



RF - TEST REPORT

- FCC Part 15.255 / RSS-210 -

Type / Model Name : BGT60CUTR13AIP

Product Description : 60 GHz short range radar module

HVIN: BGT60CUTR13AIP-SMD

Applicant : Infineon Technologies AG

Address : Am Campeon 1-15

85579 NEUBIBERG, GERMANY

Manufacturer : Infineon Technologies AG

Address : Am Campeon 1-15

85579 NEUBIBERG, GERMANY

Test Result according to the standards
listed in clause 1 test standards:

POSITIVE

Test Report No. : 80260692-00 Rev_1

27. May 2026

Date of issue



Deutsche
Akkreditierungsstelle
D-PL-12030-01-00

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ATTACHMENTs A, B as separate supplements

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations (November 2025)

Part 15, Subpart A	General
Part 15, Subpart C, Section 15.255	Operation within the band 57-71 GHz.
ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024	Testing Unlicensed Wireless Devices
KDB 364244 D01 V01	Meas 15.255 Radars

ISED Canada Rules and Regulations

RSS-Gen, Issue 5 + Amendment 1 + 2	General Requirements for Compliance of Radio Apparatus
RSS-210, Issue 11	Licence-Exempt Radio Apparatus: Category I Equipment
ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024	Testing Unlicensed Wireless Devices
KDB 364244 D01 V01	Meas 15.255 Radars

2 EQUIPMENT UNDER TEST

2.1 Information provided by the Client

Please note, we do not take any responsibility for information provided by the client or his representative which may have an influence on the validity of the test results.

2.2 Sampling

The customer is responsible for the choice of sample. Sample configuration, start-up and operation is carried out by the customer or according to his/her instructions.

2.3 Photo documentation of the EUT – Detailed photos see ATTACHMENT A

2.4 Equipment type

The EUT qualifies under **FCC §15.255(c)(2)(v)** and **RSS-210 J.3.2.a** as a field disturbance sensor, and under **FCC §15.255(c)(2)(ii)** and **RSS-210 J.3.2.b.ii** as a field disturbance sensor.

2.5 Short description of the equipment under test (EUT)

The EUT is a field disturbance sensor. It has two operation modes, working in the frequency band of 61 GHz to 61.5 GHz (Mode 1) and in the frequency band of 57 GHz to 61.56 GHz (Mode 2 - used frequency range only 59.44 GHz to 61.56 GHz) using FMCW.

Number of tested samples: 1
 Serial number: RF sample #3
 Firmware ID: Not applicable, EUT is not equipped with programmable device
 FCC ID: 2AYSQBGT60CUTR13-A
 IC ID: 28678-BGT60CUTR13
 HVIN: BGT60CUTR13AIP-SMD

2.6 Variants of the EUT

There are no variants.

2.7 Operation frequency

Operating frequency range 1: 61 GHz to 61.5 GHz
 Operating frequency range 2: 59.44 GHz to 61.56 GHz

2.8 Transmit operating modes

The EUT allows the user to select the following modes:
 - TX modulated

2.9 Antenna

The following integrated antennas are used with the EUT:

Number	Characteristic	Model number	Plug	Frequency range (GHz)	Typ. gain (dBi)
1	linear	On chip patch antenna for TX	-	57 - 64	3
2	linear	On chip patch antenna for RX	-	57 - 64	3
3	linear	On chip patch antenna for RX	-	57 - 64	3
4	linear	On chip patch antenna for RX	-	57 - 64	3

The antennas cannot be unattached by the user.

2.10 Power supply system utilised

Power supply voltage EUT : 2.6 – 4.7 V/DC ($V_{nom} = 3.3$ V/DC)
 Power supply voltage, test jig : 4.5 V/DC (3x AAA battery)

2.11 Peripheral devices and interface cables

The following peripheral devices and interface cables are connected during the measurements:

- Battery pack with USB cable Model : custom-built by customer

2.12 Determination of worst-case conditions for final measurement

Exploratory measurements have been made in all three orthogonal axes and the settings of the EUT are changed to locate at which position and at what setting the EUT produces the maximum of the emissions. For the further measurement, the EUT is set in H-position while the receiving antenna is in horizontal polarisation (in co-polarisation with EUT antennas).

As worst case, the following channels and test modes are selected for the final test:

Operation Mode	Operating frequency range (GHz)	Power setting	Modulation	BW (GHz)
1	61.0 – 61.5	P_{def}	FMCW	0.5
2	59.44 – 61.56	P_{def}	FMCW	2.12

Note 1: P_{def} = default power level with maximum power setting. Power level could not be changed with test software.

Note 2: For final testing the normal FMCW modulation was selected. Other test modes were only for pre-scan purposes, e.g. evaluating artefacts from the harmonic mixers.

2.12.1 Test jig

The EUT is mounted on a carrier PCB providing 4.5 V/DC (3x AAA battery) input voltage to the EUT.

2.12.2 Test software

The test software programDevice.bat allows following settings:

Mode 1:

- ISM CW-Mode: TX continuous wave mode, unmodulated, at 61.25 GHz,
- ISM Timing-Mode: TX modulated FMCW at single frequency 61.25 GHz (with chirp bandwidth 0)
- ISM Application-Mode: TX modulated mode FMCW (certification config).

Mode 2:

- Band2GHz CW-Mode: TX continuous wave mode, unmodulated, at 60.5 GHz,
- Band2GHz Timing-Mode: TX modulated FMCW at single frequency 60.5 GHz (with chirp bandwidth 0)
- Band2GHz Application-Mode: TX modulated mode FMCW (certification config).

3 TEST RESULT SUMMARY

Operating in the 61.0 – 61.5 GHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen 8.8	AC power line conducted emissions	passed
15.255(c)(2)(v)	RSS-210 J.3.2.a	EIRP	passed
15.255(d) 15.209(a)	RSS-210 J.4 RSS-Gen 8.9	Spurious emissions	passed
15.255(c)(2)	RSS-210 J.3.2	Peak conducted output power	not applicable *
15.255(e)(2)	RSS-210 J.3.3.d	Emission bandwidth	not applicable **
***	RSS-Gen, 6.7	99% bandwidth	passed
15.255(f)	RSS-210 J.6	Frequency stability	passed
15.203	-	Antenna requirement	passed

* Conducted power limit not applicable, as EUT fulfils 15.255(c)(2)(v) / RSS-210 J.3.2.a

** Emission bandwidth is not applicable, as EUT fulfils 15.255(c)(2)(v) / RSS-210 J.3.2.a

*** Tests performed according to General Measurement Guidance of TCB Workshop Part 15.255 Rules Amendment, October 25, 2023

Operating in the 57.0 – 61.56 GHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS-Gen 8.8	AC power line conducted emissions	passed
15.255(c)(2)(ii)	RSS-210 J.3.2.b.ii	EIRP	passed
15.255(d) 15.209(a)	RSS-210 J.4 RSS-Gen 8.9	Spurious emissions	passed
15.255(c)(2)	RSS-210 J.3.2	Peak conducted output power	not applicable *
15.255(e)(2)	RSS-210 J.3.3.d	Emission bandwidth	not applicable **
***	RSS-Gen, 6.7	99% bandwidth	passed
15.255(f)	RSS-210 J.6	Frequency stability	passed
15.203	-	Antenna requirement	passed

* Conducted power limit not applicable, as EUT fulfils 15.255(c)(2)(ii) / RSS-210 J.3.2.b.ii

** Emission bandwidth is not applicable, as EUT fulfils 15.255(c)(2)(ii) / RSS-210 J.3.2.b.ii

*** Tests performed according to General Measurement Guidance of TCB Workshop Part 15.255 Rules Amendment, October 25, 2023

3.1 Revision history of test report

Test report No	Rev.	Issue Date	Changes
80260692-00	0	14 January 2026	Initial test report
80260692-00	1	27 May 2026	4.5.3.2.1: test scheme updated; 5.3.3 KDB 364244 D01 added; 5.3.5 notes added

The test report with the highest revision number replaces the previous test reports.

3.2 Final assessment

The equipment under test fulfils the requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 22 October 2025

Testing concluded on : 07 November 2025

Checked by:

Tested by:

**Thomas
Weise**

Digital signiert von
Thomas Weise
Datum: 2026.05.28
11:20:12 +02'00'

Thomas Weise
Laboratory Manager



Sabine Kugler
2026.05.27
13:11:00 +02'00'

Sabine Kugler
Radio Team

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

**CSA Group Bayern GmbH
Straubinger Strasse 100
94447 PLATTILING
GERMANY**

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature: 15 - 35 °C

Humidity: 30 - 60 %

Atmospheric pressure: 86 - 106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. It is noted that the expanded measurement uncertainty corresponds to the measurement results from the standard measurement uncertainty multiplied by the coverage factor $k = 2$. The true value is located in the corresponding interval with a probability of 95 %. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4-2: 2011 + A1: 2014 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurements“ and is documented in the quality system acc. to DIN EN ISO/IEC 17025. For all measurements shown in this report, the measurement uncertainty of the test laboratory, CSA Group Bayern GmbH, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

4.4 Conformity Decision Rule

The applied conformity decision rule is based on ILAC G8:09/2019 clause 4.2.1 Binary Statement for Simple Acceptance Rule ($w = 0$).

Details can be found in the procedure CSA_B_V50_29.

4.5 Measurement protocol for FCC and ISCED

4.5.1 General information

CSA Group Bayern GmbH is recognized as wireless testing laboratory under the CAB identifier:

FCC: DE 0011
ISED: DE0009

4.5.2 General Standard information

The test methods used comply with ANSI C63.10 - "Testing Unlicensed Wireless Devices".

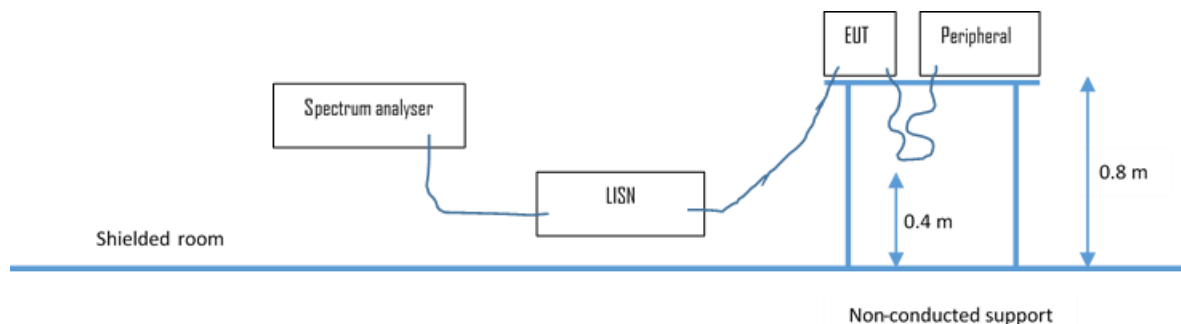
4.5.2.1 Justification

The equipment under test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions.

4.5.3 Details of test procedures

4.5.3.1 Conducted emission

Test setup according ANSI C63.10



The final level, expressed in dB μ V, is arrived at by taking the reading directly from the Spectrum analyser. This level is compared to the limit.

To convert between dB μ V and μ V, the following conversions apply:

$$\text{dB}\mu\text{V} = 20(\log \mu\text{V})$$

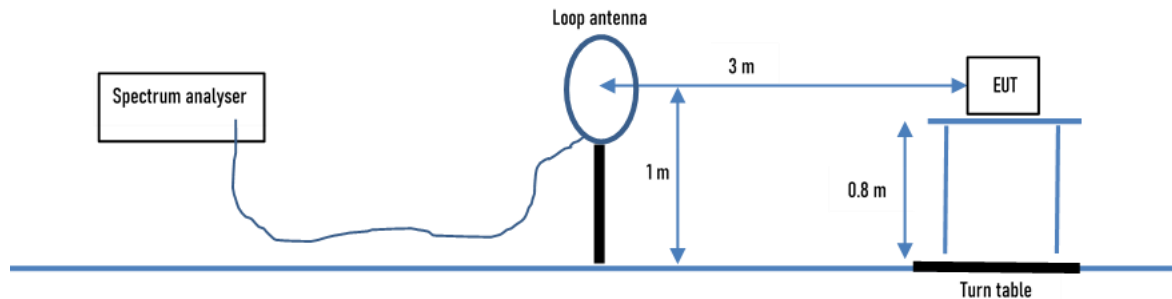
$$\mu\text{V} = \text{Inverse log}(\text{dB}\mu\text{V}/20)$$

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50 Ω / 50 μ H (CISPR 16) characteristics. The receiver is protected by means of an impedance matched pulse limiter connected directly to the RF input. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emission is re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.5.3.2 Radiated emission

4.5.3.2.1 Anechoic chamber (9 kHz - 30 MHz):

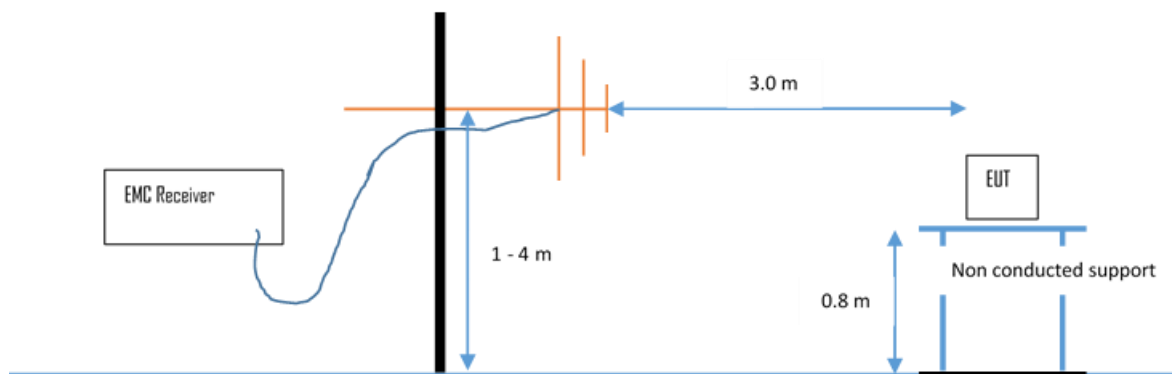
Test setup according ANSI C63.10



Emissions from the EUT are measured in the frequency range of 9 MHz to 30 MHz using a tuned receiver and a calibrated loop antenna. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 metres horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied along the site axis and the EUT is rotated 360 degrees.

4.5.3.2.2 Anechoic chamber (30 MHz - 1 GHz):

Test setup according ANSI C63.10.



Spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres and the EUT is rotated 360 degrees. The final level in dB μ V/m is calculated by taking the reading from the EMI receiver (Level dB μ V) and adding the correction factors and cable loss factor (dB). The FCC limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

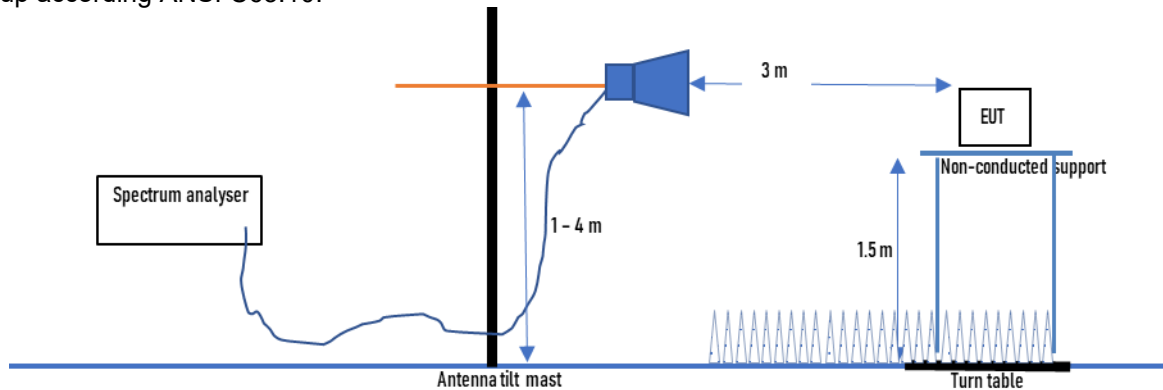
30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	-	Limit (dB μ V/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

4.5.3.2.3 Anechoic chamber (1000 MHz – 18000 MHz)

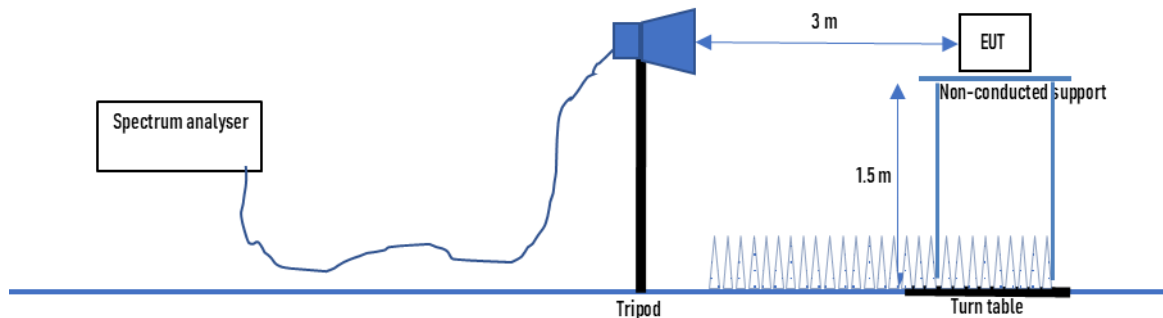
Test setup according ANSI C63.10.



