
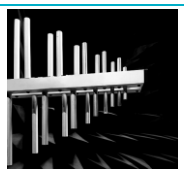
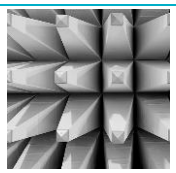

TEST REPORT

Test report no.: 1-1367-25-01-02_TR1-R02

Testing laboratory

cetecom advanced GmbH
Untertuerkheimer Strasse 6 – 10
66117 Saarbruecken / Germany
Phone: + 49 681 5 98 - 0
Fax: + 49 681 5 98 - 9075
Internet: https://www.cetecomadvanced.com
e-mail: mail@cetecomadvanced.com

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

Baumer Electric AG
Hummelstr. 17
8501 Frauenfeld / SWITZERLAND
Phone: +41 0 52 728 1122
Contact: Rainer Mauch
e-mail: rmauch@baumer.com

Manufacturer

Baumer Electric AG
Hummelstr. 17
8501 Frauenfeld / SWITZERLAND

Test standard/s

FCC 47 CFR Part 95M	Federal Communications Commission, 47 code of federal regulations, Subpart M - The 76-81 GHz Band Radar Service

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

Test Item

Kind of test item:	**Vehicle Radarsensor**
Model name:	**R670V.XXXX**
FCC ID:	**PGP-R670V**
Frequency band:	77 GHz – 81 GHz
Antenna:	PCB-On-Board antenna
Power supply:	12 V DC
Temperature range:	-40°C to +75°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:

M. Walla

cn=Meheza Walla, o=cetecom advanced GmbH, ou=WAL-310325, email=meheza.walla@cetecomadvanced.com, c=DE
2026.07.22 08:51:45 +02'00'

Meheza Walla
Lab Manager
Regulatory Services Radio

Test performed:

Thomas Vogler

cn=Thomas Vogler, o=cetecom advanced GmbH, ou=VOG-230609, email=thomas.vogler@cetecomadvanced.com, c=DE
2026.07.21 11:01:46 +02'00'

Thomas Vogler
Lab Manager
Regulatory Services Radio

1 Table of contents

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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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.

2.2 Application details

Date of receipt of order:	2026-03-11
Date of receipt of test item:	2026-04-21
Start of test:*	2026-04-21
End of test:*	2026-07-21
Person(s) present during the test:	Mr. Rainer Mauch (during set-up)

*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

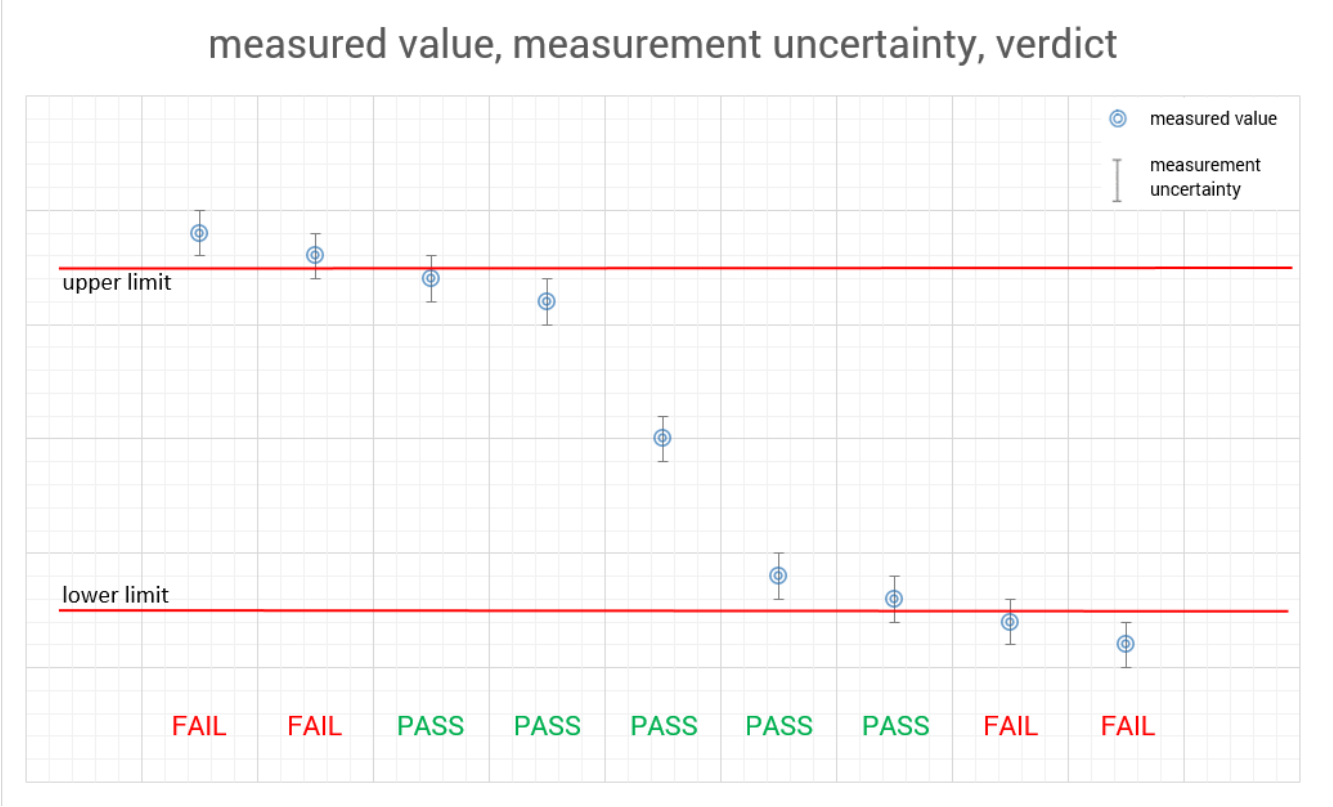
3 Test standard/s, references and accreditations

Test standard	Date	Description
FCC 47 CFR Part 95M	-/-	Federal Communications Commission, 47 code of federal regulations, Subpart M - The 76-81 GHz Band Radar Service

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.



5 Test environment

Temperature	:	T_{nom} T_{max} T_{min}	+22 °C during room temperature tests +50 °C during high temperature tests -20 °C during low temperature tests
Relative humidity content	:		40-60 %
Barometric pressure	:		not relevant for this kind of testing
Power supply	:	V_{nom} V_{max} V_{min}	12 V DC 13.8 V DC 10.2 V DC

6 Test item

6.1 General description

Kind of test item	:	Vehicle Radarsensor
Model name	:	R670V.XXXX
S/N serial number	:	U16P.10.X-1398-9848
Hardware status	:	Housing B1-State: Production intended Housing & Lens and Backplate, PCBA R98000733_OH-3
Software status	:	R670VMSF_S_01.09.00
Frequency band	:	77 GHz – 81 GHz
Type of modulation	:	FMCW
Number of channels/ modes	:	1
Antenna	:	PCB-On-Board antenna
Power supply	:	9 V to 32 V DC
Temperature range	:	-40°C to 75°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:

- 1-1367-25-01-01_TR1-A101-R01 (External photographs of EUT)
- 1-1367-25-01-01_TR1-A102-R01 (Internal photographs of EUT)
- 1-1367-25-01-01_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 measurement reports:

- 1-1367-25-01-02_TR1-A201-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).

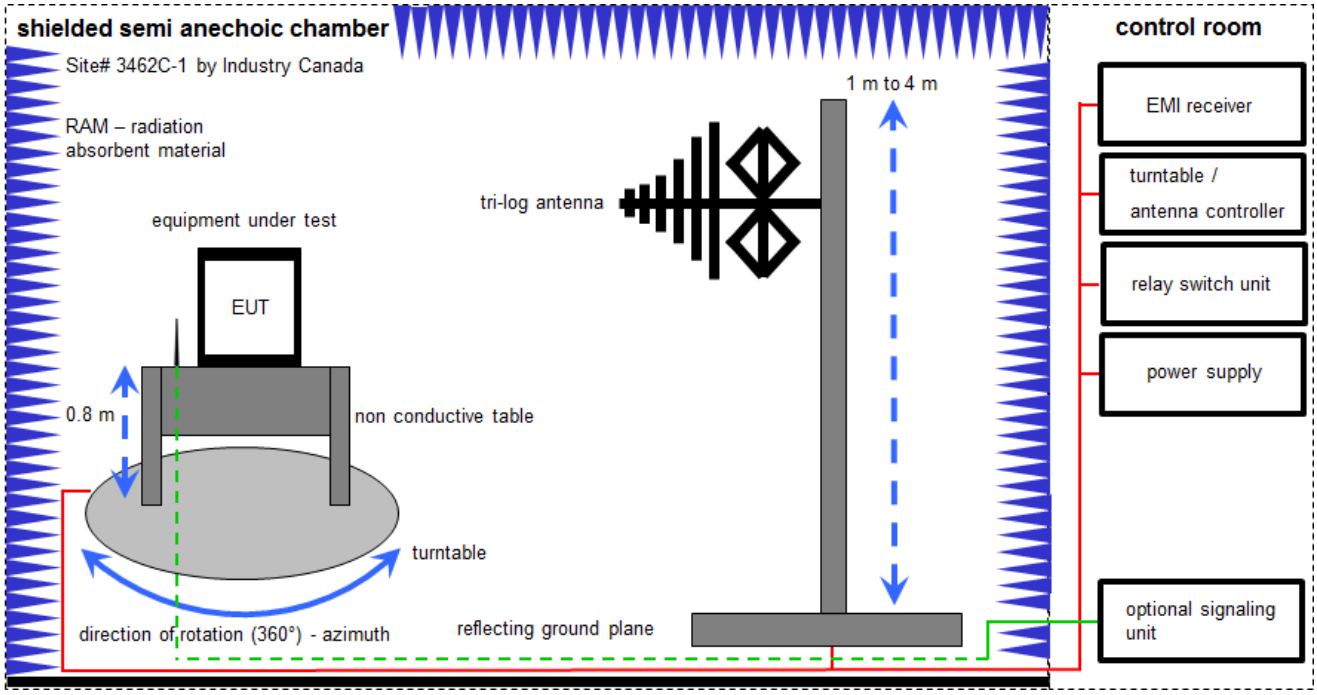
In order to simplify the identification of the equipment used at some special tests, some items of test equipment and ancillaries can be provided with an identifier or number in the equipment list below (Lab/Item).

