

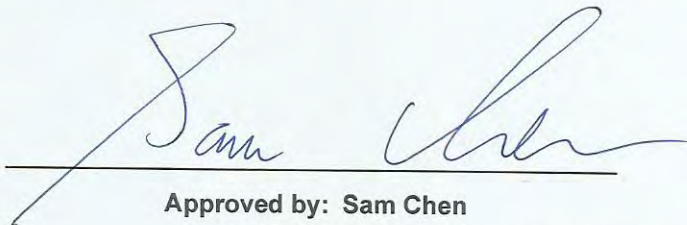


# RADIO EXPOSURE TEST REPORT

**FCC ID** : 2ARXK-VHC25  
**Equipment** : Wireless Edge Server  
**Brand Name** : VeeaHub  
**Model Name** : VHC25,VHC20  
**Applicant** : Veea Inc.  
164 E 83rd Street, NEW YORK,United States, 10028  
**Manufacturer** : Veea Inc.  
164 E 83rd Street, NEW YORK,United States, 10028  
**Standard** : 47 CFR Part 2.1091

The product was received on Aug. 09, 2021, and testing was started from Aug. 11, 2021 and completed on Sep. 18, 2021. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.



Approved by: Sam Chen

**Sporton International Inc. Hsinchu Laboratory**  
No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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## History of this test report

TEL : 886-3-656-9065  
FAX : 886-3-656-9085  
Report Template No.: CB-A1\_1 Ver1.1

Page Number : 3 of 11  
Issued Date : Jan. 13, 2022  
Report Version : 01



## Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items          | Result (PASS/FAIL) | Remark |
|---------------|-----------------|---------------------|--------------------|--------|
| 2             | -               | Exposure evaluation | PASS               | -      |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

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.

**Reviewed by: Sam Chen**

**Report Producer: Wendy Pan**



# 1 General Description

## 1.1 EUT General Information

| RF General Information |                        |                           |                                                                                                                                                                                                |
|------------------------|------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Evaluation Mode        | Frequency Range (MHz)  | Operating Frequency (MHz) | Modulation Type                                                                                                                                                                                |
| 2.4GHz WLAN            | 2400-2483.5            | 2412-2462                 | 802.11b: DSSS (DBPSK, DQPSK, CCK)<br>802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) |
| 5GHz WLAN              | 5150-5250<br>5725-5850 | 5180-5240<br>5745-5825    | 802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)<br>802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)<br>802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)                                 |
| Bluetooth              | 2400-2483.5            | 2402-2480                 | BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK)<br>LE: GFSK                                                                                                                                     |
| IEEE802.15.4           | 2400-2483.5            | 2405-2480                 | O-QPSK                                                                                                                                                                                         |



## 1.2 Antenna Information

| Ant. | Brand Name | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|------------|------------|--------------|-----------|------------|
| 1    | WNC        | VHC25      | PIFA         | I-PEX     | Note 1     |
| 2    | WNC        | VHC25      | PIFA         | I-PEX     |            |
| 3    | WNC        | VHC25      | PIFA         | I-PEX     |            |
| 4    | WNC        | VHC25      | PIFA         | I-PEX     |            |

Note 1:

| Ant. | Port           |                        |                        |                     |                                        | Gain (dBi)     |                        |                        |                     |                                        |
|------|----------------|------------------------|------------------------|---------------------|----------------------------------------|----------------|------------------------|------------------------|---------------------|----------------------------------------|
|      | WLAN<br>2.4GHz | WLAN<br>5GHz<br>UNII-3 | WLAN<br>5GHz<br>UNII-1 | Bluetooth<br>BR/EDR | Bluetooth<br>LE or<br>IEEE802.<br>15.4 | WLAN<br>2.4GHz | WLAN<br>5GHz<br>UNII-3 | WLAN<br>5GHz<br>UNII-1 | Bluetooth<br>BR/EDR | Bluetooth<br>LE or<br>IEEE802.<br>15.4 |
| 1    | -              | -                      | 2                      | 1                   | -                                      | -              | -                      | 3.6                    | 2.3                 | -                                      |
| 2    | 1              | 2                      | -                      | -                   | -                                      | 2.2            | 3.3                    | -                      | -                   | -                                      |
| 3    | -              | -                      | 1                      | -                   | 1                                      | -              | -                      | 3.5                    | -                   | 1.9                                    |
| 4    | 2              | 1                      | -                      | -                   | -                                      | 1.8            | 3.4                    | -                      | -                   | -                                      |

Note 2: The above information was declared by manufacturer.

