

TEST REPORT

Applicant: E&S International Enterprises, Inc.
Address: 7801 Hayvenhurst Avenue, Van Nuys, California
91406, United States.
Equipment Type: LAPTOP
Model Name: PCA010C11L (refer section 2.4)
Brand Name: VAIO
FCC ID: 2AYPE-VJS146
Test Standard: 47 CFR Part 2.1091
KDB 447498 D04 v01
Sample Arrival Date: Mar. 16, 2023
Test Date: Mar. 22, 2023 - Apr. 13, 2023
Date of Issue: May 08, 2023

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Julie Zhu

Checked by: Xiong Lining

Approved by: Tu Lang
(Testing Director)

Julie Zhu

Xiong Lining

Tu Lang

Revision History

Version	Issue Date	Revisions Content
<u>Rev. 01</u>	<u>May 08, 2023</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION.....	3
1.1	Test Laboratory	3
1.2	Test Location	3
2	PRODUCT INFORMATION	4
2.1	Applicant Information	4
2.2	Manufacturer Information.....	4
2.3	Factory Information.....	4
2.4	General Description for Equipment under Test (EUT).....	4
2.5	Ancillary Equipment.....	4
2.6	Technical Information	5
3	SUMMARY OF TEST RESULT	6
3.1	Test Standards	6
4	DEVICE CATEGORY AND LEVELS LIMITS	7
5	ASSESSMENT RESULT	9
5.1	Output Power	9
5.2	Tune-up power	9
5.3	RF Exposure Evaluation Result	10
5.4	Collocated Power Calculation	11
5.5	Conclusion.....	11

1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Accreditation Certificate	The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	E&S International Enterprises, Inc.
Address	7801 Hayvenhurst Avenue, Van Nuys, California 91406, United States.

2.2 Manufacturer Information

Manufacturer	E&S International Enterprises, Inc.
Address	7801 Hayvenhurst Avenue, Van Nuys, California 91406, United States.

2.3 Factory Information

Factory	E&S International Enterprises, Inc.
Address	7801 Hayvenhurst Avenue, Van Nuys, California 91406, United States.

2.4 General Description for Equipment under Test (EUT)

EUT Name	LAPTOP
Model Name Under Test	PCA010C11L
Series Model Name	PCA01xxxxx (x can be 0-9, A-Z, a-z, dash or blank)
Description of Model name differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in model name (this information provided by the customer).
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Ancillary Equipment 1	Battery	
	Brand Name	VAIO
	Model No.	VJ8BPS60
	Serial No.	N/A
	Capacity	6886mAh
	Rated Voltage	7.7V
	Limit Charge Voltage	8.8V

2.6 Technical Information

Network and Wireless connectivity	Bluetooth (BR+EDR+BLE) WIFI 802.11a, 802.11b, 802.11g, 802.11n, 802.11ac and 802.11ax U-NII-1/2A/2C/3/5/6/7/8
-----------------------------------	---

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	WLAN, Bluetooth	
Frequency Range	802.11b/g/n(HT20)/ax(HE20)	2412 MHz ~ 2472 MHz
	802.11n(HT40)/ax(HE40)	2422 MHz ~ 2462 MHz
	802.11a/ n(HT20/HT40)/ ac(VHT20/VHT40/VHT80)	5150 MHz ~ 5250 MHz
		5250 MHz ~ 5350 MHz
		5470 MHz ~ 5725 MHz
		5725 MHz ~ 5850 MHz
	802.11ax(HE20/HE40/HE80)	5150 MHz ~ 5250 MHz
		5250 MHz ~ 5350 MHz
		5470 MHz ~ 5725 MHz
		5725 MHz ~ 5850 MHz
		5925 MHz ~ 6425 MHz
		6425 MHz ~ 6525 MHz
		6525 MHz ~ 6875 MHz
		6875 MHz ~ 7125 MHz
	802.11ac(VHT160)	5150 MHz ~ 5250 MHz
		5470 MHz ~ 5725 MHz
	802.11ax(HE160)	5150 MHz ~ 5250 MHz
		5470 MHz ~ 5725 MHz
		5925 MHz ~ 6425 MHz
		6425 MHz ~ 6525 MHz
		6525 MHz ~ 6875 MHz
		6875 MHz ~ 7125 MHz
	Bluetooth	2400 ~ 2483.5 MHz
Antenna Type	WLAN	PIFA
	Bluetooth	PIFA
Exposure Category	General Population/Uncontrolled Exposure	
EUT Type	Mobile Device	

3 SUMMARY OF TEST RESULT

3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1091	Radiofrequency radiation exposure evaluation: mobile devices
2	KDB 447498 D04 v01	447498 D04 Interim General RF Exposure Guidance v01

4 DEVICE CATEGORY AND LEVELS LIMITS

Mobile Device:

CFR Title 47 §2.1091(b)

(b) For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

FCC KDB 447498 D04 General RF Exposure Guidance v01 Limit

For 300MHz to 6000Mhz

Evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP_{20cm} in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i. e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and f is in GHz, d is the separation distance (cm), and $ERP_{20 \text{ cm}}$ is per Formula (B.1).
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance (mm)										
	5	10	15	20	25	30	35	40	45	50	
	300	39	65	88	110	129	148	166	184	201	217
	450	22	44	67	89	112	135	158	180	203	226
	835	9	25	44	66	90	116	145	175	207	240
	1900	3	12	26	44	66	92	122	157	195	236
	2450	3	10	22	38	59	83	111	143	179	219
	3600	2	8	18	32	49	71	96	125	158	195
	5800	1	6	14	25	40	58	80	106	136	169

For 6000MHz to 10000Mhz

Frequencies above 300 kHz but at distances $R > \lambda/2\pi$, R is the antenna-person separation distance.
 λ =wavelength of transmitted signal.

Can calculate from the frequency of operation using $v=f*\lambda$

v =speed of light= $3*10^8$ m/s

f =frequency(Hz)

Primarily an MPE-based exclusion but also SAR-based where $\lambda/2\pi$ is $< 20\text{cm}$.

TABLE B.1—THRESHOLDS FOR SINGLE RF SOURCES
SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency		Minimum Distance		Threshold ERP
f_L MHz	f_H MHz	$\lambda_L / 2\pi$	$\lambda_H / 2\pi$	W
0.3	—	1.34	159 m	1,920 R ²
1.34	—	30	35.6 m	3,450 R ² /f ²
30	—	300	1.6 m	3.83 R ²
300	—	1,500	159 mm	0.0128 R ² /f
1,500	—	100,000	31.8 mm	19.2R ²

Subscripts L and H are low and high; λ is wavelength.
From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.

5 ASSESSMENT RESULT

5.1 Output Power

Mode	BT	WIFI 2.4G Aux. Ant	WIFI 2.4G Main Ant	WIFI 5G Aux. Ant	WIFI 5G Main Ant
Conducted Power (dBm)	8.79	19.55	19.91	19.89	19.92
Antenna Gain (dBi)	2.66	2.66	2.69	2.81	3.54
EIRP (dBm)	11.45	22.21	22.6	22.7	23.46
Note: This table listed the worst case power value, please refer to BL-SZ2330960-601/602/603/604 report for more details.					

5.2 Tune-up power

Mode	Conducted Power Range (dBm)	EIRP Range (dBm)	ERP Range (dBm)
Bluetooth	[7.00,9.00]	[10.00,12.00]	[7.85,9.85]
WIFI 2.4G Aux. Ant	[18.00,20.00]	[22.00,24.00]	[19.85,21.85]
WIFI 2.4G Main Ant	[18.00,20.00]	[22.00,24.00]	[19.85,21.85]
WIFI 5G Aux. Ant	[18.00,20.00]	[22.00,24.00]	[19.85,21.85]
WIFI 5G Main Ant	[18.00,20.00]	[22.00,24.00]	[19.85,21.85]
Note1: ERP= EIRP -2.15dB			
Note2: According KDB 447498 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.			

