TEST REPORT

Report No.: 14011152HKG-001

WowWee Group Limited

Application
For
Certification
(Original Grant)
(FCC ID: OKP0820)
(IC: 7091A-0820)

Transceiver

Prepared and Checked by:

Signed on File
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Approved by:

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Location: Intertek Testing Services Hong Kong Ltd.

Chan Chi Hung, Terry
Supervisor
Date: March 19, 2014

GENERAL INFORMATION

WowWee Group Limited
BRAND NAME: WowWee
MODEL: 0820
FCC ID: OKP0820
IC: 7091A-0820

Grantee:	WowWee Group Limited
Grantee Address:	Unit 301A-C, Energy Plaza, 92 Granville Road, Tsim Sha Tsui East, Kowloon, Hong Kong.
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Manufacturer:	WowWee Group Limited
Manufacturer Address:	Unit 301A-C, Energy Plaza, 92 Granville Road, Tsim Sha Tsui East, Kowloon, Hong Kong.
Brand Name:	WowWee
Model:	0820
Type of EUT:	Transceiver
Description of EUT:	MIP Assorted
Serial Number:	N/A
FCC ID / IC:	OKP0820 / 7091A-0820
Date of Sample Submitted:	January 28, 2014
Date of Test:	January 28, 2014 to February 19, 2014
Report No.:	14011152HKG-001
Report Date:	March 19, 2014
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

WowWee Group Limited
BRAND NAME: WowWee
MODEL: 0820
FCC ID: OKP0820
IC: 7091A-0820

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	Pass
Radiated Emission Radiated Emission on the Bandedge	15.249(a) 15.209	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2012 Edition
RSS-210 Issue 8, December 2010
RSS-Gen Issue 3, December 2010

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the pervisions 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 excepted variations in temperature and supply voltage were considered.

Table of Contents

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a 2.4GHz Bluetooth 4.0 transceiver (Robot) of a RC Car system, which is operating at 2402MHz to 2480MHz (40 channels with 2MHz channel spacing). The EUT is powered by 6VDC (4 X 1.5V "AAA" batteries). The EUT has a power ON/OFF switch, a pairing button and a LED. When the EUT is switched ON, the LED will flash. It is required to press the pairing button to pair with the corresponding controller before playing. After pairing, the LED will stay lit. After pairing, the EUT can be controlled to move forward, backward, left and right by the corresponding Bluetooth device.

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 transceiver.

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site 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 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 and IC.

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 DC 6.0 V (4 x 1.5V "AAA" batteries).

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 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 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 Equipment Modification

Any modifications installed previous to testing by WowWee Group Limited will be incorporated in each production model sold/leased in the United States and Canada.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

2.5 Measurement Uncertainty

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

2.6 Support Equipment List and Description

Ipad mini (Provided by Intertek)

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 dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
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 dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV 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 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 2402.000 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 2.2 dB

Applicant: WowWee Group Limited Date of Test: February 19, 2014
Model: 0820
Worst-Case Operating Mode: Transmitting (Bluetooth 4.0)

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2402.000	87.4	33	29.4	83.8	0	83.8	94.0	-10.2
H	4804.000	47.3	33	34.9	49.2	0	49.2	54.0	-4.8
H	7206.000	43.7	33	37.9	48.6	0	48.6	54.0	-5.4
H	9608.000	41.1	33	40.4	48.5	0	48.5	54.0	-5.5
H	12010.000	40.3	33	40.5	47.8	0	47.8	54.0	-6.2
H	14412.000	40.1	33	40.0	47.1	0	47.1	54.0	-6.9

Remark: Average measurement method is used according to ANSI C63.10.

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2402.000	89.2	33	29.4	85.6	114.0	-28.4
H	4804.000	48.9	33	34.9	50.8	74.0	-23.2
H	7206.000	45.7	33	37.9	50.6	74.0	-23.4
H	9608.000	42.8	33	40.4	50.2	74.0	-23.8
H	12010.000	42.0	33	40.5	49.5	74.0	-24.5
H	14412.000	42.3	33	40.0	49.3	74.0	-24.7

Remark: Peak Detector Data unless otherwise stated.

NOTES: 1. 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.

2. Negative sign in the column shows value below limit.

3. Horn antenna is used for the emission over 1000MHz.

4. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: WowWee Group Limited Date of Test: February 19, 2014
Model: 0820
Worst-Case Operating Mode: Transmitting (Bluetooth 4.0)

Table 2

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2442.000	87.1	33	29.4	83.5	0	83.5	94.0	-10.5
H	4884.000	47.4	33	34.9	49.3	0	49.3	54.0	-4.7
H	7326.000	43.6	33	37.9	48.5	0	48.5	54.0	-5.5
H	9768.000	41.1	33	40.4	48.5	0	48.5	54.0	-5.5
H	12210.000	39.8	33	40.5	47.3	0	47.3	54.0	-6.7
H	14652.000	41.7	33	38.4	47.1	0	47.1	54.0	-6.9

Remark: Average measurement method is used according to ANSI C63.10.

