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TEST REPORT

Report No.: 14100767HKG-001

Winfat Industrial Co., Ltd

Application
For
Certification
(Original Grant)
(FCC ID: LXE-0902)

Transmitter

Prepared and Checked by:


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Lead Engineer

Approved by:


Chan Chi Hung, Terry
Supervisor
Date: January 6, 2015

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GENERAL INFORMATION

Grantee:	Winfat Industrial Co., Ltd
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Contact Person:	Fred Leung
Tel:	(852) 2790 6898
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e-mail:	fredleung@winfat.com.cn
Manufacturer:	Caili Electronics (Shenzhen) Co., Ltd.
Manufacturer Address:	No.48 228 Industrial Estate, Heng Gang Town, Long Gang District, Shenzhen, China.
Brand Name:	N/A
Model:	0902-NL
Additional Model:	0902, 0901-NL, 0901
Type of EUT:	Transmitter
Description of EUT:	RC Dancing Elephant with Bubble Fun Танцующий слоник с мыльными пузырями и пультом дистанционного управления Éléphant danseur télécommandé à bulles Elefante Bailarín RC con Juego de Burbujas Elefante Dançarino Telecomandado com Bolhinhas Elefante ballerino soffiabolle radiocomandato Ferngesteuerter Elefant mit Seifenblasen-Spaß (0902-NL) RC Dancing Elephant with Bubble Fun (0902) RC Happy Snail with Bubble Fun Веселая улитка с мыльными пузырями и пультом дистанционного управления Joyeux escargot télécommandé avec jeu de bulles Caracol Feliz RC con Divertidas Burbujas Caracol Feliz Telecomandado com Bolhinhas Lumaca Sparabolle RC Fröhliche Schnecke mit Fernsteuerung und Seifenblasen-Spaß (0901-NL) RC Happy Snail with Bubble Fun (0901)
Serial Number:	N/A
FCC ID:	LXE-0902
Date of Sample Submitted:	October 22, 2014
Date of Test:	October 22, 2014 to November 25, 2014
Report No.:	14100767HKG-001
Report Date:	January 6, 2015
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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**SUMMARY OF TEST RESULT**

TEST SPECIFICATION	REFERENCE	RESULTS
Radiated Emission	15.249	Pass
Radiated Emission on the Bandedge		
Radiated Emission in Restricted Bands	15.205	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2013 Edition

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB 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 expected variations in temperature and supply voltage were considered.

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1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a 2.4GHz pure transmitter (i.e. Controller) for a RC Elephant. The EUT is powered by DC3.0V (2X1.5V AAA batteries). The operating frequencies are 2410MHz, 2438MHz, and 2462MHz. After powered on the EUT, it can control the Elephant to move forward and circling.

The Model: 0902, 0901-NL and 0901 are the same as the Model: 0902-NL in hardware aspect. The models are different in Cosmetics/Colour/Packing only.

Antenna Type: Internal, Integral

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.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in a 3m Chamber. Preliminary scans were performed in the 3m Chamber only to determine 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 3m Chamber used to collect the radiated data is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been 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 (2009).

The device was powered by new 2 x 1.5V AAA batteries.

For maximizing emissions below 30 MHz, the EUT was rotated through 360°, the centre of the loop antenna was placed 1 meter above the ground, and the antenna polarization was changed. For maximizing emission at and above 30 MHz, 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 report 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 plastic stand if necessary and placed on the wooden turntable, 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. Once the unit is powered up, it transmits the RF signal continuously.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

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

2.5 Support Equipment List and Description

N/A.

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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.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

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

where FS = Field Strength in dB μ V/m

RA = Receiver Amplitude (including preamplifier) in dB μ V

CF = Cable Attenuation Factor in dB

AF = Antenna Factor in dB

AG = Amplifier Gain in dB

AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where FS = Field Strength in dB μ V/m

RR = RA - AG - AV in dB μ V

LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$RA = 52.0 \text{ dB}\mu\text{V}/\text{m}$$

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

$$RR = 18.0 \text{ dB}\mu\text{V}$$

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

$$LF = 9.0 \text{ dB}$$

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

$$AV = 5.0 \text{ dB}$$

$$FS = RR + LF$$

$$FS = 18 + 9 = 27 \text{ dB}\mu\text{V}/\text{m}$$

$$\text{Level in } \mu\text{V}/\text{m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V}/\text{m})/20] = 22.4 \mu\text{V}/\text{m}$$

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**3.2 Radiated Emission Configuration Photograph**

The worst case in radiated emission was found at 48.123 MHz

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

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.

