

**Test Report acc. to FCC Title 47 CFR Part 95 M
relating to
s.m.s, smart microwaves sensors GmbH
DRVEGRD 169**

**Title 47 - Telecommunication
Part 95 - Personal Radio Services
Subpart M – The 76 – 81 GHz Band Radar Service
Measurement Procedure:
ANSI C63.26-2015**



Deutsche
Akkreditierungsstelle
D-PL-12053-01-03

MANUFACTURER

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Manufacturer's grantee code	---
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RELEVANT STANDARD

Title	47 - Telecommunication
Part	95 – Personal Radio Services
Subpart	Subpart M – The 76 – 81 GHz Band Radar Service
Measurement procedure	ANSI C63.26-2015

EQUIPMENT UNDER TEST (EUT)

Equipment category	Radar Sensor
Trade name	smartmicro
Type designation	DRVEGRD 169
Serial no.	---
Variants	---

Test result summary

Clause	Rule Part	Requirements headline	Test result		
			Pass	Fail	N.t.*
8.1	§ 15.203	Antenna requirement	Pass	Fail	N.t.*
8.2	§ 15.207	Conducted Limits	Pass	Fail	N.t.*
8.3	§95.3367	76 – 81 GHz Band Radar Service radiated power limits	Pass	Fail	N.t.*
8.4	§95.3379	Radiated emission limits, general requirements	Pass	Fail	N.t.*
8.5	§95.3379	Radiated emission limit above 40 GHz	Pass	Fail	N.t.*
8.6	§95.3379	Occupied Bandwidth	Pass	Fail	N.t.*
8.7	§95.3379	Frequency Tolerance	Pass	Fail	N.t.*
8.8	§95.3385	76 – 81 GHz Band Radar Service RF exposure evaluation	Pass	Fail	N.t.*

As far as in this report statements on conformity are made, decision rules according to DIN EN ISO/IEC 17025:2018, 7.8.6 have been applied. If the report does not state otherwise, procedure 1 according to IEC Guide 115 ed.1.0 2007 (uncertainty of measurement calculated) has been applied on measurement and test procedures which are the base of this report.

The equipment passed all the conducted tests	Yes	No
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Signature		
Name	Mr. Anup Shrestha	Mr. Ralf Trepper
Designation	RF Test engineer	Laboratory-Manager
Date of issue	2023-01-11	2023-01-11

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1. Table of contents

Revision	Date of issue	Creator	Content of change
00	11.01.23	AS	Initial release
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Table 0-1: Table of contents

Note: If the document has been changed by revision number, all previous documents are no longer valid and must be destroyed.

2. Introduction

This test report is **not an expert opinion** and consists of:

- Test result summary
- List of contents
- Introduction and further information
- Performance assessment
- Detailed test information

All pages have been numbered consecutively and bear the TÜV NORD Hochfrequenztechnik GmbH & Co. KG logo, the test report number, the date, the test specification in its current version as well as the type designation of the EUT. The total numbers of pages in this report is **89**.

The tests were carried out in a representative assembly and in accordance with the test methods and/or requirements stated in:

FCC Title 47 CFR Part 95 Subpart M Section 95.3301 -95.3385 & ANSI C63.26-2015

The sample of the product was received on:

- 2022-08-29

The tests were carried out in the following period:

- 2022-12-09 - 2023-01-12

3. Testing laboratory

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FCC Registration Number: 763407

Accredited by:

DAkKS Deutsche Akkreditierungsstelle GmbH
DAkKS accreditation number: D-PL-12053-01-00

For issuing this report the following product documentation was used:

Description	Date	Identifications
External photographs of the Equipment Under Test (EUT)	2023-01-11	Annex no. 1
Internal photographs of the Equipment Under Test (EUT)	2023-01-11	Annex no. 2
Channel occupancy / bandwidth	2023-01-11	Annex no. 3
Label sample	2023-01-11	Annex no. 4
Functional description / User Manual	2023-01-11	Annex no. 5
Test setup photos	2023-01-11	Annex no. 6
Block diagram	2023-01-11	Annex no. 7
Operational description	2023-01-11	Annex no. 8
Schematics	2023-01-11	Annex no. 9
Parts list	2023-01-11	Annex no. 10

6. Conclusions, observations and comments

The test report will be filed at TÜV NORD Hochfrequenztechnik GmbH & Co. KG for a period of 10 years following the issue of this report. It may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of TÜV NORD Hochfrequenztechnik GmbH & Co. KG.

The results of the tests as stated in this report are exclusively applicable to the EUT as identified in this report. TÜV NORD Hochfrequenztechnik GmbH & Co. KG cannot be held liable for properties of the EUT that have not been observed during these tests.

TÜV NORD Hochfrequenztechnik GmbH & Co. KG assumes the sample to comply with the requirements of FCC Title 47 CFR Part 95 for the respective test sector, if the test results turn out positive.

Comments: ---

7. Operational description

7.1 EUT details

The EUT is a 77-81 GHz radar sensor for multiple automotive applications. The sensor measures range, radial speed, azimuth and elevation angle, reflectivity and more parameters of multiple stationary and moving reflectors (targets) simultaneously. The radar sensor consists of a combination of 3 TX and 4 RX linearly polarized antennas. The antenna aims at ultra-short, short and medium range and very wide horizontal angular coverage. The sensor is also capable of ultra-high definition (4D/PxHD), where PxHD resolution means that the sensor features resolution (separation) in three parameters: range, Doppler and azimuth angle.

7.2 EUT configuration

After powering up with a nominal voltage of 24V DC, the EUT starts to function. The operational mode and frequency bands can be configured with the help of a Smartmicro tool. The sensor allows to switch between short-range mode, medium-range mode and long-range mode. The modes differ regarding the waveform and the detection performance. It is possible to visualize the sensor data (target lists, object list, cycle time, etc.). It also provides data logging, associated video documentation, play back and analysis functions.

7.3 EUT measurement description

Conducted measurements

The EUT was directly connected using a CAN interface. It has been tested with the activated EUT in continuous measuring mode. The typical voltage of 120 V AC / 60 Hz is provided on the artificial mains network.

Radiated measurements

After switch on, the EUT starts to work. The EUT was tested in a typical fashion. During preliminary emission tests, the EUT was operated in the continuous measuring mode for worst case emission mode investigation. Therefore, the final qualification testing was completed with the EUT operated in continuous measuring mode. All tests were performed in a semi-anechoic chamber (SAC) with the EUT's typical voltage: 24 V DC.

In order to establish the maximum radiation, firstly, there have been viewed all orthogonal adjustments of the test samples, secondly the test sample have been rotated at all adjustments around the own axis between 0° and 360°, and thirdly, the antenna polarization between horizontal and vertical had been varied.

Radiated measurements from 9 kHz – 30 MHz, 30MHz – 1 GHz and above 1 GHz were performed using a small loop antenna, Linear polarized Logarithmic Periodic Broadband Antenna, stacked Logarithmic-Periodic Broadband Antenna for linear polarized and horn antennas respectively with a measuring distance of 3 m inside SAC.

Radiated measurements above 1 GHz is made by placing loose-laid RF absorber material on the ground plane.

Additionally, radiated emission measurements above 1 GHz are made using calibrated linearly polarized antennas, which may have a smaller beam width (main lobe) than do the antennas used for frequencies below 1 GHz. The measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal.

Environmental Conditions during the tests

Temperature: 21 – 26°C // Relative Humidity: 35 – 45 % // Air Pressure: 1000 – 1013 hPa

8.1 Antenna requirement

8.1.1 Regulation

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 so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

8.1.2 Result

Antenna Type	Antenna description	Frequency	Gain dBi	Number of Antennas
Integrated Tx antenna	Patch array antenna	77 GHz – 81 GHz	14.2	3
Integrated Rx antenna	Patch array antenna	77 GHz – 81 GHz	11.5	4

The equipment passed the conducted tests	Yes	No	Not*
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Test setup photos / test results are attached	Yes	No	Annex no.: 2
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8.2 Conducted Limits

8.2.1 Regulation

According to FCC §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 limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Conducted Limits		
Frequency of Emission	Quasi-Peak (QP)	Average (AV)
MHz	dB μ V	dB μ V
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

(b) The limit shown in paragraph (a) of this section shall not apply to carrier current systems operating as intentional radiators on frequencies below 30 MHz. In lieu thereof, these carrier current systems shall be subject to the following standards:

- 1) For carrier current system containing their fundamental emission within the frequency band 535–1705 kHz and intended to be received using a standard AM broadcast receiver: no limit on conducted emissions.
- (2) For all other carrier current systems: 1000 μ V within the frequency band 535–1705 kHz, as measured using a 50 μ H/50 ohms LISN.
- (3) Carrier current systems operating below 30 MHz are also subject to the radiated emission limits in §15.205, §15.209, §15.221, §15.223, or §15.227, as appropriate.

(c) Measurements to demonstrate compliance with the conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines. Devices that include, or make provisions for, the use of battery chargers which permit operating while charging, AC adapters or battery eliminators or that connect to the AC power lines indirectly, obtaining their power through another device which is connected to the AC power lines, shall be tested to demonstrate compliance with the conducted limits.

8.2.2 Test procedures

The EUT and the additional equipment (if required) are connected to the main power through a line impedance stabilization network (LISN). The LISN must be appropriate to ANSI C63.10-2013.

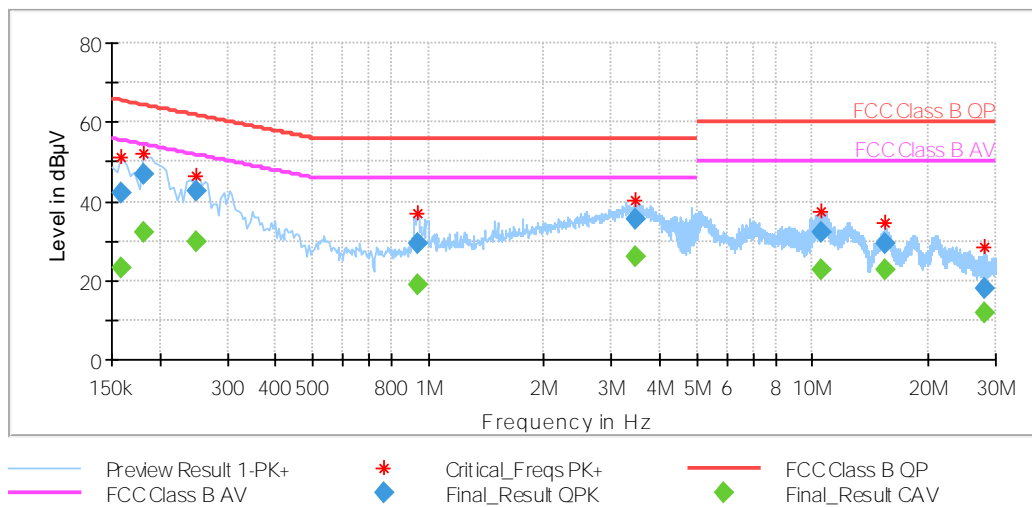
Additional equipment must also be connected to a second LISN with the same specifications described in the above section (if required).

8.2.3 Result

Conducted emissions - AC port acc. to § 15.107									
Tested with Laptop only									
Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.159000	42.34	---	65.52	23.18	1000.0	9.000	N	GND	20.1
0.159000	---	23.28	55.52	32.24	1000.0	9.000	N	GND	20.1
0.181500	---	32.35	54.42	22.07	1000.0	9.000	N	GND	20.0
0.181500	46.85	---	64.42	17.57	1000.0	9.000	N	GND	20.0
0.249000	42.78	---	61.79	19.01	1000.0	9.000	L1	GND	20.1
0.249000	---	29.84	51.79	21.95	1000.0	9.000	L1	GND	20.1
0.942000	---	19.15	46.00	26.85	1000.0	9.000	L1	GND	20.1
0.942000	29.58	---	56.00	26.42	1000.0	9.000	L1	GND	20.1
3.448500	---	26.06	46.00	19.94	1000.0	9.000	N	GND	20.2
3.448500	35.65	---	56.00	20.35	1000.0	9.000	N	GND	20.2
10.518000	32.02	---	60.00	27.98	1000.0	9.000	L1	GND	20.6
10.518000	---	22.61	50.00	27.39	1000.0	9.000	L1	GND	20.6
15.445500	---	22.68	50.00	27.32	1000.0	9.000	N	GND	20.9
15.445500	29.44	---	60.00	30.56	1000.0	9.000	N	GND	20.9
27.910500	18.19	---	60.00	41.81	1000.0	9.000	L1	GND	21.4
27.910500	---	11.88	50.00	38.12	1000.0	9.000	L1	GND	21.4

Measurement uncertainty $\pm 2\text{ dB}$

Full Spectrum

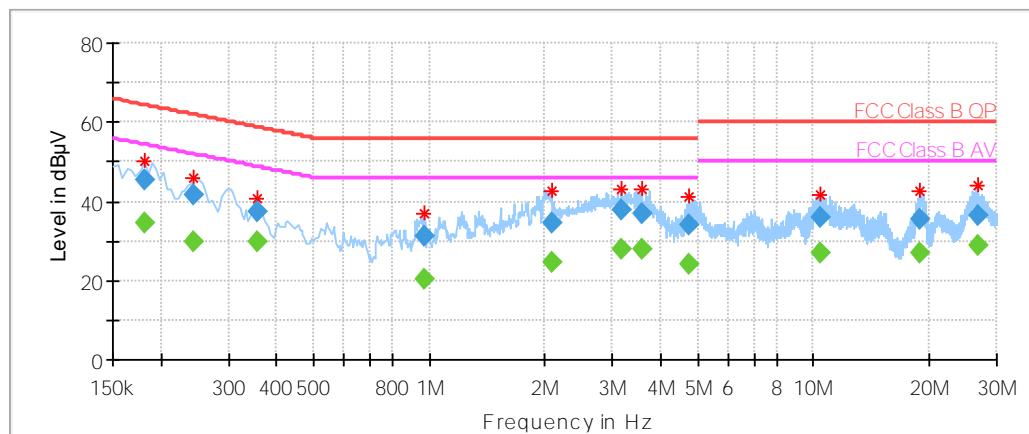


Conducted emissions - AC port acc. to § 15.107
Tested with Laptop in connection with EUT

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.181500	---	34.51	54.42	19.91	1000.0	9.000	L1	GND	20.1
0.181500	45.26	---	64.42	19.16	1000.0	9.000	L1	GND	20.1
0.244500	---	29.92	51.94	22.02	1000.0	9.000	L1	GND	20.1
0.244500	41.79	---	61.94	20.15	1000.0	9.000	L1	GND	20.1
0.357000	---	29.70	48.80	19.10	1000.0	9.000	L1	GND	20.1
0.357000	37.24	---	58.80	21.56	1000.0	9.000	L1	GND	20.1
0.973500	31.04	---	56.00	24.96	1000.0	9.000	N	GND	20.0
0.973500	---	20.54	46.00	25.46	1000.0	9.000	N	GND	20.0
2.085000	34.62	---	56.00	21.38	1000.0	9.000	N	GND	20.1
2.085000	---	24.44	46.00	21.56	1000.0	9.000	N	GND	20.1
3.151500	---	28.12	46.00	17.88	1000.0	9.000	N	GND	20.2
3.151500	37.69	---	56.00	18.31	1000.0	9.000	N	GND	20.2
3.561000	---	27.78	46.00	18.22	1000.0	9.000	N	GND	20.2
3.561000	36.96	---	56.00	19.04	1000.0	9.000	N	GND	20.2
4.740000	34.02	---	56.00	21.98	1000.0	9.000	L1	GND	20.2
4.740000	---	24.21	46.00	21.79	1000.0	9.000	L1	GND	20.2
10.414500	35.89	---	60.00	24.11	1000.0	9.000	L1	GND	20.6
10.414500	---	26.92	50.00	23.08	1000.0	9.000	L1	GND	20.6
18.825000	---	26.81	50.00	23.19	1000.0	9.000	L1	GND	21.1
18.825000	35.57	---	60.00	24.43	1000.0	9.000	L1	GND	21.1
26.929500	---	28.89	50.00	21.11	1000.0	9.000	L1	GND	21.3
26.929500	36.31	---	60.00	23.69	1000.0	9.000	L1	GND	21.3

Measurement uncertainty ± 2 dB

Full Spectrum



— Preview Result 1-PK+
 * Critical_Freqs PK+
 — FCC Class B QP
— FCC Class B AV
 ◆ Final_Result OPK
 ◆ Final_Result CAV

Test Cables used	KISN2
Test equipment used	272, 551, 665, 606, 560

The equipment passed the conducted tests	Yes	No	Not
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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8.3 76-81 GHz Band Radar Service radiated power limits

8.3.1 Regulation

According to FCC §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 follows:

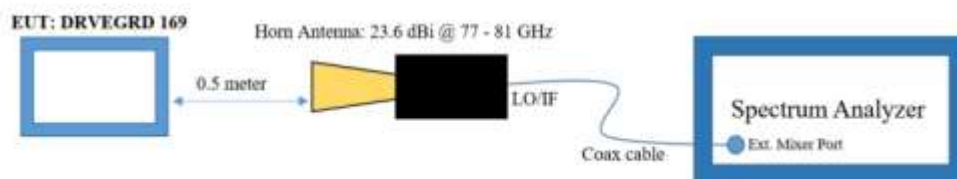
- (a) The maximum power (EIRP) within the 76-81 GHz band shall not exceed 50 dBm based on measurements employing a power averaging detector with a 1 MHz Resolution Bandwidth (RBW).
- (b) The maximum peak power (EIRP) within the 76-81 GHz band shall not exceed 55 dBm based on measurements employing a peak detector with a 1 MHz RBW.

8.3.2 Test procedure

Maximum measurement distance for the final radiated measurements above 40 GHz was determined according to ANSI C63.10-2013 section 9.8. To achieve maximum level of emission, maximizing procedure was applied according to ANSI C63.10-2013 section 9.8 where initially an exploratory search for emissions was carried out to determine the approximate direction at which each observed emissions emanates from the EUT. Secondly, for each emission observed a final measurement was executed to find the final position, polarization and orientation at which the maximum level of emission was observed. Measurement of the fundamental emission was done using a spectrum analyser according to the procedure ANSI C63.10-2013 section 9.10.

8.3.3 Test setup

Radiated measurements setup (Radiated output power)



8.3.4 Result for radiated power measurement

Transmitter fundamental radiation (§95.3367)					
#Peak Power#					
Waveforms	Centre Frequency (GHz)	Detector	EIRP Peak Power (dBm)	EIRP Limit (dBm)	Margin (dB)
Waveform 0	CF0 @ 77.85	PK	19.5 @ 77.985 GHz	55.0	35.5
	CF2 @ 79.80	PK	22.5 @ 79.935 GHz	55.0	32.5
Waveform 1	CF0 @ 77.85	PK	19.3 @ 77.899 GHz	55.0	35.7
	CF2 @ 79.80	PK	24.0 @ 79.849 GHz	55.0	31.0
Waveform 2	CF0 @ 77.85	PK	19.4 @ 77.985 GHz	55.0	35.6
	CF2 @ 79.80	PK	24.1 @ 79.8935GHz	55.0	30.9
Waveform 3	CF0 @ 78.85	PK	23.3 @ 79.123 GHz	55.0	31.7
Measurement uncertainty: 60 GHz to 90 GHz: ± 6 dB					

Transmitter fundamental radiation (§95.3367)					
#Average Power#					
Waveforms	Centre Frequency (GHz)	Detector	EIRP Average Power (dBm)	EIRP Limit (dBm)	Margin (dB)
Waveform 0	CF0 @ 77.85	AV	-9.2 @ 77.985 GHz	50.0	59.2
	CF2 @ 79.80	AV	-6.9 @ 79.935 GHz	50.0	56.9
Waveform 1	CF0 @ 77.85	AV	-5.6 @ 77.899 GHz	50.0	55.6
	CF2 @ 79.80	AV	-2.6 @ 79.849 GHz	50.0	52.6
Waveform 2	CF0 @ 77.85	AV	-8.5 @ 77.985 GHz	50.0	58.5
	CF2 @ 79.80	AV	-3.4 @ 79.8935GHz	50.0	53.4
Waveform 3	CF0 @ 78.85	AV	-4.2 @ 79.123 GHz	50.0	54.2
Measurement uncertainty: 60 GHz to 90 GHz: ± 6 dB					

Test cables used	K163
Test equipment used	666, 226, 385, 674

The equipment passed the conducted tests	Yes	No	Not*
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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8.4 Radiated emission limits, general requirements

8.4.1 Regulation

According to 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.

Intentional radiator- radiated emission limits		
Frequency	Field Strength	Measurement distance
MHz	$\mu\text{V} / \text{m}$	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
above 960	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.

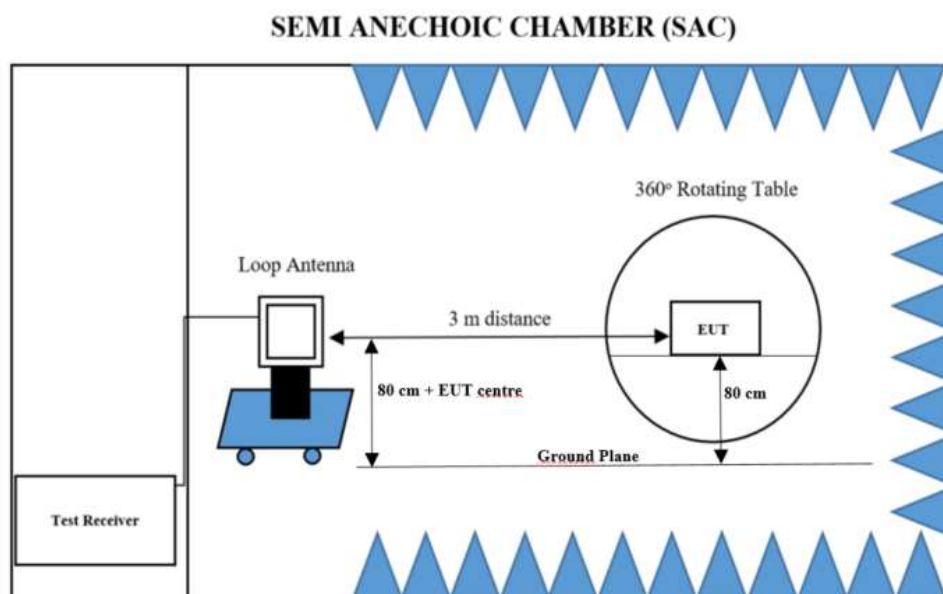
(iii) The emissions limits shown in the table in paragraph (a)(1) of this section are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9.0-90.0 kHz, 110.0-490.0 kHz, and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements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

8.4.2 Test procedure

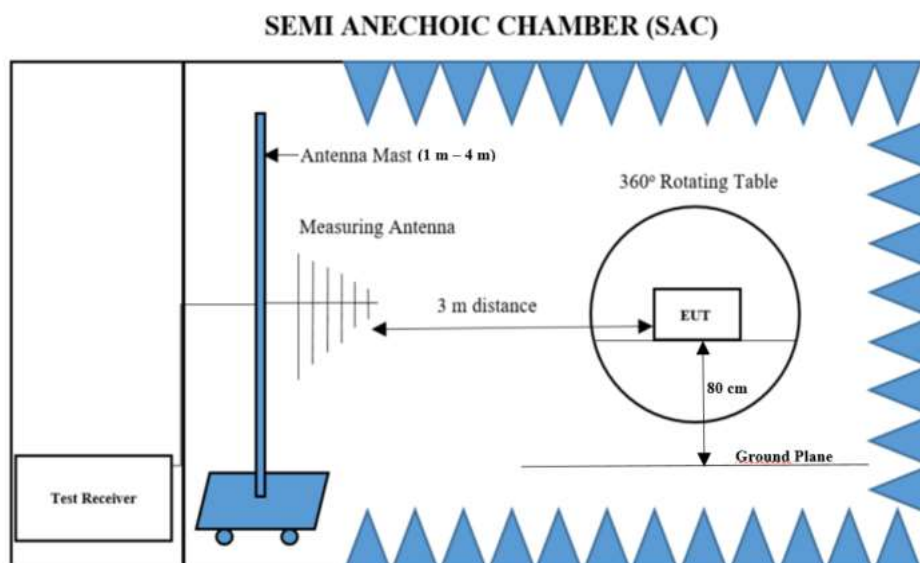
The measurement of harmonic and spurious emissions at or below 40 GHz was performed in accordance with the standard test methods ANSI C63.10-2013 section 6.3 – 6.6 and section 9.13. The measurement above 40 GHz was carried out in accordance with the test procedure ANSI C63.10-2013 section 9.12. The measurements were done using a quasi-peak detector. For the frequencies above 1 GHz, all the radiated emission measurements were carried out using an average detector.

8.4.3 Test setup

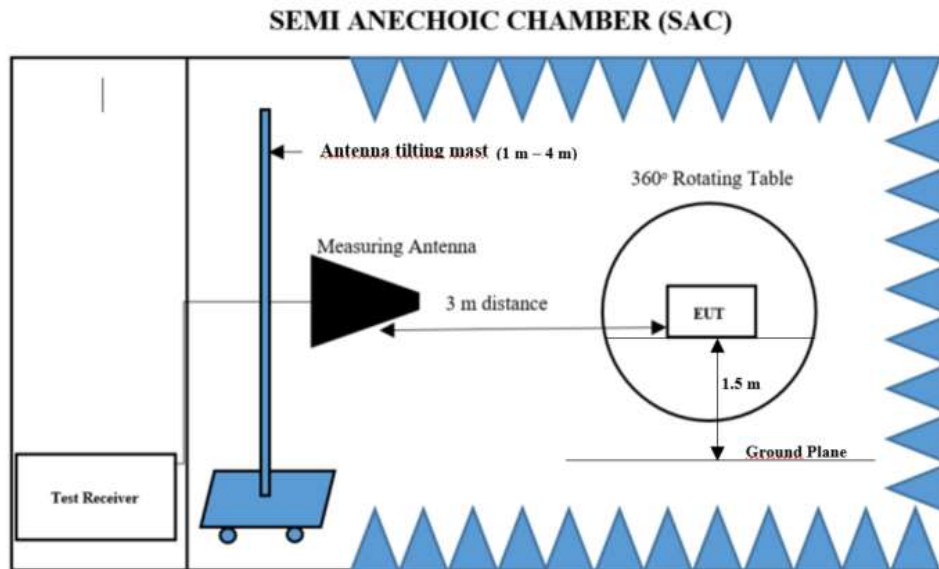
Radiated measurements setup (9 kHz – 30 MHz)



Radiated measurements setup (30 MHz – 1 GHz)



Radiated measurements setup (1 GHz – 40 GHz)



Radiated measurements from 9 kHz – 30 MHz, 30MHz – 1 GHz, 1 GHz – 18 GHz and 18 GHz – 40 GHz were performed using a small loop antenna, Linear polarized Logarithmic Periodic Broadband Antenna, stacked Logarithmic-Periodic Broadband Antenna for linear polarized and horn antenna respectively with a measuring distance of 3 m inside SAC as shown in the above test setup diagrams. Above 40 GHz, the measuring antenna is scanned around the entire perimeter of the EUT in both horizontal and vertical polarization, at the distance of 3.0 m from 40 GHz – 50 GHz, 1.0 m from 50 GHz – 75 GHz, 0.5 m from 75 GHz – 231 GHz.

The measurement procedure for harmonics and spurious emissions at or below 40 GHz is taken from ANSI C63.10-2013.

Radiated emissions test characteristics	
Frequency range	30 MHz - 40,000 MHz
Test distance	3 m*
Test instrumentation resolution bandwidth	120 kHz (30 MHz - 1,000 MHz)
	1 MHz (1000 MHz - 40,000 MHz)
Receive antenna scan height	1 m - 4 m
Receive antenna polarization	Vertical/horizontal

*According to Section 15.31 (f) (1): At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

8.4.4 Calculation of the field strength

The field strength is calculated by the following calculation:

Corrected Level = Receiver Level + Correction Factor (without the use of a pre-amplifier)

Corrected Level = Receiver Level + Correction Factor – Pre-amplifier (with the use of a pre-amplifier)

Receiver Level : Receiver reading without correction factors

Correction Factor : Antenna factor + cable loss

For example:

The receiver reading is 32.7 dB μ V. The antenna factor for the measured frequency is +2.5 dB (1/m) and the cable factor for the measured frequency is 0.71 dB, giving a field strength of 35.91dB μ V/m.

The 35.91dB μ V/m value can be mathematically converted to its corresponding level in μ V/m.

