	N/A
Radiated emission	ANSI C63.4:2000	Section 15.109 (a) Class B	N/A	6.4dB 60.73MHz Horizontal	Complied

\* The test is not applicable since the EUT does not have AC Mains

#### **3.3 Confirmation**

A-PEX INTERNATIONAL hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B Section 15.109 (a).

#### **3.4 Uncertainty**

##### Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is  $\pm 4.4$ dB.  
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is  $\pm 5.0$ 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.

#### **3.5 Test location**

A-PEX International Co., Ltd. Head Office EMC Division. No.1 semi Anechoic Chamber, 19.2 x 11.2 x 7.7 m  
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Telephone: +81 596 24 8116 Facsimile: +81 596 24 8124  
This site has been fully described in a report submitted to FCC office, and listed on February, 2002 (Registration number: 313583).  
\*NVLAP Lab. code: 200572-0

#### **3.6 Test Setup, Data of EMI & Test instruments,**

Refer to Appendix I 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.

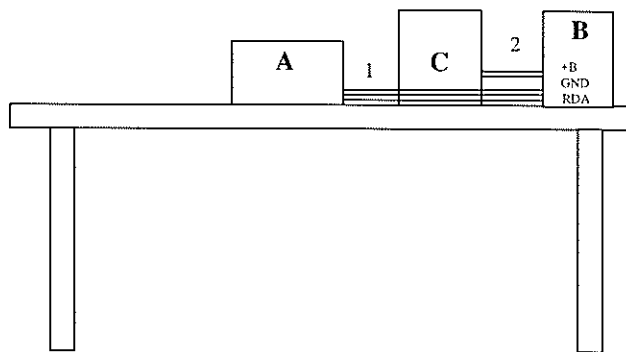
The operating mode/system was as follows:

Operation mode : Receiving

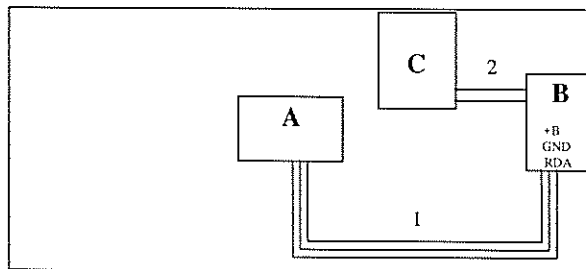
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

### 4.2 Configuration and peripherals

Front view



Top view



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**Description of EUT**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Receiver	13BBT	013	DENSO	HYQ13BBT

**Support equipment**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
B	Check bench	-	001	DENSO	N/A
C	Car Battery	B19L	161001C	Panasonic	N/A

**List of cables used**

No.	Name	Length (m)	Shield	Remark
①	Extended harness	2.0	N	Polyvinyl chloride
②	DC Power Cable	1.0	N	Polyvinyl chloride

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## **SECTION 5: Radiated emission**

### **5.1 Operating environment**

The test was carried out in a No.1 semi Anechoic Chamber, 19.2 x 11.2 x 7.7 m.

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 and the rear peripheral was aligned and flushed with rear of 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-1000MHz  
Test distance : 3m  
EUT position : Tabletop  
EUT operation mode : Receiving

### **5.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on an open test site 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 radiated emission measurements were made with the following detector function of the test receiver.

Detector Type : Quasi-Peak  
IF Bandwidth : 120 kHz

The EUT was measured in the direction to be its worst level condition.

### **5.5 Results**

Summary of the test results: Pass

Date: April 19, 2002

Tested by: H. Umeyama

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**APPENDIX 1: Photographs of test setup**

