



RADIO TEST REPORT

Test Report No. : 28IE0063-HO-01-C-R1

Applicant : Alps Electric Co., Ltd.
Type of Equipment : Passive Entry System (Hand Unit)
Model No. : TWB1U773
Test regulation : FCC Part 15 Subpart C:2008
Section 15.231
FCC ID : CWTWB1U773
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 above regulation.
4. The test results in this report are traceable to the national or international standards.
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6. Original test report number of this report is 28IE0063-HO-01-C.

Date of test: November 16 to 21, 2008

Tested by: T. Nakagawa
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NVLAP LAB CODE: 200572-0

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SECTION 1: Customer information

Company Name : Alps Electric Co., Ltd.
Brand name : ALPS
Address : 6-3-36, Nakazato, Furukawa, Osaki-City, Miyagi-pref, 989-6181 Japan
Telephone Number : +81-229-23-5111
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Contact Person : Tomosuke Takata

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

2.1 Identification of E.U.T.

Type of Equipment : Passive Entry System (Hand Unit)
Model No. : TWB1U773
Serial No. : 001: Used for Radiated emission, 99% occupied bandwidth,
and -20dB bandwidth tests
002: Used for Automatically deactivate and Duty cycle tests
Receipt Date of Sample : November 14, 2008
Country of Mass-production : Japan
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

2.2 Product Description

Model No: TWB1U773 (referred to as the EUT in this report) is the Passive Entry System (Hand Unit).

Feature of EUT: Controller unit is installed in vehicle. It performs transmission through LF antenna to hand unit(I-KEY unit), processes RF signal from I-KEY unit, and performs actions according to the signal.

Equipment Type : Transceiver
Clock frequency : 2MHz (CPU Clock)

[Transmitter]
Frequency of Operation : 433.92MHz
Type of modulation : FSK
Power Supply : DC 3.0V
Antenna Type : PCB Pattern antenna
Method of Frequency Generation : SAW Resonator
Operating voltage (Inner) : DC 2.5V to 3.3V

[Receiver]
Frequency of Operation : 125kHz
Antenna Type : Coil
Operating voltage (Inner) : DC 2.5V to 3.3V

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2008, final revised on May 19, 2008
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.231 Periodic operation in the band 40.66 - 40.70MHz
and above 70MHz

FCC 15.31 (e)

This test was performed with the New Battery (DC 3.0V) and the constant voltage was supplied to the EUT during the tests. Therefore, the EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

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 of Section 15.203.

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3.2 Procedures and results

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	Automatically Deactivate	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Section 15.231(a)(1) <IC> RSS-210 A1.1.1	N/A	N/A	Complied
2	Electric Field Strength of Fundamental Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.8	<FCC> Section 15.231(b) <IC> RSS-210 A1.1.2	N/A	9.2dB 433.92MHz Horizontal, Peak with Duty factor	Complied
3	Electric Field Strength of Spurious Emission	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> RSS-Gen 4.9	<FCC> Section 15.205 Section 15.209 Section 15.231(b) <IC> RSS-210 A1.1.2, 2.6, 2.7	N/A	21.2dB 867.84MHz Horizontal, Peak with Duty factor	Complied
4	Receiver Spurious Emissions	<FCC> ANSI C63.4:2003 12. Measurement of unintentional radiators other than ITE <IC> RSS-Gen 4.10	<FCC> Section 15.109(a) Section 15.209 <IC> RSS-Gen 6(a) RSS-210 2.6	N/A	20.9dB 625.000MHz Vertical, Horizontal, QP	Complied
5	-20dB Bandwidth	<FCC> ANSI C63.4:2003 13. Measurement of intentional radiators <IC> -	<FCC> Section 15.231(c) <IC> Reference data	N/A	N/A	Complied
6	Conducted emission	<FCC> ANSI C63.4:2003 7. AC powerline conducted emission measurements <IC> RSS-Gen 7.2.2	<FCC> Section 15.207 <IC> RSS-Gen 7.2.2	-	N/A*1)	N/A

Note: UL Japan, Inc.'s EMI Work procedures No. QPM05 and QPM15

*1) The test is not applicable since the EUT does not have AC Mains.

