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FCC RF Exposure Evaluation

Report Number:

F240669E1

Equipment under Test (EUT):

VCUNH1

Applicant:

Robert Bosch GmbH

Manufacturer:

Robert Bosch GmbH

ilac-MRA

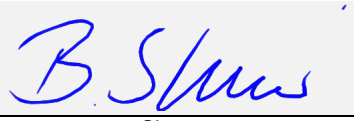
DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

[1] **CFR 47 Rule part 1** Practice and Procedure

[2] **CFR 47 Rule part 2** Frequency Allocations and Radio Treaty Matters; General Rules and Regulations

[3] **KDB 447498 D04 Interim General RF Exposure Guidance v01**

Assessed and written by:		Bernd STEINER 28.01.2025
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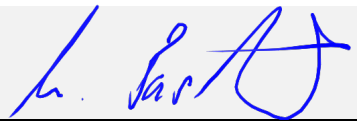
Reviewed and approved by:		Manuel BASTERT 28.01.2025
	Signature	

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1 Identification

1.1 Applicant

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1.2 Manufacturer

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Country:	Germany
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1.3 Test Laboratory

The evaluation was carried out by: **PHOENIX TESTLAB GmbH**
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accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) according to DIN EN ISO/IEC 17025:2018. The accreditation is only valid for the scope of accreditation listed in the annex of the certificate D-PL-17186-01-00.

1.4 EUT (Equipment under Test)

Test object: *	Virtual Cockpit Unit
Model name: *	VCUNH1
Article number: *	Not available
FCC ID: *	2AUXS-VCUNH1

	EUT number
	1
Serial number: *	Not available
PCB identifier: *	Not available
Hardware version: *	C3
Software version: *	SW SQBR6-32.4
Type Plate	Not available

* Declared by the applicant

1.5 Technical Data of Equipment

General EUT data			
Power supply EUT: *	DC		
Supply voltage EUT: *	U_{Nom}= 13.5 V_{DC}	U_{Min}= 6.0 V_{DC}	U_{Max}= 16.0 V_{DC}
Temperature range: *	-40°C to +85°C		
Lowest / highest internal clock frequency: *	1 Hz / 7.55 GHz		

IEEE 802.11 frequencies (2.4 GHz)	
20 MHz	
Channel 1	2412 MHz
Channel 2	2417 MHz
Channel 3	2422 MHz
Channel 4	2427 MHz
Channel 5	2432 MHz
Channel 6	2437 MHz
Channel 7	2442 MHz
Channel 8	2447 MHz
Channel 9	2452 MHz
Channel 10	2457 MHz
Channel 11	2462 MHz

IEEE 802.11 frequencies (5 GHz)					
20 MHz		40 MHz		80 MHz	
Channel 36	5180 MHz	Channel 38	5190 MHz	-	-
Channel 40	5200 MHz	-	-	Channel 42	5210 MHz
Channel 44	5220 MHz	Channel 46	5230 MHz	-	-
Channel 48	5240 MHz	-	-	-	-
Channel 149	5745 MHz	-	-	-	-
Channel 153	5765 MHz	Channel 151	5755 MHz	-	-
Channel 157	5785 MHz	-	-	Channel 155	5775 MHz
Channel 161	5805 MHz	Channel 159	5795 MHz	-	-
Channel 165	5825 MHz	-	-	-	-

Bluetooth® low energy frequencies			
Channel 00	2402 MHz	Channel 01	2404 MHz
Channel 02	2406 MHz	Channel 03	2408 MHz
…	…	…	…
…	…	…	…
Channel 18	2438 MHz	Channel 19	2440 MHz
…	…	…	…
…	…	…	…
Channel 36	2474 MHz	Channel 37	2476 MHz
Channel 38	2478 MHz	Channel 39	2480 MHz

IEEE 802.11 radio mode (2.4 GHz)		
Fulfils radio specification: *	IEEE 802.11 b IEEE 802.11 g IEEE 802.11 n (20 MHz) IEEE 802.11 n (40 MHz) IEEE 802.11 ax (20 MHz) IEEE 802.11 ax (40 MHz)	
Radio chip: *	Qualcomm QCA6696 / Alps UGKZDA2001AB	
Antenna type: *	Internal antenna: External antenna:	Inverted F-antenna Dipole printed (passive unfiltered)
Antenna name: *	Internal antenna: External antenna:	NA WIFI Antenna Part Number 2310901
Antenna gain: *	Internal antenna: External antenna:	5.20 dBi 5.57 dBi
Antenna connector: *	Internal antenna: External antenna:	- (none) Fakra
Type of modulation: *	IEEE 802.11 b	BPSK, DQPSK, CCK (1/2/5.5/11 Mbit/s)
	IEEE 802.11 g	BPSK, QPSK, 16-QAM, 64-QAM (6/9/12/18/24/36/48/54 Mbit/s)
	IEEE 802.11 n20	BPSK, QPSK, 16-QAM, 64-QAM (up to 72.2 Mbit/s 1 spatial stream) (up to 144.4 Mbit/s 2 spatial stream) (up to 72.2 Mbit/s 1 spatial stream) (up to 144.4 Mbit/s 2 spatial stream)
	IEEE 802.11 ax20	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 143.4 Mbit/s 1 spatial stream) (up to 286.8 Mbit/s 2 spatial stream)
Operating frequency range: *	IEEE 802.11b	2412 – 2462 MHz
	IEEE 802.11g	2412 – 2462 MHz
	IEEE 802.11n 20 MHz	2412 – 2462 MHz
	IEEE 802.11ax 20 MHz	2412 – 2462 MHz
Number of channels: *	IEEE 802.11b	11 (5 MHz channel spacing)
	IEEE 802.11g	11 (5 MHz channel spacing)
	IEEE 802.11n 20 MHz	11 (5 MHz channel spacing)
	IEEE 802.11ax 20 MHz	11 (5 MHz channel spacing)

* The external antenna was only active for WLAN, Bluetooth Low Energy can only be transmitted from the internal antenna

IEEE 802.11 radio mode (5GHz)		
Fulfils radio specification: *	IEEE 802.11 a IEEE 802.11 n (20 MHz) IEEE 802.11 n (40 MHz) IEEE 802.11 ac (20 MHz) IEEE 802.11 ac (40 MHz) IEEE 802.11 ac (80 MHz) IEEE 802.11 ax (20 MHz) IEEE 802.11 ax (40 MHz) IEEE 802.11 ax (80 MHz)	
Radio chip: *	Qualcomm QCA6696 / Alps UGKZDA2001AC	
Antenna type: *	Internal antenna: External antenna:	Inverted F-antenna Dipole printed (passive unfiltered)
Antenna name: *	Internal antenna: External antenna:	NA WIFI Antenna Part Number 2310901
Antenna gain: *	Internal antenna: External antenna:	4.90 dBi (typical) 2.22 dBi (typical)
Antenna connector: *	Internal antenna: External antenna:	- (none) FAKRA
Type of modulation: *	IEEE 802.11 a	BPSK, QPSK, 16-QAM, 64-QAM (6/9/12/18/24/36/48/54 Mbit/s)
	IEEE 802.11 n20	BPSK, QPSK, 16-QAM, 64-QAM (up to 72.2 Mbit/s 1 spatial stream) (up to 144.4 Mbit/s 2 spatial stream)
	IEEE 802.11 n40	BPSK, QPSK, 16-QAM, 64-QAM (up to 150 Mbit/s 1 spatial stream) (up to 300 Mbit/s 2 spatial stream)
	IEEE 802.11 ac20	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (up to 86.65 Mbit/s 1 spatial stream) (up to 173.3 Mbit/s 2 spatial stream)
	IEEE 802.11 ac40	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (up to 200 Mbit/s 1 spatial stream) (up to 400 Mbit/s 2 spatial stream)
	IEEE 802.11 ac80	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (up to 433.35 Mbit/s 1 spatial stream) (up to 866.7 Mbit/s 2 spatial stream)
	IEEE 802.11 ax20	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 143.4 Mbit/s 1 spatial stream) (up to 286.8 Mbit/s 2 spatial stream)
	IEEE 802.11 ax40	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 286.8 Mbit/s 1 spatial stream) (up to 573.5 Mbit/s 2 spatial stream)

IEEE 802.11 radio mode (5GHz)		
Type of modulation: * (cont.)	IEEE 802.11 ax80	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 600.5 Mbit/s 1 spatial stream) (up to 1201 Mbit/s 2 spatial stream)
Operating frequency range: *	IEEE 802.11a	5180 – 5240 MHz, 5745 – 5825 MHz
	IEEE 802.11n 20 MHz	5180 – 5240 MHz, 5745 – 5825 MHz
	IEEE 802.11n 40 MHz	5190 – 5230 MHz, 5755 – 5795 MHz
	IEEE 802.11ac 20 MHz	5180 – 5240 MHz, 5745 – 5825 MHz
	IEEE 802.11ac 40 MHz	5190 – 5230 MHz, 5755 – 5795 MHz
	IEEE 802.11ac 80 MHz	5210, 5755 MHz
	IEEE 802.11ax 20 MHz	5180 – 5240 MHz, 5745 – 5825 MHz
	IEEE 802.11ax 40 MHz	5190 – 5230 MHz, 5755 – 5795 MHz
	IEEE 802.11ax 80 MHz	5210, 5755 MHz

* Declared by the applicant

Bluetooth® low energy radio mode		
Fulfils radio specification: *	Bluetooth® Low Energy (BLE) 5.2	
Radio chip: *	Qualcomm QCA6696 / Alps UGKZDA2001AB	
Antenna type: *	Internal antenna*2:	Inverted F-antenna
Antenna name: *	Internal antenna*2:	NA
Antenna gain: *	Internal antenna*2:	5.20 dBi (typical)
Antenna connector: *	Internal antenna*2:	None*3
Type of modulation: *	BLE (1 Mbps PHY)	GFSK
	BLE (2 Mbps PHY)	GFSK
Operating frequency range: *	BLE (1 Mbps PHY)	2402 – 2480 MHz
	BLE (2 Mbps PHY)	2402 – 2480 MHz
Number of channels: *	BLE (1 Mbps PHY)	40 (2 MHz channel spacing)
	BLE (2 Mbps PHY)	40 (2 MHz channel spacing)

* Declared by the applicant
*2 Bluetooth Low Energy only uses the internal antenna
*3 Temporary antenna connector for test-purposes was provided by the applicant.

1.6 Additional Information

None

2 Evaluation Methods

2.1 RF exposure test exemptions for single sources

2.1.1 General Exemption 1.1307(b)(3)(i)(A)

The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

2.1.2 SAR Based Exemption 1.1307(b)(3)(i)(B)

Determination of exemption

The available maximum time-averaged power of effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz inclusive.

For the following separation distances [d] and frequency ranges P_{th} is given by the following formulas

	0.5 cm ≤ d ≤ 20cm	20 cm < d ≤ 40 cm
0.2 GHz ≤ f < 1.5 GHz	$P_{th}(mW) = ERP_{20cm}\left(\frac{d}{20}\right)^{x}$ $ERP_{20cm}\ (mW) = 2040f$ $x = -log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right)$	$P_{th}(mW) = ERP_{20cm}$ $ERP_{20cm}\ (mW) = 2040f$
1.5 GHz ≤ f ≤ 6 GHz	$P_{th}(mW) = ERP_{20cm}\left(\frac{d}{20}\right)^{x}$ $ERP_{20cm}\ (mW) = 3060$ $x = -log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right)$	$P_{th}(mW) = ERP_{20cm}$ $ERP_{20cm}\ (mW) = 3060$

2.1.3 MPE Based Exemption 1.1307(b)(3)(i)(C)

By using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

RF Source frequency [MHz]	Threshold ERP [W]
0.3 -1.34	1920 R^2
1.34 – 30	3450 R^2/f^2
30 – 300	3.83 R^2
300 – 1500	0.0128 R^2/f
1500 - 100000	19.2 R^2

2.1.4 Stand alone MPE evaluation limits

The human exposure to RF emissions from such devices could be evaluated based on the MPE limits adopted by the FCC for electric and magnetic field strength and / or power density. The limits for General Population / Uncontrolled Exposure are given in the following table from §1.1310(e)1:

Frequency Range [MHz]	Electric Field Strength (E) [V/m]	Magnetic Field Strength (H) [A/m]	Power Density (S) [mW/cm²]	Averaging Time $\|E\|^2$,$\|H\|^2$ or S [min]
0.3 – 1.34	614	1.63	*(100)	< 30
1.34 – 30	824/f	2.19/f	*(180/f²)	< 30
30 – 300	27.5	0.073	0.2	< 30
300 – 1500			f/1500	< 30
1500 – 100,000			1.0	< 30

Limits for General Population / Uncontrolled Exposure.

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

The power density is calculated as follows:

$$S = \frac{P \cdot G \cdot D}{4 \cdot \pi \cdot d^2}$$

Where:

P: conducted power

G: Antenna gain (linear)

D: Duty Cycle

d: minimum separation distance from antenna to the user

2.2 RF exposure test exemptions for simultaneous transmission sources

2.2.1 1 mW Test Exemption for simultaneous transmission sources

As discussed in §1.1307(b)(3)(ii)(A) [1] the 1 mW exemption intended for single transmitters may be also applied to simultaneous transmission conditions, within the same host device, according one of the following criteria:

a. When the maximum available power each individual transmitting antenna with the same time averaging period is ≤ 1 mW, and the nearest parts of the antenna structures of the simultaneously operating transmitters are separated by at least 2 cm
b. When the aggregate maximum available power of all transmitting antennas is ≤ 1 mW in the same time-averaging period

This exemption may not be combined with any other exemption.

2.2.2 Simultaneous transmission SAR based and MPE based test exemptions.

Although this is not a module integration in the sense of product approval, the procedure for simultaneous transmission specified in KDB 447498 D04 Interim General RF Exposure Guidance v01 in chapter 2.2 was taken into account:

According to the RF exposure KDB 447498 D04 General RF Exposure Guidance v01 in chapter 2.2.2:
This case is described in detail in § 1.1307(b)(3)(ii)(B) and covers the situations where both SAR-based and MPE-based exemption may be considered for test exemption in fixed, mobile, or portable device exposure conditions. For these cases, a device with multiple RF sources transmitting simultaneously will be considered an RF exempt device if the condition of the following formular is satisfied.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{i=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

For these test exemptions to apply, the maximum output power, duty factor, and other applicable parameters used in the standalone ERP determination tests, must be the same, or corresponding to a more conservative choice, than those required for simultaneous transmission.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0, according to calculated/estimated, numerically modelled, or measured field strengths or power density. The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to the MPE limit at the test frequency.

2.2.3 Test exemption based on the SAR to Peak Location Separation Ratio

When the ERP-based condition in the previous section does not apply, a test exemption may be still applicable based on the SAR to peak location separation ratio (SPLSR) procedure.
In this case, the simultaneously transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SPLSR that qualifies for the additional test exemption.
This ratio is defined as:

$$SPLSR = (SAR_1 + SAR_2)^{\frac{1.5}{R_i}}$$

Where: SAR_1 and SAR_2 = highest reported SAR or estimated SAR values for the two sources in the pair i, and R_i is their distance in mm.
When SPLSR ≤ 0.0.4 (rounded to two decimal digits), for all antenna pairs in the configuration, then the device qualifies for 1 g SAR test exemption.
When 10 g SAR applies (e.g. for extremities) the corresponding test exemption condition is SPLSR ≤ 0.10.
If any antenna pair does not qualify for simultaneous transmission SAR test exemption, then the device must be tested for SAR compliance, according to the enlarged zoom scan and volume scan post-processing procedures in KDB Pub. 865664 D01.

3 Results of evaluation

3.1 Used evaluation methods

RF Exposure test exemptions for single sources			
Used	Method	See sub-clause	Comment
☐	General Exemption acc. 1.1307(b)(3)(i)(A) [1]	2.1.1	-
☒	SAR Based Exemption acc. 1.1307(b)(3)(i)(B) [1]	2.1.2	For Ant 0 and 1
☐	MPE Based Exemption acc. 1.1307(b)(3)(i)(C) [1]	2.1.3	-
☐	MPE Calculation	2.1.4	

RF Exposure test exemptions for simultaneous transmission sources			
Used	Method	See sub-clause	Comment
☐	1 mW test Exemption acc. 2.2.1 [3]	2.2.1	-
☒	SAR and MPE Based Exemption acc. 2.2.2 [3]	2.2.2	
☐	SAR to Peak location separation ratio acc. 2.2.3 [3]	2.2.3	

3.2 Evaluation Distance

According to the CFR47 §2.1091 the device as declared by the applicant is a mobile device which is used at least with the following separation distances between the device and the users.

