Batteroo

ADDENDUM EMC TEST REPORT TO 97607-2

Batteriser
Model: AA

Tested To The Following Standards:

FCC Part 15 Subpart B Section 15.109

Report No.: 97607-2A

Date of issue: September 16, 2015

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of EMC testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Batteroo
310 De Duigne Drive
Sunnyvale, CA 94085

REPORT PREPARED BY:

Joyce Walker
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 97607

DATE OF EQUIPMENT RECEIPT: September 3, 2015
DATE(S) OF TESTING: September 3, 2015

Revision History

Original: Testing of the Batteriser, Model: AA to FCC Part 15 Subpart B Section 15.109.
Addendum A: To remove the company representative's name from the test report administrative page.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the sample equipment tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
1120 Fulton Place
Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.02.00
EMITest Immunity	5.02.00

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart B

Test Procedure	Description	Modifications	Results
15.109 Class B	Radiated Emissions	NA	Pass

NA = Not Applicable

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Batteriser	Batteroo	AA	1

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

FCC PART 15 SUBPART B

15.109 Radiated Emissions

Test Notes: Radiated disturbances emanating from enclosure.

Test Data

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249 - 1170		
Customer:	**Batteroo**		
Specification:	**15.109 Radiated Emissions Class B**		
Work Order #:	**97607**	Date:	9/3/2015
Test Type:	**Radiated Scan**	Time:	2:44:38 PM
Tested By:	C. Nicklas	Sequence#:	2
Software:	EMITest 5.02.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

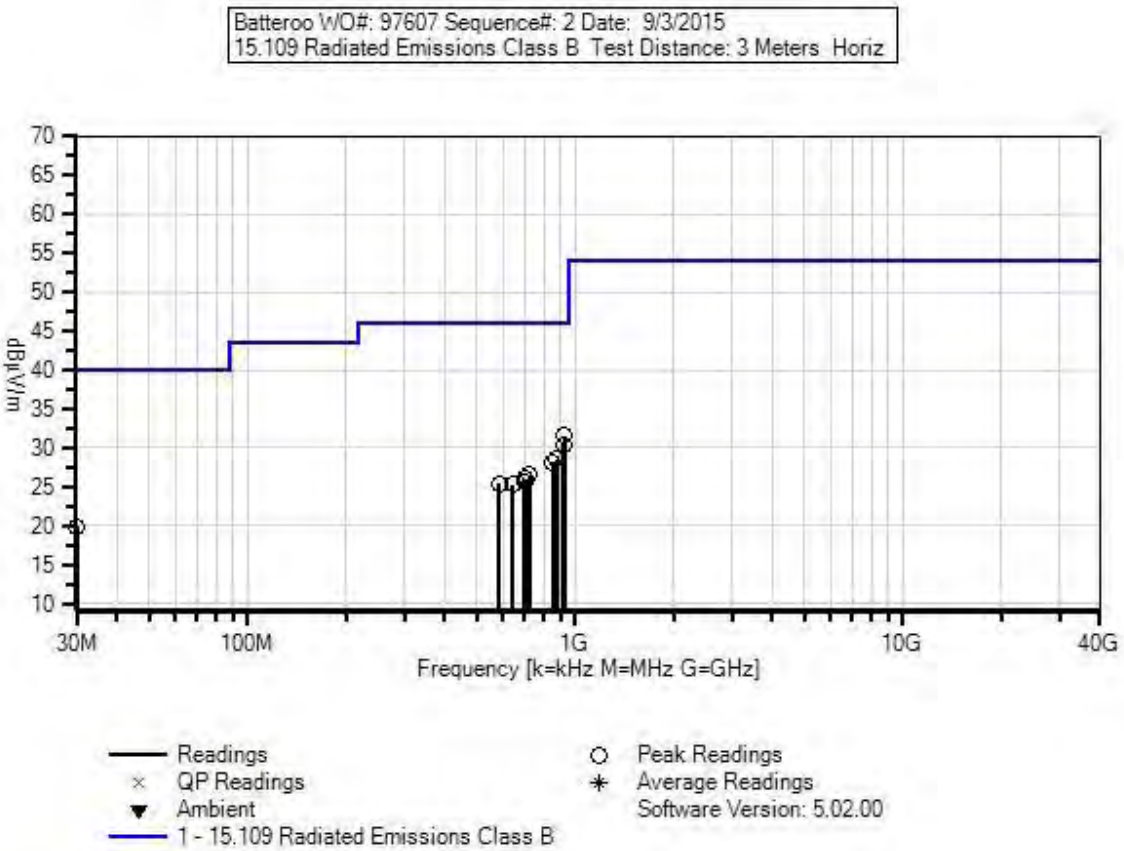
Frequency Range: 30MHz - 1GHz

Test Procedure Used: ANSI C63.4 (2014)

