



Prüfbericht-Nr.: <i>Test report no.:</i>	DE224WSB 001	Auftrags-Nr.: <i>Order no.:</i>	1110164_120	Seite 1 von 67 <i>Page 1 of 67</i>
Kunden-Referenz-Nr.: <i>Client reference No.:</i>	NA	Auftragsdatum: <i>Order date:</i>	2022-03-08	
Auftraggeber: <i>Client:</i>	Robert Bosch GmbH, Markwiesenstrasse 58, 72770 Reutlingen, Germany			
Prüfgegenstand: <i>Test item:</i>	Intuvia 100			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	BHU3200			
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-247:2017			
Wareneingangsdatum: <i>Date of sample receipt:</i>	01.04.2022			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A003238087-008 (EUT1) A003238087-001 (EUT5)			
Prüfzeitraum: <i>Testing period:</i>	20.05.2022 – 25.05.2022			
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>			genehmigt von: <i>authorized by:</i>	
Datum: <i>Date:</i>	25.07.2022		Datum: <i>Issue date:</i>	25.07.2022
	<small>Signiert von: Primoz Erzen</small>			<small>Signiert von: Patrick Reusch</small>
Stellung / Position	Sachverständige(r)/Expert		Stellung / Position	Sachverständige(r)/Expert
Sonstiges / Other:	-			
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:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legende:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient 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 a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Anmerkungen
Remarks

<p>1</p>	<p>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.</p> <p>The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.</p>
<p>2</p>	<p>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.</p> <p>As contractually agreed, this document has been signed digitally only. TÜV 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, TÜV 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.</p>
<p>3</p>	<p>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.</p> <p>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report.</p>

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Remarks

4 Die Messunsicherheit der in diesem Prüfbericht aufgeführten Messverfahren wird nicht unmittelbar in die Bewertung zur Einhaltung der jeweiligen Grenzwerte mit einbezogen. Es gelten die Anforderungen der Spezifikationen TS 103 051 und TS 100 028-1/-2 in aktueller Form, deren Grundlage der „shared risk“ Ansatz ist. Dieser beschreibt für die jeweilige Norm die maximalen zulässigen Unsicherheitsbeträge unter denen der Messwert als „wahr“ angesehen werden kann. Eine zusätzliche Betrachtung der Messunsicherheit bezüglich des gemessenen Wertes findet bei Unterschreitung der maximalen Unsicherheitsbeträge gemäß den Spezifikationen nicht statt.

The measurement uncertainty of the measurement methods listed in this test report is not directly included in the assessment of compliance with the respective limit values. The requirements of the specifications TS 103 051 and TS 100 028-1/-2 apply in their current form, based on the "shared risk" approach. For the respective standard, this describes the maximum acceptable uncertainty below which the measured value can be regarded as "true". An additional consideration of the measurement uncertainty with regard to the measured value does not take place if the maximum acceptable uncertainties according to the specifications are not reached.

5 Die Aussage zur Konformität des in diesem Prüfbericht geprüften Produktes wird auf Kundenwunsch nach den Kriterien und Anforderungen der angewendeten Normen durchgeführt. Abweichende Bewertungsbedingungen durch den Kunden werden in den jeweiligen Kapiteln gesondert dokumentiert. Grundsätzlich wird eine Konformitätsbewertung auf Basis der angewendeten Normen durchgeführt, sofern mit dem Kunden keine abweichende Regelung getroffen wurde.

The statement of conformity of the product tested in this test report is carried out according to the criteria and requirements of the applied standards on customer request. Deviating assessment conditions by the customer are documented separately in the respective chapters. In principle, the assessment of conformity is made on the basis of the standards applied, unless otherwise agreed with the customer.

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Produktbeschreibung
Product description

1	Test item	Bosch Head Unit
2	Typ-No.	BHU3200
3	Identical types	
4	Test sample obtaining	<input checked="" type="checkbox"/> Sending by customer <input type="checkbox"/> Sampling by TÜV Rheinland Group <input type="checkbox"/> others:
5	Serial-No.	No Serial Number on Device
6	FCC-ID	2AWRC-BHU3200
7	IC	26294-BHU3200
8	Description of EUT	The device is a battery driven display for bike users which gets the information to show on the screen over a BLE connection. A coin cell CR2450 is used as power source.
9	Supported radio technologies	Bluetooth 5.0
10	Max RF output power (measured)	-0,2dBm
11	Operating Frequency (declared)	2402MHz – 2480MHz
12	Channel Bandwidth (declared)	2MHz
13	Number of Channels	40
14	Modulation	GFSK
15	Rated Voltage / Frequency	3V
16	Antenna Type	<input checked="" type="checkbox"/> Integral antenna [PCB antenna (Meandered Inverted F Antenna)] <input type="checkbox"/> Dedicated antenna <input type="checkbox"/> Permanent antenna connector
17	Antenna amount of chains	1
18	Antenna Gain (declared)	0 dBi
19	Software	V1.1.25
20	Hardware	2.1.1
21	Used Samples	A003238087-008 (EUT1)

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Product description

22	Companion Device	none
23	Accessory Devices	none
24	Data Cable	USB-RS232-Cable provided by customer
25	I/O Ports	NA
26	Temperature Range	-20°C / 60°C
27	Environment	Indoor and Outdoor
28	Pictures of the EUT	Photos were removed for confidentiality as demanded by the customer

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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 <input type="checkbox"/> F <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (a)(1) RSS-247 sec. 5.1	Number of Hopping Frequencies	Does not apply for DTS equipment	P <input type="checkbox"/> F <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (a)(1) RSS-247 sec. 5.1	Time of Occupancy	Does not apply for DTS equipment	P <input type="checkbox"/> F <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (a)(1) RSS-247 sec. 5.1	Carrier Frequency Separation	Does not apply for DTS equipment	P <input type="checkbox"/> F <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (b) RSS-247 sec. 5.4	Maximum Output Power	-	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (e) RSS-247 sec. 5.2 (b)	Power Spectral Density	-	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (a)(2) RSS-247 sec. 5.2 (a)	6dB Bandwidth	-	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (d) RSS-247 sec. 5.5	Band Edge Measurement	-	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.247 (d) RSS-247 sec. 5.5	Conducted Spurious Emission	-	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>
FCC 15.205, 15.209 RSS-Gen sec. 8.9, 8.10	Radiated Spurious Emission	-	P <input checked="" type="checkbox"/> F <input type="checkbox"/> N/A <input type="checkbox"/> N/T <input type="checkbox"/>

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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 <input type="checkbox"/> F <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/T <input type="checkbox"/>

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1 EUT Classification

1.1 Wireless technologies and frequencies supported by the EUT

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

Technology	Frequency Range (TX)	Supported by the EUT	Evaluated in this report
BLE	2402 – 2480 MHz	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

1.2 Standard specific classification of the EUT

1.2.1 Applied standards

FCC CFR 47 Part 15 Subpart C - §15.247

ISED RSS-247:2017

1.2.2 Test Methods and Guidance Documents

ANSI C63.10:2013

KDB 558074 D01 DTS Measurement Guidance v05

1.2.3 System Type

<input checked="" type="checkbox"/>	DTS (Digital Transmission System)
<input type="checkbox"/>	FHSS (Frequency Hopping Spread Spectrum)

1.2.4 Type of equipment

<input type="checkbox"/>	Tabletop Equipment
<input type="checkbox"/>	Floor-Standing Equipment
<input checked="" type="checkbox"/>	Equipment that can be used in multiple orientations
<input type="checkbox"/>	Hand held Equipment

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2 General

2.1 Registration

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

FCC Registration Number: 939976

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

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

Company Number: 11235A

CAB Identifier: DE0018

2.2 Equipment modifications

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

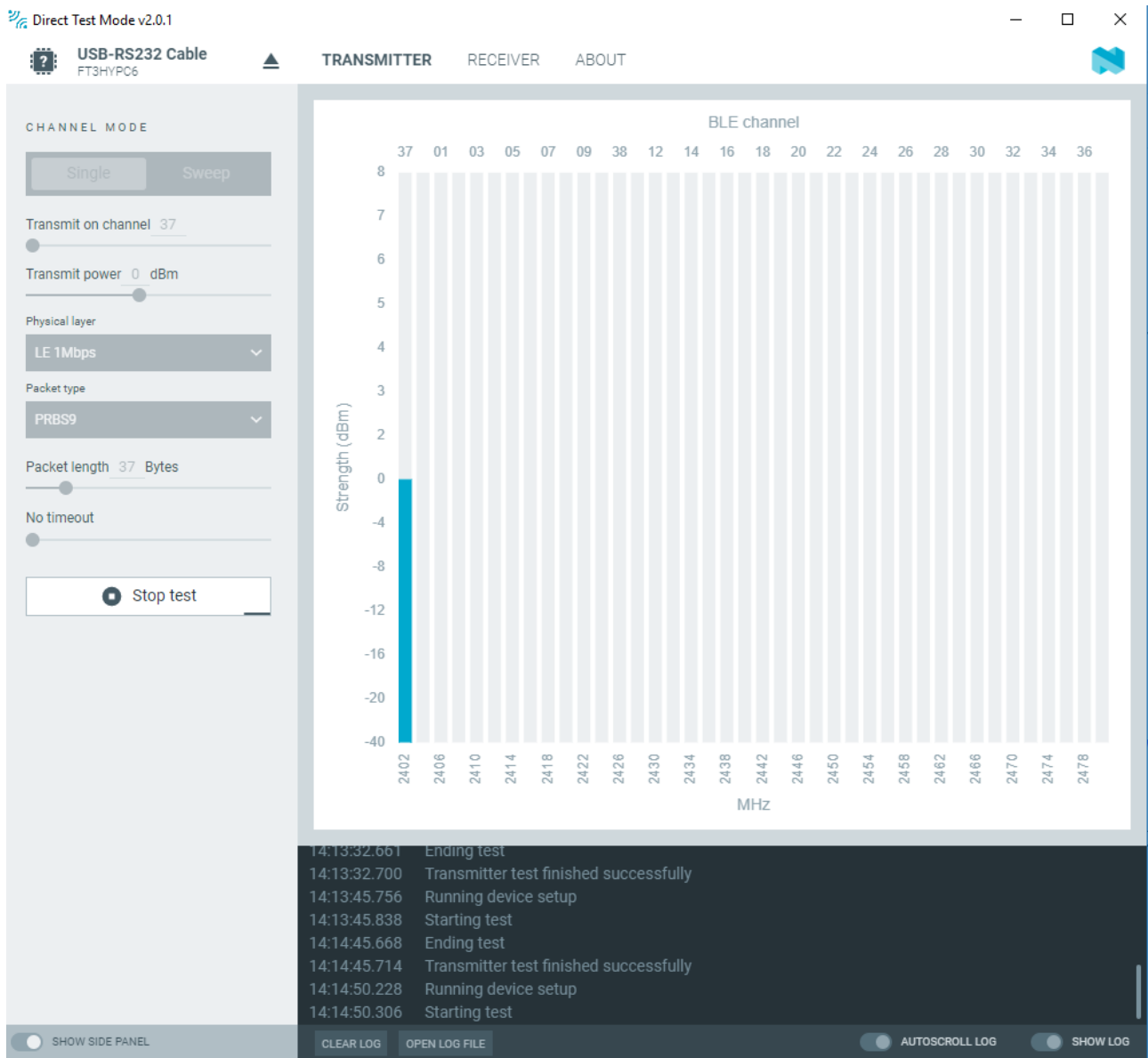
2.3 Test modes

Mode	Description	Mode configuration
All Modes		<input type="checkbox"/> The auxiliary equipment was connected to the EUT during the tests to keep the configured settings active. <input checked="" type="checkbox"/> The auxiliary equipment was only connected to the EUT before the tests for the mode configuration. During the test the auxiliary equipment was disconnected from the EUT.
1	TX Modulated mode with continuous transmission Frequency and Bandwidth selectable (Transmit power 0dBm ; Packet Type PRBS9 ; Packet length 37 Bytes ; No Timeout) ;	TX mode configured through delivered Software 'Direct Test Mode' V2.0.1 / 'nRF Connect for Desktop' V3.10.0

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Test Mode 1

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3 Test conditions

3.1 General

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

3.2 Normal test conditions

Environmental condition	Parameter	Range
Temperature	°C	22
Relative humidity	%	34
Supply voltage	Volts DC	3V

3.3 Antenna assemblies

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

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3.4 Measurement Uncertainty

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

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

Test	Value	Unit	Range
Frequency Error	2,7 *10 ⁻⁸	Hz	-
Frequency Stability under low voltage conditions			
Time	1,1*10 ⁻⁹	s	-
Conducted Carrier Power	1.0	dB	9k-1GHz
	1.7	dB	1GHz-6GHz
Conducted Spurious Emissions (RX/TX)	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	%	-

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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
<input checked="" type="checkbox"/>	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. Maximum conducted peak output power: 30 dBm (excluding antenna gain, if antennas with directional gains that do not exceed 6 dBi are used).
<input type="checkbox"/>	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
<input type="checkbox"/>		Employing at least 75 non-overlapping hopping channels <i>FCC Part 15, Subpart C, §15.247 (b) (1)</i> 1 watt
<input type="checkbox"/>	Frequency hopping systems operating 5725-5850 MHz band.	<i>FCC Part 15, Subpart C, §15.247 (b) (1)</i> 1 watt
<input type="checkbox"/>	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
<input type="checkbox"/>		Employing at least 50 hopping channels <i>FCC Part 15, Subpart C, §15.247 (b) (2)</i> 1 watt
<input type="checkbox"/>	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

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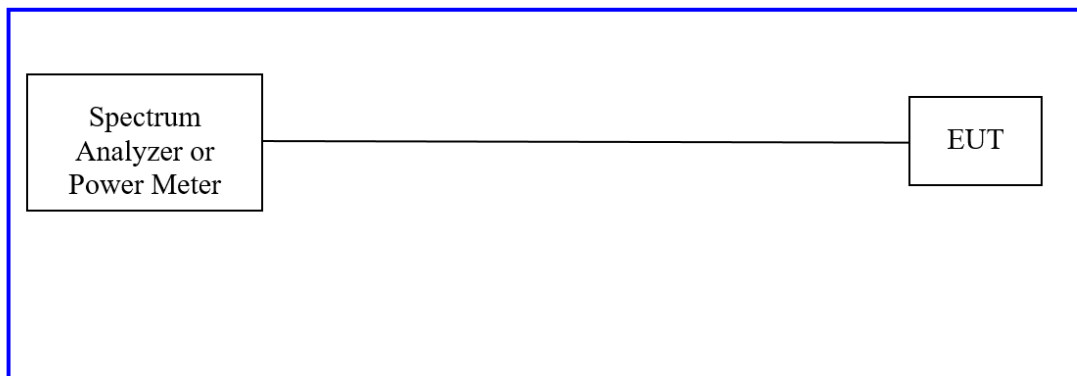
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		that the directional gain of the antenna exceeds 6 dBi
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4.1.2 Test Method

Conducted method was used to measure the maximum output power according to ANSI C63.10:2013 clause 11.9.1.1 peak power (RBW > DTS bandwidth). The EUT was connected to the spectrum analyzer via a coax cable with a known loss.



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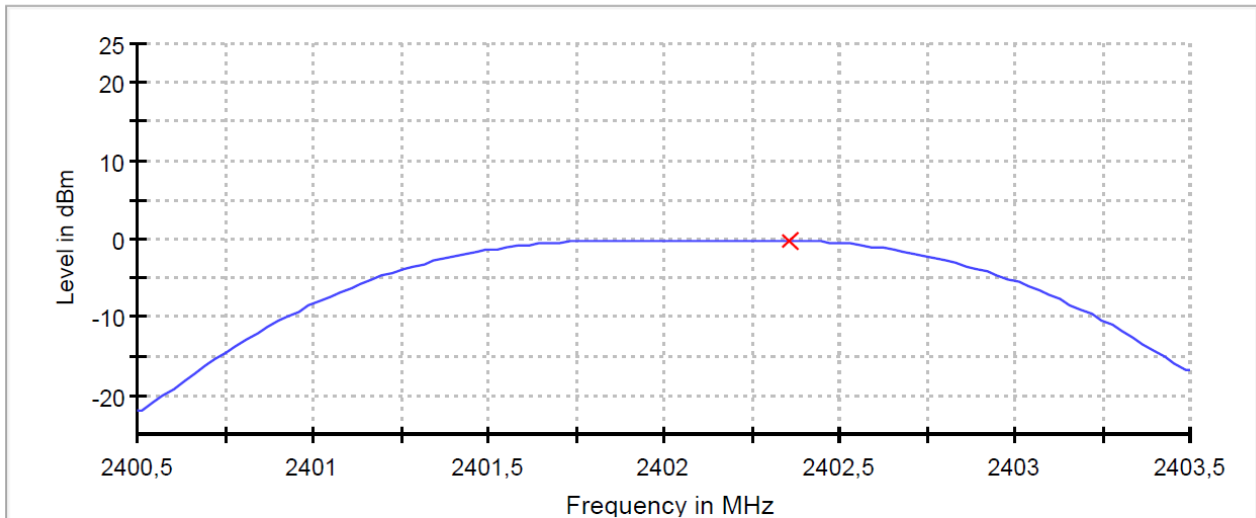
4.1.3 Test setup

EUT		A003238087-008 (EUT1)
Test Condition		Normal conditions
Chamber details		<input type="checkbox"/> 3m Fully Anechoic Chamber (FAC) <input type="checkbox"/> 10m Semi Anechoic Chamber (SAC) <input checked="" type="checkbox"/> Shielded room
Measurement positioning		Distance: EUT height: Antenna height: <input type="checkbox"/> 3m <input type="checkbox"/> 1.5m <input type="checkbox"/> 1.5m <input type="checkbox"/> 10m <input type="checkbox"/> 0.8m <input type="checkbox"/> 1m to 4m – height scan
		<input checked="" type="checkbox"/> N/A
Companion device		none
Operation mode		Mode 1: TX Modulated 1 Mbps with continuous transmission TX Modulated 2 Mbps with continuous transmission
Spectrum Analyzer	Frequency	2402 MHz, 2440 MHz, 2480 MHz
	Resolution Bandwidth	1 MHz / 2MHz
	Video Bandwidth	3MHz / 10MHz
	Measurement Time	2µs / 1µs
Further parameters		-
Test engineer		Dipl. Ing. Primoz Erzen

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4.1.4 Test results

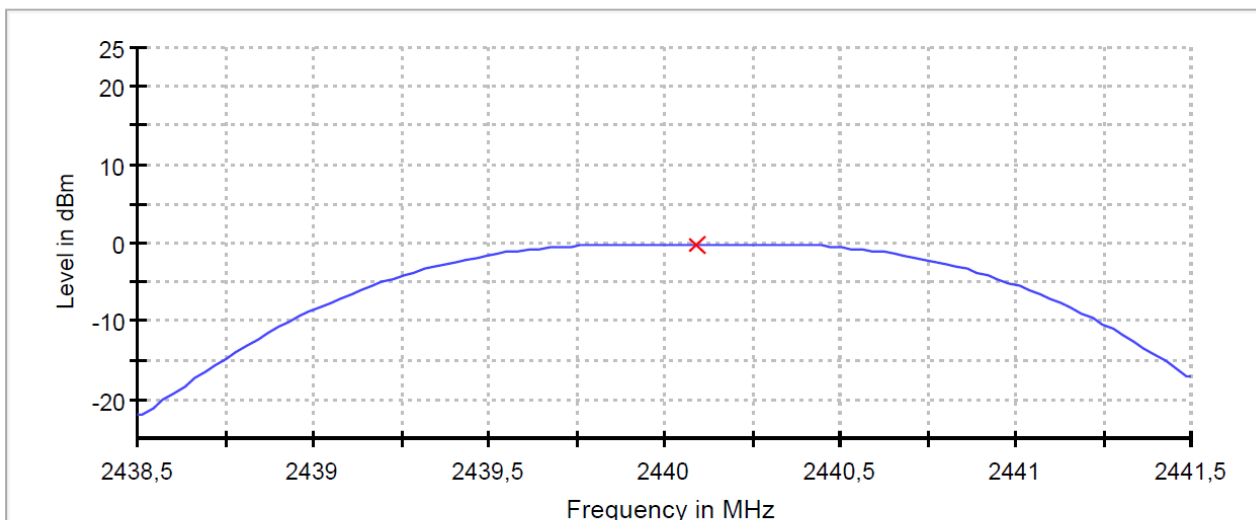
Peak Power



— Connector 1 × Peak Connector 1

Data rate 1 Mbps, Lowest Channel

Peak Power

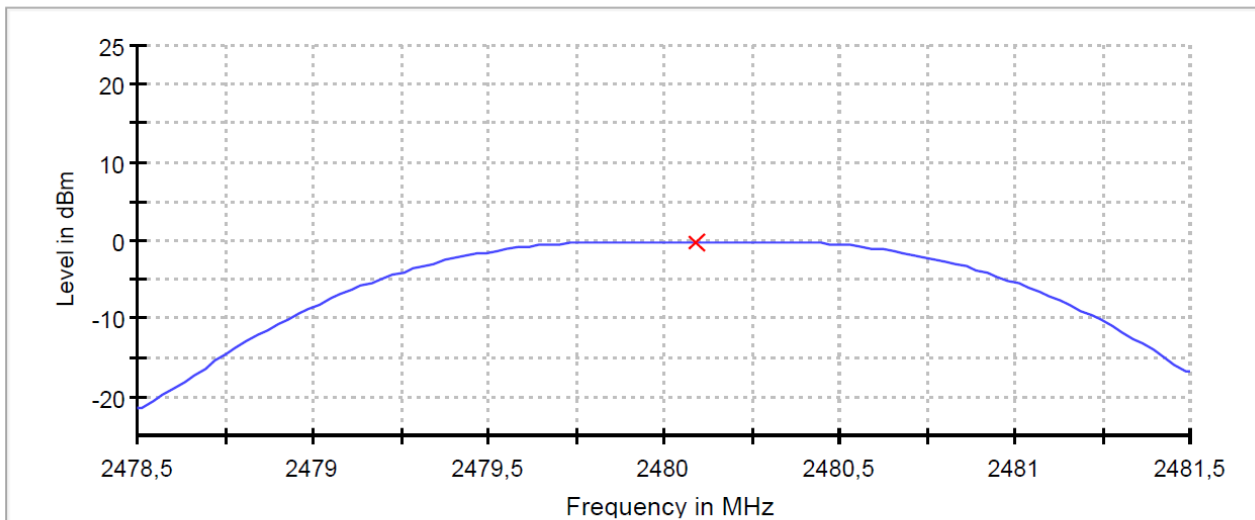


— Connector 1 × Peak Connector 1

Data rate 1 Mbps, Middle Channel

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Peak Power



— Connector 1 × Peak Connector 1

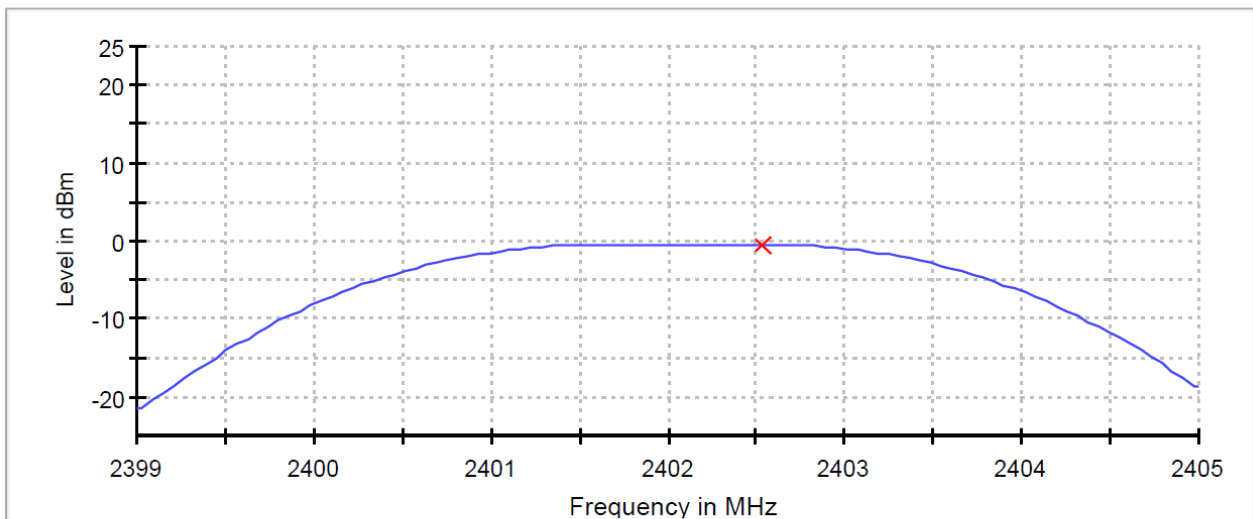
Data rate 1 Mbps, Highest Channel

Data rate 1 Mbps

Frequency (MHz)	Peak conducted output power (dBm)	Limit (dBm)	Margin (dB)	Test Result
2402	-0.2	30	30.2	Pass
2440	-0.3		30.3	Pass
2480	-0.2		30.2	Pass

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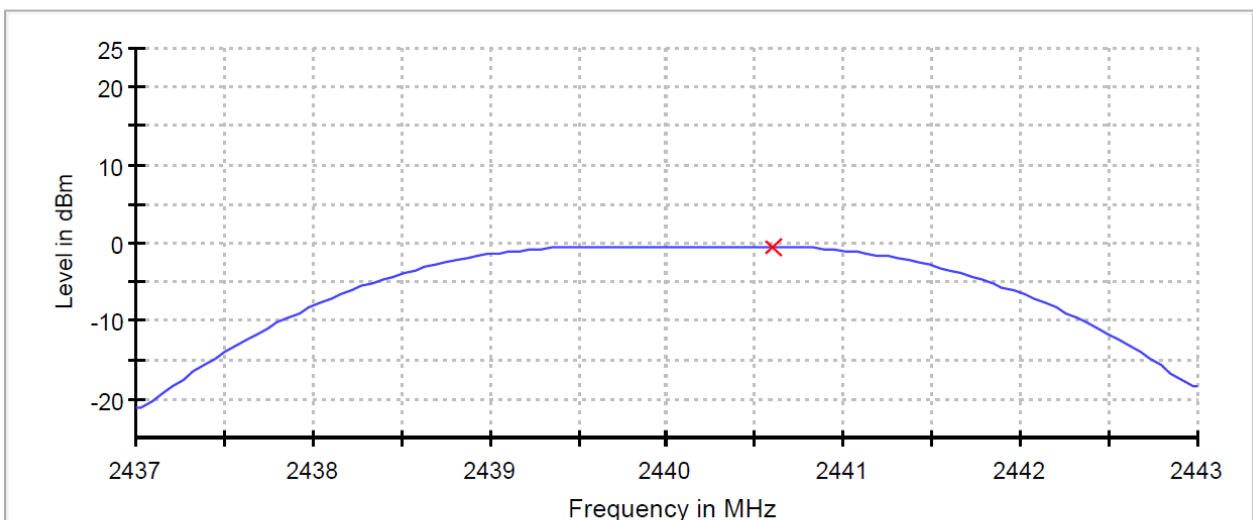
Peak Power



— Connector 1 × Peak Connector 1

Data rate 2 Mbps, Lowest Channel

Peak Power



— Connector 1 × Peak Connector 1

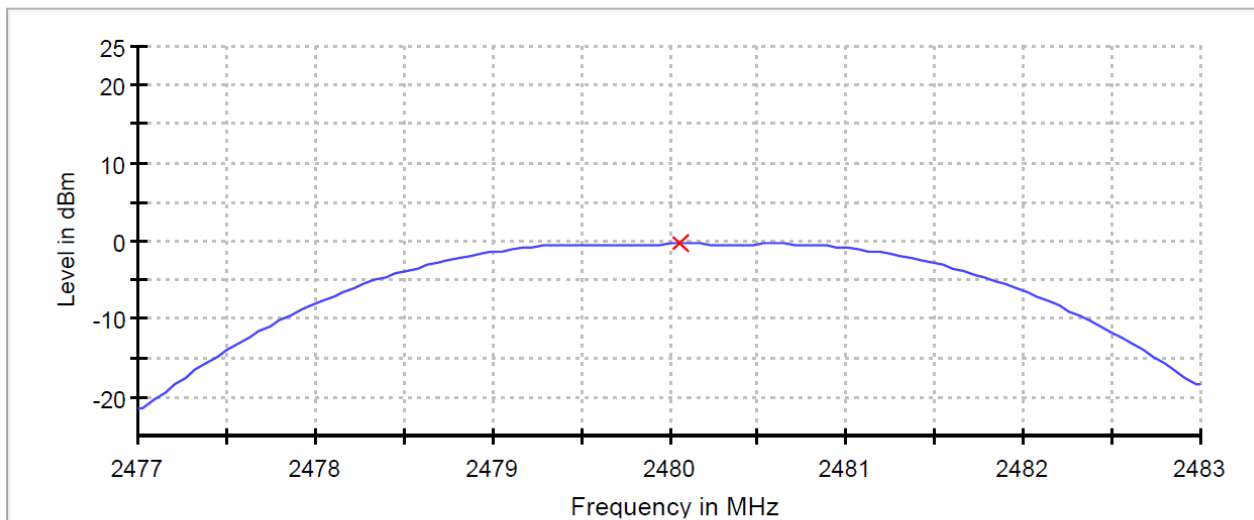
Data rate 2 Mbps, Middle Channel

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Peak Power



— Connector 1 × Peak Connector 1

Data rate 2 Mbps, Highest Channel

Data rate 2 Mbps

Frequency (MHz)	Peak conducted output power (dBm)	Limit (dBm)	Margin (dB)	Test Result
2402	-0.5	30	30.5	Pass
2440	-0.4		30.4	Pass
2480	-0.4		30.4	Pass

Final test result	Pass
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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.

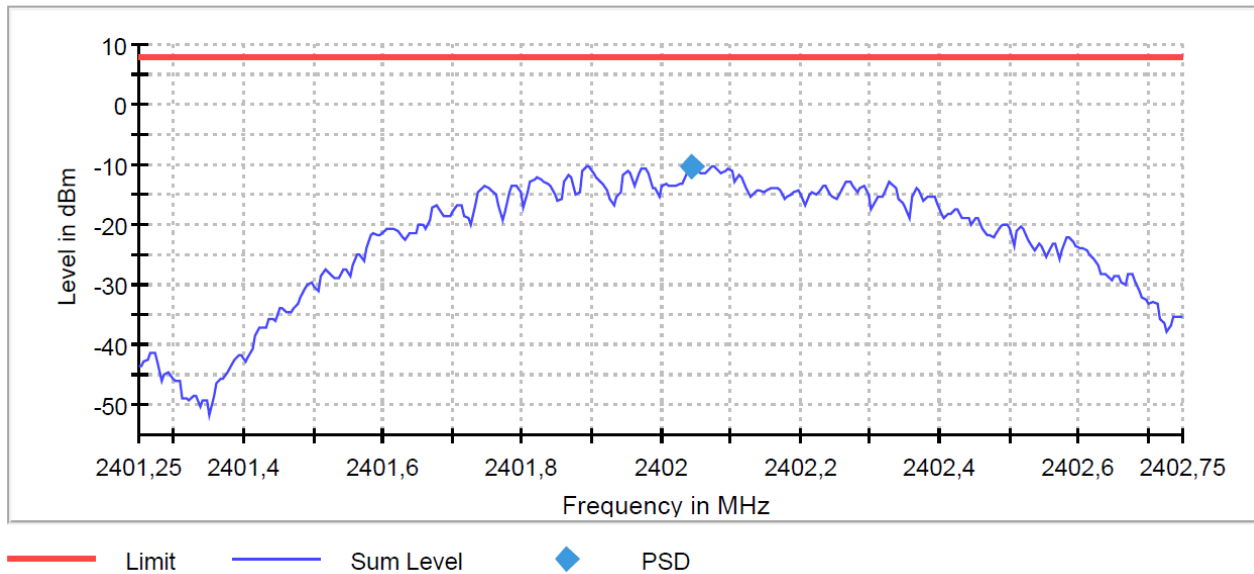
4.2.3 Test setup

EUT		A003238087-008 (EUT1)
Test Condition		Normal conditions
Chamber details		<input type="checkbox"/> 3m Fully Anechoic Chamber (FAC) <input type="checkbox"/> 10m Semi Anechoic Chamber (SAC) <input checked="" type="checkbox"/> Shielded room
Measurement positioning		Distance: EUT height: Antenna height: <input type="checkbox"/> 3m <input type="checkbox"/> 1.5m <input type="checkbox"/> 1.5m <input type="checkbox"/> 10m <input type="checkbox"/> 0.8m <input type="checkbox"/> 1m to 4m – height scan
		<input checked="" type="checkbox"/> N/A
Companion device		none
Operation mode		Mode 1: TX Modulated 1 Mbps with continuous transmission TX Modulated 2 Mbps with continuous transmission
Spectrum Analyzer	Centre Frequency	2402 MHz, 2440 MHz, 2480 MHz
	Resolution Bandwidth	10kHz
	Video Bandwidth	30kHz
	Span	1,5MHz / 3MHz
	Sweep time	1,5ms / 3ms
Further parameters		-
Test engineer		Dipl. Ing. Primoz Erzen

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Test documentation

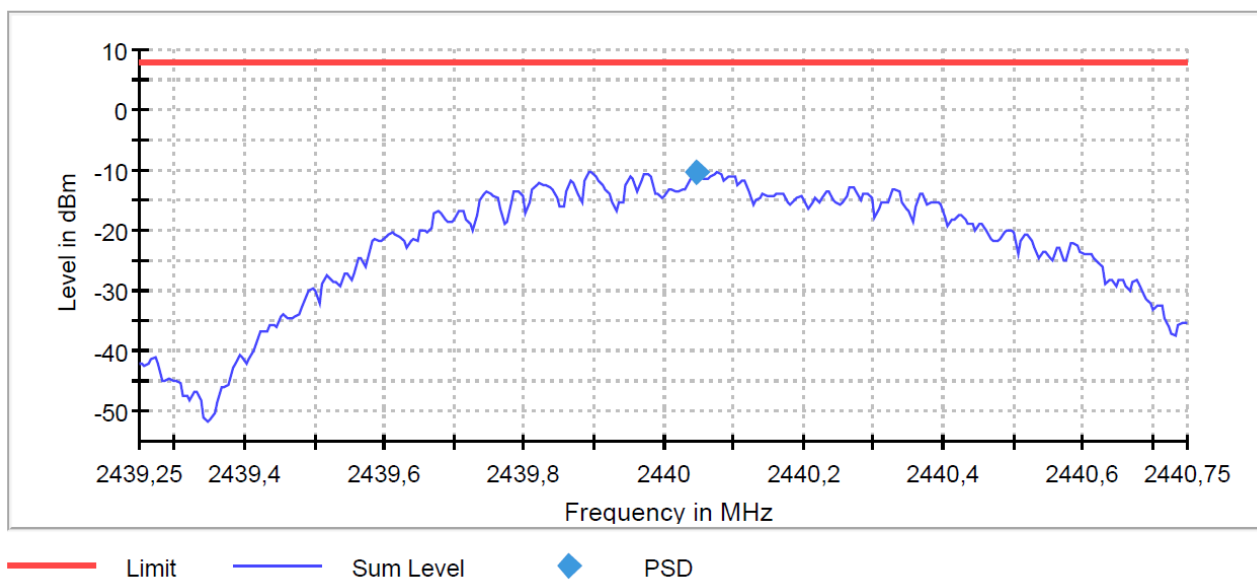
4.2.4 Test results

Peak Power Spectral Density



Data rate 1 Mbps, Lowest Channel

Peak Power Spectral Density



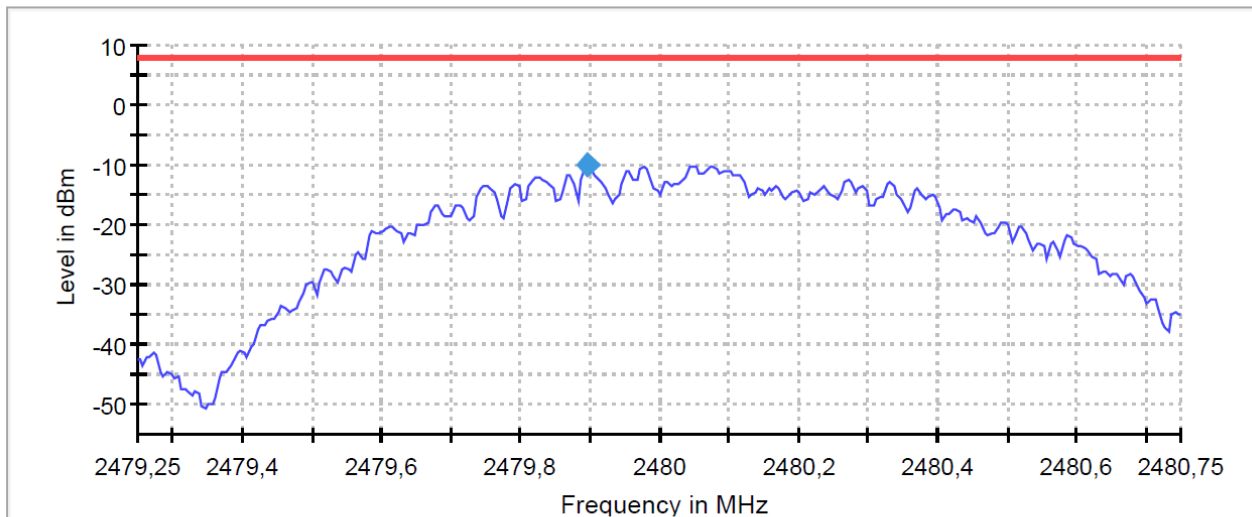
Data rate 1 Mbps, Middle Channel

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Peak Power Spectral Density



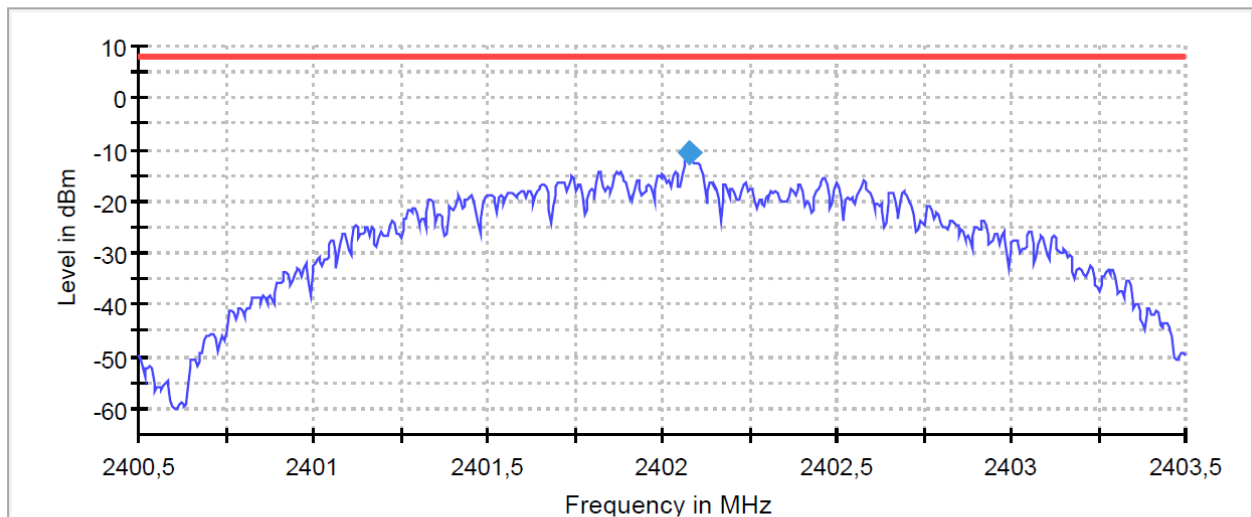
— Limit — Sum Level ◆ PSD

Data rate 1 Mbps, Highest Channel

Frequency (MHz)	Peak conducted power spectral density (dBm/MHz)	Limit (dBm)	Margin (dB)	Test Result
2402	-10.290	8	18.29	Pass
2440	-10.225		18.22	Pass
2480	-10.169		18.16	Pass

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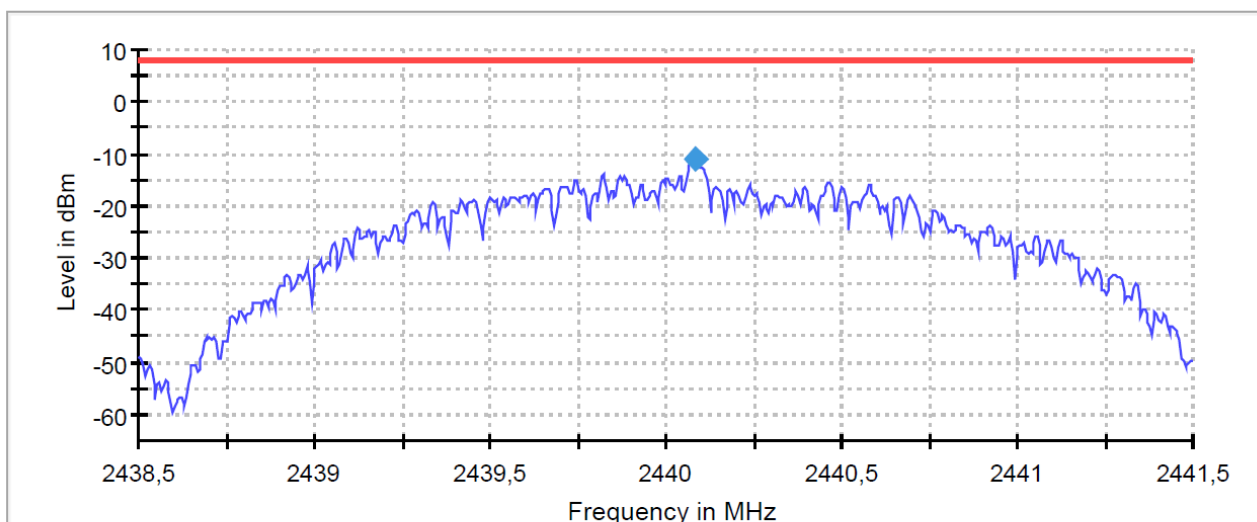
Peak Power Spectral Density



