




# EMI TEST REPORT


Test Report No. : 24GE0135-HO-1

**Applicant** : Alps Electric Co., Ltd.  
**Type of Equipment** : Passive Entry System  
(Control Unit)  
**Model No.** : TFWD1U623  
**Test standard** : FCC Part 15 Subpart C : 2003  
Section 15.209  
FCC Part 15 Subpart B : 2003  
Section 15.109  
**FCC ID** : CWTWDU623  
**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.
5. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.

**Date of test** : \_\_\_\_\_ March 5, 2004 \_\_\_\_\_

**Tested by** : \_\_\_\_\_  \_\_\_\_\_  
Kenichi Adachi  
EMC Service

**Approved by** : \_\_\_\_\_  \_\_\_\_\_  
Naoki Sakamoto  
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 (Control Unit)  
Model No. : TFWD1U623  
Serial No. : 2  
Country of Manufacture : Japan  
Receipt Date of Sample : March 3, 2004  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)

### **2.2 Product Description**

Alps Electric Co., Ltd., Model No: TFWD1U623 is the Passive Entry System (Control Unit).  
The control unit of the passive entry system is a transmitter of 125kHz.

Equipment Type : Transceiver  
Rating : DC 12.0V (Car battery)  
Temperature of operation : -40 deg. C. -+85 deg. C.  
Other Clock frequency : 65.14MHz, 16MHz, 32.768kHz

#### **Tx section**

Number of Channel	1
Frequency Characteristics	125kHz
Modulation	Amplitude
Information antenna	External (Bar antenna)
Country of Manufacture	Japan

#### **Rx section**

Type of Receiver	Single Super Heterodyne
Receiving Frequency	315MHz
Local Oscillator Frequency	325.7MHz
Intermediate Frequency	10.7MHz
Information antenna	Integral (monopole)

FCC 15.31 (e)

This test was performed with the New Battery.

FCC Part 15.203 Antenna requirement

Bar Antenna(Tx section) is installed inside the vehicle door and users cannot detach it from vehicle. Therefore, the equipment complies the requirement.

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

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C : 2003  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.209 Radiated emission limits, general requirements.  
Test Specification : FCC Part 15 Subpart B : 2003  
Title : FCC 47CFR Part15 Radio Frequency Device  
Subpart B Unintentional Radiators  
Section 15.109 Radiated emission limits

Remarks : This equipment adopted section 15.101(b) procedure-「However, receivers indicated as being subject to Declaration of Conformity that are contained within a transceiver, the transmitter portion of which is subject to certification, shall be authorized under the verification procedure.

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

##### **1) FCC Part 15 Subpart C: 2003**

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Result
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:2001	FCC Section 15.209	N/A	23.4dB 0.125MHz 0 deg.	Complied
2	Electric Field Strength of Spurious Emission	ANSI C63.4:2001	FCC Section 15.205 FCC Section 15.209	N/A	10.8dB 54.386MHz Horizontal	Complied
4	Conducted Emission	ANSI C63.4:2001	FCC Section 15.207(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.

##### **2) FCC Part 15 Subpart B: 2003**

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Result
1	Radiated emission	ANSI C63.4:2001	FCC Section 15.109(a)	N/A	16.2dB 1221MHz Horizontal	Complied
2	Conducted Emission	ANSI C63.4:2001	FCC Section 15.107(a) and 207	N/A	N/A*1)	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.

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### 3.3 Addition to standards

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS210(issue 5): 2001 + Amendment:2002 + Amendment2:2003	RSS210(issue 5): 2001 + Amendment:2002 + Amendment2:2003	Radiated	N/A	N/A	N/A
2	-26dB Bandwidth	ANSI C63.4:2001	Reference data	Radiated	N/A	N/A	N/A

### 3.4 Confirmation

UL Apex Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C : 2003 Section 15.209 and FCC Part 15 Subpart B : 2003 Section 15.109(a).

### 3.5 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 test report has enough margin.

### 3.6 Test Location

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No.1 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on February 01, 2002. (Registration number: No.1:313583 Industry Canada: No.1: IC4247)

No.2 semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05, 2002. (Registration number: No.2:846015 Industry Canada: No.2: IC4247-2)

\*NVLAP Lab. code: 200572-0

Test room	Width x Depth x Height (m)	Size of reference ground plane(m)	Other rooms
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	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 shielded room	3.1 x 5.0 x 2.7m	N/A	-

### 3.7 Test set up, Test instruments and Data of EMI

Refer to APPENDIX 1 to 3.

