

# WaveLynx Technologies RF Exposure Exhibit

**SCOPE OF WORK**

EMC TESTING – Keypad Fusion IP Reader, Part Number: ER25

**REPORT NUMBER**

103916593MPK-002B

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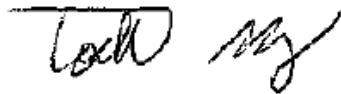


**RF Exposure Exhibit  
(mobile devices)****Report Number: 103916593MPK-002B****Project Number: G103916593****Original Report Issue Date: January 12, 2020****Revision Report Issue Date: June 11, 2020****Product Designation: Keypad Fusion IP Reader****Part Number: ER25****CPN: ER25, ER25-PCB****FCC ID: 2AEI3WLTC-ER2X-SK17****IC: 20063-WLTDHSKER17****to****47CFR 2.1091****RSS-102 Issue 5****for****WaveLynx Technologies****Tested by:**

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| <b>Report No. 103916593MPK-002B</b> |  |
|-------------------------------------|--|
| <b>Equipment Under Test:</b>        | Keypad Fusion IP Reader  |
| <b>Trade Name:</b>                  | WaveLynx Technologies  |
| <b>Part Number:</b>                 | ER25   |
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| <b>Applicable Regulation:</b>       | 47CFR 2.1091<br>RSS-102 Issue 5  |

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### 1.0 RF Exposure Summary

| Test  | Reference FCC | Reference Industry Canada | Result   |
|---|---------------|---------------------------|----------|
| Radio frequency Radiation Exposure Evaluation | 47 CFR§2.1091 | RSS-102 Issue 5           | Complies |

### 2.0 RF Exposure Limits

In this document, we evaluate the RF Exposure to human body due the intentional transmission from the transmitter (EUT). The limits for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 and RSS-102 are followed.

#### 2.1 FCC Limits

According to FCC 1.1310 table 1: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in 1.1307(b)

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range (MHz)   | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Average Time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|------------------------|
| <b>(A)Limits For Occupational / Control Exposures</b>           |                               |                               |                                     |                        |
| 0.3 – 3.0   | 614                           | 1.63                          | *100                                | 6                      |
| 3.0 – 30  | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                      |
| 30-300  | 61.4                          | 0.163                         | 1.0                                 | 6                      |
| 300 - 1500  | ...                           | ...                           | F/300                               | 6                      |
| 1500 - 100,000  | ...                           | ...                           | 5                                   | 6                      |
| <b>(B)Limits For General Population / Uncontrolled Exposure</b> |                               |                               |                                     |                        |
| 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 density

## 2.2 Industry Canada Limits

According to RSS-102, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

| <b>Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)</b>          |                    |                               |                         |                  |
|---|--------------------|-------------------------------|-------------------------|------------------|
| Frequency Range   | Electric Field     | Magnetic Field                | Power Density           | Reference Period |
| (MHz)   | (V/m rms)          | (A/m rms)                     | (W/m <sup>2</sup> )     | (minutes)        |
| 0.003-10  | 83                 | 90                            | -                       | Instantaneous*   |
| 0.1-10  | -                  | $0.73/f$                      | -                       | 6**              |
| 1.1-10  | $87/f^{0.5}$       | -                             | -                       | 6**              |
| 10-20   | 27.46              | 0.0728                        | -2                      | 6                |
| 20-48   | $58.07/f^{0.25}$   | $0.1540/f^{0.25}$             | $8.944/f^{0.5}$         | 6                |
| 48-300  | 22.06              | 0.05852                       | 1.291                   | 6                |
| 300-6000  | $3.142 f^{0.3417}$ | $0.008335 f^{0.3417}$         | $0.02619 f^{0.6834}$    | 6                |
| 6000-15000  | 61.4               | 0.163                         | 10                      | 6                |
| 15000-150000  | 61.4               | 0.163                         | 10                      | $616000/f^{1.2}$ |
| 150000-300000   | $0.158 f^{0.5}$    | $4.21 \times 10^{-4} f^{0.5}$ | $6.67 \times 10^{-5} f$ | $616000/f^{1.2}$ |
| Note: $f$ is frequency in MHz.<br>* Based on nerve stimulation (NS).<br>** Based on specific absorption rate (SAR). |                    |                               |                         |                  |

**3.0 Test Results (Mobile Configuration)**

**3.1 Classification**

Radio is installed inside a mobile host device. The antenna of the product, under normal use condition, is at least 20 cm away from the body of the user and accessible to the end user. Warning statement to the user for keeping at least 20 cm or more separation distance with the antenna should be included in user’s manual.

