

RF Exposure Assessment

Report Reference: MDE_VIS_1916_MPE_01

on

In Vehicle Infotainment

SMART CRONY IVI

FCC ID: NT8-SMARTCRONYIVI

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 In Vehicle Infotainment SMART CRONY IVI

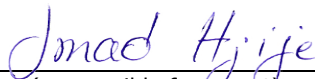
Applicable FCC and ISED Rules**For RF Exposure:**

OET Bulletin 65 Edition 97-01 August 1997

FCC 47 CFR §1.1307

FCC 47 CFR §1.1310

Report version control			
Rev Version	Release date	Changes	Version validity
-	27.09.2021	Initial version	Valid


(responsible for report)
Mr. Imad Hjije

REPORT REFERENCE:

MDE_VIS_1916_MPE_01

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: 2021-09-27
Testing Period: - (please see referenced test reports)

Applicant Data

Company Name: Visteon Corporation
Address: One Village Center Drive
Van Buren Township, MI, 48111,
U.S.A
Contact Person: Heidi Sepanik, Corporate Secretary

Manufacturer Data

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

REPORT REFERENCE:

MDE_VIS_1916_MPE_01

Test object Data

General Description of Radio Device

Kind of Device product description	This system consists of 10.25" TFT display with capacitive touch screen. RF features FM/AM, USB, BT, WiFi, in built GPS Navigation, RVC modes. It consists of a Class AB power amplifier and a DSP tuner for media & radio entertainment.
Product name	In Vehicle Infotainment
Type	SMART CRONY IVI
Declared EUT data by the supplier	
Voltage Type	Car battery
Voltage Level	13.5 V DC
Antenna / Gain	BT:3.2 dBi / WLAN: 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 WLAN: OFDM, BPSK
Specific product description for the EUT	SMART CRONY IVI In-vehicle infotainment system that combines entertainment and information delivery for driver and passengers. This system consists of features like AM/FM Radio, GPS, RVC, USB, & BT/WiFi interfaces with 10.25 Inch TFT & Touch screen interface. This Infotainment can allow a driver to perform a number of tasks, such as standard radio and listen to music over USB flash drive or Bluetooth, hands-free phone connections to make phone calls, vehicle voice commands and other types of Interactive audio or video. Heart of the IVI is NXP I.MX8 application is the automotive processor (SOC) and Hero DSP TEF6635 Digital Signal Processor (DSP).DSP acts as an AM/FM receiver and tone control unit. Communication between DSP and SOC is done through I2C, I2S interfaces.
EUT ports (connected cables during testing):	Cable Harness including DC USB AM/FM GPS
Tested datarates	1 Mbps, 2 Mbps, 3 Mbps
Special software used for testing	VMF Analyser software provided by the Applicant

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Assessed Radio Devices

Sample Name	Sample Code	Description
EUT A	DE1105011aa01	Radiated Sample
Sample Parameter	Value	
Serial No.	-	
HW Version	25761	
SW Version	4.62	
Comment	Sample with integral Antenna	

Sample Name	Sample Code	Description
EUT F	DE1105011af01	Conducted Sample
Sample Parameter	Value	
Serial No.	-	
HW Version	25761	
SW Version	4.62	
Comment	Sample with temporary external Antenna connector	

Documents used for assessment supplied to applicant

Radio technology	Details	Description
Bluetooth & WLAN 5 GHz	88W8887A: Marvell chipset supporting IEEE802.11 a/b/g/n/ac + Bluetooth 4.2	<ul style="list-style-type: none"> - FCC 15.247 Test report: max. 9.0 dBm conducted - FCC 15.407 Test report: max. 9.5 dBm conducted

Measured RF Output Power

BT:

Ambient temperature: 25 °C
 Air Pressure: 900 hPa
 Humidity: 40 %
 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	8.6	21.0	12.4	11.8
	39	2441	8.4	21.0	12.6	11.6
	78	2480	8.2	21.0	12.8	11.4

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	9.0	21.0	12.0	12.2
	39	2441	8.9	21.0	12.1	12.1
	78	2480	7.8	21.0	13.2	11.0

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MDE_VIS_1916_MPE_01

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	9.0	21.0	12.0	12.2
	39	2441	8.2	21.0	12.8	11.4
	78	2480	7.9	21.0	13.1	11.1

WLAN:

Ambient temperature: 25 °C
 Air Pressure: 990 hPa
 Humidity: 43 %
 WLAN a-Mode; 20 MHz; 6 Mbit/s

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
3	149	5745	9.4	12.9	30.0	20.6	30.0	20.6	36.0	23.1
	157	5785	9.2	12.7	30.0	20.8	30.0	20.8	36.0	23.3
	165	5825	9.1	12.6	30.0	20.9	30.0	20.9	36.0	23.4

WLAN n-Mode; 20 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
3	149	5745	9.4	12.9	30.0	20.6	30.0	20.6	36.0	23.1
	157	5785	9.5	13.0	30.0	20.5	30.0	20.5	36.0	23.0
	165	5825	9.0	12.5	30.0	21.0	30.0	21.0	36.0	23.5

WLAN n-Mode; 40 MHz; MCS0; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
3	151	5755	8.5	12.0	30.0	21.5	30.0	21.5	36.0	24.0
	159	5795	8.4	11.9	30.0	21.6	30.0	21.6	36.0	24.1

WLAN ac-Mode; 80 MHz; MCS8; SISO

U-NII-Subband	Ch. No.	Freq. [MHz]	Cond. Power [dBm]	EIRP [dBm]	FCC Cond. Limit [dBm]	Margin [dB]	IC Cond. Limit [dBm]	Margin [dB]	IC EIRP Limit [dBm]	Margin [dB]
3	155	5775	2.9	6.4	30.0	27.1	30.0	27.1	36.0	29.6

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RF Exposure Evaluation

Standards
OET Bulletin 65 Edition 97-01 August 1997

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

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				P		S		
			Antenna Gain -numeric- (mW/cm ²)	Output Power -conducted- (dBm)	Duty Cycle correction factor	Max. mean output power (dBm)	Output Power -conducted- (mW)	Output Power (EIRP) (mW)	FCC Limit (mW/cm ²)	Power Density value (mW/cm ²)	Margin to FCC Limit (mW/cm ²)
WLAN n-Mode 20 MHz	5785	3.5	2.2387	9.50	0	9.50	8.91	19.95	1.0000	0.0040	0.9960
Bluetooth	2402	3.2	2.0893	9.00	0	9.00	7.94	16.60	1.0000	0.0033	0.9967

Considering a Tune up values of max +/- 1dB, the final calculation would be:

Operational Bands	Frequency (MHz)	Antenna Gain (dBi)	G				P		S		
			Antenna Gain -numeric- (mW/cm ²)	Output Power -conducted- (dBm)	Duty Cycle correction factor	Max. mean output power (dBm)	Output Power -conducted- (mW)	Output Power (EIRP) (mW)	FCC Limit (mW/cm ²)	Power Density value (mW/cm ²)	Margin to FCC Limit (mW/cm ²)
WLAN n-Mode 20 MHz	5785	3.5	2.2387	9.50	0	10.50	11.22	19.95	1.0000	0.0050	0.9950
Bluetooth	2402	3.2	2.0893	9.00	0	10.00	10.00	16.60	1.0000	0.0042	0.9958

<End of Assessment>