

EMISSION TEST REPORT

Test Report No. : 18J0022-02
ALPINE ELECTRONICS, INC.
Model: NRC301
FCC Part 15 Subpart C

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2. This test report does not constitute an endorsement by NIST/NVLAP or U.S. Government.
3. This equipment is in compliance with above regulation. We hereby certify that the data are contain a true representation of the emission profile.
4. The results in this report apply only to the sample tested.
5. This test report clearly shows that EUT, NRC301 Remote Control Security System is in compliance with FCC Part 15 Subpart C

Date of test: October 29, 1998 **Issued date:** November 6, 1998

Tested by: _____ **Approved by:** _____
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Form Version No. 1

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Table of Contents	Page
1 GENERAL INFORMATION	3
1.1 Tested Methodology	4
1.2 Test Facility	4
2 PRODUCT DESCRIPTION	5
3 TESTED SYSTEM DETAILS	5
4 SYSTEM TEST CONFIGURATION	6
4.1 Justification	6
4.2 Test Procedure	6
Figure 4.2 Configuration of Tested System	7
5 RADIATED MEASUREMENT PHOTOS	8
Figure 5.1 Radiated Measurement Photos	8
5.1 Measurement Uncertainty	9
6 RADIATED EMISSION DATA	10
6.1 Field Strength Calculation	11
7 TEST EQUIPMENT USED	13
APPENDIX	14
Test Data	A1 - A11

1 GENERAL INFORMATION

APPLICANT : ALPINE ELECTRONICS, INC.
REGULATION(S) : FCC Part 15 Subpart C
MODEL NUMBER : NRC301
SERIAL NUMBER : -
KIND OF EQUIPMENT : Remote Control Security System
(Transmitter)
TESTED DATE : October 29, 1998
REPORT FILE NUMBER : 18J0022-02
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 accepted in a letter dated Sep. 16, 1997 (31040/SIT 1300F2) and accepted Feb. 19, 1998 (IC2973-3) by Industry Canada.

2 Product Description

ALPINE ELECTRONICS, INC. Model NRC301 (referred to as the EUT in this report) is a Remote Control Security System.

The specification is as following :

Operation Frequency : 4.19MHz
Radio Frequency Output Power : 77dBV/m or less at 3m
Power Supply : DC 3V (Lithium battery)
Antenna : Built-in type (Fixed)
Type of modulation : ASK

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) ALPINE M/N: NRC301 S/N: -	A269ZUA125	Remote Control Security System (Transmitter)		

4 SYSTEM TEST CONFIGURATION

4.1 Justification

The measurement was performed with the system configuration shown in Figure 4.2.
Running mode was taken for the EUT operation 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 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.

6 RADIATED EMISSION DATA

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

* 30MHz 4400MHz

Frequency (GHz)	Receiver Reading (dBV)	Correction Factor (dBV)	Field Strength (dBV/m)	Limit (dBV)	Margin
1.30164	65.3	-16.3	49.0	54.0	5.0

The Fundamental Frequency of this equipment is 433.9MHz. The peak of output level of fundamental frequency was confirmed at the 433.9MHz by performing the measurement.

It was corroborated that equipment was within of the tolerance which is prescribed in the FCC regulation Part 15 Subpart C sec. 15.231 (c).

Since the fundamental frequency is 433.9MHz, the upper limit could be 434.9 and lower limit could be 432.8MHz.

