

Radio Exposure Evaluation Report

FCC ID : 2AXZJ-CTX0710W3
Equipment : Telematics Control Unit
Brand Name : Lucid USA, Inc
Model Name : P11-K290G0-02
Applicant : Lucid USA, Inc
Lucid Motors, Inc 7373 Gateway Blvd,
Newark, California, United States, 94560
Manufacturer : Lucid USA, Inc
Lucid Motors, Inc 7373 Gateway Blvd,
Newark, California, United States, 94560
Standard : 47 CFR FCC Part 2 Subpart J, section 2.1091

The product was received on Jan. 17, 2023, and testing was started from Feb. 08, 2023 and completed on Feb. 16, 2023. We, SPORTON INTERNATIONAL INC. Hsinhua Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR FCC Part 2 Subpart J, section 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. Hsinhua Laboratory, the test report shall not be reproduced except in full.



Approved by: Jackson Tsai

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Photographs of EUT V01



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:

None

Reviewed by: Ryan Hsiao

Report Producer: Ann Hou

1 General Description

1.1 Information

1.1.1 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) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)

RF General Information				
Evaluation Mode	Bandwidth (MHz)	TX Frequency (MHz)	RX Frequency (MHz)	Modulation Type
GSM 850	0.2	824.2 – 849.2	869.2 – 894.2	GSM/GPRS: GMSK EDGE: 8PSK
PCS 1900	0.2	1850.2 - 1909.8	1930.2 - 1989.8	
WCDMA Band V	5	826.4 - 846.6	871.4 - 891.6	HSDPA: QPSK/16QAM
WCDMA Band II	5	1852.4 - 1907.6	1932.4 - 1987.6	
WCDMA Band IV	5	1712.4 - 1752.6	2112.4 - 2152.6	
LTE Band 2	1.4	1850.7 - 1909.3	1930.7 - 1989.3	QPSK / 16 QAM
	3	1851.5 - 1908.5	1931.5 - 1988.5	
	5	1852.5 - 1907.5	1932.5 - 1987.5	
	10	1855.0 - 1905.0	1935.0 - 1985.0	
	15	1857.5 - 1902.5	1937.5 - 1982.5	
	20	1860.0 - 1900.0	1940.0 - 1980.0	
LTE Band 4	1.4	1710.7 - 1754.3	2110.7 - 2154.3	
	3	1711.5 - 1753.5	2111.5 - 2153.5	
	5	1712.5 - 1752.5	2112.5 - 2152.5	
	10	1715.0 - 1750.0	2115.0 - 2150.0	
	15	1717.5 - 1747.5	2117.5 - 2147.5	
	20	1720.0 - 1745.0	2120.0 - 2145.0	

LTE Band 5	1.4	824.7 - 848.3	869.7 - 893.3	QPSK / 16 QAM
	3	825.5 - 847.5	870.5 - 892.5	
	5	826.5 - 846.5	871.5 - 891.5	
	10	829.0 - 844.0	874.0 - 889.0	
LTE Band 7	5	2502.5 - 2567.5	2622.5 - 2687.5	
	10	2505 - 2565	2625 - 2685	
	15	2507.5 - 2562.5	2627.5 - 2682.5	
	20	2510 - 2560	2630 - 2680	
LTE Band 12	1.4	699.7 - 715.3	729.7 - 745.3	
	3	700.5 - 714.5	730.5 - 744.5	
	5	701.5 - 713.5	731.5 - 743.5	
	10	704.0 - 711.0	734.0 - 741.0	
LTE Band 13	5	779.5 - 784.5	748.5 - 753.5	
	10	782.0	751.0	
LTE Band 29	3	-	718.5-726.5	
	5	-	719.5-725.5	
	10	-	722-723	
LTE Band 66	1.4	1710.7 - 1779.3	2110.7 - 2179.3	
	3	1711.5 - 1778.5	2111.5 - 2178.5	
	5	1712.5 - 1777.5	2112.5 - 2177.5	
	10	1715 - 1775	2115 - 2175	
	15	1717.5 - 1772.5	2117.5 - 2172.5	
	20	1720 - 1770	2120 - 2170	