Page 9 : Radiated emission

**APPENDIX 2: Test instruments**

Page 10 : Test instruments

**APPENDIX 3: Data of EMI test**

Page 11-12 : Radiated emission

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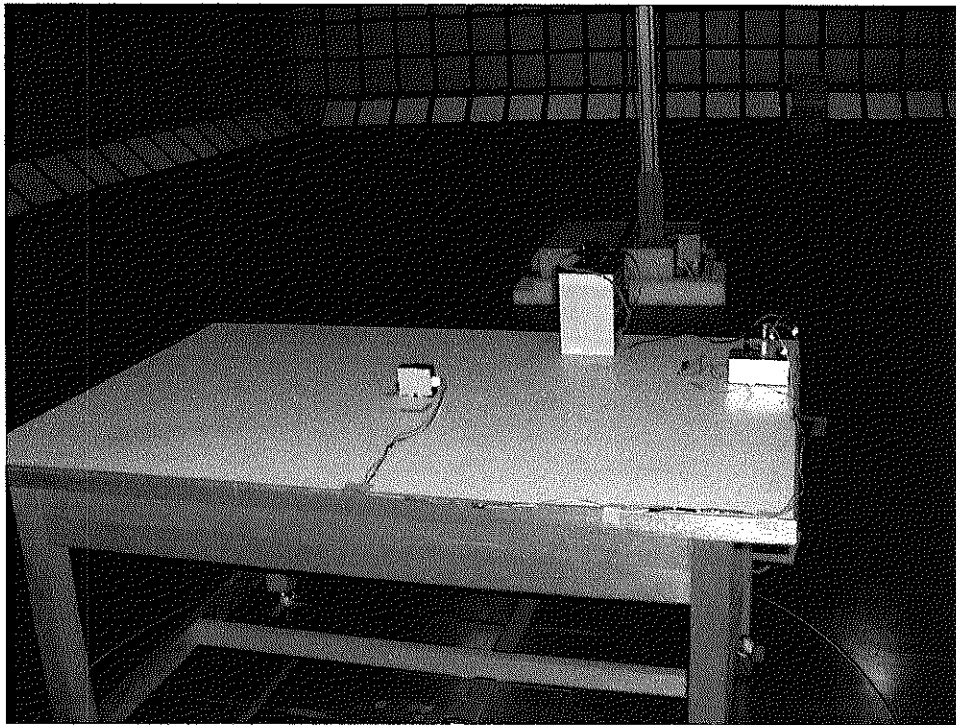
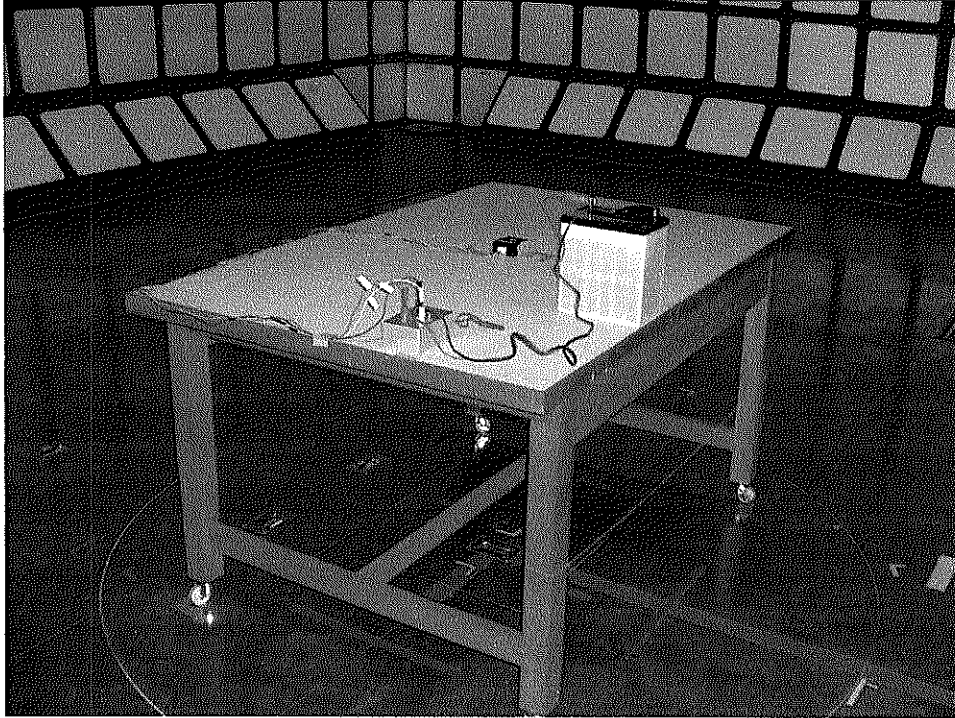
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**APPENDIX 1: Photographs of test setup**

**Radiated emission**



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# DATA OF RADIATED EMISSION TEST

