

Prüfbericht-Nr.: Test report no.:	CN25T6E6 001	Auftrags-Nr.: Order no.:	168543254	Seite 1 von 22 Page 1 of 22
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2025-03-14	
Auftraggeber: Client:	IKEA of Sweden AB Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: Test item:	GRILLPLATS			
Bezeichnung / Typ-Nr.: Identification / Type no.:	E2491-NA (Trademark: IKEA)			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	CFR47 FCC Part 15: Subpart C Section 15.247 CFR47 FCC Part 15: Subpart C Section 15.209 RSS-247 Issue 3 August 2023 RSS-Gen Issue 5 February 2021			
Wareneingangsdatum: Date of sample receipt:	2025-03-14	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no.:	A003935323-004~006			
Prüfzeitraum: Testing period:	2025-03-14 - 2025-05-22			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:	X <u>Breeze Jiang</u>		genehmigt von: authorized by:	X <u>Bell Hu</u>
Datum: Date: 2025-10-10	Signed by: Breeze Jiang		Ausstellungsdatum: Issue date: 2025-10-10	Signed by: Bell Hu
Stellung / Position:	Sachverständige(r)/Expert		Stellung / Position:	Sachverständige(r)/Expert
Sonstiges / Other:	FCC ID: FHO-E2491 IC: 10912A-E2491 HVIN: E2491-NA			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* 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				
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Prüfbericht-Nr.: CN25T6E6 001
Test report no.:

Seite 2 von 22
Page 2 of 22

Anmerkungen
Remarks

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3	Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben. Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt. <i>Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. 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>

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:

Seite 3 von 22
Page 3 of 22

Test Summary

5.1.1 ANTENNA REQUIREMENT

RESULT: Pass

5.1.2 MAXIMUM PEAK CONDUCTED OUTPUT POWER

RESULT: Pass

5.1.3 CONDUCTED POWER SPECTRAL DENSITY

RESULT: Pass

5.1.4 6dB BANDWIDTH

RESULT: Pass

5.1.5 99% BANDWIDTH

RESULT: Pass

5.1.6 CONDUCTED SPURIOUS EMISSIONS MEASURED IN 100 KHz BANDWIDTH

RESULT: Pass

5.1.7 RADIATED SPURIOUS EMISSION

RESULT: Pass

5.1.8 CONDUCTED EMISSION ON AC MAINS

RESULT: Pass

Contents

1	GENERAL REMARKS	5
1.1	COMPLEMENTARY MATERIALS.....	5
2	TEST SITES.....	6
2.1	TEST FACILITIES	6
2.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	6
2.3	TRACEABILITY	7
2.4	CALIBRATION.....	7
2.5	MEASUREMENT UNCERTAINTY	7
2.6	LOCATION OF ORIGINAL DATA	7
2.7	STATUS OF FACILITY USED FOR TESTING	7
3	GENERAL PRODUCT INFORMATION	8
3.1	PRODUCT FUNCTION AND INTENDED USE	8
3.2	RATINGS AND SYSTEM DETAILS.....	8
3.3	INDEPENDENT OPERATION MODES.....	10
3.4	NOISE GENERATING AND NOISE SUPPRESSING PARTS	10
3.5	SUBMITTED DOCUMENTS.....	10
4	TEST SET-UP AND OPERATION MODES.....	11
4.1	PRINCIPLE OF CONFIGURATION SELECTION	11
4.2	TEST OPERATION AND TEST SOFTWARE	11
4.3	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT	11
4.4	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE	11
4.5	TEST SETUP DIAGRAM	12
5	TEST RESULTS	13
5.1	TRANSMITTER REQUIREMENT & TEST SUITES.....	13
5.1.1	<i>Antenna Requirement.....</i>	<i>13</i>
5.1.2	<i>Maximum Peak Conducted Output Power</i>	<i>14</i>
5.1.3	<i>Conducted Power Spectral Density.....</i>	<i>16</i>
5.1.4	<i>6dB Bandwidth</i>	<i>17</i>
5.1.5	<i>99% Bandwidth.....</i>	<i>18</i>
5.1.6	<i>Conducted Spurious Emissions Measured in 100 kHz Bandwidth.....</i>	<i>19</i>
5.1.7	<i>Radiated Spurious Emission</i>	<i>20</i>
5.1.8	<i>Conducted Emission on AC Mains.....</i>	<i>21</i>
6	PHOTOGRAPHS OF THE TEST SET-UP	22
7	LIST OF TABLES.....	22

