EMISSION TEST REPORT

Test Report No. : 19L0007-02-1

Applicant:	**TOHOKU ALPS CO., LTD.**
Type of Equipment:	**Remote Keyless Entry (Transmitter)**
Model No.:	**72147-S5A-A / 08E61-S5D-1M0-01 / 72147-S5N-A**
Test standard:	**FCC Part 15 Subpart C**
Test Result:	**Complies**

Date of test: December 9, 1999

Tested by: _____

Naoki Sakamoto

Approved by: _____ Issued date: December 10, 1999

Kazutoyo Nakanishi

Group Leader of EMC section

Testing Laboratory

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1 GENERAL INFORMATION

APPLICANT	: TOHOKU ALPS CO., LTD.
ADDRESS	: 6-3-36, Nakazato, Furukawa-shi, Miyagi-ken, 989-6181 Japan Tel: +81-229-23-5111 Fax: +81-229-22-9997
REGULATION(S)	: FCC Part 15 Subpart C
MODEL NUMBER	: 72147-S5A-A / 08E61-S5D-1M0-01 / 72147-S5N-A
SERIAL NUMBER	: T99120801 (72147-S5A-A) T99120802 (72147-S5N-A)
KIND OF EQUIPMENT	: Remote Keyless Entry (Transmitter)
TESTED DATE	: December 8, 1999
RECEIPT DATE OF SAMPLE	: November 27, 1999
REPORT FILE NUMBER	: 19L0007-02-1
TEST SITE	: A-PEX Yokowa NO.3 Open Test Site

1.1 Tested Methodology

Radiated testing were performed according to the procedures in FCC/ANSI C63.4(1992).
Radiated testing was performed at a distance of 3 meters from the antenna to EUT .

1.2 Test Facility

The open area site measurement facility used to collect the radiated data is located on 108, Yokowa-cho, Ise-shi, Mie-ken, 516-1106 Japan.
This site has been fully described in a report dated Aug. 1, 1997 submitted to FCC office, and listed dated Sep. 16, 1997 (31040/SIT 1300F2) and accepted Feb. 19, 1998 (IC2973-3) by Industry Canada.

2 Product Description

TOHOKU ALPS CO., LTD., Model 72147-S5A-A / 08E61-S5D-1M0-01 / 72147-S5N-A (referred to as the EUT in this report) is a Remote Keyless Entry (Transmitter).

*The operation frequency is as following :
RF : 433.92MHz (SAW-R)
Modulation techniques : FSK
Rate of transmission : 1 kbps
CPU clock : 4.19MHz (Ceramic Oscillator)
Operation voltage : DC 3V (Battery)

*This EUT has two type models, one is 3 Key type and another is 4 Key.

3 Key type	**4 Key type**
72147-S5A-A	72147-S5N-A
08E61-S5D-1M0-01	-

These three models have the same electric characteristics.
The differences between above three models are as follows;
08E61-S5D-1M0-01 is the series model of 72147-S5A-A.
4 Key type (72147-S5N-A) is added “TRUNK Key” to 3 Key type.

*The description of button is as follows;
- LOCK : Transmit the LOCK command by pushing this button. (Transmission time : 256msec)
- UNLOCK : Transmit the UNLOCK command by pushing this button. (Transmission time : 256msec)
- TRUNK(only 4key type) : Transmit the TRUNK command by pushing this button. (Transmission time : 256msec)
- PANIC : Transmit the PANIC command after 1 sec. of pushing this button.
PANIC command will be transmitted during the button is on,
and 30 seconds transmission will be the maximum.

*The timing chart is as follows;

256msec. 256msec.

714msec. 4msec .

* The output level of each key is even.

