

CFR 47 Part 2, Frequency allocations and radio treaty matters; general rules and regulations Subpart J For further applied test standards please refer to section 3 of this test report.

	Test Item						
Kind of test item: Type:	Automotive Radar Sensor FR5TPCC						
FCC ID:	NF3-FR5TPCC	<u> </u>					
Frequency:	76.0 GHz – 77.0 GHz						
Antenna:	Integrated antenna	C. C					
Power supply:	8.0 to 32.0 V DC by external power supply						
Temperature range:	-40°C to +85°C						

This test report is electronically signed and valid without handwritten signature. For verification of the electronic signatures, the public keys can be requested at the testing laboratory.

## Test report authorized:

Thomas Vogler Lab Manager Radio Communications & EMC

## **Test performed:**

Meheza Walla Lab Manager Radio Communications & EMC



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## 2 General information

#### 2.1 Notes and disclaimer

The test results of this test report relate exclusively to the test item specified in this test report. CTC advanced GmbH does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item.

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#### 2.2 Application details

Date of receipt of order:	2021-06-28
Date of receipt of test item:	2021-10-15
Start of test:*	2021-10-18
End of test:*	2021-11-08
Person(s) present during the test:	-/-

\*Date of each measurement, if not shown in the plot, can be requested. Dates are stored in the measurement software.

#### 2.3 Test laboratories sub-contracted

None



## 3 Test standard/s and references

Test standard	Date	Description
CFR 47 Part 95, Subpart M	-/-	The 76-81 GHz Band Radar Service
CFR 47 Part 2, Subpart J	-/-	Frequency allocations and radio treaty matters; general rules and regulations

Guidance	Version	Description
ANSI C63.4-2014	-/-	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
ANSI C63.10-2013	-/-	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.26-2015	-/-	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 653005 D01	v01r01 2019-04	Equipment Authorization Guidance for 76-81 GHz Radar Devices

#### Accreditation

Description

D-PL-12076-01-05

Telecommunication FCC requirements https://www.dakks.de/as/ast/d/D-PL-12076-01-05e.pdf

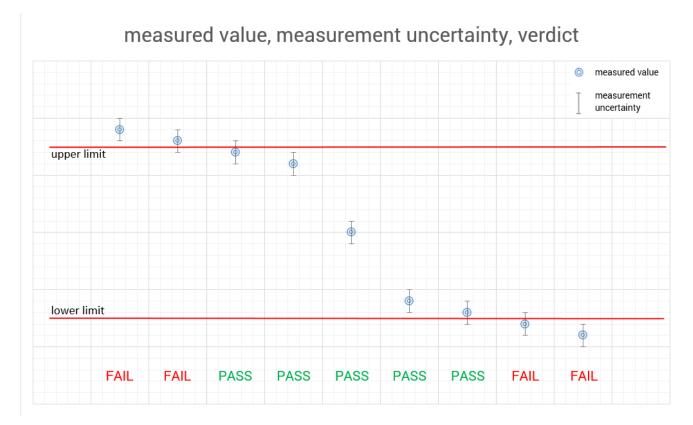




## 4 Reporting statements of conformity – decision rule

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3.

The measurement uncertainty is mentioned in this test report, see chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong."



#### 5 Test environment

Temperature :		T <sub>nom</sub> T <sub>max</sub> T <sub>min</sub>	<ul> <li>+20 °C during room temperature tests</li> <li>+85 °C during high temperature tests</li> <li>-40 °C during low temperature tests</li> </ul>
Relative humidity content	:		55 %
Barometric pressure	:		not relevant for this kind of testing
Power supply	:	V <sub>nom</sub> V <sub>max</sub> V <sub>min</sub>	12.0 / 24. V DC by external power supply 32.0 V 8.0 V



## 6 Test item

## 6.1 General description

Kind of test item :	Automotive Radar Sensor
Туре :	FR5TPCC
S/N serial number	1100010672300409703301010121117759871968
Hardware status	0265.B62.596-01
Software status	1037608766
Frequency band :	76.0 GHz – 77.0 GHz
Type of modulation :	FMCW
Number of modes :	3
Antenna :	Integrated antenna
Power supply :	8.0 to 32.0 V DC by external power supply
Temperature range :	-40°C to +85°C

## 6.2 Additional information

Operating modes as declared by manufacturer:

Modulation mode	Fcenter [GHz]	Vehicle speed	Bandwidth [MHz]
DMP07	-/-	up to 65km/h	846
DMP08	-/-	65km/h – 115 km/h	760
DMP09	-/-	above 115 km/h	652

The content of the following annexes is defined in the QA. It may be that not all of the listed annexes are necessary for this report, thus some values in between may be missing.

Test setup and EUT photos are included in test report:

1-2497/21-01-01\_AnnexA 1-2497/21-01-01\_AnnexB 1-2497/21-01-01\_AnnexD

Tests were performed on 3 modulations: DMP07, DMP08, DMP09.

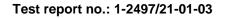


Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements with other calibrated test systems or effective verifications. Weekly chamber inspections and range calibrations are performed. Where possible, RF generating and signaling equipment as well as measuring receivers and analyzers are connected to an external high-precision 10 MHz reference (GPS-based or rubidium frequency standard).

In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

#### Agenda: Kind of Calibration

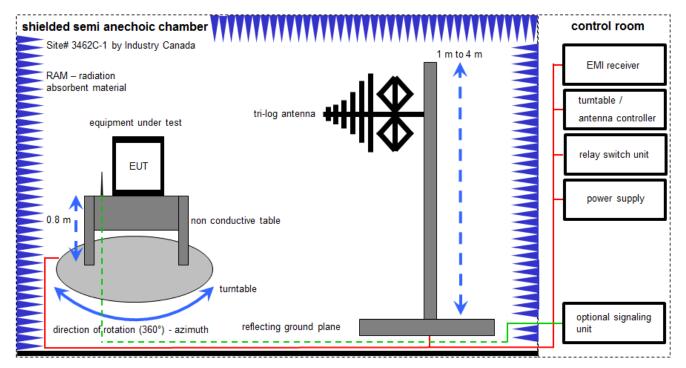
k	calibration / calibrated	EK	limited calibration
ne	not required (k, ev, izw, zw not required)	ZW	cyclical maintenance (external cyclical maintenance)
ev	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress



## 7.1 Shielded semi anechoic chamber

The radiated measurements are performed in vertical and horizontal plane in the frequency range from 30 MHz to 1 GHz in semi-anechoic chambers. The EUT is positioned on a non-conductive support with a height of 0.80 m above a conductive ground plane that covers the whole chamber. The receiving antennas are conform to specifications ANSI C63. These antennas can be moved over the height range between 1.0 m and 4.0 m in order to search for maximum field strength emitted from EUT. The measurement distances between EUT and receiving antennas are indicated in the test setups for the various frequency ranges. For each measurement, the EUT is rotated in all three axes until the maximum field strength is received. The wanted and unwanted emissions are received by spectrum analyzers where the detector modes and resolution bandwidths over various frequency ranges are set according to requirement ANSI C63.

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Measurement distance: tri-log antenna 10 meter

FS = UR + CL + AF

(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

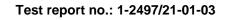
#### Example calculation:

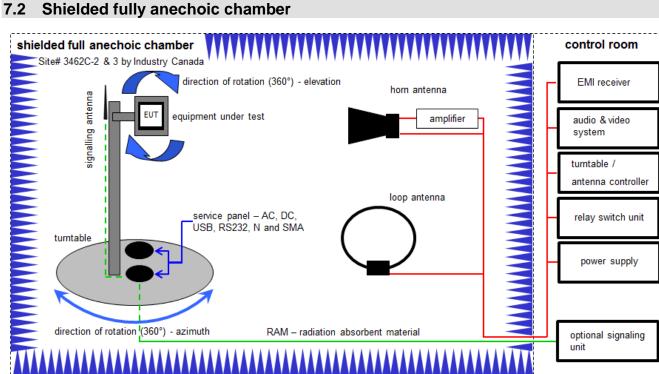
FS  $[dB\mu V/m] = 12.35 [dB\mu V/m] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dB\mu V/m] (35.69 \mu V/m)$ 



## Equipment table:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Switch-Unit	3488A	HP	2719A14505	300000368	ev	-/-	-/-
2	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2920A04466	300000580	ne	-/-	-/-
3	n. a.	Meßkabine 1	HF-Absorberhalle	MWB AG 300023		300000551	ne	-/-	-/-
4	n. a.	EMI Test Receiver	ESCI 3	R&S	100083	300003312	k	09.12.2020	08.12.2021
5	n.a.	Analyzer-Reference- System (Harmonics and Flicker)	ARS 16/1	SPS	A3509 07/0 0205	300003314	viKi!	17.01.2020	16.01.2022
6	n. a.	Antenna Tower	Model 2175	ETS-Lindgren	64762	300003745	izw	-/-	-/-
7	n. a.	Positioning Controller	Model 2090	ETS-Lindgren	64672	300003746	izw	-/-	-/-
8	n. a.	Turntable Interface- Box	Model 105637	ETS-Lindgren	44583	300003747	izw	-/-	-/-
9	n.a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	viKi!	14.01.2020	13.01.2022
10	n. a.	Spectrum-Analyzer	FSU26	R&S	200809	300003874	k	09.12.2020	08.12.2021





Measurement distance: horn antenna 3 meter; loop antenna 3 meter / 1 meter

FS = UR + CA + AF(FS-field strength; UR-voltage at the receiver; CA-loss of the signal path; AF-antenna factor)

Example calculation:  $FS [dB\mu V/m] = 40.0 [dB\mu V/m] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dB\mu V/m] (71.61 \mu V/m)$ 

#### OP = AV + D - G + CA

(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation: OP [dBm] = -39.0 [dBm] + 57.0 [dB] - 12.0 [dBi] + (-36.0) [dB] = -30 [dBm] (1 μW)

