

Dec 10, 2011

Innovation First, Inc.  
1519 INT. 30 W Greenville Texas United States

Dear Robert H. Mimplitch, III:

Enclosed you will find your file copy of a Part 15 Certification (FCC ID: UKU-VEXCAM-TX2).

For your reference, TCB will normally take another 5 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,



Shawn Xing  
Manager

Enclosure

**Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch**

6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China

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**Innovation First, Inc.**

Application  
For  
Certification  
**(FCC ID: UKU-VEXCAM-TX2)**

**Color Camera**

Model: 276-2211

5.8GHz Transmitter

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-10]

SZ11100228-1  
Dec 10, 2011

- 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 is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- 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.

TRF No.: FCC 15C\_TXa  
FCC ID: UKU-VEXCAM-TX2

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# 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
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<i>EXHIBIT 8:</i>	Miscellaneous Information
<i>EXHIBIT 9:</i>	Test Equipment List

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# INTERTEK TESTING SERVICES

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## MEASUREMENT/TECHNICAL REPORT

Innovation First, Inc. - MODEL: 276-2211  
FCC ID: UKU-VEXCAM-TX2  
Dec 10, 2011

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

Equipment Type: DXX - Part 15 Low Power Communication Device Transmitter

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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.

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Transition Rules Request per 15.37?      Yes       No

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-10 Edition] provision.

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Report prepared by:

Shawn Xing  
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Nanshan District, Shenzhen, P. R. China  
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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
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Report	20dB BW Plot	bw.pdf
External Photo	External Photo	external photos.pdf
Internal Photo	Internal Photo	internal photos.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Operation Description	Technical Description	descri.pdf
ID Label/Location	Label Artwork and Location	label.pdf
User Manual	User Manual	manual.pdf
Cover Letter	Confidentiality Letter	request.pdf
Cover Letter	Letter of Agency	agency.pdf
Cover Letter	Certification Agreement	agreement.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

The equipment under test (EUT) is a Color Camera. The EUT will operate with DC 9.6V from a VEX Microcontroller motor port. The EUT has four channels and works with a receiver part.

Antenna Type: Integral antenna

Modulation Type: FM

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

#### 1.2 Related Submittal(s) Grants

This is an application for certification of a transmitter for the Color Camera, and there is no corresponding unit for certification.



## INTERTEK TESTING SERVICES

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### 1.3 Test Methodology

Radiated emission measurement was performed according to the procedures in ANSI C63.4 (2003) and performed in Semi-anechoic chamber. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. 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 Semi-anechoic chamber used to collect the radiated data is **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC.

**EXHIBIT 2**  
**SYSTEM TEST CONFIGURATION**

## **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 (2003).

The EUT was powered by a fully charged DC 9.6V battery through a VEX Microcontroller motor port.

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.

The rear of unit shall be flushed with the rear of the table.

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 a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

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

There was no special software to exercise the device.

#### **2.3 Special Accessories**

No special accessories used.

#### **2.4 Equipment Modification**

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

No modifications were installed by Intertek Testing Services Shenzhen Ltd Kejiyuan Branch.

## INTERTEK TESTING SERVICES

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### 2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

### 2.6 Support Equipment List and Description

Description	Supplier	Model No.
Microcontroller motor part	Innovation First, Inc.	N/A

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Shawn Xing*  
*Manager*  
*Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch*  
*Agent for Innovation First, Inc.*



\_\_\_\_\_  
Signature

\_\_\_\_\_  
Dec 10, 2011

Date

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**EXHIBIT 3**

**EMISSION RESULTS**

## INTERTEK TESTING SERVICES

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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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## INTERTEK TESTING SERVICES

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### 3.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

### 3.2 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:

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

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 dB $\mu$ V  
AF = 7.4 dB  
CF = 1.6 dB  
AG = 29.0 dB  
PD = 0 dB  
AV = -10 dB  
FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 dB $\mu$ V/m

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

## INTERTEK TESTING SERVICES

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### 3.3 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

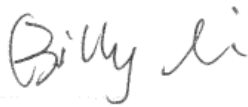
### 3.4 Radiated Emissions

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.

Worst Case Radiated Emission  
at  
601.483 MHz

Judgement: Passed by 13.5 dB

#### **TEST PERSONNEL:**



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*Signature*

Billy Li, Team Leader  
*Typed/Printed Name*

Dec 10, 2011  
*Date*



## INTERTEK TESTING SERVICES

Applicant: Innovation First, Inc.  
Model: 276-2211  
Sample: 1/1  
Worst Case Operating Mode: Transmit

Date of Test: Dec 10, 2011

Table 1

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	402.335	28.7	20.0	17.5	26.2	46.0	-19.8
Horizontal	513.506	27.1	20.0	20.2	27.3	46.0	-18.7
Horizontal	526.485	30.2	20.0	20.2	30.4	46.0	-15.6
Vertical	426.750	29.5	20.0	17.7	27.2	46.0	-18.8
Vertical	525.367	31.5	20.0	20.2	31.7	46.0	-14.3
Vertical	601.483	29.0	20.0	23.5	32.5	46.0	-13.5

- NOTES:
1. Quasi-Peak detector is used except for others 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 value in the margin column shows emission below limit.
  4. All emissions are below the QP limit.

