

# RF Exposure Evaluation Report

APPLICANT : Veea Inc.  
EQUIPMENT : Wireless Edge Server  
BRAND NAME : VeeaHub  
MODEL NAME : VHC25  
FCC ID : 2ARXK-VHC25  
STANDARD : 47 CFR Part 2.1091  
FCC KDB 447498 D01 v06

The product evaluation date was started from Aug. 28, 2024 and completed on Sep. 10, 2024. We, Sporton International Inc. (Shenzhen), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.



Approved by: Si Zhang

**Sporton International Inc. (Shenzhen)**

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**People's Republic of China**



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**Revision History**

| REPORT NO. | VERSION | DESCRIPTION              | ISSUED DATE   |
|------------|---------|--------------------------|---------------|
| FA452219   | Rev. 01 | Initial issue of report. | Sep. 14, 2024 |
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## **1. Administration Data**

### **1.1. Testing Laboratory**

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

| Testing Laboratory |                                                                                                                                                                            |                     |                                |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------|
| Test Firm          | Sporton International Inc. (Shenzhen)                                                                                                                                      |                     |                                |
| Test Site Location | 1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055<br>People's Republic of China<br>TEL: +86-755-86379589<br>FAX: +86-755-86379595 |                     |                                |
| Test Site No.      | Sporton Site No.                                                                                                                                                           | FCC Designation No. | FCC Test Firm Registration No. |
|                    | SAR01-SZ                                                                                                                                                                   | CN1256              | 421272                         |

| Applicant    |                                                  |
|--------------|--------------------------------------------------|
| Company Name | Veea Inc.                                        |
| Address      | 164 E 83rd Street, NEW YORK, United States 10028 |

| Manufacturer |                                                  |
|--------------|--------------------------------------------------|
| Company Name | Veea Inc.                                        |
| Address      | 164 E 83rd Street, NEW YORK, United States 10028 |



## 2. Description of Equipment Under Test (EUT)

| Product Feature & Specification         |                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                                | Wireless Edge Server                                                                                                                                                                                                                                                                                   |
| Brand Name                              | Veeahub                                                                                                                                                                                                                                                                                                |
| Model Name                              | VHC25                                                                                                                                                                                                                                                                                                  |
| FCC ID                                  | 2ARXK-VHC25                                                                                                                                                                                                                                                                                            |
| Wireless Technology and Frequency Range | WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz<br>WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz<br>WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz<br>WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz<br>WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz<br>ZigBee: 2405 MHz ~ 2480 MHz                             |
| Mode                                    | WLAN 2.4GHz 802.11b/g<br>WLAN 2.4GHz 802.11n HT20/HT40<br>WLAN 2.4GHz 802.11ac VHT20/VHT40<br>WLAN 2.4GHz 802.11ax HE20/HE40<br>WLAN 5GHz 802.11a<br>WLAN 5GHz 802.11n HT20/HT40<br>WLAN 5GHz 802.11ac VHT20/VHT40/VHT80<br>WLAN 5GHz 802.11ax HE20/HE40/HE80<br>Bluetooth BR/EDR/LE<br>ZigBee: O-QPSK |
| Antenna Type                            | WLAN/Bluetooth/ ZigBee: PIFA antenna                                                                                                                                                                                                                                                                   |
| HW Version                              | 4.0                                                                                                                                                                                                                                                                                                    |
| SW Version                              | 2.33.1-0.mfg.alpha.4.0.7                                                                                                                                                                                                                                                                               |
| EUT Stage                               | Identical Prototype                                                                                                                                                                                                                                                                                    |

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. WLAN2.4GHz /WLAN5GHz all support SISO and MIMO mode, MIMO tune up power was chosen to perform MPE calculation conservatively.
3. The device supports Tx Beamforming mode for WLAN 2.4GHz 802.11 n/ac/ax and WLAN 5GHz (UNII-1/UNII-3) 802.11 n/ac/ax.
4. The gain calculation method of WLAN beamforming mode is referenced to KDB 662911.
5. For WLAN CDD & Tx Beamforming mode, the MPE calculation performed separately.

**Comments and Explanations:**

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

**Antenna Gain:**

| WLAN             | Maximum Antenna gain (dBi) |       |       |       |             |
|------------------|----------------------------|-------|-------|-------|-------------|
|                  | Ant.1                      | Ant.2 | Ant.3 | Ant.4 | Beamforming |
| WLAN2.4GHz       | /                          | 2.2   | /     | 1.8   | 5.01        |
| WLAN5.2GHz       | 3.6                        | /     | 3.5   | /     | 6.56        |
| WLAN5.3GHz       | 3.5                        | /     | 3.5   | /     | /           |
| WLAN5.5GHz       | /                          | 3.2   | /     | 2.7   | /           |
| WLAN5.8GHz       | /                          | 3.3   | /     | 3.4   | 6.36        |
| Bluetooth BR/EDR | 2.3                        | /     | /     | /     | /           |
| Bluetooth LE     | /                          | /     | 1.9   | /     | /           |
| ZigBee           | /                          | /     | 1.9   | /     | /           |