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member of RWTÜV group

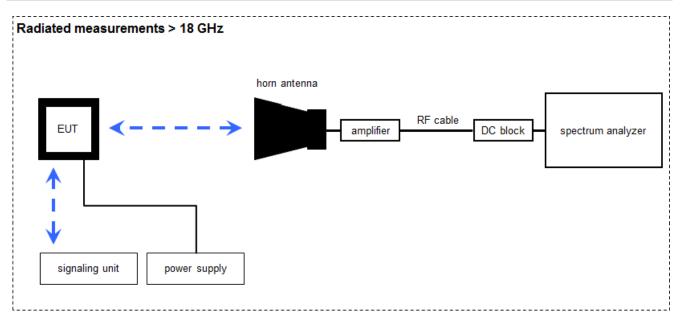


## Equipment table:

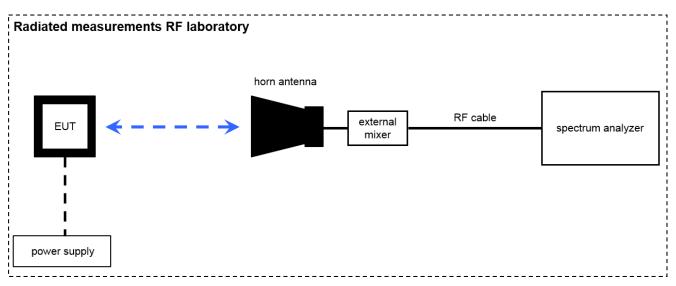
No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	DC power supply, 60Vdc, 50A, 1200 W	6032A	HP	2818A03450	300001040	viKi!	09.12.2020	08.12.2023
2	n. a.	Active Loop Antenna 9 kHz to 30 MHz	6502	EMCO	2210	300001015	vIKI!	13.06.2019	12.06.2022
3	n. a.	Anechoic chamber	FAC 3/5m	MWB / TDK	87400/02	300000996	ev	-/-	-/-
4	n. a.	TRILOG Broadband Test-Antenna 30 MHz - 3 GHz	VULB9163	Schwarzbeck Mess - Elektronik	371	300003854	viKi!	14.01.2020	13.01.2022
5	n. a.	Double-Ridged Waveguide Horn Antenna 1-18.0GHz	3115	EMCO	9709-5289	300000213	viKi!	14.07.2020	13.07.2022
6	n. a.	Switch / Control Unit	3488A	HP	*	300000199	ne	-/-	-/-
7	n.a.	Variable isolating transformer	MPL IEC625 Bus Variable isolating transformer	Erfi	91350	300001155	ne	-/-	-/-
8	n. a.	EMI Test Receiver 20Hz- 26,5GHz	ESU26	R&S	100037	300003555	k	11.12.2020	10.12.2021
9	n. a.	Highpass Filter	WHKX7.0/18G-8SS	Wainwright	19	300003790	ne	-/-	-/-
10	n. a.	Broadband Amplifier 0.5-18 GHz	CBLU5184540	CERNEX	22049	300004481	ev	-/-	-/-
11	n. a.	Broadband Amplifier 5-13 GHz	CBLU5135235	CERNEX	22010	300004491	ev	-/-	-/-
12	n. a.	4U RF Switch Platform	L4491A	Agilent Technologies	MY50000037	300004509	ne	-/-	-/-
13	n. a.	NEXIO EMV- Software	BAT EMC V3.16.0.49	EMCO		300004682	ne	-/-	-/-
14	n. a.	PC	ExOne	F+W		300004703	ne	-/-	-/-
15	n. a.	RF-Amplifier	AMF-6F06001800- 30-10P-R	NARDA-MITEQ Inc	2011572	300005241	ev	-/-	-/-



#### 7.3 Radiated measurements > 18 GHz



#### 7.4 Radiated measurements > 50/85 GHz



OP = AV + D - G

(OP-rad. output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain)

#### Example calculation:

OP [dBm] = -54.0 [dBm] + 64.0 [dB] - 20.0 [dBi] = -10 [dBm] (100 μW)

Note: conversion loss of mixer is already included in analyzer value.



## Equipment table:

No.	Lab / Item	Equipment	Туре	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n.a.	Horn Antenna 18.0-40.0 GHz	LHAF180	Microw.Devel	39180-103-021	300001747	viKi!	18.02.2019	17.02.2022
2	n. a.	Std. Gain Horn Antenna 18.0-26.5 GHz	638	Narda		300000486	viKi!	21.01.2020	20.01.2022
3	n.a.	Std. Gain Horn Antenna 26.5-40.0 GHz	V637	Narda	82-16	300000510	viKi!	23.01.2020	22.01.2022
4	n.a.	Std. Gain Horn Antenna 33.0-50.1 GHz	2324-20	Flann	57	400000683	ne	-/-	-/-
5	n. a.	Std. Gain Horn Antenna 49.9-75.8 GHz	2524-20	Flann	*	300001983	ne	-/-	-/-
6	n. a.	Std. Gain Horn Antenna 60-90 GHz	COR 60_90	Thomson CSF		300000814	ev	-/-	-/-
7	n.a.	Std. Gain Horn Antenna 73.8-112 GHz	2724-20	Flann	*	300001988	ne	-/-	-/-
8	n.a.	Std. Gain Horn Antenna 92.3-140 GHz	2824-20	Flann		300001993	ne	-/-	-/-
9	n.a.	Std. Gain Horn Antenna 114-173 GHz	2924-20	Flann	*	300001999	ne	-/-	-/-
10	n.a.	Std. Gain Horn Antenna 145-220 GHz	3024-20	Flann	*	300002000	ne	-/-	-/-
11	n.a.	Std. Gain Horn Antenna 217-330 GHz	32240-20	Flann	233278	300004960	ne	-/-	-/-
12	n. a.	Standard Gain Horn 325-500 GHz	570240-20 1785-2a	Flann	273569	300006097	ev	25.05.2020	24.05.2022
13	n. a.	Broadband LNA 18-50 GHz	CBL18503070PN	CERNEX	25240	300004948	ev	09.03.2020	08.03.2022
14	n. a.	Harmonic Mixer 3- Port, 60-90 GHz	FS-Z90	R&S	102152	300006202	k	21.01.2021	20.01.2022
15	n.a.	Harmonic Mixer 3- port, 75-110 GHz	FS-Z110	Rohde & Schwarz	101411	300004959	k	15.06.2021	14.06.2022
16	n.a.	Harmonic Mixer 3- port, 110-170 GHz	FS-Z170	Rohde & Schwarz	100014	300004156	k	11.06.2021	10.06.2022
17	n. a.	Harmonic Mixer 3- Port, 140-220 GHz	SAM-220	Radiometer Physics GmbH	200001	300004157	k	22.07.2021	21.07.2022
18	n. a.	Harmonic Mixer 3- Port, 220-325 GHz	SAM-325	Radiometer Physics GmbH	100002	300004158	k	22.07.2021	21.07.2022
19	n. a.	Spectrum Analyzer 2 Hz - 50 GHz	FSW50	R&S	101332	300005935	k	05.03.2021	04.03.2022
20	n. a.	Temperature Test Chamber	T-40/50	CTS GmbH	064023	300003540	ev	08.05.2020	07.05.2022



#### 8 Sequence of testing

#### 8.1 Sequence of testing radiated spurious 9 kHz to 30 MHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, it is placed on a table with 0.8 m height.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) see test details.
- EUT is set into operation.

#### Premeasurement\*

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna height is 1 m.
- At each turntable position the analyzer sweeps with positive-peak detector to find the maximum of all emissions.

#### **Final measurement**

- Identified emissions during the pre-measurement are maximized by the software by rotating the turntable from 0° to 360°.
- Loop antenna is rotated about its vertical axis for maximum response at each azimuth about the EUT. (For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT)
- The final measurement is done in the position (turntable and elevation) causing the highest emissions with quasi-peak (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. A plot with the graph of the premeasurement and the limit is stored.

\*)Note: The sequence will be repeated three times with different EUT orientations.



## 8.2 Sequence of testing radiated spurious 30 MHz to 1 GHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.
- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 10 m or 3 m (see ANSI C 63.4) see test details.
- EUT is set into operation.

#### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height changes from 1 m to 3 m.
- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximize the peaks by changing turntable position ± 45° and antenna height between 1 and 4 m.
- The final measurement is done with quasi-peak detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.



## 8.3 Sequence of testing radiated spurious 1 GHz to 18 GHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- If the EUT is a tabletop system, a 2-axis positioner with 1.5 m height is used.
- If the EUT is a floor standing device, it is placed directly on the turn table.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.
- Measurement distance is 3 m (see ANSI C 63.4) see test details.
- EUT is set into operation.

#### Premeasurement

- The turntable rotates from 0° to 315° using 45° steps.
- The antenna is polarized vertical and horizontal.
- The antenna height is 1.5 m.
- At each turntable position and antenna polarization the analyzer sweeps with positive peak detector to find the maximum of all emissions.

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.4.
- Based on antenna and turntable positions at which the peak values are measured the software maximizes the peaks by rotating the turntable from 0° to 360°. This measurement is repeated for different EUT-table positions (0° to 150° in 30°-steps) and for both antenna polarizations.
- The final measurement is done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement with marked maximum final results and the limit is stored.



## 8.4 Sequence of testing radiated spurious above 18 GHz

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate (e.g. 0.5 m).
- The EUT is set into operation.

#### Premeasurement

• The test antenna is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

## 8.5 Sequence of testing radiated spurious above 50/85 GHz with external mixers

#### Setup

- The equipment is set up to simulate normal operation mode as described in the user manual or defined by the manufacturer.
- Auxiliary equipment and cables are positioned to simulate normal operation conditions as described in ANSI C 63.4.
- The AC power port of the EUT (if available) is connected to a power outlet.
- The measurement distance is as appropriate for far field (e.g. 0.25 m).
- The EUT is set into operation.

#### Premeasurement

- The test antenna with external mixer is handheld and moved carefully over the EUT to cover the EUT's whole sphere and different polarizations of the antenna.
- Caution is taken to reduce the possible overloading of the external mixer.