A-PEX INTERNATIONAL EMC HEAD OFFICE DIVISION No.1 SEMI ANECHOIC CHAMBER  
Date : 2002/04/19 15:35:25

Applicant : DENSO CORPORATION  
Kind of EUT : Keyless Entry System  
Model No. : 13BBT (Receiver)  
Serial No. : 013

Report No. : 22HE0022-H0  
Power : DC 12V  
Temp°C/Humi% : 19 / 37  
Operator : HIROKA UMEYAMA



Mode / Remarks : Receiving

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

No.	FREQ [MHz]	READING QP [dB μV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	60.730	43.0	7.3	7.4	24.1	33.6	40.0	6.4	198	219
2	75.770	19.2	6.2	7.7	24.1	9.0	40.0	31.0	105	359
3	101.040	19.9	10.1	8.0	24.0	14.0	43.5	29.5	105	359
4	119.800	19.4	13.2	8.3	24.0	16.9	43.5	26.6	105	359
5	126.280	19.6	13.5	8.4	24.0	17.5	43.5	26.0	105	359
6	303.650	36.4	14.4	9.7	23.8	36.7	46.0	9.3	5	100
7	607.300	19.4	19.2	11.5	24.0	26.1	46.0	19.9	359	112
----- Vertical -----										
8	60.730	30.9	7.3	7.4	24.1	21.5	40.0	18.5	100	231
9	75.770	19.2	6.2	7.7	24.1	9.0	40.0	31.0	100	0
10	101.040	19.9	10.1	8.0	24.0	14.0	43.5	29.5	100	359
11	117.100	19.4	12.7	8.3	24.0	16.4	43.5	27.1	100	359
12	126.280	19.6	13.5	8.4	24.0	17.5	43.5	26.0	100	359
13	303.650	26.3	14.4	9.7	23.8	26.6	46.0	19.4	22	100
14	607.300	19.7	19.2	11.5	24.0	26.4	46.0	19.6	359	116

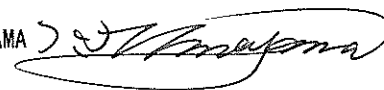
CHART:WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN

# DATA OF RADIATED EMISSION TEST

A-PEX INTERNATIONAL EMC HEAD OFFICE DIVISION No.1 SEMI ANECHOIC CHAMBER  
Date : 2002/04/19 15:35:25

Applicant : DENSO CORPORATION  
Kind of EUT : Keyless Entry System  
Model No. : 13BBT (Receiver)  
Serial No. : 013

Report No. : 22HE0022-H0  
Power : DC 12V  
Temp°C/Humi% : 19 / 37  
Operator : HIROKA UMEYAMA



