Prüfbericht-Nr.: *Test report no.:*	**DE22QW97 002**	**Auftrags-Nr.:** *Order no.:*	1110669_100	Seite 1 von 47 *Page 1 of 47*
Kunden-Referenz-Nr.: *Client reference No.:*		**Auftragsdatum:** *Order date:*	2022-03-15	
Auftraggeber: *Client:*	Julius Blum GmbH, Industriestr. 1, 6973 Höchst, Österreich			
Prüfgegenstand: *Test item:*	Servo Motor (household appliance)			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	SERVO DRIVE for AVENTOS HF/HS/HL top Modell: 23.A001			
Auftrags-Inhalt: *Order content:*	Prüfung der Funkparameter nach FCC & ISED *Test of radio parameters acc. to FCC & ISED*			
Prüfgrundlage: *Test specification:*	Vollprüfung / Complete test FCC CFR 47 Part 15 Subpart C- §15.249 RSS-210 sec. B10 (b): Issue 10			

Wareneingangsdatum: *Date of sample receipt:*	2022-05-04
Prüfmuster-Nr.: *Test sample no.:*	A003254653-010, -002
Prüfzeitraum: *Testing period:*	2022-06-09 – 2022-08-01
Ort der Prüfung: *Place of testing:*	Nürnberg *Nuremberg*
Prüflaboratorium: *Testing laboratory:*	Wireless Labor *Wireless Test Lab*
Prüfergebnis*: *Test result*:*	*Pass*

geprüft von: *tested by*:	X	**genehmigt von:** *authorized by*:	X
Datum: *Date:* 2022-09-29	Signiert von: Sami Ullah Sami Ullah	**Datum:** *Issue date:* 2022-09-29	Signiert von: Patrick Reusch P. Reusch
Stellung / *Position*	Sachverständige(r)/Expert	**Stellung /** *Position*	Head of Laboratory

Sonstiges / *Other*: The test report DE22QW97 002 replaces the test report DE22QW97 001 (FCC and IC IDs' have been updated)

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legende:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

Anmerkungen
Remarks

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.
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Anmerkungen
Remarks

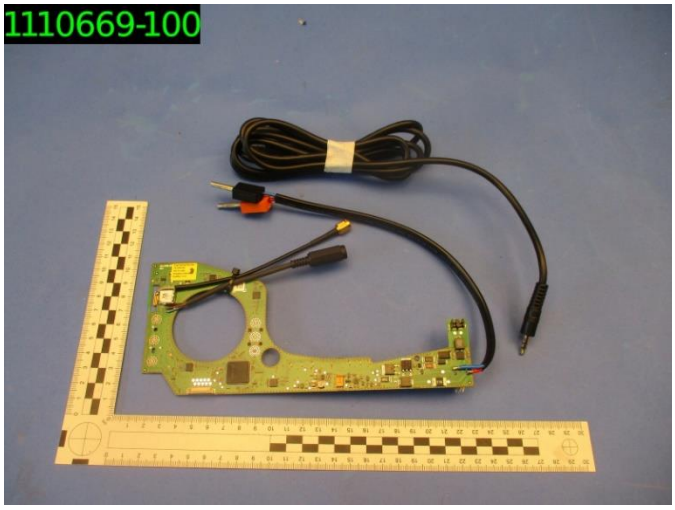
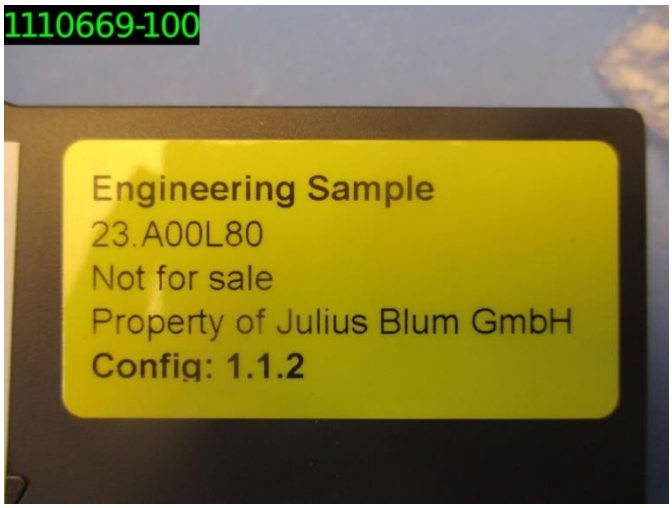
4	Die Messunsicherheit der in diesem Prüfbericht aufgeführten Messverfahren wird nicht unmittelbar in die Bewertung zur Einhaltung der jeweiligen Grenzwerte mit einbezogen. Es gelten die Anforderungen der Spezifikationen TS 103 051 und TS 100 028-1/-2 in aktueller Form, deren Grundlage der „shared risk“ Ansatz ist. Dieser beschreibt für die jeweilige Norm die maximalen zulässigen Unsicherheitsbeträge unter denen der Messwert als „wahr“ angesehen werden kann. Eine zusätzliche Betrachtung der Messunsicherheit bezüglich des gemessenen Wertes findet bei Unterschreitung der maximalen Unsicherheitsbeträge gemäß den Spezifikationen nicht statt. *The measurement uncertainty of the measurement methods listed in this test report is not directly included in the assessment of compliance with the respective limit values. The requirements of the specifications TS 103 051 and TS 100 028-1/-2 apply in their current form, based on the "shared risk" approach. For the respective standard, this describes the maximum acceptable uncertainty below which the measured value can be regarded as "true". An additional consideration of the measurement uncertainty with regard to the measured value does not take place if the maximum acceptable uncertainties according to the specifications are not reached.*
5	Die Aussage zur Konformität des in diesem Prüfbericht geprüften Produktes wird auf Kundenwunsch nach den Kriterien und Anforderungen der angewendeten Normen durchgeführt. Abweichende Bewertungsbedingungen durch den Kunden werden in den jeweiligen Kapiteln gesondert dokumentiert. Grundsätzlich wird eine Konformitätsbewertung auf Basis der angewendeten Normen durchgeführt, sofern mit dem Kunden keine abweichende Regelung getroffen wurde. *The statement of conformity of the product tested in this test report is carried out according to the criteria and requirements of the applied standards on customer request. Deviating assessment conditions by the customer are documented separately in the respective chapters. In principle, the assessment of conformity is made on the basis of the standards applied, unless otherwise agreed with the customer.*

Produktbeschreibung
Product description

1	**Test item**	Servo Motor (household appliance)
2	**Typ-No.**	SERVO DRIVE for AVENTOS HF/HS/HL top Modell: 23.A001
3	**Test sample obtaining**	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:
4	**FCC-ID**	W95-23A001
5	**IC**	8352A-23A001
6	**Description of EUT**	Refer to technical documentation and user manual
7	**Supported radio technologies**	2,4GHz ISM Band; NordicSemi Enhanced ShockBurst
8	**Max RF output power (declared)**	4 dBm
9	**Operating Frequency (declared)**	2404MHz; 2410MHz; 2452MHz
10	**Channel Bandwidth (declared)**	1 MHz
11	**Number of Channels**	3
12	**Modulation**	GFSK
13	**Rated Voltage / Frequency**	24 V DC
14	**Antenna Type**	☒ Integral antenna ☐ Dedicated antenna ☐ Permanent antenna connector
15	**Antenna amount of chains**	1
16	**Antenna Gain (declared)**	-7.8dBi (2404MHz), -8.3dBi (2410MHz), -7.7dBi (2452 MHz)
17	**Software**	BAU0176926931
18	**Hardware**	23.A001
19	**Used Samples**	A003254653-010, -002
20	**Data Cable**	USB – TTL UART Cable
21	**Temperature Range**	0°C to 40°C
22	**Environment**	Indoor

Produktbeschreibung
Product description

23	Pictures of the EUT

Conducted sample	Radiated sample
	
Model number	Model number
	

Absatz *Clause*	**Anforderungen – Prüfungen /** *Requirements - Tests*	**Bemerkungen /** *Remarks*	**Ergebnis** *Result*
FCC 15.203	Antenna Requirement	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.215 (c) RSS-Gen sec. 6.7	20dB Bandwidth and 99% emission bandwidth	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.249 (a) RSS-210 sec. B10 (a)	Field Strength of fundamental and harmonics	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.249 (d),(e) RSS-210 sec. B10 (b)	Radiated Spurious Emission	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.207 RSS-Gen sec. 8.8	AC Power Conducted Emissions	-	P ☒ F ☐ N/A ☐ N/T ☐

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EUT Classification

1.1 Wireless technologies and frequencies supported by the EUT

The named technologies are only those falling in the specification of the applied standard.

Technology	Frequency Range (TX)	Supported by the EUT	Evaluated in this report
Short range device	2400 MHz - 2483.5 MHz	☒	☒

1.2 Standard specific classification of the EUT

1.2.1 Applied standards

FCC CFR 47 Part 15 Subpart C- §15.249
RSS-210 sec. B10 (b): Issue 10

1.2.2 Test Methods and Guidance Documents

ANSI C63.10:2013

1.2.3 Type of equipment

☐	Tabletop Equipment
☐	Floor-Standing Equipment
☒	Equipment that can be used in multiple orientations
☐	Hand held Equipment

2 General

2.1 Registration

The measurement facilities for conducted and radiated disturbance measurements of the TÜV Rheinland LGA Products have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules. Measurement data will be accepted in conjunction with applications for Certification under Parts 15 and 18 of the Commission's Rules.

FCC Registration Number: 939976
Bundesnetzagentur Registration Number: BNetzA-CAB-17/21-16

The measurement facilities are also recognized by Innovation, Science and Economic Development (ISED) Canada to test to Canadian radio equipment requirements.

Company Number: 11235A
CAB Identifier: DE0018

2.2 Equipment modifications

No modifications were found to be necessary in order to perform the tests or to achieve compliance.

2.3 Test modes

Mode	Description	Mode configuration
1	TX modulated mode with continuous transmission	The DUT is connected with USB cable to a PC and configured using ArendiApprovalTest.exe software then the transmit mode on a specific channel is selected.

3 Test conditions

3.1 General

The DUT was tested standalone on the transmit test mode in normal test conditions.

3.2 Normal test conditions

Environmental condition	Parameter	Range
Temperature	°C	24
Relative humidity	%	40
Supply voltage	Volts DC	24 V

3.3 Antenna assemblies

Antenna connector is prepared so tests were done in conducted and radiated mode.

3.4 Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16-4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements“ and is documented in the quality system acc. to ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

The manufacturer has the sole responsibility of continued compliance of the device.

Test	Value	Unit	Range
Frequency Error	$2,7 *10^{-8}$	Hz	-
Frequency Stability under low voltage conditions			
Time	$1,1*10^{-9}$	s	-
Conducted Carrier Power	1.0	dB	9k-1GHz
Conducted Spurious Emissions (RX/TX)	1.7	dB	1GHz-6GHz
	2.8	dB	6GHz-40GHz
Occupied Bandwidth (OBW)	0.1	%	-
TX Power Spectral Density	4.2	mW	9kHz - 6GHz
	1.6	dB	9kHz - 6GHz
Dwell Time	$4,6 *10^{-7}$	Hz	-
Frequency Separation			-
Measurement of conducted emissions at the power supply connection to LISN	2.3	dB	9kHz – 150kHz
	2.2	dB	150kHz – 30MHz
Measurement of the field strength at distance 3m	1.6	dB	9k-150kHz
	4.5	dB	30-1000MHz
	5	dB	1-6GHz
	5.3	dB	6-40GHz
Temperature	0.8	K	-
Humidity	4	%	-
Voltage (AC/DC)	1.0	%	-

4 Test results in detail

4.1 Antenna Requirement

4.1.1 Requirements / Limits

FCC Part 15 Subpart C §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited... further, 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 which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

4.1.2 Test Results

The EUT has a permanently attached antenna (the antenna is soldered to a printed circuit board) and therefore this is sufficient to demonstrate compliance with the antenna requirement in section 15.203 according to KDB 353028 D01 Antennas Part 15 Transmitters v01.

Final test result	Pass

4.2 20 dB bandwidth and 99% emission bandwidth

4.2.1 Requirements / Limits

FCC Part 15 Subpart C §15.215

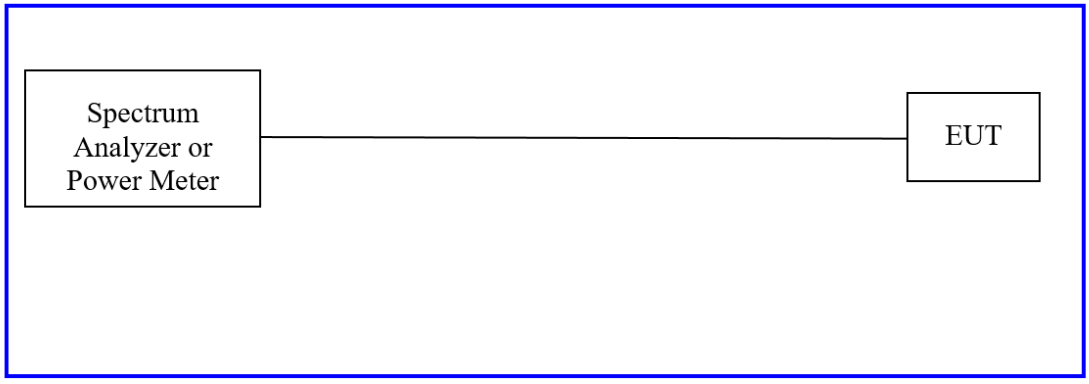
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

RSS 210, Issue 10, sec. 6.7

The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

4.2.2 Test Method

Conducted method was used to measure the 20 dB bandwidth and 99% bandwidth. The 20 dB bandwidth was measured according to ANSI C63.10:2013 clause 6.9.2, and 99% bandwidth was measured according to ANSI C63.10:2013 clause 6.9.3. The EUT was connected to the spectrum analyzer via a coax cable with a known loss.



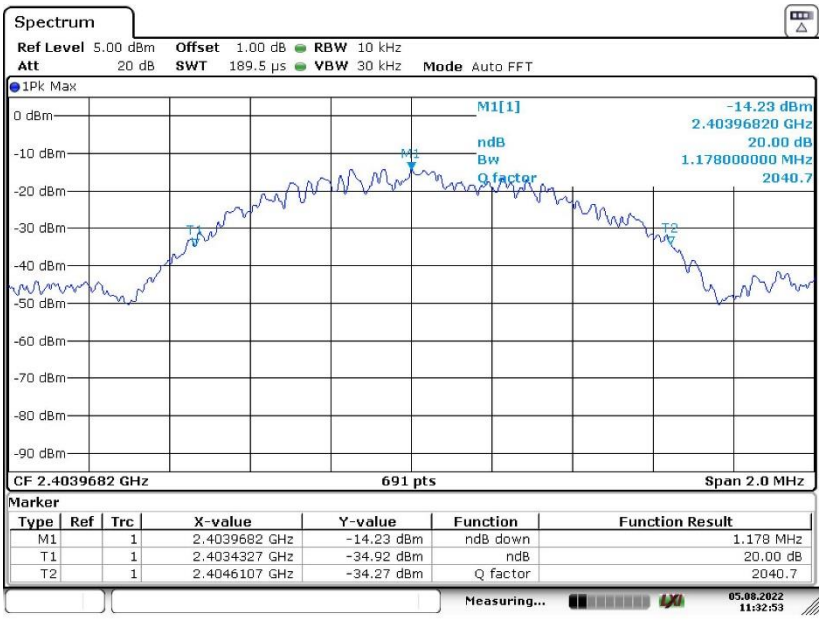
4.2.3 Test Setup

EUT		A003254653-002
Test Condition		Normal conditions
Chamber details		☒ 3m Fully Anechoic Chamber (FAC) ☐ 10m Semi Anechoic Chamber (SAC) ☐ Shielded room
Measurement positioning		Distance: ☒ 3m ☐ 10m EUT height: ☐ 1.5m ☐ 0.8m Antenna height: ☐ 1.5m ☐ 1m to 4m – height scan
		☐ N/A
Companion device		-
Operation mode		1
Spectrum Analyzer	**Centre Frequency**	2404MHz, 2410MHz, 2452MHz
	Resolution Bandwidth	10 kHz
	Video Bandwidth	30 kHz
	Span	2 MHz
	Sweep time	189.648 µs
Further parameters		-
Test engineer		Sami Ullah

4.2.4 Test Results

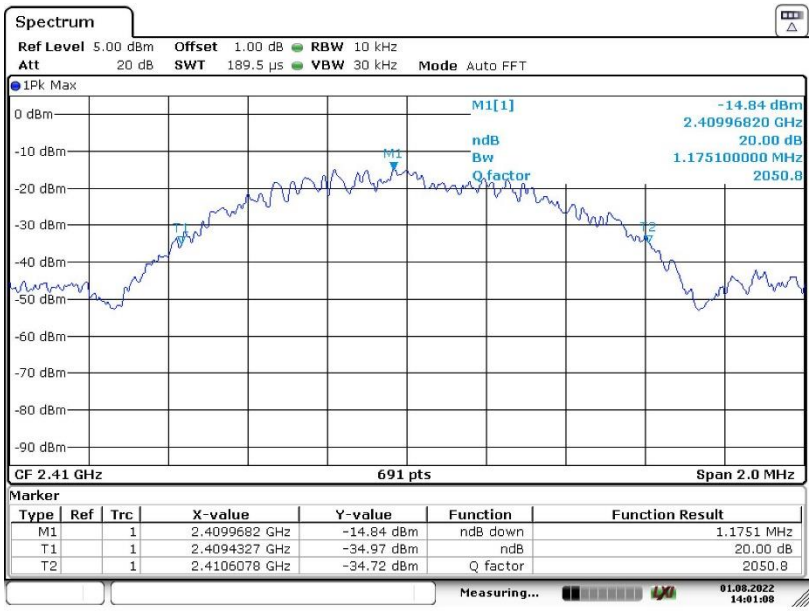
4.2.4.1 20 dB Bandwidth

- **2404 MHz**



Date: 5.AUG.2022 11:32:53

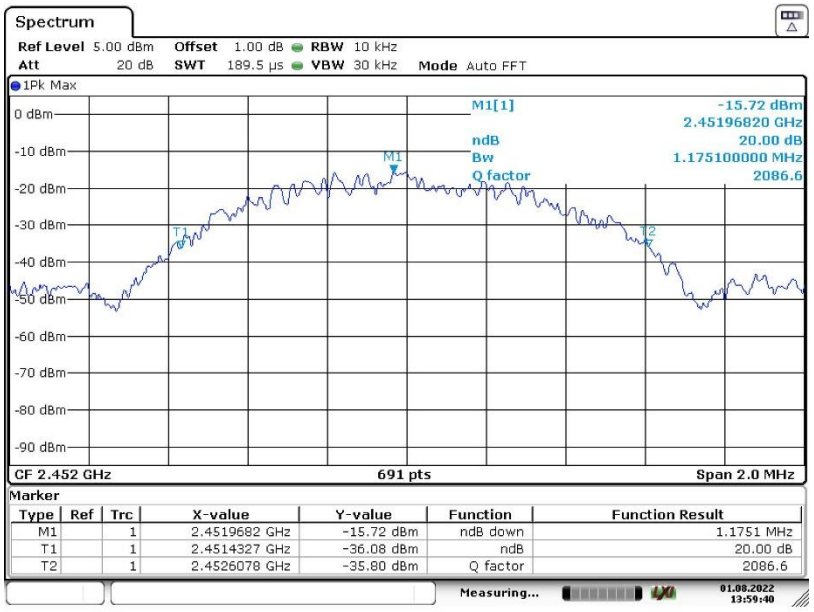
- **2410 MHz**



Date: 1.AUG.2022 14:01:08

Prüfdokumentation
Test documentation

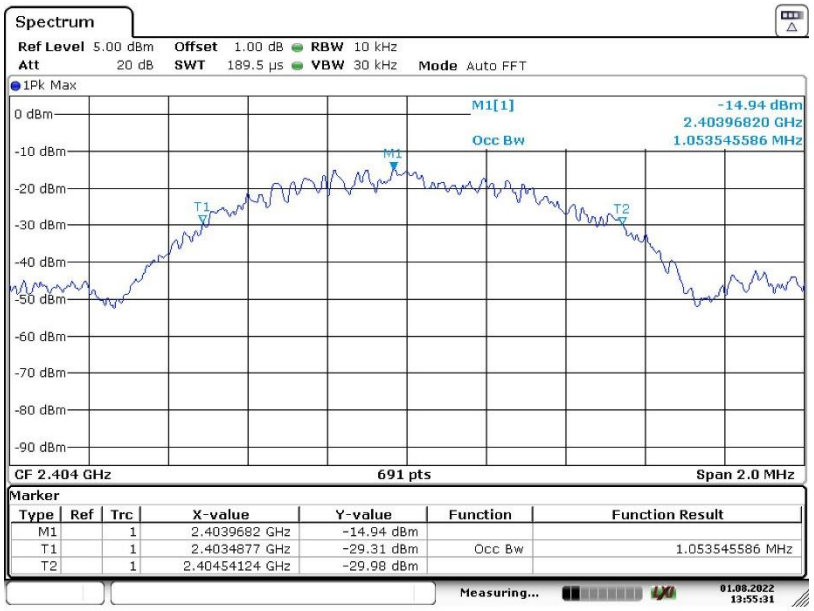
- **2452 MHz**



Frequency	20 dB Bandwidth (kHz)	Test Result
2404 MHz	1178	Pass
2410 MHz	1175	
2452 MHz	1175	

4.2.4.2 99% Bandwidth

- **2404 MHz**



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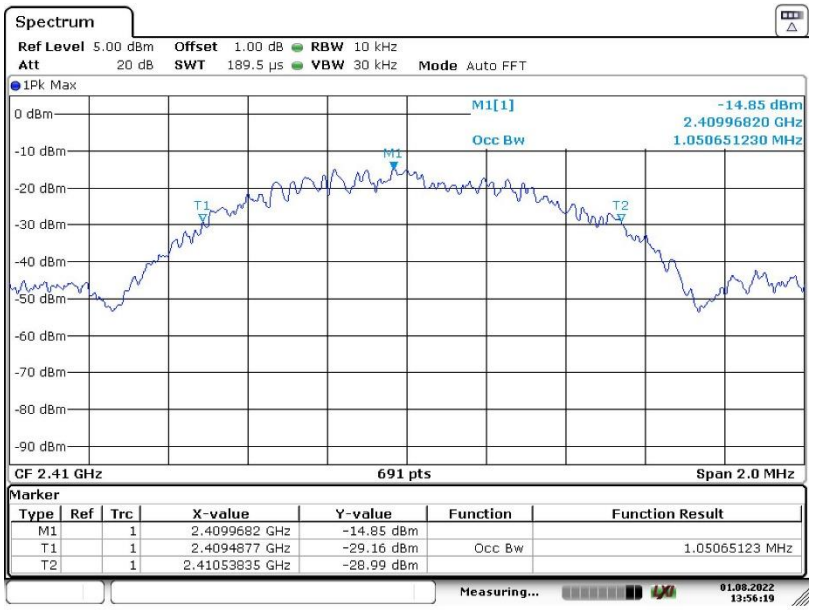
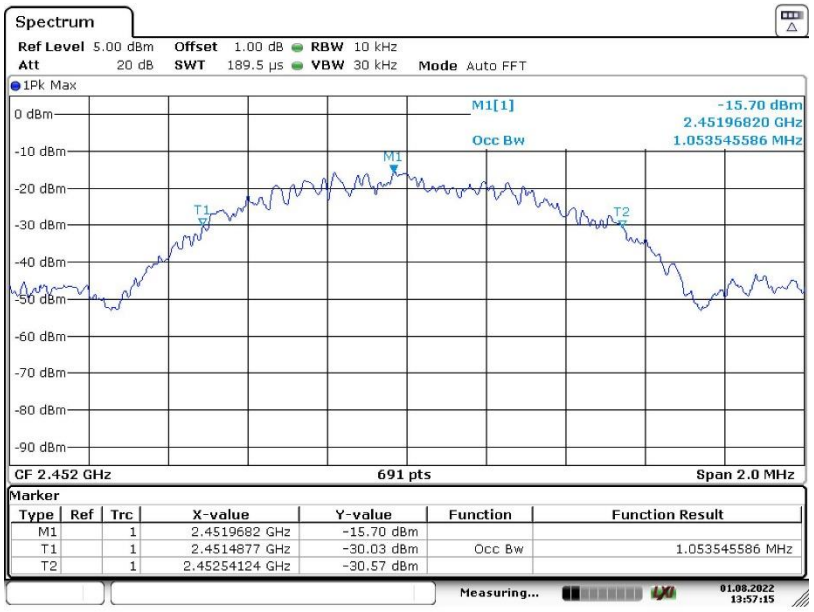
- **2410 MHz**



Date: 1.AUG.2022 13:56:20

Prüfdokumentation
Test documentation

- **2452 MHz**



Frequency	Bandwidth (kHz)
2404 MHz	1053
2410 MHz	1053
2452 MHz	1053

4.3 Radiated Spurious Emissions

4.3.1 Requirements / Limits

4.3.1.1 Field Strength of fundamental and harmonics

FCC Part 15 Subpart C §15.249 (a) / RSS-210 sec. B10 (a)

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50	500
2400-2483.5 MHz	50	500
5725-5875 MHz	50	500
24.0-24.25 GHz	250	2500

FCC Part 15 Subpart C §15.249 (c)

Field strength limits are specified at a distance of 3 meters

FCC Part 15 Subpart C §15.249 (e)

As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

The followings field strength limits applies to the DUT in dBµV/m

Fundamental Frequency	Average Field strength of fundamental (dBµV/m)	Peak Field strength of fundamental (dBµV/m)	Average Field strength of harmonics (dBµV/m)	Peak Field strength of harmonics (dBµV/m)
2400-2483.5 MHz	94	114	54	74

4.3.1.2 Radiated Spurious Emission

FCC Part 15ante Subpart C §15.249 (d) / RSS-210 sec. B10 (b)

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency [MHz]	Limit [µV/m]	Measurement distance [m]	Limits [dBµV/m]
0.009 – 0.49	2400/F(kHz)@300m	3	(48.5 – 13.8)@300m
0.49 – 1.705	24000/F(kHz)@30m	3	(33.8 – 23.0)@30m
1.705 – 30	30@30m	3	29.5@30m

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (f)(2).

Frequency [MHz]	Limit [µV/m]	Measurement distance [m]	Limits [dBµV/m]
30 – 88	100@3m	3	40.0@3m
88 – 216	150@3m	3	43.5@3m
216 – 960	200@3m	3	46.0@3m
960 - 40000	500@3m	3	54.0@3m

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor:

$$\text{Limit [dBµV/m]} = 20 \log (\text{Limit [µV/m]} / 1\text{µV/m})$$

4.3.2 Test Method

4.3.2.1 Perliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. Preliminary emission profile testing was performed inside the anechoic chamber. The receiving antenna was placed at a distance of 3m for all measurements. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT. The different measurement setup for each frequency range are shown below.

Prüfdokumentation
Test documentation

9 kHz - 30 MHz

Following Measurement Setup is used:

Test Site	Semi-anechoic chamber
Receiving Antenna	Loop antenna (HFH 2)
Receiving Antenna Height	1 m
Receiving Antenna Polarisation	Parallel – Perpendicular
EUT Table	1.0m x 1.5m non-conductive table 80cm above the floor
EUT Turn Table Step Size	22.5°
Receiver Configurations	Average and peak detectors
	RBW: 200Hz (9 - 150 kHz) and 9 kHz (150 kHz – 30 MHz)
	Step Size: 50Hz (9-150kHz) and 2.25kHz (150k-30MHz)
	Sweep Time: 100ms (FFT)

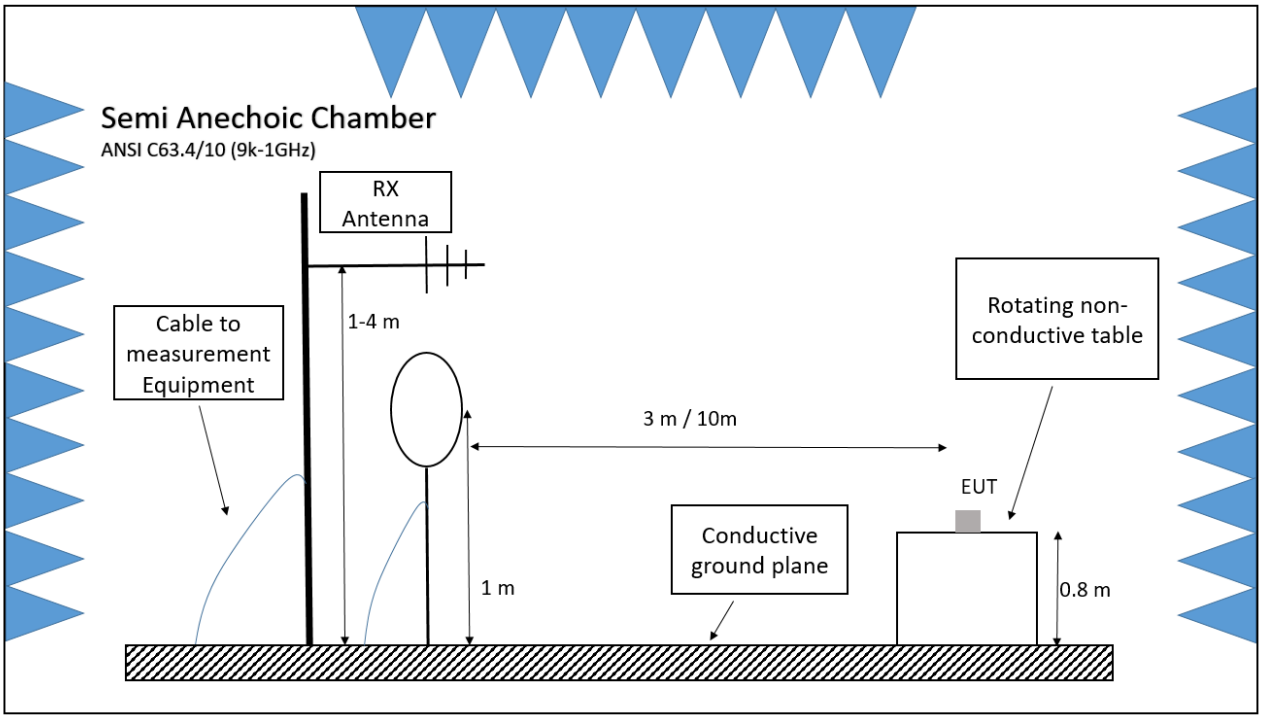
30 MHz - 1 GHz

Following Measurement Setup is used:

Test Site	Semi-anechoic chamber
Receiving Antenna	Hybrid Antenna VULB 9168
Receiving Antenna height	Varied (1m to 4 m, step size 1m)
Receiving Antenna Polarisation	Horizontal– Vertical
EUT Table	1.0m x 1.5m non-conductive table 80cm above the floor
EUT Turn Table Step Size	45°
Receiver Configurations	Peak detector
	RBW :120 kHz
	Step Size: 30kHz (30-1000MHz)
	Sweep Time : 100 ms (FFT)

Prüfdokumentation
Test documentation

For Measurements below 1 GHz, the EUT was positioned as shown in the setup photograph:

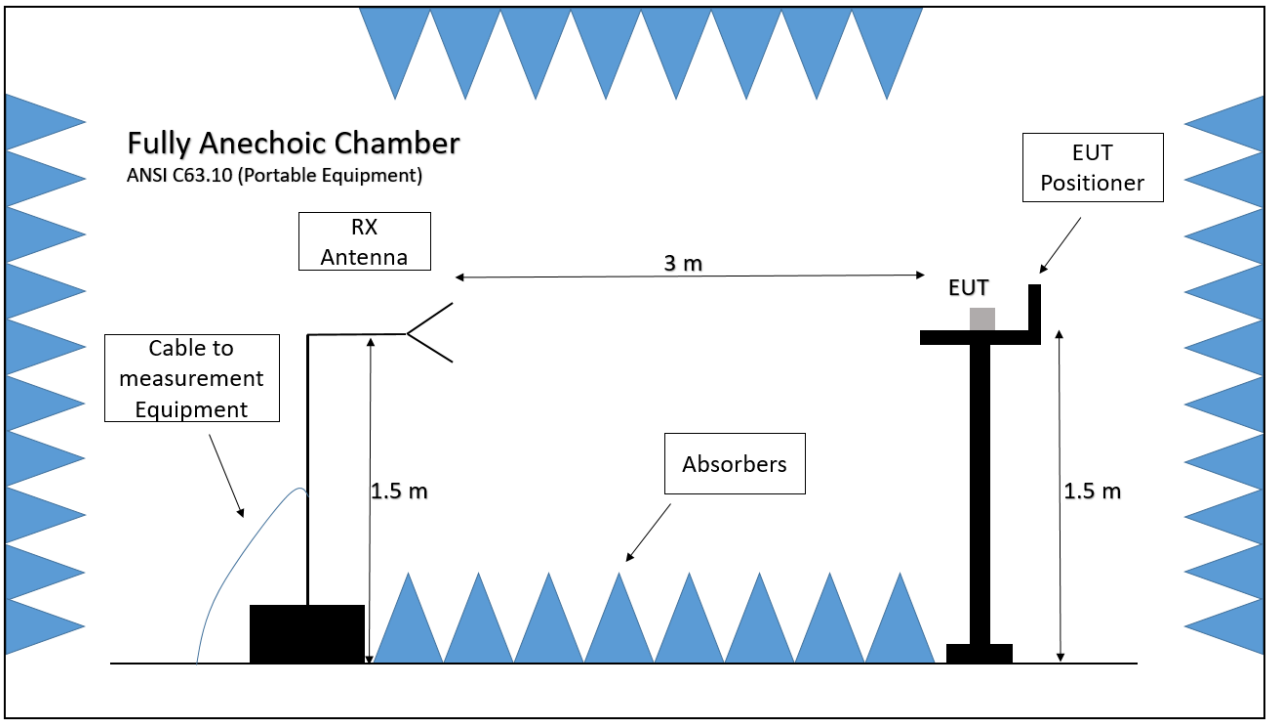


1 GHz – 26.5 GHz

Following Measurement Setup is used:

Test Site	Fully-anechoic chamber
Receiving Antenna	Horn Antenna HF907 (1-18 GHz), 3116C-PA (18-26.5 GHz)
Receiving Antenna Height	1.5 m
Receiving Antenna Polarisation	Horizontal– Vertical
EUT Positioner	40 cm x 60 cm non-conductive positioner 1.5 m above the floor / Step size,elevation angle 45°
EUT Turn Table Step Size	45°
Spectrum Analyser	Average and peak detectors
	RBW: 1 MHz
	Sweep Time : 100 ms

For Measurements over 1 GHz, the EUT was positioned as shown in the setup photograph:



4.3.2.2 Final Test

The placement of EUT and cables were the same as for preliminary testing. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked. For the measurments in the frequency range 30 MHz to 1 GHz for each measured frequency the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. For measurement above 1 GHz the turntable and positioner step sizes were set to a range of 22° and the antenna height is fixed.
For the measurments in the frequency ranges (90-110kHz, 490 kHz-1 GHz) quasi-peak detector is used, while average and peak detectors are used in other ranges.
Final testing was performed on an SVSWR compliant test site.
The final average electric field value (E_{final}) is calculated in the final measurement table using the following equation:

$$E_{final} = \text{RawRec} + \text{Corr.}$$

While

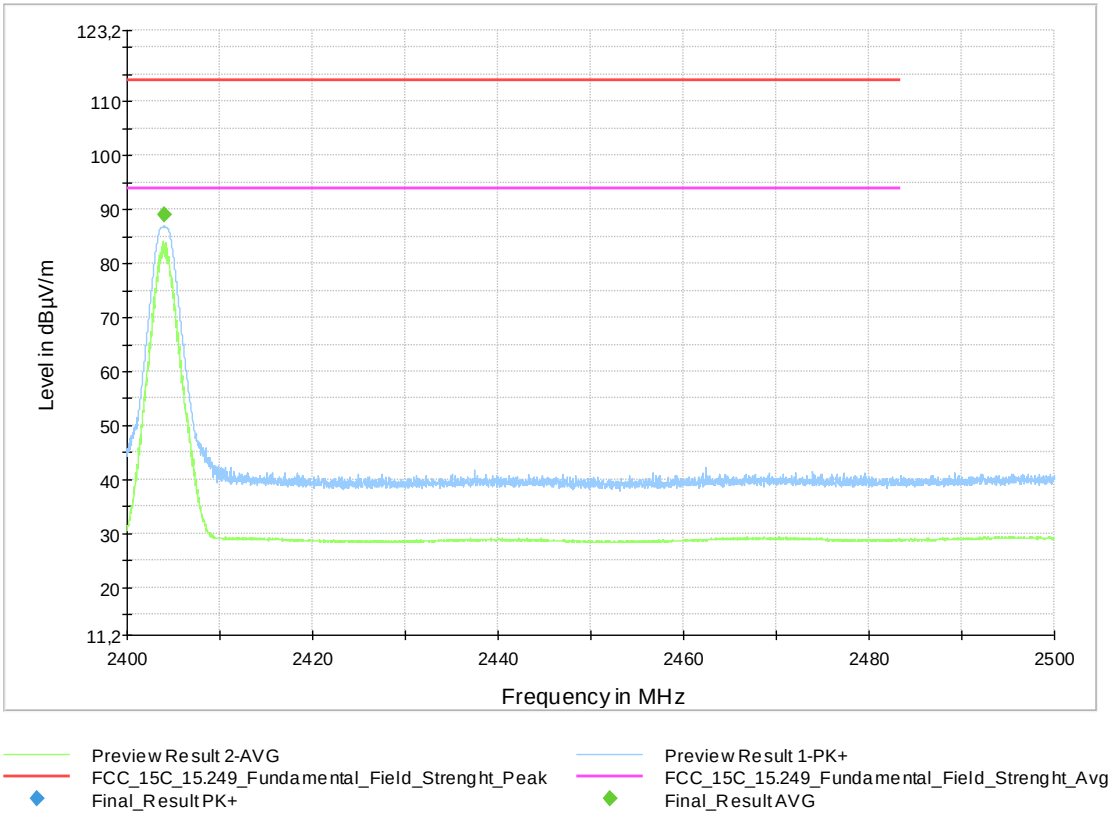
$$\text{Corr.} = \text{Trd. Corr.} + \text{Sig Path} + \text{Preamp}$$

4.3.3 Test Setup

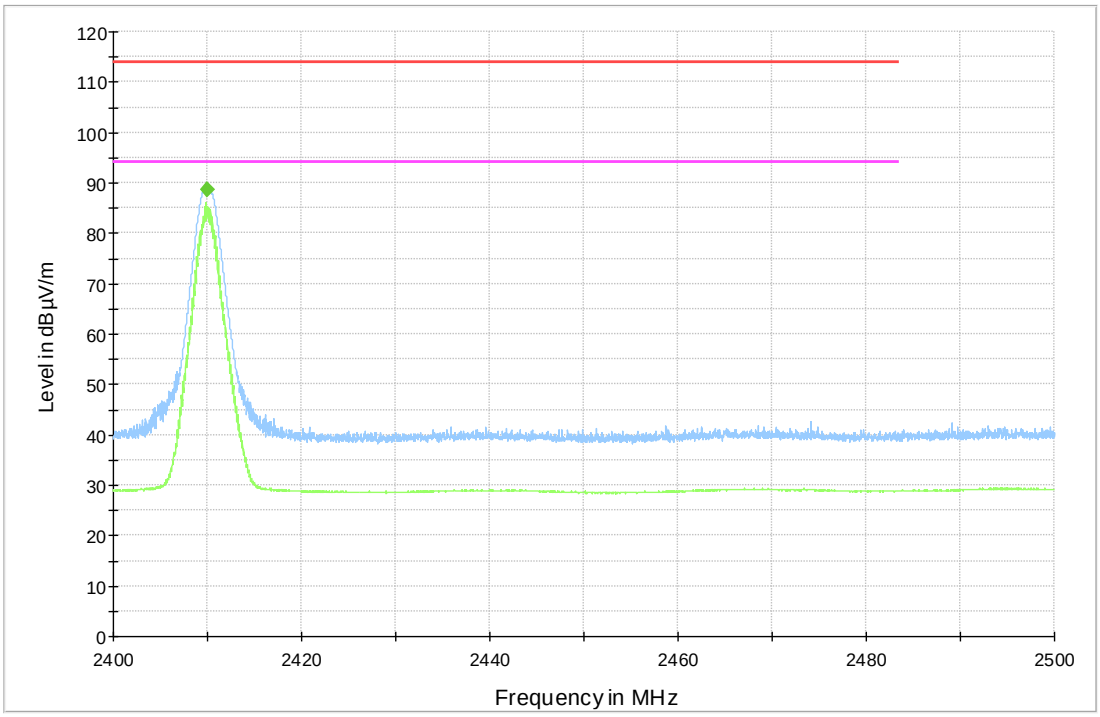
EUT	A003254653-010
Test Condition	Normal conditions
Companion device	-
Operation mode	1
Further parameters	-
Test engineer	Sami Ullah

4.3.4 Test results

4.3.4.1 Field Strength of fundamental

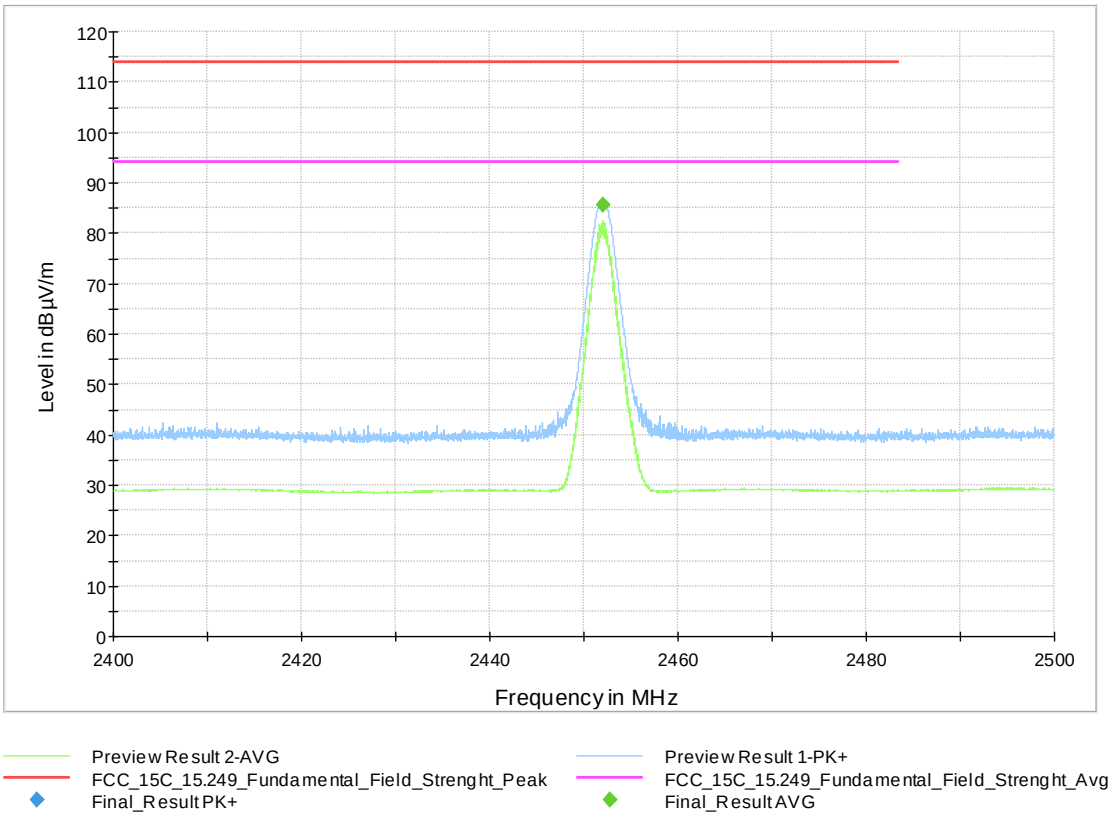


Prüfdokumentation
Test documentation



Preview Result 2-AVG
FCC_15C_15.249_Fundamental_Field_Strenght_Peak
Final_Result PK+
Preview Result 1-PK+
FCC_15C_15.249_Fundamental_Field_Strenght_Avg
Final_Result AVG

Prüfdokumentation
Test documentation

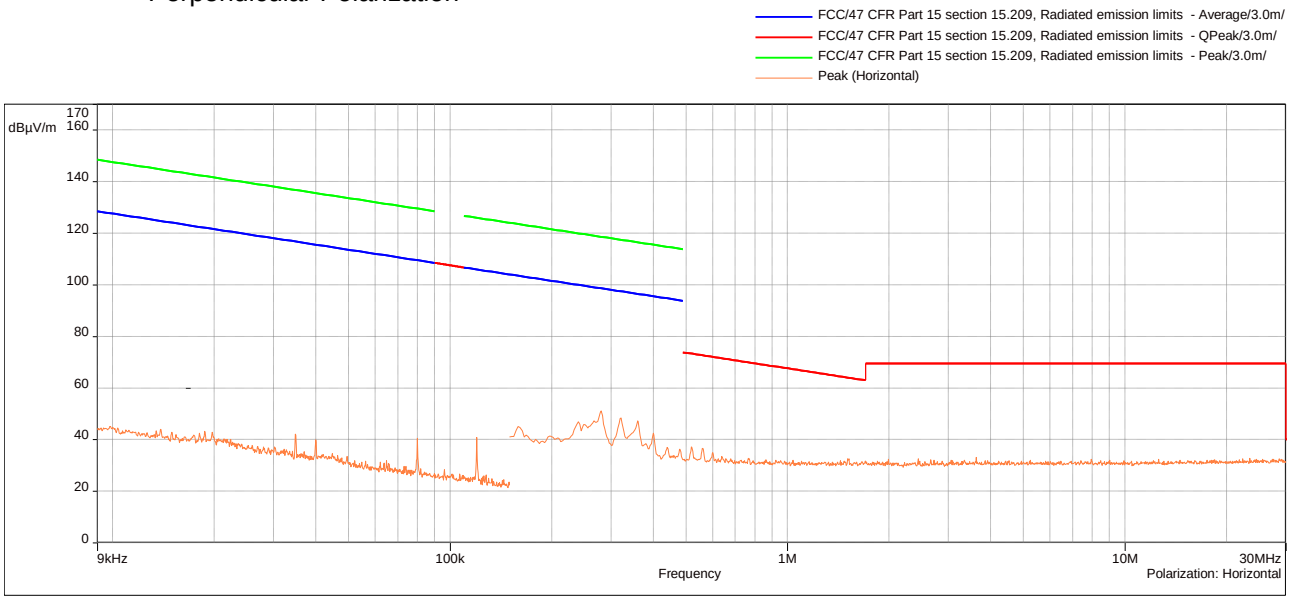


Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2403.986842	-	88.96	94	5.04	100.0	1000.000	150.0	H	242.0	2.0	-1.5
2409.975000	-	88.55	94	5.45	100.0	1000.000	150.0	H	257.0	12.0	-1.5
2452.001250	-	85.64	94	8.36	100.0	1000.000	150.0	H	253.0	2.0	-1.4

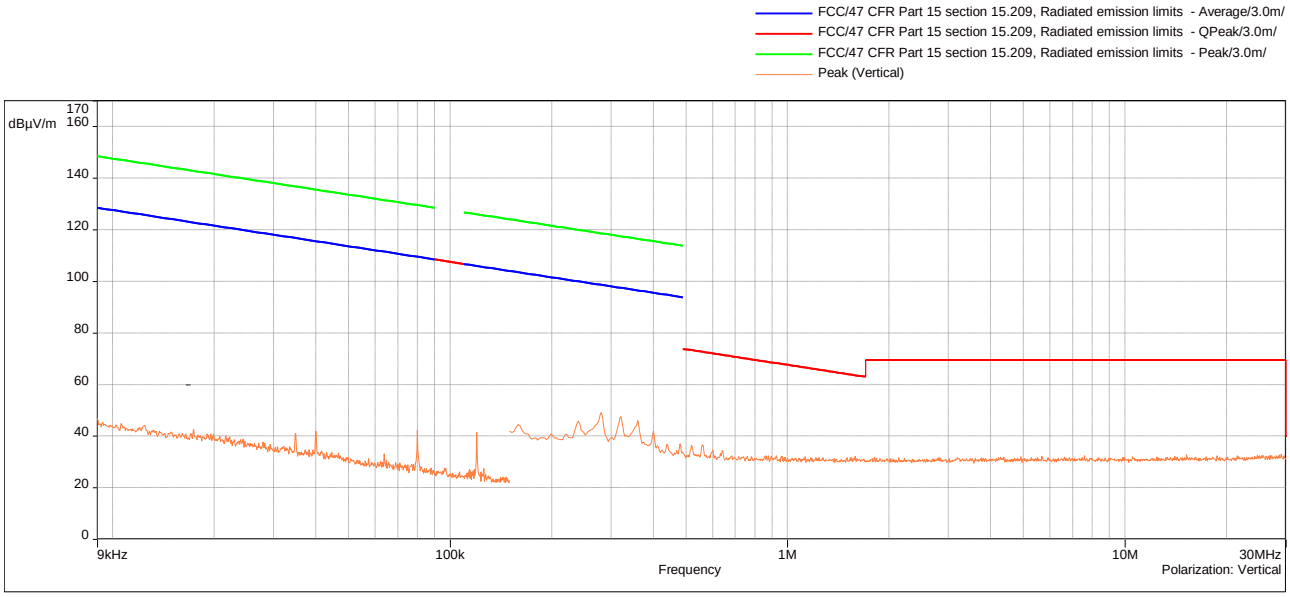
4.3.4.2 Spurious emissions and Field Strength of harmonics

- **9kHz to 30 MHz, 2452 MHz**

  - Perpendicular Polarization



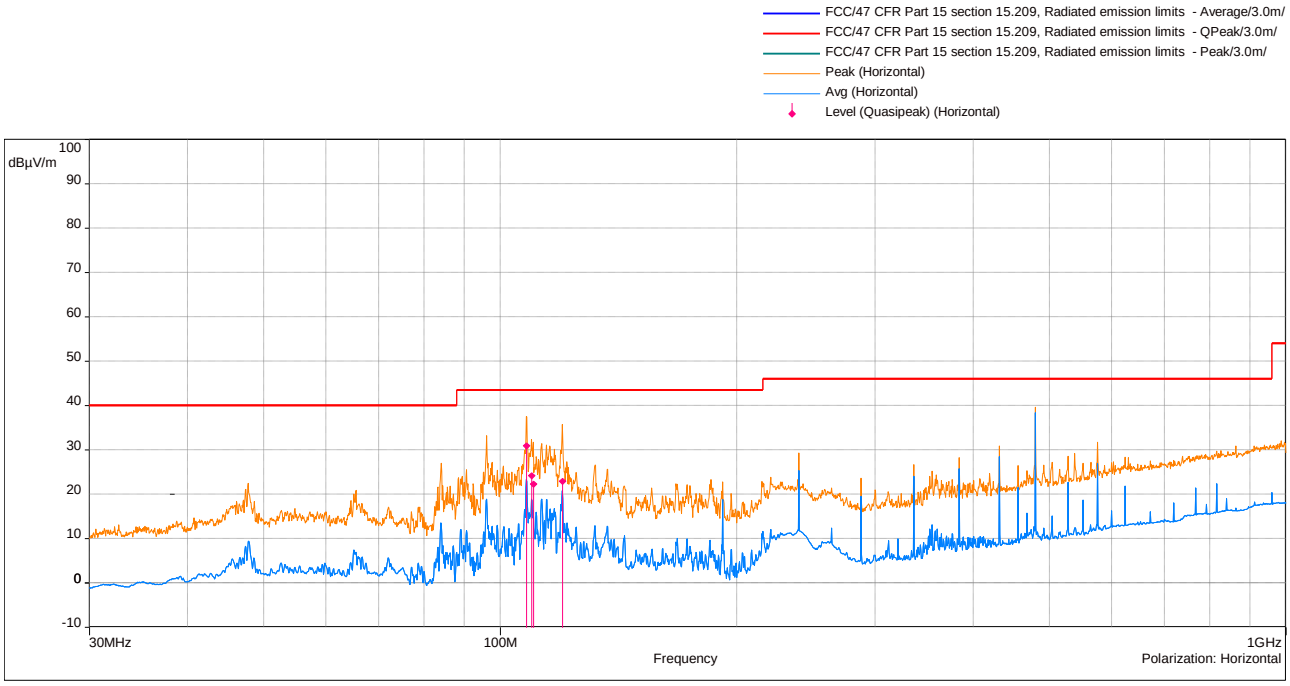
  - Parallel Polarization



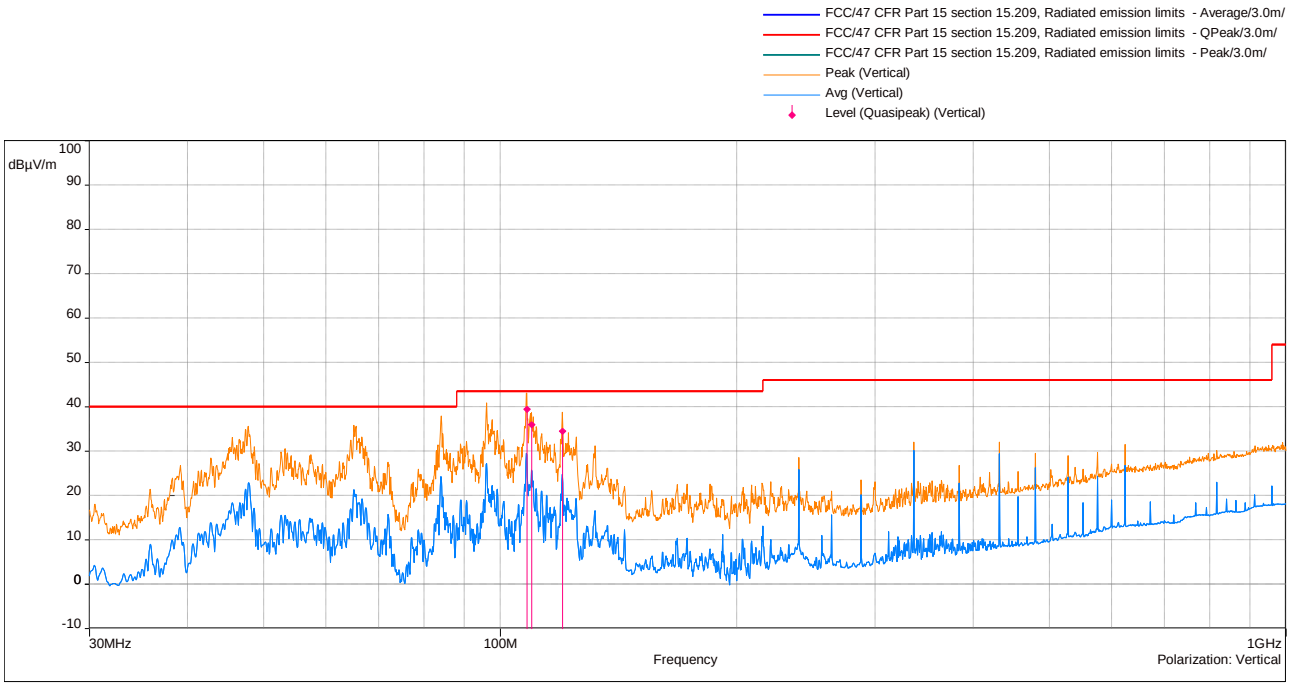
Prüfdokumentation
Test documentation

- **30 MHz – 1 GHz, 2452 MHz**

  - Horizontal Polarization



  - Vertical Polarization

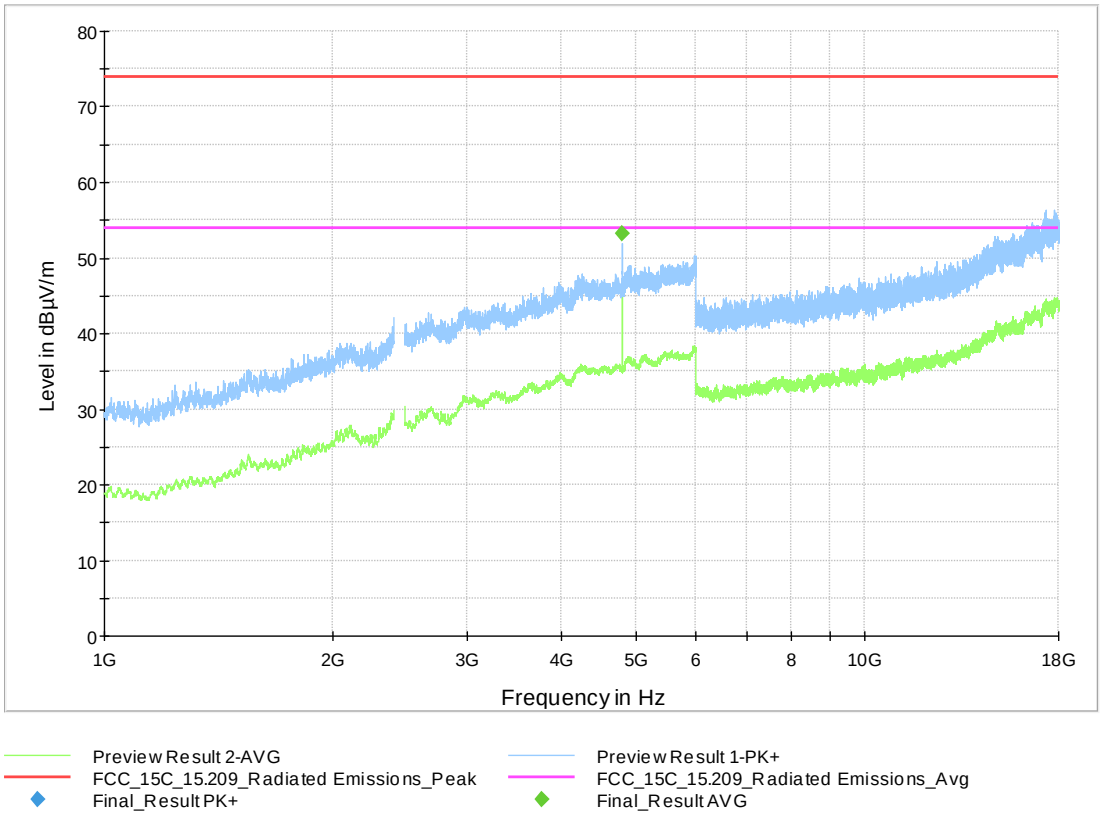


Prüfdokumentation
Test documentation

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (deg)	Height (m)	Pol	Meas. Time (s)	Corr. (dB)
108.05	30.91	43.50	-12.59	89.80	4.00	Horizontal	1.00	11.24
109.575	24.19	43.50	-19.31	119.90	4.00	Horizontal	1.00	11.49
110.225	22.33	43.50	-21.17	115.70	4.00	Horizontal	1.00	11.60
120.025	23.00	43.50	-20.50	258.10	4.00	Horizontal	1.00	12.83
108.075	39.51	43.50	-3.99	222.20	1.00	Vertical	1.00	11.24
109.625	36.01	43.50	-7.49	224.20	1.03	Vertical	1.00	11.50

Prüfdokumentation
Test documentation

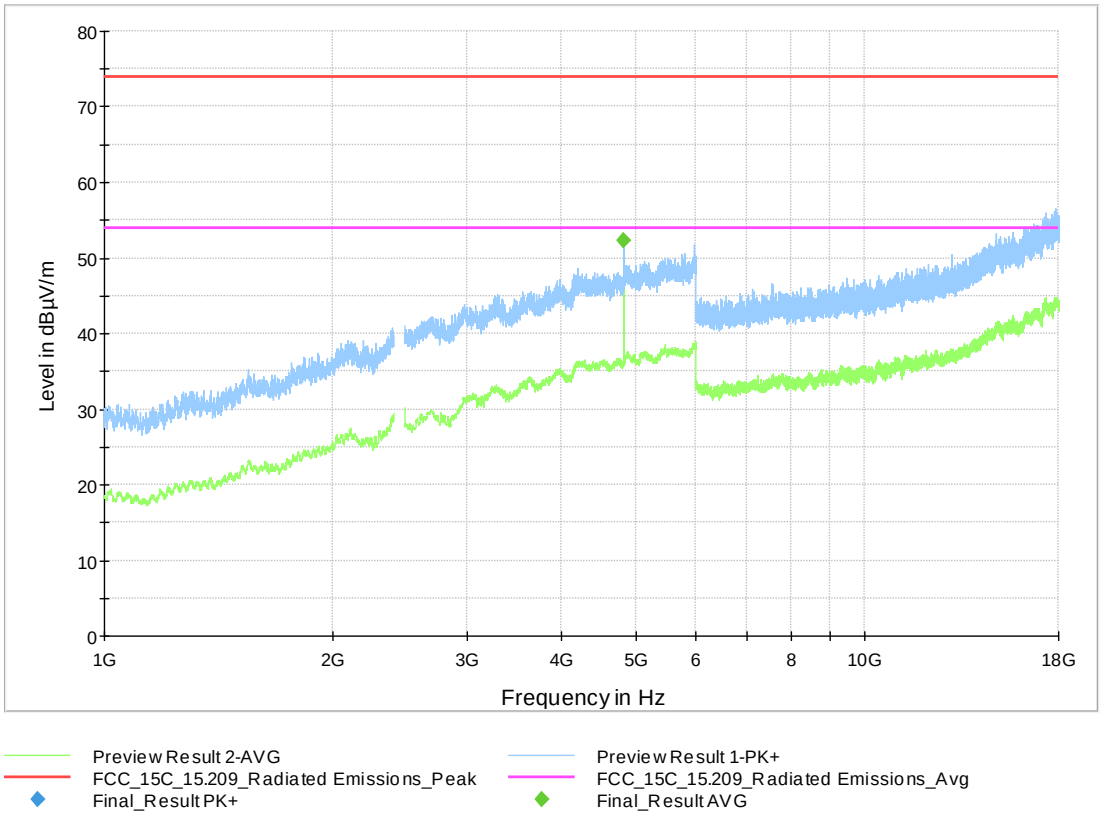
- **1-18 GHz, 2404 MHz**



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
4807.9475	-	53.16	54.00	0.84	100	1000.000	150.0	V	124.0	26.0	7.9

Prüfdokumentation
Test documentation

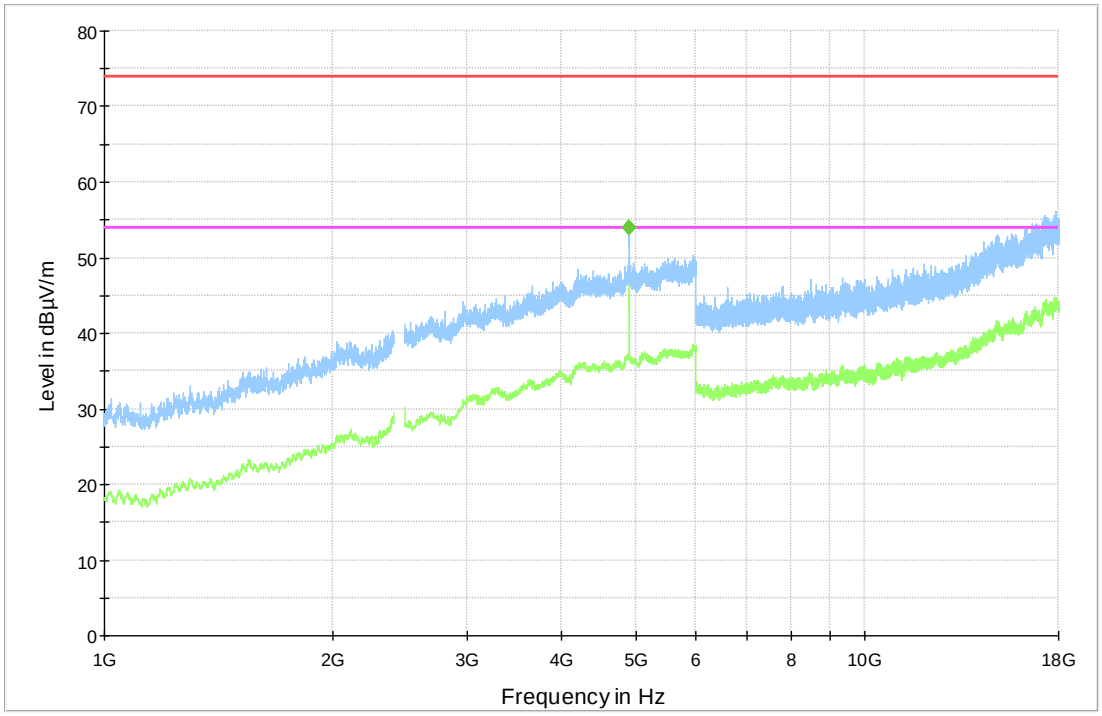
- **1-18 GHz, 2410 MHz**



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
4819.9700	-	52.29	54.00	1.71	100	1000.000	150.0	V	77.0	347.0	8.0

Prüfdokumentation
Test documentation

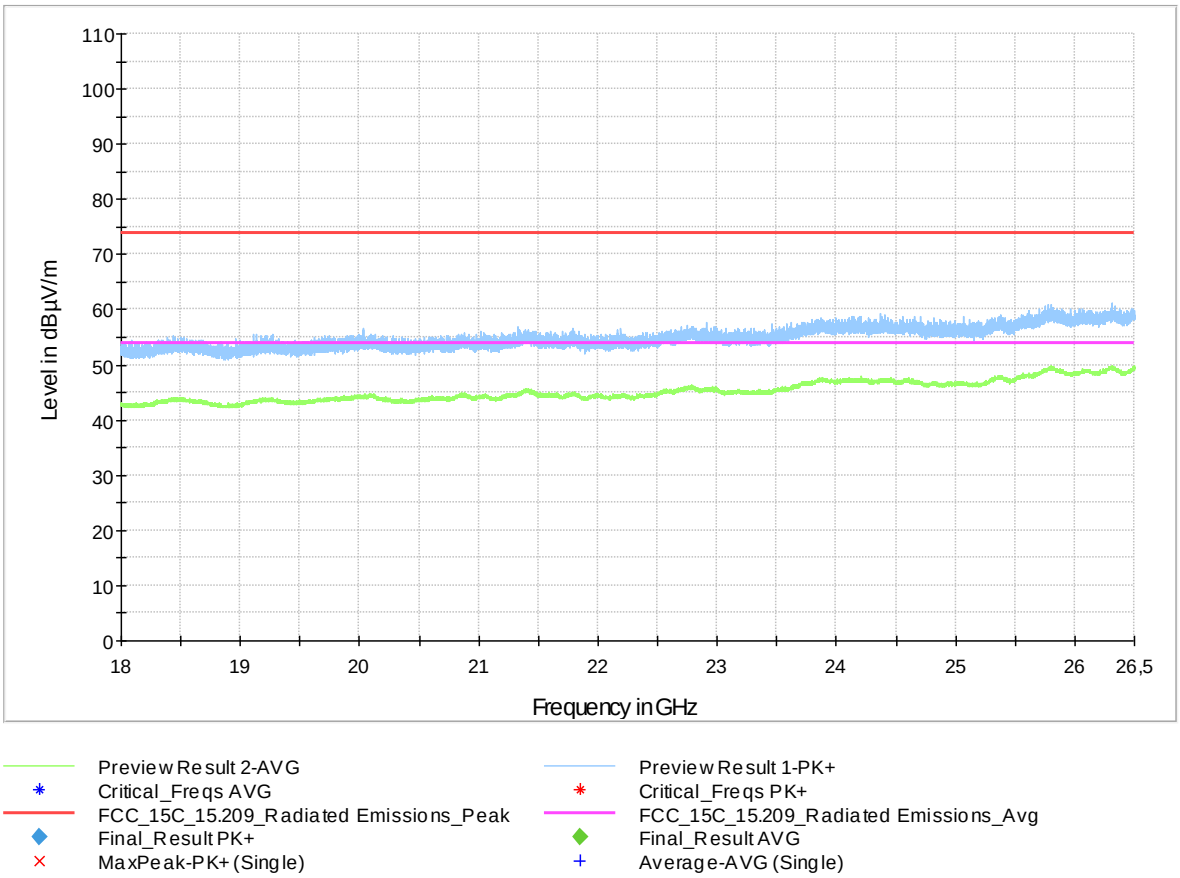
- **1-18 GHz, 2452 MHz**



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
4903.89	-	53.89	54.00	0.11	100.0	1000.000	150.0	V	146.0	0.0	8.7

Prüfdokumentation
Test documentation

- **18-26.5 GHz, 2452 MHz**



Final test result	Pass

4.4 AC Power Conducted Emission

4.4.1 Requirements / Limits

AC power-line conducted emission measurements shall be made, unless otherwise specified, over the frequency range from 150 kHz to 30 MHz, to determine the line-to-ground radio-noise voltage that is conducted from all of the EUT current-carrying power input terminals that are directly (or indirectly via separate transformers or power supplies) connected to a public power network.

FCC Part 15, Subpart C, §15.207 (a)
... 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 µH/50 ohms line impedance stabilization network (LISN).

FCC Part 15, Subpart C, §15.207, Conducted Emission Limits

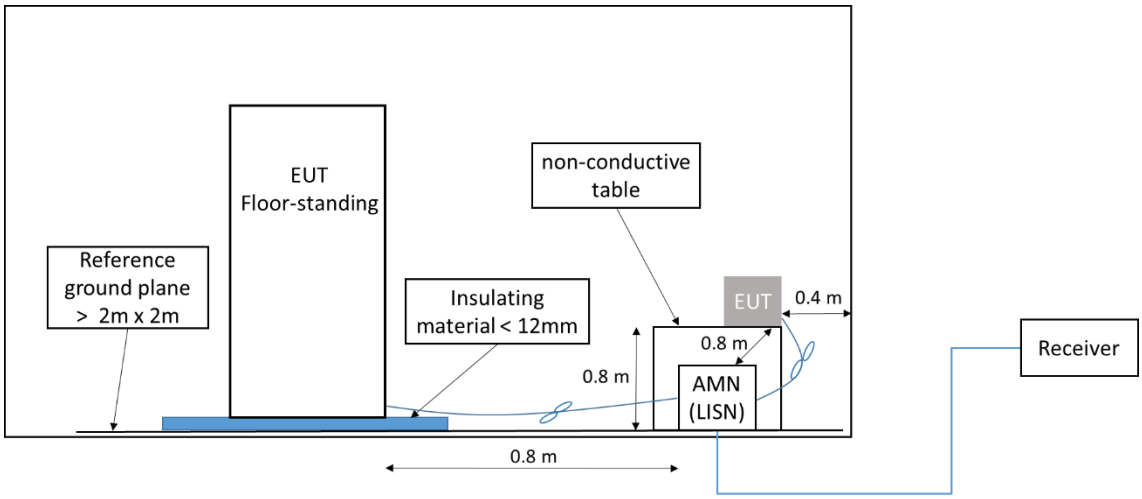
Frequency [MHz]	Conducted Limit [dBµV]	
	Quasi-peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50

*Decreases with logarithm of the frequency

FCC Part 15, Subpart C, §15.207 (c)
... 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.

4.4.2 Test Method

The test setup was made according to ANSI C63.10:2013 clauses 6.2.2 & 6.2.3 as shown in the photograph



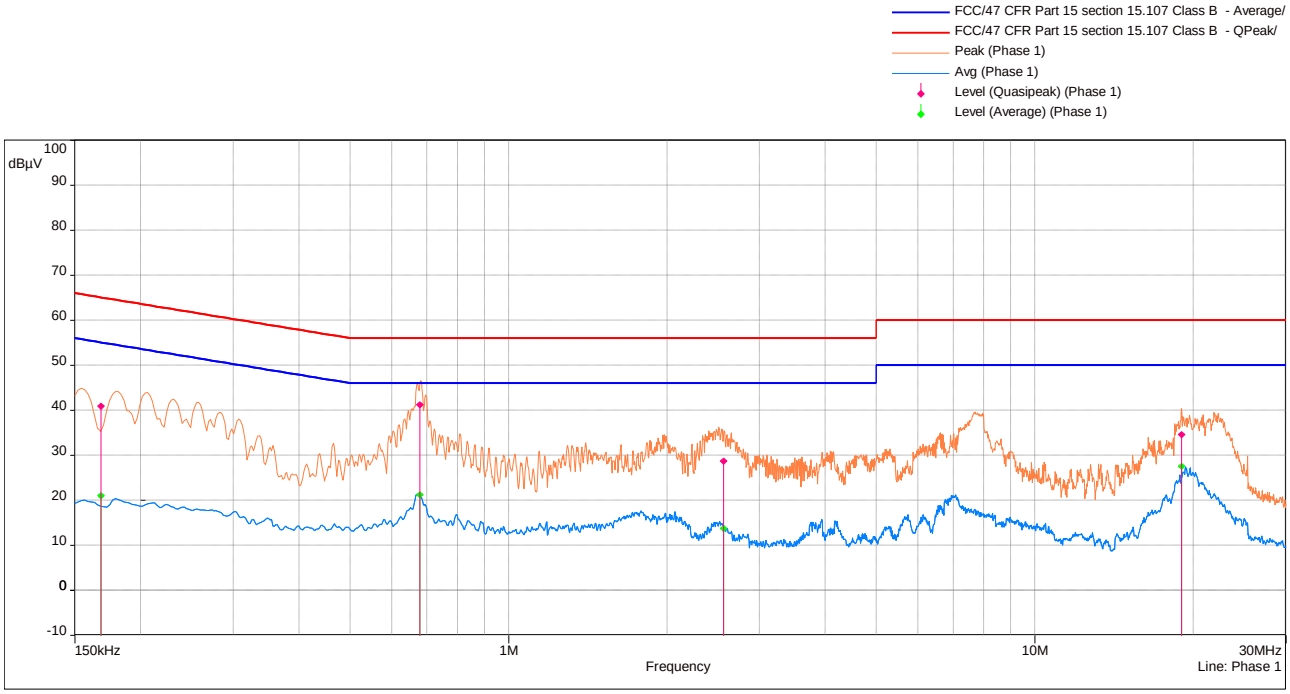
The EUT was configured to transmit on the lowest channel since it has the highest output power.

4.4.3 Test Setup

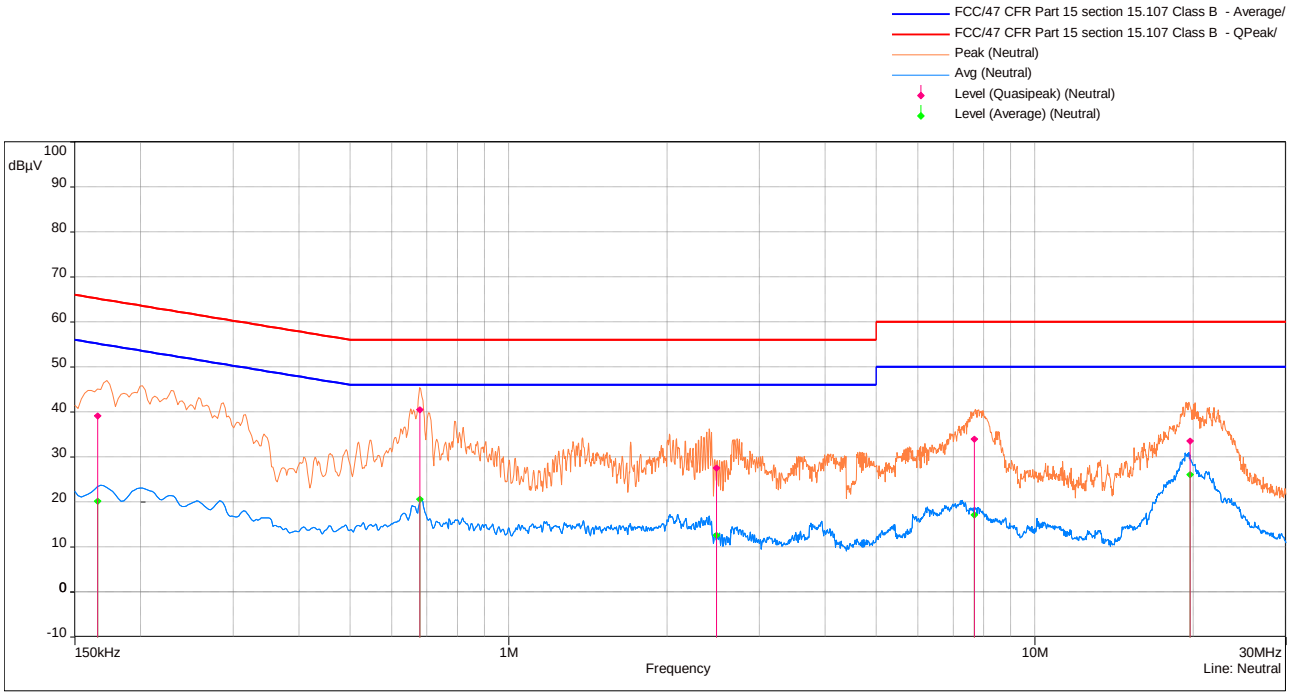
EUT	A003254653-010
Test Condition	Normal conditions
Companion device	-
Operation mode	1
Further parameters	-
Test engineer	Sami Ullah

4.4.4 Test results

– **Line: Phase 1**



– **Line: Neutral**



Prüfdokumentation
Test documentation

Frequency	Meas. AVG	Limit (dBµV)	Margin (dB)	Line	RBW	Result	Correction
0.168	21.02	55.06	-34.04	Phase 1	9k	1.00	10.04
0.67875	21.29	46.00	-24.71	Phase 1	9k	1.00	10.05
2.55975	13.75	46.00	-32.25	Phase 1	9k	1.00	10.15
18.9915	27.55	50.00	-22.45	Phase 1	9k	1.00	10.35
0.16575	20.22	55.17	-34.95	Neutral	9k	1.00	10.04
0.67875	20.61	46.00	-25.39	Neutral	9k	1.00	10.05
2.48325	12.62	46.00	-33.38	Neutral	9k	1.00	10.13
7.6695	17.12	50.00	-32.88	Neutral	9k	1.00	10.28
19.70025	26.10	50.00	-23.90	Neutral	9k	1.00	10.46