Level in μ V/m = Common Antilogarithm (35.91/20) = 62.44

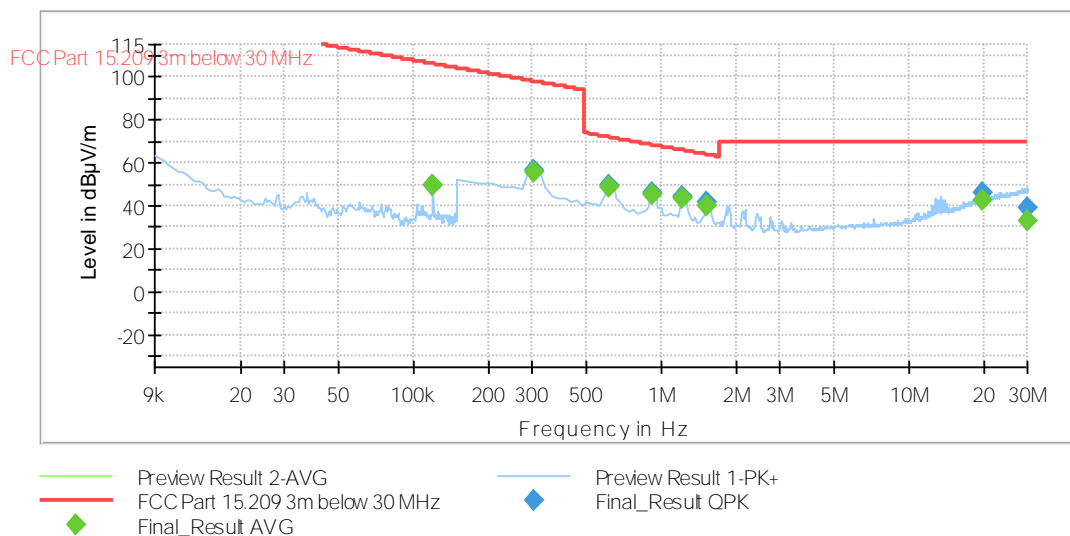
For test distance other than what is specified, but fulfilling the requirements of Section 15.31 (f) (1) the field strength is calculated by adding additionally an extrapolation factor of 20 dB/decade (inverse linear distance for field strength measurements).

8.4.5 Result

Waveform 0 @ 77.85 GHz (lower frequency)

9 kHz – 30 MHz

Transmitter spurious radiation (Section 95.3379)								
Frequency (MHz)	QuasiPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Pol	Azimuth (deg)
0.119670	49.36	---	106.04	56.67	1000.0	0.200	H	190.0
0.119670	---	49.48	---	---	1000.0	0.200	H	190.0
0.304750	---	56.06	---	---	1000.0	9.000	V	149.0
0.304750	56.85	---	97.92	41.07	1000.0	9.000	V	149.0
0.611750	49.77	---	71.86	22.09	1000.0	9.000	V	146.0
0.611750	---	48.96	---	---	1000.0	9.000	V	146.0
0.914750	46.31	---	68.34	22.04	1000.0	9.000	V	155.0
0.914750	---	45.54	---	---	1000.0	9.000	V	155.0
1.219250	---	43.36	---	---	1000.0	9.000	V	146.0
1.219250	44.44	---	65.83	21.39	1000.0	9.000	V	146.0
1.526250	---	40.19	---	---	1000.0	9.000	V	129.0
1.526250	41.85	---	63.87	22.02	1000.0	9.000	V	129.0
19.584750	45.77	---	69.50	23.73	1000.0	9.000	H	16.0
19.584750	---	42.92	---	---	1000.0	9.000	H	16.0
30.000000	---	33.07	---	---	1000.0	9.000	H	300.0
30.000000	38.78	---	69.50	30.72	1000.0	9.000	H	300.0



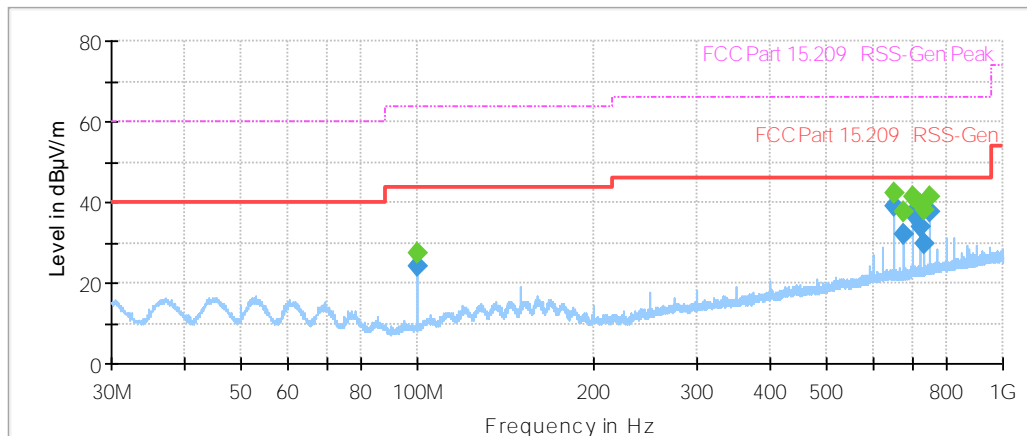
Test Cables used	K189		
Test equipment used	23, 660, 665, 667, 668, 669		
The equipment passed the conducted tests	Yes	No	Not
Test setup photos / test results are attached	Yes	No	Annex no.: 6

Waveform 1 @ 77.85 GHz (lower frequency)

30 MHz – 1 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency (MHz)	QuasiPeak (dBµV/m)	Max peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
99.990000	24.40	---	43.50	19.10	1000.0	120.000	323.0	H	224.0
99.990000	---	27.62	63.50	35.88	1000.0	120.000	323.0	H	224.0
649.980000	39.17	---	46.00	6.83	1000.0	120.000	105.0	H	203.0
649.980000	---	42.44	66.00	23.56	1000.0	120.000	105.0	H	203.0
675.000000	32.20	---	46.00	13.80	1000.0	120.000	106.0	H	231.0
675.000000	---	37.54	66.00	28.46	1000.0	120.000	106.0	H	231.0
699.990000	37.06	---	46.00	8.94	1000.0	120.000	100.0	H	231.0
699.990000	---	41.17	66.00	24.83	1000.0	120.000	100.0	H	231.0
724.980000	---	39.39	66.00	26.61	1000.0	120.000	100.0	H	224.0
724.980000	34.01	---	46.00	11.99	1000.0	120.000	100.0	H	224.0
733.320000	---	37.99	66.00	28.01	1000.0	120.000	100.0	H	222.0
733.320000	29.57	---	46.00	16.43	1000.0	120.000	100.0	H	222.0
749.970000	---	41.56	66.00	24.44	1000.0	120.000	100.0	H	224.0
749.970000	37.61	---	46.00	8.39	1000.0	120.000	100.0	H	224.0

Measurement uncertainty: ± 4 dB



- Preview Result 1-PK+
- - - FCCPart 15.209 RSS-Gen Peak
- ◆ Final_Result PK+
- FCCPart 15.209 RSS-Gen
- ◆ Final_Result QPK

Test cables used	K189, K193, K195
Test equipment used	406, 660, 665, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not*
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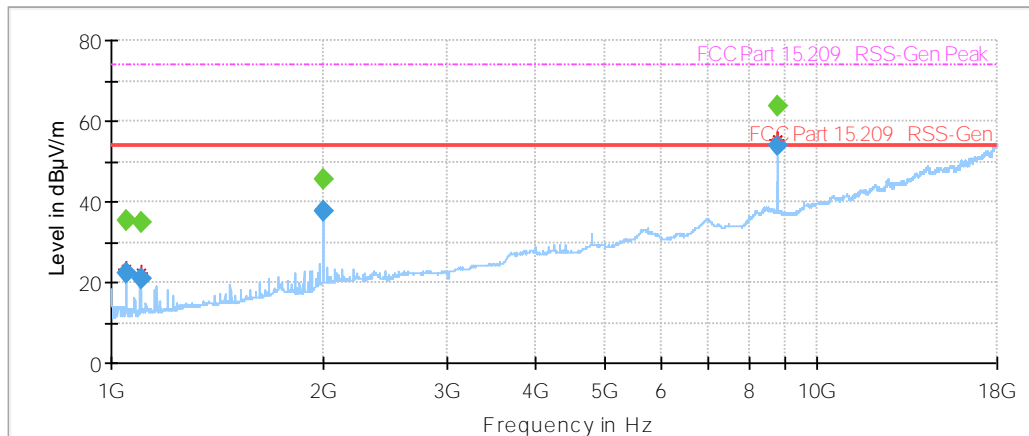
Test setup photos / test results are attached	Yes	No	Annex no.: 6
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1 GHz – 18 GHz

Transmitter spurious radiation (Section 95.3379)

Frequency (MHz)	Avg. Peak (dBµV/m)	Max peak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
1049.87500	---	35.49	74.00	38.51	1000.0	1000.000	131.0	H	190.0
1049.87500	22.41	---	54.00	31.59	1000.0	1000.000	131.0	H	190.0
1099.87500	21.13	---	54.00	32.87	1000.0	1000.000	380.0	V	66.0
1099.87500	---	35.01	74.00	38.99	1000.0	1000.000	380.0	V	66.0
1999.87500	---	45.52	74.00	28.48	1000.0	1000.000	151.0	H	235.0
1999.87500	37.72	---	54.00	16.28	1000.0	1000.000	151.0	H	235.0
8798.12500	53.80	---	54.00	0.20	1000.0	1000.000	166.0	V	11.0
8798.12500	---	63.75	74.00	10.25	1000.0	1000.000	166.0	V	11.0

Measurement uncertainty: ± 4.9 dB



- Preview Result 1-RMS
- FCC Part 15.209 RSS-Gen
- ◆ Final_Result AVG
- * Critical Freqs RMS
- - - FCC Part 15.209 RSS-Gen Peak
- ◆ Final_Result PK+

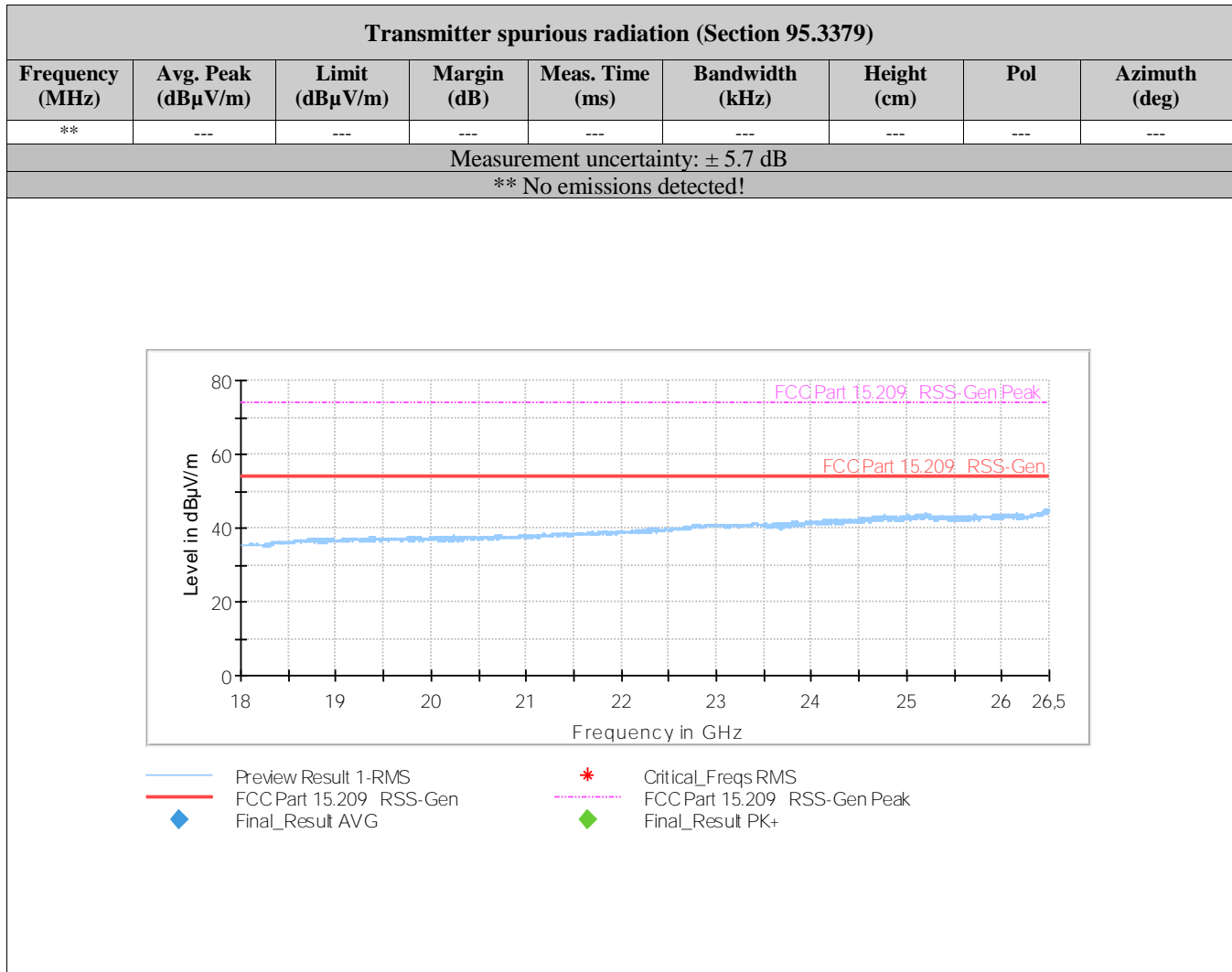
Test Cables used	K189, K193, K195
Test equipment used	445a, 660, 665, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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Waveform 0 @ 77.85 GHz (lower frequency)

18 GHz – 26.5 GHz



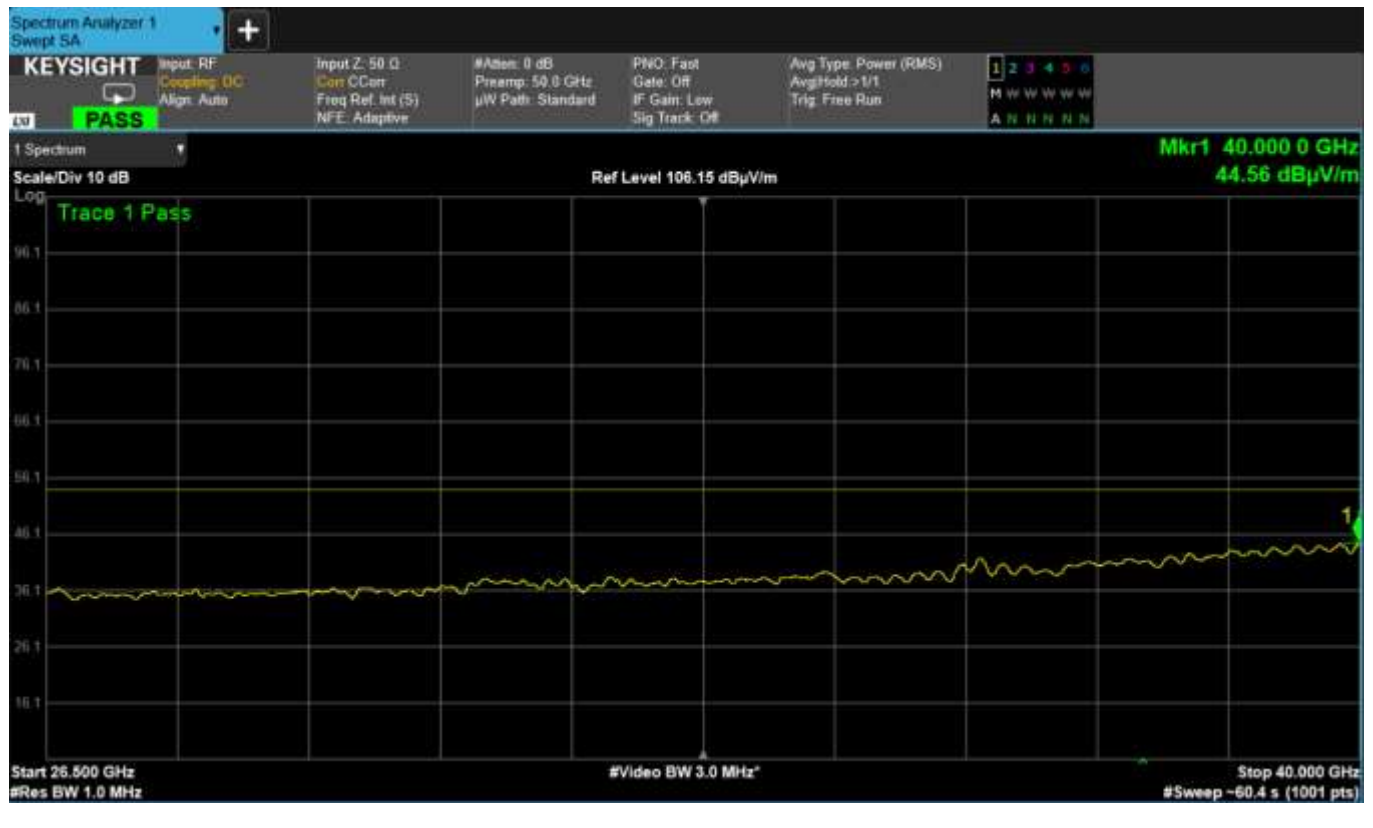
Test Cables used	K189
Test equipment used	442, 660, 665, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not [≠]
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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26.5 GHz – 40 GHz

Transmitter spurious radiation (Section 95.3379)								
Frequency (MHz)	Avg. Peak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
**	---	---	---	---	---	---	---	---
Measurement uncertainty: ± 5.7 dB								
** No emissions detected!								



Test Cables used	K189
Test equipment used	223a, 442, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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8.5 Radiated emission limit above 40 GHz

8.5.1 Regulation

According to FCC §95.3379 (a)

(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.

(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.

8.5.2 Test procedure

The measurement of harmonic and spurious emissions above 40 GHz was performed in accordance with the standard test methods ANSI C63.10-2013 sections 9.8, 9.9 and 9.12. For the frequencies above 1 GHz, all the radiated emission measurements were carried out using an average detector.

The measurement procedure for harmonics and spurious emissions above 40 GHz is taken from ANSI C63.10-2013.

Radiated emissions test characteristics	
Frequency range	9 kHz - 231,000 MHz
Test distance	10m, 3 m*
Test instrumentation resolution bandwidth	9 kHz (20 kHz – 30 MHz)
	120 kHz (30 MHz – 1.000 MHz)
	1 MHz (1000 MHz – 231.000 MHz)
Receive antenna height	1 m (20 kHz – 30 MHz)
Receive antenna polarization	0° - 90° (20 kHz – 30 MHz)
Receive antenna scan height	1 m - 4 m (30 MHz - 18,000 MHz)
	1 m – 2.5 m (18,000 MHz – 40.000 MHz)
	1 m – 1.5 m (40,000 MHz – 231.000 MHz)
Receive antenna polarization	vertical/horizontal (Above 30 MHz)

*According to Section 15.31 (f) (1): At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

8.5.3 Equations to calculate power density

Convert the EIRP in dBm to the EIRP in watts using Equation

$$EIRP_{Linear} = 10^{[(EIRP_{Log} - 30)/10]}$$

Where:

EIRP Linear is the equivalent isotropically radiated power, in watts

EIRP Log is the equivalent isotropically radiated power, in dBm

Calculate the power density at the distance specified by the limit from the EIRP in watts using Equation:

$$PD = \frac{EIRP_{Linear}}{4\pi d^2} \quad (1)$$

Where,

- PD is the power density at the distance specified by the limit, in W/m²
- EIRP_{Linear} is the equivalent isotropically radiated power, in watts
- D is the distance at which the power density limit is specified, in m

According to FCC §95.3379 (2) (i), the radiated emission limit outside the 76 - 81 GHz band between 40 GHz and 200 GHz is 600 pW/cm² at a distance of 3 meters from the exterior surface of the radiating structure. As per above equation (1)

$$EIRP_{Linear} = PD * 4\pi d^2 = 0.000006 * 4 * \pi * 9 = 0.0006786 \text{ W}$$

$$EIRP_{dBm} = -1.69$$

According to FCC §95.3379 (2) (ii), the radiated emission limit outside the 76 - 81 GHz band above 200 GHz is 1000 pW/cm² at a distance of 3 meters from the exterior surface of the radiating structure. As per above equation (1)

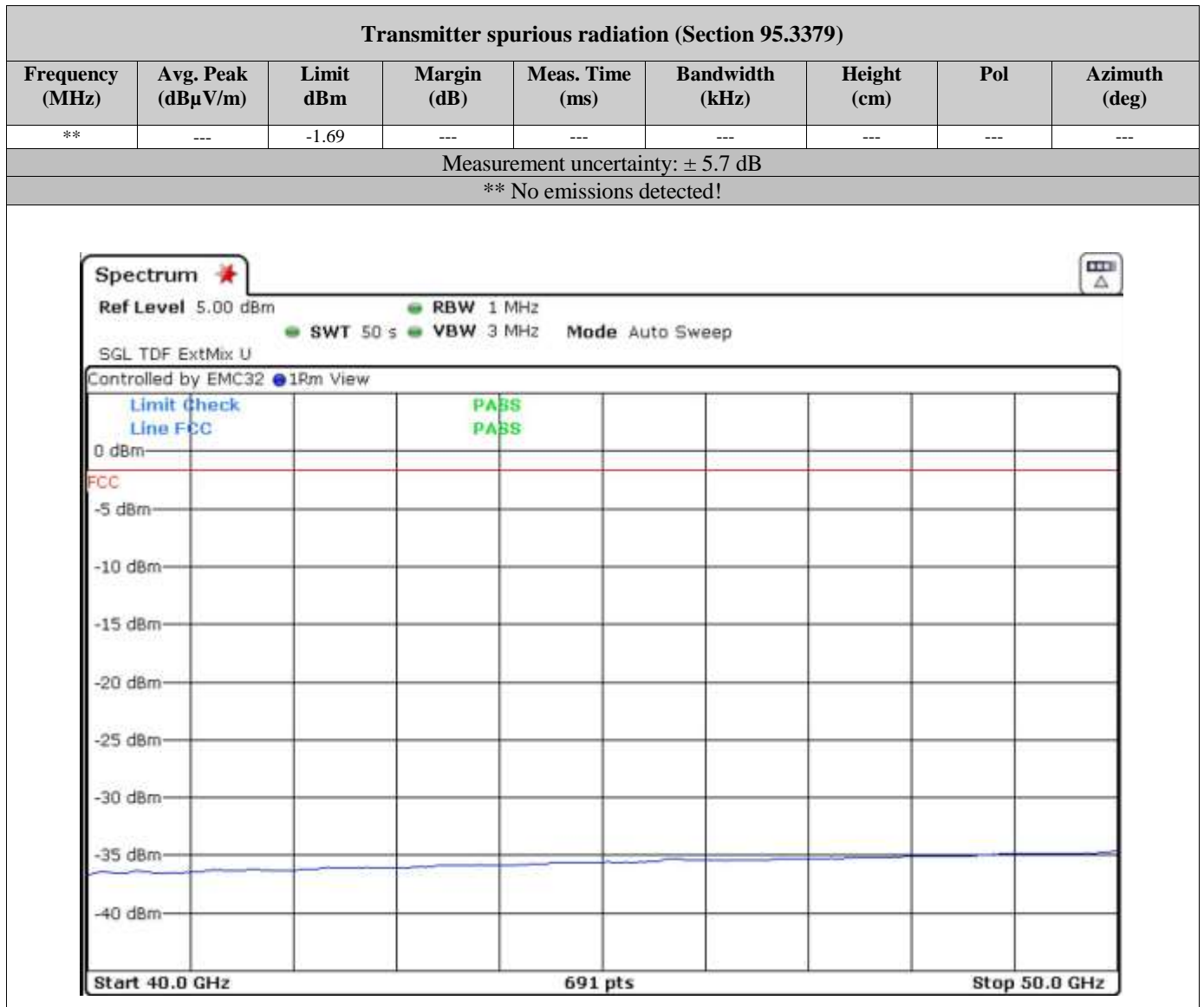
$$EIRP_{Linear} = PD * 4\pi d^2 = 0.00001 * 4 * \pi * 9 = 0.001131 \text{ W}$$

$$EIRP_{dBm} = 0.53$$

8.5.4 Test Results

Waveform 0 @ 77.85 GHz (lower frequency)

40 GHz – 50 GHz



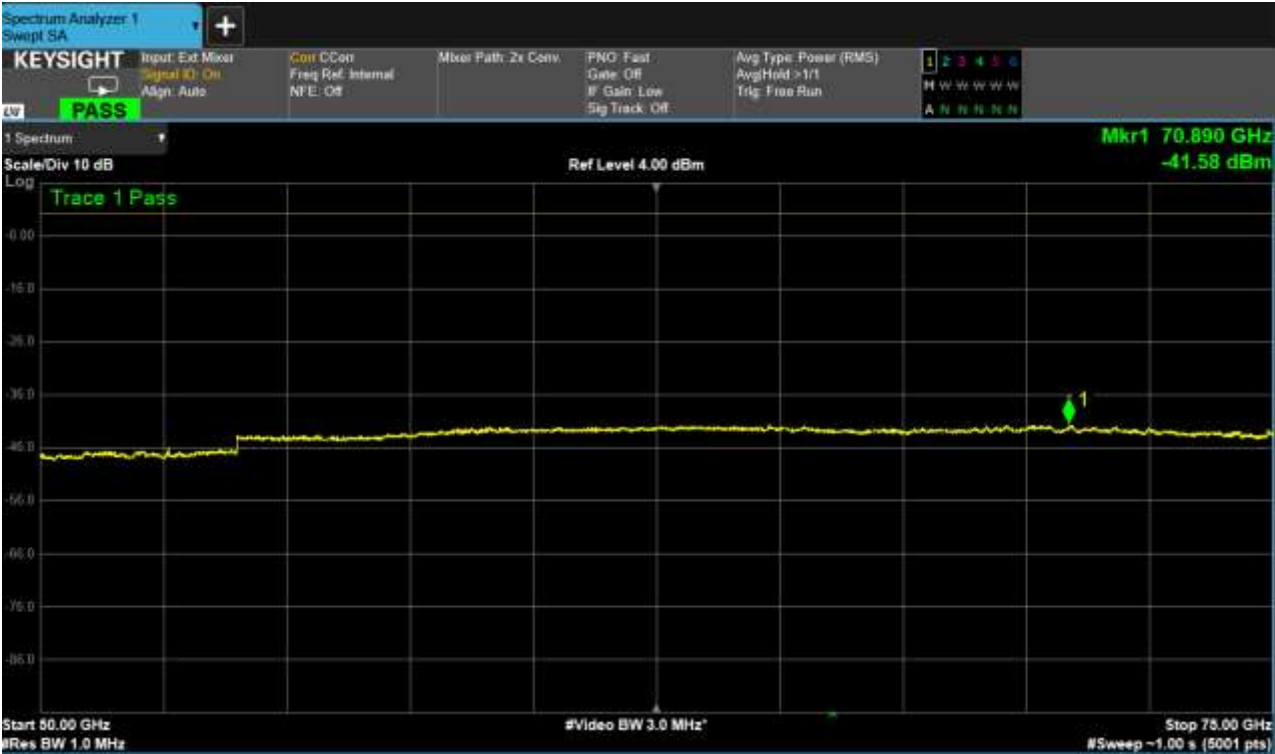
Test Cables used	K163
Test equipment used	502, 515, 518, 660, 667, 668, 669

The equipment passed the conducted tests	Yes	No	N.t.*
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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50 GHz – 75 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

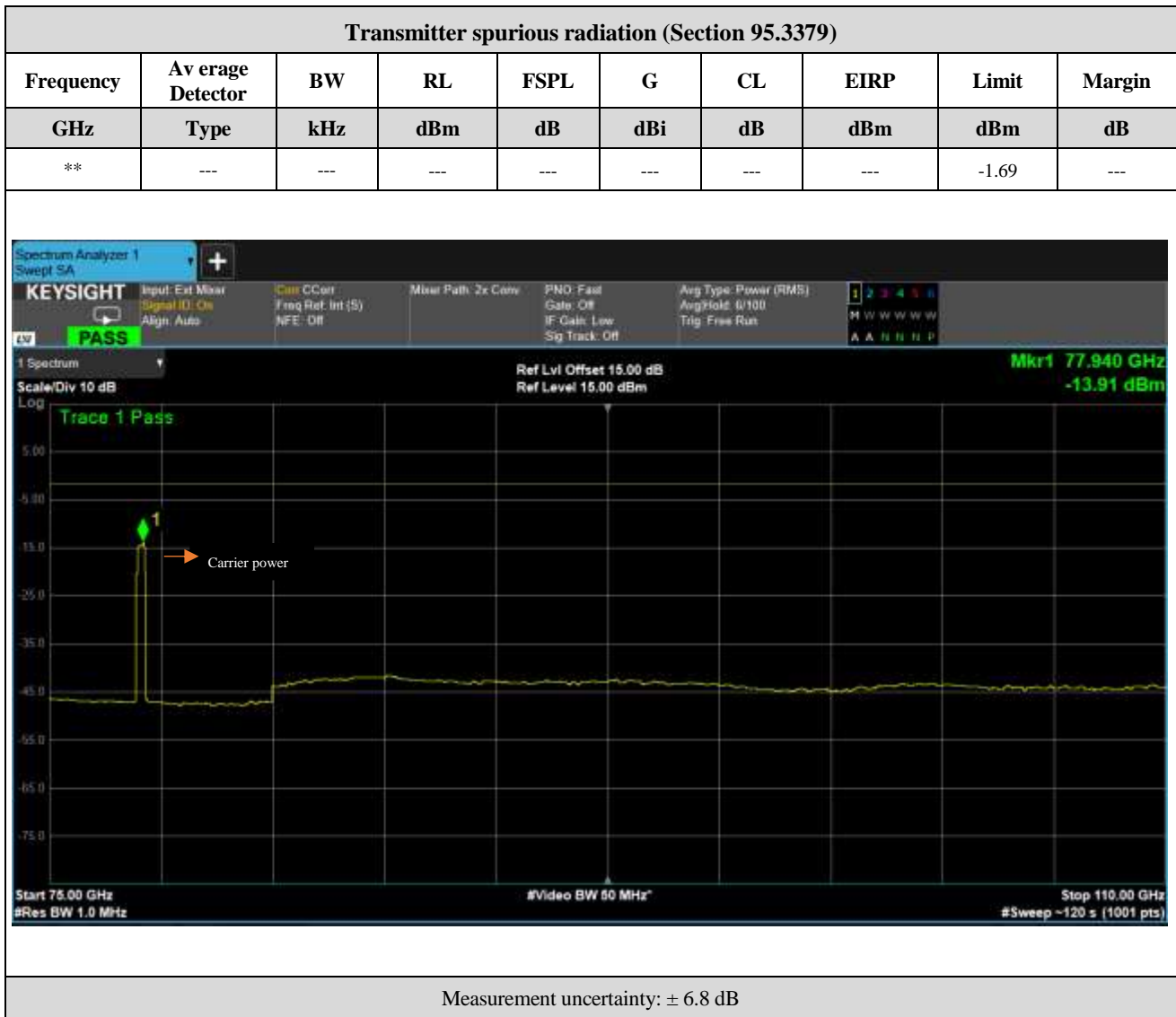
**** No emissions detected!**

Test Cables used	K163
Test equipment used	384, 673, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	NA *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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75 GHz – 110 GHz



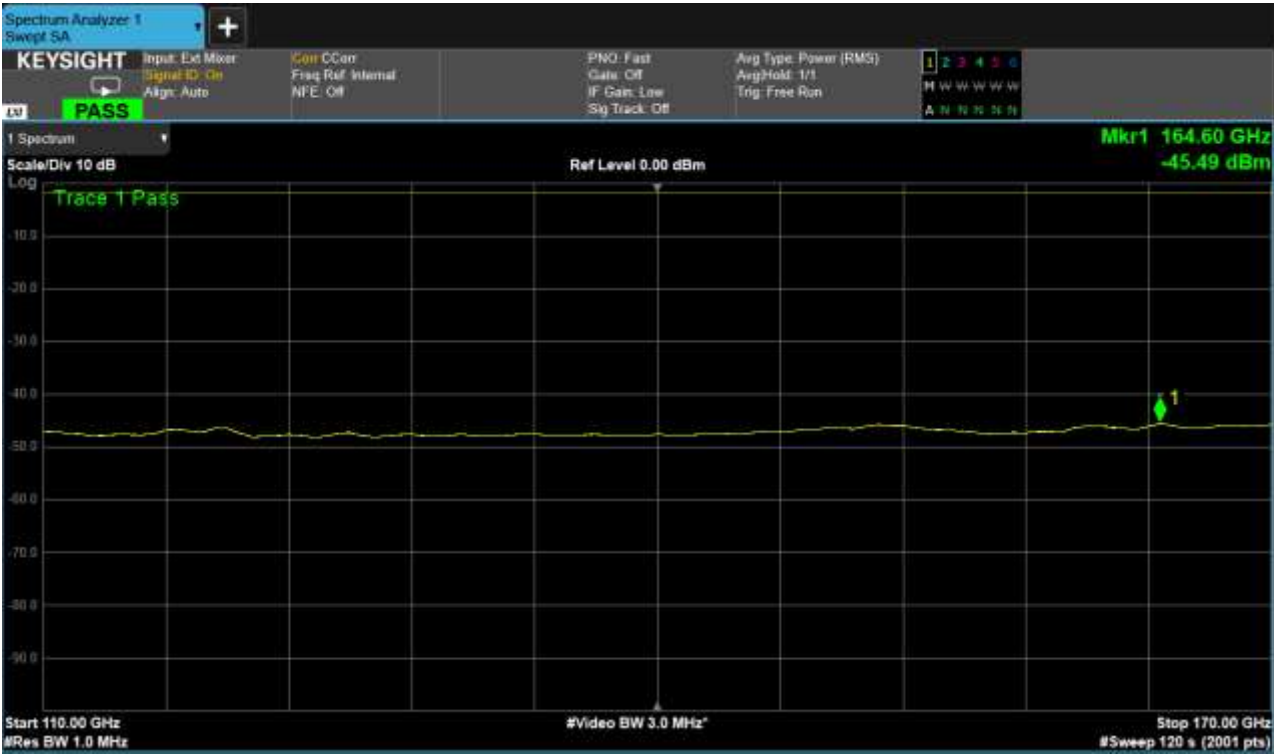
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not [§]
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

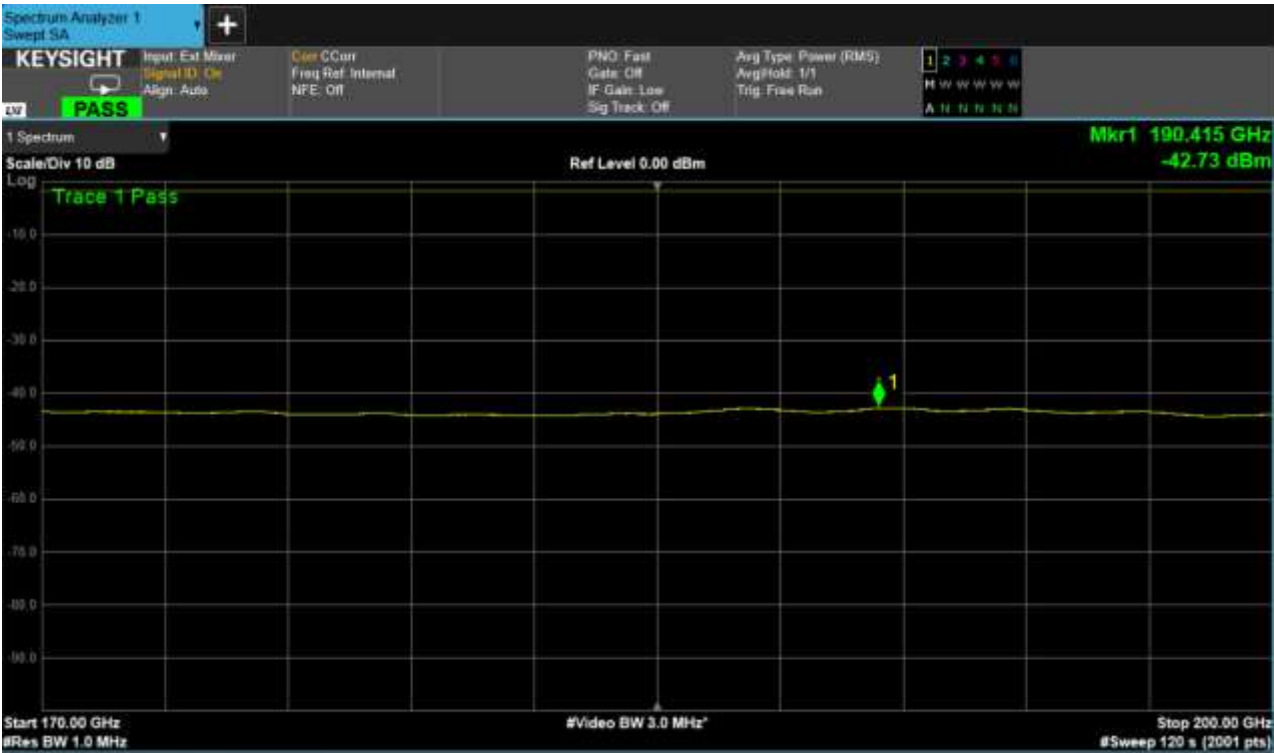
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	Not *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

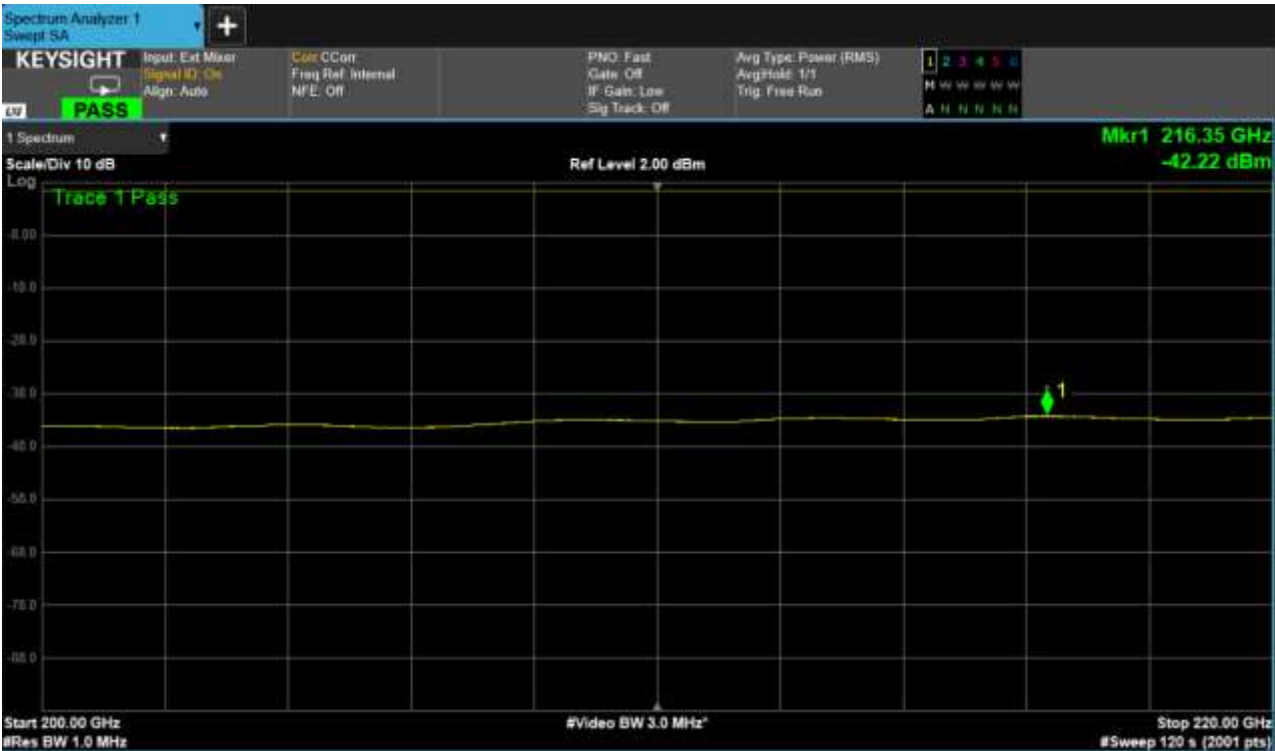
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

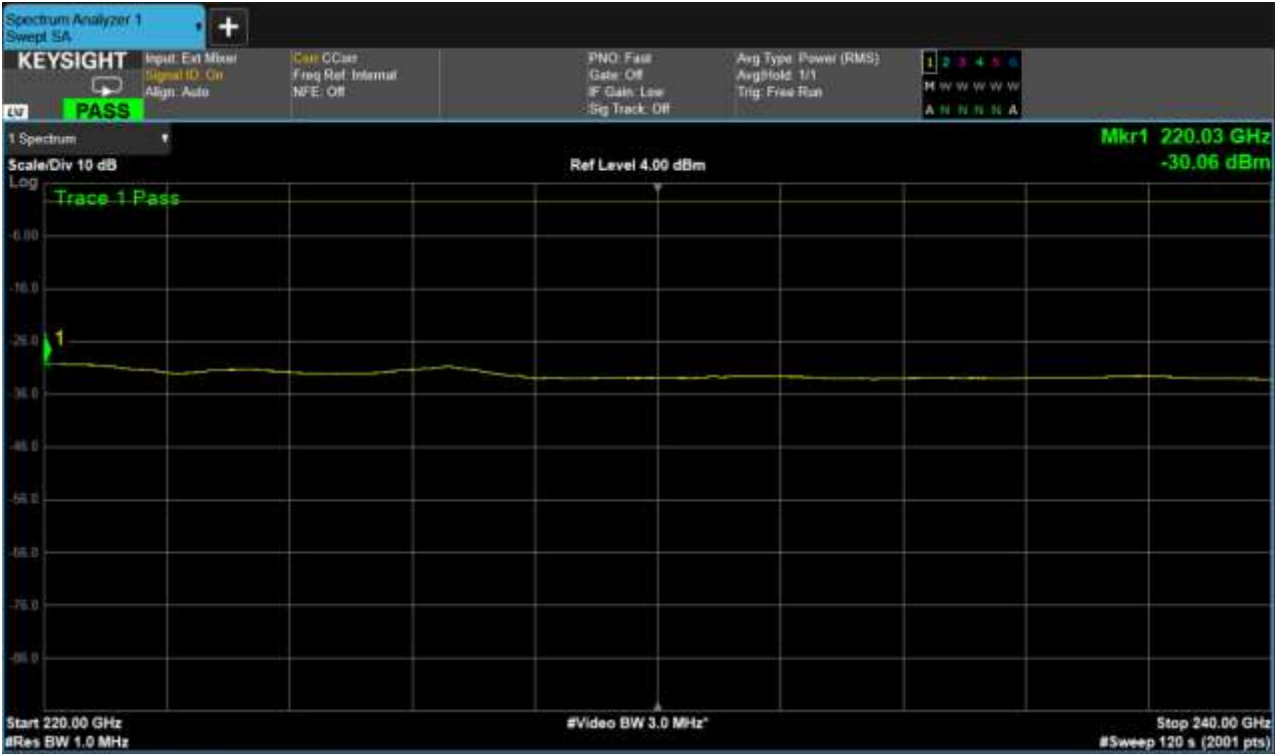
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not*
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

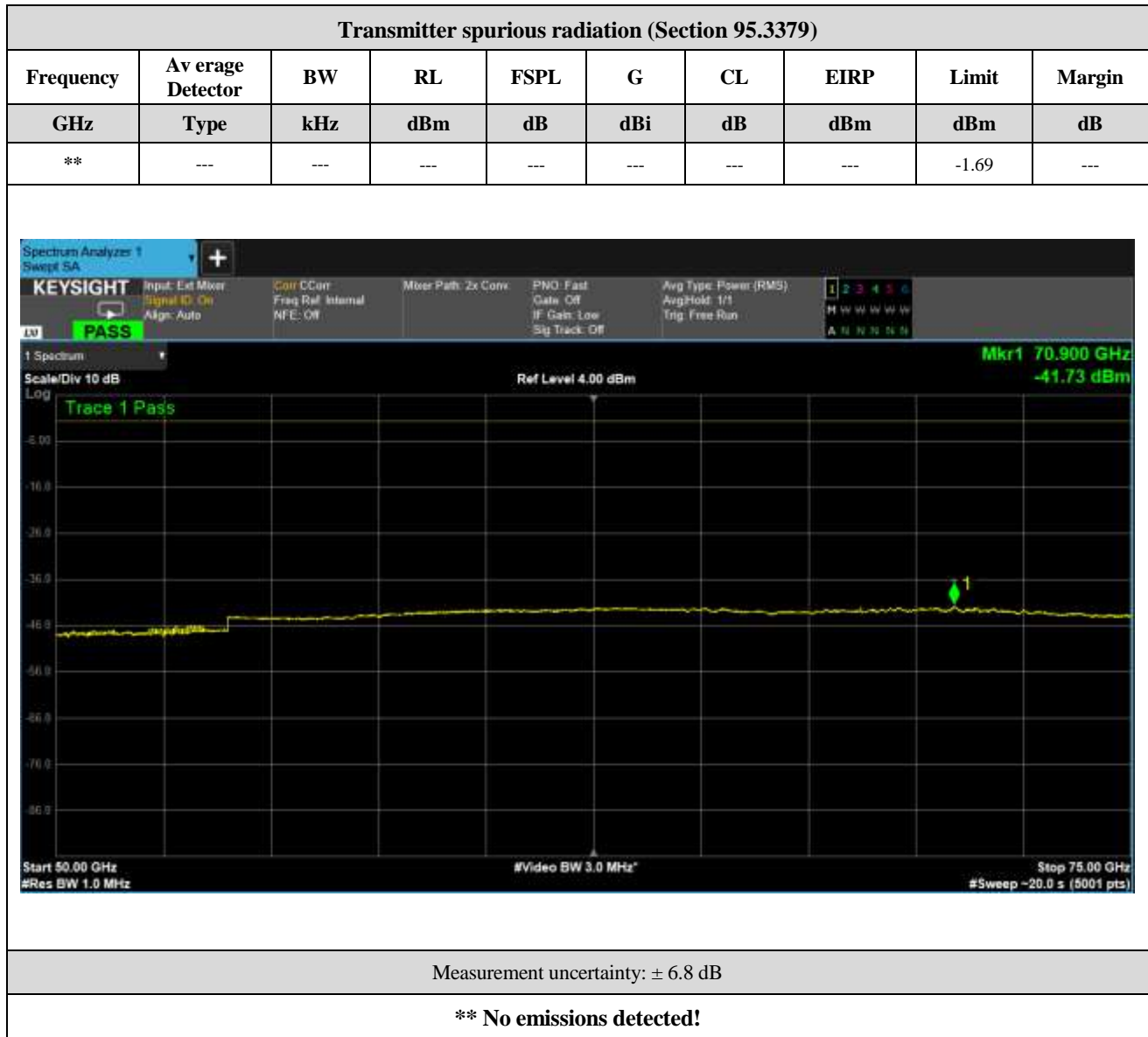
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

The equipment passed the conducted tests	Yes	No	Not *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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Waveform 0 @ 79.80 GHz (upper frequency)

50 GHz – 75 GHz



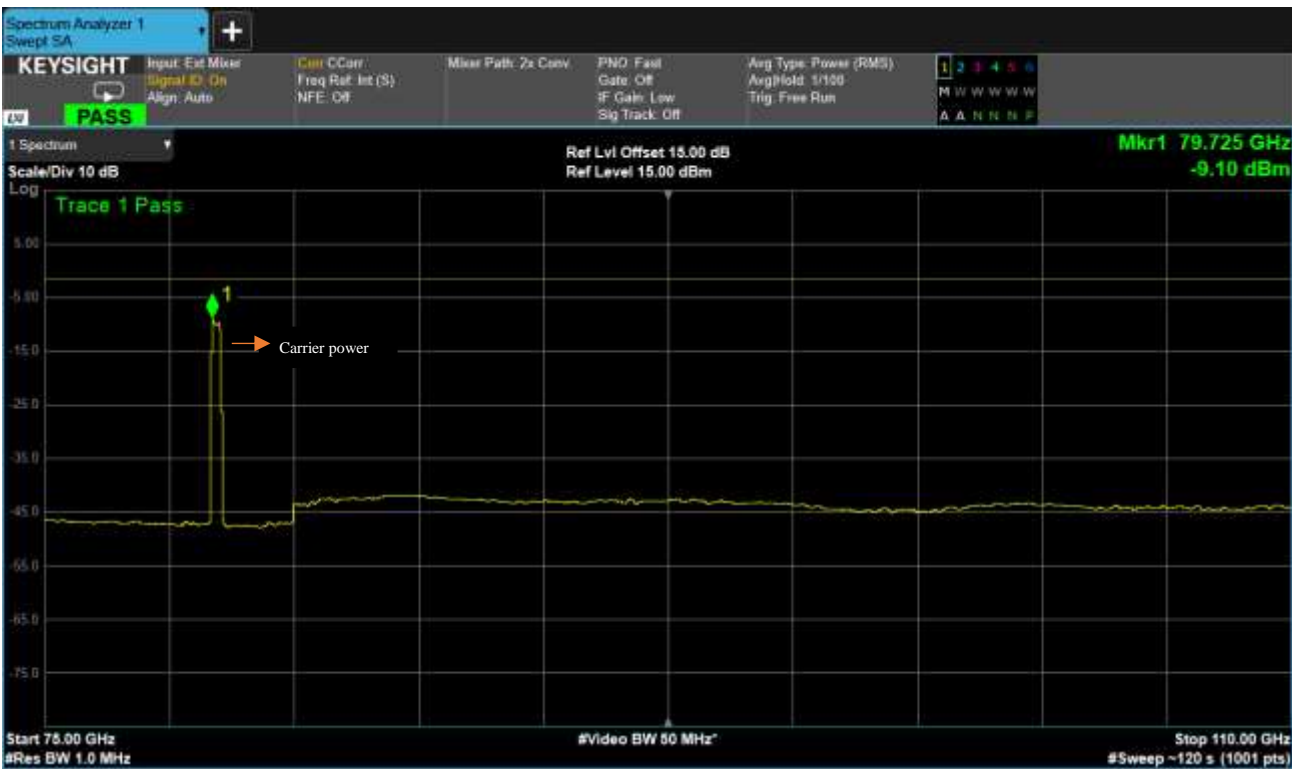
Test Cables used	K163
Test equipment used	384, 673, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	N/A *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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75 GHz – 110 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

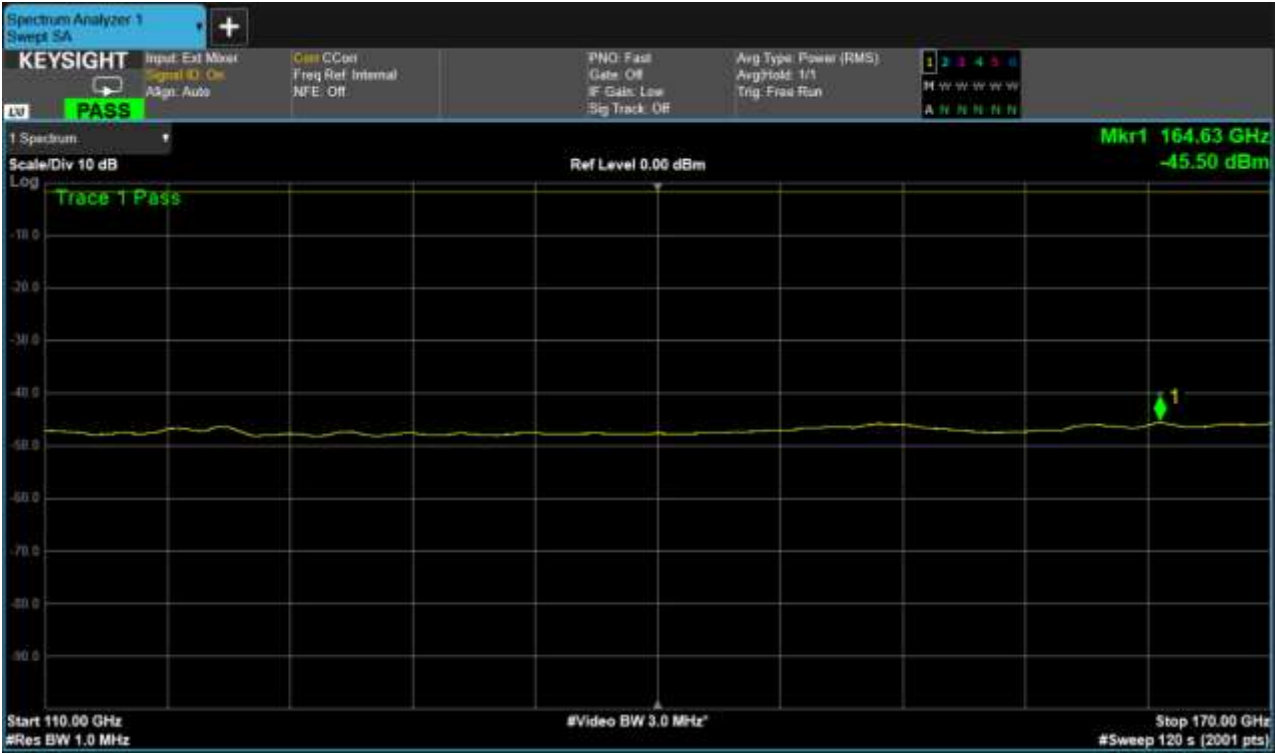
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	NA *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**


Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	NA *
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Test setup photos / test results are attached	Yes	No	Annex no.: 6
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170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

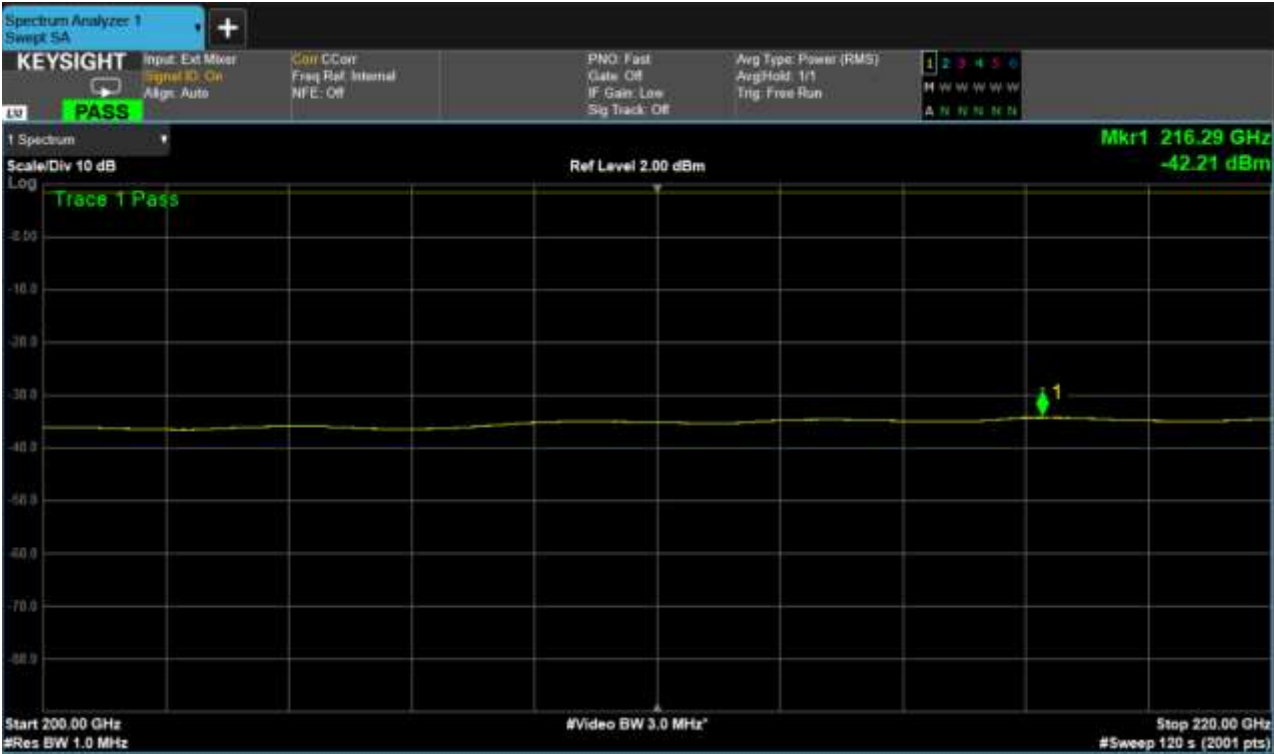
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

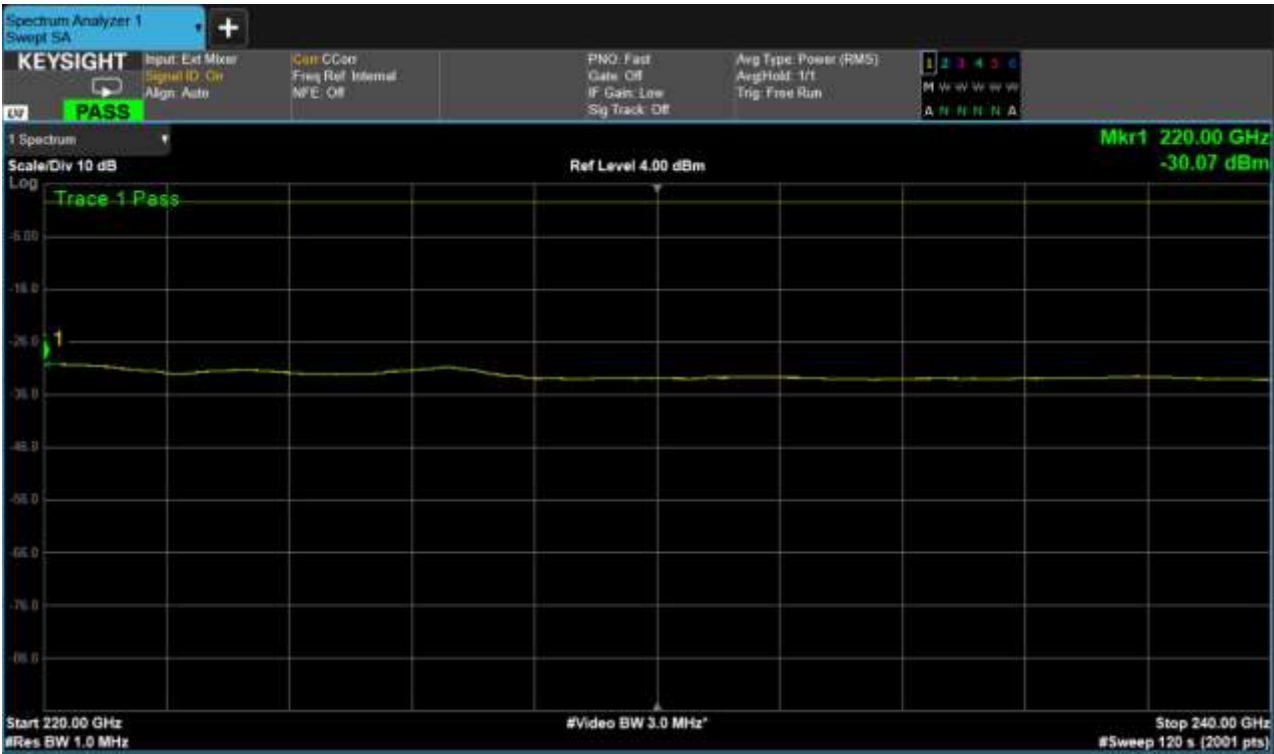
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

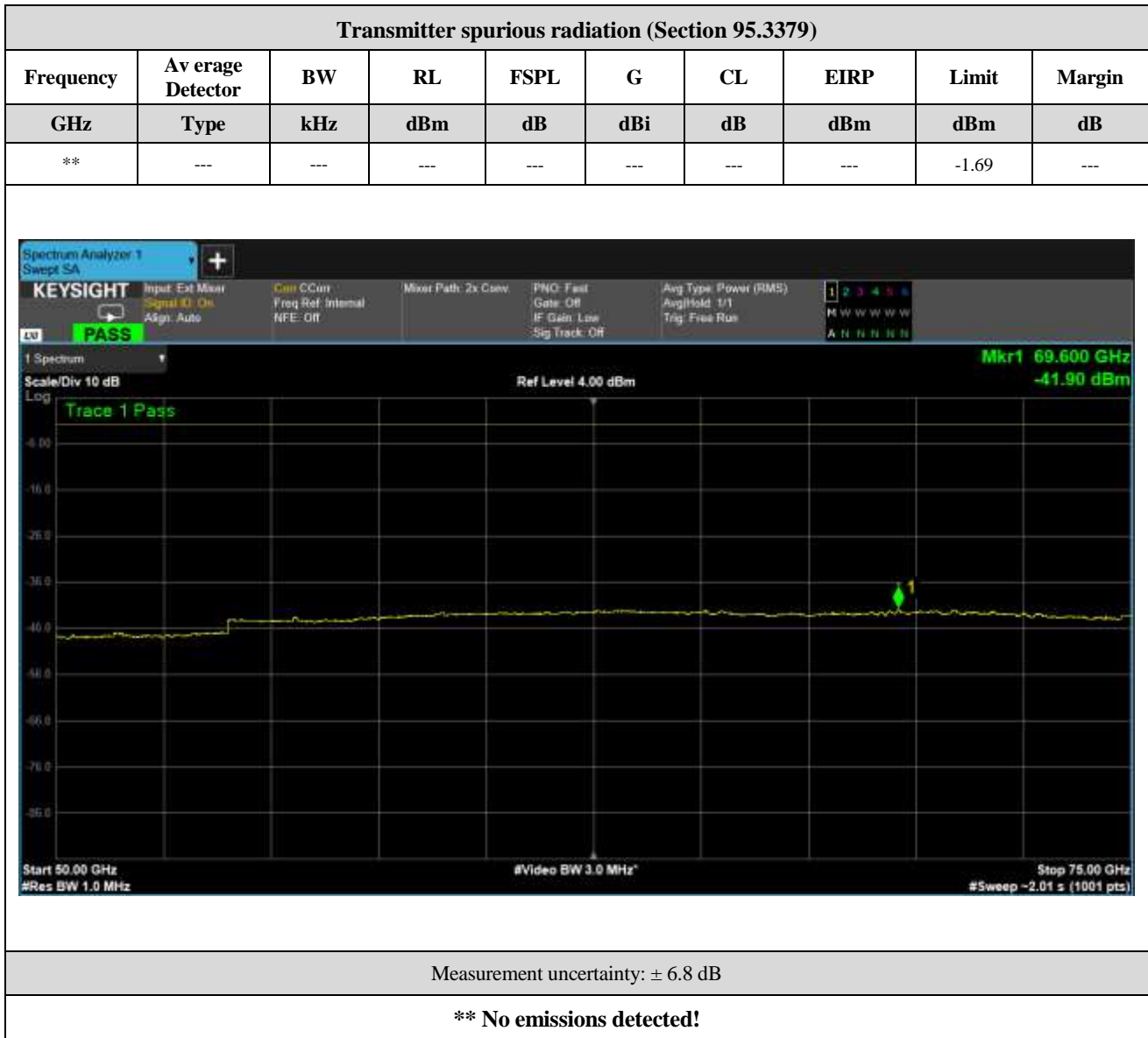
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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Waveform 1 @ 77.85 GHz (lower frequency)

50 GHz – 75 GHz



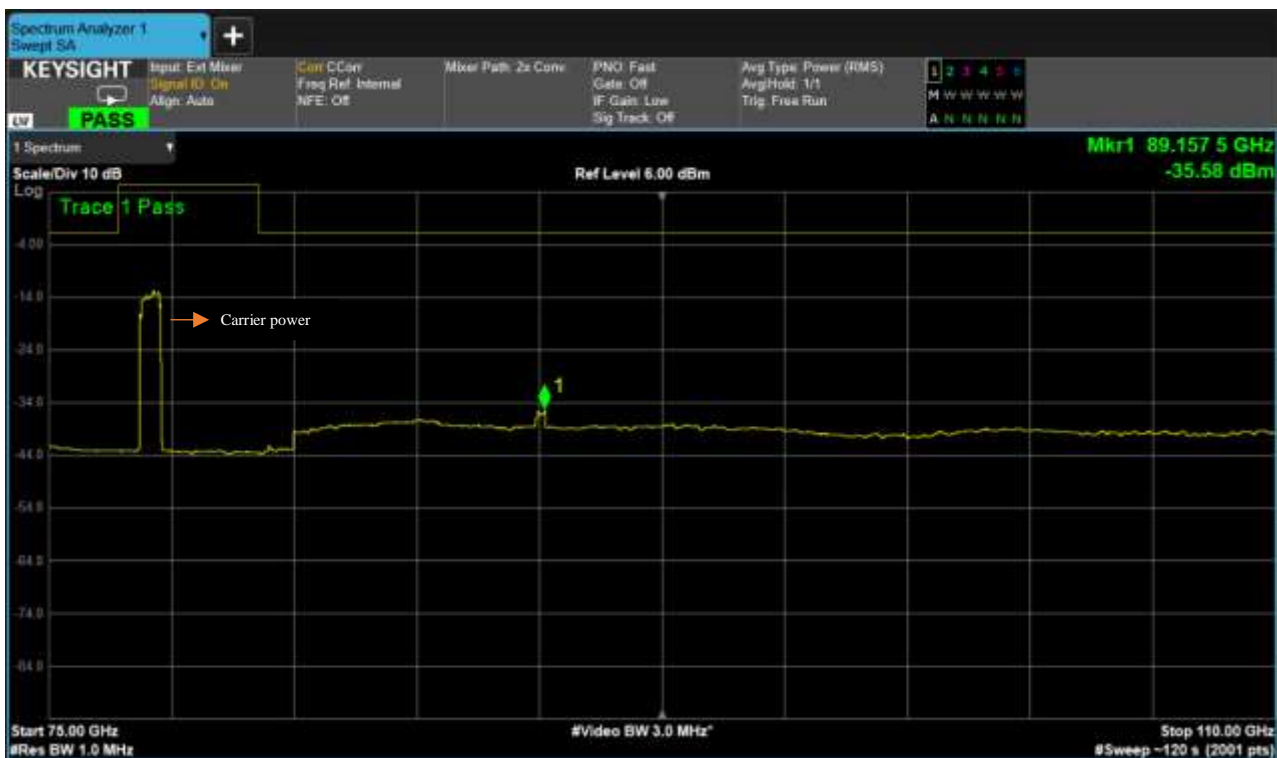
Test Cables used	K163
Test equipment used	384, 673, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	N/A *
--	-----	---------------	------------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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75 GHz – 110 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
89.1575	AV	1000	-92.78	65.5	24.7	16.4	-35.58	-1.69	33.89



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

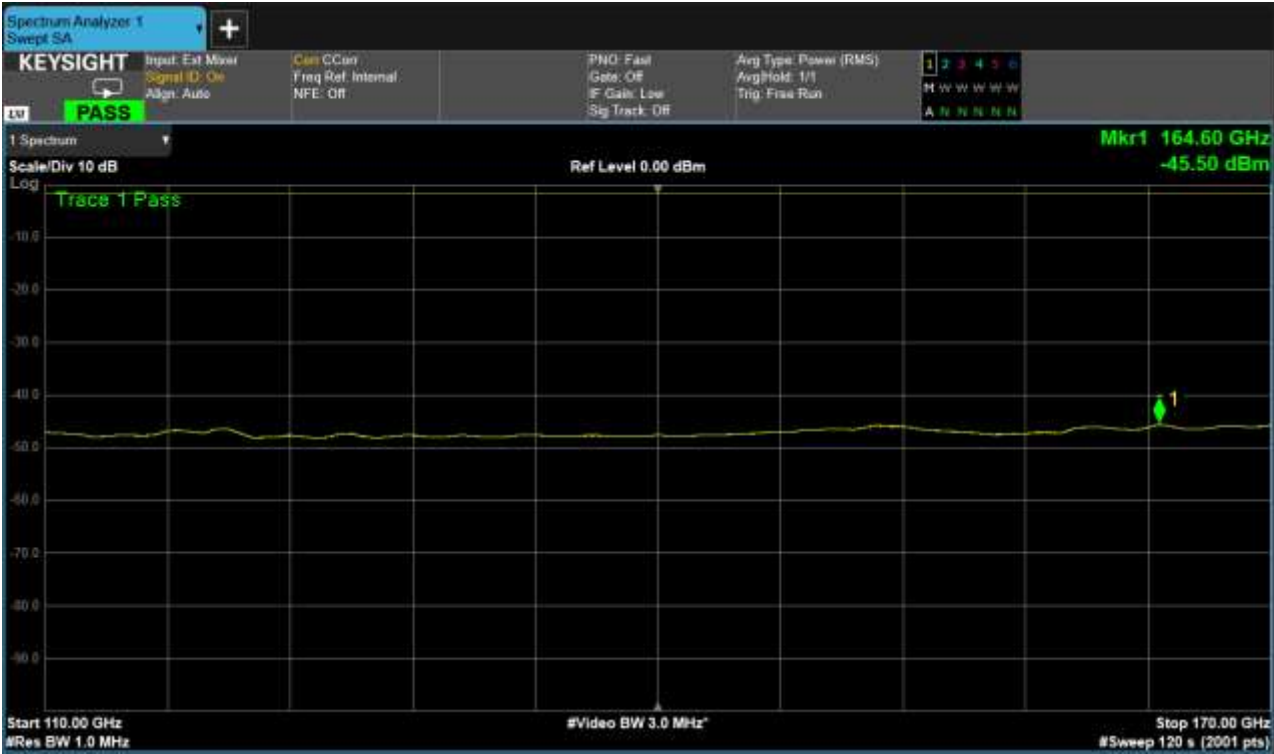
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not
--	-----	----	----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	----	--------------

110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

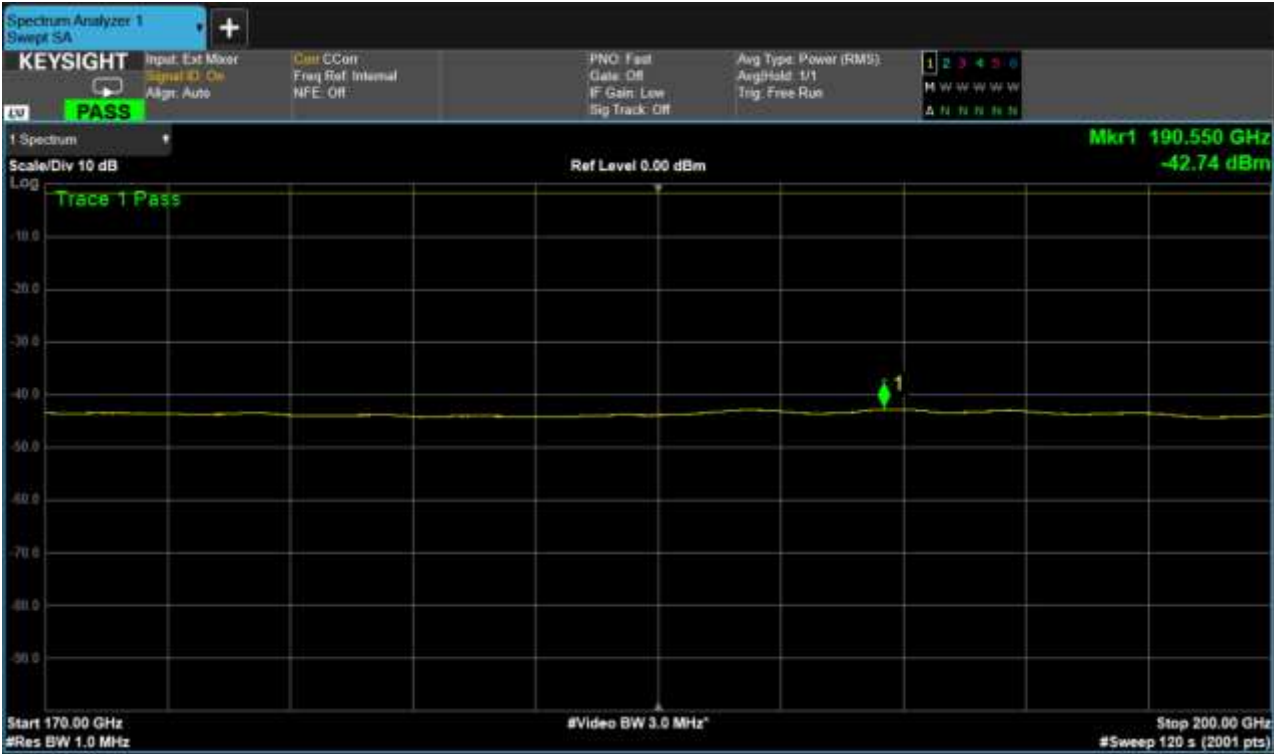
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

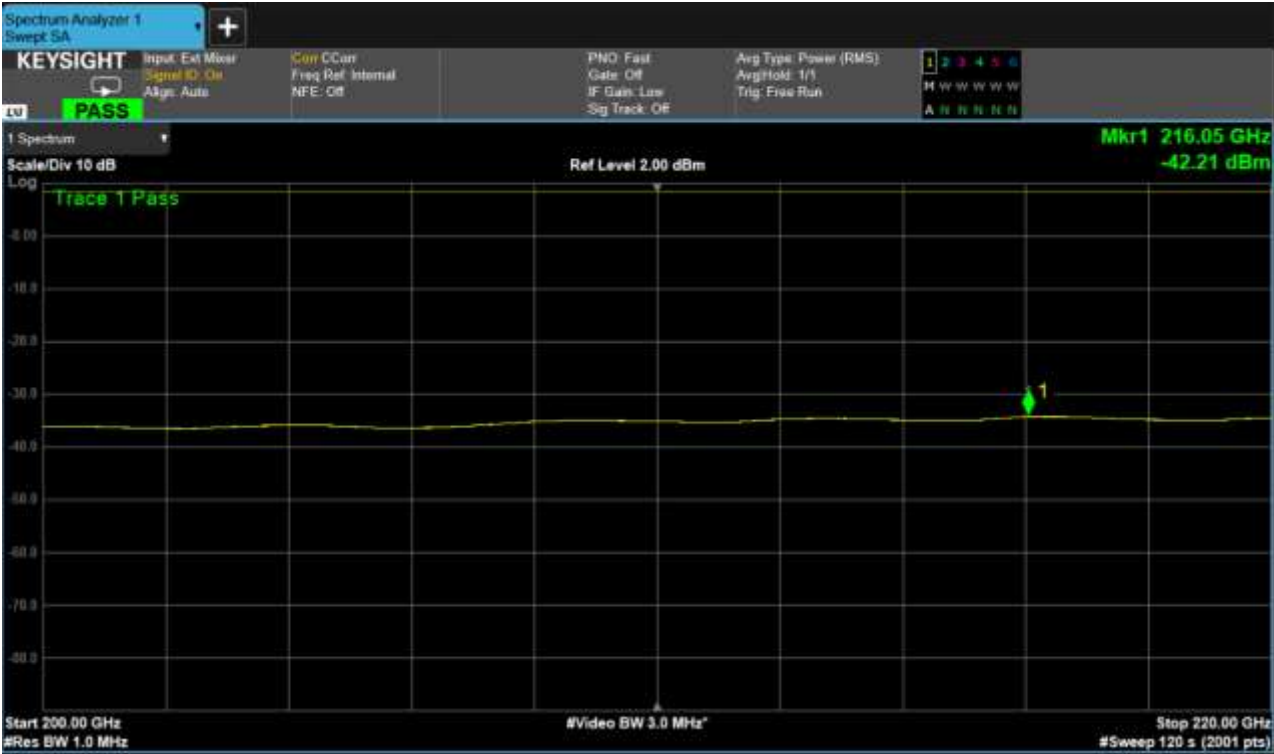
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not *
--	-----	----	------------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	----	--------------

200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

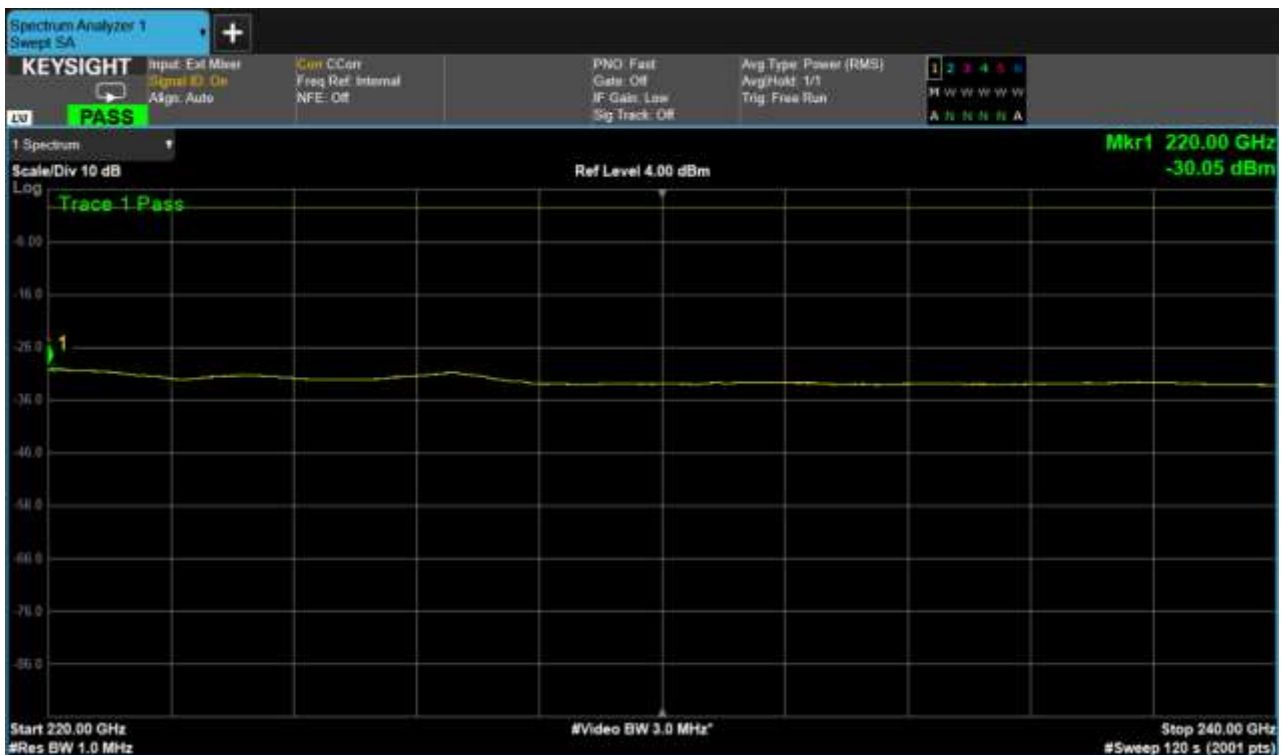
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

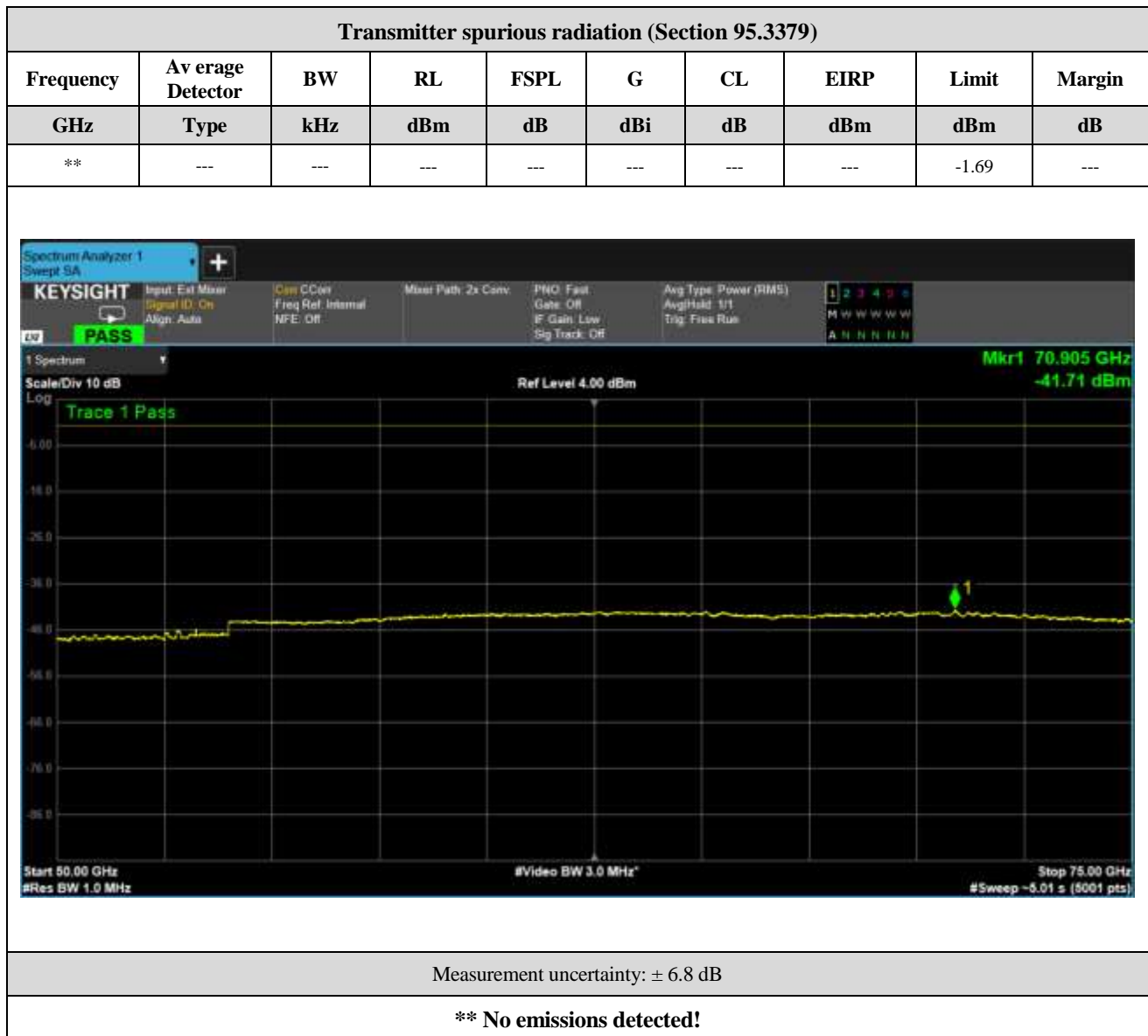
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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Waveform 1 @ 79.80 GHz (upper frequency)

50 GHz – 75 GHz



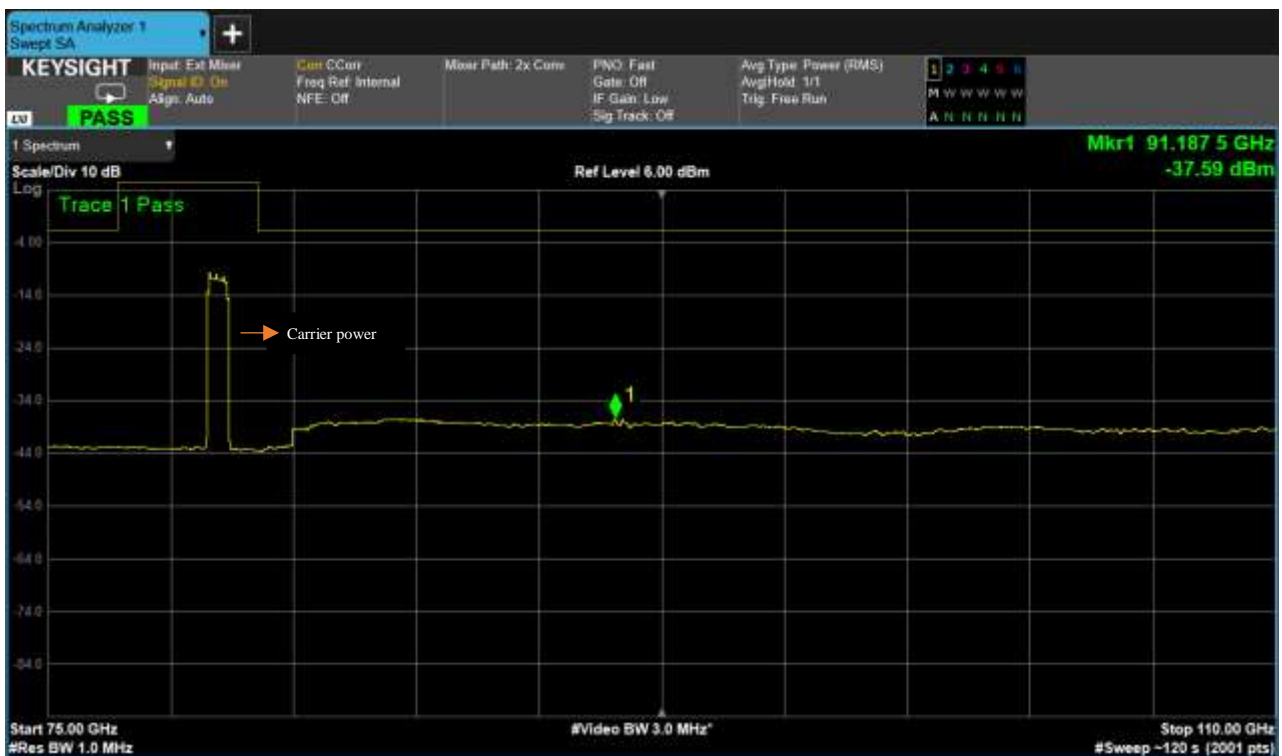
Test Cables used	K163
Test equipment used	384, 673, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	N/A *
--	-----	---------------	------------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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75 GHz – 110 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
91.1875	AV	1000	-94.89	65.6	24.8	16.5	-37.59	-1.69	35.9



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

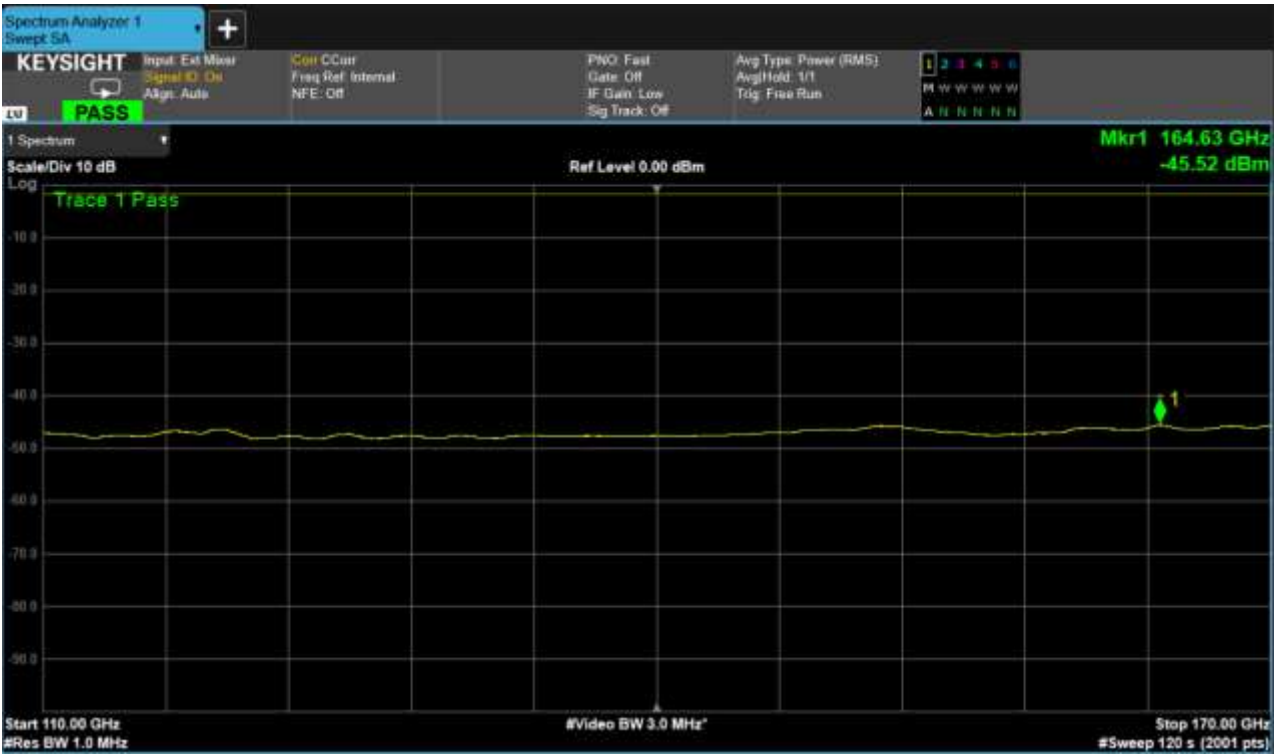
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not [§]
--	-----	---------------	-----------------------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

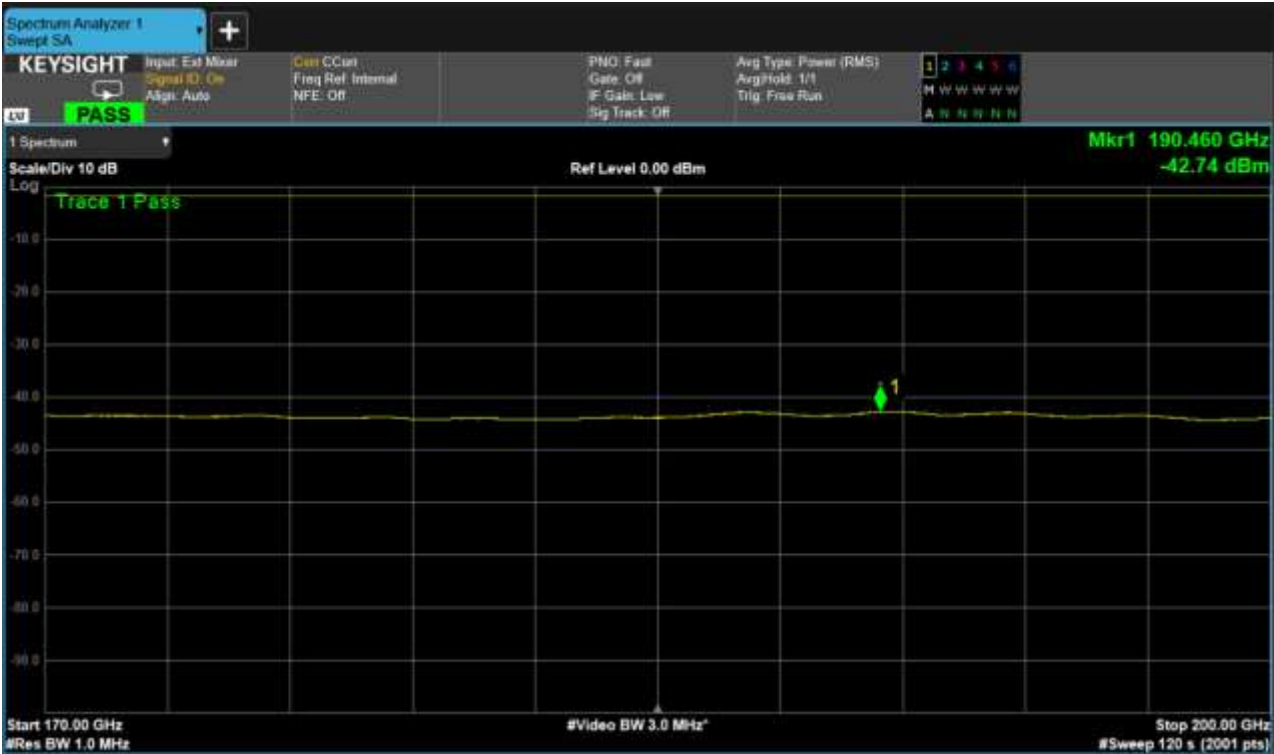
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

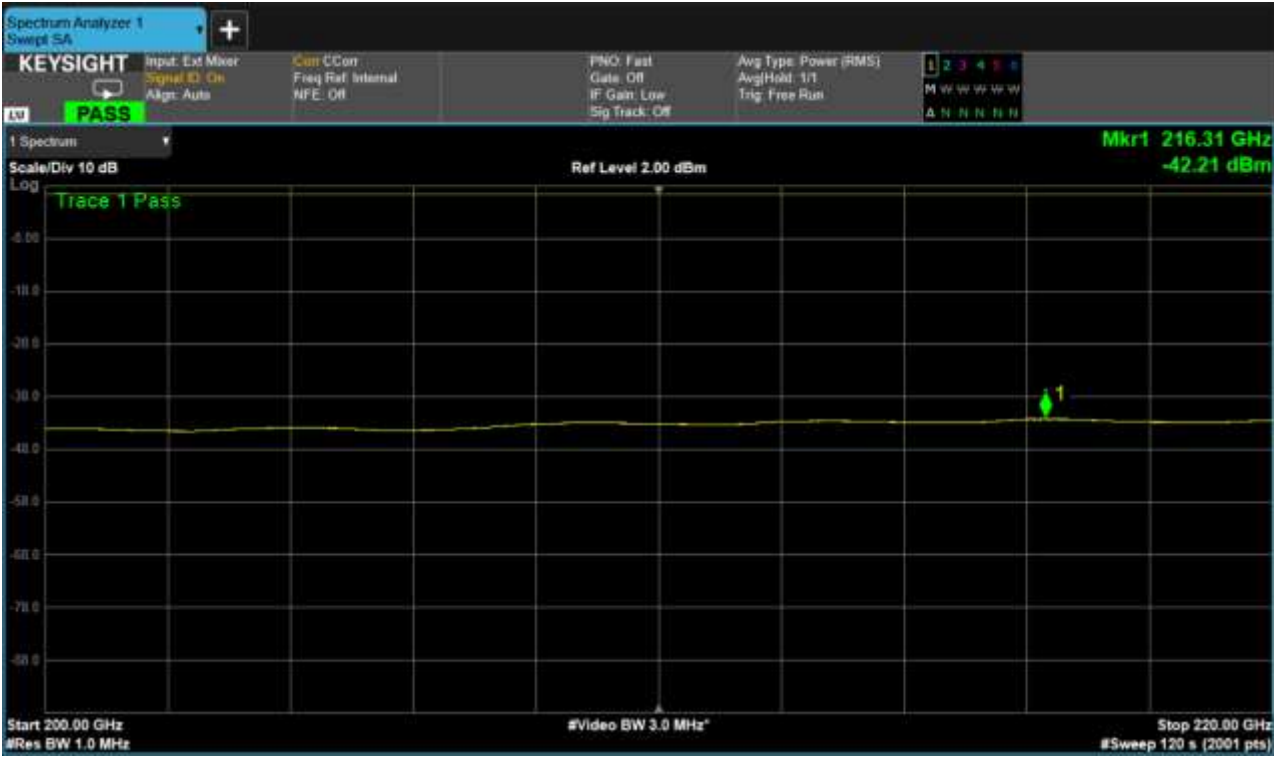
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

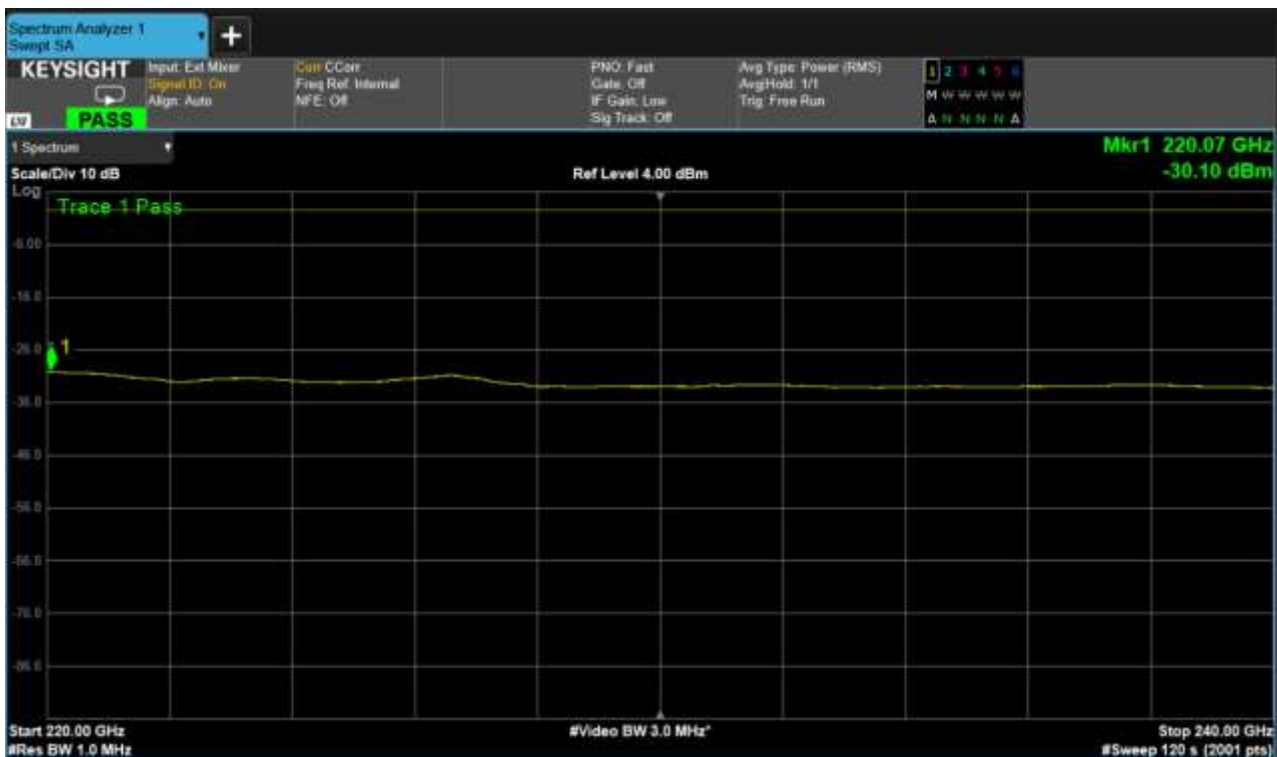
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

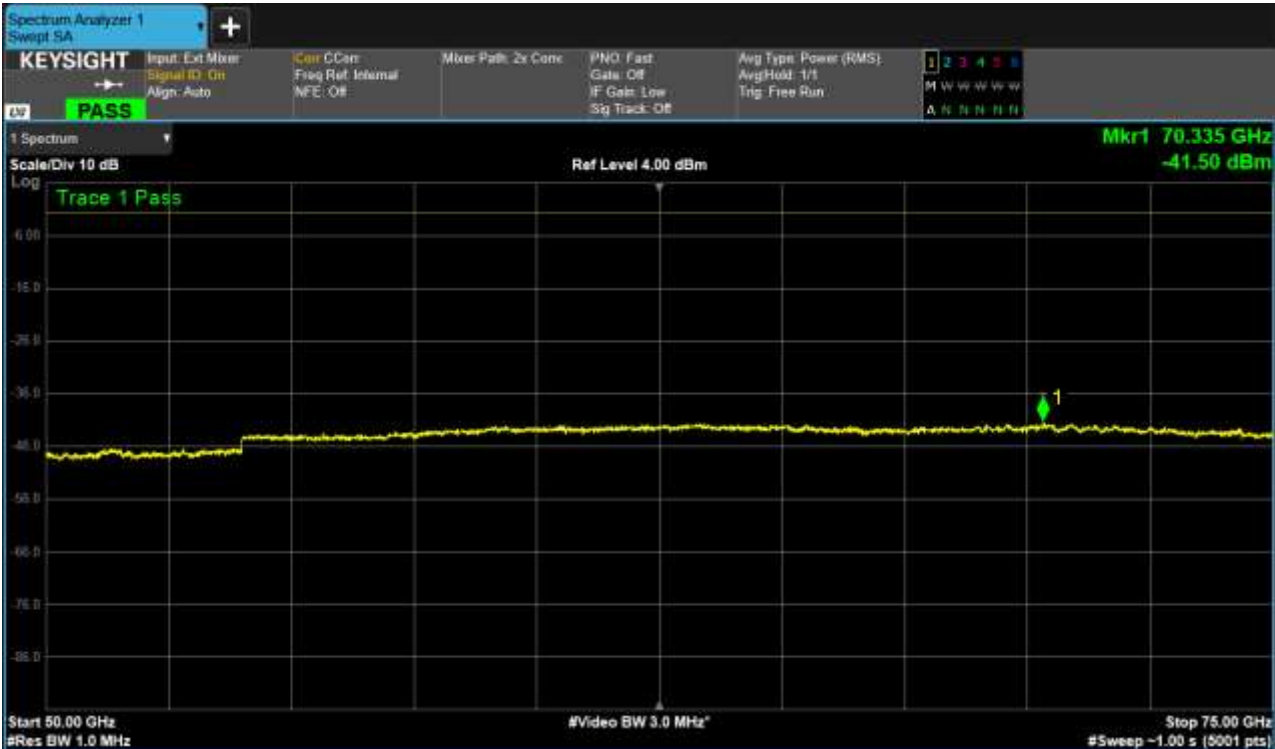
The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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Waveform 2 @ 77.85 GHz (lower frequency)

50 GHz – 75 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---

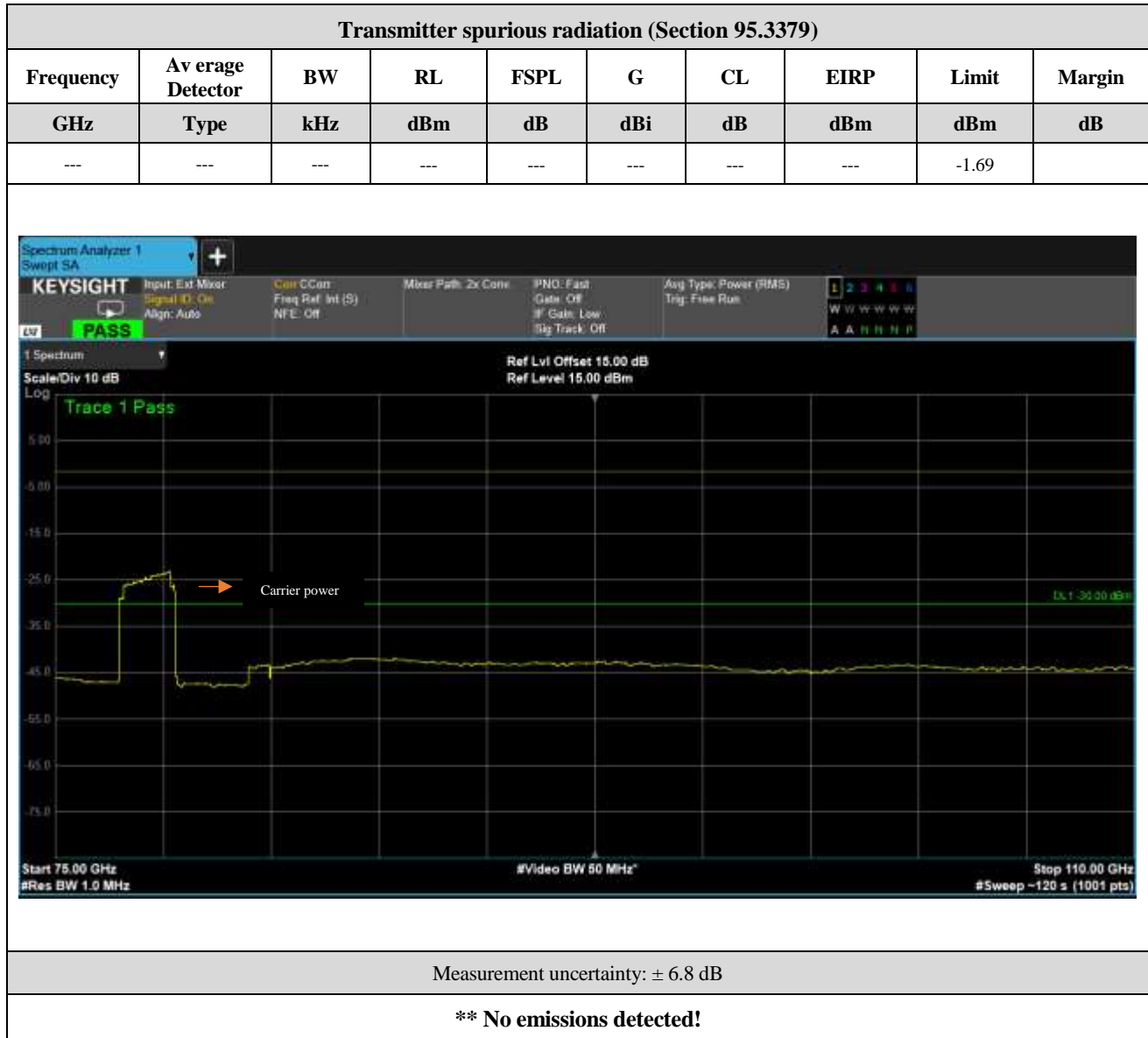


Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

Test Cables used	K163		
Test equipment used	384, 673, 660, 666, 667, 668, 669		
The equipment passed the conducted tests	Yes	No	Not
Test setup photos / test results are attached	Yes	No	Annex no.: 6

75 GHz – 110 GHz



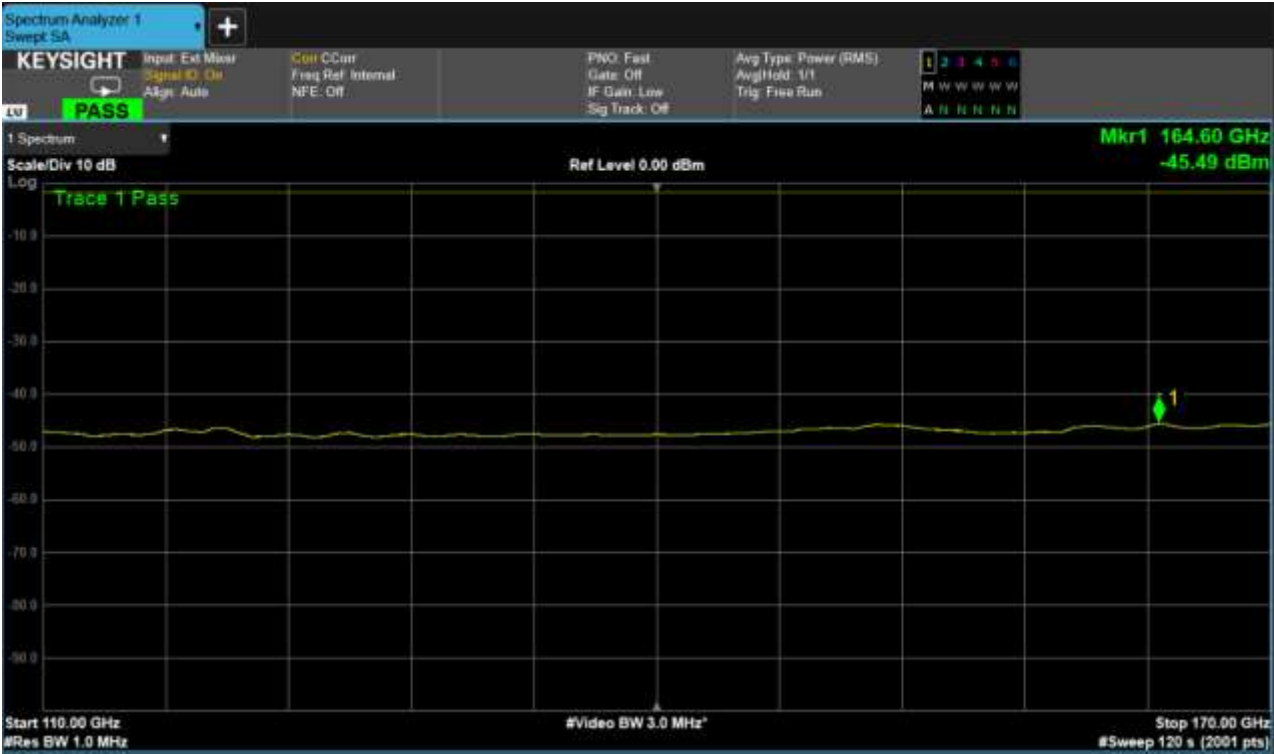
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not *
--	-----	---------------	------------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

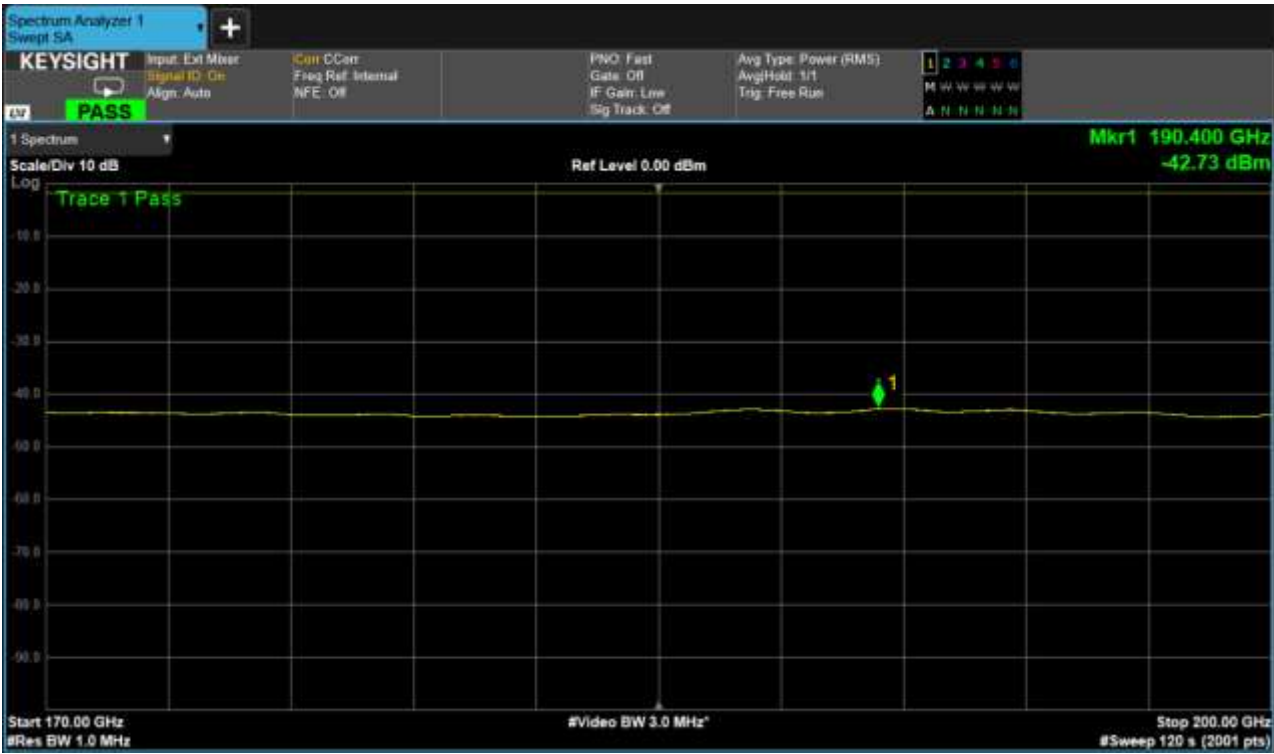
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

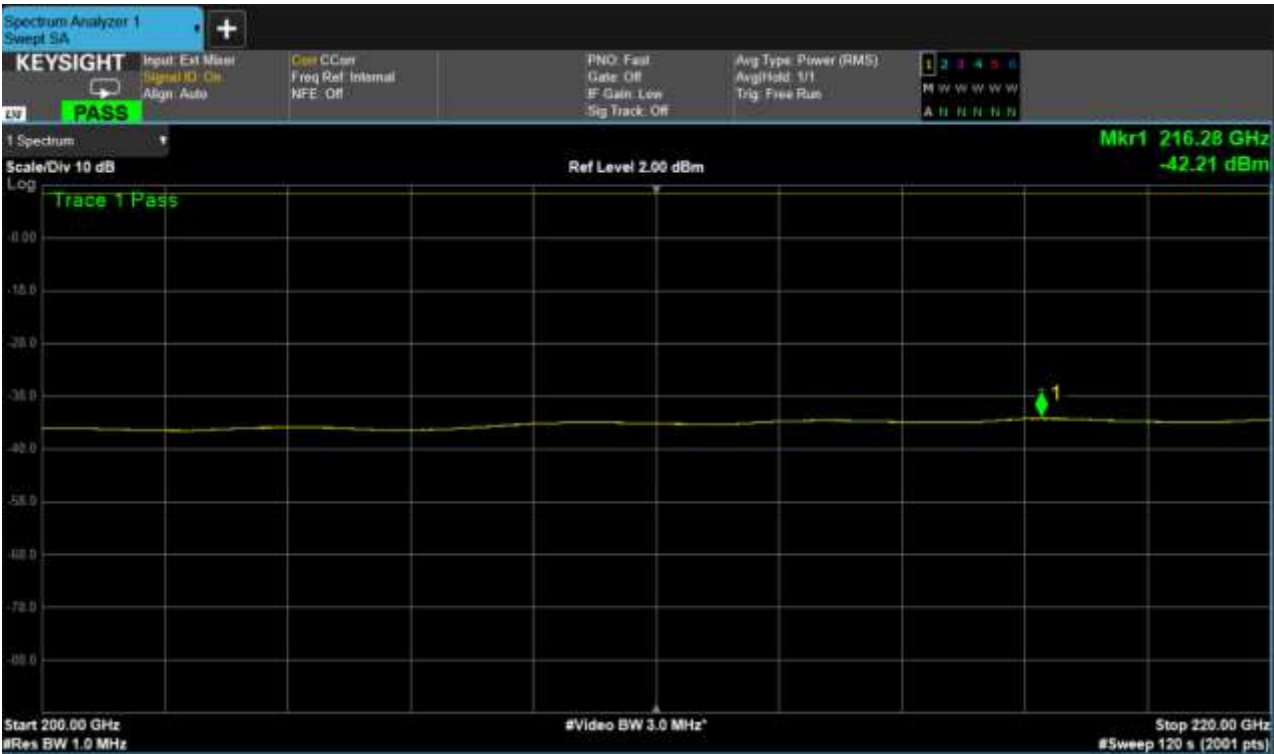
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



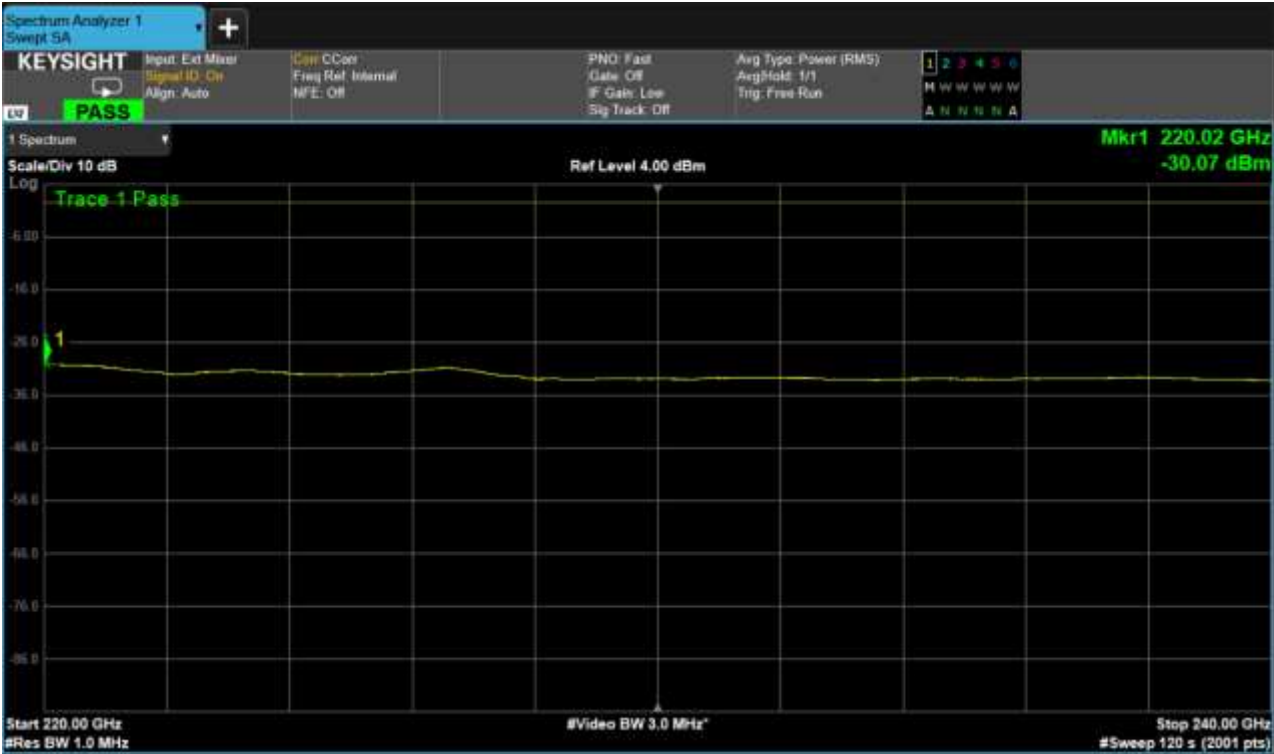
Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

Test Cables used	K163		
Test equipment used	660, 666, 667, 668, 669, 677, 688		
The equipment passed the conducted tests	Yes	No	Not[±]
Test setup photos / test results are attached	Yes	No	Annex no.: 6

220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

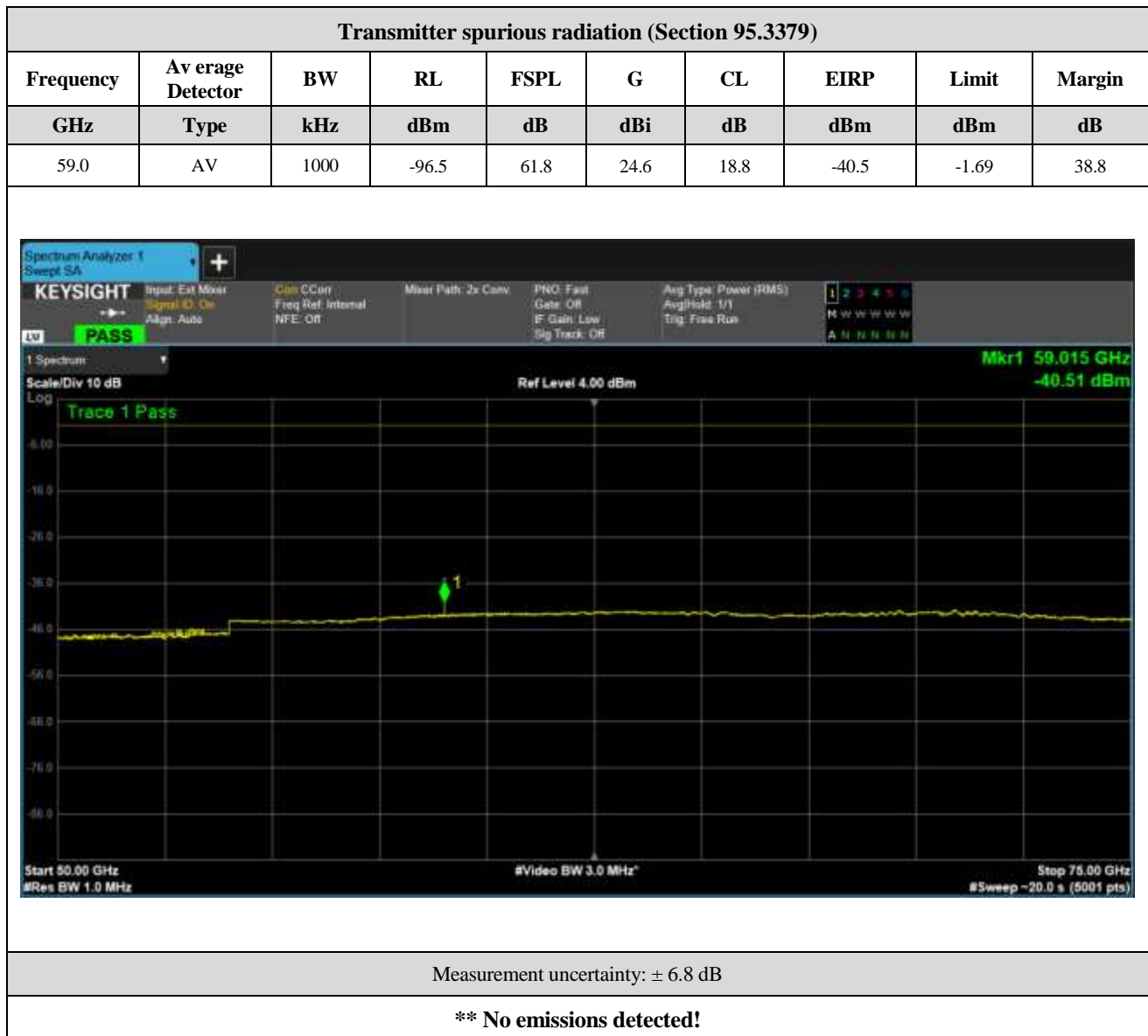
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

Waveform 2 @ 79.80 GHz (upper frequency)

50 GHz – 75 GHz



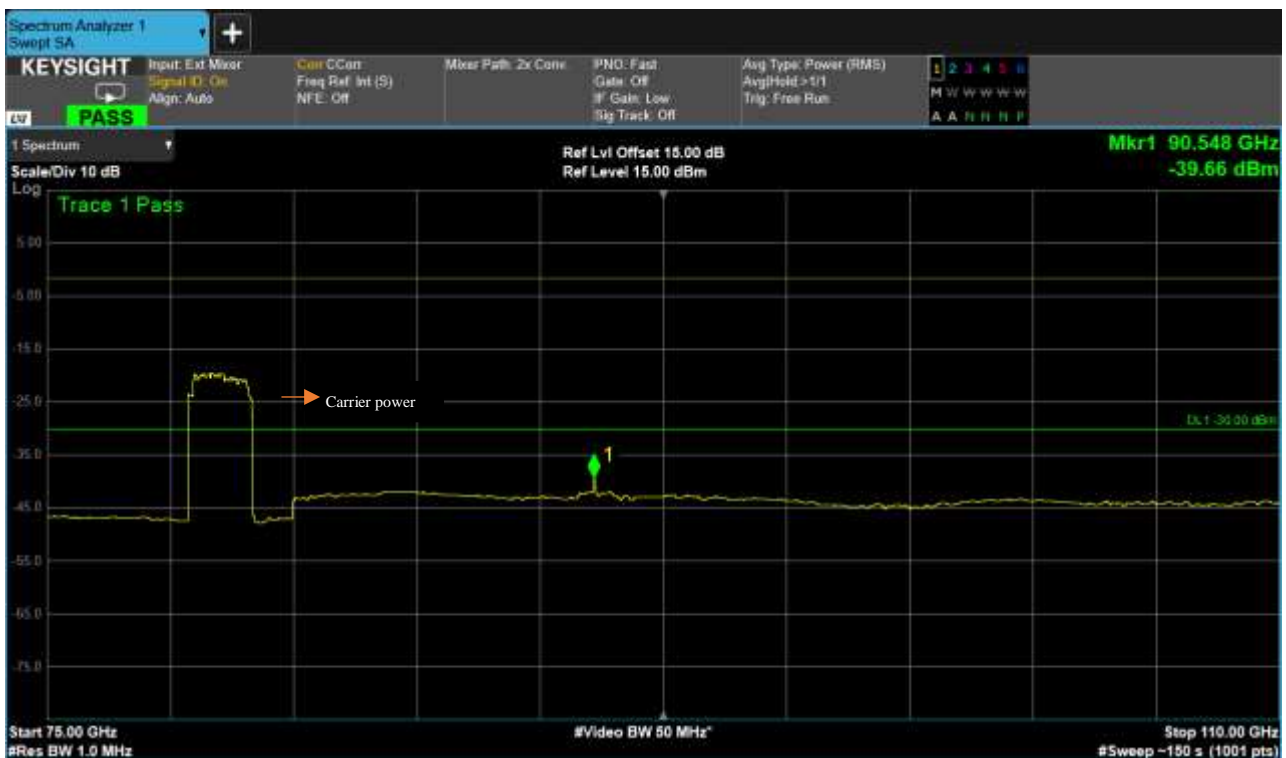
Test Cables used	K163
Test equipment used	384, 673, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	N/A *
--	-----	---------------	------------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

75 GHz – 110 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
90.548	AV	1000	-96.96	65.6	24.7	16.4	-39.66	-1.69	37.97



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

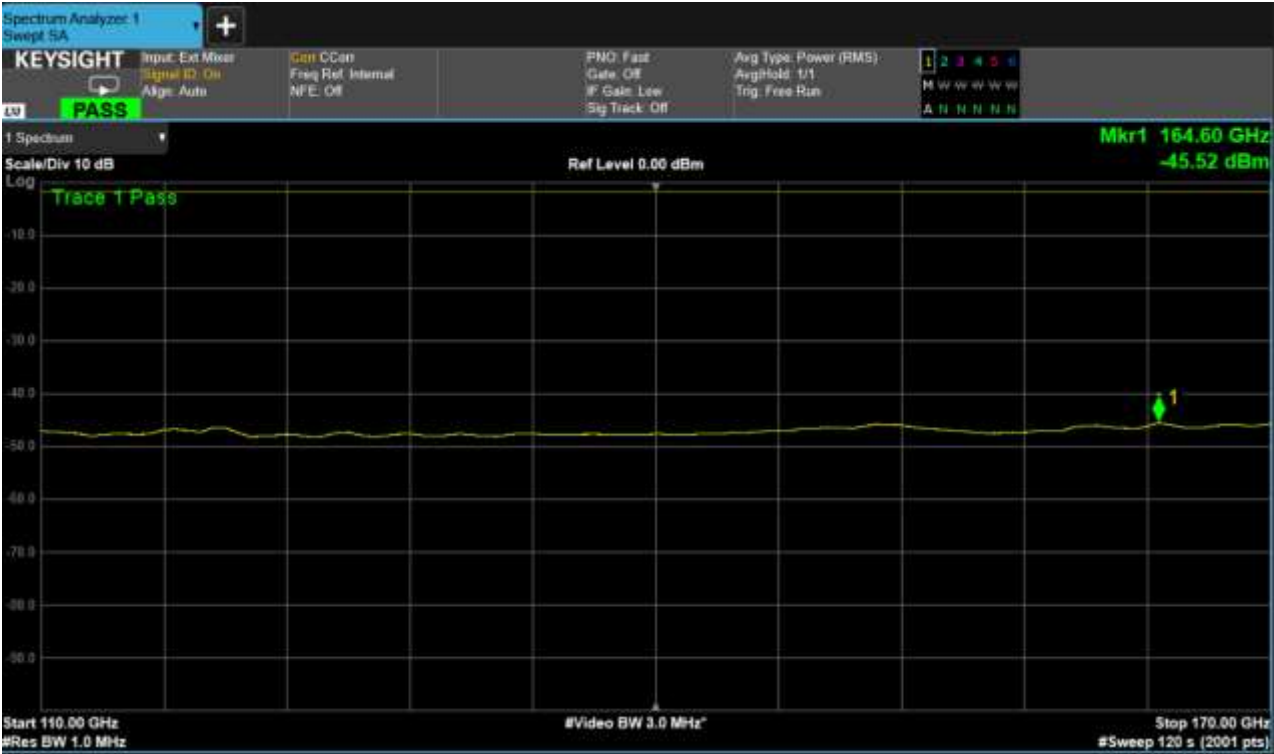
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not
--	-----	----	----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	----	--------------

110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

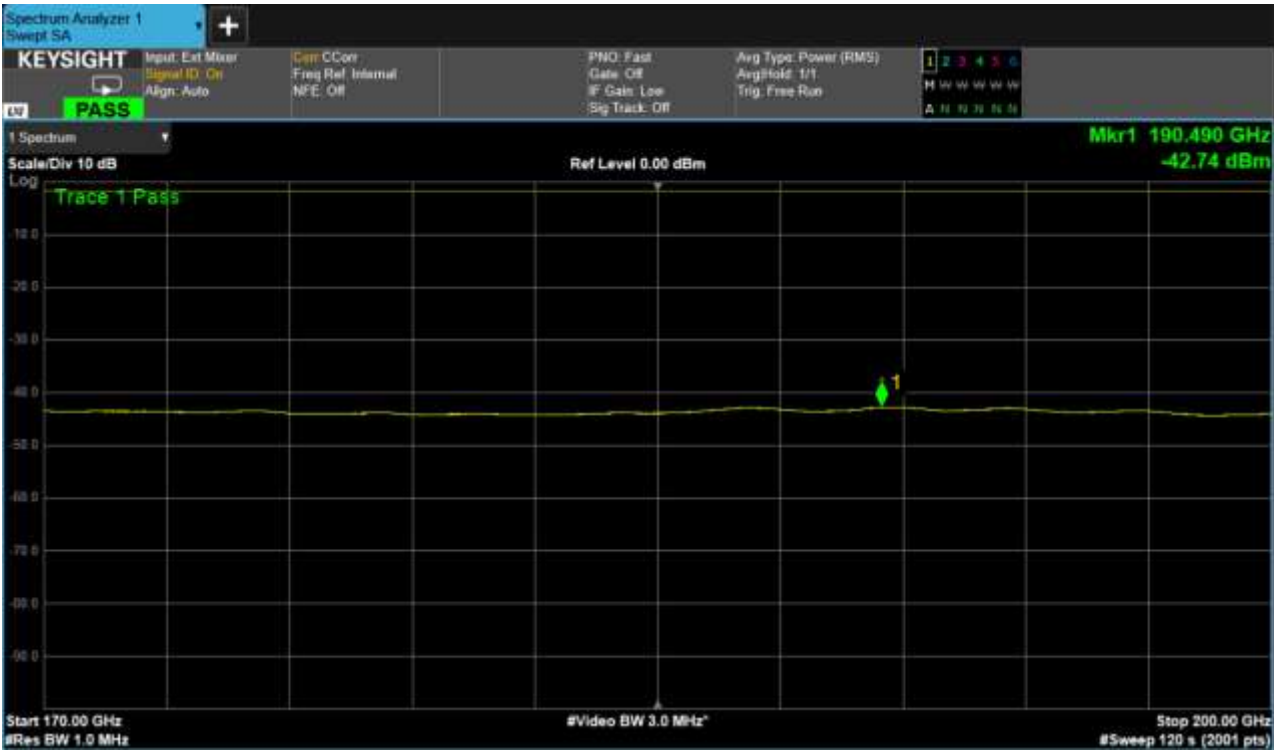
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

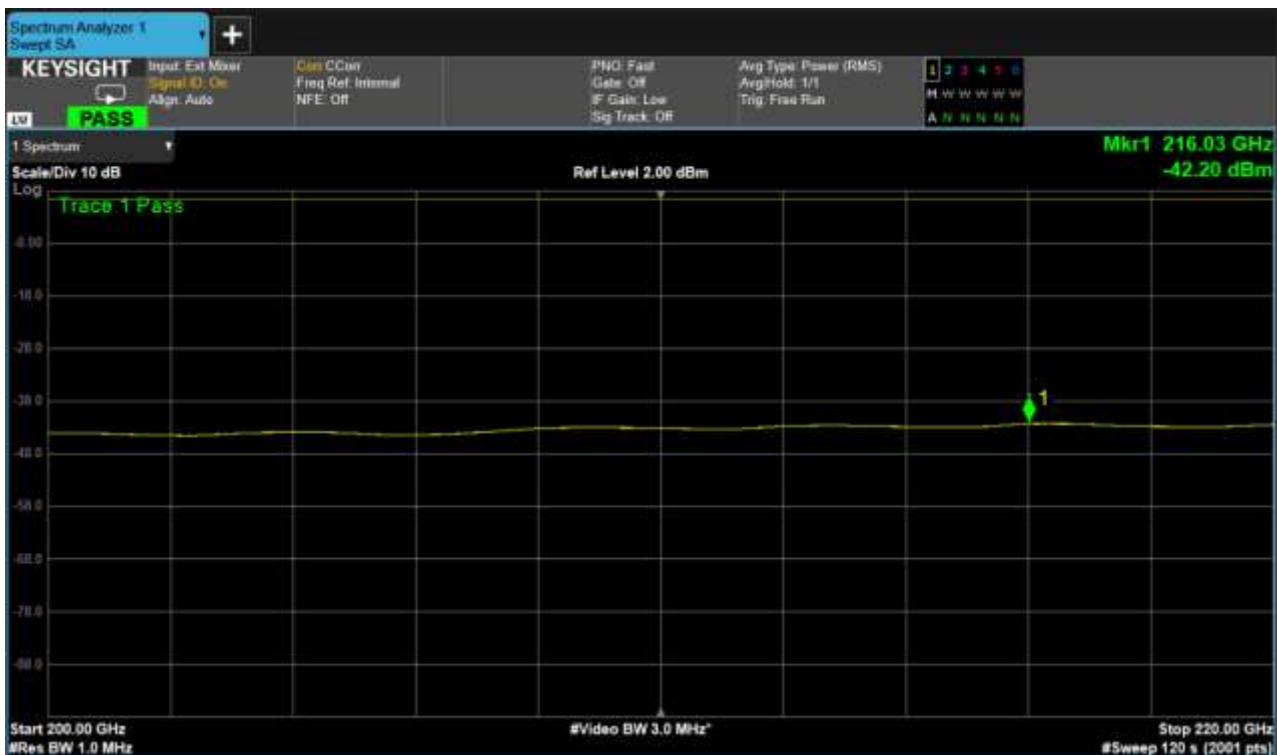
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

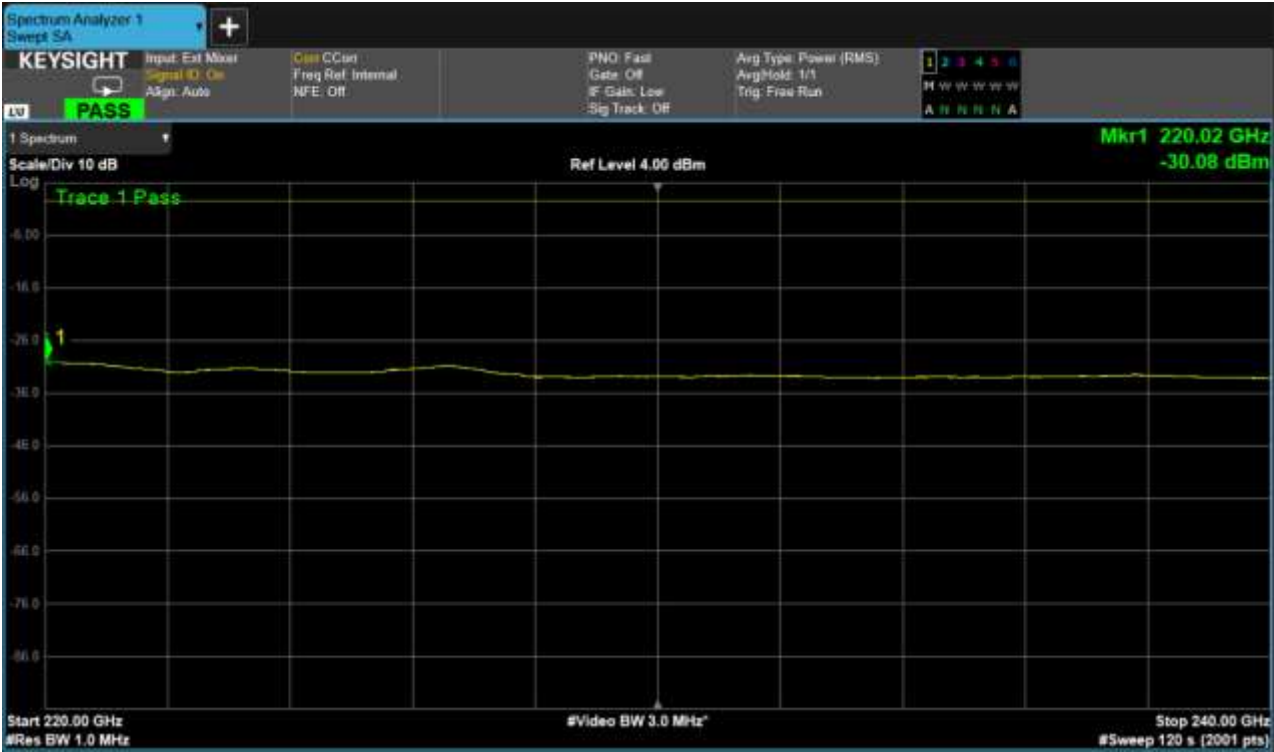
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

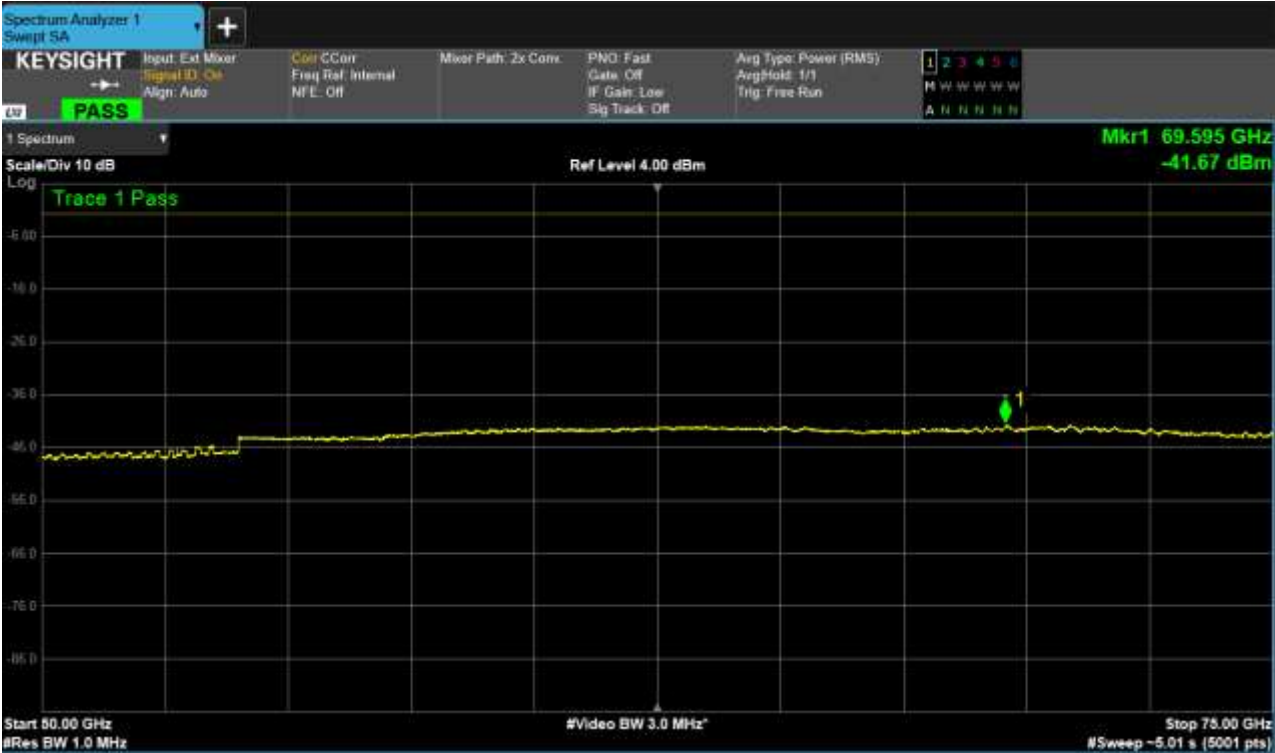
The equipment passed the conducted tests	Yes	No	NA *
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

Waveform 3 @ 78.85 GHz

50 GHz – 75 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



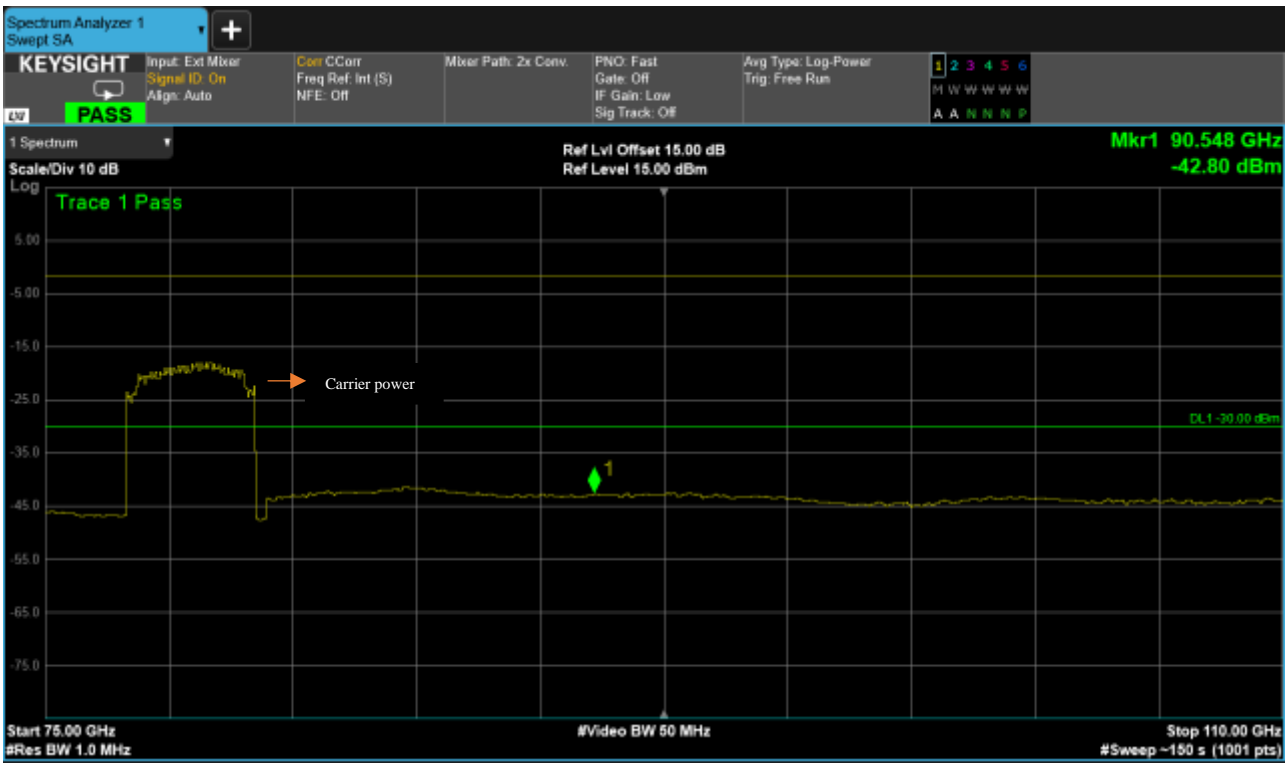
Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

