




RADIO TEST REPORT

Test Report No.: 27FE0255-YK-A

Applicant : Alps Electric Co., Ltd.
Type of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U750
FCC ID : CWTWDU750
Test Standard : FCC Part15 Subpart B: 2006
FCC Part15 Subpart C: 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: February 15, 2007

Tested by: 
Toyokazu Imamura


Approved by: 
Osamu Watatani
Manager of Yamakita EMC Lab.

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1 Applicant Information

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

2 Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U750
Serial No. : 173938
Rating : DC12V (Car Battery)
Country of Manufacture : Japan
Receipt Date of Sample : February 9, 2007
Condition of EUT : Production prototype (Not for sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No modification by the test lab.

2.2 Product Description

Model: TWD1U750 (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
Clock frequency : 16MHz (Main), 32.768kHz (Sub), 65.14MHz (Crystal)
Operation temperature range : -30 to +80 deg.C.
<Transmitter>
Frequency of operation : 125kHz
Type of modulation : AM
Antenna type : External bar
Antenna connector type : None
ITU code : A1D
<Receiver>
Frequency of operation : 315MHz
Intermediate frequency : 10.7MHz
Local frequency : 325.7MHz
Type of receiver : Super heterodyne
Antenna type : Internal bar
Antenna connector type : None

*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 Part15.203

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.

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YAMAKITA EMC LAB.

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MF060b (14.06.06)

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	19.0dB (280.00MHz, 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)	-	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	14.7dB (Horizontal, AV)	Complied
Electric Field Strength of Spurious Emission	ANSI C63.4: 2003 13. Measurement of intentional radiators	Section 15.205 & 209	Radiated	N/A	13.4dB (44.64MHz, Vertical, QP)	Complied
-26dB Bandwidth	ANSI C63.4: 2003 13. Measurement of intentional radiators	-	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.

* No addition, exclusion nor deviation has been made from the standard.

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3.3 Uncertainty

Radiated emission test

The measurement uncertainty (with 95% confidence level) for this test using Loop antenna is ± 2.3 dB.
 The measurement uncertainty (with 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.
 The measurement uncertainty (with 95% confidence level) for this test using Logperiodic antenna is ± 4.3 dB.
 The data listed in this test report has enough margin, more than site margin.

3.4 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 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		

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4 System Test Configuration

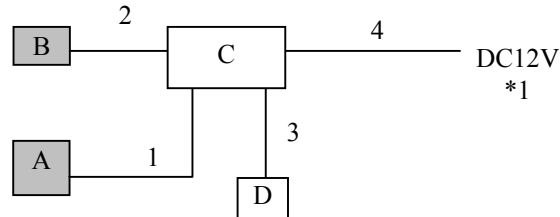
4.1 Justification

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

Test mode: Transmitting (125kHz), Receiving (315MHz)

The same type antennas (up to 6) are installed in the EUT. The test was performed with one antenna since one of the antennas is selected automatically and used.

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)	TWD1U750	173938	Alps Electric Co., Ltd.	CWTW750 (EUT)
B	LF Antenna	-	ANT-4	Alps Electric Co., Ltd.	(EUT)
C	Checker Box	-	Checker box-4	Alps Electric Co., Ltd.	-
D	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	Signal & DC power cable	0.9	Shielded	Unshielded	-
2	Antenna cable	1.8	Unshielded	Unshielded	-
3	Cable for Checker CW	0.2	Unshielded	Unshielded	-
4	DC power cable	1.0	Unshielded	Unshielded	-

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5 Radiated Emissions (Fundamental & Spurious)

5.1 Operating environment

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

Temperature : See test data
 Humidity : See test data

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 : 9kHz - 2GHz
 EUT position : Table top
 EUT operation mode : Transmitting, Receiving

5.4 Test procedure

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

Frequency: From 9kHz to 30MHz at distance 3m

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 QP, PK, and AV detector.

