RF Exposure Assessment

Report Reference: MDE_CONTI_2152_MPE_01

on

Telematic Control Unit
ZONAR SCM1

FCC ID 2AJW5-SCM1
IC: 21979-SCM1

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

Summary

Type of Report

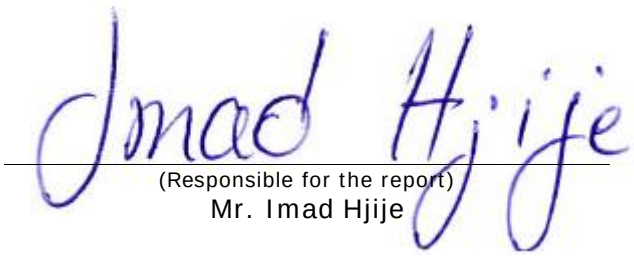
RF Exposure calculation for the Telematic Control Unit SCM1

Applicable FCC Rules

For RF Exposure:

OET Bulletin 65 Edition 97-01 August 1997
FCC 47 CFR §1.1307
FCC 47 CFR §1.1310

Report version control			
Rev Version	Release date	Changes	Version validity
-	10.11.2021	Initial version	Valid
Rev01	23.11.2022	Simultaneous Transmission added	Valid



(Responsible for the report)
Mr. Imad Hjije

Administrative Data:

Testing Laboratory

Company Name:	7layers GmbH
Address:	Borsigstr. 11 40880 Ratingen Germany
Report Template Version:	2022-05-25

Project Data

Responsible for report:	Mr. Imad Hjije
Date of Report:	2022-11-10
Testing Period:	- (please see FCC 15.247 test reports)

Applicant Data

Company Name:	Continental Automotive GmbH
Address:	Heinrich-Hertz-Str. 45 78052, Villingen-Schwenningen Germany
Contact Person:	Dr. Marion Grüner

Manufacturer Data

Company Name:	please see Applicant data
Address:	- - -
Contact Person:	-

Test object Data

General Description of Radio Device

Kind of Device product description	Telematics Control Unit
Product name	SCM1
Type / Model	ZONAR V4C
Declared EUT data by the supplier	
Power Supply Type	DC
Nominal Voltage / Frequency	12 – 24 V
Test Voltage / Frequency	12 V
Highest internal frequency	2690 MHz (highest channel from LTE Band 7)
General Description	SCM1 is a vehicle mounted telematics device incorporating - Dual mode Bluetooth for peripheral connectivity

Assessed Radio Devices

Sample Name	Sample Code	Description
EUT 16	DE1480002ag02	Radiated Sample
Sample Parameter	Value	
Serial No.	IMEI: 352763680008833	
HW Version	C	
SW Version	Leap 24.5	
Comment		

General description of ancillary equipment

Device	Details (Manufacturer, Type Model, HW, SW, S/N)	Description
-	-	-

General description of auxiliary equipment

Device	Details (Manufacturer, Type Model, HW, SW, S/N)	Description
AUX A	Panorama Antennas, Model: AGPS26-SRGR, -, -, -	External GNSS antenna

General description of setups

Setup	Combination of EUTs	Description and Rationale
S01_AG02	EUT 16+ AUX A	Radiated Setup

Documents used for assessment supplied to applicant

Radio technology	Details	Description
Bluetooth	Qualcomm module based on a QCA65x4 design	FCC 15.247 Test Report: max. 7.8 dBm conducted
Cellular	Continental Communications Rcvr for use w/ licensed Tx and CBs	Certified under: LHJ-BL28NARD1

Measured RF Output Power (Bluetooth Classic)

BT GFSK (1-DH1)

Band	Channel No.	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	6.9	21.0	14.1	9.9
	39	2441	7.8	21.0	13.2	10.8
	78	2480	6.3	21.0	14.7	9.3

BT π/4 DQPSK (2-DH1)

Band	Channel No.	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	6.0	21.0	15.0	9.0
	39	2441	7.1	21.0	13.9	10.1
	78	2480	5.7	21.0	15.3	8.7

BT 8-DPSK (3-DH1)

Band	Channel No.	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	6.6	21.0	14.4	9.6
	39	2441	7.6	21.0	13.4	10.6
	78	2480	6.2	21.0	14.8	9.2

Measured RF Output Power (Bluetooth Low Energy)

BT LE 1 Mbit/s

Band	Channel No.	Frequency [MHz]	Peak Power [dBm]	Limit [dBm]	Margin to Limit [dB]	E.I.R.P [dBm]
2.4 GHz ISM	0	2402	-1.2	30.0	31.2	1.8
	19	2440	1.0	30.0	29.0	4.0
	39	2480	-0.2	30.0	30.2	2.8

RF Exposure Evaluation

Standards
OET Bulletin 65 Edition 97-01 August 1997
RSS-102 Issue 5 – March 2015

Test limits

As specified in Table 1B of 47 CFR 1.1310 – Limits for Maximum Permissible Exposure (MPE), Limits for General Population/Uncontrolled Exposure.

Frequency range (MHz)	*Power density (mW/cm²)*
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	*Power density (W/m²)*	*Power density (mW/cm²)*
300 – 6000	$0.02619\ f^{0.6834}$	*mW/cm² = W/m² * 0.1*

Equation OET bulletin 65, page 18, edition 97-01: $S = \frac{PG}{4\pi R^2} = \frac{EIRP}{4\pi R^2}$

Where:

S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the centre of radiation of the antenna

Test Protocol

			G				P		S			
Operational Bands	Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain -numeric- (mW/cm²)	Output Power -conducted- (dBm)	Duty Cycle correction factor	Max. mean output power (dBm)	Output Power -conducted- (mW)	Output Power (EIRP) (mW)	FCC Limit (mW/cm²)	Power Density value (mW/cm²)	Margin to FCC Limit (mW/cm²)	Verdict
Bluetooth Classic	2441	3	1.9953	7.80	0	7.80	6.03	12.02	1.0000	0.0024	0.9976	PASS

Simultaneous Transmission

	1st Technology Bluetooth Classic (BT)	2nd Technology Cellular (
(S_{eq} / S_{lim})	0.0060	0.4214
Sum of (S_{eq} / S_{lim})	0.4274	
Limit	1	
Conclusion	passed	

Note: Only worst case was evaluated

<End of Assessment>