# EMI TEST REPORT

## Test Report No. : 26IE0397-YK-A

| | | |
|---|---|---|
| **Applicant** | : | **Alps Electric Co., Ltd.** |
| **Type of Equipment** | : | **Passive Entry System (Control Unit)** |
| **Model No.** | : | **TWD1U633** |
| **FCC ID** | : | **CWTWDU633** |
| **Test Standard** | : | **FCC Part15 Subpart B Section 15.109: 2006**<br>**FCC Part15 Subpart C Section 15.209: 2006** |
| **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 the above regulation.
4. The test results in this test report are traceable to the national or international standards.

**Date of test:** May 9 and 11, 2006

**Tested by:** M. Hosaka
Makoto Hosaka

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

*UL Apex Co., Ltd.*
*YAMAKITA EMC LAB.*
907 Kawanishi, Yamakita-machi, Ashigarakami-gun, Kanagawa-ken, 258-0124 JAPAN

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## 1 Applicant Information

| | | |
|---|---|---|
| Company Name | : | Alps Electric Co., Ltd. |
| Address | : | 6-3-36 Nakazato, Furukawa, Osaki-shi, Miyagi-ken, 989-6181 JAPAN |
| Telephone Number | : | +81-229-23-5111 |
| Facsimile Number | : | +81-229-23-3755 |
| Contact Person | : | Katsuhiro Seino |

## 2 Product Description

| | | |
|---|---|---|
| Type of Equipment | : | Passive Entry System (Control Unit) |
| Model No. | : | TWD1U633 |
| Serial No. | : | 20060508 |
| Rating : | : | DC12V (Car Battery) |
| Country of Manufacture | : | Japan |
| Receipt Date of Sample | : | May 9, 2006 |
| Condition of EUT | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification of EUT | : | No modification by the test lab. |

Model: TWD1U633 (referred to as the EUT in this report) is a Control Unit of Passive Entry System. The Passive Entry System is a system which locks, unlocks and can start engine only with the intelligent-key of the vehicle.

| | | |
|---|---|---|
| Equipment type | : | Transceiver |
| Operation temperature range | : | -30 ~ +80 deg. C. |
| Other clock frequency | : | 32.768kHz, 16MHz, 65.14MHz (Crystal) |
| Emission designation | : | A1D |

Tx section

| | | |
|---|---|---|
| Frequency of operation | : | 125kHz |
| Modulation | : | Amplitude |
| Antenna type | : | External Bar antenna |

Rx section

| | | |
|---|---|---|
| Frequency of operation | : | 315MHz |
| Intermediate frequency | : | 10.7MHz |
| Local frequency | : | 325.7MHz |
| Type of receiver | : | Super Heterodyne |
| Antenna type | : | Internal Bar antenna |

FCC Part15.31 (e)
The power supply of the EUT is transformed to DC5.0V and provides stable voltage, DC5.0V constantly to Radio part. Therefore, the EUT complies with the power supply regulation.

FCC Part15.111 (b)
The receiving antenna is installed inside the EUT and cannot be removed. Therefore, the EUT complies with the requirement.

FCC Part15.203 Antenna requirement
It is impossible for users to replace the antenna because the antenna is a set with EUT and installed outside of the EUT inside the vehicle. Therefore, the EUT complies with the antenna requirement.

# 3 Test Specification, Procedures and Results

## 3.1 Test specification

Test Specification : FCC Part 15 Subpart B: 2006
Title : FCC 47CFR Part 15 Radio Frequency Device
Subpart B Unintentional Radiators
Test specification : FCC Part15 Subpart C: 2006
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements

## 3.2 Procedures & Results

<Part 15 Subpart B>

| Item | Test Procedure | Limits | Deviation | Worst margin | Result |
|---|---|---|---|---|---|
| Conducted emission | ANSI C63.4: 2003 7. AC powerline conducted emission measurements | FCC §15.107(a) & 207 | N/A *1 | N/A | N/A |
| Radiated emission | ANSI C63.4: 2003 8. Radiated emission measurements | FCC §15.109(a) | N/A | 19.4dB (299.99MHz, QP, Vertical) | Complied |
| Antenna power conduction for receivers | ANSI C63.4: 2003 12.1.5 Antenna-conducted power measurements | FCC §15.111(a) | N/A *2 | N/A | N/A |

<Part 15 Subpart C>

| Item | Test Procedure | Specification | Remarks | Deviation | Worst Margin | Results |
|---|---|---|---|---|---|---|
| Conducted Emission | ANSI C63.4: 2003 7. AC powerline conducted emission measurements | Section 15.207(a) | AC Mains | N/A *1 | - | N/A |
| Electric Field Strength of Fundamental Emission | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section 15.209 | Radiated | N/A | 18.5dB (PK, Horizontal) | Complied |
| Electric Field Strength of Spurious Emission | ANSI C63.4: 2003 13. Measurement of intentional radiators | Section 15.205 & 209 | Radiated | N/A | 4.2dB (54.88MHz, QP, Vertical) | Complied |
| -26dB Bandwidth | ANSI C63.4: 2003 Annex H.6 Occupied bandwidth measurements | - | Radiated | N/A | - | Complied |

*1) The test is not applicable since the EUT has no AC mains.
*2) The test is not applicable to the EUT since the EUT does not have antenna port.
Note: UL Apex's EMI Work Procedures No.QPM05.

## 3.3 Addition to standard

No addition, deviation or exclusion has been made from the standard.

### 3.4 Uncertainty

Radiated emission
The measurement uncertainty (with 95% confidence level) for this test using Loop antenna is ±2.3dB.
The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ±4.5dB.
The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ±4.3dB.
The measurement uncertainty (with 95% confidence level) for this test using Horn antenna is ±5.2dB.
The data listed in this report meets the limits, unless the uncertainty is taken into consideration.

