EMC Test Report

Project Number: 4076029

Report Number: 4076029EMC07 **Revision Level:** 1

Client: Social Bicycles Inc.

Equipment Under Test: Smart Bike Share System

Model: SB3

FCC ID: 2ADEK22017SB3

IC ID: 12433A-22017SB3

Applicable Standards: FCC Part 15 Subpart C, § 15.209
RSS-210, Issue 9, December 2016
ANSI C63.10: 2013
RSS-GEN, Issue 4, November 2014

Report issued on: 07 March 2017

Test Result: Compliant

Tested by: _____
Jeremy O. Pickens, Senior EMC Engineer

Reviewed by: _____
David Schramm, EMC/RF/SAR/HAC Manager

Remarks:
This report details the results of the testing carried out on one sample, the results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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1 Summary of Test Results

Basic Standards	Test Result
Emissions Testing	
FCC Part 15, Subpart C, 15.209 / RSS-Gen S7.2.5 - Radiated Emissions	Compliant
FCC Part 15, Subpart C, 15.207 / RSS-Gen S7.2.4 - Conducted Emissions	NA (1)

(1) Not Applicable – The device is powered from internal battery.

1.1 *Modifications Required to Compliance*

None

2 General Information

2.1 *Client Information*

Name:	Social Bicycles Inc.
Address:	55 Prospect Street, Ste 304
City, State, Zip, Country:	Brooklyn, NY 11201, USA

2.2 *Test Laboratory*

Name:	SGS North America, Inc.
Address:	620 Old Peachtree Road NW, Suite 100
City, State, Zip, Country:	Suwanee, GA 30024, USA

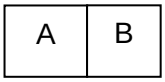
2.3 *General Information of EUT*

Type of Product:	Smart Bike Share System
Model:	SB3
Frequency Range:	13.56 MHz
Data Modes:	Near Field Communication
Antenna:	Integral / PCB
Rated Voltage:	3.7 Vdc Li-Ion Battery
Sample Received Date:	05 December 2016
Dates of testing:	11, 18 & 19 January 2017

2.4 *Operating Modes and Conditions*

The unit was set to NFC continuous Tx On mode using menu option 7.

2.1 *EUT Connection Block Diagram*



2.2 *System Configurations*

Device reference	Manufacturer	Description	Model Number	Serial Number
A	Social Bicycles	Smart Bike Share System	SB3	SC2-02B6E-EBMW-0716-P09
B	Social Bicycles	Lithium-Ion Battery Pack	SC2-BAT-15A64V2	020161020037

3 Occupied Bandwidth

3.1 *Test Result*

Test Description	Basic Standards	Test Result
99% Bandwidth	RSS-GEN 4.6.1	Reported

3.2 *Test Method*

The 99% occupied bandwidth measurement function of the spectrum analyzer was employed.

3.3 *Test Site*

SGS EMC Laboratory, Suwanee, GA

Environmental Conditions

Temperature:	25.1 °C
Relative Humidity:	38.1 %
Atmospheric Pressure:	98.0 kPa

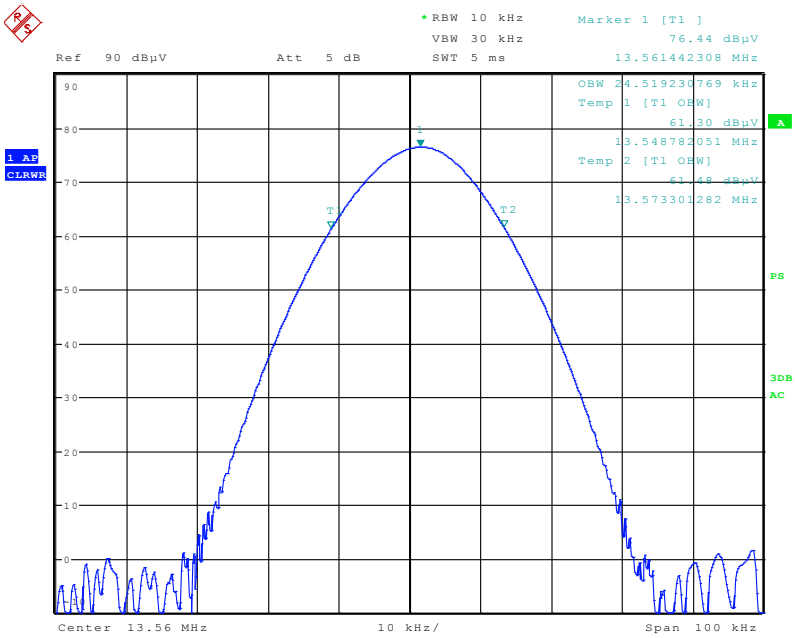
3.4 *Test Equipment*

Test Date: 18-Jan-2017 Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	21-Jul-2017

Note: The equipment calibration period is 1 year.

