



Radio Frequency Exposure Evaluation Report

FOR:

Oblong Industries Inc

Model:

BLEAP1.0

Product Description:

VIO Tracking System WAP

FCC ID: PUQ-IRWP001
IC ID: 10360A-IRWP001

Applied Rules and Standards:

CFR 47 Part 2 (2.1093),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISEDC RSS-102 Issue 5

Report number: EMC_OBLON-003-16501_SAR-EX

DATE: 2017-03-31



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Contents

1. Assessment	3
2. Administrative Data	4
2.1. Identification of the Testing Laboratory Issuing the Test Report	4
2.2. Identification of the Client / Manufacturer	4
3. Equipment under Assessment	5
4. SAR Limits	6
5. FCC and ISEDC Exemption Limits for Routine Evaluation	6
5.1. FCC SAR test exclusions per KDB 447498	6
5.2. ISEDC SAR test exclusions per IC RSS-102 Issue 5	6
6. Stand-alone Transmission SAR Exclusion Evaluation	7
6.1. Minimum required distance to device as supported by user manual and other exhibits	7
6.1. Justification for using the source based duty cycle	7
6.2. Justification for use of load based time averaging	7
6.3. SAR Exclusion Calculation Table	7
7. Simultaneous Transmission SAR Exclusion Evaluation	8
7.1. FCC 1-g SAR Calculation for single transmitter for simultaneous transmission consideration	8
7.2. Simultaneous Transmission FCC 1-g SAR Exclusion calculation based on adding radios ..	8
7.3. Simultaneous Transmission FCC 1-g SAR Exclusion calculation based on SAR to peak location separation ratio	8
8. Revision History	9

1. Assessment

The following device was evaluated against the limits for general population uncontrolled exposure specified in CFR 47 Part 2.1093 according to SAR evaluation exclusion requirements specified in FCC regulation as listed in KDB 447498, and ISED RSS-102 Issue 5.

The device meets the requirements for SAR exclusion as stipulated by the above given FCC/ISED rules as long as it remains at a distance of at least 15mm to the user.

Company	Description	Model #
Oblong Industries Inc.	VIO Tracking System WAP	BLEAP1.0

Responsible for Testing Laboratory:

Peter Nevermann

2017-03-31 Compliance (Director Radio Communications and EMC)

Date	Section	Name	Signature

Responsible for the Report:

Douglas Antiooco

2017-03-31 Compliance (Sr. EMC Engineer)

Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section 3.

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2. Administrative Data

2.1. Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
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Responsible Project Leader:	Douglas Anticoco

2.2. Identification of the Client / Manufacturer

Applicant's Name:	Oblong Industries, Inc.
Street Address:	923 East Third Street, Unit 111
City/Zip Code	Los Angeles 90013
Country	CA, USA
Contact Person:	Robert Trueblood

3. Equipment under Assessment

Model No	BLEAP1.0
HW Version	1.6
SW Version	1.6
FCC-ID	PUQ-IRWP001
IC ID	10360A-IRWP001
HVIN	V1.5
PMN	BLE Wireless Access Point
Product Description	VIO Tracking System WAP
Device Category	<input type="checkbox"/> Fixed Installation <input type="checkbox"/> Mobile <input checked="" type="checkbox"/> Portable <input type="checkbox"/> Mixed Mobile and Portable
Frequency Range / number of channels	Nominal band: 2402 – 2480; Center to center: 2402(ch 0) – 2480(ch 39), 40 channels
Type(s) of Modulation	GFSK
Modes of Operation / Declared Output power	Power of module -18dBm to 9.5dBm according to cypress module data sheet.
Max. declared antenna gain	Chip antenna is part of module, peak gain 0.5dBi
Minimum distance of antenna or radiating parts to user	15mm
Power Supply/ Rated Operating Voltage Range	5VDC from USB
Operating Temperature Range	-20 °C to 55 °C
Other Radios included in the device	Altogether 4 of the Cypress CYBLE-224110-00 BT-LE modules are integrated in the product. The FCC-ID of the module is WAP4110
Co-located Transmitters / Antennas	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Sample Revision	<input checked="" type="checkbox"/> Prototype <input type="checkbox"/> Production <input type="checkbox"/> Pre-Production
Exposure Category	<input type="checkbox"/> Occupational/ Controlled <input checked="" type="checkbox"/> General Population/ Uncontrolled

4. SAR Limits

According to FCC 2.1093 the limit for general population is the following

(2) The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

5. FCC and ISEDC Exemption Limits for Routine Evaluation

5.1. FCC SAR test exclusions per KDB 447498

KDB 447498 D01 General RF Exposure Guidance v06 Section: 4.3.1.

