

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 2**

### **SYSTEM TEST CONFIGURATION**

## 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 (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.

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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 AC mains.

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 mounted to a cardboard box, 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 wired to transmit continuously.

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

There was no special software to exercise the device. Once the button is depressed, the unit 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 Uni-Art Precise Products Ltd. will be incorporated in each production model sold/leased in the United States.

No modifications were installed by Intertek Testing Services.

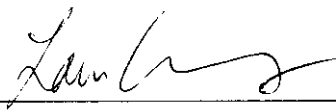
### 2.5 Support Equipment List and Description

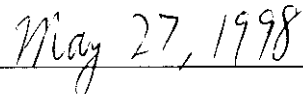
During the test, a cassette player is used to act as a audio input.

All the items listed under section 2.0 of this report are

*Confirmed by:*

*C. K. Lam*  
*Assistant Manager*  
*Intertek Testing Services*  
*Agent for Uni-Art Precise Products Ltd.*

  
\_\_\_\_\_  
Signature

  
\_\_\_\_\_  
Date

# **INTERTEK TESTING SERVICES**

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## **EXHIBIT 3**

### **EMISSION RESULTS**

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### 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:

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

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### 3.1 Field Strength Calculation (cont)

#### 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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### 3.3 Radiated Emission Data

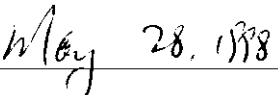
The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgement: Passed by 6.2 dB

#### **TEST PERSONNEL:**

  
\_\_\_\_\_  
Signature

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

  
\_\_\_\_\_  
Date

## INTERTEK TESTING SERVICES

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Company: Uni-Art Precise Products Ltd.  
Model: JVC HA-W100RF

Date of Test: May 18, 1998

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)
V	911.478	65.9	33.0	16	82.9	94	-11.1
H	1822.956	35.2	26.5	16	45.7	54	-8.3
H	*2734.434	43.0	29.1	34	38.1	54	-15.9
H	*3695.912	48.4	32.8	34	47.2	54	-6.8

- 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

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## INTERTEK TESTING SERVICES

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Company: Uni-Art Precise Products Ltd.  
Model: JVC HA-W100RF

Date of Test: May 18, 1998

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)
V	912.932	65.1	33	16	82.1	94	-11.9
H	1825.864	51.7	26.5	34	44.2	54	-9.8
H	*2738.796	40.5	29.1	34	35.6	54	-18.4
H	*3651.728	49.0	32.8	34	47.8	54	-6.2

- 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

## **INTERTEK TESTING SERVICES**

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Company: Uni-Art Precise Products Ltd.  
Model: JVC HA-W100RF

