

# **RadioShack Corporation**

Application  
For  
Certification  
**(FCC ID: AAO3201252)**

Transmitter

WO# 0012855  
DY/sc  
December 22, 2000

FCC ID: AAO3201252

- 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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**Intertek Testing Services Hong Kong Ltd.**  
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# INTERTEK TESTING SERVICES

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## LIST OF EXHIBITS

### *INTRODUCTION*

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**MEASUREMENT/TECHNICAL REPORT**

**RadioShack Corporation - MODEL: RadioShack 32-1252  
FCC ID: AAO3201252**

This report concerns (check one:)		Original Grant <input checked="" type="checkbox"/>	Class II Change <input type="checkbox"/>
Equipment Type: <u>Low Power Transmitter</u> (example: computer, printer, modem, etc.)			
<hr/>			
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
	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.			
<hr/>			
Transition Rules Request per 15.37?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
If no, assumed Part 15, Subpart B for unintentional radiator - the new 47 CFR [10-1-96 Edition] provision.			
<hr/>			
Report prepared by:	Daniel Yau Intertek Testing Services Hong Kong Ltd. 2/F., Garment Centre, 576, Castle Peak Road, Kowloon, Hong Kong Phone: 852-2173-8542 Fax: 852-2371-0914		
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# 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
Test Report	Bandwidth Plot	bw.pdf
External Photo	External Photo	ophoto1.jpg, ophoto2.jpg
Internal Photo	Internal Photo	iphoto1.jpg, iphoto2.jpg, iphoto3.jpg, iphoto4.jpg and iphoto5.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

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**EXHIBIT 1**

**GENERAL DESCRIPTION**

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## 1.0 General Description

### 1.1 Product Description

The equipment under test (EUT) is a 900MHZ audio link transmitter operating at 910-921.5MHz. The EUT is powered by one 9V battery. There are a power switch mute. 'Line' input and 'mic' input jack on the top panel of the EUT. Channel selector placed inside the battery compartment allows user to select the operating channel. This EUT is designed to operate with musical instruments, microphones and other audio devices.

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 transmitter. The FCC ID of the associated receiver is AAO3201252 and has been filed at the same time as this application.

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### 1.3 Test Methodology

Radiated emission measurement was performed according to the procedures in ANSI C63.4 (1992). Radiated Emission measurement was performed in Open Area Test Sites. Preliminary scans were performed 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 and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC.

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**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 9VDC battery

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.

For simplicity of testing, the unit was wired to transmit continuously.

#### **2.2 EUT Exercising Software**

There was no special software to exercise the device. Once the unit is powered up, it transmits the typical signal continuously.

#### **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

(1) 47K ohm resistive load with 1m cable.

(2) Microphone with 3m cable  
(Provided by ITS)

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

\_\_\_\_\_  
December 22, 2000 Date

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**EXHIBIT 3**

**EMISSION RESULTS**

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### 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:

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

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### 3.1 Field Strength Calculation (cont'd)

#### 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.

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

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

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

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

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

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

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

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

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### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at  
4550.051 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 3.9 dB margin

#### **TEST PERSONNEL:**



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*Signature*

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

December 22, 2000 \_\_\_\_\_  
Date

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## INTERTEK TESTING SERVICES

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Company: RadioShack Corporation

Date of Test: December 4, 2000

Model: RadioShack 32-1252

Worst Case Operating Mode: Transmitting (Ch.A)

**Table 1**

**Radiated Emissions**

Polarity	Frequency (M H z)	Reading (dB $\mu$ V )	Antenna Factor (dB )	Pre-A m p Gain (dB )	Net at 3m (dB $\mu$ V / m )	Lim it at 3m (dB $\mu$ V / m )	M argin (dB )
H	910.014	77.1	22.6	16	83.7	94.0	-10.3
H	1820.019	48.8	26.5	34	41.3	54.0	-12.7
H	*2730.033	50.5	29.1	34	45.6	54.0	-8.4
H	*3640.044	49.1	32.8	34	47.9	54.0	-6.1
V	*4550.051	50.1	34.0	34	50.1	54.0	-3.9
H	5460.334	45.3	35.2	34	46.5	54.0	-7.5
H	6370.388	40.0	36.5	34	42.5	54.0	-11.5

- 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.
- \* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Prudence S. M. Poon

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## INTERTEK TESTING SERVICES

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Company: RadioShack Corporation

Date of Test: December 4, 2000

Model: RadioShack 32-1252

Worst Case Operating Mode: Transmitting (Ch.E)

**Table 2**

**Radiated Emissions**

Polarity	Frequency (M H z)	Reading (dB $\mu$ V)	Antenna Factor (dB)	Pre-A m p Gain (dB)	Net at 3m (dB $\mu$ V / m)	Lim it at 3m (dB $\mu$ V / m)	M argin (dB)
H	918.011	75.8	22.6	16	82.4	94.0	-11.6
H	1836.022	49.3	26.5	34	41.8	54.0	-12.2
H	*2754.034	49.6	29.1	34	44.7	54.0	-9.3
H	*3672.045	49.0	32.8	34	47.8	54.0	-6.2
V	*4590.057	49.6	34.0	34	49.6	54.0	-4.4
H	5508.068	44.7	36.0	34	46.7	54.0	-7.3
H	6426.079	39.3	36.5	34	41.8	54.0	-12.2

- 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.
- \* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

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Test Engineer: Prudence S. M. Poon

## INTERTEK TESTING SERVICES

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Company: RadioShack Corporation

Date of Test: December 4, 2000

Model: RadioShack 32-1252

Worst Case Operating Mode: Transmitting (Ch.H)

**Table 3**

**Radiated Emissions**

Polarity	Frequency (M H z)	Reading (dB $\mu$ V)	Antenna Factor (dB)	Pre-A m p Gain (dB)	Net at 3m (dB $\mu$ V / m)	Lim it at 3m (dB $\mu$ V / m)	M argin (dB)
H	921.511	76.4	22.6	16	83.0	94.0	-11.0
H	1843.022	49.8	26.5	34	42.3	54.0	-11.7
H	*2764.533	53.4	29.1	34	48.5	54.0	-5.5
H	*3686.044	49.8	32.8	34	48.6	54.0	-5.4
V	*4607.559	49.4	34.0	34	49.4	54.0	-4.6
H	5529.066	44.9	36.0	34	46.9	54.0	-7.1
H	6450.921	37.4	36.5	34	39.9	54.0	-14.1

- 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.
- \* Emission within the restricted band meets the requirement of part 15.205. The corresponding limit as per 15.209 is based on Quasi peak detector data for frequencies below 1000 MHz and average detector data for frequencies over 1000 MHz.

Test Engineer: Prudence S. M. Poon

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**EXHIBIT 4**

**EQUIPMENT PHOTOGRAPHS**

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### 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, iphoto5.jpg for internal photo.

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**EXHIBIT 5**

**PRODUCT LABELLING**

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### 5.0 **Product Labelling**

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

The following statement specified under FCC section 15.19(a) is placed in the user manual.

‘ This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.’

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**EXHIBIT 6**

**TECHNICAL SPECIFICATIONS**

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### 6.0 Technical Specifications

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

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**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.

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**EXHIBIT 8**

**MISCELLANEOUS INFORMATION**

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### 8.0 Miscellaneous Information

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

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### 8.1 Measured Bandwidth

The plot on saved in bw.pdf shows the fundamental emission. From the plot, it shows the emission of the carrier is within 902-928MHZ. The unit meets the FCC bandwidth requirements.

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### 8.2 Discussion of Pulse Desensitization

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

Pulse desensitivity is not applicable for this device, since the transmitter transmits the RF signal continuously.

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### 8.3 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 transmits signal continuously, it is not necessary to apply average factor to the measurement results.

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### 8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of Low Power Transmitter operating under the Part 15, Subpart C 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 and any cables leaving the EUT are manipulated 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 8.3.

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. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

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

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

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 - 1992.

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 8.2). 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.