Antenna	Min separation distance as declared by the applicant
Antenna 0	12.93 cm
Antenna 1	4.70 cm

3.3 WLAN 2.4 GHz Emissions

The following information are based on Test-Report B23N00972-MPE from SAICT and the technical passport provided by the applicant

Antenna 0 SAR Based Exemption 1.1307(b)(3)(i)(B)

P_{con} [dBm] incl. Tuneup	P_{con} [mW] incl. Tuneup	Ant. Gain [dBi]	Cable Attenuation [dB]	$P_{e.i.r.p}$ [dBm]	$P_{e.i.r.p}$ [mW]	$P_{e.r.p}$ [dBm]	$P_{e.r.p}$ [mW]
21.14	130.02	5.20	0.80	25.54	358.10	23.39	218.35

Frequency [GHz]	d [cm]	ERP_{20cm}	x	P_{th} [mW]	$P_{e.r.p.}$ [mW]	Result
2.462	12.93	3060	1.903	1334.11	218.35	exempted
for 0.5 cm ≤ D ≤ 20 cm and 1.5 GHz ≤ f ≤ 6 GHz						

Note 1: P_{con} and Ant. Gain was declared by the manufacturer
Note 2: $P_{e.r.p.}$ = P_{con} [dBm] + Ant. Gain [dBi] – Cable Attenuation [dB] – 2.15 dB

Due to the fact that for separation distances larger than d the value for $P_{e.r.p}$ is lower than P_{th} this emission is exempted from SAR Evaluation

Antenna 1 SAR Based Exemption 1.1307(b)(3)(i)(B)

P_{con} [dBm] incl. Tuneup	P_{con} [mW] incl. Tuneup	Ant. Gain [dBi]	Cable Attenuation [dB]	$P_{e.i.r.p}$ [dBm]	$P_{e.i.r.p}$ [mW]	$P_{e.r.p}$ [dBm]	$P_{e.r.p}$ [mW]
19.14	82.04	5.57	1.40	23.31	214.29	21.16	130.66

Frequency [GHz]	d [cm]	ERP_{20cm}	x	P_{th} [mW]	$P_{e.r.p.}$ [mW]	Result
2.462	4.70	3060	1.903	194.41	130.66	exempted
for 0.5 cm ≤ D ≤ 20 cm and 1.5 GHz ≤ f ≤ 6 GHz						

Note 1: P_{con} and Ant. Gain was declared by the manufacturer
Note 2: $P_{e.r.p.}$ = P_{con} [dBm] + Ant. Gain [dBi] – Cable Attenuation [dB] – 2.15 dB

Due to the fact that for separation distances larger than d the value for $P_{e.r.p}$ is lower than P_{th} this emission is exempted from SAR Evaluation

3.4 WLAN 5 GHz Emissions

The following information are based on Test-Report B23N00972-MPE from SAICT and the technical passport provided by the applicant

Antenna 0 SAR Based Exemption 1.1307(b)(3)(i)(B)

P_{con} [dBm] incl. Tuneup	P_{con} [mW] incl. Tuneup	Ant. Gain [dBi]	Cable Attenuation [dB]	$P_{e.i.r.p}$ [dBm]	$P_{e.i.r.p}$ [mW]	$P_{e.r.p}$ [dBm]	$P_{e.r.p}$ [mW]
18.84	76.56	4.90	1.50	22.24	167.49	20.09	102.13

Frequency [GHz]	d [cm]	ERP_{20cm}	x	P_{th} [mW]	$P_{e.r.p.}$ [mW]	Result
5.825	12.93	3060	2.090	1229.61	102.13	exempted
for 0.5 cm ≤ D ≤ 20 cm and 1.5 GHz ≤ f ≤ 6 GHz						

Note 1: P_{con} and Ant. Gain was declared by the manufacturer
Note 2: $P_{e.r.p.} = P_{con}$ [dBm] + Ant. Gain [dBi] – Cable Attenuation [dB] – 2.15 dB

Due to the fact that for separation distances larger than d the value for $P_{e.r.p}$ is lower than P_{th} this emission is exempted from SAR Evaluation

Antenna 1 SAR Based Exemption 1.1307(b)(3)(i)(B)

P_{con} [dBm] incl. Tuneup	P_{con} [mW] incl. Tuneup	Ant. Gain [dBi]	Cable Attenuation [dB]	$P_{e.i.r.p}$ [dBm]	$P_{e.i.r.p}$ [mW]	$P_{e.r.p}$ [dBm]	$P_{e.r.p}$ [mW]
14.84	30.48	2.22	2.29	14.77	29.99	12.62	18.29