Test Cables used	K163		
Test equipment used	384, 673, 660, 666, 667, 668, 669		
The equipment passed the conducted tests	Yes	No	Not
Test setup photos / test results are attached	Yes	No	Annex no.: 6

75 GHz – 110 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
---	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

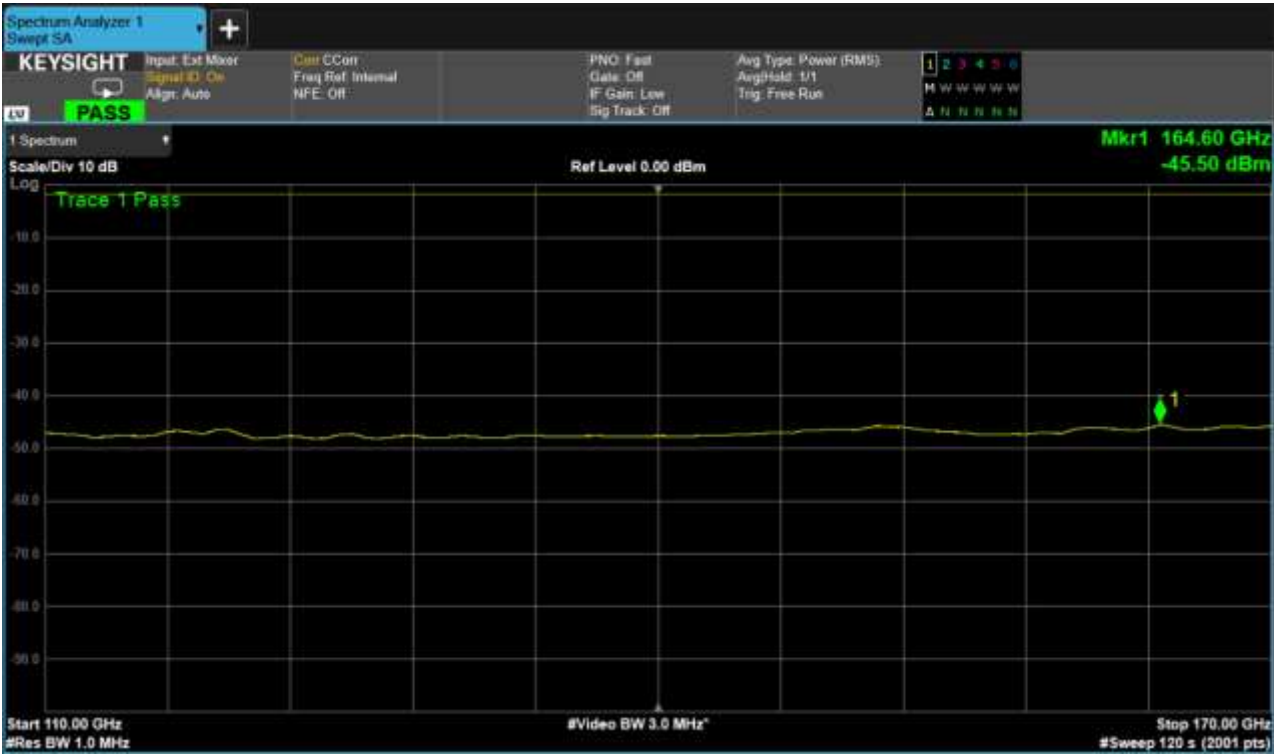
Test Cables used	K163
Test equipment used	385, 674, 660, 666, 667, 668, 669

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

110 GHz – 170 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dB	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

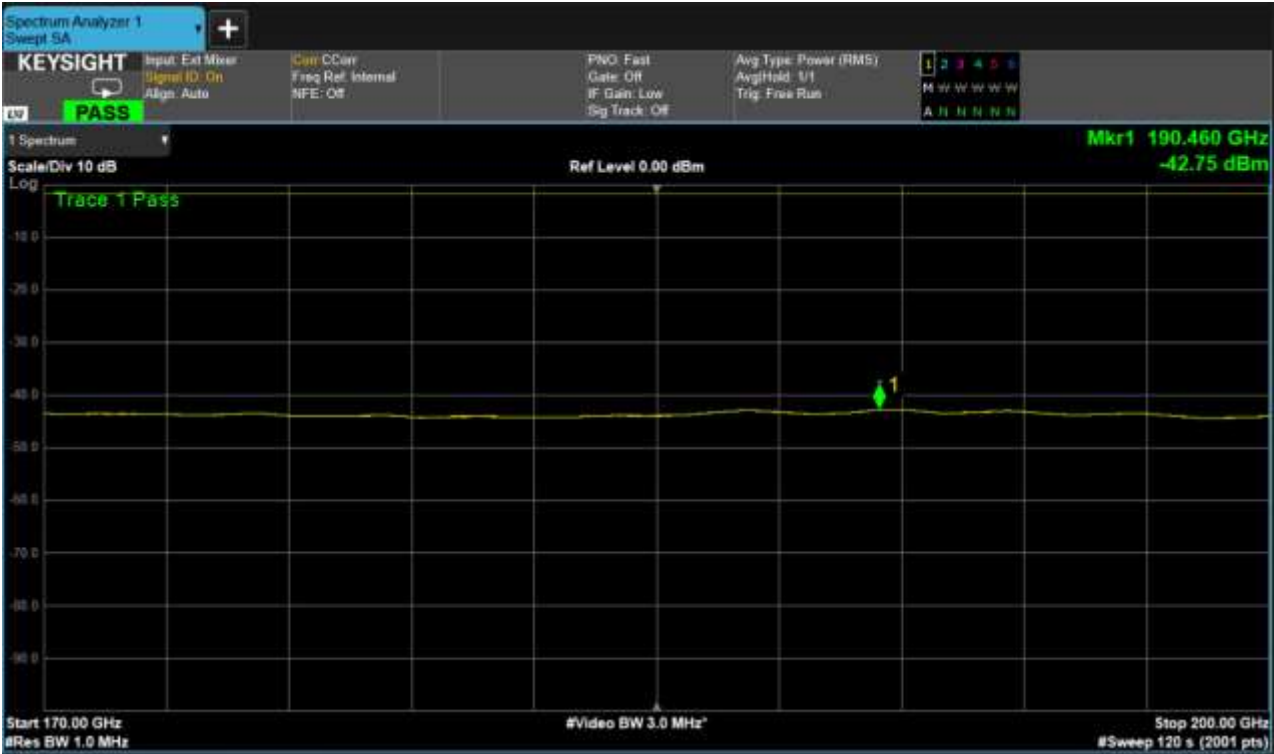
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 675, 687

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

170 GHz – 200 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	-1.69	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

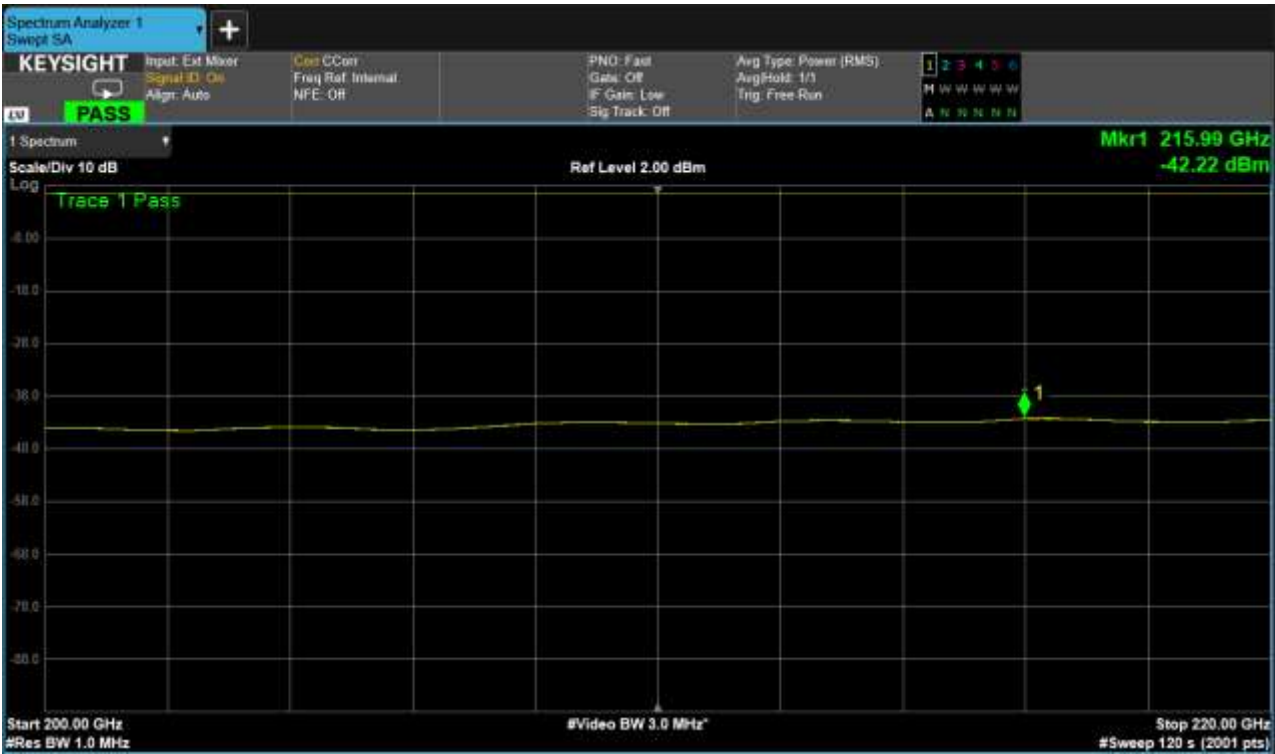
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

200 GHz – 220 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB

**** No emissions detected!**

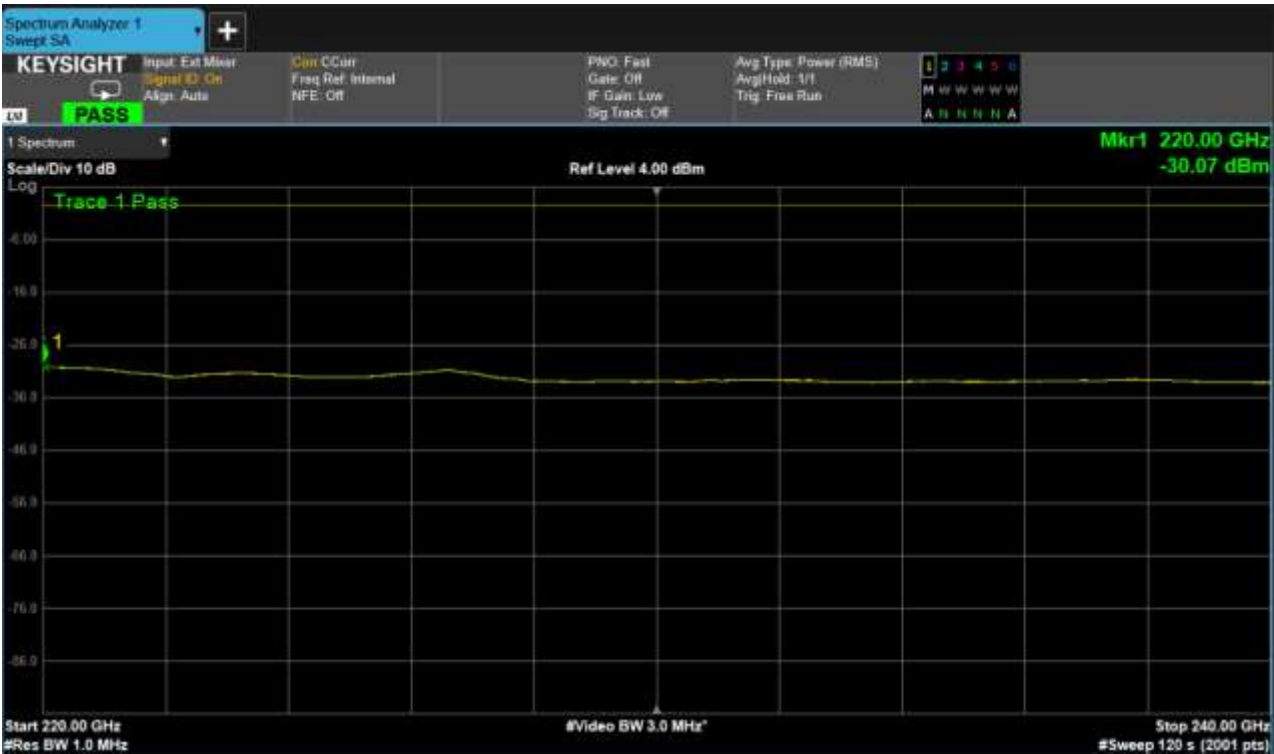
Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 677, 688

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
---	-----	---------------	--------------

220 GHz – 240 GHz

Transmitter spurious radiation (Section 95.3379)									
Frequency	Average Detector	BW	RL	FSPL	G	CL	EIRP	Limit	Margin
GHz	Type	kHz	dBm	dB	dBi	dB	dBm	dBm	dB
**	---	---	---	---	---	---	---	0.53	---



Measurement uncertainty: ± 6.8 dB									
** No emissions detected!									

Test Cables used	K163
Test equipment used	660, 666, 667, 668, 669, 679, 689

The equipment passed the conducted tests	Yes	No	Not*
--	-----	---------------	-----------------

Test setup photos / test results are attached	Yes	No	Annex no.: 6
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8.6 Occupied Bandwidth

8.6.1 Regulation

According to FCC § 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 °C with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

8.6.2 Test Procedure

Occupied Bandwidth (99 % Bandwidth) and 26 dB bandwidth were measured. The Occupied Bandwidth was measured directly from the spectrum analyzer's in-built measurement function with correct analyzer settings (RBW, VBW, detector, span and etc). For 6 dB Bandwidth, the measurement settings and procedure were carried out in accordance with the ANSI C63.10-2013 section 9.3. The bandwidth measurements were also performed in extreme environmental conditions.

8.6.3 Result

Waveforms	Centre Frequency GHz)	Measured 99% BW MHz	Measured 26dB BW MHz
Waveform 0	CF0 @ 77.85	268.27	281.11
	CF2 @ 79.80	267.83	279.36
Waveform 1	CF0 @ 77.85	612.7	626.9
	CF2 @ 79.80	611.3	627.7
Waveform 2	CF0 @ 77.85	1794.7	1842.6
	CF2 @ 79.80	1797.6	1821.1
Waveform 3	CF0 @ 78.85	3586.4	3674.5

Test Cables used	K163
Test equipment used	666, 385, 674, 226

The equipment passed the conducted tests	Yes	No	Not [§]
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Test setup photos / test results are attached	Yes	No	Annex no.: 3,6
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8.7 Frequency Tolerance

8.7.1 Regulation

According to FCC § 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 °C with an input voltage variation of 85% to 115% of rated input voltage, unless justification is presented to demonstrate otherwise.

8.7.2 Test Procedure

Frequency stability with respect to ambient temperature:

Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. If possible, a dummy load should be connected to the EUT, because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn the EUT on, and tune it to one of the number of frequencies required.

Couple the intentional radiator output to the measuring instrument by connecting an antenna to the measurement instrument with a suitable length of coaxial cable and placing the measurement antenna near the EUT (e.g., 15 cm away) or by connecting a dummy load to the measuring instrument through an attenuator, if necessary.

Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. Turn the EUT on, and couple its output to the measuring instrument by connecting an antenna to the measurement instrument with a suitable length of coaxial cable.

Adjust the location of the measurement antenna and the controls on the measuring instrument to obtain a suitable signal level (i.e., a level that will not overload the measuring instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

Tune the EUT to any one of the number of frequencies specified. Turn the EUT off, and place it inside an environmental chamber if appropriate. Allow the chamber to stabilize at +20 °C before proceeding. Turn on the EUT, and record the operating frequency of the intentional radiator at startup and two, five, and ten minutes after startup. Turn the EUT off and allow it to cool to the ambient temperature, and then repeat this procedure for the number of the frequencies specified. Four measurements are made at each operating frequency.

Frequency stability with respect to input voltage:

Supply the EUT with nominal ac voltage, or install a new or fully charged battery in the EUT. If possible, a dummy load should be connected to the EUT, because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, the EUT should be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn the EUT on, and tune it to one of the number of frequencies required.

Couple the intentional radiator output to the measuring instrument by connecting an antenna to the measurement instrument with a suitable length of coaxial cable and placing the measurement antenna near the EUT (e.g., 15 cm away) or by connecting a dummy load to the measuring instrument through an attenuator, if necessary.

Adjust the location of the measurement antenna and the controls on the measuring instrument to obtain a suitable signal level (i.e., a level that will not overload the measuring instrument, but is strong enough to allow measurement of the operating or fundamental frequency of the EUT). Turn the EUT off, and place it inside an

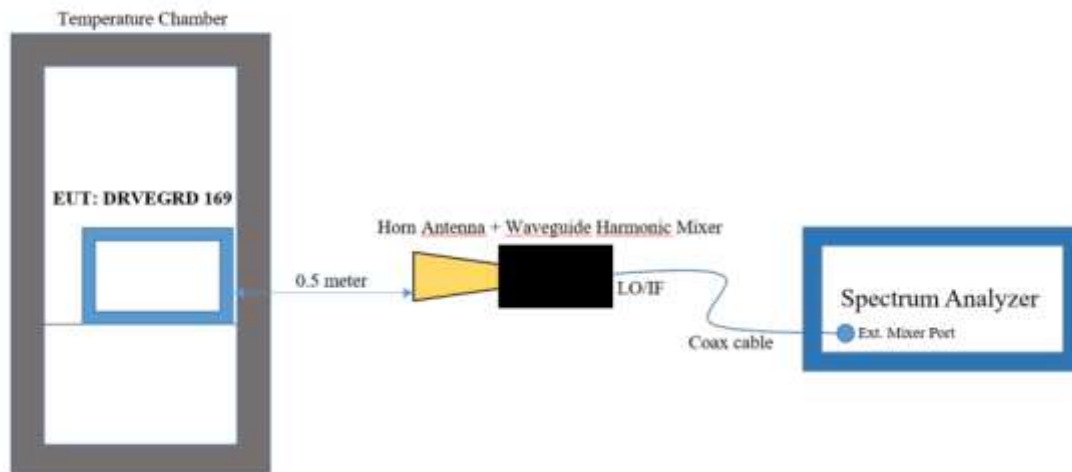
Environmental temperature chamber. For devices that are normally operated continuously, the EUT may be energized while inside the test chamber. For devices that have oscillator heaters, energize only the heater circuit while the EUT is inside the chamber.

Set the temperature control on the chamber to the highest specified EUT operating temperature, and allow the temperature inside the chamber to stabilize at the set temperature before starting frequency measurements.

While maintaining a constant temperature inside the environmental chamber, turn the EUT on and record the operating frequency at startup and two, five, and ten minutes after the EUT is energized. Four measurements in total are made.

Repeat the above procedure until the number of frequencies specified has been measured. After all measurements have been made at the highest specified temperature, turn the EUT off. Repeat the above measurement process for the EUT with the test chamber set at the lowest temperature specified by the regulatory or procuring agency. Measurements shall be made at the number of frequencies specified.

8.6.3 Test setup



8.7.4 Test Result

Waveform 0 @ 77.85 (lower frequency)

Test conditions	Frequency tolerance			
	Frequency (GHz)			
$T_{nom} = +24^{\circ} C$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$V_{min} = 7 V DC$	77.73122	78.01233	76.0	81.0
$V_{nom} = 24 V DC$	77.73122	78.01233	76.0	81.0
$V_{max} = 32 V DC$	77.73122	78.01233	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
$V_{nom} = 24 V DC$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$T_{min} -40^{\circ} C$	77.73581	78.00392	76.0	81.0
$T_{min} -20^{\circ} C$	77.73568	78.00401	76.0	81.0
$T_{min} -10^{\circ} C$	77.73568	78.00401	76.0	81.0
$T_{min} 0^{\circ} C$	77.73122	78.01233	76.0	81.0
$T_{min} +10^{\circ} C$	77.73122	78.01233	76.0	81.0
$T_{min} +20^{\circ} C$	77.73122	78.01233	76.0	81.0
$T_{min} +30^{\circ} C$	77.73616	78.00459	76.0	81.0
$T_{min} +40^{\circ} C$	77.73616	78.00459	76.0	81.0
$T_{min} +50^{\circ} C$	77.73597	78.00433	76.0	81.0
$T_{min} +85^{\circ} C$	77.73597	78.00433	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Waveform 0 @ 79.80 (upper frequency)

Test conditions	Frequency tolerance			
	Frequency (GHz)			
$T_{nom} = +24^{\circ} C$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$V_{min} = 7 V DC$	79.68538	79.95321	76.0	81.0
$V_{nom} = 24 V DC$	79.68538	79.95321	76.0	81.0
$V_{max} = 32 V DC$	79.68538	79.95321	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
$V_{nom} = 24 V DC$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$T_{min} -40^{\circ} C$	79.68577	79.95357	76.0	81.0
$T_{min} -20^{\circ} C$	79.68577	79.95357	76.0	81.0
$T_{min} -10^{\circ} C$	79.68538	79.95345	76.0	81.0
$T_{min} 0^{\circ} C$	79.68538	79.95345	76.0	81.0
$T_{min} +10^{\circ} C$	79.68538	79.95321	76.0	81.0
$T_{min} +20^{\circ} C$	79.68538	79.95321	76.0	81.0
$T_{min} +30^{\circ} C$	79.68585	79.95357	76.0	81.0
$T_{min} +40^{\circ} C$	79.68585	79.95357	76.0	81.0
$T_{min} +50^{\circ} C$	79.68551	79.95357	76.0	81.0
$T_{min} +85^{\circ} C$	79.68551	79.95357	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Waveform 1 @ 77.85 (lower frequency)

Test conditions	Frequency tolerance			
	Frequency (GHz)			
$T_{nom} = +24^{\circ} C$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$V_{min} = 7 V DC$	77.593	78.204	76.0	81.0
$V_{nom} = 24 V DC$	77.591	78.204	76.0	81.0
$V_{max} = 32 V DC$	77.592	78.204	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
$V_{nom} = 24 V DC$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$T_{min} -40^{\circ} C$	77.594	78.204	76.0	81.0
$T_{min} -20^{\circ} C$	77.594	78.206	76.0	81.0
$T_{min} -10^{\circ} C$	77.594	78.205	76.0	81.0
$T_{min} 0^{\circ} C$	77.593	78.205	76.0	81.0
$T_{min} +10^{\circ} C$	77.592	78.205	76.0	81.0
$T_{min} +20^{\circ} C$	77.592	78.204	76.0	81.0
$T_{min} +30^{\circ} C$	77.591	78.204	76.0	81.0
$T_{min} +40^{\circ} C$	77.591	78.203	76.0	81.0
$T_{min} +50^{\circ} C$	77.591	78.204	76.0	81.0
$T_{min} +85^{\circ} C$	77.593	78.203	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Waveform 1 @ 79.80 (upper frequency)

Test conditions	Frequency tolerance			
	Frequency (GHz)			
$T_{nom} = +24^{\circ} C$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$V_{min} = 7 V DC$	79.541	80.152	76.0	81.0
$V_{nom} = 24 V DC$	79.541	80.152	76.0	81.0
$V_{max} = 32 V DC$	79.541	80.152	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
$V_{nom} = 24 V DC$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$T_{min} -40^{\circ} C$	79.542	80.153	76.0	81.0
$T_{min} -20^{\circ} C$	79.542	80.154	76.0	81.0
$T_{min} -10^{\circ} C$	79.543	80.153	76.0	81.0
$T_{min} 0^{\circ} C$	79.542	80.153	76.0	81.0
$T_{min} +10^{\circ} C$	79.541	80.153	76.0	81.0
$T_{min} +20^{\circ} C$	79.542	80.153	76.0	81.0
$T_{min} +30^{\circ} C$	79.541	80.152	76.0	81.0
$T_{min} +40^{\circ} C$	79.540	80.152	76.0	81.0
$T_{min} +50^{\circ} C$	79.541	80.153	76.0	81.0
$T_{min} +85^{\circ} C$	79.542	80.153	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Waveform 2 @ 77.85 (lower frequency)

Test conditions	Frequency tolerance			
	Frequency (GHz)			
$T_{nom} = +24^{\circ} C$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$V_{min} = 7 V DC$	77.087	78.884	76.0	81.0
$V_{nom} = 24 V DC$	77.089	78.883	76.0	81.0
$V_{max} = 32 V DC$	77.086	78.885	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
$V_{nom} = 24 V DC$	f_L Measured	f_H Measured	f_L Limit	f_H Limit
$T_{min} -40^{\circ} C$	77.089	78.885	76.0	81.0
$T_{min} -20^{\circ} C$	77.082	78.884	76.0	81.0
$T_{min} -10^{\circ} C$	77.089	78.886	76.0	81.0
$T_{min} 0^{\circ} C$	77.083	78.885	76.0	81.0
$T_{min} +10^{\circ} C$	77.084	78.885	76.0	81.0
$T_{min} +20^{\circ} C$	77.084	78.885	76.0	81.0
$T_{min} +30^{\circ} C$	77.085	78.884	76.0	81.0
$T_{min} +40^{\circ} C$	77.082	78.884	76.0	81.0
$T_{min} +50^{\circ} C$	77.082	78.884	76.0	81.0
$T_{min} +85^{\circ} C$	77.083	78.884	76.0	81.0
Measurement uncertainty		$\pm 5 \cdot 10^{-8}$		

Waveform 2 @ 79.80 (upper frequency)

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
T _{nom} = +24° C	f _L Measured	f _H Measured	f _L Limit	f _H Limit
V _{min} = 7 V DC	79.031	80.826	76.0	81.0
V _{nom} = 24 V DC	79.030	80.828	76.0	81.0
V _{max} = 32 V DC	79.030	80.827	76.0	81.0
Measurement uncertainty		± 5*10 ⁻⁸		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
V _{nom} = 24 V DC	f _L Measured	f _H Measured	f _L Limit	f _H Limit
T _{min} -40 °C	79.031	80.832	76.0	81.0
T _{min} -20 °C	79.030	80.831	76.0	81.0
T _{min} -10 °C	79.031	80.828	76.0	81.0
T _{min} 0 °C	79.031	80.829	76.0	81.0
T _{min} +10 °C	79.030	80.828	76.0	81.0
T _{min} +20 °C	79.030	80.827	76.0	81.0
T _{min} +30 °C	79.030	80.827	76.0	81.0
T _{min} +40 °C	79.031	80.823	76.0	81.0
T _{min} +50 °C	79.030	80.829	76.0	81.0
T _{min} +85 °C	79.030	80.828	76.0	81.0
Measurement uncertainty		±5*10 ⁻⁸		

Waveform 3 @ 78.85

Test conditions	Frequency tolerance			
	Frequency (GHz)			
T _{nom} = +24° C	f _L Measured	f _H Measured	f _L Limit	f _H Limit
V _{min} = 7 V DC	77.318	80.916	76.0	81.0
V _{nom} = 24 V DC	77.324	80.910	76.0	81.0
V _{max} = 32 V DC	77.326	80.913	76.0	81.0
Measurement uncertainty		± 5*10 ⁻⁸		

Test conditions	Frequency tolerance			
	Frequency Measured (GHz)			
V _{nom} = 24 V DC	f _L Measured	f _H Measured	f _L Limit	f _H Limit
T _{min} -40 °C	77.316	80.920	76.0	81.0
T _{min} -20 °C	77.314	80.918	76.0	81.0
T _{min} -10 °C	77.316	80.914	76.0	81.0
T _{min} 0 °C	77.317	80.914	76.0	81.0
T _{min} +10 °C	77.314	80.916	76.0	81.0
T _{min} +20 °C	77.317	80.916	76.0	81.0
T _{min} +30 °C	77.317	80.916	76.0	81.0
T _{min} +40 °C	77.317	80.912	76.0	81.0
T _{min} +50 °C	77.317	80.914	76.0	81.0
T _{min} +85 °C	77.314	80.912	76.0	81.0
Measurement uncertainty		±5*10 ⁻⁸		

Test Cables used	K163
Test equipment used	102a, 666, 674, 401, 226, 385

The equipment passed the conducted tests	Yes	No	Nt [*]
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Test setup photos / test results are attached	Yes	No	Annex no.: 3,6
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8.8 76-81 GHz Band Radar Service RF exposure evaluation.