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:

Seite 5 von 22
Page 5 of 22

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix A: Test Results of Zigbee& Thread (802.15.4)

Appendix B: Test Results of Bluetooth LE

Appendix C: Photographs of the Test Set-up

2 Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

2-3F, 101 & 102, No.2, Nuclear Power Industrial Park, Fuming Community, Fucheng Street, Longhua District, Shenzhen 518000, China

A2LA Certificate Number: 5162.01

FCC Accreditation Designation No.: CN1260

ISED wireless device testing laboratory: 25069

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (TS8997)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
Signal Analyzer	R&S	FSV 40	101441	2024-09-26	2025-09-25
OSP	R&S	OSP 150	101017	2024-10-31	2025-10-30
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A	N/A
Power Meter	R&S	NRP2	107105	2024-10-31	2025-10-30
Wideband Power Sensor	R&S	NRP-Z81	105677	2024-09-26	2025-09-25
Shielding Room	Albatross	SR1	APC17151-SR1	2024-09-14	2027-09-13
Unwanted Emission Testing (TS9975)					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. until
EMI Test Receiver	R&S	ESR 7	102021	2024-09-29	2025-09-28
Signal Analyzer	R&S	FSV 40	101439	2024-09-29	2025-09-28
System Controller Interface	R&S	SCI-100	S10010038	N/A	N/A
Filterbank	R&S	Wlan	100759	2024-09-29	2025-09-28
OSP	R&S	OSP 120	102040	N/A	N/A
Pre-amplifier	R&S	SCU08F1	08320031	2024-09-29	2025-09-28
Amplifier	R&S	SCU-18F	180070	2024-09-29	2025-09-28
Amplifier	R&S	SCU40A	100475	2024-09-29	2025-09-28
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	193	2024-09-28	2025-09-27
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218717	2024-09-28	2025-09-27
Wideband Ridged Horn Antenna (18-40 GHz)	Steatite	QMS-00880	19067	2024-09-28	2025-09-27
Active Loop Antenna	Schwarzbeck	FMZB 1513	302	2024-09-28	2025-09-27
Test software	R&S	EMC32 (V10.60.10)	N/A	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NV9P2	N/A	N/A
3m Semi-Anechoic Chamber	Albatross	SAC-3m	APC17151-SAC	2024-09-14	2027-09-13

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:

Seite 7 von 22
 Page 7 of 22

Conducted Emissions					
Equipment	Manufacturer	M/N	S/N	Cal. Date	Cal. until
EMI Test Receiver	R&S	ESR3	102680	2024-07-23	2025-07-22
Artificial Mains Network	R&S	ENV216	101445	2024-07-25	2025-07-24
EMC32 test software	R&S	EMC32(Ver.10.50.00)	N/A	N/A	N/A

2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements as below table.

Table 2: Measurement Uncertainty

Parameter	Uncertainty (k=2)
RF output power, conducted	± 0.99 dB
Occupied Channel Bandwidth	± 2.08 %
RF power density, conducted	± 0.99 dB
Unwanted Emissions, conducted	± 0.89 dB
All emissions, radiated	± 4.17 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A & B & C of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) Co., Ltd. file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at 2-3F, 101 & 102, No.2, Nuclear Power Industrial Park, Fuming Community, Fucheng Street, Longhua District, Shenzhen 518000, China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a GRILLPLATS, which supports Bluetooth LE and Radio parameter the setting of Zigbee& Thread (802.15.4) are same wireless technologies.

For details refer to the User Manual, Technical Description and Circuit Diagram.

3.2 Ratings and System Details

Table 3: Technical Specification of EUT

General Information of EUT	Value
Kind of Equipment:	GRILLPLATS
Type Designation:	E2491-NA
Trademark:	IKEA
FCC ID:	FHO-E2491
IC:	10912A-E2491
HVIN:	E2491-NA
Operating Voltage:	AC 120V 50/60Hz
Testing Voltage	DC 3.3V From USB debugging board AC 120V 60Hz
Operating Temperature Range:	0 °C ~ +40 °C
Technical Specification of Bluetooth LE	
Operating Frequency:	2402 - 2480MHz
Type of Modulation:	GFSK
Channel Number:	40 channels
Data Rate:	1Mbps, 2Mbps
Channel Separation:	2MHz
Antenna Type:	PCB Layout Antenna
Antenna Gain:	-0.5 dBi (Provided by the Client)
Technical Specification of Zigbee& Thread (802.15.4)	
Operating Frequency:	2405.0 - 2480.0 MHz
Type of Modulation:	DSSS(OQPSK)
Channel Number:	16 channels
Channel Separation:	5 MHz
Receiver Categories	Receiver category 2
Antenna Type:	PCB Layout Antenna
Antenna Gain:	-0.5 dBi (Provided by the Client)

Table 4: RF Channel and Frequency of Bluetooth LE

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

Test frequencies are lowest channel: 2402 MHz, middle channel: 2442 MHz and highest channel: 2480 MHz for Bluetooth LE

Table 5: RF Channel and Frequency of Zigbee& Thread (802.15.4)

RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)	RF Channel	Frequency (MHz)
11	2405.0	15	2425.0	19	2445.0	23	2465.0
12	2410.0	16	2430.0	20	2450.0	24	2470.0
13	2415.0	17	2435.0	21	2455.0	25	2475.0
14	2420.0	18	2440.0	22	2460.0	26	2480.0

Test frequencies are lowest channel: 2405.0 MHz, middle channel: 2445.0 MHz and highest channel: 2480.0MHz.

3.3 Independent Operation Modes

The basic operation modes are:

- A. On, Bluetooth wireless transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- B. On, Zigbee& Thread (802.15.4) wireless transmitting mode
 - 1) Low Channel
 - 2) Middle Channel
 - 3) High Channel
- C. On, Normal operation (Bluetooth + Thread Link)
- D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to Circuit Diagram for further details.

3.5 Submitted Documents

- Application Form

- User Manual

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 5. All tests were performed according to the procedures in ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 for IC..

4.3 Special Accessories and Auxiliary Equipment

Table 6: List of Accessories and Auxiliary Equipment

Description	Manufacturer	Model	S/N
Laptop	Lenovo	T480	PF-16A6N8
iPad	Apple	Air 4	CQ1HJ48YJW

4.4 Countermeasures to Achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF).

No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test (Below 1GHz)

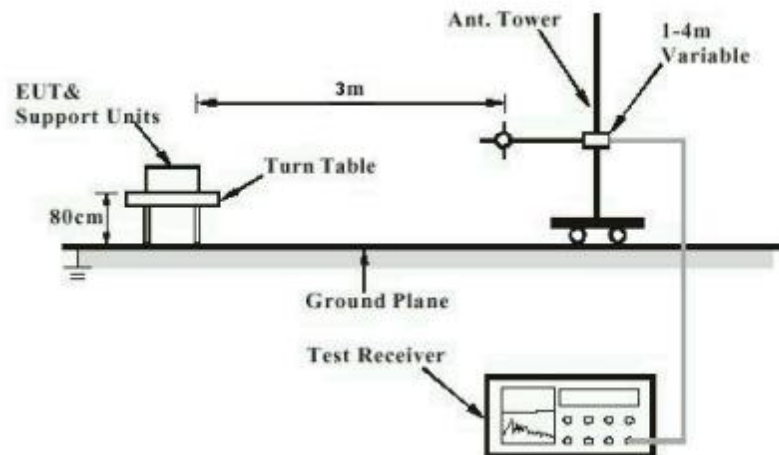


Diagram of Measurement Configuration for Radiation Test (Above 1GHz)

