



# EMI TEST REPORT

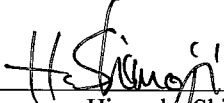
**Test Report No. : 24KE0135-HO-4**

**Applicant** : Alps Electric Co., Ltd.  
**Type of Equipment** : Passive Entry System  
(Tuner)  
**Model No.** : TFWC1U119  
**Test standard** : FCC Part 15 Subpart B : 2004  
Section 15.109  
**FCC ID** : CWTWCU119  
**Test Result** : Complied

1. This test report shall not be reproduced in full or partial, 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 report are traceable to the national or international standards.

**Date of test** : August 27, 2004

**Tested by** :   
Mitsuru Fujimura  
EMC Service

**Approved by** :   
Hironobu Shimoji  
Group Leader of EMC Service

**UL Apex Co., Ltd.**

**Head Office EMC Lab.**

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## **SECTION 1: Client information**

Company Name : Alps Electric Co., Ltd.  
Address : 6-3-36 Nakazato, Furukawa-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. : TFWC1U119  
Serial No. : 4  
Country of Manufacture : Japan  
Receipt Date of Sample : July 15, 2004  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)

### **2.2 Product Description**

Model No: TFWC1U119 is the Passive Entry System (Tuner).  
The clock frequency of EUT is 65.13833MHz.

#### **Rx section**

Rating	DC 12V
Receiving Frequency	315MHz
Modulation	FSK
Temperature of operation	-40 deg. C. -+80 deg. C.

\*The antenna for the receiver is built-in antenna in EUT so that it is permanently installed.  
(Therefore, this EUT complied with the requirement in Section 15.109 (f). )

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### **SECTION 3: Test specification, procedures & results**

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart B : 2004  
Section 15.109 Radiated emission limits  
Title : FCC 47CFR Part15 Radio Frequency Device  
Subpart B Unintentional Radiators

#### **3.2 Procedures and results**

No.	Item	Test Procedure	Specification	Remarks	Worst margin	Result
1	Radiated emission	ANSI C63.4:2003	FCC Section 15.109(a)	Radiated	3.8dB QP 69.774MHz Horizontal	Complied
2	Conducted Emission	ANSI C63.4:2003	FCC Section 15.107(a)	AC Mains only*1)	N/A	N/A

Note: UL Apex's EMI Work procedures No. QPM05

\*1) This test is not applicable since the EUT does not have AC power port.

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

#### **3.3 Addition to standards**

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

#### **3.4 Uncertainty**

##### Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Loop antenna is  $\pm 1.8$ dB.

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is  $\pm 4.5$ dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is  $\pm 5.2$ dB.

The measurement uncertainty (with a 95% confidence level) for this test using Horn Antenna is  $\pm 6.6$ dB.

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

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### 3.5 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. \*NVLAP Lab. code: 200572-0  
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Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	Listed date (for FCC)	FCC Registration Number	IC Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	February 01, 2002	313583	IC4247	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 shielded room	-	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.4 measurement room	-	-	-	3.1 x 5.0 x 2.7m	N/A	-

\*Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1 and No.2 semi-anechoic and No.3 shielded room.

### 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**

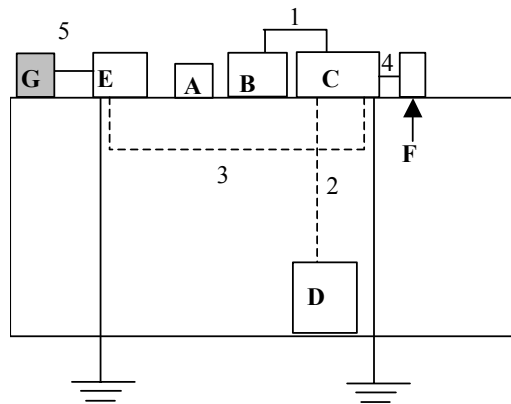
### **4.1 Operating Modes**

The sequence is used : Continuous receiving mode  
\*The test was performed under the signal from the transmitter.

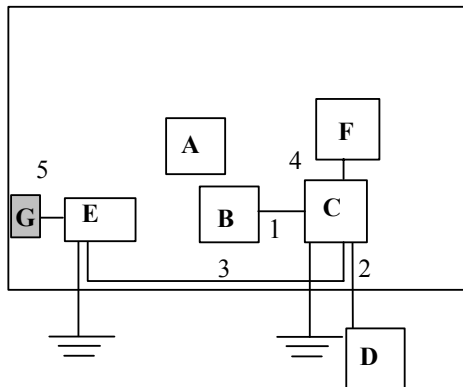
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

### **4.2 Configuration and peripherals**

#### Front View



#### Top View



\* Test data was taken under worse case conditions.