Judgment: Passed by 8.5 dB

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Applicant: Winfat Industrial Co., Ltd

Date of Test: November 25, 2014

Model: 0902-NL

Worst-Case Operating Mode: Transmitting

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2410.000	98.5	33	29.4	94.9	45.7	49.2	94.0	-44.8
H	2400.000	61.4	33	29.4	57.8	45.7	12.1	54.0	-41.9
V	4820.000	53.6	33	34.9	55.5	45.7	9.8	54.0	-44.2
V	7230.000	49.5	33	37.9	54.4	45.7	8.7	54.0	-45.3
V	9640.000	46.9	33	40.4	54.3	45.7	8.6	54.0	-45.4
V	12050.000	47.9	33	40.5	55.4	45.7	9.7	54.0	-44.3
V	14460.000	49.6	33	40.0	56.6	45.7	10.9	54.0	-43.1

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2410.000	98.5	33	29.4	94.9	114.0	-19.1
H	2400.000	61.4	33	29.4	57.8	74.0	-16.2
V	4820.000	53.6	33	34.9	55.5	74.0	-18.5
V	7230.000	49.5	33	37.9	54.4	74.0	-19.6
V	9640.000	46.9	33	40.4	54.3	74.0	-19.7
V	12050.000	47.9	33	40.5	55.4	74.0	-18.6
V	14460.000	49.6	33	40.0	56.6	74.0	-17.4

NOTES: 1. Peak Detector Data 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 is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

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Applicant: Winfat Industrial Co., Ltd

Date of Test: November 25, 2014

Model: 0902-NL

Worst-Case Operating Mode: Transmitting

Table 2

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2438.000	99.3	33	29.4	95.7	45.7	50.0	94.0	-44.0
V	4876.000	53.8	33	34.9	55.7	45.7	10.0	54.0	-44.0
V	7314.000	49.9	33	37.9	54.8	45.7	9.1	54.0	-44.9
V	9752.000	47.2	33	40.4	54.6	45.7	8.9	54.0	-45.1
V	12190.000	48.3	33	40.5	55.8	45.7	10.1	54.0	-43.9
V	14628.000	51.3	33	38.4	56.7	45.7	11.0	54.0	-43.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2438.000	99.3	33	29.4	95.7	114.0	-18.3
V	4876.000	53.8	33	34.9	55.7	74.0	-18.3
V	7314.000	49.9	33	37.9	54.8	74.0	-19.2
V	9752.000	47.2	33	40.4	54.6	74.0	-19.4
V	12190.000	48.3	33	40.5	55.8	74.0	-18.2
V	14628.000	51.3	33	38.4	56.7	74.0	-17.3

NOTES: 1. Peak Detector Data 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 is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

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Applicant: Winfat Industrial Co., Ltd

Date of Test: November 25, 2014

Model: 0902-NL

Worst-Case Operating Mode: Transmitting

Table 3

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Average Factor (dB)	Calculated at 3m (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2462.000	99.5	33	29.4	95.9	45.7	50.2	94.0	-43.8
H	2483.500	61.7	33	29.4	58.1	45.7	12.4	54.0	-41.6
V	4924.000	54.0	33	34.9	55.9	45.7	10.2	54.0	-43.8
V	7386.000	49.9	33	37.9	54.8	45.7	9.1	54.0	-44.9
V	9848.000	47.5	33	40.4	54.9	45.7	9.2	54.0	-44.8
V	12310.000	48.2	33	40.5	55.7	45.7	10.0	54.0	-44.0
V	14772.000	5.8	33	38.4	56.9	45.7	11.2	54.0	-42.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2462.000	99.5	33	29.4	95.9	114.0	-18.1
H	2483.500	61.7	33	29.4	58.1	74.0	-15.9
V	4924.000	54.0	33	34.9	55.9	74.0	-18.1
V	7386.000	49.9	33	37.9	54.8	74.0	-19.2
V	9848.000	47.5	33	40.4	54.9	74.0	-19.1
V	12310.000	48.2	33	40.5	55.7	74.0	-18.3
V	14772.000	51.5	33	38.4	56.9	74.0	-17.1

NOTES: 1. Peak Detector Data 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 is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.

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Applicant: Winfat Industrial Co., Ltd

Date of Test: November 25, 2014

Model: 0902-NL

Worst-Case Operating Mode: Transmitting

Table 4

**Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement**

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	48.123	36.5	16	11.0	31.5	40.0	-8.5
V	144.237	33.2	16	14.0	31.2	43.5	-12.3
V	240.232	29.2	16	19.0	32.2	46.0	-13.8
V	480.146	22.8	16	26.0	32.8	46.0	-13.2
H	720.399	19.1	16	30.0	33.1	46.0	-12.9
H	960.422	16.3	16	33.0	33.3	54.0	-20.7

NOTES: 1. Peak Detector Data 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 is used for the emission over 1000MHz.
5. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

Issuing Laboratory:**Intertek Testing Services Hong Kong Limited**

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**4.0 Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 Product Labelling

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

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.

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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**8.0 Miscellaneous Information**

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

8.1 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2009) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

The result of bandedge emissions can be found on the emission table of page 5 & page 7 of this report.

The resultant field strength meets the general radiated emission limit in Section 15.209, which does not exceed 74 dB μ V/m (Peak Limit) and 54 dB μ V/m (Average Limit).

