



# **EMI TEST REPORT**

**Test Report No. : 26CE0012-HO-1**

**Applicant** : Alps Electric Co., Ltd.  
**Type of Equipment** : TPMS / Keyless Tuner  
**Model No.** : TWC1U241  
**Test standard** : FCC Part15 Subpart B, Section 15.109: 2005  
**Test Result** : Complied

1. This test report shall not be reproduced except in full, without the written approval of UL Apex 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 test report are traceable to the national or international standards.

**Date of test:** October 25, 2005

**Tested by:**   
Go Ishiwata

**Approved by:**   
Osamu Watatani  
Site Manager of Yamakita EMC Lab.

**UL Apex Co., Ltd.**

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## **SECTION 1: Client information**

Company Name : Alps Electric Co., Ltd.  
Brand Name : ALPS  
Address : 6-3-36 Nakazato, Furukawa-shi, Miyagi-ken, 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 : TPMS / Keyless Tuner  
Model Number : TWC1U241  
Serial Number : 05102101  
Rating : DC5V  
Condition of EUT : Production prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Country of Manufacture : Mexico  
Receipt Date of Sample : October 24, 2005

### **2.2 Product Description**

Model: TWC1U241 (referred to as the EUT in this report) is a TPMS / Keyless Tuner.  
The clock frequency used in EUT: 40.71MHz (Oscillator circuit)

The tuner receives RF signal from keyless remote or tire pressure monitor transmitter via RF antenna, and outputs demodulated digital data to the controller.

Type of receiver : Super Heterodyne  
Receiving Frequency : 315MHz  
Operating temperature range : -40 to - 80 deg.C.

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## SECTION 3: Test specification, procedures & results

### 3.1 Test specification

Test Specification : FCC Part 15 Subpart B  
Title : FCC 47CFR Part 15 Radio Frequency Device  
Subpart B Unintentional Radiators

### 3.2 Procedures & Results

| Item                                                                                                                                                                                 | Test Procedure                                                                  | Limits        | Deviation | Worst margin                      | Result   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|---------------|-----------|-----------------------------------|----------|
| Conducted emission                                                                                                                                                                   | ANSI C63.4: 2003<br>7. AC powerline conducted emission measurements             | CISPR Pub.22  | N/A<br>*1 | N/A                               | N/A      |
| Radiated emission                                                                                                                                                                    | ANSI C63.4: 2003<br>8. Radiated emission measurements                           | FCC15.109 (a) | N/A       | 14.2dB<br>(128.69MHz, Horizontal) | Complied |
| Antenna terminal voltage                                                                                                                                                             | ANSI C63.4: 2003<br>Annex G.5 Antenna-conducted power measurement for receivers | FCC15.111 (a) | N/A<br>*2 | N/A                               | N/A      |
| Note: UL Apex's EMI Work Procedures No. QPM05<br>*1) The test is not applicable since the EUT has no AC mains.<br>*2) The test is not applicable since the EUT has no antenna ports. |                                                                                 |               |           |                                   |          |

### 3.3 Additions to standards

No addition, deviation or exclusion has been made from standards.

### 3.4 Confirmation

UL Apex Co., Ltd. hereby confirms the E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart B.

### 3.5 Uncertainty

#### Radiated emission

The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is  $\pm 4.8\text{dB}$ .  
The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is  $\pm 5.2\text{dB}$ .  
The data listed in this test report has enough margin, more than site margin.

### 3.6 Test Location

UL Apex Co., Ltd. Yamakita EMC Lab.  
907, Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken 258-0124 JAPAN  
Telephone number: +81 465 77 1011 Facsimile number: +81 465 77 2112  
NVLAP Lab. code: 200441-0

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.: IC3489A-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 EMS lab.<br>(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            |                                          |                            |

