

TEST REPORT

Test report no.: 1-0371-25-01-03_TR1-R01



Deutsche
Akkreditierungsstelle
D-PL-12047-01-00

Testing laboratory

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Accredited Testing Laboratory:

The testing laboratory (area of testing) is accredited according to DIN EN ISO/IEC 17025 (2018-03) by the Deutsche Akkreditierungsstelle GmbH (DAkkS).

The accreditation is valid for the scope of testing procedures as stated in the accreditation certificate with the registration number:

D-PL-12047-01-00.

ISED Testing Laboratory Recognized Listing Number: DE0001

FCC designation number: DE0002

Applicant

ADC Automotive Distance Control Systems GmbH

Peter-Dornier-Str. 10

88131 Lindau / GERMANY

Phone: 08382 9699 - 0

Contact: Thomas Reitmayer

e-mail: Thomas.Reitmayer@continental-corporation.com

Manufacturer

ADC Automotive Distance Control Systems GmbH

Peter-Dornier-Str. 10

88131 Lindau / GERMANY

Test standard/s

FCC - Title 47 CFR Part 95 FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 95 - Personal Radio Services

For further applied test standards please refer to section 3 of this test report.

Test Item

Kind of test item: **SRD for RTTT and other vehicle or fixed installation**

Model name: **SRR6-A**

FCC ID: **OAYSRR6A**

Frequency: 76.0 GHz – 77.0 GHz

Technology tested: FMCW

Antenna: Integrated antenna

Power supply: 6.5 V to 19 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:

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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. cetecom 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:	2025-05-09
Date of receipt of test item:	2025-05-16
Start of test:*	2025-05-19
End of test:*	2025-05-28
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 Involved test locations

Saarbruecken lab		Essen lab	
☒	Untertuerkheimer Str. 6-10 66117 Saarbruecken Germany	☐	Im Teelbruch 116 45219 Essen Germany

2.4 Test laboratories sub-contracted

None

2.5 Laboratory listings and recognitions

	Saarbruecken	Essen
FCC	DE0002	DE0003
ISED	DE0001 3462C	DE0001 3462D

3 Test standard/s, references and accreditations

Test standard	Date	Description
FCC - Title 47 CFR Part 95	-/-	FCC - Title 47 of the Code of Federal Regulations; Chapter I; Part 95 - Personal Radio Services

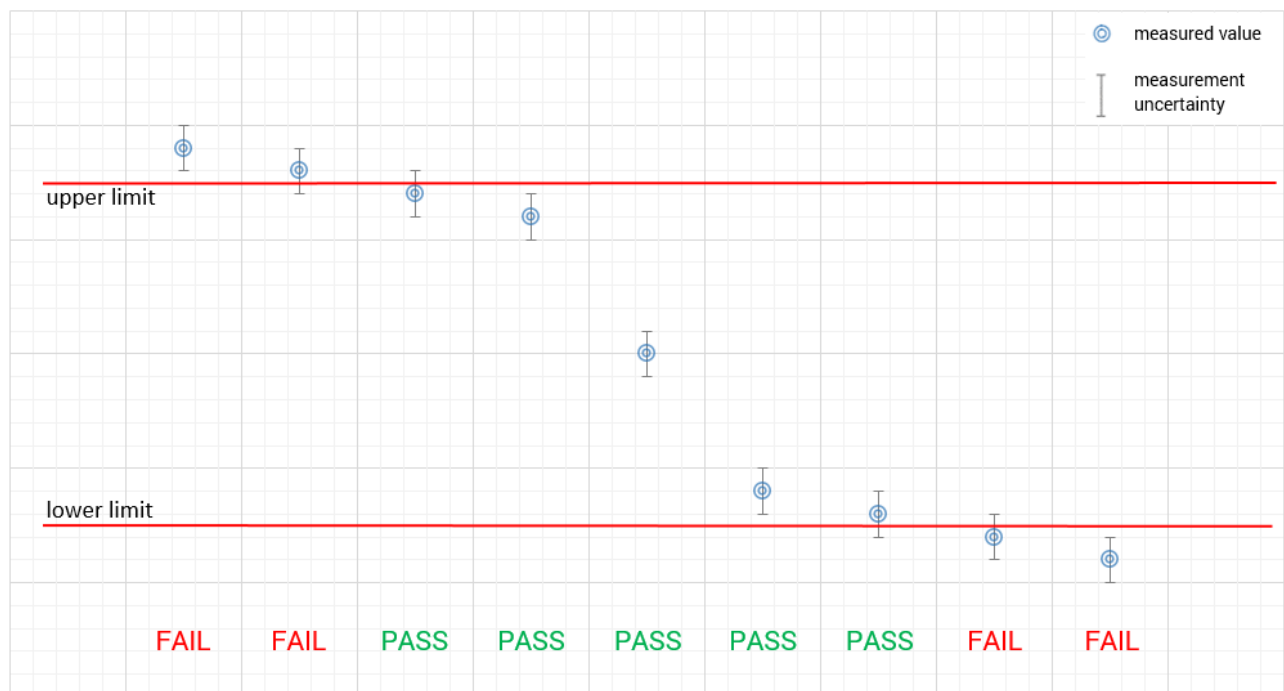
Guidance	Version	Description
ANSI C63.26-2015	-/-	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
76-81 GHz Radars KDB	v01r02	653005 D01 76-81 GHz Radars v01r02: EQUIPMENT AUTHORIZATION GUIDANCE FOR 76-81 GHz RADAR DEVICES

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.

