EMI TEST REPORT

Test Report No. : 21GE0058-YW-1

Applicant:	**TOHOKU ALPS CO., LTD.**
Type of Equipment:	**Keyless Entry Unit (Receiver)**
Model No.:	**88035SA060**
Test standard:	**FCC Part 15 Subpart B 109(a)**
Test Result:	**Complies**

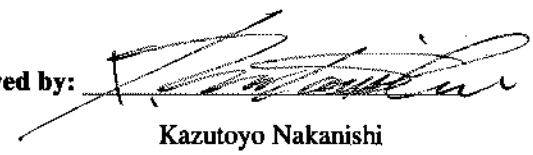
1. This test report shall not be reproduced in full or partial, without the written approval of A-Pex International Co., Ltd.
2. The results in this report apply only to the sample tested.
3. This equipment is in compliance with above regulation. We hereby certify that the data contains a true representation 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: March 9, 2001 **Issued date:** March 15, 2001

Revised date: March 26, 2001

Tested by: 

Naoki Sakamoto
EMC section

Approved by: 

Kazutoyo Nakanishi
Section Manager of EMC section

Form Version No. 2

NVLAP®
NVLAP Lab. code : 200109-0

This laboratory is registered by the NIST/NVLAP, U.S.A. The tests reported herein have been performed in accordance with its terms of registration.

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CONTENTS

SECTION 1: Client information

Company name	:	TOHOKU ALPS CO., LTD.
Address	:	6-3-36, Nakazato, Furukawa-city, Miyagi-pref. 989-6143 Japan
Telephone Number	:	+81-229-23-5111
Facsimile Number	:	+81-229-22-3755
Contact Person	:	Seino Katsuhiro

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

2.1 Identification of E.U.T.

Type of Equipment	:	Keyless Entry Unit (Receiver)
Model No.	:	88035SA060
Part No.	:	880
Rating	:	DC 12V
Country of Manufacture	:	Japan
Receipt Date of Sample	:	March 1, 2001

2.2 Product Description

Model: 88035SA060, referred to as the EUT in this report, is a Keyless Entry Unit (Receiver).

The clock frequency used in the EUT is as follows;
Type of receiver : Super Heterodyne
CPU Main Clock : 4.19MHz (Ceramic resonator)
CPU Sub Clock : 32.768kHz (Crystal)
Tuner Block Local Oscillator : 6.7738MHz (Crystal)

SECTION 3: Test specification, methods & procedures

3.1 Test Specification

Test Specification : FCC Part 15 Subpart B.109(a)

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

3.2 Methods & Procedures

No.	Item	Test Procedure	Specification	Remarks
1	Conducted emission	FCC/ANSI C63.4:1992	15.107	-
2	Radiated emission	FCC/ANSI C63.4:1992	15.109	3m

3.3 Exclusions from standards

No.	Item	Test Procedure	Specification	Remarks
1	Conducted emission	FCC/ANSI C63.4:1992	15.107	-

*This test was not performed since EUT does not have AC 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.

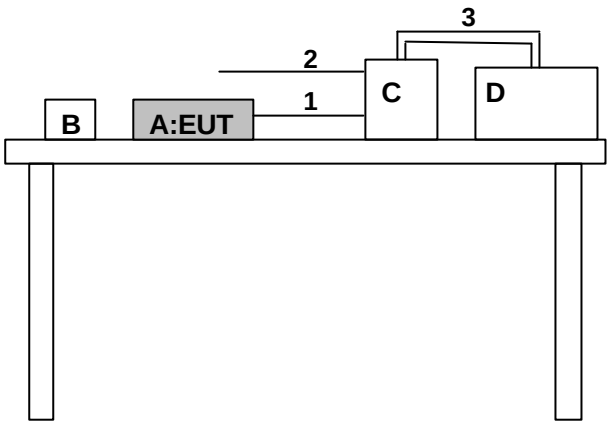
The sequence is used:

Operation: Receiving mode

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

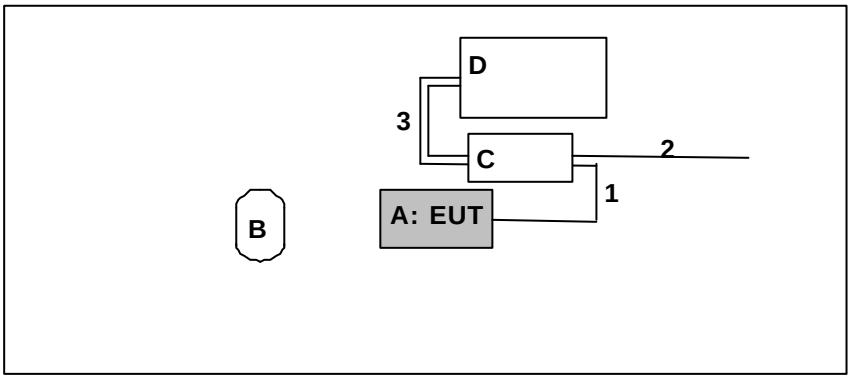
4.2 Configuration and peripherals

Front View



* Cabling was taken into consideration and test data was taken under worse case conditions.

