

# 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

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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



## **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.

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

<b>Applicant</b>	
<b>Company Name</b>	Veea Inc.
<b>Address</b>	164 E 83rd Street, NEW YORK, United States 10028

<b>Manufacturer</b>	
<b>Company Name</b>	Veea Inc.
<b>Address</b>	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 WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz ZigBee: 2405 MHz ~ 2480 MHz
Mode	WLAN 2.4GHz 802.11b/g WLAN 2.4GHz 802.11n HT20/HT40 WLAN 2.4GHz 802.11ac VHT20/VHT40 WLAN 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a WLAN 5GHz 802.11n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 WLAN 5GHz 802.11ax HE20/HE40/HE80 Bluetooth BR/EDR/LE 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
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 Power Density / Limit	WLAN 5GHz Low Band Power Density / Limit	WLAN 5GHz High Band Power Density / Limit	Bluetooth Power Density / Limit	ZigBee or BLE Power Density / Limit	$\Sigma$ (Power Density / Limit) of WLAN2.4GHz + WLAN 5GHz Low Band + WLAN5GHz High Band + Bluetooth BR/EDR+ Bluetooth 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 collocation 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-----