Radio Frequency Exposure Evaluation Report

For:
Lucid USA, Inc.

Host Model: P21-K2C000
Module Model: JODY-W354-00A

Host Product Description:
UCC (Unified Cockpit Controller)

FCC ID: 2AXZJ-K2B100
IC: 27970-K2B100

Applied Rules and Standards:
CFR Part Part1 (1.1307 &1.1310), Part 2 (2.1091),
FCC KDB 447498 D01 General RF Exposure Guidance v06
ISED RSS-102 Issue 6

Report number: EMC_LUCID_019_24001_RF_Exposure

DATE: 2024-10-02

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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for mobile devices as defined in FCC CFR Part 1 (1.1307 &1.1310), Part 2 (2.1091) and ISED standard RSS-102 issue 6 under worst case conditions (measured or rated RF output power, antenna gain, distance towards human body, multiple transmitter information as presented by the applicant).
In addition, maximum antenna gain or minimum distance towards the human body is calculated respectively, where relevant.

The device meets the limits as stipulated by the above given FCC and ISED rule parts based on available specifications for worst-case conditions at 20 cm distance to the body.

Company	Description	Host Model #	Module Model #
Lucid USA, Inc.	UCC (Unified Cockpit Controller)	P21-K2C000	JODY-W354-00A

Responsible for the Report:

Date	Section	Name	Signature
2024-10-02	Compliance	Art Thammanavarat (Senior EMC Engineer)	Art Thammanavarat Digitally signed by: Art Thammanavarat DN: CN = Art Thammanavarat email = art.thammanavarat@cetecom.com C = AD Date: 2024.10.02 14:48:23 -07'00'

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Alvin, Ilarina
Responsible Project Leader:	Akanksha Baskaran

2.2 Identification of the Client

Client Firm/Name:	Lucid USA, Inc.
Street Address:	7373 Gateway Blvd
City/Zip Code	Newark, California, 94560
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

3.1 EUT Specifications

Host Model No	P21-K2C000
HW Version	01
SW Version	491
Contains FCC ID :	2AXZJ-K2B100
Contains IC:	27970-K2B100
Product Description	UCC (Unified Cockpit Controller)
Radio Module	**Wi-Fi & Bluetooth Modules** **Model Name** : Ublox **Model Number :** JODY-W354-00A **Wireless Technologies** **Wi-Fi 5GHz :** 802.11a/ac **Bluetooth :** BDR/DER, BLE
Co-located Transmitters/ Antennas?	Bluetooth with WiFi can transmit simultaneously
Rated Operating Voltage Range	9V to 16V DCs
Operating Temperature Range	-40 °C to 85 °C
Sample Revision	■Production Unit; ☐Pre-Production
Device Category	☐Fixed Installation ■Mobile ☐Portable
Exposure Category	☐ Occupational/ Controlled ■ General Population/ Uncontrolled

3.2 Antenna Information

Radio Technology	Conducted RF Power (dBm)	Peak Antenna Gain (dBi)
Bluetooth 2.4 GHz	Bluetooth: +11.5 dBm BLE: +8.4 dBm	3.8
WLAN 5GHz	5GHz WLAN UNII-1: +18.2dBm 5GHz WLAN UNII-3: +17.0dBm	2.5

4 RF Exposure Evaluation Methods

FCC

4.1.1 § 2.1093(c)(1)

Evaluation of compliance with the exposure limits in § 1.1310 of this chapter, and preparation of an EA if the limits are exceeded, is necessary for mobile devices with single RF sources having either more than an available maximum time-averaged power of 1 mW or more than the ERP listed in Table 1 to § 1.1307(b)(3)(i)(C), whichever is greater. For mobile devices not exempt by § 1.1307(b)(3)(i)(C) at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 of this chapter is necessary if the ERP of the device is greater than ERP20cm in the formula below. If the ERP of a single RF source at distances from 20 centimeters to 40 centimeters and frequencies from 0.3 GHz to 6 GHz is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP) in comparison with the following formula only 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).

$$P_{th}(\text{mW}) = ERP_{20\,cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

4.1.2 § 2.1093(c)(2)

For multiple mobile or portable RF sources within a device operating in the same time averaging period, routine environmental evaluation is required if the formula in § 1.1307(b)(3)(ii)(B) of this chapter is applied to determine the exemption ratio and the result is greater than 1.

4.1.3 § 1.1307(b)(3)(ii)(B)

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

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

ISED RSS 102

4.1.4 Clause 2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 4.49/f0.5 W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10-2 f0.6834 W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived

5 Evaluations

5.1 FCC RF Exposure (Standalone)

Radio	Tech-Band	Freq-Low$_{[GHz]}$	Pwr$_{[dBm]}$	Power$_{[W]}$	Ant-G$_{[dBi]}$	EIRP$_{[W]}$	ERP$_{[W]}$	Threshold ERP$_{[W]}$	ERP < Threshold ERP$_{[W]}$	FCC 2.1093(c)(1) Pth$_{[mW]}$ = ERP$_{20cm}$
BT	EDR	2.4020	11.50	0.0141	3.80	0.0339	0.0207	0.77	Yes	3060.00
	LE	2.4020	8.40	0.0069	3.80	0.0166	0.0101	0.77	Yes	3060.00
WLAN	802.11a	5.1800	18.20	0.0661	2.50	0.1175	0.0716	0.77	Yes	3060.00
	802.11a	5.7450	17.00	0.0501	2.50	0.0891	0.0543	0.77	Yes	3060.00

5.2 ISED RF Exposure (Standalone)

								RF Exposure RSS-102 2.5.2 D>20 cm (300 ≤ Freq < 6000 MHz)	
Radio	Tech-Band	Freq-Low [MHZ]	Pwr$_{[dBm]}$	Power$_{[W]}$	Ant-G [dBi]	EIRP$_{[W]}$	EIRP$_{[mW]}$	Exemption limit for Routine Evaluation	Exemption (Y/N)
BT	EDR	2402.00	11.50	0.01	3.80	0.034	33.88	2.68	Yes
	LE	2402.00	8.40	0.01	3.80	0.017	16.60	2.68	Yes
WLAN	802.11a	5180.00	7.00	0.01	2.50	0.009	8.91	4.53	Yes
	802.11a	5745.00	17.00	0.05	2.50	0.089	89.13	4.86	Yes

Note: All calculations are with the manufacturer declared distance R = 20 cm minimum separation between the antenna and the human body.

Conclusion:

- The maximum RF emissions from this equipment fulfills the RF exclusion threshold limits for separation distance between the antenna and the human body greater than 20 cm. No RF Exposure evaluation is required.

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5.3 RF Exposure Test Exemptions for Simultaneous Transmission Sources

- Theoretically, the worst case of simultaneous transmission is with the Wi-Fi 5GHz and BT transmitters operating at the highest output power mode, within the nearest frequency bands.

Regulation Authority	Applicable Simultaneous Transmission Sources	Sum of the ratios of the applicable terms	Limit	RF Exclusion No evaluation required
FCC	UNII-1 + BDR	0.0067 + 0.0234 = 0.030	< 1	Yes

Conclusion:

- The sum of the fractional contributions to the applicable thresholds is less than or equal to 1, hence the multiple RF sources are exempt

6 Revision History

Date	Report Name	Changes to report	Report prepared by
2024-10-02	EMC_LUCID_019_24001_RF_Exposure	Initial Version	Art Thammanavarat

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