(Hand Unit)

#### **Support equipment**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Passive Entry System (Hand Unit)	TFWB1U618	1	Alps Electric Co., Ltd.	CWTWBU618

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(Tuner)

**Description of EUT and Support Equipment**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
B	Bar antenna	-	-	Alps Electric Co., Ltd.	-
C	Checker Box	N/A	N/A	Alps Electric Co., Ltd.	-
D	Car Battery	50B24L	N/A	YUASA	-
E	Control Unit	TFWD1UU625	5	Alps Electric Co., Ltd.	CWTWDDUU625
F	Checker PWB	-	-	Alps Electric Co., Ltd.	-
G	Tuner	TFWC1U119	4	Alps Electric Co., Ltd.	CWTWCU119

**List of cables used**

No.	Name	Length (m)	Shield	Remark
1	Antenna Cable	0.5	N	-
2	DC Power Cable	1.0	N	-
3	Signal & DC Power Cable	1.2	N	-
4	Cable for Checker PWB	0.3	N	-
5	Cable for Tuner	1.1	N	-

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## SECTION 5: Radiated emission (Fundamental and Spurious Emission)

### 5.1 Operating environment

Test place : No.1 semi anechoic chamber  
Temperature : See data  
Humidity : See data

#### Test Procedure

The Radiated Electric Field Strength intensity has been measured at a distance of 10m and a distance of 3m.

Frequency : From 9kHz to 30MHz at distance 10m

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. and 90deg.

Frequency : From 30MHz to 2GHz 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.

Measurements were performed with a QP, PK, and AV detector.

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

	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	From 1GHz to 2GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP	PK/AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	1MHz*

\* PK: Spectrum Analyzer RBW = 1MHz, VBW = 1MHz

\* AV: Spectrum Analyzer RBW = 1MHz, VBW = 10Hz

- The carrier level (or, noise levels) was (or were) measured at each position of all three axes X, Y and Z, and the position that has the maximum noise was determined.

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

\* Part 15 Section 15.31 (f)(2) (9kHz-30MHz)

9kHz – 490kHz [Limit at 10m]=[Limit at 300m]-40log (10[m]/300[m])

490kHz – 30MHz[Limit at 10m]=[Limit at 30m]-40log (10[m]/30[m])

### 5.2 Results

Summary of the test results: Pass

Date: August 27, 2004

Tested by: Mitsuru Fujimura

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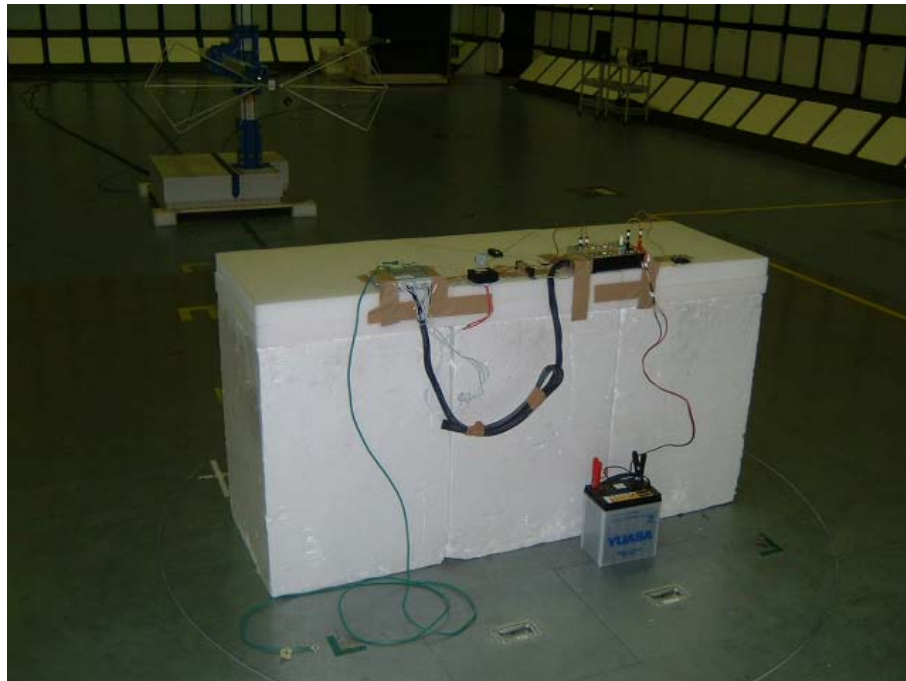
**APPENDIX 1: Photographs of test setup**

