

# **Radioshack Corporation**

Application  
For  
Certification  
**(FCC ID: AAO4900329AR)**

Superregenerative Receiver

WO# 00044391

DY/sa

June 22 ,2000

FCC ID: AAO4900329AR

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
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## LIST OF EXHIBITS

### *INTRODUCTION*

<i>EXHIBIT 1:</i>	General Description
<i>EXHIBIT 2:</i>	System Test Configuration
<i>EXHIBIT 3:</i>	Emission Results
<i>EXHIBIT 4:</i>	Equipment Photographs
<i>EXHIBIT 5:</i>	Product Labelling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual
<i>EXHIBIT 8:</i>	Miscellaneous Information

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**MEASUREMENT/TECHNICAL REPORT**

**Radioshack Corporation - MODEL: RADIOSHACK 49-329**

**FCC ID: AAO4900329AR**

This report concerns (check one:)      Original Grant       Class II Change

Equipment Type: Superregenerative Receiver (example: computer, printer, modem, etc.)

\_\_\_\_\_ Deferred  
grant requested per 47 CFR 0.457(d)(1)(ii)?      Yes       No

If yes, defer until: \_\_\_\_\_  
date

Company Name agrees to notify the Commission by: \_\_\_\_\_  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

\_\_\_\_\_ Transition Rules Request per 15.37?      Yes       No

If no, assumed Part 15, Subpart B for unintentional radiator - the new 47 CFR [10-1-96 Edition] provision.

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# INTERTEK TESTING SERVICES

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## Table of Contents

1.0 <b><u>General Description</u></b> .....	2
1.1 Product Description .....	2
1.2 Related Submittal(s) Grants .....	2
1.3 Test Methodology .....	2
1.4 Test Facility .....	2
2.0 <b><u>System Test Configuration</u></b> .....	4
2.1 Justification .....	4
2.2 EUT Exercising Software .....	4
2.3 Special Accessories .....	4
2.4 Equipment Modification .....	5
2.5 Support Equipment List and Description .....	5
3.0 <b><u>Emission Results</u></b> .....	7
3.1 Field Strength Calculation .....	8
3.2 Radiated Emission Configuration Photograph .....	9
3.3 Radiated Emission Data .....	10
4.0 <b><u>Equipment Photographs</u></b> .....	13
5.0 <b><u>Product Labelling</u></b> .....	15
6.0 <b><u>Technical Specifications</u></b> .....	17
7.0 <b><u>Instruction Manual</u></b> .....	19
8.0 <b><u>Miscellaneous Information</u></b> .....	21
8.1 Discussion of Pulse Desensitization .....	22
8.2 Calculation of Average Factor .....	23
8.3 Emissions Test Procedures .....	24
8.3 Emissions Test Procedures (Cont'd) .....	25

# INTERTEK TESTING SERVICES

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## List of attached file

Exhibit type	File Description	filename
Cover Letter	Letter of Agency	letter.pdf
Test Report	Test Report	report.doc
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated1.jpg, radiated2.jpg
External Photo	External Photo	ophoto1.jpg to ophoto2.jpg
Internal Photo	Internal Photo	iphoto1.jpg to iphoto3.jpg
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf

**EXHIBIT 1**

**GENERAL DESCRIPTION**

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## 1.0 General Description

### 1.1 Product Description

The equipment under test (EUT) is a battery operated (four 1.5V "AA" size batteries") security device. It uses a passive infrared motion sensor to detect intruders and activate a built-in alarm. There are a switch and fifteen buttons on the front panel. The switch is used to select the sounding modes, the numbering buttons are used for security code entry to de-activate the alarm, while other buttons are used to set the alarm modes. The receiver portion is used to receive the signal from the remote control for controlling the armed and disarmed operations.

For electronic filing, the brief circuit description is saved with filename: descri.pdf

### 1.2 Related Submittal(s) Grants

This is a single application for certification of a receiver. The transmitter for this receiver is authorized by Certification procedure. The FCC ID of the transmitter is AAO4900329T and has been granted on October 20, 1998.

### 1.3 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.4 (1992). All measurement was performed in Open Area Test Sites. Preliminary scans were erformed in the Open Area Test Sites only to determine worst case modes. For each scan, the procedure for maximizing emissions in Appendices D and E were followed. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

### 1.4 Test Facility

The open area test site used to collect the emission data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC.

**EXHIBIT 2**  
**SYSTEM TEST CONFIGURATION**

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## 2.0 **System Test Configuration**

### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSIC63.4 (1992).

The EUT is powered by 6VDC (four 1.5V “AA” size batteries).

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. The step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it is automatically in a receive mode

### 2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

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### 2.4 Equipment Modification

Any modifications installed previous to testing by Radioshack Corporation will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

### 2.5 Support Equipment List and Description

This product was tested in standalone configuration.