### 3.7 Test Setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

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

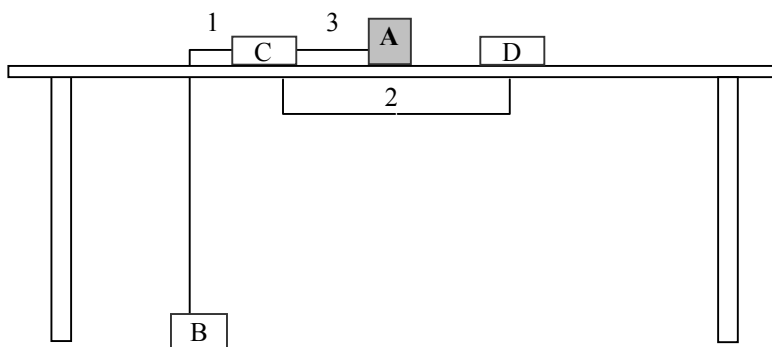
### 4.1 Operating mode

The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Operation: Constant power supply mode  
5V of power is supplied from BCM to the EUT constantly.

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

### 4.2 Configuration of Tested System



\*Cabling was 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    | Remarks (FCC ID) |
|-----|----------------------|--------------|---------------|-----------------|------------------|
| A   | TPMS / Keyless Tuner | TWC1U241     | 05102101      | ALPS            | EUT (CWTWC1U241) |
| B   | DC Power Supply      | PAN35-10A    | DE001677      | Kikusui         | -                |
| C   | Checker              | -            | -             | ALPS            | -                |
| D   | BCM                  | 284B1CM32A   | 050706-2/3    | Calsonic Kansei | -                |

#### List of cables used

| No. | Name            | Length (m) | Shield     |
|-----|-----------------|------------|------------|
| 1   | DC power cable  | 1.6        | Unshielded |
| 2   | Cable for BCM   | 0.45       | Unshielded |
| 3   | Cable for Tuner | 0.55       | Unshielded |

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## **SECTION 5: Radiated emission**

### **5.1 Operating environment**

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

Temperature : See test data  
Humidity : See test data

### **5.2 Test configuration**

EUT was placed on a platform of nominal size, 1m by 1.8m, raised 80cm above the conducting ground plane. 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 : 30 - 1000MHz  
Test distance : 3m  
EUT position : Table top  
EUT operation mode : Constant power supply

### **5.4 Test procedure**

The Radiated Electric Field Strength intensity has been measured on an open site 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. Measurements were performed with quasi-peak detector. 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.

Detector Type : Quasi-Peak  
IF Bandwidth : 120kHz

### **5.5 Results**

Summary of the test results: Pass

Date: October 25, 2005      Tested by: Go Ishiwata

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## **APPENDIX 1: Photographs of test setup**

Page 8 : Radiated emission

## **APPENDIX 2: Data of EMI test**

Page 9 - 10 : Radiated emission

## **APPENDIX 3: Test instruments**

Page 11 : Test instruments

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## Radiated emission



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# DATA OF RADIATION TEST

UL Apex Co.,Ltd.

Yamakita No.2 Open Test Site

Report No. : 26CE0012-H0 - 1

Applicant : Alps Electric Co., Ltd.  
 Kind of Equipment : TPMS/KEYLESS TUNER  
 Model No. : TWC1U241  
 Serial No. : 05102101  
 Power : DC12V  
 Mode : Constant power supply mode  
 Remarks :  
 Date : 10/25/2005  
 Test Distance : 3 m  
 Temperature : 18 °C  
 Humidity : 61 %  
 Regulation : FCC Part15B § 15.109(a)