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
vlkl!	Attention: extended calibration interval		
NK!	Attention: not calibrated	*)	next calibration ordered / currently in progress
cpu	check prior usage		

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.



Measurement distance: tri-log antenna 10 meter

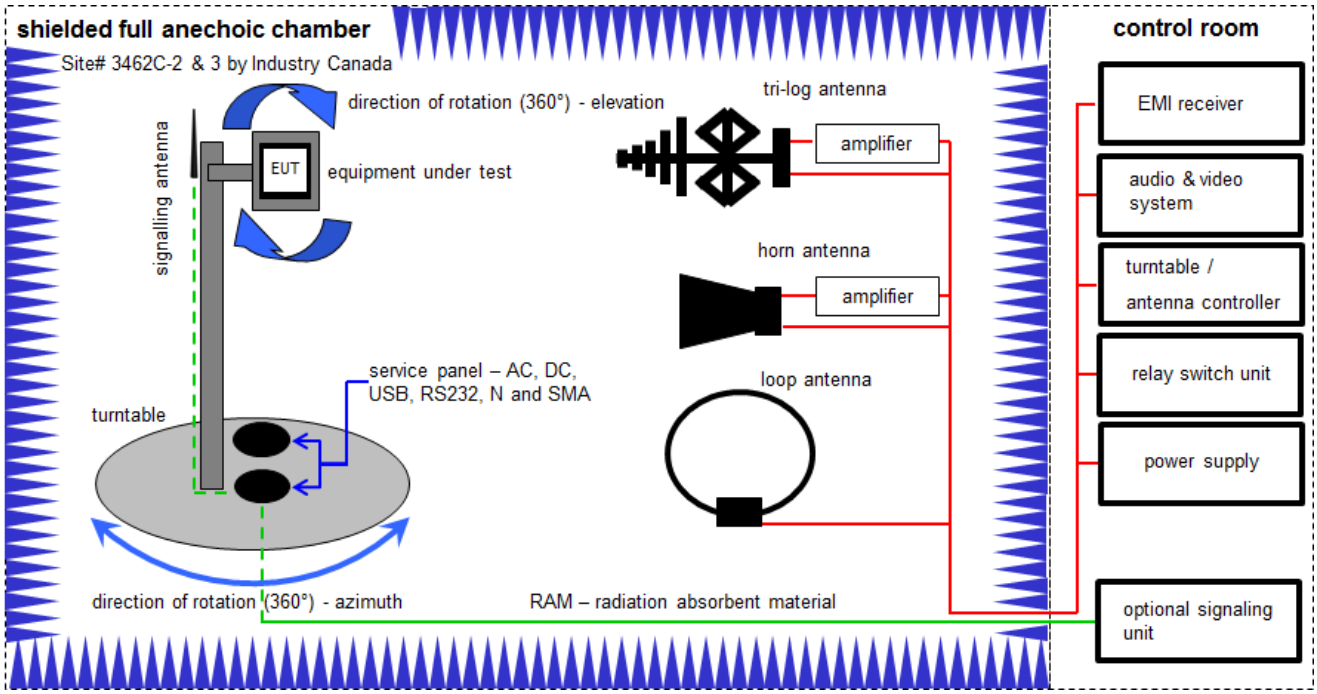
FS = UR + CL + AF
(FS-field strength; UR-voltage at the receiver; CL-loss of the cable; AF-antenna factor)

Example calculation:
FS [dBµV/m] = 12.35 [dBµV] + 1.90 [dB] + 16.80 [dB/m] = 31.05 [dBµV/m] (35.69 µV/m) @ distance

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Semi anechoic chamber	Semi anechoic chamber 3000023	MWB AG		40797	cnn	-/-	-/-
2	n. a.	TRILOG Broadband Antenna	TRILOG Broadband Antenna VULB9163	Schwarzbeck MESS-ELEKTRONIK OHG / Schönau	371	40798	cal	11.07.2024	31.07.2026
3	n. a.	Turntable	Turntable 2089-4.0	EMCO Elektronik GmbH / Gilching		40799	cnn	-/-	-/-
4	n. a.	Analyzer-Impedence-System	Analyzer-Impedence-System AIS16/1	Spitzenberger + Spies GmbH & Co. KG	UO2076 07/0 1023	40808	cal	09.12.2025	31.12.2027
5	n. a.	Switch-Unit	Switch-Unit 3488A	Hewlett Packard	2719A14505	50160	cpu	-/-	-/-
6	n. a.	Power Supply	Power Supply 6032A	Hewlett Packard	2920A04466	50161	cnn	-/-	-/-
7	n. a.	Antenna Tower	Antenna Tower 2175	ETS-Lindgren GmbH / Taufkirchen	64762	50279	cnn	-/-	-/-
8	n. a.	Positioning Controller	Positioning Controller 2090	ETS-Lindgren GmbH / Taufkirchen	64672	50280	cnn	-/-	-/-
9	n. a.	EMI Test Receiver	EMI Test Receiver ESR3 9kHz-3.6GHz	Rohde & Schwarz Messgerätebau GmbH / Memmingen	102587	50417	cal	08.12.2025	31.12.2026

7.2 Shielded fully anechoic chamber



Measurement distance: tri-log antenna 3 meter and horn antenna 3 meter; loop antenna 3 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 [dBµV/m] = 40.0 [dBµV] + (-35.8) [dB] + 32.9 [dB/m] = 37.1 [dBµV/m] (71.61 µV/m) @ distance

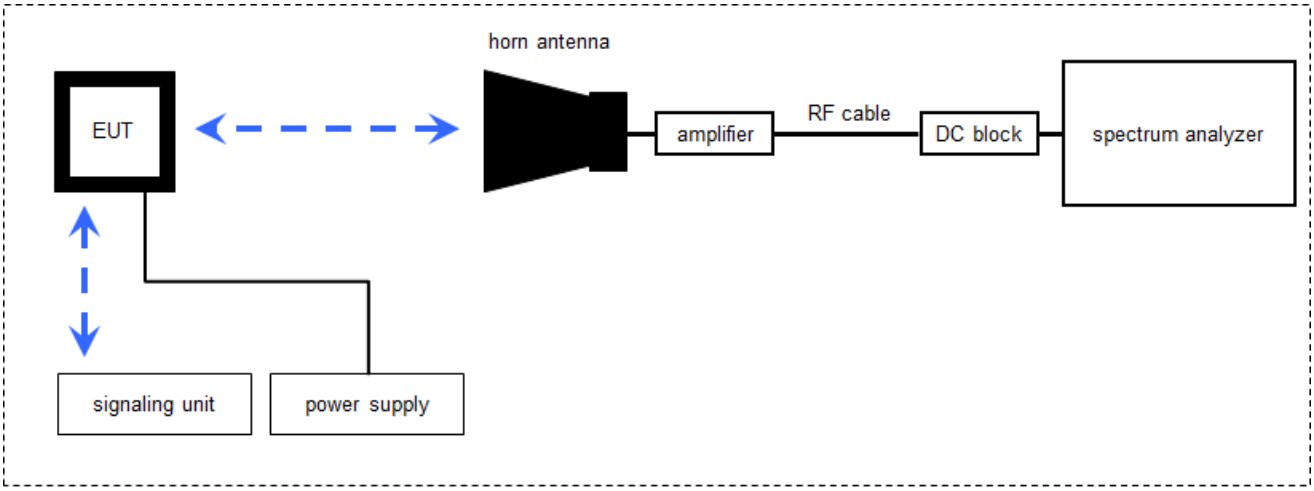
OP = AV + D - G + CA
(OP-radiated output power; AV-analyzer value; D-free field attenuation of measurement distance; G-antenna gain+amplifier gain; CA-loss signal path)

Example calculation:
OP [dBm] = -65.0 [dBm] + 50 [dB] - 20 [dBi] + 5 [dB] = -30 [dBm] (1 µW)

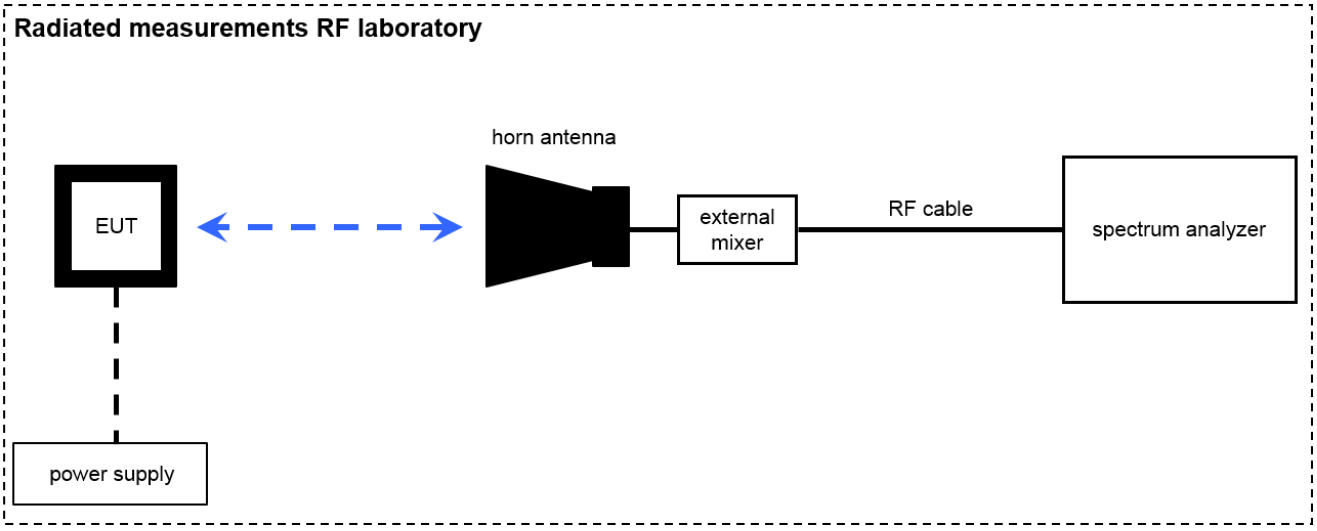
Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	MXG Microwave Analog Signal Generator	MXG Microwave Analog Signal Generator N5183A	Agilent Technologies Deutschland GmbH / Böblingen	MY47420220	40005	cal	05.12.2025	31.12.2028
2	n. a.	DC power supply, 60Vdc, 50A, 1200 W	DC power supply, 60Vdc, 50A, 1200 W 6032A	Hewlett Packard	2818A03450	40229	cal	05.12.2023	31.12.2026
3	n. a.	Double-Ridged Waveguide Horn Antenna	Double-Ridged Waveguide Horn Antenna 3115	EMCO Elektronik GmbH / Gilching	9107-3696	40342	cal	15.04.2025	30.04.2027
4	n. a.	Anechoic chamber	Anechoic chamber FAC 3/5m	MEC Import: MWB / TDK	87400/02	40349	cpu	-/-	-/-
5	n. a.	Switch / Control Unit	Switch / Control Unit 3488A	Hewlett Packard	*	40350	cnn	-/-	-/-
6	n. a.	Variable isolating transformer	Variable isolating transformer MPL IEC625 Bus Variable isolating transformer	Erfi	91350	40351	cnn	-/-	-/-
7	n. a.	Highpass Filter	Highpass Filter WHKX7.0/18G-8SS	Wainwright Instruments GmbH / Andechs	19	40365	cnn	-/-	-/-
8	n. a.	Broadband Amplifier 0.5-18 GHz	Broadband Amplifier 0.5-18 GHz CBLU5184540	MEC Import: CERNEX	22049	40373	cpu	-/-	-/-
9	n. a.	4U RF Switch Platform	4U RF Switch Platform L4491A	Agilent Technologies Deutschland GmbH / Böblingen	MY50000037	40375	cnn	-/-	-/-
10	n. a.	NEXIO EMV-Software	NEXIO EMV-Software BAT EMC V2022.0.32.0	MEC Import: Nexio		40383	cnn	-/-	-/-
11	n. a.	RF-Amplifier	RF-Amplifier AMF-6F06001800-30-10P-R	NARDA-MITEQ Inc	2011572	40400	cpu	-/-	-/-
12	n. a.	Active Loop Antenna	Active Loop Antenna 6502	EMCO Elektronik GmbH / Gilching	2210	50044	cal	07.07.2025	31.07.2027
13	n. a.	EMI Test Receiver	EMI Test Receiver ESU26	Rohde & Schwarz Messgerätebau GmbH / Memmingen	100037	50254	cal	11.12.2025	31.12.2026
14	n. a.	TRILOG Broadband Antenna	TRILOG Broadband Antenna VULB9163	Schwarzbeck MESS-ELEKTRONIK OHG / Schönau	318	50284	cal	09.02.2026	29.02.2028