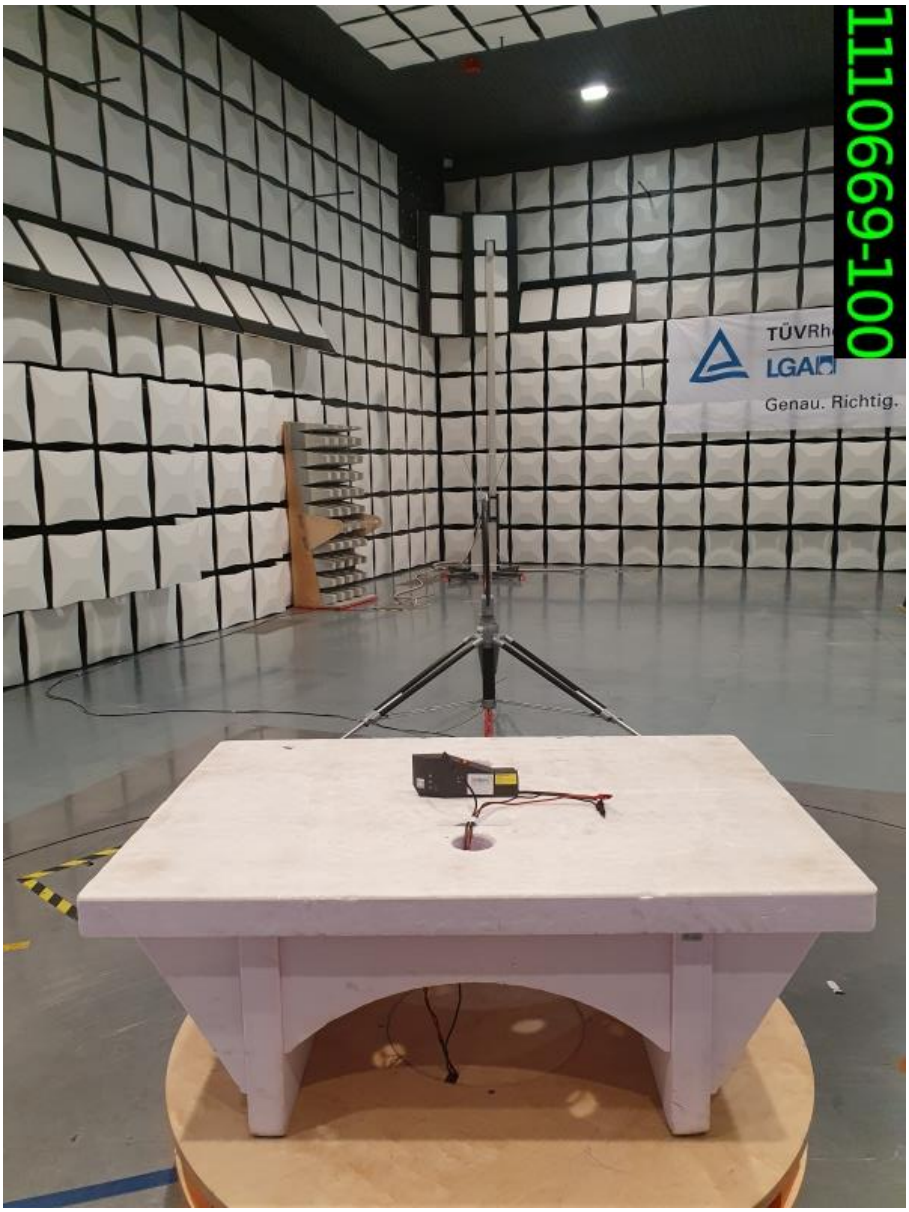
Frequency (MHz)	Meas. Q-Peak	Limit (dBµV)	Margin (dB)	Line	RBW	Result	Correction (dB)
0.168	40.90	65.06	-24.16	Phase 1	9k	1.00	10.04
0.67875	41.25	56.00	-14.75	Phase 1	9k	1.00	10.05
2.55975	28.75	56.00	-27.25	Phase 1	9k	1.00	10.15
18.9915	34.61	60.00	-25.39	Phase 1	9k	1.00	10.35
0.16575	39.18	65.17	-25.99	Neutral	9k	1.00	10.04
0.67875	40.57	56.00	-15.43	Neutral	9k	1.00	10.05
2.48325	27.63	56.00	-28.37	Neutral	9k	1.00	10.13
7.6695	34.02	60.00	-25.98	Neutral	9k	1.00	10.28
19.70025	33.62	60.00	-26.38	Neutral	9k	1.00	10.46

Final test result	Pass

Fotodokumentation
Photo documentation

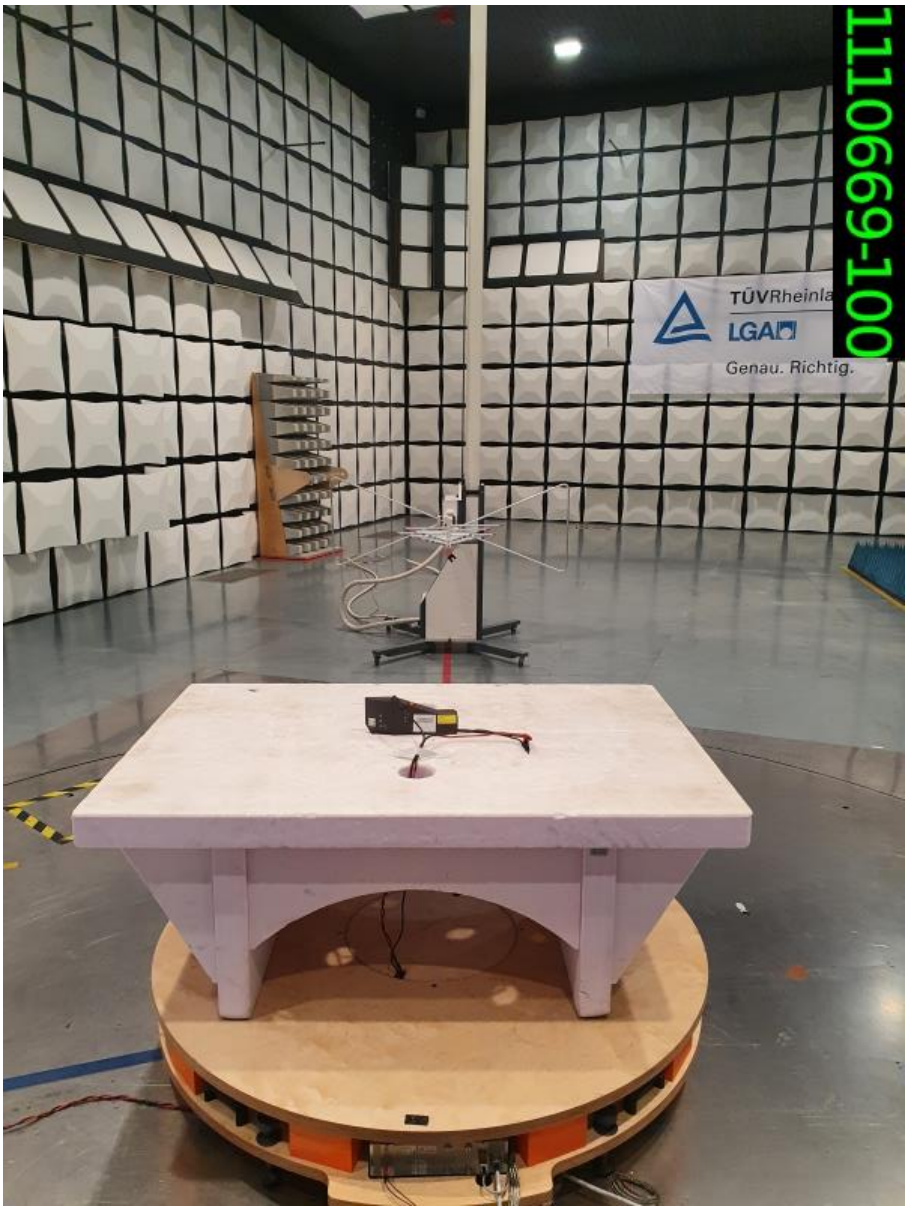
5 Test Setup Photo

Fotodokumentation
Photo documentation



Test Setup: Radiated Measurements (9 kHz - 30 MHz)

Fotodokumentation
Photo documentation

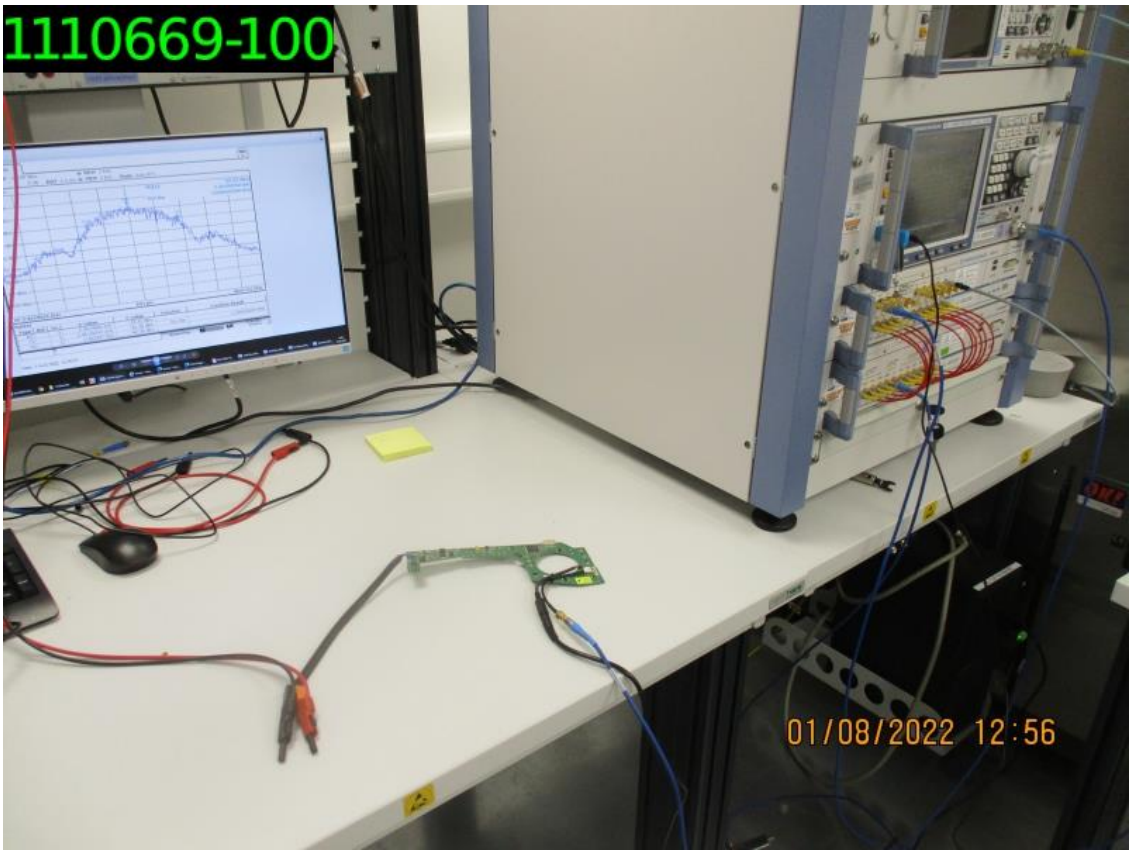


Test Setup: Radiated Measurements (30 MHz - 1 GHz)

Fotodokumentation
Photo documentation

Test Setup: Radiated Measurements (1 GHz to 26.5 GHz)

Fotodokumentation
Photo documentation



Test Setup: Conducted Measurements

Fotodokumentation
Photo documentation

Test Setup: Conducted Emission Measurements

Liste der verwendeten Prüfmittel
List of used test equipment

6 Equipment List

6.1 Hardware

Prüfmittel *Test equipment*		**Prüfmittel-Nr. / ID-Nr.** *Equipment No. / ID-No.*	**Letzte Kalibrierung** *Last calibration*	**Nächste Kalibrierung** *Next calibration*
Test System TS8997: Power Meter: OSP-B157 Spectrum Analyzer: FSV-30 Signal Generator: SMB100A Vector Signal Generator: SMBV100A	Rohde & Schwarz	2728871	07.2019	07.2021
Fully Anechoic Room	Albatross Projects GmbH	2959749	10.2018	10.2024
RSE-Filtersystem	Rohde & Schwarz	9002802	12.2019	01.2023
FSU Spectrum Analyzer	Rohde & Schwarz	2844118	02.2020	08.2023
Antenna HF907	Rohde & Schwarz	2856263	08.2018	09.2024
Antenna, Double Ridged Horn Antenna 3116C-PA	ETS LINDGREN	2900393	10.2020	10.2022
Antenna HFH 2	Rohde & Schwarz	2728893	07.2021	07.2024
Semi-Anechoic Chamber 30-1000 MHz	Siemens	2729645	06.2020	06.2025
Antenna VULB 9168	Schwarzbeck	2728787	09.2019	09.2022
Receiver ESU 8	Rohde & Schwarz	2728844	12.2021	12.2022
Receiver ESU 8	Rohde & Schwarz	2728148	11.2021	11.2022
Line Impedance Stabilization Network ESH2-Z5	Rohde & Schwarz	2731908	06.2021	06.2024
Limiter ESH3-Z2	Rohde & Schwarz	2732546	02.2021	02.2023

6.2 Software

Test Software	Developer	Version
EMC32	Rohde & Schwarz	10.60.20
BAT-EMC	NEXIO	2022.0.8.0

Änderungsverzeichnis
Change history

7 Change History

Revision Number	List of revisions	Date of issue
DE22QW97 001	Initial Release	2022-08-10
DE22QW97 002	Second Version	2022-09-29
Note: Latest revision report will replace all previous reports.		

Ende des Prüfberichts
End of Test Report