

Prüfbericht-Nr.: <i>Test report no.:</i>	DE258D0D 002	Auftrags-Nr.: <i>Order no.:</i>	1175791 210	Seite 1 von 51 Page 1 of 51
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	11955 Prüfungen nach: A. RED 2014/5	Auftragsdatum: <i>Order date:</i>	2024-03-22	
Auftraggeber: <i>Client:</i>	Julius Blum GmbH, Industriestr. 1, 6973 Höchst, Österreich			
Prüfgegenstand: <i>Test item:</i>	SERVO-DRIVE for AVENTOS HF			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	SERVO-DRIVE for AVENTOS HF , Model:21FA000.22			
Auftrags-Inhalt: <i>Order content:</i>	Prüfung der Funkparameter nach FCC & ISED <i>Test of radio parameters acc. to FCC & ISED</i>			
Prüfgrundlage: <i>Test specification:</i>	Vollprüfung / Complete test FCC CFR 47 Part 15 Subpart C- §15.247 ISED RSS-247:2023 Issue 3			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-12-12	For reasons of confidentiality, no photos of the EUT are included in this report. For EUT and test setup photos please see the Photo Documentation to this report Number.		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003887856-001 to 054			
Prüfzeitraum: <i>Testing period:</i>	2024-12-06 - 2025-07-08			
Ort der Prüfung: <i>Place of testing:</i>	Nürnberg Nuremberg			
Prüflaboratorium: <i>Testing laboratory:</i>	Wireless Labor Wireless Test Lab			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	06.08.2025 		genehmigt von: <i>authorized by:</i>	8/6/2025
Datum: <i>Date:</i>	Signiert von: Matthias Kraeutlein		Ausstellungsdatum: <i>Issue date:</i>	Signiert by: Shrinivas Naikar
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:	Dieser Prüfbericht DE258D0D-002 ersetzt den Prüfbericht DE258D0D-001 (siehe Änderungsverzeichnis) / The test report DE258D0D-002 replaces the test report DE258D0D-001 (see change history).			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
* Legend:	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. <i>This test report only relates to the above mentioned 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.</i>				

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 2 von 51
Page 2 of 51

Produktbeschreibung Product description

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms 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. <i>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.</i> <i>Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</i>
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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report.</i> <i>Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</i>
4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnissen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezüglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. <i>The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the "Zero Guard Band Rule" and "Simple Acceptance" in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.</i>
5	Wenn auf dem Bericht kein Akkreditierungshinweis aufgebracht ist, wurde der Bericht nicht im akkreditierten Bereich erstellt und ist folglich auch nicht vom EA MLA abgedeckt. Unabhängig davon wurde der Bericht auf Basis der allgemeinen Regeln der ISO/IEC 17000er Reihe erstellt. Mit "#" gekennzeichnete Prüfungen sind nicht Bestandteil der Akkreditierung D-PL-14169-03-00. <i>If there is no accreditation notice on the report, the report has not been produced in the accredited area and is consequently not covered by the EA MLA. Regardless of this, the report has been prepared based on the general rules of the ISO/IEC 17000 series. Tests marked with "#" are not covered by the accreditation D-PL-14169-03-00.</i>

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 3 von 51
Page 3 of 51

Produktbeschreibung
Product description

1	Test item	SERVO-DRIVE for AVENTOS HF
2	Typ-No.	SERVO-DRIVE for AVENTOS HF , Model:21FA000.22
3	Identical Type	21FA001.22 and 21FA005.22 (Please refer to Electrical Identical Declaration Letter by Blum, dated; 20-Mar-2025)
4	Test sample obtaining	☒ Sampling by customer ☐ Sampling by TÜV Rheinland Group ☐ others:
5	Serial-No.	-
6	Supported radio technologies evaluated in this report	2.4 GHz NordicSemi Enhanced ShockBurst
7	Supported radio technologies not evaluated in this report	-
8	Description of EUT	Servo Motor (household appliance) SERVO-DRIVE for AVENTOS HF
9	Max RF output power (measured)	1dBm (conducted)
10	Operating Frequency (declared)	2404 MHz - 2452 MHz
11	Channel Bandwidth (declared)	1000 kHz
12	Number of Channels	3
13	Modulation	GFSK
14	Rated Voltage / Frequency	24V DC
15	Radio Module Name	21A00L83
16	FCC ID	FCC ID:W95-21FA00Y
17	IC ID	IC:8352A-21FA00Y
18	Radio Module / Antenna Type	☒ Radio module with antenna on module PCB ☐ Radio module with dedicated antenna ☐ Radio module with user accessible antenna connector
19	Antenna Name	PCB trace, omni directional
20	Antenna Type	☒ Integral antenna (designed as a fixed part of the EUT) ☐ Dedicated antenna (removable, obligation to be used) ☐ Permanent antenna connector
21	Antenna number of chains	1
22	Antenna Gain (declared)	2404MHz -4 dBi 2410MHz -4 dBi 2452MHz -4 dBi
23	Software / Firmware	Not Provided
24	Hardware	Not Provided
25	Provided Samples	A003887856-001 to 054
26	Conducted measurements sample	A003887856-26 (cond. sample)
27	Radiated measurements sample	A003887856-11 (rad. sample)
28	Companion Device used for radio connection with the EUT	EUT in Test Mode. Therefore, no Companion Device was used.
29	Auxiliary equipment used to set up the EUT	Lab Notebook
30	Data Cable	USB – TTL UART Cable
31	Temperature Range	0°C to 40°C
32	Environment	Indoor

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Absatz Clause	Anforderungen - Prüfungen / Requirements - Tests	Bemerkungen/ Remarks	Ergebnis Result
FCC 15.247 (a)(1) RSS-247 sec. 5.1	20 dB Bandwidth	Does not apply for DTS equipment	P ☐ F ☐ N/A ☒ N/T ☐
FCC 15.247 (a)(1) RSS-247 sec. 5.1	Number of Hopping Frequencies	Does not apply for DTS equipment	P ☐ F ☐ N/A ☒ N/T ☐
FCC 15.247 (a)(1) RSS-247 sec. 5.1	Time of Occupancy	Does not apply for DTS equipment	P ☐ F ☐ N/A ☒ N/T ☐
FCC 15.247 (a)(1) RSS-247 sec. 5.1	Carrier Frequency Separation	Does not apply for DTS equipment	P ☐ F ☐ N/A ☒ N/T ☐
FCC 15.247 (b) RSS-247 sec. 5.4	Maximum Output Power	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.247 (e) RSS-247 sec. 5.2 (b)	Power Spectral Density	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.247 (a)(2) RSS-247 sec. 5.2 (a)	6dB Bandwidth	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.247 (d) RSS-247 sec. 5.5	Unwanted Emissions	-	P ☒ F ☐ N/A ☐ N/T ☐
FCC 15.207 RSS-Gen sec. 8.8	AC Power Conducted Emissions	Does not apply for equipment with DC supply voltage	P ☒ F ☐ N/A ☐ N/T ☐

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 5 von 51
Page 5 of 51

Prüfdokumentation
Test documentation

Contents

1	Registration	6
2	EUT Classification	6
2.1	Wireless technologies and frequencies supported by the EUT	6
2.2	Standard specific classification of the EUT	6
2.3	System Type	6
3	Test conditions and configurations	6
3.1	Normal environmental test conditions	7
3.2	Equipment modifications	7
3.3	Antenna assemblies	7
3.4	Test Modes	7
3.5	Measurement Uncertainty	8
4	Test results in detail	9
4.1	Maximum Output Power	9
4.2	Power Spectral Density	16
4.3	6 dB Bandwidth / DTS bandwidth & 99 % Bandwidth	19
4.4	Unwanted emissions	23
4.5	AC Power Conducted Emission	45
5	Test Setup Photo	48
6	Application form	49
7	Equipment List	50
7.1	Hardware	50
7.2	Software	50
8	Change history	51

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 6 von 51
Page 6 of 51

Prüfdokumentation
Test documentation

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 EUT Classification

2.1 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)	TX Function	Supported by the EUT	Evaluated in this report
802.11b	2400 – 2483.5 MHz	SISO	☐	☐
802.11g	2400 – 2483.5 MHz	SISO	☐	☐
802.11n (20MHz)	2400 – 2483.5 MHz	SISO	☐	☐
802.11n (40MHz)	2400 – 2483.5 MHz	SISO	☐	☐
BLE	2400 – 2483.5 MHz	SISO	☐	☐
BLE 5.0	2400 – 2483.5 MHz	SISO	☐	☐
Non-specific SRD	2400 – 2483.5 MHz	SISO	☒	☒

SISO: Single Input Single Output

2.2 Standard specific classification of the EUT

2.2.1 Applied standards

FCC CFR 47 Part 15 Subpart C - §15.247

ISED RSS-247:2023 Issue 3

2.2.2 Test Methods and Guidance Documents

ANSI C63.10:2013

KDB 558074 D01 DTS Measurement Guidance v05

2.3 System Type

DTS (Digital Transmission System)

2.3.1 Type of equipment

Tabletop Equipment

3 Test conditions and configurations

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 7 von 51
Page 7 of 51

Prüfdokumentation
Test documentation

3.1 Normal environmental test conditions

Environmental condition	Parameter	Range during test
Temperature	°C	21-24
Relative humidity	%	20-60
Supply voltage	V	3

3.2 Equipment modifications

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

3.3 Antenna assemblies

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

3.4 Test Modes

The EUT was rotated in all orientations (elevation and azimuth) with the help of a positioning device.

Following configurations were used for the test cases:

Mode description	Mode configuration
All Modes	The auxiliary equipment was connected to the EUT during the tests.
Mode 1: TX-Mode	The EUT was setup using the Arendi Approval Test Software in Transmitter Test Mode with PRBS9 modulation
Mode 2: RX-Mode	N/A
Mode 3: N/A	
Mode 4: N/A	

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 8 von 51
Page 8 of 51

Prüfdokumentation
Test documentation

3.5 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 ETSI TR 100 028-1/-2 and ETSI TS 103 051 (radiated measurements) and is documented in the quality system acc. to ISO/IEC 17025:2017.

Furthermore, component and process variability of devices similar to that tested may result in additional deviation.

The stated values are the expanded uncertainty values, the measured value lies within the assigned range of values with a probability of 95% ($k = 1.96$).

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

Test	Value	Unit	Range
Frequency Error	$2.7 \cdot 10^{-8}$	Hz	-
Frequency Stability under low voltage conditions			
Time	$1.1 \cdot 10^{-9}$	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	$4.6 \cdot 10^{-7}$	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	%	-

Measured value	Limit	Extended measurement uncertainty ($k=1.96$)	Confidence interval (95%)
19 dBm @ 2.48GHz	20 dBm	1.7 dB	17.3 dBm – 20.7 dBm

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 9 von 51
Page 9 of 51

Prüfdokumentation
Test documentation

4 Test results in detail

4.1 Maximum Output Power

4.1.1 Requirements / Limits

The maximum output power limit is expressed in terms of either maximum peak conducted output power or maximum conducted output power.

The maximum peak conducted output power is defined as the maximum power level measured with a peak detector using a filter with width and shape of which is sufficient to accept the full signal bandwidth.

The maximum conducted output power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

	Condition		Limit
☒	Systems using digital modulation techniques in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands		<i>FCC Part 15, Subpart C, §15.247 (b) (3)</i> 1 watt = 30dBm. Maximum conducted peak output power: 30 dBm (excluding antenna gain, if antennas with directional gains that do not exceed 6 dBi are used).
☐	Frequency hopping systems operating 2400-2483.5 MHz band.	Employing less than 75 non-overlapping hopping channels	<i>FCC Part 15, Subpart C, §15.247 (b) (1)</i> 0.125 watt = 21dBm.
☐		Employing at least 75 non-overlapping hopping channels	<i>FCC Part 15, Subpart C, §15.247 (b) (1)</i> 1 watt = 30dBm.
☐	Frequency hopping systems operating 5725-5850 MHz band.		<i>FCC Part 15, Subpart C, §15.247 (b) (1)</i> 1 watt = 30dBm.
☐	Frequency hopping systems operating 902-928 MHz band.	Employing less than 50 but at least 25 hopping channels	<i>FCC Part 15, Subpart C, §15.247 (b) (2)</i> 0.25 watt = 24dBm.
☐		Employing at least 50 hopping channels	<i>FCC Part 15, Subpart C, §15.247 (b) (2)</i> 1 watt = 30dBm
☐	Antenna gain greater than 6dBi		<i>FCC Part 15, Subpart C, §15.247 (b) (4)</i> The conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3), as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 10 von 51
Page 10 of 51

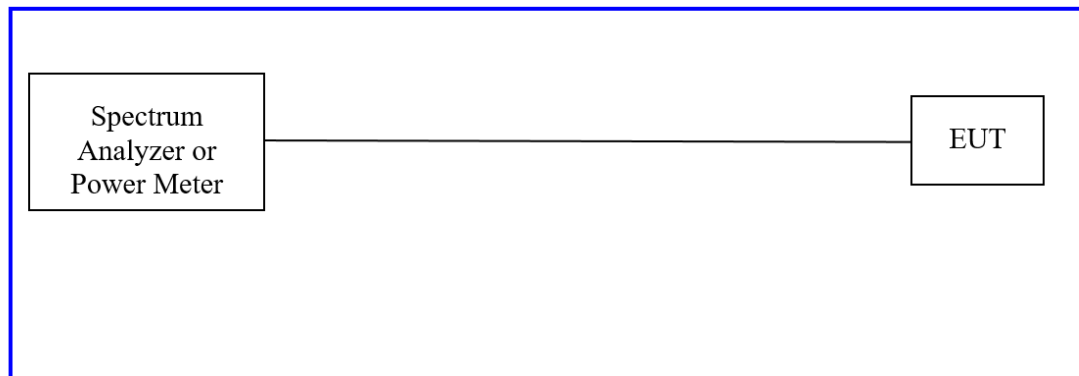
Prüfdokumentation
Test documentation

4.1.2 Test Method (Maximum Output Power)

4.1.2.1 Conducted measurements

Measurements were done according to ANSI C63.10:2013 clause 11.9.1.1 peak power (RBW > DTS bandwidth).

The EUT was connected to the spectrum analyzer or Power Meter via a coax cable with a known loss.



4.1.2.2 Radiated measurements

Measurements were done according to ANSI C63.10:2013 clause 11.9.1.1 peak power (RBW > DTS bandwidth).

The equivalent conducted output power is calculated as follows:

$$P_{\text{Out}} = P_{\text{Rad}} - G$$

Where:

P_{Out} is the maximum conducted output power in dBm,

P_{Rad} is the maximum radiated output power in dBm EIRP,

G is the antenna directional gain in dBi.

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 11 von 51
Page 11 of 51

Prüfdokumentation
Test documentation

4.1.3 Test setup (Maximum Output Power)

4.1.3.1 Conducted measurements

EUT	A003887856-26 (cond. sample)
Chamber details	Shielded room
Companion device	EUT in Test Mode. Therefore, no Companion Device was used.
Operation mode	☐ 1: TX-Mode; unmodulated ☐ 2: RX-Mode ☒ 3: TX-Modes ; modulated ☐ 4: N/A
Measurement Time	1.000 s
Points	1000000
Time resolution	1.000 µs
Further parameters	-
Test engineer	Matthias Kräutlein

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 12 von 51
Page 12 of 51

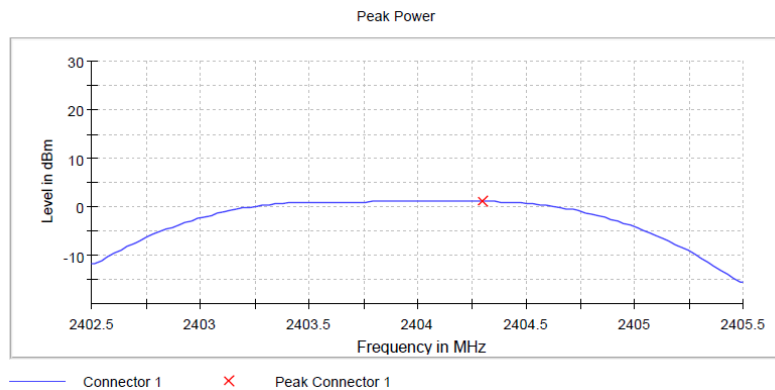
Prüfdokumentation Test documentation

4.1.4 Test results (Maximum Output Power)

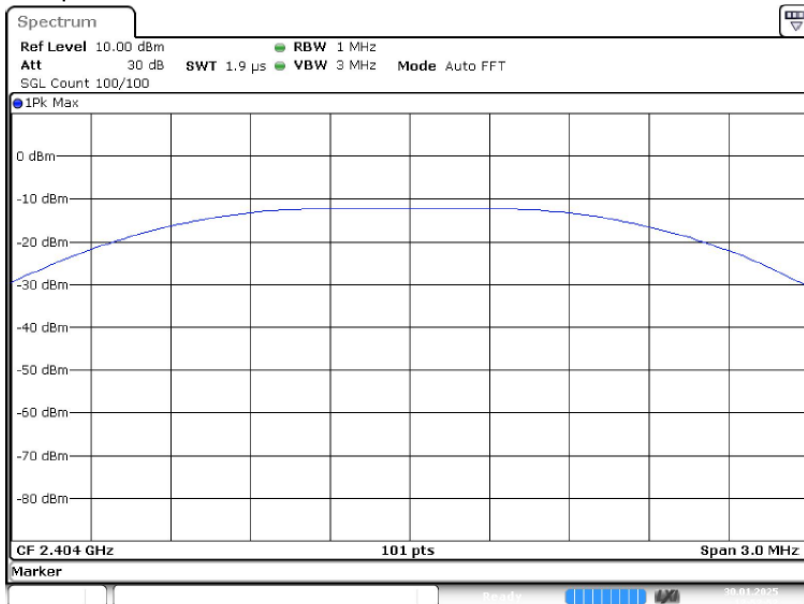
4.1.4.1 Conducted measurements

4.1.4.1.1 Lowest Channel

Test plot with correction factor



Test plot without correction factor



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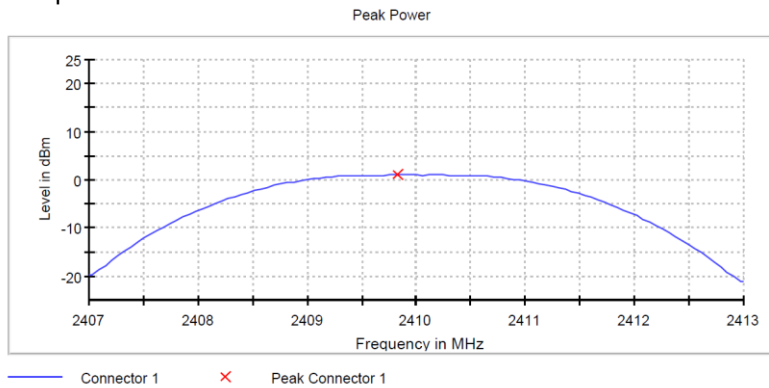
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 13 von 51
Page 13 of 51

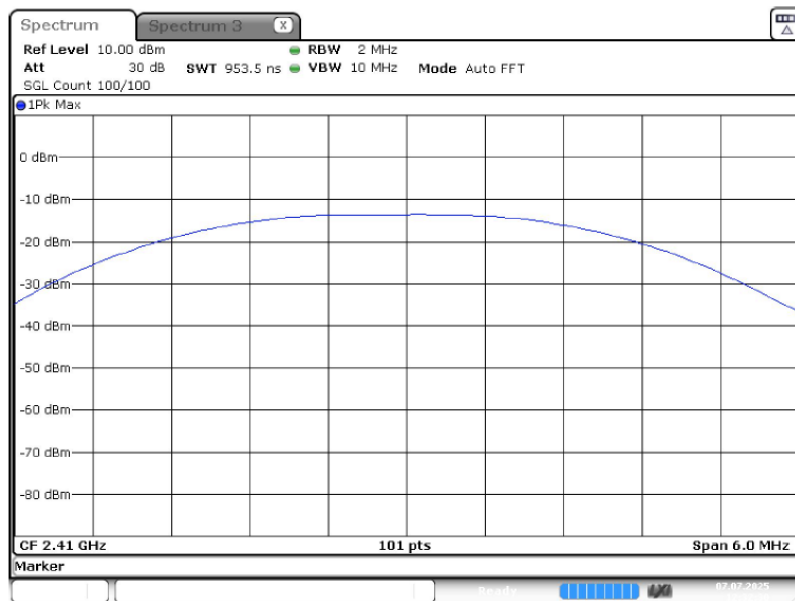
Prüfdokumentation Test documentation

4.1.4.1.2 Middle Channel

Test plot with correction factor



Test plot without correction factor



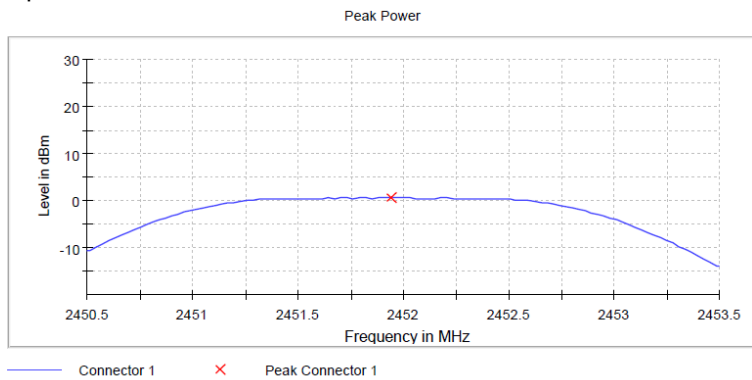
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 14 von 51
Page 14 of 51

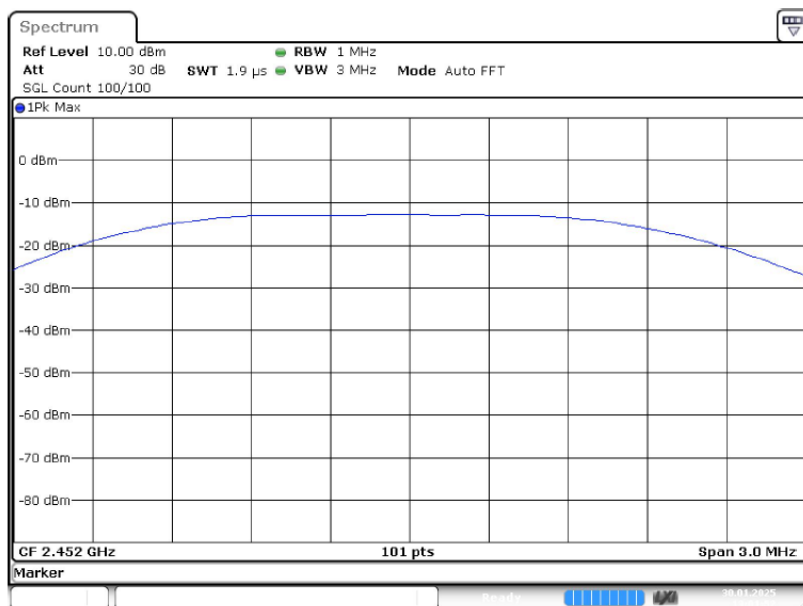
Prüfdokumentation Test documentation

4.1.4.1.3 Highest Channel

Test plot with correction factor



Test plot without correction factor



Date: 30.JAN.2025 13:01:53

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 15 von 51
Page 15 of 51

Prüfdokumentation
Test documentation

4.1.4.1.4 **Conducted measurements summary**

Frequency	Peak conducted output power (dBm)	Limit (dBm)	Margin (dB)	Test Result
Lowest	1	30	29.0	Pass
Middle	1		29.0	Pass
Highest	0.5		29.5	Pass

4.1.4.1.5 **EIRP Results:**

Frequency	Peak conducted output power (dBm)	Antenna Gain (dBi)	EIRP (dBm)
Lowest	1	-4	-3
Middle	1	-4	-3
Highest	0.5	-4	-3.5

4.1.5 **Final test result** (Maximum Output Power)

Measured overall (equivalent) maximum Output Power : 1dBm (conducted) and Maximum EIRP : -3dBm

Final test result	Pass
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Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 16 von 51
Page 16 of 51

Prüfdokumentation
Test documentation

4.2 Power Spectral Density

4.2.1 Requirements / Limits

FCC Part 15, Subpart C, §15.247 (e)

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

4.2.2 Test Method

The same method of determining the conducted output power shall be used to determine the power spectral density according to ANSI C63.10:2013 clause 11.10.2 peak PSD.

4.2.3 Test setup

EUT		A003887856-26 (cond. sample)
Chamber details		☐ 3m Fully Anechoic Chamber (FAC) ☐ 10m Semi Anechoic Chamber (SAC) ☒ Shielded room
Measurement positioning		Distance: EUT height: Antenna height: ☐ 3m ☐ 1.5m ☐ 1.5m ☐ 10m ☐ 0.8m ☐ 1m to 4m – height scan ☒ N/A
Companion device		EUT in Test Mode. Therefore, no Companion Device was used.
Operation mode		☒ 1: TX-Mode ☐ 2: RX-Mode ☐ 3: N/A ☐ 4: N/A
Spectrum Analyzer	Centre Frequency	2.404, 2452 MHz
	Resolution Bandwidth	10 kHz
	Video Bandwidth	30 kHz
	Span	1.5 MHz
	Sweep time	1500 ms
Further parameters		-
Test engineer		Matthias Kräutlein

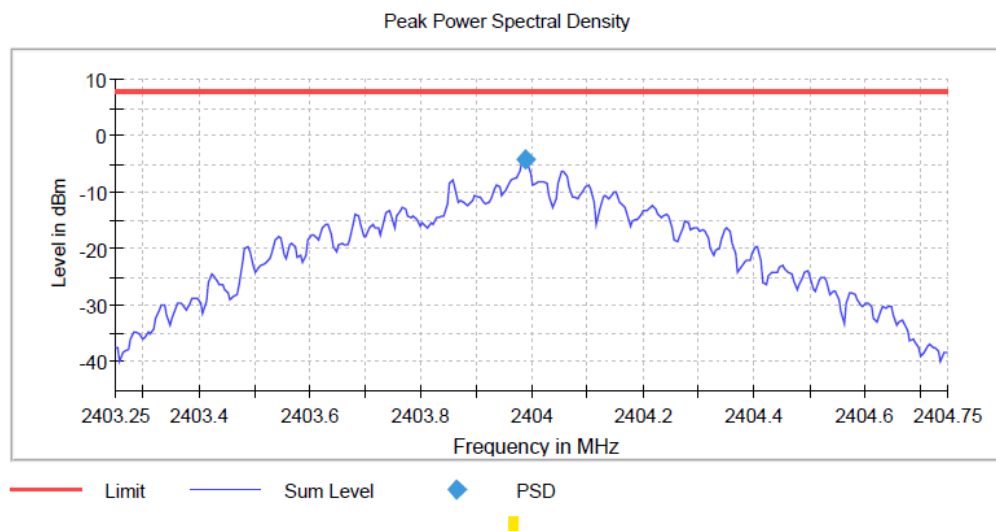
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 17 von 51
Page 17 of 51

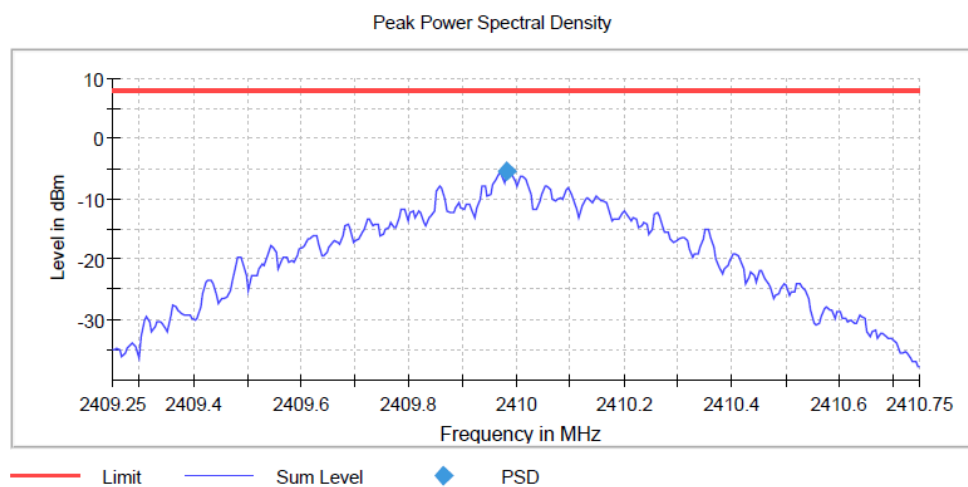
Prüfdokumentation Test documentation

4.2.4 Test results (Power Spectral Density)

Lowest Channel



Middle Channel

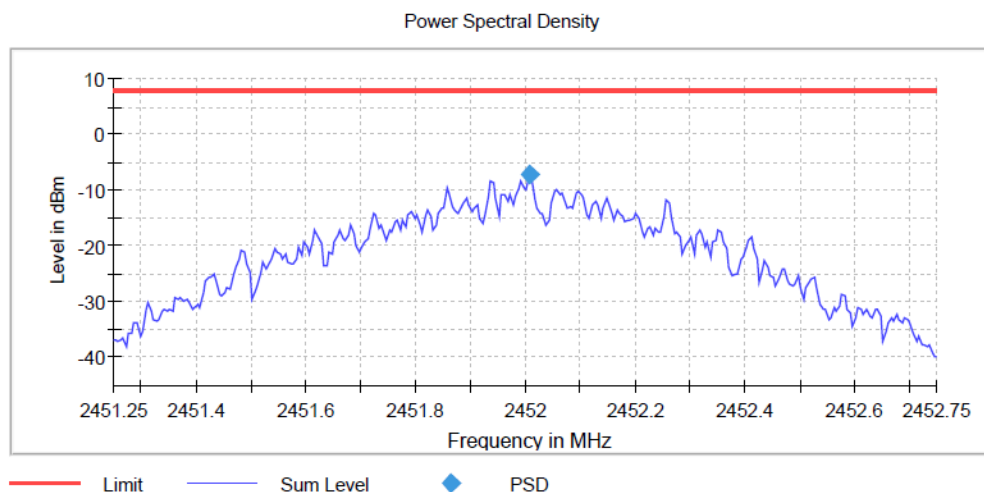


Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 18 von 51
Page 18 of 51

Prüfdokumentation Test documentation

Highest Channel



Frequency	Peak conducted power spectral density (dBm/MHz)	Limit (dBm)	Margin (dB)	Test Result
Lowest	-4.193	8	12.193	Pass
Middle	-5.493		13.493	N/A
Highest	-7.092		15.092	Pass

4.2.5 Final test result (Power Spectral Density)

Final test result	Pass
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Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 19 von 51
Page 19 of 51

Prüfdokumentation
Test documentation

4.3 6 dB Bandwidth / DTS bandwidth & 99 % Bandwidth

4.3.1 Requirements / Limits

	Condition		Limit
☐	FHS	902-928 MHz band	FCC Part 15, Subpart C, §15.247 (a) (1) (i); [ISED RSS-247 sec. 5.1 c] The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
☐	FHS	2400-2483.5 MHz band	FCC Part 15, Subpart C, §15.247 (a) (1) (iii); [ISED RSS-247 sec. 5.1 d] The 20 dB bandwidth will be used for carrier frequencies separation measurements, but no limits apply.
☐	FHS	5725-5850 MHz band	FCC Part 15, Subpart C, §15.247 (a) (1) (ii); [ISED RSS-247 sec. 5.1 e] The maximum allowed 20 dB bandwidth of the hopping channel is 1 MHz.
☒	DTS		FCC Part 15, Subpart C, §15.247 (a) (2); [ISED RSS-247 sec. 5.2 a, sec 6.2.4.2] The minimum allowed 6 dB bandwidth is 500 kHz.
☒			[ISED RSS-Gen sec. 6.7] The occupied bandwidth (99%) shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs, but no limits apply.

FHS: Frequency hopping systems; DTS: Digital transmission systems incl. Digital modulation techniques

4.3.2 Test Method

Conducted method was used to measure the 6 dB bandwidth and 99% bandwidth. The 6 dB bandwidth was measured according to ANSI C63.10 clause 6.9.2, [ISED RSS-Gen sec. 6.7] and 99% bandwidth was measured according to [ISED RSS-Gen sec. 6.7]. The EUT was connected to the spectrum analyzer via a coax cable with a known loss.

