

Test Report

Verified code: 393614

Report No.: E20240822625802-4

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: P2401

Receive Sample Date: Sep.03,2024

Test Date: Sep.14,2024 ~ Nov.13,2024

Reference Document: 47 CFR 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	E20240822625802-4	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.: P2401
Adding Model: /
Models Difference: /
Trade Name: Clarion
FCC ID: WY2P2401
Power supply: DC 13.2V,15A
Frequency Band: Bluetooth :
GFSK / π /4-DQPSK/8DPSK: 2402MHz~2480MHz
Maximum Transmit Power: GFSK: -1.78dBm
 π /4-DQPSK: -0.67dBm
8DPSK: -0.53dBm
Modulation type: GFSK for 1Mbps, π /4-DQPSK for 2Mbps, 8DPSK for 3Mbps
Antenna Specification: Chip Antenna with 3.2dBi gain (Max)
Temperature Range: -30°C~+70°C
Hardware Version: 2.0.0

Software Version: 02.00.00

Sample No: E20240822625802-0006

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. The product model has two structures are consistent with schematic, block diagram, PCB layout, Hardware version, Software version, HSD circuit and HSD socket, Offline navigation, Memory and internal structure. The only difference is whether the DAB board is installed. The differences are not affecting the RF performance.

For specific differences please refer to the following table:

Function	Product name: CAR AUDIO	
	Model name: P2401	
	Minimum Configuration	Maximum Configuration
BT (5.0)	√	√
HSD circuit and HSD socket	√	√
Offline navigation	√	√
Memory	√	√
DAB	×	√
Note: The two products have the same wireless IC, radiation circuit, power circuit and other circuits, with same shell.		

3. The maximum configuration of the model was recorded in this report.

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2. LABORATORY & ACCREDITATIONS

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 ISO/IEC 17025.

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,
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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

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).

$$P_{\text{th}} (\text{mW}) = ERP_{20 \text{ cm}} (\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (4.1)$$

In accordance with KDB447498D04 Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated_k term) shall be used to determine exemption for simultaneous transmission according to Formula

$$\text{MPE Ratio} = \sum_{j=1}^p \frac{ERP_j}{ERP_{\text{th},j}} < 1$$

ERP_j : the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j .

$ERP_{\text{th},j}$: 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.

the sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance.

3.1 MEASUREMENT RESULTS

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

Frequency Band	Antenna type	Internal Identification	Maximum antenna gain (dBi)
2402-2480	Chip antenna	Antenna 1	3.2dBi

Table 2 Transmit Power for ERP & Maximum Conducted Output Power

Antenna type	Mode	Maximum Conducted output peak Power (dBm)	Target Maximum Conducted Output peak Power (dBm)	Tolerance (dB)	Maximum Tune-up Maximum Conducted Output peak Power (dBm)	Maximum Tune-up ERP (dBm)
Chip antenna	GFSK	-1.78	-1.50	± 1	-0.5	-2.65
	$\pi/4$ -DQPSK	-0.67	-0.50	± 1	0.5	-1.65
	8DPSK	-0.53	-0.50	± 1	0.5	-1.65

Note:

- 1) The maximum output Power of BT were refer to the module report.
- 2) Maximum Tune-up ERP of External copper antenna = Maximum Tune-up Maximum Conducted Output peak Power + antenna gain -2.15.

STANDALONE MPE

Mode	Antenna type	Frequency (MHz)	Maximum Tune-up ERP (dBm)	Maximum Tune-up ERP (mW)	Threshold ERP (mW)	Verdict
GFSK	Chip antenna	2441	-2.65	0.5433	768	PASS
$\pi/4$ -DQPSK		2441	-1.65	0.6839		PASS
8DPSK		2441	-1.65	0.6839		PASS

Remark:

a. RF Exposure use distance is 20cm from manufacturer declaration of user manual.

b. Threshold $ERP(W) = 19.2R^2(W) = 19.2 \times 0.2 \times 0.2(W) = 0.7680(W) = 768(mW)$.

4. 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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