

Test Report

Verified code: 653833

Report No.: E202309059135-01-9

Customer: Kräemer Automotive Systems GmbH

Address: Obere Wässere 6-8 72764 Reutlingen Germany

Sample Name: Bentley Infotainment System(BIS)

Sample Model: KR-BIS

Receive Sample Date: Sep.22,2023

Test Date: Nov.28,2023 ~ May.10,2024

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

Test Result: Pass

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Issued Date: 2024-07-24

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E202309059135-01-9	Original Issue	2024-05-23

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name: Kräemer Automotive Systems GmbH
Address: Obere Wässere 6-8 72764 Reutlingen Germany

1.2 MANUFACTURER

Name: Kräemer Automotive Systems GmbH
Address: Obere Wässere 6-8 72764 Reutlingen Germany

1.3 FACTORY

Name : Huizhou Foryou General Electronics Co., Ltd.
Address : No.2 District A, Foryou Industry Park, No. 1 North Shangxia Road, Dongjiang Hi tech Industry Park, 516005 Huizhou city, Guangdong Province, China(PROC)

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Bentley Infotainment System(BIS)
Model No.: KR-BIS
Trade Mark: BENTLEY
FCC ID: 2AD6S-KRBIS
Power supply: DC 12V, 15A
Frequency Band: 5180MHz-5240MHz & 5745MHz~5825MHz for IEEE 802.11a/n HT20/ac VHT20;
5190MHz-5230MHz & 5755MHz~5795MHz for IEEE 802.11n HT40/ac VHT40;
5210MHz & 5775MHz for IEEE 802.11ac VHT80
2402MHz - 2480MHz for Bluetooth LE with 1M
2402MHz - 2480MHz for Bluetooth GFSK, Pi/4DQPSK, 8DPSK
Bluetooth LE for 1Mbps:4.32dBm
Bluetooth for GFSK:4.10dBm
Bluetooth for Pi/4DQPSK:6.21dBm
Bluetooth for 8DPSK:6.65dBm
U-NII-1:
9.28dBm for IEEE 802.11a
8.93dBm for IEEE 802.11n HT20
Transmit Power: 9.31dBm for IEEE 802.11acVHT20
9.54dBm for IEEE 802.11n HT40
9.31dBm for IEEE 802.11acVHT40
8.25dBm for IEEE 802.11ac VHT80
U-NII-3:
9.08dBm for IEEE 802.11a
8.06dBm for IEEE 802.11n HT20
7.97dBm for IEEE 802.11acVHT20

8.46dBm for IEEE 802.11n HT40
8.28dBm for IEEE 802.11acVHT40
8.15dBm for IEEE 802.11ac VHT80

Modulation type: GFSK for Bluetooth LE, GFSK&Pi/4DQPSK&8DPSK for Bluetooth,
OFDM for IEEE 802.11a/n/ac mode

Bluetooth LE:
Antenna 1: 2.47dBi gain (Max)

Bluetooth:
Antenna 1: 2.47dBi gain (Max)

Antenna Specification: 5G WIFI: 5150MHz – 5250MHz
Antenna 2: 2.58dBi gain (Max)
5G WIFI: 5725MHz – 5850MHz
Antenna 2: 3.66dBi gain (Max)

Temperature Range: -20 °C ~ 60 °C

Hardware Version: V0.1

Software Version: V00.00.01

Sample No: E202309059135-01-0001, E202309059135-01-0003

Note: 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.

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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,

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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 LE	Ceramics antenna	Antenna 1	2.47dBi
Bluetooth	Ceramics antenna	Antenna 1	2.47dBi
5GHz WiFi U-NII-1	Ceramics antenna	Antenna 2	2.58dBi
5GHz WiFi U-NII-3	Ceramics antenna	Antenna 2	3.66dBi

Table 2 Transmit Power

Mode	Maximum Output Power (dBm)	Maximum Tune-up Output power (dBm)
Bluetooth LE	4.32	4.00 ± 1.00
Bluetooth DH5	4.10	4.00 ± 1.00
Bluetooth 2DH5	6.21	6.00 ± 1.00
Bluetooth 3DH5	6.65	6.00 ± 1.00
5GHz WiFi U-NII-1	802.11a	9.00 ± 1.00
	802.11n HT20	9.00 ± 1.00
	802.11ac VHT20	9.00 ± 1.00
	802.11n HT40	9.00 ± 1.00
	802.11ac VHT40	9.00 ± 1.00
	802.11ac VHT80	9.00 ± 1.00
5GHz WiFi U-NII-3	802.11a	8.50 ± 1.00
	802.11n HT20	8.50 ± 1.00
	802.11ac VHT20	8.50 ± 1.00
	802.11n HT40	8.50 ± 1.00
	802.11ac VHT40	8.50 ± 1.00
	802.11ac VHT80	8.50 ± 1.00

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)
BLE 1M	2402- 2480	5.00	2.47	7.47	5.32	0.00340	0.768
BT DH5	2402- 2480	5.00	2.47	7.47	5.32	0.00340	0.768
BT DH5	2402- 2480	7.00	2.47	9.47	7.32	0.00540	0.768
BT DH5	2402- 2480	7.00	2.47	9.47	7.32	0.00540	0.768
5GHz WiFi U-NII-1	5150-5250	10.00	2.58	12.58	10.43	0.01104	0.768
5GHz WiFi U-NII-3	5725-5850	9.50	3.66	13.16	11.01	0.01262	0.768

Remark:

1. RF Exposure use distance is 20cm from manufacturer declaration of user manual.
2. Threshold $ERP(W) = 19.2R^2(W) = 19.2 \times 0.2 \times 0.2(W) = 0.768(W)$.
3. The BLE and BT do not support simultaneous transmission, the BLE and WiFi do not support simultaneous transmission, the BT and WiFi do not support simultaneous transmission.
4. $ERP(dBm) = EIRP(dBm) - 2.15$

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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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