Radiated emissions from the EUT are measured in the frequency range 1 GHz up to 18 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements.

4.5.3.2.4 Anechoic chamber (18 GHz – 40 GHz)

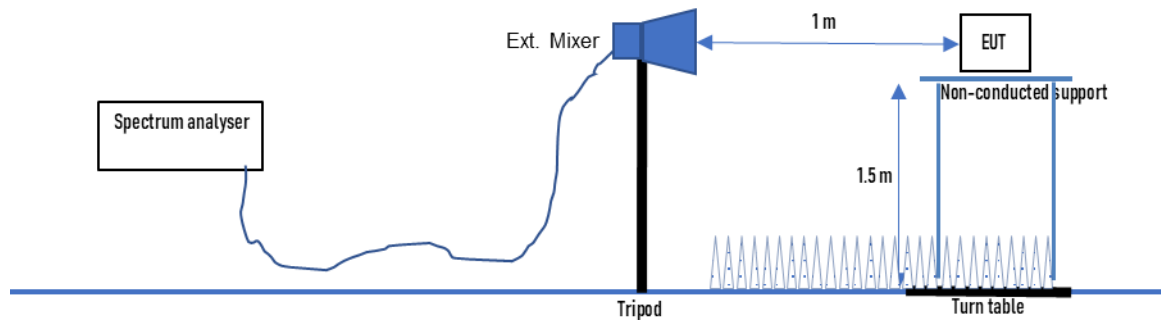
Test setup according ANSI C63.10.



Emissions from the EUT are measured in the frequency range 18 GHz up to 40 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limits are adopted.

4.5.3.2.5 Anechoic chamber (40 GHz – 200 GHz)

Test setup according ANSI C63.10.



Emissions from the EUT are measured in the frequency range 40 GHz up to 200 GHz as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and external mixer with standard gain horn. Table top equipment is placed on a non-conducting table, 1.5 metre above the ground plane. The turntable is fully covered with the appropriate absorber (Type VHP-12). Any controlling device is positioned such that it does not significantly influence the measurement results. Interconnecting cables that hang closer than 40 cm to the ground plane are folded back and forth in the center, forming a bundle 30 cm to 40 cm long. Measurements are made in three orientations of the EUT and the horizontal and vertical polarization planes of measurement antenna in a fully anechoic room. The measurement antenna is adjusted and the EUT orientated to permit the measurement of the maximum emission from the EUT. The conditions determined as worst-case will then be used for the final measurements. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty. The limits are adopted.

5 TEST CONDITIONS AND RESULTS

5.1 AC power line conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room SR2

5.1.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.1.3 Applicable standard

According to FCC Part 15, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the given limits.

According to RSS-Gen 8.8:

Unless stated otherwise in the applicable RSS, for radio apparatus that are designed to be connected to the public utility AC power network, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the range 150 kHz to 30 MHz shall not exceed the limits in table 4, as measured using a 50 μ H / 50 Ω line impedance stabilization network. This requirement applies for the radio frequency voltage measured between each power line and the ground terminal of each AC power-line mains cable of the EUT.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.10 described under item 6.2. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 33.4 dB at 20.7 MHz

Limit according to FCC Part 15, Section 15.207(a):

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

Limit according to RSS-Gen 8.8:

Frequency of Emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* The level decreases linearly with the logarithm of the frequency.

The requirements are **FULFILLED**.

Remarks: DC power supply: EA-PS 3032-10B

For detailed test result please refer to following test protocols.

5.1.6 Test protocol

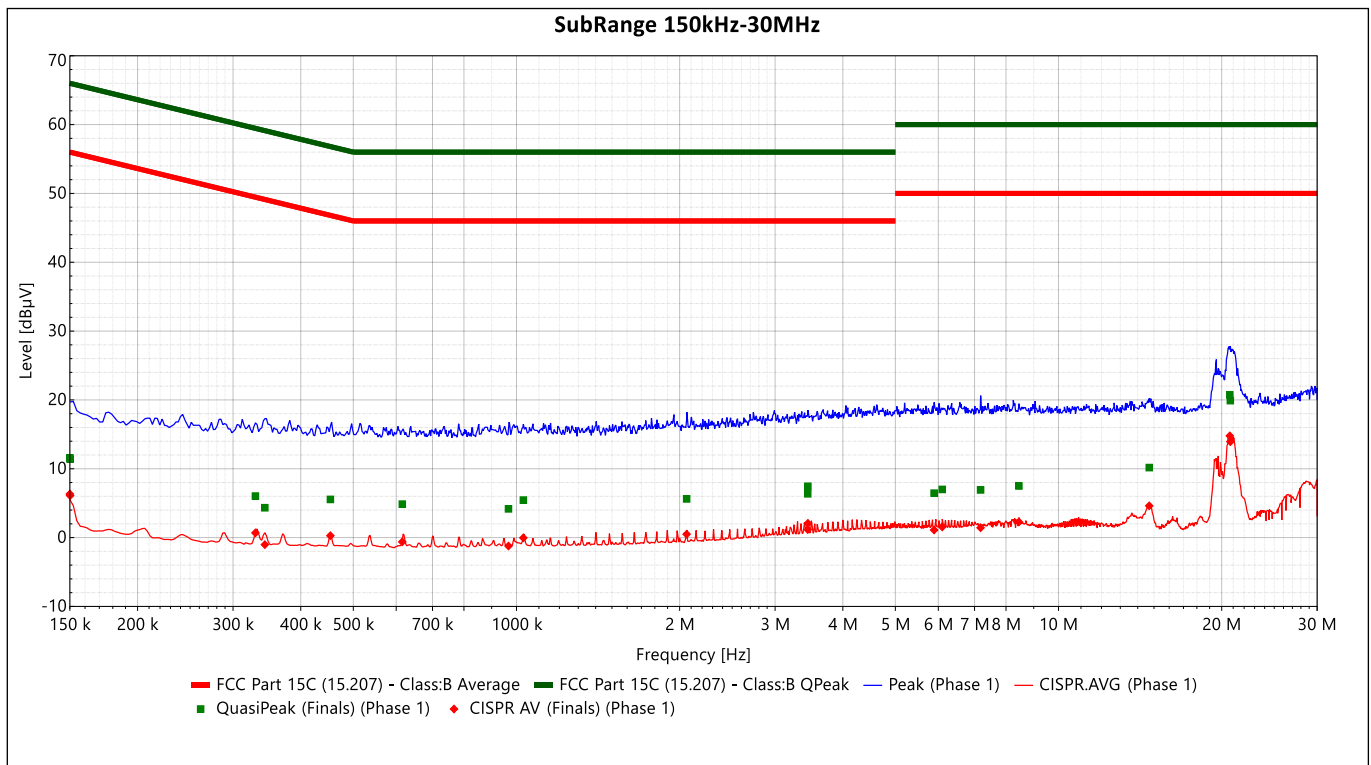
Operation mode 1 (ISM):

Position	Phase 1		
Limit	FCC Part 15C (15.207) / RSS-Gen 8.8	Class	-

Finals

Frequency (Hz)	QuasiPeak (dBμV)	QP Margin	QP Limit (dBμV)	CISPR AV (dBμV)	CISPR AV Margin	AV Limit (dBμV)	Correction (dB)
150.004 k	11.58	-54.42	66	6.33	-49.67	56	10.37
150.156 k	11.4	-54.6	66	6.1	-49.9	56	10.37
329.906 k	6.03	-53.42	59.45	0.69	-48.77	49.45	10.37
343.406 k	4.34	-54.78	59.12	-1.02	-50.14	49.12	10.37
453.656 k	5.55	-51.26	56.81	0.28	-46.53	46.81	10.39
615.656 k	4.86	-51.14	56	-0.62	-46.62	46	10.42
966.656 k	4.17	-51.83	56	-1.22	-47.22	46	10.46
1.03 M	5.45	-50.55	56	-0.03	-46.03	46	10.47
2.06 M	5.62	-50.38	56	0.49	-45.51	46	10.6
3.446 M	6.36	-49.64	56	1.16	-44.84	46	10.65
3.448 M	7.45	-48.55	56	2.07	-43.93	46	10.65
5.894 M	6.45	-53.55	60	1.11	-48.89	50	10.56
6.101 M	7	-53	60	1.55	-48.45	50	10.55
7.181 M	6.92	-53.08	60	1.43	-48.57	50	10.53
8.45 M	7.5	-52.5	60	2.27	-47.73	50	10.55
14.701 M	10.17	-49.83	60	4.62	-45.38	50	10.78
20.701 M	20.72	-39.28	60	14.78	-35.22	50	11.16
20.746 M	19.9	-40.1	60	13.93	-36.07	50	11.16

Graph

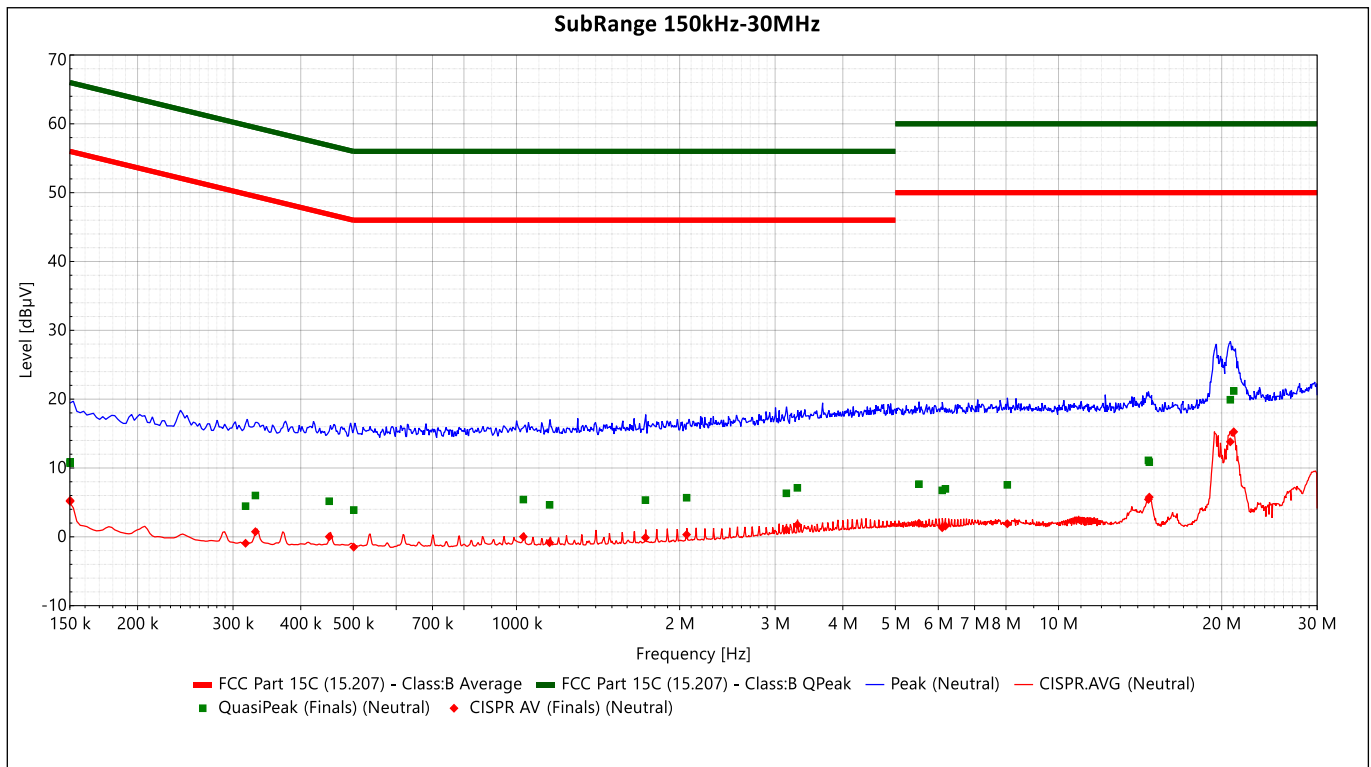


Position	Neutral		
Limit	FCC Part 15C (15.207) / RSS-Gen 8.8	Class	-

Finals

Frequency (Hz)	QuasiPeak (dBµV)	QP Margin	QP Limit (dBµV)	CISPR AV (dBµV)	CISPR AV Margin	AV Limit (dBµV)	Correction (dB)
150.156 k	10.69	-55.31	66	5.28	-50.72	56	10.37
150.156 k	10.88	-55.12	66	5.14	-50.86	56	10.37
316.406 k	4.45	-55.34	59.8	-0.94	-50.73	49.8	10.37
329.906 k	6	-53.45	59.45	0.74	-48.71	49.45	10.36
451.406 k	5.17	-51.68	56.85	0.01	-46.83	46.85	10.39
500.906 k	3.89	-52.11	56	-1.5	-47.5	46	10.39
1.03 M	5.41	-50.59	56	0.02	-45.98	46	10.48
1.151 M	4.65	-51.35	56	-0.85	-46.85	46	10.5
1.729 M	5.34	-50.66	56	-0.12	-46.12	46	10.58
2.06 M	5.68	-50.32	56	0.32	-45.68	46	10.61
3.147 M	6.32	-49.68	56	1.03	-44.97	46	10.67
3.298 M	7.12	-48.88	56	1.74	-44.26	46	10.67
5.527 M	7.65	-52.35	60	1.97	-48.03	50	10.61
6.101 M	6.75	-53.25	60	1.32	-48.68	50	10.6
6.184 M	6.96	-53.04	60	1.57	-48.43	50	10.6
8.045 M	7.55	-52.45	60	1.9	-48.1	50	10.62
14.649 M	11.11	-48.89	60	5.44	-44.56	50	11
14.703 M	10.85	-49.15	60	5.76	-44.24	50	11
20.746 M	19.91	-40.09	60	13.8	-36.2	50	11.43
21.048 M	21.19	-38.81	60	15.26	-34.74	50	11.45

Graph



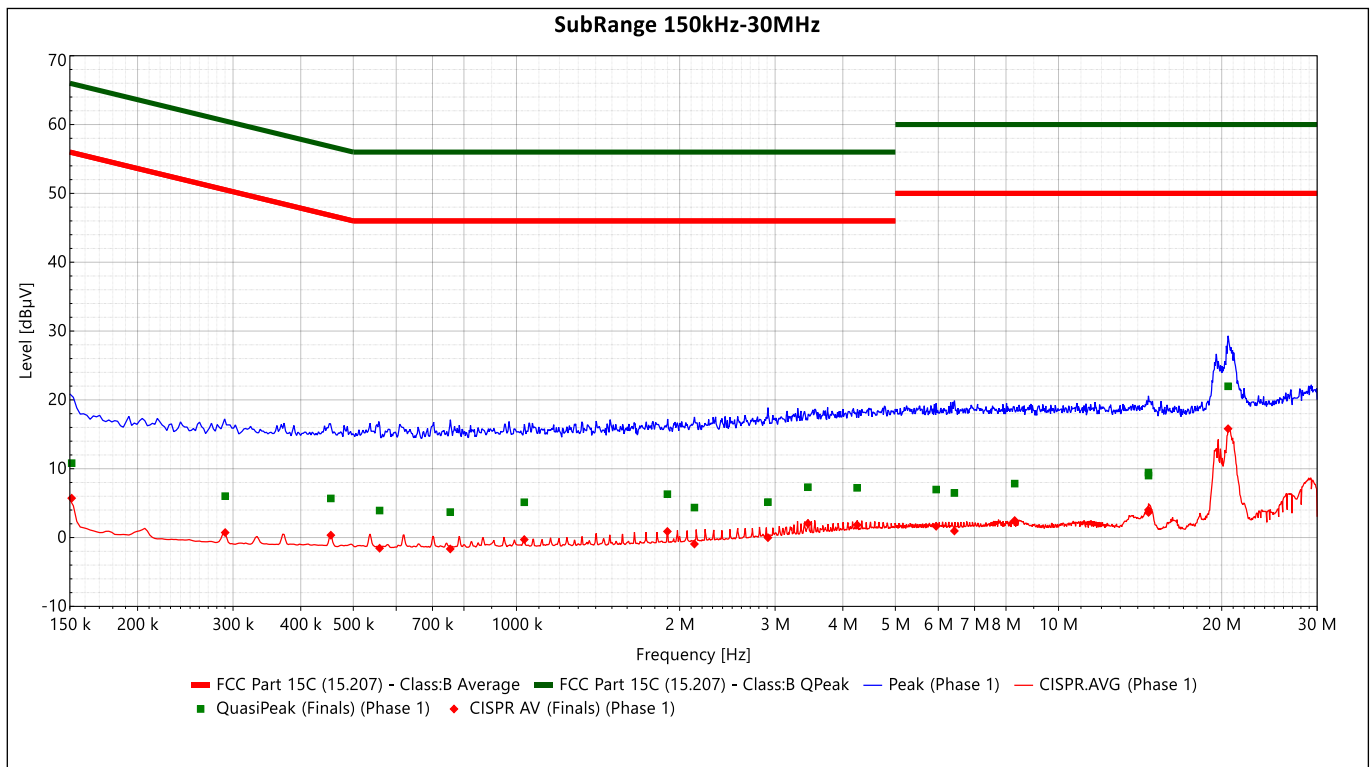
Operation mode 2:

Position	Phase 1		
Limit	FCC Part 15C (15.207) / RSS-Gen 8.8	Class	-

Finals

Frequency (Hz)	QuasiPeak (dBμV)	QP Margin	QP Limit (dBμV)	CISPR AV (dBμV)	CISPR AV Margin	AV Limit (dBμV)	Correction (dB)
151.161 k	10.81	-55.07	65.88	5.72	-50.16	55.88	10.37
290.151 k	6.01	-54.53	60.54	0.72	-49.82	50.54	10.36
454.56 k	5.68	-51.12	56.81	0.34	-46.46	46.81	10.39
559.131 k	3.93	-52.07	56	-1.55	-47.55	46	10.41
754.809 k	3.7	-52.3	56	-1.66	-47.66	46	10.43
1.034 M	5.13	-50.87	56	-0.29	-46.29	46	10.47
1.899 M	6.3	-49.7	56	0.89	-45.11	46	10.58
2.13 M	4.36	-51.64	56	-0.94	-46.94	46	10.61
2.91 M	5.15	-50.85	56	-0.02	-46.02	46	10.64
3.449 M	7.32	-48.68	56	2.05	-43.95	46	10.65
4.25 M	7.22	-48.78	56	1.84	-44.16	46	10.63
5.946 M	6.97	-53.03	60	1.64	-48.36	50	10.55
6.425 M	6.47	-53.53	60	0.96	-49.04	50	10.54
8.301 M	7.84	-52.16	60	2.47	-47.53	50	10.54
14.652 M	9.44	-50.56	60	4.01	-45.99	50	10.78
14.657 M	9	-51	60	3.65	-46.35	50	10.78
20.549 M	21.98	-38.02	60	15.81	-34.19	50	11.15

Graph

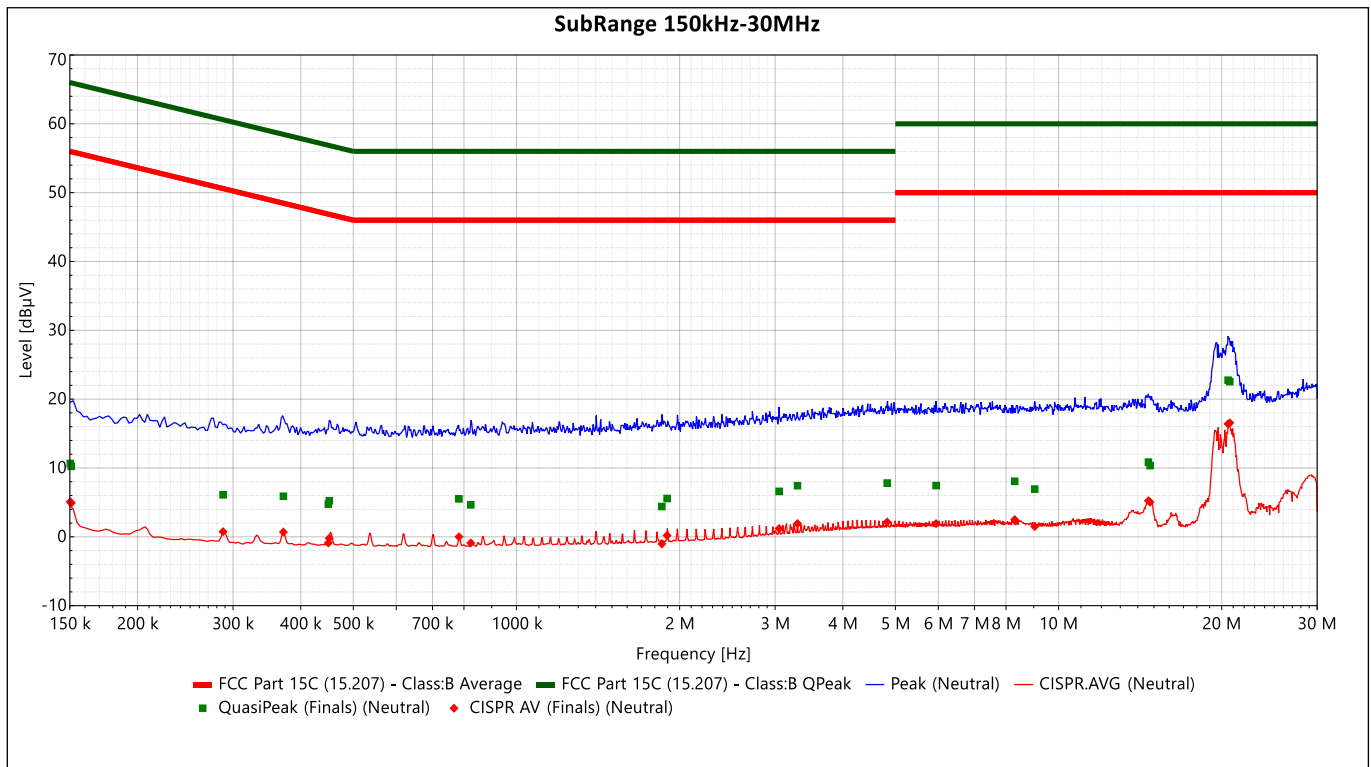


Position	Neutral		
Limit	FCC Part 15C (15.207) / RSS-Gen 8.8	Class	-

Finals

Frequency (Hz)	QuasiPeak (dBµV)	QP Margin	QP Limit (dBµV)	CISPR AV (dBµV)	CISPR AV Margin	AV Limit (dBµV)	Correction (dB)
150.25 k	10.66	-55.34	66	5.1	-50.9	56	10.37
150.85 k	10.24	-55.76	66	4.9	-51.1	56	10.37
287.517 k	6.11	-54.5	60.6	0.76	-49.85	50.6	10.37
371.578 k	5.89	-52.6	58.49	0.7	-47.79	48.49	10.37
449.669 k	4.74	-52.15	56.89	-0.89	-47.78	46.89	10.39
451.377 k	5.22	-51.62	56.85	-0.21	-47.06	46.85	10.39
783.313 k	5.52	-50.48	56	0.01	-45.99	46	10.44
823.669 k	4.65	-51.35	56	-0.89	-46.89	46	10.45
1.855 M	4.4	-51.6	56	-1.03	-47.03	46	10.59
1.896 M	5.57	-50.43	56	0.19	-45.81	46	10.59
3.051 M	6.6	-49.4	56	1.21	-44.79	46	10.66
3.3 M	7.43	-48.57	56	1.92	-44.08	46	10.67
4.829 M	7.81	-48.19	56	2.14	-43.86	46	10.63
5.944 M	7.45	-52.55	60	1.91	-48.09	50	10.6
8.301 M	8.06	-51.94	60	2.5	-47.5	50	10.63
9.038 M	6.93	-53.07	60	1.49	-48.51	50	10.66
14.65 M	10.85	-49.15	60	5.24	-44.76	50	11
14.753 M	10.35	-49.65	60	5.03	-44.97	50	11.01
20.549 M	22.75	-37.25	60	16.4	-33.6	50	11.42
20.701 M	22.54	-37.46	60	16.56	-33.44	50	11.43

Graph



5.2 OBW

For test instruments and accessories used see section 6 Part **MB**.

5.2.1 Description of the test location

Test location: Anechoic chamber FAR1
Test distance: 1 m

5.2.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.2.3 Applicable standard

According to General Measurement Guidance of TCB Workshop Part 15.255 Rules Amendment, October 25, 2023:
If applying under §15.255(c)(2)(ii) for operation over 57.0-61.56 GHz – Show that transmitter OBW is contained within 57.0-61.56 GHz band segment.

If applying under §15.255(c)(2)(v) for operation in the 61.0-61.5 GHz ISM band – Demonstrate that the transmitter occupied bandwidth (OBW) is wholly contained within the 61.0-61.5 GHz band.

According to RSS-Gen 6.7:

The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

5.2.4 Description of Measurement

According to ANSI C63.10 Clause 9.4:

The following procedure shall be used for measuring 99% power bandwidth: Use the following spectrum analyzer settings:

- 1) Span equal to approximately 1.5 times the OBW, centered on the carrier frequency
- 2) RBW, prefer 1% to 5% of OBW, or a minimum of 1 MHz if this is not possible due to a large OBW
- 3) VBW approximately $3 \times$ RBW
- 4) Set the reference level of the instrument as required to reduce the chance of the signal amplitude exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.1.6.
- 5) Sweep = No faster than coupled (auto) time.
- 6) Detector function = peak.
- 7) Trace = max-hold.

Spectrum analyser settings for OBW:

RBW: 5 MHz,	VBW: 20 MHz,	Detector: Max peak,	Sweep time: auto,	Span: 750 MHz	(Mode 1)
RBW: 28 MHz,	VBW: 80 MHz,	Detector: Max peak,	Sweep time: auto,	Span: 3 GHz	(Mode 2)

5.2.5 Test result

99% bandwidth					
Operation mode	Frequency band	Centre frequency	T ₁	T ₂	Measured OBW
(#)	(GHz)	(GHz)	(GHz)	(GHz)	(GHz)
1	60 - 61.5	61.246	61.007	61.486	0.479
2	57 - 61.56	60.504	59.465935	61.5422100	2.076

Limit according to General Measurement Guidance of TCB Workshop Part 15.255 Rules Amendment, October 25, 2023:

Frequency band
$\geq 57 - \leq 61.56$ GHz
$\geq 61 - \leq 61.5$ GHz

The requirements are **FULFILLED**.

Remarks: For detailed test results please refer to following test protocols.

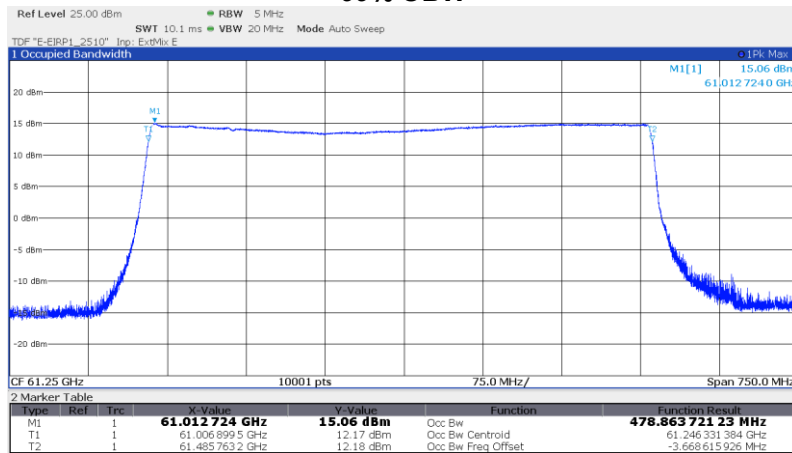
Mode 1: The OBW is contained within the 61-61.5 GHz ISM band.

Mode 2: The OBW is contained within the 57-61.56 GHz band segment.

5.2.6 Test protocols

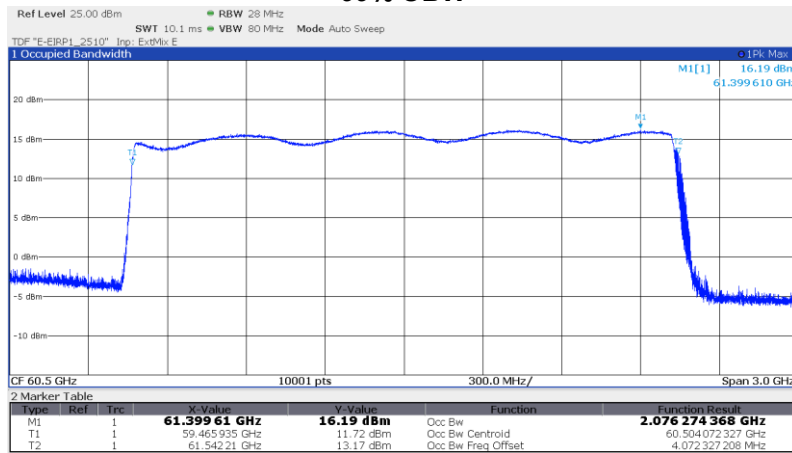
Mode 1:

99% OBW



Mode 2:

99% OBW



5.3 EIRP and transmitter off-times

For test instruments and accessories used see section 6 Part **CPR 3, DC**.

5.3.1 Description of the test location

Test location: Anechoic chamber FAR1
Test distance: 1 m

5.3.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.3.3 Applicable standard

According to FCC Part 15C, Section 15.255(c)(2)(ii):

57.0-61.56 GHz: The peak EIRP shall not exceed 3 dBm except that the peak EIRP shall not exceed 20 dBm if the sum of continuous transmitter off-times of at least two milliseconds equals at least 16.5 milliseconds within any contiguous interval of 33 milliseconds;

According to FCC Part 15C, Section 15.255(c)(2)(v):

61.0-61.5 GHz: For field disturbance sensors/radars that occupy 500 MHz bandwidth or less that are contained wholly within the frequency band 61.0-61.5 GHz, the average power of any emission, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0-61.5 GHz band, measured during the transmit interval, but still within the 57-71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.

According to RSS-210 J.3.2.a:

FDS devices that occupy a bandwidth of 500 MHz or less and where this bandwidth is contained wholly within the frequency band 61.0-61.5 GHz shall comply with the following limits: the equipment shall not exceed 40 dBm average e.i.r.p. and 43 dBm peak e.i.r.p. in the 61.0-61.5 GHz band. In addition, the average and peak e.i.r.p. of any emission outside of the band 61.0-61.5 GHz, but still within the band 57-71 GHz, shall not exceed 10 dBm average e.i.r.p. and 13 dBm peak e.i.r.p.

According to RSS-210 J.3.2.b.ii:

FDS devices operating in the 57.0-61.56 GHz band shall have the peak e.i.r.p. not exceeding 3 dBm or, if the sum of continuous transmitter off-times of at least 2 ms equals at least 16.5 ms within any contiguous interval of 33 ms, the peak e.i.r.p. shall not exceed 20 dBm.

According to KDB 364244 D01, section 3:

If the radar device is to be certified under multiple rule parts, data must be provided demonstrating compliance with the corresponding rule requirements. Note that it is permissible to switch between frequency ranges in successive 33ms frames (e.g., operation in the 57-61.56 GHz band under applicable parameters in the first 33 ms frame, followed by operation in the 57-64 GHz band under applicable parameters in the second 33 ms frame, etc.).

5.3.4 Description of Measurement

The radiated emission of the fundamental wave from the EUT is measured using a spectrum analyser and appropriate linear polarized antennas. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.10, Item 9.8. The EUT is measured in TX modulated (FMCW) under normal conditions following the procedures in 4.1.5.2.8 and Annex L.

Analyser settings:

RBW: 30 MHz VBW: 80 MHz Detector: PK Trace. Max hold

5.3.5 Test result

The peak power results are corrected by the FMCW desensitization factor:

$$\alpha = \frac{1}{\left(1 + \left[\left(\frac{2 \times \ln(2)}{\pi}\right)^2 \times \left(\frac{BW_{\text{Chirp}}}{T_{\text{Chirp}} \times RBW^2}\right)^2\right]\right)^{0.25}} \quad (\text{L.1})$$

where

α is the reduction in amplitude
 BW_{Chirp} is the FMCW Chirp Bandwidth
 T_{Chirp} is the FMCW Chirp Time
 B is the 3 dB IF Bandwidth = RBW

FMCW desensitization factor = $20 \cdot \log(\alpha)$

Operating frequency range (GHz)	BW_{Chirp} (GHz)	T_{chirp} (ms)	B (MHz)	α	FMCW desensitization factor (dB)
61.0 - 61.5	0.479	0.013	30	0.999918	-0.000709
59.44 - 61.56	2.076	0.053	30	0.999908	-0.000801

Note: Due to FMCW desensitization the RBW was adjusted to 30 MHz instead of suggested 1 MHz (according to KDB 364244) to measure the true peak.

Measured EIRP:

Operating frequency range (GHz)	Level PK (dBm)	Desensitiz. factor (dB)	True PK level (dBm)	Limit PK (dBm)	Margin PK (dB)	Level AV (dBm)	Limit AV (dBm)	Margin AV (dB)
61.0 - 61.5	16.1	0.0	16.1	43.0	-26.9	-	40.0	-23.9
59.44 - 61.56	16.2	0.0	16.2	20.0	-3.8	-	N/A	-

Note: 61 - 61.5 GHz range: PK result already below AV limit, thus no AV measurement performed.

Transmitter off-times (only applicable for Mode 2, operating frequency range 59.44 – 61.56 GHz):

Observation interval (ms)	Sum of transmitter on-times (ms)	Sum of transmitter off-times (ms)	Limit transmitter off-times (ms)
33	15.9	17.1	≥16.5

Note to requirement according to KDB 364244, section 3: In principle, it should be possible to switch between ISM bands and non-ISM bands. The off-time requirements of at least 16.5 ms per 33 ms are met in each case. The operating modes are therefore always compliant.

EIRP limit according to FCC Part 15C, Section 15.255(c)(2)(ii):

The peak EIRP shall not exceed 3 dBm except that the peak EIRP shall not exceed 20 dBm if the sum of continuous transmitter off-times of at least two milliseconds equals at least 16.5 milliseconds within any contiguous interval of 33 milliseconds

EIRP limit according to FCC Part 15C, Section 15.255(c)(2)(v):

The average power of any emission in the 61-61.5 GHz band, measured during the transmit interval, shall not exceed 40 dBm, and the peak power of any emission shall not exceed 43 dBm. In addition, the average power of any emission outside of the 61.0-61.5 GHz band, measured during the transmit interval, but still within the 57-71 GHz band, shall not exceed 10 dBm, and the peak power of any emission shall not exceed 13 dBm.