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

Frequency	9kHz - 90kHz & 110kHz - 150kHz	90kHz - 110kHz	150kHz - 490kHz	490kHz - 30MHz	30MHz - 1GHz	1GHz - 2GHz
Detector Type	PK/AV	QP	PK/AV	QP	QP	PK/AV
IF Bandwidth	200Hz	200Hz	9kHz	9kHz	120kHz	1MHz
Measuring antenna	Loop				Biconical (30-300MHz) Logperiodic (300MHz-1GHz)	Horn

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

	EUT	EUT's antenna
Horizontal	Y	Y
Vertical	Y	Y

5.5 Results

Summary of the test results : Pass * No noise was detected in 1GHz to 2GHz.

Date : February 15, 2007

Test engineer : Toyokazu Imamura

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6 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.

6.3 Results

Summary of the test results: Pass

Date : February 15, 2007

Test engineer : Toyokazu Imamura

APPENDIX 1: Photographs of test setup

Page 10 : Radiated emission
Page 11 : Pre-check of the worst position

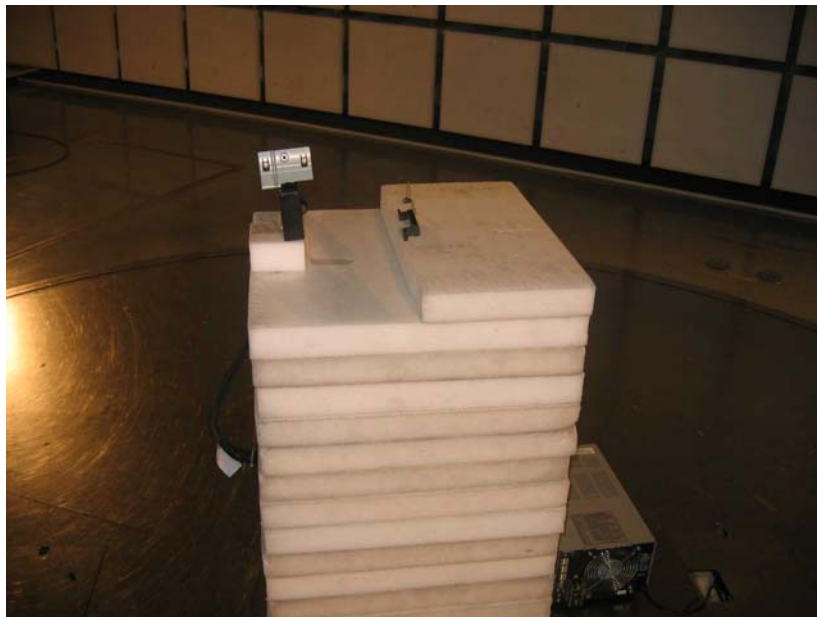
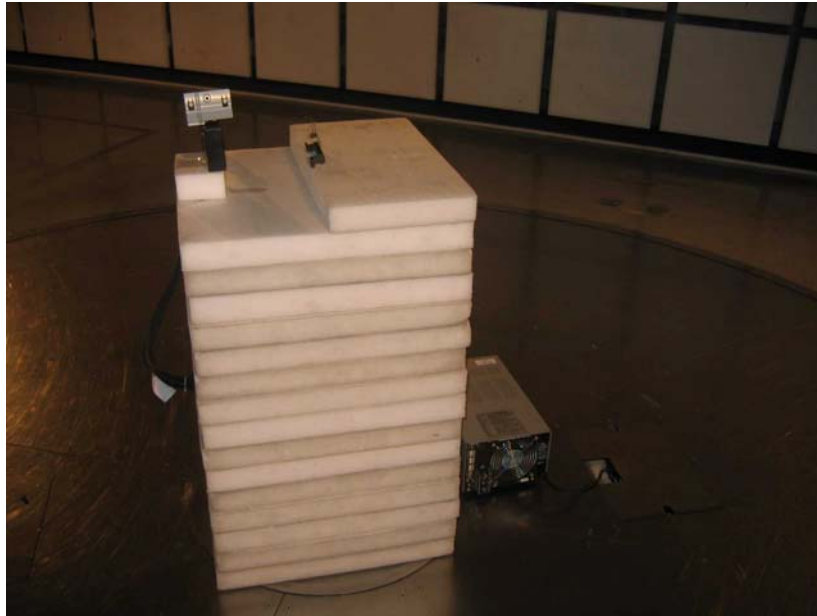
APPENDIX 2: Test Data