Frequency [GHz]	d [cm]	ERP_{20cm}	x	P_{th} [mW]	$P_{e.r.p.}$ [mW]	Result
5.825	4.70	3060	2.090	148.29	18.29	exempted
for 0.5 cm ≤ D ≤ 20 cm and 1.5 GHz ≤ f ≤ 6 GHz						

Note 1: P_{con} and Ant. Gain was declared by the manufacturer
Note 2: $P_{e.r.p.} = P_{con}$ [dBm] + Ant. Gain [dBi] – Cable Attenuation [dB] – 2.15 dB

Due to the fact that for separation distances larger than d the value for $P_{e.r.p}$ is lower than P_{th} this emission is exempted from SAR Evaluation

3.5 Bluetooth Emission

The following information are based on Test-Report B23N00972-MPE from SAICT and the technical passport provided by the applicant

Antenna 0 SAR Based Exemption 1.1307(b)(3)(i)(B)

P_{con} [dBm] incl. Tuneup	P_{con} [mW] incl. Tuneup	Ant. Gain [dBi]	Cable Attenuation [dB]	$P_{e.i.r.p}$ [dBm]	$P_{e.i.r.p}$ [mW]	$P_{e.r.p}$ [dBm]	$P_{e.r.p}$ [mW]
5.64	3.66	5.20	0.80	10.04	10.09	7.89	6.15

Frequency [GHz]	d [cm]	ERP_{20cm}	x	P_{th} [mW]	$P_{e.r.p.}$ [mW]	Result
2.480	12.93	3060	1.905	1333.19	6.15	exempted
for 0.5 cm ≤ D ≤ 20 cm and 1.5 GHz ≤ f ≤ 6 GHz						

Note 1: P_{con} and Ant. Gain was declared by the manufacturer
Note 2: $P_{e.r.p.} = P_{con}$ [dBm] + Ant. Gain [dBi] – Cable Attenuation [dB] – 2.15 dB

Due to the fact that for separation distances larger than d the value for $P_{e.r.p}$ is lower than P_{th} this emission is exempted from SAR Evaluation

3.6 Simultaneous transmission

As declared by the applicant, only WLAN 2.4 GHz and Bluetooth or WLAN 5 GHz and Bluetooth can transmit simultaneously.

Ratio assessment:

Scenario 1:

	$P_{e.r.p}$ [mW]	P_{th} [mW]	$P_{e.r.p}$ / P_{th} Ratio
WLAN 2.4 GHz Ant 0	218.35	1334.11	0.1637

	$P_{e.r.p}$ [mW]	P_{th} [mW]	$P_{e.r.p}$ / P_{th} Ratio
WLAN 2.4 GHz Ant 1	130.66	194.41	0.6721

	$P_{e.r.p}$ [mW]	P_{th} [mW]	$P_{e.r.p}$ / P_{th} Ratio
Bluetooth Ant 0	6.15	1333.19	0.0046

		Limit	Sum Ratios
		1	**0.8404**

Scenario 2:

	$P_{e.r.p}$ [mW]	P_{th} [mW]	$P_{e.r.p}$ / P_{th} Ratio
WLAN 5 GHz Ant 0	102.13	1229.61	0.0831

	$P_{e.r.p}$ [mW]	P_{th} [mW]	$P_{e.r.p}$ / P_{th} Ratio
WLAN 5 GHz Ant 1	18.29	148.29	0.1233

	$P_{e.r.p}$ [mW]	P_{th} [mW]	$P_{e.r.p}$ / P_{th} Ratio
Bluetooth Ant 0	6.15	1333.19	0.0046

		Limit	Sum Ratios
		1	**0.2110**

Due to fact that the sum of all ratios is below 1 the device under test could be considered as an RF exempted device.

4 Conclusion

The VCUNH1 complies in all operational modes to the limits given in CFR 47 §1.1310(e)1 in a separation distance of 12.93 cm for antenna 0 and 4.70 cm for antenna 1.

5 Report History

Report Number	Date	Comment
F240669E1	28.01.2025	Initial Evaluation Report
-	-	-
-	-	-

------ End of evaluation report ------