



EMI TEST REPORT

Test Report No. : 28BE0070-HO-01-A

Applicant : DENSO CORPORATION
Type of Equipment : Electronic Key
Model No. : 14ACX
FCC ID : HYQ14ACX
Test Standard : FCC Part15 Subpart C
Section 15.209, Section 15.231: 2007
Test Result : Complied

1. This test report shall not be reproduced except in full, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.

Date of test: September 19, 2007

Tested by: T. Arai
Tatsuya Arai

Approved by: O. Watatani
Osamu Watatani
Manager of Yamakita EMC Lab.

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1 Applicant Information

Company Name : DENSO CORPORATION
Address : 1-1 Showa-cho, Kariya-shi, Aichi-ken, 448-8661 Japan

2 Product Description

Type of Equipment : Electronic Key
Model No. : 14ACX
Serial No. : No.2
Rating : DC 3V (One lithium battery)
Country of Manufacture : Japan
Receipt Date of Sample : September 18, 2007
Condition of EUT : Engineering prototype
(Not for sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

Model: 14ACX (referred to as the EUT in this report) is an Electronic Key.

Equipment type : Transmitter
Frequency of operation : 314.35MHz
Oscillator frequency : 314.35 MHz SAW resonator
Type of modulation : F1D
Antenna type : Built-in type (Fixed)

FCC Part15.31 (e)

The EUT provides stable voltage, DC3.0V constantly to RF module regardless of input voltage, and the test was performed with the new battery. Therefore, the EUT complies with the power supply regulation.

FCC Part15.203 Antenna requirement

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

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3 Test Specification, Procedures and Results

3.1 Test specification

Test specification : FCC Part15 Subpart C: 2007
 Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
 Section 15.209 Radiated emission limits, general requirements
 Section 15.231 Periodic operation in the band 40.66 - 40.70 MHz and above 70 MHz

3.2 Procedures & Results

Item	Test Procedure	Specification	Remarks	Deviation	Worst Margin	Results
Conducted Emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Section 15.207(a)	AC Mains	N/A *1	-	N/A
Automatically Deactivate	ANSI C63.4: 2003	Section 15.231(a)(1)	Radiated	N/A	-	Complied
Electric Field Strength of Fundamental Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	Section 15.231(b)	Radiated	N/A	5.6dB (PK, Horizontal)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	Section 15.209 *2	Radiated	N/A	7.6dB (1886.10MHz, PK, Horizontal)	Complied
-20dB Bandwidth	ANSI C63.4: 2003 Annex H.6 Occupied bandwidth measurements	Section 15.231(c)	Radiated	N/A	-	Complied

*1) The test is not applicable since the EUT has no AC mains.

*2) For Spurious emission, Section 15.209 has been applied since the limit is stricter than in Section 15.231(b).

Note: UL Japan's EMI Work Procedures No.QPM05.

* Other than mentioned in 3.3, no addition, exclusion nor deviation has been made from the standard.

3.3 Addition to standard

Item	Test Procedure	Specification	Remarks	Worst Margin	Results
Occupied Bandwidth (99%)	ANSI C63.4:2003 13. Measurement of intentional radiators RSS-Gen 4.4.1	RSS-Gen 4.4.1	Conducted	*See data.	Complied

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3.4 Uncertainty

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

	No.1 open site	No.2 open site	No.1 anechoic chamber
Radiated emission (3m)			
30-300MHz	4.5 dB	4.4 dB	4.5 dB
300-1000MHz	4.3 dB	4.3 dB	4.3 dB
1GHz<	5.7 dB	5.7 dB	5.7 dB

Radiated Emission Test

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

3.5 Test Location

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NVLAP Lab. code : 200441-0

No. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).

IC Registration No. : 2973B-1

No. 2 test site has been fully described in a report submitted to FCC office, and accepted on April 4, 2005 (Registration No.: 466226).

IC Registration No. : 2973B-3

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).

IC Registration No. : 2973B-2

Test room	Width x Depth x Height (m)	Test room	Width x Depth x Height (m)
No.1 shielded room	8.0 x 5.0 x 2.5	No.1 Semi-anechoic chamber	10.0 x 7.5 x 5.7
No.2 shielded room	5.0 x 4.0 x 2.5		
No.3 shielded room	4.0 x 5.0 x 2.7		

Open test site	Maximum measurement distance
No.1 open test site	30m
No.2 open test site	10m

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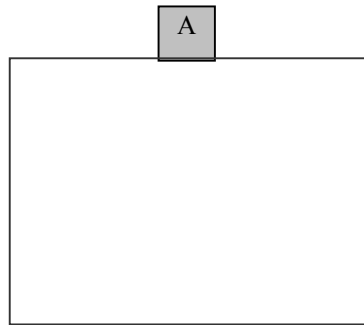
4 System Test Configuration

4.1 Justification

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

Test mode: Transmitting

4.2 Configuration of Tested System



* Test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	FCC ID (Remarks)
A	Electronic Key	14ACX	No.2	DENSO	HYQ14ACX (EUT)

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5 Automatically deactivate

5.1 Operating environment

The test was carried out in No.2 open site.

5.2 Results

Limit: A manually transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Summary of the test results : Pass

Date : September 19, 2007 Test engineer : Tatsuya Arai

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6 Radiated Emissions (Fundamental & Spurious)

6.1 Operating environment

The test was carried out in No.2 open site.

6.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

6.3 Test conditions

Frequency range : 30 - 4000MHz
Test distance : 3m
EUT operation mode : Transmitting

6.4 Test procedure

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m. Pre check measurements were performed in a screened room with a search coil at 30-1000MHz to distinguish disturbances of EUT from the ambient noise. The measuring antenna height was 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 QP and PK detector.

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

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

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

Tested by continuous wave, so the test of AV detection were not required.

The equipment was previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 12. With the position, the noise levels of all the frequencies were measured.

	Below 1GHz	Above 1GHz
Horizontal	X	X
Vertical	Z	Z

6.5 Results

Summary of the test results : Pass

* The test above 1GHz was performed with PK DETECT. Average emission measurements were not calculated with PK DETECT and Duty cycle factor since the PK measurement value did not exceed the AV limit.

Date : September 19, 2007 Test engineer : Tatsuya Arai

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7 Bandwidth

7.1 Operating environment

The test was carried out in No.2 open site.

7.2 Test procedure

The bandwidth was measured with a spectrum analyzer and an antenna which is placed by the EUT.

7.3 Results

Summary of the test results : Pass

Date : September 19, 2007 Test engineer : Tatsuya Arai

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APPENDIX 1: Photographs of test setup

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Page 12 : Pre-check of the worst position

APPENDIX 2: Test Data

Page 13 : Automatically deactivate
Page 14 - 18 : Radiated emission
14 : Fundamental
15 - 17 : Spurious
Page 18 : 20dB bandwidth and Occupied bandwidth

APPENDIX 3: Test instruments

Page 19 : Test instruments

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