### 3.5 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. 1 test site has been fully described in a report submitted to FCC office, and accepted on August 26, 2005 (Registration No.: 95486).
IC Registration No. : IC3489A

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

No. 1 anechoic chamber has been fully described in a report submitted to FCC office, and accepted on November 2, 2005 (Registration No.: 95967).
IC Registration No. : IC3489A-B

| 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. (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 | | |

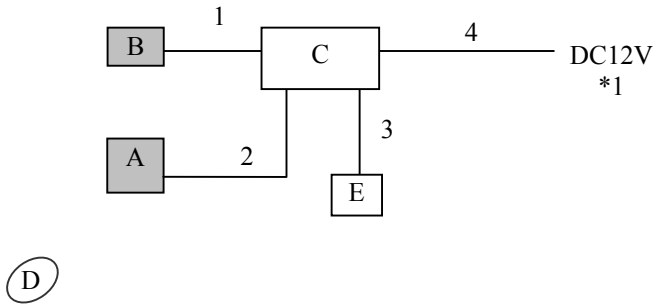
# 4 System Test Configuration

## 4.1 Justification

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

Test mode: Transmitting mode
Receiving mode

## 4.2 Configuration of Tested System




* Test data was taken under worse case conditions.

**Description of EUT and support equipment**

| No. | Item | Model number | Serial number | Manufacturer | FCC ID (Remarks) |
|---|---|---|---|---|---|
| A | Passive Entry System (Control Unit) | TWD1U633 | 20060508 | Alps Electric Co., Ltd. | CWTWDU633 (EUT) |
| B | Bar Antenna | - | - | Alps Electric Co., Ltd. | (EUT) |
| C | Checker Box | - | - | Alps Electric Co., Ltd. | - |
| D | Passive Entry System (Hand Unit) | TWB1U735 | - | Alps Electric Co., Ltd. | CWTWBU735 |
| E | Checker CW | - | - | Alps Electric Co., Ltd. | - |

*1) DC Power Supply (Model No.: PAN35-10A) was used for DC 12V input.

**List of cables used**

| No. | Name | Length (m) | Shield | | Remark |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| **1** | Antenna cable | 1.6 | Unshielded | Unshielded | - |
| **2** | Signal & DC power cable | 0.9 | Unshielded | Unshielded | - |
| **3** | Cable for Checker PWB | 0.3 | Unshielded | Unshielded | - |
| **4** | DC power cable | 1.1 | Unshielded | Unshielded | - |

# 5 Radiated Emissions

## 5.1 Operating environment

The test was carried out in No.1 anechoic chamber.

## 5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 0.5m by 0.5m, raised 80cm above the conducting ground plane. A drawing of the set up is shown in the photos of Appendix 1.

## 5.3 Test conditions

| | | |
|---|---|---|
| Frequency range and EUT operation mode | : | 30MHz - 2GHz (Receiving (Part 15 Subpart B))<br>9kHz - 1GHz (Transmitting (Part 15 Subpart C)) |
| Test distance | : | 3m |

## 5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured 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.

**<Part 15 Subpart B>**
Measurements were performed with QP, PK, and AV detector.
The radiated emission measurements were made with the following detector function of the test receiver.

| Frequency | Below 1GHz | Above 1GHz |
|---|---|---|
| Detector | QP | PK/AV |
| IF Bandwidth | QP: BW 120kHz | PK: RBW: 1MHz/VBW: 1MHz<br>AV: RBW: 1MHz/VBW: 10Hz |

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

**<Part 15 Subpart C>**
Measurements were performed with QP, PK, and AV detector.
The radiated emission measurements were made with the following detector function of the test receiver.

| Frequency | 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 |

The equipment and its antenna were previously checked at each position of three axes X, Y and Z. The position in which the maximum noise occurred was chosen to put into measurement. See the table below and photographs in page 14. With the position, the noise levels of all the frequencies were measured.

| | EUT | EUT's antenna |
|---|---|---|
| Horizontal | Z | X |
| Vertical | Z | X |

## 5.5 Results

**<Part 15 Subpart B>**
Summary of the test results : Pass
Test data : APPENDIX 2 Page 15 to 17
Date : May 11, 2006 Test engineer : Makoto Hosaka

**<Part 15 Subpart C>**
Summary of the test results : Pass
Test data : APPENDIX 2 Page 18 to 19 (Fundamental and Harmonics)
: APPENDIX 2 Page 20 to 21 (Other)
Date : May 9 and 11, 2006 Test engineer : Makoto Hosaka

# 6 26dB Bandwidth and Occupied Bandwidth

## 6.1 Operating environment

The test was carried out in No.1 anechoic chamber.

## 6.2 Test procedure

The bandwidth was measured with a spectrum analyzer and an antenna which is placed by the EUT.