EIRP limit according to RSS-210 J.3.2.a:

The equipment shall not exceed 40 dBm average e.i.r.p. and 43 dBm peak e.i.r.p. in the 61.0-61.5 GHz band. In addition, the average and peak e.i.r.p. of any emission outside of the band 61.0-61.5 GHz, but still within the band 57-71 GHz, shall not exceed 10 dBm average e.i.r.p. and 13 dBm peak e.i.r.p.

EIRP limit according to RSS-210 J.3.2.b.ii:

FDS devices operating in the 57.0-61.56 GHz band shall have the peak e.i.r.p. not exceeding 3 dBm or, if the sum of continuous transmitter off-times of at least 2 ms equals at least 16.5 ms within any contiguous interval of 33 ms, the peak e.i.r.p. shall not exceed 20 dBm.

The requirements are **FULFILLED**.

Remarks: For detailed test results please refer to following test protocols.

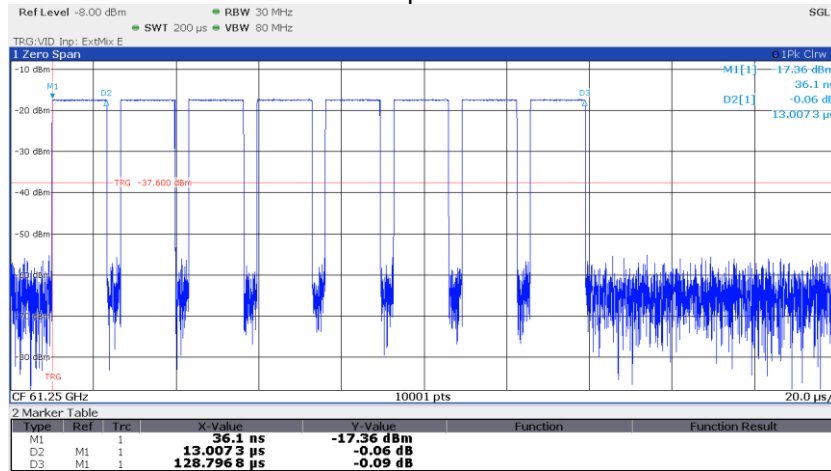
Peak EIRP: For test instruments and accessories used see section 6 Part **CPR 3**.

Chirp time and transmitter off-times: For test instruments and accessories used see section 6
Part **DC**.

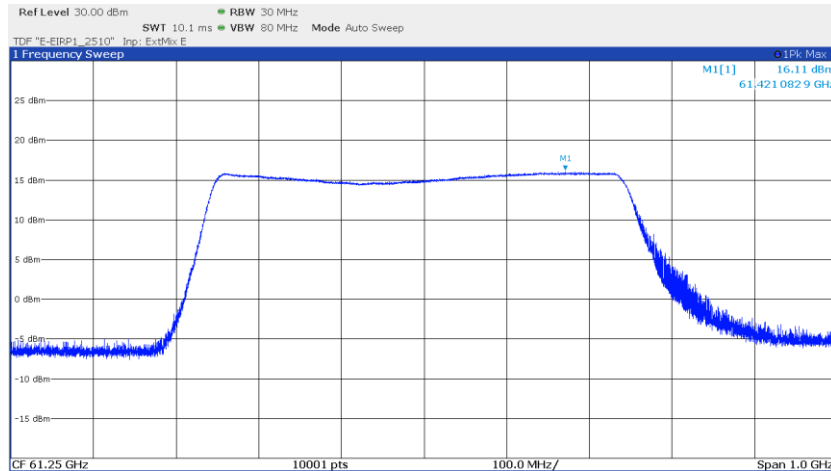
5.3.6 Test protocols

Mode 1:

Chirp time:

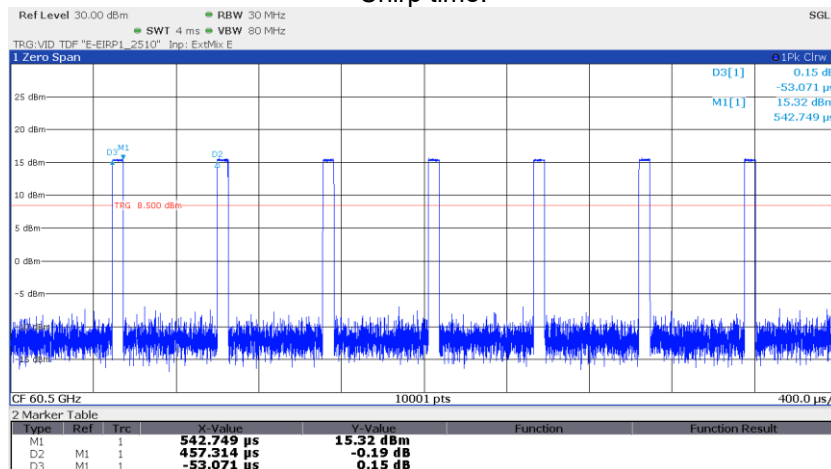


Peak EIRP:



Mode 2:

Chirp time:



5.4 Spurious emissions

For test instruments and accessories used see section 6 Part **SER1, SER 2, SER 3.**

5.4.1 Description of the test location

Test location: Anechoic chamber SAC2
Test distance: 3 m

Test location: Anechoic chamber FAR1
Test distance: 3 m (1 GHz – 18 GHz)
Test distance: 2 m (18 GHz – 40 GHz)
Test distance: 1 m (40 GHz – 200 GHz)

5.4.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.4.3 Applicable standard

According to FCC Part 15C, Section 15.255 (d):

- (1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
- (2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.
- (3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 meters.
- (4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

According to RSS-210 J.4:

The power of any emissions outside the band 57-71 GHz shall consist solely of spurious emissions and shall not exceed:

- a) the fundamental emission levels
- b) the general field strength limits specified in RSS-Gen for emissions below 40 GHz
- c) 90 pW/cm² at a distance of 3 m for emissions between 40 GHz and 200 GHz

5.4.4 Description of Measurement

The radiated emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The setup of the EUT and the measurement procedure is in accordance to ANSI C63.10, Item 9.10 and 9.11. In the frequency range above 1 GHz a spectrum analyser is used with appropriate linear polarized antennas. If the emission level in peak mode complies with the average limit testing is stopped and peak values will be reported, otherwise, the emission is measured in average mode again and reported. The EUT is measured in TX continuous mode under normal conditions.

Instrument settings:

9 kHz – 150 kHz:	RBW: 200 Hz,	Detector: Quasi peak, Mes. Time: 1 s,
150 kHz – 30 MHz:	RBW: 9 kHz,	Detector: Quasi peak, Mes. Time: 1 s,
30 MHz – 1 GHz:	RBW: 120 MHz,	Detector: Quasi peak, Mes. Time: 1 s,
1 GHz – 40 GHz:	RBW: 1 MHz,VBW: 3 MHz,	Detector: Max. peak, Trace: Max. hold, Sweep: Auto
40 GHz – 200 GHz:	RBW: 1 MHz,VBW: 3 MHz,	Detector: RMS, Trace: Max. hold, Sweep: 1 s

5.4.5 Test result $f < 1 \text{ GHz}$

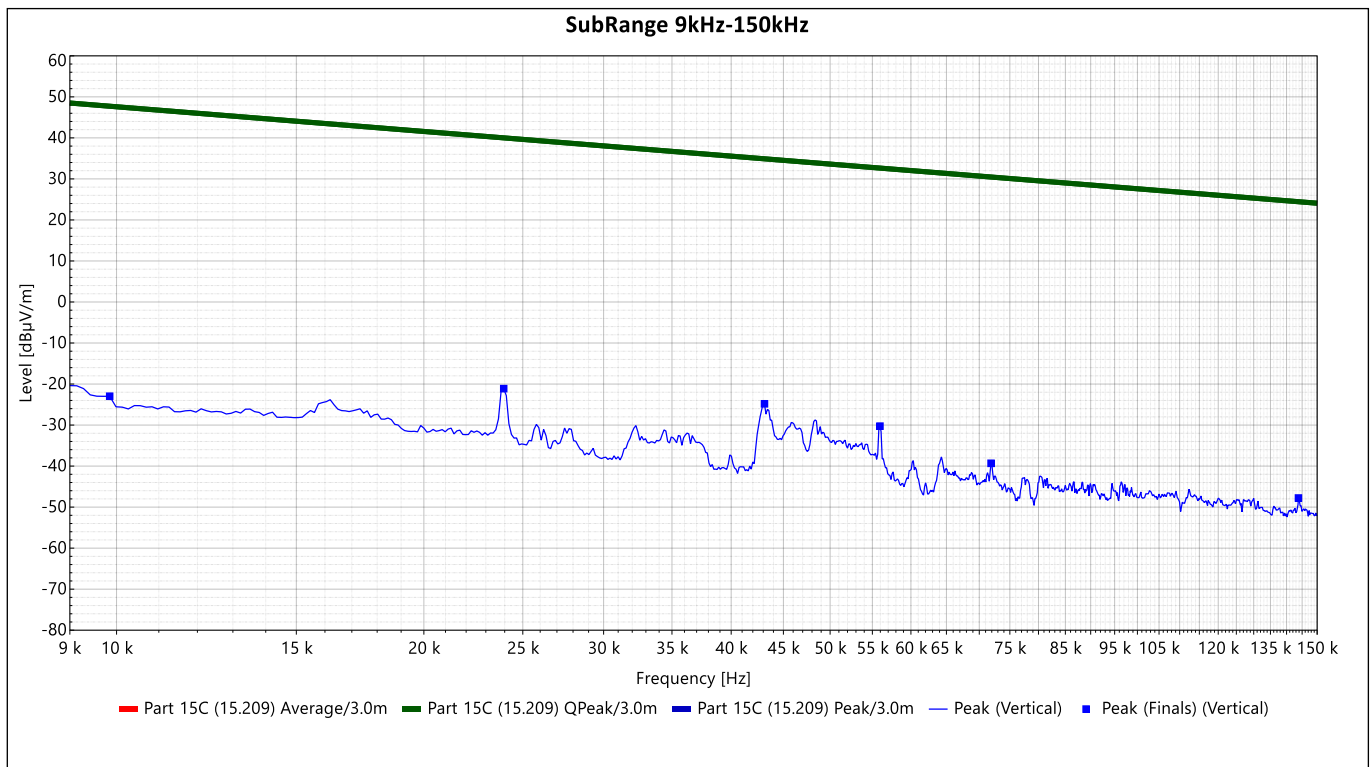
Mode 1:

Position	Vertical			
Limit	Part 15C (15.209) / RSS-Gen 8.9		Class	-

Finals

Frequency (Hz)	Peak (dB μ V/m)	angle	polarisation	RBW (Hz)	Correction (dB)
9.846 k	-22.98	124	Vertical	200	-59.79
23.946 k	-21.12	0	Vertical	200	-59.27
43.122 k	-24.82	128	Vertical	200	-59.3
55.953 k	-30.27	359	Vertical	200	-59.44
71.886 k	-39.32	1	Vertical	200	-59.42
143.796 k	-47.78	105	Vertical	200	-59.56

Graph

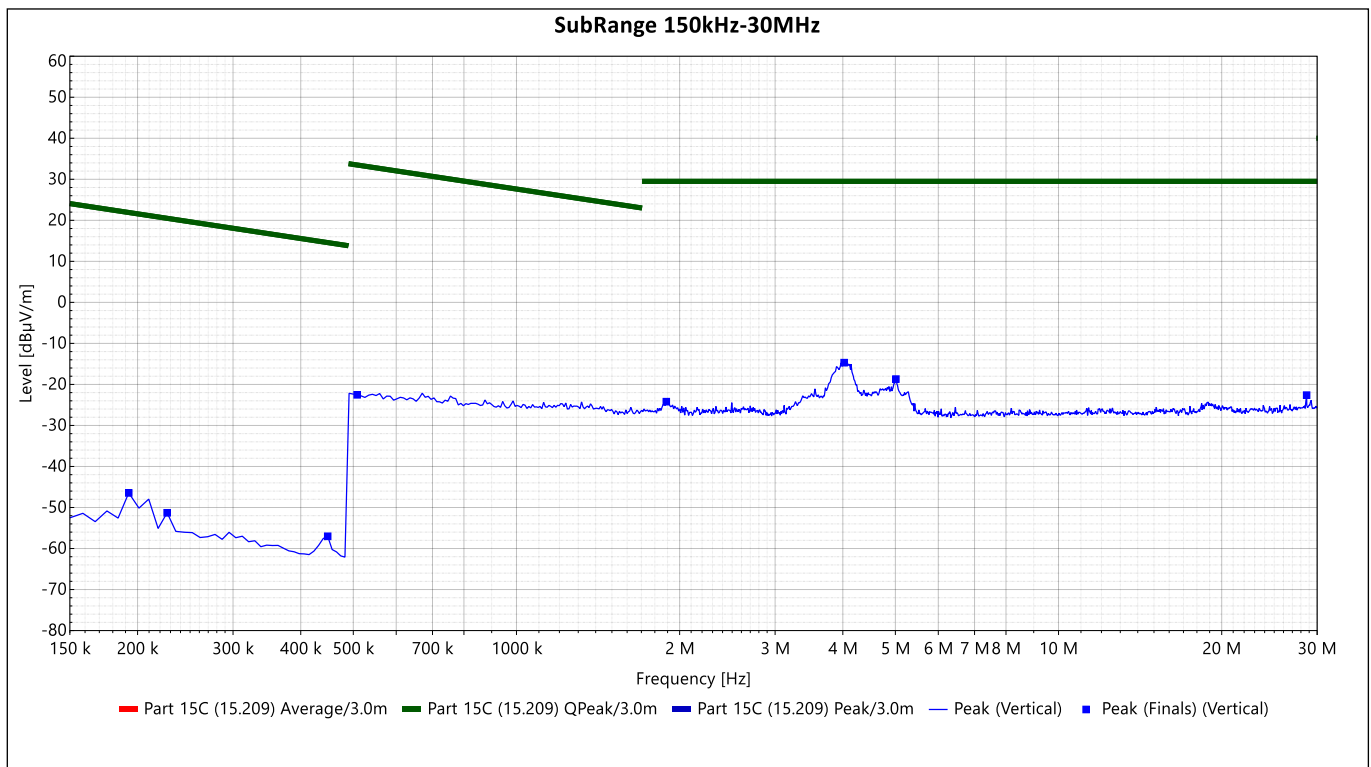


Position	Vertical		
Limit	Part 15C (15.209) / RSS-Gen 8.9	Class	-

Finals

Frequency (Hz)	Peak (dBµV/m)	angle	polarisation	RBW (Hz)	Correction (dB)
192.643 k	-46.45	2	Vertical	200	-59.55
226.757 k	-51.3	359	Vertical	200	-59.54
448.5 k	-57.02	306	Vertical	200	-59.55
508.2 k	-22.53	119	Vertical	200	-19.57
1.89 M	-24.21	262	Vertical	200	-19.61
4.022 M	-14.7	106	Vertical	200	-19.63
5.011 M	-18.7	234	Vertical	200	-19.64
28.687 M	-22.61	246	Vertical	200	-18.38

Graph

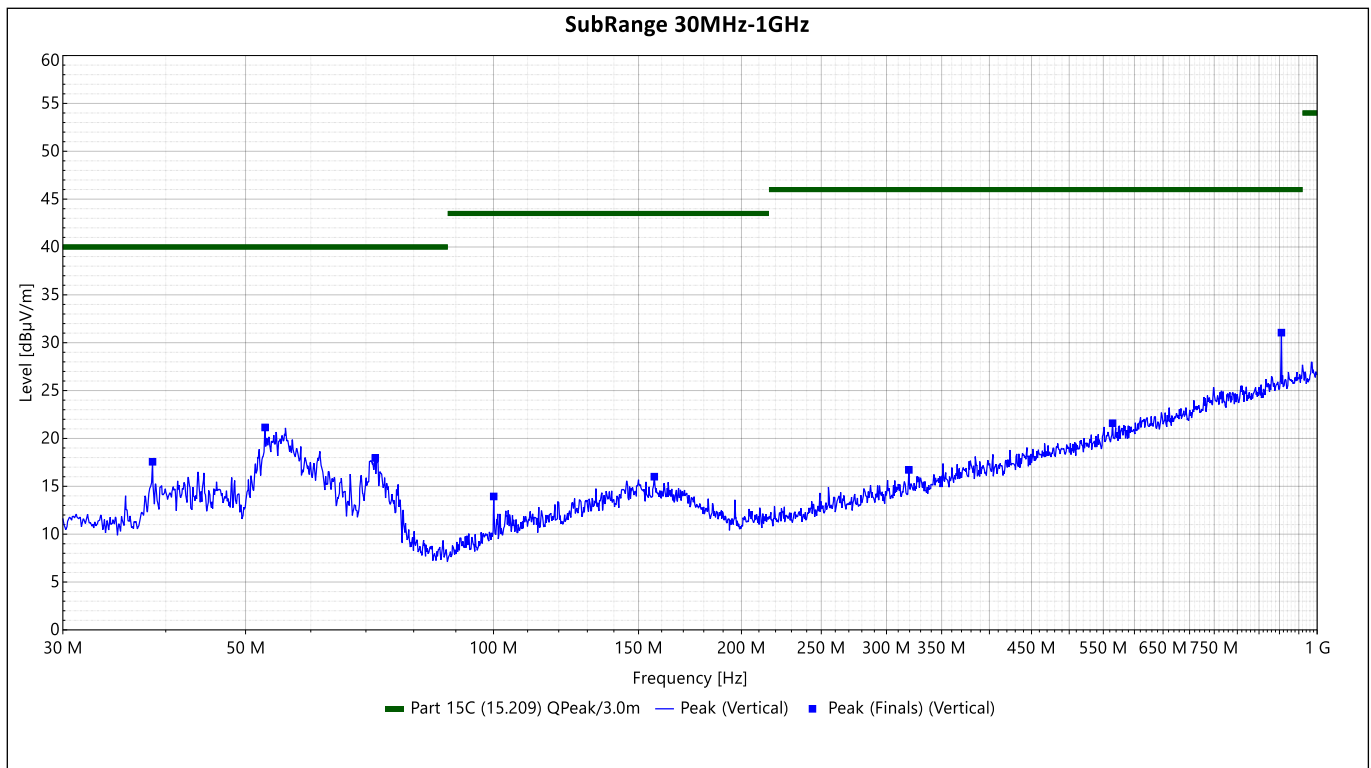


Position	Vertical		
Limit	FCC Part 15C (15.209) / RSS-Gen 8.9	Class	-

Finals

Frequency (Hz)	Peak (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
38.55 M	17.56	359	Vertical	1	120000	-10.63
52.8 M	21.15	0	Vertical	1.5	120000	-9.73
71.85 M	17.96	359	Vertical	1	120000	-13.07
100.05 M	13.94	190	Vertical	2.5	120000	-14.72
156.75 M	16	0	Vertical	1.5	120000	-9.3
319.35 M	16.72	155	Vertical	4	120000	-7.88
564.45 M	21.59	105	Vertical	2.5	120000	-1.92
904.95 M	31.05	280	Vertical	1	120000	3.67