- The final measurement is performed at the position and antenna orientation causing the highest emissions with Peak and RMS detector (as described in ANSI C 63.4).
- As external mixers may generate false images care is taken to ensure that any emission measured by the spectrum analyzer does indeed originate in the EUT. Signal identification feature of spectrum analyzer is used to eliminate false mixer images (i.e., it is not the fundamental emission or a harmonic falling precisely at the measured frequency).
- Final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit are recorded. A plot with the graph of the premeasurement and the limit is stored.

## 9 Measurement uncertainty

Test case	Uncertainty
Equivalent isotropically radiated power (e.i.r.p.)	Conducted value ± 1 dB Radiated value ± 3 dB
Permitted range of operating frequencies	± 100 kHz
Conducted unwanted emissions in the spurious domain (up to 40 GHz)	± 1 dB
Radiated unwanted emissions in the spurious domain (up to 40 GHz)	± 3 dB
Conducted unwanted emissions in the spurious domain (40 to 50 GHz)	± 4 dB
Radiated unwanted emissions in the spurious domain (40 to 50 GHz)	± 4 dB
Conducted unwanted emissions in the spurious domain (50 to 300 GHz)	± 5 dB
Radiated unwanted emissions in the spurious domain (50 to 300 GHz)	± 5 dB
DC and low frequency voltages	± 3 %
Temperature	± 1 °C
Humidity	± 3 %

## 10 Summary of measurement results

$\square$	No deviations from the technical specifications were ascertained
	There were deviations from the technical specifications ascertained
	This test report is only a partial test report. The content and verdict of the performed test cases are listed below.

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TC Identifier	Description	Verdict	Date	Remark
RF-Testing	47 CFR Part 95 Subpart M	see below	2021-11-26	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	с	NC	NA	NP	Results (max.)
§2.1046 §95.3367 (a) / (b)	Radiated power	Nominal	Nominal	$\boxtimes$				-/-
§2.1047	Modulation characteristics	-/-	-/-	$\boxtimes$				-/-
§2.1049	Occupied bandwidth (99% bandwidth)	Nominal	Nominal					-/-
§2.1051	Spurious emissions at antenna terminals	Nominal	Nominal			$\boxtimes$		see note
§2.1053 §95.3379 (a)(1) §95.3379 (a)(2) §95.3379 (a)(3)	Field strength of emissions (radiated spurious)	Nominal	Nominal					-/-
§2.1055 §95.3379 (b)	Frequency stability	Nominal and Extreme	Nominal and Extreme	$\boxtimes$				-/-

**Note:** C = Compliant; NC = Not compliant; NA = Not applicable; NP = Not performed

#### See FCC's Millimeter Wave Test Procedures:

I. A radiated method of measurements in order to demonstrate compliance with the various regulatory requirements has been chosen in consideration of test equipment availability and the limitations of many external harmonic mixers. A conducted method of measurement could be employed if EUT and mixer waveguides both are accessible and of the same type (WG number) and if waveguide sections and transitions can be found. Another potential problem is that the peak power output of devices operating under Sections 15.253 and 15.255 may exceed the +20 dBm input power limit of many commercially available mixers. For these reasons a radiated method is preferred.



## 11 Measurement results

#### 11.1 Radiated power

#### **Description:**

The fundamental radiated emission limits within the 76-81 GHz band are expressed in terms of Equivalent Isotropically Radiated Power (EIRP) and are as shown below.

#### Measurement:

Parameters					
Detector:	RMS / Pos-Peak				
Sweep time:	160 s				
Resolution bandwidth:	1 MHz				
Video bandwidth:	3 MHz				
Trace-Mode:	Max Hold				
Measurement distance:	2 m				
Measurement uncertainty:	± 3dB				

#### Limits:

#### FCC §95.3367 (a) (b)

Frequency	Measurement distance	EIRP
76.0 - 81.0 GHz	3.0 m	88 µW/cm <sup>2</sup> → 50 dBm (Average) 279 µW/cm <sup>2</sup> → 55 dBm (PEAK)

#### Measurement results:

Modulation / T	est conditions	Channel power Radiated mean power (eirp) [dBm]	Radiated peak power (eirp) [dBm]	Radiated power spectral density [dBm]	
DMP07	T <sub>nom</sub> / V <sub>min-max</sub>	21.29	31.00	2.52	
DMP08	T <sub>nom</sub> / V <sub>min-max</sub>	21.29	30.85	2.64	
DMP09	T <sub>nom</sub> / V <sub>min-max</sub>	21.31	30.91	2.21	

Note: Voltage variation does not affect the radiated signal

Test	report	no.:	1-2497/21-01-0	)3
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Plot 1: DMP07, Channel power, Tnom / Vmin-Vmax