**Radiated emission**

**Front**



**Rear**



**Worst Case Position (Horizontal : X-axis / Vertical: X-axis)**

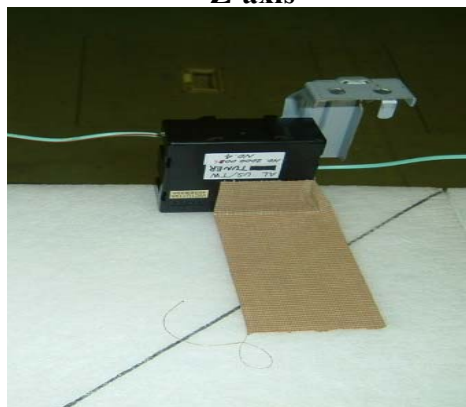
**X-axis**



**Y-axis**



**Z-axis**



## **APPENDIX 2: Test Instruments**

### **EMI test equipment**

<b>Control No.</b>	<b>Instrument</b>	<b>Manufacturer</b>	<b>Model No</b>	<b>Test Item</b>	<b>Calibration Date * Interval(month)</b>
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE /ME	2003/12/27 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE /ME	2003/11/12 * 12
MCC-05	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MCC-23	Microwave Cable	Storm	-	RE	2004/05/01 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/10/15 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/10/15 * 12
MCC-01	Coaxial Cable	Suhner/storm/Agilent/ TSJ	-	RE	2003/12/19 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE /ME	2003/12/16 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE /ME	2004/05/25 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/ TSJ	-	ME	2003/12/24 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2004/01/08 * 12
MCC-07	coaxial cable	-	-	ME	2004/01/26 * 12
MCC-08	coaxial cable	-	-	ME	2004/01/26 * 12

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

**Test Item:**

**RE: Radiated emission**

**ME: Radiated Magnetic Field Strength 9kHz – 30MHz**

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**APPENDIX 3: Data of EMI test**

**Radiated emission**

**DATA OF RADIATED EMISSION TEST**

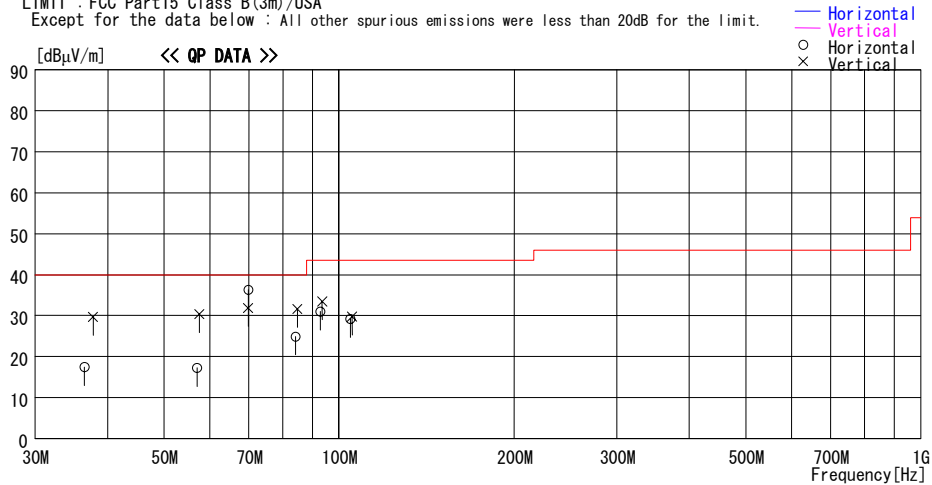
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant : ALPS Electric Co.,Ltd. Report No. : 24KE0135-HO  
Kind of EUT : Passive Keyless entry Power : DC 12V  
Model No. : TFWC1U119 Temp°C/Humi% : 23 / 65%  
Serial No. : 4 Operator : Mitsuru Fujimura

Mode / Remarks: Transmitting and Receiving / X-axis (Max-axis)

LIMIT : FCC Part15 Class B(3m)/USA

Except for the data below : All other spurious emissions were less than 20dB for the limit.



No.	FREQ [MHz]	READING QP [dBµV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBµV/m]	LIMIT [dBµV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	36.493	22.5	15.6	7.2	27.9	17.4	40.0	22.6	100	359
2	57.017	28.7	8.8	7.4	27.7	17.2	40.0	22.8	337	256
3	69.774	49.8	6.7	7.6	27.8	36.3	40.0	3.8	234	183
4	84.144	38.0	6.9	7.8	27.8	24.9	40.0	15.1	213	159
5	92.778	42.2	8.5	7.9	27.6	31.0	43.5	12.5	182	157
6	104.521	38.0	10.9	8.0	27.7	29.2	43.5	14.3	277	0
----- Vertical -----										
7	37.766	35.3	15.0	7.1	27.8	29.6	40.0	10.4	100	208
8	57.510	42.1	8.6	7.4	27.8	30.3	40.0	9.7	100	123
9	69.764	45.3	6.7	7.6	27.8	31.8	40.0	8.2	100	284
10	84.766	44.6	7.0	7.8	27.8	31.6	40.0	8.4	100	16
11	93.521	44.5	8.6	7.9	27.6	33.4	43.5	10.1	100	238
12	105.270	38.5	11.0	8.0	27.7	29.8	43.5	13.7	100	269

CHART: WITH FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS(CABLE+ATTEN.) - AMP. GAIN Page:

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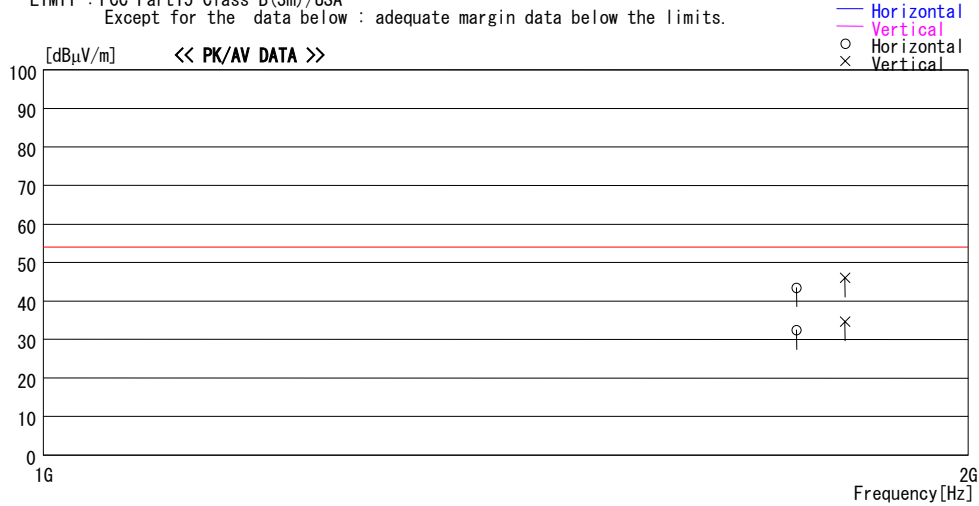
## DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Applicant : ALPS Electric Co.,Ltd.	Report No. : 24KE0135-HO
Kind of EUT : Passive Keyless entry	Power : DC 12V
Model No. : TFWC1U119	Temp°C/Humi% : 21 / 60%
Serial No. : 4	Operator : Mitsuru Fujimura

Mode / Remarks: Transmitting / Max-Axis

LIMIT : FCC Part15 Class B(3m)/USA  
Except for the data below : adequate margin data below the limits.



No.	FREQ [MHz]	READING PK/AV [dBμV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]	
----- Horizontal -----											
1	1758.759	47.8	27.4	4.7	36.4	43.5	74.0	30.5	100	0	PK
2	1758.759	36.7	27.4	4.7	36.4	32.4	54.0	21.6	100	0	AV
----- Vertical -----											
3	1823.898	49.4	28.2	4.8	36.4	46.0	74.0	28.0	100	0	PK
4	1823.898	38.0	28.2	4.8	36.4	34.6	54.0	19.4	100	0	AV

CHART:WITHOUT FACTOR ANT TYPE : -30MHz LOOP, 30-300MHz BICONICAL, 300MHz-1000MHz LOGPERIODIC, 1000MHz- HORN  
CALCULATION : READING + ANT FACTOR + LOSS (CABLE+ATTEN.) - AMP. GAIN Page: