

Prüfbericht-Nr.: <i>Test report no.:</i>	DE24ZAOP 002	Auftrags-Nr.: <i>Order no.:</i>	1173868 20	Seite 1 von 27 Page 1 of 27
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	0764423	Auftragsdatum: <i>Order date:</i>	2024-07-29	
Auftraggeber: <i>Client:</i>	Rimac Technology d.o.o., Ljubljanska 7, 10431 Sveta Nedelja, Croatia			
Prüfgegenstand: <i>Test item:</i>	Automotive use Infotainment Control Unit			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	RIM_03_N			
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>	Teilprüfung / Partial test Simultaneous Radio Test Report FCC CFR 47 Part 15 Subpart C- §15.247 FCC CFR 47 Part 15 Subpart E- §15.407 FCC CFR 47 Part 24 ,Part 27 RSS-247 Issue 3, RSS-Gen Issue 5, RSS 130 Issue 2, RSS 132 Issue 4 RSS 133 Issue 6, RSS 139 Issue 4			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2024-03-12	For Photo documentation please refer to Report number DE24UMMX, DE24Q9DI and DE24XZUT		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003673876-001 to 009			
Prüfzeitraum: <i>Testing period:</i>	2024-03-11 - 2024-03-21			
Ort der Prüfung: <i>Place of testing:</i>	Nürnberg <i>Nuremberg</i>			
Prüflaboratorium: <i>Testing laboratory:</i>	Wireless Labor <i>Wireless Test Lab</i>			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i>	 7/30/2025	genehmigt von: <i>authorized by:</i>	 30.07.2025	
Datum: <i>Date:</i>	Signed by: Shrivas Naikar	Ausstellungsdatum: <i>Issue date:</i>	Signiert von: Matthias Kraeutlein	
Stellung / Position:	Sachverständige(r)/Expert	Stellung / Position:	Sachverständige(r)/Expert	
Sonstiges / <i>Other:</i>	USA/FCC: C2PC filing for adding new host system. Canada/ISED: C4PC filing for adding new host system. Host device integrated with FCC & IC certificate radio module.			
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.: DE24ZAOP 002
Test report no.:

Seite 2 von 27
Page 2 of 27

Anmerkungen Remarks

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>
2	Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben. Informationen zur Verifizierung der Authentizität unserer Dokumente erhalten Sie über folgenden Link: Einführung in digitale Signaturen <i>As contractually agreed, this document has been signed digitally only. TUV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TUV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. For information on verifying the authenticity of our documents, please visit the following link: Introduction to Digital Signature</i>
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.: DE24ZAOP 002
Test report no.:

Seite 3 von 27
Page 3 of 27

Produktbeschreibung
Product description

1	Test item	Automotive use Infotainment Control Unit	
2	Typ-No.	RIM_03_N (Tested)	
3	Identical type number	APF_03_N	
4	Test sample obtaining	☒ Sampling by customer ☐ Sampling by TÜV Rheinland Group ☐ others:	
5	Serial-No.	B400682409239	
6	Supported radio technologies	BLE, Wi-Fi 2.4GHz, Wi-Fi 5GHz, UMTS and LTE	
7	Description of EUT	ICU drives 3 display outputs. Includes 2 USB ports, 1000BASE-T1 port, 10G Ethernet port, LTE modem, BT/Wi-Fi and GNSS connectivity. FM Radio.	
8	Max RF output power (measured) Refer to the module report	Bluetooth Low Energy	8.0 dBm at 2402MHz
		WLAN 2.4GHz	18.5 dBm at 2437MHz
		WLAN 5GHz	20.4 dBm at 5300MHz
		UMTS	22.4(Average) dBm at 846.6MHz band 5
		LTE	24.56(RMS) dBm at 1732.5MHz band 4
9	Operating Frequency (declared)	Refer to the module Report or FCC ID	
10	Channel Bandwidth (declared)	Refer to the module Report or FCC ID	
11	Number of Channels	Refer to the module Report or FCC ID	
12	Modulation	Refer to the module Report or FCC ID	
13	Rated Voltage / Frequency	14.4V DC/Battery operated	
14	FCC-ID (Radio module)	2B05X-ICU3018151	Bluetooth and Wi-Fi
		XPYTOBYL200	UMTS, LTE
15	IC (Radio module)	28731-ICU3018151	Bluetooth and Wi-Fi
		8595A-TOBYL200	UMTS, LTE
16	Antenna Name	2JF01 02P (BT/WiFi), 2J52 24P (LTE/WCDMA)	
17	Antenna Type	☐ Integral antenna (designed as a fixed part of the EUT) ☐ Dedicated antenna (removable, obligation to be used) ☒ Permanent antenna connector	
18	Antenna number of chains	BLE	1
		WLAN 2.4GHz	1
		WLAN 5GHz	2
		WCDMA	1
		LTE	1
19	Antenna Gain (declared)	Refer to the antenna datasheet	
20	Firmware	v6.0.0	
21	Hardware	ICU_3xx Series Base Board EMI v1.1.0 (P/N: S004213767-1.1), ICU_3xx Series Extension Board EMI Test 4 NA v1.0.1 (P/N: S004691875-1.1)	
22	Used Samples	A003673876-001 to 009	
23	Radiated measurements sample	A003673876-003	
24	Auxiliary equipment used to set up the EUT	N/A	
25	Accessory Devices used together with the EUT	The customer's laptop was used for the radio configuration	

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 4 von 27
Page 4 of 27

Produktbeschreibung
Product description

26	Data Cable	Main DUT harness providing power supply and RS-232 communication for debug and control
27	I/O Ports	Power input, RS-232 interface
28	Temperature Range	-40°C to +70°C
29	Environment	Indoor and Outdoor

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 5 von 27
Page 5 of 27

Produktbeschreibung
Product description

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	No retest necessary, as transmitter output power has been certified based on conducted 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	Does not apply for FHSS equipment	P ☐ F ☐ N/A ☒ N/T ☐
FCC 15.247 (d) RSS-247 sec. 5.5	Band Edge Measurement	-	P ☐ F ☐ N/A ☐ N/T ☒
FCC 15.247 (d) RSS-247 sec. 5.5	Conducted Spurious Emission	-	P ☐ F ☐ N/A ☐ N/T ☒
FCC 15.205, 15.209 RSS-Gen sec. 8.9, 8.10	Radiated Spurious Emission	Tested on the worst-case modulation and channel per frequency range as shown in original filing.	P ☒ F ☐ N/A ☐ N/T ☐

Prüfbericht-Nr.: DE24ZAOP 002 <i>Test report no.:</i>			Seite 6 von 27 Page 6 of 27
Absatz <i>Clause</i>	Anforderungen - Prüfungen / <i>Requirements - Tests</i>	Bemerkungen/ <i>Remarks</i>	Ergebnis <i>Result</i>
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.: DE24ZAOP 002
Test report no.:

Seite 7 von 27
Page 7 of 27

Prüfdokumentation
Test documentation

Contents

1	Registration	8
2	EUT Classification	8
2.1	Wireless technologies and frequencies supported by the EUT	8
2.2	Report Reference	9
2.3	Standard specific classification of the EUT	9
2.4	System Type	9
3	Test conditions and configurations	9
3.1	Normal environmental test conditions	9
3.2	Equipment modifications	10
3.3	Antenna assemblies	10
3.4	Worst-Case Test Modes	10
3.5	Test modes	10
3.6	Measurement Uncertainty	11
4	Test results in detail	12
4.1	Radiated Spurious Emissions	12
5	Application form	25
6	Equipment List	26
6.1	Hardware	26
6.2	Software	26
7	Change History	27

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 8 von 27
Page 8 of 27

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
Bluetooth Classic	2400 – 2483.5 MHz	SISO	☐	☐
Bluetooth Low Energy	2400 – 2483.5 MHz	SISO	☒	☒
802.11b	2400 – 2483.5 MHz	SISO	☐	☐
802.11g	2400 – 2483.5 MHz	SISO	☐	☐
802.11n(20MHz,40MHz)	2400 – 2483.5 MHz	SISO	☒	☐
802.11ax (20MHz)	2400 – 2483.5 MHz	SISO	☒	☒
802.11ax (40MHz)	2400 – 2483.5 MHz	SISO	☒	☐
802.11a	U-NII-1, U-NII-2A, 2C and U-NII-3	MIMO	☐	☐
802.11n(20MHz)	U-NII-1, U-NII-2A	MIMO	☒	☐
802.11ac (20MHz)	U-NII-2A	MIMO	☒	☒
802.11ac (40MHz)	U-NII-1, U-NII-2A, 2C and U-NII-3	MIMO	☐	☐
802.11ac (80MHz)	U-NII-1, U-NII-2A, 2C and U-NII-3	MIMO	☐	☐
802.11ax(20MHz,40MHz,80MHz)	U-NII-1, U-NII-2A, 2C and U-NII-3	MIMO	☐	☐
UMTS/WCDMA	Band 5	SISO	☒	☒
LTE	Band 2, Band 4, Band 5, Band 7, Band 17	SISO	☒	☒

SISO: Single Input Single Output

MIMO: Multiple input multiple Output

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 9 von 27
Page 9 of 27

Prüfdokumentation
Test documentation

2.2 Report Reference

Note: Product RIM_03_N has multiple protocols. All the supported wireless protocols and their respective test results are issued in separate test reports, following table lists the report numbers.

Radio Protocol	Report Number
RF test report for BLE (2.4GHz)	DE24UF3M 002
RF test report for Wi-Fi (2.4GHz)	DE24Q288 002
RF test report for Wi-Fi (5GHz)	DE24JKI7 002
RF test report for Cellular (Part 22, 24, 27)	DE2425F5 002
RF test report for Simultaneous Operation – (This report)	DE24ZAOP 002
RF test report for MPE/SAR Evaluation	DE2442J 002
EUT External Photos	DE24UMMX
EUT Internal Photos	DE24Q9DI
EUT test setup Photos	DE24XZUT

2.3 Standard specific classification of the EUT

2.3.1 Applied standards.

FCC CFR 47 Part 15 Subpart C- §15.247

FCC CFR 47 Part 15 Subpart E- §15.407

FCC CFR 47 Part 24, Part 27

ISED RSS-247:2017, RSS GEN, RSS 130 Issue 2,

RSS 132 Issue 4 RSS 133 Issue 6, RSS 139 Issue 4

Note: For Simultaneous mode FCC Part 24 and 27 Emission limit is applied considering the least stringent limit.

2.3.2 Test Methods and Guidance Documents

ANSI C63.10:2013

ANSI C63.26-2015

KDB 558074 D01 DTS Measurement Guidance v05

KDB 971168 D01 Power Meas License Digital Systems v03r01

KDB 662911 D01 Multiple Transmitter Output v02r01

KDB 996369 D04 Module Integration Guide v01

2.4 System Type

DTS (Digital Transmission System)

2.4.1 Type of equipment

Tabletop Equipment

3 Test conditions and configurations

3.1 Normal environmental test conditions

Environmental condition	Parameter	Range during test
Temperature	°C	21-24
Relative humidity	%	20-60
Supply voltage	V DC/Battery operated	14.4

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 10 von 27
Page 10 of 27

Prüfdokumentation Test documentation

3.2 Equipment modifications

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

3.3 Antenna assemblies

No antenna connector is prepared so tests were done in radiated mode.

3.4 Worst-Case Test Modes

The DUT was tested in its worst-case configuration as stated in the test report of the radio module JODY-W374.

Technology	Module Test Report Reference	Product Test Report Reference
BLE, WLAN 2.4GHz	MDE_UBLOX_2030_FCC_01_rev 01	BT: DE24UF3M 001 WLAN: DE24Q288 001
WLAN 5GHz	MDE_UBLOX_2030_FCC_02_rev 02	DE24JKI7 001
WDMA	MDE_UBLOX_1408_FCCa_rev 02	DE2425F5 001
LTE	MDE_UBLOX_1408_FCCc MDE_UBLOX_1408_FCCd	

Following configurations were used for the test cases:

Test case	Worst case Configuration
Maximum Output Power	Refer to Mode 1 and Mode 2
Radiated Spurious Emissions < 30 MHz	
Radiated Spurious Emissions 30 MHz – 1 GHz	
Radiated Spurious Emissions > 1 GHz	

3.5 Test modes

Mode description	Mode configuration				
All Modes	The customer's laptop was connected to the EUT during the tests to keep the configured settings active. The USB Cable was grounded and filtered at the point of feed-trough.				
Continued Transmission was enabled on the product as per the below table. and TX power were set as per the customer's instruction. AT Commands were used to configure the radios.					
Mode 1: TX-Mode; worst-case modulation	Protocol	Frequency	Band Width	Modulation	Power
	Bluetooth	2402MHz	1MHz	DH1	12dBm
	WLAN 2.4GHz	2437MHz	20MHz	AX Mode MCS0	17dBm
	WLAN 5GHz	5300MHz	20MHz	AC Mode MCS0	17dBm
	LTE	1732.5MHz	5MHz	QPSK	24dBm
Mode 2: TX-Mode; worst case modulation	Bluetooth	2402MHz	1MHz	DH1	12dBm
	WLAN 2.4GHz	2437MHz	20MHz	AX Mode MCS0	17dBm
	WLAN 5GHz	5300MHz	20MHz	AC Mode MCS0	17dBm
	WCDMA	846.5MHz	5MHz	QPSK	24dBm

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 11 von 27
Page 11 of 27

Prüfdokumentation Test documentation

☒ The tested Radio configurations were evaluated as worst-case configurations in consultation with the customer.