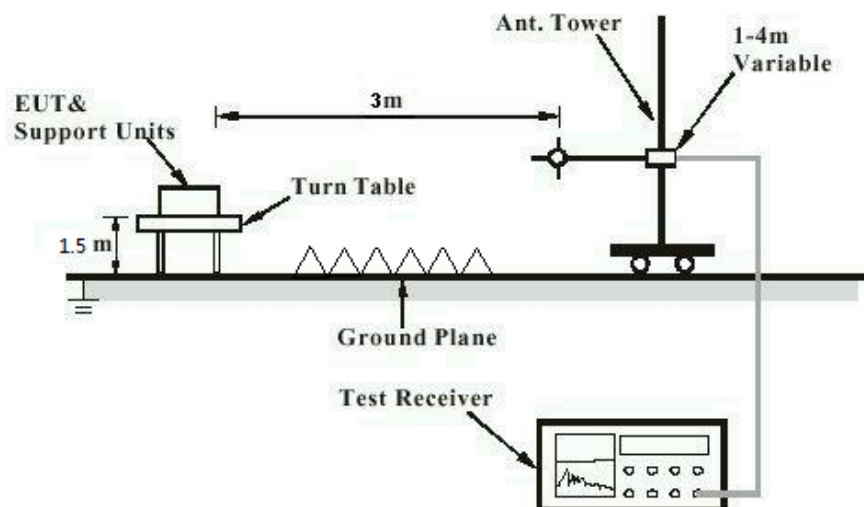
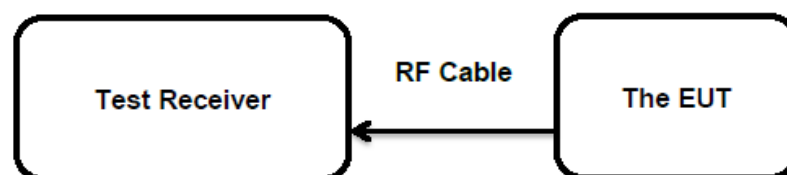


Diagram of Measurement Configuration for Conducted Transmitter Measurement



5 Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT:**Pass****Test Specification**

Test standard : FCC Part 15.247(b)(4) and Part 15.203
RSS-Gen Clause 6.8

According to the manufacturer declared, the EUT has a PCB Layout Antenna, the directional gain of antenna is -0.5 dBi for Bluetooth & 2.4GHz Thread/Zigbee , and the antenna connector is designed with permanent attachment and no consideration of replacement.

Therefore the EUT is considered sufficient to comply with the provision.

Refer to EUT Photo for further details.

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:Seite 14 von 22
Page 14 of 22

5.1.2 Maximum Peak Conducted Output Power

RESULT:

Pass

Test Specification

Test standard : FCC Part 15.247(b)(3)
RSS-247 Clause 5.4(d)

Basic standard : **Error! Reference source not found.**

Limits : < 1.0 W (Maximum Conducted Peak Power)
: <4 W (e.i.r.p.)

Kind of test site : Shielded Room

Test Setup

Date of testing : 2025-04-17

Input voltage : DC 3.3V

Operation mode : A, B

Test channel : Low / Middle / High

Ambient temperature : 25.1 °C

Relative humidity : 45 %

Atmospheric pressure : 101 kPa

For details refer to following test result.

Table 7: Test Result of Maximum Peak Conducted Output Power, Bluetooth LE

Test Mode	Data Rate	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
Bluetooth LE	1 Mbps	2402	10.50	0.0112	< 1.0
		2442	10.50	0.0112	
		2480	10.40	0.0110	
	2 Mbps	2402	10.60	0.0115	
		2442	10.50	0.0112	
		2480	10.50	0.0112	
Maximum Measured Value			10.60	0.0115	

Max. e.i.r.p.=10.60dBm-0.5dBi=10.10dBm, which is less than 36dBm=4W.

Table 8: Test Result of Maximum Peak Conducted Output Power, Thread & Zigbee (802.15.4)

Test Mode	Antenna	Test Channel (MHz)	Measured Peak Power		Limit (W)
			(dBm)	(W)	
Thread & Zigbee (802.15.4)	Ant1	2405	10.70	0.0117	< 1.0
		2445	10.60	0.0115	
		2480	10.40	0.0155	
Maximum Measured Value			10.70	0.0117	

Max. e.i.r.p.=10.70dBm-0.5dBi=10.20dBm, which is less than 36dBm=4W.