Date of Test: May 18, 1998

Graph 1

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

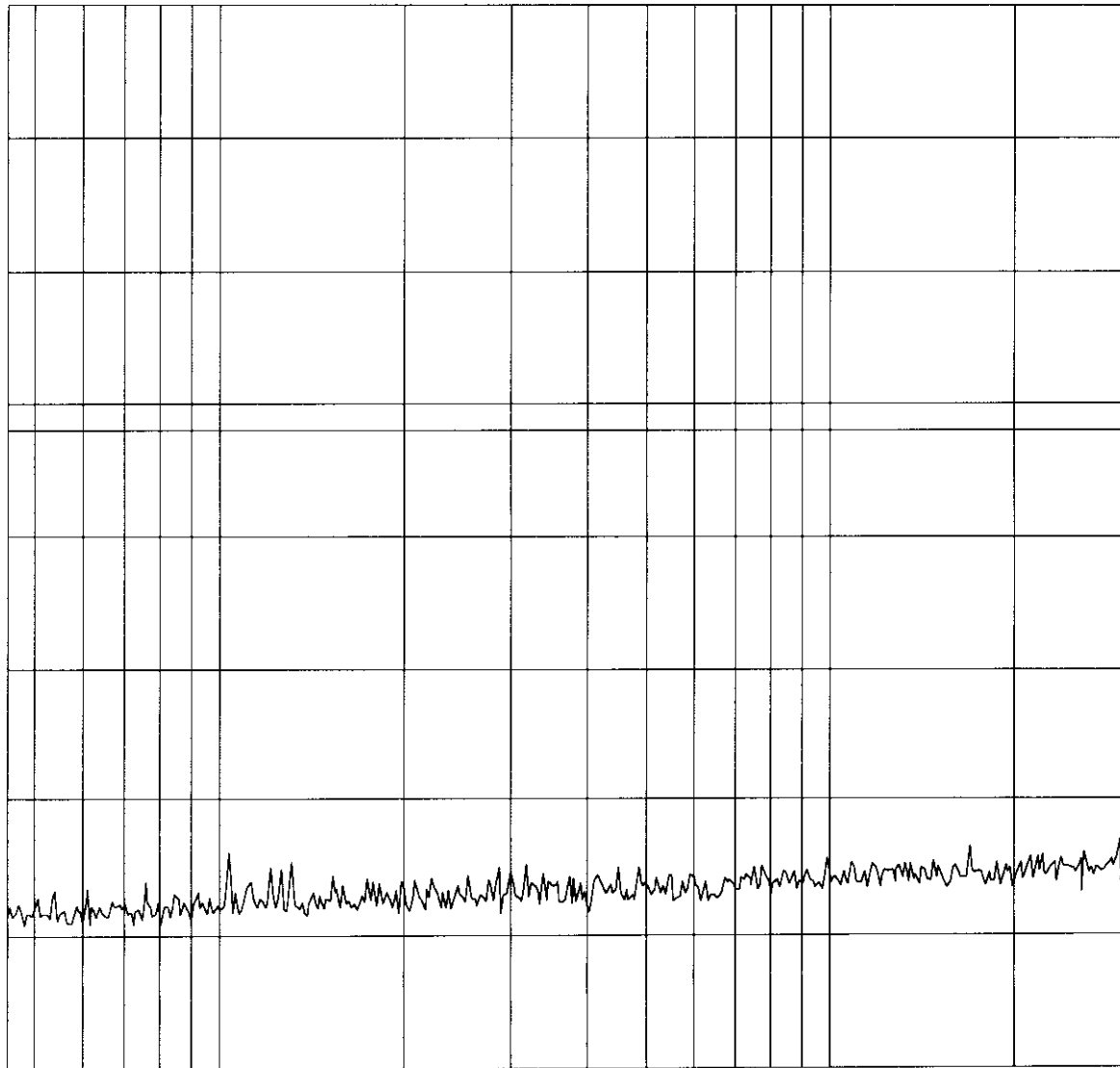
Report No.: 9803924

Tested By: [Name], Engineer, No. [ID], [Date]  
Tested By: [Name], [Title]

Equipment: [Name]  
[Model], [Type], [Frequency], [Power], [Antenna], [Mounting], [Accessories]  
[Model], [Type], [Frequency], [Power], [Antenna], [Mounting], [Accessories]

Tested at: [Location], [Date], [Time], [Weather]  
[Name], [Title], [Signature]  
[Name], [Title], [Signature]  
[Name], [Title], [Signature]

0.00



FCC 150

0.00

1.00

Ctrl. No.: N/A

## **INTERTEK TESTING SERVICES**

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Company: Uni-Art Precise Products Ltd.  
Model: JVC HA-W100RF

Date of Test: May 18, 1998

Table 2

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

Report No.: 5803924

Tested By: Hong, Report No.: 9803924

Scan Settings (1 Range)

----- Frequencies -----			----- Receiver Settings -----						
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
450k	30M	5k	10k	PK	20ms	AUTO	LN OFF	60dB	

Final Measurement Results:

no Results

Ctrl. No.: N/A

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### 3.5 Line Conducted Emission Configuration 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.

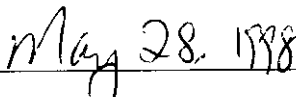
Judgement: Passed

\* All readings are peak unless stated otherwise.

#### **TEST PERSONNEL:**

  
\_\_\_\_\_  
Signature

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

  
\_\_\_\_\_  
Date



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### **EXHIBIT 4**

### **EQUIPMENT PHOTOGRAPHS**

## INTERTEK TESTING SERVICES

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### 4.0 Equipment Photographs

Photographs of the tested EUT are attached.

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## **EXHIBIT 8**

### **MISCELLANEOUS INFORMATION**

## INTERTEK TESTING SERVICES

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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 the following page shows the fundamental emission. From the plot, the emission is observed to be within the band 902-928. The unit meets the FCC bandwidth requirements.