measured value, measurement uncertainty, verdict



5 Test environment

Temperature	:	T _{nom}	+22 °C during room temperature tests
Relative humidity content	:		49 %
Barometric pressure	:		990 hPa to 1010 hPa
Power supply	:	V _{nom}	12.0 V DC by external power supply

6 Test item

6.1 General description

Kind of test item	:	SRD for RTTT and other vehicle or fixed installation
Model name	:	SRR6-A
S/N serial number	:	EUT 1: A2C78206514000022540400004
Hardware status	:	B4.4
Software status	:	192.032.004
Frequency band	:	76.0 GHz – 77.0 GHz
Type of radio transmission	:	Modulated Carrier
Use of frequency spectrum	:	
Type of modulation	:	FMCW
Number of modes	:	3
Antenna	:	Integrated antenna
Power supply	:	6.5 V to 19 V DC by external power supply
Temperature range	:	-40°C to +85°C

6.2 Additional information

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:

- 1-0371-25-01-01_TR1-A101-R01 (External photographs of EUT)
- 1-0371-25-01-01_TR1-A102-R01 (Internal photographs of EUT)
- 1-0371-25-01-01_TR1-A103-R01 (Test set-up photographs)
- Note: The referenced photos show EUT delivered by the customer in this project, not necessarily the exact one used for the specific tests. EUT identification shown in the photos may differ.

Additional reference documents from manufacturer:

- 1-0371-25-01-01_TR1-A201-R01
- 1-0371-25-01-01_TR1-A202-R01

7 Description of the test setup

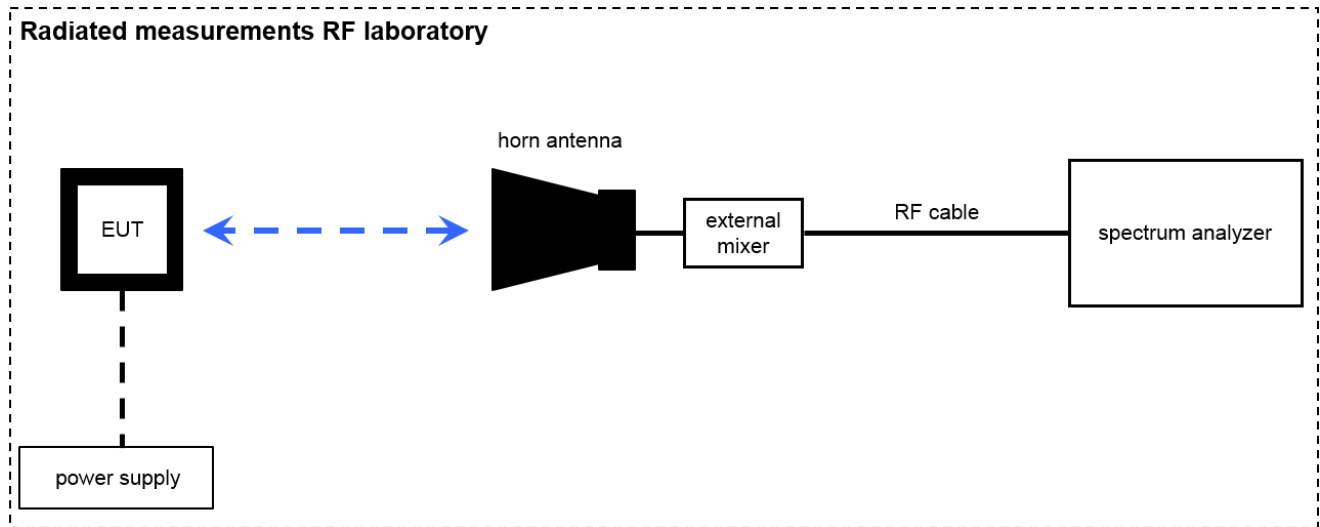
Typically, the calibrations of the test apparatus are commissioned to and performed by an accredited calibration laboratory. The calibration intervals are determined in accordance with the DIN EN ISO/IEC 17025. In addition to the external calibrations, the laboratory executes comparison measurements 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/cal	calibration / calibrated	EK	limited calibration
Ne/cnn	not required (k, ev, izw, zw not required)	zw	cyclical maintenance (external cyclical maintenance)
Ev/chk	periodic self verification	izw	internal cyclical maintenance
Ve	long-term stability recognized	g	blocked for accredited testing
vkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress
cpu	check prior usage		

7.1 Radiated measurements > 50/85 GHz



Measurement distance: horn antenna e.g. 75 cm

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

(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:

$$OP \text{ [dBm]} = -59.0 \text{ [dBm]} + 44.0 \text{ [dB]} - 20.0 \text{ [dBi]} + 5.0 \text{ [dB]} = -30 \text{ [dBm]} \text{ (1 } \mu\text{W)}$$

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

Equipment table:

No.	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	Power Supply	Power Supply E3632A	Agilent Technologies Deutschland GmbH / Böblingen	MY40001320	40007	cal	04.12.2024	04.12.2027
2	Signal- and Spectrum Analyzer 2 Hz - 85 GHz	Signal- and Spectrum Analyzer 2 Hz - 85 GHz FSW85	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101333	40009	cal	27.09.2024	27.09.2025
3	Std. Gain Horn Antenna 60-90 GHz	Std. Gain Horn Antenna 60-90 GHz COR 60_90	Thomson CSF		40087	cpu	-/-	-/-
4	Harmonic Mixer 3-Port, 60-90 GHz	Harmonic Mixer 3-Port, 60-90 GHz FS-Z90	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101555	40117	cal	25.07.2024	25.07.2025
5	Power supply	Power supply N5767A	Agilent Technologies Deutschland GmbH / Böblingen	US14J1569P	40296	cal	06.12.2023	31.12.2026

8 Sequence of testing

8.1 Sequence of testing radiated spurious above 50 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.

Final measurement

- 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 ± 3.5 dB
Permitted range of operating frequencies	± 100 kHz
Conducted unwanted emissions in the spurious domain (up to 18 GHz)	± 1 dB
Radiated unwanted emissions in the spurious domain (up to 18 GHz)	± 3.5 dB
Conducted unwanted emissions in the spurious domain (18 to 40 GHz)	± 4 dB
Radiated unwanted emissions in the spurious domain (18 to 40 GHz)	± 4 dB
Conducted unwanted emissions in the spurious domain (40 to 50 GHz)	± 4.5 dB
Radiated unwanted emissions in the spurious domain (40 to 50 GHz)	± 4.5 dB
Conducted unwanted emissions in the spurious domain (above 50 GHz)	± 5 dB
Radiated unwanted emissions in the spurious domain (above 50 GHz)	± 5 dB
DC and low frequency voltages	± 3 %
Temperature	± 1 °C
Humidity	± 3 %

10 Far field consideration for measurements above 18 GHz

Far field distance calculation:

$$D_{ff} = 2 \times D^2 / \lambda$$

with

D_{ff} Far field distance

D Antenna dimension

λ wavelength

Spurious emission measurements:

Antenna frequency range in GHz	Highest measured frequency in GHz	D in cm	λ in cm	D_{ff} in cm
18 - 26.5	26.5	3.4	1.13	20.44
26.5 - 40	40	2.2	0.75	12.91
40 - 50	50	2.77	0.60	25.58
50 - 75	75	1.85	0.40	17.11
75 - 110	110	1.24	0.27	11.28
90 - 140	140	1.02	0.22	9.72
110 - 170	170	0.85	0.18	8.19
140 - 220	220	0.68	0.14	6.78
220 - 325	325	0.43	0.09	4.01
325 - 500	500	0.26	0.06	2.25

11 Summary of measurement results

11.1 Summary

☒	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.

TC Identifier	Description	Verdict	Date	Remark
RF-Testing	47 CFR Part 95 Subpart M	see below	2025-06-25	-/-

Test specification clause	Test case	Temperature conditions	Power source voltages	Pass	Fail	NA	NP	Remark
§2.1046 §95.3367 (a) / (b)	Radiated power	Nominal	Nominal	☒	☐	☐	☐	complies
§2.1047	Modulation characteristics	-/-	-/-	☒	☐	☐	☐	complies
§2.1049	Occupied bandwidth (99% bandwidth)	Nominal	Nominal	☒	☐	☐	☐	complies
§2.1051	Spurious emissions at antenna terminals	Nominal	Nominal	☐	☐	☒	☐	see note 2, DUT has integral antenna
§2.1053 §95.3379 (a)(1) §95.3379 (a)(2) §95.3379 (a)(3)	Unwanted emissions (radiated spurious)	Nominal	Nominal	☐	☐	☐	☒	
§2.1055 §95.3379 (b)	Frequency stability	Nominal and Extreme	Nominal and Extreme	☐	☐	☐	☒	

Only delta measurements under normal conditions according to customer requirements were performed (Occupied bandwidth, Peak and Mean Power).

Note:

- 1) NA = Not applicable; NP = Not performed
- 2) ANSI C63.26-2015, chapter 5.5.1:
 "...many contemporary portable transmitters utilize integral antennas, precluding access to an antenna output port from which to perform conducted compliance measurements. For these types of transmitters, all of the data necessary to demonstrate compliance must be measured in a radiated test configuration..."

11.2 Additional comments

Reference documents:

- 1-0371-25-01-01_TR1-A201-R1.pdf
- 1-0371-25-01-01_TR1-A202-R1.pdf

Special test descriptions:

- 1-0371-25-01-01_TR1-A202-R1.pdf

Configuration descriptions:

- 1-0371-25-01-01_TR1-A202-R1.pdf

Test devices (EUT):

- EUT 1: Normal operation modes, used for general purpose testing

Associated equipment (AE):

- AE1: Control Input Display (Used to configure set the EUT mode)
- AE2: Vehicular Gateway (VG4)

Normal operation modes, as declared by customer:

Mode ID	Centre frequency [GHz]	Bandwidth [MHz]	Remark
01	76.492	938.4	Operation
17	76.492	926.7	Operation
44	76.492	816.9	EoL / Service

Details on test mode settings:

According to the customer's instructions, the following steps and commands were used to configure the test modes:

- Connect the EUT and associated equipment to an appropriate power supply
- On the Control Input Display:
 - Enter the mode ID
 - Press the "Set Mode" button
 - Press the "Start" button

12 Measurement results

12.1 Radiated power

Description:

§95.3367:

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.

Limits:

FCC §95.3367 (a) (b)

Frequency	Limit (eirp)
76.0 - 81.0 GHz	50 dBm (Average)
76.0 - 81.0 GHz	55 dBm/MHz (PEAK)

Measurement:

Measurement parameter: Average Power / Peak Power	
Detector:	RMS / Pos-peak
Resolution bandwidth:	1 MHz / 50 MHz
Video bandwidth:	3 MHz / 80 MHz
Trace-Mode:	Clear Write / Max hold

Note: KDB 653005 4.(c)(1)

Peak power measurements of swept frequency radar implementations (e.g., high sweep rate FMCW) may require a desensitization correction factor to be applied to the measurement results.

Peak power measurements are therefore performed using a larger resolution bandwidth to mitigate issues with desensitization.

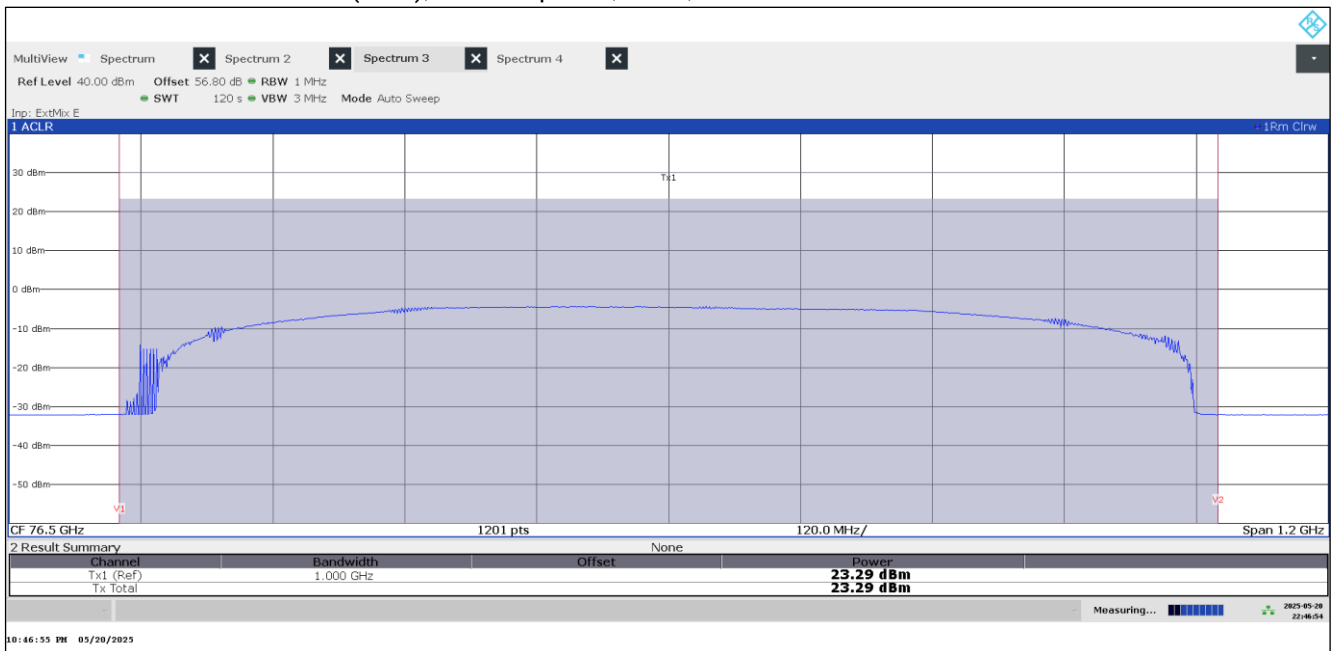
Measurement results:

EUT	Mode	Test condition	Radiated peak power (eirp)	Radiated Mean Power (eirp)
EUT 1	01	T_{nom} / V_{nom}	34.55	23.29
EUT 1	17	T_{nom} / V_{nom}	34.63	23.28
EUT 1	44	T_{nom} / V_{nom}	28.66	17.12

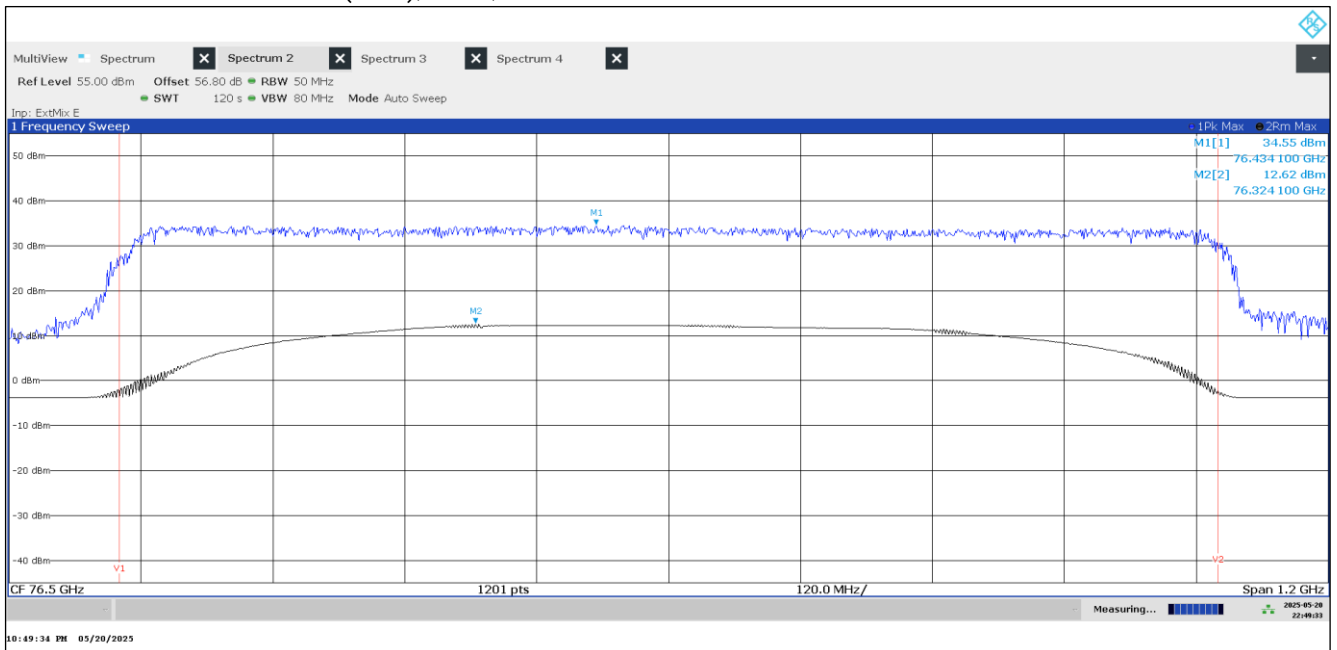
Note: Only delta measurements under normal conditions according to customer requirements were performed (Occupied bandwidth, Peak and Mean Power).

