# Radio Frequency Exposure Evaluation Report

**FOR:**
Vibrissa Inc.

**Model Name:**
Waggit

**Product Description:**
Dog collar takes subject's vitals and reports them to cloud via cellular modem. Bluetooth connectivity to configure device and read status.

**FCC ID:** 2ASDSWAG100
**IC ID:** N/A

**Applied Rules and Standards:**
CFR 47 Part 2.1093 and RSS-102 Issue 5
FCC KDB 447498 D01 General RF Exposure Guidance v06

**Test Report #:** SAR_EX_VBRSA_001_18001_FCC_ISED

**DATE:** 02/06/2019

**A2LA Accredited**

**IC recognized # 3462B-1**

***CETECOM*** **Inc.**
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*Contents*

## 1. Assessment

The following device meets the limits of 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 the relevant ISED Canada standard RSS-RSS102, as it has been evaluated against the standards mentioned above under this section.

**Responsible for Testing Laboratory:**

| Date | Section | Name | Signature |
|---|---|---|---|
| 02/06/2019 | Compliance | Cindy Li (Lab Manager) | Cindy Li Digitally signed by Cindy Li DN: cn=Cindy Li, o=Cetecom Inc., ou=EMC, email=cindy.li@cetecom.com, c=US Date: 2019.02.19 13:11:20 -08'00' |

**Responsible for the Report:**

| Date | Section | Name | Signature |
|---|---|---|---|
| 02/06/2019 | Compliance | Yuchan Lu (Test Engineer) | Yuchan Lu Digitally signed by: Yuchan Lu DN: CN = Yuchan Lu email = Yuchan.Lu@cetecom.com C = US O = CETECOM Inc. OU = EMC Date: 2019.02.19 12:39:49 -08'00' |

# 2. Administrative Data

## 2.1. Identification of the Testing Laboratory Issuing the Test Report

| | |
|---|---|
| **Company Name:** | CETECOM Inc. |
| **Department:** | Compliance |
| **Street Address:** | 411 Dixon Landing Road |
| **City/Zip Code** | Milpitas, CA 95035 |
| **Country** | USA |
| **Telephone:** | +1 (408) 586 6200 |
| **Fax:** | +1 (408) 586 6299 |
| **Compliance Manager:** | Cindy Li |
| **Responsible Project Manager:** | Rami Saman |

## 2.2. Identification of the Client

| | |
|---|---|
| **Applicant's Name:** | Vibrissa Inc. |
| **Street Address:** | 5311 Waterstone Drive |
| **City/Zip Code** | Boulder, CO, 80301 |
| **Country** | USA |

## 2.3. Identification of the Manufacturer

| | |
|---|---|
| **Applicant's Name:** | Same as Client |
| **Street Address:** | |
| **City/Zip Code** | |
| **Country** | |

## 3. Equipment under Assessment

| | |
|---|---|
| **Model:** | Waggit |
| **FWIN:** | Rev1.0.0 |
| **HVIN:** | Rev1.0.0 |
| **PMN:** | Waggit |
| **Hardware Version:** | Rev1.0.0 |
| **Software Version:** | Rev1.0.0 |
| **Minimum distance of antenna or radiating parts to user** | 5mm |
| **Power Supply/ Rated Operating Voltage Range:** | Low 3.4 VDC, Nominal 3.7 VDC, High 4.2 VDC |
| **Operating Temperature Range:** | Low 10º C, Nominal 25º C, High 55º C |
| **Modes of Operation:** | Bluetooth LE and LTE co-location |
| **Radios included in the device:** | ❖ Bluetooth LE:<br>• Module name: STMicro BLUENRG<br>• Model number: BLUENRG-MSCSP<br>• PIFA 2.72dBi<br>❖ LTE<br>• Module name: Telit LE866SV1<br>• Model number: LE866SV1304T001000<br>• FCC/IC ID: RI7LE866SV1<br>❖ GPS<br>• Module name: Jupiter SE873<br>• Model number: SE873Q5F577R001 |
| **EUT Dimensions [cm]:** | 16 x 9 x 3.3 |
| **Weight (grams) :** | 75 |
| **Co-located Transmitters/ Antennas:** | ■ Yes ☐ No |
| **Exposure Category:** | ☐ Occupational/ Controlled ■ General Population/ Uncontrolled |
| **Device Category:** | ☐Fixed Installation ☐Mobile<br>■ Portable ☐ Mixed Mobile and Portable |
| **EUT Diameter:** | ■ < 60 cm ☐ Other _____ |
| **Sample Revision** | ☐Prototype Unit; ☐Production Unit; ■Pre-Production |

# 4. FCC Exemption Limits for Routine Evaluation

## 4.1. FCC SAR test exclusions are set by KDB 447498 D01 General RF Exposure Guidance v06

KDB 447498 Section: 4.3.1. Standalone SAR test exclusion considerations

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

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR, where

- f(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* in step b) below

The test exclusions are applicable only when the minimum *test separation distance* is ≤ 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.