3.5 *Test Data*



Date: 18.JAN.2017 17:53:39

Occupied Bandwidth = 24.52kHz

4 Radiated Emissions

4.1 *Test Result*

Test Description	Basic Standards	Test Result
Radiated Emissions	FCC Part 15, Subpart C ANSI C63.4:2014	Compliant

4.2 *Test Method*

Exploratory scans were performed over the frequency range as indicated in the tables below using the max hold function and incorporating a Peak detector and using TILE! software. The final test data was measured using a Quasi-Peak detector below 1GHz and a Peak and Average detector above 1GHz. The receivers resolution bandwidth was set to 1kHz for measurements taken below 150kHz, 9kHz for in the 150kHz to 30MHz range, 120 kHz in the 30MHz to 1GHz frequency range, and 1MHz for measurements of 1GHz and higher. For testing below 30MHz, a loop antenna was employed, and peak scans were taken with the loop open towards the EUT (Co-Axial) and with the loop in-line with the EUT (Co-Planar). Above 30MHz, a biconilog antenna was used and measurements were made with the antenna positioned in both the horizontal and vertical planes of polarization. The antenna height was varied from 1 m to 4 m and the EUT was rotated 360° to find the maximum emitting point for each frequency. The radiated measurements were recorded and compared to the limits indicated in the table below.

Radiated emissions limits

Frequency Range (MHz)	Limits (µV/m) Quasi-Peak or Average	Measurement Distance (m)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note: Limits were converted to dBµV/m using the equation 20*LOG(x). Additionally, for measurements below 30MHz, the limits were adjusted to a distance of 3m using a 40dB/decade correction per §15.31(f)(2)

Example: at 20MHz, the limit is expressed as 30µV/m at 30m
20*log(30) = 29.5dBµV/m
30 to 3 meters is a single decade, so 29.5 + 40 = 69.5dBµV/m

4.3 *Test Site*

10m Absorber Lined Shielded Enclosure (ALSE), Suwanee, GA

Environmental Conditions for 9kHz-30MHz Testing

Temperature:	25.3 °C
Relative Humidity:	35.7 %
Atmospheric Pressure:	97.9 kPa

Environmental Conditions for 30-1000MHz Testing

Temperature:	24.4 °C
Relative Humidity:	14.0 %
Atmospheric Pressure:	99.9 kPa

4.4 *Test Equipment*

For 9kHz-30MHz Testing:

Test Date: 19-Jan-2017 Tester: MT

Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, LOOP, ACTIVE	6502	EMCO	B085752	9-Aug-2017
RF CABLE	SF106	HUBER & SUHNER	B085892	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079713	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079661	29-Jul-2017
EMI TEST RECEIVER	ESU40	ROHDE & SCHWARZ	B079629	20-Jun-2017

For 30-1000MHz Testing:

Test Date: 11-Jan-2017 Tester: MT

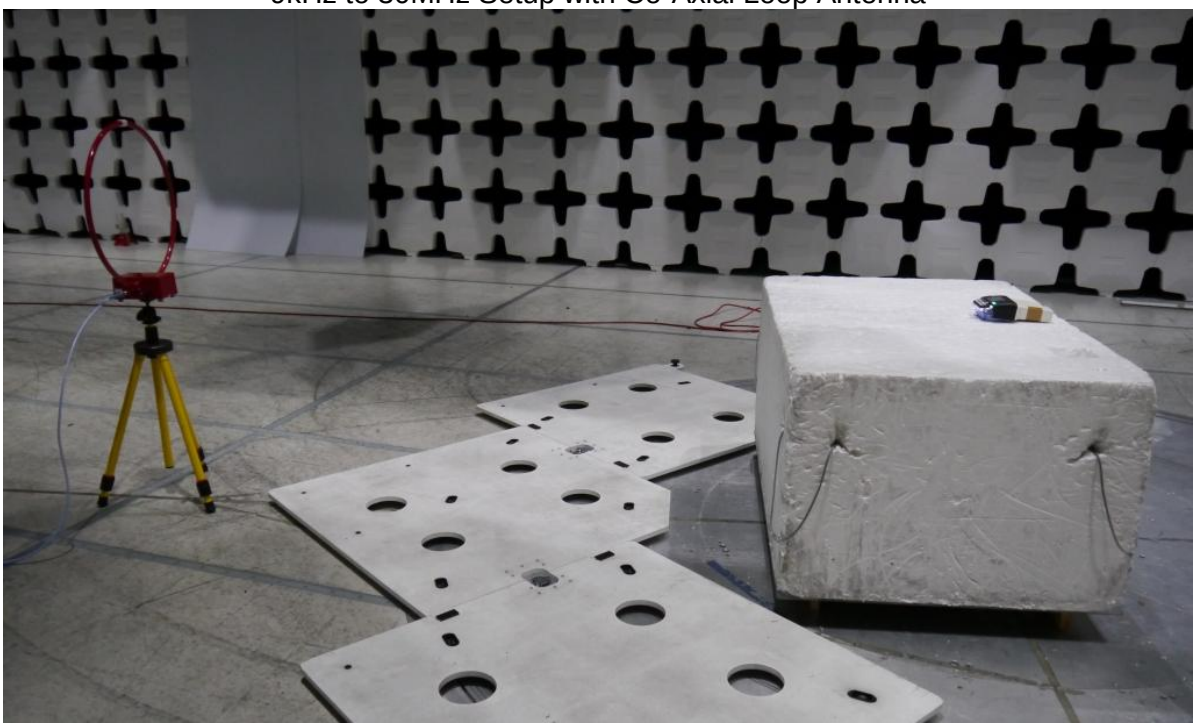
Equipment	Model	Manufacturer	Asset Number	Cal Due Date
ANTENNA, BILOG	JB6	SUNOL	B079690	10-Nov-2017
RF CABLE	SF106	HUBER & SUHNER	B079716	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B079713	27-Jul-2017
RF CABLE	SF106	HUBER & SUHNER	B085892	27-Jul-2017
RF CABLE	104PE	HUBER & SUHNER	B079793	27-Jul-2017
LOW NOISE AMPLIFIER	TS-PR18	ROHDE & SCHWARZ	B094463	16-Feb-2017
EMI TEST RECEIVER	ESU8	ROHDE & SCHWARZ	B085759	21-Jul-2017