Temperature: 22.2°C
Relative Humidity: 47%
Atmospheric Pressure: 101.0kPa

Highest Intentionally Generated Frequency is 1.5MHz

The EUT is installed on an AA battery in a generic switchable 4-battery holder.
There is a 1 kOhm Resister in series with the positive lead to load down the battery.
The EUT is lying flat at the center of the test table.


Batteroo WO#: 97607 Sequence#: 2 Date: 9/3/2015
15.109 Radiated Emissions Class B Test Distance: 3 Meters Horiz
dBµV/m
70
65
60
55
50
45
40
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25
20
15
10
30M
100M
1G
10G
40G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.109 Radiated Emissions Class B
Peak Readings
Average Readings
Software Version: 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T1	AN00567	Preamp	8447D	1/2/2015	1/2/2017
T2	ANP01183	Cable	CNT-195	9/3/2013	9/3/2015
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T5	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	924.103M	30.1	-27.9 +23.6	+1.1	+1.4	+3.2	+0.0	31.5	46.0	-14.5	Horiz
2	921.768M	29.1	-27.9 +23.5	+1.1	+1.4	+3.2	+0.0	30.4	46.0	-15.6	Horiz
3	875.062M	28.1	-28.0 +22.9	+1.0	+1.4	+3.1	+0.0	28.5	46.0	-17.5	Horiz
4	854.629M	28.2	-28.0 +22.6	+1.0	+1.3	+3.1	+0.0	28.2	46.0	-17.8	Horiz
5	721.517M	28.5	-28.0 +20.8	+1.1	+1.2	+2.9	+0.0	26.5	46.0	-19.5	Horiz
6	705.754M	28.3	-28.0 +20.6	+1.0	+1.2	+2.9	+0.0	26.0	46.0	-20.0	Horiz
7	30.168M	28.2	-27.9 +18.8	+0.2	+0.2	+0.4	+0.0	19.9	40.0	-20.1	Horiz
8	698.165M	28.1	-28.0 +20.5	+1.0	+1.2	+2.8	+0.0	25.6	46.0	-20.4	Horiz
9	584.320M	29.5	-28.0 +19.4	+1.0	+1.1	+2.4	+0.0	25.4	46.0	-20.6	Horiz
10	643.869M	28.5	-28.0 +20.0	+1.1	+1.1	+2.6	+0.0	25.3	46.0	-20.7	Horiz

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249 - 1170		
Customer:	**Batteroo**		
Specification:	**15.109 Radiated Emissions Class B**		
Work Order #:	**97607**	Date:	9/3/2015
Test Type:	**Radiated Scan**	Time:	2:35:52 PM
Tested By:	C. Nicklas	Sequence#:	1
Software:	EMITest 5.02.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