**-26dB Bandwidth : 7.41kHz**
**Occupied Bandwidth (99%) : 5.89kHz**

## 6.3 Results

Summary of the test results : Pass
Test data : APPENDIX 2 Page 22 to 23

Date : May 9, 2006 Test engineer : Makoto Hosaka

## APPENDIX 1: Photographs of test setup

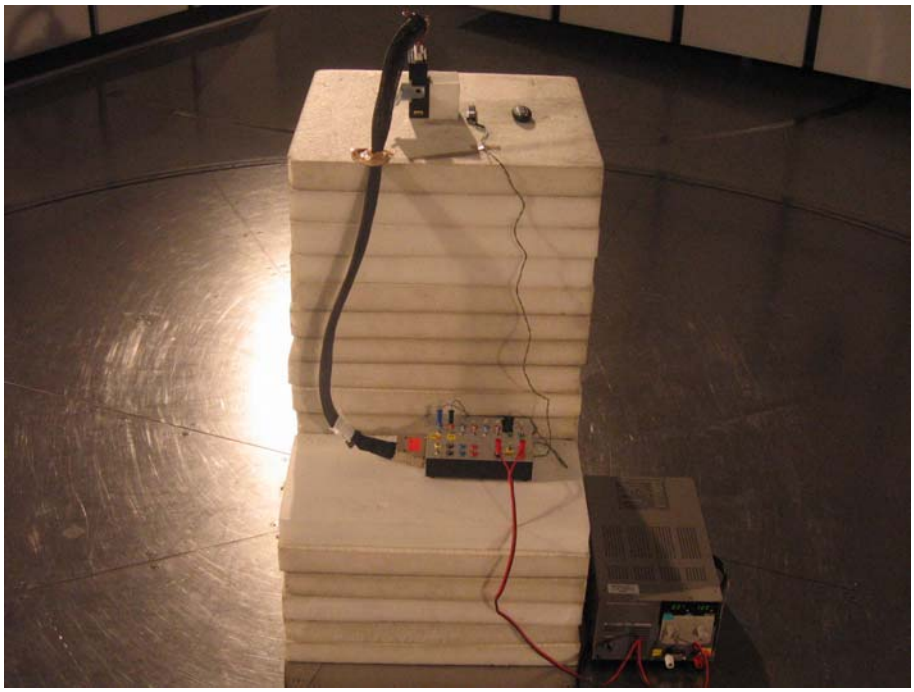


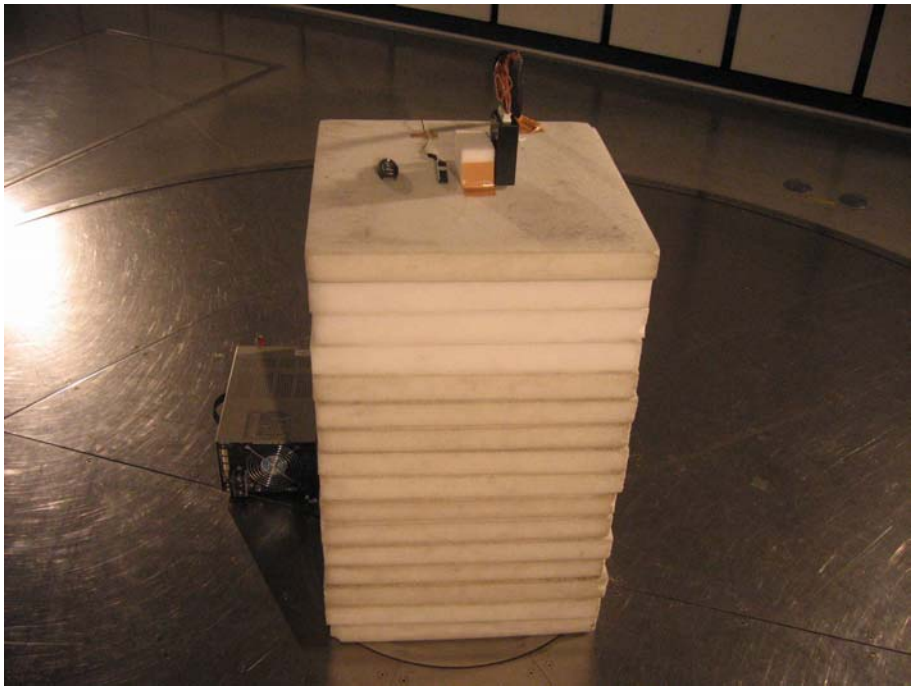
## APPENDIX 2: Test Data



## APPENDIX 3: Test instruments

**Radiated emission (Receiving)**





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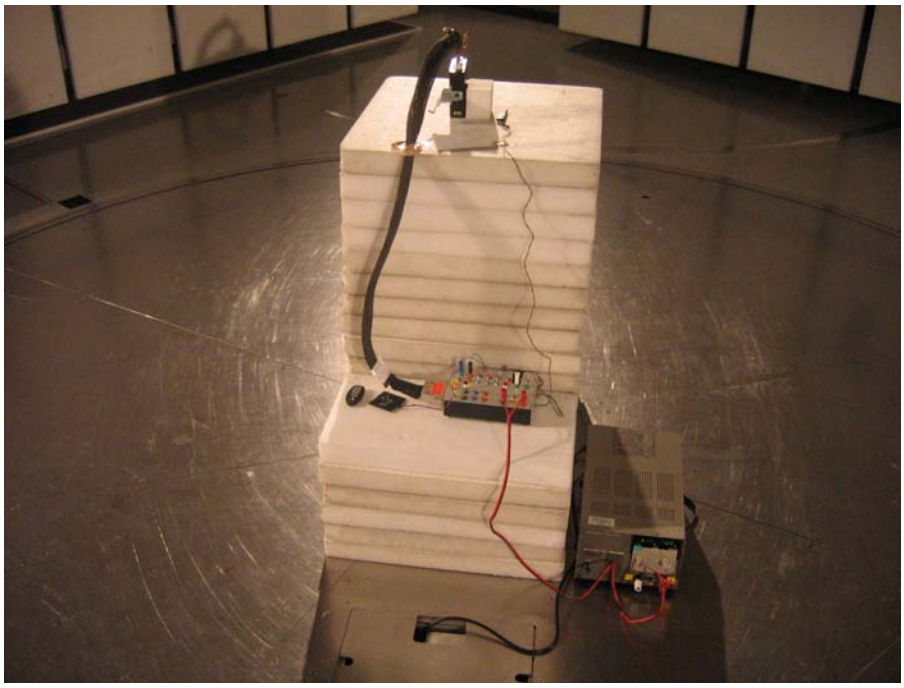
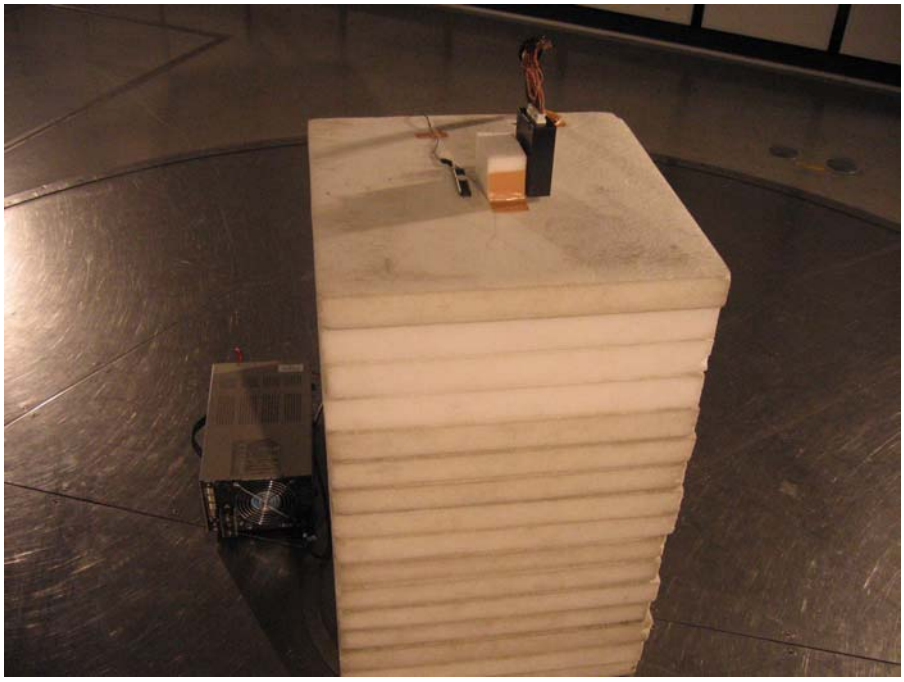
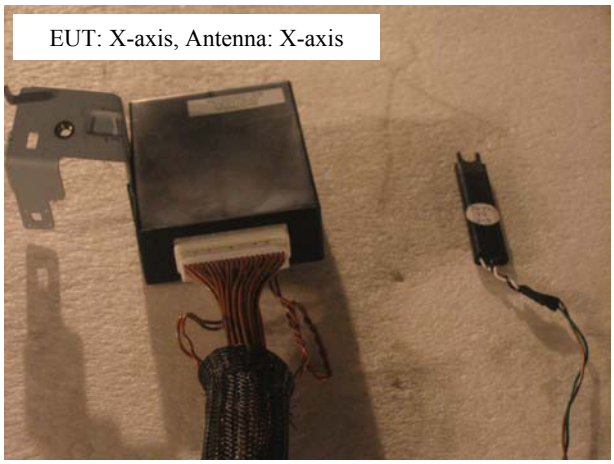
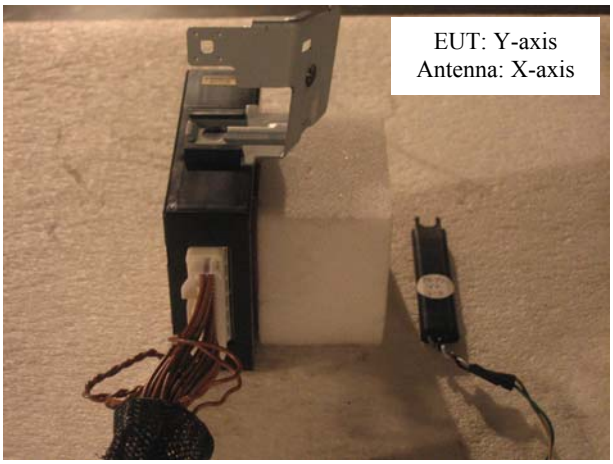
**Radiated emission (Transmitting)**

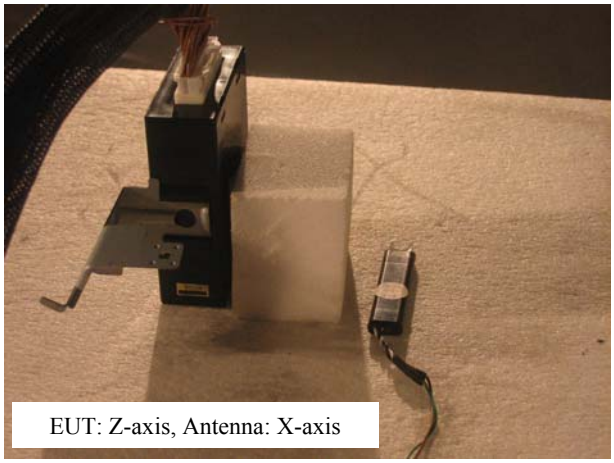


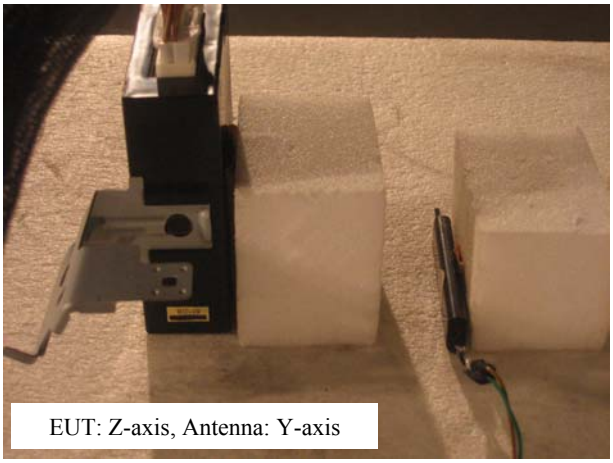


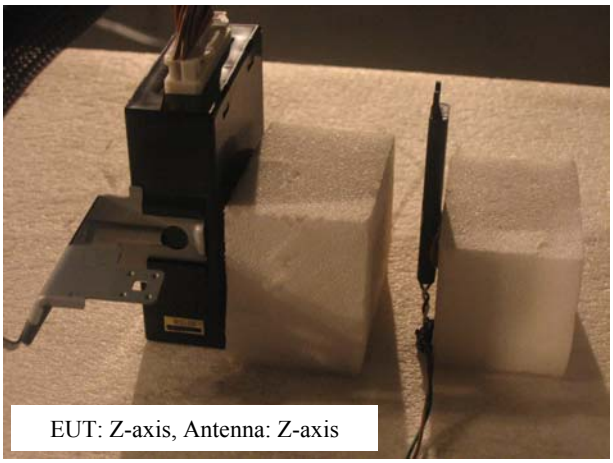
**Pre-check of worst position**



# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK-A

| | | | |
|---|---|---|---|
| Applicant | : | Alps Electric Co., Ltd. | |
| Kind of Equipment | : | Passive Entry System (Control Unit) | |
| Model No. | : | TWD1U633 | |
| Serial No. | : | 20060508 | |
| Power | : | DC12V | |
| Mode | : | Receiving | |
| Remarks | : | | |
| Date | : | 5/11/2006 | |
| Test Distance | : | 3 m | |
| Temperature | : | 21 ℃ | Engineer : Makoto Hosaka |
| Humidity | : | 52 % | |
| Regulation | : | FCC Part15B §15.109(a) | |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 48.00 | BB | 21.9 | 26.8 | 12.0 | 28.5 | 1.4 | 6.0 | 12.8 | 17.7 | 40.0 | 27.2 | 22.3 |
| 2. | 80.00 | BB | 21.7 | 27.7 | 7.2 | 28.5 | 1.8 | 6.0 | 8.2 | 14.2 | 40.0 | 31.8 | 25.8 |
| 3. | 299.99 | BB | 23.6 | 24.0 | 20.6 | 27.7 | 3.7 | 6.0 | 26.2 | 26.6 | 46.0 | 19.8 | 19.4 |
| 4. | 325.70 | BB | 21.6 | 20.6 | 15.6 | 27.8 | 4.0 | 6.0 | 19.4 | 18.4 | 46.0 | 26.6 | 27.6 |
| 5. | 651.40 | BB | 21.5 | 21.6 | 19.9 | 29.1 | 5.6 | 6.0 | 23.9 | 24.0 | 46.0 | 22.1 | 22.0 |
| 6. | 977.10 | BB | 20.7 | 20.7 | 23.8 | 28.6 | 7.0 | 6.1 | 29.0 | 29.0 | 54.0 | 25.0 | 25.0 |

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

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-01(ESI40)

Page:

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK - A

| | | | |
|---|---|---|---|
| Applicant | : Alps Electric Co., Ltd. | | |
| Kind of Equipment | : Passive Entry System (Control Unit) | | |
| Model No. | : TWD1U633 | | |
| Serial No. | : 20060508 | | |
| Power | : DC12V | | |
| Mode | : Receiving | | |
| Remarks | : PK RBW:1MHz, VBW:1MHz | | |
| Date | : 5/11/2006 | | |
| Test Distance | : 3 m | | |
| Temperature | : 21 ℃ | Engineer | : Makoto Hosaka |
| Humidity | : 52 % | | |
| Regulation | : FCC Part15B CLASS B(PK) | | |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 1037.07 | BB | 48.5 | 47.5 | 24.3 | 37.7 | 3.1 | 0.0 | 38.2 | 37.2 | 74.0 | 35.8 | 36.8 |
| 2. | 1302.80 | BB | 45.4 | 46.3 | 24.7 | 37.2 | 3.4 | 0.0 | 36.3 | 37.2 | 74.0 | 37.7 | 36.8 |

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

■ANTENNA:KHA-01(SAS-200 571)
■CABLE:KCC-D7/D13■PREAMP:KAF-02(8447B)■SPECTRUM ANALYZER:KTR-01(ESI40)

Page:

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK-A

| | | | |
|---|---|---|---|
| Applicant | : Alps Electric Co., Ltd. | | |
| Kind of Equipment | : Passive Entry System (Control Unit) | | |
| Model No. | : TWD1U633 | | |
| Serial No. | : 20060508 | | |
| Power | : DC12V | | |
| Mode | : Receiving | | |
| Remarks | : AV RBW:1MHz, VBW:10Hz | | |
| Date | : 5/11/2006 | | |
| Test Distance | : 3 m | | |
| Temperature | : 21 ℃ | Engineer | : Makoto Hosaka |
| Humidity | : 52 % | | |
| Regulation | : FCC Part15B §15.109(a) | | |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 1037.07 | BB | 35.5 | 35.5 | 24.3 | 37.7 | 3.1 | 0.0 | 25.2 | 25.2 | 54.0 | 28.8 | 28.8 |
| 2. | 1302.80 | BB | 34.3 | 34.4 | 24.7 | 37.2 | 3.4 | 0.0 | 25.2 | 25.3 | 54.0 | 28.8 | 28.7 |

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

■ANTENNA:KHA-01(SAS-200 571)
■CABLE:KCC-D7/D13■PREAMP:KAF-02(8447B)■SPECTRUM ANALYZER:KTR-01(ESI40)

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK-A

| | |
|---|---|
| Applicant | : Alps Electric Co., Ltd. |
| Kind of Equipment | : Passive Entry System (Control Unit) |
| Model No. | : TWD1U633 |
| Serial No. | : 20060508 |
| Power | : DC12V |
| Mode | : Transmitting |
| Remarks | : PK |
| Date | : 5/9/2006 |
| Test Distance | : 3 m |
| Temperature | : 24 ℃ Engineer : Makoto Hosaka |
| Humidity | : 44 % |
| Regulation | : FCC Part15C §15.209 9KHz-490kHz (3m) Pk |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 0.13 | BB | 108.8 | 105.7 | 19.4 | 26.7 | 0.1 | 5.2 | 106.8 | 103.7 | 125.3 | 18.5 | 21.6 |
| 2. | 0.25 | BB | 63.0 | 57.1 | 19.4 | 27.6 | 0.1 | 6.0 | 60.9 | 55.0 | 119.6 | 58.7 | 64.6 |
| 3. | 0.38 | BB | 58.5 | 55.5 | 19.4 | 28.1 | 0.1 | 6.0 | 55.9 | 52.9 | 116.0 | 60.1 | 63.1 |

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

■ANTENNA:KLP-01(HFH2-Z2)
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D)■RECEIVER:KTR-01(ESI40)

Page:

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK - A

| | | | |
|---|---|---|---|
| Applicant | : Alps Electric Co., Ltd. | | |
| Kind of Equipment | : Passive Entry System (Control Unit) | | |
| Model No. | : TWD1U633 | | |
| Serial No. | : 20060508 | | |
| Power | : DC12V | | |
| Mode | : Transmitting | | |
| Remarks | : AV | | |
| Date | : 5/9/2006 | | |
| Test Distance | : 3 m | | |
| Temperature | : 24 ℃ | Engineer | : Makoto Hosaka |
| Humidity | : 44 % | | |
| Regulation | : FCC Part15C §15.209 9KHz-30MHz (3m) | | |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 0.13 | BB | 86.6 | 83.5 | 19.4 | 26.7 | 0.1 | 5.2 | 84.6 | 81.5 | 105.3 | 20.7 | 23.8 |
| 2. | 0.25 | BB | 49.6 | 44.6 | 19.4 | 27.6 | 0.1 | 6.0 | 47.5 | 42.5 | 99.6 | 52.1 | 57.1 |
| 3. | 0.38 | BB | 46.1 | 42.4 | 19.4 | 28.1 | 0.1 | 6.0 | 43.5 | 39.8 | 96.0 | 52.5 | 56.2 |