Mode / Remarks : Receiving

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

× : Ver. (QP)  
○ : Hor. (QP)  
HORIZONTAL : ○

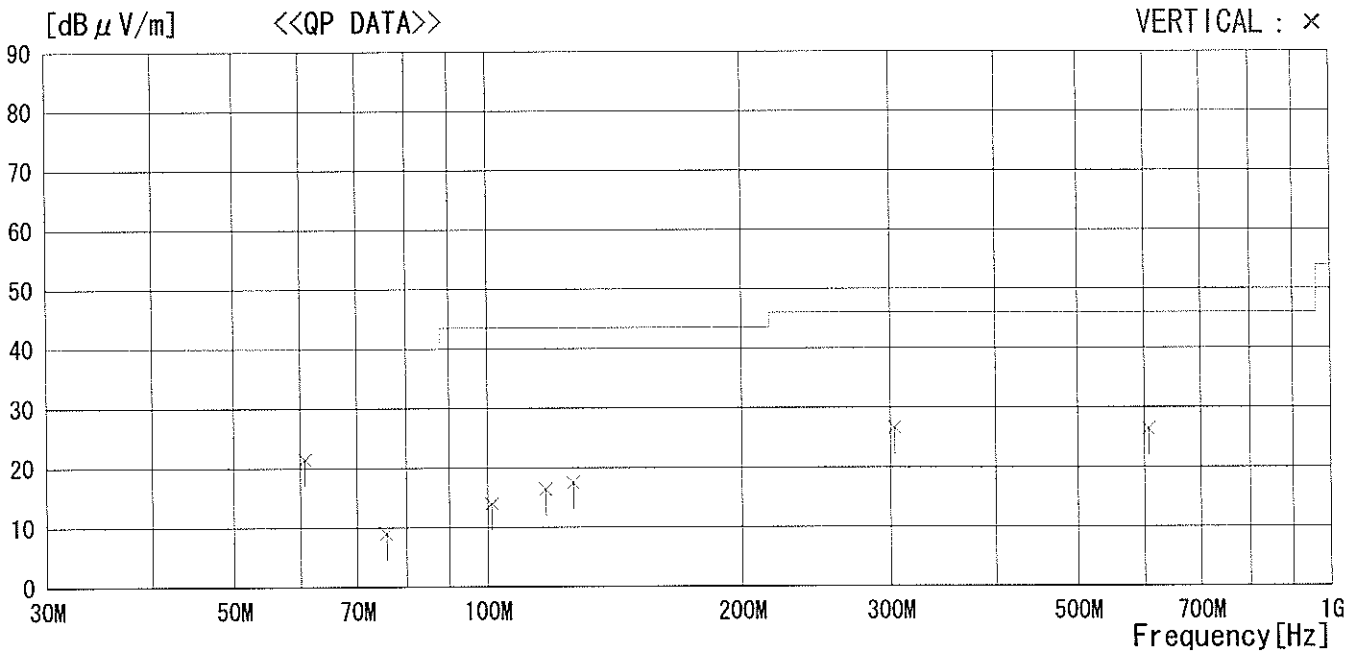
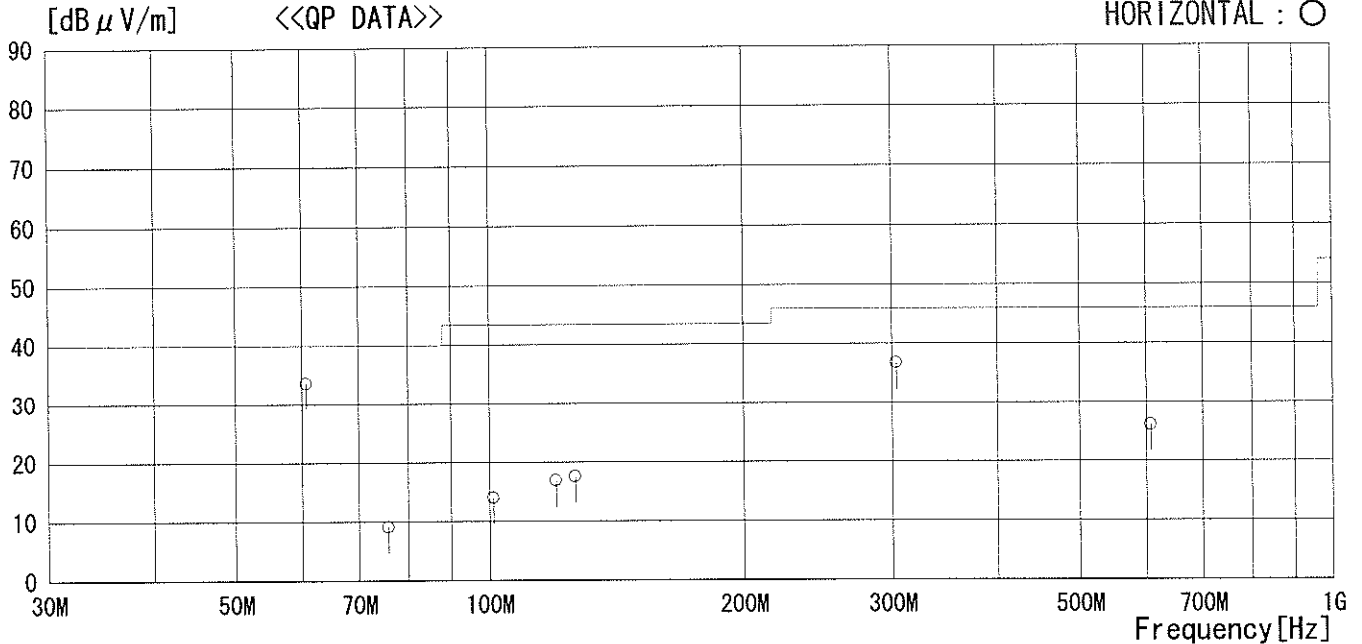


CHART: WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN