



EMI TEST REPORT

Test Report No. : 24GE0134-HO-2

Applicant : Alps Electric Co., Ltd.
Type of Equipment : Passive Entry System
(Control Unit)
Model No. : TFWD1U626
Test standard : FCC Part 15 Subpart C : 2003
Section 15.209
FCC Part 15 Subpart B : 2003
Section 15.109
FCC ID : CWTWDU626
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 8 to 11, 2004

Tested by : 
Naoki Sakamoto
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 (Control Unit)
Model No. : TFWD1U626
Serial No. : WD1U626A/402BB18A
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: TFWD1U626 is the Passive Entry System (Control Unit).
The control unit of passive entry system is a transmitter of 125kHz and a receiver of 315MHz. This 315MHz is transmitting from the hand unit. For the Hand unit, see the test report No. 24GE0134-HO-1.

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

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 (DC 12.0V). Therefore, this EUT complies with the requirement.

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
Section 15.109 Radiated emission limits
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

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 Part15 Subpart C : 2003

No.	Item	Test Procedure	Specification	Remarks	Worst margin	Result
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:2001	FCC Section 15.209	Radiated	26.7dB PK 0.125MHz 0 deg.	Complied
2	Electric Field Strength of Spurious Emission	ANSI C63.4:2001	FCC Section 15.205 FCC Section 15.209	Radiated	10.4 dB QP 36.008MHz Vertical	Complied
3	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 Part15 Subpart B : 2003

No.	Item	Test Procedure	Specification	Remarks	Worst margin	Result
1	Radiated emission	ANSI C63.4:2001	FCC Section 15.109(a)	Radiated	10.4 dB QP 36.008MHz Vertical	Complied
2	Conducted Emission	ANSI C63.4:2001	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.

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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 $\pm 1.8\text{dB}$.
The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is $\pm 4.5\text{dB}$.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}$.
The measurement uncertainty (with a 95% confidence level) for this test using Horn Antenna is $\pm 6.6\text{dB}$.
The data listed in this test report has enough margin.

3.6 Test Location

UL Apex Co., Ltd. Head Office EMC Lab.
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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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SECTION 4: Operation of E.U.T. during testing

4.1 Operating Modes

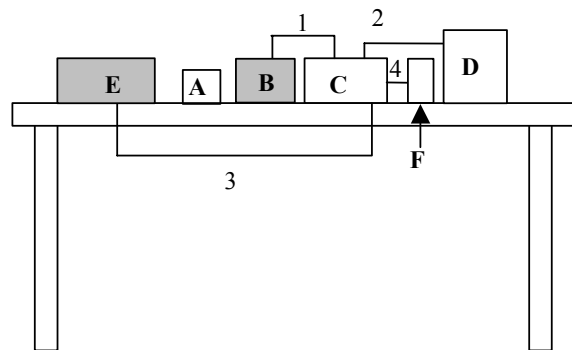
The EUT exercise program used during radiated testing was designed to exercise the various system components in a manner similar to typical use.

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

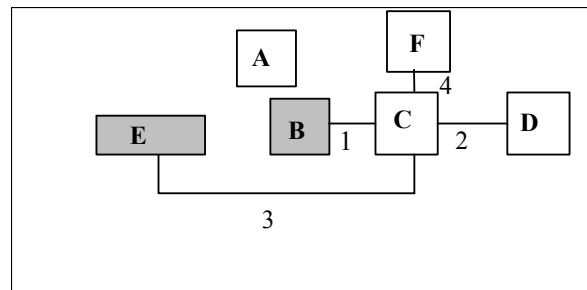
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Front View



Top View



* Test data was taken under worse case conditions.

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(Hand Unit)

Support equipment

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Hand Unit	TFWB1U619	1	Alps Electric Co., Ltd.	CWTWBU619

(Control Unit)

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	TFWD1U626	WD1U626A/402BB18A	Alps Electric Co., Ltd.	CWTWDU626
F	Checker PWB	-	-	Alps Electric Co., Ltd.	-

List of cables used

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

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: March 8 to 11, 2004

Tested by: Naoki Sakamoto

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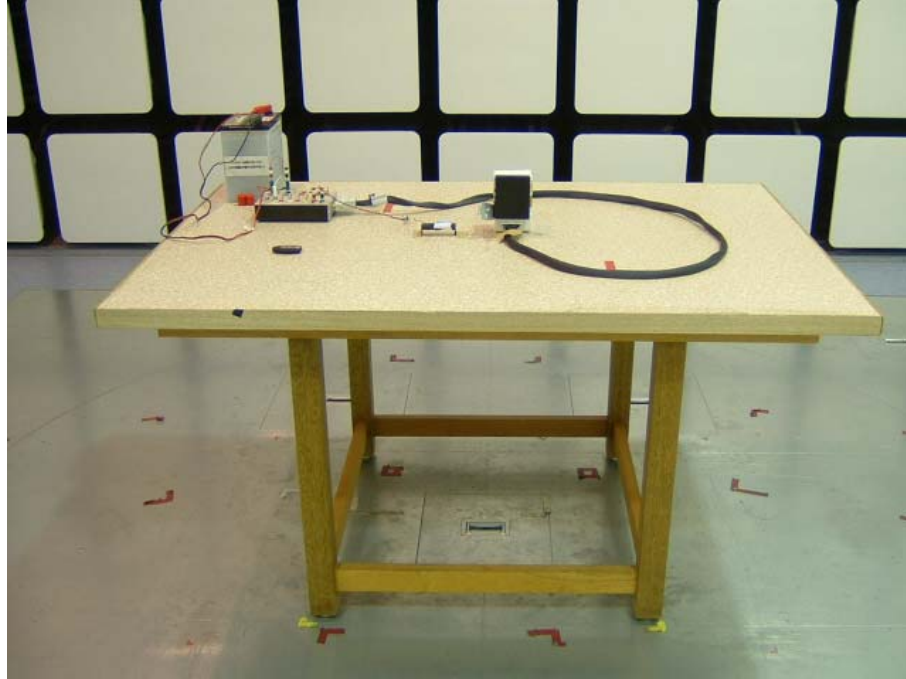
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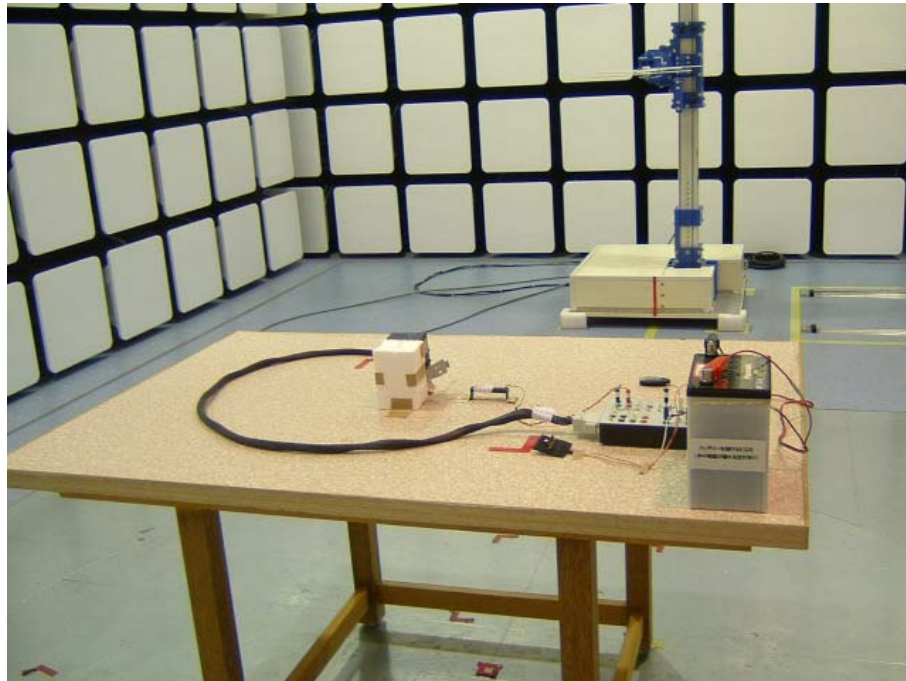
APPENDIX 1: Photographs of test setup

Radiated emission

Front



Rear

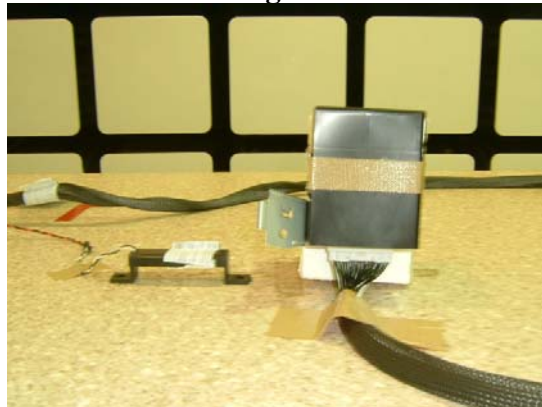


Worst Case Position (Horizontal : Angle A/ Vertical: Angle B)

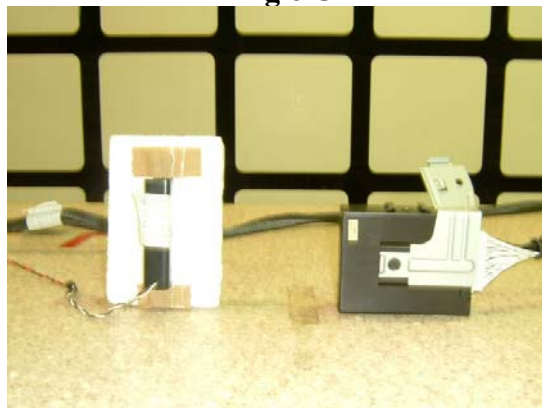
Angle A



Angle B



Angle C



APPENDIX 2: Test Instruments

EMI Test Instrument

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
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 9kHz – 30MHz

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APPENDIX 3: Data of EMI test

Radiated Emission

Radiated Emission DATA OF MAGNETIC RADIATED EMISSION TEST

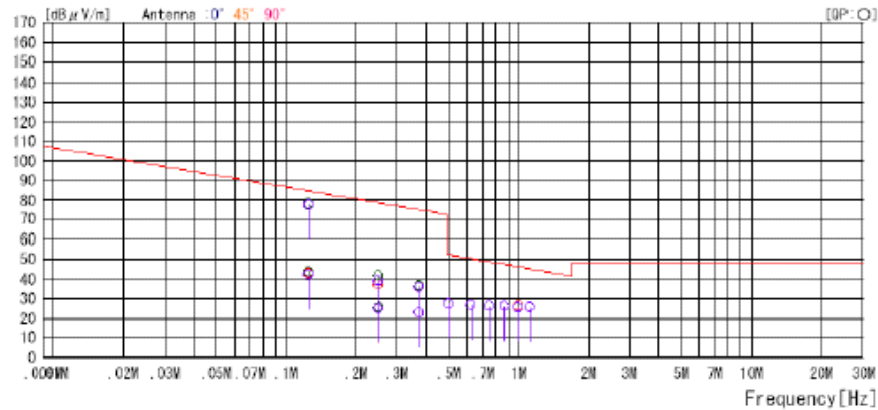
UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber

Date : 2004/03/11/23:21:31

Applicant : ALPS Electric Co., Ltd.
Kind of EUT : Passive Entry System
Model No. : TFW01U626
Serial No. : WD1U626A/402BB18A
Report No. : 24GE0134-HO
Power : DC 12V
Temp./Humid : 25 / 34
Operator : Naoki Sakamoto

Mode / Remarks : Transmitting and receiving mode

LIMIT : FCC15C §15.209(a) 10m



No.	FREQ [MHz]	READING [dB μV]	ANT FACTOR [dB]	LOSS [dB]	RESULT [dB μV/m]	LIMIT [dB μV/m]	MARGIN [dB]	ANTENNA [DEG]	TABLE	Comment
1	0.125	83.1	19.9	-25.0	78.0	104.7	26.7	0°	292	Pk
2	0.125	48.4	19.9	-25.0	43.3	84.7	41.4	0°	292	Av
3	0.250	44.1	19.9	-25.5	37.5	98.6	61.1	0°	27	Pk
4	0.250	31.8	19.9	-25.5	25.2	18.6	53.4	0°	27	Av
5	0.375	43.0	19.9	-26.7	36.2	95.1	58.9	0°	305	Pk
6	0.375	29.8	19.9	-26.7	23.0	75.1	52.1	0°	305	Av
7	0.500	34.5	19.9	-26.9	27.5	52.6	25.0	0°	169	Qp
8	0.625	33.9	19.8	-26.8	26.9	50.7	23.8	0°	296	Qp
9	0.750	33.5	19.8	-26.8	26.5	49.1	22.5	0°	220	Qp
10	1.000	33.1	19.8	-26.8	26.1	46.6	20.5	0°	51	Qp
11	1.125	32.7	19.8	-26.8	25.7	45.5	19.8	0°	355	Qp
12	0.875	33.2	19.8	-26.8	26.2	47.7	21.5	0°	67	Qp
13	0.125	83.0	19.9	-25.0	77.9	104.7	26.8	45°	234	Pk
14	0.125	48.6	19.9	-25.0	43.5	84.7	41.2	45°	234	Av
15	0.250	48.6	19.9	-26.5	42.0	98.6	56.6	45°	322	Pk
16	0.375	43.8	19.9	-26.7	37.0	95.1	58.1	45°	23	Pk
17	0.500	34.8	19.9	-26.9	27.8	52.6	24.8	45°	314	Qp
18	0.750	33.6	19.8	-26.8	26.6	49.1	22.5	45°	354	Qp
19	1.125	32.9	19.8	-26.8	25.9	45.5	19.6	45°	1	Qp
20	0.250	32.3	19.9	-26.5	25.6	78.6	52.9	45°	322	Av
21	0.375	30.0	19.9	-26.7	23.2	75.1	51.9	45°	23	Av
22	0.625	34.0	19.8	-26.8	27.0	50.7	23.7	45°	146	Qp
23	0.875	33.3	19.8	-26.8	26.3	47.7	21.4	45°	83	Qp
24	1.000	33.0	19.8	-26.8	26.0	46.6	20.6	45°	316	Qp
25	0.125	82.1	19.9	-25.0	77.0	104.7	27.7	90°	5	Pk
26	0.125	47.3	19.9	-25.0	42.2	84.7	42.5	90°	5	Av
27	0.250	46.1	19.9	-26.5	39.5	98.6	59.1	90°	52	Pk
28	0.375	43.1	19.9	-26.7	36.3	75.1	58.8	90°	155	Pk
29	0.500	34.7	19.9	-26.9	27.7	52.6	24.9	90°	175	Qp
30	0.625	34.0	19.8	-26.8	27.0	50.7	23.7	90°	356	Qp
31	1.125	32.6	19.8	-26.8	25.6	45.7	20.1	90°	297	Qp
32	0.250	31.9	19.9	-26.5	25.3	78.7	53.4	90°	52	Av
33	0.375	29.9	19.9	-26.7	23.1	75.2	52.1	90°	155	Av
34	0.750	33.5	19.8	-26.8	26.5	49.2	22.7	90°	327	Qp
35	0.875	33.1	19.8	-26.8	26.1	47.8	21.7	90°	88	Qp
36	1.000	33.0	19.8	-26.8	26.0	46.7	20.7	90°	204	Qp

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

DATA OF RADIATED EMISSION TEST

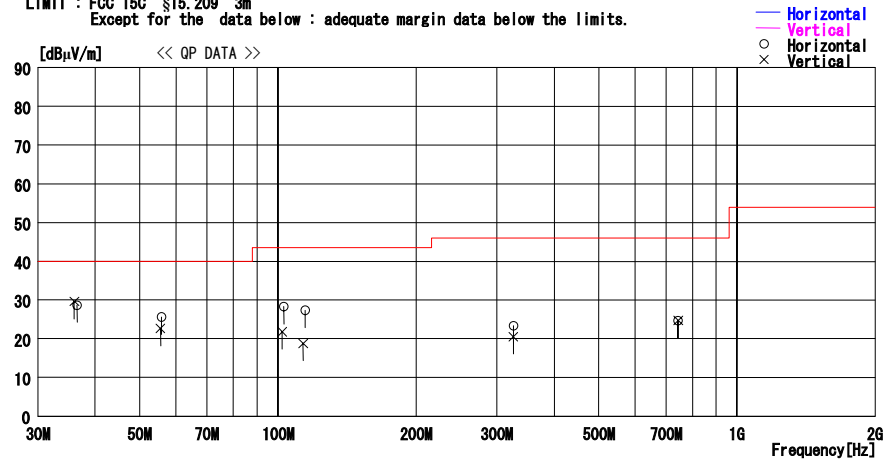
UL Apex Co., Ltd. Head Office EMC Lab. No.2 Semi Anechoic
Date : 2004/03/08 15:08:03

Applicant : Alps Electric CO.,LTD.
Kind of EUT : Passive Entry System (Control unit)
Model No. : TFWDU626
Serial No. : WD1U626A/402BB18A
Report No. : 24GE0134-HO
Power : DC12V
Temp°C/Humi% : 24 / 30%
Operator : Naoki Sakamoto

Mode / Remarks : Transmitting and Receiving mode (Max: Angle A)