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

■ANTENNA:KLP-01(HFH2-Z2)
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D) ■RECEIVER:KTR-01(ESI40)

Page:

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK-A

| | | | |
|---|---|---|---|
| Applicant | : Alps Electric Co., Ltd. | | |
| Kind of Equipment | : Passive Entry System (Control Unit) | | |
| Model No. | : TWD1U633 | | |
| Serial No. | : 20060508 | | |
| Power | : DC12V | | |
| Mode | : Transmitting | | |
| Remarks | : QP | | |
| Date | : 5/9/2006 | | |
| Test Distance | : 3 m | | |
| Temperature | : 24 ℃ | Engineer | : Makoto Hosaka |
| Humidity | : 44 % | | |
| Regulation | : FCC Part15C §15.209 9KHz-30MHz (3m) | | |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 0.50 | BB | 29.2 | 31.6 | 19.4 | 28.2 | 0.1 | 6.0 | 26.5 | 28.9 | 73.6 | 47.1 | 44.7 |
| 2. | 0.63 | BB | 47.6 | 43.0 | 19.4 | 28.4 | 0.2 | 6.0 | 44.8 | 40.2 | 71.6 | 26.8 | 31.4 |
| 3. | 0.75 | BB | 28.0 | 28.2 | 19.4 | 28.4 | 0.2 | 6.0 | 25.2 | 25.4 | 70.1 | 44.9 | 44.7 |
| 4. | 0.88 | BB | 41.7 | 37.4 | 19.4 | 28.3 | 0.2 | 6.0 | 39.0 | 34.7 | 68.7 | 29.7 | 34.0 |
| 5. | 1.00 | BB | 35.9 | 30.1 | 19.4 | 28.3 | 0.2 | 6.0 | 33.2 | 27.4 | 67.6 | 34.4 | 40.2 |
| 6. | 1.13 | BB | 34.5 | 34.0 | 19.4 | 28.3 | 0.2 | 6.0 | 31.8 | 31.3 | 66.5 | 34.7 | 35.2 |
| 7. | 1.25 | BB | 29.0 | 27.9 | 19.4 | 28.4 | 0.2 | 6.0 | 26.2 | 25.1 | 65.7 | 39.5 | 40.6 |
| 8. | 18.88 | BB | 35.5 | 46.2 | 20.1 | 28.5 | 0.8 | 6.0 | 33.9 | 44.6 | 69.5 | 35.6 | 24.9 |
| 9. | 22.50 | BB | 44.3 | 55.0 | 20.5 | 28.4 | 0.9 | 6.0 | 43.3 | 54.0 | 69.5 | 26.2 | 15.5 |
| 10. | 28.75 | BB | 37.7 | 49.8 | 21.1 | 28.5 | 1.1 | 6.0 | 37.4 | 49.5 | 69.5 | 32.1 | 20.0 |

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

■ANTENNA:KLP-01(HFH2-Z2)
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D) ■RECEIVER:KTR-01(ESI40)

Page:

# DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No.: 26IE0397-YK-A

| | | | |
|---|---|---|---|
| Applicant | : Alps Electric Co., Ltd. | | |
| Kind of Equipment | : Passive Entry System (Control Unit) | | |
| Model No. | : TWD1U633 | | |
| Serial No. | : 20060508 | | |
| Power | : DC12V | | |
| Mode | : Transmitting | | |
| Remarks | : | | |
| Date | : 5/11/2006 | | |
| Test Distance | : 3 m | | |
| Temperature | : 21 ℃ | Engineer | : Makoto Hosaka |
| Humidity | : 52 % | | |
| Regulation | : FCC Part15C §15.209 | | |

| No. | FREQ. [MHz] | ANT TYPE | READING HOR [dBμV] | READING VER [dBμV] | ANT FACTOR [dB/m] | AMP GAIN [dB] | CABLE LOSS [dB] | ATTEN. [dB] | RESULT HOR [dBμV/m] | RESULT VER [dBμV/m] | LIMITS [dBμV/m] | MARGIN HOR [dB] | MARGIN VER [dB] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | 30.88 | BB | 23.1 | 36.2 | 19.6 | 28.5 | 1.1 | 6.0 | 21.3 | 34.4 | 40.0 | 18.7 | 5.6 |
| 2. | 46.75 | BB | 31.8 | 44.1 | 12.4 | 28.5 | 1.3 | 6.0 | 23.0 | 35.3 | 40.0 | 17.0 | 4.7 |
| 3. | 54.88 | BB | 35.1 | 46.6 | 10.2 | 28.5 | 1.5 | 6.0 | 24.3 | 35.8 | 40.0 | 15.7 | 4.2 |
| 4. | 80.00 | BB | 32.5 | 47.1 | 7.2 | 28.5 | 1.8 | 6.0 | 19.0 | 33.6 | 40.0 | 21.0 | 6.4 |
| 5. | 86.88 | BB | 29.3 | 43.3 | 8.4 | 28.4 | 1.9 | 6.1 | 17.3 | 31.3 | 40.0 | 22.7 | 8.7 |
| 6. | 104.00 | BB | 33.2 | 45.2 | 11.6 | 28.4 | 2.1 | 6.1 | 24.6 | 36.6 | 43.5 | 18.9 | 6.9 |

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

■ANTENNA:KBA-03(BBA9106)30-299.99MHz/KLA-03(USLP9143)300-1000MHz
■CABLE:KCC-30/31/32/34■PREAMP:KAF-05(8447D)■EMI RECEIVER:KTR-01(ESI40)