Page 12 - 15 : Radiated Emission
12-14 : Transmitting
15 : Receiving
Page 16 - 17 : -26dB Bandwidth and Occupied Bandwidth

APPENDIX 3: Test instruments

Page 18 : Test instruments

Radiated emission



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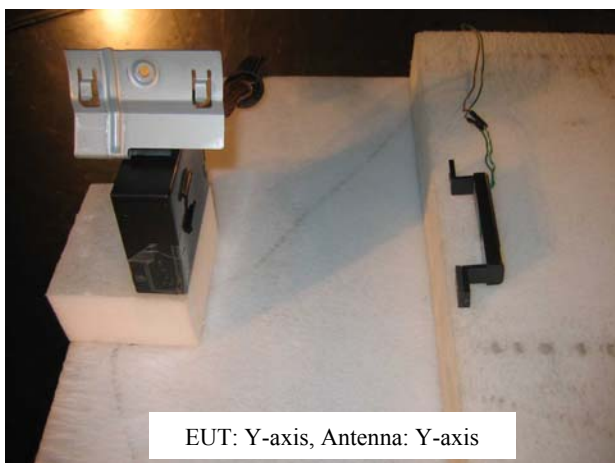
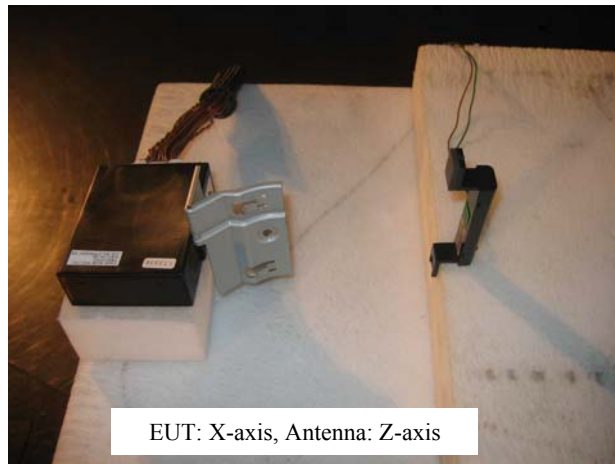
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Pre-check of the worst position



DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No. : 27FE0255-YK-A

Applicant : Alps Electric Co., Ltd.
Kind of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U750
Serial No. : 173938
Power : DC12V
Mode : Transmitting(125kHz)
Remarks : PK (9-90kHz and 110-490kHz)
Date : 2/15/2007
Test Distance : 3 m
Temperature : 20 °C Engineer : Toyokazu Imamura
Humidity : 35 %
Regulation : FCC Part15C § 15.209 9KHz-490kHz (3m) Pk

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER					HOR [dB μ V/m]	VER		HOR [dB]	VER
1.	0.13	BB	102.6	98.9	19.3	23.4	0.1	5.2	103.8	100.1	125.3	21.5	25.2
2.	0.25	BB	49.7	44.7	19.3	27.6	0.1	6.0	47.5	42.5	119.6	72.1	77.1
3.	0.38	BB	59.1	55.3	19.4	28.1	0.1	6.0	56.5	52.7	116.0	59.5	63.3

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

■ ANTENNA: KLP-01 (HFH2-Z2)

AMP: KAF-05 (8447D) ■ CABLE: KCC-30_31_32_34 (RE) ■ RECEIVER: APRCV03 (SMV41)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No. : 27FE0255-YK-A

Applicant : Alps Electric Co., Ltd.
 Kind of Equipment : Passive Entry System (Control Unit)
 Model No. : TWD1U750
 Serial No. : 173938
 Power : DC12V
 Mode : Transmitting(125kHz)
 Remarks : QP and AV(9-90kHz and 110-490kHz)
 Date : 2/15/2007
 Test Distance : 3 m
 Temperature : 20 °C Engineer : Toyokazu Imamura
 Humidity : 35 %
 Regulation : FCC Part15C § 15.209 9KHz-30MHz (3m)

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER					HOR [dB μ V/m]	VER		HOR [dB]	VER
1.	0.13	BB	89.4	86.4	19.3	23.4	0.1	5.2	90.6	87.6	105.3	14.7	17.7
2.	0.25	BB	37.6	29.2	19.3	27.6	0.1	6.0	35.4	27.0	99.6	64.2	72.6
3.	0.38	BB	47.1	43.9	19.4	28.1	0.1	6.0	44.5	41.3	96.0	51.5	54.7
4.	0.50	BB	36.5	38.2	19.4	28.2	0.1	6.0	33.8	35.5	73.6	39.8	38.1
5.	0.63	BB	44.9	40.5	19.4	28.4	0.2	6.0	42.1	37.7	71.6	29.5	33.9
6.	0.75	BB	34.2	28.3	19.4	28.4	0.2	6.0	31.4	25.5	70.1	38.7	44.6
7.	0.88	BB	39.7	35.7	19.5	28.3	0.2	6.0	37.1	33.1	68.7	31.6	35.6
8.	1.00	BB	36.1	32.9	19.5	28.3	0.2	6.0	33.5	30.3	67.6	34.1	37.3
9.	1.13	BB	35.6	32.8	19.5	28.3	0.2	6.0	33.0	30.2	66.5	33.5	36.3
10.	1.25	BB	28.2	27.4	19.5	28.4	0.2	6.0	25.5	24.7	65.7	40.2	41.0

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

■ ANTENNA: KLP-01 (HFH2-Z2)

AMP: KAF-05 (8447D) ■ CABLE: KCC-30_31_32_34 (RE) ■ RECEIVER: APRCV03 (SMV41)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No. : 27FE0255-YK-A

Applicant : Alps Electric Co., Ltd.
Kind of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U750
Serial No. : 173938
Power : DC12V
Mode : Transmitting(125kHz)
Remarks : QP
Date : 2/15/2007
Test Distance : 3 m
Temperature : 20 °C Engineer : Toyokazu Imamura
Humidity : 35 %
Regulation : FCC Part15C § 15.209

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]	HOR [dB]	VER [dB]		
1.	39.63	BB	22.9	33.3	14.2	28.5	1.2	6.0	15.8	26.2	40.0	24.2	13.8	
2.	44.64	BB	24.0	35.3	12.5	28.5	1.3	6.0	15.3	26.6	40.0	24.7	13.4	
3.	51.00	BB	24.1	34.4	10.2	28.5	1.4	6.0	13.2	23.5	40.0	26.8	16.5	
4.	97.25	BB	27.5	36.3	9.9	28.5	2.0	6.1	17.0	25.8	43.5	26.5	17.7	
5.	103.00	BB	28.1	37.3	10.9	28.4	2.1	6.1	18.8	28.0	43.5	24.7	15.5	
6.	133.75	BB	25.2	33.6	14.1	28.2	2.4	6.1	19.6	28.0	43.5	23.9	15.5	

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

■ ANTENNA: KBA-01 (BBA9106) 30-299.99MHz/KLA-01 (USLP9143) 300-1000MHz
AMP: KAF-05 (8447D) ■ CABLE: KCC-30_31_32_34 (RE) ■ RECEIVER: APRCV03 (SMV41)

DATA OF RADIATION TEST

UL Apex Co.,Ltd.
YAMAKITA No.1 ANECHOIC CHAMBER
Report No. : 27FE0255-YK-A

Applicant : Alps Electric Co., Ltd.
Kind of Equipment : Passive Entry System (Control Unit)
Model No. : TWD1U750
Serial No. : 173938
Power : DC12V
Mode : Receiving(315MHz)
Remarks : QP
Date : 2/15/2007
Test Distance : 3 m
Temperature : 20 °C Engineer : Toyokazu Imamura
Humidity : 35 %
Regulation : FCC Part15B § 15.109(a)

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS		MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]	HOR [dB]	VER [dB]		
1.	80.00	BB	24.9	31.0	6.6	28.5	1.8	6.0	10.8	16.9	40.0	29.2	23.1	
2.	96.00	BB	22.5	30.4	9.7	28.6	2.0	6.1	11.7	19.6	43.5	31.8	23.9	
3.	280.00	BB	24.4	25.8	19.2	27.6	3.6	6.0	25.6	27.0	46.0	20.4	19.0	
4.	325.70	BB	25.4	22.3	15.0	27.8	4.0	6.0	22.6	19.5	46.0	23.4	26.5	
5.	651.40	BB	20.6	20.9	19.9	29.1	5.7	6.0	23.1	23.4	46.0	22.9	22.6	
6.	977.10	BB	20.8	21.7	23.4	28.6	7.1	6.1	28.8	29.7	54.0	25.2	24.3	

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

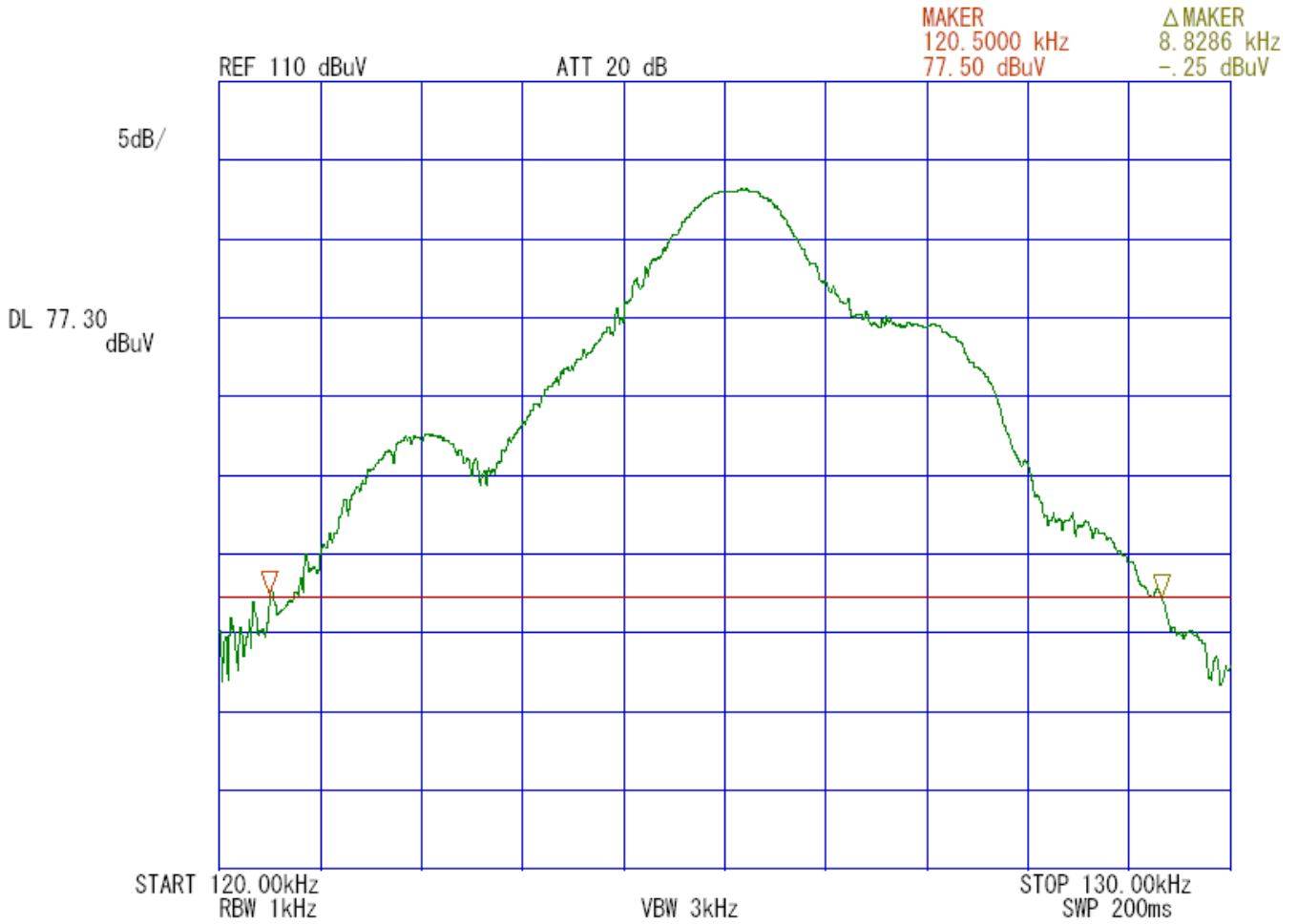
■ ANTENNA: KBA-01 (BBA9106) 30-299.99MHz/KLA-01 (USLP9143) 300-1000MHz
AMP: KAF-05 (8447D) ■ CABLE: KCC-30_31_32_34 (RE) ■ RECEIVER: APRCV03 (SMV41)

-26dB Bandwidth

COMPANY : Alps Electric Co., Ltd.
EQUIPMENT : Passive Entry System(Control Unit)
MODEL NUMBER: TWD1U750
SERIAL NUMBER: 173938
FCC ID : CWTWDU750
POWER : DC12V

UL Apex Co.,Ltd. Yamakita No.1 Anechoic Chamber
REPORT NO : 27FE0255-YK-A
REGULATION : -
DATE : 2007/02/15
TEMP./HUMI : 20°C/35%
TEST MODE : Transmitting (125kHz)
ENGINEER : Toyokazu Imamura

-26dB Bandwidth
[kHz]
8.829



Occupied Bandwidth(99%)

COMPANY : Alps Electric Co., Ltd.
EQUIPMENT : Passive Entry System(Control Unit)
MODEL NUMBER: TWD1U750
SERIAL NUMBER: 173938
FCC ID : CWTW750
POWER : DC12V

UL Apex Co.,Ltd. Yamakita No.1 Anechoic Chamber
REPORT NO : 27FE0255-YK-A
DATE : 2007/02/15
TEMP./HUMI : 20°C/35%
TEST MODE : Transmitting (125kHz)
ENGINEER : Toyokazu Imamura

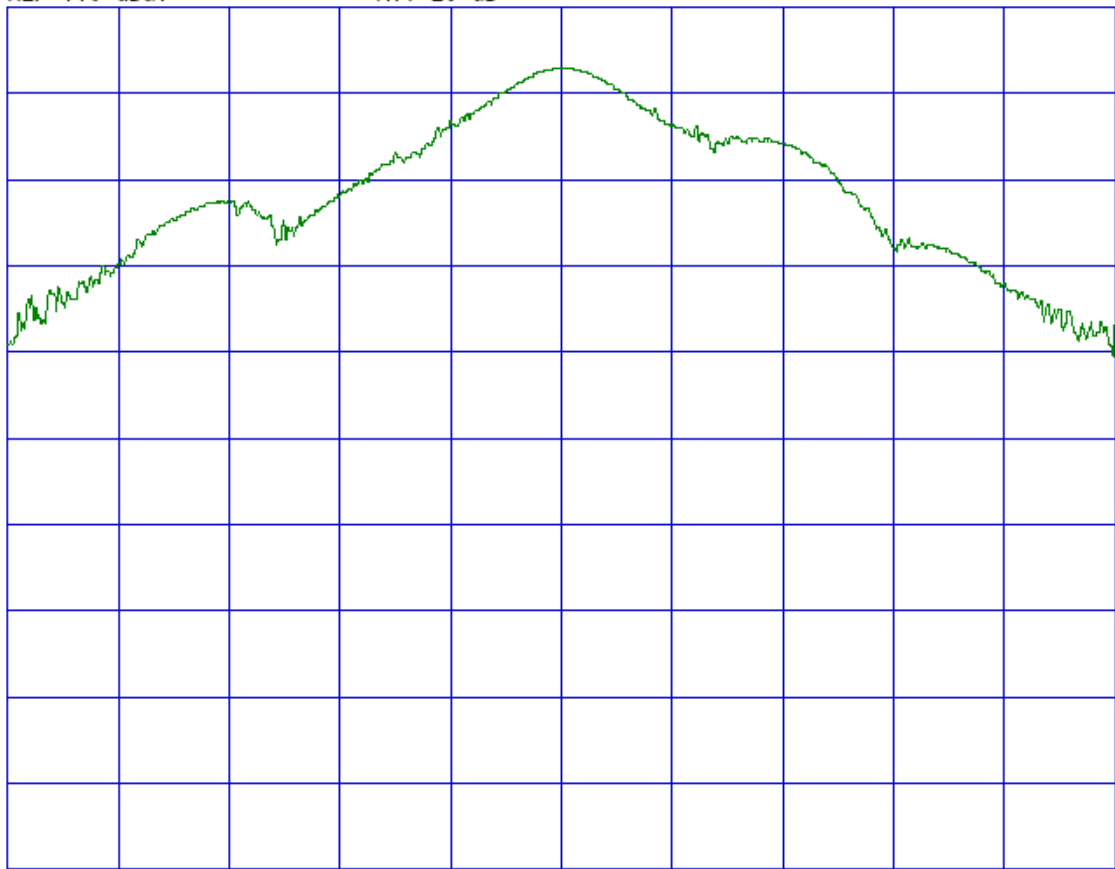
99% Occupied Bandwidth
[kHz]
6.6

OBW (99%) : 6.6kHz

REF 110 dBuV

ATT 20 dB

10dB/



START 120.00kHz
RBW 1kHz

VBW 3kHz

STOP 130.00kHz
SWP 200ms

**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/BW	-
KAEC-01(NSA)	Anechoic Chamber	JSE	Semi 3m	RE/BW	2006/08/31 * 12
