



EMI TEST REPORT

Test Report No. : 26AE0241-HO-1a

Applicant : Alps Electric Co., Ltd.
Type of Equipment : Passive Entry System
(Control Unit)
Model No. : TWD1U722
Test standard : FCC Part 15 Subpart C : 2005
Section 15.209
FCC Part 15 Subpart B: 2005
Section 15.109
FCC ID : CWTWDU722
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 : September 28, 2005

Tested by : T. Shimada
Takumi Shimada
EMC Services

Approved by : [Signature]
Naoki Sakamoto
Group Leader of EMC Services

UL Apex Co., Ltd.

Head Office EMC Lab.

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

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MF060b(01.06.05)

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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	: Katsuhiro Seino

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.	: TWD1U722
Serial No.	: 064074
Country of Manufacture	: Japan
Receipt Date of Sample	: September 27, 2005
Condition of EUT	: Production prototype

(Not for Sale: This sample is equivalent to mass-produced items.)

2.2 Product Description

Model No: TWD1U722 is Control Unit of Passive Entry System. It has a transmitting function of 125kHz and a receiving function of 315MHz.

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

Tx section

Frequency of Operation	: 125kHz
Modulation	: Amplitude
Antenna	: External (LC antenna)

Rx section

Receiving Frequency	: 315MHz
Intermediate Frequency	: 10.7MHz
Antenna	: Internal (Bar antenna)

FCC 15.31 (e)

The power supply of this EUT is transformed to DC5.0V and provides stable voltage (DC5.0V) constantly to Radio part. Therefore, this EUT complies with the requirement.

FCC 15.111(b)

The receiving antenna is installed inside the EUT and cannot be removed. Therefore, the EUT complies with the requirement in section 15.111(b).

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FCC15.203 Antenna requirement

It is impossible for users to replace the antenna, because the antenna is a set with EUT and installed outside of EUT inside the vehicle. Therefore, the equipment complies with the antenna requirement of Section 15.203.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification/Title : FCC Part 15 Subpart C 2005
FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.209 Radiated emission limits, general requirements

FCC Part 15 Subpart B 2005
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

[FCC Part 15 Subpart C]

No.	Item	Test Procedure	Specification	Remarks	Worst margin	Result
1	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.209	Radiated	<PK> 30.8dB 125.03kHz, 0 deg. <AV> 33.2dB 125.03kHz, 0 deg.	Complied
2	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	FCC Section 15.205 FCC Section 15.209	Radiated	3.2dB 49.001MHz, QP Vertical (Max Antenna, X-axis)	Complied
3	Conducted Emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	FCC Section 15.207(a)	AC Mains only *1)	N/A	N/A

Note: UL Apex's EMI Work procedures No. QPM05 and QPM15.

*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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[FCC Part 15 Subpart B]

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Result
1	Conducted emission	ANSI C63.4: 2003 7. AC powerline conducted emission measurements	FCC Section 15.107(a) and 207	N/A	N/A*1)	Complied
2	Radiated emission	ANSI C63.4: 2003 8. Radiated emission measurements	FCC Section 15.109(a)	N/A	3.2dB 49.001MHz, QP	Complied

*Note: UL Apex's EMI Work Procedure QPM05.

*1) The 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.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	-26dB Bandwidth	ANSI C63.4:2003 Annex H.6 Occupied bandwidth measurements	Reference data	Radiated	N/A	N/A	N/A
2	99% Occupied Band Width	RSS-Gen 4.4.1	-	Radiated	N/A	N/A	N/A

3.4 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 $\pm 4.5\text{dB}(3\text{m}) / 4.7\text{dB}(10\text{m})$.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is $\pm 5.2\text{dB}(3\text{m}) / 3.8\text{dB}(10\text{m})$.