— Limit — Sum Level ◆ PSD

Data rate 2 Mbps, Lowest Channel

Peak Power Spectral Density



— Limit — Sum Level ◆ PSD

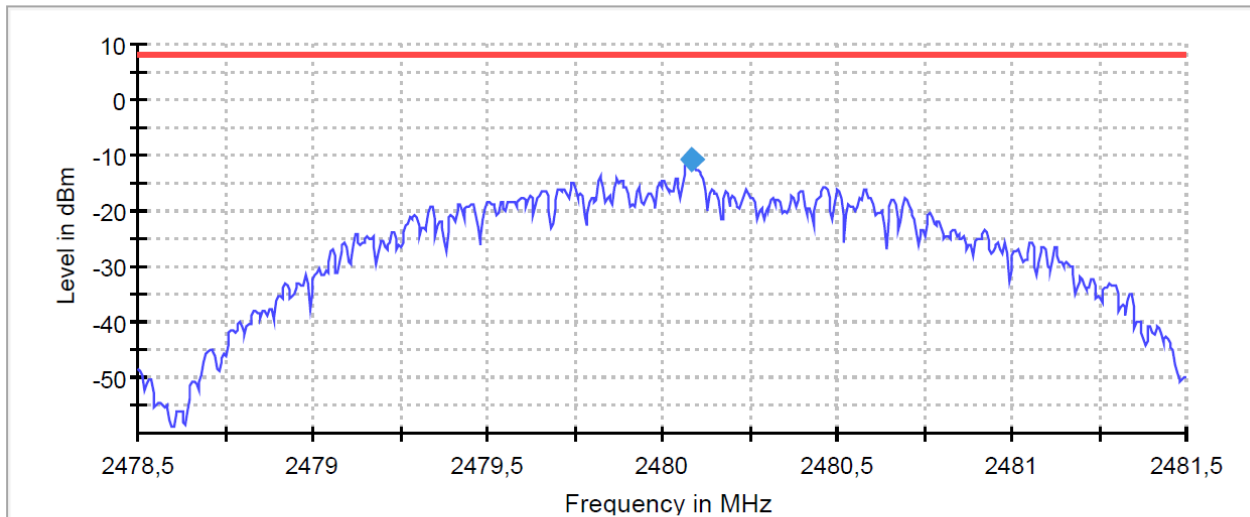
Data rate 2 Mbps, Middle Channel

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Peak Power Spectral Density



— Limit — Sum Level ◆ PSD

Data rate 2 Mbps, Highest Channel

Frequency (MHz)	Peak conducted power spectral density (dBm/MHz)	Limit (dBm)	Margin (dB)	Test Result
2402	-10,776	8	18,29	Pass
2440	-10,824		18,824	Pass
2480	-10,655		18,655	Pass

Final test result	Pass
--------------------------	------

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4.3 6 dB Bandwidth (DTS bandwidth)

4.3.1 Requirements / Limits

FCC Part 15, Subpart C, §15.247 (a) (2)

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

4.3.2 Test Method

Conducted method was used to measure the 6 dB bandwidth according to ANSI C63.10:2013 clause 6.9.2. The EUT was connected to the spectrum analyzer via a coax cable with a known loss

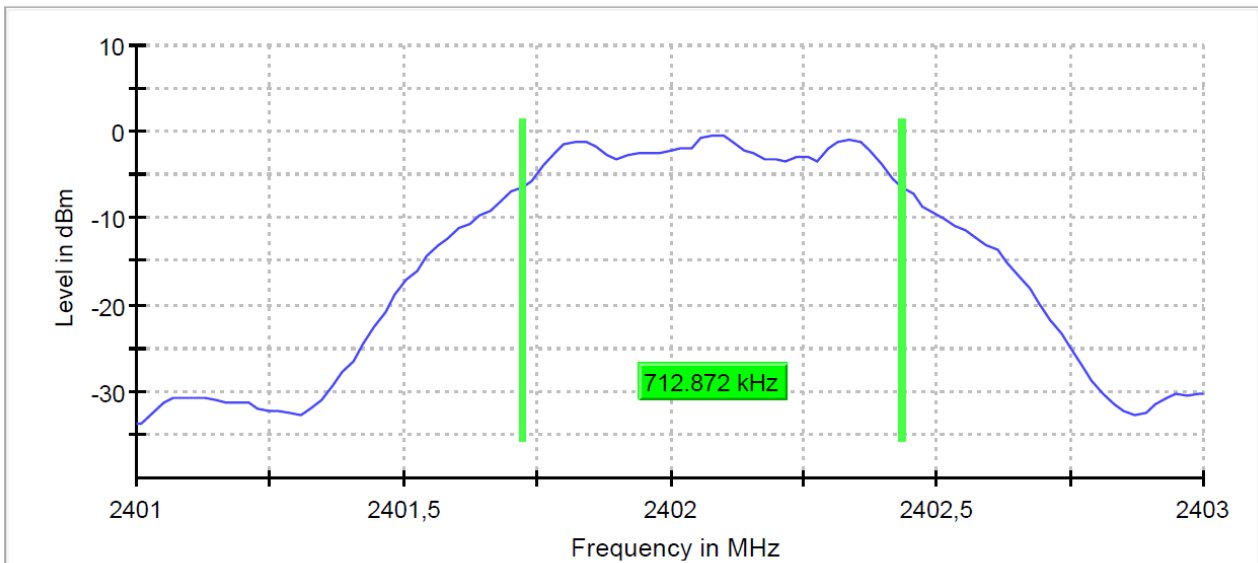
4.3.3 Test setup

EUT		A003238087-008 (EUT1)
Test Condition		Normal conditions
Chamber details		<input type="checkbox"/> 3m Fully Anechoic Chamber (FAC) <input type="checkbox"/> 10m Semi Anechoic Chamber (SAC) <input checked="" type="checkbox"/> Shielded room
Measurement positioning		Distance: EUT height: Antenna height: <input type="checkbox"/> 3m <input type="checkbox"/> 1.5m <input type="checkbox"/> 1.5m <input type="checkbox"/> 10m <input type="checkbox"/> 0.8m <input type="checkbox"/> 1m to 4m – height scan
		<input checked="" type="checkbox"/> N/A
Companion device		None
Operation mode		Mode 1: TX Modulated 1 Mbps with continuous transmission TX Modulated 2 Mbps with continuous transmission
Spectrum Analyzer	Centre Frequency	2402 MHz, 2440 MHz, 2480 MHz
	Resolution Bandwidth	100kHz
	Video Bandwidth	300kHz
	Span	2Mhz / 4MHz
	Sweep time	19µs
Further parameters		-
Test engineer		Dipl. Ing. Primož Erzen

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Test documentation

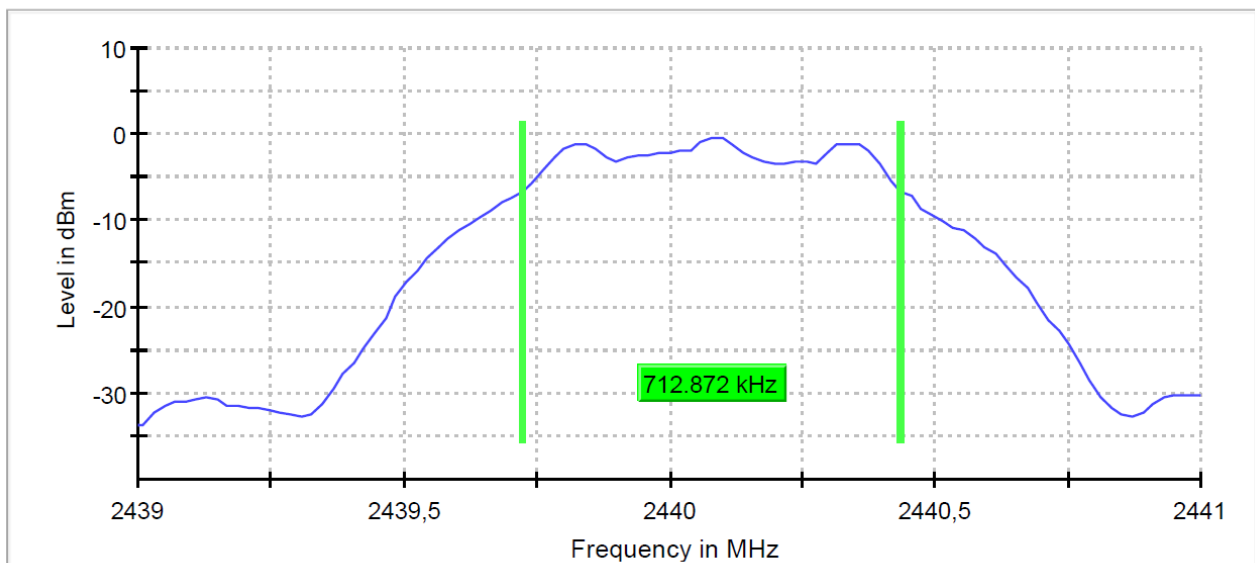
4.3.4 Test results
6dB Bandwidth

6 dB Bandwidth



Data rate 1 Mbps, Lowest Channel

6 dB Bandwidth



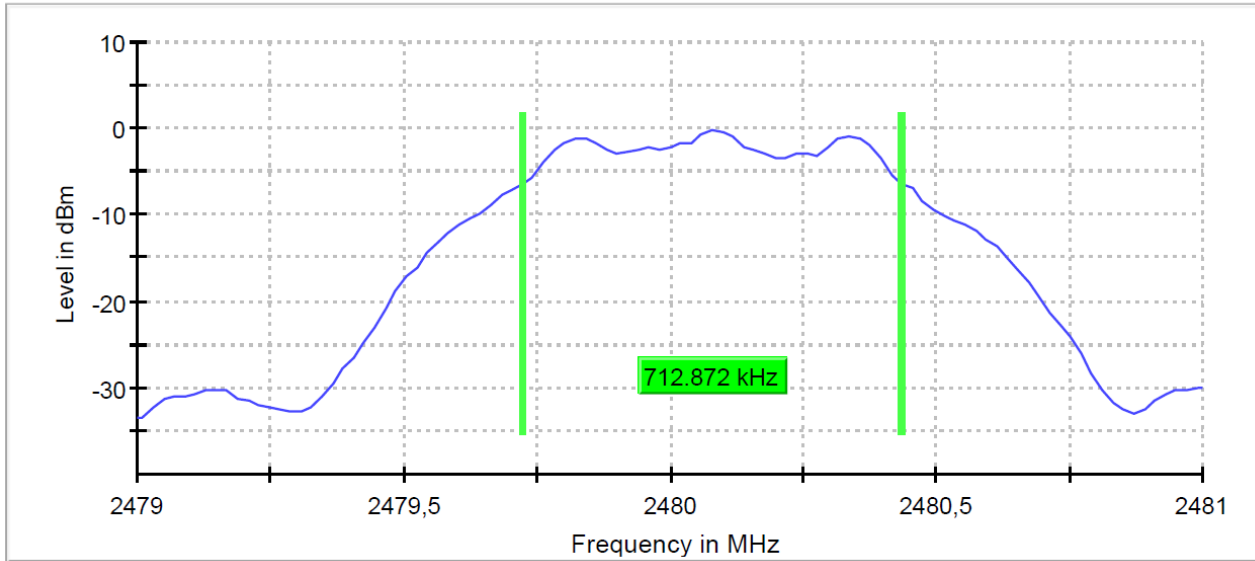
Data rate 1 Mbps, Middle Channel

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6 dB Bandwidth

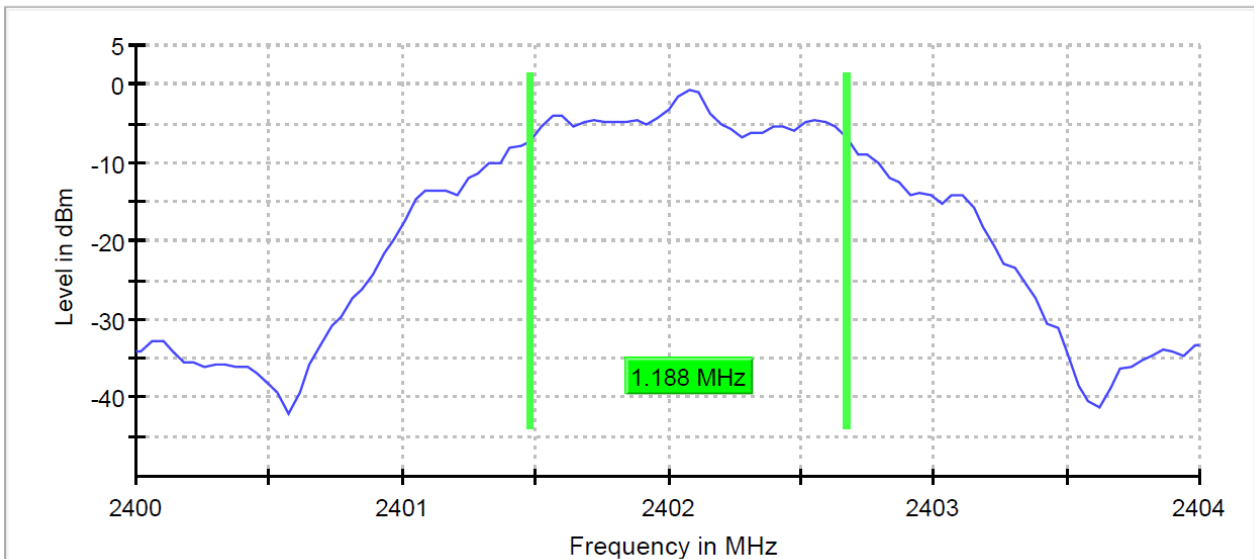


Data rate 1 Mbps, Highest Channel

Frequency MHz	6 dB Bandwidth (kHz)	Minimum bandwidth (kHz)	Test Result
2402	0.712872	500	Pass
2440	0.712872		Pass
2480	0.712872		Pass

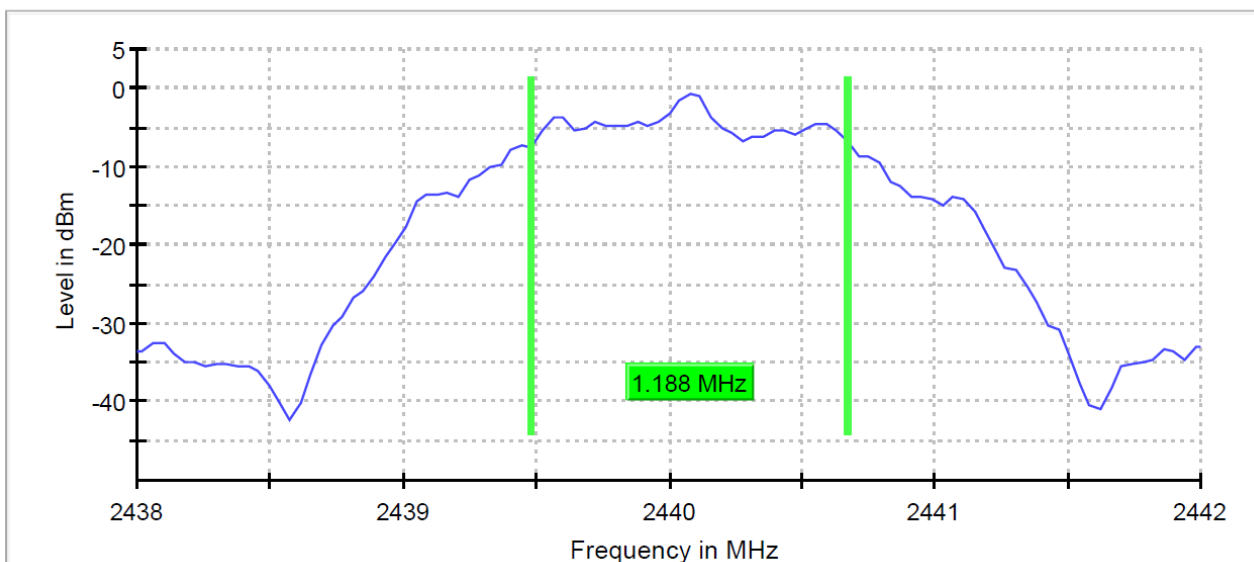
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Test documentation

6 dB Bandwidth



Data rate 2 Mbps, Lowest Channel

6 dB Bandwidth



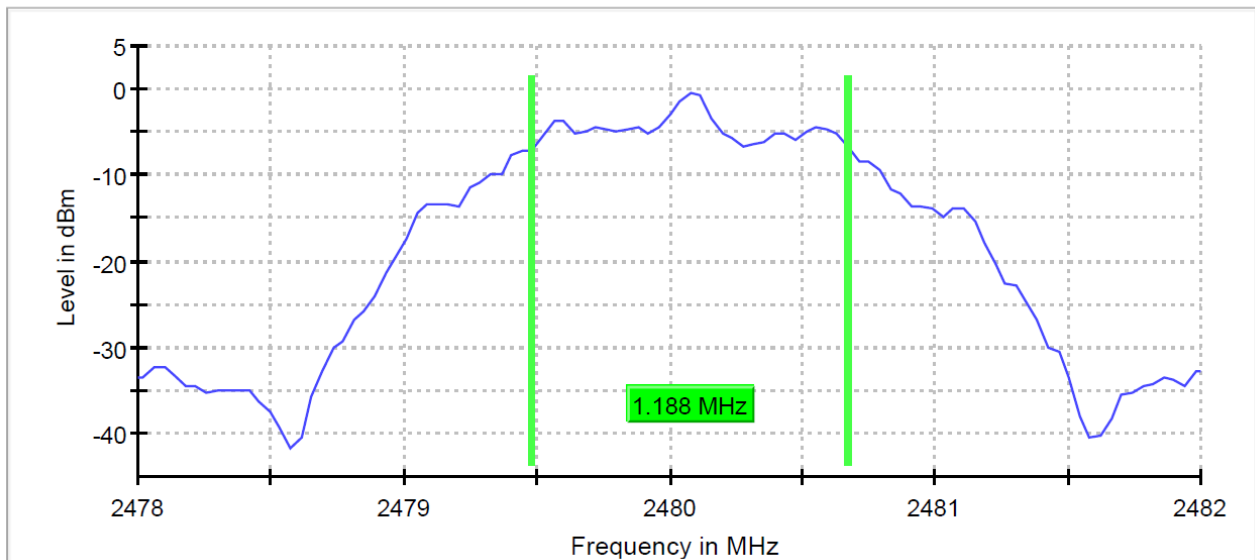
Data rate 2 Mbps, Middle Channel

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6 dB Bandwidth



Data rate 2 Mbps, Highest Channel

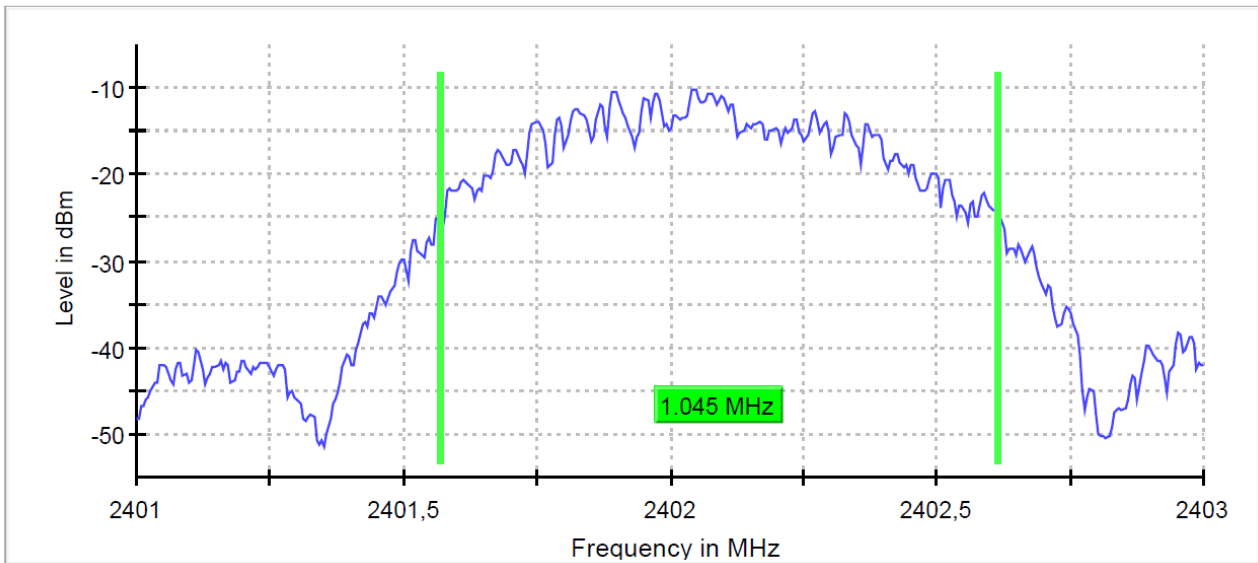
Frequency MHz	6 dB Bandwidth (kHz)	Minimum bandwidth (kHz)	Test Result
2402	1.188118	500	Pass
2440	1.188118		Pass
2480	1.188118		Pass