3 Tested Equipment Details

The FCC IDs for all equipment, plus description of all cables used in the tested system are:

Model	FCC ID	Description	Cable description	Backshell Material
(1) TOHOKU ALPS CO., LTD. M/N: 72147-S5N-A S/N: T99120802 (EUT)	NHVWB1U521	Keyless Entry System (Transmitter)	-	-

4 SYSTEM TEST CONFIGURATION

4.1 Justification

The measurement was performed with the system configuration shown in Figure 4.2.
Since 72147-S5A-A, 08E61-S5D-1M0-01 and 72147-S5N-A have the same electric characteristics, only 72147-S5N-A was tested representatively.
Running mode was taken for the EUT transmitting mode.

4.2 Test Procedure

Tabletop Equipment Radiated Emissions

EUT was placed on a platform of nominal size, 1m by 1.0m, raised 80cm above the conducting ground plane.
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.

Figure 4.2 Configuration of Tested System

Front View

Top View

5 RADIATED MEASUREMENT PHOTOS

Figure 5.1 Radiated Measurement Photos

5.1 Measurement Uncertainty

Radiated Emission Test

The measurement uncertainty (with a 95% confidence level) for this test was ±3.3dB.

The data listed in this test report has enough margin, more than 3.3dB.

6 RADIATED EMISSION DATA

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (30MHz-4400MHz).
The final data was reported in the worst-case emissions.
The minimum margin to the limit is as follows :

*** 30MHz - 1000MHz : QP Detect**
***1000MHz - 4400MHz : PK Detect**

Frequency (GHz)	Receiver Reading (dBuV)	Correction Factor (dBuV)	Field Strength (dBuV/m)	Limit (dBuV/m)	Margin (dBuV)
433.88	72.5	1.0	73.5	77.2	3.7

The Fundamental Frequency of this equipment is 433.92MHz. The peak of output level of fundamental frequency was confirmed at the 433.92MHz by perfarming the meaurement.
It was corroborated that equipment was within of the tolerance which is prescribed
in the FCC requlation Part 15 Subpart C sec. 15.231 (c).
Since the fundamental frequency is 433.92MHz, the upper limit could be 435.0 MHz and lower limit could be 432.8MHz.
The measurement result was 434.1MHz when the limit was 435.0MHz and also another measurement result was 433.6 MHz when the limit was 432.8MHz.
Any spurious emissions did not detect except fundamental frequency’s spurious.

6.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor, Cable Factor and Antenna Pad, and subtracting the Amplifier Gain from the measured reading. The sample calculation is as follows :

FS = RA + AF + CF + AT - AG

where FS = Field Strength
RA = Receiver Reading
AF = Antenna Factor
CF = Cable Factor
AT = Antenna Pad
AG = Amplifier Gain

Assume a receiver reading of 72.5 dBuV is obtained. The antenna Factor of 16.1 dB, Cable Factor of 6.4 dB is added The Antenna Pad of 6.0 dB and Amplifier Gain of 27.5 dB is subtracted, giving a field strength of 73.5 dBuV/m.

FS = 72.5+ 16.1 +6.4 + 6.0 - 27.5 = 73.5 dBuV/m

7 TEST EQUIPMENT USED

NAME	MANUFACTURER	MODEL	Control No.	Calibrated Until
Pre Amplifier	Hewlett Puckered	8447D	AF1	May 16, 2000
Pre Amplifier	Hewlett Packard	8449B	AF4	May 16, 2000
Biconical Antenna	Schwarzbeck	BBA9106	BA3	April 30, 2000
Logperiodic Antenna	Schwarzbeck	UHALP9108-A	LA6	February 14 , 2000
Horn Antenna	AH System, Inc	SAS-200/571	HA1	February 5 , 2000
Spectrum Analyzer	Hewlett Packard	8567A	SA4	May 16, 2000
Spectrum Analyzer	Advantest	R3271	SA5	September 27, 2000
Test Receiver	Rohde & Schwarz	ESVS-10	TR6	April 20, 2000
Microwave Cable Assembly	Suhner	Sucoflex104	CC-C1	April 30, 2000
Microwave Cable Assembly	Suhner	Sucoflex104	CC-C2	April 30, 2000

indicates EMI Test Equipment used.

All measurement equipment is traceable to national standard

APPENDIX

Test Data

Radiated emissions A 1 - A 3