3.6 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 *10 ⁻⁸	Hz	-
Frequency Stability under low voltage conditions			
Time	1.1*10 ⁻⁹	s	-
Conducted Carrier Power Conducted Spurious Emissions (RX/TX)	1.0	dB	9k-1GHz
	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	%	-

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 12 von 27
Page 12 of 27

Prüfdokumentation
Test documentation

4 Test results in detail

4.1 Radiated Spurious Emissions

4.1.1 Requirements / Limits (Radiated Spurious Emissions)

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode. The emissions shall not exceed the values in FCC Part 15, Subpart C §15.205, §15.209, §15.247(d).

FCC Part 15, Subpart C, §15.247 (d)

... In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

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

Frequency [MHz]	Limit [$\mu\text{V/m}$]	Measurement distance [m]	Limits [$\text{dB}\mu\text{V/m}$]
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 [$\mu\text{V/m}$]	Measurement distance [m]	Limits [$\text{dB}\mu\text{V/m}$]
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:

$$\text{Limit } [\text{dB}\mu\text{V/m}] = 20 \log (\text{Limit } [\mu\text{V/m}] / 1\mu\text{V/m})$$

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 13 von 27
Page 13 of 27

Prüfdokumentation
Test documentation

4.1.2 Test Method (Radiated Spurious Emissions)

4.1.2.1 Preliminary Test (Radiated Spurious Emissions)

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.

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 Polarization	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:

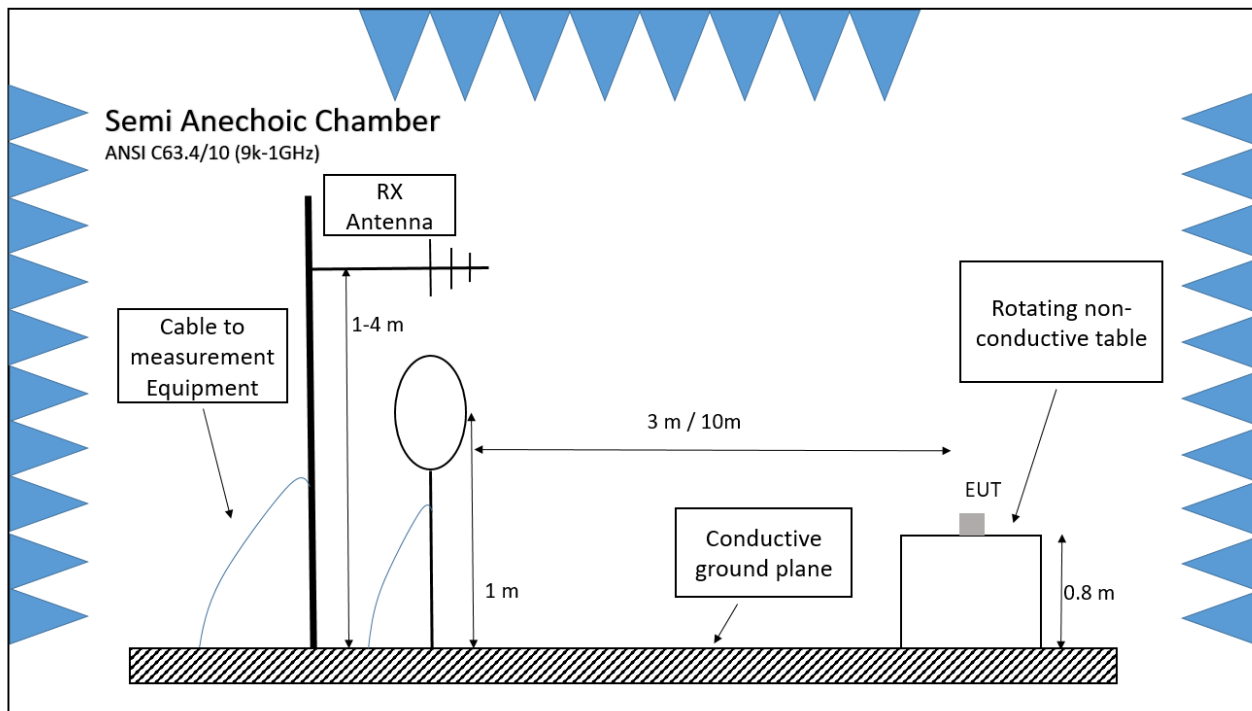
Test Site	Semi-anechoic chamber
Receiving Antenna	Hybrid Antenna VULB 9168
Receiving Antenna height	Varied (1m to 4 m, step size 1m)
Receiving Antenna Polarization	Horizontal– Vertical
EUT Table	1.0m x 1.5m non-conductive table 80cm above the floor
EUT Turn Table Step Size	45°
Receiver Configurations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

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 14 von 27
Page 14 of 27

Prüfdokumentation Test documentation

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



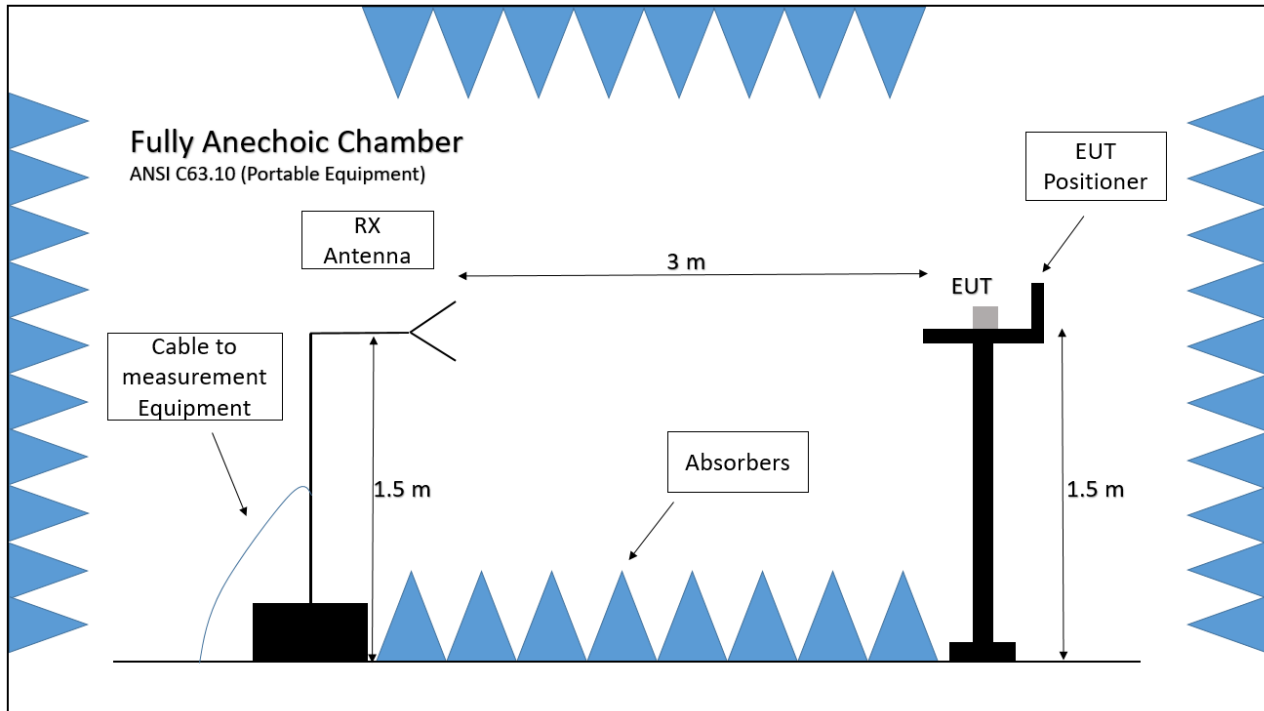
1 GHz - 26 GHz

Following Measurement Setup is used:

Test Site	Fully-anechoic chamber
Receiving Antenna	Horn Antenna HF907 (1-18 GHz), 3116C-PA (18-26 GHz)
Receiving Antenna Height	1.5 m
Receiving Antenna Polarization	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 Analyzer	Average and peak detectors
	RBW: 1 MHz
	Sweep Time: 100 ms

Prüfdokumentation Test documentation

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



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

4.1.2.2 Final Test (Radiated Spurious Emissions)

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

For the measurement 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.: DE24ZAOP 002
Test report no.:

Seite 16 von 27
Page 16 of 27

Prüfdokumentation
Test documentation

4.1.3 Test Setup (Radiated Spurious Emissions)

EUT	A003673876-003		
Test Condition	Normal conditions		
Operation mode	☒ 1: TX-Mode; worst-case modulation	☐ 2: RX-Mode	
	☐ 3: N/A	☐ 4: N/A	
Operation mode	Mode 1 and mode 2		
Further parameters	-		
Test Engineer	Shrinivas Naikar		