Final test result	Pass
--------------------------	------

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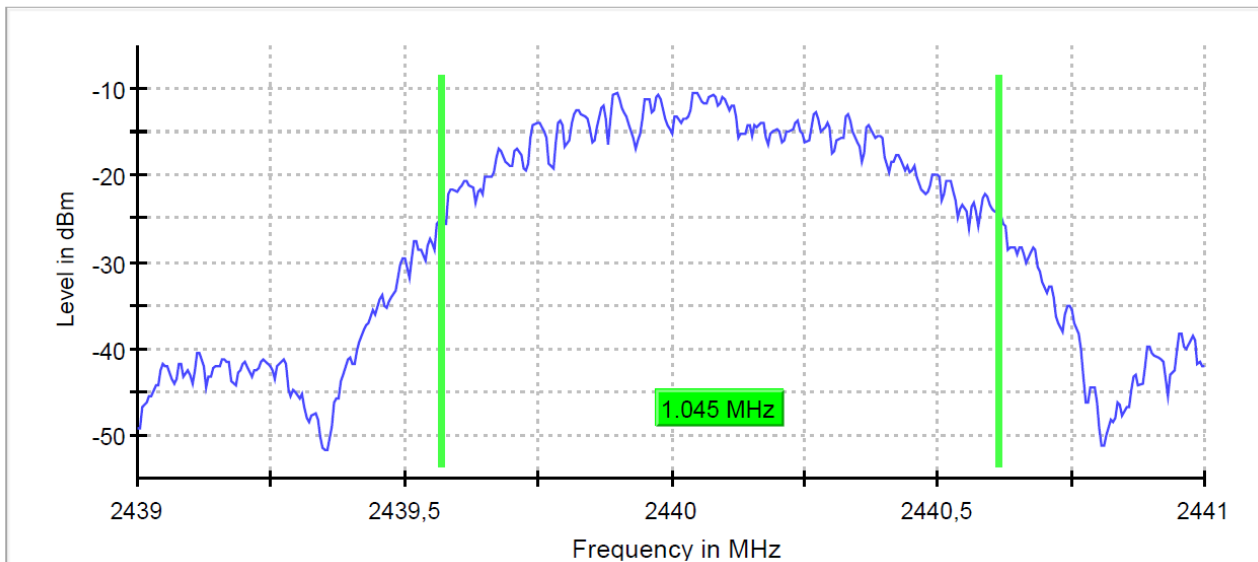
Occupied Channel Bandwidth 99%

99 % Bandwidth



Data rate 1 Mbps, lowest channel

99 % Bandwidth



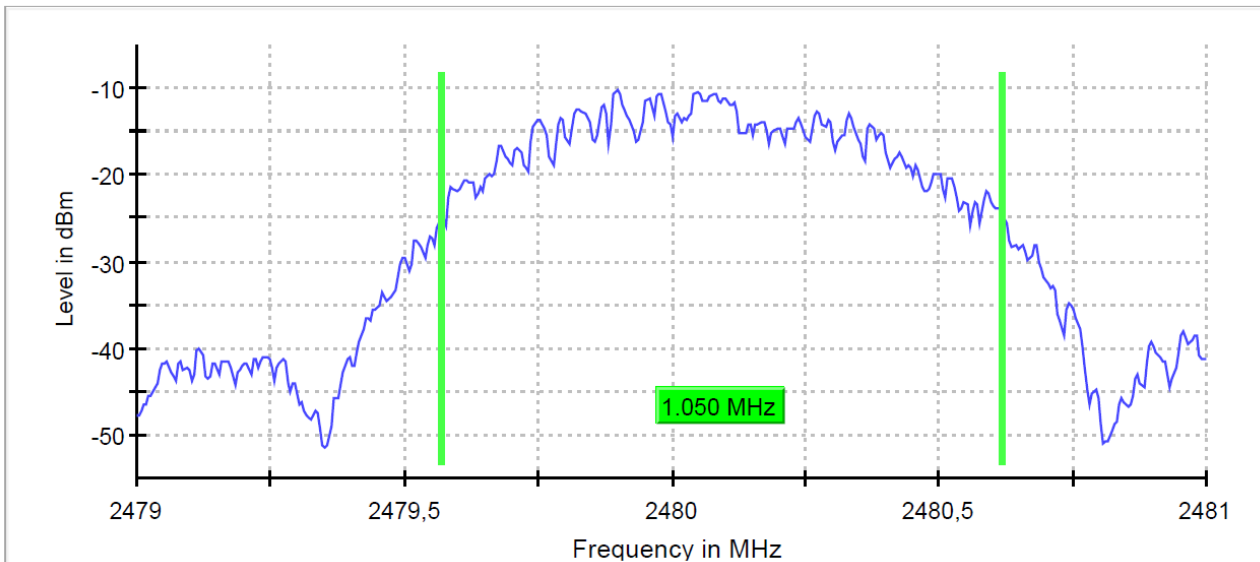
Data rate 1 Mbps, middle channel

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99 % Bandwidth

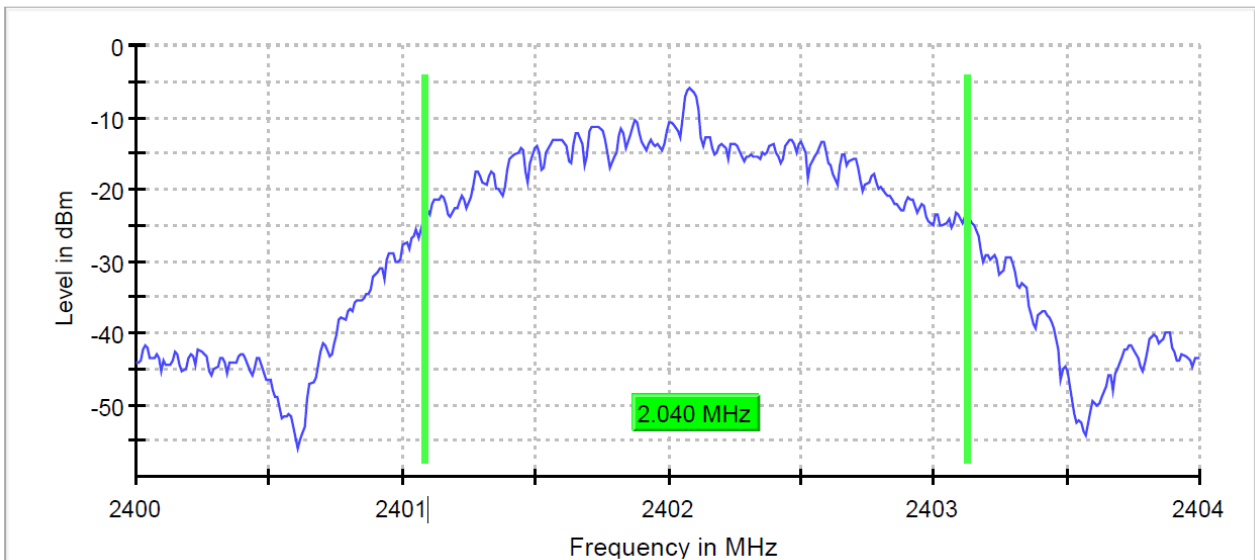


Data rate 1 Mbps, highest channel

Frequency	99% Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
Lowest	1.045000	2401.5675	2402.6125
Middle	1.045000	2439.5675	2440.6125
Highest	1.050000	2479.5675	2480.6175

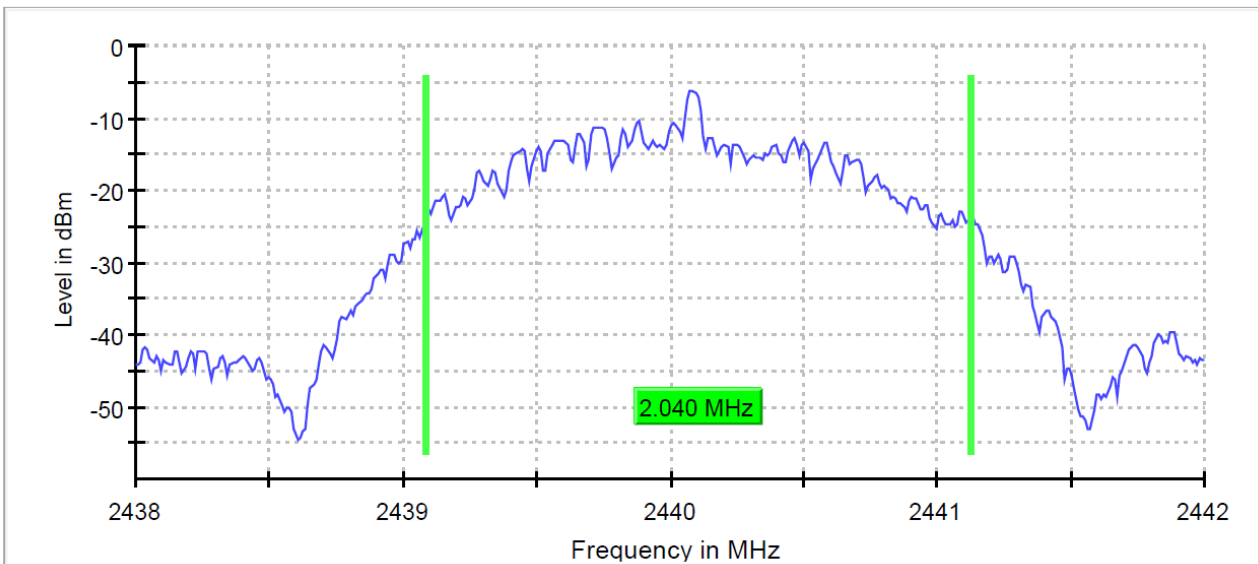
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99 % Bandwidth



Data rate 1 Mbps, lowest channel

99 % Bandwidth



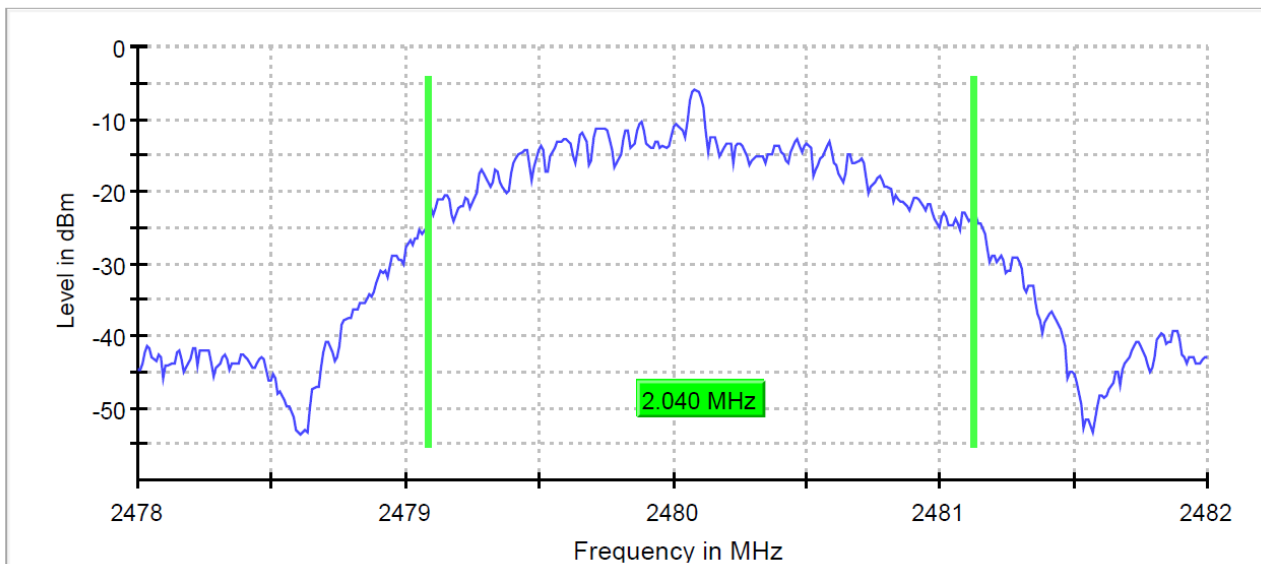
Data rate 1 Mbps, middle channel

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99 % Bandwidth



Data rate 1 Mbps, highest channel

Frequency	99% Bandwidth (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
Lowest	2.040000	2401.085	2403.125
Middle	2.040000	2439.085	2441.125
Highest	2.040000	2479.085	2481.125

Final test result	Pass
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4.4 Conducted Spurious Emissions

4.4.1 Requirements / Limits

<input checked="" type="checkbox"/>	<i>FCC Part 15, Subpart C, §15.247 (d)</i> 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, provide the transmitter demonstrates compliance with the peak conducted power limits.
<input checked="" type="checkbox"/>	<i>FCC Part 15, Subpart C, §15.247 (d)</i> 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.

4.4.2 Test Method

Conducted method was used to measure the conducted spurious emissions in frequency range (30 MHz to 26 GHz) according to ANSI C63.10:2013 clause 11.11.3 . The EUT was connected to the spectrum analyzer via a coax cable with a known loss.

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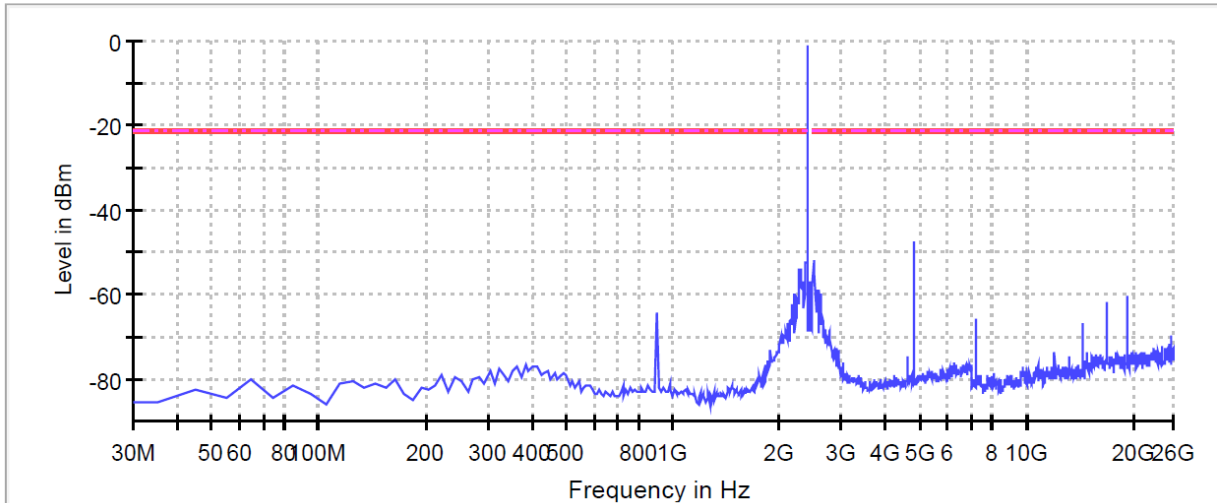
4.4.3 Test Setup

EUT		A003238087-008 (EUT1)
Test Condition		Normal conditions
Chamber details		<input type="checkbox"/> 3m Fully Anechoic Chamber (FAC) <input type="checkbox"/> 10m Semi Anechoic Chamber (SAC) <input checked="" type="checkbox"/> Shielded room
Measurement positioning		Distance: EUT height: Antenna height: <input type="checkbox"/> 3m <input type="checkbox"/> 1.5m <input type="checkbox"/> 1.5m <input type="checkbox"/> 10m <input type="checkbox"/> 0.8m <input type="checkbox"/> 1m to 4m – height scan <input checked="" type="checkbox"/> N/A
Companion device		none
Operation mode		Mode 1: TX Modulated 1 Mbps with continuous transmission TX Modulated 2 Mbps with continuous transmission
Spectrum Analyzer	Centre Frequency	2402MHz / 2440MHz / 2480MHz
	Resolution Bandwidth	100kHz
	Video Bandwidth	300kHz
	Span	Range1: 2,37GHz (30MHz-2,4GHz) Range2: 83,5MHz (2,4GHZ-2,4835GHz) Range3: 23,5165GHz (2,4835-26GHz)
	Sweep time	Range1: 23,7ms Range2: 94,8µs Range3: 236ms
Further parameters		-
Test engineer		Dipl. Ing. Primoz Erzen

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Test documentation

4.4.4 Test results

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4807.166065	-47.7	26.5	-21.1
2498.491394	-52.1	31.0	-21.1
2385.063025	-52.5	31.4	-21.1
2395.021008	-52.6	31.5	-21.1
2305.399160	-53.7	32.5	-21.1
2275.525210	-54.0	32.9	-21.1
2365.147059	-55.1	33.9	-21.1
2375.105042	-55.3	34.2	-21.1
2528.474182	-55.4	34.2	-21.1
2518.479919	-56.7	35.6	-21.1
2335.273109	-56.9	35.7	-21.1
2295.441176	-57.0	35.9	-21.1
2508.485657	-57.1	36.0	-21.1
2285.483193	-57.9	36.8	-21.1
2488.497131	-58.2	37.0	-21.1

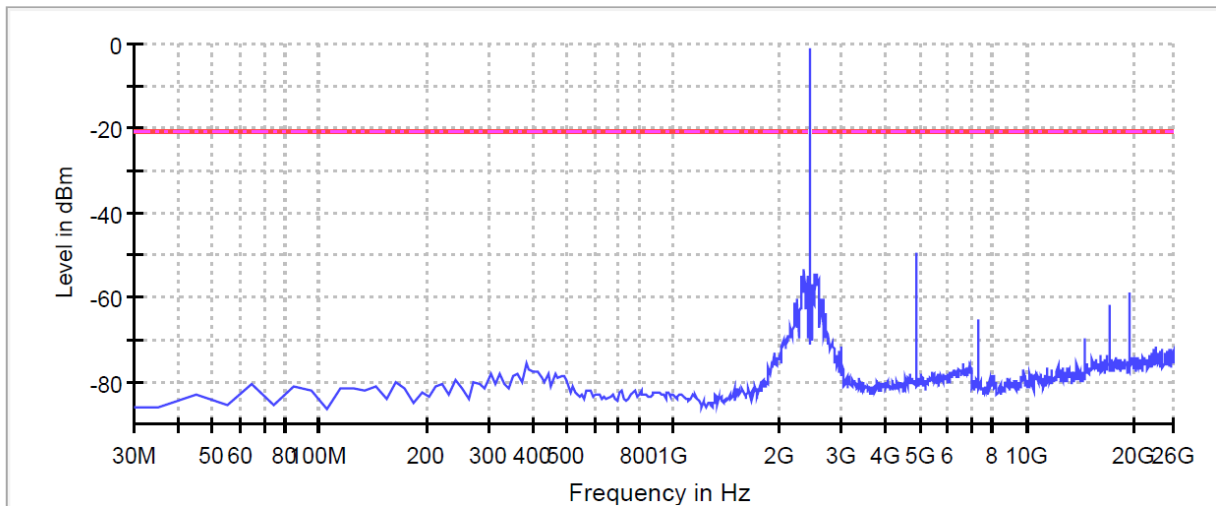
Data rate 1 Mbps, 2402MHz; Lowest Channel

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Spurious



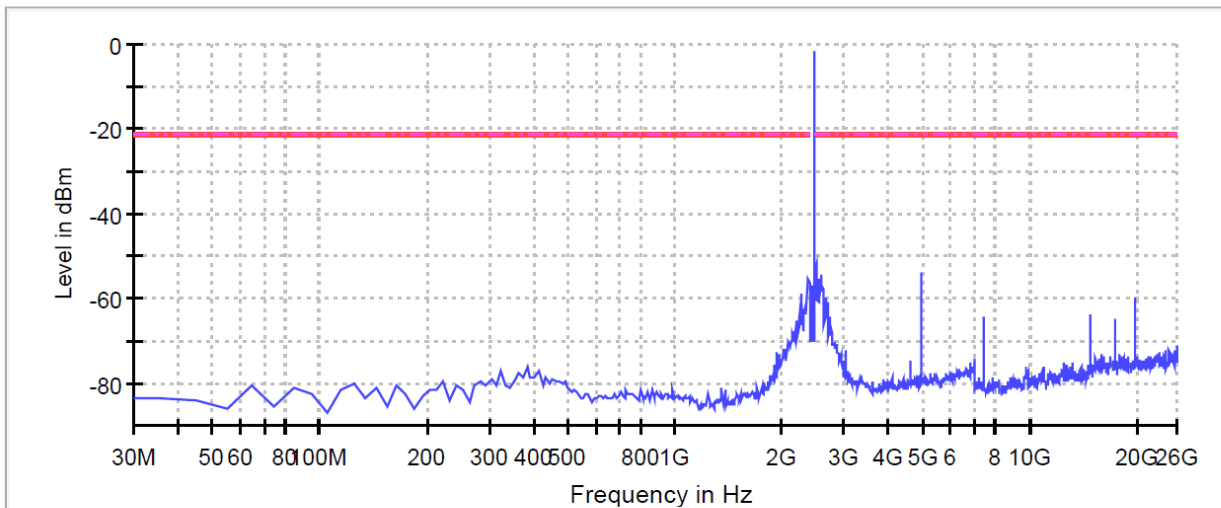
— Limit — Sum Level - - - Threshold × Critical × Final Critical

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4877.125903	-49.7	28.7	-20.9
2345.231092	-53.4	32.4	-20.9
2538.468445	-54.3	33.4	-20.9
2508.485657	-54.5	33.5	-20.9
2315.357143	-54.7	33.7	-20.9
2395.021008	-55.1	34.2	-20.9
2568.451232	-55.8	34.8	-20.9
2558.456970	-57.0	36.0	-20.9
2375.105042	-57.0	36.1	-20.9
2548.462707	-57.2	36.3	-20.9
2355.189076	-57.6	36.7	-20.9
2365.147059	-57.8	36.8	-20.9
2335.273109	-57.8	36.8	-20.9
2528.474182	-58.4	37.5	-20.9
19518.720676	-58.8	37.9	-20.9

Data rate 1 Mbps, 2440MHz; Middle Channel

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Spurious



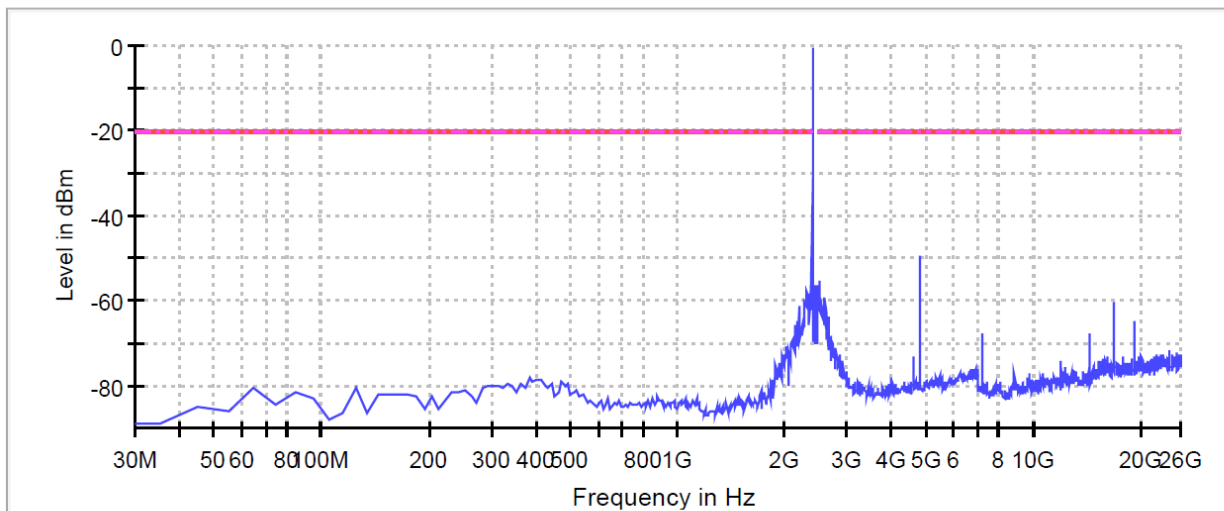
— Limit — Sum Level - - - Threshold × Critical × Final Critical

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2498.491394	-51.8	30.4	-21.4
4957.080004	-53.8	32.4	-21.4
2518.479919	-54.1	32.8	-21.4
2578.445495	-54.2	32.9	-21.4
2508.485657	-54.3	33.0	-21.4
2488.497131	-54.4	33.0	-21.4
2385.063025	-55.3	33.9	-21.4
2548.462707	-55.3	34.0	-21.4
2355.189076	-56.2	34.8	-21.4
2568.451232	-56.4	35.1	-21.4
2395.021008	-56.6	35.2	-21.4
2598.434020	-56.9	35.5	-21.4
2365.147059	-57.0	35.7	-21.4
2375.105042	-57.7	36.4	-21.4
2608.428283	-58.1	36.7	-21.4

Data rate 1 Mbps, 2480MHz; Highest Channel

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Spurious



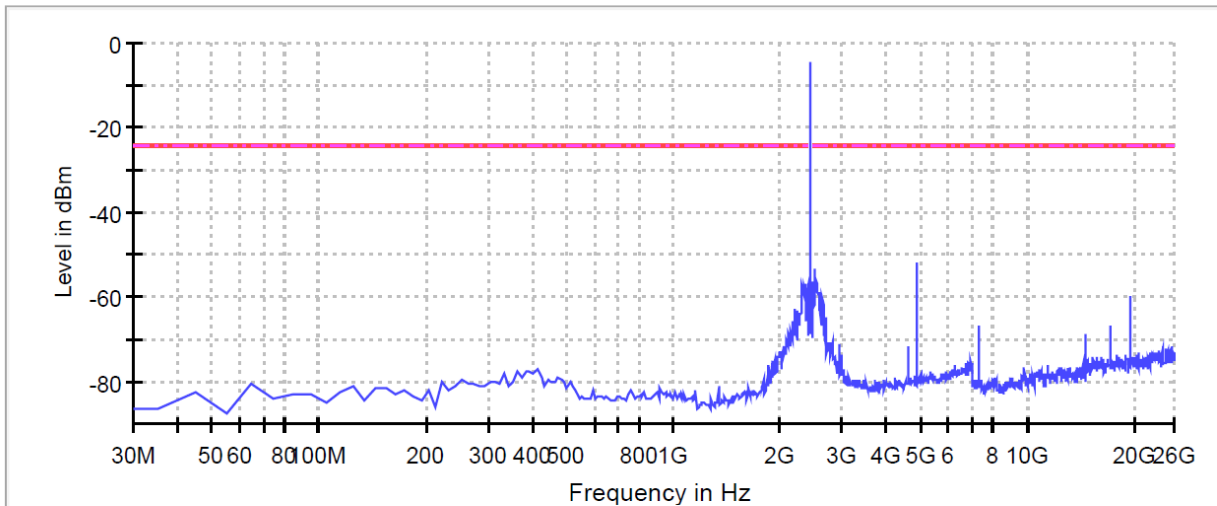
— Limit — Sum Level - - - Threshold × Critical × Final Critical

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2395.021008	-30.9	10.5	-20.4
4807.166065	-49.6	29.2	-20.4
2508.485657	-55.6	35.2	-20.4
2498.491394	-56.9	36.5	-20.4
2315.357143	-57.7	37.3	-20.4
2365.147059	-58.1	37.7	-20.4
2305.399160	-58.2	37.8	-20.4
2335.273109	-58.3	37.9	-20.4
2518.479919	-58.4	38.0	-20.4
2325.315126	-59.4	39.0	-20.4
2598.434020	-59.5	39.1	-20.4
2488.497131	-60.3	39.9	-20.4
2355.189076	-60.3	40.0	-20.4
16810.275499	-60.5	40.1	-20.4
2285.483193	-60.6	40.2	-20.4

Data rate 2 Mbps, 2402MHz; Lowest Channel

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Test documentation

Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
4877.125903	-52.0	27.6	-24.4
2508.485657	-53.3	28.9	-24.4
2528.474182	-55.4	31.0	-24.4
2365.147059	-56.9	32.4	-24.4
2538.468445	-56.9	32.5	-24.4
2345.231092	-57.3	32.8	-24.4
2315.357143	-57.4	32.9	-24.4
2395.021008	-57.8	33.4	-24.4
2335.273109	-58.1	33.7	-24.4
2548.462707	-58.6	34.2	-24.4
2558.456970	-58.6	34.2	-24.4
2355.189076	-59.0	34.6	-24.4
2588.439758	-59.0	34.6	-24.4
2375.105042	-59.1	34.7	-24.4
2325.315126	-59.5	35.0	-24.4

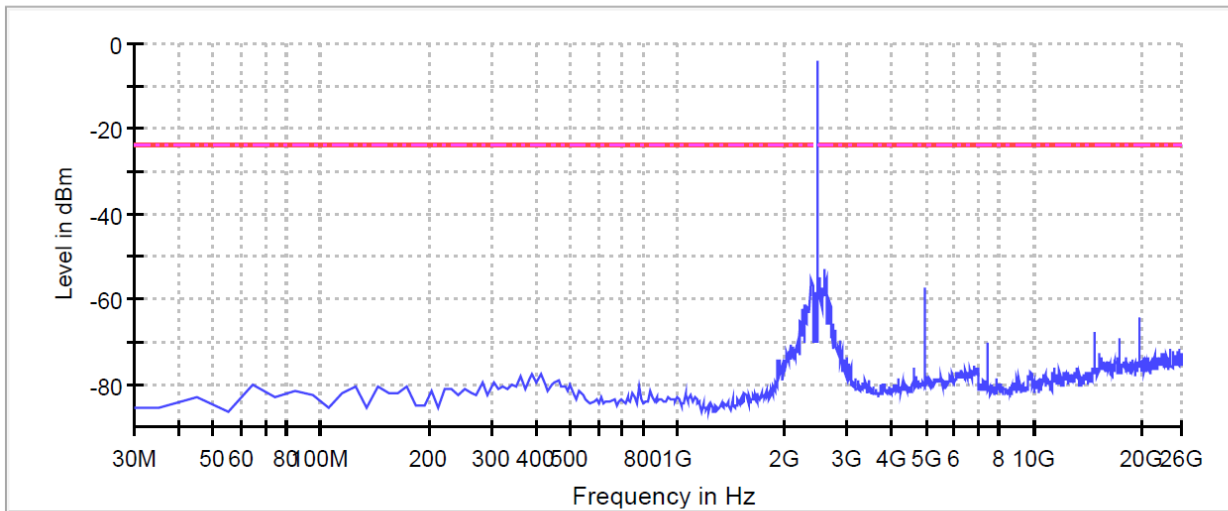
Data rate 2 Mbps, 2440MHz; Middle Channel

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Spurious



— Limit — Sum Level - - - Threshold × Critical × Final Critical

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)
2578.445495	-52.7	28.9	-23.7
2518.479919	-54.7	30.9	-23.7
2498.491394	-55.0	31.3	-23.7
2608.428283	-55.4	31.6	-23.7
2385.063025	-55.6	31.8	-23.7
2355.189076	-57.0	33.3	-23.7
2395.021008	-57.1	33.3	-23.7
4957.080004	-57.2	33.5	-23.7
2568.451232	-57.2	33.5	-23.7
2548.462707	-57.3	33.6	-23.7
2508.485657	-57.4	33.7	-23.7
2598.434020	-57.4	33.7	-23.7
2488.497131	-57.9	34.1	-23.7
2365.147059	-58.6	34.9	-23.7
2375.105042	-59.2	35.5	-23.7

Data rate 2 Mbps, 2480MHz; Highest Channel

Final test result	Pass
-------------------	------

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4.5 Band Edge Measurement

4.5.1 Requirements / Limits

<input checked="" type="checkbox"/>	<i>FCC Part 15, Subpart C, §15.247 (d)</i> 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, provide the transmitter demonstrates compliance with the peak conducted power limits.
<input checked="" type="checkbox"/>	<i>FCC Part 15, Subpart C, §15.247 (d)</i> 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.

4.5.2 Test Method

Conducted method was used to perform the band edge measurements according to ANSI C63.10:2013 clause 11.13.3.2 Peak detection. The EUT was connected to the spectrum analyzer via a coax cable with a known loss. The measurements are done when DUT is configured to the lowest and highest channels.

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4.5.3 Test Setup

EUT		A003238087-008 (EUT1)
Test Condition		Normal conditions
Chamber details		<input type="checkbox"/> 3m Fully Anechoic Chamber (FAC) <input type="checkbox"/> 10m Semi Anechoic Chamber (SAC) <input checked="" type="checkbox"/> Shielded room
Measurement positioning		Distance: EUT height: Antenna height: <input type="checkbox"/> 3m <input type="checkbox"/> 1.5m <input type="checkbox"/> 1.5m <input type="checkbox"/> 10m <input type="checkbox"/> 0.8m <input type="checkbox"/> 1m to 4m – height scan
		<input checked="" type="checkbox"/> N/A
Companion device		none
Operation mode		Mode 1: TX Modulated 1 Mbps with continuous transmission TX Modulated 2 Mbps with continuous transmission
Spectrum Analyzer	Centre Frequency	2402MHz / 2480MHz
	Resolution Bandwidth	100kHz
	Video Bandwidth	300kHz
	Span	173,5MHz
	Sweep time	208µs
Further parameters		-
Test engineer		Dipl. Ing. Primoz Erzen

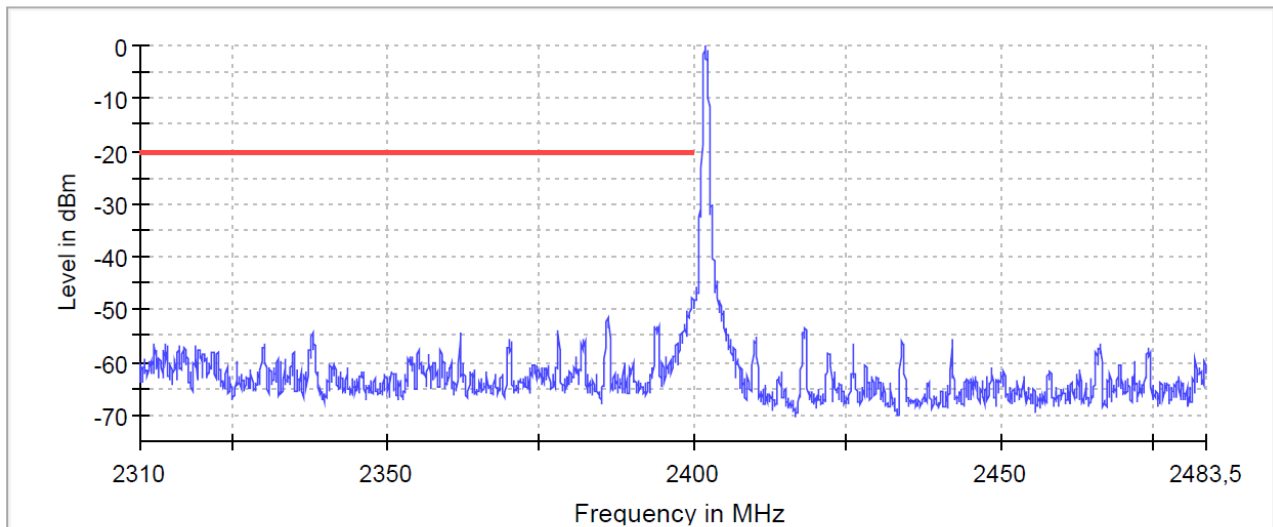
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4.5.4 Test results

Band Edge



— Limit — Sum Level × Fail

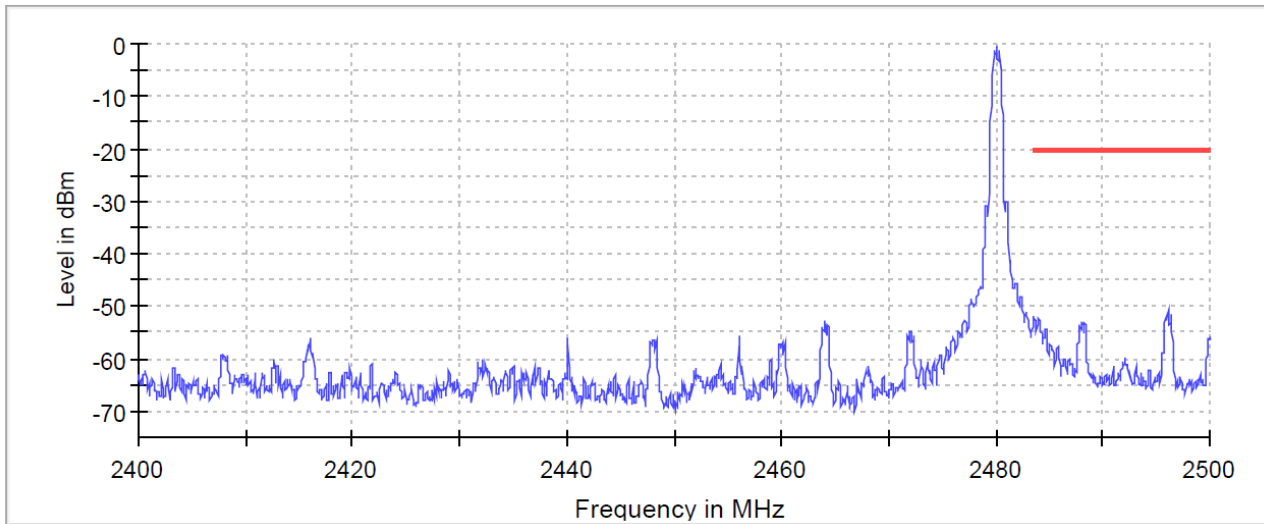
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.775000	-47.8	27.6	-20.1	PASS
2399.825000	-47.8	27.7	-20.1	PASS
2399.725000	-47.8	27.7	-20.1	PASS
2399.925000	-47.9	27.8	-20.1	PASS
2399.875000	-47.9	27.8	-20.1	PASS
2399.975000	-48.0	27.9	-20.1	PASS
2399.675000	-48.2	28.1	-20.1	PASS
2399.625000	-48.9	28.8	-20.1	PASS
2399.575000	-49.7	29.6	-20.1	PASS
2399.075000	-50.4	30.2	-20.1	PASS
2399.125000	-50.4	30.3	-20.1	PASS
2399.525000	-50.6	30.5	-20.1	PASS
2399.025000	-50.9	30.8	-20.1	PASS
2399.175000	-51.0	30.9	-20.1	PASS
2399.275000	-51.1	31.0	-20.1	PASS

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Band Edge



— Limit — Sum Level × Fail

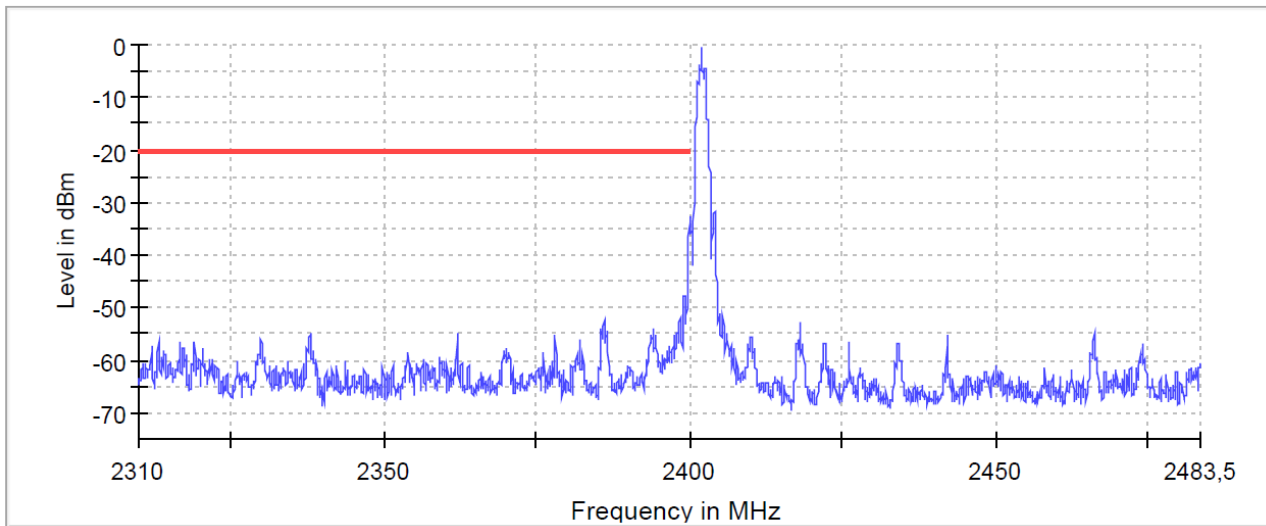
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2496.075000	-50.9	30.5	-20.4	PASS
2496.125000	-51.3	30.9	-20.4	PASS
2496.325000	-51.6	31.2	-20.4	PASS
2496.375000	-51.8	31.5	-20.4	PASS
2495.825000	-52.1	31.7	-20.4	PASS
2483.525000	-52.1	31.7	-20.4	PASS
2484.025000	-52.2	31.9	-20.4	PASS
2483.575000	-52.3	31.9	-20.4	PASS
2483.975000	-52.3	31.9	-20.4	PASS
2495.875000	-52.3	32.0	-20.4	PASS
2496.025000	-52.3	32.0	-20.4	PASS
2483.625000	-52.6	32.2	-20.4	PASS
2484.075000	-52.6	32.2	-20.4	PASS
2483.925000	-52.8	32.4	-20.4	PASS
2495.925000	-52.8	32.4	-20.4	PASS

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Band Edge



— Limit — Sum Level × Fail

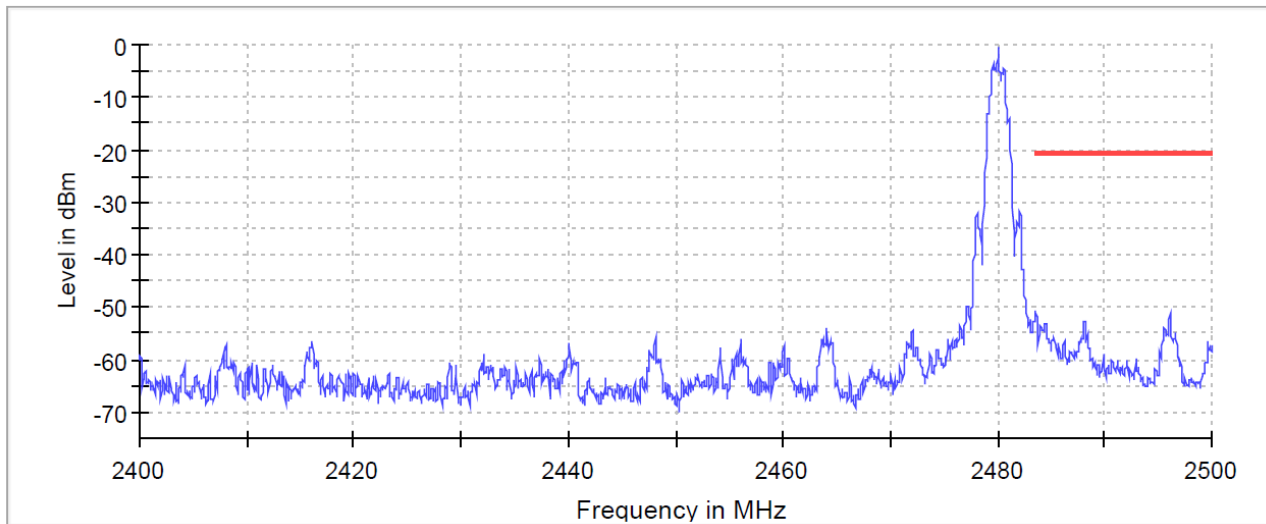
Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.975000	-33.7	13.4	-20.4	PASS
2399.925000	-36.9	16.5	-20.4	PASS
2399.875000	-39.0	18.6	-20.4	PASS
2399.825000	-39.8	19.4	-20.4	PASS
2399.775000	-42.3	21.9	-20.4	PASS
2399.725000	-44.8	24.4	-20.4	PASS
2399.675000	-46.9	26.6	-20.4	PASS
2399.175000	-47.7	27.3	-20.4	PASS
2399.225000	-47.8	27.4	-20.4	PASS
2399.125000	-48.0	27.6	-20.4	PASS
2399.625000	-48.7	28.3	-20.4	PASS
2399.275000	-48.9	28.6	-20.4	PASS
2399.075000	-49.0	28.7	-20.4	PASS
2399.575000	-50.2	29.8	-20.4	PASS
2399.325000	-51.1	30.8	-20.4	PASS

