

July 2, 2021

Breathe with B
2010 3rd St. #209
Santa Monica, CA

Dear Eric Chesbrough,

Enclosed is the EMC Wireless test report for compliance testing of the Breathe with B, B as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 1 1.1310 RF Exposure.

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if MET can be of further service to you, please contact me.

Sincerely yours,
EUROFINS E&E NORTH AMERICA

A handwritten signature in black ink that reads "Michelle Tawmging".

Michelle Tawmging
Documentation Department

Reference: (\Breathe with B\WIRS 110865 -FCC-RF Exposure)



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Electromagnetic Compatibility Criteria Test Report

for the

**Breathe with B
B**

**Tested Under
FCC Certification Rules
Title 47 of the CFR, Part 1 1.1310**

Report: WIRS 110865 -FCC-RF Exposure

July 2, 2021

Prepared For:

**Breathe with B
2010 3rd St. #209
Santa Monica, CA**

**Prepared By:
Eurofins E&E North America
3162 Belick St.
Santa Clara, CA 95054**

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Arsalan Hasan
Manager, Wireless Laboratory

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 1 of the FCC Rules under normal use and maintenance.



Eleazar Zuniga, PhD.
Director, Wireless Technologies

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	April 27, 2021	Initial Issue (Draft)
1	July 2, 2021	Added FCC ID information.

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List of Terms and Abbreviations

AC	Alternating Current
ACF	Antenna Correction Factor
Cal	Calibration
<i>d</i>	Measurement Distance
dB	Decibels
dB_μA	Decibels above one microamp
dB_μV	Decibels above one microvolt
dB_μA/m	Decibels above one microamp per meter
dB_μV/m	Decibels above one microvolt per meter
DC	Direct Current
E	Electric Field
DSL	Digital Subscriber Line
ESD	Electrostatic Discharge
EUT	Equipment Under Test
<i>f</i>	Frequency
FCC	Federal Communications Commission
GRP	Ground Reference Plane
H	Magnetic Field
HCP	Horizontal Coupling Plane
Hz	Hertz
IEC	International Electrotechnical Commission
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
LISN	Line Impedance Stabilization Network
MHz	Megahertz
μH	microhenry
μ	microfarad
μs	microseconds
NEBS	Network Equipment-Building System
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
TWT	Traveling Wave Tube
V/m	Volts per meter
VCP	Vertical Coupling Plane

Executive Summary

A. Purpose of Test

An EMC evaluation was performed to determine compliance of the Breathe with B, B, with the requirements of Part 1. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the B. Breathe with B should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the B, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 1, in accordance with Breathe with B, purchase order number #001.

Reference	Description	Compliance
§1.1310	RF Exposure	Compliant

Figure 1: Executive Summary of EMC Compliance Testing

Equipment Configuration

A. Overview

Eurofins E&E North America was contracted by Breathe with B to perform testing on the B, under Breathe with B's purchase order number #001.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Breathe with B, B.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	B	
Model(s) Covered:	B	
Filing Status:	Original	
EUT Specifications:	Primary Power: 3.7 VDC	
	FCC ID: 2AY2LB1	
	Type of Modulations:	GFSK
	Equipment Code:	DTS
	Technology	BLE
	Frequency Range	2402 MHz- 2480 MHz
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Arsalan Hasan	
Date(s):	July 2, 2021	

Figure 2: EUT Summary Table

B. References

CFR 47, Part 15, Subpart C	Federal Communication Commission, Code of Federal Regulations, Title 47, Part 15: General Rules and Regulations, Allocation, Assignment, and Use of Radio Frequencies
KDB 996369 D04	Modular Transmitter Integration Guide – Guidance For Host Product Manufacturers
ANSI C63.4:2014	Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.26: 2015	Compliance Testing of Transmitters Used in Licensed Radio Services
ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
EIA/TIA-603-A-2001	Land Mobile FM or PM Communication Equipment Measurement and Performance Standards
KDB 971168 v02r02	Measurement Guidance For Certification Of Licensed Digital Transmitters

Figure 3: Standard References

C. Test Site

All testing was performed at Eurofins E&E North America, 3162 Belick St, Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at Eurofins E&E North America.

Eurofins E&E North America is a ISO/IEC 17025 accredited site by A2LA, California #0591.02.

D. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty (dB)	K	Confidence Level
Radiated Emissions, (30 MHz – 1 GHz)	±3.24	2	95%
Radiated Emissions, (1 - 18 GHz)	±3.92	2	95%
Conducted Emission	±3.53	2	95%
CEV Telecom Port	±2.44	2	95%

Figure 4: Uncertainty Calculations Summary

E. Description of Test Sample

The EUT is a zero-maintenance hardware unit for enabling real-time monitoring of load status for non-powered rail cars.

F. Equipment Configuration

Ref. ID	Slot#	Name/Description	Model Number	Part Number	Serial Number	Rev. #
001	N/A	b device	001	N/A	N/A	001

Figure 5: EUT List

G. Support Equipment

No support equipment utilized in testing.

H. Ports and Cabling Information

Ref. ID	Port Name on EUT	Cable Desc. or reason for none	QTY	Length as tested (m)	Max Length (m)	Shielded?	Termination Box ID & Port Name
001	Micro USB Port	Flat Micro USB Cable for charging device (CE & ROHS Certified)	1	0.3	0.3	No	

Figure 6: Ports and Cabling Information

I. Mode of Operation During Testing

Device will be running maximum operations simultaneously during the EUT tests: LEDs will be flashing, pressure sensors will be detecting breathing, vibration motor will continuously be vibrating and the Bluetooth radio will be fully transmitting.

J. Method of Monitoring EUT Operation

Blinking LEDs and vibrating motors are indicative of maximum operation and lack thereof is indicative of not running at maximum intensity.

K. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

L. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Breathe with B upon completion of testing.

Electromagnetic Compatibility Criteria for Intentional Radiators

Maximum Permissible Exposure

RF Exposure Requirements: §1.1307(b)(1) and §1.1307(b)(2): Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

RF Radiation Exposure Limit: §1.1310: As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f ²)	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f ²)	<30
30-300	27.5	0.073	0.2	<30
300-1,500			f/1500	<30
1,500-100,000			1.0	<30

Figure 7: RF Exposure Limits

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S = Power Density (mW/cm²)
P = Power Input to antenna (mW)
G = Antenna Gain (numeric value)
R = Distance (cm)

For Antenna Gain → dBi = 10log(Numeric)

Bands covered under FCC Part 15.247

Test Results:

Band	Frequency (MHz)	Maximum Conducted Power (dBm)	Conducted Power (mW)	Antenna Gain (dBi)	Antenna Gain (Numeric)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Margin	Distance (cm)	Result
BLE	2402	4.038	2.534	2.72	1.870	0.00094	1	-0.999	20	Pass

MPE Calculation for Bands under Part 15.247

The safe distance where Power Density is less than the MPE limit listed above was found to be 20 cm.

Test Equipment

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

ASSET #	EQUIPMENT	MANUFACTURER	MODEL	LAST CAL DATE	CAL DUE DATE
1S4075	RADIO COMMUNICATION TESTER	ROHDE & SCHWARZ	CMW500	09/20/2020	09/20/2022
1S2399	TURNTABLE/MAST CONTROLLER	SUNOL SCIENCES	SC99V	SEE NOTE 1	
1S2600	BILOG ANTENNA	TESEQ	CBL6112D	03/19/2021	03/19/2022
1S2733	BILOG ANTENNA	TESEQ	CBL6112D	06/05/2019	06/05/2021
1S3826	DRG HORN ANTENNA	ETS-LINDGREN	3117	12/03/2020	12/03/2022
1S2198	DRG HORN ANTENNA	ETS-LINDGREN	3117	10/07/2019	10/07/2021
1S2003	PXA SIGNAL ANALYZER	KEYSIGHT	N9030B	09/15/2020	09/15/2021
1S2587	PRE AMPLIFIER	AML COMMUNICATIONS	AML0126L3801	SEE NOTE 1	
1S2653	AMPLIFIER	SONOMA INSTRUMENT	310 N	SEE NOTE 1	
1S2486	5 METER CHAMBER	PANASHIELD - ETS	5M	SEE NOTE 2	
1S3824	SIGNAL GENERATOR	ROHDE & SCHWARZ	SMA100B	11/06/2019	05/06/2021

Figure 8: Test Equipment List

Note 1: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

Note 2: Latest NSA and VSWR data available upon request.

End of Report