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

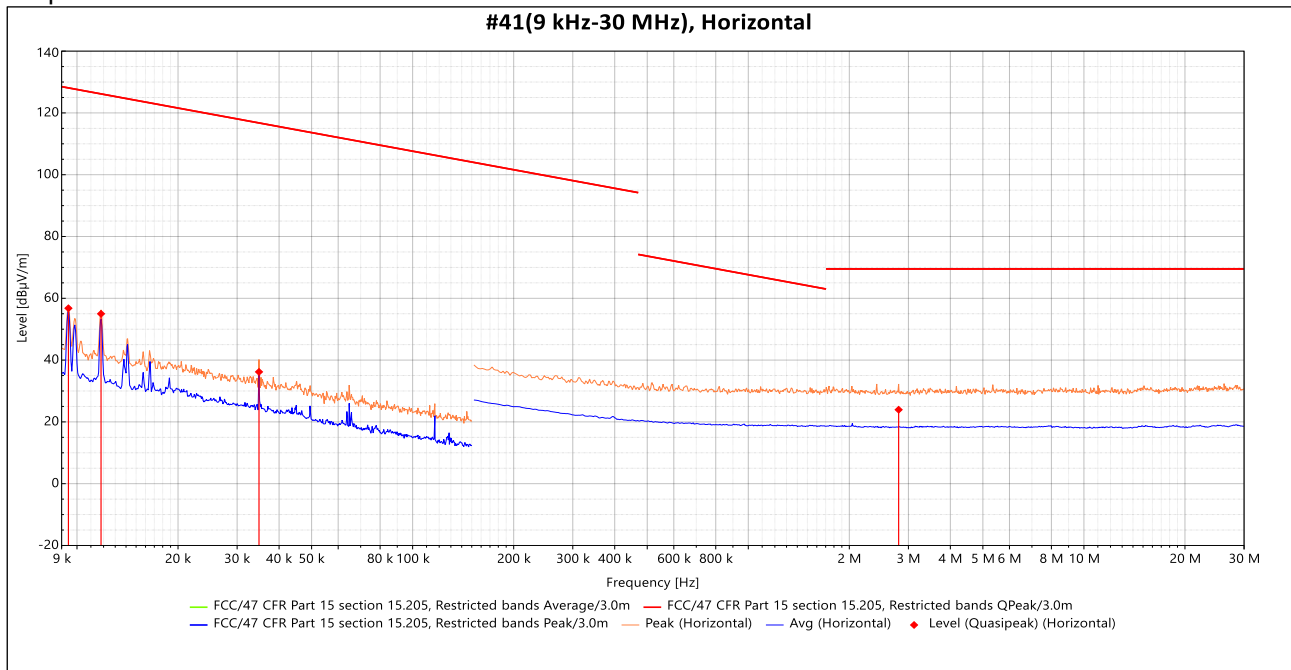
Seite 17 von 27
Page 17 of 27

Prüfdokumentation Test documentation

4.1.4 Test results (Radiated Spurious Emissions)

4.1.4.1 9 kHz to 30 MHz, BT-2402MHz+WiFi-2437MHz+WiFi-5300MHz+LTE-1732.5MHz

Perpendicular Polarization



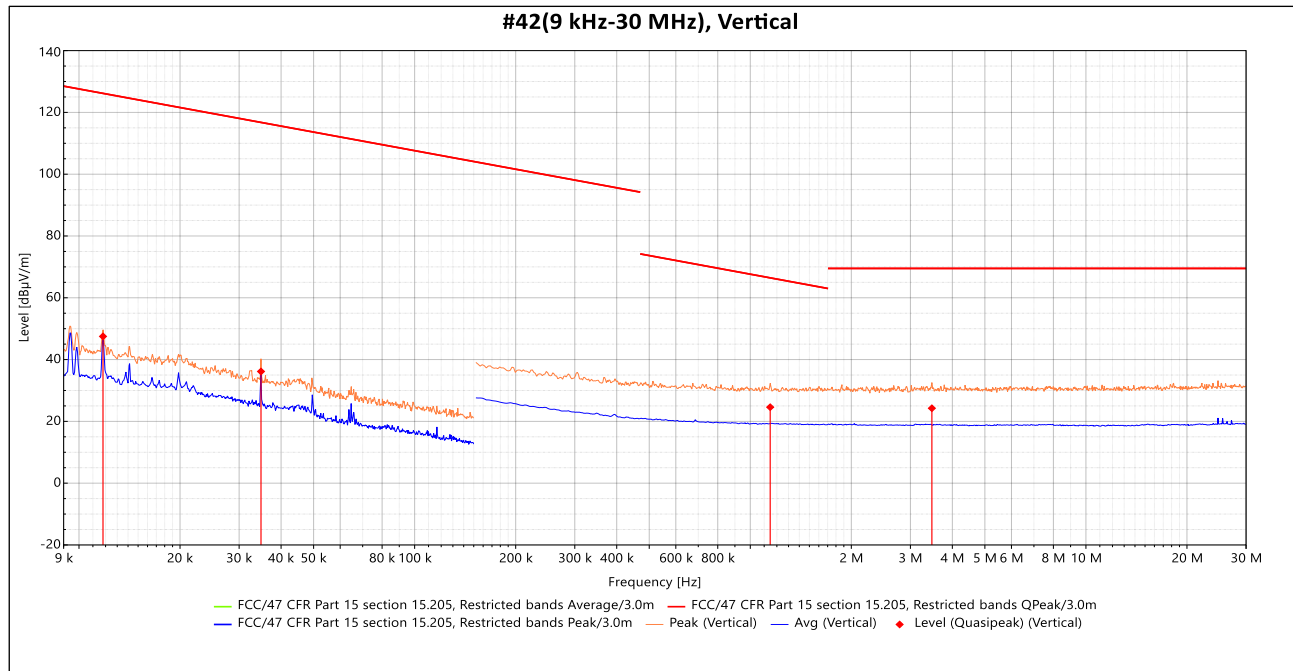
Frequency (Hz)	Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Azimuth (°)	Height (m)	Correction (dB)	RBW (Hz)
34.856 k	36.2	116.8	-80.6	89.9	1.50	20.1	200
9.429 k	56.8	128.1	-71.3	45.0	1.50	19.9	200
11.794 k	55.0	126.2	-71.2	45.0	1.50	19.9	200
2.806 M	23.9	69.5	-45.6	179.9	1.50	20.2	9 k

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 18 von 27
Page 18 of 27

Prüfdokumentation
Test documentation

Parallel Polarization



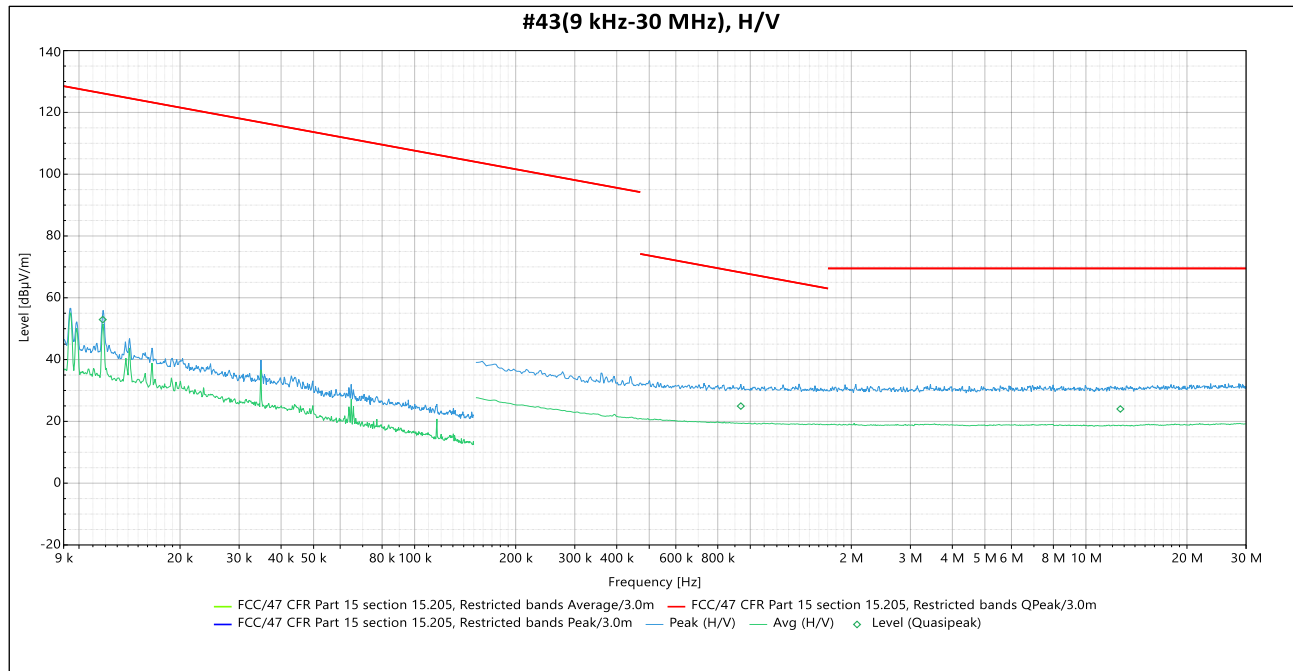
Frequency (Hz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Correction (dB)	RBW (Hz)
34.856 k	36.2	116.8	-80.6	0.1	1.50	20.1	200
11.79 k	47.5	126.2	-78.7	134.9	1.50	19.9	200
3.476 M	24.2	69.5	-45.3	225.1	1.50	20.4	9 k
1.146 M	24.6	66.4	-41.9	44.9	1.50	20.0	9 k