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Band Edge



— Limit — Sum Level × Fail

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2483.525000	-50.6	30.0	-20.6	PASS
2483.575000	-50.9	30.4	-20.6	PASS
2496.075000	-51.2	30.7	-20.6	PASS
2496.125000	-51.7	31.1	-20.6	PASS
2483.625000	-51.9	31.3	-20.6	PASS
2483.675000	-52.1	31.5	-20.6	PASS
2496.025000	-52.5	31.9	-20.6	PASS
2488.075000	-52.9	32.3	-20.6	PASS
2488.125000	-52.9	32.3	-20.6	PASS
2484.525000	-53.1	32.5	-20.6	PASS
2484.475000	-53.1	32.6	-20.6	PASS
2483.725000	-53.2	32.7	-20.6	PASS
2495.975000	-53.2	32.7	-20.6	PASS
2483.975000	-53.5	32.9	-20.6	PASS
2483.925000	-53.7	33.1	-20.6	PASS

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4.6 Radiated Spurious Emissions

4.6.1 Requirements / Limits

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

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

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4.6.2 Test Method

4.6.2.1 Preliminary Test

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

9 kHz - 30 MHz

Following Measurement Setup is used:

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

30 MHz - 1 GHz

Following Measurement Setup is used:

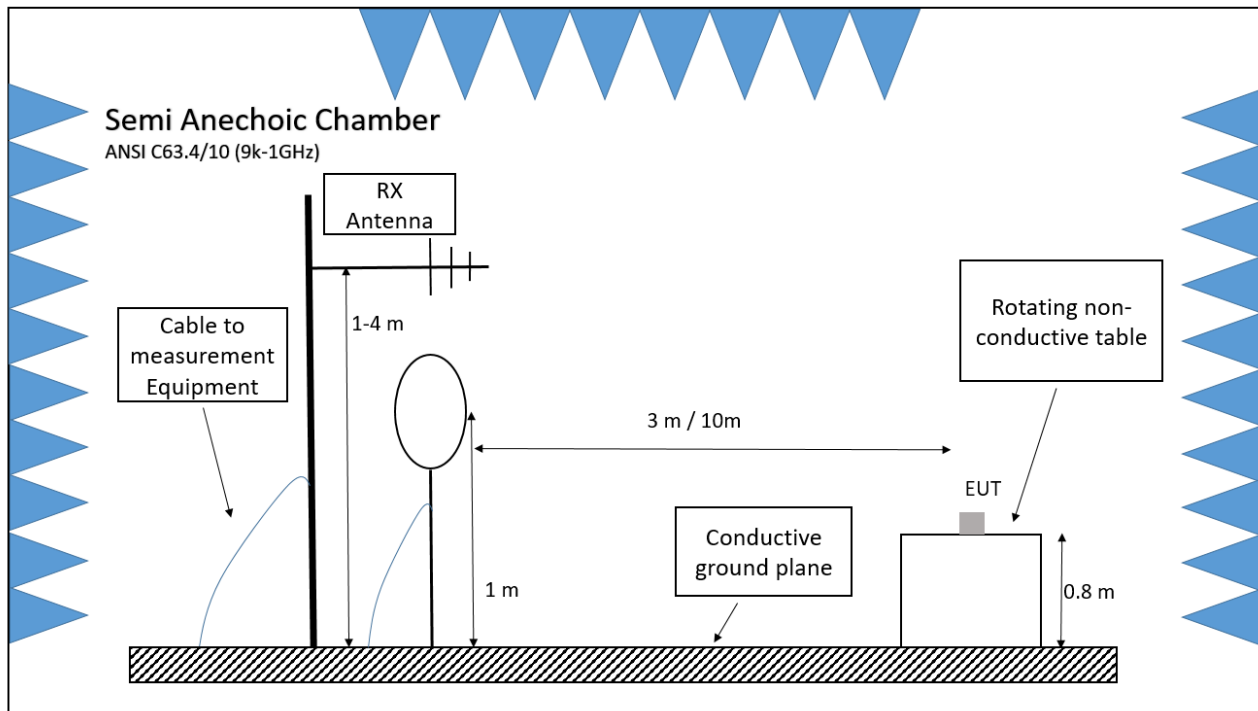
Test Site	Semi-anechoic chamber
Receiving Antenna	Hybrid Antenna VULB 9168
Receiving Antenna height	Varied (1m to 4 m, step size 1m)
Receiving Antenna Polarisation	Horizontal– Vertical
EUT Table	1.0m x 1.5m non-conductive table 80cm above the floor
EUT Turn Table Step Size	45°
Receiver Configurations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

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



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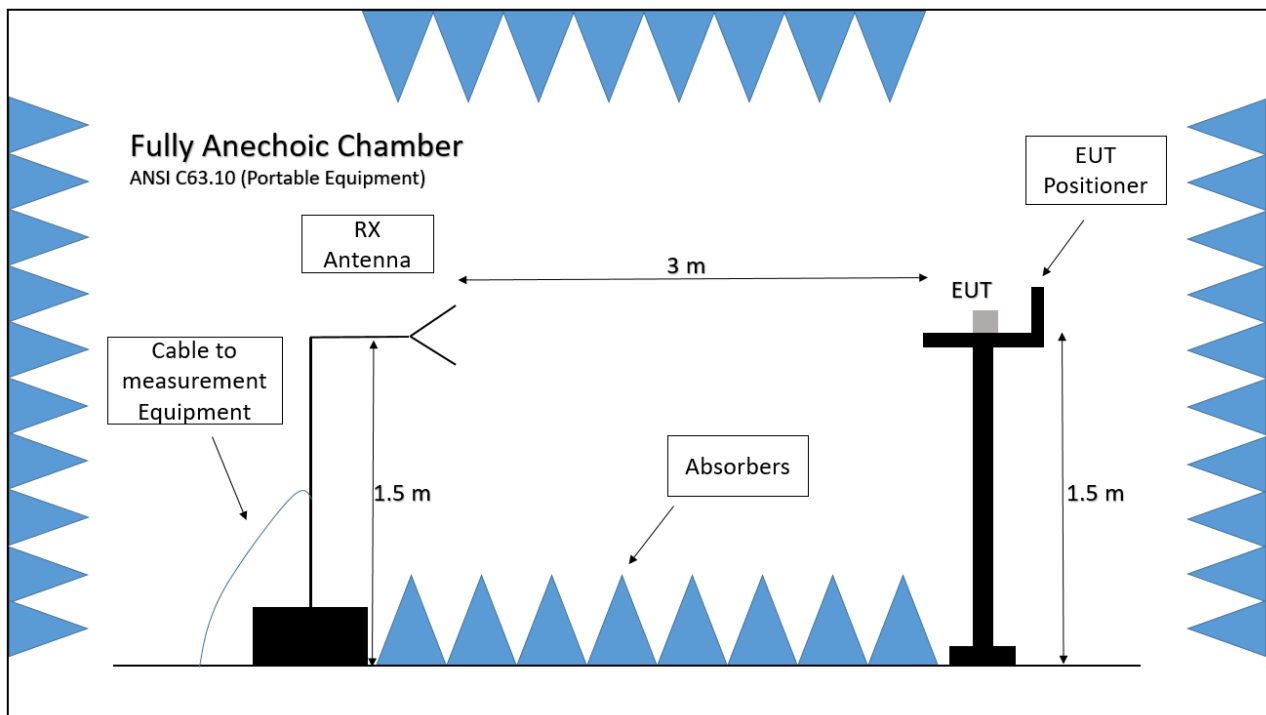
Prüfdokumentation
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1 GHz - 26 GHz

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 Polarisation	Horizontal– Vertical
EUT Positioner	40 cm x 60 cm non-conductive positioner 1.5 m above the floor / Step size,elevation angle 45°
EUT Turn Table Step Size	45°
Spectrum Analyser	Average and peak detectors
	RBW: 1 MHz
	Sweep Time : 100 ms

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



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4.6.2.2 Final Test

The placement of EUT and cables were the same as for preliminary testing. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, 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 turntable and positioner step sizes were set to a range of 22° and the antenna height is fixed.

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:

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

While

$$Corr. = Trd. Corr. + Sig Path + Preamp$$

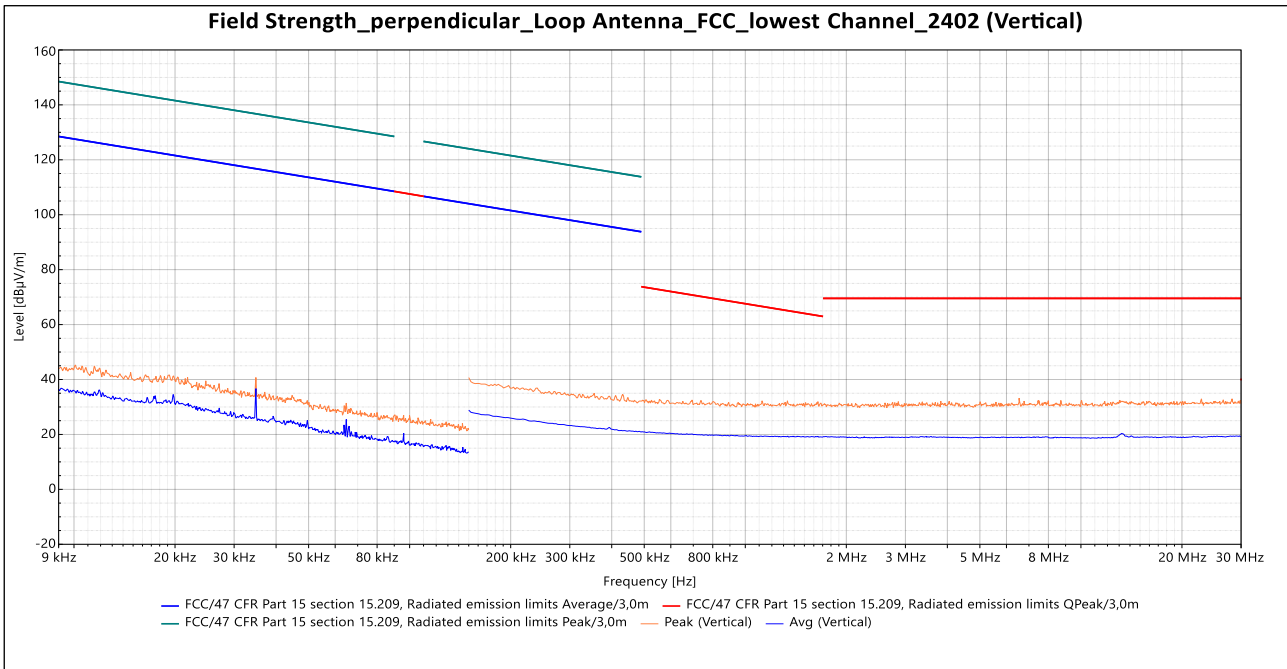
4.6.3 Test Setup

EUT	A003238087-001 (EUT5)
Test Condition	Normal conditions
Companion device	None
Operation mode	TX Modulated 1 Mbps with continuous transmission
Further parameters	-
Test engineer	Dipl. Ing. Primoz Erzen

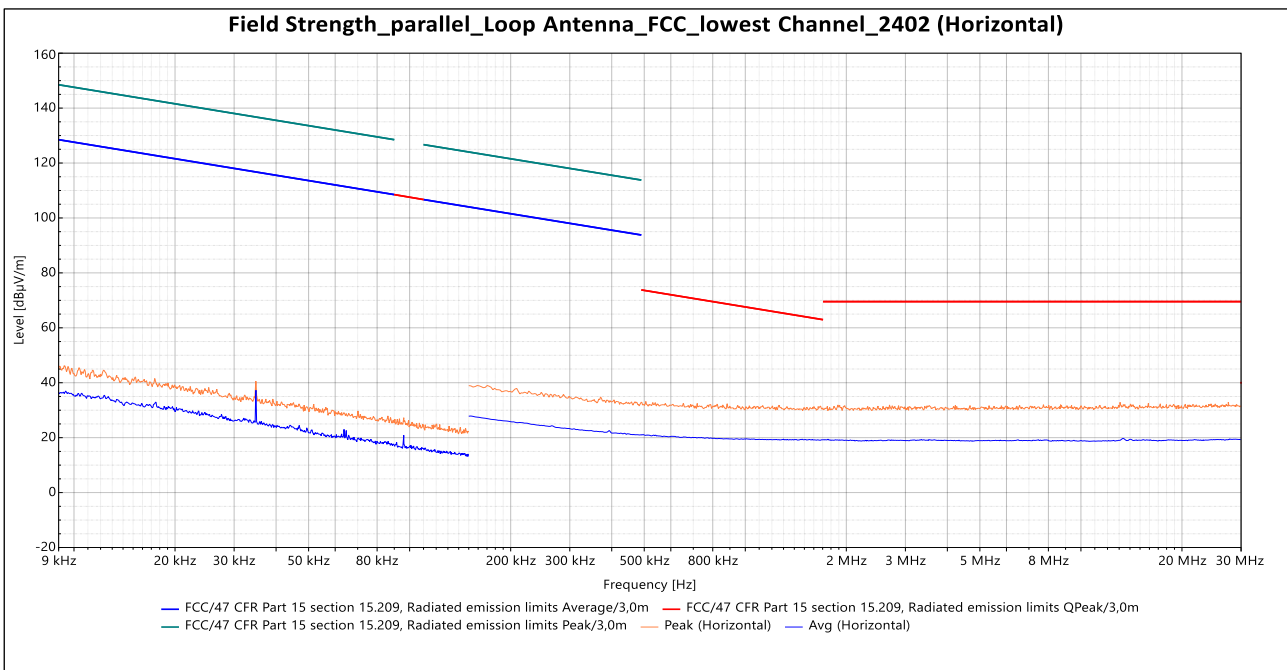
**Prüfdokumentation
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4.6.4 Test results

4.6.4.1 9kHz to 30 MHz, Lowest Channel



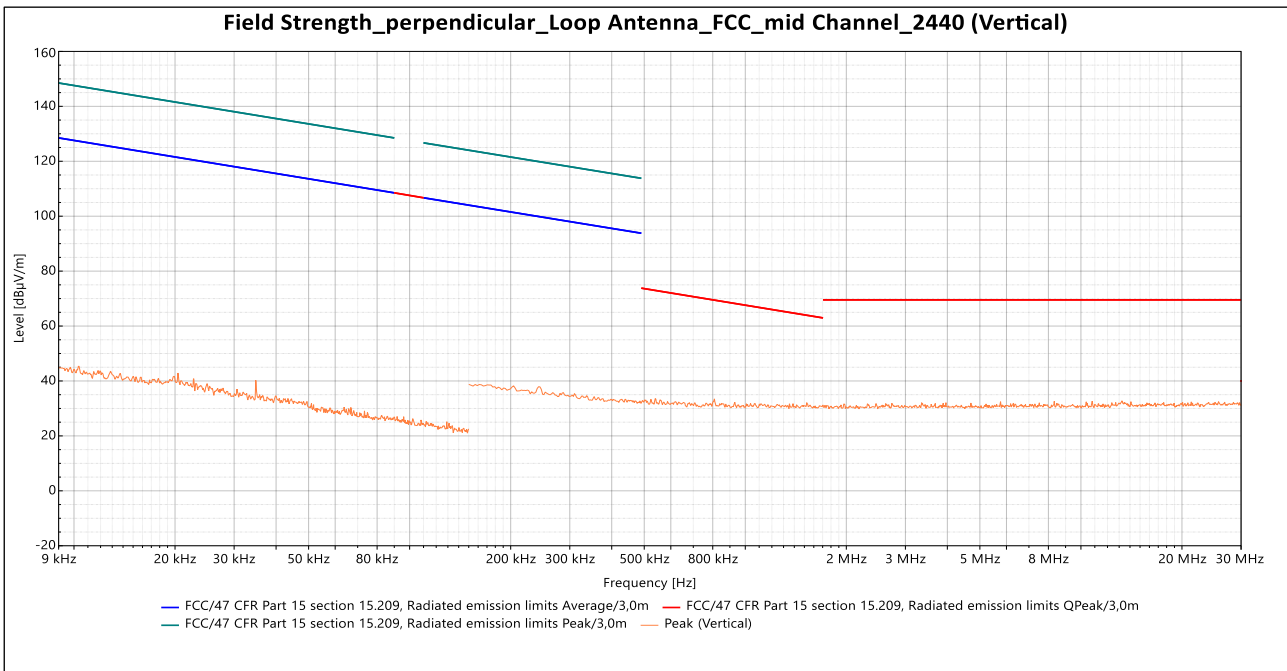
Perpendicular Polarization



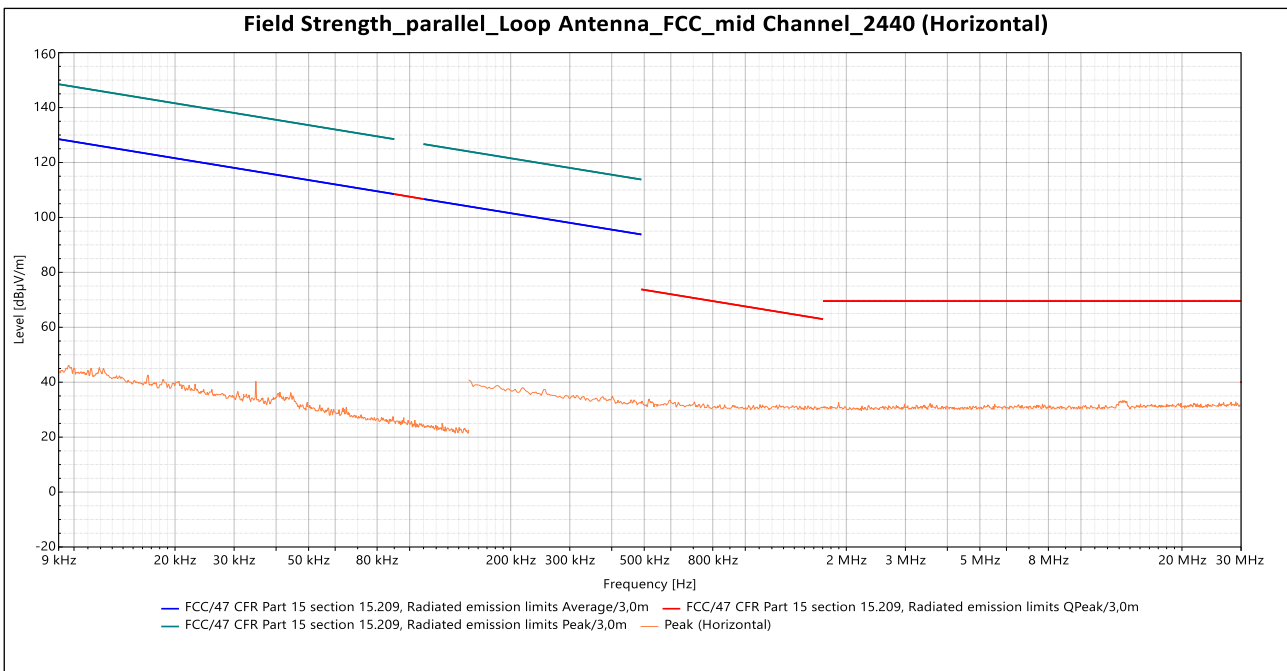
Parallel Polarization

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4.6.4.2 9kHz to 30 MHz, Middle Channel