The measurement result was 434.1MHz when the limit was 434.9MHz and also another measurement result was 433.7 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 :

*** 30MHz 1000MHz**

$$FS = RA + AF + CF + AT - AG$$

where FS = Field Strength

RA = Receiver Reading

AF = Antenna Factor

CF = Cable Factor

AT = Antenna Pad

AG = Amplifier Gain

Assume a receiver reading of 65.3 dBV is obtained. The antenna Factor of 23.0 dB, Cable Factor of 3.9 dB is added. The Antenna Pad of 6.0 dB and Amplifier Gain of 37.2 dB is subtracted, giving a field strength of 49.0 dBV/m.

$$FS = 65.3 + 23.0 + 3.9 - 6.0 - 37.2 = 49.0 \text{ dBV/m}$$

* 1000MHz 4400MHz

$$FS = RA + AF + CF - AG$$

where FS = Field Strength

RA = Spectrum Analyzer Reading

AF = Antenna Factor

CF = Cable Factor

AG = Amplifier Gain

Assume a receiver reading of 65.3 dBV is obtained. The antenna Factor of 23.0, the Cable Factor of 3.9 dB dB is added. The Amplifier Gain of 37.2 dB is subtracted, giving a field strength of 55.0 dBV/m.

$$FS = 65.3 + 23.0 + 3.9 - 37.2 = 55.0 \text{ dBV/m}$$

Calculation to the AV value from peak value

transmitting time about 660msec.

data 0 2ms.

data 1 2ms.

So we Calculated Maximum value of this trains are 50msec in 100msec.

Voltage Average Level (V) = (Epeak tT) T = (EpeakV 50msec) 100msec

This key performs only one trains transmitting (660msec) by one push.

So we think this equipment model NRC301 is conform to FCC Part 15 Subpart C limit.

7 TEST EQUIPMENT USED

NAME	MANUFACTURER	MODEL	Control No.	Calibrated Until
Pre Amplifier	Hewlett Puckered	8447D	APE	December 12, 1998
Pre Amplifier	Antirust	MH648A	AP2	January 1, 1999
Pre Amplifier	Hewlett Packard	8449B	-	January 1, 1999
Biconical Antenna	Schwarzbeck	BBA9106	BA1	April 3, 1999
Biconical Antenna	Schwarzbeck	BBA9106	BA2	July 6, 1999
Biconical Antenna	Schwarzbeck	BBA9106	BA5	July 6, 1999
Logperiodic Antenna	Schwarzbeck	UKLP9140-ALA7		May 3, 1999
Logperiodic Antenna	Schwarzbeck	UKLP9140-ALA8		August 8, 1999
Horn Antenna	AH System, Inc	SAS-200/571	YTHA2	September 22, 1999
LISN	Rohde & Schwarz	ESH2-Z5	LS1	December 15, 1998
LISN	Rohde & Schwarz	ESH3-Z5	LS2	December 15, 1998
LISN	Schwarzbeck	NSLK8127	LS3	December 15, 1998
LISN	Rohde & Schwarz	ESH3-Z5	LS4	December 15, 1998
LISN	Schwarzbeck	NNLK8121	LS5	December 15, 1998
LISN	Rolf Heine	NNB-4/200	LS6	December 15, 1998
Spectrum Analyzer	Hewlett Packard	8567A	SA1	December 12, 1998
Spectrum Analyzer	Hewlett Packard	8567A	SA3	December 11, 1998
Spectrum Analyzer	Hewlett Packard	8567A	SA4	December 12, 1998
Spectrum Analyzer	Advantest	R3365	APSPA1	December 2, 1998
Test Receiver	Rohde & Schwarz	ESHS-20	TR1	April 3, 1999
Test Receiver	Rohde & Schwarz	ESVS-30	TR2	July 5, 1999
Test Receiver	Rohde & Schwarz	ESHS-30	TR3	July 14, 1999
Test Receiver	Rohde & Schwarz	ESVS-10	TR4	July 14, 1999
Test Receiver	Rohde & Schwarz	ESHS-10	TR5	March 23, 1999
Test Receiver	Rohde & Schwarz	ESVS-10	TR6	March 23, 1999
Microwave Cable Assembly	Suhner	Sucoflex104	115352/4	Weekly Check
Microwave Cable Assembly	Suhner	Sucoflex104	96178/4	Weekly Check

indicates EMI Test Equipment used.

All measurement equipment is traceable to national standard

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APPENDIX

Test Data

Radiated emissions

A 1 - A 11