Verdict: Compliant

Plot 1: Radiated Mean Power (EIRP), Channel power, EUT1, Mode 01



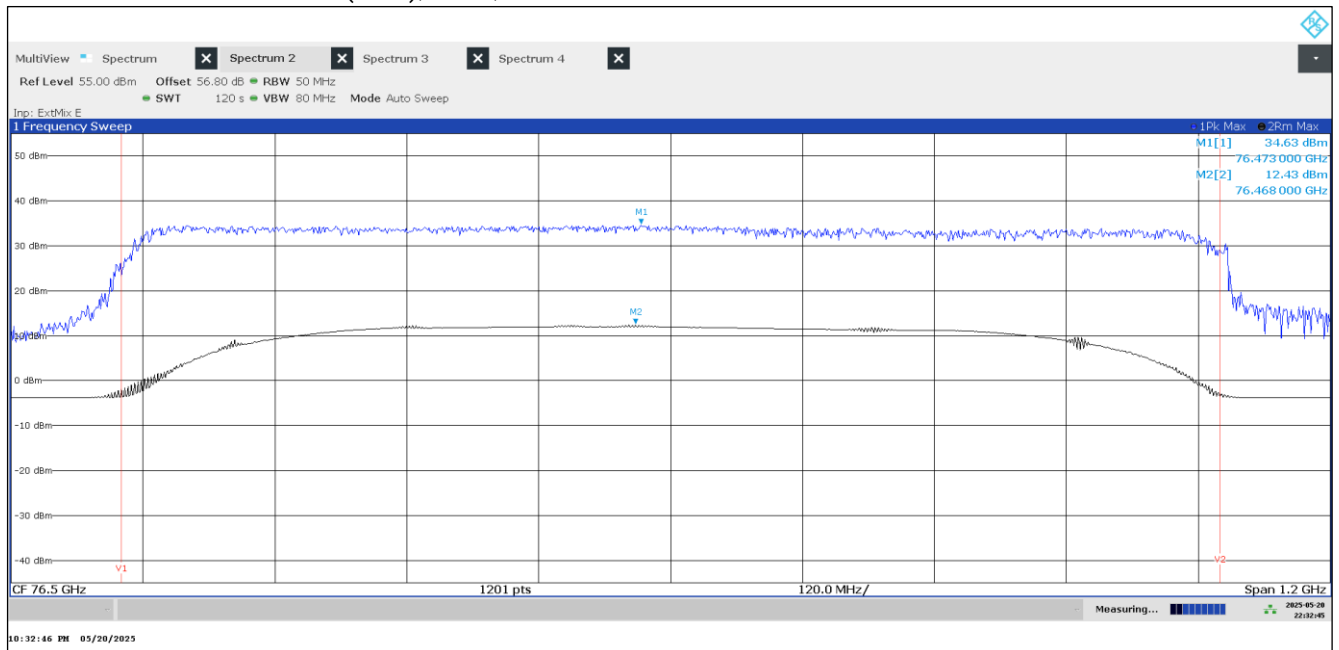
Plot 2: Radiated Peak Power (EIRP), EUT1, Mode 01



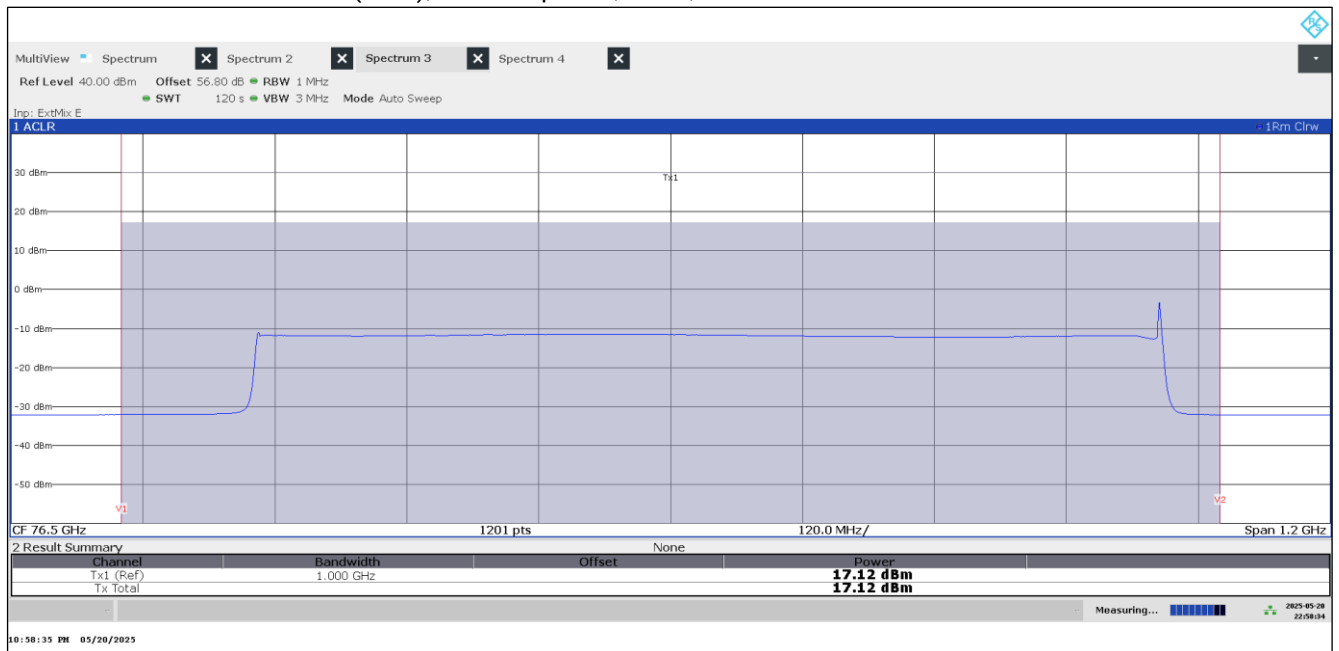
Plot 3: Radiated Mean Power (EIRP), Channel power, EUT1, Mode 17



