TEST REPORT

Report Number: 14010362HKG-001

Application
for
Original Grant of 47 CFR Part 15 Certification
Single New of RSS-210 Issue 8 Equipment Certification

2.4GHz Audio Baby Monitor - Baby Unit

FCC ID: SMH32116B
IC: 4593A-32116B

Prepared and Checked by:

Signed On File
Jess Tang
Lead Engineer

Approved by:

Digitally signed by Nip Ming Fung, Melvin
Location: Intertek Testing Services Hong Kong Ltd

Nip Ming Fung, Melvin
Assistant Manager
July 31, 2014

GENERAL INFORMATION

Applicant Name:	CIRCUS WORLD DISPLAYS LTD.
Applicant Address:	4080 Montrose Rd, Niagara Falls, Ontario L2H 1J9, Canada.
FCC Specification Standard:	FCC Part 15, October 1, 2012 Edition
FCC ID:	SMH32116B
FCC Model(s):	32116B, AA3180B
IC Specification Standard:	RSS-210 Issue 8, December 2010 RSS-Gen Issue 3, December 2010
IC:	4593A-32116B
IC Model(s):	32116B
Type of EUT:	Transceiver
Description of EUT:	2.4GHz Audio Baby Monitor - Baby Unit
Serial Number:	N/A
Sample Receipt Date:	January 09, 2014
Date of Test:	June 26 - July 3, 2014
Report Date:	July 31, 2014
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Table of Contents

EXHIBIT 1
TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 Test Results Summary & Statement of Compliance

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-210/ RSS-Gen#	Results	Details see section
Antenna Requirement	15.203	7.1.2#	Pass	2.1
Radiated Emission Radiated Emission on the Bandedge	15.249(a), 209, & 109 15.249(d)	A2.9(a) A2.9(b)	Pass Pass	4.2 4.3
Radiated Emission in Restricted Bands	15.205	2.2	Pass	4.2
AC Power Line Conducted Emission	15.207 & 15.107	7.2.4#	Pass	4.4

Note: 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 expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2012 Edition
RSS-210 Issue 8, December 2010
RSS-Gen Issue 3, December 2010

EXHIBIT 2
GENERAL DESCRIPTION

2.0 General Description

2.1 Product Description

The 32116B is a 2.4GHz Audio Baby Monitor - Baby Unit. It operates at frequency range of 2402.784MHz to 2479.680MHz. The Baby Unit is powered by an adaptor 100-240VAC 50/60Hz 150mA to 5.0VDC 600mA.

The antenna used in baby unit is integral, and the test sample is a prototype.

For FCC, the Model(s): AA3180B is the same as the Model: 32116B in electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are model number, color of enclosure and trade name to be sold for marketing purpose.

The circuit description is saved with filename: descri.pdf.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Preliminary radiated scans and all radiated measurements were performed in radiated test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.3 Test Facility

The radiated test site and conducted measurement facility used to collect the radiated data and conducted data are 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 fully placed on file with the FCC and the Industry Canada.

EXHIBIT 3
SYSTEM TEST CONFIGURATION

3.0 System Test Configuration

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by a 100-240VAC 50/60Hz 150mA to 5.0VDC 600mA adaptor.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the baby unit attached to peripherals, they were connected and operational to simulate typical use.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 1 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter was performed 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 to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitry used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 Limits.

3.1 Justification - Cont'd

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 4.2.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.2.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes have been tested, and the worst case data was included in this report.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

3.3 Details of EUT and Description of Accessories

Details of EUT:

An AC adaptor (provided with the unit) was used to power the device. Their description are listed below.

(1) An AC adaptor (100-240VAC 50/60Hz 150mA to 5.0VDC 600mA, Model: 5E-AD050060-U, Brand: Levana) (Supplied by Client)

Description of Peripherals:

There are no accessories necessary for compliance of this product.

3.4 Measurement Uncertainty

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

EXHIBIT 4
TEST RESULTS

4.0 **Test 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.

4.1 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 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
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 reflects 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

Example
Assume a receiver reading of 62.0 dBμV 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 dBμV/m. This value in dBμV/m was converted to its corresponding level in μV/m.

