



## EMI TEST REPORT

Test Report No. : 26FE0028-HO-1

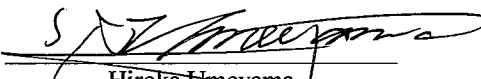
Applicant : Alps Electric Co., Ltd.  
Type of Equipment : Passive Entry System (Hand Unit)  
Model No. : TWB1U729  
Test standard : FCC Part 15 2005  
Subpart C Section 15.209, Section 15.231  
FCC ID : CWTWBU729  
Test Result : Complied

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.

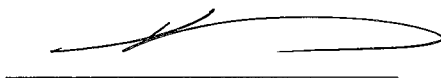
Date of test:

February 9, 2006

Tested by:

  
Hiroka Umeyama  
EMC Services

Approved by :

  
Naoki Sakamoto  
Group Leader of EMC Services

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 : Katsuhiko Seino

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

### **2.1 Identification of E.U.T.**

Type of Equipment : Passive Entry System (Hand Unit)  
Model No. : TWB1U729  
Serial No. : 1  
Country of Manufacture : Japan  
Rating : DC3.0V  
Receipt Date of Sample : February 1, 2006  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)

### **2.2 Product Description**

Model No: TWB1U729 is the Passive Entry System (Hand Unit).

The Passive Entry System is a system which locks, unlocks, and can start engine only with the intelligent-key of the vehicle.

The clock frequency of EUT is 8MHz (CPU), 315.04MHz (SAW Resonator).

Equipment Type : Transceiver  
Frequency of operation : Tx: 315MHz  
Type of modulation : FSK  
Mode of operation : Simplex  
Antenna Type : Tx: Internal/PCB Pattern (Loop)  
Method of Frequency Generation : SAW RESONATOR  
Operating voltage : DC3V (Button Battery CR2025)  
Temperature of operation : -10 to +60 degree

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

#### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C 2005  
Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.231 Periodic operation in the band 40.6640.70MHz  
and above 70MHz

#### FCC 15.31 (e)

This EUT provides stable voltage(DC3.0V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

#### FCC Part 15.203 Antenna requirement

Type of Equipment and its antenna comply with this requirement since they are built in host device (TWB1U729). When they are put up for sale and they are used with a particular antenna connector for this EUT.

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

No.	Item	Test Procedure	Specification	Deviation	Worst margin	Results
1	Automatically Deactivate	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.231(a)(1)	N/A	-	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.231(b)	N/A	6.3dB 315.00MHz Horizontal	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2003 13. Measurement of intentional radiators	Section 15.205 Section 15.209 Section 15.231(b)	N/A	4.5dB 630.00MHz Horizontal	Complied
4	-20dB Bandwidth	ANSI C63.4:2003 13. Measurement of intentional radiators	Reference data	N/A	-	-
5	Conducted emission	ANSI C63.4:2003 7. AC powerline conducted emission measurements	Section 15.207	-	N/A*1)	N/A

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

\*1) The test is not applicable since the EUT does not have AC Mains.

#### **3.3 Addition to standards**

No.	Item	Test Procedure	Specification	Remarks	Deviation	Worst margin	Results
1	99% Occupied Band Width	RSS-Gen 4.4.1	-	Radiated	N/A	N/A	N/A

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### 3.4 Uncertainty

#### Radiated Emission Test

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 report meets the limits unless the uncertainty is taken into consideration.

### 3.5 Test Location

UL Apex Co., Ltd. Head Office EMC Lab. \*NVLAP Lab. code: 200572-0

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	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	IC4247A	19.2 x 11.2 x 7.7m	7.0 x 6.0m	Preparation room
No.2 semi-anechoic chamber	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 measurement room.

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

Refer to APPENDIX 1 to 3.

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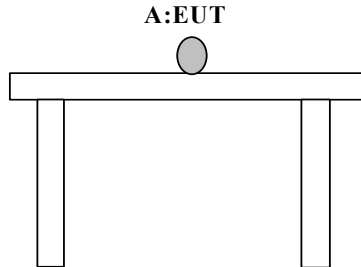
## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Modes**

The mode is used : Transmitting mode

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

### **4.2 Configuration and peripherals**



### **Description of EUT**

No.	Item	Model number	Serial number	Manufacturer	FCC ID
A	Passive Entry System (Hand Unit).	TWB1U729	1	Alps Electric Co., Ltd.	CWTWBU729

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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

### **5.2 Test configuration**

EUT was placed on a platform of table size (1m x 0.5m x 0.8m) on the conducting ground plane.  
The EUT was set on the center of the tabletop.  
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna varied in height above the conducting ground plane to obtain the maximum signal strength.  
A drawing of the set up is shown in the photos of APPENDIX 1.

### **5.3 Test conditions**

Frequency range : 30MHz-3200MHz  
Test distance : 3m  
EUT position : Tabletop  
EUT operation mode : Transmitting

### **5.4 Test procedure**

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 with the Test Receiver or the Spectrum Analyzer.

Frequency	Below 1GHz	Above 1GHz
Instrument used	Test Receiver	Spectrum Analyzer
IF Bandwidth	QP: BW 120kHz	PK: RBW:1MHz/VBW: 1MHz AV: RBW:1MHz/VBW:10Hz 20dBc : RBW:100kHz/VBW:100kHz

- The carrier level and 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 the position that has the maximum noise.

### **5.5 Results**

Summary of the test results: Pass

Date: February 9, 2006

Tested by: Hiroka Umeyama

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**APPENDIX 1: Photographs of test setup**

**Radiated emission(Worst case position)**

**Front**



**Rear**





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

**X-axis**



**Y-axis**



**Z-axis**



## **APPENDIX 2: Test Instruments**

### **EMI test equipment**

<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	RE	2005/11/14 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	RE	2005/11/10 * 12
MCC-17	Microwave Cable 1G-50GHz	Suhner	SUCOFLEX 101	RE	2006/02/02 * 12
MCC-15	Microwave Cable 1G-26.5GHz	Suhner	SUCOFLEX 104	RE	2006/02/02 * 12
MPA-05	Pre Amplifier	TSJ	TSJ 1-26.5GHz PreAmp	RE	2005/07/08 * 12
MHA-05	Horn Antenna	Schwarzbeck	BBHA9120D	RE	2006/01/09 * 12
MLA-01	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2005/10/14 * 12
MOS-01	Digital Humidity Indicator	N.T	NT-1800	RE	2004/11/25 * 24
MCC-01	Coaxial Cable 0.1-3000MHz	Suhner/storm/Agilent/TSJ	-	RE	2005/12/18 * 12
MAT-06	Attenuator(6dB)	Weinschel Corp	2	RE	2005/12/16 * 12
MBA-01	Biconical Antenna	Schwarzbeck	BBA9106	RE	2005/10/10 * 12

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

**Test Item:**

**RE: Carrier Frequency Separation, -20dB Bandwidth, Spurious Emission, Automatically deactivate**

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**APPENDIX 3: Data of EMI test**  
**Radiated Emission (Electric Field Strength of Fundamental and Spurious Emission)**

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

COMPANY : Alps Electric Co., Ltd. REPORT NO : 26FE0028-HO  
EQUIPMENT : Passive Entry System (Hand Unit) REGULATION : Fcc Part15 Subpart C 231(b) / 205  
MODEL : TWBIU729 TEST DISTANCE : 3m  
S/N : 1 DATE : 02/09/2006  
POWER : DC3.0V TEMPERATURE : 18°C  
Mode : Continuous Transmitting HUMIDITY : 30%  
Axis : Hor.: X-axis, Ver.: Z-axis ENGINEER : Hiroka Umeyama

No.	FREQ [MHz]	T/R READING		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN		DETECTOR
		HOR	VER					HOR	VER		HOR	VER	
1	315.00	70.4	66.7	14.7	27.2	10.2	0.0	68.1	64.4	75.6	7.5	11.2	PK
1	315.00	71.6	68.0	14.7	27.2	10.2	0.0	69.3	65.7	75.6	6.3	9.9	QP
1	315.00	66.4	58.4	14.7	27.2	10.2	0.0	64.1	56.1	75.6	11.5	19.5	AV

(below 1GHz)

No.	FREQ [MHz]	T/R READING		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN		DETECTOR
		HOR	VER					HOR	VER		HOR	VER	
2	630.00	38.6	37.4	19.5	28.6	12.0	0.0	41.5	40.3	46.0	4.5	5.7	QP
3	945.00	32.8	32.1	22.3	28.2	13.4	0.0	40.3	39.6	46.0	5.7	6.4	QP

(above 1GHz)

No.	FREQ [MHz]	T/R READING		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN		DETECTOR
		HOR	VER					HOR	VER		HOR	VER	
4	1260.00	57.2	59.3	23.9	41.3	1.2	0.0	41.0	43.1	74.0	33.0	30.9	PK
5	1575.00	56.4	56.5	25.6	40.9	1.3	0.0	42.4	42.5	74.0	31.6	31.5	PK
6	1890.00	58.9	57.9	30.0	40.6	1.3	0.0	49.6	48.6	74.0	24.4	25.4	PK
7	2205.00	52.7	52.5	30.9	40.8	1.3	0.0	44.1	43.9	74.0	29.9	30.1	PK
8	2520.00	55.9	55.0	30.4	41.4	1.5	0.0	46.4	45.5	74.0	27.6	28.5	PK
9	2835.00	50.1	50.6	31.4	41.8	1.6	0.0	41.3	41.8	74.0	32.7	32.2	PK
10	3150.00	54.5	53.5	31.7	42.1	1.7	0.0	45.8	44.8	74.0	28.2	29.2	PK

No.	FREQ [MHz]	T/R READING		ANT Factor [dB]	AMP GAIN [dB]	LOSS [dB]	Duty Factor [dB]	RESULT		Limit [dBuV/m]	MARGIN		DETECTOR
		HOR	VER					HOR	VER		HOR	VER	
4	1260.00	48.0	52.3	23.9	41.3	1.2	0.0	31.8	36.1	54.0	22.2	17.9	AV
5	1575.00	49.8	45.3	25.6	40.9	1.3	0.0	35.8	31.3	54.0	18.2	22.7	AV
6	1890.00	50.9	49.6	30.0	40.6	1.3	0.0	41.6	40.3	54.0	12.4	13.7	AV
7	2205.00	41.0	41.2	30.9	40.8	1.3	0.0	32.4	32.6	54.0	21.6	21.4	AV
8	2520.00	45.4	45.2	30.4	41.4	1.5	0.0	35.9	35.7	54.0	18.1	18.3	AV
9	2835.00	38.1	37.4	31.4	41.8	1.6	0.0	29.3	28.6	54.0	24.7	25.4	AV
10	3150.00	40.7	39.6	31.7	42.1	1.7	0.0	32.0	30.9	54.0	22.0	23.1	AV

REMARKS

ANTENNA TYPE:30-300MHz Biconical / 300-1000MHz Logperiodic / 1-3.2GHz Horn  
CALCULATION RESULT=Reading + ANT Factor - Amp Gain + LOSS (Cable+ ATTEN.)+Duty Factor  
\*Except for the above table : All other spurious emissions were less than 20dB for the limit.

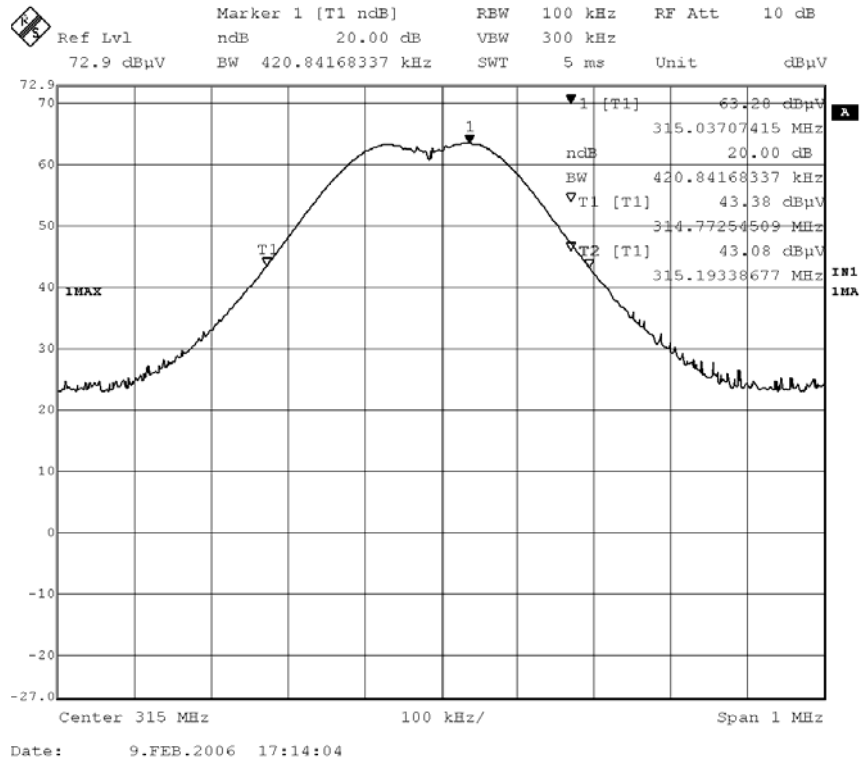
### -20dB Bandwidth

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

COMPANY : Alps Electric Co., Ltd.	REPORT NO : 26FE0028-HO
EQUIPMENT : Passive Entry System (Hand Unit)	REGULATION : Fcc Part15 Subpart C 231 ( c )
MODEL : TWB1U729	TEST DISTANCE : 3m
S/N : 1	DATE : 02/09/2006
POWER : DC3.0V	TEMPERATURE : 18°C
Mode : Continuous Transmitting	HUMIDITY : 30%
Axis : Hor.: X-axis , Ver.: Z-axis	ENGINEER : Hiroka Umeyama
Mode : Transmitting	

Bandwidth Limit : Fundamental Frequency 315MHz X 0.25% = 787.5 kHz

-20dB Bandwidth	Bandwidth Limit	Result
[kHz]	[kHz]	
420.84	787.50	Pass

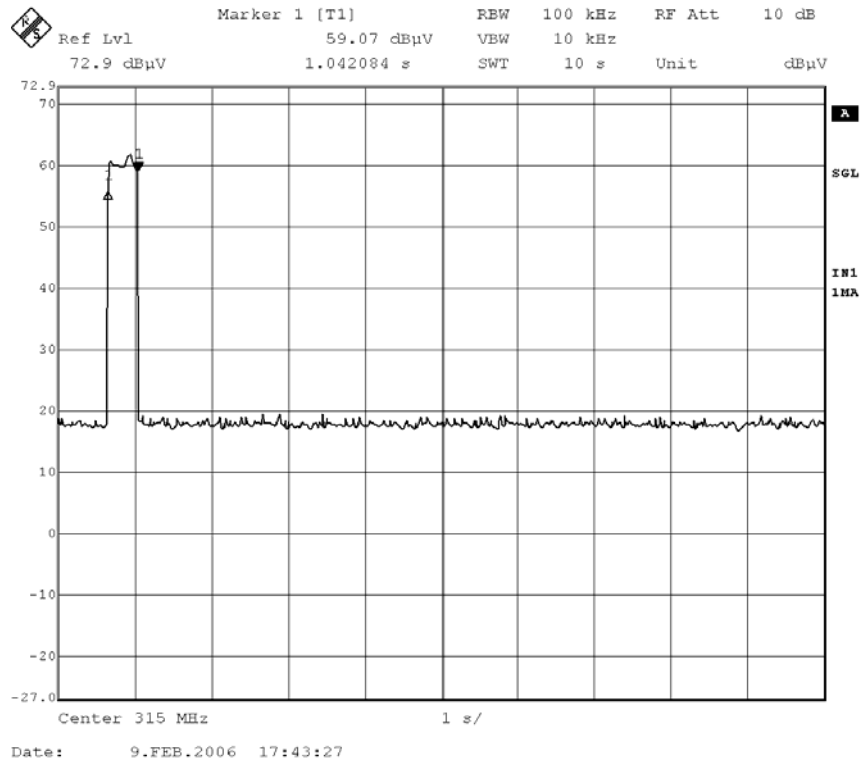


**Automatically deactivate**

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

COMPANY : Alps Electric Co., Ltd.	REPORT NO : 26FE0028-HO
EQUIPMENT : Passive Entry System (Hand Unit)	REGULATION : Fcc Part15 Subpart C 231 ( a )
MODEL : TWB1U729	TEST DISTANCE: 3m
S/N : 1	DATE : 02/09/2006
POWER : DC3.0V	TEMPERATURE : 18°C
Mode : Continuous Transmitting	HUMIDITY : 30%
Axis : Hor.: X-axis , Ver.: Z-axis	ENGINEER : Hiroka Umeyama
Mode : Transmitting	

Time of Transmitting [sec]	Limit [sec]	Result
1.04	5.00	Pass



### 99% Occupied Bandwidth