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector
1	Amphenol	P11-J67E00-02	FPC	FARKA
2	Amphenol	P11-J67200-02	FPC	FARKA
3	nextium	P11-J44000-00	FPC	FARKA
4	nextium	P11-J44100-00	FPC	FARKA

Ant.	Port	2.4G Gain (dBi)						Remark (Note. 1)
		2400	2420	2440	2460	2480	2500	
1	1	3.1	3.0	2.8	2.9	3.0	3.5	w/o cable
		0.6	0.5	0.3	0.4	0.5	1.0	with cable

Ant.	Port	5G Gain (dBi)				Remark (Note. 2)
		5150	5250	5750	5850	
1	1	1.5	2.2	4.1	4.3	w/o cable
		-1.8	-1.1	0.7	0.9	with cable
2	2	1.7	2.3	3.9	4.1	w/o cable
		-1.6	-1.0	0.5	0.7	with cable

Ant.	Port	WWAN 2G/3G Gain (dBi)					Remark (Note. 3)
		GSM 850	PCS 1900	WCDMA Band 2	WCDMA Band 4	WCDMA Band 5	
3~4	1~2	1.0	4.5	4.5	4.5	1.0	w/o cable
		-0.2	2.7	2.7	2.7	-0.2	with cable

Ant.	Port	WWAN 4G Gain (dBi)						Remark (Note. 3)
		LTE Band 2	LTE Band 4/66	LTE Band 5	LTE Band 7	LTE Band 12	LTE Band 13	
3~4	1~2	4.5	4.5	1.0	5.7	1.0	1.0	w/o cable
		2.7	2.7	-0.2	2.7	-0.2	-0.2	with cable

Note 1: WLAN 2.4G cable loss = 2.5 dB.

Note 2: WLAN 5GHz Band 1 cable loss = 3.3 dB, and 5GHz Band 4 cable loss = 3.4 dB.

Note 3: WWAN cable loss = 1.2 dB (GSM 850, FDD V, LTE Band 5, 12, 13)

WWAN cable loss = 1.8 dB (PCS 1900, FDD II, FDD IV, LTE Band 2, 4/66)

WWAN cable loss = 3.0 dB (LTE Band 7).

Note 4: The EUT has four antennas.

For 2.4GHz function:

For IEEE 802.11 b/g/n/VHT/ax mode (1TX/1RX)

Ant. 1 (port 1) could transmit/receive.

For 5GHz function:

For IEEE 802.11 a mode (1TX/1RX)

Support diversity function and pre-tested on each single chain, the worst case was Ant. 2(port 2) and it was recored in this test report.

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

Ant. 1 (port 1) and Ant. 2 (port 2) could transmit/receive simultaneously.

For WWAN 2G function (1TX/1RX):

Ant. 3 (port 1) could transmit/receive.

For WWAN 3G/4G function (1TX/2RX):

Ant. 3 (port 1) could transmit, and Ant. 3 (port 1) and Ant. 4 (port 2) could receive simultaneously.

1.1.3 Accessories

Accessories		
DC Power Cable	Signal Line	2.0 meter, non-shielded cable, w/o ferrite core
APTIV Cable	Signal Line	2.0 meter, shielded cable, w/o ferrite core
Antenna Cable (WiFi*2)	Signal Line	2.5 meter, shielded cable, w/o ferrite core
Antenna Cable (LTE L & R)	Signal Line	2.5 meter, shielded cable, w/o ferrite core
GPS Cable	Signal Line	2.0 meter, shielded cable, w/o ferrite core

Reminder: Regarding to more detail and other information, please refer to user manual.