Figure 8.1 Bandwidth

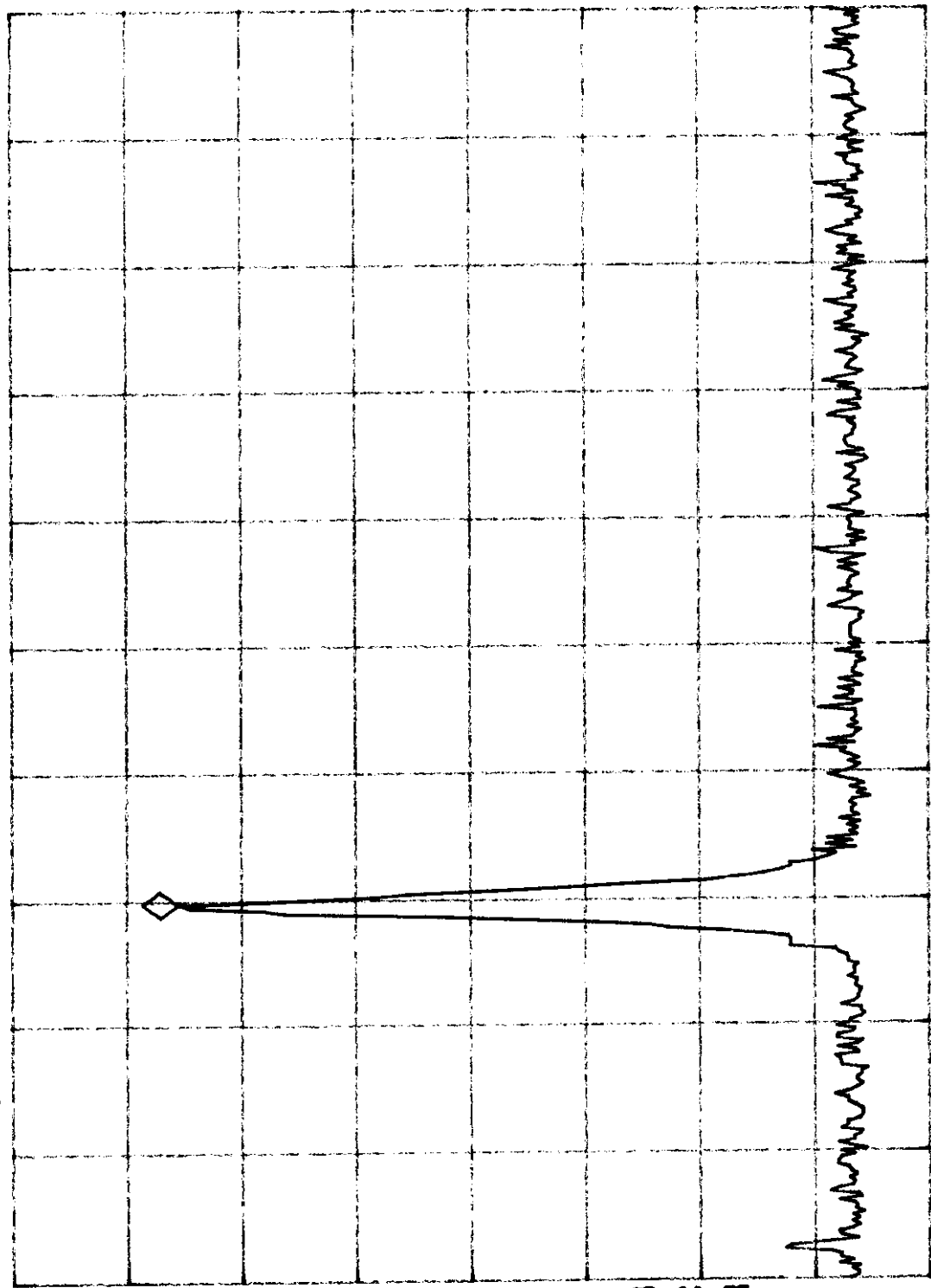
h/p

FCCID:MVAR5-900B-001T

MKR 909.74 MHz  
92.48 dBμV

REF 107.0 dBμV AT 10 dB

PEAK  
LOG  
10  
dB/



VA SB  
SC FC  
CORR

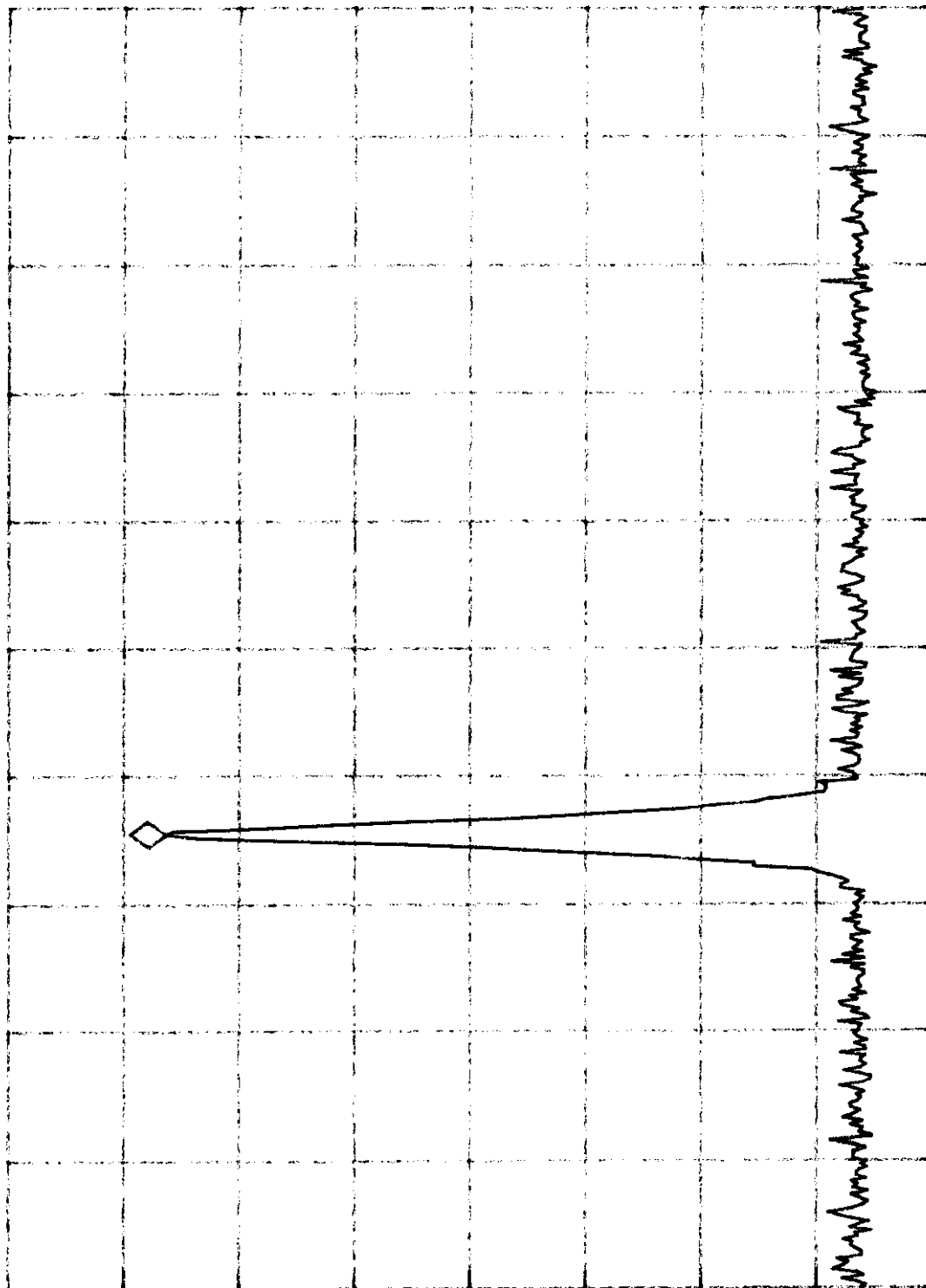
START 902.00 MHz #RES BW 100 KHz  
STOP 928.00 MHz #VBW 3 MHz SWP 20.0 msec

47

MKR 911.23 MHz  
93.25 dB $\mu$ V

REF 107.0 dB $\mu$ V AT 10 dB

PEAK  
LOG  
10  
dB/



VA SB  
SC FC  
CORR

START 902.00 MHz  
#RES BW 100 KHz

#VBW 3 MHz

STOP 928.00 MHz  
SWP 20.0 msec

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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 transmitting signal is a audio signal which is a continuous signal.



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

Average factor is not applicable for this device. Since the transmitting signal is a audio signal which is a continuous signal.

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### 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 attached to a cardboard box and 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 cardboard box 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.

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 are made as described in ANSI C63.4 - 1992.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater 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, but those measurements taken at a closer distance are so marked.