7.3 Radiated measurements > 18 GHz



7.4 Radiated measurements > 50/85 GHz



Measurement distance: horn antenna e.g. 75 cm

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

Example calculation:
FS [dBµV/m] = 40.0 [dBµV] + (-60.1) [dB] + 36.74 [dB/m] = 16.64 [dBµV/m] (6.79 µV/m) @ distance

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] = -59.0 [dBm] + 44.0 [dB] - 20.0 [dBi] + 5.0 [dB] = -30 [dBm] (1 µW)

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

Equipment table:

No.	Lab / Item	Equipment	Type	Manufacturer	Serial No.	INV. No.	Kind of Calibration	Last Calibration	Next Calibration
1	n. a.	Harmonic Mixer 3-Port, 110-170 GHz	Harmonic Mixer 3-Port, 110-170 GHz FS-Z170	Radiometer Physics GmbH	100014	40109	cal	15.07.2025	15.07.2026
2	n. a.	Harmonic Mixer 3-Port, 140-220 GHz	Harmonic Mixer 3-Port, 140-220 GHz SAM-220	Radiometer Physics GmbH	200001	40110	cal	06.08.2025	06.08.2026
3	n. a.	Harmonic Mixer 3-Port, 220-325 GHz	Harmonic Mixer 3-Port, 220-325 GHz SAM-325	Radiometer Physics GmbH	100002	40111	cal	11.07.2025	11.07.2026
4	n. a.	Harmonic Mixer 3-Port, 50-75 GHz	Harmonic Mixer 3-Port, 50-75 GHz FS-Z75	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101578	40145	cal	13.03.2026	31.03.2027
5	n. a.	Harmonic Mixer 3-Port, 60-90 GHz	Harmonic Mixer 3-Port, 60-90 GHz FS-Z90	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101555	40117	cal	01.09.2025	30.09.2026
6	n. a.	Harmonic Mixer 3-Port, 75-110 GHz	Harmonic Mixer 3-Port, 75-110 GHz FS-Z110	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101411	40141	cal	01.09.2025	30.09.2026
7	n. a.	Std. Gain Horn Antenna 114-173 GHz	Std. Gain Horn Antenna 114-173 GHz 2924-20	Flann	*	40081	cnn	-/-	-/-
8	n. a.	Std. Gain Horn Antenna 145-220 GHz	Std. Gain Horn Antenna 145-220 GHz 3024-20	Flann	*	40082	cnn	-/-	-/-
9	n. a.	Std. Gain Horn Antenna 217-330 GHz	Std. Gain Horn Antenna 217-330 GHz 32240-20	Flann	233278	40140	cnn	-/-	-/-
10	n. a.	Std. Gain Horn Antenna 49.9-75.8 GHz	Std. Gain Horn Antenna 49.9-75.8 GHz 2524-20	Flann	*	40079	cnn	-/-	-/-
11	n. a.	Std. Gain Horn Antenna 60-90 GHz	Std. Gain Horn Antenna 60-90 GHz COR 60_90	Thomson CSF		40138	cpu	-/-	-/-
12	n. a.	Std. Gain Horn Antenna 73.8-112 GHz	Std. Gain Horn Antenna 73.8-112 GHz 2724-20	Flann	*	40157	cnn	-/-	-/-
13	n. a.	Std. Gain Horn Antenna 33.0-50.1 GHz	Std. Gain Horn Antenna 33.0-50.1 GHz 2324-20	Flann	57	40115	cnn	-/-	-/-
14	n. a.	Horn Antenna 18,0-40,0 GHz	Horn Antenna 18,0-40,0 GHz LHAF180	Microw.Devel	39180-103-022	40171	cal	-/-	-/-
15	n. a.	Low Noise Amplifier, Broadband 18-50 GHz	Low Noise Amplifier, Broadband 18-50 GHz BZT-18005000-550835-SL2525-SL	B&Z Technologies	27887-27889	40789	cpu	-/-	-/-
16	n. a.	Temperature Test Chamber	Temperature Test Chamber T-40/50	CTS Clima Temperatur Systeme GmbH / Hechingen	064023	40004	calchk	11.07.2024	11.07.2026
17	n. a.	Signal- and Spectrum Analyzer	Signal- and Spectrum Analyzer FSW85	Rohde & Schwarz Messgerätebau GmbH / Memmingen	101333	40009	cal	28.08.2025	31.08.2026
18	n. a.	Power Supply	Power Supply HMP 2020	Rohde & Schwarz Messgerätebau GmbH / Memmingen	121993	41022	cal	15.05.2025	31.05.2027

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 C63.26.
- 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 C63.26) – 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 C63.26).
- 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 C63.26.
- 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 C63.26) – 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.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.26.
- 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 C63.26).
- 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 C63.26.
- 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 C63.26) – 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.

Final measurement

- The final measurement is performed for at least six highest peaks according to the requirements of the ANSI C63.26.
- 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 C63.26).
- 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 C63.26.
- 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.

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 C63.26).
- 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 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 C63.26.
- 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 C63.26).
- 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 boundary consideration for measurements above 18 GHz

Description:

The measurement distance for all final radiated measurements is chosen in accordance with ANSI C63.10-2020 chapter 9.1.4.
All measurements are made in the far-field of the measurement antenna.

Far-field boundary for mm-wave antennas:

$d_{far} = 2 \times D_{dim}^2/\lambda$

with
d_{far} Far-field boundary distance
D_{dim} Antenna dimension
λ wavelength

Fundamental emission measurements (OBW) - far-field boundary:

Antenna frequency range [GHz]	Highest measured frequency [GHz]	D_{dim} [cm]	λ [cm]	d_{far} [cm]
60 - 90	90	2.74	0.33	45.05

Spurious emission measurements - far-field boundary:

Antenna frequency range [GHz]	Highest measured frequency [GHz]	D_{dim} [cm]	λ [cm]	d_{far} [cm]
10 - 18	18	7.6	16.66	69.36
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
60 - 90	90	2.74	0.33	45.05
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
500 - 750	750	0.35	0.04	6.12

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	2026-05-07	-/-

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

Note:

1) NA = Not applicable; NP = Not performed

2) ANSI C63.26-2015 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…"

12 Additional comments

Reference documents:

- None

Special test descriptions:

- None

Configuration descriptions:

- None

Test devices (EUT):

- The normal operation mode (intended use) is used.

13 Measurement results

13.1 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 and provisions: **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	
Detector:	RMS
Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Trace-Mode:	Max Hold

Measurement parameter: Peak Power	
Detector:	Pos-Peak
Resolution bandwidth:	50 MHz
Video bandwidth:	80 MHz
Trace-Mode:	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."

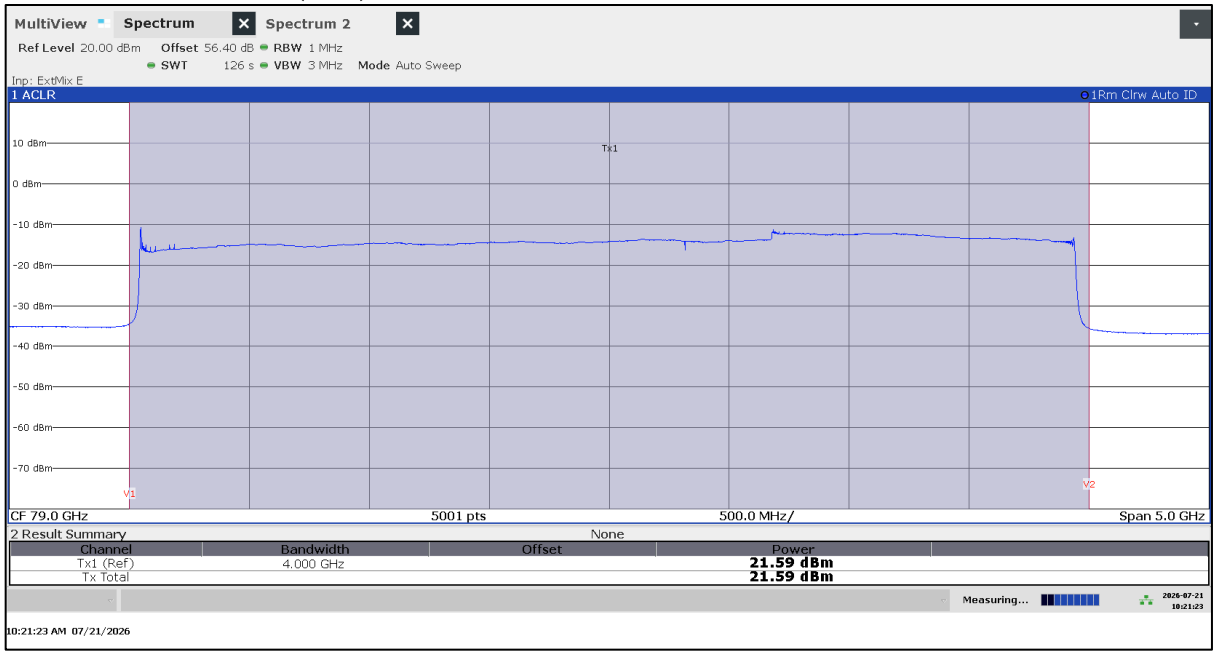
→ Peak power measurements are therefore performed using an optimized (usually larger) resolution bandwidth to mitigate issues with desensitization.