Engineer : Go Ishiwata

| No. | FREQ.<br>[MHz] | ANT<br>TYPE | READING         |                 | ANT<br>FACTOR<br>[dB/m] | AMP<br>GAIN<br>[dB] | CABLE<br>LOSS<br>[dB] | ATTEN.<br>[dB] | RESULT            |                   | LIMITS<br>[dB μ V/m] | MARGIN      |             |
|-----|----------------|-------------|-----------------|-----------------|-------------------------|---------------------|-----------------------|----------------|-------------------|-------------------|----------------------|-------------|-------------|
|     |                |             | HOR<br>[dB μ V] | VER<br>[dB μ V] |                         |                     |                       |                | HOR<br>[dB μ V/m] | VER<br>[dB μ V/m] |                      | HOR<br>[dB] | VER<br>[dB] |
| 1.  | 40.71          | BB          | 28.3            | 28.4            | 15.0                    | 27.7                | 1.3                   | 5.8            | 22.7              | 22.8              | 40.0                 | 17.3        | 17.2        |
| 2.  | 86.38          | BB          | 24.6            | 29.5            | 8.3                     | 27.7                | 1.9                   | 5.8            | 12.9              | 17.8              | 40.0                 | 27.1        | 22.2        |
| 3.  | 128.69         | BB          | 34.7            | 30.8            | 14.2                    | 27.8                | 2.4                   | 5.8            | 29.3              | 25.4              | 43.5                 | 14.2        | 18.1        |
| 4.  | 325.70         | BB          | 24.2            | 22.7            | 15.1                    | 27.5                | 3.9                   | 5.8            | 21.5              | 20.0              | 46.0                 | 24.5        | 26.0        |
| 5.  | 651.40         | BB          | 23.6            | 23.2            | 20.0                    | 28.7                | 5.7                   | 5.8            | 26.4              | 26.0              | 46.0                 | 19.6        | 20.0        |
| 6.  | 977.10         | BB          | 20.9            | 20.9            | 24.0                    | 28.3                | 7.2                   | 5.8            | 29.6              | 29.6              | 54.0                 | 24.4        | 24.4        |

CALCULATION: READING + ANT.FACTOR + CABLE LOSS - AMP.GAIN + ATTEN.

■ ANTENNA: KBA-02 (BBA9106) 30-299MHz/KLA-02 (USLP9143) 300-1000MHz

■ AMP: KAF-03 (8447D) ■ RECEIVER: KTR-01 (ESI40) ■ CABLE: KCC-20/21/22/23/29

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.