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 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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	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	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	June 05, 2002	846015	IC4247A-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

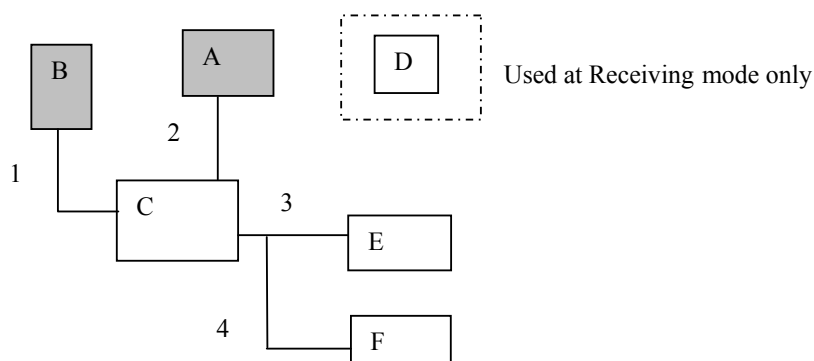
The sequence is used:

1. Continuous Transmitting mode (125kHz, to Hand Unit)
2. Receiving mode (315MHz, from Hand Unit)

Remarks: This EUT in actual use is set to have the maximum RF power that is supplied to Antenna.
The length of the antenna cable was set for the test in the worst condition (actual usage).

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

4.2 Configuration and peripherals



* Cabling was 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	FCC ID
A	Passive Entry System (Control Unit)	TWD1U722	064074	Alps Electric Co., Ltd.	CWTWDU722
B	Bar antenna	-	-	Alps Electric Co., Ltd.	-
C	Checker Box	N/A	N/A	Alps Electric Co., Ltd.	-
D	Passive Entry System* (Hand Unit)	TWB1U627	-	Alps Electric Co., Ltd.	-
E	Checker PWB	-	-	Alps Electric Co., Ltd.	-
F	Car Battery	50B24L	N/A	YUASA	-

* Used at Receiving mode only

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Test report No. : 26AE0241-HO-1a
Page : 9 of 21
Issued date : October 14, 2005
Revised date : November 11, 2005
FCC ID : CWTWDU722

List of cables used

No.	Name	Length (m)	Shield	Remark
1	Antenna Cable	2.0	N	-
2	Signal & DC Power Cable	1.0	N	-
3	Cable for Checker PWB	0.4	N	-
4	DC Power Cable	1.0	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 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/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 and noise levels were confirmed at each position of X, Y and Z axis of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

* 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: September 28, 2005

Tested by: Takumi Shimada

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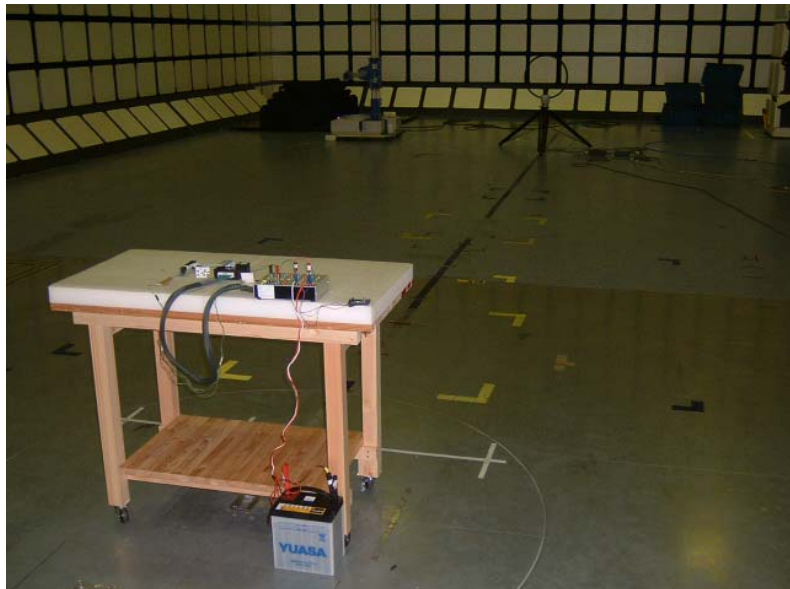
APPENDIX 1: Photographs of test setup

Radiated emission (Transmitting: 90kHz-30MHz)