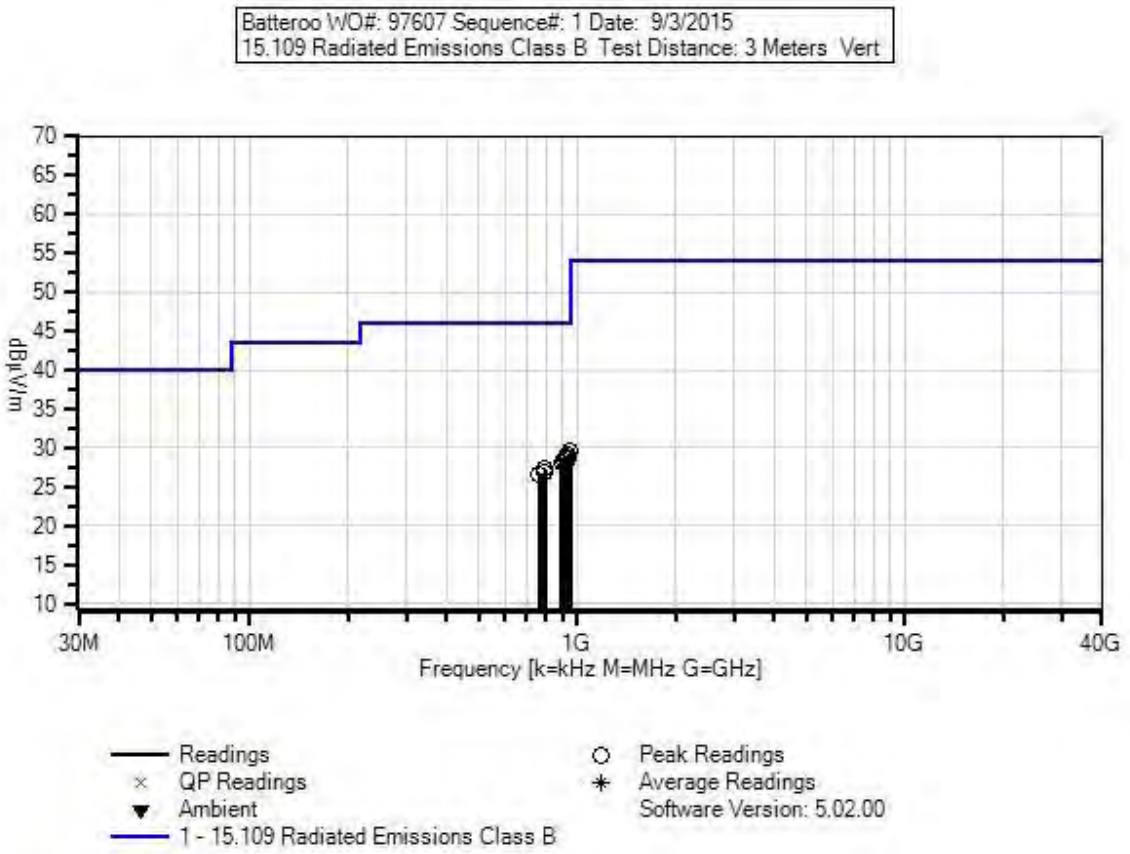
Frequency Range: 30MHz - 1GHz

Test Procedure Used: ANSI C63.4 (2014)

Temperature: 22.2°C
Relative Humidity: 47%
Atmospheric Pressure: 101.0kPa

Highest Intentionally Generated Frequency is 1.5MHz

The EUT is installed on an AA battery in a generic switchable 4-battery holder.
There is a 1 kOhm Resister in series with the positive lead to load down the battery.
The EUT is lying flat at the center of the test table.


Batteroo WO#: 97607 Sequence#: 1 Date: 9/3/2015
15.109 Radiated Emissions Class B Test Distance: 3 Meters Vert
70
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dBµV/m
30M
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Frequency [k=kHz M=MHz G=GHz]
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Peak Readings
Average Readings
Software Version: 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T1	AN00567	Preamp	8447D	1/2/2015	1/2/2017
T2	ANP01183	Cable	CNT-195	9/3/2013	9/3/2015
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T5	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	953.294M	27.5	-27.9 +24.0	+1.2	+1.4	+3.3	+0.0	29.5	46.0	-16.5	Vert
2	931.109M	27.5	-27.9 +23.7	+1.1	+1.4	+3.2	+0.0	29.0	46.0	-17.0	Vert
3	922.936M	27.6	-27.9 +23.5	+1.1	+1.4	+3.2	+0.0	28.9	46.0	-17.1	Vert
4	925.271M	27.3	-27.9 +23.6	+1.1	+1.4	+3.2	+0.0	28.7	46.0	-17.3	Vert
5	935.196M	27.2	-27.9 +23.7	+1.1	+1.4	+3.2	+0.0	28.7	46.0	-17.3	Vert
6	904.837M	27.5	-28.0 +23.3	+1.0	+1.4	+3.2	+0.0	28.4	46.0	-17.6	Vert
7	897.248M	27.3	-28.0 +23.2	+1.0	+1.4	+3.1	+0.0	28.0	46.0	-18.0	Vert
8	795.079M	28.0	-28.0 +21.8	+1.2	+1.3	+2.9	+0.0	27.2	46.0	-18.8	Vert
9	793.327M	27.5	-28.0 +21.8	+1.2	+1.3	+2.9	+0.0	26.7	46.0	-19.3	Vert
10	766.472M	27.7	-28.0 +21.5	+1.2	+1.3	+2.9	+0.0	26.6	46.0	-19.4	Vert