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**8.2 Discussion of Pulse Desensitization**

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 0.26ms for a digital “1” bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100ms

Effective period of the cycle = $2 \times 0.26 = 0.52\text{ms}$

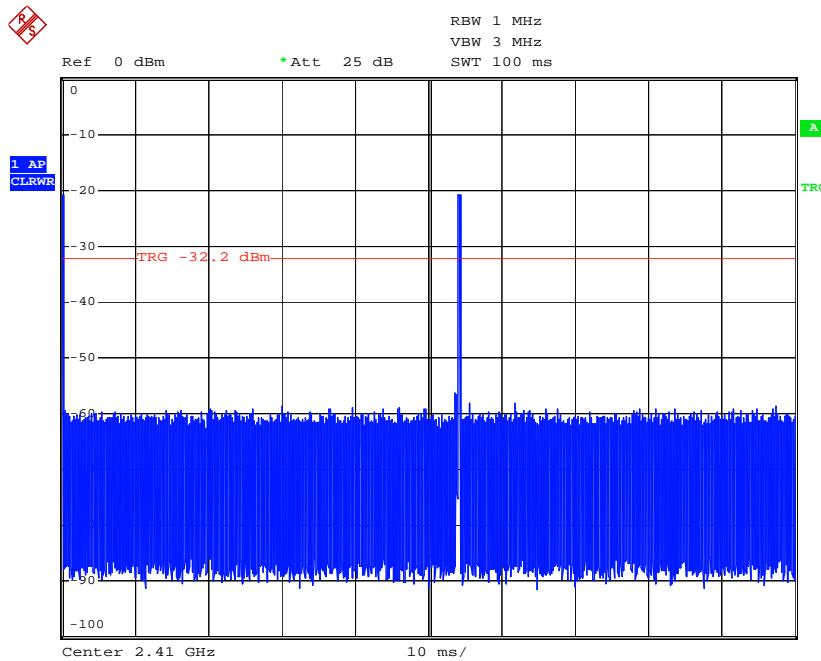
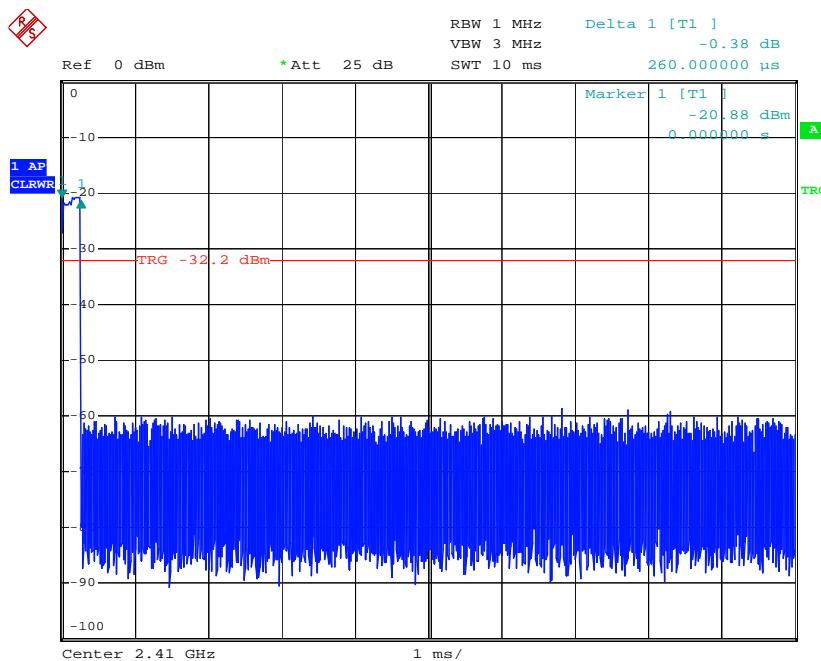
DC = $0.52 / 100 = 0.0052$

Therefore, the averaging factor is found by $20\log 0.0052 = -45.7\text{dB}$.

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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 transmitter operating under the Part 15, Subpart C rules.

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 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.

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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 (2009).

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 3 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.

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HKAS has accredited this laboratory (HOKLAS 005 – TEST) under HOKLAS for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories.

**9.0 Equipment List****1) Radiated Emissions Test**

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2666	EW-0571	EW-0447
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI7	3104C	3146
Calibration Date	Jun. 20, 2013	Nov. 01, 2013	Aug. 19, 2013
Calibration Due Date	Dec. 20, 2014	May 01, 2015	Feb. 19, 2015

Equipment	Spectrum Analyzer	Pyramidal Horn Antenna	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-0905	EW-1133
Manufacturer	R&S	EMCO	EMCO
Model No.	FSP40	3160-09	3115
Calibration Date	May 08, 2014	Jan. 28, 2014	Apr. 30, 2014
Calibration Due Date	May 08, 2015	Jul. 28, 2015	Oct. 30, 2015

2) Average factor Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2329
Manufacturer	R&S
Model No.	FSP3
Calibration Date	Jun. 19, 2014
Calibration Due Date	Jun. 19, 2015

END OF TEST REPORT