



September 15, 2022

TUV SUD America CB  
10 Centennial Drive FL2  
Peabody, MA 01960

Attention: Director of Certification

**RE: Analysis of RF Exposure per KDB 447498 D01 RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices v06 and RSS-102 Issue 5 March 2015.**

FCC ID: ASU-DIRECTORLITE

ISED Certification Number IC: 10052A-DIRECTORLITE

**1. General Information:**

Applicant: Savant Systems, Inc.  
Environment: General Population/Uncontrolled Exposure  
Exposure Conditions: Mobile

**2. Technical Information:**

Minimum Test Separation Distance: 20 cm  
Operating Frequency: 2402 MHz to 2480 MHz  
Antenna Type: Wi-Fi Dual-band Stubby Antenna  
Antenna Gain: 2.0 dBi  
Maximum Transmitter Conducted Power: 4.4 dBm  
Maximum Transmitter EIRP: 6.4 dBm

**3. Limits:**

Limits for General Population/Uncontrolled Exposure (Title 47 Subpart J §2.1091 and KDB 447498 D01 referring to limits under §1.1310)

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Electric Field Strength (H) (A/m) | Power Density (S) (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|-----------------------------------------|--------------------------|
| 0.3 - 1.34            | 614                               | 1.63                              | *(100)                                  | <30                      |
| 1.34 - 30             | 824/f                             | 2.19/f                            | *(180/f <sup>2</sup> )                  | <30                      |
| 30 - 300              | 27.5                              | 0.073                             | 0.2                                     | <30                      |
| 300 - 1500            | -                                 | -                                 | f/1500                                  | <30                      |
| 1500 - 100,000        | -                                 | -                                 | 1.0                                     | <30                      |

*f* = frequency in MHz

\*Plane-wave equivalent power density



# Limits for Devices Used by the General Public (Uncontrolled Environment (RSS-102 Issue 5 March 2015))

| Frequency Range (MHz)    | Electric Field Strength (V/m rms) | Magnetic Field (A/m rms)                 | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes) |
|--------------------------|-----------------------------------|------------------------------------------|-----------------------------------|----------------------------|
| 0.003 - 10 <sup>21</sup> | 83                                | 90                                       | -                                 | Instantaneous              |
| 0.1 - 10                 | -                                 | 0.73/f                                   | -                                 | 6**                        |
| 1.1 - 10                 | 87/f <sup>0.5</sup>               | -                                        | -                                 | 6**                        |
| 10 - 20                  | 27.46                             | 0.0728                                   | 2                                 | 6                          |
| 20 - 48                  | -58.07/f <sup>0.25</sup>          | 0.1540/f <sup>0.25</sup>                 | 8.944/f <sup>0.5</sup>            | 6                          |
| 48 - 300                 | 22.06                             | 0.05852                                  | 1.291                             | 6                          |
| 300 - 6000               | 3.142 f <sup>0.3417</sup>         | 0.008335 f <sup>0.3417</sup>             | 0.02619 f <sup>0.6834</sup>       | 6                          |
| 6000 - 15000             | 61.4                              | 0.163                                    | 10                                | 6                          |
| 15000 - 150000           | 61.4                              | 0.163                                    | 10                                | 616000/f <sup>1.2</sup>    |
| 150000 - 300000          | 0.158f <sup>0.5</sup>             | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> f         | 616000/f <sup>1.2</sup>    |

*f* is frequency in MHz

\*Based on nerve stimulation (NS)

\*\* Based on specific absorption rate (SAR)

## 4. Mobile MPE Calculation Summary using a 20cm separation distance:

| Mode               | Output Power | Power Density              |
|--------------------|--------------|----------------------------|
| BLE 5.1            | 2.75 mW      | 0.00087 mW/cm <sup>2</sup> |
| Murata BLE         | 3.357 mW     | 0.0015 mW/cm <sup>2</sup>  |
| Murata WLAN 2.4GHz | 75.162 mW    | 0.0343 mW/cm <sup>2</sup>  |
| Murata WLAN 5 GHz  | 148.252 mW   | 0.0882 mW/cm <sup>2</sup>  |

Murata figures are from the original filing MPE Exhibit

## 5. Co-Located Transmitters transmission table:

| Transmitter type | Transmitter type that can transmit at the same time |
|------------------|-----------------------------------------------------|
| BLE 5.1          | BLE                                                 |
| BLE 5.1          | WLAN 2.4GHz                                         |
| BLE 5.1          | WLAN 5 GHz                                          |