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### Head Office EMC Lab.

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

### 4.1 Operating Modes

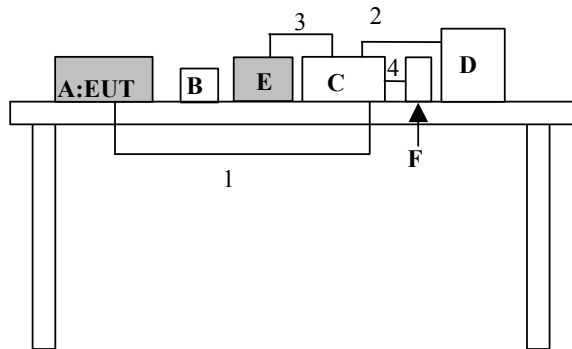
The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.

The sequence is used : Transmitting mode and Receiving mode  
\*Receiving mode: the test was performed under the signal from the transmitter.  
Tx : Control unit (125kHz)→ Hand unit  
Rx : Hand unit (315MHz)→ Control unit

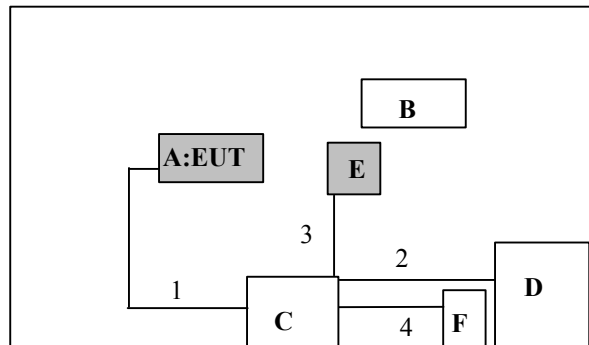
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

### 4.2 Configuration and peripherals

#### Front View



#### Top View



\* Test data was taken under worse case conditions.

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**Description of EUT and Support Equipment**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Control Unit	TFWD1U623	2	Alps Electric Co., Ltd.	CWTWDU623
B	Hand Unit	TFWB1U617	1	Alps Electric Co., Ltd.	CWTWBU617
C	Checker Box	N/A	N/A	Alps Electric Co., Ltd.	-
D	Car Battery	50B24L	N/A	YUASA	-
E	Bar antenna	TFWS1Z171A	-	Alps Electric Co., Ltd.	-
F	Checker PWB	-	-	Alps Electric Co., Ltd.	-

**List of cables used**

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

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

**5.1 Operating environment**

The test was carried out in No.1 and No.2 semi anechoic chamber.

Temperature : See data  
Humidity : See data

**Test Procedure**

The Radiated Electric Field Strength intensity has been measured on No.1 semi anechoic chamber with a ground plane and at a distance of 10m and on No 2 semi anechoic chamber with a ground plane and at 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 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
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	1MHz*

\* Spectrum Analyzer : RBW = VBW = 1MHz

- The carrier level (or, noise levels) was (or were) measured at each position of all three axes A, B and C, 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)

[Limit at 10m]=[Limit at 300m]-40 x log (10[m]/300[m])

[Limit at 10m]=[Limit at 30m]-40 x log (10[m]/30[m])

**5.5 Results**

Summary of the test results: Pass

Date: March 5, 2004

Tested by: Kenichi Adachi

**SECTION 6: -26dB Bandwidth (Reference data)**

Fundamental Frequency : 125kHz

Test data : APPENDIX 3

Test result : N/A

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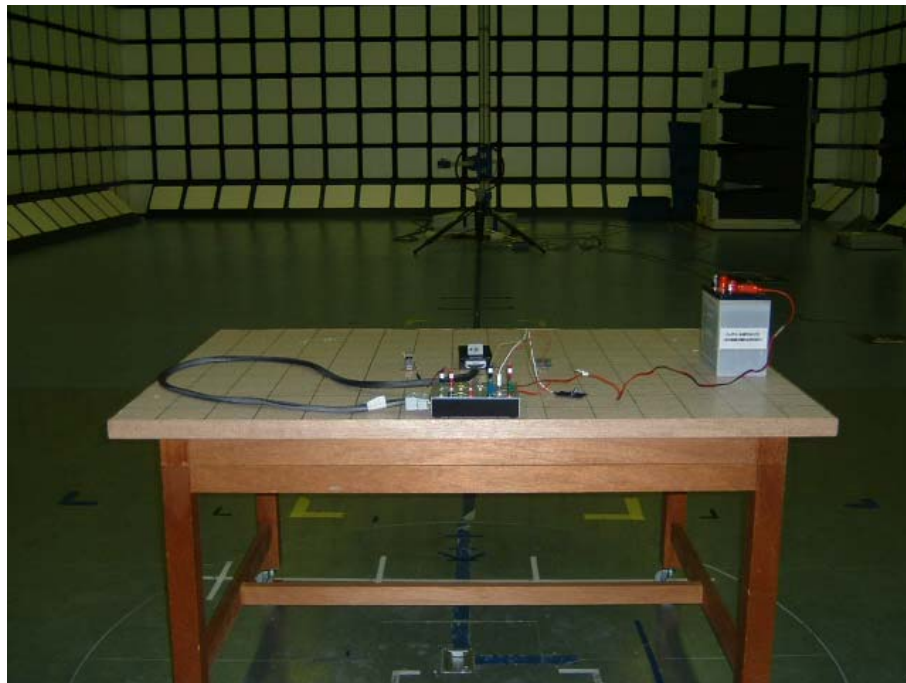


**APPENDIX 1: Photographs of test setup**

**Radiated Magnetic Field Strength (Transmitting)**  
**Front**



**Rear**

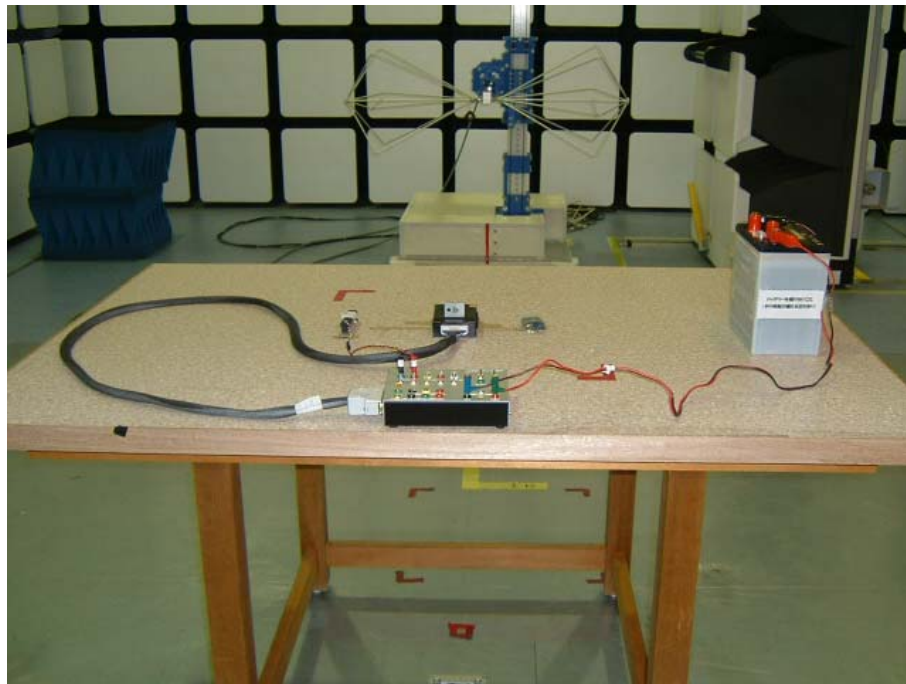


**Radiated emission (Transmitting / Receiving)**

**Front**

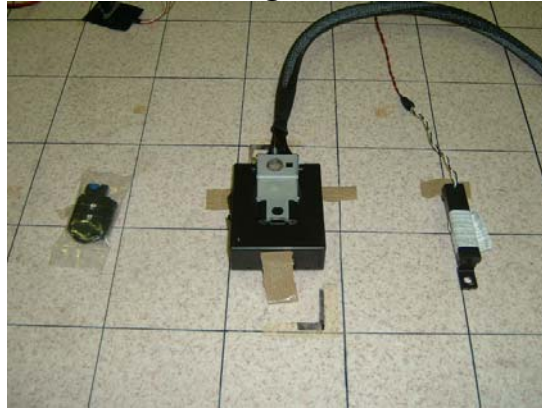


**Rear**



**Worst Case Position/Transmitting(Horizontal : Angle A/ Vertical: Angle B)**

**Angle A**



**Angle B**



**Angle C**



## **APPENDIX 2: Test Instruments**

### **EMI Test Instrument**

<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	ME	2003/12/27 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	ME	2003/11/12 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/ TSJ	-	ME	2003/12/24 * 12
MPA-04	Pre Amplifier	Agilent	8447D	ME	2004/03/08 * 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
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2003/04/11 * 12
MRENT-06	Spectrum Analyzer	Advantest	R3273	RE	2003/10/31 * 12
MCC-04	Microwave Cable	Storm	421-011	RE	2004/01/06 * 12
MCC-24	Microwave Cable	Storm	-	RE	2003/04/30 * 12
MHA-06	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2004/01/10 * 12
MPA-01	Pre Amplifier	Agilent	8449B	RE	2004/02/06 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2003/12/16 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2003/04/28 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2003/04/28 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	RE	2004/02/24 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2004/02/03 * 12
MPA-02	Pre Amplifier	Agilent	87405A	RE	2003/04/17 * 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 150kHz – 30MHz**

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**APPENDIX 3: Data of EMI test**

**Radiated Emission (Control unit)/Transmitting**

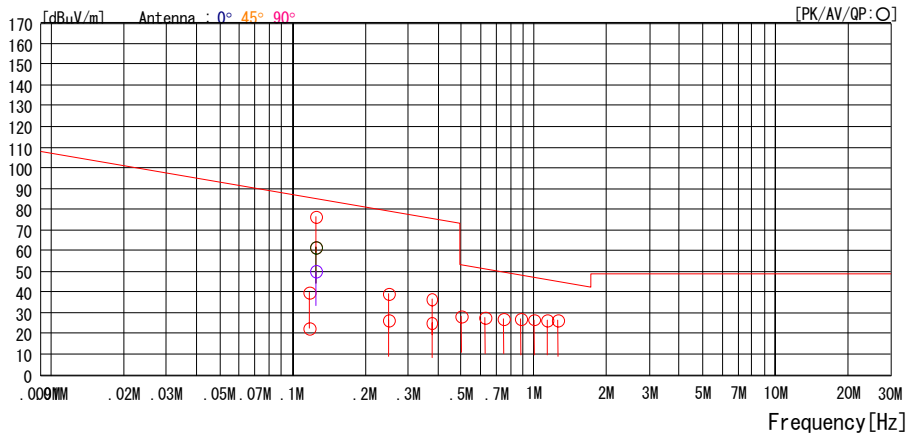
**DATA OF MAGNETIC RADIATED EMISSION TEST**

UL Apex Co.,LTD. Head Office EMC Lab. No.1 Semi Anechoic  
Date : 2004/03/05 23:38:47

Applicant : ALPS Electric Co.,Ltd. Report No. : 24GE0135-HO  
Kind of EUT : Passive Entry System Control Unit Power : DC 12V  
Model No. : TFWD1U623 Temp°C/Humi% : 24 / 32  
Serial No. : 2 Operator : Kenichi Adachi

Mode / Remarks : Transmitting / X-axis

LIMIT : FCC15C §15.209(a) 10m



No.	FREQ [MHz]	READING QP [dBμV]	ANT FACTOR [dB]	LOSS [dB]	RESULT [dBμV/m]	LIMIT [dBμV/m]	MARGIN [dB]	ANTENNA [DEG]	
1	0.125	81.4	19.9	-25.0	76.3	104.8	28.5	0°	178
2	0.125	66.5	19.9	-25.0	61.4	84.8	23.4	0°	178
3	0.250	45.6	19.9	-26.5	39.0	98.7	59.7	0°	178
4	0.250	32.5	19.9	-26.5	25.9	78.7	52.8	0°	178
5	0.375	42.8	19.9	-26.7	36.0	95.2	59.2	0°	178
6	0.375	31.8	19.9	-26.7	25.0	75.2	50.2	0°	178
7	0.500	34.8	19.9	-26.9	27.8	52.7	24.9	0°	178
8	0.625	34.3	19.8	-26.8	27.3	50.8	23.5	0°	178
9	0.750	33.9	19.8	-26.8	26.9	49.2	22.3	0°	178
10	0.875	33.6	19.8	-26.8	26.6	47.8	21.2	0°	178
11	1.000	33.4	19.8	-26.8	26.4	46.7	20.3	0°	178
12	1.125	33.3	19.8	-26.8	26.3	45.7	19.4	0°	178
13	1.250	33.2	19.8	-26.9	26.1	44.7	18.6	0°	178

CHART : WITHOUT FACTOR ANT TYPE : LOOP  
CALCULATION : READING + ANT FACTOR + LOSS ( CABLE + ATTEN. -AMP.)

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**Radiated emission (Transmitting)**

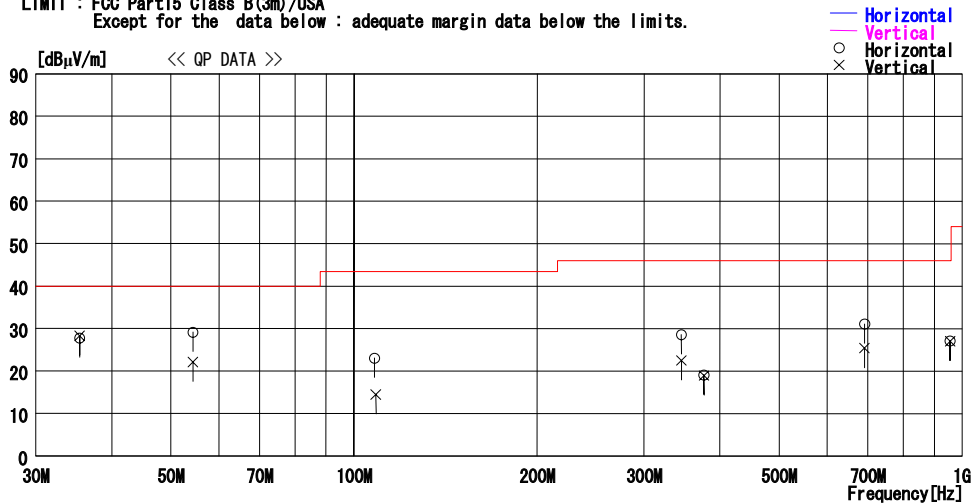
**DATA OF RADIATED EMISSION TEST**

UL Apex Co., Ltd. Head Office EMC Lab. No. 2 Semi Anechoic Chamber  
Date : 2004/03/05 23:38:47

Applicant : Alps Electric Co., Ltd. Report No. : 24GE0135-HO  
Kind of EUT : Passive Entry System Control Unit Power : DC 12V  
Model No. : TFWD1U623 Temp°C/Humi% : 24 / 38%  
Serial No. : 2 Operator : Kenichi Adachi

Mode / Remarks : Transmitting / X-axis

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



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	35.384	28.5	16.5	6.5	23.7	27.8	40.0	12.2	250	186
2	54.386	36.2	9.9	6.8	23.7	29.2	40.0	10.8	400	36
3	108.144	28.7	10.4	7.3	23.3	23.1	43.5	20.4	272	139
4	345.268	27.4	15.7	8.5	23.0	28.6	46.0	17.4	100	0
5	376.285	17.1	16.6	8.6	23.2	19.1	46.0	26.9	100	0
6	691.084	23.7	20.6	10.1	23.3	31.1	46.0	14.9	130	217
7	955.701	16.4	22.6	10.9	22.8	27.1	46.0	18.9	100	0
— Vertical —										
8	35.380	29.0	16.5	6.5	23.7	28.3	40.0	11.7	100	279
9	54.380	29.1	9.9	6.8	23.7	22.1	40.0	17.9	100	295
10	108.641	20.0	10.5	7.3	23.3	14.5	43.5	29.0	257	36
11	345.566	21.3	15.7	8.5	23.0	22.5	46.0	23.5	173	301
12	376.311	16.9	16.6	8.6	23.2	18.9	46.0	27.1	100	0
13	691.082	18.0	20.6	10.1	23.3	25.4	46.0	20.6	144	185
14	955.701	16.3	22.6	10.9	22.8	27.0	46.0	19.0	100	0

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:

## -26dB Bandwidth

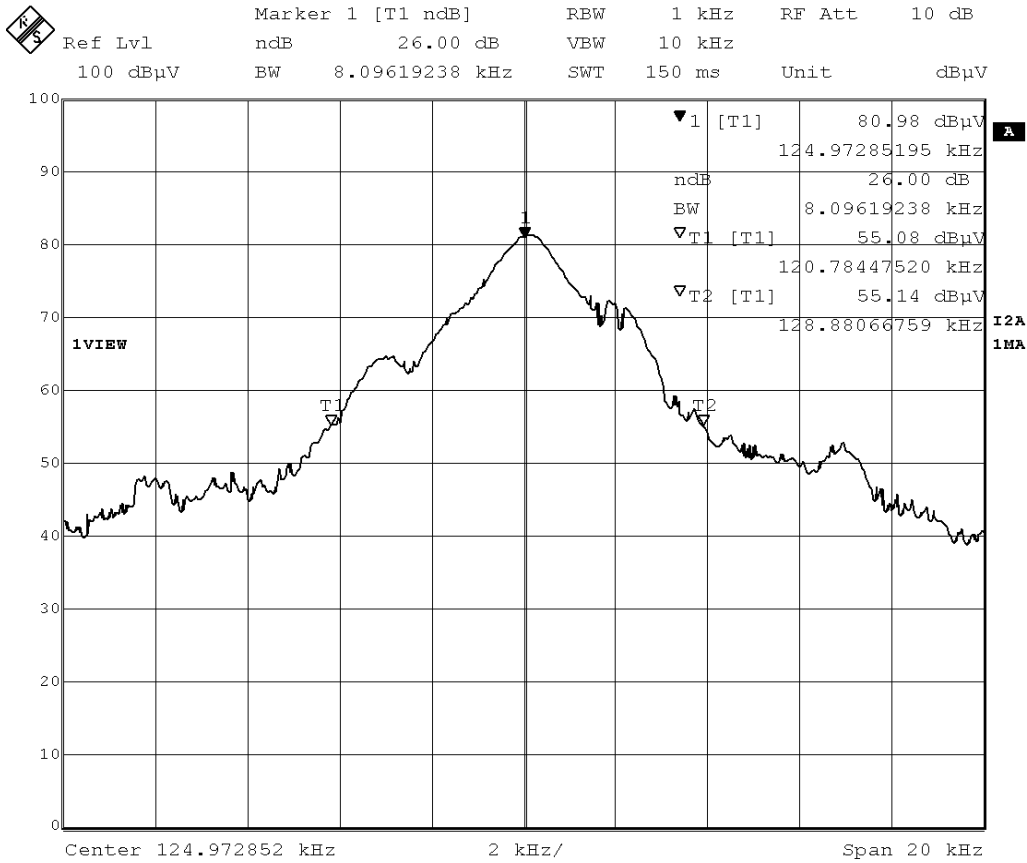
UL Apex Co., Ltd.  
 Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY : Alps Electric Co.,Ltd.  
 EQUIPMENT : Control Unit  
 MODEL : TFWD1U623  
 S/N : 2  
 FCC ID : CWTWDU623  
 POWER : DC 12V  
 MODE : Transmitting

REPORT NO. : 24GE0135-HO  
 REGULATION : -  
 TEST DISTANCE : 10 m  
 DATE : 03/05/2004  
 TEMPERATURE : 22°C  
 HUMIDITY : 32%

Engineer : Kenichi Adachi

-26dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
8.10	-	-



Date: 5.MAR.2004 21:39:35

### 99% Occupied Bandwidth

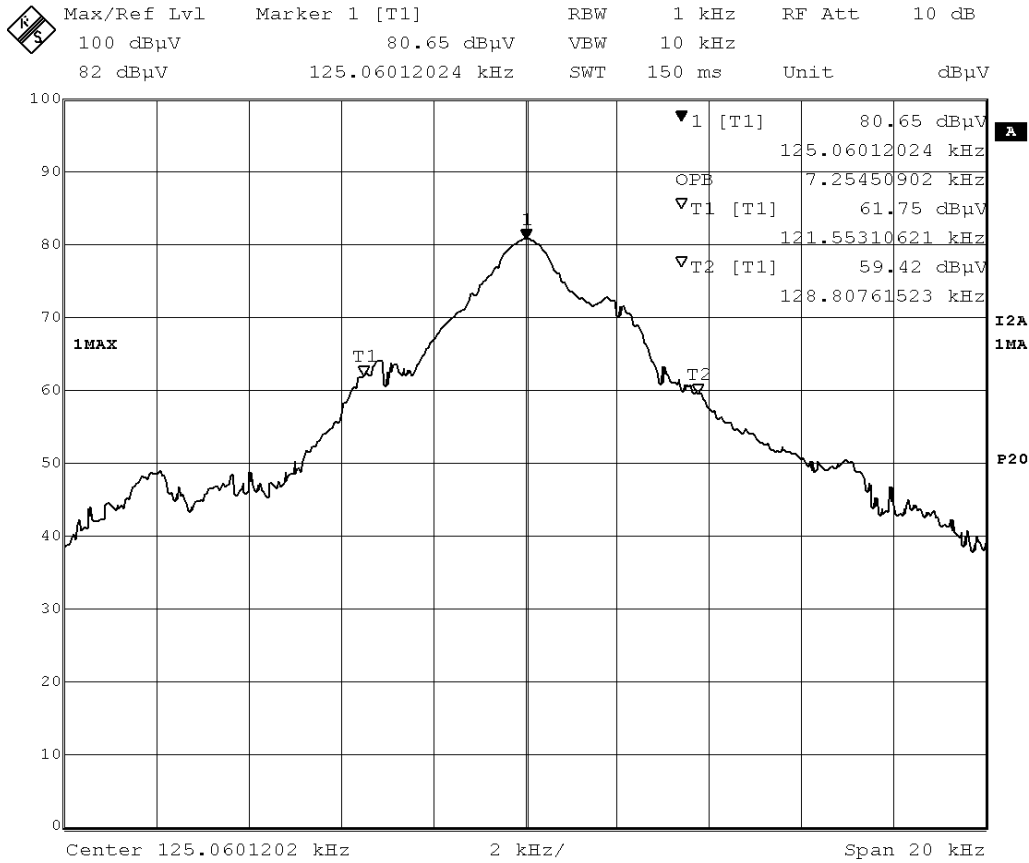
UL Apex Co., Ltd.  
 Head Office EMC Lab. No.1 Semi Anechoic Chamber

COMPANY : Alps Electric Co.,Ltd.  
 EQUIPMENT : Control Unit  
 MODEL : TFWD1U623  
 S/N : 2  
 FCC ID : CWTWDU623  
 POWER : DC 12V  
 MODE : Transmitting

REPORT NO. : 24GE0135-HO  
 REGULATION : RSS210  
 TEST DISTANCE : 10 m  
 DATE : 03/05/2004  
 TEMPERATURE : 22°C  
 HUMIDITY : 32%

Engineer : Kenichi Adachi

99% Occupied Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
7.25	-	-



Date: 6.MAR.2004 3:30:46



## Radiated Emission (Control unit)/Receiving

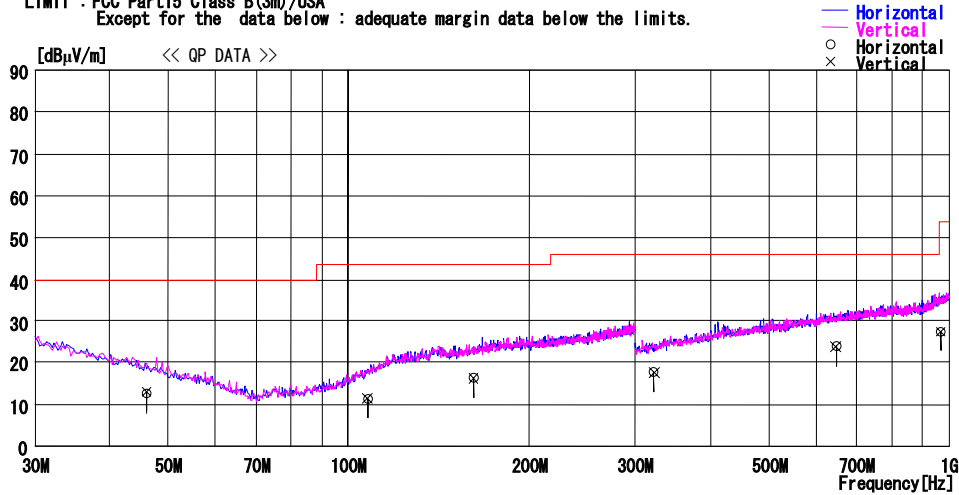
### DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/03/05 16:07:48

Applicant : Alps Electric Co., Ltd. Report No. : 24GE0135-HO  
Kind of EUT : Passive Entry System Control Unit Power : DC 12V  
Model No. : TFWD1U623 Temp°C/Humi% : 24 / 38%  
Serial No. : 2 Operator : Kenichi Adachi

Mode / Remarks : Receiving / X-axis

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



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	46.128	17.0	12.5	6.7	23.7	12.5	40.0	27.5	100	0
2	107.632	17.1	10.3	7.3	23.3	11.4	43.5	32.1	100	0
3	161.460	17.0	14.8	7.7	23.2	16.3	43.5	27.2	100	0
4	322.828	17.2	15.1	8.5	23.2	17.6	46.0	28.4	100	0
5	645.586	17.0	20.1	9.9	23.2	23.8	46.0	22.2	100	0
6	968.515	16.3	23.0	10.9	22.9	27.3	54.0	26.7	100	0
— Vertical —										
7	46.128	17.4	12.5	6.7	23.7	12.9	40.0	27.1	100	0
8	107.632	17.1	10.3	7.3	23.3	11.4	43.5	32.1	100	0
9	161.460	17.0	14.8	7.7	23.2	16.3	43.5	27.2	100	0
10	322.828	17.1	15.1	8.5	23.2	17.5	46.0	28.5	100	0
11	645.586	17.0	20.1	9.9	23.2	23.8	46.0	22.2	100	0
12	968.515	16.3	23.0	10.9	22.9	27.3	54.0	26.7	100	0

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:

**UL Apex Co., Ltd.**

**Head Office EMC Lab.**

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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MF060b(10.04.03)

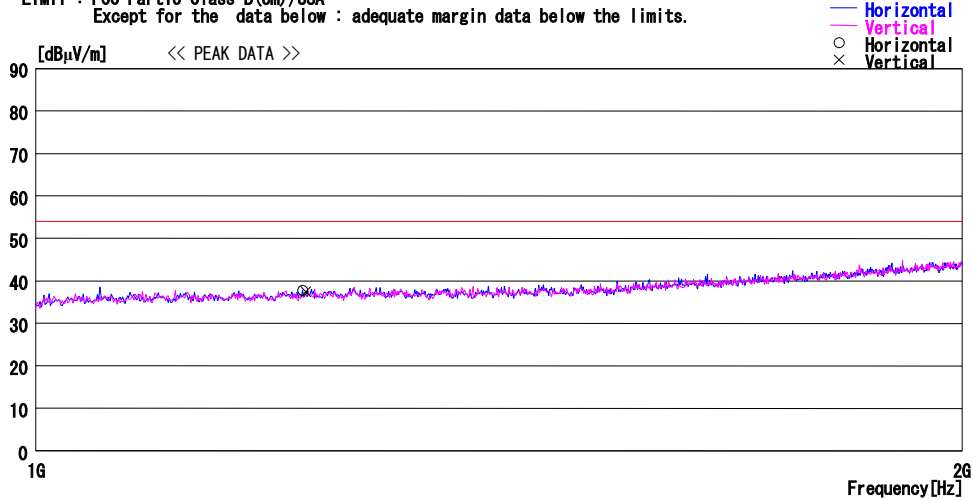
**Radiated emission (Receiving)**  
**DATA OF RADIATED EMISSION TEST**

UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2004/03/05 18:13:41

Applicant : Alps Electric Co., Ltd. Report No. : 24GE0135-HO  
Kind of EUT : Passive Entry System Control Unit Power : DC 12V  
Model No. : TFWD1U623 Temp°C/Humi% : 24 / 38%  
Serial No. : 2 Operator : Kenichi Adachi

Mode / Remarks : Receiving / X-axis

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



No.	FREQ [MHz]	READING PEAK [dBµV]	ANT FACTOR [dB/m]	LOSS [dB]	GAIN [dB]	RESULT [dBµV/m]	LIMIT [dBµV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
— Horizontal —										
1	1221.000	37.7	23.1	4.4	27.4	37.8	54.0	16.2	100	-1
— Vertical —										
2	1224.000	37.3	23.1	4.4	27.4	37.4	54.0	16.6	100	-1

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: