EMI TEST REPORT

Test Report No. : 23CE0043-YW-1

Applicant:	**Tohoku Alps Co., Ltd.**
Type of Equipment:	**Passive Entry System**
Model No.:	**TFWB1U612 (Hand Unit)**
FCC ID	**NHVWBU612**
Test standard:	**FCC Part 15 Subpart C Section 15.231 and FCC Part 15 Subpart B Section 15.109**
Test Result:	**Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of A-Pex International 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: October 25, 2002

Tested by:
Makoto Kosaka
EMC Section

Approved by:
Kazutoyo Nakanishi
Site Operation Manager of EMC Section

A-pex International Co., Ltd.
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SECTION 1: Client information

Company name	:	Tohoku Alps 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.)

Type of Equipment : Passive Entry System / (Car Lock / Unlock devices)

Tx section

Model No.	TFWB1U612(Hand Unit)
Sample No.	No.1
Number of Channel	1
Frequency Characteristics	433.92MHz
Modulation	FSK(Frequency shift keying)
Information antenna	Integral / (P.C.B pattern antenna)
Rating	DC3.0V Lithium Battery (CR2023)
Country of Manufacture	Japan

Rx section

Type of Receiver	Turned Radio Frequency Receiver
Receiving Frequency	125kHz
Local Oscillator Frequency	none
Intermediate Frequency	none
Information antenna	Integral / (Loop coil and Bar antenna)
Rating	DC3.0V Lithium Battery (CR2023)

Country of Manufacture	:	Japan
Receipt Date of Sample	:	October 25, 2002
Condition of EUT	:	Engineering prototype

2.2 Product Description

The hand unit of passive entry system is a transmitter of 433.92MHz and a receiver of 125kHz.
The control unit of the passive entry system is a transmitter of 125kHz and a receiver of 433.92MHz.
These units are the new type of keyless entry system which communicates with each other.

See reference our test report No. 23AE0036-YW-2.(Control Unit / FCC ID: NHVWDU61 / Date of Grant: 10/16/2002)

SECTION 3: Test specification, methods & procedures

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart C Intentional Radiators
Section 15.231 Periodic operation in the band 40.66 – 40.70 MHz and above 70MHz

Test Specification : FCC Part 15 Subpart B Section 15.109 Radiated emission limits
Title : FCC 47CFR Part15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Methods & Procedures

No.	Item	Test Procedure	Specification	Remarks
1	Automatically Deactivate	ANSI C63.4:2000	FCC Section 15.231(a)(1)	Radiated
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2000	FCC Section 15.231(b)	Radiated
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2000	FCC Section 15.205 FCC Section 15.209 FCC Section 15.231(b)	Radiated
4	-20dB Bandwidth	ANSI C63.4:2000	FCC Section 15.231(c)	Radiated
5	Radiated emission	ANSI C63.4:2000	FCC Section 15.109(a)	Radiated
6	Conducted Emission	ANSI C63.4:2000	FCC Section 15.107(a) and 207	AC Mains only

*These tests were performed without any deviations from test procedure except for additions or exclusions.

3.3 Exclusion from standard

No.	Item	Test Procedure	Specification	Remarks
6	Conducted Emission	ANSI C63.4:2000	FCC Section 15.107(a) and 207	

This test is not applicable since the EUT does not have AC pwer port.

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

4.1 Operating Modes

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

The operating mode/system were as follows:

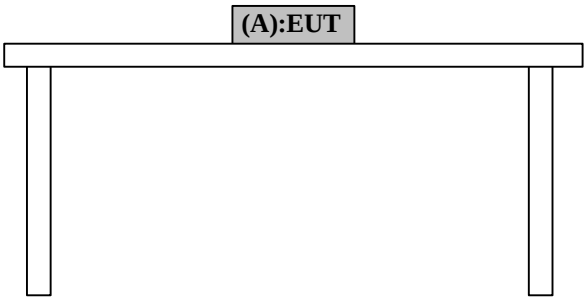
Operation mode is as follows;

- Transmitting mode
- Receiving mode

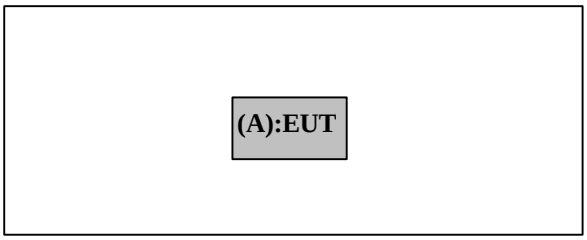
Justification: The system was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Front View (Hand Unit)



Top View (Hand Unit)



Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Passive Entry System (Hand Unit)	TFWB1U612	Sample No.1&2	Tohoku Alps	EUT

SECTION 5: Summary of test results

5.1 Test results

No.	Item	Test Procedure	Specification	Remarks	Result
1	Automatically Deactivate	ANSI C63.4:2000	Section 15.231(a)(1)	Radiated	Complied
2	Electric Field Strength of Fundamental Emission	ANSI C63.4:2000	FCC Section 15.231(b)	Radiated	Complied
3	Electric Field Strength of Spurious Emission	ANSI C63.4:2000	FCC Section 15.205 FCC Section 15.209 FCC Section 15.231(b)	Radiated	Complied
4	-20dB Bandwidth	ANSI C63.4:2000	FCC Section 15.231(c)	Radiated	Complied
5	Radiated emission	ANSI C63.4:2000	FCC Section 15.109(a)	Radiated	Complied

A-PEX INTERNATIONAL hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part 15 Subpart C Section 15.231 and FCC Part 15 Subpart B Section 15.109(a)

5.2 Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ±4.4dB.
The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ±4.8dB.
The measurement uncertainty (with a 95% confidence level) for this test using Horn antenna is ±5.8dB.
☐ The data listed in this test report may exceed the test limit because it does not have enough margin.
■ The data listed in this test report has enough margin.

5.3 Test Location

A-PEX International Co., Ltd. Yokowa No.3 test site
108 Yokowa-cho, Ise-shi, Mie-ken 516-1106 Japan
Telephone number : +81 596 39 1485
Facsimile number : +81 596 39 0232

The site has been fully described in a report submitted to FCC office, and listed on September 12, 2000 (Registration number: 90412) and they were accepted by Industry Canada on May 1, 2001(IC2973-3)
*NVLAP Lab. code : 200109-0

5.4 Photographs of test setup

Refer to Appendix 1.

5.5 Test instruments

Refer to Appendix 2.

5.6 Data of EMI Test

Refer to Appendix 3.

SECTION 6: Radiated emissions, -20dB BW & Automatically deactivate

6.1 Operating environment

The test was carried out in an open site.
Temperature : See data
Humidity : See data

30MHz –4.5GHz
EUT was placed on a platform of nominal size, 1m by 1m, raised 80cm above the conducting ground plane.
Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.
The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane and at a distance of 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.

The EUT was also previously checked at each position of three axes X, Y and Z to find the worst position. The position in which the maximum noise occurred was chosen to put into measurement. Worst cases are referred to following page.
It was operated under transmitting and receiving mode.

The radiated emission measurement were made with the following function of the test receiver and spectrum analyzer.

433.92MHz Transmitting mode
Measurement range : 30MHz to 1000MHz PK Detector, IF BW 120kHz (Test receiver)
: 1GHz to 4.5GHz PK Detector, RBW 1MHz, VBW 1MHz(Spectrum analyzer)
Test data : 30MHz - 4.5GHz : Page A1 (APPENDIX 3)
Photographs of test setup : Page 10
Test result : Pass

125kHz Receiving mode
Measurement range : 30MHz to 1000MHz CISPR QP Detector, IF BW 120kHz (Test receiver)
Test data : 30 - 1000MHz : Page A2 (APPENDIX 3)
Photographs of test setup : Page 10
Test result : Pass

6.2 -20dB Bandwidth

Bandwidth Limit: Fundamental Frequency 433.92MHz × 0.25% = 1.0848MHz

Bandwidth Limit	measurement data (20dB down) Center Freq: 433.9MHz	Result
-20dB Bandwidth (1.0848MHz)	147.9kHz	Pass

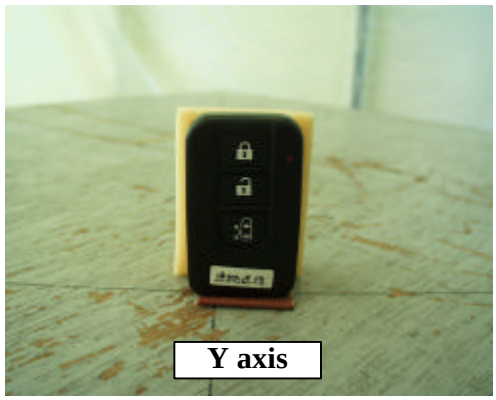
Test data : Page A3 (APPENDIX 3)

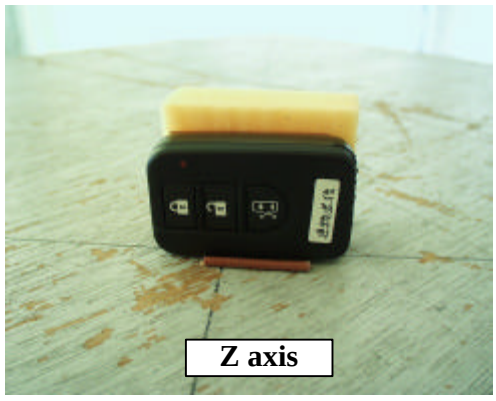
6.3 Automatically deactivate

Limit: A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

Test data : Page A3 (APPENDIX 3)
Test result : Pass (360ms)

6.4 Pre check of worse-case position





Worse case X axis (30MHz – 4.5GHz, Measurement antenna Polarization: Horizontal)
Worse case Y axis (30MHz – 4.5GHz, Measurement antenna Polarization: Vertical)

APPENDIX 1: Photographs of test setup

APPENDIX 2: Test instruments

APPENDIX 3: Data of EMI test

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APPENDIX 1: Photographs of test setup

Radiated emission

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APPENDIX 2
Test Instruments

Radio tsst equipment

Control No.	Instrument	Manufacturer	Model No.	Calibration Date Interval (month)
AF-01	Pre Amplifier	Hewlett Packard	8447D	2002/04/01 *12
AF-06	Pre Amplifier	Agilent	8449B	2001/12/21 *12
AT-06	6dB Attenuator	Anritsu	MP721B	2002/04/04 *12
BA-06	Biconical Antenna	Schwarzbeck	BBA9106	2002/02/16 *12
LA-07	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	2002/09/09 *12
SA-06	Spectrum Analyzer	Advantest	R3273	2001/11/20 *12
TR-06	Test Receiver	Rohde & Schwarz	ESVS10	2001/11/22 *12
HA-06	Horn Antenna	Schwarzbeck	BBHA9120D	2002/04/28 *12
CC-3ORC	Yokowa No.3 open Coaxial(0.01-1000MHz)	A-PEX	CC31-38, SW31-32	2002/03/30 *12
CC-C15	Microwave Cable	Suhner	SUCOFLEX	2002/04/17 *12
CC-C17	Microwave Cable	Suhner	SUCOFLEX	2002/04/26 *12
YOATS-03	Open test site	JSE	10m	2002/05/02 *12

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

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Date of carrier and supurious emissions

A-PEX INTERNATIONAL CO., LTD.
YOKOWA NO.3 OPEN SITE

Company	: TOHOKU ALPS CO., LTD.	Report No.	: 23CE0043-YW-1
Equipment	: Passive Entry System (Hand Unit)	Regulation	: FCC Part15C Section 15.231
Model	: TFWB1U612	Test Distance	: 3m
Sample No.	: 1	Date	: 2002/10/25
Power	: DC 3.0V (CR2023)	Temperature	: 25deg.C
Mode	: Transmitting (433.92MHz)	Humidity	: 64%
EUT Position	: X and Y axis(Worse case)		
FCC ID	: NHVWBU612		
IC No.	: 3495A-FWB1U612		

ENGINEER : Makoto Kosaka

Below 1GHz QP DETECT(Test Receiver: BW 120kHz)
Above 1GHz PK DETECT (Spectrum Analyzer : RBW 1MHz and VBW 1MHz)

No.	FREQ	READING		ANT	AMP	CABLE	ATTEN	Duty	RESULT		LIMIT	MARGIN	
		HOR	VER	Factor	GAIN	LOSS		Factor	HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB]	[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
1	433.860	59.1	57.0	18.9	27.9	4.8	6.0	0.0	60.9	58.8	80.8	19.9	22.0
2	867.900	33.4	30.8	24.5	26.9	7.2	6.0	0.0	44.2	41.6	60.8	16.6	19.2
3	1301.558	57.4	53.8	26.1	38.7	1.9	0.0	0.0	46.7	43.1	54.0	7.3	10.9
4	1735.375	62.1	62.0	27.5	38.3	2.3	0.0	0.0	53.6	53.5	60.8	7.2	7.3
5	2169.263	49.4	50.1	28.5	38.0	2.7	0.0	0.0	42.6	43.3	60.8	18.2	17.5
6	2603.950	50.6	53.0	29.6	38.0	3.1	0.0	0.0	45.3	47.7	60.8	15.5	13.1
7	3036.947	50.3	53.1	29.9	38.2	3.4	0.0	0.0	45.4	48.2	60.8	15.4	12.6
8	3470.792	44.1	45.1	30.2	38.1	3.7	0.0	0.0	39.9	40.9	60.8	20.9	19.9
9	3904.630	43.1	44.4	31.5	37.9	4.1	0.0	0.0	40.8	42.1	54.0	13.2	11.9
10	4338.550	43.9	44.0	32.1	38.1	4.3	0.0	0.0	42.2	42.3	54.0	11.8	11.7

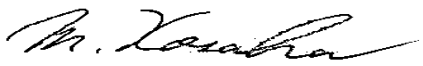
REMARKS
ANTENNA TYPE: 30-300MHz Biconical / 300-1000MHz Logperiodic / 1-4.5GHz DRG Horn
*EUT was placed in X axis when the measurement antenna was positioned horizontally.(wors case)
*EUT was placed in Y axis when the measurement antenna was positioned vertically.(wors case)
CALCULATION(30MHz to 1000MHz) : READING + ANT Factor - AMP Gain + ATTEN + Cable Loss + Duty Factor
*Except for the above table : All other spurious emissions were less than 20dB for the limit.

Data of supurious emissions(30MHz to 1000MHz)

A-PEX INTERNATIONAL CO., LTD.
YOKOWA NO.3 OPEN SITE

Company : TOHOKU ALPS CO., LTD.
Equipment : Passive Entry System (Hand Unit)
Model : TFWB1U612
Sample No. : 2
Power : DC 3.0V (CR2023)
Mode : Receiving (125kHz)
FCC ID : NHVWBU612
IC No : 3495A-FWB1U612

Report No. : 23CE0043-YW-1
Regulation : FCC Part15B Section 15.109(a)
Test Distance : 3m
Date : 2002/10/25
Temperature : 25deg.C
Humidity : 64%



ENGINEER : Makoto Kosaka

QP DETECT(Test Receiver: BW 120kHz)

No.	FREQ	READING		ANT	AMP	CABLE	ATTEN	RESULT		LIMIT	MARGIN	
		HOR	VER	Factor	GAIN	LOSS		HOR	VER		HOR	VER
	[MHz]	[dBuV]		[dB]	[dB]	[dB]	[dB]	[dBuV/m]		[dBuV/m]	[dB]	
1	48.000	22.3	22.3	11.5	28.0	1.4	6.0	13.2	13.2	40.0	26.8	26.8
2	72.000	21.8	22.4	6.4	27.9	1.8	6.0	8.1	8.7	40.0	31.9	31.3
3	96.000	23.0	23.0	9.1	27.8	2.0	6.0	12.3	12.3	43.5	31.2	31.2
4	120.000	21.6	21.3	13.0	27.9	2.4	6.0	15.1	14.8	43.5	28.4	28.7
5	144.000	22.3	22.3	14.7	27.9	2.7	6.0	17.8	17.8	43.5	25.7	25.7
6	192.000	22.3	22.1	16.0	27.8	3.0	6.0	19.5	19.3	43.5	24.0	24.2
7	336.000	21.4	22.7	17.3	28.0	4.3	6.0	21.0	22.3	46.0	25.0	23.7

REMARKS
ANTENNA TYPE: 30-300MHz Biconical / 300-1000MHz Logperiodic
CALCULATION(30MHz to 1000MHz) : READING + ANT Factor - AMP Gain + Cable Loss + ATTEN
*Except for the above table : All other spurious emissions were less than 20dB for the limit.

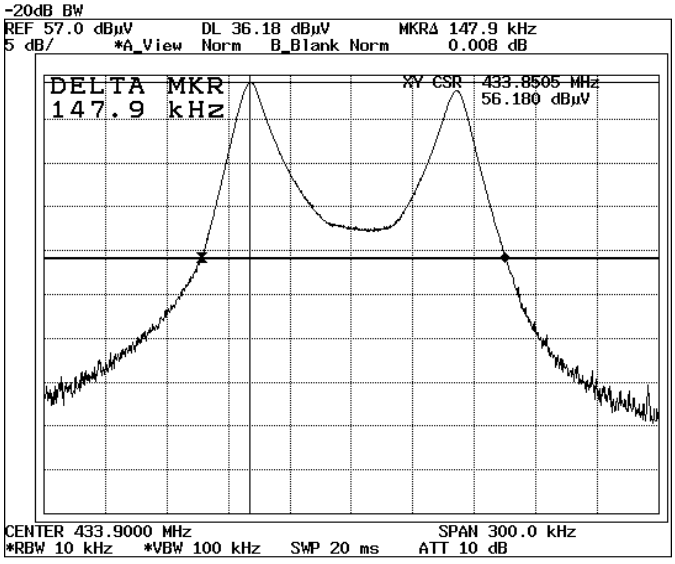
-20dB BW and Automatically deactivate

Company : TOHOKU ALPS CO., LTD.
Equipment : Passive Entry System (Hand Unit)
Model : TFWB1U612
Sample No. : No.1
Power : DC 3.0V (CR2023)
Mode : Transmitting (433.92MHz)
FCC ID : NHVWBU612
IC No : 3495A-FWB1U612

Report No. : 23CE0043-YW-1
Regulation : FCC Part15C Section 15.231
Date : 2002/10/25
Temperature : 25deg.C
Humidity : 64%

ENGINEER : Makoto Kosaka

-20 dBBandwidth (15.231(c))



Automatically deactivate (15.231(a)(1))