

Test Report

Verified code: 101277

Report No.: E20240822625802-11

Customer: Faurecia Clarion Electronics (Xiamen) Co., Ltd.

Address: 6F, No. 40, Guanri Road, Software Park Stage II, Xiamen, China

Sample Name: CAR AUDIO

Sample Model: P2402

Receive Sample Date: Sep. 03, 2024

Test Date: Sep. 11, 2024 ~ Nov. 13, 2024

Reference Document: 47 CFR, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices

Test Result: Pass

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GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-11-15

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240822625802-11	Original Issue	2024-11-13

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1. GENERAL DESCRIPTION OF EUT**1.1 APPLICANT**

Name: Faurecia Clarion Electronics (Xiamen) Co., Ltd.
Address: 6F,No.40,Guanri Road, Software Park Stage II, Xiamen, China

1.2 MANUFACTURER

Name: Faurecia Clarion Electronics Co., Ltd.
Address: 7-2 Shintoshin, Chuo-ku, Saitama-shi, Saitama, 330-0081, Japan

1.3 FACTORY

Name 1: Clarion Asia (Thailand) Co., Ltd.
Address 1: 500/39 Moo3, Hemaraj Eastern Seaboard Industrial Estate 1, Tambol Tasith, Amphur Pluakdaeng Rayong 21140,Thailand
Name 2: PT OPTIMA ELEKTRONIK MANUFAKTUR
Address 2: MANUFAKTUR Kawasan Industri JABABEKA II, JL. Industri Selatan 5 Blok FF1L, Kel. Pasirsari Cikarang Selatan, Kab. Bekasi, Prov. Jawa Barat

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: CAR AUDIO
Model No.: P2402
Adding Model: P2403

Model difference description: They are consistent with the schematic, block diagram, PCB layout, Hardware version, and Software version. The difference is the DAB board and mounting bracket as the following details, and it will not affecting the RF performance.

Function	Product name: CAR AUDIO		
	Model name: P2402		Model name: P2403
	Minimum configuration	Maximum configuration	/
WIFI 5G (B4)	√	√	√
BT	√	√	√
DAB	×	√	×
TCU	√	√	×
LHD	×	√	×
RHD	√	×	√
Note: The above products have the same wireless IC, radiation circuit, power circuit and other circuits, with same shell.			

Trade Mark: Clarion
FCC ID: WY2P2402
Power supply: DC 13.2V,15A

Frequency Band:	2402MHz - 2480MHz for Bluetooth GFSK, Pi/4DQPSK, 8DPSK 5745MHz~5825MHz for IEEE 802.11a/n HT20/ac VHT20; 5755MHz~5795MHz for IEEE 802.11n HT40/ac VHT40; 5775MHz for IEEE 802.11ac VHT80 Bluetooth GFSK: -0.85dBm Bluetooth $\pi/4$ -DQPSK: 0.71dBm Bluetooth 8DPSK: 1.12dBm U-NII-3: 6.24dBm for IEEE 802.11a 5.24dBm for IEEE 802.11n HT20 4.22dBm for IEEE 802.11acVHT20 5.36dBm for IEEE 802.11n HT40 4.46dBm for IEEE 802.11acVHT40 4.32dBm for IEEE 802.11ac VHT80
Transmit Power:	GFSK&Pi/4DQPSK&8DPSK for Bluetooth, OFDM for IEEE 802.11a/n/ac mode Bluetooth:
Modulation type:	Antenna 1: 4.4dBi gain (Max) 5G WIFI: 5725MHz – 5850MHz Antenna 2: 7.1dBi gain (Max)
Antenna Specification:	Temperature Range: -30℃~+70℃
Hardware Version:	2.0.0
Software Version:	02.00.00
Sample No:	E20240822625802-0005
Note:	1.The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions. 2. Based on the differences in models, the maximum configuration of the model P2402 was recorded in this report.

2. LABORATORY

2.1 LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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2.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

USA A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,

<http://www.grgtest.com>

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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

General

According to the KDB 447498 D04 Interim General RF Exposure Guidance v01, General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table 4.1 to support an exemption from further evaluation from 300 kHz through 100 GHz.

