

RF Exposure Assessment

On

Oshkosh NGDV

SCM2

contains FCC ID: LHJ-BL28NARD1 (Cellular)
contains FCC ID: 2AJW5-SCM2 (WiFi and Bluetooth)

Assessment Reference: MDE_CONTI_2308_MPE_01

Date: 2024-01-15

Test Laboratory:

7layers GmbH
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Germany

Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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1 Summary

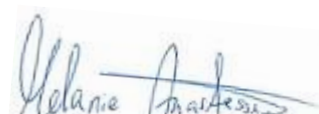
The RF-exposure assessment according to KDB 447498 D01 General RF Exposure Guidance v06 shows, that the worst-case RF exposure values of the assessed radio technologies and bands are below the Limits for General Population/Uncontrolled Exposure:

- Table 1 (II) to § 1.1310(E)(1) of 47 CFR Ch. I (10–1–21 Edition).

COMMENTS:

- Assessment limited to supported North American frequency bands
- Prediction Distance R = 40 cm


 (approved by)
 Imad Hjiye


 (responsible for report)
 Melanie Anastassiou

2 Revision History

Report version control			
Version	Release date	Change Description	Version validity
initial	2024-01-15	--	valid
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3 Administrative Data

3.1 Testing Laboratory

Company Name: 7layers GmbH
Address: Borsigstr. 11
40880 Ratingen
Germany

Report Template Version: 2022-10-21

3.2 Project Data

Responsible for report: Melanie Anastassiou
Date of Report: 2024-01-15

3.3 Applicant Data

Company Name: Continental Automotive Technologies GmbH
Address: Heinrich-Hertz-Straße 45
78052 Villingen-Schwenningen
Germany
Contact Person: Marion Grüner, (Manager Homologation)

3.4 Manufacturer Data

Company Name: please see Applicant Data
Address:
Contact Person:

4 Test object Data

Declared EUT data by the supplier	
Kind of Device product description	Telematic Control Unit
Product name(s)	SCM2
Type(s)	SCM2
Integrated transmitter	
Cellular Radio Module Continental BL28NA-RD1	
supported Radio technologies	2G/3G/4G
Supplied document(s)	Sporton RF Exposure Evaluation Report FA120221-02, Oct. 22, 2021
WLAN Bluetooth Radio Chipset Qualcomm QCA6564AU Chipset	
supported Radio technologies	WLAN 2.4 GHz and Bluetooth
Supplied document(s)	MDE_CONTI_2308_FCC_02 and MDE_CONTI_2308_FCC_04

5 Assessment

5.1 Assessment method and subject of assessment

Calculation of power density and comparison with reference levels for general public exposure.
Applicability area and limitations: Power density can be calculated in far field region.

Applied Standards:

- IEEE Std C95.3-2021, D.4.2 Antennas – Main beam on-axis, general method for determining the power density at points in the radiating near-field and far-field antenna regions.
- IEEE Std C95.1-2019, D.2 Multifrequency exposures (exposures to multiple sources)

Specific information:

- Values used for calculation are based on supplied documents and supplied RF exposure reports.
- Output power values are based on the supplied RF exposure reports.

Worst case considerations:

- Main beams of the antennas are directed to the same point in the prediction distance.
- Output power values are based on the module manufacturer MPE calculations
- Antenna gain values are based on values declared by the manufacturer.
- Cable loss of internal antenna cables set to 0.
- Duty cycle factor BT 2.4 GHz = 1.
- Duty cycle factor WLAN 2.4 GHz = 1.
- Duty cycle factor GSM = 0.5
- Duty cycle factor UMTS = 1.
- Duty cycle factor LTE = 1.
- The radio modules can transmit independently from each other:
(1 cellular band + WLAN 2,4 GHz or Bluetooth).
- Selected bands for multi frequency exposure calculations:
worst case of each cellular technology + WLAN 2.4 GHz as worst case
- Cellular LTE/UMTS/GSM module is Continental BL28NA-RD1
- WiFi chipset Qualcomm QCA6564AU (WiFi 2.4 GHz and Bluetooth cannot transmit together).

5.2 Exposure limits

Extract of

- Table 1 (II) to § 1.1310(E)(1) of 47 CFR Ch. I (10–1–21 Edition).

<i>Frequency range</i>	<i>Power density</i>	<i>Power density</i>
<i>MHz</i>	<i>W/m²</i>	<i>mW/cm²</i>
300 – 1500	f/150	f/1500
1500 - 100000	10	1

Note:

f in MHz

5.3 Formulas used for calculation

5.3.1 Single-frequency exposures (exposures to one source)

Table D.2—Determining power density on antenna main beam axis

$$S_{FF} = \frac{G_i P_{in}}{4\pi d^2}$$

In this report is the power density S_i at frequency i calculated in mW/cm^2 .

G_i is the (isotropic) far-field antenna gain (power ratio) at frequency i .

P_{in} is the power into the antenna in $mW = > P_{mW}$.

d is the distance to the antenna in cm .

5.3.2 Multi-frequency exposures (exposures to multiple sources)

Summation based on IEEE Std C95.1-2019, D.2

$$\sum_{i=1}^n \frac{exposure_i}{ERL_i} < 1$$

In this report is the power density calculated. In the tables below is “*exposure*” = S_i = power density at frequency i .

