

EMI TEST REPORT

Test Report No. : 23DE0050-HO-1

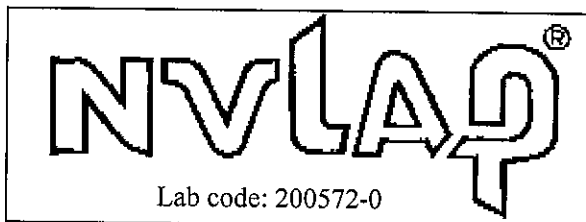
Applicant : TOHOKU ALPS CO., LTD
Type of Equipment : KEYLESS ENTRY UNIT
Model No. : 88035AE16B
Test standard : FCC Part 15 Subpart B Class B
FCC ID : NHVWG1U713
Test Result : Complied

1. This test report shall not be reproduced except 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 test 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 : December 18, 2002

Tested by : Sumio Nishii
Sumio Nishii
EMC Head Office Division

Approved by : Hironobu Shimoji
Hironobu Shimoji
Group Leader of EMC Head Office Division



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

A-Pex International Co., Ltd.

EMC Head Office Division.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone: +81 596 24 8116

Facsimile: +81 596 24 8124

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SECTION 1: Client information

Company Name : TOHOKU ALPS CO., LTD
Brand Name : ALPS
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 : KATSUHIRO SEINO

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

2.1 Identification of E.U.T.

Type of Equipment : KEYLESS ENTRY UNIT
Model No. : 88035AE16B
Serial No. : 1
Rating : DC 12V
Country of Manufacture : JAPAN
Receipt Date of Sample : November 15, 2002
Condition of EUT : Production prototype

2.2 Product description

TOHOKU ALPS CO., LTD, Model: 88035AE16B (referred to as the EUT in this report) is a Keyless Entry Unit. The clock frequency used in EUT is 4.19 MHz (for CPU main-clock) and 32.768 MHz (for CPU sub-clock) and 84.644 MHz (for Tuner oscillator). The host device 88035AE16B provide the stable power supply (DC: 12 V), and the KEYLESS ENTRY UNIT complies power supply regulation.

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SECTION 3: Test specification, procedures and results

3.1 Test specification

Test Specification : FCC Part 15 Subpart B
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	ANSI C63.4: 2001	Class B	Excluded *	N/A	N/A
Radiated emission	ANSI C63.4: 2001	Class B	N/A	5.8 dB (84.64 MHz: Horizontal)	Complied

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

3.3 Confirmation

A-Pex International Co., Ltd. hereby confirms that E.U.T., in the configuration tested, complies with the specifications, FCC Part15 Subpart B.

3.4 Uncertainty

Radiated emission test

The measurement uncertainty (with a 95% confidence level) for this test using Biconical antenna is ± 4.5 dB.

The measurement uncertainty (with a 95% confidence level) for this test using Logperiodic antenna is ± 5.2 dB.

☐ 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, more than the site margin.

3.5 Test location

A-Pex International Co., Ltd. EMC Head Office Division. No.2 semi Anechoic Chamber, 7.5 x 5.8 x 5.2 m.
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This semi anechoic chamber has been fully described in a report submitted to FCC office, and listed on June 05,2002 (Registration number: 846015).

*NVLAP Lab. code: 200572-0

3.6 Photographs of test setup, Data of EMI Test and Test instruments

Refer to APPENDIX 1 to 3.

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

4.1 Operating modes

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

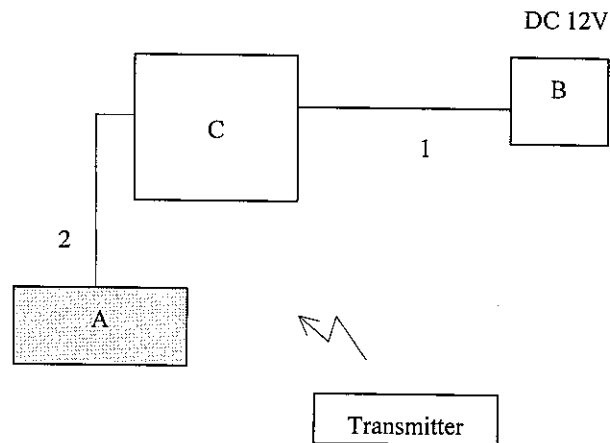
The operating mode was as follows:

Operating mode : Normal Mode (Acceptable RF signal from transmitter. Tuner oscillator and main-clock are operated intermittently.)