Top View



- Cabling was 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	FCC ID
A	Receiver	88035SA060	880 (Part No.)	TOHOKU ALPS CO., LTD.	NHVVG1U118
B	Transmitter	88035AC230	B00410093		A269ZUA111
C	Checker	-	-	-	-
D	Battery	-	-	YUASA	-

List of cables used

No.	Name	Length (m)	Shield	Backshell Material
1	I/F Cable	0.5	N	P.V.C
2	I/F Cable	0.5	N	P.V.C
3	DC Power Cable	0.25	N	P.V.C

SECTION 5: Summary of test results

5.1 Test results

EMI

No.	Item	Test Procedure	Specification	Remarks	Result
2	Radiated emission	FCC/ANSI C63.4:1992	15.109(a)	3m	Complies

A-PEX INTERNATIONAL hereby confirms that E.U.T., in the configuration tested, complies with the specifications FCC Part15 Subpart B.109(a)

5.1.1 Data of radiated emission test

The initial step in collecting radiated data was a spectrum analyzer peak scan of the measurement range (30MHz-1000MHz).
The final data was reported in the worst-case emissions.

The minimum margin to the limit is as follows :

Frequency (MHz)	Receiver Reading (dBμV)	Correction Factor (dBμV)	Field Strength (dBμV/m)	Limit (dBμV/m)	Margin (dBμV)
867.07	20.4	7.3	27.7	46.0	18.3

*All readings are CISPR quasi-peak mode(BW 120kHz).

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 Amplitude
AF = Antenna Factor
CF = Cable Factor
AT = Antenna Pad
AG = Amplifier Gain

Assume a receiver reading of 20.4 dBμV is obtained. The antenna Factor of 21.6 dB, Cable Factor of 6.9 dB and Antenna Pad of 5.8 dB is added. The Amplifier Gain of 27.0 dB is subtracted, giving a field strength of 27.7 dBμV/m.

FS = 20.4 + 21.6 + 6.9 + 5.8 – 27.0 = 27.7 dBμV/m

5.2 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 may exceed the test limit because it does not have enough margin (more than 3.3dB).

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

5.3 Test equipment used

See SECTION 6: Test instruments

5.4 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

This site has been fully described in a report submitted to FCC office, and listed on September 12, 2000 (Registration number: 90412) and it was accepted by Industry Canada on February 19, 1998 (IC2973-3).

*NVLAP Lab. code : 200109-0

5.6 Test Configuration Photographs

See Appendix 1.

5.6 Data of EMI Test

See Appendix 2.

SECTION 6: Test instruments

EMI test instrument

Instrument	Mfr.	Model No.	Control No.	Calibration Date / Interval
Pre Amplifier	Hewlett Packard	8447D	AF-01	November 06, 2000 / 1 year
Biconical Antenna	Schwarzbeck	BBA9106	BA-03	April 29, 2000 / 1 year
Logperiodic Antenna	Schwarzbeck	UHALP9108-A	LA-06	April 30, 2000 / 1 year
Spectrum Analyzer	Hewlett Packard	8567A	SA-04	November 6, 2000 / 6 months
Test Receiver	Rohde & Schwarz	ESVS10	TR-06	August 10, 2000 / 1 year

*All measurement equipment is traceable to national standard.

SECTION 7: Radiated emission

7.1 Operating environment

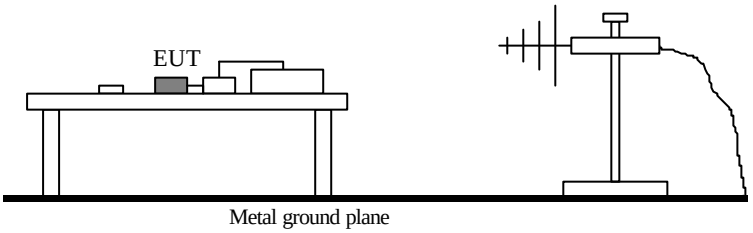
The test was carried out in an open site.

Temperature : See data
Humidity : See data

7.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.
I/O cables that were connected to the peripherals were bundled in center.
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.
A drawing of the set up is shown in fig. 1 and the photos of Appendix 1.