Note 3: Directional gain information

| Type   | Maximum Output Power                                                                                                                                | Power Spectral Density                                                                                                                   |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Non-BF | Directional gain = Max.gain + array gain.<br>For power measurements on IEEE 802.11 devices<br>Array Gain = 0 dB (i.e., no array gain) for N ANT ≤ 4 | $Directional\ IGain = 10 \cdot \log \left[ \frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$ |
| BF     | $Directional\ IGain = 10 \cdot \log \left[ \frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$            | $Directional\ IGain = 10 \cdot \log \left[ \frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$ |

Ex.

Directional Gain (NSS1) formula :

$$Directional\ IGain = 10 \cdot \log \left[ \frac{\sum_{i=1}^{N_{ANT}} \left\{ \sum_{k=1}^{N_{ANT}} g_{i,k} \right\}^2}{N_{ANT}} \right]$$

$$NSS1(g1,1) = 10^{G1/20} ; NSS1(g1,2) = 10^{G2/20} ; NSS1(g1,3) = 10^{G3/20} ; NSS1(g1,4) = 10^{G4/20}$$

$$g_{j,k} = (NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2$$

$$DG = 10 \log[(NSS1(g1,1) + NSS1(g1,2) + NSS1(g1,3) + NSS1(g1,4))^2 / N_{ANT}] \Rightarrow 10$$

$$\log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20} + 10^{G4/20})^2 / N_{ANT}]$$

Where ;

G1 = Ant 1 Gain ; G2 = Ant 2 Gain ; G3 = Ant 3 Gain ; G4 = Ant 4 Gain ;

2.4GHz DG = 5.01 dBi

5 GHz U-NII-1 DG = 6.56 dBi

5 GHz U-NII-3 DG = 6.36 dBi

**For 2.4GHz:**

**For IEEE 802.11b/g/n/VHT/ax mode (2TX/2RX):**

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

**For 5GHz UNII-1 / UNII-3:**

**For IEEE 802.11a/n/ac/ax mode (2TX/2RX):**

Port 1 and Port 2 can be used as transmitting/receiving antenna.

Port 1 and Port 2 could transmit/receive simultaneously.

**Bluetooth / IEEE802.15.4 (1TX/1RX):**

Only Port 1 can be used as transmitting/receiving antenna.



### 1.3 Table for Multiple Listing

| Model Name | Description                                                                                 |
|------------|---------------------------------------------------------------------------------------------|
| VHC25      | All the model names are identical, the difference model names served as marketing strategy. |
| VHC20      |                                                                                             |

Note1: From the above models, model: VHC25 was selected as representative model for the test and its data was recorded in this report.

Note 2: The above information was declared by manufacturer.

### 1.4 Table for EUT Operation Information

| Operation Mode | Description                                                                     |
|----------------|---------------------------------------------------------------------------------|
| 1              | WLAN 2.4GHz + 5GHz Low Band + 5GHz High Band + Bluetooth BR/EDR + IEEE 802.15.4 |
| 2              | WLAN 2.4GHz + 5GHz Low Band + 5GHz High Band + Bluetooth BR/EDR + Bluetooth LE  |

Note: The above information was declared by manufacturer.

### 1.5 Table for EUT support function

| Function |
|----------|
| AP       |
| Mesh     |

Note: The above information was declared by manufacturer.

### 1.6 Accessories

| Accessories                       |            |            |                                                        |
|-----------------------------------|------------|------------|--------------------------------------------------------|
| Equipment Name                    | Brand Name | Model Name | Rating                                                 |
| Adapter                           | Veea       | VHC25-30A  | Input: 100-240V~50/60Hz, 1.0A Max<br>Output: 12V, 2.5A |
| Other                             |            |            |                                                        |
| RJ-45 cable*1: Non-shielded, 1.8m |            |            |                                                        |

### 1.7 Testing Location

| Testing Location Information                              |                                                                                                                                                                                                                                                |
|-----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Lab. : Sporton International Inc. Hsinchu Laboratory |                                                                                                                                                                                                                                                |
| Hsinchu<br>(TAF: 3787)                                    | ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)<br>TEL: 886-3-656-9065 FAX: 886-3-656-9085<br>Test site Designation No. TW3787 with FCC.<br>Conformity Assessment Body Identifier (CABID) TW3787 with ISED. |





## 2 Maximum Permissible Exposure

### 2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|------------------------------------------------------------------|
| 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) Limits for General Population / Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> , H  <sup>2</sup> or S (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                                                              |