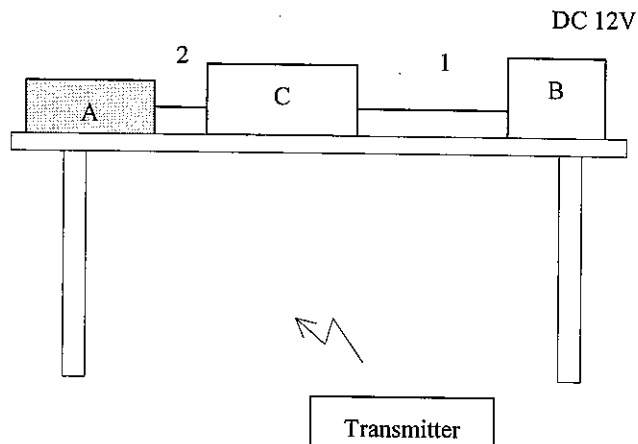
Justification : The EUT was configured in typical fashion (as a customer would normally use it) for testing.

4.2 Configuration and peripherals

Top View



Front View



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

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Description of EUT and supported equipment

No	Item	Model number	Serial number	Manufacturer	FCC ID/DoC/other
A	KEYLESS ENTRY UNIT	88035AE16B	1	ALPS	NHVVW61U713
B	Car Battery	B19L	161001C	Panasonic	-
C	Checker	88A RKE&SEC JIG	N/A	ALPS	-

List of cables used

No.	Name	Length (m)	Shield	Remark
1	DC Power Cable	0.8	N	Polyvinyl Chloride
2	Extended Harness	0.6	N	Polyvinyl Chloride

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SECTION 5: Radiated emission

5.1 Operating environment

The test was carried out in No.2 semi Anechoic Chamber, 7.5 x 5.8 x 5.2 m.

Temperature : See data
Humidity : See data

5.2 Test configuration

EUT was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The center of EUT was aligned and flushed with center of 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.

A drawing of the set up is shown in the photos of APPENDIX 1.

5.3 Test conditions

Frequency range : 30MHz - 1GHz
Test distance : 3m
EUT position : Table top
EUT operation mode: Normal Mode (Acceptable RF signal from transmitter. Tuner oscillator and main-clock are operated intermittently.)

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on a semi anechoic chamber with a ground plane and at a distance of 3m.

Measurements were performed with a quasi-peak detector.

The measuring antenna height was varied between 1 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 radiated emission measurements were made with the following detector function of the test receiver.

Frequency	30MHz-1000MHz
Detector Type	Quasi-peak
IF Bandwidth	120 kHz

The EUT was measured in the direction to be its worst level condition.

5.5 Results

Summary of the test results: Pass

Date: December 18, 2002

Test engineer: Sumio Nishii

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APPENDIX 1: Photographs of test setup

Page 9 : Radiated emission

APPENDIX 2: Data of EMI test

Page 10-11 : Radiated emission

APPENDIX 3: Test instruments

Page 12 : Test instruments

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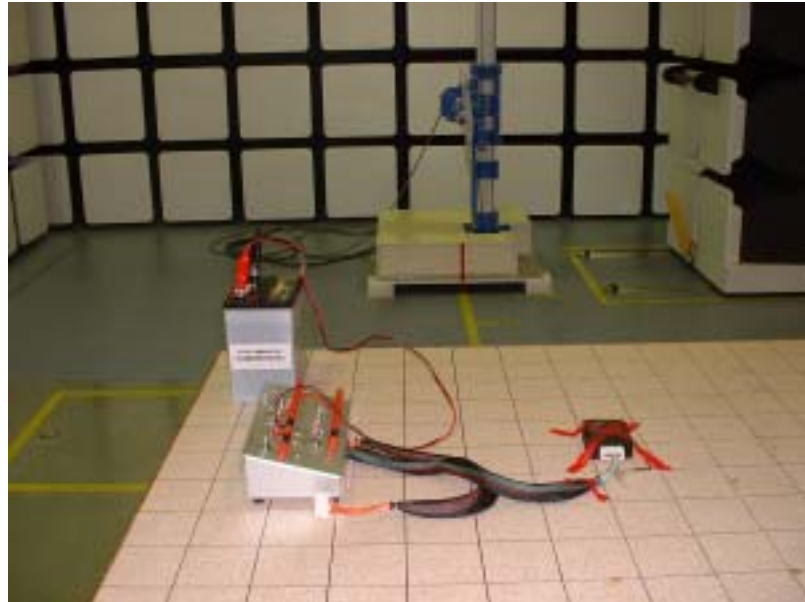
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MF060b (23.04.02)

APPENDIX 1: Photographs of test setup

Radiated emission



DATA OF RADIATION TEST

A-Pex International Co., Ltd.
No.2 SEMI ANECHOIC CHAMBER
Report No. : 23DE0050-H0-1

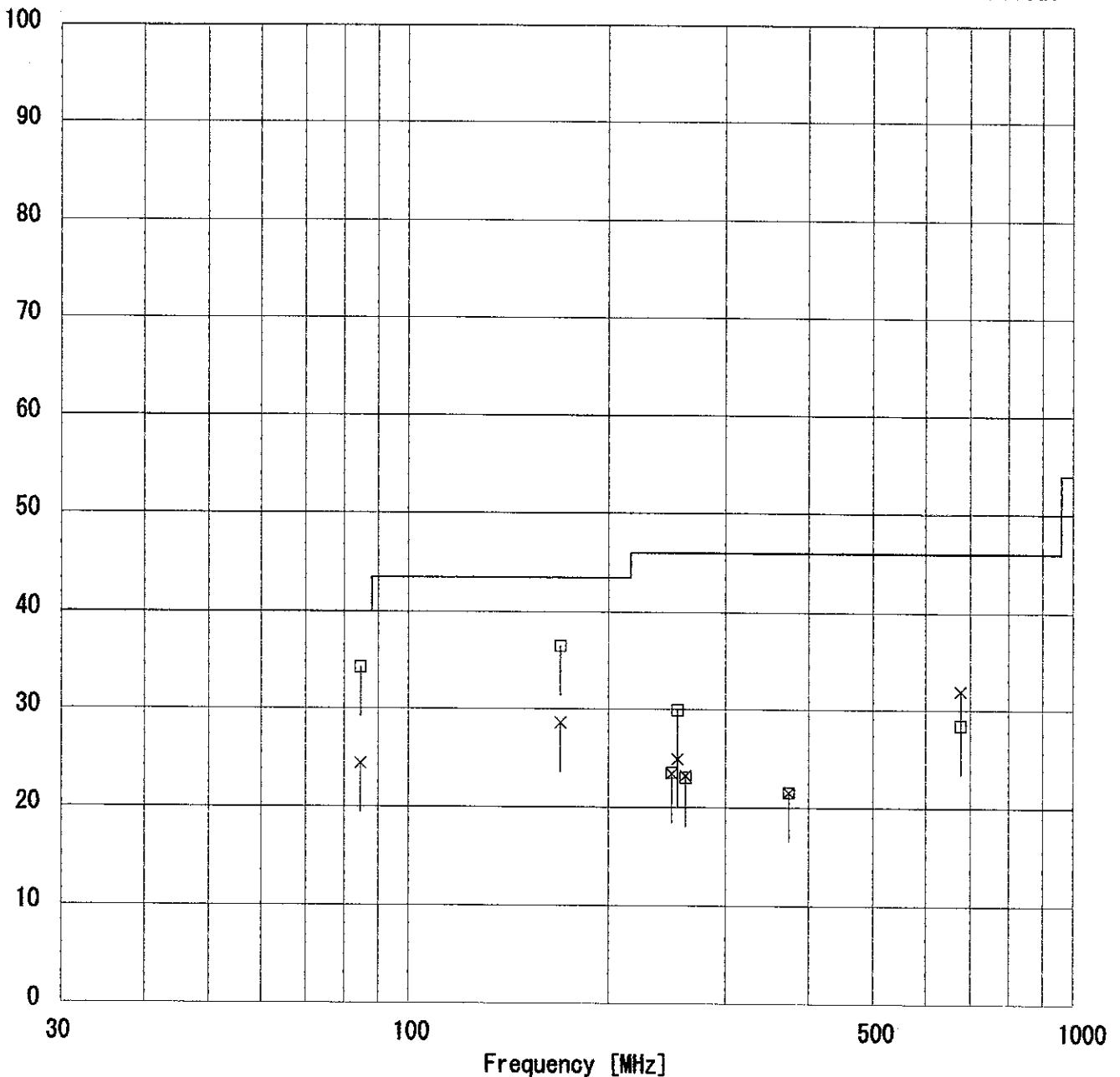
Applicant : TOHOKU ALPS CO., LTD
Kind of Equipment : Keyless Entry Unit
Model No. : 88035AE16B
Serial No. : 1
Power : DC12V
Mode : NORMAL
Remarks : X-axis DETECTOR:QP
Date : 12/18/2002
Test Distance : 3 m
Temperature : 26 °C
Humidity : 30 %
Regulation : FCC Part15B CLASS B