Figure 1. Drawing of the test set-up



7.3 Test conditions

Frequency range : 30MHz-1000MHz
Test distance : 3m
EUT position : Table top

7.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an open test site with a ground plane at a distance of 3m from the EUT to the antenna.
Pre check measurements were performed in a shielded room or used search coil for ambient noise at high-level, especially from 272MHz to 288MHz.
Measurements were performed with a CISPR quasi-peak detector(BW 120kHz).
The measuring antenna height was varied between 1m to 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 put into operation at Receiving mode

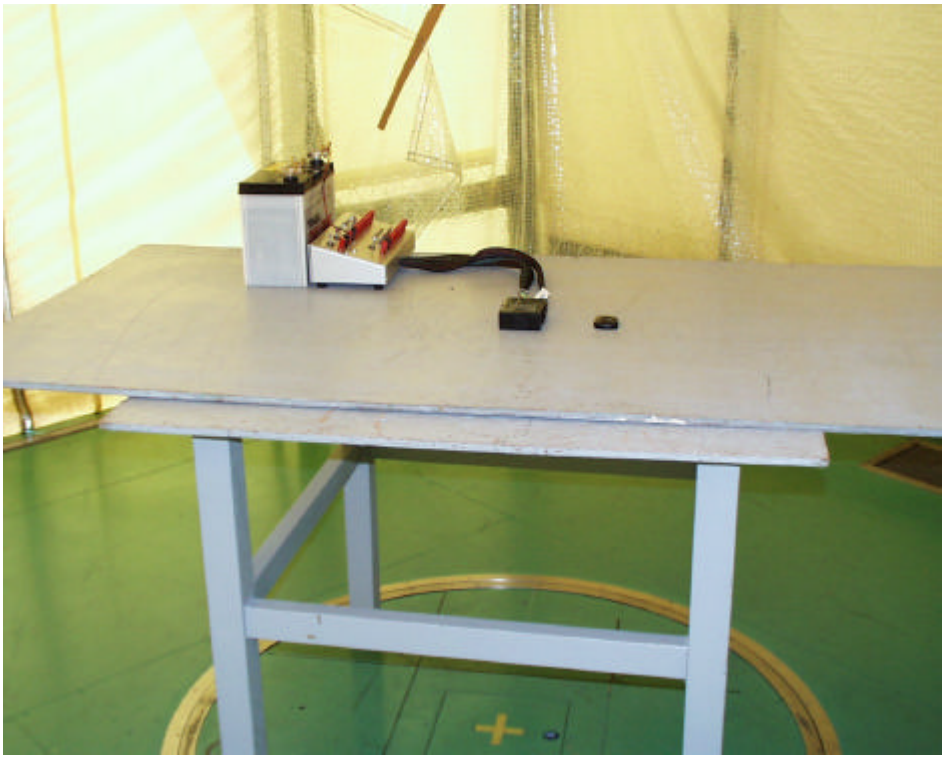
7.5 Results

Summary of the test results: Pass
Date: 2001-03-09 Tested by: N. Sakamoto

APPENDIX 1: Photographs of test setup

This section contains the following photographs:

Radiated emission



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APPENDIX 2: Data of EMI test

This section contains the following data

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DATA OF RADIATION TEST

A-PEX INTERNATIONAL CO., LTD.
YOKOWA No.3 OPEN TEST SITE
Report No. : 21GE0058-YW-1

Applicant : TOHOKU ALPS CO.,LTD.
Kind of Equipment : KEYLESS ENTRY UNIT(Receiver)
Model No. : 88035SA060
Serial No. : 880(Part No)
Power : DC12V
Mode : Receiving
Remarks : FCC ID : NHVVG1U118
Date : 3/9/2001
Test Distance : 3 m
Temperature : 24 ℃
Humidity : 36 %
Regulation : FCC Part15B. 109(a)

Engineer : Naoki Sakamoto

No.	FREQ. [MHz]	ANT TYPE	READING HOR [dBμV]	READING VER [dBμV]	ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT HOR [dBμV/m]	RESULT VER [dBμV/m]	LIMITS [dBμV/m]	MARGIN HOR [dB]	MARGIN VER [dB]
1.	33.52	BB	23.0	24.2	17.3	28.3	1.0	6.0	19.0	20.2	40.0	21.0	19.8
2.	34.94	BB	24.2	23.4	16.7	28.3	1.0	5.9	19.5	18.7	40.0	20.5	21.3
3.	41.90	BB	23.3	23.8	14.0	28.3	1.2	5.9	16.1	16.6	40.0	23.9	23.4
4.	50.28	BB	23.4	23.4	10.8	28.1	1.3	5.9	13.3	13.3	40.0	26.7	26.7
5.	88.00	BB	26.3	26.0	7.8	27.9	1.8	5.9	13.9	13.6	40.0	26.1	26.4
6.	138.27	BB	22.1	22.7	14.6	28.0	2.3	5.9	16.9	17.5	43.5	26.6	26.0
7.	433.54	BB	27.1	24.6	16.2	27.9	4.4	6.0	25.8	23.3	46.0	20.2	22.7
8.	867.07	BB	20.2	20.4	21.6	27.0	6.9	5.8	27.5	27.7	46.0	18.5	18.3

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

All other spurious emissions are more than 20dB below the limits.
ANT.TYPE : 30-300MHz Biconical, 300-1000MHz Logperiodic,1GHz-2GHz Horn

DATA OF RADIATION TEST

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