



EMI TEST REPORT

Test Report No. : 29FE0158-HO-01-A

Applicant : Alps Electric Co., Ltd.
Type of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U778
FCC ID : CWTWDU778
Test regulation : FCC Part 15 Subpart B 2009
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 product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test:

March 18, 2009

Tested by:

Kazuya Yoshioka
EMC Services

Approved by:

Makoto Kosaka
EMC Services



NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

Company Name : Alps Electric Co., Ltd.
Address : 6-3-36 Nakazato, Furukawa, Osaki-city, Miyagi-pref., 989-6181 Japan
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Contact Person : Miyuki Yamao

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

2.1 Identification of E.U.T.

Type of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U778
Serial No. : 001
Rating : DC 9.0V to 16.0V (Car battery)
Receipt Date of Sample : March 16, 2009
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

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2.2 Product Description

Model No: TWD1U778 (referred to as the EUT in this report) is the Passive Entry System (Control Unit).

Feature of EUT: The Passive Entry System is a system which locks, unlocks, and can start engine only with the intelligent-key of the vehicle. This EUT is all-in-one unit which has functions of LF transmitting and RF receiving.

Clock frequency(ies) in the system : CPU: 16MHz (Main Clock), 32.768kHz (Sub Clock), RF Tuner: 65.14MHz

[Transmitter part]

Equipment Type : Transceiver
Frequency of Operation : 125kHz (Transmitting)
Type of Modulation : ASK
Antenna Type : External / Bar antenna

* For Transmitter part, please refer to Test Report No.29FE0158-HO-01-C.

[Receiver part]

Type of Receiver : Super-heterodyne
Frequency of Operation : 315MHz (Receiving)
Oscillator frequency : 65.140MHz
Local Oscillator frequency : 325.7MHz (65.140MHz x 5)
Intermediate frequency : 10.7MHz
Method of Frequency Generation : Crystal
Antenna Type : Internal antenna (Monopole)

FCC15.111(b)

The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed (permanently attached). EUT has also an external antenna, but it is installed into the vehicle by professionals. Therefore, this EUT complies with the requirement in section 15.111(b).

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 15 Subpart B 2009, final revised on February 27, 2009
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	FCC: ANSI C63.4: 2003 7. AC powerline conducted emission measurements	Receiver	N/A *1)	N/A	N/A
	IC: RSS-Gen 7.2.2				
Radiated emission	FCC: ANSI C63.4: 2003 8. Radiated emission measurements	Receiver	N/A	23.2dB 325.700MHz Horizontal, QP	Complied
	IC: RSS-Gen 4.10				
*Note: UL Japan, Inc's EMI Work Procedure QPM05. *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

Other than above, 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	Conducted emission	Radiated emission (10m*)			Radiated emission (3m*)			Radiated emission (3m*)	
	150kHz-30MHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-40GHz
No.1 semi-anechoic chamber (±)	3.7dB	3.1dB	4.4dB	4.2dB	3.2dB	3.8dB	3.9dB	5.9dB	6.1dB
No.2 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.4dB	4.0dB	5.9dB	6.1dB
No.3 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	4.6dB	4.0dB	5.9dB	6.1dB
No.4 semi-anechoic chamber (±)	3.7dB	-	-	-	3.2dB	3.9dB	3.9dB	5.9dB	6.1dB

*10m/3m = Measurement distance

Radiated emission test (3m)

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

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3.5 Test Location

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	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

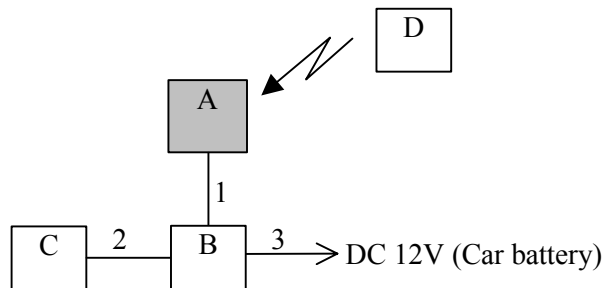
Refer to APPENDIX 1 to 3.

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

4.1 Operating modes

The mode is used : Receiving mode
* Passive Entry System (Hand Unit) was operated manually by a test engineer and the test was performed with the EUT receiving 315MHz.

4.2 Configuration and peripherals



*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	Passive Entry System (Control Unit)	TWD1U778	001	Alps Electric Co., Ltd.	EUT
B	Checker Box	-	-	-	-
C	LF Antenna	-	ANT-01	Alps Electric Co., Ltd.	-
D	Passive Entry System (Hand Unit)	TWB1U729	-	Alps Electric Co., Ltd.	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	0.9	Unshielded	Unshielded	-
2	Antenna Cable	2.2	Unshielded	Unshielded	-
3	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, 1.0m by 1.5m, 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 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 *1)
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV *2): RBW:1MHz/VBW:10Hz

*1) The Spectrum Analyzer was used in 3dB resolution bandwidth.

*2) 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 the position that has the maximum noise.

5.5 Test result

Summary of the test results: Pass

Date: March 18, 2009

Test engineer: Kazuya Yoshioka

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