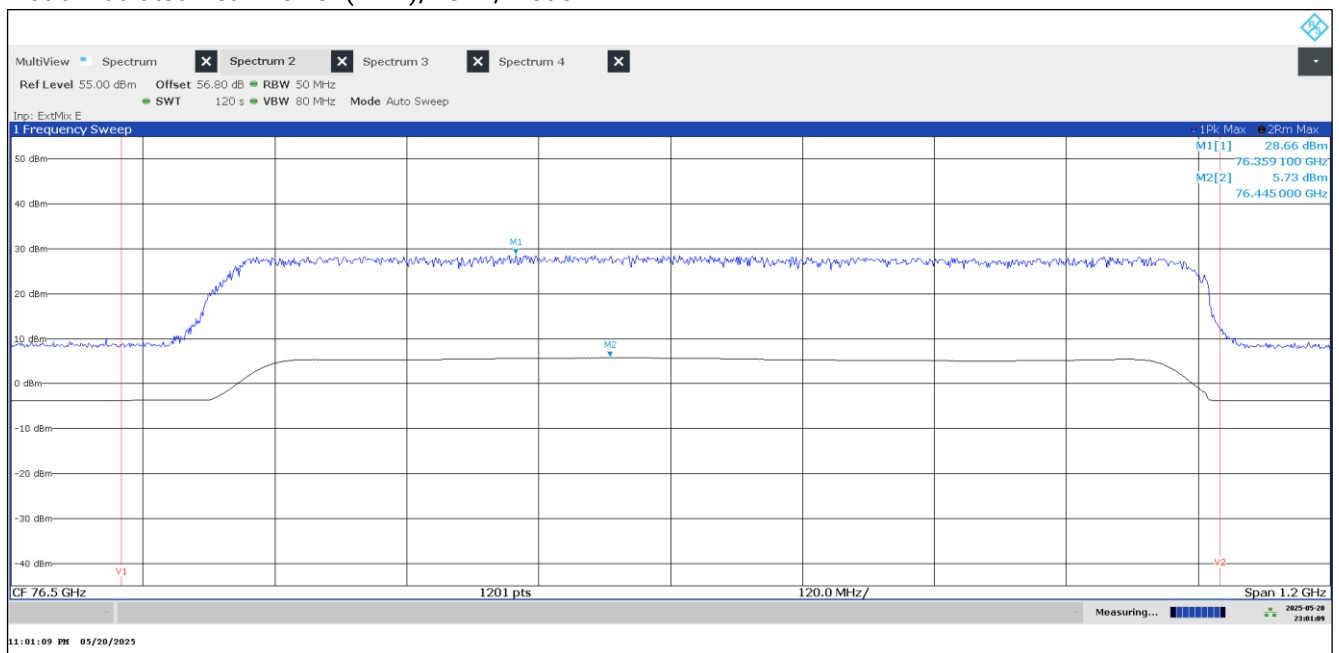
Plot 4: Radiated Peak Power (EIRP), EUT1, Mode 17



Plot 5: Radiated Mean Power (EIRP), Channel power, EUT1, Mode 44



Plot 6: Radiated Peak Power (EIRP), EUT1, Mode 44



12.2 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.

KDB 653005 D01 76-81 GHz Radars v01r02, section 3 (g)

Concerning the Section 2.1047 modulation characteristics requirement, the following information should be provided:

- 1) Pulsed radar: pulse width and pulse repetition frequency (if PRF is variable, then report maximum and minimum values).
- 2) Non-pulsed radar (e.g., FMCW): modulation type (i.e., sawtooth, sinusoid, triangle, or square wave) and sweep characteristics (sweep bandwidth, sweep rate, sweep time).

Information from manufacturer on modulation characteristics:

General:

Note – values for SW_SRR630_96.05.08 as covered by test report

Parameter	SRR6-A
Duty Cycle	Typical 41 %
Timing	Typical Cycle Time: 50ms RF on 20.3 ms (256 Ramps+Monitoring).
Modulation	FM- chirps, negative Sawtooth with linear change of center frequency over sweep bandwidth or single chirps
Sweep Bandwidth	Mode dependent: 816 / 926 / 934 / 938 MHz
Sweep rate	Max 13 MHz/ μ s
Power	Power constant during RF on
Steepness of Ramps	Steepness varies for scans and monitoring.
Calibration	No calibration routines applied
Antenna Beam Steering (Tx)	No beam steering

Note: Modulation characteristics provided by customer via the additional documents:
SRR6-A_RF_Test_Input_Doc_v5.2_SWConfigUpd.pdf

12.3 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.