TABLE 4.1—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	–	35.6 m	$1,920 R^2$
1.34	–	30	35.6 m	–	1.6 m	$3,450 R^2/f^2$
30	–	300	1.6 m	–	159 mm	$3.83 R^2$
300	–	1,500	159 mm	–	31.8 mm	$0.0128 R^2 f$
1,500	–	100,000	31.8 mm	–	0.5 mm	$19.2 R^2$
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

For mobile devices that are not exempt per Table 4.1 at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than $ERP_{20\text{cm}}$ in Formula (4.1).

Formula (4.1):

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

4. CALCULATION METHOD

Predication of MPE limit at a given distance

$EIRP(dBm) = \text{Maximum Tune-up Output power (dBm)} + \text{Maximum antenna gain(dBi)}$

$ERP(dBm) = EIRP(dBm) - 2.15$

R=minimum distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, $d=20\text{cm}$, as well as the maximum gain of the used as following information, the RF power ERP can be obtained.

Table 1 Antenna Specification

Mode	Antenna type	Internal Identification	Maximum antenna gain
Bluetooth	FPC antenna	Antenna 1	4.4dBi
5GHz WiFi U-NII-3	FPC antenna	Antenna 2	7.1dBi

Table 2 Transmit Power

Mode		Maximum Output Power (dBm)	Maximum Tune-up Output power (dBm)
Bluetooth DH5		-0.85	0.00 ± 1.00
Bluetooth 2DH5		0.71	1.00 ± 1.00
Bluetooth 3DH5		1.12	1.50 ± 1.00
5GHz WiFi U-NII-3	802.11a	6.24	6.50 ± 1.00
	802.11n HT20	5.24	5.50 ± 1.00
	802.11ac VHT20	4.22	4.50 ± 1.00
	802.11n HT40	5.36	5.50 ± 1.00
	802.11ac VHT40	4.46	4.50 ± 1.00
	802.11ac VHT80	4.32	4.50 ± 1.00

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5. ESTIMATION RESULT

5.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up Output power (dBm)	Antenna Gain (dBi)	Maximum Tune-up EIRP (dBm)	ERP (dBm)	Maximum Tune-up ERP (W)	Threshold ERP(W)
BT	2402- 2480	2.5	4.4	6.9	4.75	0.0030	0.768
5GHz WiFi U-NII-3	5725-5850	7.5	7.1	14.6	12.45	0.0176	0.768

Remark:

1. RF Exposure use distance is 20cm from manufacturer declaration of user manual.
2. Threshold $ERP(W) = 19.2R^2(W) = 19.2 \times 0.2^2(W) = 0.768(W)$.
3. $ERP(dBm) = EIRP(dBm) - 2.15$

For Simultaneous transmission:

\sum MPE ratios= MPE ratio(BT)+ MPE ratio(5G wifi-U-NII-3);

Maximum Simultaneous transmission MPE Ratio for BT and RLAN(5G wifi)

Maximum MPE ratio (BT)	Maximum MPE ratio (5G wifi-U-NII-3)	\sum MPE ratios	Limit	Results
0.0039	0.0229	0.0268	1.000	Pass

Note:

1. The bluetooth and wifi support simultaneous.
2. ERP_j : the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j.
3. $ERP_{th,j}$: exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$, according to the applicable § 1.1307(b)(3)(i)(C) Table 1 formula at the location in question.
4. Maximum MPE Ratio (BT) = Maximum Tune-up ERP(BT) / Threshold ERP = $0.0030W/0.768W = 0.0039$;
5. Maximum MPE Ratio (5G wifi-U-NII-3) = Maximum Tune-up ERP (5G wifi-U-NII-3) / Threshold ERP = $0.0176W/0.768W = 0.0229$;
6. \sum MPE ratios= Maximum MPE Ratio (BT)+ Maximum MPE Ratio (5G wifi-U-NII-3) = $0.0039+0.0229=0.0268 < 1$.

The result is pass.

6. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

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