Graph

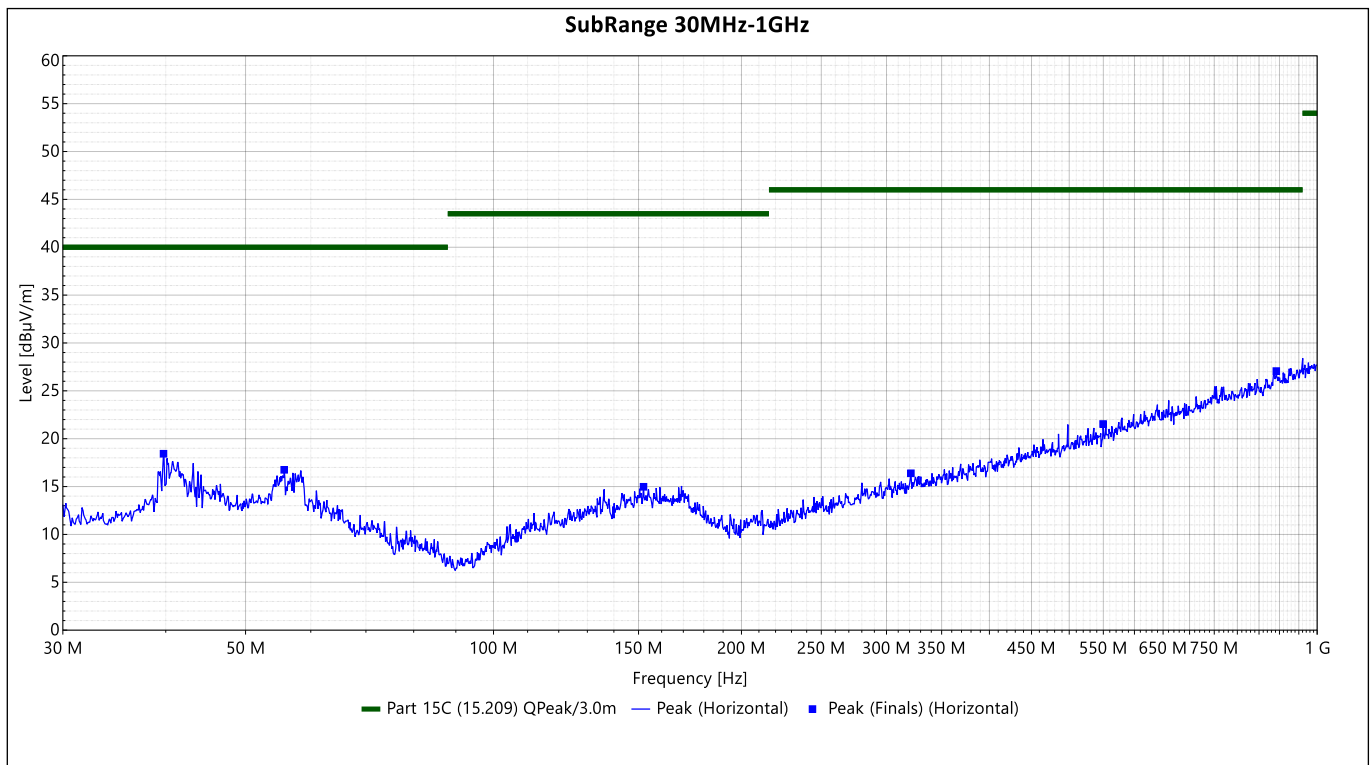


Position	Horizontal		
Limit	FCC Part 15C (15.209) / RSS-Gen 8.9	Class	-

Finals

Frequency (Hz)	Peak (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
39.75 M	18.43	0	Horizontal	1.5	120000	-10.36
55.7 M	16.75	4	Horizontal	3.5	120000	-9.96
152.1 M	14.98	160	Horizontal	1.5	120000	-9.39
321.2 M	16.39	54	Horizontal	1	120000	-7.8
549.65 M	21.53	238	Horizontal	1	120000	-2.55
892.05 M	27.06	126	Horizontal	1	120000	3.97

Graph



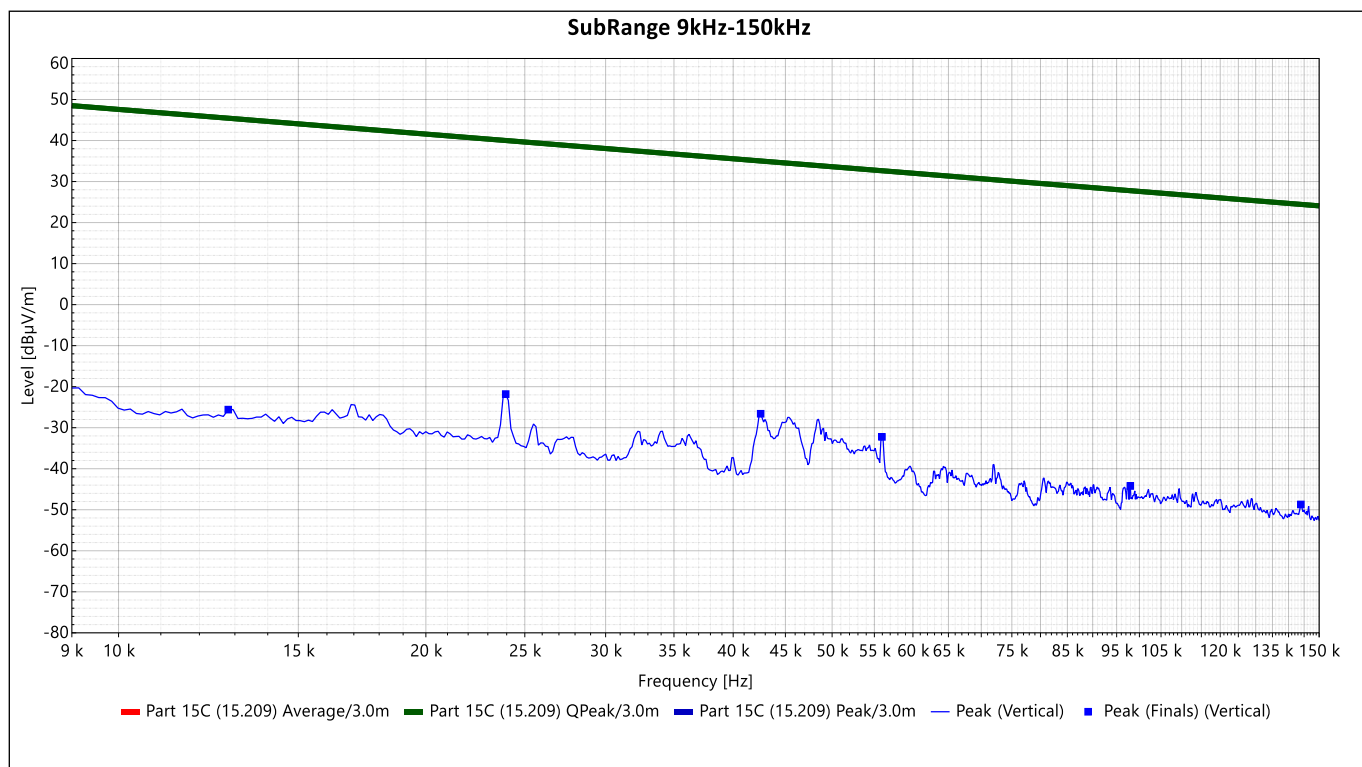
Mode 2:

Position	Vertical			
Limit	FCC Part 15C (15.209) / RSS-Gen 8.9		Class	-

Finals

Frequency (Hz)	Peak (dBμV/m)	angle	polarisation	RBW (Hz)	Correction (dB)
12.807 k	-25.59	172	Vertical	200	-59.59
23.946 k	-21.81	0	Vertical	200	-59.27
42.558 k	-26.6	344	Vertical	200	-59.29
55.953 k	-32.24	359	Vertical	200	-59.44
97.971 k	-44.2	68	Vertical	200	-59.43
143.937 k	-48.71	344	Vertical	200	-59.56

Graph

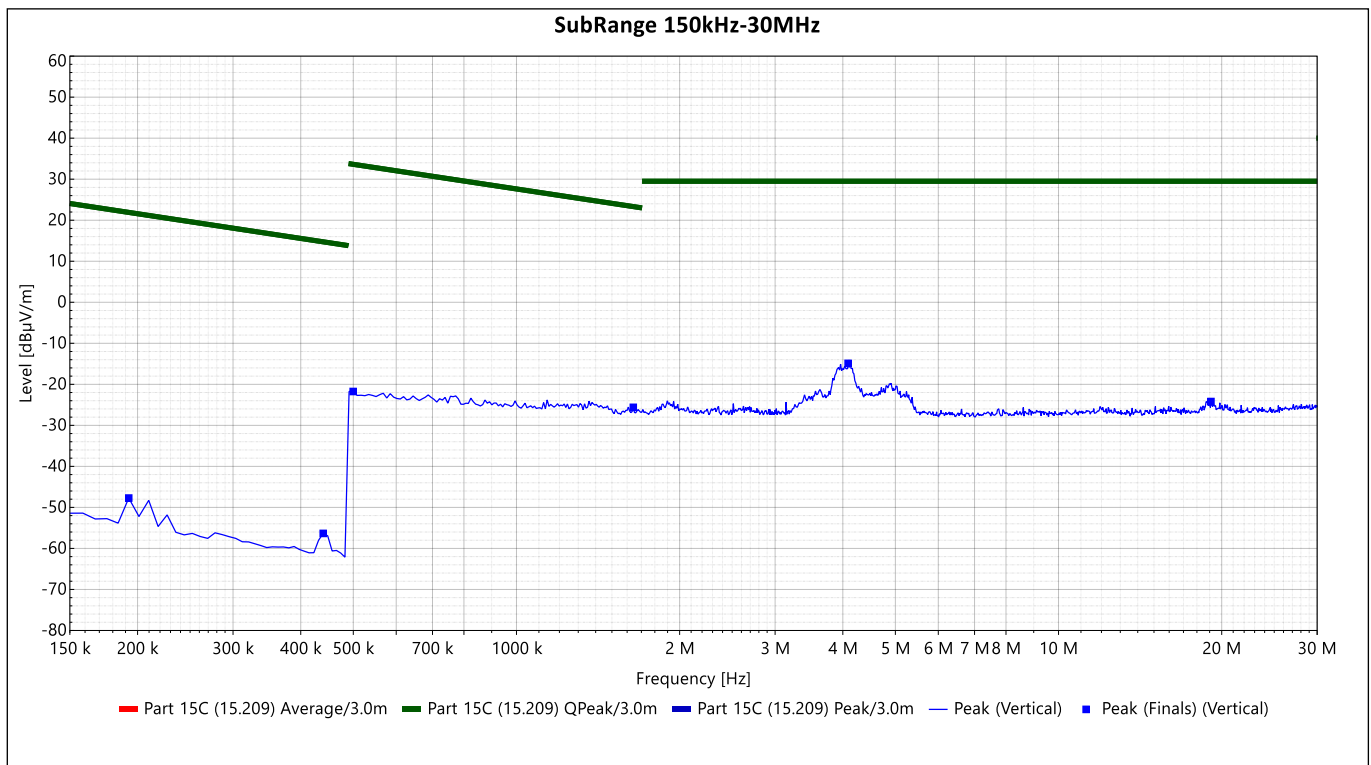


Position	Vertical			
Limit	FCC Part 15C (15.209) / RSS-Gen 8.9		Class	-

Finals

Frequency (Hz)	Peak (dBµV/m)	angle	polarisation	RBW (Hz)	Correction (dB)
192.643 k	-47.72	0	Vertical	200	-59.55
439.971 k	-56.34	13	Vertical	200	-59.55
499.671 k	-21.75	28	Vertical	200	-19.57
1.643 M	-25.61	283	Vertical	200	-19.62
4.09 M	-14.89	190	Vertical	200	-19.65
19.109 M	-24.2	330	Vertical	200	-19.25

Graph

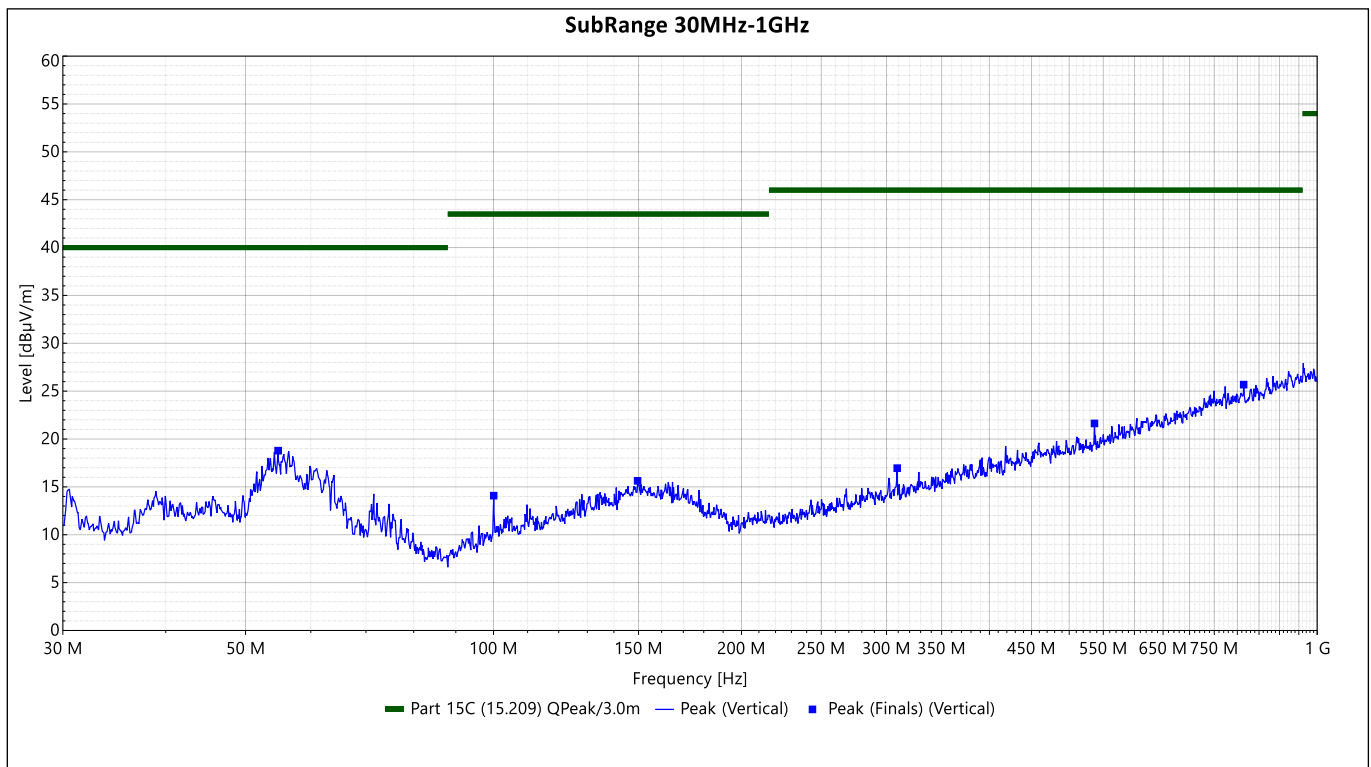


Position	Vertical		
Limit	FCC Part 15C (15.209) / RSS-Gen 8.9	Class	

Finals

Frequency (Hz)	Peak (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
54.75 M	18.78	0	Vertical	2.5	120000	-9.93
100.05 M	14.08	359	Vertical	2.5	120000	-14.72
149.6 M	15.63	0	Vertical	2.5	120000	-9.5
309.1 M	16.96	152	Vertical	1.5	120000	-8.18
536.6 M	21.63	16	Vertical	1	120000	-2.68
814.25 M	25.68	163	Vertical	2.5	120000	2.41

