

RF Exposure Assessment

Report Reference: MDE_APTIV_1903_MPE_02

on

Automotive Radio Head Unit

UConnect 5"

FCC ID: LTQ139250

Test Laboratory:

7layers GmbH
Borsigstrasse 11
40880 Ratingen
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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Summary

Type of Report


RF Exposure calculation for the Navigation display module with BT connectivity JDCP

Applicable FCC and ISED Rules

For RF Exposure:

OET Bulletin 65 Edition 97-01 August 1997
FCC 47 CFR §1.1307
FCC 47 CFR §1.1310
RSS-102 Issue 5 – March 2015

Report version control			
Rev Version	Release date	Changes	Version validity
-	11.06.2021	Initial version	Valid



(responsible for report)
Mr. Imad Hjije

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Administrative Data:

Testing Laboratory

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

Report Template Version: 2018-03-13

Project Data

Responsible for report: Mr. Imad Hjije
Date of Report: 2021-12-15
Testing Period: - (please see referenced test reports)

Applicant Data

Company Name: Aptiv Services Deutschland GmbH
Address: Am Technologiepark 1
42119 Wuppertal
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Contact Person: Seweryn Balus

Manufacturer Data

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

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Test object Data

General Description of Radio Device

Kind of Device product description	Automotive Radio Head Unit with integrated bluetooth radio and AM/FM/DAB broadcast receiver.
Product name	Automotive Radio Head Unit
Type	UConnect 5"
Declared EUT data by the supplier	
Voltage Type	Car battery
Voltage Level	13.5 V DC
Antenna / Gain	-3.5 dBi
Tested Modulation Type	BT: GFSK Modulation, 1-DHx packets π/4 DQPSK Modulation, 2-DHx packets 8-DPSK Modulation, 3-DHx packets
EUT ports (connected cables during testing):	Cable Harness including DC USB Antenna
Tested datarates	1 Mbps, 2 Mbps, 3 Mbps
Special software used for testing	-

Assessed Radio Devices

Sample Name	Sample Code	Description
EUT A	DE1352013au01	Conducted Sample
Sample Parameter	Value	
Serial No.	01012	
HW Version	H01/28715250	
SW Version	21.05.13	
Comment	Sample with temporary Antenna connector	

Sample Name	Sample Code	Description
EUT B	DE1352013am01	Radiated Sample
Sample Parameter	Value	
Serial No.	01089	
HW Version	H01/28715250	
SW Version	21.05.13	
Comment	Sample with internal Antenna	

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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 1	ASK, 0052115392, -, -, -	AM/FM/DAB Antenna

General description of setups

Setup	Details	Description
Setup_01	EUT A, AUX 1	-

Measured RF Output Power

Ambient temperature: 25 °C
 Air Pressure: 1010 hPa
 Humidity: 35 %
 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	3.3	21.0	17.7	-0.2
	39	2441	4.4	21.0	16.6	0.9
	78	2480	4.4	21.0	16.6	0.9

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	1.8	21.0	19.2	-1.7
	39	2441	3.6	21.0	17.4	0.1
	78	2480	4.0	21.0	17.0	0.5

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	1.9	21.0	19.1	-1.6
	39	2441	4.0	21.0	17.0	0.5
	78	2480	4.0	21.0	17.0	0.5

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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/cm ²)
300 – 1,500	f/1500
1,500 – 100,000	1.0

Limits specified per RSS-102, Issue 5.

Frequency range (MHz)	Power density (W/m ²)	Power density (mW/cm ²)
300 – 6000	0.02619 f ^{0.6834}	mW/cm ² = W/m ² * 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

Operational Bands	Frequency (MHz)	Antenna Gain (dBi)	G			Duty Cycle correction factor	Max. mean output power (dBm)	P		IC Limit (mW/cm ²)	S		Margin to FCC Limit (mW/cm ²)	Margin to IC Limit (mW/cm ²)
			Antenna Gain -numeric- (mW/cm ²)	Output Power -conducted- (dBm)				Output Power -conducted- (mW)	Output Power (EIRP) (mW)		FCC Limit (mW/cm ²)	Power Density value (mW/cm ²)		
2.4 GHz	2480	-3.5	0.4467	4.40	0	4.40	2.75	1.23	0.5469	1.0000	0.0002	0.9998	0.5467	

<End of Assessment>