Standalone SAR test exclusion considerations states

- 4) For 100 MHz to 6 GHz and test separation distances \leq 50 mm, the 1-g and 10-g SAR test exclusion thresholds are determined by the following:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR, and } \leq 7.5 \text{ for 10-g extremity SAR, 30 where}$$

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds*.

The test exclusions are applicable only when the minimum *test separation distance* is \leq 50 mm, and for transmission frequencies between 100 MHz and 6 GHz. When the minimum *test separation distance* is $<$ 5 mm, a distance of 5 mm according to 4.1 f) is applied to determine SAR test exclusion.

5.2. ISEDC SAR test exclusions per IC RSS-102 Issue 5

ISEDC RSS-102 Section: 2.5.1 Exemption Limits for Routine Evaluation — SAR Evaluation
SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance defined in Table 1. Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power.

Table with limits for the frequencies off interest

Frequency (MHz)	d[mm]	Exemption Limits [mW]
835	5	17
1900	5	7
2450	5	4

6. Stand-alone Transmission SAR Exclusion Evaluation

6.1. Minimum required distance to device as supported by user manual and other exhibits

The 15mm minimum separation distance is driven by the requirement to meet standalone SAR exclusion for Canada. For the ISM band this limit is 15mW. Without meeting stand-alone test exclusion it is not possible to consider simultaneous transmission test exclusion.

6.1. Justification for using the source based duty cycle

Based on the medium access mechanism in BT-LE a duty cycle of 0.5 is considered a conservative worst case.

6.2. Justification for use of load based time averaging

NA as the WAP must acknowledge/poll data from the wand.

6.3. SAR Exclusion Calculation Table

FCC / IC Standalone Transmission SAR Exclusion Calculations								
Radio	d[mm]	f[GHz]	Max Power + Tune Up [mW]	Source Based Duty Cycle	Load based duty cycle based on Maximum payload. ²	Effective Time Average Max Power [mW]	FCC / IC Limit ¹ @ 15 mm [mW]	SAR Exclusion applicable (Yes/No)
BTLE #1	15	2.48	8.91	1	1	8.91	28.6 / 15	Yes
BTLE #2	15	2.48	8.91	1	1	8.91	28.6 / 15	Yes
BTLE #3	15	2.48	8.91	1	1	8.91	28.6 / 15	Yes
BTLE #4	15	2.48	8.91	1	1	8.91	28.6 / 15	Yes

Note 1: The FCC limit was derived by calculating the maximum output power passing the threshold for 1-g SAR exclusion

Note 2: The WAP is continuously transmitting data whenever the wand is moved when the sensor data from wand is being acknowledged. Load based duty cycle cannot be considered here.

7. Simultaneous Transmission SAR Exclusion Evaluation

7.1. FCC 1-g SAR Calculation for single transmitter for simultaneous transmission consideration

Band	d[mm]	f[GHz]	Max Power + Tune Up [mW]	Source Based Duty Cycle	Load based duty cycle based on Maximum payload.	Effective Time Average Max Power [mW]	FCC 1-g SAR Exclusion calculation W/kg	Limit for 1-g SAR for sum of all simultaneous radios
BTLE	15	2.484	8.91	1	1	8.91	0.15	0.4 W/kg

7.2. Simultaneous Transmission FCC 1-g SAR Exclusion calculation based on adding radios

Transmission Mode	Simultaneous Transmission FCC 1-g SAR Exclusion calculation	FCC 1-g SAR Exclusion Threshold	SAR Exclusion applicable (Yes/No)
4 radios as above simultaneous	$4 \times 0.15 = 0.5 \text{ W/kg}$	0.4 W/kg in 1g	No

7.3 Simultaneous Transmission FCC 1-g SAR Exclusion calculation based on SAR to peak location separation ratio

Transmission Mode	Worst case pair 1-g SAR ratio calculation	Worst case pair 1-g SAR radio limit	SAR Exclusion applicable (Yes/No)
4 radios as above simultaneous	0.002	0.04	Yes

8. Revision History

Date	Report Name	Changes to report	Report prepared by
2017-03-31	EMC_OBLON-003-16501_SAR-EX	Initial version	Douglas Antioco