## 4.2. RSS-102

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] |
|---|---|---|
| 450 | 5 | 52 |
| 835 | 5 | 17 |
| 1900 | 5 | 7 |
| 2450 | 5 | 4 |
| 3500 | 5 | 2 |

# 5. Stand-Alone SAR Evaluation Exclusion

## 5.1. Justification for using the 5 mm Distance

The device is intended to be used on pet and worn around the animal neck. The conservative distance of 5 mm is an estimate of how close a human body can be to the devise in its typical application.

## 5.2. Justification for use of load based time averaging

The worst case loading for each of the radios was determined from the following information provided by client, the device's maximum possible duty cycle for each radio are as follows:

**Cellular (LTE):**

Maximum possible data sent within a 6 min window during normal use: 149.6kb

Conservative LTE data rate (2.5Mbps w/ QPSK modulation * 10% conservative data throughput) = 250 kbps

Maximum transmit duty cycle within 6 min = (149.6/250)/360=0.1662% duty cycle

**Bluetooth LE:**

Maximum possible data sent within a 6 min window during normal use: 149.6kb

Conservative BTLE data rate (1Mbps w/ QPSK modulation * 10% conservative data throughput) = 100 kbps

Maximum transmit duty cycle within 6 min = (149.6/100)/360=0.4156% duty cycle

## 5.3. SAR Exclusion Calculation Table

According to KDB 447498, SAR evaluation can be excluded if the following equation is satisfied:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] ·[√f(GHz)] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR

| FCC Standalone Transmission SAR Exclusion Calculations | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Band** | **Frequency[GHz]** | **Max Output Power[mW]** | **Source Based Duty Cycle** | **Load based duty cycle based on Maximum payload** | **Distance [mm]** | **Effective Time Average Max Power [mW]** | **P/D*SQRT(F) at ≤ 5mm** | **1-g ≤ 3.0** |
| LTE Band 13 | 0.782 | 251.19 | 1.00 | 0.001662 | 5 | 0.4175 | 0.07 | Yes |
| BTLE | 2.480 | 0.70 | 0.62 | 0.004156 | 5 | 0.0018 | 0.0006 | Yes |

- F: Frequency [GHz]
- P1: Max.Measured Output Power [mW]
- D: Distance [mm]
- SQRT(F): Square root(Frequency[GHz])

| ISED Standalone Transmission SAR Exclusion Calculations | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Band** | **Frequency[GHz]** | **Max Output Power[mW]** | **Source Based Duty Cycle** | **Load based duty cycle based on Maximum payload** | **Distance [mm]** | **Effective Time Average Max Power [mW]** | **Limit [1]** |
| LTE Band 13 | 0.782 | 251.19 | 1.00 | 0.001662 | 5 | 0.4175 | 4.26 |
| BTLE | 2.480 | 0.70 | 0.62 | 0.004156 | 5 | 0.0018 | 21.82 |

Note 1: Limit by applying liner interpolation according to RSS-102 Section 2.5.1

## 6. Simultaneous Transmission SAR Exclusion Evaluation

LTE band13 and BTLE co-location was evaluated against the FCC 1-g SAR exclusion threshold in the table below.

| Simultaneous Transmission FCC 1-g SAR Exclusion calculation | | | |
|---|---|---|---|
| **Transmission Mode** | **Simultaneous Transmission FCC 1-g SAR Exclusion calculation [W/kg]** | **FCC 1-g SAR Exclusion Threshold [W/kg]** | **SAR Exclusion applicable (Yes/No)** |
| LTE Band 13 and BTLE | 0.07+0.0006=0.0706 | < 0.4 | Yes |

## 7. Revision History

| Date | Report Name | Changes to report | Report prepared by |
|---|---|---|---|
| 02/06/2019 | SAR_EX_VBRSA-001-18001_FCC_ISED | Initial Version | Yuchan Lu |