								<u> </u>
MultiView 🎫 Spectr	um 🗙 Spe	ectrum 2	× Spectr	um 3	×			
Ref Level 50.00 dBm C		WIMHz WIMHz Mod	a Auto Sween					
Inp: ExtMix E	100 3 0 08		e Auto Sweep					
1 ACLR								O1Rm Clrv
40 dBm			T>	:1				
30 dBm								
20 dBm								
10 dBm								
TO UBIN								
0 dBm								
		~~~~	~l	~				
-10 dBm	und me the second						m	
-20 dBm							My	
V								
-30 dBm								
-40 dBm								
V1								V2
CF 76.5 GHz		1201 pts			120.0 MHz/			Span 1.2 GH
2 Result Summary		1201 pta	No					0001112.01
Channel Tx1 (Ref)	Bandwidth 1.000 GHz		Offset		Power 21.29 dBm			
Tx Total	1.000 GH2				21.29 dBm 21.29 dBm			
Ψ						Measuring		20.10.20
3:23:23 20.10.2021								

Plot 2: DMP07, Peak power and Power spectral density,  $T_{\text{nom}}$  /  $V_{\text{min}}\text{-}V_{\text{max}}$ 

					<b></b>
MultiView 📑 Spectrum	× Spectrum 2	× Spectru	.um 3 🗙		-
	et 57.00 dB ● RBW 1 MHz		_		
<ul> <li>SWT</li> <li>Inp: ExtMix E</li> </ul>	160 s 👄 VBW 3 MHz 🛛	Mode Auto Sweep			
1 Occupied Bandwidth					⊙1Pk Max ⊜2Rm Max
					M1[1] 31.00 dBm
					76.488 000 GHz
40 dBm					M2[2] 2.52 dBm
		M1			76.488 000 GHz
30 dBm	there has all an in in his has broken the	an internet and range of the	MMW un water march of the		<b>Τ</b> 2
20 dBm		and the second second in the second sec	THE REPORT OF A DURING A DURIN		8
20 dBm					
10 dBm					
11		M2			
					MAAA I
-10 dB/m	and an		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	man	
Martine Martine				- www.	hannes
-20 dBm					
-30 dBm					
30 ubin					
-40 dBm					
V1					V2
CF 76.5 GHz	1201	pts	120.0 MHz/		Span 1.2 GHz
2 Marker Table		•			
Type Ref Trc	X-Value	Y-Value	Function		nction Result
M1 1	76.488 GHz	31.00 dBm	Occ Bw		4 882 72 MHz
T1 1	76.069.051 GHz	22.28 dBm	Occ Bw Centroid		5.494888912 GHz
T2 1 M2 2	76.920726 GHz 76.488 GHz	24.31 dBm 2.52 dBm	Occ Bw Freq Offset	-2	5.111 088 099 MHz
				- Measuring	20.10.2021
				_	
13:20:24 20.10.2021					

Test report no.	: 1-2497/21-01-03
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Plot 3: DMP08, Channel power, Tnom / Vmin-Vmax

h dBm h dBm									Ś
• SW1 160 s • VBW 3 MHz Mode Auto Sweep p: ExtMix E ACLR	-			× Spectr	um 3	×			-
ACLR OIEm Ch dBm Tal Tal OIEm Ch dBm dBm Tal OIEm Ch dBm Ch				e Auto Sweep					
lam dam dam dam dam dam dam dam dam dam d	1 ACLR								o 1Rm Clrw
lam dam dam dam dam dam dam dam dam dam d									
dam	40 dBm			т	1				
h dBm dBm dBm dBm dBm dBm dBm dBm					-				
dBm dBm dBm dBm o dBm o d	30 dBm								
dBm dBm dBm dBm o dBm o d									
dBm o dB	20 dBm-								
dBm o dB									
o dBm o dBm o dBm o dBm v1 c 2 c 76.5 GHz c 1201 pts 120.0 MHz/ Span 1.2 GHz Channel Bandwidth Offset Power Tx1 (Ref) 1.000 GHz 21.29 dBm Tx Total Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel	10 dBm								
o dBm o dBm o dBm o dBm v1 c 2 c 76.5 GHz c 1201 pts 120.0 MHz/ Span 1.2 GHz Channel Bandwidth Offset Power Tx1 (Ref) 1.000 GHz 21.29 dBm Tx Total Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel Channel	0 dBm								
0 dBm				~					
0 dBm     0 dBm     0 dBm     0 dBm     0 dBm       0 dBm     v1     0 dBm     0 dBm       V1     1201 pts     120.0 MHz/       F76.5 GHz     1201 pts     120.0 MHz/       Span 1.2 G       Result Summary     None       Channel     Bandwidth     Offset       Power     21.29 dBm       Tx1 (Ref)     1.000 GHz       Tx Total     21.29 dBm	-10 dBm						- man		
0 dBm     0 dBm     0 dBm     0 dBm     0 dBm       0 dBm     v1     0 dBm     0 dBm       V1     1201 pts     120.0 MHz/       F76.5 GHz     1201 pts     120.0 MHz/       Span 1.2 G       Result Summary     None       Channel     Bandwidth     Offset       Power     21.29 dBm       Tx1 (Ref)     1.000 GHz       Tx Total     21.29 dBm		A company of the second s						4	
o dBm v1 v1 v	-20 dBm								
o dBm v1 v1 v									
V1     V2       F 76.5 GHz     1201 pts     120.0 MHz/     Span 1.2 Gl       Result Summary     None     Channel     Bandwidth     Offset     Power       Tx1 (Ref)     1.000 GHz     21.29 dBm     Tx1.29 dBm       Tx Total     21.29 dBm     21.29 dBm     13121 dBm	-30 dBm								
V1     V2       F 76.5 GHz     1201 pts     120.0 MHz/     Span 1.2 Gl       Result Summary     None     Channel     Bandwidth     Offset     Power       Tx1 (Ref)     1.000 GHz     21.29 dBm     Tx1.29 dBm       Tx Total     21.29 dBm     21.29 dBm     13121 dBm									
F 76.5 GHz     1201 pts     120.0 MHz/     Span 1.2 Gi       Result Summary     None       Channel     Bandwidth     Offset     Power       Tx1 (Ref)     1.000 GHz     21.29 dBm     Tx120.29 dBm       Tx Total     21.29 dBm     21.29 dBm									V2
Result Summary     None       Channel     Bandwidth     Offset     Power       Tx1 (Ref)     1.000 GHz     21.29 dBm       Tx Total     21.29 dBm									
Channel     Bandwidth     Offset     Power       Tx1 (Ref)     1.000 GHz     21.29 dBm       Tx Total     21.29 dBm			1201 pts			20.0 MHz/			Span 1.2 GH
Tx Total 21.29 dBm - Measuring 20.0.2		Bandwidth			ne	Power		_	
- Measuring • Measuring • 20.00.2 13:27	Tx1 (Ref)					21.29 dBm			
	Tx Total					21.29 aBm			- 20 10 202
27:07 20.10.2021	~						<ul> <li>Measuring.</li> </ul>	••	13:27:0
	3:27:07 20.10.2021								

Plot 4: DMP08, Peak power and Power spectral density,  $T_{nom}$  /  $V_{min}$ - $V_{max}$ 

					Solution
MultiView 📑 Spectru	ım X Spectrum	2 X Spectru	ım 3 🗙		•
Ref Level 50.00 dBm Of	fset 57.00 dB • RBW 1 MHz		_		
SV     Inp: ExtMix E	VT 160 s • VBW 3 MHz	Mode Auto Sweep			
1 Occupied Bandwidth				01P	k Max ⊜2Rm Max
				M1[	1] 30.85 dBm
					76,490 000 GHz
40 dBm-				M2[	2] 2.64 dBm
		M1			76,490 000 GHz
30 dBm	7	and the second	un man man man man and and	I at a second state of $\mathbb{I}^2$	
	and an	Charles and the Charles and the Inv	and a company with a second with	a second and a second	
20 dBm					
10 dBm				1	
		M2			
0 dBm					
6 6 6 6 M/				A & U	
-10 dBm					4 <b>1</b>
manumoran	- Martin -				Marmonument
-20 dBm	المر				
-20 ubiii-	/				
-30 dBm					
-40 dBm					V2
V1					The second se
CF 76.5 GHz	12	01 pts	120.0 MHz/		Span 1.2 GHz
2 Marker Table			· · · ·		
Type Ref Trc	X-Value	Y-Value	Function		n Result
M1 1	76.49 GHz	30.85 dBm	Occ Bw	759.920 50	
T1 1	76.115735 GHz	26.59 dBm	Occ Bw Centroid		95 695 488 GHz
T2 1 M2 2	76.875656 GHz 76.49 GHz	25.17 dBm 2.64 dBm	Occ Bw Freq Offset	-4.30	94 51 1 906 MHz
	70.49 012	2.04 uBill			
~				- Measuring	20.10.2021
13:30:02 20.10.2021					

Test report no.	: 1-2497/21-01-03
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Plot 5: DMP09, Channel power, Tnom / Vmin-Vmax

					<b>A</b>
MultiView - Spect			rum 3 🗙		•
	Offset 57.00 dB ● RBW 1 M SWT 160 s ● VBW 3 M	Hz Hz <b>Mode</b> Auto Sweep			
Inp: ExtMix E 1 ACLR					o 1Rm Clrw
I AGER					O IRIT CITW
40 dBm		Ti	1		
30 dBm					
20 dBm					
10 dBm					
0 dBm					
-10 dBm					
				- mg	
-20 dBm	1				
-30 dBm					
-40 dBm					
V1					V2
CF 76.5 GHz		1201 pts	120.0 MHz/		Span 1.2 GH
2 Result Summary		No	ne		
Channel Tx1 (Ref)	Bandwidth 1.000 GHz	Offset	Power 21.31 dBn		
Tx Total	21000 0112		21.31 dBn	1	
				- Measuring	20.10.202
3:33:59 20.10.2021					

Plot 6: DMP09, Peak power and Power spectral density,  $T_{\text{nom}}$  /  $V_{\text{min}}\text{-}V_{\text{max}}$ 

MultiView	Spectrum	× Sp	ectrum 2	× Spectr	um 3 💙	<				-
Ref Level 50.00	dBm Offset	57.00 dB 🖷 RB	W 1 MHz	_	_	-				