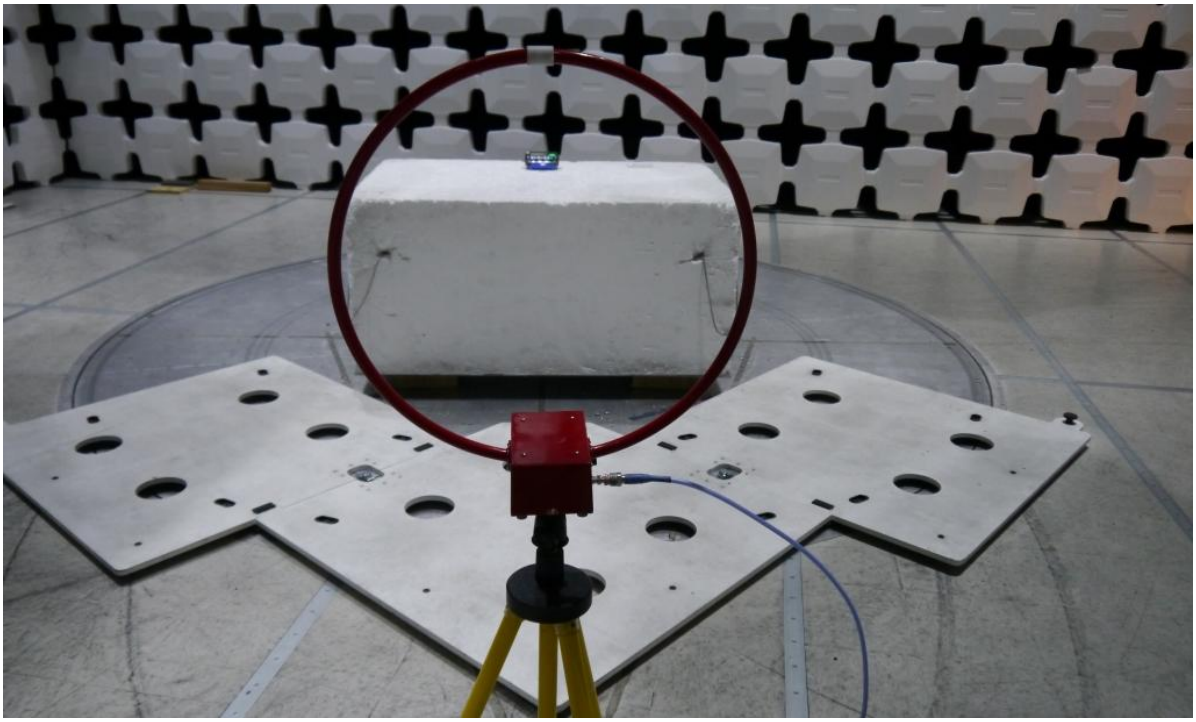
Note: The equipment calibration period is 1 year.