KAF-05	Pre Amplifier	Agilent	8447D	RE/BW	2006/04/21 * 12
KAT6-01	Attenuator	INMET	18N-6dB	RE/BW	2006/03/24 * 12
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2007/01/06 * 12
KCC-30/31/32 /34/KRM-03	Coaxial Cable/RF Relay Matrix	Fujikura/Suhner/TSJ	5D-2W/S04272B/RFM-E421	RE/BW	2006/11/27 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2007/01/06 * 12
KSA-04	Spectrum Analyzer	Advantest	R3271A	RE/BW	2006/09/05 * 12
KOS-02	Humidity Indicator	Custom	CTH-190	RE/BW	2006/07/10 * 24
APRCV03	Test Receiver	MEB	SMV41	RE	2006/10/04 * 12
KLP-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	RE/BW	2006/06/01 * 12
KJM-01	Measure	TAJIMA	GL19-55	RE/BW	-
KAF-01	Pre Amplifier	Hewlett Packard	8447D	RE	2006/05/10 * 12
KCC-D11/D12	Coaxial cable	Suhner/storm	SCOFLEX103/ 90-388-020	RE	2006/08/28 * 12
KHA-01	Horn Antenna	A.H.Systems	SAS-200/571	RE	2006/08/17 * 12

The expiration date of the calibration is the end of the expired month .

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

Test Item :

RE: Radiated emission,
BW: Bandwidth