*These tests were performed without any deviations from test procedure except for additions or exclusions.

3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	<IC> RSS-Gen 4.6.1	<IC> RSS-210 A1.1.3	Radiated	N/A	N/A	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.

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.

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, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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

4.1 Operating Modes

The mode is used :
1) Transmitting mode
2) Normal use mode
3) LF Receiving mode
(As for the pulse train of sample used in this test, please refer to “Theory of Operation”
in application document.)

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

4.2 Configuration and peripherals

1) Transmitting mode and 2) Normal use mode

A:EUT



* 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 (Hand Unit)	TWB1U773	001 *1) 002 *2)	Alps Electric Co., Ltd.	EUT

*1) Used for Radiated emission, 99% occupied bandwidth, and -20dB bandwidth tests

*2) Used for Automatically deactivate and Duty cycle tests

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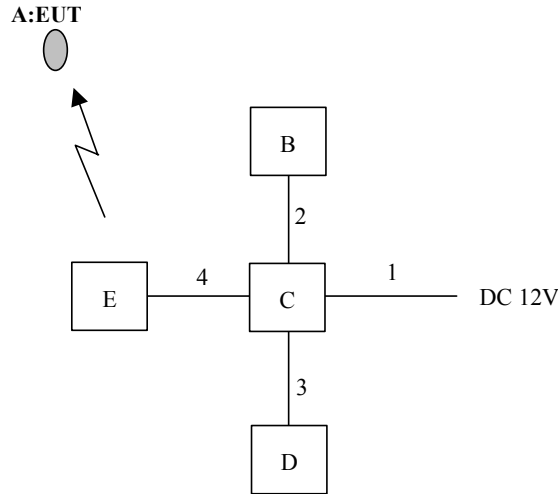
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3) LF Receiving mode



*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 (Hand Unit)	TWB1U773	001	Alps Electric Co., Ltd.	EUT
B	Tuner	TWC1G135	-	Alps Electric Co., Ltd.	-
C	CHECKER	-	-	Alps Electric Co., Ltd.	-
D	BCM	03.0005.11	-	Calsonic Kansei	-
E	LF Antenna	-	-	Alps Electric Co., Ltd.	-

List of cables used

No.	Name	Length (m)	Shield	
			Cable	Connector
1	DC Power Cable	1.5	Unshielded	Unshielded
2	Cable for Tuner	2.0	Unshielded	Unshielded
3	Cable for BCM	0.5	Unshielded	Unshielded
4	Cable for LF Antenna	0.15	Unshielded	Unshielded

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SECTION 5: Radiated emission (Electric Field Strength of Fundamental and Spurious Emission)

5.1 Operating environment

Test place : No.1 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 center 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

Test mode	-Transmitting mode -Normal use mode	-LF Receiving mode
Frequency range	30MHz-4500MHz	9kHz-1000MHz
Test distance	3m	3m
EUT position	Top of Polyurethane table	Top of Polyurethane table

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5.4 Test procedure

[Transmitting mode]

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 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.

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

	Below or equal to 1GHz	Above 1GHz (FCC15.205 and 15.231)
Detector Type	Peak	Peak
IF Bandwidth	120kHz	PK: S/A:RBW 1MHz, VBW:1MHz

- The carrier level and noise levels was were measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined. The axes were decided by measuring at each position of all these axes X, Y and Z of the EUT with and without mechanical key.

With the position, the noise levels of all the frequencies was measured.

[LF Receiving mode]

The Radiated Electric Field Strength intensity has been measured on a semi anechoic chamber with a ground plane and at a distance of 3m.

Frequency : From 9kHz to 30MHz at distance 3m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for each antenna angle 0deg. , 45deg. 90deg. and 135 deg.

Frequency : From 30MHz to 1000MHz at distance 3m

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.

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

	From 9kHz to 90kHz and From 110kHz to 150kHz	From 90kHz to 110kHz	From 150kHz to 490kHz	From 490kHz to 30MHz	From 30MHz to 1GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz

5.5 Results

Summary of the test results: Pass

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