Note: f = frequency in MHz ; \*Plane-wave equivalent power density

### 2.2 MPE Calculation Method

The MPE was calculated at 29 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

**E** = Electric field (V/m)

**P** = RF output power (W)

**G** = EUT Antenna numeric gain (numeric)

**d** = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



## 2.3 Calculated Result and Limit

### Exposure Environment: General Population / Uncontrolled Exposure

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|
| 2.4G;D1D   | 5.01     | 29.74       | 34.75      | 0.50           | 35.25              | 3.34965          | 29            | 0.31695                 | 1.00000                       |
| 2.4G;BT-BR | 2.30     | 7.74        | 10.04      | 0.50           | 10.54              | 0.01132          | 29            | 0.00107                 | 1.00000                       |
| 2.4G;BT-LE | 1.90     | 15.78       | 17.68      | 0.50           | 18.18              | 0.06577          | 29            | 0.00622                 | 1.00000                       |
| 802.15.4   | 1.90     | 15.03       | 16.93      | 0.50           | 17.43              | 0.05534          | 29            | 0.00524                 | 1.00000                       |
| 5.2G;D1D   | 6.56     | 28.12       | 34.68      | 0.50           | 35.18              | 3.29610          | 29            | 0.31189                 | 1.00000                       |
| 5.8G;D1D   | 6.36     | 28.47       | 34.83      | 0.50           | 35.33              | 3.41193          | 29            | 0.32285                 | 1.00000                       |

### Simultaneous Transmission Analysis Mode:

#### WLAN 2.4GHz + 5GHz Low Band + 5GHz High Band + Bluetooth BR/EDR + IEEE 802.15.4

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;D1D   | 5.01     | 29.74       | 34.75      | 0.50           | 35.25              | 3.34965          | 29            | 0.31695                 | 1.00000                       | 0.31695         |
| 5.2G;D1D   | 6.56     | 28.12       | 34.68      | 0.50           | 35.18              | 3.29610          | 29            | 0.31189                 | 1.00000                       | 0.31189         |
| 5.8G;D1D   | 6.36     | 28.47       | 34.83      | 0.50           | 35.33              | 3.41193          | 29            | 0.32285                 | 1.00000                       | 0.32285         |
| 2.4G;BT-BR | 2.30     | 7.74        | 10.04      | 0.50           | 10.54              | 0.01132          | 29            | 0.00107                 | 1.00000                       | 0.00107         |
| 802.15.4   | 1.90     | 15.03       | 16.93      | 0.50           | 17.43              | 0.05534          | 29            | 0.00524                 | 1.00000                       | 0.00524         |
|            |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.95800         |
|            |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

#### WLAN 2.4GHz + 5GHz Low Band + 5GHz High Band + Bluetooth BR/EDR + Bluetooth LE

| Mode       | DG (dBi) | Power (dBm) | EIRP (dBm) | Tolerance (dB) | Tune-up EIRP (dBm) | Tune-up EIRP (W) | Distance (cm) | S (mW/cm <sup>2</sup> ) | S Limit (mW/cm <sup>2</sup> ) | Ratio (S/Limit) |
|------------|----------|-------------|------------|----------------|--------------------|------------------|---------------|-------------------------|-------------------------------|-----------------|
| 2.4G;D1D   | 5.01     | 29.74       | 34.75      | 0.50           | 35.25              | 3.34965          | 29            | 0.31695                 | 1.00000                       | 0.31695         |
| 5.2G;D1D   | 6.56     | 28.12       | 34.68      | 0.50           | 35.18              | 3.29610          | 29            | 0.31189                 | 1.00000                       | 0.31189         |
| 5.8G;D1D   | 6.36     | 28.47       | 34.83      | 0.50           | 35.33              | 3.41193          | 29            | 0.32285                 | 1.00000                       | 0.32285         |
| 2.4G;BT-BR | 2.30     | 7.74        | 10.04      | 0.50           | 10.54              | 0.01132          | 29            | 0.00107                 | 1.00000                       | 0.00107         |
| 2.4G;BT-LE | 1.90     | 15.78       | 17.68      | 0.50           | 18.18              | 0.06577          | 29            | 0.00622                 | 1.00000                       | 0.00622         |
|            |          |             |            |                |                    |                  |               |                         | Sum Ratio                     | 0.95898         |
|            |          |             |            |                |                    |                  |               |                         | Ratio Limit                   | 1               |

Note: The above antenna gain was declared by manufacturer.

————THE END————