Limits:

FCC
FCC §95.3379 (b)
The occupied bandwidth from intentional radiators operated within the specified frequency band shall comply with the following:
Frequency range
76 GHz – 81 GHz

Measurement:

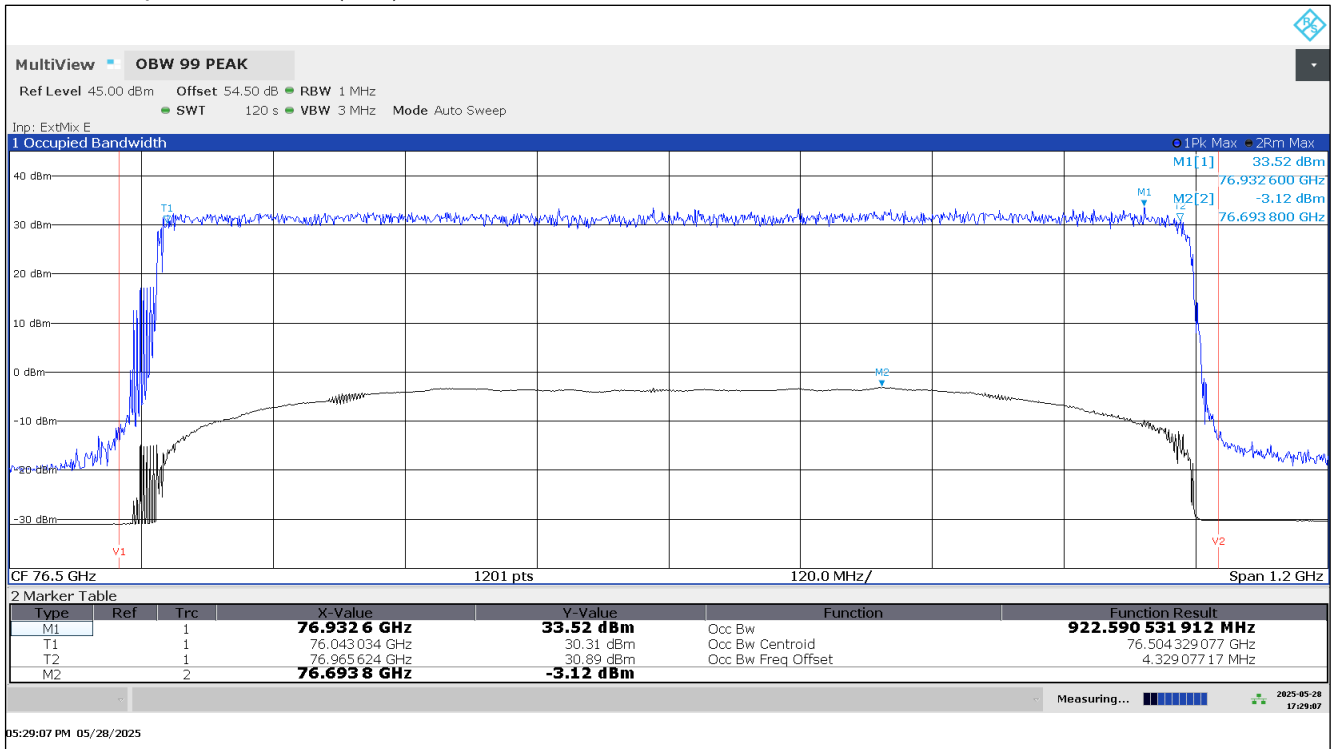
Parameters	
Detector:	Pos-Peak
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Trace-Mode:	Max Hold

Results:

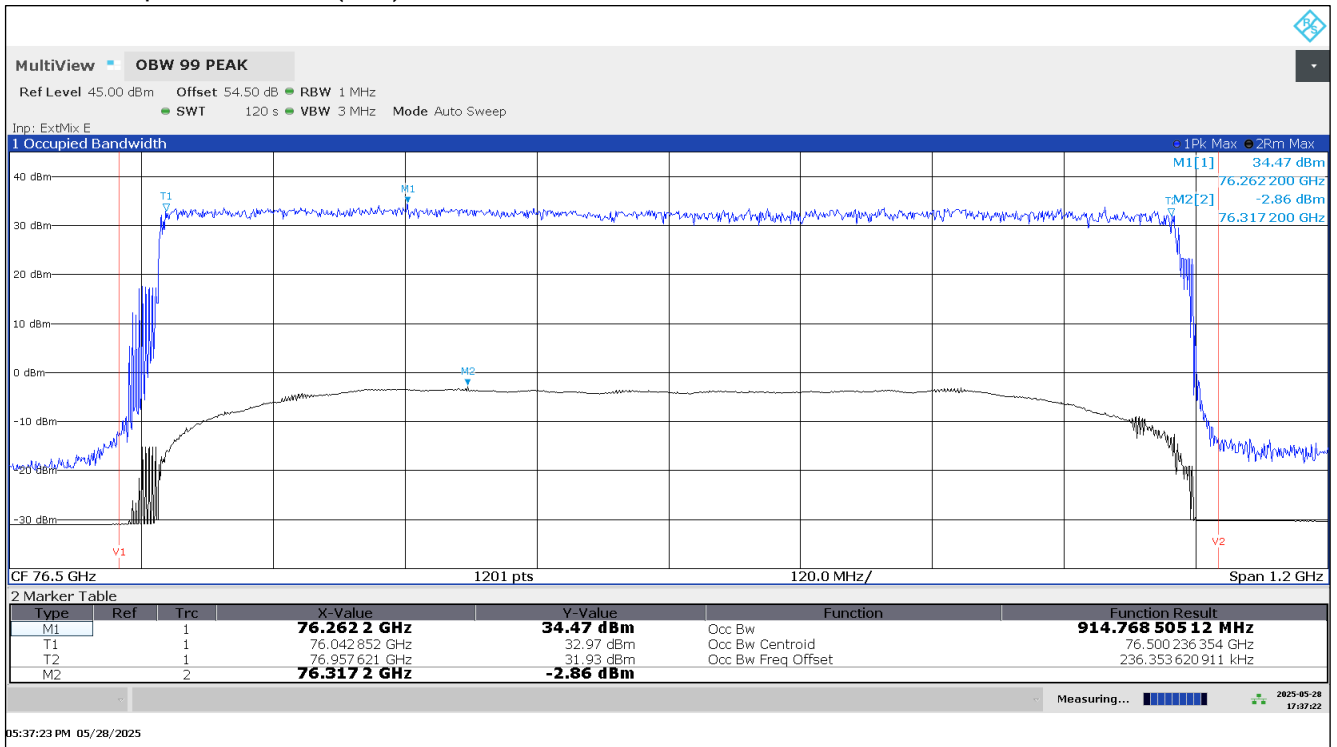
EUT	Mode	TEST CONDITIONS	f_L in GHz	f_H in GHz	Occupied Bandwidth (99%) in MHz
EUT 1	01	T_{nom} / V_{nom}	76.043 034	76.965 624	922.6
EUT 1	17	T_{nom} / V_{nom}	76.042 852	76.957 621	914.8
EUT 1	44	T_{nom} / V_{nom}	76.125 933	76.946 095	820.2