4.3.3 Test setup

EUT		A003887856-26 (cond. sample)
Chamber details		☐ 3m Fully Anechoic Chamber (FAC) ☐ 10m Semi Anechoic Chamber (SAC) ☒ Shielded room
Measurement positioning		Distance: EUT height: Antenna height: ☐ 3m ☐ 1.5m ☐ 1.5m ☐ 10m ☐ 0.8m ☐ 1m to 4m – height scan ☒ N/A
Companion device		EUT in Test Mode. Therefore, no Companion Device was used.
Operation mode		☒ 1: TX-Mode ☐ 2: RX-Mode ☐ 3: N/A ☐ 4: N/A
Spectrum Analyzer	Centre Frequency	2404 MHz, 2452 MHz
	Resolution Bandwidth	100 kHz for 6dB BW, 10kHz for 99% OBW
	Video Bandwidth	300 kHz for 6dB BW, 30kHz for 99% OBW
	Span	2 MHz
	Sweep time	Auto
Further parameters		-
Test engineer		Matthias Kräutlein

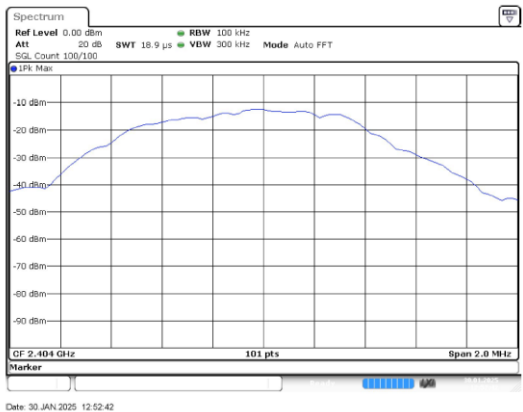
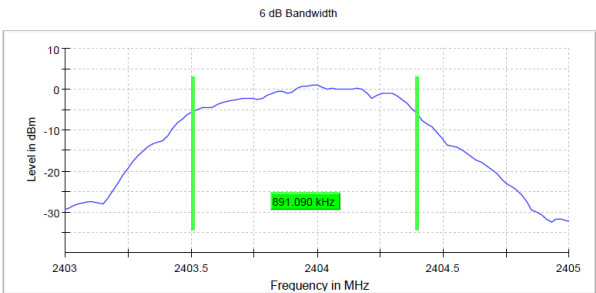
Prüfbericht-Nr.: DE258D0D 002
 Test report no.:

Seite 20 von 51
 Page 20 of 51

Prüfdokumentation
 Test documentation

4.3.4 Test results (6 dB Bandwidth / DTS bandwidth & 99 % Bandwidth)

Lowest Channel
 6 dB Bandwidth

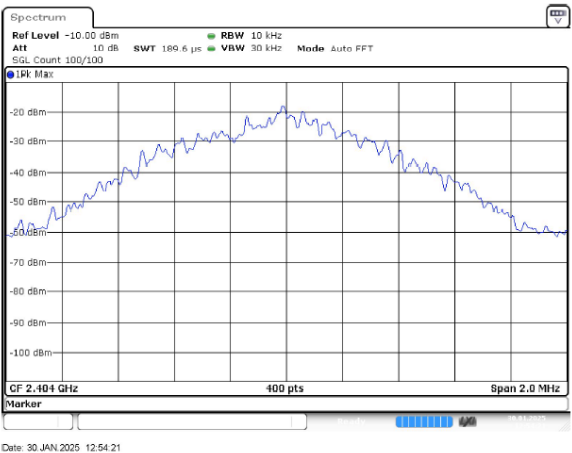
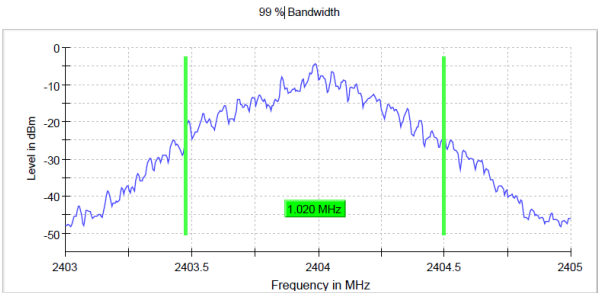


99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2404.000000	1.020000	---	---	2403.477500	2404.497500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2404.000000	PASS

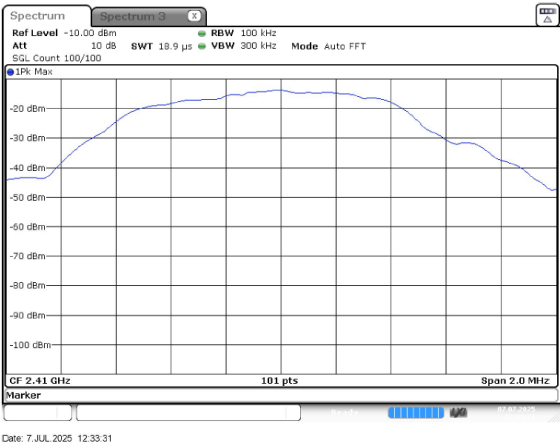
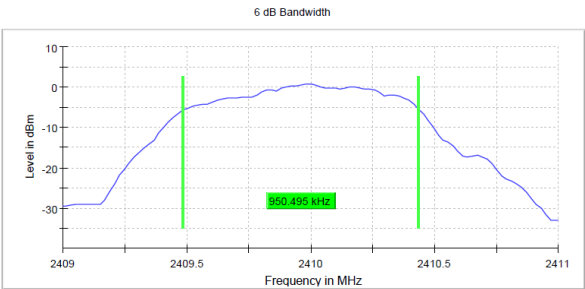


Prüfbericht-Nr.: DE258D0D 002
 Test report no.:

Seite 21 von 51
 Page 21 of 51

Prüfdokumentation
 Test documentation

Middle Channel

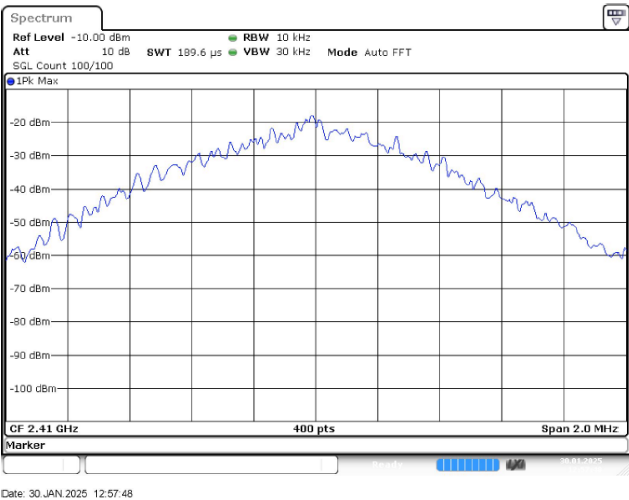
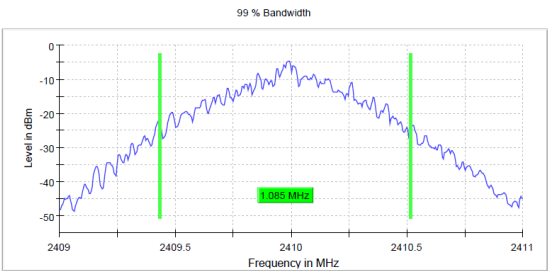


99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2410.000000	1.085000	---	---	2409.432500	2410.517500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2410.000000	PASS

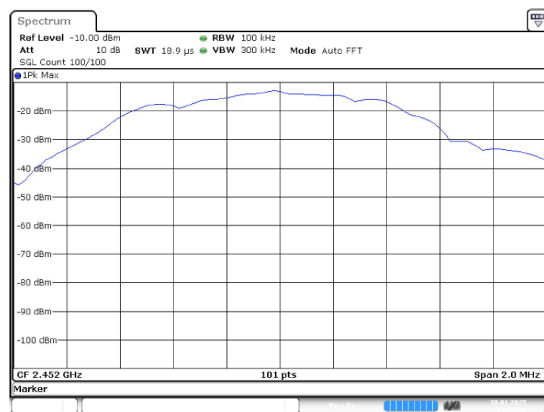
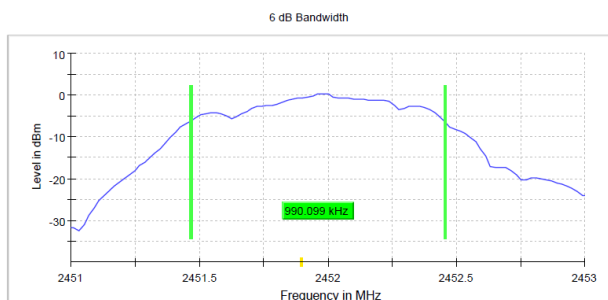


Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 22 von 51
Page 22 of 51

Prüfdokumentation Test documentation

Highest Channel



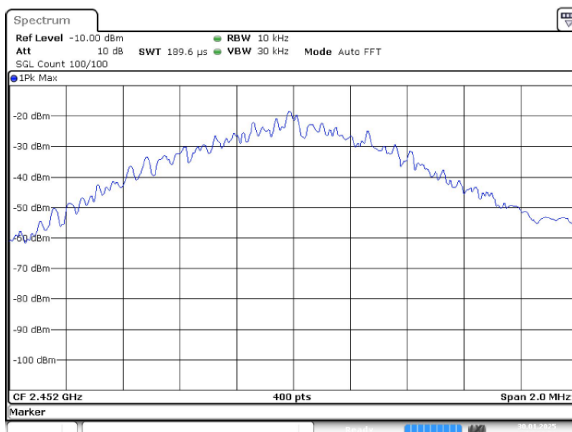
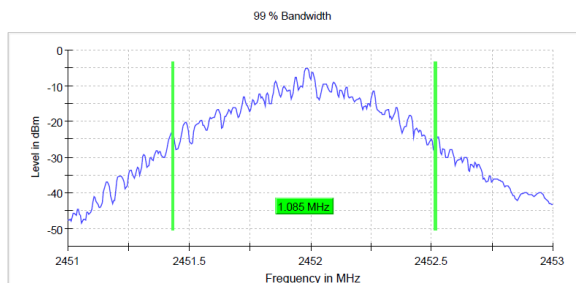
Date: 30 JAN 2025 13:01:42

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2452.000000	1.085000	---	---	2451.432500	2452.517500

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2452.000000	PASS



Date: 30 JAN 2025 13:03:32

Frequency	6 dB Bandwidth (kHz)	Minimum bandwidth (kHz)	Test Result
Lowest	0.891090	500	Pass
Middle	0.950495		Pass
Highest	0.990099		Pass

4.3.5 Final test result (6 dB Bandwidth / DTS bandwidth & 99 % Bandwidth)

Final test result	Pass
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Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 23 von 51
Page 23 of 51

Prüfdokumentation
Test documentation

4.4 Unwanted emissions

4.4.1 Requirements / Limits

☒	FCC Part 15, Subpart C, §15.247 (d); [RSS-247 sec. 5.5]: In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in § 15.209(a) [RSS-Gen sec. 8.9] is not required. Radiated emissions which fall in the restricted bands, as defined in § 15.205(a) [RSS-Gen sec.8.10], must comply with the radiated emission limits specified in § 15.209(a) [RSS-Gen sec. 8.9].
☐	FCC Part 15, Subpart C, §15.247 (d); [RSS-247 sec. 5.5]: If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this test shall be 30 dB instead of 20 dB.

FCC Part 15, Subpart C, §15.209; [RSS-Gen sec. 8.9]; Radiated Emission Limits

Frequency [MHz]	Measurement distance [m]	Limit [μV/m]	Limit [dBμV/m]	Limit @3m [dBμV/m]	Detector
0.009 – 0.09	300	2400/F(kHz)	48.5 ... 28.5	128.5 ... 108.5	AVG(Pk)
0.09 – 0.11	300	2400/F(kHz)	28.5 ... 26.8	108.5 ... 106.8	QP
0.11 – 0.49	300	2400/F(kHz)	26.8 ... 13.8	106.8 ... 93.8	AVG(Pk)
0.49 – 1.705	30	24000/F(kHz)	33.8 ... 23.0	73.8 ... 63.0	QP
1.705 – 30	30	30	29.5	69.5	QP
30 – 88	3	100	40.0	40.0	QP
88 – 216	3	150	43.5	43.5	QP
216 – 960	3	200	46.0	46.0	QP
960 - 1000	3	500	54.0	54.0	QP
1000 - 40000	3	500	54.0	54.0	AVG(Pk)

Used conversion factor $\mu\text{V/m} \rightarrow \text{dB}\mu\text{V/m}$: $\text{Limit} [\text{dB}\mu\text{V/m}] = 20 \log (\text{Limit} [\mu\text{V/m}] / 1\mu\text{V/m})$

At frequencies below 30MHz, the measured values are corrected with an inverse linear distance extrapolation factor (40dB/decade) according to FCC 15.31 (f)(2).

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90kHz, 110–490kHz and above 1000MHz. Radiated emission limits in these three bands are based on measurements employing a linear average detector.

FCC Part 15, Subpart C, §15.35(b) [RSS-Gen sec. 8.1]:

..., 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....

ANSI C63.10:2013 clause 5.5:

The spectrum shall be investigated from the lowest radio frequency signal generated in the device and up to at least the 10th harmonic of the highest fundamental frequency or to 40 GHz whichever is lower.

However, frequencies below 9 kHz do not need to be investigated.

Prüfdokumentation
Test documentation

4.4.2 Radiated measurements with general limit (Unwanted emissions)

4.4.2.1 Test Method

Radiated unwanted Emissions were tested against the general limits specified in § 15.209(a) [RSS-Gen sec. 8.9]. Emissions that fall inside the frequency band in which the intentional radiator is operating were excluded.

Emissions that exceed the general limits were additionally tested for the further requirements of §15.247 (d); [RSS-247 sec. 5.5]

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT. The different measurement setups for each frequency range are shown below.

For the final testing, 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, then 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 measurements 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.

Tabletop or floor-standing device

For measurement above 1 GHz the antenna height was changed from 1 m to 4 m with tilting towards EUT.

For the measurements 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

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

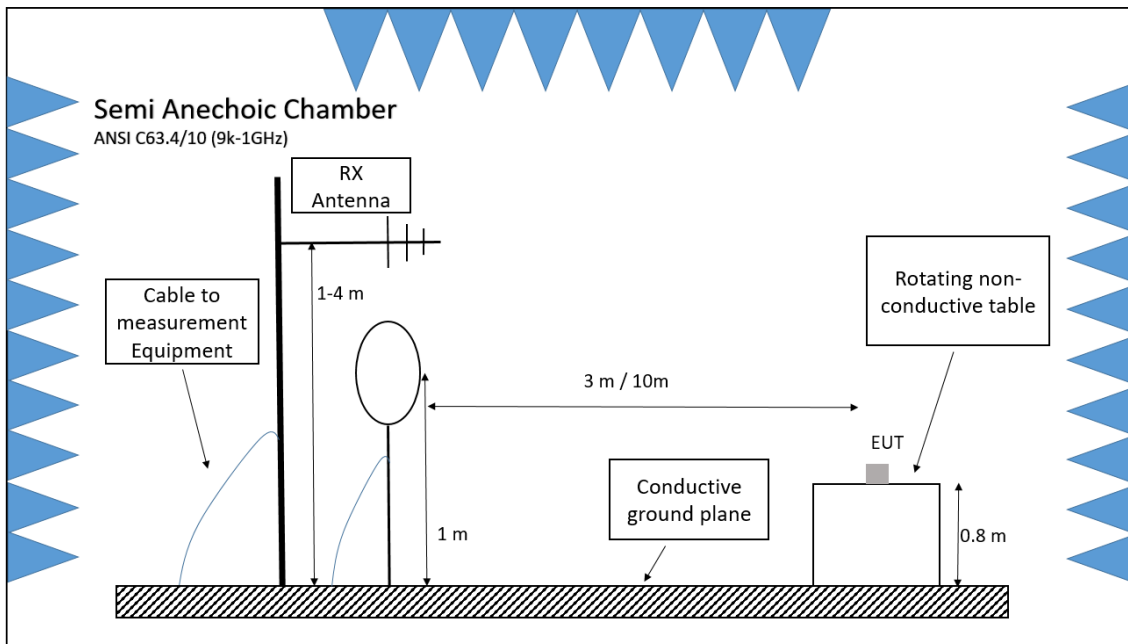
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 25 von 51
Page 25 of 51

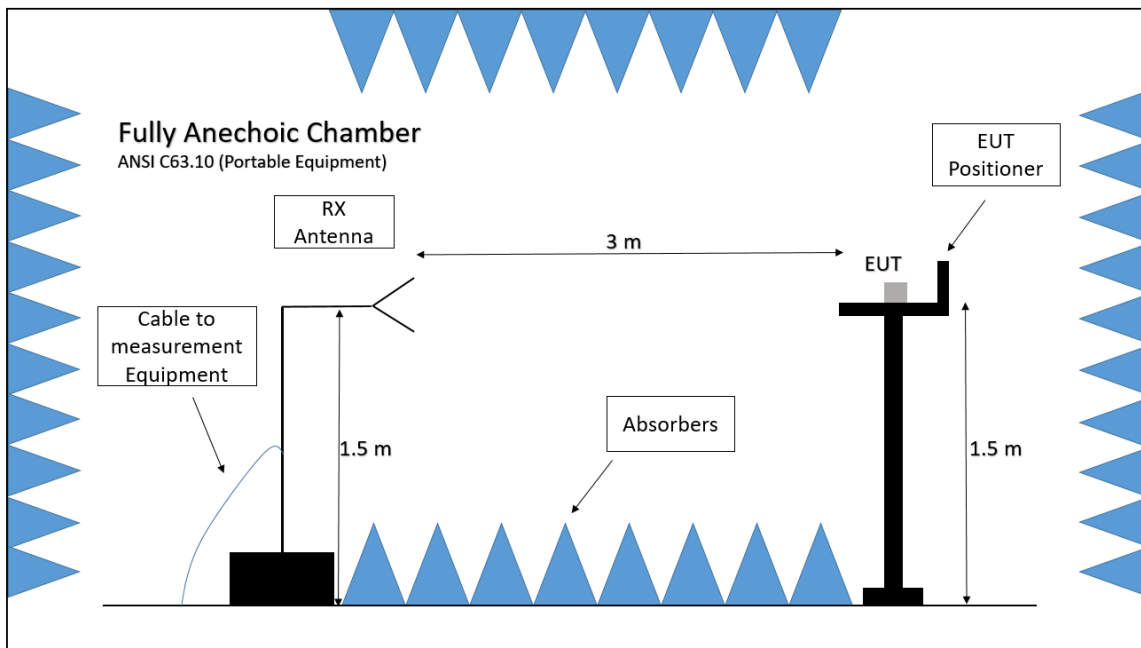
Prüfdokumentation Test documentation

4.4.2.2 EUT positioning (Radiated measurements with general limit; Unwanted emissions)

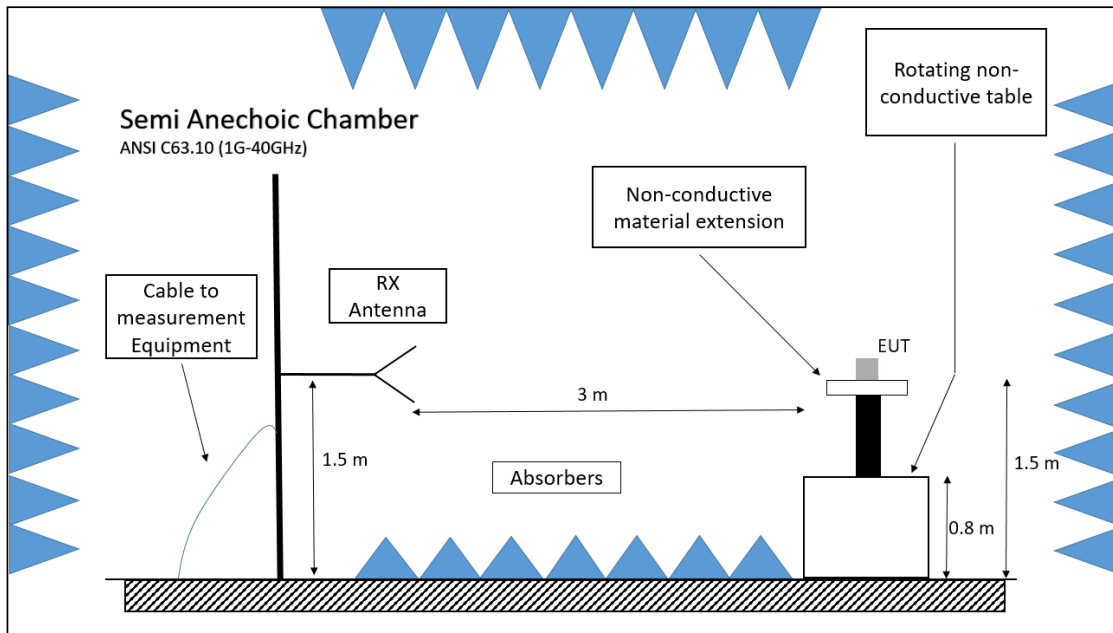
4.4.2.2.1 EUT positioning below 1GHz



4.4.2.2.2 EUT positioning above 1GHz; portable Device



4.4.2.2.3 EUT positioning above 1GHz; tabletop or floor-standing device



Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 27 von 51
Page 27 of 51

Prüfdokumentation
Test documentation

4.4.2.3 Measurement Setup (Radiated measurements with general limit; Unwanted emissions)

4.4.2.3.1 Measurement Setup 9kHz - 30MHz

Test Site	SAC (Semi Anechoic Chamber)
Receiving Antenna	Loop antenna (HFH 2)
Receiving Antenna Height	1m (center of Loop antenna)
Receiving Antenna Polarization	Parallel and perpendicular to the EUT (EUT without Loop antenna) According to ANSI C63.10:2013 clause 6.4.6
EUT Table	1.0m x 1.5m non-conductive table 80cm above the floor
EUT Turn Table Step Size	22.5° during exploratory tests Linear during maximizations for final measurements
Receiver Configurations	Average and peak detectors (9-90kHz and 110-490kHz) Quasi Peak detector (90-110kHz and 490kHz-30MHz)
	RBW: 200Hz (9 - 150kHz) and 9 kHz (150kHz – 30MHz)
	Step Size: 50Hz (9-150kHz) and 2.25kHz (150k-30MHz)
	Sweep Time: 100ms (FFT) during exploratory tests Sweep Time: 1s for final measurements

4.4.2.3.2 Measurement Setup 30MHz - 1GHz

Test Site	Semi-anechoic chamber
Receiving Antenna	Hybrid Antenna VULB 9168
Receiving Antenna height	Varied (1m to 4m, step size 1m) during exploratory tests Linear during maximizations for final measurements
Receiving Antenna Polarization	Horizontal and Vertical
EUT Table	1.0m x 1.5m non-conductive table 80cm above the floor
EUT Turn Table Step Size	45° during exploratory tests Linear during maximizations for final measurements
Receiver Configurations	Average and peak detector
	RBW :120 kHz
	Step Size: 30kHz (30-1000MHz)
	Sweep Time: 100ms (FFT) during exploratory tests Sweep Time: 1s for final measurements

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 28 von 51
Page 28 of 51

Prüfdokumentation
Test documentation

4.4.2.3.3 Measurement Setup above 1GHz; portable Device

Test Site	Fully-anechoic chamber
Receiving Antenna	Horn Antenna HF907 (1-18GHz), 3116C-PA (18-40GHz)
Receiving Antenna Height	1.5m
Receiving Antenna Polarization	Horizontal – Vertical
EUT Positioner	40cm x 60cm non-conductive positioner 1.5m above the floor Step size elevation angle 45°
EUT Turn Table Step Size	45°
Spectrum Analyzer	Average and peak detectors
	RBW: 1 MHz
	Sweep Time: 60s during exploratory tests Sweep Time: 10s for final measurements

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 29 von 51
Page 29 of 51

Prüfdokumentation Test documentation

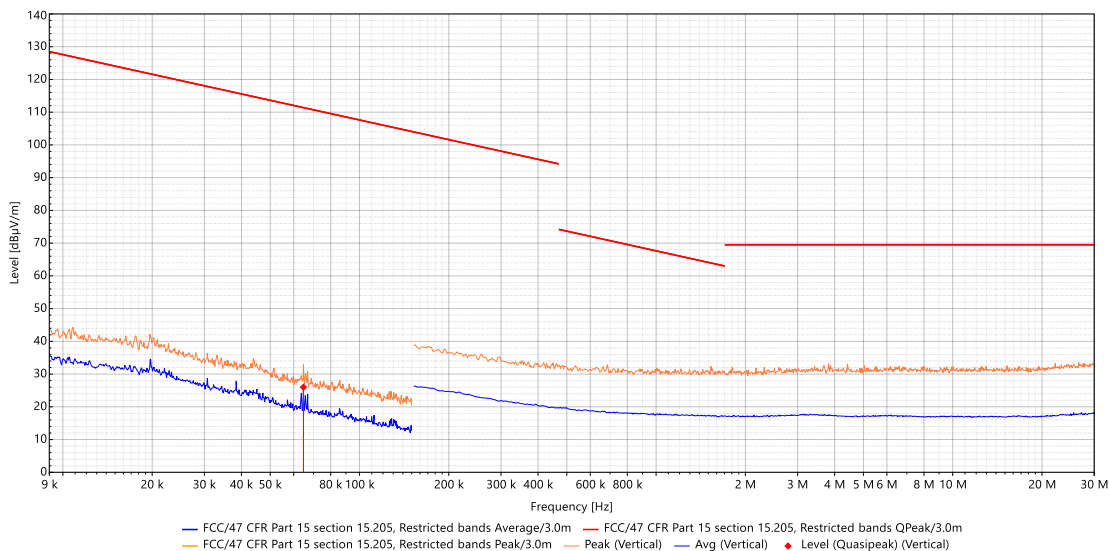
4.4.2.4 Test Setup (Radiated measurements with general limit; Unwanted emissions)

EUT	A003887856-11 (rad. sample)		
Companion device	EUT in Test Mode. Therefore, no Companion Device was used.		
Operation mode	☒ 1: TX-Mode ☐ 2: RX-Mode ☐ 3: N/A ☐ 4: N/A		
Further parameters	-		
Test engineer	Matthias Kräutlein		

4.4.2.5 Test results (Radiated measurements with general limit; Unwanted emissions)

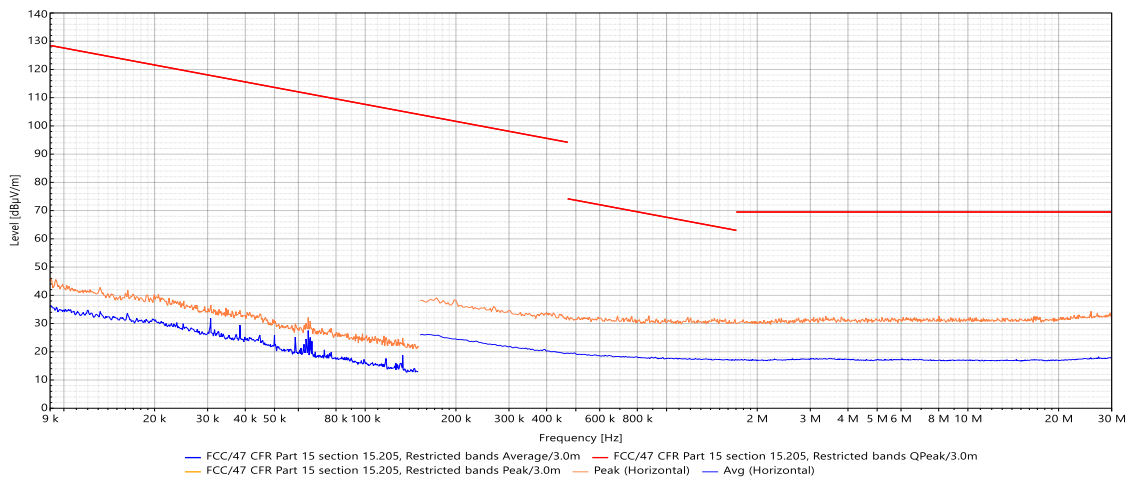
4.4.2.5.1 9 kHz to 30 MHz, lowest Channel

#19



4.4.2.5.2 Perpendicular Polarization

#18



Prüfbericht-Nr.: DE258D0D 002
Test report no.:

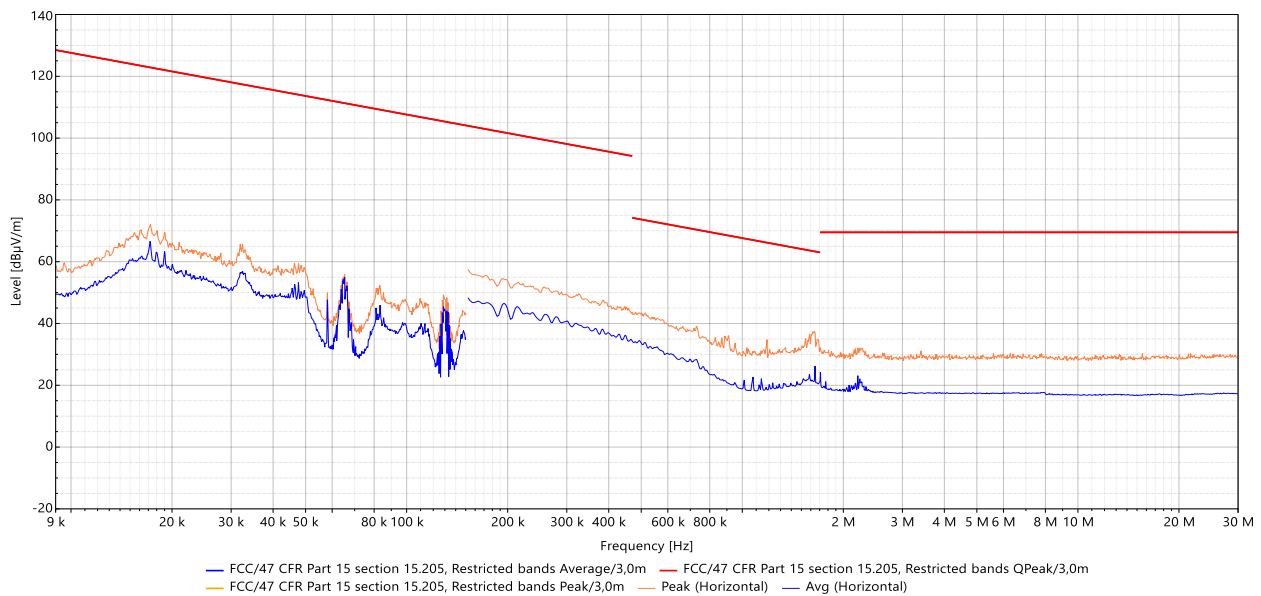
Seite 30 von 51
Page 30 of 51

Prüfdokumentation Test documentation

4.4.2.6 9 kHz to 30 MHz, middle Channel

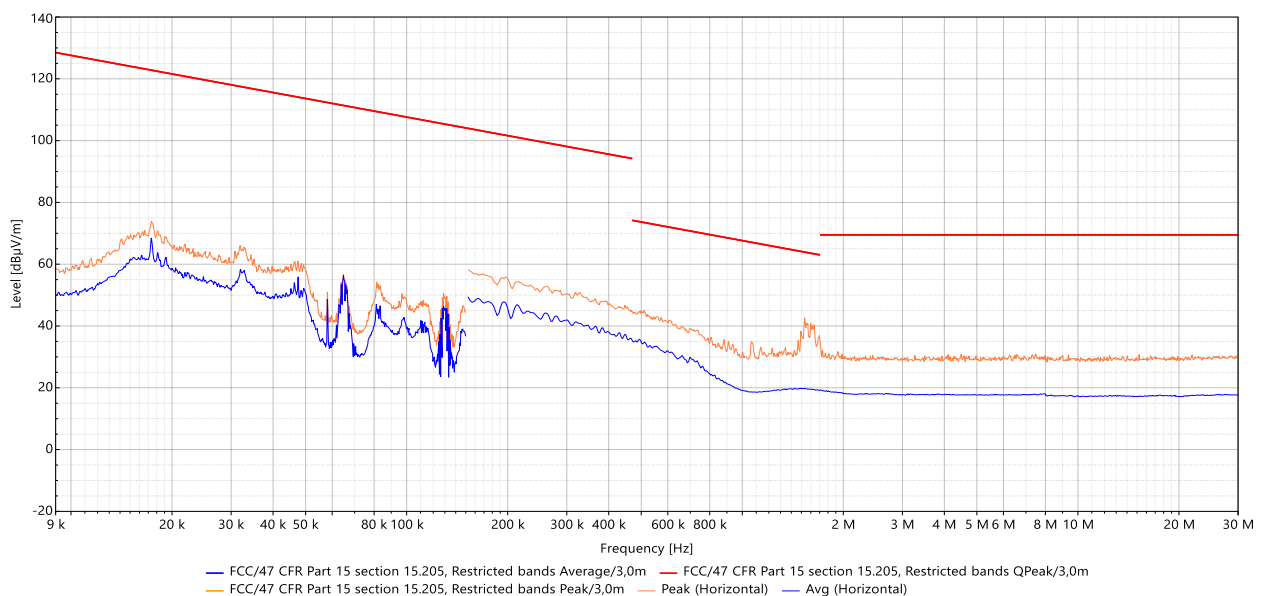
4.4.2.6.1 Parallel Polarization

#15



4.4.2.6.2 Perpendicular Polarization

#16



Prüfbericht-Nr.: DE258D0D 002
Test report no.:

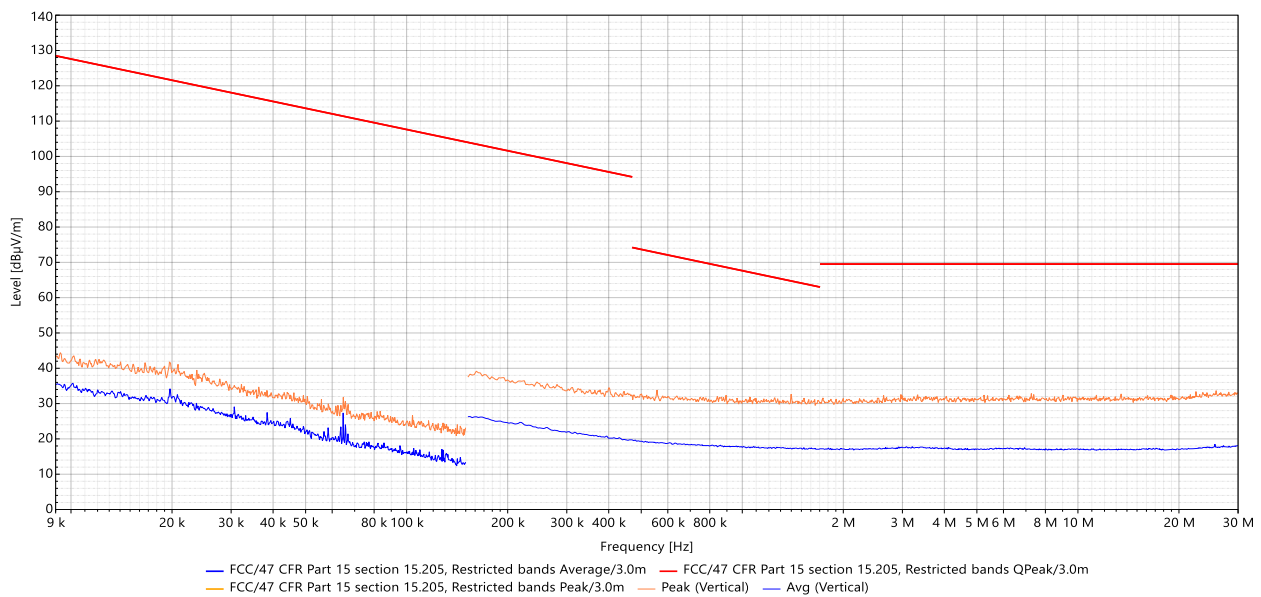
Seite 31 von 51
Page 31 of 51

Prüfdokumentation Test documentation

4.4.2.7 9 kHz to 30 MHz, highest Channel

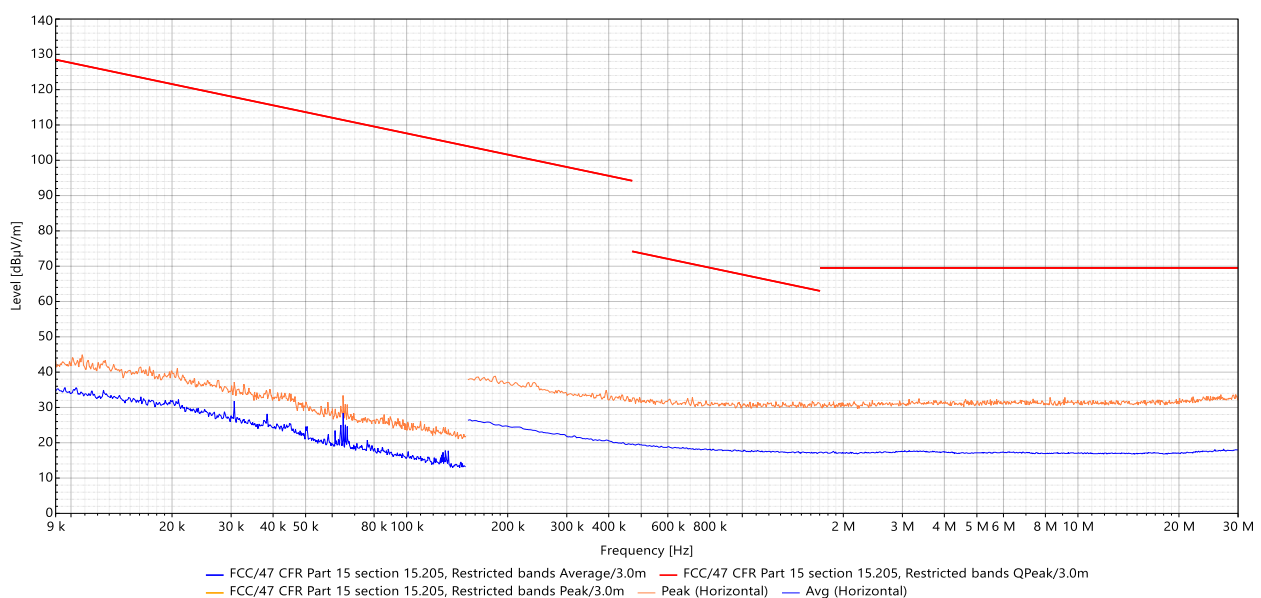
4.4.2.7.1 Perpendicular Polarization

#20



4.4.2.7.2 Parallel Polarization

#21



Prüfbericht-Nr.: DE258D0D 002
Test report no.:

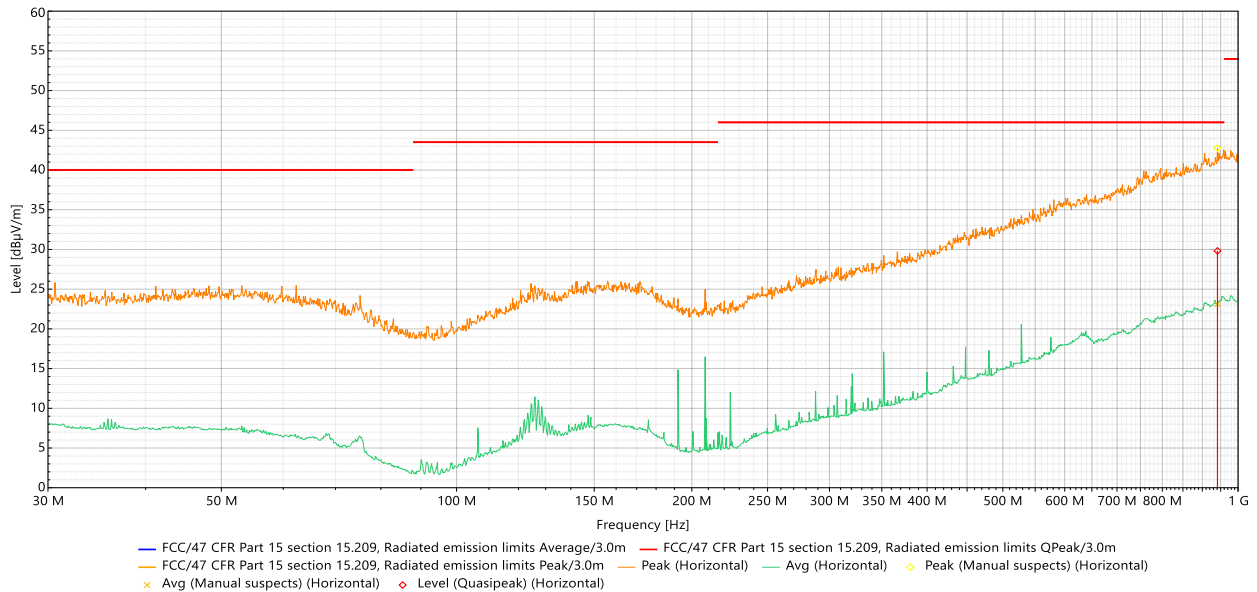
Seite 32 von 51
Page 32 of 51

Prüfdokumentation Test documentation

4.4.2.8 30 MHz to 1 GHz, lowest Channel

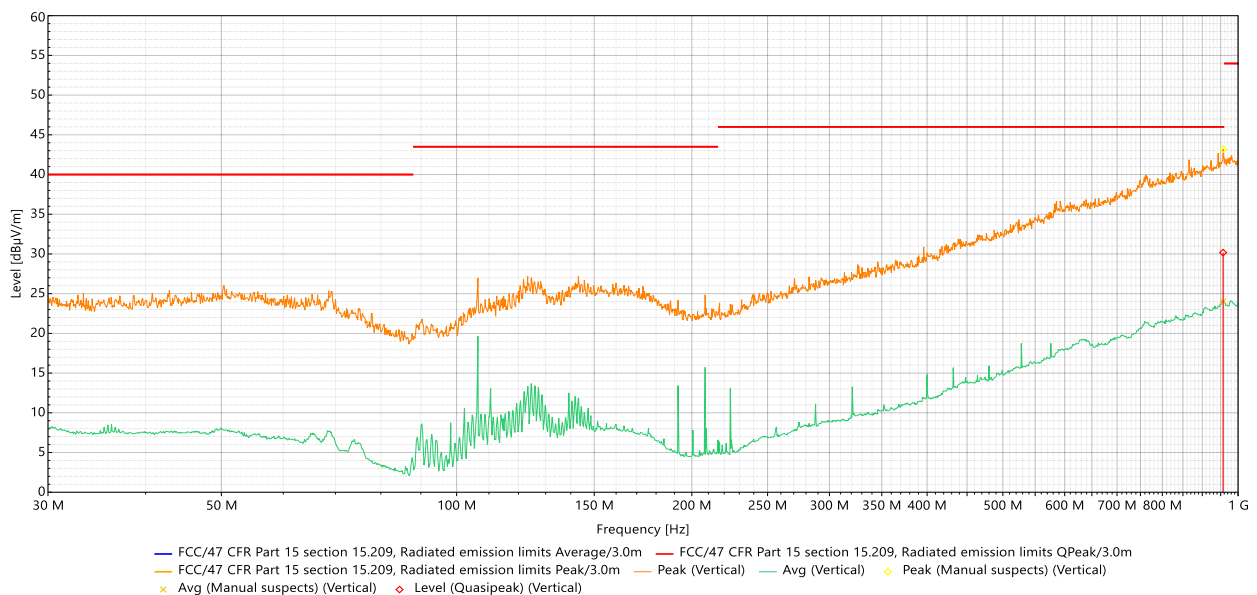
4.4.2.8.1 Horizontal Polarization

#16



4.4.2.8.2 Vertical Polarization

#16



Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Height (m)	Corr. (dB)
941.13 M	29.8	46.0	-16.2	H	239.9	1.00	28.5
956.91 M	30.2	46.0	-15.8	V	59.9	1.00	28.8

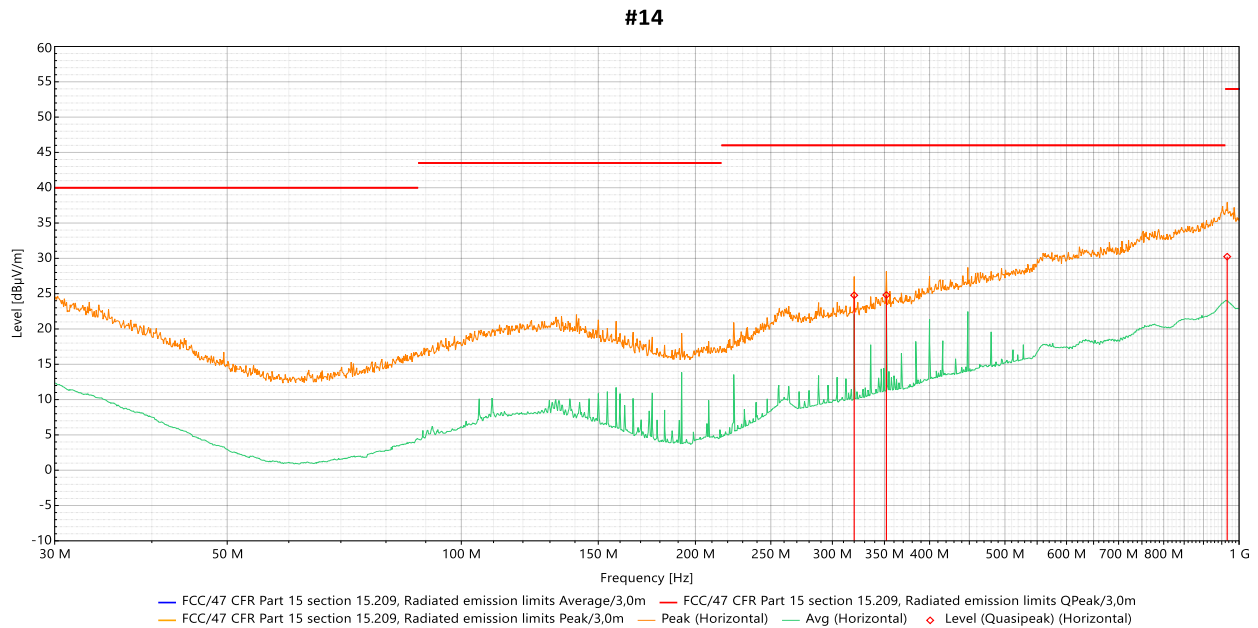
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 33 von 51
Page 33 of 51

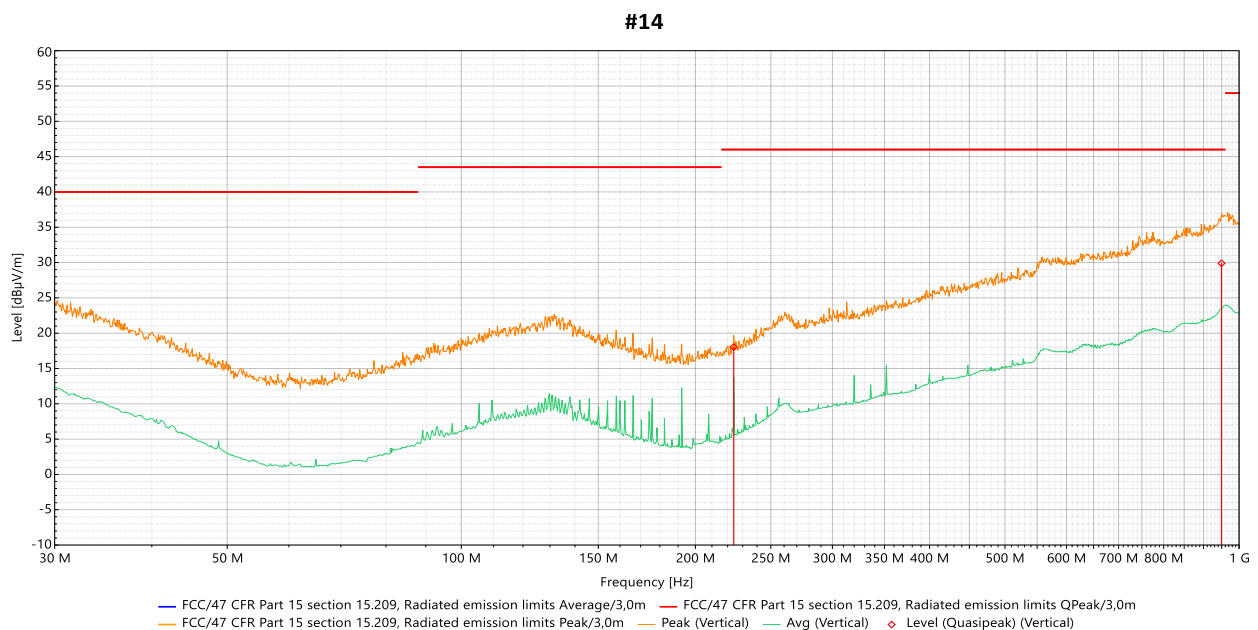
Prüfdokumentation Test documentation

4.4.2.9 30 MHz to 1 GHz, middle Channel

4.4.2.9.1 Horizontal Polarization



4.4.2.9.2 Vertical Polarization



Prüfbericht-Nr.: DE258D0D 002
Test report no.:

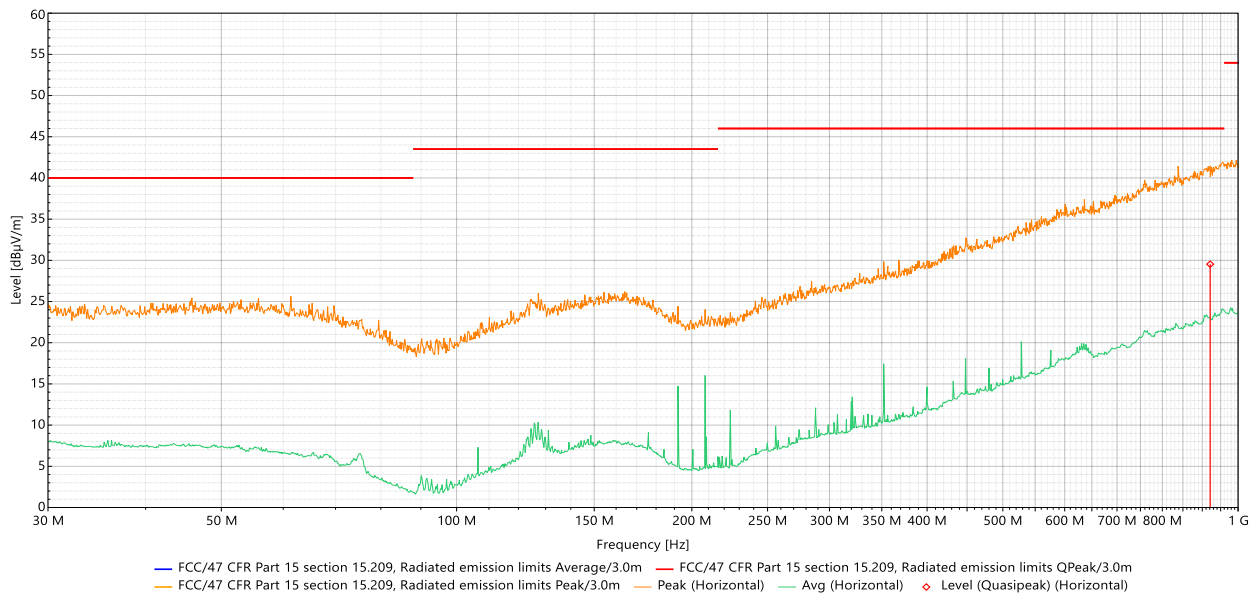
Seite 34 von 51
Page 34 of 51

Prüfdokumentation Test documentation

4.4.2.10 30 MHz to 1 GHz, highest Channel

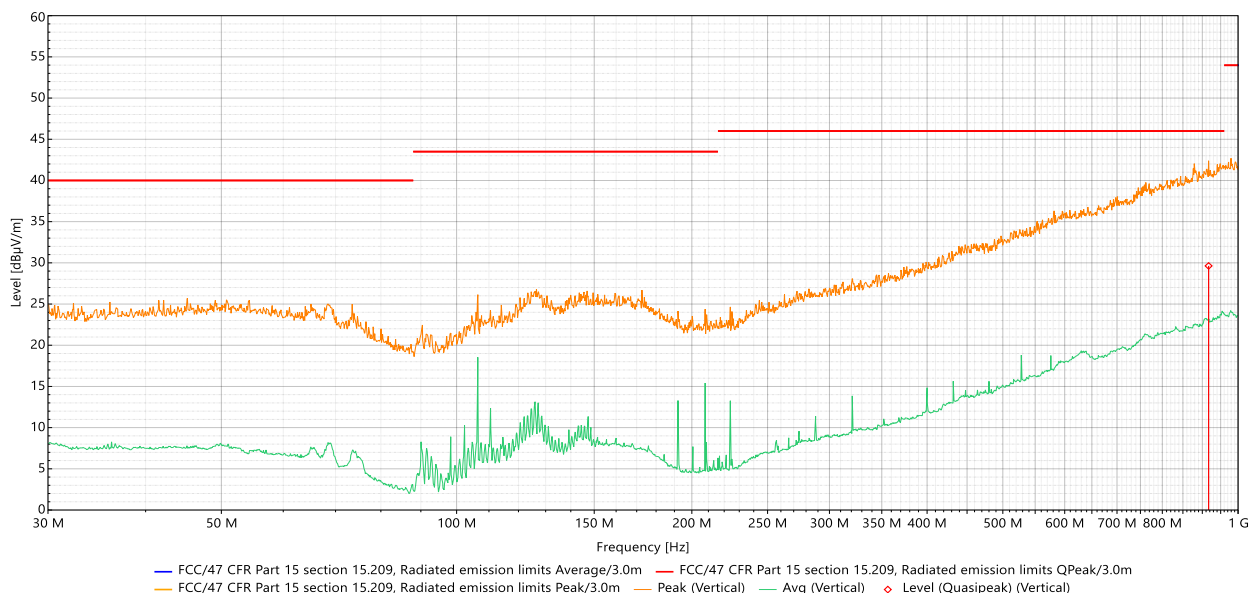
4.4.2.10.1 Horizontal Polarization

#17



4.4.2.10.2 Vertical Polarization

#17



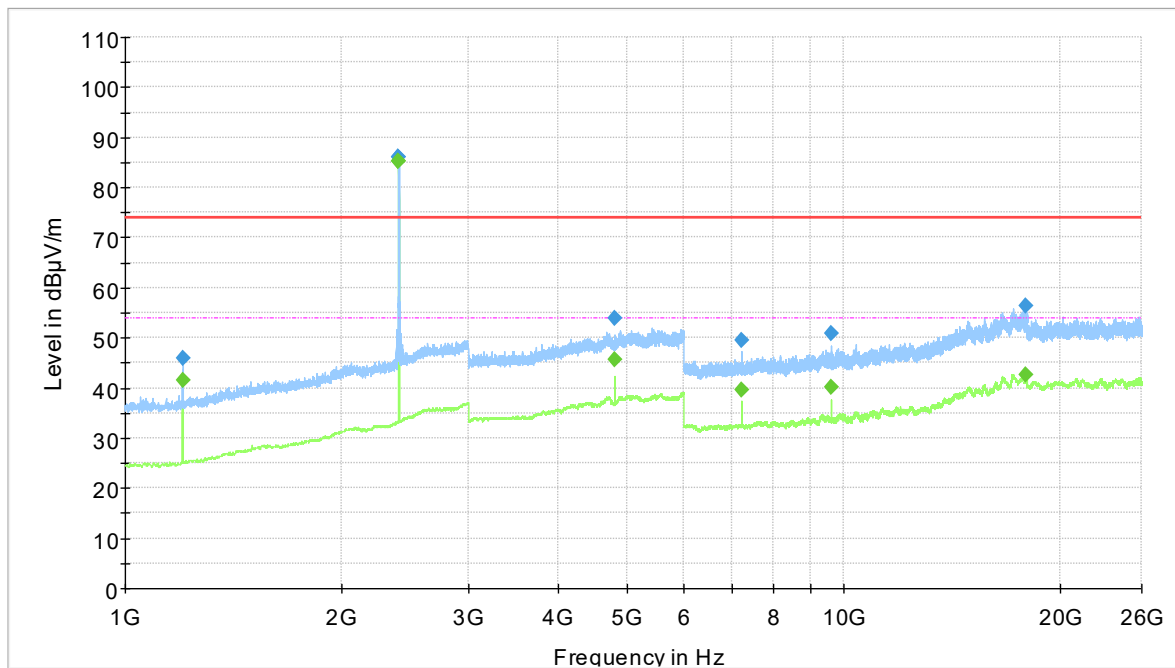
Frequency (MHz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Pol	Azimuth (deg)	Height (m)	Corr. (dB)
921.179 M	29.5	46.0	-16.5	H	300.0	1.00	28.4
916.859 M	29.6	46.0	-16.4	V	60.1	3.00	28.4

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 35 von 51
Page 35 of 51

Prüfdokumentation Test documentation

4.4.2.11 1 to 26GHz, Lowest Channel



— Preview Result 2-AVG
— FCC_15C_15.209_Radiated Emissions_Peak
◆ Final_Result PK+
 — Preview Result 1-PK+
— FCC_15C_15.209_Radiated Emissions_Avg
◆ Final_Result AVG

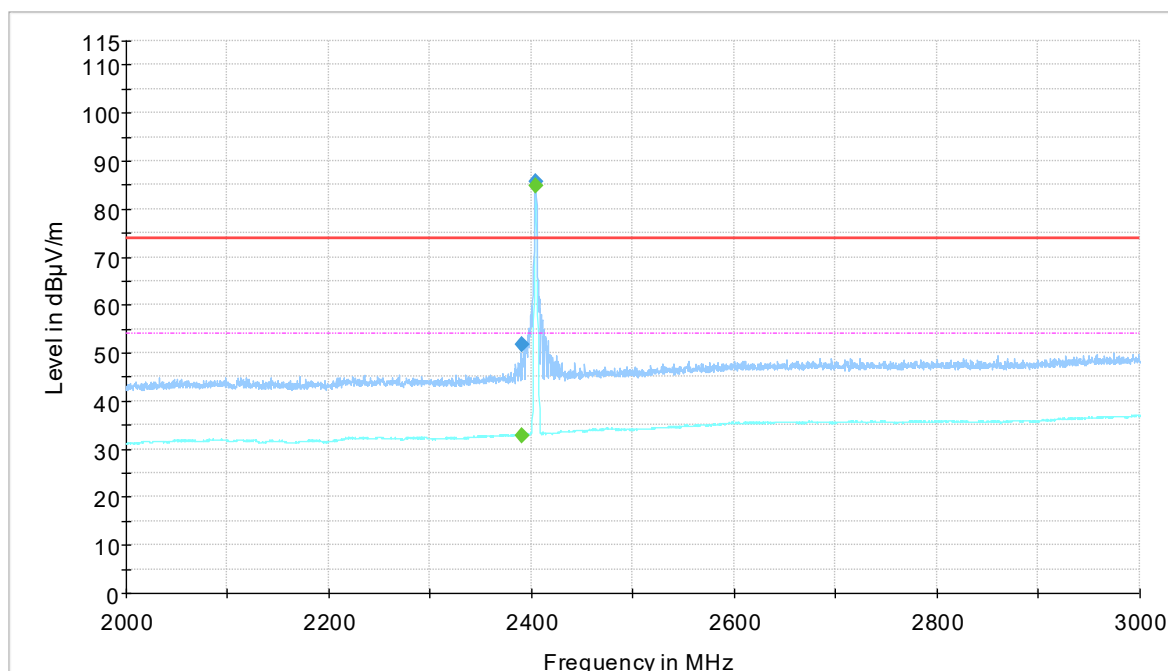
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1202.05844	---	41.48	54.00	12.52	10000	1000	150.0	H	288.0	30.0	4.9
1202.05844	45.86	---	74.00	28.14	10000	1000	150.0	H	288.0	30.0	4.9
2403.84415	---	85.21	TX		10000	1000	150.0	H	-25.0	-9.0	12.6
2403.84415	86.12	---			10000	1000	150.0	H	-25.0	-9.0	12.6
4807.94805	54.02	---	74.00	19.98	10000	1000	150.0	H	264.0	-17.0	8.7
4807.94805	---	45.73	54.00	8.27	10000	1000	150.0	H	264.0	-17.0	8.7
7211.55844	49.59	---	74.00	24.42	10000	1000	150.0	H	145.0	14.0	-2.9
7211.55844	---	39.71	54.00	14.29	10000	1000	150.0	H	145.0	14.0	-2.9
9616.50000	50.77	---	74.00	23.23	10000	1000	150.0	H	49.0	-25.0	-0.2
9616.50000	---	40.07	54.00	13.93	10000	1000	150.0	H	49.0	-25.0	-0.2
17959.0324	---	42.69	54.00	11.31	10000	1000	150.0	V	309.0	-11.0	12.1
17959.0324	56.31	---	74.00	17.69	10000	1000	150.0	V	309.0	-11.0	12.1

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 36 von 51
Page 36 of 51

Prüfdokumentation Test documentation

Restricted bands of operation. 2310-2390



— Preview Result 2-AVG
— FCC_15C_15.209_Radiated Emissions_Peak
— Preview Result 1-PK+
— FCC_15C_15.209_Radiated Emissions_Avg
◆ Final_Result PK+
◆ Final_Result AVG

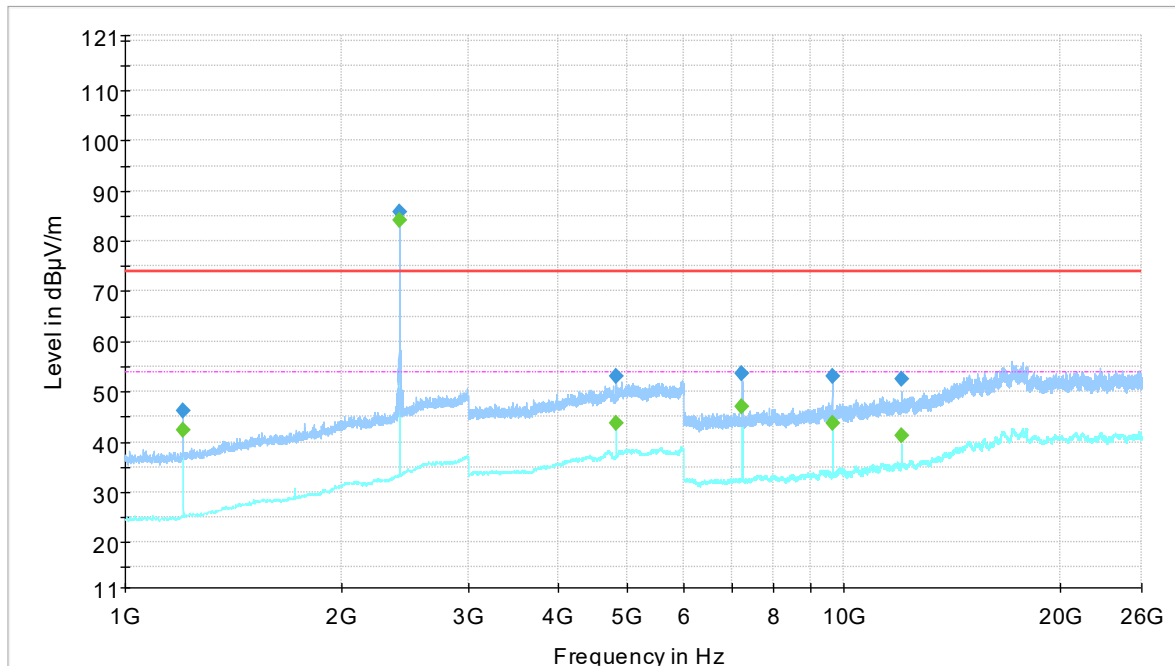
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2390.00000	51.69	---	74.00	22.31	10000.	1000.0	150.0	H	332.0	39.0	12.6
2390.00000	---	32.67	54.00	21.33	10000.	1000.0	150.0	H	332.0	39.0	12.6
2404.01298	85.57	---	74.00	-11.57	10000.	1000.0	150.0	V	320.0	10.0	12.6
2404.01298	---	84.91	54.00	-30.91	10000.	1000.0	150.0	V	320.0	10.0	12.6

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 37 von 51
Page 37 of 51

Prüfdokumentation
Test documentation

4.4.2.12 1 to 26GHz, Middle Channel



— Preview Result 2-AVG
— FCC_15C_15.209_Radiated Emissions_Peak
◆ Final_Result PK+
 - - - FCC_15C_15.209_Radiated Emissions_Avg
◆ Final_Result AVG

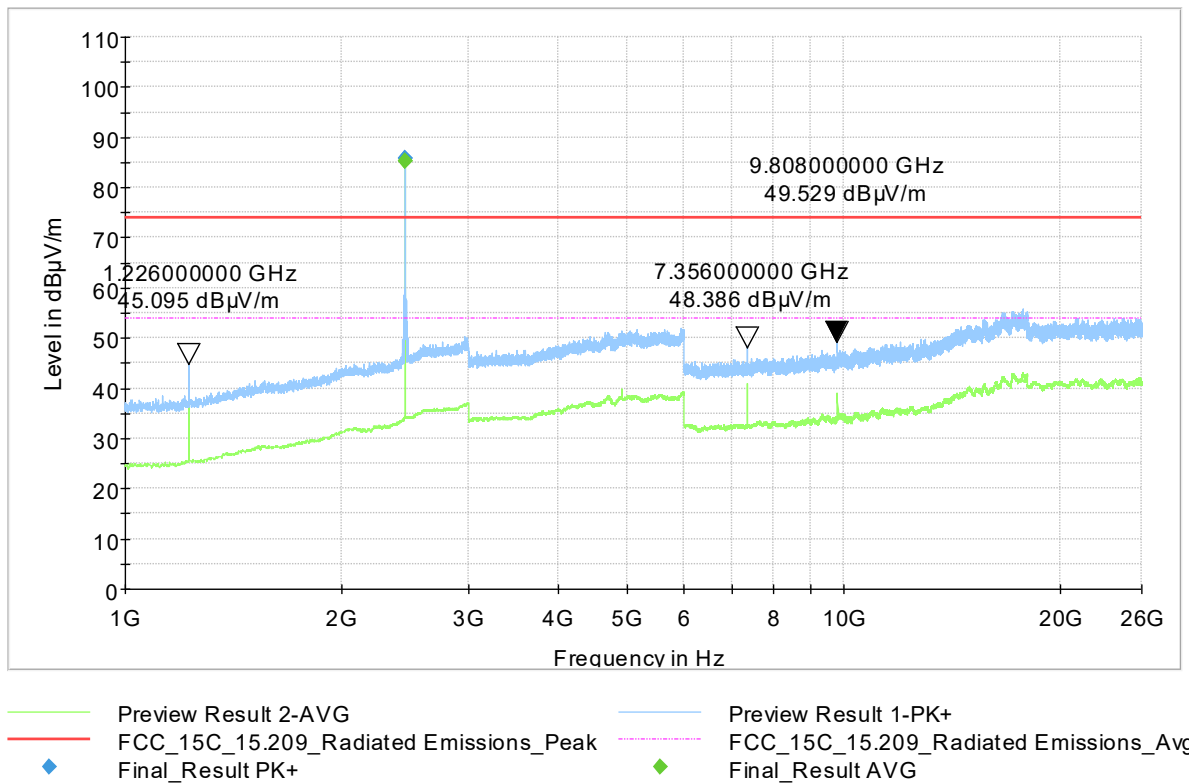
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1204.93506	46.23	---	74.00	27.77	10000.	1000.0	150.0	H	221.0	3.0	5.0
1204.93506	---	42.22	54.00	11.78	10000.	1000.0	150.0	H	221.0	3.0	5.0
2409.66233	85.82	---	TX		10000.	1000.0	150.0	H	134.0	-9.0	12.8
2409.66233	---	84.06			10000.	1000.0	150.0	H	134.0	-9.0	12.8
4820.05194	53.19	---	74.00	20.81	10000.	1000.0	150.0	V	11.0	90.0	8.9
4820.05194	---	43.80	54.00	10.20	10000.	1000.0	150.0	V	11.0	90.0	8.9
7229.83116	---	47.09	54.00	6.91	10000.	1000.0	150.0	H	292.0	23.0	-2.9
7229.83116	53.66	---	74.00	20.34	10000.	1000.0	150.0	H	292.0	23.0	-2.9
9639.53246	52.97	---	74.00	21.03	10000.	1000.0	150.0	V	116.0	60.0	-0.1
9639.53246	---	43.63	54.00	10.37	10000.	1000.0	150.0	V	116.0	60.0	-0.1
12049.0844	---	41.18	54.00	12.82	10000.	1000.0	150.0	H	66.0	66.0	1.5
12049.0844	52.63	---	74.00	21.37	10000.	1000.0	150.0	H	66.0	66.0	1.5

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 38 von 51
Page 38 of 51

Prüfdokumentation
Test documentation

4.4.2.13 1 to 26GHz, Highest Channel



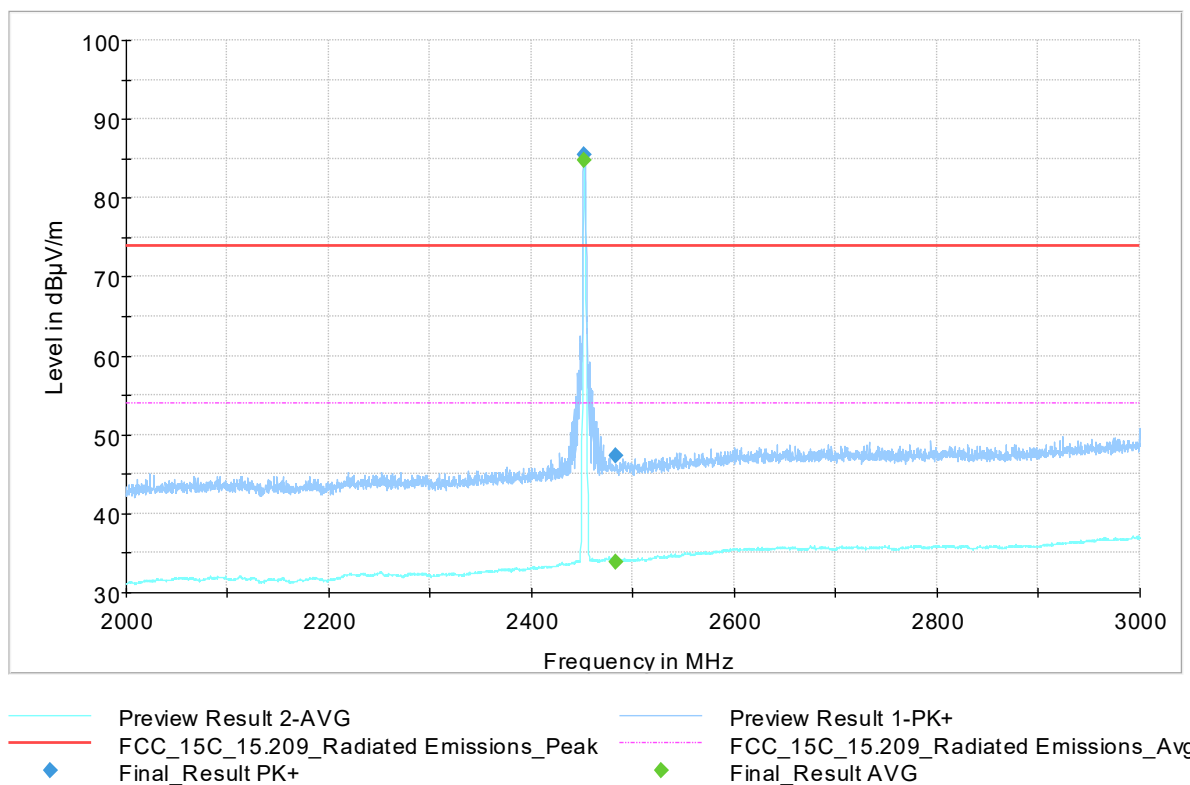
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2451.93506	---	85.20	TX		10000	1000	150.0	H	-23.0	-17.0	13.3
2451.93506	85.82	---			10000	1000	150.0	H	-23.0	-17.0	13.3

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 39 von 51
Page 39 of 51

Prüfdokumentation Test documentation

Restricted bands of operation. 2 2483.5-2500



Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Band width (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2452.05194	---	84.85	54.00	-30.85	10000.	1000.0	150.0	H	327.0	39.0	13.3
2452.05194	85.48	---	74.00	-11.48	10000.	1000.0	150.0	H	327.0	39.0	13.3
2483.50000	---	33.82	54.00	20.18	10000.	1000.0	150.0	V	226.0	30.0	13.5
2483.50000	47.34	---	74.00	26.66	10000.	1000.0	150.0	V	226.0	30.0	13.5

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 40 von 51
Page 40 of 51

Prüfdokumentation
Test documentation

4.4.3 Band Edge Measurement (Unwanted emissions)

4.4.3.1 Test Method

Unwanted emissions close to the operating band were additionally tested here.

Antenna connector is prepared, so conducted method was used according to ANSI C63.10:2013 clause 6.10. The maximum in-band antenna gain, or 2 dBi, whichever is greater was used outside the operating band.

The EUT was connected to the spectrum analyzer via a coax cable with a known loss. The measurements were done with EUT configured to the lowest and highest channels, and in hopping mode (in case of FHSS device).

4.4.3.2 Test Setup

EUT		A003887856-26 (cond. sample)	
Chamber details		Shielded room	
Companion device		EUT in Test Mode. Therefore, no Companion Device was used.	
Operation mode		☒ 1: TX-Mode ☐ 2: RX-Mode ☐ 3: N/A ☐ 4: N/A	
Spectrum Analyzer	Resolution Bandwidth	100 kHz	
	Video Bandwidth	300 kHz	
	Span	90 MHz	
	Sweep time	Auto	
Further parameters		-	-
Test engineer		Matthias Kräutlein	Mat

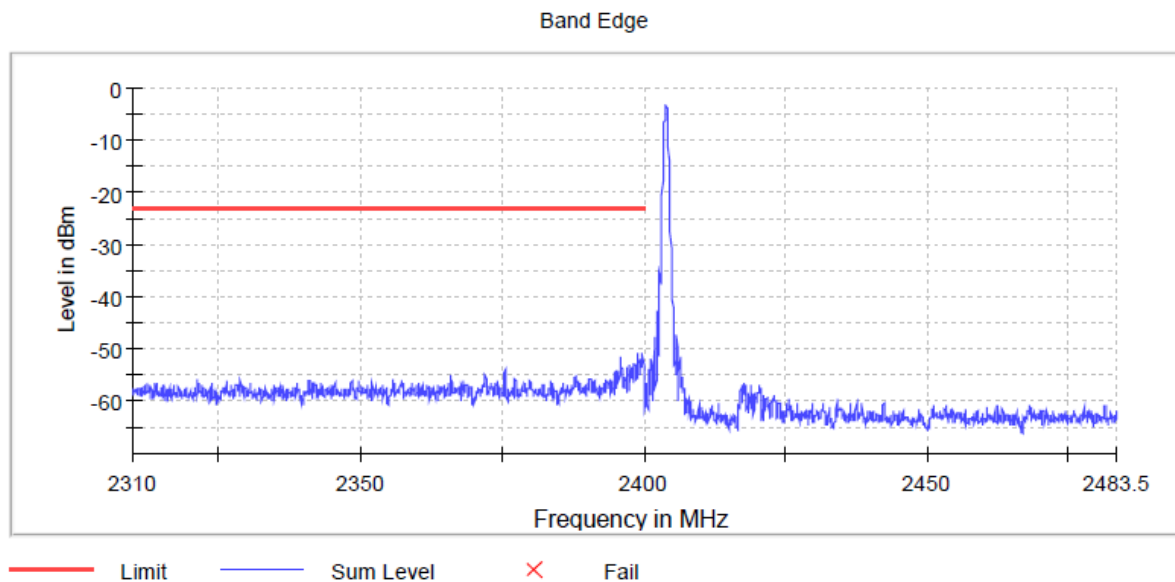
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 41 von 51
Page 41 of 51

Prüfdokumentation Test documentation

4.4.3.3 Test results (Unwanted emissions; Band Edge Measurement)

4.4.3.3.1 Lowest Channel



Inband Peak

Frequency [MHz]	Level [dBm]
2403.975000	-3.0

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.125000	-50.8	27.8	-23.0	PASS
2399.875000	-51.0	28.0	-23.0	PASS
2399.925000	-51.1	28.1	-23.0	PASS
2396.075000	-51.5	28.5	-23.0	PASS
2399.075000	-51.6	28.6	-23.0	PASS
2399.725000	-51.9	28.9	-23.0	PASS
2396.025000	-52.0	29.0	-23.0	PASS
2399.825000	-52.0	29.0	-23.0	PASS
2399.275000	-52.1	29.1	-23.0	PASS
2399.675000	-52.1	29.1	-23.0	PASS
2399.225000	-52.2	29.2	-23.0	PASS
2396.125000	-52.3	29.3	-23.0	PASS
2399.175000	-52.6	29.6	-23.0	PASS
2398.275000	-52.8	29.8	-23.0	PASS
2399.775000	-52.9	29.9	-23.0	PASS

4.4.3.3.2 Middle Channel

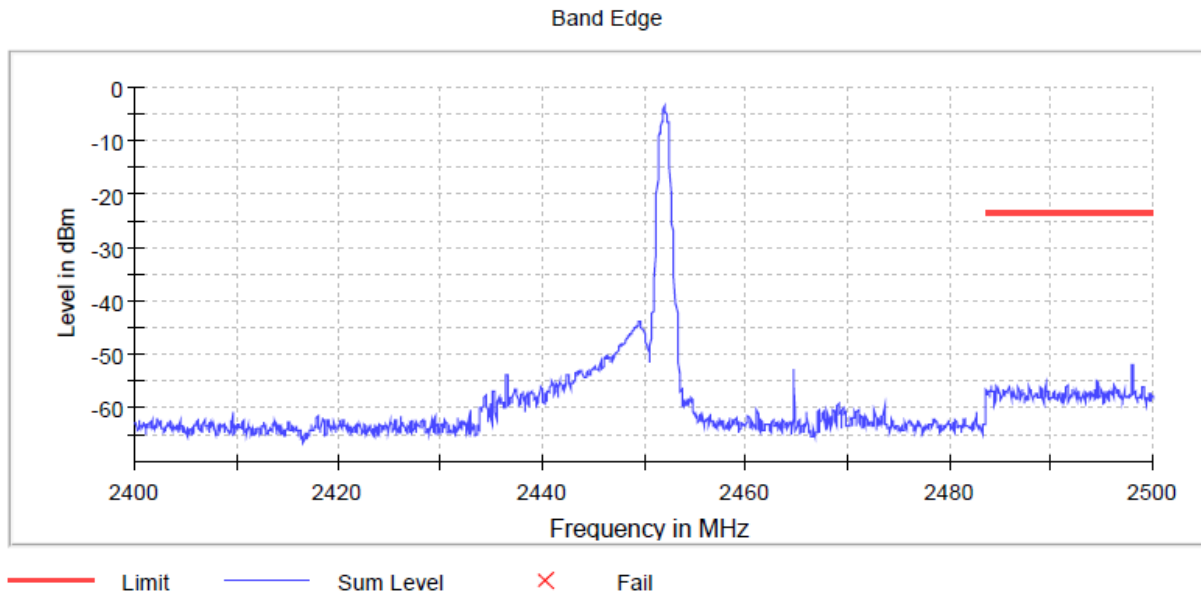
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 42 von 51
Page 42 of 51

Prüfdokumentation Test documentation

N/A

4.4.3.3.3 Highest Channel



Inband Peak

Frequency [MHz]	Level [dBm]
2451.975000	-3.3

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2497.925000	-51.9	28.6	-23.3	PASS
2497.975000	-51.9	28.6	-23.3	PASS
2498.025000	-52.6	29.3	-23.3	PASS
2497.875000	-53.1	29.8	-23.3	PASS
2498.075000	-53.8	30.4	-23.3	PASS
2494.525000	-54.9	31.6	-23.3	PASS
2494.475000	-55.4	32.1	-23.3	PASS
2489.425000	-55.4	32.1	-23.3	PASS
2494.575000	-55.5	32.2	-23.3	PASS
2489.475000	-55.6	32.3	-23.3	PASS
2485.825000	-55.6	32.3	-23.3	PASS
2491.575000	-55.6	32.3	-23.3	PASS
2485.875000	-55.9	32.6	-23.3	PASS
2496.225000	-55.9	32.6	-23.3	PASS
2484.125000	-55.9	32.6	-23.3	PASS

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 43 von 51
Page 43 of 51

Prüfdokumentation Test documentation

4.4.4 Conducted unwanted emissions

4.4.4.1 Test Method

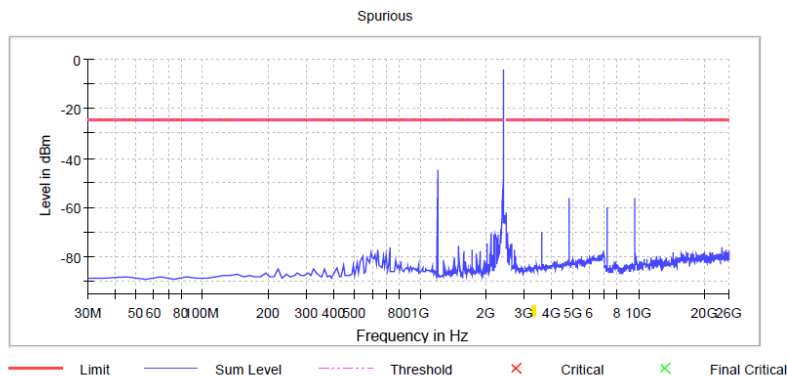
Antenna connector is prepared, so conducted method was used to measure the unwanted emissions in frequency range (30MHz to 26GHz) according to ANSI C63.10:2013 clause 11.11.2 & 11.11.3 The EUT was connected to the spectrum analyzer via a coax cable with a known loss.