**3.2 EIRP calculations**

The Keypad Fusion IP Reader, Model: ER25 consists of three radios: 125 kHz and 13.56 RFID and Bluetooth. For RF exposure compliance refer reports #103916593MPK-002B & 103916593MPK-003B.

**3.3 Maximum RF Power**

| Frequency Range (MHz) | Peak FS @10m (dBµV/m) | Note  |
|-----------------------|-----------------------|---|
| 13.56                 | 51.9                  | FS measurement was taken from Report # 103916593MPK-001B. |

| Frequency Range (MHz) | RF Output (dBm) | Antenna Gain <sup>1</sup> (dBi) | Note  |
|-----------------------|-----------------|---------------------------------|---|
| 2402-2480             | 2.16            | 0.5                             | Conducted power measurements were taken from FCC ID: WAP2001. |

<sup>1</sup>As declared by the manufacturer.

### 3.4 RF Exposure Calculation

#### 3.4.1 RF Exposure calculation for RFID

| Frequency Range (MHz) | Peak FS @10m (dBµV/m) | Peak FS @20 cm* (dBµV/m) | Peak FS @20 cm (V/m) | RSS Limit (V/m) | FCC Limit (V/m) | Results  |
|-----------------------|-----------------------|--------------------------|----------------------|-----------------|-----------------|----------|
| 13.56                 | 51.9                  | 119.86                   | 0.984                | 27.46           | 60.77           | Complies |

\* Distance Correction Factor was used.

#### 3.4.2 RF Exposure calculation for Bluetooth

Calculations for this report are based on highest power measured for each band.

| Frequency Range (MHz) | EIRP (dBm) | EIRP (mW) | Power Density (mW/cm <sup>2</sup> ) @20 cm | FCC Limit (mW/cm <sup>2</sup> ) | Results  |
|-----------------------|------------|-----------|--|---------------------------------|----------|
| 2402-2480             | 2.66       | 1.85      | 0.00037                                    | 1                               | Complies |

Note: Antenna gains below 0 are considered as 0dBi.

| Frequency Range (MHz) | EIRP (dBm) | EIRP (mW) | Power Density (W/m <sup>2</sup> ) @20 cm | RSS Limit (W/m <sup>2</sup> ) | Results  |
|-----------------------|------------|-----------|--|-------------------------------|----------|
| 2402-2480             | 2.66       | 1.85      | 0.0037                                   | 5.47                          | Complies |

Note: Antenna gains below 0 are considered as 0dBi.



### **Appendix A: Power Density Calculation**

The Power Density can be calculated using the formula

$$S = \text{EIRP} / 4\pi D^2$$

Where: S is Power Density in mW/cm<sup>2</sup>

D is the distance from the antenna in cm.

**4.0 Document History**

| <b>Revision/<br/>Job Number</b> | <b>Writer<br/>Initials</b> | <b>Reviewers<br/>Initials</b> | <b>Date</b>      | <b>Change</b>  |
|---------------------------------|----------------------------|-------------------------------|------------------|--|
| 1.0/ G103916593                 | TM                         | KV                            | January 12, 2020 | Original document  |
| 2.0/ G103916593                 | TM                         | KV                            | June 03, 2020    | Updated Model Number from F25 to ER25 per client's request.          |
| 3.0/ G103916593                 | TM                         | KV                            | June 11, 2020    | Updated report with new FCC ID, IC ID and CPNs per client's request. |