Measurement results:

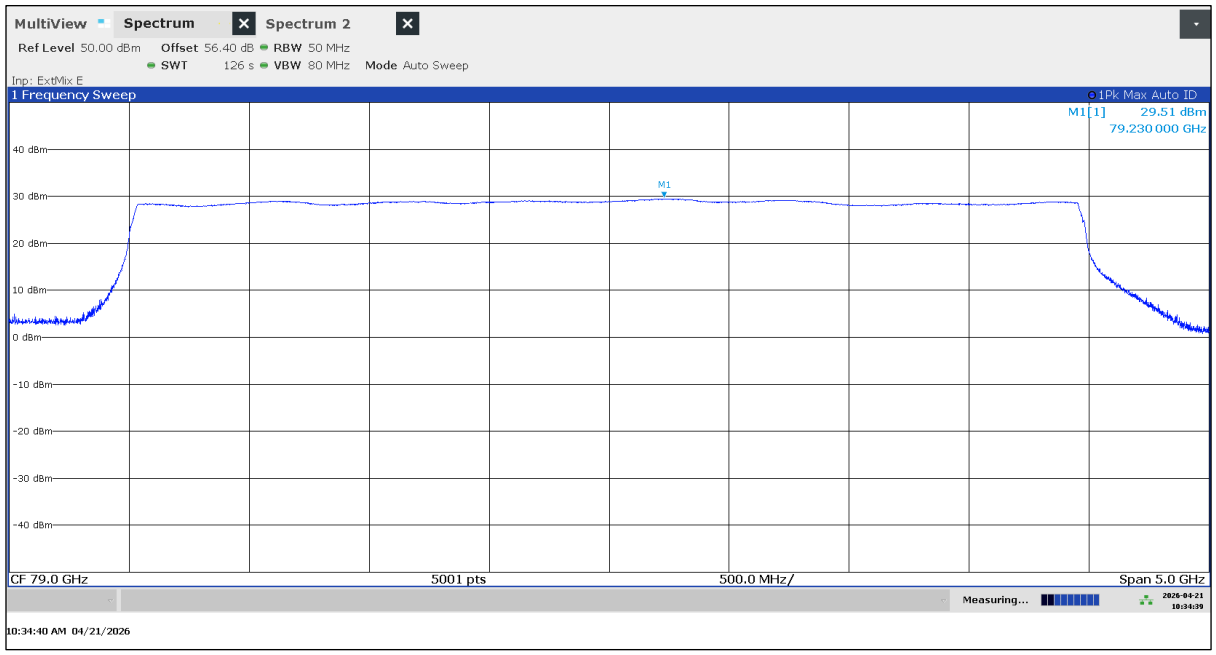
Test condition	Radiated Peak Power (EIRP)	Radiated Mean Power (EIRP)
T_{nom} / V_{nom}	**29.51 dBm**	**21.59 dBm**

Verdict: Compliant

Plot 1: Radiated Mean Power (EIRP)



Plot 2: Radiated Peak Power (EIRP)



13.2 Modulation characteristics

Description:

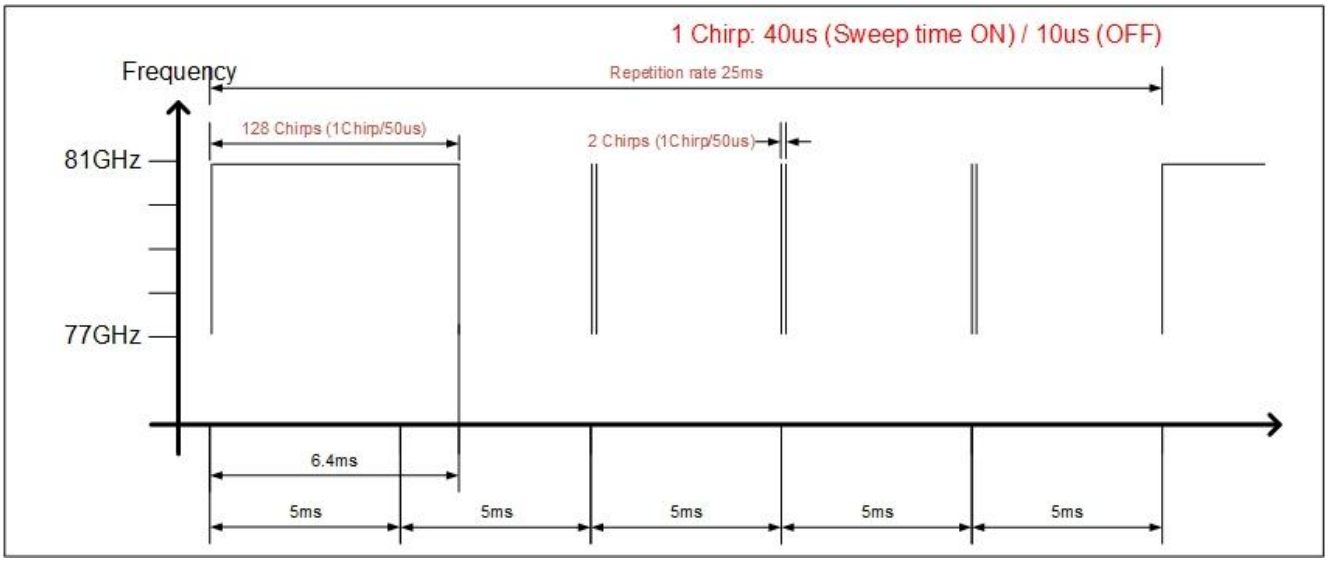
§2.1047 (d) *Other types of equipment.* A curve or equivalent data which shows that the equipment will meet the modulation requirements of the rules under which the equipment is to be licensed.

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:

Modulation Type	sawtooth
Modulation characteristics:	
Sweep bandwidth	3900 MHz
Sweep rate	128 Chirps in 6.4 ms / 6 Chirps in 10 ms = 134 Chirps in 25 ms
Sweep time	40µs (Sweep time ON), 10µs (Sweep OFF)

Plot 3: Modulation characteristics provided by customer



13.3 Occupied bandwidth / Frequency stability

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.

§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 and provisions:

FCC
FCC §2.1049/ §95.3379 (b)
The occupied bandwidth from intentional radiators operated within the specified frequency band shall comply during all conditions of operation 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

Measurement results:

Test Conditions	f_L in GHz	f_H in GHz	Occupied Bandwidth (99%) in MHz
-20 °C / V_{nom}	77.05529	80.92414	3868.85
-10 °C / V_{nom}	77.05458	80.92373	3869.15
0 °C / V_{nom}	77.05403	80.92384	3869.81
10 °C / V_{nom}	77.05342	80.92426	3870.83
T_{nom} / V_{min}	77.05260	80.92396	3871.37
T_{nom} / V_{nom}	77.052.69	80.92332	3870.63
T_{nom} / V_{max}	77.05218	80.92351	3871.33
30 °C / V_{nom}	77.05177	80.92319	3871.41
40 °C / V_{nom}	77.05108	80.92300	3871.92
50 °C / V_{nom}	77.05004	80.92262	3872.58

Note:

- The EUT is tested in the temperature range from -20°C to 50°C specified by §95.3379 (b) and RSS Gen 6.11.
- If the operating temperature range of the device specified by the manufacturer exceeds the test temperature range (-20°C to +50°C), the customer is responsible for ensuring the frequency stability and proper functioning of the device within the extended operating temperature range.
- Detailed measurement results: see measurement report 1-1367-25-01-02_TR1-A201-R01

Verdict: **Compliant**

13.4 Unwanted emissions (radiated spurious)

Description:

Measurement of the radiated unwanted emissions.

Limits and provisions:

FCC §95.3379

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

(1) Radiated emissions below 40 GHz shall not exceed the field strength as shown in the following emissions table.

FCC		
CFR Part 95.3379 (a) (1) / CFR Part 95.3379 (a) (3)		
Radiated unwanted emissions		
Frequency (MHz)	Field Strength (µV/m)	Measurement distance (m)
0.009 – 0.490	2400/F[kHz]	300
0.490 – 1.705	24000/F[kHz]	30
1.705 – 30.0	30	30
30 - 88	100	3
88 – 216	150	3
216 – 960	200	3
960 – 40 000	500	3

(i) In the emissions table in paragraph (a)(1) of this section, the tighter limit applies at the band edges.

(ii) The limits in the table in paragraph (a)(1) of this section are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(iii) The emissions limits shown in the table in paragraph (a)(1) of this section are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9.0-90.0 kHz, 110.0-490.0 kHz, and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector with a 1 MHz RBW

(2) The power density of radiated emissions outside the 76-81 GHz band above 40.0 GHz shall not exceed the following, based on measurements employing an average detector with a 1 MHz RBW:

(i) For radiated emissions outside the 76-81 GHz band between 40 GHz and 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 600 pW/cm2 at a distance of 3 meters from the exterior surface of the radiating structure.

(ii) For radiated emissions above 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 1000 pW/cm2 at a distance of 3 meters from the exterior surface of the radiating structure.