4.4.4.2 Test Setup

EUT		A003887856-26 (cond. sample)
Chamber details		Shielded room
Companion device		EUT in Test Mode. Therefore, no Companion Device was used.
Operation mode		☒ 1: TX-Mode ☐ 2: RX-Mode ☐ 3: N/A ☐ 4: N/A
Spectrum Analyzer	Centre Frequency	2404 MHz, 2452 MHz
	Resolution Bandwidth	100 kHz, 1MHz
	Video Bandwidth	300 kHz, 3 MHz
	Span	26 GHz
	Sweep time	Auto
Further parameters		-
Test engineer		Matthias Kräutlein

4.4.4.3 Test results (Conducted unwanted emissions)

4.4.4.3.1 Lowest Channel



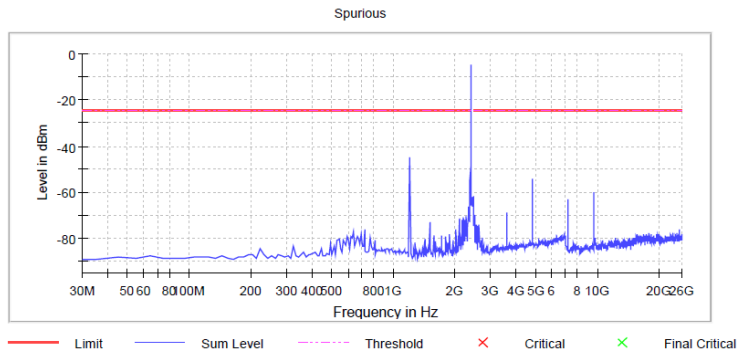
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
1200.063025	-44.8	20.6	-24.3
2395.021008	-47.4	23.1	-24.3
9614.406396	-56.2	31.9	-24.3
4807.166065	-56.2	31.9	-24.3
2375.105042	-57.2	32.9	-24.3
7215.783362	-59.8	35.5	-24.3
2385.063025	-59.9	35.6	-24.3
2365.147059	-62.2	37.9	-24.3
2355.189076	-64.0	39.7	-24.3
7205.789099	-68.4	44.1	-24.3
2325.315126	-69.0	44.8	-24.3
3607.854547	-70.0	45.7	-24.3
2498.491394	-70.5	46.2	-24.3
2106.239496	-70.6	46.3	-24.3
2175.945378	-71.0	46.8	-24.3

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 44 von 51
Page 44 of 51

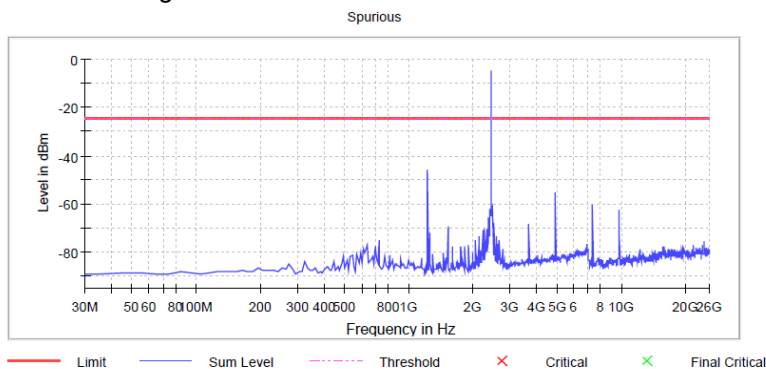
Prüfdokumentation Test documentation

4.4.4.3.2 Middle Channel



Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
1210.021008	-44.8	20.1	-24.7
1200.063025	-44.9	20.2	-24.7
2395.021008	-48.4	23.7	-24.7
4817.160327	-54.4	29.6	-24.7
2385.063025	-55.4	30.7	-24.7
9644.389184	-59.8	35.1	-24.7
9634.394921	-59.8	35.1	-24.7
7225.777624	-63.0	38.3	-24.7
2375.105042	-66.0	41.3	-24.7
2345.231092	-66.4	41.7	-24.7
2335.273109	-67.1	42.4	-24.7
7235.771887	-68.6	43.9	-24.7
3617.848810	-69.0	44.3	-24.7
2325.315126	-69.3	44.6	-24.7
2498.491394	-69.9	45.1	-24.7

4.4.4.3.3 Highest Channel



Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
1229.936975	-46.0	21.5	-24.5
4907.108691	-55.6	31.1	-24.5
7355.703039	-60.5	36.0	-24.5
2488.497131	-61.2	36.7	-24.5
9804.297386	-62.7	38.3	-24.5
2385.063025	-65.8	41.3	-24.5
2518.479919	-67.9	43.4	-24.5
3677.814386	-68.3	43.8	-24.5
2528.474182	-68.3	43.9	-24.5
1528.676471	-69.4	44.9	-24.5
2325.315126	-70.3	45.8	-24.5
2375.105042	-70.6	46.2	-24.5
2255.609244	-70.7	46.2	-24.5
2225.735294	-70.8	46.3	-24.5
2335.273109	-71.4	46.9	-24.5

4.4.5 Final test result (Conducted unwanted emissions)

Final test result

Pass

Prüfdokumentation
Test documentation

4.5 AC Power Conducted Emission

4.5.1 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 μ H/50 ohms line impedance stabilization network (LISN).

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

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

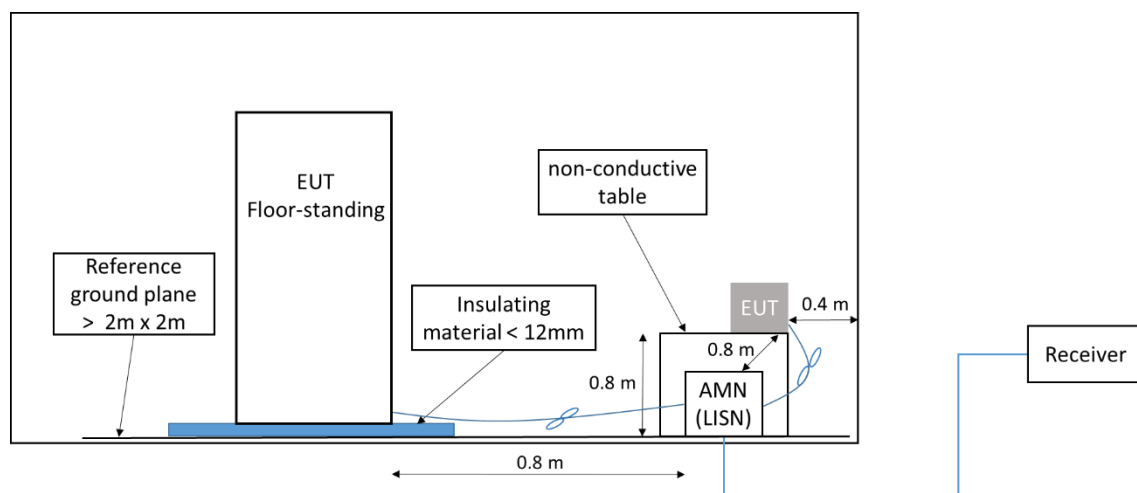
*Decreases with logarithm of the frequency

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.

4.5.2 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.

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 46 von 51
Page 46 of 51

Prüfdokumentation Test documentation

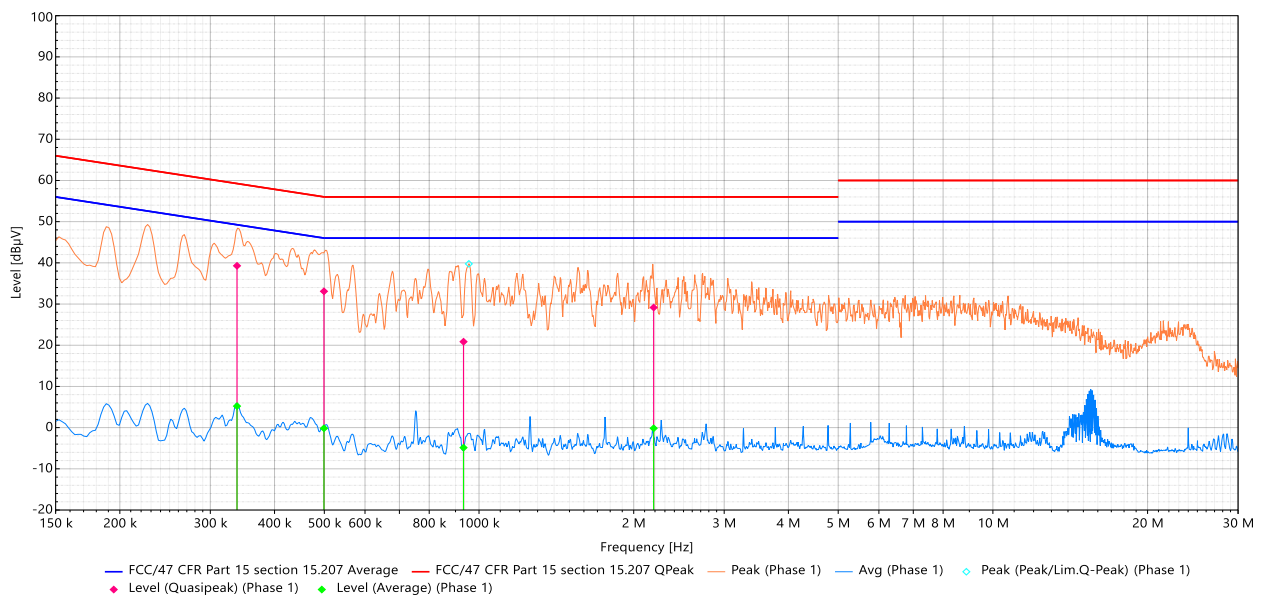
4.5.3 Test Setup (AC Power Conducted Emission)

EUT	A003887856-26 (cond. sample) A003887856-11 (rad. sample)	
Companion device	EUT in Test Mode. Therefore, no Companion Device was used.	
Operation mode	☒ 1: TX-Mode	☐ 2: RX-Mode
	☐ 3: N/A	☐ 4: N/A
Further parameters	-	
Test engineer	Matthias Kräutlein	

4.5.4 Test results (AC Power Conducted Emission)

Line: Phase 1

#28



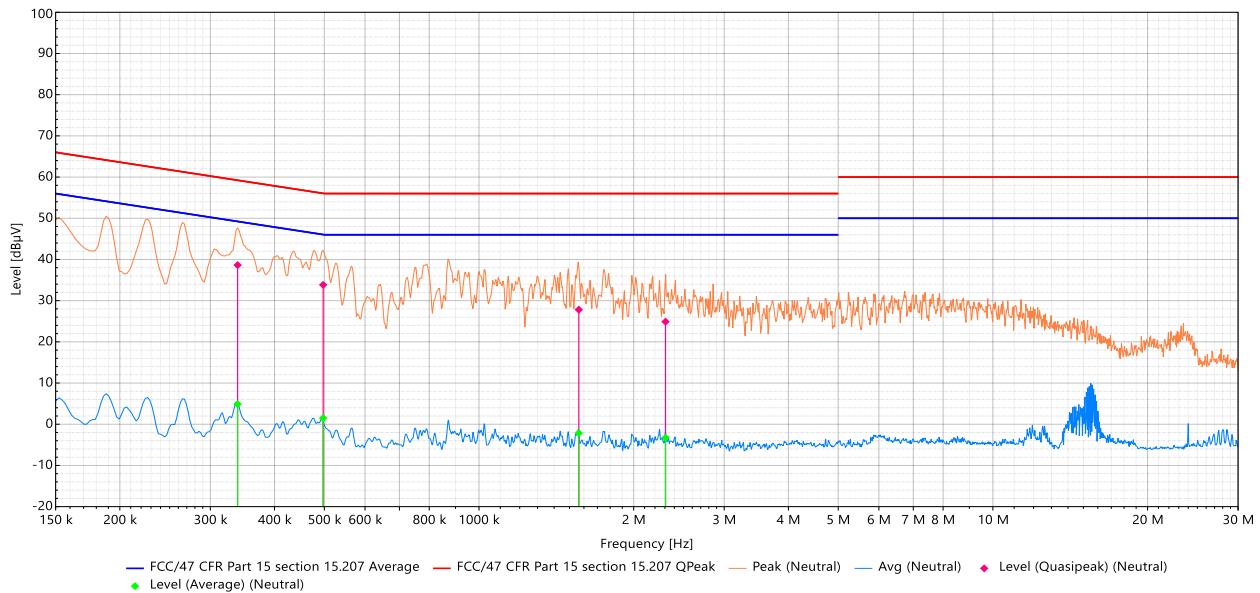
Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 47 von 51
Page 47 of 51

Prüfdokumentation Test documentation

Line: Neutral

#28



QuasiPeak

Frequency (Hz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Pos	Correction (dB)	RBW (Hz)	M. time (s)	Comments
933 k	20.9	56.0	-35.1	Phase 1	10.0	9 k	1.0	Pass
2.306 M	24.9	56.0	-31.1	Neutral	10.1	9 k	1.0	Pass
1.564 M	27.8	56.0	-28.2	Neutral	10.0	9 k	1.0	Pass
2.187 M	29.2	56.0	-26.8	Phase 1	10.0	9 k	1.0	Pass
499.2 k	33.1	56.0	-22.9	Phase 1	10.0	9 k	1.0	Pass
497.4 k	33.8	56.1	-22.2	Neutral	10.0	9 k	1.0	Pass
339 k	38.6	59.2	-20.6	Neutral	10.0	9 k	1.0	Pass
338.1 k	39.3	59.2	-20.0	Phase 1	10.0	9 k	1.0	Pass

Average

Frequency (Hz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Pos	Correction (dB)	RBW (Hz)	M. time (s)	Comments
933 k	-4.9	46.0	-50.9	Phase 1	10.0	9 k	1.0	Pass
2.306 M	-3.3	46.0	-49.3	Neutral	10.1	9 k	1.0	Pass
1.564 M	-2.2	46.0	-48.2	Neutral	10.0	9 k	1.0	Pass
499.2 k	-0.2	46.0	-46.2	Phase 1	10.0	9 k	1.0	Pass
2.187 M	-0.2	46.0	-46.2	Phase 1	10.0	9 k	1.0	Pass
497.4 k	1.5	46.1	-44.6	Neutral	10.0	9 k	1.0	Pass
339 k	4.9	49.2	-44.3	Neutral	10.0	9 k	1.0	Pass
338.1 k	5.2	49.2	-44.0	Phase 1	10.0	9 k	1.0	Pass

4.5.5 Final test result (AC Power Conducted Emission)

Final test result	Pass
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Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 48 von 51
Page 48 of 51

Fotodokumentation
Photo documentation

5 Test Setup Photo

For reasons of confidentiality, no photos of the EUT are included in this report.
For EUT and test setup photos please see the Photo Documentation to this report Number.

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 49 von 51
Page 49 of 51

Zusatzdokumentation
Additional documentation

6 Application form

The following information was provided by the customer and form the basis for the execution of the tests and the assessment of conformity. The given information can affect the results of both.

application form was provided.

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 50 von 51
Page 50 of 51

Liste der verwendeten Prüfmittel
List of used test equipment

7 Equipment List

7.1 Hardware

Prüfmittel Test equipment			Prüfmittel-Nr. / ID-Nr. Equipment No. / ID-No.	Nächste Kalibrierung Next calibration
TS8997	Spectrum Analyzer: FSV-30	Rohde & Schwarz	9000268	10.08.2025
	Humidity / Baro / Temp. Data Recorder	PCE Instruments	9000207	31.08.2025
	Temperature & Humidity Chamber: PL-3-KPH	Espec	2731999	Not used
Fully Anechoic Room		Albatross Projects GmbH	2959749	13.02.2026*
Signal Analyzser FSU26		Rohde & Schwarz	2844118	04.08.2025
Signal Analyser UXA N9041B		Keysight	2971644	24.06.2026
RSE-Filtersystem		Rohde & Schwarz	9002802	06.02.2026*
Antenna CBL 6111D 25MHz-1GHz		CHASE	2789237	04.09.2027
Antenna HF907 1-18GHz		Rohde & Schwarz	2856263	10.09.2027
Horn Antenna 3116C-PA 18-40GHz		ETS LINDGREN	2900393	19.12.2025
Semi-Anechoic Chamber 30-1000 MHz		Siemens	2729645	15.06.2025
Receiver ESU 8		Rohde & Schwarz	2728844	18.07.2025
Antenna VULB 9168 30MHz – 1GHz		Schwarzbeck	2728136	05.10.2026
Antenna HFH 2 (Loop) 9kHz-30MHz		Rohde & Schwarz	2728893	05.08.2027
Humidity / Barometer / Temperature. Data Recorder		PCE Instruments	9000206	31.08.2025

7.2 Software

Test Software	Developer	Version
EMC32	Rohde & Schwarz	10.60.20
WMS32	Rohde & Schwarz	10.60.10
BAT-EMC	NEXIO	2022.0.19.0

Prüfbericht-Nr.: DE258D0D 002
Test report no.:

Seite 51 von 51
Page 51 of 51

Änderungsverzeichnis
Change history

8 Change history

Revision Number	List of revisions
001	Initial Release
002	Certifier comments integrated
Note: Latest revision report will replace all previous reports.	

Ende des Prüfberichts
End of Test Report