RA = 62.0 dBμV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBμV/m
Level in μV/m = Common Antilogarithm [(32 dBμV/m)/20] = 39.8 μV/m

4.2 Radiated Emissions

4.2.1 Radiated Emission Configuration Photograph

Worst Case Radiated Emission
at

55.300 MHz

The worst case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.2.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 6.1 dB margin

Mode: TX-Channel 02

Table 1

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2402.784	110.1	33	29.4	39.8	66.7	94.0	-27.3
H	***4805.568***	***57.9***	***33***	***34.9***	***39.8***	***20.0***	***54.0***	***-34.0***
H	7208.352	49.3	33	37.9	39.8	14.4	54.0	-39.6
H	9611.136	54.5	33	40.4	39.8	22.1	54.0	-31.9
H	***12013.920***	***45.1***	***33***	***40.5***	***39.8***	***12.8***	***54.0***	***-41.2***
H	14416.704	43.2	33	40.0	39.8	10.4	54.0	-43.6

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)
V	2402.784	110.1	33	29.4	106.5	114.0	-7.5
H	***4805.568***	***57.9***	***33***	***34.9***	***59.8***	***74.0***	***-14.2***
H	7208.352	49.3	33	37.9	54.2	74.0	-19.8
H	9611.136	54.5	33	40.4	61.9	74.0	-12.1
H	***12013.920***	***45.1***	***33***	***40.5***	***52.6***	***74.0***	***-21.4***
H	14416.704	43.2	33	40.0	50.2	74.0	-23.8

NOTES:
1. Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters. Radiated 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 radiated 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.
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.

Mode: TX-Channel 46

Table 2

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2440.800	110.4	33	29.4	39.8	67.0	94.0	-27.0
H	***4881.600***	***59.1***	***33***	***34.9***	***39.8***	***21.2***	***54.0***	***-32.8***
H	***7322.400***	***50.2***	***33***	***37.9***	***39.8***	***15.3***	***54.0***	***-38.7***
H	9763.200	57.4	33	40.4	39.8	25.0	54.0	-29.0
H	***12204.000***	***44.6***	***33***	***40.5***	***39.8***	***12.3***	***54.0***	***-41.7***
H	14644.800	45.2	33	38.4	39.8	10.8	54.0	-43.2

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)
V	2440.800	110.4	33	29.4	106.8	114.0	-7.2
H	***4881.600***	***59.1***	***33***	***34.9***	***61.0***	***74.0***	***-13.0***
H	***7322.400***	***50.2***	***33***	***37.9***	***55.1***	***74.0***	***-18.9***
H	9763.200	57.4	33	40.4	64.8	74.0	-9.2
H	***12204.000***	***44.6***	***33***	***40.5***	***52.1***	***74.0***	***-21.9***
H	14644.800	45.2	33	38.4	50.6	74.0	-23.4

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated 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 radiated 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.

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.

Mode: TX-Channel 91

Table 3

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (dB)	Calculated at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2479.680	109.9	33	29.4	39.8	66.5	94.0	-27.5
H	***4959.360***	***58.0***	***33***	***34.9***	***39.8***	***20.1***	***54.0***	***-33.9***
H	***7439.040***	***49.9***	***33***	***37.9***	***39.8***	***15.0***	***54.0***	***-39.0***
H	9918.720	55.1	33	40.4	39.8	22.7	54.0	-31.3
H	***12398.400***	***45.8***	***33***	***40.5***	***39.8***	***13.5***	***54.0***	***-40.5***
H	14878.080	45.2	33	38.4	39.8	10.8	54.0	-43.2

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)
V	2479.680	109.9	33	29.4	106.3	114.0	-7.7
H	***4959.360***	***58.0***	***33***	***34.9***	***59.9***	***74.0***	***-14.1***
H	***7439.040***	***49.9***	***33***	***37.9***	***54.8***	***74.0***	***-19.2***
H	9918.720	55.1	33	40.4	62.5	74.0	-11.5
H	***12398.400***	***45.8***	***33***	***40.5***	***53.3***	***74.0***	***-20.7***
H	14878.080	45.2	33	38.4	50.6	74.0	-23.4

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated 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 radiated 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.