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2442.000	89.0	33	29.4	85.4	114.0	-28.6
H	4884.000	49.0	33	34.9	50.9	74.0	-23.1
H	7326.000	45.5	33	37.9	50.4	74.0	-23.6
H	9768.000	42.8	33	40.4	50.2	74.0	-23.8
H	12210.000	42.0	33	40.5	49.5	74.0	-24.5
H	14652.000	43.9	33	38.4	49.3	74.0	-24.7

Remark: Peak Detector Data unless otherwise stated.

NOTES: 1. 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.

2. Negative sign in the column shows value below limit.

3. Horn antenna is used for the emission over 1000MHz.

4. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: WowWee Group Limited Date of Test: February 19, 2014
Model: 0820
Worst-Case Operating Mode: Transmitting (Bluetooth 4.0)

Table 3

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	86.9	33	29.4	83.3	0	83.3	94.0	-10.7
H	4960.000	47.2	33	34.9	49.1	0	49.1	54.0	-4.9
H	7440.000	43.7	33	37.9	48.6	0	48.6	54.0	-5.4
H	9920.000	40.9	33	40.4	48.3	0	48.3	54.0	-5.7
H	12400.000	40.1	33	40.5	47.6	0	47.6	54.0	-6.4
H	14880.000	41.7	33	38.4	47.1	0	47.1	54.0	-6.9

Remark: Average measurement method is used according to ANSI C63.10.

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2480.000	87.9	33	29.4	84.3	114.0	-29.7
H	4960.000	48.7	33	34.9	50.6	74.0	-23.4
H	7440.000	45.4	33	37.9	50.3	74.0	-23.7
H	9920.000	42.1	33	40.4	49.5	74.0	-24.5
H	12400.000	41.9	33	40.5	49.4	74.0	-24.6
H	14880.000	43.9	33	38.4	49.3	74.0	-24.7

Remark: Peak Detector Data unless otherwise stated.

NOTES: 1. 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.

2. Negative sign in the column shows value below limit.

3. Horn antenna is used for the emission over 1000MHz.

4. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

Applicant: WowWee Group Limited Date of Test: February 19, 2014
Model: 0820
Worst-Case Operating Mode: Transmitting (Baseband)

Table 4

Radiated Emissions
Pursuant to FCC Part 15 Section 15.209 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	41.469	39.5	16	10.0	33.5	40.0	-6.5
H	69.119	42.8	16	7.0	33.8	40.0	-6.2
H	108.523	36.2	16	14.0	34.2	43.5	-9.3
H	224.103	32.6	16	18.0	34.6	46.0	-11.4
H	243.400	30.1	16	20.0	34.1	46.0	-11.9
H	274.165	27.9	16	22.0	33.9	46.0	-12.1

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.

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 and Canada.

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 Measured Bandwidth

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).

Peak Measurement
Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot
= 85.6 dBµV/m –32.0 dB
= 53.6 dBµV/m

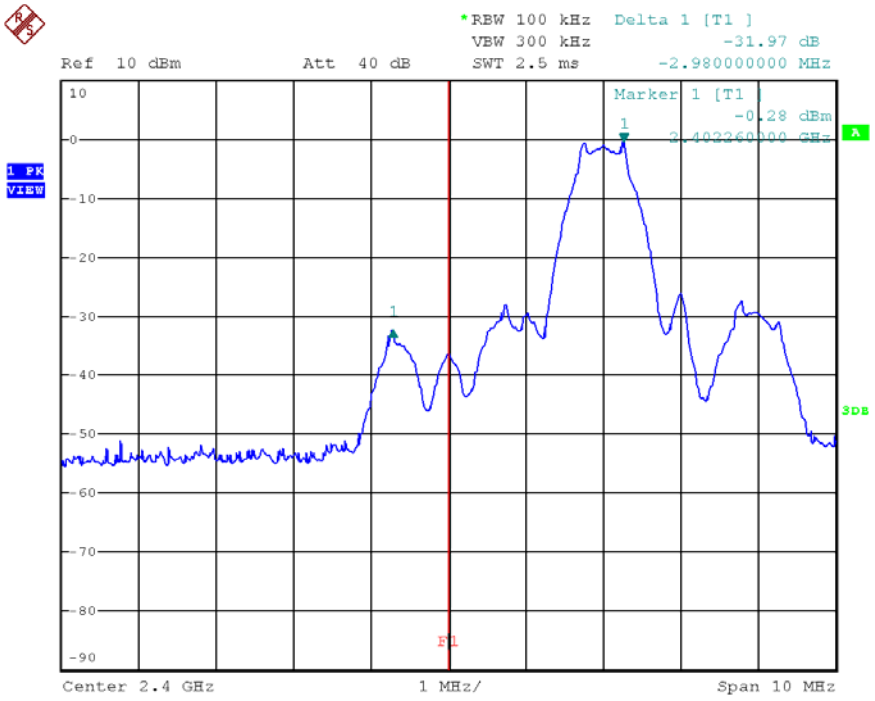
Average Resultant field strength = Fundamental emissions (average value) – delta from the plot
= 83.8 dBµV/m –32.0 dB
= 51.8 dBµV/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot
= 84.3 dBµV/m –49.2 dB
= 35.1 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot
= 83.3 dBµV/m –49.2 dB
= 34.1 dBµV/m