Frequency Range (GHz)	Power Density	EIRP
40 – 200	600 pW/cm^2 @ 3m	-1.7 dBm
200 – 231	1000 pW/cm^2 @ 3m	+0.5 dBm

(3) For field disturbance sensors and radar systems operating in the 76-81 GHz band, the spectrum shall be investigated up to 231.0 GHz.

Note: KDB 653005 4. (e)
Unwanted emissions shall be examined from the lowest radio frequency signal generated by the EUT, without going below 9 kHz, up to at least 231 GHz (preferably 243 GHz)

Limit conversion (ANSI C63.10-2013 9.6):

$EIRP[dBm] = 10 \times \log(4 \times \pi \times d^2 \times 1000 \times PD[W/m^2])$

- Power density at the distance specified by the limit: PD [W/m²]
- Equivalent isotropically radiated power: EIRP [dBm]
- Distance at which the power density limit is specified: d [m]

According to this formula, an emission limit of PD = 600 pW/cm² at a distance of d = 3 m corresponds to an equivalent isotropically radiated power of EIRP = -1.7 dBm.

Measurement:

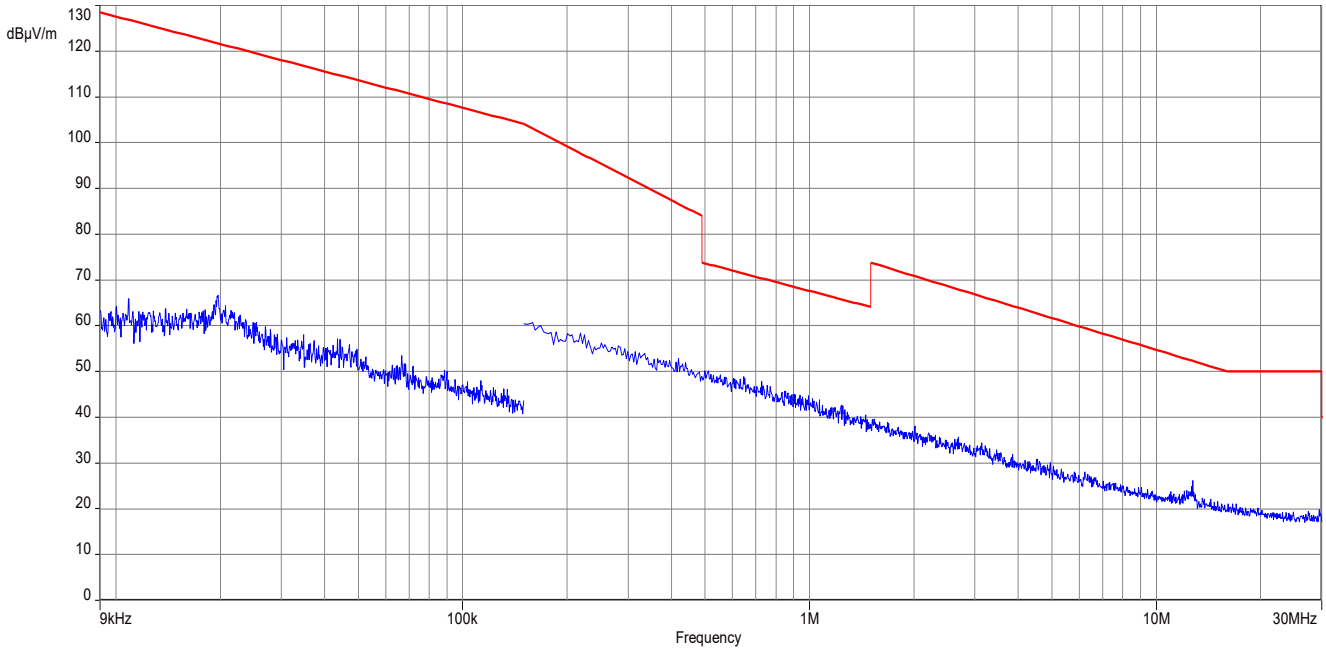
Measurement parameter	
Detector:	Quasi Peak / Pos-Peak / Lin. Average / RMS
Resolution bandwidth:	F < 1 GHz: 100 kHz F > 1 GHz: 1 MHz
Video bandwidth:	F < 1 GHz: 300 kHz F > 1 GHz: 3 MHz
Trace-Mode:	Max Hold

Measurement results:

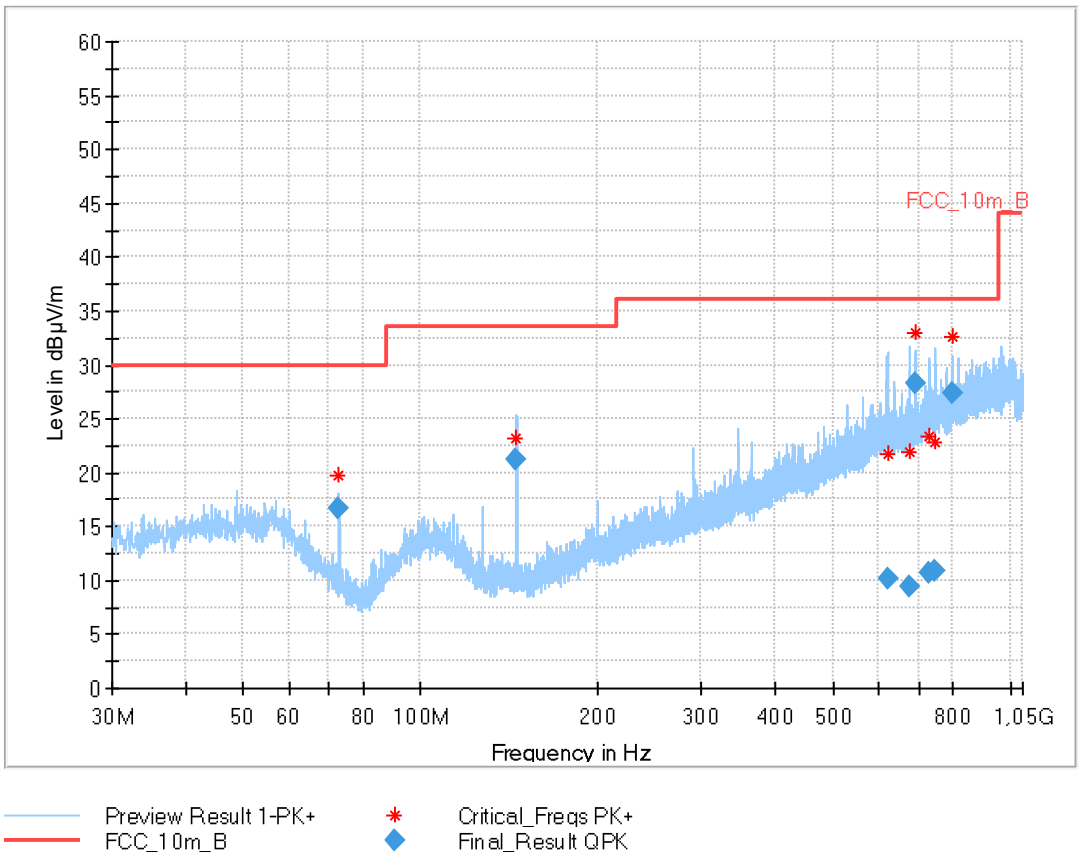
Frequency [GHz]	Detector	Bandwidth [MHz]	Level	Limit	Margin [dB]
28.8	RMS	1	50.8 dBµV/m	54 dBµV/m	3.2
Please refer to the following plots for more information on the level of spurious emissions					