LIMIT : FCC 15C §15.209 3m

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]	[DE6]
Horizontal										
1	36.511	29.8	16.1	6.5	23.7	28.7	40.0	11.3	253	6
2	55.760	33.0	9.5	6.8	23.7	25.6	40.0	14.4	245	353
3	103.018	35.2	9.1	7.2	23.2	28.3	43.5	15.2	194	184
4	114.517	31.3	12.0	7.3	23.3	27.3	43.5	16.2	295	188
5	325.700	23.1	15.1	8.4	23.2	23.4	46.0	22.6	116	114
6	744.559	16.4	21.0	10.4	23.2	24.6	46.0	21.4	203	309
Vertical										
7	36.008	30.5	16.3	6.5	23.7	29.6	40.0	10.4	112	239
8	55.511	30.0	9.6	6.8	23.7	22.7	40.0	17.3	102	41
9	102.261	28.9	9.0	7.2	23.3	21.8	43.5	21.7	187	128
10	113.508	23.1	11.7	7.3	23.3	18.8	43.5	24.7	231	126
11	325.731	20.2	15.1	8.4	23.2	20.5	46.0	25.5	168	158
12	744.721	16.5	21.0	10.4	23.2	24.7	46.0	21.3	153	128

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:

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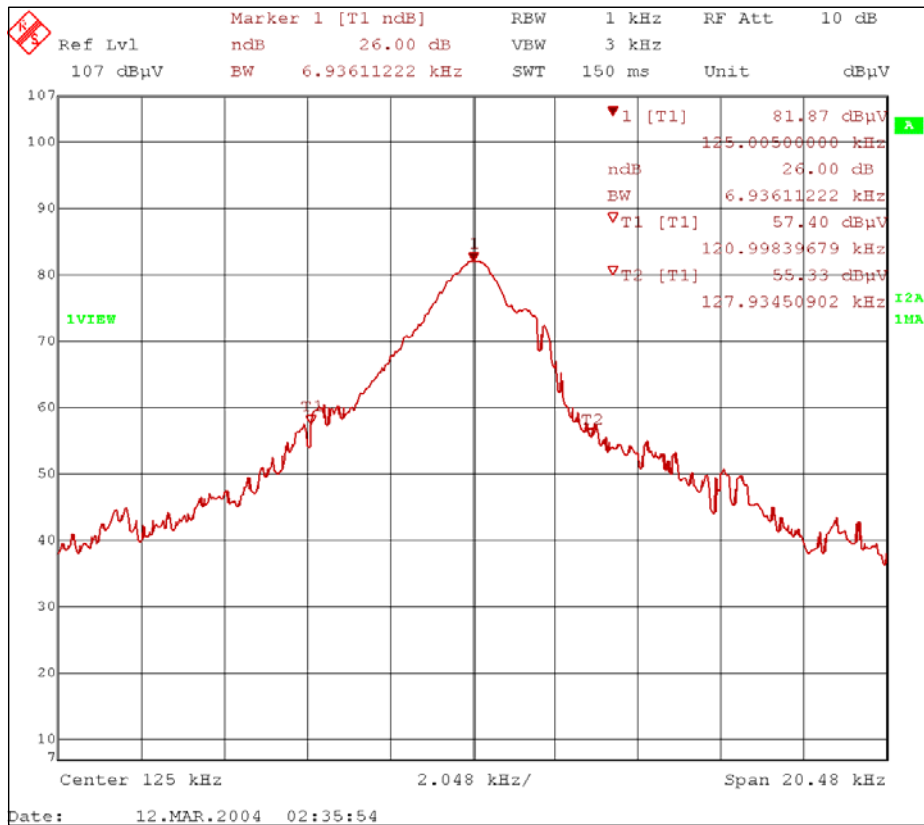
-26dB bandwidth

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

COMPANY : Alps Electric Co.,Ltd.
EQUIPMENT : Passive Entry System (Control Unit)
MODEL : TFWD1U626
S/N : WD1U626A/402BB18A
FCC ID : CWTWDU626
POWER : DC 12V
MODE : Transmitting

REPORT NO. : 24GE0134-HO
TEST DISTANCE : 10 m
DATE : 03/08/2004
TEMPERATURE : 22°C
HUMIDITY : 32%
ENGINEER : Naoki Sakamoto

-26dB Bandwidth
[kHz]
6.94



99% Occupied Bandwidth

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

COMPANY : Alps Electric Co.,Ltd.
EQUIPMENT : Passive Entry System (Control Unit)
MODEL : TFWD1U626
S/N : WD1U626A/402BB18A
FCC ID : CWTWDU626
POWER : DC 12V
MODE : Transmitting

REPORT NO. : 24GE0134-HO
REGULATION : RSS210
TEST DISTANCE : 10 m
DATE : 03/08/2004
TEMPERATURE : 22°C
HUMIDITY : 32%
ENGINEER : Naoki Sakamoto

99% Occupied Bandwidth
[kHz]
125.01

