

**SDI Technologies Inc.**

Application  
For  
Certification  
**(FCC ID: EMOZ139)**

Weather Radio Alarm Clock

WO# 0000635  
DY/km  
31 January, 2000

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## INTERTEK TESTING SERVICES

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### LIST OF EXHIBITS

#### *INTRODUCTION*

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# INTERTEK TESTING SERVICES

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## MEASUREMENT/TECHNICAL REPORT

**SDI Technologies Inc. - MODEL: ZENITH Z139S**  
**FCC ID: EMOZ139**

**31 January, 2000**

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

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

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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 C for intentional radiator - the new 47 CFR [10-1-96 Edition] provision.

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Report prepared by:

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# INTERTEK TESTING SERVICES

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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 Setup Photo	Conducted Emission	conduct1.jpg, conduct2.jpg conduct3.jpg
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	ophoto1.jpg, ophoto2.jpg, ophoto3.jpg, ophoto4.jpg
Internal Photo	Internal Photo	iphoto1.jpg, iphoto2.jpg, iphoto3.jpg iphoto4.jpg, iphoto5.jpg iphoto6.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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## INTERTEK TESTING SERVICES

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### 1.0 **General Description**

#### 1.1 Product Description

The equipment under test (EUT) is a weather band and AM / FM radio with alarm clock function. The weather band is operating at 162.475 - 162.550 MHz.

FM band is operating at 88.0 - 108.0MHz and AM band is operating at 540.0 - 1700.0kHz. The EUT is powered by AC 120V. Press the ON/OFF button, LED will light to indicate that the weather band has been turned on. Set the weather band channel selector to select the appropriate channel. While listening to weather band, radio will not play.

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.

## INTERTEK TESTING SERVICES

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### 1.3 Test Methodology

Radiated and AC mains line-conducted emission measurements were performed according to the procedures in ANSI C63.4 (1992). Radiated emission measurement was performed in Open Area Test Sites and conducted emission was performed in shield room. 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 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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## INTERTEK TESTING SERVICES

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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 ANSI C63.4 (1992.)

The EUT was powered by AC 120V.

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. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was 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 receives the signal continuously.

#### 2.3 Special Accessories

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

## INTERTEK TESTING SERVICES

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### 2.4 Equipment Modification

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

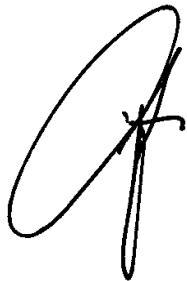
No modifications were installed by Intertek Testing Services.

### 2.5 Support Equipment List and Description

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 SDI Technologies Inc.*



\_\_\_\_\_  
**Signature**

31 January, 2000

\_\_\_\_\_  
**Date**

**EXHIBIT 3**

**EMISSION RESULTS**

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## INTERTEK TESTING SERVICES

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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.

### 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:

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

### 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.

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

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

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

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

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

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

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

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

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## INTERTEK TESTING SERVICES

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### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at  
119.0 MHz

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

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## INTERTEK TESTING SERVICES

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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 11.1 dB margin

#### **TEST PERSONNEL:**



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*Signature*

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

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January 31, 2000

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*Date*

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## INTERTEK TESTING SERVICES

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Company: SDI Technologies Inc.

Date of Test: 24 January, 2000

Model: ZENITH Z139S

Operating Mode : FM

Table 1

### Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB $\mu$ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	99	80.4	11	16	31.9	43.5	-11.6
H	109	77.4	13	16	30.9	43.5	-12.6
H	119	78.9	13	16	32.4	43.5	-11.1
H	198	71.4	16	16	27.9	43.5	-15.6
H	218	72.6	17	16	27.6	46.0	-18.4
H	238	70.9	19	16	27.9	46.0	-18.1
H	297	67.4	22	16	27.4	46.0	-18.6
H	327	65.4	24	16	27.4	46.0	-18.6
H	357	64.4	24	16	26.4	46.0	-19.6

Notes: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance 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 value in the margin column shows emission below limit.
4. Horn antenna and average detector are used for the emission over 1000MHz.

The corresponding limit as per 15.109 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: SDI Technologies Inc.  
Model: Z139S  
Operating Mode : Weather band

Date of Test: 24 January, 2000

Table 2

### Radiated Emissions

Polarity	Frequency (MHz)	Reading (dB $\mu$ V)	Antenna Factor (dB)	Pre-Amp Gain (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
H	81.053	81.7	7	16	29.2	43.5	-14.3
H	162.106	74.4	16	16	30.9	43.5	-12.6
H	243.149	69.6	20	16	27.6	46.0	-18.4
H	324.192	67.2	24	16	29.2	46.0	-16.8
H	405.244	64.3	24	16	26.3	46.0	-19.7

Notes:

1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meter. Harmonic emissions not detected at the 3-meter distance 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 value in the margin column shows emission below limit.
4. Horn antenna and average detector are used for the emission over 1000MHz.

The corresponding limit as per 15.109 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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### 3.4 Line Conducted Configuration Photograph

Worst Case Line-Conducted Configuration  
at  
16.210 MHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conduct1.jpg , conduct 2.jpg and conduct3.jpg respectively.

## INTERTEK TESTING SERVICES

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### 3.5 Line Conducted Emission Data

For electronic filing, the graph and data table of conducted emission are saved with filename: conduct.pdf.

Judgement: Passed by 15.9 dB margin

#### **TEST PERSONNEL:**



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*Signature*

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

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January 31, 2000

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*Date*

**EXHIBIT 4**

**EQUIPMENT PHOTOGRAPHS**

## INTERTEK TESTING SERVICES

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### 4.0 **Equipment Photographs**

For electronic filing, the photographs of the tested EUT are saved with filename: ophoto1.jpg to ophoto4.jpg for external photo and iphoto1.jpg to iphoto6.jpg for internal photo.

**EXHIBIT 5**

**PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

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### 5.0 **Product Labelling**

For electronic 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 schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

**EXHIBIT 7**

**INSTRUCTION MANUAL**

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## INTERTEK TESTING SERVICES

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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**

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## INTERTEK TESTING SERVICES

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### 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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## INTERTEK TESTING SERVICES

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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*.

Pulse desensitivity was not applicable for this device. Since this EUT is a superheterodyne receiver.

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## INTERTEK TESTING SERVICES

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### 8.2 Calculation of Average Factor

The average factor is not applicable for this device as the EUT is a superheterodyne receiver.

### 8.3 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of superheterodyne receiver operating under 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 ground plane. 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 axes to obtain maximum emission levels. The antenna height and polarization are 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. For line conducted emissions, the range scanned is 450 kHz to 30 MHz.

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## INTERTEK TESTING SERVICES

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### 8.3 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 measurement are 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 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.