Front



Rear

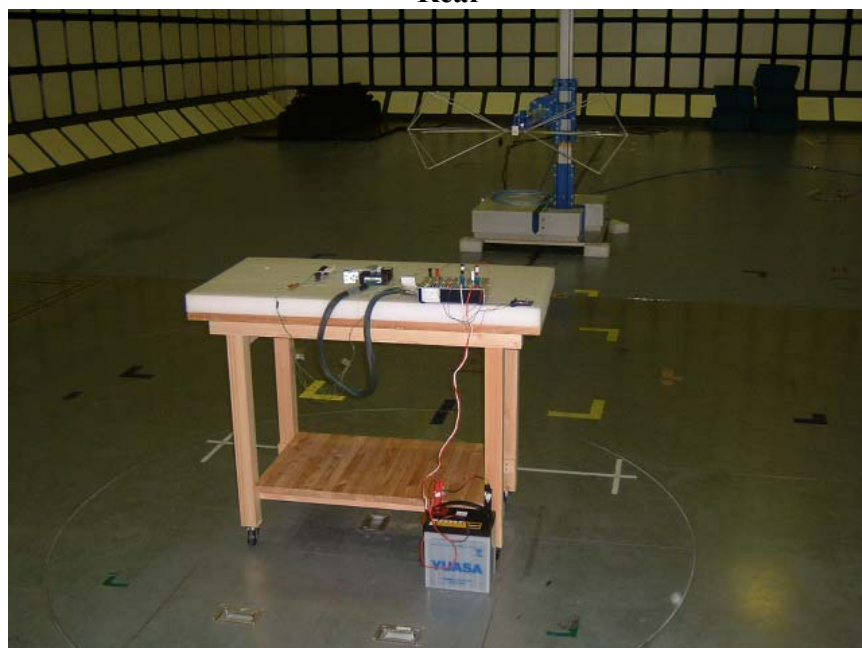


Radiated emission
(Transmitting: 30-1000MHz)

