

***April 29, 2004***

***Atom Industrial Ltd.  
Unit 1003-5, 10/F., Westley Square,  
48 Hoi Yuen Road,  
Kwun Tong, Kowloon, Hong Kong.***

***Dear Mr. Chan Wing Fai:***

***Enclosed you will find your file copy of a Part 15 report (FCC ID: NOYRF791).***

***For your reference, TCB will normally take another 15-20 days for reviewing the report. Approval will then be granted when no query is sorted.***

***Please contact me if you have any questions regarding the enclosed material.***

***Sincerely,***



***Billy Chow  
Senior Supervisor***

***Enclosure***

***FCC ID: NOYRF791***

# **Atom Industrial Ltd.**

## **Application For Certification (FCC ID: NOYRF791)**

### **Scanning Receiver**

WO# 0405048

TC/sa

April 29, 2004

FCC ID: NOYRF791

- 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.
- This report shall not be reproduced except in full without prior authorization from Intertek Testing Services Hong Kong Limited
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

#### **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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<i>EXHIBIT 2:</i>	System Test Configuration
<i>EXHIBIT 3:</i>	Emission Results
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<i>EXHIBIT 5:</i>	Product Labelling
<i>EXHIBIT 6:</i>	Technical Specifications
<i>EXHIBIT 7:</i>	Instruction Manual
<i>EXHIBIT 8:</i>	Miscellaneous Information

# INTERTEK TESTING SERVICES

## MEASUREMENT/TECHNICAL REPORT

**Atom Industrial Ltd. - MODEL: NOYRF791**  
**FCC ID: NOYRF791**

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

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

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

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 X

If no, assumed Part 15, Subpart B for unintentional radiator - the new 47 CFR [12-08-2003 Edition] provision.

Report prepared by:

Billy Chow  
Intertek Testing Services  
Hong Kong Ltd.  
2/F., Garment Centre,  
576, Castle Peak Road,  
Kowloon, Hong Kong  
Phone: 852-2173-8545  
Fax: 852-2371-0914

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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
Test Report	Test Report	report.pdf
Operation Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	Radiated.pdf
Test Setup Photo	Conducted Emission	Conduct.pdf
Test Report	Conducted Emission Test Result	Conductdata.pdf
External Photo	External Photo	Ophoto.pdf
Internal Photo	Internal Photo	Iphoto.pdf,
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
Attestation Statements	Attestation Statements	Attestation.pdf

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 1**

### **GENERAL DESCRIPTION**

## INTERTEK TESTING SERVICES

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### 1.0 **General Description**

#### 1.1 Product Description

This Equipment Under Test (EUT) is an audio wireless scanning receiver for its corresponding transmitter. The main function of the EUT is used to receive the modulated signal that is transmitted by its corresponding transmitter. It is powered by two fully charged "AAA" size rechargeable batteries. The power indicator (red LED) on the side of the EUT's body will be lighted while the power switch is on. On the other hand, a charging socket on the plastic case, which is used for charging the batteries by the corresponding transmitter via a charging cord provided. There are three buttons near the red LED; two for adjusting the volume and one for tuning the suitable channel. The receiver will scan from Channel 1 to Channel 3 once the tuning button is pressed. Furthermore, it is equipped with a 45cm length bare wire type antenna for receiving.

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 with FCC ID: NOYRF835.

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### 1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2001). Radiated measurement was performed in an Open Area Test Site and Conducted Emission measurement was performed in Shield Room. Preliminary scans were performed in the Open Area Test Site 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.

## **INTERTEK TESTING SERVICES**

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### **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 (2001).

The EUT is powered by two fully charged 'AAA' size rechargeable batteries

The unit was operated standalone and placed in the center of the [table](#). The wooden support stand enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

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 equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

For simplicity of testing, the unit was operated [in receiving mode](#).

#### 2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it received the RF 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 Atom Industrial Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

### 2.5 Measurement Uncertainty

When determining of the test conclusion, the measurement uncertainty of test has been considered.

### 2.6 Support Equipment List and Description

Transmitter with FCC ID: NOYRF835

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Billy Chow  
Senior Supervisor - Home Entertainment Electronics  
Intertek Testing Services Hong Kong Ltd. ETL SEMKO  
Agent for Atom Industrial Ltd*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
April 29, 2004 Date

## **INTERTEK TESTING SERVICES**

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### **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:

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

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## INTERTEK TESTING SERVICES

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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.