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.

Mode: Talk

Table 4

Radiated Emission Data

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	55.300	38.9	16	11.0	33.9	40.0	-6.1
V	***110.600***	***35.8***	***16***	***14.0***	***33.8***	***43.5***	***-9.7***
H	***165.900***	***33.9***	***16***	***17.0***	***34.9***	***43.5***	***-8.6***
H	221.200	33.6	16	17.0	34.6	46.0	-11.4
H	***276.500***	***28.0***	***16***	***22.0***	***34.0***	***46.0***	***-12.0***
H	***331.800***	***25.5***	***16***	***24.0***	***33.5***	***46.0***	***-12.5***
H	442.400	23.4	16	26.0	33.4	46.0	-12.6

NOTES: 1. Peak detector is used for the emission measurement.

2. All measurements were made at 3 meters. Radiated 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 radiated 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. 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.

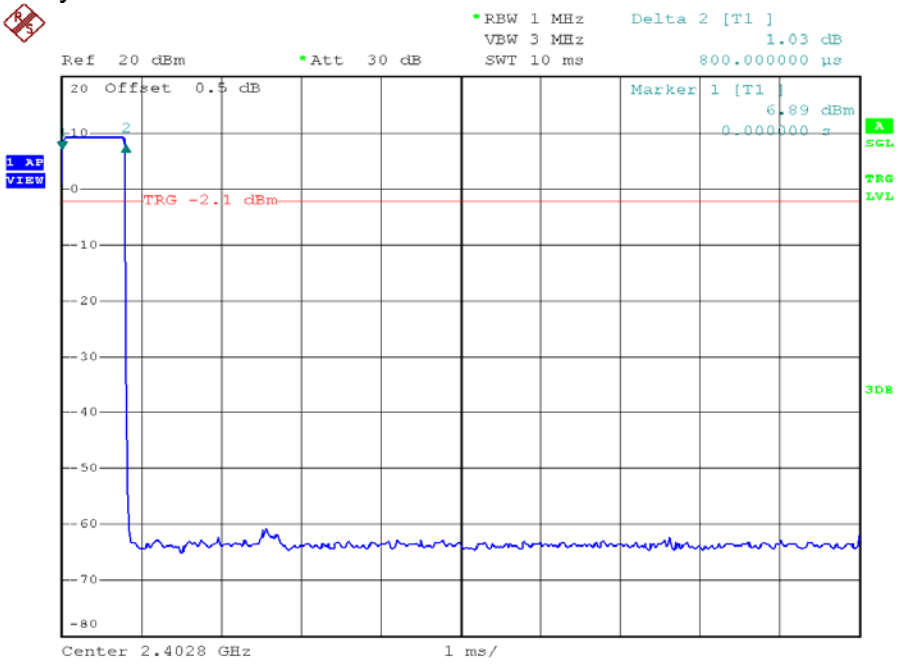
4.2.3 Transmitter Duty Cycle Calculation

For 1 parent unit operation with dummy

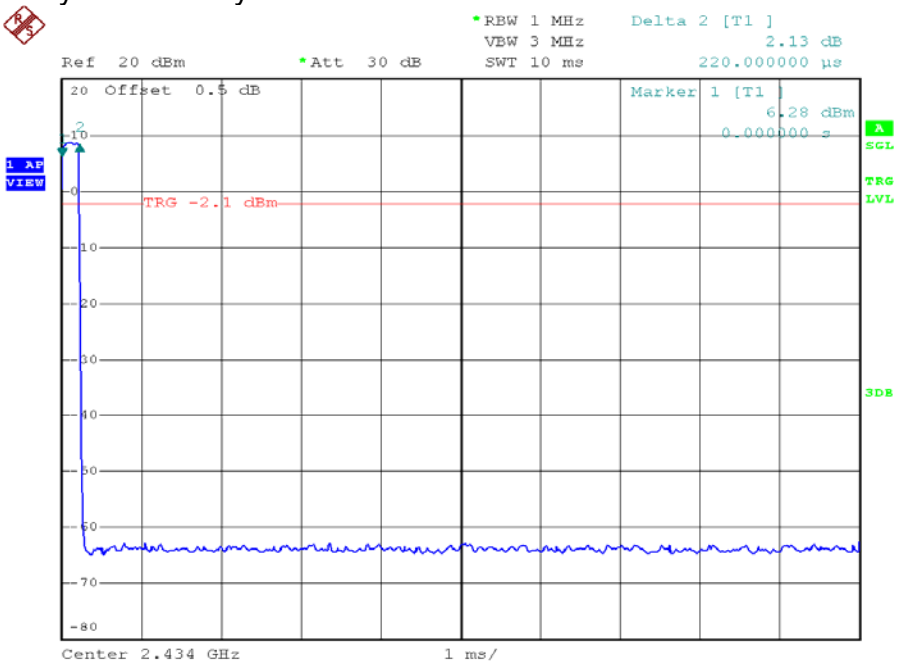
Duty Cycle (DC) = Maximum On time in 100ms/100ms
= (0.800 + 0.220)ms/100ms
= 0.0102

