

**Daka Development Ltd.**

Application  
For  
Certification  
**(FCC ID: OK71000)**

Transmitter

WO# 9904960  
WN/at  
August 15, 1999

# INTERTEK TESTING SERVICES

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# MEASUREMENT/TECHNICAL REPORT

## Daka Development Ltd - MODEL: TC78

**FCC ID: OK71000**

**August 15, 1999**

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 [10-198 Edition] provision.

Report prepared by:

**Wilson Loke**  
Intertek Testing Services  
2/F., Garment Center,  
576, Castle Peak Road,  
HONG KONG  
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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             | conducted1.jpg<br>to conducted3.jpg |
| Test Report           | Conducted Emission Test Result | conducted.pdf                       |
| Test Report           | Bandwidth Plot                 | bw.pdf                              |
| External Photo        | External Photo                 | ophoto.jpg                          |
| Internal Photo        | Internal Photo                 | iphoto1.jpg to 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                          |

# **INTERTEK TESTING SERVICES**

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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 an electronic watch dog transmitter operating at 915 MHz. The EUT is powered either by four D-size batteries or by an 6V dc adaptor. There are four control buttons on the EUT (sensitivity control, volume control, alarm sound control and ON/OFF control). When the EUT is turned on, it transmits the 915 MHz RF signal to detect whether the area has a motion or not by detecting the frequency shift. If there is a motion, the EUT will detect a frequency shift as much as 100kHz then it will trigger the alarm.

The brief circuit description is listed in the following:

- Q1 and associated circuit act as an 915MHz oscillator.
- D1 acts as a detector.
- Q8, U2(A-D) and associated circuit act as an AF amplifier.
- U3(A-B), IC4538 and associated circuit act as an one shot trigger and power amplifier ON/OFF.
- U8 and associated circuit act as a power amplifier.

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

#### 1.2 Related Submittal(s) Grants

This is a single application for certification of a transmitter. No associated receiver is used.

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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 (1992). All measurements were 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 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 ANSI C63.4 (1992.)

The EUT was powered from an 6Vdc adaptor.

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 operated standalone and placed in the center of the turntable.

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

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 EUT is turned on, it transmits the typical signal. For simplicity of testing, the unit was wired to transmit 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 Daka Development Ltd 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 a standalone configuration.

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Wilson Loke  
Senior Supervisor  
Intertek Testing Services Hong Kong Ltd.  
Agent for Daka Development Ltd*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
August 26, 1999

\_\_\_\_\_  
Date

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

### 3.0 **Emission Results**

Data is included 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:

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

### 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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### 3.2 Radiated Emission Configuration Photograph

Worst Case Radiated Emission  
at  
1830.356 MHz

For electronic filing, the front view and back view of test configuration photograph is 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 5.8 dB

#### **TEST PERSONNEL:**



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*Signature*

Kenneth H. M. Lam, Compliance Engineer  
*Typed/Printed Name*

August 26, 1999

*Date*

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## INTERTEK TESTING SERVICES

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Company: Daka Development Ltd  
Model: TC78

Date of Test: August 5, 1999

Table 1

### Radiated Emissions

| Polarity | Frequency (MHz) | Reading (dBμV) | Antenna Factor (dB) | Pre-Amp Gain (dB) | Net at 3m (dBμV/m) | Limit at 3m (dBμV/m) | Margin (dB) |
|----------|-----------------|----------------|---------------------|-------------------|--------------------|----------------------|-------------|
| V        | 915.178         | 45.9           | 33.0                | 16                | 62.9               | 94.0                 | -31.1       |
| V        | 1830.356        | 55.7           | 26.5                | 34                | 48.2               | 54.0                 | -5.8        |
| V        | *2745.534       | 51.7           | 29.1                | 34                | 46.8               | 54.0                 | -7.2        |
| V        | *3660.712       | 43.9           | 32.8                | 34                | 42.7               | 54.0                 | -11.3       |
| V        | *4575.890       | 34.5           | 34.0                | 34                | 34.5               | 54.0                 | -19.5       |
| V        | 5491.068        | 35.5           | 35.2                | 34                | 36.7               | 54.0                 | -17.3       |

- 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.

\*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: Kenneth H. M. Lam

### 3.4 Line Conducted Configuration Photograph

#### Worst Case Line-Conducted Configuration

For electronic filing, the worst case line-conducted configuration photograph are saved with filename: conducted1.jpg , conducted2.jpg and conducted3.jpg respectively.

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### 3.5 Line Conducted Emission Configuration Data

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

Judgement: Passed by more than 30dB margin

#### **TEST PERSONNEL:**



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*Signature*

Kenneth H. M. Lam, Compliance Engineer  
*Typed/Printed Name*

August 26, 1999  
*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: ophoto.jpg for external photo and iphoto1.jpg to iphoto5.jpg for internal photo.

**EXHIBIT 5**

**PRODUCT LABELLING**

### 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**

## 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 measured bandwidth, the test procedure and calculation of factors such as pulse desensitization and averaging factor.

### 8.1 Measured Bandwidth

For electronic filing, the plot shows the fundamental emission when modulated is saved with filename: bw.pdf. From the plot, the emission is observed to be confined in the specified band. And it shows that the emission are at least 55 dB below the carrier level at the band edge (902 and 928MHz).

Therefore, the unit meets the requirement of section 15.231(c).

Figure 8.1 Bandwidth

### 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 transmitting signal is a continuous signal.

### 8.3 Calculation of Average Factor

Averaging factor is not applicable for this device. Since the transmitting signal is a continuous signal.

### 8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under 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 transmitting 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 8.3.

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.

### 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 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 8.2). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter 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.