### 3. Maximum RF average output tune up power among production units

#### < Bluetooth >

| Mode             |  | Maximum Average Power (dBm) |
|------------------|--|-----------------------------|
|                  |  | Ant.1                       |
| Bluetooth BR/EDR |  | 8.00                        |
| Mode             |  | Ant.3                       |
| Bluetooth LE     |  | 16.00                       |

#### < ZigBee >

| Mode   |        | Maximum Average power(dBm) |
|--------|--------|----------------------------|
|        |        | Ant.3                      |
| 2.4GHz | ZigBee | 16.0                       |

#### <For CDD/MIMO Mode>

##### <2.4GHz WLAN >

| Mode   |                | Maximum Average Power (dBm) |
|--------|----------------|-----------------------------|
|        |                | Ant.2+4                     |
| 2.4GHz | 802.11b        | 24.00                       |
|        | 802.11g        | 24.00                       |
|        | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |
|        | 802.11ac-VHT40 | 23.00                       |
|        | 802.11ax-HE20  | 23.00                       |
|        | 802.11ax-HE40  | 23.00                       |

##### <5GHz WLAN >

| Mode   |                | Maximum Average Power (dBm) |
|--------|----------------|-----------------------------|
|        |                | Ant.1+3                     |
| 5.2GHz | 802.11a        | 23.00                       |
|        | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |
|        | 802.11ac-VHT40 | 23.00                       |
|        | 802.11ac-VHT80 | 23.00                       |
|        | 802.11ax-HE20  | 23.00                       |
|        | 802.11ax-HE40  | 23.00                       |
|        | 802.11ax-HE80  | 23.00                       |
| 5.3GHz | 802.11a        | 22.00                       |
|        | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |



|  |                |       |
|--|----------------|-------|
|  | 802.11ac-VHT40 | 23.00 |
|  | 802.11ac-VHT80 | 22.00 |
|  | 802.11ax-HE20  | 23.00 |
|  | 802.11ax-HE40  | 23.00 |
|  | 802.11ax-HE80  | 22.00 |

| Mode   |                | Maximum Average Power (dBm) |
|--------|----------------|-----------------------------|
|        |                | Ant.2+4                     |
| 5.5GHz | 802.11a        | 23.00                       |
|        | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |
|        | 802.11ac-VHT40 | 23.00                       |
|        | 802.11ac-VHT80 | 23.00                       |
|        | 802.11ax-HE20  | 23.00                       |
|        | 802.11ax-HE40  | 23.00                       |
|        | 802.11ax-HE80  | 23.00                       |
| 5.8GHz | 802.11a        | 23.00                       |
|        | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |
|        | 802.11ac-VHT40 | 23.00                       |
|        | 802.11ac-VHT80 | 23.00                       |
|        | 802.11ax-HE20  | 23.00                       |
|        | 802.11ax-HE40  | 23.00                       |
|        | 802.11ax-HE80  | 23.00                       |

Note: WLAN2.4GHz /WLAN5GHz all support SISO/MIMO mode, MIMO tune up power was chosen to perform MPE calculation conservatively for MIMO power is higher.

**<For Tx Beamforming Mode>****<2.4GHz WLAN >**

| Mode   |                | Maximum Average Power (dBm) |
|--------|----------------|-----------------------------|
|        |                | Ant.2+4                     |
| 2.4GHz | 802.11n-HT20   | 20.00                       |
|        | 802.11n-HT40   | 20.00                       |
|        | 802.11ac-VHT20 | 20.00                       |
|        | 802.11ac-VHT40 | 20.00                       |
|        | 802.11ax-HE20  | 20.00                       |
|        | 802.11ax-HE40  | 20.00                       |

**<5GHz WLAN >**

| Mode   |                | Maximum Average Power (dBm) |
|--------|----------------|-----------------------------|
|        |                | Ant.1+3                     |
| 5.2GHz | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |
|        | 802.11ac-VHT40 | 23.00                       |
|        | 802.11ac-VHT80 | 23.00                       |
|        | 802.11ax-HE20  | 23.00                       |
|        | 802.11ax-HE40  | 23.00                       |
|        | 802.11ax-HE80  | 23.00                       |

| Mode   |                | Maximum Average Power (dBm) |
|--------|----------------|-----------------------------|
|        |                | Ant.2+4                     |
| 5.8GHz | 802.11n-HT20   | 23.00                       |
|        | 802.11n-HT40   | 23.00                       |
|        | 802.11ac-VHT20 | 23.00                       |
|        | 802.11ac-VHT40 | 23.00                       |
|        | 802.11ac-VHT80 | 23.00                       |
|        | 802.11ax-HE20  | 23.00                       |
|        | 802.11ax-HE40  | 23.00                       |
|        | 802.11ax-HE80  | 23.00                       |

Note: The device supports TX Beamforming mode for WLAN 2.4GHz 802.11 n/ac/ax and WLAN 5GHz (UNII-1/UNII-3) 802.11 n/ac/ax.