Yamakita No.2 Open Test Site

Report No. : 26CE0012-H0 - 1

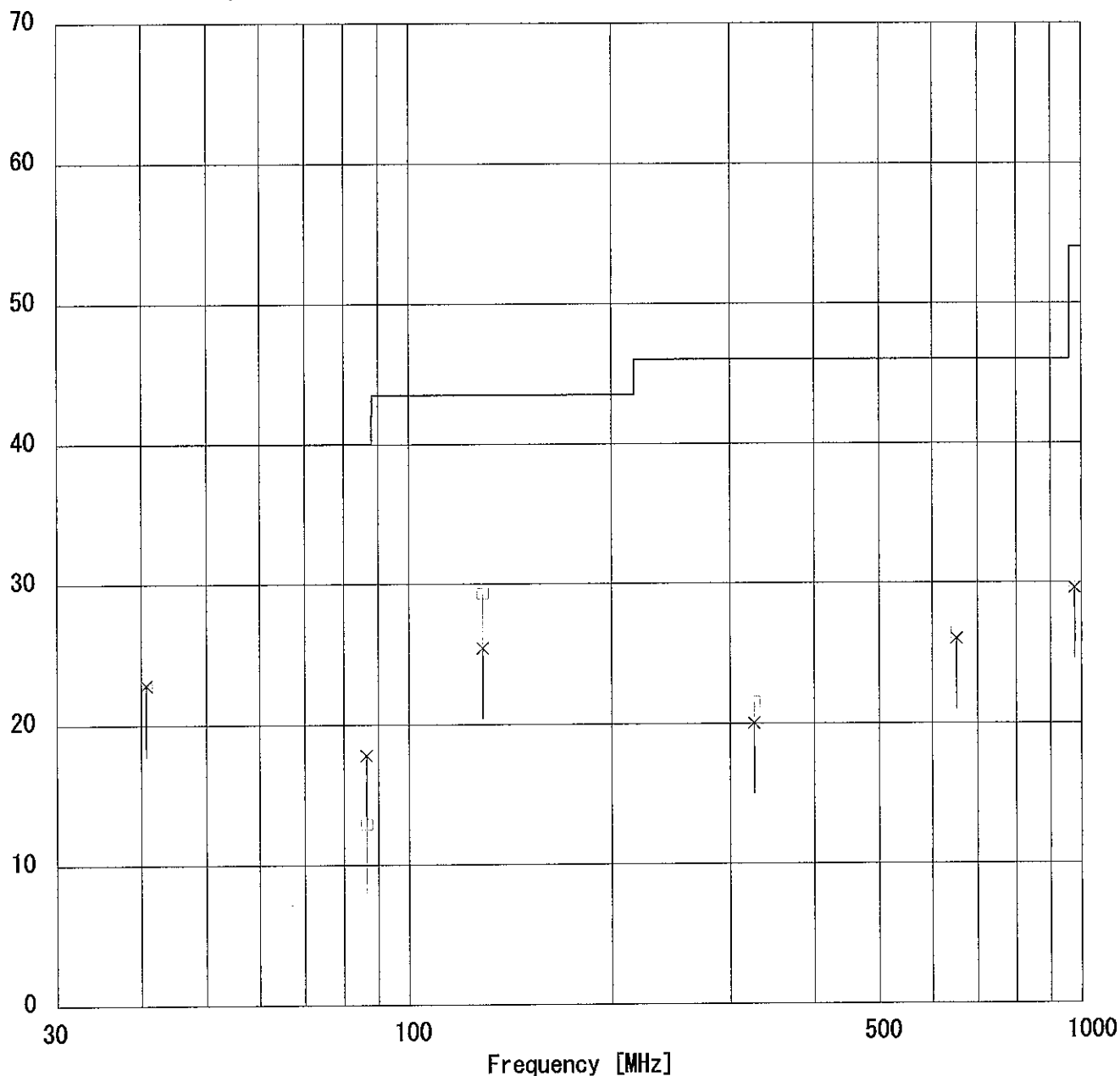
Applicant : Alps Electric Co., Ltd.  
Kind of Equipment : TPMS/KEYLESS TUNER  
Model No. : TWC1U241  
Serial No. : 05102101  
Power : DC12V  
Mode : Constant power supply mode  
Remarks :  
Date : 10/25/2005  
Test Distance : 3 m  
Temperature : 18 °C  
Humidity : 61 %  
Regulation : FCC Part15B § 15.109(a)

Engineer : Go Ishiwata

Emission Level [dB $\mu$ V/m]

□ Horizontal

× Vertical



Test Report No : 26CE0012-HO - 1

### APPENDIX 3 Test Instruments

#### EMI test equipment

| Control No.            | Instrument          | Manufacturer    | Model No.                         | Test Item | Calibration Date *<br>Interval(month) |
|------------------------|---------------------|-----------------|-----------------------------------|-----------|---------------------------------------|
| KAF-03                 | Pre Amplifier       | Hewlett Packard | 8447D                             | RE        | 2005/09/09 * 12                       |
| KAT6-03                | Attenuator          | INMET           | 18N-6dB                           | RE        | 2005/04/07 * 12                       |
| KBA-02                 | Biconical Antenna   | Schwarzbeck     | BBA9106                           | RE        | 2005/07/29 * 12                       |
| KCC-20/21/22<br>/23/29 | Coaxial Cable       | Fujikura/Suhner | 8D-2W/12D-SFA/S0<br>4272B/S04272B | RE        | 2005/09/02 * 12                       |
| KLA-02                 | Logperiodic Antenna | Schwarzbeck     | USLP9143                          | RE        | 2005/07/29 * 12                       |
| KOTS-02                | Open Test Site      | JSE             | 10m                               | RE        | 2005/08/07 * 12                       |
| KSA-02                 | Spectrum Analyzer   | Advantest       | R3265A                            | RE        | 2004/11/18 * 12                       |
| KTR-01                 | Test Receiver       | Rohde & Schwarz | ES140                             | RE        | 2005/08/05 * 12                       |
|                        |                     |                 |                                   |           |                                       |

All equipment is calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

Test Item:

RE: Radiated emission