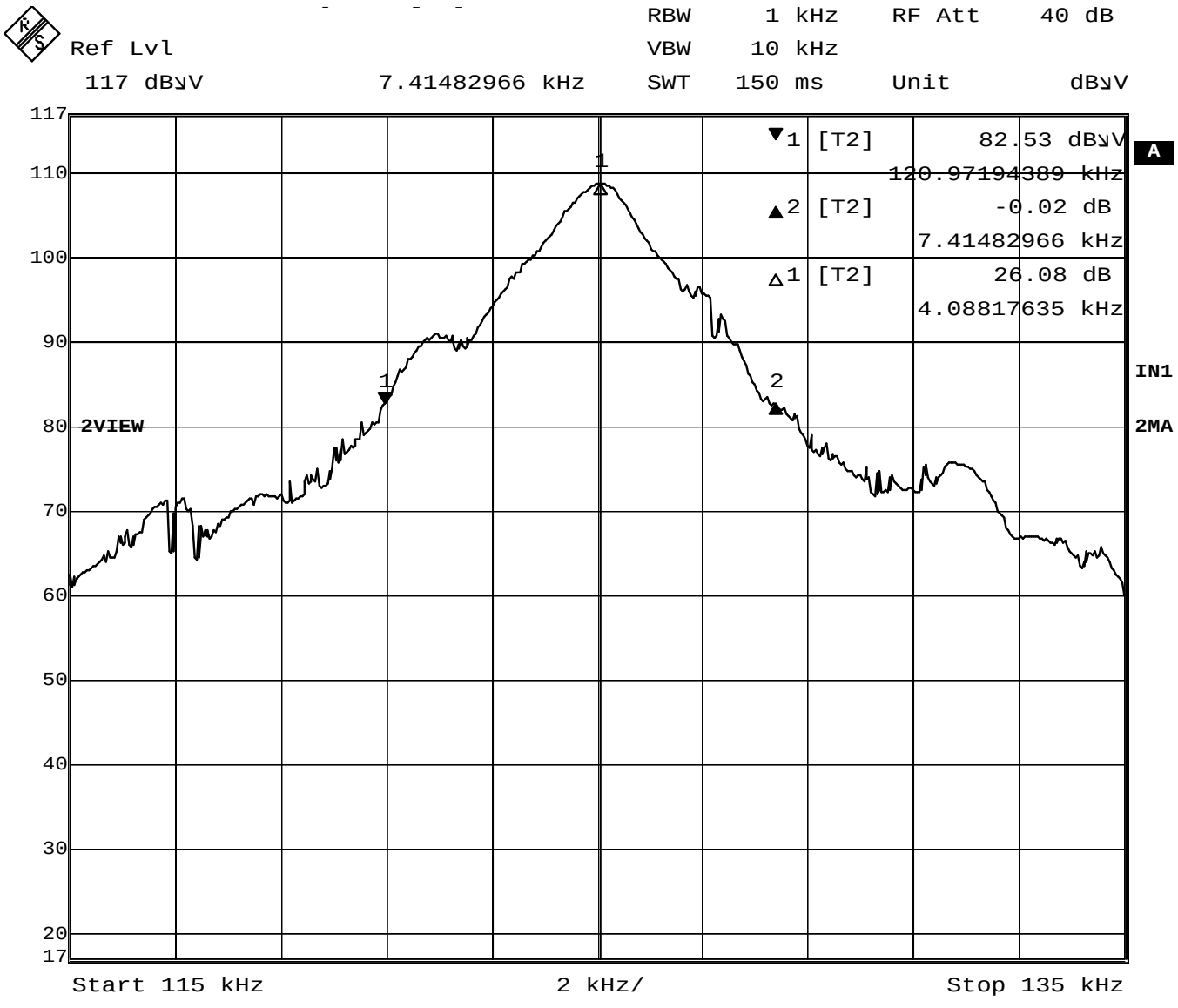
Page:

# -26dB Bandwidth

**UL Apex Co.,Ltd. Yamakita No.1 Anchoic Chamber**

| | | | |
|---|---|---|---|
| **COMPANY** | **: Alps Electric Co ., Ltd.** | **REPORT NO** | **: 26IE0397-YK-A** |
| **EQUIPMENT** | **: Passive Entry System (Control Unit)** | **REGULATION** | **: -** |
| **MODEL NUMBER** | **: TWD1U633** | **DATE** | **: 2006/05/09** |
| **SERIAL NUMBER** | **: 20060508** | **TEMP./HUMI** | **: 24deg.C./44%** |
| **FCC ID** | **: CWTWDU633** | **TEST MODE** | **: Transmitting** |
| **POWER** | **: DC12V** | **ENGINEER** | **: Makoto Hosaka** |