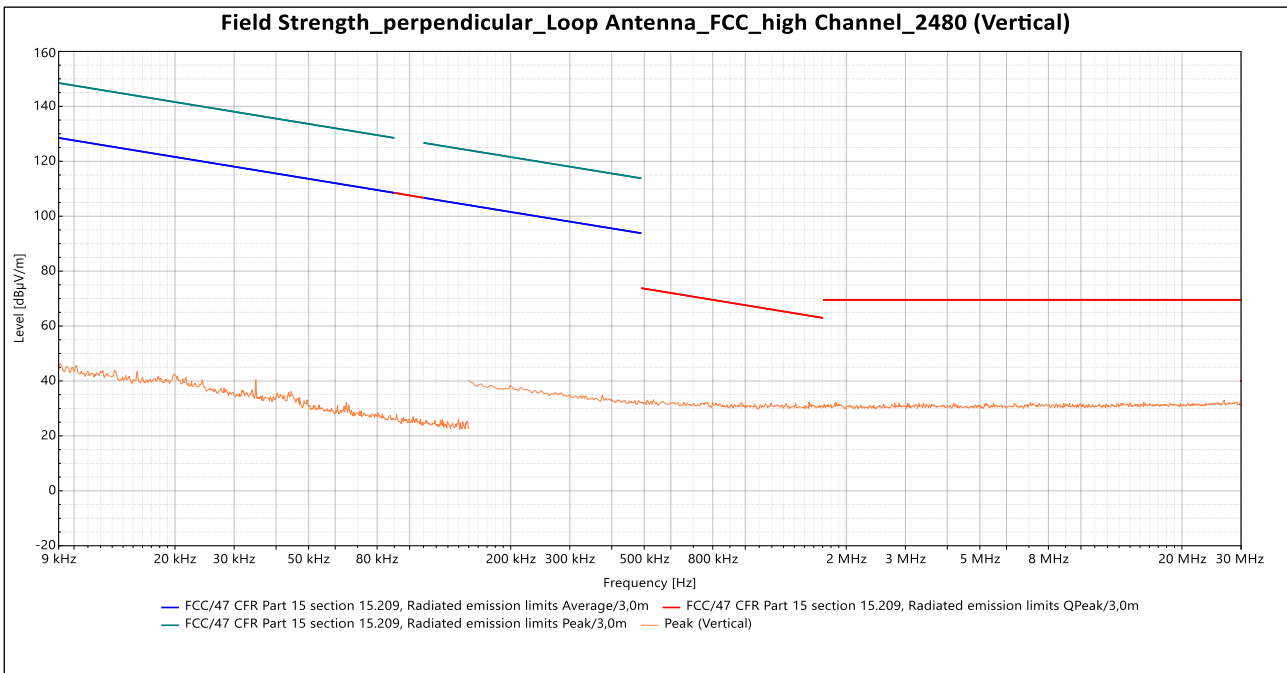
Perpendicular Polarization



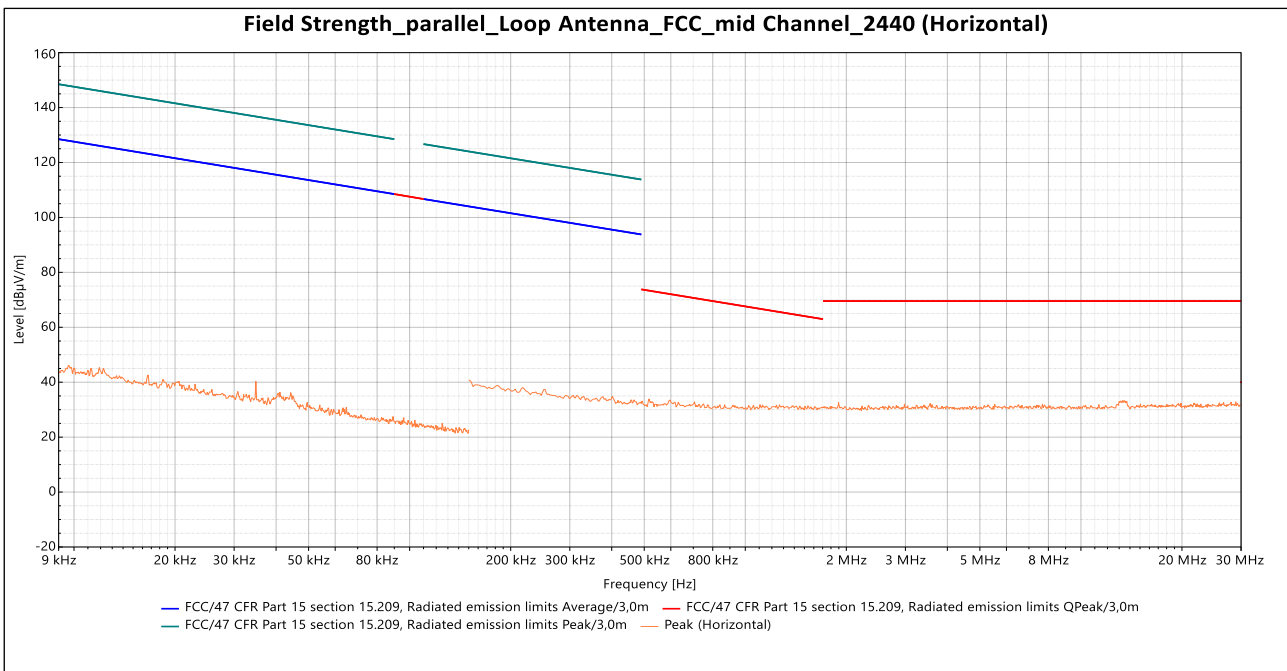
Parallel Polarization

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4.6.4.3 9kHz to 30 MHz, Highest Channel



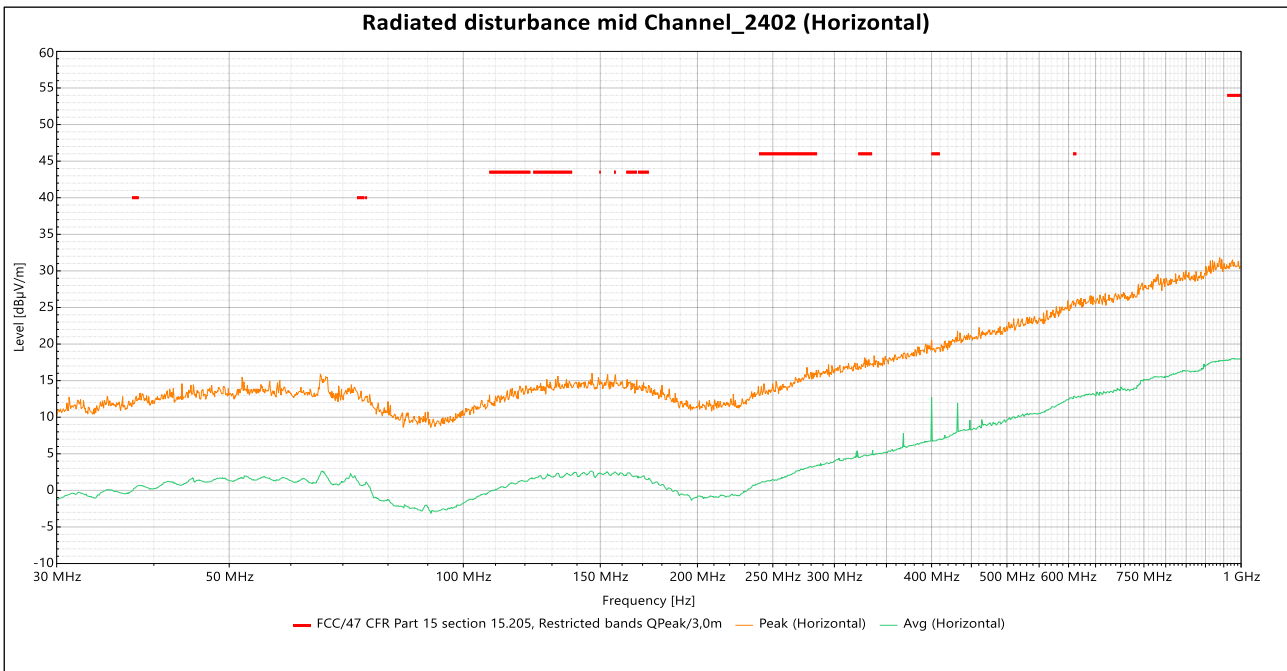
Perpendicular Polarization



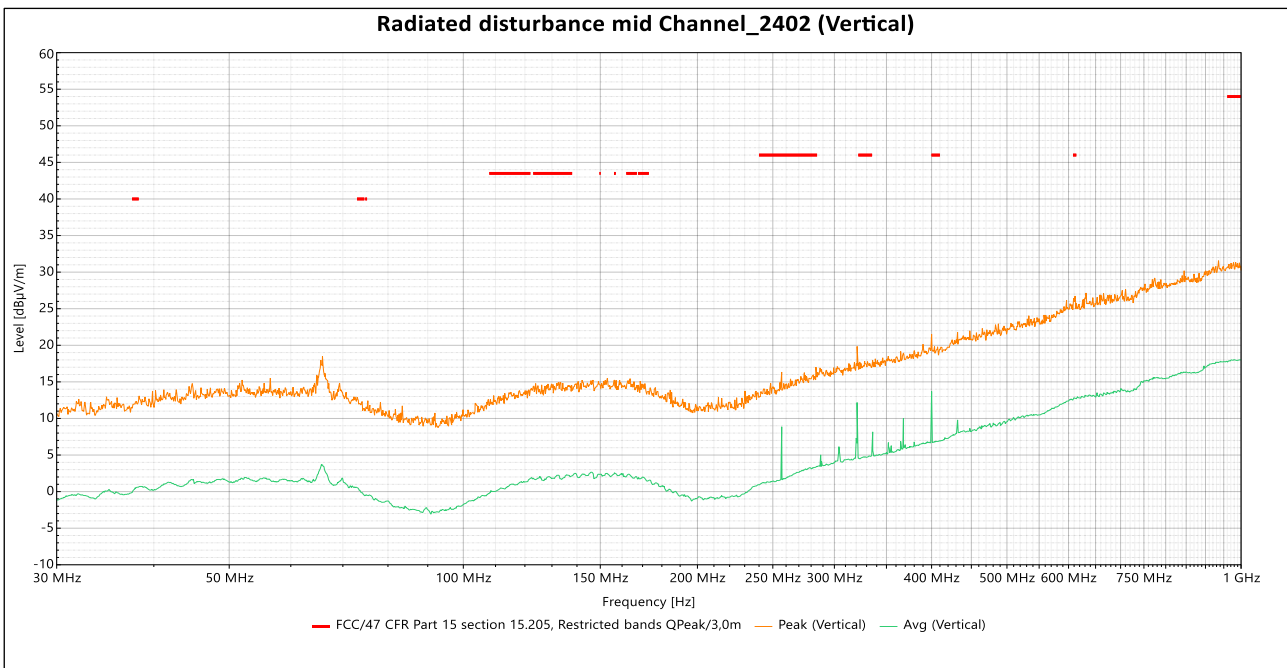
Parallel Polarization

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4.6.4.4 30 MHz – 1 GHz, Lowest Channel



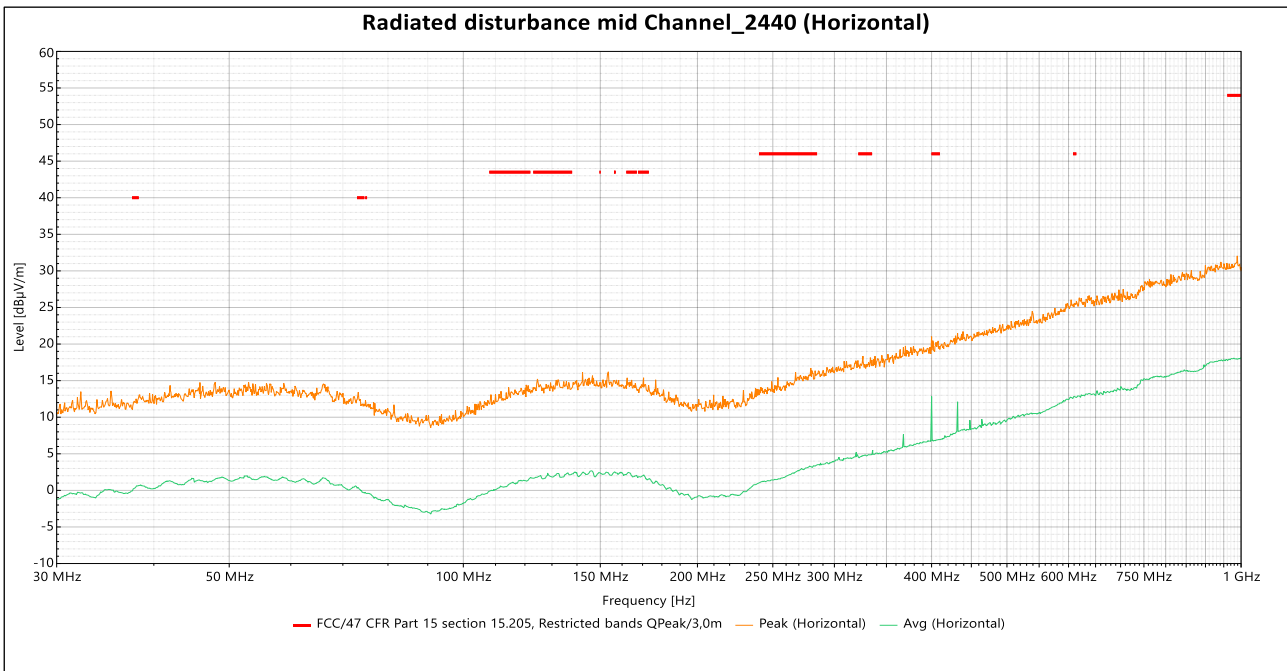
Horizontal Polarization



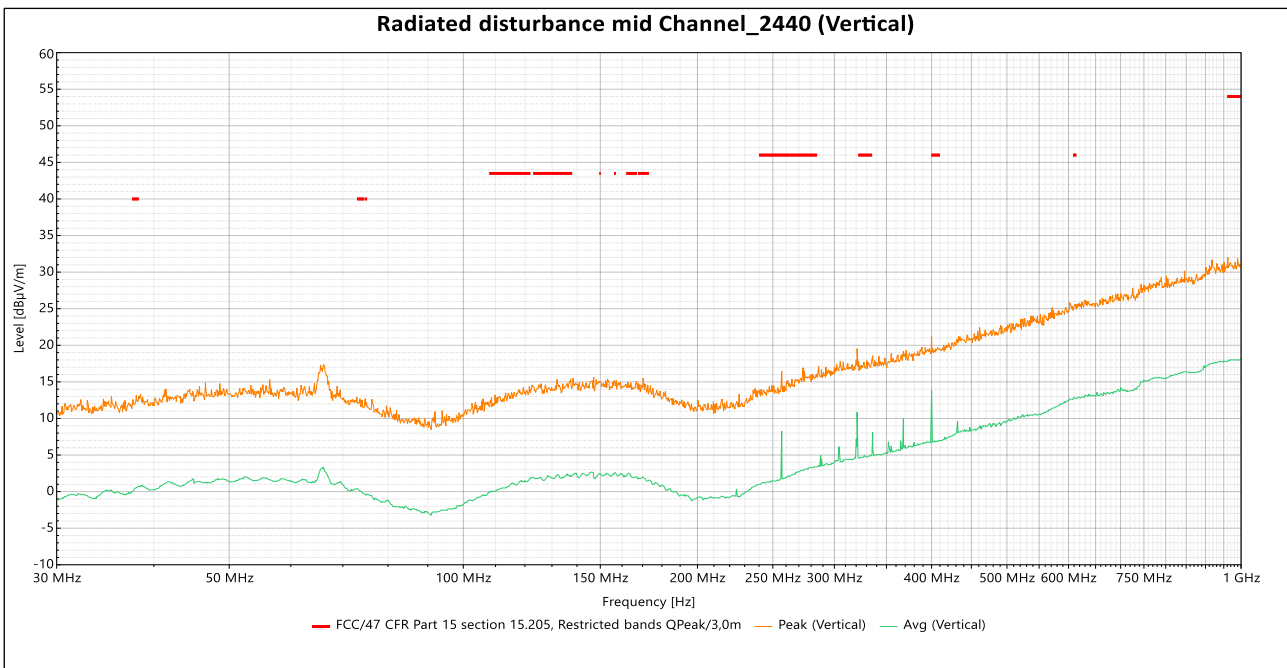
Vertical Polarization

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4.6.4.5 30 MHz – 1 GHz, Middle Channel



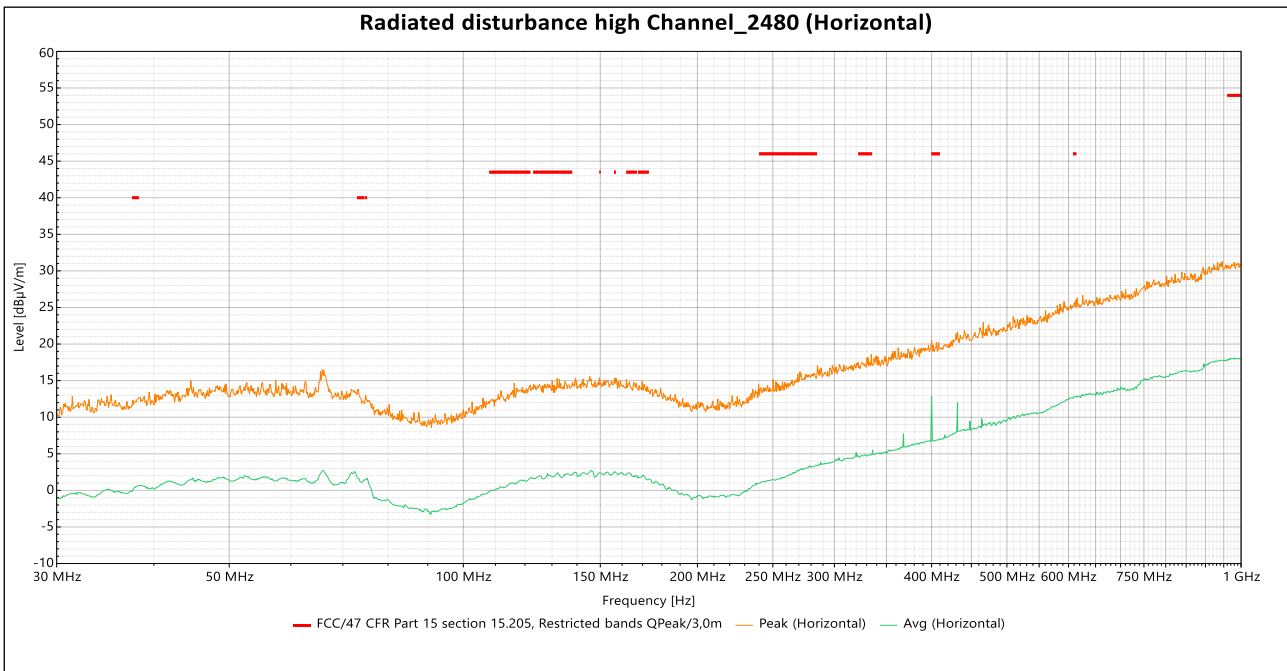
Horizontal Polarization



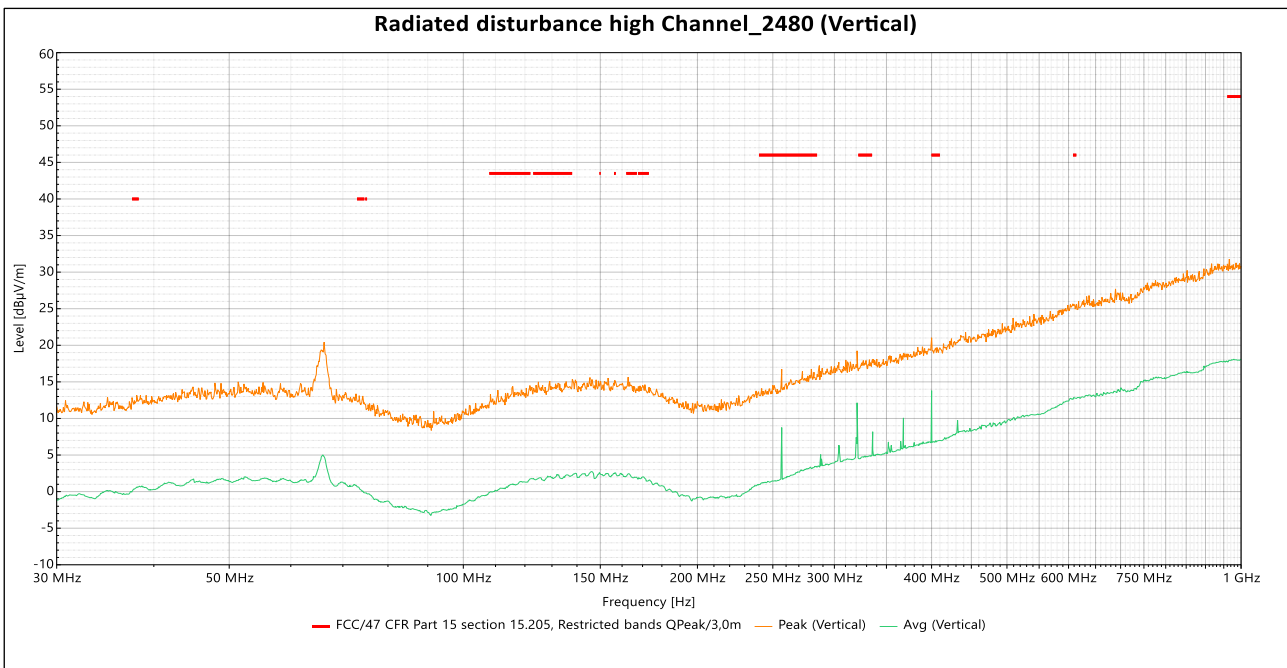
Vertical Polarization

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4.6.4.6 30 MHz – 1 GHz, Highest Channel



