

**May 18, 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: NOYRF835).**

**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  
Signed for and on behalf of  
Intertek Hong Kong  
ETL SEMKO**

**Enclosure**

**FCC ID: NOYRF835**

# **ATOM Industrial Ltd.**

## **Application For Certification (FCC ID: NOYRF835)**

### **Transmitter**

WO# 0407634

TC/el

May 18, 2004

FCC ID: NOYRF835

- 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.**

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.  
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: [www.hk.intertek-etlsemko.com](http://www.hk.intertek-etlsemko.com)

# INTERTEK TESTING SERVICES

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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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## INTERTEK TESTING SERVICES

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### MEASUREMENT/TECHNICAL REPORT

**ATOM Industrial Ltd. - MODEL: NOYRF835**  
**FCC ID: NOYRF835**

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

Equipment Type: Low Power Transmitter (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 C for intentional radiator - the new 47 CFR [12-08-03 Edition] provision.

Report prepared by:

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Intertek Testing Services  
Hong Kong Ltd.  
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# INTERTEK TESTING SERVICES

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## Table of Contents

<b>1.0 General Description</b>	3
1.1 Product Description	3
1.2 Related Submittal(s) Grants	3
1.3 Test Methodology	4
1.4 Test Facility	4
<b>2.0 System Test Configuration</b>	6
2.1 Justification	6
2.2 EUT Exercising Software	6
2.3 Special Accessories	6
2.4 Equipment Modification	7
2.5 Support Equipment List and Description	7
2.6 Measurement Uncertainty	7
<b>3.0 Emission Results</b>	9
3.1 Field Strength Calculation	10
3.1 Field Strength Calculation (cont'd)	11
3.2 Radiated Emission Configuration Photograph	12
3.3 Radiated Emission Data	13
3.4 Conducted emission Configuration Photograph	17
3.5 Conducted Emission Data	19
<b>4.0 Equipment Photographs</b>	21
<b>5.0 Product Labelling</b>	23
<b>6.0 Technical Specifications</b>	25
<b>7.0 Instruction Manual</b>	27
<b>8.0 Miscellaneous Information</b>	29
8.1 Measured Bandwidth	30
8.2 Discussion of Pulse Desensitization	31
8.3 Calculation of Average Factor	32
8.4 Emissions Test Procedures	33
8.4 Emissions Test Procedures (cont'd)	34

## 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	descryp.pdf
Test Setup Photo	Radiated Emission	radiated.pdf
Test Setup Photo	Conduct Emission	conducted.pdf
Test Report	Conducted Emission Test Result	conduct.pdf
External Photo	External Photo	ophoto.pdf
Internal Photo	Internal Photo	lphoto.pdf
Block Diagram	Block Diagram	block.pdf
Test Report	Bandwidth Plot	bw.pdf
Schematics	Circuit Diagram	circuit.pdf
ID Label/Location	Label Artwork and Location	Label.pdf
User Manual	User Manual	manual.pdf

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 1**

### **GENERAL DESCRIPTION**

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## INTERTEK TESTING SERVICES

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### 1.0 **General Description**

#### 1.1 Product Description

This Equipment Under Test (EUT) is a 900MHz audio wireless transmitter for its associated receiver (headphone). The primary function of the EUT is to modulate the audio signal to RF signal and then transmit the modulated signal via a bare wire type antenna (shows in the internal photograph). The operational frequency range is 912.4MHz to 913.6MHz (divided into 3 Channels).

This EUT is powered by AC/DC adaptor (Model: A21220N, input: 120VAC, output: 12VDC, 200mA) and will be activated if the audio signal source has received. The “channel” switch which equipped at the back of it is used to select the transmitting channel (1, 2 or 3). On the other hand, the DC and AUDIO IN socket are also equipped at the back of the EUT for provided the input of DC power and audio signal respectively. It also contains the charging and power on LED lights (in front of body) for showing the operational stats of it.

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 certification procedure of receiver for this transmitter (with FCC ID: NOYRF791) is being processed as the same time of this application.



## INTERTEK TESTING SERVICES

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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 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 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 ANSI C63.4 (2001).

The EUT was powered by AC/DC Adaptor (Model: A21220N, AC 120V to DC 12V 200mA). The unit was operated [with those peripheral and placed flush with rear of tabletop](#).

For simplifying of test, the unit was operated transmitting continuously.

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.

The worst case bit sequence was applied during test.

For simplicity of testing, the unit was operated to transmit continuously and the worst case transmission was suggested by the applicant.