EUT contains FCC ID: VPYLB1ZM and IC: 772C-LB1ZM



**6. Simultaneous Transmission MPE (BLE 5.1 + BLE 5.1 + BLE):**

| Transmitter type                   | MPE (mw/cm <sup>2</sup> ) | FCC Limit (mW/cm <sup>2</sup> ) | IC Limit (mW/cm <sup>2</sup> ) | FCC MPE ratio (MPE/Limit) | ISED MPE ratio (MPE/Limit) |
|------------------------------------|---------------------------|---------------------------------|--------------------------------|---------------------------|----------------------------|
| BLE 5.1                            | 0.00087                   | 1.0                             | 0.535                          | 0.00087                   | 0.00162                    |
| Murata BLE                         | 0.0015                    | 1.0                             | 0.54689                        | 0.0015                    | 0.00274                    |
| Sum of the ratios (should be <1.0) |                           |                                 |                                | 0.00237                   | 0.00436                    |

**7. Simultaneous Transmission MPE (BLE 5.1 + BLE 5.1 + 2.4GHz WLAN):**

| Transmitter type                   | MPE (mw/cm <sup>2</sup> ) | FCC Limit (mW/cm <sup>2</sup> ) | IC Limit (mW/cm <sup>2</sup> ) | FCC MPE ratio (MPE/Limit) | ISED MPE ratio (MPE/Limit) |
|------------------------------------|---------------------------|---------------------------------|--------------------------------|---------------------------|----------------------------|
| BLE 5.1                            | 0.00087                   | 1.0                             | 0.535                          | 0.00087                   | 0.00162                    |
| Murata 2.4GHz                      | 0.0343                    | 1.0                             | 0.54039                        | 0.0343                    | 0.06347                    |
| Sum of the ratios (should be <1.0) |                           |                                 |                                | 0.03517                   | 0.06509                    |

**8. Simultaneous Transmission MPE (BLE 5.1 + BLE 5.1 + 5GHz WLAN):**

| Transmitter type                   | MPE (mw/cm <sup>2</sup> ) | FCC Limit (mW/cm <sup>2</sup> ) | IC Limit (mW/cm <sup>2</sup> ) | FCC MPE ratio (MPE/Limit) | ISED MPE ratio (MPE/Limit) |
|------------------------------------|---------------------------|---------------------------------|--------------------------------|---------------------------|----------------------------|
| BLE 5.1                            | 0.00087                   | 1.0                             | 0.535                          | 0.00087                   | 0.00162                    |
| Murata 5GHz                        | 0.0882                    | 1.0                             | 0.96582                        | 0.0882                    | 0.09132                    |
| Sum of the ratios (should be <1.0) |                           |                                 |                                | 0.08907                   | 0.09294                    |

**9. FCC Mobile MPE Calculation Nordic BLE 5.1 using a 20cm separation distance:**

Using Power Density formula:

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the antenna



G = power gain of the antenna in the direction of interest relative to isotropic  
R = distance to the center of radiation of the antenna

|                                                              |         |                       |
|--------------------------------------------------------------|---------|-----------------------|
| Maximum peak output power at antenna input terminal:         | 4.40    | (dBm)                 |
| Maximum peak output power at antenna input terminal:         | 2.75    | (mW)                  |
| Antenna gain(typical):                                       | 2       | (dBi)                 |
| Maximum antenna gain:                                        | 1.585   | (numeric)             |
| Prediction distance:                                         | 20      | (cm)                  |
| Source Based Time Average Duty Cycle:                        | 100     | (%)                   |
| Prediction frequency:                                        | 2402    | (MHz)                 |
| MPE limit for uncontrolled exposure at prediction frequency: | 0.535   | (mW/cm <sup>2</sup> ) |
| Power density at prediction frequency:                       | 0.00087 | (mW/cm <sup>2</sup> ) |
| Power density at prediction frequency:                       | 0.009   | (W/m <sup>2</sup> )   |
| Margin of Compliance:                                        | -27.90  | (dB)                  |

**Calculation Note:** ISED calculation only presented as FCC limit at this frequency is less stringent (1.0 mW/cm<sup>2</sup>). Margin of compliances are -30.61dB for FCC and -27.90dB for ISED.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Ferdie S. Custodio', written over a horizontal line.

Ferdie S. Custodio

Name

Authorized Signatory

Title: Senior EMC Test Engineer /Wireless Team Lead