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249 - 1170		
Customer:	**Batteroo**		
Specification:	**15.109 Radiated Emissions Class B**		
Work Order #:	**97607**	Date:	9/3/2015
Test Type:	**Radiated Scan**	Time:	2:55:34 PM
Tested By:	C. Nicklas	Sequence#:	3
Software:	EMITest 5.02.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

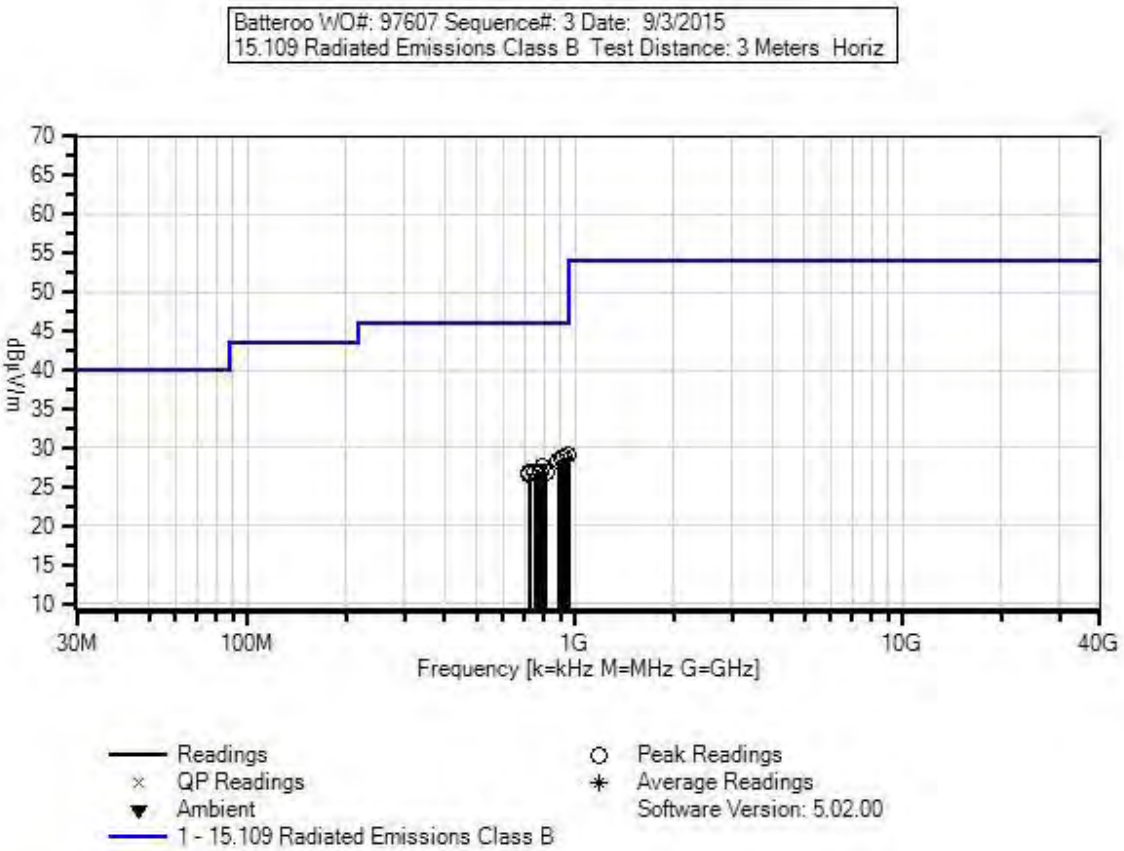
Frequency Range: 30MHz - 1GHz

Test Procedure Used: ANSI C63.4 (2014)

Temperature: 22.2°C
Relative Humidity: 47%
Atmospheric Pressure: 101.0kPa

Highest Intentionally Generated Frequency is 1.5MHz

The EUT is installed on an AA battery in a generic switchable 4-battery holder.
There is a 1 kOhm Resister in series with the positive lead to load down the battery.
The EUT is sitting upright at the center of the test table.