1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 2 Subpart J, section 2.1091
 - ♦ KDB 447498 D04 Interim General RF Exposure Guidance v01
- The following reference test guidance is not within the scope of accreditation of TAF.
- ♦ 47 CFR Part 1.1307
 - ♦ 47 CFR Part 1.1310

1.3 Testing Location

Test Lab. : Sporton International Inc. Hsinhua Laboratory		
☒ Hsinhua (TAF: 3785)	ADD: No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333411, Taiwan (R.O.C.)	
	TEL: 886-3-327-3456	FAX: 886-3-327-0973
Test site Designation No. TW3785 with FCC.		

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 ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f ²)*	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 ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f ²)*	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

Multiple Transmitters Condition

Co-location as simultaneously transmitting (co-transmitting) and the evaluation shall be consider that simultaneous transmissions from co-located devices the individual transmitters are evaluated separately. After sum of the individual value (basic restriction / reference level) are measured/calculated also have to under basic restriction / reference level.

Co-transmitting mode: 2.4GHz WLAN +WWAN mode, 5GHz WLAN + WWAN mode

2.2 RF Exposure Exempt Measurement

Option	Refer Std.	Exemption Exposure Thresholds (TL)
A	§1.1307(b)(3)(i)(A)	Available maximum time-averaged power is no more than 1 mW
B	§1.1307(b)(3)(i)(B)	$P_{th}(mW) = \begin{cases} ERP_{20cm} (d / 20cm)^x \rightarrow d \leq 20cm \\ ERP_{20cm} \rightarrow 20cm < d \leq 40cm \end{cases}$ $x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right) \text{ and } f \text{ is in GHz}$ $\begin{cases} ERP_{20cm} : 0.3GHz \leq f < 1.5GHz \rightarrow 2040 f(mW) \\ ERP_{20cm} : 1.5GHz \leq f \leq 6GHz \rightarrow 3060(mW) \end{cases}$
C	§1.1307(b)(3)(i)(C)	$\begin{cases} 0.3 \sim 1.34MHz \rightarrow ERP(W) = 1920R^2 \\ 1.34 \sim 30MHz \rightarrow ERP(W) = 3450R^2 / f^2 \\ 30 \sim 300MHz \rightarrow ERP(W) = 3.83R^2 \\ 300 \sim 1500MHz \rightarrow ERP(W) = 0.0128R^2 f \\ 1500 \sim 100000MHz \rightarrow ERP(W) = 19.2R^2 \end{cases}$ f is in MHz; R is in m; $R > \lambda / 2\pi$

2.3 Multiple RF Sources Exposure

Refer Std.	Exemption Exposure Thresholds (TL)
§1.1307(b)(3)(ii)(A)	The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required)
§1.1307(b)(3)(ii)(B)	$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k} \leq 1$ a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P , including existing exempt transmitters and those being added. b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added. c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters. P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive). P_{th,i} = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i. ERP_j = the ERP of fixed, mobile, or portable RF source j. ERP_{th,j} = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section. Evaluated_k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure. Evaluated Limit_k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.



2.4 MPE Calculation Method

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:

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

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

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

2.5 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

2.4GHz WLAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	0.50	19.09	19.59	0.00	55.4766	20.00	0.01810	1.000	B	3060	0.0181
2.4G;D1D	0.30	17.02	17.32	0.00	32.8935	20.00	0.01073	0.567	B	3060	0.0107

5GHz WLAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
5.2G;D1D	-1.00	19.28	18.28	0.00	41.0308	20.00	0.01339	1.000	B	3060	0.0134
5.8G;D1D	0.90	19.23	20.13	0.00	62.8217	20.00	0.02050	1.000	B	3060	0.0205

WWAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
850;GXW	-0.2	33.89	33.69	0.00	1,425.9687	20.00	0.46530	0.566	B	1732	0.8233
1900;GXW	2.7	29.78	32.48	0.00	1,079.2200	20.00	0.35215	1.000	B	3060	0.3527
02;F9W	2.7	22.98	25.68	0.00	225.4810	20.00	0.07357	1.000	B	3060	0.0737
04;F9W	2.7	23.04	25.74	0.00	228.6178	20.00	0.07460	1.000	B	3060	0.0747
05;F9W	-0.2	23.96	23.76	0.00	144.9139	20.00	0.04729	0.551	B	1686	0.0860
02;G7D	2.7	23.40	26.10	0.00	248.3762	20.00	0.08105	1.000	B	3060	0.0812
02;W7D	2.7	22.55	25.25	0.00	204.2255	20.00	0.06664	1.000	B	3060	0.0667
04;G7D	2.7	23.91	26.61	0.00	279.3251	20.00	0.09114	1.000	B	3060	0.0913
04;W7D	2.7	23.10	25.80	0.00	231.7982	20.00	0.07564	1.000	B	3060	0.0758
05;G7D	-0.2	25.88	25.68	0.00	225.4810	20.00	0.07357	0.558	B	1706	0.1322
05;W7D	-0.2	25.19	24.99	0.00	192.3579	20.00	0.06277	0.565	B	1729	0.1113
07;G7D	2.7	21.65	24.35	0.00	166.0007	20.00	0.05417	1.000	B	3060	0.0542
07;W7D	2.7	20.83	23.53	0.00	137.4390	20.00	0.04485	1.000	B	3060	0.0449
12;G7D	-0.2	23.26	23.06	0.00	123.3417	20.00	0.04025	0.469	B	1436	0.0859
12;W7D	-0.2	22.49	22.29	0.00	103.3023	20.00	0.03371	0.472	B	1443	0.0716
13;G7D	-0.2	22.82	22.62	0.00	111.4577	20.00	0.03637	0.521	B	1595	0.0699
13;W7D	-0.2	21.99	21.79	0.00	92.0683	20.00	0.03004	0.523	B	1600	0.0575
66;G7D	2.7	23.23	25.93	0.00	238.8416	20.00	0.07793	1.000	B	3060	0.0781
66;W7D	2.7	22.42	25.12	0.00	198.2029	20.00	0.06467	1.000	B	3060	0.0648

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

Simultaneous Transmission Analysis Mode: 2.4GHz WLAN + WWAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
2.4G;G1D	0.50	19.09	19.59	0.00	55.4766	20.00	0.01810	1.000	B	3060	0.0181
850;GXW	-0.2	33.89	33.69	0.00	1,425.9687	20.00	0.46530	0.567	B	1734	0.8224
										Sum Ratio	0.8405
										Ratio Limit	1

Simultaneous Transmission Analysis Mode: 5GHz WLAN + WWAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up ERP (mW)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Option	TL ERP (mW)	TL Ratio
5.8G;D1D	0.90	19.23	20.13	0.00	62.8217	20.00	0.02050	1.000	B	3060	0.0205
850;GXW	-0.2	33.89	33.69	0.00	1,425.9687	20.00	0.46530	0.567	B	1734	0.8224
										Sum Ratio	0.8429
										Ratio Limit	1

Note 1: Option A, B and C refer as clause 2.2

Note 2: For option B, Pth(mW) convert to TL ERP(mW); For option C, ERP(W) convert to TL ERP(mW)

Note 3: TL Ratio=Tune-up ERP(mW)/TL ERP(mW)

Note 4: Refer as clause 2.3 Multiple RF Sources Exposure. Please follow below option and sum TL ration table.

Option	Sum TL Ratio_B	Option	Sum TL Ratio_C	Option	Sum TL Ratio_E
B	$\sum_{i=1}^a \frac{P_i}{P_{th,i}}$	C	$\sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}}$	E	$\sum_{k=1}^c \frac{Evaluated_k}{ExposureLimit_k}$

Note: The above antenna gain was declared by manufacturer.

—————THE END—————