Verdict: Compliant

Plot 4: 9 kHz – 30 MHz



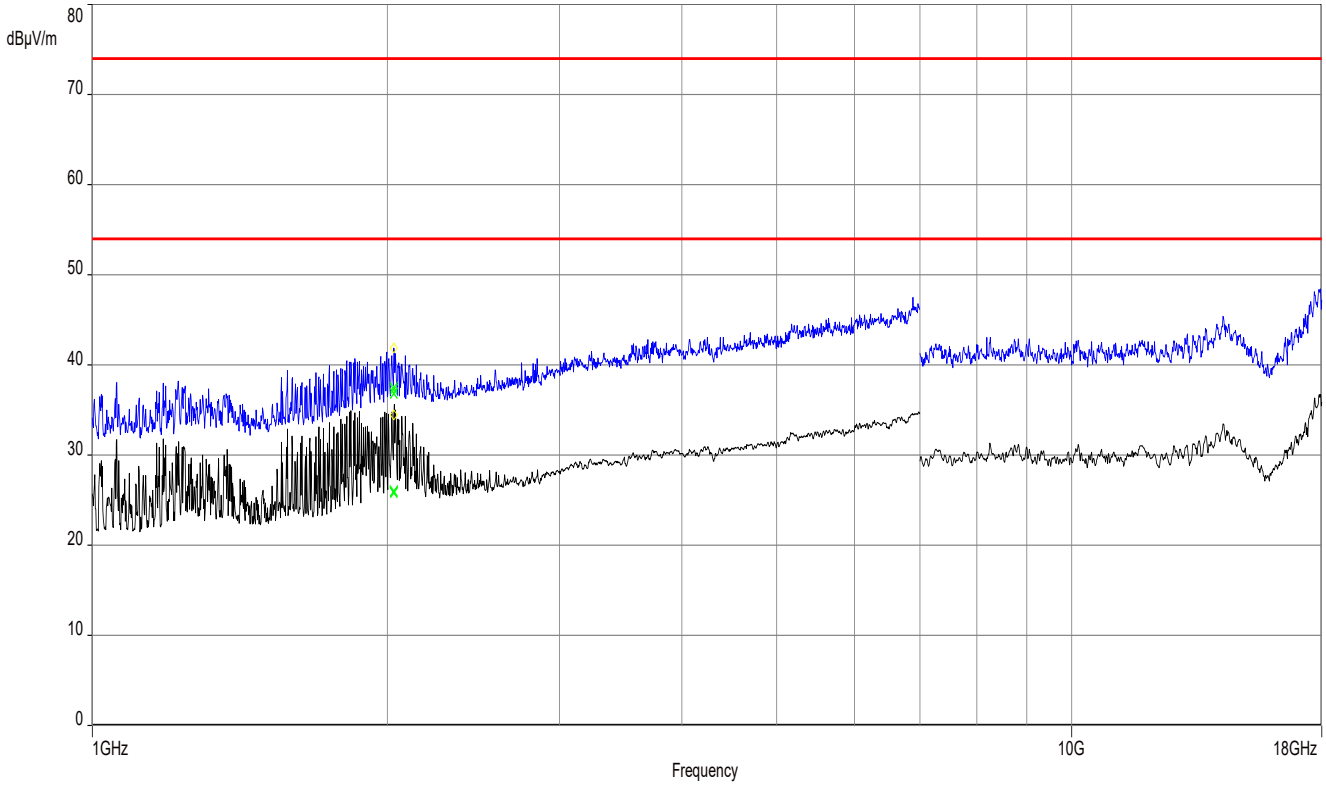
Plot 5: 30 MHz – 1 GHz



Final_Result

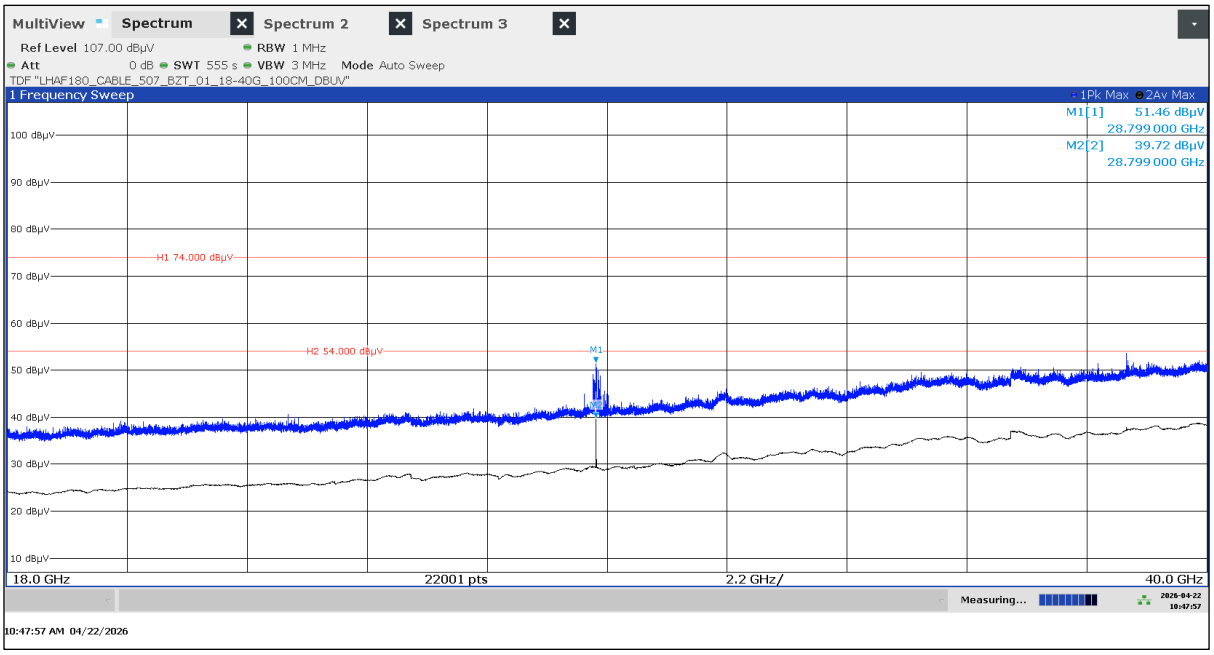
Frequency (MHz)	QuasiPeak (dBµV/m	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
72.651	16.66	30.0	13.3	1000	120.0	200.0	V	23	9
145.237	21.16	33.5	12.3	1000	120.0	104.0	V	22	9
619.125	10.20	36.0	25.8	1000	120.0	143.0	H	92	22
672.968	9.48	36.0	26.5	1000	120.0	200.0	H	150	22
690.080	28.22	36.0	7.8	1000	120.0	378.0	H	115	22
728.205	10.65	36.0	25.4	1000	120.0	200.0	H	-18	22
746.027	10.87	36.0	25.1	1000	120.0	145.0	H	234	23
799.527	27.32	36.0	8.7	1000	120.0	304.0	H	0	23