Batteroo WO#: 97607 Sequence#: 3 Date: 9/3/2015
15.109 Radiated Emissions Class B Test Distance: 3 Meters Horiz
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Average Readings
Software Version: 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
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T2	ANP01183	Cable	CNT-195	9/3/2013	9/3/2015
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T5	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	950.375M	27.1	-27.9 +23.9	+1.2	+1.4	+3.3	+0.0	29.0	46.0	-17.0	Horiz
2	923.519M	27.5	-27.9 +23.5	+1.1	+1.4	+3.2	+0.0	28.8	46.0	-17.2	Horiz
3	908.924M	27.5	-28.0 +23.3	+1.1	+1.4	+3.2	+0.0	28.5	46.0	-17.5	Horiz
4	887.323M	27.8	-28.0 +23.0	+1.0	+1.4	+3.1	+0.0	28.3	46.0	-17.7	Horiz
5	796.247M	28.2	-28.0 +21.9	+1.2	+1.3	+2.9	+0.0	27.5	46.0	-18.5	Horiz
6	780.483M	27.9	-28.0 +21.6	+1.2	+1.3	+2.9	+0.0	26.9	46.0	-19.1	Horiz
7	814.929M	27.4	-28.0 +22.1	+1.1	+1.3	+3.0	+0.0	26.9	46.0	-19.1	Horiz
8	754.795M	28.2	-28.0 +21.3	+1.2	+1.3	+2.8	+0.0	26.8	46.0	-19.2	Horiz
9	725.604M	28.6	-28.0 +20.9	+1.1	+1.2	+2.9	+0.0	26.7	46.0	-19.3	Horiz
10	724.437M	28.5	-28.0 +20.9	+1.1	+1.2	+2.9	+0.0	26.6	46.0	-19.4	Horiz

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249 - 1170		
Customer:	**Batteroo**		
Specification:	**15.109 Radiated Emissions Class B**		
Work Order #:	**97607**	Date:	9/3/2015
Test Type:	**Radiated Scan**	Time:	3:17:54 PM
Tested By:	C. Nicklas	Sequence#:	4
Software:	EMITest 5.02.00		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Frequency Range: 30MHz - 1GHz