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dBµV/m (Peak Limit) and 54 dBµV/m (Average Limit).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VBW 300 kHz
SWT 2.5 ms
Delta 1 [T1]
-31.97 dB
-2.980000000 MHz
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Att 40 dB
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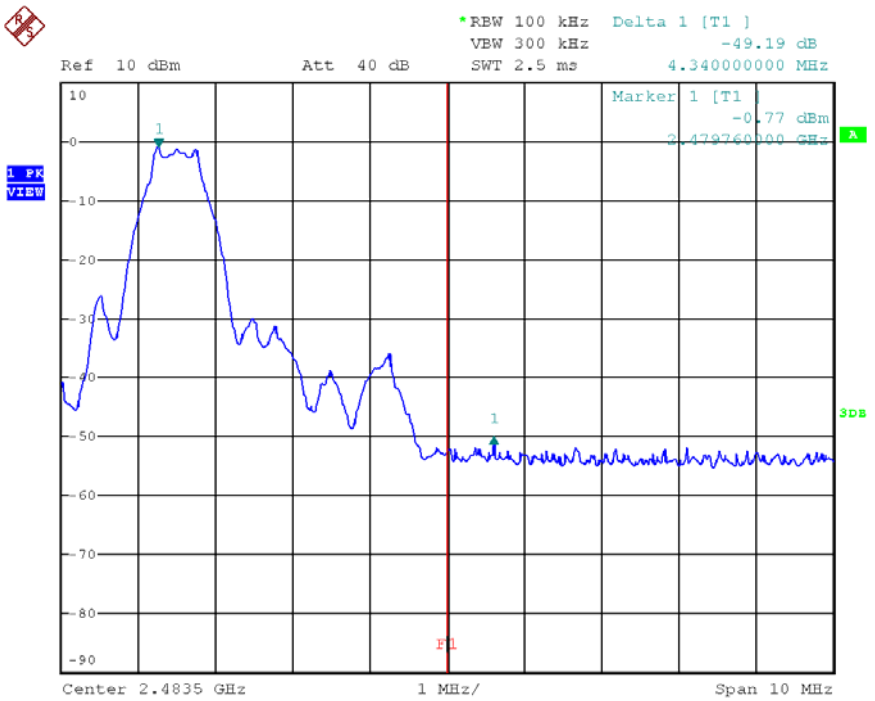
-0.28 dBm
2.402260100 GHz
1 PK
VIEW
3DB
Center 2.4 GHz
1 MHz/
Span 10 MHz


*RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 1 [T1]
-49.19 dB
4.340000000 MHz
Ref 10 dBm
Att 40 dB
Marker 1 [T1]
-0.77 dBm
2.479760100 GHz
1 PK
VIEW
3DB
Center 2.4835 GHz
1 MHz/
Span 10 MHz

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 3.125ms for a digital “1” bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 2MHz, so the pulse desensitivity factor is 0dB.

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 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 (2009). A typical or an unmodulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

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.

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 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.

9.0 Confidentiality Request

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

10.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2666	EW-2253	EW-1015
Manufacturer	R&S	ROHDESCHWARZ	EMCO
Model No.	ESCI7	FSP40	3115
Calibration Date	Jun. 20, 2013	Apr. 24, 2013	Mar. 05, 2013
Calibration Due Date	Jun. 20, 2014	Apr. 24, 2014	Sep. 05, 2014

Equipment	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2512	EW-0447
Manufacturer	EMCO	EMCO
Model No.	3104C	3146
Calibration Date	Jun. 25, 2013	Aug. 19, 2013
Calibration Due Date	Dec. 25, 2014	Feb. 19, 2015

2) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 28, 2013
Calibration Due Date	Oct. 28, 2014