Inp: ExtMix E	● SWT	160 s 👄 VB	WI3 MHz M	ode Auto Sweep						
1 Occupied Band	dwidth							(	o1Pk Ma	x ⊜2Rm Max
									M1[1]	30.91 dBr
									70	5.491 000 GH
40 dBm									M2[2]	2.21 dBr
				M1					70	5.491 000 GH
30 dBm		Thomas	mannin	www.www.www.h	MMMMMM MMM	whether the starter	phan 12	_		
		4					4			
20 dBm							1			
							1 1			
10 dBm-										
				M2			1	N		
0 dBm	0.0 4 4	1						hanan n		
	- ARAC	v	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	44		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		ALV VIN		
-10 dBm							-w	- · · W		
have been and the stand of the	unis V						J ~ M		An Markan	real getal de la
-20 dBm							-			
		J					1			
-30 dBm										
-40 dBm										
V1										V2
			1001		10					
CF 76.5 GHz			1201 p	ots	12	0.0 MHz/				Span 1.2 GH
2 Marker Table Type Ref	Trc	X-Value		Y-Value		Function		Euro	ction Re	oult
M1		76.491 G	Hz	30.91 dBm	Occ Bw	Tancuorr				27 MHz
T1	1	76.167 558 G		24.21 dBm	Occ Bw Cer	ntroid				5289 GHz
T2	1	76.824815 G	Hz	23.88 dBm	Occ Bw Fre	q Offset			-3.81371	1 48 MHz
M2	2	76.491 G	HZ	2.21 dBm						
							- Measurin	g 🔳		20.10.202
										1014210
13:42:33 20.10.2021										

## **11.2 Modulation characteristics**

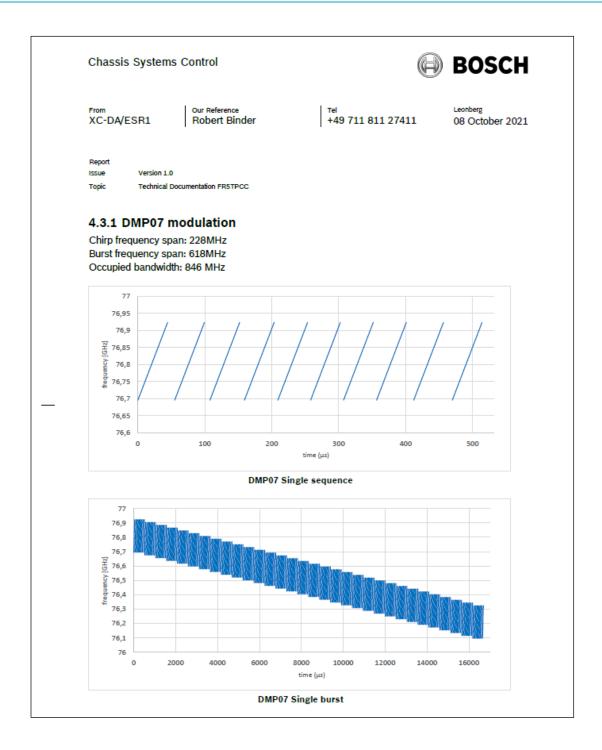
#### **Description:**

§2.1047 (d) Other types of equipment. A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

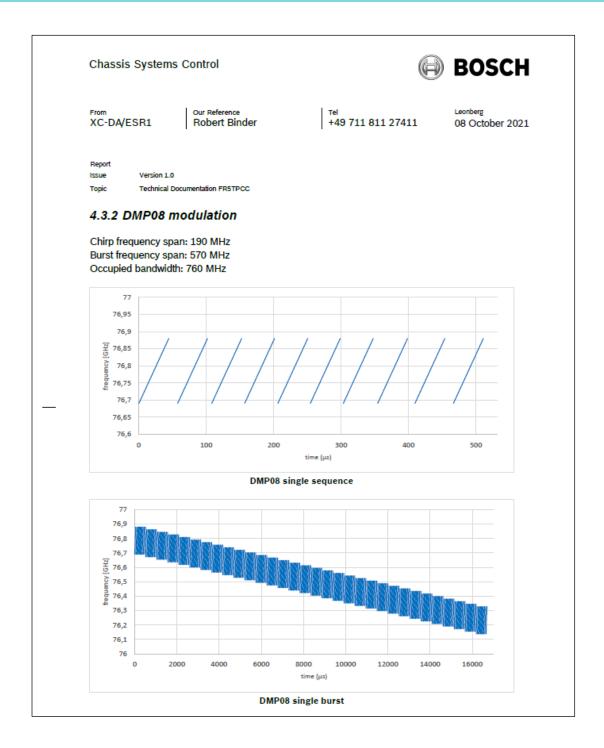
#### Comments from manufacturer on modulation characteristics according to KDB:

	bl		BOSC
	eference Tel ert Binder +49	9 711 811 27411	Leonberg 08 October 2
Report Issue Version 1.0			
Topic Technical Documentation	n FR5TPCC		
4.3 Modulation desc			
	le depends on vehicle speed: Modulation mode	Active TX cha	nnolo
Vehicle speed up to 65km/h	DMP7	TX1, TX2, TX3	
65km/h – 115 km/h	DMP8	TX1, TX2, TX3	
above 115 km/h	DMP9	TX1, TX2, TX3	
is turned off. In every seque chirps on TX3.	nce, 4 chirps are emitted on 1	x1 antenna, 3 chirps	
A burst takes 16,7ms and co sequence is shifted slightly. of cycle. A single cycle takes 66ms.	onsists of 32 sequences (320 Once burst emission is comp		-
sequence is shifted slightly. of cycle. A single cycle takes 66ms.	Once burst emission is comp		-
sequence is shifted slightly. of cycle. A single cycle takes 66ms. TX1 P TX3 P TX3 1 44,32 44,32 44,32	Once burst emission is comp Single sequence P TX1 P TX2 P TX1 44,32 44,32 44,32	P         TX2         P         TX3         P           44,32         44,32         44,32	TX1         P         TX2           44,32         44,32         44,32
sequence is shifted slightly. of cycle. A single cycle takes 66ms.	Single sequence           P         TX1         P         TX2         P         TX1           44,32         44,32         44,32         44,32         44,32           µs         µs         µs         µs         µs	leted, transmitter is tur P TX2 P TX3 P	TX1 P TX2
sequence is shifted slightly. of cycle. A single cycle takes 66ms. TX1 P TX3 P TX3 1 44,32 44,32 44,32	Once burst emission is comp Single sequence P TX1 P TX2 P TX1 44,32 44,32 44,32	P         TX2         P         TX3         P           44,32         44,32         44,32	TX1         P         TX2           44,32         44,32         44,32
sequence is shifted slightly. of cycle. A single cycle takes 66ms. TX1 P TX3 P TX3 1 44,32 44,32 44,32 µs µs µs	Single sequence           P         TX1         P         TX2         P         TX1           44,32         44,32         44,32         44,32         44,32           μs         μs         μs         μs         t₅≈522μs	P         TX2         P         TX3         P           44,32         44,32         44,32	TX1 P TX2 44,32 44,32 µs µs
sequence is shifted slightly. of cycle. A single cycle takes 66ms. TX1 P TX3 P TX3 I 44,32 44,32 44,32 µs µs µs	Single sequence           P         TX1         P         TX2         P         TX1           44,32         44,32         44,32         44,32           µs         µs         µs         t₅≈522µs	P TX2 P TX3 P 44,32 44,32 μs μs	TX1         P         TX2           44,32         44,32         44,32           μs         μs         μs

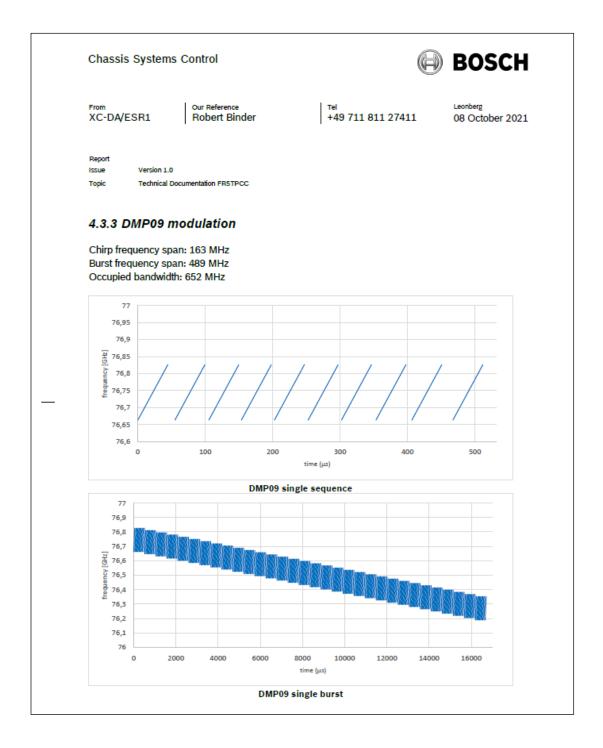














Chassis Systems		E	BOSCH
From XC-DA/ESR1	Our Reference Robert Binder	Tel +49 711 811 27411	Leonberg 08 October 202
Report Issue Version 1.0			
	ocumentation FR5TPCC		
4.4 Duty Cycl	e		
	ms. Additionally, every 2 <sup>™</sup> luty cycle:	66ms. Within this time, the sensor <sup>t</sup> cycle, sensor emits a monitoring $h_{th} + \frac{monitoring\_length}{2}$	
	Duty_cycle =	th +2* 100 cycle_length	
Burst length	Duty cycle		
16,7ms	25,5%		
XC-DA/ESR1			



## 11.3 Occupied bandwidth

#### **Description:**

§2.1049 The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

#### Measurement:

Parameters		
Detector:	Pos. Peak	
Sweep time:	160 s	
Resolution bandwidth:	1 MHz	
Video bandwidth:	3 MHz	
Trace-Mode:	Max Hold	
Measurement distance:	2 m	
Measurement uncertainty:	Span/1000	

#### Limits:

FCC §95.3379 (b)

Frequency range f(lowest) > 76.0 GHz f(highest) < 81.0 GHz	
------------------------------------------------------------	--

#### Measurement results:

Modulations / Test conditions		99% Occupied	OBW [MHz]	
		f <sub>L</sub> [GHz]	f <sub>H</sub> [GHz]	
DMP07	T <sub>nom</sub> / V <sub>min-max</sub>	76.069 051	76.920 726	851.7
DMP08	T <sub>nom</sub> / V <sub>min-max</sub>	76.115 735	76.875.656	759.9
DMP09	T <sub>nom</sub> / V <sub>min-max</sub>	76.167 558	76.824 815	657.3

Note: Voltage variation does not affect the radiated signal

## 11.4 Field strength of spurious emissions

#### **Description:**

The power density of any emissions outside the 76-81 GHz band shall consist solely of spurious emissions and shall not exceed the following:

#### Limits:

### FCC §95.3379

FCC							
CFR Part 95.3379 (a) (1) / CFR Part 95.3379 (a) (3)							
Radiated Spurious Emissions							
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.							
Frequency [MHz]         Field Strength [dBµV/m]         Measurement distance							
0.009 - 0.490	2400/F[kHz]	300					
0.490 – 1.705	24000/F[kHz]	30					
1.705 – 30.0	30	30					
30 88	30.0	10					
88 – 216	33.5	10					
216 – 960	36.0	10					
960 - 40 000	54.0	3					

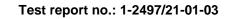
#### Limits:

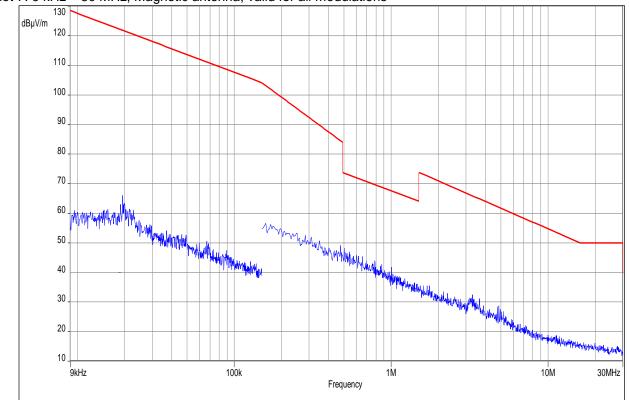
#### FCC §95.3379 (a) (2) (i) + (ii)

Frequency Range [GHz]	Measurement distance	Power Density
40 - 200	3.0 m	600 pW/cm <sup>2</sup> → -1.7 dBm
200 – 231	3.0 m	1000 pW/cm <sup>2</sup> → +0.5 dBm

#### Measurement results:

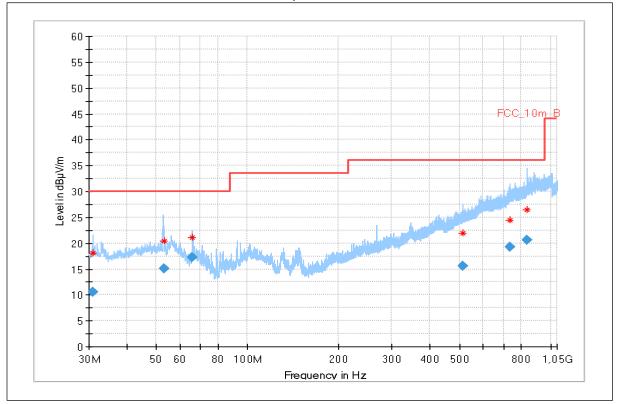
No critical peak found!	Frequency in [GHz]	Detector	Bandwidth [kHz]	Level [dBµV]	Distance [m]	Limit [dBµV]	Margin [dB]





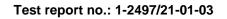
Plot 7: 9 kHz - 30 MHz, Magnetic antenna, valid for all modulations

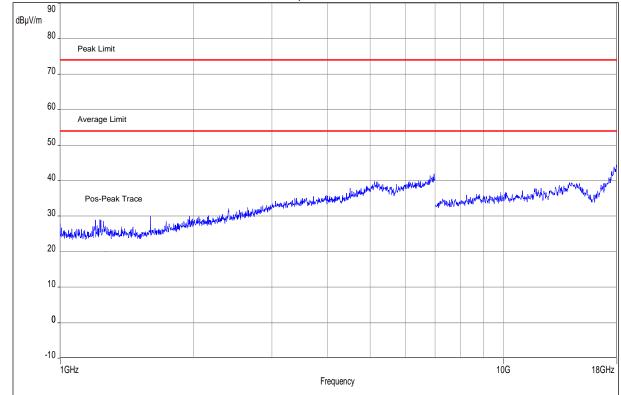
Plot 8: 30 MHz - 1 GHz, antenna vertical / horizontal polarization, valid for all modulations



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CTC I advanced





Plot 9: 1 GHz - 18 GHz, antenna vertical / horizontal polarization, valid for all modulations

Plot 10: 18 GHz - 40 GHz, antenna vertical / horizontal polarization, valid for all modulations

MultiView	Spectrum								_
Ref Level 100	.00 dBµV	RBW	1 MHz						