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 19 von 27
Page 19 of 27

Prüfdokumentation
Test documentation

Ground Parallel Polarization



Frequency (Hz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Correction (dB)	RBW (Hz)
11.771 k	52.9	126.2	-73.2	89.9	1.50	19.9	200
12.665 M	24.0	69.5	-45.5	179.8	1.50	20.4	9 k
937.263 k	24.9	68.2	-43.3	315.0	1.50	20.0	9 k

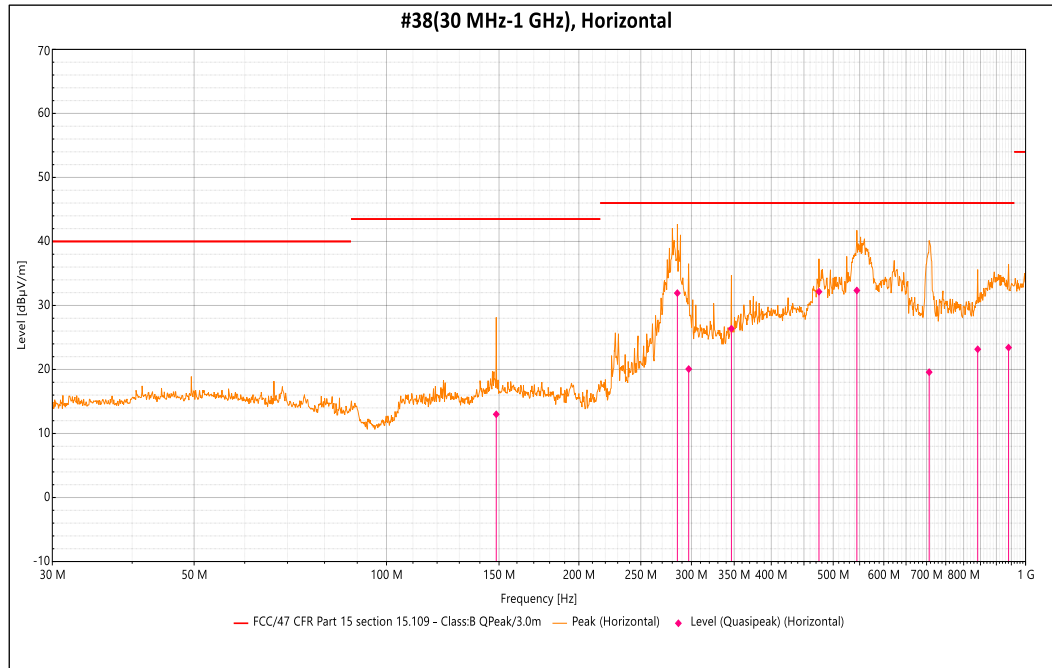
Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 20 von 27
Page 20 of 27