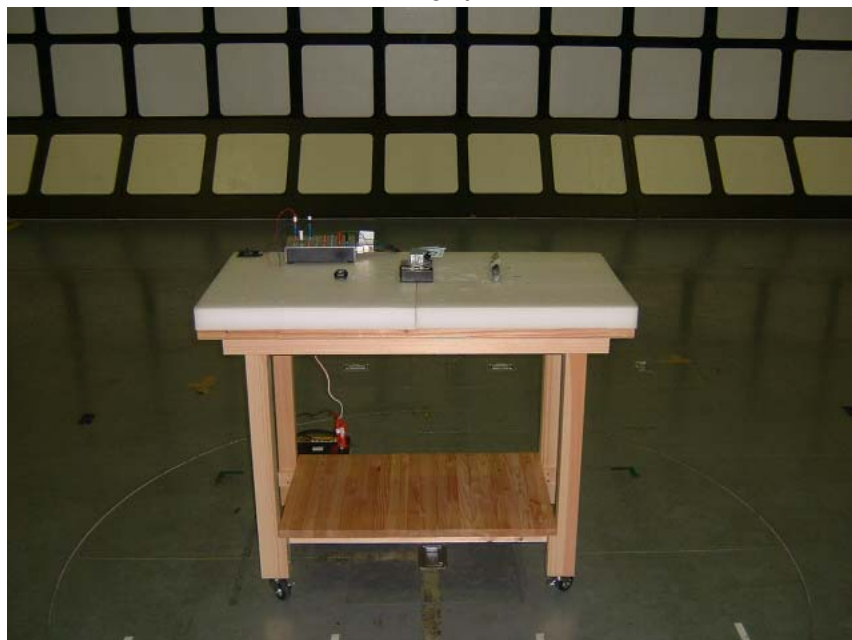
Front



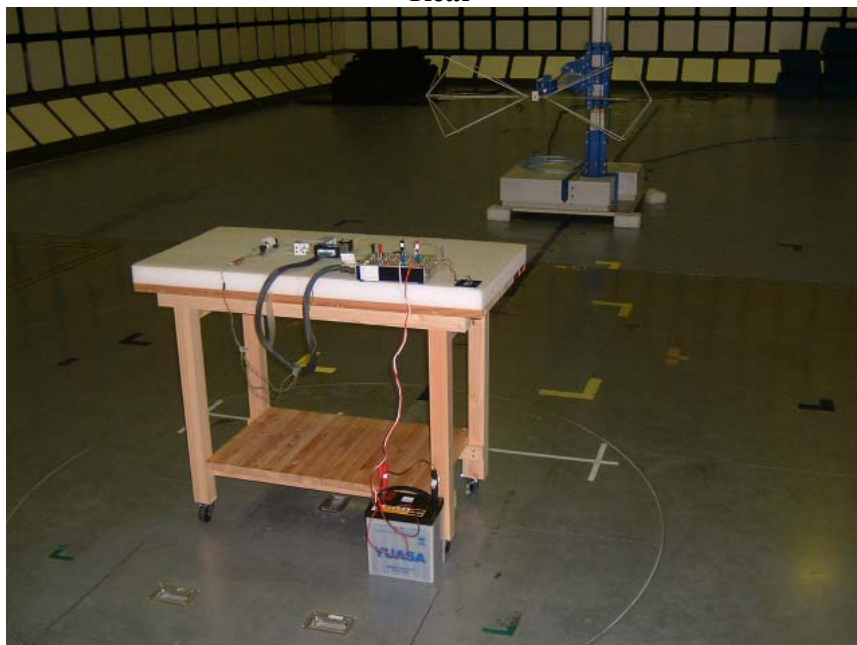
Rear



Radiated emission
(Receiving)
Front

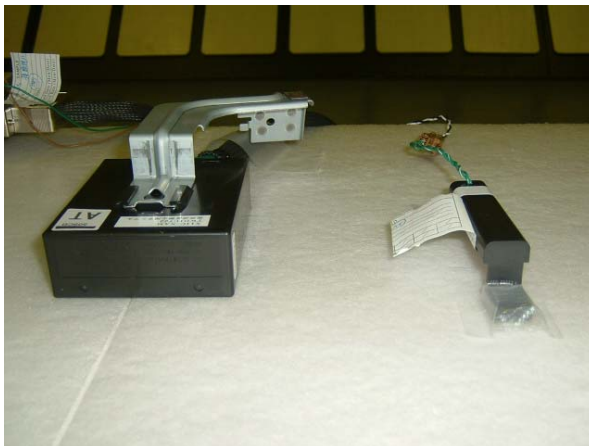


Rear

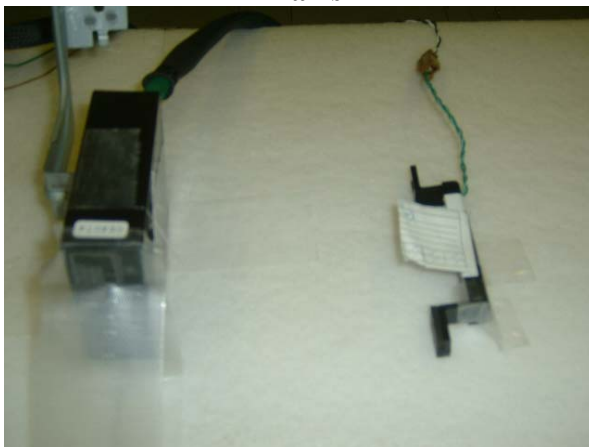


Worst Case Position (Horizontal: X-axis/Vertical: X-axis)

X-axis



Y-axis



Z-axis



APPENDIX 2: Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-01	Anechoic Chamber	TDK	Semi Anechoic Chamber 10m	RE / ME	2004/11/13 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE / ME	2004/11/12 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2004/10/14 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2004/10/14 * 12
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/TSJ	-	RE	2004/12/19 * 12
MLPA-02	Loop Antenna	Rohde & Schwarz	HFH2-Z2	ME	2004/12/10 * 12
MCC-03	Coaxial Cable	Fujikura/Suhner/Agilent/TSJ	-	ME	2004/12/24 * 12
MCC-31	coaxial cable	ULApex	-	ME	2005/06/02 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2004/12/16 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2005/01/10 * 12
MCC-18	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	RE	2005/02/03 * 12
MCC-26	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX104	RE	2005/08/30 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE / ME	2005/05/24 * 12
MPA-05	Pre Amplifier	TSJ	TSJ 1-26.5GHz PreAmp	RE	2005/07/08 * 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 (Transmitting)

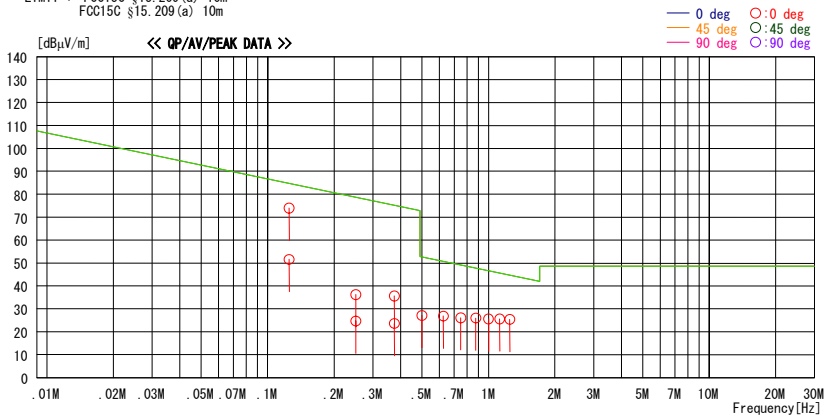
DATA OF MAGNETIC RADIATED EMISSION TEST

UL Apex Co., LTD. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2005/09/28 11:09:14

Applicant : ALPS Electric Co., Ltd
Kind of EUT : Passive Entry System (Control Unit)
Model No. : TWD1U722
Serial No. : 064074
Report No. : 26AE0241-HO
Power : DC 12V
Temp°C/Humi% : 25deg. C / 62%
Operator : Takumi Shimada

Mode / Remarks : Transmitting / X-Axis

LIMIT : FCC15C §15.209(a) 10m
FCC15C §15.209(a) 10m



Freq.	Reading	DET	Ant.Fac	Loss	Gain	Result	Limit	Margin	Antenna	Table
[MHz]	[dBμV]		[dB/m]	[dB]	[dB]	[dBμV/m]	[dBμV/m]	[dB]	[deg]	[deg]
0.12503	80.2	PEAK	19.7	0.3	26.2	74.0	104.8	30.8	0deg	180
0.12503	57.8	AV	19.7	0.3	26.2	51.6	84.8	33.2	0deg	180
0.25060	43.3	PEAK	19.7	0.6	27.3	36.3	98.7	62.4	0deg	180
0.25060	31.8	AV	19.7	0.6	27.3	24.8	78.7	53.9	0deg	180
0.37500	43.1	PEAK	19.7	0.5	27.7	35.6	95.2	59.6	0deg	180
0.37500	31.2	AV	19.7	0.5	27.7	23.7	75.2	51.5	0deg	180
0.50000	34.7	QP	19.6	0.7	27.8	27.2	52.7	25.5	0deg	180
0.62500	34.5	QP	19.6	0.7	27.9	26.9	50.8	23.9	0deg	180
0.75000	33.8	QP	19.6	0.7	27.9	26.2	49.2	23.1	0deg	180
0.87500	33.5	QP	19.6	0.8	27.9	26.0	47.8	21.8	0deg	180
1.00000	33.3	QP	19.6	0.6	27.9	25.6	46.7	21.1	0deg	180
1.12500	33.3	QP	19.6	0.6	27.9	25.6	45.7	20.1	0deg	180
1.25000	33.1	QP	19.7	0.6	27.9	25.5	44.7	19.2	0deg	180

CHART : WITH FACTOR ANT TYPE : LOOP
CALCULATION : READING + ANT FACTOR + LOSS(CABLE + ATTEN. -AMP.)

Page:

Radiated Emission (Receiving)

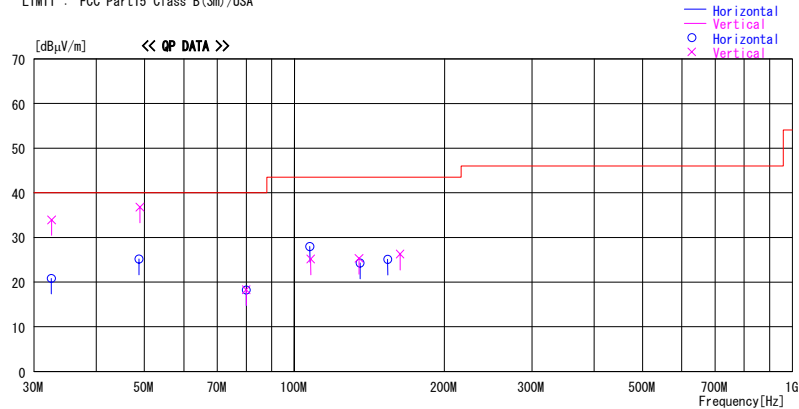
DATA OF RADIATED EMISSION TEST

UL Apex Co., Ltd. Head Office EMC Lab. No.1 Semi Anechoic Chamber
Date : 2005/09/28 15:04:49

Applicant : ALPS Electric Co., Ltd.
Kind of EUT : Passive Entry System (Control Unit)
Model No. : TWD1U722
Serial No. : 064074
Report No. : 26AE0241-HO
Power : DC 12V
Temp./Humi. : 25deg.C / 62%
Operator : Takumi Shimada

Mode / Remarks : Receiving / Max-Axis

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



Frequency	Reading	DET	Antenna	Loss	Level	Angle	Height	Polar.	Limit	Margin
			Factor	Gain						
[MHz]	[dBμV]		[dB/m]	[dB]	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
32.502	37.1	QP	17.8	-21.0	33.9	359	100	Vert.	40.0	6.1
32.487	24.0	QP	17.8	-21.0	20.8	294	217	Hori.	40.0	19.2
48.750	35.4	QP	10.5	-20.7	25.2	171	320	Hori.	40.0	14.8
49.001	47.1	QP	10.4	-20.7	36.8	359	100	Vert.	40.0	3.2
80.007	31.9	QP	6.6	-20.2	18.3	171	238	Hori.	40.0	21.7
80.011	31.9	QP	6.6	-20.2	18.3	247	100	Vert.	40.0	21.7
107.377	36.2	QP	11.3	-19.5	28.0	359	300	Hori.	43.5	15.5
107.875	33.3	QP	11.4	-19.5	25.2	87	120	Vert.	43.5	18.4
135.513	29.3	QP	14.1	-19.1	24.3	21	236	Hori.	43.5	19.3
134.764	30.3	QP	14.1	-19.1	25.3	105	100	Vert.	43.5	18.2
153.999	28.6	QP	15.3	-18.8	25.1	359	204	Hori.	43.5	18.4
162.994	29.0	QP	15.9	-18.6	26.3	45	100	Vert.	43.5	17.2

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

Radiated Emission (Receiving)

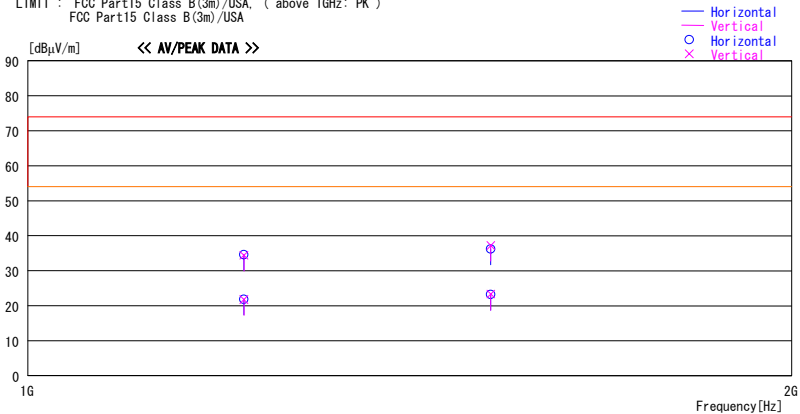
DATA OF RADIATED EMISSION TEST

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

Applicant : ALPS Electric Co., Ltd
Kind of EUT : Passive Entry System (Control Unit)
Model No. : TWD1U722
Serial No. : 064074
Report No. : 26AE0241-HO
Power : DC 12V
Temp./Humi. : 25deg.C / 62%
Operator : Takumi Shimada

Mode / Remarks : Receiving / Max-Axis

LIMIT : FCC Part15 Class B(3m)/USA, (above 1GHz: PK)
FCC Part15 Class B(3m)/USA



Frequency	Reading	DET	Antenna		Level	Angle	Height	Polar.	Limit	Margin
			Factor	Loss& Gain						
[MHz]	[dBμV]		[dB/m]	[dB]	[dBμV/m]	[Deg]	[cm]		[dBμV/m]	[dB]
1216.811	50.1	PK	23.1	-38.8	34.4	0	100	Vert.	74.0	39.6
1216.365	50.3	PK	23.1	-38.8	34.6	0	100	Hori.	74.0	39.4
1216.811	37.5	AV	23.1	-38.8	21.8	0	100	Vert.	54.0	32.2
1522.127	51.5	PK	23.9	-38.1	37.3	0	100	Vert.	74.0	36.6
1522.127	37.5	AV	23.9	-38.1	23.3	0	100	Vert.	54.0	30.7
1216.365	37.6	AV	23.1	-38.8	21.9	0	100	Hori.	54.0	32.1
1521.837	50.5	PK	23.9	-38.1	36.3	0	100	Hori.	74.0	37.8
1521.837	37.5	AV	23.9	-38.1	23.3	0	100	Hori.	54.0	30.7