Att		T 100 s 👄 VBW	3 MHz Mode	Auto Sweep					
TDF "LHAF180_C	ABLE502_CBL1_	18-40G_150CM	L_DBUV"						
I Frequency Sv	veep								●2Av MaxLi
								M1[1	] 53.72 dB
									39.79100
90 dBµ∨								M2[2	]—39.80 dB
									39.0440 G
80 dBµV									
4 DBUV									
70 dBµV									
60 dBµV									
60 dBhA									
54 DBUV									. Media a
50 dBµV							A second descent	Norman	Munantup
					and may ret	mental	have a sold a		
		and an and rear with	montentingent	nowwww.	warmen w				M2
the dBHY	have a property and								$\sim$
						·	~~~~~		
30 dBµV				man		-			
			~ ~~						
20 dBµV									
10 dBµV									
·F ·									
18.0 GHz			1001 pt	s	2	.2 GHz/			40.0 G
2010 0112			1001 pt	•	-				21.10.2

CTC I advanced

Test report no.	: 1-2497/21-01-03
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Plot 11: 40 GHz - 60 GHz	, antenna vertical / horizontal	valid for all modulations
FIULTE: 40 GHZ - 00 GHZ	., antenna ventuar / nonzontar	, valiu iui ali muuulaliuns

MultiView 📑	Spectrum								
Ref Level 20.00	dBm Offse	t 27.74 dB 🖷 F	RBW 1 MHz						_
Att	0 dB 👄 SWT	100 s 👄 🔪	BW 3 MHz Mo	de Auto Sweep					
1 Frequency Swe	ер								o1Rm Max
								M1[1	] -43.01 dBr 41.848 0 GH
10 dBm									41.040 0 011
0 dBm									
ART 95M									
-10 dBm									
13 DBM									
-20 dBm									
30 DBM									
-40 dBm									
-50 dBm									
30 0011					$\sim$				
-60 dBm									
-70 dBm									
40.0 GHz			1001 pt	is is in the second sec	:	2.0 GHz/	1	I	60.0 GHz
							- Measuring.		20.10.2021

Plot 12: 60 GHz to 90 GHz, DMP07, antenna horizontal / vertical polarization

Ref Level 30.00 dBm       Offset 45.00 dB 9 RBW 1 MHz	MultiView	Spectrum	X Sp	ectrum 2	× Spectr	um 3	:	×			<b>*</b>
• SWT 100 s • VBW 3 MHz Mode Auto Sweep Prequency Sweep • • 10m Max Auto 10 0 dem • • • • • • • • • • • • • • • • • • •					opecti	cini c					
Frequency Sweep     • 1Rm Max Auto 1D       0 dBm     0 dBm       dBm     <					de Auto Sweep						
		Sween								● 1 Rm	May Auto TD
D dBm dBm RT 95M 10 dBm 20 dBm 20 dBm 40	1 Hoquency	o weep									i maximaco 10
D dBm dBm RT 95M 10 dBm 20 dBm 20 dBm 40											
D dBm dBm RT 95M 10 dBm 20 dBm 20 dBm 40											
d8m     d8m <td>20 dBm-</td> <td></td>	20 dBm-										
d8m     d8m <td></td> <td> </td>											
RT 95M 10 dBm 20 dBm 30 dBm 40 dBm	10 dBm										ļ
RT 95M 10 dBm 20 dBm 30 dBm 40 dBm											
RT 95M 10 dBm 20 dBm 30 dBm 40 dBm											
10 dBm 20 dBm 30 dBm 40 dBm	0 dBm										
20 dBm 30 dBm 40 dBm 40 dBm 50.0 GHz 1001 pts 3.0 GHz/ 90.0 GHz 1001 pts 3.0 GHz/ 1001 pts 3.0 GHz/ 101 pts 3.0 GHz/ 101 pts 101 pts	PART 95M										
20 dBm 30 dBm 40 dBm 40 dBm 50.0 GHz 1001 pts 3.0 GHz/ 90.0 GHz 1001 pts 3.0 GHz/ 1001 pts 3.0 GHz/ 101 pts 3.0 GHz/ 101 pts 101 pts							MM.				
30 dBm 40 dBm 50.0 GHz 1001 pts 3.0 GHz/ 90.0 GH 20.0 GHz 1001 pts 3.0 GHz/ 90.0 GH 101 pts 3.0 GHz/ 90.0 GH	-10 dBm						1				
30 dBm 40 dBm 50.0 GHz 1001 pts 3.0 GHz/ 90.0 GH 20.0 GHz 1001 pts 3.0 GHz/ 90.0 GH 101 pts 3.0 GHz/ 90.0 GH											
30 dBm 40 dBm 50.0 GHz 1001 pts 3.0 GHz/ 90.0 GH 20.0 GHz 1001 pts 3.0 GHz/ 90.0 GH 101 pts 3.0 GHz/ 90.0 GH	-20 dBm										
40 dBm 60.0 GHz 1001 pts 3.0 GHz/ 90.0 GH ■ Measuring ■ 20.0.331 101 pts 3.0 GHz/ 90.0 GH	20 0011										
40 dBm 60.0 GHz 1001 pts 3.0 GHz/ 90.0 GH ■ Measuring ■ 20.0.331 101 pts 3.0 GHz/ 90.0 GH											
50.0 GHz 1001 pts 3.0 GHz/ 90.0 GH Measuring ▲ 20.10.201 18:16:2	-30 dBm										
50.0 GHz 1001 pts 3.0 GHz/ 90.0 GH Measuring ▲ 20.10.201 18:16:2											
50.0 GHz 1001 pts 3.0 GHz/ 90.0 GH Measuring ▲ 20.10.201 18:16:2	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	A									
- Measuring 20.10.28:	-40 dBm	+			L						
- Measuring 20.10.28:						<u>├</u> ─┘	<u> </u>		ļ		l
- Measuring 20.10.28:											
	60.0 GHz			1001 pt	ts			3.0 GHz/			90.0 GHz
									<ul> <li>Measuring.</li> </ul>	••	20.10.2021
16:28 20.10.2021	8:16:28 20.10.20	121									



MultiView	Spectrum	× Sp	ectrum 2	× Spect	rum 3	3	×			-
Ref Level 30	0.00 dBm Offse	t 45.00 dB 🖷 RI	3W 1 MHz	_		_	_			
Inp: ExtMix E	● SWT	100 s 👄 VE	3₩ 3 MHz Mo	de Auto Sweep						
1 Frequency	Sweep								01Rm	n Max Auto ID
									M1[1	] -33,33 dBr
										63.132 0 GH
20 dBm										
LO dBm										
) dBm										
ART 95M										
						JLM				
10 dBm						1				
-20 dBm										
20 0011										
-30 dBm	M1									
	Ť									
	-1									
-40 dBm										
					$\vdash$					
60.0 GHz			1001 pt	ts	1	3	.0 GHz/			90.0 GH:
	~							- Measuring.		20.10.202

Plot 13: 60 GHz to 90 GHz, DMP08, antenna horizontal / vertical polarization

Plot 14: 60 GHz to 90 GHz, DMP09, antenna horizontal / vertical polarization

MultiView	Spectrum	× Sp	ectrum 2	× Spect	rum 3	3	×			•
Ref Level 30.0	0 dBm Offset SWT			ode Auto Sweep						
np: ExtMix E		100 S 🛎 VI		de Auto Sweep						
Frequency S	weep									n Max Auto ID
									M1[1	] -34.79 dBr 63.192 0 GH
20 dBm										
l0 dBm										
) dBm										
ART 95M					+'					
						JM.				
10 dBm-										
20 dBm					-	$\square$		_		
30 dBm										
30 dbm	M1									
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1									
40 dBm	<u> </u>									
					<b> </b>		+			
1 60.0.CU			1001 -	ta						
60.0 GHz			1001 p	ts	_		3.0 GHz/	Mongaria		90.0 GH
	~							e wieasuring.		19:00:5



np: ExtMix F	<ul> <li>Offset 33.63 dB</li> <li>SWT 100 s</li> </ul>		de Auto Sweep			
Frequency Sweep					O1Rm	n Max Auto
					M1[1	] -38,95
						95.6690
0 dBm						
						1
dBm				 		
7K1 95M						1
10 dBm						
3 DBM						 I
20 dBm					 l	
						1
O DBM					 ļ]	
M1						1
						1
50 dBm						
						1
50 dBm						
						1
70 dBm					 	
					I	1
90.0 GHz		1001 pt		 .0 GHz/	L	140.0

Plot 15: 90 GHz - 140 GHz, antenna vertical / horizontal, valid for all modulations

Plot 16: 140 GHz - 220 GHz, antenna vertical / horizontal, valid for all modulations

MultiView	Spectrum	X Sp	ectrum 2	× Specti	.um 3	×			-
Ref Level 30.0	0 dBm Offset		W 1 MHz	_	_				
Inp: ExtMix G	● SWT	100 s 👄 VB	W 3 MHz Mo	de Auto Sweep					
1 Frequency Sv	veep							⊖1Rrr	n Max Auto ID
								M1[1]	-39.46 dBn 140.440 0 GH;
20 dBm									
10 dBm									
0 dBm									
PART 95M									
-10 dBm-									
-13 DBM									
-20 dBm									
-30 DBM -30 dBm									
M1 40 dBm									
( dubinn		~~~~	~~~~~						
-50 dBm									
-60 dBm									
140.0.00			1001						222.0.5
140.0 GHz	~		1001 pt		8	.0 GHz/	- Measuring.		220.0 GHz
9:27:14 20.10.2021									19127113

Test report no.: 7	1-2497/21-01-03
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Ref Level 20.00		Spectrum 2		n 3 🗙	
		.00 s 🗢 VBW 3 MHz 🛛 M	ode Auto Sweep		
inp: ExtMix J L Frequency Swe	ep				●1Rm Max Auto
					M1[1] -27.87 220.0050
0 dBm					
ART 95M					
10 dBm					
20 dBm					
30 dBm					 
10 dBm					
0 dBm					
0 dBm					
O dBm					
20.0 GHz		1001 p	ts	1.1 GHz/	231.0

## Plot 17: 220 GHz to 231 GHz, horizontal / vertical polarization, valid for all modulations



#### 11.5 Frequency stability

#### **Description:**

§95.3379 (b) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

#### Limits:

FCC §95.3379 (b)

Frequency range	f(lowest) > 76.0 GHz	f(highest) < 81.0 GHz	
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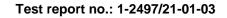
#### Measurement results:

#### Temperature variation:

Modulation	Temperature in °C	f∟ in GHz	f <sub>H</sub> in GHz
