



EMI TEST REPORT

Test Report No. : 28LE0167-HO-01

Applicant : Alps Electric Co., Ltd.
Type of Equipment : TPMS/Keyless Tuner
Model No. : TWC1G124
FCC ID : CWTWC1G124
Test regulation : FCC Part 15 Subpart B 2008
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:

September 1, 2008

Tested by:


Satofumi Matsuyama
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 |
| 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 No. | : | TWC1G124 |
| Serial No. | : | 08082201 |
| Receipt Date of Sample | : | September 1, 2008 |
| Country of Mass-production | : | JAPAN |
| Rating | : | DC5.0V |
| Condition of EUT | : | Production model |
| Modification of EUT | : | No Modification by the test lab |

2.2 Product Description

Model No: TWC1G124 (referred to as the EUT in this report) is the TPMS/Keyless Tuner.

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

Clock frequency(ies) in the system : 52.90MHz(Oscillator circuit)

| | | |
|--------------------------------|---|-----------------------------|
| Type of Receiver | : | Super heterodyne |
| Frequency of operation | : | 433.92MHz |
| Local Oscillator circuit | : | 423.22MHz (52.90MHz x 8) |
| Intermediate frequency | : | 10.7MHz |
| Antenna Type | : | Internal antenna (Monopole) |
| Antenna Connector Type | : | N/A |
| Method of Frequency Generation | : | Crystal |

FCC15.111(b)

The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed. 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 2008, final revised on May 19, 2008
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 | 18.8dB 867.840MHz, Vertical, 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.

*These tests were performed without any deviations from test procedure except for addition or exclusion.

3.3 Additions or deviations to standards

No addition, deviation, nor exclusion has been made from standards.

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.

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.

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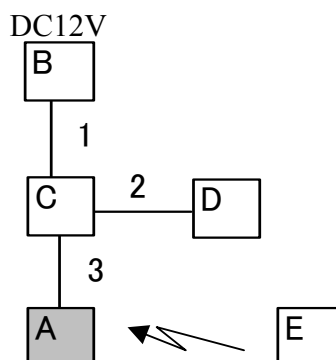
SECTION 4: Operation of E.U.T. during testing

4.1 Operating modes

The mode is used : Receiving mode (433.92MHz)

* Transmitter 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 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 | TPMS/Keyless Tuner | TWC1G124 | 08082201 | Alps Electric Co., Ltd. | EUT |
| B | Car Battery | - | - | YUASA | - |
| C | CHECKER | - | - | Alps Electric Co., Ltd. | - |
| D | BCM | 284B2ED70A | 061018-2/5 | Calsonic Kansei | - |
| E | Transmitter | TWB1U752 | 071011-TX | Alps Electric Co., Ltd. | - |

List of cables used

| No. | Name | Length (m) | Shield | | Remark |
|-----|-----------------|------------|------------|------------|--------|
| | | | Cable | Connector | |
| 1 | DC power cable | 1.0 | Unshielded | Unshielded | - |
| 2 | Cable for BCM | 0.45 | Unshielded | Unshielded | - |
| 3 | Cable for TUNER | 0.85 | Unshielded | Unshielded | - |

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SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.2 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 80cm 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 test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

| | | |
|-----------------|---------------|---|
| Frequency | Below 1GHz | Above 1GHz |
| Instrument used | Test Receiver | Spectrum Analyzer |
| IF Bandwidth | QP: BW 120kHz | PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz |

- 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: September 1, 2008

Test engineer: Satofumi Matsuyama

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