Software:
“Radiated Emissions” TILE! profile dated Dec 2015

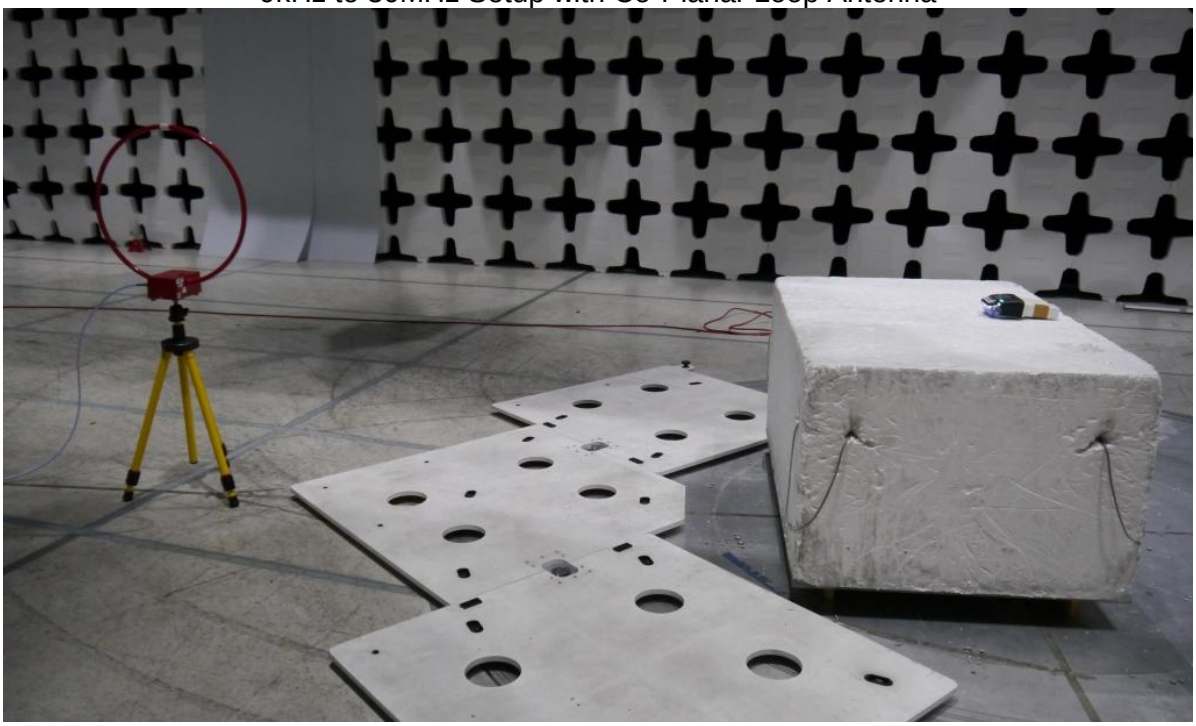
4.5 *Test Setup Photographs*

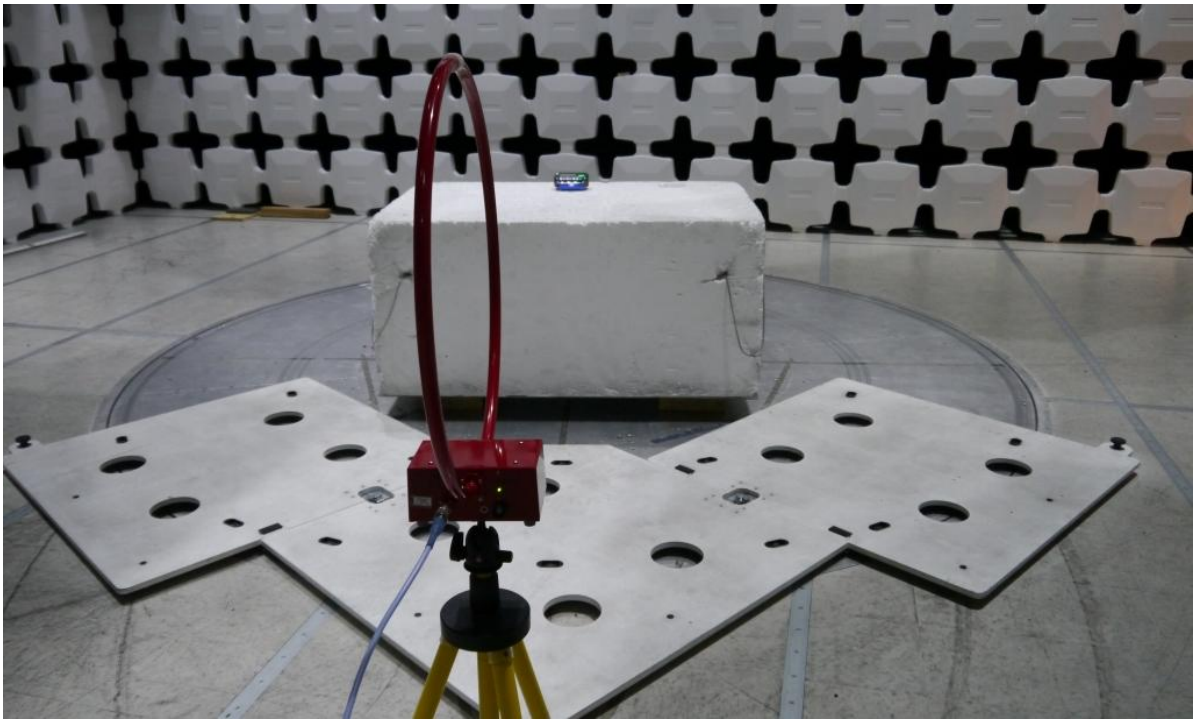
9kHz to 30MHz Setup with Co-Axial Loop Antenna