#### 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.

## INTERTEK TESTING SERVICES

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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 Uncertainly

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

### 2.6 Support Equipment List and Description

Walkman with 1.8 meter cable as auxiliary input of EUT

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.*  
*Agent for ATOM Industrial Ltd.*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
May 18, 2004 Date

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## **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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### 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  
1827.178 MHz

For electronic filing, the front view and back view of the test configuration photographs are saved with filename: radiated.pdf 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 10.8 dB margin

#### **TEST PERSONNEL:**



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*Signature*

Terry C. H. Chan, Compliance Engineer  
*Typed/Printed Name*

May 18, 2004  
Date

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## INTERTEK TESTING SERVICES

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Company: ATOM Industrial Ltd.

Date of Test: May 8, 2004

Model: NOYRF835

Worst Case Operating Mode: Transmitting Mode (Ch.1)

**Table 1**

**Radiated Emissions**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp (dB)	Antenna factor (dB)	Average Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	912.393	58.1	16	33.0	0	75.1	94.0	-18.9
H	1824.792	49.4	34	27.2	0	42.6	54.0	-11.4
H	2737.188	44.7	34	30.4	0	41.1	54.0	-12.9
H	3649.572	40.7	34	33.3	0	40.0	54.0	-14.0
H	4561.960	38.0	34	34.9	0	38.9	54.0	-15.1
H	5474.300	36.7	34	35.7	0	38.4	54.0	-15.6

- 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 radiated emission test was observed up to 40GHz.
- \* 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: Terry C. H. Chan

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## INTERTEK TESTING SERVICES

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Company: ATOM Industrial Ltd.

Date of Test: May 8, 2004

Model: NOYRF835

Worst Case Operating Mode: Transmitting Mode (Ch.3)

**Table 2**

**Radiated Emissions**

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp (dB)	Antenna factor (dB)	Average Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
V	913.589	58.0	16	33.0	0	75.0	94.0	-19.0
H	1827.178	50.0	34	27.2	0	43.2	54.0	-10.8
H	2740.767	45.2	34	30.4	0	41.6	54.0	-12.4
H	3654.356	41.5	34	33.3	0	40.8	54.0	-13.2
H	4567.945	40.3	34	34.9	0	41.2	54.0	-12.8
H	5481.534	39.2	34	35.7	0	40.9	54.0	-13.1

- 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.
6. Horn antenna and average detector are used for the emission over 1000MHz.
7. The radiated emission test was observed up to 40GHz.
- \* 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: Terry C. H. Chan

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## INTERTEK TESTING SERVICES

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Company: ATOM Industrial Ltd.  
Model: NOYRF835  
Worst Case Operating Mode: Charging

Date of Test: May 8, 2004

**Table 3**

**Radiated Emissions  
Pursuant to FCC 15.109: Emissions Requirement**

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	35.846	33.8	16	10.0	27.8	40.0	-12.2
V	38.249	33.6	16	10.0	27.6	40.0	-12.4
V	43.651	32.9	16	10.0	26.9	40.0	-13.1
V	48.549	31.2	16	11.0	26.2	40.0	-13.8
V	55.485	30.4	16	11.0	25.4	40.0	-14.6
V	59.346	31	16	10.0	25.0	40.0	-15.0

Notes: 1. Peak Detector Data

2. Negative sign (-) in the margin column signify levels below the limit

3. Only emissions significantly above equipment noise floor are reported

Test Engineer: Terry C. H. Chan

## **INTERTEK TESTING SERVICES**

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

#### **Worst Case Conducted Emission**

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

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Company: ATOM Industrial Ltd.  
Model: NOYRF835

Date of Test: May 8, 2004

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

For Electronic filing, the conducted emission test result is saved with filename:  
conduct.pdf

## 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: conduct.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:**



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*Signature*

Terry C. H. Chan, Compliance Engineer  
*Typed/Printed Name*

May 18, 2004  
Date



## **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.

## **INTERTEK TESTING SERVICES**

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### **EXHIBIT 6**

### **TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

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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.

## **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. Moreover, it was said that the declaration which mention in following pages will also be committed at the time.



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### **EXHIBIT 8**

### **MISCELLANEOUS INFORMATION**

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### 8.0 **Miscellaneous Information**

The miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factor such as pulse desensitization and averaging factor (calculation and timing diagram).

### 8.1 Measured Bandwidth

For electronic filing, the plot on saved in bw.pdf shows the fundamental emission which are with and **without** applying modulation (0.5Vrms, 25kHz audio input signal). From the plot, it shows the emission is within the band edge 902MHz and 928MHz.

## **INTERTEK TESTING SERVICES**

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### **8.2 Discussion of Pulse Desensitization**

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

## **INTERTEK TESTING SERVICES**

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### **8.3 Calculation of Average Factor**

The average factor is not applicable for this device as the transmitted signal is a continuously signal.

### 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 - 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 8.3.

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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## INTERTEK TESTING SERVICES

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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 - 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 8.2). 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.