Average Factor (AF) in dB = 20 $\log_{10}$ (0.0102)
= -39.8dB

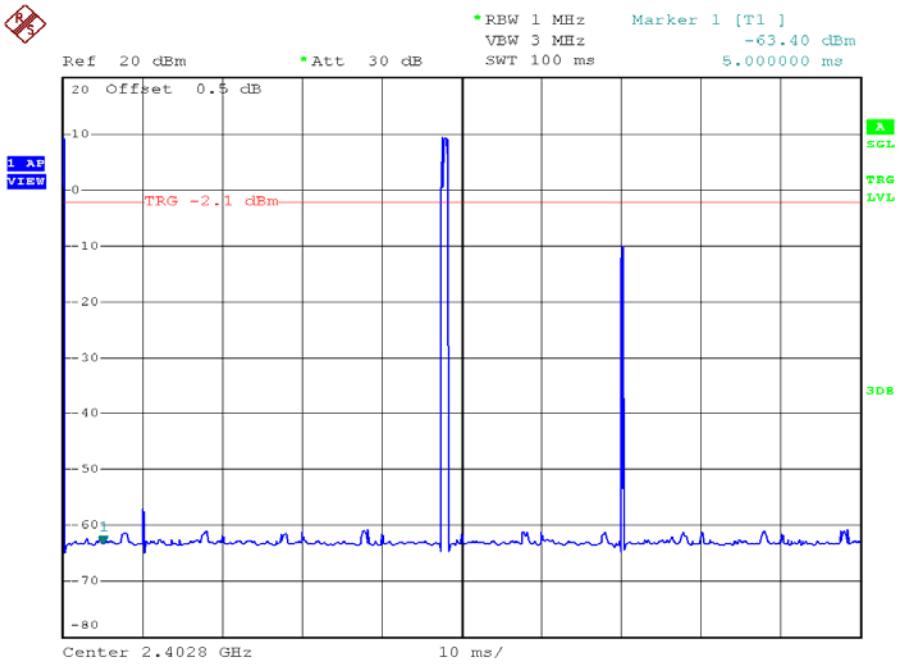
Plot of transmitter ON time
Baby unit Traffic