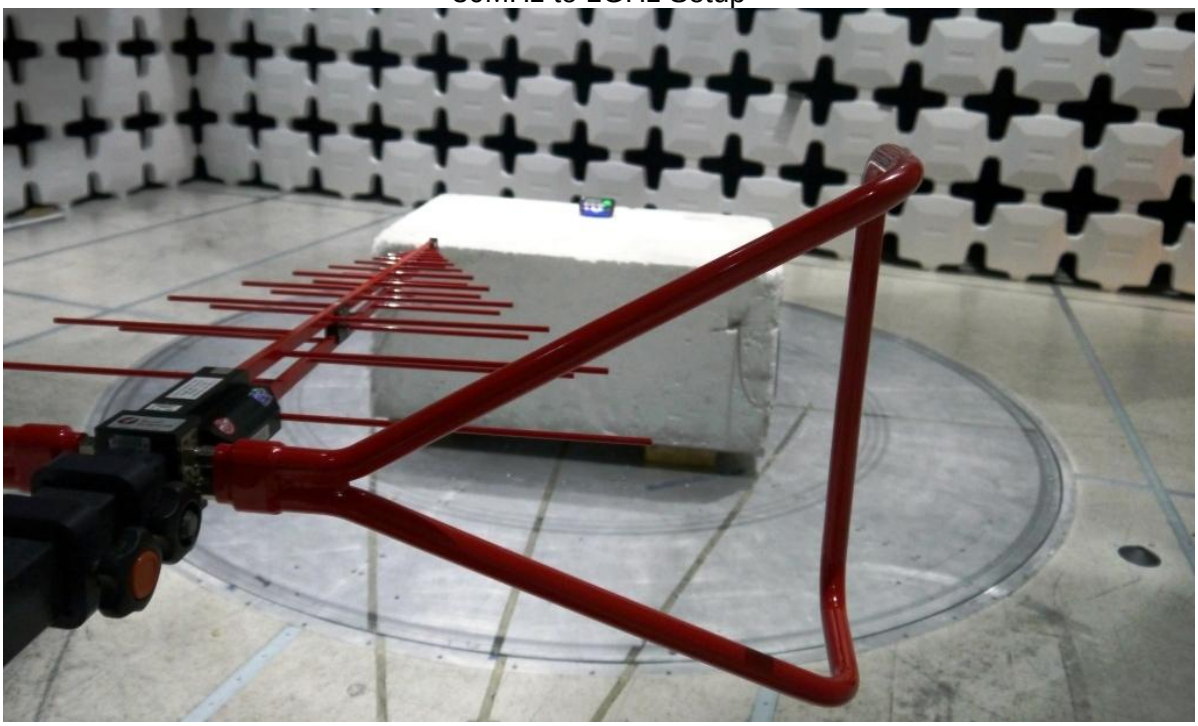


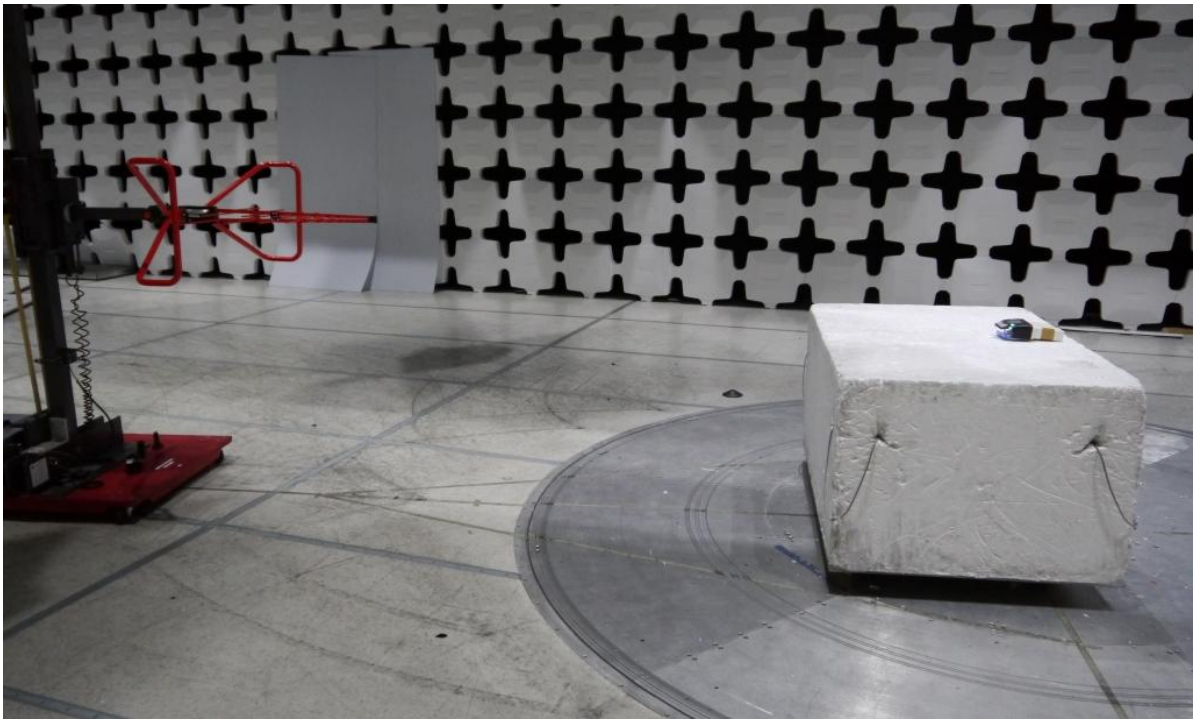
9kHz to 30MHz Setup with Co-Planar Loop Antenna