Graph

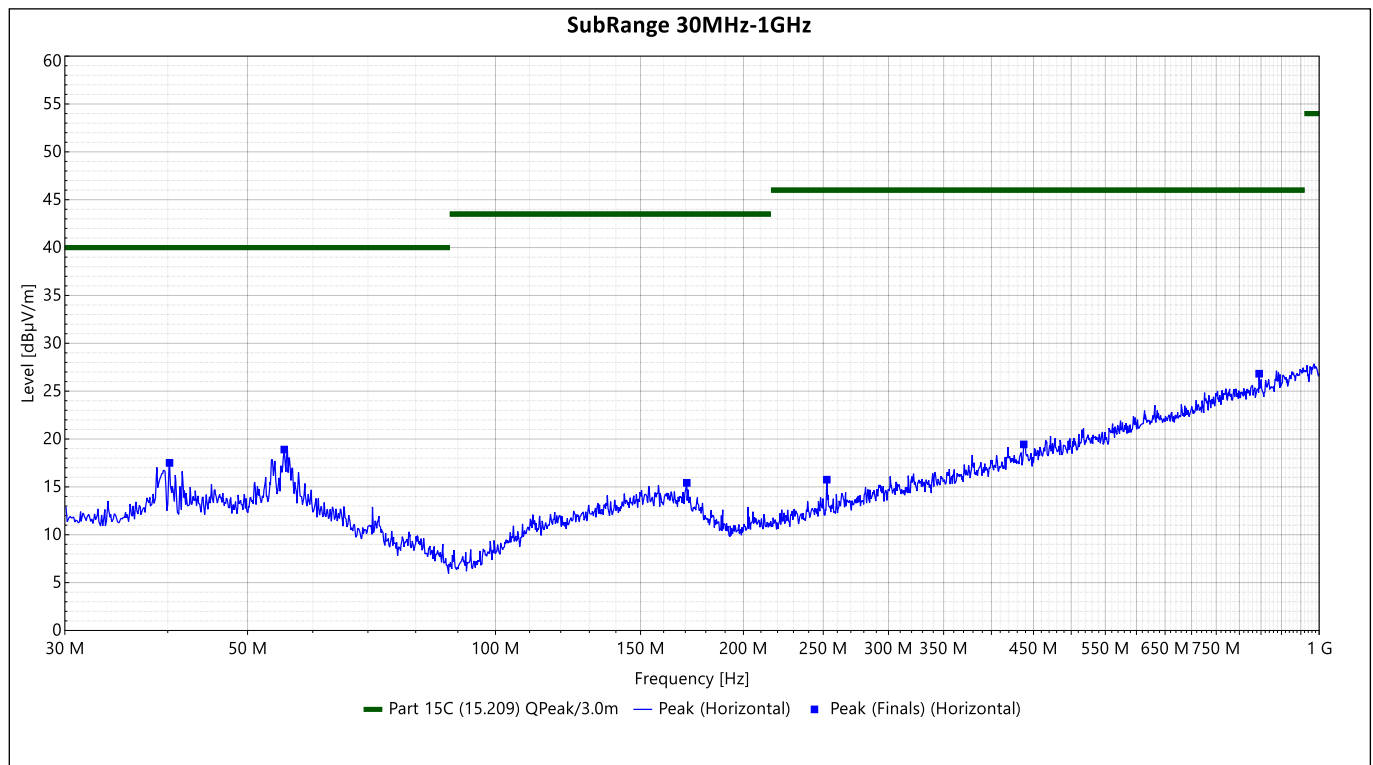


Position	Horizontal		
Limit	FCC Part 15C (15.209) / RSS-Gen 8.9	Class	

Finals

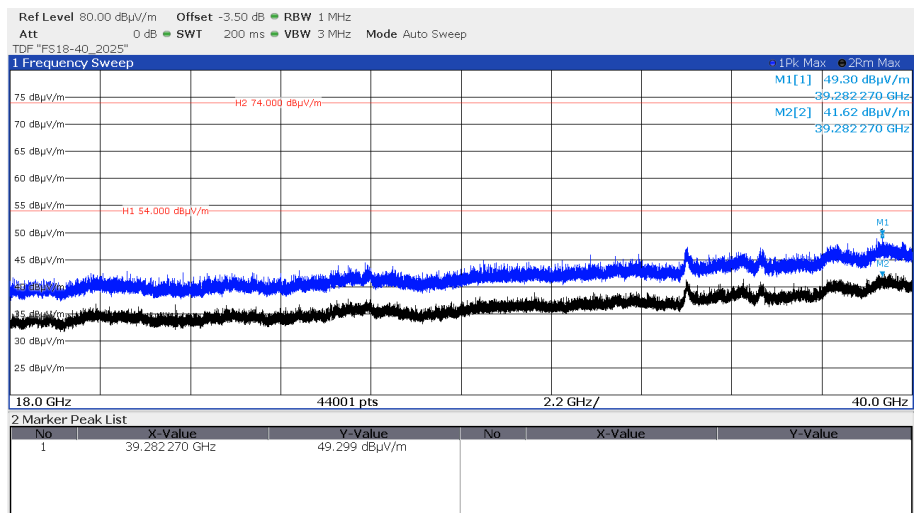
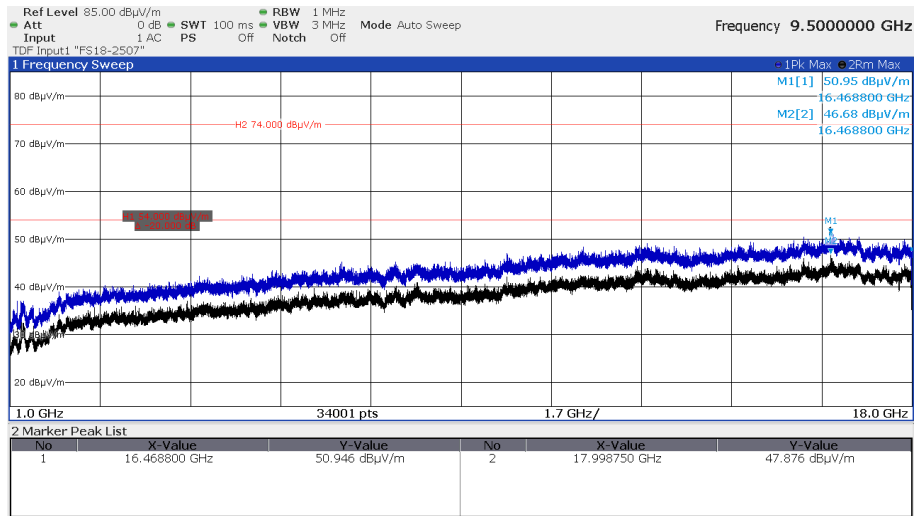
Frequency (Hz)	Peak (dBµV/m)	angle	polarisation	Height	RBW (Hz)	Correction (dB)
40.2 M	17.5	8	Horizontal	3.5	120000	-10.28
55.4 M	18.9	3	Horizontal	3.5	120000	-9.96
170.7 M	15.41	202	Horizontal	3.5	120000	-9.64
252.5 M	15.75	0	Horizontal	2	120000	-10.28
437.85 M	19.44	267	Horizontal	1	120000	-4.69
845.45 M	26.82	9	Horizontal	2	120000	3.11

Graph

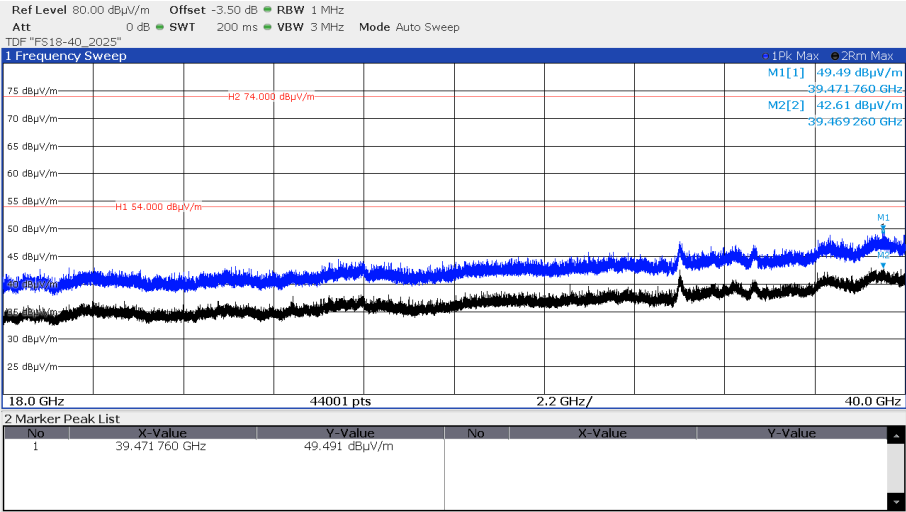
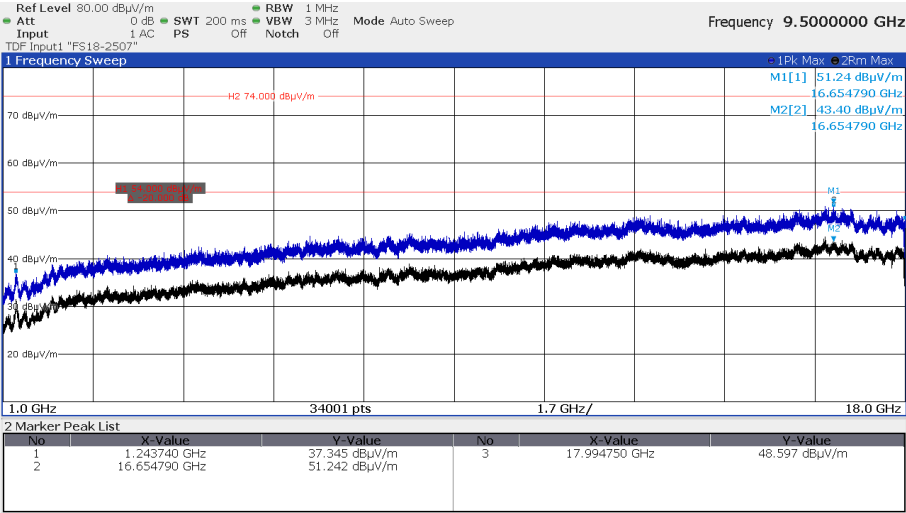


5.4.6 Test result 1 GHz < f < 40 GHz

Mode 1:



Mode 2:



5.4.7 Test result f > 40 GHz

Determination of the EIRP emission limit for f > 40 GHz:

For calculation of the limit the Friis formula is used.

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

$P_{out} * G = \text{EIRP}$;
Therefore

$$\text{EIRP} = P_d * 4 * \pi * r^2$$

$$\text{EIRP} = -9.9 \text{ dBm}$$

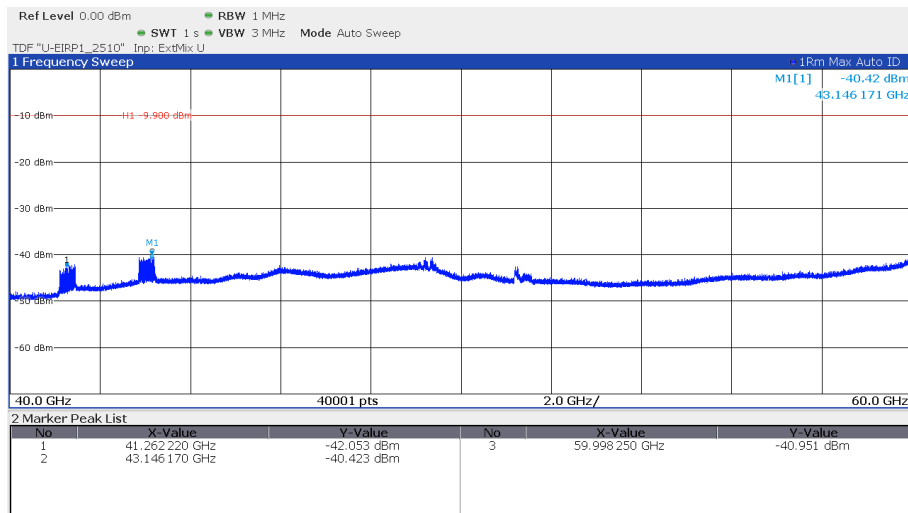
where

r is the measurement distance (3 m)

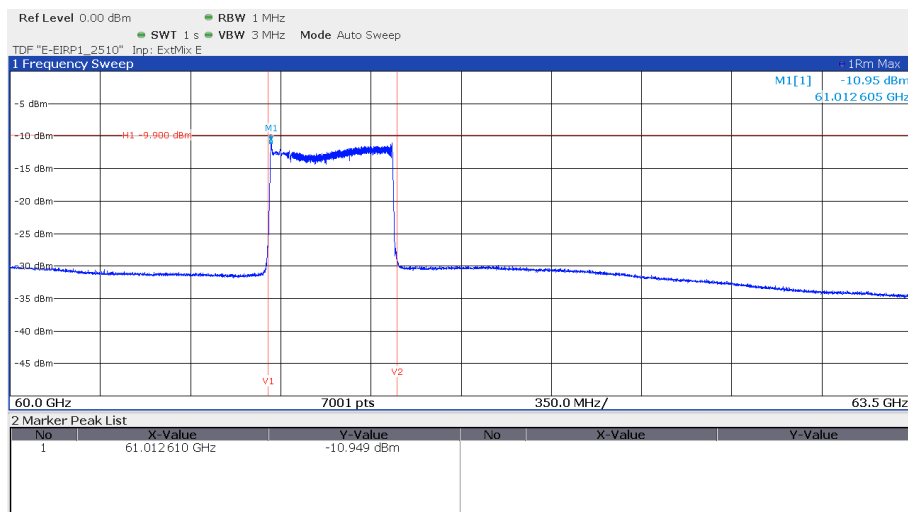
P_d is the emission density (90 pW/cm²)

Note: According to ANSI C63.10 4.1.5.2.8 and Annex L there is no FMCW desensitization for average detection.

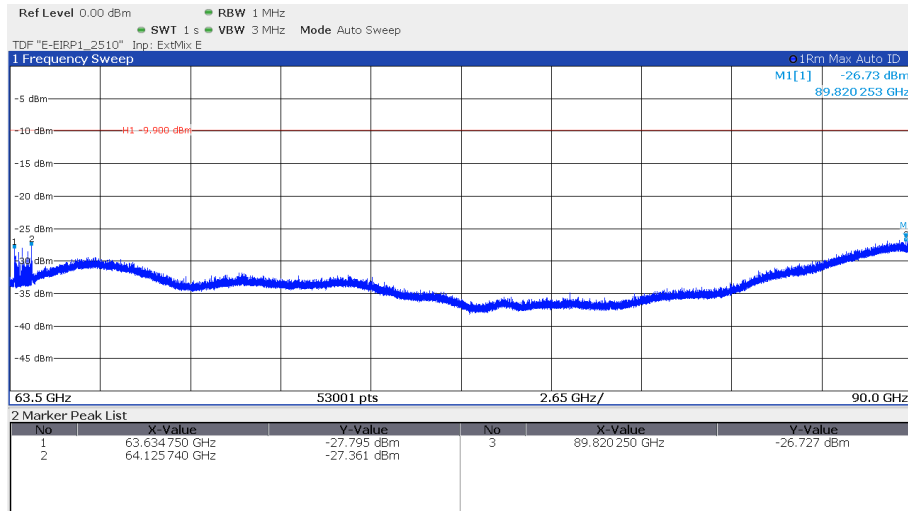
Mode 1:



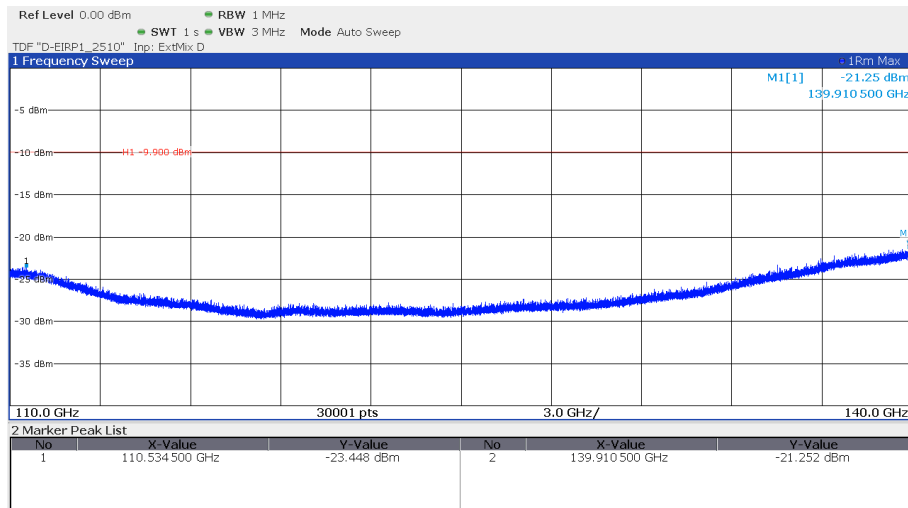
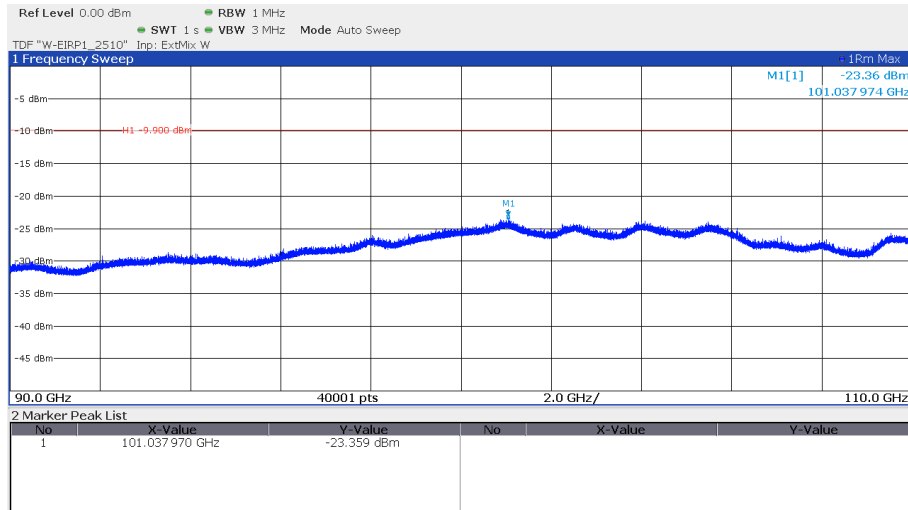
Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.