5.3 RF Exposure Evaluation Result

For 300MHz to 6000MHz

Evolution Mode	Maximum power (dBm)	Maximum power (mw)	Distance (mm)	Threshold Power (mW)	Power / Limit	Verdict
Bluetooth	9.85	9.66	213.5	3463.85	0.003	Pass
WIFI 2.4G Aux. Ant	21.85	153.11	213.5	3464.06	0.044	Pass
WIFI 2.4G Main Ant	21.85	153.11	213.5	3464.06	0.044	Pass
WIFI 5G Aux. Ant	21.85	153.11	213.5	3507.01	0.044	Pass
WIFI 5G Main Ant	21.85	153.11	213.5	3507.01	0.044	Pass

For 6000MHz to 10000MHz

Evolution Mode	Distance (cm)	$\lambda / 2 \pi$ (m)	$\lambda / 2 \pi$ (cm)	$R > \lambda / 2 \pi$
U-NII-8	21.35	0.007	0.700	Yes

Evolution Mode	Frequency (MHz)	ERP (W)	ERP (dBm)	ERP (W)	Power / Limit	Verdict
WIFI 6G Aux. Ant	6985	0.875	16.35	0.043	0.049	Pass
WIFI 6G Main Ant	6985	0.875	15.66	0.04	0.046	Pass

5.4 Collocated Power Calculation

Evolution mode	Frequency (GHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$ of WIFI 2.4G Aux. Ant + WIFI 2.4G Main Ant	Verdict
WIFI 2.4G Aux. Ant	2.412	0.0440	0.088	Pass
WIFI 2.4G Main Ant	2.412	0.0440		
Evolution mode	Frequency (GHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$ of Bluetooth + WIFI 2.4G Main Ant	Verdict
Bluetooth	2.402	0.0030	0.047	Pass
WIFI 2.4G Main Ant	2.412	0.0440		
Evolution mode	Frequency (GHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$ of Bluetooth + WIFI 5G Aux. Ant + WIFI 5G Main Ant	Verdict
Bluetooth	2.402	0.0030	0.091	Pass
WIFI 5G Aux. Ant	5.75	0.0440		
WIFI 5G Main Ant	5.75	0.0440		
Evolution mode	Frequency (GHz)	Power /Limit	$\Sigma(\text{Power} / \text{Limit})$ of Bluetooth + WIFI 6G Aux. Ant + WIFI 6G Main Ant	Verdict
Bluetooth	2.402	0.0030	0.098	Pass
WIFI 6G Aux. Ant	6.985	0.0490		
WIFI 6G Main Ant	6.985	0.0460		

Note:

1. $\Sigma(\text{Power} / \text{Limit})$: This is a summation of [(power for each transmitter/ antenna included in the simultaneous transmission)/ (corresponding Power limit)], for Bluetooth + WIFI 6G Aux. Ant + WIFI 6G Main Ant..
2. Both of the 2.4GHz/5GHz/6GHz can transmit simultaneously, the formula of calculated the Power is $CP1 / LP1 + CP2 / LP2 + \dots \text{etc.} < 1$
 CP = Calculation power
 LP = Limit of power
3. Both of the 5GHz WIFI and 6GHz WIFI can't transmit simultaneously at same time.
4. The worst-case situation is 0.098, which is less than "1". This confirmed that the device comply with FCC KDB 447498 D04 Power limit.
5. The DUT work frequency range used is 2400 MHz ~ 2483.5 MHz, 6875 MHz ~ 7125 MHz the result close to the limit by the above formula, so we select worst case power to calculate the exclusion power threshold.
6. More power list please refer to BL-SZ2330960-601/602/603/604 test report.

5.5 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--