EMI TEST REPORT

Test Report No. : 32GE0143-HO-01-A

Applicant	:	**Alps Electric Co., Ltd.**
Type of Equipment	:	**Passive Entry System (Tuner)**
Model No.	:	**TWC1U283**
Test regulation	:	**FCC Part 15 Subpart B: 2012**
FCC ID	:	**CWTWC1U283**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Date of test: May 20, 2012

Representative test engineer:
Tomotaka Sasagawa
Engineer of WiSE Japan,
UL Verification Service

Approved by:
Masanori Nishiyama
Leader of WiSE Japan,
UL Verification Service

NVLAP LAB CODE: 200572-0

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap

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SECTION 1: Customer information

Company Name	:	Alps Electric Co., Ltd.
Address	:	6-3-36, Nakazato, Furukawa, Osaki-city, Miyagi-pref, 989-6181, Japan
Telephone Number	:	+81-229-23-5111
Facsimile Number	:	+81-229-22-3755
Contact Person	:	Toru Kinoshita

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

2.1 Identification of E.U.T.

Type of Equipment	:	Passive Entry System (Tuner)
Model No.	:	TWC1U283
Serial No.	:	Refer to Section 4, Clause 4.2
Receipt Date of Sample	:	May 20, 2012
Country of Mass-production	:	Japan
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 No: TWC1U283 (referred to as the EUT in this report) is the Passive Entry System (Tuner).

Feature of EUT: This unit receives the RF output signal from the FOB (Transmitter) in response to several switch operations. This unit sends detected signal to the Controller through Signal and RSSI outputs. The Controller provides operations according to receiving signals.

Clock frequency(ies) in the system	:	29.5533MHz (Oscillator circuit)
Type of Receiver	:	Super hetrodyne
Frequency of Operation	:	315MHz
Oscillator Frequency	:	29.5533MHz (Crystal)
Local Oscillator Frequency	:	315.235MHz (29.5533MHz x1/3 x32)
Intermediate Frequency	:	235kHz
Antenna Type	:	Internal Antenna (Monopole)
Method of Frequency Generation	:	Crystal
Operating voltage (Inner)	:	DC 4.5 V to 5.5V
Operating temperature range	:	-40 deg. C to +85 deg. C

FCC15.111(b)
The receiving antenna (of this EUT) is installed inside the EUT and cannot be removed (permanently attached). Therefore, Radiated emission test was performed.

SECTION 3: Test specification, procedures & results

3.1 Test specification

Test Specification : FCC Part 15 Subpart B: 2012, final revised on March 30, 2012 and effective April 30, 2012

Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures and results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	**FCC:** ANSI C63.4: 2003 7. AC powerline conducted emission measurements	**FCC:**Part 15 Subpart B 15.107(a)	N/A *1)	N/A	N/A
	IC: RSS-Gen 7.2.4	**IC:** RSS-Gen 7.2.4			
Radiated emission	**FCC:** ANSI C63.4: 2003 8. Radiated emission measurements	**FCC:** Part 15 Subpart B 15.109(a)	N/A	16.5dB 945.705MHz Horizontal, QP	Complied
	IC: RSS-Gen 4.10	**IC:** RSS-Gen 6.1			
*Note: UL Japan, Inc's EMI Work Procedure 13-EM-W0420. *1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.					

3.3 Addition to standard

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

3.4 Uncertainty

EMI
The following uncertainties have been calculated to provide a confidence level of 95% using a coverage factor k=2.

Test room (semi-anechoic chamber)	**Radiated emission**						
	(3m*)(±dB)				**(1m*)(±dB)**		**(0.5m*)(±dB)**
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.2dB	5.0dB	5.1dB	4.7dB	5.7dB	4.4dB	4.3dB
No.2	4.1dB	5.2dB	5.1dB	4.8dB	5.6dB	4.3dB	4.2dB
No.3	4.5dB	5.0dB	5.2dB	4.8dB	5.6dB	4.5dB	4.2dB
No.4	4.7dB	5.2dB	5.2dB	4.8dB	5.6dB	5.1dB	4.2dB

*3m/1m/0.5m = Measurement distance

Radiated emission test(3m)
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Head Office EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8116 Facsimile : +81 596 24 8124

	FCC Registration Number	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	313583	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	655103	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	148738	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	134570	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	-	4.0 x 4.5 x 2.7m	4.75 x 5.4 m	-
No.6 measurement room	-	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	-	8.0 x 4.5 x 2.8m	2.0 x 2.0m	-
No.10 measurement room	-	-	2.6 x 2.8 x 2.5m	2.4 x 2.4m	-
No.11 measurement room	-	-	3.1 x 3.4 x 3.0m	2.4 x 3.4m	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 x 2.0m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Data of EMI, Test instruments, and Test set up

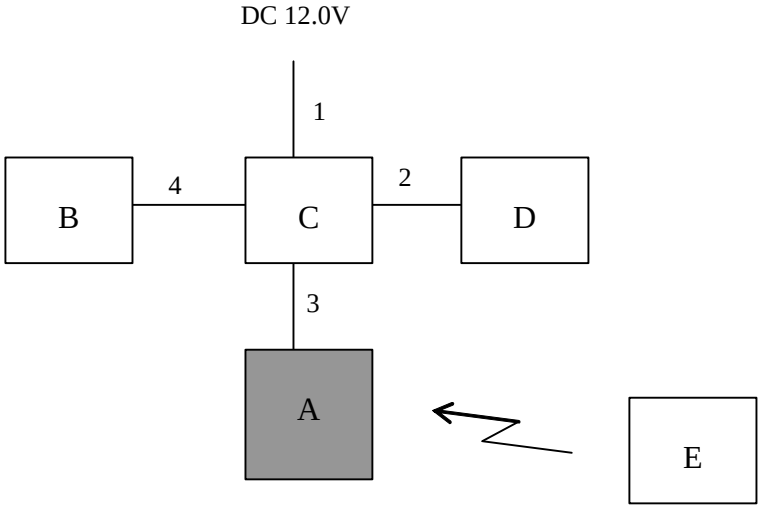
Refer to APPENDIX.

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

4.1 Operating modes

The mode is used : Receiving (Rx) mode, 315MHz
* Passive Entry System (Transmitter) was operated manually by a test engineer and the test was performed with the EUT receiving 315MHz.

4.2 Configuration and peripherals



*Cabling and setup were 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	Remark
A	Passive Entry System (Tuner)	TWC1U283	09031701	Alps Electric Co., Ltd.	EUT
B	LF Antenna	-	-	Alps Electric Co., Ltd.	-
C	CHECKER	-	-	Alps Electric Co., Ltd.	-
D	BCM	-	-	Calsonic Kansei	-
E	Passive Entry System (Transmitter)	TWB1U771	09091403	Alps Electric Co., Ltd.	-

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.9	Unshielded	Unshielded	-
2	Cable for BCM	0.5	Unshielded	Unshielded	-
3	Cable for Tuner	2.0	Unshielded	Unshielded	-
4	Cable for LF Antenna	0.3	Unshielded	Unshielded	-

SECTION 5: Radiated Emission

5.1 Operating environment

Test place : No.2 semi anechoic chamber
Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a urethane platform of nominal size, 1.0m by 1.5m, raised 0.8m above the conducting ground plane. The EUT was set on the center/edge of the tabletop.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna was varied in height above the conducting ground plane to obtain the maximum signal strength.
Photographs of the set up are shown in Appendix 3.

5.3 Test conditions

Frequency range : 30MHz-300MHz (Biconical antenna) / 300MHz-1000MHz (Logperiodic antenna)
1000MHz-2000MHz (Horn antenna)
Test distance : 3m
EUT position : Table top
EUT operation mode : See Clause 4.1

5.4 Test procedure

The height of the measuring antenna 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 with the Test Receiver, or the Spectrum Analyzer.
The radiated emission measurements were made with the following detector function of the test receiver and the Spectrum analyzer.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer *1)
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 3MHz AV *2): RBW:1MHz/VBW:10Hz

*1) The Spectrum Analyzer was used in 3dB resolution bandwidth.
*2) When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at representative X-axis since no difference was found among each position.

5.5 Test result

Summary of the test results: Pass

Date: May 20, 2012 Test engineer: Tomotaka Sasagawa

APPENDIX 1: Data of EMI test

Radiated Emission
(Below 1GHz)

DATA OF RADIATED EMISSION TEST

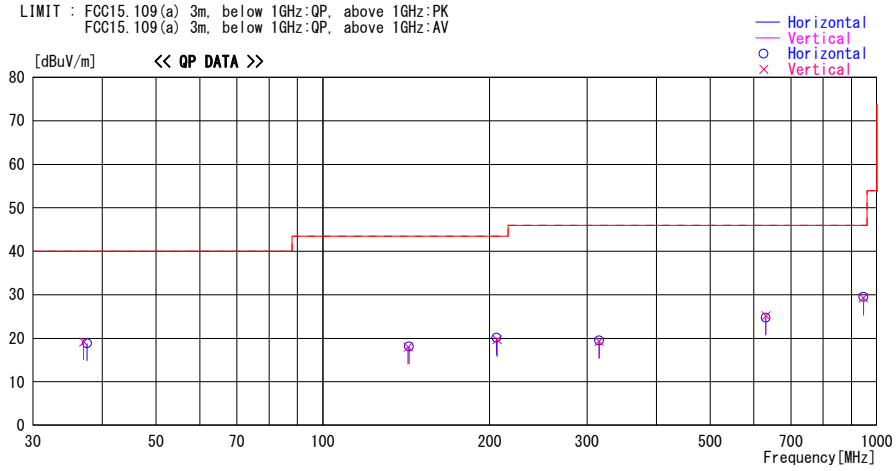
UL Japan, Inc. Head Office EMC Lab. No.2 Semi Anechoic Chamber

Report No. : 32GE0143-HO-01

Temp./Humi. : 22deg. C / 39% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Receiving mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
37.034	25.4	QP	15.4	-21.7	19.1	264	100	Vert.	40.0	20.9	
37.575	25.4	QP	15.2	-21.8	18.8	181	100	Hori.	40.0	21.2	
142.545	23.9	QP	14.4	-20.3	18.0	10	100	Vert.	43.5	25.5	
143.086	24.0	QP	14.4	-20.3	18.1	355	100	Hori.	43.5	25.4	
205.851	23.5	QP	16.4	-19.8	20.1	260	100	Hori.	43.5	23.4	
206.392	23.1	QP	16.4	-19.8	19.7	226	100	Vert.	43.5	23.8	
315.235	23.2	QP	14.9	-18.8	19.3	5	100	Vert.	46.0	26.7	
315.235	23.4	QP	14.9	-18.8	19.5	170	100	Hori.	46.0	26.5	
630.470	23.5	QP	20.1	-18.4	25.2	212	100	Vert.	46.0	20.9	
630.470	23.0	QP	20.1	-18.4	24.7	74	100	Hori.	46.0	21.3	
945.705	22.9	QP	22.7	-16.3	29.3	244	100	Vert.	46.0	16.7	
945.705	23.1	QP	22.7	-16.3	29.5	346	100	Hori.	46.0	16.5	

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

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

Radiated Emission
(Above 1GHz)

DATA OF RADIATED EMISSION TEST

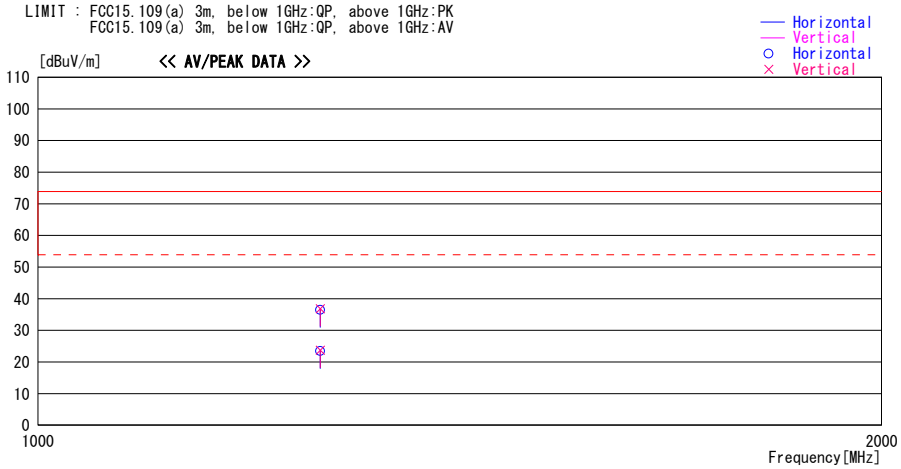
UL Japan, Inc. Head Office EMC Lab.No.2 Semi Anechoic Chamber

Report No. : 32GE0143-HO-01

Temp./Humi. : 24deg. C / 42% RH
Engineer : Tomotaka Sasagawa

Mode / Remarks : Receivigng mode

LIMIT : FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:PK
FCC15.109(a) 3m, below 1GHz:QP, above 1GHz:AV



Frequency [MHz]	Reading [dBuV]	DET	Antenna Factor [dB/m]	Loss& Gain [dB]	Level [dBuV/m]	Angle [Deg]	Height [cm]	Polar.	Limit [dBuV/m]	Margin [dB]	Comment
1260.940	45.2	PK	25.7	-34.1	36.8	0	100	Vert.	73.9	37.1	
1260.940	44.9	PK	25.7	-34.1	36.5	0	100	Hori.	73.9	37.4	
1260.940	32.1	AV	25.7	-34.1	23.7	0	100	Vert.	53.9	30.2	
1260.940	31.9	AV	25.7	-34.1	23.5	0	100	Hori.	53.9	30.4	

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

*The limit is rounded down to one decimal place.
*The test result is rounded off to one or two decimal places, so some differences might be observed.

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APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2011/06/21 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2012/02/06 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2012/04/06 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2012/04/03 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2011/10/23 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2011/10/23 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2012/02/16 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2011/11/02 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2011/09/26 * 12
MHA-06	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	254	RE	2012/02/22 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE	2012/02/28 * 12
MCC-132	Microwave Cable	HUBER+SUHNER	SUCOFLEX104	336161/4(1m) / 340639(5m)	RE	2011/09/06 * 12

The expiration date of the calibration is the end of the expired month.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:
RE: Radiated emission