Verdict: Compliant

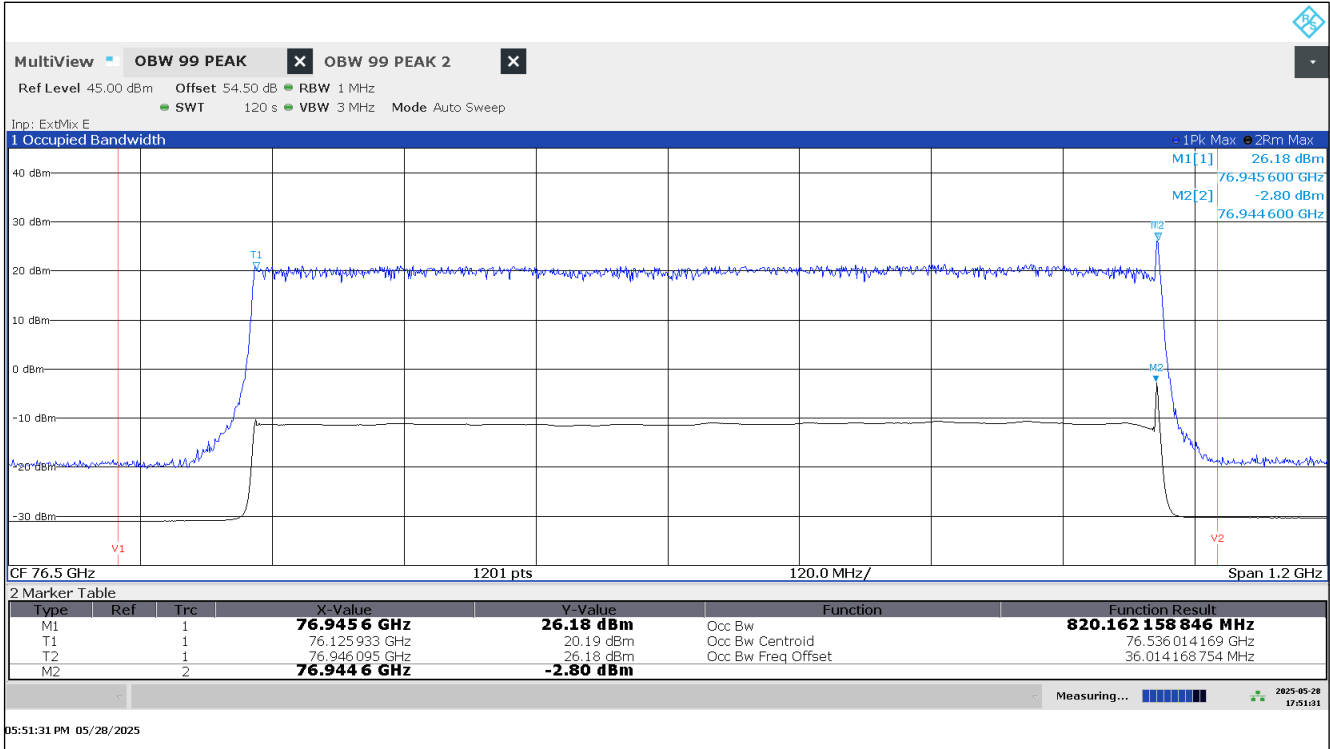
Plot 7: Occupied Bandwidth (99%), EUT 1, Mode 01



Plot 8: Occupied Bandwidth (99%), EUT 1, Mode 17



Plot 9: Occupied Bandwidth (99%), EUT 1, Mode 44



13 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
IC	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/N₀	Carrier to noise-density ratio, expressed in dB-Hz

14 Document history

Version	Applied changes	Date of release
D1	Initial release - DRAFT	2025-05-30
D2	11.2 Additional comments (updated)	2025-06-10
R01	Initial release	2025-06-25

END OF TEST REPORT