	-40	76.071 050	76.923 434
	-20	76.071 742	76.922 531
	-10	76.071 262	76.922 689
	0	76.069 820	76.922 348
DMP07 (Worst Case)	10	76.068 727	76.920 920
DiviP07 (WOISt Case)	20	76.069 051	76.920 726
	30	76.068 822	76.920 288
	40	76.068 797	76.918 614
	50	76.069 336	76.920 031
	85	76.069 776	76.919 512

#### Voltage variation:

Voltage variation of rated input voltage	f∟in GHz	f <sub>H</sub> in GHz					
< 85 % of U	Voltage veriation does n	est offect the redicted signal					
> 115 % of U	Voltage variation does not affect the radiated signal						



\_

Plot 18: OBW, T<sub>min</sub> / V<sub>nom</sub>

Ref Level 50.0	0 dBm Offset ● SWT	t 57.00 dB • RE 160 s • VE		de Auto Sweep					
l Occupied Bar	ndwidth							o 1Pk M	lax 😑 2Rm I
								M1[1]	30.27
40 dBm									76.492 000
				Mi				M2[2]	2.26
30 dBm				7					76.491 000
20 dBm	T Sparkakano	uturneturturturt	Jusuman	Malwaniman	MANNAM	WINNIN		LANG -	
								5	
.0 dBm				Ma					
dBm	W							,V,	MAL
10 dBm	مستلالير	man man					mound	may a	1 · · Mart
20 dBm									
30 dBm									
40 dBm									
V1									V2
F 76.5 GHz		I	1201 pt	ts	12	0.0 MHz/	1	1	Span 1.2
Marker Table									
Type Ref M1	Trc 1	X-Value 76.492 G	H7 '	Y-Value 30.27 dBm	Occ Bw	Function	81	Function R 52.384 090 (	
T1	1	76.071 05 0		21.60 dBm	Occ Bw Cer	ntroid	0.		42 362 GHz
T2	1	76.923 434 0 76.491 G	Hz	23.70 dBm 2.26 dBm	Occ Bw Fre	q Offset		-2.75763	37 992 MHz
M2	2	76.491 G	Π2	2.26 a bill					<u> </u>

Plot 19: OBW, -20 °C / V<sub>nom</sub>

1ultiView 📑 Spectro	um X Spectrum	2 X Spectru	ım 3 🗙	
Ref Level 50.00 dBm Of SV p: ExtMix E	ffset 57.00 dB ● RBW 1 MH: WT 160 s ● VBW 3 MH:	z z <b>Mode</b> Auto Sweep		
Occupied Bandwidth				o 1Pk Max ⊜2Rm M
				M1[1] 30.41 c 76.490 000
) dBm				M2[2] 2.21 c
		M1		76.490 000
) dBm T1	mel man and a second	umumumm	amaralialianianiana.	npulled the fille
) dBm				
) dBm				
ubin ub		M2		
dBm				No II A A
	1 American Marine Marin			man MMM
ىر الس	how the			- march
20 dBm				
30 dBm				
IO dBm				V2
76.5 GHz	1	201 pts	120.0 MHz/	Span 1.2 (
Marker Table		•	· · · ·	
Type Ref Trc	X-Value	Y-Value	Function	Function Result
M1 1 T1 1	76.49 GHz 76.071 742 GHz	<b>30.41 dBm</b> 25.04 dBm	Occ Bw Occ Bw Centroid	850.789 132 263 MHz 76.497 136 41 GHz
T2 1	76.922531 GHz	22.91 dBm	Occ Bw Freq Offset	-2.863 589 53 MHz
M2 2	76.49 GHz	2.21 dBm	- · ·	
				Measuring 20.10

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Plot 20: OBW, -10 °C / V<sub>nom</sub>

Ref Level 50.00 dB np: ExtMix E Occupied Bandwi	● SWT 160	B●RBW 1MHz s●VBW 3MHz M	lode Auto Sweep				o 1Pk M	lax ⊜2Rm Ma
							M1[1]	30.74 df
10 dBm							M2[2]	76.490 000 G 2.29 dt
			M1					2.29 a 76.490 000 G
30 dBm	<u>T1</u>	unanter lever marches	n have as at a caller.		A DATA A A		1 1 172	
	Maderdensenerar	and the manufacture	COMPARING AND A COMPARING A	AUM CHACAROMADUNA	www.www.h_h_h_	اسالسالسالسا	-lululiz	
) dBm							<b>k</b> .	
) dBm							<u> </u>	
			M2					
dBm	1						<b>\</b>	
– A MMAMAM™			l		I		n.	NA AL
10 dBm	1 de la de l						·	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
لسعد	معلماً معرف المعالم ال						No.	1 M Charles
20 dBm	کر							
30 dBm	<i></i>							
oo abiii								
40 dBm								₋
V1								V2
F 76.5 GHz		1201	pts	120	).0 MHz/			Span 1.2 G
Marker Table								
	rc X-Va		Y-Value		Function		Function R	esult
M1 T1		.49 GHz 1 262 GHz	<b>30.74 dBm</b> 25.96 dBm	Occ Bw Occ Bw Cen	troid	85	1.427 939 8 76 496 9	514 MHZ 75521 GHz
T2	1 76.92	2689 GHz	23.22 dBm	Occ Bw Free				79183 MHz
M2	2 <b>76</b> .	.49 GHz	2.29 dBm					20.10.

Plot 21: OBW, 0 °C / Vnom

					<b>\$</b>
MultiView 📑 Spectrum	Spectrum	2 X Spectru	im 3 🗙		
Ref Level 50.00 dBm Offse	et 57.00 dB • RBW 1 MHz				
● SWT	160 s 👄 VBW 3 MHz	Mode Auto Sweep			
Inp: ExtMix E 1 Occupied Bandwidth					o1Pk Max ⊜2Rm Max
					M1[1] 30.72 dBn
40 dBm					76,490 000 GH
40 dBm					M2[2] 2.26 dBn
30 dBm		M1			76,490 000 GH
Thyman	in she have been builded and the she	mentrational and a second second second	no managementation of the second of the seco	phalipana	$\mathcal{M}_{\nabla}^{T2}$
20 dBm					
					Mark 1
10 dBm					
14		M2			
					<u> </u>
-10 dBm	au man	- + + + + + + + + + + + + + + + + + +			**************************************
- 10 UBM	- tunner				. muran
-20 dBm					~~
N					
-30 dBm					
-40 dBm					V2
V1					V2
CF 76.5 GHz	12	01 pts	120.0 MHz/		Span 1.2 GHz
2 Marker Table					
Type Ref Trc M1 1	X-Value 76.49 GHz	Y-Value <b>30.72 dBm</b>	Occ Bw	Fu 852 52	Inction Result 28 691 866 MHz
T1 1	76.069 82 GHz	21.31 dBm	Occ Bw Centroid		76.496083915 GHz
T2 1	76.922348 GHz 76.49 GHz	23.85 dBm 2.26 dBm	Occ Bw Freq Offset		-3.916085071 MHz
M2 2	70.49 002	2.20 u Dill			<b>20.10.2021</b>
~				- Measuring	20.10.2021
4:18:59 20.10.2021					

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Plot 22: OBW, +10 °C / V<sub>nom</sub>

MultiView 📑 Spec	trum 🗙 Spectrum	n 2 🗙 Spectru	m 3 🗙	
Ref Level 50.00 dBm	Offset 57.00 dB ● RBW 1 MH	1z	_	
	SWT 160 s ● VBW 3 MH	Iz Mode Auto Sweep		
np: ExtMix E Occupied Bandwidth				⊙1Pk Max ⊜2Rm I
				M1[1] 30.79
-0 dBm				76.488.000
o dom		M1		M2[2] 2.32
0 dBm		<b>T</b>		76.489.000
J.	mark white the way with the way	www.www.www.www.www.ww	warman hand hall	And And And 2
0 dBm				
0 dBm		M2		
dBm M		Ť		
A MANNA				N N N N N
10 dBm				man Wild Will
when y	hunder			I I I I I I I I I I I I I I I I I I I
20 dBm				
/"				L
30 dBm				
40 dBm				
V1				V2
Ϋ́,				
F 76.5 GHz Marker Table		201 pts	120.0 MHz/	Span 1.2
Type Ref Trc	X-Value	Y-Value	Function	Function Result
M1 1	76.488 GHz	30.79 dBm	Occ Bw	852.192 734 184 MHz
T1 1 T2 1	76.068 727 GHz 76.920 92 GHz	22.68 dBm 23.65 dBm	Occ Bw Centroid Occ Bw Freg Offset	76.494 823 453 GHz -5.176 546 745 MHz
M2 2	76.489 GHz	2.32 dBm	Ste Divined Onset	5.170340743 1412
~				- Measuring Measuring

Plot 23: OBW, +20 °C / V<sub>nom</sub>

				<
AultiView 🎫 Spectrur	m × Spectrum 2	× Spectru	m 3 🗙	
Ref Level 50.00 dBm Offs				_
● SW1 D: ExtMix E	T 160 s 🗢 VBW 3 MHz	Mode Auto Sweep		
Occupied Bandwidth				● 1Pk Max ●2Rm Ma
				M1[1] 31.00 d
0 dBm				76,488,000 0
		M1		M2[2] 2.52 d 76.488 000 0
0 dBm				
Thursdown	moundation	www.www.www.angeneration	MINWUNWUNWUMUMUM	hand hand hand have a second and have hard hard hard hard hard hard hard hard
0 dBm				
D dBm		M2		
		Ţ		
				Phone in the second sec
10 dBm				man WVV
when when				- mar Mar
20 dBm				
لع				
30 dBm				
40 dBm				
VI				
F 76.5 GHz	120	l pts	120.0 MHz/	Span 1.2 G
Marker Table				
Type Ref Trc M1 1	X-Value 76.488 GHz	Y-Value 31.00 dBm	Occ Bw	Function Result 851.674 882 72 MHz
T1 1	76.069051 GHz	22.28 dBm	Occ Bw Occ Bw Centroid	76.494888912 GHz
T2 1	76.920726 GHz	24.31 dBm	Occ Bw Freq Offset	-5.111 088 099 MHz
M2 2	76.488 GHz	2.52 dBm		
				<ul> <li>Measuring</li> <li>Measuring</li> </ul>
20:24 20.10.2021				

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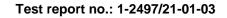
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Plot 24: OBW, +30 °C / V<sub>nom</sub>

				•
MultiView 🎫 Spect	rum X Spectrum	2 × Spectru	.m 3 🗙	
Ref Level 50.00 dBm	Offset 57.00 dB = RBW 1 MHz		_	
	SWT 160 s 🗢 VBW 3 MHz	Mode Auto Sweep		
np: ExtMix E L Occupied Bandwidth				⊙1Pk Max ⊜2Rm N
				M1[1] 31.05
0 dBm				76.488.000
-u uBm		M1		M2[2] 2.66
0 dBm		<b>T</b>		76,488,000