Note:

- 1) The cable loss is taken into account in results.
- 2) Antenna gain(G): -0.5 dBi for Bluetooth & Thread & Zigbee (802.15.4)

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:

Seite 16 von 22
Page 16 of 22

5.1.3 Conducted Power Spectral Density

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.247(e) RSS-247 Clause 5.2(b)
Basic standard	: ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 for IC..
Limits	: < 8 dBm / 3kHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-04-17
Input voltage	: DC 3.3V
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: 25.1 °C
Relative humidity	: 45 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A, B.

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:

Seite 17 von 22
Page 17 of 22

5.1.4 6dB Bandwidth

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)
Basic standard	: ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 for IC..
Limits	: > 500 kHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-04-17
Input voltage	: DC 3.3V
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: 25.1 °C
Relative humidity	: 45 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A, B.

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:

Seite 18 von 22
Page 18 of 22

5.1.5 99% Bandwidth

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.247(a) RSS-Gen Clause 6.7
Basic standard	: ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 for IC..
Limits	: Within assigned band 2400-2483.5MHz
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-04-17
Input voltage	: DC 3.3V
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: 25.1 °C
Relative humidity	: 45 %
Atmospheric pressure	: 101 kPa

For the measurement records, refer to the appendix A, B.

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:Seite 19 von 22
Page 19 of 22

5.1.6 Conducted Spurious Emissions Measured in 100 kHz Bandwidth

RESULT:

Pass

Test Specification

Test standard	: FCC Part 15.247(d) RSS-247 Clause 5.5
Basic standard	: ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 for IC..
Limits	: 20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power); In addition, radiated emissions which fall in the restricted bands, must also comply with the radiated emission limits specified in 15.209(a)
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-04-17
Input voltage	: DC 3.3V
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: 25.1 °C
Relative humidity	: 45 %
Atmospheric pressure	: 101 kPa

Test results of 100kHz Bandwidth of Frequency Band Edge by Conducted method refer to test plots, and compliance is achieved as well.

For the measurement records, refer to the appendix A, B.

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:Seite 20 von 22
Page 20 of 22

5.1.7 Radiated Spurious Emission

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.247(d) & FCC Part 15.205 RSS-247 Clause 3.3 & 5.5
Basic standard	: ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1- 2023+C63.10a-2024 for IC..
Limits	: Refer to 15.209(a) of FCC part 15.247(d) RSS-Gen Section 8.9 & 8.10
Kind of test site	: 3m Semi-anechoic Chamber

Test Setup

Date of testing	: 2025-04-27
Input voltage	: AC 120V, 60Hz
Operation mode	: A, B
Test channel	: Low / Middle / High
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: Refer to test result

Remark:

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A, B.

Prüfbericht - Nr.: CN25T6E6 001
Test Report No.:Seite 21 von 22
Page 21 of 22

5.1.8 Conducted Emission on AC Mains

RESULT:**Pass****Test Specification**

Test standard	: FCC Part 15.207(a) RSS-Gen Clause 8.8
Basic standard	: ANSI C63.10-2020 for FCC, ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 for IC..
Frequency range	: 0.15 – 30MHz
Classification	: Class B
Limits	: FCC Part 15.207(a) RSS-Gen Table 4
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2025-05-22
Input voltage	: AC 120V, 60Hz
Operation mode	: C
Earthing	: connected
Ambient temperature	: Refer to test result
Relative humidity	: Refer to test result
Atmospheric pressure	: 101 kPa

Testing was carried out within frequency range 9kHz to the tenth harmonics. Only the worst case spurious emissions configuration of the each mode were reported.

For the measurement records, refer to the appendix A.

6 Photographs of the Test Set-Up

For photographs of the test set-up, refer to the appendix C.

7 List of Tables

Table 1: List of Test and Measurement Equipment.....	6
Table 2: Measurement Uncertainty	7
Table 3: Technical Specification of EUT.....	8
Table 4: RF Channel and Frequency of Bluetooth LE.....	9
Table 5: RF Channel and Frequency of Thread/Zigbee.....	9
Table 6: List of Accessories and Auxiliary Equipment.....	11
Table 7: Test Result of Maximum Peak Conducted Output Power, Bluetooth LE.....	15
Table 8: Test Result of Maximum Peak Conducted Output Power, Thread & Zigbee (802.15.4).....	15