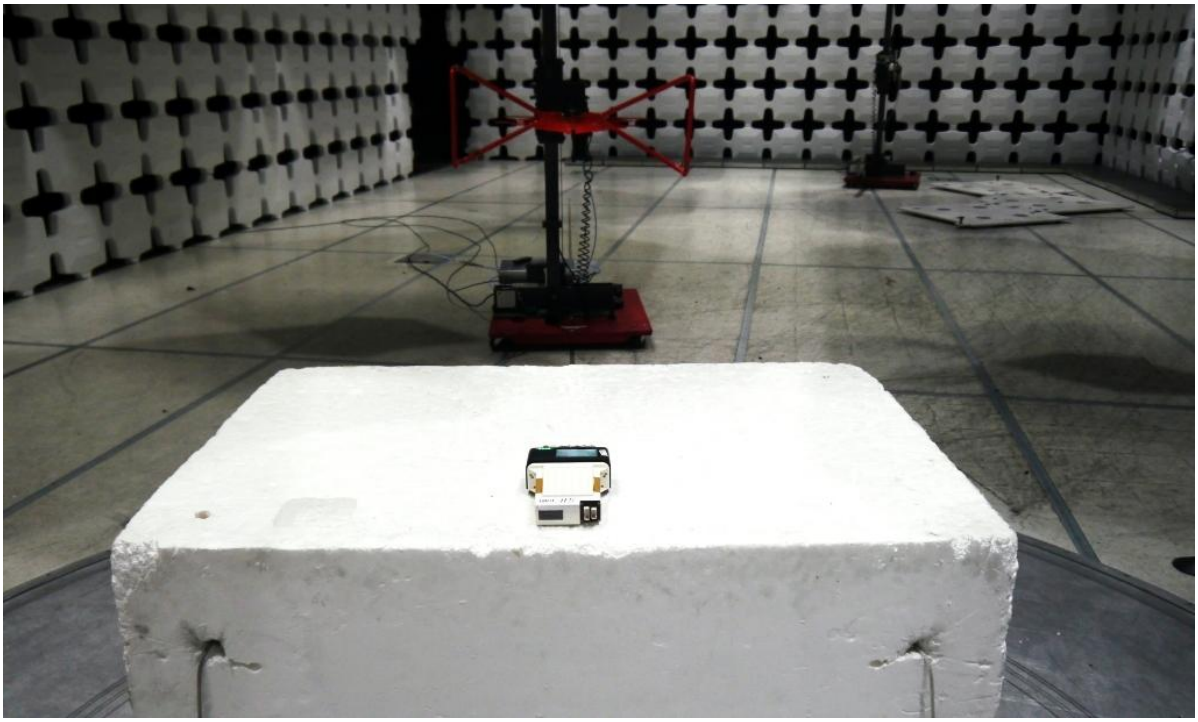




30MHz to 1GHz Setup

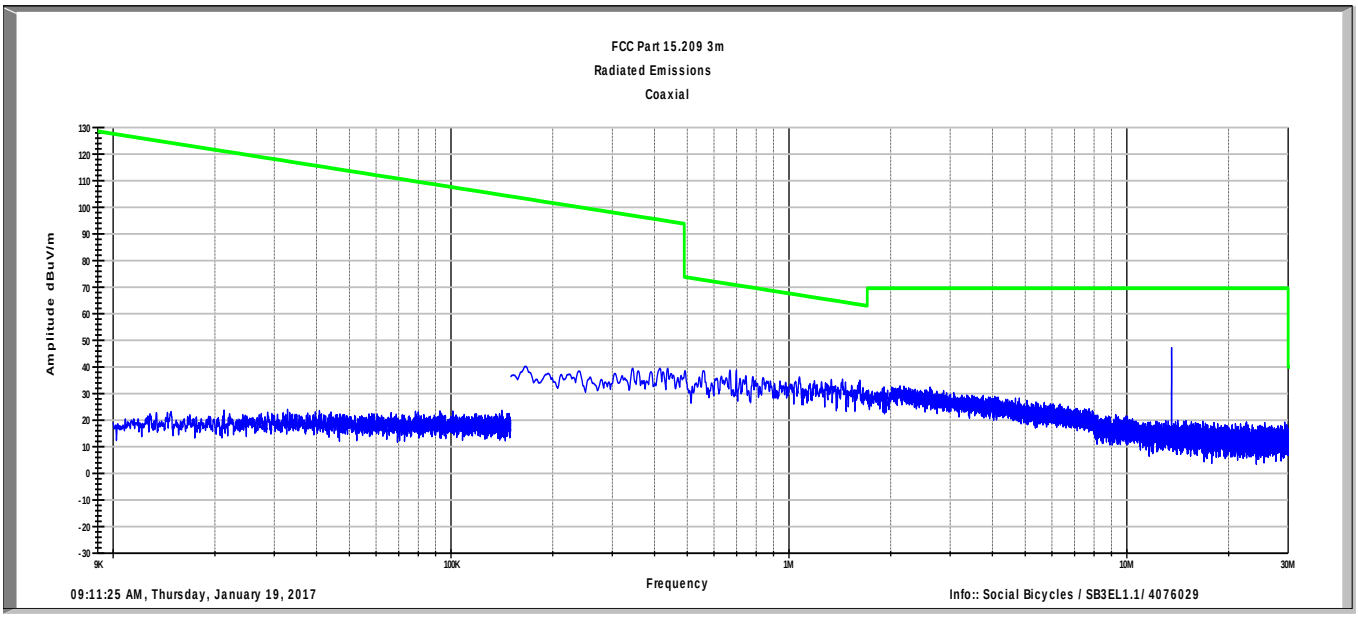






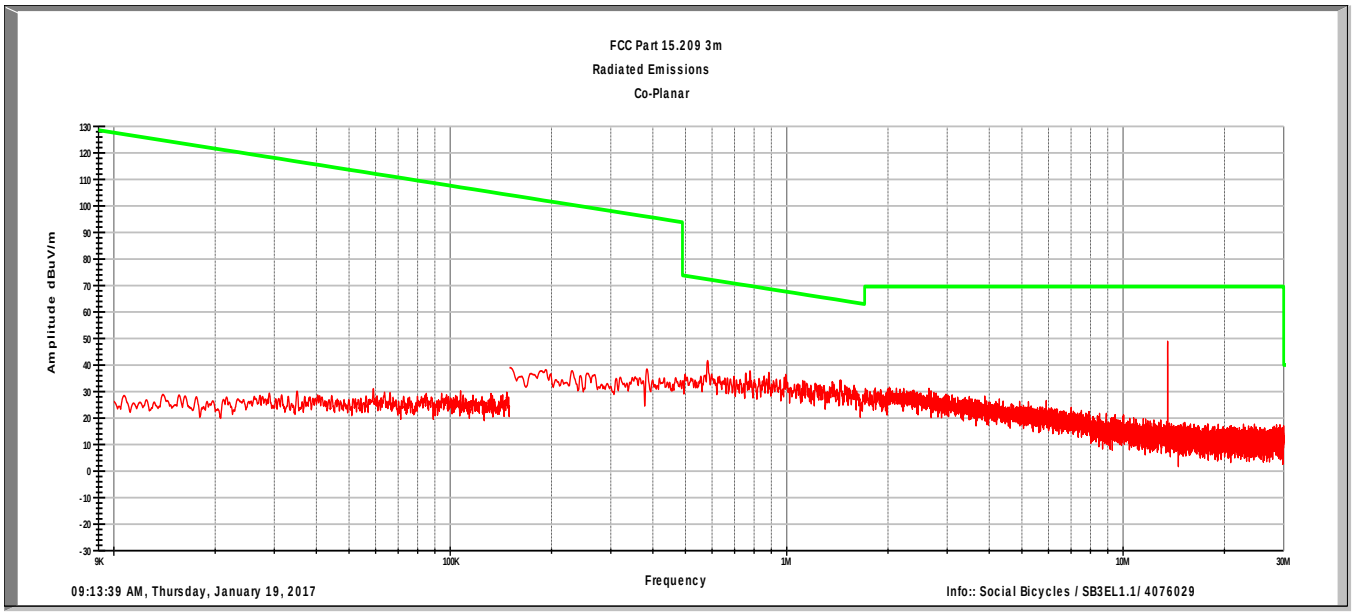
4.6 *Test Data*