Horizontal Polarization



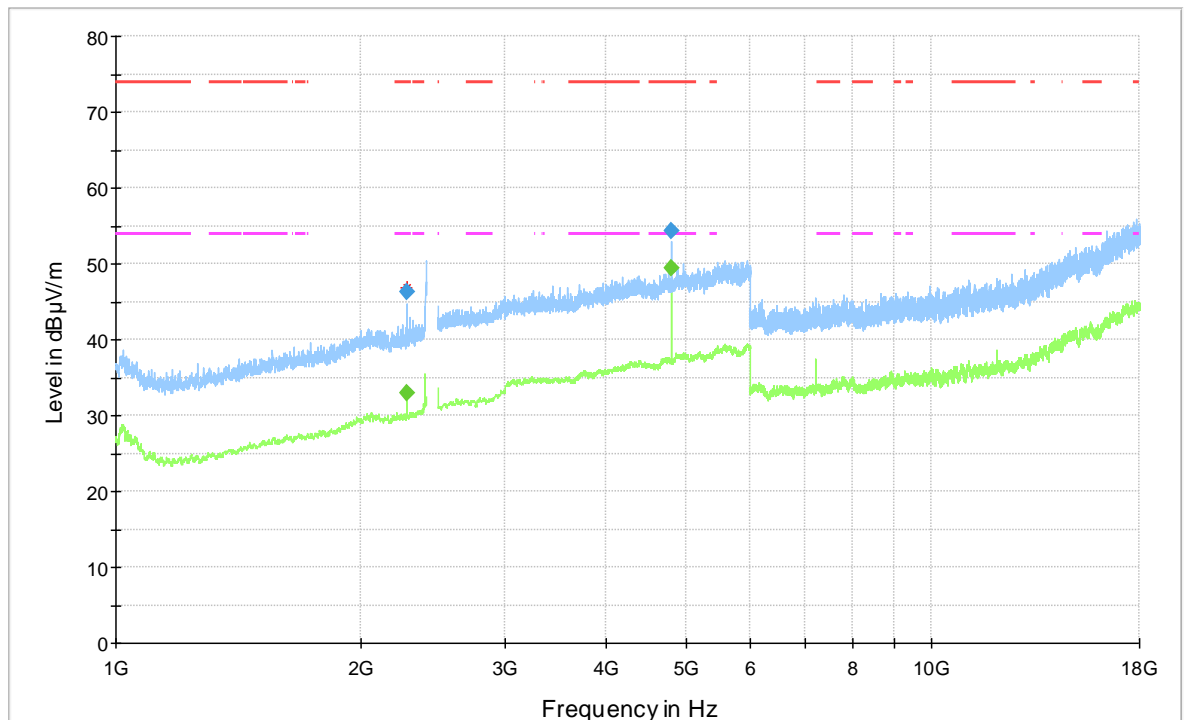
Vertical Polarization

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4.6.4.7 1-18 GHz, Lowest Channel

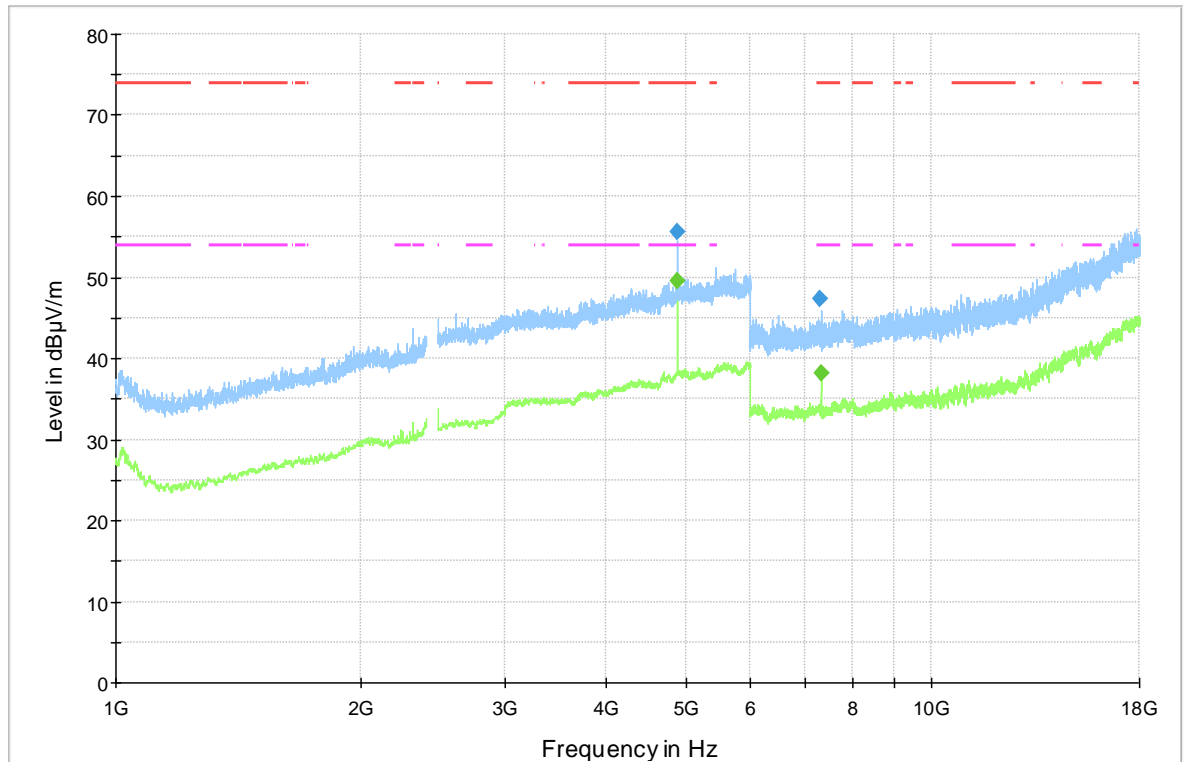


- Preview Result 2-AVG
- * PK+
- FCC_15C_15.205_Radiated_Emissions_Peak
- ◆ Final_Result PK+
- × MaxPeak-PK+ (Single)
- Preview Result 1-PK+ AVG
- * AVG
- FCC_15C_15.205_Radiated_Emissions_Avg
- ◆ Final_Result AVG
- + Average-AVG (Single)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
2273.955	46.25	---	74.00	27.75	100.0	1000.000	150.0	V	323.0	97.0	-1.3
2273.989	---	33.03	54.00	20.97	100.0	1000.000	150.0	V	5.0	92.0	-1.3
4804.002	---	49.42	54.00	4.58	100.0	1000.000	150.0	V	299.0	67.0	7.9
4803.721	54.34	---	74.00	19.66	100.0	1000.000	150.0	V	295.0	76.0	7.9

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4.6.4.8 1-18 GHz, Middle Channel



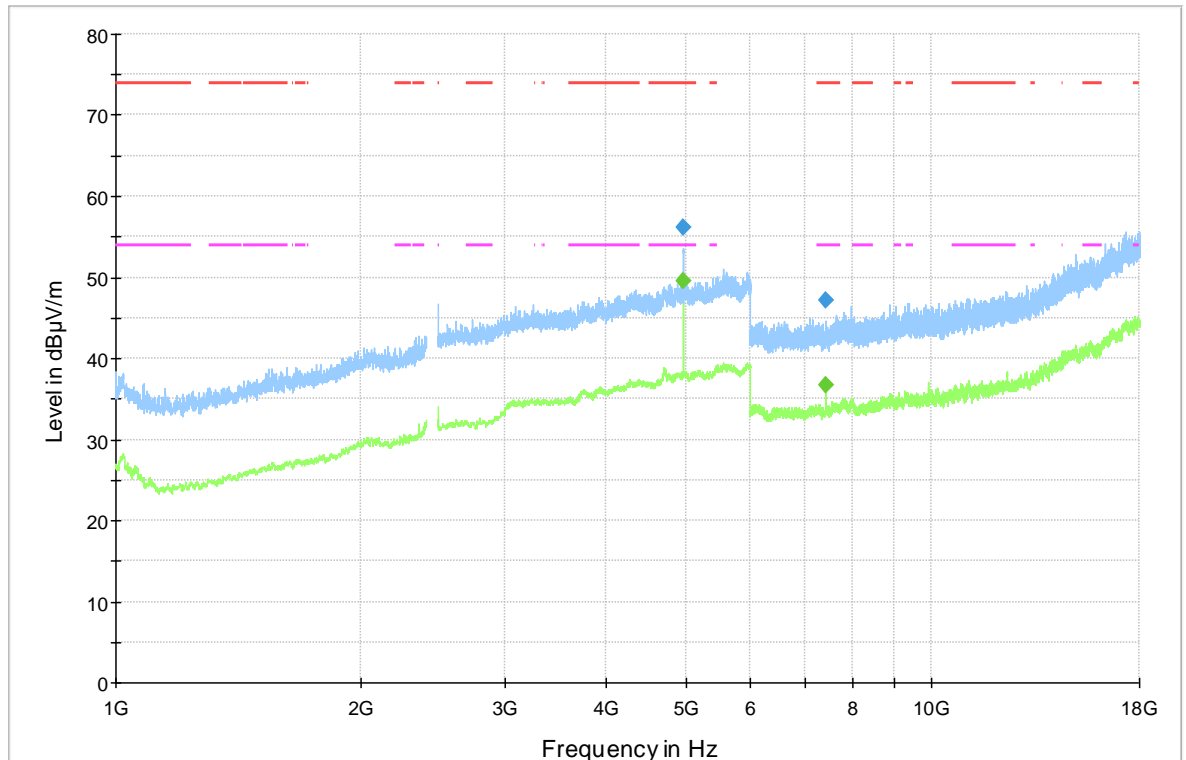
— Preview Result 2-AVG
- - - FCC_15C_15.205_Radiated_Emissions_Peak
◆ Final_Result PK+

— Preview Result 1-PK+
- - - FCC_15C_15.205_Radiated_Emissions_Avg
◆ Final_Result AVG

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
4879.970	---	49.54	54.00	4.46	100.0	1000.000	150.0	V	289.0	85.0	8.6
4880.170	55.62	---	74.00	18.38	100.0	1000.000	150.0	V	288.0	78.0	8.6
7319.397	47.42	---	74.00	26.58	100.0	1000.000	150.0	H	0.0	107.0	-3.2
7319.846	---	38.15	54.00	15.85	100.0	1000.000	150.0	H	-4.0	67.0	-3.2

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4.6.4.9 1-18 GHz, Highest Channel



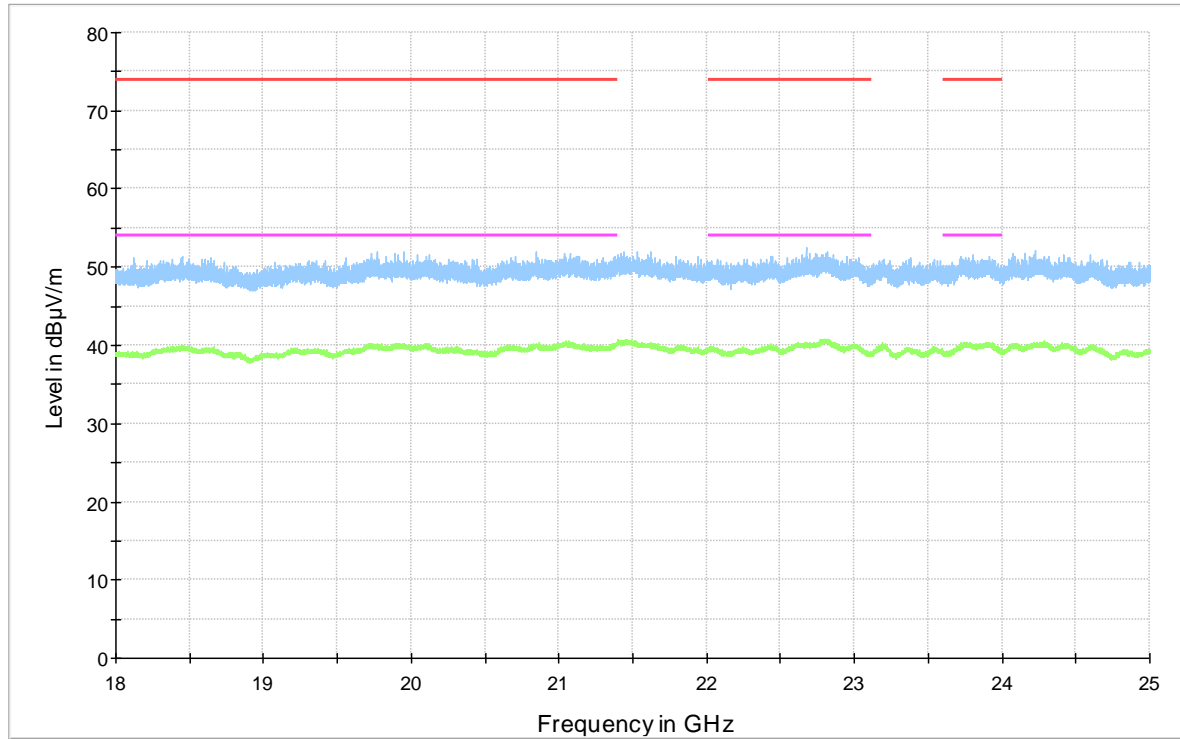
— Preview Result 2-AVG
- - - FCC_15C_15.205_Radiated_Emissions_Peak
◆ Final_Result PK+






— Preview Result 1-PK+
- - - FCC_15C_15.205_Radiated_Emissions_Avg
◆ Final_Result AVG

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB)
4959.675000	56.21	---	74.00	17.79	100.0	1000.000	150.0	H	287.0	93.0	8.7
4960.192500	---	49.54	54.00	4.46	100.0	1000.000	150.0	H	290.0	93.0	8.7
7439.654792	---	36.61	54.00	17.39	100.0	1000.000	150.0	V	120.0	42.0	-3.2
7441.234583	47.18	---	74.00	26.82	100.0	1000.000	150.0	H	-11.0	28.0	-3.2

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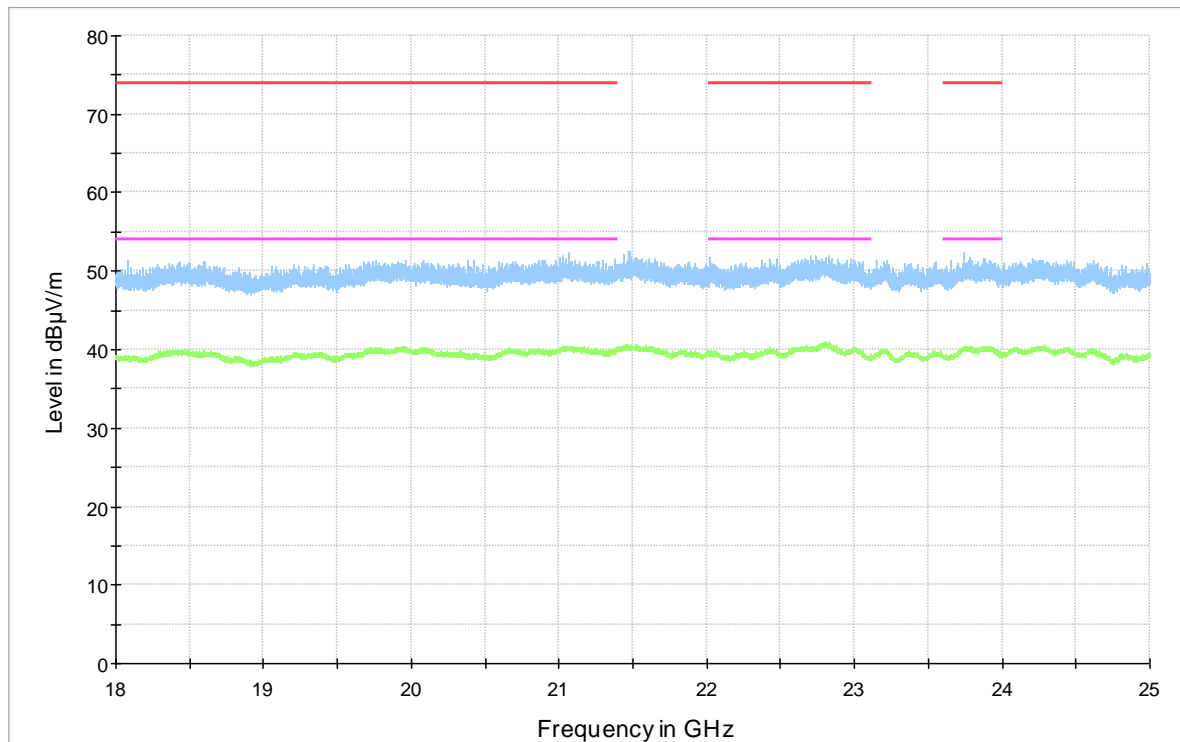
4.6.4.10 18-25 GHz, Lowest Channel








- | | |
|--|---|
|  Preview Result 2-AVG |  Preview Result 1-PK+ |
|  Critical_Freqs AVG |  Critical_Freqs PK+ |
|  FCC_15C_15.205_Radiated_Emissions_Peak |  FCC_15C_15.205_Radiated_Emissions_Avg |
|  Final_Result PK+ |  Final_Result AVG |

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4.6.4.11 18-25 GHz, Middle Channel



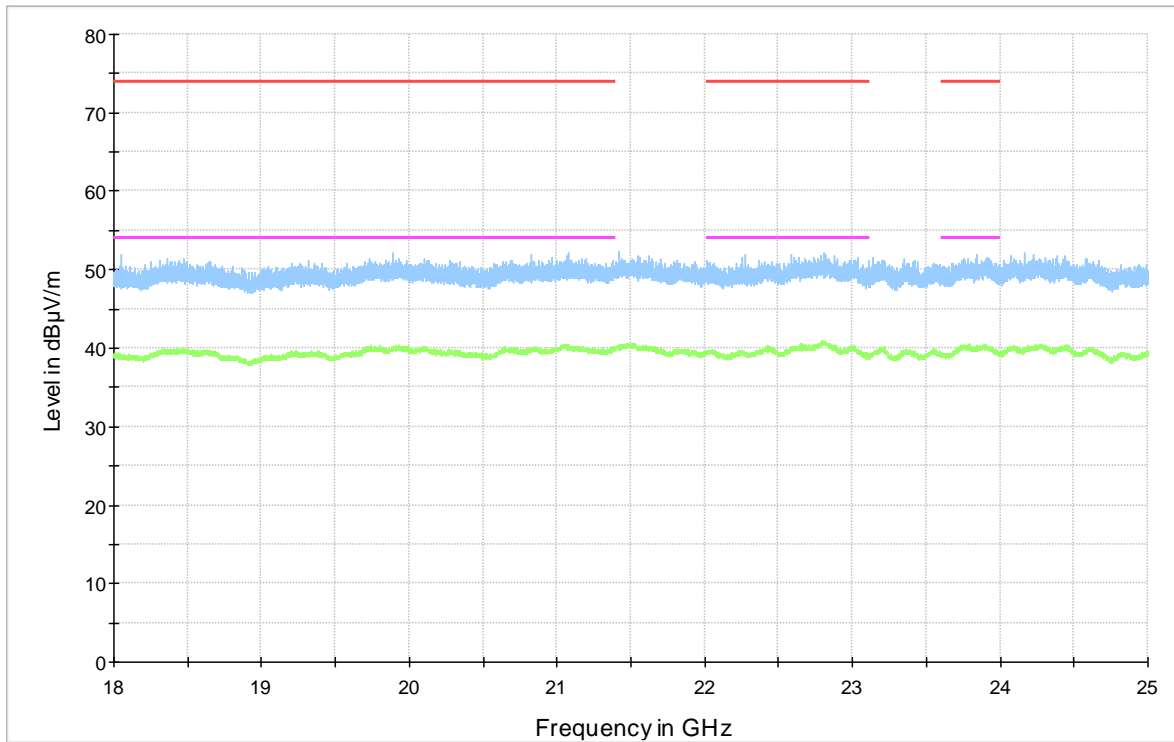
- | | |
|--|---|
|  Preview Result 2-AVG |  Preview Result 1-PK+ |
|  Critical_Freqs AVG |  Critical_Freqs PK+ |
|  FCC_15C_15.205_Radiated_Emissions_Peak |  FCC_15C_15.205_Radiated_Emissions_Avg |
|  Final_Result PK+ |  Final_Result AVG |









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18-25 GHz, Highest Channel



- | | |
|--|---|
|  Preview Result 2-AVG |  Preview Result 1-PK+ |
|  Critical_Freqs AVG |  Critical_Freqs PK+ |
|  FCC_15C_15.205_Radiated_Emissions_Peak |  FCC_15C_15.205_Radiated_Emissions_Avg |
|  Final_Result PK+ |  Final_Result AVG |

Final test result

Pass

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5 Test Setup Photo

Photos were removed for confidentiality as demanded by the customer.

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Liste der verwendeten Prüfmittel
List of used test equipment

6 Equipment List

6.1 Hardware

Prüfmittel <i>Test equipment</i>		Prüfmittel-Nr. / ID-Nr. <i>Equipment No. / ID-No.</i>	Letzte Kalibrierung <i>Last calibration</i>	Nächste Kalibrierung <i>Next calibration</i>
Test System TS8997: Power Meter: OSP-B157 Spectrum Analyzer: FSV-30 Signal Generator: SMB100A Vector Signal Generator: SMBV100A	Rohde & Schwarz	2728871	08.2020	08.2022
Fully Anechoic Room	Albatross Projects GmbH	2959749	08.10.2021	08.10.2024
RSE-Filtersystem	Rohde & Schwarz	9002802	19.01.2022	19.01.2023
Signal Analyser UXA N9041B	Keysight	2971644	06.04.2022	06.04.2023
Antenna HF907	Rohde & Schwarz	2856263	01.09.2021	01.09.2024
Antenna, Double Ridged Horn Antenna 3116C-PA	ETS LINDGREN	2900393	12.10.2020	12.10.2022
Antenna HFH 2	Rohde & Schwarz	2728893	09.07.2021	09.07.2024
Semi-Anechoic Chamber 30-1000 MHz	Siemens	2729645	15.06.2022	15.06.2025
Antenna VULB 9168	Schwarzbeck	2728787	14.09.2019	24.09.2022
Receiver ESU 8	Rohde & Schwarz	2728844	23.12.2021	23.12.2022

6.2 Software

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

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7 Change History

Revision Number	List of revisions	Date of issue
DE224WSB 001	Initial Release	25.07.2022
Note: Latest revision report will replace all previous reports.		

Ende des Prüfberichts
End of Test Report