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Daniel Yau  
Technical Manager - Home Entertainment Electronics  
Intertek Testing Services Hong Kong Ltd.  
Agent for Radioshack Corporation*



\_\_\_\_\_ Signature

\_\_\_\_\_ June 22, 2000 \_\_\_\_\_ Date

**EXHIBIT 3**  
**EMISSION RESULTS**

### 3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

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### 3.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

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

where FS = Field Strength in dB $\mu$ V/m

RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

PD = Pulse Desensitization in dB

AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

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

#### Example

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$

$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0 \text{ dB}$$

$$AV = -10 \text{ dB}$$

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in mV/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

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### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at  
310.914 MHz

For electronic filing, the front view and back view of the test configuration photographs are saved with filename: radiated1.jpg and radiated2.jpg respectively.

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### 3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 8.4 dB margin

#### **TEST PERSONNEL:**



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*Signature*

Prudence S. M. Poon, Compliance Engineer  
*Typed/Printed Name*

June 22, 2000

Date

# INTERTEK TESTING SERVICES

Company: Radioshack Corporation  
Model: RADIOSHACK 49-329

Date of Test: May 16, 2000

**Table 1**

## Radiated Emissions

Polarity	Frequency (M H z)	Reading (dB $\mu$ V )	Antenna Factor (dB )	Pre-Amp Gain (dB )	Net at 3m (dB $\mu$ V /m )	Lim it at 3m (dB $\mu$ V /m )	M argin (dB )
H	30.492	22.8	16	11.6	27.2	40.0	-12.8
H	35.781	20.4	16	11.2	25.2	40.0	-14.8
H	40.641	22.1	16	11.7	26.4	40.0	-13.6
H	45.908	22.2	16	11.9	26.3	40.0	-13.7
H	50.829	23.0	16	11.7	27.3	40.0	-12.7
H	55.781	22.4	16	11.0	27.4	40.0	-12.6
H	301.371	29.9	16	14.3	31.6	46.0	-14.4
H	303.946	33.2	16	14.3	34.9	46.0	-11.1
H	305.694	33.8	16	14.3	35.5	46.0	-10.5
H	307.434	34.3	16	14.3	36.0	46.0	-10.0
H	309.176	35.4	16	14.3	37.1	46.0	-8.9
H	310.914	35.9	16	14.3	37.6	46.0	-8.4
H	312.669	33.9	16	14.3	35.6	46.0	-10.4
H	314.346	31.1	16	14.3	32.8	46.0	-13.2
H	316.094	30.2	16	14.3	31.9	46.0	-14.1
H	317.806	31.9	16	14.3	33.6	46.0	-12.4

- NOTES:
1. Peak Detector Data unless otherwise stated.
  2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative sign in the column shows value below limit.
  4. Horn antenna and average detector are used for the emission over 1000MHz.

Test Engineer: Prudence S. M. Poon

**EXHIBIT 4**

**EQUIPMENT PHOTOGRAPHS**

### 4.0 Equipment Photographs

For electronic filing, photographs of the tested EUT are saved with filename: ophoto1.jpg, ophoto2.jpg for external photo, and iphoto1.jpg, iphoto3.jpg for internal photo.

**EXHIBIT 5**

**PRODUCT LABELLING**

### 5.0 **Product Labelling**

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

**EXHIBIT 6**

**TECHNICAL SPECIFICATIONS**

### 6.0 Technical Specifications

For electronic filing, the block diagram and schematic of the tested EUT are saved with filenames: block.pdf and circuit.pdf respectively.

**EXHIBIT 7**

**INSTRUCTION MANUAL**

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### 7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

**EXHIBIT 8**

**MISCELLANEOUS INFORMATION**

### 8.0 Miscellaneous Information

This miscellaneous information includes details of the test procedure and calculation of factors such as pulse desensitization and averaging factor.

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### 8.1 Discussion of Pulse Desensitization

The determination of pulse desensitivity was made in accordance with Hewlett Packard Application Note 150-2, *Spectrum Analysis ... Pulsed RF*.

This device is a superregenerative receiver. The emission are continuous, and no desensitization of the measurement equipment occurs.

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### 8.2 Calculation of Average Factor

The emission limits are specified using spectrum analyzers or receivers which incorporate quasi-peak detectors. Typical measurements are made using peak detectors, however, emissions which approach the respective emission limit are measured using a quasi-peak detector.

For measurements above 1 GHz, spectrum analyzers or receivers using average detectors are employed, or the appropriate average factor can be applied.

Measurements using spectrum analyzers with filters other than peak detectors are recorded in the data table section of this report.

This device is a superheterodyne receiver.

It is not necessary to apply average factor to the measurement results.

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### 8.3 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of superregenerative receivers operating under the Part 15, Subpart B rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 1992.

The equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the groundplane. During the radiated emissions test, the turntable is rotated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.2.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.

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### 8.3 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

As battery powered, a new, fully charged battery is used.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Measurements are normally conducted at a measurement distance of three meters. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.