| -26dB Bandwidth [kHz] | Bandwidth Limit [kHz] |
|---|---|
| 7.41 | - |



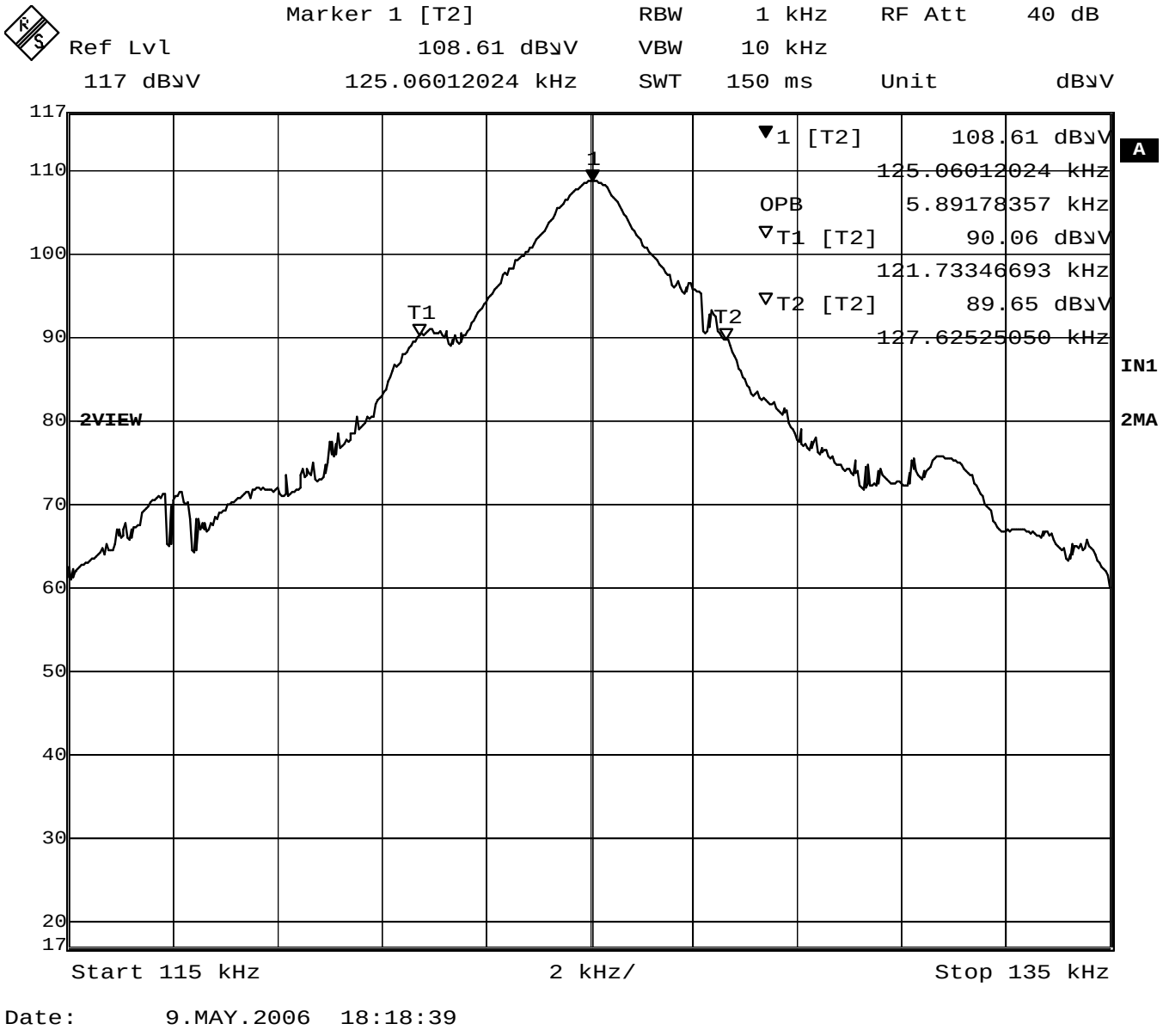

Date: 9.MAY.2006 18:26:31

# Occupied Bandwidth(99%)

UL Apex Co.,Ltd. Yamakita No.1 Anchoic Chamber

| | | | |
|---|---|---|---|
| **COMPANY** | **: Alps Electric Co ., Ltd.** | **REPORT NO** | **: 26IE0397-YK-A** |
| **EQUIPMENT** | **: Passive Entry System (Control Unit)** | **REGULATION** | **: -** |
| **MODEL NUMBER** | **: TWD1U633** | **DATE** | **: 2006/05/09** |
| **SERIAL NUMBER** | **: 20060508** | **TEMP./HUMI** | **: 24deg.C./44%** |
| **FCC ID** | **: CWTWDU633** | **TEST MODE** | **: Transmitting** |
| **POWER** | **: DC12V** | **ENGINEER** | **: Makoto Hosaka** |

| 99% Occupied Bandwidth [kHz] |
|---|
| 5.89 |

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Test Report No :26IE0397-YK-A

## APPENDIX 3
## Test Instruments

**EMI test equipment**

| Control No. | Instrument | Manufacturer | Model No | Test Item | Calibration Date * Interval(month) |
|---|---|---|---|---|---|
| YA-RE | Radiated emission(software) | UL-Apex | RE(Ver.1.5) | RE | |
| KAEC-01(NSA) | Anechoic Chamber | JSE | Semi 3m | RE, BW | 2005/09/03 * 12 |
| KAF-05 | Pre Amplifier | Agilent | 8447D | RE 1,2,3 | 2006/04/21 * 12 |
| KAT6-01 | Attenuator | INMET | 18N-6dB | RE 1,2,3 | 2006/03/24 * 12 |
| KBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | RE 1,3 | 2006/01/17 * 12 |
| KCC-30/31/32 /34/KRM-03 | Coaxial Cable/RF Relay Matrix | Fujikura/Suhner/TSJ | 5D-2W/S04272B/RF M-E421 | RE 1,2,3 | 2005/12/22 * 12 |
| KLA-03 | Logperiodic Antenna | Schwarzbeck | USLP9143 | RE 1,3 | 2006/01/17 * 12 |
| KSA-04 | Spectrum Analyzer | Advantest | R3271A | RE 1,2,3 | 2005/09/13 * 12 |
| KTR-01 | Test Receiver | Rohde & Schwarz | ESI40 | RE 1,2,3,BW | 2005/08/05 * 12 |
| KOS-02 | Digital Humidity Indicator | Custom | CTH-190 | RE, | 2004/07/22 * 24 |
| KBM-01 | Barometer | SATO | 7610-20 | RE, BW | 2004/08/09 * 60 |
| KAF-02 | Pre Amplifier | Hewlett Packard | 8449B | RE 1 | 2006/04/24 * 12 |
| KCC-D7/D13 | Coaxial cable | Advantest/Suhuner | A01002/SUCOFLEX104 | RE 1 | 2006/04/11 * 12 |
| KHA-01 | Horn Antenna | A.H.Systems | SAS-200/571 | RE 1 | 2005/08/20 * 12 |
| KLP-01 | Loop Antenna | Rohde & Schwarz | HFH2-Z2 | RE 2 | 2005/06/17 * 12 |
| KCC-D7 | Coaxial Cable | Advantest | A01002 | BW | 2006/04/11 * 12 |
| KOS-01 | Digital Humidity Indicator | Custom | CTH-190 | BW | 2004/08/19 * 24 |
| | | | | | |
| | | | | | |

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

Test Item :

RE: Radiated emission
1: Receiving
2: Transmitting (9kHz-30MHz)
3: Transmitting (30-1000MHz)
BW: Bandwidth