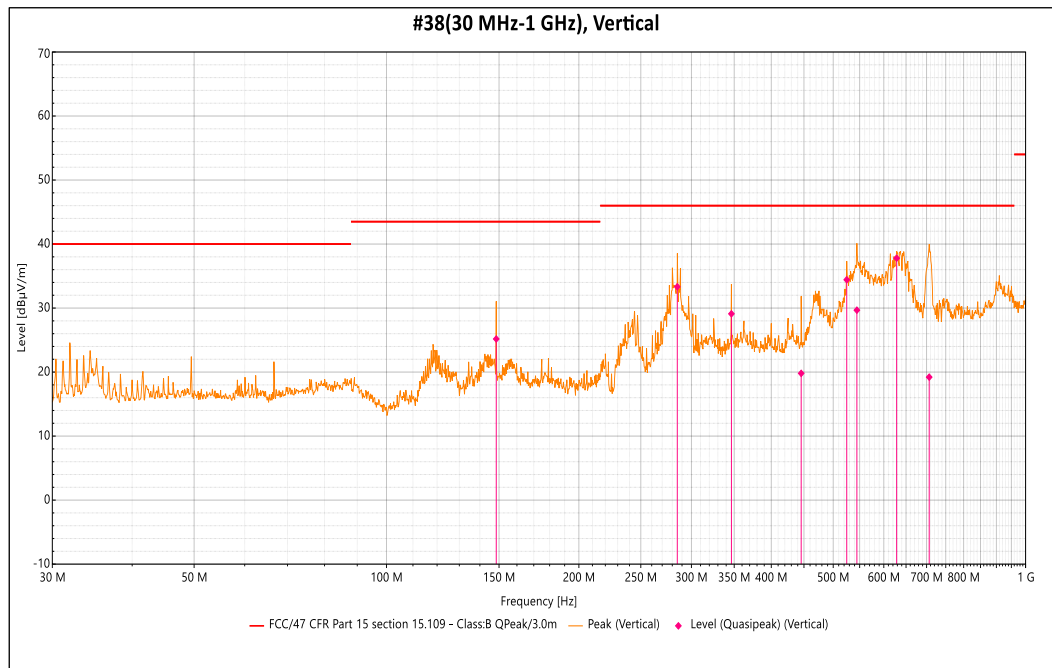
Prüfdokumentation Test documentation

4.1.4.2 30 MHz to 1 GHz, BT-2402MHz+WiFi-2437MHz+WiFi-5300MHz+LTE-1732.5MHz

Horizontal Polarization



Vertical Polarization



Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 21 von 27
Page 21 of 27

Prüfdokumentation
Test documentation

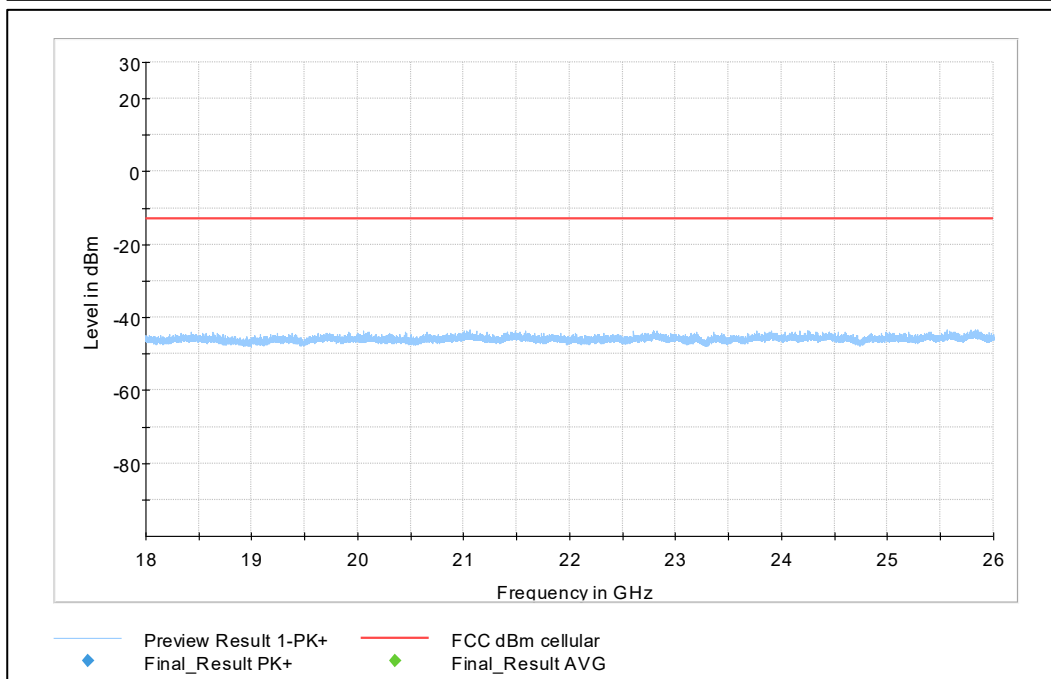
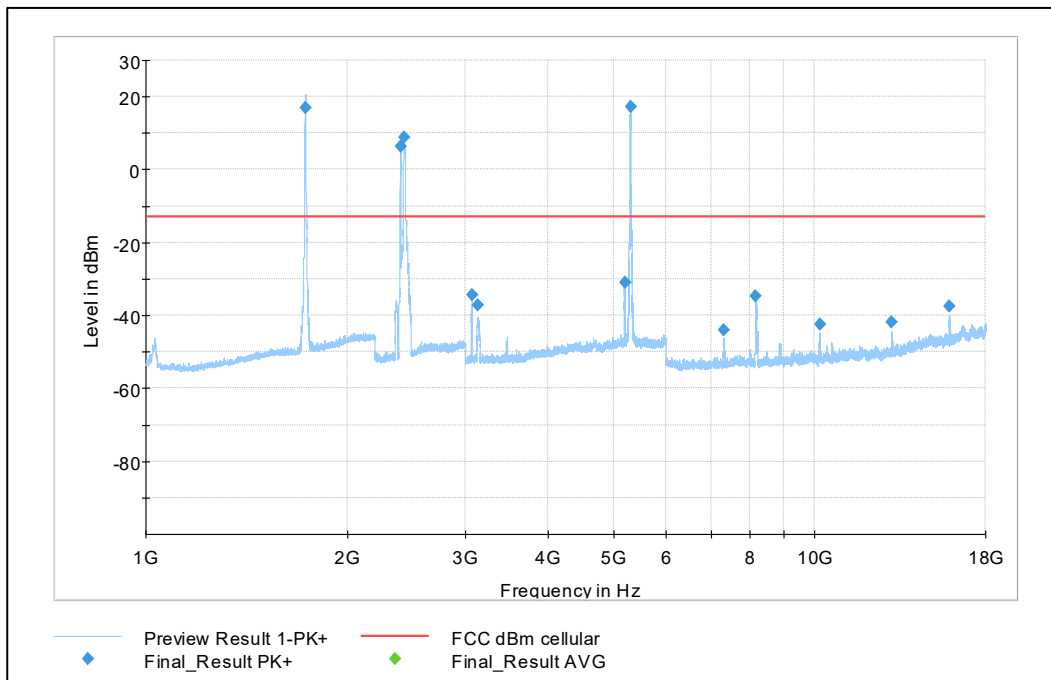
Frequency (Hz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pos	Azimuth (°)	Height (m)	Correction (dB)	RBW (Hz)	M. time (s)
148.503 M	13.0	43.5	-30.5	H	83.1	3.09	-10.5	120 k	1.0
706.616 M	19.2	46.0	-26.8	V	112.9	1.02	-1.3	120 k	1.0
706.538 M	19.6	46.0	-26.4	H	193.8	4.00	-1.3	120 k	1.0
445.51 M	19.8	46.0	-26.2	V	78.0	1.33	-6.1	120 k	1.0
297.079 M	20.1	46.0	-25.9	H	88.4	1.00	-9.9	120 k	1.0
841.52 M	23.2	46.0	-22.8	H	297.0	1.08	0.6	120 k	1.0
940.547 M	23.4	46.0	-22.6	H	323.3	1.73	2.0	120 k	1.0
346.509 M	26.4	46.0	-19.6	H	69.1	1.26	-8.7	120 k	1.0
148.504 M	25.2	43.5	-18.3	V	169.5	1.55	-10.5	120 k	1.0
346.508 M	29.1	46.0	-16.9	V	111.2	1.79	-8.7	120 k	1.0
544.512 M	29.7	46.0	-16.3	V	194.7	1.18	-4.3	120 k	1.0
285.189 M	31.9	46.0	-14.1	H	277.7	1.16	-10.2	120 k	1.0
475.002 M	32.2	46.0	-13.8	H	84.5	1.02	-5.6	120 k	1.0
544.488 M	32.3	46.0	-13.7	H	154.0	1.02	-4.3	120 k	1.0
285.11 M	33.3	46.0	-12.7	V	77.9	2.06	-10.2	120 k	1.0
525.01 M	34.4	46.0	-11.6	V	18.1	1.21	-4.4	120 k	1.0
628.442 M	37.8	46.0	-8.2	V	1.9	1.02	-2.2	120 k	1.0

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 22 von 27
Page 22 of 27

Prüfdokumentation
Test documentation

4.1.4.3 1 to 26 GHz, BT-2402MHz+WiFi-2437MHz+WiFi-5300MHz+LTE-1732.5MHz (Radiated Spurious Emissions)



Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 23 von 27
Page 23 of 27

Prüfdokumentation
Test documentation

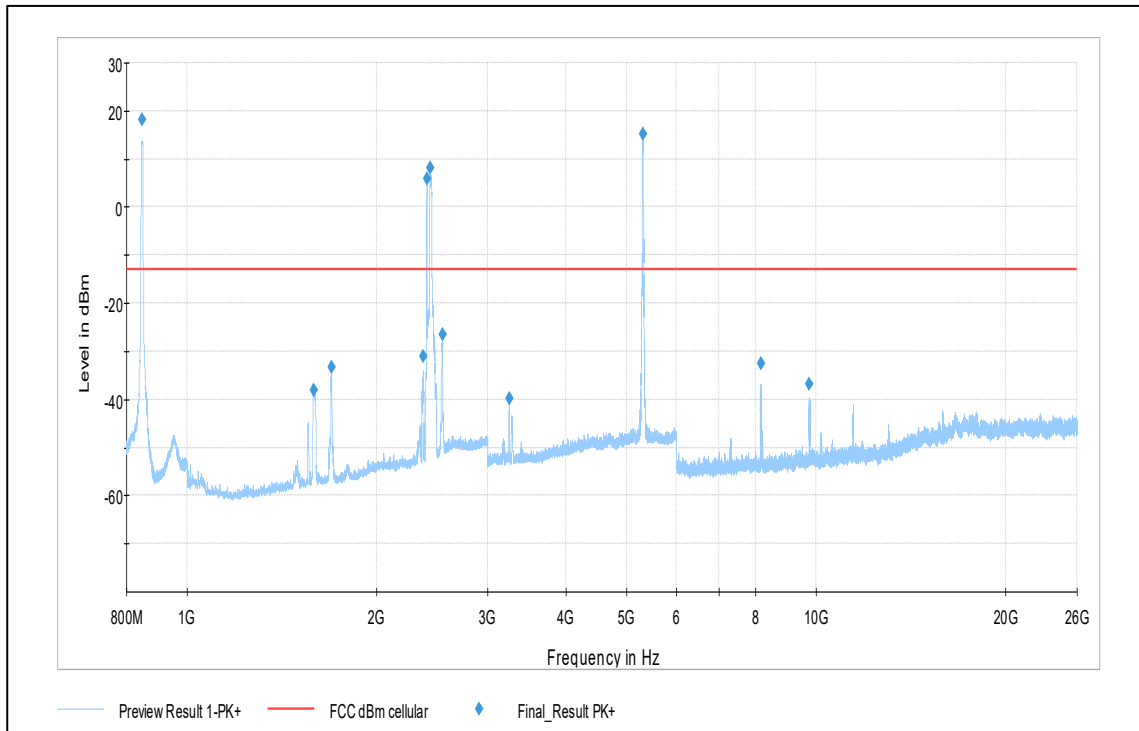
Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	MeasTime (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
1734.183	16.97	LTE Fundamental Frequency				150.0	V	256.0	115.0	-88.3
2401.950	6.30	BT Fundamental Frequency				150.0	H	172.0	96.0	-83.9
2434.868	8.72	WLAN 2.4GHz Fundamental Frequency				150.0	H	182.0	104.0	-83.6
3072.650	-34.43	-13.00	21.43	100.0	1000	150.0	H	168.0	93.0	-93.9
3134.252	-37.16	-13.00	24.16	100.0	1000	150.0	H	173.0	114.0	-93.9
5197.679	-31.10	-13.00	18.10	100.0	1000	150.0	V	116.0	133.0	-87.2
5302.610	17.36	WLAN 5GHz Fundamental Frequency				150.0	V	238.0	6.0	-87.3
7312.445	-44.01	-13.00	31.01	100.0	1000	150.0	V	250.0	-8.0	-100.5
8167.690	-34.71	-13.00	21.71	100.0	1000	150.0	V	12.0	-13.0	-99.0
10178.320	-42.47	-13.00	29.47	100.0	1000	150.0	H	41.0	121.0	-96.8
13037.148	-41.97	-13.00	28.97	100.0	1000	150.0	V	-9.0	-8.0	-94.7
15901.953	-37.42	-13.00	24.42	100.0	1000	150.0	H	241.0	115.0	-91.0

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 24 von 27
Page 24 of 27

Prüfdokumentation Test documentation

4.1.4.4 1 to 26 GHz, BT-2402MHz+WiFi-2437MHz+WiFi-5300MHz+WCDMA 846.5MHz (Radiated Spurious Emissions)



Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	MeasTime (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
846.558	18.21	WCDMA Fundamental Frequency				150.0	V	277.0	90.0	-95.6
1586.257	-38.14	-13.00	25.14	500.0	1000	150.0	V	-1.0	0.0	-88.6
1695.226	-33.33	-13.00	20.33	500.0	1000	150.0	V	178.0	0.0	-88.0
2369.103	-31.09	-13.00	18.09	500.0	1000	150.0	H	169.0	90.0	-84.4
2402.039	5.89	BT Fundamental Frequency				150.0	H	169.0	90.0	-84.2
2434.663	8.19	WLAN 2.4GHz Fundamental Frequency				150.0	H	183.0	90.0	-84.2
2543.595	-26.59	-13.00	13.59	500.0	1000	150.0	H	79.0	90.0	-82.9
3248.981	-39.72	-13.00	26.72	500.0	1000	150.0	H	177.0	90.0	-93.7
5303.468	15.14	WLAN 5GHz Fundamental Frequency				150.0	V	255.0	0.0	-87.3
8163.847	-32.46	-13.00	19.46	500.0	1000	150.0	V	-1.0	0.0	-99.0
9759.602	-36.71	-13.00	23.71	500.0	1000	150.0	H	75.0	90.0	-97.3

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 25 von 27
Page 25 of 27

Zusatzdokumentation
Additional documentation

5 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.

No application form was provided.

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 26 von 27
Page 26 of 27

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.	Nächste Kalibrierung Next calibration
Fully Anechoic Room	Albatross Projects GmbH	2959749	08.10.2024
Signal Analyzer FSU 26	Rohde & Schwarz	2844118	04.08.2025
Signal Analyzer UXA N9041B	Keysight	2971644	06.04.2024
RSE-Filtersystem	Rohde & Schwarz	9002802	06.02.2025
Antenna CBL 6111D 25MHz-1GHz	CHASE	2815644	06.09.2024
Antenna HF907 1-18GHz	Rohde & Schwarz	2856263	01.09.2024
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	23.02.2025
Antenna HFH 2 (Loop) 9kHz-30MHz	Rohde & Schwarz	2728893	09.07.2024
Antenna VULB 9168 30MHz – 1GHz	Schwarzbeck	2728136	05.10.2026
DC Power supply	Thurlby Thandar Instruments	2728692	23.03.2026

6.2 Software

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

Prüfbericht-Nr.: DE24ZAOP 002
Test report no.:

Seite 27 von 27
Page 27 of 27

Änderungsverzeichnis
Change history

7 Change History

Revision Number	List of revisions
002	Reviewer Comments Updated
001	Initial Release
Note: Latest revision report will replace all previous reports.	

Ende des Prüfberichts
End of Test Report