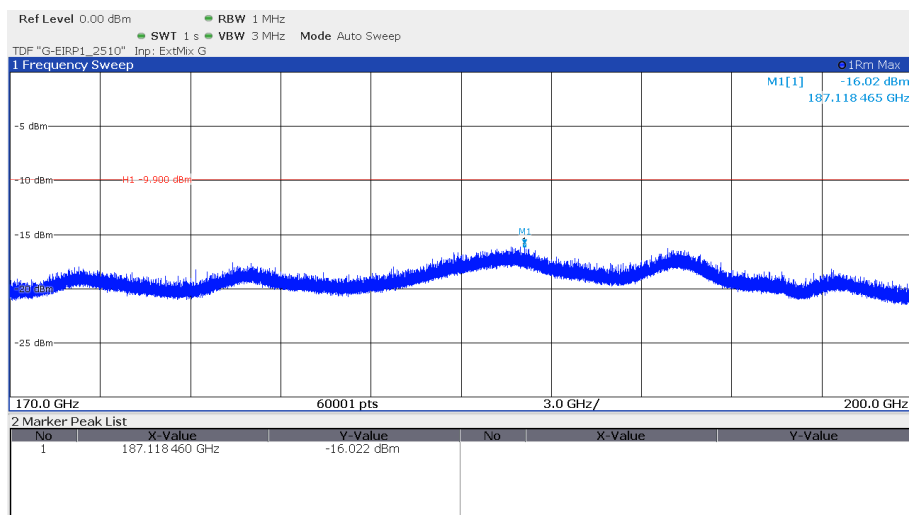
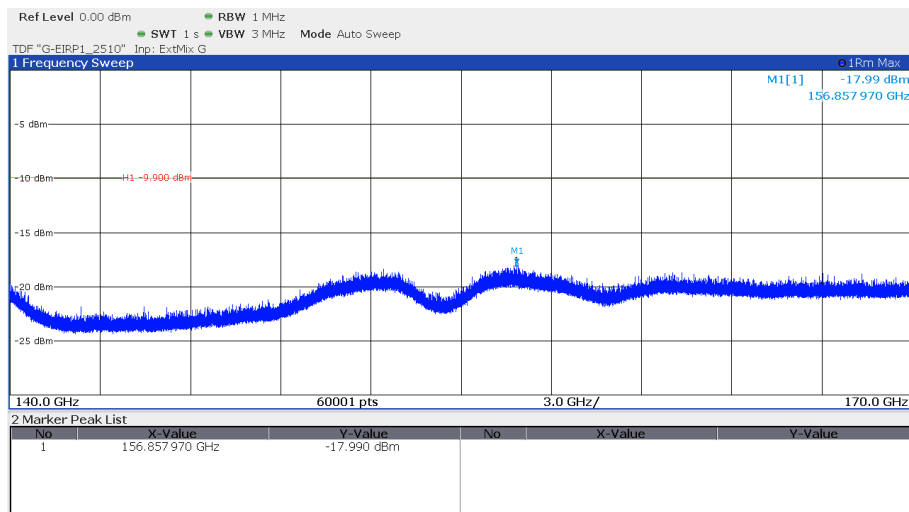


Note: operating frequency range: 61 – 61.5 GHz.

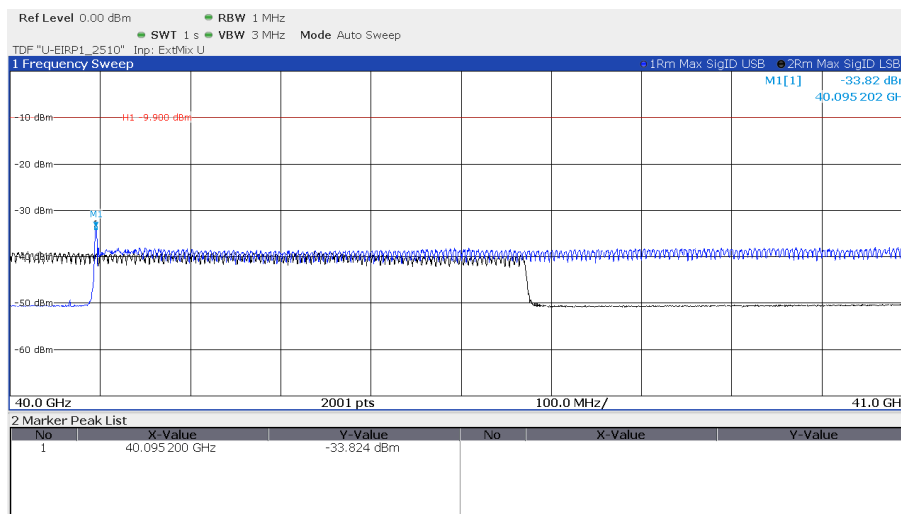


Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.

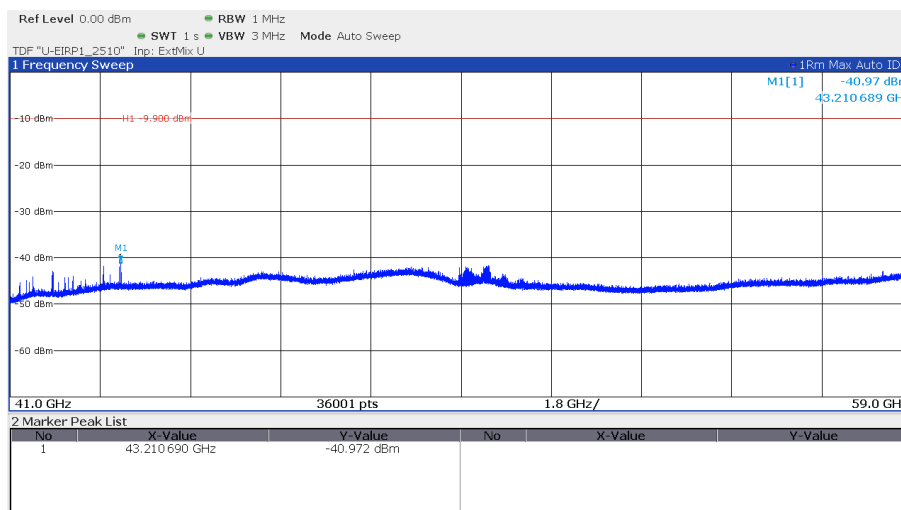




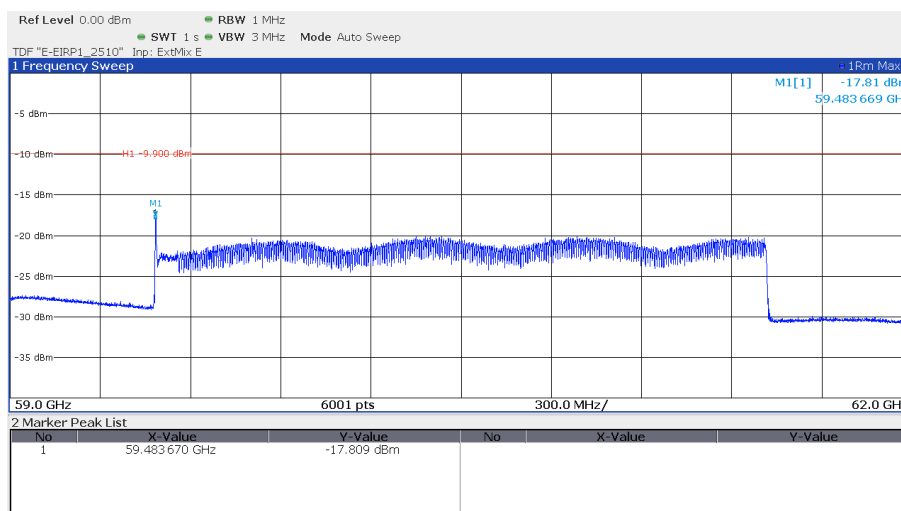
Mode 2:



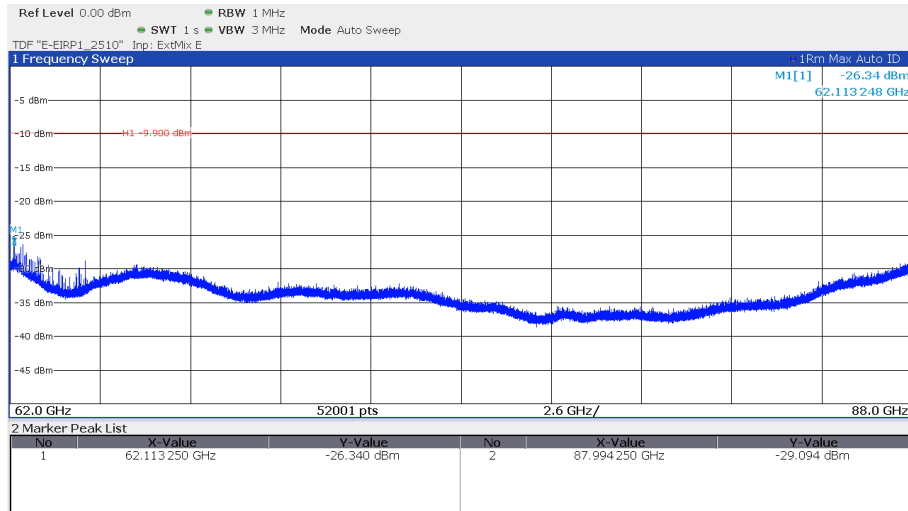
Note: No emissions from EUT found, shown emissions are solely from mixing products of the harmonic mixer.



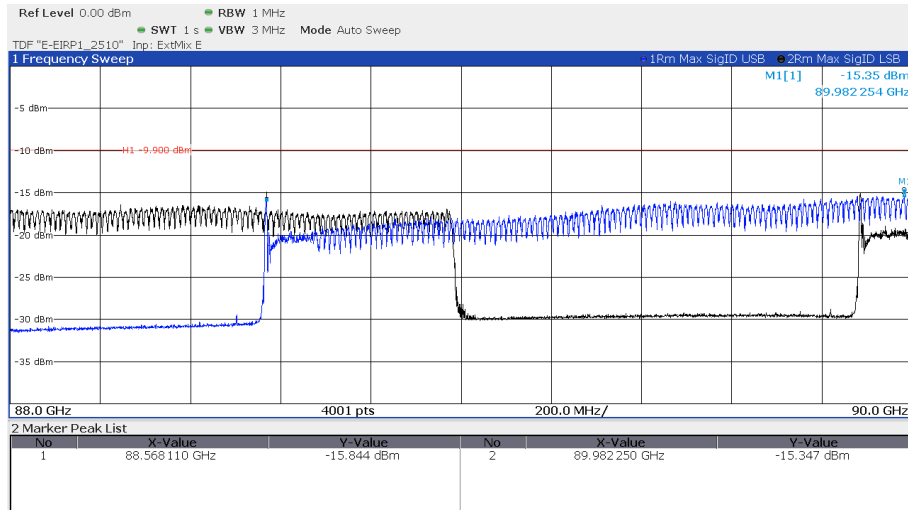
Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



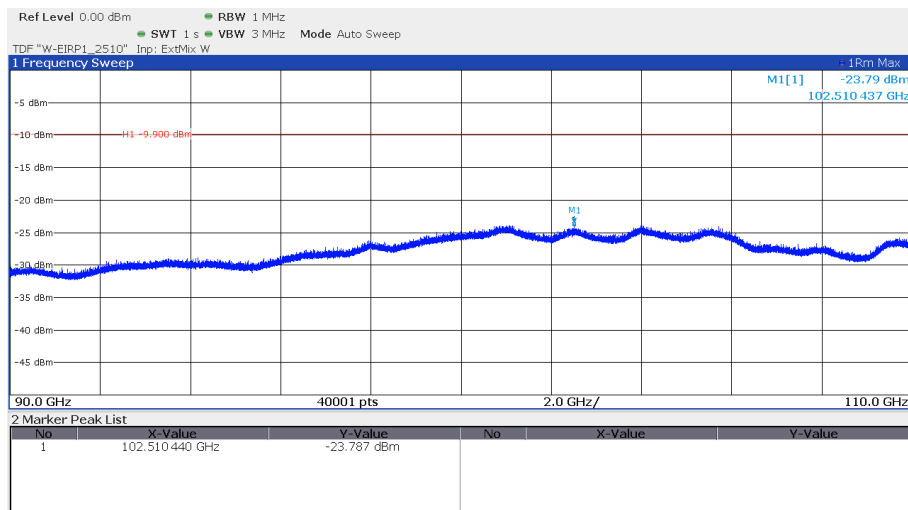
Note: operating frequency range: 59.5 – 61.5 GHz.

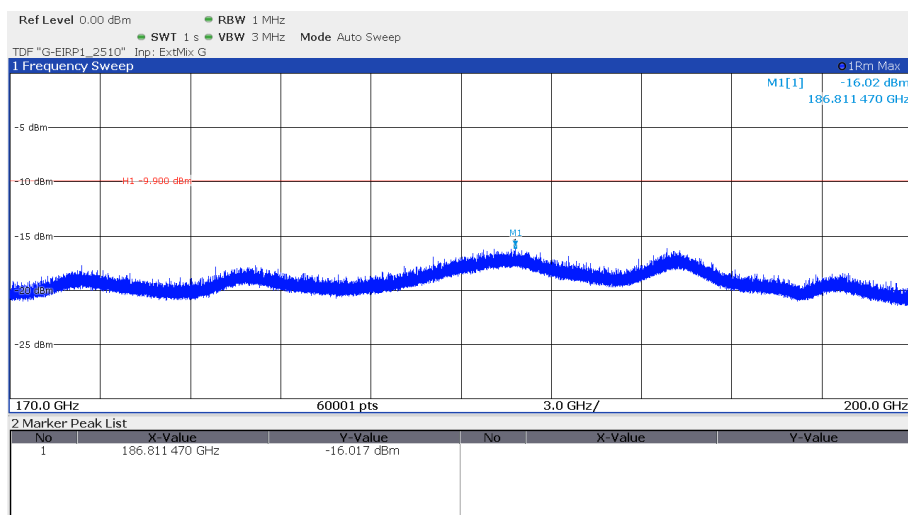
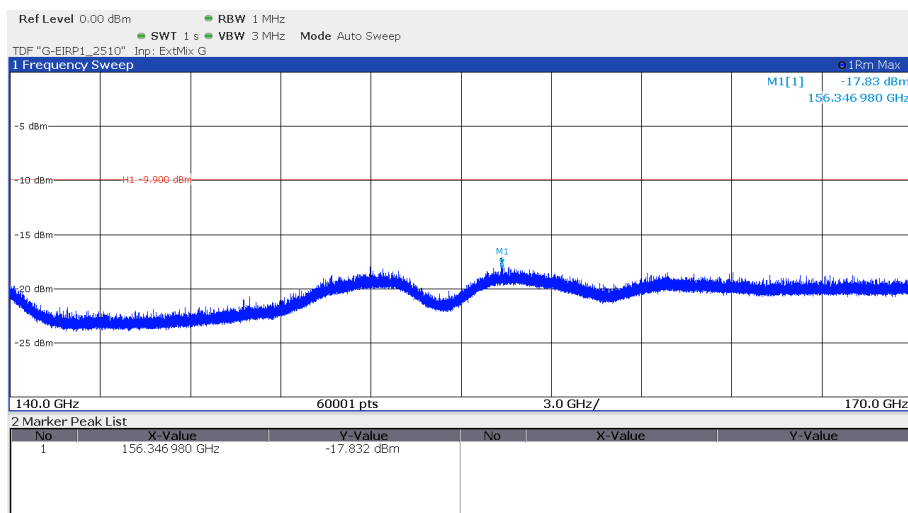
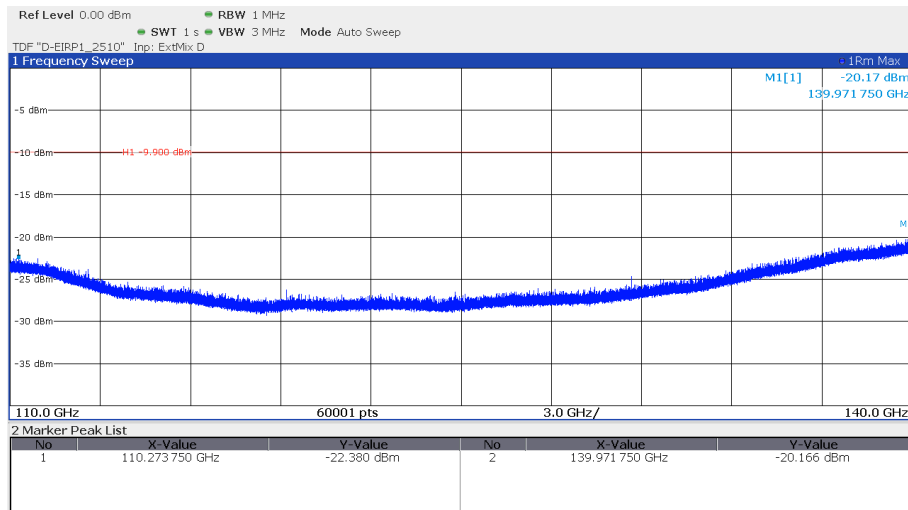


Note: To minimize unintended mixing products generated by the external mixer the AutoID function was used.



Note: No emissions from EUT found, shown emissions are solely from mixing products of the harmonic mixer.





Average limit according to FCC Part 15C, Section 15.255(d):

- (1) The power density of any emissions outside the 57-71 GHz band shall consist solely of spurious emissions.
- (2) Radiated emissions below 40 GHz shall not exceed the general limits in §15.209.
- (3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm² at a distance of 3 meters.
- (4) The levels of the spurious emissions shall not exceed the level of the fundamental emission.

General radiated limit according to FCC Part 15C, Section 15.209:

Frequency (MHz)	15.209 Limits (µV/m)	Measurement distance (m)
0.009 - -0.49	2400/f(kHz)	300
0.49 – 1.705	24000/f(kHz)	30
1.705 – 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

Limit according to RSS-210 J.4:

The power of any emissions outside the band 57-71 GHz shall consist solely of spurious emissions and shall not exceed:

- a) the fundamental emission levels
- b) the general field strength limits specified in RSS-Gen for emissions below 40 GHz
- c) 90 pW/cm² at a distance of 3 m for emissions between 40 GHz and 200 GHz

General radiated limit according to RSS-Gen 8.9:

Frequency (MHz)	RSS-Gen Limits (µA/m)	Measurement distance (m)
0.009 - -0.49	63.7/f(kHz)	300
0.49 – 1.705	63.7/f(kHz)	30
1.705 – 30.0	0.08	30

Frequency (MHz)	RSS-Gen Limits (µV/m)	Measurement distance (m)
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

The requirements are **FULFILLED**.

Remarks: The measurement was performed up to 200 GHz.

For frequencies < 40 GHz the general radiated limit has been applied.

5.5 Frequency stability

For test instruments and accessories used see section 6 Part **FE**.

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up

See Attachment B for detailed photo documentation of the test set-up.

5.5.3 Applicable standard

According to FCC Part 15C, Section 15.255(f):

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.

According to RSS-210 J.6:

Fundamental emissions shall be contained within the 57-71 GHz frequency band during all conditions of operation when tested at the temperature and voltage variations specified for the frequency stability measurement in RSS-Gen.

5.5.4 Description of Measurement

The frequency stability is measured with the spectrum analyser. The sweep points are set to maximum for higher the frequency resolution or the function "frequency counter" is used. The signal is unmodulated; the marker of the analyser is set to maximum amplitude at normal temperature, the frequency is recorded. Then the maximum supply voltage is set and the marker of the analyser is set to maximum amplitude. This procedure is done again for the minimum supply voltage. The EUT is now driven at normal supply voltage but in the climatic chamber to range the temperature from -40 °C to +85 °C in steps of 10 degrees. The drifting carrier is measured by setting the marker at the analyser.

5.5.5 Result

Mode 1: 61 - 61.5 GHz frequency band:

Lowest frequency f_{low}	61.005743 GHz
Highest frequency f_{high}	61.485763 GHz

Test conditions		Test result	
		Frequency (GHz)	
		f_{low}	f_{high}
$T_{min} (-20)^{\circ}C$	V_{nom}	61.007281	61.484603
$T (-10)^{\circ}C$	V_{nom}	61.006710	61.484797
$T (0)^{\circ}C$	V_{nom}	61.006200	61.485627
$T (10)^{\circ}C$	V_{nom}	61.006336	61.485660
$T_{nom} (20)^{\circ}C$	$V_{min} (2.2 V)$	61.006871	61.485585
$T_{nom} (20)^{\circ}C$	$V_{nom} (3.3 V)$	61.006900	61.485763
$T_{nom} (20)^{\circ}C$	$V_{max} (5.4 V)$	61.006855	61.485604
$T (30)^{\circ}C$	V_{nom}	61.007011	61.485259
$T (40)^{\circ}C$	V_{nom}	61.006951	61.485023
$T (50)^{\circ}C$	V_{nom}	61.006648	61.484744
$T (60)^{\circ}C$	V_{nom}	61.006199	61.484359
$T_{max} (65)^{\circ}C$	V_{nom}	61.005743	61.484210

Mode 2: 57 - 61.56 GHz frequency band:

Lowest frequency f_{low}	59.464778 GHz
Highest frequency f_{high}	61.542210 GHz

Test conditions		Test result	
		Frequency (GHz)	
		f_{low}	f_{high}
$T_{min} (-20)^{\circ}C$	V_{nom}	59.466317	61.541049
$T (-10)^{\circ}C$	V_{nom}	59.465746	61.541244
$T (0)^{\circ}C$	V_{nom}	59.465235	61.542074
$T (10)^{\circ}C$	V_{nom}	59.465371	61.542107
$T_{nom} (20)^{\circ}C$	$V_{min} (2.2 V)$	59.465906	61.542032
$T_{nom} (20)^{\circ}C$	$V_{nom} (3.3 V)$	59.465935	61.542210
$T_{nom} (20)^{\circ}C$	$V_{max} (5.4 V)$	59.465890	61.542051
$T (30)^{\circ}C$	V_{nom}	59.466047	61.541706
$T (40)^{\circ}C$	V_{nom}	59.465986	61.541470
$T (50)^{\circ}C$	V_{nom}	59.465683	61.541191
$T (60)^{\circ}C$	V_{nom}	59.465234	61.540805
$T_{max} (65)^{\circ}C$	V_{nom}	59.464778	61.540656

Limit according to FCC Part 15C, Section 15.255(f):

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.

Limit according to RSS-Gen 6.11:

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.

The requirements are **FULFILLED**.

Remarks: The OBW99 is always inside of the operating frequency band.
EUT is considered operating over a temperature range of -20°C to +65°C and a supply voltage of
2.6 V to 4.7 V ($V_{\text{nom}} = 3.3 \text{ V}$). Thus for testing $V_{\text{min}} = 2.2 \text{ V}$, $V_{\text{max}} = 5.4 \text{ V}$.

5.6 Antenna requirement

According to FCC Part 15C, Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

The EUT has integrated antennas. No other antenna can be used with the device.

The supplied antenna meets the requirements of part 15.203.

Remarks: None.

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Kind of Equipment	Manufacturer	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	EA-PS 3032-10B	DC-Power Supply	EA-Elektro Automatik GmbH & Co. KG	02-02/50-10-013				
	ESR3	EMI Test Receiver	Rohde & Schwarz Memmingen	09-02/03-21-001	16/07/2026	16/07/2025		
	ENV432	V-Netznachbildung	Rohde & Schwarz Memmingen	09-02/20-21-001	02/09/2026	02/09/2024	30/07/2026	30/07/2025
	61605	ACDC PowerSupply	Chromsa ATE Inc.	09-02/20-22-001				
	KK-SPU195FR01-2X11_N-50-3-64	Kabelkonf. Spuma_195-	Huber + Suhner	09-02/50-21-031				
	KK-SPU195FR01-2X11N-3,5M	Kabelkonf. Spuma_195-	Huber + Suhner	09-02/50-21-037				
	CDB-10K-18-50V-NMF-I	DC Blocker	Tactron Elektronik	09-02/50-22-033			04/06/2026	04/06/2025
	BAT-EMC 2024.0.12.0	Nexio Software	EMCO Elektronik GmbH	09-02/68-21-002				
CPR 3	FS-Z90	Harmonic Mixer 60-90 GHz	Rohde & Schwarz München	02-02/11-14-003	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-15-001	19/05/2026	19/05/2025		
	QWH-EPRR00/WR-12/60-90 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-004				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-030				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-031				
DC	FS-Z90	Harmonic Mixer 60-90 GHz	Rohde & Schwarz München	02-02/11-14-003	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-15-001	19/05/2026	19/05/2025		
	QWH-EPRR00/WR-12/60-90 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-004				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-030				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-031				
FE	FS-Z90	Harmonic Mixer 60-90 GHz	Rohde & Schwarz München	02-02/11-14-003	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-15-001	19/05/2026	19/05/2025		
	QWH-EPRR00/WR-12/60-90 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-004				
	METRAHIT WORLD	TRMS Multimeter	GOSSSEN-METRAWATT GmbH	02-02/32-15-001	27/11/2025	27/11/2024		

	WK-340/40	Climatic Chamber	Weiss Umwelttechnik GmbH	02-02/45-05-001	16/07/2026	16/07/2025	16/01/2026	16/07/2025
	6543A	Power Supply	HP Hewlett-Packard	02-02/50-05-157				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-030				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-031				

MB	FS-Z90	Harmonic Mixer 60-90 GHz	Rohde & Schwarz München	02-02/11-14-003	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-15-001	19/05/2026	19/05/2025		
	QWH-EPRR00/WR-12/60-90 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-004				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-030				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-031				

SER 1	ESR 7	EMI Test Receiver	Rohde & Schwarz Memmingen	09-02/03-21-004	18/08/2026	18/08/2025		
	HFH2-Z2E	Active Loop Antenna	Rohde & Schwarz Memmingen	09-02/24-21-001	05/08/2026	05/08/2025		
	IN600	Bias Unit	Rohde & Schwarz Memmingen	09-02/50-21-015				
	KK-7.8F-2XNM_4.0M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-018				
	KK-7.8F-2XNM_4.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-023				
	KK-7.8F-2XNM_9.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-025				
	KK-SF118-2X11N-4.0M	RF Cable	Huber + Suhner	09-02/50-23-034				

SER 2	ESR 7	EMI Test Receiver	Rohde & Schwarz Memmingen	09-02/03-21-004	18/08/2026	18/08/2025		
	BBV 9743 B	Broadb. Ampl. 10MHz-6GHz	Schwarzbeck Mess-Elektronik	09-02/17-21-002			17/12/2025	17/12/2024
	VULB9168	Trilog-Broadband	Schwarzbeck Mess-Elektronik	09-02/24-22-003	05/08/2026	05/08/2025	21/08/2026	21/08/2025
	KK-7.8F-2XNM_4.0M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-018				
	KK-7.8F-2XNM_4.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-023				
	KK-7.8F-2XNM_9.5M	Cable Assembly 7.8	Tactron Elektronik	09-02/50-21-025				
	50F-003 N 3dB	Attenuator 3dB	Tactron Elektronik	09-02/50-22-002				
	CDB-10K-18-50V-NMF-I	DC Blocker	Tactron Elektronik	09-02/50-22-031			04/06/2026	04/06/2025
	KK-SF526S-2X11N-10.0M	RF Cable	Tactron Elektronik	09-02/50-25-002				

	BAT-EMC 2024.0.12.0	Nexio Software	EMCO Elektronik GmbH	09-02/68-21-002				
SER 3	ESW26	EMI Test Receiver	Rohde & Schwarz München	02-02/03-17-002	25/04/2026	25/04/2025		
	FS-Z110	Harmonic Mixer 75-110 GHz	Rohde & Schwarz München	02-02/11-14-002	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FS-Z90	Harmonic Mixer 60-90 GHz	Rohde & Schwarz München	02-02/11-14-003	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-15-001	19/05/2026	19/05/2025		
	RPG FS-Z170	Harmonic Mixer 110-170 GHz	Radiometer Physics GmbH	02-02/11-17-001	20/05/2026	20/05/2025	16/10/2026	16/10/2025
	RPG FS-Z220	Harmonic Mixer 140-220GHz	Radiometer Physics GmbH	02-02/11-17-002	21/05/2026	21/05/2025	16/10/2026	16/10/2025
	FS-Z60	Harmonic Mixer 40-60 GHz	Radiometer Physics GmbH	02-02/11-18-001	27/05/2026	27/05/2025	16/10/2026	16/10/2025
	FSW43	Spectrum Analyser	Rohde & Schwarz München	02-02/11-21-001	09/09/2026	09/09/2025		
	AMF-6D-01002000-22-10P	RF Amplifier	MITEQ, Inc.	02-02/17-15-004				
	LNA-40-18004000-33-5P	Amplifier 18-40 GHz	MITEQ, Inc.	02-02/17-20-002				
	BBHA 9170	SHF-EHF Horn Antenna	Schwarzbeck Mess-Elektronik	02-02/24-05-015	06/03/2028	06/03/2025		
	QWH-UPRR00/WR-19/40-60 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-001				
	QWH-EPRR00/WR-12/60-90 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-004				
	QWH-WPRR00/WR-10/75-110 GHz	Horn Antenna	Quinstar Technology, Inc.	02-02/24-14-006				
	FH-SG-170/WR6/110-170	Gain Horn Antenna	Rohde & Schwarz München	02-02/24-17-002				
	05-HA25/WR5/140-220	Gain Horn Antenna	Tactron Elektronik	02-02/24-17-004				
	3117	Horn Antenna	ETS Lindgren	02-02/24-20-007	20/11/2025	20/11/2024		
	BAM 4.5-P	Antenna Mast	maturo GmbH	02-02/50-17-024				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-030				
	UFA210A (LU7-022-1000)	RF Cable	Rosenberger HF-Technik	02-02/50-17-031				
	KK-SF106-2X11N-6,5M	RF Cable	Huber + Suhner	02-02/50-18-016				
	KMS116-GL140SE-KMS116-1.0M	Cable DC-40GHz	GigaLane Co., Ltd.	02-02/50-20-026				
	0_5 Meter DC-18GHz	NMS111-GL200SC06_5	Tactron Elektronik	09-16/50-23-003				
	SF526S-21PC35-11N-300mm	RF-Cable	Huber + Suhner	09-16/50-24-010				

7 DETAILED MEASUREMENT UNCERTAINTY

Note: The following table provides an overview of all uncertainties for CSA Group Bayern GmbH

Measurement	Ucisp [dB]	Ulab comb. + [dB]	Ulab comb. - [dB]	Ulab exp. + [dB]	Ulab exp. - [dB]
EMISSION					
Conducted disturbance at AC mains and other port power using a V-AMN (150 kHz to 30 MHz)	3.4 dB	1.48 dB	1.58 dB	2.96 dB	3.16 dB
Radiated disturbance (disturbance current in a Loop antenna 9 kHz to 30 MHz)	na	1.36 dB	1.39 dB	2.73 dB	2.78 dB
Radiated disturbance (electrical field strength in a SAC; 30 MHz – 1000 MHz; Hybrid antenna; 3 m or 10 m)	6.3 dB	2.08 dB	2.07 dB	4.17 dB	4.13 dB
Radiated disturbance (electrical field strength in a SAC / FAR; 1 GHz – 6 GHz)	5.2 dB	2.54 dB	1.87 dB	5.07 dB	3.73 dB
Radiated disturbance (electrical field strength in a SAC / FAR; 6 GHz – 18 GHz)	5.5 dB	2.70 dB	2.15 dB	5.40 dB	4.30 dB
Radiated disturbance (electrical field strength in a SAC / FAR ; 18 GHz – 40 GHz)	na	2.95 dB	2.78 dB	5.91 dB	5.55 dB
Radiated disturbance (electrical field strength in a FAR ; 40 GHz – 60 GHz)	na	2.52 dB	2.52 dB	5.04 dB	5.04 dB
Radiated disturbance (electrical field strength in a FAR ; 60 GHz – 90 GHz)	na	2.52 dB	2.52 dB	5.04 dB	5.04 dB
Radiated disturbance (electrical field strength in a FAR ; 75 GHz – 110 GHz)	na	2.52 dB	2.52 dB	5.04 dB	5.04 dB
Radiated disturbance (electrical field strength in a FAR ; 110 GHz – 170 GHz)	na	2.52 dB	2.52 dB	5.04 dB	5.04 dB
Radiated disturbance (electrical field strength in a FAR ; 140 GHz – 220 GHz)	na	2.52 dB	2.52 dB	5.04 dB	5.04 dB
6 dB / 20 dB / 26 dB / 99% bandwidth	na	$2.5 \cdot 10^{-7} \%$	$2.5 \cdot 10^{-7} \%$	$4.9 \cdot 10^{-6} \%$	$4.9 \cdot 10^{-6} \%$
Frequency stability	na	$2.5 \cdot 10^{-7} \%$	$2.5 \cdot 10^{-7} \%$	$4.9 \cdot 10^{-6} \%$	$4.9 \cdot 10^{-6} \%$

- End of test report -