## INTERTEK TESTING SERVICES

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### 3.5 Transmitter Spurious Emissions (Radiated)

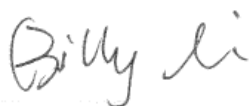
Worst Case Radiated Emission  
at  
5875.125 MHz

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

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 0.2 dB

#### **TEST PERSONNEL:**



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*Signature*

Billy Li, Team Leader  
*Typed/Printed Name*

Dec 10, 2011  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Innovation First, Inc.  
 Model: 276-2211  
 Sample: 1/1  
 Worst Case Operating Mode: Transmit

Date of Test: Dec 10, 2011

Table 2

### Radiated Emissions

(5790MHz)

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	5790.000	99.1	36.1	36.2	99.2	114.0	-14.8
Vertical	11580.000	50.3	35.3	41.9	56.9	74.0	-17.1
Vertical	17370.000	52.1	33.9	45.2	63.4	74.0	-10.6
Vertical	5724.300	59.5	36.1	36.2	59.6	74.0	-14.4

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	5790.000	88.5	36.1	36.2	88.6	94.0	-5.4
Vertical	11580.000	40.6	35.3	41.9	47.2	54.0	-6.8
Vertical	17370.000	41.2	33.9	45.2	52.5	54.0	-1.5
Vertical	5724.300	43.0	36.1	36.2	43.1	54.0	-10.9

- Notes:
1. Peak Detector is used for peak measurement, Average Detector is used for average measurement.
  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 is used for the emission over 1000MHz.

Test Engineer: Billy Li

## INTERTEK TESTING SERVICES

Applicant: Innovation First, Inc.  
 Model: 276-2211  
 Sample: 1/1  
 Worst Case Operating Mode: Transmit

Date of Test: Dec 10, 2011

Table 3

### Radiated Emissions

(5828MHz)

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	5828.000	99.4	36.1	36.2	99.5	114.0	-14.5
Vertical	11656.000	50.8	35.3	41.9	57.4	74.0	-16.6
Vertical	17484.000	52.9	33.9	45.2	64.2	74.0	-9.8

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	5828.000	87.9	36.1	36.2	88.0	94.0	-6.0
Vertical	11656.000	41.3	35.3	41.9	47.9	54.0	-6.1
Vertical	17484.000	41.8	33.9	45.2	53.1	54.0	-0.9

- Notes:
1. Peak Detector is used for peak measurement, Average Detector is used for average measurement.
  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 is used for the emission over 1000MHz.

Test Engineer: Billy Li

## INTERTEK TESTING SERVICES

Applicant: Innovation First, Inc.  
 Model: 276-2211  
 Sample: 1/1  
 Worst Case Operating Mode: Transmit

Date of Test: Dec 10, 2011

Table 4

### Radiated Emissions

(5866MHz)

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	5866.000	98.7	36.1	36.2	98.8	114.0	-15.2
Vertical	11732.000	51.0	35.3	41.9	57.6	74.0	-16.4
Vertical	17598.000	53.3	33.9	45.2	64.6	74.0	-9.4
Vertical	5875.125	73.5	36.1	36.2	73.6	74.0	-0.4

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	5866.000	85.9	36.1	36.2	86.0	94.0	-8.0
Vertical	11732.000	41.8	35.3	41.9	48.4	54.0	-5.6
Vertical	11598.000	42.2	33.9	45.2	53.5	54.0	-0.5
Vertical	5875.125	53.7	36.1	36.2	53.8	54.0	-0.2

- Notes:
1. Peak Detector is used for peak measurement, Average Detector is used for average measurement.
  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 is used for the emission over 1000MHz.

Test Engineer: Billy Li

**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, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

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**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.

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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 schematics 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.

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**EXHIBIT 8**

**MISCELLANEOUS INFORMATION**

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### 8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandwidth, the test procedure and calculation of factor such as pulse desensitization.

## INTERTEK TESTING SERVICES

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### 8.1 Bandedge Plot

Pursuant to FCC part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over excepted variations in temperature and supply voltage were considered.

Figure 8.1 Bandwidth



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### 8.2 Transmitter Duty Cycle Calculation and Measurements

The EUT antenna output port was connected to the input of the spectrum analyzer. The analyzer center frequency was set to EUT RF channel carrier. The SWEEP function on the analyzer was set to ZERO SPAN. The Transmitter ON time was determined from the resultant time-amplitude display:

	See attached spectrum analyzer chart (s) for Transmitter timing
	See Transmitter timing diagram provided by manufacturer
x	Not applicable, duty cycle was not used.

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## INTERTEK TESTING SERVICES

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### 8.3 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 - 2003.

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.

Above 1000 MHz, peak detector is used for peak measurement and average detector is used for average measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths.

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.

Detector function for conducted emissions is in QP & AV mode and IFBW setting is 9 kHz from the frequency band 150 kHz to 30MHz.

## 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 measurements are made as described in ANSI C63.4 - 2003.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 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. 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 restricted 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.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 9**  
**TEST EQUIPMENT LIST**

## INTERTEK TESTING SERVICES

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### 9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	02-Jul-11	02-Jan-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	08-Mar-11	08-Mar-12
SZ061-08	Horn Antenna	ETS	3115	00092346	15-Mar-10	15-Mar-12
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	08-Mar-11	08-Mar-12
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	08-Mar-11	08-Mar-12
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	15-Jan-11	15-Jan-12
SZ062-02	RF Cable	RADIALL	RG 213U	--	25-Mar-11	25-Mar-12
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	16-Sep-11	16-Sep-12
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	16-Sep-11	16-Sep-12