#### **4. RF Exposure Limit Introduction**

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled 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                       |

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

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

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

## 5. Radio Frequency Radiation Exposure Evaluation

### 5.1. Standalone Power Density Calculation

<For CDD/MIMO Mode>

| Band             | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|------------------|-----------------|--------------------|---------------------|--------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| 2.4GHz WLAN      | 2412.0          | 2.20               | 24.00               | 26.200             | 416.869           | 0.083                                       | 1.000                       | <b>0.083</b>          |
| 5.2GHz WLAN      | 5180.0          | 3.60               | 23.00               | 26.600             | 457.088           | 0.091                                       | 1.000                       | 0.091                 |
| 5.3GHz WLAN      | 5260.0          | 3.50               | 23.00               | 26.500             | 446.684           | 0.089                                       | 1.000                       | 0.089                 |
| 5.5GHz WLAN      | 5500.0          | 3.20               | 23.00               | 26.200             | 416.869           | 0.083                                       | 1.000                       | 0.083                 |
| 5.8GHz WLAN      | 5745.0          | 3.40               | 23.00               | 26.400             | 436.516           | 0.087                                       | 1.000                       | 0.087                 |
| Bluetooth BR/EDR | 2402.0          | 2.30               | 8.00                | 10.300             | 10.715            | 0.002                                       | 1.000                       | <b>0.002</b>          |
| Bluetooth LE     | 2402.0          | 1.90               | 16.00               | 17.900             | 61.660            | 0.012                                       | 1.000                       | <b>0.012</b>          |
| ZigBee           | 2405.0          | 1.90               | 16.00               | 17.900             | 61.660            | 0.012                                       | 1.000                       | <b>0.012</b>          |

<For Beamforming mode>

| Band        | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|-------------|-----------------|--------------------|---------------------|--------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| 2.4GHz WLAN | 2412.0          | 5.01               | 20.00               | 25.010             | 316.957           | 0.063                                       | 1.000                       | 0.063                 |
| 5.2GHz WLAN | 5180.0          | 6.56               | 23.00               | 29.560             | 903.649           | 0.180                                       | 1.000                       | <b>0.180</b>          |
| 5.8GHz WLAN | 5745.0          | 6.36               | 23.00               | 29.360             | 862.979           | 0.172                                       | 1.000                       | <b>0.172</b>          |

**Note:**

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. WLAN2.4GHz and WLAN5GHz chose the higher SISO gain as MIMO gain to perform MPE calculation.
3. Chose the maximum RF output tune up power and the maximum antenna gain of all antennas among same frequency WLAN band to perform MPE calculation conservatively.

**5.2. Collocated Power Density Calculation**

| WLAN 2.4GHz<br>Power Density /<br>Limit | WLAN 5GHz Low<br>Band Power<br>Density / Limit | WLAN 5GHz High<br>Band Power<br>Density / Limit | Bluetooth<br>Power Density /<br>Limit | ZigBee or BLE<br>Power Density /<br>Limit | $\Sigma$ (Power Density / Limit) of<br>WLAN2.4GHz + WLAN 5GHz Low<br>Band + WLAN5GHz High Band +<br>Bluetooth BR/EDR+ Bluetooth<br>LE/ZigBee |
|-----------------------------------------|------------------------------------------------|-------------------------------------------------|---------------------------------------|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| 0.083                                   | 0.180                                          | 0.172                                           | 0.002                                 | 0.012                                     | 0.449                                                                                                                                        |

**Note:**

1. According to the EUT characteristic, WLAN 2.4GHz and WLAN5GHz/Bluetooth/Bluetooth BLE/ZigBee can transmit simultaneously, and Bluetooth BLE and ZigBee cannot transmit simultaneously
2. According to the EUT characteristic, Bluetooth BR/EDR and WLAN5GHz/BLE/ZigBee can transmit simultaneously.
3. According to the EUT characteristic, WLAN 5GHz Low Band and WLAN5GHz High Band can transmit simultaneously.
4. Always chose the worst evaluation value of Bluetooth BLE and ZigBee to do analysis.
5. For colocation analysis, choose the highest (power density/limit) among WLAN 2.4GHz/5GHz MIMO mode and Beamforming mode respectively.
6.  $\Sigma$ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz + WLAN 5GHz Low Band + WLAN5GHz High Band + Bluetooth BR/EDR+ Bluetooth LE/ZigBee.
7. Considering all transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1.

**Conclusion:**

According to 47 CFR §2.1091, the equipment at least **20 cm** to show compliance with the power density limit, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----