Mr.M.	mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm	mannananan	WARMAN MANAMALAN	hand a hard a
0 dBm				
0 dBm		M2		
dBm				
				www.
and the second s	- Marine Ma			mar and the second seco
20 dBm				
30 dBm				
40 dBm				V2
F 76.5 GHz	12	201 pts	120.0 MHz/	Span 1.2
Marker Table				
Type Ref Trc	X-Value 76.488 GHz	Y-Value 31.05 dBm	Function	Function Result 851.465 883 342 MHz
M1 1 T1 1	76.068822 GHz	24.77 dBm	Occ Bw Occ Bw Centroid	851.465 883 342 MHZ 76.494 554 942 GHz
T2 1	76.920288 GHz	22.58 dBm	Occ Bw Freq Offset	-5.445 057 644 MHz
M2 2	76.488 GHz	2.66 dBm	·	
				- Measuring 🚺 👬 20.

Plot 25: OBW, +40 °C / V<sub>nom</sub>

MultiView 📑 Spectru	im × Spectrum	2 × Spectru	ım 3 🗙	
	fset 57.00 dB ● RBW 1 MHz			
אט: ExtMix E	/T 160 s ● VBW 3 MHz	Mode Auto Sweep		
Occupied Bandwidth				o 1Pk Max ●2Rm
				M1[1] 31.1
0 dBm				76.488.00
		M1		M2[2] 2.5 76.488.00
0 dBm	moundant	an and the and the decision of the	howhited but on an alternation of a	72
MUNN LIM		The second control of the second s	www.www.www.www.www.	hand hand hand
0 dBm				
0 dBm		M2		
dBm-		<b>\</b>		
A AMMAN				NA ALA ALA
10 dBm	- man	-		
non the second				
20 dBm				
A				
30 dBm				
40 dBm				
V1				V2
F 76.5 GHz	11	201 pts	120.0 MHz/	Span 1.3
Marker Table	12	.01 pts	120.0 MHZ/	Span 1.
Type Ref Trc	X-Value	Y-Value	Function	Function Result
M1 1	76.488 GHz	31.17 dBm	Occ Bw	849.816 314 319 MH
T1 1 T2 1	76.068797 GHz 76.918614 GHz	23.71 dBm 26.15 dBm	Occ Bw Centroid Occ Bw Freg Offset	76.493 705 471 GH -6.294 528 703 MH
M2 2	76.488 GHz	2.58 dBm	222 84 1109 81000	0.23 .020 /00 Mil
~				- Measuring 🚺 🚺 👬 24



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Plot 26: OBW, +50 °C / V<sub>nom</sub>

								•
MultiView 📑 Spe	ctrum 🗙 S	pectrum 2	× Spectru	m 3 💙	<			
Ref Level 50.00 dBm	Offset 57.00 dB 🖷 🖡	RBW 1 MHz			_			I
	• SWT 160 s • V	/BW 3 MHz Mod	e Auto Sweep					
np: ExtMix E Occupied Bandwidth							o 1Pk M	lax ⊜2Rm M
							M1[1]	31.11
0 dBm								76.488 000
o dom			M1				M2[2]	2.61
0 dBm			7					76,488 000
-M-	Mun Mulluhan	nonununu	will man all man and the second	MMMM_MLML	www.www.w.	LANA MA	-l-h-R	
0 dBm							3. C	
0 dBm			M2					
						······ .	1	MA.
	and a second a second a second a						and the second	M
20 dBm								
30 dBm								
40 dBm								V2
F 76.5 GHz		1201 pts		12	0.0 MHz/			Span 1.2
Marker Table					· · · · · · · · · · · · · · · · · · ·			
Type Ref Trc	X-Value		Y-Value		Function	_	Function R	
M1 1	76.488		1.11 dBm 26.00 dBm	Occ Bw Occ Bw Cer	stroid	8	50.694 758	94 MHz 83 41 GHz
T1 1 T2 1	76.069336 76.920031		26.00 dBm 24.56 dBm	Occ Bw Cer				8341 GHZ 9921 MHZ
M2 2	76.488	GHZ	2.61 dBm	GCC DW HIE	g onoce		3.510.50	2 221 11112
~						- Measuring.		20.
								12

Plot 27: OBW, T<sub>max</sub> / V<sub>nom</sub>

					<b></b>
MultiView 📒 Spectrum	× Spectrum 2	× Spectru	ım 3 🗙		
Ref Level 50.00 dBm Offse	t 57.00 dB • RBW 1 MHz		_		
● SWT	160 s 👄 VBW 3 MHz	Mode Auto Sweep			
Inp: ExtMix E					
1 Occupied Bandwidth					●2Rm Max
				M1[1] 76	30.91 dBm .508 000 GHz
40 dBm				M2[2]	2.57 dBm
				76	.508 000 GHz
30 dBm	power of the power while	which when the shaked when	had hal man and a line has a second	phila have a second	
20 dBm					
10 dBm		M	2		
0 dBm					4
-10 dbm ///////		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	hampan		MALL .
mound would have here and here here here here here here here her				They I	Marine
-20 dBm					
-30 dBm					
-40 dBm					
V1					V2
CF 76.5 GHz	120	1 pts	120.0 MHz/	S	pan 1.2 GHz
2 Marker Table					
Type Ref Trc	X-Value	Y-Value	Function	Function Res	ult
M1 1 T1 1	76.508 GHz 76.069776 GHz	30.91 dBm 24.28 dBm	Occ Bw Occ Bw Centroid	849.735 395 29 76.494 643	
T2 1	76.919512 GHz	26.16 dBm	Occ Bw Centrola Occ Bw Freq Offset	-5.356116	
M2 2	76.508 GHz	2.57 dBm		0,000110	
~				- Measuring	20.10.2021 11:56:51
11:56:51 20.10.2021					



# 12 Glossary

EUT	Equipment under test		
DUT	Device under test		
UUT	Unit under test		
GUE	GNSS User Equipment		
ETSI	European Telecommunications Standards Institute		
EN	European Standard		
FCC	Federal Communications Commission		
FCC ID	Company Identifier at FCC		
	Industry Canada		
PMN	Product marketing name		
HMN	Host marketing name		
HVIN	Hardware version identification number		
FVIN	Firmware version identification number		
EMC	Electromagnetic Compatibility		
HW	Hardware		
SW	Software		
Inv. No.	Inventory number		
S/N or SN	Serial number		
C	Compliant		
NC	Not compliant		
NA	Not applicable		
NP	Not performed		
PP	Positive peak		
QP	Quasi peak		
AVG	Average		
OC	Operating channel		
OCW	Operating channel bandwidth		
OBW	Occupied bandwidth		
OOB	Out of band		
DFS	Dynamic frequency selection		
CAC	Channel availability check		
OP	Occupancy period		
NOP	Non occupancy period		
DC	Duty cycle		
PER	Packet error rate		
CW	Clean wave		
MC	Modulated carrier		
WLAN	Wireless local area network		
RLAN	Radio local area network		
DSSS	Dynamic sequence spread spectrum		
OFDM	Orthogonal frequency division multiplexing		
FHSS	Frequency hopping spread spectrum		
GNSS	Global Navigation Satellite System		
C/N <sub>0</sub>	Carrier to noise-density ratio, expressed in dB-Hz		

## **13 Document history**

Version	Applied changes	Date of release
-/-	Initial release – DRAFT	2021-11-12
-/-	S/N – Hardware status – Software status (Updated)	2021-11-26

## 14 Accreditation Certificate – D-PL-12076-01-05

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The accreditation certificate shall only apply in connection with the notice of accreditation of 09.06.2020 with the accreditation number D-PL-12076-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 05 pages. Registration number of the certificate: D-PL-12076-01.01 Frankfurt am Main, 09.05.2020 The certificate together with its annex reflects the status at the time of the dotted issue. The current status of the score of accreditation of the score of accreditation on the found of the dotted burdle Akkentionengistelle Gmain. http://www.datik.ai/en/content/accredited-bodies-datiks	The accreditation was granted pursuant to the Act on the Accreditation Body (AkGStelleG) of 31 July 2009 (Federal Law Gazette 1 p. 2625) and the Regulation (EC) No 755/2008 of the European Parliament and of the Council of July 2008 entiting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European On the European cooperation for Accreditation (EA), International Accreditation Forum (AP) and International Joboratory Accreditation Cooperation (EAC). The signal content of the surpean cooperation for Accreditation (EAC), The signal content of the surpean cooperation for Accreditation (EAC). The signal content of the surpean cooperation for Accreditation (EAC), The signal content of the surpean cooperation for Accreditation (EAC). The signal content of the surpean content of the surpean cooperation for Accreditation (EAC). The signal content of the surpean content of the surpean cooperation for Accreditations. The up-to-date state of membership can be retrieved from the following websites: EA: www.ilacorg IAE: www.ilacorg IAE: www.ilaf.nu

## Note: The current certificate annex is published on the websites (link see below).

https://www.dakks.de/files/data/as/pdf/D-PL-12076-01-05.pdf https://www.dakks.de/files/data/as/pdf/D-PL-12076-01-05e.pdf

or

https://ctcadvanced.com/app/uploads/2020/06/D-PL-12076-01-05\_TCB\_USA.pdf