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

-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 : TWD1U722

S/ N : 064074

FCC ID : CWTWDU722

POWER : DC 12V

MODE : Transmitting

REPORT NO. : 26AE0241-HO

REGULATION : -

TEST DISTANCE : 10 m

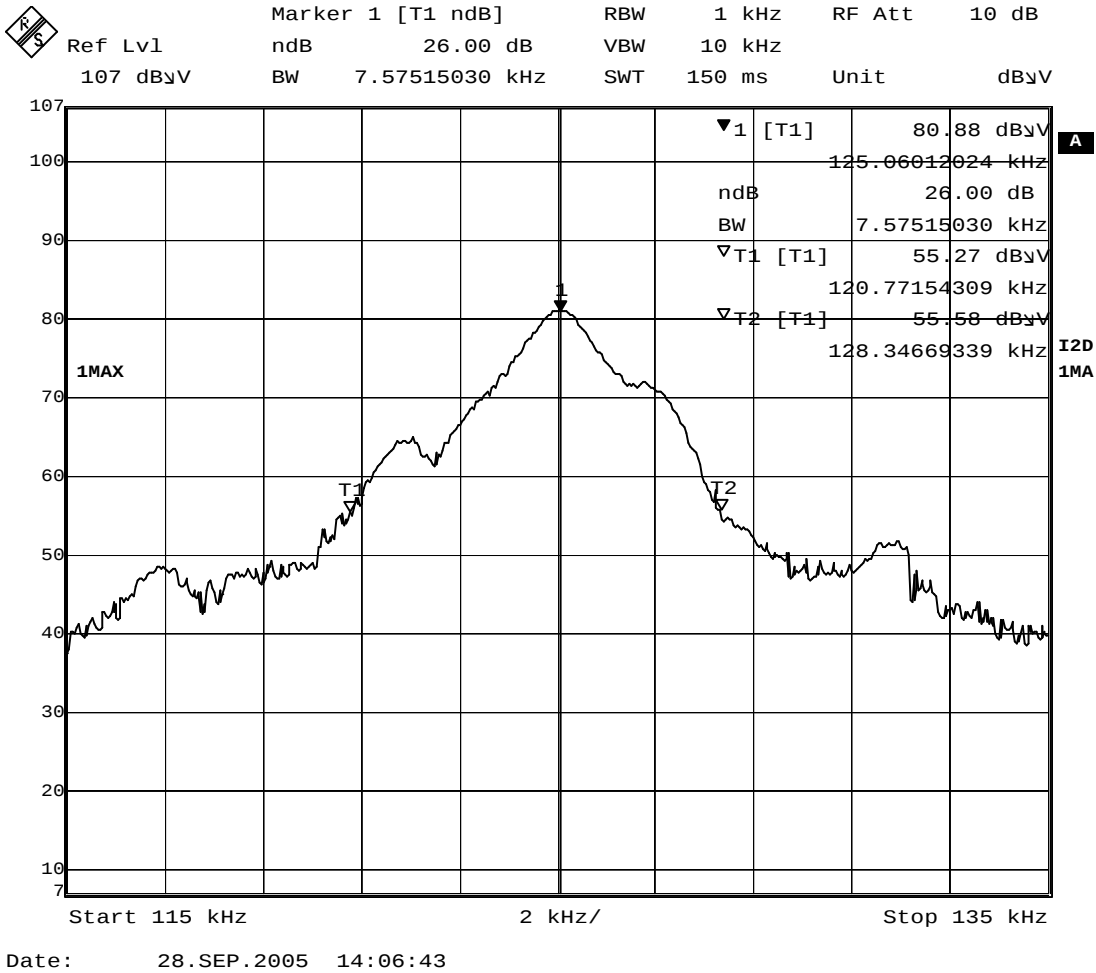
DATE : 09/28/2005

TEMPERATURE : 25℃

HUMIDITY : 62%

Engineer : Takumi Shimada

-26dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
7.58	-	-



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 : TWD1U722
S/ N : 064074
FCC ID : CWTWDU722
POWER : DC 12V
MODE : Transmitting

REPORT NO. : 26AE0241-HO
REGULATION : -
TEST DISTANCE : 10 m
DATE : 09/28/2005
TEMPERATURE : 25°C
HUMIDITY : 62%
Engineer : Takumi Shimada

99% Occupied Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
6.57	-	-