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

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

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

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

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

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

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

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

## **INTERTEK TESTING SERVICES**

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### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at  
840.120 MHz

For electronic filing, the front view and back view of the test configuration photographs are saved with filename: radiated.pdf.

## INTERTEK TESTING SERVICES

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### 3.3 Radiated Emission Data

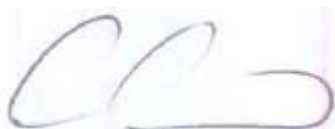
The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 9.4 dB margin

The radiated emissions test was observed up to 5GHz.

#### **TEST PERSONNEL:**

**Prepared and check by:**



---

Signature  
Intertek Hong Kong  
ETL SEMKO

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Lawrence H. C. Chow, Compliance Engineer  
Typed/Printed Name

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April 29, 2004  
Date

## INTERTEK TESTING SERVICES

Company: Atom Industrial Ltd.

Date of Test: April 14, 2004

Model: NOYRF791

Worst case operating mode: Receiving

**Table 1**  
**Radiated Emissions (Upper End)**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp (dB)	Antenna factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	840.120	21.60	16	31.0	36.6	46.0	-9.4
V	420.060	21.00	16	25.0	30.0	46.0	-16.0
V	1260.180	43.50	34	26.1	35.6	54.0	-18.4
H	1680.240	43.10	34	27.2	36.3	54.0	-17.7
V	2100.300	41.90	34	29.4	37.3	54.0	-16.7
V	2520.360	40.60	34	30.4	37.0	54.0	-17.0
V	3360.480	39.00	34	31.9	36.9	54.0	-17.1

**Table 2**  
**Radiated Emissions (Lower End)**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp (dB)	Antenna factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	840.117	21.20	16	31.0	36.2	46.0	-9.8
V	420.055	20.70	16	25.0	29.7	46.0	-16.3
V	1260.176	42.70	34	26.1	34.8	54.0	-19.2
H	1680.231	42.20	34	27.2	35.4	54.0	-18.6
V	2100.298	41.10	34	29.4	36.5	54.0	-17.5
V	2520.354	39.70	34	30.4	36.1	54.0	-17.9
V	3360.473	38.10	34	31.9	36.0	54.0	-18.0

NOTES: 1. Peak Detector is used below 1000MHz 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.

5. 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: Lawrence H. C. Chow

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## INTERTEK TESTING SERVICES

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Company: Atom Industrial Ltd.  
Model: NOYRF791  
Worst case operating mode: Charging

Date of Test: April 14, 2004

**Table 3**

**Radiated Emissions**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp (dB)	Antenna factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	33.183	30.6	16	10	24.6	40	-15.4
V	35.17	30.2	16	10	24.2	40	-15.8
V	36.039	29.9	16	10	23.9	40	-16.1
V	43.116	29.7	16	10	23.7	40	-16.3
V	46.178	28.6	16	11	23.6	40	-16.4
V	47.113	28.5	16	11	23.5	40	-16.5

- NOTES: 1. Peak Detector is used below 1000MHz 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.
5. 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: Lawrence C. H. Chow

## **INTERTEK TESTING SERVICES**

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### **3.4 Conducted Emission Configuration Photograph**

Worst Case Conducted Emission  
at  
charging mode

For electronic filing, the front view, rear view and side view of the test configuration photographs are saved with filename: conduct.pdf.

## **INTERTEK TESTING SERVICES**

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Company: Atom Industrial Ltd.  
Model: NOYRF791

Date of Test: April 14, 2004

### **Conducted Emissions Section 15.107 Requirements**

## INTERTEK TESTING SERVICES

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### 3.5 Conducted Emission Data

For electronic filing, the graph and data table of conducted emission are saved with filename: conductdata.pdf. The data table lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by at least 20 dB margin

#### **TEST PERSONNEL:**

***Prepared and check by:***



---

*Signature*  
*Intertek Hong Kong*  
*ETL SEMKO*

Lawrence H. C. Chow, Compliance Engineer  
*Typed/Printed Name*

April 29, 2004  
*Date*

## INTERTEK TESTING SERVICES

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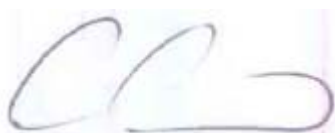
### 3.6 38dB Rejection Measurement

The data on the following page lists the significant rejection frequencies, the limit and the margin of compliance.

Judgment: Passed by on response for the cellular band transmission.

#### **TEST PERSONNEL:**

***Prepared and check by:***



---

*Signature*  
*Intertek Hong Kong*  
*ETL SEMKO*

Lawrence C. H. Chow, Compliance Engineer  
*Typed/Printed Name*

April 29, 2004  
*Date*

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## INTERTEK TESTING SERVICES

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### 3.7 38dB Rejection Measurement Procedures

#### Step 1

Firstly, the RF generator was connected with the EUT for giving the reference signal to EUT, and then, the output of the receiver was connected to an audio analyzer (R&S radiocommunication monitor) for checking the audio output level is in appropriate level (12dB SINAD).

\*The reference signal was constructed with 1k audio, 19kHz pilot signal, 75kHz deviation in FM modulation.\*

After that, the power level of RF generator was adjusted to produce a 12 dB SINAD on the audio output. This was done across the receiver bands (scanning range) to determine a reference level. The highest sensitivity reference level was recorded for future use.

#### Step 2

When the reference level was found, the output level of RF generator was risen to 40 dB above the reference level and the output frequency was set to a low2, medium and high frequency in both the mobile and base cellular bands A(Mobile = 824.04 MHz through 848.97 MHz, Base = 869.04 MHz through 893.97 MHz).

The scanning process was activated to see whether the cellular bands transmission could be received or not.

If the process stopped in particular frequency/(ies) during the scanning, this/these frequency/(ies) will be noted as response frequency/(ies).

After all the frequency of response was noted, the RF signal generator was set to measure the sensitivity at each of these response frequencies to do the 38dB rejection test intensively. The power level for this/these response frequency/(ies) then adjusted to appropriate for producing 12dB SINAD on the audio output.

The power level which obtain in step 2 was noted.

P.S.

The difference between the reference power level and the power level in response frequency/(ies) should be 38dB.

Frequencies used on the Signal Generator were 824.04, 836.50 and 848.97MHz for the Mobile and 869.04, 887.73 and 893.97MHz for the Base.

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## INTERTEK TESTING SERVICES

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Company: Atom Industrial Ltd.  
Model: NOYRF791  
Worst case operating mode: Receiving

Date of Test: April 14, 2004

**Table 2**

**38dB Rejection Measurement**

Injected frequency (Cellular) in MHz	Level 12dB SINAD at injected frequency in dBm	Rejection in dB	Limit in dB (dB)
824.040	>10	>48.5	38.0
836.000	>10	>48.5	38.0
848.970	>10	>48.5	38.0
869.040	>10	>48.5	38.0
881.000	>10	>48.5	38.0
893.970	>10	>48.5	38.0

- NOTES:
1. The reference level of the EUT is -38.5dBm.
  2. The RF reference signal is RF signal modulated with 1kHz audio signal, 19kHz pilot signal, 75k deviation FM signal.
  5. The corresponding limit as per 15.121(b).

Test Engineer: Lawrence C. H. Chow

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## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 4**

### **EQUIPMENT PHOTOGRAPHS**

## INTERTEK TESTING SERVICES

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### 4.0 **Equipment Photographs**

For electronic filing, photographs of the tested EUT are saved with filename: ophoto.pdf for external photo, and iphoto.pdf for internal photo.

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## **INTERTEK TESTING SERVICES**

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### **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.

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## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 6**

### **TECHNICAL SPECIFICATIONS**

### 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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## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 7**

### **INSTRUCTION MANUAL**

## 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.

## **INTERTEK TESTING SERVICES**

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### **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 (calculation and timing diagram).

## 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*.

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

## **INTERTEK TESTING SERVICES**

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### **8.2 Calculation of Average Factor**

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

### 8.3 Emissions Test Procedures

This device is a [scanning](#) receiver. It is not necessary to apply average factor to the measurement result.

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of Scanning 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 - 2001.

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 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 5GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

### 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 measurements were made as described in ANSI C63.4 - 2001.

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.