Temperature: 22.2°C
Relative Humidity: 47%
Atmospheric Pressure: 101.0kPa

Highest Intentionally Generated Frequency is 1.5MHz

The EUT is installed on an AA battery in a generic switchable 4-battery holder.
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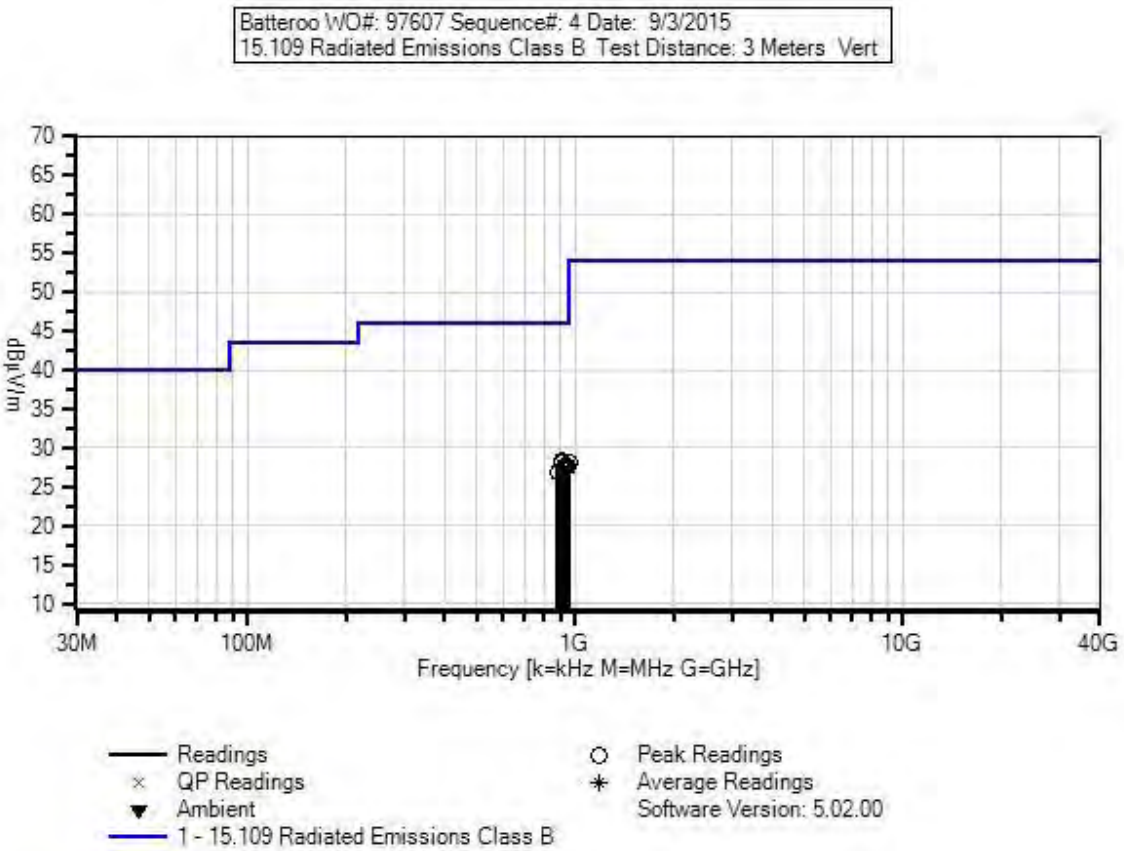
The EUT is sitting upright at the center of the test table.


Batteroo WO#: 97607 Sequence#: 4 Date: 9/3/2015
15.109 Radiated Emissions Class B Test Distance: 3 Meters Vert
70
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dBµV/m
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Peak Readings
Average Readings
Software Version: 5.02.00

Test Equipment:

ID	Asset #/Serial #	Description	Model	Calibration Date	Cal Due Date
	AN03471	RF Characteristics Analyzer	E4440A	12/19/2013	12/19/2015
T1	AN00567	Preamp	8447D	1/2/2015	1/2/2017
T2	ANP01183	Cable	CNT-195	9/3/2013	9/3/2015
T3	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
T4	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
T5	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

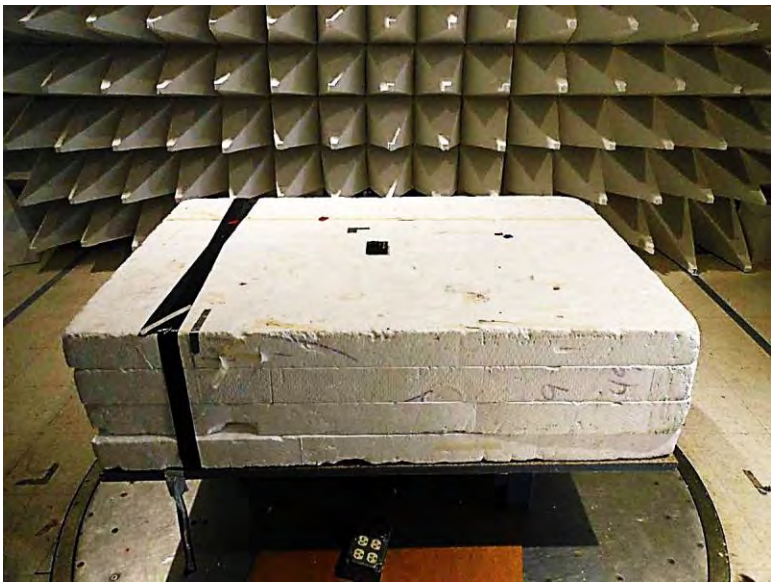
#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	913.011M	27.3	-28.0 +23.4	+1.1	+1.4	+3.2	+0.0	28.4	46.0	-17.6	Vert
2	959.716M	26.2	-28.0 +24.1	+1.2	+1.4	+3.3	+0.0	28.2	46.0	-17.8	Vert
3	907.172M	27.0	-28.0 +23.3	+1.1	+1.4	+3.2	+0.0	28.0	46.0	-18.0	Vert
4	934.028M	26.2	-27.9 +23.7	+1.1	+1.4	+3.2	+0.0	27.7	46.0	-18.3	Vert
5	949.208M	25.8	-27.9 +23.9	+1.2	+1.4	+3.3	+0.0	27.7	46.0	-18.3	Vert
6	944.537M	25.8	-27.9 +23.8	+1.2	+1.4	+3.3	+0.0	27.6	46.0	-18.4	Vert
7	923.519M	26.2	-27.9 +23.5	+1.1	+1.4	+3.2	+0.0	27.5	46.0	-18.5	Vert
8	920.017M	26.0	-27.9 +23.5	+1.1	+1.4	+3.2	+0.0	27.3	46.0	-18.7	Vert
9	925.271M	25.7	-27.9 +23.6	+1.1	+1.4	+3.2	+0.0	27.1	46.0	-18.9	Vert
10	882.068M	26.3	-28.0 +23.0	+1.0	+1.4	+3.1	+0.0	26.8	46.0	-19.2	Vert