Co-Axial Radiated Emissions Data (9kHz-30MHz) – 3 meters



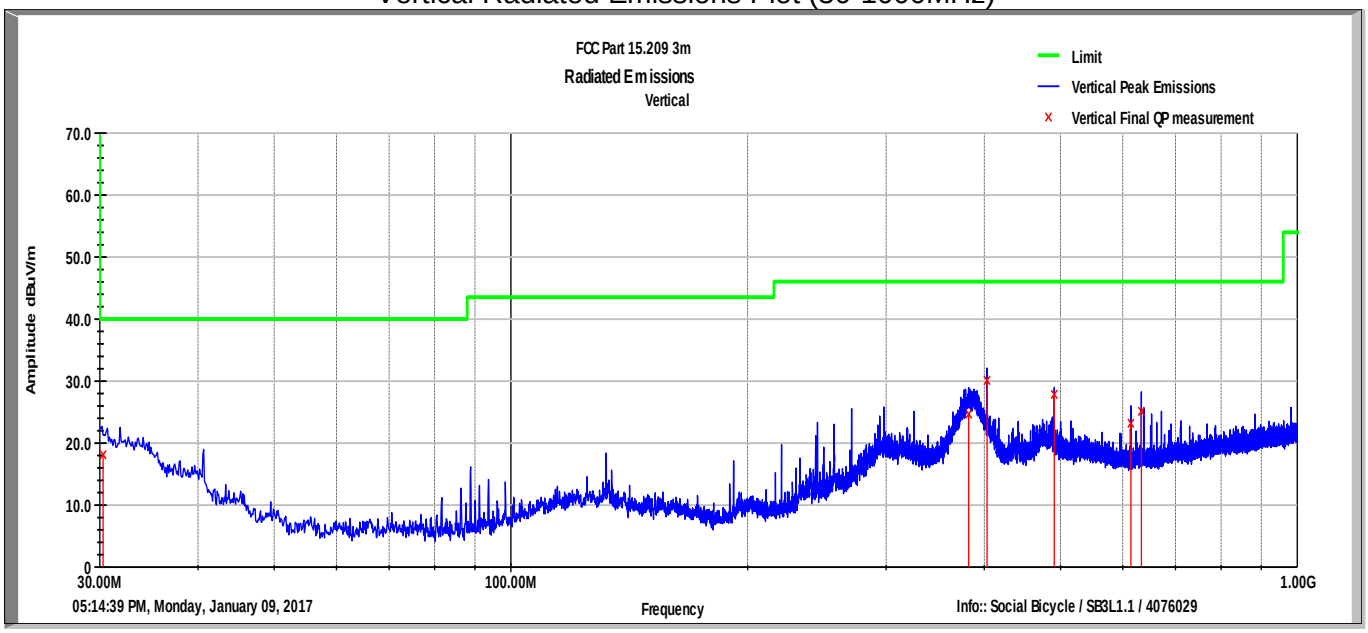
Fundamental = 47.1dBµV/m @ 13.56MHz. Limit = 69.5dBµV/m (22.4dB Margin)