Plot 6: 1 GHz – 18 GHz

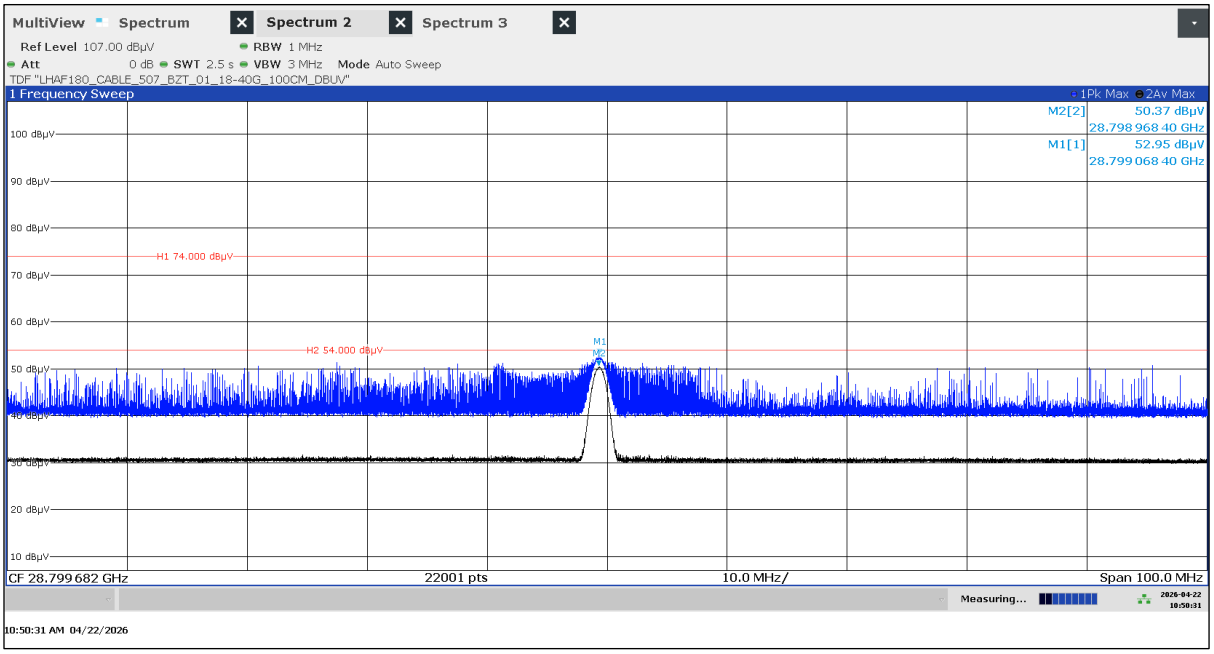


Blue trace, upper limit: peak
Black trace, lower limit: AVG

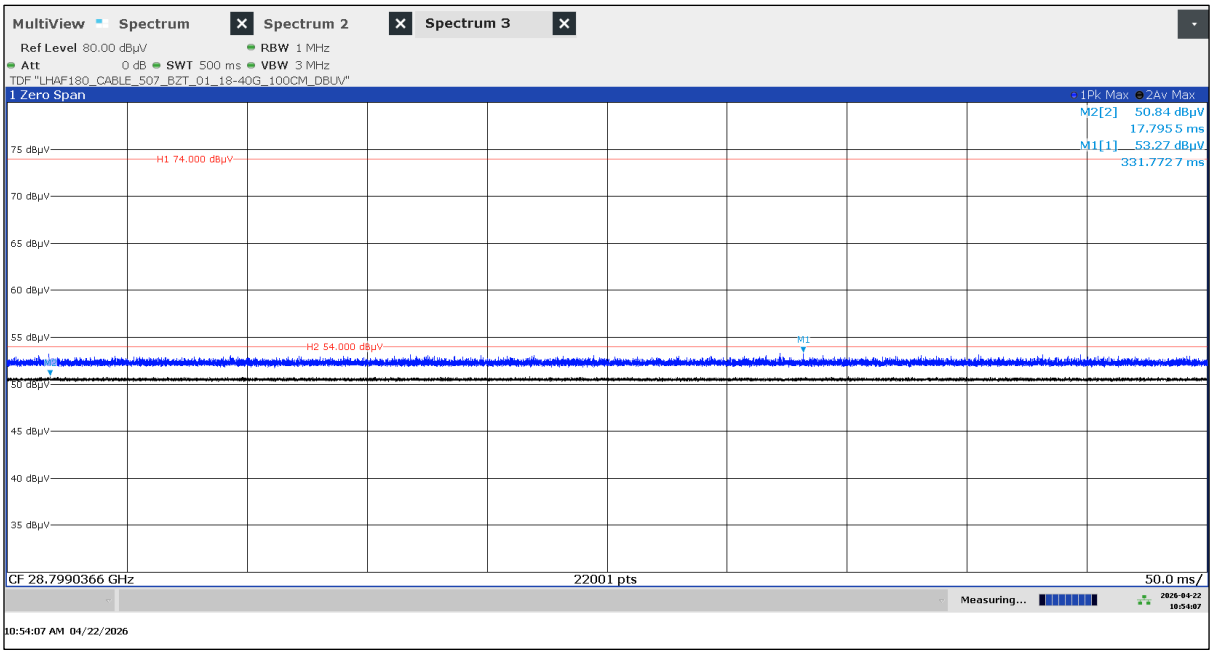
Plot 7: 18 GHz – 40 GHz



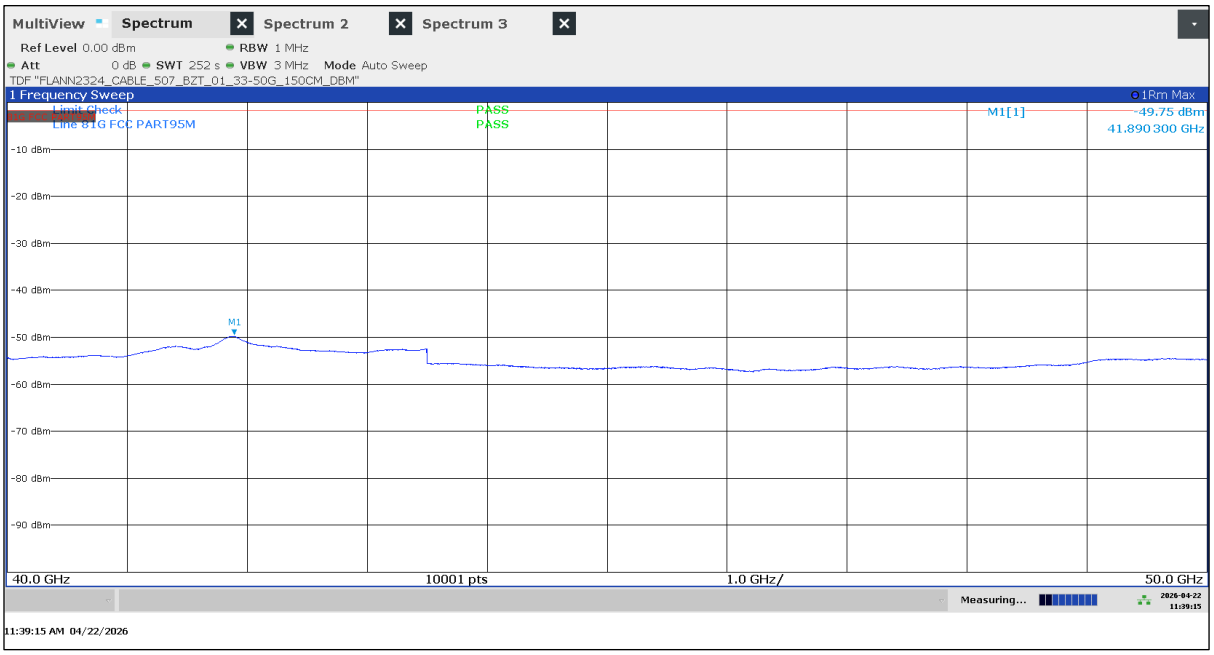
Plot 8: 28.8 GHz



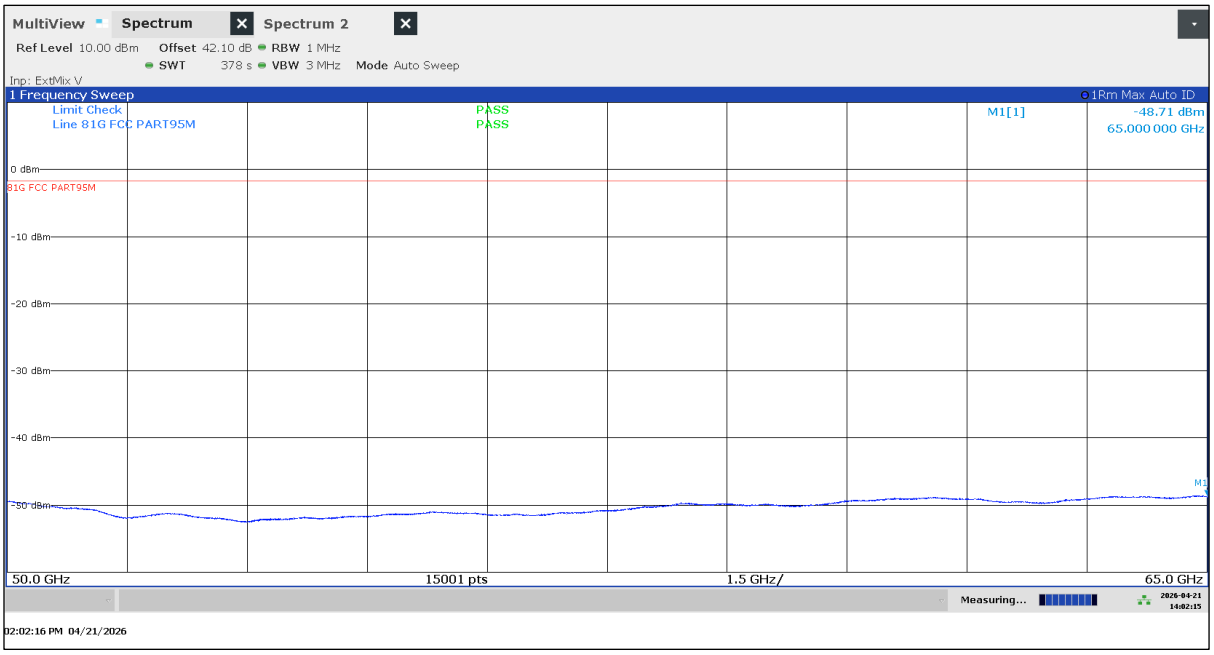
Plot 9: 28.8 GHz, Zero Span



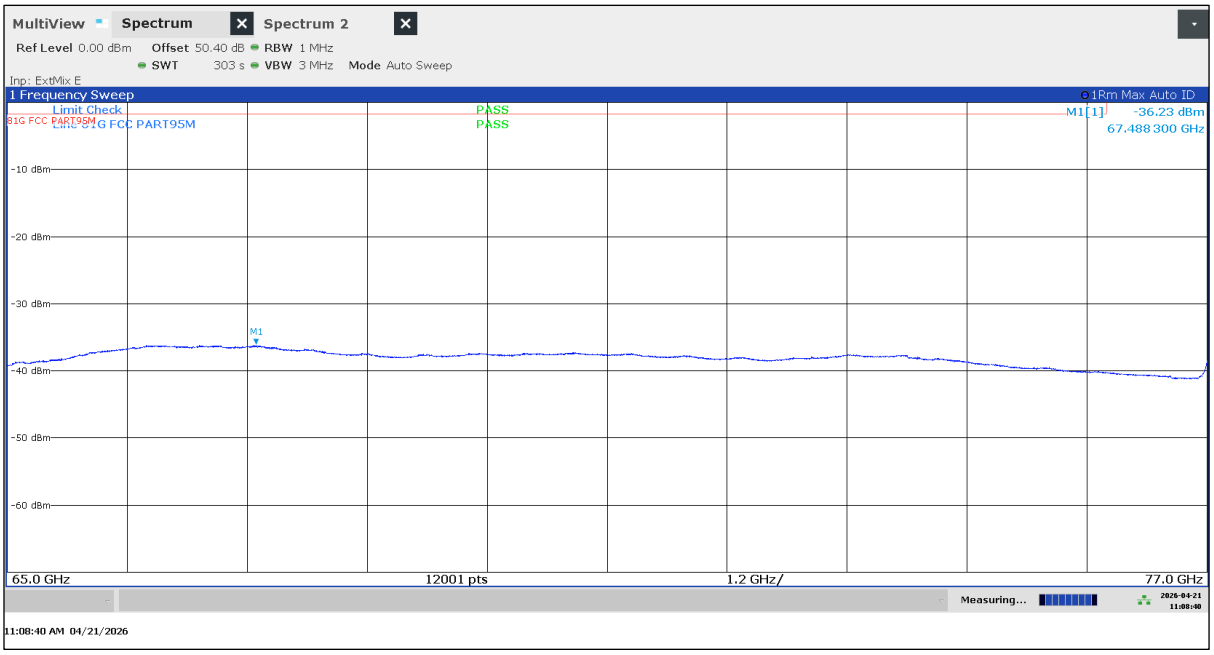
Plot 10: 40 GHz – 50 GHz



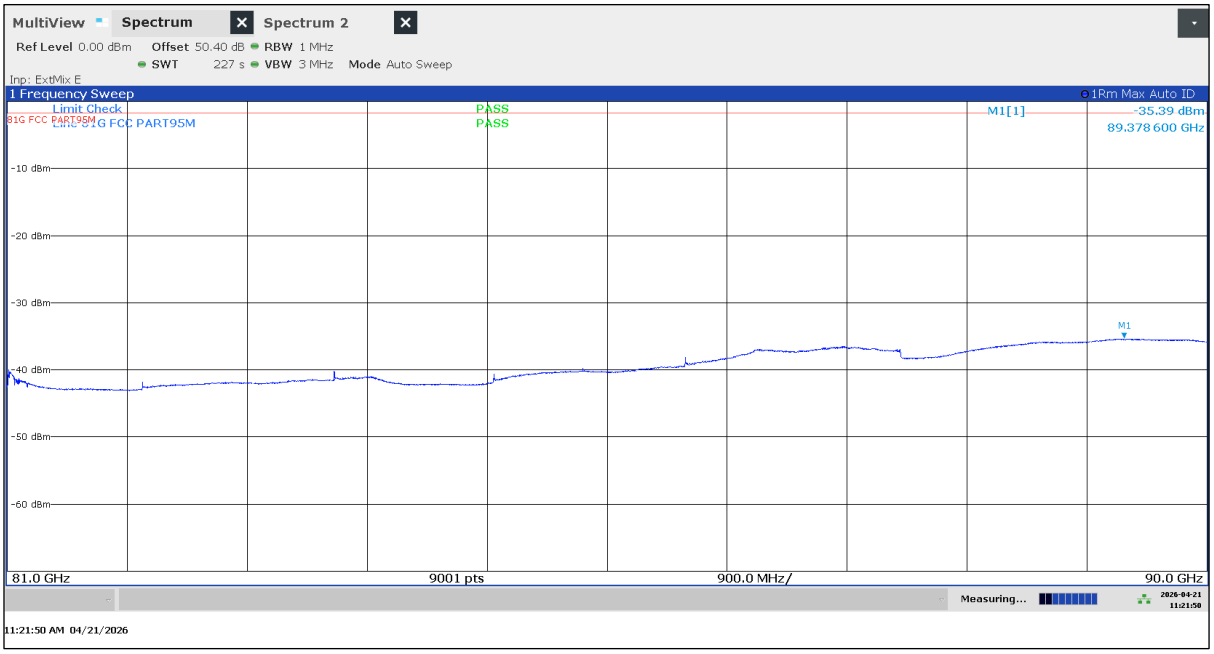
Plot 11: 50 GHz – 65 GHz



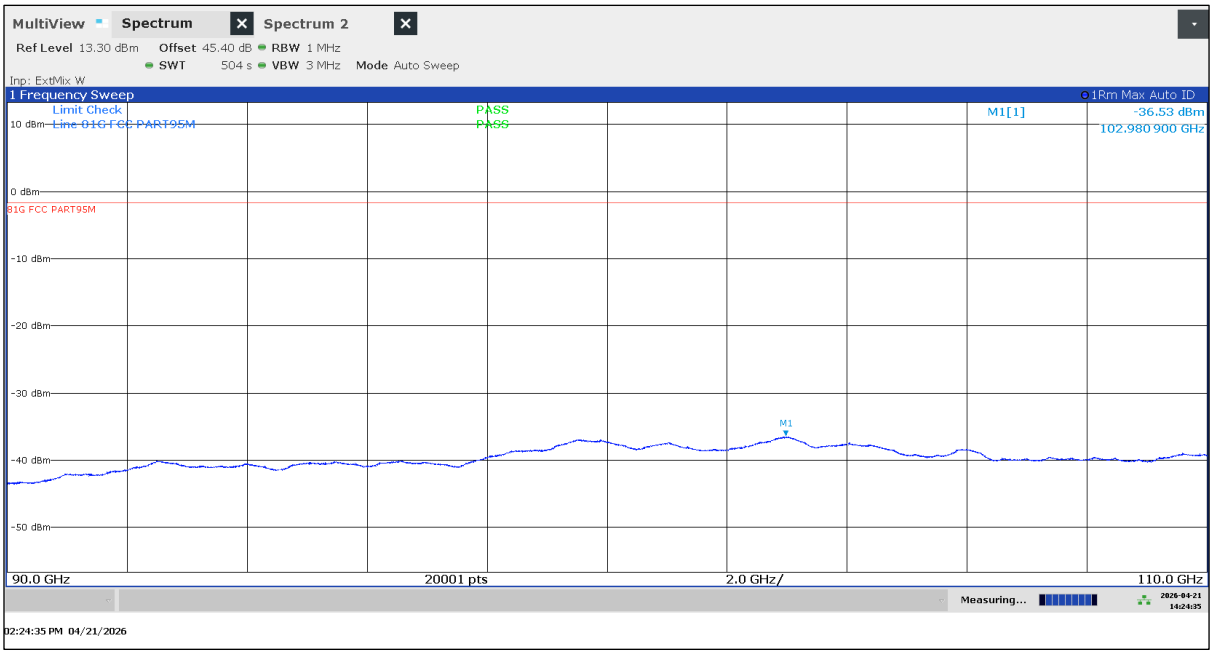
Plot 12: 65 GHz – 77 GHz



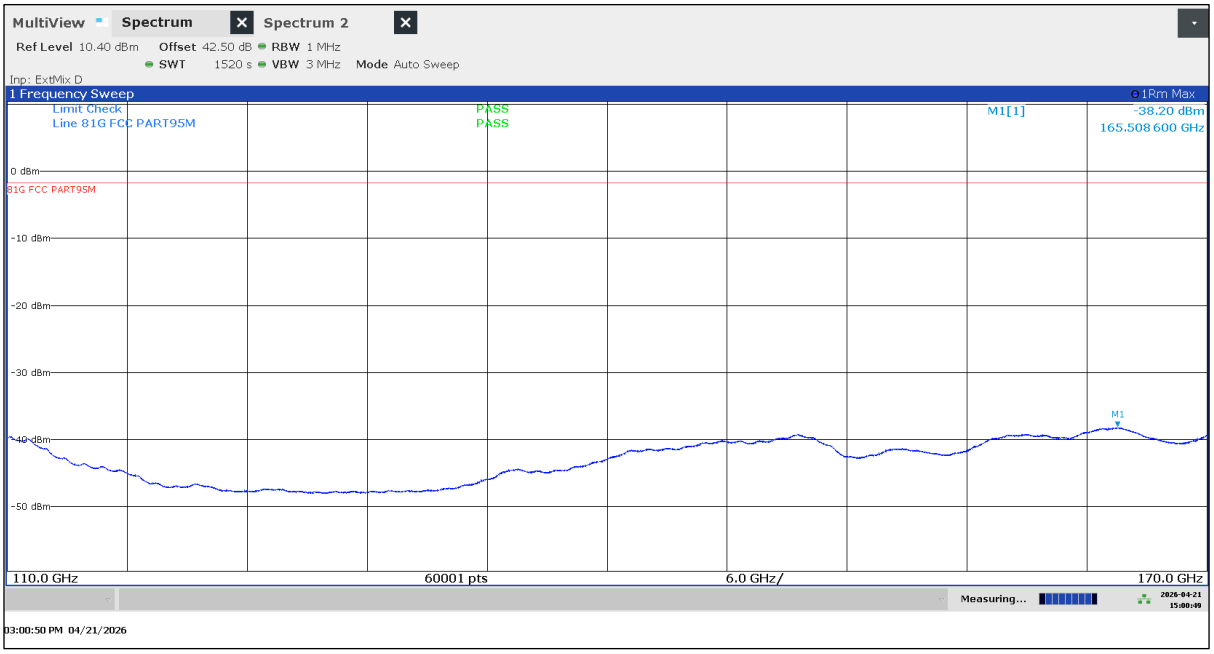
Plot 13: 81 GHz – 90 GHz



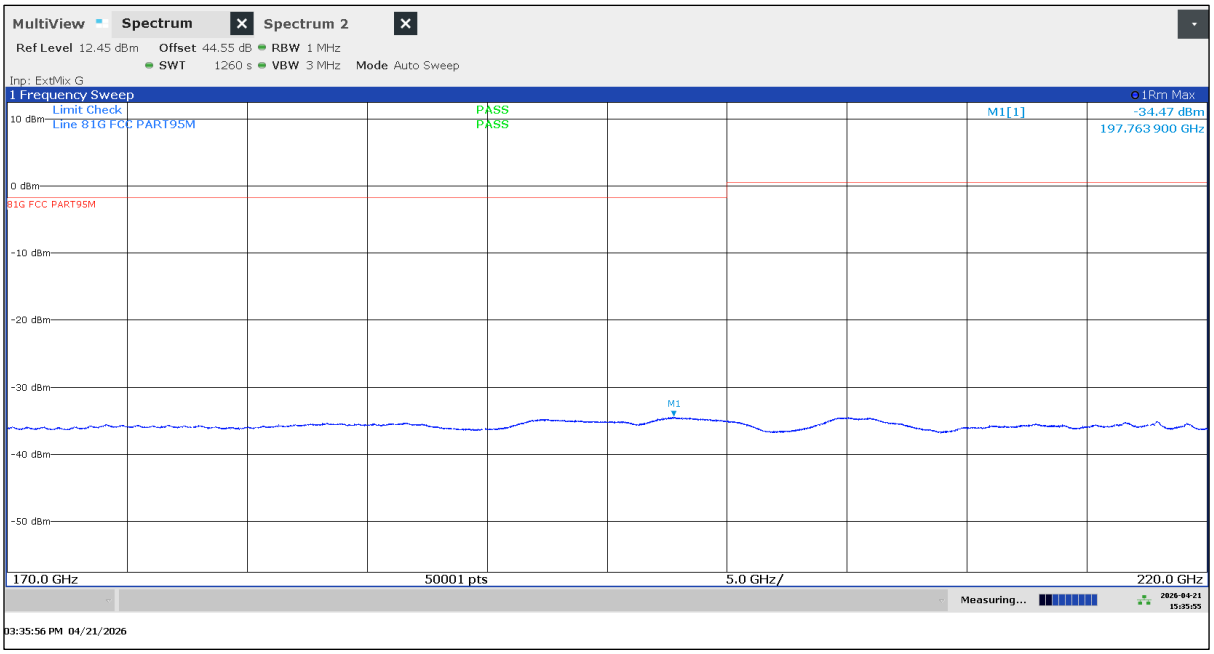
Plot 14: 90 GHz – 110 GHz



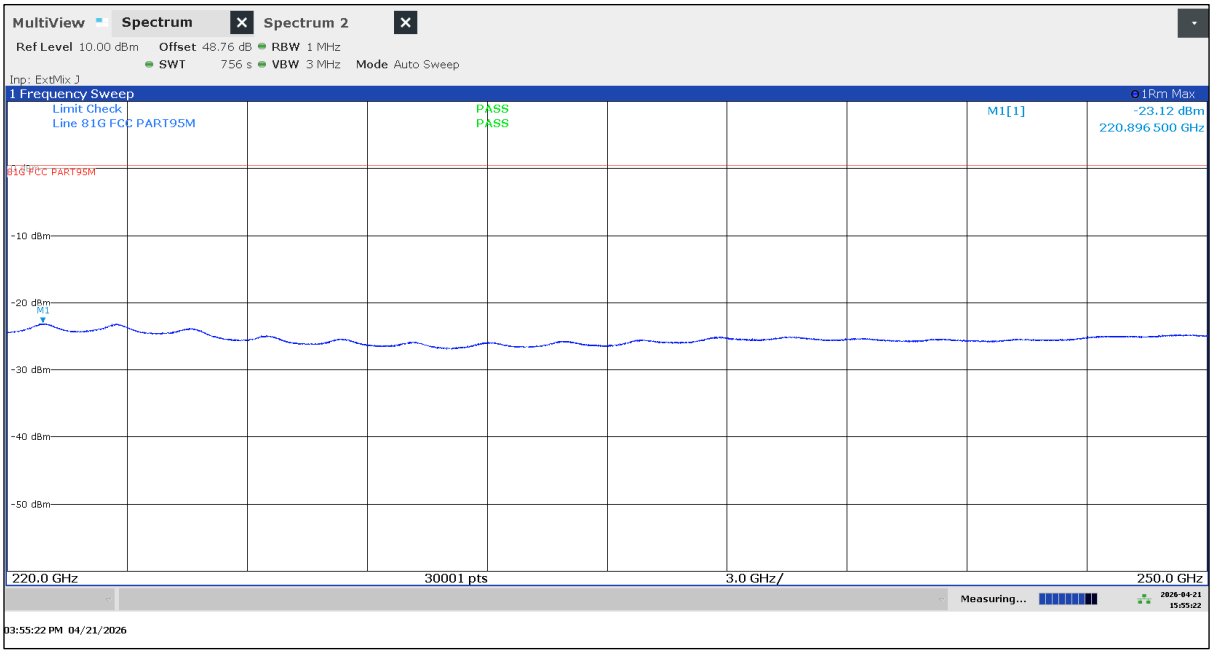
Plot 15: 110 GHz – 170 GHz



Plot 16: 170 GHz – 220 GHz



Plot 17: 220 GHz – 250 GHz



14 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	Combination of Grantee Code and Equipment Product Code
ISED	Innovation, Science and Economic Development 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	Continuous 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_0	Carrier to noise-density ratio, expressed in dB-Hz

15 Document history

Version	Applied changes	Date of release
-/-	Initial release - DRAFT	2026-05-08
R01	Initial release	2026-05-27
R02	Radiated Mean Power updated	2026-07-21

################################## END OF TEST REPORT ##################################