Test Setup Photos

EUT

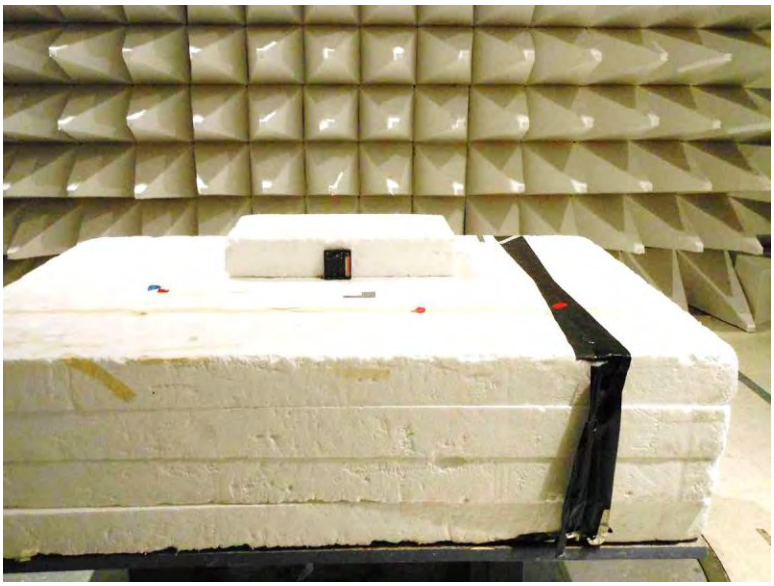
EUT Installed over Battery

EUT Installed

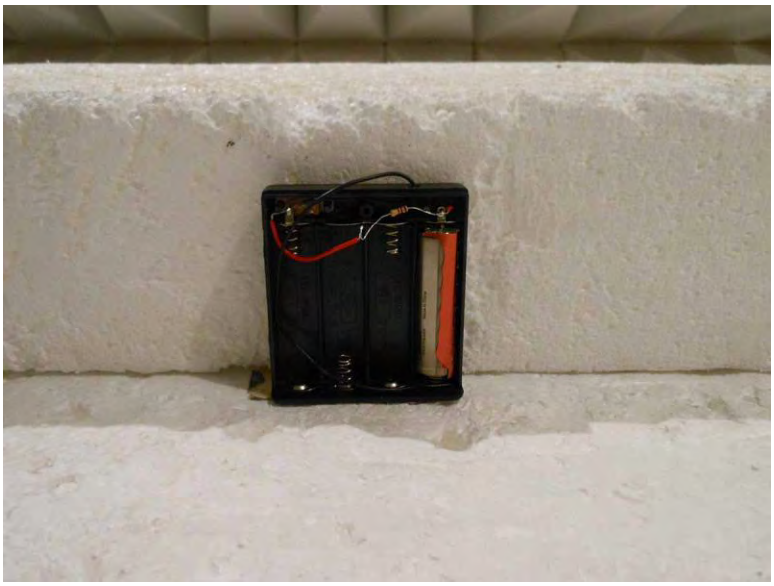


Flat Orientation

Flat Orientation



Upright Orientation



Upright Orientation

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or carrot ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.