



## EMI TEST REPORT

Test Report No. : 29KE0211-HO-04-A

**Applicant** : Alps Electric Co., Ltd.  
**Type of Equipment** : Passive Entry System (Tuner)  
**Model No.** : TWC1G154  
**FCC ID** : CWTWC1G154  
**Test regulation** : FCC Part 15 Subpart B 2009  
**Test Result** : Complied

1. This test report shall not be reproduced in full or partial, 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 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:**

July 17, 2009

**Tested by:**

  
Tomotaka Sasagawa  
EMC Services

**Approved by :**

  
Makoto Kosaka  
EMC Services



NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.

\*As for the range of Accreditation in NVLAP, you may refer to the WEB address,

<http://uljapan.co.jp/emc/nvlap.html>

**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

MF060b (09.01.08)

<b>CONTENTS</b>	<b>PAGE</b>
<b>SECTION 1: Customer information .....</b>	<b>3</b>
<b>SECTION 2: Equipment under test (E.U.T.) .....</b>	<b>3</b>
<b>SECTION 3: Test specification, procedures &amp; results .....</b>	<b>4</b>
<b>SECTION 4: Operation of E.U.T. during testing .....</b>	<b>6</b>
<b>SECTION 5: Radiated Emission .....</b>	<b>7</b>
<b>APPENDIX 1: Photographs of test setup.....</b>	<b>8</b>
Radiated Emission .....	8
Worst Case Position (Horizontal: X-axis/ Vertical:X-axis) .....	9
<b>APPENDIX 2: Data of EMI test .....</b>	<b>10</b>
Radiated Emission .....	10
<b>APPENDIX 3: Test instruments .....</b>	<b>12</b>

## **SECTION 1: Customer information**

Company Name : Alps Electric Co., Ltd.  
Address : 6-3-36 Nakazato, Furukawa, Osaki-city, Miyagi-pref., 989-6181 Japan  
Telephone Number : +81-229-23-5111  
Facsimile Number : +81-229-22-3755  
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 (Tuner)  
Model No. : TWC1G154  
Serial No. : 09070801  
Country of Mass-production : JAPAN  
Receipt Date of Sample : July 13, 2009  
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

### **2.2 Product Description**

Model No: TWC1G154 is Passive Entry System (Tuner).

Feature of EUT : This unit receives the RF output signal from the Hand Unit in response to several switch operations. This unit sends detected signal to the Controller through Signal and RSSI outputs. The Controller provides operations according to receiving signals.

Receiving Frequency : 433.92MHz  
Oscillator Frequency : 13.55313MHz (Crystal)  
Local Oscillator Frequency : 433.7MHz (13.55313MHz \* 32 )  
Intermediate Frequency : 220kHz  
Type of Receiver : Super-heterodyne  
Operating Voltage : DC4.5-5.5V (Nominal supply voltage)  
Antenna Type : Internal antenna (Monopole)

EUT is provided stable voltage (DC 5V) from the BCM(Body Control Module) regardless of input voltage.

### **FCC15.111(b)**

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

---

**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

## 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	N/A	N/A *1)
	IC: RSS-Gen 7.2.2				
Radiated emission	FCC: ANSI C63.4: 2003 8. Radiated emission measurements	Receiver	N/A	18.2dB 955.911MHz QP, Vert.	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 (semi-anechoic chamber)	Conducted emission (+dB)
	150kHz-30MHz
No.1	3.7dB
No.2	3.7dB
No.3	3.7dB
No.4	3.7dB

Test room (semi-anechoic chamber)	Radiated emission (10m*)(+dB)			Radiated emission (3m*)(+dB)					
	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	9kHz-30MHz	30MHz-300MHz	300MHz-1GHz	1GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz
No.1	3.1dB	4.4dB	3.9dB	3.2dB	3.8dB	3.9dB	5.0dB	5.0dB	5.4dB
No.2	-	-	-	3.2dB	4.4dB	4.0dB	5.0dB	5.2dB	5.4dB
No.3	-	-	-	3.2dB	4.2dB	3.8dB	5.0dB	5.3dB	5.3dB
No.4	-	-	-	3.2dB	4.0dB	3.8dB	5.0dB	5.3dB	5.3dB

\*10m/3m = 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

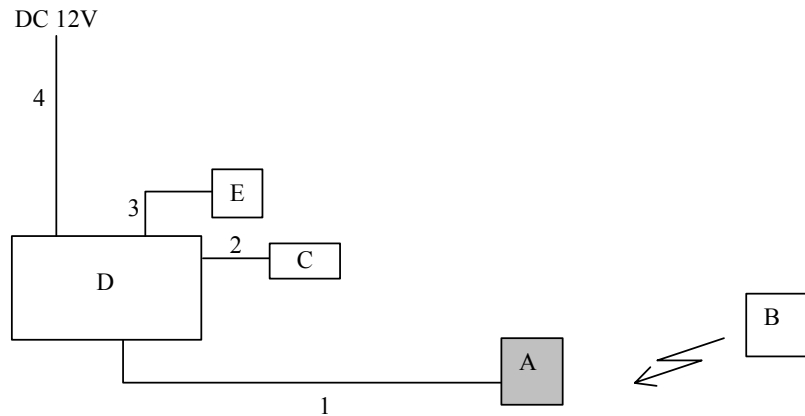
Refer to APPENDIX 1 to 3.

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

### **4.1 Operating modes**

The mode is used : Receiving mode  
\*Hand Unit was operated manually by a test engineer, and the test was performed with the EUT receiving 433.92MHz.

### **4.2 Configuration and peripherals**



\*Cabling and setup(s) 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 (Tuner)	TWC1G154	09070801	Alps Electric Co., Ltd.	EUT
B	Hand Unit	TWB1U785	09070902	Alps Electric Co., Ltd.	-
C	LF antenna	-	R080111	Alps Electric Co., Ltd.	-
D	Checker	-	RKEA678-W01	Alps Electric Co., Ltd.	-
E	BCM	05.005.12	00460	Calsonic Kansei	-

#### **List of cables used**

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	2.0	Unshielded	Unshielded	-
2	Signal Cable	0.1	Unshielded	Unshielded	-
3	Signal Cable	0.4	Unshielded	Unshielded	-
4	DC Cable	1.8	Unshielded	Unshielded	-

**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

## **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 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 *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: July 17, 2009

Test engineer: Tomotaka Sasagawa

---

**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