ERL_i is the corresponding exposure reference level at frequency i .

IEEE Std C95.1-2019:

exposure reference level (ERL): The maximum exposure level relative to ambient electric and/or magnetic field strength or power density, induced and/or contact current, or contact voltage.

NOTE 1— ERLs provide an adequate margin of safety against established adverse health effects.

NOTE 6— In some documents, ERLs are called reference levels, derived limits, permissible exposure limits, maximum permissible exposure values, action levels, or investigation levels.

5.4 Module(s) single-frequency exposures used for multi-frequency calculation

5.4.1 Single-frequency exposures

Prediction Distance d in cm =>	20	TX freq. band	Prediction freq.	Avarage (temporal) power (log.)	Avarage (temporal) power (lin)	Max. Gain (log.)	Gain (lin.)	Power density at distance d	Power density limit at frequency f _i	Ratio to exposure reference level	Sum of S _i / ERL _i	Compliance, if Sum of S _i / ERL _i < 1
		f _{Band}	f _i	P _{dBm}	P _{mW}	g _{dB}	G _i	S _i	ERL _i	S _i / ERL _i	-	-
Radio technology	Band	MHz	MHz	dBm	mW	dB	-	mW/cm ²	mW/cm ²	-	-	-
GSM	850	824 - 849	824,2	33,5	2238,72	2	1,58	0,353	0,549	0,642	0,642	Pass
GSM	1900	1850 - 1910	850,2	30,5	1122,02	2,5	1,78	0,198	0,567	0,350	0,350	Pass
UMTS	FDDII	1850 - 1910	1852,4	24,5	281,84	2,5	1,78	0,100	1,000	0,100	0,100	Pass
UMTS	FDDIV	1710 - 1760	1712,4	24,5	281,84	5,5	3,55	0,199	1,000	0,199	0,199	Pass
UMTS	FDDV	824 - 849	826,4	24,5	281,84	2	1,58	0,089	0,551	0,161	0,161	Pass
LTE	eFDD2	1850 - 1910	1850,7	24,0	251,19	2,5	1,78	0,089	1,000	0,089	0,089	Pass
LTE	eFDD4	1710 - 1755	1710,7	24,0	251,19	5,5	3,55	0,177	1,000	0,177	0,177	Pass
LTE	eFDD5	824 - 849	824,7	24,0	251,19	2	1,58	0,079	0,550	0,144	0,144	Pass
LTE	eFDD7	2500 - 2570	2502,5	24,0	251,19	7	5,01	0,250	1,000	0,250	0,250	Pass
LTE	eFDD12	699 - 716	699,7	24,0	251,19	3,5	2,24	0,112	0,466	0,240	0,240	Pass
LTE	eFDD13	777 - 787	779,5	24,0	251,19	3,5	2,24	0,112	0,520	0,215	0,215	Pass
Bluetooth LE	2.4 GHz ISM	2402 - 2480	2402,0	2,1	1,62	5,7	3,72	0,001	1,000	0,001	0,001	Pass
Bluetooth Classic	2.4 GHz ISM	2402 - 2480	2402,0	1,4	1,38	5,7	3,72	0,001	1,000	0,001	0,001	Pass
WLAN 2.4 GHz	2.4 GHz ISM	2412 - 2472	2412,0	13,3	21,38	5,7	3,72	0,016	1,000	0,016	0,016	Pass

Yellow marked = worst case band of the radio technology

Information: 10 W m⁻² = 1 mW cm⁻²

5.5 Calculation

5.5.1 Calculation of multi-frequency exposures

Prediction Distance d in cm =>	20	TX freq. band	Prediction freq.	Avarage (temporal) power (log.)	Avarage (temporal) power (lin)	Max. Gain (log.)	Gain (lin.)	Power density at distance d	Power density limit at frequency f _i	Ratio to exposure reference level	Sum of S _i / ERL _i	Compliance, if Sum of S _i / ERL _i < 1
		f _{Band}	f _i	P _{dBm}	P _{mW}	g _{dB}	G _i	S _i	ERL _i	S _i / ERL _i	-	-
Radio technology	Band	MHz	MHz	dBm	mW	dB	-	mW/cm ²	mW/cm ²	-	-	-
GSM	850	824 - 849	824,2	33,5	2238,72	2	1,58	0,353	0,549	0,642	0,658	Pass
WLAN 2.4 GHz	2.4 GHz ISM	2412 - 2472	2412	13,3	21,38	5,7	3,72	0,016	1,000	0,016		
UMTS	FDDIV	1710 - 1760	1712,4	24,5	281,84	5,5	3,55	0,199	1,000	0,199	0,215	Pass
WLAN 2.4 GHz	2.4 GHz ISM	2412 - 2472	2412	13,3	21,38	5,7	3,72	0,016	1,000	0,016		
LTE	eFDD7	2500 - 2570	2502,5	24	251,19	7	5,01	0,250	1,000	0,250	0,266	Pass
WLAN 2.4 GHz	2.4 GHz ISM	2412 - 2472	2412	13,3	21,38	5,7	3,72	0,016	1,000	0,016		

Information: 10 W m⁻² = 1 mW cm⁻²

END OF REPORT