Baby unit Dummy



Baby Unit Dummy + Traffic in 100ms



4.3 Radiated Emission on the Bandedge

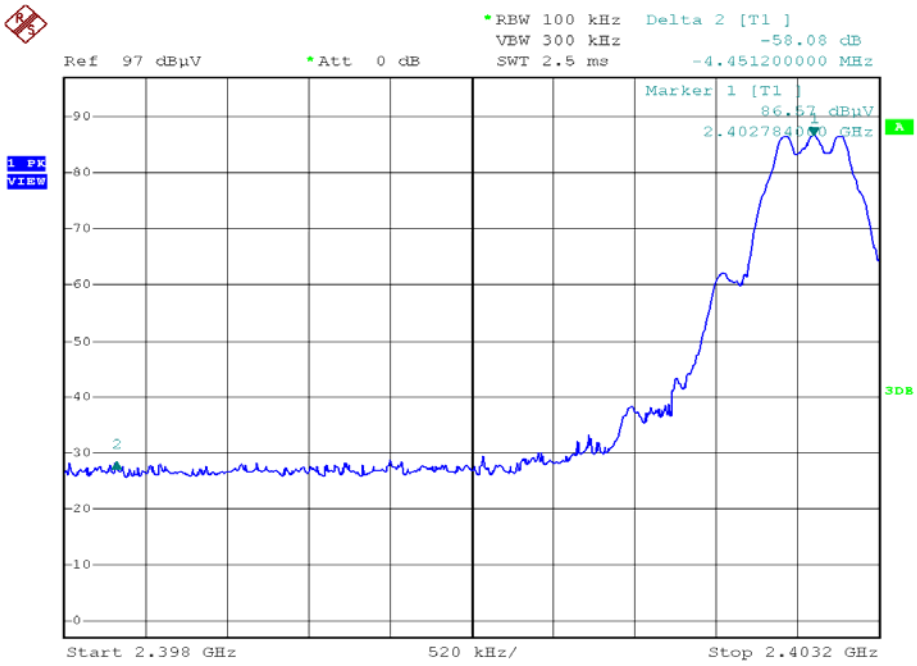
From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz and 2483.5MHz). In case of emissions up to two standard bandwidths away from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is 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 50 dB below the level of the fundamental or to the general radiated emission limits in FCC Part 15 Section 15.209, whichever is the lesser attenuation, which meet the requirement of FCC Part 15 Section 15.249(d) / RSS-210 A2.9(b).

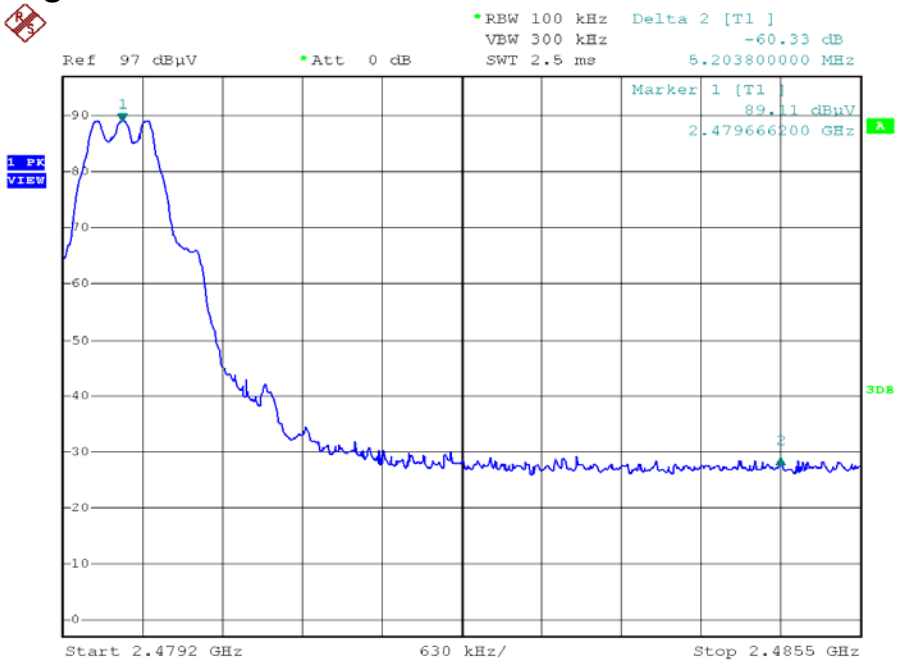
The plots of radiated emission on the bandedge are saved as below.

Plots of radiated emission on the bandedge

Lowest channel



Highest channel



4.4 AC Power Line Conducted Emission

[ ] Not applicable – EUT is only powered by battery for operation.

[×] EUT connects to AC power line. Emission Data is listed in following pages.

[ ] Baby Unit connects to AC power line and has transmission. Parent Unit connects to AC power line but has no transmission. Emission Data of Baby Unit is listed in following pages.