8.8.1 Regulation

According to FCC §95.3385, regardless of the power density levels permitted under this subpart, devices operating under the provisions of this subpart are subject to the radiofrequency radiation exposure requirements specified in §§1.1307(b), 2.1091, and 2.1093 as appropriate. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

8.8.2 Test result

MPE calculation to the FCC ID:

These equations are generally accurate in the far field of an antenna but will over predict power density in the near field, where they could be used for making a “worst case” prediction.

$$S = PG/4\pi R^2 \quad \text{or} \quad S = \text{EIRP} / (4\pi R^2)$$

Where:

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units e.g. mW)

G = power gain of the antenna in the direction of interest relative to the isotropic radiator

R = distance to the centre of radiation of the antenna (appropriate units e.g. cm)

EIRP = equivalent isotropically radiated power

Calculation:

Waveforms	Centre Frequency	Operating Frequency	EIRP		Power density (S) @ 20 cm	
					Calculated	Limit
	GHz	GHz	dBm	mW	mW/ cm ²	
Waveform 0	CF0 @ 77.85	77.985	19.5	89.1	0.018	1.0
	CF2 @ 79.80	79.935	22.5	177.8	0.035	1.0
Waveform 1	CF0 @ 77.85	77.899	19.3	85.1	0.017	1.0
	CF2 @ 79.80	79.849	24.0	251.2	0.050	1.0
Waveform 2	CF0 @ 77.85	77.985	19.4	87.1	0.017	1.0
	CF2 @ 79.80	79.894	24.1	257.0	0.051	1.0
Waveform 3	CF0 @ 78.85	79.123	23.3	213.8	0.043	1.0

The equipment passed the conducted tests	Yes	No	Not*
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Test setup photos / test results are attached	Yes	No	---
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9. Additional information to the test report

Remarks	Description
N.t. ¹	Not tested, because the antenna is part of the PCB
N.t. ²	Not tested, because the EUT is directly battery powered
N.t. ³	Not tested, because not applicable to the EUT
N.t. ⁴	Not tested, because not ordered

10. List of test equipment

State Dec. 20, 2022					
Marking	Manufacturer	SW/Type/Serial-No.	Last Cal./Val.	Next Cal./Val.	No.
<i>I Measuring Instruments</i>					
Attenuator	Radiall	---	Nov 19	Nov 22	62
Attenuator 3dB	Suhner	6803/17	Nov 19	Nov 22	137
Attenuator 3dB / 18 GHz	Suhner	3dB/18GHz	Nov 19	Nov 22	299
Terminator	Texcan	---	Nov 19	Nov 22	304
Attenuator 6dB / 18 GHz	Suhner	6dB/18GHz	Nov 19	Nov 22	344
Attenuator 20dB / 20GHz	Parzich	40AH-20	Nov 19	Nov 22	354
Terminator	KDI	T173CS	Nov 19	Nov 22	490
Variable transformer	RFT	LS 002	---	---	154a
Variable transformer	Schunt+Ben	---	---	---	155
Power sensor	Marconi	6914	Dec 22	Dec 24	258
Power sensor	Rohde & Schwarz	NRP18SN	Feb 22	Feb 24	651
3-Path Diode Power Sensor 10 MHz to 8 GHz	Rohde & Schwarz	NRP8S	Dec 22	Dec 24	663
3-Path Diode Power Sensor 10 MHz to 18 GHz	Rohde & Schwarz	NRP18S-20	Dec 22	Dec 24	664
Diode Power Sensor 100 kHz – 6 GHz	Rohde & Schwarz	NRV-Z5 S/N: 829562/008	Nov 22	Nov 24	390
Coaxial Directional Coupler	Narda	3003-20	Jan 21	Jan 24	370/342
Coaxial directional coupler	Mini Circuits	ZFDC-20-5	Mai 22	Mai 24	434
Coaxial directional coupler	Narda+Suhner	4246B-20	Sep 22	Sep 25	472/492
Coaxial directional coupler	Narda	3045C-10	Sep 22	Sep 25	110a
Coaxial directional coupler	Narda	3044B-10	Sep 22	Sep 25	21a
Coaxial directional coupler	Narda	3044B-30	Sep 22	Sep 25	327
Coaxial directional coupler	Narda	3022 / 50204	Sep 22	Sep 25	303
Coaxial High Pass Filter	Mini circuits	NHP-700	Apr 21	Apr 24	435
Coaxial High Pass Filter	Mini circuits	NHP-200	Apr 21	Apr 24	405
Coaxial High Pass Filter	Mini circuits	NHP-25+	Apr 21	Apr 24	455
High Pass Filter	Mini circuits	VHF-3500+	Sep 22	Sep 25	451
High Pass Filter	Mini circuits	VHF-1200+	Apr 21	Apr 24	452
Bandpass Filter	Schomandl	BN86871	Nov 21	Nov 24	66
Bandpass Filter	Schomandl	BN68673	Nov 21	Nov 24	67
Low Pass Filter	Mini circuits	SLP550	Apr 21	Apr 24	273
Low Pass Filter	Mini circuits	SLP550	Apr 21	Apr 24	274
RF Current Probe 9 kHz – 30 MHz	Rohde & Schwarz	ESH2-Z1	Aug 21	Aug 24	42
Passive Test Probe – 9 kHz – 30 MHz	TÜV NORD	VDE 0876	Apr 21	Apr 24	45
Coaxial Fixed Attenuator DC – 1 GHz	Texscan	HFP50/10	Jul 20	Jul 23	60
8 Wire Impedance Stabilisation Network T-Section - 50 W	Schwarzbeck	CAT5 8158	Nov 21	Nov 23	71a
RF Current Injection Clamp 0.15 – 1GHz	Rohde & Schwarz	BN 42441/50	Nov 21	Nov 24	93
Absorbing Clamp MDS 30MHz – 1GHz	Lüthi GmbH	EM 101	Nov 19	Nov 22	156
Insertion Unit	Lüthi GmbH	MDS-21	Nov 19	Nov 22	160
Insertion Unit	Rohde & Schwarz	URV5-Z4	Jul 22	Jul 24	162
Coaxial RF Termination - 0 – 1000 MHz	Telewave Inc.	TWL 35	Nov 21	Nov 24	164
Coaxial RF Termination - 0 – 1000 MHz	Telewave Inc.	TWL 60	Nov 21	Nov 24	165
Fixed Attenuator - DC – 1.5GHz	Bird	Mod/ 8343-060	Apr. 20	Apr. 23	177
Rotary Step Attenuator DC – 2 GHz	Texscan	TA – 50	Mar20	Mar 23	184
CDN up to 230 MHz	MEB	KEN-M 2 /M 3	Oct 22	Oct 24	262
CDN up to 230 MHz	MEB	KEN-M 2 /M 3	Dec 21	Dec 23	264
Impulse limiter 10 dB	Rohde & Schwarz	ESH3 Z2	Jun 22	Jun 24	272
Fixed Attenuator - DC – 18 GHz 30 dB	MTS	---	Nov 20	Nov 23	275
Fixed Attenuator - DC – 18 GHz 30 dB	MTS	---	Mai 22	Mai 24	276
Passive Probe - 9 kHz – 30 MHz 2.5 kΩ	RFT	TK 121	Jun 20	Jun 23	302

Passive probe 1.5kΩ	Schwarzbeck	TK 9416	Oct 20	Oct 23	621
Termination Resistor 50 W	Radiall	404011	Nov 21	Nov 23	309
Branching device (4x) 50W	Rohde & Schwarz	892228/20	Sep 22	Sep 25	320
Dummy-Load - 2 – 18 GHz	Narda	MODEL 367NF	Nov 19	Nov 22	343
DC Block Adapter - 0.045 – 26.5 GHz	Hewlett-Packard	11742A	Apr 21	Apr 24	356
RF Probe 0.02 – 1000 MHz	Rohde & Schwarz	URY-Z7	Aug 22	Aug 25	368
150W attenuator	Weinschel	49-20-33	Oct 19	Oct 22	374
Fixed Coaxial Attenuator - DC – 18 GHz	Weinschel	23-6-34	Feb 20	Feb 23	375
Insertion Unit 100V 100 kHz – 2 GHz	Rohde & Schwarz	URY-Z4	Jun 22	Jun 24	417
Panoramic Adapter (Monitoring)	Schwarzbeck	PAN1550	---	---	429
DC-BLOCK - DC – 6.0 GHz 50 W	Mini Circuits	BLK-6-N+	Nov 21	Nov 24	462
Terminating resistor 50Ω SMA	---	---	Nov 19	Nov 22	493
Terminating resistor 50Ω SMA	---	SC 60-601-0000-31	Nov 19	Nov 22	497
Fixed Attenuator -0 – 40 GHz	Anritsu	41KC-10	Nov 19	Nov 22	504
Fixed Attenuator -0 – 40 GHz	Anritsu	41KC-10	Nov 19	Nov 22	505
Fixed Attenuator -0 – 40 GHz	Anritsu	41KC-6	Nov 19	Nov 22	506
Fixed Attenuator -0 – 40 GHz	Anritsu	41KC-3	Nov 19	Nov 22	507
Electric Dummy Load	RA-NAV Lab.	DA-75U	---	---	526
Power Splitter / Combiner	Mini Circuits	ZESC-2-11	Nov 19	Nov 22	527
3 Way Power Splitter / Combiner	Mini Circuits	ZFSC-3-1	Mar 20	Mar 23	529
3 Way Power Splitter / Combiner	Mini Circuits	ZFSC-3-1	Mar 20	Mar 23	530
RF-Attenuator - 6 dB	Haefely	---	Mar 20	Mar 23	540
RF-Attenuator - 1– 120 MHz 12 dB	Haefely	---	Mar 20	Mar 23	541
RF-Attenuator - 1– 120 MHz 39 dB	Haefely	---	Mar 20	Mar 23	542
LISN 9kHz – 30 MHz	Schwarzbeck	NNLA 8120 (SN: 8120499A)	Oct 22	Oct 24	551
HV Probe P6013A	Tektronix	P6013A	Jul 22	Jul 24	559
VLISN 5μH	Schwarzbeck	8125-1944	Nov 21	Nov 23	585
VLISN 5μH	Schwarzbeck	8125-1945	Nov 21	Nov 23	586
20dB Attenuator, up to 18 GHz	Mini Circuit	BW-N20W5+	Nov 19	Nov 22	594
Step Attenuator - DC-18 GHz 0 to 11 dB	Hewlett-Packard	8494B	Nov 19	Nov 22	604
Analyser Reference System	Spitzenberger & Spies	PAS 1000 SyCore + ARS 16/1	Mar 22	Mar 24	606a/b/c
Capacitive Coupling Clamp 5 kV	Schlöder	SFT 415	Mai 20	Mai 23	608
RF Probes for 50 Ω Receivers	Schwarzbeck	TK 9416	Jun 22	Jun 24	612
Current probe TRMS	BEHA APROB	CHB35	Nov 22	Nov 24	652
Semi Anechoic Chamber	COMTEST	SAC-3m	Apr 21	Apr 23	660
Maturo Turntable	Maturo	TT2.0SI (SN: TT2.05SI/817 SW: 1.0.0.4473)	---	---	667
Maturo Antenna Mast	Maturo	TAM4.5-E-10kg (SN: 10011/216/2588.01)	---	---	668
Maturo Controller	Maturo	FCU3.0/009/2588.01 (SN: 10014/2019)	---	---	669
Current probe 20 Hz – 100 MHz	Rohde & Schwarz	EZ-17 (0816.2063.03)	Mar 20	Mar 23	670
Coupling Decoupling Network	AMETEK	CDN ST08A	Oct 22	Oct 24	672
BONN HF Switch Matrix DC – 8 GHz	BONN Elektronik	BAS 0080-3	---	---	682
External Directional Coupler	BONN Elektronik	BDC 1060-40/500	Dec 20	Dec 22	683
BI-Directional Coax. Coup. 50-1000 MHz	Narda	3020A	Nov 21	Nov 23	141
Vertical coupling plate	TÜV NORD HFT	---	---	---	265
Measuring table	TÜV NORD HFT	---	---	---	106
Data line coupling network	EM Test AG	CNV 504/ 508	---	---	285
2 Generators					
EFT/Burst Generator	Schlöder	SFT 1400	Sep 22	Sep 24	46a

ESD Generator	Schlöder	SESD 216	Dec 21	Dec 23	653
Signal Generator	Rohde & Schwarz	SMB100A SW 4.20.028.58	Sep 22	Sep 24	571
RF Generator	Rohde & Schwarz	SGT100A	Jun 22	Jun 24	636
Signal Generator	Rohde & Schwarz	SMG	Jun 22	Jun 24	136a
Signal Generator	Marconi	2042	Jul 22	Jul 24	6
Signal Generator	Marconi	2024	Jul 22	Jul 24	213
Puls Generator	EM Test	MPG 200	Cal. before use	Cal. before use	181
Surge Generator	H+H	MIG063 IN S-T	Apr 21	Apr 23	561
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500 S/N: 171332	Aug 22 Factory cal.	Aug 23	691
3. Antennas					
Loop Ant. 9kHz-30MHz	Schwarzbeck	FMZB1516	Oct 21	Oct 23	23
Biconical Ant. 30-300 MHz	Schwarzbeck	VHA9103/BBA9106	Mai 22	Mai 24	80/616
Double Ridged Horn	Schwarzbeck	BBHA9120C	Feb 22	Feb 24	169
Double Ridged Horn	Schwarzbeck	BBHA 9120A	Mai 20	Mai 24	284
Tri-Log Broadband	Schwarzbeck	VULB9168	Mai 21	Mai 23	406
Broadband Horn 14-40 GHz	Schwarzbeck	BBHA9170	Feb 22	Feb 24	442
Log Per Antenna 0.7-20 GHz	Schwarzbeck	STLP9148	Mai 21	Mai 23	445a
Bilog Ant.	CHASE	CBL6111	Cal. before use	Cal. before use	167
Spectrum analyser Mixer 220 – 325 GHz	Radiometer Physics	SAM325 / 20029	Aug 21	Aug 23	591
Dual Mode Potter Horn 220-325 GHz	Radiometer Physics	325-WR2	---	---	592
Dual Mode Potter Horn 75-110 GHz	Radiometer Physics	---	---	---	649
Gain Horn Antenna 50-75 GHz	Dorado	GH-15-20	---	---	511
Standard Gain Horn 1.7 – 2.6 GHz	Narda	645	---	---	514
W-band active Sextupler with input drive amplifier	Spacek Labs Inc.	AW-6XW-0	---	---	221a
60 to 65 GHz active frequency quadrupler	Spacek Labs Inc.	A625-4XW-0	---	---	222a
Harmonic Mixer 40-60 GHz	Rohde & Schwarz	FS-Z60/ 100037	Aug 21	Aug 23	515
Gain Horn Antenna 40-60 GHz	Dorado	GH-19-20 / 070106	---	---	518
Spectrum analyser Mixer 90-140 GHz	Radiometer Physics	SAM140 / 20006	Aug 21	Aug 23	545
Dual Mode Potter Horn 90-140 GHz	Radiometer Physics	140-WR8	---	---	547
Spectrum analyser Mixer 140-220GHz	Radiometer Physics	SAM220 / 20002	Aug 21	Aug 23	546
Dual Mode Potter Horn 140-220 GHz	Radiometer Physics	220-WR5.1	---	---	548
Harmonic Mixer 60-90 GHz	Rohde & Schwarz	FS-Z90 / 100062	Aug 21	Aug 23	501
Dual Mode Potter Horn 60-90 GHz	Radiometer Physics	90-W12	---	---	549
Gain Horn 33-55 GHz	Dorado	040810	---	---	383
Gain Horn 50-75 GHz	Dorado	031003	---	---	384
Gain Horn 75-110 GHz	Dorado	040808	---	---	385
Standard Gain Ant. 26.5-40 GHz	Maury Microwave	U211C	---	---	532/628
Waveguide Harmonic Mixer 50 – 75 GHz	Keysight	M1971V	Jan 22	Jan 24	673
Waveguide Harmonic Mixer 75 – 110 GHz	Keysight	M1971W	Jan 22	Jan 24	674
Stacked Log.-Per. Antenna 70 MHz – 10 GHz	Schwarzbeck	STLP 9129	---	---	662
Spectrum/Signal Analyzer Extension Module 110 GHz – 170 GHz (WR-6.5)	Virginia Diodes, Inc.	SAX 637	Jun 22	Jun 24	675
Spectrum/Signal Analyzer Extension Module 140 GHz – 220 GHz (WR-5.1)	Virginia Diodes, Inc.	SAX 636	Jun 22	Jun 24	677
Spectrum/Signal Analyzer Extension Module 220 GHz – 330 GHz (WR-3.4)	Virginia Diodes, Inc.	SAX 635	Jun 22	Jun 24	679
Conical Gain Horn Ant. 110 GHz – 170 GHz [21 dBi]	Virginia Diodes, Inc.	Conical Antenna WR-6.5	---	---	687
Conical Gain Horn Ant. 140 GHz – 220 GHz [21 dBi]	Virginia Diodes, Inc.	Conical Antenna WR-5.1	---	---	688
Diagonal Gain Horn Ant. 220 GHz – 330 GHz [26 dBi]	Virginia Diodes, Inc.	Diagonal Antenna WR-3.4	---	---	689
4. Amplifier					

RF-Power Amplifier 250 kHz – 150 MHz	ENI	3100LA	---	---	123
RF pre-amplifier 100kHz-1.3GHz	HP	8447E	Sep 20	Sep 24	166a
Mitteq amplifier 26.5-40 GHz	Mitteq	---	Sep 22	Sep 24	223a
RF pre-amplifier 1-18GHz	Narda	---	Sep 22	Sep 24	345
Mitteq Amplifier 18-26GHz	Mitteq	---	Apr 20	Apr 23	433
Microwave amplifier 12-28GHz	Schwarzbeck	BBV9719	Sep 22	Sep 24	443
Microwave amplifier 0.5-18GHz	Schwarzbeck	BBV9718	Sep 22	Sep 24	444
RF-Power Amplifier 10kHz-1000 MHz	Poetschke	8100 (Band 1) BHED (Band 2) BHED (Band 3)	---	---	684
RF-Power Amplifier 800 MHz – 4,2 GHz	Amplifier Research	10S1G4	---	---	685
RF-Power Amplifier 4 GHz – 8 GHz	Amplifier Research	35S4G8A	---	---	686
RF-Power Amplifier 0.69 GHz – 6 GHz	Rohde & Schwarz	BBA150-D110/E60	---	---	690

5. Power supplies

Programmable Power Supply	Fluke	PM 2813	---	---	28a
Power Supply	HP	---	---	---	125
Power Supply	Sorensen	LM 30-6	---	---	134a
Power Supply	HP	6034L	---	---	226
Regulated Power Supply	Farnell	AP60-50	---	---	408
Power Supply	EA	PSI 8080-40-DT	---	---	560
Power Supply	HP	6032A	---	---	644

6. Meters

Microwave Frequency Counter	Hewlett-Packard	5351B	Nov 20	Nov 22	432
Temperature test cabinet	Heraeus Vötsch	VMT04/35	---	---	102a
Temperature test cabinet	Brabender	TTE 32/40 H	---	---	87
Digital-Hygro-Thermometer	Greisinger	GFTH95	Nov 19	Nov 22	57a
Volt & RF Power Meter	Rohde & Schwarz	URV35	Jun 22	Jun 25	161
Power Meter	Marconi	6960/ S.N: 1214	Dec 22	Dec 25	139a
Spectrum Analyzer - 9 kHz – 18 GHz	Rohde & Schwarz	FSL18	Cal. before use	Cal. before use	171a
Multimeter	Gossen Metrawatt	Metrahit pro	Nov 21	Nov 23	215a
Humidity/Temperature Measuring device	TESTO	Testo 625	Nov 21	Nov 23	259a
Volt & RF Power Meter	Rohde & Schwarz	URV35	Cal. before use	Cal. before use	271
Multimeter	Gossen Metrawatt	Metrahit 26S	Oct 22	Oct 24	313
Level and Power Meter - 9 kHz – 3 GHz	Rohde & Schwarz	URY	Apr 22	Apr 24	307
Temperature test device	Ahlhorn	Almemo 2390-5 PT100	Mar 20	Mar 23	401/402
Digital-Vacuum-/Barometer	Greisinger	GDH12AN	Oct 19	Oct 22	558
Digital Storage Oscilloscope	Tektronix	TDS 2012C	Nov 22	Nov 24	568
Miniature Flat, Zero-Biased Schottky Detector –0.1– 18 GHz	Narda	4503A-03	Val. before use	Val. before use	613
Digital-Vacuum-/Barometer	Greisinger	GDH-200-14	Nov 21	Nov 23	632
Network Analyser 9 kHz -6 GHz	Rohde & Schwarz	ZVL6 (SN: 101268)	Sep 22	Sep 24	534
Signal Analyser 10 Hz – 30 GHz	Rohde & Schwarz	FSV 30 S/N: 100932	Aug 21	Aug 23	502
EMI Test receiver ESW26	Rohde & Schwarz	R&S ESW26 (SN: 101383/26 SW: R&S ESW2.10)	Nov 21	Nov 23	665
Signal analyser Keysight 50GHz	Keysight	UXA N9040B (SN: MY57213006 SW: A.27.02/2020 1.0)	Jan 22	Jan 24	666

7. test/control software

EMC32	Rohde & Schwarz	V10.60.20	---	---	---
Maturo mcApp	Maturo	SW: V3.4.9.4537 (19.04.04)	---	---	---
SPS EMC	Spitzenberger & Spies	SW: V4.1.3	---	---	---
EMV-Soft	Schlöder GmbH	SW: V11.95	---	---	---
ISMISO	EM Test AG	SW:V3.63	---	---	---

11. List of test cables

Internal Cable Number	Connector Type	Frequency Range (MHz)	Cable Length (m)	Manufacturer
3	N	0,5 - 8000	3	Cellflex
4	N	0,5 - 8000	3	Cellflex
4a	BNC	10 – 1500	0.50	Telemeter
12a	N	10 – 265000	6	Huber + Suhner
14a	BNC	10 – 1000	1.00	Telemeter
17a	APC3.5	10 – 26500	2.13	Huber + Suhner
18a	APC3.5	10 – 26500	2.13	Huber + Suhner
22	BNC	10 – 1000	1.50	---
27	BNC	10 – 1000	1.00	Fabrica Milanese Cond.
35	N	10 – 2000	1.10	Fujikura
40	BNC	---	0.50	Aircell
43	SMA	10 – 18000	0.50	Rosenberger
44	SMA	---	0.50	Huber + Suhner
45	SMA	10 – 18000	0.50	Huber + Suhner
48	SMA	---	0.50	Huber + Suhner
49	N	10 – 18000	1.00	Huber + Suhner
50	N	10 – 18000	1.00	Huber + Suhner
51	N	10 – 18000	1.00	Huber + Suhner
52	N	10 – 18000	1.00	Huber + Suhner
54	BNC	10 – 3500	1.00	Aircell
58	N	10 – 18000	2.00	Huber + Suhner
59	N	10 – 18000	1.00	Huber + Suhner
60	N	10 – 18000	2.00	Huber + Suhner
61	N	10 – 18000	1.00	Huber + Suhner
62	SMA	---	0.50	Huber + Suhner
63	SMA	10 – 18000	0.50	Huber + Suhner
64	SMA	10 – 18000	0.50	Huber + Suhner
65	APC3.5	10 – 26500	0.60	---
66	APC3.5	10 – 26500	0.60	---
67	APC3.5	10 – 26500	0.60	---
68	APC3.5	10 – 26500	0.60	---
72	BNC	---	0.40	---
73	BNC	---	0.40	---
76	SMA	10 – 30000	3.00	Gore
79	BNC/N	10 – 1000	5.00	---
80	SMA	---	0.25	Huber + Suhner
87	SMA	10 – 18000	0.15	Huber + Suhner
88	SMA	10 – 18000	0.15	Huber + Suhner
89	SMA	10 – 18000	0.15	Huber + Suhner
90	SMA	10 – 18000	0.15	Huber + Suhner
91	SMA	---	1.50	Huber + Suhner
94	BNC	---	1.10	---
95	BNC	---	0.80	---
96	BNC	---	0.80	---
100	N	10 – 26500	6.00	Rosenberg
101	N	10 – 18000	2.90	Huber + Suhner
102	SMA	10 – 18000	2.00	Huber + Suhner
111	BNC	10 – 1000	0.50	---
112	BNC	10 – 1000	0.50	---
114	SMA	10 – 18000	0.25	Huber + Suhner
116	SMA	10 – 18000	0.25	Huber + Suhner
119	N	10 – 20000	8.00	Jyebao
121	SMA	10 – 18000	1.50	Huber + Suhner
122	SMA	10 – 18000	2.00	Huber + Suhner

Internal Cable Number	Connector Type	Frequency Range (MHz)	Cable Length (m)	Manufacturer
123	SMA	10 – 18000	2.00	Huber + Suhner
145	SMA	10 – 26500	8.00	Huber + Suhner
147	APC3.5	10 – 40000	1.50	Jyebao
148	APC3.5	10 – 40000	3.00	Jyebao
151	SMA	10 – 18000	0.50	Rosenberger
152	SMA	10 – 18000	0.50	Rosenberger
154	BNC	10 – 1000	1.00	---
155	N/BNC	---	0.85	---
157	BNC	---	0.50	---
158	SMA	10 – 26500	2.00	Huber + Suhner
160	SMA	10 – 18000	0.40	Nortel Networks
161	SMA	10 – 18000	1.00	Huber + Suhner
162	APC3.5	10 – 26500	2.00	Huber + Suhner
163	APC3.5	10 – 26500	2.00	Huber + Suhner
164	APC3.5	10 – 26500	2.00	Huber + Suhner
165	APC2.9	10 – 26500	2.00	Huber + Suhner
166	APC3.5	10 – 26500	5.70	Rosenberger
167	APC3.5	10 – 40000	1.00	Jyebao
168	APC3.5	10 – 40000	1.00	Jyebao
169	APC3.5	10 – 40000	1.00	Jyebao
170	APC3.5	10 – 40000	1.00	Jyebao
171	APC3.5	10 – 40000	1.00	Jyebao
172	SAM	---	0.90	Huber + Suhner
173	APC	10 – 26500	2.00	Huber + Suhner
174	APC	10 – 26500	---	Huber + Suhner
175	SMA	10 – 18000	0.40	Huber + Suhner
176	N-SMA	10 – 18000	0.50	Huber + Suhner
188	N	10 – 18000	5.00	Huber + Suhner
189	PC-PC	10 – 26500	6.00	Jyebao
190	PC-PC	10 – 26500	6.00	Jyebao
192	N-N	10 – 18000	3.0	Jyebao
193	N-N	10 – 18000	3.0	Jyebao
194	N-SMA	10 – 18000	2.0	Jyebao
195	N-SMA	10 – 18000	2.0	Jyebao
EMV 1	BNC	---	2.00	Henn
EMV 2	BNC	10 – 1000	2.00	Henn
EMV 4	BNC	---	9.70	Henn
EMV 5	BNC	---	3.80	Henn
EMV 6	BNC/N	10 – 1000	5.00	Lüthi
EMV 7	BNC	10 – 1000	1.50	Henn
EMV 8	BNC	10 – 1500	1.70	Henn
EMV 9	BNC	10 – 1000	1.70	Henn
EMV 11	BNC	---	5.20	Hasselt
EMV 12	BNC	10 – 1000	2.40	Hasselt
EMV 13	BNC	10 – 1000	4.10	Hasselt
EMV 14	BNC	10 – 1000	2.50	Hasselt
EMV 15	BNC	---	0.90	Henn
EMV 16	Fischer	---	2.00	---
EMV 18a	Fischer	---	1.00	---
EMV 19a	Fischer	---	1.50	---
KISN2	BNC	10 – 2000	4.80	---

End of test report