Co-Planar Radiated Emissions Data (9kHz-30MHz) – 3 meters



Fundamental = 48.8dBµV/m @ 13.56MHz. Limit = 69.5dBµV/m (20.7dB Margin)

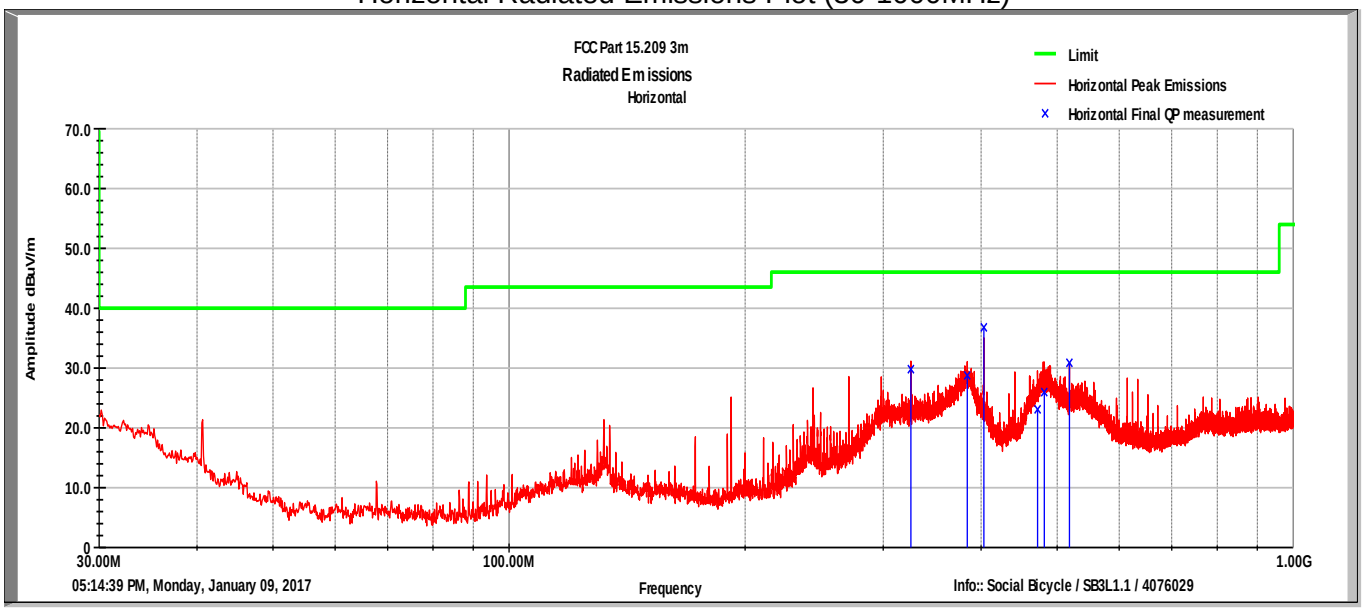
Vertical Radiated Emissions Plot (30-1000MHz)



Vertical Radiated Emissions Data (30-1000MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
30.29	27.5	V	270.0	175.0	22.1	0.5	32.0	18.1	40.0	-21.9
382.13	40.4	V	28.0	149.0	15.9	1.7	33.3	24.7	46.0	-21.4
403.20	45.3	V	310.0	149.0	16.4	1.7	33.3	30.1	46.0	-15.9
490.91	41.0	V	351.0	278.0	18.1	1.9	33.2	27.8	46.0	-18.2
614.40	34.3	V	206.0	100.0	19.8	2.1	33.1	23.2	46.0	-22.8
633.59	35.9	V	180.0	178.0	20.1	2.2	33.1	25.1	46.0	-20.9
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

Horizontal Radiated Emissions Plot (30-1000MHz)



Horizontal Radiated Emissions Data (30-1000MHz)

Frequency MHz	Raw QP (dBuV)	Polarity (V/H)	Azimuth (degrees)	Height (cm)	AF (dB/m)	Loss (dB)	Amp (dB)	QP Value (dBuV/m)	Limit (dBuV/m)	Margin (dB)
325.47	46.9	H	117.0	365.0	14.7	1.6	33.4	29.8	46.0	-16.2
383.99	44.5	H	301.0	270.0	15.9	1.7	33.3	28.8	46.0	-17.3
403.21	52.0	H	116.0	250.0	16.4	1.7	33.3	36.8	46.0	-9.2
472.08	36.6	H	303.0	243.0	17.8	1.9	33.2	23.1	46.0	-22.9
481.42	39.2	H	281.0	186.0	18.0	1.9	33.2	26.0	46.0	-20.1
518.41	43.6	H	276.0	185.0	18.5	2.0	33.2	30.9	46.0	-15.2
QP Value = Level + AF + CL - Amp										
Margin = QP Value - Limit										

5 Revision History

Revision Level	Description of changes	Revision Date
0	Initial release	31 January 2017
1	Changed references from “SB1” to “SB3” Corrected FCC and IC IDs	07 March 2017