4.4.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration

The worst case line conducted configuration photographs are saved with filename: config photos.pdf

4.4.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance

Passed by more than 20 dB margin

Worst Case: Talk

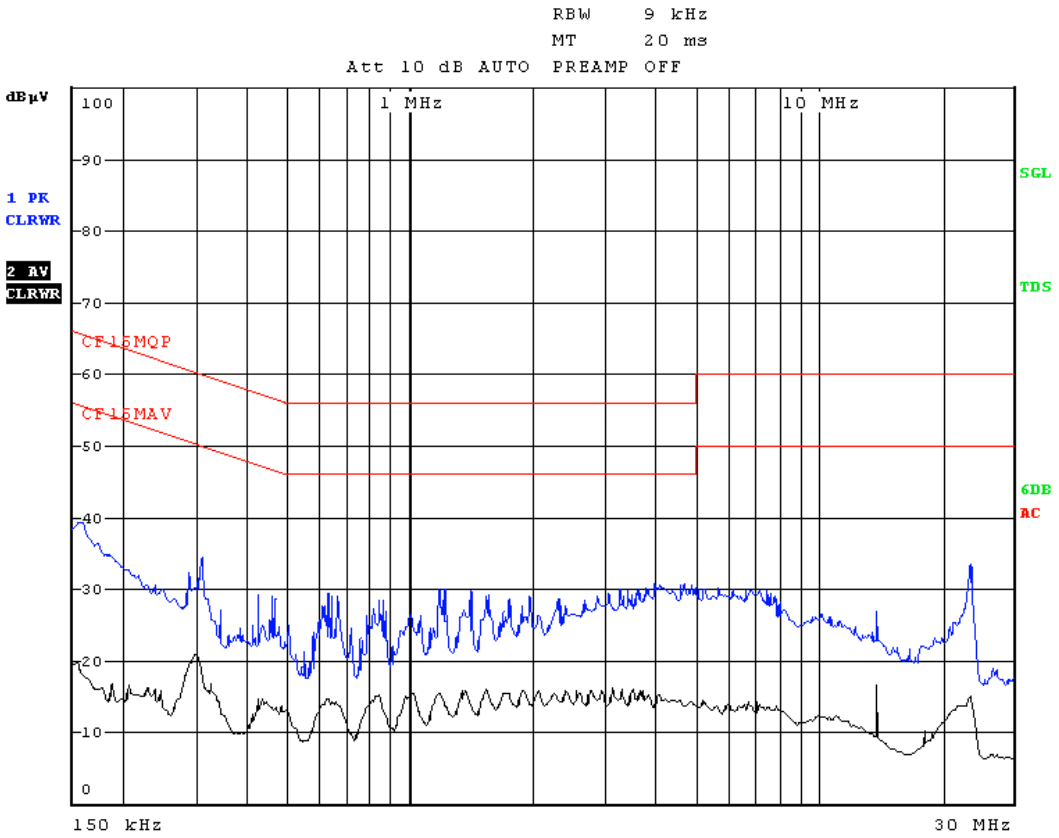


EXHIBIT 5
EQUIPMENT LIST

5.0 **Equipment List**

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Log Periodic Antenna	Biconical Antenna
Registration No.	EW-2251	EW-0446	EW-2512
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI	3146	3104C
Calibration Date	Nov. 20, 2013	Apr. 30, 2013	Jun. 25, 2013
Calibration Due Date	Nov. 20, 2014	Oct. 30, 2014	Dec. 25, 2014

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna	Spectrum Analyzer
Registration No.	EW-2253	EW-1015	EW-2188
Manufacturer	R&S	EMCO	AGILENTTECH
Model No.	FSP40	3115	E4407B
Calibration Date	May. 8, 2014	Mar. 05, 2013	Apr. 16, 2014
Calibration Due Date	May. 8, 2015	Sep. 05, 2014	Apr. 16, 2015

Equipment	Broad-Band Horn Antenna
Registration No.	EW-1679
Manufacturer	SCHWARZBECK
Model No.	BBHA9170
Calibration Date	Jun. 5, 2014
Calibration Due Date	Jun. 5, 2015

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2500	EW-2501
Manufacturer	ROHDESCHWARZ	R&S
Model No.	ESCI	ENV-216
Calibration Date	Mar. 22, 2013	Dec. 25, 2013
Calibration Due Date	Aug. 28, 2014	Nov. 30, 2014

END OF TEST REPORT