Engineer : Sumio Nishii
: Sumio Nishii

Emission Level [dB μ V/m]

□ Horizontal

× Vertical



DATA OF RADIATION TEST

A-Pex International Co., Ltd.
No.2 SEMI ANECHOIC CHAMBER
Report No. : 23DE0050-H0-1

Applicant : TOHOKU ALPS CO., LTD
Kind of Equipment : Keyless Entry Unit
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Serial No. : 1
Power : DC12V
Mode : NORMAL
Remarks : X-axis DETECTOR:QP
Date : 12/18/2002
Test Distance : 3 m
Temperature : 26 °C
Humidity : 30 %
Regulation : FCC Part15B CLASS B

Engineer : Sumio Nishii

No.	FREQ. [MHz]	ANT TYPE	READING		ANT FACTOR [dB/m]	AMP GAIN [dB]	CABLE LOSS [dB]	ATTEN. [dB]	RESULT		LIMITS [dB μ V/m]	MARGIN	
			HOR [dB μ V]	VER [dB μ V]					HOR [dB μ V/m]	VER [dB μ V/m]		HOR [dB]	VER [dB]
1.	84.64	BB	46.4	36.6	8.1	27.1	1.0	5.8	34.2	24.4	40.0	5.8	15.6
2.	169.29	BB	39.5	31.7	16.0	26.3	1.4	5.8	36.4	28.6	43.5	7.1	14.9
3.	249.00	BB	23.9	23.8	18.3	26.3	1.8	5.8	23.5	23.4	46.0	22.5	22.6
4.	253.93	BB	30.3	25.3	18.4	26.3	1.8	5.7	29.9	24.9	46.0	16.1	21.1
5.	261.00	BB	23.2	23.4	18.6	26.3	1.8	5.7	23.0	23.2	46.0	23.0	22.8
6.	373.34	BB	23.8	23.8	16.5	26.8	2.3	5.7	21.5	21.5	46.0	24.5	24.5
7.	677.15	BB	27.5	31.0	19.2	27.5	3.4	5.8	28.4	31.9	46.0	17.6	14.1

CALCULATION: $\text{READING}[\text{dB } \mu \text{ V}] + \text{ANT. FACTOR}[\text{dB/m}] + \text{CABLE LOSS}[\text{dB}] - \text{AMP. GAIN}[\text{dB}] + \text{ATTEN}[\text{dB}]$.

All other spurious emissions were less than 20dB for the limit.

ANT. TYPE : 30-300MHz Biconical, 300-1000MHz Logperiodic, 1000MHz- Horn

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APPENDIX 3 Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Test Item	Calibration Date * Interval(month)
MAEC-02	Anechoic Chamber	TDK	Semi Anechoic Chamber 3m	RE	2002/04/12 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	RE	2001/12/27 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	RE	2002/05/02 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	MCC-12-01(8D -2W-15m) MCC-12-02(5D -2W-0.7m) MCC-12-05(RF SW) MCC-12-03(5D -2W-0.8m) MCC-12-06(RF SW) MCC-12-04(5D -2W-1m)	RE	2002/05/09 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	RE	2002/05/02 * 12
MOS-02	Digital Humidity Indicator	N.T	NT-1800		2002/12/10 * 12
MPA-04	Pre Amplifier	Agilent	8447D	RE	2002/03/13 * 12
SA-01	Spectrum Analyzer	Hewlett Packard	8567A	RE	2002/04/03 * 12
MSA-02	Spectrum Analyzer	Advantest	R3265A	RE	2002/09/20 * 12
MTR-02	Test Receiver	Rohde & Schwarz	ESCS30	RE	2002/10/11 * 12
MMM-01	Multi Meter	Fluke	FLUKE 26-3		2002/08/22 * 12

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

Test Item:

CE: Conducted emission,
RE: Radiated emission,
H/F: Harmonics and voltage fluctuation
RFI: RFI Power test,
AT: Antenna terminal disturbance voltage